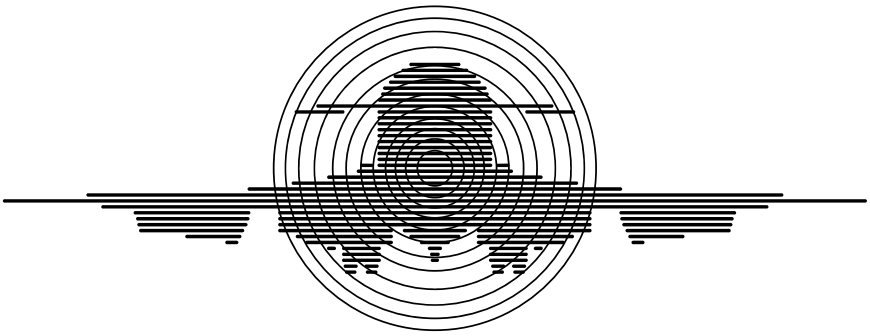
OPERATOR'S MANUAL
FLIGHT MANAGEMENT SYSTEM



CMA-9000

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SECTION 1

INTRODUCTION

SYSTEM OVERVIEW

The CMA-9000 FLIGHT MANAGEMENT SYSTEM (FMS) provides a complete Global Navigation System (GNS) and area navigation (RNAV) solution for world-wide four-dimensional aircraft navigation in the oceanic/remote, en-route, terminal and non-precision approach. It includes extensive flight management capabilities and a full range of navigation and flight planning features, together with simple route and flight plan creation and modification procedures. A world-wide subscription navigation database, stored in a non-volatile memory, provides the CMA-9000 FMS with information on waypoints, navaids and airports. In addition the database is capable of storing customer defined routes and waypoints. The CMA-9000 FMS is a Flight Management System (FMS) which also integrates the functionality of Radio Management System (RMS) and Control Display Unit (CDU) into a standalone, cockpit mounted enclosure.

The CMA-9000 FMS accepts data from the following external navigation sensors, if installed:

Sensors	Civil Certified/Approved/Military
Distance Measuring Equipment (DME)	Civil certified
VHF Omni-directional Range (VOR)	Civil certified
TACAN	Civil and Military installations
External GPS	Civil certified or Military (not approved for civil certified installation)
External Embedded GPS/INS (EGI)	Military (not approved for civil certified installation)
Inertial Reference System (IRS)	Civil certified
Doppler Velocity Sensor (DVS)	Military (not approved for civil certified installation)
Air Data Computer	Civil certified
Heading Source (AHRS)	Civil certified
AHRS (when used with Kalman Filtered Navigator)	Civil certified

Information from these sensors is combined with air reference data inputs of heading, true air speed and altitude to determine aircraft position. This position is then used for navigating along a programmed flight plan created by selecting waypoints along a desired route from the navigation database (flight planning).

In dual/triple CMA-9000 FMS installations, the systems can be configured in either independent or synchronized mode automatically upon startup.

Flight management capabilities include:

- Multi-sensor navigation modes with available sensors
- Standard Instrument Departure (SID)
- Standard Terminal Arrival Routes (STAR)
- GPS instrument approaches
- Direct-to/intercept navigation, holding patterns, procedure turns, arcs, offset tracks and search patterns
- Automatic waypoint sequencing, with and without turn anticipation
- Required and actual navigation performance (RNP/ANP)

- Required time of arrival (RTA)
- Fuel management and radio tuning functions
- CARP

COMPONENT DESCRIPTION

A. FLIGHT MANAGEMENT SYSTEM (FMS) WITH EMBEDDED DISPLAY UNIT

The provides a color display of alphanumeric data. An alphanumeric keyboard allows data entry, data editing and system control of the flight management functions.

The display is a sunlight readable color Active Matrix Liquid Crystal Display (AMLCD). Dedicated function keys and line select keys allow easy operator control of flight management functions. The keyboard panel is integrally lit from a panel light dimming bus. The CMA-9000 FMS panel is illustrated in Section 2 along with an explanation of the keys and their function.

For the control of the display brightness, two options are proposed. The first option consists in the combination of light sensors and manual brightness setting. Two light sensors on the CMA-9000 FMS front panel sense any change in the cockpit ambient light level. This results in an increase or decrease in display brightness relative to a manual brightness setting. The second option consists in an external dimming bus.

The Flight Management Unit (FMU) accepts data from external navigation sensors and performs all the signal processing and computations required to generate high performance navigation data. The FMU accepts operator's commands from the alphanumeric keyboard, provides navigation, steering and status data on its own display and to the primary navigation flight displays. The FMU also provides suitably formatted outputs for the flight guidance system.

B. EXTERNAL GLOBAL POSITIONING SYSTEM (GPS) RECEIVER

The external GPS Receiver receives signals transmitted by US DoD Global Positioning System satellites. It provides all the signal processing and computational capability required to determine aircraft position, velocity and time. The sensor continuously monitors the integrity of the satellites using a high performance Receiver Autonomous Integrity Monitor (RAIM).

NAVIGATION MODES

The CMA-9000 FMS is providing a Military or Civil configuration option; integrity monitoring and resulting consequences as required by TSO-C115b, AC20-130A and DO-236A are the main differences between the two options.

CIVIL NAVIGATION MODE

When in the civil navigation option, the sensor navigation solutions will be assumed not to have integrity unless proven otherwise. The navigation modes selection logic is geared to safety (integrity) and the CMA-9000 FMS may force mode transitions to remain in a navigation mode with integrity, thereby also preventing unnecessary alarms from being raised. This configuration option is intended to fully comply with TSO-C115, AC20-130A and the integrity requirement of DO-236A.

The CMA-9000 FMS will determine integrity, availability and accuracy for each navigation mode solution.

A navigation solution will be available if sufficient data required to compute the solution is received from the sensor source and no critical failures are detected. For each navigation solution, a horizontal position sensor value, Navigation Performance (NP), will be determined. The probability of the error exceeding the NP containment value will be no more than 10^{-5} per hour for the variables monitored. For some navigation solutions, insufficient data may not ensure that the required probability is always met. In this case, when in the military navigation option, the CMA-9000 FMS will nevertheless compute a NP value using the available data. In this same case, when in the civil navigation option, the CMA-9000 FMS will make the NP value unavailable.

When in the civil navigation option, a navigation solution will be deemed to have integrity if:

- The solution's NP value is less than the active error limit and,
- For some sensors where the NP does not include all the necessary variables to ensure the required probability is always met, other criteria ensuring integrity are met. If integrity can never be assured, the CMA-9000 FMS will declare the navigation solution for a specific sensor never having integrity. The error limit can be configured to either Phase of Flight (POF) or Required Navigation Performance (RNP).

All accuracy-based transitions will use the 95% probability error statistics and will include a hysteresis value of 100m, except for the transition from GPS to INS/GPS sensor and the transition from VOR/DME with integrity to DME/DME with integrity. The transitions for these two cases will be done without hysteresis. This is also applicable when the navigation sensor cross-check is configured. In a configuration with multiple FMSs, a hysteresis of 100m will also be applied when switching from a sensor to another identical sensor but from a different FMS.

The CMA-9000 FMS has the following navigation modes: Hybrid GPS/INS, GPS (or cGPS), mGPS, DME/DME, VOR/DME/TACAN, hybrid INS/DVS, Inertial, Doppler, KALMAN and Dead-Reckoning (DR). The availability of specific navigation modes depends on the equipment configuration.

Available sensors are selected in the following order of priority, based on nominal accuracy performance:

Navigation modes	Applicability
GPS	GPS sensor
DME/DME	DME sensor
VOR/DME/TACAN*	NAV, DME sensors
	NAV, DME, TACAN* sensors
Inertial	EGI sensor
	IRS sensor
Emulated INS via KALMAN FILTER	APIRS/AHRS equipment
Dead Reckoning	N/A

**When TACAN is proven accurate for Civil navigation.*

A. GPS

GPS is normally the highest priority navigation mode of the FMS and will be used when sufficient satellite coverage exists in the phases of flight for which it is approved.

The GPS mode will be selected for navigation when its RAIM function (or FMS's computed NAIM when a backup navigation sensor is also available to the FMS) computes a Horizontal Integrity Limit (HIL) value which is less than the GPS Position Integrity Alert Limit (GPIAL). The latter is a function of the current phase of flight and of the Required Navigation Performance (RNP). When the HIL exceeds the alert limit, or if the GPS loses its RAIM function, then:

- **If GPS is the only sensor available for navigation:**

  GPS will remain selected for navigation, but the GPS Integrity annunciator will illuminate and the "GPS POS UNCERTAIN" alert message will be displayed.

  If at any time GPS becomes unavailable for navigation, the CMA-9000 FMS will revert to the Dead Reckoning (DR) mode of navigation, the GPS integrity annunciator will illuminate, and the "GPS NAV LOST" alert message will be displayed.

- **If additional sensors are available and approved for the phase of flight (DME/DME or VOR/DME/TACAN):**

  The CMA-9000 FMS will continuously compute an ANP based on the difference of two positions (GPS and other sensor) and the accuracy of the other sensor. If this ANP exceeds the required accuracy, or if at any time the GPS sensor becomes unavailable for navigation, the CMA-9000 FMS will revert to the next best IFR-approved navigation mode, the GPS Integrity annunciator will illuminate, and the "GPS NAV LOST"* alert message will be displayed.

B. DME/DME

DME/DME is used in areas with sufficient DME and TACAN coverage, provided the appropriate navigation database is configured. In this mode the CMA-9000 FMS automatically tunes the DME transceiver, acquiring distance information from up to six DME and TACAN (DME capable) ground stations. The DME distance is corrected for slant range error. Information on the DME facilities in use is displayed on the DME STATUS page, and individual stations can be inhibited from the navigation solution from the DME DESELECT page.

C. VOR/DME/TACAN

VOR/DME navigation is used in areas with sparse DME coverage where there are less than three DME stations available. This mode combines co-located DME or TACAN distance and VOR or TACAN bearing to determine position. Tuned facility information is displayed on the VOR/DME/TCN STATUS page.

D. Inertial

This navigation mode is available in military or civil configuration when an EGI or Inertial is configured. The CMA-9000 FMS inertial navigation mode is based on the following parameters:

- Present Position Latitude and Longitude;
- North-South velocity;
- East-West velocity.

The CMA-9000 FMS is using the raw INS position and velocities provided by the EGI or Inertial equipment.

E. KALMAN FILTER

The KALMAN sensor interface is used when stand-alone GPS navigation and radio navigation are not possible. Initiation of the KALMAN navigation mode is automatic upon loss of GPS and radio navigation.

The CMA-9000 FMS will use the Attitude and Heading Reference System (AHRS), and the GPS, to provide a KALMAN filter navigation mode. In this mode, the primary navigation sensor will be a GPS receiver.

The AHRS is used as a dead-reckoning navigation system by emulating an Inertial Navigation System (INS) with a KALMAN filter performing closed-loop GPS based correction and alignment of the INS position. The KALMAN Filter provides the means to combine both navigation modes so that accurate navigation can continue for some time after the GPS is lost. The amount of time available will depend on the performance of the AHRS used (typically 2 minutes).

F. DEAD RECKONING (DR)

When the external sensor data inputs become insufficient to maintain the normal navigation modes, the CMA-9000 FMS reverts to the dead reckoning mode of navigation. The CMA-9000 FMS must then rely on the last known aircraft position, combined with heading and TAS inputs, and the last valid computed wind, for its aircraft position calculation. Prolonged DR operation will result in decreased position accuracy. Alerts are provided when the estimated position accuracy exceeds the requirements for each phase of flight.

The CMA-9000 FMS will automatically recover its normal modes of operation and position accuracy upon restoration of the external sensor inputs.

MILITARY NAVIGATION MODE

The Military Navigation mode does not comply with TSO C115b and TSO C129a.

When in the military navigation configuration option, the sensor navigation solutions will be assumed to have integrity unless proven otherwise. The navigation modes selection logic is geared to accuracy performance and the CMA-9000 FMS will not necessarily force mode transitions based on the integrity. Some integrity monitoring is nevertheless performed to raise alarms. The pilot is expected to consider navigation mode alarms and force navigation sensor selections if necessary.

When the military navigation configuration option is selected and the navigation sensor cross-check* option is activated, the FMS will activate a different GPS group sensor selection logic by comparing the INS/GPS, military GPS, and civil GPS positions to one another. INS/GPS, military GPS, and civil GPS navigation mode transitions occur based on position error discrepancies while providing the crew with the appropriate alert messages.

**The sensor cross-check function is an alternate way to compute pseudo integrity when sensors without integrity are installed.*

When in the military navigation option, integrity is only required and defined for navigation solutions with GPS input during the approach phase. Not having integrity does not prevent a navigation mode solution from being used; however, it reduces its priority in the modes selection logic. Availability decides if a sensor can be used at all.

All accuracy-based transitions will use the 95% probability error statistics and will include a hysteresis value of 100m, except for the transition from GPS to INS/GPS sensor. This is also applicable when the navigation sensor cross-check is configured.

The CMA-9000 FMS has the following navigation modes: Hybrid GPS/INS, GPS (or cGPS), mGPS, DME/DME, VOR/DME/TACAN, hybrid INS/DVS, Inertial, Doppler, KALMAN and Dead-Reckoning (DR). The availability of specific navigation modes depends on the equipment configuration.

Available sensors are selected in the following order of priority, based on nominal accuracy performance:

Navigation modes	Applicability
Hybrid GPS/INS	EGI sensor
GPS (or cGPS *)	GPS sensor
mGPS	EGI sensor
DME/DME	DME sensor
VOR/DME	NAV, DME sensors
	NAV, DME, TACAN sensors
Hybrid INS/DVS	EGI sensor DVS sensor
Doppler velocity sensor	DVS sensor
Inertial	EGI sensor
IRS	IRS sensor
Emulated INS via KALMAN FILTER	APIRS/AHRS equipment
Dead Reckoning	N/A

** cGPS is displayed for the civil GPS when dual GPS is configured along with a Litton LN-100GT EGI.*

A. Hybrid GPS/Inertial

The hybrid GPS/INS mode is offered only when the CMA-9000 FMS is configured in military mode and an EGI is configured. The highest priority will be given to the hybrid GPS/INS sensor if it is configured and no invalid flag is associated to its combined GPS/INS solution. If a flag is associated with the combined solution the equipment may still provide pure GPS or INS solutions. The priority associated to these solutions will follow the order listed above.

B. GPS (or cGPS/mGPS* for dual GPS installations)

GPS is normally the highest priority navigation mode of the FMS and will be used when sufficient satellite coverage exists in the phases of flight for which it is approved.

The GPS mode will be selected for navigation when its RAIM function (or FMS's computed NAIM when a backup navigation sensor is also available to the FMS) computes a Horizontal Integrity Limit (HIL) value which is less than the GPS Position Integrity Alert Limit (GPIAL). The latter is a function of the current phase of flight and of the Required Navigation Performance (RNP). When the HIL exceeds the alert limit, or if the GPS loses its RAIM function, then:

- **If GPS (or cGPS) is the only sensor available for navigation:**

  GPS will remain selected for navigation, but the GPS Integrity annunciator will illuminate and the "GPS POS UNCERTAIN"* alert message will be displayed.

NOTE: This message is enabled in either of the following two cases:
  - *When a GPS or an EGI other than the LITTON LN-100 GT is configured and the POF (Phase of Flight) error limits are selected in the configuration;*
  - *When an EGI LITTON LN-100 GT is configured and the GPS integrity result bits sent by the EGI are set.*

  If at any time GPS becomes unavailable for navigation, the CMA-9000 FMS will revert to the Dead Reckoning (DR) mode of navigation, the GPS integrity annunciator will illuminate, and the "GPS NAV LOST" alert message will be displayed.

- **If additional sensors are available and approved for the phase of flight (DME/DME or VOR/DME/TACAN):**

  The CMA-9000 FMS will continuously compute an ANP based on the difference of two positions (GPS and other sensor) and the accuracy of the other sensor. If this ANP exceeds the required accuracy, or if at any time the GPS sensor becomes unavailable for navigation, the CMA-9000 FMS will revert to the next best IFR-approved navigation mode, the GPS Integrity annunciator will illuminate, and the "GPS NAV LOST"* alert message will be displayed.

For dual GPS installations comprising an embedded GPS/INS (EGI) consisting of the following equipment:

- INS/GPS (equipment: LN-100GT)
- military GPS sensor (as received from LN-100GT)
- civil GPS

When sensor cross-checking is configured, the FMS uses a modified algorithm to determine the mode transitions between the INS/GPS, military GPS, and civil GPS sensors. Ultimately, the FMS will transition to the best available navigation mode based on the information it has on each of its interfacing sensors.

** When dual GPSs are configured (civil and military from EGI), the messages which are triggered may vary slightly (e.g. cGPS POS UNCERTAIN / mGPS POS UNCERTAIN or c*GPS NAV LOST / mGPS NAV LOST*) – the detailed full list of messages is provided in Appendix E.*

C. DME/DME

DME/DME is used in areas with sufficient DME and TACAN coverage, provided the appropriate navigation database is configured. In this mode the CMA-9000 FMS automatically tunes the DME transceiver, acquiring distance information from up to six DME and TACAN (DME capable) ground stations. The DME distance is corrected for slant range error. Information on the DME facilities in use is displayed on the DME STATUS page, and individual stations can be inhibited from the navigation solution from the DME DESELECT page.

D. VOR/DME/TACAN

VOR/DME navigation is used in areas with sparse DME coverage where there are less than three DME stations available. This mode combines co-located DME or TACAN distance and VOR or TACAN bearing to determine position. Tuned facility information is displayed on the VOR/DME/TCN STATUS page.

E. Hybrid INS/DVS

The CMA-9000 FMS uses the hybrid INS/DVS position and velocities provided by the EGI sensor for navigation.
It sets INS/DVS Navigation solution accuracy to the EGI sensor supplied Quality Factor value for the INS/DVS solution.

F. Inertial

This navigation mode is made available in military or civil configuration when an EGI or Inertial is configured.
The CMA-9000 FMS inertial navigation mode is based on the following parameters:

- Present Position Latitude and Longitude;
- North-South velocity;
- East-West velocity.

The CMA-9000 FMS is using the raw INS position and velocities provided by the EGI or Inertial sensor.

G. DVS

The CMA-9000 FMS uses the Doppler Velocity Sensor position and velocities complemented with the pitch, roll and selected heading for navigation.
It sets DVS Navigation solution accuracy to the DVS Quality Factor value for the DVS solution.

H. KALMAN FILTER

The KALMAN sensor interface is used when stand-alone GPS navigation and radio navigation are not possible. Initiation of the KALMAN navigation mode is automatic upon loss of GPS and radio navigation.

The CMA-9000 FMS will use the Attitude and Heading Reference System (AHRS), and the GPS, to provide a KALMAN filter navigation mode. In this mode, the primary navigation sensor will be a GPS receiver.

The AHRS is used as a dead-reckoning navigation system by emulating an Inertial Navigation System (INS) with a KALMAN filter performing closed-loop GPS based correction and alignment of the INS position. The KALMAN Filter provides the means to combine both navigation modes so that accurate navigation can continue for some time after the GPS is lost. The amount of time available will depend on the performance of the AHRS used (typically 2 minutes).

I. DEAD RECKONING (DR)

When the external sensor data inputs become insufficient to maintain the normal navigation modes, the CMA-9000 FMS reverts to the dead reckoning mode of navigation. The CMA-9000 FMS must then rely on the last known aircraft position, combined with heading and TAS inputs, and the last valid computed wind, for its aircraft position calculation. Prolonged DR operation will result in decreased position accuracy. Alerts are provided when the estimated position accuracy exceeds the requirements for each phase of flight.

The CMA-9000 FMS will automatically recover its normal modes of operation and position accuracy upon restoration of the external sensor inputs.

WAYPOINT NAVIGATION

The CMA-9000 FMS navigates from waypoint to waypoint sequentially, automatically changing the legs, and displays all required navigation parameters, computed according to the relationships and direction sense illustrated in Figure 1-1.

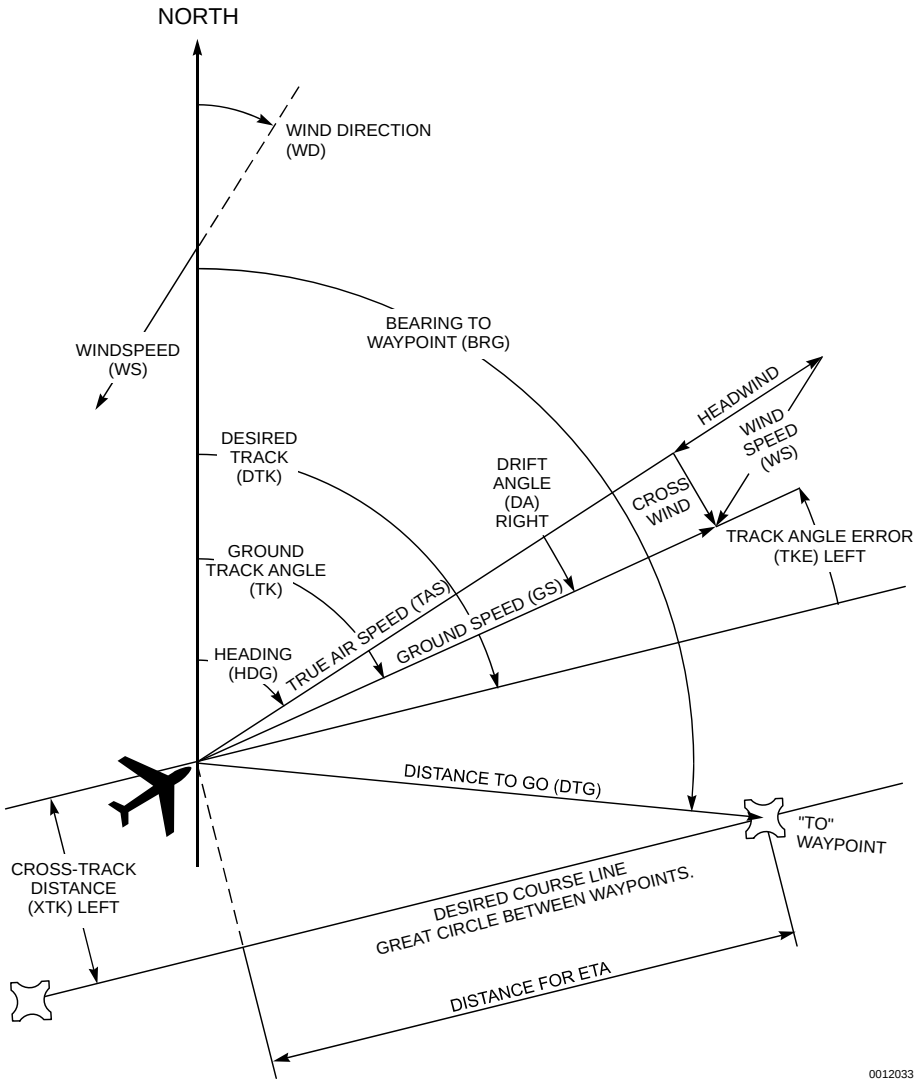

Figure 1-1 Navigation Relationships

The CMA-9000 FMS steering function anticipates the next leg prior to reaching the active (TO) waypoint so that the aircraft turns are smooth without any overshoot. Waypoints may be defined as either fly-by (with turn anticipation) or fly-over (no turn anticipation). For fly-over transition the aircraft is considered to have passed a given point when it has crossed the perpendicular to the desired track at that point. Thus, for leg sequencing to occur, the aircraft needs only to pass abeam the waypoint.
For fly-by leg transition, leg switching, in most cases, occurs when the aircraft passes the bisector of the active leg and the next leg.

After the last defined waypoint is overflown, or when a route discontinuity is active, the CMA-9000 FMS will provide guidance along the extension of the last leg (when configured FIXED wing) or towards the last overflown waypoint (when configured ROTOR), but will prevent autopilot-coupled navigation by disengaging the LNAV mode of the autopilot/flight director (AP/FD) system.

Angular inputs to the CMA-9000 FMS may be referenced to either magnetic or true north. The input mode is installation dependent as defined in the Airplane/Rotorcraft Flight Manual Supplement. The reference used for the CMA-9000 FMS angular displays and outputs to the flight instruments, can also be selected by the operator.

TERMINAL AREA OPERATIONS AND GPS INSTRUMENT APPROACHES

Standard Instrument Departures (SID), Airways, Standard Terminal Arrival Routes (STAR), STAR transitions, GPS and GPS overlay instrument approaches, and approach transitions, can be selected from for the departure/arrival airports. These procedure may be modified on the LEGS pages.

The implementation of the GPS instrument approach procedures is based, not only on TSO-C129a, but also on the evolving Required Navigation Performance (RNP) airspace concept. The transition from en-route through terminal to non-precision approach is effectively a seamless series of waypoints/legs with progressive increases in HSI lateral deviation display sensitivity (to reduce flight technical error), and reductions in RNP value, and appropriately-timed alert or advisory messages.

NAVIGATION DATABASE

The navigation database includes most of the information that the operator would normally determine by referring to the navigation charts. The database may be tailored to specific customer needs and contains such data as en-route and terminal VHF, NDB navigation facilities, airports, waypoints and named intersections. All ARINC 424 procedural legs are implemented. The leg types and the corresponding displays are illustrated in Appendix B.

PHASES OF FLIGHT

The phases of flight are defined as follows:

Approach: When below 15,000 feet AGL and within 2 nm of the FAF, with all GPS instrument approach conditions satisfied.

Terminal: For arrivals, when below 15,000 feet AGL **and** within 30 nm radial distance of the arrival airport, but not in approach phase of flight. For departures, when below 16,000 feet AGL **and** less than 33 nm radial distance from the departure airport.

En-route: When in neither approach nor terminal phases of flight.

ACRONYMS AND ABBREVIATIONS

A	-	Above (altitude)
AA	-	Air-To-Air
AAIM	-	Aircraft Autonomous Integrity Monitoring
AC	-	Aircraft
ACCUR	-	Accuracy
ACID	-	Aircraft Identifier
ACT	-	Active
ACMS	-	Aircraft Conditioning Monitoring System
ACQ	-	Acquisition mode
ADC	-	Air Data Computer
ADF	-	Automatic Direction Finder
ADIRS	-	Air Data Inertial Reference System
ADS	-	Automatic Dependent Surveillance
ADx	-	Primary (AD1) or Secondary (AD2) ADF radio
AF	-	Initial Approach Fix
AFCS	-	Automatic Flight Control System
AFMS	-	Airplane Flight Manual Supplement
AG	-	Air-To-Ground
AGC	-	Automatic Gain Control
AGL	-	Above Ground Level
AHCAS	-	Advanced Helicopter Cockpit and Avionics System
AHRS	-	Attitude Heading Reference System
ALT	-	Altitude
AMLCD	-	Active Matrix Liquid Crystal Display
AMU	-	Audio Management Unit
ANP	-	Actual Navigation Performance
ANT	-	Antenna
AP/FD	-	Autopilot/Flight Director
APIRS	-	Aircraft Piloting Inertial Reference System
APPR	-	Approach
ARC	-	Arc to Fix/Radius to Fix
ARINC	-	Aeronautical Radio Incorporated
ARPT	-	Airport
ARR	-	Arrival
ATA	-	Actual Time of Arrival
ATC	-	Air Traffic Control
ATK	-	Along Track Distance
ATOS	-	Airborne Tactical Observation and Surveillance System
ATT	-	Attitude
BARO	-	Barometric
BRT	-	Brightness
BRG	-	Bearing
BW	-	Back Course Marker
Cx	-	COM radio (primary : C1, secondary : C2)
CAP	-	Capable
CARP	-	Calculated Air Release Point
CDI	-	Course Deviation Indicator
CDU	-	Control Display Unit

CF - Final Approach Course to fix
CFG - Configuration
CHK - Checker
CLR - Clear
CMx - Primary (CM1) or Secondary (CM2) COM radio
CMA - Canadian Marconi (Avionics)
CMD - Command
CMU - Communications Management Unit
COM - Communication
COMMS - Communication Radios
CON - Connection
CONC - Concentrator
COORD - Coordinates
CPS - Compass
CRP - Computed Air Release Point
CRS - Course (desired track) of route leg or to waypoint
CRZ - Cruise
CTR - Center

DA - Drift Angle
DEL - Delete
DEP - Departure
DES - Destination
DESEL - Deselected
DEST - Destination
DF - Direct To Fix
DGNSS - Differential Global Navigation Satellite System
DIFF - Differential
DISCON - Route Discontinuity
DIS - Distance
DIST - Distance
DLU - Data Loader Unit
DMAP - Digital Map
DME - Distance Measurement Equipment
DOD - Department Of Defense
DOP - Dilution of Precision
DR - Dead Reckoning
DTG - Distance To Go
DTK - Desired Track
DTO - Direct To
DTRA - Transition Distance
DTW - Distance To Waypoint
DVS - Doppler Velocity Sensor

E - East
E/W - East/West
EDT - Edit
EFA - Estimated Fuel at Arrival
EFIS - Electronic Flight Instrumentation System
EGI - External Embedded GPS/INS
EHE - Estimated Horizontal Error
EHSI - Electronic Horizontal Situation Indicator
ENRT - En-Route
EQUIP - Equipment
ESC - Escape Point

EST	-	Estimated
ESS	-	External Sub-System
ETA	-	Estimated Time of Arrival
ETE	-	Estimated Time Enroute
EW	-	Electronic Warfare
EXEC	-	Execute
FAF	-	Final Approach Fix
FDE	-	Failure Detection and Exclusion
FF	-	Final Approach Fix
FFK	-	Front panel Function Key
FL	-	Flight Level
FLT	-	Flight
FMx	-	Flight Management (FM1, FM2)
FMS	-	Flight Management System
FMU	-	Flight Management Unit
F/O	-	First Officer
FOM	-	Figure of Merit
FPU	-	Floating Point Unit
FR	-	From
FREQ	-	Frequency
FSD	-	Full Scale Deflection
FT	-	Feet
FTE	-	Flight Technical Error
GD	-	Guard
GDOP	-	Geometric Dilution of Precision
GLNS	-	GLONASS
GLONASS	-	Global Navigation Satellite System (Russian)
GMT	-	Greenwich Mean Time
GNS	-	Global Navigation System
GNSSU	-	Global Navigation System Sensor Unit
GPIAL	-	GPS Position Integrity Alert Limit
GPP	-	Gessellschaft Fur Prozessrechner Programmierung mbH (German company that makes HCS)
GPS	-	Global Positioning System
GS	-	Ground Speed
GSM	-	Global Navigation System Sensor Module
GWT	-	Gross Weight
/H	-	Holding Pattern
HARP	-	High Altitude Release Point
HAT	-	Height Above Terrain
HCS	-	Helicopter Communication System
HDG	-	Heading
HDOP	-	Horizontal Dilution of Precision
HF	-	High Frequency
HFOM	-	Horizontal Figure Of Merit
HIL	-	Horizontal Integrity Limit
HOR	-	Horizontal
HR	-	Hour
HIS	-	Horizontal Situation Indicator
HT	-	Height
HW	-	Hardware
HYB	-	Hybrid

IAF	-	Initial Approach Fix
IAS	-	Indicated Airspeed
IC	-	Intercom
ICAO	-	International Civil Aviation Organisation
ID	-	Identifier
IDENT	-	Identifier
IDT	-	Identifier
IF	-	Intermediate Fix
IFDS	-	Integrated Flight Display System
IFR	-	Instrument Flight Rules
in Hg	-	Inches of Mercury
ILS	-	Instrument Landing System
IM	-	Innner Marker
INBD	-	Inbound
INACT	-	Inactive
INIT	-	Initialize
INT	-	Integrity
INTC	-	Intercept Course
INS	-	Inertial Navigation System
IP	-	Identification Point
IRS	-	Inertial Reference System
ITU	-	Telecommunication Union
JOY	-	Joystick
KG	-	Kilogram
KT	-	Knot(s)
L	-	Left
LAT	-	Latitude or Lateral
LB	-	Pound
LDA	-	Landing distance available
LDR	-	Light Detector
LIB	-	Library
LNAV	-	Lateral Navigation mode of the autopilot/flight director system
LOC	-	Localizer
LOCB	-	Localizer Backcourse approach
LONG	-	Longitude
LRU	-	Line Replaceable Unit
LSK	-	Line Select Key
LVL	-	Level
LW	-	Light Weight
M	-	Meter
MA	-	Missed Approach Point when not RW
MAG	-	Magnetic
MAGVAR	-	Magnetic Variation
MAHP	-	Missed Approach Holding Point
MAINT	-	Maintenance
MAP	-	Missed Approach Point
MB	-	Millibars (hectopascal)
MC	-	Mission Computer
MCDU	-	Multipurpose Control and Display Unit
MCP	-	Mode Control panel

MDA	-	Minimum Descent Altitude
MDA-DA	-	Minimum Descent Altitude-Decision Altitude
MEW	-	Mean Effective Wind
MGRS	-	Military Grid Reference System
MHz	-	Mega Hertz
MID	-	Maritime Identification Digits
MIN	-	Minute
MLS	-	Microwave Landing System
MM	-	Middle Marker
MOD	-	Modified
MRK	-	Mark
MSG	-	Message
MSLA	-	Mean Sea Level Altitude
MTBF	-	Mean Time Between Failures
N	-	North
Nx	-	NAV radio (primary : N1, secondary : N2)
NAV	-	Navigation or Navaid
NDB	-	Non-directional Beacon
NDBD	-	NDB approach with DME facility (GPS or NDB/(DME))
NM	-	Nautical Mile
NOTAMS	-	Notices To Airmen
NP	-	Navigation Performance
NPA	-	Non-Precision Approach
NVx	-	Primary (NV1) or secondary (NV2) NAV radio
NVM	-	Non-Volatile Memory
VNAV	-	Vertical Navigation
NVIS	-	Night Vision Imaging System
/O	-	Overfly Waypoint
OAT	-	Outside Air Temperature
OEI	-	One Engine Inoperative
OFST	-	Offset
OGE	-	Out of Ground Effect
OM	-	Outer Marker
OP	-	Operations (independent/synchronized)
ORIG	-	Origin
PBD	-	Place/Bearing/Distance
PBPB	-	Place/Bearing-Place/Bearing
PEE	-	Position Estimation Error
PERF	-	Performance
PG	-	Page
PIT	-	Programmable Interrupt Timer
PLS	-	Personnal Locator System
POF	-	Phase of Flight
POS	-	Position
PPOS	-	Present Aircraft Position
PREDEF	-	Predefined
PREV	-	Previous
PRN	-	Pseudo Range Number
PROG	-	Progress
P-T	-	Procedure Turn
PWR	-	Power

QFE - A method of setting the altimeter to compensate for changes in barometric pressure and runway elevation. Pilot receives information from airfield and adjusts his altimeter accordingly and it will read zero altitude at touchdown on the runway.
QNH - The more common method of setting the altimeter to compensate for changes in barometric pressure. Pilot receives information from airfield, adjusts his altimeter accordingly and the altimeter will read airfield elevation at touchdown.

/R - Radial-To
R - Right
RAD - Radial
RADALT - Radar Altitude
RADAR - Radio Detecting And Ranging
RAIM - Receiver Autonomous Integrity Monitor
RALT - Radio Altimeter
RCU - Remote Control Unit
RCV - Receive only
REC - Flight Recorder
REF - Reference
REL - Relative
RES - Reserve
RESEL - Reselect
RF - Radio Frequency
RFMS - Rotorcraft Flight Manual Supplement
RIB - Radio Interface Board
RMS - Radio Management System
RNAV - Required Navigation
RNG - Range
RNP - Required Navigation Performance
RTA - Required Time of Arrival
RTC - Real Time Clock
RTE - Route
RW - Runway Threshold

/S - Search Pattern
S/W - Software
S - South
SAR - Search and Rescue
SARSAT - Search And Rescue Satellite Aided Tracking
SAT - Satellite
SATCOM - Satelite Communication System
SD - Slowdown Point
SDF - Simplified Directional Facility
SEL - Selected
SID - Standard Instrument Departure
SIMUL - Simulation
SMS - Short Message Service
SP - Space
SPD - Speed
SQK - Squawk
SSM - Sign Status Matrix
SSR - Secondary Surveillance Radar
STAR - Standard Terminal Arrival Routes
STAT - Status
STBY - Standby

STC	-	Supplemental Type Certificate
STS	-	Status
SURF	-	Surface
SYNC	-	Synchronization
/T	-	Tactical Direct-To
T	-	Angle referenced to True North
TACAN	-	Tactical Air Navigation
TACT	-	Tactical
TAS	-	True Air Speed
TCN	-	TACAN
TD	-	Touchdown Fix when not RW
TDN	-	TransDowN
TE	-	Trailing Edge
TEL	-	Telephone
TEMP	-	Temperature
TERM	-	Terminal
TF	-	Track To Fix
TGL	-	Temporary Guidance Leaflet
TK	-	Track (Actual)
TKE	-	Track Angle Error
TOGA	-	Take-Off/Go-Around
TP	-	Turn Point
TPDR	-	Transponder
TR	-	Transmit/Receive
TRANS	-	Transition
TRK	-	Track
TRG	-	Transmit on Guard
TSE	-	Total System Error
TSO	-	Technical Standard Order
TTFF	-	Time To First Fix
TTG	-	Time To Go
TTS	-	Time To Station
TX1	-	V/UHF1 Transmitting
TX2	-	V/UHF2 Transmitting
UF	-	UHF radio
UHF	-	Upper High Frequency
UTC	-	Universal Time Coordinates
UTM	-	Universal Transverse Mercator
V	-	Velocity (VX, VY, VZ)
VAL	-	Value
VDOP	-	Vertical Dilution of Precision
VECT	-	Vector
VERT	-	Vertical
VFOM	-	Vertical Figure Of Merit
VFR	-	Visual Flight Rules
VHF	-	Very High (30-300 MHz) Frequency
VNAV	-	Vertical Navigation
VUHF	-	Very Upper High Frequency
VIR	-	VOR ILS Receiver
VIS	-	Visible
VOR	-	VHF Omni-directional Radio Range
VORD	-	VOR/DME approach (GPS or VOR/DME)

W	-	West
WD	-	Wind Direction
WPT	-	Waypoint
WS	-	Windspeed
WT	-	Weight
WGS	-	World Geodetic System
WGT	-	Weight
WXR	-	Weather Radar
XFILL	-	Cross FMS Fill
XPDR	-	Transponder
XMT	-	Transmit
XTE	-	Extended Trailing Edge Point
XTK	-	Cross Track
Z	-	Zulu (UTC) time

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SECTION 2 - CMA-9000 FMS CONTROL AND DISPLAY

CONTENTS

Subject **Page**

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SECTION 2

CMA-9000 FMS CONTROL AND DISPLAY

GENERAL

The CMA-9000 FMS is provided with an embedded Color Display Unit (CDU) and a Multipurpose Control Display Unit (MCDU). The MCDU can be interfaced with up to seven other ARINC-739 capable LRUs (ACARS, SATCOM, ACMS,…). The display section of the CMA-9000 FMS is a color Active Matrix Liquid Crystal Display (AMLCD) providing fourteen lines of twenty-four characters.

The CMA-9000 FMS and the MCDU have a full alphanumeric keyboard, with special function keys. These special function keys are in fact Front Panel Function Keys (FFKs) (e.g. INIT/REF, RTE, DEP/ARR, etc.). There are six line select keys (LSK) on each side of the display area. The functions of the LSKs are specific to each screen page.

CMA-9000 FMS and MCDU DISPLAY PANEL

The front panel arrangement of the CMA-9000 FMS is illustrated in Figure 2-1. The data is presented on a 3 X 4 inch Active Matrix Liquid Crystal Display (AMLCD). The display format is partitioned into specifically defined areas.

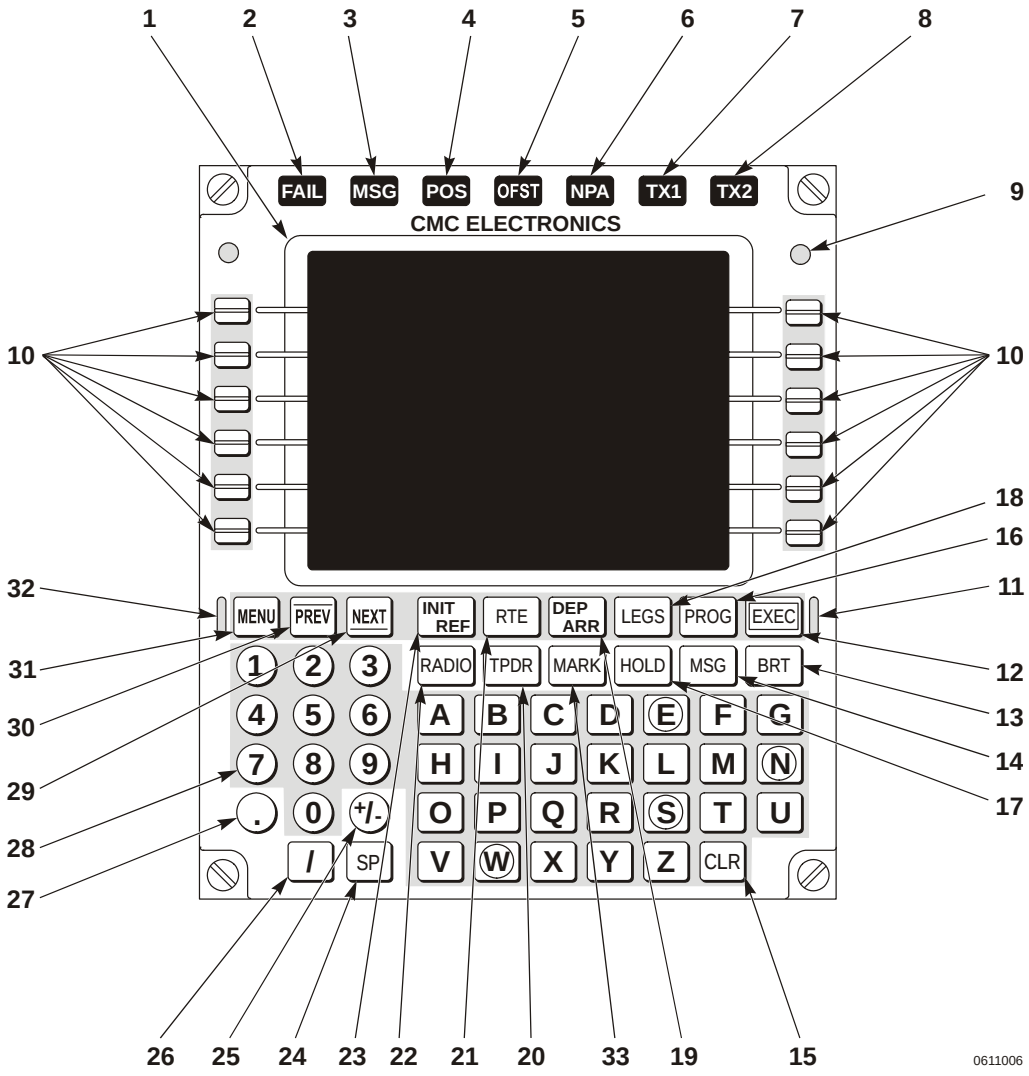

Figure 2-1 CMA-9000 FMS Front Panel (Hardware variation 030/430)

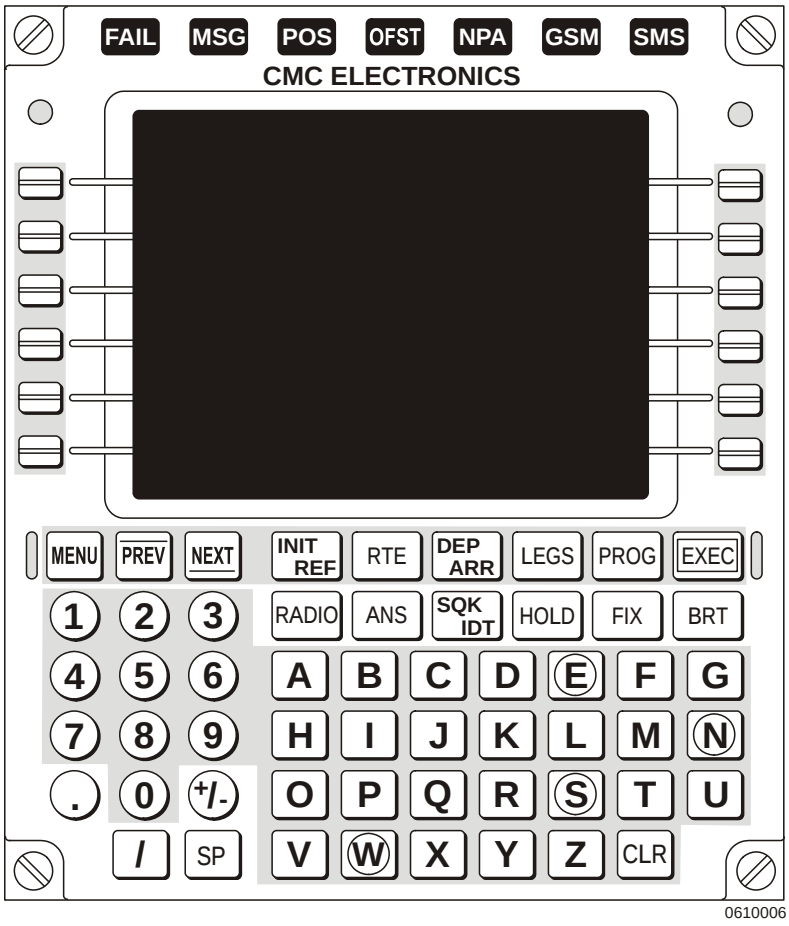

Figure 2-2 CMA-9000 FMS Front Panel (Hardware variation 001/101/301/501)

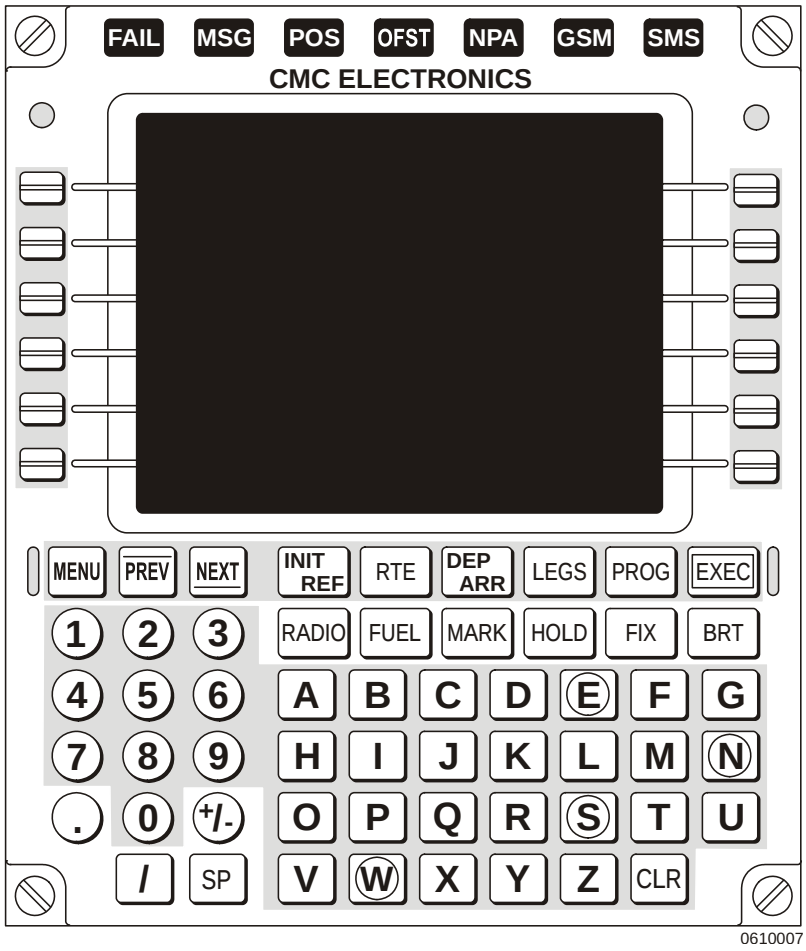

Figure 2-3 CMA-9000 FMS Front Panel (Hardware variation 002/003/005/102/103/302/303/502/503)

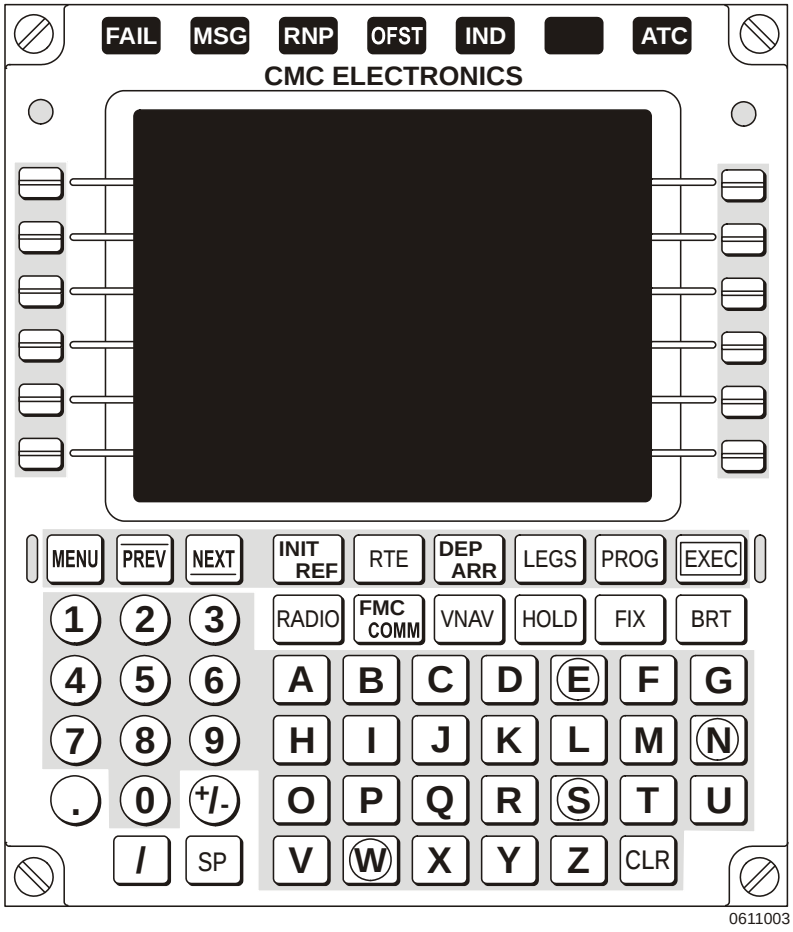

Figure 2-4 CMA-9000 FMS Front Panel (Hardware variation 045/445)

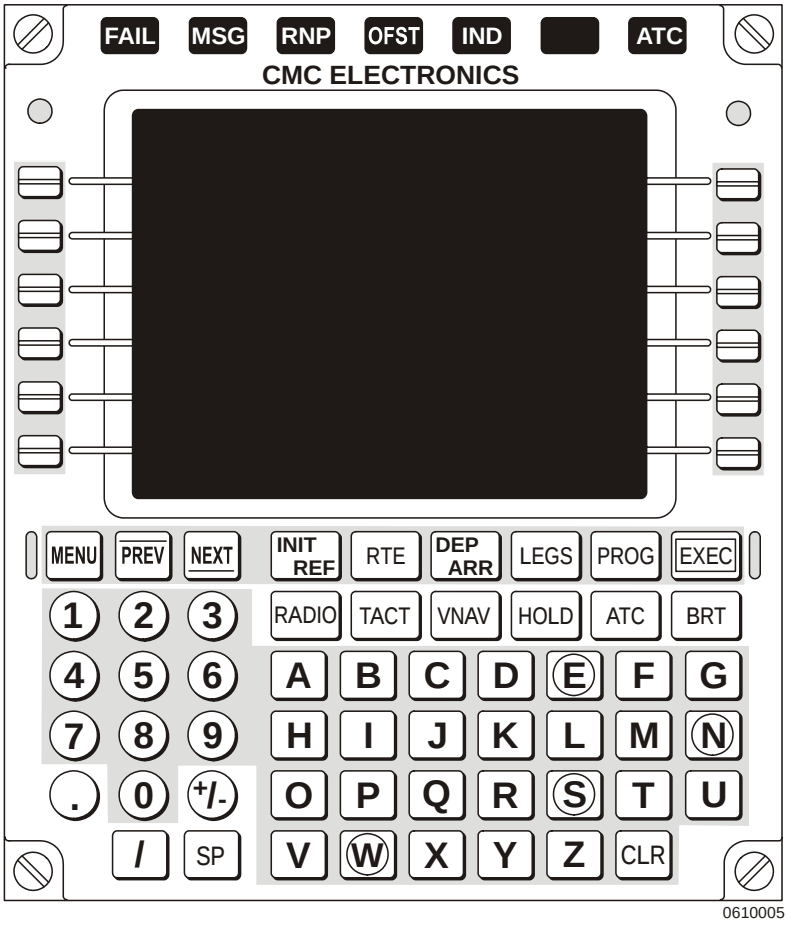

Figure 2-5 CMA-9000 FMS Front Panel (Hardware variation 050)

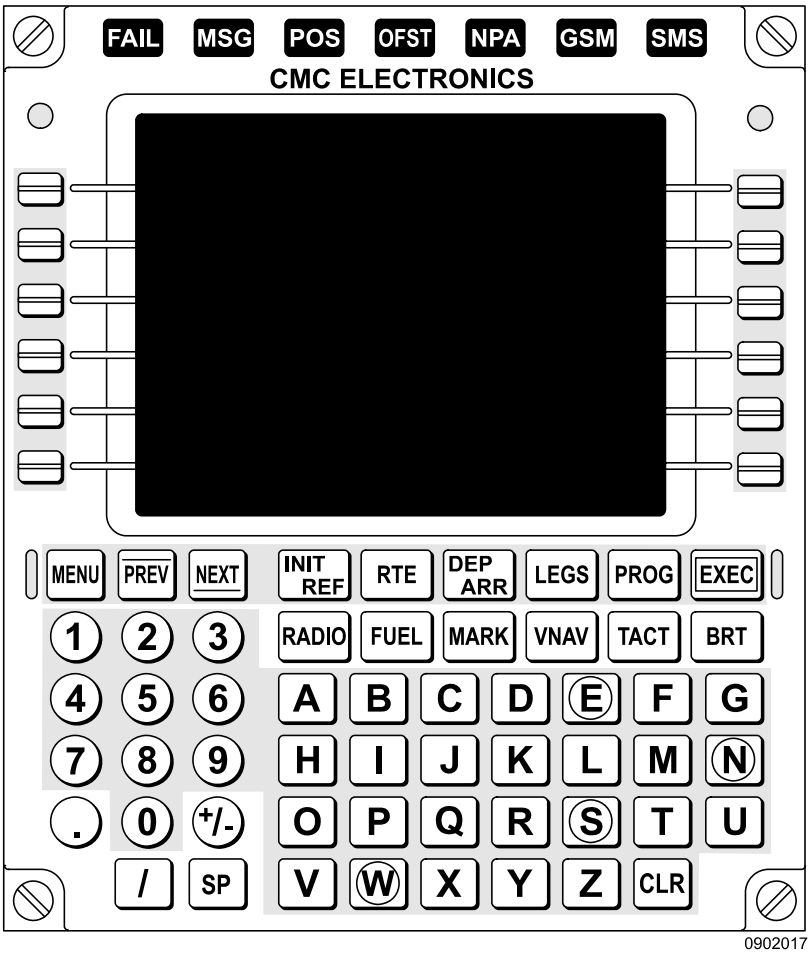

Figure 2-6 CMA-9000 FMS Front Panel (Hardware variation 106/506)

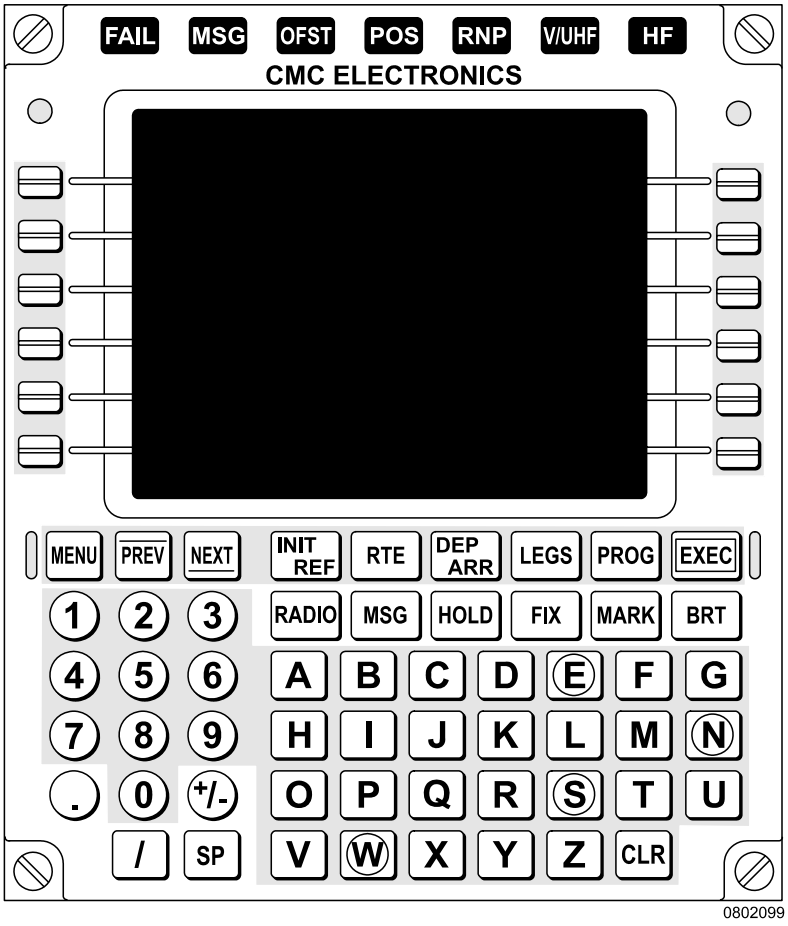

Figure 2-7 CMA-9000 FMS Front Panel (Hardware variation 290)

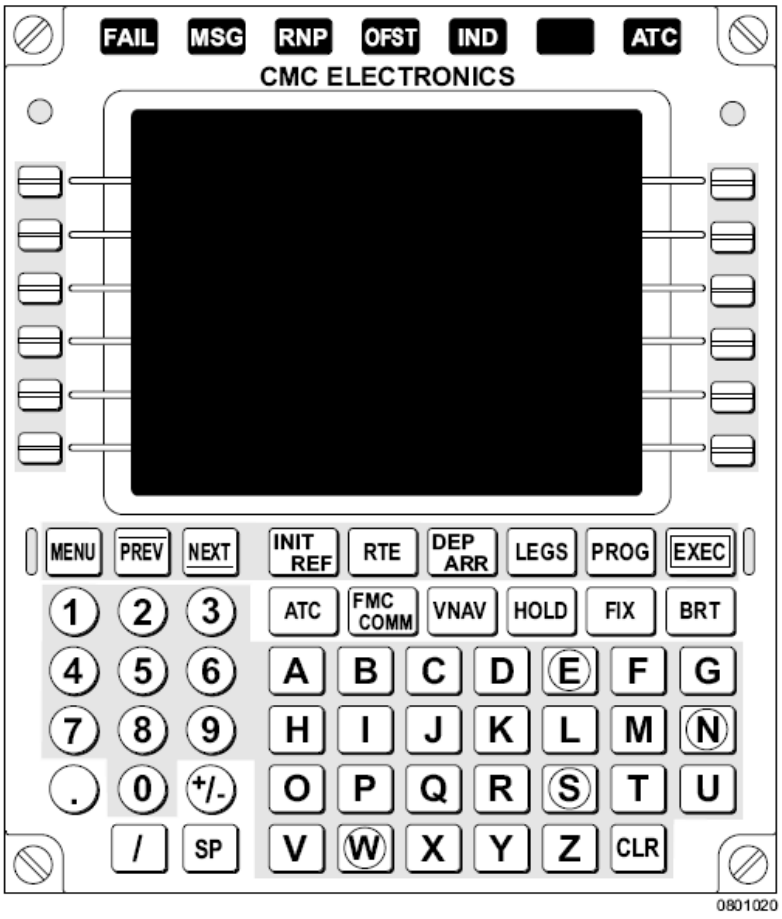

Figure 2-8 CMA-9000 FMS Front Panel (Hardware variation 060/460)

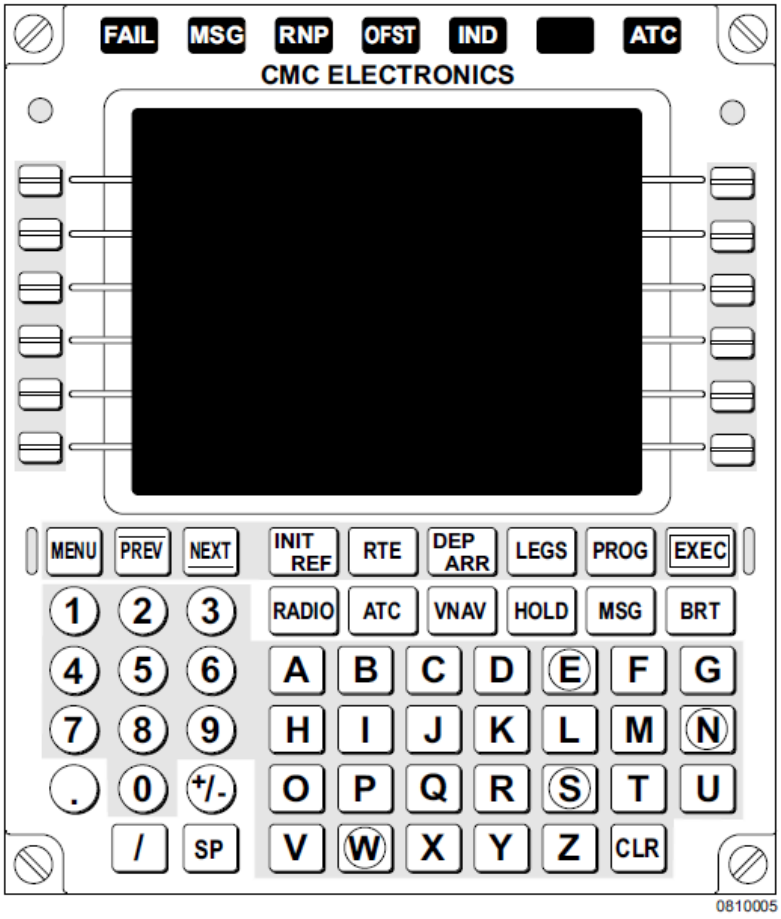

Figure 2-9 CMA-9000 FMS Front Panel (Hardware variation 070/470)

The items mentioned in the first column are used for referencing to annunciators and keys of Figure 2-1.

Display Screen:

1. Provides 14 lines of 24 characters.

   The color and font size conventions used in the display are configurable. Each item can be displayed with a predefined color and a predefined font size. Under the approved STANDARD configuration, the color convention is as follows:

   AMBER: The AMBER color is used only in case of critical alert conditions requesting immediate crew attention or action (e.g. alert scratchpad messages). The MESSAGE RECALL page(s), provides the alert conditions. The amber color is not configurable for these conditions.

   CYAN: Page titles, prompts and inactive route and GLONASS related information. In reverse video for certain status indications.

   GREEN: Fixed data fields, field titles and waypoint names. In reverse video for temporary states prompting crew attention. In reverse video for navigation and guidance actions (e.g. missed approach initiation, manual waypoint sequence, hold exit initiation).

   MAGENTA: Depending on configuration, used in normal video, or reverse video, to identify the active TO waypoint on ACT RTE LEGS 1/X, and PROGRESS pages.

   RED: Reserved for maintenance purposes only. Major change (e.g. confirmation of system re-configuration).

   WHITE: Computed (dynamic) data, data units, scratchpad data, data entry error, and advisory/maintenance messages. Depending on configuration in reverse video for active TO waypoint on ACT PROGRESS, and ACT RTE LEGS 1/X pages.

   Three different font sizes are used, as follows:

   LARGE: Manual entries, and waypoint information from the navigation database.
   MEDIUM: Computed or system generated data.
   SMALL: Data field units.

   In brief, the color convention for the STANDARD configuration is as follows:

Items	Font	Color
Page Title	Large	Cyan
Active waypoint	Large	Reverse video magenta
Page prompt	Large	Cyan
Legs page waypoint	Large	Green
Fix caption	Medium	Green
Units	Small	White
Tuning in progress	Medium	Reverse video white
Active waypoint being sequenced (fly-by transition)	Large	Reverse video white
Entered data	Large	White
Computed data	Medium	White
Temporary states pilot attention requested	Large	Reverse video green

ANNUNCIATORS:

The following are the possible annunciators which are avaialble for the different CMA-9000 H/W panel variations.

NOTE: That the physical location of these annunciators may vary depending on the specific panel (see front panel figures provided earlier in this section for specific panel variation annunciator locations).

FAIL Annunciator - illuminates at maximum brightness with the display blank upon detection of a major CMA-9000 FMS failure (e.g. CMA-9000 FMS system is halted).

MSG Annunciator - illuminates when a new alert message appears in the scratchpad. The annunciator stays lit as long as the condition causing the alert message remains, or until the message is acknowledged by pressing the CLR key, or until the message is viewed on the MESSAGE RECALL page. New alert messages also cause the remote MSG annunciator to illuminate on the instrument panel in the pilot's field of view (advisory messages do not). Any acknowledged alert message is available for recall on the MESSAGE RECALL page as long as the condition causing it remains.

POS Annunciator - illuminates when the CMA-9000 FMS is in dead reckoning navigation mode.

RNP Annunciator - illuminates when the FMS ANP exceeds the RNP for the phase of flight.

OFST Annunciator - illuminates during offset (parallel track) navigation or CARP temporary position updates.

NPA Annunciator - illuminates when Non-Precision Approach has been initiated.

IND Annunciator - illuminates when the FMS operates on INDEPENDENT mode.

TX1 Annunciator - illuminates when the configured V/UHF unit #1 emits RF power (radio is transmitting).

TX2 Annunciator - Illuminates when the configured V/UHF unit #2 emits RF power (radio is transmitting).

GSM Annunciator - illuminates for incoming call on the GSM network.

ATC Annunciator - illuminates when a connection is established with an Air Traffic Control Center.

SMS Annunciator - illuminates when the Short Message Service text message has been received.

V/UHF Annunciator - illuminates when the VUHF radio reports to the FMS that it is transmitting.

HF Annunciator - illuminates when the HF radio reports to the FMS that it is transmitting.

SENSOR - Item 9:

9. **LDR** Sensor - detects ambient light conditions in order to perform auto-brightness control of display screen and annunciators.

KEYS AND ANNUNCIATORS- Items 10-33:

10. **Line Select Keys (LSK)** - There are twelve LSKs on the CMA-9000 FMS panel, six on either side of the display. LSKs are identified by their location from top to bottom of the screen and as left or right, e.g. LSK 1L, LSK 6R. Entry of data from the scratchpad into the selected field is accomplished by pressing the adjacent LSK which moves the data from the scratchpad to the selected field. Data entries are permitted only on lines adjacent to the LSKs. Data can also be duplicated from a data field into the scratchpad by pressing the LSK adjacent to the desired data line. Inward pointing arrow symbols indicate that an option may be selected in that field. Outward pointing arrow symbols indicate that a new page will be displayed when the adjacent LSK is pressed, or that an action will be initiated.

11. **EXEC** Annunciator - illuminates when a modification to the active route is in process but has not been executed. When the EXEC annunciator is lit, the impact of the data displayed on the LEGS page may be reviewed on other CMA-9000 FMS pages, except the PROGRESS pages, and may be made active for guidance of the aircraft by pressing the EXEC key.

12. **EXEC** Key - is used to accept modifications to the active route (flight plan) performed on the LEGS, RTE (route), Departures/Arrivals, SAR, or HOLD pages or VNAV pages, or Tactical Approach pages. Modifications to the active flight plan will turn on the EXEC annunciator and display in reverse video a MOD status in the page title line and also an ERASE prompt. When data entries have been made active (by pressing the EXEC key), the title MOD status will revert to ACT (active). Until the MOD status is made active, the CMA-9000 FMS will continue to use the previous active data for navigation and guidance even though it is not displayed. Any modification can be erased (cancelled) prior to EXECution by pressing the ERASE LSK.

13. **BRT** Key - controls the brightness of the screen and annunciators. After an elapsed time of 5 seconds, the first press of this key will always increase brightness, each depression of the BRT key alternately brightens or dims the display.

    NOTE1: When night and NVG mode selected and short power interruption occurs, the brightness of the display may require minor re-adjustments.

    NOTE2: When external dimming control is selected in the configuration, the brightness of the screen and annunciators can also be controlled by an external system providing a 0-5 VDC to the FMS.

14. **MSG** Key (VAR 030, 070, 470) - accesses the MESSAGE RECALL page for display of System Alert messages.

    FIX key (VAR 040, 060, 460) - provides access to FIX page for all fix and abeam waypoint functions.

    ATC (VAR 050) - provides access to CPDLC/ATC related pages (if functionality configured).

    TACT (VAR 106/506) - provides access to tactical related functions.

    MARK (VAR 290) - when pressed creates a Mark On Top waypoint with the CMA-9000 FMS present position. It provides access to the PREDEF WPT 2/2 page where this waypoint is stored.

15. **CLR** Key - clears one character to the left during scratchpad data entry. When pressed and held for more than 1 second, it clears the entire scratchpad. The CLR key also clears alert and advisory messages from the scratchpad. The DELETE message can be cleared by a single press of the CLR key. Pressing the CLR key with the scratchpad empty will display DELETE in the scratchpad. The delete process is completed by pressing the LSK next to the data to be removed.

16. **PROG** Key - accesses the PROGRESS pages for display of current flight and navigation status information.

17. **HOLD** Key (all variations except 106/290/506) - if no holding pattern exists in the flight plan, brings LEGS page in view with "/H" in the scratchpad for line selection of the desired holding fix waypoint. If a holding pattern already exists in the flight plan, accesses the HOLD page for the definition of holding pattern parameters at the designated waypoint or present position.

    FIX key (VAR 290) - provides access to FIX page for all fix and abeam waypoint functions.

    VNAV (VAR 106/506) - provides access to the vertical navigation functions.

18. **LEGS** Key - displays LEGS pages containing detailed data concerning each leg of the flight plan.

19. **DEP ARR** Key - provides access to the DEP/ARR page for the selection of departure and arrival procedures and runways.

20. **TPDR** Key (VAR 030/430) - provides access to the ATC radio control page. This page allows the pilot to control the operation of the ATC Transponder.

    ANS Key (VAR 001/101/301/501) - SMS annunciator active: displays the newest message of the short message service on its dedicated page. GSM annunciator active: accepts the phone call when pressed the first time, hangs up when pressed a second time. Priority is given to GSM.

    FUEL Key (VAR 002, 003, 005, 102, 103, 106, 302, 303, 502, 503, 506) - Provides a quick access function to Fuel estimation and status pages.

    TACT (VAR 050) - provides access to tactical related functions.

    FMC COMM (VAR 045, 060, 445, 460) - provides access to FMS datalink related pages.

    MSG Key (VAR 290) - accesses the MESSAGE RECALL page for display of System Alert messages.

    ATC (VAR 070/470) - provides access to CPDLC/ATC related pages (if functionality configured).

21. **RTE** Key - provides access to the ROUTE page for the definition of routes.

22. **RADIO** Key - provides access to RADIO tuning functions.

    ATC (VAR 060/460) - provides access to CPDLC/ATC related pages (if functionality configured).

23. **INIT REF** Key - provides access to pages and various reference data pages.

24. **SP** Key - provides a "space" character for separation of words.

NOTE1 If the NEXT functionality is configured, the INIT/REF, RTE, DEP/ARR, LEGS, PROG, FREQ, FUEL and HOLD keys allow the access to the following page.

NOTE2 If the key is pressed for more than 1 second, the MESSAGE RECALL page will be displayed.

25. **Plus-Minus [+/-]** Key - pressing the [+/-] will first display the "-" (minus) symbol. Pressing it a second time will display the "+" (plus) symbol.

26. **Slash (/)** Key - separates data fields in scratchpad data entry.

27. **Decimal (.)** Key - provides decimal point for numeric data entries.

28. **Alpha-Numeric Keyboard** - allows entry of alpha-numeric data.

29. **NEXT** Key - when multiple-page displays are indicated in the page title line, pressing the NEXT key advances the display to the next higher page number or to page 1 if presently on the last page.

30. **PREV** Key - when multiple-page displays are indicated in the page title line, pressing the PREV key backs up the display to the previous page or to the last page if presently on page 1.

31. **MENU** Key - Provides access to the MCDU MENU 1/2 page that allows access to other subsystems connected to the MCDU (e.g. CMU, IFDMU, SATCOM, onside and cross-side FMS).

32. **MENU** Annunciator - Illuminates when a sub-system, other than the one the MCDU is currently connected to, is requesting the crew attention.

    For example, if any of the installed subsystems that uses the ARINC 739 MCDU as control head (e.g. CMU, IFDMU, SATCOM) is requesting crew attention while the MCDU is connected to the FMS, the MENU light will be turned on. Conversely, if the MCDU is connected to any of the above mentioned sub-systems and the FMS is requesting attention, the MENU annunciator will also be turned on.

    The FMS requests attention (e.g. MENU light on) when the MCDU is logged on a subsystem different from the FMS and the FMS generated a new alert or maintenance message.

33. **SQK_IDT** key (VAR 001/101/301/501) - Provides a quick access function to Squawk ident of the active ATC transponder.

    MARK Key (all variations except 290) - when pressed creates a Mark On Top waypoint with the CMA-9000 FMS present position. It provides access to the PREDEF WPT 2/2 page where this waypoint is stored (if CFG KEY 2 is configured to MARK).

    VNAV (VAR 040, 050, 060, 070, 460, 470) - provides access to the vertical navigation functions.

    HOLD Key (VAR 290) - if no holding pattern exists in the flight plan, brings LEGS page in view with "/H" in the scratchpad for line selection of the desired holding fix waypoint. If a holding pattern already exists in the flight plan, accesses the HOLD page for the definition of holding pattern parameters at the designated waypoint or present position.

NOTE: Items 16 to 19 and 20 to 23 may be configured to function as a NEXT key allowing the crew to scroll through the similar pages. For example, if this configuration option is selected, pressing PROG twice will provide access to the second PROGRESS page (e.g. PROGRESS 2/X page).

GENERAL RULES OF DISPLAY OPERATION

The operating procedures detailed in the following sections are governed by a general set of rules for CMA-9000 FMS operation. Familiarity with these rules will greatly simplify the process of learning system operation.

A typical screen page is illustrated below as an aid in describing the various page layouts, page prompts, and data entry rules.

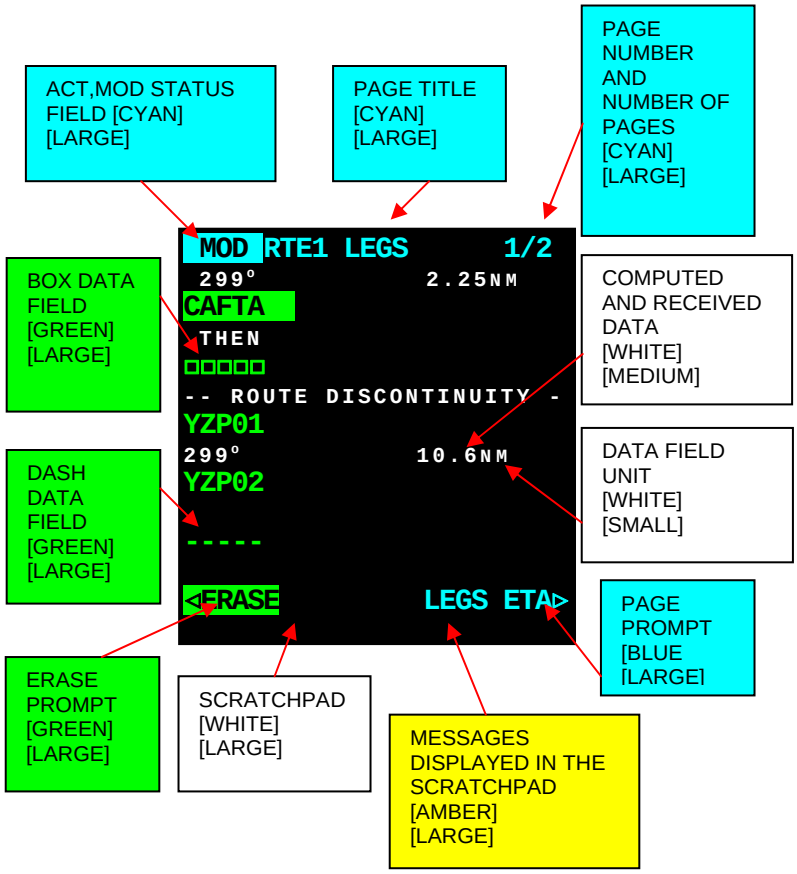

Figure 2-10 Basic Display Format

Page Title - the name of the page is shown on the top line of the display.

Page Number - when a display consists of several pages (as indicated in the upper right of the page), the additional pages may be displayed by pressing the NEXT or PREV keys. When the NEXT key configuration option is selected, the Front-panel Function Keys (FFKs) (elements 14 to 23 on Figure 2-1) can be used as a NEXT key as well.

Page Prompt - the LSK adjacent to a page prompt will display the associated screen page.

Scratchpad - the scratchpad is located on the bottom (14th) line of the display. Keyboard entries are displayed in the scratchpad and then moved to the data field by pressing the appropriate Line Select Key (LSK). Error checking for invalid format or data type, or out of range values, is performed when the LSK is pressed. Copying data from a data field into the scratchpad is accomplished by pressing the appropriate LSK when the scratchpad is empty. Data in the scratchpad remains there when a new page is selected, and can thus be carried over for entry into other pages.

Messages - the System Alert messages can either be displayed in the scratchpad and placed on the "Message Recall" list, or placed only on the "Message Recall" list depending on the system configuration. REFER TO APPENDIX E OF THIS MANUAL FOR THE LIST OF MESSAGES.

ALERT MESSAGES

A. Sytem Alert

- Require immediate pilot action.
- Displayed in amber in the MESSAGE RECALL page.
- Displayed in amber in the scratchpad until acknowledged.
- Alert Messages are the highest priority scratchpad messages (cannot be typed over or overwritten by any other message type or data entry), They must must be acknowledged by pressing the CLR key before data entry can take place.

B. Maintenance Alert

- Indicates a particular CMA-9000 FMS failure condition.
- Displayed in amber on the MAINT MESSAGES page.
- Never displayed on the scratchpad.
- Have priority over Maintenance Advisory messages.

ADVISORY MESSAGES

A. Maintenance Advisory

- *Displayed in white on the MAINT MESSAGES page.*
- *Displayed on the scratchpad unless an associated collector message exists and is active (until acknowledged).*

B. Status Advisory

- Do not require immediate pilot action but indicate a particular equipment failure condition.
- Displayed in white on the MAINT MESSAGES page and on the scratchpad.
- Lowest priority scratchpad messages (can be typed over and overwritten by any other message type).
- Data entered into the scratchpad by pressing an LSK, or via the keyboard, takes priority over maintenance advisory messages.

C. Data Entry
- Entry error advisory messages are identified in the scratchpad by a leading "!".

Both the MESSAGE RECALL page and the MAINT MESSAGES page can be accessed via the [INIT REF] key, via the MSG key or by pressing and holding the[INIT REF] key for more than 1 second.

When more than one new alert message occurs, the CMA-9000 FMS MSG annunciator will stay illuminated until all the messages have been viewed in turn by pressing the [CLR] key which deletes the current message and displays the next one. Alert messages are prioritized with the highest displayed first.

Messages may also be cleared from the scratchpad by viewing them on the MESSAGE RECALL page or MAINT MESSAGES page. Some messages are cleared automatically when the condition causing the message was corrected or is no longer appropriate.

ERASE Prompt [LSK 6L] - Whenever a modification to the active flight plan is in progress, the ERASE prompt appears. Pressing the ERASE prompt LSK erases all modifications and restores the display of the active flight plan.

Dash Data Fields - a dash data field (-----) implies an optional data entry.

Box Data Fields - a box data field ( ) implies a mandatory data entry.

ACT, MOD Status - leg modifications to the active flight plan will display the MOD status (in reverse video) ahead of the page title. Upon execution of modifications (by pressing the EXEC key) the MOD status will return to ACT status in normal video.

Slash Rule [/] - the slash key " / " is used to separate two items of data entered in the same data field (such as wind direction and speed).

If a single entry is made without being preceeded or followed by a slash, it will be entered into the data area closest to the LSK (e.g., into the first area for a left side LSK, and into the second area for a right side LSK). Otherwise, to force a single data item to be entered into the correct area of the field, it must be preceeded or followed by a slash as appropriate.

Blank Fields - a blank field " " on certain pages implies that the data has not yet been computed.

Asterisk Fields - an asterisk field " **** " on certain pages implies that the data exceeds the maximum value for that field, or that the information is not received by the external equipment.

Leading Zeros - leading zeros are only required during data entry for: 1. Angular data (bearing, course, wind direction, etc.)
2. Latitude/longitude coordinates
3. Runway identifiers

Cancellation of Slash Symbol Waypoint Legends (/H, /O, /S) - any procedure attached to a waypoint and identified by a legend consisting of the slash symbol followed by a single letter, such as a holding pattern (/H), or a waypoint converted to fly-over (/O), or a search pattern (/S) can be cancelled by using the slash key alone without a letter and the appropriate LSK. In the case of a holding pattern or search pattern, this should be performed prior to the waypoint becoming the active waypoint.

NOTE: Cancellation of the procedure does not delete the waypoint.

WAYPOINT NAMES AND OTHER CONVENTIONS

Terminal Area Waypoints - where specific identifiers have not been assigned, the following two-character prefix codes are added to the runway identifier (number) to create terminal area and approach-related waypoints in the navigation database:

AF - Initial Approach Fix
CF - Final Approach Course Fix
FF - Final Approach Fix
IF - Intermediate Fix
MA - Missed Approach Point when not RW
SD - Step-down Fix
RW - Runway Threshold
OM - Outer Marker
MM - Middle Marker
IM - Inner Marker
BM - Back Course Marker
TD - Touchdown Fix when not RW

Unnamed Turnpoints and Intersections - where no name has been assigned to a turnpoint or intersection, the waypoint name in the navigation database is created by adding the distance of the point from the nearest applicable navigation facility to the facility identifier, e.g. SEA77.

Temporary Waypoints - place/bearing/distance (PBD), place/bearing-place/bearing (PBPB) and along track waypoints are automatically named by adding a sequence number to the first three characters of the reference waypoint, e.g. ANC01. Similarly, the names of waypoints entered in latitude/longitude are created by adding a sequence number to the prefix WPT.

DME ARC Waypoints - the waypoint name in the navigation database is created by adding the radial from the DME station in degrees followed by the radius of the arc in nautical miles (represented by a letter: A = 1 nm, B = 2 nm, J = 10 nm, etc) to the prefix D, e.g. D173J.

Conditional Waypoints - a conditional waypoint is used in the navigation database when a route leg does not terminate at a defined latitude and longitude. Such legs include radar vectors, intercepts, and course or heading legs, or a leg with a manual or an altitude termination. Conditional waypoint names are displayed in parentheses as shown below. Conditional waypoints cannot be used for direct-to navigation, nor as references for temporary waypoint creation, and cannot be copied into the scratchpad.

(INTC) - Leg terminates at the interception of the next leg.

(3000) - Leg terminates at the altitude shown. When a conditional altitude waypoint is active and where a suitable altitude input is not available, a NEXT WPT prompt is displayed at LSK 6R of PROGRESS 1/4 page, and a MANUAL WPT SEQUENCE alert message is displayed. Operator action is required to sequence to the next waypoint.

(VECT) - Leg is a radar vector. As described above, operator action is required to sequence to the next waypoint.

Course Legends - courses may be displayed with the following legends depending on the leg type, as listed below:

CRS	-	Indicates a course leg inbound to the next waypoint
FR FIX	-	Indicates a course outbound from the FIX
HDG	-	Indicates a heading leg
HOLD AT	-	Replaces the TO WPT course on RTE LEGS 1/X and PROGRESS 1/4 pages when navigating a holding pattern
P-T	-	Appended to the courses of the outbound legs of the procedure turn

Course Prefixes - the required turn direction (L or R) is added as a prefix to the displayed course, and is most commonly used at the inbound turn of a procedure turn and in missed approaches.

SECTION 3 - PREFLIGHT

CONTENTS

Subject **Page**

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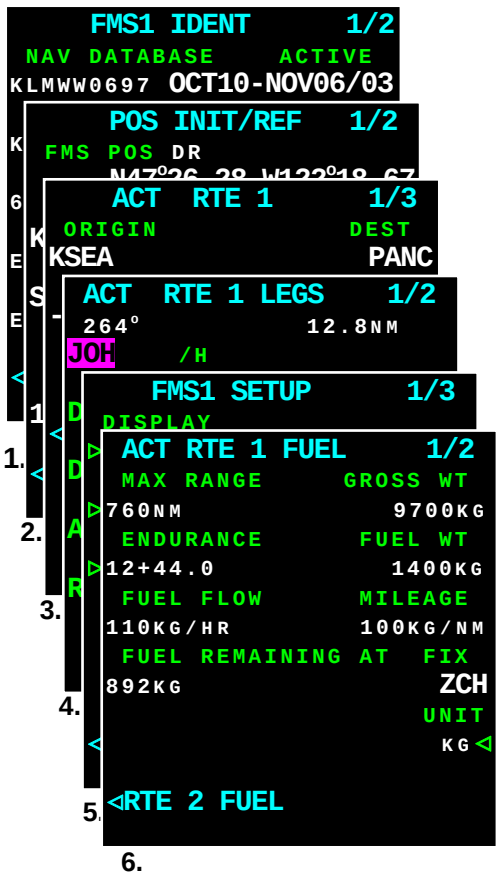
SECTION 3

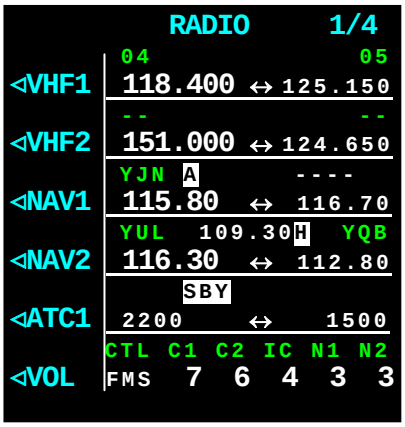
PREFLIGHT

CONDENSED PREFLIGHT PROCESS

This page sequence gives an overview of the Preflight operations of the CMA-9000 FMS. The intent of each step is summarized on the next page.



If radios are used **1A.**



1B.

PREFLIGHT

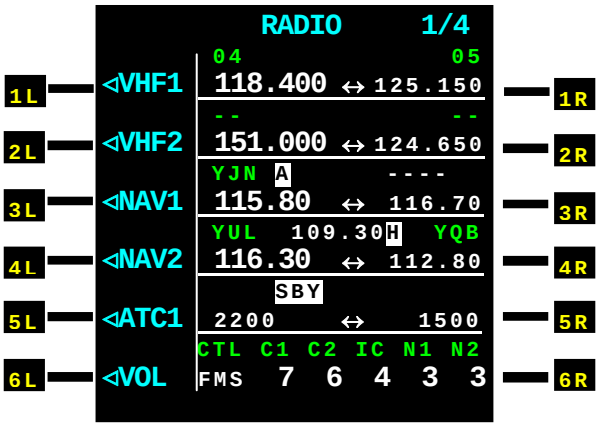
1. IDENT - check software version number. Check Configuration Number. Check active database date and interchange if necessary.
2. RADIO - check frequencies (if radios are used).
3. POS INIT/REF - check aircraft present position, time and date.
4. MOD, ACT RTE, DEPARTURES - enter route, confirm CMA-9000 FMS flight plan matches clearance.
5. ACT RTE LEGS - check all course and distances between waypoints of the active route.
6. SETUP - check display reference (MAGNETIC, TRUE).
7. FUEL (only if configured) - if a fuel computer is not configured, enter fuel quantity and fuel flow, for computation of maximum range and endurance, and the fuel remaining over a desired waypoint.
8. GPS SAT DESELECT - only if ARINC 743A GPS is configured): check that GPS satellites are not deselected or deselected according to NOTAMs.

A detailed description of each display page is contained in Appendix A. Radio display pages are detailed in Section 13.

START-UP AND INITIALIZATION

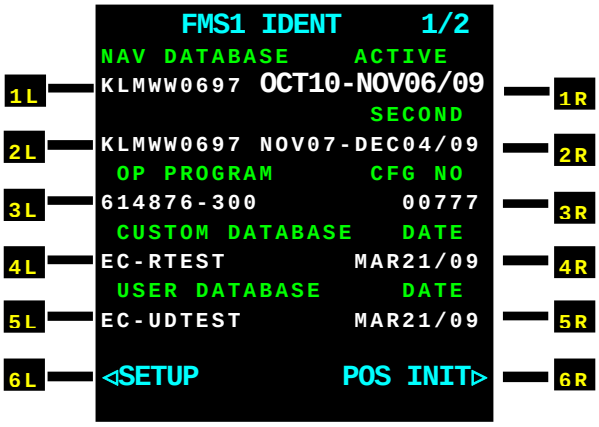
1. Verify that all relevant circuit breakers are on.
2. The CMA-9000 FMS will show a white display while testing the FAIL, MSG, POS, OFST, NPA, TX1, TX2, HF, V/UHF, IND, RNP, GSM, SMS and EXEC annunciators. Refer to section 2 for applicable annunciator. After these tests, it displays the RADIO (Horizontal or Vertical) page or the IDENT 1/2 power up page based on the configuration page.

RADIO PAGE Type HORIZONTAL: Or



RADIO PAGE Type VERTICAL:

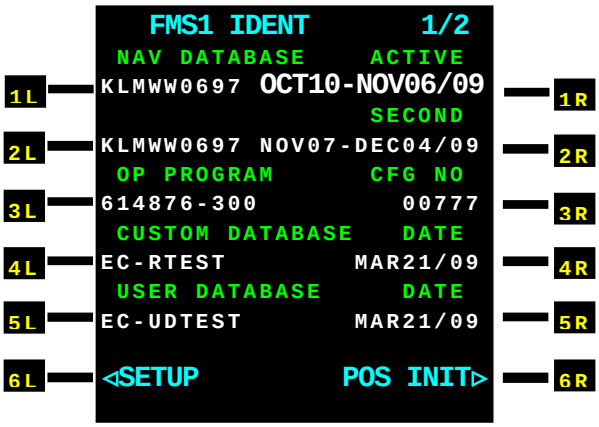
Or



3. Adjust the intensity of the CMA-9000 FMS display by pressing and holding the BRT key until a comfortable viewing level is obtained.

   Each depression of the BRT key alternately brightens or dims the display. On initial power up, or when a time interval of more than 5 seconds has elapsed since the last time the [BRT] key was pressed, the first press of this key will always increase brightness.

4. If RADIO page is displayed then press [INIT REF], <IDENT> (LSK 1L) to display the IDENT 1/2 page.



5. Verify the OP PROGRAM (software version) and CFG NO. (system configuration) against the Aircraft Flight Manual Supplement.

   If either software or configuration numbers are incorrect, maintenance action is required.

6. Verify the date of the active database cycle.

   If all identification data is correct, system start up and initialization is complete.

ACTIVE DATABASE SELECTION

CAUTION: When the active database is changed, any existing active route is deleted.

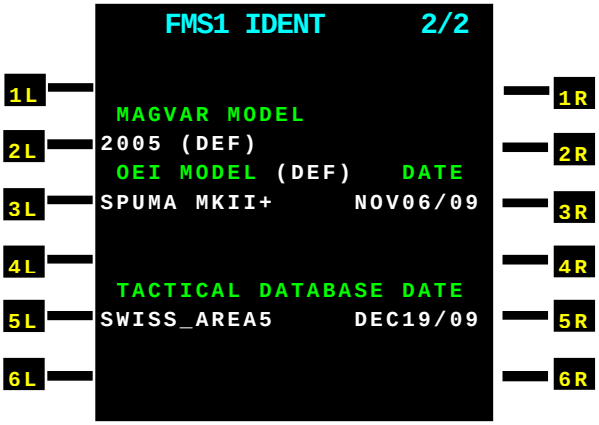
1. Copy the SECOND cycle date into the scratchpad, by pressing LSK 2R.

2. Move the cycle date into the ACTIVE field by pressing LSK 1R.

   The active database cycle is replaced by the second database cycle, as shown by the interchange of cycle dates. The active database cycle is displayed in large font. The active database can only be changed on the ground.

Display the IDENT 2/2 page by pressing [INIT REF], <IDENT> and [NEXT].

This page displays the identification of the magnetic variation, the OEI definition (loaded flight data) and Tactical Approach Database (if configured).



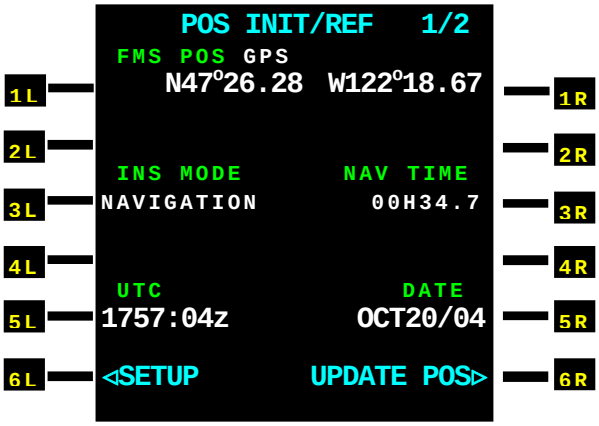
CMA-9000 FMS DISPLAY SETUP

From the IDENT 1/2 page, go to DISPLAY 1/1 page, by pressing [INIT REF] and <DISPLAY> (LSK 4L).

1. Press LSK 1L and adjust display PARALLAX for proper viewing angle.
2. Press <DISPLAY> (LSK 3L) and select color or monochrome for this test. Re-select color thereafter.
3. Press <INIT/REF> (LSK 6L).
4. Press <IDENT> (LSK 1L) to return to the IDENT 1/2 page.

SYSTEM POSITION, DATE AND TIME UPDATE

From the IDENT 1/2 page go to POS INIT/REF 1/2 page by pressing <POS INIT> (LSK 6R).



NOTE: Position/time/date cannot be updated if the NAV mode is GPS, INS/GPS (and cGPS/mGPS if GPS and EGI are installed).

At power up the system position is the last calculated position prior to shutdown, or the current GPS position, if available. Initialization of position, date and time is not normally required. If GPS is available, the CMA-9000 FMS internal clock is updated to GPS-based UTC and date.

Unless an INS is configured and the GPS position is available, a manual initialization of position, date, and time is not normally required except during an initial aircraft installation, or possibly after a maintenance action. In this case, if GPS position is unavailable, the alert message "SET INS POS" appears.

If the navigation mode is not GPS (nor INS/GPS, cCGS, mGPS):

1. Enter the new time into the scratchpad, e.g. 175704.
2. Move the new time to UTC field by pressing LSK 5L.

and/or

3. Enter the new date to the scratchpad, e.g. OCT20/04.

4. Move the new date to the DATE field by pressing LSK 5R.

To initialize the position use the POS INIT/REF 1/2 page:

1. Enter the airport identifier into the scratchpad.

2. Move the airport identifier to the REF WAYPOINT field by pressing LSK 2L.

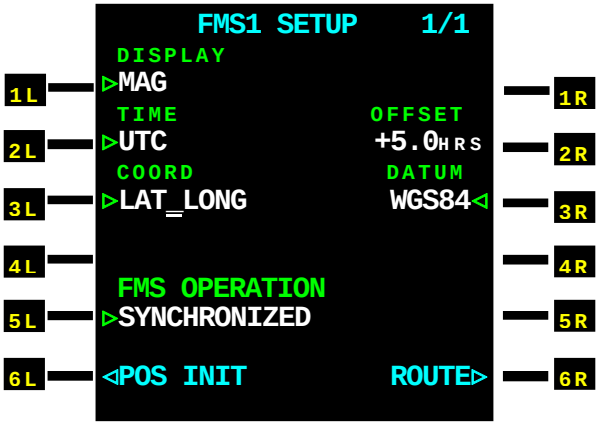
REF WAYPOINT *and INS mode fields blank on aircraft lift-off.*

3. Line select airport or INS position into the scratchpad (by pressing LSK 2R or LSK 4R, or enter any other desired position into the scratchpad (e.g. N472628W1221867).

4. Move the new position to the POSITION field by pressing LSK 1R.

ANGULAR REFERENCES FOR NAVIGATION AND DISPLAY

Display the INIT/REF INDEX 1/2 page by pressing [INIT REF]. From the INIT/REF INDEX 1/2 page, display the SETUP 1/1 page by pressing <SETUP> (LSK 5L).



The default angular reference of all NAVIGATION DISPLAYS (heading, course, actual track, and bearing) is MAGNETIC NORTH (degree symbol), and that of WIND DIRECTION is TRUE NORTH (T symbol).

If configured, and the cockpit true/mag switch is not installed, change the navigation reference DISPLAY to TRUE or MAGNETIC by pressing LSK 1L. In some installations, the display reference of the navigation angles can only be controlled by a true/mag cockpit switch. In this case the MAG/TRUE DISPLAY prompt (at LSK 1L) is removed from the SETUP page.

Upon entering the polar region (latitude above N73 or below S60), the angular reference automatically reverts to true north and the reference toggling is inhibited.

If the angular reference was magnetic previous to entering the polar region, an advisory scratchpad message is displayed to inform the crew of the change from magnetic to true north.

Upon the airplane leaving the polar region, the system behaviour depends upon the aircraft installation.

If the true/mag cockpit switch is not installed, the angular reference display is maintained to True and the True/Mag toggling capability is restored. An advisory scratchpad message prompts the crew to check the angular reference.

If the true/mag cockpit switch is installed, the FMS uses the switch to determine the angular display reference. If the switch was set to Mag previous to entering the Polar region, the FMS automatically reverts the reference to MAG and displays an advisory message to indicate the true to magnetic reversion.

Select time reference to LOCAL or UTC by pressing LSK 2L.

If UTC time is selected enter the local time offset from the UTC time by pressing LSK 2R. (Validity checking ensures entry is between +/-12.0 hours and steps are 0.5 hours).

Press <COORD> (LSK 3L) and select coordinates. Possible values are LAT_LONG, UTM, MGRS and SWISS_GRID.

Only one coordinate system is active for both entry and display of positional information at any given time.
Swiss Grid position is defined as Northing and Easting coordinates up to 999 km, locating a position to within 10 meter square. The CMA-9000 FMS is able to display to full range of the Swiss Grid coordinate system. However, the CMA-9000 FMS will only accept manual entries within the following limits:

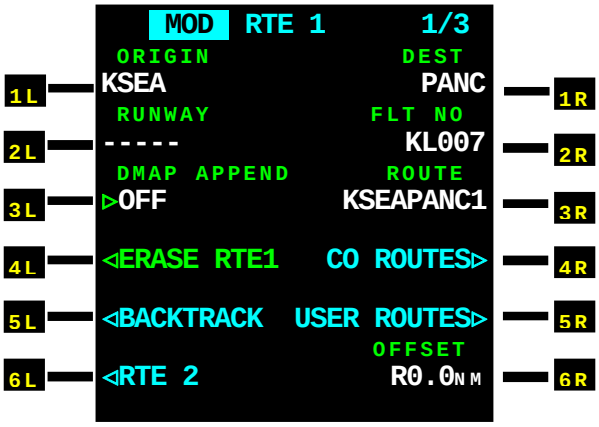
062 - 302 (Northing)
480 - 865 (Easting)

Press <DATUM> (LSK 3R) and select appropriate datum. Fifty-one possible values can be configured (e.g.: WGS84, ARC 1960, AUSSIE 84).

NOTE: If the SWISS_GRID coordinates are chosen, the DATUM is set to CH1903 and cannot be changed.

ACTIVE ROUTE SELECTION USING THE CUSTOM ROUTE NAME

Display the RTE 1/X page by pressing the [RTE] function key.



1. Key in the custom route identifier into the scratchpad, e.g.: KSEAPANC1.
2. Move the custom route name to the CO ROUTES field by pressing LSK 3R.

   "MOD" status is displayed in the title line. A "!WAIT" advisory message appears in the scratchpad while the route information is being extracted from the navigation database.
3. Verify the ORIGIN and DEST identifiers.
4. Enter flight number into the scratchpad. Move to the FLT NO field by pressing LSK 2R.
5. Accept the new active route by pressing [EXEC].

   "MOD" status in the title line changes to "ACT". The selected route is now active.

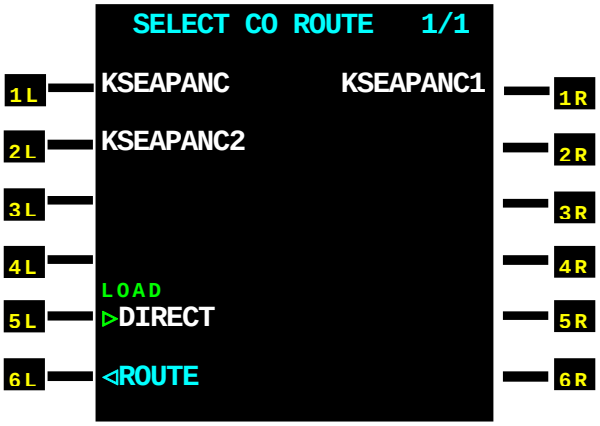
   NOTE: With an ELBIT, EURONAV, or EURONAV_A702 DMAP configured, the CMA-9000 FMS will automatically display the RTE x LEGS 1/X page if valid DMAP waypoints are received and DMAP APPEND mode is ON. If the DMAP APPEND mode is OFF and valid DMAP waypoints are received, the DMAP WPT page will be displayed. The DMAP APPEND prompt appears on the RTE 1/X page only if a DMAP (ELBIT, EURONAV, or EURONAV_A702 type only) is configured.

NOTE: When loading a custom route in flight, the CMA-9000 FMS will append a "+" to the custom route identifier on the RTE page thus indicating that the custom route has been appended to the end of the current flight plan.
When a custom route is inversed, the route name is preceded by the prefix INV in reverse video.

ROUTE SELECTION FROM THE LIST OF CUSTOM ROUTES

With the ACT or MOD RTE 1/X page displayed:

Display the custom routes by pressing <CO ROUTES> (LSK 4R).



Custom routes are displayed left to right, sorted by origin identifier.

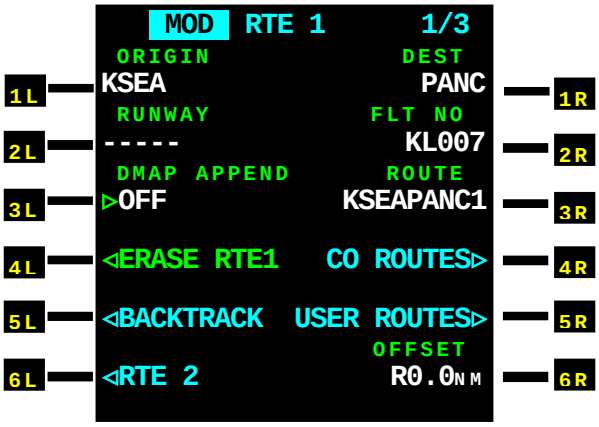
NOTE: If the display of the CO ROUTE is configured to ORIG_DEST, the entry of an ORIGIN or both ORIGIN and DEST identifiers on RTE x 1/X page will reduce the custom routes list, when on ground, to those specified in the ORIGIN or ORIGIN and DEST fields. When airborne, all custom routes are displayed. If CO ROUTE is configured to ALL, every CO ROUTE in the custom database will be displayed.

1. Display the desired route by pressing [NEXT] or [PREV] as often as required.
2. Select route identifier by pressing the appropriate LSK.
3. Select the direction in which the route is loaded by toggling DIRECT/INVERSE using LSK 5L.
4. The RTE 1/X page is re-displayed. Verify the ORIGIN and DEST identifiers.
5. Accept the new active route by pressing [EXEC].

   When airborne, selecting a custom route will replace the destination with the selected custom route destination and will insert a discontinuity after the active waypoint followed by the selected custom route waypoints. If a procedure (for e.g. STAR or Approach) is part of the flight plan, the whole procedure is replaced by the selected custom route.

ACTIVE ROUTE SELECTION USING THE USER ROUTE NAME

Display the RTE 1/X page by pressing the RTE function key.



1. Press the <USER ROUTES> prompt (LSK 5R) the USER ROUTES 1/X page is displayed.
2. Select from the USER ROUTES 1/X page the user route identifier, e.g.: KSEAPANC1.

   The RTE 1/X page is re-displayed with the user route identifier displayed at the ROUTE field, LSK 3R.

   "MOD" status is displayed in the title line. A "!WAIT" advisory message appears in the scratchpad while the route information is being extracted from the navigation database.
3. Verify the ORIGIN and DEST identifiers.
4. Enter flight number into the scratchpad. Move to the FLT NO field by pressing LSK 2R.
5. Accept the new active route by pressing [EXEC].

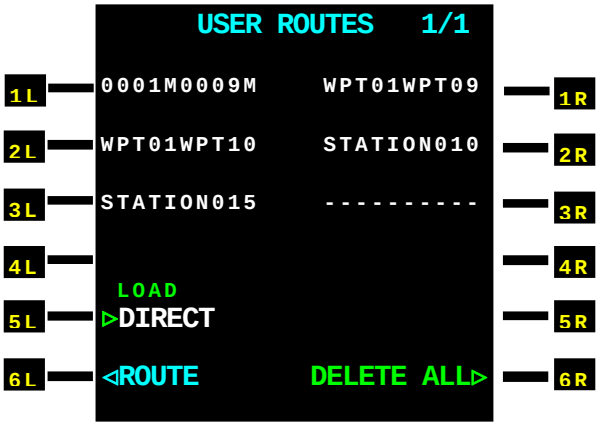
   "MOD" status in the title line changes to "ACT". The selected route is now active.

NOTE: When loading a user route in flight, the CMA-9000 FMS will append a "+" to the user route identifier on the ROUTE page thus indicating that the user route has been appended to the end of the current flight plan.
When a user route is inversed, the route name is preceded by the prefix INV in reverse video.

ROUTE SELECTION FROM THE LIST OF USER ROUTES

With the ACT or MOD RTE 1/X page displayed:

Display the user routes by pressing <USER ROUTES> (LSK 5R).



User routes are displayed left to right, in the order of entry.

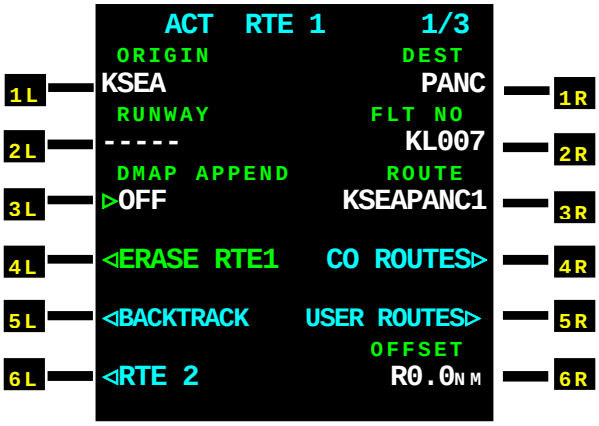
1. Display the desired route by pressing [NEXT] or [PREV] as often as required.
2. Select route identifier by pressing the appropriate LSK.
3. Select the direction in which the route is loaded by toggling DIRECT/INVERSE using LSK 5L.
4. The RTE 1/X page is re-displayed. Verify the ORIGIN and DEST identifiers.
5. Accept the new active route by pressing [EXEC].

   When airborne, selecting a user route will replace the destination with the selected user route destination and will insert a discontinuity after the active waypoint followed by the selected user route waypoints. If a procedure (for e.g. STAR or Approach) is part of the flight plan, the whole procedure is replaced by the select user route.

BUILDING A ROUTE VIA WAYPOINT INSERTION

When no custom route is available, a route can be created by first defining the origin and destination airports on the ROUTE page, followed by entry of the individual waypoints on the RTE x LEGS page.

Display the ACT or MOD RTE x 1/X page by pressing [RTE].



1. Key the departure airport identifier into the scratchpad and move it to the ORIGIN field by pressing LSK 1L.

   "MOD" status is displayed in the title line. The "ERASE RTE" prompt is displayed at LSK 4L (displayed only when xFMU is not configured) and the EXEC annunciator illuminates.
   "BACKTRACK" prompt is displayed at LSK 5L only if configured.

2. Key the destination airport identifier into the scratchpad and move it to the DEST field by pressing LSK 1R.

3. Display the MOD RTE x LEGS 1/1 page by pressing [LEGS].

   The TO WPT identifier field contains boxes.

4. Key the identifier of the first waypoint into the scratchpad and move it to the TO WPT location by pressing LSK 1L.

   The direct course and distance from present position to the TO WPT is computed and displayed, and the INTC CRS prompt is displayed at the LSK 6R location with dashes ("---") in the intercept course field.

NOTE: The minimum route comprises of the origin and destination airports (or waypoints if configured to ROTOR) and a single waypoint. If desired, direct-to navigation from the present position to the first waypoint of the route can be initiated at this time as described in Section 9 (Direct-To/Intercept).

5. Key in all subsequent waypoint identifiers in turn, inserting them into the route by pressing the appropriate left hand LSK. Press [NEXT] as required to display a new RTE x LEGS page.

6. Additional temporary waypoints can be inserted into the route as described in Section 5.

BUILDING A ROUTE VIA AIRWAY INSERTION

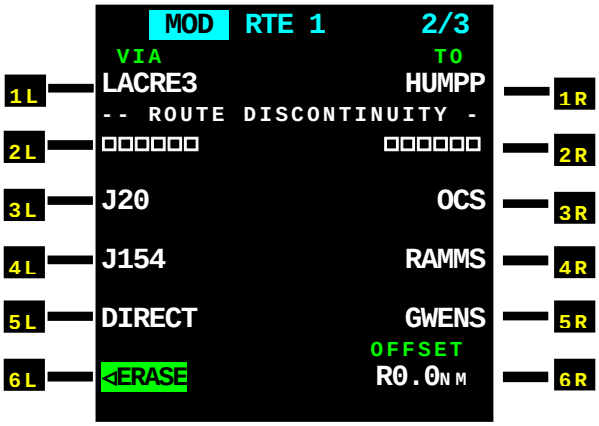
When no custom route is available, a route can be created by first defining the origin and destination airports on the ROUTE page, followed by entry of the individual airway identifier on the ROUTE page.

1. Key the departure airport identifier into the scratchpad and move it to the ORIGIN field by pressing LSK 1L.

   "MOD" status is displayed in the title line. The "ERASE" prompt is displayed at LSK 6L and the EXEC annunciator illuminates.

2. Key the destination airport identifier into the scratchpad and move it to the DEST field by pressing LSK 1R.

3. Display the RTE x 2/X page by pressing [NEXT].



4. Key the identifier of the first waypoint into the scratchpad and move it to the TO location by pressing LSK 1R.

   DIRECT is displayed below VIA, indicating that the first flight leg will be from Present Position direct to the first waypoint of the desired airway.

5. Key in the airway identifier and move it to the airway field by pressing LSK 2L, a box data field appears against LSK 2R.

6. Key in the next airway identifier and move it to the airway field by pressing LSK 3L, the waypoint at the junction of the two airways appears in the box data field against LSK 2R and a box data field appears against LSK 3R.

7. Key in all subsequent airway identifiers in turn, inserting them into the route by pressing the appropriate left hand LSK. Press NEXT as required to display a new ROUTE page.

NOTE: The route structure can be modified by defining the waypoint identifier at which the desired airway is terminated and repeating the procedure for entering the following airways.

If a departure or an arrival is selected on the DEP/ARR page, the procedure and the transition name will be displayed in the VIA and TO fields.

If a waypoint is inserted immediately before an already inserted waypoint, a DIRECT TO to the entered waypoint will be created followed by a route discontinuity and a DIRECT TO to the already inserted waypoint.

The route structure can also be modified by adding and/or erasing waypoints on the selected RTE x LEGS page.

8. Display the first leg by pressing [LEGS] and [PREV] or [NEXT] as required.

9. Close-up any route discontinuity as described in Section 5.

10. Verify the course, distance, altitude/speed advisory of each airway leg in turn by pressing [NEXT] as required to display all legs.

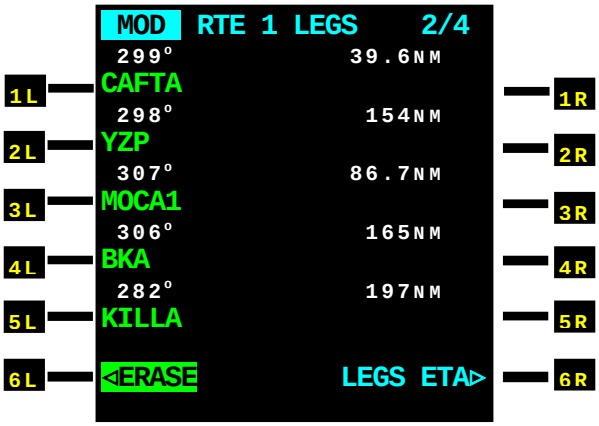
11. Make the selected route active by pressing [EXEC].

BUILDING A DEPARTURE PROCEDURE

For departures from an airport, Standard Instrument Departures (SID) can be incorporated into the route by manual entry of the individual waypoint identifiers. Legs which are defined by course/heading legs rather than by waypoints can be created by combinations of place/bearing/distance and place/bearing-place/bearing waypoints as described in Section 5, or by direct-to or manual navigation once airborne.

VERIFYING ACTIVE ROUTE LEGS BY COURSE AND DISTANCE

Display the MOD RTE x LEGS 1/X page by pressing [LEGS].



1. Verify the course and distance of all route legs.
2. Display all route legs in sequence by pressing [NEXT] as often as required.
3. Return to the MOD RTE x LEGS 1/X page by pressing [LEGS] or [PREV] as required.
4. Make the route active by pressing [EXEC].

   The "MOD" status in the title line changes to "ACT", the ERASE prompt disappears and the EXEC annunciator extinguishes.

INITIAL LEG

Following the waypoint of a route, navigation and guidance is computed initially for the leg from present position direct to the first waypoint. On takeoff, the CMA-9000 FMS automatically re-computes a Direct-To to the first waypoint.
If a runway and SID are selected and the first leg is not a Direct-To leg, navigation and guidance is computed initially from the runway threshold to the first waypoint. On take-off, the CMA-9000 FMS automatically re-computes the initial leg using the present position as the start of the leg.

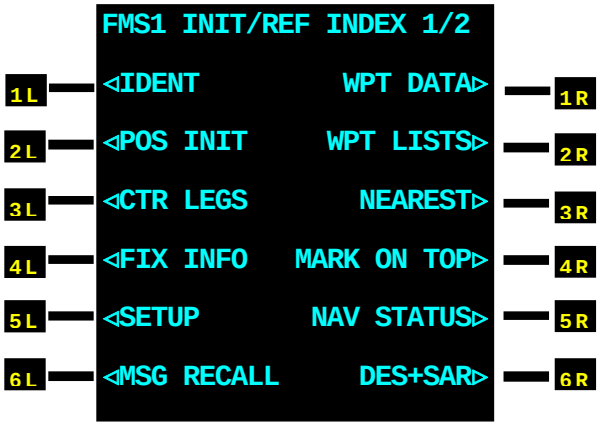
To navigate a different first leg, follow any of the route modification procedures described in Section 5.

CANCELLING ANY PROCEDURE OR ROUTE MODIFICATION

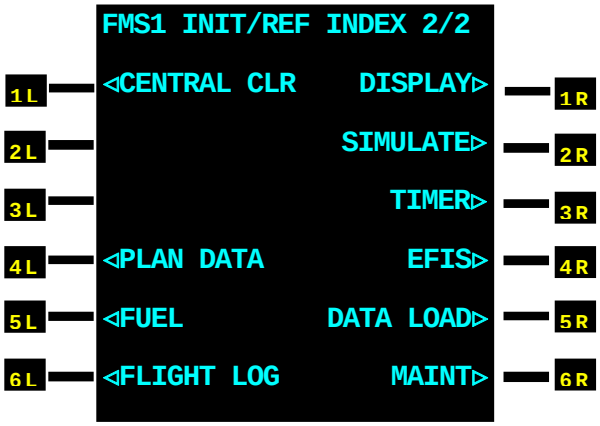
During any procedure which involves a modification to the active route, an ERASE prompt is displayed at LSK 6L. Prior to EXECuting the procedure, it can be cancelled and all route modifications deleted by pressing <ERASE> (LSK 6L).

ACCESSING INIT/REF INDEX PAGES

Display the INIT/REF INDEX 1/2 page by pressing [INIT REF].



Display the INIT/REF INDEX 2/2 page by pressing [NEXT] or [PREV].



NOTE: All prompts displayed on the INIT/REF INIDEX pages are configurable and the page layouts illustrated above are provide as examples only. In this particular example, LSK 5L, LSK 6L, LSK 2R, LSK 3R and LSK 4R are installation dependent, and thus may not appear as shown above. LSK 5R appears only when the aircraft is on ground for maintenance database loading. LSK 6R appears only when the aircraft is on ground for maintenance operations.

CRUISE PERFORMANCE PARAMETERS INITIALIZATION (if configured)

When a modification is made to the origin airport or associated departure procedure, the TRANS ALT field will be update to show the navigation database extracted value, if one exists, otherwise the configured FMS default value will be displayed.

When a modification is made to the destination airport or associated arrival procedure, the TRANS LVL field will be update to show the navigation database extracted value, if one exists, otherwise the configured FMS default value will be displayed.

The Transition Altitude and Transition Level are user modifiable.

Additional details on the TRANS ALT and TRANS LVL fields can be seen on the PLAN DATA page in Appendix A.

For flight planning calculations while on ground, the CMA-9000 FMS will provide user modifiable Cruise TAS and Cruise Wind values.

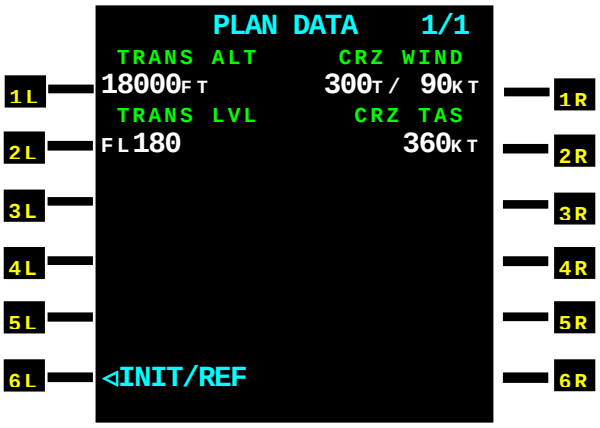
Upon a warm or cold start, the CMA-9000 FMS will keep the Cruise TAS value prior to the power down. Upon a change in configuration, the CMA-9000 FMS will set the Cruise TAS value in accordance with the aircraft type:

ROTOR:
CRZ_TAS: 130KTS
FIX:
CRZ_TAS: 480KTS

The CMA-9000 FMS will reset the Cruise Wind value to zero after a cold start on ground. Upon a warm start or cold start in air, the CMA-9000 FMS will keep the Cruise Wind value prior to the power down.

Display the INIT/REF INDEX 1/2 page by pressing [INIT REF].

1. Display the PLAN DATA 1/1 page by pressing [INIT REF], [NEXT] and <PLAN DATA> (LSK 4L).



2. To modify the TRANS ALT and/or TRANS LVL field(s), key in the transition altitude (e.g.: "18000" in feet or "180" in flight level) and move it into the either the TRANS ALT or TRANS LVL field by pressing LSK 1L or 2L, respectively.

3. Key in the cruise wind (e.g. 300/90) and move it into the CRZ WIND field by pressing LSK 1R.

4. Key in the planned cruise true airspeed (e.g. 360) and move it into the CRZ TAS field by pressing LSK 2R.

FUEL PERFORMANCE PARAMETERS INITIALIZATION (if configured)

These are not mandatory entries.

Refer to Section 14, Performance functions.

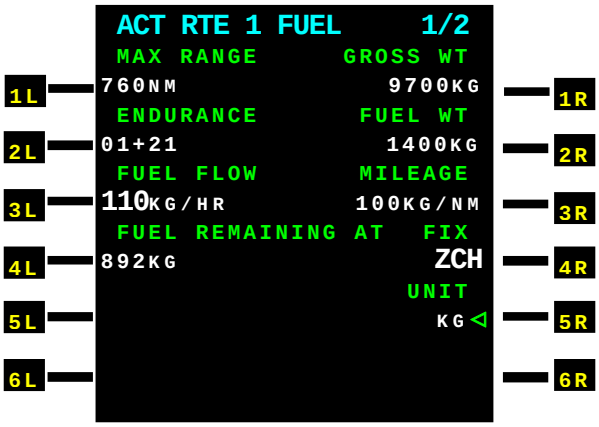
FUEL AND WEIGHT PERFORMANCE PARAMETERS INITIALIZATION (if configured)

If the FUEL+WEIGHTS option is configured for the FUEL pages, the CMA-9000 FMS provides on the RTE x FUEL 2/2 page several fields used by the operator to enter the empty weight, optional equipment weight, crew weight, cargo weight and total fuel weight including reserve. These values are used by the CMA-9000 FMS to calculate the initial Gross-Weight (GWT) estimate, displayed on the RTE x FUEL 1/2 page. Once the initial GWT is accepted by the CMA-9000 FMS, the Gross Weight will be continuously estimated by subtracting the fuel consumption based on the average fuel flow. The display of the GWT units will match the display of the fuel flow units that is, if the fuel flow is displayed in Kg/Hr or Lb/Hr, then the GWT will also be displayed in Kg or Lb respectively.

CAUTION: The unit selection on the FUEL 1/2 and FUEL 2/2 pages has to be consistent with other fuel indicators configured in the cockpit. Verify units on the FUEL pages and on other fuel indicators.

Display the INIT/REF INDEX 2/2 page by pressing [INIT REF], [PREV] or [NEXT].

Display the RTE x FUEL 1/2 page by pressing <FUEL> (LSK 5L) on the INIT/REF INDEX 2/2 page or the [FUEL] functional key (if configured).



1. Key in the current fuel weight (e.g. 9700) and move it into the FUEL WT field by pressing LSK 2R.

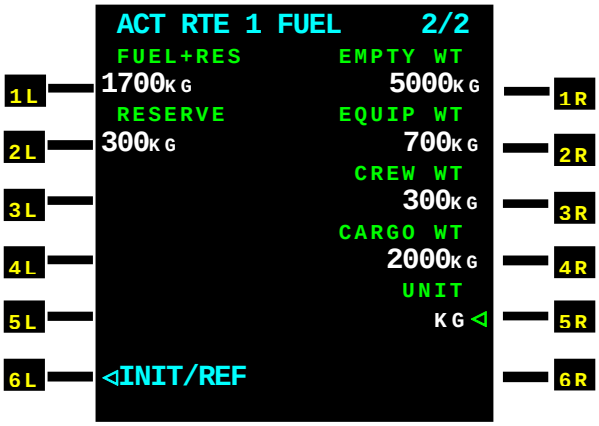
2. Key in the current fuel flow (e.g. 110) and move it into the FUEL FLOW field by pressing LSK 3L.

3. UNIT at LSK 5R toggles between LB and KG.

   Maximum range and endurance are calculated based on entered fuel quantity and fuel flow rate. The maximum range is computed along the track to the FIX waypoint (if the FIX is defined) or with the current track, given current or estimated fuel weight (excluding the reserve), fuel flow, and ground speed (if the FIX is not defined). The endurance is computed using the given current or estimated fuel weight (excluding the reserve) and fuel flow.

CAUTION: On power interruptions, the fuel units will revert to the configured units (from maintenance page). Verify units when reading or entering values.

Display the RTEx FUEL 2/2 page by pressing [NEXT] or [PREV].



4. Key in the fuel weight including reserve (e.g. 1700) and move it into the FUEL+RES field by pressing LSK 1L.

5. Key in the fuel reserve weight (e.g. 300) and move it into the RESERVE field by pressing LSK 2L.

6. Key in the aircraft empty weight (e.g. 5000) and move it into the EMPTY WT field by pressing LSK 1R.

7. Key in the optional equipment weight (e.g. 700) and move it into the EQUIP WT field by pressing LSK 2R.

8. Key in the total crew weight (e.g. 300) and move it into the CREW WT field by pressing LSK 3R.

9. Key in the total cargo weight (e.g. 2000) and move it into the CARGO WT field by pressing LSK 4R.

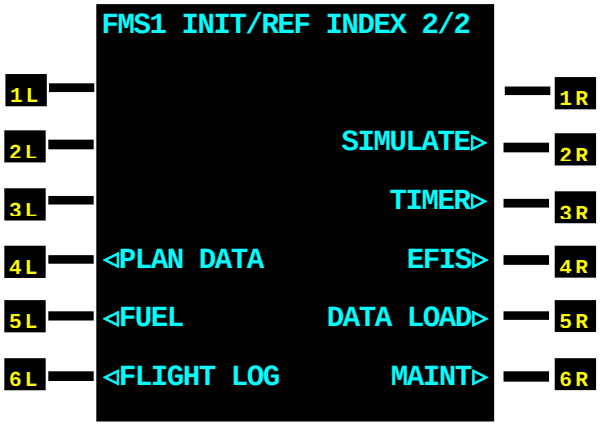
10. UNIT at LSK 6R toggles between LB and KG.

NOTE: The quantities on the RTEX x FUEL 2/2 page are displayed in white except for the case of an IFDS EFIS installation when:

- *The quantities are displayed in amber as long as the GROSS WT DISCREPANCY alert message is active; and*
- *The quantities are displayed in white when there is no difference between the gross weight sent by the IFDS and the CMA-9000 FMS-computed gross weight.*

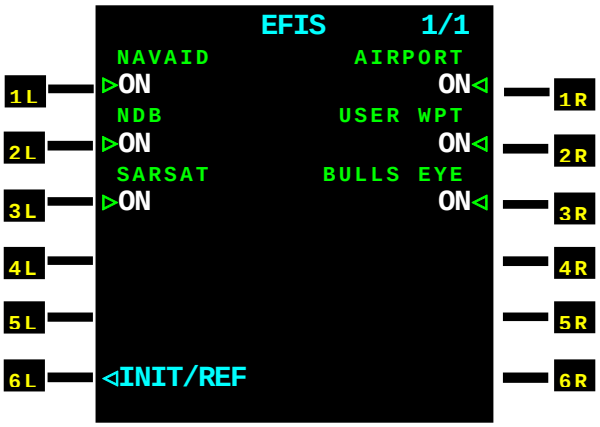
EFIS DISPLAY (EFIS-EQUIPPED AIRCRAFT ONLY and if configured)

Display the INIT/REF INDEX 2/2 page by pressing [INIT REF], [PREV] or [NEXT].



The EFIS prompt (LSK 4R) is displayed only if an EFIS is configured (except for the IFDS or AHCAS or COLLINS-84 EFIS which does not allow background data). The <MAINT> prompt (LSK 6R) displays the Maintenance menu. Access to these pages is protected by a PASSWORD.

Display the EFIS 1/1 page by pressing <EFIS> (LSK 4R).



The default state (ON, OFF) of the display elements are configured at the time of installation.

1. Add the desired element to the EFIS display by pressing the appropriate LSK until ON is displayed.

   Transmission of selected data to the EFIS will be initiated.

2. To halt transmission of a undesired data element, press the appropriate LSK until OFF (declutter) is displayed.

All the initial EFIS database symbol settings will be preserved after a power outage (if configured accordingly).

GPS SATELLITE DESELECTION (If configured)

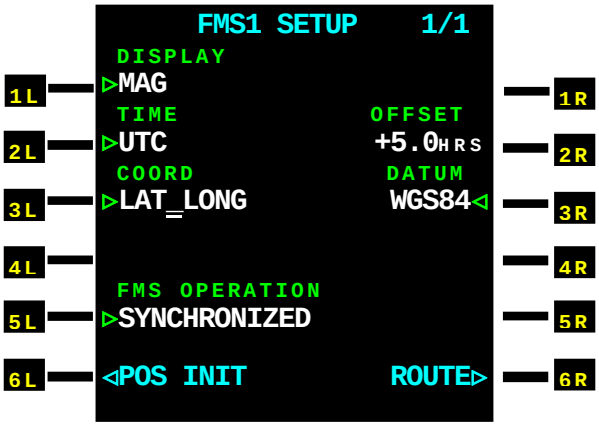
If required by NOTAM deselect the indicated satellite(s). Refer to Appendix A, GPS SAT DESELECT 1/1 page for the deselection commands.

Otherwise ensure that no satellites are deselected.

DUAL FMS OPERATIONS

In dual CMA-9000 FMS installations, the operator can set the CMA-9000 FMS to operate in either synchronized or independent mode from the SETUP 1/1 page. The operating mode can be configured to automatically startup in either synchronized or independent mode.

From the INIT/REF INDEX 1/2 page, display the SETUP 1/1 page by pressing <SETUP> (LSK 5L).



1. Select either INDEPENDENT or SYNCHRONIZED mode of operation.

   NOTE: When the XFMS synchronization option of the FMS is configured to ALWAYS, manual selection of independent mode is inhibited.
   When the XFMS synchronization option of the FMS is configured to NO (e.g. independent) manual selection of the independent and synchronized modes are inhibited.

2. Press LSK 5L, confirm by pressing LSK 6R or cancel by pressing LSK 6L.

After confirming change to independent mode, the alert scratchpad message "FMS INDEPENDENT OP" is displayed by all CMA-9000 FMSs.

NOTE: Selection from independent to synchronized mode is prevented with the display of the alert message "UNABLE FMS-FMS SYNC" when:

- communication between the CMA-9000 FMSs has been lost,
- on-side CMA-9000 FMS is in a holding pattern,
- on-side CMA-9000 FMS is in a GPS approach,
- any CMA-9000 FMS in a missed approach procedure,
- a conflicting operational s/w part number,
- one CMA-9000 FMS has a different active navigation database,
- user databases are different.
- Tactical approach databases are different.

NOTE: On synchronization, the flight plan is transferred from the CMA-9000 FMS where the synchronization was done to the other CMA-9000 FMSs overriding any existing flight plan.

SYNCHRONIZED OPERATIONS

NOTE: To operate correctly in the synchronized mode the CMA-9000 FMSs must contain the same databases. Furthermore the active database must be the same in all CMA-9000 FMSs.

In the synchronized mode of operation, the following items are automatically synchronized between all CMA-9000 FMSs:

- CMA-9000 FMS position initialization
- UTC entry
- Date Entry
- Time system selection (UTC/LOCAL)
- Time offset
- Coord-datum selection
- Database selection
- Flight plan entries or changes (on pressing [EXEC] to activate the flight plan)
- Backtrack route deletion request (on pressing [EXEC] key to activate the backtrack route)
- TRUE/MAG Display reference setting
- TRUE/MAG Wind reference setting
- Altimeter setting
- System wind, track and ground speed entries (allowed only in Dead Reckoning)
- RNP entry
- Missed approach request
- Hold exit request and hold entry procedure
- Selection/deselection of synchronized navigation (using the best overall sensor)
- Alert messages and their fault sources
- Clearing of alert and advisory messages
- System sensor for navigation
- Navigation data (present position, ground speed, track, ANP)
- Flight number entry
- Transition altitude/level entry
- Availability of GPS approach integrity

- TAS (offside TAS used when onside TAS source unavailable)
- Heading (offside heading used when onside heading source unavailable)
- Airport and waypoint reference
- Deselected GPS satellites for predictive RAIM
- HSI sensitivity entry
- Altitude upon on-side source failure
- Current status of the guidance intercept logic
- Start radio self-test command
- LNAV discrete
- DME scanning control status
- DME Hold dual tuning parameters
- Transponder dual tuning parameters
- Auto/MANUAL VOR Tuning status
- DME scanning selection of stations from active scanning side to passive side
- Auto VOR Tuning Control status
- User database modifications
- Temporary waypoint list
- Fuel data

Only one CMA-9000 FMS can change an active flight plan at any time. If one CMA-9000 FMS is already in MOD status (route modifications in progress), any attempt to change the flight plan of another CMA-9000 FMS will bring in view the " !CDU ENTRY CONFLICT" message in the scratchpad.

In synchronized mode, both CMA-9000 FMS will use the best system sensor for navigation and guidance computations (unless deselected on the DESELECT 1/1 page). Therefore, CMA-9000 FMS present position, track and ground speed are synchronized.

NOTE: In a civil configuration with multiple FMSs, a hysteresis of 100 meters applies when switching from a sensor to another identical sensor but from a different FMS. This is illustrated by the following example: if FMS1 and FMS2 are both in GPS navigation mode (with each FMS receiving its own onside GPS position) and the overall FMS system position is that of GPS1, the FMS system position will not switch to become that of GPS2 until GPS2's position is at least 100 meters better than the current system position (e.g. GPS1's position).

In synchronized mode of operation, the GPS integrity annunciator will illuminate only if the GPS integrity is lost on <u>all</u> GPS sensors.

When synchronized, an CMA-9000 FMS will change to independent mode if its Phase of Flight is different from the other CMA-9000 FMS(s) for more than 30 seconds.

INDEPENDENT OPERATION

In the independent mode of operation, all entries made on either CMA-9000 FMS are not reflected on the other CMA-9000 FMS. However, the active or inactive flight plan can still be copied from one CMA-9000 FMS to the other via the RTE XFILL prompt (LSK 4L) on the RTE 1/1 page. If the navigation database or the operational program is not the same on all CMA-9000 FMSs when a flight plan transfer is attempted, the alert message "UNABLE FMS-FMS SYNC" is displayed on the scratchpad line. When the flight plan transfer is completed, the copied flight plan appears as a modification on the other CMA-9000 FMS. The modified route becomes active by pressing [EXEC].

During independent operation and if the navigation mode is GPS, the alert message GPS-GPS POS DISAGREE is displayed in the scratchpad if the CMA-9000 FMS position is significantly different than that of the other CMA-9000 FMS.

NOTE: Due to slight variations in the position computation made by each CMA-9000 FMS, leg sequencing may not occur at exactly the same time on all CMA-9000 FMSs while in independent operation.

RADIO TUNING OPERATION - DUAL FMS or FMS and RADIO HEAD

The radio tuning feature does not use CMA-9000 FMS cross talk to establish synchronization. It uses burst tuning and the radios' feedback to establish synchronization. Its operation will not be affected by the selection of synchronized or independent mode of operation.

In a DUAL FMS architecture, when the standby frequency is entered, it is cross talked to the cross-side FMS (both FMS always display the same standby frequency of the same radio).

SECTION 4 - DEPARTURES

CONTENTS

Subject **Page**

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SECTION 4

DEPARTURES

CAUTION: In case of disagreement between the published SID information and CMA-9000 FMS displayed information, the operator **MUST** follow the published SID directives.

INTRODUCTION

The complete departure procedure, including Standard Instrument Departure (SID) and SID transition, can be loaded into the route at the same time or in segments, depending on the ATC clearance received. The segments are selected from lists of named procedures extracted from the navigation database for the specified origin airport.

When a SID is selected, the waypoints and procedural legs are extracted from the navigation database, procedural leg types are decoded, and all resulting waypoints are inserted into the route in the correct order.

SID transitions are appended to the route after the SID and are usually separated from it by a route discontinuity, unless the last waypoint of the SID and the first waypoint of the en-route portion of the route are identical. Figure 4-1 shows a typical SID and SID transition.

The SID transition is linked to the appropriate waypoint of the en-route portion, and enroute waypoints preceding the intersecting waypoints are deleted. If there is no SID transition, the SID is separated from the en-route portion by a route discontinuity. For certain types of SID and transition, the waypoints may not be loaded into the route until the runway is selected.

ATC clearances which modify the selected SID procedures can be incorporated by selection of the new procedure while the aircraft still on ground. This results in the automatic deletion of the waypoints associated with the cancelled procedure.

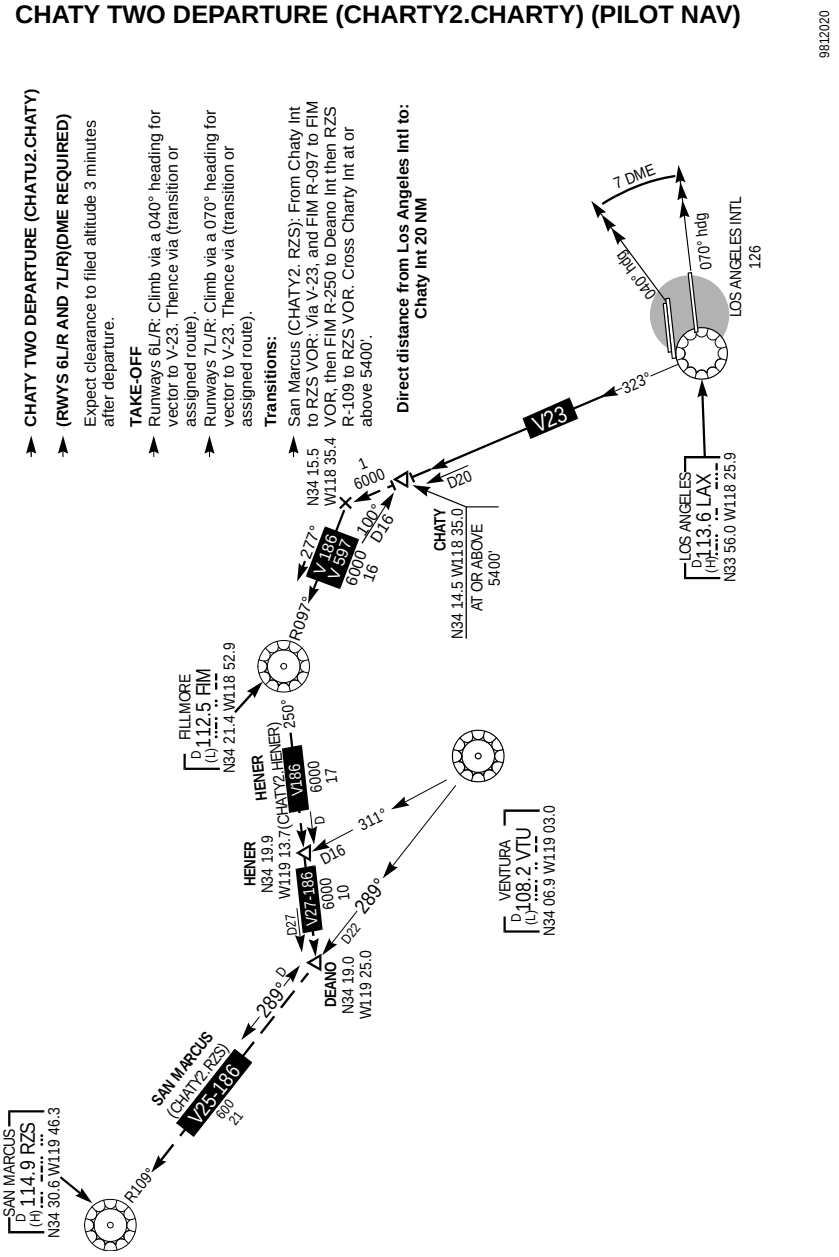


Figure 4-1 Typical Standard Instrument Departure with Transition Procedure

NOTE: When stringing a SID procedure to an Enroute Transition or Enroute segment at their common waypoint, if speed and/or altitude constraints exist for this waypoint in both procedures, the constraint(s) from the SID procedure are retained.
The SID altitude/airspeed constraint(s) will probably be lower/slower than the Enroute Transition or Enroute constraints.

CAUTION: During Standard Instrument Departures, the CMA-9000 FMS does not support the low speed flight regime of aircraft in which the bank angle is limited by the autopilot to 15 degrees as a function of airspeed and aircraft flap/slat configuration. Where required by the magnitude of the track angle change, the CMA-9000 FMS will use up to a maximum of 30 degree bank angle in computing the roll steering command to the autopilot. Crews should therefore exercise caution when engaging LNAV in this flight regime and may wish to use the heading select mode until sufficient airspeed is allowing bank angles larger than 15 degrees. No difficulties are anticipated for engaging LNAV when track angle changes are less than 15 degrees.

SID SPECIFICATION IN FLIGHT

The CMA-9000 FMS allows the insertion of a SID procedure in flight providing the CMA-9000 FMS is configured as a ROTOR-type aircraft.

The CMA-9000 FMS allows the activation in flight of an inactive route containing a SID, subject to the specification of the inactive runway.

The CMA-9000 FMS prefixes an inactive SID sequence with the corresponding inactive runway waypoint on activation in flight.

The CMA-9000 FMS allows navigation database, custom database, user database and digital map (DMAP) waypoints as origin and destination airports if it is configured for a ROTOR-type aircraft.

CONDENSED SID AND SID TRANSITION PROCESS

This section provides an overview of the process of selecting the SID and SID transition procedures. The intent of each step is summarized on the next page.

1. MOD, ACT ROUTE - Select departure/arrival index page.

2. DEP/ARR INDEX - Select departure.

3. DEPARTURES - Select SID, SID transition,and/or runway.

4. MOD, ACT LEGS - Confirm the SID, SID transition and/or runway procedure agrees with the clearance, then execute the modified route.

5. ALTIMETER SETTING- If CMA-9000 FMS does not have access to baro-corrected altitude, enter QNH on PROGRESS 3/3 or 4/4 page, to convert pressure altitude to baro-corrected altitude for altitude terminated legs.

A detailed description of each CMA-9000 FMS page is contained in Appendix A.

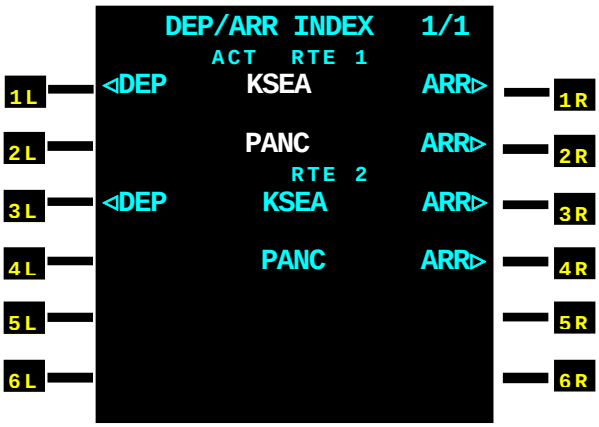
STANDARD INSTRUMENT DEPARTURE (SID) SELECTION

This procedure is based on the SID and SID transition depicted in Figure 4-1 and assumes that only these portions of the departure are to be loaded at this time.

Display the DEP/ARR INDEX 1/1 page by pressing:

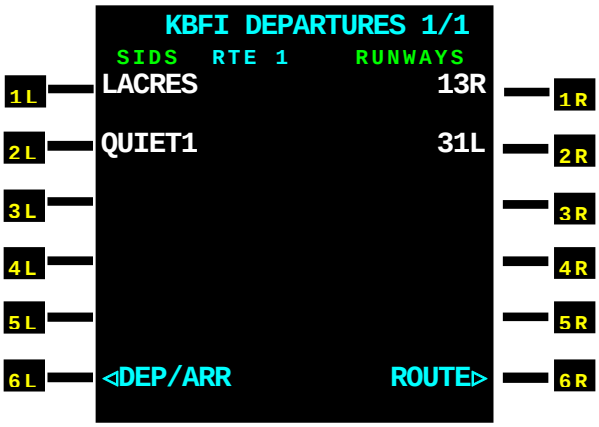
- [DEP/ARR] (if on ground).
- [DEP/ARR] (if airborne and midway point of active route not reached yet).
- From ARRIVALS 1/1 page.
- From DEPARTURES 1/1.

NOTE: If the CMA-9000 FMS is configured for two routes (RTE 1 and RTE 2), the origin and destination of the inactive route are also displayed. The active route information is displayed in white text. The inactive route origin and destination airport codes are displayed in cyan.



1. Display the DEPARTURES 1/X page by pressing the DEP prompt at LSK 1L.

   The DEPARTURES 1/X page is displayed, with the origin airport ICAO code included in the title line. Lists of SIDs and runways for that airport are displayed



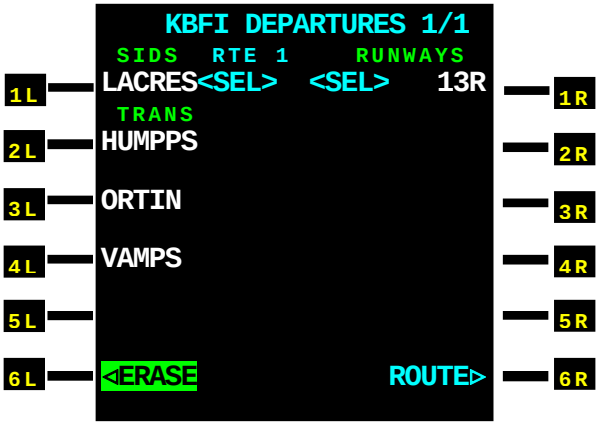
2 Display the desired RUNWAY by pressing the PREV or NEXT key as required, and select the RUNWAY by pressing the appropriate right hand LSK.

The message "*SET QNH" will be displayed in the scratchpad if the CMA-9000 FMS is not receiving Baro corrected altitude. (See ALTIMETER SETTING procedure in this section). This message is installation dependent and will not be displayed if deconfigured.*

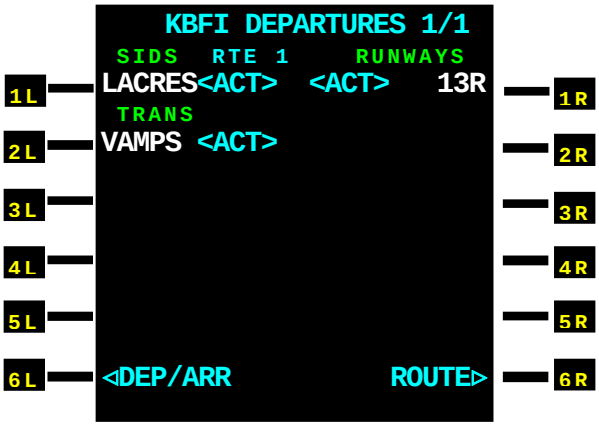
NOTE: Once a runway is selected, then only those SIDs applicable to that runway will be displayed.

3. Display the desired SID by pressing the PREV or NEXT key as required, and select the SID by pressing the appropriate left hand LSK.

The SID list is replaced by the selected SID, with the legend "<SEL>" beside the name. Transitions available for the selected SID are listed below the SID, under the heading "TRANS". If no transitions are available, the word "-NONE-" is displayed. If no runway was selected, a list of runways applicable to the selected SID appears on the right hand side of the page.



4. Display the desired SID transition by pressing the PREV or NEXT key as required, and select the transition by pressing the corresponding left hand LSK.



The list of transitions is replaced by the selected transition, with the legend "<SEL>" beside the name.

NOTE: Any selected element can be changed by pressing the appropriate left/right hand LSK to re-display the desired list (toggles the selection).

5. Display the first SID leg by pressing LEGS and PREV or NEXT as required.

NOTE: For certain types of SID and SID transition, the selection of the runway may also be required before the SID waypoints are loaded into the route from the navigation database. The message "!SELECT TRANS/RUNWAY" is then displayed in the scratchpad.

6. Close-up any route discontinuity as described in Section 5.

7. Verify the course, distance, altitude/speed advisory, and procedural leg type information of each SID leg in turn by pressing NEXT as required to display all legs.

NOTE: Pressing ERASE (LSK 6L) at any time during this procedure will cause all selections made up to that time to be deleted.

8. Make the selected SID and SID transition active by pressing EXEC.

   The message "*SET QNH" will be displayed in the scratchpad if the CMA-9000 FMS is not receiving Baro-corrected altitude. (See ALTIMETER SETTING procedure in this section). This message is installation dependent and will not be displayed if deconfigured.*

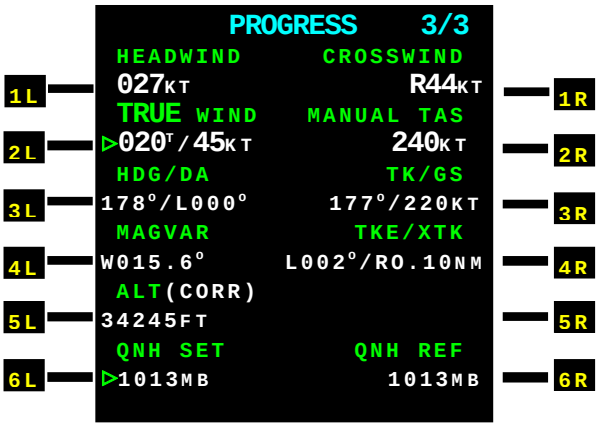
   On DEPARTURES page, the active SID and SID transition are now shown with the legend "<ACT>" beside the name(s).

ALTIMETER SETTING

Baro-corrected altitude is required to ensure proper sequencing of attitude-terminated legs. If the aircraft installation provides only a pressure altitude input to the CMA-9000 FMS, manual entry of the altimeter correction is necessary to convert this input to baro-corrected altitude. Refer to the approved AFMS/RFMS for further details.

Display the PROGRESS 3/3 or 4/4 page by pressing PROG and PREV.

PROGRESS 3/3 or 4/4 page includes the altitude, QNH altimeter setting and QNH altimeter reference.



To enter an altimeter setting, enter value in Inches of Mercury (inHg) or in Millibars (MB) and line select it to LSK 6L respectively on PROGRESS 3/3 page or on PROGRESS 4/4 page.

When the installation provides for pressure altitude and for hybrid INS/GPS altitude, PROGRESS 4/4 page fields LSK 6L or 6R display the calculated mean sea level QNH for reference.

NOTE: The CMA-9000 FMS will select and use the altitude from the priority list below:

- *baro corrected altitude*
- *pressure altitude*
- *IRS baro-inertial altitude*
- *GPS altitude**
- *EGI hybrid inertial altitude.*

*For installation including GPS and EGI, the CMA-9000 FMS will select the altitude from the GPS used for navigation (civil or military from EGI).

For entries, units are automatically detected and decimal point entry is not required.

NOTE: This altimeter setting will be used until after landing, or until leaving the terminal area. The altimeter setting is cancelled and the field displays dashes ("--.--") on leaving the terminal area (distance from the departure airport is greater than 33 nm, or the altitude is greater than 16,000 feet above airport elevation).
When no altimeter setting is defined, field displays boxes (.) on entering the terminal area (distance from the destination airport is less than 30 nm, or the altitude is less than 15,000 feet above airport elevation). This indicates a mandatory input is required.

A baro-corrected altitude is computed and displayed next to LSK 5L (PROGRESS 3/3) or (PROGRESS 4/4).

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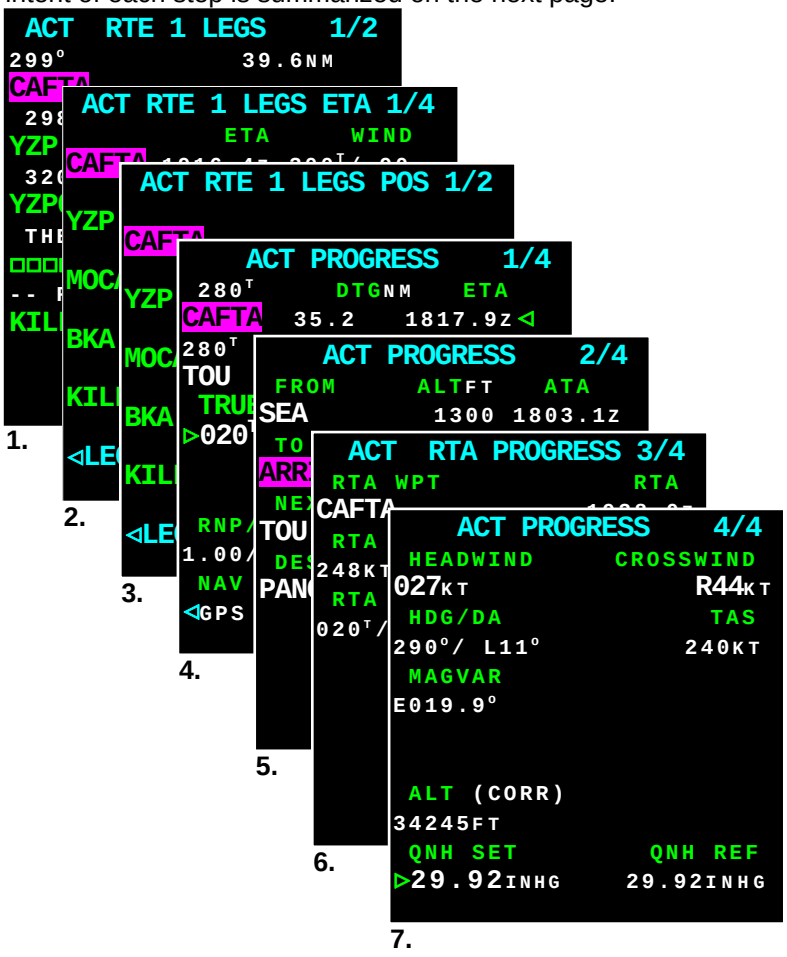
SECTION 5

ENROUTE

CONDENSED EN-ROUTE PROCESS

This page sequence gives an overview of the CMA-9000 FMS pages used in the en-route phase of flight. The intent of each step is summarized on the next page.



NOTE: Progress pages can be in a set of 3 or 4 (depending on configuration).

1. **LEGS** - displays each route leg and waypoint. Waypoints may be modified or created, and direct-to/intercept, fly-over or holding procedures performed on these pages.

2. **LEGS ETA** - displays ETA for each waypoint on the corresponding LEGS page.

3. **LEGS POS** - displays position in latitude and longitude for each waypoint in the corresponding LEGS page.

4. **PROGRESS 1/4** - displays current active waypoint, distance to go (DTG), course, estimated time of arrival (ETA), next waypoint, wind, current track and ground speed (TK/GS), track angle error and cross track (TKE/XTK), Required and Actual Navigation Performance (RNP/ANP), HSI scaling, and Navigation Mode.

5. **PROGRESS 2/4** - displays identifier of the last (FROM) waypoint overflown, its crossing altitude (ALT) and actual time of arrival (ATA). Displays the distance to go (DTG), estimate time of arrival (ETA), for the ACTIVE, NEXT and DESTINATION waypoints of the route.

6. **RTA PROGRESS 3/4** - used to compute the TAS required to reach a waypoint at a required time of arrival (RTA). After entry of RTA waypoint, displays WIND used for RTA or recommended RTA TAS computation.

7. **PROGRESS 4/4** - displays the wind components (HEADWIND or TAILWIND, CROSSWIND), Heading and Drift Angle (HDG/DA), True Air Speed (TAS), Magnetic Variation, System Altitude in feet (ALT), System Altitude in meters (when configured), QNH Altimeter setting (QNH SET) and QNH Altimeter Reference (QNH REF).

   or:

   If the 3-set PROGRESS pages is configured then above steps 4, 5, 6, and 7 are replaced with:

4. **PROGRESS 1/3** - displays identifier of the last (FROM) waypoint overflown, its crossing altitude (ALT) and actual time of arrival (ATA). Displays the distance to go (DTG), estimate time of arrival (ETA), for the ACTIVE, NEXT and DESTINATION waypoints of the route. Also displays Required and Actual Navigation Performance (RNP/ANP), HSI scaling, and Navigation Mode.

5. **PROGRESS 2/3** - used to compute the TAS required to reach a waypoint at a required time of arrival (RTA). After entry of RTA waypoint displays WIND used for RTA or recommended RTA TAS computation.

6. **PROGRESS 3/3** - displays the wind components (HEADWIND or TAILWIND, CROSSWIND), True/ Magnetic Wind, True Air Speed (TAS), Heading and Drift Angle (HDG/DA), Track and Ground Speed (TK/GS), Magnetic Variation, Track Angle and Cross-track error (TKE/XTK), System Altitude in feet (ALT), System Altitude in meters (when configured), QNH altimeter setting (QNH SET) and QNH Altimeter Reference (QNH REF).

Detailed descriptions of each display page are contained in Appendix A. Sections 6 and 7 describe arrival and approach procedures. Direct-to and holding pattern procedures are contained in Sections 9 and 10 respectively.

LEAVING THE TERMINAL AREA

On leaving the terminal area, when the radial distance from the departure airport becomes greater than 33 nm **or** the aircraft climbs above 16,000 feet above airport elevation, the CMA-9000 changes from terminal to en-route phase of flight, with the following indications:

1. HSI lateral deviation sensitivity changes from 1 nm to 5 nm full scale over a ten (10) second period.

2. On the PROGRESS 1/3 or 1/4 page the RNP value changes from 1 nm to 2 nm.

NOTE: The FMS will generate the SET QNH message when at a distance greater than 33 nm from the origin airport or crosses through the transition altitude (TRANS ALT) and either of the following condition exist:

a) An installed cockpit baro/standard altimeter reference selector is set to "baro" reference, or,
b) The FMS receives a QNH input that indicates a non-standard altimeter setting.

Refer to SET QNH message logic in Section E for more details.

DISPLAYING THE LEGS OF THE ROUTE

Display the ACT RTE x LEGS 1/X page by pressing the [LEGS] functional key.

The active leg to the TO waypoint and the next four legs are displayed. The distance to the TO waypoint is the distance-to-go from the present position; for subsequent legs it is the leg length.

NOTE: Depending on the configuration, the identifier of the TO waypoint is displayed in reverse video, magenta or white.

Display all the legs in sequence by pressing [NEXT] as often as required.

NOTE: The maximum number of waypoints in a flight plan allowed by the system is 199 (e.g. maximum of 40 LEGS page can be used).

The legs of the inactive route (if RTE2 option is configured) can also be viewed in the RTE x LEGS 1/X page by pressing the <RTE x LEGS> prompt (LSK 6L) on the ACT RTE x LEGS page.

NOTE: The pages related to the inactive route are displayed in cyan.

INSERTING WAYPOINTS

A. PLACE/BEARING/DISTANCE WAYPOINTS

With the desired reference waypoint identifier in the scratchpad by keyboard entry or LSK action:

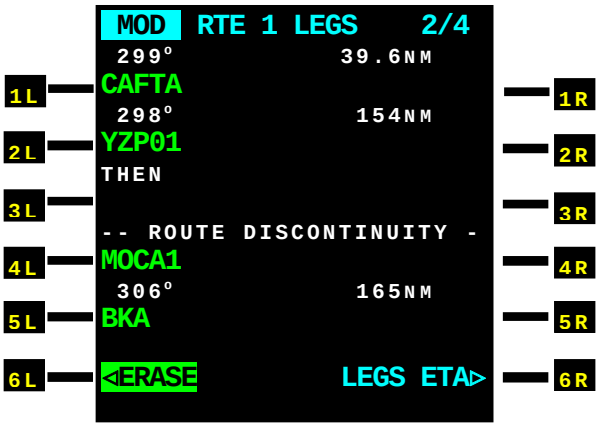
1. Key the bearing and distance separated by a slash (/), into the scratchpad. e.g.: YZP320/45.

2. Display the desired insert location in the route by pressing [LEGS], and [NEXT] or [PREV] as required.

Move the waypoint to the desired place in the route by pressing the appropriate LSK.

The new waypoint is inserted ahead of the existing waypoint. The new waypoint identifier is created with a name based on the first three characters of the reference waypoint identifier followed by a sequence number, e.g.: YZP01.

3. Verify the waypoint entry by checking the course and distance of the previous and next legs.



4. Make the modified route active by pressing [EXEC].

NOTE: The system allows for a maximum of 99 temporary waypoints in a flight plan.

B. PLACE/BEARING-PLACE/BEARING WAYPOINTS

With the first reference waypoint identifier in the scratchpad:

1. Key into the scratchpad the bearing of the waypoint from the first reference waypoint followed by a slash (/) and the second reference waypoint and bearing e.g. CAFTA268/YZP148.

2. Display the desired insert location in the route by pressing [LEGS] and [NEXT] or [PREV] as required.

3. Move the waypoint to the desired place in the route by pressing the appropriate LSK.

The new waypoint is inserted ahead of the existing waypoint. The new waypoint identifier is created based on the identifier of the first reference waypoint as described in the previous procedure, e.g. CAF01.

4. Verify the waypoint entry by checking the course and distance of the previous and next legs.

5. Make the modified route active by pressing [EXEC].

Waypoints entered by means of place/bearing-place/bearing will be displayed as place/bearing/distance waypoints, based on the first reference waypoint.

NOTE: *The system allows for a maximum of 99 temporary waypoints in a flight plan.*

C. ALONG-TRACK WAYPOINTS

An along-track waypoint lies on the inbound (outbound) course to (from) the reference waypoint at the selected distance. No course change occurs at the along-track waypoint.

With the reference waypoint identifier in the scratchpad:

1. To enter a new waypoint AFTER the reference waypoint, key in /, and distance, e.g. KILLA/20.

or:

2. To enter a new waypoint BEFORE the reference waypoint, key in /, [+/-], distance, e.g. KILLA/-20.

or:

3. To move an initial DME ARC fix along the arc, key in /, desired radial from the DME station, e.g. D173J/203.

then:

4. Display the reference waypoint location in the route by pressing [LEGS] and [NEXT] or [PREV] as required.

5. Move the waypoint to the reference waypoint in the route by pressing the appropriate LSK.

NOTE: All along-track waypoints must be inserted at the reference waypoint location, independently of their actual relative position relative to that waypoint.

6. Verify the waypoint entry by checking the course and distance of the previous and next legs.

7. Make the modified route active by pressing [EXEC].

NOTE: If the leg created by the along-track waypoint overlaps an adjacent waypoint, such that a course reversal is created, the along-track waypoint is not accepted and the data entry error message "!OUT OF RANGE" is displayed.

D. LATITUDE/LONGITUDE WAYPOINTS

1. Key the coordinates into the scratchpad (LATITUDE, LONGITUDE) e.g. N60W146.

NOTE: Coordinates must be entered with whole degrees and optionally whole minutes with a resolution of up to 0.01 minutes.

2. Display the desired insert location in the route by pressing [LEGS] and [NEXT] or [PREV] as required.

3. Move the waypoint to the desired place in route by pressing the appropriate LSK.

4. Verify the waypoint entry by checking course and distance of the previous and next legs.

5. Make the modified route active by pressing [EXEC].

The waypoint name is automatically named "WPT" followed by a sequence number (e.g. WPT01). Alternatively, the waypoint name can be automatically named using the latitude and longitude degree components (e.g. N60W120). This option is selectable through configuration pages.

NOTE: The system allows maximum 99 temporary waypoints in a flight plan.

E. NAVIGATION DATABASE WAYPOINTS

1. Key the new waypoint identifier into the scratchpad.

2. Display the desired insert location in the route by pressing [LEGS] and [NEXT] or [PREV] as required.

3. Move the waypoint to the desired place in the route by pressing the appropriate LSK.

If the identifier is not found in the navigation database, the message "!NOT IN DATABASE" will be displayed in the scratchpad.

4. Verify the waypoint entry by checking course and distance of the previous and next legs.

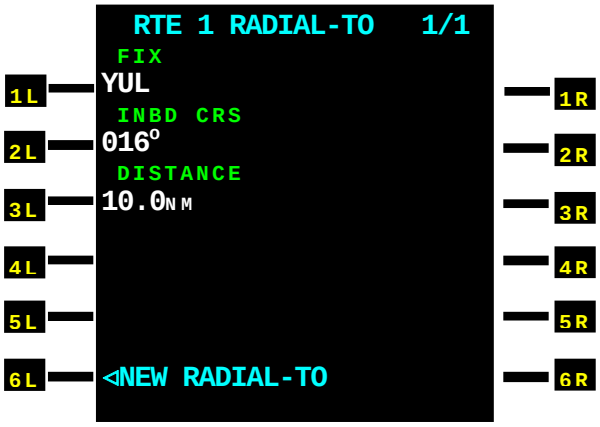
5. Make the modified route active by pressing [EXEC].

INSERTING A RADIAL-TO SEGMENT

A Radial-To segment is first defined in the RADIAL-TO page accessed in one of the following ways:

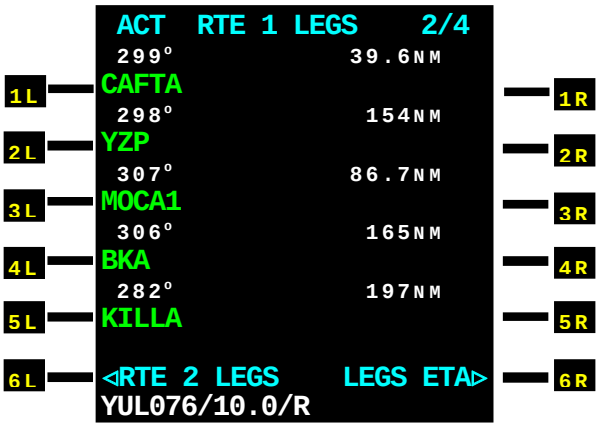
- by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R), entering the waypoint ident in the REF ID field at LSK 1L and then pressing <RADIAL-TO> (LSK 4R);
- by typing /R in the scratchpad and pressing the LSK corresponding to the waypoint on which the operator wants to define a Radial-To procedure.

NOTE: A"RADIAL-TO" can also be inserted in the inactive route by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R), [NEXT] (for the INACT DES+SAR or TACTICAL 2/2), entering the waypoint ident in the REF ID field at LSK 1L and <RADIAL-TO> (LSK 4R).



1. Enter the parameters defining a Radial-To procedure: waypoint identifier, inbound course (radial) and distance.

2. Access the ACT RTE x LEGS or RTE x LEGS page(s) by pressing NEW RADIAL-TO at LSK 6L. The corresponding RTE x LEGS page(s) is accessed with the Radial-To information in the scratchpad.



Press the LSK (1L, 2L, 3L, 4L or 5L) where the segment is to be inserted.

NOTES:

a) If the reference point is not part of the selected route, then the segment is inserted between the waypoint corresponding to the LSK pressed and the following waypoint.
b) If the reference waypoint belongs to the route, the route is modified as follows:

1- The insertion waypoint is two places ahead. The Radial-To segment replaces the segment between the insertion waypoint and the next.

2- The insertion waypoint is one waypoint ahead of the reference waypoint. Radial-To segment replaces the segment between the insertion and the reference waypoints.

3- The insertion waypoint is the reference waypoint. The following segments replace the segment between the preceding and the reference segment. The segment created between the preceding and the Radial-To entry waypoints is followed by the Radial-To segment.

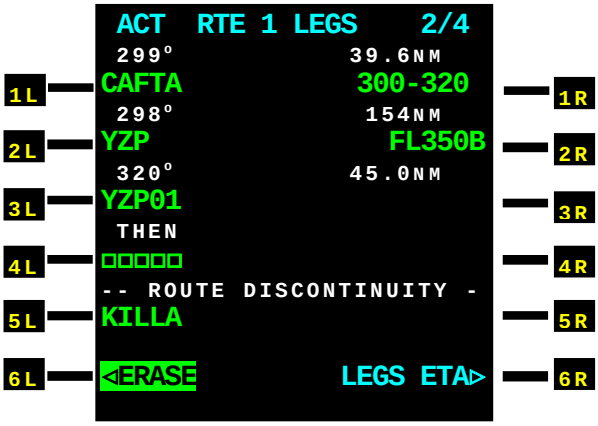
4- The insertion waypoint follows the reference waypoint. This is an abnormal situation, where the Radial-To flight path is flown back and forth at the reference waypoint. A discontinuity is created at the next waypoint.

5- The insertion waypoint is more than one waypoint passed the reference waypoint. The Radial-To segment is introduced as described for a reference waypoint that does not belong to the route. However the route will be comprised of a closed loop section.

ROUTE DISCONTINUITIES

Under normal conditions, the active route will form a continuous path of linked waypoints (legs). However, a ROUTE DISCONTINUITY will be inserted into the flight plan if the end of a leg is indeterminate, or when the entered waypoint is not part of the existing active flight plan.

Under these conditions, "THEN" followed by a boxed data field and ROUTE DISCONTINUITY lines are inserted immediately after the new waypoint. Along-track waypoints do not create a ROUTE DISCONTINUITY.



A ROUTE DISCONTINUITY can be inserted into the flight plan by selecting RTE DISCON (LSK 1R) on the the DES+SAR or TACTICAL 1/2 or INACT DES+SAR or TACTICAL 2/2 page. The active or inactive RTE x LEGS page will be displayed with " " in the scratchpad. Insert the " " into the flight plan by pressing the appropriate left LSK. The ROUTE DISCONTINUITY will be inserted before the selected waypoint.

ROUTE DISCONTINUITY CLOSE-UP

CAUTION: Close-ups can occur only upwards, e.g. moving a downtrack waypoint to an earlier location. Moving a waypoint downwards (e.g. to a later location) causes the waypoint to be DUPLICATED into the new location.

With ACT (or MOD) LEGS page displayed showing "THEN" and "ROUTE DISCONTINUITY" lines:

1. Display the next desired waypoint in the route by pressing [NEXT] as required.

2 Key in, or copy the waypoint identifier into the scratchpad by pressing the appropriate LSK.

3. Display the page with the THEN box data field by pressing [PREV] as often as required.

4. Move the waypoint to the THEN field by pressing the appropriate LSK.

5. Verify the entry by checking course and distance of the previous and next legs.

6. Make the modified route active by pressing [EXEC].

NOTE: To minimize keystrokes, the close-up of a route discontinuity should be performed before EXECuting the route modification which causes it.

WAYPOINT DELETION

A. BY CLOSE-UP METHOD

1. Display the waypoint to be deleted by pressing [LEGS] and [NEXT] or [PREV] as required.

2. Copy the waypoint identifier following the one to be deleted into the scratchpad by pressing the appropriate LSK.

3. Move the waypoint to the location of the waypoint to be deleted by pressing the appropriate LSK.

The selected waypoint is deleted from the route.

4. Verify the entry by checking the course and distance of the previous and next legs.

5. Make the modified route active by pressing [EXEC].

NOTE: In this case, a ROUTE DISCONTINUITY is not created.

"Close up" is the simplest method to delete a number of consecutive waypoints, but this can also be performed by a series of [CLR] key operations.

B. BY CLEAR KEY

1. Start the deletion by pressing [CLR].

   "DELETE" message is displayed in the scratchpad.

NOTE: "DELETE" is displayed only when the scratchpad is empty.

2. Display the desired waypoint by pressing [LEGS], and [NEXT] or [PREV] as required.

3. Delete the selected waypoint by pressing the appropriate LSK.

   A "ROUTE DISCONTINUITY" is inserted in place of the deleted waypoint. Any holding pattern or search pattern associated with the deleted waypoint will also be deleted.

4. Verify the entry by checking course and distance of the previous and next legs.

5. Make the modified route active by pressing [EXEC].

FLY-OVER AND FLY-BY WAYPOINTS

Waypoints are loaded into the route as fly-by (with turn anticipation) or fly-over (no turn anticipation) as coded in the navigation database. By default, all waypoints, including manually-entered temporary waypoints, are initially defined as fly-by unless specifically coded as fly-over. Any waypoint can be converted from one type to the other, with the exception that the missed approach waypoint is always defined as a fly-over waypoint and cannot be modified.

With any ACT or MOD RTE x LEGS page displayed:

A. TO CONVERT TO FLY-OVER FROM FLY-BY

1. Display the DES+SAR or TACTICAL 1/2 page, and select "FLY-OVER" by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R) and <FLY OVER> (LSK 6L).

   The ACT RTE x LEGS 1/X page is displayed with "/O" in the scratchpad.

NOTE: A"FLY-OVER" can also be inserted in the inactive route by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R), [NEXT] (for the INACT DES+SAR or TACTICAL 2/2) and <FLY-OVER> (LSK 6L).
The inactive RTE y LEGS 1/X page is displayed with "/O" in the scratchpad.

or:

Key in "/O".

2. Display the desired waypoint by pressing [LEGS], and [PREV] or [NEXT] as required (on the active or inactive route).

3. Move the "/O" to the waypoint location by pressing the appropriate left hand LSK.

   The legend "/O" is displayed to the right of the waypoint name.

4. Make this route modification active by pressing [EXEC].

   The waypoint is now defined as a fly-over waypoint and turn anticipation is inhibited for that waypoint only. The switch to the next leg will occur automatically on crossing over or abeam the waypoint.

B. TO CONVERT TO FLY-BY FROM FLY-OVER

CAUTION: Special care should be taken if any fly-over waypoint extracted from the navigation database is converted to fly-by (particularly the final approach fix and missed approach holding fix). The crew will remain responsible at all times for remaining within protected airspace, and for compliance with all altitude constraints.

1. Display the desired waypoint by pressing [LEGS] and [PREV] or [NEXT] as required.

2. Key in "/", and move the "/" to the waypoint location by pressing the appropriate left hand LSK.

   The legend "/O" is removed from the waypoint name.

3. Make this route modification active by pressing [EXEC].

   The waypoint is now defined as a fly-by waypoint and turn anticipation will occur at the appropriate distance prior to reaching that waypoint.

NOTE: The missed approach waypoint is always defined as a fly-over waypoint, and cannot be converted to fly-by. Any holding pattern or search pattern defined at a waypoint is cancelled if that waypoint is converted to a fly-over waypoint.

LEG SEQUENCING

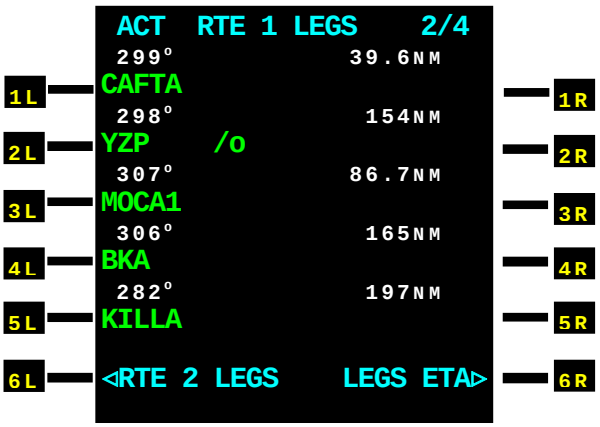
A. FLY-BY WAYPOINTS

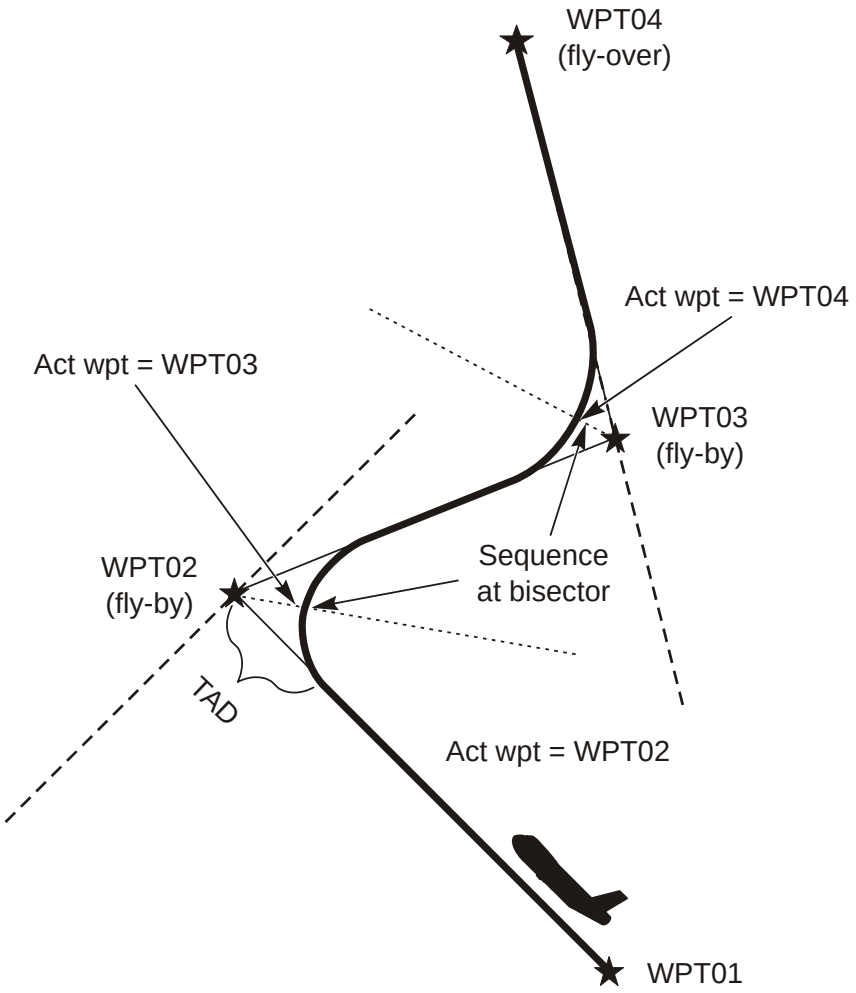
The CMA-9000 FMS sequences fly-by waypoints when crossing the bisector of the active leg and next leg, or when passing the wayline of the active leg, whichever occurs first. In certain exceptional cases where the next leg is short, sequencing may occur based on crossing the wayline of the next leg, if that is the first situation to occur. If the aircraft is performing a downwind approach to a runway, sequencing of the FAF will only be possible after the aircraft has turned towards the runway.

During the first half of the fly-by leg transition, between the initial turn point and the leg switching point (bisector), the active waypoint is displayed in white reverse video on the LEGS and PROGRESS pages. Also, during that period, the waypoint alert information sent to the EFIS will remain on to indicate the transition (except for Rockwell Collins 3 EFIS, where no waypoint alert is generated during this segment). This highlights the fact that the HSI is displaying guidance information relative to the next leg whereas the current active leg has not been sequenced yet. The white waypoint annunciation is an option configurable (ON/OFF) in the CMA-9000 FMS maintenance pages.

B. FLY-OVER WAYPOINTS

The CMA-9000 FMS sequences fly-over waypoints when passing the wayline of the active leg.





LEGEND:

———	Entered flight plan displayed on GAMA EFIS
▬▬▬	Flight path followed by Guidance
----------	Bisector
– – – – –	Wayline
TAD	Turn Anticipation Distance
★	Waypoint symbol
WPTXX	Waypoint identifier

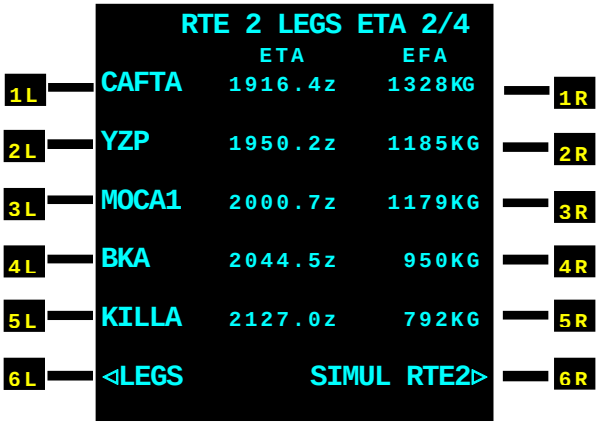
0510010

Figure 5-1 Bi-sector and Circular transition

ETA AND EFA

Display the desired waypoint in the route by pressing [LEGS], [PREV] or [NEXT] as required.

1. Display the ACT RTE x LEGS ETA 1/X or RTE x LEGS ETA 1/X page by pressing <LEGS ETA> (LSK 6R).



ETAs are based on measured wind and forecast waypoint winds (performance data is also used if it is available).

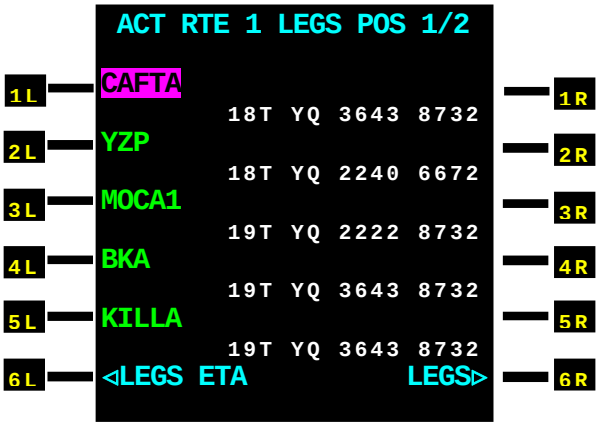
While on ground, ETEs are displayed instead of ETAs and they are based on the CRZ TAS as entered in the PLAN DATA page.

EFAs are based either on the current fuel flow and ground speed if a fuel computer is configured or on the fuel flow entered by the pilot on the FUEL 1/2 page.

2. Return to the previously displayed RTE x LEGS page by pressing [LEGS] or the <LEGS> prompt at LSK 6L.

WAYPOINT LATITUDE/LONGITUDE DISPLAY

Display the coordinates for each waypoint by pressing [LEGS], <LEGS ETA> (LSK 6R), <LEGS POS> (LSK 6R).



Return to the LEGS page by pressing [LEGS] or the <LEGS> prompt (LSK 6R).

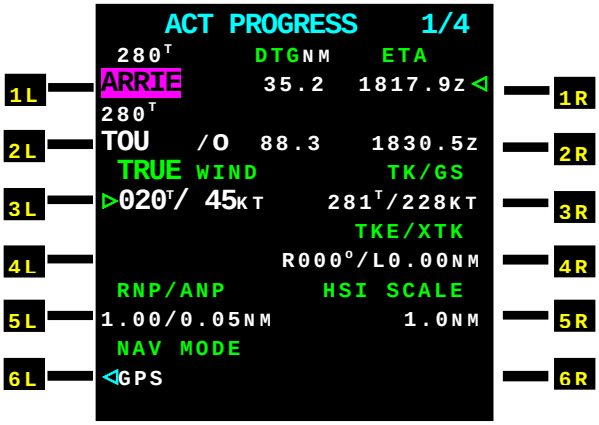
NOTES:

1. *Flight plan waypoint modifications are not permitted on the RTE x LEGS POS Y/X page.*
2. *The position displayed on the ACT RTE x LEGS POS or RTE x LEGS POS page depends on the selection for the coordinate system made on the SETUP 1/1 page.*

PROGRESS ALONG THE ROUTE (DISTANCE-TO-GO, ETA)

NOTE: *Similar information is available on PROGRESS 1/3 and PROGRESS 2/3 page, when CMA-9000 FMS is configured for the three set PROGRESS pages.*

Display the PROGRESS 1/4 page by pressing [PROG].



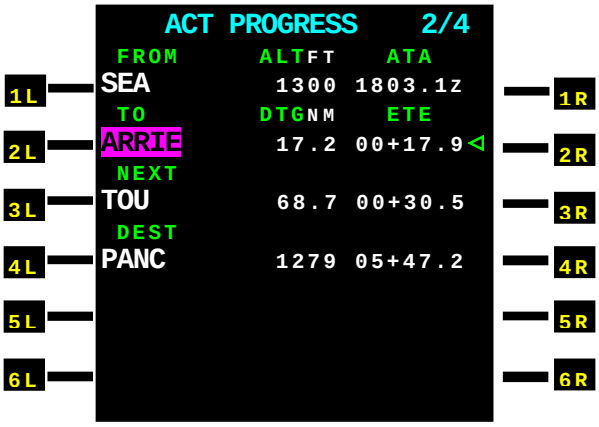
1. When operating outside the polar region (latitude above N73° or below S60°) the crew can toggle the display reference of the wind direction to either TRUE or MAGNETIC by pressing LSK 3L. Upon entry in the polar region the wind direction reference is forced to TRUE and the toggling is inhibited by removing the prompt "<" at LSK 3L.

2. To override the current RNP, enter into the scratchpad the desired RNP value and then press LSK 5L. Manually entered RNP value will be displayed in large font size.

NOTE: If the entered RNP exceeds the default RNP for the phase of flight, an alert message "VERIFY RNP VALUE" will be displayed in the scratchpad.

3. To view the status of the current navigational sensor, press LSK 6L and the POS INIT/REF 2/2 page is displayed.

4. Display PROGRESS 2/4 page by pressing [NEXT].



PROGRESS 1/4 and 2/4 pages always show the information for the currently active route. Route modifications which have not yet been EXECuted are ignored.

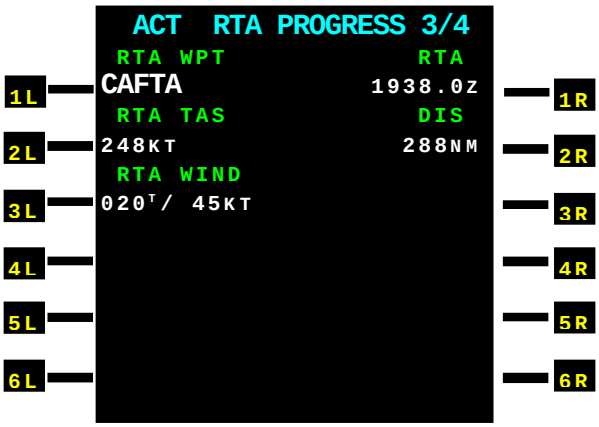
NOTE: When established in a hold, the FROM and TO waypoints become the same and the TO waypoint course is replaced by the title "HOLD AT". The ATA is the time of entry of the hold, on the first crossing of the holding waypoint. The distance-to-go to the TO WAYPOINT is from present position direct to the holding waypoint. The ETA to the TO WAYPOINT is for the next crossing of the holding waypoint. The ETAs and distances to go for the next and destination waypoints are based on the holding waypoint location and current TAS.

REQUIRED TIME OF ARRIVAL COMPUTATION

With the desired waypoint identifier in the scratchpad:

Display the RTA PROGRESS 3/4 or 2/3 page by pressing [PROG], [PREV], [PREV] or [PROG], [NEXT] respectively.

1. Move the waypoint identifier into the RTA WPT field by pressing LSK 1L.



2. Key in the required time of arrival (e.g.: 1938) and move the entry into the RTA field by pressing RTA (LSK 1R).

   The computed ETA is replaced by the manual entry of RTA, displayed in LARGE font. The required TAS to reach the RTA waypoint at the required time is computed. RTA WIND is current wind, or CRZ WIND if on the ground. Manual entry of the RTA TAS will result in a new ETA. Manual entry of RTA WIND allows the evaluation of the ETA for the given waypoint.

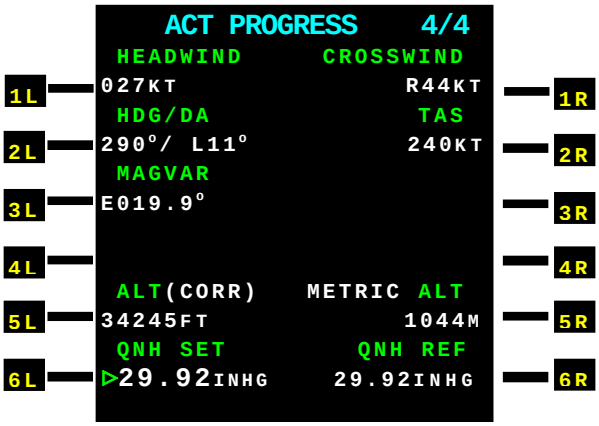
WIND COMPONENTS, NAVIGATION ANGLES AND AIR DATA

Display the PROGRESS 3/3 or 4/4 page by pressing [PROG] and [PREV].

PROGRESS 3/3 or 4/4 page includes the display of wind, aircraft heading, drift angle, true air speed, magnetic variation, altitude, QNH altimeter setting and QNH Altimeter Ref (if configured).

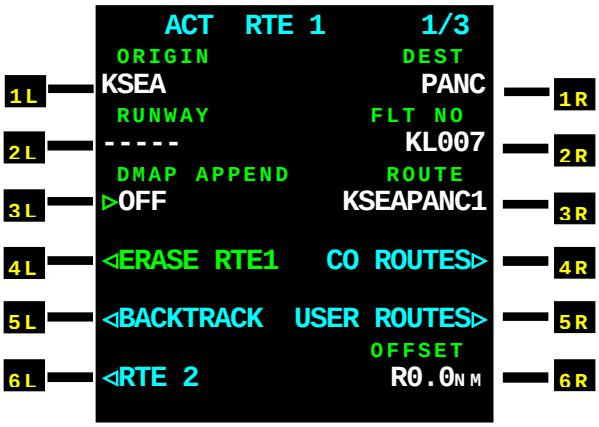
NOTE: The QNH ALTIMETER REF is displayed at 6R and therefore computed by the CMA-9000 FMS only when the 4-page set PROGRESS is configured and when the pressure altitude (from ADC) and hybrid INS/GPS altitude (from the EGI/GPS) are available.

The HEADWIND (TAILWIND) field displays the present headwind or tailwind components in knots. The sense of the CROSSWIND component is the side FROM which the wind is blowing.



OFFSET TRACK INITIATION

Display the ACT RTE x 1/X page by pressing [RTE].



1. Enter the desired track offset in nautical miles (e.g.: L10.0) and move the entry into the OFFSET field by pressing LSK 6R.

2. Initiate the capture of the offset track by pressing [EXEC].

   Navigation and guidance will now be relative to the offset track. If the CMA-9000 FMS is autopilot-coupled, the CMA-9000 FMS will capture the offset track at a 45 degree angle if the offset value is greater than the normal cross-track limit. Offset route waypoints are located on the bisector of the angle between the original route legs. The OFST annunciator of the FMS illuminates.

NOTE: Offset track navigation can be initiated only on legs defined by two waypoints or on direct-to.

OFFSET TRACK CANCELLATION

Automatic Cancellation:

An active offset path is automatically cancelled upon any of the following conditions:

- Active leg is not a TF (track to fix) or DF (direct to fix) leg; or
- A direct-to/intercept is executed; or
- Active leg is part of an approach; or
- Holding Pattern or search pattern defined on the active waypoint; or
- Next leg is a DME arc
- Active TO waypoint is designated as fly-over

Manual Cancellation:

Display the ACT RTE x 1/X page by pressing [RTE].

1. Set the offset value to zero by entering 0 (zero) into the scratchpad and moving it into the OFFSET field by pressing LSK 6R.

   or:

2. Delete the offset value by pressing [CLR] and then LSK 6R.

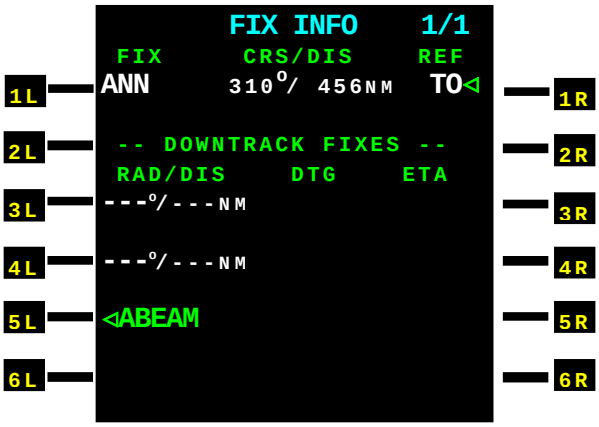
3. Initiate return to the original track by pressing [EXEC].

   The advisory message "END OF OFFSET" is displayed in the scratchpad. The FMS OFST annunciator is turned off. Navigation and guidance will now be relative to the original track. If autopilot-coupled, the CMA-9000 FMS will capture the original track at a 45 degree angle if the offset value was greater than the normal cross-track limit.

POSITION FIX INFO DISPLAY

With the desired waypoint identifier in the scratchpad:

Display the FIX INFO 1/1 page by pressing [FIX] or [INIT REF], <FIX INFO>.



1. Enter the waypoint identifier in the scratchpad and move it into the FIX field by pressing LSK 1L.

   The bearing (radial) and distance FROM the FIX to the aircraft are displayed. The displayed reference of the bearing (radial) (e.g. true or magnetic North) is consistent with the other navigation angles as described in the SETUP page in Section 3.

2. Display the reciprocal by pressing REF (LSK 1R).

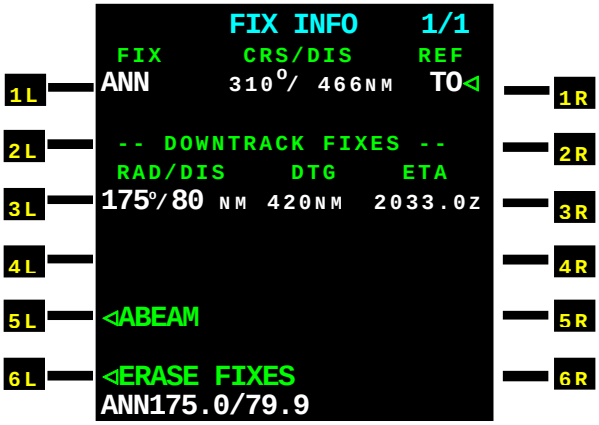
   The course and distance TO the FIX from the aircraft are displayed as seen in the figure above.

DOWNTRACK FIX CREATION

With the desired reference waypoint identifier in the scratchpad:

Display the FIX INFO 1/1 page by pressing [FIX] or [INIT REF], <FIX INFO>.

1. Move the waypoint identifier into the "fix" field by pressing LSK 1L.

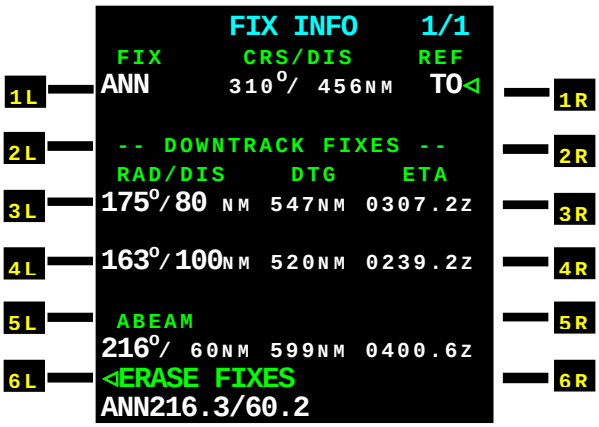


2. To create a downtrack fix along the flight plan where the radial from the entered "fix" intersects, key in the radial (e.g. 175) and press LSK 3L or LSK 4L. **or:**

3. To create a downtrack fix along the flight plan where the distance from the entered "fix" intersects, key in /, distance (e.g. /80) and press LSK 3L or LSK 4L. **or:**

4. To create a downtrack fix along the flight plan where the aircraft will be directly abeam the entered "fix", press <ABEAM> (LSK 5L).

The distance to go (DTG) and ETA to the intersection point are displayed. If the radial, distance or abeam fix does not intercept the route ahead of the aircraft, or the intersection point does not lie within 500 nm of the reference fix, then the advisory message "!INVALID INTERSECTION" is displayed. Figure 5-2 shows a typical downtrack fix creation involving the radial, distance or abeam fix intercepting the route ahead of the aircraft. The displayed reference of the bearing (radial) (e.g. true or magnetic North) is consistent with the other navigation angles as described in the SETUP page in Section 3.



5. Line select the intersection to the scratchpad by pressing LSK 3L, LSK 4L, or LSK 5L.

The intersection is displayed as a Place Bearing/Distance in the scratchpad e.g. ANN216.3/60.2.

NOTE: When the FIX is a 7-character waypoint identifier, the intersection is displayed as a waypoint coordinate.

6. Display the desired location in the route by pressing [LEGS] and [NEXT] or [PREV] as required.

7. Move the waypoint to the desired place in the route by pressing the appropriate LSK.

8. Verify the waypoint entry and make the modified route active by pressing [EXEC].

NOTE: When no intersection is found with the active Flight Plan, the FIX INFO page will retain the radial or distance entry.

If an ARINC 702 type EFIS is configured, it will display a green circle around the FIX waypoint. The EFIS will display the radial as a line extending from the FIX. The distance is displayed as a circle with its radius equal to the distance value entered.

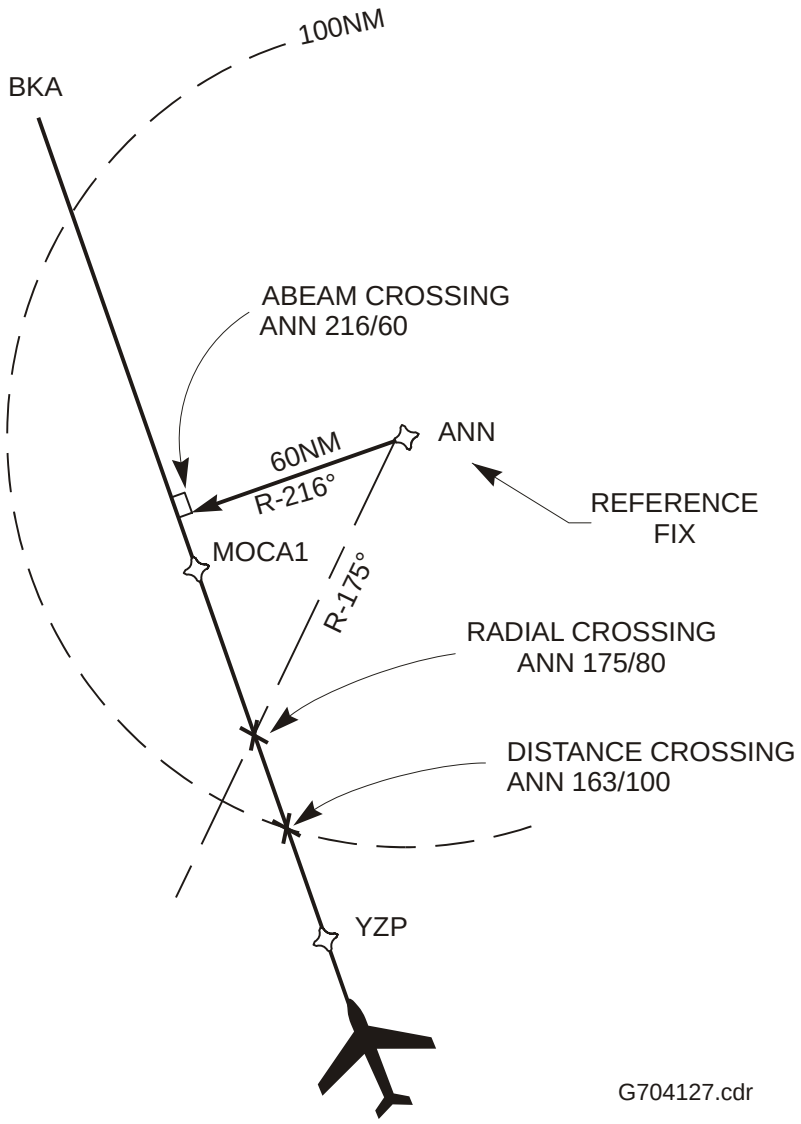
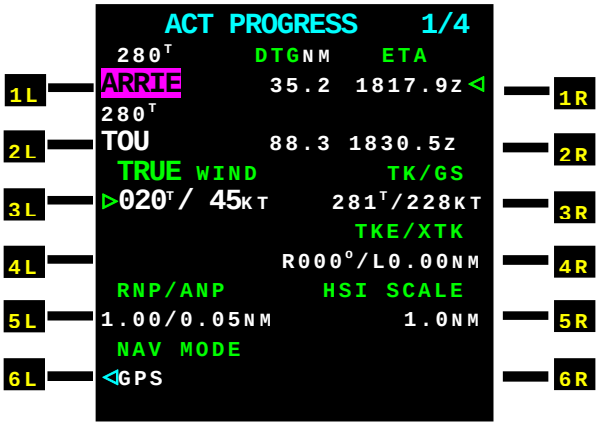


Figure 5-2 Typical Downtrack Fix Creation

CURRENT NAVIGATION MODE STATUS

Display the ACT PROGRESS 1/3 or 1/4 page by pressing [PROG].

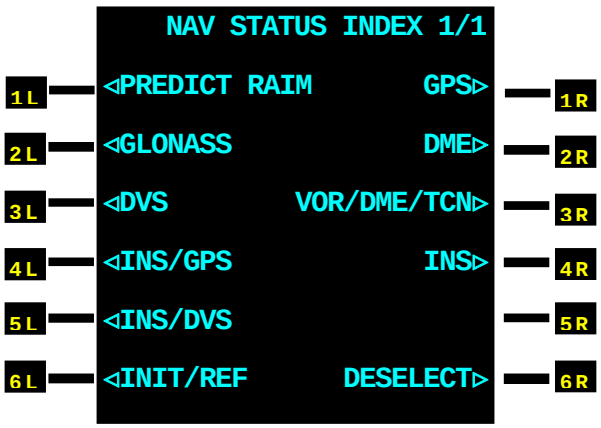


NOTE: The current navigation mode (NAV MODE) of the CMA-9000 FMS is displayed at LSK 6L. The Required Navigation Performance (RNP) for the phase of flight and the current estimated navigation performance (ANP) are displayed in nautical miles. The Required Navigation Performance (RNP) may be manually entered by keying in RNP in nautical miles (e.g. 1.0) and moving it to the RNP field by pressing LSK 5L. If the entered RNP exceeds the RNP for the phase of flight then the "VERIFY RNP VALUE" alert message is raised. Refer to Section 15 RNP Capability for additional information.

More information on the NAVigation mode can be found on the POS INIT/REF 2/2. To access the POS INIT/REF 2/2 page press the <NAV MODE> (LSK 6L).

GPS SENSOR AND SATELLITE STATUS

Display the NAV STATUS INDEX 1/1 page by pressing [INIT REF], <NAV STATUS> (LSK 5R).

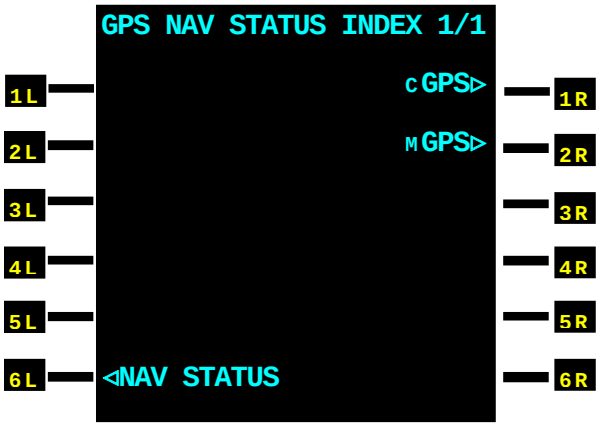


Display the GPS STATUS 1/2 page by pressing GPS (LSK 1R).

Two GPS monitor pages are displayed, accessible by pressing the [NEXT] or [PREV] functional key.

NOTE: DME, VORDME, VORDME/TCN, INS, KALMAN, DVS, INS/GPS and INS/DVS prompts are displayed only if their interfaces are configured.

For dual GPS installations with a civll GPS and a Litton LN-100GT EGI configured, selection of LSK 1R will display the following page which can then be used to call up the specific civil or miltary GPS status page:

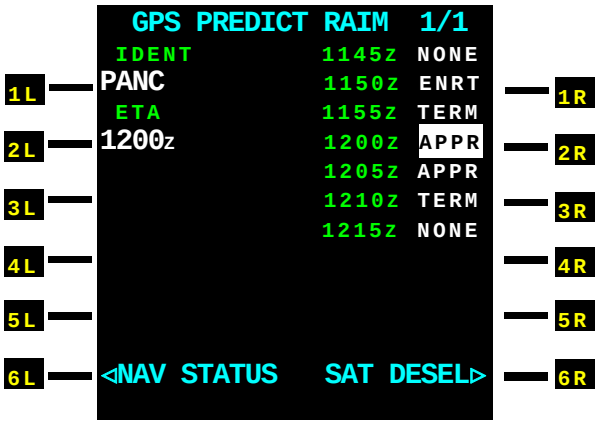


PREDICTIVE RAIM REQUESTS

CAUTION: It is not recommended to perform manual predictive RAIM requests when the aircraft is about to enter the approach phase of flight as the CMA-9000 FMS automatically sends predictive RAIM requests as well. No manual predictive RAIM request should be done when the aircraft is within DTG=6 nm to the FAF waypoint.

Display the NAV STATUS INDEX 1/1 page by pressing [INIT REF], <NAV STATUS> (LSK 5R).

Display the GPS PREDICT RAIM 1/1 page by pressing <PREDICT RAIM> (LSK 1L).



The GPS PREDICT RAIM 1/1 page for the destination airport is displayed, with the current estimated time of arrival (ETA) in the LSK 2L field. The arrival times listed on the right hand side of the display are for the ETA (at the centre in reverse video), and at intervals of 5 minutes before and after the ETA, up to a maximum of 15 minutes. After a short delay, the results of the predictive RAIM computation are displayed for each arrival time. The possible outcomes are:

DISPLAYED	*PREDICTED HIL (NOTE 1)*
APPR	*Less than or equal to 0.3 nm.*
TERM	*Greater than 0.3 nm but less than or equal to 1.0 nm.*
ENRT (NOTE 2)	*Greater than 1.0 nm but less than or equal to 2.0 nm.*
NONE	*Greater than 2.0 nm.*
*" **** "*	*No computed HIL data due to lack of current almanac information, or due to GPS sensor failure.*

1. To determine the predicted HIL for any waypoint, key the waypoint identifier into the scratchpad and move it to the IDENT field by pressing LSK 1L.

   The ETA field is replaced by dashes ("---"), and the right side of the display blanks.

2. Key the ETA for the new waypoint into the scratchpad and move it to the ETA field by pressing LSK 2L.

   The range of arrival times appears on the right side of the display and after a short delay the predicted HIL value for each arrival time is displayed.

NOTES:

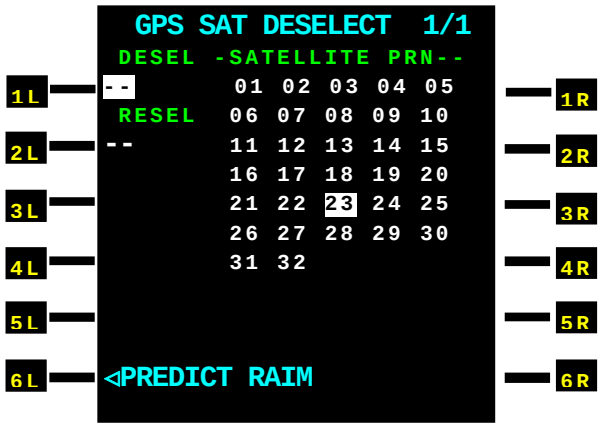
1. *A HIL prediction can be initiated at any time and for any waypoint stored in the system whether or not it is part of the active route. If the identifier is that of an airport, and an approach has been selected, the integrity computation is based on the missed approach waypoint, otherwise the airport reference location is used. If the waypoint is not part of the route, the ETA must also be entered.*

2. *Also used for oceanic/remote phase of flight.*

   If the predictive RAIM function indicates that GPS instrument approach integrity will not be available at the ETA, the operator should modify the ETA (new ETA attainable by flying at a different speed or making a flight plan change), conduct the approach with other approved equipment, or discontinue IFR operations.

PREDICTIVE RAIM SATELLITE DESELECTION

Display the GPS SAT DESELECT page by pressing <SAT DESEL> (LSK 6R) from the GPS PREDICT RAIM 1/1 page.



GPS Satellites can be excluded from the PRAIM calculations if a satellite is known to be providing erroneous data. Satellite status information may be obtained from Notices to Airmen (NOTAM).

1. Key into scratchpad the satellite Pseudo Range Number (PRN).

2. Press LSK 1L to deselect the satellite. The corresponding number will appear in reverse video white color.

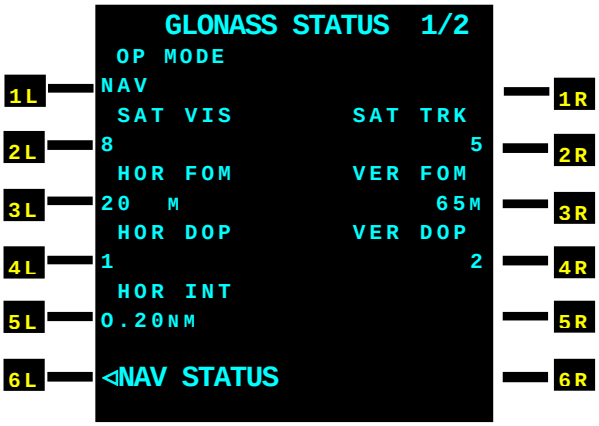
Or

3. Press LSK 2L to re-select the satellite. The corresponding number will reappear in mdieum font white color.

More then one satellite can be excluded from the PRAIM calculations. The deselected satellites are automatically re-enabled at the next system power on.

GLONASS STATUS 1/2

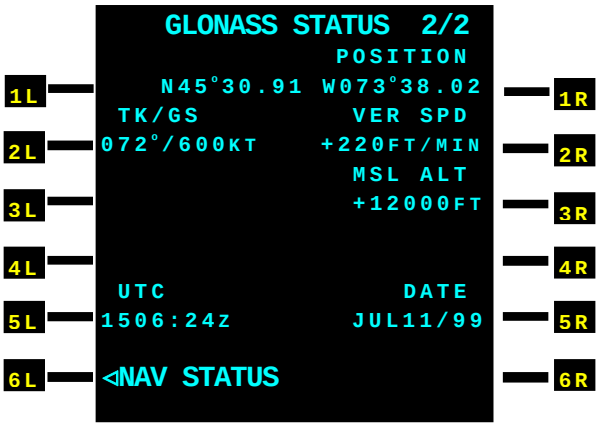
Display the GLONASS STATUS 1/2 page by pressing [INIT/REF], <NAV STATUS>, <GLONASS>.



NOTE: The GLONASS STATUS 1/2 page is only used to display the GLONASS transmitted parameters. The field descriptions are identical to the GPS STATUS 1/2 page. The GLONASS page is displayed in cyan color to emphasize the fact that GLONASS is not used by the FMS for navigation.

GLONASS STATUS 2/2

Display the GLONASS STATUS 2/2 page by pressing [INIT/REF], <NAV STATUS>, <GLONASS>.

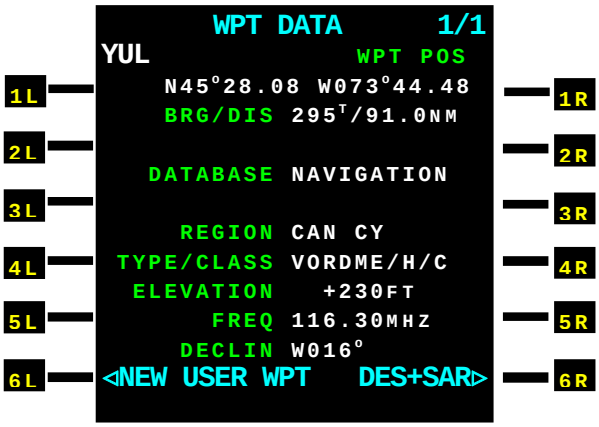


NOTE: The GLONASS STATUS 2/2 page is only used to display the GLONASS transmitted parameters. The field descriptions are identical to the GPS STATUS 2/2 page. The GLONASS page is displayed in cyan color to emphasize the fact that GLONASS is not used by the FMS for navigation.

WAYPOINT INFORMATION FROM THE NAVIGATION DATABASE

1. Key in the desired identifier (waypoint, navaid, airport, temporary waypoint), or copy it into the scratchpad from any other page.

2. Display the WPT DATA 1/2 page by pressing [INIT REF], <WPT DATA> (LSK 1R).



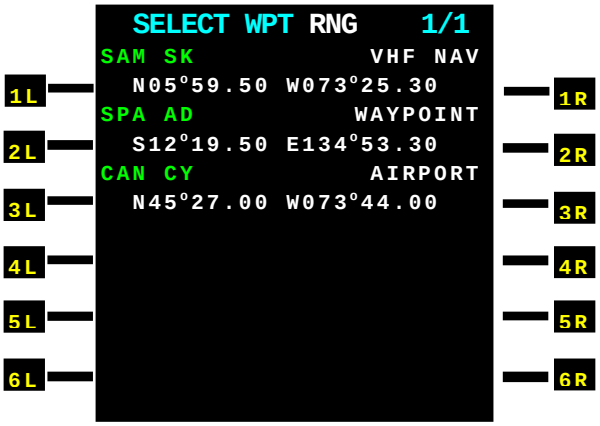
3. Move the scratchpad entry to the ID field by pressing LSK 1L.

4. Detailed information appropriate to the selected identifier type is displayed in one or two pages as required. If the identifier is not contained in the database, the "!NOT IN DATABASE" advisory message is displayed in the scratchpad.

DUPLICATE IDENTIFIER SELECTION

The SELECT WPT 1/X page is automatically displayed when multiple occurrences of the entered identifier are found in the navigation database. The duplicated identifier is incorporated into the page title line. Duplicated identifiers are listed on as many pages as necessary, in order of increasing distance from the previous waypoint.

NOTE: Display the desired coordinates by pressing [NEXT] as required and then select it by pressing the appropriate left or right hand LSK.



The display reverts to the page where the duplicated identifier was entered, with the selected identifier in the data field.

When the operator enters in the flight plan (active or inactive) a waypoint identifier which is not unique, then the "SELECT WPT" page is displayed if any of the two entry modalities was used:

1. Via the FMS keypad;

2. Via the FMS line select key from any page except the "RTE x LEGS" page(s) or the "PROGRESS" page(s) or the "RTE x" page(s).

The operator selected waypoint via the "SELECT WPT" page is inserted in the flight plan followed by a discontinuity.

When the operator enters a unique waypoint identifier in the flight plan (active or inactive) via the FMS keypad or via the FMS line select key from any page except the RTE x LEGS page(s) or the "PROGRESS" page(s) or the "RTE x" page(s), the waypoint is inserted in the flight plan followed by a discontinuity.

When the operator inserts a waypoint copied using the FMS line select key on the "RTE x LEGS" page or the "PROGRESS" page or the "RTE x" page in the flight plan (active or inactive), a close up to that particular waypoint will be done (if the waypoint is inserted before its current position in the flight plan) or the waypoint will be inserted in the flight plan followed by a discontinuity (if the waypoint is inserted after its current position in the flight plan).

If the operator inserts in the active route (inactive route) a waypoint copied from any inactive route (active route) page then the behavior will be the same as when entering an identifier using the FMS keypad.

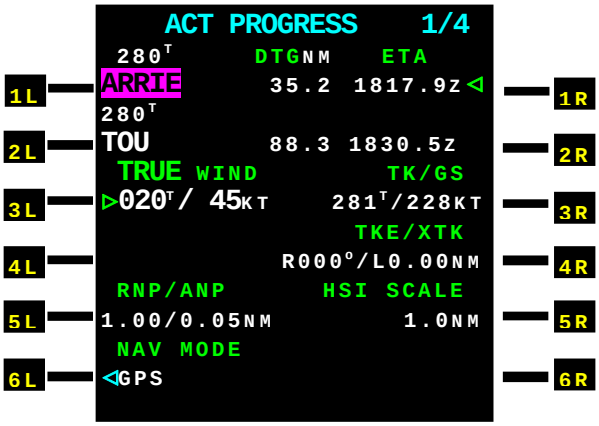
NOTE: The flight plan can contain waypoints with the same identifier but with different coordinates (a frequent case being user waypoints named by the operator with an identifier already existing in the navigation database).

The custom database (usually built using a navigation database) should not contain duplicate waypoints compared with the navigation database.
If duplicate waypoints exist then the custom database occurrence will not be shown on the SELECT WPT page.

RNP MODIFICATION

Refer to Section 15 RNP Capability for a detailed description of the CMA-9000 FMS RNP capability.

Display the PROGRESS 1/3 or 1/4 page by pressing [PROG].



1. Key into the scratchpad the desired RNP (Required Navigation Performance in nautical miles) and move it to the RNP field by pressing LSK 5L.

   The entered RNP value is displayed in LARGE font. If the entered RNP value exceeds the default RNP for the phase of flight then the alert message "VERIFY RNP VALUE" will be displayed in the scratchpad.

2. To revert to the default RNP for the phase of flight, press [CLR] then LSK 5L.

   The default value for the phase of flight (Enroute=2.0; Terminal=1.0; Approach=0.3) is displayed in the RNP field in medium font.

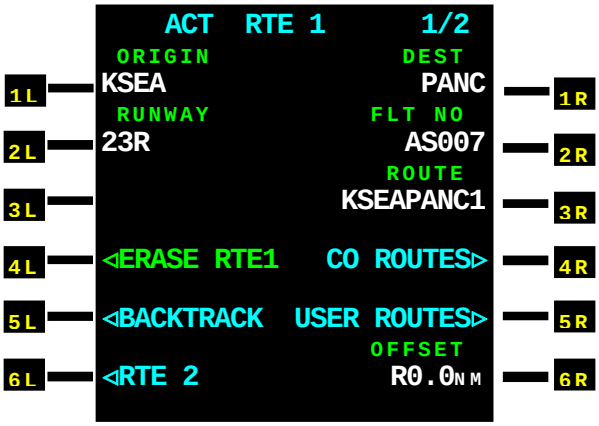
ROUTE 2 OPTION

When configured with RTE 2 option, two independent routes (RTE 1 and RTE 2) may reside in the CMA-9000 FMS at the same time. The CMA-9000 FMS allows activation of one route as the active flight plan. The other flight plan is stored as the inactive route. The default route at power-up, with both routes empty, is RTE 1.

The inactive route may be manually created or selected from the stored custom routes. It may also be copied from the active route. The procedures to create, select, and/or edit the inactive route are identical to those of the active route.

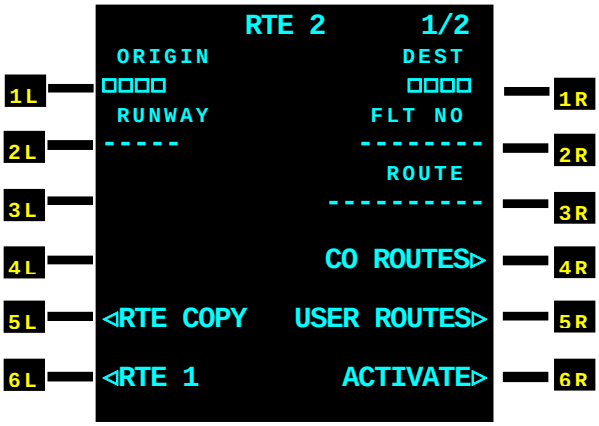
When configuring the NO xFMS option, the prompt ERASE RTEx appears at LSK 4L when RTE x is defined. It allows to erase the RTE x.

1. Display the ACT RTE x 1/X page by pressing [RTE] (a route has been previously entered and executed).



2. Access the inactive route by pressing LSK 6L (e.g. RTE 2).

NOTE: The inactive route pages are displayed in monochrome cyan to distinguish them from the active route pages.



A. INACTIVE ROUTE MANIPULATIONS (SUMMARY)

1. Using the procedures outlined in Section 3, enter the origin, destination, and waypoints, or select a stored custom route as the inactive route. Next, press <CONFIRM>, (LSK 6R) to save the modifications or <CANCEL> (LSK 6L) to delete them.

NOTE: In the case of a dual CMA-9000 FMS installation, the inactive route modification is cross-talked to the off-side FMS upon pressing the <CONFIRM> prompt.

If the EFIS model permits, the EFIS displays the inactive flight plan in cyan when an inactive route page is displayed on the FMS.

2. The inactive route is edited directly on the ROUTE, LEGS, DEP/ARR and HOLD pages. Both active and inactive routes have their own independent set of ROUTE, LEGS, DEP/ARR, FUEL and HOLD pages.

3. To ACTIVATE the inactive route, press LSK 6R on the inactive RTE page, followed by pressing the [EXEC] key.

NOTE: The following RTE COPY procedures highlight the basic steps required to select, then activate a second route.

B. INACTIVE ROUTE MANIPULATIONS (DETAILED STEPS)

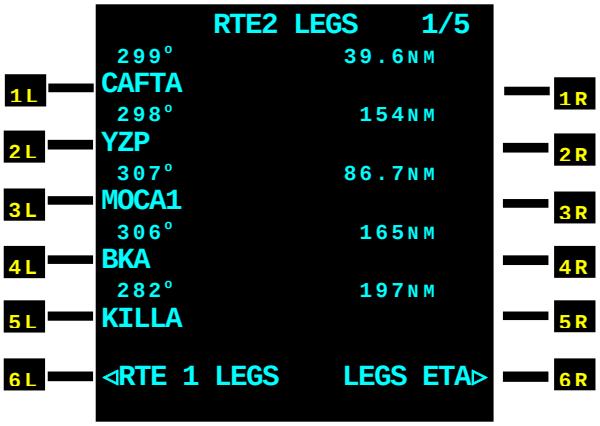
1. To copy the active route, e.g. RTE 1, to the inactive route, press LSK 5L of the inactive RTE page. RTE 1 remains active and continues to be used for navigation.

2. Press LSK 6R to CONFIRM copying of the route. ERASE RTE2 appear at LSK 4L when RTE 2 is defined.

NOTE: The copied route contains the current active TO and subsequent waypoints. Overflown waypoints are not copied.

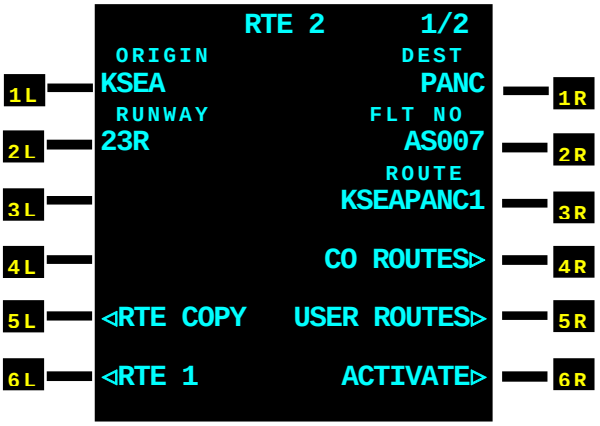
In the case of a dual CMA-9000 FMS installation, the inactive route is crosstalked to other FMU's upon each CONFIRM of flight plan changes and upon synchronization.

3. Press [LEGS] to display the RTE 2 waypoints. Modify the RTE x LEGS page as required to build a new flight plan based on the current active route.



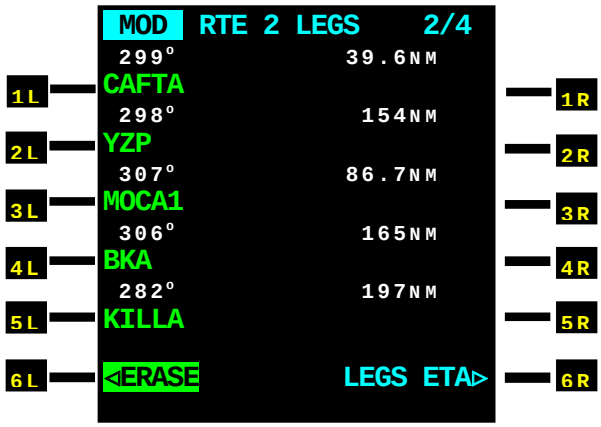
4. Access the RTE x LEGS ETA and FUEL pages to perform predictions as for the active route. Predictions are based on the aircraft's present position direct to the first waypoint in the inactive route.

5. When changes are completed, press the [RTE] key to access the RTE 2 page.



6. Press <ACTIVATE> (LSK 6R) to the inactive route.

7. The RTE 2 LEGS page is displayed. Press the [EXEC] key to confirm activation of RTE 2.



8. Prior to pressing <ACTIVATE>, <ERASE> (LSK 6L), may be used to cancel activation.

9. The LEGS page title legend changes from MOD to ACT. The former inactive route, now active, is displayed in multiple colors.

10. The previously active route's TO and subsequent waypoints now form the inactive route (displayed in cyan).

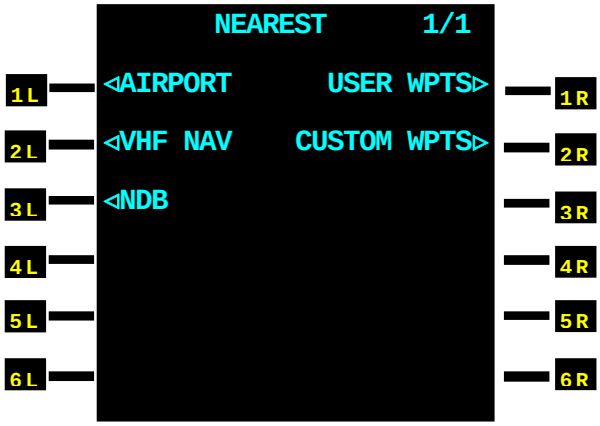
NEAREST

The CMA-9000 FMS presents information about the current airspace by providing bearing and distance with respect to a center reference waypoint of the 50 closest waypoints within a distance of 640 nautical miles for either of the following categories of waypoints:

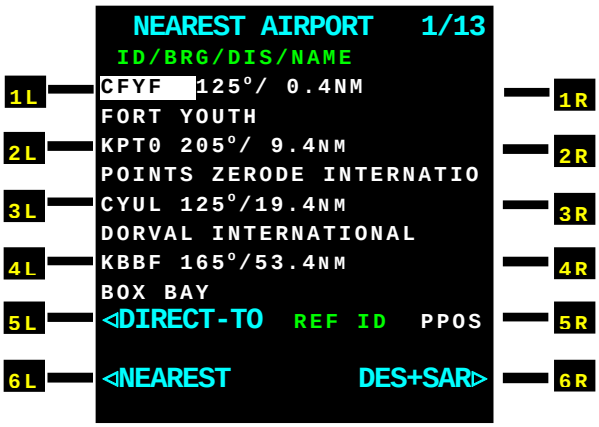
- AIRPORT
- Non Directional Beacon (NDB)
- VHF NAV
- CUSTOM WPT
- USER WPT

The respective waypoints are displayed in order of distance from the closest to the farthest. By default, the reference point is selected to be the current position of the aircraft. The first time the NEAREST page is accessed after a cold start, the center reference waypoint is set to the present position (PPOS). If the reference waypoint is the present position, distance and bearing information are refreshed every 10 seconds, otherwise for any other waypoint type, the bearing and distance are computed once (before the respective page is exited and entered again). For the NEAREST USER WPTS page the bearing and distance of each displayed waypoint are updated every 10 seconds regardless of the center reference waypoint type.

Display the NEAREST page by pressing [INIT REF] and <NEAREST> (LSK 3R) or [INIT/ REF], <BULLS EYE>, [PREV], <NEAREST> {if Tactical Config BULLS EYE is configured}.



A. Display NEAREST AIRPORT 1/X page:



Press [INIT REF], <NEAREST> (LSK 3R) and <AIRPORT> (LSK 1L) to display the NEAREST AIRPORT 1/X page. Information for 4 airports is displayed on each page. To view the other pages press [NEXT] or [PREV].

When entering any NEAREST AIRPORT page, the first entry of the respective page is displayed in reverse video. By pressing any other LSK the corresponding identifier is displayed in reverse video and it is copied in the scratchpad.

Any location contained in this page can be selected as a DIRECT-TO destination. The destination is selected by pressing the corresponding LSK of the desired destination and then pressing <DIRECT-TO> (LSK 5L). The MOD RTE x LEGS 1/X page is displayed and the selected waypoint identifier is inserted as the first waypoint of the page.

Also any location displayed on one of the NEAREST AIRPORT pages can be selected as a DES+SAR or TACTICAL destination. The destination is selected by pressing the corresponding LSK of the desired destination and then pressing <DES+SAR> or <TACTICAL> (LSK 6R). The DES+SAR or TACTICAL 1/2 page is displayed and the selected waypoint identifier is inserted in the REF ID filed (LSK 1L).

The center reference waypoint (LSK 5R) is set to the present position (PPOS) when the page is accessed after a cold start. The center reference waypoint can be selected from any of the following databases: Navigation Database, Custom Database, User Database, Temporary Waypoint List, Active Route or Inactive Route.

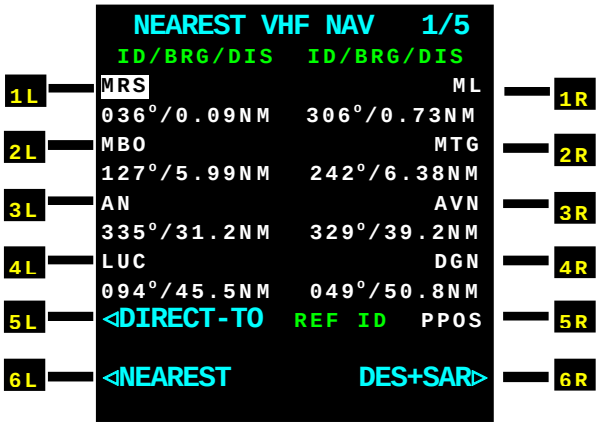
To modify the source of the reference computation, press LSK 5R.

Whenever one of the following conditions occurs, the center reference waypoint is set to PPOS and the NEAREST waypoint list is refreshed:

The center reference waypoint is a User or Temporary or Route waypoint and the waypoint is deleted.

The center reference waypoint is from the User database and the database is updated.

B. DISPLAY NEAREST VHF NAV:



Press [INITREF], <NEAREST> and <VHF NAV > to display the NEAREST VHF NAV 1/X page. The information for 8 waypoints is displayed on each page. To view the other pages press [NEXT] or [PREV].

Any location contained in this page can be selected as a DIRECT-TO destination. The destination is selected by pressing the corresponding LSK of the desired destination and than pressing <DIRECT-TO> (LSK 5L). The MOD RTE LEGS 1/X page is displayed and the selected waypoint identifier is inserted as the first waypoint of the page.

Also any location displayed on one of the NEAREST VHF NAV pages can be selected as a DES+SAR or TACTICAL destination. The destination is selected by pressing the corresponding LSK of the desired destination and then pressing <DES+SAR> or <TACTICAL> (LSK 6R). The DES+SAR or TACTICAL 1/2 page is displayed and the selected waypoint identifier is inserted in the REF ID filed (LSK 1L).

The center reference waypoint (LSK 5R) is set to the present position (PPOS) when the page is accessed after a cold start. The center reference waypoint can be selected from any of the following databases: Navigation Database, Custom Database, User Database, Temporary Waypoint List, Active Route or Inactive Route.

To modify the source of the reference computation, press LSK 5R.
When the center reference waypoint is changed, the list is re-ordered by proximity using the entered waypoint.

Whenever one of the following conditions occurs, the center reference waypoint is set to PPOS and the NEAREST waypoint list is refreshed.

1. The center reference waypoint is a User or Temporary or a Route waypoint and the waypoint is deleted.

2. The center reference waypoint is from the User database and the database is updated.

NOTE: The NEAREST NDB, NEAREST USER WPTS, and NEAREST CUSTOM WPTS pages are similar to the NEAREST VHF NAV pages.

TIMER (If configured)

The CMA-9000 FMS provides a timer, which may be used as a count-up or countdown timer, and which will generate a TIMER ALARM alert message upon expiration.

The CMA-9000 FMS allows the user to either enter in an alarm time or a count-down value (range from 0 to 23 hours, 59 minutes and 59 seconds).

With the timer not activated, and a valid alarm time entered, the user has the ability to add 5, 15 or 30 minutes to the alarm time.

By initiating the timer to start, if an alarm time was set, then the time remaining is displayed in the countdown field. Similarly, if a countdown time was set, the corresponding alarm time is displayed.

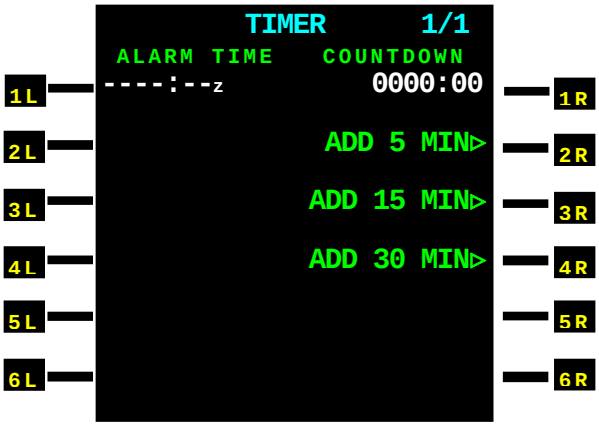
Once activated, the CMA-9000 FMS enables the user to update the timer, stop or deactivate/clear the timer.

The TIMER continues to function in the background, even though the page is no longer displayed, until the timer reaches zero, or is manually stopped.

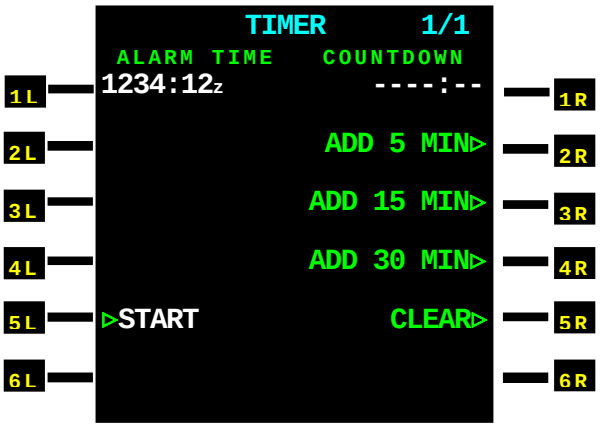
TIMER 1/1 page (If configured)

Display TIMER 1/1 page by pressing [INIT REF], [NEXT] and <TIMER> (LSK 3R).

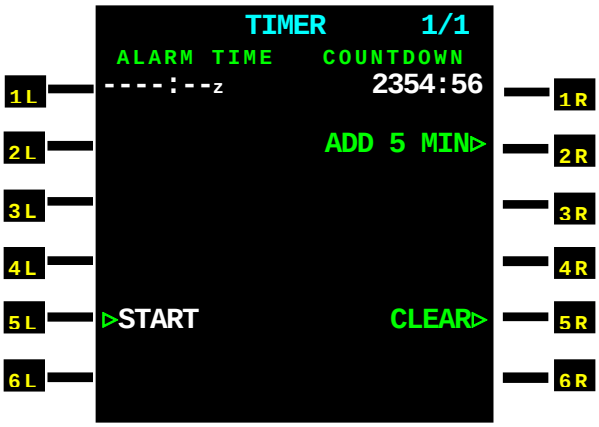
A. Display when no data is entered or after pressing [CLR]:



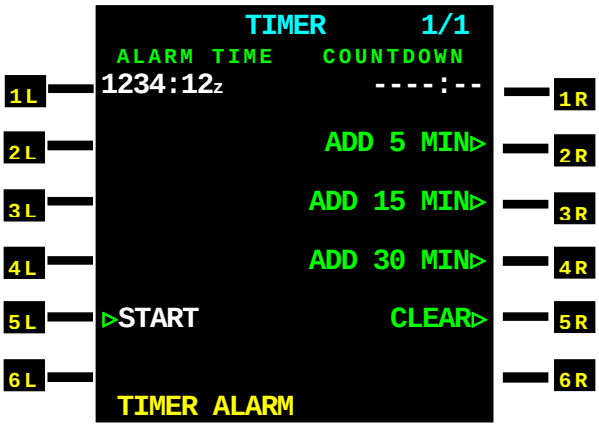
B. Display after an alarm time is entered:



C. Display after a countdown time is entered:



D. Display after timer alarm triggered:



SECTION 6 - ARRIVALS

CONTENTS

Subject **Page**

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SECTION 6

ARRIVALS

CAUTION: In case of disagreement between the published arrival information and CMA-9000 FMS displayed information, the operator **MUST** follow the published arrival information.

INTRODUCTION

The complete arrival procedure, including Standard Arrival Route (STAR) and STAR transition can be loaded into the route at the same time or in segments, depending on the ATC clearance received. The segments are selected from lists of named procedures extracted from the navigation database for the destination airport.

When an arrival procedure is selected, the waypoints and procedural legs are extracted from the navigation database, procedural leg types are decoded, and all resulting waypoints are inserted into the route in the correct order.

The first waypoint of the STAR (or STAR transition) is linked to the coinciding waypoint of the en-route portion, and subsequent en-route waypoints are deleted. If the first waypoint of the STAR (or STAR transition) does not coincide with any en-route waypoint, then the STAR (or STAR transition) is separated from the en-route portion by a route discontinuity. For certain types of STAR and transition, the waypoints may not be loaded into the route until the approach is selected.

Approach transitions are appended to the route after the STAR and are usually separated from it by a route discontinuity, unless the last waypoint of the STAR and the first waypoint of the approach transition are identical. Arrival waypoints may include speed and altitude constraint advisories.

If the aircraft installation provides only a pressure altitude input to the CMA-9000 FMS, manual entry of the altimeter correction is necessary to convert this input to baro-corrected altitude. Refer to the approved AFMS/RFMS for further details. When required, entry of the altimeter correction for the destination airport should be performed as soon as received, and prior to reaching a radial distance of 30 nm from the destination airport and an altitude below 15,000 feet above, the destination airport elevation.

NOTE: When stringing STAR and Approach Transitions procedures at their common waypoint, if speed and/or altitude constraints exist for this waypoint in both procedures, the constraint(s) from the Approach transition are retained.
The Approach altitude/airspeed constraint(s) will probably be lower/slower than the STAR constraints.

CONDENSED ARRIVAL PROCESS

This page provides an overview of the process of selecting the arrival procedures. The intent of each step is summarized on the next page.

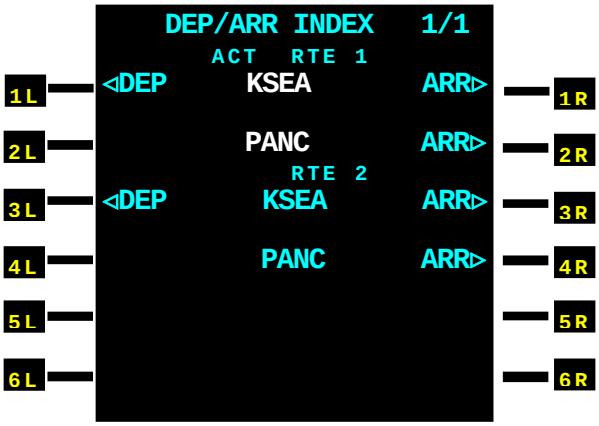
1. **MOD, ACT ROUTE -** select departure/arrival index page.
2. **DEP/ARR INDEX -** select arrival at desired airport (origin or destination).
3. **ARRIVALS -** select STAR and STAR transition.
4. **MOD, ACT LEGS -** confirm the arrival procedure agrees with the clearance, then make the modified route active.

A detailed description of each page appears in Appendix A.

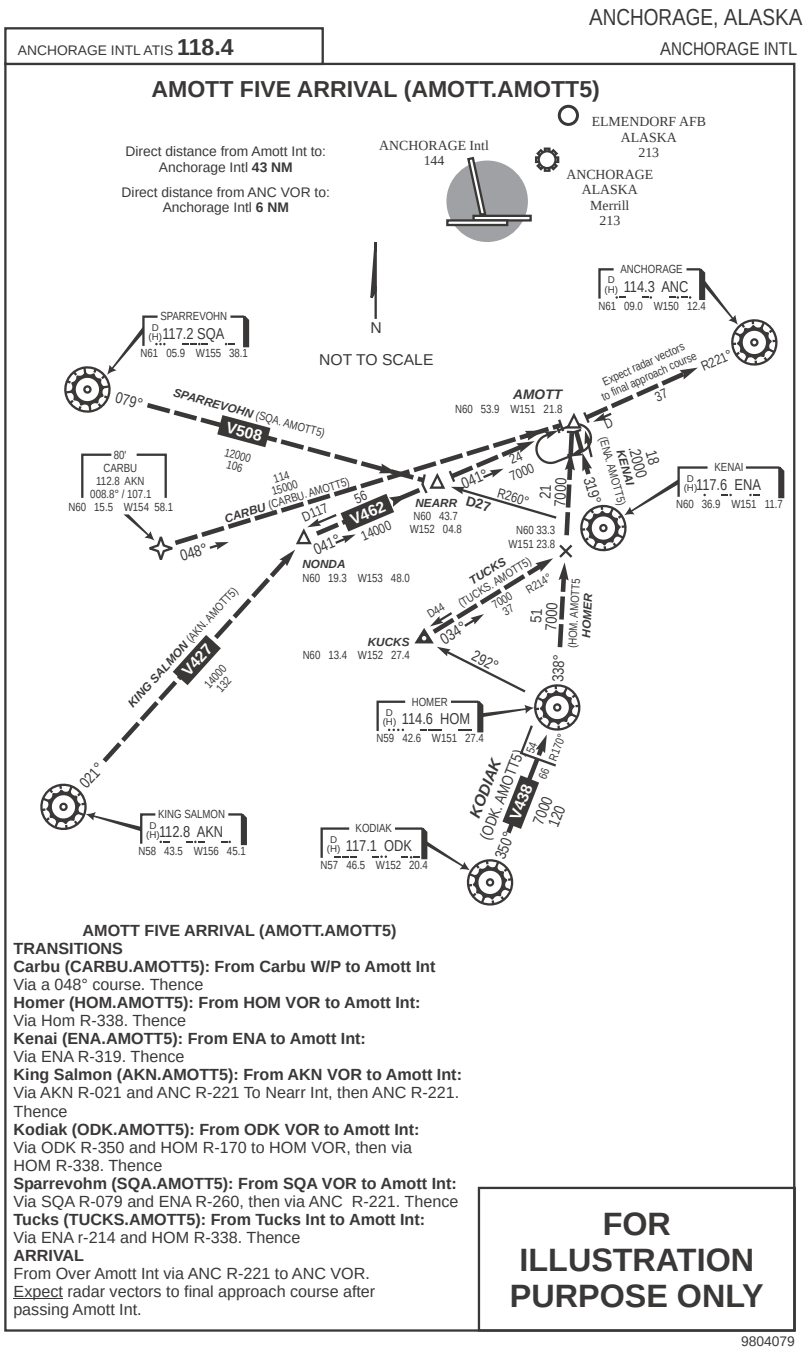
STANDARD TERMINAL ARRIVAL ROUTE (STAR) SELECTION

This procedure is based on the STAR and STAR transition depicted in Figure 6-1 and assumes that only these portions of the arrival are to be loaded at this time.

Display the DEP/ARR INDEX 1/1 page by pressing DEP/ARR.



1. Display the ARRIVALS 1/1 page for either the origin or destination airport by pressing the ARR prompt at LSK 1R or 2R respectively.



AMOTT FIVE ARRIVAL (AMOTT.AMOTT5)

TRANSITIONS

Carbu (CARBU.AMOTT5): From Carbu W/P to Amott Int
Via a 048° course. Thence

Homer (HOM.AMOTT5): From HOM VOR to Amott Int:
Via Hom R-338. Thence

Kenai (ENA.AMOTT5): From ENA to Amott Int:
Via ENA R-319. Thence

King Salmon (AKN.AMOTT5): From AKN VOR to Amott Int:
Via AKN R-021 and ANC R-221 To Nearr Int, then ANC R-221. Thence

Kodiak (ODK.AMOTT5): From ODK VOR to Amott Int:
Via ODK R-350 and HOM R-170 to HOM VOR, then via HOM R-338. Thence

Sparrevohm (SQA.AMOTT5): From SQA VOR to Amott Int:
Via SQA R-079 and ENA R-260, then via ANC R-221. Thence

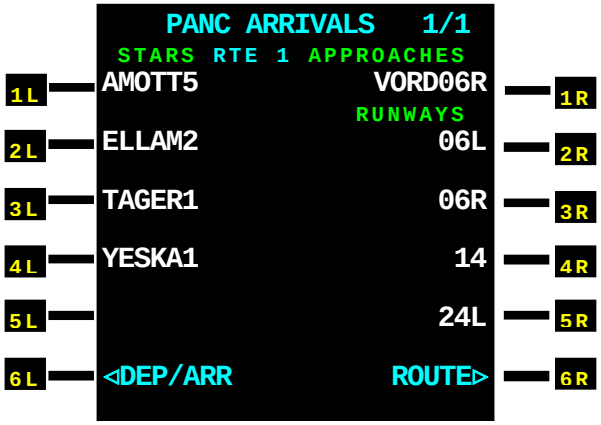
Tucks (TUCKS.AMOTT5): From Tucks Int to Amott Int:
Via ENA r-214 and HOM R-338. Thence

ARRIVAL

From Over Amott Int via ANC R-221 to ANC VOR.
Expect radar vectors to final approach course after passing Amott Int.

Figure 6-1 STAR, STAR Transition

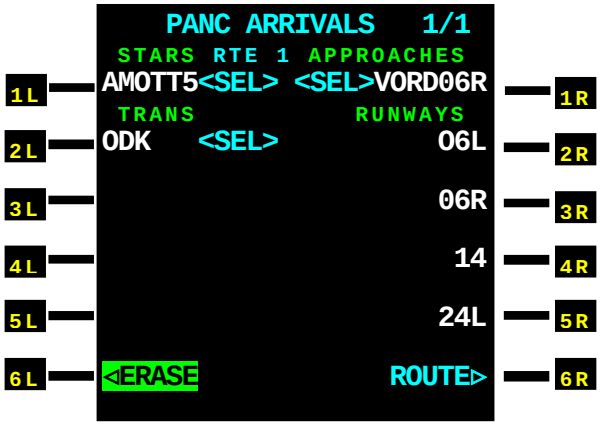
The ARRIVALS 1/X page for the selected airport is displayed, with the airport name included in the title line. Lists of STARs, approaches and runways for that airport are displayed.



2. Display the desired STAR by pressing the PREV or NEXT key as required, and select the STAR by pressing the appropriate left hand LSK.

   The STAR list is replaced by the selected STAR, with the legend "<SEL>" beside the name. Transitions available for the selected STAR are listed below the STAR, under the heading "TRANS". If no transitions are available, the word "-NONE-" is displayed. A list of the approaches and runways applicable to the selected STAR appears on the right hand side of the page.

NOTE: If an approach has already been selected, then only those STARs applicable to that approach will be displayed.



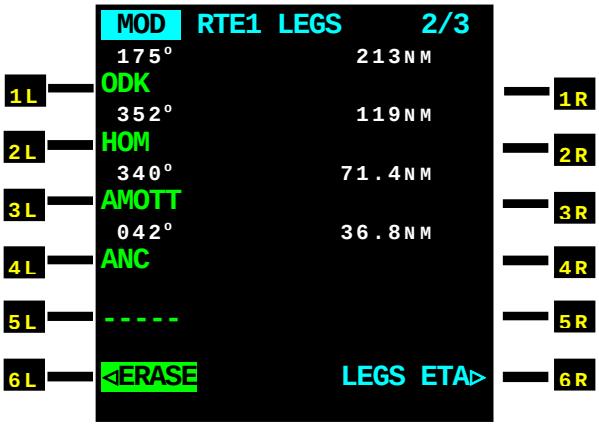
3. Display the desired STAR transition by pressing the PREV or NEXT key as required, and select the transition by pressing the corresponding left hand LSK.

   The list of transitions is replaced by the selected transition, with the legend "<SEL>" beside the name.

NOTE: The selected procedure can be changed by pressing the appropriate left hand LSK to re-display the desired list (toggles the selection).

4. Display the first STAR leg by pressing LEGS and PREV or NEXT as required.

NOTE: For certain types of STAR and STAR transition, the selection of the approach or approach transition may also be required before the STAR waypoints are loaded into the route from the navigation database. The message !SELECT TRANS/APPR/RWY is then displayed in the scratchpad.



5. Close-up any route discontinuity as described in Section 5.

6. Verify the course, distance, altitude/speed advisory, and procedural leg type information of each STAR leg in turn, pressing NEXT as required to display all legs.

7. Make the selected STAR and STAR transition active by pressing EXEC.

   On re-display of the ARRIVALS page, the active STAR and STAR transition are shown with the legend "<ACT>" beside the name(s).

NOTE: Pressing ERASE (LSK 6L) at any time during this procedure will cancels any modification currently in progress.

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SECTION 7 - APPROACH

CONTENTS

Subject **Page**

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SECTION 7-1

LATERAL NAVIGATION

CAUTION: In case of disagreement between the published approach information and CMA-9000 FMS displayed information, the operator **MUST** follow the published approach information.

The CMA-9000 FMS is approved for instrument approach navigation (except ILS, LOC, LOC-BC, LDA, SDF and MLS) provided the required sensor(s) outlined below is used.

GENERAL

The navigation database can contain GPS, GPS overlay, ILS approaches and non-precision approaches. Approach types are identified by their prefix followed by the runway number:

	GPS	- GPS approach (GPS)
	ILS	- ILS approach (reference only)
	LOC	- Localizer approach (reference only)
	LOCB	- Localizer Backcourse approach (reference only)
	NDB	- NDB approach (GPS or NDB)
*	NDBD	- NDB approach with DME facility (GPS or NDB/(DME))
	RNAV	- RNAV approach (GPS or VOR/DME)
	VOR	- VOR approach (GPS or VOR)
	VORD	- VOR/DME approach (GPS or VOR/DME)

* Use of the DME for this approach type is optional
( ) Required sensor.

Approach transitions are appended to the route after the STAR and are usually separated from it by a route discontinuity, unless the last waypoint of the STAR and the first waypoint of the approach transition are identical. Approach transitions may include procedure turns. Missed approach procedures are loaded as part of the approach. Arrival waypoints may include speed and altitude constraint advisories. Figure 7-1 shows a typical approach involving a full procedure turn and missed approach.

If a runway is selected rather than an approach, only the runway threshold waypoint is loaded into the route.

Baro-corrected altitude is required to enable automatic sequencing of procedure legs with altitude terminations. If the aircraft installation provides only a pressure altitude input to the CMA-9000 FMS, manual entry of the altimeter correction on the PROGRESS 1/X page is necessary to derive the baro-corrected altitude. Refer to the approved AFMS/RFMS for further details. When required, entry of the altimeter correction for the arrival airport should be performed as soon as received, and prior to reaching a radial distance of 30 nm from, and an altitude below 15,000 feet above, the arrival airport.

When the approach transition includes a procedure turn, the CMA-9000 FMS creates two outbound legs based on the procedure turn reference fix, followed by a turn in the correct direction to intercept the inbound course to the final approach fix.

The still-air lengths of the procedure turn outbound legs are computed based on a time of 1 minute and 45 seconds respectively at a speed of 180 knots. The two outbound waypoints are named using the first three characters of the procedure turn reference fix, with the suffix PT added. The last character (L or R) indicates the direction of the turn at that waypoint. In addition, the courses of the two outbound legs have the legend P-T.

The CMA-9000 FMS provides navigation and guidance in the normal fashion for the two outbound legs of the procedure turn, followed by a turn to intercept the final approach course inbound to the final approach fix. When the maximum allowable procedure turn distance is less than 10 nm, the length of the first outbound leg may be reduced. As a result, navigation and guidance may sequence to the second outbound leg almost immediately after crossing the procedure turn reference fix.

CAUTION: During the procedure turn, it is the responsibility of the crew to ensure that the maximum distance from the procedure turn reference fix is not exceeded and that the aircraft remains within protected airspace at all times. The distance-to-go shown on the PROGRESS 1/3 or 1/4 page **cannot** be used for this purpose, except when the FAF is the TO WPT. The distance from the procedure turn reference fix can be monitored using the FIX page, as described in Section 5.

Deletion of the procedure turn reference fix or the first outbound waypoint results in the deletion of the entire procedure turn. The two outbound waypoints cannot be copied to the scratchpad, and cannot be used as reference waypoints.

ATC clearances which modify the selected arrival procedures can be incorporated at any time by selection of the new procedure. This results in the automatic deletion of the waypoints associated with the cancelled procedure.

NOTE: When stringing an Approach procedure to an Approach Transition or STAR procedure at their common waypoint, if speed and/or altitude constraints exist for this waypoint in both procedures, the constraint(s) from the Approach procedure are retained.
The Approach altitude/airspeed constraint(s) will probably be lower/slower than the Approach Transition or STAR constraints.

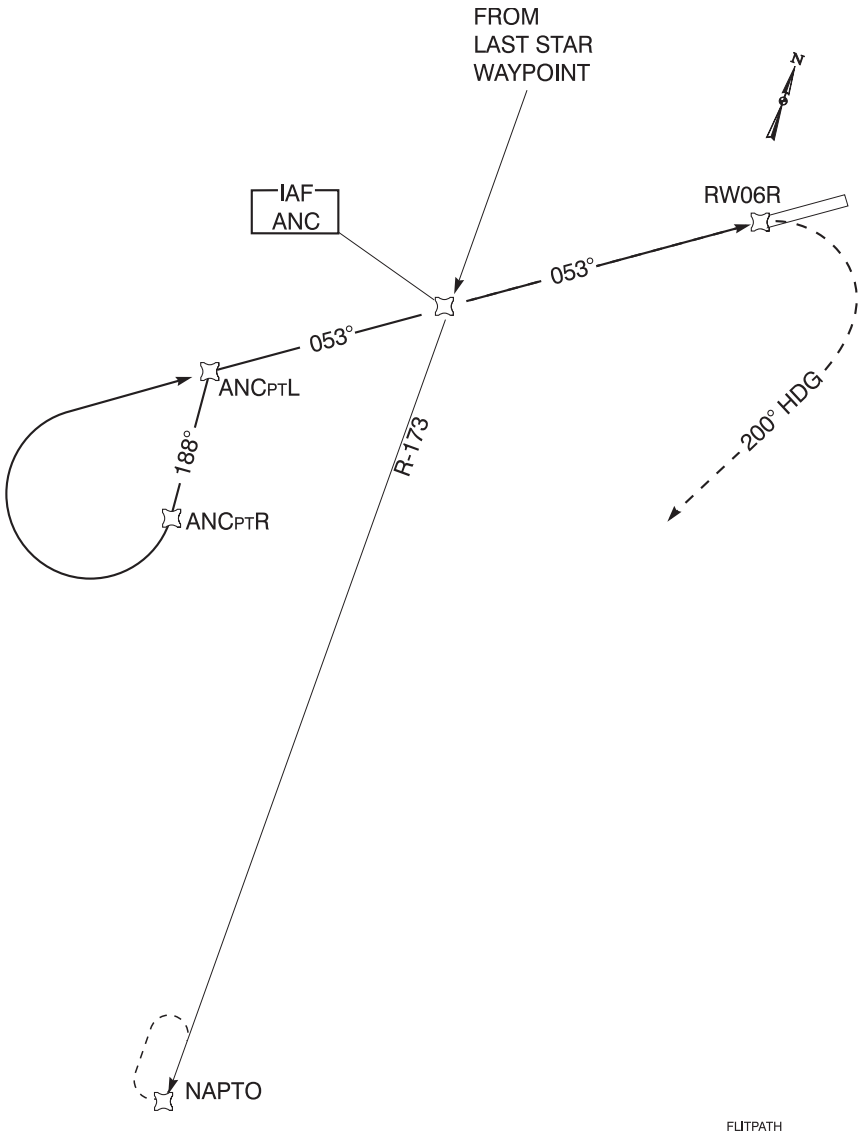


Figure 7-1 Typical Arrival Procedure

CONDENSED APPROACH PROCESS

The following describes the process of selecting the approach procedures.

1. **MOD, ACT ROUTE -** select departure/arrival index page.

2. **DEP/ARR INDEX -** select arrival at desired airport (origin or destination).

3. **ARRIVALS -** select APPROACH and APPROACH transition.

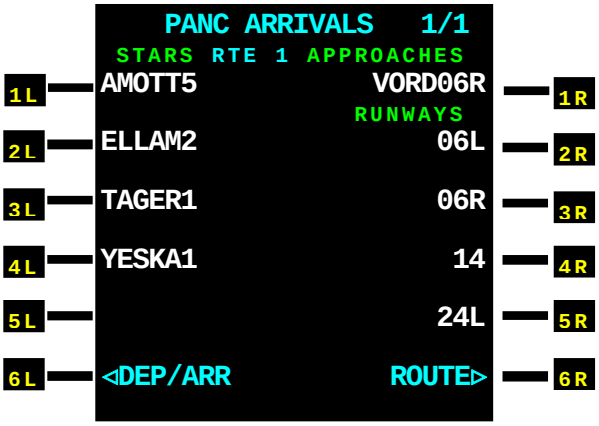
4. **MOD, ACT RTE x LEGS -** confirm that the approach procedure agrees with the ATC clearance, then make the modified route active.

A detailed description of each page is contained in Appendix A.

The procedure described below is based on the approach shown in Figure 7-2, and assumes that the STAR has already been selected and made active.

Display the DEP/ARR INDEX 1/1 page by pressing [DEP/ARR].

1. Select the desired arrival by pressing LSK 1R or 2R.



The ARRIVALS 1/X page is displayed, with the airport name included in the title line. Approaches are listed on the right hand side of the page, followed by the runways. The selected STAR and STAR transition are displayed on the left hand side of the page with the legend "<ACT>" beside the name. If a STAR has already been selected, only those approaches applicable to that STAR are displayed.

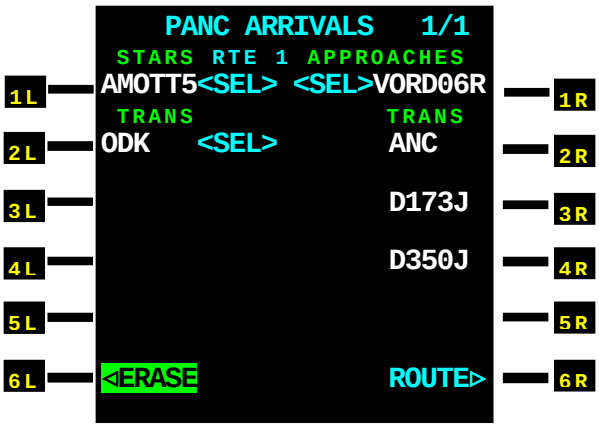
2. Display the desired approach by pressing [PREV] or [NEXT] as required, and select the approach by pressing the appropriate right hand LSK.

The approach list is replaced by the selected approach, with the legend "<SEL>" beside the name. Approach transitions (initial approach fixes) available for the selected approach are listed below it. If no transitions are available, the word "-NONE-" is displayed.

NOTE: Do not select a runway before the approach unless a VFR approach is planned, since this results in only the runway threshold waypoint being loaded into the route.

3. Display the desired approach transition by pressing [PREV] or [NEXT] as required, and select the approach transition by pressing the corresponding right hand LSK.

   The list of transitions is replaced by the selected transition, with the legend "<SEL>" beside the name.



NOTE: For CMA-9000 FMS arrivals, the selection of the approach transition may not be necessary in order to avoid duplication of numerous legs. (The STAR procedure may lead up to the FAF already).

4. Display the first approach leg (normally the approach transition waypoint, if selected) by pressing [LEGS] and [PREV] or [NEXT] as required.

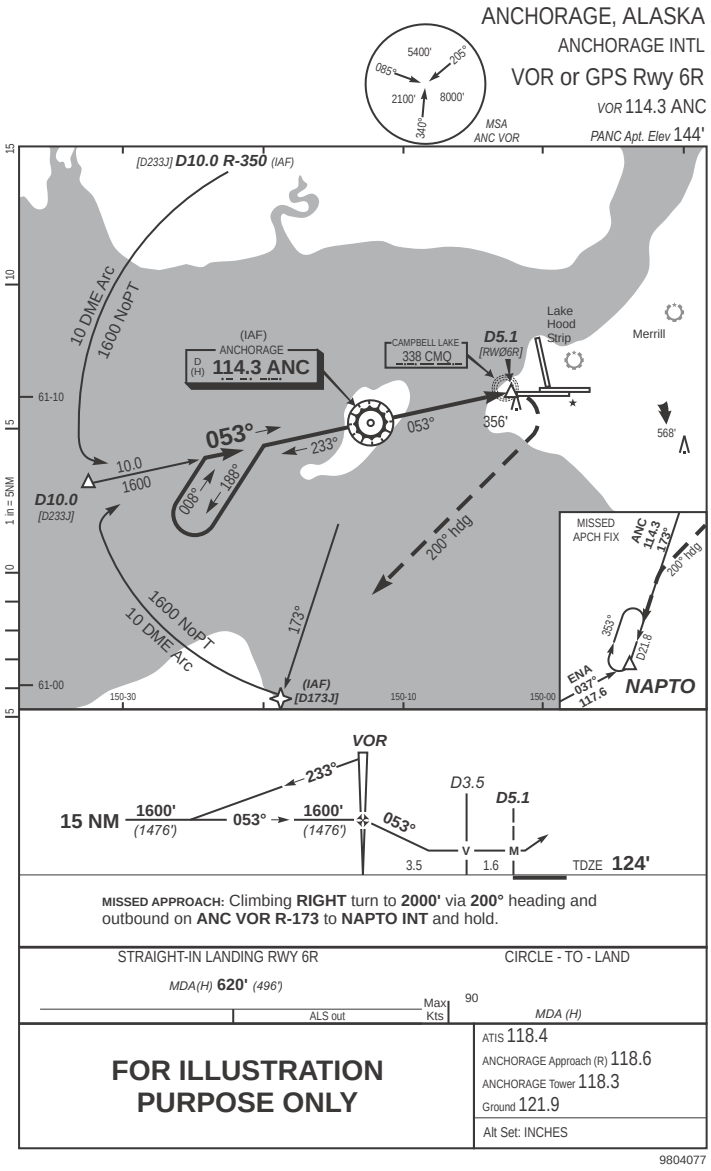
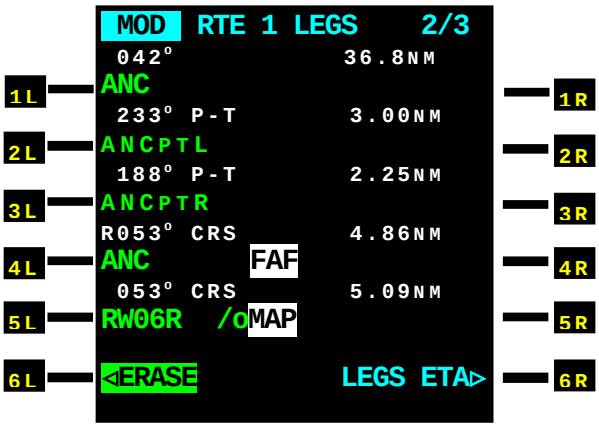
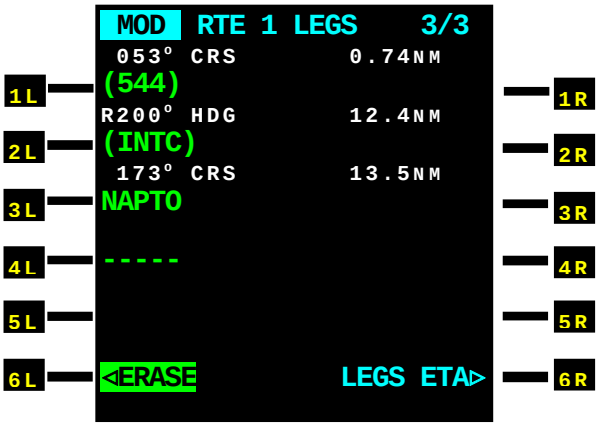


Figure 7-2 GPS Overlay Approach

5. Close-up the route discontinuity if present, as described in Section 5.



6. Verify the course, distance, speed/altitude advisory (if displayed), and procedural leg type information of each approach leg in turn, including the missed approach procedure, pressing [NEXT] as required to display all legs.



7. Make the selected approach and approach transition active by pressing [EXEC].

   On re-display of the ARRIVALS page, the active approach and approach transition are shown with the "<ACT>" legend beside the name.

ENTERING THE TERMINAL AREA

On entering the terminal area, the GPS instrument approach phase of flight (approach mode) will be armed automatically, or an operator action may be required using an instrument panel-mounted switch, depending on the installation. Refer to the AFMS for details.

When the radial distance from the destination airport becomes less than 30 nm; **and** the aircraft descends below 15,000 feet above airport elevation the following indication occurs:

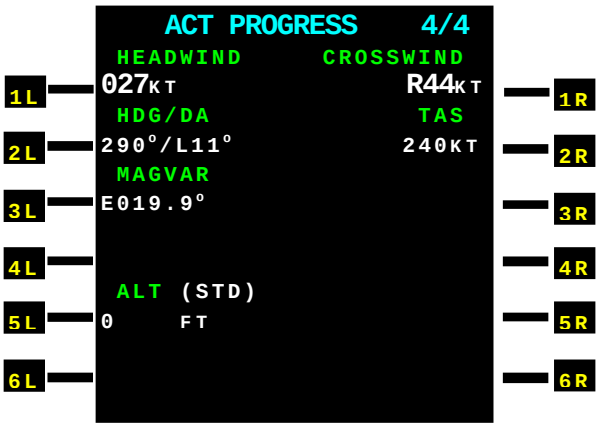
- On the PROGRESS 1/3 or 1/4 page the RNP value changes from 2 nm to 1 nm.
- NOTE: The above indication will occur only if the RNP had not already been set manually to a value less than or equal to 1 nm.

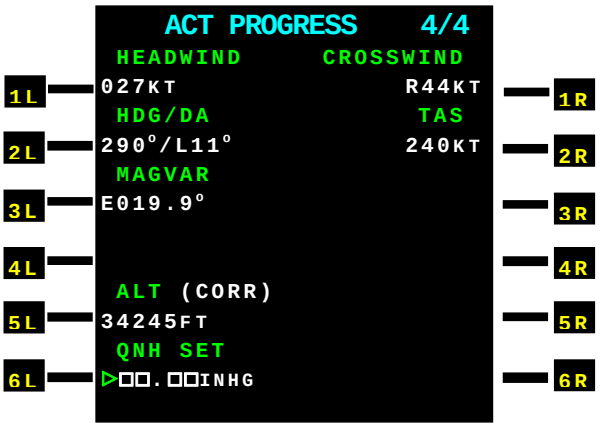
ALTIMETER CORRECTION

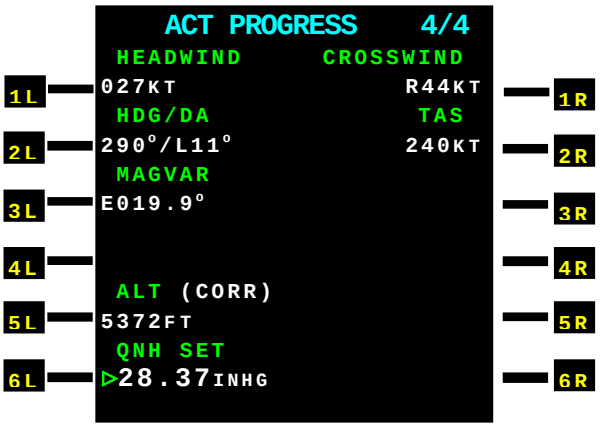
CAUTION: The CMA-9000 FMS altimeter setting entry should be verified using standard crew cross-check procedures because of the potential impact on missed approach navigation and guidance. The baro-corrected altitude generated by the CMA-9000 FMS using the manually-entered altimeter setting provides the automatic waypoint sequence function for altitude-terminated legs of the missed approach. An error in the CMA-9000 FMS altimeter setting may therefore cause the aircraft to exceed the protected airspace due to an early or late waypoint sequence.

NOTE: If the FMS is configured for VNAV, local altimeter setting is a mandatory input to enable the VNAV approach guidance.

Display the PROGRESS 3/3 or 4/4 page by pressing [PROG], [PREV].







When the installation provides for altitude, PROGRESS 4/4 page fields LSK 6L or 6R display the calculated mean sea level QNH for reference.

To enter an altimeter setting, enter value in Inches of Mercury (inHg) or in Millibars (MB) and line select it to LSK 6L respectively on PROGRESS 3/3 page or on PROGRESS 4/4 page.

The altimeter setting is displayed in LARGE font, and the baro-corrected altitude computed. This field is also displayed, in small font, when both the QNH and baro-corrected altitude are received by the FMS. This field is not displayed when the baro-corrected altitude is received but no external QNH is available to the FMS. This field is not displayed when the altitude source is GPS, INS or manual.

For entries units are automatically detected and decimal point entry is not required.

NOTE: This altimeter setting will be used until after landing, or until leaving the terminal area. *The altimeter setting is cancelled and the field displays dashes ("--.--") on leaving the terminal area (distance from the departure airport is greater than 33 nm, or the altitude is greater than 16,000 feet above airport elevation).*
When no altimeter setting is defined, field displays boxes (.) on entering the terminal area (distance from the destination airport is less than 30 nm, or the altitude is less than 15,000 feet above airport elevation). This indicates a mandatory input is required.

If the installation provides a baro-correction, a baro-corrected altitude is computed and displayed next to LSK 5L (PROGRESS 3/3) or (PROGRESS 4/4).

NOTE: The CMA-9000 FMS will generate the alert message "SET QNH" while airborne and 30 nm or less from the destination airport and below the transition level (TRANS LVL) if the system altitude is standard.

GPS INSTRUMENT APPROACH SELECTION

CAUTION: Straight line flight from waypoint to waypoint, as loaded from the navigation database, does not ensure compliance with the published procedure. Should differences arise between the approach chart and the navigation database, the published chart, supplemented by NOTAMS, takes precedence.

Provided the approach has been armed, when a valid approach has been selected and loaded into the active flight plan from the navigation database, the approach phase of flight is activated automatically 2 nm prior to the FAF, as described below.

NOTE: Selection of a new destination airport will result in the deletion of all approach and missed approach waypoints from the flight plan.

NOTE: If a holding pattern is defined at the FAF, the CMA-9000 FMS *will stay in terminal phase of flight on entering the hold and execute the approach on exiting the hold.*

Even in GPS navigation mode, the CMA-9000 FMS will not enter approach mode when flying an ILS, LOC-BC, LOC-circle to land, LDA, LOC, SDF and MLS type approach.

At 3 nm inbound to the FAF: The advisory message HSI SCALE TO CHANGE is displayed. In installations requiring manually arming of the approach mode, the ARM APPROACH advisory message is repeated, if the approach mode has not yet been armed.

At 2 nm inbound to the FAF: With GPS approach integrity predicted to exist at the FAF, the Missed Approach Point (MAP), and the current aircraft position, the CMA-9000 FMS transitions automatically to the approach mode, with the following indications:

- NPA annunciator illuminates and when configured, GPS APPR CAP remote annunciator also illuminates.
- HSI lateral deviation sensitivity changes from terminal to apporach phase of flight (1 nm to 0.3 nm) full scale.
- When configured, MISSED APPR prompt is displayed at LSK 6R on RTE LEGS 1/X, VNAV 1/1 and PROGRESS 1/3 or 1/4 pages.
- On the PROGRESS 1/3 or 1/4 page the RNP value changes from 1 nm to 0.3 nm.

NOTE: The legend of the "GPS APPR CAP" annunciator may vary depending on the aircraft installation. Refer to the AFMS/RFMS for further details.

NOTE: The 3 nm and 2 nm inbound distances to the FAF are measured along the CMA-9000 FMS-predicted path. These distances may not necessarily coincide with the DTG (distance to go) to the FAF displayed on the HSI/CDU. DTG is a direct distance to the waypoint.

CAUTION: If, as part of the approach procedure, the aircraft is cleared direct-to the Missed Approach Holding Point (MAHP), line selecting the MAHP identifier from the RTE x LEGS page to the scratchpad and moving it to the TO waypoint field will result in all remaining approach waypoints to be deleted.

To avoid this situation, the MAHP identifier must be manually typed into the scratchpad and then moved to the TO waypoint field. A discontinuity will be added after the direct-to waypoint followed by the rest of the approach procedure.

At the missed approach point: If the missed approach procedure has not been initiated, the following indications occur:

- TO/FROM flag on the HSI displays FROM indicating that the MAP waypoint has been overflown.
- Distance-to-go to the MAP displayed on the RTE LEGS 1/X and PROGRESS 1/3 or 1/4 pages starts to increase.
- Navigation and guidance continue along the extension of the final approach course.

If the FMS is configured for VNAV, the VNAV Approach terminates when crossing the runway threshold.

NOTE: That the missed approach point may not necessarily coincide with the runway threshold. For details on the CMA-9000 Display Panel *and (E)HSI indications associated to the VNAV Approach termination, refer to the "Vertical Navigation" sub-section.*

CAUTION: The missed approach point (MAP) is not sequenced unless the pilot manually initiates the missed approach by selecting MISSED APPR> prompt, when it is configured, (e.g. PROGRESS 1/X page) or by pressing the TOGA switch, if the MISSED APPR> is not configured.

NO APPR INTEGRITY alert: The CMA-9000 FMS determines the availability of approach integrity prior to the 2 nm point along track to the FAF.

Depending on the installation, the approach integrity is defined for civil and military navigation configuration as follows:

- For civil navigation configurations, the CMA-9000 FMS uses a Predictive RAIM function to predict the availability of approach integrity;
- For military navigation configurations without a Predictive RAIM function available, the current GPS Group NP (Navigation Performance) value is used in place of Predictive RAIM HIL and assumed to be the same at the FAF and MAP as at the current position.
- For military navigation configuration with EGI and civil GPS installed, the CMA-9000 FMS uses the Predictive RAIM function of the civil GPS, and the military GPS Navigation performance to determine the approach integrity. Moreover supplemental integrity is provided by comparing:
  - Civil and military GPS positions;
  - INS/GPS and military GPS positions.

  If the position difference between the 2 sensors compared is smaller than the maximum accuracy of the 2 sensors, the integrity is valid for the approach phase of flight.

If the Predictive RAIM of the CMA-9000 FMS determines the approach integrity will not be available at the FAF and/or the MAP, the CMA-9000 FMS remains in the terminal phase of flight and the following occurs at 2 nm inbound to the FAF:

- NPA annunciator does NOT illuminate and when configured, GPS APPR CAP remote annunciator does not illuminate.
- Alert message NO APPR INTEGRITY is displayed, with illumination of the remote MSG annunciator.
- When configured, MISSED APPR prompt (LSK 6R) is displayed on RTE x LEGS 1/X, VNAV 1/1 and PROGRESS 1/3 or 1/4 pages.
- HSI lateral deviation sensitivity and RNP remains at 1 nm.

If the FMS is configured for VNAV, the VNAV Approach terminates. For details on the CMA-9000 Display Panel and HSI indications associated to the VNAV Approach termination, refer to the "Vertical Navigation" subsection.

If after transitioning to the approach phase of flight, a loss of GPS approach integrity is detected after passing the FAF inbound, then the following events are delayed until 5 minutes after the loss is detected:

- The LNAV STEERING is set to INVALID;
- NO APPR INTEGRITY alert message displayed in the scratchpad;
- The discrete output APPROACH ENABLED (if configured) and the GPS APPR CAP remote annunciator extinguish;
- When configured, <MISSED APPR> prompt (LSK 6R) is displayed on RTE x LEGS 1/X and PROGRESS 1/3 or 1/4 pages.

NOTE: In GPS overlay approaches, there may be a difference between the distance-to-go displayed by the CMA-9000 FMS and the DME distance from the facility shown on the approach chart. Operators need to take this into account when interpreting the CMA-9000 FMS distance information.

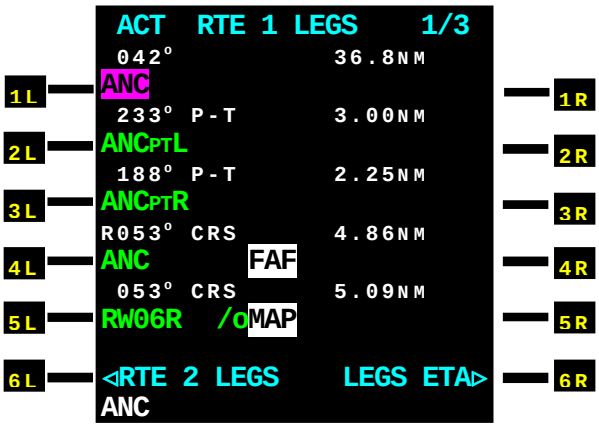
NOTE: If the HDOP exceeds 4 anytime during the approach, the approach will be cancelled immediately (e.g. no 5 min delay).

NOTE: Operators should be aware that when flying a GPS overlay approach, a charted track defined by a VOR radial may differ slightly from the CMA-9000 FMS-displayed course due to differences in the magnetic variation value used to define the VOR magnetic track and that computed by the CMA-9000 FMS local magnetic variation model. Both methods of navigation should result in the same track over the ground.

VECTORING TO FINAL APPROACH FIX

ATC (Air Traffic Control) clearance to the FAF can be handled by converting the loaded approach into a straight-in approach. This is accomplished by direct-to navigation to intercept the inbound course to the final approach fix (FAF).

With the ACT or MOD RTE LEGS 1/X page displayed:



1. Copy to the scratchpad, the FAF identifier, and move it to the TO WPT location by pressing LSK 1L.

2. Key-in the desired inbound course to the FAF and press <INTC CRS> (LSK 6R).

   The intercept course changes to LARGE font and is copied to the TO WPT course.

3. Verify the course and distance of the leg to the TO WPT, and make the direct-to intercept active by pressing EXEC.

   Navigation and guidance to intercept the inbound course to the FAF on the current heading is provided.

A straight-in approach can also be created in advance by inserting a temporary waypoint into the route as an initial approach fix (IAF) created as a place/bearing/distance waypoint based on, the FAF. On receipt of the ATC clearance, direct-to navigation to this temporary IAF, or to intercept the new leg inbound to the FAF, can then be performed.

CIRCLING APPROACHES

Navigation and guidance to the landing runway during a circling approach procedure can be obtained, while retaining the correct missed approach procedure waypoints, by using direct-to intercept navigation to the landing runway threshold waypoint at the appropriate time.

With the primary GPS or GPS overlay instrument approach procedure loaded into the route and made active:

1. At a convenient time, prepare for the circling maneuver by entering the landing runway number in the scratchpad.

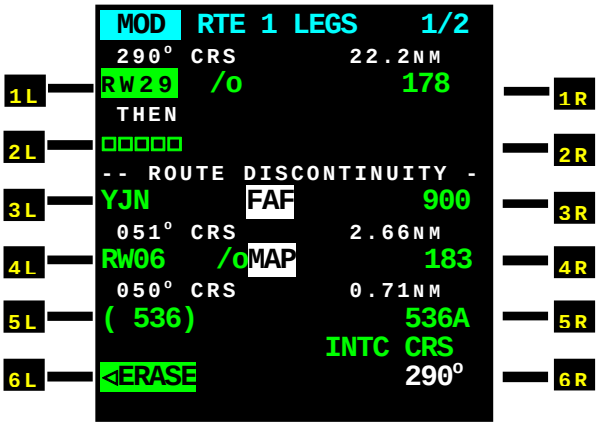
NOTE: The prefix "RW" is not required, but a leading zero must be used (e.g. 14 or RW14, 06L or RW06L).

2. Display the ACT RTE x LEGS 1/X page by pressing [LEGS], and move the landing runway number identifier to the TO WPT field by pressing LSK 1L.

   The "INTC CRS" prompt is displayed at LSK 6R with dashes ("---") as the default inbound course. A route discontinuity is inserted after the landing runway threshold waypoint.

3. Key in the landing runway heading as the intercept course, and select the direct-to intercept mode by pressing <INTC CRS> (LSK 6R).

   The inbound course is moved to the INTC CRS prompt field in LARGE font and is also copied to the to waypoint course.



4. Verify the course of the intercept leg and distance to the to waypoint.

NOTE: Do not press [EXEC] until visibility conditions permit the circling maneuver to the landing runway. Navigation and guidance displays and autopilot/flight director operation will continue to be referenced to the current leg of the original instrument approach procedure until [EXEC] is pressed.

5. When visibility conditions permit, make the direct-to course intercept to the landing runway active by pressing [EXEC].

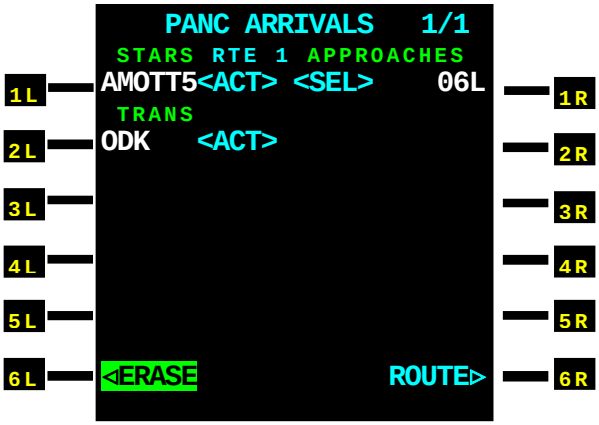
   Navigation and guidance to the landing runway threshold waypoint on the selected inbound course is provided.

NOTE: If a missed approach is necessary during the circling maneuver, direct-to navigation (with or without an intercept) to the missed approach holding fix, or to an intermediate missed approach waypoint, will initiate the required navigation and guidance.

VFR APPROACHES

Display the ARRIVALS 1/X page for the desired airport by pressing DEP/ARR.

NOTE: If the DEP/ARR INDEX 1/1 page is displayed, select the desired arrival airport by pressing the appropriate <ARR> prompt (LSK 1R or LSK 2R).



1. If an approach is already selected, delete it by pressing LSK 1R.

   All approaches and runways are listed.

2. Display the desired runway by pressing [PREV] or [NEXT] as required and select it by pressing the appropriate right hand LSK.

   The APPROACHES field title is replaced by RUNWAYS with the selected runway displayed below it with the legend "<SEL>".

3. Display the MOD RTE x LEGS 1/X page by pressing [LEGS].

   The runway threshold waypoint is inserted into the route preceeded by a route discontinuity.

4. Create an initial approach fix at a suitable distance from the runway threshold on the backwards extension of the runway heading using a place/bearing/distance temporary waypoint.

NOTE: The temporary IAF is optional since direct-to navigation to the runway threshold intercepting the inbound course will accomplish the same result.

5. Make the modified route active by pressing [EXEC].

   Direct-to navigation to the temporary IAF, or to intercept the inbound leg to the runway threshold will provide the necessary navigation and guidance.

MISSED APPROACH INITIATION

CAUTION: If the missed approach described on the LEGS page differs from the published missed approach, then fly the missed approach utilizing the Autopilot HDG SEL mode instead of LNAV (FMS).

CAUTION: If direct-to navigation is executed at low altitude while in the approach phase of flight, an immediate normal direct-to maneuver is performed, and the CMA-9000 FMS reverts to terminal phase of flight. The crew remains responsible at all times for complying with all obstacle avoidance and altitude restrictions during the direct-to navigation.

CAUTION: When the first leg of a missed approach is an altitude-terminated leg and the missed approach point is crossed at an altitude that higher than the normal MDA, the FMS will sequence the altitude-terminated leg earlier than would normally be the case, and in some cases will result in an immediate turn upon crossing the Missed Approach Point, in the direction of the leg following the altitude-terminated leg. If that following leg involves intercepting a course, then under certain wind conditions and geometries of the leg to be intercepted, a valid intercept may not occur. In such case, the FMS will command a Direct-To the termination of the leg to be intercepted. The DIRECT-TO FIX alert message will be generated. In such cases the pilot should fly the missed approach manually or using the Autopilot HDG SEL mode instead of the LNAV (FMS) mode, until the aircraft is in an acceptable position to continue with FMS commanded flight path.

When in the approach phase of flight, the missed approach can be initiated at any time by:

1. Pressing <MISSED APPR> (LSK 6R) (e.g PROGESS 1/X page) when configured, or

2. Pressing the standard Take-Off/Go-Around (TOGA) switch, or

3. Initiating direct-to navigation to any waypoint.

When a missed approach is initiated:

- The CMA-9000 FMS reverts to the terminal phase-of-flight.
- NPA annunciator extinguishes when configured, GPS APPR CAP remote annunciator also extinguishes.
- HSI NAV flag disappears from view (if it had been displayed as a result of lack of approach integrity).
- When configured, the <MISSED APPR> prompt (LSK 6R) disappears from the RTE x LEGS 1/X, VNAV 1/1 and PROGRESS 1/3 or 1/4 pages.
- NO APPR INTEGRITY alert message disappears (if displayed).
- On the NAV STATUS page, RNP value changes from 0.3 nm to 1.0 nm.
- On overflying the MAP, navigation and guidance sequences to the first waypoint of the missed approach procedure.

Navigation and guidance for the missed approach procedure is provided in the normal fashion, including the holding pattern at the missed approach holding fix (if coded in the navigation database), except that manual leg sequencing may be required for legs with alititude terminations, as noted below.

CAUTION: During Missed Approaches, the CMA-9000 FMS does not support the low speed flight regime of aircraft in which the bank angle is limited to 15 degrees as a function of airspeed and aircraft flap/slat configuration. Where required by the magnitude of the track angle change, the CMA-9000 FMS will use up to a maximum of 30 degree bank angle in computing the roll steering command to the autopilot. Crews should therefore exercise caution when engaging LNAV in this flight regime and may wish to use the heading select mode until the required airspeed is achieved that allows larger bank angles than 15 degrees. No difficulties are anticipated for engaging LNAV when track angle changes are less than 15 degrees.

The results of the various means of initiating a missed approach are summarized below.

1. When the MISSED APPR prompt is configured and the missed approach is initiated by pressing the MISSED APPR line select key, the LNAV steering output remains valid, and the autopilot/flight director therefore will remain in LNAV-engaged mode (if active). The CMA-9000 FMS reverts to the terminal phase-of-flight.

2. If the missed approach is initiated by pressing the TOGA switch, the LNAV autopilot/flight director mode automatically remains valid. The CMA-9000 FMS reverts to the terminal phase of flight.

3. If the autopilot/flight director mode is changed from LNAV-engaged to any other mode, the CMA-9000 FMS steering signal output will no longer be used, however the CMA-9000 FMS remains in the approach phase of flight.

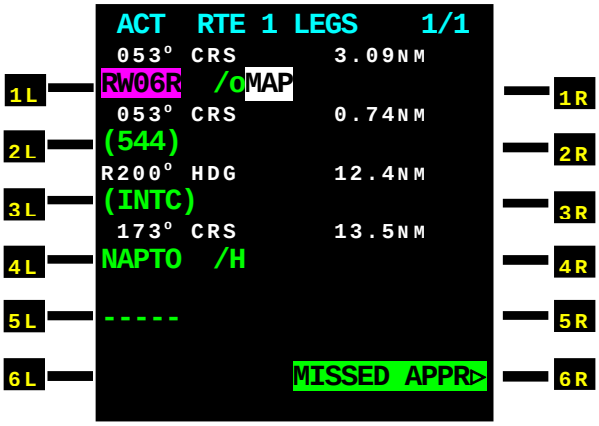
4. When configured, if the <MISSED APPR> LSK is pressed before reaching the MAP, navigation and guidance is provided along the final approach course until reaching the MAP, followed by sequencing to the missed approach procedure waypoints.

Manual Waypoint Sequencing: When a baro-corrected altitude input is provided to the *CMA-9000 FMS*, the sequencing of missed approach legs with an altitude termination (waypoint identifier is an altitude displayed in parentheses) will be automatic. If no baro-corrected altitude input is available, automatic leg sequencing is not possible at such waypoints, and a manual leg sequence must be accomplished. When such a waypoint becomes the active waypoint, the following occurs:

- MANUAL WPT SEQUENCE alert message is displayed with illumination of the remote MSG annunciator.
- <NEXT WPT> prompt is displayed at LSK 6R on the RTE x LEGS 1/X and PROGRESS 1/3 or 1/4 pages. Waypoint sequencing occurs when <NEXT WPT> is pressed.

NOTE: When a holding pattern is part of the missed approach procedure, the CMA-9000 FMS will automatically exit the holding pattern after performing a single race track. If it is required to continue the hold, a new holding pattern must be manually entered. Please refer to the holding pattern section for details.

With ACT RTE LEGS 1/X displayed:



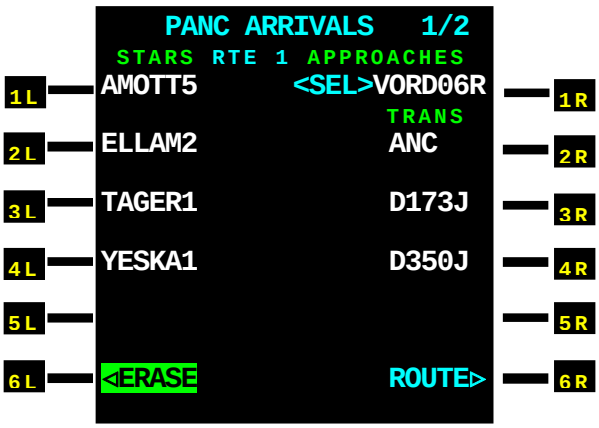
1. Initiate the missed approach by pressing <MISSED APPR> (LSK 6R).

   Navigation and guidance for the first missed approach leg is provided.

NOTE: The <MISSED APPR> prompt will only be displayed if it is configured otherwise the sole means to initiate the missed approach manouver is to press the TOGA switch.

NEW APPROACH AFTER A MISSED APPROACH

With the desired ARRIVALS 1/1 page displayed:



1. Delete the "<ACT>" approach by pressing LSK 1R.

   All approaches and runways are displayed.

2. Select the desired approach (and transition) by pressing the appropriate right hand LSK(s).

NOTE: If the same approach is to be flown a second time, delete and reselect the existing approach, or approach transition, by pressing LSK 1R or LSK 2R and then pressing the appropriate right hand LSK(s).

3. Display the MOD RTE x LEGS 1/X page by pressing [LEGS].

   The waypoints of the new approach procedure are separated from the TO WPT by a route discontinuity.

4. Initiate navigation to the first waypoint of the new approach procedure by direct-to navigation, with or without an intercept, as required by the clearance.

5. Verify the course and distance of the new approach procedure legs, pressing [PREV] or [NEXT] as required.

6. Make the new approach procedure active by pressing [EXEC].

NOTE: EXECution of the new approach procedure causes all remaining waypoints of the current missed approach procedure to be deleted, except the active waypoint. If automatic leg sequencing from the active waypoint to the first waypoint of the new approach procedure is desired, simply close up the route discontinuity by copying the first waypoint of the new approach procedure to the scratchpad and pressing LSK 2L. Make the new route active by pressing [EXEC].

MODIFYING APPROACH PROCEDURES

To accommodate changes in approach clearances, new procedures can be selected at any time.

Display the ARRIVALS 1/1 page for the desired airport by pressing [DEP/ARR].

NOTE: The ARRIVALS 1/1 page for the destination airport will be displayed by default if the aircraft is more than halfway to its destination. Otherwise, if the DEP/ARR INDEX 1/1 page is displayed, select the desired arrival airport by pressing the appropriate <ARR> prompt (LSK 1R or LSK 2R).

1. Press the appropriate right LSK. Pressing LSK toggles the selection status between selected and not selected.

The selected approach procedure (or portion thereof) is deleted. Repeat this process as required.

NOTE: Deleting the approach will re-display all approaches and runways. Deleting only the approach transition results in display of only the transitions appropriate to the selected approach.

2. Select the new procedure(s) as described in previous sections.

3. Display the MOD RTE x LEGS 1/X page by pressing [LEGS], and verify the course and distance of the legs of the modified approach procedure, pressing [PREV] or [NEXT] as required.

4. Make the modified route active by pressing [EXEC].

NOTE: Special care is required when verifying the legs of a modified approach procedure, particularly when only a partial reselection has been made. Route discontinuities may exist, and certain waypoints of the retained segment(s), which may have been deleted automatically as part of the loading of the original approach procedure, may have to be re-inserted individually into the route by manual entry.

APPROACH MODE DESELECTION

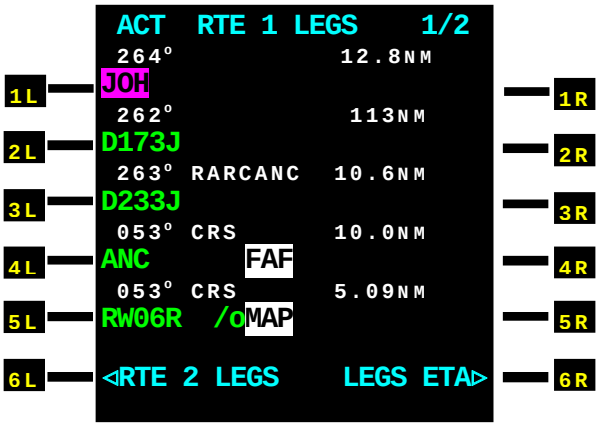
If the approach mode is active (e.g. the transition to the approach phase of flight occurred at the 2 nm point inbound to the FAF), it can be deselected, while retaining the waypoints of the approach and missed approach, by:

1. initiating a missed approach procedure as described above or

2. executing direct-to navigation to any waypoint as described in Section 9; or

3. if not yet at the FAF, by defining a holding pattern at the FAF, as described in Section 10.

DME ARC INTERCEPTION



The CMA-9000 FMS provides automatic, autopilot-coupled interception of a DME arc at the arc's starting point. Interception of the arc at an intermediate point on the arc must be accomplished manually, as follows:

1. Disengage LNAV.

2. Perform a Direct to the arc's starting waypoint.

3. Manually fly the intercept.

NOTE: When the arc capture criteria are met (combination of XTK and TKE), leg sequencing to arc navigation occurs automatically, indicated by an automatic waypoint sequence to the waypoint terminating the arc, and rotation of the HSI course pointer to the arc's tangential course at the aircraft position.

4. Re-engage LNAV.

or:

Autopilot-coupled interception of the arc at an intermediate point on the arc may be accomplished by moving the arc's starting point along the arc to the desired radial from the DME station as follows:

With the arc's starting waypoint identifier in scratchpad:

1. Key in /, radial of the desired intermediate point on the arc from the DME station e.g. D173J/220.

2. Display the arc's starting waypoint location in the route by pressing [LEGS] and [NEXT] or [PREV] as required.

3. Line select the scratchpad entry to the arc's starting waypoint location.

The new arc's starting waypoint is displayed with a new identifier derived from the entered radial e.g. D220J.

4. Make the modified route active by pressing [EXEC].

Once established on the arc, the HSI course pointer displays the tangential course along the arc path. Lateral deviation is measured from this tangential course. Near the end of the arc, sequencing to the next waypoint occurs automatically, with the turn anticipation point computed such that no overshoot of the next navigation leg will occur up to maximum ground speed of 315 knots.

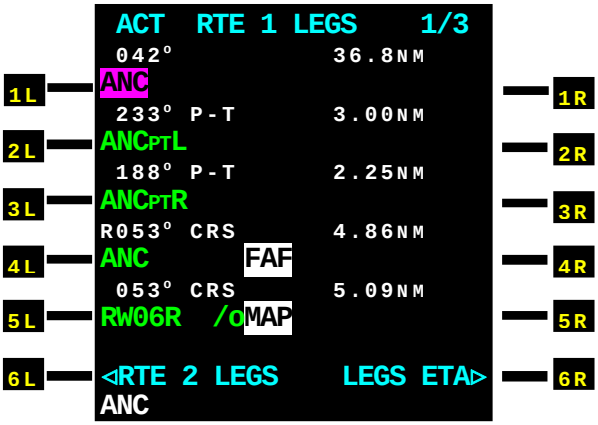
At any time on the arc, the message HIGH ARC EXIT SPEED may be generated to indicate that the combination of true air speed and wind will cause an overshoot of the next navigation leg.

DELETION OF PROCEDURE TURNS

If an approach transition including a procedure turn has been loaded into the route, it can be readily deleted and converted into a straight-in approach.

With the ACT or MOD RTE x LEGS 1/X page displayed:

1. Line select to the scratchpad (do not key in), the procedure turn reference fix LSK 4L.



2. Move the procedure turn reference fix to the TO WPT location by pressing LSK 1L.

   The procedure turn reference fix and the two outbound waypoints are deleted from the MOD route, and the FAF waypoint becomes the TO WPT, with the correct inbound course to the FAF displayed as the default intercept course.

NOTE: The procedure turn also can be deleted by deleting the reference fix by means of the [CLR] functional key. However, depending on the order of the deletion and direct-to navigation actions, the intercept inbound course may have to be entered manually since the default value will be that of the original leg inbound to the reference fix.

SECTION 7-2

VERTICAL NAVIGATION

GENERAL

This section applies to those aircraft installations where the FMS is configured for VNAV. Refer to AFMS for further details.

Current CMA-9000 FMS implementation supports a VNAV Approach mode. The Vertical Navigation (VNAV) function provides **advisory geometric** vertical guidance on the HSI glideslope scale and is **not coupled** to the autopilot/flight-director system. An invalid condition for VNAV will bring the glideslope flag in-view and prevent display of misleading information.

CAUTION: When the VNAV approach function is utilised during non-precision approaches, it is **mandatory** for the crew to have the VNAV approach page displayed on the CMA-9000 Display Panel.

In all instances, the altimeter **MUST** remain the primary altitude source for the crew.

VNAV APPROACH MODE

Within the terminal area, the FMS provides airplane vertical deviation advisory information, with respect to a path projected backward at a specified vertical path angle (VPA) from the runway threshold crossing height (TCH) and passing through the final approach fix (FAF). For vertical profile view, refer to Figure 7-3. Laterally, the glidepath is centered on the final approach course with its width limited to +/- 6.0 nm inbound to FAF and limited to +/- 0.6 nm from FAF up to the runway threshold. If the aircraft position is outside this zone defining the glidepath width, or if the aircraft is not inbound to the landing runway vertical deviation advisory information will not be provided (e.g. glideslope pointer will be biased out-of-view). For plan view, refer to Figure 7-4.

NOTE: FMS must be in GPS NAV mode for display of vertical deviation information.
If the selected approach name (as it appears on the VNAV page title) does not include a runway number (e.g. 19L), then the VNAV glidepath calculation cannot be activated since the approach does not have an associated runway threshold.

The glidepath will automatically be activated upon entering the terminal area, provided the aircraft is positioned within the zone defining the glidepath width as described above.

When the glidepath is activated, the deviation from the vertical path is being actively computed and displayed on the HSI/ADI depending on the installation.

The FMS can be configured for temperature compensation. The compensation may be required for destination airport temperature conditions deviating from the ISA temperature. When configured a system alert message, "SET AIRPORT TEMP" will be displayed in the scratchpad when the aircraft enters the terminal area. If the airport temperature is entered into the FMS, the vertical deviation information will include temperature compensation.

CAUTION: In warm temperature conditions, the temperature compensated altitudes presented on the VNAV Approach and LEGS CMA-9000 Display Panel pages will be lower than the charted procedure altitudes.

Temperature compensation is applied to altitudes for all approach and approach transition waypoints.

The FMS determines the VPA for the selected approach based on the following priority scheme :

1. Use VPA encoded in the navigation database ; or

2. Compute VPA based on vertical path joining FAF altitude plus 50ft and runway threshold elevation plus 50ft ; or

3. If no FAF altitude is encoded, use 3.00 degrees vertical path projected backward from the runway elevation plus 50ft.

NOTE: When following the VNAV profile, upon overflying the FAF, the crew may notice a difference between the indicated altitude and the FAF charted altitude. The indicated altitude will be ***50 ft or more above*** *the FAF charted altitude. The reason for this difference is because the FMS computes the target vertical profile using the VPA determined by the above priority scheme.*

If the computed VPA is below 2.75 degrees, an alert message ("LOW GLIDEPATH ANGLE") will apprear in the scratchpad.

If the computed VPA exceeds 3.77* degrees, an alert message ("HIGH GLIDEPATH ANGLE") will appear.

NOTE: Maximum value is configurable up to 10.0 degrees depending on the installation.

CAUTION: If LOW or HIGH GLIDEPATH ANGLE message are displayed, the crew has to verify the VPA displayed on the VNAV approach page. If VPA is appropriate, the approach can be conducted. If VPA is inapropriate (exceed aircraft performance limitation or does not correspond to approach plate value) stop using the FMS for this advisory VNAV approach and advise maintenance operation. Guidance will still be provided in case HIGH/LOW glidepath message are displayed.

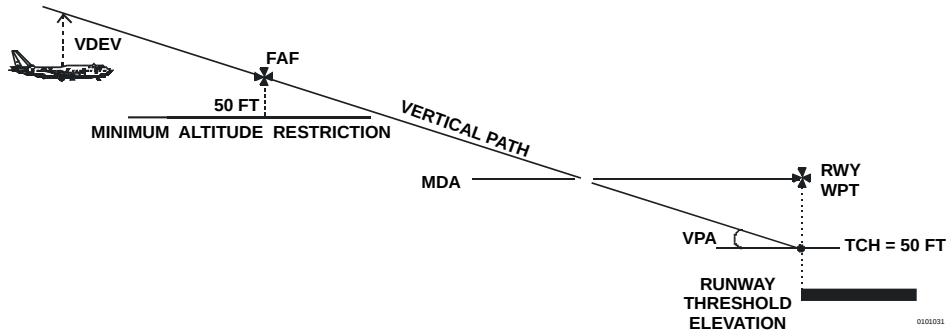


Figure 7-3 Profile View of Vertical Path for a VNAV Approach

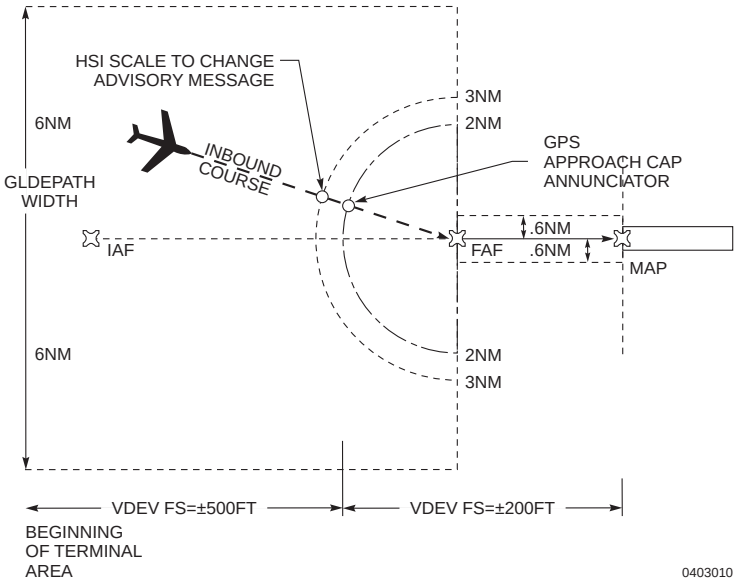
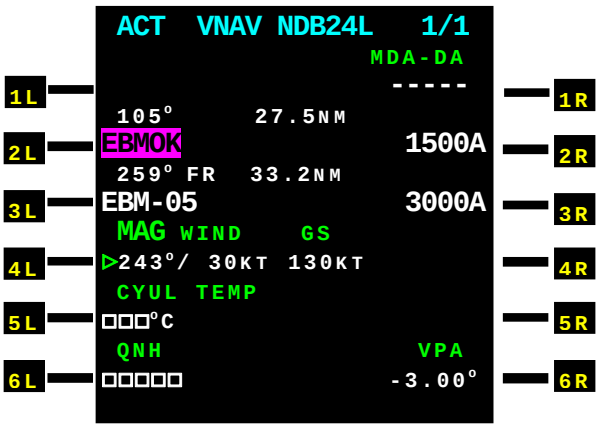


Figure 7-4 Plan View of the VNAV Approach Zone Along the Glidepath

PROCEDURE FOR SELECTING VERTICAL NAVIGATION

1. With a valid approach selected, press [VNAV] to display the VNAV Approach page.



2. If baro-corrected altitude is not available to the FMS then QNH entry from CMA-9000 Display Panel pages **must** be performed. In this case white boxes are displayed at LSK 6L
Enter the QNH value (refer to NOTE [1]).

3. Assuming a Minimum Descent Altitude-Decision Altitude (MDA-DA) of 710ft, enter 710 in scratchpad.
Enter the MDA-DA at LSK1R. The MDA entry is optional.

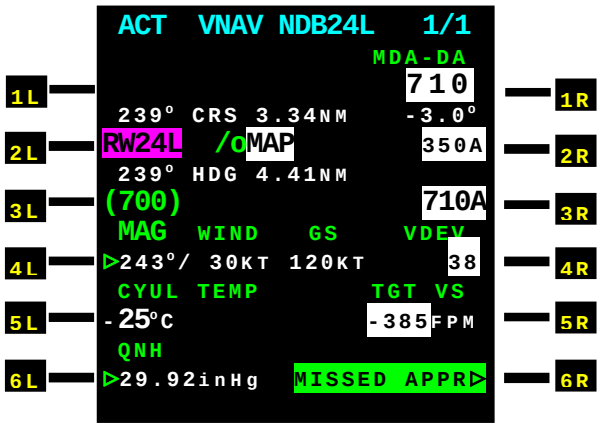
4. If the temperature entry is configured to "MANDATORY", then a manual entry of the temperature **must** be performed. In this case white boxes are displayed at LSK 5L otherwise dashes are displayed.

   The temperature entry must be within -55°C to +55°C.

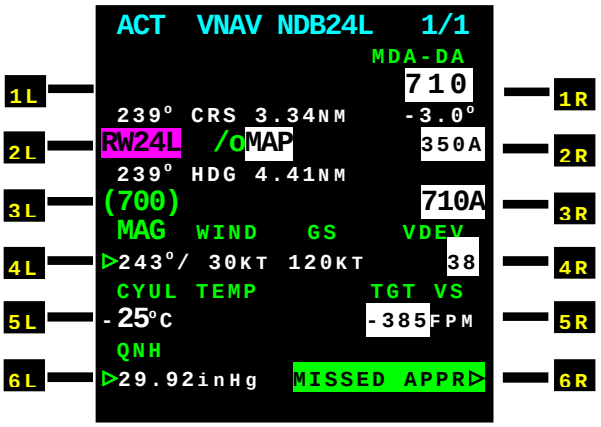
4.1 Assuming a temperature of -25°C is reported at the destination airport, enter –25 in the scratchpad. Press LSK 5L and then press the [EXEC] key. All altitudes, including the MDA-DA, for approach and approach transition waypoints are corrected for the specified temperature *(*refer to NOTE [2] and [3]).
To review the charted altitudes, simply clear the temperature field by pressing [CLR], LSK 5L on the VNAV Approach page and then [EXEC].

4.2 Press [LEGS] to review temperature compensated altitudes. Adjusted altitudes will be displayed in reverse video white.

5. When the glidepath is active, current aircraft altitude relative to the vertical path is indicated by the installation dependent vertical deviation/glideslope pointer. The computed vertical deviation and target vertical speed are displayed on the active VNAV Approach page [NOTE 5].



6. Coincident with the lateral deviation scale change, the vertical deviation scale changes at 2 nm inbound to the FAF from 500ft full-scale to 200ft full-scale. When on final approach, a Missed Approach prompt appears at LSK 6R when it is configured.



7. The VNAV Approach terminates when crossing the runway threshold. If sequencing the missed approach point and the same approach is re-selected, the entered MDA-DA value is retained. Similarly, the QNH and Airport Temp entries are retained if approach for same destination airport is re-selected.

NOTES: [1]: CMA-9000 Display Panel entry of QNH can be in inHg or mb. Decimal point need not be entered. Local altimeter setting within terminal area is a mandatory input to enable VNAV approach guidance. In installations where baro-corrected altitude is provided to the FMS from an Air Data Computer the QNH field (LSK 6L) will be blank.
Refer to the section titled:
"CMA-9000 Display Panel ENTERED ALTIMETER CORRECTION"
for further details.

[2]: When TEMP ENTRY field of VNAV CONFIG page is set to ALERT, and no data entry was made previously an alert message "SET AIRPORT TEMP" will be displayed in the scratchpad at LSK 5L upon entering the terminal area with an approach selected.

[3]: If an inactive route definition is in progress upon a temperature entry in the VNAV approach page, the message "!CONFIRM INACTIVE ROUTE" will be displayed.

[4]: If the aircraft is outside of the zone defined by the glidepath width as specified above or if the aircraft is not inbound to the landing runway:

- *Target vertical speed and vertical deviation is not displayed on this page.*
- *The vertical deviation/ glideslope pointer is biased-out-of-view.*
- *The VPA for the approach is also displayed at LSK 2R and/or LSK 3R when the FAF or the MAP is the active waypoint or NEXT waypoint.*

VNAV APPROACH TERMINATION

The VNAV Approach mode will become unavailable under any of the following conditions:

- The FMS navigation mode is not GPS (or cGPS or mGPS or INS/GPS).
- Altitude input is invalid.
- FMS detects an abnormal variation of the altitude rate.
- FMS system valid flag set invalid by hardware fault.
- FMS altitudes disagree.
- FMS altitude is not baro-corrected in terminal area.
- For nav database approaches: the computed glidepath angle for the selected runway exceeds 10.00 degrees.

The VNAV Approach page will cease to display ACT in the title and the FMS will bias the HSI Vertical Deviation pointer out of view.

SECTION 7-3

TACTICAL APPROACH

See Section 11 for specifics on the TACTICAL APPROACH function.

SECTION 8 - POST FLIGHT PROCEDURES

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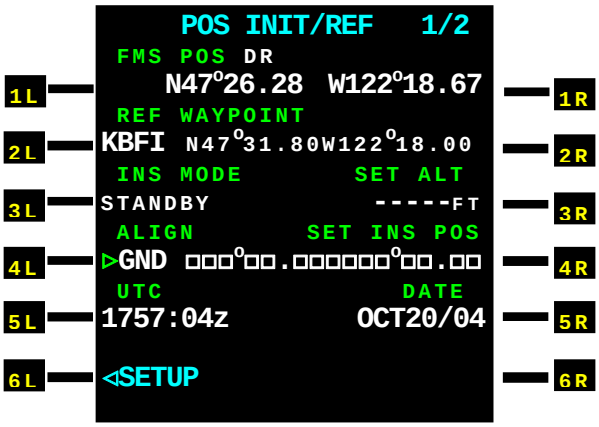
SECTION 8

POST-FLIGHT PROCEDURES

POSITION ACCURACY CHECK - FLIGHT TERMINATION

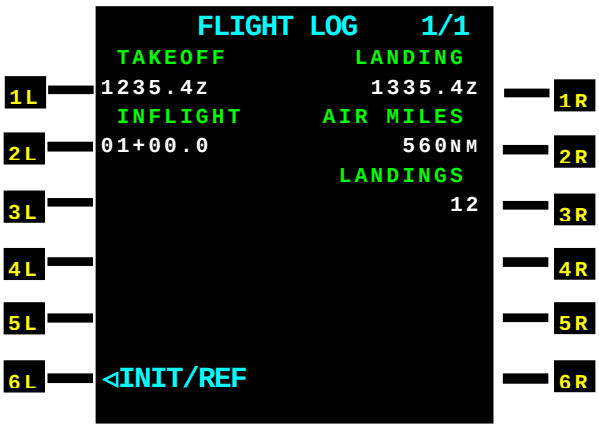
1. With the INIT/REF INDEX 1/2 page displayed, press POS INIT (LSK 2L).



2. Verify the present position.

NOTE: A position check can be performed, when over a known reference point, in flight by copying the present position into the scratchpad by pressing LSK 1R. This frozen present position can be stored for later analysis as a temporary waypoint at the end of the active route.

TAKE-OFF AND LANDING TIMES (if configured)



1. Display the INIT/REF INDEX 2/2 page by pressing INIT REF, and then NEXT.
2. Display the FLIGHT LOG 1/1 page by pressing FLIGHT LOG (LSK 6L).

NOTE: The initial takeoff time should only be reset following a ground to air transition for FIXED wing aircraft and the first ground to air transition following a cold start on the ground for ROTOR aircraft.

SECTION 9 - DIRECT-TO/INTERCEPT

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SECTION 9

DIRECT-TO/INTERCEPT

INTRODUCTION

The active flight plan may be modified at any time by the entry of a direct-to procedure to navigate the aircraft directly to a downtrack waypoint or to intercept a course inbound to a waypoint. The direct-to waypoint may be an existing waypoint on or off the route. Entry of an off-route waypoint will create a discontinuity in the active route which can be closed up as described in Section 5. When the direct-to waypoint is already part of the current flight plan, all flight plan waypoints prior to the direct-to waypoint will be deleted.
The following describes the Direct-To a fixed course/Direct-To a heading and the Direct-To a waypoint procedures.

NOTE: The direct-to function can be defined as standard or moving_dtk (via a configurable option). In addition to this selection, a tactical direct-to function can also be available. When both are configured, they co-exist in the FMS. (Refer to Section 11 for the tactical direct-to function or the direct-to a moving waypoint).

NAVIGATION OF DIRECT-TO A WAYPOINT WHEN CMA-9000 FMS IS CONFIGURED FOR A "STANDARD" DIRECT-TO

When a Direct-to a waypoint procedure is executed the CMA-9000 FMS calculates an intercept course to the waypoint based on the aircraft velocity, present position, track, and wind velocity.

Roll steering command, track angle error (TKE), and lateral deviation (XTK) are provided to guide the aircraft to intercept the calculated course.

Figure 9-1 illustrates the Direct-To a waypoint procedure.

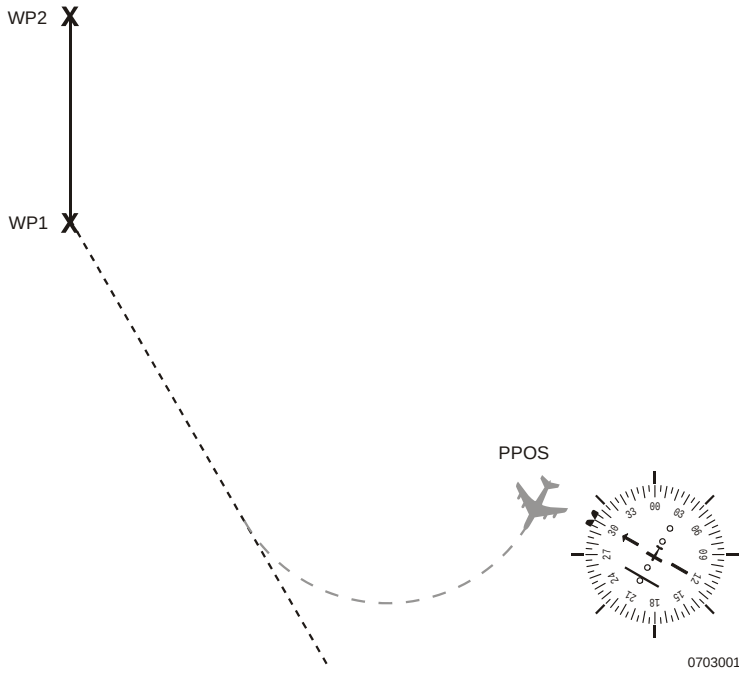


Figure 9-1 "Standard" Direct-To a Waypoint Procedure

DIRECT-TO A WAYPOINT PROCEDURE

A. DIRECT-TO A WAYPOINT IN THE ACTIVE ROUTE

1. Display ACT RTE x LEGS 1/X page by pressing [LEGS].
2. Display the desired waypoint by pressing [NEXT] or [PREV] as required.
3. Key in, or copy the waypoint identifier into the scratchpad by pressing the appropriate LSK.
4. Return to the first ACT RTE x LEGS 1/X page by pressing [LEGS] or [PREV] as required.
5. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.

   "ACT" status on the title line is replaced by "MOD". The direct course and distance from aircraft present position to the TO waypoint is displayed.

6. Verify the inbound course and distance of the leg to the TO WPT.

   Information on any other page can be verified prior to making the direct-to leg active.

7. Make the direct-to leg active by pressing [EXEC].

   NOTE: Waypoints between the old TO WPT and new one are deleted from the active route. The "MOD" status in the title line is replaced by "ACT". Navigation and guidance change to the new leg from present position to the TO waypoint. If autopilot-coupled, the aircraft will immediately start to turn towards the direct-to waypoint.

   NOTE: A direct to a waypoint may also be achieved by using the DIRECT-TO prompt.

B. DIRECT-TO AN OFF-ROUTE WAYPOINT

1. Key in the off-route waypoint identifier.
2. Display the ACT RTE x LEGS 1/X page by pressing [LEGS].
3. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.

   "ACT" status on the title line is replaced by "MOD". The direct course and distance from aircraft present position to the TO waypoint is displayed.

   "THEN" and "ROUTE DISCONTINUITY" lines are inserted immediately after the new TO waypoint.

4. Verify the inbound course and distance of the leg to the TO WPT.
5. Make the direct-to leg active by pressing [EXEC].
6. Close up the route discontinuity as defined by the ATC clearance.

NOTE: This procedure may result in the creation of an "orphan" waypoint. That is, an isolated waypoint with no connection to the rest of the flight plan.

C. DIRECT-TO A WAYPOINT IN THE INACTIVE ROUTE

1. Display the inactive RTE x LEGS 1/X page by pressing [RTE] followed by LSK 6L <RTE 2> or <RTE 1> (e.g: In order to access whichever is the inactive route, e.g: RTE 1 or RTE 2).

   NOTE: The active RTE page field will show the text "ACT" to the left of the title of the RTE page when a route/flight plan exists whereas the inactive route does not show the text "ACT".

2. Display the desired waypoint by pressing [NEXT] or [PREV] as required.

3. Key in, or copy the waypoint identifier into the scratchpad by pressing the appropriate LSK.

4. Return to the first inactive RTE x LEGS 1/X page by pressing [LEGS] or [PREV] as required.

5. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.

6. Verify the inbound course and distance of the leg to the TO WPT.

   Information on any other page can be verified prior to making the direct-to leg active.

7. Insert the direct-to leg in the inactive route by pressing <CONFIRM>.

NOTE: A direct to a waypoint may also be achieved by using the DIRECT-TO prompt.

NAVIGATION OF DIRECT-TO WITH INTERCEPT

When the Intercept Course function is executed (EXEC key pressed), which may be performed either on the ground or airborne, the navigation and guidance data output by the CMA-9000 FMS (desired track, track angle error, crosstrack distance) are relative to the specified intercept course inbound to the waypoint. The mode used is dependent on the aircraft installation. The CMA-9000 FMS initially enters a Track Hold mode (TRK configuration) or a Heading Hold (HDG configuration) mode or keeps the wings level (LEVEL configuration) prior to capturing the intercept leg.

A. When configured for constant track (TRK), or constant heading (HDG), the CMA-9000 FMS enters the Track/Heading Hold mode when the following conditions are satisfied (refer to Figure 9-1):

- The direct-to/intercept function has been executed (EXEC key pressed).
- The aircraft is airborne and on a valid intercept track/heading.
- The LNAV mode of the autopilot/flight director (AP/FD) system is engaged.

The order in which the conditions occur is not important. When all three conditions are satisfied, the current aircraft track/heading is maintained until the intercept leg is captured by the lateral steering function of the CMA-9000 FMS, or until LNAV is disengaged. If LNAV is disengaged and a new track/heading is established, re-engaging LNAV will cause the CMA-9000 FMS to maintain the new track/heading.

When the CMA-9000 FMS is in Track/Heading Hold mode, continuous checks are performed by the CMA-9000 FMS to determine if the intercept is achievable. These checks are performed when Track/Heading Hold is first activated and are repeated periodically until the leg is captured by the CMA-9000 FMS steering function.

Cancellation of Track/Heading Hold occurs under the following conditions:

CAUTION: Paragraph 1. below may result in a small track/heading change.

1. If the predicted intercept point is very close (e.g. less than 0.1 nm) to the leg's termination waypoint and the airplane is turned from a valid heading intercept, then a path is calculated direct-to the waypoint and a DIRECT TO FIX alert message is displayed. The display of guidance data remains relative to the intercept course.

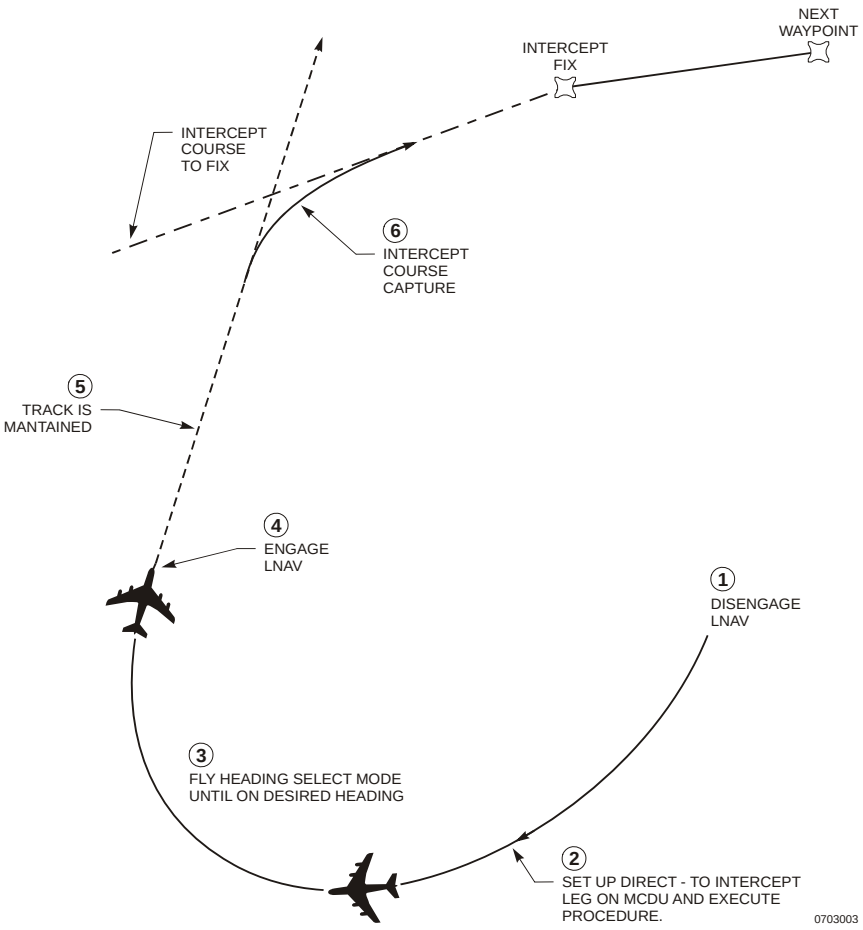


Figure 9-2 Direct-To/Intercept Phases (Heading Hold Mode)

2. If the present aircraft track/heading does not cross the intercept leg or the track angle error is larger than 135-degree, then:

   a. If the cross-track distance is greater than the 45-degree leg capture distance, the CMA-9000 FMS causes the LNAV mode to disengage and the "NOT ON INTERCEPT TRK" or "NOT ON INTERCEPT HDG" message is displayed.

   b. If the cross-track distance is less than the 45-degree capture distance, path capture is passed over to the normal CMA-9000 FMS steering function. No advisory message is displayed.

3. If the track angle error relative to the intercept course is greater than 90-degree, and the aircraft present position is past the abeam point to the intercept fix, the LNAV AP/FD mode will not engage and the "NOT ON INTERCEPT TRK" or "NOT ON INTERCEPT HDG" message will be displayed.

When the "NOT ON INTERCEPT TRK" or "NOT ON INTERCEPT HDG" message is displayed, the CMA-9000 FMS is no longer in Track/Heading Hold mode, and aircraft automatic guidance is controlled by the normal AP/FD modes. However, if LNAV is disengaged and a new track/heading is established to intercept the course, re-engaging LNAV will cause the CMA-9000 FMS to return to Track/Heading Hold mode using the new aircraft track/heading.

If the CMA-9000 FMS LNAV discrete is not configured, the information regarding the AFCS (Auto Flight Control System) LNAV status is sent through other means to the CMA-9000 FMS. When the CMA-9000 FMS receives this information the roll command output value changes to compute the value required to intercept the angle (value which was frozen at the moment the AFCS LNAV switch was pressed).

B. When configured to remain wings level, the CMA-9000 FMS keeps the roll command to a zero value until initiating the turn to capture the intercept leg. If the intercept is not achievable the FMS will trigger the alert message "NOT ON INTERCEPT HDG" or "NOT ON INTERCEPT TRK".

In configurations where LNAV input is not available, if the intercept is not achievable or a "direct to fix" mode has been initiated, the CMA-9000 FMS continues to monitor the conditions for a valid intercept. If a valid intercept is detected, the CMA-9000 FMS will remove the alert message and resume the normal intercept procedure.

In configurations where LNAV input is available, at any time prior to initiation of the inbound turn, the action of disabling LNAV input, selecting a new heading, and re-enabling LNAV input will cause the CMA-9000 FMS to set roll command to zero until the inbound turn is initiated once again.

DIRECT-TO A WAYPOINT WITH AN INTERCEPT PROCEDURE

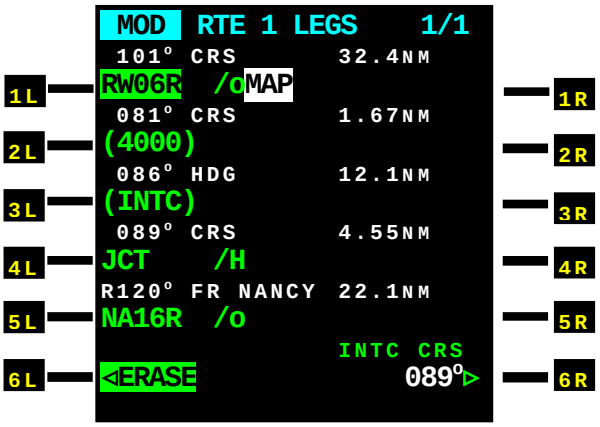
A. ON THE DEFAULT INBOUND COURSE (LEG INTERCEPT)

Enter the identifier of the desired direct-to waypoint in the scratchpad:

1. Display the first ACT LEGS page by pressing LEGS.

2. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.

   The "INTC CRS" prompt is displayed, at the LSK 6R location, with the default inbound course shown in medium font size. If the direct-to waypoint is part of the active route, the default inbound course is the inbound course of the route leg to the selected waypoint. If it is an off-route waypoint, the default inbound course is direct from present position and is also displayed as the TO WPT course.



3. Select the direct-to intercept mode with default inbound course by pressing INTC CRS (LSK 6R).

   The default inbound course changes to LARGE font, and is copied to the TO WPT course. The current track/heading will not intercept the inbound course prior to reaching the TO WPT, a "NOT ON INTERCEPT TRK" or "NOT ON INTERCEPT HDG" advisory message will be displayed.

4. Verify the course and distance of the leg to the TO WPT.

NOTE: If the aircraft track/heading is incorrect, turn the aircraft to the correct track/heading prior to pressing EXEC key.

5. Make the direct-to leg active by pressing EXEC.

   The "MOD" status in the title line is replaced by "ACT". Navigation and guidance will change to the new leg from present position to intercept the inbound course to the TO waypoint on the current track/heading.

B. ON A MANUALLY ENTERED INBOUND COURSE (COURSE INTERCEPT)

With the identifier of the desired direct-to waypoint in the scratchpad:

1. Display the first ACT LEGS page by pressing LEGS.
2. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.
3. Key in the inbound course.
4. Select the direct-to intercept mode by pressing INTC CRS (LSK 6R).

The "INTC" prompt is displayed, at the LSK 6R location, with the scratchpad inbound course shown in LARGE font size. The scratchpad inbound course is also copied to the TO WPT course. If the current track/heading will not intercept the inbound course prior to reaching the TO WPT, a "NOT ON INTERCEPT TRK" or "NOT ON INTERCEPT HDG" advisory message will be displayed.

5. Verify the course and distance of the leg to the TO WPT.

NOTE: If the aircraft track/heading is incorrect, turn the aircraft to the correct track/heading prior to pressing EXEC key.

6. Make the direct-to leg active by pressing EXEC.

The "MOD" status in the title line is replaced by "ACT". Navigation and guidance change to the new leg from present position to intercept the inbound course to the TO waypoint on the current track/heading.

NOTE: If a new heading clearance is received to intercept the inbound course, steering aircraft to new heading and re-engaging LNAV will cause the CMA-9000 FMS to fly the new intercept heading.

SECTION 10 - HOLDING PATTERN NAVIGATION

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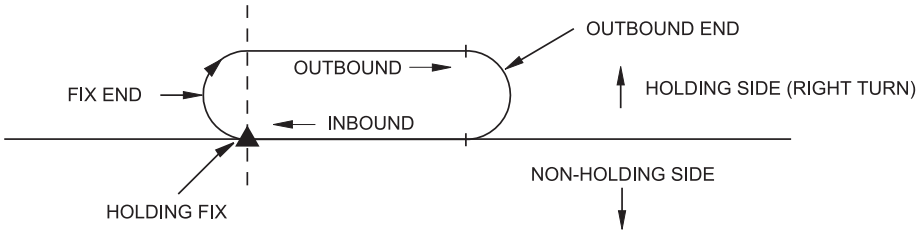
SECTION 10

HOLDING PATTERN NAVIGATION

GENERAL

The CMA-9000 FMS can navigate a race-track holding pattern at a holding fix. The parameters of the desired holding pattern may either be entered before take-off or while flying enroute. The holding fix is entered as a waypoint. This waypoint may be preselected, so that upon reaching it, the CMA-9000 FMS will provide guidance to enter and continue the holding pattern until such time as the pattern is terminated either automatically or by operator action.

The shape and terminology of the figure below depicts a right turn holding pattern. For left turn holding patterns, the corresponding entry and holding procedures are symmetrical with respect to the inbound track.



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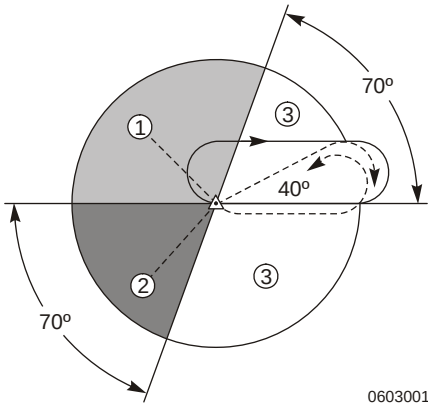
The holding pattern entry procedures described below may be flown manually or under autopilot control. When holding patterns are flown manually, intermediate points of the holding pattern procedure (including entry procedures) must be overflown and should be flown slightly outside the polygone (either the triangle or rectangle) represented in the figure (examples) provided in the Entry Procedures section. The course pointer on the HSI will always show the inbound course.

ENTRY PROCEDURES

The entry into the holding pattern will be according to the track angle in relationship to the three entry sectors shown below.



A. SECTOR 1 APPROACH - PARALLEL ENTRY

1. On reaching the holding fix, the aircraft will turn onto an outbound heading so as to fly a leg parallel to the inbound leg for a length of approximately 2.6 times the turn radius; and then:

2. Turn left on to the holding side to intercept the inbound track; and then:

3. Upon flying over the holding fix, turn right and follow the holding pattern.

The following figures shows the parallel entry and expected aircraft guidance on a typical* GAMA EFIS display.

* For COLLINS EFIS-84 display system, no holding pattern is displayed; rather the crew is provided with an '/HL' or '/HR' appended to the holding fix's waypoint name to indicate a left or right hand rotation hold pattern, respectively.

NOTE: The advisory message PARALLEL HOLD ENTRY is displayed as soon as either of the following conditions are fulfilled:

- *one minute prior to the holding fix when the aircraft is on track inbound to the holding fix independently of the ground speed*
- *one minute prior to the holding fix if the ground speed is greater than 250 kts*
- *ten seconds prior to the holding fix if the ground speed is less than 250 kts*

The message is removed as soon as the holding fix is overflown a second time.

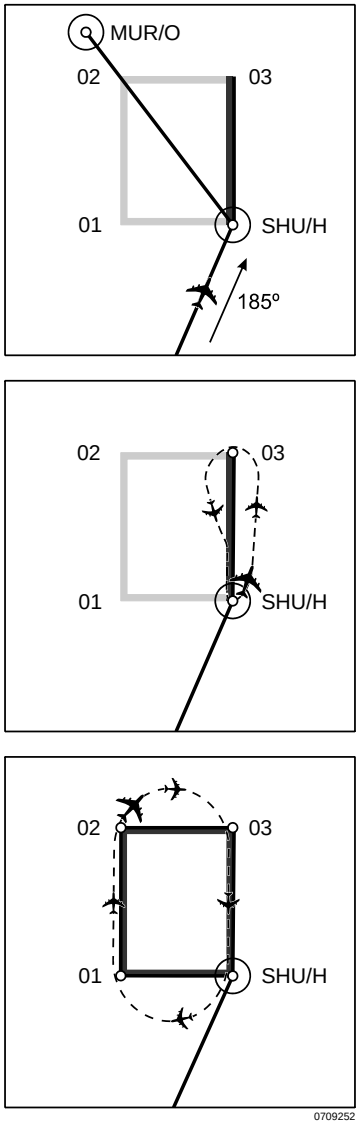


Figure 10-1 Parallel Entry

B. SECTOR 2 APPROACH - OFFSET ENTRY (also called TEARDROP)

1. On reaching the holding fix, the aircraft will turn to the heading required to fly a 40° track relative to the reciprocal of the inbound track on the holding side; then:

The following figures show the teardrop entry and expected aircraft guidance on a typical* GAMA EFIS display.

* For COLLINS EFIS-84 display system, no holding pattern is displayed; rather the crew is provided with an '/HL' or '/HR' appended to the holding fix's waypoint name to indicate a left or right hand rotation hold pattern, respectively.

NOTE: The advisory message TEARDROP HOLD ENTRY is displayed as soon as either of the following conditions are fulfilled:

- *one minute prior to the holding fix when the aircraft is on track inbound to the holding fix independently of the ground speed*
- *one minute prior to the holding fix if the ground speed is greater than 250 kts*
- *ten seconds prior to the holding fix if the ground speed is less than 250 kts*

The message is removed as soon as the holding fix is overflown a second time.

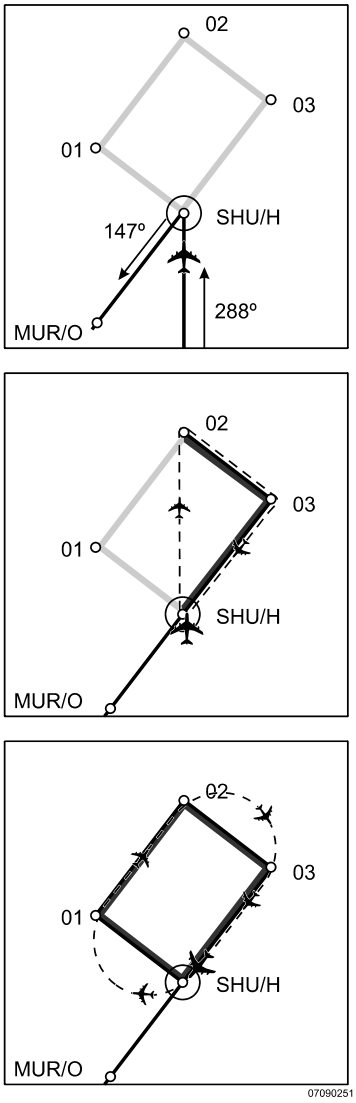


Figure 10-2 Teardrop Entry

2. Fly outbound until the turn distance needed to acquire the inbound leg is reached; and then:

3. Turn right to intercept the inbound track of the holding pattern.

4. On the second arrival over the holding fix, the aircraft will turn right to follow the holding pattern.

C. SECTOR 3 APPROACH - DIRECT ENTRY

On reaching the holding fix, the aircraft will turn right to follow the holding pattern.

The following figures show the direct entry and expected aircraft guidance on a typical* GAMA EFIS display.

* For COLLINS EFIS-84 display system, no holding pattern is displayed; rather the crew is provided with an '/HL' or '/HR' appended to the holding fix's waypoint name to indicate a left or right hand rotation hold pattern, respectively.

NOTE: The advisory message DIRECT HOLD ENTRY is displayed as soon as either of the following conditions are fulfilled:

- *one minute prior to the holding fix when the aircraft is on track inbound to the holding fix independently of the ground speed*
- *one minute prior to the holding fix if the ground speed is greater than 250 kts*
- *ten seconds prior to the holding fix if the ground speed is less than 250 kts*

The message is removed as soon as the holding fix is overflown.

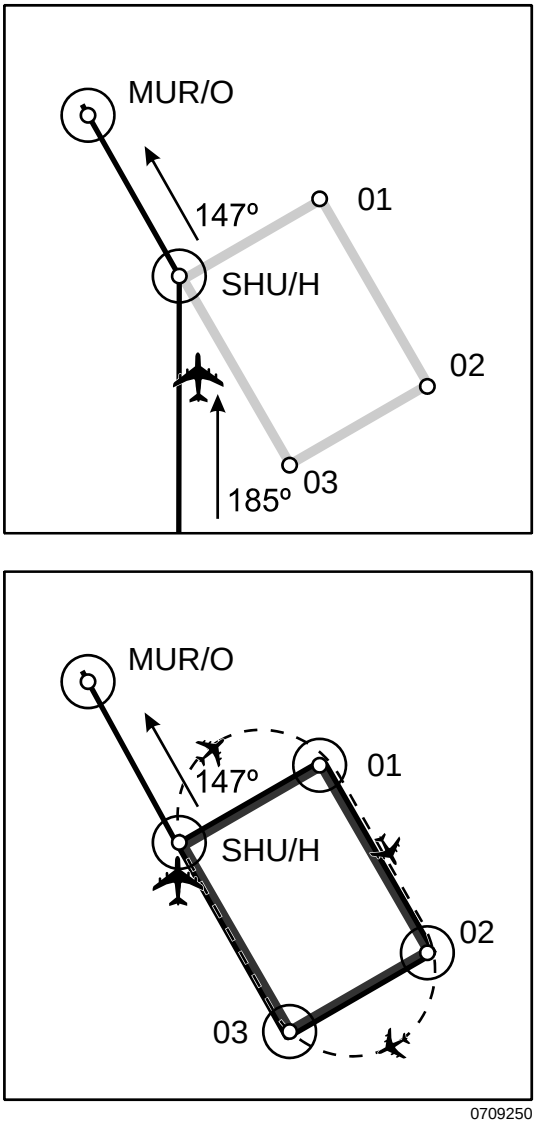


Figure 10-3 Direct Entry

HOLDING PATTERN GEOMETRY

The initial geometry of the holding pattern is computed on the first fly-over of the holding fix, based on current TAS and computed wind, and at a bank angle for a rate one (1) turn, or not exceeding the maximum configured roll, whichever is less. The size of the holding pattern is compared to the dimensions of the protected airspace, less a small buffer, defined by ICAO for the maximum holding speed (see Table10-1) and maximum wind for that altitude. On each subsequent fly-over of the holding fix the holding pattern geometry is recomputed using the current TAS and wind.

If the combination of actual holding speed and wind will cause the ICAO holding pattern protected airspace to be exceeded, the alert message HIGH HOLDING SPEED is generated one (1) minute prior to reaching the holding fix on entry, and on each subsequent fly-over of the fix.

NOTE: When buffet protection is configured, the CMA-9000 FMS removes the buffet limit during a hold to ensure that the bank angle limit does not cause an increase in the holding pattern area.

Aircraft Type	Altitude (feet)	Maximum IAS (knots)
Fixed wing, slow	0-14,000	170
Fixed wing, fast	0-14,000	230
(Aerobatic)	14,000-20,000	240
	20,000-34,000	265
	34,000 and above	0.83 Mach
Helicopter	0-6,000	100
	6,000-14,000	170

Table 10-1 ICAO Maximum Holding Speeds

NOTE: The holding pattern geometry provides parallel inbound and outbound legs.

HOLDING PATTERN AT A ROUTE WAYPOINT

With any ACT LEGS page displayed:

Press HOLD, *the ACT RTE x LEGS 1/X page is displayed with "/H" in the scratchpad.*

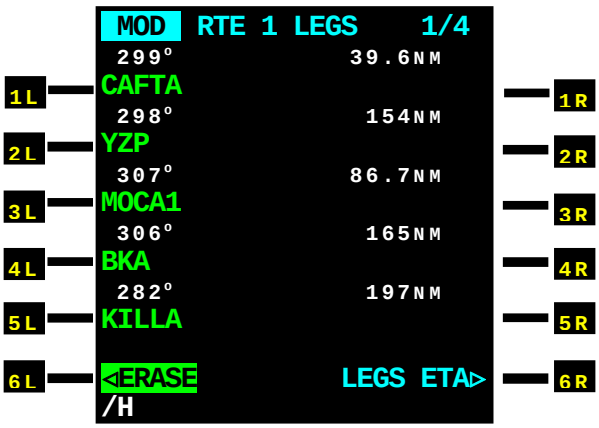
or:

Display the DES+SAR or TACTICAL 1/2 or INACT DES+SAR or TACTICAL 2/2 page, and select "HOLD" by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R) and <HOLD> (LSK 3R).

NOTE: The holding pattern can also be inserted in the inactive route by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R), [NEXT] (for the INACT DES+SAR or TACTICAL 2/2) and <HOLD> (LSK 3R). The inactive RTE y LEGS 1/X page is displayed with "/H" in the scratchpad.

or:

Key in "/H".



or:

Press [LEGS] and key in /H.

then:

1. Display the desired HOLD FIX waypoint by pressing [PREV] or [NEXT] as required.
2. Move the /H prompt to the desired holding waypoint by pressing the appropriate LSK.

   The MOD HOLD page is displayed. Default values of hold parameters are displayed (right turn, inbound course equal to course of route leg to holding waypoint, and leg time of 1 or 1.5 minutes depending on aircraft altitude at the time the hold entry is initiated). Follow the manual entry procedure below to modify any hold parameters. If present in the navigation database, speed and altitude restrictions are also displayed.

   When the aircraft crosses 14000 ft, the HOLD leg time does not change automatically.
3. Change the turn direction by pressing LSK 2L.

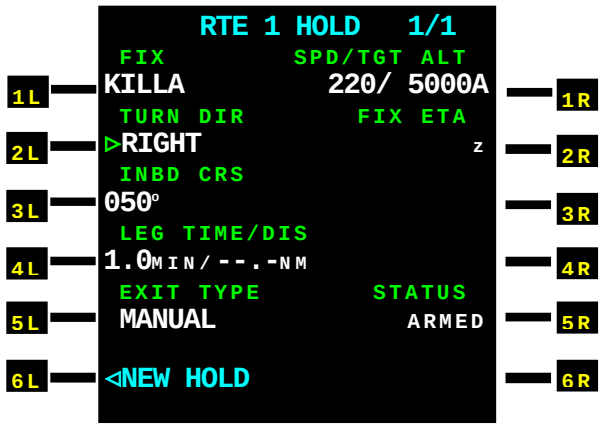
   and/or:
4. Key in the new inbound course into the scratchpad and move it to the INBD CRS field by pressing LSK 3L.

   and/or:
5. Key in the new leg time/leg distance into the scratchpad and move it to the TIME/LEG DIS field by pressing LSK 4L.

   The field which has not been entered (either time or distance) is replaced by dashes.

   then:
6. Verify the new holding pattern parameters.

7. Arm the hold by pressing [EXEC].



9. Return to the RTE x LEGS 1/X page by pressing [LEGS].

The previously displayed ACT x LEGS 1/X page is displayed with "/H" legend beside the waypoint identifier. The holding pattern is now armed at the selected waypoint. On reaching this waypoint, navigation and guidance is provided to perform a standard entry and on the HOLD 1/X page, the title line status will be shown as "ACT HOLD".

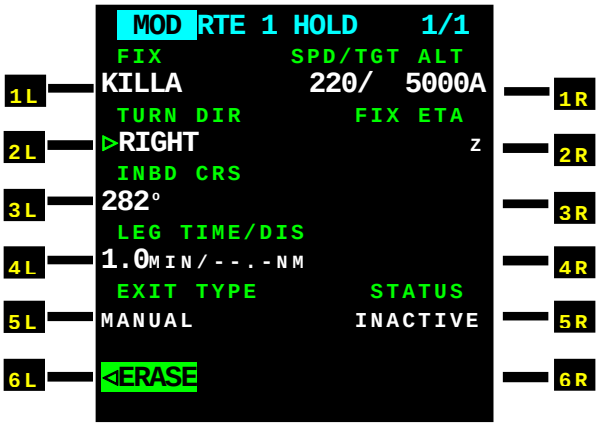
On reaching the holding waypoint the course to the TO WPT displayed on the RTE x LEGS 1/X and PROGRESS 1/3 or 1/4 pages is replaced by the legend "HOLD AT", and a HOLD prompt is displayed at LSK 6R.

A navigation database holding pattern used for a course reversal is identified as EXIT TYPE "ONCE". The exit of this type of holding pattern is performed automatically by the CMA-9000 FMS upon completion of the entry procedure (e.g.: second crossing of the holding fix).

HOLDING PATTERN AT AN OFF-ROUTE WAYPOINT

Key a valid off-route waypoint identifier followed by /H into the scratchpad (e.g.: KILLA/H).

NOTE: If the waypoint is not in the navigation database, the temporary waypoint should be created and inserted in the desired location in the route (as described in Section 5) before defining the holding pattern.



1. Display the desired location in the route by pressing [LEGS] and [NEXT] as required.

2. Move the waypoint entry to the desired location by pressing the appropriate LSK.

   The MOD HOLD page is displayed. Modify the holding pattern parameters as required, following the manual entry procedure described previously.

3. Verify the holding pattern parameters, and arm the hold by pressing [EXEC].

   NOTE: If the off-route waypoint is made the TO WPT, EXECuting the holding pattern ALSO results in direct-to navigation to the holding waypoint without an intercept course. If an intercept course is required, return to the LEGS page and setup the intercept course prior to pressing EXEC.

HOLDING PATTERN AT PRESENT POSITION

1. Display the ACT RTE x LEGS 1/X page with the /H prompt in the scratchpad by pressing HOLD.

   If a holding pattern has already been defined, the HOLD 1/1 page is displayed. Press NEW HOLD (LSK 6L) to display the ACT RTE x LEGS 1/X page, with a HOLD PPOS prompt displayed at LSK 6R.

NOTE: To cancel the procedure at this stage, press [LEGS]. The <HOLD PPOS> prompt at LSK 6R is replaced by the normal <LEGS ETA> prompt.

2. Select the present position hold mode by pressing <HOLD PPOS> (LSK 6R).

   The MOD HOLD 1/X page is displayed, with the holding waypoint identifier shown as "PPOS". If necessary, modify the hold parameters following the manual entry procedure described above.

3. Verify the pattern parameters.

4. Initiate an immediate entry to the hold at present position by pressing [EXEC].

   The present position is defined at the moment the [EXEC] key is pressed.

   The "MOD" status in the title line changes to "ACT". The CMA-9000 FMS performs a standard entry to the hold. If the inbound course is not aligned with the current course, an appropriate standard hold entry procedure will be followed.

NOTE: A holding pattern at present position can only be initiated using the procedure described above. The manual entry of "/H" cannot be used.

After EXECuting a hold at the present position, PPOS/H is shown in the first position of the ACT RTE x LEGS 1/X page. If, subsequently, a DIRECT-TO a waypoint not existent in the current route is performed, then the holding pattern is exited, the PPOS/H is deleted from the ACT RTE x LEGS 1/X page, and the respective waypoint is inserted in the first position of the ACT RTE x LEGS 1/X page followed by a discontinuity and the initial route.

SECOND HOLDING PATTERN

With the ACT HOLD or HOLD page displayed:

1. Initiate the definition of a new hold by pressing <NEW HOLD> (LSK 6L).

2. Follow any of the previously described hold definition procedures.

   The HOLD page title line will display 1/X instead of 1/1. Holding patterns are displayed in the order of route waypoints. When in ACT HOLD or HOLD pages, all holding patterns in the route can be displayed using [NEXT] or [PREV] keys.

MODIFYING AN EXISTING HOLD

A. PRIOR TO HOLD ENTRY

1. Display the HOLD 1/X page by pressing [HOLD].
2. Modify the holding parameters.

HOLD page title line will display MOD HOLD.

3. Verify the new pattern parameters, and accept them by pressing [EXEC].

B. AFTER HOLD ENTRY INITIATED

1. Display the HOLD 1/X page by pressing [HOLD].

When the aircraft is in the holding pattern, the ACT HOLD page is displayed.

2. Modify the holding parameters.

The HOLD page title line will change from ACT HOLD to MOD HOLD.

3. Verify the new pattern parameters, and make them active by pressing [EXEC].

The HOLD page title line will change from MOD HOLD to HOLD.

NOTE: The new parameters become effective for navigation and guidance only on the next fly-over of the holding fix, at which time the HOLD page title line will change from HOLD to ACT HOLD.

EXITING A HOLDING PATTERN

A. EXIT OVER FIX (HOLD AT) WAYPOINT

1. Display the ACT HOLD 1/X page by pressing [HOLD].

(Refer to HOLD 1/1 page in Appendix A for details.)

2. Arm the exit hold procedure by pressing <EXIT HOLD> (LSK 6R).

The "EXIT HOLD" prompt disappear, the status changes to EXITING HOLD and the <ERASE> prompts displayed in green reverse video. "ACT" status in the title line changes to "MOD", and the EXEC annunciator illuminates.

NOTE: The hold exit can be cancelled at this point by pressing <ERASE> (LSK 6L). The prompt reverts to "NEW HOLD", the <EXIT HOLD> prompt is displayed in green reverse video, the status changes to IN PROGRESS, "MOD" status reverts to "ACT", and the EXEC annunciator extinguishes.

3. Initiate exit from the hold by pressing [EXEC].

On the RTE x LEGS 1/X, PROGRESS 1/3 or 1/4, and VNAV 1/1 pages, the legend "HOLD AT" is replaced with "EXIT HOLD" upon arming the holding pattern exit.

Navigation and guidance is provided for an immediate turn (not applicable to the first outbound turn) towards the holding fix to exit the holding pattern over the fix, followed by continuation of the active route. The immediate turn is not applicable for the very first holding pattern turn. If crew must exit the pattern during the first run, a direct-to procedure to the next waypoint (e.g. waypoint following the holding fix) must be executed as described below, Exit By Direct-To Navigation To Any Waypoint.

If an entry into the holding pattern is being performed, the entry procedure is completed normally prior to exiting the hold. Sequencing of the holding fix is done without turn anticipation (Fly-over).

In order to sequence the holding fix and proceed with the holding fix sequence when the pattern is flown manually, the aircraft must overfly (or pass outside) the second temporary (diagonally opposite to the holding fix) waypoint as shown in Entry Procedures subsection.

B. EXIT BY DIRECT-TO NAVIGATION TO THE HOLDING FIX

Perform a standard direct-to procedure to the holding fix.

When the direct-to is executed, navigation and guidance is provided for an immediate turn towards the inbound holding course. Sequencing of the holding fix is done with turn anticipation (Fly-by).

C. EXIT BY DIRECT-TO NAVIGATION TO ANY WAYPOINT

Perform a standard direct-to procedure to any waypoint.

When the direct-to is EXECuted, navigation and guidance is provided to turn in the shortest direction to the direct-to course.

CONTINUE TO HOLD

When a procedure is define with an exit type equals to ONCE or AT TGT ALT, and it is required to stay in the hold, the following procedure should be executed:

1. Display the ACT HOLD 1/X page by pressing [HOLD].

Refer to HOLD 1/1 page in Appendix A for details.

2. Resume the exit hold procedure by pressing <ONCE> (LSK 5L).

The "RESUME HOLD" prompt disappear, the status changes to RESUMING HOLD, the exit type changes to MANUAL and the <ERASE> promtps displayed in green reverse video. "ACT" status in the title line changes to "MOD", and the EXEC annunciator illuminates.

NOTE: The resuming hold can be cancelled at this point by pressing <ERASE> (LSK 6L). The prompt reverts to "NEW HOLD", the <RESUME HOLD> prompt is displayed in green reverse video, the status changes to EXIT ARMED, "MOD" status reverts to "ACT", and the EXEC annunciator extinguishes.

NOTE: After the ONCE or AT TGT ALT procedure has been changed to a manual hold, it is impossible to return to the hold procedure fetched from the navigation database.

3. Confirm the resume hold procedure by pressing <EXEC> (LSK 6R).

   The "RESUME HOLD" prompt is changed to EXIT HOLD, the status changes to IN PROGRESS, and the <NEW HOLD> promtps is displayed. "MOD" status in the title line changes to "ACT", and the EXEC annunciator extinguishes.

HOLDING PATTERN DELETION

A. PRIOR TO ENTRY

   1. Display the desired holding waypoint by pressing [LEGS], [NEXT] or [PREV] as required.
   2. Key in /.
   3. Cancel the hold by pressing the appropriate LSK.

   The "/H" legend at the selected waypoint is deleted. The waypoint is NOT deleted from route.

   4. Accept the modified route by pressing [EXEC].

B. AFTER HOLD ENTRY INITIATED

   Perform any exit hold procedure.

SECTION 11 - TACTICAL FUNCTIONS

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SECTION 11

TACTICAL FUNCTIONS

NOTE: The following functions can only be used in aircraft conducting military, para-military, search and rescue, coast-guard or police operations.

These functions are not covered by any TSO performance standards.

SEARCH PATTERN (If configured)

NOTE: SAR patterns are limited to use under Visual Flight Rules only, unless the aircraft is 2000 feet above all obstacles within 10 nautical miles of the aircraft flight path.

The CMA-9000 FMS can navigate three types of search patterns from a search fix: expanding square, creeping ladder and sector search (Figure 1). The parameters of the desired search pattern may either be entered before take-off or while en-route to the search area. Based on parameters entered, the FMS computes the maximum ground speed at which the search should be performed. If the aircraft speed exceeds the maximum SAR ground speed computed, the pattern will not be flown optimally and overshoot will occur. The starting point of the search pattern is entered as a waypoint. This waypoint may be pre-selected, so that upon reaching it, the CMA-9000 FMS will provide guidance to enter and continue the defined pattern until such time as the pattern is terminated either automatically or by operator action.

Alternately, the search pattern may be initiated at present position by selecting the PPOS prompt (LSK 5L) on the RTE x SQUARE, LADDER, or SECTOR 1/X page.

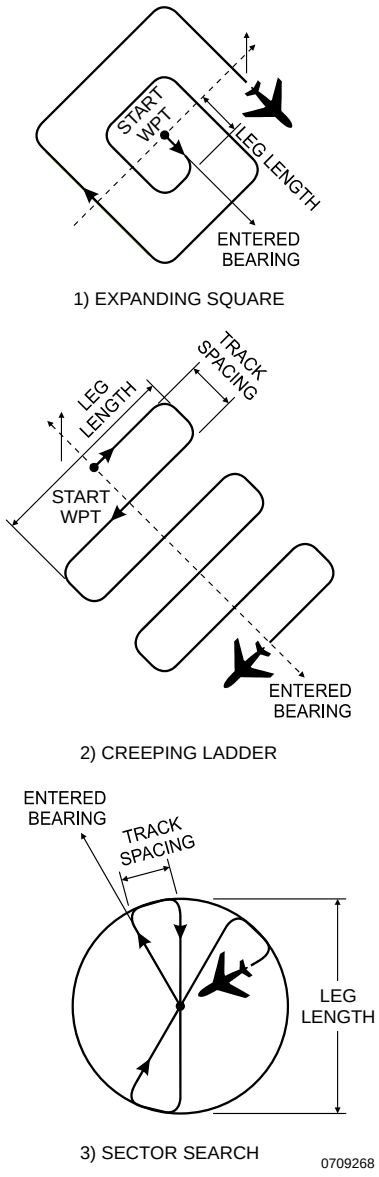


Figure 11-1 Search Patterns

The FMS treats SAR waypoints as fly-by waypoints (e.g. involving turn anticipation). Crews should be aware of this characteristic when defining the search on the SAR page. Refer to Figure 11-2 (a), which is an example of a ladder pattern for a search field of 5 nm in width that needs to be flown with a track spacing of 1 nm. When defining the dimensions of the search area, it is recommended to increase the leg length (or diameter for the sector pattern searches) by twice the turn radius (r) as shown in Figure 11-2 (b) in order to start and end the turns outside the search field.

Failure to take this characteristic into consideration may cause a loss of visibility during the turns, depending on aircraft type (fixed wing vs rotor, banking capability).

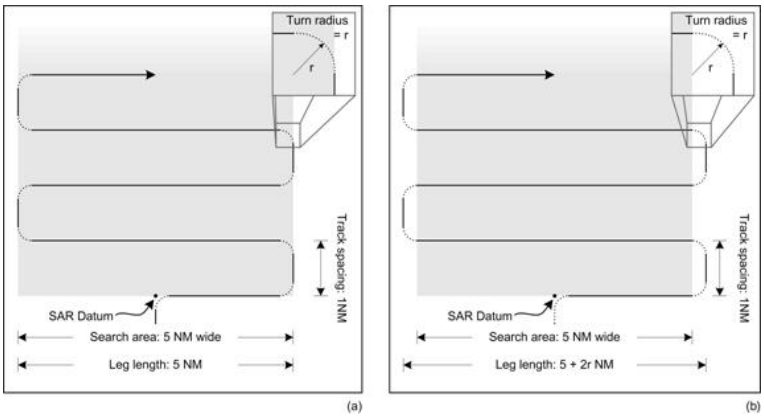


Figure 11-2 Ladder Search Pattern Details

The following table provide the value for twice the turn radius. It can be added to the search area when entering leg length for ladder pattern searches or diameter for the sector pattern searches.

Maximum Ground Speed (knots)	Maximum Bank Angle (degrees)			
	15	20	25	30
50	0.3	0.2	0.2	0.1
60	0.4	0.3	0.2	0.2
70	0.5	0.4	0.3	0.2
80	0.7	0.5	0.4	0.3
90	0.9	0.6	0.5	0.4
100	1.1	0.8	0.6	0.5
110	1.3	1.0	0.8	0.6
120	1.6	1.2	0.9	0.7
130	1.8	1.4	1.1	0.9
140	2.1	1.6	1.2	1.0
150	2.4	1.8	1.4	1.1
160	2.8	2.0	1.6	1.3
170	3.1	2.3	1.8	1.5
180	3.5	2.6	2.0	1.6
190	3.9	2.9	2.3	1.8
200	4.4	3.2	2.5	2.0
210	4.8	3.5	2.8	2.2
220	5.3	3.9	3.0	2.4

Table 11-1 Twice the Turn Radius in nautical miles function of Max Bank Angle and Max Ground Speed

When entering the ladder search, the FMS treats the entry waypoint of the search pattern as a fly-over. Hence the crew should ensure that the pattern is entered without a significant course change at the pattern entry waypoint, to avoid a large overshoot.

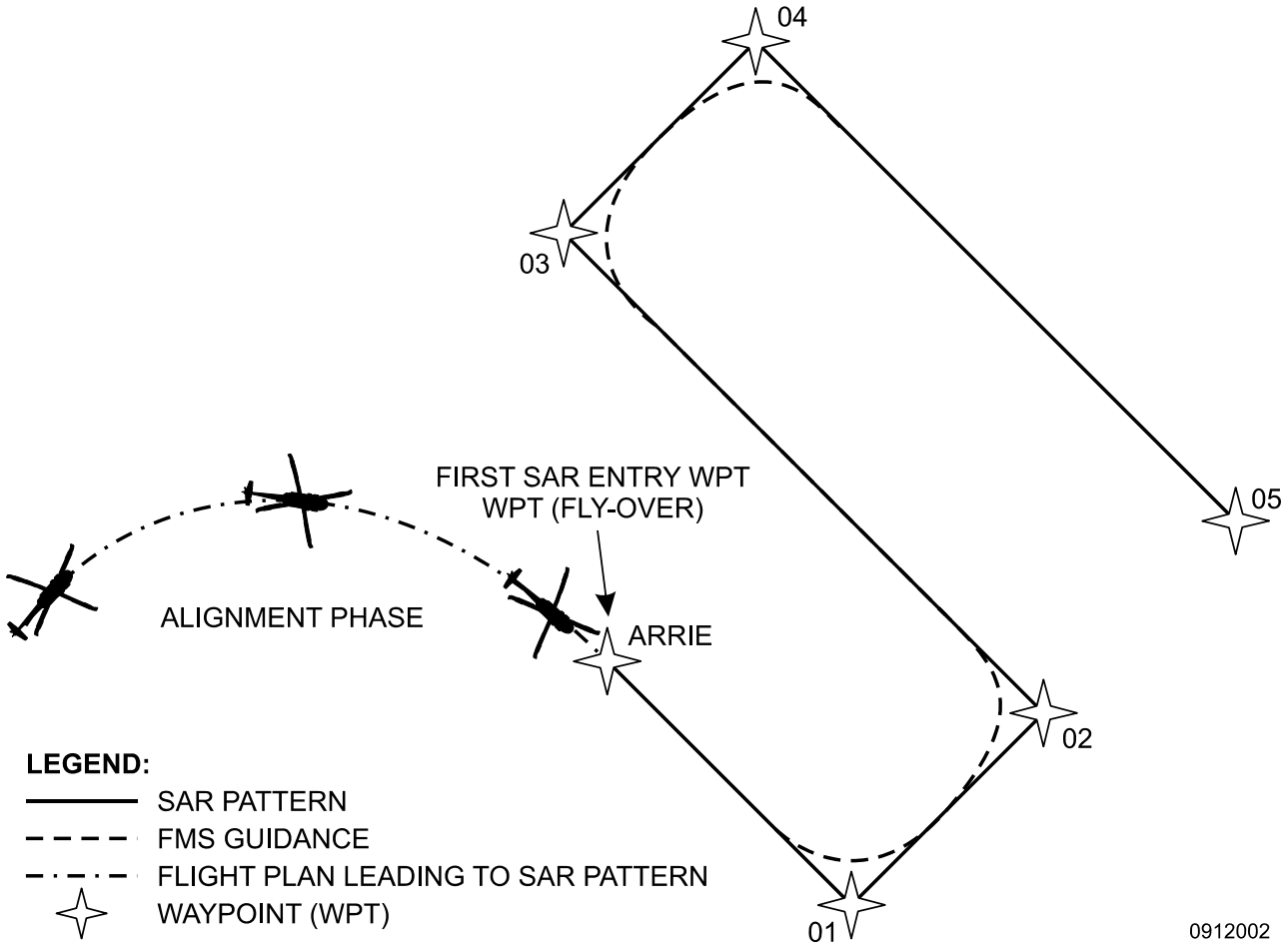
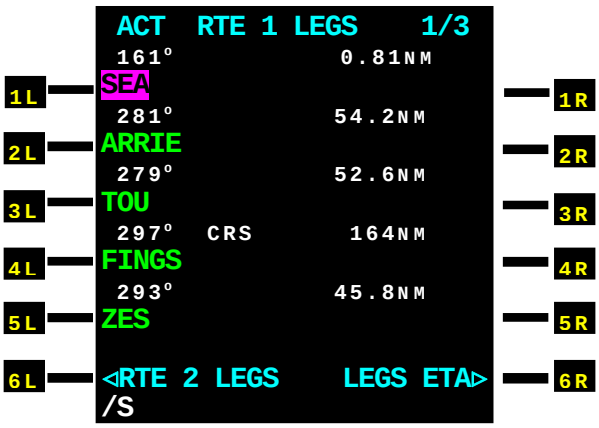


Figure 11-3 Ladder Search Pattern Details

SEARCH PATTERN IN THE ACTIVE ROUTE

Display the ACT RTE x LEGS 1/X page by pressing the [LEGS] functional key. Enter "/S" in the scratchpad.

The RTE LEGS 1/X page is displayed with "/S" in the scratchpad.



then:

1. Display the desired SEARCH FIX waypoint by pressing [PREV] or [NEXT] as required.

2. Move the *"/S"* prompt to the desired search waypoint by pressing the appropriate LSK key.

   The MOD RTE x SQUARE 1/1 page is displayed. Default values of search parameters are displayed.

   NOTE: The SAR Bearing field displays the value of the current bearing to the respective waypoint. Follow the manual entry below to modify any search parameters.

3. Change the pattern type by pressing [PREV] or [NEXT]. By pressing once the [NEXT] functional key, the MOD RTE x LADDER 1/1 page is displayed. Another press of the [NEXT] functional key will display the MOD RTE x SECTOR 1/1 page.

   and/or:

4. For SQUARE and LADDER search, key in the leg length (between 0.1 and 40 nautical miles) into the scratchpad and move it to the TRACK SPACING or LEG LENGTH field by pressing LSK 1R.

   and/or:

5. For SECTOR search, key in the diameter value of the leg length (between 0.1 and 40 nautical miles) into the scratchpad and move it to the DIAMETER field by pressing LSK 1R.

   and/or:

6. For LADDER search, key in the leg width (between 0.1 and 4.0 nautical miles) into the scratchpad and move it to the TRACK SPACING field by pressing LSK 2R.

   and/or:

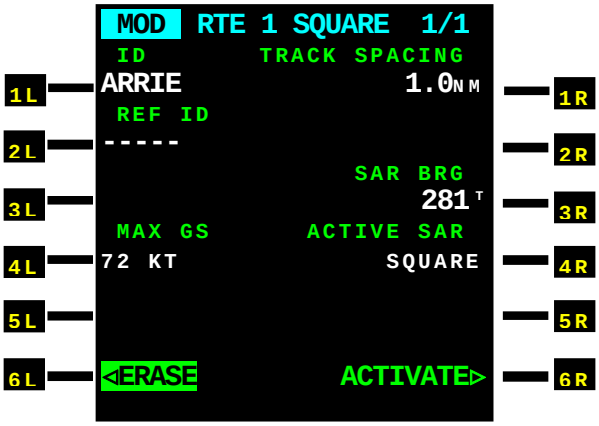
7. For SECTOR search, key in the angle (between 5 and 90 degrees) into the scratchpad and move it to the ANGLE field by pressing LSK 2R.

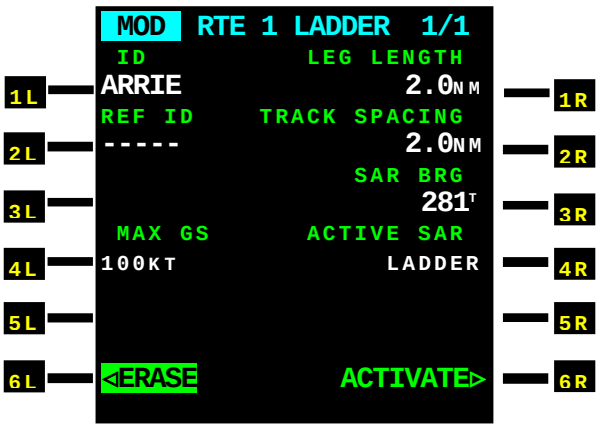
   and/or:

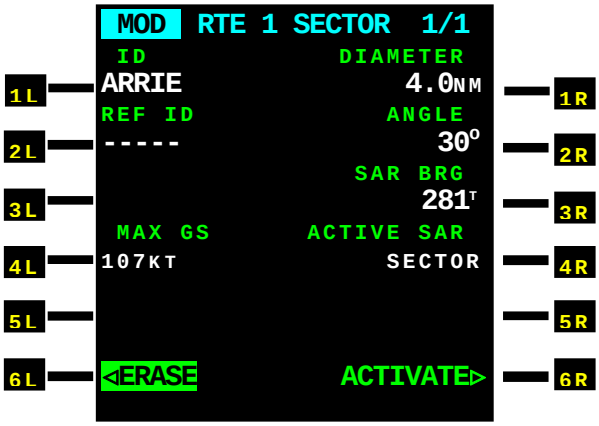
8. If needed, key in the new search bearing into the scratchpad and move it to the SAR BRG field by pressing LSK 3R.

   then:

9. Verify the NEW search pattern parameters.







10. Arm the search by pressing <ACTIVATE> and [EXEC].

11. Return to the ACT RTE x LEGS 1/X page by pressing [LEGS].

    The ACT RTE LEGS 1/X page is displayed with "/s" legend beside the search waypoint identifier. The search pattern is now armed at the selected waypoint. On reaching this waypoint, navigation and guidance is provided to perform the selected pattern

    On reaching the search waypoint, the course to the TO WPT displayed on the RTE *LEGS 1/X and PROGRESS 1/4 pages is replaced by the legend "SEARCH", and the Distance to go is the direct distance to the search waypoint.*

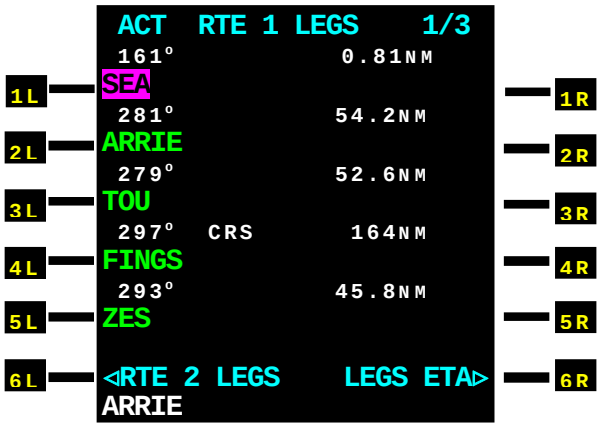
    NOTE: Only one search pattern may be defined in the route at a given time.

A second possibility for defining a search pattern at a route waypoint is the following:

1. Display the ACT RTE x LEGS 1/X page by pressing the [LEGS] functional key.

2. Press the LSK corresponding to the waypoint on which the search pattern will be defined.

    The ACT RTE x LEGS 1/X page is displayed with the respective waypoint displayed in the scratchpad.

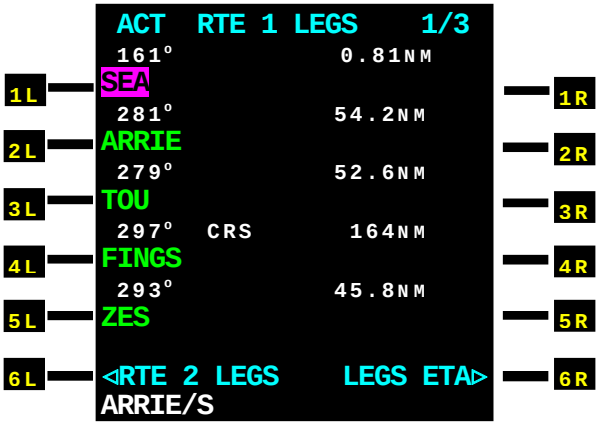


3. Press [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R).

   The DES+SAR or TACTICAL *1/2 page is displayed with the respective waypoint displayed in the REF ID field (LSK 1L).*

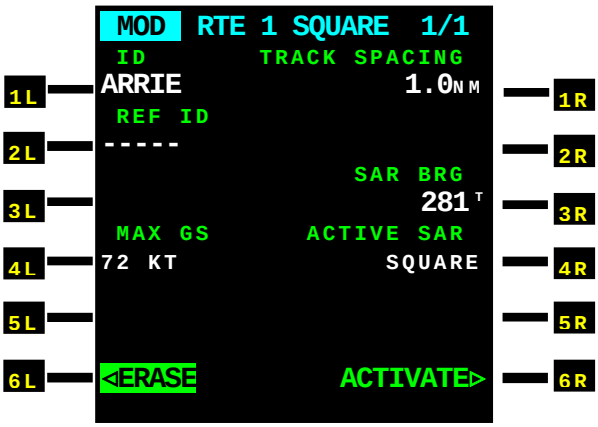
4. Press one of the 3 search patterns available (SQUARE on LSK 3L, LADDER on LSK 4L, SECTOR on LSK 5L).

   The ACT RTE x LEGS 1/X page is displayed with the respective waypoint followed by "/S" displayed in the scratchpad.



5. Press the LSK corresponding to the field where the search pattern needs to be inserted in the flight plan.

   The MOD RTE x SQUARE 1/1 page (the search page corresponding to the LSK pressed in step 4) is displayed with the respective waypoint displayed in the ID field.



6. If necessary, change the pattern type by pressing [PREV] or [NEXT]. In the case shown above, by pressing once the [NEXT] functional key, the MOD RTE x LADDER 1/1 page is displayed. Another press of the [NEXT] functional key will display the MOD RTE x SECTOR 1/1 page.

7. If necessary, change the pattern parameters (TRACK SPACING, LEG LENGTH, SAR BRG, DIAMETER and ANGLE).

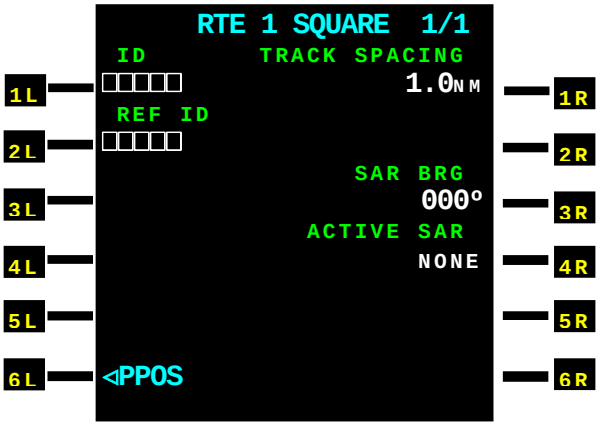
8. Press ACTIVATE (LSK 6R) and the EXEC functional key.

   The waypoint identifier followed by "/S" is inserted in the flight plan and the CMA-9000 FMS will provide guidance for the defined search pattern as soon as the search origin will be reached.

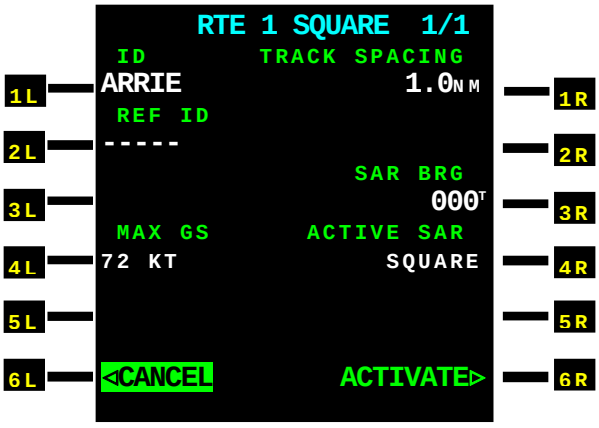
A third possibility for defining a search pattern at a route waypoint is the following:

1. Display the DES+SAR or TACTICAL 1/2 page and select the search pattern by pressing one of the search pattern prompts provided on LSK 3L (SQUARE), LSK 4L (LADDER), LSK 5L (SECTOR).

   The search pattern page is displayed.



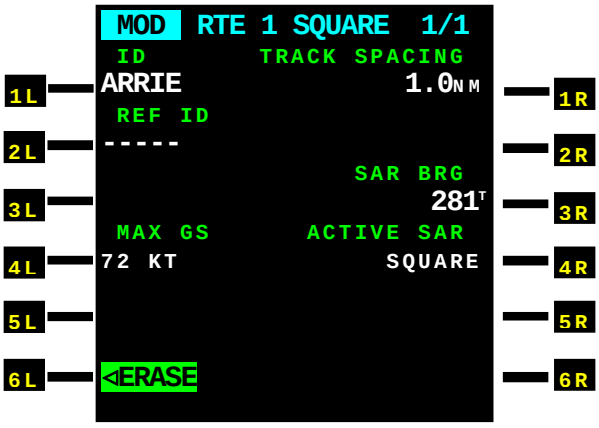
2. Enter the waypoint identifier in the ID field.



3. If necessary, change the pattern parameters (TRACK SPACING, SAR BRG, DIAMETER, and ANGLE).

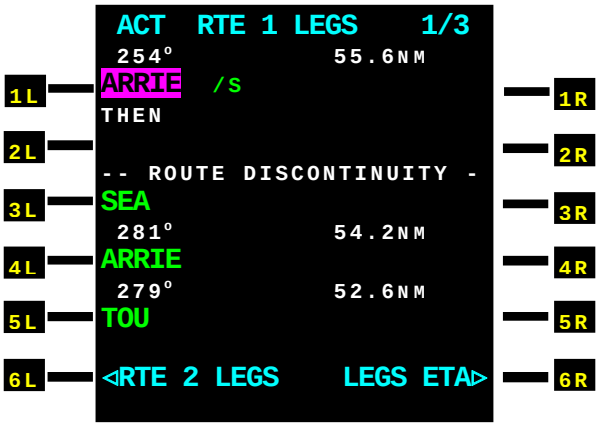
4. Activate the pattern by pressing LSK 6R.

The MOD RTE x SQUARE 1/1 page is displayed.



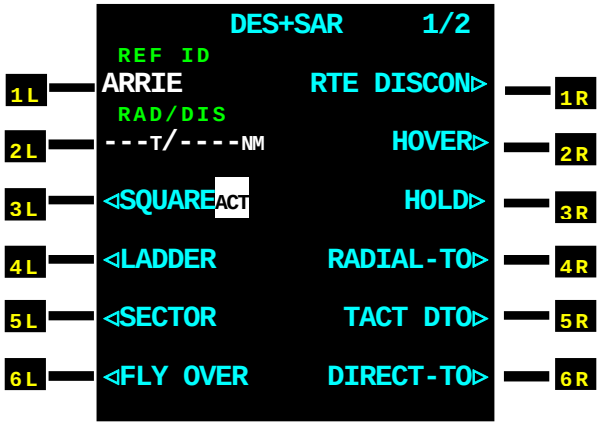
5. Press the [EXEC] functional key.

   The search pattern is added as the first waypoint in the legs page followed by a discontinuity and the original flight plan.



6. Press [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R).

   The DES+SAR or TACTICAL *1/2 page is displayed with the status "ACT" (reverse video white) appended to the prompt if an activated square search pattern is in the flight plan.*

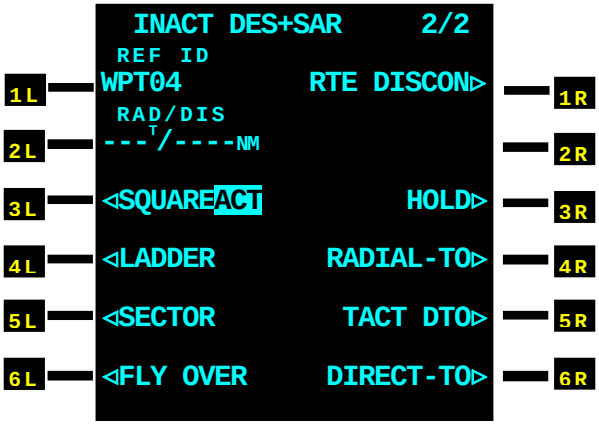


SEARCH PATTERN IN THE INACTIVE ROUTE

The same steps can be applied for the insertion of the search pattern procedures in the inactive route. Press <DES+SAR> or <TACTICAL> [NEXT] to access the INACT DES+SAR or TACTICAL 2/2 page. These steps relate to the inactive route pages:

RTE y 1/X and RTE y LEGS 1/X.

NOTE: The insertion of a search pattern in an inactive route is disallowed when the active route is being modified. Data entry advisory message "!ACTIVE ROUTE IN MOD" is displayed in this case.



SEARCH PATTERN AT AN OFF-ROUTE WAYPOINT

Key in a valid off-route waypoint identifier followed by "/S" into the scratchpad (e.g.: AAA/S).

NOTE: If the waypoint is not in the navigation database, the temporary waypoint should be created and inserted in the desired location in the route (as described in Section 3) before defining the search pattern.

1. Display the RTE x LEGS page so that the search pattern can be inserted at the desired location in the route by pressing [LEGS] and [NEXT] as required.

2. Move the waypoint entry to the desired location by pressing the appropriate LSK.

   The MOD RTE x SQUARE 1/1 page is displayed. Press [NEXT] or [PREV] to select a different search pattern. Modify the search pattern parameters as required, following the manual entry procedure described previously.

3. Verify the search parameters, and arm the search by pressing the <ACTIVATE> and [EXEC] keys.

   NOTE: If the off-route waypoint is made the TO WPT, executing the search pattern also results in Direct-To *navigation to the search waypoint without an intercept course. If an intercept course is required, return to the RTE LEGS page and setup the intercept course prior to pressing the [EXEC] key.*

SEARCH PATTERN USING THE SEARCH AND RESCUE MENU

1. Display the SQUARE/SECTOR/LADDER 1/1 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, and choose one of the three search patterns.

2. Define a search pattern origin by either entering a previously defined ID (Nav, Custom, User database or Temporary waypoint), or by defining a position relative to a REF ID (Nav, Custom, User database or Temporary waypoint).

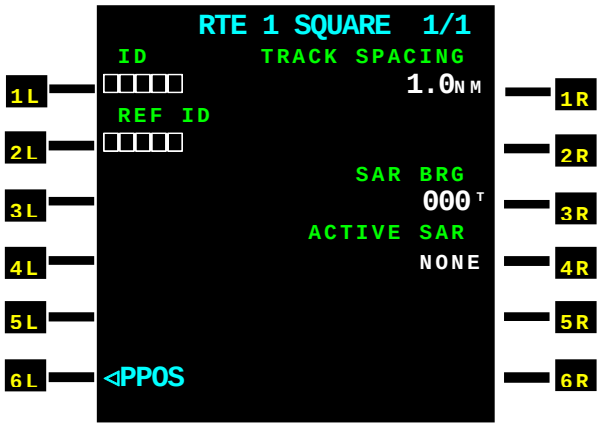
3. Verify the search parameters and arm the search by pressing the <ACTIVATE> and [EXEC] keys.

NOTE: This method of initiating a search pattern inserts the designated search pattern origin at the top of the ACT LEGS page and initiates a Direct-To *navigation to the search pattern origin.*

SEARCH PATTERN AT PRESENT POSITION (IN FLIGHT ONLY)

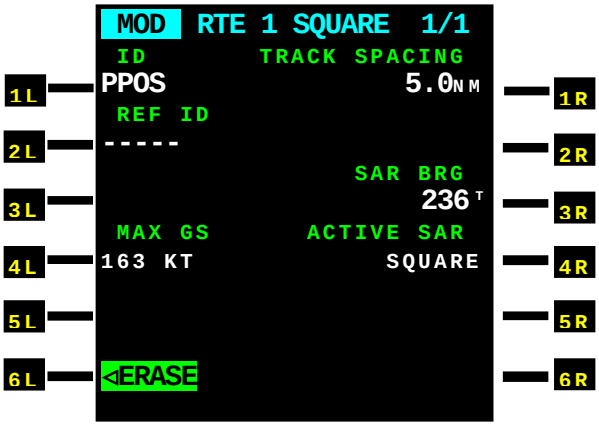
1. Display the default values of the search parameters SQUARE/LADDER/SECTOR 1/X page by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R), and <SQUARE> (LSK 3L), or <LADDER> (LSK 4L), or <SECTOR> (LSK 5L).

   The MOD RTE x SQUARE 1/1 page is displayed. Press [NEXT] or [PREV] to select a different search pattern. The PPOS prompt is displayed at LSK 5L.



2. Select the present position search mode by pressing SEARCH PPOS (LSK 6R).

   The MOD RTE x SQUARE/SECTOR/LADDER 1/1 page is displayed with the search waypoint identifier shown as "PPOS". If necessary, modify the search parameters following the manual entry procedure described above.



3. Verify the pattern parameters.

4. Initiate an immediate search at present position by pressing the [EXEC] key.

   The present position is defined at the moment the [EXEC] key is pressed.

   The "MOD" status in the title line disappears.

   NOTE: A search pattern at present position can only be initiated using the procedure described above while in flight. The manual entry of "/S" cannot be used.

   After EXECuting a search at the present position, PPOS/S is shown in the first position of the ACT RTE x LEGS 1/X page. If, subsequently, a Direct -To a waypoint not existent in the current route is performed, then the search pattern is exited, the PPOS/S is deleted from the ACT RTE x LEGS 1/X page, and the respective waypoint is inserted in the first position of the ACT RTE x LEGS 1/X page followed by a discontinuity and the initial route.

MODIFYING AN EXISTING SEARCH PATTERN

NOTE: Modification to the search parameter is allowed only prior to search mode engagement. If the engaged search pattern needs to be changed, execute a Direct-To the search waypoint and re-define the search pattern as needed.

1. Display the SQUARE/SECTOR/LADDER 1/1 page by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R), and <SQUARE> (LSK 3L), or <LADDER> (LSK 4L), or <SECTOR> (LSK 5L).

2. Modify the search parameters.

   The search page title line will display MOD.

3. Verify the new pattern parameters, and accept them by pressing the <ACTIVATE> and [EXEC] keys.

EXITING A SEARCH PATTERN

A. EXIT BY DIRECT-TO NAVIGATION TO ANY WAYPOINT

Perform a standard Direct-To procedure to any waypoint.

When the Direct-To is executed, navigation and guidance is provided to turn in the shortest direction to the Direct-To course.

B. AUTOMATIC EXIT

After 80 search waypoints, the CMA-9000 FMS will automatically sequence to the next flight plan waypoint. The advisory message "END OF SEARCH" will then appear in the scratchpad.

DISPLAYING THE SEARCH PATTERN PARAMETERS AFTER SEARCH DEFINITION

Display the SQUARE/SECTOR/LADDER 1/1 page by pressing [INIT REF], <DES+SAR> or <TACTICAL> (LSK 6R), and <SQUARE> (LSK 3L), or <LADDER> (LSK 4L), or <SECTOR> (LSK 5L).

SEARCH PATTERN DELETION

A. PRIOR TO ACTIVATION (INACTIVE)

1. Display the desired search waypoint by pressing [LEGS], [NEXT] or [PREV] as required.
2. Key in "/".
3. Cancel the search by pressing the appropriate LSK.

   The "/s" legend at the selected waypoint is deleted. The waypoint is not deleted from route.
4. Accept the modified route by pressing [EXEC].

B. AFTER ACTIVATION (ENGAGED)

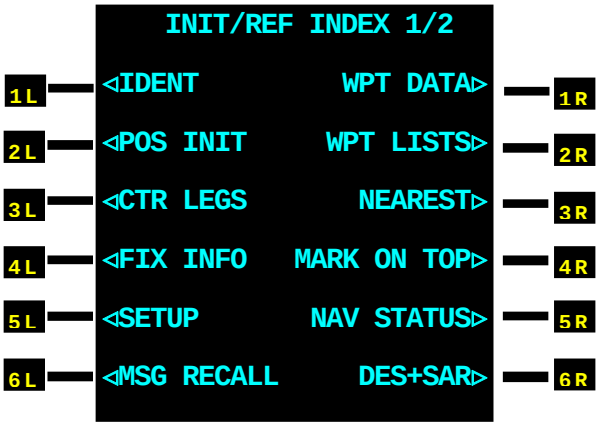
Perform a standard Direct-To procedure to any waypoint.

MARK ON TOP (If configured)

The CMA-9000 FMS can store the current system position in the predefined store point label "ONTOP". This position is displayed on the PREDEF WPT 2/2 page and can be used also for creating a new user waypoint.

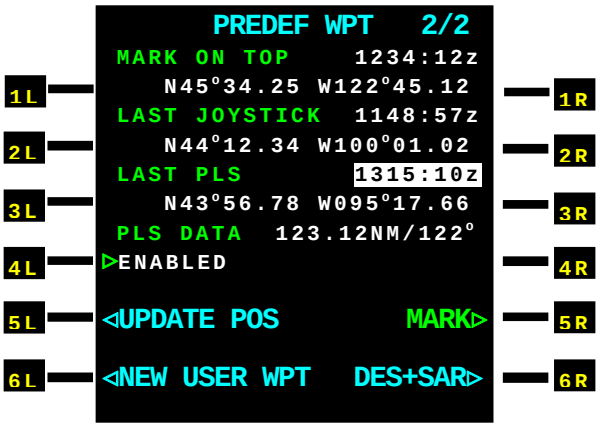
This function allows the operator to create a waypoint instantly when flying over a landmark or a mission significant point.

A. {**If CFG KEY 2 is <u>not</u> configured to the MARK functional key**}. Press [INIT REF].



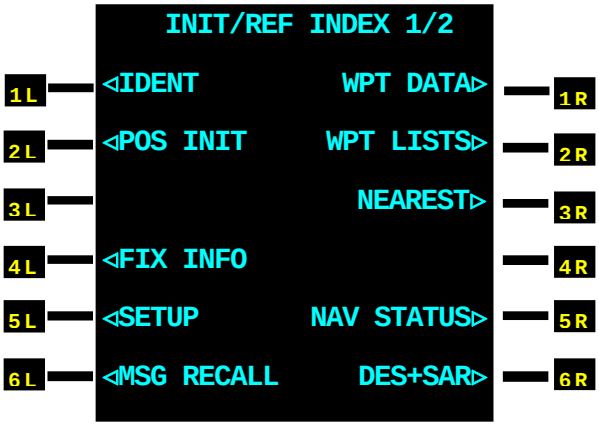
To access the PREDEF WPT 2/2 page, press <MARK ON TOP> (LSK 4R) or <[INIT REF], <WPT LISTS>, <PREDEF WPT> and [NEXT].

NOTE: The display below does not contain the LAST PLS position (PLS equipment not configured) and the UPDATE POS prompt (EGI or DVS equipment not configured).



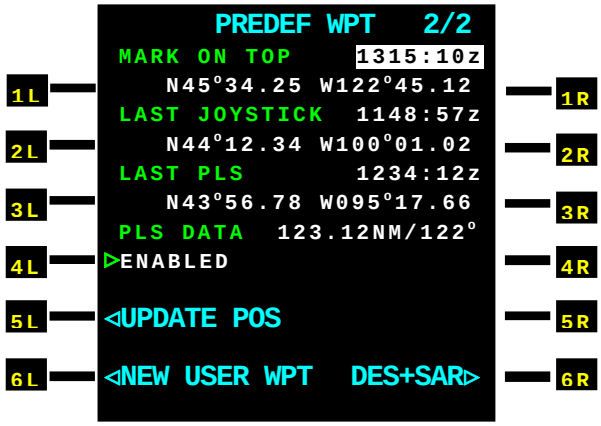
Pressing <MARK>, (LSK 5R) stores the current CMA-9000 FMS system position in the predefined store point label "MARK ON TOP".

B. {**If CFG KEY 2 is configured to MARK**}. The [MARK] functional key becomes active and the softkey <MARK ON TOP> (LSK 4R on the INIT/REF INDEX 1/2 page) is not displayed.



Press [MARK] or
[INIT REF], <WPT LISTS> ,<PREDEF WPT>, and [NEXT] to access the PREDEF WPT 2/2 page.

NOTE: The display below presents the LAST PLS position (PLS equipment configured) and the UPDATE POS prompt (EGI or DVS equipment configured).



After pressing the MARK functional key the current CMA-9000 FMS system position is stored in the predefined label "MARK ON TOP".

The CMA-9000 FMS Weather Radar or AHCAS EFIS input interface decodes the selected Joystick Latitude/Longitude received from the Weather Radar or AHCAS joystick equipments and displays this data in the field "LAST JOYSTICK" (if configured) along with the time of reception.

The CMA-9000 FMS computes the PLS waypoint position in latitude and longitude and in bearing/distance from the aircraft present position using the range and steering angle data provided by the PLS. This data is displayed in the field "LAST PLS" (this field is displayed on the PREDEF WPT 2/2 page if the PLS equipment is configured).

Press <NEW USER WPT>, LSK 6L to store the waypoint in the User Database. The position of the waypoint with the most recent time of reception is transferred into the USER WPT 1/2 page. Refer to the USER DATABASE procedure section in Section 11-4.

To insert any of the three positions present on the page in a flight plan, press one of the LSKs (1R, 2R, or 3R) to copy the point in the scratchpad, and follow the waypoint insertion procedures as presented in Section 3.

The UPDATE POS prompt opens the page with the same name which allows manual updates of the following navigation modes: INS/GPS {SAGEM SIGMA50H EGI configuration only}, INS/DVS {SAGEM SIGMA50H EGI configuration only}, INS {Litton LN_100GT EGI configuration only}, and DVS {DVS configuration only}. Refer to the UPDATE POS in section 12.

HOVER PROCEDURE (TRANSDOWN TO HOVER) (If configured)

The CMA-9000 FMS can also manage a transdown profile to hover based on the definition of a mark point MRK, a track at MRK opposite to a wind direction, and a hover height at the MRK point. The theoretical profile for height and speed used to go from the current height and speed value to the final height and speed value is taken into account.
The TDN and MARK points are treated as flyover waypoints. No other waypoint can be inserted between them.

The transdown to hover flight profile is split in two phases:

- In the first phase the CMA-9000 FMS computes a trajectory in order to put the aircraft in the correct wind direction. The helicopter is brought to a point TDN facing the wind. The TDN point located at the same altitude as the beginning of the maneuver is obtained by calculating a guided automatic transition distance (DTRA) to the MRK point.
- The second phase deals with the transition from TDN to MRK: it is characterized by a fixed bearing and, before engaging the transition, the distance is recalculated based on true airspeed (TAS) and current altitude (a command is then sent to the AFCS, which begins the descent and deceleration profiles).

The definition of the MRK point can be done by waypoint marking or by waypoint selection on the CMA-9000 FMS CDU. Thus the MRK point may be entered manually, selected from the database or defined as the present position. The MRK point may be defined on the CMA-9000 FMS CDU by the MARK key (if available). In addition the CMA-9000 FMS provides two input types to mark a point.

- One input allows the CMA-9000 FMS to receive a position for the MRK point from an external device such as a Weather Radar or DMAP.
- The other input (installation-dependent) allows the CMA-9000 FMS to receive a position for the MRK point, to activate and execute the hover procedure by pressing an external push-button.

Unless wind parameters are manually entered on the PROGRESS 1/4 page, the wind used for the hover procedure is the one computed by the CMA-9000 FMS at reception of the procedure request (wind direction frozen at procedure execution time, wind module frozen when overflying the TDN waypoint).

CAUTION: The transdown to hover procedure will be executed over flat surfaces in an obstacle free environment. If the procedure is flown without the CMA-9000 FMS being coupled to an auto-pilot, it will be flown as close as possible to the EFIS-displayed flight path.

Two scenarios are represented in Figures 11-4 and 11-5:

- The MARK point is designated by either using the joystick on the weather radar or by entering its coordinates on the CMA-9000 FMS CDU (Figure 11-4).
- The MARK point is designated when overflying a certain point (Figure 11-5).

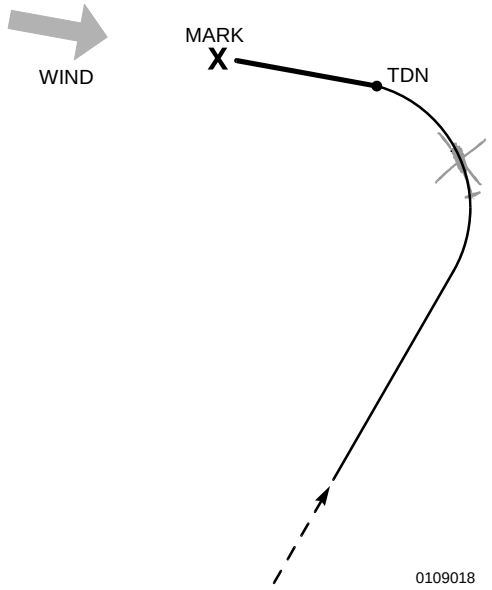


Figure 11-4

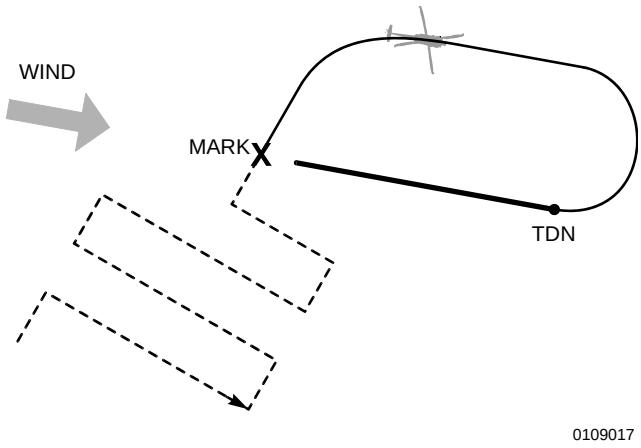


Figure 11-5

Display the HOVER 1/1 page by pressing:
[INIT REF],<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT DATA>,<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,select waypoint identifier or coordinates,<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT LISTS>,<DMAP WPT>,select DMAP waypoint identifier,<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,[NEXT],<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<MARK ON TOP>,<DES+SAR> or <TACTICAL>,<HOVER> or
[MARK] {if CFG KEY 2 configured to MARK},<DES+SAR> or <TACTICAL>, <HOVER> or
{if FTDN command of IFDS is sent}

Unless the entry is made from the PREDEF WPT 2/2 page, enter or designate the Hover (MRK) point using LSK 1L or LSK 1R on the HOVER 1/1 page. The identifier (LSK 1L) or the coordinates (LSK 1R) of a waypoint can be changed as long as there is no hover procedure defined in the active route.

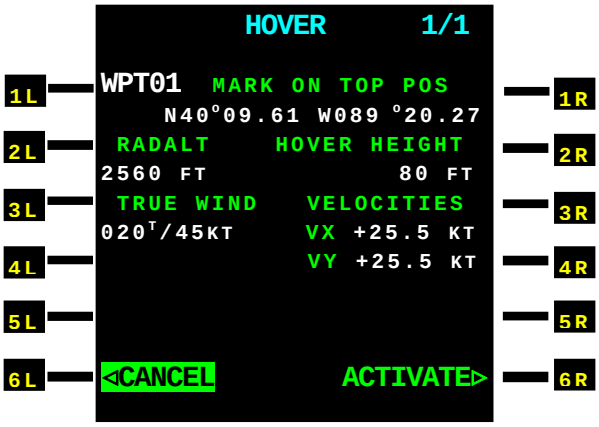
If the system wind is not available, the wind parameters can be entered manually on the PROGRESS 1/4 page.

Activate the procedure using the ACTIVATE prompt on LSK 6R. At this point it is still possible to change the MRK point if needed. Otherwise press [EXEC] to insert the TDN and MRK waypoints in the flight plan and initiate the guidance.

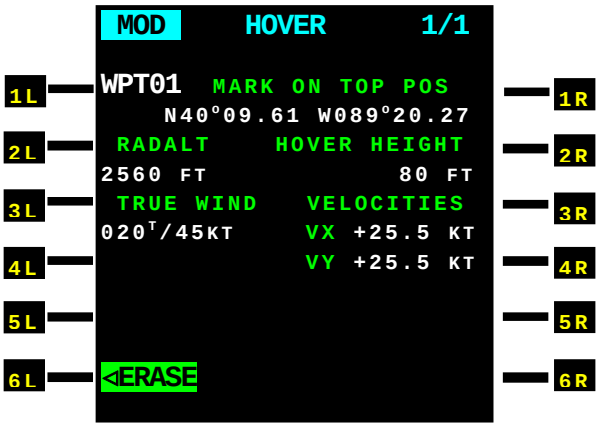
NOTE: The Hover height is entered on the AFCS and displayed on the CMA-9000 FMS HOVER page.

One of the following actions can be used to exit the hover procedure:

- Initiating another hover procedure.
- Initiating a Direct-To a waypoint procedure.
- Cancelling the route.

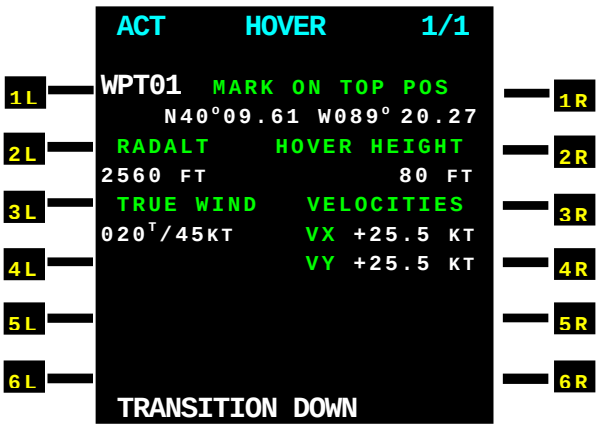


After the <ACTIVATE> key (LSK 6R) has been pressed, the HOVER 1/1 page is displayed:



At the same time the Transdown (TDN) and Mark (MRK) waypoints are inserted in the RTE1 LEGS:

After the [EXEC] key has been pressed.



The corresponding LEGS page is:

USER DATABASE

The CMA-9000 FMS contains a User database which is used to store user waypoints and user routes. User waypoints can be:

- entered from the scratchpad or
- received from the digital map or
- loaded from or saved to the DLU.

It is also possible to associate the existing route (MOD/ACT) with a user route created by the user and stored in the User database.

NOTE: A Central Clear discrete input is provided in order to clear the CMA-9000 FMS routes and user database. The aircraft installation provides the means to action this input.

User waypoints can be defined as different types:

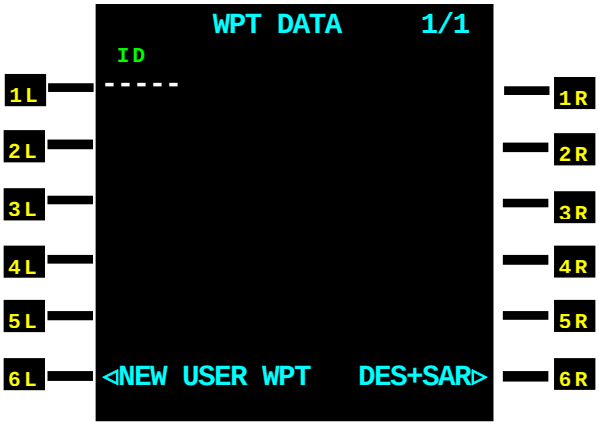
- Waypoint (fixed or moving);
- Airport;
  - VHF NAV (TACAN only).

A new user waypoint can be created on the USER WPT pages either by directly entering the coordinates of the new waypoint or by using a known position as reference and a radial/distance from the reference position to the desired user waypoint position.

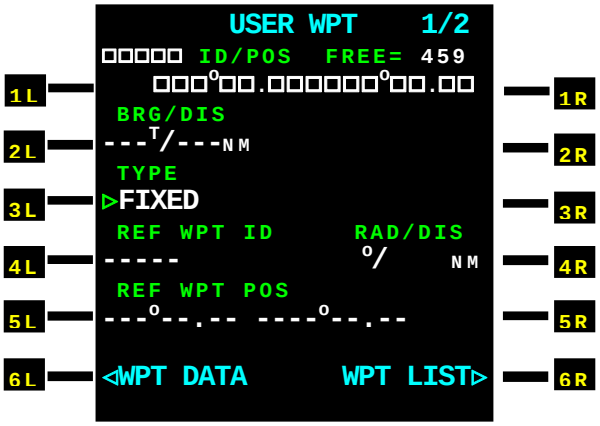
Moving waypoints may be created if the Moving Waypoint configuration option is selected.

A. MANUAL ENTRY OF A FIXED USER WAYPOINT IN THE DATABASE

Display the WPT DATA 1/1 page by pressing [INIT REF], <WPT DATA> (LSK 1R).

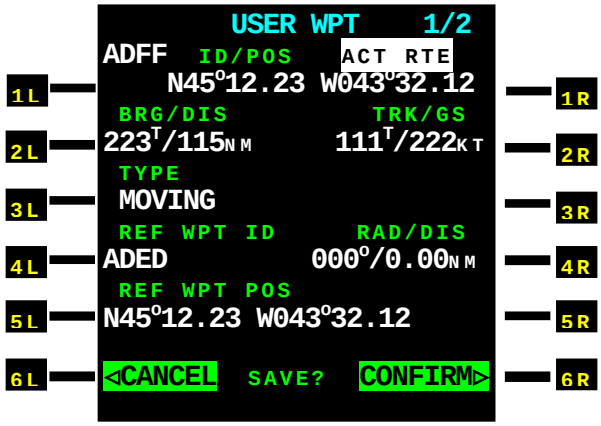


1. Press the <NEW USER WPT> prompt at LSK 6R.



2. Enter the waypoint identifier in the ID field at LSK 1L.

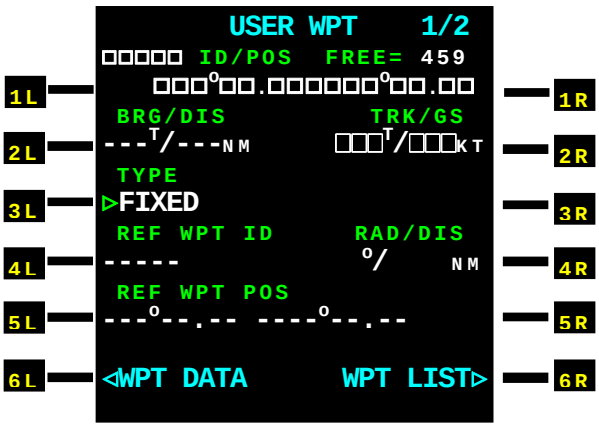
3. Enter the position at LSK 1R or enter the Bearing/Distance at position LSK 2L. By entering a Bearing/Distance, the CMA-9000 FMS computes a position using as reference the present position and displays the coordinates of the user waypoint to be displayed on LSK 1R. The number of available waypoints are displayed in the "FREE="field (a maximum of 460 user waypoints can be defined).



4. When the mandatory fields are filled (e.g. name and position of the new user waypoint), a CANCEL/CONFIRM prompt is displayed. Press <CONFIRM> to accept (LSK 6R) or <CANCEL> (LSK 6L).

B. MANUAL ENTRY OF A MOVING USER WAYPOINT IN THE DATABASE

Access the USER WPT 1/2 page by pressing [INIT REF], <WPT DATA> (LSK 1R), and <NEW USER WPT> (LSK 6L).



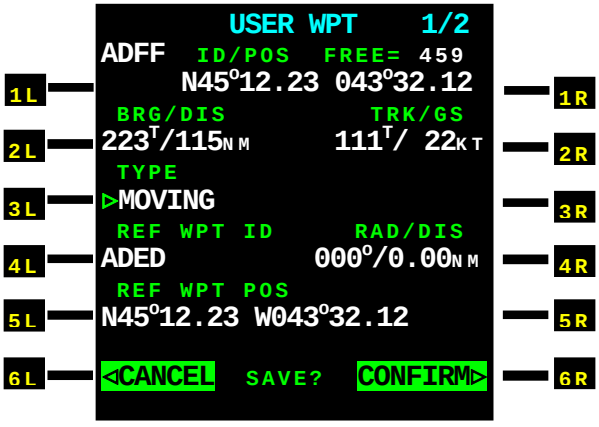
1. To create a moving waypoint, toggle the "Type" prompt (LSK 3L) from Fixed to Moving.

2. Enter the waypoint identifier in the ID field at LSK 1L.

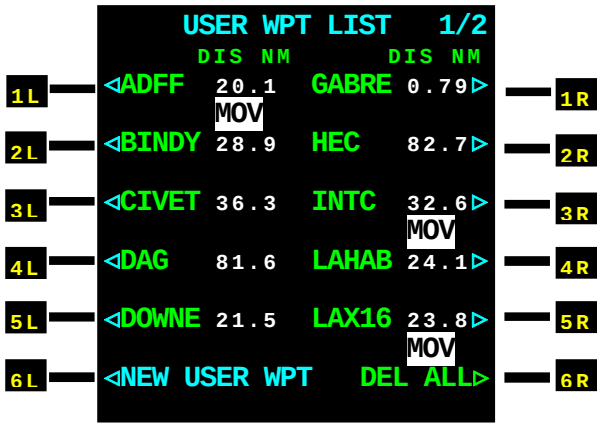
3. Enter the position at LSK 1R or the Bearing/Distance at position LSK 2L.

4. Enter the Track and Ground Speed of the moving waypoint at LSK 2R.

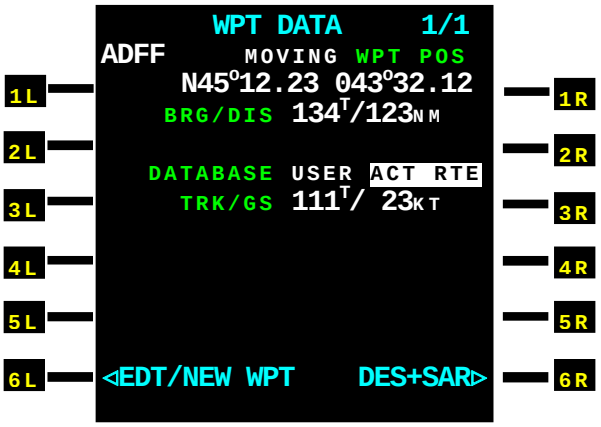
5. When the mandatory fields are filled, a CANCEL/CONFIRM prompt is displayed. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).



6. After confirming, the moving waypoint is saved in the user database and can be viewed in the user waypoint list (user waypoints are displayed in alphabetical order on the USER WPT LIST 1/1 page). Access the USER WPT LIST 1/1 page by pressing [INIT REF], <WPT LISTS> (LSK 2R), and <USER WPT> (LSK 1L). The moving waypoints are identified by displaying the symbol MOV in reverse video besides and underneath the waypoint identifier. The distance from the present position to the user waypoints is also displayed in the USER WPT LIST 1/X page.



7. Any user waypoint (fixed or moving) can be visualized and modified by pressing the corresponding LSK on the USER WPT LIST 1/X page. The WPT DATA 1/1 page will be displayed and changes can be performed on the parameters. If a moving waypoint which is present in the active route is displayed then "ACT RTE" field at LSK 3R is displayed in reverse video.



*NOTE: The distance is displayed with "***" when the distance is above 500 nm.*

C. MANUAL ENTRY OF AN AIRPORT TYPE USER WAYPOINT IN THE DATABASE

Access the USER WPT 1/2 page by pressing [INIT REF], <WPT DATA> (LSK 1R), and <NEW USER WPT> (LSK 6L).

1. Enter the waypoint identifier in the ID field at LSK 1L.

2. Enter the position at LSK 1R or enter the Bearing/Distance at LSK 2L.

NOTE: The steps 1 and 2 can be replaced by entering a known identifier in LSK 4L and defining a radial/distance from the reference position to the desired user waypoint position.

3. Press [NEXT] to display the USER WPT 2/2 page.

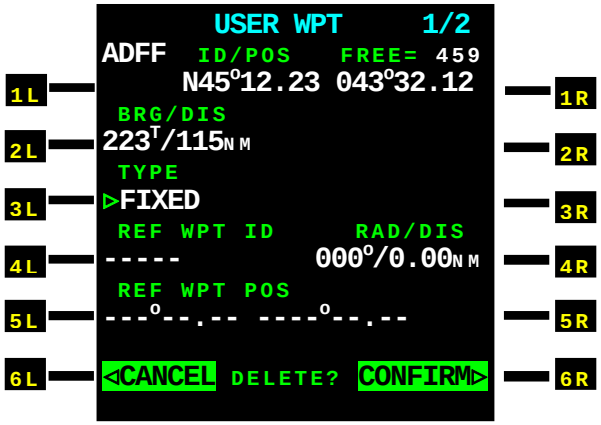
4. Toggle Identifier type (WAYPOINT, AIRPORT, VHF NAV) at LSK 1R and select AIRPORT.

5. Enter the airport ELEVATION at LSK 5R (mandatory field). When the mandatory fields are completed (e.g. name and position of the new user waypoint), a CANCEL/CONFIRM prompt is displayed. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).

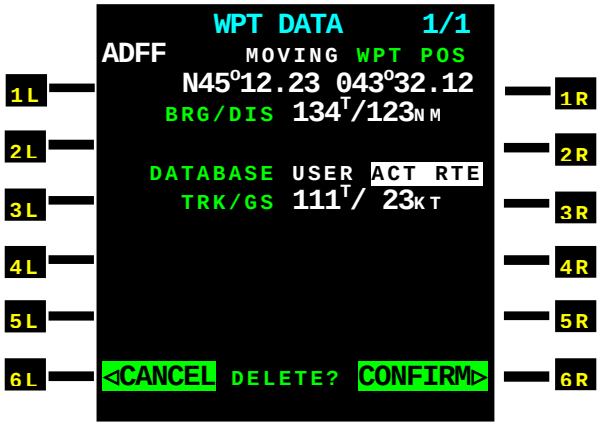
D. DELETE A USER WAYPOINT FROM THE USER DATABASE

Any existing user waypoint can be deleted from the user database by displaying the waypoint information and then using the CLR functional key. This user waypoint deletion can be performed in several ways:

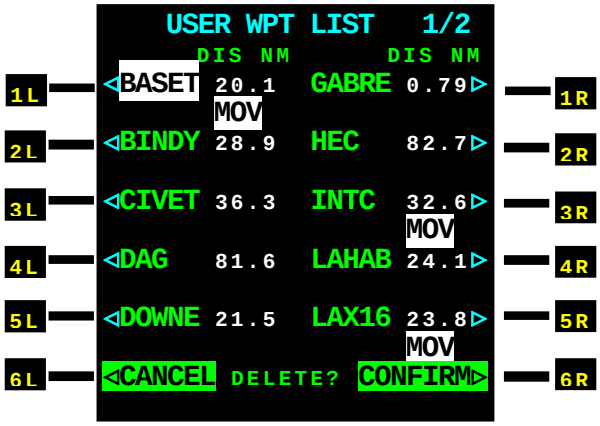
1. With the USER WPT 1/2 page displayed press the CLR functional key and then LSK 1L. The CANCEL/CONFIRM prompt is displayed. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).



2. With the WPT DATA 1/1 page displayed press the CLR functional key and then LSK 1L. The CANCEL/CONFIRM prompt is displayed. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).

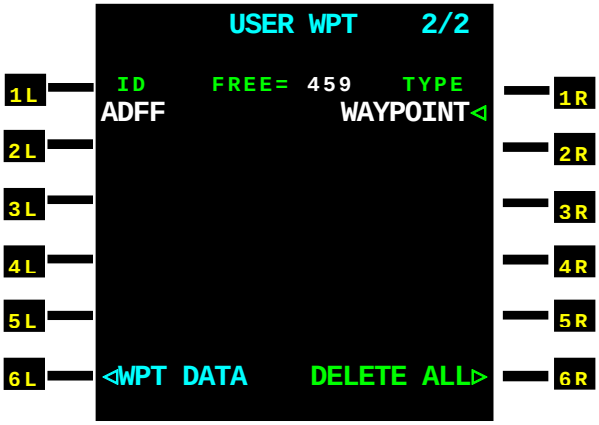


3. With the USER WPT LIST 1/1 page displayed, press the CLR functional key and then the LSK corresponding to the user waypoint that has to be deleted. The CANCEL/CONFIRM prompt is displayed. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).



E. DELETE ALL THE USER WAYPOINTS FROM THE USER DATABASE

All the user waypoints can be deleted from the user database using a single prompt DELETE ALL on the USER WPT 2/2 page.
The same prompt is also available from the USER WPT LIST X/Y page.
Access the USER WPT 2/2 page by pressing [INIT REF], <WPT DATA>, <NEW USER WPT>, [NEXT].

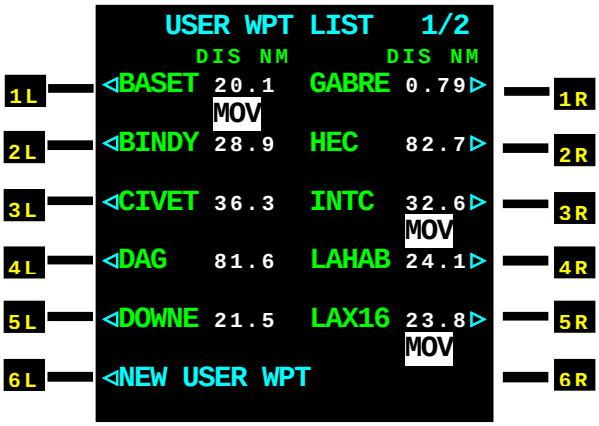


On the USER WPT 2/2 page press the DELETE ALL prompt (LSK 6R) and a CANCEL/CONFIRM prompt is displayed. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).

NOTE: If a moving waypoint is present in the active or modified route, pressing the DELETE ALL prompt will display the advisory message !MOV WPT IN ROUTE instead of the CANCEL/CONFIRM prompt.

F. VIEW ALL THE USER WAYPOINTS IN THE DATABASE

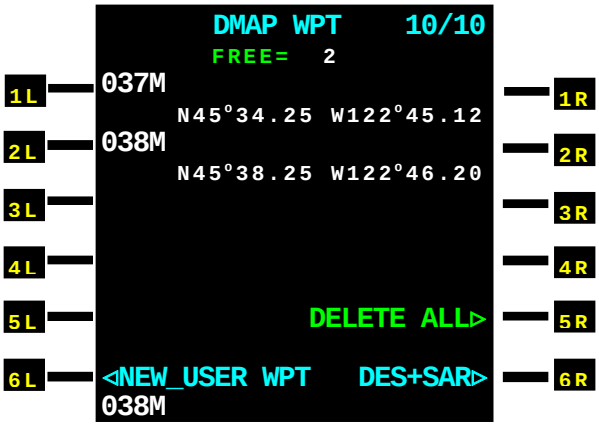
The complete list of the user waypoints can be viewed by pressing [INIT REF], <WPT LISTS>, <USER WPT>. Up to 10 user waypoints are displayed on a single page and a maximum of 460 waypoints can be defined. To view the other pages press [NEXT] or [PREV].



G. CREATING A USER WAYPOINT FROM A DMAP WAYPOINT

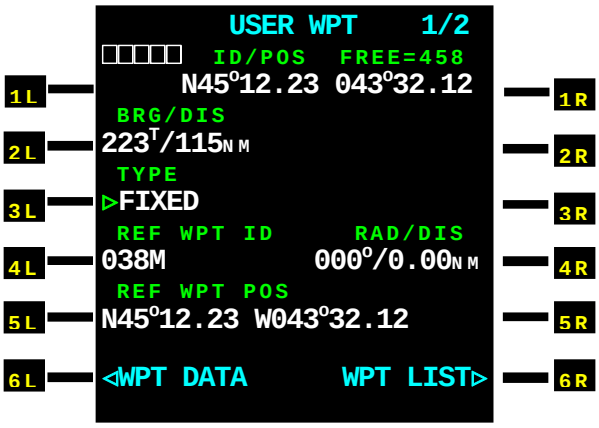
If either an ELBIT, EURONAV, or EURONAV_A702 Digital Map is configured, the DMAP WPT pages display a list of waypoints received from the DMAP. A total of 40 user waypoints are reserved for storage of position designation received from the digital map. These 40 waypoints are automatically created from the positions received from the DMAP.

To access the DMAP WPT X/Y page, press [INIT REF], <WPT LISTS> (LSK 2R), and <DMAP WPT> (LSK 2L).



1. Press the key corresponding to the reference identifier of the waypoint to store in the user database at LSK 1L, 2L, 3L or 4L. This action copies the identifier into the scratchpad.

2. Press <NEW USER WPT> at LSK 6R. This causes the display to open the USER WPT 1/2 page. The DMAP reference identifier appears in the REF WPT ID field at LSK 4L, and the waypoint position appears in the POSITION field at LSK 1R and REF WPT POS at LSK 5L.

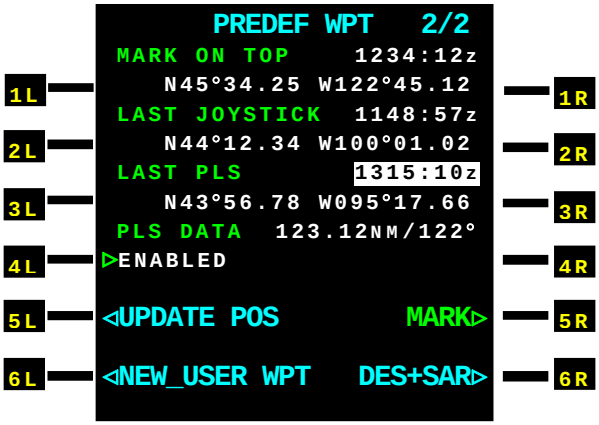


3. If desired, enter a radial/distance at LSK 4R. Enter a new waypoint identifier in the scratchpad and press LSK 1L.

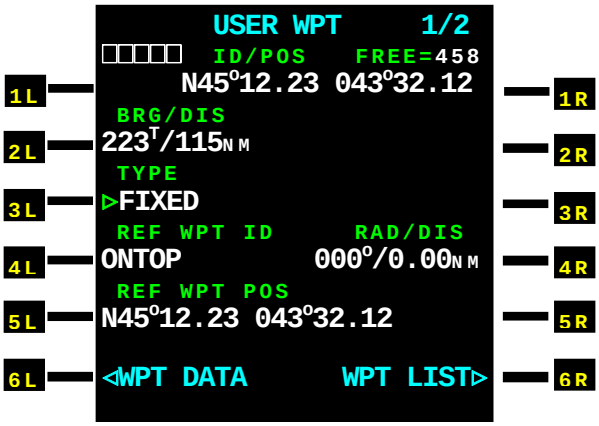
4. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).

H. CREATING A USER WAYPOINT FROM A MARK ON TOP OR A JOYSTICK POSITION

Once the Mark On Top or the Joystick (if configured) has been acquired as described in the MARK ON TOP Section, the new waypoint position appears on the PREDEF WPT 2/2 page at LSK 1R (Mark On Top) and LSK 2R (Last Joystick).



1. By pressing the <NEW USER WPT> prompt (LSK 6L) the USER WPT 1/2 page is displayed and the most recent acquired position (between the MARK ON TOP and the LAST JOYSTICK) is transferred to the REF WPT ID and POS field. The identifier is displayed at LSK 4L and the WPT POS is displayed at LSK 5L. The identifier is either ONTOP or JSTCK depending on which waypoint is transferred from the PREDEF WPT 2/2 page.

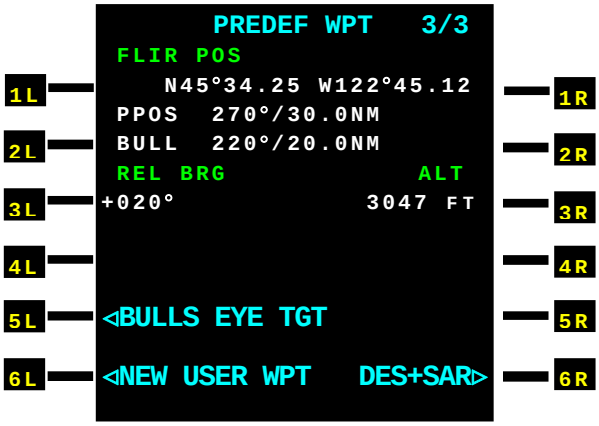


2. Enter an identifier for the new waypoint in the scratchpad and press LSK 1L.

3. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L).

I. CREATING A USER WAYPOINT FROM A FLIR POSITION

If FLIR is configured, the FLIR position appears on the PREDEF WPT 3/3 page at LSK 1R (FLIR POS).



1. By pressing the <NEW USER WPT> prompt (LSK 6L), the USER WPT 1/2 page is displayed and enters the last updated position of the FLIR into POS field at LSK 1L. The identifier (FLIR) is displayed at LSK 4L and the WPT POS is displayed at LSK 5L on the USER WPT 1/2 page.

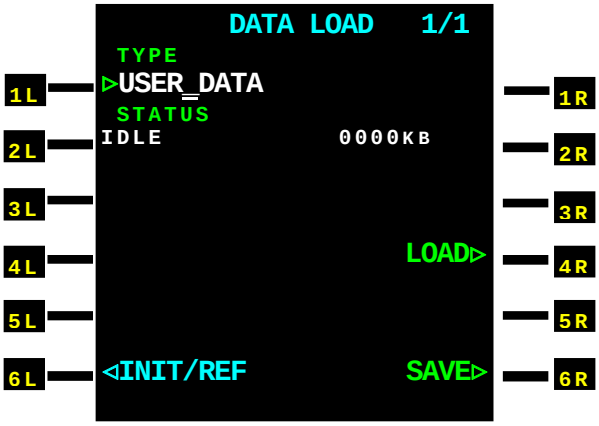
2. Enter an identifier for the new waypoint in the scratchpad and press LSK 1L on the USER WPT 1/2 page.

3. Press <CONFIRM> (LSK 6R) to accept or <CANCEL> (LSK 6L) on the USER WPT 1/2 page.

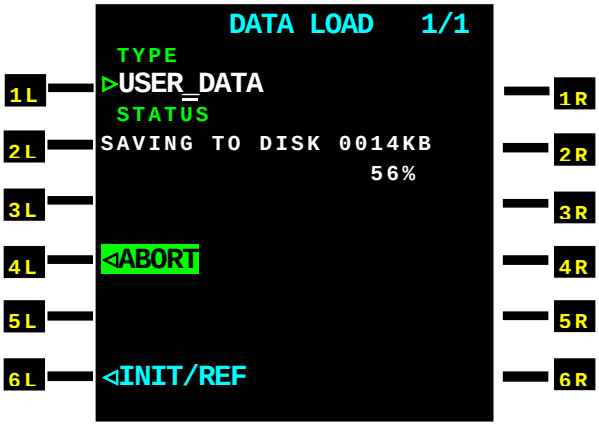
J. SAVING THE DATABASE FOR USE BY ANOTHER AIRCRAFT

The user data accumulated during the missions can be retrieved from the CMA-9000 FMS using a serial (e.g. Targa) data loader. This data can then be loaded into any CMA-9000 FMS.

1. By pressing [INIT REF], [NEXT], <DATA LOAD>, the DATA LOAD 1/1 page is displayed. Toggle the TYPE prompt (LSK 1L) till it indicates USER_DATA.



2. Press SAVE (LSK 6R) to start data download from the CMA-9000 FMS to the Data Loader Unit (only when aircraft on ground).

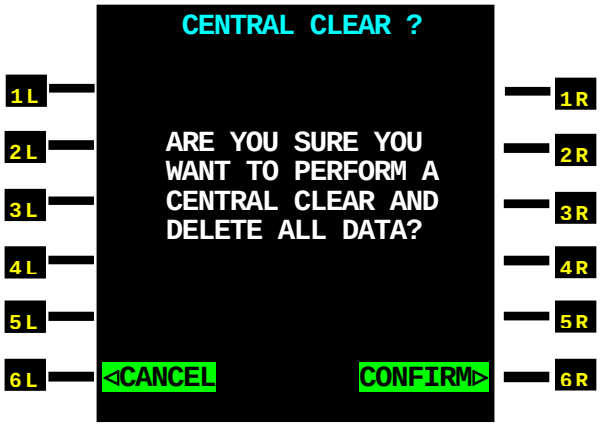


CENTRAL CLEAR? (If configured)

When configured, the CMA-9000 FMS accepts a Central Clear command via an external input or via an FMS command from a line select key. When the external option is selected, the aircraft installation provides the means to action this input.

Upon detection of the active state of the Central Clear function (either via the discrete input or via the CDU), the CMA-9000 FMS will purge its internal memory of all User route(s), User waypoint(s), Temporary waypoint(s), DMAP waypoint(s), Predefined waypoint(s), Active route, Inverse route, Inactive route, Sarsat waypoint(s), Bulls Eye waypoints, phone data phone book, active phone number, all SMS messages, pre-can messages, tactical approach database and the Reference waypoint on POS INIT page.

To display the CENTRAL CLEAR ? page, press [INIT REF], [NEXT] and <CENTRAL CLEAR>.



BACKTRACK ROUTE (If configured)

The CMA-9000 FMS provides an backtrack route function which retraces the route flown allowing an aircraft to fly back, from the present position to the origin, following the same sequence of waypoints flown but excluding any waypoints associated to the following special procedures:

- STAR;
- SID;
- APPROACH;
- TACTICAL APPROACH
- HOVER,
- SAR (LADDER, SQUARE, and SECTOR patterns),
- HOLDING.

NOTE: The origin of a SAR or HOLDING procedure is included in the inverse route.

When a manual Direct-To or a Direct-To with Intercept is performed in the active route, the CMA-9000 FMS adds a temporary waypoint to the inverse route to mark the present position except when on ground or during the special procedures mentioned above.

All legs in the backtrack route are flown as Track between two Fixes (ARINC 424 TF leg type), except for the first leg, which is flown as a Track between two Fixes (ARINC 424 TF leg type) only if the previously flown leg is preserved. Otherwise, the first leg is flown as a Direct To Fix (ARINC 424 DF leg type).
Activation of the backtrack route while in-flight is configurable with two following options. The resulting modified route consists of:

A. Configuration Option 1 (default)

If a current active TO waypoint is defined:
- the current active TO waypoint, starting at the Top waypoint location on the MOD LEGS page, followed by a discontinuity, then
- a temporary waypoint to mark the present position and then
- the waypoints of the backtrack route.

Otherwise,
- a temporary waypoint to mark the present position, starting at the Top waypoint location on the MOD LEGS page; then
- the waypoints of the backtrack route.

B. Configuration Option 2

- the first waypoint of the backtrack route, starting at the Top waypoint location on the MOD LEGS page, which is the last overflown waypoint with its course set in the opposite track direction (e.g. original track - 180º); then
- the remaining waypoints of the backtrack route.

Following activation of the backtrack route while on ground, the resulting modified route consist of the waypoints of the backtrack route, starting at the Top waypoint location on the MOD LEGS page, regardless of the selected configuration option.

When the Inactive route is engaged, the CMA-9000 FMS keeps the existent waypoints in the backtrack route and continues adding waypoints to the same backtrack route list as the new route is flown.

The backtrack route records the waypoint attribute (flyby or flyover).

The backtrack route is available only from the active route page.

1. Display the ACT RTE 1 1/X page by pressing the RTE functional key:

2. Display the MOD RTE LEGS 1/X page by pressing the <BACKTRACK> prompt (LSK 5L).

   When the backtrack route is selected, the CMA-9000 FMS creates a temporary waypoint to mark the present position. This temporary waypoint is inserted in the modified route under the discontinuity.

3. Verify the waypoint entry by checking course and distance of the previous and next legs.

4. Make the modified route active by pressing EXEC.

NOTE: The system allows maximum 50 temporary waypoints in a flight plan.

RENDEZ-VOUS WITH A MOVING WAYPOINT (If configured)

The CMA-9000 FMS is capable of providing aircraft guidance to a "rendez-vous" point with a moving waypoint (defined as described in the Sub-Section, Manual Entry Of A Moving User Waypoint In The Database). The "rendez-vous" is an intercept point with the moving waypoint trajectory.

A rendez-vous position is determined once a moving waypoint is inserted in the flight plan and every 10 seconds from there on. The rendez-vous position is recomputed as long as the Time To Go (TTG) is over one minute.

In the case of an achievable rendez-vous, the CMA-9000 FMS uses the rendez-vous position in the flight plan and provides guidance data relative to the direct course computed inbound to this rendez-vous position.

In the case of an unachievable rendez-vous, the CMA-9000 FMS uses the moving waypoint position in the flight plan and provides guidance data relative to the bearing to the moving waypoint.

The CMA-9000 FMS defines the moving waypoint inserted in the route as a fly-over.

The CMA-9000 FMS considers a rendez-vous unachievable in any of the following conditions:

1. The moving waypoint is the active waypoint and interception of the moving waypoint is not possible within a traveling distance of 500 nautical miles from the current position.

2. The moving waypoint is in the active route but is not the active waypoint and interception of the moving waypoint is not possible within a traveling distance of 500 nautical miles from the previous waypoint.

3. The moving waypoint is in the modified route but is not the first waypoint and interception of the moving waypoint is not possible within a traveling distance of 500 nautical miles from the previous waypoint.

4. The moving waypoint is the first waypoint of the modified route and interception of the moving waypoint is not possible within a traveling distance of 500 nautical miles from the current position.

In condition 1, the CMA-9000 FMS generates a !RENDEZVOUS UNACHIEVABLE alert message and invalidates its roll command output.

In conditions 2 to 4, the CMA-9000 FMS generates a !RENDEZVOUS UNACHIEVABLE advisory message.

When a rendez-vous is determined while on ground, the CMA-9000 FMS uses the CRZ_TAS and CRZ_WIND values on the PLAN DATA page for the rendez-vous computation.

NAVIGATION OF DIRECT-TO A WAYPOINT WHEN CMA-9000 FMS IS CONFIGURED FOR A "MOVING DTK" DIRECT-TO

When Direct-To a waypoint procedure is executed the CMA-9000 FMS provides Roll steering, track angle error and lateral deviation guidance to the FD/AP based on the aircraft present position and track.

Initially the CMA-9000 FMS uses the bearing from the aircraft position to the Direct-To waypoint as the intercept course, because the aircraft position is changing the intercept course changes. The aircraft remains on the variable intercept course and consequently the lateral deviation is kept centered until the track angle error becomes smaller than +/-2 degrees. During this phase the aircraft is flown using the roll steering (the lateral deviation does not yet convey useful information).

When the track angle error becomes smaller than +/-2 degrees the intercept course becomes fixed in space. The lateral deviation varies according to the aircraft position and can now be used for guidance along with the roll steering command.

Figure 11-6 illustrates the Direct-To a waypoint procedure, including the expected desired track and lateral deviation indications on the HSI at points of interest along the procedure.

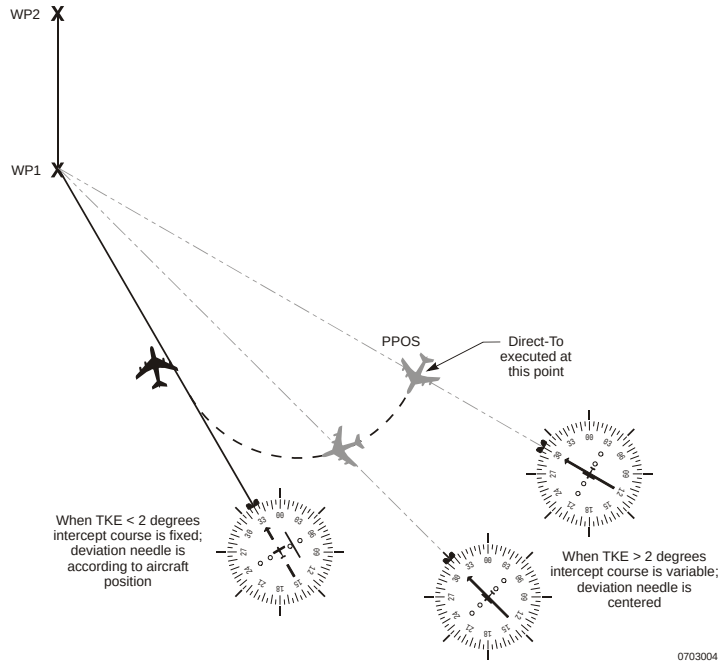


Figure 11-6 "Moving DTK" Direct-To a Waypoint Procedure

NAVIGATION OF TACTICAL DIRECT-TO A WAYPOINT

When a Tactical Direct-To a waypoint procedure is executed, the CMA-9000 FMS provides Roll steering, track angle error and lateral deviation guidance to the FD/AP based on the aircraft present position and track.

The Tactical Direct-To behaves similarly as the "Moving DTK" Direct-To (refer to Section 9). The difference between the Tactical Direct-To and the "Moving DTK" Direct-To consists in the condition to freeze the direct track to the active waypoint. In the case of the Tactical Direct-To, this condition is the minimum turn distance (as opposed to the +/- 2 degrees track difference in the case of a "Moving DTK" Direct.-To).

TACTICAL DIRECT-TO A WAYPOINT PROCEDURE

A. TACTICAL DIRECT-TO A WAYPOINT IN THE ACTIVE ROUTE

1. Display the DES+SAR OR TACTICAL 1/2 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>.
2. Enter the waypoint identifier in the REF ID field.
3. Press <TACT DTO> (LSK 5R).
4. The waypoint identifier followed by the "/T" qualifier is displayed in the scratchpad and the ACT RTE x LEGS 1/X page is displayed.
5. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.

   "ACT" status on the title line is replaced by "MOD". The direct course and distance from aircraft present position to the TO waypoint is displayed.
6. Verify the inbound course and distance of the leg to the TO WPT.

   Information on any other page can be verified prior to making the tactical direct-to leg active.
7. Make the tactical direct-to leg active by pressing [EXEC].

Another method of initiating a Tactical Direct-To is using the "/T" qualifier directly:

1. Display ACT RTE x LEGS 1/X page by pressing [LEGS].
2. Display the desired waypoint by pressing [NEXT] or [PREV] as required.
3. Key in, or copy the waypoint identifier into the scratchpad by pressing the appropriate LSK.
4. Key in the "/T" qualifier after the waypoint identifier.
5. Return to the first ACT RTE x LEGS 1/X page by pressing [LEGS] or [PREV] as required.

6. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.

   "ACT" status on the title line is replaced by "MOD". The direct course and distance from aircraft present position to the TO waypoint is displayed.

7. Verify the inbound course and distance of the leg to the TO WPT.

   Information on any other page can be verified prior to making the tactical direct-to leg active.

8. Make the tactical direct-to leg active by pressing [EXEC].

B. TACTICAL DIRECT-TO A WAYPOINT IN THE INACTIVE ROUTE

1. Display the INACT DES+SAR OR TACTICAL 2/2 page by pressing [INIT REF], <DES+SAR> or <TACTICAL> , [NEXT].

2. Enter the waypoint identifier in the REF ID field.

3. Press <TACT DTO> (LSK 5R).

4. The waypoint identifier followed by the "/T" qualifier is displayed in the scratchpad and the RTE x LEGS 1/X page is displayed.

5. Move the waypoint identifier to the TO WPT field by pressing LSK 1L.

6. Verify the inbound course and distance of the leg to the TO WPT.

   Information on any other page can be verified prior to making the tactical direct-to leg active.

7. Insert the tactical direct-to leg in the inactive route by pressing <CONFIRM>.

BULLS EYE (If configured)

Display BULLS EYE 1/3 page by pressing [INIT REF], <BULLS EYE> {if no CFG KEY is configured to BULL} or [BULL] {if any CFG KEY is configured to BULL}. Press [NEXT] or [PREV] to scroll to page 2/3 or 3/3.

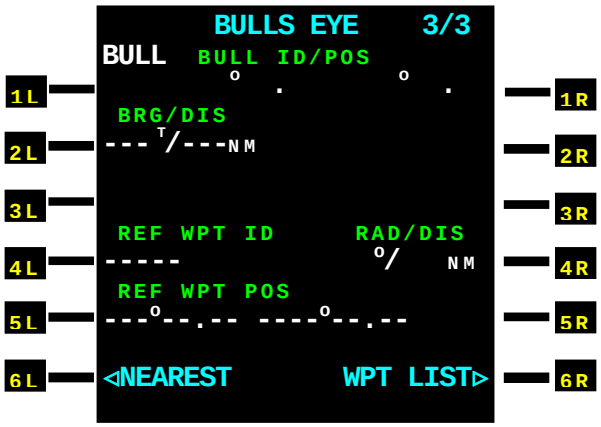
The BULLS-EYE pages are used to define a reference point which will be used by a number of aircraft in a mission. The purpose of the BULLS-EYE is to identify present positions of these aircraft as well as the target position always relative to this reference point. Only the aircraft which are part of the mission know the reference point.

1. Create the Bulls Eye reference point (use BULLS EYE 3/3 page). Definition of Bulls Eye can be achieved by typing a waypoint ident (from any FMS databases) on LSK 1L. This will take the waypoint coordinates and ident and assigned them to the Bulls Eye reference point. Bulls Eye can also be defined by entering directly coordinates on LSK 1R. In this case the ident will always be "BULL".

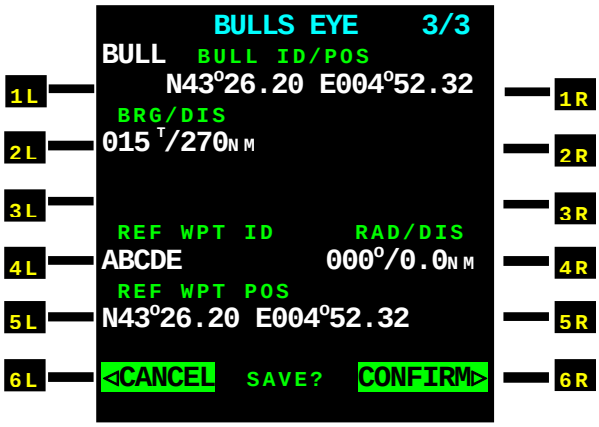
2. An alternative way can also be made using a reference waypoint. The reference waypoint ident can be entered at LSK 4L. Then the relative radial/distance from the reference waypoint to the Bulls Eye can be entered at LSK 4R. In any case, the Bulls Eye waypoint definition or modification can only be done when it is not part of the flight plan.

   NOTE: If FLIR is configured, a Bulls Eye target can also be made from the PREDEF WPT 3/3 page. Selecting LSK 5L from the PREDEF WPT 3/3 page will access the BULLS EYE 2/3 page and enter the last received position and altitude of the FLIR into the Bulls Eye target position (via the bulls eye target reference waypoint) and MSL altitude field.

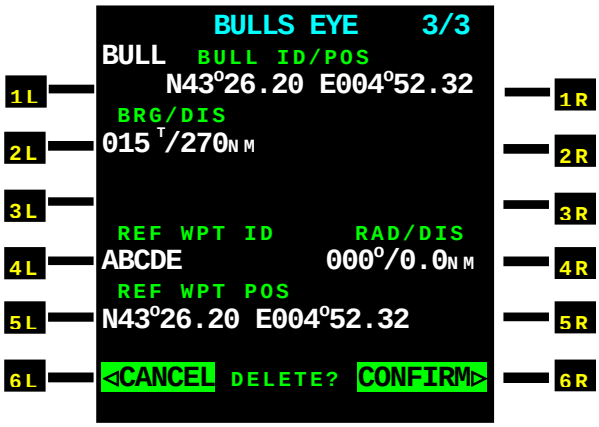
   A. Initial entry page.



B. After modifying the Bulls Eye waypoint and entering all mandatory fields.

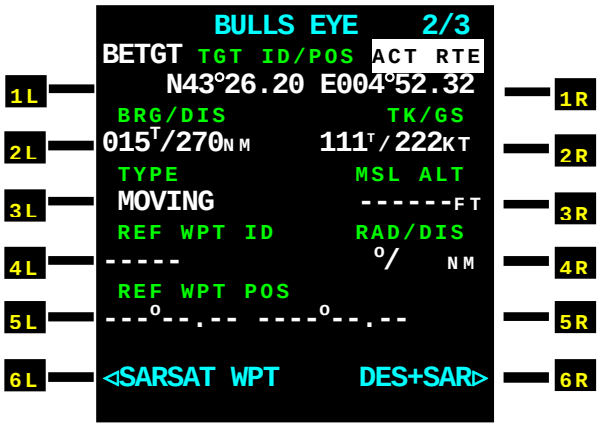


C. After entering DELETE on the Bulls Eye waypoint.



Press cancel to delete or confirm to enter data.

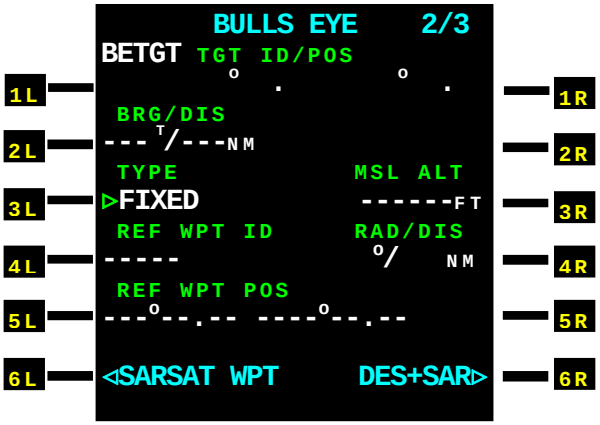
3. Then the Bulls Eye target point can be created (use BULLS EYE 2/3 page). Definition of Bulls Eye Target can be achieved by typing a waypoint ident (from any FMS databases) on LSK 1L. This will take the waypoint coordinates and the ident and assigned them to the Bulls Eye Target point. Bulls Eye Target can also be defined by entering directly coordinates on LSK 1R. In this case the ident will always be "BETGT".



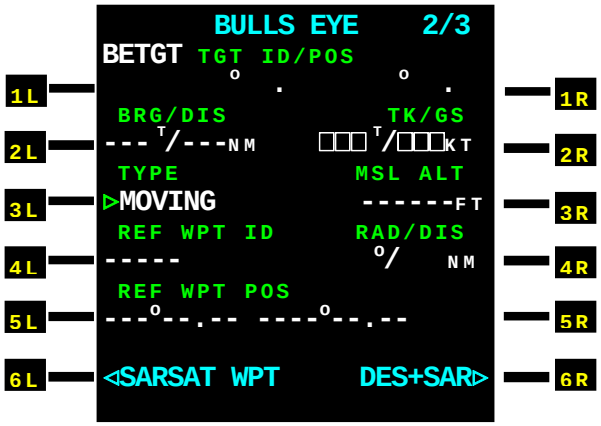
An alternative entry can also be made using a reference waypoint. The reference waypoint ident can be entered at LSK 4L. Then the relative radial/distance from the reference waypoint to the Bulls Eye can be entered at LSK 4R. The Bulls Eye target can be defined as either a fixed waypoint or a moving waypoint. This selection is made via the LSK 3L. When the Bulls Eye target is a moving waypoint, a track and ground speed is required to be entered. This entry is done via LSK 2R. As an option, the Bulls Eye target altitude can be entered on LSK 3R.

In any case, the Bulls Eye Target point definition or modification can only be done when it is not part of the flight plan.

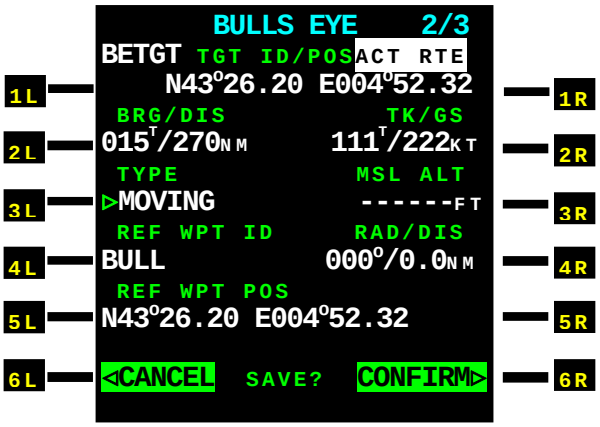
A. Initial entry page for fixed Bulls Eye target.



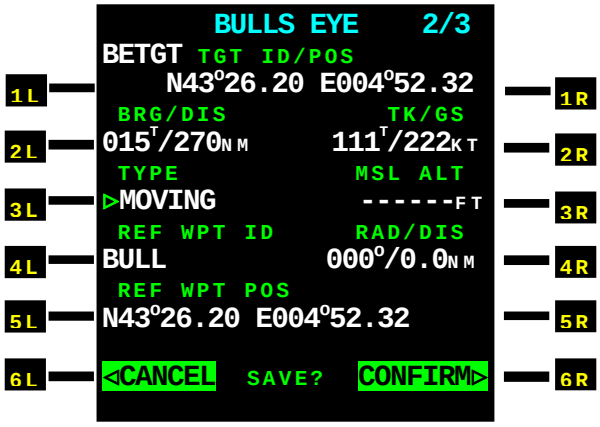
B. Initial entry page for moving Bulls Eye target.



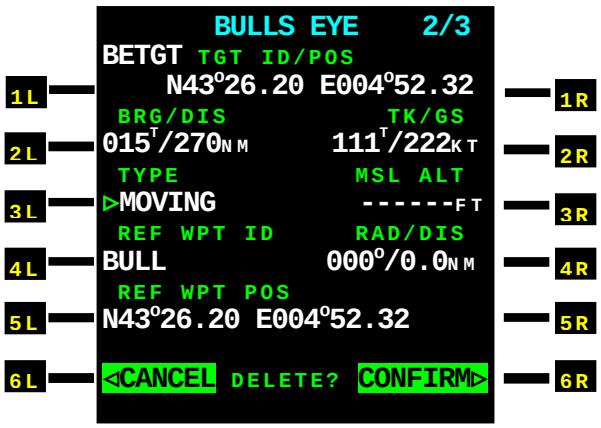
C. After modifying data for a moving Bulls Eye Target waypoint in the active route.



D. After modifying the Bulls Eye Target and entering all mandatory fields (the active route does not contain the Bulls Eye Target waypoint if it is moving).



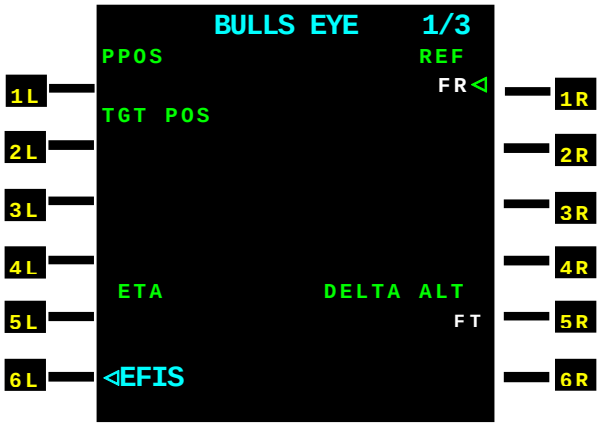
E. After entering DELETE on the Bulls Eye Target waypoint.



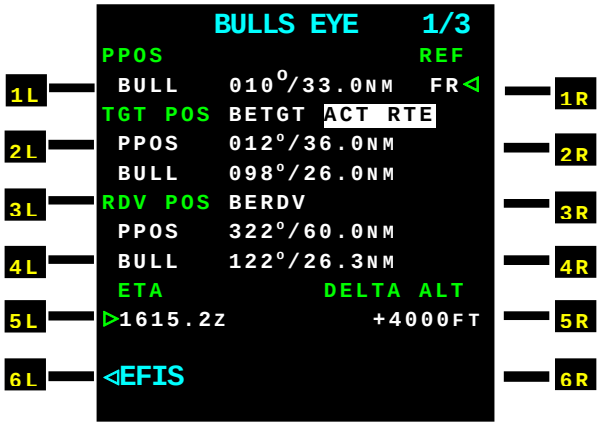
Press cancel to delete or confirm to enter data.

4. Once the Bulls Eye reference point and the Bulls Eye target point have been defined, BULLS EYE 1/3 page allows a review of all information on the same page

A. When no Bulls Eye waypoint and no Bulls Eye Target waypoint have been created.

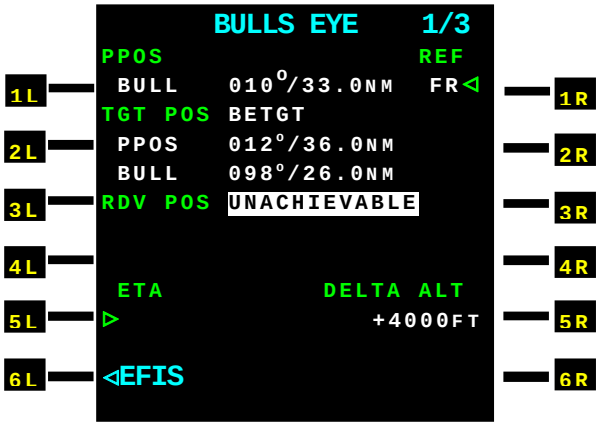


B. When the Bulls Eye Target (moving) rendezvous is achievable and part of the active route.

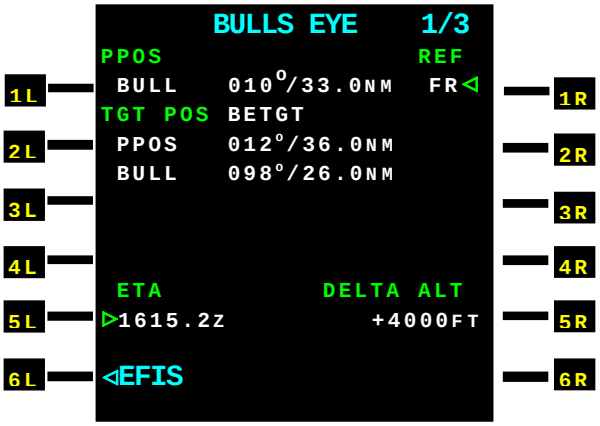


When a rendezvous point is achievable, the rendezvous bearing and distance relative to the aircraft present position and to the Bulls Eye reference point are displayed. Also, the Bulls Eye target estimate time of arrival (ETA) or estimated time en-route (ETE) and delta altitude are displayed on LSK 5L and LSK 5R respectively.

C. When the Bulls Eye Target rendezvous is unachievable.



D. When the Bulls Eye Target is fixed.

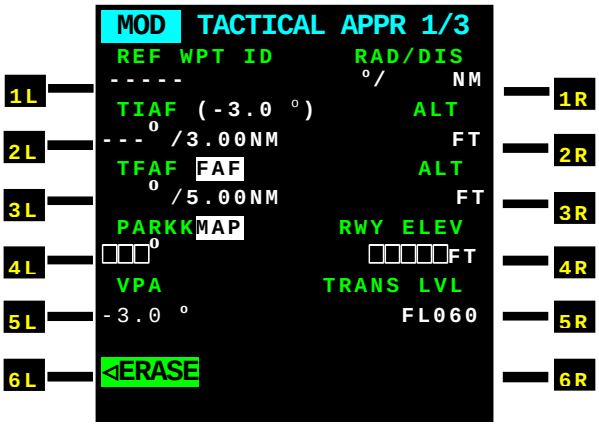


TACTICAL APPROACH (if configured)

NOTE: The TACTICAL APPROACH function has been designed to make as much use of the FMS's already existing VNAV approach mode function. Consequently, much of the logic which tactical approaches uses is exactly the same as that which applies to the VNAV approach function.
Additional details on this can be found in the VNAV APPROACH MODE section of Section 7.

Tactical approaches are intended to allow the operator to perform approaches to any crew-selected or defined waypoint (e.g. navigation database waypoint, user waypoint, or temporary waypoint). The tactical approach geometry relative to this waypoint, known as the Tactical Approach Runway Threshold Waypoint, is created by the operator. The Tactical approach can also be selected from the ARRIVALS page when a tactical approach database has been previously loaded in the FMS. The FMS provides the crew with advisory vertical guidance (e.g. Vertical Track Deviation) while conducting a tactical approach. The FMS also provides lateral guidance to conduct the approach and the missed approach segment of the tactical approach.

Once the pseudo-runway threshold is defined, the operator must enter on the TACTICAL APPR 1/3 page the required fields to define the geometry of the tactical approach procedure to be conducted.
Initial Tactical Approach page display when runway threshold is defined from the LEGS page (PARKK/A entered).



The crew has to enter the following mandatory information before the Tactical Approach can be executed:

A. The Final Approach Course (LSK 4L). Refer to Figure 11-7.

B. The Runway Elevation (LSK 4R). Runway elevation is defined as the height above WGS-84 reference ellipsoid. Refer to Figure 11-8.

NOTE: The Missed Approach Point (MAP) altitude constraint will be set to 50ft above the Runway Elevation.

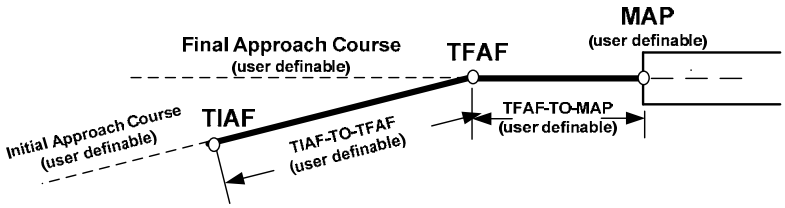


Figure 11-7 Tactical Approach Lateral Profile Geometry

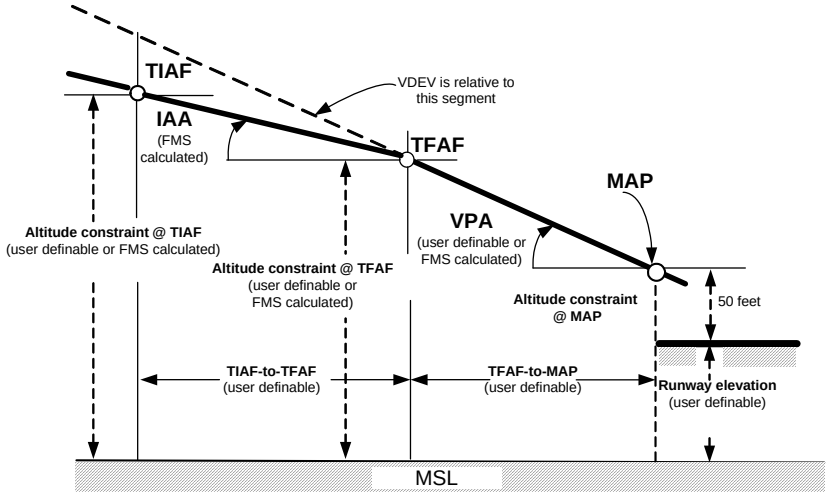
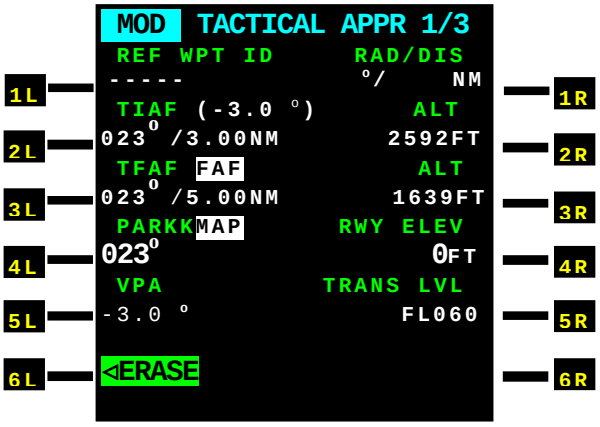


Figure 11-8 Tactical Approach Vertical Profile Geometry

When mandatory entries are entered the FMS will compute the coordinates and altitude constraints of the TIAF, TFAF, MAP, TMAP1, TMAP2 waypoints using the default tactical approach parameters.



NOTE: The Initial Approach Angle (IAA) displayed next to TIAF waypoint is used for quick validation of Vertical Profile generated (refer to Figure 11-8).

The TRANS LVL field seen on the TACTICAL APPR 1/3 page contains the Transition Level value that is currently set in the FMS (refer to PLAN DATA 1/1 page, if configured). This value is defined on the PLAN DATA 1/1 page and is copied over to the TACTICAL APPR 1/3 page. This value cannot be directly modified on the TACTICAL APPR 1/3 page and is placed here only for operator reference when executing/accepting the tactical approach procedure that was created.

CAUTION: It is the crew's responsibility to ensure that the appropriate transition level for the tactical approach destination was correctly entered.

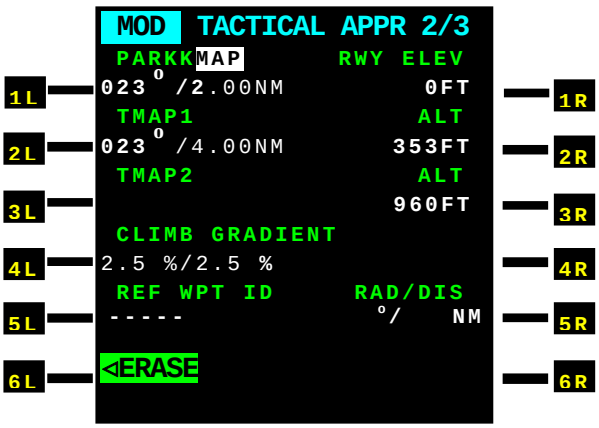
The crew can manually overwrite the length default values of the initial tactical approach, the final tactical approach segments, the Initial approach Course, the tactical approach vertical path angle (VPA), the TFAF and the TIAF altitude constraints. Refer to Table 11-2 for recomputed parameters upon modification of default values.

Table 11-4 specify all defaults, minimum and maximum parameter values than can me manually modified by the crew. If any parameter is out of range due to manual entry or by tactical approach profile re-computation the message !OUT OF RANGE will be displayed on the scratchpad and the entry will be rejected.

Modified Tactical Approach Parameters	Will be recomputed	Path Affected
Distance *NOTE: Altitude constraints of tactical approach waypoints remain constant when the following parameters are changed*.		
TIAF-to-TFAF distance (LSK 2L)	• TIAF coordinates, • AA	Vertical & Lateral
TFAF-to-MAP distance (LSK 3L)	• TIAF coordinates • TFAF coordinates • VPA	Vertical & Lateral
Vertical Path Angle *NOTE: The TIAF and TFAF coordinates remains the same when the following parameter is changed.*		
Vertical Path Angle (VPA) (LSK 5L)	• TFAF altitude constraint • IAA • TIAF altitude constraint will be set to TFAF altitude if computed TFAF is higher than TIAF.	Vertical
Course *NOTE: Altitude constraints, VPA, IAA and climb gradients remain the same when the following parameters are changed.*		
Initial Approach Course (IAC) (LSK 2L)	• TIAF coordinates	Lateral
Altitude *NOTE: The TIAF, TFAF, MAP, TMAP1 and TMAP2 coordinates remain the same when the following parameters are changed.*		
Runway elevation (LSK 4R)	• MAP altitude constraint • TFAF altitude constraint • TIAF altitude constraint • TMAP1 altitude constraint • TMAP2 altitude constraint	Vertical
TFAF altitude constraint (LSK 3R)	• VPA • IAA • TIAF altitude constraint will be set to TFAF altitude if computed TFAF is higher than TIAF.	Vertical
TIAF altitude constraint (LSK 2R)	• IAA	Vertical

Table 11-2 Tactical Approach Parameters

The second Tactical Approach page presents the information related to the Tactical Missed Approach segment. The FMS automatically generates a Tactical Missed Approach procedure based on default parameters. Refer to Figure 11-9 and 11-10 for lateral and vertical Tactical Missed Approach Profiles.



NOTE: Climb Gradient between for the 2 Missed Approach legs is displayed information only and cannot be modified by the crew.

NOTE: Runway Elevation is displayed for information only and cannot be modified by the crew on this page.

The crew can manually overwrite the default length values of the 2 tactical missed approach segments, the Turn Missed Approach Course, the TMAP1 and TMAP2 altitude constraints. Refer to Table 11-3 for recomputed parameters upon modification of default values.

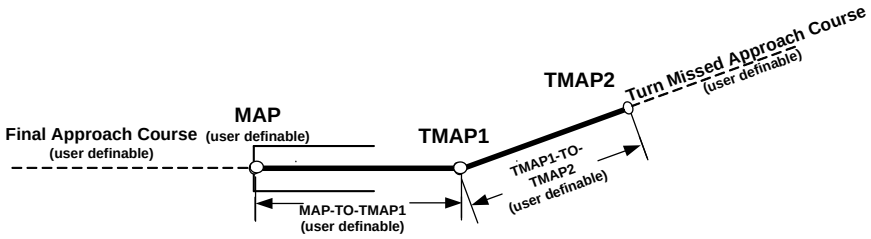


Figure 11-9 Tactical Missed Approach Lateral Profile Geometry

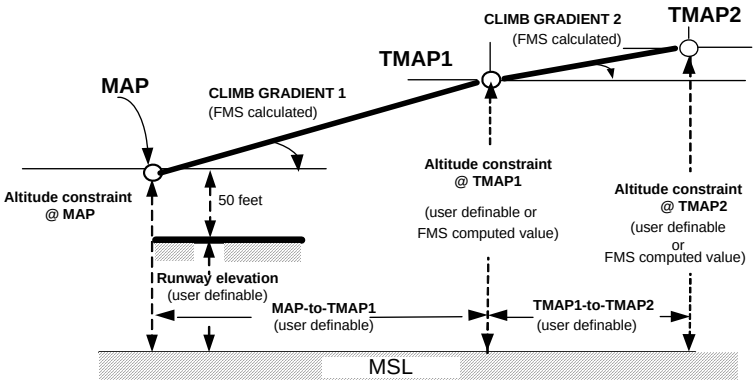
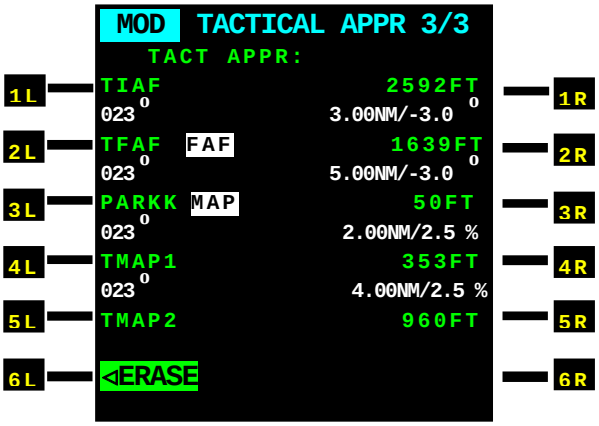


Figure 11-10 Tactical Missed Approach Vertical Profile Geometry

Modified Tactical Missed Approach Parameters	Will be recomputed	Path Affected
Distance *NOTE: Altitude constraints of tactical approach waypoints remain constant when the following parameters are changed.*		
MAP-to-TMAP1 distance (LSK 1L)	• TMAP1 coordinates • TMAP2 coordinates • CLBGRD1	Vertical & Lateral
TMAP1-to-TMAP2 distance (LSK 2L)	• TMAP2 coordinates • CLBGRD2	Vertical & Lateral
Course *NOTE: Altitude constraints, VPA, IAA and climb gradients remain the same when the following parameter is changed.*		
Turn Missed Approach Course (IAC) (LSK 2L)	• TMAP2 coordinates	Lateral
Altitude *NOTE: The TIAF, TFAF, MAP, TMAP1 and TMAP2 coordinates remain the same when the following parameters are changed.*		
TMAP1 altitude constraint (LSK 2R)	• CLBGRD1 • CLBGRD2 • TMAP2 altitude constraint will be set to TMAP1 altitude if computed TMAP1 is higher than TMAP2.	Vertical
TMAP2 altitude constraint (LSK 3R)	• CLBGRD2	Vertical

Table 11-3 Tactical Missed Approach Parameters

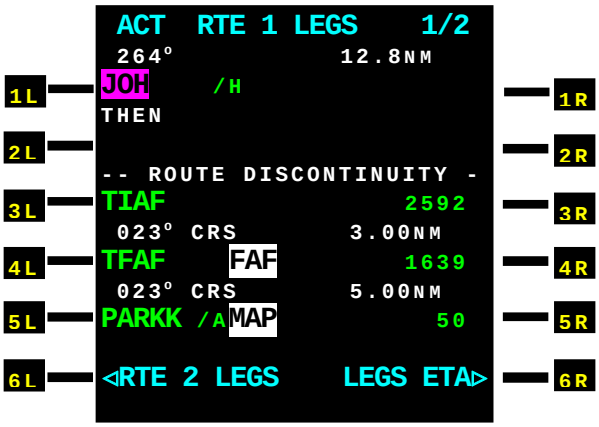
The third Tactical Approach pages gives the crew an overview of all Tactical Approach and Missed Approach parameters.



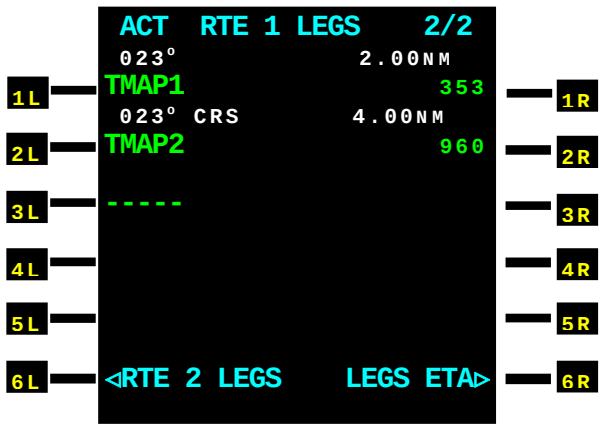
Parameters	Unit	Minimum	Default	Maximum
TIAF-to-TFAF distance	NM	2.00	3.00	20.00
TFAF-to-MAP distance	NM	4.00	5.00	20.00
MAP-to-TMAP1 distance	NM	1.00	2.00	10.00
TMAP1-to-TMAP2 distance	NM	1.00	4.00	20.00
Initial Approach Angle (IAA)	°	-10.0	-3.0	0.0
Vertical Path Angle (VPA)	°	-10.0	-3.0	-1.0
Climb Gradient 1 (CLBGRD1)	%	0.0	2.5	20.0
Climb Gradient 2 (CLBGRD2)	%	0.0	2.5	20.0
Initial Approach Course (IAC)	°	Final Approach Course - 30°	Final Approach Course	Final Approach Course + 30°
Turn Missed Approach Course (TMAC)	°	Final Approach Course - 30°	Final Approach Course	Final Approach Course + 30°

Table 11- 4 Tactical Approach default, minimum and maximum values

As a result of the aforementioned manual entries, the FMS presents to the crew (on the RTE X LEGS page) the tactical approach procedure waypoints TIAF (e.g. Tactical Initial Approach Fix), TFAF (e.g. Tactical Final Approach Fix) and the associated pseudo-altitude constraints:



The Tactical Missed Approach procedure waypoints are presented as well to the crew.



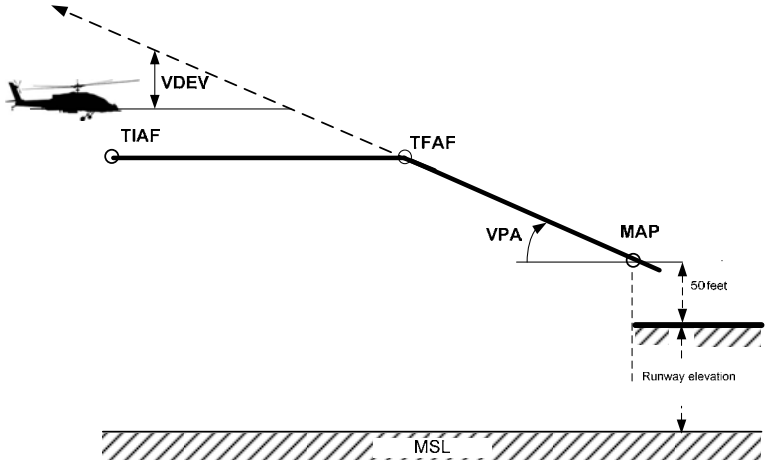


Figure 11-11 Tactical Approach VDEV indication

CAUTION: The VDEV provided by the FMS is always to the Final Approach segment as depicted on Figure 11-11.

See additional details on the TACTICAL APPR page in Appendix A.

ENTERING A TACTICAL APPROACH

A flight plan can only contain a single approach and/or arrival procedure at any given time.
Should an approach already exist in a flight plan, this would need to be removed from the flight plan before the tactical approach can be inserted.

NOTE: If a second tactical approach is required for planning purposes, it may be defined in the inactive flight plan.

A tactical approach procedure can be entered in any of the following methods:

1. A waypoint identifier or position can be entered into the scratchpad followed by a /A and then line selected to the desired flight plan location (e.g. enter JFK or N4528.05W07344.45/A in the scratchpad and insert at appropriate line location on the LEGS page).

2. /A can be entered over an existing flight plan waypoint on the LEGS page thus making the waypoint the destination for the tactical approach.

3. Via the TACT APPR prompt located on DES+SAR or TACTICAL 2/4 (or DES+SAR or TACTICAL 4/4 for the inactive route). As is the case for other waypoints entered via the DES+SAR or TACTICAL pages, the reference waypoint ID (RWY THR WPT for tactical approaches) can be entered in the scratchpad prior to going to the DES+SAR or TACTICAL page.

4 Selecting LSK 1L on TACTICAL APPR 1/3 if a tactical approach had already been entered and the tactical approach procedure still exists on this page (e.g. the RWY THR WPT field still shows an waypoint identifier). This will then copy the RWY THR WPT field value to the scratchpad, append /A to it, and automatically call up the LEGS page to allow insertion of same tactical approach procedure.

5. Via the TACT APPR prompt located on the TACTICAL 1/2 page (or INACT TACTICAL 2/2 for the inactive route). As is the case for other waypoints entered via the TACTICAL pages, the reference waypoint ID (RWY THR WPT for tactical approaches) can be entered in the scratchpad prior to going to the TACTICAL page.

TACTICAL APPROACH SELECTION FROM DATABASE (Optional)

When a Tactical Approach database is loaded in the FMS the crew can select a tactical approach from the ARRIVALS page.

NOTE: This can be especially useful once a missed approach has occurred and the crew wishes to now reattempt a tactical approach to the same tactical landing sight using the same, previously entered, tactical approach parameters.

DESELECTING A TACTICAL APPROACH FROM FLIGHT PLAN

If a tactical approach exists in the flight plan, it can be deselected from the flight plan by ensuring the following:

1. For the active flight plan, none of the 3 tactical approach created waypoints (e.g. TA01, TA02, or RWY THR WPT) are the "TO" waypoint, and, then entering a "/" in the scratchpad and line selecting this to the key next to the RWY THR WPT (e.g. MAP) waypoint of the flight plan.

2. For the inactive flight plan, entering a "/" in the scratchpad and line selecting this to the key next to the RWY THR WPT (e.g. MAP) waypoint of the inactive flight plan.

MODIFICATION OF A TACTICAL APPROACH IN FLIGHT PLAN

1. This is achieved by going to the TACTICAL APPR page via any means (e.g. entering /A on top of the tactical approach MAP on the LEGS page or via the DES+SAR or TACTICAL page 2/4) and changing the desired tactical approach parameter(s) only when the "TO" waypoint is not part of the entered tactical approach procedure (e.g. the "TO" waypoint is not TA01, TA02, or MAP).

2. In order to modify a tactical approach which exists in the active flight plan when the active (e.g. TO) waypoint is a tactical approach procedure waypoint (e.g. either the TA01, TA02, or MAP), the operator will need to either:

   - move the tactical approach procedure downpath by means of a DIRECT TO and then modify the tactical approach (as described in 1 just above), or
   - close-up the tactical approach (e.g. select a waypoint downpath of the tactical approach FAF and bring this waypoint before the tactical approach procedure in the flight plan). After this the operator can access the tactical approach procedure via DES+SAR or TACTICAL page 2/4 to make any necessary changes.

DELETING A TACTICAL APPROACH

If a tactical approach was created, it can be deleted from the FMS by performing any of the following:

1. Entering a new ORIGin on the RTE page.

   The above statement also holds true for the following scenario:
   When performing an FMS cold-start on ground if the DEST field on the RTE page was a tactical approach destination.

   NOTE: That when this occurs, upon power-up following the long-term power interruption, the ORIG field of the RTE page will be set equal to the value that existed in the DEST field prior to the power interruption (e.g. it will be set equal to the RWY THR WPT identifier). The DEST field will then be reset to its blank default value.

   This is done to allow the ORIGin field to already be preset for a subsequent departure from the tactical approach landing site.

1. In a single FMS installation, by selecting the ERASE RTEx prompt on the RTE x 1/2 page.

CALCULATED AIR RELEASE POINT (CARP) AND HIGH ALTITUDE RELEASE POINT (HARP) (If configured)

NOTE: Hereafter, unless specifically mentioned references to 'Calculated Air Release Point' or 'CARP' also includes and pertains to the following procedures: Custom HARP, Custom HAHO, Free Fall.

The Calculated Air Release Point function is a tactical function used for air drops of personnel, cargo, or heavy equipment. In the FMS, the CARP procedure is defined as a series of six legs/waypoints, as shown in the following figure, five of which are calculated by the FMS:

1. Identification Point (IP) - Optional user-defined waypoint that may be used as a reference for a Mark on Top operation.

2. Turn Point (TP) - FMS computed waypoint used to align the aircraft along the track of the drop zone. The TP-SD leg is a turn such that the track becomes the same direction as the landing zone and the wings are level upon reaching the slow-down point.

3. Slowdown Point (SD) - FMS computed waypoint used to signal to the pilot that the altitude and speed must be changed to the CARP target altitude and speed. The SD-CRP leg is along the same track as the drop zone and its length is computed to allow the aircraft sufficient time to reach the target altitude and speed prior to reaching CARP.

4. CARP Point (CRP) - FMS computed waypoint indicating that the drop may begin; green light indication. This waypoint is computed using the provided Point of Impact and Ballistics parameters.

5. Extended Trailing Edge (XTE) Point - FMS computed waypoint indicating the drops must cease; red light indication. The direction and length of the CRP-XTE leg are the same as the drop zone.

6. Escape Point (ESC) - FMS computed waypoint indicating the aircraft may now change track and proceed with the following waypoint. This waypoint is computed from the escape time and speed during the drop.

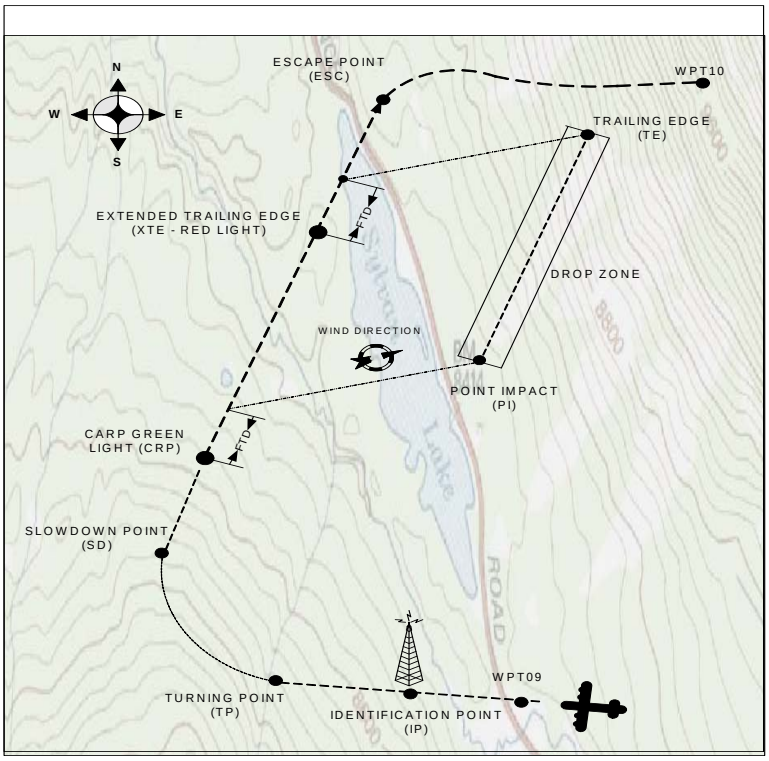


Figure 11-12 Typical CARP Profile

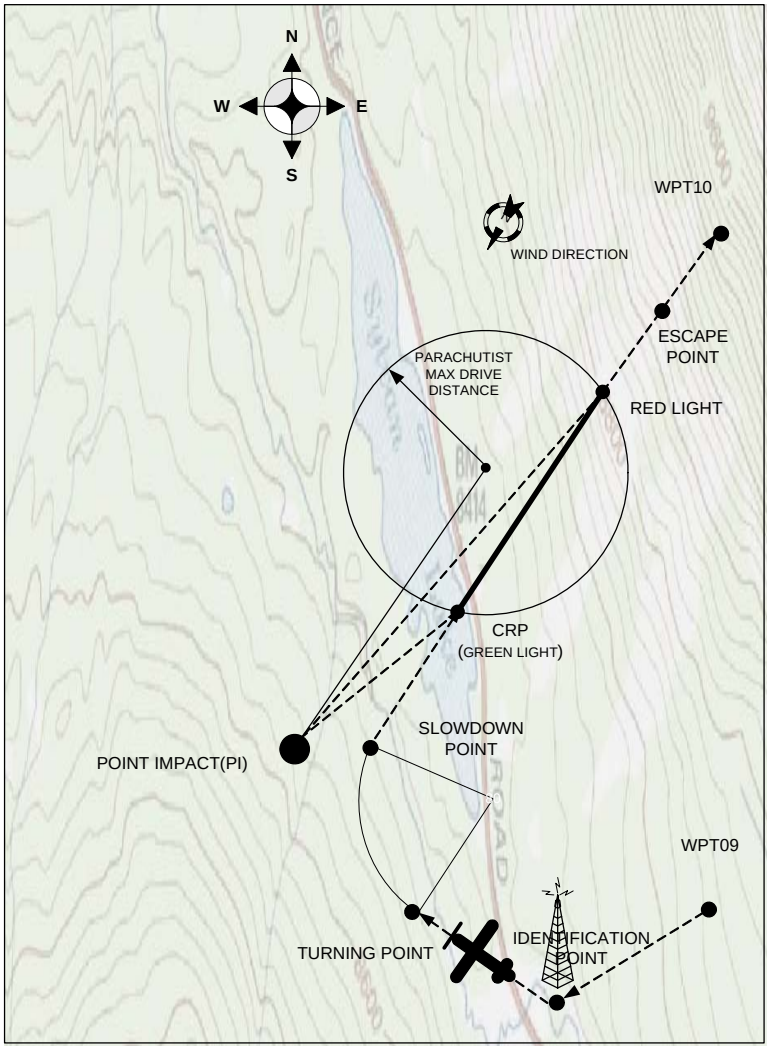


Figure 11-13 Typical HAHO Profile

The FMS provides horizontal guidance to and from each waypoint of the CARP procedure, including roll steering outputs, EHSI/EFIS indications, and PROGRESS page displays. Annunciation is provided via CARP procedure waypoints and drop zone display on EFIS, "CARP Active" and "At CARP" remote annunciators, CARP PROGRESS page displays and CMA-9000 Display Panel scratchpad advisories.

Two CARP procedures may be simultaneously defined, one on the active route and another on the inactive route.

INITIATION OF A CARP/HARP PROCEDURE

A CARP procedure can be initiated via the following methods:

A. Assuming no CARP procedure is already included in the flight plan:

1. Press [INIT/REF].
2. Press the "DES+SAR or TACTICAL" LSK.
3. Press [NEXT]. The following page will then be in view:

4. Press the "CARP" LSK. This brings up the LEGS page with CRP01/C in the scratchpad.
5. Proceed to steps C2 to C4.

B. Using the tactical function key (if configured):

1. Press [TACT]. This brings up the LEGS page with CRP01/C in the scratchpad.
2. Proceed to steps C2 to C4.

C. Execute the following steps:

1. Manually type CRP01/C in the scratchpad.

2. Selected the flight plan location on the LEGS page. This automatically inserts the CARP procedure in the selected flight plan location and brings up the CARP PLAN 1/3 page in MOD state.

3. Select the type of CARP procedure to perform by toggling the TYPE (LSK 1L) between CUST CARP, CUST HARP, CUST HAHO, FREE FALL

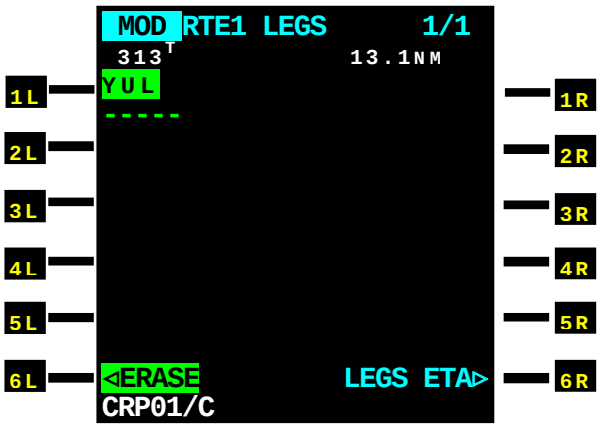
4. For the selected drop type, enter all desired parameters on the 3 CARP PLAN pages. These may include patterns defining the landing zone geometry, mission parameters, ballistic data, local pressure, and wind data as defined in the CARP PLAN pages in Appendix A.

5. Press EXEC. If insufficient parameters are entered, then pressing the EXEC key will display a "!CARP DATA MISSING" advisory message and prevent the route from being activated. Correct as needed.

The Initialization Point (IP) and drop zone waypoints, Point of Impact (PI) and Trailing Edge (TE), may be defined relative to one another with Place/Bearing/Distance on the CARP PLAN 1/3 page, refer to Section 5, INSERTING WAYPOINTS.

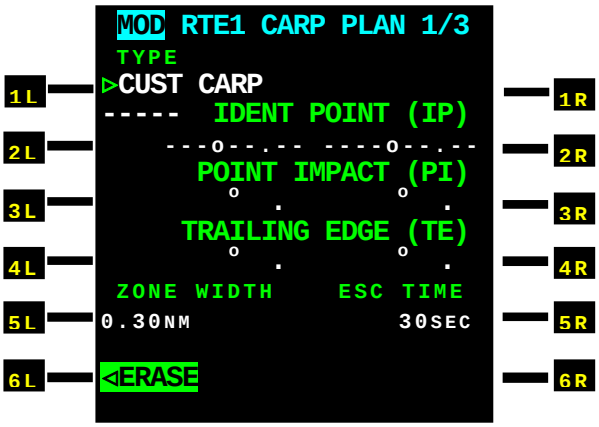
1. Press LSK 3R, CARP.

2. The RTE x LEGS 1/1 page is displayed.



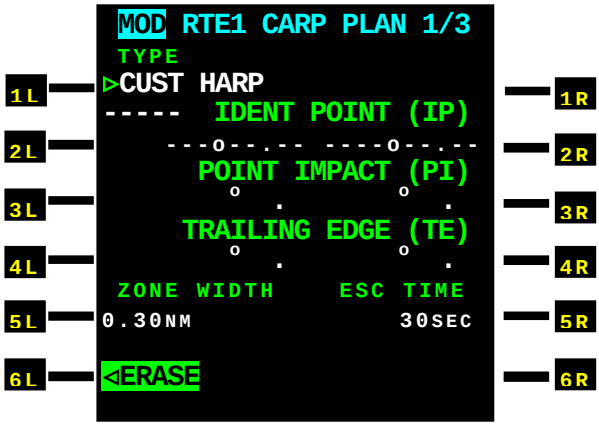
3. Select a Flight Plan Location.

4. The CUST CARP selected CARP PLAN 1/3 page is displayed.

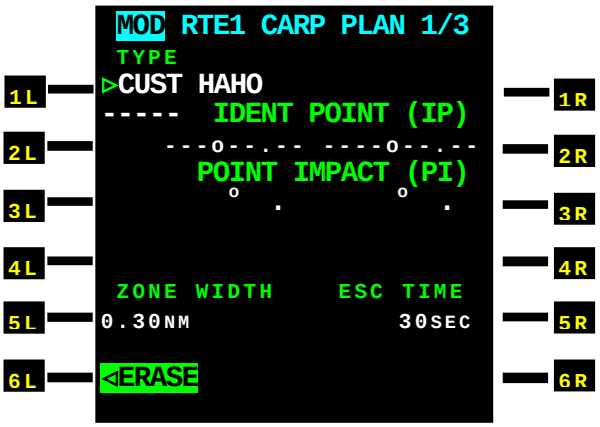


5. Toggling between TYPEs will show the following different CARP PLAN pages:

   A. The CUST HARP selected CARP PLAN 1/3 page is displayed.



   B. The CUST HAHO selected CARP PLAN 1/3 page is displayed.



C. The FREE FALL selected CARP PLAN 1/3 page is displayed.

6. Enter CARP parameters on three CARP PLAN pages and press EXEC.

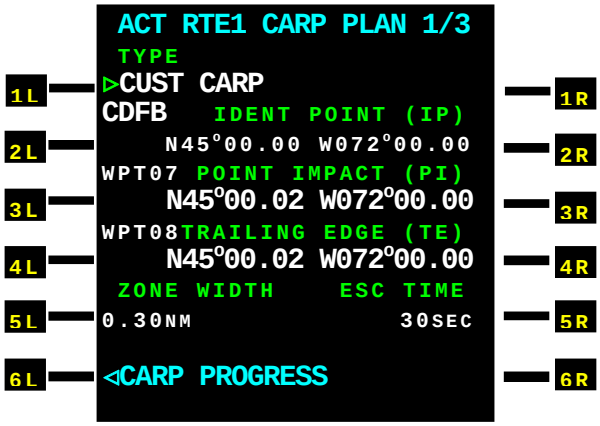
CARP PLAN 1/3 (If configured)

Display CARP PLAN 1/3 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <CARP> when a CARP procedure is in the displayed flight plan or
[TACT] when TACT key is configured and a CARP procedure is in the displayed flight plan.

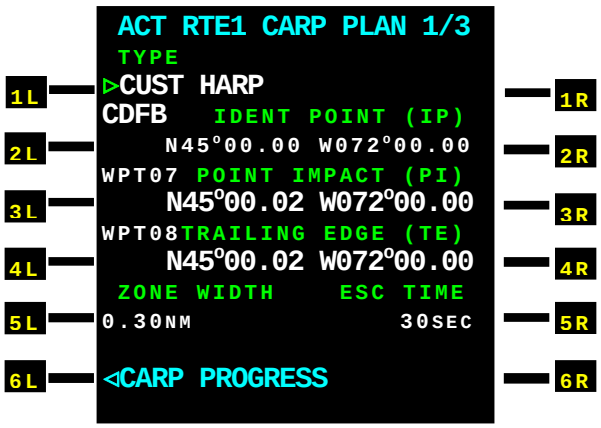
Automatically accessed whenever /C is entered over a CARP procedure on the LEGS page.

The CARP PLAN pages are used to define the parameters for a CARP procedure. The CARP procedure may be defined in either the active or inactive route.

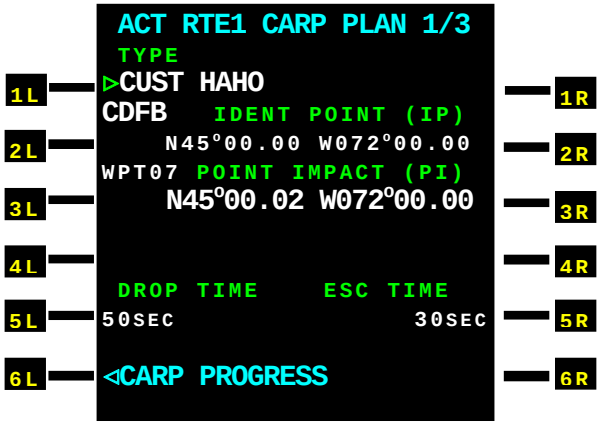
A. Active status and sample inputs – Custom CARP.



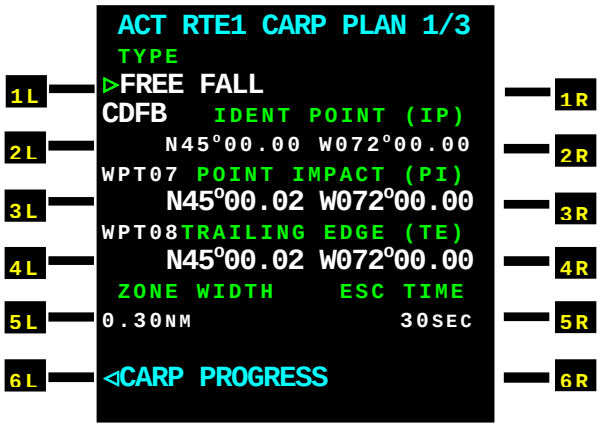
B. Active status and sample inputs - Custom HARP.



C. Active status and sample inputs - Custom HAHO.



D. Active status and sample inputs – FREE FALL.



ACT/MOD/" " RTE x (title): ACT indicates that the EXECuted CARP procedure is active (CARP Active discrete is on). MOD indicates the CARP procedure modifications have not been EXECuted yet. A blank field indicates the CARP procedure:

- Is in the active flight plan, but is not considered Active yet (CARP Active discrete is OFF), or
- The CARP procedure for the Inactive route is being displayed.

Also, RTE x (where 'x' can be 1 or 2) indicates for which route the current CARP procedure is being displayed.

TYPE [1L]: Air Release Type selection key - CUST CARP, CUST HARP, CUST HAHO, FREE FALL. The Air Release Type affects the CARP parameters displayed.

IP [2L]: Optional Waypoint Identifier of the Identification Point (IP). The entry may be in the form of a place-bearing-distance (wptidBRG/DIS, e.g. WPT07012/112). If an IP position is entered in LSK [2R], then a temporary waypoint is automatically created and the identifier (WPTXX) is displayed in [2L]. Otherwise, a database waypoint identifier may be entered in this field.

IP [2R]: Optional Latitude and Longitude coordinates of the Identification Point (IP). The format of the position must be in the form of latitude and longitude ("NxxWxxx" or "Nxxxx.xxWxxxxx.xx"). If an identifier is entered in LSK [2L], then its position is automatically displayed here in normal font.

PI [3L]: Waypoint Identifier of the Point of Impact (PI). The entry may be in the form of a place-bearing-distance (wptidBRG/DIS, e.g. WPT07012/112). If a PI position is entered in LSK [3R], then a temporary waypoint is automatically created and the identifier (WPTXX) is displayed in [3L]. Otherwise, a database waypoint identifier may be entered in this field.

PI [3R]: Latitude and Longitude coordinates of the Point of Impact (PI). The format of the position must be in the form of latitude and longitude ("NxxWxxx" or "Nxxxx.xxWxxxxx.xx"). If an identifier is entered in LSK [3L], then its position is automatically displayed here in normal font.

TE [4L]: Waypoint Identifier of the Drop Zone Trailing Edge (TE). The entry may be in the form of a place-bearing-distance (wptidBRG/DIS, e.g. WPT07012/112). If a TE position is entered in LSK [4R], then a temporary waypoint is automatically created and the identifier (WPTXX) is displayed in [4L]. Otherwise, a database waypoint identifier may be entered in this field. Not available for CUST HAHO drops.

TE [4R]: Latitude and Longitude coordinates of the Trailing Edge (TE). The format of the position must be in the form of latitude and longitude ("NxxWxxx" or "Nxxxx.xxWxxxxx.xx"). If an identifier is entered in LSK [4L], then its position is automatically displayed here in normal font. Not available for CUST HAHO drops.

ZONE WIDTH [5L]: Drop zone width (nm). Default value is 0.30. Range [0.03..9.99]. This field is not displayed for CUST HAHO.

DROP TIME [5L]: In case of Custom HAHO. Time, in seconds, needed to perform all the intended drops. Used to compute the best solution. Default is dashes, range [1...999].

ESC TIME [5R]: Desired elapsed time (sec) after reaching the XTE (Red Light) that A/C must maintain current heading, speed, and altitude. Default value is 30, range [1…999].

CARP PROGRESS [6L]: Access to CARP PROGRESS page. Displayed for the active route only.

ERASE [6L]: Cancel any active route modifications and/or any CARP parameter changes. Only displayed when the page is displaying the MOD status. If by pressing ERASE the CARP procedure is removed from the flight plan, then the LEGS page is automatically displayed.

CANCEL [6L]: Cancel the changes made to the inactive route.

CONFIRM [6R]: Confirm the changes made to the inactive route. If the CARP solution does not exist with the parameters entered, an advisory message is displayed in the scratchpad and the CANCEL/CONFIRM prompts remain displayed. The user may then correct the parameters, press CANCEL or remove the procedure from the flight plan.

NOTES:

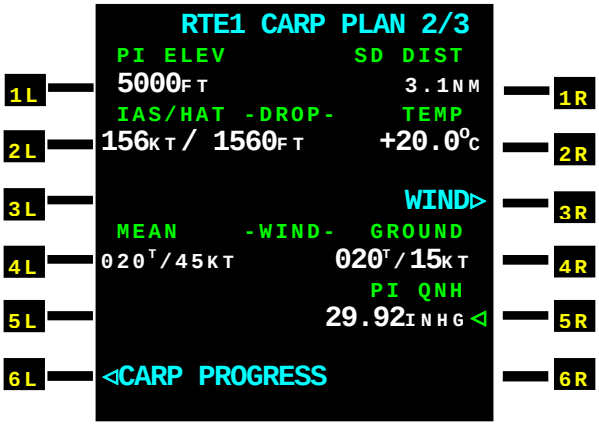
- *Pressing on a waypoint ID or position LSK with an empty scratchpad copies the ID or position to the scratchpad.*
- *Waypoint entries may be relative to any waypoint using relative bearing and distance as offsets (e.g. WPT12123/60 defines a position with a bearing of 123 degrees and distance of 60 nm relative to WPT12).*
- *Invalid entries in terms of format or range are not accepted by the FMS and an advisory message is displayed in the scratchpad.*
- *Pressing the RESET key on the CARP PLAN 3/3 page resets all parameters to their default values (for the chosen type of CARP/HARP).*

CARP PLAN 2/3 (If configured)

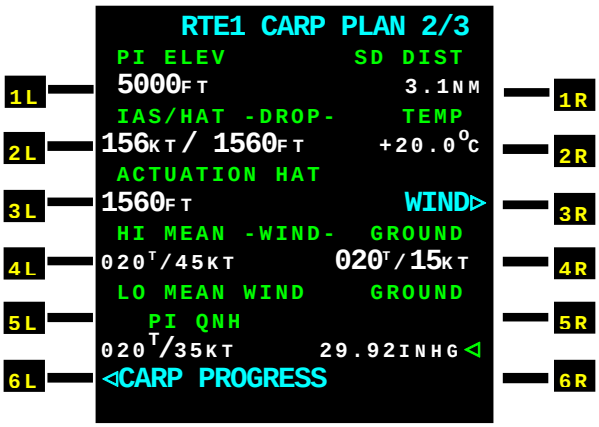
Display CARP PLAN 2/3 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <CARP>, [NEXT] when a CARP procedure is in the displayed flight plan or
[TACT], [NEXT] when TACT key is configured and a CARP procedure is in the displayed flight plan.

Automatically accessed whenever /C is entered over a CARP procedure on the LEGS page, [NEXT].

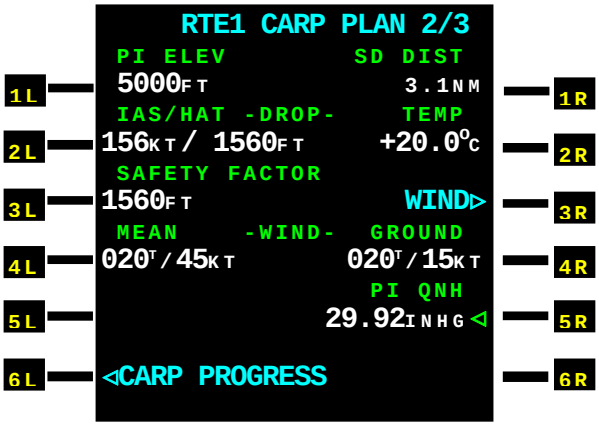
A. Custom CARP view:



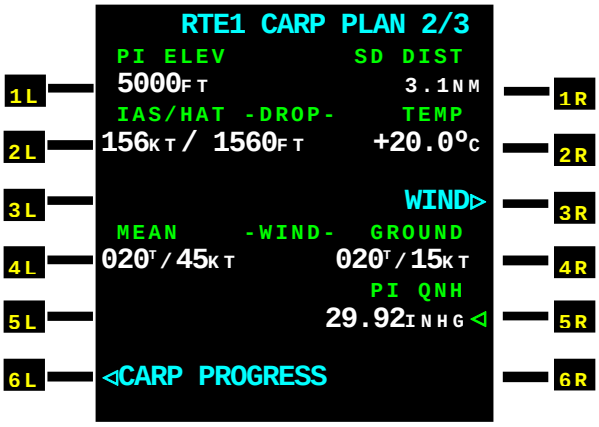
B. Custom HARP view:



C. Custom HAHO view:



D. Free Fall view:



ACT/MOD/" " RTE x (title): ACT indicates that the EXECuted CARP procedure is active (CARP Active discrete is on).
MOD indicates the CARP procedure modifications have not been EXECuted yet. A blank field indicates the CARP procedure:

- Is in the active flight plan, but is not considered Active yet (CARP Active discrete is OFF), or
- The CARP procedure for the Inactive route is being displayed.

Also, RTE x (where 'x' can be 1 or 2) indicates for which route the current CARP procedure is being displayed.

PI ELEV [1L]: Point of Impact (PI) elevation (feet) above Mean Sea Level (MSL). Range [-1000…9999]. The maximum sum of the DROP HAT and PI ELEV is 19999 feet.

SD DIST [1R]: Display and entry of Slowdown Distance (nm), defined as the distance from the Slowdown point (SD) to the CARP green light waypoint (CRP). The default is the FMS computed value. If insufficient CARP parameters are available to compute a value, the FMS displays dashes until sufficient parameters are available, at which time the default value is displayed. Manual entry overrides the FMS computed value. Manual entry range: 0.0 to 99.9 nm.

DROP IAS/HAT [2L]: Mission Indicated Air Speed (knts) and Height Above Terrain (HAT) (ft) planned for the drop. The default is boxes. A manual entry is required. When the entered HAT is less than the entered VERT DIST value, an invalid data entry message is displayed. Range [50...175] / [0...19999]. The maximum sum of DROP HAT and PI ELEV is 19999 feet. DROP HAT value must be greater than the ACUATION HAT for CUST HARP. DROP HAT value must be greater than the entered safety factor for CUST HAHO.

DROP TEMP [2R]: Static air temperature ((C) at the drop altitude. The default is the FMS value taken from the ADC at the current altitude corrected for temperature deviation. Manual entry may override. When temperature from ADC is not available, the standard day temperature deviation is used to compute the temperature at the drop altitude. If the drop HAT has not yet been entered, the ADC static air temperature is displayed, if available. Otherwise dashes are displayed. Range [-99.9…99.9]

ACTUATION HAT [3L]: Displayed for CUST HARP only. Height, in feet, above PI where the parachute cord is pulled. Actuation HAT must be less than the entered DROP HAT, and greater than the entered DECEL DIST. Default display is boxes. Manual entry is required. Range [0…19999].

SAFETY FACTOR [3L]: Displayed for CUST HAHO only. A safety buffer (ft) from exit to assembly of parachutists under canopy and for assembly at a certain altitude once they arrive over the drop zone. The safety factor must be less than the entered DROP HAT. Default value is 2,000 feet. Range [0…5000].

WIND [3R]: Access to the CRP01 WIND page.

MEAN WIND [4L]: Mean Effective Wind (MEW) direction and speed (() /(kt) or (T)/(kt) from PI altitude to drop altitude to be used in the FMS CARP calculations. Unit used depends on current display setup (true or mag).The default display is computed by the FMS based on current and predicted wind at the mission altitude. A manual entry is allowed. If a ground wind is entered (GROUND WND), then the displayed value is modified to take into account both the FMS predicted value at the drop altitude and the entered ground wind. Range [0…360] / [0…99]. Not displayed for CUST HARP.

HI MEAN WIND [4L]: Displayed for CUST HARP only. Mean Effective Wind (MEW) direction and speed (()/(kt) or (T)/(kt) from the drop altitude to the actuation altitude to be used in the FMS CARP calculations. Unit used depends on current display setup (true or mag).The default display is computed by the FMS based on current and predicted wind at the drop and actuation altitudes. A manual entry may force a specific value, which may be based on observations by a ground team using the procedure defined in AFI 11-217. Range [0…360] / [0…99].

GROUND WIND [4R]: Wind direction and speed (()/(kt) or (T)/(kt) observed by a ground team at PI (Point of Impact). Unit used depends on current display setup (true or mag). If a Mean Effective Wind (MEW) has been entered or a LO MEAN WIND for HAHO, this field is cleared. The default display is dashes. Range [0…360] / [0…99]

LO MEAN WIND [5L]: Displayed for CUST HARP only. Mean Effective Wind (MEW) direction and speed (°)/(kt) or (^{T})/(kt) from PI altitude to actuation altitude to be used in the FMS CARP calculations. Unit used depends on current display setup (true or mag).The default display is computed by the FMS based on current and predicted wind at the actuation altitude. A manual entry is allowed. If a ground wind is entered (GROUND WND), then the displayed value is modified to take into account both the FMS predicted value at the actuation altitude and the entered ground wind. If the actuation HAT has not yet been entered, dashes are displayed. Range [0…360] / [0…99].

PI QNH [5R]: Altimeter setting at PI in mb or inHg. The displayed unit (mb or inHg) can be toggled via LSK 5R when the scratchpad is empty. Displayed, in small font, when the FMS altimeter setting (QNH) is used. Manual entry is allowed in inches of mercury (in Hg) with a range from 27.0 to 32.0 in Hg or in millibars (mb) with a range from 915 to 1083 mb. When neither a manual PI QNH entry nor the FMS QNH is available, boxes are displayed.

CARP PROGRESS [6L]: Access to CARP PROGRESS page.

ERASE [6L]: Cancel any active route modifications and/or any CARP parameter changes. Only displayed when the page is displaying the MOD status. If by pressing ERASE the CARP procedure is removed from the flight plan, then the LEGS page is automatically displayed.

CANCEL [6L]: Cancel the changes made to the inactive route.

CONFIRM [6R]: Confirm the changes made to the inactive route. If the CARP solution does not exist with the parameters entered, an advisory message is displayed in the scratchpad and the CANCEL/CONFIRM prompts remain displayed. The user may then correct the parameters, press CANCEL or remove the procedure from the flight plan.

NOTES:

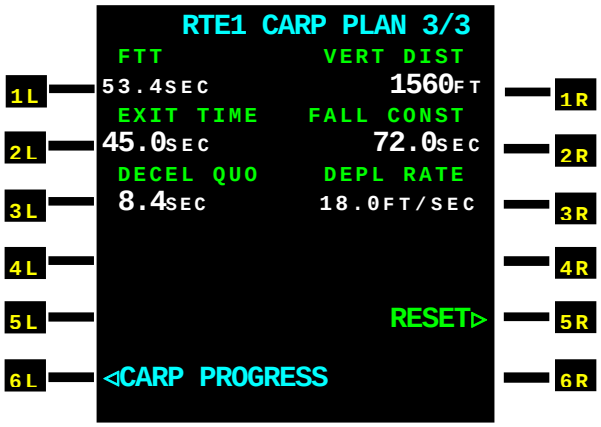
- *Entering DELETE on any field causes it to resume its default value.*
- *Pressing the RESET key on the CARP PLAN 3/3 page resets all parameters to their default values.*

CARP PLAN 3/3 (If configured)

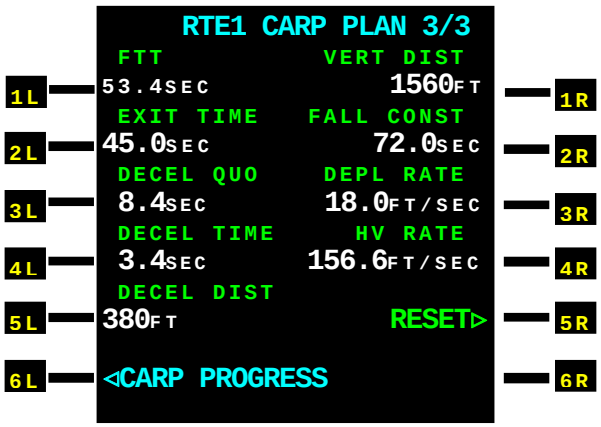
Display CARP PLAN 3/3 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <CARP>, [PREV] when a CARP procedure is in the displayed flight plan or
[TACT], [PREV] when TACT key is configured and a CARP procedure is in the displayed flight plan.

Automatically accessed whenever /C is entered over a CARP procedure on the LEGS page, [PREV].

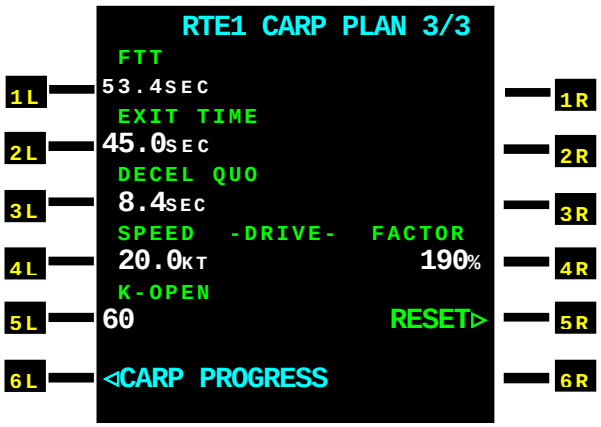
A. Custom CARP view:



B. Custom HARP view:



C. Custom HAHO view:



D. Free Fall view:

ACT/MOD/" " RTE x (title): ACT indicates that the EXECuted CARP procedure is active (CARP Active discrete is on).
MOD indicates the CARP procedure modifications have not been EXECuted yet. A blank field indicates the CARP procedure:

- Is in the active flight plan, but is not considered Active yet (CARP Active discrete is OFF), or
- The CARP procedure for the Inactive route is being displayed.

Also, RTE x (where 'x' can be 1 or 2) indicates for which route the current CARP procedure is being displayed.

FTT [1L]: Forward Travel Time (sec). The total effective time that the dropped equipment/personnel travels at the aircraft speed/direction. It is the sum of Exit time and Deceleration Quotient time. When FTT is directly obtainable from ballistic table, then a manual entry may be performed. The value then appears in large font while fields DECEL QUO and EXIT TIME show dashes. If the value is calculated from entered values for EXIT TIME and DECEL QUO, then the value is displayed in normal font. The default value is boxes. If only one of the two fields EXIT TIME and DECEL QUO is entered, then dashes are displayed for FTT. Operator entry is mandatory. Range [0.0…99.9]. This field is not displayed for Free Fall.

HORIZONTAL DISTANCE [1L]: Displayed for Free Fall only. Horizontal distance of fall, in meters, traveled by the load. Extracted from the free fall ballistic data tables. Default display is boxes. Range [0..999].

VERT DIST [1R]: Displayed for CUST CARP and CUST HARP only. Vertical distance (ft) traveled by the load until stabilization. Data may be extracted from parachute ballistic data tables. The default value is boxes. Operator entry is required. When the value entered is too large for the value of MISSION HAT, an invalid data entry message is displayed. Range [1-2999].

EXIT TIME [2L]: Drop Exit Time (sec). Elapsed time from the green light signal to the exit of the first element from the airplane. Value may be extracted from parachute ballistic data tables. The default value is dashes. If a value is entered for DECEL QUO, then the default display is boxes. When an FTT value is manually entered, then dashes are displayed. Range [0…99.9]. For Free Fall type this field is a required entry.

FALL CONST [2R]: Displayed for CUST CARP and CUST HARP only. A fall time constant, in seconds, used to determine drift effect during the time the parachutist/load falls after exiting the aircraft until reaching stabilization. Compensates for the non-linear rate of fall of the load. Data may be extracted from ballistic data tables. The default value is boxes. Operator entry is required. Range [1…99.9].

DECEL QUO [3L]: Deceleration Quotient (sec). Value may be extracted by the operator from the ballistic tables in AFI 11-231. The default value is dashes. If a value is entered for EXIT TIME, then the default display is boxes. When an FTT value is manually entered, then dashes are displayed. Range [0…99.9]. Not displayed for Free Fall.

DEPL RATE [3R]: Displayed for CUST CARP and CUST HARP only. Deployed rate of fall in feet/second. Sea level standard day rate of fall of the load after the parachute is fully deployed and the drop is stabilized. Data may be extracted from parachute ballistic tables. The default display is boxes. Operator entry is required. Range [1..69.9].

DECEL TIME [4L]: Displayed for CUST HARP only. Deceleration time (sec). Elapsed time from actuation until deployment. Extracted from the parachute ballistic data tables. Default display is boxes. Range [0...99.9].

DRIVE SPEED [4L]: Displayed for CUST HAHO only. Speed, in knots, the parachute is capable of traveling at. Default value is 20.8. Range [0..99.9].

HV RATE [4R]: Displayed for CUST HARP only. High velocity rate of fall in feet/second. Sea level, standard day vertical velocity of the load under free fall (before the parachute is deployed). Data may be extracted from the parachute ballistic data tables. Default display is boxes. Range [1...999.9].

DRIVE FACTOR [4R]: Displayed for CUST HAHO only. Drive safety factor (%). Percentage of the total computed drive distance to be used for safety reasons. Default value is 80%. Range [0...100].

DECEL DIST [5L]: Displayed for CUST HARP only. Deceleration Distance (ft). The distance the load descends from actuation to full deployment of the parachute. Extracted from the parachute ballistic data tables. This distance must be smaller than the actuation HAT. Range [0...9999].

K-OPEN [5L]: Displayed for CUST HAHO only. Parachute ballistic (glide) constant when deployed (characteristic to each parachute type). Default value is boxes. Range [0...99].

RESET [5R]: Resets all the CARP parameters on all the CARP PLAN x/3 pages to their default values.

CARP PROGRESS [6L]: Access to CARP PROGRESS page.

ERASE [6L]: Cancel any active route modifications and/or any CARP parameter changes. Only displayed when the page is displaying the MOD status. If by pressing ERASE the CARP procedure is removed from the flight plan, then the LEGS page is automatically displayed.

CANCEL [6L]: Cancel the changes made to the inactive route.

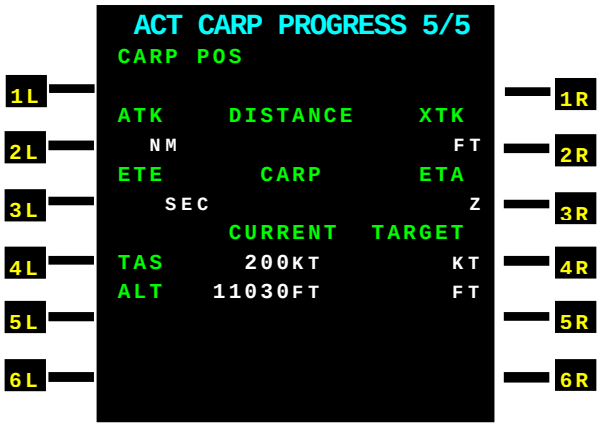
CONFIRM [6R]: Confirm the changes made to the inactive route. If CARP data is missing, an advisory message is displayed in the scratchpad and the CANCEL/CONFIRM prompts remain displayed. The user may then correct the parameters, press CANCEL or remove the procedure from the flight plan.

CARP PROGRESS X/X (when X/X = 4/4 if 3 page set and CARP is configured or X/X = 5/5 if 4 page set and CARP is configured)

Display ACT PROGRESS X/X page by pressing [PROG] and then [PREV] {If CARP is configured}.

The CARP PROGRESS page is used to display the progress towards the CARP procedure waypoints. Currently, only one CARP procedure in the active route is supported.

A. Display with no CARP procedure in the flight plan.



B. Display with CARP procedure in the flight plan.

CARP POSITION (1L): Current position, in geographic coordinates, of the Computed Air Release Point (CRP waypoint).

STATUS (1R): CARP Status: (blank), ACTIVE, NEAR CARP, AT CARP, DROP ZONE, or ESCAPE.

STATUS INDICATION	MEANING
(blank)	The CARP procedure is not active.
ACTIVE	A CARP procedure is in the active flight plan and the active waypoint in the flight plan is a CARP procedure waypoint or less than 20 minutes remain to the CARP green light (CRP).
NEAR CARP	The CARP mode is active and the A/C is less than 60 seconds before arrival at the CRP waypoint (green light).
AT CARP	The CARP mode is active and the A/C is less than 5 seconds before arrival at the CRP waypoint (green light).
DROP ZONE	The CARP mode is active and the A/C is within the CARP drop zone. This state begins 0.5 seconds before arriving at the CRP waypoint (green light).
ESCAPE	The CARP mode is active and the A/C is beyond the CARP drop zone and prior to the Escape (ESC) waypoint.

ATK DISTANCE (2L): Along Track Distance (nm) to the CRP green light or XTE or ESC waypoint along the path defined by the flight plan. Prior to reaching the CARP green light, the distance displayed is that to the CARP green light waypoint. During the drop (after the CRP waypoint has sequenced), the distance displayed is that to the XTE waypoint. This field is not displayed when CARP procedure is not yet in the active flight plan. Range [0...99.9]. '*' symbols are displayed when ATK exceeds the range.

XTK DISTANCE (2R): Cross Track Offset (feet) from the desired path line defined by the CRP (Green Light) point and the XTE(RedLight) point as computed by the FMS. Field not displayed when CARP procedure not yet in flight plan. Range [0...9999]. "****" is displayed when XTK exceeds the range.

CARP ETE (3L): Estimated Time (sec) EnRoute (ETE) to CRP (green light) waypoint or XTE (red light) once CRP has been sequenced or ESC once XTE is sequenced. The "CARP" indication changes to "XTE" upon sequencing the CRP waypoint. The "XTE" indication changes to "ESC" upon sequencing XTE.

CARP ETA (3R): Estimated Time of Arrival in (hhmm:ss) at CRP (green light) waypoint, or XTE (Red Light) once CRP has been sequenced or ESC once XTE has been sequenced.

CURRENT TAS (4L): Current True Air Speed (kt).

CURRENT ALT (4L): Current system altitude (feet).

TARGET TAS (4R): Target True Air Speed (kt). Only displayed after crossing the Slow-Down (SD) waypoint or less than 60 seconds remain to the CRP waypoint, at which point the TAS derived from the Mission IAS is displayed. Once the TAS used for the CRP waypoint calculations is frozen, this frozen TAS value is then displayed until the CARP procedure is terminated.

TARGET ALT (4R): Target altitude (feet). Only displayed after crossing the Slow-Down (SD) waypoint or less than 60 seconds remain to the CRP waypoint, at which point the altitude derived from the Mission HAT is displayed. . Once the altitude used for the CRP waypoint calculations is frozen, this frozen altitude value is then displayed until the CARP procedure is terminated.

CARP PLAN [6L]: If a CARP procedure is defined in the active flight plan, accesses the CARP PLAN 1/3 page; otherwise, the field is not shown.

CARP MARK [6R]: Equivalent to pressing CARP MARK on the TMP UPDATE POS page. The TMP UPDATE POS page is displayed, and the flight plan is set to MOD state displaying the ERASE prompt and illuminating the EXEC key. The IP point is displayed as the reference position, the offset from the reference is R0ft. While the CARP is not active or CARP waypoint positions are frozen or NO CARP SOLUTION is being displayed, the CARP MARK text disappears and pressing this LSK has no effect.

NOTE: Except for CURRENT TAS and CURRENT ALT, values are only displayed when a CARP procedure is in the active flight plan.

NOTE: The accuracy of the fields of this page, including the "status indicator" is in accordance with the update rate of the FMS pages, e.g. 1 second. Better accuracy is obtained via the status advisory messages and the "AT CARP" discrete output.

CARP SEQUENCE OF EVENTS

The following table presents normal events and actions related to CARP procedures. The ordering is typical, but may vary based on the entered geometry, mission, and ballistic parameters.

Event	FMS Action	Operator Action
CARP procedure initiated.	• CARP procedure waypoints with ETA and drop zone displayed on the EFIS. • CARP procedure waypoints displayed on the LEGS page. • Mission altitude and IAS are used for the CARP waypoint calculations.	
En route to CARP.	• ETA displayed for each waypoint of the CARP procedure displayed on the EFIS and on the LEGS ETA page	• Adjusts aircraft speed to meet the required time of arrival. PROGRESS RTA page may be used as an aid.
Less than 20 minutes to CRP or active waypoint is a CARP procedure waypoint.	• CARP ACTIVE remote annunciator illuminates • "ACTIVE" state displayed on the CARP PROGRESS page • Along-track and cross-track distance and ETE/ETA to CARP displayed on CARP PROGRESS page. • CARP procedure waypoints displayed on the PROGRESS pages.	
Less than 20 minutes to CRP	• "20 MIN TO CARP" advisory message displayed on the scratchpad	
Less than 1 minute to IP or TP	• FMS switches to Inertial mode • CARP Plan data modifications prohibited	
IP is reached		• Position update optionally performed.
Less than 10 minutes to CRP	• "10 MIN TO CARP" advisory message displayed on the scratchpad	
Turn Point (TP) is reached and Cross Track Distance < 0.3 nm	• HSI scale reduced to 0.3 nm (full scale)	

Event	FMS Action	Operator Action
Slowdown waypoint (SD) is reached	• "SLOWDOWN" advisory message displayed on the scratchpad • Current and Target TAS and Altitude displayed on the CARP PROGRESS page	• Begins slowdown and altitude change to mission values.
Less than 1 minute to CRP	• "1 MIN TO CARP" advisory message displayed on the scratchpad • "AT CARP" remote annunciator flashes at a 0.5 seconds rate. • "NEAR CARP" state displayed on the CARP PROGRESS page	
Altitude < 150 ft of mission altitude or less than 30s to CRP	• Current altitude is used for CRP, XTE, and ESC calculations and to fix Target Altitude on the CARP PROGRESS page.	
Speed < 20 kts of mission speed or less than 30 seconds to CRP	• Current groundspeed is used for CRP, XTE, and ESC calculations and to fix Target TAS on the CARP PROGRESS page.	
Less than 10 seconds to CRP	• CRP, XTE, and ESC waypoint positions are frozen	
Less than 5 seconds to CRP	• "5 SEC TO CARP" advisory message displayed on the scratchpad • "AT CARP" remote annunciator extinguishes • "AT CARP" state displayed on the CARP PROGRESS page	
CRP waypoint is reached	• "GREEN LIGHT" advisory message displayed on the scratchpad • "AT CARP" remote annunciator illuminates (0.5 seconds before CRP) • "DROP ZONE" state displayed on the CARP PROGRESS page (0.5sec before CRP)	• Commands beginning of drop.
XTE waypoint is reached	• "RED LIGHT" advisory message displayed on the scratchpad • "AT CARP" remote annunciator extinguishes • "ESCAPE" state displayed on the CARP PROGRESS page	• Commands end of drop. • Cleanup is performed (doors closed…)
ESC waypoint is reached	• "CARP ACTIVE" remote annunciator extinguishes • CARP PROGRESS fields blanked • Standard FMS navigation modes priority restored. • Guidance to next waypoint in flight plan provided • Any existing temporary position update will be cancelled and is annunciated by generating the TEMP POS UPDATE END scratchpad message	

CARP ALERT MESSAGES

The FMS monitors the altitude, speed, and cross-track error during a CARP procedure. The altitude and speed errors are obtained using the entered mission Indicated Air Speed (IAS) and Height Above Terrain (HAT) values on the CARP PLAN pages. The errors may be sub-divided in three areas, per the following figure:

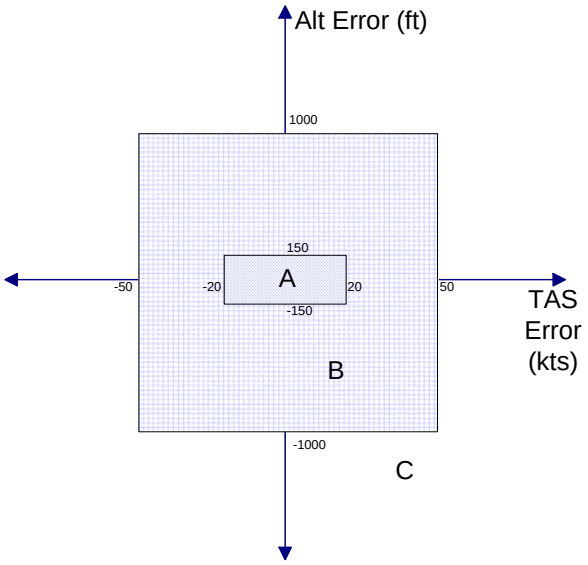


Figure 11- 14

The FMS response, per area in the figure, is:

A. No alert messages signalled.

B. At one minute from the CRP waypoint, the alert message "CARP ALT NOT MET" or "CARP TAS NOT MET" is raised. The message is displayed until the error is removed.

NOTE: At 10 seconds prior to reaching the CRP waypoint, the TARGET TAS and ALTITUDE (seen on the CARP PROGRESS page) are updated to the current TAS and altitude, if the NO CARP SOLUTION message is not present. For the case when the NO CARP SOLUTION message is present, the TARGET TAS and ALTITUDE will remain to the last target values prior to the NO CARP SOLUTION message appearing.
The alert message(s) is, however, still displayed if the error condition persists, leaving the operator the choice to continue the mission or not. CARP advisory messages and remote annunciators are provided as usual, allowing the operation to continue.

C. At one minute from the CRP waypoint, the alert messages "CARP ALT NOT MET" or "CARP TAS NOT MET", and "NO CARP SOLUTION" are raised. If the situation is corrected prior to 10 seconds to CRP, then the situation reverts to A or B; otherwise, "NO CARP SOLUTION" remains until the CARP procedure is terminated.
Whilst "NO CARP SOLUTION" is displayed, the standard CARP advisories and the AT CARP remote annunciator are disabled. This alert message may also be raised if not in the inertial navigation mode (e.g. due to inertial sensors inputs being lost), or baro-altitude or baro-correction input is lost.

The "NO CARP SOLUTION" message will also be displayed if equipment failures preclude a valid CARP solution computation and a valid offside FMS CARP solution is not available.

The "CARP XTK TOO LARGE" message will be displayed if the aircraft is flying the CARP procedure between the CRP (Green Light) and XTE (Red Light) waypoints and the cross-track error is larger than half the drop zone width, as was defined in the CARP PLAN 1/3 page. CARP advisory messages and remote annunciators are provided as usual, allowing the operation to continue.

EXIT FROM CARP

The FMS will automatically terminate the CARP procedure once the ESC waypoint is sequenced. It is also possible to exit CARP with a direct-to or close up operation on the LEGS page and then pressing EXEC. The procedure may also be directly deleted from the flight plan if any of its waypoints is not the active waypoint.

CARP RE-ENTRY

To abort and re-enter a CARP procedure, it is required to perform the following steps:

1. Exit the last CARP procedure (as indicated above). The EXEC key does not have to be pressed.

2. Re-initiate the CARP procedure at the first waypoint location of the flight plan. Refer to Section 11, INITIATION OF A CARP PROCEDURE for more details.

3. The FMS will retain all the previously entered CARP PLAN values, requiring only the EXEC key to be pressed.

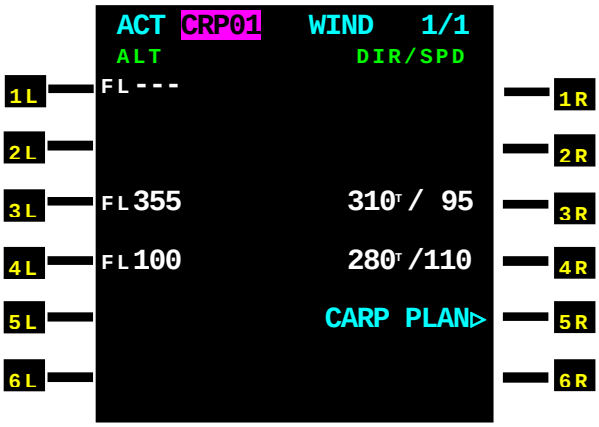
CARP WIND ENTRY

The FMS allows for entry of forecast winds at 4 different flight levels in order to compute a more accurate CARP lateral profile.

If a CARP flight plan already exists, then entering CARP winds is applied to the modified flight plan.

In the absence of any entered wind data, the CARP procedure will assume that no wind exists at the CRP (green light) waypoint.

The CARP wind page is shown below.



1. Flight level entries are entered into the scratchpad and line selected to LSK 1L.

2. Flight level entries shown numerical decreasing order on positions LSK 1L to 4L.

3. Once confirmed, a specific wind level entry can be deleted using the CLR key and then line selecting to the desired flight level.

Details on CARP wind entry are provided on the WIND 1/1 page as outlined in Appendix A.

CARP SPEED TARGET ON DISPLAY SYSTEM

Various cockpit display systems also support displaying the FMS CARP target speed target. For these display systems, the CARP target speed will only come into view after sequencing the slowdown waypoint of the CARP flight plan procedure.

POSITION UPDATES FOR CARP - GENERAL

In order to ensure continued and stable operation during the CARP drop, one minute prior to the first CARP procedure waypoint, the FMS will automatically switch to Inertial Navigation mode.

The accuracy of the Inertial at that time will depend on the accuracy and time of its last update. If GPS or DME/DME or VOR/DME navigation modes were active prior to the switch to Inertial, then the accuracy of the latter will depend on the accuracy of the previously active FMS mode and the time elapsed since it was available; the FMS performs corrections to its computed inertial position based on the position drift that existed when it exited these modes. If only Inertial mode was previously active, then the accuracy will depend on the time elapsed since the last position update and its accuracy. The accuracy of the active navigation mode may be viewed on the UPDATE POS 1/2 page.

Two types of position updates are possible on the CMA-9000:

Long-term update:	As described in Section 12, POSITION UPDATE.
Temporary update:	Position offset applied to the CARP flight plan waypoints and which has a limited duration; used mainly for local frame shifts during tactical operations. Refer to the next section, CARP TEMPORARY POSITION UPDATE for more detail on this operation.

CARP TEMPORARY POSITION UPDATE

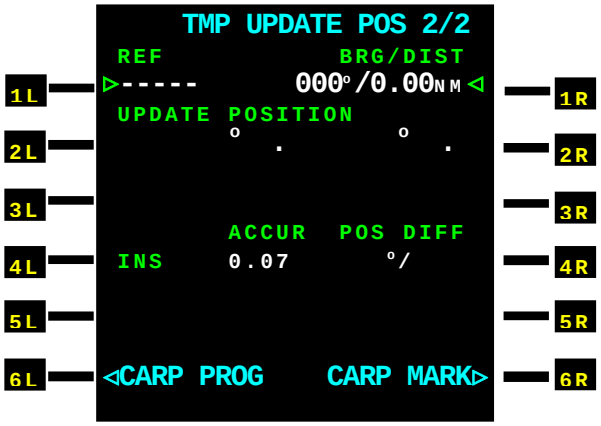
A "temporary" update used to implement a coordinate frame shift of CARP flight plan waypoint positions from a local coordinate system to the coordinate system used by the CMA-9000. This is useful when the aircraft is flying in a region where the local terrain map/database being used is very precise relative to some local Identification Point (IP) landmark (e.g. bearing and distance to local IP are accurate) but the latitude and longitude coordinates of the IP are inaccurate/offset with respect to that used by the CMA-9000. Temporary position offsets strictly apply to CARP procedure waypoints, and the update may only be performed when CARP is active (the active waypoint is a CARP procedure waypoint or 20 minutes remain to the CARP green light). This update is performed using a mark on top operation (CARP MARK). When a temporary position offset is active, the OFST annunciator is illuminated and the EHSI/EFIS indicates POS OFST (or some other appropriate indication that a position offset is currently active in the FMS's flight plan).

For CARP mark on top operations, the CARP MARK prompt must be pressed while a reference position is flown over or abeam. When flying near the waypoint, the user may specify a relative bearing/range or cross-track offset, which may be obtained from radar or other sensor providing bearing/range data.

Functionality of the CARP temporary position update is described in this section and makes specific references to the TMP UPDATE POS page; however, additional details on the TMP UPDATE POS page are provided in Appendix A.

CARP MARK TEMPORARY POSITION UPDATE

When the CARP status is ACTIVE and there is at least a period of 10 seconds before reaching the CRP (green light) waypoint and a CARP solution exists (e.g. the NO CARP SOLUTION scratchpad message is not being annunciated), then the CARP MARK prompt appears on both the TMP UPDATE POS page and CARP PROGRESS page.



When the CARP MARK prompt is available, perform the following to apply a temporary position update to the CARP procedure:

1. Ensure that either the CARP PROGRESS page or the TMP UPDATE POS page is in view.

   NOTE: That the TMP UPDATE POS page should be set to show the appropriate REF ID field. Typically, the REF ID is the IP (Identification Point) waypoint when this optional waypoint has been defined as part of the CARP procedure.

2. As the aircraft flies over or abeam to the known position, press the CARP MARK prompt (on either the TMP UPDATE POS or CARP PROGRESS page).
   The displayed data corresponds to the position when the CARP MARK prompt was selected.

3. At LSK 1R, enter the desired relative bearing/distance or crosstrack offset at to the known position, as applicable.

4. Press the EXEC key.

ENDING A TEMPORARY CARP POSITION UPDATE

A CARP temporary position update will end automatically when either:

1. All the waypoints of the CARP procedure are sequenced, or

2. A direct-to is performed, or

3. The CARP procedure is deleted from the flight plan, or

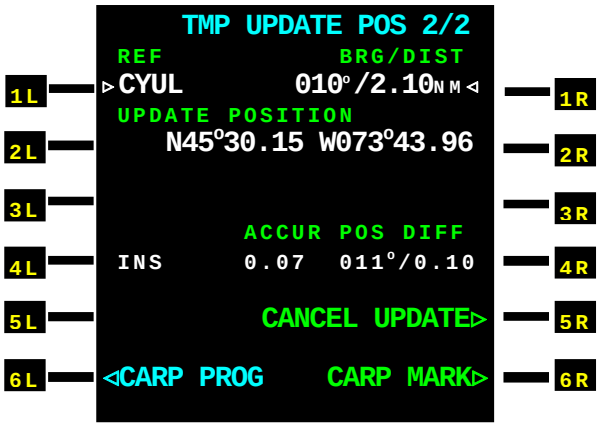
4. A manual CANCEL UPDATE operation is performed. This may only be performed while the CARP waypoint positions are not frozen (e.g. before 10 seconds to CRP).

To perform a manual CANCEL UPDATE, the following steps must be taken:

1. Press CANCEL UPDATE on the TMP UPDATE POS 2/2 page.

2. Press the EXEC key.

The CANCEL UPDATE feature strictly applies to CARP temporary position updates.

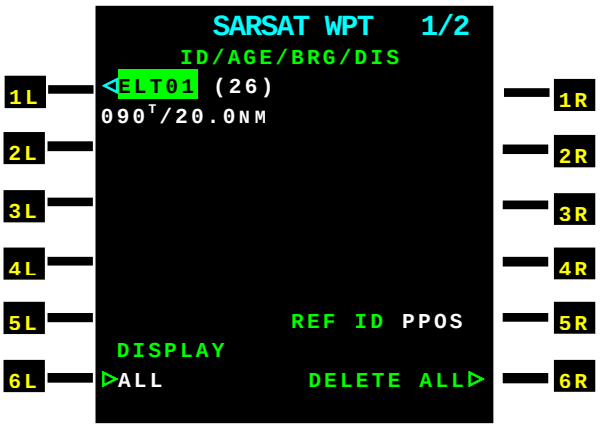


The end of a temporary CARP position update is indicated by displaying the TEMP POS UPDATE END status advisory message.

COSPAS/SARSAT DISTRESS BEACON HANDLING (If configured)

NOTE: The FMS allows communication with DF equipment (DF-935-12, DF-430-102, or DF-430-112) which provides information related to COSPAS/SARSAT distress beacons. Distress beacon information can be used by the FMS for navigation purposes.

To view main COSPAS/SARSAT information press [INIT REF], <WPT LISTS>, <SARSAT WPT>.

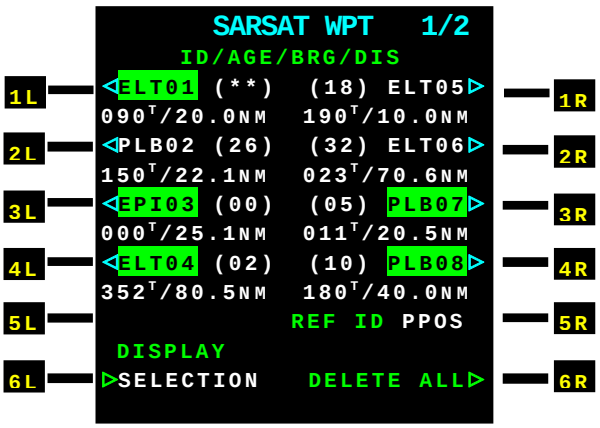


The information available from the beacon is:

- Beacon identifier (ELTxx, PLBxx, EPIxx or TSTxx where xx=01...99 or ** if greater than 99).
- Age since last reception of beacon signal.
- Bearing/distance relative to the REF ID (default is present position of aircraft).

The reference identifier (REF ID) can be set to any reference waypoint of the FMS.

Access to details on a specific beacon is achieve by pressing the associated LSK (in this example LSK 1L). When many beacons are received by the FMS (e.g. maximum of 8 beacons), all beacons are presented on that page.



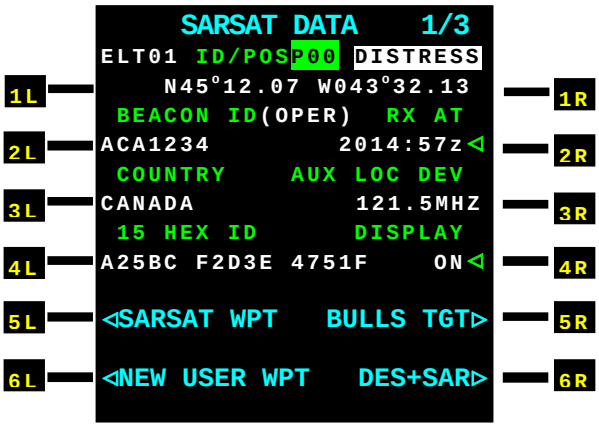
In order to uncluttered the EFIS & DMAP displays, the operator can define which beacon received are to be displayed on EFIS & DMAP; this is done by:

1. Defining if the received beacon needs to be displayed or not (setting is done from the detail beacon page named SARSAT DATA page).

2. Toggling the display selection from LSK 6L; toggle option are SELECTION or ALL.

If required, all beacons can be deleted via the DELETE ALL option.

Once a specific COSPAS/SARSAT beacon has been selected, the following information from it is available:



The information available from the beacon are:

- Beacon's identifier (ELTxx, PLBxx, EPIxx or TSTxx where xx=01..99).
- Beacon's position coordinates.
- Beacon's resolution (P00, P02, P04, P15).
- Beacon's type (TEST or distress).
- Beacon's identification (NATI, ADDR, OPER, SN, NIN, MMSI or RCS).
- Last reception time (or age) of beacon signal (the time/age can be swapped by toggling LSK 2R).
- Beacon's registration country.
- Beacon's auxiliary radio-location device.
- Beacon's 15 hexadecimal identifier.

From this page the operator can:

- Define if the received beacon needs to be displayed or not on the EFIS & DMAP (via the DISPLAY ON/OFF prompt).
- Return to the previous page (via the SARSAT WPT prompt).
- Define the SARSAT beacon as the Bulls Eye target (via the BULLS TGT prompt).
- Create a new user waypoint as the SARSAT beacon (via the NEW USER WPT prompt).
- Perform search and rescue or any other tactical navigation to the SARSAT beacon (via the DES+SAR or TACTICAL prompt).

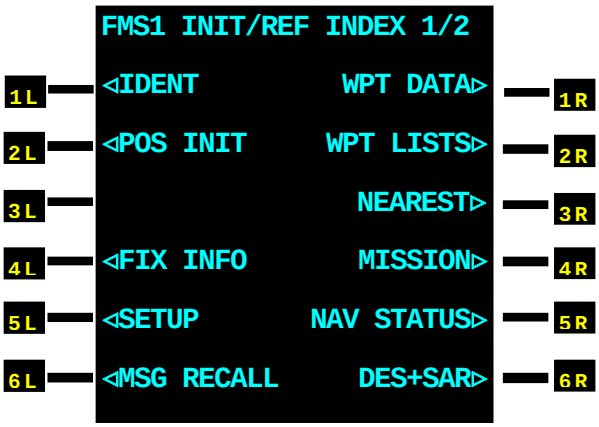
Refer to Appendix A for details on SARSAT pages.

TARGET POSITION RECEPTION (from ATOS and/or RADAR, if configured)

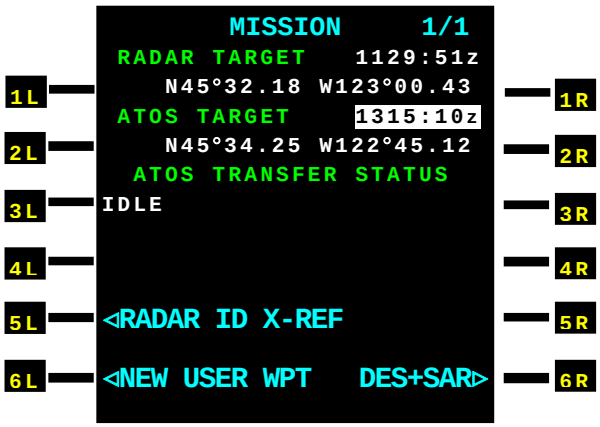
If configured, the Galileo Avionic ATOS LW equipment (Airborne Tactical Observation and Surveillance System – Light Weight) and/or FIAR 1500B RADAR equipment can transfer to the FMS a target position upon operator selection. The operator can subsequently use this position just like any other waypoint (e.g. it can be used to create a user waypoint; it can be used as the reference ID waypoint for search and rescue operations; it can be used as the holding pattern entry fix, etc.)

Reception by the FMS of a new target position from either the ATOS or RADAR is communicated to the flight crew by displaying the NEW TARGET POSITION status advisory scratchpad message.

The operator can then access the newly received position by going to the MISSION page. When the ATOS and/or RADAR is configured this page can viewed by selecting the MISSION prompt on page INIT/REF INDEX 1/2



The MISSION then shows the latest received target positions from the ATOS and/'or RADAR equipment. The last target position received (either from the ATOS or RADAR equipment) will show the time it was received by the FMS in inverse white video font.



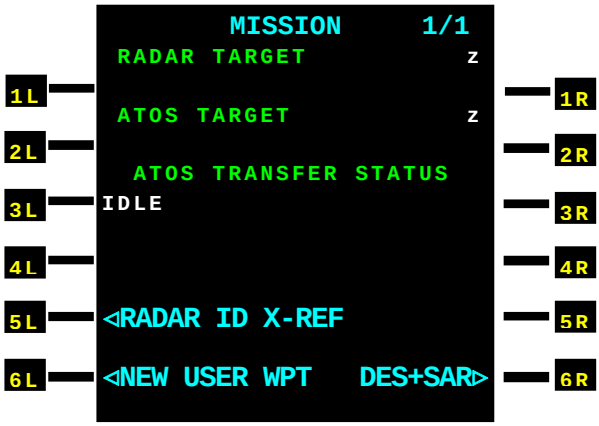
DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL page instead of the DES+SAR page.
When there is no data in the scratchpad, selection of this key will create a temporary waypoint with the Radar Target or the ATOS Target position (the most recent one received is selected) and the temporary waypoint ID is entered in the REF ID field of the DES+SAR 1/Y (or TACTICAL 1/Y) page. When there is a valid position in the scratchpad, selection of this key will create a temporary waypoint and enter temporary waypoint identifier in the REF ID field of the DES+SAR 1/Y (or TACTICAL 1/Y) page.
When the inactive route is in modification, instead of accessing the DES+SAR 1/Y (or TACTICAL 1/Y) page, this prompt gives access to the INACT DES+SAR 1/X 1/Y (or INACT TACTICAL 1/Y) page.

CAUTION: It is the crew's responsibility to ensure that the appropriate Target Position (Radar or ATOS) is selected (time in inverse video white) before creating a new user waypoint or accessing the DES+SAR page. Thus, the recommended practice would be to first transfer the desired target waypoint position to the scratchpad (e.g: by line-selecting LSK 1L/1R or LSK 2L/2R) and then creating with this position either a new user waypoint (by selecting NEW USER WPT at LSK 6L) or by transferring the selected target position to the DES+SAR page (by selecting DES+SAR at LSK 6R).

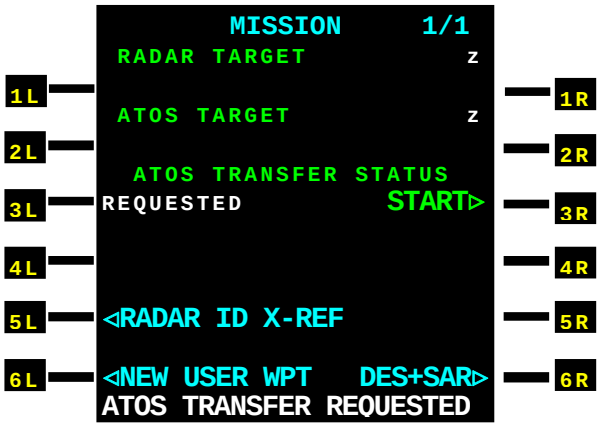
ATOS FLIGHT PLAN TRANSFER TO FMS (if ATOS is configured)

Upon operator request, the ATOS can transfer mission flight plan waypoints to the FMS that the FMS then loads into its inactive route. Up to maximum of 99 waypoints can be transferred to the FMS.

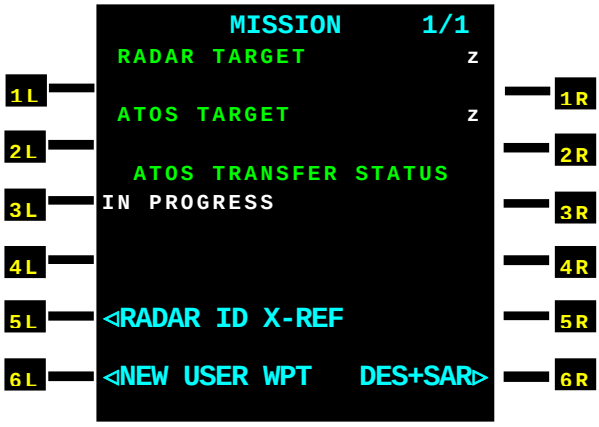
A. Default MISSION page is displayed when no target position is received and no ATOS transfer has been requested.



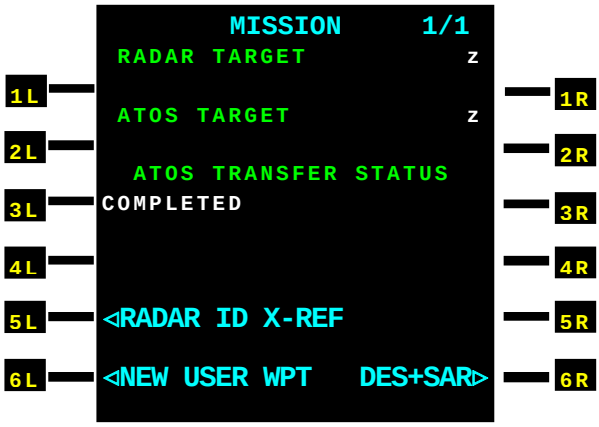
B. MISSION page is displayed when a flight plan transfer request is received from the ATOS equipment. Furthermore, reception by the FMS of a request from the ATOS to transfer its mission flight plan waypoints is also communicated to the flight crew by displaying the ATOS TRANSFER REQUESTED status advisory scratchpad message.



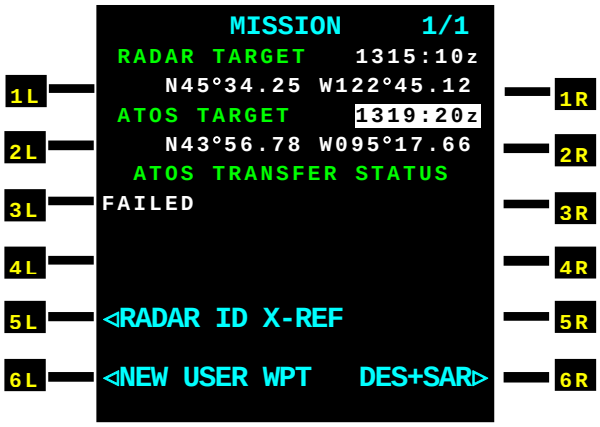
C. This page is displayed when the transfer has been initiated by pressing the START> prompt located at LSK 3R.



D. This page is displayed when the flight plan transfer from the ATOS has been received successfully.



E This page is displayed when the flight plan transfer from the ATOS failed.



NOTE: The 'z' displayed in the TARGET lines are only displayed if the time reference of the FMS is set to UTC.

The FMS will then store the received mission waypoints from the ATOS in its inactive route.

Upon successful mission data transfer from the ATOS, the FMS will create, in the inactive route, origin and destination airports with the following priority:

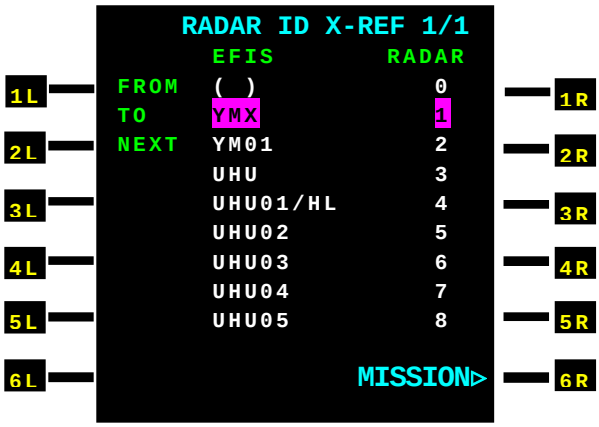
- the FMS will use the origin and destination airports currently in the active route (if any are defined), or,
- the FMS will create an origin airport named "ORIG" with the coordinates of the first mission data waypoint received from the ATOS and a destination airport named "DEST" with the coordinates of the last mission data waypoint received from the ATOS.

When the ATOS is configured, the FMS continuously transmits its active flight plan waypoints (up to a maximum of 81) to the ATOS equipment.

FMS WAYPOINT TRANSMISSION TO RADAR (if FIAR 1500B RADAR is configured)

When the FIAR 1500B RADAR is configured, the FMS continuously transmits (up to) the first 10 active flight plan waypoints* to the FIAR 1500B RADAR equipment.
** active flight plan waypoints transmitted to the RADAR also include those waypoints that are not seen as actual waypoints on the LEGS page, such as procedural type waypoints. For example, SAR pattern waypoints do not appear on the LEGS page (only the first waypoint of the SAR pattern appears) but each of the waypoints comprising the SAR pattern would be seen on the RADAR ID X-REF 1/1 page.*

The operator can cross-reference the FMS waypoints that are transmitted to the EFIS (GAMA) with those seen on the RADAR's display by viewing the RADAR ID X-REF 1/1 page.



FROM (1L, 1R): Display the FROM waypoint identifier transmitted to the EFIS and the corresponding waypoint number used on the RADAR display. For waypoints without identifier created by the FMS, parenthesis (e.g.: "( )") are displayed to indicate that no identifier is defined. For example, when a direct-to is executed, the FROM waypoint will be shown as "( )" on the EFIS column.

TO (2L, 2R): Display the TO waypoint identifier transmitted to the EFIS and the corresponding waypoint number used on the RADAR display.

NEXT (2L, 2R): Display the NEXT waypoint identifier transmitted to the EFIS and the corresponding waypoint number used on the RADAR display. For waypoints without identifier created by the FMS, parenthesis (e.g.: "( )") are displayed to indicate that no identifier is defined.

FLIGHT PLAN WAYPOINTS (3L, 4L, 5L, 3R, 4R, and 5R): Display the flight plan waypoint transmitted to the EFIS and the corresponding waypoint numbers used on the RADAR display.

MISSION [6R]: Access the MISSION 1/1 page.

SECTION 12 - NAVIGATION SENSORS

CONTENTS

Subject **Page**

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SECTION 12

NAVIGATION SENSORS

GENERAL

The CMA-9000 FMS includes the following navigation modes, in decreasing priority order: Hybrid GPS/INS, GPS (cGPS/mGPS when dual GPS is configured with Litton LN-100GT EGI), DME/DME, VOR/DME/TACAN, Hybrid INS/DVS, Inertial, DVS, KALMAN and Dead Reckoning. If one or several equipment supporting a navigation mode is not configured, then only a sub-set of the above mentioned navigation modes will be available.

Transition from one mode to another is automatic. Manual deselection of all the navigation modes is also possible using the DESELECT 1/1 page (as described in Section 15).

GPS NAVIGATION (CIVIL)

NOTE: Applicable if an external GPS is configured but not applicable to a hybrid INS/GPS sensor installation described in section EGI NAVIGATION.

The GPS sensor uses independent channels and can track any combination of GPS satellites. The GPS sensor computes and outputs three-dimensional position and velocity components, time, ground speed, and track. Both code and carrier phase tracking are used. Carrier phase tracking greatly reduces position and velocity errors under highly dynamic aircraft manoeuvres.

The GPS sensor continuously monitors satellite health. All unhealthy satellites are dropped from the position solution. In addition, all GPS signals-in-space used in the position solution are checked for failure by a Receiver Autonomous Integrity Monitor (RAIM). It is understood that satellite failures are unannounced and can occur at any instant. The RAIM continuously calculates the horizontal (HIL) and vertical integrity limits. The integrity limit gives the radius in the horizontal plane and vertical direction within which the worst-case radial position error will stay 99.99999% of the time without a satellite failure, and 99.9% of the time in the presence of a satellite failure. The HIL is compared in the CMA-9000 FMS to the value required for the phase of flight (alert limit), and an alert is generated when the integrity value exceeds the alert limit. Alert limits are described in Section 15, RNP Capability Modification.
Furthermore, when the FMS also has available to it a backup sensor, the FMS will use the GPS to backup sensor position error and backup sensor accuracy in computing a NAIM (Non-Autonomous Receiver Monitor) HIL value which gets used in determining the GPS navigator's overall Navigation Performance.

The RAIM function maximises the availability of the oceanic, en-route, terminal, non-precision approach while guaranteeing the integrity as described above.

When GPS is the sensor used for navigation and the HIL (Horizontal Integrity Limit) is within the phase of flight limit, the GPS HIL is displayed as the Actual Navigation Performance (ANP) value on the PROGRESS 1/4 (or PROGRESS 1/3) page. The HIL is displayed on the GPS STATUS 2/2 page.

The combination of a GPS INT annunciator as well as an alert message GPS NAV LOST provides an indication between the loss of FDE (Failure Detection and Exclusion) availability and the loss of navigation.

The GPS sensor requires a minimum of four satellites for navigation, five satellites to allow integrity monitoring and the detection of a failed satellite, and six or more satellites to identify and exclude (isolate) the failed satellite from the navigation solution. No operator action is required to accomplish satellite failure detection and exclusion (FDE) as these functions are automatic. Provided adequate signal-to-noise levels exist, any satellite with an elevation angle of 2° or more above the antenna's local horizon can be acquired, and once acquired, it will be tracked to an elevation angle of 0° above the horizon.

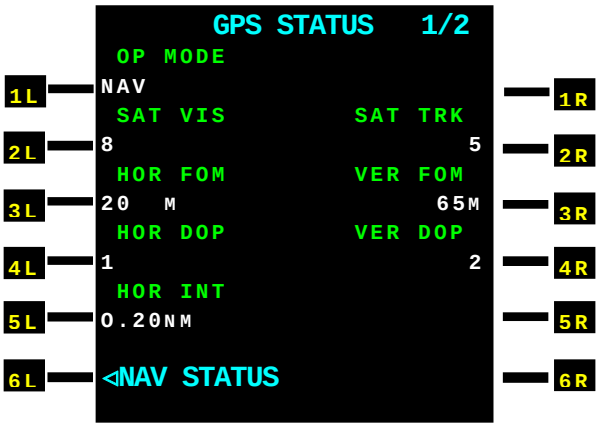
Typical time-to-first-fix (TTFF) values are 55 seconds (initialized) and 120 seconds (un-initialized, e.g. search-the-sky mode). Satellite re-acquisition after signal loss is typically 5 seconds. When a sufficient number of satellites that has been acquired, the GPS sensor enters navigation mode and outputs the required data to the CMA-9000 FMS.

GLOBAL POSITIONING SYSTEM PAGES (ARINC 743A/ARINC 743/TRIMBLE TA-12 format)

There are no data entries on these pages. For additional information refer to Appendix A.

1. Display the GPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <GPS> (LSK 1R).

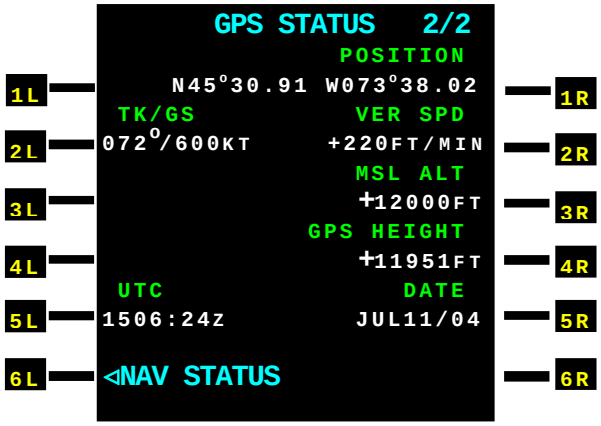
   For dual GPS installations, display the cGPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <GPS> (LSK 1R), <cGPS> (LSK 1R).



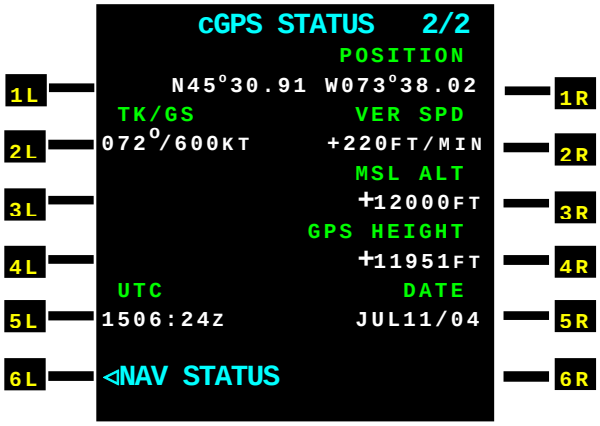
2. Display the GPS STATUS 2/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <GPS> (LSK 1R), [NEXT].

For dual GPS installations (civil & Litton LN-100GT EGI), display the cGPS STATUS 2/2 page by pressing [PREV] or [NEXT].

A. For single GPS installations:



B. For dual GPS installations (civil & Litton LN-100GT EGI):



MILITARY GPS NAVIGATION

For installations where a dual GPS is configured with the Litton LN-100GT EGI, the FMS will also support a military GPS navigation mode (shown as mGPS on the FMS's POS/INIT/REF 2/X page).

In such installations when the navigation sensor cross-check option is enabled, the FMS uses a weighting logic algorithm to compare the position provided by the military GPS to both:

- the position provided by the hybrid INS/GPS sensor of the EGI; and
- the position provided by the civil GPS sensor

Results of this comparison will trigger related alert messages to inform the crew of the position differences and ensuing navigator changes.

EGI NAVIGATION

Applicable if the Embedded GPS INS (EGI) is configured.

The GPS sensor and INS complementary nature provide reliable and precise navigation even if the GPS constellation geometry does not provide enough integrity for the route being flown.
The EGI provides a hybrid output that combines the INS and GPS outputs through a Kalman filter. This output provides a weighted contribution of the INS and of the GPS position. When the GPS signal and constellation geometry are adequate, the output is based on the GPS position. When the GPS signal quality degrades, the EGI outputs in a progressive manner, with more of the INS contribution in the solution. In general, the contribution of the INS drift, when the geometry is not optimal it remains small and allows the segment of the route to be flown seamlessly.

In addition to the hybrid INS/GPS the EGI also provides a pure GPS and a pure INS position solutions.

The CMA-9000 FMS reverts to the pure GPS position or to another sensor when the quality factor or integrity of the INS/GPS has degraded below what is required for the phase of flight. In this case the CMA-9000 FMS may select the pure GPS or pure INS position (available with the Litton LN-100 GT EGI) if the remaining sensors are not fit for navigation. Refer to General at the beginning of this Section.

The message "INS/GPS POS UNCERTAIN" or "GPS POS UNCERTAIN" is turned on if the CMA-9000 FMS is forced to continue to use the hybrid INS/GPS or the respective GPS sensor. This happens when the GPS position has lost integrity and there is no valid backup radio navigation sensor (DME/DME or VOR/DME).

In addition to the INS and GPS navigation mode, the SAGEM SIGMA50H EGI provides a hybrid INS/DVS navigation solution, which is described below. The CMA-9000 FMS selects this solution according to the same sensor selection criteria.

The GPS sensor in the EGI follows the same general behaviour as described above in Sub-Section, GPS Navigation.

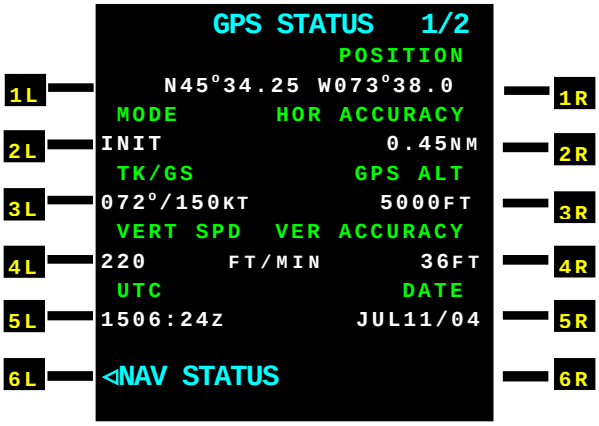
INS/GPS SYSTEM PAGES (EGI format)

There are no data entries on these pages except for the INS STATUS page when in ALIGN mode. For additional information refer to Appendix A.

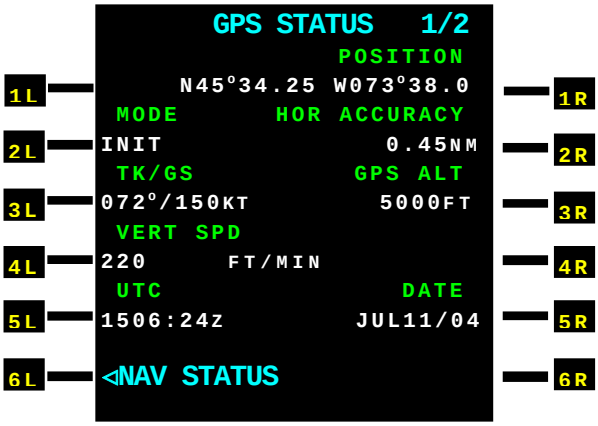
1. Display the GPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <GPS> (LSK 1R).

For dual GPS installations (civil & Litton LN-100GT EGI), display the mGPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <GPS> (LSK 1R), <mGPS> (LSK 2R).

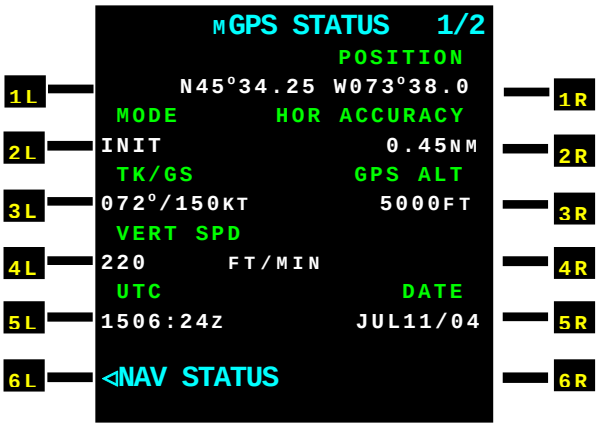
A. SAGEM SIGMA50H EGI installation:



B. LITTON LN_100GT EGI installation:



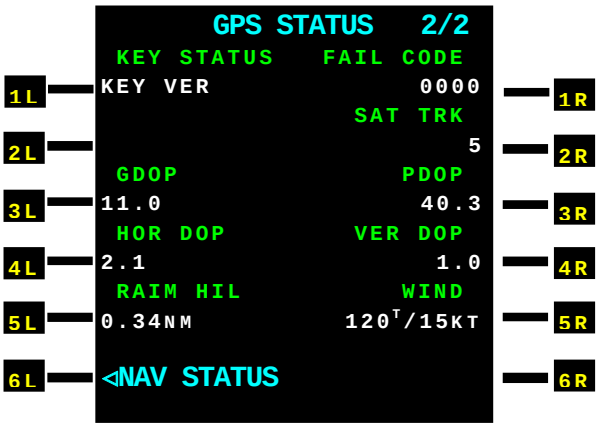
C. LITTON LN_100GT EGI with dual GPS configured:



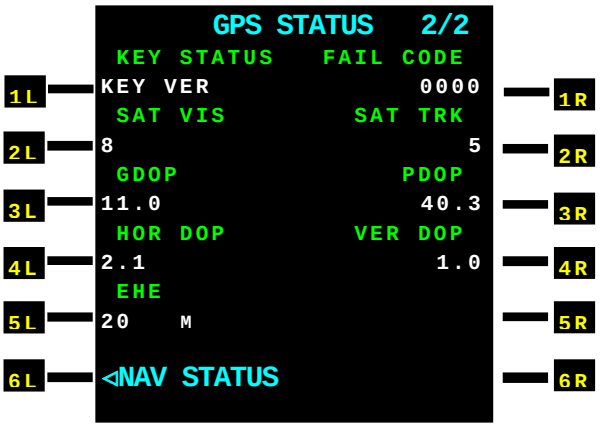
2. Display the GPS STATUS 2/2 page by pressing [PREV] or [NEXT].

   For dual GPS installations (civil & Litton LN-100GT EGI), display the mGPS STATUS 2/2 page by pressing [PREV] or [NEXT].

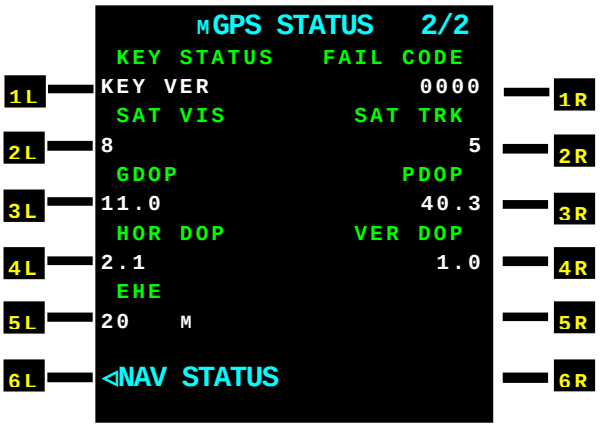
   A. SAGEM SIGMA50H EGI installation:



B. LITTON LN_100GT EGI installation:

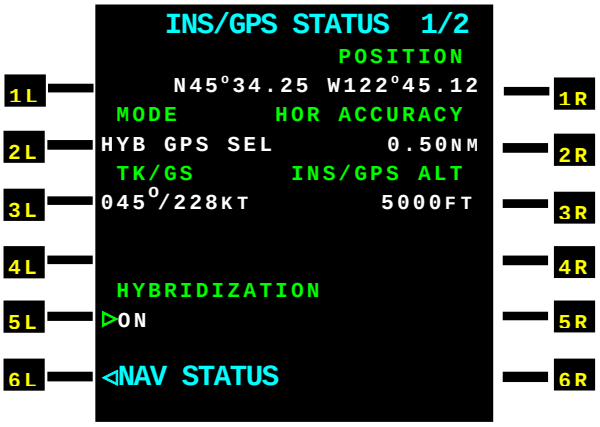


C. LITTON LN_100GT EGI with dual GPS installation:



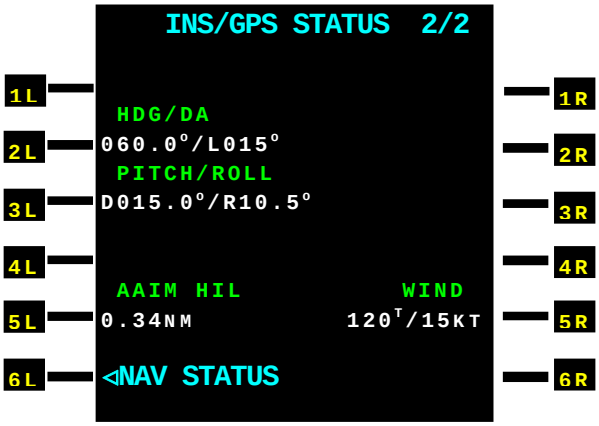
3. Display the INS/GPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R) and <INS/GPS> (LSK 4L).

   This page displays the outputs of the INS/GPS navigator as well as some INS/GPS inputs from the EGI. Control over the hybridisation mode is also provided. All status and data fields will show "*" symbols when the EGI is declared failed and blanks when data is not available.

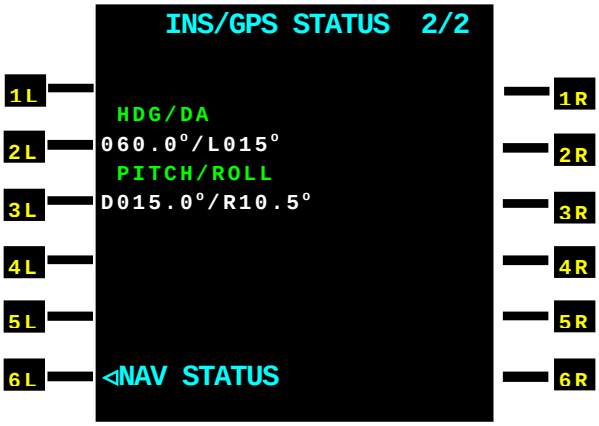


4. Display the INS/GPS STATUS 2/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <INS/GPS> (LSK 5R) and [NEXT].

   A. SAGEM SIGMA50H EGI installation:



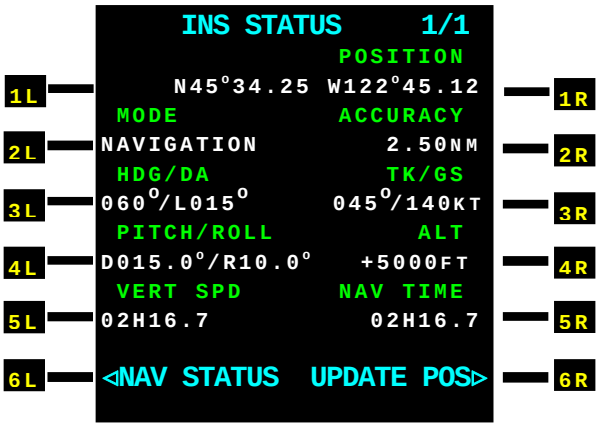
   B. LITTON LN_100GT EGI installation:



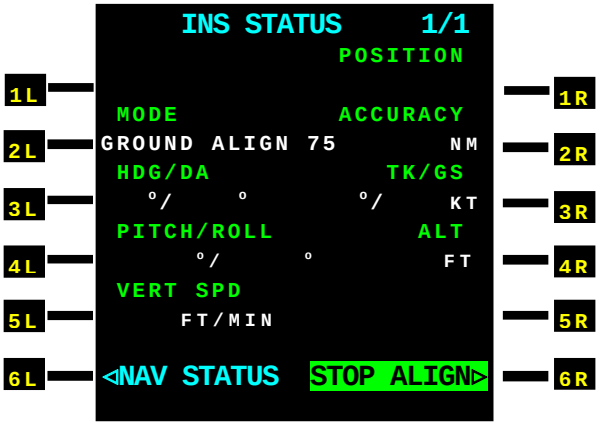
5. Display the INS STATUS 1/1 page by pressing [INIT REF], <NAV STATUS> (LSK 5R) and <INS> (LSK 5R).

NOTE: The INS STATUS 1/1 page is available only when the LITTON LN_100GT EGI is configured.

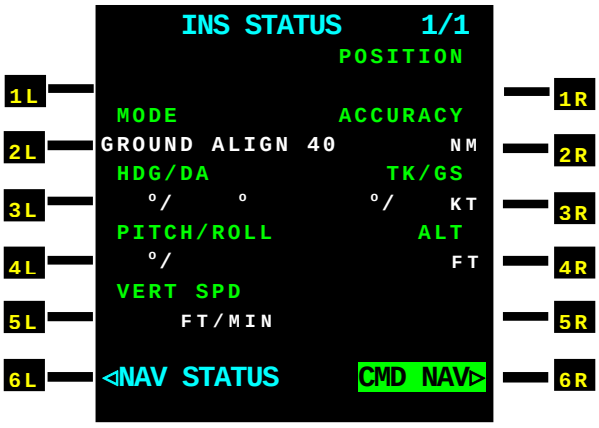
A. Page displayed when INS is in NAV mode:



B. Page displayed when INS is in GROUND ALIGN mode 100 to 50:



C. Page displayed when INS is in GROUND ALIGN mode 49 to 00:



6. When the EGI is in ALIGN mode and the alignment counter is between 100 and 50 press STOP ALIGN <LSK 6R> to stop alignment if required.

7. To transition to the degraded NAV mode when the EGI is in the align mode and when the alignment counter is between 50 and 00 press CMD NAV <LSK 6R> to command NAV mode.

INS/DVS NAVIGATION MODE (SAGEM EGI configuration only)

A stand-alone inertial/DVS navigation mode is selected for use by the CMA-9000 FMS when higher priority navigation modes are unavailable or not adequate for the phase of flight. For additional information refer to Section 1.

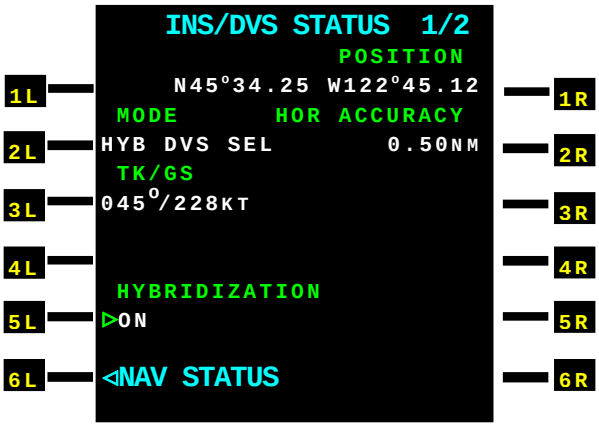
The EGI INS/DVS navigation mode is based on a hybrid solution based on INS position and DVS velocity.

The SAGEM EGI provides a hybrid output, which combines the INS and DVS solutions. This output provides a weighted contribution of the INS and of the DVS position.

1. Display the INS/DVS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> (LSK 5R) and <INS/DVS> (LSK 5L).

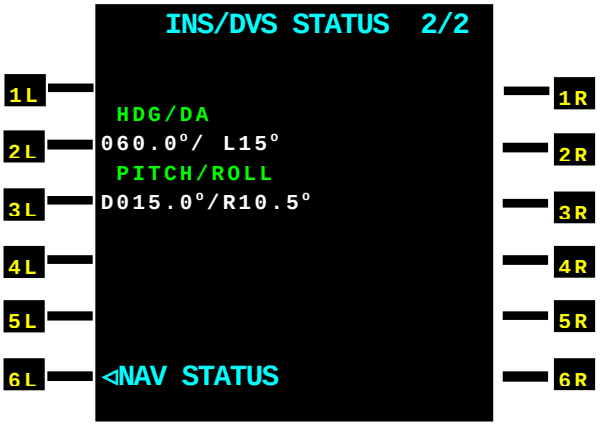
2. Activate or deactivate the mode using the HYBRIDIZATION prompt (LSK 5L)

3. EGI status, position, accuracy, TK and GS are displayed.



4. Display the INS/DVS STATUS 2/2 page by pressing [NEXT].

5. EGI Heading, Drift Angle, Pitch and Roll are displayed on page 2/2.



POSITION UPDATE

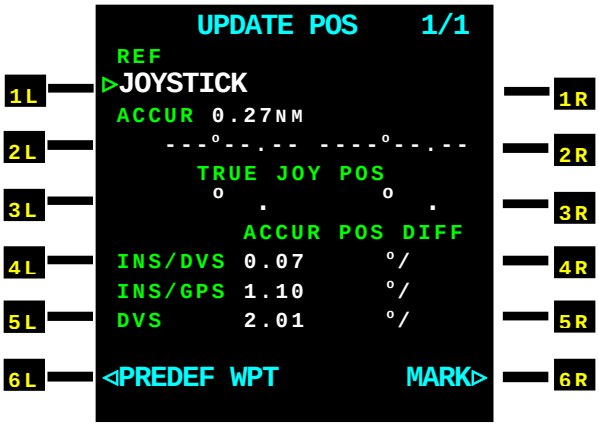
This section describes the procedure to update the INS or the DVS position with the CMA-9000 FMS-computed or other known positions. It is applicable for the INS/GPS, INS/DVS, and pure inertial or DVS modes.

NOTE: For the SIGMA50H EGI, a manual update of the INS/DVS will automatically update the INS/GPS, and vice-versa.

The following procedures are based on an installation where the MARK function key has been configured. For installations where the MARK key is not present, a MARK line select key is provided in the UPDATE POS page (LSK 6R) and on the PREDEF WPT 2/2 page (LSK 4R).

Access the UPDATE POS 1/1 page by pressing:

UPDATE POS (LSK 6R) in the INS STATUS page or [INIT REF], <POS INIT> (LSK 2L) and <UPDATE POS> (LSK 6R).



The PREDEF WPT 2/2 page is accessed by pressing the MARK function key, the MARK softkey from the PREDEF WPT and the UPDATE POS pages (If configured) or from the weather radar or AHCAS EFIS Joystick. For additional information refer to Section 11. Manual position update is performed by one of the following methods:

1. Update by overfly and mark-on-top of a known position, Refer to Section 11, User Database. In this case the UPDATE POS page has the REF field dashed (LSK 1L) and the CMA-9000 FMS position displayed (LSK 2R) corresponding to moment when the MARK key was pressed.

NOTE: The navigation mode from which the CMA-9000 FMS position is derived can be chosen by deselecting the other modes on the DESELECT page. The PROGRESS or POS INIT pages indicate the current CMA-9000 FMS navigation mode.

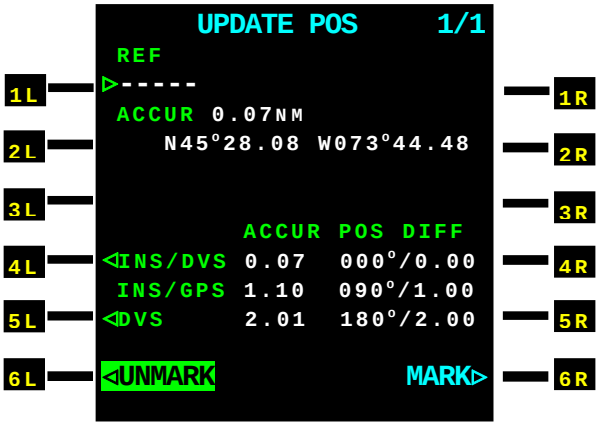
- The desired marked CMA-9000 FMS position can be replaced by another known position by entering the position in the UPDATE POS field at LSK 2R.
  - directly by bringing the position entered in the scratchpad
  - indirectly with a waypoint ID at (LSK 1L), if desired add a distance/bearing offset at (LSK 1R).
  - or by toggling (LSK 1L) to the CMA-9000 FMS or the joystick selection and selecting the corresponding position.
- Press the MARK key.
- To cancel the position chosen for the update press UNMARK (LSK 6L).
- Select the sensors (INS/DVS (LSK 4L) or DVS (LSK 5L) for which a position update is required.
- Press CONFIRM (LSK 6R). The CMA-9000 FMS then updates the selected navigators with the position indicated in the UPDATE POS field. Press CANCEL (LSK 6L) if no update is desired.

2. Update by Weather Radar/EFIS AHCAS joystick position selection {when configured}, refer to Section 11, User Database. In this case the UPDATE POS page has the JOYSTICK as reference and the position displayed on LSK 2R corresponds to the time when the joystick position was received.

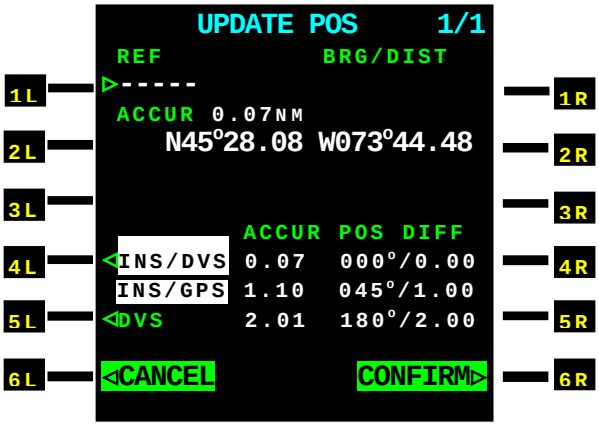
   - The desired joystick position can be replaced by another known position by entering the position in the UPDATE POS field at LSK 2R.
     - directly from the TRUE JOY POS (LSK 3R) via the scratchpad if a position was already entered (toggle LSK 1L until joystick position appears).
     - or indirectly with a waypoint ID at (LSK 3L). If the ID for the waypoint is in the database then the corresponding Lat/Long true joystick position is displayed at LSK 3R. Press LSK 3R to copy this position in the scratchpad, then LSK 2R to replace the UPDATE POS.
   - Press MARK key.
   - To cancel the update press the UNMARK (LSK 6L).
   - Select the sensors (INS/DVS or DVS) for which a position update is required.
   - Press CONFIRM. The CMA-9000 FMS then updates the selected navigators with the position indicated in the UPDATE POS field.

3. MARK Function Key configured:

   A. UPDATE POS 1/1 by pressing the MARK function key. All positions are frozen and sensors are selectable.

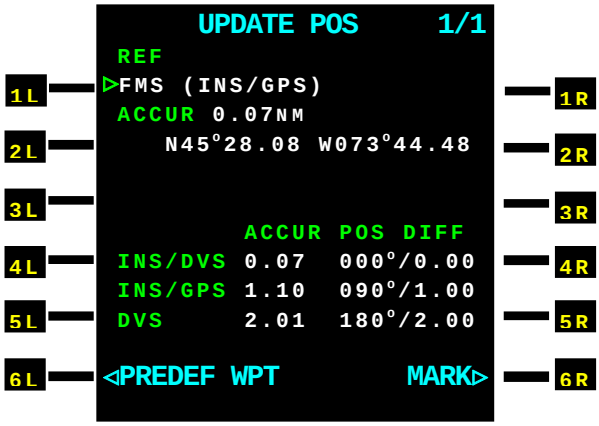


B. UPDATE POS 1/1 sensors selected, update ready to be confirmed key pressed and EGI selected.

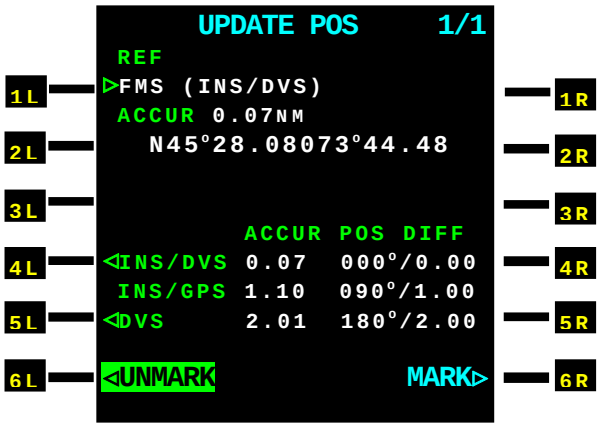


4. MARK function key not configured, changing the reference with the CMA-9000 FMS position:

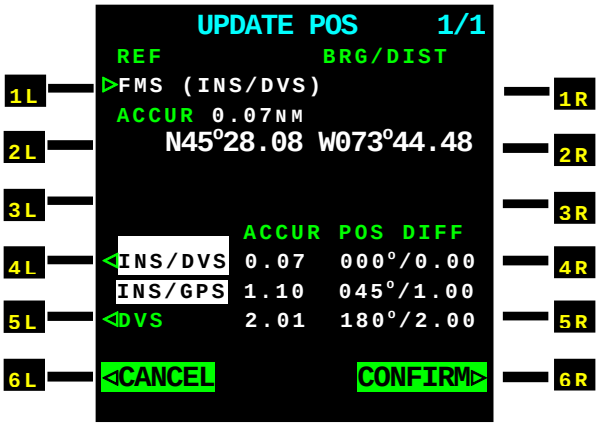
A. UPDATE POS 1/1 default state; the CMA-9000 FMS position is used by default.



B. UPDATE POS 1/1 pressing the MARK LSK key on the INIT/REF 2/2 page, all positions are frozen and sensors are selectable.

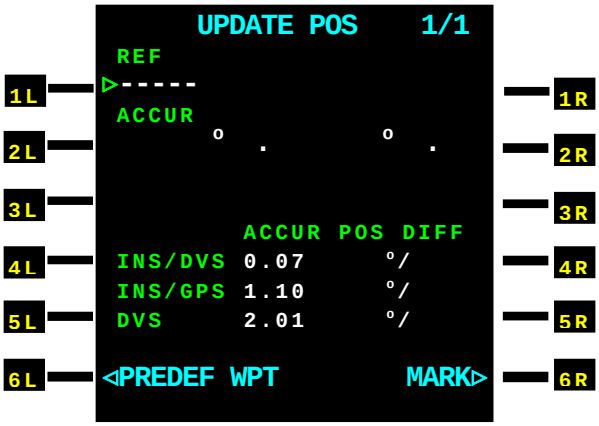


C. UPDATE POS 1/1 sensors selected, MARK key pressed, position update ready to be confirmed and sensors to be updated (INS/DVS and INS/GPS) selected.

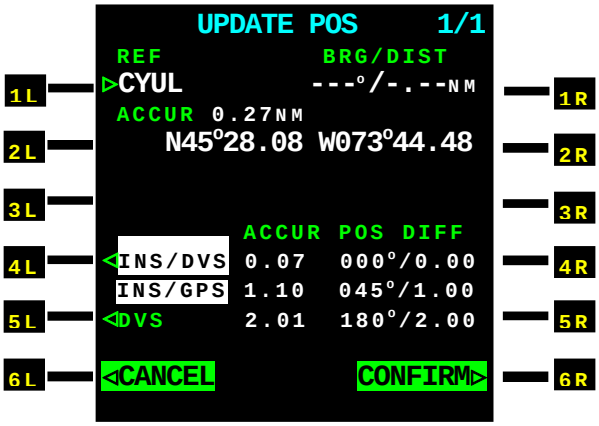


5. MARK function key not configured, changing the reference with a waypoint position:

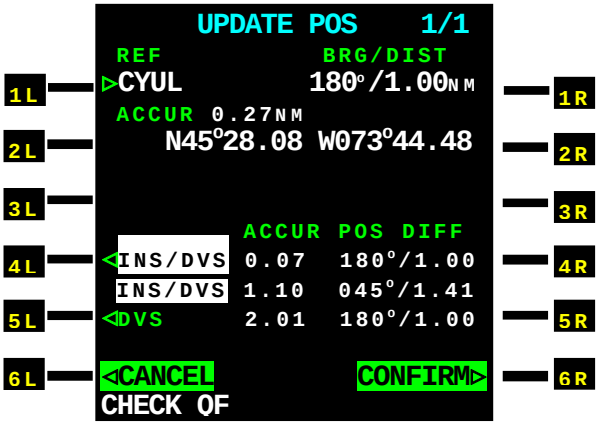
A. UPDATE POS 1/1 pressing LSK 1L, the identity entry prompt appear.



B. UPDATE POS 1/1 waypoint ID entered, MARK key pressed and sensors to be updated (LSK 4L) selected.



C. UPDATE POS 1/1 offset entered. The position is updated and CHECK QF appears if the position difference between the sensor to be updated and the reference position is greater than the accuracy of the sensor to be updated.



DME NAVIGATION

The DME/DME navigation mode is selected for use by the CMA-9000 FMS when higher priority navigation modes are unavailable or not adequate for the phase of flight. For additional information refer to Section 1.

DME/DME is used in areas with sufficient DME coverage and for which the appropriate navigation database is installed. In this mode the CMA-9000 FMS automatically tunes the on-board DME equipment acquiring distance from up to six DME or TACAN ground stations to determine aircraft position.

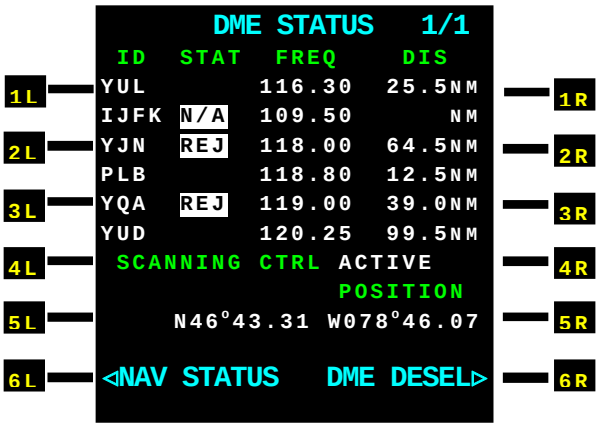
CAUTION: In DME/DME or VOR/DME modes when a VOR or a DME station is lost or acquired the FMS system may sense a position change. This situation is similar to when the FMS switches between navigation modes (GPS, DME/DME, VOR/DME, inertial, DR, etc.) when the integrity of a mode is not satisfied.

When the FMS is coupled to the autopilot, this newly sensed cross track error causes lateral steering command and an aircraft heading change as the FMS/autopilot attempts to intercept and capture the recalculated desired track. This autopilot manoeuvre is proportionate with the calculated track error and may be judged severe by the pilot. In this case, the pilot should disconnect the autopilot and ensure correct flight path control, smooth out the correction to, and interception of, the new calculated track.

DME STATION MONITOR

The DME page displays those stations used by the CMA-9000 FMS in DME navigation. A total of six DME stations may be used to determine the aircraft's position. At least three stations are required to navigate in DME/DME mode.

1. Display the DME STATUS 1/X page via the NAV STATUS INDEX 1/1 page.



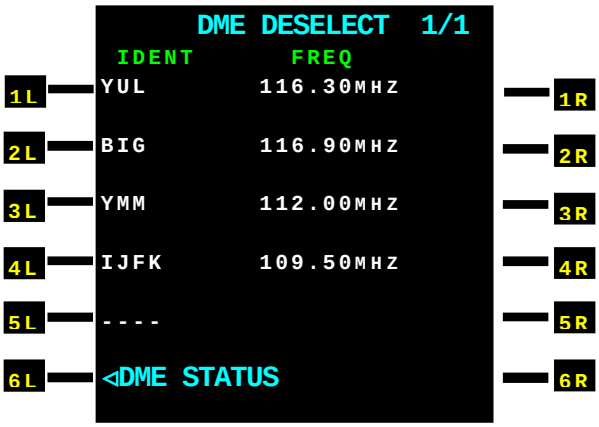
2. This page displays the DME stations used by the CMA-9000 FMS for DME navigation, the frequencies tuned, and the slant range distances. Associated with each station is a status that indicates the following:

   "REJ" : station not used in determining a position fix (rejected due to bad geometry).
   " " : station used for DME navigation.
   "N/A" : station not responding to tuning.

DME STATION DESELECTION

In some situations, the operator may choose to deselect a DME station due to known problems with the station so as to prevent the CMA-9000 FMS from using this station in its DME station selection process for DME navigation. To deselect a DME station, proceed as follows:

1. From the DME STATUS 1/1 page, press <DME DESEL> (LSK 6R).



Up to a maximum of 25 stations may be deselected. Press [NEXT] or [PREV] keys to view all DME stations deselected.

Insertion of more than 5 stations is achieved by moving a station entered in the scratchpad to any of the line select key locations 1 through 5.

2. Key the DME station identifier into the scratchpad and insert the station into the DESELECTION list by pressing the appropriate LSK.

DME STATION RESELECTION

To remove a deselected DME navaid from the DME DESELECTION list, proceed as follows:

1. Press the [CLR] key.

2. Press the appropriate LSK.

VOR/DME OR VOR/DME/TACAN NAVIGATION MODE

VOR/DME/TACAN Navigation is selected for use by the CMA-9000 FMS when higher priority navigation modes are unavailable or not adequate for the phase of flight. For additional information refer to Section 1.

The CMA-9000 FMS uses the VOR or TACAN radial bearing in conjunction with a DME or TACAN slant range from a manually tuned VOR/DME and/or TACAN stations to compute a VOR/DME/TACAN-based position.

At least one VOR/DME or TACAN station, up to a maximum of two VOR/DME and one TACAN stations, must be tuned to compute the position.

CAUTION: In DME/DME or VOR/DME modes when a VOR or a DME station is lost or acquired the FMS system may sense a position change. This situation is similar to when the FMS switches between navigation modes (GPS, DME/DME, VOR/DME, inertial, DR, etc.) when the integrity of a mode is not satisfied.

When the FMS is coupled to the autopilot, this newly sensed cross track error causes lateral steering command and an aircraft heading change as the FMS/autopilot attempts to intercept and capture the recalculated desired track. This autopilot manoeuvre is proportionate with the calculated track error and may be judged severe by the pilot. In this case, the pilot should disconnect the autopilot and ensure correct flight path control, smooth out the correction to, and interception of, the new calculated track.

VOR/DME/TACAN STATION MONITOR

The VOR/DME/TCN STATUS 1/1 page displays those stations used for VOR/DME/TACAN navigation.

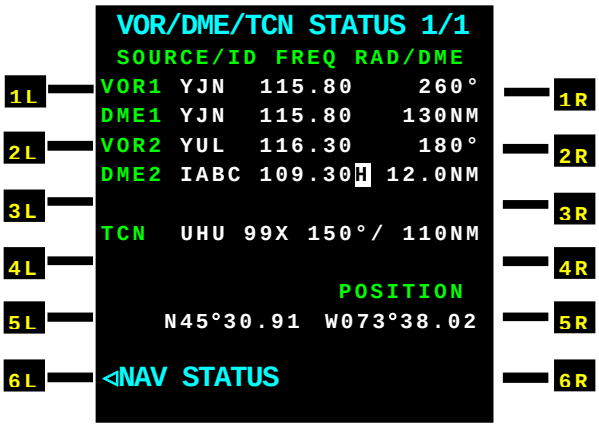
1. Display the VOR/DME/TCN STATUS 1/1 page via the NAV STATUS INDEX 1/1 page.

2. The station identifier, tuned frequency, station radial, and slant range distance are displayed for every equipment configured. When there are no stations listed, the station identifier will display blanks. When there is no equipment configured, all the above fields will display blanks.

NOTE: In the case of a TACAN operating in AA TR or AA REC mode the TACAN identifier (line 3) is not displayed.

3. The calculated position is also displayed when valid Navaid data is available.

NOTE: The title of this page varies with the installation. If no TACAN is configured the title is VOR/DME STATUS. If only a TACAN is configured then the title is TACAN STATUS.



DOPPLER VELOCITY SENSOR (DVS) NAVIGATION

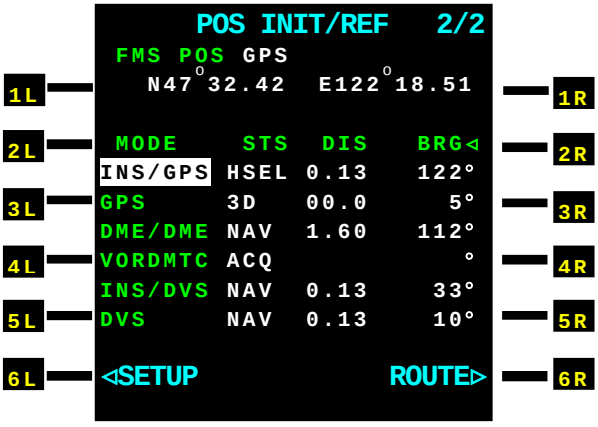
The purpose of the DVS mode is to provide a stand-alone navigation solution for use when higher priority navigation modes are unavailable or not adequate for the phase of flight. Refer to Section 1.

If the CMA-9000 FMS is configured for military navigation reversion to the DVS navigation mode is automatic upon loss of higher priority modes of navigation.

If the CMA-9000 FMS is configured for civil use the DVS navigation solution is considered without integrity and the corresponding navigation mode will be given the lowest priority.

Depending on the DVS installed in the aircraft, the CMA-9000 FMS will receive and process x and y velocity data which, when combined with heading and attitude allows the CMA-9000 FMS to compute the aircraft position, ground speed, altitude, status and maintenance data.

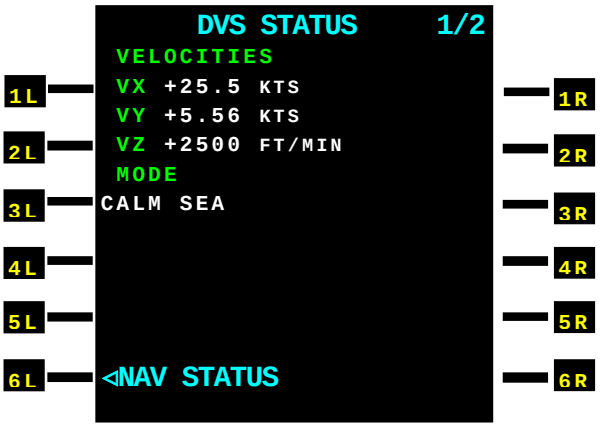
When the DVS navigation solution is available the DVS calculated position with respect to the CMA-9000 FMS position is available on the POS INIT REF 2/2.



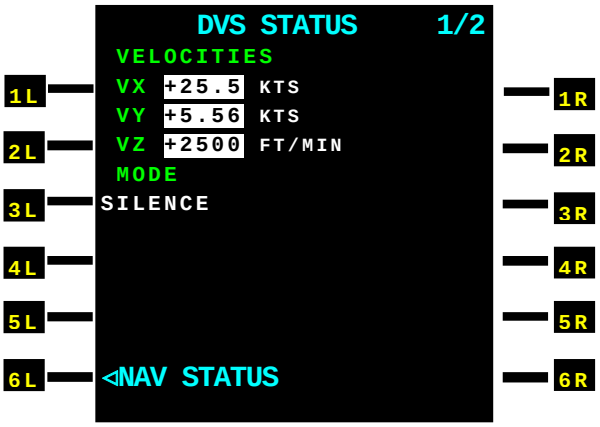
A. RDN-85 DVS installation.

1. Display the DVS STATUS 1/2 page via the NAV STATUS INDEX 1/1 page.

2. The velocity in each of the three axes and the DVS functional mode are displayed.



The velocities are displayed in reverse video when the RDN-85 DVS is in one of the following modes: TEST, SILENCE or MEMORY or if one specific velocity is in TEST mode.



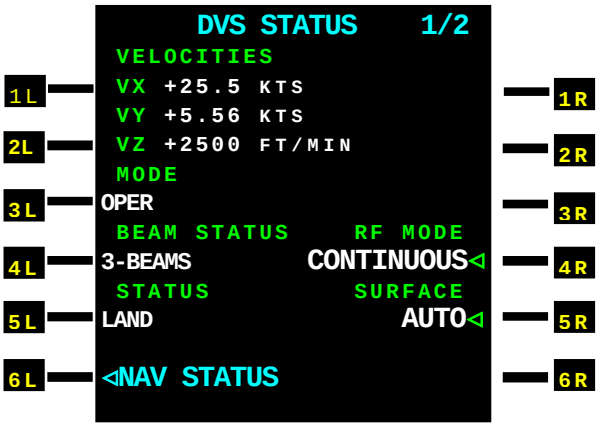
B. ANV353 DVS installation.

1. Display the DVS STATUS 1/2 page via the NAV STATUS INDEX 1/2 page.

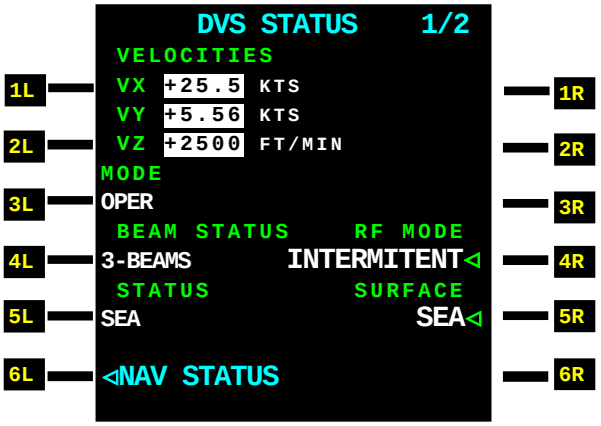
2. The velocity in each of the three axes, the DVS operational mode, the beam and surface status are displayed.

3. The RF mode in effect is displayed. If required toggle using the RF MODE (LSL 4R) to select the appropriate RF mode.

4. Toggle the prompt at (LSK 5R) to change the surface type.



The velocities are displayed in reverse video when the ANV353 DVS receives invalid velocity data or when the DVS is in TEST.



When the DVS mode is SEA or CALM SEA (RDN 85 only) the CMA-9000 FMS corrects the Doppler velocities for the water motion.

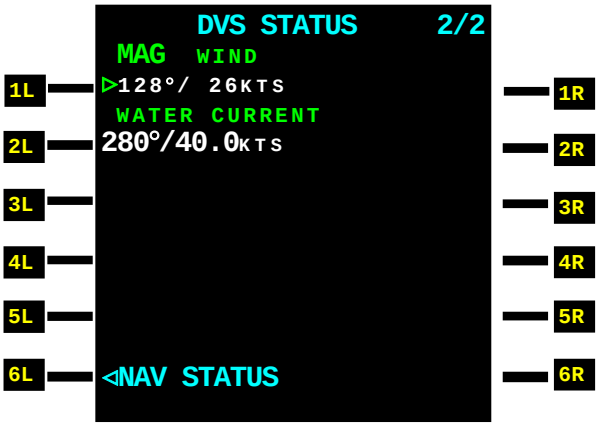
Enter water motion compensation on page DVS STATUS 2/2.

1. Display the DVS STATUS 1/2 page via the NAV STATUS INDEX 1/1 page and [NEXT].

2. When the CMA-9000 FMS cannot compute the wind, the current wind direction and speed (in knots) are displayed in large fonts. Enter the wind direction and speed. Otherwise the value is displayed in medium font and manual entries are not permitted. When the scratchpad is empty and A/C is outside the polar region (latitude between N73 and S60), pressing LSK 1L will toggle between the True and Magnetic display options.

NOTE: The system wind being displayed here is the same as may be observed on the PROGRESS 1/4 page. For the DVS, the wind value is used by the CMA-9000 FMS in the estimation of surface water current.

3. Enter the water speed in the direction the current is flowing toward and the current direction.



INERTIAL NAVIGATION VIA KALMAN FILTER

NOTE: Applies only if this function is configured. This function is mutually exclusive with the GPS/INS function described in Section EGI Navigation mode.

The purpose of the KALMAN sensor interface is to provide a stand-alone inertial navigation mode for use when stand-alone GPS navigation and radio navigation are not possible.

Navigation mode automatically reverts to inertial upon loss of GPS and radio navigation.

The CMA-9000 FMS is using the Attitude and Heading Reference System (AHRS), and the GPS to provide a KALMAN Filter navigation mode. In this mode, the primary navigation sensor is the GPS receiver. The AHRS is used as a dead-reckoning navigation system by emulating an Inertial Navigation System (INS) with a KALMAN Filter performing closed-loop GPS based correction and alignment of the INS position. Each sensor has specific performance characteristics and behaviour which, when combined, provide for continuous navigation whenever the GPS is not available. The GPS receiver has bounded but noisy positioning and velocity errors and the GPS navigation solution is subject to the availability of the GPS satellite constellation. The AHRS exhibits steady error growth which, when converted to a dead-reckoning system, will yield steady error growth in the position and velocity navigation solution. The AHRS-based inertial navigation solution is always available when the GPS position is lost. The noise characteristic of the AHRS determines the amount of time this position can be safely used for navigation.

The KALMAN Filter is providing the means to combine both navigation modes so that accurate navigation can continue for some time after the GPS is lost. The amount of time available will depend on the performance of the AHRS used (typically 2 minutes). The GPS and the AHRS are integrated via a KALMAN Filter and the KALMAN Filter is used to continuously correct and align the AHRS-based inertial navigation solution, as if the inertial navigation solution were static at a known position point. The block diagram is as follows:

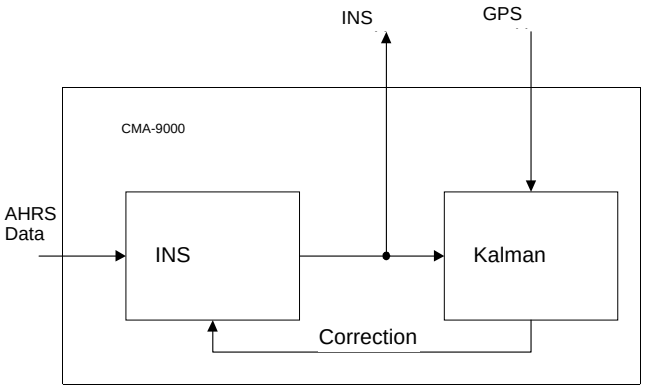


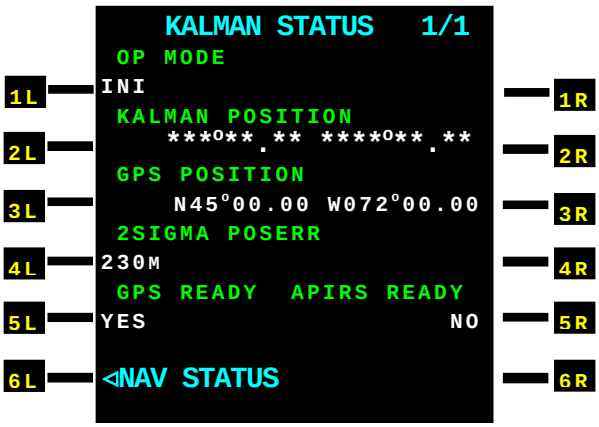
Figure 12-1 KALMAN Filter Block Diagram

The KALMAN Filter models the evolution of the AHRS errors according to the AHRS model. As long as GPS can provide measurement data with integrity, the AHRS errors can be continuously estimated and corrected in the emulated INS navigator. However, once there is no GPS data, the true AHRS errors (as seen at the INS emulator output) and the KALMAN Filter estimates of these errors will begin to diverge. The rate of divergence is a direct result of the AHRS quality - worse the AHRS quality, the quicker the INS navigator will diverge from the true GPS position. Also the GPS receiver will calibrate the INS emulator to the GPS accuracy.
The KALMAN Filtered navigation mode is available 1 minute after power is applied. If power is interrupted for greater than 50 msec then the KALMAN Filter is re-initialized.

KALMAN STATUS 1/1 PAGE

There are no data entries on this page. For additional information refer to Appendix A.

Display KALMAN STATUS 1/1 page by pressing [INIT REF], <NAV STATUS>, and <KALMAN> (LSK 5R).



INERTIAL NAVIGATION MODE

The purpose of the FMS/inertial sensors interface is to provide a stand-alone inertial navigation mode for use when stand-alone GPS navigation and radio navigation are not possible.

Reversion to the inertial navigation mode is automatic upon loss of GPS and radio navigation.

Depending on the inertial sensors installed in the aircraft, the FMS will receive and process ARINC 704/571/419 inertial data which may include position, ground speed, altitude, E-W and N-S inertial velocities, baro-inertial altitude, true and synthetic magnetic heading, status and maintenance data.

The inertial navigation mode is based on the FMS-calculated mixed inertial position, track and ground speed. The mixed inertial position is computed as a weighted average of the three inertial sensor positions.

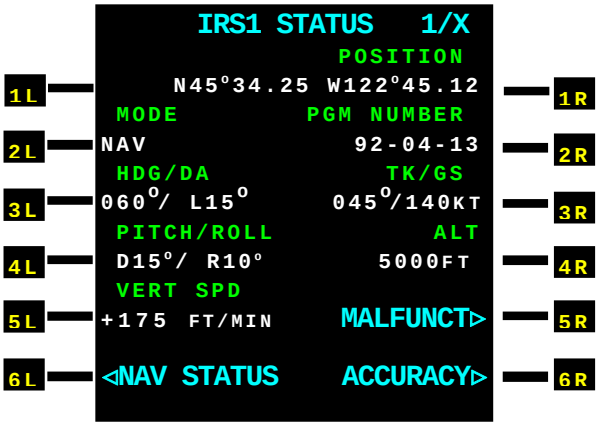
When in GPS or DME navigation mode and the ANP is within the phase of flight limit, each FMS calculates a bias vector between its system position and the mixed inertial position.

When the inertial navigation mode becomes active, the mixed inertial position is corrected with the bias vector in order to prevent large FMS position change.

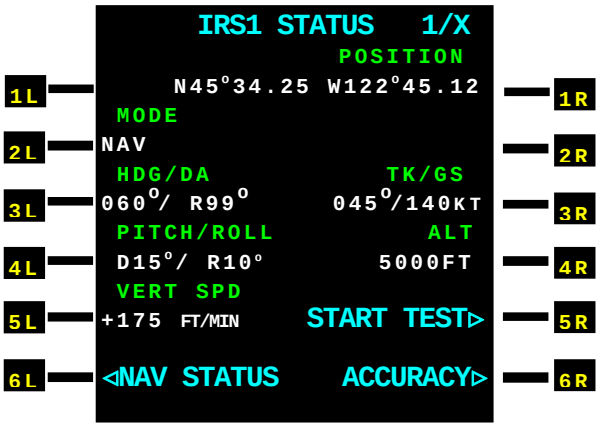
The actual navigation performance (ANP) of the mixed inertial position is derived from the inertial drift rate, the time elapsed since inertial navigation mode became active, and the system ANP when the inertial navigation mode became active. The FMS computes an inertial ANP based on a drift rate of 2 nautical miles per hour of inertial navigation.

1. Display the IRS STATUS 1/X page by pressing [INIT REF], <NAV STATUS> (LSK 5R) and <IRS> (LSK 4R).

   A. LTN_92 installation:



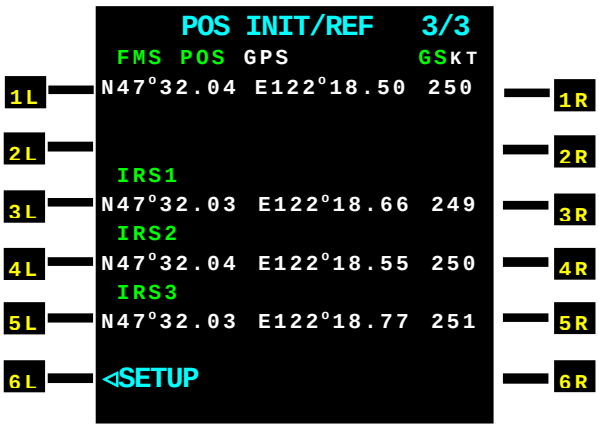
B. LTN_101, LASEREF_V and ADIRU installation:



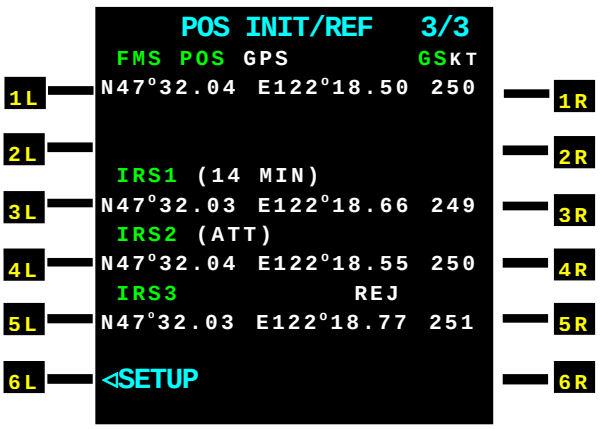
The crew can verify the individual IRS position and ground speed against the FMS system position and ground speed. It can also verify the individual IRS status, action code, and update mode.

1. Display the POS INIT/REF 3/3 page by pressing [INIT REF], <POS INIT> (LSK 2R), [NEXT], [NEXT].

A. LTN_92 installation:

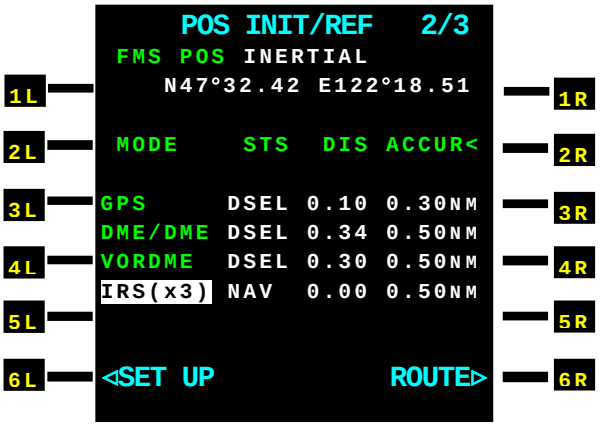


B. LTN101, ADIRU or LASEREF_V:



The crew can monitor the number of inertial sensors are used for navigation in the POS INIT 2/3 page by pressing [INIT REF], <POS INIT> (LSK 2R), [NEXT].

The number of inertial used for navigation is displayed next to the IRS mode.

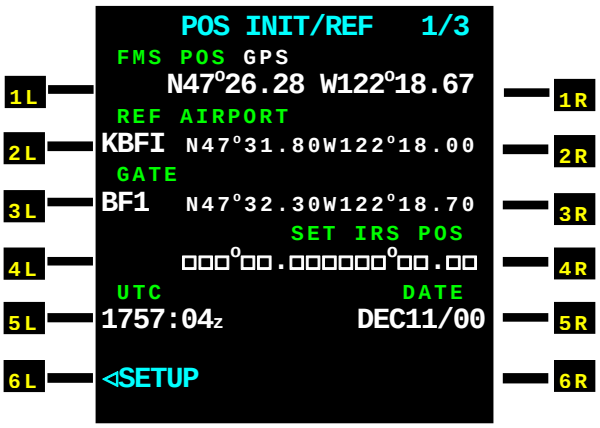


INERTIAL – POSITION INITIALIZATION PROCESS

The IRS initialization of position is commanded by the on side FMS. The IRS can be initialized automatically or manually:

- When the IRS is in ALIGN mode and GPS has integrity, each FMS automatically initializes its onside IRS.
- When the IRS is in ALIGN mode and GPS integrity is not available, the IRS initialization must be commanded by the crew by entering aircraft present position into the SET IRS POSITION field of the POS INIT page. Upon pilot entry of latitude and longitude, the FMS initializes its onside IRS and cross-talks the initialization data to the other FMS(s). On receipt of the initialization data, the other FMS(s) automatically initialize(s) its/their respective IRS.

1. Display the POS INIT/REF 1/3 page by pressing [INIT REF], <POS INIT>.



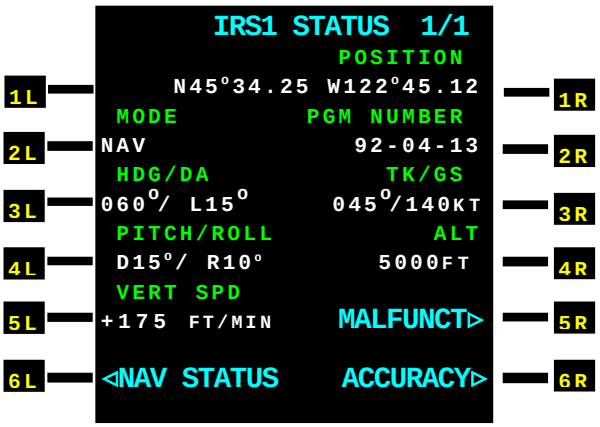
For additional information refer to Appendix A.

IRS SYSTEM PAGES

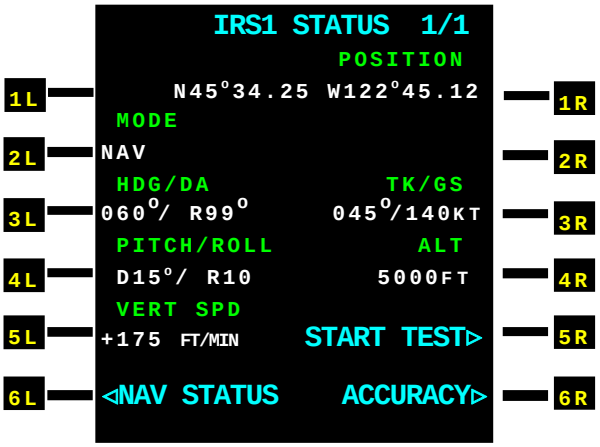
There are no data entries on these pages except for the INS STATUS page when in ALIGN mode. For additional information refer to Appendix A.

1. Display the IRS STATUS 1/1 page by pressing [INIT REF], <NAV STATUS> and <IRS>.

A. Page displayed for LTN92:



B. Page displayed for FOR ADIRU, LTN_101 and LASEREF_V:



INERTIAL NAVIGATION ON HIGH LATITUDE

When the system mixed inertial latitude exceeds 85 degrees N or S, the FMS will cease to compute a mixed inertial position. The system inertial position will slowly transition to coincide with the position of the inertial sensor closest to the mixed inertial position computed before the FMS present position latitude exceeded N-S 85 degrees.

The true heading, inertial track and ground speed information used by the FMS will be taken from the nearest IRS. The other inertial sensor(s) will be automatically rejected. If the selected nearest inertial sensor fails, the system will select the next nearest inertial sensor.
Upon an automatic rejection of an inertial sensor, the character string "REJ" will be displayed in lower case on the POS REF 2/2 page, adjacent to the rejected sensor.

Upon aircraft position latitude is less than N-S 85 degrees, the rejected inertial sensor(s) will be automatically re-enabled and the FMS will re-start the computation of the mixed inertial position, track and ground speed.

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SECTION 13 - CMA-9000 FMS PAGES - RADIO TUNING

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Subject **Page**

SECTION 13

CMA-9000 FMS PAGES - RADIO TUNING

NOTE: In the key sequences shown to display the pages, square brackets "[ ]" indicate a function key and angle brackets "< >" indicate a line select key (left and right softkeys).

GENERAL

The CMA-9000 FMS offers primary or backup radio tuning of navigation and communication radios. It can provide tuning for:

- Single or Dual DMEs (Chelton DN-441B, Collins DME-442, or Collins DME-4000)
- Single Collins DME-42
- Single or Dual NAVs (Chelton VN-411B, Collins VIR-432 or Collins NAV-4500)
- Single Collins VIR-32
- Single or Dual ADFs (Chelton DF-431B or Collins ADF-462)
- Single or Dual COMs (Chelton VC-401B, Chelton VC-401C, Collins VHF-422, Collins VHF-4000)
- Single or Dual VUHF radios (Marconi Selenia SRT-651N/A or SRT-651/N-F)
- Single or Dual ATC TRANSPONDERs (Bendix-King MST-67A or Collins TDR-94D)
- Single Audio Management Unit (TEAM)
- Single Direction Finder (Collins DF-430-102)
- Single HF (Collins SRT-170/M2)
- Single IFF Transponder (SELEX Communications M425)

Tuning capabilities include active and standby frequency entry control of all radio modes (including self-test), and a pilot entered library.

In certain installation architectures supporting multiple FMSs, the crew should attempt to tune the given radio from any other installed FMS(s) if the original tuning attempt fails. This is valid, for example, when the FMS is operating in independent mode (as confirmed by the INDEPENDENT OP alert message).

The CMA-9000 FMS provides control and display of the active/standby frequencies and settings of all the radios interfaced on the RADIO Page. This page provides tuning entries and access to more detailed radio control pages, where self-test and radio modes can be selected. Upon power-up, the CMA-9000 FMS reads from the radios their current valid tuned frequencies and settings, or automatically tunes them to the frequencies and settings used prior to the last power interruption. Two display formats are available for the RADIO top page: a horizontal or a vertical presentation. In the horizontal display format, the active and standby frequencies are displayed side by side. In the vertical display format, the active frequency is displayed on top of the standby frequency.

RADIO TUNING LIBRARY

For pilot convenience, the FMS provides library pages for memorized radio frequencies or channels. There is one library for each of the following radio types: VHF, V/UHF, COM, NAV and ADF radio types

Library entries consist of the following parameters:

- preset number (mandatory),
- identifier and data (optional),
- frequency or channel (mandatory).

Each library allows for 99 entries. Preset numbers are unique numbers from 1 to 99. The maximum length of the identifier is 5 characters. Identifiers do not need to be unique, but when tuning by identifier, only the first one encountered in the library will be used. All libraries are password protected. Scanning and viewing is always accessible. Changes to a library are allowed only when the library is unlocked.

RADIO 1/X or 2/X (Horizontal display format)

This RADIO top page allows the pilot a variable number and mix of COM, NAV and Surveillance radios depending on the operational needs (frequently used radios on first page, less used on second and positioned on any line of a page). COM (VHF), NAV, ADF, VUHF, ATC, DF and Volume Control are supported.

The RADIO 1/X page can be configured as the default cold start power up page of the CMA-9000 FMS.

The RADIO 1/X page is displayed by pressing [RADIO].

The CMA-9000 FMS provides alert mechanisms to inform the pilot of radio failures. Alerts messages are displayed if radios fail or they are not responding to the tuning request.

General - for all radios the following applies:

Two frequencies/channels are displayed for each radio. When a new frequency/channel is entered, it is placed to the right of the active frequency, in the stand-by position. The associated line select key toggles the stand-by/active frequency/channel and vice-versa (when the scratchpad is empty).

The CMA-9000 FMS allows the user to select a frequency by entering one of the following elements in the scratchpad and pressing the associated line select key:

- a preset number
- the identifier (for NAV radio: from the navigation database as 1st priority and from the radio library as 2nd priority; for all other radios from the radio library as 1st priority)
- the frequency/channel value

If a valid preset number is entered, the corresponding frequency/channel (from the library) is displayed. Preset or ident entries have priority over the frequency/channel when entered simultaneously according to the slash rule (e.g. 01//122.5). In this case the frequency entered will be that of the corresponding preset or ident from the library.

The CMA-9000 FMS provides a special awareness/status field located above the frequency line. The use of the special awareness/status field is located in the detailed section of each radio. The status indicates the current state of the radio.

The special awareness/status field is highlighted in the figure below for a typical radio.

For navigation radios (excluding ATC) the following applies:

The CMA-9000 FMS provides alert mechanisms to inform the pilot of radio failures. Warnings appear if radios fail or they are not responding to the tuning request.

NOTE: Refer to the specific radio horizontal page description for details.

The CMA-9000 FMS displays all tuned active frequencies in large white font. During the tuning process the active frequencies are displayed in large inverse white font. If the tuning operation is not successful they are displayed in small amber font as a warning to the pilot.

The CMA-9000 FMS can be configured to allow burst tuning; either by CMA-9000 Display Panel entry or by a dedicated radio control head.

The operating frequencies for the Navigation radios are defined in each respective radio section. The CMA-9000 FMS does not accept values out of range. An error message will appear in the scratchpad, if invalid entries are made by the user.

In some installations, the tuning can be achieved either from the FMS or from a backup controller. If the radio tuning is disabled from the FMS, entries made to the NAV or ADF radio(s) will generate an entry advisory message (!RADIO TUNING DISABLED) to inform the pilot that he may no longer tune these radios from the CMA-9000 FMS.

For communication radios the following applies:

A frequency or channel can be selected by entering the desired value in the scratchpad and pressing the associated line select key. These radios do not provide tuning validation.

The CMA-9000 FMS does not require trailing/leading zeros for frequency entry.

Generally, the CMA-9000 FMS displays all tuned active frequencies in large white font. During the tuning process the active frequencies are displayed in large inverse white font. If the tuning operation is not successful they are displayed in small amber font as a warning to the pilot. Exceptions to these are indicated within each specific radio section.

In some installations, the tuning can be achieved either from the FMS or from a backup controller. If the radio tuning is disabled from the FMS, entries made to the COM radio(s) will generate an entry advisory message (!RADIO TUNING DISABLED) to inform the pilot that he may no longer tune these radios from the CMA-9000 FMS.

Operating Frequencies and Ranges:

The operating frequencies for the Navigation and Communication radios are shown in the table below. An error message will appear in the scratchpad if invalid entries are made.

RADIO	LOWER LIMIT	UPPER LIMIT	INCREMENT
VOR/ILS/ DME	108.00 MHz	117.95 MHz (VOR/ILS) 135.95 (DME)	50 kHz
ADF	100.0 kHz 2181.0 MHz or 190.0 kHz 2179.0 kHz	1899.0 kHz (See Note 2) 2183.0 kHz or 1799.0 kHz 2185.0 kHz	0.5 kHz

RADIO	LOWER LIMIT	UPPER LIMIT	INCREMENT
TRANSPONDER	0 (octal)	7777 (octal)	1
COM	118.000 MHz	135.975 MHz 136.975 MHz 151.975 MHz (see Note 1)	25 kHz (see Note 3)
COM	118.000 MHz	136.975 MHz 151.990 MHz (see Note 1)	25/8.33 kHz (see Notes 3 & 4) or 8.33 kHz (see Note 4)
UHF	225.000 MHz	399.975 MHz	25 kHz

RADIO	LOWER LIMIT	UPPER LIMIT	INCREMENT
TACAN (CH)	0 X, 0 Y	B6X, B6Y	252 channel
TACAN (TX)	1025 MHz	1150 MHz	50 kHz
TACAN (RX)	926 MHz	1213 MHz	50 kHz

RADIO	LOWER LIMIT	UPPER LIMIT	INCREMENT
DF	30.000 Mhz	87.975 Mhz	25 Khz
DF	108.000 Mhz	173.975 Mhz	25 Khz
DF	225.000 Mhz	399.975 Mhz	25 kHz
DF	401.650 MHz(ARGOS)		
DF	406 Mhz band (COSPAS / SARSAT)		

The CMA-9000 FMS also provides with the capability to tune V/UHF radios. For a frequency in the VHF band, the CMA-9000 FMS sets the modulation mode depending on the frequency band. For frequency in the UHF band, the modulation mode is selectable by the user. The modulation mode and the frequency ranges to be used are given in the following table.

FREQ BAND	LOWER LIMIT	UPPER LIMIT	MODULATION
VHF	30.000 MHz	87.975 MHz	FM
VHF (RX only)	108.000 MHz	117.975 MHz	AM
VHF	118.000 MHz	136.990MHz	AM
VHF	137.000 MHz	155.975 MHz	AM
VHF (Maritime Band – see Note 5)	156.000 MHz	173.975 MHz	FM
UHF	225.000 MHz	399.975 MHz	AM or FM

NOTES:

(1) The upper limit of the COM radio is configurable. The possible values are 135.975, 136.975, 136.990 and 151.975 MHz.

(2) The legal range is from 190 kHz to 1860 kHz but the radio can tune outside this range. The performance is not guaranteed for those frequencies. In addition the radio may tune from 2181 kHz to 2183 kHz for marine distress frequencies.

(3) The COM radio frequencies with increments of 25 kHz

(4) The upper limit of the COM radio frequencies with increments of 8.33 kHz.

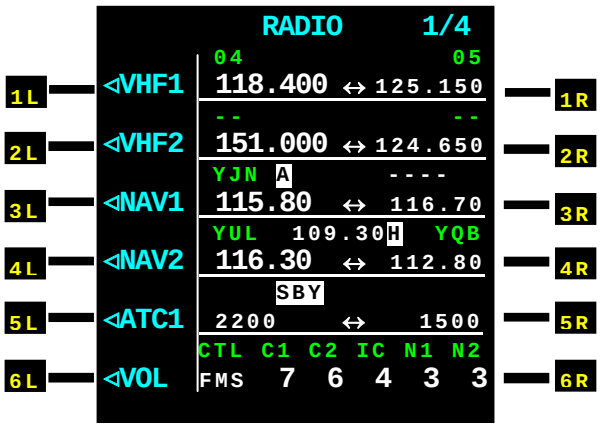
(5) Certain frequencies in the maritime band (156.000 - 173.975) can also be tuned by entering the corresponding maritime channel number, e.g. for those frequencies which have an associated maritime channel. When in the maritime mode, the FMS automatically commands the +/- 4.6 KHz spacing and the radio will 'listen' on the offset frequency if such an associated offset exists for the entered maritime channel. When the operator chooses to command a frequency instead of a maritime channel within this band, the +/- 4.6 KHz maritime offset request is not commanded by the FMS.

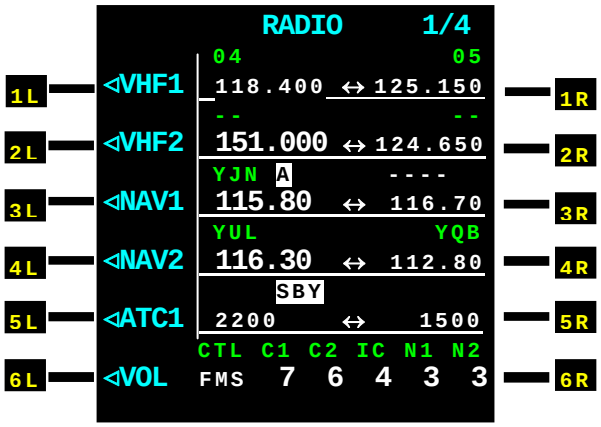
(6) All values in table are inclusive.

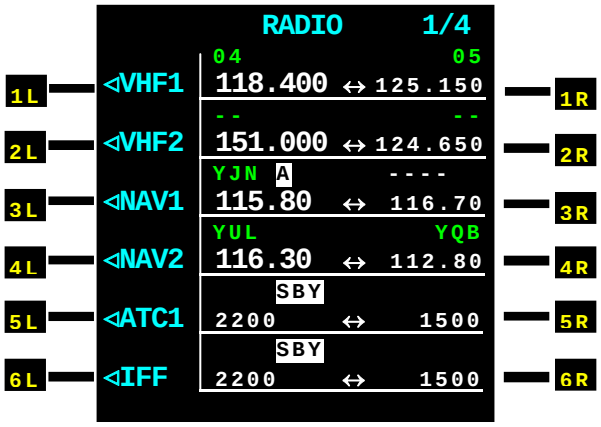
The CMA-9000 FMS also provides with the capability to tune HF radios with the following frequency ranges:

FREQ BAND	LOWER LIMIT	UPPER LIMIT
HF	2000.0 KHz	29999.9 KHz

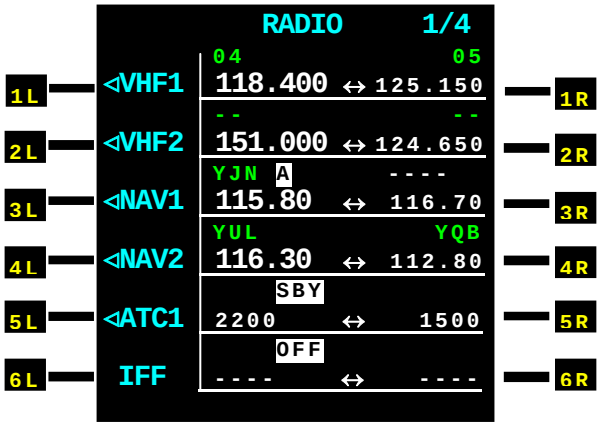
Horizontal RADIO Page Type (VHF1, VHf2, NAV1, NAV2, ATC1, VOL):







Page displayed when IFF power is set to OFF from the RADIO PWR page.



NOTE: The page layout can differ based on the number of radios installed and on which line they are configured. There may be empty lines. If more than 6 radios are configured, another RADIO top page 2/x will be available. The acronyms of some type of radios are configurable items.

NOTE: It is also possible; for certain HF and V/UHF radios, to configure an external discrete which would inhibit access to the dedicated radio's FMS control pages. In such cases, FMS NOT IN CTRL will be displayed in the field where the radio's tuning information is normally displayed on this RADIO page. Access to the HF and V/UHF dedicated radio pages is inhibited by removing the caret next to the radio's name (as seen in the example above at LSK3L and 4L).
When radio control is restored to the FMS for any of these radios, the HF and/or V/UHF's the settings/selections were made on the alternate control panel(s) will be reflected on the FMS.

The frequency becomes amber when unable to tune a radio.

The area of the RADIO 1/X page located between the preset/ident fields (e.g. just above the ..are reserved for special awareness information pertaining to the specific radio(s).
Additionally, this area will display the FMS commanded radio power status for the IFF transponders (e.g. text showing "OFF" will be displayed in the special awareness field when the IFF power control is selected to OFF).

Details pertaining to a radio's specific special awareness field are captured in the dedicated radio's section.

VHF1 [1L]: Access to the VHF1 radio page.

VHF2 [2L]: Access to the VHF2 radio page.

VHF1 [1R]: Display and modify the VHF active and standby frequencies/presets. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies.

VHF2 [2R]: Display and modify the VHF active and standby frequencies/presets. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies.

NAV1 [3L]: Access to the NAV1 radio page.

NAV2 [4L]: Access to the NAV2 radio page.

NAV1 [3R]: Display and modify the NAV active and standby frequencies/ident/preset. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies.
When auto-tuning mode is active, an inverse video 'A' is displayed next to the active ident/preset. Auto-tuning mode is entered by assigning "DELETE" (press the [CLR] key) to the NAV1 standby frequency. Returning to manual tuning mode requires "DELETE" (press the [CLR] key) to be assigned to the NAV1 standby frequency or swapping of the active and standby NAV1 frequencies.

NAV2 [4R]: Display and modify the NAV active and standby frequencies/ident/ presets. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies.
When auto-tuning mode is active, an inverse video 'A' is displayed next to the active ident/preset. Auto-tuning mode is entered by assigning "DELETE" (press the [CLR] key) to the NAV2 standby frequency. Returning to manual tuning mode requires ["DELETE" (press the [CLR] key) to be assigned to the NAV2 standby frequency or swapping of the active and standby NAV2 frequencies.

ATCx [5L]: Access to the ATC radio page.

ATCx [5R]: Used to display and modify the ATC active and standby codes from the current active transponder or from the last active transponder when toggled back to standby mode. Default value will be the primary transponder at power-up (cold start) when both transponders are in standby mode.

NOTE: ATC Radio equipment name can be configured as "ATC", "TPDR" or "XPDR". The case displayed above is the "ATC" configuration.

When configured to prevent FMS tuning of the ATC transponder (ATC CONFIG 2/X LSK 5R) and the MC_FAILED discrete input indicates that the Mission Computer is active, it will reject any data entry or modification of the data (e.g. standby code) by displaying !MC IN CONTROL data advisory scratchpad message.

VOL [6L]: Access to the Volume Control page when the FMS has control of the AMU.

VOL [6R]: Provides information as to which equipment (FMS/MC) has control over the AMU and displays the specific radio volume level.

NOTE: The Volume control and status location can differ based on the number of radios and operator display configuration preferences. [1L] / [2L] / [3L] / [4L] / [5L] are other possibilities where the Volume Control could be located.
The following acronyms are used: CTL=Controller, C1=COM1, C2=COM2, IC=InterCom, N1=NAV1, N2=NAV2.

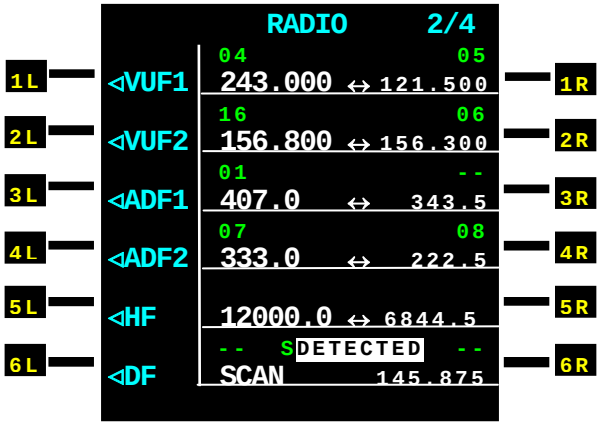
IFF [6L]: Access to the IFF radio page. When IFF power is set to off from the RADIO PWR page, this line select key is disabled (IFF radio page cannot be accessed).

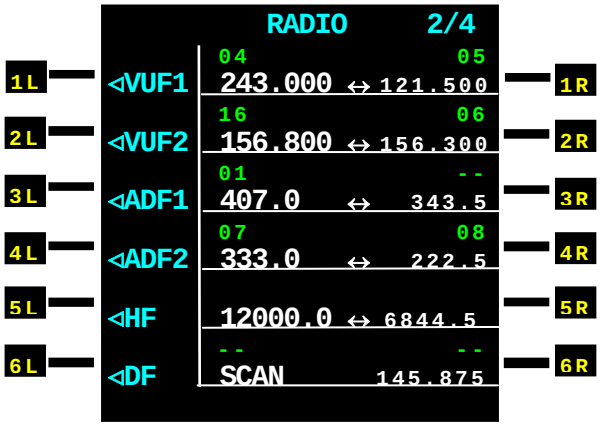
IFF [6R]: Used to display and modify the IFF active and standby Mode 3/A codes. Additionally, it is used to display the master mode status and the mode 1-2-S and C. Line selection of this field is disabled when IFF power is set to OFF from the RADIO PWR page.

RADIO 2/X PAGE (Horizontal display format)

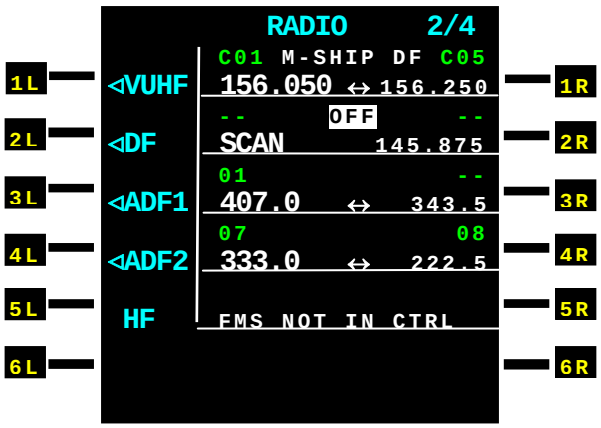
Press [RADIO] [NEXT] to display RADIO 2/X page.

The RADIO 2/4 page is only available when configured.

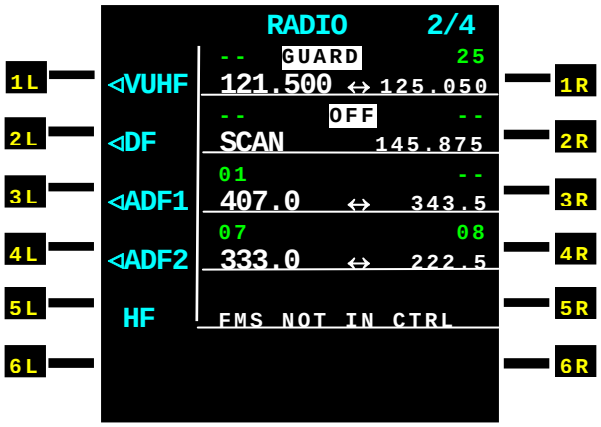




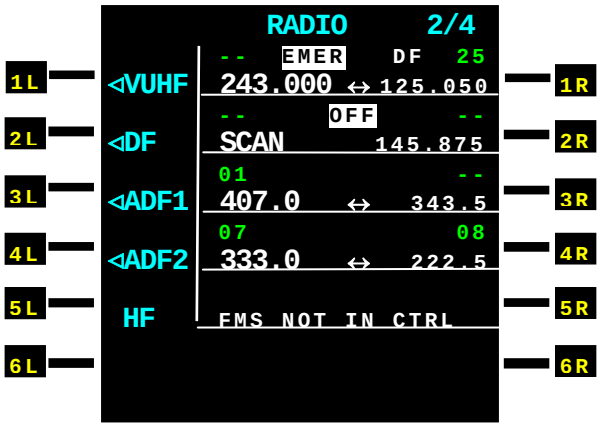
Single SRT-651/N-F V/UHF radio configured in Maritime SHIP and DF modes active. Also, HF radio being control by alternate cockpit control panel:



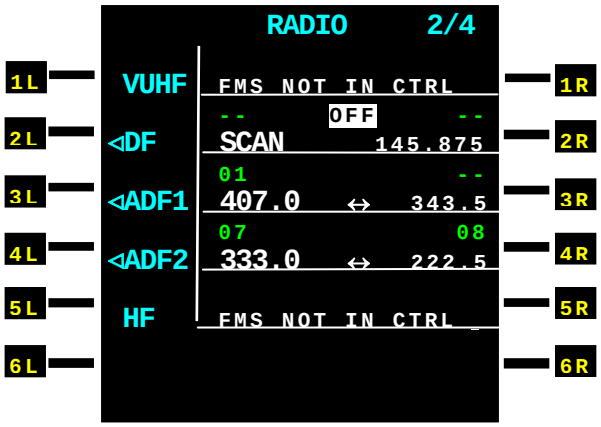
Single SRT-651/N-F V/UHF radio configured - GUARD activated:



Single SRT-651/N-F V/UHF radio configured - Emergency 243 Guard Precedence activated while DF mode on:



Single SRT-651/N-F V/UHF radio configured - V/UHF not being controlled by FMS:



NOTE: The page layout can differ based on the number of radios installed and on which line they are configured. There may be empty lines. If more than 6 radios are configured, another RADIO top page 2/x will be available. The acronym of some type of radios are configurable items.

VUF1 [1L] or **VUHF [1L]:** Access to the VUF1 (or VUHF) radio page.

NOTE: If a single V/UHF is installed the radio's name can be configured to be shown as "VUHF" (this is seen is several of the above pictures).

VUF2 [2L]: Access to the VUF2 radio page.

VUF1 [1L] or **VUHF [1R]:** Display and modify the VUF1 (or VUHF) active and standby frequencies/presets.

For the SRT-651/N-F radio, the possible status field indications are:

- EMER (in inverse white video): indicates Emergency 243 Guard Precedence is commanded
- GUARD (in inverse white video): indicates guard frequency is being tuned
- M-CST (normal white video): indicates maritime coast is active
- M-SHIP (normal white video): indicates maritime ship is active
- DF (normal white video): indicates V/UHF direction finder mode has been commanded ON

NOTE: EMER, GUARD, M-CST, and M-SHIP all appear in the same location in the status field and are thus mutually exclusive of each other. The display priority of EMER and GUARD is higher than that of M-CST and M-SHIP.

VUF2 [2R]: Display and modify the VUF2 active and standby frequencies/presets.

ADF1 [3L]: Access to the ADF1 radio page.

ADF2 [4L]: Access to the ADF2 radio page.

ADF1 [3R]: Display and modify the ADF active and standby frequencies/presets.

ADF2 [4R]: Display and modify the ADF active and standby frequencies/presets.

HF [5L]: Access to the HF radio page.

HF [5R]: Display and modify the HF active and standby frequencies/ident/preset.

DF [6L]: Access to the DF radio page.

NOTE: This prompt is shown at LSK 2L in several of the above pictures.

DF [6R]: Display and modify the DF active and standby frequencies/identifier/preset.

NOTE: This prompt is shown at LSK 2R in several of the above pictures.

RADIO 1/X or 2/X (Vertical display format)

This page allows the pilot to verify and modify the active frequencies for the COM, NAV, ADF, ATC, FM1(Fug8), FM2(Fug9), UHF and/or VUHF (SRT-651/N-A only) radios.

The RADIO 1/X page can be configured as the default cold start power up page of the CMA-9000 FMS.

The RADIO 1/X page is displayed by pressing [RADIO].

NOTE: The actual page generated by the system will depend on the Radio Equipment installed and configured as well as the configured radio names.

General - for all radios the following applies:

Two frequencies/channels are displayed for each radio. When a new frequency/channel is entered, it is placed below the active frequency, in the stand-by position. The associated line select key toggles the stand-by/active frequency/channel and vice-versa (when the scratchpad is empty).

The CMA-9000 FMS allows the user to select a frequency by entering one of the following elements in the scratchpad and pressing the associated line select key:

- a preset number
- the identifier (for NAV radio: from the navigation database as 1st priority and from the radio library as 2nd priority; for all other radios from the radio library as 1st priority)
- the frequency/channel value

If a valid preset number is entered, the corresponding frequency/channel (from the library) is displayed. Preset or ident entries have priority over the frequency/channel when entered simultaneously according to the slash rule (e.g. 01//122.5). In this case the frequency entered will be that of the corresponding preset or ident from the library.

The CMA-9000 FMS allows the user to select the previous/next preset from the library by entering '+' or '-' in the scratchpad and pressing the associated softkey.

The CMA-9000 FMS provides frequency/channel validation by verifying the user requested frequency/channel matches the radio feedback frequency/channel.

NOTE: Refer to the specific radio horizontal page description for details.

For navigation radios (excluding ATC) the following applies:

The CMA-9000 FMS provides alert mechanisms to inform the pilot of radio failures. Warnings appear if radios fail or they are not responding to the tuning request.

NOTE: Refer to the specific radio horizontal page description for details.

The CMA-9000 FMS displays all tuned active frequencies in large white font. During the tuning process the active frequencies are displayed in large inverse white font. If the tuning operation is not successful they are displayed in small amber font as a warning to the pilot.

The CMA-9000 FMS can be configured to allow burst tuning; either by CMA-9000 Display Panel entry or by a dedicated radio control head.

The operating frequencies for the Navigation radios are defined in each respective radio section. The CMA-9000 FMS does not accept values out of range. An error message will appear in the scratchpad, if invalid entries are made by the user.

In some installation, the tuning can be achieved either from the FMS or from a backup controller. If the radio tuning is disabled from the FMS, entries made to the NAV or ADF radio(s) will generate an entry advisory message (!RADIO TUNING DISABLED) to inform the pilot that he may no longer tune these radios from the CMA-9000 FMS.

For communication radios the following applies:

A frequency or channel can be selected by entering the desired value in the scratchpad and pressing the associated line select key. These radios do not provide tuning validation.

The CMA-9000 FMS does not require trailing/leading zeros for frequency entry.

In some installations, radio tuning can be achieved either from the FMS or from a backup controller. If the radio tuning is disabled from the FMS, entries made to the COM radio(s) will generate an entry advisory message (!RADIO TUNING DISABLED) to inform the pilot that he may no longer tune these radios from the CMA-9000 FMS.

For the V/UHF radio, the following applies:

The user interface for the VUHF radio is the same as that of the regular communication radios as described above but with the following additional features/differences:

In some installations, radio tuning can be achieved either from the FMS or from a backup controller. If the radio tuning is disabled from the FMS, entries made to the V/UHF radio(s) will inhibit V/UHF page access as well as generating a data entry error message (!FMS NOT IN CONTROL) in order to inform the pilot that he may no longer tune these radios from the CMA-9000 FMS.

For frequency in the VHF band, CMA-9000 FMS sets the modulation mode depending on the frequency band. For frequency in the UHF band, the modulation mode is selectable by the user. The modulation mode and the frequency ranges to be used are given in the following table.

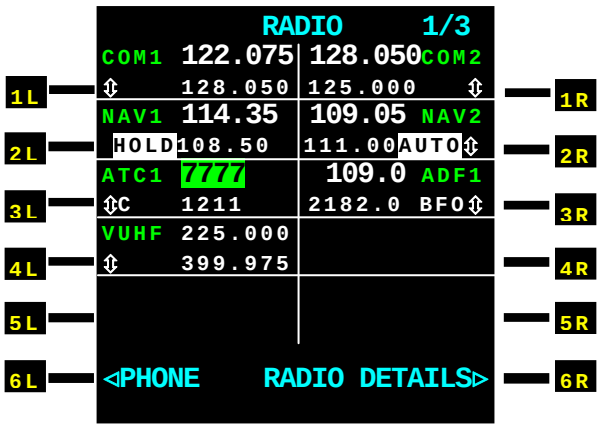
Radio Models	Frequency / Channel Range (MHz)	Channel Spacing (KHz)	Band / Modulation
SRT-651/N-A or SRT-651/N-F	30.000 - 87.975 108.000 - 117.975 118.000 - 155.975 156.000 - 173.975 225.000 - 399.975 400.000 - 469.975**	25 25 25 25 or 25/8.33* 25 25	VHF/FM VHF/AM VHF/AM VHF/FM UHF/AM/FM UHF/FM

* Channel spacing is configurable.
** This range only available for SRT-651/N-A radio.

RADIO PAGE Type (COM, NAV, ATC, ADF, FM1, FM2, UHF):

NOTE: Page layout can differ based on configured items and position of respective configured items.

RADIO PAGE Type (COM, NAV, ATC, ADF, VUHF*):
** Only SRT-651/N-A V/UHF radio variant can be configured in vertical radio page layout.*



NOTE: XX below is based on the configured position of each radio. It can be anything between 1L to 5L or 1R to 5R.

COM1/2 [XX]: Display and modify the active and standby frequencies/channels of the COM1/COM2 radio. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies/channels. If the transmit mode activation (e.g. push-to-talk) is installed, the frequency/channel is displayed in reverse video black font on green background.

NOTE: Name may differ (COM vs VHF) based on configured name.

NAV1/2 [XX]: Display and modify the active and standby frequencies of the NAV1/NAV2 radio(s). Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies. When auto-tuning mode is active, an inverse video 'AUTO' is displayed below to the NAV1/NAV2 fixed caption prompt. Returning to manual tuning mode requires 'DELETE' (press the [CLR] key) to be assigned to the NAV1/NAV2 standby frequency or swapping of the active and standby NAV1/NAV2 frequencies. When a DME hold is set (via the NAV radio page), an inverse video 'HOLD' is displayed below to the NAV1/NAV2 fixed caption prompt. Also, when DME hold is set, the double arrow toggle prompt disappears to indicate that if an entry is made, the entered frequency will correspond to the active frequency (e.g. not the standby), this is because the frequency displayed next to the HOLD prompt is the hold frequency.

ATC1/2 [XX]: Display and modify active and standby ident of the active ATC radio (in a dual installation). Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles between active/standby idents. Also displays the Transponder mode (C= Altitude mode on, blank= Altitude mode off) below the fixed caption ATC field. When the [SQK/IDT] key is pressed the active Ident code will be displayed in inverse green for the duration of the Squawk (18 seconds). During the duration of the squawk, the CMA-9000 FMS is inhibit the toggle operation. If the transponder is in standby, an inverse video 'SBY' is displayed below the fixed caption ATC field.

NOTE: Name may differ (ATC vs TPDR vs XPDR) based on configured name.

ADF1/2 [XX]: Display and modify the active and standby frequencies of the ADF1 or ADF2 radio. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies. The ADF mode will be displayed in normal white font below the field ADF. Possible values are: ADF, ANT, BFO. The BFO status has priority over ADF and ANT.

FM1/2 [XX]: Display and modify the active and standby frequencies of the FM1 / FM2 radio. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies. The value displayed starts with the channel (no leading zero), followed by the band (L for lower and U for upper), and followed by the mode (D for duplex, S for simplex, R for relay).

UHF [XX]: Display and modify the active and standby frequencies of the UHF radio. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles active/standby frequencies.

PHONE [6L]: Access to the PHONE TOP 1/1 page (if PHONE or HCS is configured).

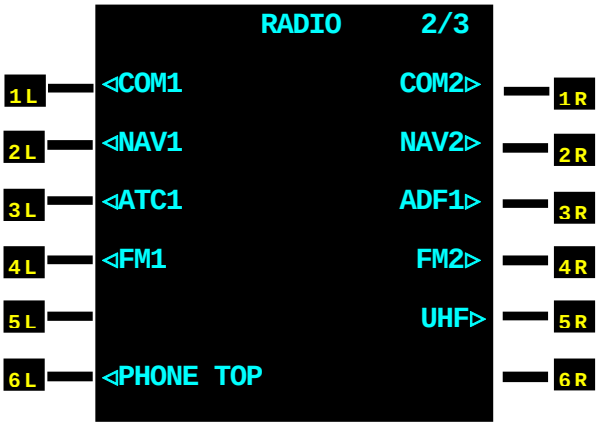
RADIO DETAILS [6R]: Access to the RADIO DETAILS page.

NOTE: This is equivalent of pressing the NEXT key while viewing the RADIO 1/3 page.

RADIO 2/X PAGE (Vertical display format)

Press [RADIO] [NEXT] to display RADIO 2/X page.

NOTE: This page is only available in the vertical configuration of radio top page.



NOTE: The presentation above may differ. It is based on the configured position and names of each radio. The term XX below can be anything between 1L to 5L or 1R to 5R.

COM1 [XX]: Access to the COM page (if configured).

NAV1 [XX]: Access to the NAV page (if configured).

ATC1 [XX]: Access to the ATC page (if configured).

FM1 [XX]: Access to the FM1 page (if configured).

PHONE TOP [6L]: Access to the PHONE TOP 1/1 page (if PHONE or HCS is configured).

COM2 [XX]: Access to the COM page (if configured).

NAV2 [XX]: Access to the NAV page (if configured).

ADF1 [XX]: Access to the ADF page (if configured).

FM2 [XX]: Access to the FM2 page (if configured).

UHF [XX]: Access to the UHF page (if configured)

VUHF [XX]: *Not shown*. Access to the VUHF page (if configured*).*
Only SRT-651/N-A V/UHF radio variant can be configured in vertical radio page layout.

ATC2 [XX]: *Not shown*. Access to the ATC page (if configured).

ADF2 [XX]: *Not shown*. Access to the ADF page (if configured).

RADIO TEST X/Y (2/Y or 3/Y or …) PAGE

The RADIO top pages and RADIO TEST pages are configurable. However, the radio names (same acronyms as on the RADIO top pages) that appear are the ones whose self-test capability have been configured.

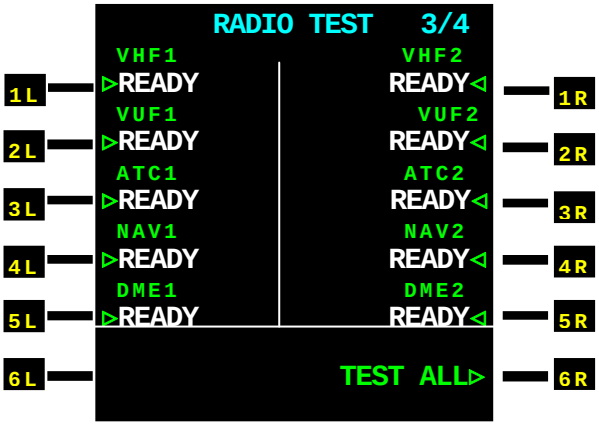
The RADIO TEST page can be available while the aircraft is on the ground (for preflight check and setup) or can be always available. The selection is done via a configuration option. When configured to be only visible on the ground, this page is removed from the top-level menu after take-off. When configured to be always visible, the RADIO TEST page is always visible from the top-level menu but the prompt TEST ALL disappears after take-off. Individual radio library and self-test functions are always accessible from the specific radio equipment.

Press [RADIO], [NEXT], [NEXT] (When only one RADIO top page is configured) OR
[RADIO], [NEXT], [NEXT], [NEXT]... (When more than one Radio top page is configured) OR
[RADIO], [RADIO], [RADIO]... (When the "Next Keys" is Configured to "Yes" in the "Display Config" maintenance page).

NOTE: The page number is based on the number of RADIO top page(s).

Unless accessed for the first time the page may display the results of radio test previously done. Pressing the corresponding LSK brings the radio test states to READY.

The RADIO TEST Y/X page provides the capability of initiating self-tests on the radios.



NOTE: The page layout can differ based on the radios equipment installed as well as the configured radio names

Toggle options for test status are READY, CONFIRM?, INIT, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT. Pressing for the third timerestores the display to READY.

VHF1 TEST [xL] and VHF2 TEST [xR]: Displays VHF test status & results.

VUF1 TEST [xL] and VUF2 TEST [xR]: Displays VUHF test status & results.

ATC1 TEST [xL] and ATC2 TEST [xR]: Displays ATC test status & results.

NAV1 TEST [xL] and NAV2 TEST [xR]: Displays NAV test status & results.

DME1 TEST [xL] and DME2 TEST [xR]: Displays DME test status & results.

Where x = 1, 2, 3, 4, or 5.

Other radios not shown in the figure that can be configured are:
DF, COM, ADF, VUHF.

TEST ALL [6R]: Executes the test (only available when the aircraft is on-ground) for all the listed radios on the RADIO TEST x/y pages. Pressing the LSK the first time causes CONFIRM? to appear besides each radio LSK. Pressing the LSK again cause the test to start. The status and test result appear beside each radio's LSK.

CLEAR ALL [6R]: Clears all test results (only available when the aircraft is on-ground).

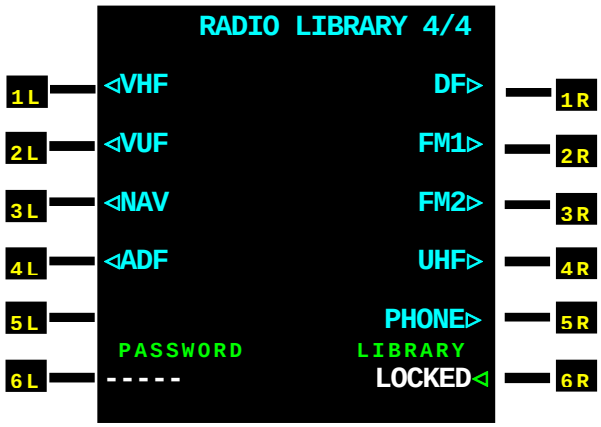
RADIO LIBRARY Y/X (2/Y or 3/Y or ...) PAGE

The RADIO LIBRARY pages are also configurable and only available while the aircraft is on the ground for preflight check and setup. After takeoff, they are not required anymore and are removed from the top-level menu. The RADIO page(s) numbering is then updated accordingly. Individual radio library and self-test functions are then accessible from the specific radio equipment. Hence, the RADIO page(s) numbering (X/Y) will vary depending on the number of radios installed, function configured, and phase of flight.

Press [RADIO], [NEXT] (When only one RADIO top page is configured) or,
[RADIO] [NEXT], [NEXT],(When more than one RADIO top page is configured).

The RADIO LIBRARY Y/X page provides capability to access the different radios library.

Entries are only allowed when the library is unlocked. If the library is locked, viewing and scrolling is still permitted.



NOTE: The page layout can differ based on the number of radios installed and on which line they are configured. There may be empty lines. The acronyms of some type of radios are configurable items.

VHF [1L]: Access to the VHF LIBRARY 1/N page.

VUF [2L]: Access to the VUF LIBRARY 1/N page.

NAV [3L]: Access to the NAV LIBRARY 1/N page.

ADF [4L]: Access to the ADF LIBRARY 1/N page.

DF [1R]: Access to the DF LIBRARY 1/N page.

FM1 [2R]: Access to the FM1 LIBRARY 1/N page.

FM2 [3R]: Access to the FM2 LIBRARY 1/N page.

UHF [4R]: Access to the UHF LIBRARY 1/N page.

PHONE [5R]: Access to the PHONE LIBRARY 1/N page.

PASSWORD [6L]: Unlocks the library pages to allow data entries. Enter the password in the scratchpad and press the sixth left line select key to unlock library. The password is changed by, entering the old password followed by a slash and the new password in the scratchpad (e.g. old password/new password). The range of the password is an integer value from 0 to 32767.

LIBRARY [6R]: Lock the library when it is unlocked by pressing [6R]. If the library is already locked pressing [6R] has no effect.

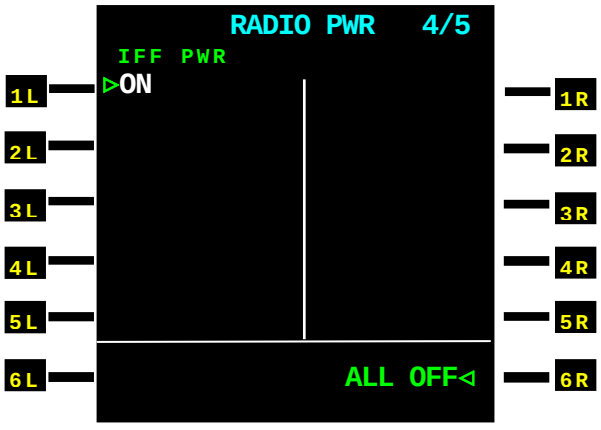
RADIO PWR X/Y (2/Y or 3/Y ...)

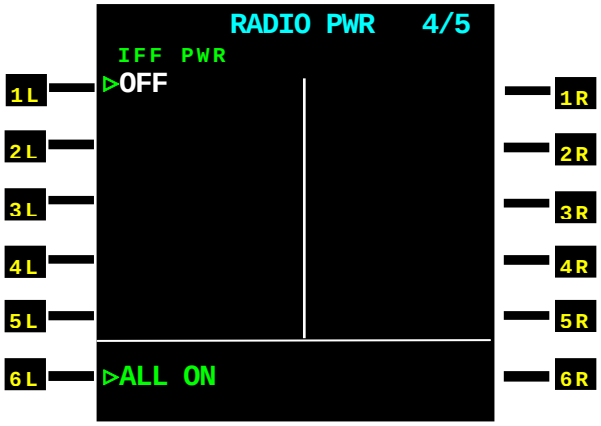
The RADIO PWR page provides the capability of controlling specific radio power state or all radio power states at once.
Display and access to the RADIO PWR page will only be available when at least one radio power control is configured and the aircraft is on the ground.

Press [RADIO], [NEXT] (When only one top RADIO page and no RADIO TEST page displayed) or,
[RADIO], [NEXT], [NEXT] (When only one top RADIO page and one RADIO TEST page displayed) or,
[RADIO], [NEXT], [NEXT], [NEXT] (When two top RADIO pages and one RADIO TEST page displayed) or,
[RADIO], [NEXT], [NEXT], [NEXT], [NEXT] (When two top RADIO pages and two RADIO TEST page are displayed) or,

NOTES:

- *If configured, pressing [RADIO] acts as if the [NEXT] key is pressed.*
- *The IFF, if configured, is the only radio that can be power controlled by the FMS.*
- *The page number is based on the number of RADIO top page(s) and RADIO TEST page(s).*





NOTE: The page layout can differ based on the radios equipment, configured radio names and assigned power control.

IFF PWR [1L]: Toggles IFF power status for the IFF transponder. The possible values are OFF or ON.

ALL ON [6L]: Provides the capability of setting the power status to ON for all the specific radios displayed in the RADIO PWR page.

NOTE: This prompt is not displayed when all the radios shown on the RADIO PWR page(s) are ON.

ALL OFF [6R]: Provides the capability of setting the power status to OFF for all the specific radios displayed in the RADIO PWR page.

NOTE: This prompt is not displayed when all the radios shown on the RADIO PWR page(s) are OFF.

NAVIGATION RADIOS (NAV DME RADIO)

NOTE: NAV Radio equipment name can be configured as "NAV", "VOR" or "VIR".

The FMS will support the following NAV and DME Radios in the frequency range and channel spacing specified below:

RADIO MODEL	FREQUENCY RANGE	CHANNEL SPACING	NOTE
BK DM-441B	108.00 – 117.95 MHz	50 KHz	-
RC DME-442	108.00 – 117.95 MHz	50 KHz	-
RC DME-4000	108.00 – 117.95 MHz	50 KHz	-
RC DME-42	108.00 – 117.95 MHz	50 KHz	-

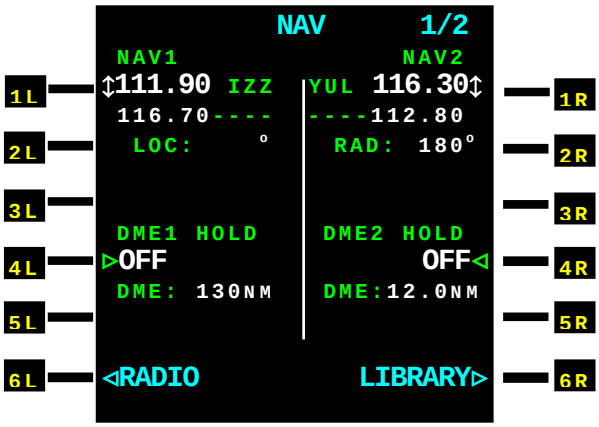
NOTE: The CMA-9000 FMS does not accept out of range values. An error message will appear in the scratchpad if invalid entries are made by the user. If the FMS has been disable for radio tuning via a discrete input, entries made to these radios will generate an error message "RADIO TUNING DISABLED" to inform the pilot that he may no longer tune this radio from the FMS.

NAVIGATION RADIOS (NAV Page 1/2)

This page allows the pilot to control the operation of the NAV and DME radios by transmitting and receiving digital labels capable of controlling up to 2 NAV and 2 DME radios.

Display the first NAV 1/2 page from the horizontal configuration by pressing [RADIO], <NAV#> or [RADIO], [NEXT], <NAV#> or [RADIO], [RADIO]*, <NAV#>.

Display the first NAV 1/2 page from the vertical configuration by pressing [RADIO], [NEXT], <NAV#> or [RADIO], <RADIO DETAILS>, <NAV#> or [RADIO], [RADIO]*, <NAV#>.



NOTE: NAV Radio equipment name can be configured as "NAV", "VOR" or "VIR". The case displayed above is the "NAV" configuration.

*NOTE: The NAV and DME ident suffix "**x**" (e.g. NAV, NAV1...) and the side (left or right) where the NAV/DME units appear is depending on the installation configuration.*
** The FMS can be configured so that pressing the RADIO key successively toggles through RADIO page Y/X.*

NAV1 [1L]: Display and modify active/standby NAV frequency, ident and preset of the NAV1 radio. If configured, the crew has the option to activate or deactivate the VOR auto-tuning mode. The crew may be presented to the right of the title of this prompt, the text "AUTO" or "MAN" (as a function of what has been configured) to highlight whether or not the VOR auto-tuning mode is activated or not.

Toggling between auto-tuning and manual tuning can be achieved by selecting and entering "DELETE" (press the [CLR] key) to the NAV1 standby frequency. Returning to manual tuning mode can alternately be achieved by swapping the active and standby NAV1 frequencies. Once the switch to automatic occurs the active frequency will be replaced by a frequency selected automatically and the manually entered frequency will be lost.

NOTE: ILS ident validation within the FMS occurs by referencing the Recommended Navaid embedded within the approach procedure since validation of the station's Morse code ident is not available to the FMS.

NAV2 [1R]: Same as above, but referencing NAV2 instead of NAV1.

NOTE: If the NAV function is set to MANUAL, the tuning selection indicator is disabled.

LOC/RAD [2L], [2R]: Depending on the active frequency, the following is displayed:
- NAV VOR radial when VOR frequency is tuned; or
- NAV LOCalizer course when a LOCalizer frequency is tuned.

DME HOLD [4L], [4R]: Toggles DME hold status for the DME radio (not applicable for the VIR-31). The possible values are OFF and ON. For the VIR-32/DME-42 radio installation, this field is used as a status field only which means it cannot be toggled.

DME [5L], [5R]: Displays the DME slant range when VOR or LOCalizer frequency is tuned.

NOTE:

- *When valid feedback is received, the DME distance field will show the slant range distance associated to the DME frequency in small white font. If no distance is received for an otherwise valid frequency (e.g. due to the station being out of range) this field will be blank. If the feedback from the DME receiver is not valid (e.g. fail condition), **** is displayed in the slant range field.*
- *When DME hold is set to ON the system transfers the active preset and frequency to the NAV HOLD slot and freezes the DME tuning to this frequency. After DME hold has been initiated the active preset and VOR/ILS frequency can be changed but this will not affect DME tuning.*
- *Modification of active and standby frequencies is as described for RADIO 1/N page.*
- *The standby frequencies are entered as stated for the RADIO 1/N page. However, the display is always large white font since there is no tuning done on the standby frequencies.*

RADIO [6L]: Access to the RADIO top level page where the NAV radio is located.

LIBRARY [6R]: Access to the NAV Library page.

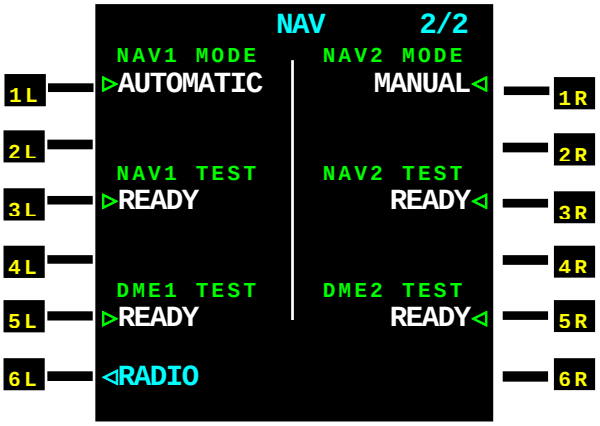
NAVIGATION RADIOS (NAV Page 2/2)

This page allows the pilot to control the operation of the NAV and DME radios by transmitting and receiving digital labels capable of controlling up to 2 NAV and 2 DME radios.

NOTE: This page is only displayed if VOR-auto-tuning or radio test is configured.

Display second NAV 2/2 page from the horizontal configuration by pressing [RADIO], <NAV#>, [NEXT] or [RADIO], [NEXT], <NAV#>, [NEXT] or [RADIO], [RADIO], <NAV#>, [NEXT].

Display second NAV 2/2 page from the vertical configuration by pressing [RADIO], [NEXT], <NAV#>, [NEXT] or [RADIO], <RADIO DETAILS>, <NAV#>, [NEXT] or [RADIO], [RADIO], <NAV#>, [NEXT].



*NOTE: The NAV and DME ident suffix "**x**" (e.g. NAV, NAV1...) and the side (left or right) where the NAV/DME units appear is depending on the installation configuration.*

NAV1 MODE [1L]: Toggles NAV1 mode status for the NAV radio. The possible values are AUTOMATIC or MANUAL.

NAV2 MODE [1R]: Same as above, but referencing NAV2 instead of NAV1.

NAV1 TEST [3L]: Toggles NAV1 test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

NAV2 TEST [3R]: Same as above, but referencing NAV2 instead of NAV1.

DME1 TEST [5L]: Toggles DME1 test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

DME2 TEST [5R]: Same as above, but referencing DME2 instead of DME1.

RADIO [6L]: Access to the RADIO top level page where the NAV radio is located.

NAVIGATION RADIOS (ADF RADIO)

The FMS will support the following ADF Radios in the frequency range and channel spacing specified below:

RADIO MODEL	FREQUENCY RANGE	CHANNEL SPACING	NOTE
RC ADF-462	190.0 to 1799.5 KHz 2179.0 to 2185.0 KHz	0.5 KHz	-
BK DF-431B	100.0 to 1899.0 KHz 2181.0 to 2183.0 KHz	0.5 KHz	See NOTE *

Figure 13-1 ADF Radio Models, Frequency Range and Channel Spacing

*NOTE: *The legal range is from 190.0 KHz to 1860.0 KHz but the radio can tune outside this range. The performance is not guaranteed for those frequencies. In addition the radio may tune from 2181.0 KHz to 2183.0 KHz for marine distress frequencies.*

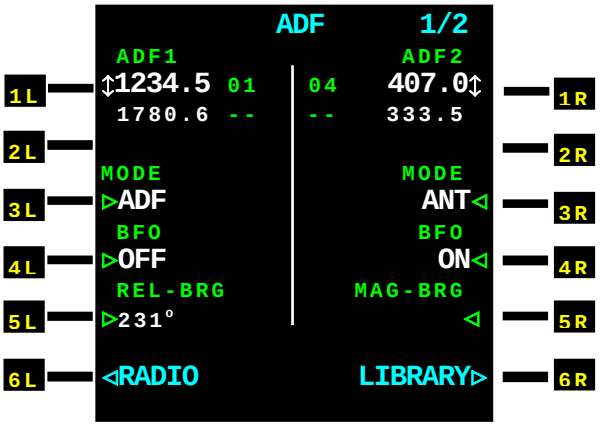
NOTE: The FMS does not accept out of range values. An error message will appear in the scratchpad if invalid entries are made by the user. If the ADF Frequency Source Selection discrete is set then entries made will generate an error message "RADIO TUNING DISABLED" to inform the pilot that he may no longer tune this radio from the FMS.

NAVIGATION RADIOS (ADF Page 1/2)

This page allows the pilot to control the operation of up to 2 ADF units.

Display the first ADF RADIO page from the horizontal configuration by pressing [RADIO], <ADF#> or [RADIO], [NEXT], <ADF#> or [RADIO], [RADIO], <ADF#>.

Display the second ADF RADIO page from the vertical configuration by pressing [RADIO], [NEXT], <ADF#> or [RADIO], <RADIO DETAILS>, <ADF#> or [RADIO], [RADIO], <ADF#>.



*NOTE: The ADF ident suffix "**x**" (e.g. ADF, ADF1...) and the side (left or right) where the ADF units appear are depending on the installation configuration. The tables below provide examples.*

ADF1 [1L]: Display and modify active/standby preset number and frequency of the ADF1 radio. Selecting LSK_1L when the scratchpad is empty will toggle the standby and the active preset/frequency.

ADF2 [1R]: Display and modify active/standby preset number and frequency of the ADF2 radio. Selecting LSK_1R when the scratchpad is empty will toggle the standby and the active preset/frequency.

MODE [3L,3R]: Displays mode status for the ADF radio. Pressing this softkey selects the next option. The possible values are ADF and ANT.

BFO [4L,4R]: Displays mode status for the ADF radio. Pressing this softkey selects the next option. The possible values are ON and OFF.

REL-BRG/MAG BRG/TRUE BRG [5L,5R]: Set and display of the ADF Bearing display mode and Bearing data. At power on, the FMS will display the last ADF Bearing display mode setting prior to the last FMS power interruption.

NOTE: The ADF does not provide bearing data while it's mode of operationis is set to "ANT".

RADIO [6L]: Access to the RADIO top level page where the ADF radio is located.

LIBRARY [6R]: Access to the ADF Library page.

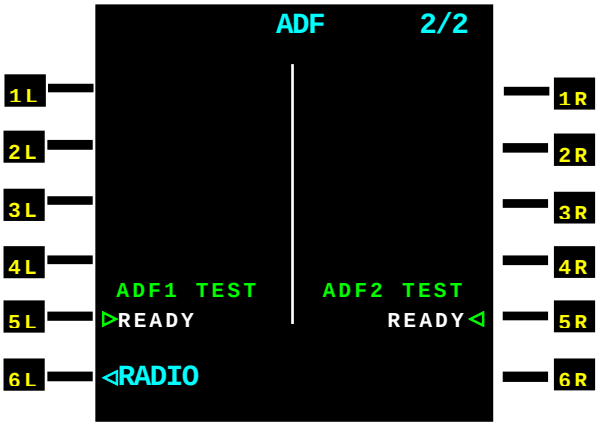
NAVIGATION RADIOS (ADF Page 2/2)

This page allows the pilot to control the operation of up to 2 ADF units.

NOTE: This page is only displayed if radio test is configured.

Display the second ADF RADIO page from the horizontal configuration by pressing [RADIO], <ADF#>, [NEXT] or [RADIO], [NEXT], <ADF#>, [NEXT] or [RADIO], [RADIO], <ADF#>, [NEXT].

Display the second ADF RADIO page from the vertical configuration by pressing [RADIO], [NEXT], <ADF#>, [NEXT] or [RADIO], <RADIO DETAILS>, <ADF#>, [NEXT] or [RADIO], [RADIO], <ADF#>, [NEXT].



*NOTE: The ADF ident suffix "**x**" (e.g. ADF, ADF1...) and the side (left or right) where the ADF units appear are depending on the installation configuration.*

ADF1 TEST [5L]: Toggles ADF1 test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

ADF2 TEST [5R]: Same as above, but referencing ADF2 instead of ADF1.

RADIO [6L]: Access to the RADIO top level page where the ADF radio is located.

NAVIGATION RADIOS (DF Page 1/1 or 1/2)

The FMS will support the following Rockwell-Collins radios:

- DF-430-102
- DF-935-12

In the frequency range and channel spacing specified below, in addition to ARGOS (401.650MHz) and COSPAS/SARSAT (406MHz) frequencies:

RADIO MODEL	FREQUENCY RANGE	CHANNEL SPACING	NOTE
DF-430-102	30.0 to 87.975 MHz 108.0 to 117.975 MHz 118.0 to 136.975 MHz 137.0 to 173.975 MHz 225.0 to 399.975 MHz Supports 401.650 MHz (ARGOS)	25 KHz	-
DF-430-102 and DF-935-12	Supports 406 Mhz band (COSPAS / SARSAT)	N/A	-

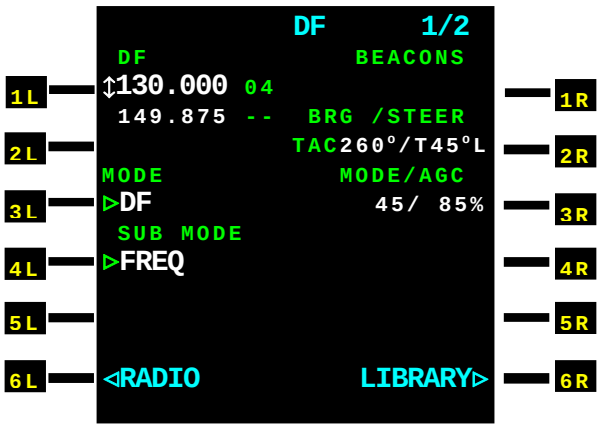
Figure 13-2 DF-1 - DF Frequency Range and Channel Spacing

NOTE: The FMS generates a warning message in the scratchpad whenever the user enters out of range values or invalid data.

NOTE: For COSPAS/SARSAT operation, please refer to the Tactical section (e.g. section 11).

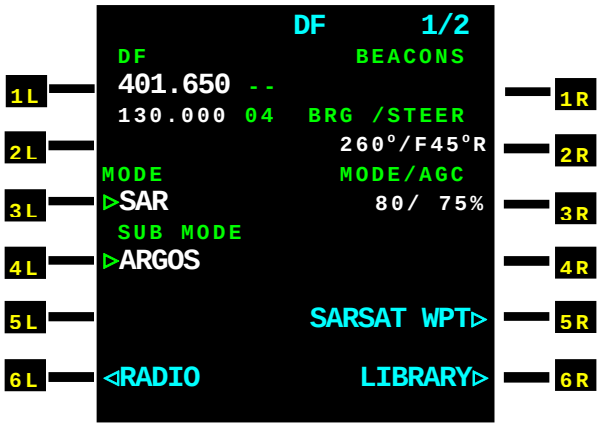
Display the first DF RADIO page from the horizontal configuration by pressing [RADIO], <DF#> or [RADIO], [NEXT], <DF#> or [RADIO], [RADIO], <DF#>.

A. DF is in DF mode and FREQ sub-mode. Tactical frequency is detected and data (bearing/steering/modulation/AGC) is available and displayed.

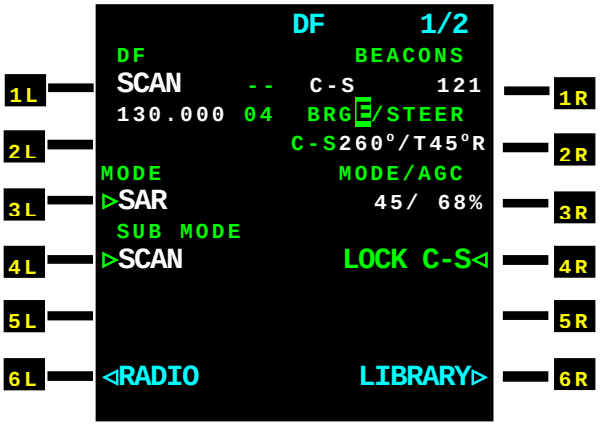


B. DF is in DF mode and FREQ sub-mode. Tactical frequency is not detected and the data is not available.

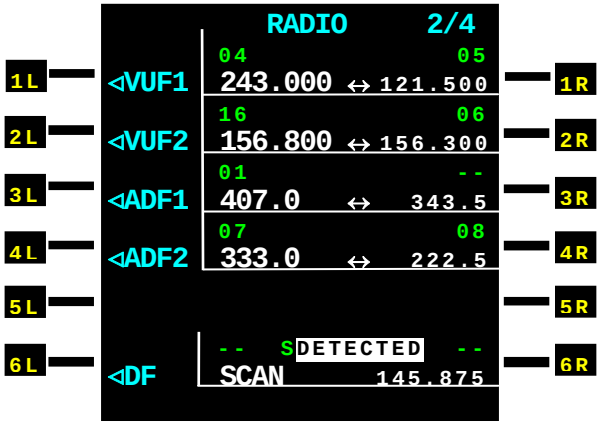
C. DF is in SAR mode and ARGOS sub-mode. ARGOS frequency is detected and data is available and displayed. 401.650 (ARGOS frequency) is displayed in the active frequency field. Frequency toggle prompt is not displayed in SAR mode. SARSAT WPT page prompt is displayed when at least one SARSAT wpt exists in the list.



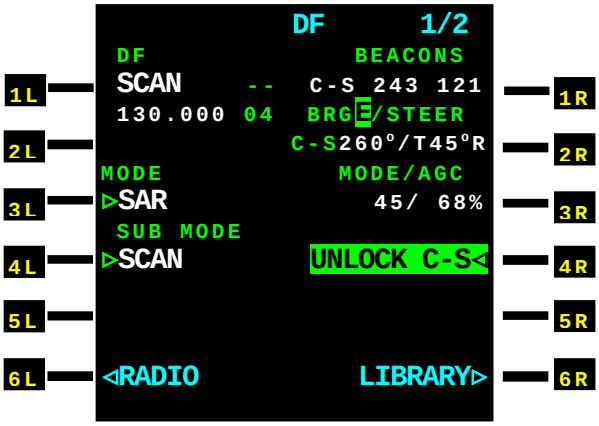
D. DF is in SAR mode and SCAN sub-mode. Multiple C-S beacons as well as 121.5MHz beacons detected. C-S data is available and displayed. LOCK C-S prompt is displayed since multiple beacons are detected. SCAN is displayed in the active frequency field. Frequency toggle prompt is not displayed in SAR mode.



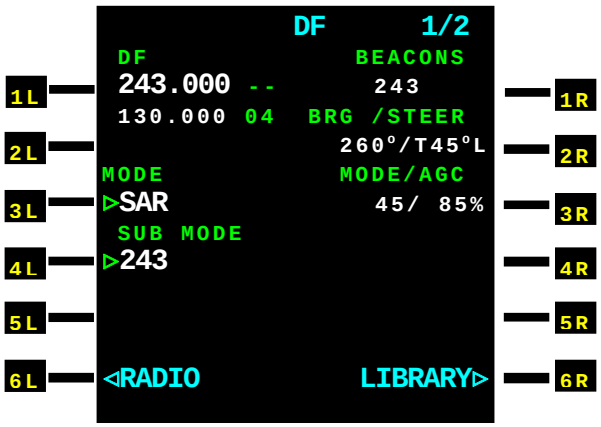
NOTE: When the SAR mode is active, the letter "S" will be seen in small green font on the RADIO X/Y page as shown just below.
When the SCAN sub-mode is active, the word "SCAN" is also seen on RADIO X/Y page shown just below.
When the DF is in a scanning mode (TAC SCAN or SAR SCAN) and a beacon is detected, the text "DETECTED" appears on the RADIO X/Y page.



E. DF is in SAR mode and SCAN sub-mode. Multiple C-S beacons as well as 121.5MHz and 243MHz beacons detected. C-S data is available and displayed. UNLOCK C-S prompt is displayed since the DF is currently synchronized with one of the C-S beacons. SCAN is displayed in the active frequency field. Frequency toggle prompt is not displayed in SAR mode.



F. DF is in SAR mode and 243 sub-mode. 243MHz beacon detected and data is displayed.



DF1 [1L]: Display and modify the active/standby DF frequency and preset.

BEACONS [1R]: Displays the types of detected beacons (C-S, 243 and 121).

BRG /STEER [2R]: Depending on the selected mode and sub-mode, the following is displayed:
- In any "DF" sub-mode, the bearing and steering, to the user defined tactical frequency, if tuned and available; or
- In "SAR SCAN" mode, the bearing and steering of detected C-S beacon(s), if available; or
- In all remaining "SAR" sub-modes, the bearing and steering of the selected detected beacon if detected and available.

NOTE: The FMS will display the letter "E" in reverse video green just to the right of the text "BRG" when the DF reports that it is estimating the bearing.
The bearing value will be preceded by a "T" (representing TO) or "F" (representing FROM).
The steering value will indicate "L" (left) or "R" (right) steering.

MODE [3L]: Toggles and display the next DF mode of operation. The possible values are "DF" and "SAR".

MOD/AGC [3R]: Depending on the selected mode and sub-mode, the following is displayed:
- In any "DF" sub-mode, the modulation and AGC (Automatic Gain Control) values of the beacon defined by the user's tactical frequency, if available; or
- In "SAR SCAN" mode, the modulation and AGC values of detected C-S beacon(s), if available; or
- In all remaining "SAR" sub-modes, the modulation and AGC values of the selected detected beacons(s) if available.

SUB MODE [4L]: Toggle and display the next available DF sub-mode of operation option. The possible values are "FREQ", "BUOY", "TAC SCAN", "121", "243", "C-S", "ARGOS" and "SCAN".

LOCK C-S/UNLOCK C-S [4R]: When the DF is in SAR SCAN mode and it detects multiple C-S beacons, an option to synchronize (or lock) with 1 of these beacons is provided. Once the bearing displayed is that of the beacon the operator wishes to follow, pressing the "LOCK C-S" prompt will instruct the DF radio to synchronize with that C-S beacon only.

SARSAT WPT[5R]: Access to the SARSAT WPT 1/2 page.

RADIO [6L]: Access to the RADIO top level page where the DF radio is located.

LIBRARY [6R]: Access to the DF Library 1/N page containing frequency presets.

NAVIGATION RADIOS (DF Page 2/2)

This page is only available when "DF TEST" is configured.

Display the first DF RADIO page from the horizontal configuration by pressing [RADIO], <DF>, [NEXT] or [RADIO], [NEXT], <DF>, [NEXT] or [RADIO], [RADIO], <DF>, [NEXT].

DF TEST [5L]: Display the DF test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

RADIO [6L]: Access to the RADIO top level page where the DF radio is located.

COMMUNICATION RADIOS (COM RADIO)

The FMS will support the following COM Radios in the frequency range and channel spacing specified below:

RADIO MODELS	CHANNEL RANGE	CHANNEL SPACING	NOTE
VC 401B	118.000 to 135.975	25 MHz	1
VC 401C	118.000 to 136.975	25 MHz	
VHF-422	118.000 to 151.975	25 MHz	
VHF-4000	118.000 to 136.990	8.33, 8.33/25 MHz	2,3
	118.000 to 151.990	8.33, 8.33/25 MHz	2,3

Figure 13-3 COM Radio Models, Channel Range and Channel Spacing

NOTE 1: The Channel range and spacing are configurable items.

NOTE2: The Channel Range and spacing is a configurable item. When 8.33 or 8.33_25 KHz channel spacing is configured, the ARINC Characteristic 716-11 "Airborne VHF Communications Transceiver" provides the frequency-channel pairing plan. The 8.33 KHz channel spaced frequencies are entered via their respective channel names instead of an actual frequency.

NOTE 3: 8.33 kHz spacing is not applicable to the Bendix King VC 401B radio.

NOTE: The FMS does not accept out of range values. An error message will appear in the scratchpad if invalid entries are made by the user. If the COM Frequency Source Selection discrete is set then entries made will generate an error message "RADIO TUNING DISABLED" to inform the pilot that he may no longer tune this radio from the FMS.

The COM VHF radio equipment name can also be configured as COM1/COM2, COM3/COM4 or VHF/VHF1.

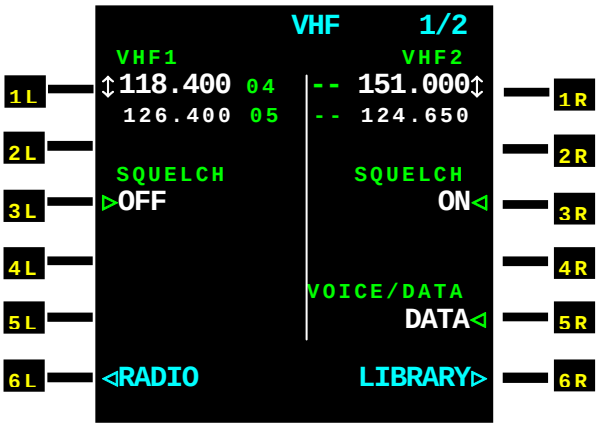
COMMUNICATION RADIOS (VHF RADIO Page 1/2)

This page allows the pilot to control the operation of the VHF radios by transmitting and receiving digital labels capable of controlling up to two VHF units.

This page allows the pilot to verify and modify the active and standby frequencies for the COM radios. It allows the pilot to control the operation of these radios.

Display the first VHF 1/2 page from the horizontal configuration by pressing [RADIO], <VHF#> or [RADIO], [NEXT], <VHF#> or [RADIO], [RADIO], <VHF#>.

Display the first VHF 1/2 page from the vertical configuration by pressing [RADIO], [NEXT], <VHF#> or [RADIO], <RADIO DETAILS>, <VHF#> or [RADIO], [RADIO], <VHF#>.



NOTE: The COM VHF radio equipment name can also be configured as "COM" or "VHF".

*The VHF ident suffix "**x**" (e.g. VHF, VHF1...) and the side (left or right) where the COM units appear is depending on the installation configuration. The tables below provide examples.*

VHF1 [1L]: Display and modify active/standby preset number and channel of the VHF1 radio. Selecting LSK 1L when the scratchpad is empty will toggle the standby and the active preset/frequency.

VHF2 [1R]: Same as above, but referencing VHF2 instead of VHF1 and LSK 2R instead of LSK 1L.

NOTE: It is possible to have "-" in one or both of the active and standby fields after FMS maintenance. Toggling is not allowed when "-" are present in the standby field. Then, a frequency needs to be entered in the standby field first before the active/standby field toggling is allowed, otherwise a warning message will be displayed in the scratchpad.

SQUELCH [3L]: When configured and for VHF-422 and VHF-4000 VHF radios only, toggles COM1 radio squelch status ON or OFF.

SQUELCH [3R]: Same as above, but referencing COM2 instead of COM1.

VOICE/DATA [5R]: When voice/data control is configured and for the VHF-422 and VHF-4000 VHF radios only, allows the crew to place the VHF radio in either the VOICE or DATA mode.

RADIO [6L]: Access to the RADIO top level page where the VHF radio is located.

LIBRARY [6R]: Access to the access to the VHF Library page.

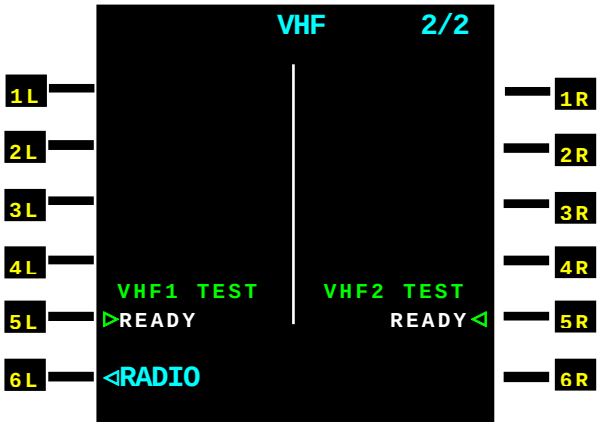
COMMUNICATION RADIOS (VHF RADIO Page 2/2)

This page allows the pilot to control the operation of the VHF radios by transmitting and receiving digital labels capable of controlling up to two VHF units.

NOTE: This page is only displayed if radio test is configured.

Display the second VHF 2/2 page from the horizontal configuration by pressing [RADIO], <VHF#>, [NEXT] or [RADIO], [NEXT], <VHF#>, [NEXT] or [RADIO], [RADIO], <VHF#>, [NEXT].

Display the second VHF 2/2 page from the vertical configuration by pressing [RADIO], [NEXT], <VHF#>, [NEXT] or [RADIO], <RADIO DETAILS>, <VHF#>, [NEXT] or [RADIO], [RADIO], <VHF#>, [NEXT].



NOTE: The COM VHF radio equipment name can also be configured as "COM" or "VHF".

*The VHF ident suffix "**x**" (e.g. VHF, VHF1...) and the side (left or right) where the COM units appear is depending on the installation configuration. The tables below provide examples.*

VHF1 TEST [5L]: Toggles VHF1 test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

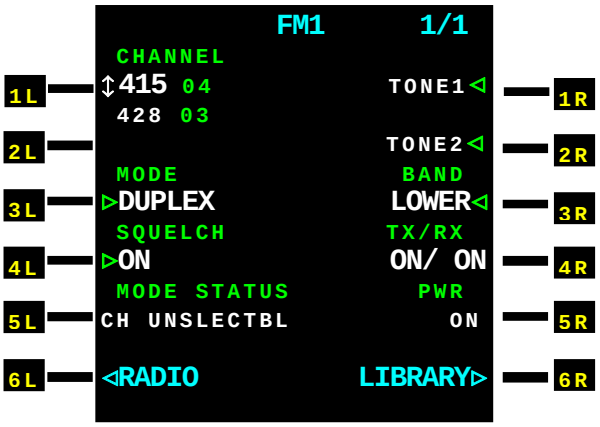
VHF2 TEST [5R]: Same as above, but referencing VHF2 instead of VHF1.

RADIO [6L]: Access to the RADIO top level page where the VHF radio is located.

COMMUNICATION RADIOS (RS-422 FM1 RADIO)

This page allows the pilot to control the operation of the FUG8 radio. The channel number is modified via scratchpad entry and then pressing [1L]. A channel entry can also be made via the FM1 library page.

Display the FM1 1/1 page by pressing [RADIO], [NEXT], <FM1>.



For all fields defined below, when a communication failure is detected with the radio, dashes are displayed in each field.

CHANNEL [1L]: Displays the active and standby preset and channel numbers for the FUG8 radio. Pressing the LSK when the scratchpad is empty will toggle the standby and active channels. The possible values are from 347 to 510.

MODE [3L]: Displays mode status for the FUG8 radio. Pressing this softkey selects the next option. The possible values are DUPLEX, SIMPLEX and RELAY.

SQUELCH [4L]: Displays squelch status for the FUG8 radio. Pressing this softkey selects the next option. The possible values are ON and OFF.

MODE STATUS [5L]: Displays FUG8 mode status. The possible values are OK, PARAM ERROR, H/W ERROR, PWR OFF and CH UNSLECTBL.

RADIO [6L]: Access to the RADIO top level page where the FM1 radio is located.

TONE 1 [1R]: Pressing this softkey activates the call tone 1 (1750 Hz). While this key is pressed, TONE 1 is displayed in inverse green large font.

TONE 2 [2R]: Pressing this softkey activates the call tone 2 (2135 Hz). While this key is pressed, TONE 2 is displayed in inverse green large font.

BAND [3R]: Displays band selected for the FUG8 radio. Pressing this softkey selects the next option. The possible values are UPPER and LOWER.

TX/RX (4R): Indicates the transmitter & receiver status (indicator only). Possible values are ON and blank.

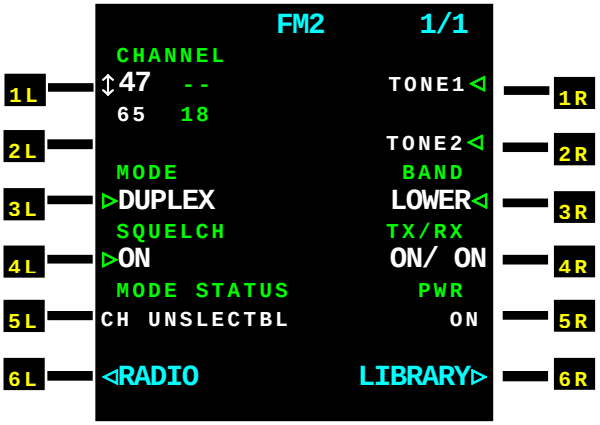
PWR (5R): Indicates the power status (indicator only). Possible values are ON and blank.

LIBRARY [6R]: Access to FM1 LIBRARY page (last page viewed).

COMMUNICATION RADIOS (RS-422 FM2 RADIO)

This page allows the pilot to control the operation of the FUG9 radio. The channel number is modified via scratchpad entry and then pressing [1L]. A channel entry can also be made via the FM2 library page.

Display the FM2 1/1 page by pressing [RADIO], [NEXT], <FM2>.



For all fields defined below, when a communication failure is detected with the radio, dashes are displayed in each field.

CHANNEL [1L]: Displays the active and standby preset and channel numbers for the FUG9 radio. Pressing the LSK when the scratchpad is empty will toggle the standby and active channels. The possible values are from 0 to 92.

MODE [3L]: Displays mode status for the FUG9 radio. Pressing this softkey selects the next option. The possible values are DUPLEX, SIMPLEX and RELAY.

SQUELCH [4L]: Displays squelch status for the FUG9 radio. Pressing this softkey selects the next option. The possible values are ON and OFF.

MODE STATUS [5L]: Displays FUG9 mode status. The possible values are OK, PARAM ERROR, H/W ERROR, PWR OFF and CH UNSLECTBL.

RADIO [6L]: Access to the RADIO top level page where the FM2 radio is located.

TONE 1 [1R]: Pressing this softkey activates the call tone 1 (1750 Hz). While this key is pressed, TONE 1 is displayed in inverse green large font.

TONE 2 [2R]: Pressing this softkey activates the call tone 2 (2135 Hz). While this key is pressed, TONE 2 is displayed in inverse green large font.

BAND [3R]: Displays band selected for the FUG9 radio. Pressing this softkey selects the next option. The possible values are UPPER and LOWER.

TX/RX (4R): Indicates the transmitter & receiver status (indicator only). Possible values are ON and blank.

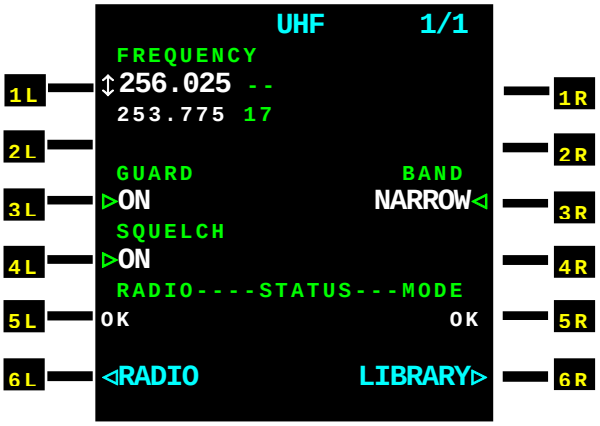
PWR (5R): Indicates the power status (indicator only). Possible values are ON and blank.

LIBRARY [6R]: Access to FM2 LIBRARY page (last page viewed).

COMMUNICATION RADIOS (RS-422 UHF RADIO)

This page allows the pilot to control the operation of the UHF radio. The frequency is modified via scratchpad entry and then pressing [1L]. A frequency entry can also be made via the UHF library page.

Display the UHF 1/1 page by pressing [RADIO], [NEXT], <UHF>.



For all fields defined below, when a communication failure is detected with the radio, dashes are displayed in each field.

FREQUENCY [1L]: Displays the active and standby preset numbers and frequencies of the UHF radio. Pressing the LSK when the scratchpad is empty will toggle the standby and active frequencies.

GUARD [3L]: Displays guard receiver status for the UHF radio. Pressing this softkey selects the next option. The possible values are ON and OFF.

SQUELCH [4L]: Displays squelch status for the UHF radio. Pressing this softkey selects the next option. The possible values are ON and OFF.

RADIO STATUS (5L): Displays UHF radio status. The possible values are OK and FAILPWR OFF.

RADIO [6L]: Access to RADIO top page.

BAND [3R]: Displays band selected for the UHF radio. Pressing this softkey selects the next option. The possible values are NARROW and WIDE.

MODE STATUS (5R): Displays UHF mode status. The possible values are OK, PARAM ERROR, H/W ERROR, PWR OFF and FQ UNSLECTBL.

LIBRARY [6R]: Access to UHF LIBRARY page (last page viewed).

COMMUNICATION RADIOS (VUHF RADIO)

The VUHF radio equipment name is COM, however it can also be configured as COM1/COM2 or COM3/COM4 or VUF/VUHF or VUF1/VUF2.

NOTE: *The case displayed in this section is the "VUF" configuration.*

The name "VUHF" is only be used in a single VUHF radio configuration.

The FMS supports the following VUHF Radios in the frequency ranges, channel spacing and modulations specified below:

Radio Model / Variant	Frequency / Channel Range (MHz)	Channel Spacing (KHz)	Band / Modulation	Emergency Guard Band Frequency (MHz)	Notes
SRT-651/N-A or SRT-651/N-F	30.000 – 87.975	25	VHF/FM	40.500	
	108.000 – 117.975	25	VHF/AM	121.500	1
	118.000 – 136.990	25 or 25/8.33	VHF/AM	121.500	2
	137.000 – 155.975	25	VHF/AM	121.500	
	156.000 – 173.975	25	VHF/FM	156.800	3
	225.000 – 399.975	25	UHF/AM/FM	243.000	
	400.000 – 469.975	25	UHF/FM	243.000	4

Figure 13-4: VUHF Radio Model, Frequency/Channel Range, Channel Spacing, Band/Modulation, and Emergency Guard Band Frequency

NOTE 1: The Channel Range and spacing are configurable items. If 8.33 MHz channel spacing is configured for the 118.000 - 136.990 MHz band, ICAO Annex 10 "channel" name and Frequency-Channel pairing applies. For requirement clarity, throughout this section the term "frequency" will be used to refer to all radio frequency and channel (ATC VHF) bands, except for the "MARITIME" band where the term "channel" will be used.

NOTE 2: The radio receives only.

NOTE 3: The MARITIME mode is only available if configured for certain V/UHF radios. Paired maritime channel, frequency, and simplex and half-duplex operation is given in the Maritime Channel - Frequency pairing Table found in this section.

NOTE 4: The upper UHF band (400.000 to 469.975 Mhz) is only available if configured on the SRT-651/N-A radio (this frequency range is not available for the SRT-651/N-F radio variant).

Channel Designator	Transmitting Frequencies (MHz)	
	Ship Stations	Coast Stations
60	156.025	160.625
01	156.050	160.650
61	156.075	160.675
02	156.100	160.700
62	156.125	160.725
03	156.150	160.750
63	156.175	160.775
04	156.200	160.800
64	156.225	160.825
05	156.250	160.850
65	156.275	160.875
06	156.300	156.300
66	156.325	160.925
07	156.350	160.950
67	156.375	156.375
08	156.400	156.400
68	156.425	156.425
09	156.450	156.450
69	156.475	156.475
10	156.500	156.500
70	156.525	156.525
11	156.550	156.550
71	156.575	156.575
12	156.600	156.600
72	156.625	156.625
13	156.650	156.650
73	156.675	156.675
14	156.700	156.700
74	156.725	156.725
15	156.750	156.750
75	156.775	156.775
16	156.800	156.800
76	156.825	156.825
17	156.850	156.850
77	156.875	156.875
18	156.900	161.500
78	156.925	161.525
19	156.950	161.550
79	156.975	161.575
20	157.000	161.600
80	157.025	161.625
21	157.050	161.650
81	157.075	161.675
22	157.100	161.700
82	157.125	161.725
23	157.150	161.750
83	157.175	161.775
24	157.200	161.800
84	157.225	161.825

Channel Designator	Transmitting Frequencies (MHz)	
	Ship Stations	Coast Stations
25	157.250	161.850
85	157.275	161.875
26	157.300	161.900
86	157.325	161.925
27	157.350	161.950
87	157.375	161.975
28	157.400	162.000
88	157.425	162.025

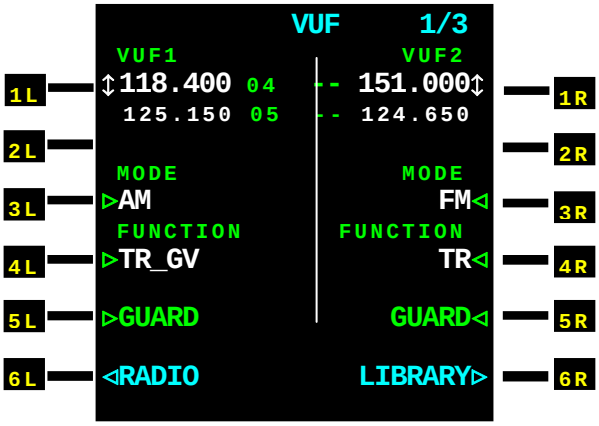
Figure 13-5: Maritime Channel-Frequency Pairing

COMMUNICATION RADIOS (VUF RADIO Page 1/3) – for SRT-651/N-A V/UHF radio

This page allows the pilot to control the operation of the VUHF radios by transmitting and receiving digital labels capable of controlling up to two SRT-651/N-A V/UHF radios.

Display the first VUF 1/3 page from the horizontal configuration by pressing [RADIO], <VUF#> or [RADIO], [NEXT], <VUF#> or [RADIO], [RADIO], <VUF#>.

Display the first VUF 1/3 page from the vertical configuration by pressing [RADIO], [NEXT], <VUF#> or [RADIO], <RADIO DETAILS>, <VUF#> or [RADIO], [RADIO], <VUF#>.



NOTE: The COM VUF radio equipment name can also be configured as "COM" or "VUF".

*The VUF ident suffix "**x**" (e.g. VUF, VUF1...) and the side (left or right) where the radio units appear is depending on the installation configuration. The tables below provide examples.*

NOTE: If single VUHF installed and configured name is VUF, then the display will show VUHF.

VUF1 [1L]: Display and modify the active/standby preset number and frequency/channel of the VUF1 radio. Entry from the keyboard is validated and then the frequency and preset/channel, if available, are placed in the standby field below the active field, otherwise an error message is displayed in the scratchpad. If the scratchpad is empty it toggles between active/standby identifiers. During the tuning process, the active frequency is displayed in large font inverse white color. If the tuning operation is not successful, the frequency is displayed in small font amber font color as a warning to the pilot. Preset and channel are displayed in small font green color.

VUF2 [1R]: Same as above, but referencing VUF2 instead of VUF1.

NOTE: It is possible to have "-" in one or both of the active and standby fields after FMS maintenance. Toggling is not allowed when "-" are present in the standby field. At that time, a frequency/channel needs to be entered in the standby field first before the active/standby field toggling is allowed, otherwise a warning message will be displayed in the scratchpad.

MODE [3L]/[3R]: Controlling the radio mode. The mode display in associated status field can be AM, FM and MARITIME.

"MARITIME" option is only available if "VUHF MARITIME BD" is configured and VUF function is set to TR or TR_G.

FUNCTION [4L]/[5R]: Toggles VUHF function options. The possible values are: TR, TR_GV, TR_GU or TR and TR_G depending on which option is configured.

GUARD [5L]/[5R]: Enable the Coast GUARD radio setting. It is used to set the VUHF active frequency to 243.000 MHz, mode to AM and function to TR. The active frequency/preset displayed prior to key press will be transferred in the standby position.

NOTE: When the GUARD key is pressed, GUARD is displayed in large inverse green font for 2 seconds.

RADIO [6L]: Access to the RADIO top level page where the VUFx radio is located.

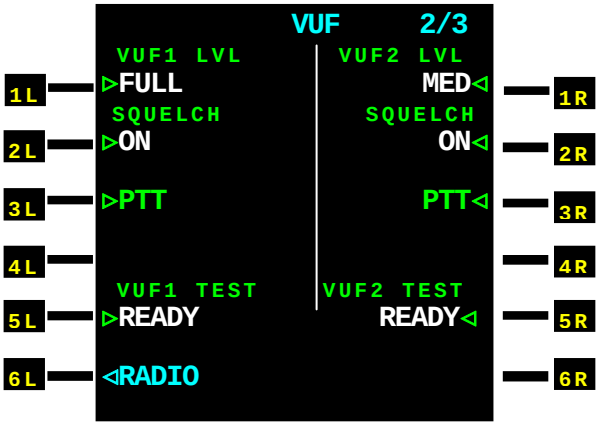
LIBRARY [6R]: Access the VUHF LIBRARY 1/N page.

COMMUNICATION RADIOS (VUF RADIO Page 2/3) – for SRT-651/N-A V/UHF radio

This page allows the pilot to control the operation of the VUHF radios by transmitting and receiving digital labels capable of controlling up to two SRT-651/N-A V/UHF radios.

Display the second VUF 2/3 page from the horizontal configuration by pressing [RADIO], <VUF#>, [NEXT] or [RADIO], [NEXT], <VUF#>, [NEXT] or [RADIO], [RADIO], <VUF#>, [NEXT].

Display the second VUF 2/3 page from the vertical configuration by pressing [RADIO], [NEXT], <VUF#>, [NEXT] or [RADIO], <RADIO DETAILS>, <VUF#>, [NEXT] or [RADIO], [RADIO], <VUF#>, [NEXT].



NOTE: The VUF suffix and the side where the VUF unit appears is the same as on the first VUF page.

NOTE: If single VUHF installed and configured name is VUF, then the display will show VUHF.

VUF1 LVL [1L]/[1R]: Toggle and display the next VUHF RF output power level, LOW, MED and FULL in large font white color. Otherwise the default VUF power level is displayed in small font white color.

SQUELCH [2L]/[2R]: Display squelch status for the VUHF radio. The possible values are OFF and ON.

PTT [3L]]/[3R]: Enable the PTT switch. The status field displays the enabling/disabling status in large font green color or large font inverse green while the line select key is "press and hold".

VUF1 TEST [5L]: Displays VUHF1 test status & results. Toggle options for test status are READY, CONFIRM?, INIT, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

VUF2 TEST [5R]: Displays VUHF2 test status & results. Toggle options for test status are READY, CONFIRM?, INIT, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

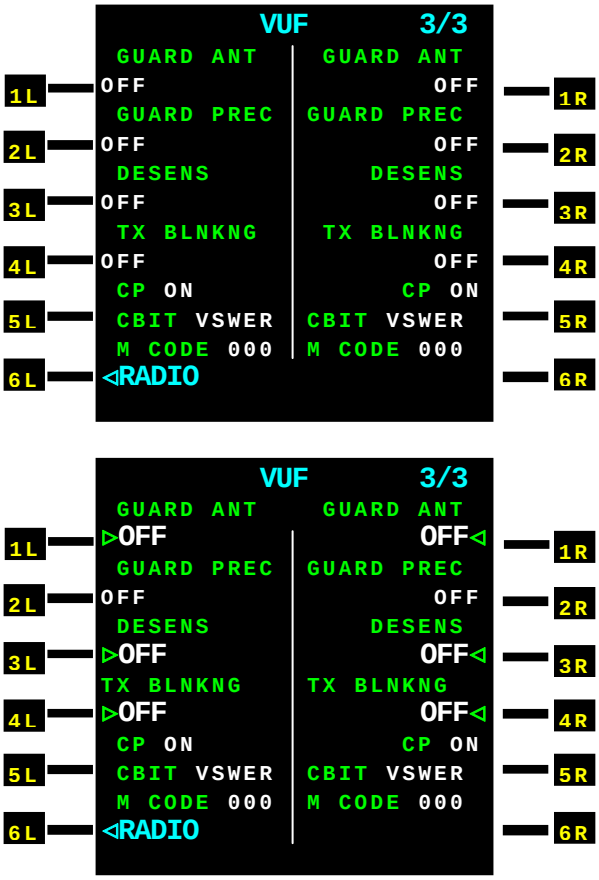
RADIO [6L]: Access to the RADIO top level page where the VUFx radio is located.

COMMUNICATION RADIOS (VUF RADIO Page 3/3) – for SRT-651/N-A V/UHF radio

This page allows the pilot to control the operation of the VUHF radios by transmitting and receiving digital labels capable of controlling up to two SRT-651/N-A V/UHF radios.

Display the third VUF 3/3 page from the horizontal configuration by pressing [RADIO], <VUF#>, [NEXT], [NEXT] or [RADIO], [NEXT], <VUF#>, [NEXT], [NEXT] or [RADIO], [RADIO], <VUF#>, [NEXT], [NEXT].

Display the third VUF 3/3 page from the vertical configuration by pressing [RADIO], [NEXT], <VUF#>, [NEXT], [NEXT] or [RADIO], <RADIO DETAILS>, <VUF#>, [NEXT], [NEXT] or [RADIO], [RADIO], <VUF#>, [NEXT], [NEXT].



NOTE: The VUF suffix and the side where the VUF unit appears is the same as on the first VUF page.

GUARD ANT [1L]/[1R]: Display/control current guard antenna selection status ON or OFF. When the VUHF STAT CTRL is configured to ENABLE, the GUARD ANT function option is displayed in large font white color with a caret in large font green color pointing inward; otherwise it is displayed in small font white color for the left and right side respectively.

GUARD PREC (2L)/(2R): Display current guard precedence mode state ON or OFF in small font white color.

DESENS (3L)/(3R): Display/control current desensitization mode state ON or OFF. When the VUHF STAT CTRL is configured to ENABLE, the GUARD ANT function option is displayed in large font white color with a caret in large font green color pointing inward; otherwise it is displayed in small font white color for the left and right side respectively.

TX BLNKNG (4L)/4R): Display/control current transmitted blanking mode state ON or OFF. When the VUHF STAT CTRL is configured to ENABLE, the GUARD ANT function option is displayed in large font white color with a caret in large font green color pointing inward; otherwise it is displayed in small font white color for the left and right side respectively.

CP, CBIT, M CODE [5L]/[5R]: The control panel prompt and status is only displayed if the control panel status received from the VUF radio is "ON", otherwise the field is blanked. "CP" is displayed in small font green color for the left and right side respectively.
The continuous bit "CBIT" prompt and status is only displayed if CBIT failures occur and are reported by the radio, otherwise the field is blanked. "CBIT" is displayed in small font green color and CBIT error codes is displayed in small font white color for the left and right side respectively.
The maintenance code prompt "M CODE" and status is only displayed if failures occur and are reported by the radio, otherwise the field is blanked. "M CODE" is displayed in small font green color and "M CODE" error codes is displayed in small font white color for the left and right side respectively.

RADIO [6L]: Access to the RADIO top level page where the VUF radio is located.

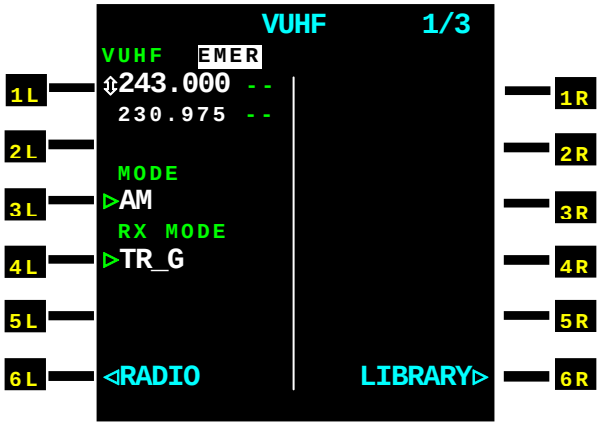
COMMUNICATION RADIOS (VUF RADIO Page 1/3) – for SRT-651/N-F V/UHF radio

This page allows the pilot to control the operation of the SRT-651/N-F VUHF radio.

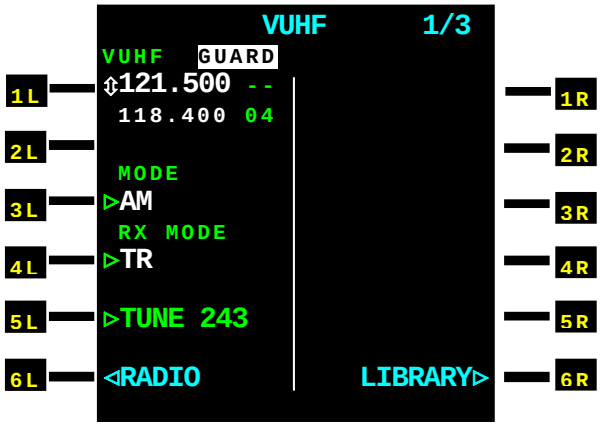
Display the first VUHF 1/3 page from the horizontal configuration by pressing [RADIO], <VUHF> (when the VUF radio is installed on the first RADIO top page) or [RADIO], [NEXT], <VUHF> (When the VUF radio is installed on the second RADIO top page) or [RADIO], [RADIO], <VUHF> (When the VUF radio is installed on the second RADIO top page and the "NEXT Keys" is set to "Yes" in the "DISPLAY CONFIG" maintenance page).

The next several pages will show various examples the VUHF page layout following activation/selection of several V/UHF functions.

Selection of TUNE 243 activates the 243 Emergency Guard Precedence:

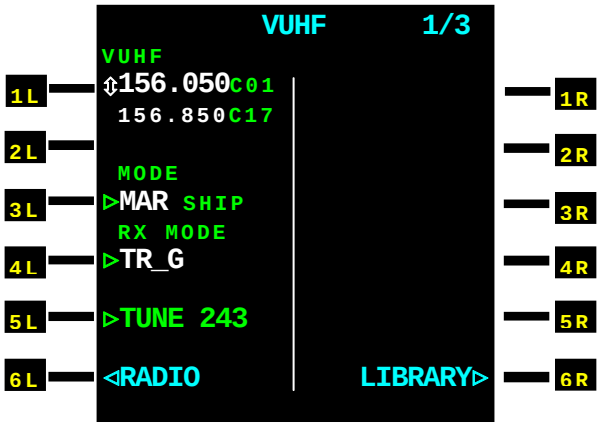


After TUNE GUARD is selected and prior active frequency was in the range 108.000-155.975 MHz:



A maritime band frequency is the active frequency and MAR TYPE is set to SHIP on VUHF page 2/3:

NOTE: for the maritime mode, MAR TYPE (on VUHF 2/3 and consequently on VUHF 1/3) will automatically be set as function of the entered maritime band frequency.



VUHF [1L]: Display and modify the active/standby preset number and frequency/channel of the VUHF radio. Entry from the keyboard is validated and then the frequency and preset/channel, if available, are placed in the standby field below the active field, otherwise an error message is displayed in the scratchpad. Preset and channel are displayed in small font green color. Maritime channel numbers are shown in the form CXX (where XX=the maritime channel number).
Additionally, guard and emergency 243 activation will be shown next to the text VUHF. To indicate activation of these, GUARD and EMER, respectively, will be displayed just next to the title text VUHF in inverse white font to inform the crew of the selection of these prompts.

NOTE:

- *It is possible to have dashes "-" in one or both of the active and standby fields after FMS maintenance. Toggling is not allowed when "-" are present in the standby field. At that time, a frequency/channel needs to be entered in the standby field first before the active/standby field toggling is allowed, otherwise a warning message will be displayed in the scratchpad.*
- *If a maritime channel is entered while in either MAR SHIP or MAR COAST, then this has no effect on the MAR TYPE setting (e.g. the existing setting is retained).*

TUNE GUARD [2L]: Selection of this prompt will tune the radio to emergency frequency corresponding to the currently active frequency band. That is, once this prompt is selected, the active frequency will be commanded to either 40.500, 121.500, 156.800 ("C16" will also be shown in preset field), or 243.000 MHz (see table of Figure 13-4), and the previously active frequency will be moved into the standby field. The receiver mode (RX MODE) will also change to TR and "GUARD" will be annunciated next to the text at LSK 1L/1R as well on the corresponding V/UHF radio's line on the top RADIO page (e.g. RADIO 1/X or 2/X).
Also, once this prompt is activated, the prompt itself is removed from view until the operator makes another V/UHF radio parameter selection which causes the guard state to no longer be maintained.
When TUNE 243 is activated this prompt is removed from view and unavailable for selection.

MODE [3L]: Possible options are AM, FM, MAR SHIP, and MAR COAST. Depending on the frequency field value entered, the mode displayed can be either AM or FM. The crew will need to toggle this prompt to enter a maritime channel based mode of operation.(e.g. MAR SHIP or MAR COAST).

The possible MODE options for the various frequency bands shown in the table shown of Figure 13-4 are described here:

- when the entered active frequency lies within a frequency range having only AM as a possible modulation, the MODE will change to "AM".
- when the entered active frequency lies within a frequency range having only FM as a possible modulation and is not a maritime band frequency having an associated maritime channel, the MODE will change to "FM"
- when the MODE is AM or FM, the crew may at any time toggle this prompt to enter the maritime mode.
- while in the maritime mode (MAR SHIP or MAR COAST), if the crew enters a frequency which exists in the table of figure 13-5, the FMS will automatically display the corresponding maritime channel and maritime type (SHIP or COAST) for the selected frequency; otherwise, if the frequency is not in the table, the FMS will set MODE to be that corresponding to the entered frequency's modulation.
- when the active frequency lies within a frequency range having either AM or FM, MODE will remain unchanged from its current setting.
- when entering the maritime mode, the VUHF LVL setting will only be LOW PWR or MED PWR.

RX MODE [4L]: Toggles and displays VUHF receiver mode options. The possible values are: TR, TR_G

TUNE 243 [5L]: Selection activates the emergency 243 guard precedence mode within the V/UHF radio. The FMS will then set the V/UHF control parameters as follows:

- active frequency will be set to 243.000
- the previously active frequency field content will be moved into the standby field
- mode will be set to AM
- receiver mode set to TR_G
- SQUELCH will be set OFF on VUHF page 2/2
- "EMER" will be annunciated next to the text at LSK 1L/1R as well on the corresponding V/UHF radio's line on the top RADIO page (e.g. RADIO 1/X or 2/X).
- the TUNE 243 prompt will be removed and only returns once emergency 243 is exitted

RADIO [6L]: Access to the RADIO top level page where the VUHF is located.

LIBRARY [6R]: Access the VUHF LIBRARY 1/N page.

COMMUNICATION RADIOS (VUHF RADIO Page 2/3) – for SRT-651/N-F V/UHF radio

This page allows the pilot to control the operation of the SRT-651/N-F VUHF radio.

Display the first VUHF 2/3 page from the horizontal configuration by pressing [RADIO], <VUHF> , [NEXT] (when the VUHF radio is installed on the first RADIO top page) or [RADIO], [NEXT], <VUHF> [NEXT] (when the VUHF radio is installed on the second RADIO top page) or [RADIO], [RADIO], <VUHF> [NEXT] (when the VUHF radio is installed on the second RADIO top page and the "Next Keys" is set to "Yes" in the "Display Config" maintenance page).

VUHF LVL [1L]: Toggle and display the next VUHF RF output power level, LOW PWR, MED PWR and FULL PWR in large font white color. In maritime mode, this option can only be set to either LOW PWR or MED PWR (will be changed to MED PWR if set to FULL PWR when entering maritime mode).

SQUELCH [2L]: Toggle and display the squelch status for the VUHF radio. The possible values are OFF and ON.

DF [3L]]: Toggle and display the Direction Finder (DF) status. Used to turn ON or OFF the Direction Finder mode within the V/UHF radio. The possible values are OFF and ON.
If the DF status is toggled to ON, the RX MODE is changed to display TR_G.

Any of the following conditions will cause the DF mode to automatically be set to OFF:

- activation of the TUNE GUARD function
- the DF mode is already ON and RX MODE is changed from TR_G to TR
- when the active frequency is changed to a frequency in the range 30.000 to 87.975 MHz

MAR TYPE [4L]: Toggle and display the maritime type. The possible values are: SHIP, COAST. While already in maritime mode, selecting this prompt will switch the active frequency to the corresponding 4.6 Mhz offset, if one exists for the given channel.

NOTE: that the selected MAR TYPE is shown at the MODE prompt at LSK 3L.
NOTE: If a maritime channel is entered while in either MAR SHIP or MAR COAST, then this has no effect on the MAR TYPE setting (e.g. the existing setting is retained).

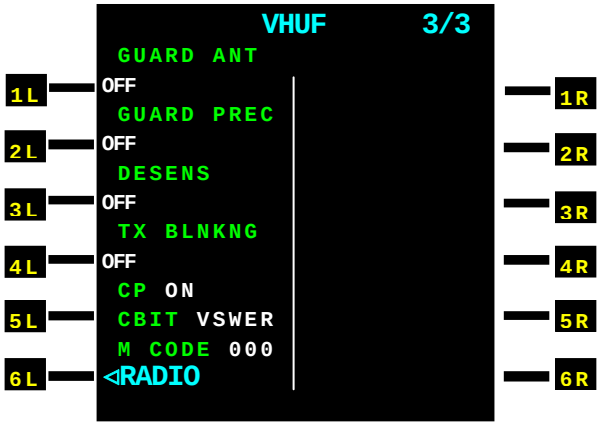
VUHF TEST [5L]: Displays VUHF1 test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Possible test results are: PASS or FAIL or TIMEOUT.

RADIO [6L]: Access to the RADIO top level page where the VUHF is located.

COMMUNICATION RADIOS (VUHF RADIO Page 3/3) – for SRT-651/N-F V/UHF radio

This page allows the pilot to control the operation of the SRT-651/N-F VUHF radio.

Display the first VUHF 3/3 page from the horizontal configuration by pressing [RADIO], <VUHF> , [NEXT], [NEXT] (when the VUHF radio is installed on the first RADIO top page) or [RADIO], [NEXT], <VUHF> [NEXT], [NEXT] (when the VUHF radio is installed on the second RADIO top page) or [RADIO], [RADIO], <VUHF> [NEXT] [NEXT] (when the VUHF radio is installed on the second RADIO top page and the "Next Keys" is set to "Yes" in the "Display Config" maintenance page).



GUARD ANT [1L]: Display current guard antenna selection status ON or OFF. When the VUHF STAT CTRL is configured to ENABLE, the GUARD ANT function option is displayed in large font white color with a caret in large font green color pointing inward; otherwise it is displayed in small font white color for the left and right side respectively.

GUARD PREC (2L): Display current guard precedence mode state ON or OFF in small font white color.

DESENS (3L): Display current desensitization mode state ON or OFF. When the VUHF STAT CTRL is configured to ENABLE, the GUARD ANT function option is displayed in large font white color with a caret in large font green color pointing inward; otherwise it is displayed in small font white color for the left and right side respectively.

TX BLNKNG (4L): Display current transmitted blanking mode state ON or OFF. When the VUHF STAT CTRL is configured to ENABLE, the GUARD ANT function option is displayed in large font white color with a caret in large font green color pointing inward; otherwise it is displayed in small font white color for the left and right side respectively.

CP, CBIT, M CODE [5L]: The control panel prompt and status is only displayed if the control panel status received from the VUHF radio is "ON", otherwise the field is blanked. "CP" is displayed in small font green color for the left and right side respectively.
The continuous bit "CBIT" prompt and status is only displayed if CBIT failures occur and are reported by the radio, otherwise the field is blanked. "CBIT" is displayed in small font green color and CBIT error codes is displayed in small font white color for the left and right side respectively.
The maintenance code prompt "M CODE" and status is only displayed if failures occur and are reported by the radio, otherwise the field is blanked. "M CODE" is displayed in small font green color and "M CODE" error codes is displayed in small font white color for the left and right side respectively.

RADIO [6L]: Access to the RADIO top level page where the VUHF radio is located.

COMMUNICATION RADIOS (HF RADIO)

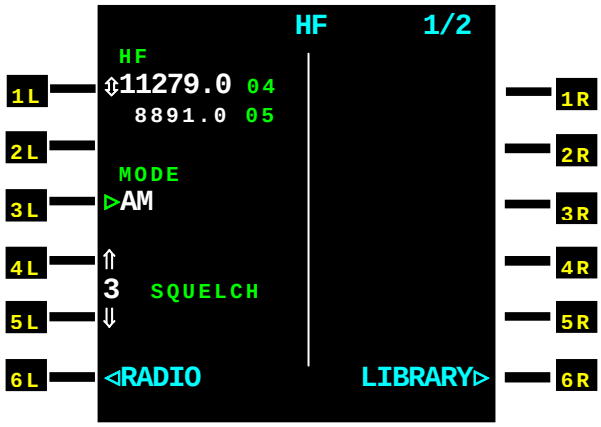
The CMA-9000 FMS also provides with the capability to tune HF radios.

FREQ BAND	LOWER LIMIT	UPPER LIMIT
HF	2000.0 KHz	29999.9 KHz

COMMUNICATION RADIOS (HF RADIO Page 1/2)

This page allows the pilot to control the operation of the HF radio by transmitting and receiving digital labels capable of controlling a single HF radio.

Display the first HF 1/2 page from the horizontal configuration by pressing [RADIO], <HF> (when the HF radio is installed on the first RADIO top page) or [RADIO], [NEXT], <HF> (when the HF radio is installed on the second RADIO top page) or [RADIO], [RADIO], <HF> (when the HF radio is installed on the second RADIO top page and the "Next Keys" is set to "Yes" in the "Display Config" maintenance page).



HF [1L]/[1R]: Display and modify the active/standby preset number and frequency/channel of the HF radio. Entry from the keyboard is validated and then the frequency and preset/channel, if available, are placed in the standby field below the active field, otherwise an error message is displayed in the scratchpad. If the scratchpad is empty it toggles between active/standby identifiers. During the tuning process, the active frequency is displayed in large font inverse white color. If the tuning operation is not successful, the frequency is displayed in small font amber font color as a warning to the pilot. Preset and channel are displayed in small font green color. Frequency entries are to be made in Khz.

MODE [3L]/[3R]: Allows selection and display of the HF mode of operation. The possible mode selections are "AM", "CW", "LSB" and "USB".

." ." [4L] / [4R] / ." ." [5L] / [5R]: Display and modify SQUELCH level (0 to 7). When the scratchpad is empty, the line select keys are used to increment/decrement the squelch level. When a valid squelch level is entered in the scratchpad and the line select key pressed, the squelch level is set to that new value.

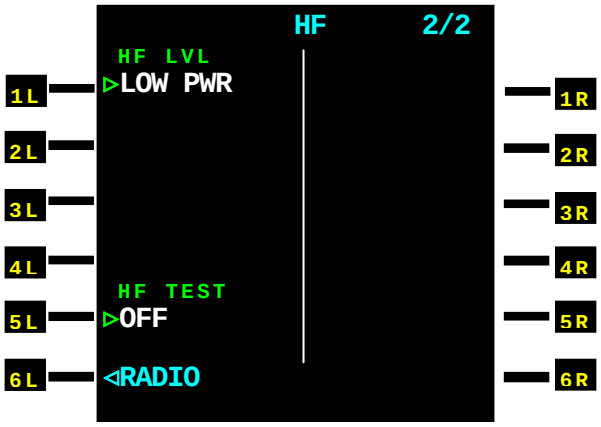
RADIO [6L]: Access to the RADIO top level page where the HF radio is located.

LIBRARY [6R]: Access the HF LIBRARY 1/N page.

COMMUNICATION RADIOS (HF RADIO Page 2/2)

This page allows the pilot to control the operation of the HF radio by transmitting and receiving digital labels capable of controlling a single HF radio.

Display the first HF 2/2 page from the horizontal configuration by pressing [RADIO], <HF>, [NEXT] (when the HF radio is installed on the second RADIO top page) or [RADIO], [NEXT], <HF>, [NEXT] (when the HF radio is installed on the second RADIO top page) or [RADIO], [RADIO], <HF>, [NEXT] (when the HF radio is installed on the second RADIO top page and the "Next Keys" is set to "Yes" in the "Display Config" maintenance page).



HF LVL [1L]/[1R]: Allows selection and display of the HF power settings. The possible power selections are "LOW PWR", "MED PWR" and "FULL PWR".

HF TEST [5L] / [5R]: Toggles HF test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT. This field will revert to the "READY" prompt if the HF self test is not confirmed within 5 seconds.

RADIO [6L]: Access to the RADIO top level page where the HF radio is located.

TRANSPONDERS (ATC RADIO)

The FMS supports the following ATC Radios in the code range and channel spacing specified below:

NOTE: ATC Radio equipment name can be configured as "ATC", "XPDR" or "TPDR".

RADIO MODEL	ATCRBS MODE A CODE RANGE (octal)	INCREMENT	NOTE
RC TDR 94D-005	0 to 7777	1	-
BK MST-67A	0 to 7777	1	-

Figure 13-6: ATC Radio Models, Air Traffic Control Radar Beacon System

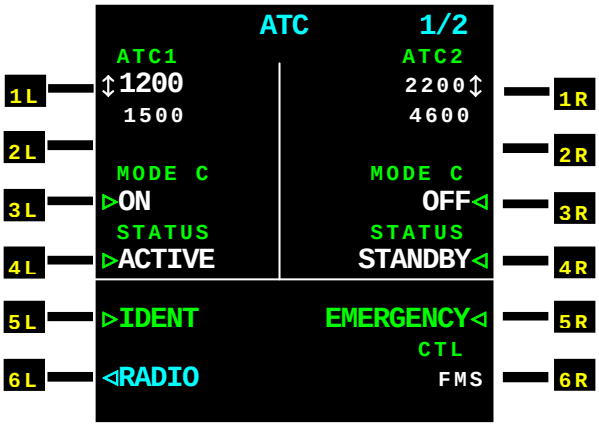
NOTE: The FMS does not accept out of range values. An error message will appear in the scratchpad if invalid entries are made by the user.

TRANSPONDERS (ATC Page 1/2)

This page allows the pilot to control the operation of the ATC radios by transmitting and receiving digital labels capable of controlling up to 2 ATC radios.

Display the first ATC RADIO 1/2 page from the horizontal configuration by pressing [RADIO], <ATC> or [RADIO], [NEXT], <ATC> or [RADIO], [RADIO], <ATC> or [ATC], [TPDR] or [XPDR].

Display the first ATC RADIO 1/2 page from the vertical configuration by pressing [RADIO], [NEXT], <ATC> or [RADIO], <RADIO DETAILS>, <ATC> or [RADIO], [RADIO], <ATC>.



NOTES: The ATC equipment name can also be configured as "TPDR" or "XPDR".

*The ATC ident suffix "**x**" (e.g. ATC, ATC1...) and the side (left or right) where the ATC units appear is depending on the installation configuration. The tables below provide examples.*

It is recommended to always install the ATC control/status on the first RADIO top page next to line select keys [5L]/ [5R].

The page title and acronym used must be identical to the Front panel Function Key acronym when implemented.

ATC1 [1L]: Displays and allows modification of the active and standby identity code for the ATC1 transponder. Enter identifier in scratchpad and press LSK 1L. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles between active/standby identifiers.

When a radio has been tuned to a new code from a remote control unit (RCU) and the radio is capable of providing tuning feedback, the new code is displayed in the active field and the current active code is moved in the standby field. This way, consistent setting is displayed on both control units.
The FMS displays a tuned active code in large font white color. During the tuning process, the active code is displayed in large font inverse white color. If the tuning operation is not successful, the code is displayed in small font amber color as a warning to the pilot. If an EMERGENCY request is made when this field already showing the active code in amber, then this field will change to show the active code in inverse video amber font.

For S/W 300V and higher:

When the ATC is transmitting the "IDENT" pulse (refer to 5L below), the following rules apply:

- entry of an ATC code in the standby field is allowed only for emergency codes
- toggling the standby/active code is allowed only if the standby code is an emergency code

For non-emergency ATC codes, the FMS will display an advisory message (!NO ENTRY ALLOWED) to inform the user that the FMS cannot accept the command.

ATC2 [1R]: Same as above, but referencing ATC2 instead of ATC1 and LSK 2R instead of LSK 1L.

NOTE: For ATC1 and ACT2 it is possible to have "-" in one or both of the active and standby fields after FMS maintenance. At that time, a code needs to be entered in the standby position first before the active/standby field toggling is allowed, otherwise a warning message will be displayed in the scratchpad.

MODE C [3L]: Toggles ATC1 SSR Mode C functions for the ATC radio. The possible values are ON and OFF.

MODE C [3R]: Same as above, but referencing ATC2 instead of ATC1.

NOTE: New code and setting are accepted when the radio is in "STANDBY" mode, but the tuning of the radio to the new code and/or setting will only occur when the radio status will be set to "ACTIVE"

STATUS1 [4L]: Displays the activity status of the ATC1 transponder. Pressing this softkey selects the next option. The possible values are ACTIVE and STANDBY. The STATUS1 is automatically switched to ACTIVE on a transition from ground to airborne and is automatically switched to STANDBY upon a transition from airborne to ground. Only one ATC unit can be active at a given time, therefore making one of them active will cause the other to become standby.

STATUS2 [4R]: Same as above, but referencing ATC2 instead of ATC1.

IDENT [5L]: Allow the crew to add the Special Position Identification "IDENT" pulse to the ATCRBS Mode A reply code on the ATC radio which is "ACTIVE". It is possible to re-initiate the "IDENT" at any time, including when it is already being transmitted.

EMERGENCY [5R]: Displayed in large font green when the configured emergency code is not 0000, otherwise the field is blank. Pressing this softkey transmits the configured emergency code to the ATC and sets the transponder status to active. Displayed in large font inverse green as long as the active code is an emergency code and the radio is active.

NOTE: Activation of emergency mode on ground will only be possible if the ATC ON GND configuration option on the A429 ATC CONFIG 1/2 page has been selected.

RADIO [6L]: Access to the RADIO top level page where the ATC transponder is located.

CTL [6R]: Available only when the transponder is configured to be controlled by either the FMS or an external Mission Computer, otherwise this field is blank. This field displays whether the FMS or the Mission Computer is in tuning control of the transponder. The crew can tune the transponder from the FMS only when the FMS is in control.

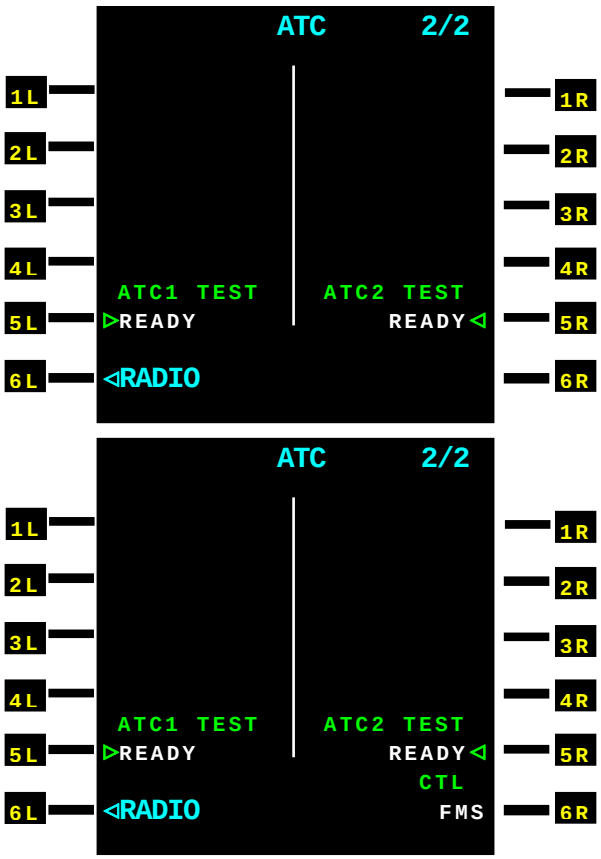
TRANSPONDERS (ATC Page 2/2)

This page allows the pilot to control the operation of the ATC radios by transmitting and receiving digital labels capable of controlling up to 2 ATC units.

NOTE: This page is only displayed if radio test is configured.

Display the second ATC RADIO page 1/2 from the horizontal configuration by pressing [RADIO], <ATC>, [NEXT] or [RADIO], [NEXT], <ATC>, [NEXT] or [RADIO], [RADIO], <ATC>, [NEXT] or [ATC] or [TPDR] or [XPDR], [NEXT].

Display the second ATC RADIO page 1/2 from the vertical configuration by pressing [RADIO], [NEXT], <ATC>, [NEXT] or [RADIO], <RADIO DETAILS>, <ATC>, [NEXT] or [RADIO], [RADIO], <ATC>, [NEXT].



NOTE: The ATC equipment name can also be configured as "TPDR" or "XPDR".

*The ATC ident suffix "**x**" (e.g. ATC, ATC1...) and the side (left or right) where the ATC units appear is depending on the installation configuration.*

ATC1 TEST [5L]: Toggles ATC1 test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

NOTE: In dual ATC installations, selecting either LSK 5L or LSK 5R initiates a self-test on ATC1 and ATC2 simultaneously.

ATC2 TEST [5R]: Same as above, but referencing ATC2 instead of ATC1.

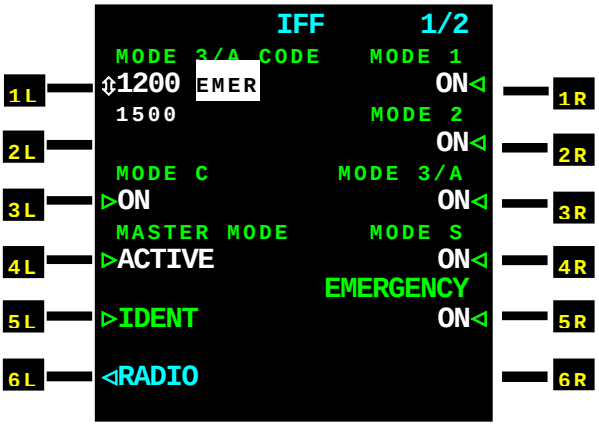
RADIO [6L]: Access to the RADIO top level page where the ATC transponder is located.

CTL [6R]: Available only when the transponder is configured to be controlled by either the FMS or an external Mission Computer, otherwise this field is blank. This field displays whether the FMS or the Mission Computer is in tuning control of the transponder. The crew can tune the transponder from the FMS only when the FMS is in control.

IFF TRANSPONDER 1/2

This page allows the pilot to control the operation of the IFF transponder by transmitting and receiving digital labels. Only single IFF installations are supported.

Display the first IFF 1/2 page from the horizontal configuration by pressing [RADIO], <IFF> or [RADIO], [NEXT], <IFF> or [RADIO], [RADIO], <IFF>.



MODE 3/A CODE [1L]: Displays and allows modification of the active and standby identity code for the IFF transponder. Enter identifier in scratchpad and press LSK1L. Entry may be made to the standby position only when a new value is in the scratchpad. If the scratchpad is empty it toggles between active/standby identifiers.
The FMS displays a tuned active code in large font white color. During the tuning process, the active code is displayed in large font inverse white color. If the tuning operation is not successful, the code is displayed in small font amber color as a warning to the pilot. If the transponder "IDENT" mode is active, the code is displayed in large font inverse green color.

New code and setting are accepted when the IFF master mode is in "STANDBY" or mode 3/A is "OFF", but the tuning of the IFF to the new code and/or setting will only occur when the IFF status will be set to "ACTIVE" and mode 3/A is "ON". The valid range for the MODE 3/A code is a 4 digit code 0000-7777 (where each digit ranges from 0 to 7, inclusive). AN "EMER" string is displayed in white inverse video when the EMERGENCY is set to "ON".

If the transponder "IDENT" mode is active, attempting to toggle the standby and active fields is not allowed; and attempting to enter a code in the standby field is not allowed and in both cases, the FMS generates an advisory message to inform the pilot that the FMS can not accept the command.

MODE C [3L]: Used to enable or disable the IFF transponder Mode C altitude code. The possible values are "ON" and "OFF".

MASTER MODE [4L]: Displays the current status of the IFF transponder master mode. Pressing this softkey selects the next option. The possible values are ACTIVE and STANDBY. The Master Mode can be controlled by an external switch.

IDENT [5L]: Allows the crew to add the Special Position Identification "IDENT" pulse to the IFF Mode 3/A reply. It is possible to re-initiate the "IDENT" period at any time, including those times during which it is already being transmitted.

The caret in large font green color pointing inward is displayed when the IFF MASTER MODE is "ACTIVE" and the MODE 3/A is "ON".

RADIO [6L]: Access to the RADIO top level page where the IFF transponder unit is located.

MODE 1 [1R]: Used to set/unset MODE 1 code transmission. The possible values are "ON" and "OFF". It will be possible to toggle between ON and OFF only if a valid mode 1 code exists.

MODE 2 [2R]: Used to set/unset MODE 2 code transmission. The possible values are "ON" and "OFF". It will be possible to toggle between ON and OFF only if a valid mode 2 code exists.

MODE 3/A [3R]: Used to set/unset MODE 3/A code transmission. The possible values are "ON" and "OFF".

MODE S [4R]: Used to set/unset MODE S code transmission. The possible values are "ON" and "OFF". It will be possible to toggle between ON and OFF only if a valid mode S code exists.

EMERGENCY [5R]: Used to set or unset the EMERGENCY transmission, the possible values are "ON" and "OFF". Setting this field to "ON" allows the crew to set the IFF master mode to "ACTIVE", Only for CIVIL emergency, display the "EMERGENCY CODE" that is configured on page A429 IFF CONFIG 1/1 on the active IFF transponder Mode 3/A code, and set the IFF transponder "PWR" to "ON".

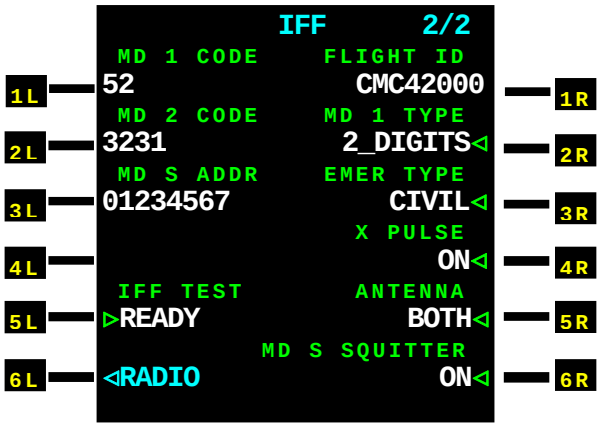
The EMERGENCY field will be set to "OFF" if the IFF transponder status is changed to "STANDBY", or the IFF EMERGENCY is set to "OFF", or the IFF power is set to "OFF, or, only for "CIVIL" emergency, the IFF transponder line select key [1L] is pressed (active and standby code toggle field)

NOTE: The selection between the "CIVIL" or "MILITARY" code is made on page IFF 2/2.

IFF TRANSPONDER 2/2

This page allows the pilot to control the operation of the IFF transponder by transmitting and receiving digital labels. Only single IFF installations are supported.

Display IFF 2/2 page from the horizontal configuration by pressing [RADIO], <IFF>, [NEXT] or [RADIO], [NEXT], <IFF>, [NEXT], or [RADIO], [RADIO], <IFF>, [NEXT].



MD 1 CODE [1L]: Used to display and set the two or four digit IFF Mode 1 code. The FMS displays a tuned active code in large font white color. During the tuning process, the active code is displayed in large font inverse white color. If the tuning operation is not successful, the code is displayed in small font amber color to indicate a tuning failure.
Valid range for 2 digit code 00-73 (where tens digit ranges from 0 to 7, inclusive, and the units digit ranges from 0 to 3, inclusive).
Valid range for 4 digit code 0000-7777 (where each digit ranges from 0 to 7, inclusive).

NOTE: New code and setting are accepted when the IFF master mode is in "STANDBY" or the mode 1 is "OFF", but the tuning of the IFF to the new code and/or setting will only occur when the IFF status will be set to "ACTIVE" and mode 1 is "ON".

MD 2 CODE [2L]: Used to display and set the four digit IFF Mode 2 code. The FMS displays a tuned active code in large font white color. During the tuning process, the active code is displayed in large font inverse white color. If the tuning operation is not successful, the code is displayed in small font amber color to indicate a tuning failure.
Valid range for 4 digit code 0000-7777 (where each digit ranges from 0 to 7, inclusive).

NOTE: New code and setting are accepted when the IFF master mode is in "STANDBY" or the mode 2 is "OFF", but the tuning of the IFF to the new code and/or setting will only occur when the IFF status will be set to "ACTIVE" and mode 2 is "ON".

MD S ADDR [3L]: Used to display and set the IFF mode S address... The FMS displays a tuned active code in large font white color. During the tuning process, the active code is displayed in large font inverse white color. If the tuning operation is not successful, the code is displayed in small font amber color to indicate a tuning failure.
Any 8-digit octal mode S address can be entered.
Valid range for 8 digit code 00000000-77777777 (where each digit ranges from 0 to 7, inclusive).

NOTE: New code and setting are accepted when the IFF master mode is in "STANDBY" or the mode S is "OFF", but the tuning of the IFF to the new code and/or setting will only occur when the IFF status will be set to "ACTIVE" and mode S is "ON".

IFF TEST [5L]: Toggles IFF test status & results. Toggle options for test status are READY, CONFIRM?, STARTED. Pressing LSK the first time causes CONFIRM? to appear the second press initiates the tests. Test result is: PASS or FAIL or TIMEOUT.

NOTE: With the IFF MASTER MODE set to ACTIVE, upon self-test activation, the IFF transponder will execute a more complete/extensive self-test that includes a transponder transmission test.

RADIO [6L]: Access to the RADIO top level page where the IFF transponder is located.

FLIGHT ID [1R]: Allows entry of the IFF transponder's mode S flight ID. This field could contain up to 8 alphanumeric characters.

NOTE: The flight ID seen on this page corresponds to the flight no seen on the RTE page, e.g. changing this field changes the value seen on the RTE page, and vice-versa.

MD 1 TYPE [2R]: Allows selection of the type of mode 1 code. Toggle options are 2_DIGITS or 4_DIGITS.

EMER TYPE [3R]: Allows selection of the emergency type. The emergency code corresponding to the selected type will be activated when EMERGENCY is selected on IFF page 1/2. Toggle options are CIVIL or MILITARY.

X PULSE [4R]: Allows to set or unset the IFF X PULSE transmission. Toggle options are ON or OFF.

ANTENNA [5R]: Allows user to control various IFF antenna options. Toggle options are TOP, BOTTOM, or BOTH.

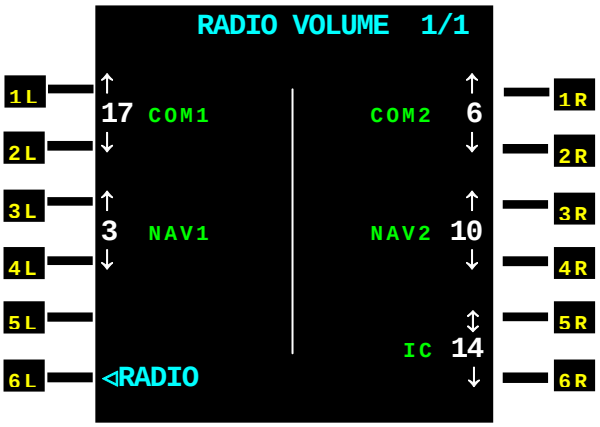
MD S SQUITTER [6R]: Allows to set or unset the IFF MODE-S squitter. Toggle options are ON or OFF.

RADIOS VOLUME 1/1 PAGE

The page is only available when the MC has failed and the FMS has taken the control of the volume levels.

Access to the RADIO VOLUME page is only available when the FMS has the control of the AMU.

Display RADIO VOLUME page 1/1 from the horizontal configuration by pressing [RADIO], <VOL> or [RADIO], [NEXT], <VOL> or [RADIO], [RADIO], <VOL>.



NOTE: Only the radio installed and for which the volume level can be controlled are displayed, except IC which is not a configurable equipment.

↑ **[1L]/[1R]/[3L]/[3R]/[5R]:** When the scratchpad is empty, the line select keys are used to decrement the selected radio volume level. When a valid volume level is entered in the scratchpad and the line select key pressed, the volume of the corresponding radio is set to that new value.
When the MC takes control of the volume levels while in the page, the volume levels will be displayed as status only, therefore their display will change from large font white color to small font white color. Furthermore, after exiting the page, access to the Radio Volume page from the RADIO top level page will not be available anymore.
During the tuning process, the radio volume level is displayed in large font inverse white color. If the tuning operation is not successful, the volume level is displayed in small font amber color as a warning to the pilot. Furthermore, the FMS will provide warnings if the AMU or radios fail or are not responding to the tuning request. The valid volume level range is between 0 and 20.

↓ **[2L]/[2R]/[4L]/[4R]/[6R]:** When the scratchpad is empty, the line select keys are used to increment the selected radio volume level. When a valid volume level is entered in the scratchpad and the line select key pressed, the volume of the corresponding radio is set to that new value.
When the MC takes control of the volume levels while in the page, the volume levels will be displayed as status only, therefore their display will change from large font white color to small font white color. Furthermore, after exiting the page, access to the Radio Volume page from the RADIO top level page will not be available anymore.
During the tuning process, the radio volume level is displayed in large font inverse white color. If the tuning operation is not successful, the volume level is displayed in small font amber color as a warning to the pilot. Furthermore, the FMS will provide warnings if the AMU or radios fail or are not responding to the tuning request. The valid volume level range is between 0 and 20.

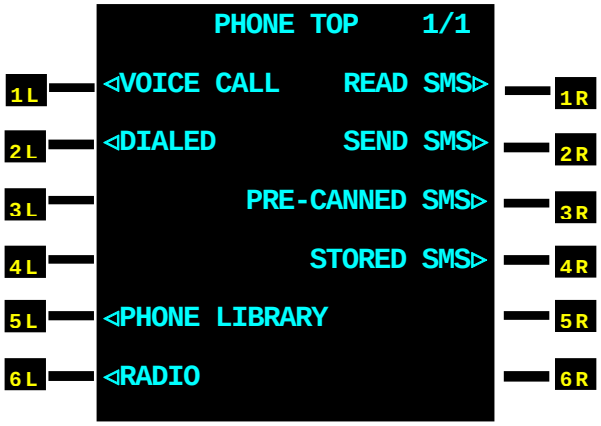
RADIO [6L]: Access to the RADIO top level page where the VOLUME is located.

PHONE TOP 1/1

This page allows the pilot to access phone sub pages. This is the top level entry page for the phone system (either HCS or Iridium).

Display PHONE TOP 1/1 page by pressing [RADIO], <PHONE>.

NOTE: The PHONE can only be configured in the "vertical"configuration option of the RADIO top page.



VOICE CALL [1L]: Access to PHONE: VOICE CALL page.

READ SMS [1R]: Access to PHONE: READ SMS page.

DIALED [2L]: Access to PHONE: DIALED TOP page.

SEND SMS [2R]: Access to PHONE: SEND SMS page.

PRE-CANNED SMS [3R]: Access to PHONE: PRE-CANNED SMS page.

STORED SMS [4R]: Access to PHONE: STORED SMS page.

PHONE LIBRARY [5L]: Access to PHONE: LIBRARY page.

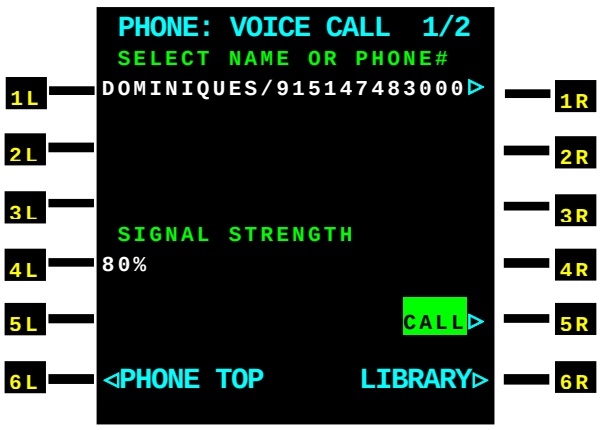
RADIO [6L]: Access to RADIO top page.

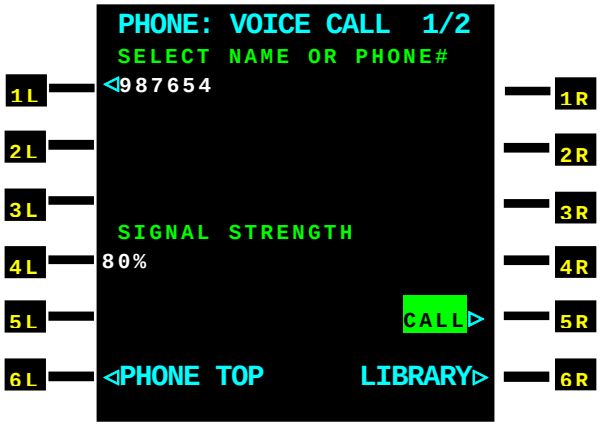
PHONE VOICE CALL 1/2

This page allows the pilot to transmit/receive Phone Voice Calls.

Display PHONE VOICE CALL 1/2 page by pressing [RADIO], <PHONE>, <VOICE CALL> (When the PHONE or HCS is configured)

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.





SELECT NAME OR PHONE# [1L]: Displays name and/or phone number. Pressing this soft key will transfer the content of the scratchpad to this field. If the scratchpad contains a phone number then only the phone number will appear. If the scratchpad contains a name (as specified in the Phone Library) then the name will appear followed by the associated phone number (separated by a slash "/" character). When name + phone number entered the priority is given to the name (e.g. only the name is considered and number is ignored).

NOTE: When a phone number or name/phone number exceed 24 characters, this LSK is also used to return to the display of the first 23 characters.
In the case where only a phone number is entered and the phone number is longer than 24 characters then extra digits can be added using the 2 characters "/-". Any digit after the 2 characters "/-" will be appended to the current phone number.
Valid characters for the name are any letters from A to Z and any digits from 0 to 9 and the character plus "+". The name must start with a letter.

SELECT NAME OR PHONE# [1R]: If the phone number or the name/phone number exceeds 24 characters, then it will be possible to see the extra characters by pressing this soft key. The display will scroll to show the extra characters.

SIGNAL STRENTGH [4L]: Displays the signal strength of the phone. (This field is only visible for the iridium phone configuration).

POWER [4R]: Turns the phone ON or OFF.
(This field is only visible for the GSM phone. Not applicable to Iridium configuration).

*NOTE: W*ill display dashes when communication is totally lost.

CALL [5R]: Initiates the phone call. This will transmit a DIAL command to the phone transceiver using the displayed phone number. When CALL is selected, the page PHONE VOICE CALL 2/2 is automatically displayed.
For the Iridium phone:

This prompt is blank if:

- No phone number has been entered, or
- The phone is not available (e.g. failed), or
- The call status is: RINGING, DIALING or CONNECTION ESTABLISHED (phone is busy).

For the GSM phone:

in S/W 300: This prompt is blank if:

- No phone number has been entered, or
- The phone is not available (e.g. failed), or
- The call status is: RINGING, DIALING or CONNECTION ESTABLISHED (phone is busy).

in S/W 300V and higher: This prompt is blank if:

- No phone number has been entered, or
- The phone is not available (e.g. failed).

PHONE TOP [6L]: Access to PHONE top page.

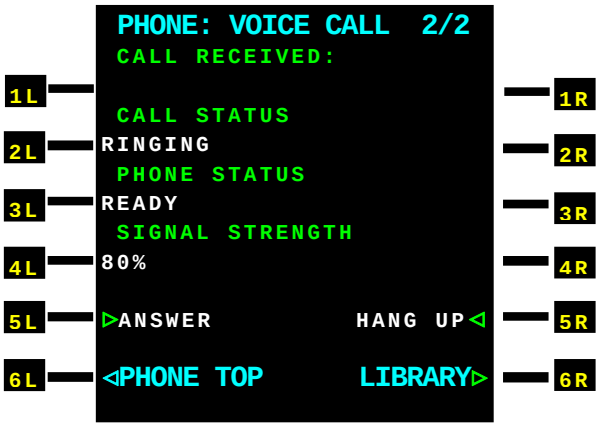
LIBRARY [6R]: Access to PHONE LIBRARY page.

PHONE VOICE CALL 2/2

This page allows the pilot to transmit/receive Phone Voice Calls.

Display PHONE VOICE CALL 2/2 page by pressing [RADIO], <PHONE>, <VOICE CALL> [NEXT] (When the PHONE or HCS is configured)

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.



CALLING: [1L]: Displays name and/or phone number called. This field is only displayed when the call is initiated from the FMS.

CALL RECEIVED: [1L]: Displays phone number of the caller (only if available). This field is only displayed when a call is received by the FMS.

CALL STATUS (2L): Displays the Call Status after a voice call command (dial/answer/hang up) has been initiated.

For the GSM phone, the possible values are CONNECTION IN PROGRESS, CONNECTION ESTABLISHED, DISCONNECTED, BUSY, PARAMETER ERROR, CONNECTION ERROR and GSM FAULT. Display is blank if no voice call command has been initiated in the last 10 seconds.

For the Iridium phone, the possible values are:
----------: when communication is totally lost with the phone
IDLE: when the phone is working and in idle (no call tx, no call rx)
DIALING: when the FMS is calling someone
RINGING: when the phone receives a call from the network
CONNECTION ESTABLISHED: when the call is in progress
NO DIALTONE: when FMS initiates a call and the phone returns the message NO DIAL TONE
NO ANSWER: when FMS initiates a call and the phone returns the message NO ANSWER
NO CARRIER: when FMS initiates a call and the phone returns the message NO CARRIER
BUSY: when FMS initiates a call and the phone returns the message BUSY
ERROR: when FMS initiates a call and the phone returns an error message.

PHONE STATUS (3L): Displays the phone status.
For the GSM phone, the possible values are: CONNECTION ACTIVE, CONNECTION NOT ACTIVE, INCOMING CALL and GSM FAULT.
For the iridium phone, the possible values are: ----------, READY, UNAVAILABLE, UNKNOWN, RINGING, IN PROGRESS.

NOTE: Will display dashes when communication is totally lost.

SIGNAL STRENGTH [4L]: Displays the signal strength of the phone. This field is only visible for the iridium phone configuration.

POWER [4R]: (not shown on figure) Turns the phone ON or OFF. Only applicable to GSM phone. Not applicable to Iridium configuration.

NOTE: Will display dashes when communication is totally lost.

ANSWER [5L]: Transmits an ANSWER command to the phone transceiver. When ANSWER is selected, it is displayed in inverse green large font for 2 seconds.
For the Iridium phone: This prompt is displayed only when there is a received call, otherwise it is blank.

For the GSM phone:
in S/W 300: This prompt is displayed only when there is a received call, otherwise it is blank.
in S/W 300V and higher: This prompt is blank only if the phone is not available (e.g. failed).

HANG UP [5R]: Transmits a HANGUP command to the phone transceiver. When HANG UP is selected, it is displayed in inverse green large font for 2 seconds.
For the Iridium phone: This prompt is displayed only when the phone is in ringing state or a call is established, otherwise it is blank.

For the GSM phone:
in S/W 300: This prompt is displayed only when the phone is in ringing state or a call is established, otherwise it is blank.
in S/W 300V and higher: This prompt is blank only if the phone is not available (e.g. failed).

PHONE TOP [6L]: Access to PHONE top page.

LIBRARY [6R]: Access to PHONE LIBRARY page.

PHONE READ SMS 1/N

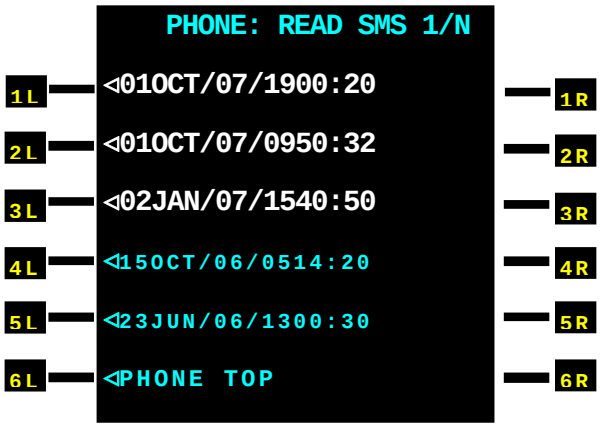
This page provides the pilot with access to incoming SMS text messages received from the Phone. The incoming messages are listed in order of age (most recent message on top). The messages are assigned a name which includes its time of reception of the format selected on the CONFIG->DISPLAY->DATE selection. For example (ddmmmyy/hhmm: ss or mmmdd/yy/hhm : ss where, mmm =month alpha, dd =day, yy =year, hh =hours, mm =minutes and ss =seconds).

NOTE: That if time is UTC a small z is added after the seconds to indicate Zulu time.

Only the most recent 35 incoming messages are listed, older ones (read and unread) are automatically deleted. New messages appear in white large font until they are read. Messages that have already been opened are displayed in small blue font.

Display PHONE READ SMS 1/N page by pressing [RADIO], <PHONE>, <READ SMS> (When the PHONE or HCS is configured)

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.



ddMM/yy/hhmm : ss **[1L..5L]:** Access to PHONE: SMS MESSAGE 1/1 to display a received SMS text message. The most recently received SMS text message is displayed at [1L] and the oldest received one is displayed at [5L].

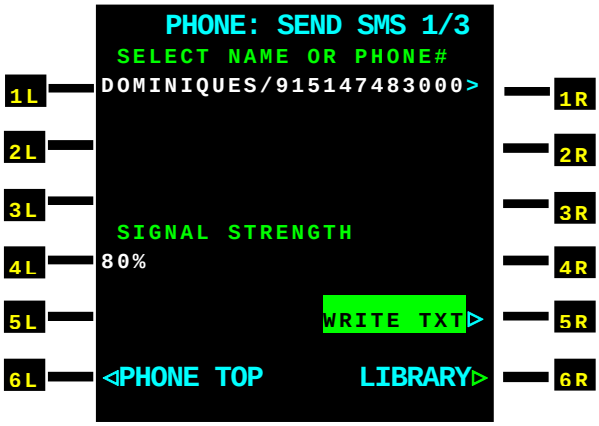
PHONE TOP [6L]: Access to PHONE top page.

PHONE SEND SMS 1/3

This page allows the pilot to select the person to whom the SMS is for.

Display PHONE SEND SMS 1/3 page by pressing [RADIO], <PHONE>, <SEND SMS>. (When the PHONE or HCS is configured)

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.



SELECT NAME OR PHONE# [1L]: Displays name and phone number.
For the Iridium phone:

Pressing this softkey will transfer the content of the scratchpad to this field. If the scratchpad contains a phone number then only the phone number will appear. If the scratchpad contains a name (as specified in the Phone Library) then the name will appear followed by the associated phone number. When a name & phone number exceed 24 characters, this LSK is also used to return to the display of the first 23 characters.
If the phone number to enter is longer than 24 characters then extra digits can be added using the characters /-. Any digit after the characters /- will be appended to the current phone number.
The value is always kept and is reset (e.g. dashes) by a cold start on-ground.

For the GSM phone:

in S/W 300:

Pressing this softkey will transfer the content of the scratchpad to this field. If the scratchpad contains a phone number then only the phone number will appear. If the scratchpad contains a name (as specified in the Phone Library) then the name will appear followed by the associated phone number. When a name & phone number exceed 24 characters, this LSK is also used to return to the display of the first 23 characters.
If the phone number to enter is longer than 24 characters then extra digits can be added using the characters /-. Any digit after the characters /- will be appended to the current phone number.
The value is always kept and is reset (e.g. dashes) by a cold start on-ground.

in S/W 300V:

This field always shows "GROUND STATION" and doesn't accept a user entry.

SELECT NAME OR PHONE# [1R]: If the phone number & name exceeds 24 characters, then it will be possible to see the extra characters by pressing this softkey. The display will scroll to show the extra characters.

SIGNAL STRENTGH [4L]: Displays the signal strength of the phone. This field is only visible for the iridium phone configuration.

POWER [4R]: (not shown on figure) Turns the phone ON or OFF. Only applicable to GSM phone. Not applicable to Iridium configuration.

NOTE: Will display dashes when communication is totally lost.

WRITE TXT [5R]: Goes into text editing mode. When WRITE TXT is selected, the page 2/3 is automatically displayed.
The default is blank. The prompt is displayed only when a name/phone number has been entered (on line 1L). This prompt is blank if:

- No phone number has been entered, or
- The phone is not available (e.g. failed)

PHONE TOP [6L]: Access to PHONE top page.

LIBRARY [6R]: Access to PHONE LIBRARY page.

PHONE SEND SMS 2/3

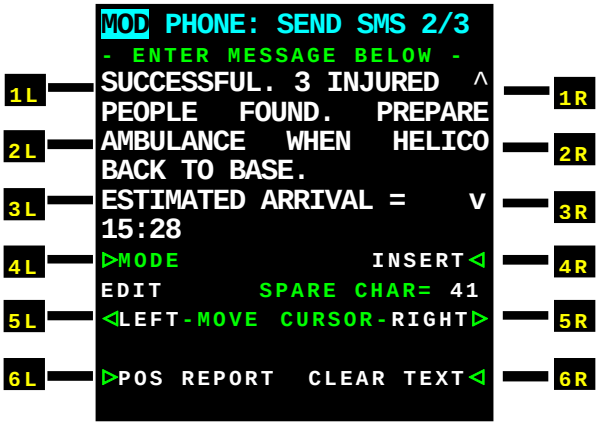
This page allows the pilot to edit the SMS text message and then subsequently transmit the message. The basic editing features are available on this page, such as: move cursor right, left, up, down, insert and overwrite edit mode, copy a text line. 6 lines of text are displayed at a time. The pilot can use [NEXT] and [PREV] to move the cursor up and down to scroll through the entire text message. An auto wrap feature will break lines between words for readability.

Display PHONE SEND SMS 2/3 page by pressing [RADIO], <PHONE>, <SEND SMS> (When the PHONE or HCS is configured),or <WRITE TXT> [RADIO], <PHONE>, <SEND SMS> (When the PHONE or HCS is configured), [NEXT].

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.

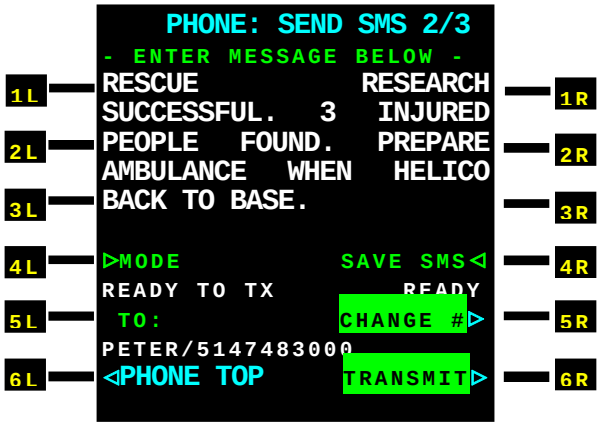
This page is displayed as follows when text with more than 6 lines entered (note up and down cursors appearing in the last column of the editor):

*NOTE: When operating in EDIT mode, **MOD** is displayed in the upper left corner of the page.*



This page is displayed as follows once the SMS text message has been edited and is ready to be transmitted (READY TO TRANSMIT mode):

NOTE: The message to be transmitted can only contain a maximum of 160 alphanumeric characters.



[1L], [2L], [3L]: When operating in EDIT mode, if the scratchpad is empty, pressing these softkeys will transfer the entire text line from the line directly associated with the softkey to the scratchpad. If the scratchpad contains any text, then the system will copy that text into the line directly associated with the softkey and place the cursor at the end of this line. In overwrite mode, the text at this line is replaced by the scratchpad text. In insert mode, the scratchpad text is inserted on this line and the text below this line is pushed down one line.

[1R], [2R], [3R]: When operating in EDIT mode, if the scratchpad is empty, pressing these softkeys will transfer the entire text line from the line just below the softkey to the scratchpad. If the scratchpad contains any text, then the system will copy that text into the line just below the softkey and place the cursor at the end of this line. In overwrite mode, the text at this line is replaced by the scratchpad text. In insert mode, the scratchpad text is inserted on this line and the text below this line is pushed down one line.

[1R] [3R]: When operating in EDIT mode and when the message text contains more than 6 lines up and down cursors appear at position 1R and 3R to allow scrolling window movement. The 1R prompt will move the window one line up and the 3R prompt will move the window one line down.

MODE [4L]: Toggle between EDIT and READY TO TX. The default value when coming from the SEND SMS 1/3 page via the LSK WRITE TXT is EDIT. When operating in EDIT mode, pressing this key exit the EDIT mode and goes to READY TO TX mode.

INSERT [4R]: When operating in EDIT mode, pressing this key controls the text entry mode by toggling between INSERT and OVERWRITE entry mode.

NOTE: When OVERWRITE mode is selected, the cursor is displayed in inverse green video.

SPARE CHAR= (4R): When operating in EDIT mode, this field displays the number of spare characters available.
For the Iridium phone: The maximum number of spare characters is 160.

For the GSM phone:
in S/W 300: The maximum number of spare characters is 160.
in S/W 300V and higher: The maximum number of spare characters is 66.

SAVE SMS [4R]: This prompt is only available in READY TO TX mode. The default value is READY. When pressed, the text is saved in the first available slot. Each subsequent press will "push" the older message saved to the slot n+1 (queue principle). If more than 10 messages were already saved, the last one will be completely lost. Also, once saved, the prompt changes to SAVED. If the mode goes back to edit then the prompt toggles to READY.

<**LEFT-MOVE CURSOR-RIGHT**> **[5L],[5R]:** When operating in EDIT mode, these keys control the cursor movement laterally in the text field. Pressing the RIGHT key **[5R]** when the cursor is at the end of a line or the LEFT key **[5L]** when the cursor is at the beginning of a line will cause the cursor to automatically wrap around to the next or previous line. This entire field disappears when in READY TO TX mode.

TO: (5L): Displays name and/or phone number to whom the SMS is dedicated.

CHANGE # > [5R]:
For the Iridium phone:
When operating in READY TO TX mode, pressing this key allows the operator to change the caller's name and/or phone number. When CHANGE # is selected, it automatically jumps to the SEND SMS 1/3 page.

For the GSM phone:

In S/W 300:

When operating in READY TO TX mode, pressing this key allows the operator to change the caller's name and/or phone number. When CHANGE # is selected, it automatically jumps to the SEND SMS 1/3 page.

In S/W 300V and higher: This prompt is blank.

POS REPORT [6L]: When operating in EDIT mode, pressing this key enters the current date & time, the flight identifier (as entered on the RTE page) and the current aircraft position (in whatever format selected on the SETUP page). The information is entered at the cursor position and started on a new line. Once pressed, the cursor is set to the end of the position report data. The time format will always be in UTC (e.g. not local). If the available number of characters is not enough to enter the complete position report information, a data entry error message is displayed (e.g. !EDITOR BUFFER FULL).

The format of the position report is as follows:

ddmmmyyyy/hhmm:ssUTC
FLT ID=iiiiiiiii
POS (jjjjjjjjj)=
ppppppppppppppppppp
where
dd = day (01-31)
mmm = month (jan-dec)
yyyy = year (2008-20xx)
hh = hour (00-23)
mm = minute (00-59)
ss = second (00-59)
iiiiiiiii = flight id (as entered on the RTE 1/2 page)
jjjjjjjjj = Datum (as selected on the SETUP 1/1 page)
ppppppppppppppppppppp = position (according to coordinate system selected on the SETUP 1/1 page)

PHONE TOP [6L]: Access to PHONE top page. This prompt is only available in READY TO TX mode.

CLEAR TXT [6R]: When operating in EDIT mode, pressing this key clears the entire text message. This prompt is only available when the message text contains at least one character.

TRANSMIT > [6R]: When operating in READY TO TX mode, pressing this key transmits the entire entered text message. When TRANSMIT is selected, it automatically jumps to the SEND SMS 3/3 page.
For the Iridium phone:
This prompt is blank if:

- The phone is not available (e.g. failed), or
- The call status is RINGING, DIALING or CONNECTION ESTABLISHED (phone is busy)

For the GSM phone

in S/W 300:

- The phone is not available (e.g. failed), or
- The call status is RINGING, DIALING or CONNECTION ESTABLISHED (phone is busy).

in S/W 300V and higher: This prompt is blank if the phone is not available (e.g. failed).

[NEXT],[PREV]: When operating in EDIT mode, pressing these keys control the cursor movement vertically in the text field (DOWN/UP). When operating in READY TO TX mode, pressing these keys control the page displayed.

[CLR]: When operating in EDIT mode, pressing this key deletes the character just before the cursor.

*NOTE: If any advisory/alert messages appear on the scratchpad, pressing **[CLR]** will clear these messages first.*

PHONE SEND SMS 3/3

This page allows the pilot to enables the pilot to monitor SMS call status & to hang-up during an SMS transmission.
Access to the PHONE: SEND SMS 3/3 page, from the vertical configuration, is as follows:
[RADIO], <PHONE>, <SEND SMS> (When the PHONE or HCS is configured), <WRITE TXT>, <TRANSMIT> or
[RADIO], <PHONE>, <SEND SMS> (When the PHONE or HCS is configured),[PREV]

Page display when SMS transmission initiated:

SENDING SMS TO: [1L]: Displays name and/or phone number to whom the SMS will be transmitted. The default value is dashes (e.g. when no name / phone number entered).

SMS ERROR CODE(2L): Only when iridium phone configured. Displays the SMS error code received only if SMS not transmitted properly. Static and dynamic fields are blank as soon as new SMS transmission starts and remains blank if SMS transmitted properly. The code is a 3 digit value received from the Iridium phone.

PHONE STATUS(3L): Displays the phone status.
For the GSM phone, the possible values are: CONNECTION ACTIVE, CONNECTION NOT ACTIVE, INCOMING CALL and GSM FAULT.
For the iridium phone, the possible values are: ----------, READY, UNAVAILABLE, UNKNOWN, RINGING, IN PROGRESS.

NOTE: Will display dashes when communication is totally lost.

SIGNAL STRENTGH [4L]: Displays the signal strength of the phone. This field is only visible for the iridium phone configuration.

POWER [4R]: *(not shown on figure)* Turns the phone ON or OFF .Only applicable to GSM phone. Not applicable to Iridium configuration.

NOTE: Will display dashes when communication is totally lost.

PHONE TOP [6L]: Access to PHONE top page.

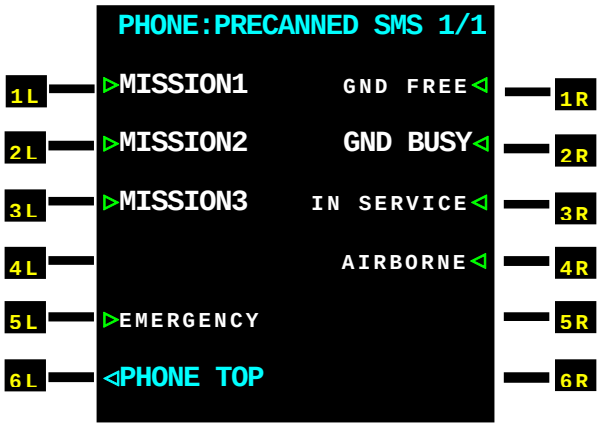
PHONE PRECANNED SMS 1/1

Display PHONE PRECANNED SMS 1/1 page by pressing [RADIO], <PHONE>, <PRE-CANNED SMS> (When the PHONE or HCS is configured), or [ANS] (When the HCS (GSM phone) and ANS key are configured and no new unread message nor new received call)

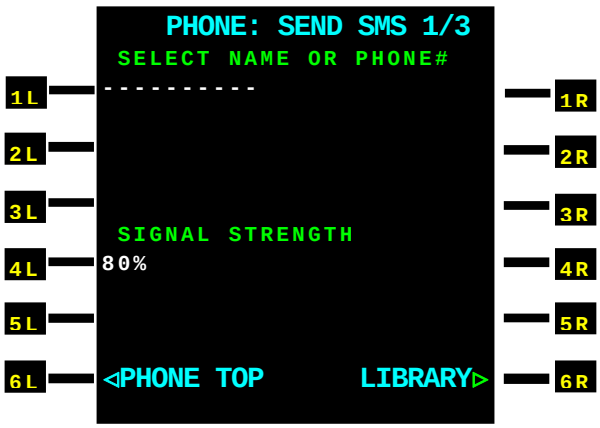
NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.

A. This page is defined to allow quick reporting of aircraft status by use of pre-canned SMS text message templates. Pre-canned templates may be defined and loaded into the system using an external data loader. Each template includes a header of up to 10 characters for use as a menu item, the template location [1L…6R] and an expanded text message template. When the pre-canned message contains additional template text the menu selection is shown with a large white font rather than a small white font for empty messages. The menus prepared below are from a sample application (NOTE: MISSION 1, 2, 3 and GND BUSY contain template text while the other selections do not).

NOTE: MISSION 1, 2, 3 and GND BUSY contain template text while the other selections do not.



B. Page display after a pre-canned SMS text message containing additional text was selected:



MISSION1 [1L]: Pressing this key can lead to two different results:

1. If the "MISSION 1" pre-canned SMS text message contains additional text, then the displayed page will automatically change to the SEND SMS page and the "MISSION 1" template SMS text message will be automatically loaded into this page. This is displayed in the above example where a pre-canned SMS text message has been created prior to the mission as indicated. The pre-canned message is automatically opened in EDIT mode with the cursor at line 1 position 1 as shown and OVERWRITE entry mode active. The pilot can then modify this pre-canned message if required and then send the SMS text message as indicated in the SEND SMS page description.

2. If the "MISSION 1" pre-canned SMS text message template is empty then the displayed message header will be automatically sent (e.g. "MISSION 1" is sent as the SMS text message). This implies that the pre-canned SMS text message is not loaded to the SEND SMS page under these circumstances. When a pre-canned message containing no additional template text is selected, the displayed font changes from small white to large inverse green font for 2 seconds in order to indicate that the message is being transmitted.

NOTE: Messages which are sent as displayed are displayed in small white font while messages with additional pre-canned text are displayed in large white font.

GND FREE [1R]: Same as **[1L**] for "GND FREE" message.

MISSION2 [2L]: Same as **[1L]** for "MISSION 2" pre-canned text message.

GND BUSY [2R]: Same as **[1L]** for "GND BUSY" pre-canned text message.

MISSION3 [3L]: Same as **[1L]** for "MISSION 3" pre-canned text message.

IN SERVICE [3R]: Same as **[1L]** for "IN SERVICE" message.

AIRBORNE [4R]: Same as **[1L]** for "AIRBORNE" message.

EMERGENCY [5L]: Same as **[1L]** for "EMERGENCY" message.

PHONE TOP [6L]: Access to PHONE top page.

NOTE: Prompt may be overwritten by pre-can message if more than 10 msg loaded.

PHONE SMS MESSAGE 1/1

This page provides the operator with a display of the incoming SMS text messages. There is a maximum of 160 characters (or 6 lines maximum) that are available for the incoming SMS text message. An auto wrap feature will break lines between words for readability.

When a new SMS text message is received the <SMS> annunciator will be lit. When this annunciator is lit, pressing the <PHONE> key from the RADIO page will automatically force the display of the PHONE SMS MESSAGE 1/1 page and the most recently received text message will be displayed and the annunciator will then be turned off.

When the ANSWER discrete input is configured, this page is displayed if only one unread SMS exist.

Display PHONE SMS MESSAGE 1/1 page by pressing:
[RADIO],<PHONE> (when the <SMS> annunciator is lit), or
[RADIO],<PHONE>,<READ SMS>,<mmmdd/yy/hhmm:ssz… mmmdd/yy/hhmm:ssz>, or
[ANS] (when HCS (e.g. GSM phone) and ANS key are configured and there is no new voice call (answering a voice call message has higher priority)); or Pressing the ANSWER discrete input (if discrete input configured).

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.

[1L], [2L], [3L], [2R], [4R]: No function.

[1R], [3R]: *(not shown in figure)* When the message text contains more than 6 lines, up and down cursors appear at position 1R and 3R to allow scrolling window movement. The 1R prompt will move the window one line up and the 3R prompt will move the window one line down.

DELETE [4L]: Deletes the message that is currently displayed. The next message automatically takes its place.

READ SMS [5L]: Access to PHONE: READ SMS 1/1 page.

FORWARD [5R]: This prompt will allow the operator to forward the message received to another user. When pressing this key, the system will pre-load the SEND SMS 2/3 page with the received text and will jump to the SEND SMS 1/3 page to allow selection of the name/phone number to whom the message is forward.

PHONE TOP [6L]: Access to PHONE top page.

READ NEW [6R]: This prompt will only be displayed when a new SMS text message is received (as indicated by the <SMS> annunciator becoming lit) while this page is already displaying a previously received SMS text message. Pressing this key while this page is displayed will enable the pilot to view other new messages in sequence of reception as the <SMS> annunciator becomes lit.

PHONE STORED SMS 1/1

This page allows the pilot to access the stored SMS text messages.
The maximum number of stored SMS text message is 10.

Display PHONE: STORED SMS 1/1 page by pressing [RADIO], <PHONE>, <STORED SMS> (When the PHONE or HCS is configured)

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.

This page is displayed as follows when SMS2 has been selected for deletion (by pressing CLR key then LSK2L).

SMS1 to SMS10 [1L to 5R]: Access to STORED SMS page x/10 to display the stored SMS text messages.

PHONE TOP [6L]: Access to PHONE top page.

CANCEL [6L]: Cancels the deletion of a saved SMS.

CONFIRM [6R]: Confirms the deletion of a saved SMS.

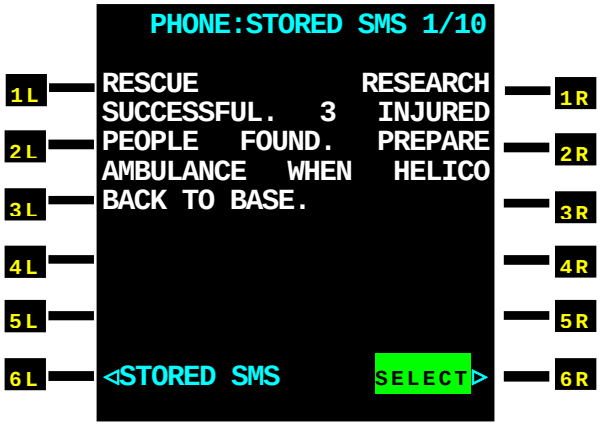
PHONE STORED SMS 1/N

This page allows the pilot to select the stored SMS text message and then subsequently transmit the message.

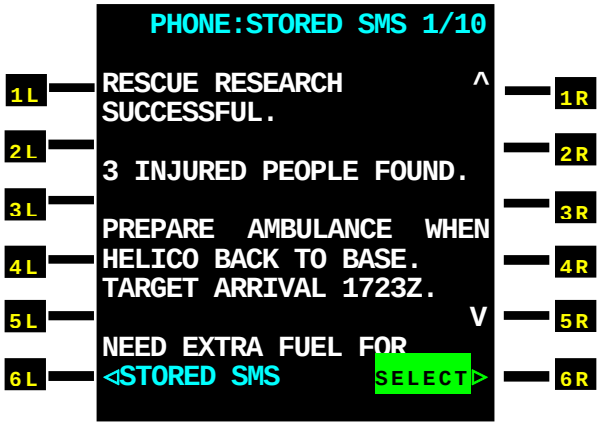
Display PHONE: STORED SMS 1/N page by pressing [RADIO], <PHONE>, <STORED SMS> (When the PHONE or HCS is configured), <SMSx>

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.

This page is displayed as follows once the SMS text message has been selected.



This page is displayed when the SMS text message is more than 10 lines.



[1R] [5R]: When the message text contains more than 10 lines up and down cursors appear at position 1R and 5R to allow scrolling window movement. The 1R prompt will move the window one line up and the 5R prompt will move the window one line down.

SELECT > [6R]: Pressing this key transfers the entire text message entered into the active SEND SMS 2/3 page and displays automatically the page SEND SMS 1/3. Then the operator simply has to select the name or phone number to whom the SMS is dedicated.

STORED SMS [6L]: Access to STORED SMS top page.

PHONE DIALED TOP 1/N

This page provides the pilot with access to the last dialed calls made & SMS sent from the FMS. The dialed calls are listed in order of age (most recent message on top). The calls information contains the following information:

- name of called person (if available)
- phone number of called person
- type of transmission (CALL or SMS)
- date & time

The time of transmission is of the format selected on the CONFIG->DISPLAY->DATE selection. For example (ddmmmyy/hhmm : ss or mmmdd/yy/hhmm : ss where, mmm =month alpha, dd =day, yy =year, hh =hours, mm =minutes and ss =seconds).

NOTE: That if time is UTC a small z is added after the seconds to indicate Zulu time.

Only the most recent 10 calls are listed, older ones (read and unread) are automatically deleted.

Access to the PHONE: DIALED TOP 1/N page, from the vertical configuration, is as follows:
[RADIO], <PHONE>, <DIALED> (When the PHONE or HCS is configured)

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.

[1L]: Display of called name (if available) and called number.

[1R]: Display of date & time the call was made & call type. The call type option is either CALL: or SMS:.

[2L..5L] & [2R.5R]: Display of n+1, n+2,n+3, n+4, n+5 calls made (next in history). Where n is based on the page number.

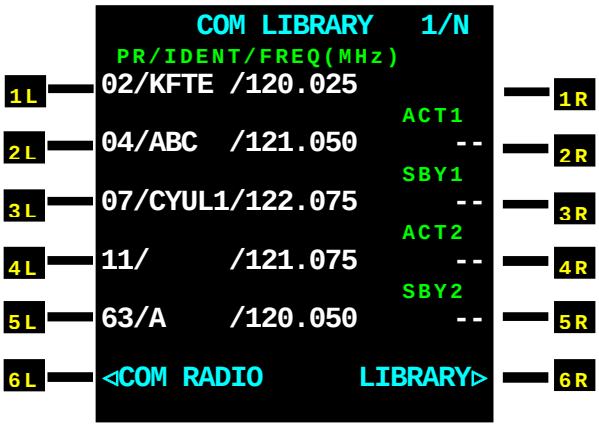
PHONE TOP [6L]: Access to PHONE top page.

COM LIBRARY 1/N

This page allows the pilot to view and modify the preset numbers, identifiers and frequencies that are stored in the COM radio library.

Display COM LIBRARY 1/N page from the horizontal configuration by pressing [RADIO], [NEXT]…, <COM> or [RADIO], <COMx> <LIBRARY>.

Display COM LIBRARY 1/N page from the vertical configuration by pressing [RADIO], [PREV], <COM> or [RADIO], [NEXT], <COMx> <LIBRARY>.



The maximum number of COM LIBRARY entries is 99. The maximum number of COM LIBRARY pages is 20. The [NEXT] and [PREV] keys are used to scroll forward or backward in the preset numbers.

[1L],[2L],[3L],[4L],[5L]: Display and modify COM library entries.

- *To add a new record in the library, key into the scratchpad the preset number, the identifier and the frequency, each separated by the slash symbol ("/") and press any of the line select keys that are associated with a library record (LSK 1L, LSK 2L, LSK 3L, LSK 4L or LSK 5L). The new record will be added to the library. The library will also be re-sorted and the new entry will be displayed. If the record (identified by preset number) was already existing then it will be overwritten. An ident is restricted to alphanumeric characters, e.g. "+" and "-" are not allowed as ident characters.*
- *A preset number must be specified.*
- *Also entry of an existing preset number followed by a slash and nothing else will, upon pressing a line select key associated with a library record, display the entered preset without changing its ident or frequency.*
- *To delete a record from the library, Press [CLR] key to display DELETE in the scratchpad, and press the line select key (LSK) corresponding to this record. The record will be deleted and the library will be resorted.*
- *To modify a library record enter the parameter to be modified using the "slash" rule, e.g. if nothing is entered before the slash then the field remains unchanged.*

- *Ex: To change 04/ABC /111.050 to 04/ABC /112.075 at LSK 2L press the following keys:*
  a) "//112.075" and LSK 2L or
  b) LSK 2L to transfer the current library record into the scratchpad, press the [CLR] key 5 times to erase the 5 last characters of the frequency, then enter the new frequency by pressing [2],[.],[0],[7],[5] and press the LSK 2L to enter the modified record into the library.
- *In order to transfer a library record to the active or standby field of the COM LIBRARY page first press the LSK corresponding to library record. This places the preset number, the identifier and the frequency in the scratchpad. Then press LSK 1R, LSK 2R, LSK 3R or LSK 4R (as desired) to transfer the contents of the scratchpad. The identifier will not be displayed on the radio page field even though it was displayed in the scratchpad.*

If COM1 is configured:

ACT1 [2R]: Display active preset number/modify active preset number and frequency of the COM1 radio.

SBY1 [3R]: Display standby preset number/modify standby preset number and frequency of the COM1 radio.

If COM2 is configured:

ACT2 [4R]: Display active preset number/modify active preset number and frequency of the COM2 radio.

SBY2 [5R]: Display standby preset number/modify standby preset number and frequency of the COM2 radio.

COM RADIO [6L]: Access to COM RADIO page.

NOTE: "COM" or "VHF" depending on the configuration.

LIBRARY [6R]: Access to RADIO LIBRARY 2/N page.

NOTE: The LIBRARY [6R] prompt is present while the aircraft is on the ground. After take-off it is removed and access to the LIBRARY page is then accessible from the specific radio equipment only.

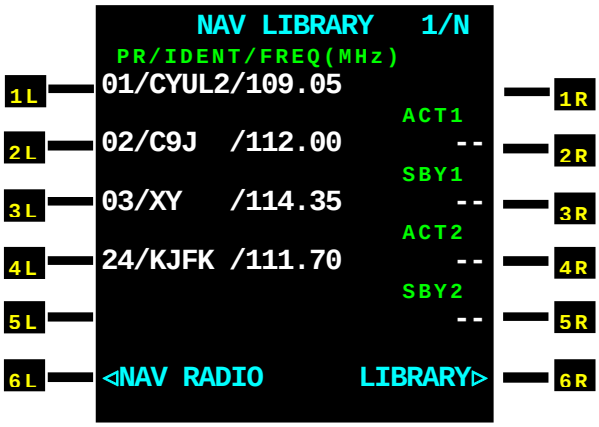
The LIBRARY is automatically locked when the aircraft takeoff.

NAV LIBRARY 1/N

This page allows the pilot to view and modify the preset numbers, identifiers and frequencies that are stored in the NAV radio library.

Display NAV LIBRARY 1/N page from the horizontal configuration by pressing [RADIO], [NEXT], <NAV> or [RADIO], <NAVx>, <LIBRARY>.

Display NAV LIBRARY 1/N page from the vertical configuration by pressing [RADIO], [PREV], <NAV> or [RADIO], [NEXT], <NAVx>, <LIBRARY>.



The maximum number of NAV LIBRARY entries is 99. The maximum number of NAV LIBRARY pages is 20. The [NEXT] and [PREV] keys are used to scroll forward or backward in the preset numbers.

[1L],[2L],[3L],[4L], [5L]: Display and modify NAV library entries. Same comments as for the NAV library entry apply here. Refer to COM LIBRARY page fields [1L], [2L],[3L],[4L], [5L] for data entry rules.

NAV RADIO [6L]: Access to NAV page.

NOTE: "NAV", "VIR" or "VOR" depending on the configuration.

If NAV1 is configured:
ACT1 [2R]: Display active preset number/modify active preset number of the NAV1 radio.

SBY1 [3R]: Display standby preset number/modify standby preset number and frequency of the NAV1 radio.

If NAV2 is configured:
ACT2 [4R]: Display active preset number/modify active preset number and frequency of the NAV2 radio.

SBY2 [5R]: Display standby preset number/modify standby preset number and frequency of the NAV2 radio.

LIBRARY [6R]: Access to RADIO LIBRARY 2/N page.

NOTE: If the NAV1 radio is operating in automatic tuning mode, as soon as any manual entry is made via the ACT field, the NAV1 radio mode returns to manual tuning. The same applies for the NAV2 radio when an entry is made via the ACT2 field.

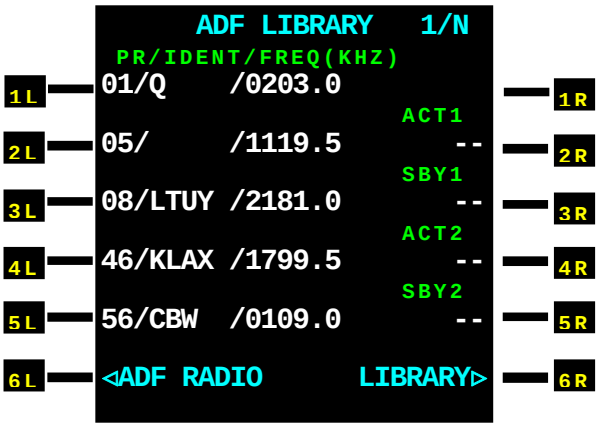
NOTE: The LIBRARY [6R] prompt is present while the aircraft is on the ground. After take-off it is removed and access to the LIBRARY page is then accessible from the specific radio equipment only.

The LIBRARY is automatically locked when the aircraft takeoff.

ADF LIBRARY 1/N

This page allows the pilot to view and modify the preset numbers, idents and frequencies that are stored in the ADF radio library.

The functionality of the page is the same as the COM or NAV LIBRARY page.



The maximum number of ADF LIBRARY entries is 99. The maximum number of ADF LIBRARY pages is 20. The [NEXT] and [PREV] keys are used to scroll forward or backward in the preset numbers.

[1L],[2L],[3L],[4L],[5L]: Display and modify ADF library entries.
Same comments as for the COM library entry apply here. Refer to COM LIBRARY page fields [1L], [2L],[3L],[4L], [5L] for data entry rules.

ADF RADIO [6L]: Access to ADF RADIO page.

If ADF1 is configured:
ACT1 [2R]: Display active preset number/modify active preset number and frequency of the ADF1 radio.

SBY1 [3R]: Display standby preset number/modify standby preset number and frequency of the ADF1 radio.

If ADF2 is configured:
ACT2 [4R]: Display active preset number/modify active preset number and frequency of the ADF2 radio.

SBY2 [5R]: Display standby preset number/modify standby preset number and frequency of the ADF2 radio.

LIBRARY [6R]: Access to RADIO LIBRARY 2/N page.

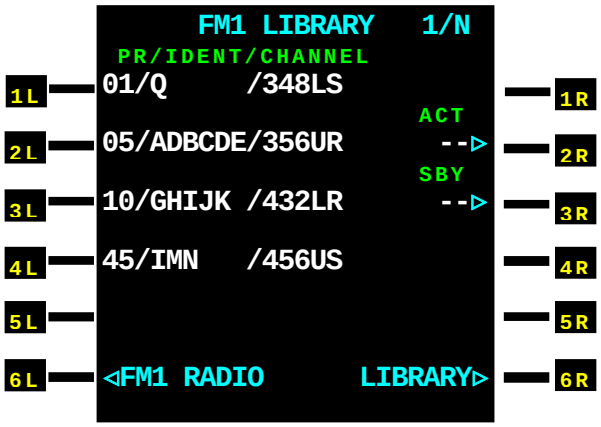
NOTE: The LIBRARY [6R] prompt is present while the aircraft is on the ground. After take-off it is removed and access to the LIBRARY page is then accessible from the specific radio equipment only.

The LIBRARY is automatically locked when the aircraft takeoff.

RS-422 FM1/FM2 LIBRARY 1/N

This page allows the pilot to view and modify the preset numbers, identifiers and channels that are stored in the FM1/FM2 radio library.

The functionality of the page is the same as the COM or NAV LIBRARY page.



The maximum number of FM1/FM2 LIBRARY entries is 99. The maximum number of FM1/FM2 LIBRARY pages is 20. The [NEXT] and [PREV] keys are used to scroll forward or backward in the preset numbers.

[1L],[2L],[3L],[4L],[5L]: Preset, identifier and frequency entries in the library. Refer to text at the start of this section.

ACT [2R]: Display active preset number/modify active preset number and Channel of the FUG8/FUG9 radio and access FM1/FM2 RADIO page.

SBY [3R]: Display standby preset number/modify standby preset number and Channel of the FUG8/FUG9 radio and access FM1/FM2 RADIO page.

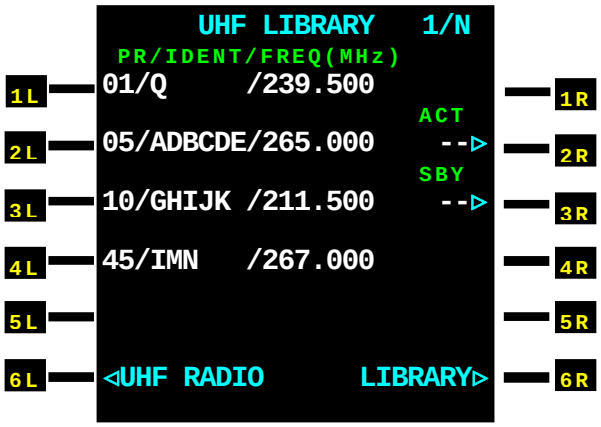
LIBRARY [6R]: Access to RADIO LIBRARY page.

FM1 RADIO [6L]: Access to FM1 RADIO page.

RS-422 UHF LIBRARY 1/N

This page allows the pilot to view and modify the preset numbers, identifiers and frequencies that are stored in the UHF radio library.

The functionality of the page is the same as the FM1 LIBRARY page.



[1L],[2L],[3L],[4L],[5L]: Preset, identifier and frequency entries in the library. Refer to text at the start of this section.

ACT [2R]: Display active preset number/modify active preset number and frequency of the UHF radio and access UHF RADIO page.

SBY [3R]: Display standby preset number/modify standby preset number and frequency of the UHF radio and access UHF RADIO page.

LIBRARY [6R]: Access to RADIO LIBRARY page.

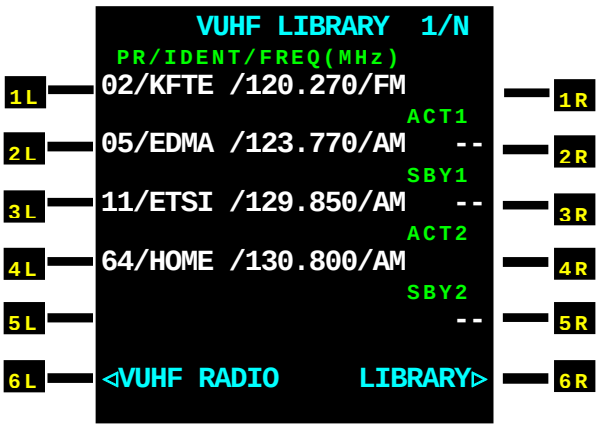
UHF RADIO [6L]: Access to UHF RADIO page.

VUHF LIBRARY 1/N (SRT-651 V/UHF RADIOS)

This page allows the pilot to view and modify the preset frequencies in the VUHF library. It also allows user to select an entry and set the preset frequency in the active or standby field.

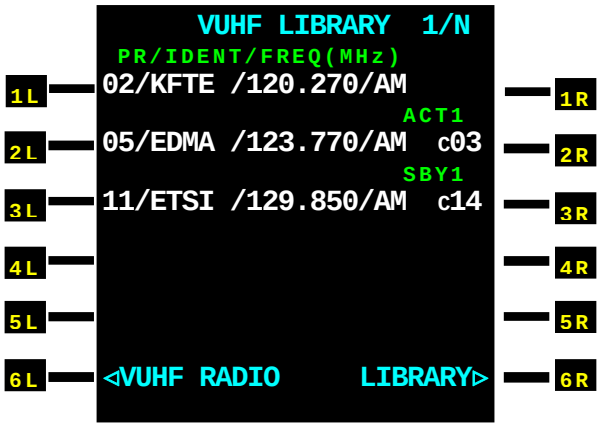
Display VUHF LIBRARY 1/N page by pressing [RADIO], <VUF>, <LIBRARY>.

NOTE: VUHF equipment can also be configured as "COM1" or "COM3". In that case, "COM LIBRARY" will be displayed as the page's name and "COMx RADIO" will be displayed at LSK 6L.



The maximum number of VUHF LIBRARY entries is 99. The maximum number of VUHF LIBRARY pages is 20. The [NEXT] and [PREV] keys are used to scroll forward or backward in the preset numbers.

For the SRT-651/N-F radio while in MAR SHIP or MAR COAST mode, the value shown in the active/standby preset field is the maritime channel number in the for "cXX" (where XX=maritime channel number).



[1L],[2L],[3L],[4L],[5L]: Display and modify VUHF library entries. Same comments as for the COM library entry apply here except that the modulation must be added with a slash as the last entry. Refer to COM LIBRARY page fields [1L], [2L],[3L],[4L], [5L] for data entry rules.

If VUHF1 is configured:
ACT1 [2R]: Display active preset number/modify active preset number and frequency of the VUHF1 radio.
For the SRT-651/N-A radio:

- the maritime channel number is displayed in the form MXX (where XX = the maritime channel number).
- when entering a valid library preset number, the entry will be interpreted as a maritime channel (if it is a valid maritime channel number value) and the MODE will remain MARITIME.

For the SRT-651/N-F radio:

- the maritime channel number is displayed in the form CXX (where XX = the maritime channel number).
- when entering a valid library preset number, the maritime mode will be exited and the MODE will change to the modulation associated to the preset.

SBY1 [3R]: Display standby preset number/modify standby preset number and frequency of the VUHF1 radio.
For the SRT-651/N-A radio:

- the maritime channel number is displayed in the form MXX (where XX = the maritime channel number).
- when entering a valid library preset number, the entry will be interpreted as a maritime channel.

For the SRT-651/N-F radio:

- the maritime channel number is displayed in the form CXX (where XX = the maritime channel number).

If VUHF2 is configured:
ACT2 [4R]: Display active preset number/modify active preset number and frequency of the VUHF2 radio.

SBY2 [5R]: Display standby preset number/modify standby preset number and frequency of the VUHF2 radio.

VUHF RADIO [6L]: Access to VUHF RADIO page.

LIBRARY [6R]: Access to RADIO LIBRARY page.

PHONE LIBRARY 1/N

This page allows the pilot to view and modify the identifiers that are stored in the Phone library (phone book).

Display PHONE LIBRARY 1/N page by pressing:
[RADIO], [PREV], <PHONE> (When the PHONE or HCS is configured); Or
[RADIO], <PHONE> (When the PHONE or HCS is configured), <LIBRARY>

NOTE: The PHONE can only be configured in the "vertical" configuration option of the RADIO top page.

The [NEXT] and [PREV] keys are used to scroll forward or backwards through the list.

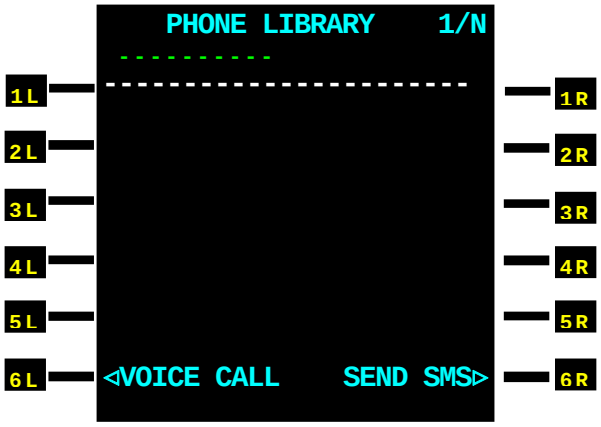
The maximum size of the library is 100 elements therefore the maximum number of pages is 20.
The maximum length of the name entry is ten characters.

To add a new record into the Phone Library, key into the scratchpad the name and the phone number separated by a slash symbol ("/") and press the line select key associated with the last library record (displayed with dashes). The new record will be added to the Phone Library in a alpha-numeric ascending order. It is also possible to add the name and phone number separately. To do this the name must be entered in the scratchpad followed by a slash and then a line select key should be pressed. This will store the name into the Phone Library but with no phone number associated with it. The phone number should then be entered in the scratchpad preceded by a slash (e.g. to enter a new number or update it). The line select key associated with the desired name should then be pressed to store the phone number.

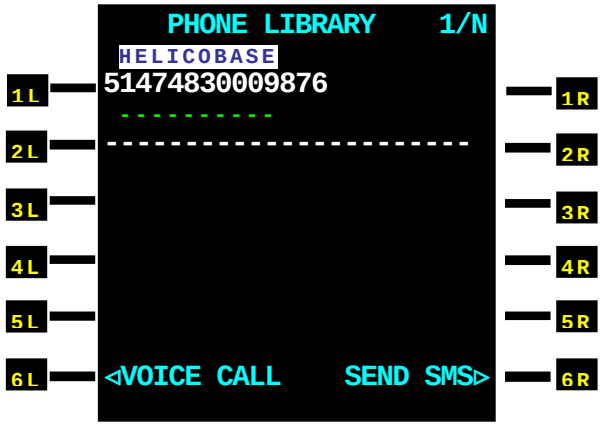
If the phone number is longer than 24 characters then extra digits can be added using the characters /-. Any digit after the characters /- will be appended to the current phone number. To delete a record from the Phone Library, put DELETE in the scratchpad and press the line select key corresponding to this record.

To activate a phone number, press the LSK corresponding to the desired name. This changes the selected name to inverse video white. Then press either VOICE CALL or SEND SMS. The page will automatically change to either PHONE: VOICE CALL 1/2 page or PHONE: SEND SMS. The name & number selected will automatically be set in the proper page.

Page display at start-up (e.g. empty library):



Page display after single entry made:



NAME & PHONE # [1L] - [5L]: Name & phone number. Two mode of operation: entry or selection.
In entry mode, pressing the softkey will transfer the content of the scratchpad to this field. The name will appear on top of the associated phone number. If the phone number is 24 characters or less, all numbers are display on 1 line. When a phone number exceeds 24 characters, this LSK is also used to return to the display of the first 23 characters. Valid characters for the name are any letters from A to Z and any digits from 0 to 9 and the character plus "+". The name must start with a letter.
In selection mode, pressing the soft key will display the name selected in inverse video white. When a page is displayed for the 1st time, the default name in inverse video will always be the one on the top of the page.

PHONE # [1R] - [5R]: When a phone number exceeds 24 characters, this LSK is used to show the extra characters of the phone number. The character at position 24 is replaced with the ">" symbol. The phone number is a maximum of 30 characters.

VOICE CALL [6L]: Access to the PHONE: VOICE CALL 1/2 page. The selected name & number will be inserted on the VOICE CALL 1/2 page.

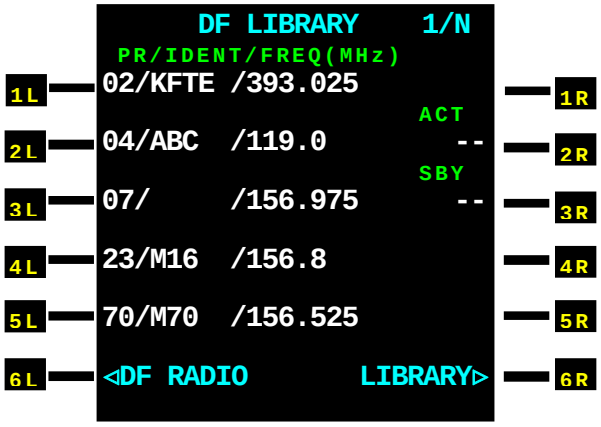
SEND SMS [6R]:
For the Iridium phone: Access to the PHONE: SEND SMS 1/3 page. The selected name and number will be inserted on the SEND SMS 1/3 page.

For the GMS phone:
In S/W 300: Access to the PHONE SEND SMS 1/3 page. The selected name and number will be inserted on the SEND SMS 1/3 page.
in S/W 300V and higher: This prompt is blank.

DF LIBRARY 1/N

This page allows the pilot to view and modify the preset numbers, identifiers and frequencies that are stored in the DF radio library

Display DF LIBRARY 1/N page from the horizontal configuration by pressing [RADIO], [NEXT], <DF> or [RADIO], <DF>, <LIBRARY>.



NOTE: The LIBRARY [6R] prompt is present while the aircraft is on the ground. After takeoff it is removed and access to the LIBRARY page is then accessible from the specific radio equipment only.

The maximum number of DF LIBRARY entries is 99. The maximum number of DF LIBRARY pages is 20. The [NEXT] and [PREV] keys are used to scroll forward or backward in the preset numbers.

[1L],[2L],[3L],[4L],[5L]: Preset, identifier and frequency entries in the library. Refer to text at the start of this section.

ACT [2R]: When a DF radio is installed and configured, display the active preset number and allow modification to the active preset number and frequency of the DF radio, otherwise the prompt and preset fields are blank.

SBY [3R]: When a DF radio is installed and configured, display the standby preset number and allow modification to the standby preset number and frequency of the DF radio, otherwise the prompt and preset fields are blank.

ACT2 [4R]: When a DF radio is installed and configured as DF2, display the active preset number and allow modification to the active preset number and frequency of the DF2 radio, otherwise the prompt and preset fields are blank.

SBY2 [5R]: When a DF radio is installed and configured as DF2, display the standby preset number and allow modification to the standby preset number and frequency of the DF2 radio, otherwise the prompt and preset fields are blank.

LIBRARY [6R]: The FMS will display the "LIBRARY" prompt only while the aircraft is on the ground (e.g. field is blank while the aircraft is airborne). When the prompt is present, pressing the line select key will provide access to the RADIO LIBRARY top level page.

NOTE: The LIBRARY [6R] prompt is present while the aircraft is on the ground. After take-off it is removed and access to the LIBRARY page is then accessible from the specific radio equipment only.

NOTE: The LIBRARY is automatically locked when the aircraft takeoff.

DF RADIO [6L]: Access to DF RADIO page.

HF LIBRARY 1/N (SRT-170/M2)

Access to the HF Library page, from the horizontal configuration, is as follows:

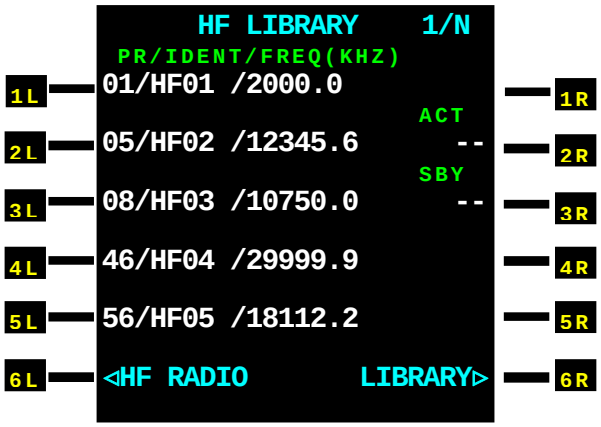
- [RADIO], [NEXT]..., <HF> (From the RADIO LIBRARY page when a HF radio is installed and the aircraft is on the ground); or
- [RADIO], <HF>, <LIBRARY> (From the HF radio page when a HF radio is installed and configured).

The FMS will revert to the radio top page where the HF radio prompt is displayed when all the following conditions occur:

- one of the HF library pages is being displayed on the FMS, and,
- the installation has the HF remote tune discrete configured and it indicates that the FMS is not controlling the radio.

This page allows the pilot to view and modify the preset numbers, idents and frequencies that are stored in the HF radio library.

The functionality of the page is the same as the COM LIBRARY page. Refer to COMMUNICATION RADIOS (HF RADIO) section for frequency range.



[1L] - [5L]: Preset, ident and frequency entries in the library. Fields have the same functionality as the ones on the COM library. Refer to the HF section for the frequency range.

ACT [2R]: Display the active preset number and allow modification to the active preset number and frequency of the HF radio.

SBY [3R]: Display the standby preset number and allow modification to the standby preset number and frequency of the HF radio.

LIBRARY [6R]: The FMS will display the "LIBRARY" prompt only while the aircraft is on the ground (e.g. field is blank while the aircraft is airborne). When the prompt is present, pressing the line select key will provide access to the RADIO LIBRARY top level page.

NOTE: The LIBRARY [6R] prompt is present while the aircraft is on the ground. After take-off it is removed and access to the LIBRARY page is then accessible from the specific radio equipment only.

NOTE: The LIBRARY is automatically locked when the aircraft takeoff.

HF RADIO [6L]: Access to HF 1/2 RADIO page.

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SECTION 14 - PERFORMANCE FUNCTIONS

CONTENTS

Subject **Page**

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SECTION 14

PERFORMANCE FUNCTIONS

FUEL PERFORMANCE CALCULATION

From displayed fuel flow and remaining fuel quantity, the CMA-9000 FMS will compute the following parameters and display them on the FUEL 1/2 page:

- Predicted maximum range with remaining fuel.
- Predicted endurance (in hours plus minutes).
- Predicted quantity of fuel remaining at an operator specified downtrack waypoint.

The CMA-9000 FMS will accept total remaining quantity of fuel and fuel flow information from the fuel computer system. If a fuel computer system is not configured or has failed, the CMA-9000 FMS allows the operator to manually enter on the RTE x FUEL page the total fuel quantity and the fuel flow.

The CMA-9000 FMS also provides the means to perform "what if" calculations via the RTE x FUEL page by allowing operator entry of fuel flow and total remaining fuel quantity. The temporary values entered by the operator will be replaced by fuel computer data (if available) upon each new access of the Fuel page.

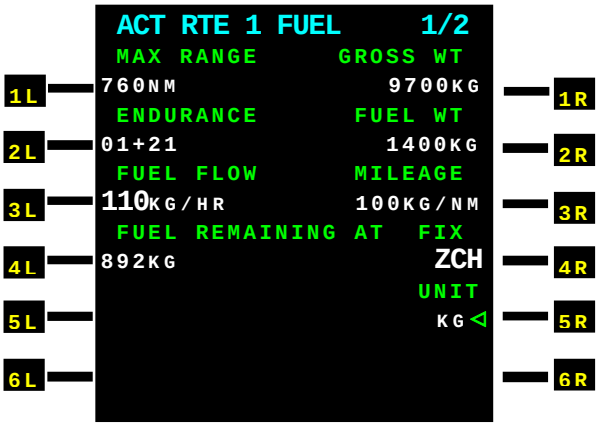
If the FUEL+WEIGHTS option is configured for the FUEL pages, the CMA-9000 FMS provides on the RTE x FUEL 2/2 page several fields used by the operator to enter the empty weight, optional equipment weight, crew weight, cargo weight and total fuel weight including reserve. These values are used by the CMA-9000 FMS to calculate the initial Gross-Weight (GWT) estimate, displayed on FUEL 1/1 page. Once the initial GWT is accepted by the CMA-9000 FMS, the Gross Weight will be continuously estimated by subtracting the fuel consumption based on the average fuel flow. The GWT units will match the fuel flow units, that is, if the fuel flow is in Kg/Hr or Lb/Hr, then the GWT will be in Kg or Lb respectively.

If the FUEL option is configured for the FUEL pages, the CMA-9000 FMS receives the gross weight value from the Fuel computer in addition to the fuel weight and fuel flow values.

In multiple FMS installation, all fuel data is cross-talked between FMSs.

CAUTION: The unit selection on the FUEL 1/2 and FUEL 2/2 pages has to be consistent with other fuel indicators installed in the cockpit. Verify units on the FUEL pages and on other fuel indicators.

Display the INIT/REF INDEX 2/2 page by pressing [INIT REF], [PREV] or [NEXT].
Display the RTE x FUEL 1/2 page by pressing FUEL (LSK 5L) on the INIT/REF INDEX 2/2 page or the [FUEL] functional key (if configured).



1. Key in the current fuel weight (e.g. 9700) and move it into the FUEL WT field by pressing LSK 2R.

2. Key in the current fuel flow (e.g. 110) and move it into the FUEL FLOW field by pressing LSK 3L.

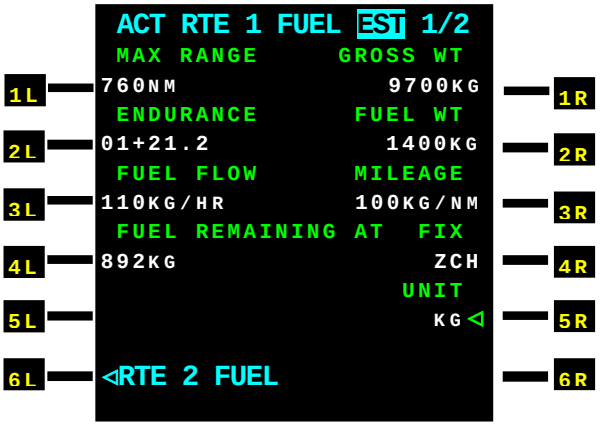
3. UNIT at LSK 6R toggles between LB and KG.

   Maximum range and endurance are calculated based on entered fuel quantity and fuel flow rate. The maximum range is computed along the track to the FIX waypoint (if the FIX is defined) or with the current track, given current or estimated fuel weight (excluding the reserve), fuel flow, and ground speed (if the FIX is not defined). The endurance is computed using the given current or estimated fuel weight (excluding the reserve) and fuel flow.

CAUTION: On power interruptions, the fuel units will revert to the configured units (from maintenance page). Verify units when reading or entering values.

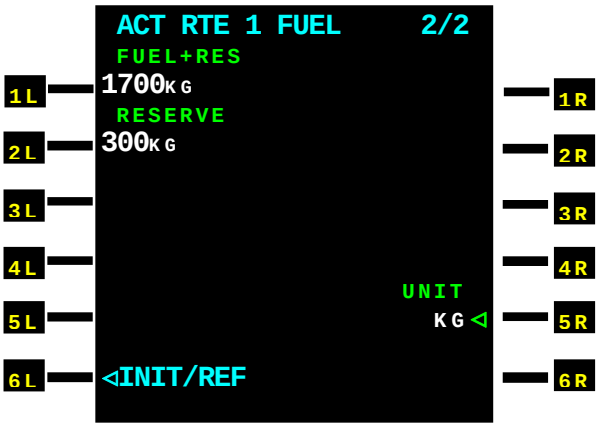
NOTE: "EST" is displayed after "FUEL" in reverse video on each of the title page (see above) whenever the Active route is displayed and one of the following conditions is met:

- *fuel quantity or fuel flow configured but not received from the sensor; or*
- *aircraft is on ground; or*
- *manually entered values for FUEL FLOW (LSK 3L) or FUEL WEIGHT (LSK 2R).*



Display the RTE x FUEL 2/2 page by pressing [NEXT] or [PREV].

FUEL option configured:

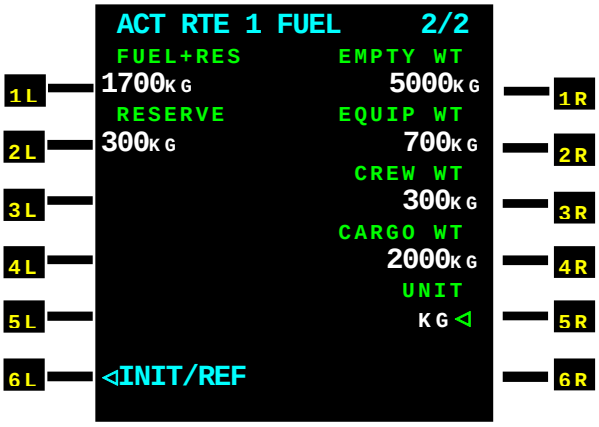


In the case of a FUEL+WEIGHTS configuration the following steps can be taken:

4. Key in the fuel weight including reserve (e.g. 1700) and move it into the FUEL+RES field by pressing LSK 1L. Entry is allowed if the fuel weight is unavailable from the sensor.

5. Key in the fuel reserve weight (e.g. 110) and move it into the RESERVE field by pressing LSK 2L.

FUEL+WEIGHTS option configured:



6. Key in the aircraft empty weight (e.g. 5000) and move it into the EMPTY WT field by pressing LSK 1R.

7. Key in the optional equipment weight (e.g. 700) and move it into the EQUIP WT field by pressing LSK 2R.

8. Key in the total crew weight (e.g. 300) and move it into the CREW WT field by pressing LSK 3R.

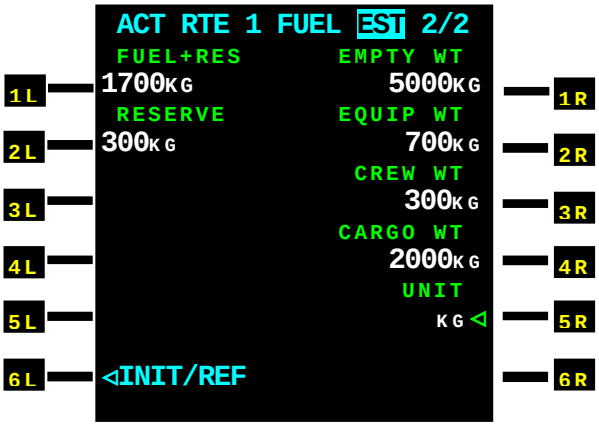
9. Key in the total cargo weight (e.g. 2000) and move it into the CARGO WT field by pressing LSK 4R.

10. UNIT at LSK 5R toggles between LB and KG.

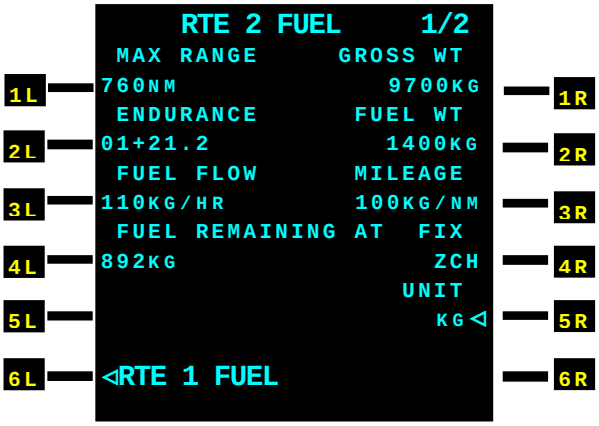
NOTE: The quantities on the RTE x FUEL 2/2 page are displayed in white except for the case of an IFDS EFIS installation when:

- *the quantities are displayed in amber as long as the GROSS WT DISCREPANCY alert message is active; and*
- *the quantities are displayed in white when there is no difference between the gross weight sent by the IFDS and the CMA-9000 FMS-computed gross weight.*

NOTE: "EST" is displayed after "FUEL" on each of the title page (see below) when specific conditions are met (refer to the NOTE related to the FUEL 1/2 page description herein).



The inactive fuel route page is displayed in monochrome cyan to distinguish it from the active route:



FUEL REMAINING AT ANY WAYPOINT

With the desired waypoint identifier in the scratchpad (keyed in, or copied from any other page), move it into the FIX field by pressing LSK 4R in the RTE x FUEL 1/2 page.

Fuel remaining at the selected waypoint is calculated based on the displayed fuel quantity (excluding reserve), fuel flow rate and ground speed.

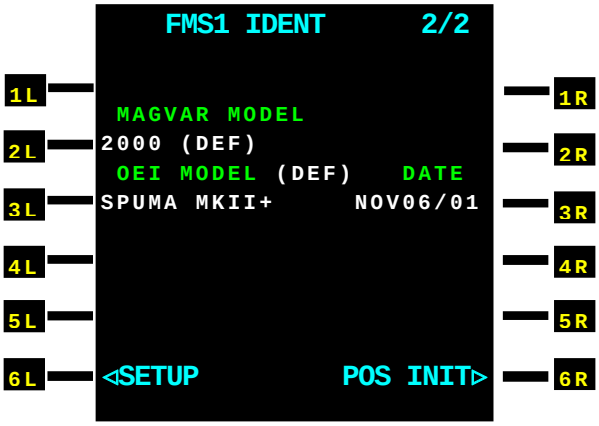
NOTE: By default the last waypoint of the active route is displayed. If an airport destination is entered in the RTE page, then that destination waypoint is used to decide if the alert message "NOT ENOUGH FUEL" will be triggered or not. The message is triggered if the fuel required to fly the along track distance from the present position to the destination airport coordinates (excluding the missed approach procedure) is not sufficient.

SIMULATION FUNCTIONS

The CMA-9000 FMS provides Fly Away and OEI Cruise simulation functions, which allow the pilot to determine in advance the consequences of the loss of an engine in hover or cruise operation. The CMA-9000 FMS also provides a RTE x LEGS page simulation that allows the pilot to perform simulated ETA/EFA computations on the inactive route.

There is no consequence of these calculations on the active flight data.

Entry of the performance charts required for the Fly Away and OEI Cruise functions is done via the data load unit. The name and date identification of the loaded tables are displayed on the IDENT 2/2 page.



A. SIMUL FLY AWAY FUNCTION

Upon opening the SIMUL FLY AWAY 1/3 page or selecting the "RESTORE DEFAULTS" prompt on the same page, the CMA-9000 FMS initializes to the default value (values received from other aircraft sub-systems) the current gross weight, current baro-corrected altitude, current outside air temperature and current wind. Then it computes the Fly away height (minimum height to maintain in hover or the maximum drop in height upon loss of an engine during hover); OEI OGE weight (weight required to maintain the specified barometric altitude without any drop in height upon loss of an engine); and OGE CEILING height (minimum altitude at which the ground effect is no longer felt).

The pilot can modify the gross weight, Fly away height, barometric altitude, outside air temperature and wind. If the gross weight is modified, a new Fly away height, OEI OGE weight and OGE CEILING height are calculated; similarly, if a Flyaway height is entered, the function determines the required gross weight, OEI OGE weight and OGE CEILING height. Manual entry is distinguishable by either displaying values in reverse video (as in the case of the GROSS WT, FLY AWAY HT, BARO ALT fields) or large font size (as in the case of OAT and WIND fields).

If one of the parameters is out of bounds or invalid, an advisory message is triggered (refer to Appendix E for details).

B. SIMUL OEI CRUISE FUNCTION

Upon opening the SIMUL OEI CRUISE 2/3 page or selecting the "RESTORE DEFAULTS" prompt on the same page, the CMA-9000 FMS initializes to the default value (values received from other aircraft sub-systems) the current gross weight, present baro-corrected altitude and present outside air temperature. Then it computes the jettison weight (weight to lose in order to maintain the current altitude) and the level altitude (maximum altitude after engine loss if no weight is dropped).

The gross weight, barometric altitude and outside air temperature can be modified by the pilot to determine different scenarios. Whenever a manual input is done, the gross weight and barometric altitude are displayed in inverse video and the outside air temperature in large font.

If one of the parameters is out of bounds or invalid, an advisory message is displayed. If more than one advisory message is activated only the highest priority message is displayed.

The messages "AIR TEMP NOT VALID", "BARO ALTITUDE NOT VALID", "GROSS WEIGHT NOT VALID", "WIND NOT VALID", and "FLY AWAY HT NOT VALID" are displayed depending on the situation.

C. SIMUL RTEx FUNCTION

While in flight, upon opening the SIMUL RTEx 3/3 page or selecting the "DEFAULT VAL" prompt on the same page, the CMA-9000 FMS initializes to the default value (values received from other aircraft sub-systems) the current values of TAS, fuel flow, wind, and fuel weight. Then it computes the ETA/EFA for the waypoints that are part of the inactive route.

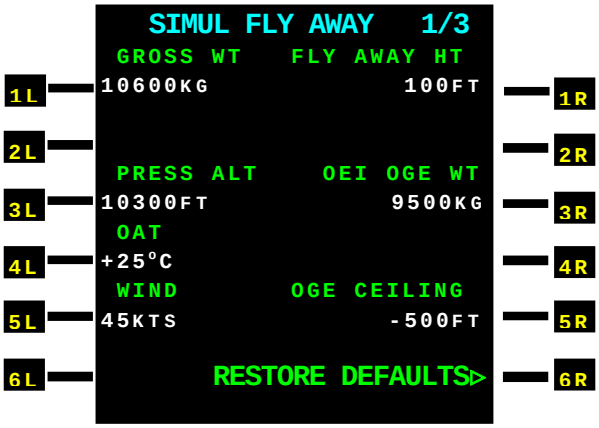
The SIMUL RTEx 3/3 page shown on ground displays the following values:

- CRZ TAS and CRZ WIND as defined in the PLAN DATA page;
- Fuel flow is set at a value of 615 kg/hr;
- Fuel weight is set at a value of 4000 kg.

The pilot can modify one or all the values on this page in order to compute different scenarios for the ETA/EFA values. Manual entry is distinguishable by displaying the values in large font size.

SIMUL FLY AWAY 1/3 (If SIMUL PG option Configured)

Display SIMUL FLY AWAY 1/3 page by pressing [INIT REF], [NEXT] and < SIMULATE> (LSK 2R).



1. Key in the gross weight (e.g., 10600) and move it into the GROSS WT field by pressing LSK 1L.
2. Key in the fly away height (e.g., 100) and move it into the FLY AWAY HT field by pressing LSK 1R.
3. Key in the pressure altitude (e.g., 10300) and move it to the PRESS ALT field by pressing LSK 3L.
4. Key in the outside air temperature (e.g., +25) and move it to the OAT field by pressing LSK 4L.
5. Key in the wind speed (e.g., 45) and move it to the WIND field by pressing LSK 5L.

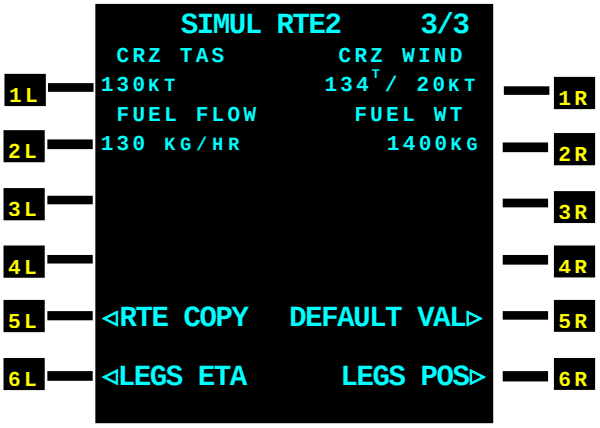
SIMUL OEI CRUISE 2/3 (If SIMUL PG option Configured)

Display SIMUL OEI CRUISE 2/3 page by pressing [INIT REF], [NEXT] and <SIMULATE> (LSK 2R) and [NEXT].

1. Key in the gross weight (e.g., 10600) and move it into the GROSS WT field by pressing LSK 1L.
2. Key in the pressure altitude (e.g., 10300) and move it to the PRESS ALT field by pressing LSK 3L.
3. Key in the outside air temperature (e.g., +25) and move it to the OAT field by pressing LSK 4L.

SIMUL RTEx 3/3 or 1/1 (If SIMUL PG and RTE2 options is Configured)

Display SIMUL RTEx 3/3 or 1/1 page by pressing [INIT REF], [NEXT], <SIMULATE> (LSK 2R), and [PREV].



Any of values in the fields 1L, 1R, 2L, 2R can be modified by the pilot by manually entering a desired value.

1. Press the LEGS ETA prompt (LSK 6L) to access the RTE x LEGS ETA 1/X page which presents the ETA/EFA computed for the waypoints of the inactive route.

NOTE: If the inactive route does not exist, the CMA-9000 FMS copies the active route into the inactive route when the inactive route LEGS ETA/EFA page is accessed in order to perform simulated ETA/EFA computations. If an inactive route already exists, the CMA-9000 FMS allows the pilot to copy the active route into the inactive route in order to perform simulated ETA/EFA computations using the active route (note: the previous inactive route will be overwritten and unretreivable).

2. Press the LEGS POS prompt (LSK 6R) to access the RTE x LEGS POS 1/X page, which presents the coordinates of the waypoints of the inactive route.
3. Press the RTE COPY prompt (LSK 5L) to copy the active route into the inactive route

NOTE: The previous inactive route is deleted and un-retrievable). When RTE COPY is selected, LSK 6L is replaced with "<CANCEL", LSK 6R is replaced with "CONFIRM>" and "SAVE?" is displayed.

4. Press the DEFAULT VAL prompt (LSK 5R) to override the user-entered simulated settings (CRZ TAS, CRZ WIND, FUEL FLOW and FUEL WT) with the on-ground or in-air default settings.

SECTION 15 RNP CAPABILITY

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SECTION 15

RNP CAPABILITY

OVERVIEW

When installed in accordance with AC 20-130A or equivalent, the CMA-9000 FMS is eligible for TGL-10 P-RNAV and AC 90-100 approvals. The information to support RNP approvals is contained in this section .

This section describes RNP capabilities for the CMA-9000 Flight Management System (FMS) when the civil navigation configuration is set. This information is intended to be used by operators and regulatory authorities to facilitate RNP operational approvals. It does not constitute an operational approval by itself. The intent of the RNP capability section is to address the 95% Total System Error (TSE) accuracy requirement and to declare the performance monitoring and alerting capability for the applicable navigation modes.

For all navigation modes, the Actual Navigation Performance (ANP) does not include any consideration of the Flight Technical Error (FTE). The ANP represents the 95% probable radial error of the estimated aircraft position.

The CMA-9000 FMS monitors the position estimation error and generates an alert when the ANP exceeds the current RNP.

In GPS navigation mode, the FMS monitors the Horizontal Integrity Limit (HIL) and activates an integrity lamp and annunciation when the HIL exceeds the RNP value.

FLIGHT TECHNICAL ERROR

In the current implementation, the Flight Technical Error (FTE) is not integrated in the Performance Monitoring and Alerting. Operational procedures must be developed taking into consideration the (CDI) scaling, auto-pilot and flight director capabilities to bound the (FTE) as required to support the (TSE) requirements in the RNP airspace.

Crew procedures should also be developed to address the case when the (FTE) becomes larger and does not support the RNP procedure.

The FMS drives a course deviation indicator (CDI) with RNP-dependent full-scale deviation (FSD) as described in the following table.

Current RNP (NM)	HSI FSD [NM]
Enroute default or RNP entry above 1.01	5.0
Terminal default or RNP entry above 0.31	1.0
Approach default or any RNP entry	0.3

Table 15-1 HSI FSD vs RNP

PERFORMANCE, MONITORING AND ALERTING

When configured to ANP/HIL=1.0, the ANP presented to the aircrew on the PROGRESS page represents the 99.999% probable radial position estimation error (PEE).

The CMA-9000 FMS monitors the ANP and generates the "CHECK ANP" CDU alert message when the ANP exceeds the current RNP.

NOTE: That the condition has to be present for 30 seconds before the message is displayed in en-route and terminal phase of flight and for 10 seconds when in approach phase of flight.

In GPS mode, the CMA-9000 FMS activates the INT (integrity) lamp when the HIL exceeds the current RNP.

GPS NAVIGATION MODE

A. ACCURACY

When installed in accordance with the CMA-9000 Installation Manual, the GPS navigation mode exceeds the 95% 2D accuracy requirements of AC20-130A. A typical 95% probable position estimation radial error is 0.04 nm.

B. INTEGRITY

GPS-based position integrity is the GPS HIL computed by the Receiver Autonomous Integrity Monitor (RAIM) function of the integrated GPS Sensor Module. HIL is expressed in nautical miles and represents the radius of a circle centered around the estimated GPS position, such that the probability that the aircraft's true position lies within the circle is 99.999% when no satellite failure exists and 99.9% under all conditions of satellite failure.

This exceeds the 10^{-5} per flight hour requirement for containment integrity for RNP operations as defined in RTCA-DO-236B/DO-283A.

C. CONTINUITY

Based on typical values of the Mean Time Between Failures (MTBF) of the GPS receiver and on the industry-acce pted failure rate of the GPS satellites (10^{-5}/hour/satellite), the CMA-9000 FMS meets the 10^{-4} per flight hour continuity requirement.

DME/DME NAVIGATION MODE

The assumptions used to support the accuracy requirements are:
Minimum three DME facilities are required to support the DME/DME navigation mode. It is assumed that the DME transceiver is compliant with TSO-C66c.

A. ACCURACY

In the DME/DME navigation mode, a typical 95% position error is 0.5 nm in en-route and 0.4 nm in the terminal area. The DME-DME navigation mode is not available for approach mode.

B. INTEGRITY

Based on typical MTBF values of the DME ground facilities and of the airborne DME transceivers, the CMA-9000 FMS has a probability of misdetection by hardware of a failure condition that would cause the DME-DME navigation fix to be outside the containment limit of an order of magnitude of 10^{-4} per flight hour.
This probability is improved by line of position reasonableness check internal to the FMS. Reasonableness checks based on distance and ground stations geometry are applied during the DME facility selection process and prior to use of the DME slant distance measurements to derive the navigation solution.

C. CONTINUITY

Based on typical values of the Mean Time Between Failures (MTBF) of the DME ground facilities and the airborne DME transceiver, the CMA-9000 FMS meets the 10^{-4} per flight hour continuity requirement.

VOR/DME NAVIGATION MODE

The assumptions used to support the accuracy requirements are:
A minimum of one VOR and one DME facilities are required to compute a navigation solution. It is assumed that the VOR receiver is compliant with TSO-C40a and the DME is compliant to TSO-C66c.

A. ACCURACY

In the VOR/DME navigation mode, a typical 95% position error is between 0.6 and 0.8 nm if the distance to the tuned ground station is less than 7nm and 1.5nm greater distances. The VOR-DME navigation mode is not available for approach mode.

B. INTEGRITY

Based on typical MTBF values of the VOR ground facilities and of the VOR receivers, the CMA-9000 FMS has a probability of misdetection by hardware of a failure condition that would cause the VOR-DME navigation fix to be outside the containment limit of an order of magnitude of 10^{-4} per flight hour.
This probability is improved by having an internal FMS line of position reasonableness check. Reasonableness checks based on bearing and distance are applied prior to use of the VOR bearing received and the DME distance received in the solution.

C. CONTINUITY

Based on typical values of the Mean Time Between Failures (MTBF) of the VOR ground facilities and the airborne VOR receiver, the CMA-9000 FMS meets the 10^{-4} per flight hour continuity requirement.

KALMAN NAVIGATION MODE

The Kalman navigation mode is based on GPS sensor and APIRS sensor. The APIRS provides attitude, velocities and accelerations to the FMS. The FMS uses this information to compute a mixed GPS & APIRS solution. The Kalman navigation mode is not considered applicable for RNP operations.

INERTIAL NAVIGATION MODE

The CMA-9000 is used in combination with an inertial navigation/reference system meeting the requirements of FAA AC 25-4 and/or 14 CFR Part 121 Appendix G. Subject to a time limitation for the inertial navigation mode.

A. ACCURACY

The inertial drift rate model used for assessment of current inertial navigation accuracy assumes a 2 nautical miles per hour drift rate in the cross-track direction after the FMS is placed in the inertial navigation mode. The inertial navigation mode in RNP airspace is time limited based on the current RNP. In Terminal phase of flight the inertial navigation mode must not be used more than 30 minutes after the CMA-9000 is placed in the inertial navigation mode. In Enroute phase of flight, its usage can be extended to 60 minutes. The Inertial navigation mode is not available for the approach mode.

B. INTEGRITY

The CMA-9000 provides an indication of the inertial position integrity by monitoring inertial navigation accuracy and IRS data output validity status. Based on typical MTBF values of the inertial sensor, the CMA-9000 FMS has a probability of misdetection by hardware of a failure condition that would cause the inertial position to be outside the containment limit of an order of magnitude of 10^{-4} per flight hour.
This probability is improved when a mixed inertial position is computed using 3 IRS sensors.

C. CONTINUITY

Based on typical values of MTBF of the inertial sensor, the CMA-9000 FMS meets the 10^{-4} per flight hour continuity requirement.

SECTION 16 - MCDU FUNCTIONS

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SECTION 16

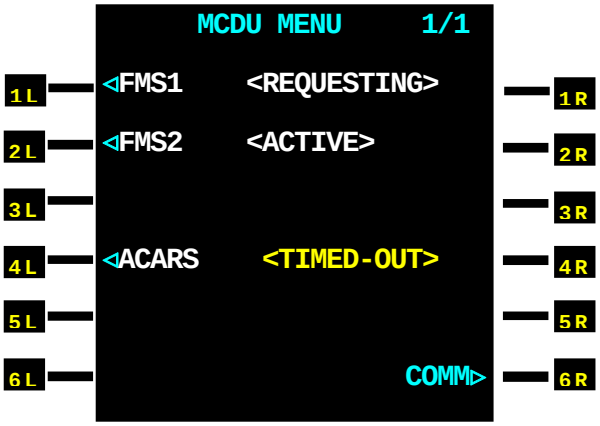
MCDU FUNCTIONS

MCDU SUBSYSTEM CONTROL (if configured)

The FMS has the built in capability to interface with External Sub-Systems (ESS) through ARINC 739 protocol and act as a MCDU for these external sub-systems. After a FMS cold start, automatic logon into an ESS is possible if there is at least one ESS configured in the auto logon priority list. There are 11 FMS hardkeys can be assigned as key logon functions in the configuration. When a hardkey is pressed, the FMS will logon into the assigned ESS.

The MCDU MENU page displays all configured external sub-systems and the internal FMS.

Display MCDU MENU X/X page by pressing [MENU].



The sub-systems displayed have a dedicated key. The internal FMS is displayed at LSK 1L. The name of ESS1 is displayed at LSK 2L, the name of ESS2 is displayed at LSK 3L and so on.

NOTE: That up to 7 external sub-system can be installed, meaning 8 equipments can be displayed on the MCDU MENU page (including the internal FMS that is always part of the sub-system list), from LSK 1L to LSK 5L on MCDU MENU 1/2, and from LSK 1L to LSK 3L on MCDU MENU 2/2.

TANDEM MODE (if TANDEM is configured)

The Tandem Mode consists of 2 FMSs namely the 'Trainer' and 'Student' FMS. The tandem mode implies that the Trainer's FMS will act as a MCDU and will be connected through the A739 protocol to one external subsystem which is the Student FMS.

In the tandem mode, the trainer and student FMSs will display simultaneously: the current display page; keystroke commands; scratchpad information and annunciators, with the exceptions of the radio volume control (if configured) and display brightness settings. The trainer's FMS will have access to both FMSs; his own and the student. The student will only have access to his own FMS.

Any entry on the trainer's FMS will result in a modification of the data on the student FMS. The trainer's FMS internal system is not affected by the entry. An alpha-numerical value entered in the scratchpad on any FMS is appended to the scratchpad data that is already being displayed.

Tandem functionality is available either in independent or synchronized mode. When in independent mode and Tandem is active, the trainer's FMS will not have radio volume settings. The trainer's FMS will initiate the Tandem Mode when logging on into the student's FMS. The trainer's FMS will terminate the Tandem Mode when logging off the student's FMS.

When the Tandem function is configured, navigation sensor de-selections are cross-talked to the cross-side FMS in order to de-select the navigation sensors from only one FMS. When Tandem mode is active (both FMSs have the exact same display), the EFIS Center-Legs mode is cross-talked in order to have the same EFIS display on both 'Student' and 'Trainer' EFIS.

SECTION 17 - ABNORMAL PROCEDURES

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SECTION 17

ABNORMAL PROCEDURES

POWER INTERRUPTIONS

A short CMA-9000 FMS power interruption, lasting less than 7 seconds in the air or less than 90 seconds on the ground (depending on the configuration), will have no impact on the active flight plan of the CMA-9000 FMS. The CMA-9000 FMS will recover and redisplay the active CMA-9000 FMS page (except for duplicate waypoint pages, where the previously displayed page will be recovered). Verify position and update if necessary. Verify that the deselected sensors remained deselected and correct if necessary. Navigation and guidance will continue to operate normally. Re-select the desired flight instrument display and AP/FD modes. It is recommended that the flight crew review the content of the flight plan specially considering the modifications made within 5 seconds prior to the power outage.

NOTE: A momentary power interruption (less than 200 milliseconds) will not cause the GPS sensor to transition to acquisition mode.

A power interruption lasting longer than 7 seconds while the aircraft is airborne will require pilot action to re-select the active CMA-9000 FMS page and:

1. Enter a valid TO waypoint on the RTE x LEGS 1/X page.

2. Verify position and flight plan, update (if necessary).

3. Re-select the desired flight instrument display and AP/FD modes.

A power interruption lasting longer than 7 or 90 seconds (depending on the configuration selection) when the aircraft is on the ground will result in the loss of the flight plan. Re-enter the origin and destination airports and the flight plan.

HIGH TEMPERATURE OPERATIONS

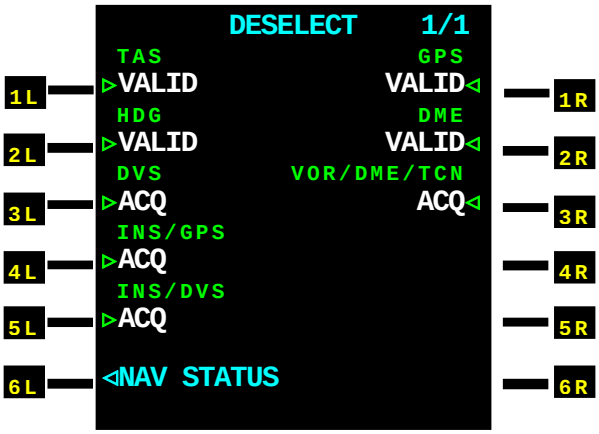
A protection mechanism has been implemented to protect the lamp life duration (Refer to CMA-9000 Installation Manual section VI Servicing). This mechanism dims the display when the temperature reaches an environmental temperature higher than approximately +70C. The CMA-9000 FMS has been qualified to maintain full brightness for a minimum of 30 minutes. It is therefore recommended to manually decrease the display dimming (using the BRT key or the external display control unit) to the minimum acceptable dimming setting if and only if the CMA-9000 FMS is to be operated in DAY luminance mode for longer than 30 minutes. No degraded operation is foreseen in normal operation mode below +70 C.

EQUIPMENT DESELECTION

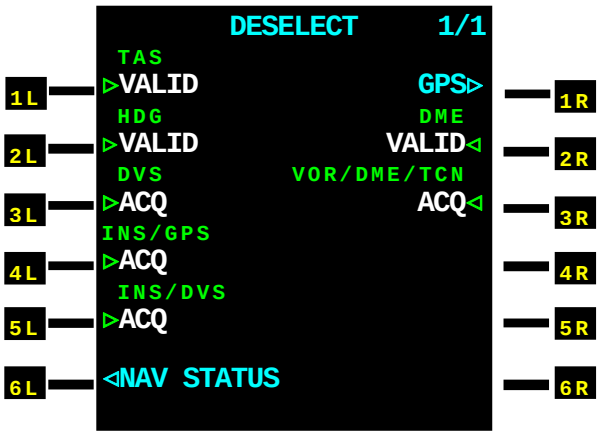
CAUTION: For installations in which GPS is the only navigation sensor, deselection of the GPS input will cause reversion to dead reckoning mode. See below and refer to the AFMS/RFMS for details.

1. Display the DESELECT page by pressing [INIT REF], <NAV STATUS> (LSK 5R) and <DESELECT> (LSK 6R).

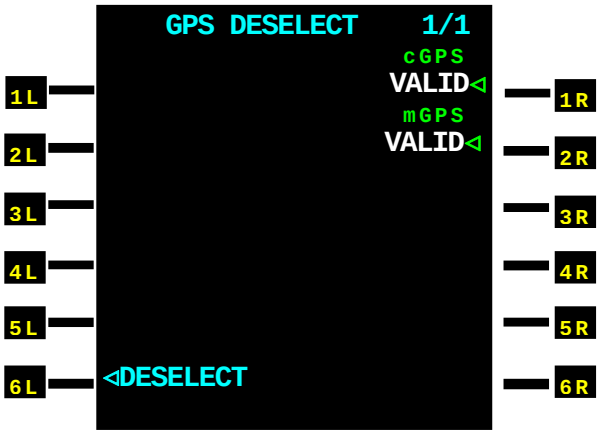
   Single GPS installed:



   Dual GPS installed:



When dual GPS is configured, selction of LSK 1R will bring the crew to the GPS DESLECT 1/1 page that allows the crew to deselect either the military of civil GPS.



The DESELECT 1/1 page permits deselection of the TAS, the HDG, a sensor input or a navigation source.

NOTE: VOR, DME, DVS, INS, INS/GPS, INS/DVS, KALMAN and XFMS prompts are only displayed if such equipments are interfaced with the CMA-9000 FMS. Refer to the AFMS for details.

If an equipment is suspected of being intermittent or unreliable, it should be manually deselected to prevent the possibility of navigation error.

2. Deselect the equipment by pressing the LSK besides its name until DESEL appears under it.

NOTE: To reselect the deselected equipment, follow step 2 until VALID or ACQ appears in the equipment's field.

TAS INPUT DESELECTION (OPTIONAL)

If the TAS input is observed to be intermittent or unreliable, this input should be manually deselected to prevent the possibility of temporary navigation errors.

1. Display the DESELECT 1/1 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <DESELECT> (LSK 6R).

2. Deselect the TAS by pressing LSK 1L until DESEL appears under the TAS line.

NOTE: To reselect a deselected TAS, follow steps 1 and 2 until VALID appears in the TAS field.

OPERATION WITH FAILED TAS INPUT

When operating in a position-fixing navigation mode (e.g. GPS, DME/DME, DME/VOR), long term navigational accuracy is not degraded due to loss of the TAS input. However, short term accuracy may be degraded during periods of rapidly changing ground speed and the computation and display of wind will not be available.

OPERATION WITH A FAILED ALTITUDE INPUT

When the CMA-9000 FMS is operated with the external CMA-3012/CMA-3024/CMA-3112 GNSSU or the Trimble TA-12 GPS receiver, the system installation is approved for en-route and terminal operations without altitude aiding, and for GPS instrument approaches with only an input of pressure altitude rather than baro-corrected altitude. See the AFMS/RFMS for further details.

If the FMS is configured for VNAV, baro-corrected altitude must be available for the FMS to calculate its Vertical Deviation. Baro-corrected altitude can be read directly from an Air Data Computer, or generated by the FMS from an Air Data Computer's pressure altitude and pilot entry of pressure correction on the PROGRESS 3/3, 4/4 or 4/5 page.

Once in flight, the actual satellite constellation determines whether altitude aiding is required to achieve the level of integrity to conduct a GPS instrument approach. With a good satellite constellation, no altitude aiding may, in fact, be necessary. Therefore the loss of the altitude input to the CMA-9000 FMS may have no impact on the operation of the flight, with the exception that manual waypoint sequencing will be required for altitude-terminated legs. This can be achieved via the <NEXT WPT> prompt (LSK 6R) on RTE x LEGSs and PROGRESS pages.

When all altitude inputs are lost, including GPS, manual update of aircraft altitude may be made on PROGRESS 4/4 (or 3/3) page.

HEADING INPUT DESELECTION (OPTIONAL)

If the heading input becomes intermittent or unreliable, it should be manually deselected to prevent navigation errors.

1. Display the DESELECT 1/1 page by pressing [INIT REF], <NAV STATUS> (LSK 5R), <DESELECT> (LSK 6R).

2. Deselect the HDG by pressing LSK 2L, until DESEL message appears in the HDG field.

NOTE: To reselect a deselected HDG follow steps 1 and 2, until VALID appears in the HDG field.

NAVIGATION IN DEAD RECKONING (DR) MODE

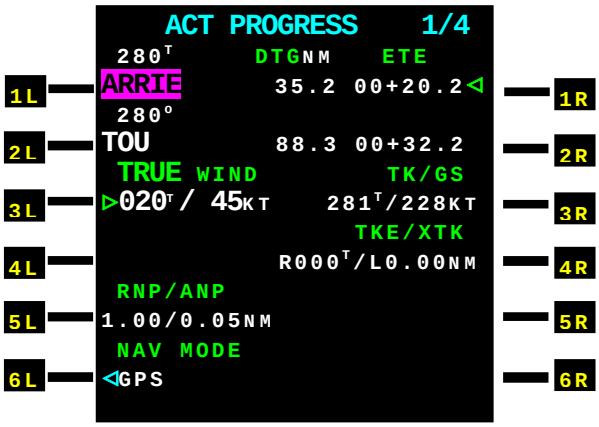
CAUTION: IFR operation in dead reckoning mode may not be permitted in certain classes of airspace.

When reversion to DR mode occurs (due to unavailability of all other navigation modes), the CMA-9000 FMS must rely solely on heading, true airspeed and the last computed value of wind, for navigation. This results in a position accuracy which degrades continuously during prolonged intervals of DR operation. The rate at which accuracy degrades depends on the quality of the source of the heading and speed inputs. The CMA-9000 FMS may therefore only maintain its normal accuracy if DR operation does not exceed three to five minutes duration (at typical speeds; it will be longer at lower speeds).

Navigation accuracy during prolonged DR operation may be improved by manual updating of present position and/or the actual track and ground speed and/or the wind speed and wind direction based on external information. This is particularly necessary during periods of changing winds, since the CMA-9000 FMS providing navigation data assumes constant wind during DR operation. In an installation where digital True Airspeed (TAS) is not provided, the CMA-9000 FMS assumes constant ground speed during DR operation, therefore the latter must be updated manually at regular intervals.

Manual update of the CMA-9000 FMS track and ground speed is accomplished as follows:

1. Display the PROGRESS 1/4 page by pressing [PROG] when the 4-page set of PROGRESS pages is configured (the PROGRESS 3/3 page when the 3-page set of PROGRESS pages is configured).



2. Enter the track angle in True (T)/Magnetic (°)and ground speed in knots into the scratchpad, e.g. 281/228.

3. Move the track angle and ground speed to the TK/GS field by pressing LSK 3R.

NOTE: Track angle and ground speed will automatically be updated as soon as the CMA-9000 FMS resumes normal navigation operation.

OPERATION WITH FAILED HEADING INPUT

When the heading input is unavailable, the two main consequences are: the computation of wind is unavailable, and more importantly, the CMA-9000 FMS accuracy may be temporarily degraded during turns exceeding 20 degrees except when in GPS mode. To prevent this temporary loss of accuracy, it is necessary to manually enter a new value of track angle each 10 to 20 seconds during a turn and again on completion of the turn. Follow steps 2. and 3. as described in NAVIGATION IN DEAD RECKONING (DR) MODE, skipping the entry of ground speed data. The procedure is not required when navigating with a valid GPS position.

MANUAL POSITION UPDATES

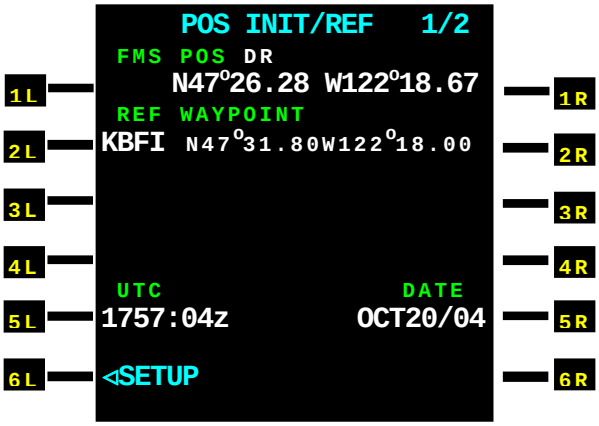
Manual position updates can be performed when navigating in Dead Reckoning mode.

The following operator action is required:

1. Prior to reaching a known reference position, get this known reference position coordinates to the scratchpad by following one of these three methods:
   - If the known point is a flight plan waypoint, go to the ACT RTE x LEGS POS 1/X page and line-select the appropriate waypoint coordinates to the scratchpad;
   - If the known point is a NavDataBase element, retrieve its coordinates from the NavDataBase via the WPT DATA 1/1 page, and line-select them to the scratchpad (LSK 1R);
   - Type the coordinates directly into the scratchpad.

2. Display the POS INIT/REF 1/2 page by pressing [INIT REF], <POS INIT> (LSK 2L).

3. When directly overhead the known reference position, enter the scratchpad coordinates into the CMA-9000 FMS POS field by pressing LSK 1R. The CMA-9000 FMS position is immediately updated to the new coordinates.



APPENDIX A - CMA-9000 FMS DISPLAY PAGES - DETAILED DESCRIPTIONS

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APPENDIX A

CMA-9000 FMS DISPLAY PAGES - DETAILED DESCRIPTIONS

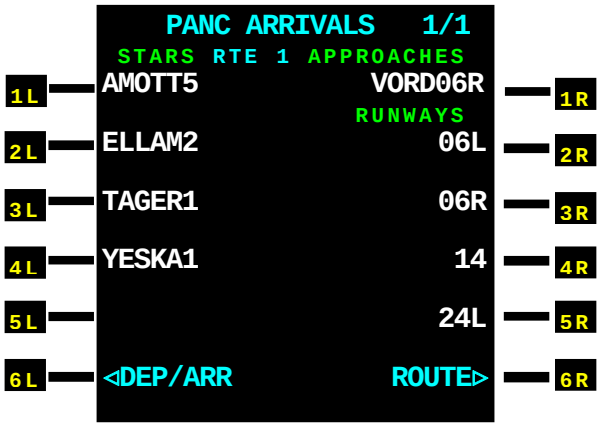
NOTE: In the key sequences shown to display the pages; square brackets "[ ]" indicate a function key, angle brackets "< >" indicate a line select key (left and right softkeys).

ARRIVALS 1/X

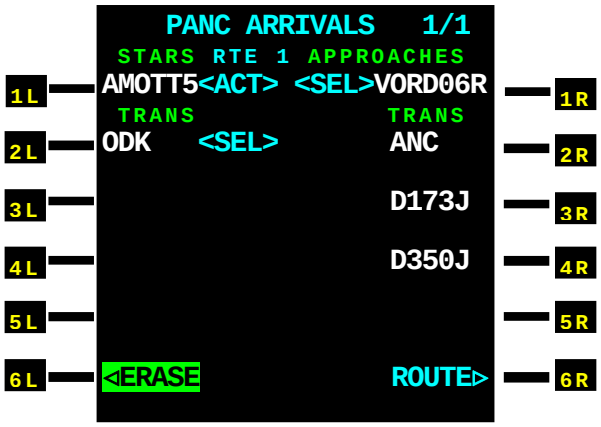
This page provides a listing of all arrival procedures, approach, tactical approach procedures and runways for the selected origin/destination. The selected or activated STAR, STAR transition, approach, tactical approach, approach transition or runway are displayed.

Access the ARRIVALS page either from DEP/ARR INDEX 1/1 page, press <ARR>; or press [DEP/ARR] (if airborne and past midway point of active route).

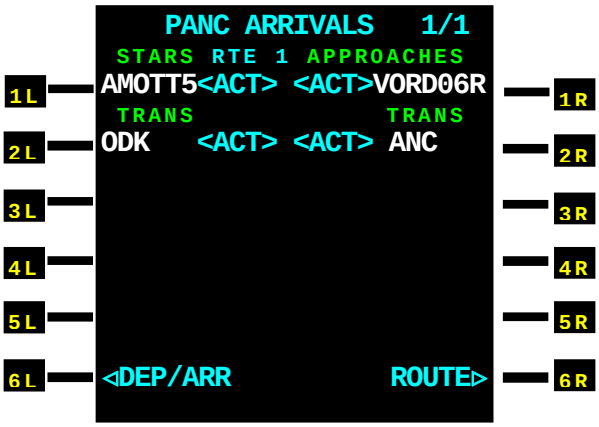
A. Initial Display:



B. Display after STAR selected and route executed, STAR transition selected, and approach selected:

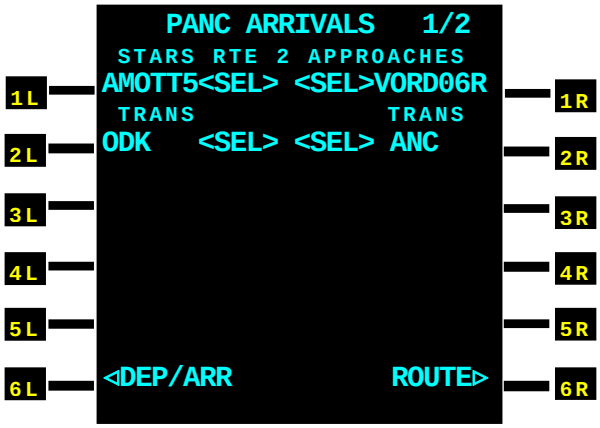


C. Display after all selections executed:



D. Inactive arrivals page, when changes not yet confirmed:

E. Inactive arrivals page after all selections confirmed:



PANC (title): Airport identifier (all page data applies only to the identified airport).

RTE (#): Display related route number.

STARS [1L,2L,3L,4L,5L]: Alphabetical listing of all STARS applicable to the airport. Line selection of the desired STAR removes all other STARS and non-applicable approaches/runways and displays a listing of applicable arrival transitions. Deletion of the Selected/Active STAR cancels any STAR, STAR transition selections (line selection toggles the STAR, STAR transition status between selected and not selected).

TRANS [2L,3L,4L,5L]: Displayed after STAR selection. Used to select/delete any arrival (enroute) transitions associated with the selected STAR.

DEP/ARR [6L]: Returns to the DEP/ARR INDEX 1/1 page (unless a route modification is in progress).

ERASE [6L]: Cancel any route modifications and/or any arrival selections. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route. Also refer to the comments about CANCEL/CONFIRM in ERASE [6L] above.

APPROACHES [1R,2R,3R,4R,5R]: Alphabetical listing of all approaches applicable to the airport. Line selection of the desired approach removes all other approaches/runways and non-applicable STARS and displays a listing of applicable approach transitions. Deletion of the selected/active approach cancels any approach, approach transition selection.

TACT APPR [1R,2R,3R,4R,5R]: Alphabetical listing of all tactical approaches applicable to the selected origin/destination. Line selection of the desired tactical approach removes all other tactical approaches, approaches/runways and non-applicable STARS. Deletion of the selected/active approach cancels any approach, approach transition selection. Only displayed if TACTICAL APPR is configured. The displayed name is right justified.

TRANS [2R,3R,4R,5R]: Displayed after approach selection. Used to select/delete any approach transition associated with the selected approach.

RUNWAY [2R,3R,4R,5R]: Alphabetical listing of all runways applicable to the airport. Line selection of the desired runway deletes all approaches and non-applicable STARS. Deletion of the selected/active runway cancels any runway selection.

ROUTE [6R]: Access to the RTE 1/X page related to the displayed ARRIVAL.

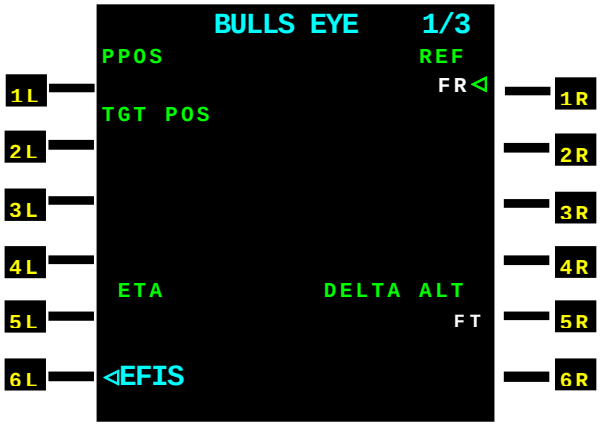
CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route. Also refer to the comments about CANCEL/CONFIRM in ERASE [6L] above.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

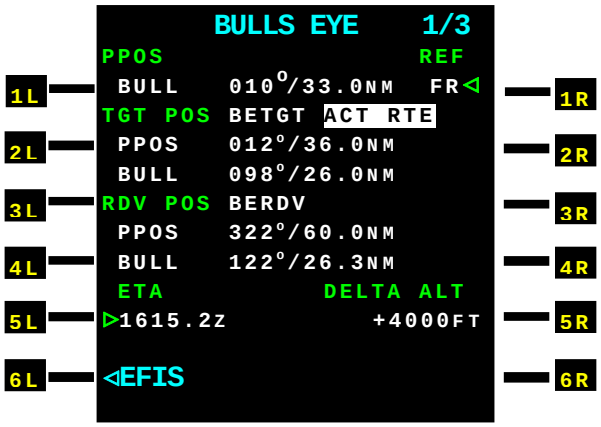
BULLS EYE 1/3 (if Tactical Config BULLS EYE is configured)

Display BULLS EYE 1/3 page by pressing [INIT REF], <BULLS EYE> {if no CFG KEY is configured to BULL} or [BULL] {if any CFG KEY is configured to BULL} or [TACT],<BULL TOP> {if TACT key configured, and BULLS TOP configured on TACTICAL page.}.

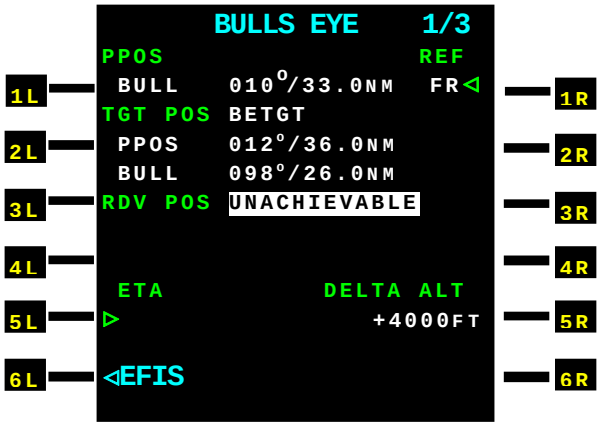
A. When no Bulls Eye waypoint and no Bulls Eye Target waypoint have been entered.



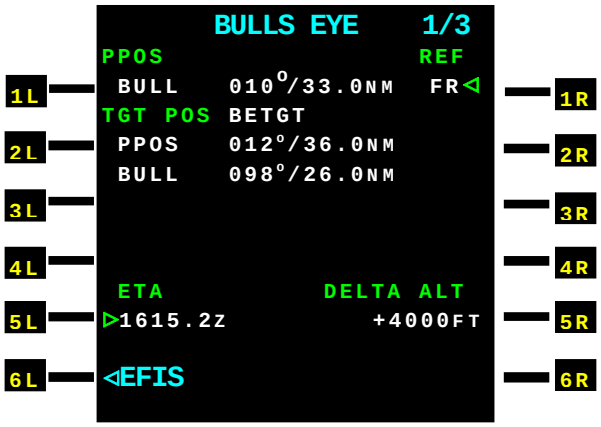
B. When the Bulls Eye Target rendezvous is achievable and part of the active route.



C. When the Bulls Eye Target rendezvous is unachievable.



D. When the Bulls EyeTarget is fixed.



PPOS (1L): Displays the present aircraft position bearing and distance relative to the Bulls eye waypoint. This field is blank when the Bulls eye waypoint is not defined. The Bulls eye ident always correspond to the one defined in the BULLS EYE 3/3 page.

REF [1R]: Toggles the bearing/distance reference type displayed of the present aircraft position relative to the Bulls Eye waypoint. FR: Radial (RAD) from Bulls Eye waypoint to present position. TO: Course (CRS) from present position to Bulls Eye waypoint. The default value on cold start is FR.

TGT POS (2L,2R): Displays the Bulls Eye Target waypoint ident. When the Bulls eye target is part of the active route "ACT RTE" is displayed in inverse video white.

TGT POS BRG/DIS (2L,2R, 3L,3R): Displays the Bulls Eye Target bearing/distance relative to the present aircraft position (PPOS) and relative to the Bulls eye waypoint (BULL). The Bulls eye ident always correspond to the Bulls eye ident defined on BULLS EYE 3/3 page. When the Bulls eye target is not defined, this field is blank. If the Bulls eye waypoint is not defined, the bearing/distance relative to Bulls eye waypoint is blank.

RDV POS (3L,3R): Displays the Bulls Eye Target Rendezvous ident or status. When the Bulls Eye Target Rendezvous is achievable the ident "BERDV" is displayed, otherwise "UNACHIEVABLE" is displayed in inverse video white. When the Bulls Eye Target is not defined or is a fixed waypoint, the field is blank.

RDV POS BRG/DIS (4L,4R): Displays the Bulls eye Target Rendezvous bearing/distance relative to the aircraft present position (PPOS) and relative to the Bulls eye waypoint (BULL). The Bulls eye ident always correspond to the Bulls eye ident defined the BULLS EYE 3/3 page. When the Bulls eye target Rendezvous is not achievable, this field is blank. If the Bulls eye waypoint is not defined, the bearing/distance relative to Bulls eye reference is blank.

ETA/ETE [5L]: Estimated time of arrival or estimated time en route to the Bulls Eye Target Rendezvous (or to the Bulls Eye Target itself if it is not moving). The field is blank if the Bulls Eye Target Rendezvous is not achievable. On selection will toggle between ETA and ETE.

NOTE: When the aircraft is on ground, if PLAN DATA page is not installed the ETE/ETA field is blank.

DELTA ALT (5R): Displays the altitude difference between the Bulls Eye Target Rendezvous (or the Bulls Eye Target itself if a) it is not moving or b) the Bulls Eye Target Rendezvous is unachievable) and the aircraft. The field is blank if the Bulls Eye Target altitude has not been entered on the BULLS EYE 2/3 page.

EFIS [6L]: Access to the EFIS 1/1 page. This field is only displayed when one of the following EFIS is configured: SPERRY, SPERRY2, GAMA, SEXTANT, ROCKWELL, ROCKWELL2, ROCKWELL3, BARCO, AHCAS2, MEGGIT, or Primus Epic, otherwise, this field is blank.

BULLS EYE 2/3 (if Tactical Config BULLS EYE is configured)

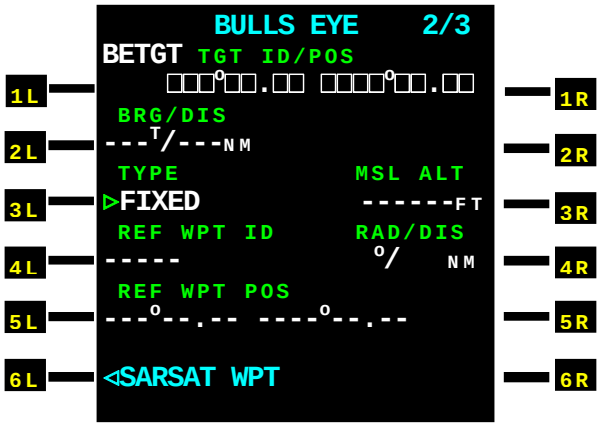
Display BULLS EYE 2/3 page by pressing [INIT REF], <BULLS EYE>, [NEXT] {if configured on one of the INIT/REF pages}
or [TACT],<BULL TGT> {if TACT key configured, and BULLS TGT configured on TACTICAL page.}
or [BULL], [NEXT] {if any CFG KEY is configured to BULL}
or [INIT/REF], <WPT LISTS>, <SARSAT WPT>, <NNN##>, <BULLS TGT>
(Where NNN is "ELT" or "PLB" or "EPI" or "TST" and ## varies from 01 to 99)

The BULLS EYE 2/3 page allows selection or creation of the Bulls Eye Target waypoint. It may be created as a moving waypoint when the configuration option is selected.

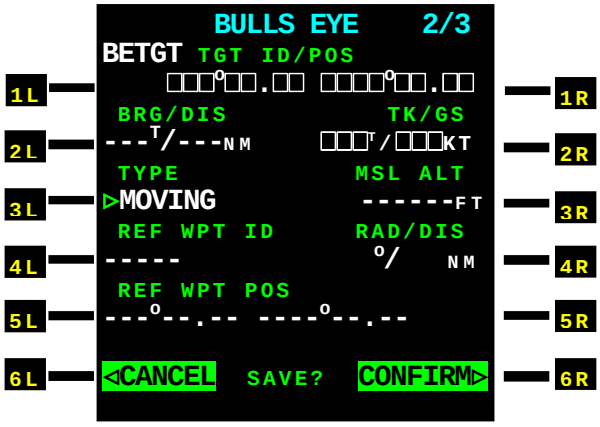
When the Bulls Eye Target waypoint is a moving waypoint and it is present in the active route, an ACT RTE caption is displayed in reverse video.

When the Bulls Eye Target waypoint is being created or modified and all mandatory fields are entered, CANCEL/CONFIRM prompts will appear. Leaving the BULLS EYE 2/3 page without confirmation will automatically perform a CANCEL.

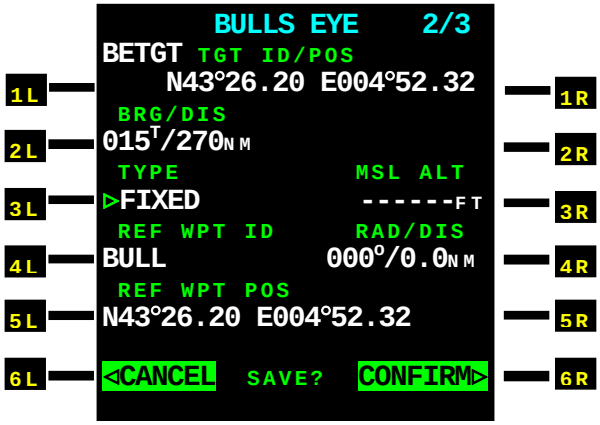
A. The page display is as follow when no Bulls Eye Target waypoint has been entered or after entering DELETE on the TGT ID field.



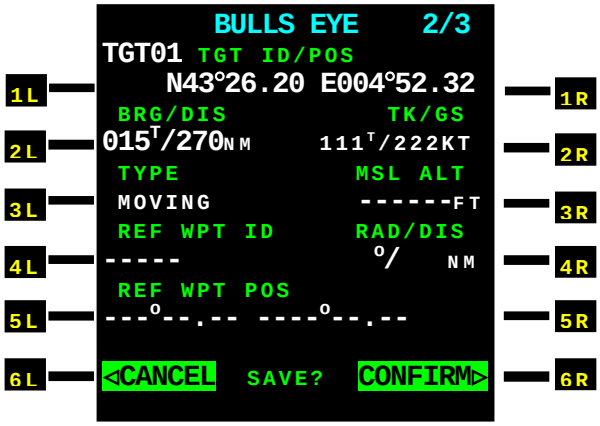
B. When no Bulls Eye Target waypoint has been entered but the type is set to MOVING.



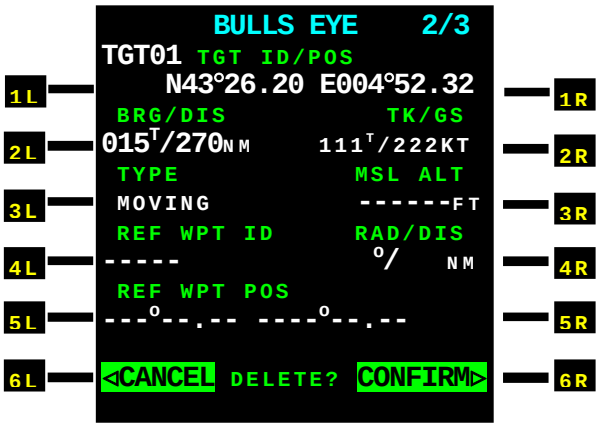
C. After defining the Bulls Eye Target waypoint manually:



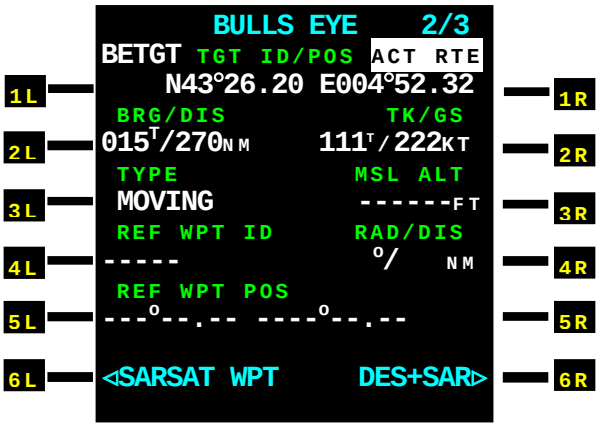
D. After selecting a new Bulls Eye Target:



E. After entering DELETE on the Bulls Eye Target waypoint:



F. When the Bulls Eye Target waypoint is in the active route:



TGT ID [1L]: Bulls Eye Target waypoint identifier (5 characters max.). Entry of an ID triggers a search in all the FMS databases for the requested waypoint. Once the selected waypoint is determined, the ID/POS, BRG/DIS, TYPE and TK/GS (for moving wayoints) fields are updated with the waypoint data. The ident is reset to BETGT when a manual entry is performed on the POS, BRG/DIS or REF ID/POS/RAD/DIS fields. Entering DELETE in this field will delete the Bulls Eye Target entry and reset all fields to their default values. The default value of this field is BETGT.

POS [1R]: Bulls Eye Target waypoint position. Manual entry forces default value to appear in the TGT ID, REF WPT ID, REF WPT POS and RAD/DIS fields and automatically updates the BRG/DIS field. For a moving Bulls Eye Target, the value will be recomputed and displayed at a minimum rate of once every second. The default value is boxes. This field also displays ACT RTE in reverse white video when the Bulls Eye Target waypoint is present in the active route. Only modification to a manually defined Bulls Eye Target is allowed in this state.

BRG/DIS [2L]: Bearing and distance from the current aircraft position to the Bulls Eye Target waypoint. Manual entry forces default value to appear in the TGT ID, REF WPT ID, REF WPT POS, and RAD/DIS fields, and automatically updates the POS field. BRG and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated. The values will be recomputed and displayed at a minimum rate of once every second. The default values are dashes, and the minimum/maximum values for the bearing are 0/360 degrees and 0/999 NM for the distance.

TK/GS [2R]: Track angle and ground speed of a moving Bulls Eye Target waypoint. This field is only displayed if the selected Bulls Eye Target is a moving waypoint. Entry is allowed on this field only when the Bulls Eye Target is manually defined.

TYPE [3L]: Waypoint selection type: FIXED or MOVING. Toggling this field is allowed only when the Bulls Eye Target is
manually defined and is not in the flight plan, and the moving waypoints are configured.

MSL ALT [3R]: MSL altitude of the Bulls Eye Target waypoint in feet. Default value is dashes and the minimum/maximum values are -1000/65535 feet.

REF WPT ID [4L]: Reference waypoint identifier with dashes as default value. Entry of an ID triggers a search in all the FMS databases for the requested waypoint. Once the selected waypoint is determined, its position will be displayed in the REF WPT POS field, the RAD/DIS and the TGT ID will be reset to their default values and the POS and BRG/DIS fields will be automatically updated. Entering a moving waypoint as a reference will use the moving waypoint's position computed at the moment of the entry.

RAD/DIS[4R]: Radial/distance from the reference position to the desired Bulls Eye Target waypoint position. The values are blanked when no REF WPT POS is defined, otherwise zeros are displayed as the default values. No entries are allowed when the fields are blanked. Manual entry automatically updates the POS and BRG/DIS fields. RAD and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated. The minimum/maximum values for the radial are 0/360 degrees and 0/999 NM for the distance.

REF WPT POS [5L]: Reference position with dashes as default value. It corresponds to the position of the REF WPT ID or a manually entered value. Upon entry of a value, the RAD/DIS and the TGT ID fields are reset to their default values, the REF ID field will be set to dash symbols and the POS and BRG/DIS fields will be automatically updated.

SARSAT WPT [6L]: Access to the SARSAT WPT page. Displayed only if a DF is configured.

CANCEL [6L]: Cancels modifications or deletion of the Bulls Eye Target waypoint. Upon cancellation of a modification, all
the fields return to their previous values.

DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL 1/Y page instead of the DES+SAR 1/Y page. Access to the DES+SAR (or TACTICAL) page and sets the Bulls Eye Target waypoint as reference waypoint.

CONFIRM [6R]: Confirms a modification or deletion of the Bulls Eye Target waypoint. Confirmation of a modification is rejected when either no position or no tk/gs have been entered. Upon confirmation of the deletion of the Bulls Eye Target waypoint, all fields are reset to their default values. Note: Unless confirmation is requested for a deletion, changes are still allowed while CONFIRM is on the screen.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts upon modification of the Bulls Eye Target waypoint.

(DELETE?): Displayed between the CANCEL/CONFIRM prompts upon deletion of the Bulls Eye Target waypoint.

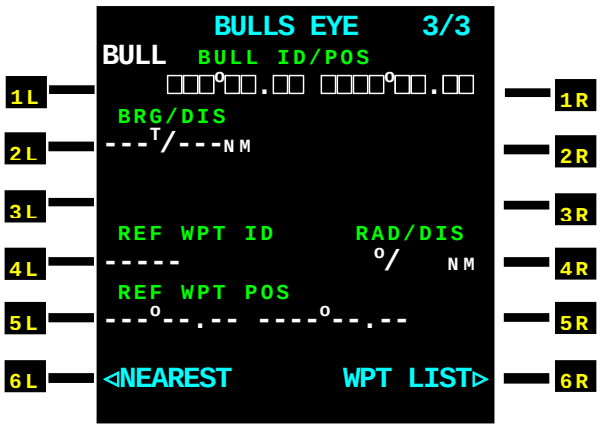
BULLS EYE 3/3 (if Tactical Config BULLS EYE is configured)

Display BULLS EYE 3/3 page by pressing [INIT REF], <BULLS EYE>, [PREV] {if not configured on one of the INIT/REF pages}
or [TACT],<BULL WPT> {if TACT key configured, and BULLS WPT configured on TACTICAL page.}
or [BULL], [PREV] {if CFG KEY 5 is configured to BULL}

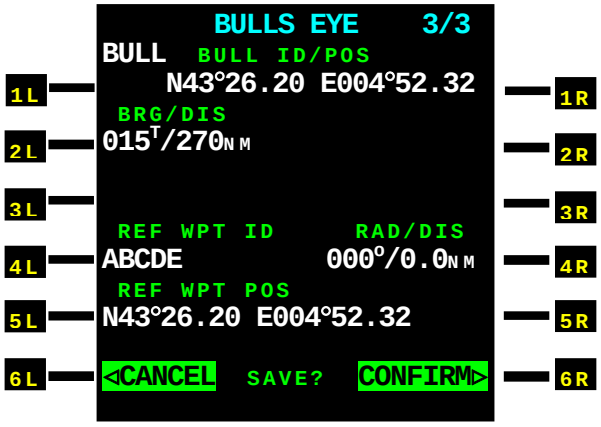
The BULLS EYE 3/3 pages allow creation or selection of the Bulls Eye waypoint. For selection from the user database, the Bulls Eye waypoint can only be defined as a fixed waypoint.

When the Bulls Eye waypoint is being created or modified and all mandatory fields are entered, CANCEL/CONFIRM prompts will appear. Leaving the BULLS EYE 3/3 page without confirmation will automatically perform a CANCEL.

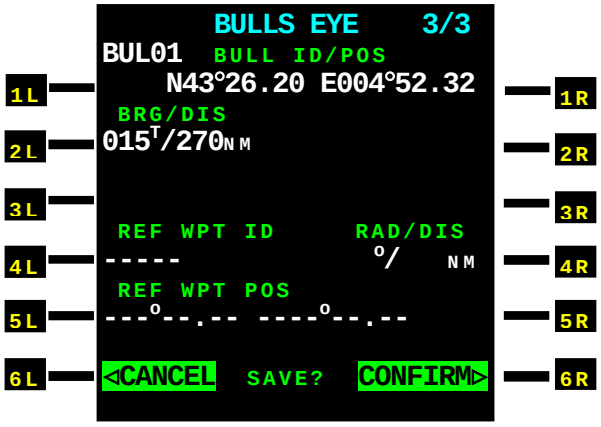
A. The page display is as follow when no Bulls Eye waypoint has been entered or after entering DELETE on the BULL ID field.



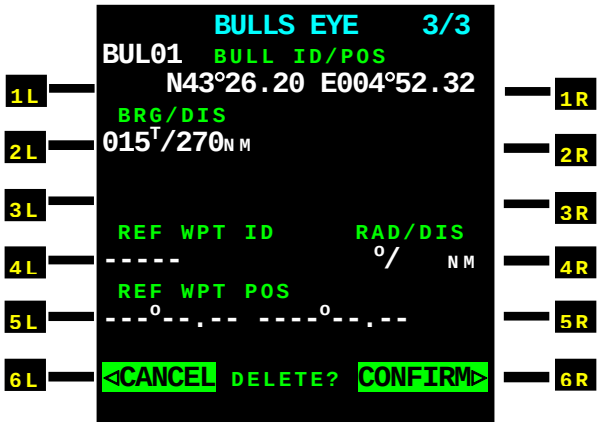
B. After a manual entry of the Bulls Eye waypoint:



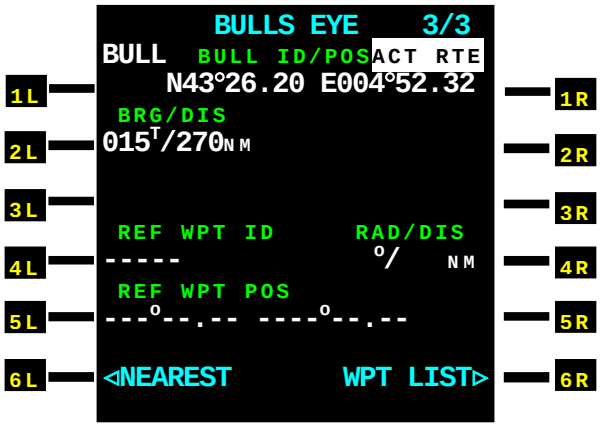
C. After selection of the Bulls Eye waypoint:



D. After entering DELETE on the Bulls Eye waypoint:



E. When the Bulls Eye waypoint is in the active route:



BULL ID [1L]: Bulls Eye waypoint identifier (5 characters max.). Entry of an ID triggers a search in all the FMS databases for the requested waypoint. Once the selected waypoint is determined, the ID/POS, BRG/DIS and TYPE fields are updated with the waypoint data. The ident is reset to BULL when a manual entry is performed on the POS, BRG/DIS or REF ID/POS/RAD/DIS fields. Entering DELETE in this field will delete the Bulls Eye waypoint entry and reset all fields to their default values. The default value for this field is BULL.

POS [1R]: Bulls Eye waypoint position. Manual entry forces default value to appear in the BULL ID, REF WPT ID, REF WPT POS and RAD/DIS fields and automatically updates the BRG/DIS field. The default value is boxes. This field also displays ACT RTE in reverse white video when the Bulls Eye waypoint is present in the active route. Only modification to a manually defined Bulls Eye waypoint is allowed in this state.

BRG/DIS [2L]: Bearing and distance from the current aircraft position to the Bulls Eye waypoint. Manual entry forces default value to appear in the BULL ID, REF WPT ID, REF WPT POS, and RAD/DIS fields, and automatically updates the POS field. BRG and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated. The values will be recomputed and displayed at a minimum rate of once every second. The default values are dashes, and the minimum/maximum values for the bearing are 0/360 degrees and 0/999 NM for the distance.

REF WPT ID [4L]: Reference waypoint identifier with dashes as default value. Entry of an ID triggers a search in all the FMS databases for the requested waypoint. Once the selected waypoint is determined, its position will be displayed in the REF WPT POS field, the RAD/DIS and the BULL ID will be reset to their default values and the POS and BRG/DIS fields will be automatically updated. Entering a moving waypoint as a reference will use the moving waypoint's position computed at the moment of the entry.

RAD/DIS[4R]: Radial/distance from the reference position to the desired Bulls Eye waypoint position. The values are blanked when no REF WPT POS is defined, otherwise zeros are displayed as the default values. No entries are allowed when the fields are blanked. Manual entry automatically updates the POS and BRG/DIS fields. RAD and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated. The minimum/maximum values for the radial are 0/360 degrees and 0/999 NM for the distance.

REF WPT POS [5L]: Reference position with dashes as default value. It corresponds to the position of the REF WPT ID or a manually entered value. Upon entry of a value, the REF ID field will be set to dash symbols, the RAD/DIS and the BULL ID will be reset to their default values and the POS and BRG/DIS fields will be automatically updated.

NEAREST[6L]: Access to the NEAREST 1/1 page.

CANCEL [6L]: Cancels modification or deletion of the Bulls Eye waypoint. Upon cancellation of a modification, all the fields return to their previous values.

WPT LIST [6R]: Access to the USER WPT LIST 1/N page. This prompt is present only if at least one user waypoint is defined in the user database.

CONFIRM [6R]: Confirms modification or deletion of the Bulls Eye waypoint. Upon confirmation of the deletion of the Bulls Eye waypoint, all fields are reset to their default values. Note: Unless confirmation is requested for a deletion, changes are still allowed while CONFIRM is on the screen.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts upon modification of the Bulls Eye waypoint.

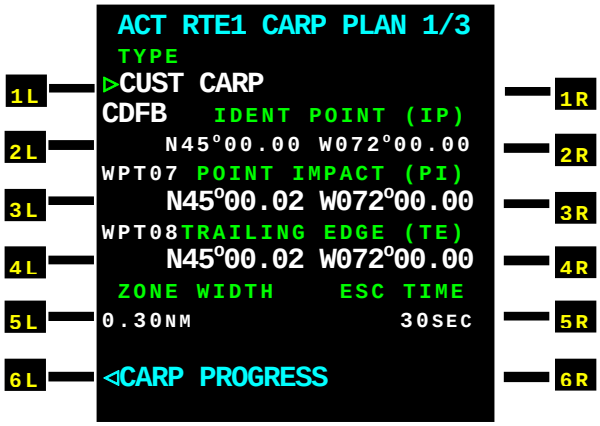
(DELETE?): Displayed between the CANCEL/CONFIRM prompts upon deletion of the Bulls Eye waypoint.

CARP PLAN 1/3 (If CARP configured)

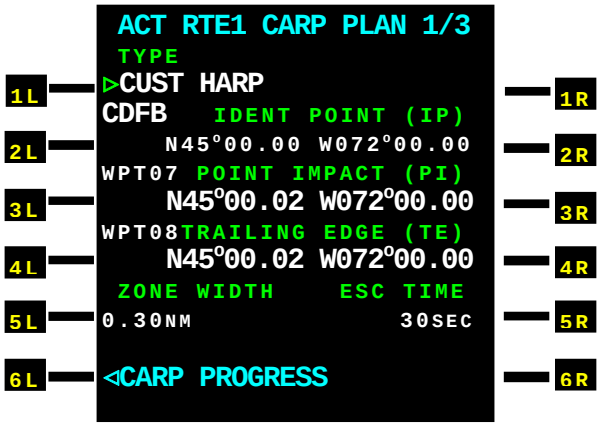
Display CARP PLAN 1/3 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <CARP> {when a CARP procedure is in the displayed flight plan} or
[TACT], <CARP> {when TACT key is configured and a CARP procedure is in the displayed flight plan}
Automatically accessed whenever /C is entered over a CARP procedure on the LEGS page.

The CARP PLAN pages are used to define the parameters for a CARP procedure. The CARP procedure may be defined in either the active or inactive route.

A. ACTive status and sample inputs – Custom CARP.



B. ACTive status and sample inputs - Custom HARP.



C. ACTive status and sample inputs - Custom HAHO.

D. ACTive status and sample inputs – FREE FALL.

ACT/MOD/" " RTEx (title): ACT indicates that the EXECuted CARP procedure is active (CARP Active discrete is on). MOD indicates the CARP procedure modifications have not been EXECuted yet. A blank field indicates the CARP procedure:

- Is in the active flight plan, but is not considered Active yet (CARP Active discrete is OFF), or
- The CARP procedure for the Inactive route is being displayed.

Also, RTEx (where 'n' can be 1 or 2) indicates for which route the current CARP procedure is being displayed.

TYPE [1L]: Air Release Type selection key - CUST CARP, CUST HARP, CUST HAHO, FREE FALL. The Air Release Type affects the CARP parameters displayed.

IP [2L]: Optional Waypoint Identifier of the Identification Point (IP). The entry may be in the form of a place-bearing-distance (wptidBRG/DIS, e.g. WPT07012/112). If an IP position is entered in LSK [2R], then a temporary waypoint is automatically created and the identifier (WPTXX) is displayed in [2L]. Otherwise, a database waypoint identifier may be entered in this field.

IP [2R]: Optional Latitude and Longitude coordinates of the Identification Point (IP). The format of the position must be in the form of latitude and longitude ("NxxWxxx" or "Nxxxx.xxWxxxxx.xx"). If an identifier is entered in LSK [2L], then its position is automatically displayed here in normal font.

PI [3L]: Waypoint Identifier of the Point of Impact (PI). The entry may be in the form of a place-bearing-distance (wptidBRG/DIS, e.g. WPT07012/112). If an PI position is entered in LSK [3R], then a temporary waypoint is automatically created and the identifier (WPTXX) is displayed in [3L]. Otherwise, a database waypoint identifier may be entered in this field.

PI [3R]: Latitude and Longitude coordinates of the Point of Impact (PI). The format of the position must be in the form of latitude and longitude ("NxxWxxx" or "Nxxxx.xxWxxxxx.xx"). If an identifier is entered in LSK [3L], then its position is automatically displayed here in normal font.

TE [4L]: Waypoint Identifier of the Drop Zone Trailing Edge (TE). The entry may be in the form of a place-bearing-distance (wptidBRG/DIS, e.g. WPT07012/112). If a TE position is entered in LSK [4R], then a temporary waypoint is automatically created and the identifier (WPTXX) is displayed in [4L]. Otherwise, a database waypoint identifier may be entered in this field. Not available for CUST HAHO drops.

TE [4R]: Latitude and Longitude coordinates of the Trailing Edge (TE). The format of the position must be in the form of latitude and longitude ("NxxWxxx" or "Nxxxx.xxWxxxxx.xx"). If an identifier is entered in LSK [4L], then its position is automatically displayed here in normal font. Not available for CUST HAHO drops.

ZONE WIDTH [5L]: Drop zone width (nm). Default value is 0.30. Range [0.03..9.99]. This field is not displayed for CUST HAHO.

DROP TIME [5L]: In case of Custom HAHO. Time, in seconds, needed to perform all the intended drops. Used to compute the best solution. Default is dashes, range [1..999].

ESC TIME [5R]: Desired elapsed time (s) after reaching the XTE (Red Light) that A/C must maintain current heading, speed, and altitude. Default value is 30. Range [1..999].

CARP PROGRESS [6L]: Access to CARP PROGRESS page. Displayed for the active route only.

ERASE [6L]: Cancel any active route modifications and/or any CARP parameter changes. Only displayed when the page is displaying the MOD status. If by pressing ERASE the CARP procedure is removed from the flight plan, then the LEGS page is automatically displayed.

CANCEL [6L]: Cancel the changes made to the inactive route.

CONFIRM [6R]: Confirm the changes made to the inactive route. If the CARP solution does not exist with the parameters entered, an advisory message is displayed in the scratchpad and the CANCEL/CONFIRM prompts remain displayed. The user may then correct the parameters, press CANCEL or remove the procedure from the flight plan.

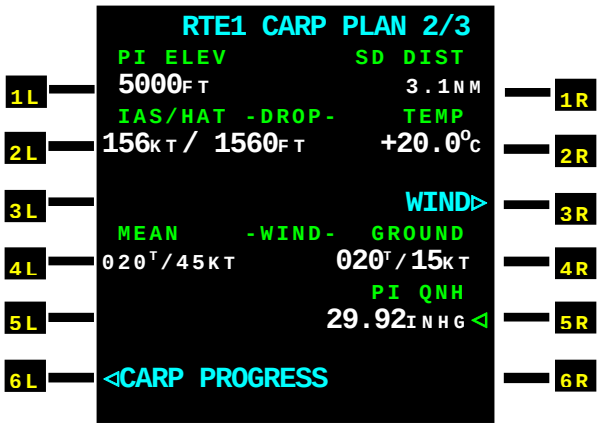
NOTES:

- *Pressing on a waypoint ID or position LSK with an empty scratchpad copies the ID or position to the scratchpad.*
- *Waypoint entries may be relative to any waypoint using relative bearing and distance as offsets (e.g. WPT12123/60 defines a position with a bearing of 123 degrees and distance of 60 nm relative to WPT12).*
- *Invalid entries in terms of format or range are not accepted by the FMS and an advisory message is displayed in the scratchpad.*
- *Pressing the RESET key on the CARP PLAN 3/3 page resets all parameters to their default values (for the chosen type of CARP/HARP).*

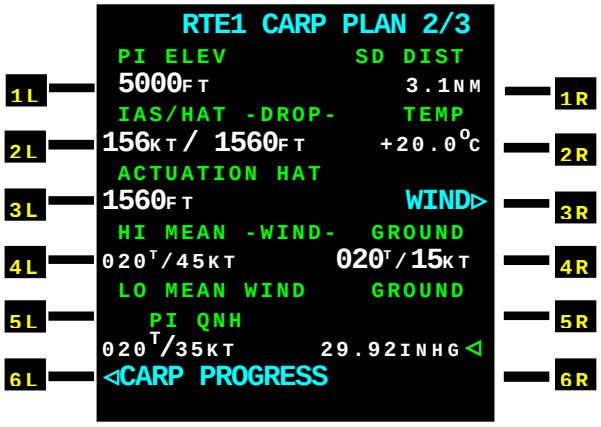
CARP PLAN 2/3 (If CARP configured)

Display CARP PLAN 2/3 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <CARP>, [NEXT] {when a CARP procedure is in the displayed flight plan} or
[TACT], <CARP>,[NEXT] {when TACT key is configured and a CARP procedure is in the displayed flight plan}
Automatically accessed whenever /C is entered over a CARP procedure on the LEGS page, [NEXT].

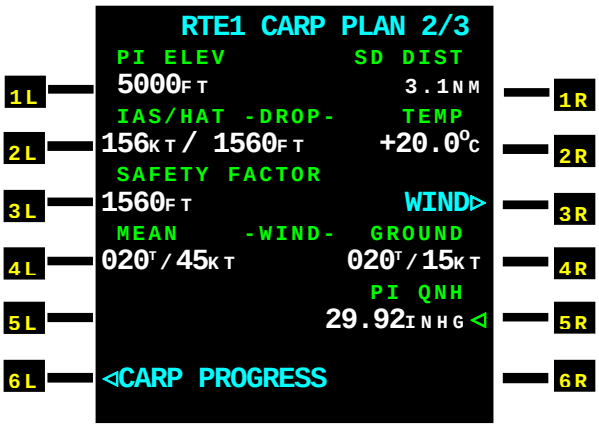
A. Custom CARP view:



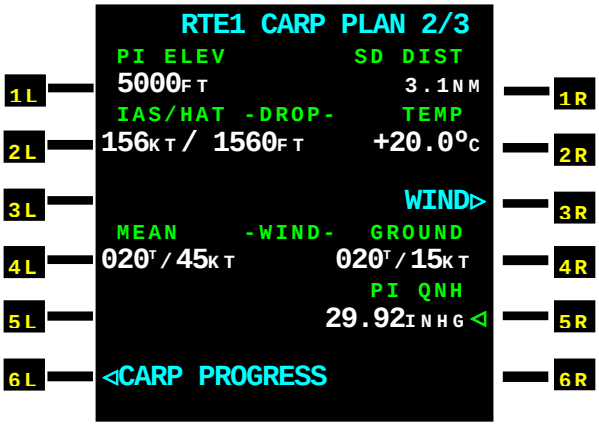
B. Custom HARP view:



C. Custom HAHO view:



D. Free Fall view:



ACT/MOD/" " RTEx (title): ACT indicates that the EXECuted CARP procedure is active (CARP Active discrete is on).
MOD indicates the CARP procedure modifications have not been EXECuted yet. A blank field indicates the CARP procedure:

- Is in the active flight plan, but is not considered Active yet (CARP Active discrete is OFF), or
- the CARP procedure for the Inactive route is being displayed.

Also, RTEx (where 'n' can be 1 or 2) indicates for which route the current CARP procedure is being displayed.

PI ELEV [1L]: Point of Impact (PI) elevation (feet) above Mean Sea Level(MSL). Range [-1000 .. 9999]. The maximum sum of the DROP HAT and PI ELEV is 19999 feet.

SD DIST [1R]: Display and entry of Slowdown Distance (nm), defined as the distance from the Slowdown point (SD) to the CARP green light waypoint (CRP). The default is the FMS computed value. If insufficient CARP parameters are available to compute a value, the FMS displays dashes until sufficient parameters are available, at which time the default value is displayed. Manual entry overrides the FMS computed value. Manual entry range: 0.0 to 99.9 nm.

DROP IAS/HAT [2L]: Mission Indicated Air Speed (knts) and Height Above Terrain (HAT) (ft) planned for the drop. The default is boxes. A manual entry is required. When the entered HAT is less than the entered VERT DIST value, an invalid data entry message is displayed. Range [50 .. 175] / [0 .. 19999]. The maximum sum of DROP HAT and PI ELEV is 19999 feet. DROP HAT value must be greater than the ACUATION HAT for CUST HARP. DROP HAT value must be greater than the entered safety factor for CUST HAHO.

DROP TEMP [2R]: Static air temperature ((C) at the drop altitude. The default is the FMS value taken from the ADC at the current altitude corrected for temperature deviation. Manual entry may override. When temperature from ADC is not available, the standard day temperature deviation is used to compute the temperature at the drop altitude. If the drop HAT has not yet been entered, the ADC static air temperature is displayed, if available. Otherwise dashes are displayed. Range [-99.9 .. 99.9]

ACTUATION HAT [3L]: Displayed for CUST HARP only. Height, in feet, above PI where the parachute cord is pulled. Actuation HAT must be less than the entered DROP HAT, and greater than the entered DECEL DIST. Default display is boxes. Manual entry is required. Range [0 .. 19999].

SAFETY FACTOR [3L]: Displayed for CUST HAHO only. A safety buffer (ft) from exit to assembly of parachutists under canopy and for assembly at a certain altitude once they arrive over the drop zone. The safety factor must be less than the entered DROP HAT. Default value is 2,000 feet. Range [0 .. 5000].

WIND [3R]: Access to the CRP01 WIND page.

MEAN WIND [4L]: Mean Effective Wind (MEW) direction and speed (() /(kt) or (T)/(kt) from PI altitude to drop altitude to be used in the FMS CARP calculations. Unit used depends on current display setup (true or mag).The default display is computed by the FMS based on current and predicted wind at the mission altitude. A manual entry is allowed. If a ground wind is entered (GROUND WND), then the displayed value is modified to take into account both the FMS predicted value at the drop altitude and the entered ground wind. Range [0 .. 360] / [0 .. 99]. Not displayed for CUST HARP.

HI MEAN WIND [4L]: Displayed for CUST HARP only. Mean Effective Wind (MEW) direction and speed (() /(kt) or (T)/(kt) from the drop altitude to the actuation altitude to be used in the FMS CARP calculations. Unit used depends on current display setup (true or mag).The default display is computed by the FMS based on current and predicted wind at the drop and actuation altitudes. A manual entry may force a specific value, which may be based on observations by a ground team using the procedure defined in AFI 11-217. Range [0 .. 360] / [0 .. 99].

GROUND WIND [4R]: Wind direction and speed (() /(kt) or (T)/(kt) observed by a ground team at PI (Point of Impact). Unit used depends on current display setup (true or mag). If a Mean Effective Wind (MEW) has been entered or a LO MEAN WIND for HAHO, this field is cleared. The default display is dashes. Range [0 .. 360] / [0 .. 99]

LO MEAN WIND [5L]: Displayed for CUST HARP only. Mean Effective Wind (MEW) direction and speed (°) /(kt) or (^{T})/(kt) from PI altitude to actuation altitude to be used in the FMS CARP calculations. Unit used depends on current display setup (true or mag).The default display is computed by the FMS based on current and predicted wind at the actuation altitude. A manual entry is allowed. If a ground wind is entered (GROUND WND), then the displayed value is modified to take into account both the FMS predicted value at the actuation altitude and the entered ground wind. If the actuation HAT has not yet been entered, dashes are displayed. Range [0 .. 360] / [0 .. 99].

PI QNH [5R]: Altimeter setting at PI in mb or inHg. The displayed unit (mb or inHg) can be toggled via LSK 5R when the scratchpad is empty. Displayed, in small font, when the FMS altimeter setting (QNH) is used. Manual entry is allowed in inches of mercury (in Hg) with a range from 27.0 to 32.0 in Hg or in millibars (mb) with a range from 915 to 1083 mb. When neither a manual PI QNH entry nor the FMS QNH is available, boxes are displayed.

CARP PROGRESS [6L]: Access to CARP PROGRESS page.

ERASE [6L]: Cancel any active route modifications and/or any CARP parameter changes. Only displayed when the page is displaying the MOD status. If by pressing ERASE the CARP procedure is removed from the flight plan, then the LEGS page is automatically displayed.

CANCEL [6L]: Cancel the changes made to the inactive route.

CONFIRM [6R]: Confirm the changes made to the inactive route. If the CARP solution does not exist with the parameters entered, an advisory message is displayed in the scratchpad and the CANCEL/CONFIRM prompts remain displayed. The user may then correct the parameters, press CANCEL or remove the procedure from the flight plan.

NOTES:

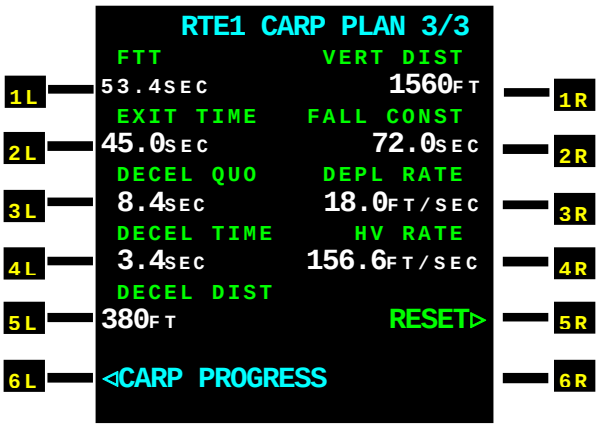
- *Entering DELETE on any field causes it to resume its default value.*
- *Pressing the RESET key on the CARP PLAN 3/3 page resets all parameters to their default values.*

CARP PLAN 3/3 (If CARP configured)

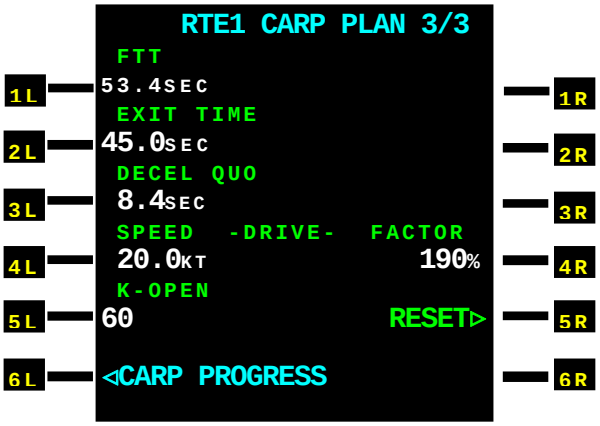
Display CARP PLAN 3/3 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <CARP>, [PREV] {when a CARP procedure is in the displayed flight plan} or
[TACT], <CARP>, [PREV] {when TACT key is configured and a CARP procedure is in the displayed flight plan}
Automatically accessed whenever /C is entered over a CARP procedure on the LEGS page, [PREV].

A. Custom CARP view:

B. Custom HARP view:



C. Custom HAHO view:



D. Free Fall view:

ACT/MOD/" " RTEx (title): ACT indicates that the EXECuted CARP procedure is active (CARP Active discrete is on).
MOD indicates the CARP procedure modifications have not been EXECuted yet. A blank field indicates the CARP procedure:

- Is in the active flight plan, but is not considered Active yet (CARP Active discrete is OFF), or
- the CARP procedure for the Inactive route is being displayed.

Also, RTEx (where 'n' can be 1 or 2) indicates for which route the current CARP procedure is being displayed.

FTT [1L]: Forward Travel Time (s). The total effective time that the dropped equipment/personnel travels at the aircraft speed/direction. It is the sum of Exit time and Deceleration Quotient time. When FTT is directly obtainable from ballistic table, then a manual entry may be performed. The value then appears in large font while fields DECEL QUO and EXIT TIME show dashes. If the value is calculated from entered values for EXIT TIME and DECEL QUO, then the value is displayed in normal font. The default value is boxes. If only one of the two fields EXIT TIME and DECEL QUO is entered, then dashes are displayed for FTT. Operator entry is mandatory. Range [0.0 .. 99.9]. This field is not displayed for Free Fall.

HORIZONTAL DISTANCE [1L]: Displayed for Free Fall only. Horizontal distance of fall, in meters, travelled by the load. Extracted from the free fall ballistic data tables. Default display is boxes. Range [0..999].

VERT DIST [1R]: Displayed for CUST CARP and CUST HARP only. Vertical distance (ft) travelled by the load until stabilization. Data may be extracted from parachute ballistic data tables. The default value is boxes. Operator entry is required. When the value entered is too large for the value of MISSION HAT, an invalid data entry message is displayed. Range [1-2999].

EXIT TIME [2L]: Drop Exit Time (s). Elapsed time from the green light signal to the exit of the first element from the airplane. Value may be extracted from parachute ballistic data tables. The default value is dashes. If a value is entered for DECEL QUO, then the default display is boxes. When an FTT value is manually entered, then dashes are displayed. Range [0 .. 99.9]. For Free Fall type this field is a required entry.

FALL CONST [2R]: Displayed for CUST CARP and CUST HARP only. A false time constant, in seconds, used to determine drift effect during the time the parachutist/load falls after exiting the aircraft until reaching stabilization. Compensates for the non-linear rate of fall of the load. Data may be extracted from ballistic data tables. The default value is boxes. Operator entry is required. Range [1..99.9].

DECEL QUO [3L]: Deceleration Quotient (s). Value may be extracted by the operator from the ballistic tables in AFI 11-231. The default value is dashes. If a value is entered for EXIT TIME, then the default display is boxes. When an FTT value is manually entered, then dashes are displayed. Range [0 .. 99.9]. Not displayed for Free Fall.

DEPL RATE [3R]: Displayed for CUST CARP and CUST HARP only. Deployed rate of fall in feet/second. Sea level standard day rate of fall of the load after the parachute is fully deployed and the drop is stabilized. Data may be extracted from parachute ballistic tables. The default display is boxes. Operator entry is required. Range [1..69.9].

DECEL TIME [4L]: Displayed for CUST HARP only. Deceleration time (s). Elapsed time from actuation until deployment. Extracted from the parachute ballistic data tables. Default display is boxes. Range [0..99.9].

DRIVE SPEED [4L]: Displayed for CUST HAHO only. Speed, in knots, the parachute is capable of travelling at. Default value is 20.8. Range [0..99.9].

HV RATE [4R]: Displayed for CUST HARP only. High velocity rate of fall in feet/second. Sea level, standard day vertical velocity of the load under free fall (before the parachute is deployed). Data may be extracted from the parachute ballistic data tables. Default display is boxes. Range [1..999.9].

DRIVE FACTOR [4R]: Displayed for CUST HAHO only. Drive safety factor (%). Percentage of the total computed drive distance to be used for safety reasons. Default value is 80%. Range [0..100].

DECEL DIST [5L]: Displayed for CUST HARP only. Deceleration Distance (ft). The distance the load descends from actuation to full deployment of the parachute. Extracted from the parachute ballistic data tables. This distance must be smaller than the actuation HAT. Range [0..9999].

K-OPEN [5L]: Displayed for CUST HAHO only. Parachute ballistic (glide) constant when deployed (characteristic to each parachute type). Default value is boxes. Range [0..99].

RESET [5R]: Resets all the CARP parameters on all the CARP PLAN x/3 pages to their default values.

CARP PROGRESS [6L]: Access to CARP PROGRESS page.

ERASE [6L]: Cancel any active route modifications and/or any CARP parameter changes. Only displayed when the page is displaying the MOD status. If by pressing ERASE the CARP procedure is removed from the flight plan, then the LEGS page is automatically displayed.

CANCEL [6L]: Cancel the changes made to the inactive route.

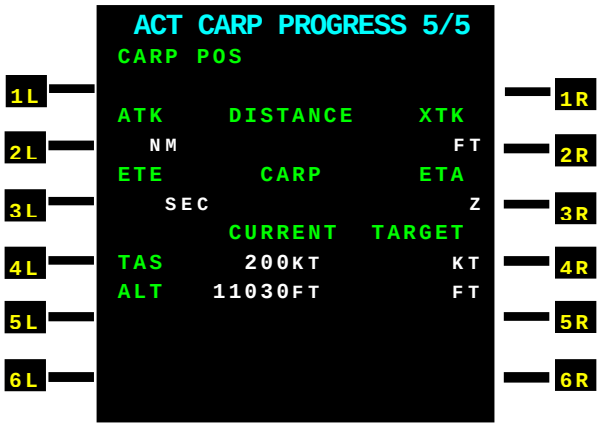
CONFIRM [6R]: Confirm the changes made to the inactive route. If CARP data is missing, an advisory message is displayed in the scratchpad and the CANCEL/CONFIRM prompts remain displayed. The user may then correct the parameters, press CANCEL or remove the procedure from the flight plan.

CARP PROGRESS X/X (when X/X = 4/4 if 3 page set and CARP is configured or X/X = 5/5 if 4 page set and CARP is configured)

Display ACT PROGRESS X/X page by pressing [PROG], and then [PREV] {If CARP is configured}.

The CARP PROGRESS page is used to display the progress towards the CARP procedure waypoints. Currently, only one CARP procedure in the active route is supported.

A. Display with no CARP procedure in the flight plan.



B. Display with CARP procedure in the flight plan.

CARP POSITION (1L): Current position, in geographic coordinates, of the Computed Air Release Point (CRP waypoint).

STATUS (1R): CARP Status: (blank), ACTIVE, NEAR CARP, AT CARP, DROP ZONE, or ESCAPE.

STATUS INDICATION	MEANING
(blank)	The CARP procedure is not active.
ACTIVE	A CARP procedure is in the active flight plan and the active waypoint in the flight plan is a CARP procedure waypoint or less than 20 minutes remain to the CARP green light (CRP). This status is always displayed if the NO CARP SOLUTION alert message is on.
NEAR CARP	The CARP mode is active and the A/C is less than 60 seconds before arrival at the CRP waypoint (green light).
AT CARP	The CARP mode is active and the A/C is less than 5 seconds before arrival at the CRP waypoint (green light).
DROP ZONE	The CARP mode is active and the A/C is within the CARP drop zone. This state begins 0.5 seconds before arriving at the CRP waypoint (green light).
ESCAPE	The CARP mode is active and the A/C is beyond the CARP drop zone and prior to the Escape (ESC) waypoint.

ATK DISTANCE (2L): Along Track Distance(nm) to the CRP green light or XTE or ESC waypoint along the path defined by the flight plan. Prior to reaching the CARP green light, the distance displayed is that to the CARP green light waypoint. During the drop (after the CRP waypoint has sequenced), the distance displayed is that to the XTE waypoint. This field is not displayed when CARP procedure is not yet in the active flight plan. Range [0..99.9]. '*' symbols are displayed when ATK exceeds the range.

XTK DISTANCE (2R): Cross Track Offset (feet) from the desired path line defined by the CRP (Green Light) point and the XTE(Red Light) point as computed by the FMS. Field not displayed when CARP procedure not yet in flight plan. Range [0..9999]. "****" is displayed when XTK exceeds the range.

CARP ETE (3L): Estimated Time (s) EnRoute (ETE) to CRP (green light) waypoint or XTE (red light) once CRP has been sequenced or ESC once XTE is sequenced. The "CARP" indication changes to "XTE" upon sequencing the CRP waypoint. The "XTE" indication changes to "ESC" upon sequencing XTE.

CARP ETA (3R): Estimated Time of Arrival in (hhmm:ss) at CRP (green light) waypoint, or XTE (Red Light) once CRP has been sequenced or ESC once XTE has been sequenced.

CURRENT TAS (4L): Current True Air Speed (kt).

CURRENT ALT (4L): Current system altitude (feet).

TARGET TAS (4R): Target True Air Speed (kt). Only displayed after crossing the Slow-Down (SD) waypoint or less than 60 seconds remain to the CRP waypoint, at which point the TAS derived from the Mission IAS is displayed. Once the TAS used for the CRP waypoint calculations is frozen, this frozen TAS value is then displayed until the CARP procedure is terminated.

TARGET ALT (4R): Target altitude (feet). Only displayed after crossing the Slow-Down (SD) waypoint or less than 60 seconds remain to the CRP waypoint, at which point the altitude derived from the Mission HAT is displayed. . Once the altitude used for the CRP waypoint calculations is frozen, this frozen altitude value is then displayed until the CARP procedure is terminated.

CARP PLAN [6L]: If a CARP procedure is defined in the active flight plan, accesses the CARP PLAN 1/3 page; otherwise, the field is not shown.

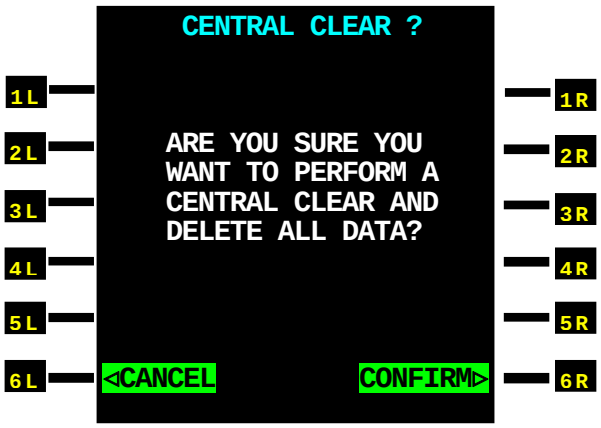
CARP MARK [6R]: Equivalent to pressing CARP MARK on the TMP UPDATE POS page. The TMP UPDATE POS page is displayed, and the flight plan is set to MOD state displaying the ERASE prompt and illuminating the EXEC key. The IP point is displayed as the reference position, the offset from the reference is R0ft. While the CARP is not active or CARP waypoint positions are frozen or NO CARP SOLUTION is being displayed, the CARP MARK text disappears and pressing this LSK has no effect.

NOTE: Except for CURRENT TAS and CURRENT ALT, values are only displayed when a CARP procedure is in the active flight plan.

NOTE: The accuracy of the fields of this page, including the "status indicator" is in accordance with the update rate of the FMS pages, e.g. 1 second. Better accuracy is obtained via the status advisory messages and the "AT CARP" discrete output.

CENTRAL CLEAR ? (if Tactical Config CENTRAL CLEAR is configured)

Display CENTRAL CLEAR ? page by pressing
[INIT/REF], [NEXT], <CENTRAL CLEAR> { if not configured on TACTICAL page}
Or [TACT], <CENTRAL CLEAR> {if TACT key is configured and CENTRAL CLEAR configured on TACTICAL page}



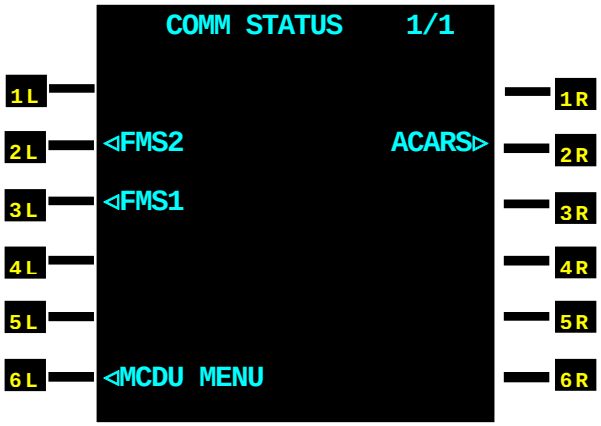
CANCEL [6L]: Cancels the central clear when requested on the INIT/REF 2/2 page. Pressing this prompt also returns to the INIT/REF 2/2 page.

CONFIRM [6R]: Confirms the central clear when requested on the INIT/REF 2/2 page. Pressing this prompt also returns to the INIT/REF 2/2 page.

COMM STATUS 1/1

Display COMM STATUS 1/1 page by pressing [MENU], <COMM> (one MCDU page displayed) OR
[MENU], [NEXT], <COMM> (two MCDU pages displayed).

The COMM STATUS page displays the installed external sub-systems connected to the MCDU and provides an interface to the ESS FAILURE page.



ESS (2L to 5L), (1R to 3R): Displays the installed sub-systems. Prompt leads to the ESS FAILURE page. When the external sub-system name is unknown (Menu Text Exchange failed), the CMA-9000 FMS displays 4 dashes (----) besides the prompt. The installed sub-systems have a dedicated key. For example, ESS1 is displayed at LSK 1L, ESS2 is displayed at LSK 2L and so on.

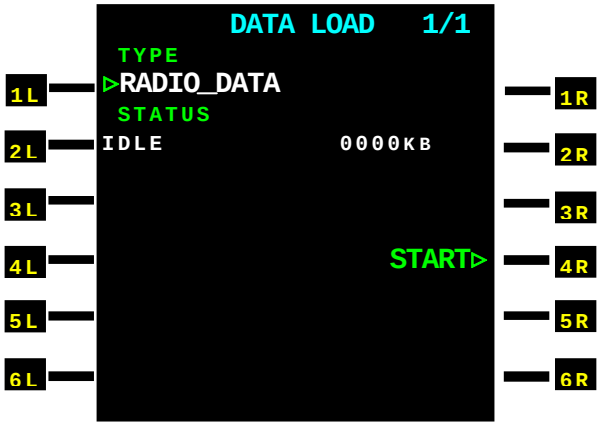
The COMM STATUS page shows only the installed sub-systems.

MCDU MENU [6L]: Returns to MCDU MENU X/X page.

DATA LOAD 1/1 (if aircraft is on ground)

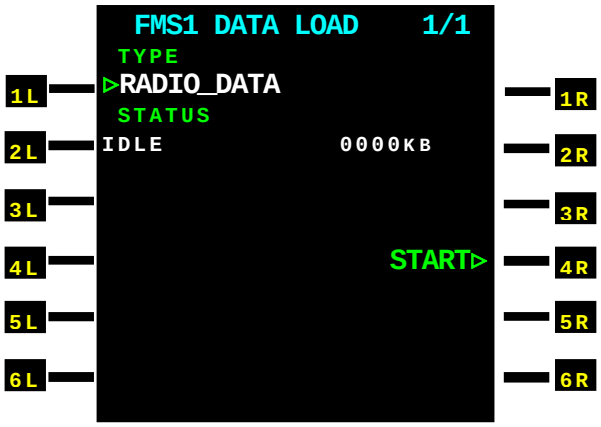
Display DATA LOAD 1/1 page by pressing [INIT REF], [NEXT], <DATA LOAD>.

A. With ARINC 615 DLU, initial display:

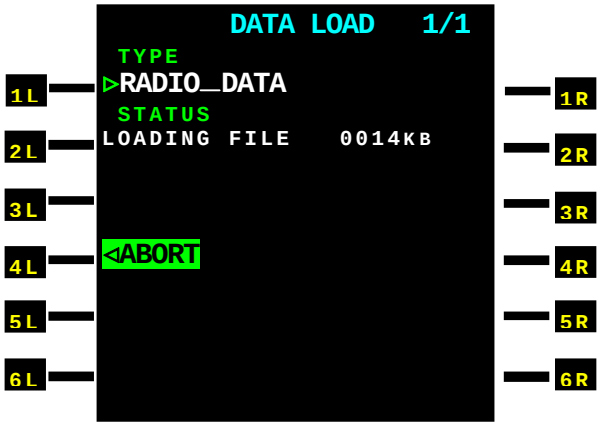


NOTE: If the same runway is deselected and then re-selected, the display shows <ACT> instead of <SEL>.

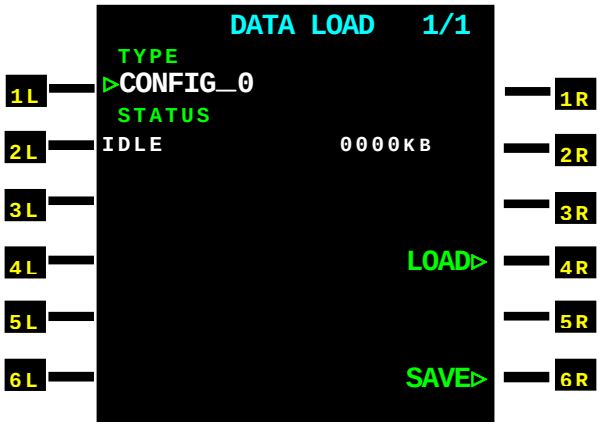
B. Display of Data Load 1/1 page when Tandem mode is configured (FMSx is displayed where x is the Student FMS SDI):



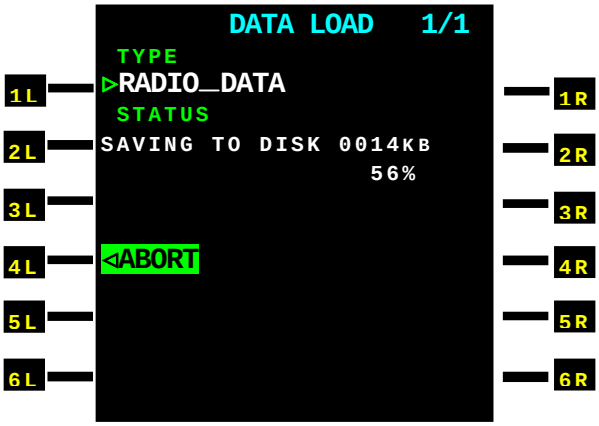
C. With ARINC 615 DLU, during load:



D. With PDP/3-DOS DLU, initial display:



E. With PDP/3-DOS DLU, during save:



TYPE [1L]: Indicates and allows selection of the the data type to be loaded:
Toggle USER_DATA/NAV_DATA/CUSTOM_DATA/RADIO_DATA/
CONFIG_0/CONFIG_1/CONFIG_2/CONFIG_3/PRECAN_MSG/
MAGVAR_MODEL/DIMMING/OEI_MODEL.

USER_DATA	=	User database (user routes and waypoints).
NAV_DATA	=	Navigation database (example: Jeppesen).
CUSTOM_DATA	=	Custom database (custom routes and waypoints).
RADIO_DATA	=	Radio Tuning libraries.
CONFIG_0/1/2/3	=	FMS configuration files.
PRECAN_MSG	=	Pre-canned Messages (See PHONE Page for details).
MAGVAR_MODEL	=	Magnetic variation model database (coefficients).
DIMMING	=	Dimming curve for display brightness
OEI_MODEL	=	OEI model data tables.
TACT_APPR	=	Tactical approaches database

In order to load files from the Targa DLU (e.g. PDP/3-DOS DLU) to the CMA-9000 FMS, the following file extension convention is used (otherwise, file transfer is not performed):

DATA TYPE	FILE EXTENSION
USER_DATA	*.UDB
NAV_DATA	*.NDB
CUSTOM_DATA	*.RTE
RADIO_DATA	*.RAD
CONFIG	*.CFG
MAGVAR_MODEL	*.MVA
PRECAN_MSG	*.PCM
OEI_MODEL	*.OEI
DIMMING	*.DIM
TACT_APPR	*.TAC

LOADING BLOCK (2L): Displays number of blocks loaded.

STATUS (2L): Displays STATUS messages, number of 1 kilobyte blocks loaded, and (for the PDP/3-DOS DLU) the percentage complete.

ABORT [4L]: Abort data load when in progress.

START [4R]: Start data load when A/C on ground (ARINC 615 DLU).

LOAD [4R]: Start data upload (DLU to FMU) when A/C on ground (PDP/3-DOS DLU).

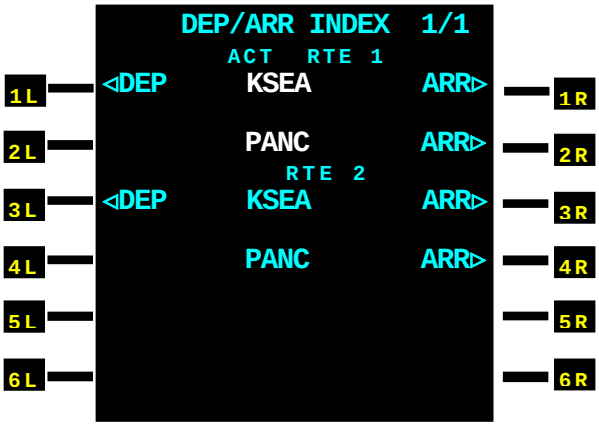
SAVE [6R]: Start data download (FMU to DLU) when A/C on ground. Only displayed for USER_DATA and CONFIG data type (PDP/3-DOS DLU).

DEP/ARR INDEX 1/1

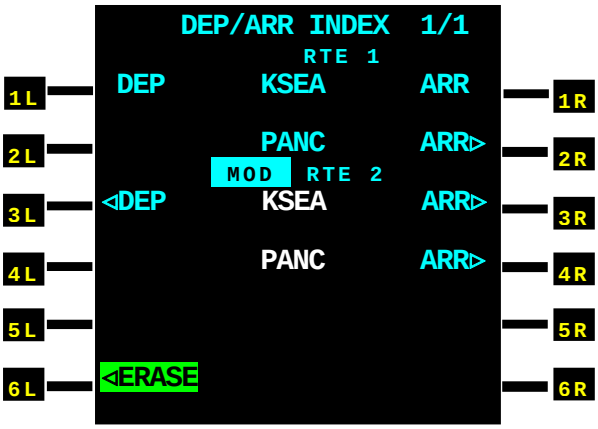
This page provides access to arrival and departure for origin and destination airport.

Display the DEP/ARR INDEX 1/1 page by pressing:
[DEP/ARR] (if on ground). or
[DEP/ARR] (if airborne and midway point of active route not reached yet). or
From ARRIVALS 1/1 page. or
From DEPARTURES 1/1.

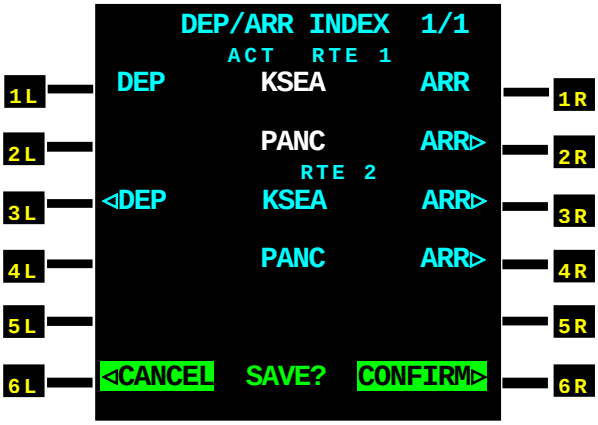
A. Active DEP/ARR Index:



B. DEP/ARR Index during a MOD in active RTE2:



C. DEP/ARR Index during an edit of INACTIVE route:



RTE (#): Display related route number.

ACT or MOD: Active or Modified route status displayed before active route number.

DEP [1L/3L]: Access to the DEPARTURES 1/X page for RTE 1 or 2 ORIGIN airport. Arrow (▷) disappears when other route is being changed .

ERASE [6L]: Cancel modifications to flight plan. If confirm and erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed only if the RTE was erased on the RTE 1/X page. Used to restore the active route.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route.

ARR [1R or 3R]: Access to the ARRIVALS 1/X page for RTE 1 or 2 ORIGIN airport. {If RTE 2 is configured}.

ARR [2R or 4R]: Access to the ARRIVALS 1/X page for RTE 1 or 2 DEST airport. {If RTE 2 is configured}.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

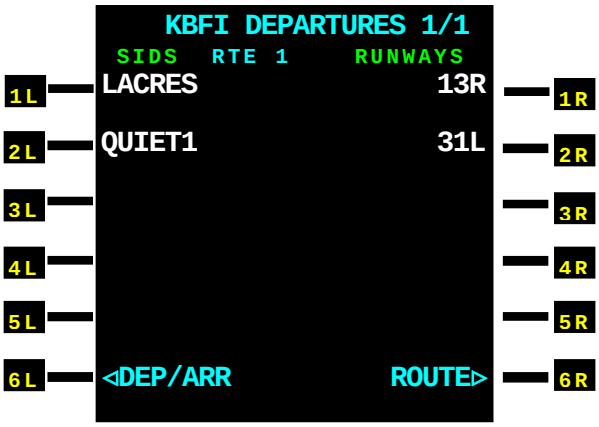
(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

DEPARTURES 1/X

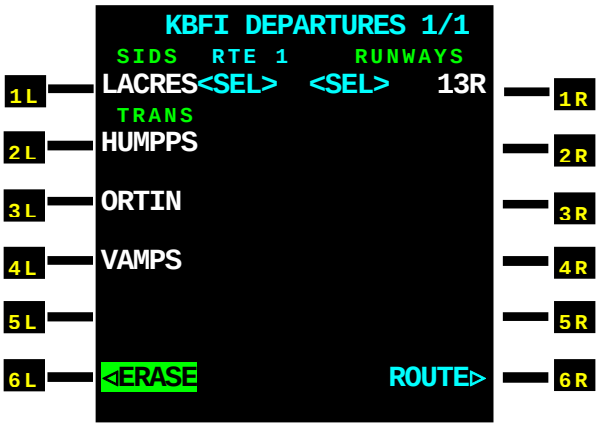
This page provides a listing of all-departing procedures and runways for the selected airport. The selected or activated SIDS, SIDS transition, and runways are displayed.

Display the DEPARTURES 1/X page by pressing the corresponding <DEP> prompt on the DEP/ARR INDEX 1/1 page, or
[DEP/ARR] (if on ground and route active).

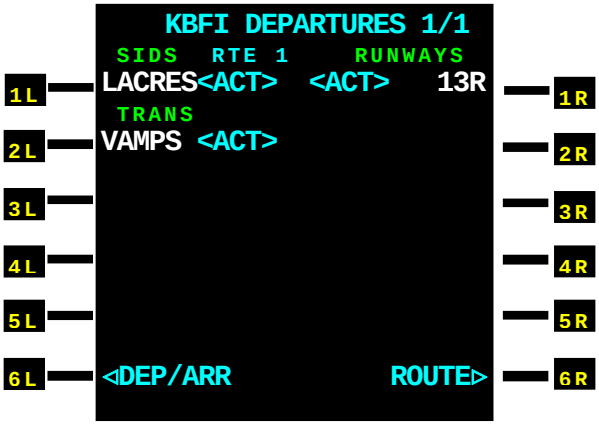
A. Initial Display:



B. Display after SIDS selected and runway selected:

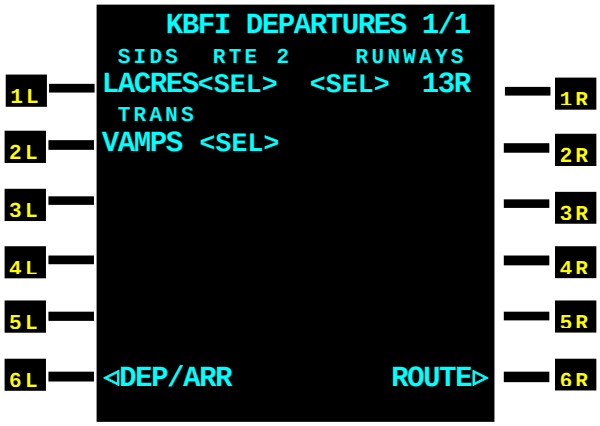


C. Display after all selections are executed:



D. Inactive departures page display after SIDS selected and runway selected:

E. Display after all selections confirmed on the inactive route:



KBFI (title): Airport identifier (all page data applies only to the identified airport).

RTE(#): Display related route number.

SIDS [1L,2L,3L,4L,5L]: Alphabetical listing of all SIDS applicable to the airport. Line selection of the desired SID removes all other SIDS and non-applicable runways and displays a listing of applicable departure transitions. Deletion of the Selected/Active SID cancels any SID and SID transition selections (line selection toggles the SID, SID transition status between selected and not selected).

TRANS [2L,3L,4L,5L]: Displayed after SID selection. Used to select/delete any departure transitions associated with the selected SID.

DEP/ARR [6L]: Returns to the DEP/ARR INDEX 1/1 page (unless a route modification is in progress).

ERASE [6L]: Cancel any route modifications and/or any departure selections. If confirm and erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route.

RUNWAYS [1R,2R,3R,4R,5R]: Alphabetical listing of all runways applicable to the airport. Line selection of the desired runway deletes all non-applicable SIDS. Deletion of the selected/active runway cancels any runway selection.

ROUTE [6R]: Access to the RTE 1/X page related to the displayed DEPARTURE.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

DES+SAR 1/2 (if CARP and TACTICAL APPR are not configured)
DES+SAR 1/4 (if CARP or TACTICAL APPR is configured)

The page title is TACTICAL if the TACT key is configured.

Display DES+SAR 1/2 page *(or 1/4 if CARP or TACTICAL APPR is configured)* by pressing:
[INIT REF],<NEAREST>,<AIRPORT> and <DES+SAR> or
[INIT REF],<NEAREST>,<VHF NAV> and <DES+SAR> or
[INIT REF],<NEAREST>,<NDB> and <DES+SAR> or
[INIT REF],<NEAREST>,<USER WPTS> and <DES+SAR> or
[INIT REF],<NEAREST>,<CUSTOM WPTS> and <DES+SAR> or
[INIT REF],<DES+SAR> or
[INIT REF],<WPT LISTS>,<DMAP WPT>,<DES+SAR> or
[INIT REF],<WPT DATA>,<DES+SAR> or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,<DES+SAR> or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,[NEXT],<DES+SAR>
{if Tactical Config BULLS EYE is configured}:
[INIT/REF], <BULLS EYE>,[NEXT],<DES+SAR>

NOTE: The ACTIVE route DES+SAR 1/2 (or 1/4 if CARP or TACTICAL APPR is configured) page is displayed when the DES+SAR prompt is selected and the inactive route is not being modified.

REF ID [1L]: Storage of the reference identifier. If there is a valid position in the scratchpad when the page is opened, then the CMA-9000 FMS creates a temporary waypoint at that position and places the identifier in this field. If the reference identifier is a moving waypoint, the following prompts are blanked and disabled on this page: <SQUARE, <LADDER, <SECTOR, <FLY OVER, HOVER>, HOLD>, RADIAL-TO> and TACT DTO>.

RTE DISCON [1R]: Brings up the RTE x LEGS 1/X page with discontinuity symbols (□□□□□) in the scratchpad.

RAD/DIS [2L]: The RAD/DIS combination allows the pilot to position a waypoint relative to the REF ID. The relative position is used to create a temporary waypoint when a new DES+SAR procedure is selected. The values are blanked, when no REF ID is defined, otherwise dashes are displayed as the default value. No entries are allowed, when the field is blanked.

HOVER [2R]: Appears when configured.
- HOVER waypoint not entered in the field REF ID of the DES+SAR page: Display the Hover page. If a HOVER pattern is already in the selected route, the active data is displayed.
- HOVER waypoint entered in the field REF ID of the DES+SAR page: Display the Hover page with the identifier stored in the ID field (even when a Hover pattern is currently active). It is not currently possible to enter a Hover pattern in any route location other than the first; hence, the RTE x LEGS 1/X page is not displayed as for other leg types.

SQUARE [3L]: Appears when configured.
- The status "ACT" (reverse video white) is appended to the prompt if an activated square search pattern is in the flight plan.
- SAR waypoint not entered in the field REF ID of the DES+SAR page: Display the SQUARE page.
- SAR waypoint entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

LADDER [4L]: Appears when configured.
- The status "ACT" (reverse video white) is appended to the prompt if an activated ladder search pattern is in the flight plan.
- SAR waypoint not entered in the field REF ID of the DES+SAR page: Display the LADDER page.
- SAR waypoint entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

SECTOR [5L]: Appears when configured.
- The status "ACT" (reverse video white) is appended to the prompt if an activated sector search pattern is in the flight plan.
- SAR waypoint not defined or part of the Route: Display the SECTOR page.
- SAR waypoint entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

HOLD [3R]:
- HOLD waypoint entered in the field REF ID of the DES+SAR page: Exact same behaviour as pressing the HOLD hard key. The HOLD page appears if a holding pattern already exists; otherwise, the RTE x LEGS 1/X page appears with /H in the scratchpad. The HOLD page has a NEW HOLD LSK to allow a new holding pattern to be defined.
- HOLD waypoint entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with the identifier and /H qualifier in the scratchpad.

FLY OVER [6L]:
- Fly Over waypoint not entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with only /O in the scratchpad.
- Fly Over waypoint entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with the identifier and /O in the scratchpad.

RADIAL-TO [4R]:
- Radial-to waypoint not entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with only the /R qualifier in the scratchpad.
- Radial-to waypoint entered in the field REF ID of the DES+SAR page: Display the RADIAL-TO page with the identifier in the ID field. The NEW RADIAL-TO field will bring up the LEGS page for insertion in the route.

TACT DTO [5R]: Appears when the MILITARY NAVIGATION option is configured:
- Tactical Direct-to waypoint not entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with only /T in the scratchpad.
- Tactical Direct-to waypoint entered in the field REF ID of the DES+SAR page: Display the RTE x LEGS 1/X page with the identifier and /T in the scratchpad.

DIRECT-TO [6R]:
- Case i. No DES+SAR point defined : Brings up the LEGS page.
- Case ii. DES+SAR point defined : Brings up the LEGS page with the identifier in the scratchpad and perform a direct-to (add the REF ID to first waypoint of the LEGS page).

DES+SAR 2/4 (if CARP or TACTICAL APPR is configured)

The page title is TACTICAL if the TACT key is configured.

Display DES+SAR 2/4 page by pressing:
[INIT REF],<NEAREST>,<AIRPORT>,<DES+SAR> and [NEXT] or
[INIT REF],<NEAREST>,<VHF NAV>,<DES+SAR> and [NEXT] or
[INIT REF],<NEAREST>,<NDB>,<DES+SAR> and [NEXT] or
[INIT REF],<NEAREST>,<USER WPTS>,<DES+SAR> and [NEXT] or
[INIT REF],<NEAREST>,<CUSTOM WPTS>,<DES+SAR> and [NEXT] or
[INIT REF],<DES+SAR> and [NEXT] or
[INIT REF],<WPT LISTS>,<DMAP WPT>,<DES+SAR> and [NEXT] or
[INIT REF],<WPT DATA>,<DES+SAR> and [NEXT] or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,<DES+SAR> and [NEXT] or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,[NEXT],<DES+SAR> and [NEXT]

NOTE: The DES+SAR 2/4 page is available when the inactive route is not being modified.

REF ID [1L]: Storage of the reference identifier. If there is a valid position in the scratchpad when the page is opened, then the FMS will create a temporary waypoint at that position and places the identifier in this field. If the reference identifier is a moving waypoint, the following prompts are blanked and disabled: CARP> and TACT APPR>.

RAD/DIS [2L]: The RAD/DIS combination allows the pilot to position a waypoint relative to the REF ID. The relative position is used to create a temporary waypoint when a new DES+SAR procedure is selected.

CARP [3R]: Displayed when CARP is configured. Pressing the line select key:

- If SAR waypoint is not entered in field REF ID of the DES+SAR page and no CARP procedure exists in the flight plan then display the LEGS page with CRP01/C in the scratchpad.
- If SAR waypoint is not entered in the field REF ID of the DES+SAR page and a CARP procedure exists in the flight plan then display the CARP PLAN 1/3 page.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page and no CARP procedure exists in the flight plan then display the LEGS page with the identifier and /C qualifier in the scratchpad allowing entry in the flight plan.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page and it is different from the PI of the existing CARP procedure then display the CARP PLAN 1/3 page with the identifier in the scratchpad.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page and it has the same identifier as PI of the existing CARP procedure then display the CARP PLAN 1/3 page.

TACT APPR [4R]: Displayed when the TACT APPR option on the CONFIG page is configured.

- If no SAR waypoint is entered in the field REF ID of the DES+SAR page and no previously defined tactical approach Runway Threshold Waypoint then display default LEGS page with the /A qualifier in the scratchpad allowing entry in the flight plan.
- If no SAR waypoint is entered in the field REF ID of the DES+SAR page and previously defined the tactical approach Runway Threshold Waypoint then display the TACTICAL APPR page.
- If SAR waypoint is already defined then display the default LEGS page with the identifier with the /A qualifier in the scratchpad allowing entry in the flight plan.

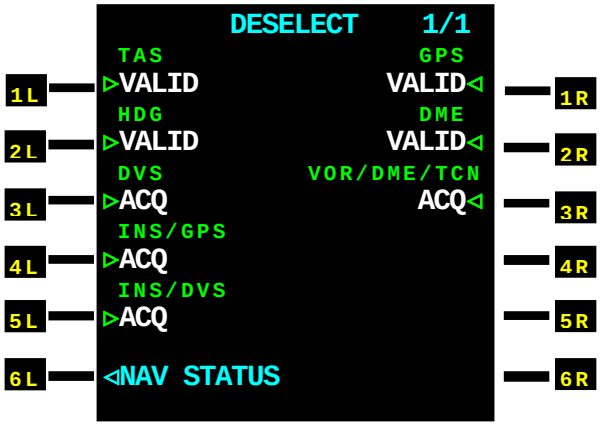
DESELECT 1/1

The DESELECT 1/1 page displays the status of the system True Air Speed (TAS) and Heading data. It is also used to prevent usage of any unsuitable sensor for navigation (GPS, VOR, TAS, HDG, KALMAN, DME, etc).

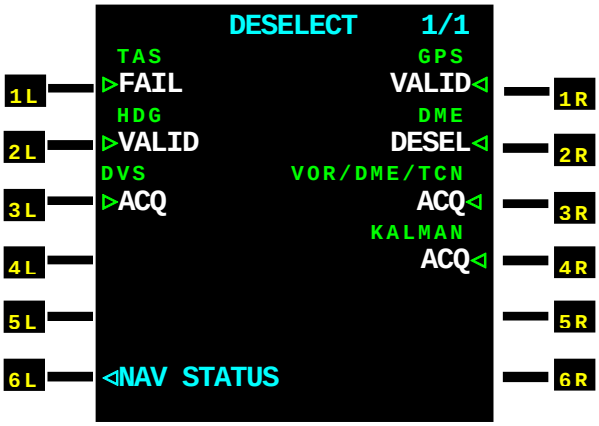
NOTE: Flight crew must deselect all unwanted sensors after each long power outage. All sensors are automatically re-selected after a long power outage.

Display DESELECT 1/1 page by pressing [INIT REF], <NAV STATUS>, and <DESELECT>.

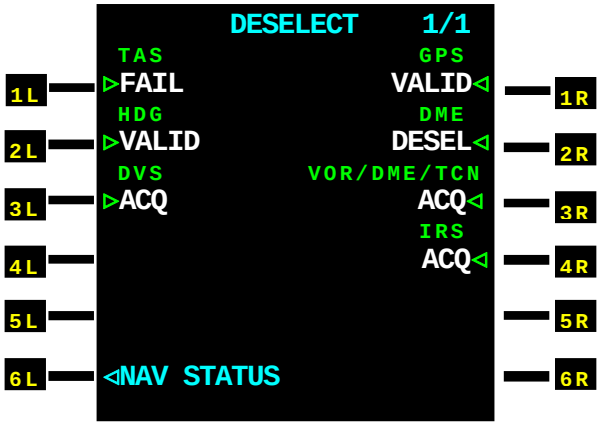
A. Display with EGI interfaces configured:



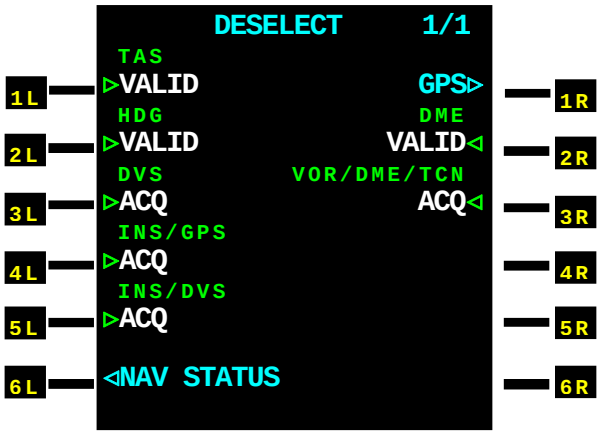
B. Display with GPS (ARINC 743A format) and APIRS interfaces configured:



C. Display with IRS interfaces configured:



D. Display with dual GPS (LN-100GT and civil GPS):



TAS [1L]: Displays the TAS status (VALID or FAIL), when pressed toggles between VALID/DESEL or ACQ/DESEL options to control usage of true airspeed in the navigation solution.

HDG [2L]: Displays the HDG status (VALID or FAIL), when pressed toggles between VALID/DESEL or ACQ/DESEL options to control usage of HDG in the navigation solution.

DVS [3L]: When selected it toggles between VALID/DESEL or ACQ/DESEL options to control usage of the DVS in the navigation solution (if DVS configured).

INS/GPS[4L]: Toggle options: VALID/DESEL or ACQ/DESEL (If EGI interfaces is configured).

INS/DVS [5L]: When pressed toggles between VALID/DESEL or ACQ/DESEL options to control usage of the INS/DVS hybrid mode in the navigation solution (if SAGEM EGI is configured).

NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

GPS [1R]: If single GPS is configured, then when selected, it toggles between VALID/DESEL or ACQ/DESEL options to control usage of the GPS in the navigation solution. If dual GPS is configured, it acts as a prompt which opens the GPS DESELECT 1/1 page.

DME[2R]: Toggle options: VALID/DESEL or ACQ/DESEL (If DME interface is configured).

VOR/DME/TCN [3R]: When selected, it toggles between VALID/DESEL or ACQ/DESEL options to control usage of the VOR/DME/TCN solution in the navigation solution. Field disappears or changes to VOR/DME or TACAN depending on the configured equipment configuration.

INS [4R]: Toggle options: VALID/DESEL or ACQ/DESEL (If INS interface is configured).

KALMAN [4R]: Toggle options: VALID/DESEL or ACQ/DESEL (If APIRS is configured).

IRS [4R]: When selected, it toggles between VALID/DESEL or ACQ/DESEL options to control usage of the IRS in the navigation solution (if IRS is configured).

X-FMS [5R]: *Not shown.* Toggle options: VALID/DESEL or ACQ/DESEL (if X-FMU is configured).

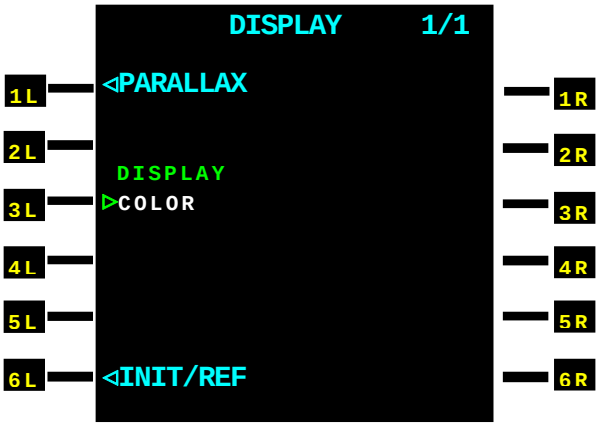
NOTE: ACQ - Acquisition mode.

DISPLAY 1/1

The DISPLAY 1/1 page allows access to display preference changes and screen position adjustment.

Press [INIT REF], [NEXT] and <DISPLAY> to access the DISPLAY 1/1 page.

The DISPLAY page allows access to display preference changes and screen position adjustment.



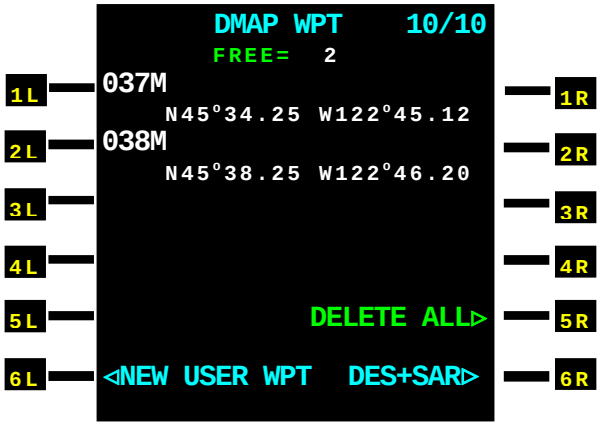
PARALLAX [1L]: Provides access to PARALLAX ADJUST 1/1 to adjust screen placement.

DISPLAY [3L]: Selection of (COLOR, MONOCHROME); COLOR displays characteristic, MONOCHROME displays all text in green.

INIT/REF [6L]: Returns to INIT/REF 1/2 page.

DMAP WPT 1/X (if ELBIT, EURONAV, or EURONAV_A702 DMAP is configured)

Display DMAP WPT 1/X page by pressing [INIT REF], <WPT LISTS> and <DMAP WPT>.
The DMAP WPT page displays the list of waypoints received from the DMAP. Upon entry (manual or automatic), the CMA-9000 FMS automatically displays the DMAP WPT X/X page containing the last received waypoint.



FREE= nn: Displays the number of undefined digital map waypoints store positions which are available, where nn is between 0 and 40.

nnnM (1L-4L): Displays the coordinate position stored in the defined digital map waypoint 'nnnM', where nnn is a CMA-9000 FMS sequence number from 001 to 999 assigned when a new waypoint is received from the digital map. The only allowed scratchpad entry in those fields is the [CLR] key entry which will delete the selected DMAP waypoint.

CANCEL [6L]: Cancels deletions of all stored digital map waypoints positions. Displayed after selection of DELETE ALL sofkey.

DELETE ALL [5R]: Deletes all stored waypoints. This softkey when selected presents the CANCEL and CONFIRM sofkey options.

NOTE: The delete is cancelled if another page is selected while the CANCEL and CONFIRM sofkeys are displayed.

NEW USER WPT [6L]: When a defined digital map waypoint label is displayed in the scratchpad, selection of this line key will open the USER WPT 1/2 page with the coordinates and the DMAP waypoint identifier entered for the definition of a new user waypoint. The operator has to simply enter the ID field and confirm or cancel this operation.

CONFIRM [6R]: Upon selecting this sofkey the CMA-9000 FMS deletes all selected waypoints in the digital map waypoint list.

DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL 1/Y page instead of the DES+SAR 1/Y page. This softkey, when selected, will open the DES+SAR 1/Y (or TACTICAL 1/Y) page. If a defined digital map waypoint label is displayed in the scratchpad, selection of this line key will automatically place this identifier in the reference i.d field of the DES+SAR 1/Y (or TACTICAL 1/Y) page.

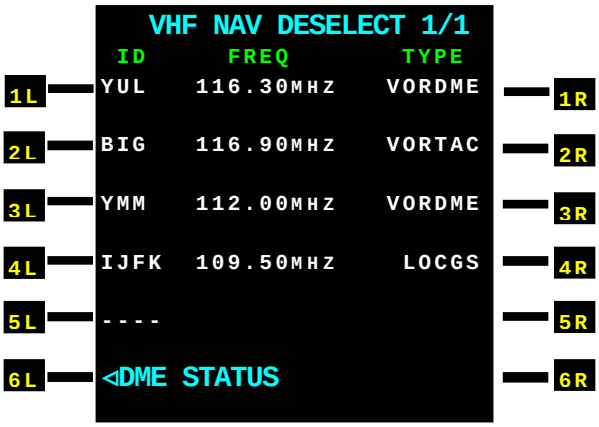
[NEXT]: When more than 4 digital map waypoints are defined, this key cycles to the next series of digital map waypoints.

[PREV]: When more than 4 digital map waypoints are defined, this key cycles to the previous series of digital map waypoints.

VHF NAV DESELECT 1/X (if DME interface is configured)

This page enables the user to deselect VHF navaids (up to 25 stations can be added to the deselection list) and prevent the CMA-9000 FMS from using it for DME-DME navigation and VOR auto-tuning logic. It also allows a deselected station to be reselected by deleting it from the deselection list. The list is not retained on power up.

Display VHF NAV DESELECT 1/X page by pressing [INIT REF], <NAV STATUS>, <DME> and < DME DESEL> {if DME is configured} or
[INIT/REF], <NAV STATUS>, <VOR/DME> or <VOR/DME/TACAN>, and <VOR DESEL> {if NAV and VOR AUTOTUNING are configured}.



ID [1L, 2L, 3L, 4L, 5L]: To add a station to the deselect list, type the identifier in the scratchpad and press a softkey. To remove the station from the list, press CLR key and the corresponding softkey. Up to 25 stations can be added to the deselection list. A new page is automatically added when it is needed.

TYPE (1L, 2L, 3L, 4L, 5L): Displays VHF navaid type in the third column. The navaid type can be any of the following:

- DME
- ILSDME
- ILSTACAN
- LOCGS
- LOCONLY
- MLSDMEN
- MLSDMEP
- TACAN
- VNCDME
- VNCTACAN
- VOR
- VORDME
- VORTAC

DME STATUS [6L]: Access to DME STATUS 1/1 page. This prompt only appears if this page was accessed from the DME STATUS page.

VOR/DME STATUS [6L]: Access to VOR/DME STATUS 1/1 page. This prompt only appears if this page was accessed from the VOR/DME STATUS page. *Not shown on figure.*

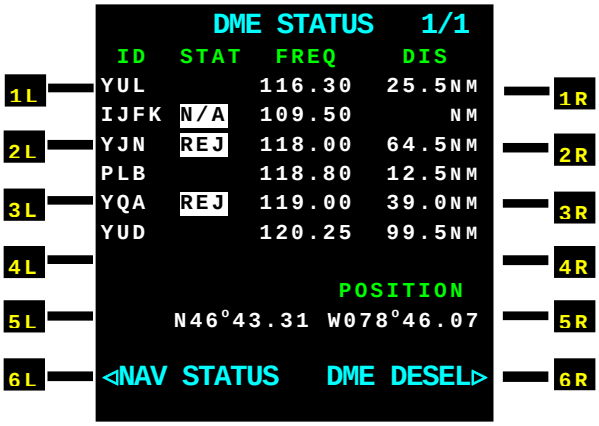
VOR/DME/TCN STATUS [6L]: Access to VOR/DME/TCN STATUS 1/1 page. This prompt only appears if this page was accessed from the VOR/DME/TCN STATUS page. *Not shown on figure*
.

DME STATUS 1/1 (if DME/DME interface is configured)

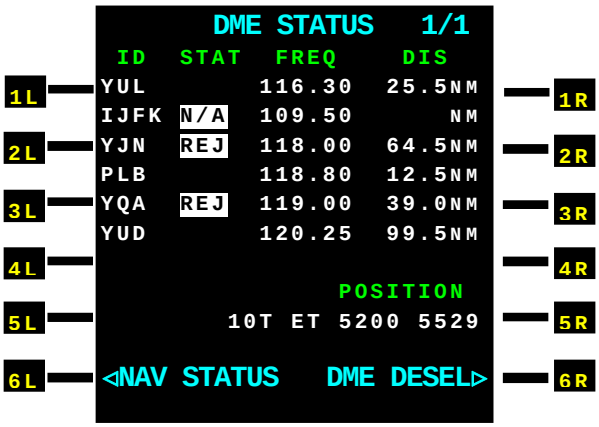
The DME STATUS 1/1 page displays the DME stations selected by the CMA-9000 FMS for DME-DME navigation. Up to six stations are displayed. For each station the identifier (ID), status (STAT), frequency (FREQ) and distance (DIS) are given. As the CMA-9000 FMS automatically tunes all available DME stations within the vicinity of the aircraft, the display will continually change.

Display DME STATUS 1/1 page by pressing [INIT REF], <NAV STATUS> and <DME>.

CMA-9000 FMS position with Latitude and Longitude coordinates:



CMA-9000 FMS position with UTM coordinates:



ID (1L, 2L, 3L): 3 or 4-character DME IDENTIFIER in the first column.

STAT (1L, 2L, 3L): Tuning STATUS in the second column.
REJ: DME station is not used in determining position (due to bad geometry).
N/A: Station not responding to tuning.

FREQ (1L, 2L, 3L): DME frequency (MHz) in the third column.

DIS (1L, 2L, 3L): DME slant range distance (nm) in the fourth column.

POSITION (5R): Display DME derived position. Display depends on the selected coordinates system and datum.

NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

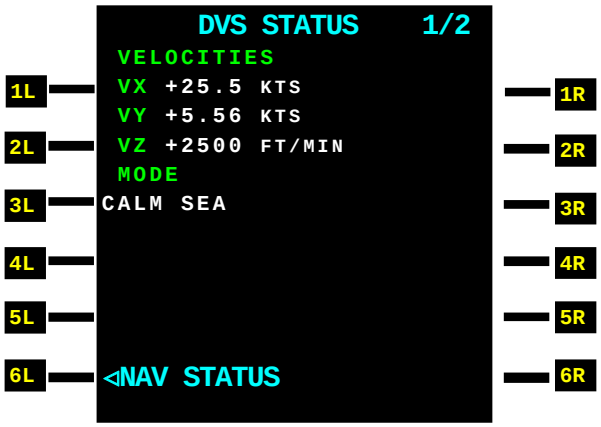
DME DESEL [6R]: Access to VHF NAV DESELECT 1/X page.

DVS STATUS 1/2 (Only if DOPPLER is configured)

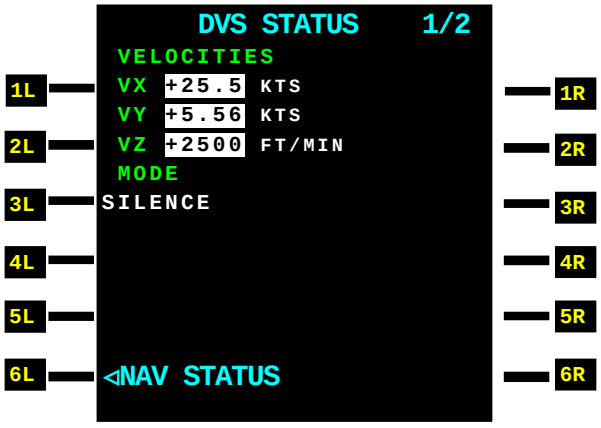
Display DVS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS>, and <DVS>.

The DVS STATUS 1/1 page displays velocity measurements and the status of the Doppler Velocity Sensor.

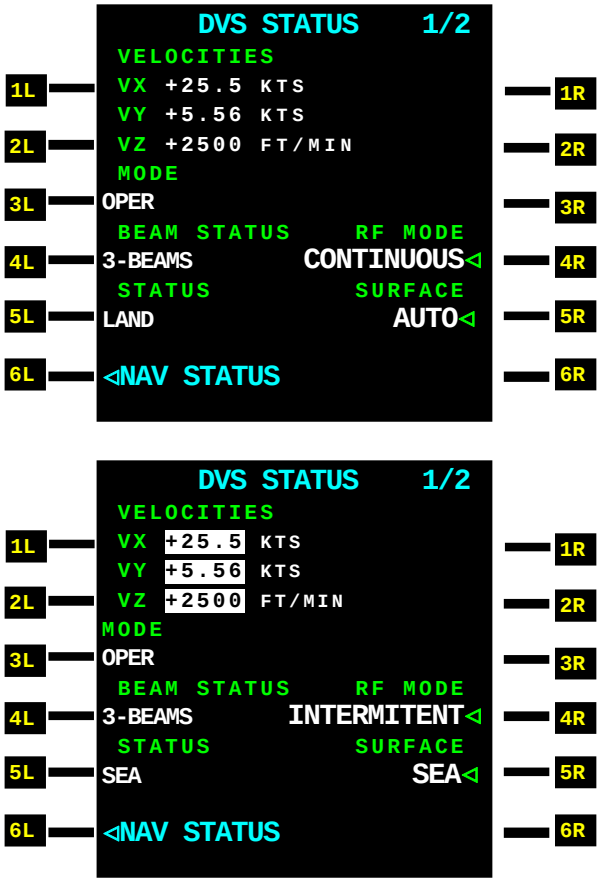
A. RDN-85 DVS, displayed in Normal Video:



B. RDN-85 DVS, displayed in Reverse Video:



C. ANV353 DVS



VELOCITIES (1L, 2L): Vx, Vy, and Vz display the Doppler measured aircraft referenced velocities. Fields are displayed in reverse video when:

- the RDN-85 DVS is in the following modes: TEST, SILENCE or MEMORY or if one specific speed is in TEST mode.

- The ANV-353 DVS receives frozen velocity labels data.

  NOTE: When the ANV-353 DVS is forced to MUTE using the RF MODE field [4R], the Doppler velocities transition automatically to MEMORY mode.

For all other modes the display is in normal video.

*NOTE: When the DVS status is FAILED, or the DVS mode is PREPOSITIONING INS or SPEED NOT COMPUTED for the RDN-85 DVS the velocities will be displayed as *******.*

MODE (3L): Display Doppler Status.
For RDN85: TEST, SILENCE, LAND, CALM SEA, SEA, MEMORY, SPEED NOT COMPUTED or PREPOSITIONING INS.

For ANV353: INIT,OPER,MAINT,FAIL,********,blank

******** is displayed if "no activity" from the STATUS word.

Blank is displayed when the CMA-9000 FMS requests:

- a boresight change.
- or a BIT command.

The following fields are displayed only when the ANV353 DVS is configured.

BEAM STATUS (4L): Displays the ANV-353 DVS beam status. Possible values for this field are: MEMORY, 3-BEAMS, 4-BEAMS.

RF MODE [4R]: Sends the RF MODE to the ANV-353 DVS. Possible values for this field are: CONTINUOUS, INTERMITENT, MUTE. When the command is sent, the status is displayed in large font. When received from the DVS, the status is displayed in medium font.

STATUS (5L): Displays the Surface status sent by the ANV-353 DVS. Possible values for this field are: SEA/LAND. This field is displayed only when an ANV353 DVS is configured.

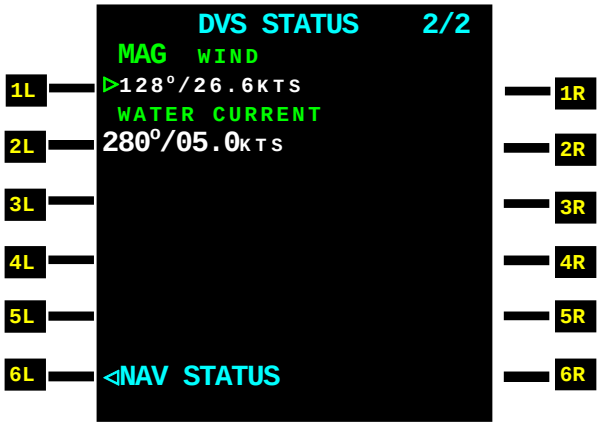
SURFACE [5R]: Sends the surface type to the ANV-353 DVS. Possible values for this field are: LAND, SEA, AUTO (if SURF CFG is set to AUTO) or LAND, SEA (if SURF CFG is set to MANUAL). This field is displayed only when an ANV353 DVS is configured.

NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

DVS STATUS 2/2 (Only if DOPPLER is configured)

Display DVS STATUS 2/2 page by pressing [INIT REF], <NAV STATUS>, <DVS> and [NEXT].

The DVS STATUS 2/2 page displays water motion compensation entries and the resulting compensation values.



TRUE/MAG WIND [1L]: Display of the current wind direction and speed (in knots). If the wind cannot be computed by the CMA-9000 FMS, a large font is used and manual entry of a wind value is allowed; otherwise, manual entries are not permitted and the value is displayed in small font. The direction is in degrees TRUE or MAG, defaulted to the WIND REF configuration option, and has a 0 to 359 degrees range. When the scratchpad is empty and A/C is outside the polar region (latitude between N73 and S60), pressing LSK 1L will toggle between the True and Magnetic display options TRUE/MAG. The wind speed is in knots with a range of 0 to 200 knots. The wind being displayed here is the same as may be observed on the PROGRESS 1/4 page. For the DVS, the wind value is used by the CMA-9000 FMS in the estimate of a surface water current.

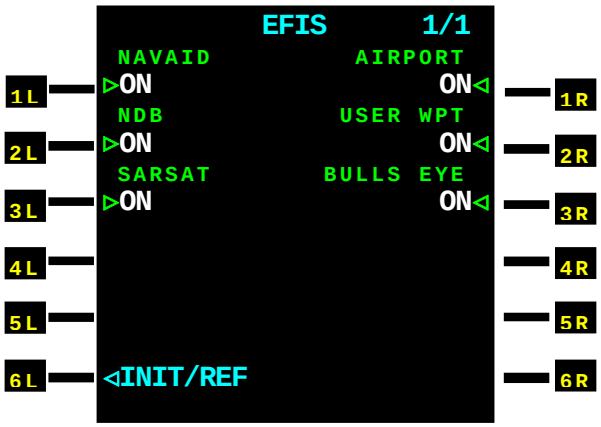
WATER CURRENT [2L]: Entry of the water speed in the direction the current is flowing towards. Speed is entered in knots with a range of 0 to 40 knots. The direction is entered in degrees, TRUE or MAG following the TRUE/MAG discrete, with a range of 0 to 359 degrees. Default value on cold start is 0 degree and 0 knot.

NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

EFIS 1/X (if EFIS interface is configured)

The EFIS page enables the pilot to selectively filter background data sent to the EFIS by the CMA-9000 FMS. This page is not available for the IFDS, AHCAS, or EFIS-84 EFISs (which do not allow background data).

Display EFIS 1/1 page by pressing [INIT REF], [NEXT], and <EFIS>.



NAVAID [1L]: Enables or disables the output of the navaids to EFIS. Toggle options: ON/OFF.

AIRPORT [1R]: Enables or disables the output of the airports to EFIS. Toggle options: ON/OFF.

NDB [2L]: Enables or disables the output of NDBs to EFIS. Toggle options: ON/OFF.

USER WPT [2R]: Enables or disables the output of User waypoints to EFIS. Toggle options: ON/OFF.

SARSAT [3L]: Enables or disables the output of SARSAT waypoints on the EFIS. Toggle options: ON/OFF. Displayed only if a DF is configured.

NOTE: When this option is set to ON, only the SARSAT waypoints selected on the SARSAT WPT 1/1 page are output to the EFIS.

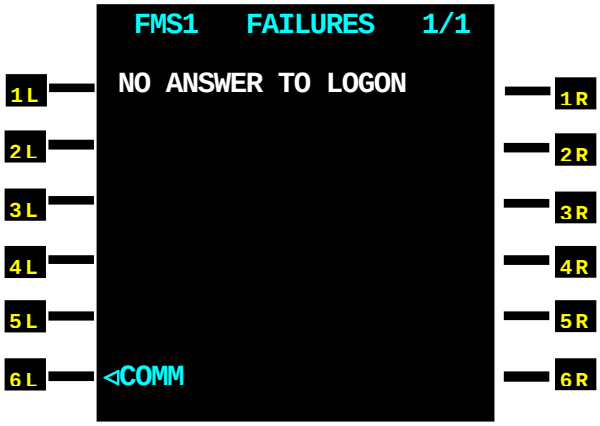
BULLS EYE [3R]: Enables or disables the output of Bulls Eye waypoints to EFIS. Toggle options: ON/OFF. Displayed only if BULLS EYE is configured.

INIT/REF [6L]: Returns to the INIT/REF INDEX 2/2 page.

ESS FAILURE 1/1

The ESS FAILURE 1/1 page displays the error messages when the communication with the selected external sub-system is failed.

Display ESS FAILURE 1/1 page by pressing MENU], <COMM> and <ESSx>.



TITLE: The title shows the external sub-system selected from the COMM page.

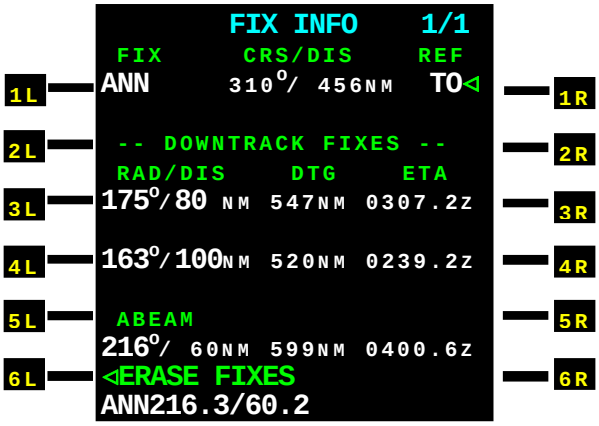
All lines: Displays the protocol error message between the MCDU and the external sub-system, starting at column 2 and line 2 of the page.

COMM [6L]: Returns to COMM STATUS 1/1 page.

FIX INFO 1/1

The FIX page provides bearing or course and distance information relative to an entered FIX. Distance To Go (DTG) and ETA are displayed for radial, distance and abeam intersections. The FIX entry must be a valid waypoint or navaid. Radial/Distance (RAD/DIS) entries can be radials or distances from the entered FIX. Radial or distance or abeam intersection data may be entered as waypoints in the route by line selecting into the scratchpad and transferring to the RTE LEGS 1/X page.

Display FIX INFO 1/1 page by pressing [FIX] or [INIT REF], <FIX INFO>.



FIX [1L]: FIX identifier. Valid entry is any airport, navaid or waypoint identifier found in the navigation/custom/temporary waypoints/user waypoints databases, the Bulls Eye waypoints or in the Active route, except for moving waypoints, which are not allowed. Displays selected fix on EHSI. Entry of seven-character waypoint is allowed.

RAD/DIS [3L, 4L]: Radial and/or distance from FIX. If radial line or distance intersects the active route, distance to go and ETA at the intersection are displayed. Radial entry is displayed on EHSI as a radial line. Distances are displayed on EHSI as a circle around the fix.

ABEAM [5L]: Initially, the ABEAM prompt is displayed. Line selecting ABEAM displays radial/distance, distance to go and ETA at the abeam intersection.

ERASE FIXES [6L]: Removes all downtrack fixes from display. A downtrack fix can also be deleted by using the CLR key.

DTG (3L,4L,5L): Distance to go along the flight plan to the downtrack fix. The field becomes blank after the downtrack fix was overflown.

ETA (3L,4L,5L): Estimated Time of Arrival at the downtrack fix. After the downtrack fix was overflown (the DTG field is blank), this field displays the actual time of arrival at the downtrack fix.

NOTE: On ground, ETEs are displayed instead of ETAs if the PLAN DATA page is configured. If not configured, the field is blank.

REF [1R]: FR: Radial (RAD) from FIX to present position. TO: Course (CRS) from present position to FIX. The default value is the last selected value, which is restored after a power interruption.

RAD/DIS(1L): Displayed when REF is FR. Radial/Distance from FIX to present position.

CRS/DIS(1L): Distance when REF is TO. Course/Distance to FIX from present position.

NOTE: Downtrack fixes are not possible with seven-character waypoints.

FLIGHT LOG 1/1 (if Flight Log is configured)

Display FLIGHT LOG 1/1 page by pressing [INIT REF], [NEXT] and <FLIGHT LOG>.

TAKEOFF (1L): Display of initial takeoff zulu time hours and minutes. The time is reset after a cold start on ground and set after a cold start on ground followed by a ground-air transition.

INFLIGHT (2L): Display of in-flight duration in hours and minutes. It is only reset after a cold start followed by a takeoff; otherwise, if a landing is detected, the value will be frozen and it will be resumed after the following take off.

INIT/REF [6L]: Returns to INIT/REF INDEX 2/2 page.

LANDING (1R): Display the last landing zulu time hours and minutes when the aircraft is on the ground. When the aircraft is airborne, blanks are displayed. The last landing time is updated after each air to ground transition.

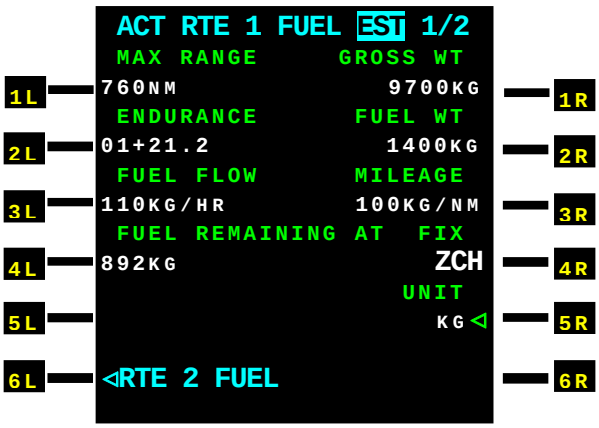
AIR MILES (2R): Display the total nautical miles travelled. It is only reset after a cold start followed by a takeoff; otherwise, if a landing is detected, the value will be frozen and resumed after take off.

LANDINGS [3R]: Display the number of landings since the last cold start on the ground. The landings count is increased after every air ground transition. The landings count is reset after a cold start once the aircraft is on ground.

FUEL 1/2 page (if FUEL is configured)

Display FUEL 1/2 page by pressing [INIT REF], [NEXT] and <FUEL> or [FUEL] (if the FUEL hard-key is configured).

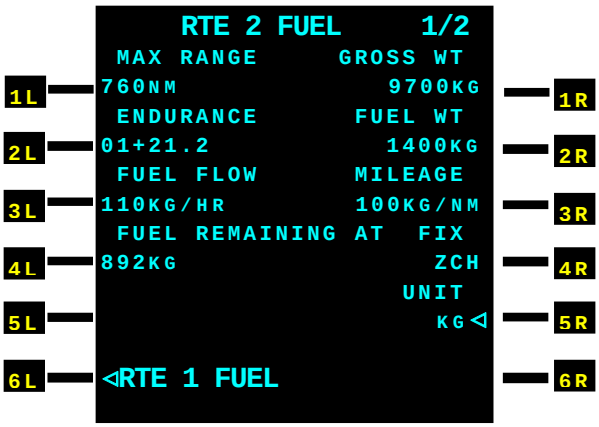
A. Display of fuel route page when route is activated and executed:



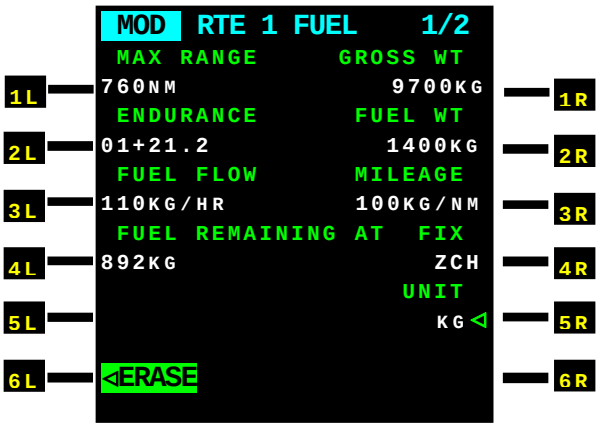
NOTE: "EST" is displayed after "FUEL" in reverse video on each of the title page (see above) whenever the Active route is displayed and one of the following conditions is met:

1) *fuel quantity or fuel flow configured but not received from the sensor; or*
2) *aircraft is on ground; or*
3) *manually entered values for FUEL FLOW (LSK 3L) or FUEL WEIGHT (LSK 2R).*

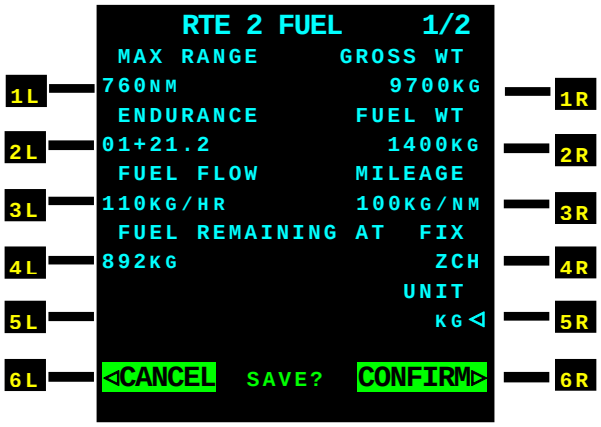
B. The inactive fuel route page (RTE 1 or RTE 2) is displayed in monochrome cyan to distinguish it from the active route:



C. *Display of fuel route page* when the active RTE is being modified:



D. After performing a RTE COPY or any edit from the Inactive route page, the CANCEL/CONFIRM prompts are displayed on the inactive fuel route page:



ACT FUEL (title): When the fuel sensor is used for calculating the active flight plan.

ACT FUEL EST (title): Displayed when the active route is displayed and:

- either fuel flow or fuel quantity are configured, but are not received from sensors for calculations for the active flight plan; or
- aircraft on ground; or
- manually entered values for FUEL FLOW (LSK 3L) or FUEL WEIGHT (LSK 2R).

MOD FUEL (title): When the fuel sensor is used for calculating the modified flight plan.

MOD FUEL EST (title): Displayed when Active modified route is displayed and:

- either fuel flow or fuel quantity are configured, but are not received from sensors for calculations for the active flight plan; or
- aircraft on ground; or
- manually entered values for FUEL FLOW (LSK 3L) or FUEL WEIGHT (LSK 2R).

MAX RANGE (1L): Displays calculated maximum range along track to the FIX waypoint if is defined (nm) or if it is not with the current track, given current or estimate fuel weight (excluding reserve), fuel flow and ground speed.

ENDURANCE (2L): Displays calculated endurance (hours), given current or estimate fuel weight (excluding reserve) and fuel flow.

FUEL FLOW [3L]: Displays the fuel flow.

- For the active route fuel page, the current rate of fuel consumption from the fuel sensor. A value (0-32728 kg/hr or 0-32728 lb/hr) may be manually entered if the fuel flow rate is unavailable from the sensor or for estimation purposes and will be displayed in large font. When the fuel flow from the fuel sensor is no longer received, the last valid fuel flow value received is stored as a manually entered value and the display is changed from normal to large font. If the CMA-9000 FMS is cold started, the aircraft on ground and the fuel flow is not available from fuel sensor "-----" is displayed.

- For the inactive route fuel page, the fuel flow value corresponding to the SIMUL RTEx page value is displayed in medium font if the SIMUL_PG option is configured. Otherwise, the current rate of fuel consumption from the fuel sensor is displayed in medium font. A value (0-32728 kg/hr or 0-32728 lb/hr) may be manually entered if the fuel flow rate is unavailable from the sensor or for estimation purposes only if the SIMUL_PG option is not configured and will be displayed in large font. When the fuel flow from the fuel sensor is no longer received, the last valid fuel flow value received is stored as a manually entered value only if the SIMUL_PG option is not configured and the display changed from normal to large font. If the SIMUL_PG option is configured, any manual entry is rejected and the "!NO ENTRY ALLOWED" advisory message is displayed.

FUEL REMAINING AT (4L): Displays calculated fuel remaining at a fix, given current fuel weight (excluding reserve), fuel flow, true airspeed, and wind.

RTE 1 FUEL [6L]: Access to RTE 1 FUEL 1/2 page

RTE 2 FUEL [6L]: Access to RTE 2 FUEL 1/2 page

ERASE [6L]: Cancel modifications to flight plan (Erase modified flight plan). If ERASE_MODS option is configured to CONFIRM, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed only if the RTE was erased on the RTE 1/X page. Used to restore the active route.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancels the changes made to the inactive route.

GROSS WT (1R): Displays calculated or received total aircraft gross weight.

- Received from Fuel Computer:
  If the gross weight is received from an external source, then the received value is displayed (in normal white font).

- Internally Calculated:
  If the gross weight is not received from an external source and the CMA-9000 FMS FUEL_PG option is configured with detailed weights, to FUEL+WEIGHTS, then an internally computed value is displayed (in normal white font):
  Gross weight is the sum of empty weight, optional equipment weight, crew weight, cargo weight, and total fuel weight including reserve. The Gross weight will be automatically updated so long as the CMA-9000 FMS receives fuel weight or fuel flow from the fuel computer.
  If the gross weight is not received from an external source and the CMA-9000 FMS FUEL_PG option is not configured with detailed weights, to FUEL+WEIGHTS, then an internally computed value is displayed (in normal white font):
  Gross weight is then calculated from the previous gross weight minus the change in fuel weight. The Gross weight will be automatically updated so long as the CMA-9000 FMS receives fuel weight or fuel flow from the fuel computer.
  If the gross weight, fuel flow, and fuel weight are not received from an external source and the CMA-9000 FMS FUEL_PG option is configured for detailed weights, to FUEL+WEIGHTS, then the gross weight is internally computed from the manually entered detailed weight values and is displayed as a computed value (in normal white font). The gross weight is then recalculated when the user enters new fuel or detailed weight values.
- Manually Entered:
  If the gross weight, fuel flow, and fuel weight are not received from an external source and the CMA-9000 FMS FUEL_PG option is not configured for detailed weights to FUEL+WEIGHTS, then the last received or computed value is displayed as a manual entry and may be manually updated by the user (in large white font).

FUEL WT [2R]: Displays the fuel weight excluding reserve.

- For the active route fuel page, the current calculated fuel weight from the fuel sensor is displayed in medium font. A value may be manually entered if the fuel weight is unavailable from the sensor or for estimation purposes and displayed in large font, 0 to 655360 kg or lb.
- For the inactive route fuel page, the fuel weight value corresponding to the SIMUL RTEx page value is displayed in medium font if the SIMUL_PG option is configured. Otherwise, the current calculated fuel weight from the fuel sensor is displayed in medium font. A value, 0 to 655360 kg or lb, may be manually entered if the fuel weight is unavailable from the sensor or for estimation purposes only if the SIMUL_PG option is not configured and is displayed in large font. If the SIMUL_PG option is configured, any manual entry is rejected and the "!NO ENTRY ALLOWED" advisory message is displayed.

MILEAGE (3R): Displays the calculated mileage in kilograms or pounds per nautical mile.

FIX [4R]: Display or entry of designated Waypoint for "FUEL REMAINING AT" computation. Default is the last route waypoint as defined on the RTE page in the DEST field. The fuel remaining at that point is computed based on the along track distance from the present position to the destination airport coordinates (excluding the missed approach procedure).

UNIT [5R]: Displays/selects current units for weight display (e.g. kilograms (kg) or pounds (lb)).

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

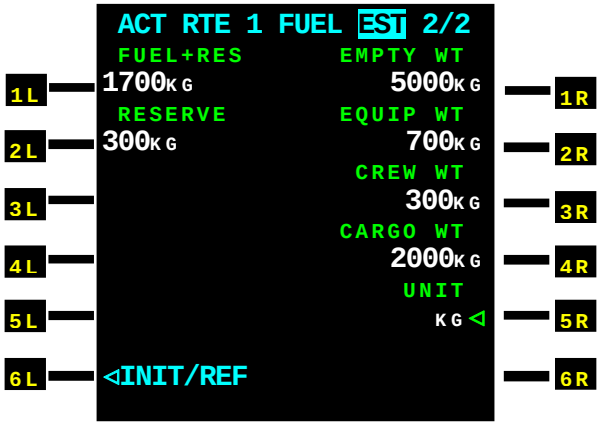
(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

When a page change is done, the data coming from the fuel computer (if configured) will have the priority and supersede the manual entry.

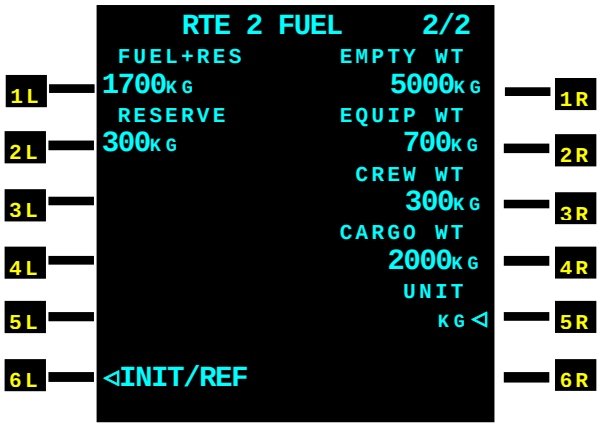
FUEL 2/2 page (if FUEL or FUEL+WEIGHTS is configured)

Display FUEL 2/2 page by pressing [INIT REF], [NEXT], <FUEL> and [NEXT] or [FUEL] (if the FUEL hard-key is configured), and [NEXT].

A. Display of fuel route page, when route is activated and executed:

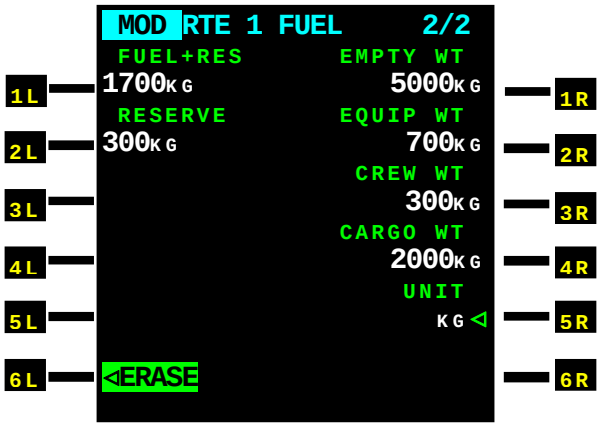


B. The inactive fuel route page (RTE 1 or RTE 2) is displayed in monochrome cyan to distinguish it from the active route:

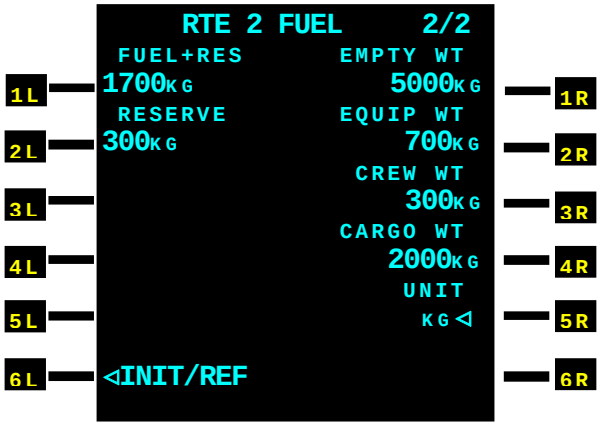


NOTE: "EST" is displayed after "FUEL" in reverse video on each of the title page (see above) when the Active route is displayed and specific conditions are met (refer to the NOTE in the FUEL 1/2 page description herein).

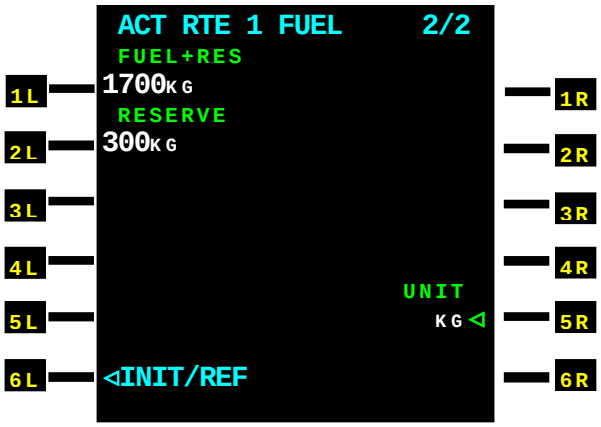
C. Display of fuel route page when the active RTE being modified:



D. After performing a RTE COPY or any edit from the Inactive route page, the CANCEL/CONFIRM prompts are not displayed on the inactive fuel route page:



E. Display of fuel route page without FUEL_PG option configured to FUEL+WEIGHTS, when route activated and executed:



ACT FUEL(title): When the fuel sensor is used for calculating the active flight plan.

ACT FUEL EST(title): For display conditions, refer to corresponding field of FUEL 1/2 page description herein.

MOD FUEL(title): When the fuel sensor is used for calculating the modified flight plan.

MOD FUEL EST(title): For display conditions, refer to corresponding field of FUEL 1/2 page description herein.

FUEL+RES [1L]: Display of total fuel weight (including reserve).

- For the active route fuel page, the current calculated total fuel weight from the fuel sensor is displayed in medium font. A value may be manually entered only if the total fuel weight is unavailable from the sensor. The value is displayed in large font with a value in between 0 to 655360 kg or lb.

NOTE: The entry of a parameter also revises the FUEL WT value on page FUEL 1/2. This field is periodically updated based on current fuel flow consumption. When losing the fuel weight from fuel sensor, the last fuel weight value from fuel sensor is kept until a manual value is entered.

- For the inactive route fuel page, if the SIMUL_PG option is configured, the total fuel weight value corresponds to the SIMUL RTEx page fuel weight value plus the fuel reserve value and is displayed in medium font. If the SIMUL_PG option is not configured, the current calculated total fuel weight from the fuel sensor is displayed in medium font. A value may be manually entered only if the fuel weight is unavailable from the sensor and if the SIMUL_PG option is not configured. The value is displayed in large font with a value in between 0 to 655360 kg or lb. In this case, the entry of a parameter also revises the FUEL WT value on page FUEL 1/2. If the SIMUL_PG option is configured, any manual entry is rejected and the "!NO ENTRY ALLOWED" advisory message is displayed.

RESERVE [2L]: Display and entry of fuel reserve.

NOTE: A fuel reserve entry also revises the FUEL WT value on page FUEL 1/ 2 for the active route. For the inactive route, the FUEL WT value on page FUEL 1/ 2 will only be updated if the SIMUL_PG option is *not configured. This field will be periodically updated based on current fuel flow consumption when the total FUEL+RES value is equal to the fuel reserve value.*

INIT/REF [6L]: Returns to INIT/REF INDEX 2/2 page.

ERASE [6L]: Cancel modifications to flight plan (Erase modified flight plan). If ERASE_MODS option is configured to CONFIRM, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancels the changes made to the inactive route.

EMPTY WT [1R]: Display and entry of aircraft empty weight (0 to 45358kg/99999lb) This field is shown only if FUEL_PG option is configured to FUEL+WEIGHTS.

EQUIP WT [2R]: Display and entry of optional equipment weight (0 to 45358kg/99999lb) This field is shown only if FUEL_PG option is configured to FUEL+WEIGHTS.

CREW WT [3R]: Display and entry of total crew weight. (0 to 45358kg/99999lb) This field is shown only if FUEL_PG option is configured to FUEL+WEIGHTS.

CARGO WT [4R]: Display and entry of total cargo weight (0 to 45358kg/99999lb) This field is shown only if FUEL_PG option is configured to FUEL+WEIGHTS.

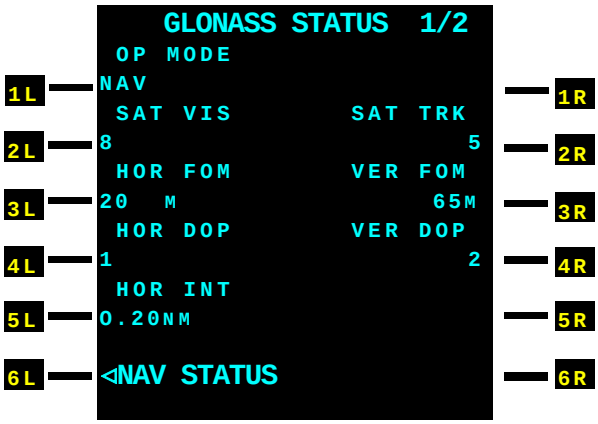
UNIT [5R]: Displays/selects current units for weight display (e.g. kilograms (kg) or pounds (lb)).

NOTE: For a Sextant IFDS EFIS installation, when there is a discrepancy between the gross weight calculated by the CMA-9000 FMS and the one received from the IFDS, all the data fields are displayed in amber.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

GLONASS STATUS 1/2 (if GLONASS is configured)

Display the GLONASS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> and <GLONASS>.



OP MODE (1L): GLONASS receiver operational mode.

- TEST: Self-Test Mode.
- INI: Initialization Mode.
- ACQ: Acquisition Mode.
- NAV: Navigation Mode.
- NAV/ALT: Altitude/Clock Aided Navigation Mode.
- NAV/DIFF: Differential Navigation Mode.
- NAV/AIDED: Direction/Speed Aided Navigation Mode.
- FAILED: Failure detected.

SAT VIS (2L): Number of healthy satellites visible.

SAT TRK (2R): Number of satellites tracked.

HOR FOM (3L): Horizontal Figure Of Merit (meters).

VER FOM (3R): Vertical Figure Of Merit (meters).

HOR DOP (4L): Horizontal Dilution Of Precision (no units). This is a measurement of overall positional and temporal accuracy in the horizontal plane.

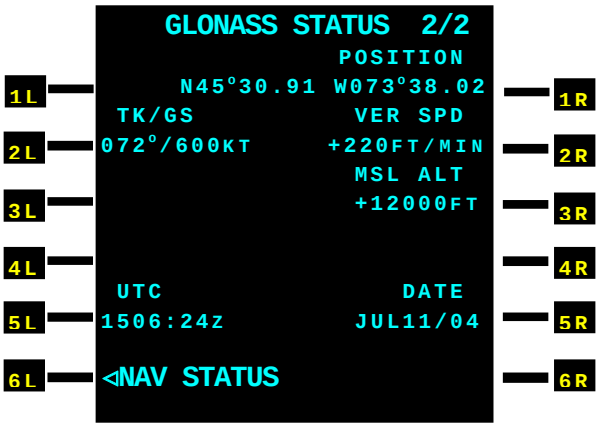
VER DOP (4R): Vertical Dilution Of Precision (no units). Measurement of overall positional and temporal accuracy in the vertical plane. A low VDOP is desirable, a high VDOP undesirable.

HOR INT (5L): Horizontal Integrity Limit (nautical miles).

NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

GLONASS STATUS 2/2 (if GLONASS is configured)

Display the GLONASS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS>, <GLONASS> and [NEXT].



POSITION (1L,1R): GLONASS position LATITUDE and LONGITUDE.

TK/GS (2L): Track angle (degrees) and Ground Speed (knots).

UTC (5L): GLONASS Universal Coordinated Time (UTC).

NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

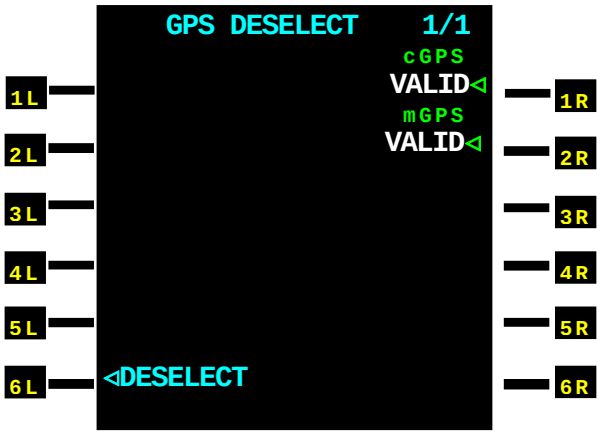
VER SPD (2R): GLONASS Vertical Velocity (feet per minute).

MSL ALT [3R]: GLONASS Mean Sea Level Altitude (in feet).

DATE [5R]: GLONASS Date.

GPS DESELECT 1/1

Display the GPS DESELECT 1/1 page by pressing [INIT/ REF], <NAV STATUS>, <DESELECT>, <GPS>



cGPS [1R]: When selected, it toggles between VALID/DESEL or ACQ/DESEL options to control usage of the civil GPS in the navigation solution.

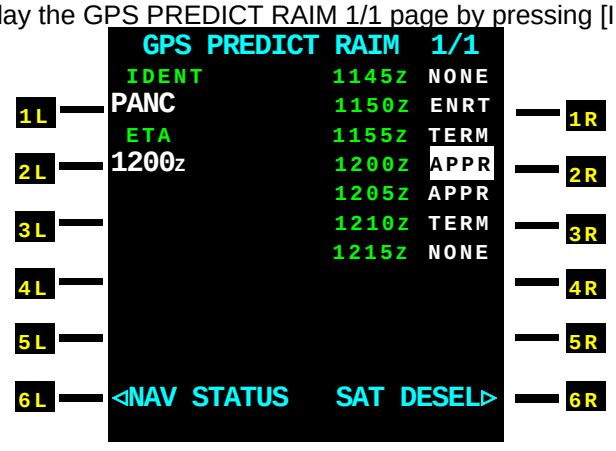
mGPS [2R]: When selected, it toggles between VALID/DESEL or ACQ/DESEL options to control usage of the military GPS in the navigation solution.

DESELECT [6L]: Access DESELECT 1/1 page.

GPS PREDICT RAIM 1/1(if ARINC 743A is configured)

Used to predict future GPS integrity at any required space/time point.

Display the GPS PREDICT RAIM 1/1 page by pressing [INIT REF], <NAV STATUS> and <PREDICT RAIM>.



IDENT [1L]: Any valid waypoint identifier where GPS integrity predictions are required.

NOTE: Defaults to destination airport on initial display of the page.

ETA [2L]: Estimated time of arrival when GPS integrity predictions are required.

NOTE: Defaults to ETA at the MAP waypoint when page first displayed. If no MAP waypoint yet inserted, defaults to destination airport reference point. On entry of a flight plan route waypoint identifier, defaults to ETA at entered route waypoint (based on current wind and speed). When on ground, ETA must be manually entered. When airborne, predictive RAIM ETA is based on system wind.

NAV STATUS [6L]: Returns to the NAV STATUS INDEX 1/1 page.

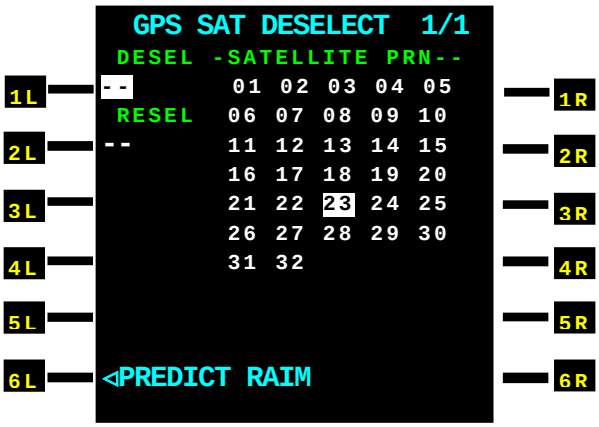
SAT DESEL [6R]: Access to the GPS SAT DESELECT 1/1 page.

Predicted GPS integrity at entered IDENT/ETA ± 15 minutes: Displays the most restrictive phase of flight that should be navigable with GPS at the entered position (identifier) and time (ETA) ± 15 minutes by intervals of 5 minutes. Possible GPS integrity status:

- NONE: GPS would not meet en-route navigation requirements.
- ENRT: GPS should meet en-route navigation requirements.
- TERM: GPS should meet terminal and en-route navigation requirements.
- APPR: GPS should meet GPS instrument approach, terminal and en-route navigation requirements.
- ****: Asterisks indicate that the GPS cannot provide a predicted integrity. The most probable reason is that the GPS almanac needs to be updated. Allow a maximum of 25 minutes for the GPS to automatically load the most recent satellite constellation almanac.

GPS SAT DESELECT 1/1

Display the GPS SAT DESELECT 1/1 page by pressing [INIT REF], <NAV STATUS>, <PREDICT RAIM> and <SAT DESEL>.



DESEL [1L]: Deselect satellite Pseudo Range Number (PRN). The number is 2 digits from 01 to 32.

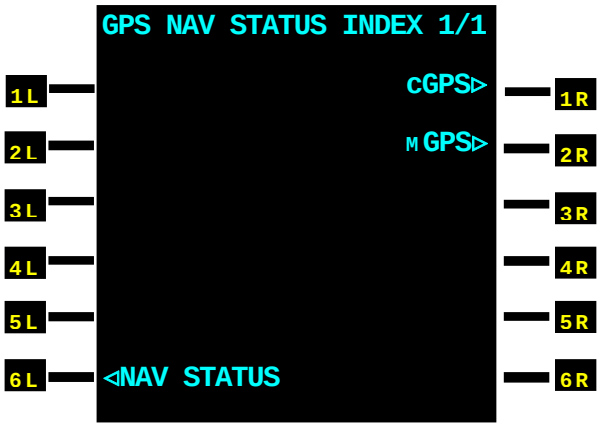
RESEL [2L]: Reselect satellite Pseudo Range Number (PRN). The number is 2 digits from 01 to 32.

SATELLITE PRN: Matrix of satellite(s) deselected from PRAIM calculations. Deselected satellites are indicated in WHITE reverse video color.

PREDICT RAIM [6L]: Returns to the GPS PREDICT RAIM 1/1 page.

GPS NAV STATUS INDEX 1/1

Display the GPS NAV STATUS INDEX 1/1 page by pressing [INIT/REF], <NAV STATUS><GPS> {If dual GPS are configured}



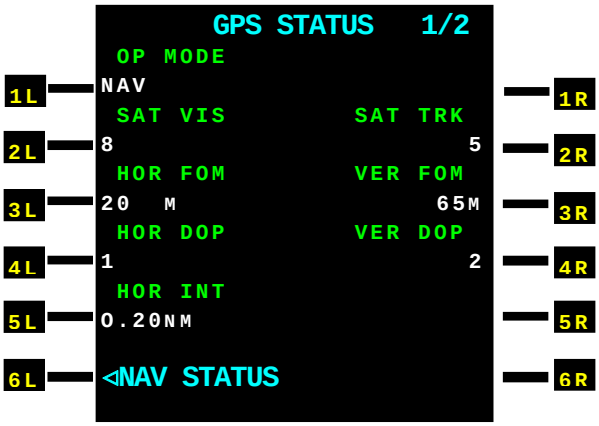
cGPS [1R]: Access to civil cGPS STATUS 1/2 page.

mGPS [2R]: Access to military mGPS STATUS 1/2 page.

NAV STATUS [6L]: Access to NAV STATUS page.

GPS STATUS 1/2 or cGPS STATUS 1/2 (if ARINC 743/743A GPS is configured)

Display the GPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> and <GPS>
or
Display the cGPS STATUS 1/2 page by pressing [INIT/REF], <NAV STATUS>, <GPS>,<cGPS> {if dual GPS (civil & EGI LN_100GT) configured}



OP MODE (1L): GPS receiver operational mode.

- TEST: Self-Test Mode.
- INI: Initialization Mode.
- ACQ: Acquisition Mode.
- NAV/SBAS: Satellite Based Augmentation System Navigation Mode.
  NAV/ALT: Altitude Aided Navigation Mode.
- NAV/DIFF: Differential Navigation Mode.
- NAV/AIDED: Direction/Speed Aided Navigation Mode.
- FAILED: Failure detected.

SAT VIS (2L): Number of healthy satellites visible.

SAT TRK (2R): Number of satellites tracked.

HOR FOM (3L): Horizontal Figure Of Merit (meters).

VER FOM (3R): Vertical Figure Of Merit (meters).

HOR DOP (4L): Horizontal Dilution Of Precision (no units). This is a measurement of overall positional and temporal accuracy in the horizontal plane.
VER DOP (4R): Vertical Dilution Of Precision (no units). Measurement of overall positional and temporal accuracy in the vertical plane. A low VDOP is desirable, a high VDOP undesirable.

HOR INT (5L): Horizontal Integrity Limit (nautical miles).

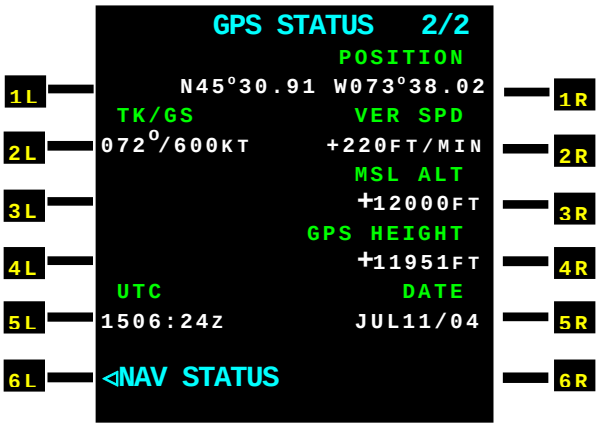
NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

GPS STATUS 2/2 or cGPS STATUS 2/2 (if ARINC 743/743A GPS is configured)

Display GPS STATUS 2/2 page by pressing [INIT REF], <NAV STATUS>, <GPS> and [NEXT]

or

Display cGPS STATUS 2/2 page by pressing [INIT/REF], <NAV STATUS>, <cGPS>, [NEXT] {if dual GPS (civil & EGI LN_100GT) configured}



TK/GS (2L): Track angle (degrees) and Ground Speed (knots).

UTC (5L): GPS Universal Coordinated Time (UTC).

NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

POSITION (1R): GPS position LATITUDE and LONGITUDE.

VER SPD (2R): GPS Vertical Velocity (feet per minute).

MSL ALT [3R]: GPS Mean Sea Level Altitude (in feet).

GPS HEIGHT [4R]: GPS Height (in feet). Only displayed if the GPS type is A743A_4.

DATE [5R]: GPS Date.

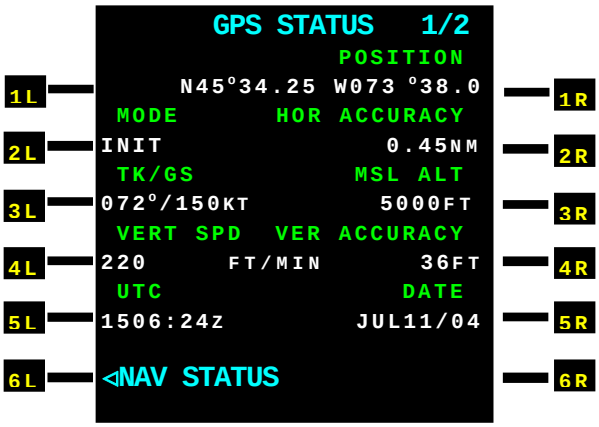
GPS STATUS 1/2 (EGI is configured) or mGPS STATUS 1/2 (dual GPS: LN-100GT w/ civil GPS)

Display GPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> and <GPS>.

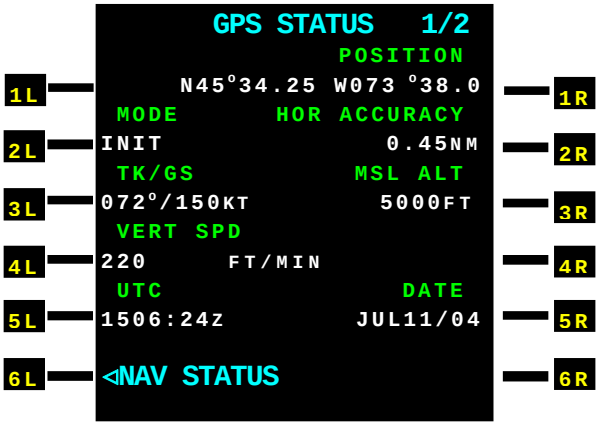
or

Display mGPS STATUS 1/2 page by pressing [INIT/REF], <NAV STATUS>, <GPS>, <mGPS>, (if dual GPS (civil & EGI LN_100GT) configured}

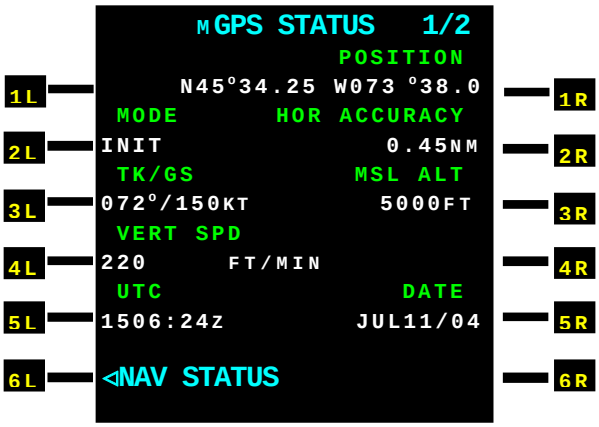
A. SIGMA50H:



B. LN_100GT:



C. LN_100GT w/ civil GPS :



MODE (2L): Displays the GPS operational status. The possible indications depend on the EGI configuration as indicated in the following table:

Mode		LN_100GT (EGI)	SIGMA50H (EGI)
FAIL	Fault mode	**X**	**X**
3D	3D position calculation mode	**X**	
2D	**2D position calculation mode**	**X**	
ACQ	Acquisition mode	**X**	
TEST	Self-test mode	**X**	
INID	Almanac Search	**X**	
INIC	Clock Warm-up	**X**	
INIT	Initialisation mode		**X**
3D+T	3D position and time calculation mode	**X**	
OPER	3D position and time calculation mode		**X**
2D+T	2D position and time calculation mode	**X**	
DSEL	Deselected	**X**	**X**

TK/GS (3L): Ground track angle (degrees) and Ground Speed (knots).

VERT SPD (4L): Displays GPS vertical velocity (in Ft/min).

UTC (5L): Displays GPS Universal Coordinated Time (UTC).

NOTE: Display format does not change with time display mode selection.

NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

POSITION (1R): Displays GPS Position.

HOR ACCURACY (2R): Displays GPS estimated error (95%) of horizontal position (in nm).

MSL ALT (3R): Displays Mean Sea Level GPS altitude (in Ft).

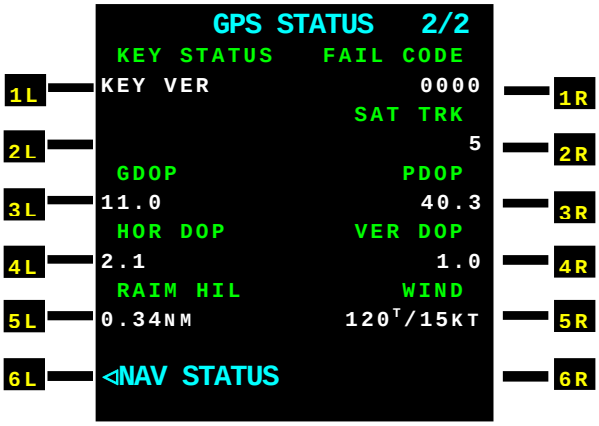
VER ACCURACY (4R): Displays GPS estimated error (95%) of GPS altitude (field available only if SIGMA50H EGI is configured).

DATE (5R): Displays GPS Date.

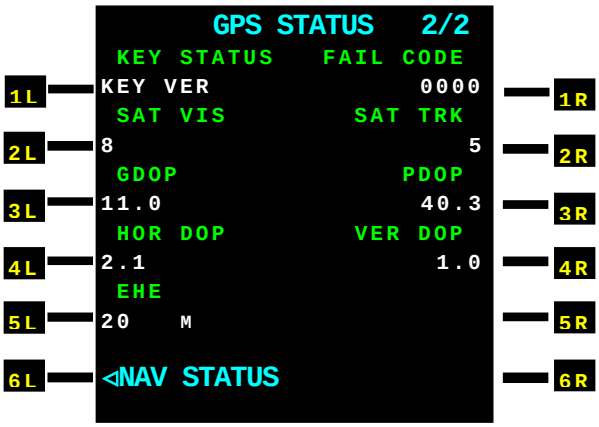
GPS STATUS 2/2 (EGI is configured)

Display GPS STATUS 2/2 page by pressing [INIT REF], <NAV STATUS>, <GPS> and [NEXT].

A. SIGMA50H:



B. LN_100GT:



KEY STATUS (1L): Displays GPS key status (highest to lowest display priority):

Key Status		LN_100GT (EGI)	SIGMA50H (EGI)
PPS-SM FAIL	Circuit failure.	X	X
ZEROIZE ERR	Erase failure.	X	X
KEY LOAD ERR	**Key loading error (parity error,…)**	X	X
NO KEY	Key is missing.	X	X
BAD KEY	Bad key error.	X	
2 HR ALERT	Keys will expire within 2 hours.	X	X
INSUFF KEY	Insufficient key.	X	X
KEY UNVER	Keys unverified.	X	
KEY VER	Keys verified.	X	
NOT USED	Keys not used.		X
USED	Keys used.		X

SAT VIS (2L): Number of healthy satellites visible {Litton EGI configuration only}.

GDOP (3L): Displays Geometric Dilution of Precision (0.0 to 51.0).

HOR DOP (4L): Horizontal Dilution of Precision (no units). This is a measurement of overall positional and temporal accuracy in the horizontal plane. A low HDOP is desirable, a high HDOP undesirable.

RAIM HIL (5L): Displays the Horizontal Integrity Limit supplied by the GPS RAIM function. {SIGMA50H configuration only}.

EHE (5L): Displays GPS estimated error of horizontal position (in meters). {Litton EGI configuration only}.

NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

FAIL CODE (1R): Displays GPS failure code. This code is the hexadecimal value of bits 14 – 26 of GPS discrete status word.

SAT TRK (2R): Number of satellites used by localization function.

PDOP (3R): Displays Position Dilution of Precision (0.0 to 51.0).

VER DOP (4R): Vertical Dilution of Precision (no units). Measurement of overall positional and temporal accuracy in the vertical plane. A low VDOP is desirable, a high VDOP undesirable.

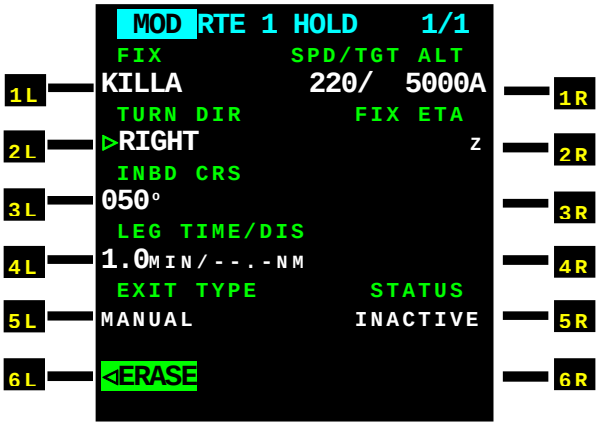
WIND [5R]: Displays GPS Wind direction and Wind Speed. {Litton EGI configuration only}.

HOLD 1/X

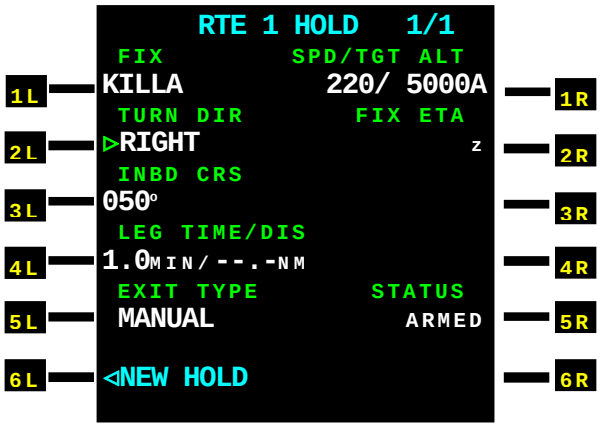
- [HOLD] If a holding FIX already exists in the route.
- Automatically accessed whenever a proposed holding fix was entered on the RTE LEGS page (e.g. appending '/H' to an existing waypoint).

Used to review and/or revise the details of either an existing or proposed holding pattern. A manually exited holding pattern can be defined by the pilot. A holding pattern termination at an altitude or after one full circuit is the result of the departure/arrival procedures in the database. The possible display formats are shown below.

A. Prior to EXECution (EXEC annunciator is illuminated):

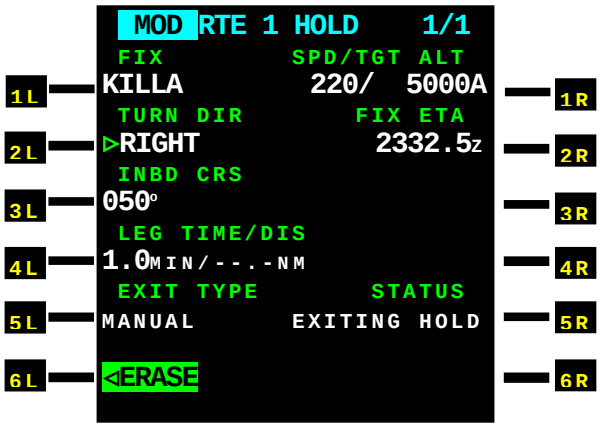


B. After EXECution, but prior to hold entry:



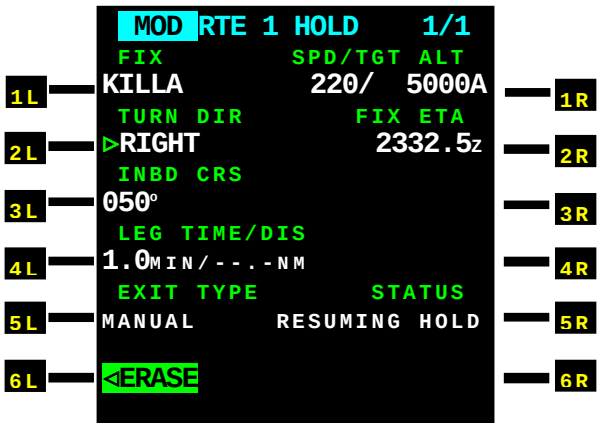
C. After hold entry initiated:

D. After pressing the EXIT HOLD key:



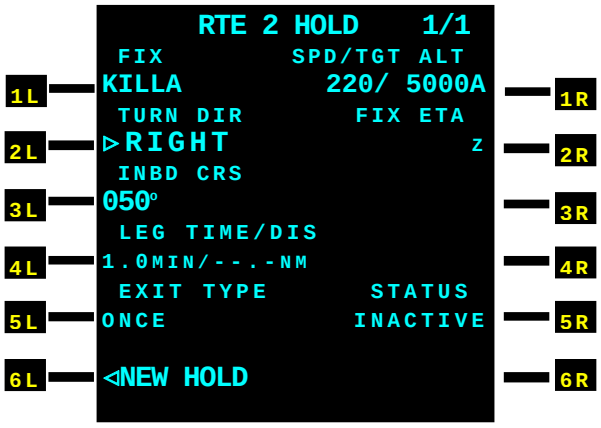
E. During holding exit procedure (after pressing EXEC key):

F. When the exit was armed and the RESUME HOLD prompt was pressed:

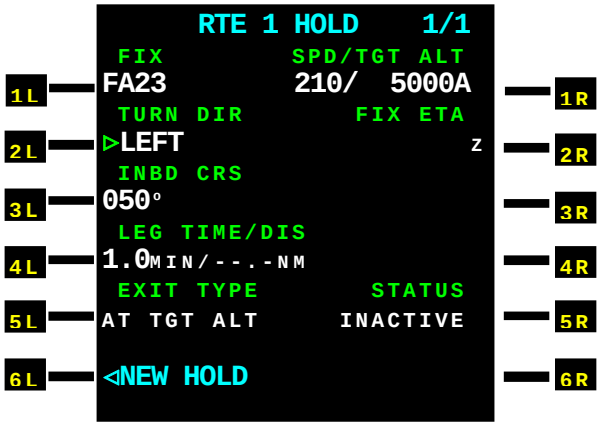


G. Inactive hold prior to confirmation:

H. Inactive route after confirmation:



I. After EXECution, but prior to hold entry (exit type AT TGT ALT displayed):



ACT/MOD/" "(title): MOD indicates the holding pattern has not been executed. ACT indicates that the aircraft has entered the holding pattern. A blank field indicates the holding fix has not yet been reached or the route is inactive.

FIX [1L]: The waypoint identifier of the holding fix. Assigned PPOS for holding pattern at present position.

TURN DIR [2L]: Holding pattern turn direction (right or left).

INBD CRS [3L]: Holding pattern in-bound course to fix. Defaults to inbound course of the preceeding leg to FIX (0° to 360°).

LEG TIME/DIS [4L]: Holding pattern inbound leg time or leg distance: When a slash ('/') character is entered, the entry is interpreted as the leg distance, otherwise, the entry is interpreted as the leg time. When leg time is entered, the leg distance field displays dashes and when leg distance is entered, the leg time field displays dashes.
Holding pattern inbound leg time: Defaults to 1.0 minute at or below 14,000 feet and 1.5 minutes above 14,000 feet.
Holding pattern inbound leg distance: Dashes normally displayed, valid range is between 1.0 nm to 99.9 nm.

EXIT TYPE [5L]:
- MANUAL - indicates that exit from the holding pattern must be manually initiated (via Direct-To or pressing EXIT HOLD).
- ONCE - indicates automatic exit at the fix after completion of entry procedure. (Normally used in lieu of a standard procedure turn).
- AT TGT ALT - indicates automatic exit at the fix after reaching an altitude. The latter types are from the navigation database.

When this LSK is pressed the exit type toggles between ONCE or AT TGT ALT to MANUAL, it can not be toggled back to the previous exit type unless the change is erased. When the exit type is MANUAL, the ">" symbol is not displayed since the MANUAL exit type cannot be changed. The symbol ">" is also not displayed when the inactive route is displayed since changing the exit type is only allowed in the active route. Changing the exit type when the holding pattern status is EXIT ARMED has the same effect as pressing the RESUME HOLD prompt.

NEW HOLD [6L]: Displayed only if there is no route modification in process. Access to the RTE LEGS 1/X page to define a new holding pattern (/H in scratchpad).

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route.

ERASE [6L]: Used to erase all route modifications in progress including HOLD definition. The prompt is not available for inactive route modifications. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL and CONFIRM prompts on line select keys 6L and 6R respectively.

SPD/TGT ALT [1R]: Displays speed/altitude restrictions for corresponding waypoint on the RTE LEGS 1/X page. Altitude display can be in feet or FL. If waypoint is before the midway point of the active route, Transition Altitude is used. If waypoint is after the midway point of the active route, Transition Level is used.
The speed/altitude constraints extracted from the navigation database is displayed in small font. Manual entry of speed/altitude constraints is displayed in large font. Refer to field **ALTITUDE CONSTRAINTS** on RTE LEGS 1/X page for the manual entry format.
If the FMS is configured for VNAV, approach and approach transition waypoint altitude constraints are temperature-compensated, provided that destination airport temperature was entered on the VNAV page. Temperature-compensated altitude constraint is displayed in reverse video white.

FIX ETA (2R): Estimated time of arrival over holding fix.

STATUS [5R]: Indicates the status of the holding pattern.

- INACTIVE: The holding pattern is part of the inactive flight plan or active flight plan but not yet reached the active TO waypoint.
- ARMED: The active TO waypoint is in the holding pattern, but not yet reached.
- IN PROGRESS: The aircraft has entered the holding pattern.
- EXITING HOLD: The holding pattern is in progress and the "EXIT HOLD>" prompt has been pressed.
- EXIT ARMED: The aircraft is exiting the holding pattern, the "EXIT HOLD>" prompt and the EXEC key have been pressed.
- RESUMING HOLD: The exit is armed and the "RESUME HOLD>" prompt has been pressed.

EXIT HOLD [6R]: Active only when the displayed holding pattern status is IN PROGRESS. Pressing this LSK causes EXITING HOLD prompt to appear, the route goes in MOD status and the EXEC lamp illuminates. If the EXEC key is pressed in the EXITING HOLD state, the holding pattern exit is armed

RESUME HOLD [6R]: Displayed when the holding pattern status is EXIT ARMED. Pressing this LSK changes the status to RESUMING HOLD and causes the route to be in MOD and the EXEC lamp to illuminate. If the EXEC key is pressed in the RESUMING HOLD state, the holding pattern is resumed and the exit type is manual.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

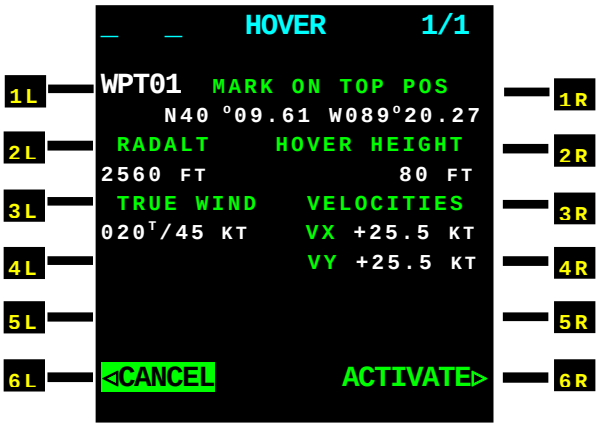
(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

HOVER 1/1 (if HOVER configured, A/C configured as ROTOR, RALT equipment configured and Active route displayed)

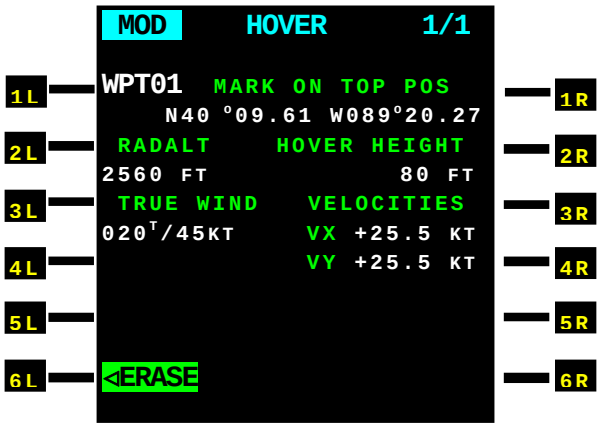
This page is used to enter the hover point, verify the parameters for the Transdown to hover procedure and activate the procedure.

Display the HOVER 1/1 page by pressing:
[INIT REF],<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT DATA>,<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,select waypoint identifier or coordinates,<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT LISTS>,<DMAP WPT>,select DMAP waypoint identifier,<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,[NEXT],<DES+SAR> or <TACTICAL>,<HOVER> or
[INIT REF],<MARK ON TOP>,<DES+SAR> or <TACTICAL>,<HOVER> or
[MARK] {if CFG KEY 2 configured to MARK},<DES+SAR> or <TACTICAL>, <HOVER> or
{if Flight Transdown command of IFDS is sent} or
[TACT], <HOVER> {if TACT key configured and HOVER configured on the TACTICAL page}

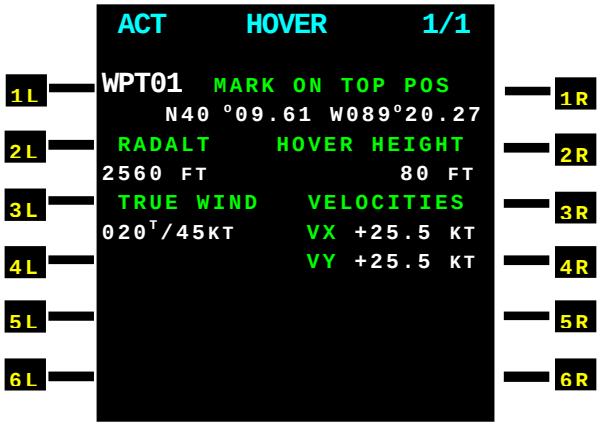
Displayed when a waypoint identifier or waypoint coordinates for mark waypoint are defined and either the hover procedure is not active (in the active route) or a new mark waypoint is created.



A. Displayed when the Hover procedure has been activated (LSK 6R):



B. Displayed when the Hover procedure has been executed ([EXEC] key):



ACT/MOD/blank (STATUS): MOD indicates that the hover waypoints were inserted in the flight plan. ACT indicates that the procedure was executed.

ID [1L]: Input waypoint ID. Not a mandatory entry field. Used to designate any waypoint stored in the databases as the mark point. If the entered waypoint ID is not found in one of the databases or the waypoint ID is a moving waypoint, the entry will be rejected. The waypoint ID is cleared when the active route is erased.

ID COORDINATES [1R]: Coordinates of the mark point. This is a mandatory entry field. A latitude/longitude format is displayed in this field. The waypoint coordinates are cleared when the active route is erased.

field name (1R): When displayed indicates how the mark point was designated/entered: MARK ON TOP POS, LAST JSTICK POS. The field name remains blank if the mark point is taken from the database or if the coordinates were entered manually.

RADALT (2L): Displays the radio altitude (ft).

HOVER HEIGHT (2R): Displays the hover height (ft).

TRUE WIND (3L): Displays the true wind's direction and velocity.

NOTE: The calculation of the aircraft orientation at the mark *point will not be based on the wind orientation when the wind velocity is less than 5 knots. Instead it will be based on the bearing from the aircraft to the* mark *point.*

VELOCITIES (3R): Displays AFCS X and Y velocities if one of the following EFIS is configured: AHCAS, AHCAS2, ROCKWELL2 and ROCKWELL3.
Displays Doppler X and Y velocities {If DVS is configured and IFDS EFIS is configured}.

TAS (3R): Displays the true airspeed {If the IFDS EFIS is configured but DVS is not configured or none of the following EFIS are configured: IFDS, AHCAS, AHCAS2, and ROCKWELL2 and ROCKWELL3}.

ACTIVATE [6R]: ACTIVATE (display in green) inserts the latest entered hover waypoint and the computed Transdown (TDN) waypoint into the flight plan. The ACTIVATE prompt is displayed when a waypoint identifier or waypoint coordinates are present on line 1 and either a) the hover procedure is not active (not in the active route) or b) a new mark waypoint is created. When the hover procedure is activated but not executed (active route in MOD status), the prompt is suppressed. Activation is possible only if the altitude data received from the radio altimeter is valid ACTIVATE is displayed (in white) only when the procedure is not active. Confirms the changes made to the inactive procedure. Inserts the latest entered hover waypoint and the computed TDN waypoint into the flight plan. It also starts the computation of the TDN waypoint. Activation is possible only if the altitude data received from the radio altimeter is valid.

CANCEL/ERASE [6L]: CANCEL (reverse video green color) will delete all the fields (identifier and coordinate of the mark waypoint). It will restore previously defined mark waypoint (in the active route) if existed. The CANCEL prompt is displayed under the same conditions as the ACTIVATE prompt. See comments on ERASE [6L] of RTE 1/X page for the ERASE option.

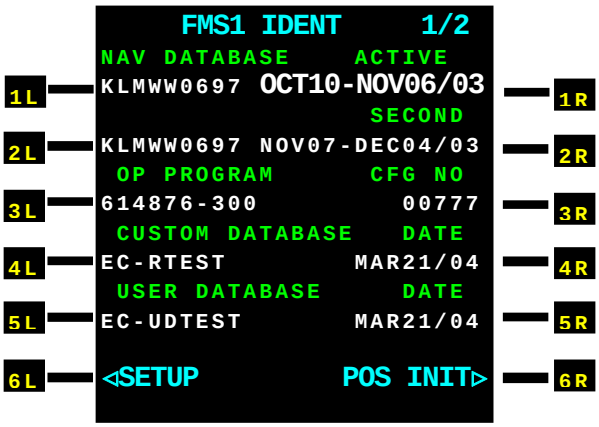
CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM}
Confirm the changes to the active route.

IDENT 1/2

This page displays the effective expiry dates for the current and next cycle databases and enables the pilot to manually select the active navigation database. The loaded custom and user databases are also identified. The page allows the identification of the configured software in the CMA-9000 FMS and provide validity check for the configuration.

NOTE: FMS ID "FMSx" will not be shown when cross-FMS is not configured.

- Display the IDENT 1/2 page by pressing [INIT REF] and <IDENT> (LSK 1L) or automatically after power on if the default power-up page is configured to IDENT.



NAV DATABASE (1L,2L): Navigation database identification.

OP PROGRAM (3L): Operational Program number.

CUSTOM DATABASE (4L): Displays the custom database Identifier. Up to 8 characters may be shown. Stars "********" are shown when no custom database is loaded. Blanks are shown when the database identifier is not valid.

USER DATABASE (5L): Displays the user database Identifier. Up to 9 characters may be shown. Stars "********" are shown when no user database is loaded. Blanks are shown when the database identifier is not valid or the loaded database modified.

SETUP [6L]: Access to SETUP 1/1 page.

ACTIVE [1R]: Displays active database effectivity date. To select the second database as the active database. Press LSK 2R to copy the second database date to the scratchpad. Press LSK 1R to select it as the ACTIVE DATABASE. The current active database can be selected when on the ground. Doing so will clear any previously loaded flight plan.

SECOND [2R]: Displays second database effectivity date. Keypress will copy this date into the scratchpad.

CFG NO (3R): Configuration CRC checksum. This number is verified against the information in the Installation and Flight Line Manual by maintenance personnel during system installation.

DATE (4R): Display the custom database affectivity date. Stars "*****/**"are shown when no database is loaded. Blanks are shown when the date is not valid.

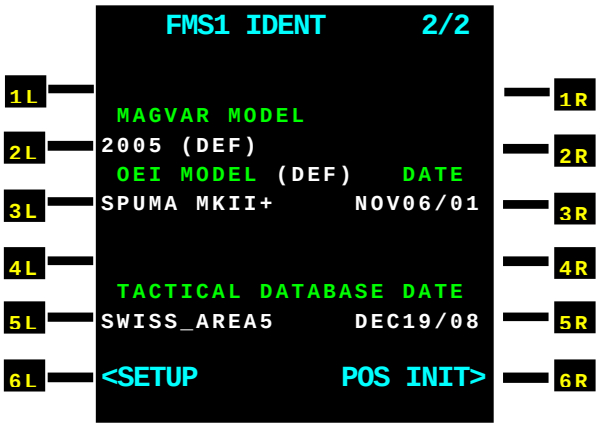
DATE [5R]: Display the user database date. Stars "*****/**"are shown when no database is loaded. Blanks are shown when the date is not valid or the loaded database has been modified.

POS INIT [6R]: Access to POS INIT/REF 1/X page.

IDENT 2/2

This page displays the identification of the loaded flight data.

Display the IDENT 2/2 page by pressing [INIT REF], <IDENT> and [NEXT].



MAGVAR MODEL (2L): Displays the name of the Magnetic Variation Table Model. (DEF) indicates the default 2005 Model is used.

OEI MODEL (3L): Displays the name of the loaded OEI Model used for OEI Cruise and Fly Away simulation. The OEI model name may contain up to 14 characters.

DATE (3R): Displays the date indicated in the OEI Model data loaded.

TACTICAL DATABASE (5L): Displays the tactical approach database name. The name may contain up to 14 characters. "**********" is shown when no database is loaded. If Tactical APPR is not configured, this field is blank.

DATE (5R): Displays the tactical approach database date. The date format is as per the configuration date format (e.g. DATE from the DISPLAY CONFIG pages). "*****/**" is shown when no database is loaded. If Tactical APPR is not configured, this field is blank.

SETUP [6L]: Access to SETUP 1/1 page.

POS INIT [6R]: Access to POS INIT/REF 1/X page.

INACT DES+SAR 2/2 (if CARP and TACTICAL APPR are not configured)
INACT DES+SAR 2/4 (if CARP or TACTICAL APPR is configured)

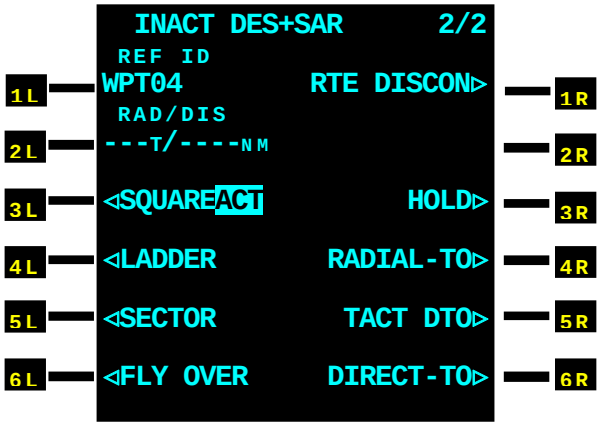
The page title is INACT TACTICAL if the TACT key is configured.

The INACT DES+SAR 2/X page is displayed in cyan.

Displaying the INACT page switches the displayed RTE x LEGS 1/X pages to the inactive route. Also all the commands available on this page (listed below) can be applied to the respective waypoint in the inactive route. In the LEGS page it is possible to switch back to the active route.
If the INIT REF hard key is pressed while displaying the INACT DES+SAR 2/2 page, the INIT/REF INDEX 1/2 page is displayed unless the inactive route is being modified.
When the active route is being modified (MOD) and the DES+SAR prompt is being pressed, the DES+SAR 1/2 page is displayed, the access to the INACT DES+SAR 2/2 page is denied, and the advisory message !ACTIVE ROUTE IN MOD is displayed.
When the inactive route is being modified and the <DES+SAR> prompts being pressed, the INACT DES+SAR 2/2 page is displayed, the access to the DES+SAR 1/2 page is denied, and the advisory message !INACTIVE ROUTE IN MOD is displayed.

NOTE: The INACTIVE DES+SAR 2/2 (or 2/4 if CARP or TACTICAL APPR is configured) page will be displayed when the DES+SAR prompt is selected and the inactive route is being modified.

To access the INACT DES+SAR 2/X page press:
[INIT REF], <DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<WPT LISTS>,<DMAP WP >,<DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<WPT DATA>,<DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,<DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<WPT LISTS>,<PREDEF WP>, [NEXT], <DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<NEAREST>,<AIRPORT>,<DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<NEAREST>,<VHF NAV>,<DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<NEAREST>,<NDB>,<DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<NEAREST>,<USER WPTS>,<DES+SAR>, [NEXT] and [NEXT] or
[INIT REF],<NEAREST>,<CUSTOM WPTS>,<DES+SAR>, [NEXT] and [NEXT].



REF ID [1L]: Storage of the reference identifier. If there is a valid position in the scratchpad when the page is opened, then the CMA-9000 FMS creates a temporary waypoint at that position and places the identifier in this field.

RTE DISCON [1R]: Brings up the RTE x LEGS 1/X page with discontinuity symbols (□□□□□) in the scratchpad.

RAD/DIS [2L]: The RAD/DIS combination allows the pilot to position a waypoint relative to the REF ID. The relative position is used to create a temporary waypoint when a new DES+SAR procedure is selected.

NOTE: HOVER [2R]: Not available (Hover is not possible on the inactive route).

SQUARE [3L]: Appears when configured. The status "ACT" (reverse video cyan) is appended to the prompt if an activated square search pattern is in the inactive flight plan. Pressing the line select key:
- If SAR waypoint is not entered in field REF ID of the DES+SAR page, display the SQUARE page.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

LADDER [4L]: Appears when configured. The status "ACT" (reverse video cyan) is appended to the prompt if an activated ladder search pattern is in the inactive flight plan. Pressing the line select key:
- If SAR waypoint is not entered in the field REF ID of the DES+SAR page, display the LADDER page.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

SECTOR [5L]: Appears when configured. The status "ACT" (reverse video cyan) is appended to the prompt if an activated sector search pattern is in the inactive flight plan. Pressing the line select key:

- If SAR waypoint is not defined or is part of the Route, display the SECTOR page.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

HOLD [3R]: Pressing the line select key:

- If HOLD waypoint is entered in the field REF ID of the DES+SAR page, yield to the same behaviour as pressing the HOLD hard key. The HOLD page appears if a holding pattern already exists; otherwise, the RTE x LEGS 1/X page appears with /H in the scratchpad. The HOLD page has a NEW HOLD LSK to allow a new holding pattern to be defined.
- If HOLD waypoint is entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with the identifier and /H qualifier in the scratchpad.

FLY OVER [6L]: Pressing the line select key:

- If Fly Over waypoint is not entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with only /O in the scratchpad.
- If Fly Over waypoint entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with the identifier and /O in the scratchpad.

RADIAL-TO [4R]: Pressing the line select key:

- If Radial-to waypoint is not entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with only the /R qualifier in the scratchpad.
- If Radial-to waypoint is entered in the field REF ID of the DES+SAR page, display the RADIAL-TO page with the identifier in the ID field. The NEW RADIAL-TO field will display the LEGS page for insertion in the route.

TACT DTO [5R]: Appears when the MILITARY NAVIGATION option is configured. Pressing the line select key:

- If Tactical Direct-to waypoint is not entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with only /T in the scratchpad.
- If Tactical Direct-to waypoint is entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with the identifier and /T in the scratchpad.

DIRECT-TO [6R]: Pressing the line select key:

- If Direct-to waypoint is not entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page.
- If Direct-to waypoint is entered in the field REF ID of the DES+SAR page, display the RTE x LEGS 1/X page with the identifier in the scratchpad.

INACT DES+SAR 4/4 (if CARP or TACTICAL APPR is configured)

The page title is INACT TACTICAL if the TACT key is configured.

Display DES+SAR 4/4 page by pressing:
[INIT REF],<NEAREST>,<AIRPORT>,<DES+SAR> and [PREV] or
[INIT REF],<NEAREST>,<VHF NAV>,<DES+SAR> and [PREV] or
[INIT REF],<NEAREST>,<NDB>,<DES+SAR> and [PREV] or
[INIT REF],<NEAREST>,<USER WPTS>,<DES+SAR> and [PREV] or
[INIT REF],<NEAREST>,<CUSTOM WPTS>,<DES+SAR> and [PREV] or
[INIT REF],<DES+SAR> and [PREV] or
[INIT REF],<WPT LISTS>,<DMAP WPT>,<DES+SAR> and [PREV] or
[INIT REF],<WPT DATA>,<DES+SAR> and [PREV] or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,<DES+SAR> and [PREV] or
[INIT REF],<WPT LISTS>,<PREDEF WPT>,[NEXT],<DES+SAR> and [PREV]

NOTE: The INACT DES+SAR 3/4 and 4/4 pages are available when the inactive route is being modified.

The INACT DES+SAR 4/4 page is available by pressing [PREV] while displaying the DES+SAR 1/4 page. The INACT DES+SAR 3/4 and 4/4 pages is displayed in cyan.
Displaying either of the INACT pages will switch the displayed LEGS pages to the inactive route. Also all the commands available on this page (listed below) can be applied to the respective waypoint in the inactive route. In the LEGS page it is always possible to switch back to the active route.
If the INIT REF hard key is pressed while displaying the INACT DES+SAR 3/4 or 4/4 pages, the INIT/REF INDEX 1/2 page is displayed.
When the active route is being modified (MOD) and the DES+SAR prompt is being pressed, the DES+SAR 1/2 page is displayed, the access to the INACT DES+SAR 3/4 and 4/4 pages is denied, and the advisory message !ACTIVE ROUTE IN MOD is displayed when trying to access the INACT DES+SAR 3/4 or 4/4 pages.
When the inactive route is being modified and the DES+SAR prompt is being pressed, the INACT DES+SAR 3/4 page is displayed, the access to the DES+SAR 1/4 and 2/4 pages is denied, and the advisory message !INACTIVE ROUTE IN MOD is displayed when trying to access ether the DES+SAR 1/4 or 2/4 pages.

REF ID [1L]: Storage of the reference identifier. If there is a valid position in the scratchpad when the page is opened, then the FMS will create a temporary waypoint at that position and places the identifier in this field. If the reference identifier is a moving waypoint, the following prompts are blanked and disabled: CARP> and TACT APPR>.

RAD/DIS [2L]: The RAD/DIS combination allows the pilot to position a waypoint relative to the REF ID. The relative position is used to create a temporary waypoint when a new DES+SAR procedure is selected.

CARP [3R]: Displayed when CARP is configured. Pressing the line select key:

- If SAR waypoint is not entered in field REF ID of the DES+SAR page and no CARP procedure exists in the flight plan then display the LEGS page with CRP01/C in the scratchpad.
- If SAR waypoint is not entered in the field REF ID of the DES+SAR page and a CARP procedure exists in the flight plan then display the CARP PLAN 1/3 page.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page and no CARP procedure exists in the flight plan then display the LEGS page with the identifier and /C qualifier in the scratchpad allowing entry in the flight plan.
- If SAR waypoint is entered in the field REF ID of the DES+SAR page and it is different from the PI of the existing CARP procedure then display the CARP PLAN 1/3 page with the identifier in the scratchpad.

TACT APPR [4R]: Displayed when the TACT APPR option on the CONFIG page is configured.

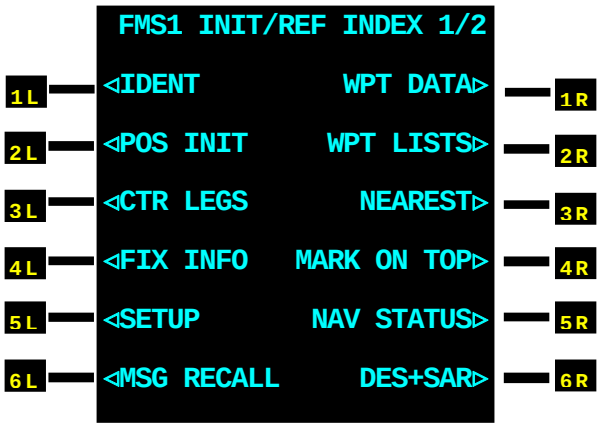
- If no SAR waypoint is entered in the field REF ID of the DES+SAR page and no previously defined tactical approach Runway Threshold Waypoint then display default LEGS page with the /A qualifier in the scratchpad allowing entry in the flight plan.
- If no SAR waypoint is entered in the field REF ID of the DES+SAR page and previously defined the tactical approach Runway Threshold Waypoint then display the TACTICAL APPR page.
- If SAR waypoint is already defined then display the default LEGS page with the identifier with the /A qualifier in the scratchpad allowing entry in the flight plan.

INIT/REF INDEX 1/2

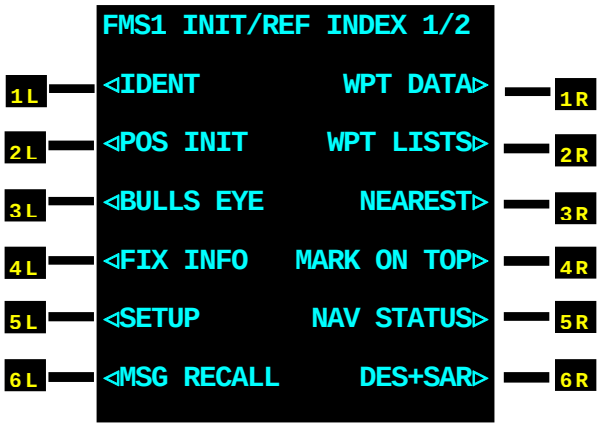
Display the INIT/REF INDEX 1/2 page by pressing [INIT REF].

NOTE: FMS ID "FMSx" will not be shown when cross-FMS is not configured.

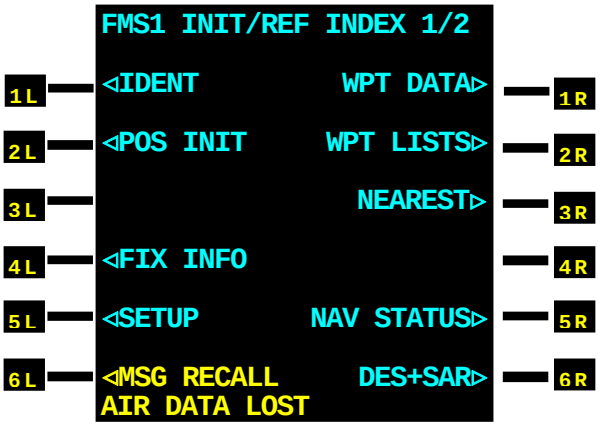
Displays {If PREDEF is configured and MARK key is not configured, display {If configured for SEARCH} and if EFIS Step mode is configured}.



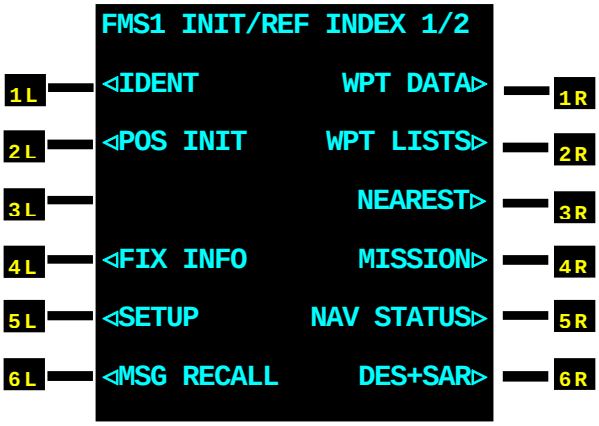
B. Display {If PREDEF is configured and MARK key is not configured, display {If configured for SEARCH} and {Tactical Config BULLS EYE is configured and none of the CFG KEY is configured to BULL}}.



C. Display MARK key configured and {If PREDEF configured}.



D. Display {If PREDEF configured, MARK key configured and, ATOS or/and FIAR 1500B RADAR configured}.



[1L] to [6L] and [1R] to [5R]:
These keys permit to access one of the following pages according to the INIT/REF option configuration:

IDENT [1L]: Access to IDENT 1/1 page.

WPT DATA [1R]: Access to WPT DATA 1/1 page.

POS INIT [2L]: Access to POS INIT/REF 1/X page.

WPT LISTS[2R]: Access to WPT LISTS 1/1 page.

CTR LEGS [3L]: Access to the LEGS 1/X page in center step EFIS mode {If EFIS step mode is configured}.

BULLS EYE [3L]: Access to BULLS EYE 1/3 page. {If BULLS EYE is configured}.

NOTE: When the Tactical Config BULLS EYE is configured, the EFIS step mode can not be installed.

NEAREST[3R]: Access to NEAREST 1/1 page.

FIX INFO [4L]: Access to FIX INFO 1/1 page.

MARK ON TOP [4R]: Store the current CMA-9000 FMS system position in the predefined store point label 'ONTOP', and jump to the PREDEF WPT 2/2 page {if PREDEF WPT configured and MARK key is not configured}.

MISSION [4R]: Access to MISSION 1/1 page {if the PREDEF PG is not configured or configured with the MARK key also configured} and {the ATOS and/or the FIAR 1500B RADAR is/are configured}.

SETUP [5L]: Access to SETUP 1/1 page.

NAV STATUS [5R]: Access to NAV STATUS INDEX 1/1 page.

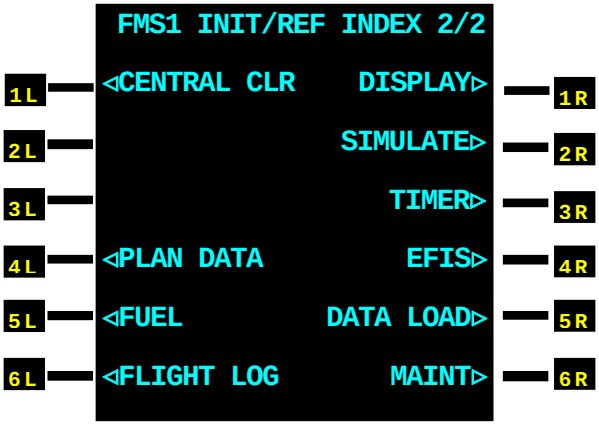
MSG RECALL [6L]: Access to MESSAGE RECALL 1/X page. This prompt is displayed in:
- amber if at least one alert message has not been acknowledged.
- cyan if no alert message or all messages was acknowledged.

DES+SAR or TACTICAL [6R]: Access to the DES+SAR or TACTICAL 1/2 page.

INIT/REF INDEX 2/2

Display the INIT/REF INDEX 2/2 page by pressing [INIT REF] and [NEXT].

NOTE: FMS ID "FMSx" will not be shown when cross-FMS is not configured.



[1L] to [6L] and [1R] to [6R]:
These keys permit to access one of the following pages according to the INIT/REF option configuration.

CENTRAL CLR [1L]: Performs a central clear. Displayed only when configured. Pressing this prompt access the CENTRAL CLEAR ? page.

PLAN DATA [4L]: Access to PLAN DATA 1/1 page.

FUEL [5L]: Access to FUEL 1/2 page (If FUEL is configured).

FLIGHT LOG [6L]: Access to FLIGHT LOG 1/1 page (If FLIGHT LOG is configured).

DISPLAY [1R]: Access to DISPLAY 1/1 page, which contains parallax adjustment and display selection.

SIMULATE [2R]: Access to the SIMUL FLY AWAY 1/3 page {if SIMUL is configured and RTE2 is configured} or access to the SIMUL FLY AWAY 1/2 page {if SIMUL is configured only}.

TIMER [3R]: Access to TIMER 1/1 page {If TIMER page is configured}.

EFIS [4R]: Access to EFIS 1/1 page (If EFIS interface is configured and type is not IFDS/AHCAS/EFIS-84).

DATA LOAD [5R]: Access to DATA LOAD 1/1 page.

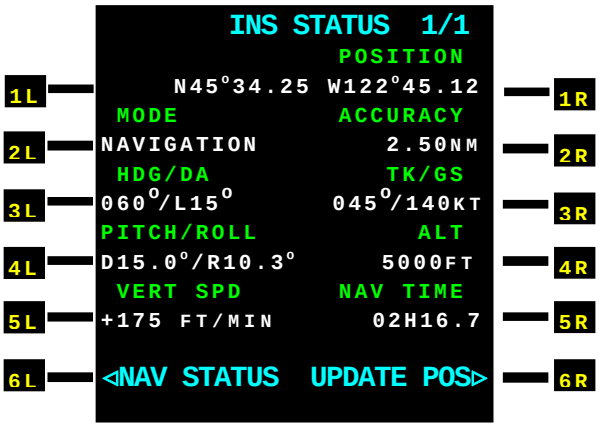
MAINT [6R]: Access to MAINT MESSAGES 1/X page. Available only if aircraft is on ground and internal FMS failure(s) present.

INS STATUS 1/1 (if LITTON EGI interface is configured)
IRSx STATUS X/Y (if IRS interface is configured; x= 1, 2 or 3; X/Y= 1/1, 1/2, 2/2, 1/3, 2/3 or 3/3)

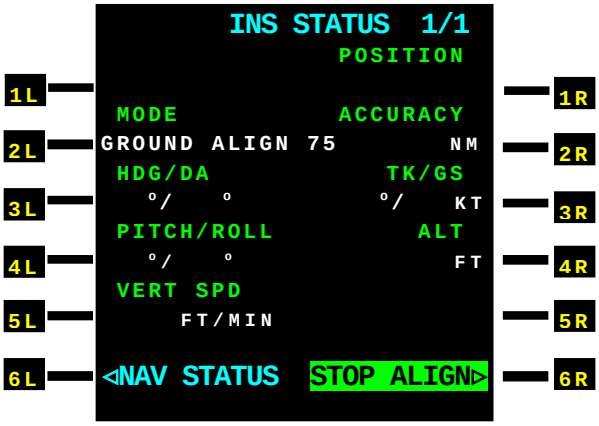
(LITTON EGI configuration only)

Display the INS STATUS 1/1 page by pressing [INIT REF], <NAV STATUS> and <INS>.

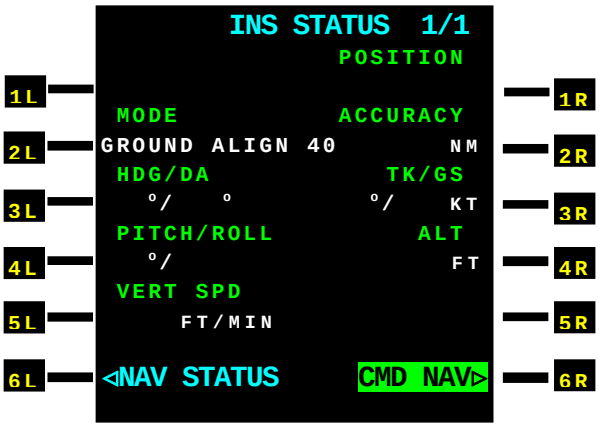
A. Page displayed when INS is in NAV mode:



B. Page displayed when INS is in GROUND ALIGN mode 100 to 50:



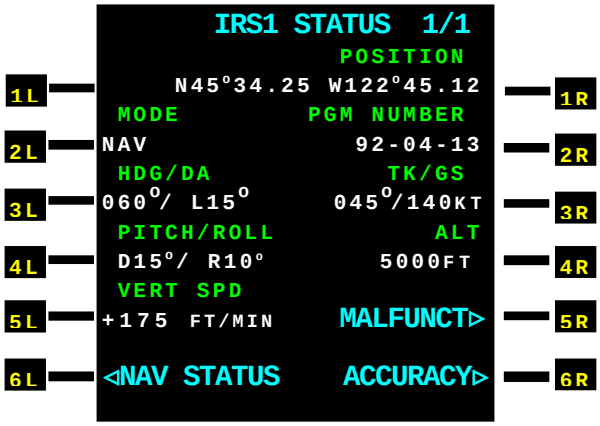
C. Page displayed when INS is in GROUND ALIGN mode 49 to 00:



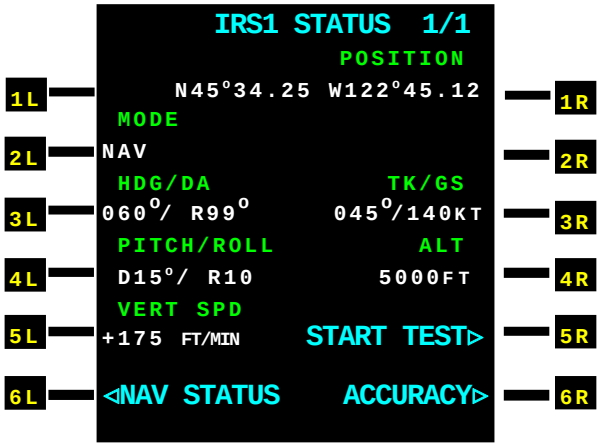
(IRS configuration only)

Display the IRS STATUS 1/1 page by pressing [INIT REF], <NAV STATUS> and <IRS>.

A. Page displayed for LTN92:



B. Page displayed for ADIRU, LTN_101 and LASEREF_V:



MODE (2L):

- For EGI: Displays INS mode status. Possible Status are: STANDBY, CALIBRATE, TEST nnn [where nn is the test counter 100 to 0 e.g, TEST 45], ATTITUDE, GROUND ALIGN nnn [where nn is the alignment counter 100 to 0 e.g., GROUND ALIGN 75], STORE HEADING, NAVIGATION, FLIGHT ALIGN.
- For LTN 92: Displays current IRS mode status. Possible status indications are:
  - ALIGN 90,80,70,50,20,10 or 2(alignment code available only for onside INS (If configured))
  - ALIGN(for offside IRSs)
  - NAV
  - ATT
- For LTN_101, ADIRU or LASEREF_V: Displays current IRS mode status. Possible status indications are:
  - ALIGN
  - NAV
  - ATT
  - TEST

HDG/DA (3L):

- For EGI: When EGI is configured, display hybrid heading and drift angle. Heading display follows current Magnetic or True selection.
- For LTN_92, LTN_101, ADIRU or LASEREF_V:Displays IRS True or Mag heading (label 314 or 320) and drift angle (321) when LTN92, LTN_101, ADIRU or LASEREF_V is configured. For FIX configuration and if the drift angle >= 100 (degrees), the value is set to 99 (degrees).

PITCH/ROLL (4L):

- For EGI: Displays hybrid pitch and roll angles when EGI is configured.
- For LTN_92, LTN_101, ADIRU or LASEREF_V: Displays IRS pitch and roll angles when LTN92, LTN_101, ADIRU or LASEREF_V is configured.

VERT SPD (5L): Displays INS Vertical Velocity (feet per minute).

NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

POSITION (1R):
- For EGI: Displays inertial position.
- For LTN92: Displays pure inertial position.
- For LTN_101, ADIRU or LASEREF_V: Displays pure inertial position.

ACCURACY (2R): For EGI: Displays INS quality factor (in nm).

PGM NUMBER(2R): For LTN92: If configured, Displays IRS software program number.

NOTE: Only displayed on the onside IRS STATUS page.

TK/GS (3R): Displays Inertial track True or Mag angle (degrees) and ground speed (knots).

ALT (4R):
- For EGI: Displays hybrid baro inertial altitude (Ft) when EGI is configured.
- For LTN_92, LTN_101, ADIRU or LASEREF_V: Displays baro inertial altitude (Ft).

NAV TIME (5R): For EGI: This label is displayed only when the INS/GPS is in NAV mode. Displays the amount of time the INS has been in NAV mode.

START/END TEST [5R]: For LTN_101, ADIRU or LASEREF_V: Initiates the ADIRS Remote Test. Once the test is initiated, the **START TEST** prompt is replaced by **END TEST** to allow the termination of the test in progress.

MALFUNCT [5R]: When LTN92 is configured, access to the IRS MALF MESSAGE X/X page. Appears only when an INS fault is present.

UPDATE POS [6R]: For EGI: Access to the UPDATE POS 1/1 page. This label is displayed only when the INS-GPS is in NAV mode.

STOP ALIGN [6R]: For EGI: This label is displayed only when the INS-GPS is in ALIGN mode and is interruptible (alignment counter is between 100 and 50). The selection of this softkey when active will send a command to the INS-GPS to stop alignment.

CMD NAV [6R]: For EGI: This label is displayed only when the INS-GPS is not in NAV mode. The selection of this softkey will send a command to the INS-GPS to command NAV mode when confirmed.

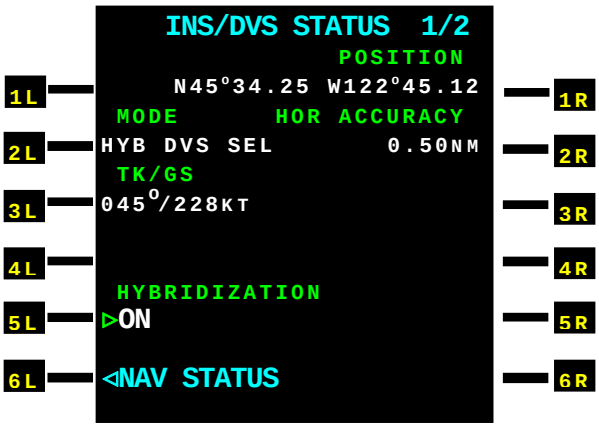
NOTE: INS-GPS will transition to degraded NAV mode if this selection is made when alignment counter is between 50 and 00.

ACCURACY [6R]: For LTN92, LTN_101, ADIRU or LASEREF_V: Access to the corresponding IRSx ACCURACY x/3 page. Appears only when IRSx is in NAV mode.

INS/DVS STATUS 1/2 (SAGEM EGI configuration only)

Display the INS/DVS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> and <INS/DVS>.

This page displays the outputs of the INS/DVS navigator as well as some INS/DVS inputs from the EGI. Control over the hybridization mode is also provided. All status and data fields will show "*" symbols when the EGI is declared fail and blanks when data is not available.



MODE (2L): Displays the current mode of the Hybrid INS/DVS solution. Possible mode indications are:

INIT:	Hybrid INS/GPS not in Navigation mode; solution is not available.
FAIL:	EGI failure; Hybrid INS/DVS solution is not available.
HYB DVS SEL:	Hybrid INS/DVS solution is available but no DVS velocities being incorporated in the INS-DVS filter because the DVS is unavailable.
HYB DVS ON:	Hybrid INS/DVS solution is available and being actively updated by INS-DVS filter.
HYB DVS OFF:	Hybrid INS/DVS solution is available but DVS blending turned off.

TK/GS (3L): Track Angle and Ground Speed.

HYBRIDIZATION [5L]: Displays the INS/DVS hybridization mode. The selection of this softkey commands the EGI to toggle the INS/DVS hybridization mode between ON and OFF.

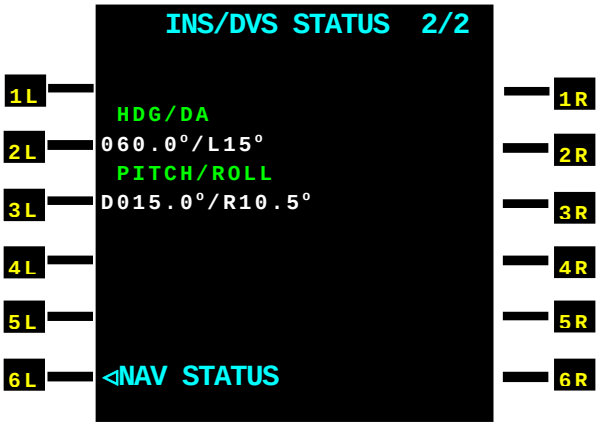
NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

POSITION (1R): Displays Hybrid INS/DVS position. The format displayed will vary with the coordinates format selection on the SETUP page.

HOR ACCURACY (2R): Displays Hybrid INS/DVS horizontal accuracy (95% quality factor).

INS/DVS STATUS 2/2 (SAGEM EGI configuration only)

Display the INS/DVS STATUS 2/2 page by pressing [INIT REF], <NAV STATUS> and <INS/DVS> and [NEXT].



HDG/DA (2L): Displays heading and drift angle. Heading display follows current Magnetic or True selection.

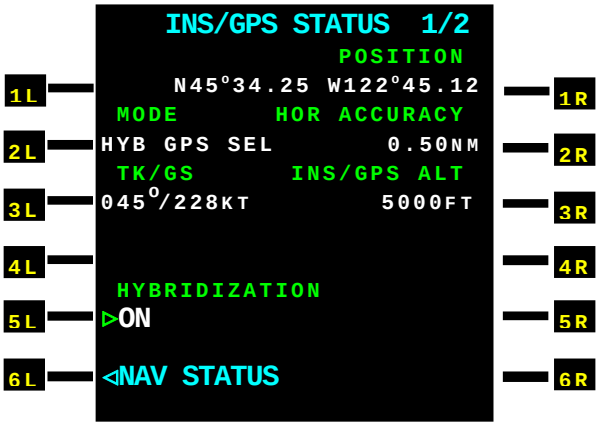
PITCH/ROLL (2L): Displays the INS pitch and roll angles.

NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

INS/GPS STATUS 1/2 (if EGI interface is configured)

Display the INS/GPS STATUS 1/2 page by pressing [INIT REF], <NAV STATUS> and <INS/GPS>.

This page displays the outputs of the INS/GPS navigator as well as some INS/GPS inputs from the EGI. Control over the hybridization mode is also provided. All status and data fields will show "*" symbols when the EGI is declared failed and blanks when data is not available.



MODE (2L): Displays the status of the Hybrid INS/GPS solution. Possible status indications are:

INIT:	EGI not in Navigation mode, Hybrid solution is not available.
FAIL:	EGI failure of GPS, INS or device, Hybrid solution is not available.
HYB GPS SEL:	Hybrid solution is available but no GPS updates being incorporated in the INS-GPS Kalman filter because GPS unavailable for the last 8 seconds.
HYB GPS ON:	Hybrid solution is available and being actively updated by INS-GPS Kalman filter.
HYB GPS OFF:	Hybrid solution is available but GPS blending is turned off.

TK/GS (3L): Displays hybrid Ground Track Angle (degrees) and Ground Speed (knots).

HYBRIDIZATION [5L]: Displays the EGI hybridization mode. The selection of this softkey commands the EGI to toggle the EGI hybridization mode between ON and OFF.

NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

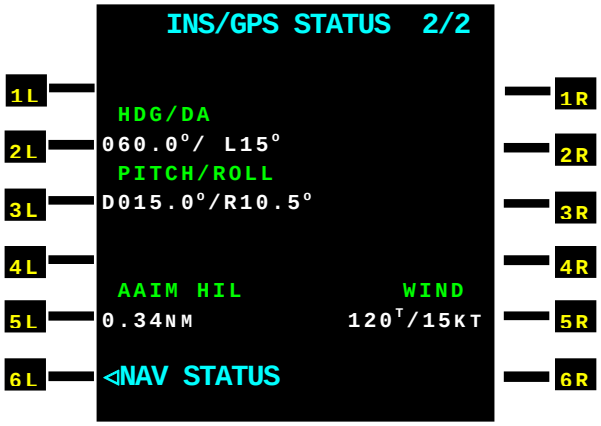
POSITION (1R): Displays hybrid position.

HOR ACCURACY (2R): Displays hybrid horizontal accuracy (95% quality factor) (in nm).

INS/GPS ALT (3R): Displays INS/GPS/Baro altitude (MSL).

INS/GPS STATUS 2/2 (if EGI interface is configured)

Display the INS/GPS STATUS 2/2 page by pressing [INIT REF], <NAV STATUS>, <INS/GPS> and [NEXT].



HDG/DA (2L): Displays heading and drift angle. Heading display follows current Magnetic or True selection.

PITCH/ROLL (3L): Displays the INS pitch (Up/Down) and roll (Left/Right) angles.

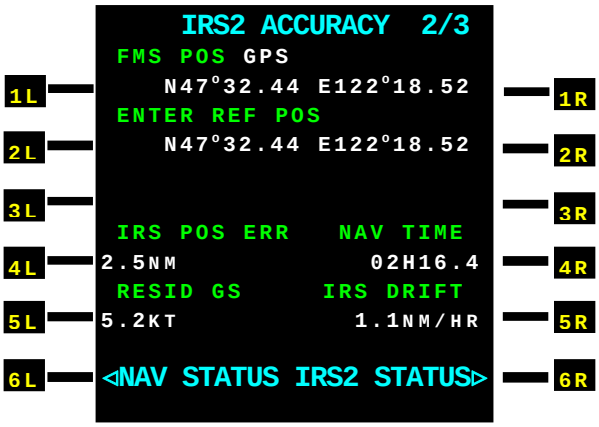
AAIM HIL (5L): Displays Hybrid INS/GPS Horizontal Integrity Limit from the Aircraft Autonomous Integrity Monitoring (AAIM) function (if SAGEM EGI configured).

NAV STATUS [6L]: Access to NAV STATUS INDEX 1/1 page.

WIND (5R): Displays wind direction and wind speed (if SAGEM EGI configured).

IRSx ACCURACY X/X (X: 1, 2 or 3; if IRSx is in NAV mode)

For LTN-92, LTN_101, ADIRU and LASEREF_V
Display IRSx ACCURACY X/X page by pressing [INIT REF], <NAV STATUS> and <IRS>, <ACCURACY>.
There are three identical pages, one for each INS. The first page accessed refers to the INS previously displayed on the IRSx STATUS X/3 page. Pressing PREV or NEXT key will display other IRSx ACCURACY X/3 pages.



FMS POS (1L or 1R): Displays current FMS position.

ENTER REF POS [2L or 2R]: Valid latitude and longitude entry will enable accuracy test to be performed and results displayed on following lines. Default value is FMS position, as displayed in LSK 1R.

IRS POS ERR (4L): Displays inertial position error once a valid reference position is entered in LSK 2L or LSK 2R, and IRS in NAV mode.

RESID GS (5L): Displays residual ground speed once a valid reference position is entered in LSK 2L or LSK 2R, and INS in NAV mode.

NAV STATUS [6L]: Returns to the NAV STATUS INDEX 1/1 page.

NAV TIME (4R): Displays elapsed time in hours and minutes (tenths) since IRS entered NAV mode (Time-in-Nav).

- For LTN92: This parameter is computed by the FMU displaying the page.
- For Honeywell ADIRU and Laseref V: This parameter is decoded from label 126.
- For LTN101: This parameter is decoded from label 160.

IRS DRIFT (5R): Displays inertial drift rate (only when IRS Time in NAV > 10 minutes) once a valid reference position is entered in LSK 2R, and IRS in NAV mode.

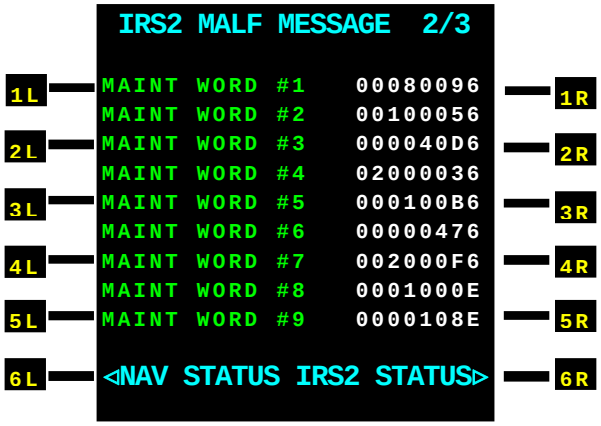
IRSx STATUS [6R]: Returns to the corresponding IRSx STATUS X/3 page.

IRSx MALF MESSAGE X/X (X: 1, 2 or 3; If an IRS fault is present)

For LTN-92.
Display IRSx MALF MESSAGE X/X page by pressing [INIT REF], <NAV STATUS> and <IRS>, <MALFUNCT>.

From IRSx STATUS X/X page, <MALFUNCT>
This page displays hexadecimal strings corresponding to contents of IRS maintenance words. Only the maintenance words having at least one fault bit set will have their hexadecimals content displayed.

Each malfunction bit of these words is correlated to an action message (scratchpad) to the operator or maintenance personnel.
There are three identical pages, one for each INS. The first page accessed refers to the INS previously displayed on the IRSx STATUS X/3 page. Pressing PREV or NEXT key will display other IRSx MAINT MESSAGE X/3 pages.



Maintenance word contents are displayed in white. Asterisks indicate that the maintenance word is not received by the FMU; blanks indicate that the maintenance word is received, but with no valid data.

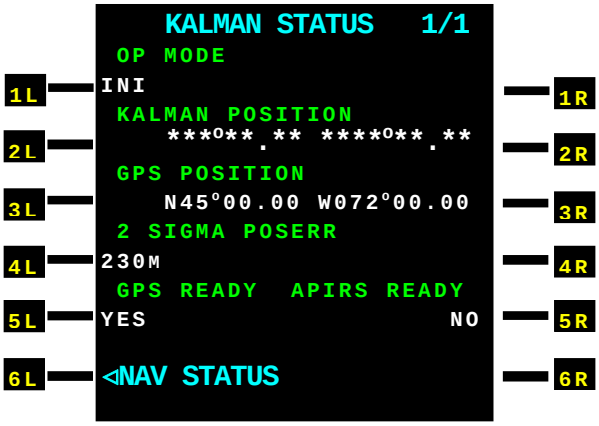
NAV STATUS [6L]: Returns to the NAV STATUS INDEX 1/1 page.

IRSx STATUS [6R]: Returns to the corresponding IRSx STATUS X/3 page.

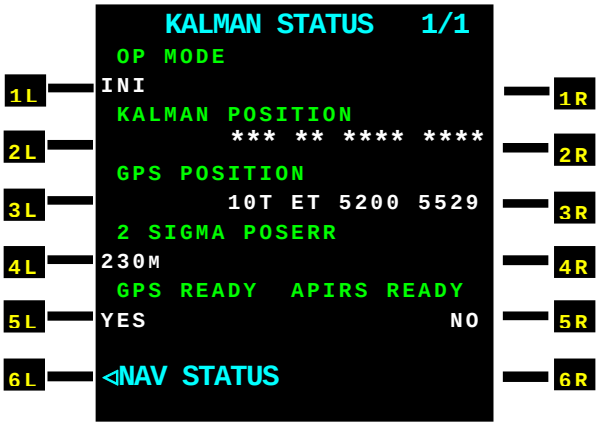
KALMAN STATUS 1/1 (if APIRS interface is configured)

Display KALMAN STATUS 1/1 page by pressing [INIT REF], <NAV STATUS> and <KALMAN>.

A. When LAT/LONG is selected:



B. When UTM is selected:



OP MODE (1L): Displays operational mode status (INITIALIZE, NAV, STAND ALONE or DR).

KALMAN POSITION (2L): Displays Kalman position.

GPS POSITION (3L): Displays GPS position.

2 SIGMA POSERR (4L): Displays 2 sigma error.

GPS READY (5L): Displays GPS functionality: YES means ready, NO means not ready.

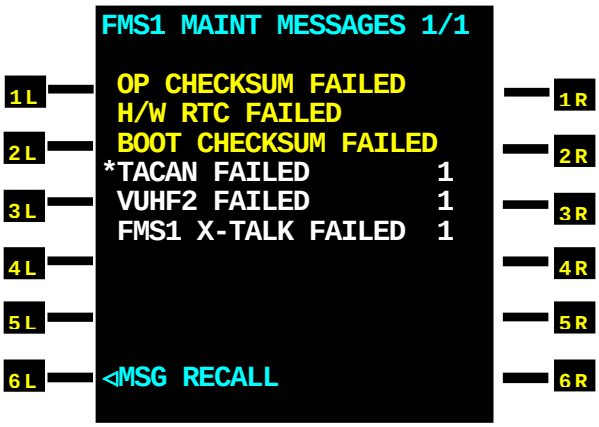
NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

APIRS READY (5R): Displays APIRS functionality: YES means ready, NO means not ready.

MAINT MESSAGES 1/X

This page displays all CMA-9000 FMS hardware related messages and all maintenance advisory messages which require maintenance action. It is displayed only if any message related to internal failure are detected, otherwise MAINT MSG prompt will not be displayed on the MESSAGE RECALL page and this page will not be available.

Display MAINT MESSAGE 1/1 page by pressing [INIT REF], <MSG RECALL> and <MAINT MSG>.



Maintenance messages are displayed in amber. Maintenance Advisory messages are displayed in white with the latest identified by a leading asterisk *. The digit to the extreme right of each maintenance advisory message indicates which FMU is reporting the message. No digit means that all FMUs are reporting the same message.

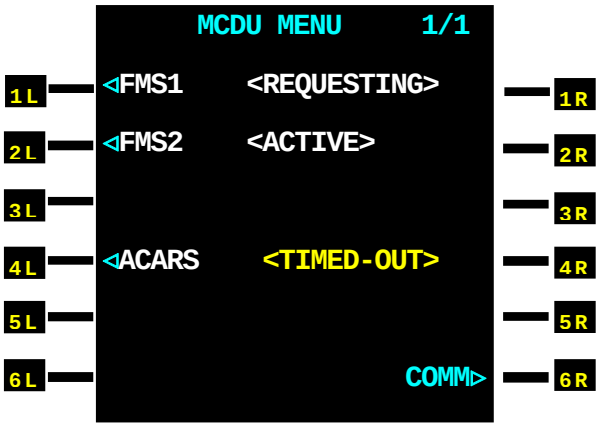
MSG RECALL [6L]: Access to the MESSAGE RECALL 1/X page. This prompt is displayed in amber when new alert messages are displayed.

NOTE: Message(s) will re-appear at power up only if fault is still present.

MCDU MENU X/X {if there is at least one external sub-system configured}

The MCDU MENU page displays all configured external sub-systems and the internal FMS.

Display MCDU MENU X/X page by pressing [MENU].



SUB-SYSTEM [1L to 5L]: Displays the installed external sub-systems, the internal FMS and their status. The sub-system identifier is displayed in large white font, and the status is displayed between '<>' in large cyan font (or amber for the TIMED-OUT status) starting at column 9. The status displayed can either be <REQUESTING>, <ACTIVE> or <TIMED-OUT>.

When Tandem mode is configured and active, the <ACTIVE> or BLANK status is replaced with <TANDEM> on the ESS1 only. <TANDEM> is displayed in white font.

The CMA-9000 FMS will initiate a communication process with the corresponding selected sub-system when the key is pressed.

COMM [6R]: The COMM prompt leads to the COMM STATUS 1/1 page. The prompt is displayed on the last MCDU MENU page.

MESSAGE RECALL 1/X

Only system alert messages are displayed on this page. All messages are displayed in amber, with the latest identified by a leading asterisk *.

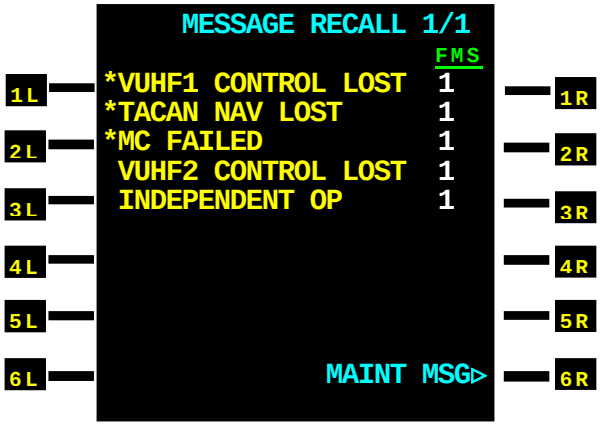
The digit to the extreme right of each message indicates which FMU is reporting the message. No digit means that all FMUs are reporting the same message or that the FMS is operating in independent mode.

System alert messages will cause both the CMA-9000 FMS MSG annunciator and the remote CMA-9000 FMS MSG annunciator to illuminate until all new alert messages have been cleared/acknowledged by the pilot. Once all alert messages have been viewed either via the scratchpad or by going to the MESSAGE RECALL page, the CMA-9000 FMS MSG annunciator and the remote CMA-9000 FMS MSG annunciator will turn off.

NOTE: All current alert messages may be acknowledged simultaneously by display on the MESSAGE RECALL 1/X page.

These messages are removed automatically when the conditions which caused them have been corrected.

Display MESSAGE RECALL 1/1 page by pressing [INIT REF], and <MSG RECALL>. Or [INIT REF] key is held down for more than 1 second.



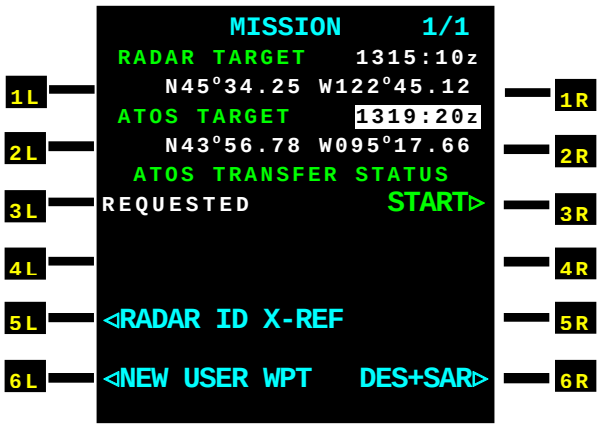
FMS (1R): This fixed caption text will appear for a multiple FMS installation.

This text highlights which FMS is reporting the specific message(s) generated on this page (as indicated by the '1', and/or '2', and/or '3' displayed next to the specific message).

MAINT MSG [6R]: Access to MAINT MESSAGES 1/X page. Prompt appears only if there are maintenance alert or maintenance advisory messages.

MISSION 1/1 (if ATOS or/and RADAR is configured)

Display the MISSION 1/1 page by pressing [INIT REF], <MISSION> {if the PREDEF PG is not configured or configured with the MARK key also configured} and {the ATOS and/or the FIAR 1500B RADAR is/are configured}.



RADAR TARGET [1L,1R]: Displays Radar Target position. Selection of 1L or 1R line key will place the Radar Target position in the scratchpad. A time stamp is displayed above this line, showing the last time a Radar Target position has been received. If the Radar Target position time is the most recent (compared to the ATOS Target position when configured and available), then its time is displayed in reverse white video. When the UTC time is selected (SETUP 1/1 page), a "z" is located after the time to indicate that time is Zulu (UTC). If the time selected is LOCAL, the "z" is not displayed. This field and title is only displayed when the FIAR1500B RADAR is configured.

ATOS TARGET [2L,2R]: Displays ATOS Target position. Selection of 2L or 2R line key will place the ATOS Target position in the scratchpad. A time stamp is displayed above this line, showing the last time an ATOS Target position has been received. If the ATOS Target position time is the most recent (compared to the Radar Target position), then its time is displayed in reverse video white. When the UTC time is selected (via SETUP 1/1 page), a "z" is located after the time to indicate that time is Zulu (UTC). If the time selected is LOCAL, the "z" is not displayed. This field and title is only displayed when the ATOS is configured.

ATOS TRANSFER STATUS (3L): This field displays the ATOS flight plan transfer status when the ATOS equipment is configured, otherwise this field is blank. The status could be one of the following:
1 - IDLE: Default status when no transfer request has been initiated by the ATOS; or
2 - REQUESTED: When the ATOS equipment informs the FMS that it is ready for flight plan transfer; or
3 - IN PROGRESS: When the START prompt has been pressed and the flight plan transfer is in progress; or
4 - COMPLETED: When a flight plan transfer from the ATOS has been completed successfully; or
5- FAILED: When the flight plan transfer has failed.

RADAR ID X-REF [5L]: Access to the RADAR ID X-REF 1/1 page if FIAR 1500B Radar is configured, otherwise, this prompt is not displayed.

NEW USER WPT [6L]: Access to the USER WPT 1/2 page and transfers the Radar target or the ATOS target position (the most recent one is selected) into the position field of that page. When the ATOS target is selected, the REF WPT ID on the user waypoint page is set to "ATOS" and the reference position is set to the ATOS target position. If the Radar target is selected, the REF WPT ID on the user waypoint page is set to "RADAR" and the reference position is set to the RADAR target position. When no target (RADAR or ATOS) are displayed on the page, this prompt is blanked.

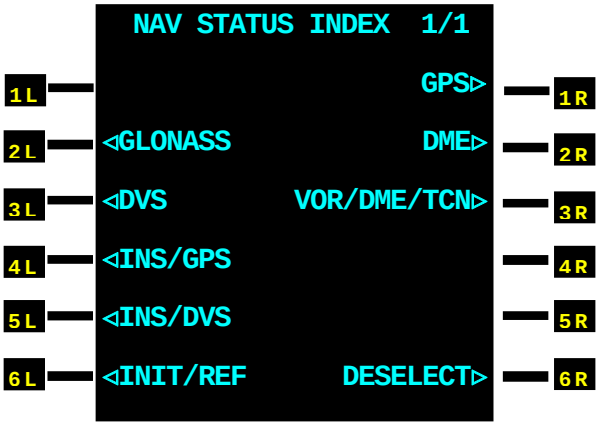
START [3R]: This prompt is displayed when the ATOS equipment requests a flight plan transfer to the FMS. When this prompt is pressed, the flight plan transfer is initiated from the ATOS and the prompt disappears until a new ATOS transfer request is received from the ATOS. This prompt is only available if the ATOS equipment is configured. When this prompt is pressed while a route (active or inactive) modification is in progress, the transfer is prevented and the message !MOD IN PROGRESS is displayed in the scratchpad.

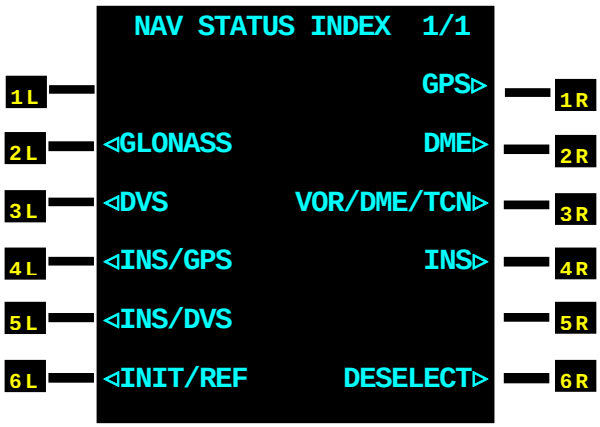
DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL page instead of the DES+SAR page. Access to the DES+SAR 1/Y (or TACTICAL 1/Y) page. When there is no data in the scratchpad, selection of this key will create a temporary waypoint with the Radar Target or the ATOS Target position (the most recent one received is selected) and the temporary waypoint ID is entered in the REF ID field of the DES+SAR 1/Y (or TACTICAL 1/Y) page. When there is a valid position in the scratchpad, selection of this key will create a temporary waypoint and enter temporary waypoint identifier in the REF ID field of the DES+SAR 1/Y (or TACTICAL 1/Y) page.
When the inactive route is in modification, instead of accessing the DES+SAR 1/Y (or TACTICAL 1/Y) page, this prompt gives acess to the INACT DES+SAR 1/X 1/Y (or INACT TACTICAL 1/Y) page.

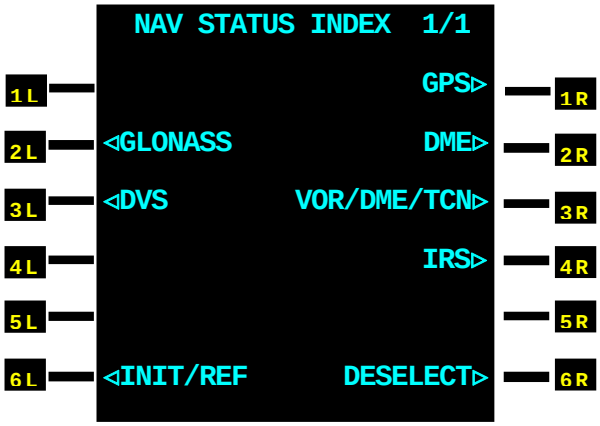
NAV STATUS INDEX 1/1

Display the NAV STATUS INDEX 1/1 page by pressing [INIT REF] and <NAV STATUS>.

This page provides an access to the various Navigation Status pages. Only pages for which the equipment is configured are displayed.







PREDICT RAIM [1L]: *Not shown.* Access to GPS PREDICT RAIM 1/1 page.

GPS [1R]: Access to GPS STATUS 1/2 page or the GPS NAV STATUS INDEX 1/1 page when dual GPS(Civil/Military) configured.

GLONASS [2L]: Access to GLONASS STATUS 1/2 page.

DME[2R]: Access to DME STATUS 1/1 page.

DVS[3L]: Access to DVS STATUS 1/2 page.

VOR/DME/TCN [3R]: Access to VOR/DME/TCN STATUS 1/1 page. Disappears or changes to VOR/DME or TACAN depending on the configured equipment**.**

INS/GPS[4L]: Access to INS/GPS STATUS 1/2 page.

INS[4R]: For EGI: Access to INS STATUS 1/1 page.

IRS[4R]: For LTN 92, LTN 101, ADIRU or LASEREF_V: Access to the IRS STATUS Onside/x page.

KALMAN [4R]: *Not shown.* Access to KALMAN 1/1 page.

INS/DVS [5L]: Access to INS/DVS STATUS 1/2 page.

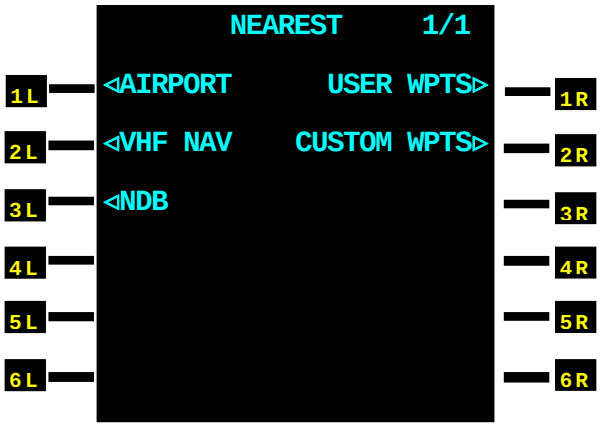
X-FMS [5R]: *Not shown*. Access to X-FMS POS DIF 1/1 page.

INIT/REF [6L]: Access to the INIT/REF INDEX 1/2 menu page.

DESELECT [6R]: Access to DESELECT 1/1 page.

NEAREST 1/1

Display a selectable, categorized list of navigation types to which the function NEAREST is to be applied by pressing [INIT REF], <NEAREST> or [INIT/ REF], <BULLS EYE>, [PREV], <NEAREST> {if Tactical Config BULLS EYE is configured}. By selecting the navigation data type, an ordered list based on proximity will appear.



AIRPORT [1L]: Access to the NEAREST AIRPORT page.

VHF NAV [2L]: Access to the NEAREST VHF NAV page.

NDB [3L]: Access to the NEAREST NDB page.

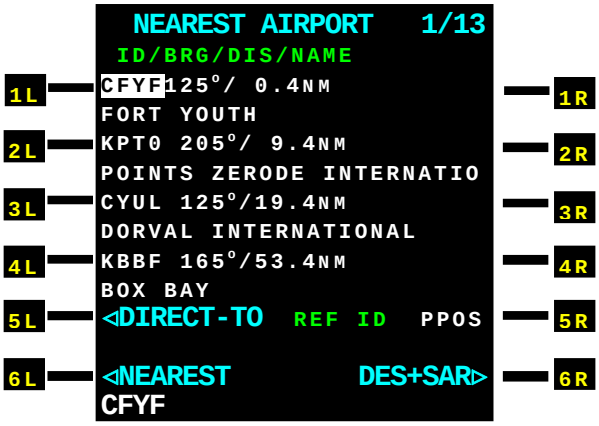
USER WPTS [1R]: Access to the NEAREST USER WPTS 1/X page.

CUSTOM WPTS [2R]: Access to the NEAREST CUSTOM WPTS 1/X page.

NEAREST AIRPORT 1/X

Display the NEAREST AIRPORT 1/X page by pressing [INIT REF], <NEAREST> and <AIRPORT>.

This page displays an ordered list by distance of the closest 50 airports that are within a radius of 640 nm with respect to the center reference identifier. The bearing and distance from the center reference waypoint are displayed under each waypoint identifier. A maximum of 4 waypoints is displayed per page. The first 24 characters of the airport name are displayed next to each waypoint identifier. The first time this nearest page is accessed after a cold start, the center reference waypoint is set to the present position (PPOS). When the reference waypoint is set to PPOS, the bearing/distance of each waypoint is refreshed every 10 seconds. The first airport on the page is displayed in reverse video. The selection changes by pressing any active LSK (corresponding to a nearest airport).



WPT IDENT [1L-4L]: Select the respective airport and display it in reverse video. The waypoint identifier corresponding to the selected key is copied into the scratchpad if it is available. Each new selection of an LSK updates the scratchpad with the corresponding waypoint identifier.

DIRECT-TO [5L]: Transfer the highlighted waypoint to the first waypoint on the LEGS page and display the LEGS page.

NEAREST [6L]: Return to the NEAREST 1/1 page.

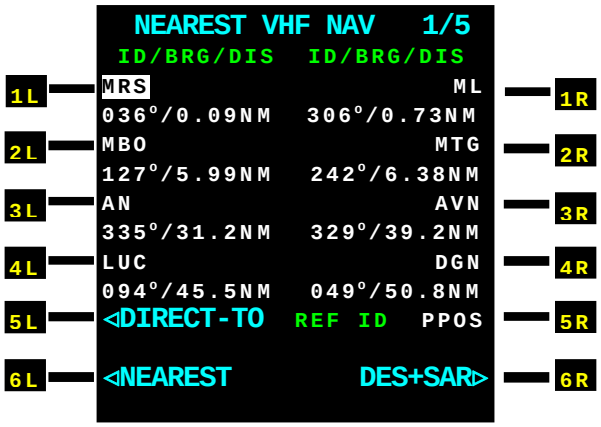
REF ID [5R]: The center reference identifier can be selected from any of the following database: the navigation database, the custom database, the user database, the temporary waypoints list, the active route or the inactive route.
Whenever the REF ID center is modified, the list is recalculated and re-ordered by proximity using the new entered center reference waypoint In the case of multiple waypoints with the same identifier, the SELECT WPT page is displayed for selection.
After cold start or when [CLR] key is pressed in this field PPOS is set as the center reference waypoint.

DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL page instead of the DES+SAR page. Access to DES+SAR 1/Y (or TACTICAL 1/Y) page. If there is a valid position in the scratchpad, it will automatically be converted to a temporary waypoint and placed in the REF ID field on the DES+SAR 1/Y page (or TACTICAL 1/Y). If there is a valid identifier in the scratchpad, it will automatically be placed in the REF ID field on the DES+SAR 1/Y (or TACTICAL 1/Y) page.

NEAREST VHF NAV 1/X (also applicable for NEAREST NDB, CUSTOM WPT, and USER WPT)

Display the NEAREST VHF 1/X page by pressing [INIT REF], <NEAREST> and <VHF NAV>.
{also applicable for NEAREST NDB, CUSTOM WPT AND USER WPT}.

This page provide an ordered list of the closest 50 VHF Navigation Aids defined as follows: within a 640 nm radius around the aircraft present position, the 50 waypoints closest to the center reference waypoint are displayed. The bearing and distance from the center reference waypoint are displayed under each waypoint identifier. The bearings and distances are refreshed every 10 seconds in the NEAREST USER WPT page, and in the other nearest pages they are refreshed every 10 seconds when the center reference waypoint is the present position or a user waypoint. A maximum of 8 waypoints are displayed per page. When accessing the page, the first VHF NAV on the page 1/X (or subsequent pages) is displayed in reverse video. The selection change by pressing any active LSK (corresponding to a nearest VHF NAV).



WPT LIST [1L-4L], [1R-4R]: Selection of the LSK select the respective VHF NAV and display it in reverse video. The waypoint identifier corresponding to the selected key is copied into the scratchpad if it is available. Each new selection of an LSK updates the scratchpad with the corresponding waypoint identifier. For the NEAREST USER WPT page, when a user waypoint is deleted by cross-talk, no sorting is done and the user waypoint is blanked. When a user waypoint is created by cross-talk, no sorting is triggered for the nearest USER WPT list.

DIRECT-TO [5L]: Transfer the highlighted waypoint to the first waypoint on the LEGS page and display the LEGS page.

NEAREST [6L]: Selection of this LSK return to the NEAREST 1/1 page.

REF ID [5R]: Entry of any waypoint identifier from the navigation database, the custom database, the user database, the temporary waypoints list, the active route or the inactive route.
Whenever the REF ID center is modified, the list is recalculated and re-ordered by proximity using the new entered center reference waypoint In the case of multiple waypoints with the same identifier, the SELECT WPT page is displayed for selection.
After cold start or when [CLR] key is entered in this field PPOS is set as the center reference waypoint.

DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL page instead of the DES+SAR page. Access to DES+SAR 1/Y (or TACTICAL 1/Y) page. If there is a valid position in the scratchpad, it will automatically be converted to a temporary waypoint and placed in the REF ID field on the DES+SAR 1/Y (or TACTICAL 1/Y) page. If there is a valid identifier in the scratchpad, it will automatically be placed in the REF ID field on the DES+SAR 1/Y (or TACTICAL 1/Y) page.

PARALLAX ADJUST 1/1

This page provides vertical and horizontal display adjustment. The operator can move up, down, left and/or right of the display to adjust for parallax errors.

PARALLAX ADJUST 1/1 page is accessed by pressing [INIT REF], [NEXT], <DISPLAY> and <PARALLAX>.

LEFT [3L]: Moves the display 1 column left.

DISPLAY [6L]: Provides access to DISPLAY 1/1 page.

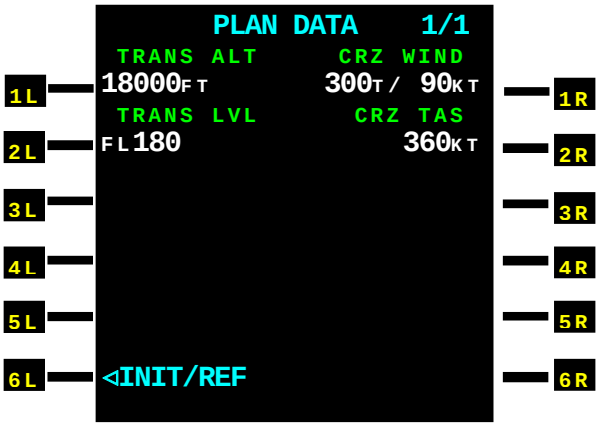
MOVE UP [2R]: Moves the display 1 line up.

RIGHT [3R]: Moves the display 1 column right.

MOVE DOWN [4R]: Moves the display 1 line down.

PLAN DATA 1/1 (if configured)

Display PLAN DATA 1/1 page by pressing [INIT REF], [NEXT] and <PLAN DATA>.



TRANS ALT [1L]: When a modification is made to the origin airport or associated departure procedure, this field will be updated to show the navigation database extracted value, if one exists, otherwise the FMS default value will be displayed.

The valid enterable range for this field is 0 to 450 or 1000 to 45000.

NOTE: if a value between 0 and 450, inclusive, is entered, it will be converted and shown as a transition altitude in feet.

Entering DELETE on this field, when a manually entered value had previously been entered, will restore this field to the navigation database extracted value or to the FMS default. Deletion of the default value or navigation database values is inhibited.

Crew entries will not be erased by a new value extracted from the navigation database as a result of the latest flight plan modifications. However, if this new extracted value is different from the crew entered value, the FMS will generate the TRANS ALT/LVL MISMATCH message.

The FMS will also generate the CHECK TRANS/ALT LVL status advisory message if there is no value in the navigation database for the selected origin and/or associated departure procedure(s) and no manual crew entry exists to the TRANS ALT field at the moment the flight plan is executed.

NOTE: The TRANS ALT value defines the altitude at which the crew should change from local pressure altimeter setting to standard pressure altimeter setting. The TRANS ALT value is used in triggering the SET QNH message.

TRANS LVL [2L]: When a modification is made to the destination airport or associated arrival procedure, this field will be update to show the navigation database extracted value, if one exists, otherwise the FMS default value (as configured) will be displayed.

The valid enterable range for this field is 0 to 450 or 1000 to 45000.

NOTE: If a value between 1000 and 45000, inclusive, is entered, it will be converted and shown as a transition level in Flight Level units.

Entering DELETE on this field, when a manually entered value had previously been entered, will restore this field to the navigation database extracted value or to the FMS default. Deletion of the default value or navigation database values is prohibited.

Crew entries will not be erased by a new value extracted from the navigation database as a result of the latest flight plan modifications. However, if this new extracted value is different from the crew entered value, the FMS will generate the TRANS ALT/LVL MISMATCH message.

The FMS will also generate the CHECK TRANS/ALT LVL status advisory message if there is no value in the navigation database for the selected destination and/or associated arrival/approach procedure(s) and no manual crew entry exists to the TRANS LVL at the moment the flight plan is executed.

If tactical approach is configured, the CHECK TRANS/ALT LVL status advisory message is generated when making the inactive route containing a tactical approach into the now active route.

Also, if tactical approach is configured, this field is identical and shared with the TRANS LVL field seen on the TACTICAL APPR page.

NOTE: The TRANS LVL value defines the altitude at which the crew should change from standard pressure altimeter setting to local pressure altimeter setting. The TRANS LVL value is used in triggering the SET QNH message.

INIT/REF [6L]: Returns to INIT/REF INDEX 2/2 page.

CRZ WIND [1R]: Enter the wind at cruise altitude (direction-true/speed-knots). Used for flight planning.

NOTE: This is not *the system computed wind (0° to 360°/0 Knots to 200 Knots).*

CRZ TAS [2R]: TAS (knots) at cruise altitude. Used for flight planning. This is not the system TAS (0 to 999 Knots). Upon a change in configuration, the Cruise TAS values will be set in accordance with the aircraft type: 130 Knots (if configured ROTOR) or 480 Knots (if configured FIX).

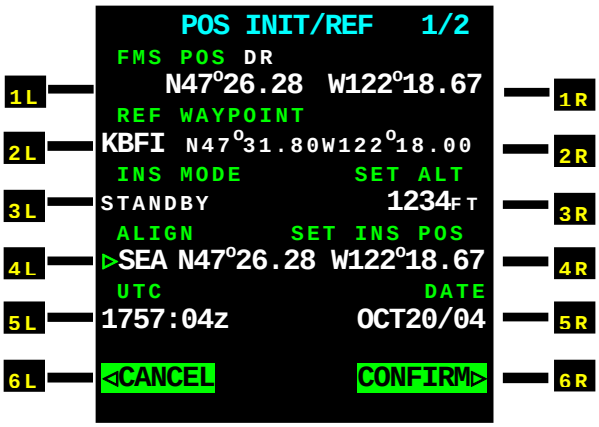
POS INIT/REF 1/2 (if EGI is configured) OR POS INIT/REF 1/3 (if IRS is configured)

Display the POS INIT/REF 1/2 page by pressing [INIT REF] and <POS INIT> or [INIT REF], <IDENT> and <POS INIT>.

A. POS INIT/REF 1/2 page after EGI is powered on:

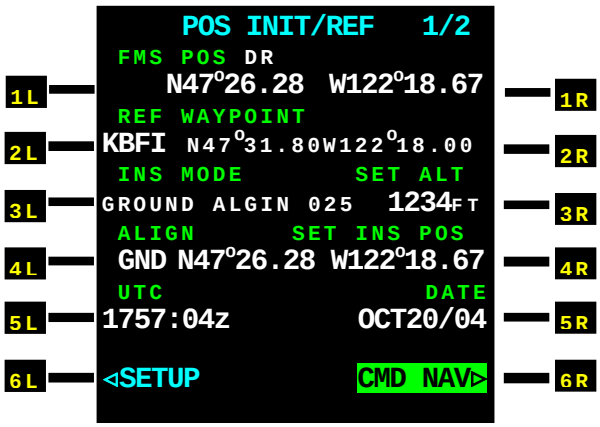
B. POS INIT/REF 1/2 page after position entered (EGI SIGMA50H only):

C. POS INIT/REF 1/2 page after START ALIGN selection:

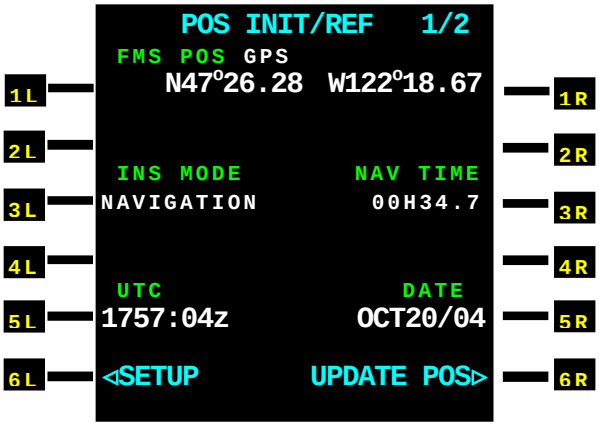


D. POS INIT/REF 1/2 page in Interruptible Alignment mode:

E. POS INIT/REF 1/2 page when Degraded NAV Mode is possible:

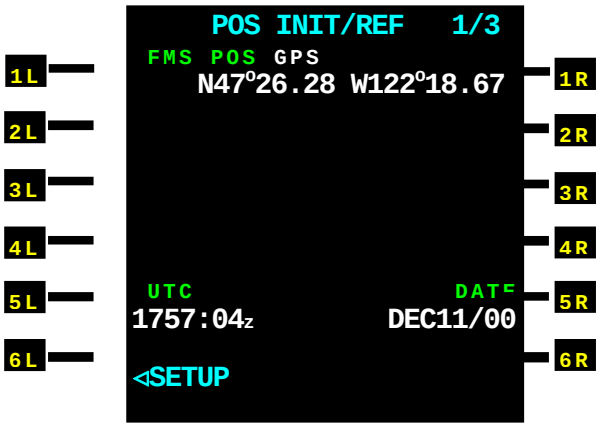


F. POS INIT/REF 1/2 page in NAV mode:

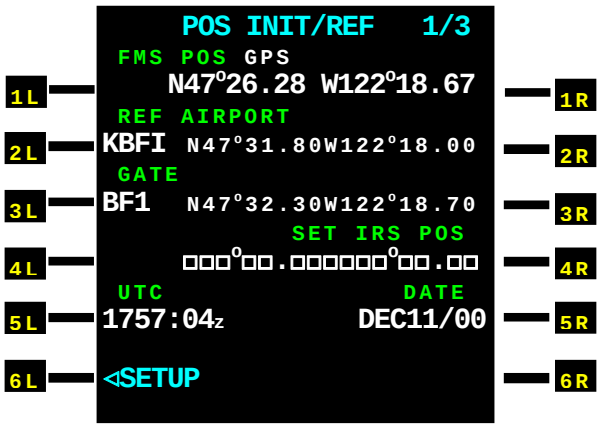


If LTN-92, LTN_101, ADIRU and LASEREF_V are configured:

G. When inertial in NAV mode (SET IRS POS field is not displayed):

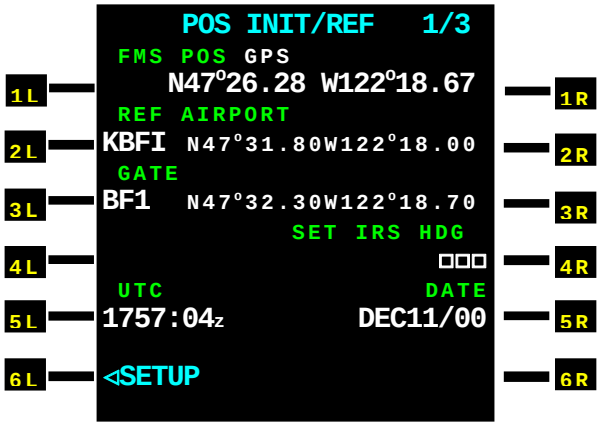


H. When inertial in Align mode (SET IRS POS field is displayed):



If LTN_101 or ADIRU is configured:

I. When inertial in Attitude mode (SET IRS HDG field is displayed):



FMS POS [1L or 1R]: FMS position on power up, this corresponds to the last computed position stored in the CMA-9000 FMS. Manual entry is allowed (in DR modes only). The navigation mode is also displayed.

REF WAYPOINT [2L]: If ROTOR is configured. Reference waypoint; any waypoint accepted . Blank on liftoff.

REF AIRPORT [2L]: If FIX mode is configured. Reference airport; Valid entry is four character ICAO airport; Blank on liftoff; Entry deletes previous gate number.

INS MODE (3L): If EGI is configured. Displays INS mode status. Possible Status are:

SAGEM SIGMA 50H	LITTON LN-100GT
STANDBY	STANDBY
	CALIBRATE
	INITIALIZATION
	ATTITUDE
	STORE HEADING
GROUND ALIGN nn[1]	GROUND ALIGN nn[1]
SEA ALIGN nn[1]	
FLIGHT ALIGN nn[1]	FLIGHT ALIGN
NAVIGATION	NAVIGATION
	TEST tt[2]
FAIL	FAIL

[1]nn is the alignment counter 0 to 99
[2]tt is the test counter 0 to 99

GATE [3L]: If FIX mode is configured. Gate entry possible only after valid airport entry in LSK 2L. Blanks at liftoff or returns to dashes upon REF AIRPORT entry.

GATE coordinates (3R): If FIX mode is configured. Displays after valid entry in LSK 3L.

NAV TIME (3R): If EGI is configured. This label is displayed only when the INS is in NAV mode. Displays the amount of time the INS was in NAV mode.

SET ALT [3R]: If EGI is configured. (SIGMA50H EGI configuration only) Set altitude (MSL) entry line to be provided to the EGI. This input may optionally be set to a specific value prior to starting an alignment.

ALIGN [4L]: If EGI is configured. (SIGMA50H EGI configuration only) Alignment type: GND or SEA.

SET INS POS [4R]: If EGI is configured. Set INS position entry line. Boxes are displayed when INS in STANDBY mode and no position is entered in the field or when EGI is in test mode and test is completed. Manual entry is only allowed for as long as the INS is in STANDBY mode. Manual entry can be via keyboard or line selecting CMA-9000 FMS POS or REF WAYPOINT coordinates (N/S 00° to 90°, E/W 000° to 180°). A DELETE from the scratchpad clears the field if no alignment was performed.

SET IRS POS [4R]: If LTN92, LTN_101 or ADIRU is configured.

- If LTN-92 is configured: Inertial Sensor Initial Position entry field. In synchronized mode, boxes displayed when any INS in align mode and requesting initial position. Automatic entry of FMS position upon acquisition of GPS with integrity. Manual entry also allowed for as long as any INS is in align mode and GPS integrity not available. Position entry is sent to all IRSs, provided that FMS cross-talk is available. Field (title and data) is blanked when no INS is in ALIGN mode.
  In independent mode, boxes displayed when onside IRS in ALIGN mode and requesting initial position. Automatic entry of FMS position upon acquisition of GPS with integrity. Manual entry allowed as long as onside INS is in align mode and GPS integrity not available. Position entry is sent only to the onside INS. Field (title and data) is blanked when onside INS not in ALIGN mode.
- If LTN_101, ADIRU or LASEREF_V is configured: Inertial Sensor Initial Position entry field. Boxes displayed when any IRS in align mode. Automatic entry of FMS position upon acquisition of GPS with integrity (GPS HIL less or equal to 0.3 nm). Manual entry also allowed for as long as any IRS is in align mode and GPS integrity not available (GPS HIL greater than 0.3 nm). Field (title and data) is blanked when no IRS is in ALIGN mode.

NOTE: IRSx ENTER PPOS message appears in scratchpad when position rejected by IRS (3+3T test or latitude check).

SET IRS HDG [4R]: If LTN_101, ADIRU or LASEREF_V is configured: IRS Magnetic Heading entry field. Boxes displayed when any IRS in Attitude mode and requesting magnetic heading entry. Field (title and data) is blanked when no IRS is in Attitude mode.

UTC/LOCAL [5L]: Display and entry of UTC or LOCAL time (hour, minute, second). On power up, the UTC is updated by GPS UTC after GPS acquisition is completed. Manual entry is allowed if GPS time not available (0hr 00min 00sec to 23hr 59min 59sec).

DATE [5R]: Display an entry of the CMA-9000 FMS system date. Date format will depend on aircraft's installation. American format: MMMDD/YY, European format: DDMMM/YY. Manual entry allowed if GPS date not available.

NOTE: Displays CMA-9000 FMS real time clock date when GPS date not available.

CANCEL [6L]: If EGI is configured. Cancels INS data initialization.

SETUP [6L]: Access to the SETUP 1/1 page.

START ALIGN [6R]: If EGI is configured. (SIGMA50H EGI configuration only) This label is displayed only when the INS is in STANDBY mode. The selection of this softkey will lead to a CANCEL or CONFIRM request.

CONFIRM [6R]: If EGI is configured. After this softkey is pressed, the CMA-9000 FMS will transmit the initialization data displayed on this page to the INS unit.

STOP ALIGN [6R]: If EGI is configured. This label is displayed only when the INS is in an alignment mode and is interruptible. The alignment mode is not interruptible in FLIGHT ALIGN mode in the SAGEM SIGMA50H configuration. The selection of this softkey will command the INS to stop alignment.

CMD NAV [6R]: If EGI is configured. This label is displayed only when the INS is in an alignment mode and a degraded Navigation mode may be activated. The selection of this softkey will command the INS to enter NAV mode.

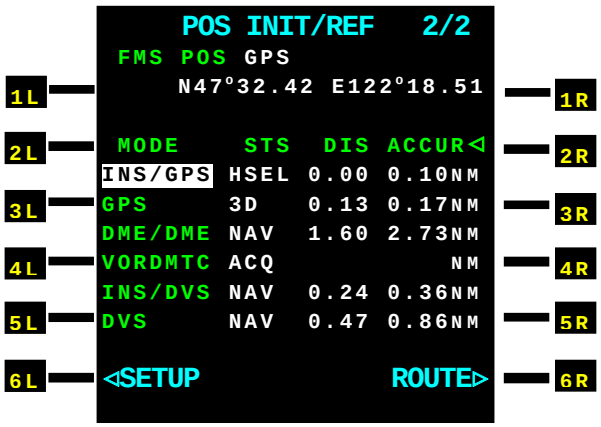
UPDATE POS [6R]: If EGI or IRS is configured. Access to the UPDATE POS 1/1 page.

POS INIT/REF 2/2 (if EGI interface is configured) or 2/3 (if IRS interface is configured)

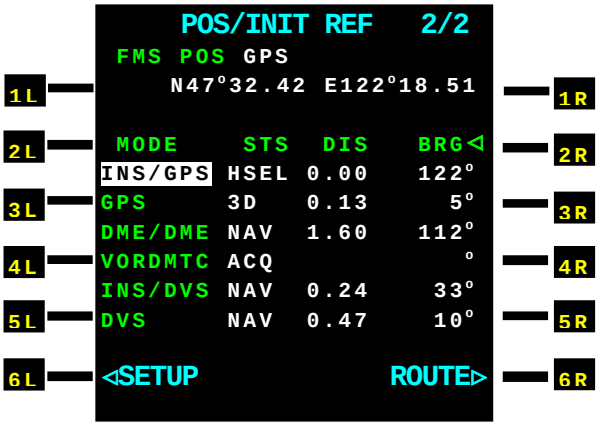
Display the POS INIT/REF 2/2 page by pressing [INIT REF], <POS INIT> and [NEXT] or [INIT REF], <IDENT>, <POS INIT> and [NEXT].

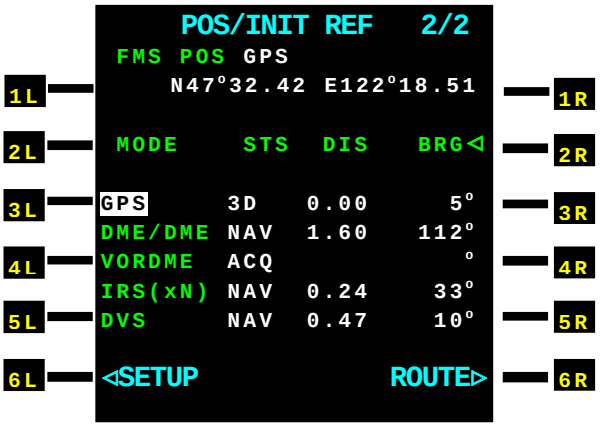
The CMA-9000 FMS continuously monitors and displays the CMA-9000 FMS position, bearing and range of each navigation mode position with respect to the CMA-9000 FMS position, and the accuracy of the navigation sensor positions.
The accuracy shown is the sensor accuracy except for the INS (valid for an inertial sensor but not for the inertial frame of an EGI). For the INS the value displayed is the accuracy of the inertial navigation mode (the accuracy is the accuracy of the previous sensor at the time the INS was selected then the accuracy degrades with the INS drift).
Accuracy and bearing share the same column and toggling between the two is done with LSK [2R]. Accuracy is always displayed by default upon entering the page.

A. This display is shown when in LAT/LONG and ACCURACY selected and CMA-9000 FMS is airborne.

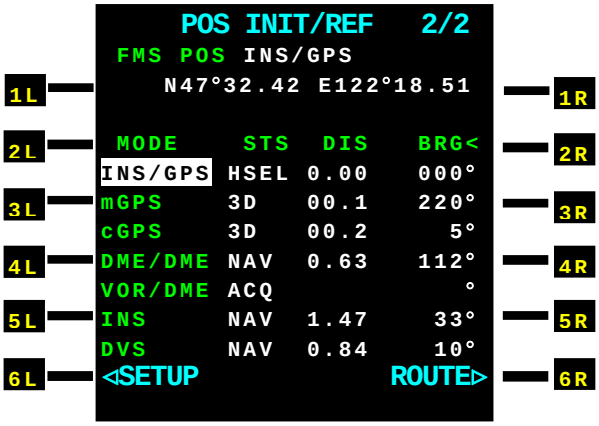


B. This display is shown when in LAT/LONG and BEARING selected and CMA-9000 FMS is airborne.





Dual GPS (e.g. LN-100GT EGI and civil GPS is configured):



FMS POS [1L]: Displays current CMA-9000 FMS system position and the navigation mode.

MODE [2L]: Displays the names for each of the navigation modes that are configured. The active navigation mode will be highlighted.

NOTE: For LTN92, LTN_101, ADIRU or LASEREF_V: N corresponds to the number of the IRS used for the triple mix solution.

STS (2L): Displays the current status of each navigation mode. The following are the possible values for each navigation mode:

INS/GPS		GPS (cGPS/mGPS) (see note 2)		INS (not shown - same line as INS/DVS)	
H ON	Hybrid ON	FAIL	Fault mode	A###	Alignment mode
HSEL	Hybrid Mode selected	3D	3D navigation mode	T###	Test mode
HOFF	Hybrid OFF	3D+T or OPER	3D+T (OPER) navigation mode	ATT	Attitude
FAIL	Fault mode	2D	2D navigation mode	STBY	Standby mode
INIT	Initialisation mode	2D+T	2D+T navigation mode	HDG	Memorized heading mode
DSEL	Deselected	ACQ	Acquisition mode	NAV	Navigation mode
		TEST	Selftest mode	IFA	In Flight Alignment mode
		INID	Almanac Search	CAL	Calibration mode
		INIC	Clock Warm-up	DSEL	Deselected
		INIT	Initialization mode		
		NAV	Navigation mode		
		AID	Direction/ speed aiding mode		
		SBAS	Satellite Based Augmentation System Navigation Mode.		

INS/GPS		GPS (see note 2)		INS (not shown - same line as INS/DVS)	
		ALT	Altitude/ clock aiding mode		
		DIF	Differential mode		
		DSEL	Deselected		

DME/DME		**VOR/DMTC**		**KALMAN (*not shown– below INS*)**	
NAV	Navigation mode	NAV	Navigation mode	HON	Hybrid ON (Navigation mode)
ACQ	Acquisition mode	ACQ	Acquisition mode	INITIALIZE	Initialization mode
CONV	Converging mode	CONV	Converging mode	HOFF	Hybrid OFF (Stand-Alone mode)
FAIL	Fault mode	FAIL	Fault mode	DSEL	Deselected
DSEL	Deselected	DSEL	Deselected	DR	DR mode

DVS		**INS/DVS**	
FAIL	Fault mode	H ON	Hybrid ON
INIT	Initialisation mode	HSEL	Hybrid Mode selected
DR	Independent mode	HOFF	Hybrid OFF
NAV	Navigation mode	FAIL	Fault mode
DSEL	Deselected	INIT	Initialisation mode
		DSEL	Deselected

NOTE 1: '' are displayed when the status labels are not received from the sensor, and blanks are displayed when the status labels have NCD SSMs.*

NOTE 2: Some configured equipment may provide only a subset of these modes. Refer to the GPS 1/2 status page.

For LTN-92, LTN101 or ADIRU:

IRS	
ALIGN	ALIGN mode
NAV	Navigation mode
ATT	ATTITUDE mode
DSEL	Deselected

DIS (2L): Display the distance in nautical miles between the CMA-9000 FMS position and each navigation mode positions (only if sensor is in NAV).

ACCUR (2R): Displayed only if the LSK is toggled to display ACCUR. Display the estimated navigation accuracy (95%) of each navigation mode.

BRG (2R): Displayed only if the LSK is toggled to display BRG. Bearing from the CMA-9000 FMS position to each navigation mode position is displayed relative to True (superscript T indicates true North) or Magnetic North (based on the setting on the SETUP page).

SETUP [6L]: Access to the SETUP 1/1 page.

ROUTE [6R]: When on the ground, access to the active RTE 1/X page.

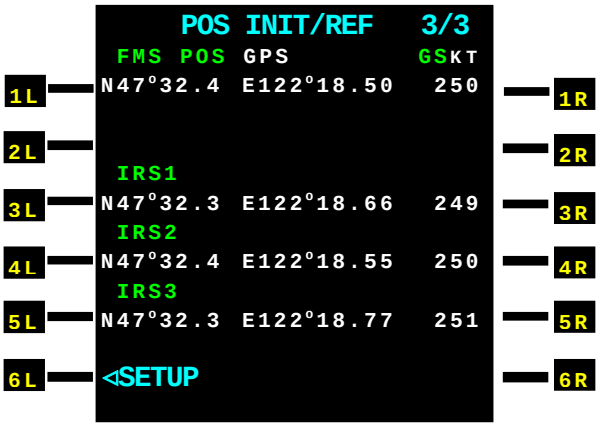
NAV STATUS [6R]: When airborne, access to the NAV STATUS INDEX 1/1 page.

POS INIT/REF 3/3 (if LTN-92, LTN101, ADIRU or LASEREF_V interface is configured)

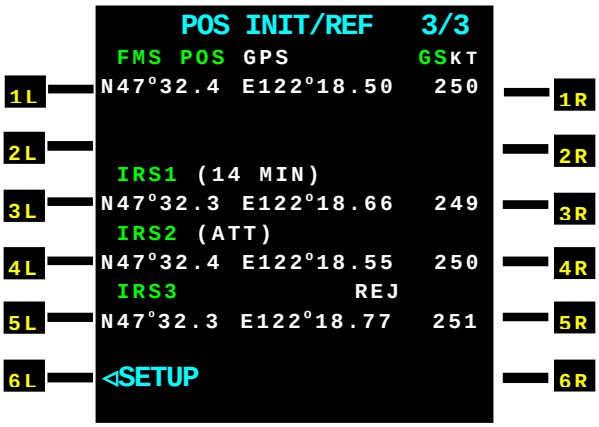
Display the POS INIT/REF 3/3 page by pressing [INIT REF], <POS INIT>, [NEXT] and [NEXT] or [INIT REF], <IDENT>, <POS IINIT>, [NEXT] and [NEXT].

This page allows the crew to verify the individual IRS position and ground speed against the FMS system position and ground speed. It also allows verifying the individual IRS status, action code, and update mode.

A. For LTN92:



B. For LTN101, ADIRU or LASEREF_V:



FMSx POS (1L): Displays current FMS system position. Navigation mode displayed in white on field title line (GPS, DME, VOR/DME, INERTIAL or DR).

IRSx (3L, 4L, 5L): If LTN-92 is configured. Displays IRSx updated inertial position.
Data line displays:

- When position valid: position data;
- When position invalid: blanks;
- When position failed or not received: asterisks.

Title line displays:

- When IRS in ALIGN: time to alignment in minutes (counting down from 7 minutes);
- When IRS in ATTITUDE: ATT.
- When the FMS has automatically deselected this IRS in polar navigation: REJ.

IRSx (3L, 4L, 5L): If LTN101, ADIRU or LASEREF_V is configured. Displays IRSx inertial position.
Data line displays:

- When position is valid: position data;
- When position is invalid: blanks;
- When position is failed or not received: asterisks.

Title line displays: If ADIRU or LASEREF_V is configured. When IRS in ALIGN: time to alignment in minutes (counting down from 14 minutes).

NOTE: For an alignment time greater than 14 minutes, the FMS will display the value of 15.if LTN101 is configured:

- *When IRS in ALIGN: time to alignment in minutes (counting down from 7 minutes).*
- *When IRS in ATTITUDE: ATT.*
- *When the FMS has automatically deselected this IRS in polar navigation: REJ.*

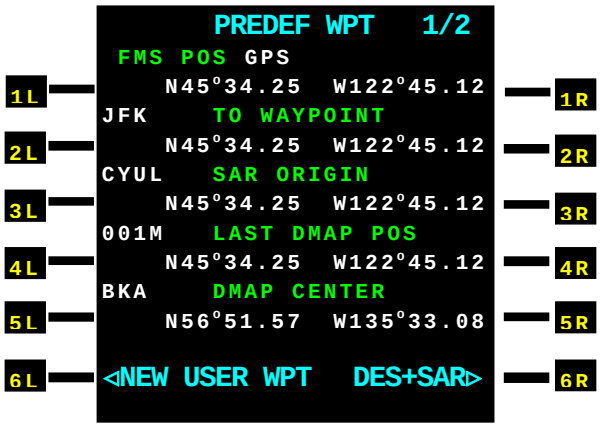
SETUP [6L]: Returns to the SETUP 1/1 page.

GS (1R, 3R, 4R, 5R): Displays current FMS, IRS1, IRS2, and IRS3 ground speed. Displays blank field when not in NAV.

PREDEF WPT 1/X (If configured)

Display the PREDEF WPT 1/X page by pressing [INIT REF], <WPT LISTS> and <PREDEF WPT> or [MARK] and [NEXT] {if one of the configurable function keys is configured to MARK}.

NOTE: Page number X will be either 2 or 3 based on the elements configured. X=3 when FLIR is configured.



FMS POS [1L,1R]: Displays the CMA-9000 FMS system current position solution and its source. Selection of 1L or 1R line key will place the present position in the scratchpad.

TO WAYPOINT [2L]: Displays the identifier of the current TO waypoint. Selection of 2L line key will place the identifier of the TO Waypoint in the scratchpad (provided the waypoint is not a conditional waypoint).

SAR ORIGIN [3L]: Displays the identifier of the search pattern origin waypoint, if one is defined in the active route. Selection of 3L line key will place the identifier of the search pattern origin waypoint in the scratchpad {if Search function is configured}.

LAST DMAP POS [4L]: Displays the identifier of the last waypoint received from the digital map. Selection of 4L line key will place the identifier of the last DMAP waypoint in the scratchpad {if DMAP ELBIT, EURONAV or EURONAV_A702 is configured}.

DMAP CENTER [5L]: Displays the identifier of the DMAP Center waypoint, if one was entered manually or will default to the identifier of the last waypoint of the active route. Following a manual entry, the DMAP Center waypoint identifier is displayed in large font. Dashes are displayed in the DMAP Center identifier field when no manual entry was made and no active route exists or when a position was entered manually via selection of 5R line key. Selection of 5L line key will place the identifier of the DMAP Center waypoint in the scratchpad if the waypoint is not a conditional waypoint. This field (including title) is only displayed when DMAP ELBIT or EURONAV_A702 is configured.

NEW USER WPT [6L]: Access to USER WPT 1/2 page.

TO WAYPOINT [2R]: Displays the position of the current TO waypoint. Selection of 2R line key will place the position of the TO Waypoint in the scratchpad.

SAR ORIGIN [3R]: Displays the position of the search pattern origin. Selection of 3R line key will place the position of the search pattern origin in the scratchpad {if Search function is configured}.

LAST DMAP POS [4R]: Displays the last position coordinate received from the digital map. Selection of 4R line key will place the position of the last DMAP waypoint in the scratchpad {if DMAP ELBIT, EURONAV or EURONAV_A702 is configured}.

DMAP CENTER [5R]: Displays the position of the DMAP Center waypoint , if one was entered manually or defaults to the position of the last waypoint of the active route. Following a manual entry, the DMAP Center waypoint position is displayed in large font and the identifier field is filled with dashes. Dashes are displayed in the DMAP Center position field when no manual entry was made and no active route exists. Selection of 5L line key will place the identifier of the DMAP Center waypoint in the scratchpad {if DMAP ELBIT or EURONAV_A702 is configured}.

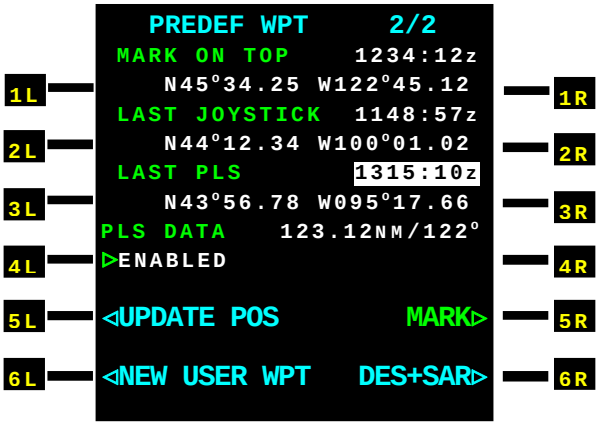
DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL 1/Y page instead of the DES+SAR 1/Y page. Access to DES+SAR 1/Y (or TACTICAL 1/Y) page. If there is a valid position in the scratchpad, it will automatically be converted to a temporary waypoint and placed in the REF ID field on the DES+SAR 1/Y (or TACTICAL 1/Y) page. If there is a valid identifier in the scratchpad, it will automatically be placed in the REF ID field on the DES+SAR 1/Y (or TACTICAL 1/Y) page.

PREDEF WPT 2/X (If configured)

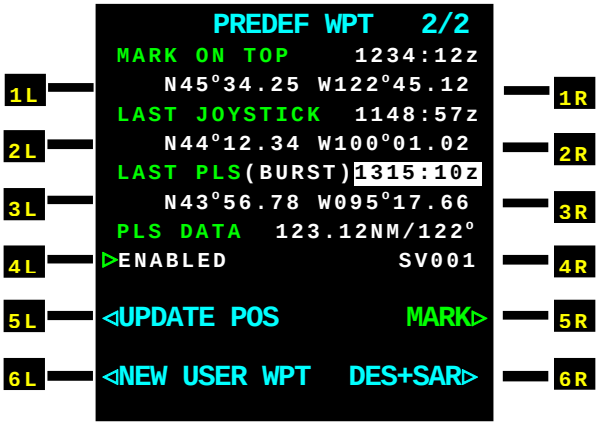
Display the PREDEF WPT 2/X page by pressing [INIT REF], <WPT LISTS>, <PREDEF WPT> and [NEXT] or [MARK] {if CFG KEY 2 configured to MARK and UPDATE POS page not being displayed} or {if Joystick position fix received {WXR or AHCAS EFIS is configured}.

NOTE: Page number X will be either 2 or 3 based on the elements configured. X=3 when FLIR is configured.

A. PLS AN_ARS6 configured:



B. PIS CUBIC_V12 configured:



MARK ON TOP POSITION [1L,1R]: Displays the Mark On Top position. Selection of 1L or 1R line key will place the Mark On Top position in the scratchpad. A time stamp is displayed above the coordinates, showing the last time a Mark On Top was executed. If the Mark On Top position time is the most recent (compared to PLS and Last Joystick), then its time is displayed in reverse video white.

LAST JOYSTICK [2L,2R]: Displays the last joystick position received from the Weather Radar interface or the AHCAS/AHCAS2 EFIS interface, along with the time of reception. If the Last Joystick position time is the most recent (compared to PLS and Mark On Top), then its time is displayed in reverse video white.
Selection of 2L or 2R line select key will place the PLS position in the scratchpad.

LAST PLS [3L,3R]:

- PLS AN/ARS6 configured:
  Displays the last Personnel Locator System position received. Selection of 3L or 3R line select key will place the PLS position in the scratchpad. A time stamp is displayed above this line, showing the last time a PLS position has been received. If the PLS position time is the most recent (compared to Mark On Top and Last Joystick), then its time is displayed in reverse video white.
- PLS CUBIC V12 configured:
  Displays the last Personnel Locator System position. Selection of 3L or 3R line select key will place the PLS position in the scratchpad. A time stamp is displayed above this line, showing the last time a PLS position has been received. If the PLS position time is the most recent (compared to Mark On Top and Last Joystick), then its time is displayed in reverse video white.
  Depending on the PLS operating mode (received and decoded by the FMS) different parameters are received by the FMS as follows:
  - DATA and GPS (URX-3000) operating modes: Latitude and Longitude received from PLS, update/no update received on the Status Matrix; Bearing and distance are computed by the FMS.
  - BURST and CONT operating modes: Bearing and Range received from PLS, update/no update received on each label; Latitude and Longitude are computed by the FMS.
    The PLS operating mode is displayed on this line. Possible values are: (DATA), (URX), (BURST), or (CONT).

    When the PLS operating mode or position are:
    - Normal and, the Central Clear is active (refer to CENTRAL CLEAR page above) or the heading is failed, then the FMS will blank the PLS data.
    - Invalid, then the FMS will display stars in the PLS data fields corresponding to the failed data and blank the other fields.

    In addition, the display of this field is "frozen" when one of the following set of data is received as no computed data:
    - Operating Mode, Surviving Number, Bearing or distance during the operating mode BURST or CONTINUOUS.
    - Operating Mode, Surviving Number or both Latitude and longitude during the operating mode GPS (URX-3000) or DATA.

LAST PLS [4R]:

PLS AN/ARS6 configured:

- Displays the last received relative distance from the aircraft and bearing. The bearing is displayed relative to True or Magnetic North based on the TRUE/MAG selection (a T superscript indicates True North). When the PLS relative distance or the bearing are:
  - Normal and, the Central Clear is active (refer to CENTRAL CLEAR page above) or the heading is failed, then the FMS will blank the PLS data.
  - Not computed, then the FMS will blank the PLS data.
  - Invalid, then the FMS will display stars in the PLS data fields and blank the other fields.

PLS CUBIC V12 configured:

- Displays the Surviving number received from the PLS, SV001 to SV127. The surviving number is updated based on the Status Matrix of the label received from the CUBIC V12 PLS.

NOTE: Selection of 4R line select key will not place the PLS Surviving Number in the scratchpad.

- Displays also the relative distance from the aircraft and the bearing. Bearing is displayed relative to True or Magnetic North based on the TRUE/MAG selection (a T superscript indicates True North).
- When the PLS surviving number, relative distance or the bearing are:
  - Normal and, the Central Clear is active (refer to CENTRAL CLEAR page above) or the heading is failed, then the FMS will blank the PLS data.
  - Invalid, then the FMS will display stars in the PLS data fields corresponding to the failed data and blank the other fields.
- In addition, the display of this field is "frozen" when one of the following set of data is invalid:
  - Operating Mode, Surviving Number, Bearing or distance during the operating mode BURST or CONTINUOUS.
  - Operating Mode, Surviving Number or both Latitude and longitude during the operating mode GPS (URX-3000) or DATA.

PLS DATA [4L]: Displays the PLS data. Possible values are ENABLED or DISABLED. When ENABLED is set, if the PLS information is received then all PLS displayed parameters are updated by the FMS (e.g. PLS's time, position, bearing, distance for all the types of PLS. As well, PLS surviving number & operating mode for PLS CUBIC V12). When DISABLED is set, if the PLS information is received then all PLS displayed parameters are not updated by the FMS, and remain unchanged.

NOTE: Enabling/Disabling the PLS data is used for display purposes only, and the FMS continues to output the PLS waypoint position regardless of this prompt value).

MARK [4R]: *Not Shown.* {Displayed if MARK hard key not configured}. Store the current CMA-9000 FMS On Top position and display in the MARK ON TOP field (1R). The positions on the UPDATE POS page are also frozen.

UPDATE POS [5L]: Access to the UPDATE POS 1/1 page. This prompt is only available if an EGI or IRS is configured or a DVS navigator is available.

NEW USER WPT [6L]: Accesses the USER WPT 1/2 page and enters the last updated position of the Mark On Top position or last Joystick position or last PLS position into the position field of that page.

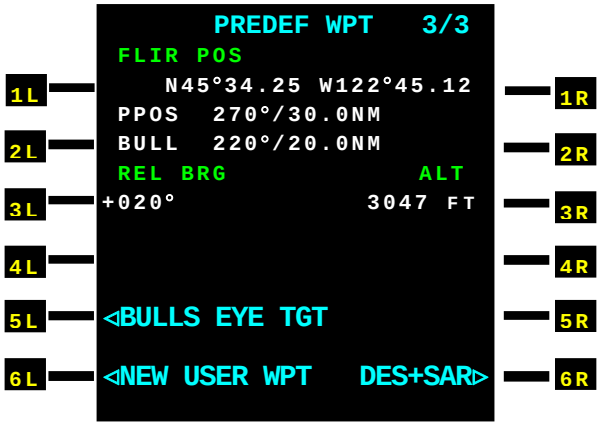
NOTE: This prompt is only displayed when a mark on top or last joystick or last PLS position exists.

DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL 1/Y page instead of the DES+SAR 1/Y page. Access to the DES+SAR 1/Y page. When there is no data in the scratchpad, selection of this key will enter the last updated waypoint of the Mark On Top or the Joystick waypoint or the last PLS position in the REF ID field of the DES+SAR 1/Y page. When there is a valid position in the scratchpad, selection of this key will create a temporary waypoint at this position and enter the identifier in the REF ID field of the DES+SAR 1/2 page.

NOTE: If the PLS position time is the most recent and the PLS position is not valid, then pressing NEW USER WPT or DES+SAR prompts will transfer the last computed position and surviving number.

PREDEF WPT 3/3 (If configured)

Display the PREDEF WPT 3/3 page by pressing [INIT/REF], <WPT LISTS>, <PREDEF WPT>, [NEXT], [NEXT] [MARK], [NEXT] {if CFG KEY configured to MARK and UPDATE POS page not being displayed} [TACT], <FLIR> { if TACT key configured and FLIR configured on TACTICAL page}



FLIR POS [1L,1R]: Displays the last FLIR position received from the FLIR interface when available. If the position is not received or received as FAIL, stars will be displayed. If the position cannot be computed, the position will be blank.
When LSK is pressed, the position will be copied in the scratchpad.

PPOS/BULL [2L,2R]: Displays the FLIR bearing/distance relative to the present aircraft position (PPOS) and relative to the Bulls eye waypoint (BULL). If the Bulls eye is not defined (or not configured) or the position is not received, this field is blank. The "BULL" string changes according to the BULLS EYE name defined in the BULLS EYE page.

REL BRG [3L]: Displays the FLIR relative bearing. The FLIR relative bearing is computed using the received FLIR Azimuth minus the aircraft true heading. If the FLIR Azimuth is not received, the relative bearing is blank.

ALT [3R]: Displays the FLIR MSL altitude in feet. If the altitude is not received, the altitude is blank.

BULLS EYE TGT [5L]: Access to the BULLS EYE 2/3 page (e.g. bulls eye target page) and enters the last received position and altitude of the FLIR into the BULLS EYE TARGET position (via the bulls eye target reference wpt) and MSL altitude field. This prompt is only displayed when the BULLS EYE function is configured and a valid FLIR position is displayed.

NEW USER WPT [6L]: Access to the USER WPT 1/2 page and enters the last updated position of the FLIR into the position field of that page. This prompt is only displayed when a valid FLIR position is displayed.

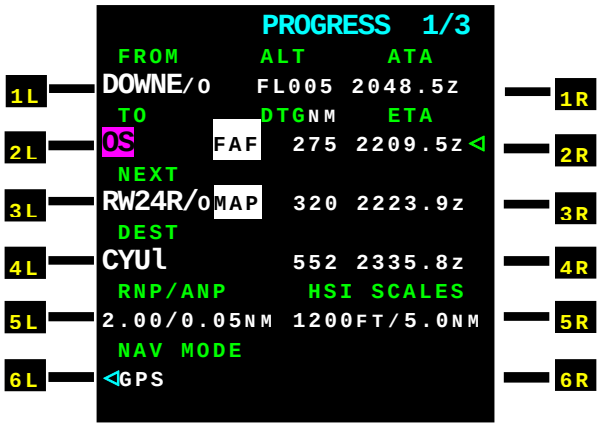
DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL page instead of the DES+SAR page. Access to the DES+SAR 1/Y (or TACTICAL 1/Y) page. When there is no data in the scratchpad, selection of this key will enter the last updated FLIR position in the REF ID field of the DES+SAR 1/Y (or TACTICAL 1/Y) page. When there is a valid position in the scratchpad, selection of this key will create a temporary waypoint at this position and enter the identifier in the REF ID field of the DES+SAR 1/Y (or TACTICAL 1/Y) page.

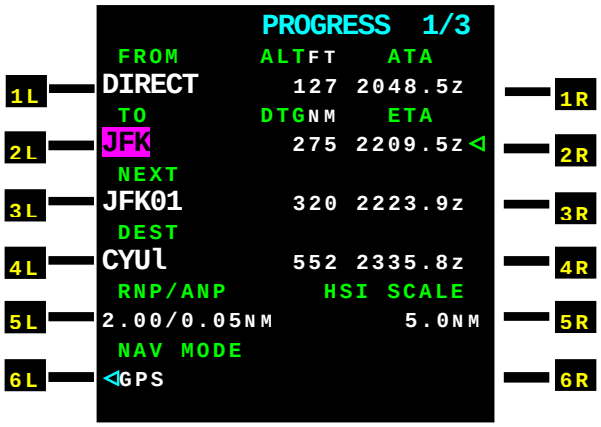
PROGRESS 1/3 (when 3-page set is configured)

This page provides the progress of various parameters to the user. Access PROGRESS 1/3 page by pressing [PROG].

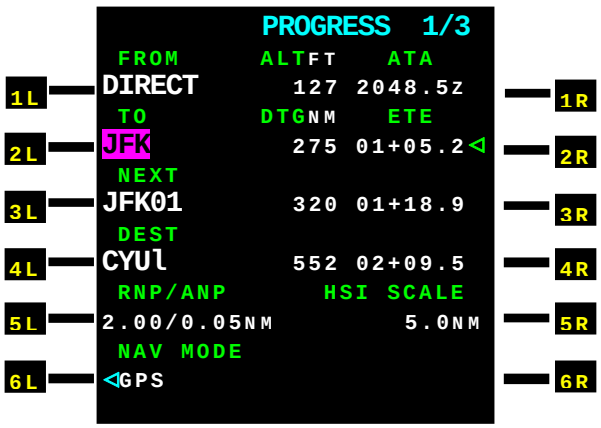
This page becomes PROGRESS 1/4 when CARP is configured.

A. When ETA is selected:

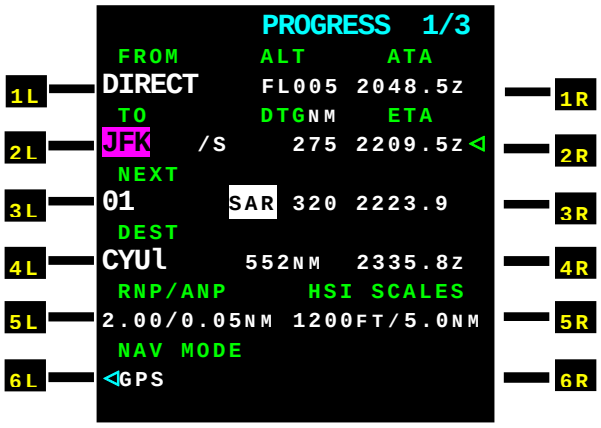




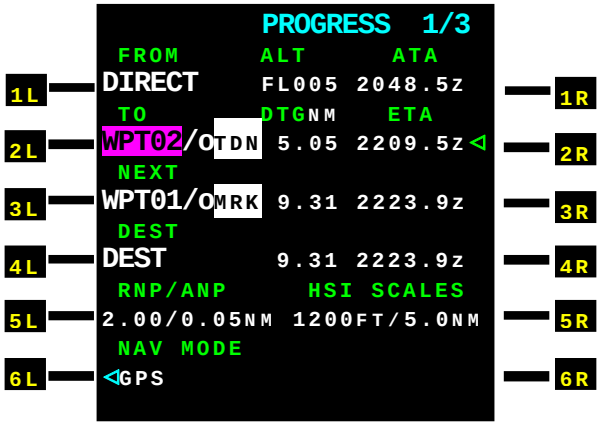
B. When ETE selected:



C. When SAR part of the active route:



D. When a HOVER procedure is part of the active route:



FROM (1L): Identifier of the last (FROM) waypoint overflown. Displays "GROUND" after takeoff before reaching the active waypoint. Special attributes are displayed in inverse video white (refer to NOTE 2).

NOTE: If SAR waypoint ident displayed (e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

ALT (1L): Crossing altitude over the FROM waypoint. Display can be either in feet or FL. If waypoint is before the midway point of the active route, Transition Altitude criterion is used. If waypoint is after the midway point of the active route, Transition Level criterion is used.

ATA (1R): Actual time of arrival at the FROM waypoint.

TO (2L): Identifier of active TO waypoint. Special attributes are displayed in inverse video white (refer to NOTE 2).

NOTE: If SAR waypoint ident displayed e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

DTG (2L): Cumulative distance-to-go from present position to waypoint along the flight plan route.

ETA (2R): Display Estimated Time of Arrival (ETA) at waypoint.

NOTE: When the aircraft is on ground, the ETE (estimated time en route) to the waypoint is displayed instead of the ETA if the PLAN DATA page is configured. If they are not configured, the field is blank.

ETE (2R): Display Estimated Time En-route (ETE) to waypoint (displayed only on ground).

NOTE: When the aircraft is on ground, the ETE to the waypoint is displayed instead of the ETA if the PLAN DATA page is configured. If it is not configured, the field is blank.

NEXT (3L): Identifier of NEXT waypoint. Special attributes are displayed in inverse video white (refer to NOTE 2).

NOTE: If SAR waypoint ident displayed (e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

DEST (4L): Identifier of the destination airport/waypoint.

RNP/ANP [5L]: Used for entry and/or display of the Required Navigation Performance (RNP) for the phase of flight and displays Actual Navigation Performance (ANP). RNP is defined as a statement of the navigation performance necessary for operation within a defined airspace (adapted from ICAO definitions). RNP includes requirements for accuracy, integrity, continuity and availability of navigation signals and equipment. The Actual Navigation Performance field displays one of the following (depending on the navigation mode): GPS ANP, INS quality factor, or dead reckoning quality factor. Refer to Section 15, RNP Capability for additional information.

HSI SCALE [5R] or (5R): Entry and display of HSI full scale deviation (in nautical miles). Entry is only allowed during the en-route phase of flight. Either 1 nm or 5 nm can be entered as the HSI scale. {Displayed only if EFIS is configured and not configured for en-route navigation}. If VNAV option is configured the title becomes "**HSI SCALES**" and an additional field for full scale value of vertical deviation (in ft) is displayed.

NAV MODE [6L]: Current sensor used for navigation. Pressing LSK 6L will access the POS REF 2/X page. Possible navigation modes:

- INS/GPS{if EGI installed}
- cGPS {if dual GPS installed}
- mGPS {if dual GPS installed}
- GPS {if EGI only or CIVIL GPS only configured}
- DME
- VOR/DME
- INS/DVS
- INERTIAL
- DVS
- KALMAN {if APIRS installed}
- DR

MISSED APPR [6R]: *Not Shown.* If the prompt display is configured, prompt appears during final GPS instrument approach with no route modification in progress. Pressing this key will automatically sequence the Missed Approach Point (MAP) to the missed approach procedure. The function of this key is limited to the FMS, and has no impact on any missed approach or take-off/go-around mode of the flight guidance system.

NEXT WPT [6R]: *Not Shown.* Prompt is displayed when automatic waypoint sequencing is not possible. Examples include when the active leg is vector, or an altitude-terminated leg without a Baro-corrected altitude input. Pressing NEXT WPT results in an immediate transition of navigation and guidance to the next waypoint in the flight plan.

NOTE 1: The destination DTG and ETA are not affected by any route modification procedure that has not yet been EXECuted. In addition, when the aircraft is on ground, the ETE (estimated time en route) to the point is displayed instead of the ETA if either the PLAN DATA page is configured. If they are not configured, the field is blank.

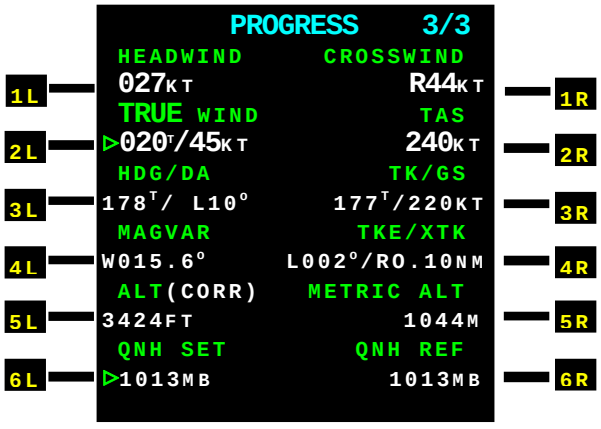
NOTE 2: Special attributes associated with waypoints identifiers are:

- *FAF: When a Final approach fix waypoint identifier is displayed.*
- *MAP: When a Missed approach fix waypoint identified is displayed.*
- *SAR: When a Search pattern waypoint except for the search pattern origin is displayed.*
- *TDN: When a Hover Transition down waypoint identifier is displayed.*
- *MRK: When a Hover Mark waypoint identifier is displayed.*
- *IP: When the CARP Identification Point is displayed.*
- *TP: When the CARP Turning Point is displayed.*
- *SD: When the CARP Slow-Down waypoint is displayed.*
- *CRP: When the CARP Greenlight waypoint is displayed.*
- *XTE: When the CARP Redlight waypoint is displayed.*
- *ESC: When the CARP Escape waypoint is displayed.*

PROGRESS 3/3 (when 3-page set is configured)

This page provides the progress of various data to the user. Access PROGRESS 3/3 page by pressing [PROG] and [PREV].

This page becomes PROGRESS 3/4 if CARP is configured.



HEADWIND/TAILWIND (1L): Present headwind or tailwind component (in knots).

CROSSWIND (1R): Present crosswind component (left or right in knots, direction from which wind is blowing).

TRUE/MAG WIND [2L]: Current true wind direction and speed (in knots). Displayed in small font when the wind value is computed by the FMS, in large font when the value is frozen. When the scratchpad is empty, and A/C is outside the polar region (latitude between N73 and S60), pressing LSK 2L will toggle between the True and Magnetic display options. TRUE/MAG toggling is disabled, the > is not displayed, and TRUE is displayed in the title line when the A/C is in the polar region. When the scratchpad contains a valid wind entry, pressing LSK 2L will enter the wind overriding the displayed wind, if the wind value is frozen. The wind is frozen at low speed and under failure conditions (TAS or heading input failure). Wind entry is also allowed when TAS and heading are valid in DME/DME and VOR/DME navigation modes. After a cold start on ground, the wind value is not displayed (field blank).

TAS (2R): True Air Speed (in knots).

HDG/DA (3L): Aircraft heading and drift angle.

TK/GS [3R]: Current aircraft track and ground speed (in knots). Entry allowed only when navigating in DR mode, to aid the navigation solution.

MAGVAR (4L): Magnetic variation at aircraft position.

TKE/XTK (4R): Present track angle error (Left or Right) from course of active leg and present cross-track error (Left or Right) in nautical miles from the active leg. When a ROCKWELL3 EFIS is configured, the XTK value displayed will be either the crosstrack relative to the arc (when the arc is being flown) or to the active leg otherwise. In the case of procedure turn and hover procedure, the XTK will be blanked when:

- Active leg is a CF leg, and
- XTK distance is greater than 0.2nm, and
- Track angle error is greater than 20 degrees

The appropriate altitude value field is displayed at LSK 5L key in the order of priority:

ALT (CORR) (5L): When a baro-corrected altitude is available. The baro-corrected altitude can be:

- A baro-corrected altitude received from the ADC, or
- A standard pressure altitude received from the ADC with a QNH baro-correction applied, or
- A baro-inertial altitude received from the IRS with a QNH baro-correction applied.

ALT (STD) (5L): When a standard pressure altitude is received from the ADC.

ALT (IRS) (5L): When a baro-inertial altitude is received from the IRS.

ALT (GPS) (5L): When a geometric altitude is received from the GPS.
In the case of a dual GPS configuration (e.g. civil & military), the GPS altitude is the one received from the active selected sensor (either military or civil GPS).

ALT (INS) (5L): When a hybrid inertial altitude is received from the EGI.
ALT (MAN) (5L): When none of the altitude sources are available, manual entry is allowed. Displayed in large font.

METRIC ALT [5R]: FMS system altitude, displayed in meters. Displayed only if selected in the display configuration.

QNH SET [6L]: Displayed when no baro-corrected altitude is received from the ADC and either a pressure or an IRS baro-inertial altitude is available. Displayed, in small font, when a baro-correction (QNH) is received from an external source. Otherwise, allows the entry of a barometric correction (QNH) in inches of mercury (in Hg) with a range from 27.0 to 32.0 in Hg or in millibars (mb) with a range from 915 to 1083 mb. When a QNH altimeter setting is entered, a correction is applied to the pressure altitude and the resulting baro-corrected value is displayed as ALT(CORR) (5L). The displayed unit (mb or inHg) can be toggled via LSK 6L when the scratchpad is empty.
This field is also displayed, in small font, when both the QNH and baro-corrected altitude are received by the FMS. This field is not displayed when the baro-corrected altitude is received, but no external QNH is available to the FMS. This field is not displayed when the altitude source is GPS, INS (EGI) or manual.

QNH REF [6R]: Displayed when only pressure altitude from the ADC and hybrid inertial altitude from the EGI are available and the QNH SET field is displayed. Displays a computed value of the mean sea-level (QNH) pressure as a reference value to the pilot. The units of this field will be slave to the selected unit on the QNH SET (6L) field. This field is right justified.

NOTE: The manually entered altimeter setting is cancelled and the field displays dashes ("--.--") on leaving the terminal area (distance from the departure airport is greater than 33 nm, or the altitude is greater than 16,000 feet above airport elevation.

When no altimeter setting is defined field displays boxes (" □ □ □ □ □ ") on entering the terminal area (distance from the destination airport is less than 30 nm, or the altitude is less than 15,000 feet above airport elevation).This indicates a mandatory input is required for a VNAV approach.

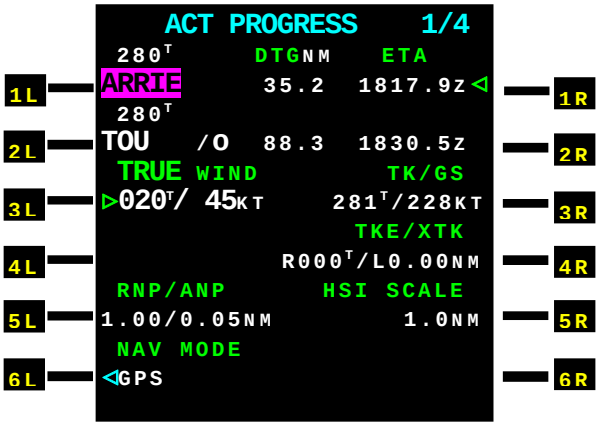
PROGRESS 1/4 (when 4-page set is configured)

The PROGRESS 1/4 page allows the pilot to monitor current dynamic data concerning progress along the active route. Two display formats are possible as shown below.

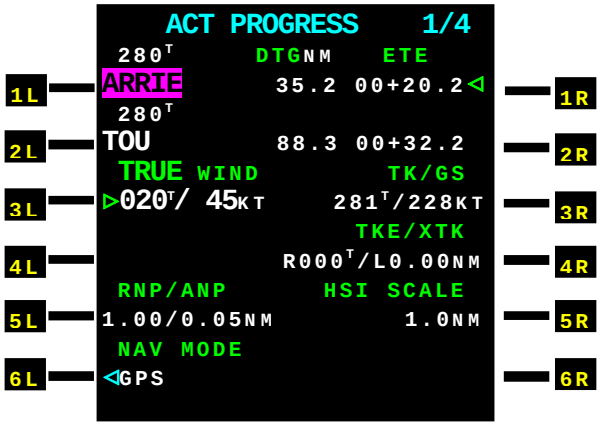
Display ACT PROGRESS 1/4 page by pressing [PROG].

This page becomes ACT PROGRESS 1/5 if CARP is configured.

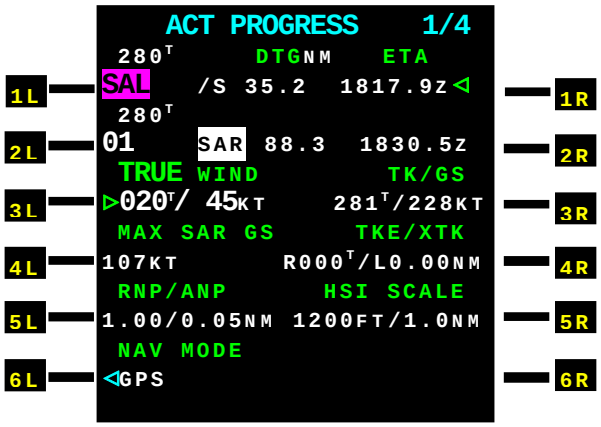
A. When ETA is selected:



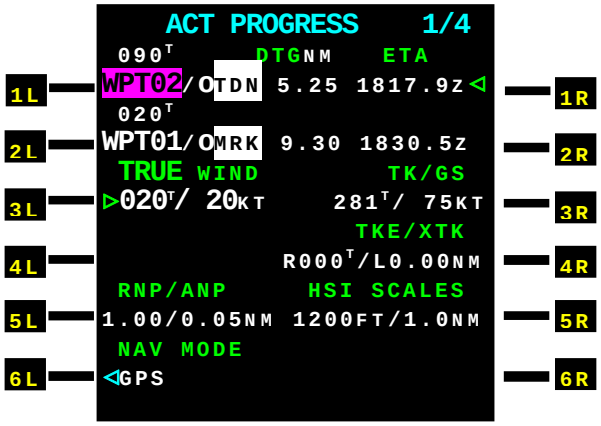
B. When ETE is selected:



C. When SAR is part of active route:



D. When a HOVER procedure is part of the active route:



DESIRED TRACK (DSTK) (1L): True (superscript T)/Magnetic (^{o}) Desired track to the active waypoint changed to "HOLD AT" during holding pattern, or "EXIT HOLD" when holding pattern exit is armed.

NOTE: Prefix: turn direction (Left, either, Right)Suffix: Angle type (crs-course, hdg-heading)

ACTIVE WAYPOINT (1L): Active waypoint identifier in reverse video. Special attributes are displayed in inverse video white (refer to NOTE 1).

NOTE: If SAR waypoint ident displayed (e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

ACTIVE WAYPOINT PROCEDURE (1L): Special procedure associated to the active waypoint.

"/H": Holding pattern.
"/O": Fly over waypoint.
"/S": Search pattern for search pattern origin only.
"/T": Tactical direct-to
"/A": Tactical approach
"/C" CARP Greenlight waypoint.

DTG (ACTDTG) (1L): Distance to go (2nd column) from present position to the active waypoint.

ETA (ACTETA) (1R): Estimated time of arrival at the active waypoint. On selection will change to ETE (also effects a change on PROGRESS 2/4).

ETE (1R): Displays estimated time en-route to active waypoint.

NOTE: When the aircraft is on ground, if PLAN DATA page is not configured *the ETE/ETA field is blank.*

NEXT COURSE (2L): NEXT flight plan course True (superscript T)/Magnetic (^{o}).

NEXT WAYPOINT (2L): Display the identifier at the waypoint following the active waypoint. Special attributes are displayed in inverse video white (refer to NOTE 1).

NOTE: If SAR waypoint ident displayed (e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

PROCEDURE AT NEXT WPT (2L): Display special procedure associated with the next waypoint.

"/H": Holding pattern.
"/O": Overfly.
"/S": Search pattern for search pattern origin only.
"/A": Tactical approach
"/C": CARP Greenlight waypoint.

DTG (2L): Distance to go (2nd column) from present position to next waypoint.

ETA (2R): Display estimated time of arrival at the next waypoint.

ETE (2R): Displays estimated time en-route to the next waypoint.

NOTE: When the aircraft is on ground, if PLAN DATA page is not configured *the ETE/ETA field is blank.*

TRUE/MAG WIND [3L]: Current true wind direction and speed (in knots). Displayed in small font when the wind value is computed by the FMS, in large font when the value is frozen (see definition below). When the scratchpad is empty and A/C is outside the polar region (latitude between N73 and S60), pressing LSK 3L will toggle between the True and Magnetic display options. TRUE/MAG toggling is disabled, the > is not displayed, and TRUE is displayed in the title line when the A/C is in the polar region. When the scratchpad contains a valid wind entry, pressing LSK 3L will enter the wind overriding the displayed wind, if the wind value is frozen. The wind is frozen at low speed and under failure conditions (TAS or heading input failure). Wind entry is also allowed when TAS and heading are valid in DME/DME and VOR/DME navigation modes. After a cold start on ground, the wind value is not displayed (field blank).

CAUTION: The crew must be aware of the reference for heading indication as it may differ from the wind reference selected on this page.

MAX SAR GS [4L]: Maximum ground speed to perform the SAR pattern without any overshoot. This field is only displayed when the SAR waypoint is the active TO waypoint and when the SAR is active. Otherwise the complete field is blank (fixed caption & dynamic data).

RNP/ANP [5L]: Used for entry and/or display of the Required Navigation Performance (RNP) for the phase of flight and displays Actual Navigation Performance (ANP). RNP is defined as a statement of the navigation performance necessary for operation within a defined airspace (adapted from ICAO definitions). RNP includes requirements for accuracy, integrity, continuity, and availability of navigation signals and equipment. The Actual Navigation Performance field displays one of the following, the actual navigation performance, or a quality factor depending on the navigation mode. Refer to Section 15, RNP Capability for additional information.

NAV MODE [6L]: Current navigation mode. Pressing LSK 6L will access POS INIT/REF 2/X page. The CMA-9000 FMS can have the following navigation modes:

- INS/GPS{if EGI installed}
- cGPS {if dual GPS installed}
- mGPS {if dual GPS installed}
- GPS {if EGI only or CIVIL GPS only configured}
- DME
- VOR/DME
- INS/DVS
- INERTIAL
- DVS
- KALMAN {if APIRS installed}
- DR

TK/GS [3R]: Current aircraft track and ground speed (in knots). Entry allowed only when navigating in DR mode, to aid the navigation solution.

TKE/XTK (4R): Present track angle error (Left or Right) from course of active leg and present cross-track error (Left or Right) in nautical miles from the active leg. When a ROCKWELL3 EFIS is configured, the XTK value displayed will be either the crosstrack relative to the arc (when the arc is being flown) or to the active leg otherwise. In the case of procedure turn and hover procedure, the XTK will be blanked when:

- Active leg is a CF leg, and
- XTK distance is greater than 0.2nm, and
- Track angle error is greater than 20 degrees

HSI SCALE (5R): Entry and display of HSI full scale deviation (in nautical miles). Entry is only allowed during the en-route phase of flight. Either 1 nm or 5 nm can be entered as the HSI scale. {Displayed only if EFIS is configured and not configured for en-route navigation}. If VNAV option is configured the title becomes "**HSI SCALES**" and an additional field for full scale value of vertical deviation (in ft) is displayed.

MISSED APPR [6R]: *Not Shown.* If the prompt display is configured, prompt appears during final GPS instrument approach with no route modification in progress. If configured for display, pressing the line select key adjacent to this prompt, the FMS will automatically sequence the Missed Approach Point (MAP) to the missed approach procedure otherwise it will have no effect. {Active when flying final approach}.

NEXT WPT [6R]: *Not Shown.* Prompt is displayed when automatic waypoint sequencing is not possible. Examples include when the active leg is vector, or an altitude-terminated leg without a Baro-Corrected altitude input. Pressing NEXT WPT results in an immediate transition of navigation and guidance to the next waypoint in the flight plan. {Active when flying a manually terminated leg (ex. VECTOR)}.

NOTE 1: Special attributes associated with waypoints identifiers are:

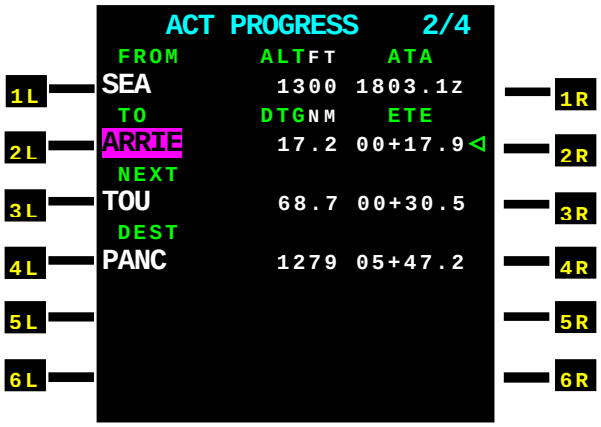
- *FAF: When a Final approach fix waypoint identifier is displayed.*
- *MAP: When a Missed approach fix waypoint identified is displayed.*
- *SAR: When a Search pattern waypoint except for the search pattern origin is displayed.*
- *TDN: When a Hover Transition down waypoint identifier is displayed.*
- *MRK: When a Hover Mark waypoint identifier is displayed.*
- *IP: When the CARP Identification Point is displayed*
- *TP: When the CARP Turning Point is displayed.*
- *SD: When the CARP Slow-Down waypoint is displayed.*
- *CRP: When the CARP Greenlight waypoint is displayed.*
- *XTE: When the CARP Redlight waypoint is displayed.*
- *ESC: When the CARP Escape waypoint is displayed.*

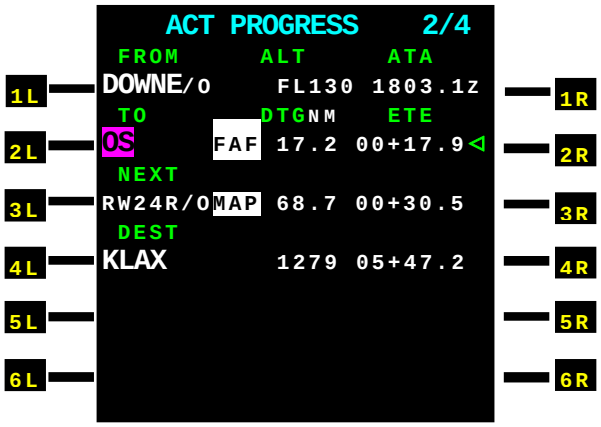
PROGRESS 2/4 (when 4-page set is configured)

Display ACT PROGRESS 2/4 page by pressing [PROG] and then [NEXT].

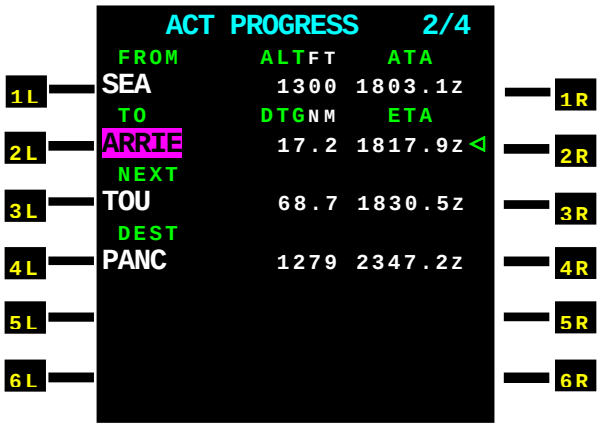
This page becomes ACT PROGRESS 2/5 when CARP is configured.

A. When ETE selected:

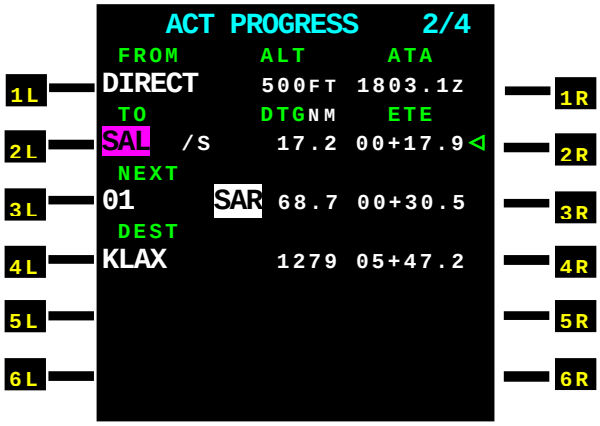




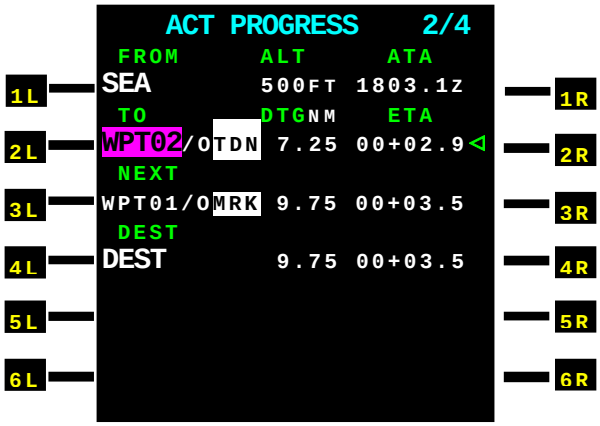
B. When ETA selected:



C. When SAR part of the active route:



D. When a HOVER procedure is part of the active route:



FROM (1L): Identifier of the last (FROM) waypoint overflown. Displays "GROUND" after takeoff before reaching the active waypoint. Special attributes are displayed in inverse video white (refer to NOTE 1).

NOTE: If SAR waypoint ident displayed (e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

ALT (1L): Crossing altitude over the FROM waypoint. Display can be either in feet or FL. If waypoint is before the midway point of the active route, Transition Altitude criterion is used. If waypoint is after the midway point of the active route, Transition Level criterion is used.

ATA (1R): Actual time of arrival at the FROM waypoint.

TO (2L): Identifier of active TO waypoint. Special attributes are displayed in inverse video white (refer to NOTE 1).

NOTE: If SAR waypoint ident displayed (e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

DTG (2L): Cumulative distance-to-go from present position to waypoint along the flight plan route.

ETA (2R): Estimated time of arrival at waypoint. On selection will change to ETE (also effects a change on PROGRESS 1/4).

ETE (2R): Displays Estimated time en-route at waypoint.

NOTE: When the aircraft is on ground, if PLAN DATA page is not configured the ETE/ETA field is blank.

NEXT (3L): Identifier of NEXT waypoint. Special attributes are displayed in inverse video white (refer to NOTE 1).

NOTE: If SAR waypoint ident displayed (e.g. 01 - 79), then the ident will not be transferred to the scratchpad.

DEST (4L): Identifier of the Destination airport/waypoint.

NOTE 1: Special attributes associated with waypoints identifiers are:

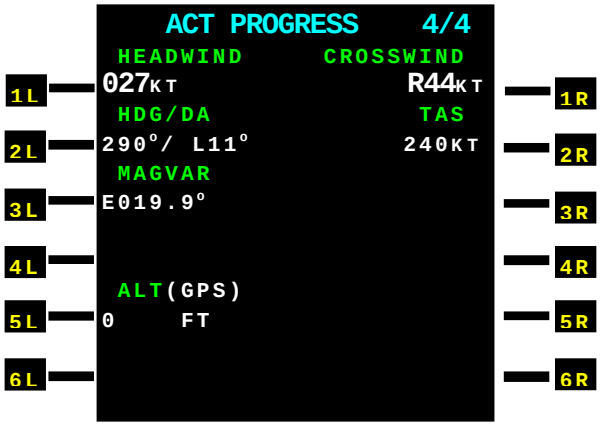
- *FAF: When a Final approach fix waypoint identifier is displayed.*
- *MAP: When a Missed approach fix waypoint identified is displayed.*
- *SAR: When a Search pattern waypoint except for the search pattern origin is displayed.*
- *TDN: When a Hover Transition down waypoint identifier is displayed.*
- *MRK: When a Hover Mark waypoint identifier is displayed.*
- *IP: When the CARP Identification Point is displayed.*
- *TP: When the CARP Turning Point is displayed.*
- *SD: When the CARP Slow-Down waypoint is displayed.*
- *CRP: When the CARP Greenlight waypoint is displayed.*
- *XTE: When the CARP Redlight waypoint is displayed.*
- *ESC: When the CARP Escape waypoint is displayed.*

PROGRESS 4/4 (when 4-page set is configured)

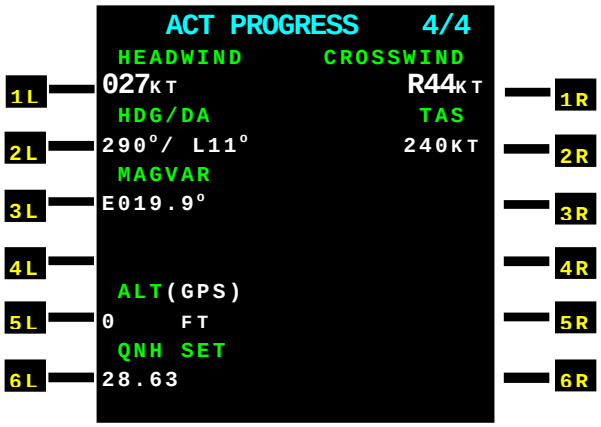
Display ACT PROGRESS 4/4 page by pressing [PROG], and then [PREV].

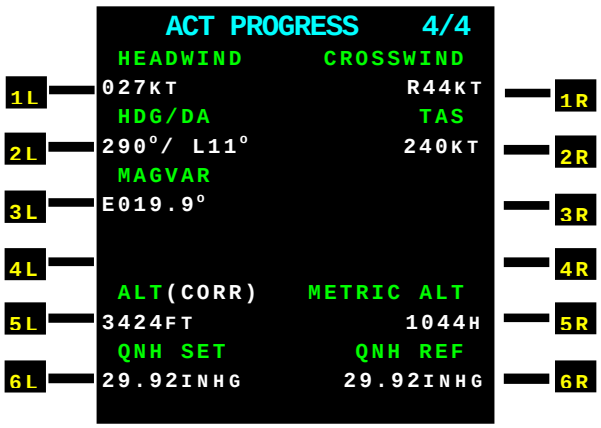
This page becomes ACT PROGRESS 4/5 when CARP is configured.

If QNH is not available (via proper configuration).



If QNH is available (via proper configuration).





HEADWIND/TAILWIND (1L): Present headwind or tailwind component. Display in knots.

CROSSWIND (1R): Present crosswind component (left or right in knots, direction from which wind is blowing). Display in knots.

HDG/DA (2L): Aircraft Heading and Drift angle. Display in degrees.

TAS (2R): True Air Speed (in knots).

MAGVAR (3L): Magnetic variation at aircraft position. Display in degrees.

ALT (xxx) [5L]: FMS system altitude, displayed in feet. The (xxx), displayed in white font, identifies the type of altitude displayed. It can be, in order of priority:

- (CORR): When a baro-corrected altitude is available. The baro-corrected altitude can be:
  - a baro-corrected altitude received from the ADC, or
  - a standard pressure altitude received from the ADC with a QNH baro-correction applied, or
  - a baro-inertial altitude received from the IRS with a QNH baro-correction applied.
- (STD): When a standard pressure altitude is received from the ADC.
- (IRS): When a baro-inertial altitude is received from the IRS.
- (GPS): When a geometric altitude is received from the GPS.
- (INS): When a hybrid inertial altitude is received from the EGI.
- (MAN): When none of the altitude sources are available, manual entry is allowed. Displayed in large font.

METRIC ALT [5R]: CMA-9000 FMS system altitude, displayed in meters. Displayed only if selected in the display configuration.

QNH SET [6L]: Displayed when no baro-corrected altitude is received from the ADC and either a pressure or an IRS baro-inertial altitude is available. Displayed, in small font, when a baro-correction (QNH) is received from an external source. Otherwise, allows the entry of a barometric correction (QNH) in inches of mercury (in Hg) with a range from 27.0 to 32.0 in Hg or in millibars (mb) with a range from 915 to 1083 mb. When a QNH altimeter setting is entered, a correction is applied to the pressure altitude and the resulting baro-corrected value is displayed as ALT(CORR) (LSK 5L). The displayed unit (mb or inHg) can be toggled via LSK 6L when the scratchpad is empty.
This field is also displayed, in small font, when both the QNH and baro-corrected altitude are received by the FMS. This field is not displayed when the baro-corrected altitude is received but no external QNH is available to the FMS. This field is not displayed when the altitude source is GPS, INS or manual.

QNH REF [6R]: Displayed only when the Pressure Altitude input from the ADC is available, Hybrid INS/GPS navigation solution from the EGI is computed and available, the INS/GPS AAIM altitude is not failed, and the QNH SET field is displayed.. Displays a computed value of the mean sea-level (QNH) pressure as a reference value to the pilot. The units of this field will be slave to the selected unit on the QNH SET (LSK 6L) field. This field is right justified. Both fields display asterisks if the ADC or INS/GPS is failed or blanks if no altitude data is received.

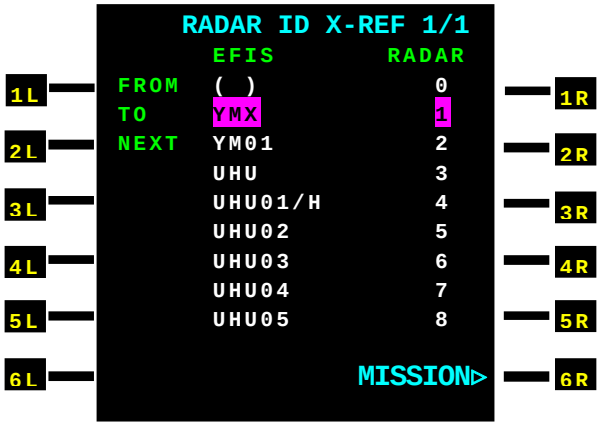
NOTE: The manually entered altimeter setting is cancelled and the field displays dashes ("--.--") on leaving the terminal area (distance from the departure airport is greater than 33 nm, or the altitude is greater than 16,000 feet above airport elevation.)
When no altimeter setting is defined, field displays boxes (" ") on entering the terminal area (distance from the destination airport is less than 30 nm, or the altitude is less than 15,000 feet above airport elevation). This indicates a mandatory input is required.

RADAR ID X-REF 1/1 (if FIAR 1500B RADAR is configured)

Display the RADAR ID X-REF 1/1 page by pressing [INIT REF], <MISSION>, <RADAR ID X-REF {if the PREDEF PG is not configured or configured with the MARK key also configured} and {the FIAR 1500B RADAR is configured}.

This page is used to associate the waypoint naming transmitted to the EFIS with the waypoint naming used by the FIAR 1500B RADAR. The EFIS receives waypoint names containing up to 12 alphanumeric characters while the RADAR uses sequential numbers from 00 to 99.

Some waypoint identifiers displayed on this page are intermediate waypoints created by the FMS that are not part of the flight plan presented on the LEGS page. The intermediate waypoints could be for example, the search pattern waypoints (01-79) that are displayed on the EFIS but not on the LEGS page.



FROM (1L,1R): Display the FROM waypoint identifier transmitted to the EFIS and the corresponding waypoint number used on the RADAR display. For waypoints without identifier created by the FMS, parenthesis (e.g.:"( )") are displayed to indicate that no identifier is defined. For example, when a direct-to is executed, the FROM waypoint will be shown as "( )" on the EFIS column.

TO (2L,2R): Display the TO waypoint identifier transmitted to the EFIS and the corresponding waypoint number used on the RADAR display.

NEXT (2L,2R): Display the NEXT waypoint identifier transmitted to the EFIS and the corresponding waypoint number used on the RADAR display. For waypoints without identifier created by the FMS, parenthesis (e.g.:"( )") are displayed to indicate that no identifier is defined.

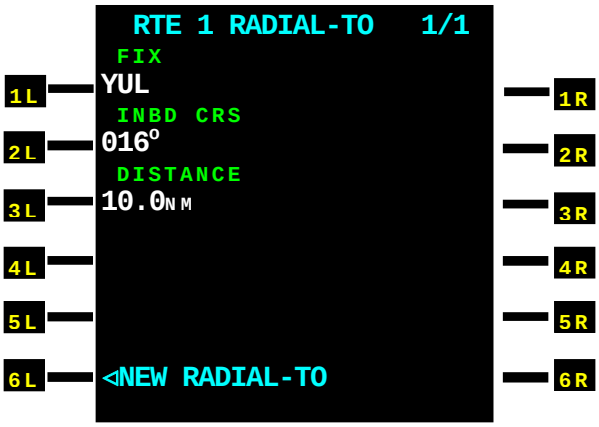
FLIGHT PLAN WAYPOINTS (3L, 4L, 5L, 3R, 4R, 5R): Display the flight plan waypoint transmitted to the EFIS and the corresponding waypoint numbers used on the RADAR display.

MISSION [6R]: Access the MISSION 1/1 page.

RADIAL-TO 1/1

Display RADIAL-TO 1/1 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, enter identifier in the REF ID field, and <RADIAL-TO> or [INIT REF], <DES+SAR> or <TACTICAL>, <RADIAL-TO> or appending '/R' to an existing waypoint on the RTE LEGS page.

Used to enter the parameters defining a Radial-To procedure: waypoint identifier, inbound course and distance.



FIX [1L]: Destination waypoint of the radial-to procedure. The identifier entered is checked to ensure that:

- All characters are alphanumeric; and
- the maximum size of the identifier is 5 characters; and
- the identifier exists in one of the following databases: NDB, LIB, TMP, USR or RTE; or is one of the Bulls Eye waypoints and
- the identifier is not a moving waypoint.

INBD CRS [2L]: Radial on which the temporary waypoint will be created. Acceptable range is 0 to 360 degrees.

DISTANCE [3L]: Distance from the FIX in nautical miles. Acceptable range is 0 to 99.9 nautical miles.

NEW RADIAL-TO [6L]: Used to place the procedure (example: YUL016/10/R) in the scratchpad and switch to the RTE x LEGS 1/X page.

RTA PROGRESS 2/3 (when 3-page set is configured)

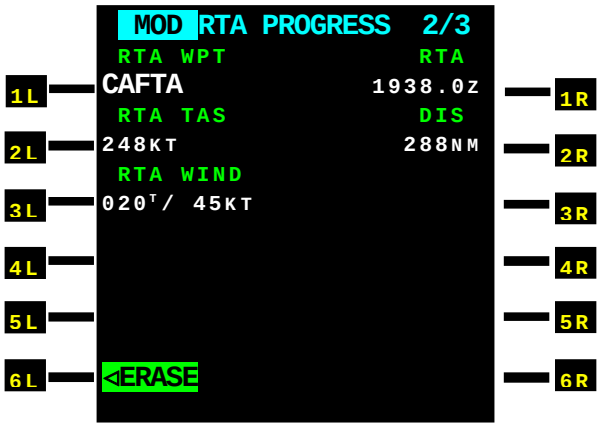
This page is used to evaluate the required True airspeed (TAS) to reach a waypoint at the required time of arrival (RTA), or to evaluate the estimated time of arrival at the RTA waypoint under different TAS and wind conditions.

Display ACT RTA PROGRESS 2/3 page by pressing [PROG] and [NEXT].

This page becomes PROGRESS 2/4 when CARP is configured.

A. Normal ACTIVE format:

B. PROGRESS during a MOD:



RTA WPT [1L]: RTA Waypoint identifier, must be in the route. Field contains dashes and page is blank when no identifier is entered. Deletion of the RTA waypoint blanks the page but does not remove the waypoint from the route. Automatically blanked after sequencing the RTA waypoint out of the flight plan.

RTA TAS [2L]: Displayed only after entry of the RTA waypoint. TAS used for RTA computation or recommended TAS to reach the waypoint at the required time. In flight, default value is system TAS; on ground, default value is cruise TAS from the PLAN DATA 1/1 page (if configured); otherwise default value is 0. Manually entered RTA TAS is displayed in large font. Deletion will bring back default value.

RTA WIND [3L]: Displayed only after entry of the RTA waypoint. Wind used for RTA or recommended RTA TAS computation. In flight, default value is system wind; on ground, default value is cruise wind from the PLAN DATA 1/1 page (if configured); otherwise default value is 0. Manual entry is displayed in large font, and does not change the system or cruise wind. Deletion will bring back default value. Down track winds from LEGS page should be used (0° to 360°/0KT to 200KT).

ERASE [6L]: Displayed only when a route modification is in progress. Pressing ERASE (LSK 6L) will undo all changes to the route. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed only if the RTE was erased on the RTE 1/X page. Used to restore the active route.

RTA [1R]: Estimated time of arrival at the RTA waypoint is displayed in small characters. Required time of arrival entered manually is displayed in large font.

DIS (2R): Along track distance from present position to the RTA waypoint.

RTA PROGRESS 3/4 (when 4-page set is configured)

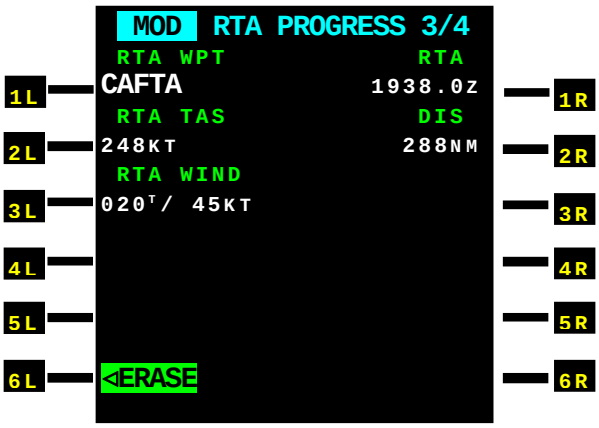
Used to evaluate the required true air speed (TAS) to reach a waypoint at the required time of arrival (RTA), or to evaluate the estimated time of arrival at the RTA waypoint under different TAS and wind conditions.

Display ACT RTA PROGRESS 3/4 page by pressing [PROG], [NEXT] and then [NEXT].

This page becomes RTA PROGRESS 3/5 when CARP is configured.

A. Normal ACTIVE format:

B. PROGRESS Index during a MOD:



RTA WPT [1L]: RTA Waypoint identifier, must be in the route. Field contains dashes and page is blank when no identifier is entered. Deletion of the RTA waypoint blanks the page but does not remove the waypoint from the route. Automatically blanked after sequencing the RTA waypoint out of the flight plan.

RTA TAS [2L]: Displayed only after entry of the RTA waypoint. TAS used for RTA computation or recommended TAS to reach the waypoint at the required time. In flight, default value is system TAS; on ground, default value is cruise TAS from the PLAN DATA 1/1 page (if configured); otherwise default value is 0. Manually entered RTA TAS is displayed in large font. Deletion will bring back default value.

RTA WIND [3L]: Displayed only after entry of the RTA waypoint. Wind used for RTA or recommended RTA TAS computation. In flight, default value is system wind; on ground, default value is cruise wind from the PLAN DATA 1/1 page (if configured); otherwise default value is 0. Defaults to system wind in flight and cruise wind on ground. Manual entry is displayed in large font, and does not change the system or cruise wind. Deletion will bring back default value.

ERASE [6L]: Displayed only when a route modification is in progress. Pressing ERASE (LSK 6L) will undo all changes to the route. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed only if the RTE was erased on the RTE 1/X page. Used to restore the active route.

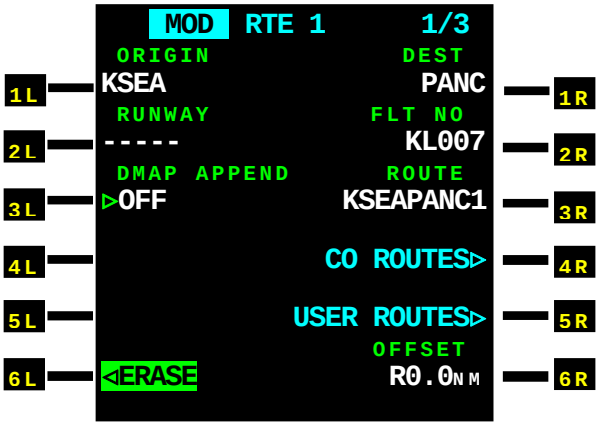
RTA [1R]: Estimated time of arrival at the RTA waypoint is displayed in small characters. Required time of arrival entered manually is displayed in large font.

DIS (2R): Along track distance from present position to the RTA waypoint.

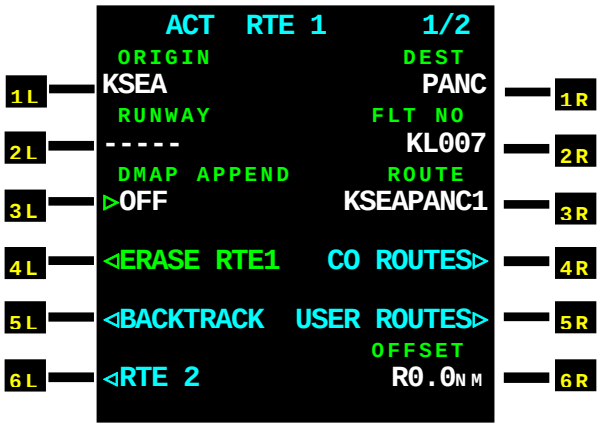
RTE x 1/X

Access RTE 1 1/X page by either pressing [RTE]; or
from POS INIT/REF 2/X page, <ROUTE>; or
from ARRIVALS 1/X page, <ROUTE>.or
from DEPARTURES page, <ROUTE> or
from USER ROUTES page, <ROUTE> or
from SELECT CO ROUTE page, <ROUTE> or
from SELECT CO ROUTE page, route name selected.

A. Page display of active RTE being modified:

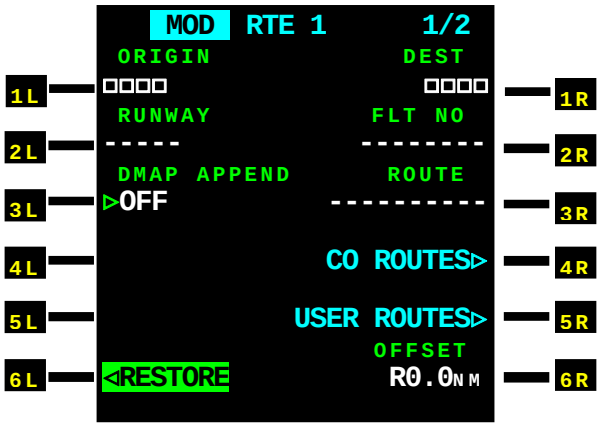


B. The following page is displayed when a user route or custom route is activated in DIRECT mode and executed, and aircraft is airborne (single CMA-9000 FMS installation):

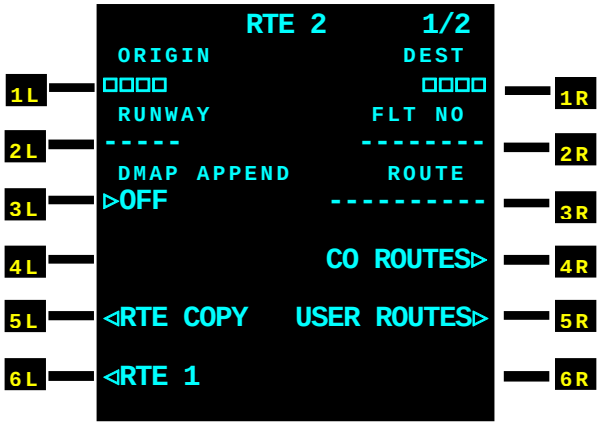


C. Page display when route activated and executed, and aircraft airborne (dual/triple CMA-9000 FMS installation):

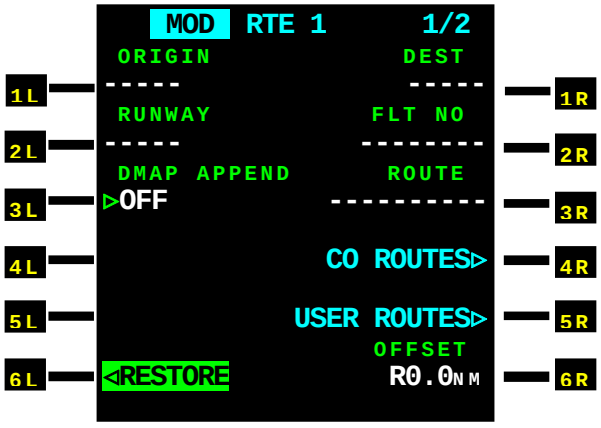
D. Page display after a DELETE (press [CLR] key) to the ORIGIN or ERASE RTE1 key is pressed:



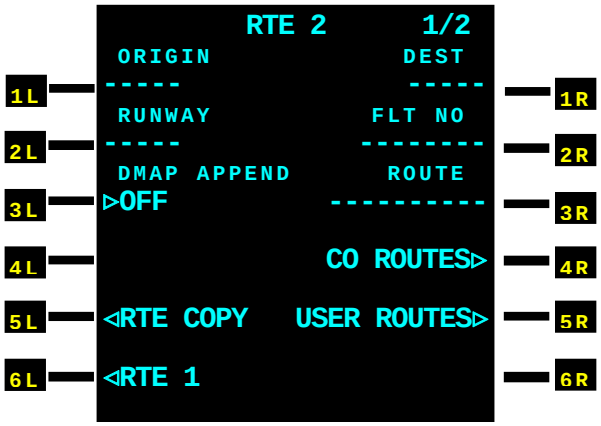
E. The inactive route (RTE 1 or RTE 2) is displayed in monochrome cyan to distinguish it from the active route (for FIX wing aircraft type configuration):



F. Page display after a DELETE of the ORIGIN or ERASE RTE1 key is pressed (for ROTOR aircraft type configuration):

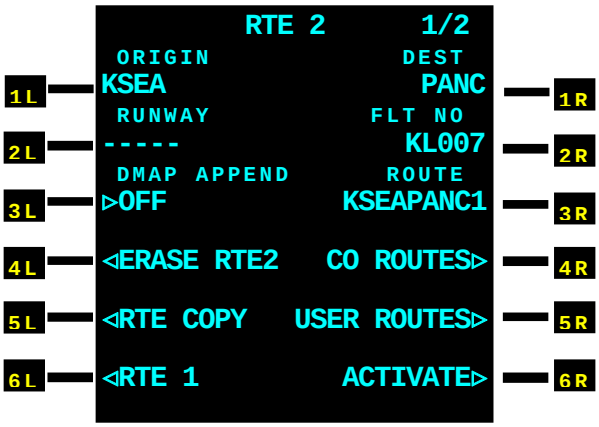


G. The inactive route (RTE 1 or RTE 2) is displayed in monochrome cyan to distinguish it from the active route (for ROTOR aircraft type configuration):

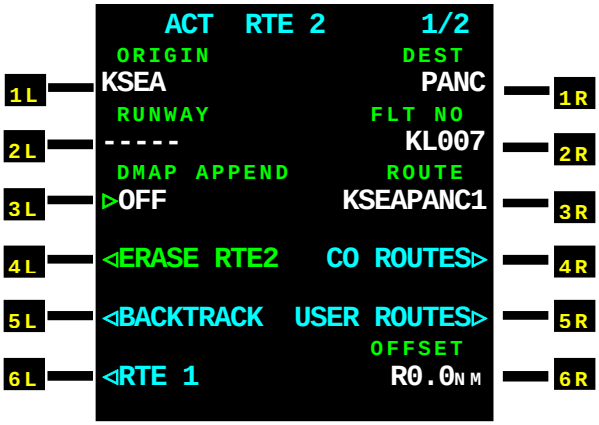


H. After performing a RTE COPY or any edit, the CANCEL/CONFIRM prompts are displayed:

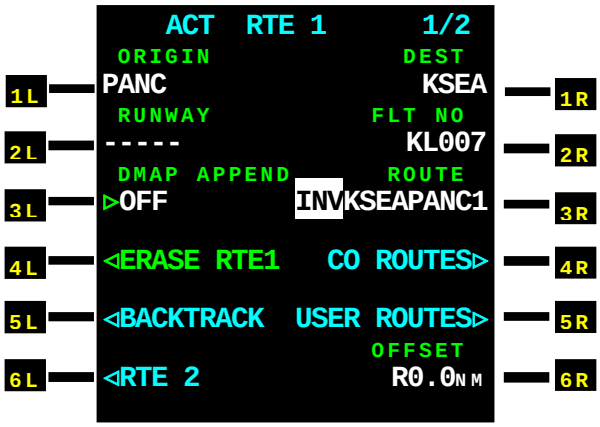
I. Page display after selecting CONFIRM (in a single CMA-9000 FMS configuration):



J. Page display after performing a RTE 2 <ACTIVATE> from the RTE2 page and [EXEC] key pressed. When RTE 2 is activated the Backtrack route will begin appending en-route waypoints from the new route as they are flown past. In this way when <BACKTRACK> is pressed some time later the Backtrack Route loaded in the MOD RTE will contain RTE 1 waypoints from the initial origin until RTE 2 was activated and RTE 2 waypoints from there on:



K. The following page is displayed when a user route or custom route is activated in INVERSE mode and executed, and aircraft is airborne:



L. The following page is displayed when a user route or custom route is appended to an active route in INVERSE mode and executed:

M. The following page is displayed when a user route or custom route is appended to an inactive route in INVERSE mode and executed:

ORIGIN [1L]: Used for entry and/or display of the origin identifier (any navigation database, user database, digital map, temporary waypoint and position if configured for tactical approach). Entry or re-entry, or deletion clears any existing route. Following entry, selections can be made on the ARRIVALS page for the origin, in case the origin is an airport. For the active route, deletion erases all waypoints from the modified route and triggers the RESTORE prompt. For the inactive route, deletion erases all waypoints from the inactive route and triggers the CANCEL and CONFIRM prompts. Entry of an origin is mandatory for FIX wing aircraft configuration but is not for ROTOR.

DEST [1R]: Used for entry and/or display of the destination identifier (any navigation database, user database, digital map, temporary waypoint and position if configured for tactical approach). Entry or re-entry clears arrival procedures of the previous destination. Following entry, selections can be made on the ARRIVALS page for the destination, in case the destination is an airport. Entry of a destination is mandatory for FIX wing aircraft configuration but is not for ROTOR.
A new destination entry after all arrivals/approaches have been completely sequenced will cause the arrival/approach procedural attributes of the procedural waypoints to be cleared; the overflown procedural waypoints will consequently assume the form of enroute waypoints and consequently no enroute waypoints downpath will be deleted from the flight plan.

RUNWAY [2L]: Runway entry. Valid entries are origin airport runways. Line may be selected via DEPARTURE page. Deleted upon reaching first waypoint.

FLT NO [2R]: Flight number. Displays entered company flight number. Displays dashes until valid flight number is entered. Valid flight number may only be alphanumeric and up to 8 characters long.

NOTE: When the M425 IFF is configured, the flight ID seen on this page corresponds to the flight number as seen on the IFF page, e.g. changing this field changes the value seen on the IFF page, and vice-versa.

DMAP APPEND [3L]: This prompt appears only if DMAP ELBIT, EURONAV or EURONAV_A702 type is configured. Pressing this key toggles the DMAP append mode On/Off. If the DMAP append mode is ON, and a valid DMAP waypoint is received from the DMAP unit, and the DMAP waypoint was successfully stored in the DMAP Reserved waypoint List, then the received DMAP waypoint is appended to the end of the route, or before the first encountered discontinuity. If an inactive route page is being displayed, then the DMAP waypoint is included in the inactive route.

ROUTE [3R]: Enter Custom Route or User Route (name) and press [EXEC] key.
- Custom Route Name displayed when route has been loaded using USER ROUTES or SELECT CO ROUTE pages.
- Custom Route Name or User Route name entered by the operator and executed with the [EXEC] key.

ERASE RTEx [4L]: Erases the current displayed non-empty route (active or inactive – e.g. origin, destination and all waypoints on the LEGS page). This option is only displayed when the displayed route is not empty and when the CMA-9000 FMS is configured for single mode of operation.

NOTE: RTEx corresponds to RTE1 or RTE2 depending on which route is being displayed.

For the active route:
- When LSK 4L is selected, the active route is erased, the route status becomes MOD and RESTORE is displayed at LSK 6L to allow the user to undo the erase operation. Pressing RESTORE returns to the previous active route. Pressing the EXEC key accepts the erase operation (active route becomes empty).

For the inactive route:
- When LSK 4L is selected, the inactive route is erased, CANCEL is displayed at LSK 6L and CONFIRM is displayed at LSK 6R. Pressing CANCEL returns to the previous inactive route. Pressing CONFIRM accepts the erase operation (inactive route becomes empty).

RTE XFILL [4L]: This prompt appears only in independent mode of operation. Key press transfers the active route to the off-side FMSs. Press [EXEC] key on the off-side FMSs to activate transferred route. This prompt disappears when using this key to cross-fill the route to the off-side FMS and reappears if the route is modified on one of the CMA-9000 FMSs.

CO ROUTES [4R]: Access to SELECT CO ROUTE 1/X page

RTE COPY [5L]: Displayed only on an inactive route page and when at least one waypoint is present in the active route. Key press copies active route onto inactive route.

BACKTRACK [5L]: Pressing this key will create a modified route containing:
- as a configurable item, the active TO waypoint followed by a discontinuity; then
- the waypoints of the backtrack route at the moment the key was pressed.

The MOD RTE x LEGS page will be displayed. As for any route modification, the backtrack route may then be modified and executed. This key is only available on the active route page.

USER ROUTES [5R]: Access to USER ROUTES 1/1 page.

RTE 1 [6L]: Access to RTE 1 1/X page

RTE 2 [6L]: Access to RTE 2 1/X page

ERASE [6L]: Displayed only when a route modification is in progress. Pressing this key will undo all changes to the route and return to the ACT Route status. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL and CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed only when the route's origin is deleted in flight or on ground or when the erase active route key is pressed. It will cause a return to the previous route and ACT RTE status.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

OFFSET [6R]: This prompt appears only if the "OFFSET" display element is configured. To initiate offset (parallel track) navigation enter lateral offset (L99.9-R99.9) and press [EXEC]. Maximum desired lateral offset distance left or right of course is 99.9 nm. Entry is allowed only in flight if the path to the active waypoint is a track to fix leg or a Direct-To; and not part of an approach procedure; and not terminated by an outbound leg of type Search or Hold; and; not part of an active CARP procedure. Entry of 0 or performing a [CLR] key will cancel the offset. The default OFFSET display when an offset has not been entered or after a cancellation will be R0.0.

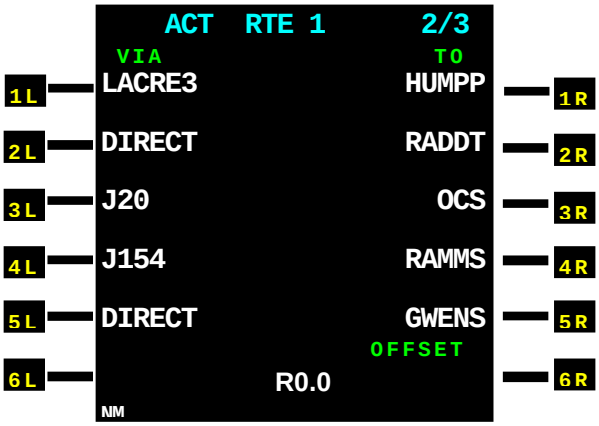
ACTIVATE [6R]: Prompt displayed only when route is not active and at least one waypoint is present in the inactive route. Key press will cause the EXEC key to illuminate. This function is rejected when a moving waypoint is present in the active route.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

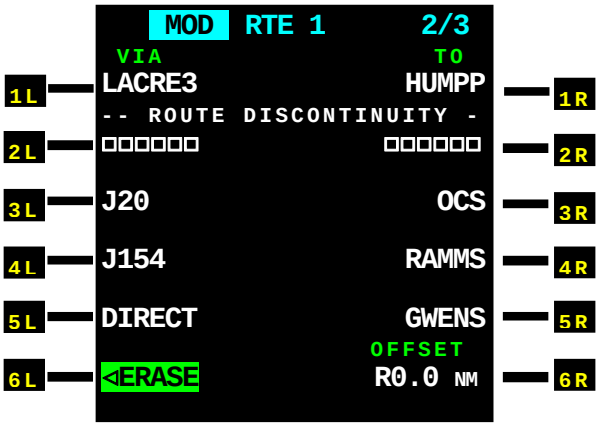
RTE x 2/X

Access RTE x 2/X page by either pressing [RTE], [NEXT]; or
from POS INIT/REF 2/X page, <ROUTE>, [NEXT]; or
from ARRIVALS 1/X page, <ROUTE>, [NEXT], or
from DEPARTURES 1/X page, <ROUTE>, [NEXT], or
from USER ROUTES 1/X page, <ROUTE>, [NEXT], or
SELECT CO ROUTE 1/X page, <ROUTE>, [NEXT].

A. Page displayed of an Active route:

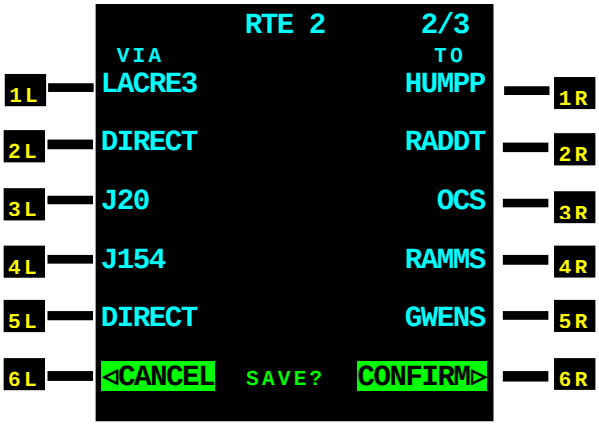


B. Active route during modification:



C. Inactive route page before editing:

D. Inactive route during modification:



VIA [1L to 5L]: Via lines:

- Valid entries are DIRECT or an airway identifier only.
- Procedure names automatically appear when selected on the DEPARTURE or ARRIVAL pages.
- Defaults to direct if no entry is made.
- Entry of an airway with the previous or next TO entry not on that airway is invalid.
- Entry of an airway on the first via line initiates an airway intercept. Boxes will appear in the first TO line;
- Entering a waypoint in the boxes will cause the first VIA line to be dashed, and pushes the airway and TO waypoint down to the next line. The first fix on the airway that is closest to being abeam of the aircraft is displayed on the first TO line.
- Subsequent entry of an airway determines the intersection waypoint.
- If the waypoint is unnamed, a waypoint is created in latitude/longitude, identified by an X followed by the entered airway name (e.g. XJ532).
- CARP procedures show "CARP" in the VIA field. CARP procedures can not be defined on the RTE 2/2 page.
- Approach transition show "APPR TRANS" in the VIA field when selected from the DEPARTURE or ARRIVAL pages.
- Missed approach show "MISSED APPR" in the VIA field when selected from the DEPARTURE or ARRIVAL pages.

TO [1R to 5R]: To waypoints:

- Valid entries are published waypoints, VHF navaids, runways, and ICAO airport identifiers.
- Valid created waypoint types are: Place-Bearing-Distance (PBD), Lat/Long and Place-Bearing-Place-Bearing (PB-PB).
- Waypoint on airway.
- Seven (7) character waypoint identifier for oceanic latitude/longitude waypoints.
- CARP procedures show the "ESC01" waypoint in the TO field. It is not allowed to define a CARP procedure on the RTE 2/2 page. Pressing this key with the CARP procedure "ESC01" waypoint ID displayed and an empty scratchpad brings "CRP01" in the scratchpad.

RTE 1 [6L]: Access to RTE 1 1/X page

RTE 2 [6L]: Access to RTE 2 1/X page

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route.

ERASE [6L]: Displayed only when a route modification is in progress. Pressing ERASE (LSK 6L) will undo all changes to the route and return to the ACT Route status. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed (in amber) only when the route's origin is deleted in RTE 1/X page. Used to restore the active route.

ACTIVATE [6R]: Displayed only when route is not active. Key pressed will cause the EXEC key to illuminate.

OFFSET [6R]: Displayed only when in flight or en-route. To initiate offset (parallel track) navigation enter lateral offset (L99.9-R99.9) and press [EXEC]. Maximum desired lateral offset distance left or right of course is 99.9 nm. Entry is allowed only in flight if the path to the active waypoint is a track to fix leg or a Direct-To; and not part of an approach procedure; and not terminated by an outbound leg of type Search or Hold; and not part of an active CARP procedure. Entry of 0 or performing a [CLR] key will cancel the offset. The default OFFSET display when an offset has not been entered or after a cancellation will be R0.0.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

RTE x LADDER 1/1

Display RTE x LADDER 1/1 page by pressing [INIT REF], <DES+SAR> or <TACTICAL>, and <LADDER> (active route) or [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <LADDER> (inactive route) or [LEGS], "/S" in the scratchpad entered next to the Search waypoint already defined as a Ladder pattern. Or [TACT], <LADDER> {if TACT key configured and LADDER configured on the TACTICAL page}.

Automatically accessed whenever a route is executed when a search pattern that has not been activated is present in the modified route. The displayed SAR page is selected in the following order of priority:

- the current page, if already in a SAR page; or
- the last modified SAR page; or
- the last selected SAR page from DES+SAR or TACTICAL page.

NOTE: Each pressing of the [NEXT]/[PREVIOUS] key will cause the display of the three search pattern pages: SQUARE, SECTOR, or LADDER.

Listed below are the different ways to create a search pattern waypoint if no search pattern was already defined in the route:

A. Search Pattern at a Route Waypoint – Active Route & modified Active Route only:
   1. Enter "/S" or a valid waypoint identifier followed by "/S" in the scratchpad.
   2. Display the desired waypoint location in the route by pressing [LEGS] (and [NEXT] as desired) and press the appropriate LSK to append the "/S" to the desired waypoint or to enter the waypoint followed by "/S" into the route (MOD RTE X SQUARE 1/1 page is displayed).
   3. Using [NEXT] or [PREV] keys, select the desired Search pattern page: RTE X SQUARE 1/1, RTE X SECTOR 1/1 or RTE X LADDER 1/1.
   4. Enter desired Search parameters.
   5. Press <ACTIVATE> softkey to store the desired Search parameters into the Search route waypoint record.
   6. Arm the search by pressing EXEC.

B. Search Pattern Waypoint Created from SAR Pages (e.g. Off-Route Waypoint) – Active Route & modified Active Route only:
   1. Display RTE X SQUARE 1/1, RTE X LADDER 1/1 or RTE X SECTOR 1/1 by pressing [INIT REF], <DES+SAR> or <TACTICAL>, <SQUARE> or <LADDER> or <SECTOR>.
   2. Enter a valid waypoint identifier in ID [LSK 1L] field or REF ID [LSK 2L] field.
   3. Enter desired Search parameters.
   4. Press <ACTIVATE> softkey to create a Search pattern waypoint with the desired Search parameters into the MOD route.
   5. Arm the search by pressing EXEC.

C. Search Pattern at the Present Position (A/C must be Airborne) – Active Route & modified Active Route only:
   1. Display RTE X SQUARE 1/1, RTE X SECTOR 1/1 or RTE X LADDER 1/1 by pressing [INIT REF], <DES+SAR> or <TACTICAL>, <SQUARE> or <LADDER> or <SECTOR>.
   2. Select the present position search mode by pressing <PPOS> at [LSK 5L].
   3. Enter desired Search parameters.
   4. Press <ACTIVATE> softkey to store the desired Search parameters into the Search route waypoint record.
   5. Initiate an immediate search at present position by pressing EXEC.

D. Search Pattern at a Route Waypoint – Inactive Route & modified Inactive Route only:
   1. Enter "/S" or a valid waypoint identifier followed by "/S" in the scratchpad.
   2. Display the desired waypoint location in the route by pressing [LEGS] (and [NEXT] as desired) and press the appropriate LSK to append the "/S" to the desired waypoint or to enter the waypoint followed by "/S" into the route (RTE X SQUARE 1/1 page is displayed).
   3. Using [NEXT] or [PREV] keys, select the desired Search pattern page: RTE X SQUARE 1/1, RTE X SECTOR 1/1 or RTE X LADDER 1/1.
   4. Enter desired Search parameters.
   5. Press <CONFIRM> softkey to store the desired Search parameters into the Search route waypoint record and confirm the modifications to the inactive route.

E. Search Pattern Waypoint Created from SAR Pages (e.g. Off-Route Waypoint) – Inactive Route & modified Inactive Route only:
   1. Display RTE X SQUARE 1/1, RTE X LADDER 1/1 or RTE X SECTOR 1/1 by pressing [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], <SQUARE> or <LADDER> or <SECTOR>
   2. Enter a valid waypoint identifier in ID [LSK 1L] field or REF ID [LSK 2L] field.
   3. Enter desired Search parameters.
   4. Press <CONFIRM> softkey to create a Search pattern waypoint with the desired Search parameters into the inactive route. Any other modification in the modified inactive route is confirmed at the same time.

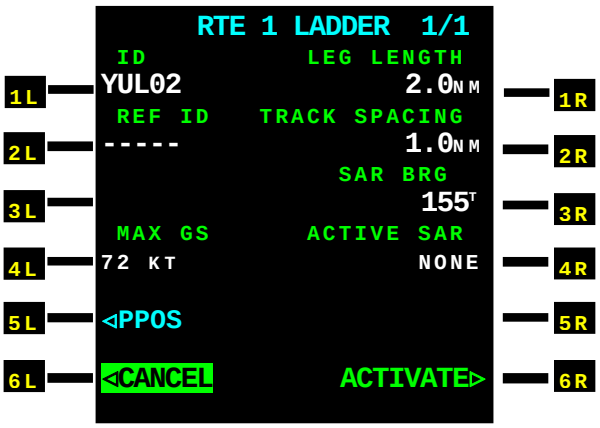
To define a new search pattern or a search pattern at present position, it is necessary to delete any previous search pattern.

To cancel an active search pattern, it is necessary to perform a direct-to procedure to any waypoint or to land the aircraft.

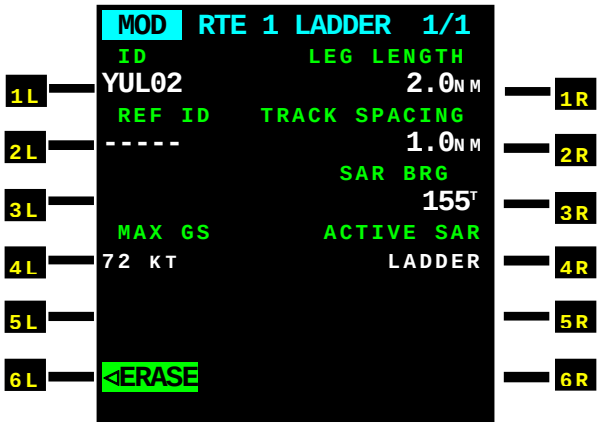
To delete an inactive search pattern, type '/' in the scratchpad, then press the softkey corresponding to the search anchor waypoint.

NOTE: The parameters of the inactive SAR may be lost if not confirmed before a page change is performed.

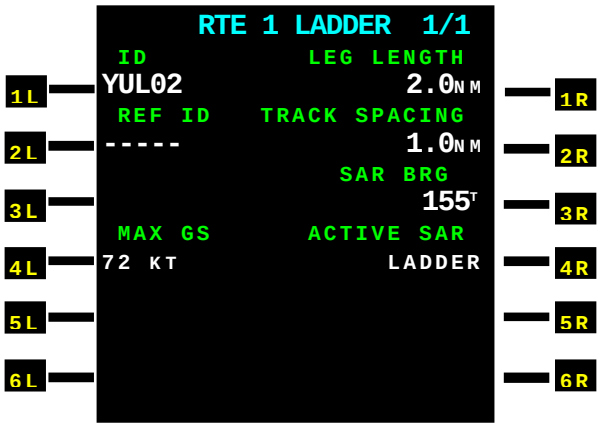
F. Creating a LADDER SAR from the Active route LADDER 1/1 page (before pressing <ACTIVATE> (LSK 6R), before pressing [EXEC]):



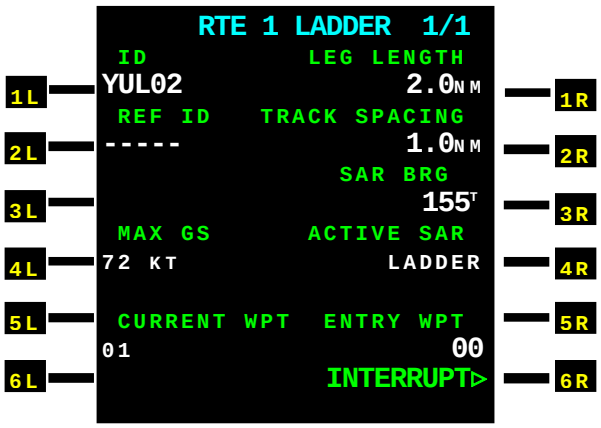
G. LADDER SAR from the Active route LADDER 1/1 page (after pressing <ACTIVATE> (LSK 6R), before pressing [EXEC]):



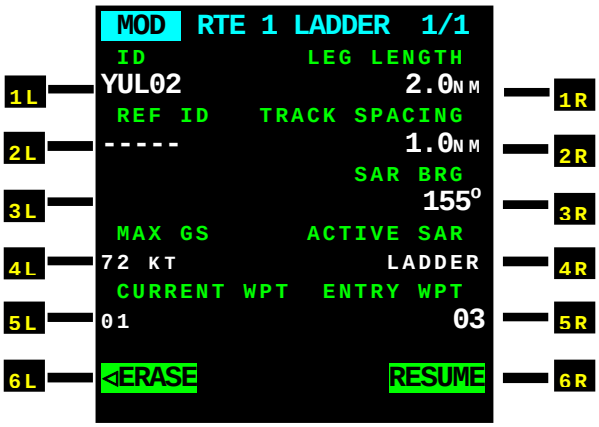
H. LADDER SAR from the Active route LADDER 1/1 page (after pressing [EXEC]):



I. When LADDER SAR is in progress in the Active route LADDER 1/1 page:

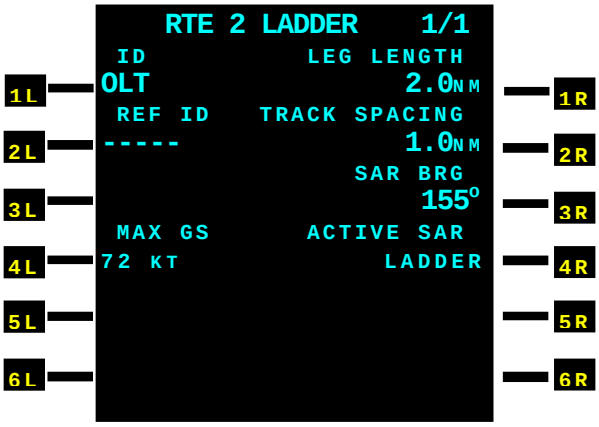


J. Resuming a LADDER SAR from the Active route RTE x LADDER 1/1 page (before pressing [EXEC]):



K. When inserting or modifying a LADDER SAR from the Inactive route LADDER 1/1 page:

L. LADDER SAR from the Inactive route LADDER 1/1 page (after pressing CONFIRM)



ACT/MOD/blank(STATUS): MOD indicates the search is not being executed. ACT indicates that the search pattern is being executed. "blank" indicates an executed search fix has not been reached or the search pattern for the inactive route is being displayed.

ID [1L]: Name of starting search pattern waypoint. If a search pattern waypoint is defined in route, its identifier is displayed in the field and it cannot be overwritten. Otherwise, waypoint entries are allowed, except for moving waypoint, and the entered identifier is displayed, if any. If no entries were made to both ID & REF ID fields, 5 boxes " " are displayed. Else, if an entry was made in REF ID field, 5 dashes "-----" are displayed.

NOTE: When a new ID is entered, the operator should clear the relative bearing and distance data field relative to the previous ID by pressing [NEXT] then [PREV].

REF ID [2L]: Name of waypoint considered to be a reference for the relative bearing/distance elements entered in the fields 3L and 4L. If a search pattern waypoint is defined in the route, the field is filled with 5 dashes "-----" and no entry is allowed. Otherwise, entries are allowed and the entered identifier is displayed, if any. If no entries were made to both ID & REF ID fields, 5 boxes " " are displayed. Else, if an entry was made in ID field, 5 dashes "-----" are displayed.

LEG LENGTH [1R]: Value of the leg length (between 0.1 and 40 nm). The parameter is kept in non-volatile memory (NVM) and its initial default value is 2.0 nm. Subsequent change of the parameter value, validated by pressing the <ACTIVATE> softkey followed by the EXEC key, will become the new default value kept in non-volatile memory (NVM). This default value is preserved even after a cold-start.

RELATIVE BRG [3L]: The relative bearing of the search pattern entry waypoint compared to the reference REF ID. This field is displayed as long as REF ID contains an entry (000^T True or 000° Magnetic is the default value).

TRACK SPACING [2R]: Value of the width length (between 0.1 and 40 nm). The parameter is kept in NVM and its initial default value is 1.0 nm. Subsequent change of the parameter value, validated by pressing the <ACTIVATE> softkey followed by the EXEC key, will become the new default value kept in NVM. This default value is preserved even after a cold-start.

SAR BRG [3R]: Value of the bearing (TRUE or MAG) of the first leg in the Search pattern (000^T or 000° is the default value).

DISTANCE [4L]: The distance of the search pattern entry waypoint from the reference REF ID. This field is displayed as long as REF ID contains an entry and the displayed default value is 10.0 nm. Minimum and maximum valid values are 0.1 nm and 99.9 nm respectively.

MAX GS (4L): The maximum Ground Speed required to fly the pattern without overshoot. This field is displayed only after a valid waypoint identifier has been entered, and is mutually exclusive with the DISTANCE field.
This maximum ground speed is re-computed every time a modification is performed on the search parameters (track spacing, leg length, diameter or angle).

ACTIVE SAR [4R]: Type of the active search pattern present in the flight plan. When there is no active search pattern "none" is displayed.

PPOS [5L]: The search pattern is started at the present position. Toggles between PPOS and CURRENT WPT # (displayed only after the search pattern is active). The PPOS prompt becomes available only for active route in the air and if the active route does not contain another search pattern waypoint.

CURRENT WPT (5L): Number of the search waypoint towards which the aircraft flies. Displayed only for a search pattern waypoint in progress and only on the Search page of the selected pattern. The field value increases as the aircraft overflies the search waypoints. The range of values for this field is:

- [02->80] if an EFIS of type IFDS is configured;
- [01->79] for all other EFIS types.

ENTRY WPT [5R]: Number of the search pattern entry waypoint. Displayed only for a search pattern waypoint in progress and only on the search page of the selected pattern. The field value remains fixed but can be modified manually by first interrupting (via INTERRUPT prompt) the search pattern and then resuming it (via RESUME prompt) at a new ENTRY WPT value. At the beginning of a new search, the value of this field goes back to its default value:

- 01 if an EFIS of type IFDS is configured;
- 00 for all other EFIS types.

The allowed range of input values for this field is:

- [02->80] if an EFIS of type IFDS is configured;
- [01->79] for all other EFIS types.

ERASE [6L]: Cancel the changes made to the modified active route. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL and CONFIRM prompts on line select keys 6L and 6R respectively.

CANCEL [6L]: Erase all the fields and sets the Search parameters back to their default values. For the inactive route only, it will also cancel the modifications made to the inactive route and will command display of LEGS page, if the cancellation follows modifications to the inactive route.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

RESTORE [6L]: Is displayed only if the route was erased on the RTE 1/X page. Used to restore the active route.

NOTE: CANCEL appears when NOT in modified and when the ACTIVATE key is present (e.g. Search pattern parameters are entered in the SAR page but no Search pattern waypoint defined in route yet).

ACTIVATE/INTERRUPT/RESUME/CONFIRM [6R]:

- ACTIVATE is displayed (in green) only when the pattern is not active in the active route or the modified active route. It creates the Search pattern waypoint into the modified active route, if no search pattern waypoint already exists. Otherwise, it is used to confirm further modifications to the search pattern waypoint. Once the search pattern waypoint is activated but not in progress yet, the search pattern parameters can be modified at will (TRACK SPACING, LEG LENGTH, DIAMETER, ANGLE, TRUE BRG, ENTRY WPT #) causing CANCEL/ERASE/ACTIVATE prompts to reappear every time a parameter is modified. If the search procedure is created using the Search menu ([INIT REF], <DES+SAR> or <TACTICAL>, <SQUARE> or <LADDER> or <SECTOR>, ACTIVATE enters the search waypoint as the first waypoint in the flight plan (followed by a discontinuity and the rest of the waypoints). If the search procedure is created using "/S" on the LEGS page, the <ACTIVATE> softkey updates the search pattern waypoint parameters.
- INTERRUPT is used to initiate an interruption of the Search pattern. When the INTERRUPT LSK is pressed, its color changes from green to inverse green, the active search pattern becomes a modified one, and the EXEC lamp illuminates. The current waypoint field freezes to the number of the last TO search waypoint and the CMA-9000 FMS disables the steering command (upon EXEC key press).
- RESUME is used when an interrupted SAR pattern needs to be restarted from a search waypoint entered in the ENTRY WPT field (LSK 5R). When the RESUME LSK is pressed, its color changes from green to inverse green, the EXEC lamp illuminates, and a value can be entered in the ENTRY WPT field (entry is permitted only after RESUME was pressed).

- For modified active route: CONFIRM is displayed if ERASE MODS is configured as CONFIRM. For modified inactive route: CONFIRM is used to confirm the changes made to the inactive route. However, when it is displayed following the creation of a search pattern waypoint into the modified inactive route or following modifications to the search parameters in the inactive route, then pressing the CONFIRM prompt will confirm the changes made to the search pattern and other changes made to the inactive route (same functionality as the ACTIVATE prompt for the active route & modified active route).

NOTES:

- *The INTERRUPT/RESUME keys is displayed only on the search pattern page corresponding to the executed pattern (e.g. if a LADDER pattern was executed, INTERRUPT/RESUME appears only on the LADDER pattern page).*
- *Using the [NEXT]/[PREV] keys on one of the search pattern pages causes selection of the next/previous search pattern page respective of the following order: SQUARE, SECTOR, LADDER.*
- *Re-entry into the pattern using RESUME is not permitted on the search origin, e.g. ENTRY WPT cannot be equal to:*
- *01 if an EFIS of type IFDS is configured*
- *00 for all other EFIS types*
- *Pressing the <ACTIVATE> prompt, while valid entries exist for REF ID, RELATIVE BRG & DISTANCE fields, will cause the creation of a Search pattern waypoint located at the position of the REF ID waypoint offset by the BRG/DIS elements. A new waypoint identifier will be created and displayed in the ID field. The REF ID field will be filled with dashes and the RELATIVE BRG & DIST fields (title and data) will disappear.*
- *Entering a valid waypoint identifier in the ID field, while valid entries already exist for REF ID, RELATIVE BRG and DISTANCE fields, will cause the REF ID field to be filled with dashes and the RELATIVE BRG and DISTANCE fields (title and data) to disappear.*

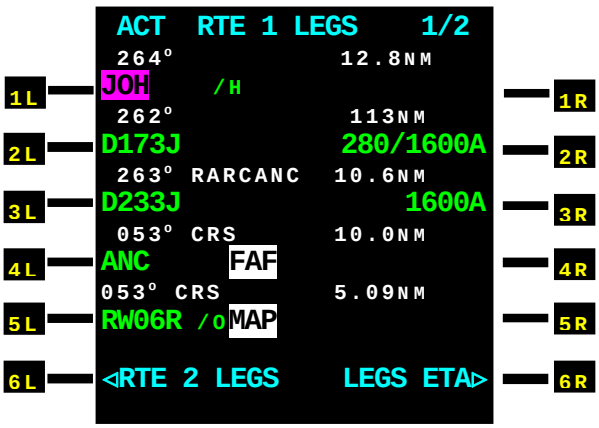
RTE x LEGS 1/X

The RTE x LEGS page is used to display and modify the active flight plan. Waypoints can be created, inserted and deleted. This also applies to approach procedure waypoints preceeding the missed approach point (MAP). A holding pattern can be defined on any waypoint. Waypoints can be converted from fly-by (with turn anticipation) to fly-over (no turn anticipation). Exceptions to this are moving waypoints, which can be only fly-over. Moving waypoints may also be inserted or removed from the flight plan; however, no procedures may be attached. The seven illustrations below demonstrate the different display formats this page may have depending on the function being performed.

When a DMAP waypoint is received and the DMAP Append mode is ON, the LEGS page containing the appended waypoint is displayed {ELBIT, EURONAV , EURONAV_A702 or DMAP configuration only}.

Display ACT RTE LEGS 1/X page by pressing [LEGS].

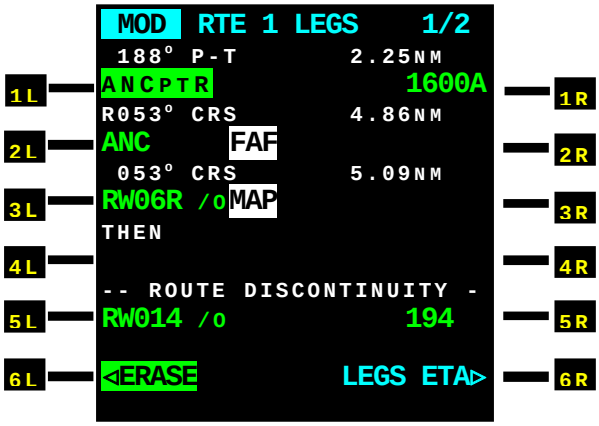
A. Normal ACTIVE format:



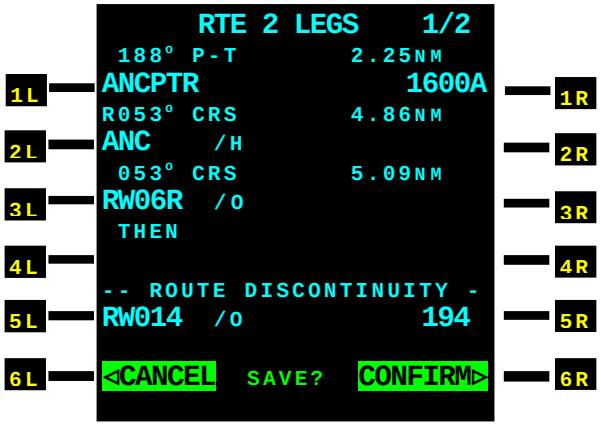
B. Active route with Route Discontinuity:

C. Inactive route with Discontinuity:

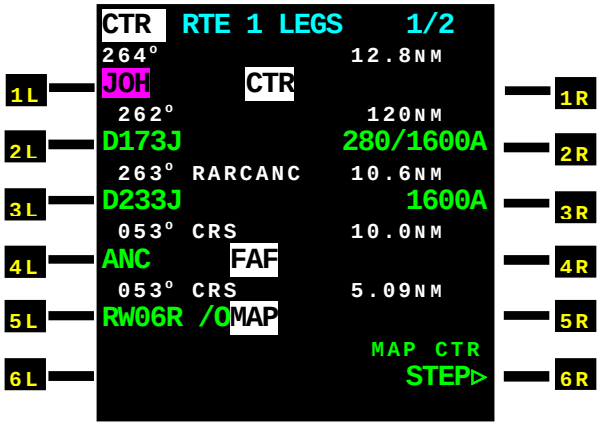
D. Route modification in progress:



E. Inactive route modification in progress:

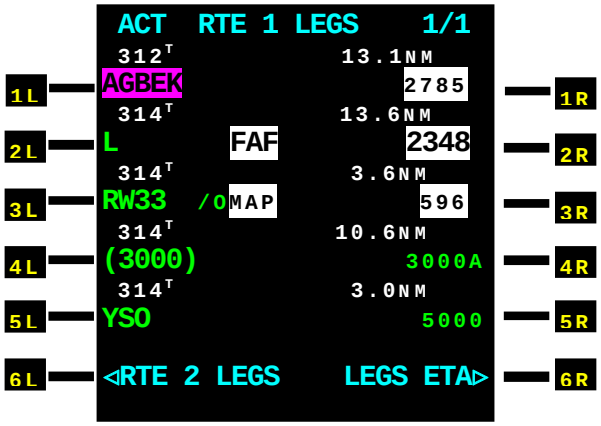


F. LEGS page in PLAN mode:

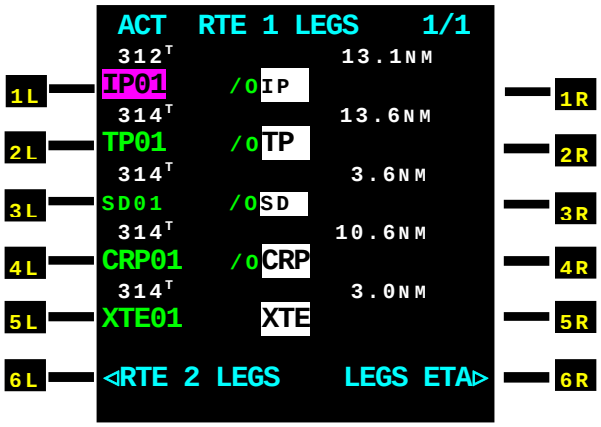


G. Active route erased:

H. Normal Active page with Temperature compensated altitudes:



I. Normal ACTIVE page with CARP procedure:



ACT/MOD/CTR(title): ACT: Displaying active route legs.
MOD: Displaying modified route legs.
CTR: EFIS center step mode active.

PAGE NUMBER (title): Number of available LEGS pages. The Active TO waypoint is located on the first page: RTE LEGS 1/X.

LEG COURSE: For the active waypoint: Present course/heading to be flown. For all downtrack waypoints: 1) Initial course for that leg. 2) Stored procedural course. 3) Stored procedural heading (Heading have the suffix HDG). Courses and headings are magnetic (°) or true course (T) based on configuration. Field is blank if the leg direction is undefined (e.g. for a route discontinuity).

LEG DISTANCE: For the active waypoint: Distance to go from present position to the waypoint.

NOTE: For vectors and altitude legs: Blank. For the next (upcoming) leg: Flight plan leg distance.

WAYPOINT IDENTIFIER [1L, 2L, 3L, 4L, 5L]: Up to 7 characters (5 characters if Tactical Approach is configured). Used for entry and/or display of any valid waypoint identifier. Valid entries are: Identifier, Latitude Longitude, Place/Bearing/Distance, Place/Bearing-Place/ Bearing and Along Track Distance. The active waypoint identifier is displayed on top of RTE LEGS 1/X page in reverse video (black on white or black on magenta, or magenta), depending on the installation. The active waypoint cannot be deleted but may be overwritten. Conditional waypoints cannot be manually entered. They appear as a result of procedure selection via the DEPARTURES and/or ARRIVALS pages.
If CARP is configured and CRP01/C is entered manually, the waypoints of the CARP procedure (TP, SD, CRP, XTE, and ESC), except IP, are immediately inserted in the LEGS page and the CARP PLAN 1/3 page is displayed. If an identifier followed by /C is entered, the waypoints of the CARP procedure (TP, SD, CRP, XTE, and ESC), except IP, are immediately inserted in the LEGS page and the CARP PLAN 1/3 page is displayed with the waypoint identifier as PI. IP is only shown in the LEGS pages once it is defined in the CARP PLAN 1/3 page. The CARP procedure waypoints (IP, TP, SD, CRP, XTE, and ESC) are an indivisible group, with no possibility of removal of a single waypoint or insertion of a waypoint in between. Pressing the LSK of any CARP procedure waypoint when the scratchpad is empty brings "CRP01" to the scratchpad.

WAYPOINT PROCEDURE [1L, 2L, 3L, 4L, 5L]: Slash symbol legends indicate a special procedure is associated with a waypoint: "/H" for holding pattern procedure at waypoint, "/O" for overfly waypoint, "/S" for search waypoint, "/C" for CARP procedures, "/T" for tactical direct-to, "/A" for tactical approach runway threshold waypoints. Procedures are cancelled by entering "/" into the scratchpad and pressing the appropriate LSK.
Entering /C over any CARP procedure waypoint displays the CARP PLAN 1/3 page. Entering /C over any other existing waypoint in the flight plan is not allowed. Entering / over any CARP procedure waypoint removes the CARP procedure and CRP01 waypoint from the flight plan. From the point of view of the following operations, the CARP procedure waypoints are an indivisible group and are treated as one waypoint (e.g. the operation on any waypoint in the procedure produces the same effect as if the procedure was one waypoint): "DELETE", close-up of a down path waypoint, insertion of an off-route waypoint. If a CARP procedure is being flown and some of its points are sequenced, then a direct-to operation deletes the CARP procedure from the flight plan.
If Tactical Approach is present in the flight plan, the following 3 methods can be used to delete the tactical approach from the flight plan:

- Entering a forward slash / in the scratchpad and inserting this at the LSK location next to the tactical approach runway threshold waypoint (e.g. MAP waypoint) in the flight plan (provided none of the tactical approach procedure related waypoints is currently an active waypoint)
- Closing out a route. This will completely remove all 3 tactical approach waypoints.
- Selecting a new destination.

NOTE: That the last item above will not generate any scratchpad message indicating that an approach already exists in the flight plan. The rationale for this that the crew would be well aware of their intent to enter a new destination and as such would be no different in philosophy than them selecting a destination to a new civil destination (e.g. any approach existing in the flight plan would automatically be deleted).

SPEED CONSTRAINTS (or RESTRICTIONS) [1R, 2R, 3R, 4R, 5R]: Display of mandatory speed in knots (coming from the Navigation Database or pilot-entered) at the waypoint identified on the same line. Speed constraints require an altitude constraint at same waypoint. Speed constraints may be manually entered, modified and deleted (1 to 999 Knots).
The speed/altitude constraints extracted from the navigation database are displayed in small font.
The field to scratchpad transfer of speed constraint is rejected.

ALTITUDE CONSTRAINTS (or RESTRICTIONS) [1R, 2R, 3R, 4R, 5R]: Display of mandatory altitude - constraints (coming from the Navigation Database or pilot-entered) in one of the following ways:

- The suffix A identifies a crossing restriction at or above the displayed value (example display A: 1600A means cross D173J at or above 1600 feet).
- The suffix B identifies a crossing restriction at or below the displayed value (example display B: FL350B means cross YZP at or below flight level 350).
- Two flight level values separated by "-" identify an altitude window crossing restriction (example display B: 300-320 means cross N51W125 between flight levels 300 and 320).

The speed/altitude constraints extracted from the navigation database are displayed in small font.If the FMS is configured for VNAV, approach and approach transition waypoint altitude constraints are temperature-compensated, provided that destination airport temperature was entered on the VNAV page. Temperature-compensated altitudes constraints are displayed in reverse video white.

Altitude constraints may be manually entered, modified and deleted, given the following rules:

- Navigation Database constraints can never be deleted. They can only be modified. Deletion of pilot-entered constraint brings back the original constraint (if any) from the Navigation Database.
- For SIDS, approach, tactical approach (if configured), approach-transition and missed approach waypoints (except for altitude terminated legs), the pilot cannot enter an altitude restriction lower than the one from the Navigation Database or the one as determined by the tactical approach geometry computation if configured for tactical approaches.
- For altitude terminated legs, the altitude constraint cannot be modified. The range for constraint is from 1 to 65000 Feet.
- Entries of three digits or less are considered as a flight level unless the waypoint is part of the final approach, in which case all entries are interpreted in feet.
- Entries of four or five digits are considered to be an altitude in feet.
- Entries with a decimal point are rejected.

The field to scratchpad transfer of altitude constraints are rejected.

ROUTE TERMINATION: Dash prompts follow the last waypoint of the route.

ROUTE DISCONTINUITY: The route is not forming a continuous path of linked waypoints. A discontinuity will be inserted into the flight plan if the end of the leg is indeterminate. The route discontinuity can be removed by close up, e.g. by copying a waypoint following the discontinuity to a position preceding or on the discontinuity.

ERASE [6L]: Displayed only when a route modification is in progress. Used to erase modifications. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL and CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed only if the Route was erased on the RTE 1/X page. Used to restore the active route.

RTE 1 LEGS [6L]: Access to the RTE 1 LEGS 1/X page.

RTE 2 LEGS [6L]: Access to the RTE 2 LEGS 1/X page.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route.

LEGS ETA [6R]: Access to the corresponding RTE LEGS ETA Y/X page.

MAP CTR STEP [6R]: Prompt appears when EFIS CP is in PLAN mode. Used to move the center of the EFIS MAP display to the next waypoint in the flight plan.

INTC CRS XXX° [6R]: *Not shown.* Prompt appears on a Direct-To leg entry, except for a moving waypoint. A desired inbound course to the Direct-To Waypoint may be entered by keying the course into the scratchpad and pressing LSK 6R.

HOLD PPOS [6R]: *Not shown.* Prompt appears on pressing of HOLD key in flight. Used to define a Holding Pattern at present position. Access to the HOLD 1/X page.

MISSED APPR [6R]: *Not shown.* If configured for display, prompt appears during final GPS instrument approach with no route modification in progress. If the prompt is configured for display, pressing the line select key adjacent to the prompt, the FMS will automatically sequence the Missed Approach Point (MAP) to the missed approach procedure.

NEXT WPT [6R]: *Not shown.* Prompt is displayed when automatic waypoint sequencing is not possible. Examples include when the active leg is vector, or an altitude-terminated leg without a Baro-Corrected Altitude input. Pressing NEXT WPT results in an immediate transition of navigation and guidance to the next waypoint in the flight plan.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

FAF,MAP,CTR, MOV: FAF is displayed when the waypoint is defined as the Final Approach Fix. MAP is displayed when waypoint is defined as the Missed Approach Point. CTR also appears in the title when in MAP CTR STEP mode. MOV is displayed when the waypoint is a moving waypoint. All are displayed in reverse white color.

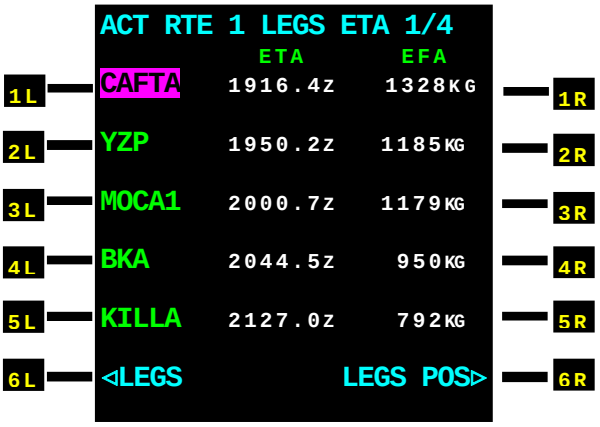
IP, TP, SD, CRP, XTE, ESC: CARP Procedure waypoint indications are displayed in reverse white.

RTE x LEGS ETA 1/X

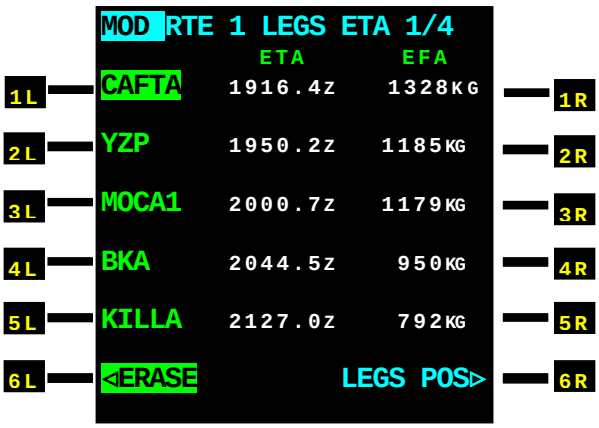
Provides the ETA and EFA for each waypoint on the corresponding RTE LEGS Y/X page.

Display ACT RTE LEGS ETA Y/X page by pressing [LEGS] and <LEGS ETA>.

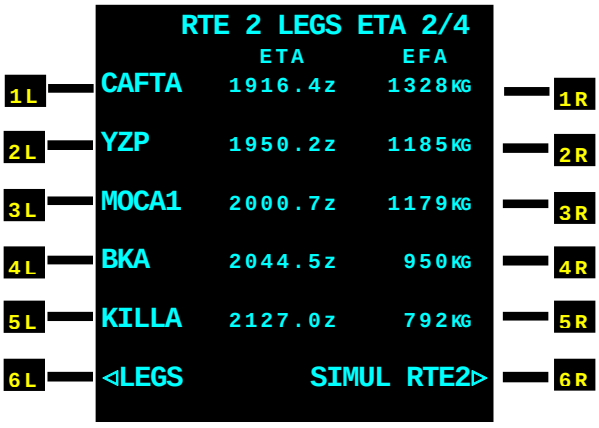
A. Normal ACTIVE format:



B. LEGS ETA during a MOD:

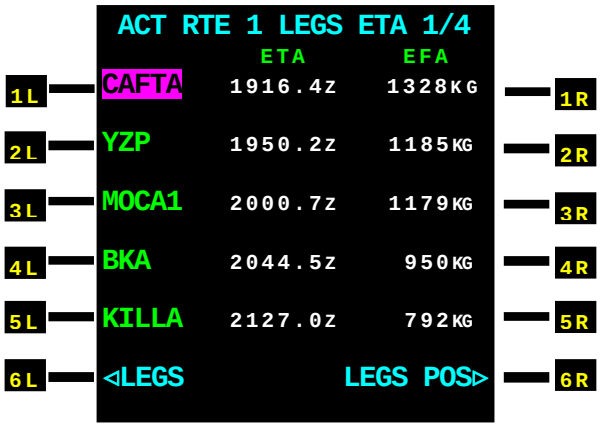


C. LEGS ETA Index of Inactive route:

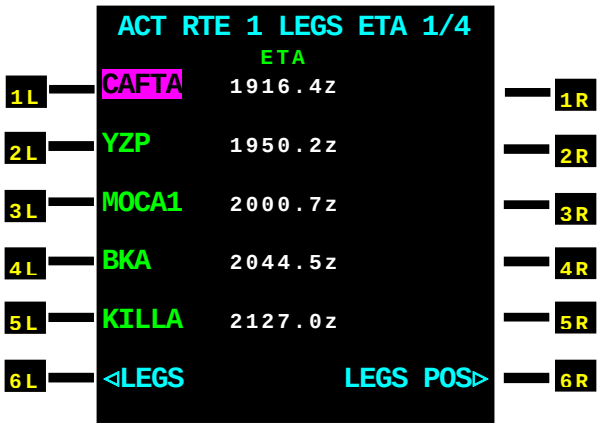


D. Active route erased:

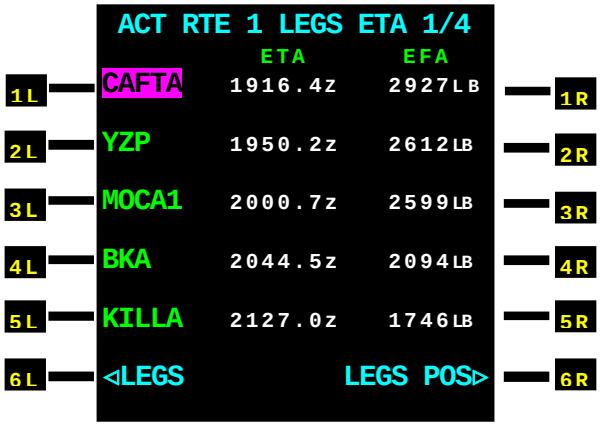
E. Active route restored:



F. Fuel page not configured:



G. Units configured to lbs using 5R prompt on FUEL page:



WAYPOINT IDENTIFIER [1L, 2L, 3L, 4L, 5L]: Displays the same identifiers as on the corresponding RTE LEGS Y/X page.

ETA (1L,2L,3L,4L,5L): Displays ETA of the waypoint identified on the same line. If a route discontinuity exists, subsequent ETAs are based on an assumed great circle course across the discontinuity.
On ground, TAS is set to zero hence ETA is blank.

NOTE: On ground, ETEs are displayed instead of ETAs if the PLAN DATA page is configured. If it is not configured, the field is blank.

LEGS [6L]: Returns to the corresponding RTE LEGS Y/X page. To display the RTE LEGS 1/X page and the active waypoint, press the LEGS function key.

ERASE [6L]: Erases route modifications (if any). If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL and CONFIRM prompts on line select keys 6L and 6R respectively.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancel the changes made to the inactive route.

RESTORE [6L]: Displayed only if the route was erased on the RTE 1/X page. Used to restore the active route.

EFA (1R, 2R, 3R, 4R, 5R): Estimated Fuel at Arrival. Estimated remaining Fuel quantity at waypoint based on the fuel consumption rate. If a route discontinuity exists, subsequent EFAs are based on an assumed great circle course across the discontinuity. Field is not displayed when fuel weight (excluding reserve) or fuel flow or true airspeed or wind are not available. For the active route, this field is not displayed if the FUEL page is not configured. For the inactive route, this field is not displayed if the FUEL page or Simulation pages are not configured. Units are toggled from the 5R field on the FUEL 1/2 page (units of kg or lb).

LEGS POS [6R]: Access to the corresponding RTE LEGS POS Y/X page. Display depends on the selected coordinates system and datum.

SIMUL RTEx [6R]: Access to the SIMUL RTEx 3/3 page (only available on the inactive route LEGS ETA page when the SIMULATION pages have been configured and when ACTIVATE has not been selected).

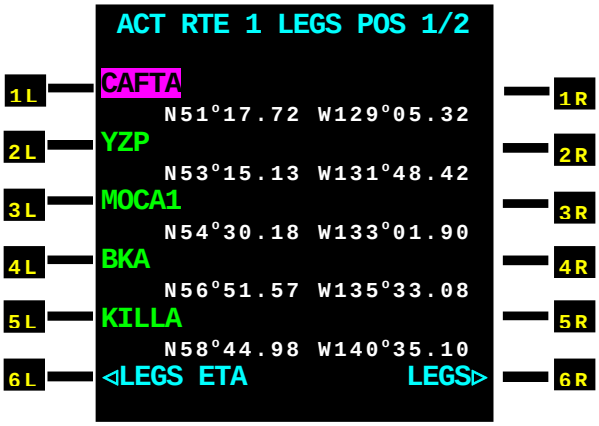
NOTE: RTEx can correspond to RTE1 or RTE2 based on which route is the inactive route.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

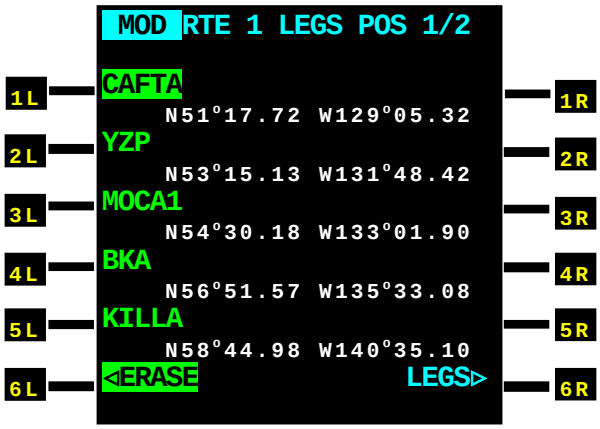
RTE x LEGS POS 1/X

Provides the position in latitude and longitude, using the WGS 84 Earth model, for each waypoint on the corresponding RTE LEGS Y/X page.
Display ACT RTE LEGS POS 1/X page by pressing [LEGS], <LEGS ETA> and <LEGS POS > (active route) or [LEGS], <LEGS ETA>, <SIMUL RTEx >, <LEGS POS> (inactive route - only when the SIMULATION pages are configured).

A. Normal ACTIVE format:



B. LEGS POS during a MOD:



C. LEGS POS of INACTIVE route *(when SIMUL page is configured*:

D. LEGS POS Index of INACTIVE route during a mod:

WAYPOINT IDENTIFIER (1L,2L,3L,4L,5L): Displays the same identifiers as on the corresponding RTE LEGS Y/X page.

LEGS ETA [6L]: Returns to the corresponding RTE LEGS ETA Y/X page.

ERASE [6L]: Erase route modifications. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL and CONFIRM prompts on line select keys 6L and 6R respectively.

RESTORE [6L]: Displayed only if the RTE was erased on the RTE 1/X page. Used to restore the active route.

CANCEL [6L]: Cancel the changes made to the inactive route.

SIMUL RTEx [6L]: Access to the SIMUL RTEx 3/3 page (only available on the inactive route LEGS POS page when the SIMULATION pages have been configured and when ACTIVATE has not been selected).

NOTE: RTEx can correspond to RTE1 or RTE2 based on which route is the inactive route.

LAT-LONG (1R, 2R, 3R, 4R, 5R): Display position of the waypoint identified on the previous line.

LEGS [6R]: Returns to the corresponding RTE LEGS Y/X page.

CONFIRM [6R]: Confirm the changes made to the inactive route.

NOTE: Flight plan waypoint modifications are not permitted on the LEGS POS page.

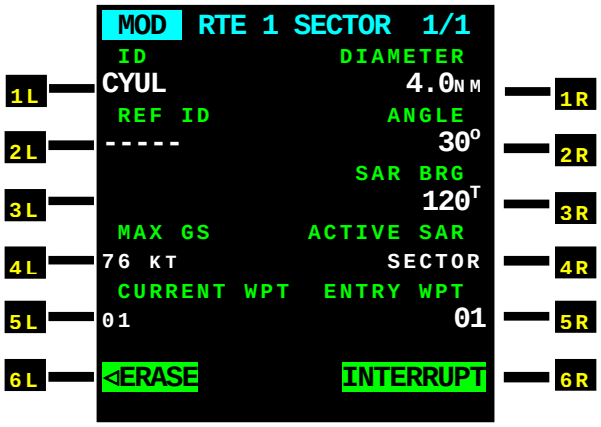
RTE x SECTOR 1/1

To access SECTOR 1/1page, press
[INIT REF], <DES+SAR> or <TACTICAL> and <SECTOR> (on the active route) or
[INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], and <SECTOR> (on the inactive route) or
[TACT], <SECTOR> {if TACT key configured and SECTOR configured on the TACTICAL page} or
[LEGS], "/S" in scratchpad entered next to the Search waypoint already defined as a Sector pattern.
Automatically accessed whenever a route is executed when a search pattern that has not been activated is present in the modified route. The displayed SAR page is selected in the following order of priority:

- the current page, if already in a SAR page; or
- the last modified SAR page; or
- the last selected SAR page from DES+SAR or TACTICAL page.

NOTE: Each pressing of the [NEXT]/[PREV] key will cause the display of the three search pattern pages: SQUARE, SECTOR, or LADDER.

A. Interrupting a SECTOR SAR from the active route SECTOR 1/1 page:



B. When inserting of modifying a SECTOR SAR from the Inactive route SECTOR 1/1 page:

C. SECTOR SAR from the Inactive route SECTOR 1/1 page (after pressing CONFIRM).

ACT/MOD/blank(STATUS): MOD indicates the search is not being executed. ACT indicates that the search pattern is being executed. "blank" indicates an executed search fix has not been reached.

ID [1L]]: Name of starting search pattern waypoint. If a search pattern waypoint is defined in the route, its identifier is displayed in the field and no entry is allowed. Otherwise, entries are allowed and the entered identifier is displayed, if any. If no entries were made to both ID & REF ID fields, 5 boxes " " are displayed. Else, if an entry was made in REF ID field, 5 dashes "-----" are displayed.

NOTE: When a new ID is entered the operator should clear the relative bearing and distance data field relative to the previous ID by pressing [NEXT] then [PREV].

DIAMETER [1R]: Value of the leg diameter (between 0.1 and 40 nm), default value is 4 nm. Subsequent change of the parameter value, validated by pressing the <ACTIVATE> softkey followed by the EXEC key, will become the new default value. This default value is preserved even after a cold-start.

REF ID [2L]: Name of waypoint considered being a reference for the relative bearing/distance elements entered in the fields 3L and 4L. If a Search pattern waypoint is defined in route, the field is filled with 5 dashes "-----" and no entry is allowed. Otherwise, entries are allowed and the entered identifier is displayed, if any. If no entries were made to both ID & REF ID fields, 5 boxes " " are displayed. Else, if an entry has been made in ID field, 5 dashes "-----" are displayed.

ANGLE [2R]: Value of the angle (between 5 and 90°) of the search sector "slice", default value is 30°. Subsequent change of the parameter value, validated by pressing the <ACTIVATE> softkey followed by the EXEC key, will become the new default value. This default value is preserved even after a cold-start.

RELATIVE BRG [3L]: The relative bearing of the search pattern entry waypoint compared to the reference REF ID. This field is displayed as long as REF ID contains an entry and the displayed default value is 000°.

SAR BRG [3R]: Value of the bearing (TRUE or MAG) of the first leg in the Search pattern (000^T or 000° is the default value).

DISTANCE [4L]: The distance of the search pattern entry waypoint from the reference REF ID. This field is displayed as long as REF ID contains an entry and the displayed default value is 10.0 nm.

MAX GS (4L): The maximum Ground Speed required to fly the pattern without overshoot. This field is displayed only after a valid waypoint identifier has been entered, and is mutually exclusive with the DISTANCE field.
This maximum ground speed is re-computed every time a modification is performed on the search parameters (track spacing, leg length, diameter or angle).

ACTIVE SAR [4R]: Type of the active search pattern present in the flight plan. When there is no active search pattern "none" is displayed.

PPOS [5L]: The search pattern is started at the present position. Toggles between PPOS and CURRENT WPT # (displayed only after the search pattern is active). The PPOS prompt becomes available only for the active route in the air and if the active route does not contain another search pattern waypoint.

CURRENT WPT (5L): Number of the search waypoint towards which the aircraft flies. This value increases as the aircraft overfly the search waypoints. The default value for this field is 01.

ENTRY WPT [5R]: Number of the search pattern entry waypoint. Displayed only for a search pattern waypoint in progress and only on the Search page of the selected pattern. The default value of this field is 01 and can be manually entered (changed) as long as the search was not executed. After the search was executed, the value of this field stays fixed and cannot be manually changed (unless INTERRUPT/RESUME was pressed). The field value remains fixed but can be modified manually by first interrupting (via INTERRUPT prompt) the search pattern and then resuming it (via RESUME prompt) at a new ENTRY WPT value. If a search is cancelled or erased (before being execution) the value of this field returns to its default value.

- 01 if an EFIS of type IFDS is configured;
- 00 for all other EFIS types.

The allowed range of input values for this field is:

- [02->80] if an EFIS of type IFDS is configured;
- [01->79] for all other EFIS types.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

ERASE [6L]: Cancels the changes made to the modified modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Erase all the fields and set the Search parameters back to their default values. For the inactive route only, it also cancel the modifications made to the inactive route and command display of the LEGS page, if the cancellation follow modifications to the inactive route. CANCEL appears:

- In active route (not modified) only when the <ACTIVATE> softkey is present (e.g. Search pattern parameters are entered in the SAR page but no Search pattern waypoints are defined in the route) in the modified inactive route.

RESTORE [6L]: Is displayed only if the RTE was erased on the RTE 1/X page. Used to restore the active route.

ACTIVATE/INTERRUPT/RESUME/CONFIRM [6R]:

- ACTIVATE is displayed (in green) only when the pattern is not active in the active route or the modified active route and after the fields on the page are filled. It creates the search pattern waypoint into the modified active route, if no search pattern waypoint already exists. Otherwise, it is used to confirm further modifications to the search pattern waypoint. Once the search pattern waypoint is activated but not in progress yet, the search pattern parameters can be modified at will (LENGTH, WIDTH, TRUE BRG, ENTRY WPT #) causing CANCEL/ERASE/ ACTIVATE prompts to reappear every time a parameter is modified. If the search procedure is created using the Search menu ([INIT REF], <DES+SAR> or <TACTICAL>, <SQUARE> or <LADDER> or <SECTOR>, ACTIVATE enters the search waypoint as the first waypoint in the flight plan (followed by a discontinuity and the rest of the waypoints). If the search procedure is created using "/S" on the LEGS page, the ACTIVATE softkey updates the search pattern waypoint parameters.
- INTERRUPT is used to initiate an interruption of the search pattern. When the INTERRUPT LSK is pressed, its color changes from green to inverse green, the active search pattern becomes a modified one, and the EXEC lamp illuminates. The current waypoint # field freezes to the number of the last TO search waypoint and disables the steering command (upon [EXEC] key press).

- RESUME is used when a SAR pattern needs to be restarted from a search waypoint entered in the ENTRY WPT # field (LSK 5R). When the RESUME LSK is pressed, its color changes from green to inverse green, the EXEC lamp illuminates, and a value can be entered in the ENTRY WPT # field (an entry the ENTRY WPT # is permitted only after <RESUME> was pressed).
- For modified active route: CONFIRM is displayed if ERASE MODS is configured as CONFIRM. For modified inactive route: CONFIRM is used to confirm the changes made to the inactive route. However, when it is displayed following the creation of a search pattern waypoint into the modified inactive route or following modifications to the search parameters in the inactive route, then pressing the CONFIRM prompt will confirm the changes made to the search pattern and other changes made to the inactive route (same functionality as the ACTIVATE prompt for the active route & modified active route).

After an INTERRUPT on the first leg of a search pattern, the re-entry into the pattern using RESUME is not permitted on the search origin (e.g. ENTRY WPT # cannot be equal to 1).

NOTES:

- *The INTERRUPT/RESUME keys is displayed only on the search pattern page corresponding to the executed pattern (e.g. if a LADDER pattern was executed, INTERRUPT/RESUME appears only on the LADDER pattern page).*
- *Pressing the ACTIVATE prompt, while valid entries exist for REF ID, RELATIVE BRG & DISTANCE fields, will cause the creation of a search pattern waypoint located at the position of the REF ID waypoint offset by the BRG/DIS fields elements. A new waypoint identifier will be created and displayed in the ID field. The REF ID field will be filled with dashes and the RELATIVE BRG & DIST fields (title and data) will disappear.*

- *Entering a valid waypoint identifier in the ID field, while valid entries already exist for REF ID, RELATIVE BRG and DISTANCE fields, will cause the REF ID field to be filled with dashes and the RELATIVE BRG and DISTANCE fields (title and data) to disappear.*

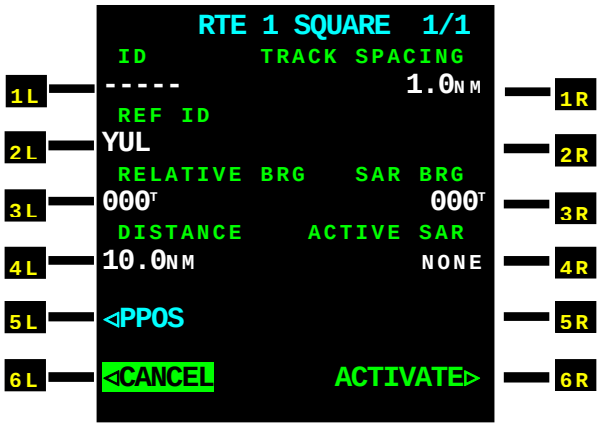
RTE x SQUARE 1/1

To access SQUARE 1/1page, press [INIT REF], <DES+SAR> or <TACTICAL> and <SQUARE> (active route) or [INIT REF], <DES+SAR> or <TACTICAL>, [NEXT], and <SQUARE> (inactive route) or
[TACT], <SQUARE> {if TACT key configured and SQUARE configured on the TACTICAL page} or
LEGS], "/S" in scratchpad entered next to the Search waypoint already defined as a Square pattern or by default upon creation of a Search pattern waypoint.
Automatically accessed whenever a route is executed when a search pattern that has not been activated is present in the modified route. The displayed SAR page is selected in the following order of priority:

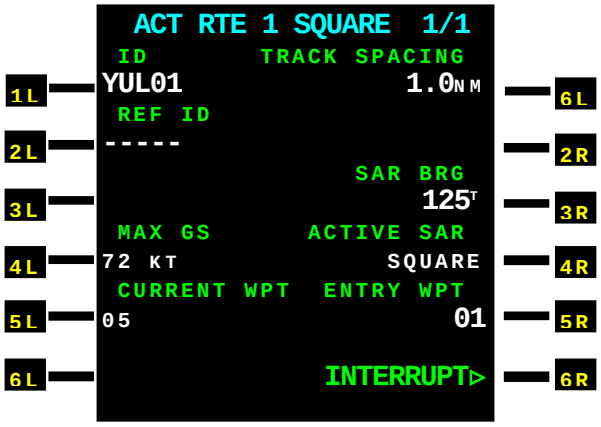
- the current page, if already in a SAR page; or
- the last modified SAR page; or
- the last selected SAR page from DES+SAR or TACTICAL page.

NOTE: Each pressing of the [NEXT]/[PREV] key will cause the display of the three search pattern pages: SQUARE, SECTOR, or LADDER.

A. When creating a SQUARE SAR from the Active route SQUARE 1/1 page (before pressing <ACTIVATE>):

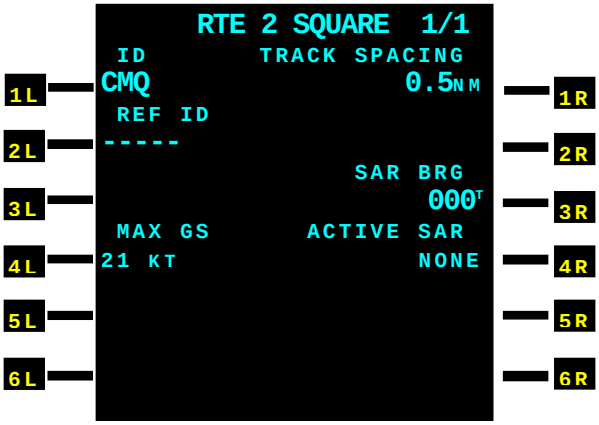


B. When SQUARE SAR is in progress in the Active route SQUARE 1/1 page:



C. When inserting or modifying a SQUARE SAR from the Inactive route SQUARE 1/1 page:

D. SQUARE SAR from the Inactive route SQUARE 1/1 page (after pressing CONFIRM).



ACT/MOD/blank(STATUS): MOD indicates the search is not being executed. ACT indicates that the search pattern is being executed. "blank" indicates an executed search fix has not been reached.

ID [1L]: Name of starting search pattern waypoint. If a search pattern waypoint is defined in the route, its identifier is displayed in the field and no entry is allowed. Otherwise, entries are allowed and the entered identifier is displayed.

NOTE: When a new ID is entered the operator should clear the relative bearing and distance data field relative to the previous ID by pressing [NEXT] then [PREV].

TRACK SPACING [1R]: Value of the leg length (between 0.1 and 40 nm). The parameter is kept in NVM and its initial default value is 2.0 nm. Subsequent change of the parameter value, validated by pressing the <ACTIVATE> softkey followed by the EXEC key, will become the new default value. This default value is preserved even after a cold-start.

REF ID [2L]: Name of waypoint considered being a reference for the relative bearing/distance elements entered in the fields 3L and 4L. If a search pattern waypoint is defined in route, the field is filled with 5 dashes "-----" and no entry is allowed. Otherwise, entries are allowed and the entered identifier is displayed.

RELATIVE BRG [3L]: The relative bearing of the search pattern entry waypoint compared to the reference REF. This field is displayed as long as REF ID contains an entry and the displayed default value is 000^{T} or 000°.

SAR BRG [3R]: Value of the bearing (TRUE or MAG) of the first leg in the Search pattern (000^{T} or 000° is the default value).

DISTANCE [4L]: The distance of the search pattern entry waypoint from the reference REF ID. This field is displayed as long as REF ID contains an entry and the displayed default value is 10.0 nm.

MAX GS (4L): The maximum Ground Speed required to fly the pattern without overshoot. This field is displayed only after a valid waypoint identifier has been entered, and is mutually exclusive with the DISTANCE field.
This maximum ground speed is re-computed every time a modification is performed on the search parameters (track spacing, leg length, diameter or angle).

ACTIVE SAR [4R]: Type of the active search pattern present in the flight plan. When there is no active search pattern "none" is displayed.

PPOS [5L]: The search pattern is started at the present position. Toggles between PPOS and CURRENT WPT # (displayed only after the search pattern is active). The PPOS prompt becomes available only for the active route in the air and if the active route does not contain another search pattern waypoint.

CURRENT WPT (5L): Number of the search waypoint towards which the aircraft flies. This value increases as the aircraft overfly the search waypoints. The default value for this field is:
- [02->80] if an EFIS of type IFDS is configured;
- [01->79] for all other EFIS types.

ENTRY WPT [5R]: Number of the search pattern entry waypoint. Displayed only for a search pattern waypoint in progress and only on the Search page of the selected pattern. The default value of this field is 01 and can be manually entered (changed) as long as the search hasn't been executed. After the search was executed, the value of this field stays fixed and cannot be manually changed (unless INTERRUPT/RESUME was pressed). The field value remains fixed but can be modified manually by first interrupting (via INTERRUPT prompt) the search pattern and then resuming it (via RESUME prompt) at a new ENTRY WPT value. If a search is cancelled or erased (before being execution) the value of this field returns to its default value:
- 01 if an EFIS of type IFDS is configured;
- 00 for all other EFIS types.

The allowed range of input values for this field is:
- [02->80] if an EFIS of type IFDS is configured;
- [01->79] for all other EFIS types.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

ERASE [6L]: Cancel the changes made to the modified active route. If confirm erase route modifications is configured, then upon pressing ERASE a confirmation is requested by displaying CANCEL/CONFIRM prompts on line select keys 6L and 6R respectively.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Erase all the fields and set the search parameters back to their default values. For the inactive route only, it also cancel the modifications made to the inactive route and command display of the LEGS page, if the cancellation follow modifications to the inactive route. CANCEL appears:

- in active route (not modified) only when the <ACTIVATE> softkey is present (e.g. Search pattern parameters are entered in the SAR page but no search pattern waypoints are defined in the route) in the modified inactive route.

RESTORE [6L]: Is displayed only if the RTE was erased on the RTE 1/X page. Used to restore the active route.

ACTIVATE/INTERRUPT/RESUME/CONFIRM [6R]:

- ACTIVATE is displayed (in green) only when the pattern is not active in the active route or the modified active route and after the fields on the page are filled. It creates the search pattern waypoint into the modified active route, if no search pattern waypoint already exists. Otherwise, it is used to confirm further modifications to the search pattern waypoint. Once the search pattern waypoint is activated but not in progress yet, the search pattern parameters can be modified at will (LENGTH, WIDTH, TRUE BRG, ENTRY WPT #) causing CANCEL/ERASE/ ACTIVATE prompts to reappear every time a parameter is modified. If the search procedure is created using the Search menu ([INIT REF], <DES+SAR> or <TACTICAL>, <SQUARE> or <LADDER> or <SECTOR>, ACTIVATE enters the search waypoint as the first waypoint in the flight plan (followed by a discontinuity and the rest of the waypoints). If the search procedure is created using "/S" on the LEGS page, the <ACTIVATE> softkey updates the Search pattern waypoint parameters.
- INTERRUPT is used to initiate an interruption of the search pattern. When the INTERRUPT LSK is pressed, its color changes from green to inverse green, the active search pattern becomes a modified one, and the EXEC lamp illuminates. The current waypoint # field freezes to the number of the last TO-search waypoint and disables the steering command (upon [EXEC] key press).
- RESUME is used when a SAR pattern needs to be restarted from a search waypoint entered in the ENTRY WPT # field (LSK 5R). When the RESUME LSK is pressed, its color changes from green to inverse green, the EXEC lamp illuminates, and a value can be entered in the ENTRY WPT # field (an entry the ENTRY WPT # is permitted only after <RESUME> was pressed).
- For modified active route: CONFIRM is displayed if ERASE MODS is configured as CONFIRM. For modified inactive route: CONFIRM is used to confirm the changes made to the inactive route. However, when it is displayed following the creation of a search pattern waypoint into the modified inactive route or following modifications to the search parameters in the inactive route, then pressing the CONFIRM prompt will confirm the changes made to the search pattern and other changes made to the inactive route (same functionality as the ACTIVATE prompt for the active route & modified active route).

After an INTERRUPT on the first leg of a search pattern, the re-entry into the pattern using RESUME is not permitted on the search origin (e.g. ENTRY WPT # cannot be equal to 1).

NOTES:

- *The INTERRUPT/RESUME keys is displayed only on the search pattern page corresponding to the executed pattern (e.g. if a LADDER pattern was executed, INTERRUPT/RESUME appears only on the LADDER pattern page).*
- *Pressing the ACTIVATE prompt, while valid entries exist for REF ID, RELATIVE BRG & DISTANCE fields, will cause the creation of a search pattern waypoint located at the position of the REF ID waypoint offset by the BRG/DIS field elements. A new waypoint identifier will be created and displayed in the ID field. The REF ID field will be filled with dashes and the RELATIVE BRG & DISTANCE fields (title and data) will disappear.*

- *Entering a valid waypoint identifier in the ID field, while valid entries already exist for REF ID, RELATIVE BRG and DISTANCE fields, will cause the REF ID field to be filled with dashes and the RELATIVE BRG and DIST fields (title and data) to disappear.*

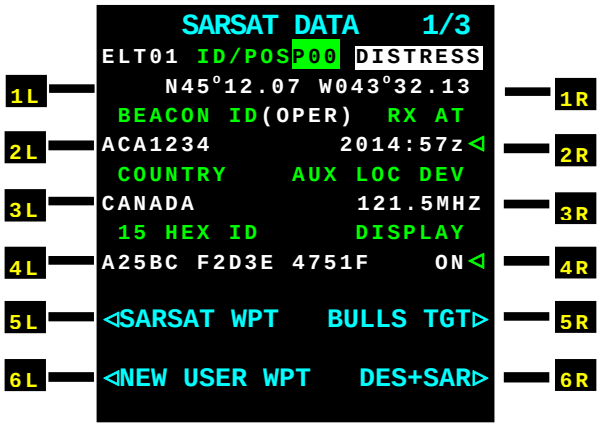
SARSAT DATA 1/X

The SARSAT DATA X/X page displays the COSPAS/SARSAT specific data regarding a SARSAT waypoint received from the DF equipment. Where the page number (X) varies from 1 to 8.

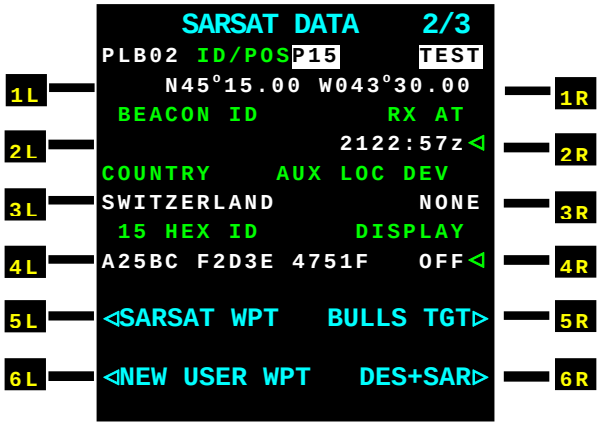
Display SARSAT DATA 1/1 page:
(if a DF is configured) press [INIT/REF], <WPT LISTS>, <SARSAT WPT> and <NNN##>.
(if a DF-430-102 is configured) press [RADIO], <DF>, <SARSAT WPT>and <NNN##>.
(if TACT key is configured and SARSAT is configured on the TACTICAL page) press [TACT], <SARSAT> and <NNN##>.

(Where NNN is "ELT" or "PLB" or "EPI" or "TST and ## varies from 01 to 99).

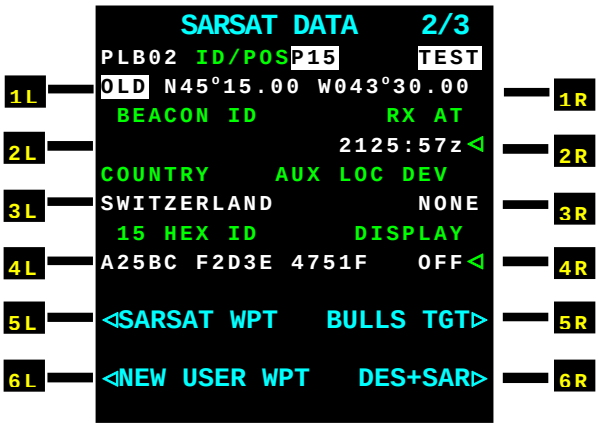
A. Waypoint ELT01 is a distress message received from an ELT and the waypoint is transmitted to the EFIS. Position resolution is 4 seconds.



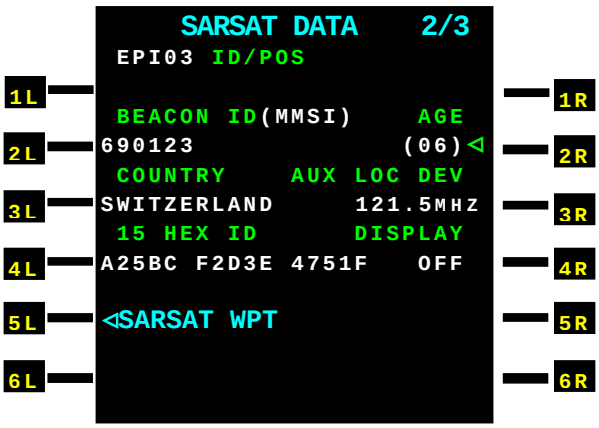
B. Waypoint PLB02 is a test message received from a PLB, the beacon does not transmit specific ID and the waypoint is not selected for transmission to EFIS if DISPLAY option is set to SELECTION on the SARSAT WPT 1/2 page. Position resolution is 15 minutes.



C. Same as previous display (PLB02) except that last SARSAT waypoint update had an invalid position.



D. Waypoint EPI03 is a distress message received from an EPIRB, the position is not displayed since this beacon cannot provide its position, the transmission of this SARSAT waypoint is then forced to OFF. The SARSAT waypoint reception age is displayed instead of the received time.



ID [1L]: Display of the SARSAT waypoint ID. The ID format is as follow:

- For ELT beacon: "ELT##"
- For PLB beacon: "PLB##"
- For EPIRB beacon: "EPI##"
- For TEST beacon: "TST##"

Where ## is a sequential number between 01 and 99.

POS [1R]: Display of the SARSAT waypoint position (when available). If a SARSAT waypoint gets updated with an invalid position the text "OLD" is displayed in inverse video white before the position.

RESOLUTION (1R): The position resolution is displayed next to the "ID/POS" static field when the position is available, otherwise the resolution is not displayed. The position resolution is displayed using the following format:
"P00": Resolution of 4 seconds, displayed in inverse video green.
"P02": Resolution of 2 minutes, displayed in inverse video white.
"P04": Resolution of 4 minutes, displayed in inverse video white.
"P15": Resolution of 15 minutes, displayed in inverse video white.

MESSAGE TYPE (1R): Displays "TEST" in reverse video white when the beacon is in Test mode. Otherwise the field is blank when the beacon is in normal operating mode (Distress).

BEACON ID (2L): Display the vehicle identification. The identification can be one of these following possibilities for an aircraft (ELT beacon type):

- (NATI): The aircraft nationality and registration marking is a unique alphanumeric code assigned by national administrations in accordance with Annex 10 to the Convention on International Civil Aviation (see REF [E1]). The code is made of up to 7 characters as per the Modified-Baudot code
- (ADDR): Aircraft 24-bit address as assigned by the responsible administration in accordance with ICAO guidance in Annex 10 of the ICAO convention on Civil Aviation the aircraft address is displayed as 6 hexadecimal characters (see REF [E1]).
- (OPER): The aircraft operator identified with a 3-letter designation agreed by ICAO (see REF [E1]) and the serial number (ranging from 1 to 4095) normally assigned by the aircraft operator.
- (SN): The beacon unique serial identification code number ranging from 0 to 1,048,575 and the COSPAS-SARSAT type approval certificate number ranging from 0 to 1023 if available.
- (NIN): The beacon National Identification Number (ranging from 0 to 262143) assigned by the appropriate national authority.

The identification can be one of these possibilities for a ship (EPIRB beacon type):

- (MMSI): Marine Mobile Service Identity number, display the last 6-digit of the 9-digit MMSI.
- (RCS): Radio Call Signs of up to seven characters that comply with the ITU Radio Regulations on the formation of call signs (see REF [E1]).
- (SN): The beacon unique serial identification code number ranging from 0 to 1,048,575 and the COSPAS-SARSAT type approval certificate number ranging from 0 to 1023 if available.
- (NIN): The beacon National Identification Number (ranging from 0 to 262143) assigned by the appropriate national authority.

The identification can be one of these possibilities for a personal beacon (PLB beacon type):

- (SN): The beacon unique serial identification code number ranging from 0 to 1,048,575 and the COSPAS-SARSAT type approval certificate number ranging from 0 to 1023 if available.
- (NIN): The beacon National Identification Number (ranging from 0 to 262143) assigned by the appropriate national authority.

If the beacon id cannot be decoded, this field is blank.

RX AT/AGE [2R]: Toggle option RX AT/AGE.
"RX AT": Time stamp at which the SARSAT waypoint has last been received.
"AGE": Elapsed time (in minutes) since last SARSAT waypoint reception.
The default display is "RX AT".

COUNTRY (3L): Display the country of beacon registration. If the country cannot be decoded, the 3-digit decimal country/territory code is displayed.

NOTE: The country code is based on the International Telecommunication Union (ITU) and listed as Maritime Identification Digits (MID) in Appendix 43 of the ITU Radio Regulations. This country code designates the country of beacon registration and it is used to obtain additional information on the owner of the distress beacon using the MID to interrogate the appropriate beacon registration database.

AUX LOC DEV (3R): Display the auxiliary radio-location device available on board of the distress aircraft or ship. The possible display are:

- "NONE": No auxiliary radio-locating device
- "121.5 MHz": 121.5MHz locator beacon
- "9 GHz": Maritime 9 GHz (SART)
- "OTHER": Other auxiliary radio-locating device(s)

This field is blank for the PLB beacon type or if the data cannot be decoded.

15 HEX ID (4L): Display the received 15 hexadecimal characters (15 HEX ID) identifying each 406 MHz COSPAS-SARSAT beacon.

DISPLAY [4R]: Toggle options: ON/OFF. When set to ON, the current SARSAT waypoint is selected for output to the EFIS. When set to OFF, the current SARSAT waypoint is not transmitted to the EFIS. If the POS is not available, this option is forced to OFF and the field cannot be toggled (the "<" is not displayed). This field is only displayed when one of the following EFIS is configured: SPERRY, SPERRY2, GAMA, SEXTANT, ROCKWELL, ROCKWELL2, ROCKWELL3, BARCO, AHCAS2, MEGGIT or Primus Epic, otherwise, this field is blank.

SARSAT WPT [5L]: Access to SARSAT WPT 1/1 page.

BULLS TGT [5R]: Access the BULLS EYE 2/3 page and put the SARSAT waypoint coordinates as default BULLS EYE TARGET waypoint coordinates and the SARSAT waypoint as the REF waypoint. This prompt will only be displayed when the SARSAT waypoint coordinates are valid and the BULLS EYE is configured.

NEW USER WPT [6L]: Access to USER WPT 1/2 page and put the SARSAT waypoint coordinates and ident as default user waypoint coordinates and ident. This prompt will only be displayed when the SARSAT waypoint coordinates are valid.

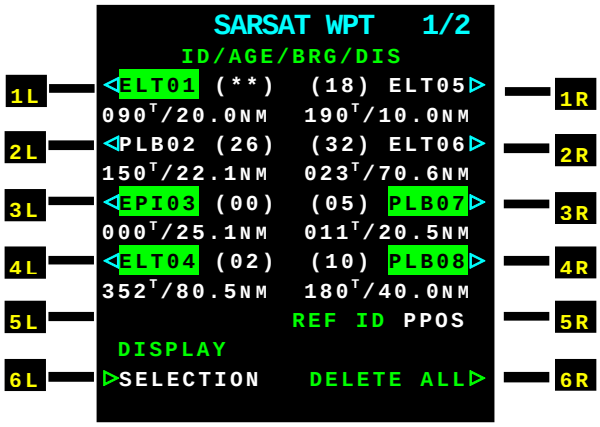
DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL page instead of the DES+SAR page. Access to DES+SAR 1/Y (or TACTICAL 1/Y) page. The SARSAT waypoint will automatically be converted to a temporary waypoint and placed in the REF ID field on the DES+SAR 1/Y (or TACTICAL 1/Y) page. This field will only be displayed when the SARSAT waypoint coordinates are valid.

SARSAT WPT 1/2

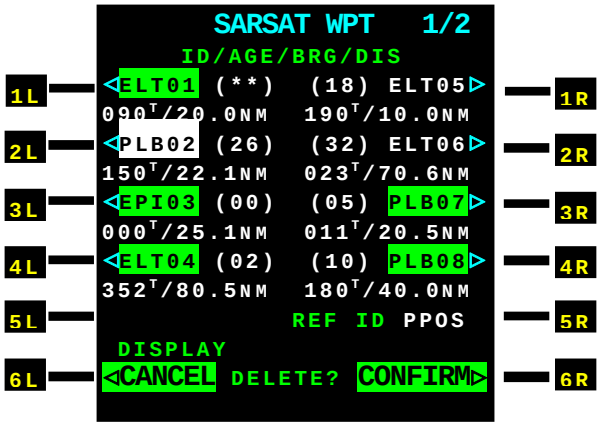
The SARSAT WPT page displays the COSPAS/SARSAT waypoint(s) received from the Direction Finder (DF) equipment.

Display SARSAT WPT 1/2 page:
(if a DF is configured) press [INIT/REF], <WPT LISTS> and <SARSAT WPT>.
(if Tactical Config BULLS EYE is configured) press [INIT/REF], <BULLS EYE>, [NEXT] and <SARSAT WPT>.
(if DF-430-102 is configured) press [RADIO], <DF> and <SARSAT WPT>.
(if TACT key is configured and SARSAT is configured on the TACTICAL page) press [TACT] and <SARSAT>.

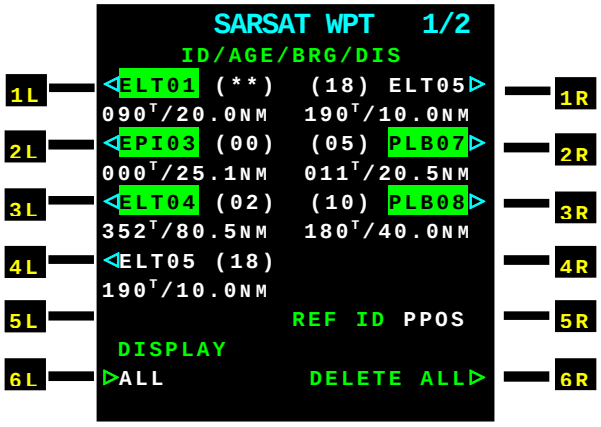
A. When 8 SARSAT waypoints have been received and ELT01, EPI03, ELT04, PLB07 and PLB08 are transmitted to the EFIS.



B. When waypoint PLB02 has been selected for deletion.



C. When deletion of waypoint PLB02 has been confirmed.



ID/AGE/BRG/DIS[1L-4L], [1R-4R]: Displays the SARSAT waypoint ident, age of last message reception in minutes and bearing/distance relative to the REF ID. Bearing/distance field is displayed only when a valid beacon position is available. When the ident is displayed in reverse video green it means that the SARSAT waypoint is selected (on SARSAT DATA X/X page) for transmission to the EFIS. Entering DELETE on a SARSAT waypoint will bring up CANCEL/CONFIRM prompts for the deletion of the selected SARSAT waypoint. The waypoint selected for deletion will be displayed in reverse video white. Selection of the LSK will display the corresponding SARSAT DATA page.

REF ID [5R]: Entry of any waypoint identifier from the navigation database, the custom database, the user database, the temporary waypoints list, the Bulls Eye waypoints, the active route or the inactive route. In the case of multiple waypoints with the same ID, the SELECT WPT page is displayed for selection. The first time this page is accessed after a cold start, the reference waypoint is set to the present position. Entering delete will return to PPOS.

DISPLAY[6L]: Toggle options: SELECTION/ALL. When "SELECTION" is chosen, the selected SARSAT waypoints (displayed in reverse video green) are transmitted to the EFIS. When ALL is selected, all SARSAT waypoints are transmitted to the EFIS. The selection (SELECTION or ALL) is kept in memory during a power down. Upon a cold start on ground, the transmit option is default to SELECTION. This field is blank when the SARSAT transmission is set to OFF on the EFIS 1/1 page. This field is only displayed when one of the following EFIS is configured: SPERRY, SPERRY2, GAMA, SEXTANT, ROCKWELL, ROCKWELL2, ROCKWELL3, BARCO, AHCAS2, MEGGIT or Primus Epic, otherwise, this field is blank.

CANCEL [6L]: Cancels the deletion of a SARSAT waypoint or all SARSAT waypoints as applicable.

DELETE ALL [6R]: Request to delete all SARSAT waypoints and triggers the CANCEL/CONFIRM prompts. When this prompt is pressed, all SARSAT waypoints will be displayed in reverse video white. If no SARSAT waypoint is available this prompt is not displayed.

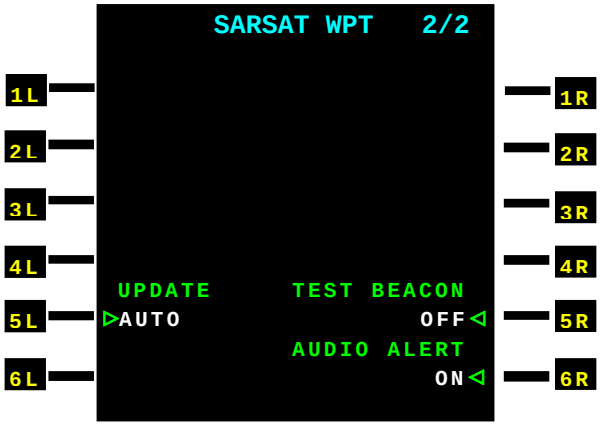
CONFIRM [6R]: Confirms the deletion of a SARSAT waypoint or all SARSAT waypoints as applicable.

(DELETE?): Displayed between the CANCEL/CONFIRM prompts upon deletion of SARSAT waypoint(s).

SARSAT WPT 2/2

This page enables the pilot to select the FMS update mode and the type of messages decoded from the DF.

Display SARSAT WPT 2/2 page:
(if a DF is configured) press [INIT/REF], <WPT LISTS> <SARSAT WPT> and [NEXT].
(if DF-430-102 is configured) press [RADIO], <DF>, <SARSAT WPT> and [NEXT].
(if TACT key is configured and SARSAT is configured on the TACTICAL page) press [TACT], <SARSAT> and [NEXT].



UPDATE [5L]: Toggle options: AUTO/MANUAL. When the AUTO mode is selected, the FMS compares the new COSPAS-SARSAT message received with the SARSAT waypoints, if a SARSAT waypoint already exists for this message, the waypoint information is updated, otherwise a new SARSAT waypoint is created. When the MANUAL mode is selected, the FMS decodes and displays all messages received even if the messages decoded is an update of an existing SARSAT waypoint. The default setting is AUTO. When toggling this option from MANUAL to AUTO, the FMS keeps only the latest SARSAT waypoint received from a beacon, all duplicate SARSAT waypoints are deleted. When toggling from AUTO to MANUAL, no deletion is performed.

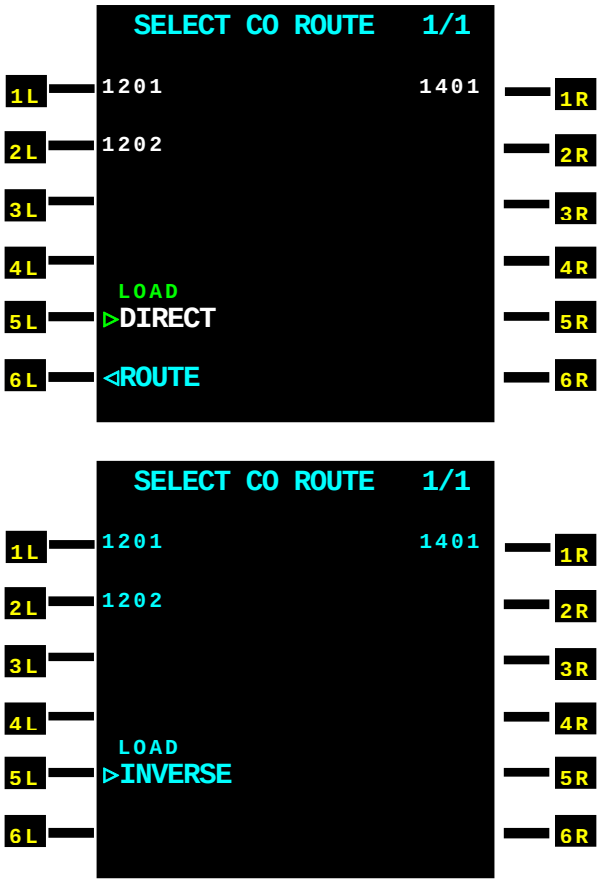
This field is only applicable when DF-935-12 is configured. Otherwise, it is blanked.

TEST BEACON [5R]: Toggle options: ON/OFF. When the message filter is set to "OFF", only the distress messages are decoded and displayed. When the message filter is set to "ON", the distress and test messages are decoded and displayed. The default setting is OFF. When toggling this option from ON to OFF, all TEST SARSAT waypoints are deleted. When toggling from OFF to ON, no deletion is performed.

AUDIO ALERT [6R]: Toggle options: ON/OFF. Upon reception of a new sarsat waypoint, when ON is selected, a pulse is generated on the discrete output DF_SARSAT to activate an audio alert signal. When OFF is selected, the audio alert is muted. The default setting is ON (reset on a cold start on ground).
This field is only displayed when DF_SARSAT discrete output is configured; otherwise, it is blanked.

SELECT CO ROUTE 1/X

Display SELECT CO ROUTE 1/1 page by pressing [RTE] and <CO ROUTES>.



When a company route is selected for the inactive route, all the fields are displayed in cyan (as shown in the figure above right).

ROUTE [1L,2L,3L,4L,1R,2R,3R,4R]: Custom Route Name. Pressing the corresponding LSK will load the custom route (DIRECT or INVERSE mode) in the sequence selected in LSK 5L into the modified route and return to the RTE 1/1 page. If the display of the CO ROUTE is configured to ORIG_DEST, only the particular routes associated with the entered origin and destination will be displayed. If CO ROUTES is configured to ALL, every CO ROUTE in the database will be displayed.

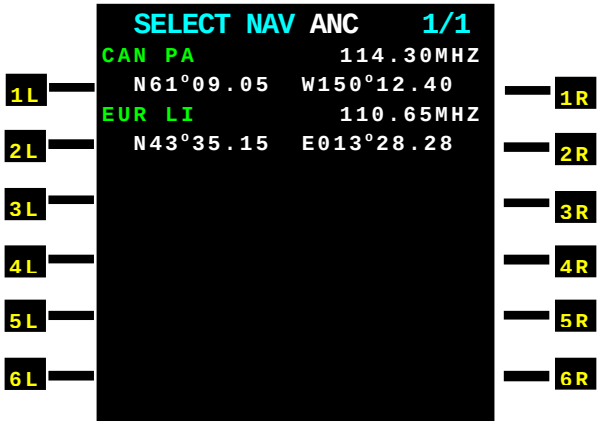
NOTE: When airborne, a custom *route name selected on page SELECT CO ROUTE 1/1 will replace the current active route without replacing the origin.*

LOAD [5L]: Toggle DIRECT/INVERSE direction of the route to be loaded.

ROUTE [6L]: Access to the RTE 1/X page.

SELECT NAVAID {name } 1/X

Automatically displayed on entry of a navaid identifier that has duplicates in the navigation database. It is displayed only if the entry was made from the NAV radio page.



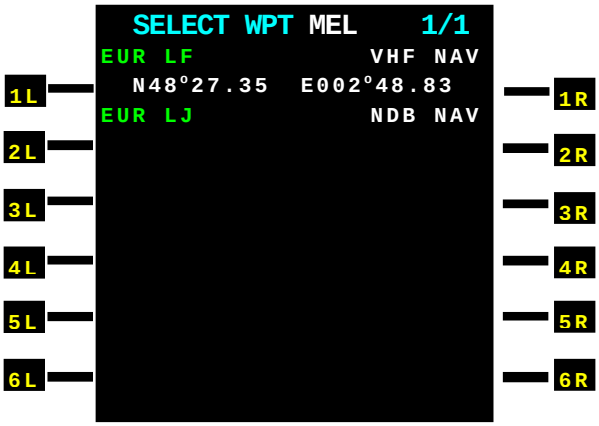
TITLE LINE: Displays duplicated navaid identifier.

NAVAID DESCRIPTION [all LSK's]: Displays all unique locations that are associated with the common identifier. Title line of each navaid indicates ICAO region code, ICAO country code (or terminal area airport identifier) and frequency. Navaids are sorted in order of increasing distance from present position.

Pressing one of the appropriate LSKs will automatically select the navaid description and return to the previous page from which this page was accessed. The navaid identifier will then be displayed on the line where entry was previously attempted.

SELECT WPT {name} 1/X

Automatically displayed on entry of a waypoint identifier that has duplicates in the navigation database.



TITLE LINE: Displays duplicated waypoint identifier.

WAYPOINT DESCRIPTION [all LSK's]: Displays all unique locations which are associated with the common identifier. Title line of each waypoint indicates ICAO region code, ICAO country code (or terminal area airport identifier) and waypoint type (see also explanation of WPT DATA page). Waypoints are sorted in the following manner:

a. For manual insertions into the route, waypoints are listed in order of increasing distance from the previous flight plan waypoint.
b. For Direct-To procedures, waypoints are listed in order of increasing distance from present position.
c. For custom routes, resolution of duplicated waypoints occurs automatically, with the waypoint closest to the previous flight plan waypoint being selected.

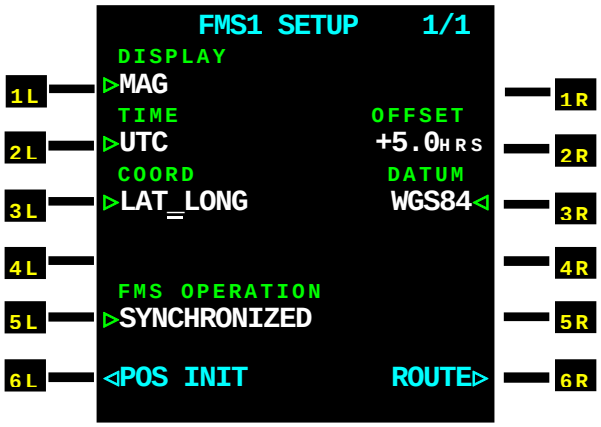
Pressing one of the appropriate LSKs will automatically select the waypoint description and return to the previous page from which this page was accessed. The waypoint identifier will then be displayed on the line where entry was previously attempted.

NOTE: The ICAO region field will be blanked if the waypoint is found from the Custom or User database, or the waypoint is a temporary waypoint.

SETUP 1/1

This page allows the user to setup selected parameters. Display SETUP 1/1 page by pressing [INIT REF] and <SETUP>.

NOTE: FMS ID "FMSx" will not be shown when cross-FMS is not configured.



DISPLAY [1L]: Display Reference of all courses, tracks and bearings and angular outputs to the EHSI. Toggle options: MAG/TRUE. When the A/C is in the polar region (latitude > N73 or S60), TRUE/MAG toggling is disabled, the > is not displayed, and TRUE is displayed in the data field. Otherwise, if the TRUE/MAG discrete input is configured, the current state of the discrete is displayed in small font (the prompt "▷" is not displayed).The DISPLAY default value is configurable.

NOTE: This toggle option is not available if the BARCO EFIS is configured and label 171 is properly received from the CMA-9000 FMS. The current status is displayed in small font (the prompt "▷" *is not displayed).*

TIME [2L]: Toggle options: GPS Universal Coordinated Time (UTC) and LOCAL Time.

COORD [3L]: Selection of displayed coordinate system: {LAT_LONG, *UTM, MGRS, SWISS_GRID*}.

OFFSET [2R]: Entry for local time offset from the UTC time. Validity checking ensures entry is between +/-12.0 hours and steps are 0.5 hours.

DATUM [3R]: Selection of Datum used to display the position coordinates. For example if WGS72 is selected then displayed coordinates are in this datum and entries are assumed at this datum as well. Choices are WGS84, WGS72, etc.

NOTE: All navigation functions use Lat/Long in WGS84, this function only affect display/entry to pilot of positional information. When COORD is SWISS GRID, DATUM is forced to CH1903 and cannot be modified.

FMS OPERATION [5L]: CMA-9000 FMS cross-talk mode of operation. Toggle options: INDEPENDENT/SYNCHRONIZED. Mode changes need to be confirmed (Field is not displayed if the FMS is configured not to be synchronized).

CANCEL [6L]: Used to cancel request to change CMA-9000 FMS cross-talk mode of operation.

POS INIT [6L]: Accesses the POS INIT/REF 1/X page.

CONFIRM [6R]: Used to confirm request to change CMA-9000 FMS cross-talk mode of operation (independent or synchronized).

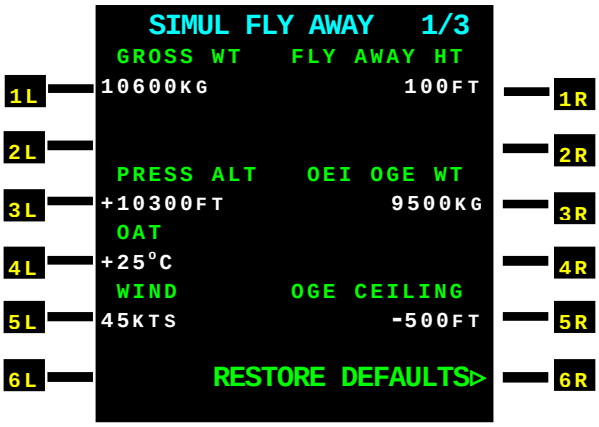
ROUTE [6R]: Accesses the RTE 1/1 page.

SIMUL FLY AWAY 1/3 page (If SIMUL configured and RTE2 configured)
SIMUL FLY AWAY 1/2 page (if SIMUL configured only)

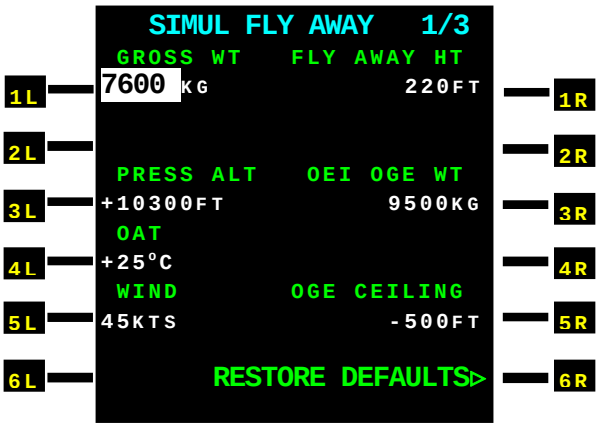
Display SIMUL FLY AWAY 1/3 or 1/2 page by pressing [INIT REF], [NEXT] and < SIMULATE>.

The SIMUL FLY AWAY page is used to perform performance simulations with one engine inoperative during hover operation. Star (*) symbols will be displayed and the advisory FUNCTION NOT COMPUTED message will appear when calculated values exceed the permitted range. Fields will be left empty when default values are not available.

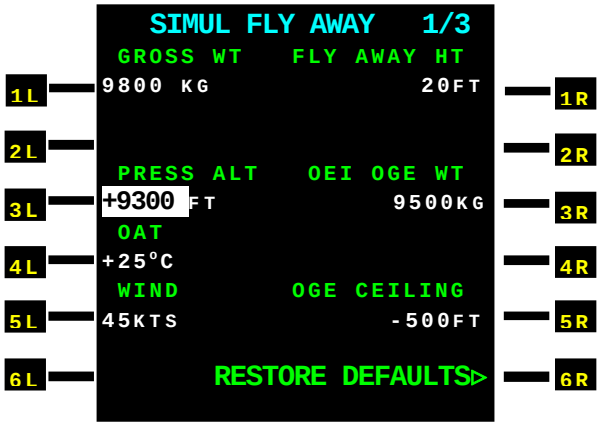
A. Default Display:



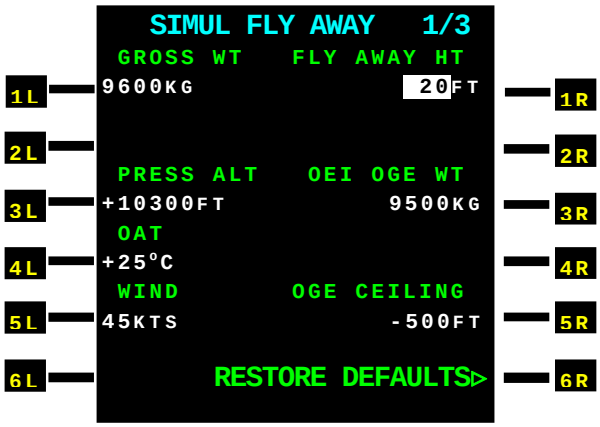
B. Display after manual entry of Gross Wt:



C. Display after manual entry of Pressure-Altitude:



D. Display after manual entry of Fly Away Height:



GROSS WT [1L]: Total aircraft gross weight. Range 6000kg to 11000kg. Initially displays in normal video the current active value per the FUEL 1/2 page. May be manually overwritten for simulation causing the value to appear in reverse video and forcing the calculation of a new fly away height. Inversely, entry of a fly away height will cause this field to display a new gross weight in normal video. When computed, the advisory NO FLY AWAY will appear if:

Current active gross weight minus fuel weight (excluding reserve) is greater than Computed gross weight.

The advisory will disappear if the pilot clears it or the page is exited or new simulated values are entered causing the fly away condition to be met. If the default value is not available or its value exceeds the range of computation, the advisory GROSS WT NOT VALID will appear. Upon manual entry, pilot clearance of the message or exiting the page, the advisory will disappear.

FLY AWAY HT [1R]: Fly away height. Minimum height to maintain in hover. This corresponds to the maximum drop in height upon loss of an engine during Hover. Calculated and displayed in normal video initially and upon entry of gross weight. Manual entry will be displayed in reverse video and cause a recalculation of gross weight. The advisory NO FLY AWAY will appear if:

Radio Altimeter Height minus fly away height is less than 15ft

The advisory will disappear if the pilot clears it, or the page is exited, or new simulated values are entered causing the FLY AWAY condition to be met.

NOTE: As the fly away height *data chart depends upon wind speed and mass index the minimum/maximum range varies infinitely for different scenarios and as such the input range cannot be specified.*

PRESS ALT [3L]: Pressure altitude. Valid range -2000ft to +12000ft. Defaults to the current pressure altitude in normal video. Manual entry is displayed in reverse video and causes a recalculation of Gross Weight or Fly Away Height depending on which data was being simulated as well as a recalculation of One Engine Inoperative Out of Ground Effect Weight if the Outside Air Temperature is available and valid. If the default value is not available or its value exceeds the range of computation, the advisory PRESS ALT NOT VALID will appear. Upon manual entry, or pilot clearance of the message, or exiting the page, the advisory will disappear.

OEI OGE WT [3R]: Display of One Engine Inoperative Out of Ground Effect Weight. This is the weight required to maintain the specified pressure altitude without any drop in height upon loss of an engine. The OEI/OGE WT is obtained only when the OAT and PRESS ALT are available and valid.

OAT [4L]: Outside Air Temperature. Valid range -40°C to +50°C. Defaults to the current temperature in small font. Manual entry is displayed in large font and causes a recalculation of Gross Weight or Fly Away Height depending on which data was being simulated as well as a recalculation of One Engine Inoperative Out of Ground Effect Weight if the PRESS ALT is available and valid. If the default value is not available or its value exceeds the range of computation, the advisory AIR TEMP NOT VALID will appear. Upon manual entry, or pilot clearance of the message, or exiting the page, the advisory will disappear.

WIND [5L]: Wind speed. Range 0 to +50 Knots. Defaults to the current wind value in small font. Manual entry is displayed in large font and causes a recalculation of Gross Weight or Fly Away Height depending on which data was being simulated. If the default value is not available or its value exceeds the range of computation, the advisory WIND NOT VALID will appear. Upon manual entry, or pilot clearance of the message, or exiting the page, the advisory will disappear.

OGE CEILING (5R): Displays the Out of Ground Effects Ceiling height. This is the minimum altitude at which the ground effect is no longer felt (lift increases due to the ground). This value is calculated from the entered parameters and cannot be modified by the user.

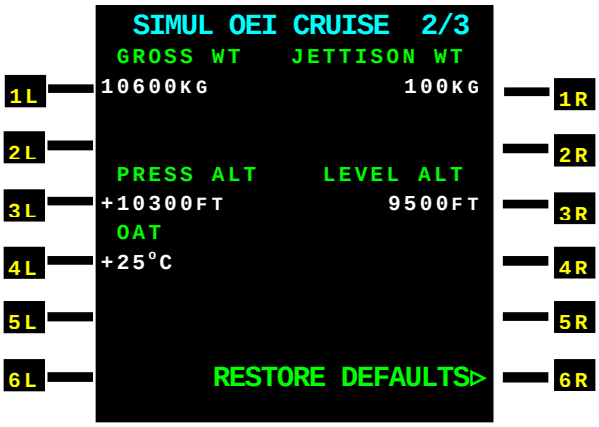
RESTORE DEFAULTS [6R]: Restores the default values for GROSS WT, PRESS ALT, OAT, and WIND. Fly Away Height and One Engine Inoperative Out of Ground Effect Weight are re-calculated.

SIMUL OEI CRUISE 2/3 page (if SIMUL configured and RTE2 configured)
SIMUL OEI CRUISE 2/2 page (if SIMUL configured only)

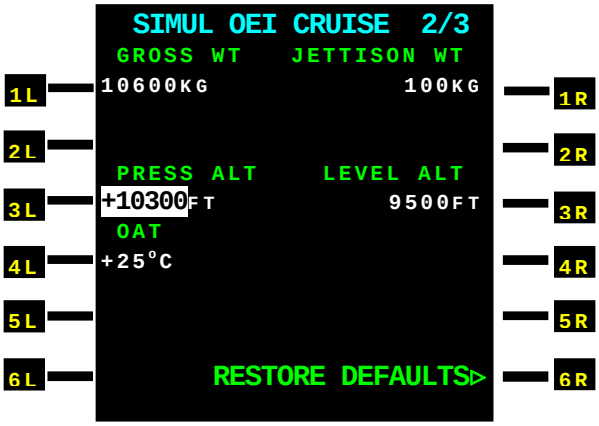
Display SIMUL OEI CRUISE 2/3 or 2/2 page by pressing [INIT REF], [NEXT] and <SIMULATE> and [NEXT].

The SIMUL OEI CRUISE page is used to perform performance simulations with one engine inoperative during cruise operation. Star (*) symbols will be displayed and the advisory FUNCTION NOT COMPUTED message will appear when calculated values exceed the permitted range. Fields will be left empty when default values are not available.

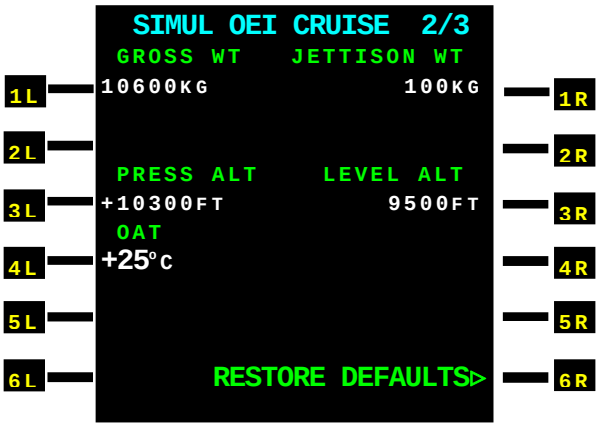
A. Default Display:



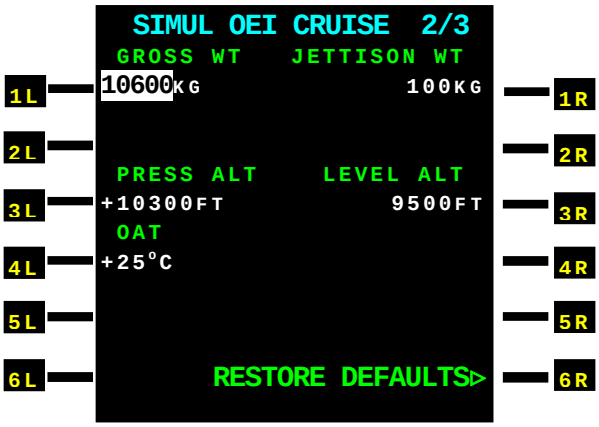
B. Display after manual entry of Pressure Altitude:



C. Display after manual entry of Outside Air Temperature:



D. Display after manual entry of Gross Weight:



GROSS WT [1L]: Total aircraft gross weight. The validity range is specified in the loaded OEI model data tables. Initially displays in normal video the current active value per the FUEL 1/2 page. May be manually overwritten for simulation causing the value to appear in reverse video and forcing the calculation of a new jettison weight and level altitude. If the default value is not available or its value exceeds the range of computation, the advisory GROSS WT NOT VALID message will appear. Upon manual entry, or pilot clearance of the message, or exiting the page, the advisory will disappear.

JETTISON WT [1R]: Display of weight to drop in order to maintain the current altitude.

PRESS ALT [3L]: Pressure altitude. Valid range -2000 ft to +12000ft. Defaults to the current pressure altitude in normal video. Manual entry is displayed in reverse video and causes a recalculation of Gross Weight and Fly Away Height depending on which data was being simulated as well as a recalculation of One Engine Inoperative Out of Ground Effect Weight. If the default value is not available or its value exceeds the range of computation, the advisory PRESS ALT NOT VALID message will appear. Upon manual entry, or pilot clearance of the message, or exiting the page, the advisory will disappear.

LEVEL ALT [3R]: Display of maximum altitude after engine loss if no weight is dropped.

OAT [4L]: Outside Air Temperature. Valid range -40°C to +50°C. Defaults to the current temperature in small font. Manual entry is displayed in large font and causes a recalculation of gross weight or fly away height depending on which data was being simulated as well as a recalculation of one engine inoperative out of ground effect weight. If the default value is not available or its value exceeds the range of computation, the advisory AIR TEMP NOT VALID message will appear. Upon manual entry, or pilot clearance of the message, or exiting the page, the advisory will disappear.

RESTORE DEFAULTS [6R]: Restores the default values for GROSS WT, PRESS ALT, and OAT. Jettison Weight and Level Altitude are re-calculated.

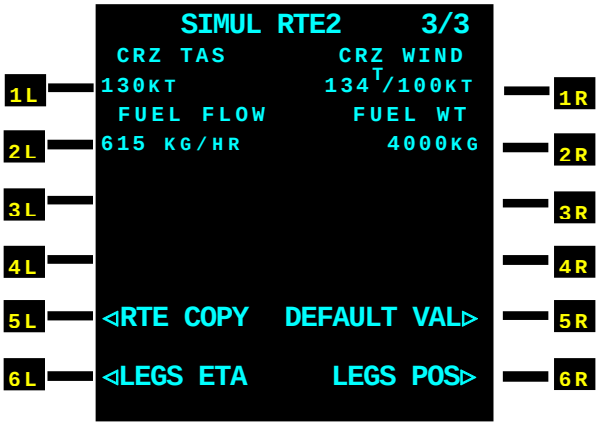
SIMUL RTEx 3/3 page or 1/1 (if SIMUL PG and RTE2 is configured)

Display SIMUL RTE x 3/3 or 1/1 page by pressing [INIT REF], [NEXT] and <SIMULATE> and [PREV].

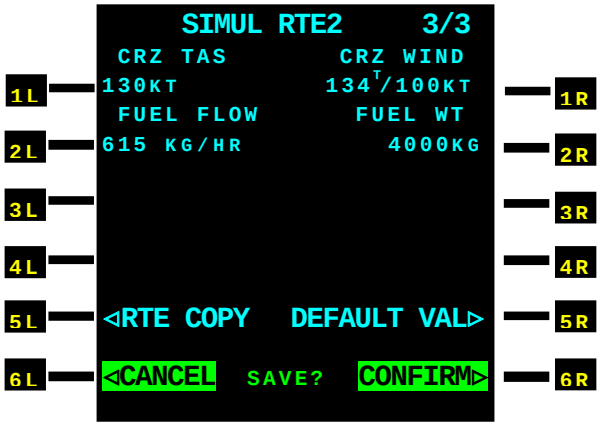
The SIMUL RTEx page enables the user to use a simulated ground speed, TAS or wind and simulated fuel weight/flow inputs in order to perform ETA/EFA computations for the inactive route.

NOTE: This page is not accessible when ACTIVATE was selected (but not executed) on the active or the inactive route (active or inactive route in MOD). Also, this page is displayed in monochrome cyan since it is only applicable to the inactive route. RTEx can correspond to RTE1 or RTE2 based on which route is the inactive route.

A. Normal format:



B. *RTE COPY was selected*:



CRZ TAS [1L]: Display or entry of the simulated/default cruise TAS value. A simulated TAS value is displayed in large font. The range of entry is 0-999 Knots. A default TAS value is displayed in medium font. When the aircraft is on the ground, the default cruise TAS is the TAS specified on the PLAN DATA page. When the aircraft is in the air, the default cruise TAS is the actual aircraft TAS. Entering DELETE resets the field to its default value.

CRZ WIND [1R]: Display or entry of the simulated/default cruise wind value. A simulated wind value is displayed in large font. The range of entry is from 0-200 Knots. A default wind value is displayed in medium font. When the aircraft is on the ground the default cruise wind is the wind specified on the PLAN DATA page. When the aircraft is in the air, the default cruise wind is the actual wind. Entering DELETE resets the field to its default value.

FUEL FLOW [2L]: Display or entry of the simulated/actual rate of fuel consumption. A simulated fuel flow value is displayed in large font. The range of entry is from 0-32728 kg/hr or 0-72153 lb/hr. A default fuel flow value is displayed in medium font. When the rate of fuel consumption is available from the fuel sensor, the default fuel flow is provided by the fuel sensor, otherwise, the default fuel flow value is 615 kg/hr (1356 lb/hr). Entering DELETE resets the field to its default value.

FUEL WT [2R]: Display or entry of the simulated/actual fuel weight excluding reserve. A simulated fuel weight value is displayed in large font. The range of entry is from 0-655360 kg or lb. When the fuel weight is available from the fuel sensor, the default fuel weight is provided by the fuel sensor, otherwise, the default fuel weight value is 4000 kg (8818 lb). Entering DELETE resets the field to its default value.

RTE COPY [5L]: Copies the active route into the inactive route. When RTE COPY is selected LSK 6L is replaced with "<CANCEL", LSK 6R is replaced with "CONFIRM>" and "SAVE?" is displayed.

NOTE: The previous inactive route is deleted and un-retrievable.

DEFAULT VAL [5R]: Overrides the user-entered simulated settings (CRZ TAS, CRZ WIND, FUEL FLOW and FUEL WT) with the on-ground or in-air default settings.

LEGS ETA [6L]: Access to RTE x LEGS ETA 1/X page.

NOTE: If the inactive route does not exist, the CMA-9000 FMS copies the active route into the inactive route when the inactive route LEGS ETA/EFA page is accessed in order to perform simulated ETA/EFA computations. If an inactive route already exists, the CMA-9000 FMS allows the pilot to copy the active route into the inactive route in order to perform simulated ETA/EFA computations using the active route. The previous inactive route is overwritten and irretrievable.

CANCEL [6L]: {If ERASE MODS is configured as CONFIRM} Cancels the changes made to the inactive route.

LEGS POS [6R]: Access to RTE x LEGS POS 1/X page.

CONFIRM [6R]: {If ERASE MODS is configured as CONFIRM} Confirm the changes made to the inactive route.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

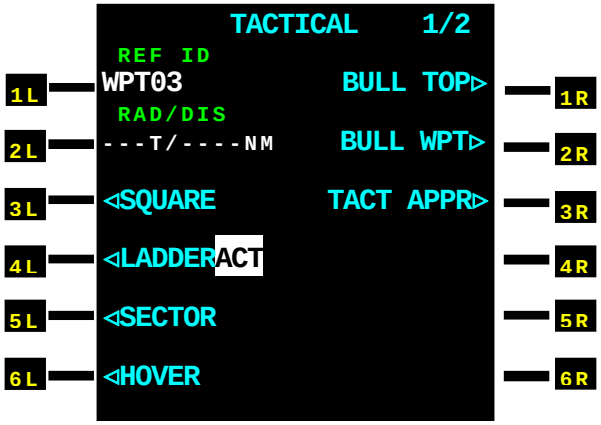
TACTICAL X/Y page (if configured)

These pages are only accesible if the TACT key is configured. Otherwise, the name of the page is DES+SAR.

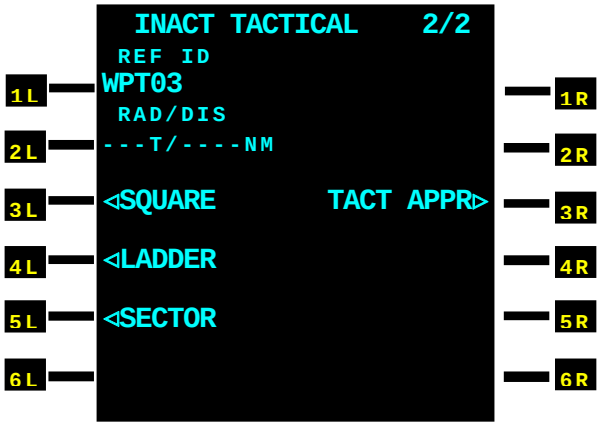
[TACT]
[INIT/REF], <BULLS EYE>, [NEXT], <TACTICAL>
[INIT/REF], <WPT DATA>, <TACTICAL>
[INIT/REF], <WPT LISTS>, <DMAP WPT>, <TACTICAL>
[INIT/REF], <WPT LISTS>, <SARSAT WPT>, <NNN##>, <BULLS TGT>, <TACTICAL>
[INIT/REF], <WPT LISTS>, <PREDEF WPT>, <TACTICAL>
[INIT/REF], <WPT LISTS>, <PREDEF WPT>, [NEXT], <TACTICAL>
[INIT/REF], <WPT LISTS>, <PREDEF WPT>, [PREV], <TACTICAL>
[INIT/REF], <NEAREST>, <AIRPORT>, <TACTICAL>
[INIT/REF], <NEAREST>, <VHF NAV>, <TACTICAL>
[INIT/REF], <NEAREST>, <VHF NDB>, <TACTICAL>
[INIT/REF], <NEAREST>, <VHF CUSTOM WPT>, <TACTICAL>
[INIT/REF], <NEAREST>, <USER WPT>, <TACTICAL>
[INIT/REF], <MISSION>, <TACTICAL>
[MARK] , <TACTICAL>
[MARK], [NEXT] , <TACTICAL>
[MARK], [PREV] , <TACTICAL>
[RADIO], <DF>, <SARSAT WPT>, <NNN##>, <TACTICAL>

These pages give access to the configured tactical functions. Pages 1/2, 1/4 and 2/4 are used for the active route and pages 2/2, 3/4 and 4/4 are used for the inactive route. When the TACT key or the TACTICAL prompt is selected and the inactive route is in modification, the INACT TACTICAL 2/2 or 3/4 will be displayed. When an inactive page is displayed, all text are displayed in cyan.

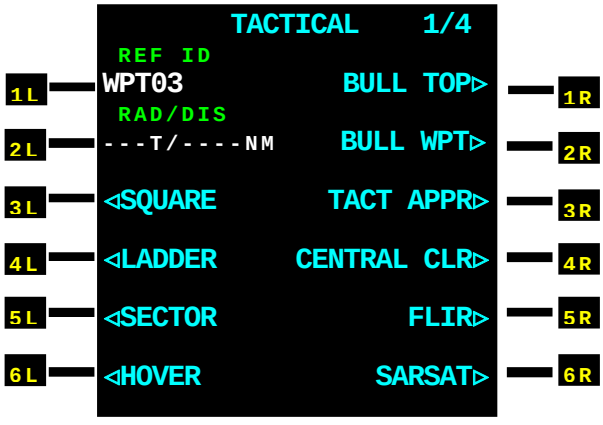
Page display example when 2 pages (one for the active and one for the inactive route) are used. In this example, SQUARE, LADDER, SECTOR, HOVER, BULLS EYE and TACT APPR are configured.



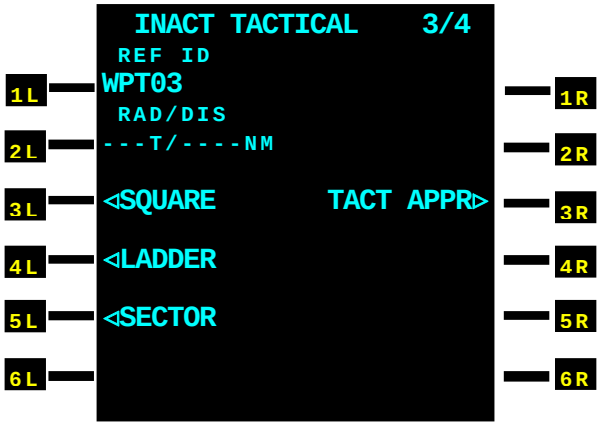
Display of the inactive tactical page when 2 pages set is used.

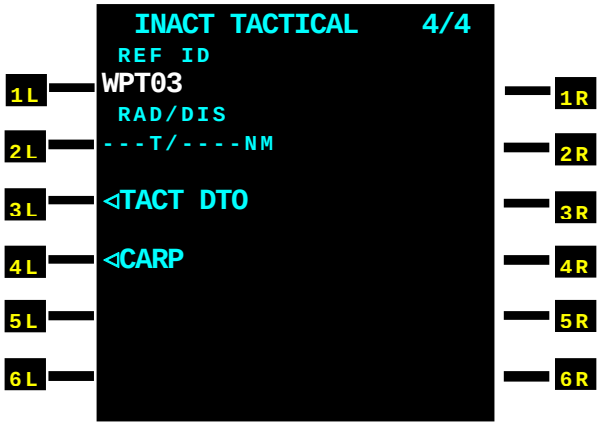


Page display example when 4 pages (two for the active and two for the inactive route) are used. In this example, SQUARE, LADDER, SECTOR, HOVER, BULLS EYE, CENTRAL CLR, FLIR and TACT APPR are configured.



Display of the inactive tactical page when 4 pages set is used.





PAGE NUMBER [title]:

X: When all options are configured on one page only, X varies between 1 and 2. The first page is for the active route and the second page is for the inactive route. When the options are configured on two tactical pages, X varies between 1 and 4. The first 2 pages are for the active route and the second 2 pages are for the inactive route.

Y: When all options are configured on one page, Y equals to 2. If the options are configured on 2 tactical page, the value of Y is 4..

INACT [title]: "INACT" string is displayed to indicate that the inactive route is displayed, which is for page 2/2 and 4/4.

REF ID [1L]: Storage of the reference identifier. If there is a valid position in the scratchpad when the page is opened, then the FMS will create a temporary waypoint at that position and places the identifier in this field. Moving waypoint identifier is not allowed on this field.

RAD/DIS [2L]: The RAD/DIS combination allows the pilot to position a waypoint relative to the REF ID. The relative position is used to create a temporary waypoint when a new procedure is selected. Creating a temporary waypoint from a moving waypoint is not allowed. By default, the RAD/DIS fields show dashes.

[3L] to [6L] and [1R] to [6R]:
These keys permit to access one of the following pages according to the TACTICAL PG CONFIG option configuration:

BULL TOP: Access the BULLS EYE 1/3 page. This prompt is not displayed for the inactive (INACT) TACTICAL page(s).

BULL TGT:
Case i. NO TACTICAL REF ID defined : Access the BULLS EYE 2/3 page.
Case ii. TACTICAL REF ID defined : Access the BULLS EYE 2/3 page and put the TACTICAL waypoint coordinates as default BULLS EYE TARGET waypoint coordinates and the TACTICAL REF ID waypoint as the REF waypoint.
This prompt is not displayed for the inactive (INACT) TACTICAL page(s).

BULL WPT: Access the BULLS EYE 3/3 page. This prompt is not displayed for the inactive (INACT) TACTICAL page(s).

CARP:
Case i. No TACTICAL REF ID defined and no CARP procedure exists in the flight plan: Brings up the LEGS page with CRP01/C in the scratchpad.
Case ii. No TACTICAL REF ID defined and a CARP procedure exists in the flight plan: Brings up the CARP PLAN 1/3 page.
Case iii. TACTICAL REF ID defined and no CARP procedure exists in the flight plan: Brings up the LEGS page with the identifier and /C qualifier in the scratch pad allowing entry in the flight plan.
Case iv. TACTICAL REF ID defined and different from the PI of the existing CARP procedure: Brings up the CARP PLAN 1/3 page with the identifier in the scratchpad.
Case v. TACTICAL REF ID defined and has the same identifier as PI of the existing CARP procedure: Brings up the CARP PLAN 1/3 page.

CENTRAL CLR: Access the CENTRAL CLEAR? page.

FLIR: Access the PREDEF WPT 3/3 page (FLIR dedicated page). This prompt is not displayed for the inactive (INACT) TACTICAL page(s).

HOVER:
Case i. No TACTICAL REF ID defined : Brings up the Hover page. If a HOVER pattern is already in the selected route, the active data is displayed.
Case ii. TACTICAL REF ID defined : Brings up the Hover page with the identifier stored in the ID field (even when a Hover pattern is currently active).It is not currently possible to enter a Hover pattern in any route location other than the first; hence, the LEGS page is not displayed as for other leg types.
This prompt is not displayed for the inactive (INACT) TACTICAL page(s).

LADDER: The status "ACT" (reverse video white) is appended to the prompt if an activated ladder search pattern is in the flight plan.
Case i. No TACTICAL REF ID defined : Brings up the LADDER page.
Case ii. TACTICAL REF ID defined : Brings up the LEGS page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

MISSION: Access the MISSION 1/1 page.

SARSAT: Access the SARSAT WPT page. This prompt is not displayed for the inactive (INACT) TACTICAL page(s).

SECTOR: The status "ACT" (reverse video white) is appended to the prompt if an activated sector search pattern is in the flight plan.
Case i. No TACTICAL REF ID defined : DES+SAR point defined : Brings up the SECTOR page.
Case ii. No TACTICAL REF ID defined : Brings up the LEGS page with the identifier and /S qualifier in the scratchpad allowing entry anywhere in the flight plan.

SQUARE: The status "ACT" (reverse video white) is appended to the prompt if an activated square search pattern is in the flight plan.
Case i. No TACTICAL REF ID defined : Brings up the SQUARE page.
Case ii. TACTICAL REF ID defined : Brings up the LEGS page with the identifier and /S qualifier in the scratchpad.

TACT APPR :
Case i. No TACTICAL REF ID defined and no previously defined tactical approach Runway Threshold Waypoint: Brings up the default LEGS page with the /A qualifier in the scratchpad allowing entry in the flight plan.
Case ii. No TACTICAL REF ID defined and previously defined the tactical approach Runway Threshold Waypoint: Brings up the TACTICAL APPR page.
Case iii. TACTICAL REF ID is already defined: Brings up the default LEGS page with the identifier with

TACTICAL DTO:
Case i. No TACTICAL REF ID defined : Brings up the LEGS page with only /T in the scratchpad.
Case ii. TACTICAL REF ID defined : Brings up the LEGS page with the identifier and /T in the scratchpad.

TACTICAL APPR 1/3 page (if configured)

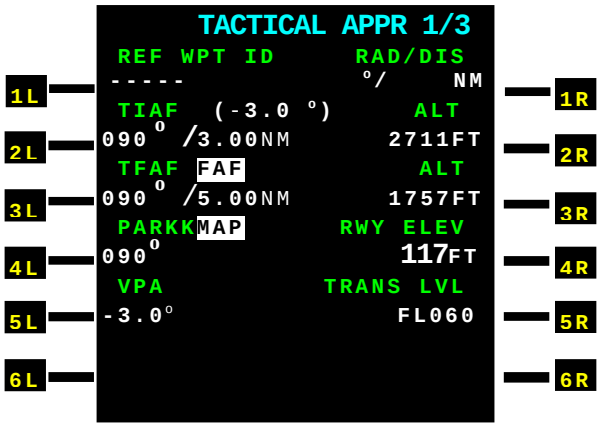
Display TACTICAL APPR 1/3 page:
1. For the active route press[TACT], <TACT APPR> if TACT key is configured and TACT APPR configured on the TACTICAL page.
   [INIT/ REF], <DES+SAR > or <TACTICAL>, [NEXT], <TACT APPR> if a valid tactical approach waypoint had previously been entered.
   For the inactive route press [TACT], <TACT APPR>, [NEXT], if TACT key is configured and TACT APPR configured on the TACTICAL page.
   [INIT/ REF], <DES+SAR> or <TACTICAL>, [PREV], <TACT APPR> if a valid tactical approach waypoint had previously been entered The REF ID field of the TACTICAL page can optionally be used. If the crew chooses to enter the REF ID field on the TACTICAL page and then select TACT APPR, then inserting REF ID field tactical approach runway threshold waypoint can subsequently be entered into the flight plan by using the method described in b) or c).
   If a valid tactical approach runway threshold waypoint had not previously been entered, then upon selecting the TACT APPR prompt, the FMS will automatically insert a /A in the scratchpad and display LEGS page 1/X. After inserting this tactical approach runway threshold waypoint into the flight plan, the TACTICAL APPR page is displayed.
   If a valid tactical approach runway threshold waypoint had previously been entered and the tactical approach runway threshold waypoint has been sequenced in the flight plan, then the tactical approach page showing the previously entered parameters can be displayed again by selecting TACT APPR> on TACTICAL page.

2. Automatically accessed whenever a proposed tactical approach has been entered on the LEGS page. This is done by inserting a waypoint,, say ABCDE, as the tactical approach runway threshold waypoint by typing ABCDE/A and inserting this into the LEGS page flight plan at the desired location
3. /A is entered on existing tactical approach on LEGS page. The crew manually enter a /A in the scratchpad and then inserts this at the LSK location next to the pseudo-MAP (e.g. Tactical Approach Runway Threshold Waypoint) on the LEGS page.

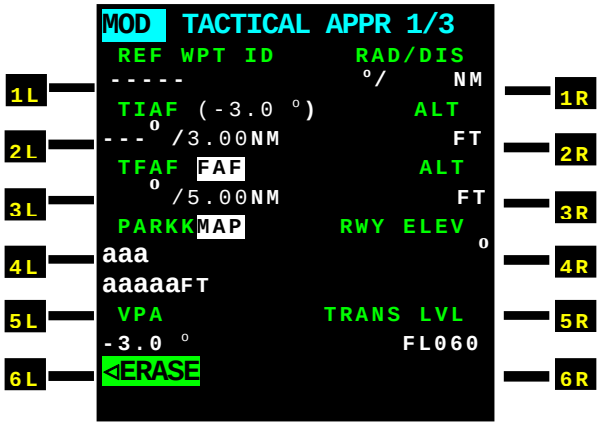
The TACTICAL APPR page displays the parameters defining the tactical approach procedure.

NOTE: This page is only available if the TACTICAL APPROACH option is configured.

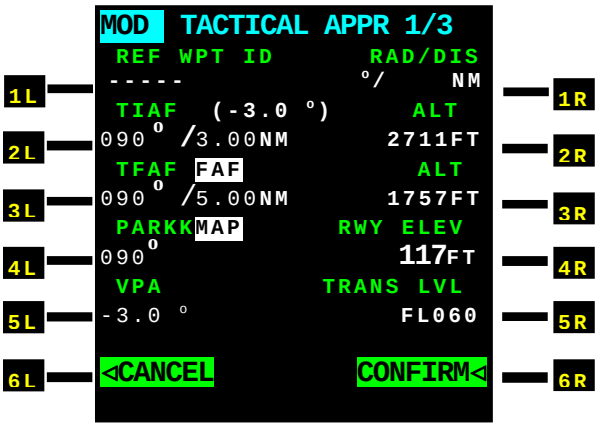
A. Default page:



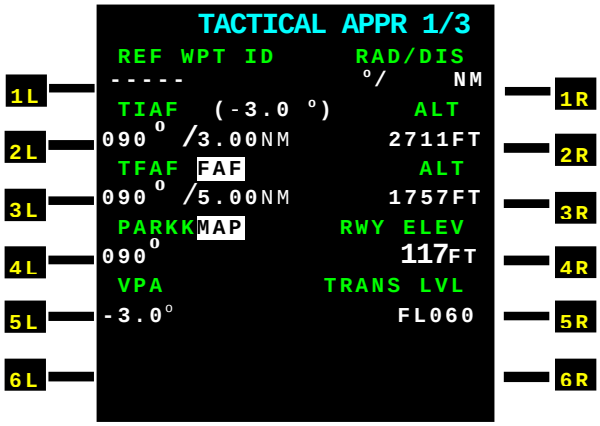
B. Prior to EXECution:



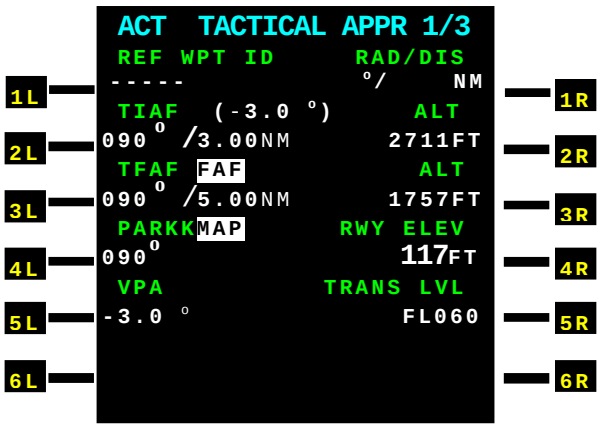
C. If "ERASE MODS" option is set to "CONFIRM"



D. After EXECution, but not tracking the tactical approach profile:

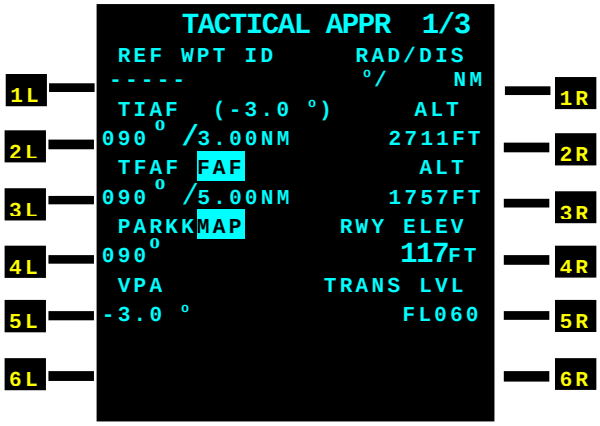


E. When VNAV tactical approach is active:



F. nactive tactical approach page prior to confirmation:

G. Inactive tactical approach page after confirmation:



ACT/MOD/" " (title): ACT will appear when the active waypoint is part of the tactical approach procedure. MOD will appear when the crew is in the process of modifying the flight plan. A blank field will indicate the tactical approach has been defined but is not yet active.

REF WPT ID [1L]: This field will allow the crew to enter a reference waypoint identifier in order to set the position of the TIAF waypoint in the horizontal plane. Upon entry of the REF WPT ID, the fields RAD/DIS are set to 0 deg/0.00 nm and the TIAF waypoint is located at the REF WPT ID position. The valid range for radial and distance are angle between 0 and 360 degrees and distance between 0 and 999 nm respectively. When EXEC button is pressed or DELETE is entered on this field, the REF WPT ID is deleted. If the reference position does locate the TIAF waypoint outside the permitted range, an advisory message will be displayed in the scratchpad indicating that the TIAF location is invalid.

TIAF [2L]: This field will allow the crew to select the Initial Approach Course and the TIAF-to-TFAF distance.

i) Initial Approach Course:
By default, the Initial Approach Course is displayed as dashes if no course is entered at the LSK 4L. When the Final Approach Course (LSK 4L) is entered, the Initial Approach Course is updated with its value. Refer to SWOP40603 for the minimum, maximum and default value of IAC.

ii) TIAF-to-TFAF distance:
The distance is left justified and displayed with 4 characters. A slash "/" must be typed before this value in the scratch pad followed by the desired distance. Refer to SWOP40603 for the minimum, maximum and default value of of
TIAF-toTFAF distance.

IAA (2L): This field will display the FMS computed Intermediate Approach Angle. This angle shown in this field is display only and cannot be modified by the operator. The value is left justified and always displayed with one decimal. Refer to SWOP40603 for the minimum, maximum and default value of IAA.

TFAF [3L]: This field will allow the crew to visualize the Final Approach Course to change the TFAF-to-TMAP distance.

i) Final Approach Course:
The Final Approach Course is the same value that is entered at the LSK 4L.

ii) TFAF-to-MAP distance:
The distance is left justified and displayed with 4 characters. A slash "/" must be typed before this value in the scratch pad followed by the desired distance. Refer to SWOP40603 for the minimum, maximum and default value of TFAF-to-MAP distance.

FINAL APPROACH COURSE (FAC) [4L]: This field will allow the crew to enter the Final Approach Course, which is the runway course. This field is a mandatory entry, when no course has been entered, boxes are displayed ([][][]). This field is always displayed in white large font. The field title display the runway threshold waypoint ident (MAP waypoint). Value will be between 0 and 360 degrees inclusively.

VPA [5L]: The FMS will allow crew entry/modification of the VPA (Vertical Path Angle) in degrees required to define the tactical approach geometry. The value is left justified and always displayed with one decimal. Refer to SWOP40603 for the minimum, maximum and default value of the VPA. VPA entries can be either positive or negative. As such, the FMS will show the value as a negative number on the TACTICAL APPR page and will (for internal computational purposes) accordingly change the sign convention to properly
define the geometry.

ERASE [6L]: When selected, the FMS will allow the crew to erase any route modifications associated to tactical approach
selections.

CANCEL [6L]: When selected, the FMS will cancel changes made to the inactive route (or active route if the *'ERASE*
MODS' option is set to 'CONFIRM').

RAD/DIS [1R]: Radial/distance from the reference position to the desired TIAF waypoint position. The values are blanked, when no REF WPT ID is defined, otherwise zeros are displayed as the default values. No entries are allowed, when the fields are blanked. Manual entry automatically updates the TIAF location. RAD and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated.

ALT [2R]: This field will allow the crew to enter the altitude constraint at the TIAF in ft. The entry is valid as long as the computed IAA is within the permitted range.
ALT [3R]: This field will display as well as allow the crew to enter the altitude constraint at the TFAF in ft. The entry is valid as long as the computed VPA and IAA are within the permitted range.

RWY ELEV [4R]: This field is a mandatory crew entry of the runway threshold elevation for the tactical approach. This field is used in defining the tactical approach geometry. The valid range for this field is -1000 to 25000. If the selected tactical approach runway threshold waypoint entered by the crew exists in the user database as a user airport waypoint, then the FMS will automatically store its corresponding elevation value into this field. The user database's airport waypoint value for the field elevation will then become the default value for this entry.

TRANS LVL (5R): This field will display the current transition level defined on the PLAN DATA page. This field is a display only field.

CONFIRM [6R]: When selected, the FMS will allow the crew to confirm tactical approach changes made to the inactive route (or active route if the *'ERASE MODS' option is set to 'CONFIRM').*

TACTICAL APPR 2/3 page (if configured)

Display TACTICAL APPR 2/3 page:

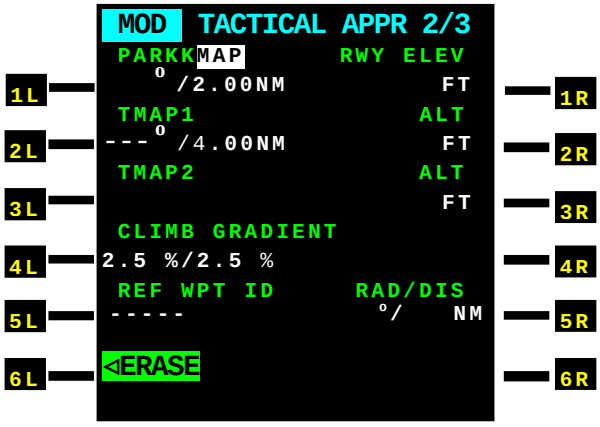
1. press [TACT], <TACT APPR>, [NEXT] if TACT key is configured and TACT APPR configured on the TACTICAL page.

2. [INIT/ REF], <DES+SAR> or <TACTICAL>, [NEXT], <TACT APPR>, [NEXT] if a valid tactical approach waypoint had previously been entered.

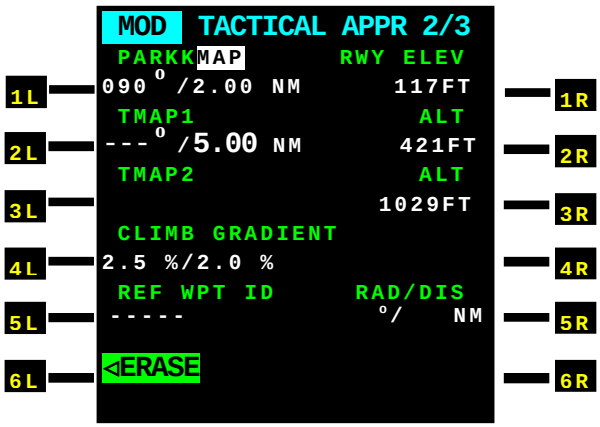
3. For the inactive route:
   [TACT], <TACT APPR>, [NEXT] if TACT key is configured and TACT APPR configured on the TACTICAL page.
   [INIT/ REF], <DES+SAR> or <TACTICAL>, [PREV], <TACT APPR>, [NEXT] if a valid tactical approach waypoint had previously been entered.

This page is used to customize the tactical missed approach when the tactical approach is created manually. When the missed approach point (MAP) has not been defined, only the default parameters are displayed on the page. Once the MAP course and elevation have been defined from the TACTICAL APPR 1/3 page, the altitudes constraints and leg courses are computed and displayed.

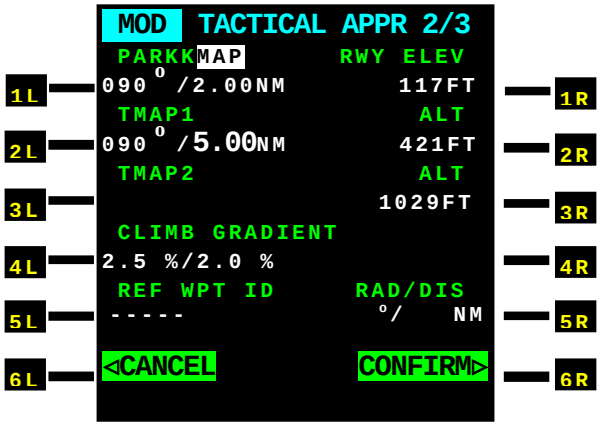
A. Default page:



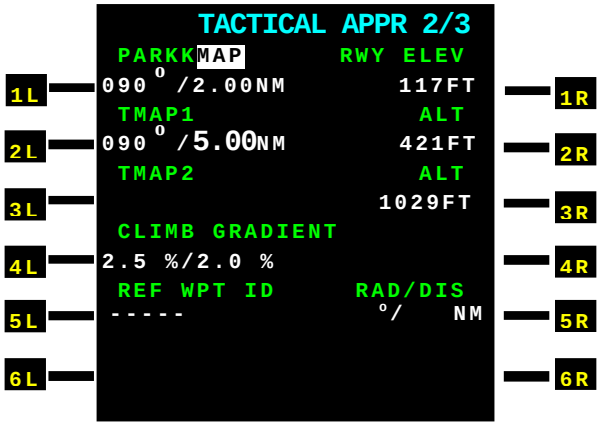
B. After modification of the TMAP1 to TMAP2 distance, but prior to execution:



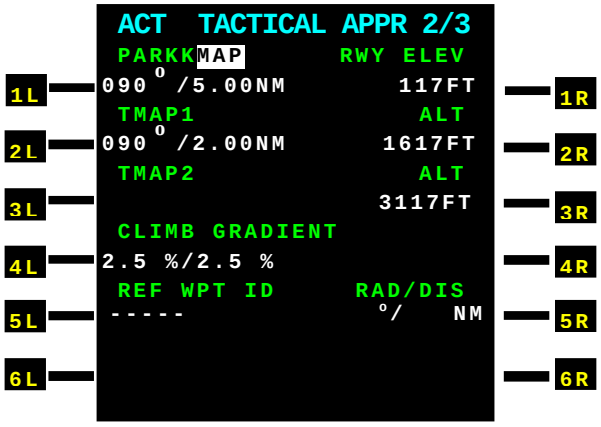
C. If "ERASE MODS" option is set to "CONFIRM":



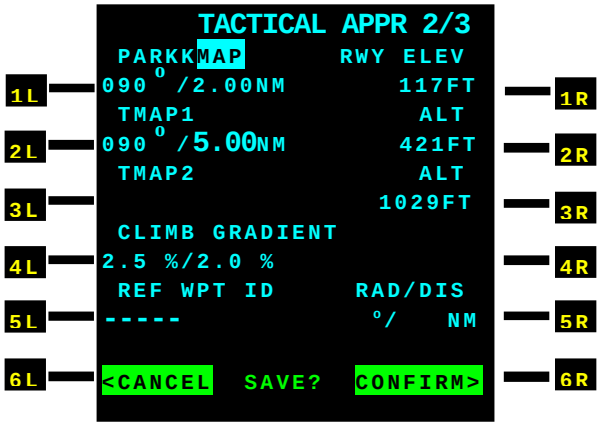
D. After EXECution, but not tracking the tactical approach profile:



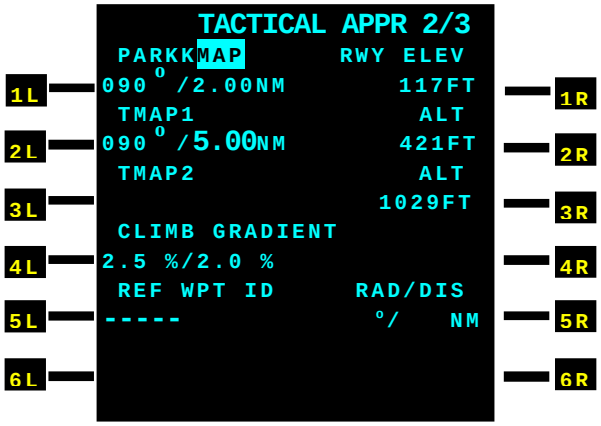
E. When VNAV tactical approach is active:



F. Inactive tactical approach page prior to confirmation:



G. Inactive tactical approach page after confirmation:



ACT/MOD/" " (title): ACT will appear when the active waypoint is part of the tactical approach procedure. MOD will appear when the crew is in the process of modifying the flight plan. A blank field will indicate the tactical approach has been defined but is not yet active.

WAYPOINT IDENTIFIER [1L]: This field displays on the title, the ruway threshold waypoint (MAP) identifier. This field will allow the crew to review the final approach (runway) course and edit the MAP-to-TMAP1 distance. The distance is left justified and displayed with 4 characters. To enter a value, a slash ("/") must be typed in the scracth pad first followed by the desired distance.

TMAP1 [2L]: This field will allow the crew to enter the Turn Missed Approach Course and the TMAP1-to-TMAP2 distance in nm.

i) Missed Approach Course
   By default, dashes are display on the course entry section of the field to indicate that the information is optional. If nothing is entered, upon execution of the flight plan, the value of the Final Approach Course course is copied to this field to create a straight segment.
ii) TMAP1-to-TMAP2 distance
   A slash ("/") must be typed before entering a value for the TMAP1-TMAP2 distance. The distance is left justified and displayed with 4 characters.

TMAP2 (3L): This field displays the TMAP2 text in the title which is the second missed approach reserved identifier.

CLIMB GRADIENT (4L): Displays the climb gradient of the vertical path defined by the MAP-to-TMAP1 altitude constraint/distance and the climb gradient defined by the TMAP1-to-TMAP2 altitude constraint/distance. The two climb gradients are separated by a slash ("/"). No input is allowed on this field. The values displayed are left justified and displayed with one decimal. Refer to SWOP40603 for the minimum, maximum and default value of the Climb Gradient.

REF WPT ID [5L]: This field will allow the crew to enter a reference waypoint identifier in order to set the position of the TMAP2 waypoint in the horizontal plane. Upon entry of the REF WPT ID, the field RAD/DIS are set to 0deg/0.00 nm and the TMAP2 waypoint is located at the REF WPT ID position. The Turn Missed Approach Course and TMAP1-to-TMAP2 distance is then computed based on the REF WPT ID and the vertical profile is updated by recomputing the TMAP1-TMAP2 climb angle. When EXEC button is pressed or DELETE is entered on this field, the REF WPT ID is deleted.

ERASE [6L]: When selected, the FMS will allow the crew to erase any route modifications associated to tactical approach selections.

CANCEL [6L]: When selected, the FMS will cancel changes made to the inactive route (or active route if the *'ERASE MODS' option is set to 'CONFIRM').*

RWY ELEV (1R): This field displays the runway elevation in feet entered on the TACT APPR 1/3 page. No entry is allowed on this
field.

TMAP1 ALT [2R]: This field displays and allows entry of the altitude constraint at the first missed approach point (TMAP1). The entry is valid as long as the computed climb gradients are within the permitted range.

TMAP2 ALT [3R]: This field displays and allows entry of the altitude constraint at the second missed approach point (TMAP2). The entry is valid as long as the computed Climb angle 2 is within the permitted range.

RAD/DIS [5R]: Radial/distance from the reference position to the desired TMAP2 waypoint position. The values are blanked, when no REF WPT ID is defined, otherwise zeros are displayed as the default values. No entries are allowed, when the fields are blanked.
Manual entry automatically updates the TMAP2 location. RAD and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated.

CONFIRM [6R]: When selected, the FMS will allow the crew to confirm tactical approach changes made to the inactive route (or active route if the *'ERASE MODS' option is set to 'CONFIRM').*

TACTICAL APPR 3/3 page (if configured)

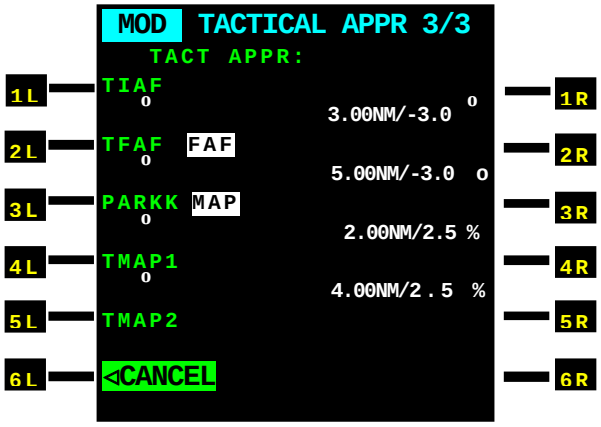
Display TACTICAL APPR 3/3 page by pressing

1. [INIT/REF], <DES+SAR> or <TACTICAL>, [NEXT], <TACT APPR>, [PREV] if TACT key is configured and TACT APPR configured on the TACTICAL page.

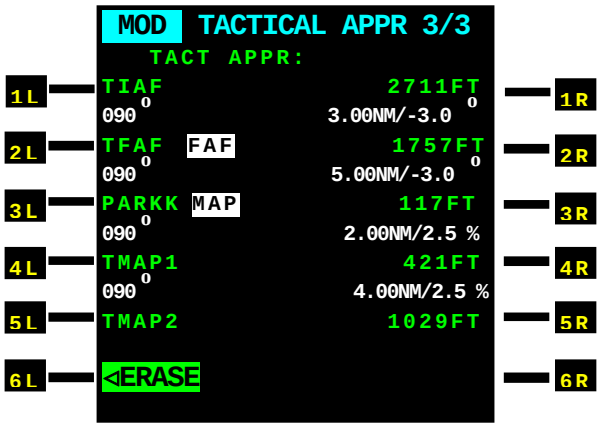
2. Or, from DEP/ARR INDEX 1/1 page, <ARR>, <TACT APPR> if a valid tactical approach is selected in the ARRIVALS page {If the TACT key is configured)} [TACT], TACT APPR>, [PREV]

This page is used to review the complete tactical approach procedure. No entry is allowed on this page. When a tactical approach is loaded from the tactical approach database, a name is displayed next to the "TACT APPR:" field, otherwise, no name is displayed.

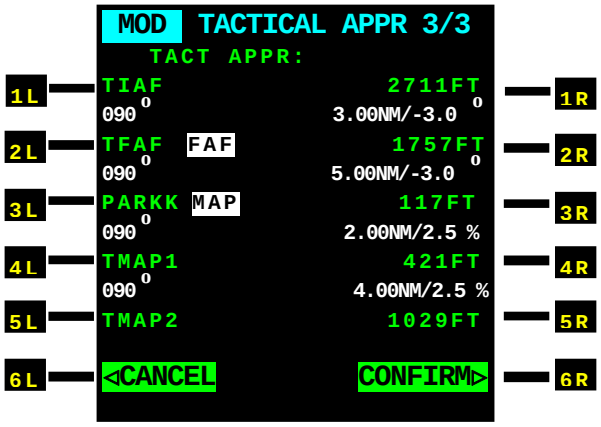
A. Display of default page presented with the default tactical approach parameters:



B. Display prior to EXECution:



C. Display if "ERASE MODS" option is set to "CONFIRM":

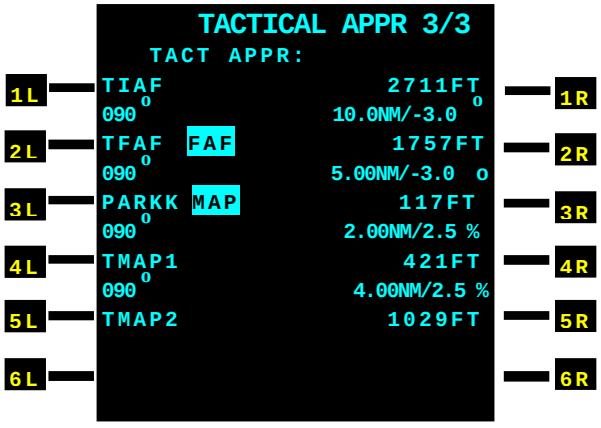


D. Display after EXECution, but not tracking the tactical approach profile:

E. Display when VNAV tactical approach is active:

F. Display of inactive tactical approach page prior to confirmation:

G. Display of inactive tactical approach page after confirmation:



ACT/MOD/" " (title): ACT will appear when the active waypoint is part of the tactical approach procedure. MOD will appear when the crew is in the process of modifying the flight plan. A blank field will indicate the tactical approach has been defined but is not yet active.

TACT APPR (1L,1R): This field displays the tactical approach name loaded from the tactical approache database. The approach name is limited to 7 characters and it is displayed in small white font for the active route and cyan for the inactive route. When the tactical approach is created manually from the FMS MCDU interface, the tactical approach name is blank but the title remains display.

TIAF (1L): This field displays the Initial Approach Course.

TFAF (2L): This field displays the Final Approach Course.

MAP (3L): This field displays the Final Approach Course (equals to runway course).

TMAP1 (4L): This field displays the Turn Missed Approach Course.

TMAP2 (5L): This field displays only the "TMAP2" text to easily associate the altitude display at LSK 5R with the TMAP2 waypoint.

ERASE [6L]: When selected, the FMS will allow the crew to erase any route modifications associated to tactical approach selections.

CANCEL [6L]: When selected, the FMS will cancel changes made to the inactive route (or active route if the 'ERASE MODS' option is set to 'CONFIRM').

TIAF ALT/DIS/IAA [1R]: This field displays the altitude constraint in ft at the TIAF waypoint, the distance between the TIAF waypoint and the TFAF waypoint in nm and the Intermediate Approach Angle between those two waypoints. When the altitude constraint is temperature compensated, it is displayed in inverse video white.
Note: that when the vnav approach is active and a VDEV is presented in the VNAV APPR 1/1 page, this VDEV ***is not*** *relative to this IAA but to the VPA defined for the TFAF-MAP segment.*

TFAF ALT/DIS/VPA [2R]: This field displays the altitude constraint in ft at the TFAF waypoint, the distance between the TFAF waypoint and the MAP waypoint in nm and the Vertical Path Angle between those two waypoints. When the altitude constraint is temperature compensated, it is displayed in inverse video white.

MAP ALT/DIS/GRADIENT [3R]: This field displays the altitude constraint in ft at the MAP waypoint, the distance between the
MAP waypoint and the TMAP1 waypoint in nm and the climb gradient between those two waypoints.

TMAP1 ALT/DIS/GRADIENT [4R]: This field displays the altitude constraint in ft at the TMAP1 waypoint, the distance between the TMAP1 waypoint and the TMAP2 waypoint in nm and the climb gradient between those two waypoints.

TMAP2 ALT [5R]: This field displays the altitude constraint in ft at the TMAP2 waypoint.

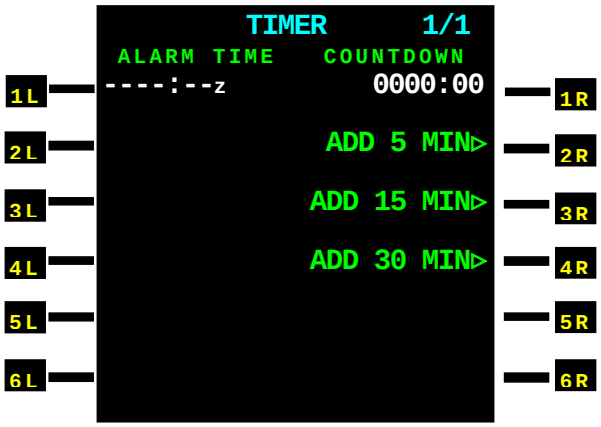
CONFIRM [6R]: When selected, the FMS will allow the crew to confirm tactical approach changes made to the inactive route (or
active route if the *'ERASE MODS' option is set to 'CONFIRM').*

TIMER 1/1 page (if TIMER PG is configured)

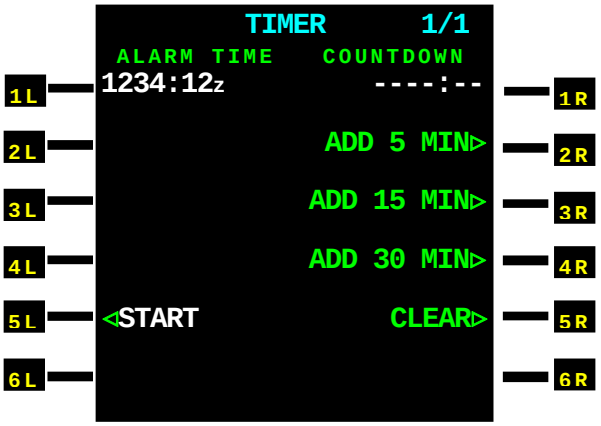
Display TIMER 1/1 page by pressing [INIT REF], [NEXT] and <TIMER>.

The TIMER page is used to generate a "TIMER ALARM" alert message after a user specified alarm time was reached (count-up timer) or a certain time duration has elapsed (countdown timer).

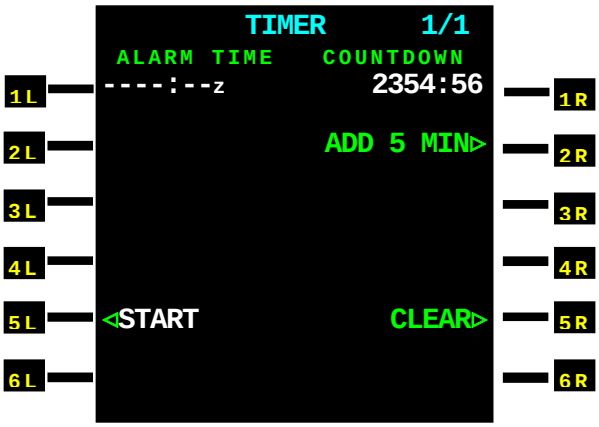
A. Display when no data is entered or after pressing CLEAR:



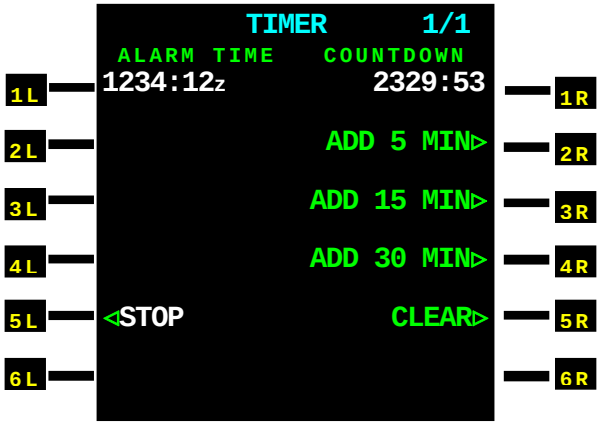
B. Display after an alarm time is entered:



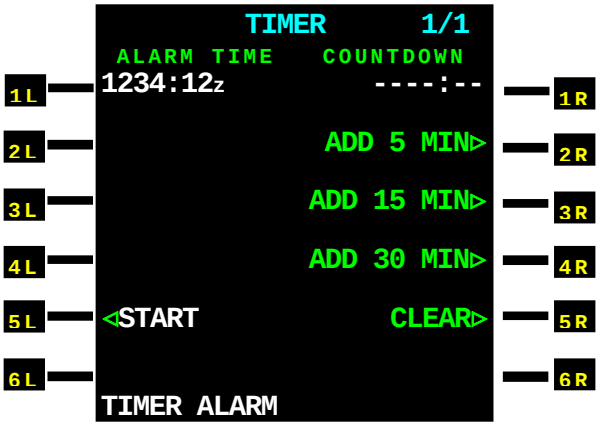
C. Display after a countdown time is entered:



D Display after timer is activated. Countdown decrements:



E. Display after timer alarm triggered:



TITLE: TIMER

ALARM TIME [1L]: Display and entry of a count-up alarm event time (UTC or local time based on SETUP page selection). If a countdown time was entered and activated (with START LSK 5L), the time at which the countdown timer will expire is displayed. Upon data entry when the timer is active, the countdown time is adjusted accordingly. Upon data entry when the timer is not active, the countdown time shows dashes. If the timer is not activated and an alarm time is being displayed, pressing [CLR] puts dashes for the alarm time and sets the countdown time to 0000:00; otherwise, resetting is not permitted and an advisory message is displayed. Entering a non-valid time format or out of range value generates an invalid format or out of range advisory message respectively.

COUNTDOWN [1R]: Time display and entry for countdown timer. Decreases to 0000:00 when the timer is activated and then shows dashes automatically. The allowable data entry range is from 0000:00 to 2359:59. If an alarm time was entered and activated (with START), the time remaining to reach the alarm time is displayed. Upon data entry when the timer is active, the alarm time is adjusted accordingly. Upon data entry when the timer is not active, the alarm time shows dashes. If the timer is not activated and a non-zero countdown time is being displayed, pressing [CLR] sets the countdown time to 0000:00; otherwise, resetting is not permitted and an advisory message is displayed. Entering a non-valid time format or out of range value generates an invalid format or out of range advisory message respectively.

ADD 5 MIN [2R]: Adds 5 minutes to the alarm and/or countdown time, whichever is being displayed. If no alarm or countdown time is being displayed, the countdown time will be set to 5 minutes. Displayed only if adding 5 minutes to the countdown value will not cause it to exceed its maximum range value.

ADD 15 MIN [3R]: Adds 15 minutes to the alarm and/or countdown time, whichever is being displayed. If no alarm or countdown time is being displayed, the countdown time will be set to 15 minutes. Displayed only if adding 15 minutes to the countdown value will not cause it to exceed its maximum range value.

ADD 30 MIN [4R]: Adds 30 minutes to the alarm and/or countdown time, whichever is being displayed. If no alarm or countdown time is being displayed, the countdown time will be set to 30 minutes. Displayed only if adding 30 minutes to the countdown value will not cause it to exceed its maximum range value.

START [5L]: Pressing this softkey activates the timer. Displayed only if an alarm time or non-zero countdown time is being displayed and the timer is not already activated. With the TIMER ALARM alert message set but not cleared, starting the timer removes the alert message.

STOP [5L]: Pressing this softkey deactivates the timer. The countdown time stops decreasing and the alarm time shows dashes. Displayed only if the timer is activated and has not expired.

CLEAR [5R]: Clears the TIMER ALARM alert message (if timer expired), deactivates the timer (if activated), sets the alarm time to dashes and sets the countdown time to 0000:00. Displayed only if the alarm time and/or non-zero countdown time is being displayed.

NOTE: "TIMER ALARM" message will be displayed in the scratchpad when the alarm timer goes off. This is an Alert message type and will not illuminate the MSG annunciator.

TMP UPDATE POS 2/2 (If CARP, PREDEF PG and either EGI or IRS are configured**)**

Display TMP UPDATE POS 2/2 page by pressing:
[INIT/REF], <POS INIT>, <UPDATE POS> and [NEXT] or
[INIT/REF], <WPT LISTS>, <PREDEF WPT> and [NEXT], <UPDATE POS> and [NEXT] or
[INIT/REF], <NAV STATUS>, <INS>, <UPDATE POS> and [NEXT]
[PROG], [PREV] and <MARK>

This page is used for applying temporary position offsets on CARP procedure waypoint. The position update is performed by a mark on top operation. The mark on top operation can be performed by over flying a reference waypoint or flying by the waypoint and entering a relative bearing/distance that could be obtained from radar or other device.

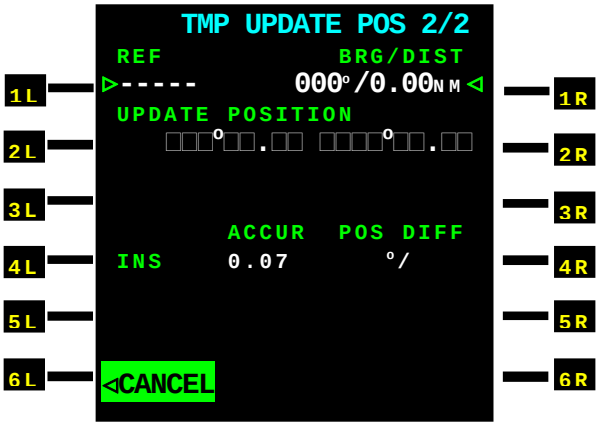
During temporary position updates, the FMS position is not affected, but the flight plan waypoints for the CARP tactical function are shifted while and only while the procedure is active.

Upon exit and re-entry to the TMP UPDATE POS page via the UPDATE POS 1/2 page, all user data entry fields maintain their previous values.

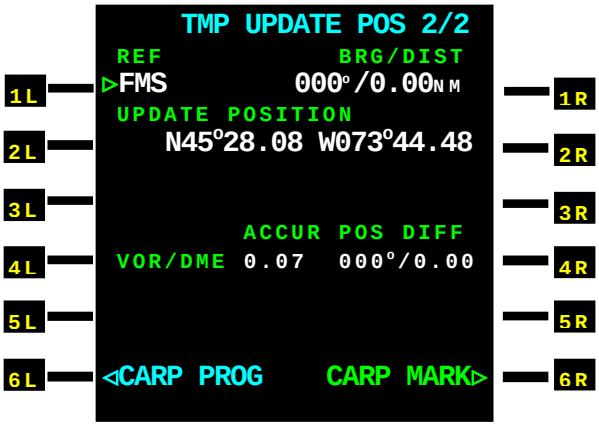
No entry is allowed, in any field on this page, when any of the following conditions occur:

- The inactive route is in a modified state, or
- CARP is not active, or
- CARP calculations are frozen, or
- NO CARP SOLUTION is being displayed.

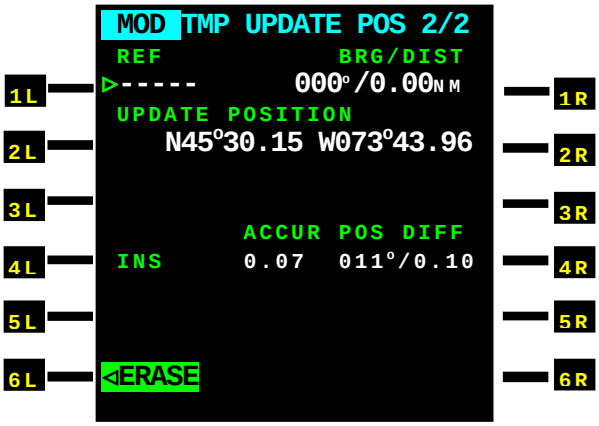
A. Display after pressing CARP MARK LSK on the default display. The CANCEL prompt appears. The EXEC key lights up only after entering a REF or UPDATE POSITION:



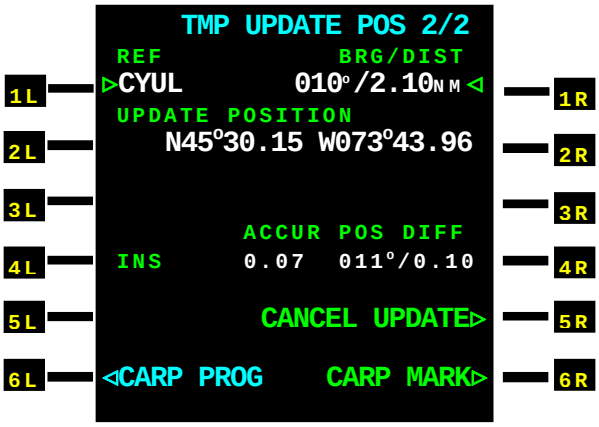
E. Display after toggle of [1L] on default display:



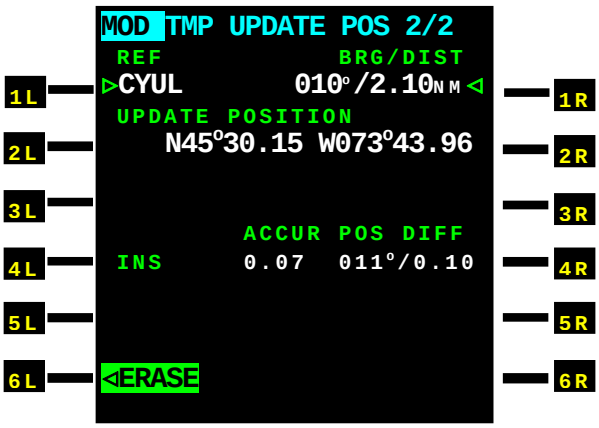
F. Display after pressing CARP MARK LSK and entering an UPDATE POSITION for a temporary position update:



G. Display after EXECution of a temporary position update:



H. Display after pressing CANCEL UPDATE LSK:



MOD/" " (title): MOD indicates an active flight plan modification has not been EXECuted yet; otherwise, the field is blank.

REF [1L]: This field displays the reference position. Successively pressing this LSK with an empty scratchpad, the REF changes between the system position (FMS), and a waypoint ID entry prompt (----).
When the waypoint ID entry prompt (----) is displayed the user can specify a waypoint ID via the scratchpad. When this page is accessed via the MARK key on the CARP PROGRESS page this field will contain the IP identifier by default. When FMS is displayed the FMS computed position is used as reference. This is the default state when accessed via the UPDATE POS 1/2 page.

BRG/DIST/XTK OFFSET [1R]: This field displays the vector that is added to the REF ID position to generate the UPDT POS position. Two formats are supported. Except when the reference is FMS, pressing the LSK with an empty scratchpad causes the display to toggle between the two formats.
The default format is BRG/DIST: bearing (in degrees clockwise from North - either True or Magnetic depending on setup page) and distance (in nautical miles). The default values for the BRG/DIST format are 0 with valid range of 0 to 360 degrees and 0.00 to 99.9 nautical miles.
The second format is XTK OFFSET and is not available when REF is FMS: cross-track distance from the REF position to the closest point along the path passing through the aircraft position and in the direction of the heading. L indicates the aircraft is to the left of the ID point, R is to the right. The default value is R0 with valid range from 000 to 999 feet.

UPDATE POSITION [2L]: This field displays the position from which the marked FMS position is to be subtracted to compute a position correction vector. Once the position update is completed and executed, this position correction vector is subtracted from the CARP procedure waypoint positions. UPDATE POSITION may be entered manually via the scratchpad; otherwise it is computed as the sum of the REF position and the BRG/DIST or XTK OFFSET vector.
When entered manually, the REF and BRG/DIST fields are set to ----; otherwise
When the REF is FMS, this field changes value as the FMS position changes until the MARK LSK is pressed, at which time it is frozen.
When the REF is a waypoint ID, this field is static.

MODE (4L): This field displays the marked FMS navigation mode.

ACCUR (4L): This field displays the horizontal position accuracy of the marked FMS position (in nautical miles).

POS DIFF (4R): This field displays the bearing and distance from the FMS position to the UPDATE POSITION. Prior to pressing the MARK key, the current FMS position is used, and after pressing the MARK key, the marked FMS position is used. When the REF is FMS, this field equals that of the BRG/DIST. The default values are 0 and 0.00 respectively. Range is from 0 to 360 degrees and from 0.00 to 999 nautical miles.

CANCEL UPDATE [5R]: This LSK is used to perform manual cancellation of the temporary position update. Pressing the LSK triggers the ERASE prompts to appear, the MOD status to be displayed, and the EXEC key to be lit. When no temporary position update is active or mark has been pressed (and not cancelled), this field is blank and pressing the LSK has no effect.

CARP PROG [6L]: This LSK is used to access the CARP PROGRESS page.

CANCEL [6L]: This LSK is used to cancel the marked position. Displayed only once the CARP MARK key has been pressed.

ERASE [6L]: Cancels any route modifications and any temporary offset that has not yet been executed. Only displayed when the page is displaying the MOD status.

CARP MARK [6R]: This LSK is used to mark the current FMS position.

UPDATE POS 1/1 (if PREDEF PAGE and IRS, EGI or DVS interface is configured) or UPDATE POS 1/2 (if CARP is configured)

Display UPDATE POS 1/1 page by pressing:

[INIT REF], <POS INIT> and <UPDATE POS> or
[INIT REF], <WPT LISTS>, <PREDEF WPT> and [NEXT], <UPDATE POS> or
[INIT REF], <NAV STATUS>, <INS> and <UPDATE POS>.

This page allows manual updates of the following navigation mode positions to be performed:
INS/GPS {SIGMA50H EGI configuration only},
INS/DVS {SIGMA50H EGI configuration only},
INS {IRS or LN_100GT EGI configuration only}, and/or
DVS {DVS configuration only}.
For the SIGMA50H EGI, a manual update of the INS/DVS will automatically update the INS/GPS, and vice-versa.

Three basic methods of performing a navigation mode position update are supported:
Update by Overfly and Mark of a Known Position,
Update by Weather Radar Joystick Position Selection {Weather Radar (WXR) configuration only or AHCAS/AHCAS2 EFIS configuration}, and
Update using another navigation mode position.
These methods are briefly described below.

Update by Overfly and Mark of a Known Position

1. The user flies to the known position and presses the MARK key as the known position is overflown. The MARK key may be the physical hard key or the softkey on the UPDATE POS page per CFG KEY configuration settings.

2. If the MARK hard key was pressed, the PREDEF WPT page automatically appears with the MARK ON TOP field containing the CMA-9000 FMS position at the time the MARK key was pressed. If the MARK softkey was pressed, the UPDATE POS page is already being displayed.
3. The user selects <UPDATE POS>, bringing forth the UPDATE POS page with the CMA-9000 FMS position as reference. The displayed data corresponds to the positions when the MARK key was pressed.
4. The user presses <REF>, bringing forth an entry prompt ( ).
5. The user enters the known position. The position may be entered directly in the UPDATE POS field, or indirectly with an identifier with or without an offset.
6. The user selects the navigators for which a position update is sought.
7. The user presses <CONFIRM>. The CMA-9000 FMS then updates the selected navigators with the position indicated in the UPDATE POS field.

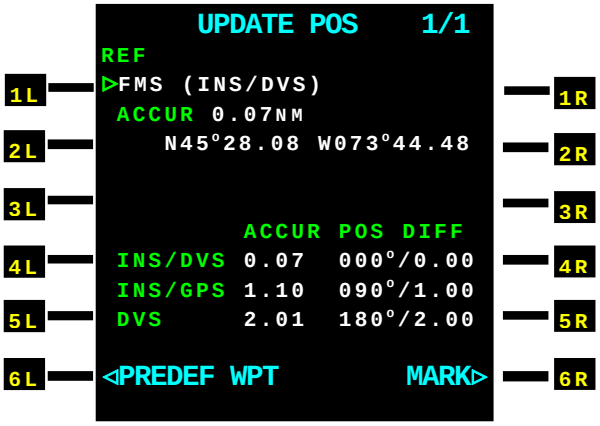
Update by Weather Radar Joystick Position Selection {WXR or AHCAS/AHCAS2 configuration only}

1. The user selects a known position on the weather radar using a joystick.
2. The PREDEF WPT page automatically appears with the LAST JOYSTICK field containing the position transmitted by the weather radar or received from AHCAS/AHCAS2 EFIS.
3. The user selects <UPDATE POS>, bringing forth the UPDATE POS page with JOYSTICK as reference. The displayed data corresponds to the positions when the joystick position was received.
4. The user enters the true josytick position. The position may be entered directly or with an identifier. The UPDATE POS field will get automatically updated by the CMA-9000 FMS.
5. The user selects the navigators for which a position update is sought.
6. The user presses <CONFIRM>. The CMA-9000 FMS then updates the selected navigators with the position indicated in the UPDATE POS field.

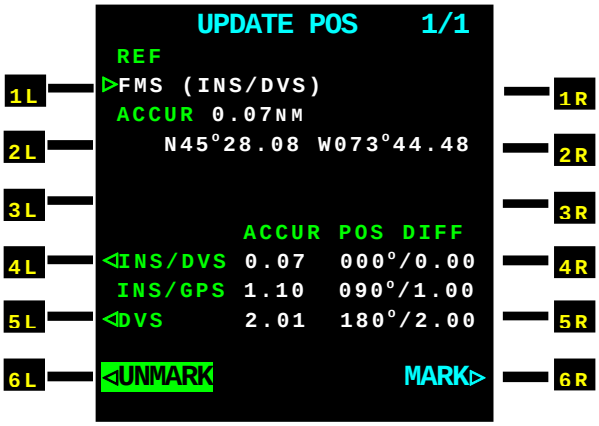
Update using another navigation mode position

1. The user verifies the CMA-9000 FMS Navigation mode on the PROGRESS or POS INIT pages corresponds to the mode from which an update position will be obtained. The user may deselect some navigation modes by pressing [INIT REF],<NAV STATUS>, <DESELECT>.
2. The user presses the MARK key. The MARK key may be the physical hard key or the softkey on the UPDATE POS page per CFG KEY configuration settings.
3. If the MARK hard key was pressed, the PREDEF WPT page automatically appears. If the MARK softkey was pressed, the UPDATE POS page is already being displayed.
4. The user selects <UPDATE POS>, bringing forth the UPDATE POS page with the CMA-9000 FMS position as reference. The displayed data corresponds to the positions when the MARK key was pressed.
5. The user selects the navigators for which a position update is sought.
6. The user presses <CONFIRM>. The CMA-9000 FMS then updates the selected navigators with the position indicated in the UPDATE POS field.

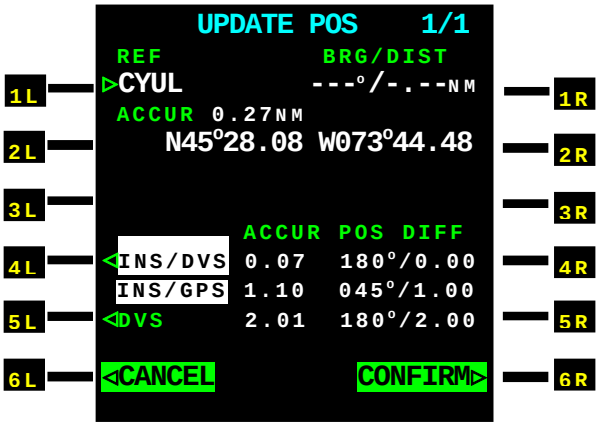
A. Update POS 1/1 page default state, the CMA-9000 FMS position is used by default.



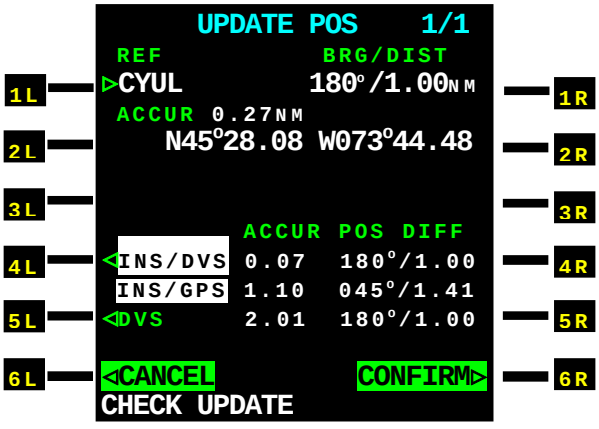
B. Update POS 1/1 page by pressing the MARK key, all positions are frozen and sensors are selectable:



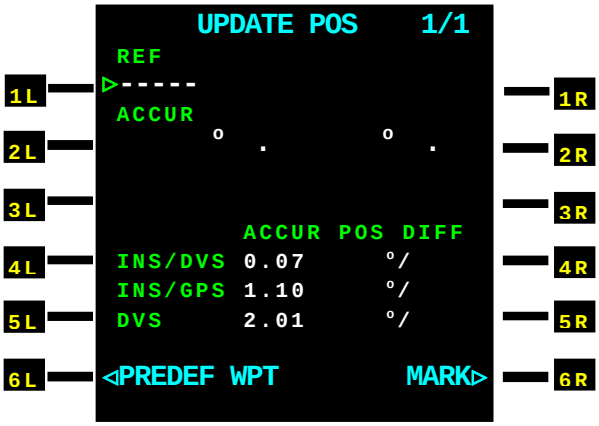
C UPDATE POS 1/1 waypoint ID entered, MARK key pressed and EGI selected.



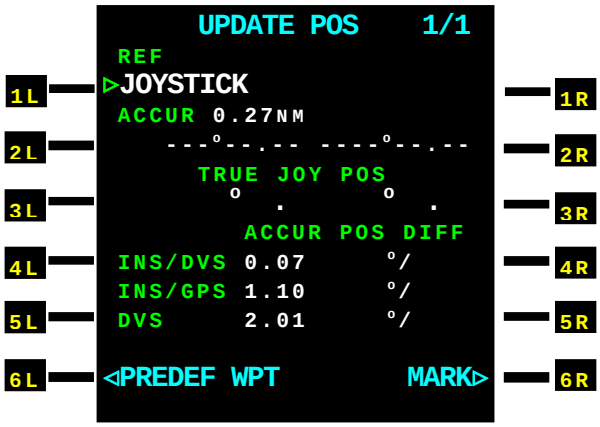
D. Update POS 1/1 offset entered, the update position is updated and CHECK UPDATE appears:



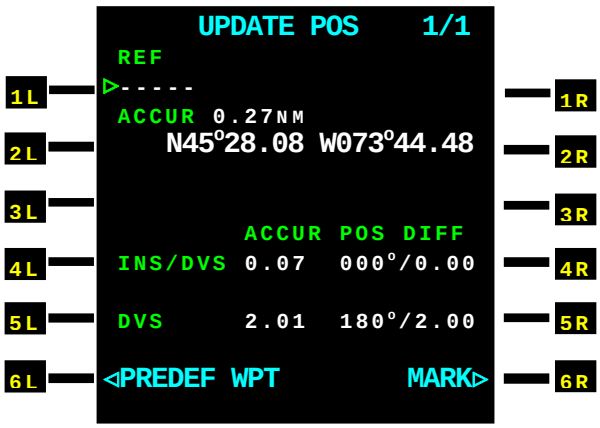
E. Update POS 1/1 page pressing LSK 1L, the identifier entry prompt appears:



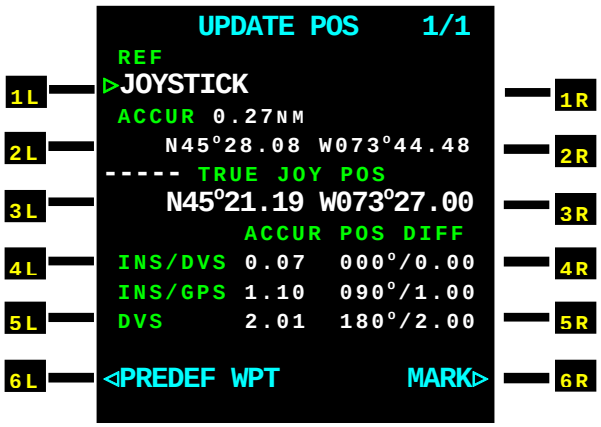
F. UPDATE POS 1/1 page by pressing LSK 1L, the joystick prompts appear.



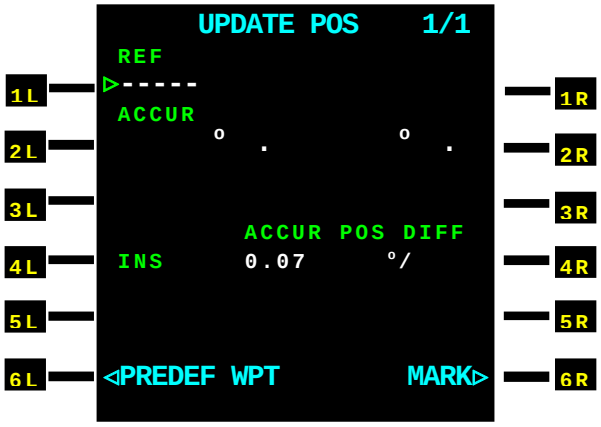
G. UPDATE POS 1/1 position entered (INS/GPS unavailable because hybridization is on).



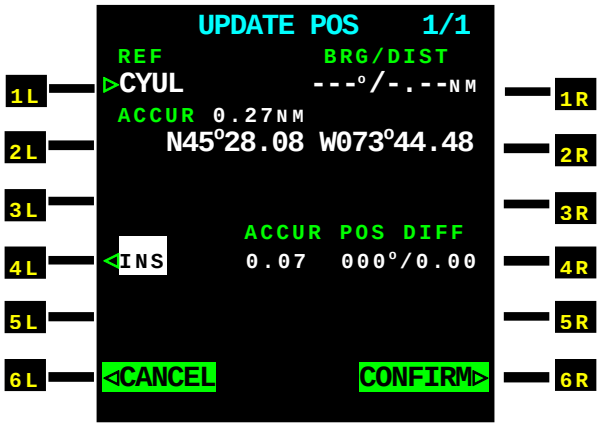
H. UPDATE POS 1/1 entering the true joystick position computes the update position.



I. UPDATE POS 1/1 pressing [1L] LSK, the ident entry prompt appear. IRS configured.



J. UPDATE POS 1/1 waypoint ID entered, MARK key is pressed and INS (IRS) is selected.



REF [1L]: This field displays the reference identifier. Successively pressing this button with an empty scratchpad, the reference selection changes between the system position (FMS – default state = active nav), INS/GPS, GPS, the joystick prompt (JOYSTICK), and a waypoint identifier entry prompt (-----) (in this order).

- When the *system* is used as the reference, the CMA-9000 FMS active navigation mode is displayed in parenthesis next to it.
- When the CMA-9000 FMS - INS/GPS navigation is used as the reference, INS/GPS is displayed in parenthesis next to it.
- When the CMA-9000 FMS - GPS navigation is used as the reference, GPS is displayed in parenthesis next to it.
- When the *entry* prompt is selected, this button allows the pilot to specify a waypoint ID via the scratchpad.
- When the *joystick* prompt is selected, a prompt appears to specify the true joystick marked position by entering the waypoint ID at LSK 3L or the position coordinates at LSK 3R.
    - When a position is specified via field at LSK 2R, the reference ID is dashed.

NOTE: When this softkey is pressed, the entry prompt data fields are reset.

ACCUR (2L): This field displays the reference's accuracy. When the reference is a fix location or joystick derived position, the value is set to the configurable option value.

BRG/DIST [1R]: This optional prompt is displayed when a waypoint ID was entered as the reference. This field can be used to offset the identifier position by entering the desired bearing and range. Pressing [CLR], then the LSK key in this field forces the offset back to its default (no offset).

UPDATE POS [2R]: This field displays the final position which be used to perform the update. It can also be used to enter coordinates via the scratchpad. When a position is manually entered, the REF prompt becomes dashed. When an offset is entered, the update position corresponds to the offset reference's position.

TRUE JOY POS [3R]: {WEATHER RADAR or AHCAS EFIS configured} This field is displayed only when the joystick prompt is selected. This field allows the true joystick position coordinates to be entered via the scratchpad.

TRUE JOY POS ID [3L]: {WEATHER RADAR or AHCAS EFIS configured} This field is displayed only when the joystick prompt is selected. This field allows the true joystick position ID to be entered via the scratchpad.

INS/DVS or INS/GPS [4L]: {SIGMA50H EGI configured} This field selects/deselects the INS/GPS and INS/DVS navigators. The INS/GPS is displayed only when hybridization is off. This prompt is available for selection only if a valid update position was entered and the MARK key was pressed. When selected, the navigators are highlighted in white. The "CHECK UPDATE" advisory message appears if a sensor is selected whose accuracy is smaller than its position difference with the update position.

INS [4L]: {IRS or LN_100GT EGI configured} This field selects/deselects the INS navigator. When the LN_100GT EGI is installed, this prompt is available for selection only if a valid update position was entered and the MARK key was pressed. When the IRS is installed, this prompt is available for selection only if in Inertial navigation mode. If a valid update position was entered and if the MARK key was pressed. When selected, the navigator is highlighted in white. The "CHECK UPDATE" advisory message appears if a sensor is selected whose accuracy is smaller than its position difference with the update position.

DVS [5L]: {DVS configured} This field selects/deselects the DVS navigator. This prompt is available for selection only if a valid update position was entered and the MARK key is pressed. When selected, the navigator is highlighted in green. The "CHECK UPDATE" advisory message appears if a sensor is selected whose accuracy is smaller than its position difference with the update position.

POS DIFF (4R, 5R): These fields display the position difference between the sensor navigation position and the update position in nautical miles.

ACCUR (4R, 5R): These fields display the sensor navigation accuracy in nautical miles.

PREDEF WPT [6L]: Displayed only when the CANCEL and UNMARK prompt are not displayed. Pressing this softkey will bring the PREDEF WPT 2/2 page.

CANCEL [6L]: Displayed only when at least one sensor is selected for update. Pressing this softkey will unselect all sensors.

CONFIRM [6R]: Displayed only when at least one sensor is selected for update. Selecting this softkey will cause the CMA-9000 FMS to update the selected sensors' position to the update position and then unselect all sensors. The "!OUT OF RANGE" advisory message appears if the INS/GPS position difference with the reference position is greater than 15 nautical miles. When the "!OUT OF RANGE" message is displayed, the INS, INS/DVS and/or INS/GPS position are not updated.

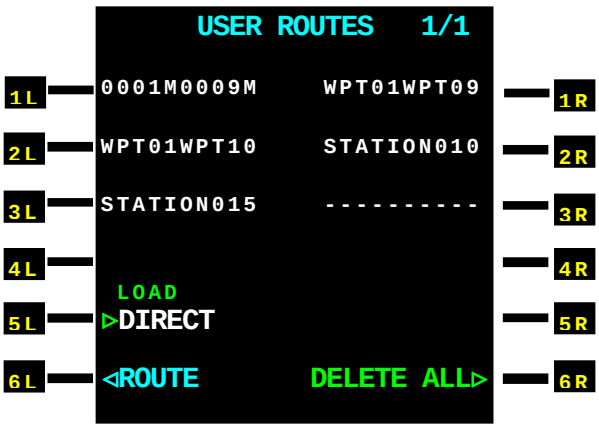
MARK [6R]: {MARK softkey configuration only} Displayed only when the CONFIRM prompt is not displayed. Pressing this softkey will freeze all positions and allow the sensors to be selected.

UNMARK [6L]: Displayed only once the MARK key is pressed and the CANCEL prompt is not displayed. Pressing this softkey will unfreeze all positions and unselect all sensors.

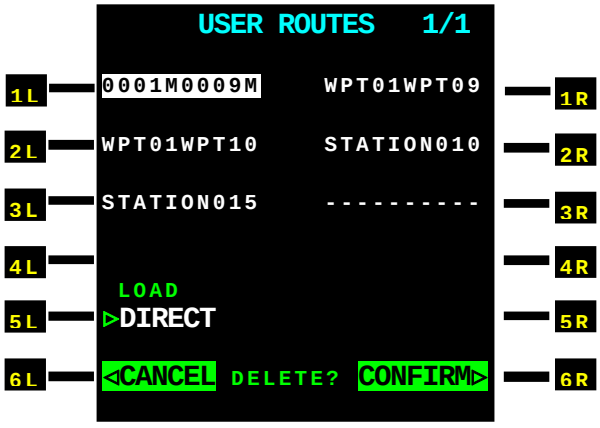
USER ROUTES 1/1

Display USER ROUTES 1/1 page by pressing [RTE] and <USER ROUTES> or [RTE], <RTE X> and <USER ROUTES>.

A. Normal display:



B. When route is deleted:



ROUTE [1L,2L,3L,4L,5L,1R,2R,3R,4R,5R]: User Route name. When a name is entered from the scratchpad in the field containing dashes, the CANCEL and CONFIRM prompts are displayed. Press CONFIRM in order to save a new user route identical to the route that is being displayed on the RTE and LEGS pages. Pressing [CLR], then the LSK key on a user route name will bring up the CANCEL and CONFIRM prompts. Press CONFIRM for the deletion of that user route. Selecting a user route name with the scratchpad empty will bring forth the RTE page with the selected user route loaded (but not activated).

NOTE: When airborne, a user route name selected on page USER ROUTES 1/1 will replace the current active route without replacing the origin.
When a route name is entered over an existing one, the advisory message "!INVALID ENTRY" will be displayed. In the case where an 11th route name would have to be entered (which is not allowed in the system), one of the existing 10 route names has to be deleted in order to make room for that new route since the maximum number of user routes is 10.

LOAD [5L]: Toggle DIRECT/INVERSE direction of the route to be loaded. DIRECT is the default.

ROUTE [6L]: Return to the RTE X 1/1 page.

DELETE ALL [6R]: Delete all user routes. Pressing this key causes the CANCEL and CONFIRM prompts to appear. Press CONFIRM to delete. This prompt only appear if at least one user route exists.

(DELETE?): Displayed between the CANCEL/CONFIRM prompts upon deletion of a user waypoint.

CANCEL [6L]: Cancels the creation of a new user route or deletion of a single user route or of all user routes, as applicable.

CONFIRM [6R]: Confirms the creation of a new user route or deletion of a single user route or of all user routes, as applicable. Cross-talks the creation or deletion to the cross-side FMS if FMSs are in synchronized mode.

NOTE: An advisory message "!USER ROUTE EXISTS" will be displayed if a duplicated name of user route is entered. The entry will be rejected.

USER WPT 1/2

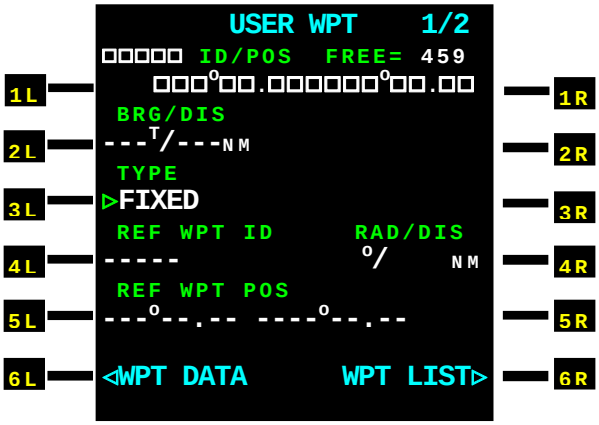
Display the USER WPT 1/2 page, press [INIT REF], <WPT DATA>,<NEW USER WPT>.

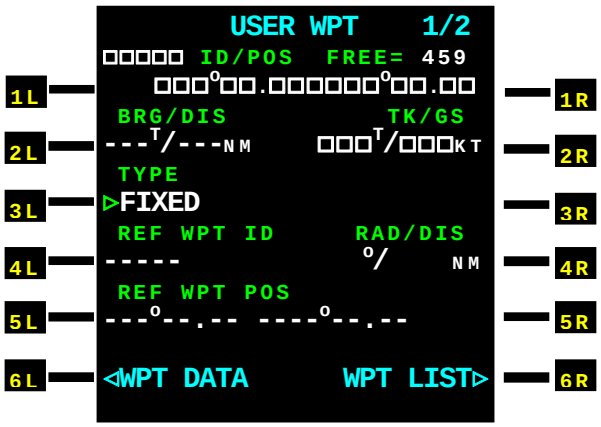
The USER WPT pages allow for the creation or modification of user waypoints. Moving waypoints can be created or modified if Moving waypoint is configured.

When any moving waypoint identifier that is present in the active route is entered, an ACT RTE caption is displayed in reverse video.

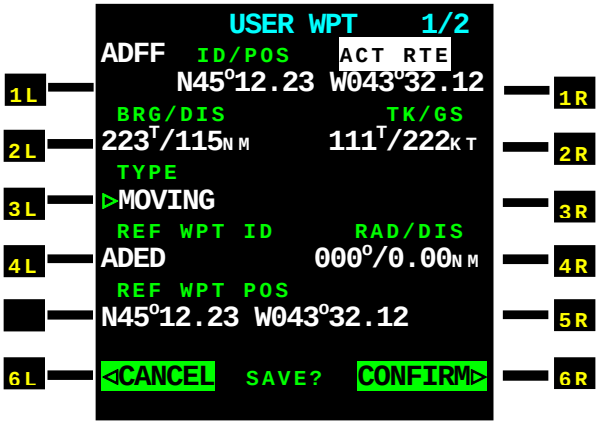
When any identifier is entered and all mandatory fields are entered, CANCEL/CONFIRM prompts will appear. Leaving the USER WPT pages without confirmation will automatically perform a CANCEL.

A. Page displayed for creation of a new fixed user waypoint:

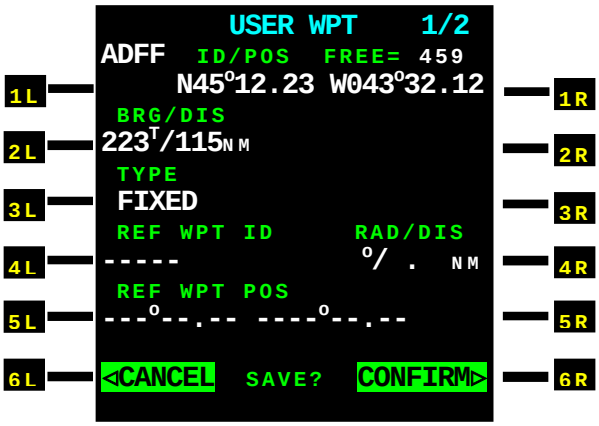


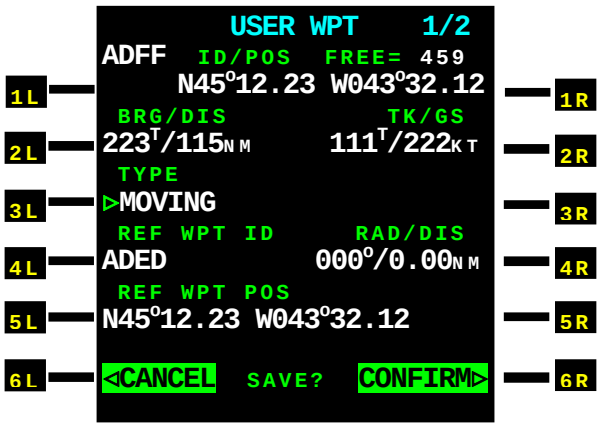


B. After modifying data for an existing moving waypoint identifier in the active route:

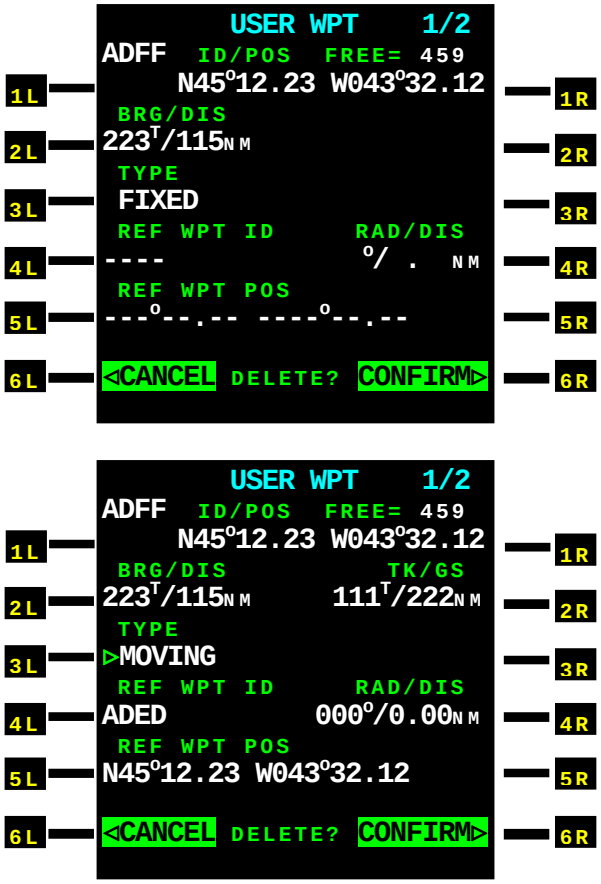


C. After entering a new identifier and all mandatory fields or modifying data for an existing fixed waypoint identifier or moving waypoint identifier is not in the active route:





D. After entering DELETE on an existing user waypoint identifier:



ID [1L]: User waypoint identifier (5 characters max.).
When the identifier entered exists as a non-user waypoint, the entry is allowed and an advisory !DUPLICATE WAYPOINT appears. When the identifier entered exists as a user waypoint, its parameters are automatically displayed in all fields. If a modification is in progress, entering a new identifier will delete the previously displayed information and display the information corresponding to the newly entered identifier. Pressing [CLR] in this field will bring the DELETE? prompt. Deletion of a moving user waypoint in the active route or modified route is not permitted. The default value is boxes.

POS [1R]: User waypoint position in the selected coordinate system and datum. Automatically displayed if the user waypoint identifier entered exists. Manual entry forces default value to appear in the REF WPT ID and REF WPT POS and RAD/DIS fields and automatically updates the BRG/DIS field. For moving waypoints, the value will be recomputed and displayed at a minimum rate of once every second. The default value is boxes.

FREE(1R): Number of user waypoint free slots in user database (460 user waypoints max.) The number displayed is always the difference between 460 and number of fixed and moving waypoints (460 - no of fixed waypoint - no of moving waypoint).

BRG/DIS [2L]: Bearing and distance from the current aircraft position to the waypoint. Manual entry forces default value to appear in the REF WPT ID and REF WPT POS and RAD/DIS fields and automatically updates the POS field. BRG and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated. The values will be recomputed and displayed at a minimum rate of once every second. The default values are dashes, and the minimum/maximum values for the bearing are 0/360 degrees and 0/999 nm for the distance.

TK/GS [2R]: Track angle and ground speed of moving waypoint. TK and GS values may be entered individually or simultaneously; a '/' symbol appended to a value in the scratchpad indicates only the TK value must be updated. The default value is boxes, and the minimum/ maximum values for the track angle are 0/360 degrees and 0/999 Kts for the ground speed.

TYPE [3L]: FIXED or MOVING waypoint type indication. The default upon entry in the page will be FIXED, as applicable. The toggling is only possible when adding a new user waypoint.

REF WPT ID [4L]: Reference waypoint identifier with dashes as default value. Entry of an identifier will display its position in the REF WPT POS field and the POS and BRG/DIS fields will be automatically updated. When entering a moving waypoint as a reference waypoint, the waypoint's position computed at the time of the entry will be used. In the case of a MARK ON TOP position used as a reference from the PREDEF WPT 2/2 page, the REF WPT ID field displays the identifier "ONTOP". In the case of a LAST JOYSTICK position used as a reference from the PREDEF WPT 2/2 page, the REF WPT ID field displays the identifier "JSTCK". In the case of a LAST PLS position used as a reference from the PREDEF WPT 2/2 page, the REF WPT ID field displays either the identifier "PLS" when PLS CUBIC AN/ARS6 is configured, or the identifier "SVxxx" where xxx is a number between 001 and 127 when PLS CUBIC V12 is configured. In the case of a FLIR position used as a reference from the PREDEF WPT 3/3 page, the REF WPT ID field displays the identifier "FLIR".

RAD/DIS[4R]: Radial/distance from the reference position to the desired user waypoint position. The values are blanked, when no REF WPT POS is defined, otherwise zeros are displayed as the default values. No entries are allowed, when the fields are blanked. Manual entry automatically updates the POS and BRG/DIS fields. RAD and DIS values may be entered individually or simultaneously; a '/' symbol preceding a value in the scratchpad indicates only the DIS value must be updated. The minimum/maximum values for the radial are 0/360 degrees and 0/999 NM for the distance.

REF WPT POS [5L]: Reference position with dashes as default value. It corresponds to the position of the reference waypoint identifier or a manually entered value. Upon entry of a value, the REF ID field will be set to dash symbols and the POS and BRG/DIS fields will be automatically updated.

WPT DATA [6L]: Access to the WPT DATA 1/1 page.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts upon modification of a user waypoint.

(DELETE?): Displayed between the CANCEL/CONFIRM prompts upon deletion of a user waypoint.

CANCEL [6L]: Cancels the definition, modifications, or deletion of a user waypoint. All the fields return to their default value (when cancelling the creation of a user waypoint), or to their original value (when cancelling a user waypoint modification).

NOTE: If one user waypoint has been created, some new changes are made and cancelled, all the latest changes are lost.

WPT LIST [6R]: Access to the USER WPT LIST 1/N page.

CONFIRM [6R]: Confirms the definition, modifications, or deletion of a user waypoint.

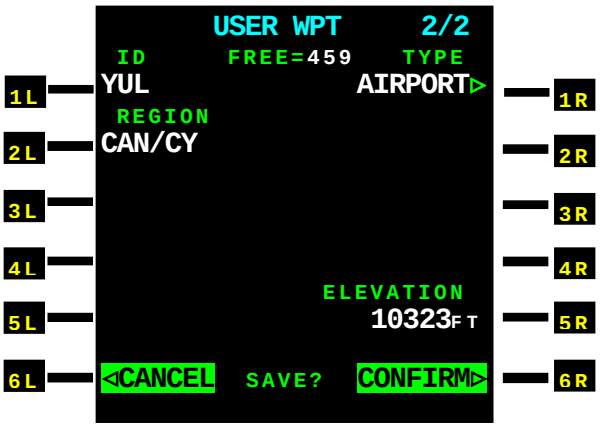
NOTE: Changes are still allowed while CONFIRM is on the screen.

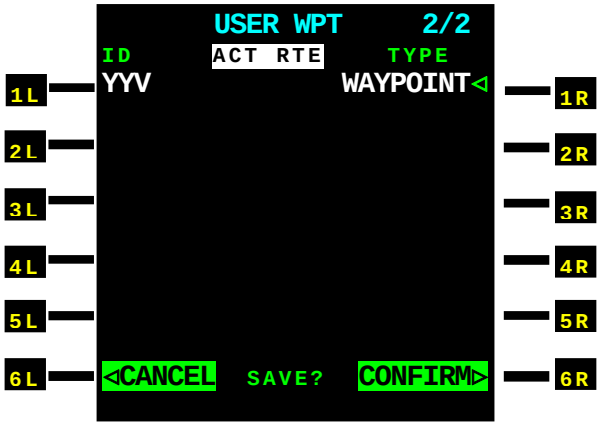
USER WPT 2/2

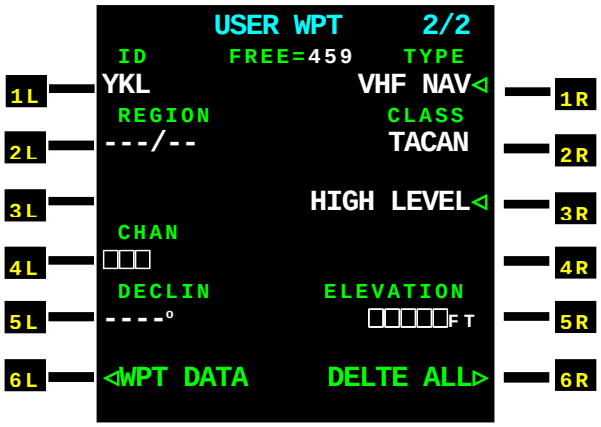
Display USER WPT 2/2 page to modify parameters of an existing waypoints by pressing [INIT_REF], <WPT DATA>, <NEW USER WPT> and [NEXT].

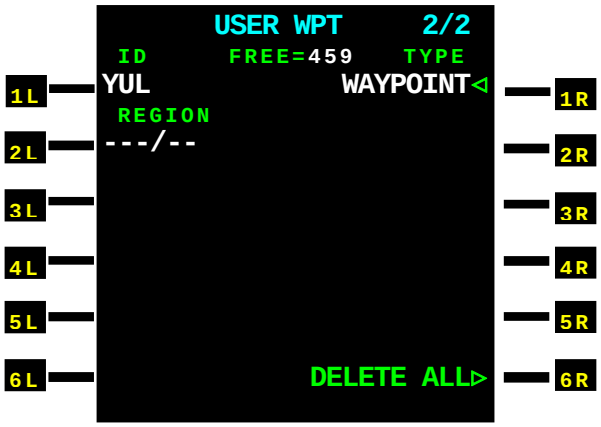
The USER WPT pages allows for the creation of new user waypoints of different class and types or the modification of existing user waypoints. USER WPT 1/2 allows to enter basic property of waypoint such its ID and position. USER WPT 2/2 allows the definition of the type and class of the new waypoint along with their additional properties.(mandatory and optional field):

When the new waypoint created is of type other than WAYPOINT, mandatory fields must be entered as indicated by the display of the page.









ID [1L]: User waypoint identifier with boxes as default value. Identical to USER WPT 1/1 page.

FREE: Number of user waypoint free slots in user database (460 user waypoints max.) The number displayed is always the difference between 460 and number of fixed and moving waypoints (460 - no of fixed waypoints - no of moving waypoint).

TYPE [1R]: Identifier type. Possible values are:

VHF NAV:	TACAN (only TACAN fixed stations)
AIRPORT:	Airports
WAYPOINT:	Position Waypoint

The default upon power up is WAYPOINT. Moving waypoints may only be of type WAYPOINT.

REGION [2L]: The REGION and the ICAO code (not displayed for MOVING waypoints). This field allows also entry of REGION and/or ICAO. The default values are dashes.

Complete list of region codes:

AFR: Africa	MES: Middle East/South Asia
CAN: Canada	PAC: Pacific
EEU: Eastern Europe	SAM: South America
EUR: Europe	SPA: South Pacific
LAM: Latin America	USA: United States of America
CUS: Specific to customer	

Sample ICAO country codes (2 characters):

EH= Europe, Netherlands EG= Europe, UK

Complete list of the ICAO country code are contained in ARINC 424 document.

NAVAID CLASS TYPE (2R): TACAN

NOTE: The only available user waypoint VHF NAV type is TACAN.

NAVAID CLASS LEVEL [3R]: Toggle between: HIGH LEVEL, LOWLEVEL, TERMINAL and UNDEFINED. The default value is High Level.

CLASS [2R], [3R]: NAVAID Class: (VHF NAV only).

[2R]	[3R]
	H-High Level
	L- Low Level
TACAN	T-Terminal
	U-Undefined

The default upon selection of VHF NAV type will be TACAN.

CHAN [4L]: TACAN NAVAID channel. The default value is boxes, and the range is 1 to 126 with X or Y appended.

DECLIN [5L]: VHF NAV Aid station declination (VHF NAV only). The default value is boxes, and the minimum/maximum values are W127/E127 degrees.

ELEVATION [5R]: Enter the elevation in feet (Airport and VHF NAV only). The default value is boxes, and the minimum/maximum values are –9999/+9999 ft.

WPT DATA [6L]: Access to the WPT DATA 1/1 page.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts upon modification of a user waypoint.

(DELETE?): Displayed between the CANCEL/CONFIRM prompts upon deletion of a user waypoint.

CANCEL [6L]: Cancels the definition, modifications or deletion of a user waypoint or performs a deletion of all user waypoints as indicated by the question above the prompt. All the fields return to their default value (when cancelling the creation of a user waypoint), or to their original value (when cancelling a user waypoint modification).

NOTE: If one user waypoint was created, some new changes were made and cancelled, then all the latest changes are lost.

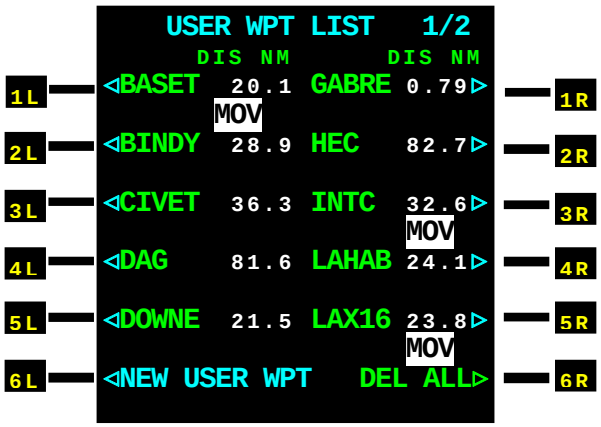
DELETE ALL [6R]: Request to delete all user waypoints and triggers the CANCEL and CONFIRM prompts. If a moving waypoint is present in the active or modified route, then the advisory message "!MOV WPT IN ROUTE" is displayed.

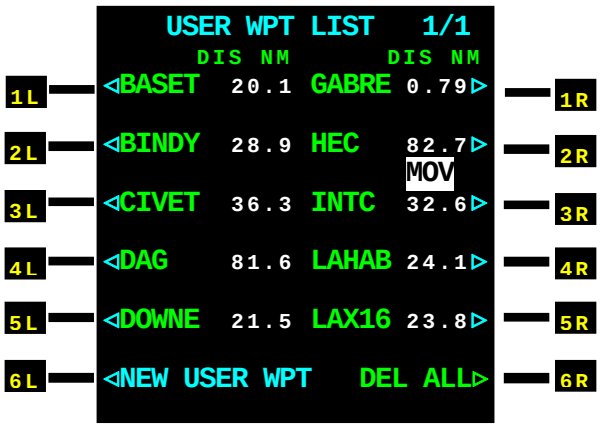
CONFIRM [6R]: Confirms the definition, modifications or deletion of a user waypoint or performs a deletion of all user waypoints as indicated by the question.

NOTE: Changes are still allowed while CONFIRM is on the screen.

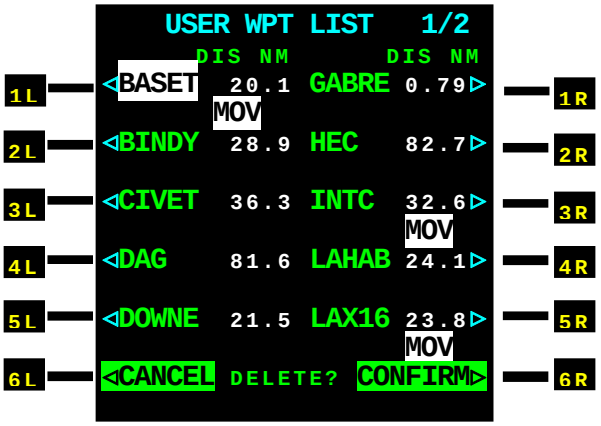
USER WPT LIST 1/X

Display USER WPT LIST 1/X page by pressing:
[INIT_REF], <WPT LISTS>, <USER WPT> or
[INIT/REF], <WPT DATA>, <NEW USER WPT>, <WPT LIST> {if Tactical Config BULLS EYE is configured} or
[INIT/ REF], <BULLS EYE>, [PREV], <WPT LIST> {if no CFG KEY is configured to BULL} or
[BULL], [PREV], <WPT LIST> {if any CFG KEY is configured to BULL}.
The user waypoints are displayed in alphabetical order.





Other pages 1/X are viewed using the key [NEXT]. The distance between present position (PPOS) and waypoints are updated every second.
User waypoint can be deleted by pressing [CLR] followed by the LSK corresponding the waypoint to be deleted.



USER WPT ID [1L,2L,3L,4L,5L,1R,2R,3R,4R,5R]: User waypoint identifier and distance from the present position (PPOS). Selecting the waypoint will display the WPT DATA 1/1 page with all the information pertaining to that waypoint.

FIXED or MOVING waypoint type:

- When MOV is displayed on the line below the waypoint and it refers to the situation when the waypoint is a moving waypoint. It is displayed in reverse white color.
- if there is no indication, the user waypoint is FIXED.

NEW USER WPT [6L]: Access to the USER WPT page for user waypoint creation/modification.

(DELETE?): Displayed between the CANCEL/CONFIRM prompts upon deletion of a user waypoint.

CANCEL [6L]: Cancel the deletion of the USER WPT.

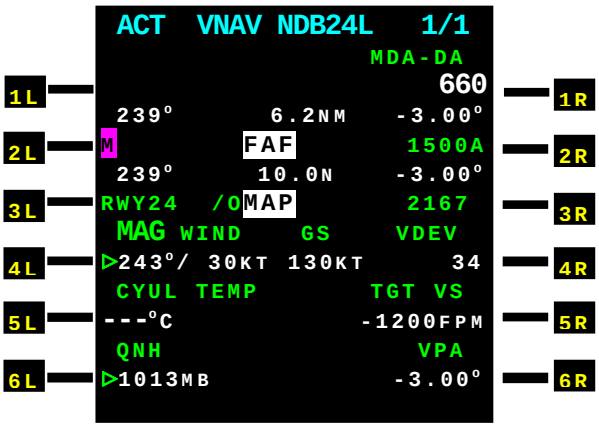
CONFIRM [6R]: Delete the selected waypoint. Cross-talks the deletion to the cross-side FMS if FMSs are in synchronized mode.

DEL ALL [6R]: Request to delete all user waypoints and triggers the CANCEL/CONFIRM prompts. If a moving waypoint is present in the active or modified route, then the error message "!MOV WPT IN ROUTE" will be displayed instead of the CANCEL/CONFIRM prompts.

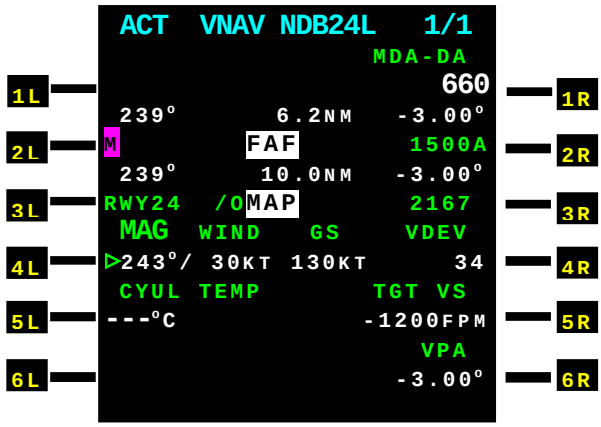
VNAV APPR 1/1 Page (if VNAV interfaces is configured)

This page applies only to the selected approach of the active route.
Display VNAV 1/X page by pressing [VNAV].

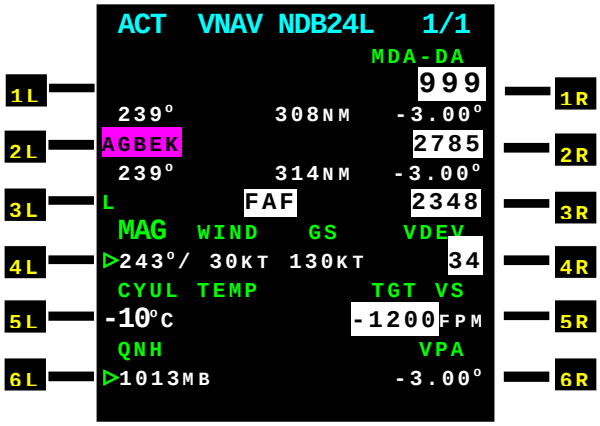
A. Only pressure altitude available to the FMS from the Air Data Computer:



B. Baro-corrected altitude available to the FMS from the Air Data Computer:



C. Destination Airport temperature is entered:



TITLE:"ACT" is displayed when the VNAV approach (glide path) is active. Destination approach/runway identifier of the active route is displayed. "MOD" is displayed if the active route is being modified.

COURSE / DISTANCE / WAYPOINT IDENTFIER [2L, 3L]: Displays leg course/heading and distance-to-go to the active and next waypoints respectively. Field is blank if the information is undefined (e.g. for a route discontinuity). The Course/Distance field of the active waypoint can be replaced by one of the following active procedure status:

- Hold procedure: HOLD AT
- Hold procedure exit armed: EXIT HOLD
- Search procedure: SEARCH

Additionally, active and next waypoint identifiers may be followed by one of the following special procedures:

- "/H" : Holding pattern
- "/O" : Fly over waypoint
- "/S" : Search pattern
- "/T" : Tactical direct-to
- "/A": Tactical approach
- "/C" : CARP procedure

TRUE/MAG WIND and GS [4L]: Displays current wind direction and speed and ground speed. Wind direction is crew selectable to magnetic or true North reference when the A/C is outside the polar region (latitude between N73 and S60). TRUE/MAG toggling is disabled and TRUE is displayed in the title line when the A/C is in the polar region.

Destination Airport TEMP [5L]: Enables entry of surface air temperature reported for the destination airport. When the entered temperature differs from the ISA temperature, entry is used to provide temperature correction of MDA-DA, approach and approach transition waypoint altitudes, vertical deviation and target vertical speed. Corrected altitudes and vertical deviation are displayed in reverse video white. Valid airport temperature range is -55°C to +55 °C.

QNH [6L]: When no baro-corrected altitude from an Air Data Computer is available to the FMS, and pressure or INS altitude is valid, then this field displays the altimeter setting (QNH) entry.

When the QNH value is derived from an FMS synchro input, the QNH value is displayed in normal fonts within a range of 27.00 to 32.35 inches of mercury (inHg). No manual entry of QNH is allowable. Pressing LSK 6L toggles the displayed QNH unit system between inches of mercury and millibars (mb).

When a synchro input of QNH is not available to the FMS, this field allows manual entry of the altimeter setting. The allowable entry format can be either in inches of mercury within a range of 27.00 to 32.00, or in millibars within a range of 915 to 1083. The QNH unit system is automatically detected from the entered value. The decimal point entry is not required. The entered QNH value is displayed in large fonts. Pressing LSK 6L with the scratchpad empty toggles the displayed QNH unit system between inches of mercury and millibars. The altimeter setting entries (including unit system toggling) are copied between VNAV and PROGRESS pages, and cross-talked between FMS. Upon leaving the terminal area, an altimeter setting entered from the CMA-9000 Display Panel is cancelled and the field displays boxes ("□□□□□").

ERASE [6L]: Prompt appears while flight plan is in MOD status, caused by lateral or vertical modifications. EXEC key required to activate any change.

MDA-DA [1R]: Enables manual entry of minimum descent altitude/decision altitude in feet. Temperature compensated if a temperature is entered at LSK [5L]. Valid MDA-DA range is between the MAP altitude and the FAF altitude. Temperature compensated MDA is displayed in reverse video white. Field is always displayed in LARGE font.

VPA | ALTITUDE [2R]: Displays (VPA) and altitude restriction for ACTIVE waypoint. VPA field is blank if the waypoint is not the FAF or MAP or step-down fix. Temperature-compensated altitude constraints are displayed in reverse video white. The altitude is displayed in NORMAL font if the altitude is coming from the navigation database. The altitude is displayed in LARGE font if it is a manually entered altitude.

VPA | ALTITUDE [3R]: Displays vertical path angle and altitude restriction for "NEXT" waypoint. VPA field is blank if the waypoint is not FAF or MAP. Temperature-compensated altitude constraints are displayed in reverse video white. The altitude is displayed in NORMAL font if the altitude is coming from the navigation database. The altitude is displayed in LARGE font if it is a manually entered altitude.

VDEV [4R]: Displays the vertical deviation in feet with respect to the computed approach vertical profile (negative value indicates aircraft below vertical path). Maximum displayed value is 9999 feet. The vertical deviation is displayed in reverse video white.

TGT VS [5R]: Displays target vertical speed (feet/min) based on current ground speed and the approach vertical path angle (VPA). This value is temperature compensated if a temperature is entered at LSK 5L. The field is blank when the vertical deviation is invalid. The target vertical speed is displayed in reverse video white.

VPA (6R): Displays glide-path descent angle in degrees when approach selected and missed approach prompt is not displayed.

ARR [6R]: Prompt appears when no approach selected and [VNAV] key is pressed. Provides access to the ARRIVALS page.

MISSED APPR [6R]: If configured for display by the selected configuration, this prompt enables transition within the FMS to the missed approach phase of flight, allowing sequencing of MAP waypoint. If the display of this prompt is configured, the prompt is displayed after transition to GPS approach mode (normally occurs at 2 nm inbound to the FAF if all GPS approach conditions are met). The function of this key is limited to the FMS, and has no impact on any missed approach or take-off/go-around mode of the flight guidance system.

NEXT WPT [6R]: Prompt is displayed when automatic waypoint sequencing is not possible. Examples include when the active leg is vector, or an altitude-terminated leg without a baro-corrected altitude input. Pressing NEXT WPT results in an immediate transition of navigation and guidance to the next waypoint in.

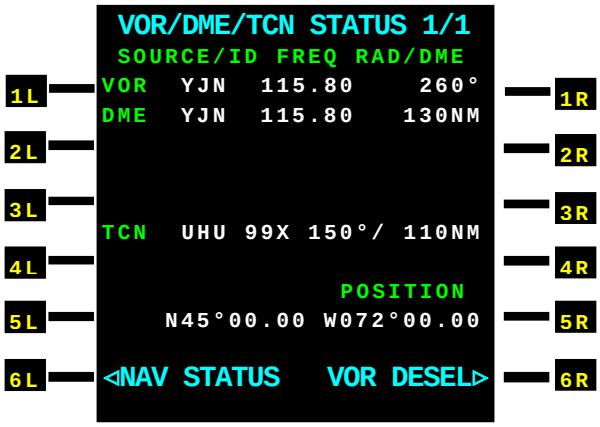
VOR/DME/TCN STATUS 1/1 Page (if VOR, DME or TACAN interfaces are configured)

The VOR/DME/TCN page displays the VOR, DME, and TACAN sensor inputs used in CMA-9000 FMS radial/distance radio navigator and the resulting position fix.

Display VOR/DME/TCN STATUS 1/1 page by pressing [INIT REF], <NAV STATUS>, and <VORDMETCN> or <VORDME> or <TACAN>.

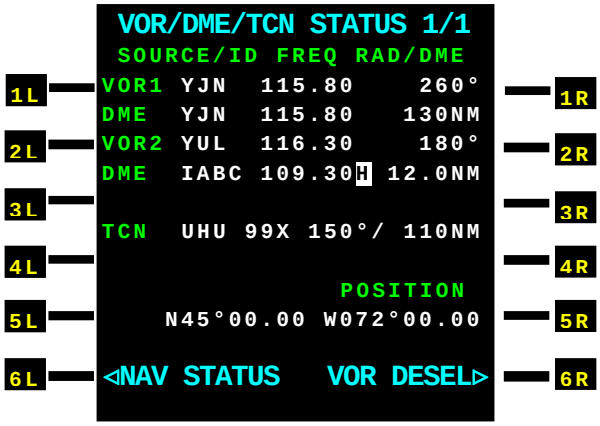
NOTE: The title will change to VOR/DME or TACAN, as applicable, if some of the equipment is not configured.

A. Single VOR and DME configuration.
Single TACAN.



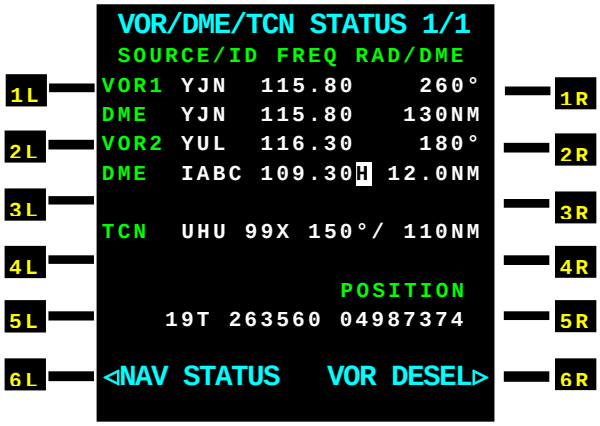
B. Dual VOR and single DME configuration, VOR1 and VOR2 connected to DME.
Dual VOR and DME configuration, VOR1 connected to DME1 and VOR2 connected to DME2.
Single TACAN.

When LAT/LONG is selected:



C. Dual VOR and DME configured, VOR1 connected to DME1 channel 1 and DME2 channel 2, VOR2 connected to DME1 channel 2 and DME2 channel 1.
Single TACAN.

When UTM selected:



VORx ID/FREQ/RAD (1L-Line 3, 2L-Line 5): Displays VOR station identifier and tuning frequency (MHz) from the interface (1 and 2 indicate the source of the VOR information). This field is blanked when the CMA-9000 FMS is unable to find the requested station (either due to invalid bearing, distance or values outside of thresholds) or when the value of the frequency is changed and is searching for the new station identifier.

DMEx ID/FREQ/DME Slant range (1L-Line 4, 2L- Line 6): Display of DME station identifier, tuned frequency (MHz) and slant range from the station (always in nautical mile). The fields are blanked when the FMS is unable to find the requested station (e.g. invalid distance) or when the value of the frequency is changed and the FMS is searching for the new station ident. An inverse white "H" appears next to the frequency when the DME is in "HOLD" mode. The frequency and slant range are values received from the radio interface

TCN ID/CHAN RAD/DME Slant range (4L -Line 8): Display of TACAN station identifier, tuning channel radial from station (always in MAG) and TACAN slant range from station. The fields are blanked when the CMA-9000 FMS is unable to find the requested station (either due to invalid channel, bearing, distance or values outside of thresholds) or when the value of the channel is changed and the CMA-9000 FMS is searching for the new station ident.

NAV STATUS [6L]: Returns to NAV STATUS INDEX 1/1 page.

POSITION (5R): Displays position LATITUDE and LONGITUDE or UTM.

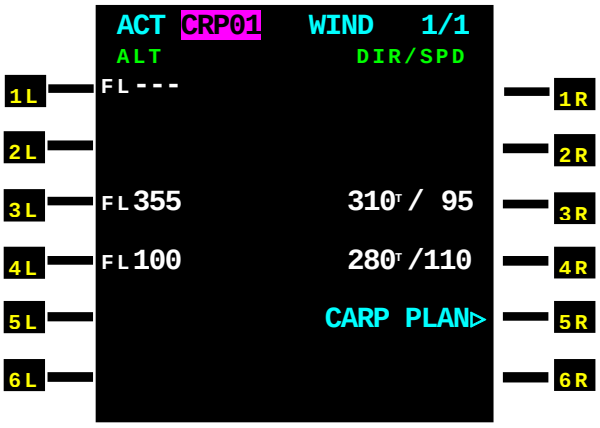
VOR DESEL [6R]: Access to VHF NAV DESELECT 1/X page.

WIND 1/1 (If CARP is configured)

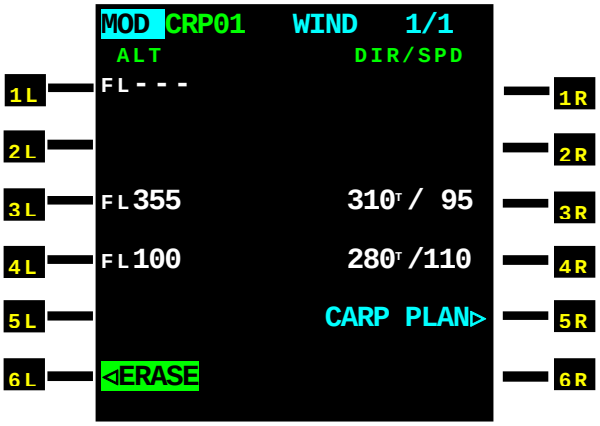
Allows entry and display of wind speed and direction for the selected waypoints at up to four different levels.

Display WIND 1/1 page by pressing [INIT REF], and <DES+SAR> or <TACTICAL>, [NEXT], <CARP>, [NEXT] and <WIND> {when a CARP procedure is in the active flight plan}.

A. Normal ACTIVE format:



B. WIND page during a MOD



TITLE LINE: Displays the CRP01 waypoint name, page number and the ACT/MOD status.

ALT [1Lto 4L]: Flight level corresponding to wind data.

NOTE: The altitude data can only be entered at LSK 1L. Altitudes are displayed in descending order at (1L), (2L), (3L), (4L). If four altitudes already exist, one of these must be deleted prior to the manual entry of a new altitude.

ERASE [6L]: Displayed only when a CARP plan/route modification is in progress. Pressing ERASE (LSK 6L) will undo all changes to the route and return to the ACT Route status.

CANCEL [6L]: Cancel the changes made to the inactive route.

DIR/SPD [1R, 2R, 3R, 4R]: Allows entry of wind direction and speed for the given waypoint at the corresponding flight level. Entry is only allowed once a flight level has been entered.

CARP PLAN [5R]: Access to the CARP PLAN 2/3 page. Displayed on page WIND 1/1.

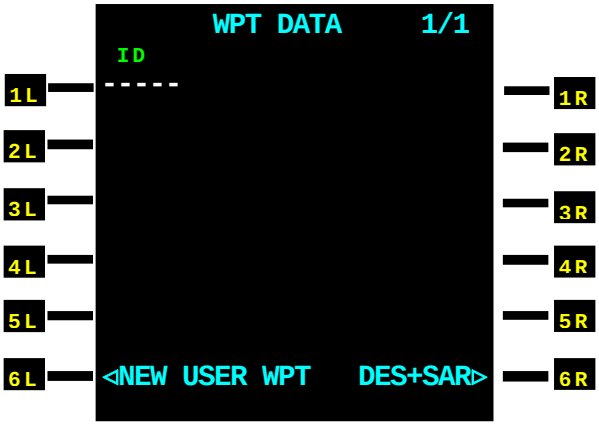
CONFIRM [6R]: Confirm the changes made to the inactive route.

WPT DATA 1/1

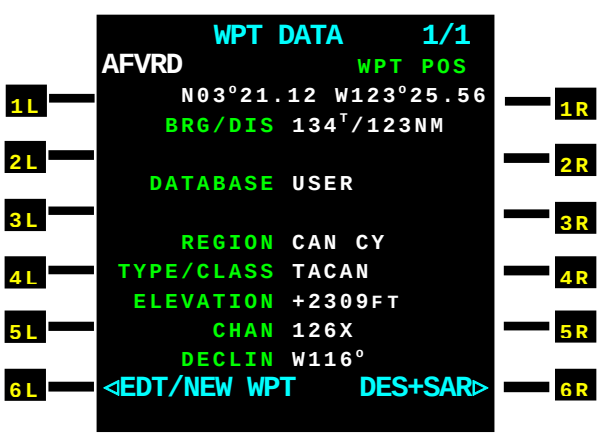
The WPT DATA 1/1 page allows for the display and partial modification of waypoint information from the navigation, temporary, custom, or user databases. Moving (if configured) and fixed waypoints information may be viewed. It also provides access to the USER WPT page for modification of all user waypoint parameters.

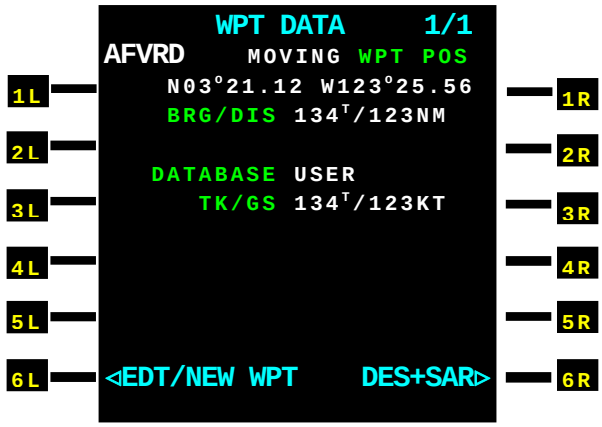
Display WPT DATA 1/1 page by pressing [INIT REF], and <WPT DATA>.

A. Display upon entry into the page (with no identifier being supplied from the previous page):

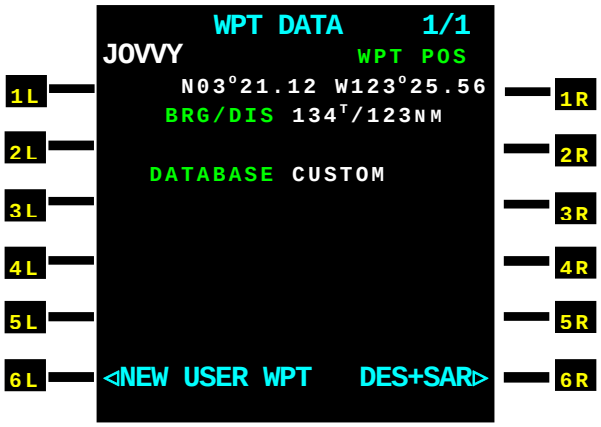


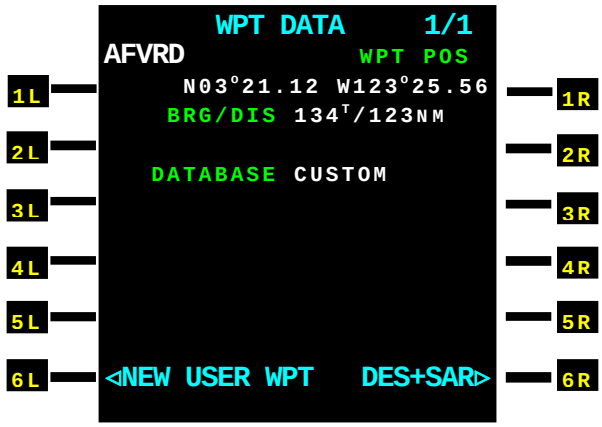
B. Display upon entry of an existing identifier in the fixed user waypoint database. The displayed page differs depending if displaying a moving or fixed waypoint and depending on the type and class. Large font used for modifiable fields:



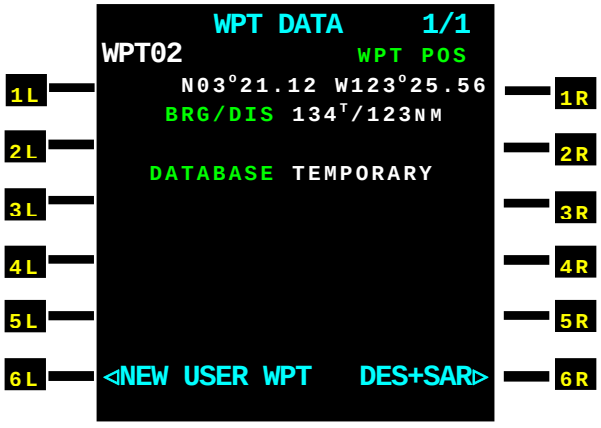


C. Display upon entry of an existing identifier custom or navigation waypoint database. Display varies with the waypoint type or class:

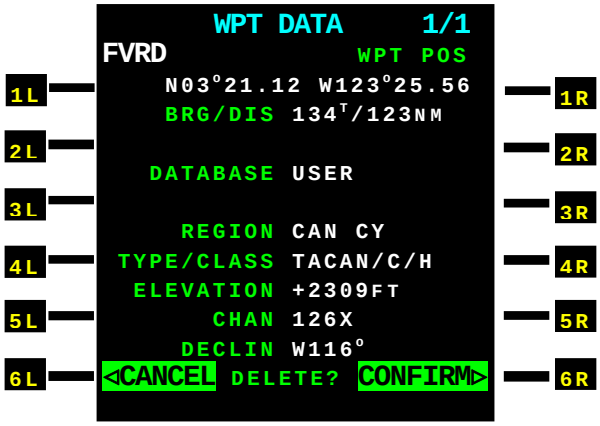




D. Display upon entry of an existing identifier in the temporary waypoint database:



E. Display after deleting the user fixed waypoint, or moving waypoint. Deletion of a moving waypoint that is present in the active route or the modified route is rejected:



ID [1L]: Waypoint identifier (5 characters max.). Entry of an identifier will display all the parameters of that waypoint. In the case of multiple waypoints with the same identifier, the SELECT WPT page will be displayed for specification. Pressing this key with an empty scratchpad copies the identifier to the scratchpad. To delete a user waypoint, press CLR to get the DELETE message and select identifier LSK key. Entry of an invalid identifier will cause the advisory !NOT IN DATABASE message to appear. If a modification is in progress, entering a new identifier will automatically cancel the deletion, as applicable. Because the Bulls Eye waypoints have their own dedicated pages, entering the Bulls Eye waypoint in this field will display the BULLS EYE 3/3 page and the Bulls Eye Target waypoint will display the BULLS EYE 2/3 page.

WPT POS [1R]: Display of waypoint position. Pressing this key with an empty scratchpad copies the position to the scratchpad.

BRG/DIS [1R]: Bearing and distance from the current aircraft position to the waypoint. The values will be recomputed and displayed at a minimum rate of once every second.

NAME (2L),(2R): Airport waypoint names, 24 characters max.

DATABASE (2L),(2R): Display of the database containing the waypoint. Possible values are NAVIGATION, CUSTOM, USER, and TEMPORARY.

TK/GS [3R]: Track angle and ground speed of moving waypoint.

REGION (3L), (3R) lower line: Display of REGION and ICAO code.

Complete list of region codes:

AFR: Africa
CAN: Canada
EEU: Eastern Europe
EUR: Europe
LAM: Latin America
CUS: Specific to customer
MES: Middle East/South Asia
PAC: Pacific
SAM: South America
SPA: South Pacific
USA: United States of America

Sample ICAO country codes (2 characters):

EH= Europe, Netherlands EG= Europe, UK

TYPE/CLASS (4L), (4R) upper line: Display of identifier type or VHF NAVAID class. Possible values are:

AIRPORT:	Airports
NDB:	Non-Directional Beacon waypoint
WAYPOINT:	Simple Position Waypoint

VHF Navigation Aids classes: **a/b/c**

a	**b**	**c**
DME	C - Co-located	H - High Level
ILSDME	N - Non co-located	L - Low Level
ILSTACAN	O - Out of Service	T - Terminal
LOCGS	* - N/A	U - Undefined
LOCONLY		
MLSDMEN		
MLSDMEP		
TACAN		
VNCDME(DME component of a VORDME)		
VNCTACAN (TACAN component of a VORTAC)		
VOR		
VORDME		
VORTAC		

ELEVATION (4L), (4R) lower line: Display of elevation in feet (Airport and VHF NAV only).

FREQ (5L), (5R) upper line: Display of NAVAID frequency (MHz) (DME, ILSDME, VOR, and VORDME VHF NAV only).

CHAN (5L), (5R) upper line: Display of TACAN channel.

CH/FREQ (5L), (5R): Display of TACAN channel and corresponding NAVAID frequency (MHz) (VORTAC VHF NAV only).

DECLIN (5L), (5R) lower line: Display of VOR Station Declination (VHF NAV only).

MAGVAR (5L), (5R) lower line: Display of magnetic variation (WAYPOINT only).

NEW USER WPT [6L]: Displayed only for non-user waypoints. Access the USER WPT pages allowing creation of a new user waypoint or modification of any field of an existing one.

EDT/NEW WPT [6L]: Access the USER WPT pages allowing modification of any field of the selected waypoint or creation of a new user waypoint. The user waypoint data being displayed will automatically appear on the USER WPT pages.

(SAVE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

(DELETE?): Displayed between the CANCEL/CONFIRM prompts when the inactive route is in modification.

CANCEL [6L]: Cancels the modifications performed to a user waypoint.

CONFIRM [6R]: Confirms the modifications performed to a user waypoint.

DES+SAR [6R] or TACTICAL [6R]: When TACT key is configured, the DES+SAR prompt is replaced by TACTICAL. In this case, the prompt gives access to the TACTICAL 1/Y page instead of the DES+SAR 1/Y page. Transfer the waypoint information to the REF ID on the DES+SAR 1/Y (or TACTICAL 1/Y) page and display the DES+SAR 1/Y (or TACTICAL 1/Y) page depending on the configuration.

WPT LISTS 1/1

Display WPT LISTS 1/1 page by pressing [INIT REF] and <WPT LISTS>.

USER WPT [1L]: Access to USER WPT 1/X page.

SARSAT WPT [1R]: Access to the SARSAT WPT page. Displayed only if a DF is configured.

DMAP WPT [2L]: Access to DMAP WPT 1/X page. Displayed only if a DMAP (DMAP ELBIT, DMAP EURONAV, or DMAP EURONAV_A702) is configured.

PREDEF WPT [3L]: Access to PREDEF WPT 1/2 page.

APPENDIX B - NAVIGATION LEG TYPE DEFINITIONS

CONTENTS

Subject **Page**

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APPENDIX B

NAVIGATION LEG TYPE DEFINITIONS

INTRODUCTION

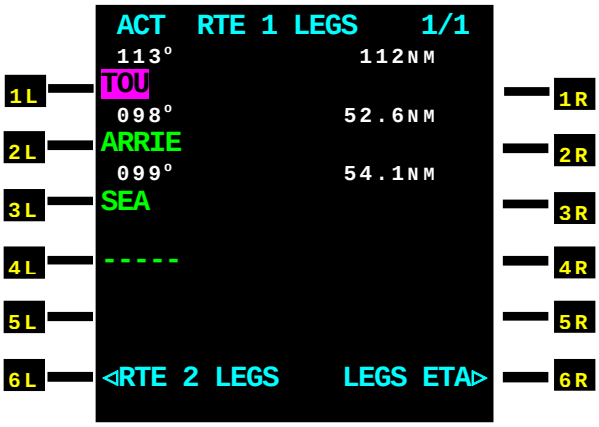
For lateral guidance, the desired lateral route is entered into the CMA-9000 FMS through keyboard entries such as custom route, origin, destination, SID, waypoints, STAR and/or approach. Entries and selections of published procedures are translated using 20 different types of navigation legs to define the lateral path. Each of these types of legs is graphically illustrated with accompanying display in the following paragraphs.

DIRECT TO A FIX (WAYPOINT – DF LEG)

Refer to Section 9 for detailed information.

TRACK BETWEEN FIXES (TF LEG)

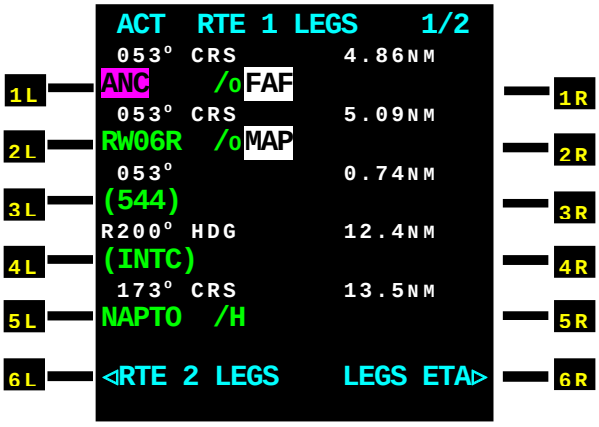
This navigation leg is a great circle path from a starting to an ending waypoint.

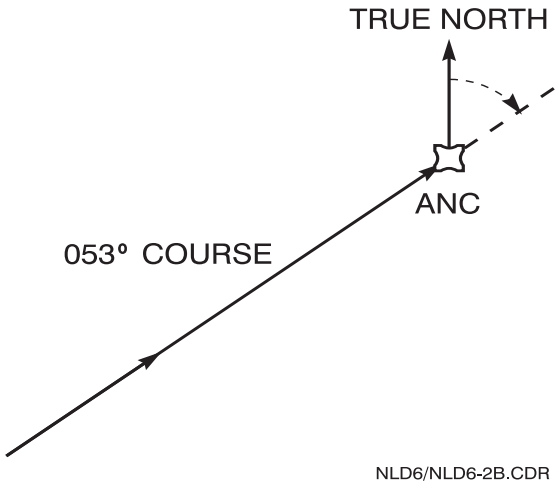


NLD6/NLD6-1B.CDR

COURSE TO A FIX (CF LEG)

This navigation leg is defined by an ending waypoint and a course into the waypoint.

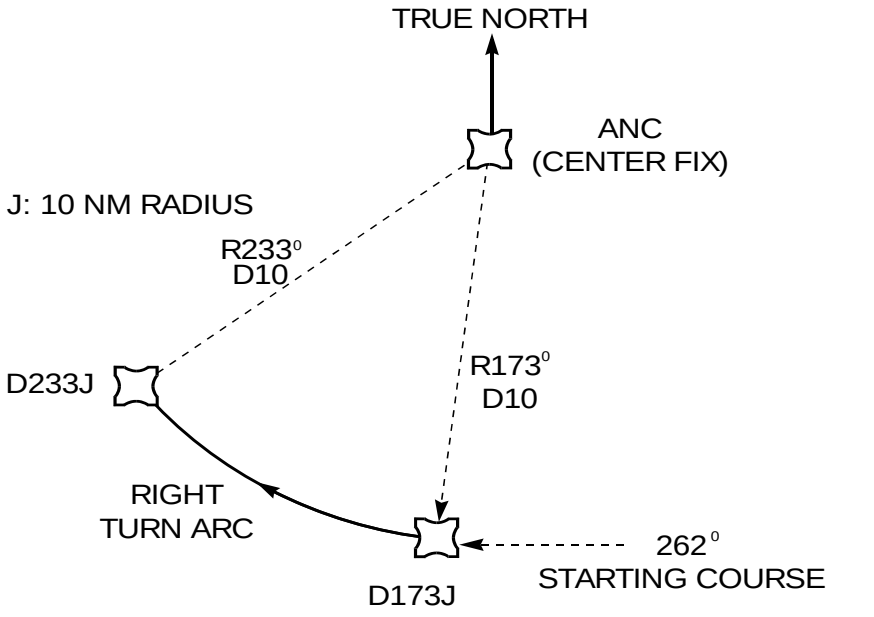




NLD6/NLD6-2B.CDR

DME ARC TO A FIX OR CONSTANT RADIUS TO A FIX (AF AND RF LEGS)

This navigation leg is an arc about a center fix. The leg goes clockwise (right arc), or counterclockwise (left arc) starting at a waypoint, or an intercept point on the radius, and terminates at a waypoint with a terminating tangential course.

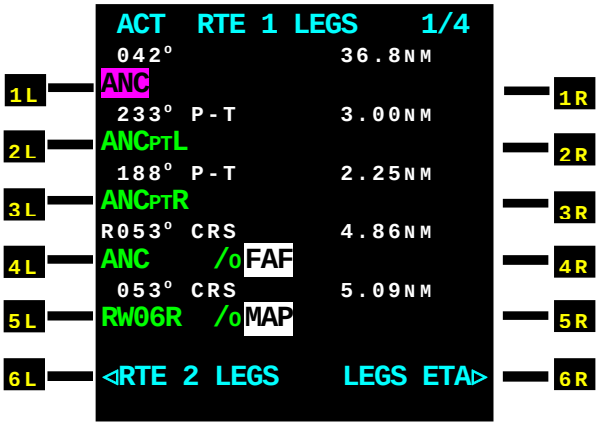


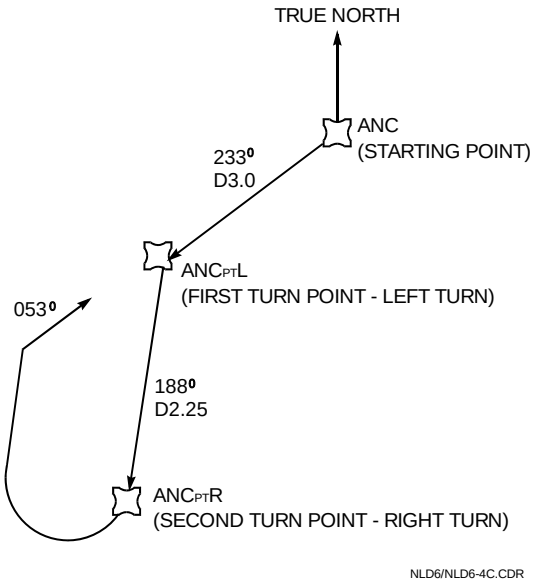
NLD6/NLD6-3B.CDR

PROCEDURE TURN (PI LEG)

Refer to Section 7 for detailed information.

This navigation leg is defined by a starting waypoint, an initial direction, a turn direction and a course to intercept on the following course to fix navigation leg.



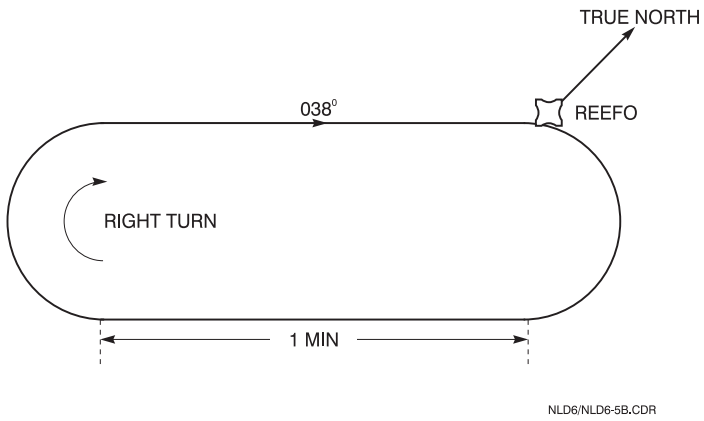


HOLDING PATTERN (HM, HF, HA LEGS)

Refer to Section 10 for detailed information.

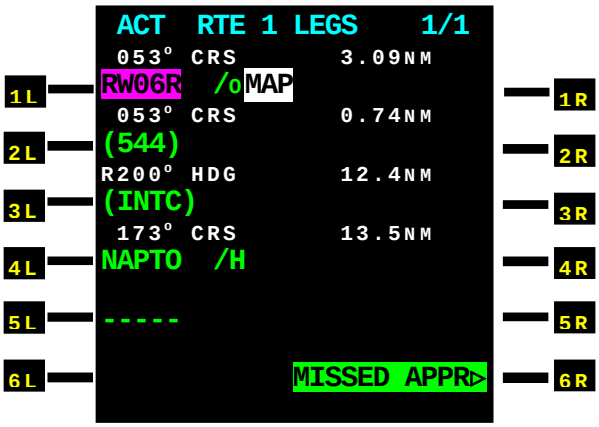
This navigation leg is defined by a waypoint, a turn direction, an inbound course and a time or distance length. The leg terminates when:

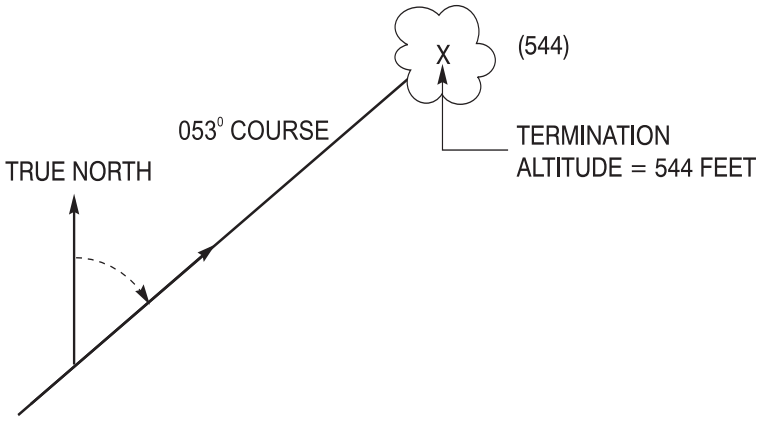
- Crossing the waypoint and a hold exit has been initiated by the pilot (manually ended hold).
- Crossing the waypoint after completing the entry procedure (hold for course reversal, the hold page TITLE field display HOLD ONCE).
- Crossing the waypoint and reaching the target altitude (hold to an altitude, the hold page TITLE field display HOLD TO ALT).



COURSE TO AN ALTITUDE (CA LEG)

This navigation leg is defined by a course from previous leg termination position and a target altitude.

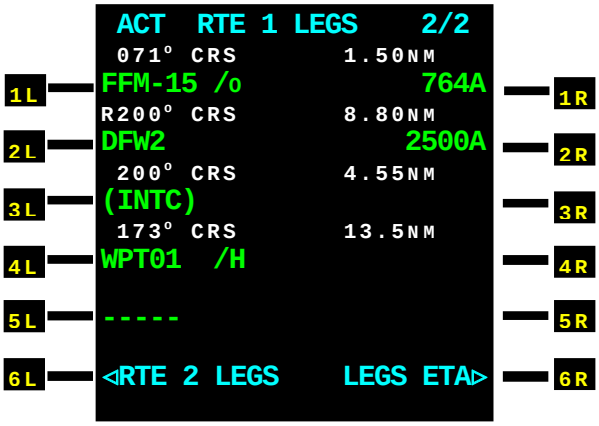


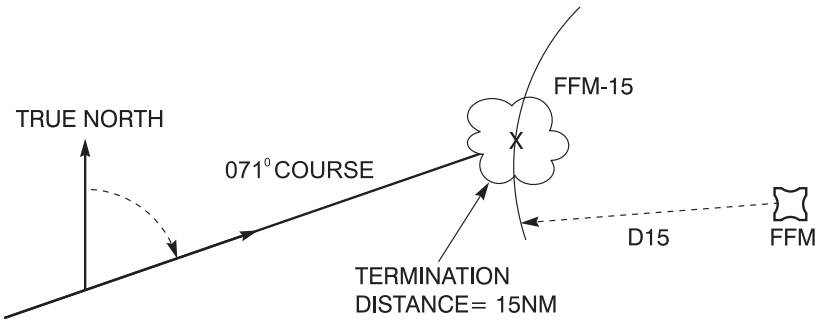


NLD6/NLD6-6B.CDR

COURSE TO A DME DISTANCE (CD LEG)

This navigation leg is defined by a course from current aircraft position and terminates when reaching a distance from a DME Navaid.

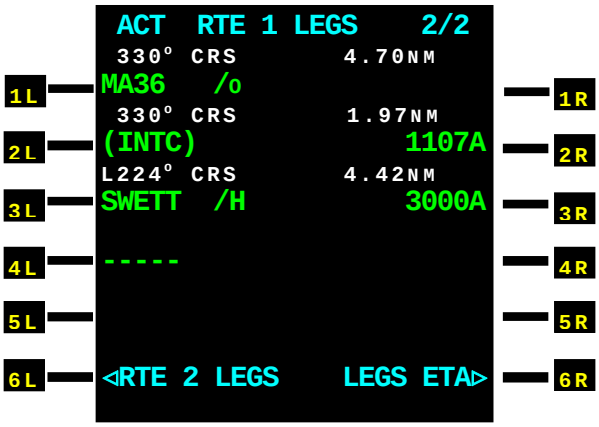


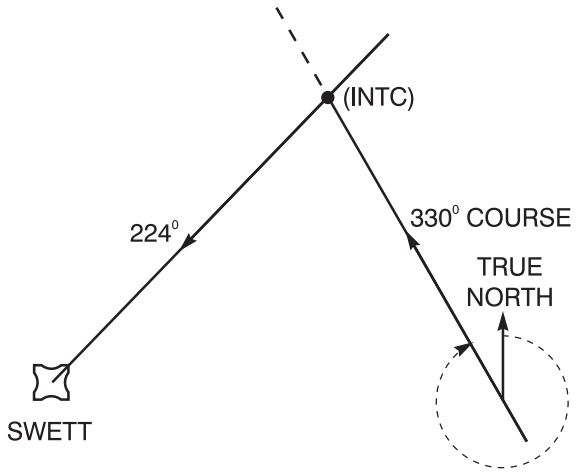


NLD6/NLD6-7B.CDR

COURSE TO A COURSE INTERCEPT (CI LEG)

This navigation leg is defined by a course from current aircraft position and terminates when a desired course which is referenced to a waypoint is intercepted and captured.

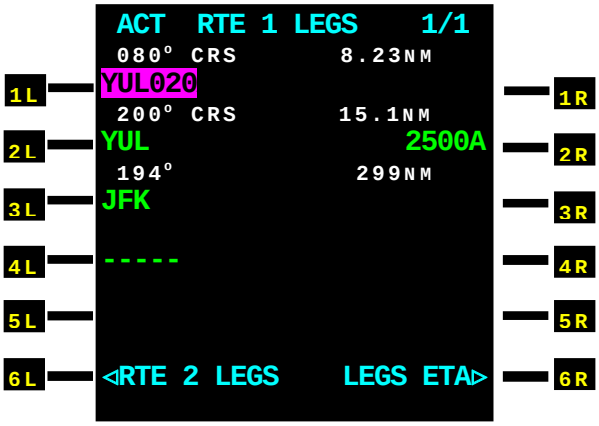


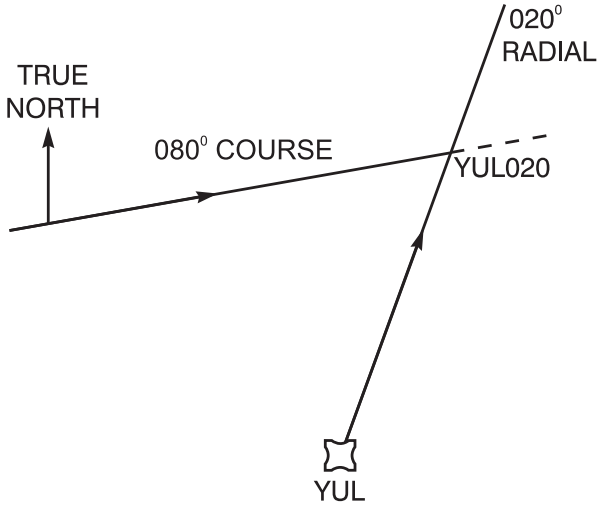


NLD6/NLD6-8B.CDR

COURSE TO A RADIAL (CR LEG)

This navigation leg is defined by a course from current aircraft position and terminates when crossing a radial from a referenced waypoint.

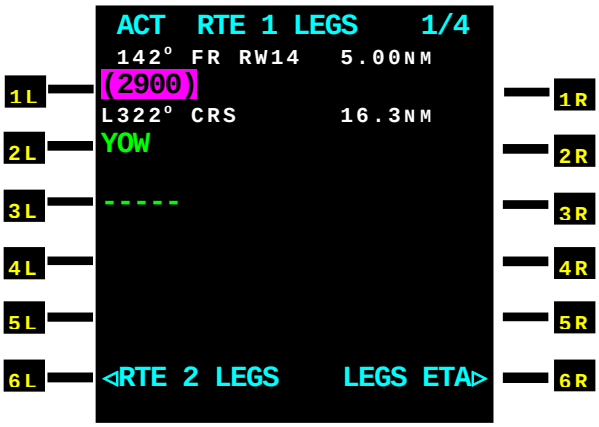


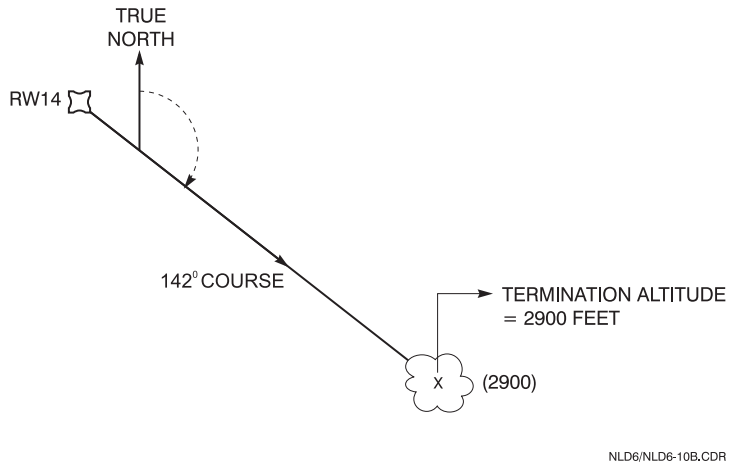


NLD6/NLD6-9B.CDR

COURSE FROM A FIX TO AN ALTITUDE (FA LEG)

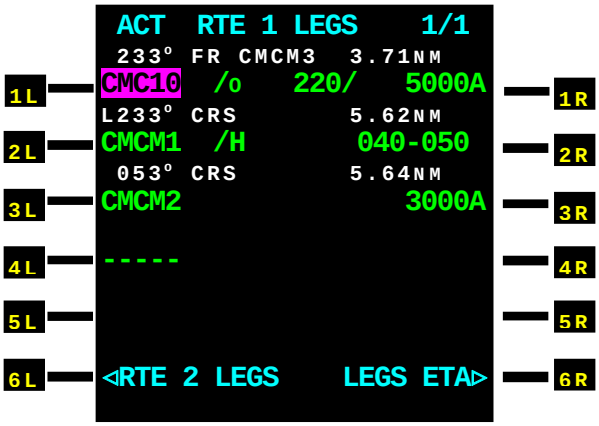
This navigation leg is defined by a waypoint, a course and an altitude termination.

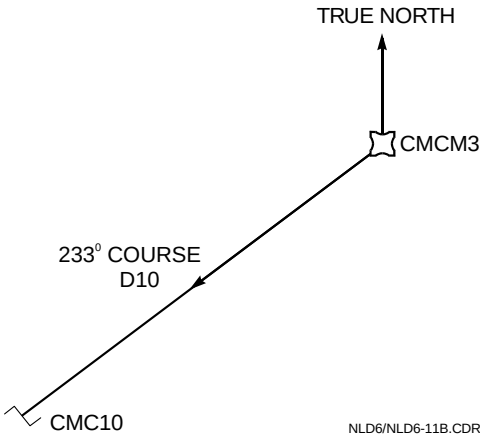




COURSE FROM A FIX TO A DISTANCE

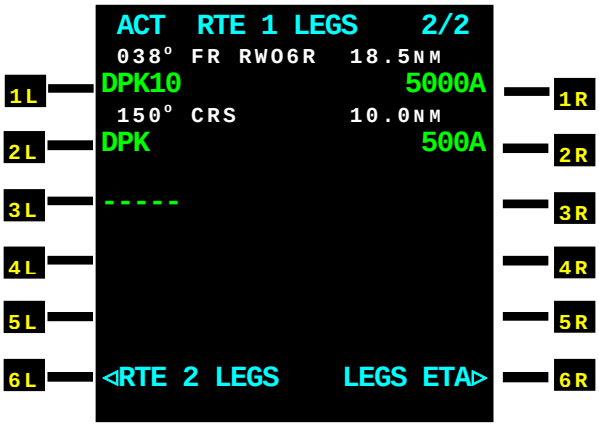
This navigation leg is defined by a waypoint, a course and a distance to travel from the waypoint.

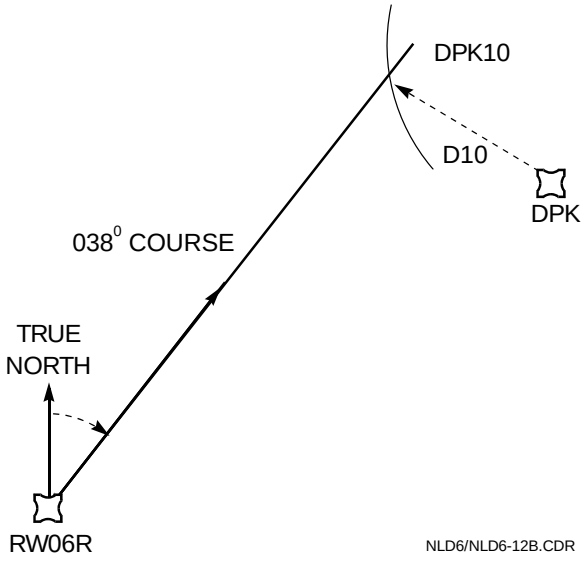




COURSE FROM A FIX TO A DME DISTANCE (FD LEG)

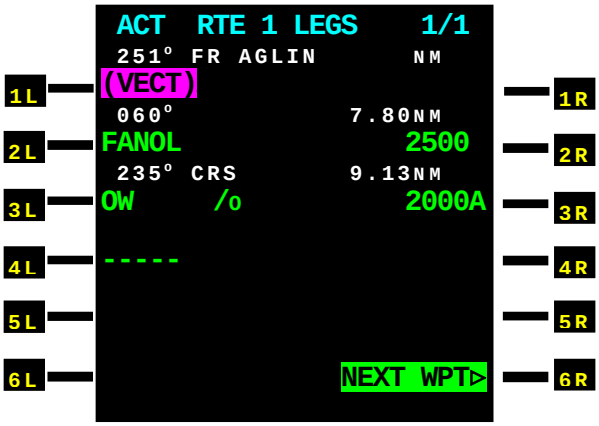
This navigation leg is defined by a waypoint and a course and terminates when reaching a distance from a DME Navaid.

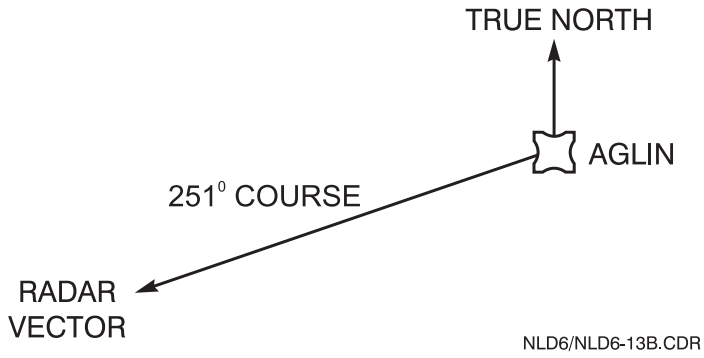




COURSE FROM A FIX TO A MANUAL TERMINATION (FM LEG)

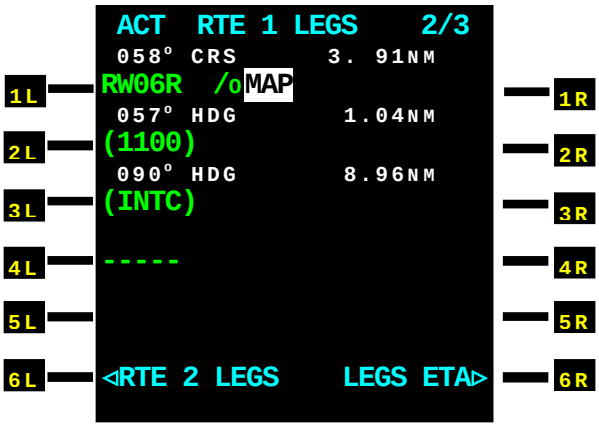
This navigation leg is defined by a waypoint and a course and terminates on pilot request.

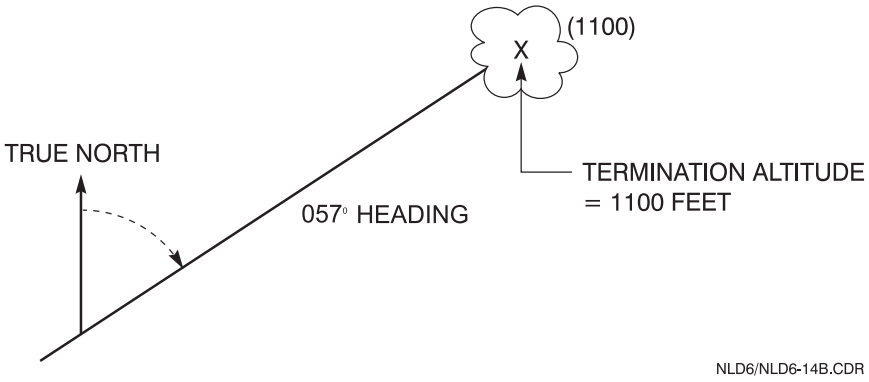




HEADING TO AN ALTITUDE (VA LEG)

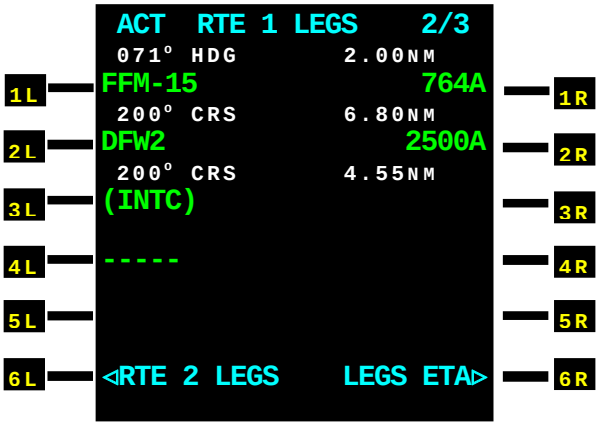
This navigation leg is defined by a heading from current aircraft position and terminates when reaching a target altitude.

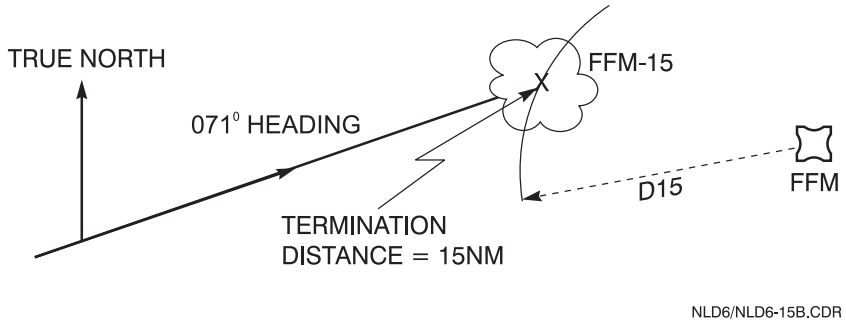




HEADING TO A DME DISTANCE (VD LEG)

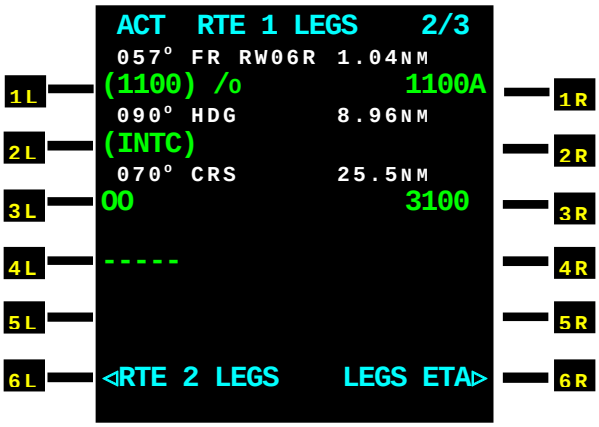
This navigation leg is defined by a heading from current aircraft position and terminates when reaching a distance from a DME Navaid.

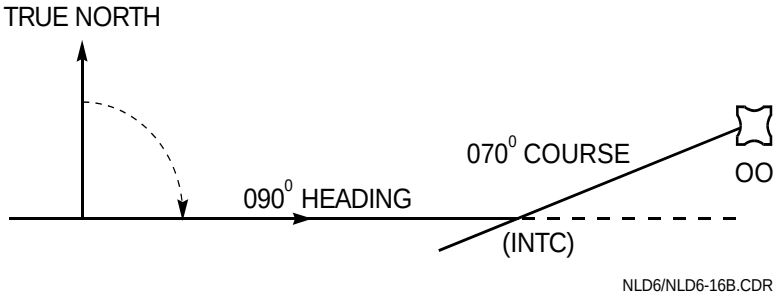




HEADING TO A COURSE INTERCEPT (VI LEG)

This navigation leg is defined by a heading from current aircraft position and terminates when a desired course which is referenced to a waypoint is intercepted and captured.

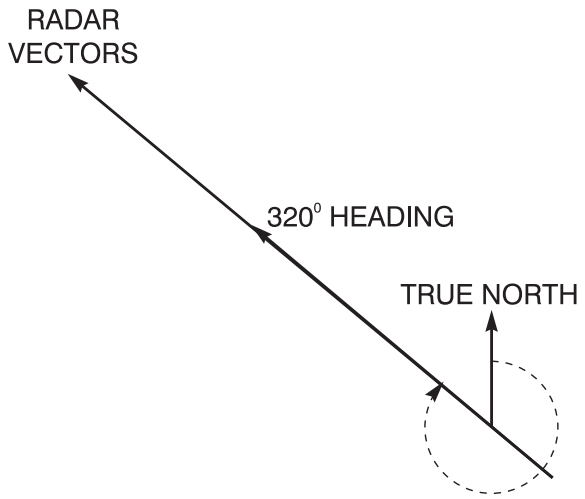




NLD6/NLD6-16B.CDR

HEADING TO A MANUAL TERMINATION (VM LEG)

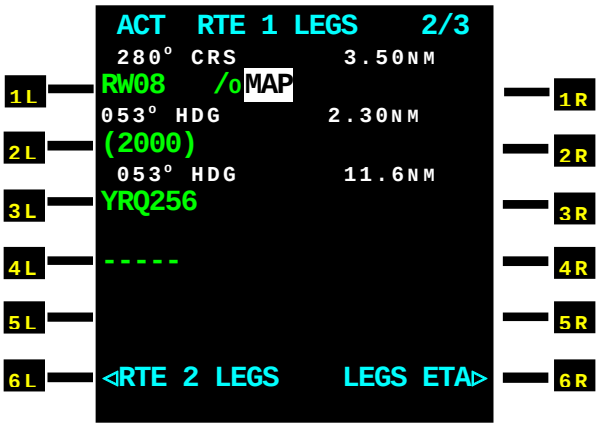
This navigation leg is defined by a heading from current aircraft position and terminates on pilot request.

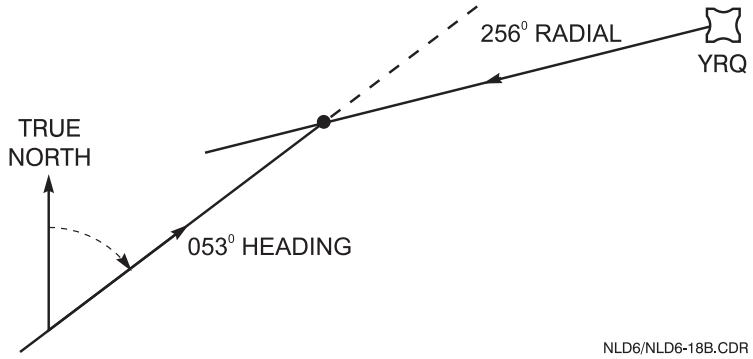


NLD6/NLD6-17B.CDR

HEADING TO A RADIAL (VR LEG)

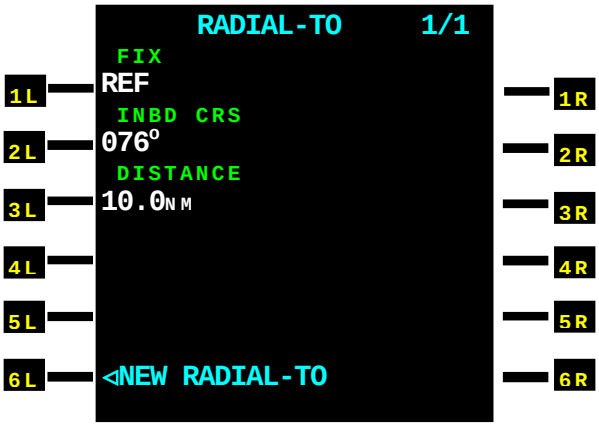
This navigation leg is defined by a heading from current aircraft position and terminates when crossing a radial from a referenced waypoint.

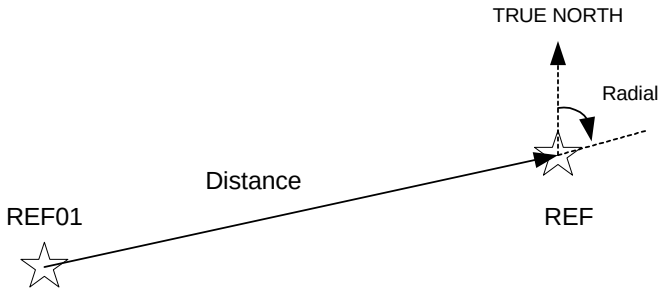




RADIAL-TO

This navigation leg is defined by an entry waypoint and a reference waypoint. The entry waypoint is created by the reverse to a radial and a distance to the reference waypoint. The reference waypoint can be a waypoint in the route or another waypoint. The new leg in inserted in the route.





SEARCH PATTERN

Refer to Section 11 for detailed information.

APPENDIX C - NAVIGATION DISPLAYS

CONTENTS

Subject **Page**

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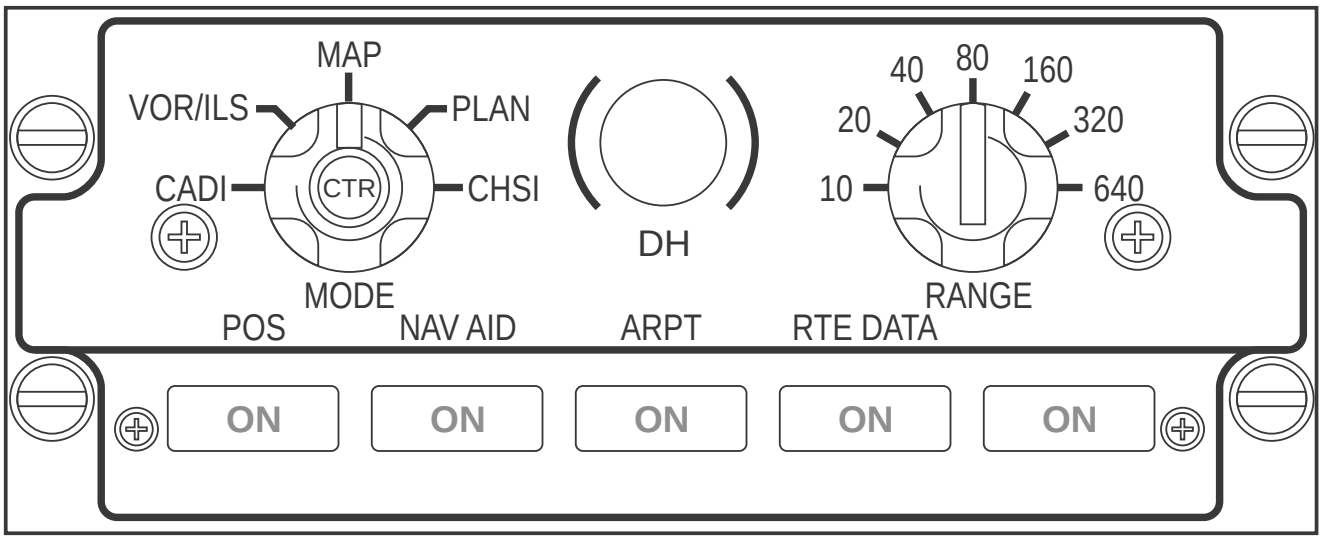
NAVIGATION DISPLAYS

APPENDIX C-1

NAVIGATION DISPLAYS – EHSI/EFIS

INTRODUCTION

The information displayed by the CMA-9000 FMS on the EHSI/EFIS flight instrument panel can be viewed in one of two modes: MAP or PLAN. The MAP mode can be configured to show a CENTER display. The two EHSI/EFIS modes and the CENTER mode are selected via the mode switch on the control panel.

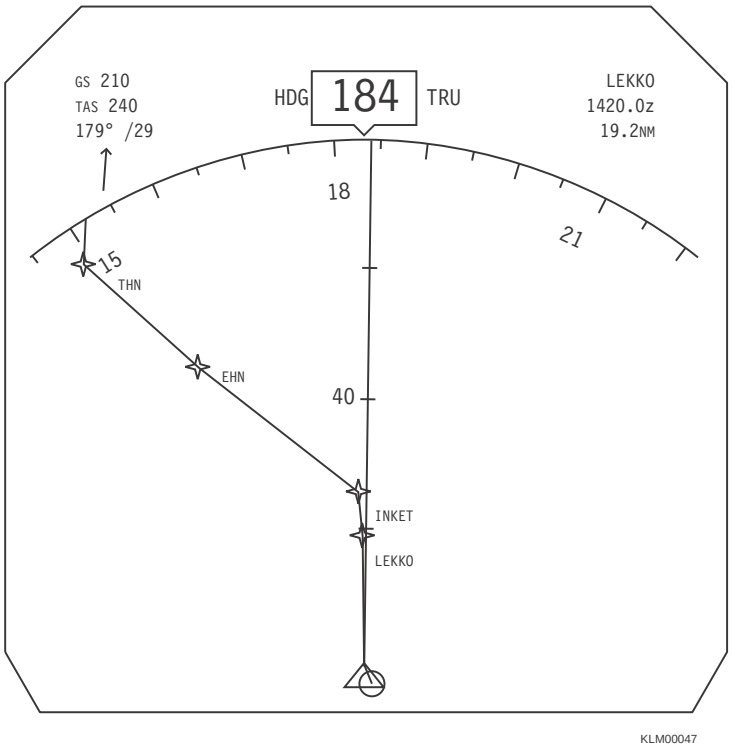


KLM00049

Typical EHSI/EFIS Control Panel

MAP MODE

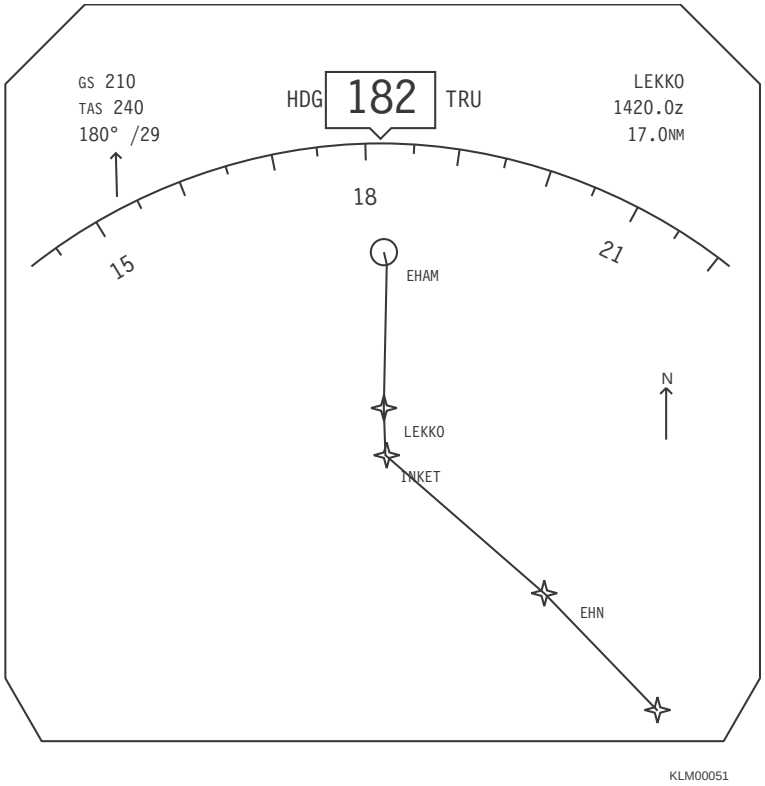
In MAP mode, the EHSI/EFIS displays active and/or modified routes and background data relative to the aircraft position and the current heading. The background data, route data, navigation aids and airports, may be selectively removed using the NAVAID, ARPT and RTE DATA push buttons usually found on a typical EHSI/EFIS control panel (as shown above).



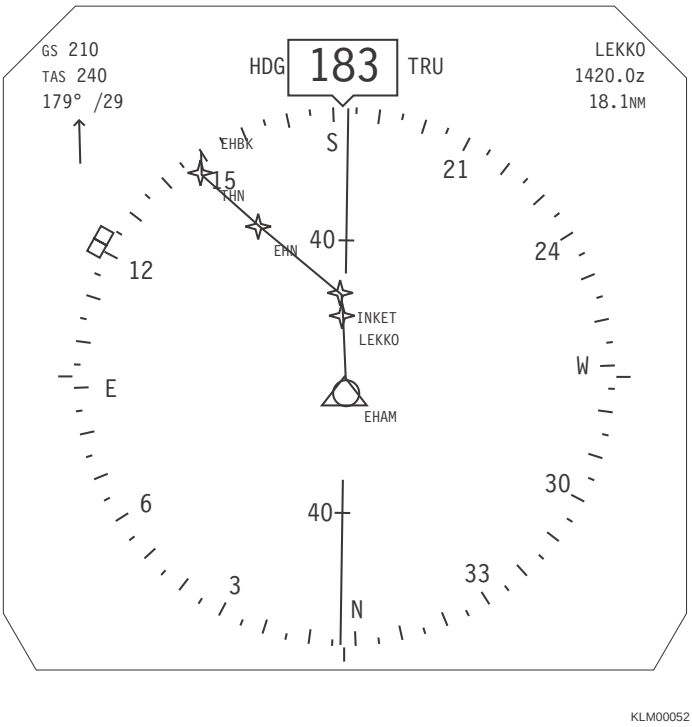
Typical MAP Mode

PLAN MODE

In PLAN mode the EHSI/EFIS displays the active and/or modified routes relative to true north and the center waypoint displayed on the CMA-9000 FMS RTE LEGS page. The center waypoint can be stepped through each waypoint in the route by pressing the MAP CTR STEP prompt on the RTE LEGS page.



Typical PLAN Mode



KLM00052

Typical CTR Mode

In both MAP and PLAN modes the EHSI displays dynamic data and position pointers. The range of the MAP and PLAN display modes can be set to 5[1], 10, 20, 40, 80, 160, 320 or 640 nautical miles via the range switch on the EHSI control panel.

EHSI DISPLAYS -- SYMBOLOGY AND COLORS

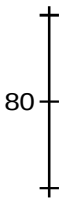
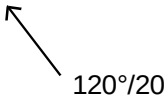
The color conventions used on the EHSI/EFIS display are as follows.

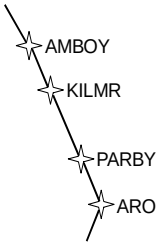
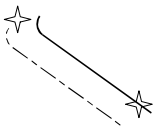
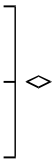
Green	(G)	position data
White	(W)	armed flight modes, present status situation
Magenta	(M)	fly-to condition, engaged flight modes
Cyan	(C)	background information
Black	(B)	blank areas, 'OFF' condition

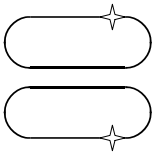
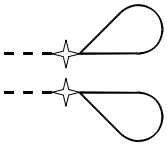
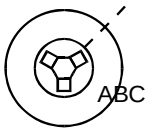
[1] The 5 nm range is only available on certain installations. On such installations, the range may span from either 5 to 640 nm or from 5 to 320 nm.

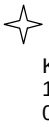
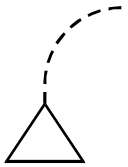
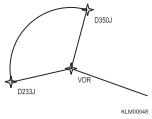
NAVIGATION MODE AND ADVISORY MESSAGES

The EHSI/EFIS uses CMA-9000 FMS data to generate symbology and information described below. Presentation may vary from one EHSI/EFIS type to another.

NAME	SYMBOL	APPLICABLE MODE(S)	REMARKS
PRESENT TRACK LINE and RANGE SCALE (W)		MAP MAP CTR VOR/ILS	Indicates ground track which will result with present heading and winds. Displayed range mark and figure is ½ the actual selected range.
ACTIVE WAYPOINT IDENTIFIER (M)	ABCDE	MAP, MAP CTR, PLAN	Indicates active flight plan waypoint (top right corner).
ETA DISPLAY(W)	0834.5z	MAP MAP CTR PLAN	Indicates FMS calculated ETA for the active waypoint based on present groundspeed (top right corner).
DISTANCE DISPLAY (W)	123.4 NM	MAP MAP CTR PLAN	Distance is displayed to next FMS waypoint in NM (top right corner)
GROUND SPEED INDICATOR (W)	GS 123	ALL	Indicates current ground speed (top left).
WIND DIRECTION ARROW (W) and DIGITAL DIRECTION/ SPEED (W)		MAP MAP CTR, VOR/ILS VOR/ILS CTR	Indicates wind direction with respect to the map display orientation and compass reference and digital wind direction and speed (top left).
WAYPOINT: ACTIVE (M) INACTIVE (W)		MAP MAP CTR PLAN	Active - Represents the waypoint the aircraft is currently navigating to. Inactive- Represents a navigation point making up the selected active route.

NAME	SYMBOL	APPLICABLE MODE(S)	REMARKS
ACTIVE ROUTE (M) ACTIVE ROUTE MODIFICATIONS (W) INACTIVE ROUTES (C)		MAP MAP CTR PLAN	The active route is displayed with a continuous lines (M) between waypoints. Active route modifications are displayed with short dashes (W) between waypoints. When a change is activated in the FMC, the short dashes are replaced with a continuous line (M). Inactive routes are displayed with long dashes (C) between waypoints.
OFFSET PATH (M)		MAP MAP CTR PLAN	Presents a dot-dash line parallel to an offset from the active route.
AIRPORT IDENTIFIER and RUNWAY (W)	 22L	MAP MAP CTR PLAN	Appears when selected. Available when HSI range is 80, 160, 320 or 640 nm. For tactical approaches, no airport identifier pr runway number is displayed.
AIRPORT and RUNWAY (W)		MAP MAP CTR PLAN	Appears when selected. Available when HSI range is 10, 20 or 40 nm. Dashed centerlines extend outward 14.2 nm. For tactical approaches, no airport identifier pr runway number is displayed.
VERTICAL POINTER (M) and DEVIATION SCALE (W)		MAP MAP CTR	Displays vertical deviation from selected vertical profile (pointer) in MAP mode during descent only. Scale indicates ±400 ft deviation.
VERTICAL ALTITUDE PROFILE POINT and IDENTIFIER (G)	O T/C O S/C O T/D O E/D	MAP MAP CTR PLAN	Represents an PMS calculated point and is labeled on the flight plan path as T/C (top-of-climb), T/D (top-of-descent), S/C (step climb), and E/D (end-of-descent). Deceleration points have no identifier.

NAME	SYMBOL	APPLICABLE MODE(S)	REMARKS
HOLDING PATTERN ACTIVE (M) MODIFICATION (W) INACTIVE (C))		MAP MAP CTR PLAN	A fixed size holding pattern is displayed when selected or an instrument procedure with a holding pattern is selected into the route. Actual holding pattern size is displayed when holding waypoint is active and HSI range 80 nm or less.
PROCEDURE TURN ACTIVE (M) MODIFICATION (W) INACTIVE (C))		MAP MAP CTR PLAN	A fixed size procedure turn is displayed when an instrument approach procedure with a procedure turn is selected into route. Actual procedure turn size is displayed when procedure turn is active and HSI range is 40 or less.
NORTH POINTER (G)		PLAN	Indicates map background is oriented and referenced to true north.
SELECTED REFERENCE POINT and BEARING DISTANCE INFORMATION (G)		MAP MAP CTR PLAN	Displays the reference point selected on the FIX page. Bearing and/or distance from the Fix are displayed with dashes.
VOR (C,G) DME/TACAN (C,G) VORTAC (C,G) NDB (M)		MAP MAP CTR	When NAVAID P/B is ON, all appropriate navaids in range appear in addition to those navaids which are standard or active. Tuned nav aids are displayed regardless of the NAVAID P/B and appear green. When HSI is 80, 160, 320 or 640 only high altitude navaids are displayed. Otherwise, both high and low altitude navaids are displayed.
AIRPORT (C)	 KTEB	MAP MAP CTR	When the ARPT P/B is ON, airports within the map area are displayed. Origin and destination airports are always displayed independent of ARPT P/B.

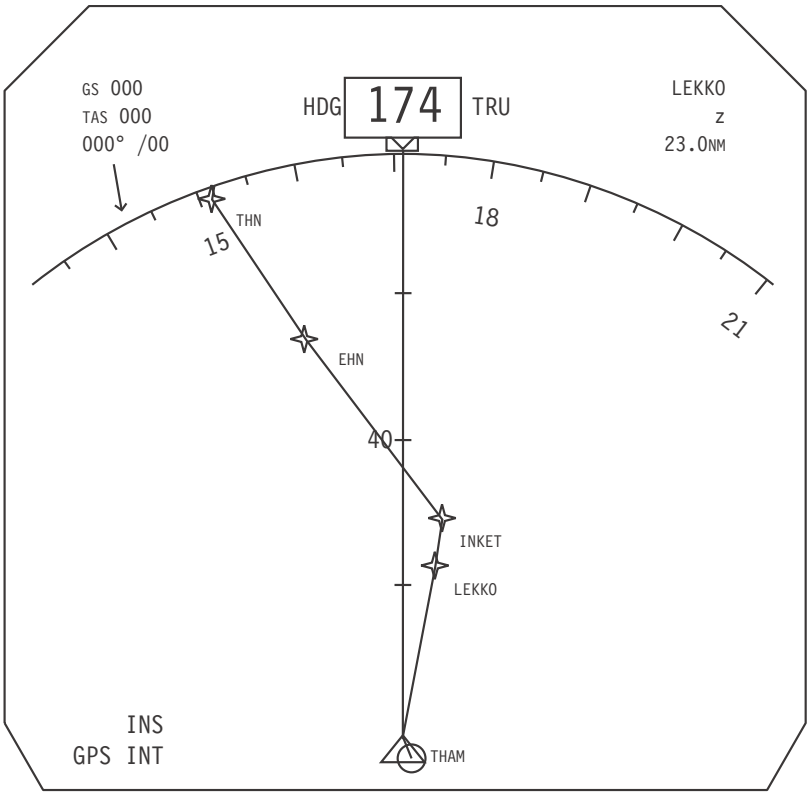
NAME	SYMBOL	APPLICABLE MODE(S)	REMARKS
ROUTE DATA (M, W		MAP MAP CTR PLAN	When the RTE DATA P/B is ON, altitude and ETA for route waypoints can be displayed.
IRS POSITION	* (W)	MAP MAP CTR	When POS P/B is ON indicates IRS position.
TREND VECTOR (W)		MAP MAP CTR	Predicts aircraft directional trend at the end of 30, 60 and 90 second intervals. Based on bank angle and ground speed. 3 segments are displayed when selected range is greater than 20 nm, 2 segments are displayed on the 20 nm scale and one segment on 10 nm scale.
ALTITUDE RANGE ARC (G)		MAP MAP CTR	When intersected with the track line, it predicts the point where the reference altitude will be reached, based on current vertical speed.
DME ARC		MAP MAP CTR	Predicts the track over the ground of an aircraft flying at a constant distance from a navigational aid by reference to distance measuring equipment (DME).
MAP SOURCE ANNUNCIATION (G)	FMS 1, 2 or 3	MAP MAP CTR	Display EHSI source when alternate source is selected.

EHSI/EFIS DISPLAYS -- NAVIGATION MODE AND ADVISORY MESSAGES

The EHSI/EFIS displays messages related to procedures, nav modes and nav alerts, as well as FMS alerts. The following are various type of messages that can be displayed:

- Holding pattern entry types: parallel, teardrop, direct
- Search active indication
- GPS approach armed status
- GPS integrity lost
- Unable RNP
- Offset route active (with magnitude and direction of offset)
- Active navigation mode (e.g. GPS, VOR/DME/TACAN, DME, INERTIAL, DR)
- Position offset active
- CARP active
- FMS alert level scratchpad message triggered

An example of navigation mode and advisory message display is given below:



APPENDIX C-2

NAVIGATION DISPLAYS - EFIS (GAMA STANDARDS)

INTRODUCTION

NOTE: The information presented in this section may not apply to all GAMA type EFIS systems as some systems have fewer capabilities than others. For example, the Rockwell Collins EFIS-84 does not support displaying of background data.

The information displayed by the CMA-9000 FMS on the EFIS Navigation Display can be viewed in one of the following three modes: MAP, ARC, or ROSE, selectable via the EFIS Mode Select Panel.

In MAP mode, the CMA-9000 FMS is the primary source of data for the EFIS display. In this mode, the EFIS display shows the aircraft position relative to the route and other earth-referenced data, including VHF navaids, NDBs and airports. For EFIS's that support displaying background data, these different categories of data may be selectively removed via the EFIS 1/1 page* of the FMS to de-clutter the map display. A summary of MAP mode symbology is presented below:
* *EFISs which do not support background data do not have this page available for display on the FMS.*

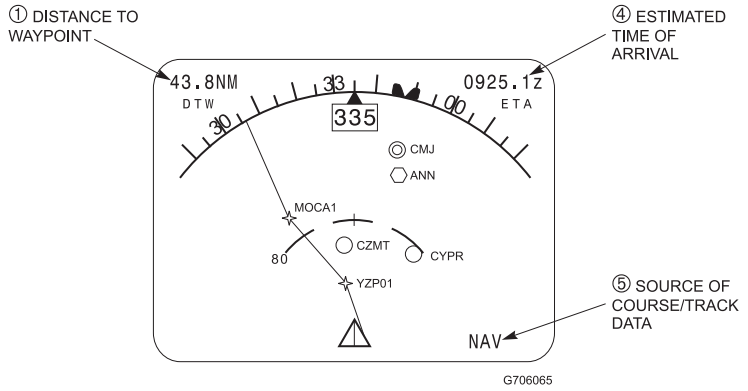
1. Active Route - these symbols represent waypoints on the active route within current EFIS map range. The active waypoint identifier is displayed in magenta.

2. Airport - airports within current EFIS map range are displayed when the AIRPORT option is selected on the EFIS 1/1 page of the FMS.

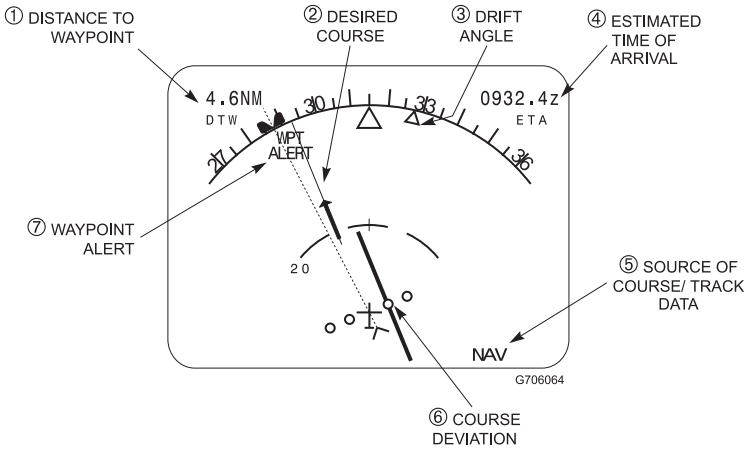
3. VHF navaid - this symbol represents any of the following types of navaids: DME, TACAN, VOR, VOR/DME, VORTAC. Navaids within current EFIS map range are displayed when the NAVAID option is selected on the EFIS 1/1 page of the FMS.

4. Non-Directional Beacon (NDB) - NDBs within current EFIS map range are displayed when the NDB option is selected on the EFIS 1/1 page of the FMS.

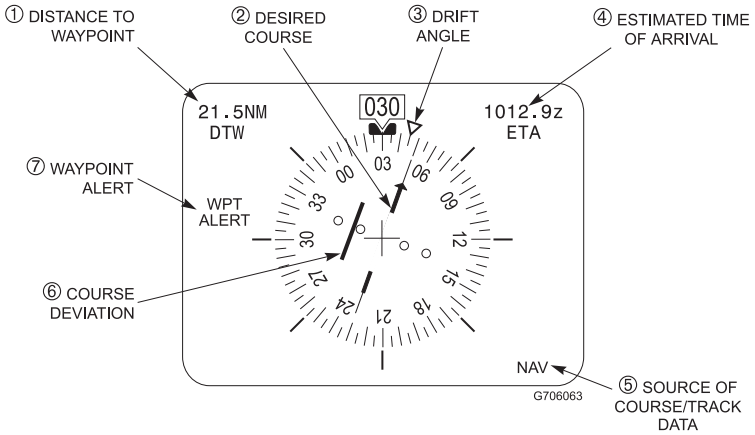
In Rose mode or Arc mode, the information is displayed on the EFIS in a format similar to a conventional HSI, with the difference being that in Arc mode, the display is restricted to a 90E arc facing the aircraft. Information displayed in these modes may come from different sources such as ILS, VOR, or NAV. A NAV indication identifies the CMA-9000 FMS as the source.



Navigation Display MAP Mode



Navigation Display Arc Mode



Navigation Display Rose Mode

The following information is displayed in one or more of the EFIS modes:

1. Distance to Waypoint (DTW) - the distance to the active waypoint.

   NOTE: For the IFDS type EFIS the distance indicated may be erroneous if the the actual DTW is greater than 655.35 nm.

2. Desired Course - the CMA-9000 FMS desired course when the source of course/track data is NAV.

3. Drift Angle - the drift angle is the difference between the computed track angle and the actual aircraft heading.

4. Estimated Time of Arrival (ETA) - the estimated time of arrival at the active waypoint. The Z indicates Zulu (the phonetic call for GMT).

5. Source of Course/Track Data - the source of course/track and deviation data: ILS, VOR, or NAV. NAV indicates CMA-9000 FMS as the source.

6. Course Deviation - the CMA-9000 FMS lateral deviation when the source of course/track data is NAV.

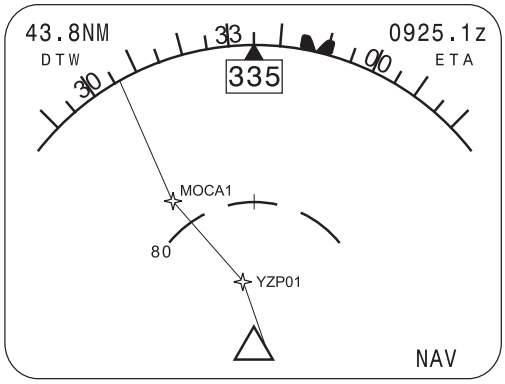
7. Waypoint Alert - announces an upcoming flight leg change by the CMA-9000 FMS. The annunciation appears 60 seconds (ground speed of 250 knots or greater) or 10 seconds (ground speed less than 250 knots) prior to the leg change and extinguishes at the moment of the leg change, at the bisector line or at the start of turn if a ROCKWELL3 EFIS is configured.

EFIS DISPLAYS

Examples of MAP mode displays for different types of routes are illustrated in the following paragraphs. In all of these examples, it is assumed that the NAVAID, NDB and AIRPORT options have been deselected via the EFIS 1/1 page of the FMS.

TYPICAL ROUTE

This display represents an active route in which only two waypoints are within the EFIS map range of 160 nm, YZP01 being the active waypoint.

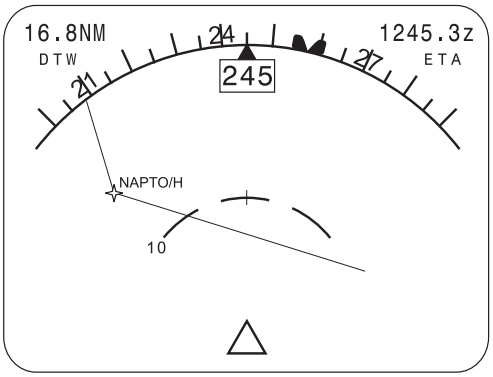


G706066

DIRECT-TO/INTERCEPT NAVIGATION

This example illustrates what would appear on the EFIS display after a Direct-To waypoint has been manually entered and executed via the FMS. A Direct-To waypoint with an Intercept is displayed in a similar manner. For more information on Direct-To/Intercept navigation, refer to Section 9.

NOTE: The Rockwell Collins 3 EFIS has the capability to display Direct-To intercepts using arcs.



G706067

HOLDING PATTERN NAVIGATION

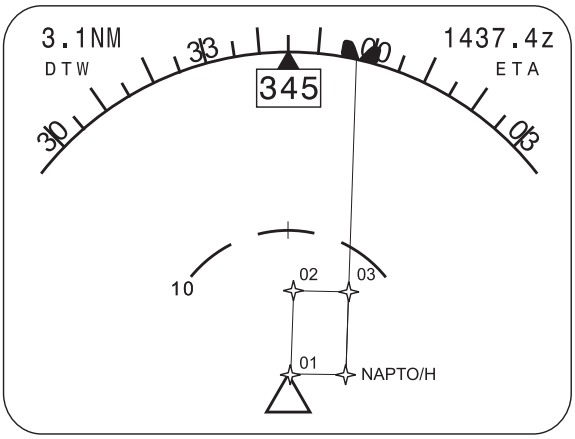
Holding pattern waypoints are identified by a /H is appended at the end of the holding fix identifier (refer to Note 1). Examples of EFIS displays for the standard holding pattern and for the different types of entry procedures are provided in the following paragraphs. For more information on Holding Pattern navigation, refer to Section 10.

NOTE 1: On the Rockwell Collins EFIS-84 a /HL (for left-hand turn direction) or /HR (right-hand turn direction) is appended instead since the holding pattern itself is not seen on the display. The purpose of this is to continuously provide the flight crew with an indication of the turn direction from the holding fix since no other visual cues are available on the display.

NOTE 2: The Rockwell Collins 3 EFIS has the capability to display holding patterns using arcs.

STANDARD HOLD/DIRECT ENTRY

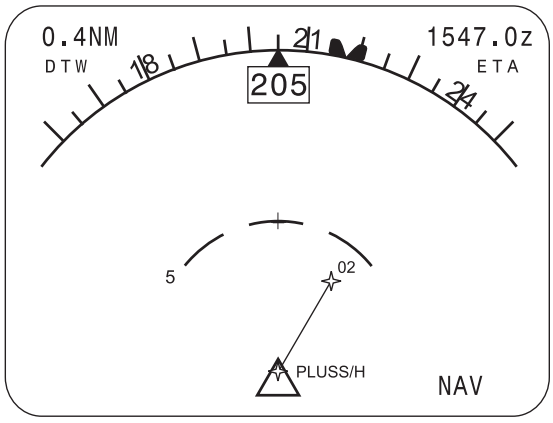
Standard holding patterns and direct hold entries are both displayed in an identical manner on the EFIS. The display consists of four waypoints positioned in a rectangular pattern. The holding fix is labelled with the waypoint identifier, while the remaining waypoints are numbered from 01 to 03, in an order indicative of the holding pattern orientation and turn direction. This example represents a direct entry into a right-turn hold with an inbound course of 173°, as it would appear after completion of the outbound turn.



G706068

PARALLEL ENTRY

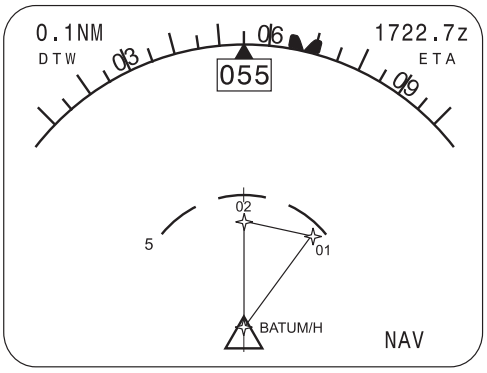
A parallel entry is represented as a single line extending from the holding fix to the end of the outbound leg, labelled 02. The aircraft initially flies on a course parallel to this line and starts turning inbound upon reaching waypoint 02. This example represents a parallel entry into a left-turn hold with an inbound course of 056°, as it would appear after the initial crossing of the fix.



G706069

OFFSET ENTRY

An offset entry is displayed as a triangular pattern in which the holding fix is labelled with the waypoint identifier. The remaining waypoints are numbered 01 and 02, in an order indicative of the holding pattern orientation and turn direction. The aircraft initially flies on a course parallel to the outbound leg and starts turning inbound on reaching waypoint 01. This example represents an offset entry into a left-turn hold with an inbound course of 234°, as it would appear on the initial crossing of the fix.



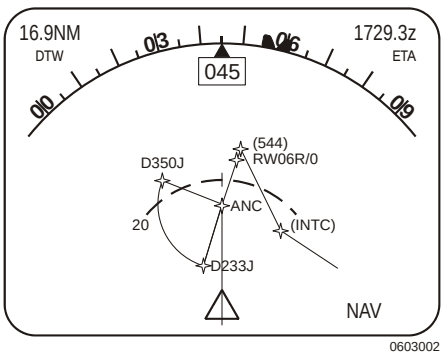
G706070

DME ARC

DME arcs are represented by a series of straight line segments designed to approximate the circular path of the arc (refer to Note 1). The waypoints located between the arc's initial fix and final fix have no identifier. They are positioned at 20-degree intervals along the arc. The DME arc in this example is represented by five segments located between the arc's initial fix D350J and final fix D233J. For more information on DME arc navigation, refer to Section 7.

NOTE 1 :On the Rockwell Collins EFIS-84 either a /ARCL (indicating a left-hand arc turn direction is required at the arc's initial fix) or /ARCR (indicating a right-hand arc turn direction is required at arc's initial fix) is appended to the arc's initial and final fixes. The reason for this is to continuously provide better situational awareness by proving an indication of the turn direction from the arc's initial fix since the arc itself is not visible on the display system.

NOTE 2: The Primus Epic EFIS and the Rockwell Collins 3 EFIS have the capability to display DME arcs using arcs. Furthermore, for the Rockwell Collins 3 EFIS, the cross-track error computed by the FMS is relative to the arc.

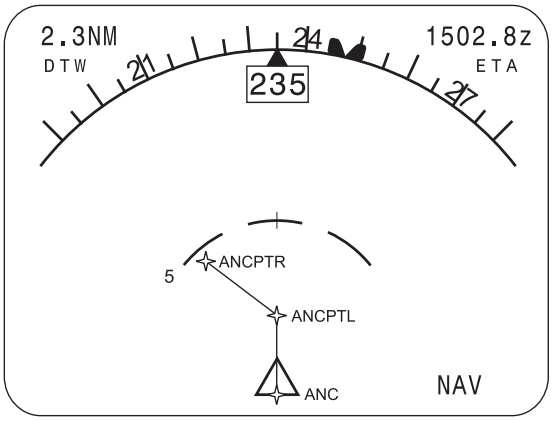


0603002

PROCEDURE TURN

Procedure turns are typically represented by three waypoints arranged in a V-shaped pattern. The naming convention for these waypoints indicates the turn direction at the end of each leg. Thus, in this example, a left turn is performed at ANCPTL and a right turn at ANCPTR.

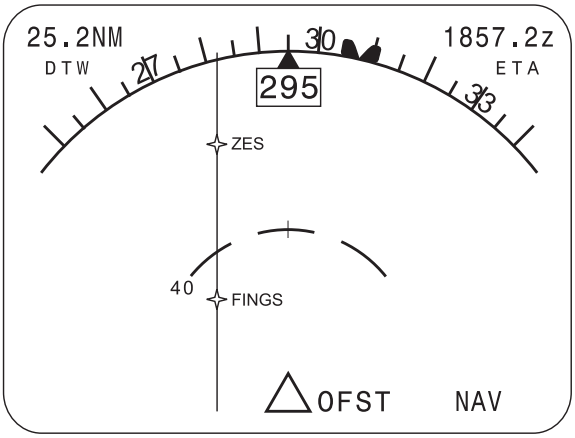
NOTE: The Rockwell Collins 3 EFIS has the capability to display procedure turns using arcs.



G706072

OFFSET NAVIGATION

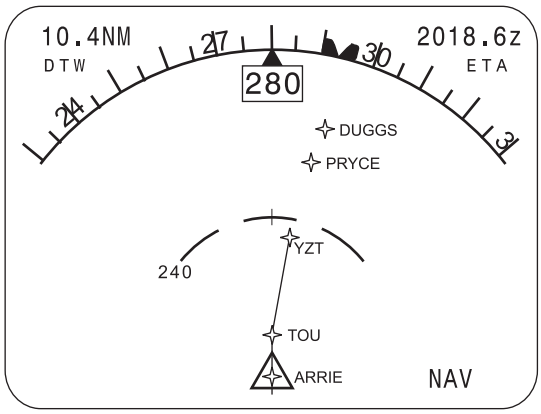
This example shows a typical EFIS display for an aircraft flying a route with a right offset of 20 nm relative to the original flight plan. Although the offset route itself is not displayed, lateral guidance relative to the offset route is provided when Rose mode or Arc mode is selected via the EFIS Mode Select Panel. For more information on offset route navigation, refer to Section 5.



G706073

ROUTE DISCONTINUITY

When the active route contains a discontinuity, all route waypoints within the current EFIS map scale are shown on the EFIS display. Waypoints following the discontinuity are left unconnected*. This example represents an active route with a discontinuity between waypoints YZT and PRYCE. For more information on route discontinuities, refer to Section 5.

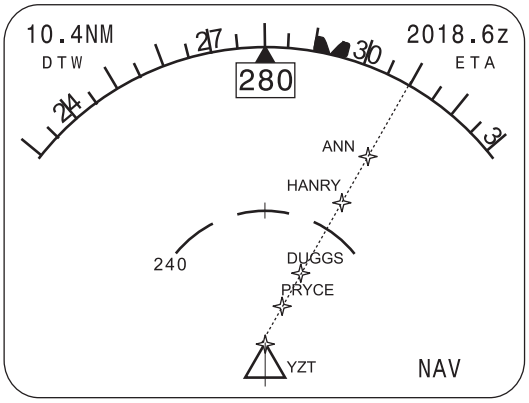


G706074

* For the Rockwell Collins EFIS-84, the entire flight plan disappears from the Navigation Display once the last waypoint before a discontinuity is sequenced. For such as case, ideally, the crew should have taken action in their flight plan to ensure that discontinuities are removed prior to sequencing the last waypoint before the discontinuity. This would ensure continuous availability of flight data throughout the route.
If the FMS does sequence the last waypoint prior to a discontinuity and the flight plan disappears from the display system, the operator can, amongst other things, perform a DIRECT-TO in order to restore the flight plan.

MAP CENTER STEP

The reference position of the EFIS map display is normally the aircraft position, represented by a triangular symbol at the bottom of the display. With the Map Center Step feature, this reference position can be changed to the position of any route waypoint, making it possible to preview the entire route on the EFIS without changing aircraft position. This example shows the resulting EFIS display after waypoint YZT in the previous example has been moved to the bottom of the display using the Map Center Step feature.



G706075

To change the reference position to the position of any route waypoint, proceed as follows:

1. Go to the INIT/REF INDEX 1/2 page and press the <CTR LEGS> prompt (LSK 6L).

   The CTR RTE x LEGS 1/X page is displayed with the MAP CTR STEP prompt at LSK 6R, along with a <CTR> cursor next to the active waypoint.

2. Press the MAP CTR STEP prompt repeatedly until the <CTR> cursor appears beside the desired waypoint.

   The waypoint with the <CTR> cursor now appears at the bottom of the EFIS map display.

3. To return to an aircraft-centered display, go to any CMA-9000 FMS page other than the RTE x LEGS 1/X page, or press [LEGS].

   On the RTE x LEGS 1/X page, the MAP CTR STEP prompt has disappeared, along with the <CTR> cursor.

APPENDIX D - CMA-9000 FMS DISPLAY PAGES FLOW DIAGRAMS

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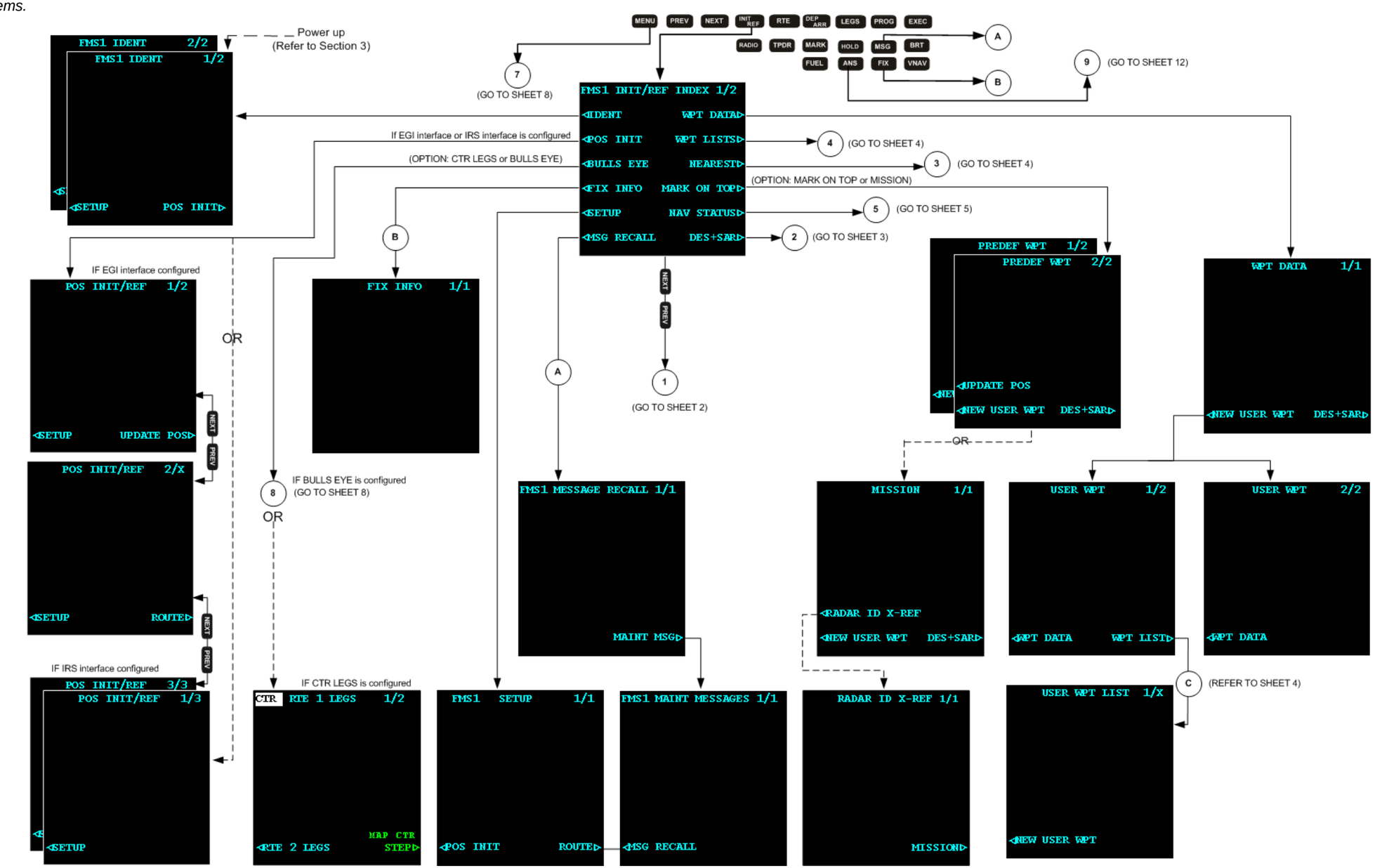
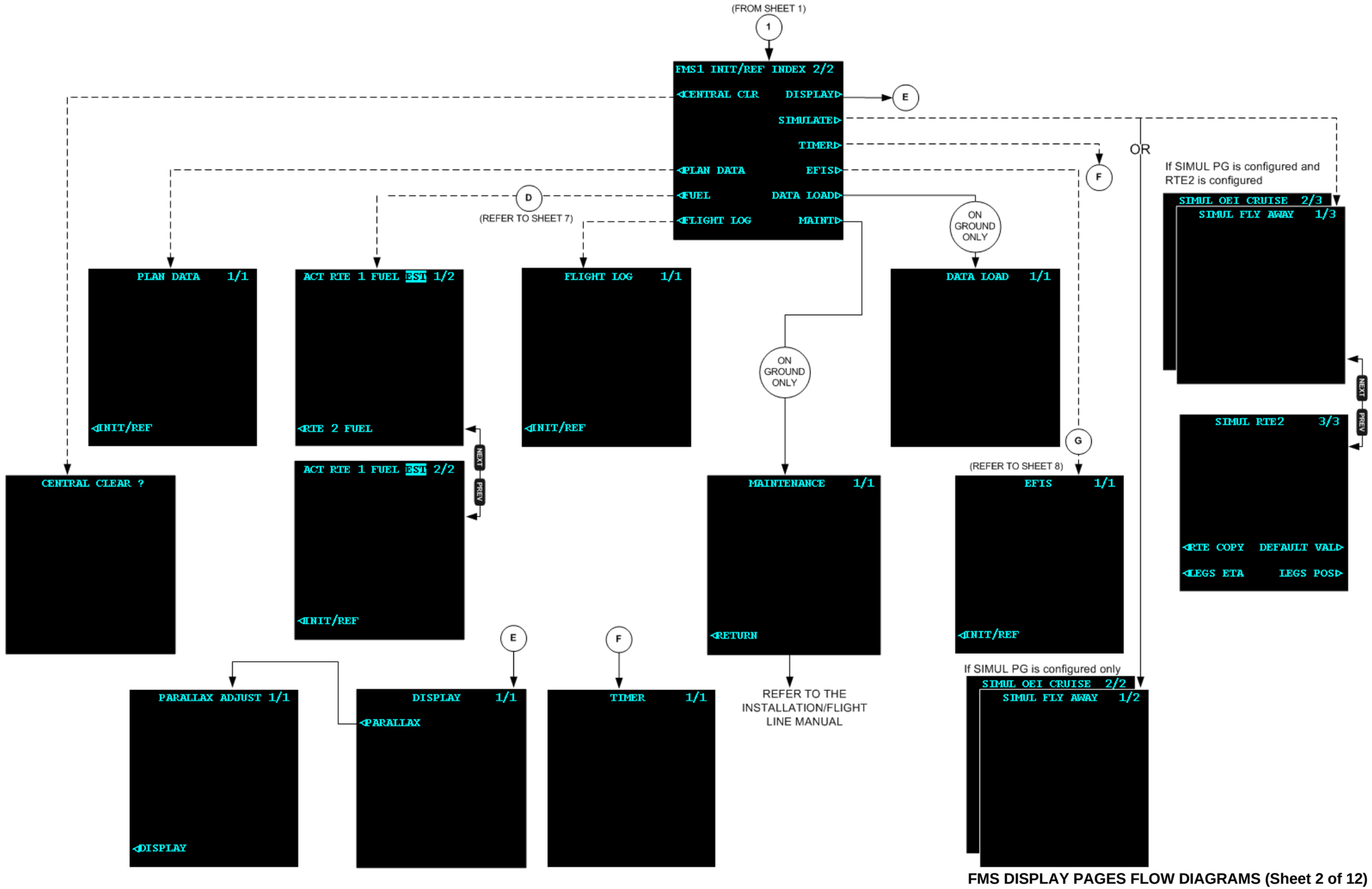
NOTE: This is a top down flow diagram.
Dash lines represent configured items.

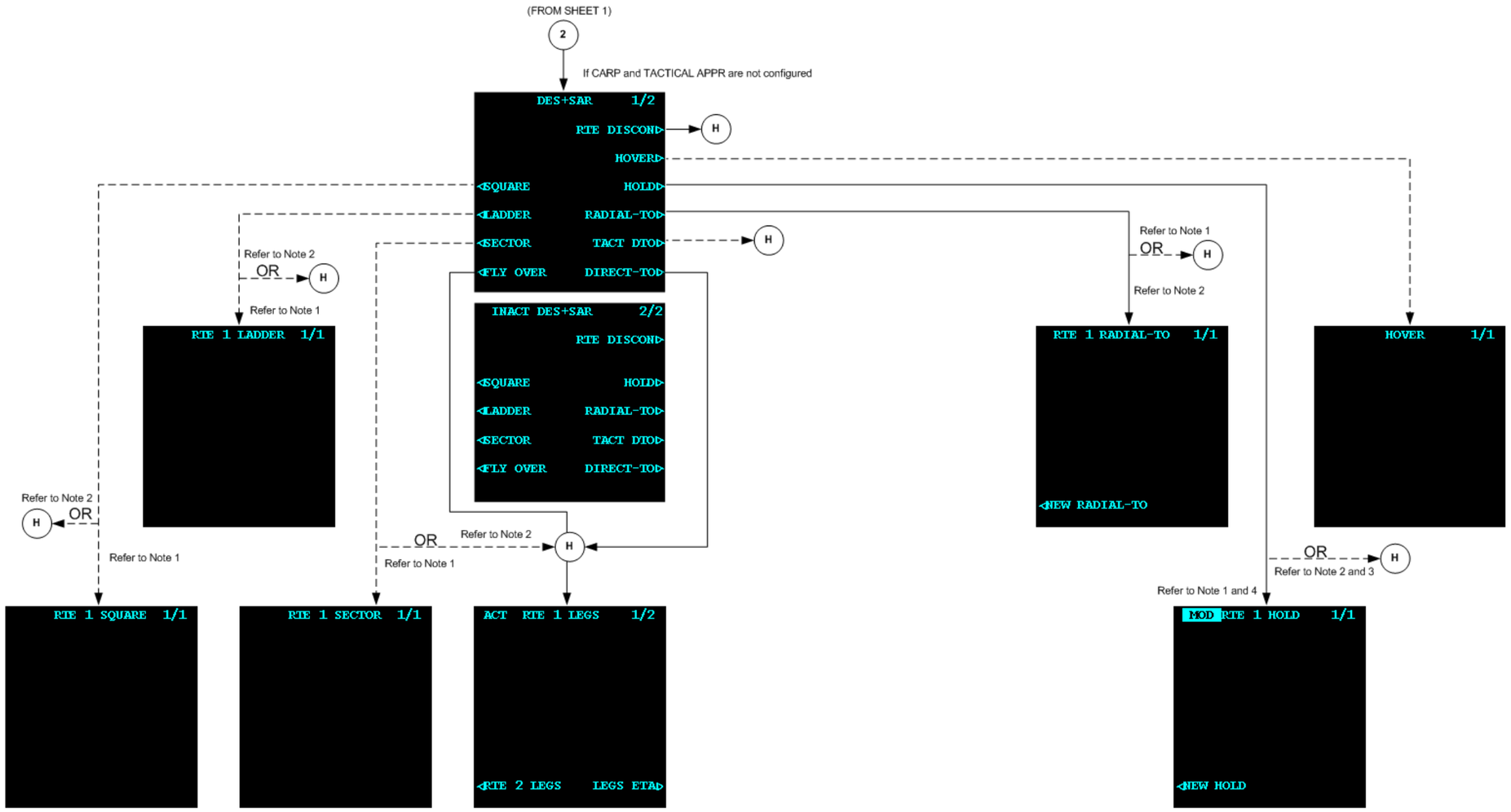


FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 1 of 12)

NOTE: Dash lines represent configured items.



FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 2 of 12)



NOTES:

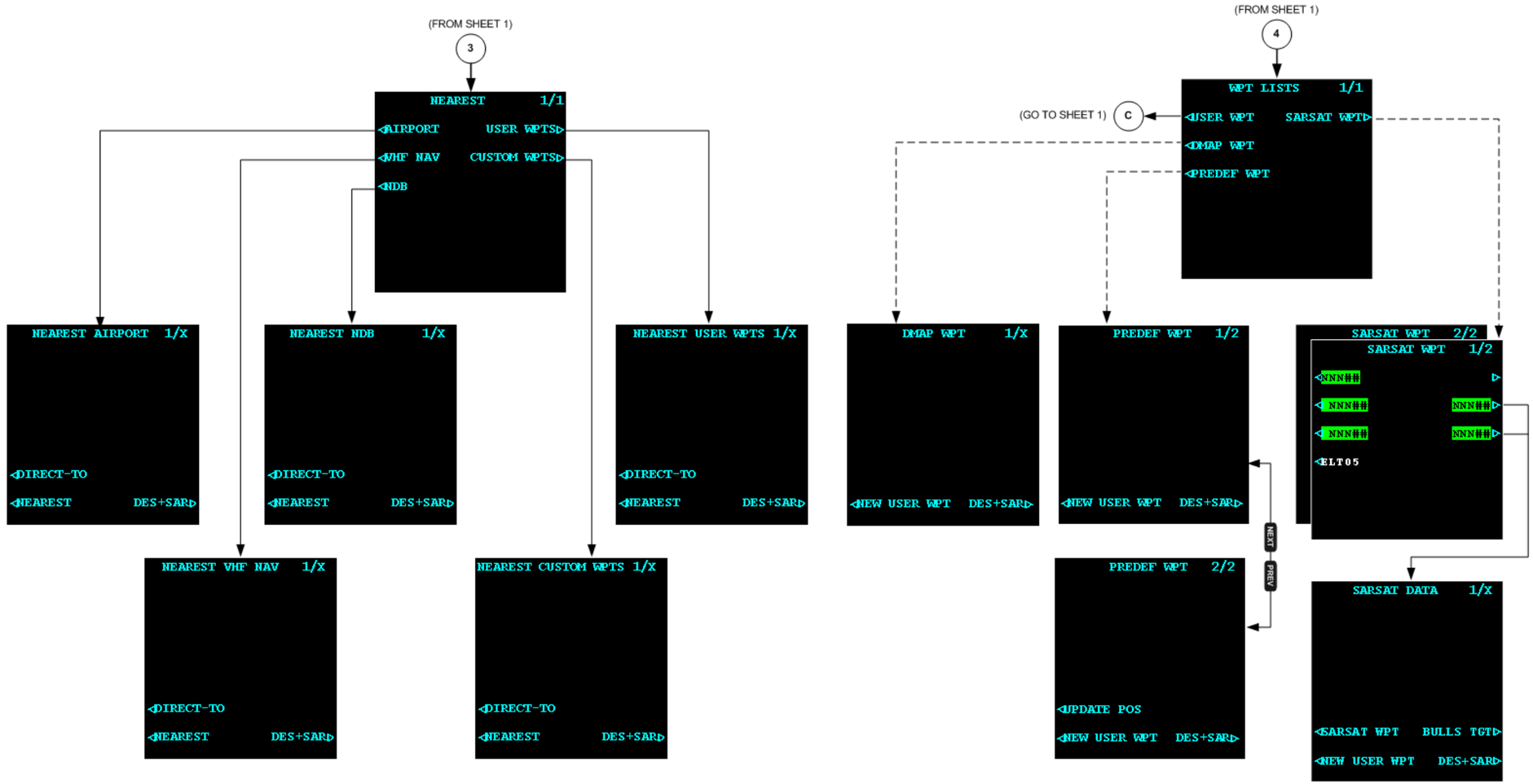
1 No DES+SAR point defined

2 DES+SAR point defined

3 Holding pattern exist

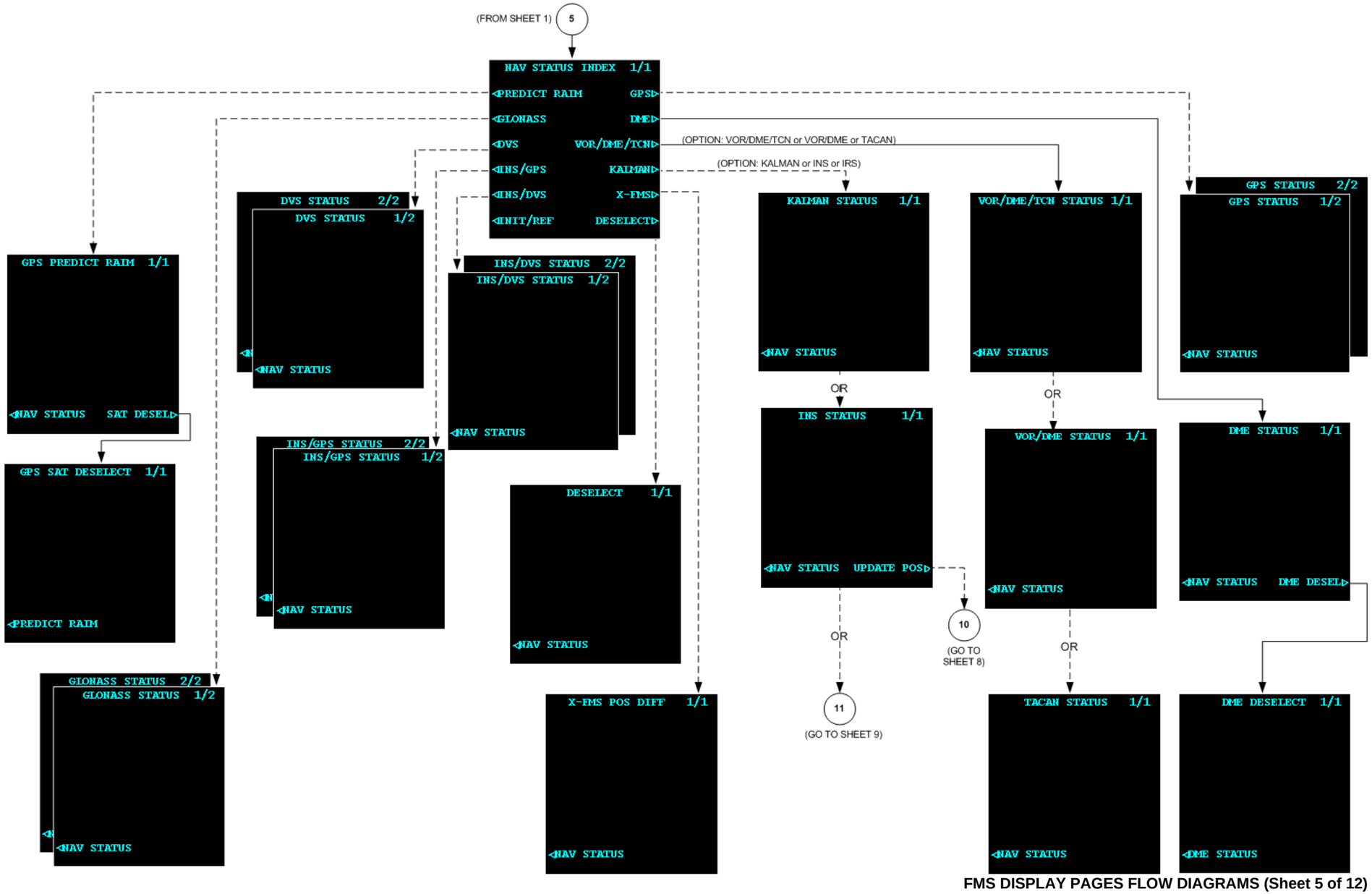
4 Holding pattern does not exist

FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 3 of 12)



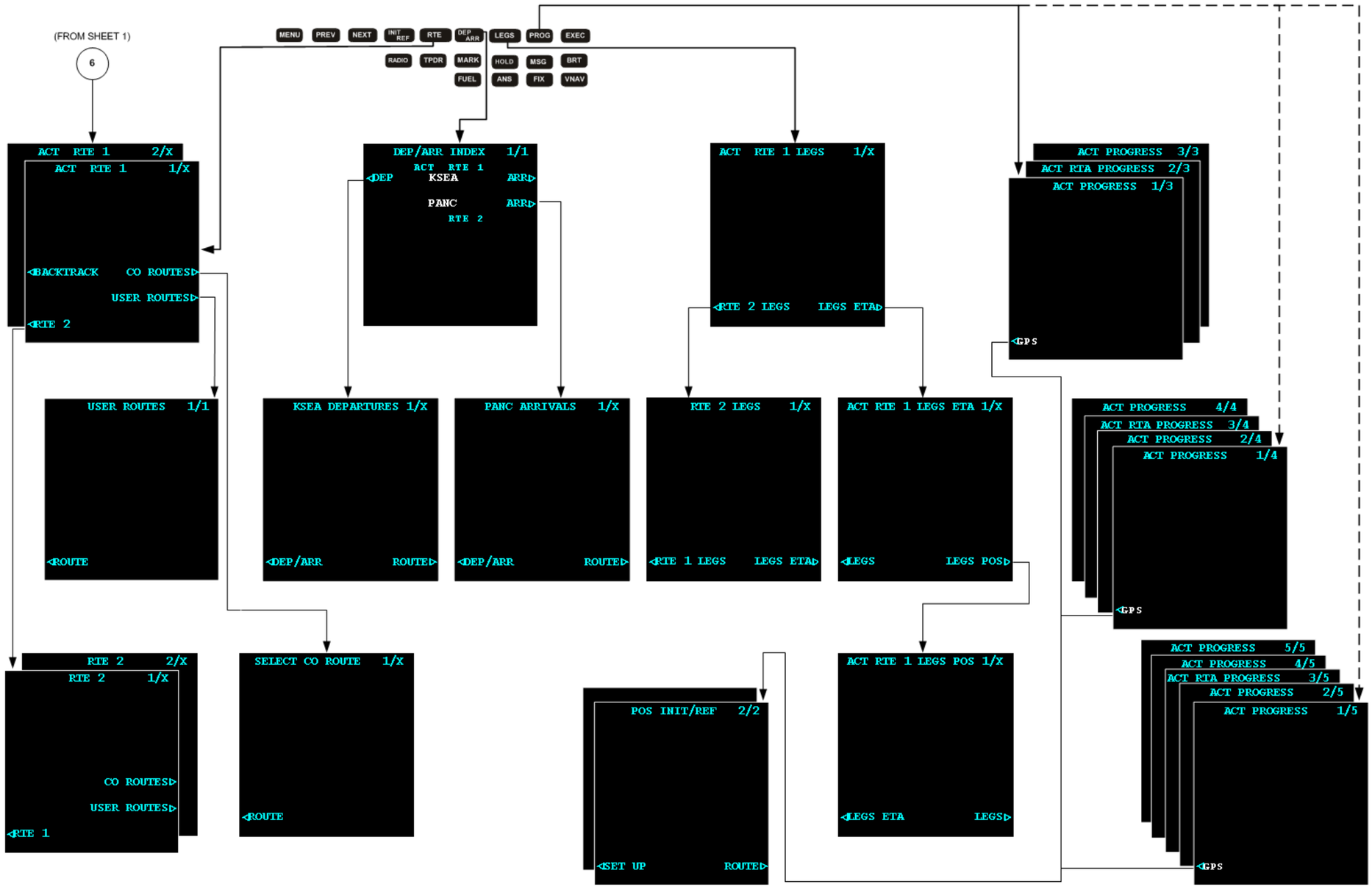
FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 4 of 12)

NOTE: Dash lines represent configured items.



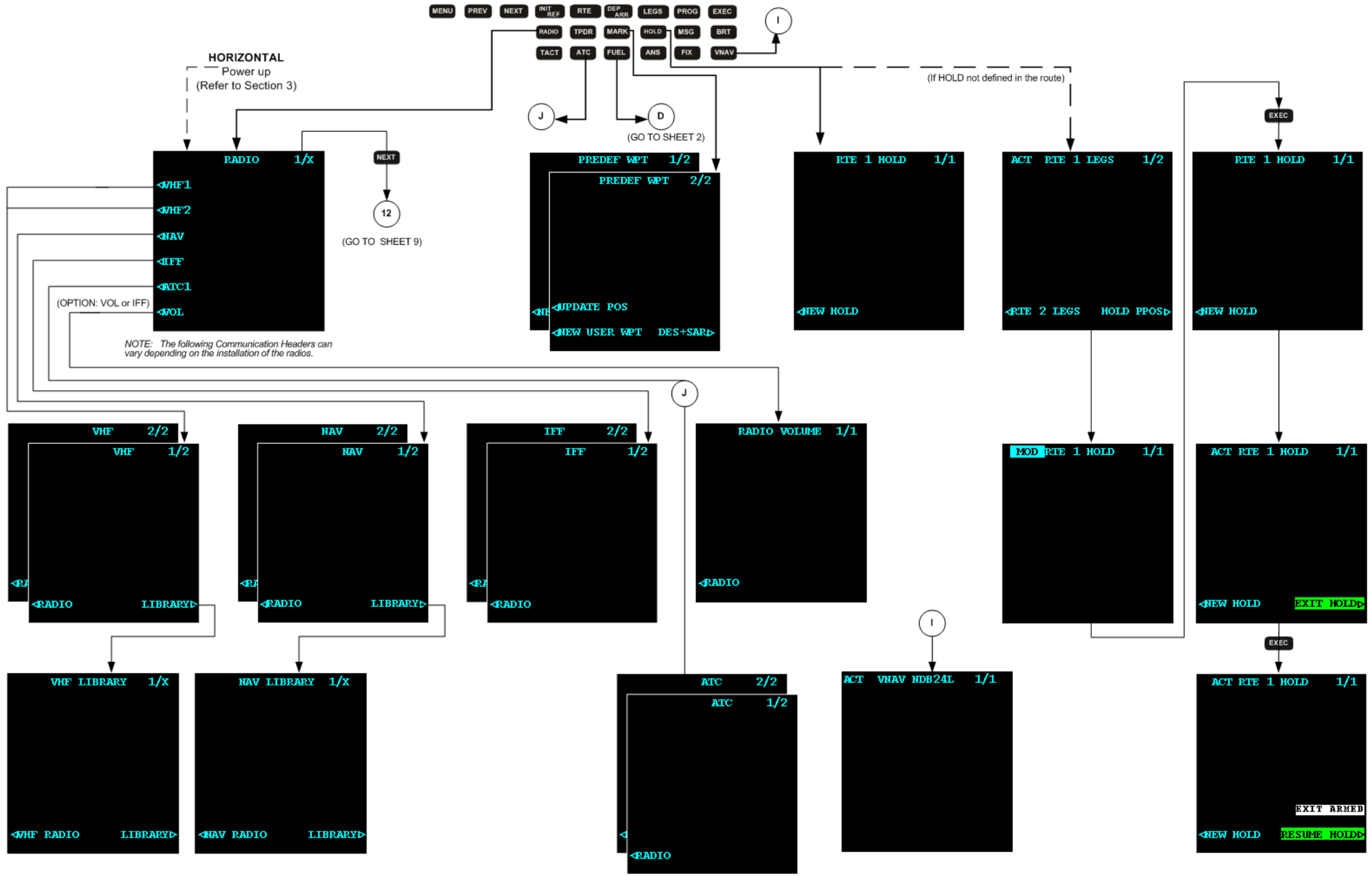
FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 5 of 12)

NOTE: Dash lines represent configured items.

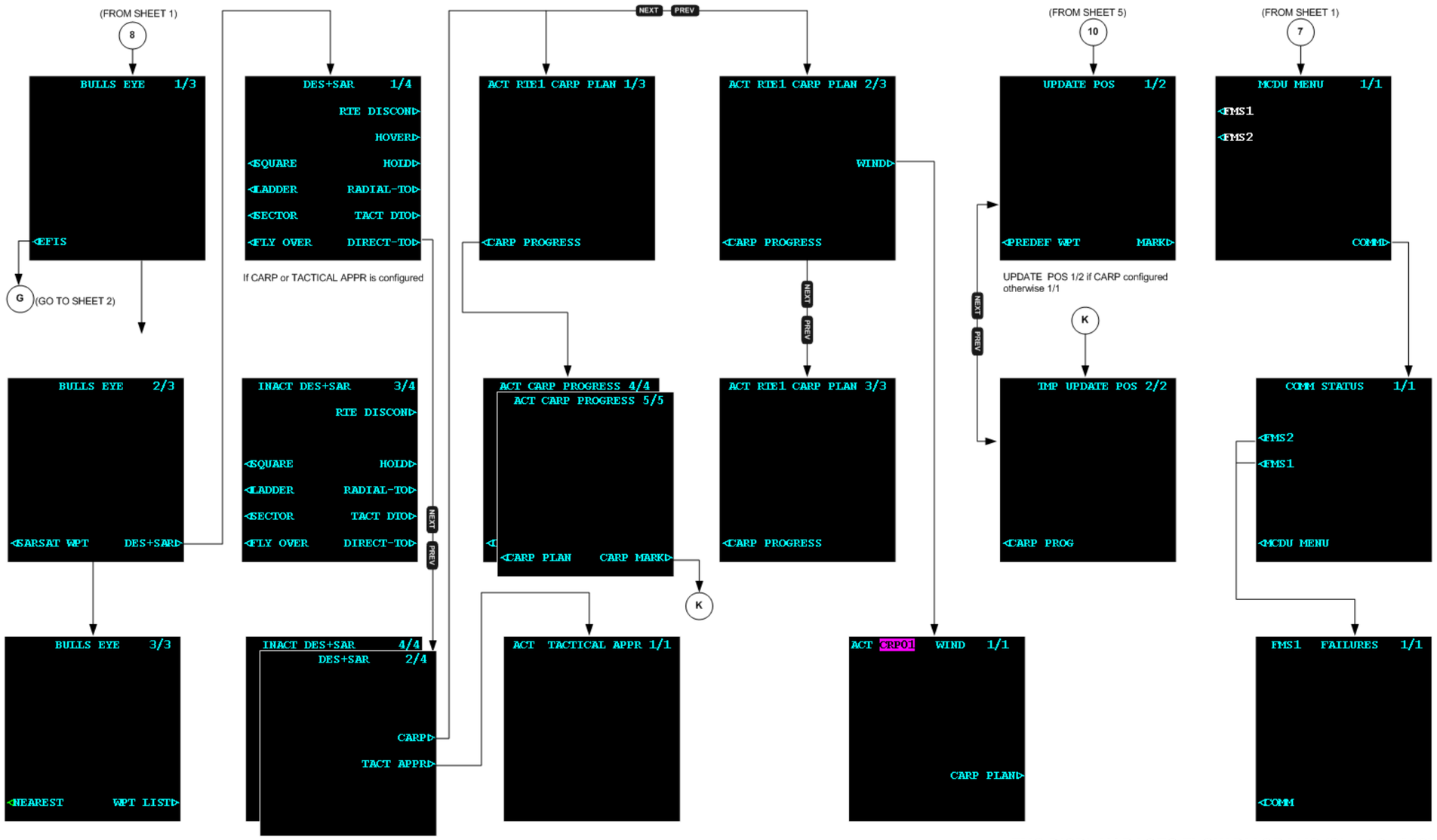


FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 6 of 12)

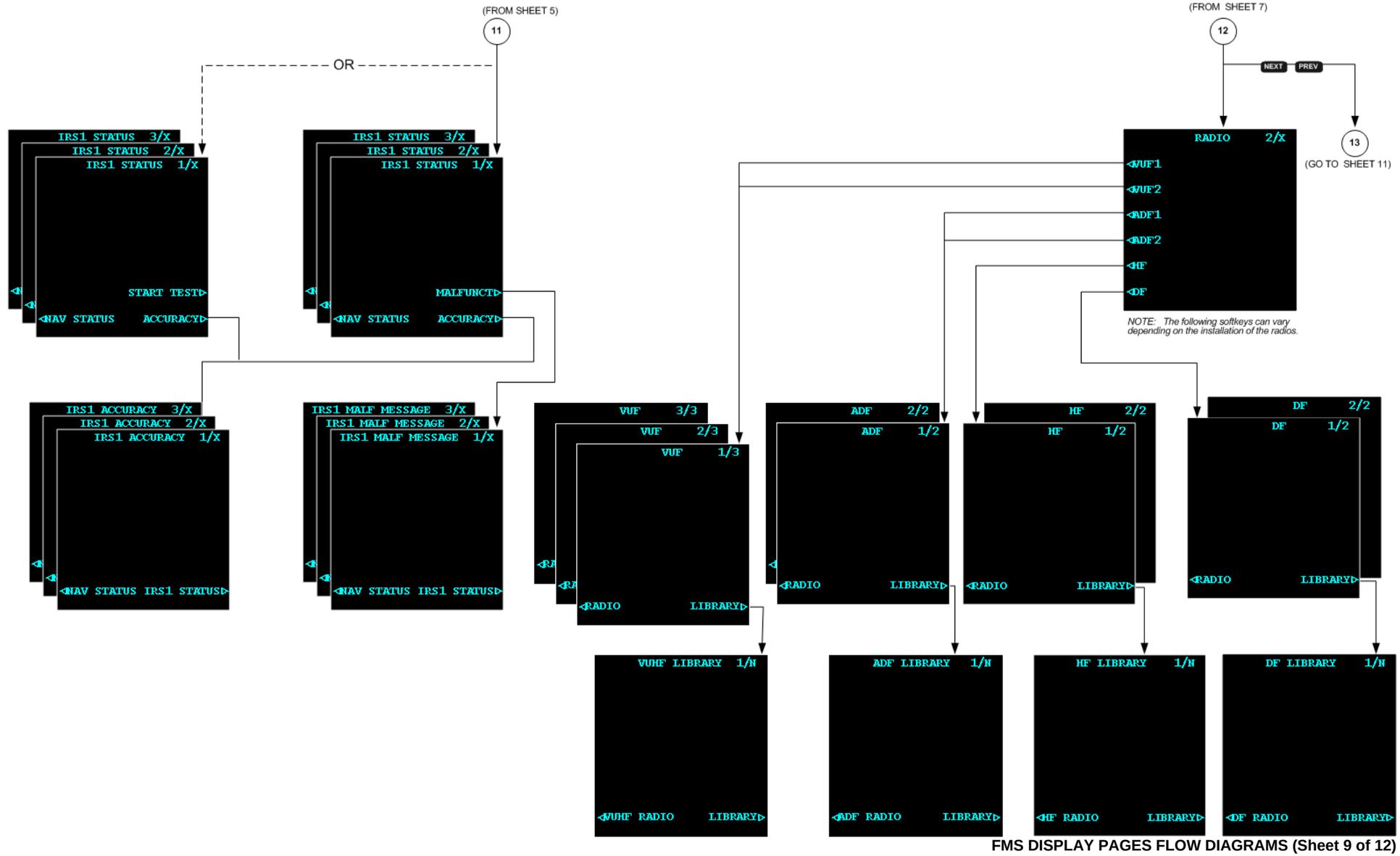
NOTE: Dash lines represent configured items.



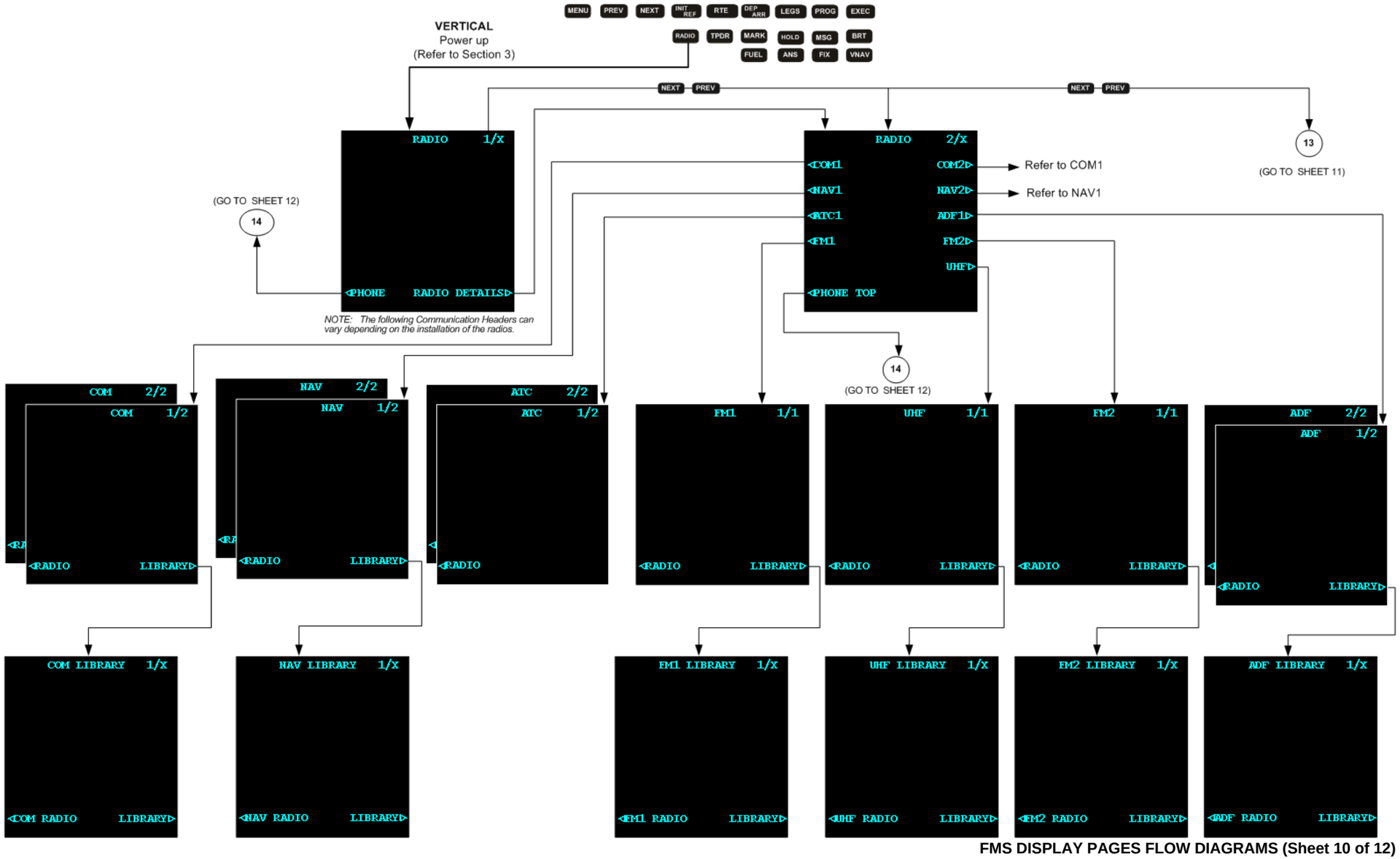
FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 7 of 12)



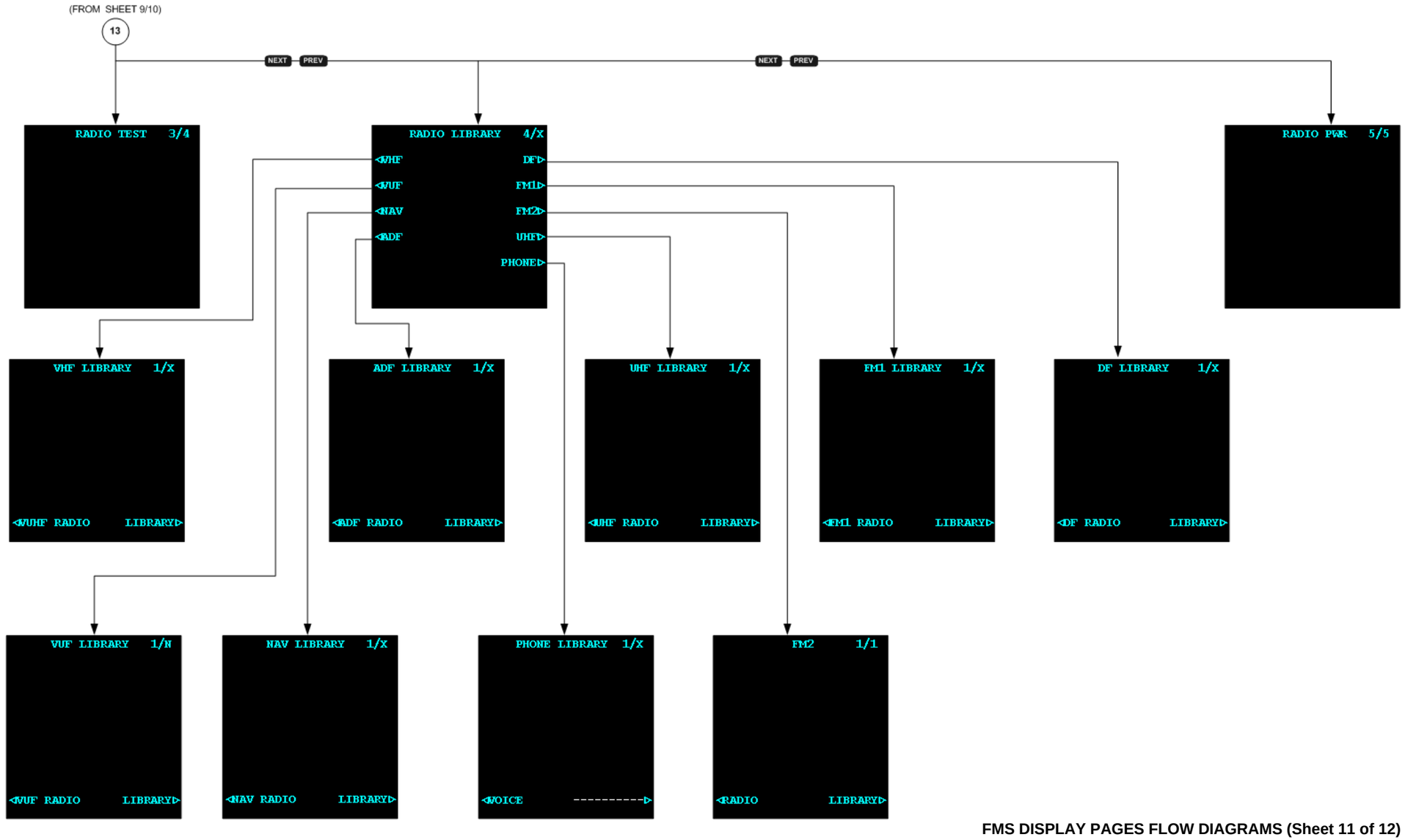
FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 8 of 12)



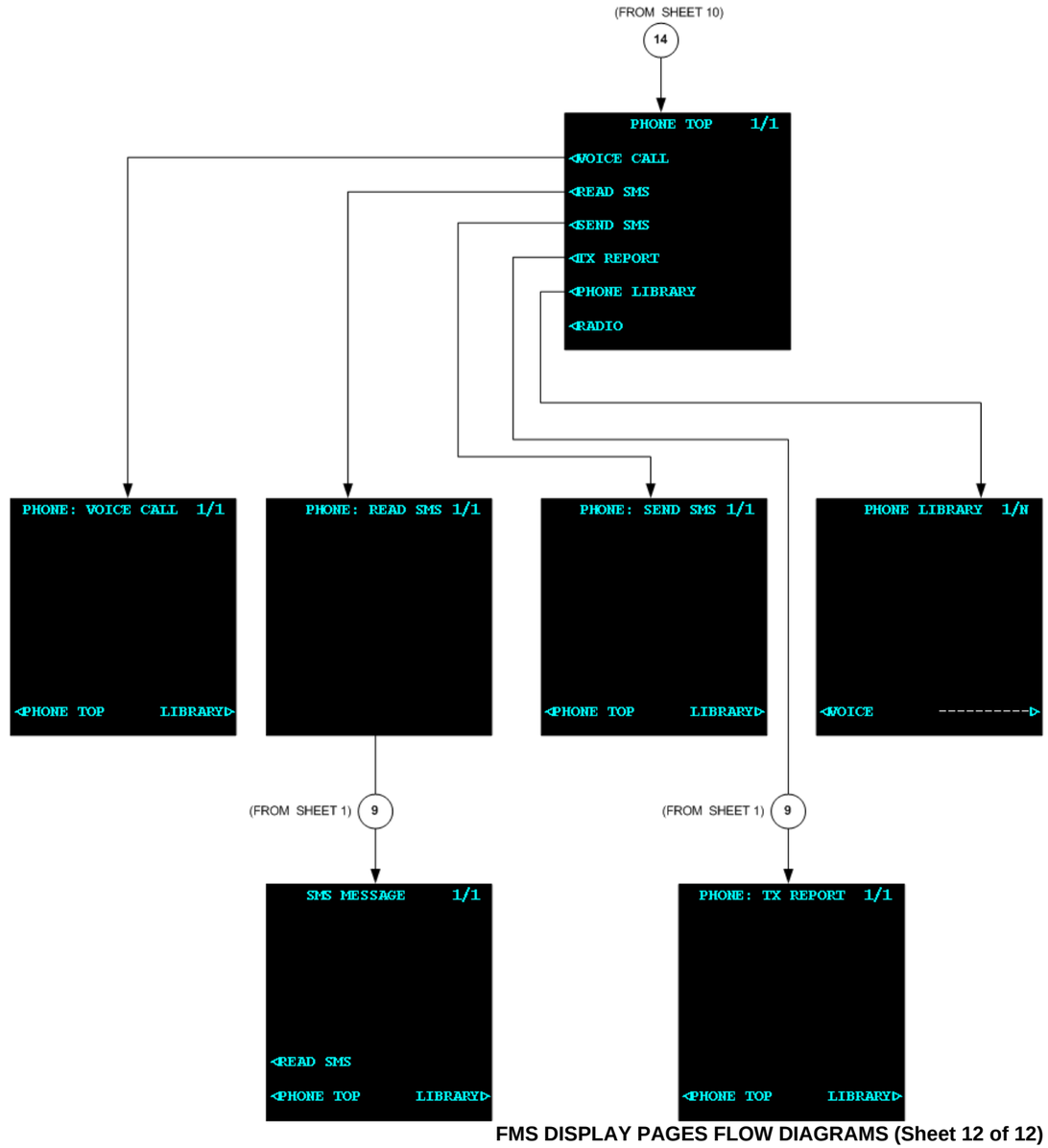
FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 9 of 12)



FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 10 of 12)



FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 11 of 12)



FMS DISPLAY PAGES FLOW DIAGRAMS (Sheet 12 of 12)

APPENDIX E - SYSTEM MESSAGES AND REMOTE ANNUNCIATORS

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APPENDIX E

SYSTEM MESSAGES AND REMOTE ANNUNCIATORS

The CMA-9000 FMS can generate the following types of system messages:

- System Alert Messages: messages that require immediate pilot action;
- Maintenance Alert Messages: messages that indicate a particular CMA-9000 FMS failure condition;
- Maintenance Advisory Messages: messages that do not require immediate pilot action but indicate a particular equipment failure condition;
- Status Advisory Messages: messages that do not require immediate pilot action but require pilot awareness;
- Data Entry Advisory Messages: messages that indicate that the user-entered data is incorrect.

SYSTEM ALERT MESSAGES

System Alert Messages are messages that require immediate pilot action. Alert Messages are the highest priority scratchpad messages (cannot be typed over or overwritten by any other message type).

Alert messages are displayed in amber color in the scratchpad and on the MESSAGE RECALL page. These messages disappear automatically when the condition that caused them no longer exists.

Alert messages cause both the CMA-9000 FMS front panel MSG annunciator and the remote MSG annunciator to illuminate until all messages are cleared/acknowledged by the pilot. Alert messages are cleared (thus acknowledged) from the scratchpad by pressing the CLR key.

New messages that have not yet been acknowledged are displayed with an asterisk (*) prefix on the MESSAGE RECALL page. Bringing in view the MESSAGE RECALL page(s) acknowledges all messages at once.

Alert messages have the highest priority and supersede any advisory message or typed-in data displayed in the scratchpad.

Alert messages that are related to navigation sensor performance are displayed only if the sensor is interfaced with the CMA-9000 FMS and configured through the CMA-9000 FMS maintenance pages (see Installation Manual).

Alert messages are prioritized internally by the CMA-9000 FMS, with the highest displayed at the top and the lowest at the bottom of the MESSAGE RECALL page.

Unless otherwise noted, the CMA-9000 Master Caution is inactive (e.g. FMS is still functional) for all the System Alert messages.

Collector Alert messages are messages that combine several fault conditions into a single alert message (e.g. AIR DATA LOST combines ADC1 FAILED and ADC2 FAILED Maintenance Advisory messages).

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
2 HOURS GPS KEY ALERT	The SA/AS GPS key will expire in two hours.	Enter the new key to avoid the loss of the GPS navigation.	EGI interface
ADF CONTROL LOST **ADF1 CONTROL LOST** **ADF2 CONTROL LOST**	The FMS has detected a failure of the identified ADF radio or a failure of the ADF receiver communication bus. *NOTE: This message will be triggered only if configured and will be inhibited in polar area or if the roll angle is greater than 20 degrees.*	Control ADF from another source. ADF receiver is no longer operational, use other navigation aids. Advise maintenance	ADF interface
AHRS/IRS HDG MISMATCH	The FMS detects a difference of about 6 degrees plus 0.5 times the absolute value of the roll angle between AHRS and IRS provided heading for at least one second.	Select appropriate source of heading. Advise maintenance	If the message is configured IRS interface AHRS interface
AIR DATA LOST	The FMS detects a total loss of ADC data on the onside and offside FMSs.	Ensure that ADC is powered. Verify if the ADC(s) operate(s) normally. Advise maintenance.	ADC interface
AMU CONTROL LOST	The FMS cannot set a radio volume level or has detected a failure of the AMU or the AMU communication bus.	Control the AMU from another source. Advise maintenance.	AMU interface
ARM APPROACH	The FMS detects that at 30 nm to the destination airport, that the approach mode has not been enabled (armed). The FMS repeats the check at 3 nm to the FAF.	Arm the destination airport at 30 nm. Arm the FAF at 3 nm.	Approach mode configured to MANUAL
ATC CONTROL LOST **ATC1 CONTROL LOST** **ATC2 CONTROL LOST**	The FMS cannot control the transponder.	Control transponder from another source. Advise maintenance.	ATC transponder interface
ATOS INPUT LOST	The FMS has detected a failure or a loss of communication from the ATOS equipment.	Ensure that ATOS is powered. Verify that the ATOS operates normally. Advise maintenance.	Installations in which the ATOS equipment is configured.
CARP ALT NOT MET	This message is enabled when the current altitude (AGL) is not within 150 feet of the Mission HAT from 60 seconds prior to reaching the CARP Green Light (CRP) waypoint until the CARP Red Light (XTE) waypoint is sequenced.	Correct altitude to achieve the mission altitude.	Configurations supporting CARP/HARP

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
CARP TAS NOT MET	This message is enabled when the TAS is not within 20 knots of the TAS derived from the Mission IAS from 60 seconds prior to reaching the CARP Green Light (CRP) waypoint until the CARP Red Light (XTE) waypoint is sequenced.	Correct speed to achieve the mission TAS.	Configurations supporting CARP/HARP
CARP XTK TOO LARGE	This message is enabled when the aircraft is flying the CARP procedure between the CRP (Green Light) and XTE (Red Light) waypoints and the cross-track error is either: • Greater than half the drop zone width for Custom CARP, Custom HARP or Free Fall procedures. • Or greater than 150 meters for Custom HAHO procedures.	Stop the drop and steer the aircraft back on track.	Configurations supporting CARP/HARP
CDU2 INPUT LOST **CDU3 INPUT LOST**	Communication with external CDUx is not available.	Use another CDU. Advise maintenance.	External CDU configured
cGPS NAV LOST	Civil GPS sensor is not being used for the active navigation.	Use another sensor for navigation.	Civil GPS and EGI interface installed at the same time.
cGPS POS UNCERTAIN	The FMS is using civil GPS position data for which the integrity does not meet requirements for the phase of flight, and cannot back it up with any other sensor. This message does not imply that the civil GPS position is in error, only that confidence in the position accuracy is reduced. GPS integrity is lost. GPS INT remote annunciator (if installed) illuminates. The FMS is not using the civil GPS as active sensor but it detects a loss of integrity and a procedure (SID, Star, Transition, Approaches or Tactical Approaches. is loaded in the active flight plan.	Verify GPS position and monitor Horizontal Integrity Limit (HIL). Revert to an alternate navigation means if GPS position becomes too unreliable.	Civil GPS and EGI interface installed at the same time.
CHECK ANP	The FMS ANP (Actual Navigation Performance) value exceeds the RNP (Required Navigation Performance) value.	Verify RNP/ANP values on PROGRESS 1/3 or 1/4 page. Monitor FMS position, perform manual position update if necessary (not possible in GPS Nav mode). Otherwise revert to an alternate means of navigation.	All configurations

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
CHECK TRUE/MAG REF	Phase of flight is Approach or Terminal and the angle reference is TRUE.	If required, change Angle reference to MAG via FMS SETUP page (or alternatively via external switch).	All configurations
COM CONTROL LOST **COM1 CONTROL LOST** **COM2 CONTROL LOST** **COM3 CONTROL LOST** **COM4 CONTROL LOST**	The FMS cannot control the COM radio or the VUHF radio.	Control COM/VUHF from another source. Advise maintenance.	• COM radio interface • VUHF radio interface • COM or VUHF radio configured as COM1 or COM3
COURSE CHANGE>125 AHEAD	The FMS detects that the course change of a fly-by leg transition (from the active leg to the next leg) is greater than 125 degrees and within 2 minutes from the turn anticipation point (triggered for non-published procedures only).	As deemed necessary, modify flight plan if such a course change is not desired.	Message configured to alert.
DATABASE OUT OF DATE	Navigation Database selected is not the current cycle.	Select correct database or advise maintenance crew to load current database cycle.	All configurations
DATUM MISMATCH	In a dual/triple FMS installation with the FMSs synchronized, the FMS detects that the datum selection received from the off-side FMS is not configured in the FMS's preferred datum list. Displayed as long as the mismatch persists.	Pilot to ensure that any datum mismatches are resolved (DATUM selection line on SETUP 1/1 page.	Multi-FMS installations
DCU INPUT LOST	If IS&S EFIS (configuration option IS_S) is configured and the FMS has detected a failure of all configured onside and offside DCUs.	Ensure that EFIS is powered. Verify if the EFIS(s) operate(s) normally. Advise maintenance.	IS&S EFIS configuration only.

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION

DF CONTROL LOST	The FMS has detected one of the following conditions:
	if a DF-430-102 is configured:
	• The FMS detects a DF radio failure or it cannot tune the DF radio (requested tuning does not match feedback for 10 seconds).
	if a DF-935 is configured:
	The following conditions are detected during a period of 10 seconds:
	• The command echo is not received from the Direction Finder equipment (DF); or
	A bad command echo is received (Bad<CR>) from the DF.
		Control DF radio from another source
		Advise maintenance.
			DF-430-102 or DF-935 interface

DF INPUT LOST	The FMS has detected a failure or a loss of communication from the DF radio.	Ensure that DF is powered. Verify if the DF operates normally. Advise maintenance.	DF 430-112 interface
DIRECT TO FIX	When flying a VI or CI leg followed by a CF leg (these legs being part of a published procedure), the FMS detects that the predicted intercept point is so close to the CF leg termination that the intercept path cannot be calculated.	Review the intercept course entered.	All configurations
DISCONTINUITY AHEAD	60 seconds before the end of the active leg or at the beginning of the active leg when its duration is shorter than 60 seconds, and the FMS detects that the next waypoint is followed by a discontinuity. The message remains displayed as long as the FMS flies into the route discontinuity. *NOTE: The FMS will invalidate its roll command output when reaching the discontinuity.*	Select RTE LEGS page to enter next waypoint or close up route discontinuity.	All configurations
DMAP INPUT LOST	The FMS detects a total loss of DMAP input data on the onside and offside FMSs.	Ensure that DMAP is powered. Verify if the DMAP operates normally. Advise maintenance.	DMAP interface

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
DME/DME NAV LOST	DME-DME navigation can no longer be used as a means of navigation. If FMS was in DME-DME navigation mode, it automatically reverts to the next available navigation mode. **CAUTION:** In aircraft installations consisting of dual FMS interfaced with dual DME transceivers, the alert message "DME/DME NAV LOST" could be erroneously triggered upon the loss of one of the two DME receivers. The problem occurs when one FMS has lost its single DME input: the DME/DME navigation is still provided by the off-side FMS via FMS cross-talk. The DME/DME NAV LOST message should be ignored in this case.	Verify if identified DME transceiver operates normally. Use another navigation sensor as a means of primary navigation. Advise maintenance.	DME interface
DME CONTROL LOST **DME1 CONTROL LOST** **DME2 CONTROL LOST**	The FMS cannot control the DME which is paired with the NAV radio. The FMS detects a failure with the DME channel used for manual tuning via the NAV radio.	Control DME from another source. DME receiver is no longer operational, use other navigation aids. Advise maintenance.	DME interface
DVS NAV LOST	The FMS detects a total loss of DVS input data on the onside and offside FMSs. DVS sensor can no longer be used for navigation.	Ensure that DVS is powered. Verify if the DVS operates normally. Advise maintenance.	Doppler interface
EFIS INPUT LOST	The FMS detects a total loss of EFIS input data on the onside and offside FMSs.	Ensure that EFIS is powered. Verify if the EFIS(s) operate(s) normally. Advise maintenance.	EFIS interface
EGI POS DIFF	The FMS detects a position difference between pure GPS solution and INS/GPS solution greater than maximum accuracy of the two sensors or The FMS detects a degraded operation mode of the EGI.	Use another navigation sensor as a means of primary navigation. Advise maintenance.	EGI Interface and Nav cross-check configured
END OF ROUTE	Passing the last waypoint in the route. FMS steering becomes invalid.	Select RTE LEGS page to enter additional waypoints to resume FMS steering.	All configurations
ENTER POS/DATE/TIME	FMS battery failure detected invalidating the RTC date/time and current position.	Enter date, time and position. Advise maintenance. Master Caution is active.	All configurations

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
FLIR INPUT LOST	The FMS detects a total loss of Forward Looking Infrared Radar input data.	Ensure that FLIR is powered. Verify if the FLIR operates normally. Advise maintenance.	FLIR interface
FMS ALTITUDES DISAGREE	Excessive difference between two baro-corrected altitude inputs, two FMS-calculated baro-corrected altitudes or two pressure altitude inputs.	Verify altimeter setting on all systems.	Multi-FMS installations
FMS-D/D POS DIFF	The FMS detects a difference in FMS position and DME/DME position greater than maximum accuracy of the two sensors.	Verify if DME receiver operates normally. Advise maintenance.	Nav cross-check configured
FMS DEGRADED	The FMS has detected an internal hardware fault related to its I/O interface. The fault prevents full function of the FMS. This fault is not critical to the operation of the FMS user interface or processing.	Continue to use the FMS user interface. Backup systems will takeover the affected operations. See MAINT MESSAGES page for fault trouble shooting. Advise maintenance.	All configurations
FMS-V/D POS DIFF	The FMS detects a difference in FMS position and VOR/DME position greater than maximum accuracy of the two sensors.	Verify if DME and VOR receivers operate normally. Advise maintenance.	Nav cross-check configured
FMS FAILED	The FMS has detected an internal hardware fault.	Do not use the FMS for radio tuning or navigation. See MAINT MESSAGES page for more details. Advise maintenance crew. Master Caution is active.	All configurations
FUEL INPUT LOST	The FMS detects a total loss of Fuel Computer data on the onside and offside FMSs.	Verify if Fuel Computer(s) operate(s) normally. Manually enter fuel quantity and fuel flow on FUEL 1/1 page. Advise maintenance.	Fuel Computer interface
FMS-INS POS DIFF	The FMS detects a difference in FMS position and INS position greater than maximum accuracy of the two sensors.	Verify if EGI receiver operates normally. Advise maintenance.	EGI Interface and Nav cross-check configured
FUEL RESERVE	Reserve fuel is being used.	Plan to land before the fuel is exhausted.	Fuel Computer interface
GLONASS INPUT LOST	The FMS has detected a failure of all configured onside and offside GLONASS sensors.	GLONASS is not longer operational.	GLONASS is configured.
GPP CONTROL LOST	The FMS has detected a loss of communication with the Gessellschaft fur Prozessrechner Programmierung (GPP) unit.	GPP receiver is no longer operational. Advise maintenance.	HCS, FM1, FM2, UHF interfaces.

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
GPS-GPS POS DISAGREE	The position difference between the two/three GPS exceeds the position check limit defined in Section 15 (RNP Capability), even though each GPS position respects the position check limit.	If during approach, perform missed approach. On each FMS, access the onside FMS "GPS STATUS 2/2" page. Compare the two/three GPS positions and determine which position is the most probable one. Select Independent Mode and ensure that the A/P in command is being driven by the FMS with the most probable position.	Single civil GPS interface per FMS Multi-FMS installations
GPS-GPS POS DISAGREE (cont'd)		Synchronized Mode can be re-established when the message disappears from each FMS "MESSAGE RECALL" page. Report problem to maintenance.	
GPS NAV LOST	Neither the GPS nor the INS/GPS sensor is being used for the active navigation.	Maintain the flight path within the range of NAVAIDS.	GPS interface or EGI interface
GPS POS DIFF	The FMS detects a position difference between civil GPS solution and military GPS (from EGI) solution greater than maximum accuracy of the two sensors	Verify if EGI and civil GPS receivers operate normally. Advise maintenance.	Civil GPS and EGI interface installed at the same time. Nav cross-check configured
GPS POS UNCERTAIN	No IFR approved navigation sensor (including GPS) meets requirements for the phase of flight. The FMS is using GPS position data for which the GPS integrity does not meet requirements for the phase of flight, and cannot back it up with any other sensor. This message does not imply that the GPS position is in error, only that confidence in the position accuracy is reduced. GPS integrity is lost. GPS INT remote annunciator (if installed) illuminates. GPS POS UNCERTAIN is mutually exclusive with GPS NAV LOST.	GPS approaches cannot be flown. Verify GPS position and monitor Horizontal Integrity Limit (HIL). Revert to an alternate navigation means if GPS position becomes too unreliable.	GPS interface EGI interface GPS and EGI are not configured at the same time Error limits is set to POF
GROSS WT DISCREPANCY	FMS has detected a significant difference between the gross weight received from the IFDS EFIS and the gross weight computed by the FMS.	One of the weight fields on the FUEL 2/2 page has to be updated in order to clear the message.	• IFDS EFIS interface

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
HEADING INPUT LOST	Total loss of heading input. When not in GPS navigation, the FMS builds up an error during rapid turns, and should be used with caution. No wind computation is available.	Refer to Operator's Manual Section 16 for operation with a failed heading input.	AHRS interface
HF CONTROL LOST	The FMS has detected a HF radio failure	Ensure that HF radio is powered. Verify that the HF radio operates normally. Advise maintenance.	Installations in which the HF radio is configured.
HIGH ARC EXIT SPEED	The combination of current TAS and computed wind may cause the aircraft to overshoot the next flight plan leg.	Reduce speed prior to exiting the arc.	All configurations
HIGH GLIDEPATH ANGLE	Computed glide-path angle for the selected approach exceed the maximum VPA allowed.	Check VPA displayed on VNAV APPR page. If VPA is appropriate conduct approach normal. If VPA is not appropriate stop using the FMS for advisory VNAV of this approach and report issue to maintenance operations.	VNAV configuration
HIGH HOLDING SPEED	The combination of current TAS and computed wind may cause the ICAO holding pattern protected airspace to be exceeded. This message is displayed one (1) minute prior to reaching the holding fix and on passage over the fix.	Reduce speed prior to reaching the holding fix.	If the message is configured.
HIGH SAR SPEED	The FMS detects that the ground speed (e.g. combination of current TAS and computed wind) will cause the search and rescue pattern to overshoot. This message is displayed starting from one (1) minute prior to reaching the SAR entry point until the SAR entry point is reached. This message is only displayed when airborne.	Reduce speed to make sure that the search area is covered.	SAR is configured.
IFF CONTROL LOST	The FMS has detected an IFF failure (CBIT) or it cannot tune the IFF e.g. the requested tuning does not match the feedback received for 10 seconds when in normal (non-maintenance) mode of operation.	Ensure that IFF transponder is powered. Verify that the IFF transponder operates normally. Advise maintenance.	Installations in which the IFF transponder is configured.

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
INDEPENDENT OP	In a dual/triple-FMS installation, the identified FMS is now operating independently of the off-side FMS(s), because of at least one of the following reasons: Independent mode manually requested on SETUP 1/1 page. An inter-FMS communication failure has occurred. The Operational Software programs are not the same in all FMSs. The active navigation database is not the same in all FMSs. The user database is not the same in all FMSs. The tactical approach database is not the same in all FMSs. The FMSs have been in a different phase of flight for more than thirty seconds.	Any automatically synchronized item listed in Section 3-5 of the Operator's Manual, dual-FMS Operations, must be now performed independently on each FMS. 1. Clear message. 2. See MESSAGE RECALL and/or MAINT MESSAGE page(s) for more details. Advise mainten-ance. 3. Verify tactical approach database on IDENT 2/2 page, select appropriate database if possible, otherwise advise mainten-ance.	Multi-FMS installations
INDEPENDENT OP (cont'd)		4. Verify Op Program on IDENT 1/1 page and advise mainten-ance if different. 5. Verify active navigation database on IDENT 1/1 page, select appropriate database if possible, otherwise advise mainten-ance. Verify consistency of altitude input of each FMS. 6. Verify user waypoints list on the USER WPT LIST X/X pages and verify the user routes list on the USER ROUTES 1/1 page. 7. Verify consistency of altitude input of each FMS	
INS NAV LOST	INS function in EGI has failed on the onside and offside FMSs.	INS cannot be used for navigation. Advise maintenance.	EGI interface
INS/DVS NAV LOST	No INS/DVS navigation solution is available due to an INS and a DVS failure (SIGMA50H EGI only).	INS/DVS solution cannot be used for navigation. Advise maintenance.	• EGI interface • Doppler interface
INS/GPS NAV LOST	Communication failure with the EGI on the onside and offside FMSs.	INS/GPS cannot be used for navigation. Advise maintenance.	EGI interface
INS-GPS POS DIFF	Excessive drift of the INS position with respect to the GPS position.	Verify aircraft position with a different sensor. Deselect this sensor if necessary. Advise maintenance.	EGI interface without civil GPS interface

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
INS/GPS POS UNCERTAIN	The FMS is using embedded INS/GPS (EGI) sensor position data for which the sensor integrity does not meet requirements for the phase of flight and there are no other IFR approved navigation sensors available to cross check the EGI position. This message does not imply that the EGI position is in error, only that confidence in the position accuracy is reduced.	Verify INS/GPS position and monitor HIL (Horizontal Integrity Limit).	EGI interface and no civil GPS interface configured. Error limits is set to POF
IRSx ALIGN FAIL	INS/IRS reports alignment failure. Message enabled for LTN-92 and ADIRS interfaces.	LTN-92: Ensure that entered position meets LTN-92 latitude check and 3+3T check. Retry INS initialization on POS INIT page. ADIRS: Ensure that entered position meets Reasonableness Test and System Performance Test. Retry IRS initialization on POS INIT page.	IRS interface configured
IRSx CHECK ACCURACY	INS reports that some of its navigation parameters may have become unreliable. or FMS determined that INS inertial position drift exceeds 3+3T nm, where T is the INS Time in Nav in hours. Message enabled for ADIRS interfaces.	Move appropriate INS/IRS Mode Selector Unit to ATTitude position. If attitude data of INS/IRS seems unreliable, switch this INS/IRS to OFF.	IRS interface configured
IRSx CYCLE OFF/NAV	ADIRS alignment fault.	Cycle Mode Selector Unit through OFF and back to either NAV or ALIGN.	ADIRS interface configured
IRSx ENTER HEADING	In Attitude mode, magnetic heading must be manually updated. Message enabled for ADIRS interface.	Magnetic heading must be manually entered in SET IRS HDG field of POS INIT 1/2 page every 15 minutes.	ADIRS interface configured
IRSx ENTER PPOS	INS requests position initialization. Message enabled for LTN-92 and ADIRS interfaces.	Perform INS/IRS initialization on POS INIT page. For LTN-92, ensure that entered position meets latitude test and 3+3T test, and retry INS initialization on POS INIT page. For ADIRS: Ensure that entered position meets Reasonableness Test and System Performance Test. Retry IRS initialization on POS INIT page.	IRS interface configured

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
IRSx ON BAT	INS/IRS reports that AC power is too low and is operating on DC backup power. If the backup power source is a battery unit, 15 to 30 minutes of operation are available with a fully charged battery. If primary power is not restored promptly, the battery voltage will fall below the level required to operate the INS/IRS. Message enabled for LTN-92 and ADIRS interfaces.	Verify IRS AC power.	IRS interface configured
IRSx ON SEC. POWER	Honeywell Laseref V: Upon detection of the IRS is on secondary power for more than 10 seconds.	Advise maintenance.	IRS interface configured
IRSx SELECT ATTITUDE	LTN-92 INS reports invalid navigation data. INS outputs still valid: pitch, roll and platform heading. INS cannot be used in FMS-based inertial navigation mode. FMS-based inertial navigation mode, heading and altitude inputs still available as long as one inertial sensor is still operating normally.	Move appropriate INS Mode Selector Unit switch position to ATT position.	IRS interface configured
KALMAN NAV LOST	Kalman filter navigator is not available as a backup navigation source. The APIRS measurements for the Kalman filter are not ready. The APIRS measurements for the Kalman filter are out of range.	Avoid conducting a low-level altitude mission where GPS signal may be affected.	APIRS interface
LOW BATTERY POWER	The power level of the internal battery is low. Manually-entered data may be lost if there is a primary power interruption during flight.	After any power interruption, monitor system performance and re-enter data as required. Advise maintenance.	All configurations
LOW GLIDEPATH ANGLE	Computed glide-path angle for the selected approach is lower than 2.75 degrees.	Check VPA displayed on VNAV APPR page. If VPA is appropriate conduct approach normal. If VPA is not appropriate stop using the FMS for advisory VNAV of this approach and report issue to maintenance operations.	VNAV configuration

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
MANUAL WPT SEQUENCE	Sequencing to the next waypoint needs to be manually initiated by the pilot. This message is displayed in conjunction with the NEXT WPT prompt with legs requiring a manual termination. This message also appears when the FMS is flying an altitude-terminated leg and a baro-corrected altitude is not available.	Press NEXT WPT prompt (LSK 6R) when required on the PROGRESS 1/4 or LEG 1/X pages.	All configurations
MC FAILED	The FMS detects a failure with the Mission Computer.	AMU radio volume control must be performed from the FMS.	AMU interface
mGPS NAV LOST	Military GPS (from EGI) sensor is not being used for the active navigation.	Use another sensor for navigation.	Civil GPS and EGI interface installed at the same time.
mGPS POS UNCERTAIN	The FMS is using military GPS position data for which the integrity does not meet requirements for the phase of flight, and cannot back it up with any other sensor. This message does not imply that the military GPS position is in error, only that confidence in the position accuracy is reduced. The FMS is not using the military GPS as active sensor but it detects a loss of integrity and a procedure (SID, Star, Transition, Approaches or Tactical Approaches. is loaded in the active flight plan.	Use another sensor for navigation.	Civil GPS and EGI interface installed at the same time.
NAV CONTROL LOST **NAV1 CONTROL LOST** **NAV2 CONTROL LOST**	The FMS detects that it cannot control the NAV (VOR/ILS) radio.	Control NAV radio from another source. Advise maintenance.	• NAV radio interface • NAV radio name is configured to NAV
NO APPR INTEGRITY	The predicted or actual GPS integrity does not meet the requirements for approach.	Activate the missed approach or use alternate means of navigation (if available) to perform the approach.	• GPS interface • EGI interface
NO CARP SOLUTION	This message is enabled: • in independent mode, the on-side CARP solution is unachievable or • in synchronized mode, all the on-side and off-side CARP solutions are unachievable.	Ensure inertial sensor inputs, baro correction (as seen on CARP PLAN 2/3 page), and baro corrected altitude are available to FMS otherwise adjust the aircraft altitude or speed.	All CARP/HARP configurations.
NO NAV DATABASE	No navigation database has been loaded.	Advise maintenance to reload navigation database.	All configurations

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
NOT ENOUGH FUEL	Not enough fuel to get to destination. (Endurance Reserve not included) is below Time To Go (TTG).	Re- route to a closer destination.	Fuel computer interface
NOT ON INTERCEPT HDG	Current aircraft heading does not intercept desired course to fix. This alert message appears after executing a Direct-To with Intercept-Course, or when flying a Heading-to-Intercept leg of a NavDataBase procedure (SID/STAR).	Fly the aircraft to an appropriate intercept heading. Re-engage LNAV.	All configurations
NOT ON INTERCEPT TRK	Current aircraft track does not intercept desired course to fix. This alert message appears after executing a Direct-To with Intercept-Course, or when flying a Course-to-Intercept leg of a NavDataBase procedure (SID/STAR).	Fly the aircraft to an appropriate intercept course. Re-engage LNAV to capture new active leg.	All configurations
QNH DISAGREE	Difference between the onside external QNH source and the offside external QNH source (from cross-talk) exceeds 0.07 inch of mercury.	Adjust QNH to same level on both sides.	Multi-FMS installations
PHONE CONTROL LOST	The FMS has detected a loss of communication with the Iridium phone	Iridium phone cannot be controlled by the FMS Advise maintenance.	Phone interface
PLS INPUT LOST	The FMS has detected a total loss of PLS input data on the onside and offside FMSs.	Ensure that PLS is powered. Verify if PLS operates normally. Advise maintenance. Take alternate means for location missions.	PLS interface
POSITION SHIFT	While LNAV is engaged, the FMS transitions from one navigation mode (e.g: position fixing) to another thus inducing a position jump larger than 1nm.	Crew to monitor that the aircraft smoothly recaptures the lateral flight plan.	All configurations
RADAR INPUT LOST	The FMS has detected a failure or a loss of communication from the FIAR 1500B Radar.	Ensure that FIAR 1500B Radar is powered. Verify if Radar operates normally. Advise maintenance.	Installations in which the FIAR 1500B Radar is configured.
RENDEZVOUS UNACHIEVABLE	The moving waypoint is the active waypoint and interception of the moving waypoint is not possible within a traveling distance of 500 nautical miles of the current position because conditions have changed.	Change flight parameter to reach this moving waypoint.	Moving waypoint
ROUTE CORRUPTION	Current route is corrupted.	Reload route from Custom Route Database.	All configurations
SARSAT WPT LIST FULL	The FMS detects that the SARSAT waypoint list is full and a new message is received from the DF.	A new SARSAT beacon has been received. To display it, delete a beacon already displayed.	DF-935 or DF-430 interface.

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
SET AIRPORT TEMP	Outside Air Temperature at the destination airport is required.	Enter temperature.	VNAV
SET INS POS	Manual alignment of the INS (EGI) is required.	Perform alignment.	EGI interface
SET QNH	1) Executing a flight plan containing a SID without baro-corrected altitude input available. 2) When pressure altitude or IRS baro-inertial altitude is available to the FMS and the crew selects corrected altitude using the altitude selection switch, but no baro-corrected altitude is available (ROCKWELL/ROCKWELL2/ROCKWELL3/AHCAS2/BARCO/IS&S EFISs only). 3) The FMS detects, while airborne, that it is within a 30 nm distance from the destination airport and below the transition level (TRANS LVL) specified on the PLAN DATA page while the system altitude is standard.	For items 1) & 2): Enter ALTIMETER SETTING (current pressure in inches of mercury (in Hg) or in millibars (mb) on PROGRESS 4/4 (or 3/3) page. The FMS will correct its pressure altitude input accordingly. For item 3): Set altimeter to barometric setting.	If the message is configured, and the FMS is in terminal and approach operations
SET QNH (cont'd)	4) The FMS detects that: a) the FMS detects that it is at least 33 nm away from the origin airport, or is above the transition altitude (TRANS ALT) specified on the PLAN DATA page, and, b) an installed cockpit baro/standard altimeter reference selector is set to "baro" reference or the FMS receives a QNH input greater than 29.93 or less than 29.91 Hg. 5) The FMS detects that it is within a 30 nm distance from the destination airport and below the transition level (TRANS LVL) specified on the PLAN DATA page and that the system altitude is standard.	For item 4): Set altimeter to standard setting. For item 5): Set altimeter to barometric setting.	If the message is configured, and the FMS is in terminal and approach operations

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
SET QNH (cont'd)	<u>If the IS&S EFIS is installed:</u> If this message has been triggered as a result of being within a 30 nm distance from the destination airport while below the transition level (TRANS LVL) specified on the PLAN DATA page, then this message is reset if barometric pressure reference is selected by the crew and barometric corrected altitude is available. <u>If the IS&S EFIS is installed:</u> If this message has been triggered as a result of being at least 33 nm away from the origin airport, and, is above the transition altitude (TRANS ALT) specified on the PLAN DATA page, then this message is reset if standard pressure reference is selected by the crew.		If the message is configured, and the FMS is in terminal and approach operations
SET QNH (cont'd)	*NOTE: For ROTOR aircraft, airport terminal areas are only detected around navigation database airports*.		If the message is configured, and the FMS is in terminal and approach operations
TACAN NAV LOST	No TACAN sensor data is available for the onside and offside FMSs. TACAN navigation mode is no longer available. If FMS was in TACAN navigation mode, it automatically reverts to the next available navigation mode.	Ensure that identified TACAN receiver is powered. Verify if TACAN receiver operates normally. Advise maintenance.	TACAN interface
TACT APPR DB INVALID	The FMS detects a tactical approach database corruption.	Tactical approach already loaded in the flight plan is still considered valid and can be used but attempt to re-select a tactical approach from the database is prohibited. Advise maintenance.	Tactical Approach configured
TDN FUNCTION LOST	The FMS has detected a failure of all configured onside and offside Radio Altimeters. As a result, the TDN functionality has been lost.	Ensure that Radio Altimeter is powered. Verify if Radio Altimeter operates normally. Advise maintenance.	• Hover function • Radar Altimeter interface

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
TDN NOT POSSIBLE	During a hover maneuver, when over-flying the TDN waypoint one of the two conditions occurs: cross track value greater than 0.2 nm or cross track error value greater than 20°. This message appears in order to protect the autopilot against excessive maneuvers.	The roll steering command is automatically disabled and the hover has to be re-activated and re-executed.	• Hover function • Radar Altimeter interface
TIMER ALARM	Timer has expired.	Perform required post-timeout action.	Timer page
TPDR CONTROL LOST **TPDR1 CONTROL LOST** **TPDR2 CONTROL LOST**	The FMS cannot control the ATC transponder.	Control transponder from another source. Advise maintenance.	• ATC transponder interface • ATC transponder name configured as TPDR
VERIFY RNP VALUE	A manually entered RNP value greater than that approved for the phase of flight is used.	The crew is responsible for monitoring navigation performance and ensuring that the aircraft remains within protected airspace at all times. Verify that the RNP value is appropriate for the phase of flight. Modify as necessary.	All configurations
VHF CONTROL LOST **VHF1 CONTROL LOST** **VHF2 CONTROL LOST**	The FMS cannot control the COM radio	Control COM radio from another source. Advise maintenance.	• COM radio interface • COM radio name configured as VHF
VIR CONTROL LOST **VIR1 CONTROL LOST** **VIR2 CONTROL LOST**	The FMS cannot tune the NAV (VOR/ILS) radio	Control NAV radio from another source. Advise maintenance.	• NAV radio interface • NAV radio name configured as VIR
VOR CONTROL LOST **VOR1 CONTROL LOST** **VOR2 CONTROL LOST**	The FMS detects that it cannot control the NAV (VOR/ILS) radio	Control NAV radio from another source. Advise maintenance.	• NAV interface • NAV radio name is configured as VOR
VOR/DME NAV LOST	The FMS has detected a VOR and/or DME receiver failure on the onside and offside FMSs. VOR-DME navigation mode is no longer available. If FMS was in VOR-DME navigation mode, it automatically reverts to the next available navigation mode.	Control the VOR or DME receivers from another source. Verify if VOR and DME receivers operate normally. Advise maintenance	• NAV interface • DME interface

SYSTEM ALERT MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
VOR/DME/TCN NAV LOST	TACAN failure has been detected in addition to a VOR and/or DME receiver failure on the onside and offside FMSs. VOR-DME-TCN navigation mode is no longer available. If FMS was in VOR-DME-TCN navigation mode, it automatically reverts to the next available navigation mode.	Control the VOR or DME receivers from another source. Ensure that identified TACAN receiver is powered. Verify if TACAN, VOR and DME receivers operate normally. Advise maintenance.	• NAV interface • DME interface • TACAN interface
VUHF CONTROL LOST **VUHF1 CONTROL LOST** **VUHF2 CONTROL LOST**	FMS cannot control the VUHF radio	Control VUHF radio from another source. Advise maintenance.	• VUHF radio interface • VUHF radio name configured as VUHF
WXR INPUT LOST	No Weather Radar data is available for the onside and offside FMSs.	Ensure that WXR is powered. Verify if WXR operates normally. Advise maintenance.	Weather Radar interface
XPDR CONTROL LOST **XPDR1 CONTROL LOST** **XPDR2 CONTROL LOST**	The FMS cannot control the transponder	Control the transponder from another source. Advise maintenance.	• ATC transponder interface • ATC transponder name configured as XPDR

MAINTENANCE ALERT MESSAGES

Maintenance Alert messages are messages that indicate a particular CMA-9000 FMS failure condition:

- *Displayed in amber on the MAINT MESSAGES page.*
- *Never displayed on the scratchpad.*
- *Always associated with a specific system alert message.*
- *Unless otherwise noted, the CMA-9000 Master Caution is active (e.g. FMS is not functional) for all the Maintenance Alert messages.*
- *The associated message alert FMS DEGRADED suggests that the cause of the problem may be determined and that the FMS may be used in a degraded navigation mode. However:* ***Do not use the FMS for navigation if the cause of the problem cannot be determined.***

MAINTENANCE ALERT MESSAGE	DESCRIPTION	ACTION	ASSOCIATED SYSTEM ALERT MESSAGE
BAD SDI STRAPPING	The FMS detects that both SDI pins are open.	In flight: Discontinue use of the given by pulling FMS circuit breaker. On ground: Advise maintenance.	FMS FAILED
BOOT CHECKSUM FAILED	Boot software failure. SYSTEM cannot be reprogrammed with new operational software.	Do not use the FMS for navigation. Master Caution is inactive. Advise maintenance.	None
H/W A429 IP# FAILED	ARINC 429 receiver failure detected. Where # is 1 to 24. *SYSTEM DEGRADED displayed on MESSAGE RECALL page.*	Do not use the FMS to communicate with the equipment configured at the failed input port. Master Caution is inactive. Advise maintenance.	FMS DEGRADED
H/W A429 TX# FAILED	ARINC 429 transmitter failure detected. Where # is 1 to 8. *SYSTEM DEGRADED displayed on MESSAGE RECALL page.*	Do not use the FMS to communicate with the equipment(s) configured at the failed output port. Master Caution is inactive. Advise maintenance.	FMS DEGRADED
H/W CPU CLKMUL FAILED	K6 CPU frequency is not 220 MHz. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED
H/W CPU FAILED	CPU failure detected. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED
H/W FLASH FAILED	The SYSTEM detects a failure during the internal flash test. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED
H/W FPU FAILED	FPU failure detected. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED

MAINTENANCE ALERT MESSAGE	DESCRIPTION	ACTION	ASSOCIATED SYSTEM ALERT MESSAGE
H/W PIT FAILED	Programmable Interval Timer failure detected. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED
H/W PWR SUPP FAILED +5 **H/W PWR SUPP FAILED +12** **H/W PWR SUPP FAILED -12**	The SYSTEM detects a supply voltage out of limit on the 5, 12 or -12 Volts supplies. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED
H/W RAM FAILED	SYSTEM random access memory (RAM) test failure. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise Maintenance.	FMS FAILED
H/W RTC FAILED	Real Time Clock failure detected. Time cannot be retained during SYSTEM power-off.	Do not use the FMS for navigation. Manually enter date/time. Master Caution is inactive. Advise maintenance.	None
H/W SERIAL I/O FAILED	The SYSTEM detects a failure with the SERIAL I/O Controller. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	CDU keyboard, discretes and annunciators may no longer operate. Advise Maintenance.	FMS FAILED
H/W UART RX# FAILED	The SYSTEM detects a failure with the SERIAL I/O Controller. Where # is 1 to 4. *SYSTEM DEGRADED displayed on MESSAGE RECALL page.*	Do not use the FMS to communicate with the equipment configured at the failed input port. Master Caution is inactive. Advise Maintenance.	FMS DEGRADED
H/W UART TX# FAILED	The SYSTEM detects a failure with the SERIAL I/O Controller. Where # is 1 to 4. *SYSTEM DEGRADED displayed on MESSAGE RECALL page.*	Do not use FMS to communicate with the equipment configured at the failed output port. Master Caution is inactive. Advise Maintenance.	FMS DEGRADED
MAG VAR CRC FAILED	Magnetic Variation Tables checksum failure. *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED
OP CHECKSUM FAILED	Operation Program checksum failure. The SYSTEM is unreliable for communication *SYSTEM FAILED displayed on MESSAGE RECALL page.*	Do not use the FMS for navigation. Advise maintenance.	FMS FAILED

MAINTENANCE ADVISORY MESSAGES

Maintenance advisory messages are messages that do not require immediate pilot action but that indicate a particular equipment failure condition:

- *Displayed in white on the MAINT MESSAGES page.*
- *Displayed on the scratchpad unless an associated collector message exists and is active (until acknowledged).*
- *Lowest priority scratchpad messages (can be typed over and overwritten by any other message type).*
- *Unless otherwise noted, the CMA-9000 Master Caution is inactive (e.g. FMS is still functional) for all the Maintenance Advisory messages.*
- *Collector messages are messages that combine several fault conditions into a single alert message. (e.g. AIR DATA LOST combines ADC1 FAILED and ADC2 FAILED Maintenance Advisory messages).*

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
AAIM ALT FAILED	Out of bounds GPS altitude failure (SAGEM EGI installation only).	If in TERMINAL or ENROUTE phase of flight the INS/GPS navigation mode is kept, but the pilot can manually deselect this mode. Advise Maintenance to verify the SAGEM EGI	EGI interface
AAIM SAT FAILED	Non-isolated satellite failure.	As above.	EGI interface
ADC1 FAILED **ADC2 FAILED**	The FMS has detected a failure of the ADC receiver or the ADC communication BUS.	Ensure that ADC is powered. Verify that ADC operates normally. Advise maintenance. Refer to Section 15 of the Operator's Manual for operation with a failed TAS/Altitude input if an alternate TAS/Altitude source is not available.	ADC interface
ADF1 FAILED **ADF2 FAILED**	The FMS has detected a failure of the identified ADF radio or a failure of the ADF receiver communication bus.	Control ADF from another source. ADF receiver is no longer operational, use other navigation aids. Advise maintenance.	ADF interface
AHRS1 FAILED **AHRS2 FAILED** **AHRS3 FAILED**	AHRS input failure or a failure of the AHRS communication bus or AHRS is in alignment mode or AHRS is in manual heading update mode (in directional mode). When this message is present, another heading source is available. Otherwise, the HEADING INPUT LOST alert message will be displayed.	Ensure that AHRS is powered. Verify if AHRS operates normally. Advise maintenance.	AHRS interface

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
AMU FAILED	The FMS has detected a failure of the AMU or a failure of the AMU communication bus.	Control the AMU from another source. Advise maintenance.	AMU interface
AMU CH1 FAILED **AMU CH2 FAILED** **AMU CH3 FAILED**	The FMS has detected a failure of a particular AMU Audio Board.	Use another channel to control the AMU. Advise maintenance.	AMU interface
APIRS FAILED	The FMS has detected a failure of the identified APIRS or a failure of the APIRS communication bus.	Ensure that APIRS is powered. Verify if APIRS operates normally. Advise maintenance.	APIRS interface
APU FAILED	The FMS detects a failure or a loss of communication with the APU.	Be aware that the total fuel flow does not include the APU fuel flow; inform maintenance.	APU Interface
APU FUEL FLOW FAILED	The FMS detects it is not receiving the fuel flow from the APU or the received fuel flow is invalid.	Be aware that the total fuel flow does not include the APU fuel flow; inform maintenance.	APU Interface
ATC1 ALT FAILED **ATC2 ALT FAILED**	The FMS has detected a failure of the transponder altitude bus.	Do not use transponder Mode C capability. Advise maintenance.	• ATC transponder interface • ATC transponder name configured as ATC
ATC1 FAILED **ATC2 FAILED**	The FMS has detected a failure of the ATC transponder or a failure of the ATC transponder communication bus.	Control the ATC transponder from another source. Advise maintenance.	• ATC transponder interface • ATC transponder name configured as ATC
ATOS FAILED	The FMS detects a failure or a loss of communication with the Airborne Tactical Observation and Surveillance System.	Ensure that ATOS is powered. Verify if ATOS operates normally. Advise maintenance	• ATOS interface
AUTO RESET	Upon an exceptional fault the FMS has restarted.	The unit has detected a problem and has attempted to restart. No action required except to verify it is functioning as expected. Advise maintenance.	All configurations
BORESIGHT DISCREPANCY	Discrepancy between the boresight values of the EGI and the newly entered FMS INS values.	Enter new values for roll, pitch, and yaw boresight in the EGI - BORESIGHT 1/1 maintenance page.	EGI interface
CAPT EHSI FAILED	Failure of the Capt. EHSI or failure of the Capt. EHSI communication bus.	Ensure that Capt EHSI is powered. Verify if EHSI operates normally. Map display available on F/O EHSI. Advise maintenance.	EHSI interface

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
COM1 FAILED **COM2 FAILED** **COM3 FAILED** **COM4 FAILED**	The FMS has detected a failure of the COM radio or its communication bus or VUHF radio or its communication bus.	Control the COM/VUHF radio from another source. COM/VUHF radio is no longer operational, use other communication radios. Advise maintenance.	• COM radio interface • VUHF radio interface • COM or VUHF radio name configured as COM1 or COM3
CONC1 FAILED **CONC2 FAILED**	The FMS has detected a failure of the CONCENTRATOR or its communication bus.	Control the CONCENTRATOR from another source. Loss of the CONCENTRATOR input alone does not cause any adverse effect, the specific equipment affected by the failure will be annunciated directly.	Concentrator interface
CONFIG INVALID	The FMS detects an installation configuration failure. This message automatically generates an associated "FMS FAILED" alert message.	Do not use the FMS for any function. Advise maintenance crew to load a valid configuration Master Caution is active.	All configurations
DATUM LISTS MISMATCH	In a dual/triple FMS installation with the FMSs synchronized, the FMS detects that the preferred datum list configured differs from that of the off-side FMS.	Advise maintenance crew to ensure that the same preferred datum list is selected on all configured FMSs.	Multi-FMS installations
DCU1 FAILED **DCU2 FAILED** **DCU3 FAILED**	If IS&S EFIS (configuration option IS_S) is configured and the FMS detects a failure or a loss of communication with the specific DCU (Data Concentrator Unit).	Ensure that DCU is powered. Verify if the EFIS operates normally. Advise maintenance.	DCU interface
DF FAILED	The FMS detects a failure or a loss of communication with the DF-430 radio.	Ensure that DF is powered. Verify if the DF can be controlled by any other sources (such as alternate FMS(s) or control panel). Advise maintenance.	DF interface
DMAP1 FAILED **DMAP2 FAILED** **DMAP3 FAILED**	DMAP failure or DMAP communication bus failure.	Check DMAP power. Do not use the DMAP to FMS's failed functionality. Advise maintenance.	DMAP interface
DME1 FAILED **DME2 FAILED**	The FMS detects a failure with the DME communication bus.	Control the DME from another source. Advise maintenance.	DME interface
DVS/GPS SPEED DIFF	A difference of more than 15 knots has occurred for more than two minutes between the GPS and the Doppler North-East velocities.	None.	• GPS interface • Doppler interface
DVS FAILED	Doppler velocity sensor failure or a DVS communication bus failure detected.	Ensure that DVS is powered. Verify if the DVS operates normally. Advise maintenance.	Doppler interface

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
DVS CTRL FAILED	Missing control data from the Doppler velocity sensor.	Degraded mode of operation may still be available. Advise maintenance.	Doppler interface
EFIS1 FAILED **EFIS2 FAILED**	EFIS failure or EFIS communication bus failure detected.	Ensure that EFIS is powered. Verify if the EFIS operates normally. Advise maintenance.	EFIS interface
FLIR FAILED	The FMS detects a failure or a loss of communication with the Forward Looking Infrared Radar.	Ensure that FLIR is powered. Verify if the FLIR operates normally. Advise maintenance.	FLIR interface
FMS CLOCK FAILED	The FMS detected failure of its real time clock.	Manually enter date and time. Master Caution is active.	All configurations
FMS1 X-TALK FAILED **FMS2 X-TALK FAILED** **FMS3 X-TALK FAILED**	1. Offside FMS input failure. 2. In a dual/triple configuration, the synchronized mode of operation and manual flight plan synchronization are not possible. 3. Possible loss of ATC or DME Hold channel control. 4. Failure of the cross-talk bus detected.	1. Ensure that identified FMS is powered. Verify if identified FMS operates normally. Advise maintenance. 2. Any automatically synchronized item listed in Section 3 of the Operator's Manual, dual-FMS Operations, must be performed independently on each FMS. 3. Verify if ATC is still operational. Navigate without the ATC and the DME HOLD function. 4. Advise maintenance.	Multi-FMS installations
FUEL1 FAILED **FUEL2 FAILED**	The FMS has detected a failure of the Fuel Computer or a failure of the Fuel Computer communication bus.	Ensure that the identified Fuel Computer is powered. Verify if the Fuel Computer operates normally. Advise maintenance. *NOTE: In installations that FUEL FLOW SDI is configured to SUM_DUAL, the fuel flow indicated represents only that for the engine whose fuel computer has not failed and the indicated fuel quantity may be less than actual.*	Fuel Computer
FUEL FLOW FAILED	Fuel Computer input failure.	Verify Fuel Computer operation. Advise Maintenance.	Fuel Compute
FUEL QTY FAILED	Fuel quantity from fuel computer is not available or valid.	Advise maintenance.	Fuel computer installed.

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
F/O EHSI FAILED	The FMS has detected a F/O EHSI input failure or a F/O EHSI communication bus failure.	Ensure that F/O EHSI is powered. Verify F/O EHSI operates normally. Map display available on Capt. EHSI. Advise maintenance.	EHSI interface
GLONASS FAILED **GLONASS1 FAILED** **GLONASS2 FAILED**	The FMS has detected a failure or a loss of communication with the GLONASS sensor. *NOTE: GLONASSx is displayed in a multiple-FMS configuration only.*	Advice maintenance.	GLONASS interface configured
GPP FAILED	The FMS detects a failure to communicate with Gessellschaft fur Prozessrechner Programmierung (GPP) unit.	GPP Receiver is no longer operational. Advise maintenance	HCS, FM1, FM2, UHF interfaces
GPS ANTENNA FAILED	The EGI GPS in DR mode and not using satellite data for navigation as it is not tracking any satellite for more than 5 seconds.	Advise maintenance.	EGI LN-100GT or SIGMA-50H configured.
GPS BATTERY LOW	The EGI GPS battery is low or has failed.	Advise Maintenance.	EGI interface
GPS (EGI) FAILED	FMS detected a failure of the GPS in the identified EGI sensor.	Advise Maintenance.	EGI interface
GPS FAILED **GPS1 FAILED** **GPS2 FAILED**	The FMS has detected a failure of the GPS unit or a failure of the GPS unit communication bus.	Entry of date and time may be required. Functions requiring GPS position/time will not operate. Advise maintenance.	GPS interface Multi-FMS installations
GPS ZEROIZE FAILED	Failure in the zeroization process of the SA/AS key. The FMS automatically selects the next best sensor for navigation.	GPS cannot be used for navigation. Advise maintenance if the message is persistent.	EGI interface
HF FAILED	The FMS detects a HF radio failure.	Ensure that HF radio is powered. Verify that the HF radio operates normally. Advise maintenance.	Installations in which the HF radio is configured.
IFF FAILED	The FMS detects a failure or a loss of communication with the IFF.	Ensure that IFF transponder is powered. Verify that the IFF transponder operates normally. Advise maintenance.	Installations in which the IFF transponder is configured.
INS FAILED	INS function in EGI has failed.	INS cannot be used for navigation. Advise maintenance if the message persists.	EGI interface
INS/GPS FAILED	Communication failure with the EGI.	INS/GPS cannot be used for navigation. Advise maintenance if the message persists.	EGI interface
IRSx BAT WARN	ADIRS DC input power out of range.	Call maintenance.	ADIRS interface configured

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
IRSx CHECK ADC	LTN-92 INS or ADIRS reports invalid ADC inputs. No usage of some or all ADC info. INS/IRS may not be able to provide baro-inertial altitude data. Depending of the installation, the FMS may have lost its only source of altitude. The ALTITUDE FAILED message would then also be displayed.	LTN-92: Take note of INS maintenance word contents on appropriate INS MAINT MESSAGE page. Advise maintenance.	IRS interface configured
IRSx CHECK REF	INS reports analog output failure.	Verify following INS analog outputs: attitude, heading, drift angle, platform heading. LTN-92: Take note of INS maintenance word contents on appropriate INS MAINT MESSAGE page. Advise maintenance.	IRS interface configured
IRSx COOL FAIL	ADIRS overheat detected. Internal temperature exceeds 72 degrees C.	Cycle Mode Selector Unit through OFF. Call maintenance.	ADIRS interface configured
IRSx DELAYED MAINT	LTN-92 INS reports an internal soft failure.	Take note of INS maintenance word contents on appropriate INS MAINT MESSAGE page. Advise maintenance to service INU when convenient.	IRS interface configured
IRSx EXCESS MOTION	LTN-92 INS or ADIRS reports excessive motion during alignment phase. ALIGN mode automatically re-sequences to 10 minutes (32 seconds if in rapid re-align mode).	Ensure that aircraft remains stationary during alignment period.	IRS interface configured
IRSx FAILED	Inertial sensor input failure. Inertial Navigation mode, heading and altitude inputs (if applicable) still available as long as one inertial sensor is still operating normally.	Ensure that inertial sensor is powered. Verify if inertial sensor operates normally. Turn off INU/IRU and advise maintenance. LTN-92 INS: Take note of INS maintenance word contents on appropriate INS MAINT MESSAGE page.	IRS interface configured
IRSx SEC. POWER WARN	LASEREF V IRS: Upon detection of the IRS is on secondary power for more than 10 seconds.	Advice maintenance	IRS interface configured
LEVER ARM DISCREPANCY	Discrepancy between the lever arm values in the EGI and the new values in the FMS.	Verify the lever arm values and re-enter if necessary.	EGI interface
MAG VAR OUT OF DATE	Magnetic variation tables out of date (more than 5 years old). Message displayed at power-up, or after loading tables via data loader.	Advise maintenance to load up-to-date magnetic variation tables.	All configurations

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
NAV1 FAILED **NAV2 FAILED**	The FMS detects a failure with the NAV (VOR/ILS) radio or the NAV radio communication bus.	Try to control the NAV radio from another source. NAV receiver is no longer operational, use other navigation aids. Advise maintenance.	• NAV radio interface • NAV radio name is configured to NAV
GPS ANTENNA FAILED	The GPS sensor detects a GPS antenna failure and goes in GPS DR navigation.	Advise Maintenance.	EGI interface
PHONE FAILED	The FMS detects a failure of the Iridium Phone communication bus.	Advise Maintenance.	Iridium Phone interface
PLS FAILED	The FMS detects a failure of the PLS range or the PLS steering or a failure of the PLS communication bus.	Take alternate means for location missions. Advise maintenance.	PLS interface
RADAR FAILED	The FMS detects either: 1) A failure or loss of communication with the FIAR 1500B Radar equipment, or, 2) Latitude and longitude labels received from the FIAR 1500B Radar equipment have different SSMs from each other for 5 seconds.	Ensure that the RADAR is powered. Verify if the Radar operate(s) normally. Advise maintenance.	Installations in which the FIAR 1500B Radar is configured.
RALT FAILED **RALT1 FAILED** **RALT2 FAILED**	The FMS detects a failure of the Radio Altimeter or a failure of the Radio Altimeter communication bus.	Ensure that RALT is powered. Verify if the RALT operates normally. Advise maintenance.	Radar Altimeter interface
TACAN FAILED	TACAN receiver input failure or a failure of the TACAN receiver or a receiver communication bus has been detected.	Ensure that the identified TACAN receiver is powered. Verify if the TACAN receiver operates normally. Advise maintenance.	TACAN interface
TPDR1 ALT FAILED **TPDR2 ALT FAILED**	The FMS has detected a failure of the transponder altitude bus	Do not use transponder Mode C capability. Advise maintenance.	• ATC transponder interface • ATC transponder name is configured as TPDR
TPDR1 FAILED **TPDR2 FAILED**	The FMS has detected a failure of the ATC transponder or a failure of the ATC transponder communication bus.	Control transponder from another source. Advise maintenance.	• ATC transponder interface • ATC transponder name is configured as TPDR

ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
UNABLE FMS-FMS SYNC	In a dual-FMS installation, operator's or automatic attempt to synchronize FMSs failed because: 1. An inter-FMS communication failure has occurred. 2. The Operational Software programs is not the same in all FMSs. 3. The active navigation database is not the same in all FMSs.	Any automatically synchronized item listed in Section 3 of the Operator's Manual, dual-FMS Operations, must be now performed independently on each FMS. See MESSAGE RECALL and/or MAINT MESSAGE page(s) for more details. Advise maintenance. Verify Op Program on IDENT 1/1 page and advise maintenance if different. Verify active navigation database on IDENT 1/1 page, select appropriate database if possible, otherwise advise maintenance.	Multi-FMS installations
VHF1 FAILED **VHF2 FAILED**	The FMS has detected a failure of the COM radio or a failure of the COM radio communication bus.	Control the COM radio from another source. COM radio is no longer operational, use other communication radios. Advise maintenance.	• COM radio interface • COM radio name configured as VHF
VIR FAILED **VIR1 FAILED** **VIR2 FAILED**	The FMS has detected a failure with the NAV (VOR/ILS) radio or a NAV radio communication bus failure.	Try to control the NAV radio from another source. NAV receiver is no longer operational, use other navigation aids. Advise maintenance.	• NAV radio interface • NAV radio name configured as VIR
VUHF FAILED **VUHF1 FAILED** **VUHF2 FAILED**	The FMS has detected a failure of the identified VUHF receiver or a failure of the radio communication bus.	Try to control the VUHF radio from another source. VUHF radio is no longer operational, use other communication radios. Advise maintenance.	• VUHF interface • VUHF radio name configured as VUHF
VOR1 FAILED **VOR2 FAILED**	The FMS detects a failure with the NAV (VOR/ILS) radio or a failure of the radio communication bus.	Try to control the NAV radio from another source. NAV receiver is no longer operational, use other navigation aids. Advise maintenance.	• NAV radio interface • NAV radio name configured as VOR
WXR FAILED	A communication failure has occurred with the weather radar.	Ensure that WXR is powered. Verify if WXR operates normally. Advise maintenance.	Weather radar interface
XPDR1 ALT FAILED **XPDR2 ALT FAILED**	The FMS has detected a failure of the transponder altitude bus.	Do not use transponder Mode C capability. Advise maintenance.	• ATC transponder radio interface • ATC transponder configured as XPDR
XPDR1 FAILED **XPDR2 FAILED**	The FMS has detected a failure of the ATC transponder or a failure of the transponder communication bus.	Control the transponder from another source. Advise maintenance.	• ATC transponder radio interface • ATC transponder configured as XPDR

STATUS ADVISORY MESSAGES

- *Status Advisory messages are messages which do not require immediate pilot action but require pilot* awareness*: Displayed in white on the scratchpad (until acknowledged).*
- *Never displayed on the MESSAGE RECALL or MAINT MESSAGES page.*
- *Second lowest scratchpad priority (can be typed over and overwritten by any message type except maintenance advisory messages).*

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
1 MIN TO CARP	The FMS detects that 1 minute remains prior to reaching the CRP waypoint.	Prepare for CARP per the CARP procedure checklist.	Configurations supporting CARP/HARP
5 SEC TO CARP	The FMS detects that 5 seconds remains prior to reaching the CRP waypoint.	Prepare for CARP per the CARP procedure checklist.	Configurations supporting CARP/HARP
10 MIN TO CARP	The FMS detects that 10 minute remains prior to reaching the CRP waypoint.	Prepare for CARP per the CARP procedure checklist.	Configurations supporting CARP/HARP
20 MIN TO CARP	The FMS detects that 20 minute remains prior to reaching the CRP waypoint.	Prepare for CARP per the CARP procedure checklist.	Configurations supporting CARP/HARP
AIR TEMP NOT VALID	Air temperature is invalid or out of bounds (valid range: -40C to 50C). *NOTE: This message is enabled only on the SIMUL FLY AWAY 1/3 and SIMUL OEI CRUISE 2/3 pages.*	Advise maintenance to verify and reload OEI_FLYAWAY file.	• Simulation page • OEI Fly Away database
ATOS XFER REQUESTED	The FMS detects that a mission data is ready to be transferred from the ATOS to the FMS.	At the crew's discretion, a mission data transfer from the ATOS can be initiated using the START> prompt on the MISSION 1/1 page.	Installations in which the ATOS equipment is configured.
AUTOMATIC HOLD EXIT	A holding pattern will be exited automatically by the FMS *NOTE: Applicable to HA, HF leg types (holding patterns from Navigation Database).*	N/A	All configurations
BACKTRACK ROUTE FULL	The backtrack route has been filled up to its maximum of 199 waypoints and there is an attempt to record the 200th waypoint in the backtrack route flight plan (first waypoint entered manually by the operator or waypoint overflown in the active route).	Check the route and reduce number of waypoints.	Backtrack route

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
BERDV UNACHIEVABLE	The FMS detects that interception of the moving Bulls Eye Target is not possible. *NOTE: This message is generated only once upon selection or modification of the moving Bulls Eye Target if it is not in the active route.*	Check if the entered BULLS EYE TARGET parameters and correct.	if Tactical Config BULLS EYE is configured
CAPT MAP CONTROL IN USE	The FMS detects that Capt and F/O are using the same FMS to drive their EFIS map. *NOTE: Selected FMS is using Captain EFIS panel selections. F/O EFIS control panel selections are ignored.*	Capt or F/O to select another FMS if individual map displays are required.	SMITHS_5ATI or ASTRONAUTICS EHSI configured installations.
CDU ENTRY CONFLICT	The FMS detects conflict of entry in dual/triple-FMS operations.	Insure no conflicting action between flight crew members.	Multi-FMS installations
cGPS NAV DESELECTED	The civil GPS sensor has been de-selected by the crew.	Ensure GPS navigation mode should be deselected.	Civil GPS and EGI interface installed at the same time and DESELECT page configured.
CHECK TRANS ALT/LVL	The FMS detects that all the following have occurred: a) the operator presses the EXEC button and activates the flight plan; and, b) a value for transition altitude or transition level does not exist in the navigation database for the selected ORIGin/DESTination airport or departure/arrival procedure(s); and, c) the change in the MODified flight plan includes a change to the ORIGin/DESTination airport or departure/arrival procedure(s); and, d) no manual entry has been made for:	Ensure that correct TRANS ALT and/or TRANS LVL is set.	If the message is configured.

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
CHECK TRANS ALT/LVL (cont'd)	i) the TRANS ALT field (for the case that a new ORIGin or departure procedure(s) was added to the active flight plan); or ii) the TRANS LVL field (for the case that a new DESTination or arrival procedure(s) was added to the active flight plan) If Tactical Approach is configured and: a) The operator has made the inactive route, containing a tactical approach in its flight plan, into the now active route; and b) A value for transition altitude or transition level does not exist in the tactical approach database for the selected tactical approach procedure.		
CHECK TRUE/MAG REF	If the TRUE/MAG cockpit switch is not installed and the A/C has transitioned out of the Polar region.	If required, change Angle reference to MAG via FMS SET-UP page (or alternatively via external switch).	
CHECK UPDATE	The FMS detects that the position difference between the sensor to be updated and the reference position is greater than the accuracy of the sensor to be updated. This message is only available on the UPDATE POS 1/1 page.	Review the position update.	All configurations
COURSE CHANGE>125 AHEAD	The FMS detects that the course change of a fly-by leg transition (from the active leg to the next leg) is greater than 125 degrees and within 2 minutes from the turn anticipation point (triggered for non-published procedures only).	As deemed necessary, modify flight plan if such a course change is not desired.	Message configured to advisory.
DIMMING INTERNAL MODE	External control source for display dimming is providing a signal of less than 0.3 VDC for more than 2 seconds.	Use internal dimming mode.	External dimming control source installed.
DIRECT HOLD ENTRY	The FMS detects holding pattern entry procedure to be used on crossing of holding fix.	Acknowledge the holding pattern entry.	All configurations

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
DIRECT TO FIX	The FMS detects Upon flying a Direct-To with intercept course that the predicted intercept point is so close to the leg's termination waypoint such that the intercept path cannot be calculated. The FMS then calculates a path direct to the waypoint.	Review the intercept course entered.	All configurations
DMAP WPT LIST FULL	DMAP Reserved Waypoint List is full.	Limit the DMAP list to ten waypoints	DMAP interface
DMAP WPT NOT APPENDED	All the following conditions are required for this message to be displayed: 1) EURONAV_A702 DMAP is configured, and 2) The DMAP auto-append feature is ON, and 3) The FMS logic prevents appending a newly received DMAP waypoint due to the currently viewed FMS flight plan (active or inactive) being modified by an off-side FMS.	When the flight pan currently in view is no longer in the MOD state, retransmit DMAP waypoint as required.	EURONAV_A702 DMAP configured installations.
DMAP XFER FAILED	Loss of communication with Digital Map Display System Interface	Verify the DMAP power and self-test status. Advise maintenance.	DMAP interface
DME NAV DESELECTED	DME Sensor manually de-selected by the pilot.	Ensure DME navigation sensor should be deselected.	• DME interface • DESELECT page
EMERGENCY ENGAGED	Emergency tuning switch has been engaged to set the emergency frequencies	Acknowledge emergency status.	• Emergency discrete • At least one of the following radio is configured: COM VUHF ATC
END OF OFFSET	End of offset navigation.	Acknowledge the end of the offset.	All configurations
END OF SEARCH	End of search.	Acknowledge end of search pattern.	All configurations
F/O MAP CONTROL IN USE	Capt and F/O are using the same FMS to drive their EFIS map. *NOTE: Selected FMS is using F/O EFIS panel selections. Capt EFIS control panel selections are ignored.*	Capt or F/O to select another FMS if individual map displays are required.	SMITHS_5ATI or ASTRONAUTICS EHSI configured installations.
FLY AWAY HT NOT VALID	Fly away height out of tabular bounds. *NOTE: This message is enabled only on the SIMUL FLY AWAY 1/2 and SIMUL OEI CRUISE 2/2 pages.*	Advise maintenance (to verify and reload OEI_FLYAWAY file).	• Simulation page • OEI Fly Away database

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
FMS NAV IN DR	The FMS is receiving insufficient navigation information from other sensors. *NOTE: The FMS is in dead reckoning navigation mode using heading and speed inputs and last computed value of wind.*	Take appropriate measure to fly in manual mode. Verify sensors power status and self-test status.	All configurations
FUNCTION NOT COMPUTED	Weight index out of tabular bounds. *NOTE: This message is enabled only on the SIMUL FLY AWAY 1/2 and SIMUL OEI CRUISE 2/2 pages.*	Advise maintenance (to verify and reload OEI_FLYAWAY file).	• Simulation page • OEI Fly Away database
GPS INTEGRITY VALID	GPS sensor has just acquired integrity that satisfies the limit requirement for the phase of flight. *NOTE: This message is turned on when the integrity lamp goes from ON to OFF. Similarly, the message is turned off when the lamp comes ON.*	Advisory	• GPS interface • EGI interface (except LN-100GT
GPS NAV DESELECTED	GPS sensor has been de-selected by the pilot.	Ensure GPS navigation mode should be deselected.	• GPS interface • DESELECT page
GREEN LIGHT	CARP (Green Light) waypoint has been reached. Message is enabled when the CARP function is configured.	Start CARP drop.	Configurations supporting CARP/HARP
GROSS WEIGHT NOT VALID	Gross weight invalid or out of bounds (valid range: 6000kg to 11000kg). *NOTE: This message is enabled only on the SIMUL FLY AWAY 1/3 and SIMUL OEI CRUISE 2/3 pages.*	Advise maintenance (to verify and reload OEI_FLYAWAY file).	• Simulation page • OEI Fly Away database
HOLD EXIT TYPE CHANGED	A modified route that contains a holding pattern for which the exit type has been changed is executed.		
HSI SCALES CHANGING	The FMS is commanding HSI lateral scale deviation sensitivity change from 5 nm to 1 nm full scale when entering the terminal area	Acknowledge HSI scale change (change of POF).	EHSI or EFIS interface in terminal phase of flight
HSI SCALES TO CHANGE	At 3 nm inbound to the FAF and the GPS approach is enabled (armed). *NOTE: The HSI lateral deviation sensitivity will change from 1 nm to 0.3 nm full scale at 2 nm to the FAF waypoint.*	Acknowledge HSI scale change (change of POF).	EHSI or EFIS interface in terminal phase of flight.
INS/DVS NAV DESELECTED	INS/DVS navigator has been de-selected by the pilot.	Ensure INS/DVS navigation mode should be deselected.	• EGI interface • Doppler interface • DESELECT page

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
INS DRIFT EXCEEDS 2NM	FMS detects a position difference between the FMS current position and the INS pure position greater than 2 nm.	Advisory	Civil GPS and EGI interface installed at the same time.
INS/GPS NAV DESELECTED	INS/GPS navigator has been de-selected by the pilot.	Ensure INS/GPS navigation mode should be deselected.	• EGI interface • DESELECT page
IN INERTIAL MODE	Reversion to Inertial navigation mode.	Acknowledge inertial navigation mode. Verify GPS integrity by monitoring the NAV STATUS page.	• EGI interface
KALMAN NAV DESELECTED	KALMAN navigator has been de-selected by the pilot.	Ensure KALMAN navigation mode should be deselected.	• APIRS interface • DESELECT page
MAINTENANCE LOG FULL	Not enough memory is available to save a file.	Advise maintenance to verify the content of the Log file and delete some entries.	All configurations
mGPS NAV DESELECTED	The military GPS sensor (from the EGI) has been de-selected by the crew.	Ensure military GPS navigation mode should be deselected.	Civil GPS and EGI interface installed at the same time and DESELECT page configured.
NEW SARSAT WPT	The FMS has received a new SARSAT waypoint. *NOTE: When an existing SARSAT waypoint gets updated this message is not raised.*	Press WPT LISTS then SARSAT LSKs to display the information about the new SARSAT beacon received.	DF-935 or DF430 interface.
NEW TARGET POSITION	The FMS has received a new valid target position from the FIAR 1500B Radar or the ATOS.	At crew's discretion, process the received waypoint as operationally necessary.	Installations in which the FIAR 1500B Radar and/or ATOS equipment is/are configured.
NO FLY AWAY	(Active gross weight – fuel weight) > computed gross weight OR (radio altitude – fly away height) < 15 ft *NOTE: This message is enabled only on the SIMUL FLY AWAY 1/2 and SIMUL OEI CRUISE 2/2 pages.*	Advise maintenance to verify and reload OEI_FLYAWAY file.	• Simulation page • OEI Fly Away database
NOT ON INTERCEPT HDG	When a Direct-To with Intercept-Course is pending (modified route), The FMS detects that current aircraft heading does not intercept desired course to fix.	Verify intercept course entry and the heading of the aircraft.	All configurations
NOT ON INTERCEPT TRK	When a Direct-To with Intercept-Course is pending (modified route), The FMS detects that current aircraft track does not intercept desired course to fix.	Verify intercept course entry and the track.	All configurations
PRESS ALT NOT VALID	Pressure altitude is invalid or out of bounds.	Enter a valid pressure altitude.	N/A
PARALLEL HOLD ENTRY	Holding pattern entry procedure to be used at crossing of holding fix.	Acknowledge the holding pattern entry.	All configurations

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
PASSWORD CHANGED	The library password has been successfully changed.	N/A	One of following radio is configured COM VUHF VOR/ILS ADF
RED LIGHT	The FMS detects the XTE (Red Light) CARP waypoint has been reached. Message is enabled when the CARP function is configured.	Stop CARP drop.	Configurations supporting CARP/HARP
RENDEZVOUS UNACHIEVABLE	The interception of the moving waypoint is not possible (greater than500 nm). *NOTE: This message is generated when the moving waypoint is not the active waypoint.*	Take appropriate measures to meet the moving waypoint.	Moving waypoint
SLOWDOWN	The FMS detects the slowdown waypoint for CARP has been reached. Message is enabled when the CARP function is configured.	CARP Slowdown waypoint has been reached.	Configurations supporting CARP/HARP
SMS NOT TRANSMITTED	The FMS detects that SMS was not transmitted by the Iridium phone.	Retry to send the SMS.	Iridium Phone interface.
SMS TRANSMITTED OK	The FMS detects that SMS was transmitted by the Iridium phone.	Advisory	Iridium Phone interface.
TARGET XFER FAILED	The FMS detects a target waypoint transmission from the ATOS LW or FIAR 1500B Radar for which the position received is out of range.	The crew should retransmit the target position. If the problem persists the interface between FMS and the transmitting equipment should be checked.	Installations in which the FIAR 1500B Radar and/or ATOS equipment is/are configured.
TEARDROP HOLD ENTRY	The FMS detects holding pattern entry procedure to be used at crossing of holding fix.	Acknowledge the holding pattern entry.	All configurations
TEMP POS UPDATE END	The FMS detects the termination of an active temporary position update.	None.	Configurations supporting CARP/HARP

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
TRANS ALT/LVL MISMATCH	The FMS detects that all the following have occurred: a) the operator presses the EXEC button and activates the flight plan; and, b) a transition altitude/level is stored in the navigation database for the selected ORIGin/DESTina-tion airport or departure/arrival procedure(s); and, c) a manual entry currently exists in the TRANS ALT or TRANS LVL field; and, d) operator entered value for the TRANS ALT does not match the new TRANS ALT extracted from the nav database or operator entered value for the TRANS LVL does not match the new TRANS LVL extracted from the nav database.	Ensure that the correct TRANS ALT and TRANS LVL are selected.	If the message is configured.
TRANS ALT/LVL MISMATCH (cont'd)	If Tactical Approach is configured and: a) the operator presses the EXEC button and activates the flight plan; and, b) a transition altitude/level is stored in the tactical approach database for the selected tactical approach procedure; and, c) a manual entry currently exists in the TRANS ALT or TRANS LVL field; and, d) operator entered value for the TRANS ALT does not match the new TRANS ALT extracted from the tactical approach database or operator entered value for the TRANS LVL does not match the new TRANS LVL extracted from the tactical approach database database; and, e) a PLAN DATA page is configured.		
TRANSITION DOWN	Hover procedure execution. Displayed until the TDN waypoint is reached, at which point the message is removed automatically.	Acknowledge the hover procedure.	• Hover function • Radar Altimeter configured
USING MAG REF	If the TRUE/MAG cockpit switch is installed and is set to MAG upon the A/C transitioning out of the polar region.	The flight crew decides if the navigation angles and wind direction reference must be preserved as MAG or switched back to TRUE	All configuration

STATUS ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
USING TRUE REF	The FMS automatically reverts to True north angular reference upon entry in the polar region and the angular reference used before entry in polar region was Magnetic north.	None. The flight crew acknowledges that the navigation and wind direction are referenced to True North	All configuration
VOR/DME NAV DESELECTED	VOR Sensor manually deselected by the pilot. *NOTE: Message enabled only when DESELECT page configured.*	Ensure VOR/DME navigation mode is deselected.	• NAV interface • DME interface
WAYPOINT BYPASSED	FMS detects that the airplane crosses the wayline (perpendicular line to the next leg at the waypoint) of the next leg before the bisector or the wayline of the active leg.	Acknowledge that the FMS sequences both the active and the next leg.	Leg sequencing
WIND NOT VALID	Wind speed invalid.	Advise maintenance (to verify and reload OEI_FLYAWAY file).	• Simulation page • OEI Fly Away database
X-FMS NAV DESELECTED	FMS-FMS synchronized navigation manually deselected by the pilot.	Ensure cross FMS navigation mode should be deselected.	Multi-FMS installations

DATA ENTRY ADVISORY MESSAGES

Data Entry Advisory messages are messages that are only displayed on the scratchpad. They indicate that the CMA-9000 FMS has determined that the user-entered data is incorrect.

- *Displayed in white on the scratchpad (until acknowledged)*
- *Never displayed on the MESSAGE RECALL or MAINT MESSAGES page*
- *Second highest scratchpad priority (can be typed over and overwritten by system alert messages only).*

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!25 kHz STEP ERROR	The frequency entered is not a multiple of 25 kHz.	Enter a frequency which is a multiple of 25 kHz.	One of following radio is configured: COM VUHF VUHF VHF
!2ND APP/ARR NOT ALLOWED	The FMS detects the operator is attempting to enter a tactical approach in the active or modified flight plan while an approach, arrival procedure, STAR, or STAR transition waypoint is already present in the flight plan.	As appropriate, deselect/remove any currently selected approach and/or arrival procedures to be able to enter the new approach/arrival procedure.	If tactical approach is configured.
!2ND MOV WPT NOT ALLOWED	Operator is attempting to enter a second moving waypoint in the active or in the modified flight plan.	Cancel entry or cancel the first moving point then enter the new one.	Moving waypoint
!2ND SEARCH NOT ALLOWED	The operator is attempting to enter a second search procedure in the flight plan when one is already defined.	Cancel the old search procedure in the flight plan before entering a new one.	Search patterns
!ACTIVE ROUTE IN MOD	The operator attempts to access the INACT DES+SAR or TACTICAL 2/2 page	Execute active route prior to accessing DES+SAR or TACTICAL 2/2 page.	All configurations
!ACTIVATE SEARCH	Operator attempting to execute a flight plan with a search pattern in modification.	Complete search pattern modification or cancel it.	N/A
!APPROACH WPT/LEG	Operator is attempting to modify the final approach or missed approach segments.	Review the route modification.	All configurations
!ATC NOT ACTIVE **!XPDR NOT ACTIVE** **!TPDR NOT ACTIVE**	Operator is attempting to squawk the ID of an inactive ATC transponder.	Perform the squawk on an active transponder.	ATC transponder interface
!ATC NOT ACTIVE **!XPDR NOT ACTIVE** **!TPDR NOT ACTIVE**	Cannot Squawk ATC because status is standby.	Change ATC status to active before Squawking.	ATC transponder interface

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!BULLS EYE NOT ALLOWED	Operator is attempting to enter a Bulls Eye or Bulls Eye Target waypoint in the inactive flight plan.	Enter the Bulls Eye waypoint(s) in the active flight plan only.	if Tactical Config BULLS EYE is configured
!BULLS EYE IN ROUTE	Operator is attempting to select a different Bulls Eye waypoint while the Bulls Eye waypoint is part of the active flight plan. Operator is attempting to define a second Bulls Eye waypoint in the active flight plan while there is already one defined.	Remove Bulls Eye waypoint from flight plan before selecting a new Bulls Eye waypoint.	if Tactical Config BULLS EYE is configured
!BULLS TGT IN ROUTE	Operator is attempting to select a different Bulls Eye Target waypoint while the Bulls Eye Target waypoint is part of the active flight plan. Operator is attempting to define a second Bulls Eye Target waypoint in the active flight plan while there is already one defined.	Remove Bulls Eye Target waypoint from flight plan before selecting a new Bulls Eye Target waypoint.	if Tactical Config BULLS EYE is configured
!BULLS EYE DATA MISSING	Operator is attempting to confirm a Bulls Eye or Bulls Eye Target modification without having defined all mandatory information.	Ensure LAT/LON have been defined. Ensure track and ground speed have been defined for moving Bulls Eye Target.	if Tactical Config BULLS EYE is configured
!CARP DATA MISSING	Upon EXECution of the active flight plan or confirmation of inactive route modifications, the FMS detects that mandatory CARP PLAN data is missing. Message is enabled when the CARP function is configured.	Enter missing data in CARP plan pages.	Configurations supporting CARP/HARP
!CARP IN PROGRESS	The operator attempts to change CARP data entry when it is no longer allowed. Message is enabled when the CARP function is configured.	The operator attempts to change CARP data entry when it is no longer allowed.	Configurations supporting CARP/HARP
!CDU ENTRY CONFLICT	Conflict of entry in dual-FMS operations.	Check entry and re-enter data as required.	Multi-FMS installations
!CONFIG_0 INVALID !CONFIG_1 INVALID !CONFIG_2 INVALID !CONFIG_3 INVALID	While computing the CRC checksum on a new configuration to be uploaded to the RS-422 DLU, the FMS detects an invalid configuration.	Review the configuration.	All Configuration

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!CONFIRM INACTIVE ROUTE	Operator is trying to enter temperature at destination airport while the inactive route is being modified.	Complete inactive route modification or cancel it.	VNAV configured and second route configured
!DATA LOADER IN USE	Operator is attempting to access database while data loader is active.	Wait until data loader transfer is completed.	Data loader interface
!DISPLAY REF TRUE	Operator is attempting to move a waypoint along a DME arc while in True North reference display.	Select magnetic display on SETUP 1/1 page.	All configuration
!DUPLICATE IDENT	Operator is attempting to define a phone book entry with a name that is already defined.	Choose another ident.	Iridium Phone interface
!DUPLICATE WAYPOINT	Operator is attempting to enter a waypoint with an identifier already existing in the database, except the user database.	Choose another ident.	All configuration
!DUPLICATE USER WAYPOINT	Operator is attempting to enter an user waypoint with an identifier already existing in the user database.	Enter another ident.	All configuration
!EDITOR BUFFER FULL	The FMS detects that the text editor buffer is full.	Stop adding text or delete existing text before adding more text.	HCS interface configured
!EMPTY	Operator is attempting to delete an item from an emptied list (DME DESELECTION page).	None.	DME interface
!END OF EDITOR LINE	Last editor line has been reached.	Delete empty lines or move cursor up.	HCS interface configured
!ENTER ACT WPT/LEG	Occurs with a power-up restart of FMS in-flight or with an attempt to execute (or when LEGS key pressed) a flight plan without an active TO waypoint.	Execute a Direct-To or leg intercept to create an active TO waypoint.	All configurations

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!ENTER DESTINATION	Operator is attempting to execute a flight plan without a destination airport.	Enter the DESTINATION airport.	All configurations except for ROTOR
!ENTER PHONE NUMBER	Operator is attempting to perform a call or send a SMS without indicating the phone number to call.	Enter a phone number.	Iridium phone interface
!ENTER MODE 1 CODE	Following an attempt to turn the IFF mode 1 to "ON", the FMS detects that there is no valid mode 1 code entered.	Enter a valid mode 1 code on IFF page 2/2.	Installations in which the IFF transponder is configured.
!ENTER MODE 2 CODE	Following an attempt to turn the IFF mode 2 to "ON", the FMS detects that there is no valid mode 2 code entered.	Enter a valid mode 2 code on IFF page 2/2.	Installations in which the IFF transponder is configured.
!ENTER MODE S CODE	Following an attempt to turn the IFF mode S to "ON", the FMS detects there is no valid mode S code entered.	Enter a valid mode S code on IFF page 2/2.	Installations in which the IFF transponder is configured.
!ENTER ORIGIN	Operator is attempting to execute a flight plan without an origin airport, or to enter the destination airport prior to the ORIGIN airport.	Enter the ORIGIN airport.	All configurations except for ROTOR
!ENTER PHONE NUMBER	The FMS detects that the command sent to the HCS (Helicopter Communication System) has no associated phone number.	Enter the phone number.	HCS interface
!FIXED WPT LIST FULL	Operator is attempting to create more than 450 fixed waypoints.	Cancel entry.	All configurations
!FMS NOT IN CONTROL	The FMS detects an attempt to access the either the HF or V/UHF page, or, to tune the HF or V/UHF when the FMS is not controlling the respective radio.	As necessary, the crew should first switch to FMS control for the given radio when attempting to access either the HF or V/UHF radio page.	HF or V/UHF configurations where the respective HF or V/UHF tune discrete configuration option has been configured.
!FREQ/CHAN IS NEEDED	Operator is attempting to enter a radio library entry without frequency or channel information.	Enter the frequency after the Preset and Ident.	• One of the following radio is configured: COM VUHF VOR/ILS ADF
!FULL	Operator is attempting to de-select more than 25 DME stations.	Review DME de-selection list for possible deletions.	DME interface

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!FUNCTION NOT AVAILABLE	Function invoked by the FMS function key just pressed is not yet implemented in the FMS (ATC) or not configured (FUEL, MARK, FREQ).	None.	• One of the following radio is configured: COM VUHF VOR/ILS ADF ATC Fuel computer
!GPS DATE	Operator is attempting to enter a new system date when the system date is coming from the GPS sensor.	Do not enter date.	• GPS interface • EGI interface
!GPS NOT AVAILABLE	GPS almanac is not available for Predictive RAIM request. or Operator is invoking the GPS PRAIM function while the GPS sensor is failed.	Check GPS power, wait at least 25 minutes for a new almanac to be acquired and re-initiate the request for RAIM prediction. or If FMS is fed by an external GPS sensor (other than internal GSM), verify power of external GPS sensor.	GPS interface
!GPS UTC	Operator is attempting to enter a new system time when the system time is coming from the GPS sensor.	Do not enter time.	• GPS interface • EGI interface
!GUARD BAND	Operator is attempting to enter a frequency that is in a guard band based on the preset maritime offset mode.	Enter a frequency not in a guard band based on the preset maritime offset mode.	VUHF radio interface
!HOLD EXIT IN PROGRESS	Operator is attempting to change a holding pattern parameter while hold exit is armed.	Cancel entry.	All configurations
!HOLDING IN PROGRESS	Operator is attempting to delete the active holding procedure or to synchronize the FMSs while active in a holding pattern.	Exit holding pattern or execute a Direct-To.	• All configurations • Multi-FMS installations
!HOVER IN PROGRESS	The FMS detects the operator is attempting to synchronize the FMSs while active in a hover procedure.	If FMS synchronization is required, cancel the hover procedure prior to re-synchronize FMSs.	HOVER enable.
!HOVER MRK WPT	The operator attempts to insert a waypoint between the TDN and MRK waypoints.	Cancel the hover procedure before entering a waypoint in the LEGS page.	• Hover function • Radar Altimeter interface
!IDENT/FREQ IS NEEDED	Only frequency was entered in the radio library.	Enter the Ident before the frequency.	• One of the following radio is configured: COM VUHF VOR/ILS ADF

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!IDENT NOT FOUND	Entered radio station ident was not found in the navigation database or in the radio tuning library.	Check identifier or re-enter a valid identifier.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!IN APPROACH	Operator is attempting to synchronize the FMSs while in approach.	Wait until the approach is completed before synchronizing the FMSs.	• All configurations • Multi-FMS installations
!IN FLIGHT	Operator is attempting to enter data while the aircraft is airborne into a data field legal only for use on the ground. Examples that would generate this message when the FMS is configured to fixed wing: • Active database selection • Origin airport (if an entry already exists) • SID selection • Departure runway selection	Do not enter data in flight.	• All configurations
!IN MISSED APPROACH	Operator is attempting to synchronize the FMSs while in missed approach.	Wait until the missed approach is completed before synchronizing the FMSs, or cancel missed approach by executing a DIRECT-TO procedure.	• All configurations • Multi-FMS installations
!INACTIVE ROUTE IN MOD	The operator attempts to access the HOVER or DES+SAR or TACTICAL 1/2 page while the inactive route is being modified (inactive route in MOD).	Execute or delete the inactive route before trying to reach the HOVER or DES+SAR or TACTICAL 1/2 page.	• All configurations • Multi-FMS installations
!INCORRECT PASSWORD	The password entered to unlock the radio library is incorrect.	Enter a valid password.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!INVALID AIRWAY	The airway entered in the VIA field of the RTE page is not found in the NavDataBase.	If possible, select an alternate airway.	• All configurations • Multi-FMS installations
!INVALID APPROACH	The selected approach is invalid or corrupted.	If possible, select an alternate approach.	• All configurations • Multi-FMS installations
NOTE The preceding message is generated when there are coding or packing errors in the Navigation Database which cause an invalid leg type, a reference point required in a procedure is missing or a procedure calls up an invalid intersection point. This also applies to !INVALID SID, !INVALID SID TRANS, !INVALID STAR, !INVALID STAR TRANS, !INVALID APPR TRANS, and !INVALID RUNWAY messages.			

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!INVALID APPR TRANS	The selected approach transition is invalid or corrupted.	If possible, select an alternate approach or approach transition.	All configurations
!INVALID CHANNEL	An invalid channel was entered in FM library.	Enter a valid channel.	FM1 or FM2 interface.
!INVALID DATABASE	Operator is attempting to activate an invalid database.	Check database.	All configurations
!INVALID DELETE	Operator is attempting to DELETE an undeletable field.	Select correct field for deletion or overwrite the field data.	All configurations
!INVALID ENTRY	Operator is attempting to enter incorrect data to the selected field.	Enter correct data for the desired field.	All configurations
!INVALID FORMAT	Operator is attempting to enter data having an incorrect format for the selected field.	Enter correct data for the desired field.	All configurations
!INVALID FREQUENCY	Entered frequency does not fall within the valid range.	Re-enter valid frequency.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!INVALID IDENT	An invalid Ident was entered in the library.	Enter a valid Ident (5 characters max).	• One of the following element is configured: COM VUHF VOR/ILS ADF
!INVALID INTERSECTION	Place/Bearing-Place/Bearing inputs do not intersect to form a valid waypoint or the entered downtrack intersection does not exist.	Review data entry. Modify as necessary.	All configurations
!INVALID LINE SELECT	Invalid line select key was pressed.	Choose valid LSK when deleting RADIO library element.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!INVALID MODE	RADIO cannot operate in this mode.	Before selecting this mode change the other RADIO parameter(s).	• One of the following element is configured: VUHF
!INVALID PRESET	Invalid Preset was entered in the library.	Enter a valid Preset (00 to 99).	• One of the following element is configured: COM VUHF VOR/ILS ADF
!INVALID RUNWAY	Operator selected an invalid runway (error in database).	Select a runway in the database or enter runway manually.	All configurations
!INVALID SID	Operator selected an invalid SID (error in database).	If possible, select alternate SID.	All configurations

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!INVALID SID TRANS	Operator selected an invalid SID TRANS (error in database).	If possible, select alternate SID or SID transition.	All configurations
!INVALID STAR	Operator selected an invalid STAR (error in database).	If possible, select alternate STAR or manually enter STAR waypoints.	All configurations
!INVALID STAR TRANS	Operator selected an invalid STAR TRANS (error in database).	If possible, select alternate STAR or STAR transition.	All configurations
!INVALID X-TALK CONFIG	Operator is attempting to synchronize FMSs despite invalid X-talk installation/ configuration.	Advise maintenance to verify dual FMS system interconnects.	All configurations Multi-FMS installations
!IP TO PI OUT OF RANGE	The entered PI or IP position on the CARP PLAN pages causes the distance from the PI to IP waypoints to be greater than 30NM. Message is enabled when the CARP function is configured.	Correct IP or PI position on the CARP PLAN pages.	Configurations supporting CARP/HARP
!LIBRARIES IN USE	Operator trying to access the libraries while another has another system is already accessing the libraries.	Complete or cancel the other systems access to the libraries.	N/A
!LIBRARY IS LOCKED	Library is locked.	Unlock the library before saving the Preset frequencies.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!MC IN CONTROL	The FMS detects that the operator is attempting to: • modify a radio volume level when the mission computer (MC) is in control of the Audio Management Unit or • modify any transponder entry when MC CTL is configured and the MC is in control of the ATC.	Tune the radio volume settings or the transponder from the mission computer.	Audio Management Unit configured. ATC configured with MC control option
!MEMORY LOCKED	Operator is attempting to modify protected memory.	Unlock maintenance memory.	All configurations

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!MOD IN PROGRESS	The message is generated due to one of the following 2 conditions: 1) Cannot access the CTR RTE LEGS pages to preview the flight plan on the EFIS display because there is a route modification in progress. or 2) When the ATOS is configured and an active or inactive route is in modification and the FMS detects a request to start a mission data transfer from the ATOS.	1) Execute changes and then preview flight plan. 2) Execute changes and re-initiate the mission transfer request from the ATOS.	1) GAMA EFIS configured installations. 2) For ATOS configured installations
!MOV WPT IN ROUTE	Operator is attempting to delete a moving waypoint from user database when the moving waypoint is also in the route. Operator is attempting to activate or copy an inactive route while a moving waypoint is defined in the active route.	Ensure that the moving waypoint is not part of the route before deletion.	Moving waypoint
!MOV WPT NOT ALLOWED	The operator is attempting to enter a moving waypoint in the second route.	Cancel entry.	Moving waypoint
!MOVING WAYPOINT	The operator is attempting to remove the fly-over procedure from a moving waypoint or to insert a search pattern a holding pattern or a tactical direct-to on a moving waypoint.	Cancel entry.	Moving waypoint
!MOVING WPT LIST FULL	The operator is attempting to create more than 10 moving waypoints.	Cancel entry.	Moving waypoint
!MULTIPLE AWY INTERSECTS	On RTE page, multiple common waypoints are found between two successive airways.	Enter desired intersection waypoint in TO-field of first airway.	All configurations
!NO AIRWAY INTERSECTION	No intersection is found when an operator is trying to link two airways on RTE page.	Enter proper waypoint in TO-field of first airway.	All configurations
!NO AWY WPTS TO LOAD	On RTE page, the waypoint entered in the TO-field of a pending airway is the same as the starting waypoint of the airway (TO-field of previous line).	Enter proper waypoint in TO-field of pending airway.	All configurations

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!NO ENTRY ALLOWED	Operator is attempting to enter data into a non-entry data field. For example, in a SID/STAR modification of some combinations of waypoints is not allowed.	Select correct data field for entry.	All configurations
!NO LEG PROC ALLOWED	On RTE page, entry of procedures (holding pattern, search patterns, fly-over) are not allowed in TO-field. This refers to the procedures preceded by a "/" ("/H", "/S", "/O").	Enter these special procedures on the RTE LEGS page.	All configurations
!NO SUCH CO ROUTE	Route not found in custom route database.	Access SELECT CO ROUTE pages to determine correct custom route name or manually define flight plan by entering waypoints on RTE LEGS pages.	All configurations
!NOT CONFIGURED	Element Not Configured - Illegal Entry.	Advise maintenance to ensure that all configuration pages are correctly set.	All configurations
!NOT IN DATABASE	FMS could not find entered identifier in the navigation database, or in the company route database, or in the user database,, or as a Bulls Eye waypoint or a Bulls Eye Target waypoint.	Check identifier or re-enter the desired identifier.	All configurations
!NOT IN LIBRARY	FMS could not find entered preset number or identifier in the radio tuning library.	Verify desired preset number/identi-fier.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!NOT IN PHONE BOOK	The Ident entered was not found in the phone book.	Enter a valid Ident from the phone book.	HCS interface.
!NOT IN ROUTE	On RTA PROGRESS page or FUEL page, FMS could not find the entered identifier in flight plan.	Check the identifier or verify identifier from RTE LEGS page.	All configurations
!NOT REMOVABLE	The operator is trying to remove the WGS84 datum from the datum list.	Cancel entry.	All configurations
!OUT OF RANGE	Operator is attempting to enter data having an incorrect range for selected field. Also displayed when inserting an along track waypoint which would overlap an adjacent waypoint.	Enter correct data for the desired field.	All configurations

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!PHONE BOOK ALREADY FULL	The FMS detects that the operator tried to add a new phone identifier and number when the phone library is already full.	Cancel entry or remove unnecessary data to allow new entry.	HCS interface.
!PRESET NEEDED FIRST	The entry of +/- to increment/decrement the active/standby preset number requires a valid preset number already appears in the entry field.	Enter a valid preset number explicitly. The +/- key can be used afterwards.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!PRESET NOT IN LIBRARY	The Preset entered was not found in the radio tuning library.	Enter a valid Preset.	• One of the following element is configured: COM VUHF VOR/ILS ADF
!PRESS RESUME FIRST	Operator is attempting to resume an interrupted search pattern by entering a waypoint number in the ENTRY WPT # field.	The RESUME key has to be pressed before entering a waypoint number.	Search pattern
!RADIO TUNING DISABLED	Operator is attempting to change a radio frequency while FMS radio tuning is inhibited.	Verify reason for radio tuning inhibit.	• One of the following element is configured: COM ADF VOR/ILS DME
!RALT FAILED	At hover execution the FMS detects that the radio altitude data is not available.	Ensure RALT is powered and working properly. Advise maintenance.	Radio Altimeter interface
!RESERVED IDENTIFIER	Operator trying to create a user waypoint with one of the following reserved identifiers: "ORIG", "DEST", "PPOS", "RDZVS", "BULL", "BETGT", "BERDV", "TIAF", "TFAF", "TMAP1", "TMAP2","###M" where # is a number (DMAP waypoint format).	Enter a different identifier.	N/A
!ROUTE FULL	Operator is attempting to enter more than 199 waypoints in the flight plan.	Review the flight plan for possible deletions.	All configurations
!ROUTE TRUNCATED	The selected custom route or arrival procedure has been truncated to fit flight plan capacity (199 waypoints maximum).	Review the flight plan for possible deletions and re-select arrival path.	All configurations
!RUNWAY N/A FOR SID	Runway not applicable for SID.	Not applicable.	All configurations
!SEARCH IN PROGRESS	Search pattern is active.	Terminate search pattern and redo procedure.	Search pattern

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!SELECT TRANS/APPR/RWY	Selection of the STAR transition or approach or runway is required before the STAR waypoints can be loaded into a route from the navigation database.	Select STAR transition, approach, or runway as appropriate.	All configurations
!SELECT TRANS/RUNWAY	Selection of the SID transition or runway is required before the SID waypoints can be loaded in route from the navigation database.	Select SID transition or runway as appropriate.	All configurations
!TACT APPR DATA MISSING	The FMS detects that there is mandatory data missing from the TACTICAL APPR page after the crew has attempted to insert the tactical approach runway threshold waypoint. by pressing the EXECute CMA-9000 Display Panel hard key.	Enter all mandatory fields require to define tactical approach.	If tactical approach is configured
!TACT APPR IN PROGRESS	The FMS detects that that the crew is attempting to redefine an already entered tactical approach when one of the five waypoints for the already existing tactical approach is the active waypoint (e.g. TO waypoint)	Ensure that no tactical approach procedure waypoint is the TO. Then proceed with modification to the tactical approach procedure.	If tactical approach is configured
!TE TO IP OUT OF RANGE	The entered TE or IP position on the CARP PLAN pages causes the distance from the TE to IP waypoints to be greater than 50NM. Message is enabled when the CARP function is configured.	Correct TE or IP position on the CARP PLAN pages.	Configurations supporting CARP/HARP
!TE TO PI OUT OF RANGE	The entered TE or PI position on the CARP PLAN pages causes the distance from the TE to PI waypoints to be greater than 20NM. Message is enabled when the CARP function is configured.	Correct TE or PI position on the CARP PLAN pages.	Configurations supporting CARP/HARP
!TEMP DATABASE FULL	Temporary database is full (99 waypoints or 50 waypoints with the first three letters are different).	Use existing temporary waypoints or reload the custom route (for waypoints not in Navigation database).	All configurations
!TEMP OFST OUT OF RANGE	The FMS detects that the difference between the current FMS position and the entered temporary position update is greater than or equal to 100 NM.	Enter a temporary offset position less than 100 NM from current aircraft position.	Configurations supporting CARP/HARP

DATA ENTRY ADVISORY MESSAGE	DESCRIPTION	ACTION	APPLICABLE CONFIGURA-TION
!TOO MANY DIGITS	The operator has entered more than 30 digits for the phone number.	Check the number and make sure that the number of digits is less than 31.	HCS interface
!UNABLE FMS-FMS SYNC	In a dual-FMS installation, operator's attempt to synchronize FMSs failed because of an inter-FMS communication failure.	Any automatically synchronized item listed in Section 3, dual-FMS Operations, must be now performed independently on each FMS. See MESSAGE RECALL and/or MAINT MESSAGE page(s) for more details. Advise maintenance.	Multi-FMS installations
!USER ROUTE EXISTS	The entered user route name is the same as an existing user route	Enter a different user route name.	All configurations
!USER WPT LIST FULL	The operator attempts to add a new waypoint whilst the FMS list is full (450 fixed and 10 moving waypoints)	Cancel entry or delete unnecessary waypoints to make room for the new one(s)	All configurations
!VERIFY POSITIVE TEMP	Operator entering a positive temperature for the airport temperature on the VNAV APPR page after a valid VNAV approach has been loaded.	Ascertain that new positive temperature is correct.	VNAV configured
!VERT DIST EXCEEDS HAT	The current VERT DIST value exceeds current HAT value on the CARP PLAN pages. This advisory message is generated on both data entry, HAT and VERT DIST whenever this condition is met. Message is enabled when the CARP function is configured.	Correct VERT DIST or HAT fields on the CARP PLAN pages accordingly.	Configurations supporting CARP/HARP
!WAIT	Custom Route load in process.	Wait until the FMS has completed loading of the custom route.	Data loader interface
!WPT NOT IN AIRWAY	On RTE page, waypoint entered in TO-field of a pending airway is not found on this airway.	Enter proper waypoint in TO-field of pending airway.	All configurations

REMOTE ANNUNCIATORS

A. ANNUNCIATORS

Outputs are provided to drive external annunciators to alert the pilot of system status or flight plan sequencing.

NOTE: The actual legends and colors of the remote annunciators may vary depending on the installation. Refer to the AFMS/RFMS for details.

ANNUNCIATOR	DESCRIPTION	ACTION
FAIL (Amber)	Illuminates when an FMS failure condition has been detected.	Revert to an alternate means of navigation.
MSG (Amber)	The message annunciator will illuminate when a new alert message has been generated by the FMS.	Check alerting message in the scratchpad or on the MESSAGE RECALL page and take appropriate action.
POS (Amber)	Illuminates when the FMS is in DR navigation mode.	Take appropriate measures to fly in DR mode.
OFST (Green)	The offset annunciator will illuminate when the FMS is in parallel offset navigation.	Monitor parallel offset navigation.
NPA (Green)	GPS Approach Capture annunciator illuminates at 2 nm inbound to FAF when all conditions for a GPS instrument approach procedure have been met.	Proceed with GPS approach.
TX1 (Green)	Illuminates when the VUHF1 radio is emitting RF power.	None.
TX2 (Green)	Illuminates when the VUHF2 radio is emitting RF power.	None.
GSM (Green)	Illuminates when a voice call is being received or a call is in progress from either the IRIDIUM AeroPhone or from the Helicopter Communications System.	Answer the phone.
SMS (Green)	Illuminates when a new SMS text message has been received from either the IRIDIUM AeroPhone or from the Helicopter Communications System, and has not been read yet.	Read the new SMS message.
RNP (Amber)	Illuminates when the FMS ANP exceeds the RNP for the phase of flight.	Verify RNP/ANP values on PROGRESS 1/3 or 1/4 page. Monitor FMS position, perform manual position update if necessary (not possible in GPS Nav mode). Otherwise revert to an alternate means of navigation.
IND (Amber)	Illuminates when the onside FMS is operating in independent mode.	Manage independent FMS operations as required. Advise maintenance.
ATC (Green)	Illuminates when a connection is established with an Air Traffic Control Center.	None.
V/UHF (Green)	Illuminates when the V/UHF radio reports to the FMS that it is transmitting.	None.
HF (Green)	Illuminates when the HF radio reports to the FMS that it is transmitting.	None.

B. NAVIGATION FLAG

The EFIS annunciator, will be displayed under the operational or system hardware conditions listed below. At the same time, the validity of the CMA-9000 roll steering output signal will be set to INVALID, resulting in the disengagement of the autopilot/flight director LNAV mode.

1. OPERATIONAL CONDITIONS

   a. The aircraft is airborne and the speed is below the minimum take-off speed. ACTION: None. If the NAV flag has appeared during the take-off roll, it will disappear shortly after.

   b. The active waypoint is undefined (e.g. at a route discontinuity, at the end of the route, or if no route is loaded). The NAV flag will be accompanied by a !SELECT ACT WPT/LEG advisory message. ACTION: Select the active waypoint.

   c. During direct-to intercept navigation when engaging the LNAV autopilot mode before being on an appropriate intercept heading. The NAV flag will be accompanied by a NOT ON INTERCEPT CRS advisory message. ACTION: Fly to an intercept heading before re-engaging the LNAV mode.

   d. At 2 nm inbound to the FAF for a GPS approach when all conditions necessary for the approach have not been met (e.g. no GPS integrity, loss of GPS navigation, a route discontinuity exists before the FAF, or the aircraft is not in the approach zone). The NAV flag will be accompanied by a number of possible alert or advisory messages, depending on the cause. ACTION: Depending on the cause, eliminate or change the operational condition, or, if related to the GPS function, initiate a missed approach.

   e. When the active route leg loaded from the navigation database is a heading or course to intercept the next leg and the aircraft is not on the correct course or heading. The NAV flag will be accompanied by a NOT ON INTERCEPT HDG or NOT ON INTERCEPT CRS advisory message. ACTION: Fly to the correct intercept heading or course before re-engaging the AP/FD LNAV mode.

2. HARDWARE CONDITIONS

   a. A CMA-9000 hardware failure condition (including loss of communication with the CMA-9000 FMS) is detected by the built-in test function. ACTION: Revert to an alternate means of navigation.

   b. Loss of power input to the CMA-9000. ACTION: Check circuit breakers. Restore power input only if no evidence of a hardware failure exists.

   c. The CMA-9000 FMS has been turned off. ACTION: Turn on the CMA-9000 FMS.

   d. A heading input failure occurs when navigating in dead reckoning modes, or when flying any heading leg. ACTION: Switch to an alternate heading source, or revert to another navigation mode or to an alternate means of navigation.

   e. A True Airspeed input failure occurs when navigating in dead reckoning. ACTION: Revert to an alternate means of navigation.