Honeywell

Aerospace Electronic Systems

SYSTEM INSTALLATION MANUAL

BENDIX/KING ®

KGP 560

**General Aviation
Enhanced Ground Proximity Warning System
(GA-EGPWS)**

TAWS TSO-C151b Class B & Class C Equipment

Manual Number 006-10611-0003
Revision 3, June 16, 2003

TRADEMARK NOTICE

PATENT PENDING

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Installation/Maintenance Manual Discrepancy Notification

The Honeywell Product Support Department maintains this manual. This manual supports the installation and/or maintenance of the **BENDIX/KING** equipment and systems designated on the cover of this manual. If a discrepancy is found in this manual, please mail or fax this form (or a copy) and a copy of the page(s) with the discrepancy noted. The recommended change(s) will be evaluated and incorporated into the manual as necessary at the time of the next revision.

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Manual Number and Revision:_____

Discrepancy:_____

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Honeywell Aerospace Electronic Systems
SYSTEM INSTALLATION MANUAL
KGP-560 GA-EGPWS

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1 SECTION I – GENERAL INFORMATION

1.1 Introduction

This manual contains information relative to the physical, mechanical and electrical characteristics of the KGP-560 General Aviation Enhanced Ground Proximity Warning System (GA-EGPWS). It is intended to provide the detail required to assist the installer in preparation for installation and appropriate work instructions to ensure a proper installation and checkout.

This document assumes a familiarity with avionics installation practices, with systems on-board the aircraft and access to manuals and regulations commensurate with installation of such equipment.

The information contained herein, together with the general procedures outlined in FAA AC 43.13-1B (Acceptable Methods, Techniques…), AC 23-18 (Installation of Terrain Awareness and Warning System (TAWS) Approved for Part 23 Airplanes), AC 25-23 (Airworthiness Criteria for the Installation Approval of a Terrain Awareness and Warning System (TAWS) for Part 25 Airplanes) and other appropriate advisory circulars must be followed carefully to assure a safe and electrically sound system installation.

The contents of this manual are for information and reference use only and must not be construed as a formal FAA approved work authorization.

It is highly recommended that prior to beginning the installation of the KGP-560 system that this manual be carefully reviewed. Upon review the necessary configuration items and system requirements will be identified allowing a speedy installation.

Operational information including KGP-560 functions, features, procedures, limitations, etc. are contained in the KGP-560 GA-EGPWS Pilot's Guide. A Pilot's Guide is supplied with each system shipped or it can be ordered separately.

1.2 Purpose

This manual includes the basic guidelines, considerations and recommendations for the installation and ground checkout of the KGP-560 GA-EGPWS and associated components. In addition it will supply the installation procedures and limitations in sufficient detail to ensure that when installed in accordance with these procedures the KGP 560 will meet the requirements of the Terrain Awareness And Warning System (TAWS) TSO-C151b Class B & Class C when required or desired.

1.3 Document Overview

This document is organized as follows:

Section I	General Information
Section II	Installation
Section III	Electrical Interconnects
Section IV	System Installation Design
Section V	Installation Configuration & Checkout
Section VI	Operation
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1.4 Applicability of the System Installation Manual

This manual will describe the detailed system requirements for the Bendix/King KGP-560 GA-EGPWS.

1.4.1 Equipment Applicability

This installation manual is applicable only to the KGP-560 GA-EGPWS unit and listed accessories.

Unit	Nomenclature	Manufacturers' Part Number	Bendix/King Part Number
KGP 560 EGPWC	GA–EGPWS unit	965-1198-005	066-01196-0205
KGP 560 Config. Module	Configuration Module	700-1710-002 or 700-1710-004 (Plastic) or 700-1710-021	071-01710-0002 or 071-01710-0004 071-01710-0021
KGP 560 Database Card	Americas Terrain Database	4XXN (Latest Release)	071-00167-0101
KGP 560 Database Card	Atlantic Database	4XXA (Latest Release)	071-00167-0102
KGP 560 Database Card	Pacific Database	4XXP (Latest Release)	071-00167-0103
KGP 560 Pilot's Guide	Pilot's Guide	006-18254-0001	006-18254-0001

Note: It is highly recommended to use the 071-01710-00021 Configuration Module. It proves additional information to the internal GPS card to expedite initialization.

TABLE 1-1: EQUIPMENT APPLICABILITY

1.5 KGP-560 GA-EGPWS

There are two different part numbers on this unit. The Manufacturers' part number (965-119X-0XX) is used as the TSO reference number. The Bendix/King part number (066-01196-XXXX) used for ordering new and replacement equipment. Both of these numbers are for the same piece of equipment designated as the KGP-560 GA-EGPWS computer.

The 12-digit Bendix/King number is used to order the unit. The GA-EGPWS utilizes a 10-digit part number for formal TSO identification. This part number will identify the configuration of the GA-EGPWS that affects form, fit, or function as seen by the pilot.

The 10 digit part number is defined as follows:
- 965-119Y-0XX (example 965-1198-003)
- GA-EGPWC Hardware (including boot code) = 965-119Y-0XX where Y = 2, 3, 4, 5 as hardware part numbers rolls.
- Application Software (including Configuration Software) = -0XX
- Terrain Database - Version not identified in 10-digit part number but with a separate identifier.
- Modifications - All modifications will be identified via "mod dots". No mod dots will be skipped.

The digits identifying the Application software will match the respective version number of the Application software.

The 965-119Y-0XX part number is used for formal certification identification. An additional Bendix/King identification number, 066-01196-XXXX is on the front label for use in ordering new and replacement equipment from Bendix/King. The Bendix/King number should not be used as the sole means of identifying the part number on certification paperwork.

1.5.1 Regional Terrain Database

The regional terrain database card is marked with the database version. The terrain database card must be ordered for the geographic area in which the aircraft is to be operated. When ordering the terrain database part number 071-00167-0101, 0102 or -0103, the latest database available is provided. The regional terrain database card remains inside the KGP-560 during operation.

1.6 System Description

The GA-EGPWS provides a real-time situational awareness display of surrounding terrain and obstacles in relation to an aircraft's altitude and flight path. The system is designed to visually and aurally alert the flight crew of potential trouble ahead and will instruct the crew to avoid a terrain/obstacle conflict. GA-EGPWS includes a built-in terrain database designed to help eliminate CFIT accidents.

The terrain information is displayed in the cockpit similar to weather radar. At a glance, a pilot can immediately determine if the surrounding terrain is above or below the aircraft's altitude or presents a potential threat.

Additional GA-EGPWS features include "Peaks" and the optional display of "Geometric Altitude." Peaks provide a digital elevation for the highest and lowest displayed terrain and a unique representation of sea level water and its corresponding shoreline. Geometric Altitude is the KGP-560's internal calculation of the current Mean Seal Level (MSL) altitude. In some installations this computed `Geometric' altitude is labeled as Geodetic Sea Level (GSL, equivalent to mean sea level). This is the altitude used by the system to create the Terrain Display and the Terrain alerts. This Geometric Altitude is designed to eliminate altitude errors resulting from temperature extremes, non standard pressure altitude conditions and altimeter miss-sets that accounts for 25% of all fixed wing Controlled Flight Into Terrain accidents. Additional information is contained in the KGP-560 Pilot's Guide.

The KGP-560 General Aviation Enhanced Ground Proximity Warning System (GA-EGPWS) is intended to be used to enhance the on-board terrain situational awareness and meet the Class B mandate of TSO-C151b (AC 23-18, AC 25-23) and Class C operation for non-mandated installations.

1.6.1 Basic KGP-560 GA-EGPWS System

The KGP-560 General Aviation Enhanced Ground Proximity Warning System (GA-EGPWS) is a revolutionary step in reducing the risk of Controlled Flight Into Terrain (CFIT) accidents. It is a computer with very simple interfaces capable of producing advanced alerting for prevention of CFIT accidents. In addition to the alerting protection the system can also produce a terrain display. This display depicts relative terrain in reference to the lateral and vertical position of the aircraft. The KGP-560 is a safety product designed to enhance the pilot's situational awareness in relation to terrain.

The KGP-560 (release –005) meets the requirements of TSO-C151b Class B & Class C. It is a lessor system than GA-EGPWS/TAWS systems meeting the Class A qualifications of this TSO. This system does not have the GPWS backup modes present in the Class A equipment perfected by Honeywell over the last 30 years. The KGP-560 as with all EGPWS/TAWS systems is vulnerable to terrain data, runway and obstacle errors.

The KGP-560 GA-EGPWS is our first EGPWS system to minimize the system requirements down to a level economical to the private pilot. The KGP-560 is the central component in the system providing timely alerts and optional display of impending terrain incursions.

The system is intended to be installed in Light Turbine and Piston aircraft and to satisfy the requirements of TSO-C151b Class B as well as other aircraft desiring the Class C protection. The KGP-560 LRU is a very small package with a very simple set of inputs and outputs.

It has effective operational performance in providing timely alerts and operational terrain display to enhance situational awareness. This performance, coupled to the system's simplicity, practicality, small size and weight, with a minimum number of required aircraft sensors, provides a formidable safety value.

No Radio Altimeter, Landing Gear discrete or Glideslope receiver is necessary. This significantly lowers the installation costs.

Note: The KGP-560 is a system designed to minimize the system requirements down to a level economical to the private pilot. It is the central component in the system providing timely alerts and optional display of impending terrain incursions. The KGP-560 GA-EGPWS is a TSO-C151b Class B and Class C compliant system.

1.6.2   System Constraints

The performance of the KGP-560 GA-EGPWS terrain protection is limited in areas where navigational accuracy is degraded. Terrain data or runway location data may have errors inherent in the source of such data. Such errors can delay a terrain alert, or may cause unwanted alerts.

The Terrain Display is to be used to enhance situational awareness only, and is not to be used for navigation or escape guidance.

The limited basic GPWS functions, per TSO-C151b Class B and Class C (1. Excessive Rates of Descent, 2. Negative climb Rate or Altitude Loss After Takeoff and 3. Voice callout "Five Hundred (Above)") rely upon GPS and Pressure Altitude inputs only and cannot sense forward terrain. Therefore warning times based upon these alerts for flight into precipitous terrain with little or no preamble terrain can be very short.

Terrain clearances or descent rates during radar vectoring or any other aircraft maneuvers not compatible with those required by the GPWS Minimum Operating Performance Standards of TSO-C151b Class B and Class C may cause unwanted alerts.

1.6.3   System Components

The KGP-560 LRU, Configuration Module and a Regional Terrain Database are rudimentary parts of the GA-EGPWS. Additional equipment that provides inputs and accepts outputs is necessary.

The KGP-560 LRU is a small remote mounted unit that computes the threat based upon the sensor inputs and selected configuration.

The Configuration Module stores the mapped parameters. It is mounted on the mating connector.

The Regional Terrain Database is a removable CompactFlash data card that resides inside the KGP-560 LRU. This card contains all the terrain data, known man-made obstacles and runway data for the appropriate region. The world is classified into three regions, Americas, Atlantic, & Pacific, which are shown in the KGP 560 Pilot's Guide.

The KGP-560 GA-EGPWS system consists of inputs, including GPS position, pressure altitude and an optional temperature probe input and outputs, including connection into an audio panel, cockpit switches, illuminated annunciators and an optional display interface. Honeywell strongly recommends the KGP-560 system be installed to interface with a Terrain Display system.

The typical KGP-560 GA-EGPWS is composed of the KGP-560 LRU, a GPS antenna, a connection to an encoding altimeter, a switch/annunciator panel, a terrain display and a connection to the audio panel.
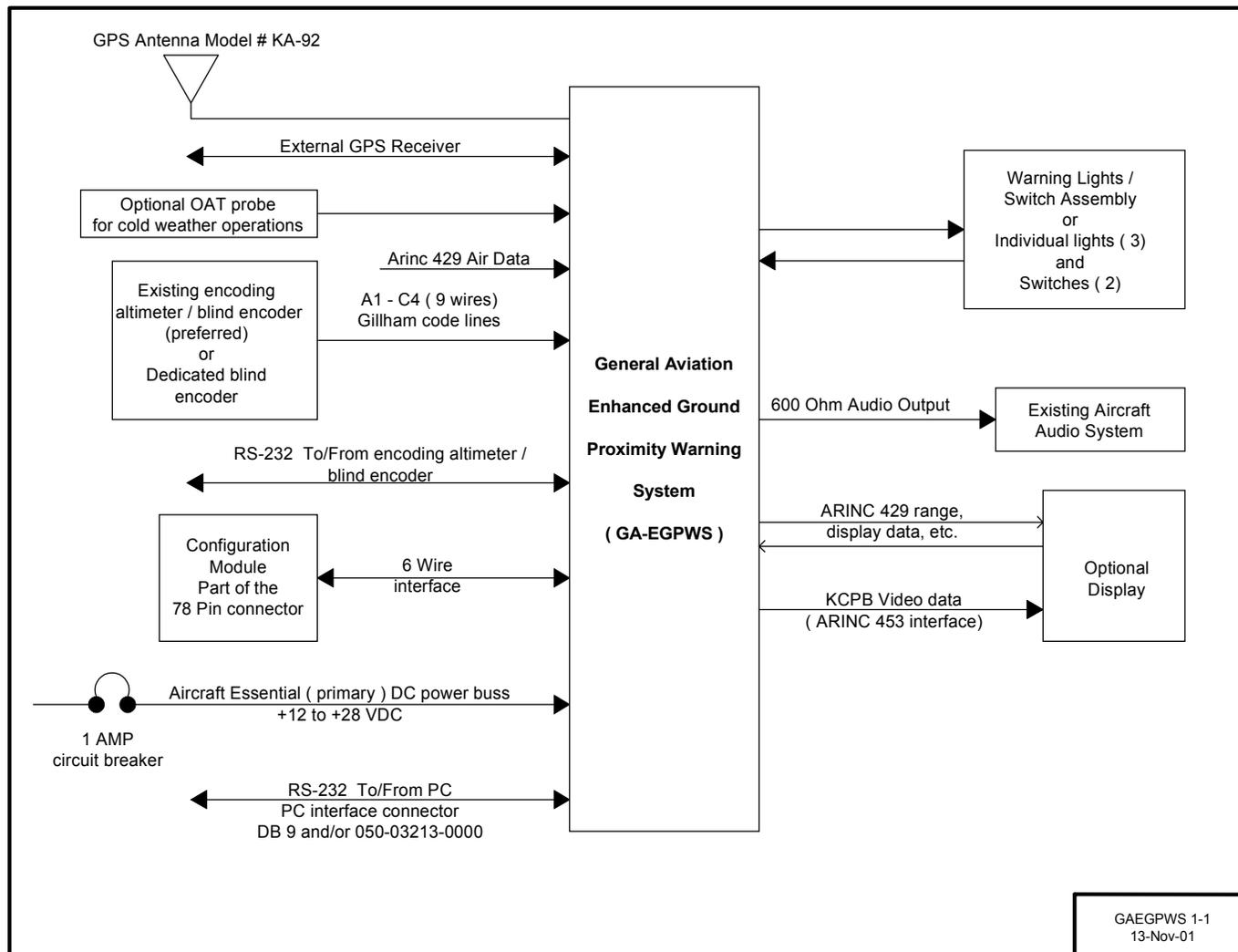
FIGURE 1-1: SYSTEM BLOCK DIAGRAM

1.6.4 System Operation

The KGP-560 Pilots Guide provides system operational detail. The following operational considerations will affect the choices that need to be made for the GA-EGPWS installation.

1.6.4.1 GA-EGPWS Modes of Operation

The KGP-560 GA-EGPWS has two configurable sets of alert/warning curves. One configuration selects the set of alerting/warning curves that comply with the requirements of TSO-C151b Class B. The other set of warning curves are optimized for some General Aviation operations formerly known as 'the non-TSO curves' but now called the TSO-C151b Class C curves.

The TSO-C151a Class B curves are most compatible with IFR operations. The Class C curves are most compatible if the system is to be installed in an aircraft not covered by the current Class B mandate and/or operates VFR.

Note: All aircraft that are required by Federal Aviation Regulations to have Terrain Awareness and Warning System comply with TSO-C151b Class B must be configured with the Class B TSO operational curves. Additionally, a Class B Audio Menu must be selected to meet the alert/warning aural requirements of the TSO.

1.6.4.1.1 Aircraft & Mode Type Selection

The KGP-560 GA-EGPWS Aircraft / Mode Type (Category 1) selection, see Section 4.3.1.1, facilitates aircraft type and mode selection. The warning curve selection (Class B or Class C) is done during system configuration and is selectable via the Aircraft / Mode Type selection.

1.6.4.1.2 GPS Sensor

The KGP-560 contains an embedded GPS-XPRESS Card sensor (GPS receiver) that produces validated navigational position data by continuous signal acquisition and tracking of the navigational satellite network. The GPS Sensor receives the C/A code signals transmitted by the satellite network on the L1 frequency of 1575.42 MHz. The sensor has 8 signal processing channels allowing 8 satellites to be tracked simultaneously. The GPS Sensor uses data in the satellites' navigation messages to solve for latitude, longitude, altitude, horizontal velocity, vertical velocity and current UTC.

GPS Data can also be supplied via the ARINC 743, 743A and RS-232/422 interfaces. A GPS Antenna Splitter could be used in lieu of installing another antenna.

1.6.4.2 Options

1.6.4.2.1 Display Option

TSO-C151b Class B or Class C does not require a display for terrain data, however, if at all possible, terrain data should be displayed for the aircraft operator. The terrain display greatly improves situational awareness. The GA-EGPWS supports numerous displays including traditional Radar displays as well as some modern Multifunction Display Systems (MFDs).

Installations, which include a display, will also need to provide the GA-EGPWS with range data via ARINC 429 format.

1.6.4.2.2 Altitude Monitor Option

The KGP-560 GA-EGPWS has the ability to monitor altitude sources and provide cautionary messages should an altitude source be suspected of being in error. This feature compares barometric altitude with GPS altitude and generates a "Check Altitude" message when an error is detected. This is a highly recommended option, which can alert a pilot to problems such as a stuck altimeter or plugged static port. This option requires no additional hardware and is enabled during the system installation by programming the configuration module. This feature can provide both audio and display messages.

1.6.4.2.3 Outside Air Temperature (OAT)

The KGP-560 GA-EGPWS supports an interface to an OAT probe for aircraft operated in cold environments. Very cold air temperatures cause an increase in the density of the air mass and can result in barometric altimeter errors, both in sensitive altimeters/encoders and blind encoders. Aircraft normally operated in very cold climates can benefit from the addition of an OAT probe interfaced to the GA-EGPWS. If the aircraft is equipped with an Air Data Computer which outputs Digital data with Static Air Temperature on an ARINC 429 port, this can be used instead of an encoder and external OAT Probe. OAT and SAT label input selection is programmed into the configuration module during system installation.

1.7 Technical Characteristics

1.7.1 KGP-560 GA-EGPWS Information

P/N 965-1198-005

TSO Compliance:	TSO-C151b Class B & Class C. See *Environmental Characteristics* listed in the Section 9
Physical Dimensions:	See Section 2.3 Equipment Installation
Weight:	Less than 1.6 lbs. w/ mating connector
Power Requirements:	10 VDC - 32 VDC, <1 Amp, up to 8.0 Watts dissipation
Temperature Range	-40°C to 55°C
Humidity Range	Tested to 85% RH for 48 Hours
Installation Space	See Section 2.3 Equipment Installation
Altitude	Up to 55,000 feet
Cooling	No forced cooling required

TABLE 1-2: KGP-560 UNIT TECHNICAL SPECIFICATIONS

1.7.2 KGP-560 Configuration Module Information

P/N 071-01710-0002, -0004, -0021

TSO Compliance:	TSO-C151b Class B & Class C. See *Environmental Characteristics* listed in the Section 9
Weight:	Less than 2 oz.
Power Requirements:	Provided by Unit
Temperature Range	-40°C to 55°C
Humidity Range	Tested to 85% RH for 48 Hours
Installation Location	See Section 2.3 Equipment Installation
Altitude	up to 55,000 feet
Cooling	No forced cooling required

TABLE 1-3: KGP-560 CONFIGURATION MODULE SPECIFICATIONS

1.7.3 KGP-560 Regional Terrain Database Information

P/N 071-00182-0101, -0102, -0103

TSO Compliance:	TSO-C151b Class B & Class C. See *Environmental Characteristics* listed in the Section 9
Weight:	Less than 1 oz.
Power Requirements:	Provided by Unit
Temperature Range	-40°C to 55°C
Humidity Range	Tested to 85% RH for 48 Hours
Installation Location	See Section 2.3 Equipment Installation
Altitude	up to 55,000 feet
Cooling	No forced cooling required

TABLE 1-4: KGP-560 REGIONAL TERRAIN DATABASE SPECIFICATIONS

1.8 Unit and Accessories Supplied

Some part numbers may not be currently available. Consult the current Honeywell catalog or contact your Honeywell representative for equipment availability.

1.8.1 KGP-560 GA-EGPWS Computer

Model Designation	Description	Manufacturers' ID Number	Bendix/King Part Number
KGP-560 GA-EGPWS	GA-EGPWS LRU	965-1198-005	066-01196-0205

Note: The KGP-560 must be ordered using the Bendix/King 066-01196-0205 part number.

1.8.2 KGP-560 GA-EGPWS Configuration Module

Model Designation	Description	Manufacturers' ID Number	Bendix/King Part Number
KGP-560 Config. Module	Configuration Module	700-1710-021	071-01710-0021
KGP-560 Config. Module	Configuration Module	700-1710-004	071-01710-0004
KGP-560 Config. Module	Configuration Module	700-1710-002	071-01710-0002

Note: The KGP-560 configuration module must be ordered using the Bendix/King 071-01710-0002, 071-01710-0004 or 071-01710-0021 part number. The –00021 configuration module is highly recommended.

1.8.3 KGP-560 GA-EGPWS Install Kit

Model Designation	Description	Manufacturers' ID Number	Bendix/King Part Number
KGP-560 Install Kit (Same as KGP 560 Install Kit)	Installation Kit	N/A	050-03621-0000

KGP-560 Installation Kit (050-03621-0000) contents include:

P/N	Description
030-01157-0011	SOCKET CRMP 20G (Qty. 9)
030-01171-0000	CONN SUB-D HSG 9S (FEMALE PINS)
033-00230-0000	TELEPHONE JACK, 4 CONDUCTOR
030-01451-0000	CONTACT SOCKET (Qty. 78)
030-02351-0004	HOOD/LVR ASSY
030-03296-0001	HI DENSITY SUBD78P
030-00134-0001	CONN COAX RT ANGLE

1.8.4 KGP-560 GA-EGPWS Regional Terrain Database

Model Designation	Description	Manufacturers' ID Number	Bendix/King Part Number
AMERICAS DATABASE for KGP-560 GA-EGPWS	Americas Database	4XXN (Latest Release)	071-00167-0101
ATLANTIC DATABASE for KGP-560 GA-EGPWS	Atlantic Database	4XXA (Latest Release)	071-00167-0102
PACIFIC DATABASE for KGP-560 GA-EGPWS	Pacific Database	4XXP (Latest Release)	071-00167-0103

TABLE 1-5: KGP-560 REGIONAL TERRAIN DATABASES

Note: **The appropriate terrain data base card must be ordered for the region in which the aircraft is to be operated. When ordering the terrain database, the latest database available is provided.**

1.9 Accessories Required But Not Supplied

1.9.1 Cable and Wire

P/N	Description
MIL-W-22759/16	WIRE (OR EQUIVALENT)
MIL-C-27500	SHIELDED WIRE (OR EQUIVALENT)
RG-10599	SHIELDED WIRE
M17/176-00002	SHIELDED WIRE
M17/158-RG400	COAXIAL CABLE (OR EQUIVALENT)

1.10 Optional Accessories Not Supplied

1.10.1 Optional GPS Antenna & GPS Antenna Installation Kit

P/N	Description
071-01553-0200	KA 92 GPS Antenna (TSO C129)
050-03318-0000	KA 92 GPS Antenna Installation Kit

Note: Please see Section 2.3.6 for GPS Antenna installation considerations. The KA 92 is not required if an existing KA 91 or KA 92 GPS antenna is already installed on the aircraft when the optional antenna splitter is used. Reference Section 1.10.2 below for an antenna splitter.

KA 92 Installation Kit (050-03318-0000) contents include:

P/N	Description
030-00134-0001	CONNECTOR, TNC RT ANGLE
047-10735-0002	BACKPLATE, ANTENNA
089-05909-0012	SCR PHP 8-32X3/4 (Qty 4)
187-01831-0000	ANTENNA GASKET
155-06019-0000	INSTALL DWG KA 92

1.10.2 Optional GPS Antenna Splitter

To have the flexibility of using an existing KA 92 GPS Antenna, Honeywell offers a splitter that will greatly simplify the installation procedure. One of the split ports is DC blocked from the common port so that equipment voltage regulators do not conflict.

Some installation constraints may prohibit the use of the GPS Antenna Splitter. See Section 2.3.7 for additional details.

P/N	Description
050-03610-0003	GPS ANTENNA SPLITTER KIT

GPS Antenna Splitter Kit (050-03610-0003) contents include:

P/N	Description
030-00134-0000	CONN COAX (Qty 3)
030-00134-0001	CONN COAX RT ANGLE
071-01600-0001	GPS ANTENNA SIGNAL DIVIDER/SPLITTER

1.10.3 Optional Temperature Probe

The EGPWS is capable of interfacing directly to a standard 500-ohm temperature probe for aircraft operated in cold environments. Very cold air temperatures cause an increase in the density of the air mass and can result in barometric altimeter errors, both in sensitive altimeters/encoders and blind encoders. Aircraft normally operated in very cold climates can benefit from the addition of an OAT probe interfaced to the EGPWS

Note: The KGP-560 GA-EGPWS will accept temperature data from a Digital Air Data Computer given there is a Static Air Temperature (SAT) label present on the bus.

P/N	Description
050-03610-0002	TEMP PROBE KIT

Temp Probe Kit (050-03610-0002) contents include:

P/N	Description
010-00068-0016	CRIMP TRML 6S M3.5
090-01034-0001	MOUNTING PLATE, TEMP. PROBE
137-00042-0001	TEMP PROBE, 500 OHM
MS3106E12S-3S	STRAIGHT PLUG, 2 PIN

1.10.4 Annunciators & Switches

Various light & switch options may be used when installing the KGP-560 GA-EGPWS system. Annunciator, switches and compact annunciator/switch panels are available from other vendors, see Section 1.10.4.3 for additional annunciator vendors.

1.10.4.1 Optional Annunciator Install Kit

Specification Drawing 031-00810-01 defines the sub-assembly parts, spacers to cover different panel thickness and artwork definitions for associated items.

P/N	Description
050-03610-0000	ANNUNCIATOR INSTALL KIT

Annunciator Install Kit (050-03610-0000) contents include:

P/N	Description
030-01459-0001	CONTACT SKT 20AWG (Qty 20)
030-03430-1001	CONN. RECT. SKT. MODULE, SIZE 22, LMD SERIES
030-03430-1006	CONN. RECT. CONT. SKT. SIZE 22, LMD SERIES (Qty 16)
030-03430-3001	CONN. RECT. DIODE MDL, 8 DISCRETE, SIZE 22
030-03430-6002	CONN. RECT. HSG, SPLICE, TOOL-LESS, LMS SERIES
031-00791-0001	SWITCH PUSH MOM 1 POLE
031-00810-0001	INDICATOR, COMMON GND (Qty 2)
031-00810-0003	SWITCH BODY, ALT, COMMON GND
031-00810-0022	MOUNTING SLEEVE/CONNECTOR, .109 IN. (Qty 3)
(See the Note below)	
031-00810-0100	LAMP CAPSULE (TERR/TERR)
031-00810-0101	LAMP CAPSULE (TERR. INHIBIT/OFF/ON)
031-00810-0103	LAMP CAPSULE (TERRAIN N/A)

Note: The following mounting sleeve/spacer/connector assemblies are not included in this kit but are available to accommodate instrument panel thickness as follows:

P/N	Description
031-00810-0020	0.022 to 0.042 Inches
031-00810-0021	0.053 to 0.073 Inches
031-00810-0023	0.115 to 0.135 Inches
031-00810-0024	0.180 to 0.200 Inches
031-00810-0025	0.240 to 0.260 Inches

1.10.4.2 Optional Terrain Switching Kit

P/N	Description
050-03610-0001	TERRAIN SWITCHING KIT

Terrain Switching Kit (050-03610-0001) contents include:

P/N	Description
030-01459-0001	CONTACT SKT 20AWG (Qty 7)
031-00810-0002	SWITCH BODY, MOM, COMMON GND
031-00810-0022	MOUNTING SLEEVE/CONNECTOR, .109 IN.
(Please see the Note in Section 1.10.2 for additional Sleeve/Connector sizes)	
031-00810-0102	LAMP CAPSULE (RADAR, IND/RDR/TERR)
032-00153-0001	4 POLE RELAY
033-00235-0001	RELAY SOCKET
131-00750-0023	RES CF 75 QW 5%

1.10.4.3 Other Vendors

The following information on compact annunciator/switch panels is supplied for the convenience to the GA-EGPWS installers. The manufacturer provides complete details necessary to install these parts listed here.

- West Coast Specialties' Annunciator Panel 90-44802-1. Contact West Coast Specialties in Preston, WA at 425/222-3118.

- Mid-Continent Instrument's MD 41-1208 & MD 41-1308. Contact Mid-Continent in Wichita, KS at 316/630-0101 or in Van Nuys, CA at 818/786-0300 or at http://www.mcico.com

- Edmo Distributing Inc., Spokane, WA. Phone: 800-235-3300

1.10.5 PC Diagnostic Connection Components

To provide the necessary serial PC Diagnostic connection, the female DB-09 D-Sub-Miniature connector included in the KGP-560 Installation Kit can be wired to the GA-EGPWS as shown in Figure 3-4: Basic GA-EGPWS Interconnect. Alternatively, the PC Data Loader Kit used with the KLN 90B can be installed and used for the serial Diagnostic Port Interface with a PC. See the KLN 90B Install Manual for wiring the Data Loader connections.

P/N	Description
050-03213-0000	PC DATA LOADER KIT

PC Data Loader Kit (050-03213-0000) contents include:

P/N	Description
030-03223-0000	ADAPTER RS-232 9-25
155-02794-0001	COMPUTER CBL ASSY

1.10.6 Special Tools Required

The following special tools (or their equivalent) are necessary for working with the P1 connector. Only one item from each category is needed.

1.10.6.1 Crimping Tool – P1

Description	Vendor Part Number
Hand Crimping Tool	MIL M22520/2-1
Hand Crimping Tool	Positronic Industries 9507
Hand Crimping Tool	Daniels AFM8

1.10.6.2 Contact Positioner – P1

Description	Vendor Part Number
Contact Positioner	MIL M22520/2-06
Contact Positioner	Positronic Industries 9502-3
Contact Positioner	Daniels K41

1.10.6.3 Insertion/Removal Tool – P1

Description	Vendor Part Number
Insertion/Removal Tool	MIL M81969/1-04

1.11 Regional Terrain Database Updates

The proper Regional Terrain Database for where the aircraft is to be operated is required to be installed in the KGP-560 GA-EGPWS LRU. Regional Terrain databases can be ordered for card updates or another region by contacting:

> Honeywell International Inc.
>
> Aerospace Electronic Systems
>
> One Technology Center
>
> 23500 West 105th Street
>
> Olathe, Kansas 66061 USA
>
> Attn: Navigation Services MS-66
>
>
> Telephone: (800) 247-0230 within the United States or Canada
>
> (913) 712-3145 outside of the United States or Canada
>
> Fax: (913) 712-3904
>
>
> e-mail: nav.database@honeywell.com

See Section 5.3 for Regional Terrain Database installation and verification procedures.

2 SECTION II – INSTALLATION

2.1 Introduction

This section contains suggestions and factors to consider before installing the KGP-560 System. This section includes the required equipment, installation considerations and mechanical installation drawings, and will give a brief description of the procedures for the initial installation of the KGP-560 into an aircraft. The installation parts are listed in Section 1. Close adherence to these suggestions will assure satisfactory performance from the equipment.

Note: The conditions and tests performed on the system components are minimum performance standards. It is the responsibility of those desiring to install the KGP-560 either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within standards.

2.2 Unpacking And Inspecting Equipment

Exercise caution when unpacking equipment. Perform a visual inspection of the unit for evidence of damage incurred during shipment. If a damage claim must be filed, save the shipping container and all the packing materials to substantiate your claim. The claim should be filed as soon as possible. The shipping container and all packing material should be retained in the event that storage or reshipment of the equipment is necessary.

Multiple components are typically shipped with each KGP-560 unit including the configuration module, installation kit, regional database and required documentation. Ensure all components are removed from the shipping container.

2.3 Equipment Installation Considerations

2.3.1 General Considerations

The equipment should be installed in the aircraft in a manner consistent with acceptable workmanship and engineering practices, and in accordance with the instructions set forth in this publication. To ensure the system has been properly and safely installed in the aircraft, the installer should make a thorough visual inspection and conduct an overall operational check of the system, on the ground, prior to flight.

Caution: After installation of the cabling and before installation of the equipment, a check should be made with the aircraft primary power supplied to the mounting connector, to ensure that power is applied only to the pins specified in the interwiring diagrams, per instruction in Section 5.2.

The KGP-560 System installation will conform to standards designated by the customer, installing agency, and existing conditions as to the unit location and type of installation. However, the following suggestions should be carefully considered before installing your system.

2.3.2 Avionics Cooling Considerations

The most important contribution to improved reliability of all avionics equipment is to limit the maximum operating temperature of the individual unit, whether panel mounted or remote mounted. While modern circuit designs consume less total energy, the heat dissipated per unit volume (Watts/cubic inch) remains much the same due to contemporary high density packaging techniques. While each individual unit may not require forced air cooling, the combined heat generated by several units operating in a typical panel or rack can significantly degrade the reliability of the equipment. Consequently, the importance of providing force air cooling to avionics equipment mounted in either a panel or rack is essential to the life span of the equipment. Adequate provisions for cooling should be incorporated during the installation.

2.3.3 KGP-560 Installation Considerations

The following paragraphs contain information pertaining to the installation of the KGP-560 System, including considerations and instructions concerning the location and mounting of the equipment.

2.3.3.1 KGP-560 Cooling Considerations

The KGP-560 requires no external forced air-cooling and consumes very little power.

2.3.3.2 Installation/Location Considerations

The typical GA-EGPWS will need to interface to the aircraft audio system, aircraft DC power, panel mounted warning lamps and switches, a source of barometric altitude (usually an encoding altimeter or blind encoder), a GPS antenna, and a panel mounted display. The interface to the GPS antenna is an important item. See Section 2.3.6 for details.

Consideration should be given to the following items affected by the choice of installation location within the aircraft:

> A. Environmental Considerations
>
> B. Ease of Interface to aircraft systems
>
> C. GPS Antenna location and coaxial cable length
>
> D. Ability to extract and insert new terrain/obstacle Databases supplied on a CompactFlash Card as the regional terrain database CompactFlash card may be updated periodically.

If possible, install the KGP-560 in an easily accessible dry, temperature-controlled area such as within the passenger compartment of the aircraft. Standard avionics bays are acceptable as well.

If possible, the KGP-560 should **NOT** be located in close proximity to equipment that produce considerable heat.

Locations, which require disassembly of the aircraft to gain access, are less desirable.

Any location that is exposed to moisture and/or temperature extremes should be avoided.

Select a mounting location that allows sufficient clearance at the front of the unit for connectors and cables.

Do not bundle data lines or antenna cable with any power cables.

No more than 8.0dB-signal loss is allowed in the GPS antenna cable run. See to Section 2.3.6.

Mount the unit to provide good electrical bonding to airframe ground. Lightning strike protection and RF susceptibility and emission characteristics depend on good electrical grounding of the unit and cable shield returns.

If possible, clearance to the top of the KGP-560 should be provided to facilitate removal and installation of the regional terrain database CompactFlash card. The terrain database card is removed and installed with power **NOT** applied to the system. The KGP-560 may be removed from the aircraft to extract and install database cards if the mounting location does not provide enough clearance.

Installing the Regional Terrain Database is accomplished by:

> Moving the cover over the CompactFlash card out of the way.

> Pressing the flash card ejector button located within the unit.

> Removing the old flash card.

> Inserting the new flash card and replacing the cover.

If possible, mount the KGP-560 such that the above can be accomplished without requiring disassembly of the aircraft or removal of the KGP-560.

The EGPWS provides a single 600 ohm audio output which should be connected to a un-switched/un-muted auxiliary audio input on the aircraft's audio control panel. Programming the configuration module sets the audio output power level.

2.3.3.3 Annunciator Lamp Considerations

The KGP-560 can drive seven lamps and accepts input from four switches. The lamps should be identified as:

FUNCTION	COLOR	LEGEND
Warning	Red	EGPWS / TERR / WARN
Caution	Amber	EGPWS / TERR / CAUT
Terrain INOP/Not Available	Amber	TERR INOP / NOT AVAIL / TERR N/A
Terrain On	Green	TERR
Terrain Inhibit On	Green / Amber	TERR OR ALERT INHIB

TABLE 2-1: KGP-560 LAMP/SWITCH LEGENDS

The caution and warning lamps should be located in the pilot's primary visual field of view. Various light & switch options may be used when installing the KGP-560 GA-EGPWS system. The red Warning lamp must be located in the pilot's primary field of view. Refer to FAR Part 23.1322. Annunciator, switches and compact annunciator/switch panels are available from several vendors. The complete data to install this equipment is provided by the manufacturer.

2.3.3.4 Equipment Installation Procedure

> A. Place the unit into aircraft and secure it. **(Please refer to Section 5 for detailed installation sequence and preparation)**
> B. Attach the harness to the front mating connector of the unit.
> C. Attach antenna coax cable J2 to the front of the unit. (If the internal GPS receiver is to be used)

2.3.3.5 Mechanical Installation Instructions

Make sure that the unit is installed in a location where the ambient temperatures are between –67 DEG F to + 131 DEG F (-55 DEG C to +55 DEG C). The GA-EGPWS Computer is surface/rigidly mounted and does not require a mounting rack. Allow at least one inch of free air space around the top and rear of the unit and at least ½ inch along each side. Allow adequate space for the installation of cables and connectors. Consideration must be taken for the removal and installation of the data base flash card located in the top of the computer. The mounting hole pattern and dimensions may be obtained from the following figure. Mark, punch and drill the mounting holes. Care must be taken to avoid damage to adjacent equipment or cables. Mount the unit to provide good electrical bonding to the airframe ground.

2.3.3.5.1   Outline Drawing– KGP-560 EGPWC (with GPS)
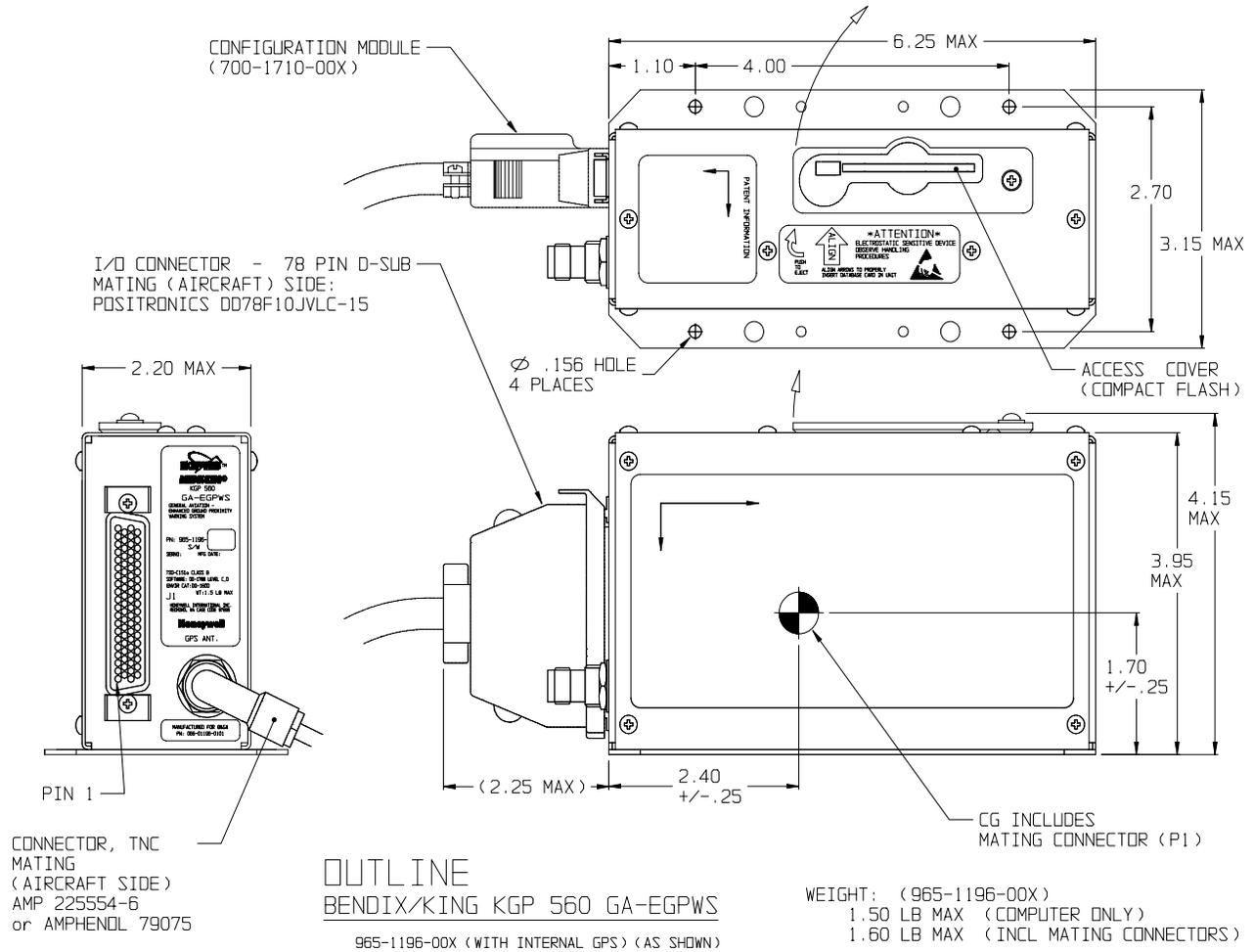
FIGURE 2-1: GA-EGPWS COMPUTER OUTLINE DRAWING

(965-1196-00X SHOWN, 965-1198-00X SIMILAR)

2.3.3.6 GA-EGPWS Computer Installation Mounting

KGP-560 mounting hole patterns and dimensions required for the installation are depicted in the following drawing:
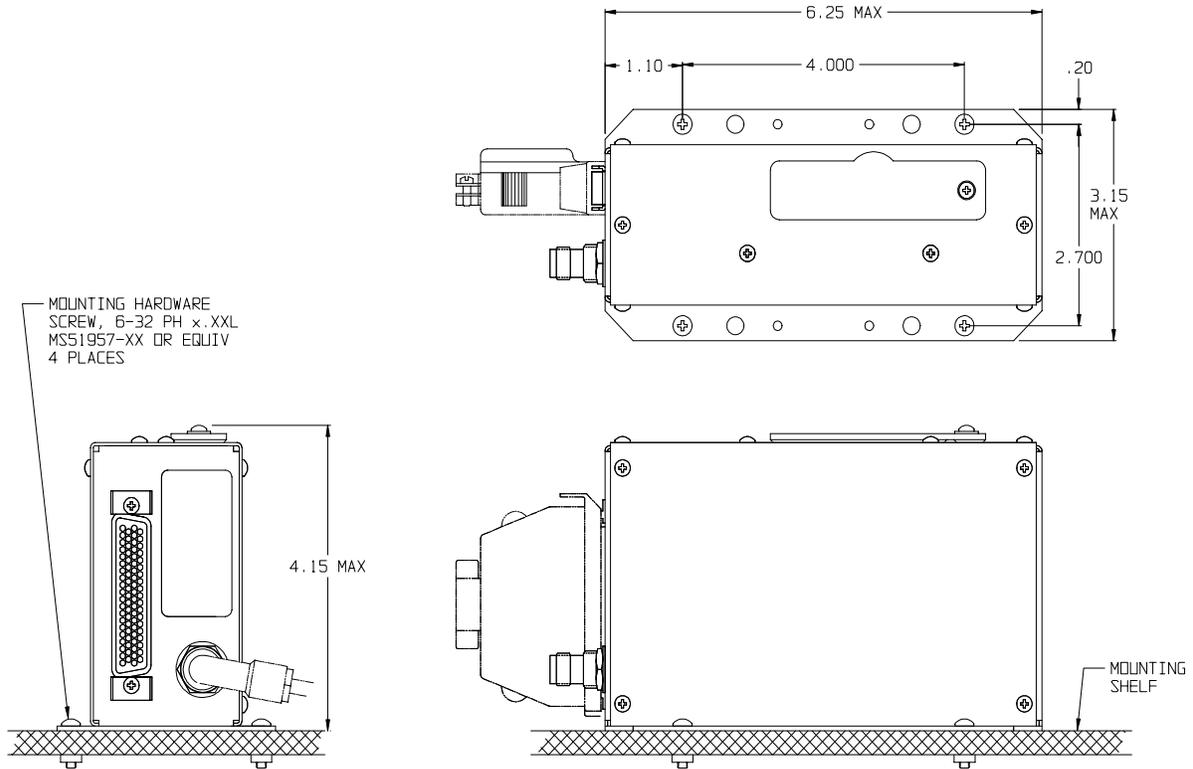
STANDARD MOUNTING

FIGURE 2-2: STANDARD MOUNTING

2.3.4 Configuration Module Installation

The KGP-560 system requires a Configuration Module for storage of required operational parameters that include the aircraft interface and functionality definitions specific to the installed aircraft. Required programming of the Configuration Module is detailed in Section 5.4.4 of this manual.

2.3.4.1 Installation Considerations

A. The Configuration Module must be mounted to the mating connector. Make sure to leave adequate space to mount the Configuration Module when installing the Unit.

B. Make sure that the unit is installed in a location where the ambient temperatures are -67°F to +158°F (-50°C to +70°C).

2.3.4.2 Installation Procedure

A. Install the Configuration Module onto the connector. Refer to the following procedures and Figure 2-9.

B. Tighten the mounting screws to secure the Configuration Module.

2.3.5 Configuration Module Installation Assembly

The purpose of this procedure is to give assembly sequence and information for assembly of the P1 Connector, Backshell and the installation of the GA-EGPWS - Configuration Module.

Note: **Step 4 to secure ground wire is not required for Configuration Module P/N 071-01710-0004 & -0021. Configuration Module P/N 071-01710-0004 & -00021 do not require grounding.**

REQUIRED: Two items as follows:

1.   KGP-560 Installation Kit   (Honeywell P/N 050-03621-0000)
2.   Configuration Module   (Honeywell P/N 071-01710-0002, -0004 or –00021)

ITEM 2 DESCRIPTION:

See Section 1.8.3 for KGP-560 Installation Kit contents.

INSTALLATION ASSEMBLY SEQUENCE

STEP 1   Install all GA-EGPWS system aircraft wiring to this connector using items the Crimp Contacts and Connector. See the following figures.
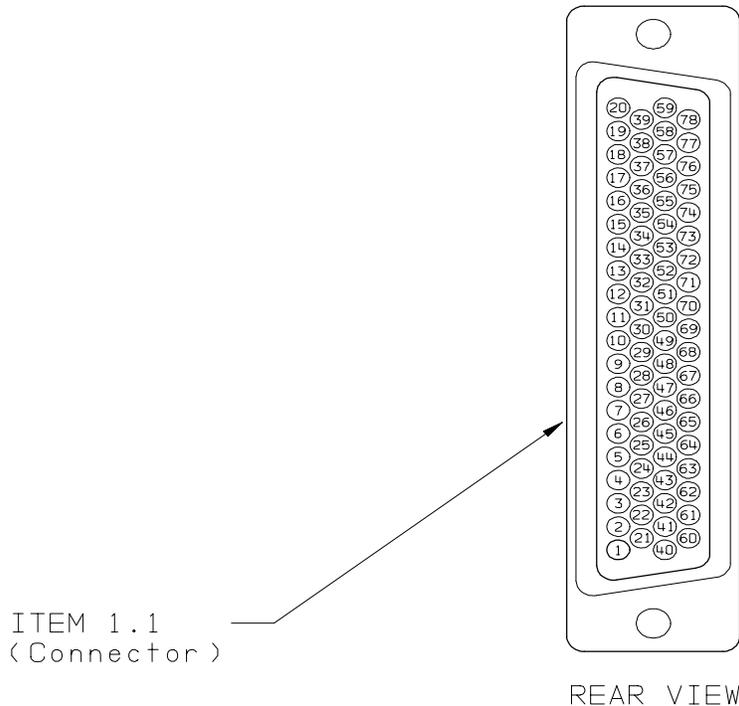
FIGURE 2-3: CONNECTOR REAR VIEW

STEP 2   Wire the Configuration Module. This part will replace the Backshell plate.
 Install the pre-crimped colored wires into item Connector as shown below.

```
BLU - (75)
ORN - (76)
BLK - (77)
WHT - (18)
RED - (17)
VIO - (16)
```

ITEM 2.0
(Configuration
Module)

Ground Wire -
Will be terminated
at Step 4

Connector

REAR VIEW
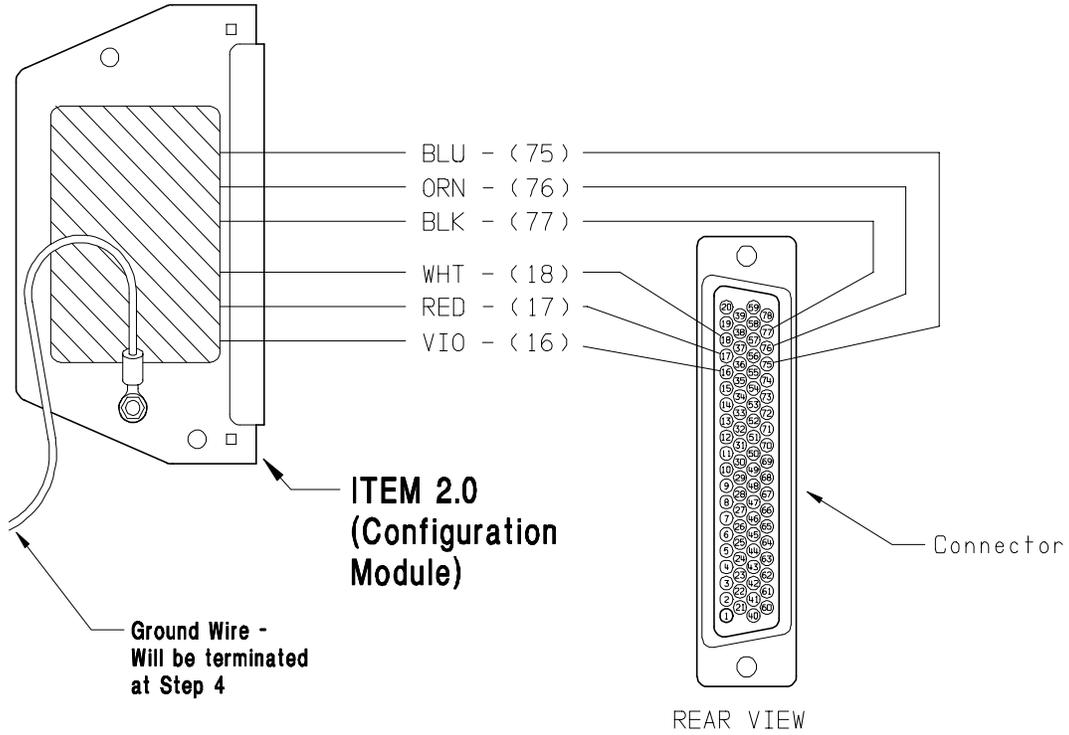
FIGURE 2-4: CONNECTOR WIRE INTERCONNECT

STEP 3   Position the Slide Lock onto wired connector as shown below:

ITEM 1.7
(Slide Lock)

Connector

REAR VIEW
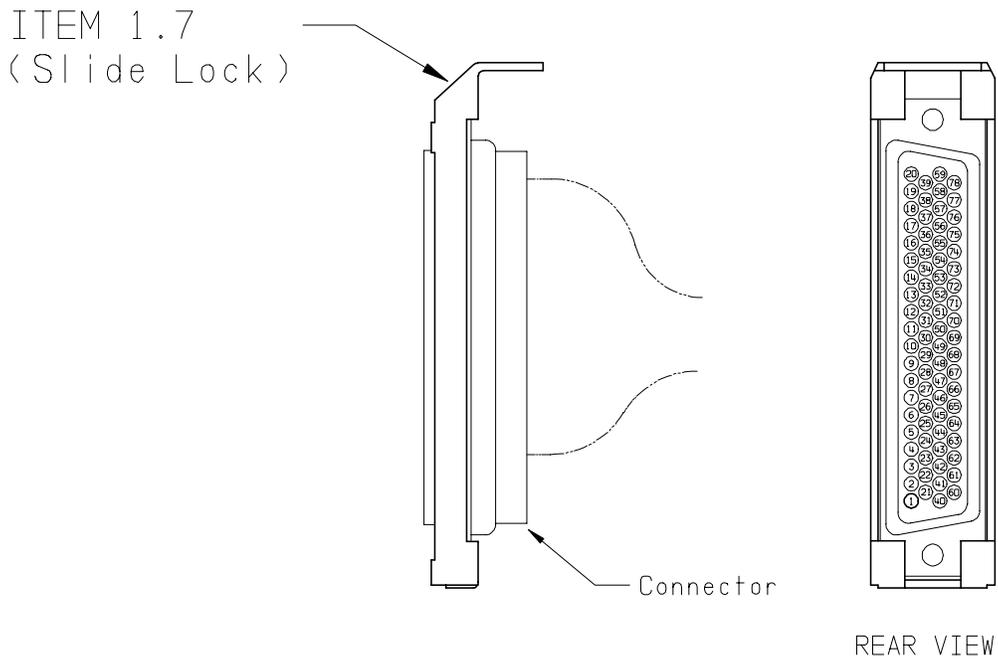
FIGURE 2-5: CONNECTOR SLIDE LOCK

STEP 4   Install the backshell housing onto connector using the Screws as shown below:

Ground Wire (used for electrostatic discharge {ESD} protection). Terminate the ground wire using one of the following methods:

1. Terminate ground wire, along with the pigtails from the shielded wires, to a local ground within two ft. of this connector. Or

2. Splice a longer wire to this ground wire and route to nearest convenient ground source in aircraft.

Note: The ground wire is not required or supplied for configuration module P/N 071-01710-0004 & -0021.
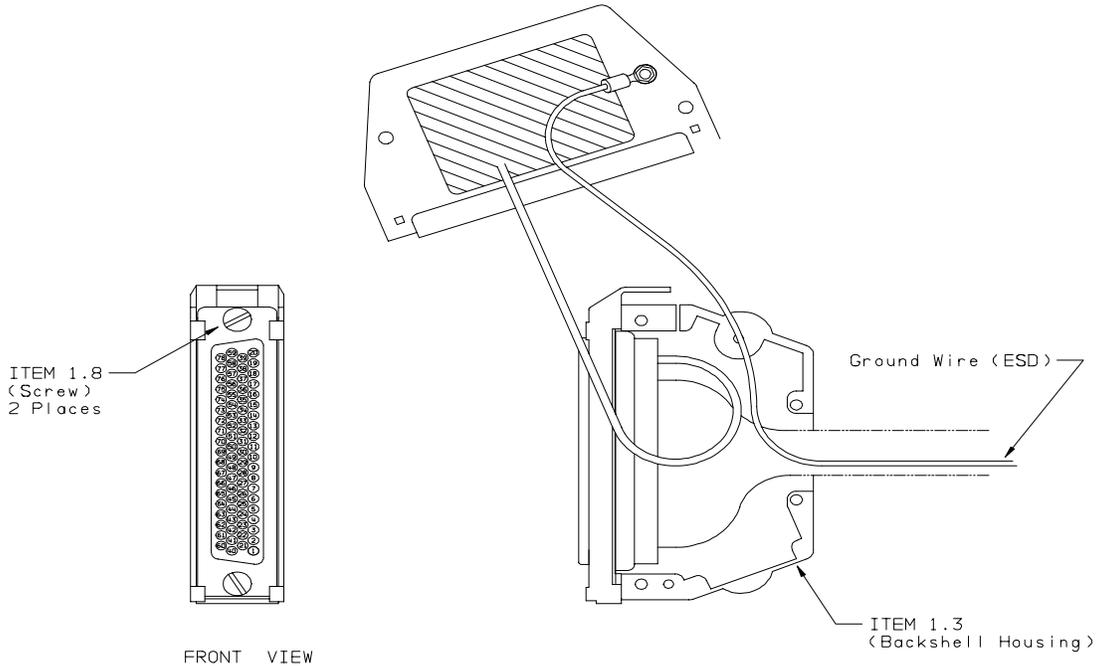
FIGURE 2-6: CONNECTOR BACKSHELL CONNECTION

STEP 5   Install the Spring Clip as shown below:
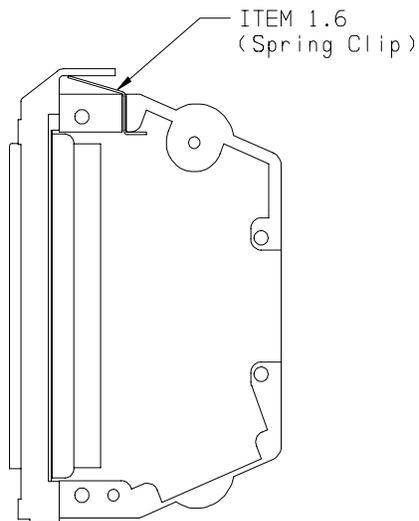
FIGURE 2-7: CONNECTOR SPRING CLIP

STEP 6 Organize and dress wiring exiting from backshell. Route Configuration Module wires exiting from connector, then coil as shown in the next figure. Install the Cable Clamp as shown. Do not tighten screws yet.
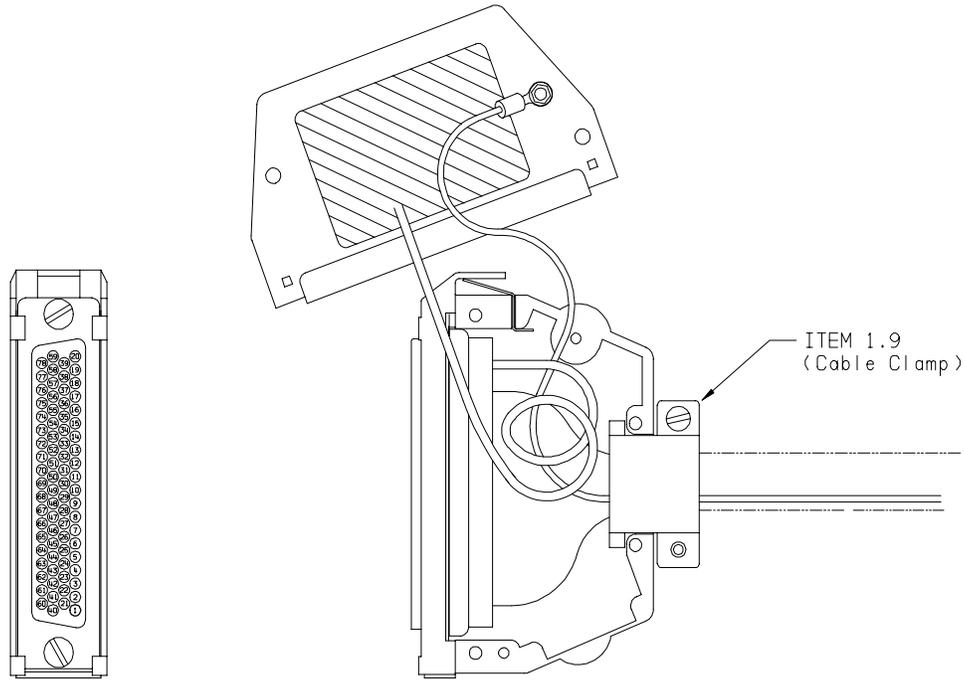
FRONT VIEW

FIGURE 2-8: CONNECTOR CONFIGURATION MOUNT

STEP 7 Secure Configuration Module to connector assembly using the Screws as shown below. Tighten Cable Clamp screws as required.
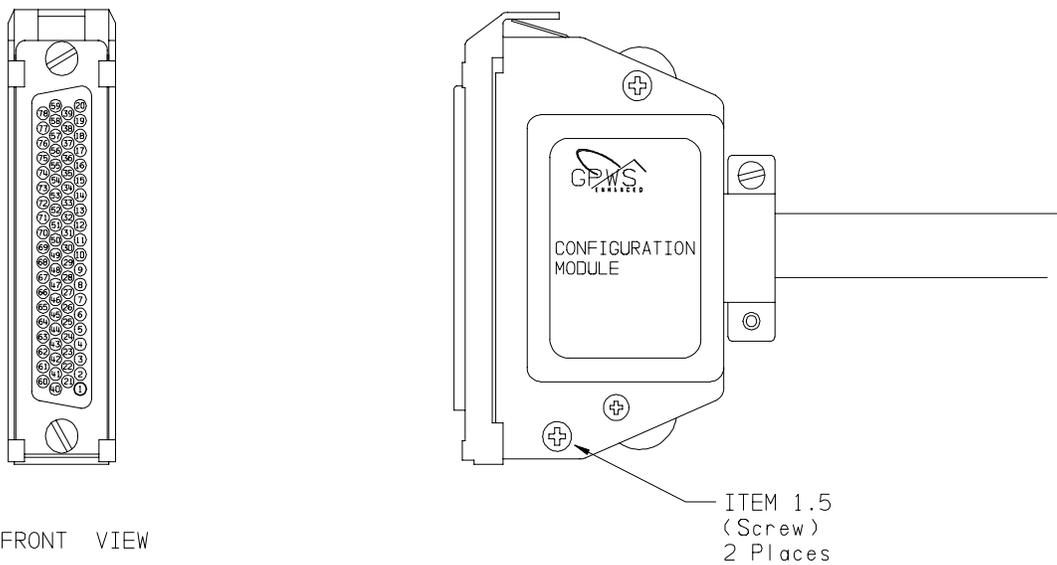
FRONT VIEW

FIGURE 2-9: FRONT CONNECTOR WITH CONFIGURATION MODULE

2.3.6 GPS Antenna Installation

The GA-EGPWS optionally uses an external GPS antenna (Honeywell model no. KA 92).   Detailed installation instructions for this antenna are available in the Honeywell KLN series and GNS-XLS series System Installation Manuals. Please refer to these documents for this data.

2.3.7 GPS Antenna Splitter Option

The GPS Antenna Splitter allows the existing KA 91 or KA 92 GPS antenna to be interfaced to the KGP 560 EGPWS.

The installer has the option of installing the KA 92 antenna, or installing a GPS Antenna Splitter kit with an existing KA 91/92 GPS antenna.   The existing antenna is typically part of an existing KLN 89/89B/90/90A/90B/900 GPS receiver or GNS-XLS Flight Management System (FMS) that has been previously installed and approved on the aircraft. See Section I for part number and ordering information for the GPS Antenna Splitter Kit option.

The following criteria must be observed when using the antenna splitter:

1. The length of an M17/128-RG400 coaxial cable cannot exceed 18 feet.

2. The maximum allowable signal loss between the KA 91/92 antenna and the KLN series GPS receiver cannot exceed 8.0 dB. Refer to the appropriate KLN series GPS receiver Installation Manual for determination of loss.

3. The maximum allowable signal loss between the KA 91/92 antenna and the KGP 560 cannot exceed 8.0 dB. Refer to the following table to determine the loss between the antenna and the KGP 560.

Part Number	Description	Signal Loss (ea.)	Example Quantity	Example Signal Loss	Actual Quantity	Actual Signal Loss
071-01600-001	GPS Antenna Splitter	3.4 dB	1 ea.	3.4 dB		
M17/128-RG400	Coaxial Cable - 18 ft max	0.2dB/ft	10 ft	2.0 dB		
030-00134-0000	Straight TNC Connector	0.1dB	2 ea.	0.2 dB		
030-00134-0001	RT Angle TNC Connector	0.1dB	2 ea.	0.2 dB		
030-00101-0002	Panel Mount Plug	0.1dB	0	0		
M39012/28-0504	Bulkhead TNC Connector	0.1dB	0	0		
M39012/29-0504	Panel TNC Connector	0.1dB	0	0		

TOTAL SIGNAL LOSS (8.0 dB max.)   5.8 dB   _____ _____

TABLE 2-2: SIGNAL LOSS WORKSHEET

2.3.8   Temperature Probe

The GA-EGPWS can be interfaced to a standard 500 Ohm Outside Air Temperature probe. See Section 1 for part number information.

2.3.9   Display

The GA-EGPWS can be interfaced to numerous displays. Refer to Section 11.3 in this document for a list of supported displays.

2.3.10   Installation Constraints

The TSO C151b Class B & Class C identifies the minimum performance standards, tests, and other conditions applicable for issuance of design and production approval of the KGP-560. The TSO does not specifically identify acceptable conditions for installation of the system. This systems installation manual defines the acceptable installation conditions that must be met. Aircraft specific environmental and functional compatibility has been addressed during the creation of this document.

3 SECTION III – ELECTRICAL INTERCONNECTS

3.1 Introduction

This section contains the appropriate electrical interconnect information and details necessary for system planning and design of the KGP-560 GA-EGPWS installation. You will find information relative to the KGP-560 system requirement options available to the system planner and the electrical characteristics of the various interfaces. You will also find pin lists and interconnect diagrams in this section.

Section 3 contains interconnect diagrams, electrical interface information and pin assignments for the KGP-560 system. Refer to Figure 3-3 for a typical KGP-560 system interconnect diagram. There are several interconnect drawings for typical equipment that can interface with the KGP-560 included.

The installing agency may contact Honeywell Product Support at (913) 782-0600 for information regarding the compatibility of equipment not listed in this manual. Normal business hours are 8:00 AM to 5:00 PM Central Time, Monday through Friday. Also contact manufacturer of specific equipment for compatibility.

3.2 Purpose

Detailed information necessary for system planning and designing the electrical portion of this installation is described in this section.

3.3 Applicable Part Numbers Subsection Description

Information given in this section pertains only to the KGP-560 System with part numbers shown in Section 1.6. See Section 1 for complete part number descriptions and ordering information.

3.4 Requirements and Limitations Subsection Description.

Operational requirements or constraints relating to the interface are described in this section. Widely followed regulatory requirements may also be described here. Regionally enforced requirements vary greatly and adherence to them remains the responsibility of the installing agency.

3.5 Electrical Characteristics Subsection Description.

The electrical characteristics and format of the interface signals are described in this section. Any part number specific differences in signal format are also described here. Overlined pin names generally indicate active low signals, although the absence of an overline does not necessarily indicate an active high signal.

3.6 Interface Subsection Description

The harness techniques for shielding and shield termination described in this manual are identical to those specified for the test harness used during HIRF and Lightning testing. Adherence to the information in this manual is essential in establishing an installation environment equivalent to the test environment used during HIRF and Lightning testing.

Should grounding the shields, as shown in the interconnect diagrams, cause unacceptable interference due to noise sources on the aircraft, double shielded wire may be substituted for single shielded wire shown in this manual. The outer shield must be grounded at both ends to comply with HIRF and Lightning requirements. The inner shield may then be grounded at a single end to protect against the aircraft noise source. Normally the inner shield is grounded at the source end of the signal carried by the wire. Planning to install double shielded wire for low level signals known to have a history of interference may be easier than later adding the double shielded wire into the aircraft harness.

3.7 Installation Constraints

The TSO-C151b Class B & Class C (as stated in Section 2.3.10) identifies the minimum performance standards, tests, and other conditions applicable for issuance of design and production approval of the KGP-560. The TSO does not specifically identify acceptable conditions for installation of the system. This systems installation manual defines the acceptable installation conditions that must be met. Aircraft specific environmental and functional compatibility has been addressed during the creation of this document.

3.8 Planning Considerations – Description of Features and Options

The following features and options need special consideration before installation to properly setup the aircraft configuration.

3.8.1 Encoding Altimeters / Blind Encoders / Digital Air Data Computers (DADC)

The GA-EGPWS computer can be configured to accept barometric altitude data from either a Digital Air Data Computer via a digital interface, or from an encoding altimeter or blind encoder. In all cases, the altitude source must be referenced to 29.92 in. Hg. and not be adjustable by the flight crew. General Aviation installations will typically use an encoding altimeter or blind encoder. Honeywell has tested various encoding altimeters and blind encoders for compatibility with the GA-EGPWS computer. These units are listed in Section 11.1 of this document.

In all cases, when interfacing the GA-EGPWS computer to encoding altimeters or blind encoders, the encoders must have power applied at all times when the GA-EGPWS computer is in use and the **altitude common (strobe) line must be grounded**. If you are interfacing to an existing encoder which is providing Gillham Altitude data to a transponder, make absolutely certain that the common line is not being driven by the transponder.

3.8.1.1 Altitude Monitor Option

The GA-EGPWS has the ability to monitor altitude sources and provide cautionary messages should an altitude source be suspected of being in error. This feature compares barometric altitude with GPS altitude and generates an aural and (if a terrain display is installed) a visual "Check Altitude" message when an error is detected. This is a highly recommended option, which can alert a pilot to problems such as a stuck altimeter or plugged static port.

This option requires no additional hardware and is enabled during system installation by programming the configuration module. If selected, the GA-EGPWS computer has the ability to warn the pilot with both aural and display messages of possible altimeter problems.

With this option enabled, several possible combinations of fault detection are possible. Refer to Section 4 in this document for configuration details.

In addition to recommending the Altitude Monitor Option, Honeywell highly recommends, if the display is capable, to enable the display of Geometric Altitude. Please refer to Section 7.2.4, for further information.

3.8.1.2 Encoding Altimeters That Are The Pilot's Primary Altitude Reference

Using the pilot's encoding altimeter as the altitude source for the GA-EGPWS computer will allow the system to alert the pilot to a stuck altimeter or a plugged static system. In some installations the pilot's encoding altimeter will also be wired to the aircraft's transponder. In this situation, a stuck altimeter or plugged static system can result in air traffic control and the pilot both believing an erroneous altitude. Upon detecting a significant long-term error between GPS altitude and barometric altitude the GA-EGPWS would generate a "Check Altitude" message. **This arrangement provides the best detection of large serious barometric altitude errors.**

3.8.1.3 Aircraft Equipped With A Blind Encoder.

Using an existing blind encoder as the source for the GA-EGPWS will allow the system to detect a failed blind encoder or plugged static system. If the pilot's altimeter fails, the GA-EGPWS will be unable to detect this problem. This arrangement allows the GA-EGPWS to monitor the altitude source, which is reported to ATC.

3.8.1.4 A Dedicated Blind Encoder

In some aircraft, it may be desirable, or necessary to add a dedicated blind encoder specifically as an altitude source for the GA-EGPWS. Since this dedicated encoder shares the aircraft static system, the GA-EGPWS will be able to detect a plugged static system and any failure of its dedicated encoder. It will not be able to detect a failure of the pilot's altimeter or the encoder, which is reporting altitude to ATC. Basically, this arrangement would provide additional safety in its ability to detect static system problems.

3.8.2   Cockpit Lamps & Switches

The GA-EGPWS drives lamps and accepts inputs from switches. The lamps and switches must be identified as detailed in Section 1.10.4. Various light & switch options may be used when installing the KGP-560 GA-EGPWS system. Annunciator, switches and compact annunciator panels are available from several vendors. The same data to install these panels is included in the Interconnect Diagrams but generally the installation details are provide by the manufacturer.

Certain displays may also support the display and actuation of Lamp and Switches. Refer to the installation information with the display and KGP-560 configuration information in Section 4.3.1.5.

3.8.3   Audio

The GA-EGPWS provides a single 600-Ohm audio output to be connected to the aircraft's audio system using an un-switched un-muted warning input. Programming the configuration module sets the audio output power level. See Section 3.8.3 for interphone audio output information.

3.8.4   GPS Antenna

To use the internal GPS receiver (card) the GA-EGPWS must be interfaced to an external GPS antenna. Detailed installation instructions for the Bendix/King model no. KA 91 or KA 92 antenna is available in the Honeywell KLN series and GNS-XLS series System Installation Manuals. Please refer to these documents for this data.

3.8.5 Outside Air Temperature (OAT) Option

The GA-EGPWS can be interfaced to a standard 500 Ohm Outside Air Temperature probe. The use of an OAT will improve altitude accuracy when the aircraft is operated at cold temperatures. Aircraft, which are routinely flown in cold climates, at altitudes that place the aircraft close to terrain, will benefit from the use of an OAT. High performance aircraft, which are flown at high, (cold) altitudes; high above precipitous terrain are less of a concern. In all cases, system accuracy is improved by the addition of an OAT. As a general rule, if the aircraft is operated in a geographic area where temperatures are routinely at or below 0° C a temperature probe should be considered.

The GA-EGPWS supports an optional OAT probe for aircraft operated in cold environments. Operational environments where the OAT probe is needed to supplement the Geometric Altitude calculation are when operating -15°C below ISA. This is typically environments of 0°C and below. Since the DOD GPS selective availability has been turned off, the need for the OAT is further diminished.

Very cold air temperatures cause an increase in the density of the air mass and can result in barometric altimeter errors, both in sensitive altimeters/encoders and blind encoders. Aircraft normally operated in very cold climates can benefit from the addition of an OAT probe interfaced to the GA-EGPWS. If the aircraft is equipped with an Air Data Computer which outputs Digital data with Corrected Altitude on an ARINC 429 port, this can be used instead of an encoder and external OAT probe. OAT options are programmed into the configuration module during system installation.

3.8.6 Display Option

The GA-EGPWS can be interfaced to numerous types of displays. Choosing to display this terrain data is the most important enhancement to situational awareness. This is especially true for lower performance aircraft. In addition to showing terrain ahead of the aircraft, (depending on configuration settings and display types) the GA-EGPWS can display Geometric Altitude (GSL/MSL altitude), Magnetic Track, Range in NM, and the elevations of the highest and lowest terrain features shown on the display (`Peaks'). The color and intensity of the terrain displayed, instantly alerts the pilot to areas of dangerous terrain and conversely to areas of less precipitous terrain.

TSO-C151b Class B & Class C do not require a display for terrain data, however, if at all possible, terrain data should be displayed for the aircraft operator. The terrain display greatly improves situational awareness. The GA-EGPWS supports numerous displays including traditional Radar displays as well as modern MFD's. Installations, which include a display, will also need to provide the GA-EGPWS with range data via ARINC 429 format.

Refer to Section 11.3 of this manual for a list of supported display types.

3.9 General Electrical Interface Information

3.9.1 Introduction

The GA-EGPWS provides external interfaces for integration into aircraft systems and to support maintenance functions. The interfaces are made via the front panel D sub-miniature connector. The KGP-560 also has a TNC coaxial connector on the front panel to provide for a GPS antenna connection. The following sections describe each of the external interfaces contained in these physical interfaces. See Section 4.2 for current interface configuration capabilities of the GA-EGPWS.

3.9.2 Signal Interfaces

This section identifies and describes the general electrical characteristics and number of each interface type located in the front aircraft interface connectors. The front aircraft interface connector is defined as J1 (78 contacts) and J2 (GPS antenna). Section 3.10 identifies the connector pin assignments. The signal mnemonic for each signal is included in the following paragraphs.

No two-wire absolute AC signals are available. All analog inputs provide broken wire detection on all input signal legs. Unless otherwise stated, the "Maximum reverse fault current" is defined as the current resulting from an internal component failure, with the input signal at zero volts.

3.9.2.1 Grounds

3.9.2.1.1 Chassis Ground

Used for redundant metal connection. These pins are internally connected to DC Ground (see paragraph 3.9.2.1.2) and could be used as a signal return.

      Pin Assignment (Signal Mnemonic):   J1-2, J1-29, J1-38, J1-46,   (CHASSIS GND)
                                                J1-58, J1-62, J1-70, J1-75

3.9.2.1.2 DC Ground

For discrete inputs and lamp driver outputs. This pin is internally connected to Chassis Ground (see paragraph 3.9.2.1.1).

      Pin Assignment (Signal Mnemonic):
     (same as +28 VDC Return)   J1-21   (AIRCRAFT PWR RET)
  Note: All analog signals are differential input.

3.9.2.2 Primary Power Input

Nominal Input	28 VDC	14 VDC
Normal Voltage Range	22.0 to 30.3 VDC	11.0 to 15.1 VDC
Normal Surge Voltage Range	15 – 40VDC (30 msec)	7.5 – 20VDC (30 msec)
Abnormal Voltage Range	20.5 to 32.2 VDC	10.0 to 16.1 VDC
Abnormal Surge Voltage Range	37.8 VDC (1sec); 46.3 VDC (100 msec)	18.9 VDC (1sec); 23.1 VDC (100 msec)
Normal Frequency Range	not applicable	not applicable
Frequency Transients	not applicable	not applicable
Power Requirements	5 Watts – No Warnings 5.5 Watts with warning voice over 600 Ω speaker +2.5 Watts with Internal GPS (includes antenna power)[1]	5 Watts – No Warnings 5.5 Watts with warning voice over 600 Ω speaker +2.5 Watts with Internal GPS (includes antenna power)[1]
Recommended Power Control Device	1 Amp delayed action circuit breaker.	1 Amp delayed action circuit breaker.

Pin Assignment (Signal Mnemonic):
Power Input (12 to 28 VDC)   J1-1   (AIRCRAFT POWER)
Power Return   J1-21   (AIRCRAFT PWR RET)

[1]Based on the Honeywell GPS card specification.

3.9.2.3 DC Analog Inputs

Unless otherwise specified, Input Signal accuracy is 1% linearity +0.1% full scale offset

3.9.2.3.1 Outside Air Temperature

Quantity	1
Input Impedance, each leg	> 100 KΩ
Reverse Fault Current	< 200 μamps
Input Voltage Range	+0.3 VDC to +0.6VDC
Input Filter	0.1 Second Low Pass, $\pm$ 10%
Input Type	Differential
Broken Wire Detect	Input will be biased less than -80° C
Pin Assignment (Signal Mnemonic):	
Signal (+)	J1-39 (OAT_H)
Return (-)	J1-19 (OAT_L)

Note: For temperature probe excitation see Section 3.9.2.9.

3.9.2.4 ARINC 429/575 Digital Serial Bus Inputs

Quantity	4
Format	DITS, ARINC 429/575 Low speed
Low Speed Data Rate	12.0 KBPS to 14.5 KBPS
High Speed Data Rate	N/A
Direction of Information Flow	Type 'A' broadcast for ARINC 429/575
Word/Frame Structure	Type 'B' 32 bit words consisting of 8 bits label and 24 bits data/status

Pin Assignment (Signal Mnemonic):		
Receive #1 A leg	J1-47	(429RX_1A)
Receive #1 B leg	J1-66	(429RX_1B)
Receive #2 A leg	J1-8	(429RX_2A)
Receive #2 B leg	J1-27	(429RX_2B)
Receive #3 A leg	J1-9	(429RX_3A)
Receive #3 B leg	J1-28	(429RX_3B)
Receive #4 A leg	J1-48	(429RX_4A)
Receive #4 B leg	J1-67	(429RX_4B)

3.9.2.5 RS-232 / RS-422 Digital Serial Bus

Two full duplex RS-232 / RS-422 buses are provided at the aircraft interface connectors. The RS-422 transceivers are electrically multiplexed with the RS-232 transceivers, and are selected through the configuration process. The maintenance RS-232 bus is described in paragraph 3.9.3.1. The specific characteristics (data rate, parity, data bits, stop bits) is defined in the configuration selection. RS-422 cable termination will not be required for typical applications.

The RS-232 bus meets the characteristics specified in RS-232C and supports the following characteristics:

Note: RS-232/422 baud rate inputs are specified by configuration, see Section 4. Higher baud rate selections may not be currently supported by the GA-EGPWS.

Data Rate	1200, 2400, 4800, 9600, 19200 or 38400 bits/Sec
Parity	None, Odd or Even
Data bits	7 or 8
Stop bits	1 or 2
Maximum Recommended Cable Length	15 meters

The RS-422 bus meets the characteristics of TIA/EIA-422-B and supports the following characteristics:

Data Rate	1200, 2400, 4800, 9600, 12000, 19200 or 38400 bits/Sec
Maximum Transceivers on Bus	20
Receiver Input Impedance	12 KΩ

3.9.2.5.1 GPS RS-232 Digital Serial Bus

One port is provided for use with external or internal RS-232 GPS interfaces. This port is common with the GPS RS-422 port described in Section 3.9.2.5.2 and can only function as a RS-232 interface or a RS-422 interface but not both.

Pin Assignment (Signal Mnemonic):

Transmit	J1-5	(GPS_TXA)
Receive	J1-6	(GPS_RXA)
Common	J1-29	(CHASSIS GND)

Note: If an internal GPS configuration is used then this RS-232 receive input will be non-functional.

3.9.2.5.2 GPS RS-422 Digital Serial Bus

One port is provided for use with external GPS interfaces. This port is common with the GPS RS-232 port described in Paragraph 3.9.2.5.1 and can only function as a RS-232 interface or a RS-422 interface but not both.

Pin Assignment (Signal Mnemonic):

Transmit A leg	J1-5	(GPS_TXA)
Transmit B leg	J1-25	(GPS_TXB)
Receive A leg	J1-6	(GPS_RXA)
Receive B leg	J1-26	(GPS_RXB)

Note: If an internal GPS configuration is used then this RS-232 receive input will be non-functional.

3.9.2.5.3 Air Data RS-232 Digital Serial Bus

One port is provided for use with Air Data computer or Static Pressure Sensor interfaces. This port is common with the Air Data RS-422 port described in Section 3.9.2.5.4 and can only function as a RS-232 interface or a RS-422 interface but not both.

Pin Assignment (Signal Mnemonic):

Transmit	J1-44	(ADC_TXA)
Receive	J1-45	(ADC_RXA)
Common	J1-46	(CHASSIS GND)

3.9.2.5.4 Air Data RS-422 Digital Serial Bus

One port is provided for use with Air Data computer or Static Pressure Sensor interfaces. This port is common with the Air Data RS-232 port described in Section 3.9.2.5.3 and can only function as a RS-232 interface or a RS-422 interface but not both.

Pin Assignment (Signal Mnemonic):

Transmit A leg	J1-44	(ADC_TXA)
Transmit B leg	J1-64	(ADC_TXB)
Receive A leg	J1-45	(ADC_RXA)
Receive B leg	J1-65	(ADC_RXB)

3.9.2.5.5 GAMMA RS-232 Digital Serial Bus

One port is provided for use with the GAMMA bus interfaces. This port can only function as an RS-232 interface.

Pin Assignment (Signal Mnemonic):

Transmit	J1-4	(RS232TXD_GAMMA)
Receive	J1-24	(RS232RXD_GAMMA)
Common	J1-70	(CHASSIS GND)

3.9.2.6 Discrete Inputs

Discrete signals are intended for remote switching through the aircraft, and are therefore subject to being connected to other signals, and are also subject to transient voltage conditions. For these reasons, the following rules apply to each input, unless otherwise stated.

Each input is capable of withstanding voltage transients of $\pm$ 600VDC for 10 μs, without damage. The Ground discretes are internally biased via a pull up resistor, and are externally pulled down to ground when active. The characteristics of each ground discrete input are as follows:

Ground Discrete Characteristics

Quantity	15
Active Voltage Range (Logic True)	< 1 KΩ (to ground) or < +3 VDC
Inactive Voltage Range (Logic False)	> 40 KΩ (to ground) or > +17 VDC
Diode Isolation	Each input is diode isolated to prevent current sinking
Input Impedance	> 10 KΩ
Maximum Fault Current	< 100 μA (at +28 VDC input)
Pin Assignment (Signal Mnemonic):	See specific discrete in (GND_DISC_xx) Category 5

3.9.2.7 Configuration Module Interface

System configuration is defined via a configuration module, which resides in the KGP-560 mating connector backshell. The configuration module contains the aircraft interface and functionality definitions specific to the installed aircraft. Refer to Section IV for interface and functional definitions by category.

Electrical Characteristics		Refer to the EGPWS Configuration Module	
Pin Assignment (Signal Mnemonic):			CM wire color
Clock	J1-17	(SPICLK_CM)	Red
Master Data Out	J1-77	(SPIMOSI_CM)	Blk
Master Data In	J1-76	(SPIMISO)	Orn
Configuration Module Select	J1-18	(SPISEL_CM#)	Wht
Configuration Module +5VDC	J1-16	(+5 VSC)	Vio
Config. Module +5VDC Return	J1-75	(CHASSIS GND)	Blu

3.9.2.8 GPS Antenna Input

A GPS input connector is available on the front of the KGP-560.

Quantity	1
Cable Length/Allowed Signal Loss	Not more than -8 dB, at 1575.42 MHz, for cable and connector loss from antenna to unit.
Connector Type	TNC
Low Level DC on RF Output	+5 VDC ±5%, 50 mAmps maximum, Shield Ground.
Pin Assignment (Signal Mnemonic):	GPS ANT (COAX)

3.9.2.9 OAT Excitation Output

This output is an accurate excitation source for 500 Ω resistive sensors and for GSE testing of the reference.

Quantity	1
Output Voltage	2.500 VDC ±10 mVDC (no load)
Maximum Load	500 Ω
Pin Assignment (Signal Mnemonic):	J1-20 (OAT_REF)

Note: This output has a source impedance of 2.00 ΩK, 0.1%.

3.9.2.10   Lamp Driver Outputs

The GA-EGPWS supports two kinds of Ground/Open discrete outputs used to signal various discrete conditions. Monitor outputs are used to signal failure conditions for the GA-EGPWS. Monitor outputs default to an active state when there is a failure or if power is removed from the GA-EGPWS. The other Lamp Driver outputs are used to signal the warning or mode control status of the GA-EGPWS.

Short-term current limit protection is provided on all drivers for output shorting conditions. Ground going output discretes may be connected together to produce a "wired OR" function for the active low state of the signals.

3.9.2.10.1 Monitor Output Characteristics

Quantity	1
Type of Output:	Switch Closure to Ground
Max. Open Circuit Voltage:	30 VDC
Current Limit	1 Amp
Potential Across "Closed" Switch:	2.5 VDC Max
Pin Assignment (Signal Mnemonic):	(MON_OUT_1)

Note: Intended to operate with +28VDC lamp sources and will not operate with +5VDC lamp sources.

3.9.2.10.2 Discrete Output Characteristics

Quantity	4
Type of Output:	Switch Closure to Ground
Max. Open Circuit Voltage:	30 VDC
Current Limit	500 mAmp (typical)
Potential Across "Closed" Switch:	1 VDC Max
Pin Assignment (Signal Mnemonic):	See specific output in (DISC_OUT_xx) Category 5

3.9.2.11   Audio Output

There is one 600-ohm output. There are several possible volume levels available with the GA-EGPWS as shown below, with maximum output being 100mW (600Ω). The actual audio level output by the GA-EGPWS is dependent on several items:

- Selection of nominal warning/alert audio volume level (max, -6, -12, -18 or -24 dB) via Category 7.

- If a self-test is in progress, warning/alerts are given 6 dB below normal voices.

3.9.2.11.1 Low Level (Interphone) Audio Output

The transformer isolated 600-ohm output is capable of driving one 600-ohm load at the specified level (or at a reduced level). This output is primarily designed for headphones and interphone systems.

Quantity	1	
Nominal Output Impedance	$600\Omega \pm 10\%$	
Maximum Single Channel Power Output	100 mW Nominal ()	
Available Power Output Levels	5 [1]	
Pin Assignment (Signal Mnemonic):		
Signal (+)	J1-59	(AUD_LL_H)
Return (-)	J1-78	(AUD_LL_L)

3.9.2.12   ARINC Digital Serial Output Busses

3.9.2.12.1 ARINC 429 Output Bus

The ARINC 429 output is a low speed bus.

Quantity	1	
Format	DITS, ARINC 429	
Low Speed Data Rate	12.0 KBPS to 14.5 KBPS	
High Speed Data Rate	100 KBPS $\pm$ 1%	
Direction of Information Flow	Type 'A' broadcast for ARINC 429	
Word/Frame Structure	Type 'B' 32 bit words consisting of 8 bits label and 24 bits data/status	
Pin Assignment (Signal Mnemonic):		
Bus #1 (A leg)	J1-68	(429TX_1A)
Bus #1 (B leg)	J1-49	(429TX_1B)

3.9.2.12.2 ARINC 453 Output Bus or KCPB

Quantity	1	
Format	1600 bit Manchester BI-phase per ARINC 708A	
Data Rate	1 Mb per second	
Impedance	$70 - 78\Omega$	
Pin Assignment (Signal Mnemonic):		
Bus #1 (A leg)	J1-30	(KCPB_1A)
Bus #1 (B leg)	J1-10	(KCPB_1B)

Note: Intended to operate with +28VDC lamp sources and will not operate with +5VDC lamp sources.

Note: Additional information is available in the KCPB Interface Methodology document and specific display ARINC 453 interface definitions.

---

[1] Five selectable levels

3.9.3 Test Interface

The GA-EGPWS provides interfaces for various test and maintenance functions. In addition, it is the interface used to program the configuration module. The installer may choose to bring this interface to a connector to make it more convenient to configure the unit and obtain maintenance information. A 9-pin D-Sub and 4 conductor phone jack are supplied in the installation kit.

3.9.3.1 RS-232 Maintenance Port

One port is provided which meets the characteristics specified in RS-232C. This bus can be used to access internal data from the GA-EGPWS for both bench simulation and aircraft testing. In addition to the internal data, other items such as unit configuration and flight history can also be accessed. This port is wired to a DB9 connector that remains accessible in the aircraft and is plugged into a PC during configuration module programming and diagnostic testing.

Baud Rate	19,200	
Parity	None	
Data bits	8	
Stop bits	1	
Maximum Recommended Cable Length	15 meters	
Pin Assignment (Signal Mnemonic):		
Transmit	J1-43	(RS232TXD_MON)
Receive	J1-63	(RS232RXD_MON)
Common	J1-62	(GND)

3.9.3.2 GSE Present Discrete Input

A discrete input for test and Ground Support Equipment is provided. Grounding this pin indicates to the EGPWS that test or Ground Support Equipment is connected to the system. Pin J1-51 is not used during an aircraft installation and should remain open.

3.10 Interconnect Pinout Lists

3.10.1 Pinouts Listed by Designation

Pin Designation	Pin No.	Destination
		Aircraft Power & Ground Connections
AIRCRAFT POWER	J1-01	+ 28 VDC Power Input via 1 amp CB
AIRCRAFT PWR RET	J1-21	Aircraft Ground
CHASSIS GND	J1-02	Aircraft Ground
CHASSIS GND	J1-58	Aircraft Ground
		Configuration Module
+5VSC	J1-16	+5VDC (Violet wire)
CHASSIS GND	J1-75	+5VDC Return (Blue wire)
SPICLK_CM	J1-17	Serial Clock (Red wire)
SPIMISO	J1-76	Serial Input (Orange wire)
SPIMOSI_CM	J1-77	Serial Output (Black wire)
SPISEL_CM#	J1-18	Serial Select (White wire)
		Cockpit Switches & Annunciators
DISC_OUT_01	J1-60	Red "WARNING" Lamp
DISC_OUT_02	J1-41	Amber "CAUTION" Alert Lamp
GND_DISC_12	J1-71	Cockpit Disp. Select Discrete #1 (Mom. Gnd)
MON_OUT_1	J1-03	INOP Annuc. - `Terrain Not Available'
GND_DISC_07	J1-15	Self Test Discrete Switch (Mom. Gnd)
GND_DISC_15	J1-35	Terrain Alert Inhibit Discrete Switch (Gnd)
		Terrain Display
429RX_1A	J1-47	Range ARINC 429 Input (Line A)
429RX_1B	J1-66	Range ARINC 429 Input (Line B)
	Shielded Pair	Shield Common
		ARINC 453 or KCPB
KCPB_1A	J1-30	Picture Bus (A) Output Data #1 (Line A)
KCPB_1B	J1-10	Picture Bus (B) Output Data #1 (Line B)
	Shielded Pair	Shield Common
		9 – Pin EGPWS Diagnostic Connector
CHASSIS GND	J1-62	Pin 5 – Monitor Common
RS232RXD_MON	J1-63	Pin 3 – Monitor Port (RS-232 Receive)
RS232TXD_MON	J1-43	Pin 2 – Monitor Port (RS-232 Transmit)
	Triple Shielded	Shield Common
		Discrete Outputs
DISC_OUT_03	J1-61	Wx/Terrain Display Select Relay Discrete
DISC_OUT_04	J1-42	Reserved
GND_DISC_13	J1-74	Reserved

Pin Designation   Pin No.   Destination

Aural Output
Shielded Pair------------------Shield Common

AUD_LL_L   J1-78----------⌒----------------------------600 Ω Low Level Audio Output (-)

AUD_LL_H   J1-59----------⌄----------------------------600 Ω Low Level Audio Output (+) to an

unswitched auxiliary audio amp input

J2 – TNC   Position Source Inputs (see Notes)
KA 92 GPS Antenna

GPS_TXA   J1-05----------⌒----------------------------Input from GPS RS-232 (Rx) Source

GPS_RXA   J1-06----------⌄----------------------------Input from GPS RS-232 (Tx) Source

CHASSIS GND   J1-29 _____ ⌋   GPS RS-232 Common

GPS_TXA   J1-05----------⌒----------------------------Output to GPS RS-422 (Rx – A leg) Source

GPS_TXB   J1-25----------⌄----------------------------Output to GPS RS-422 (Rx – B leg) Source

GPS_RXA   J1-06----------⌒----------------------------Input from GPS RS-422 (Tx – A leg) Source

GPS_RXB   J1-26----------⌄----------------------------Input from GPS RS-422 (Tx – B leg) Source

Two Shielded Pair -----------Shield Common

429RX_2A   J1-08----------⌒----------------------------GPS ARINC 429 LS Input (Line A)

429RX_2B   J1-27----------⌄----------------------------GPS ARINC 429 LS Input (Line B)

Shielded Pair------------------Shield Common

Encoding Altimeter Source

Pin Designation	Pin No.	Destination
GND_DISC_06	J1-12	Gray Code A1
GND_DISC_05	J1-52	Gray Code A2
GND_DISC_04	J1-33	Gray Code A4
GND_DISC_03	J1-14	Gray Code B1
GND_DISC_02	J1-34	Gray Code B2
GND_DISC_01	J1-73	Gray Code B4
GND_DISC_11	J1-32	Gray Code C1
GND_DISC_10	J1-13	Gray Code C2
GND_DISC_09	J1-72	Gray Code C4

(Must be grounded) ------------Common Line

Air Data Sources (see Notes)

ADC_TXA   J1-44----------⌒----------------------------Input from ADC RS-232 (Rx) Source

ADC_RXA   J1-45----------⌄----------------------------Input from ADC RS-232 (Tx) Source

CHASSIS GND   J1-46 _____ ⌋   ADC RS-232 Common

ADC_TXA   J1-44----------⌒----------------------------Output to ADC RS-422 (Rx – A leg) Source

ADC_TXB   J1-64----------⌄----------------------------Output to ADC RS-422 (Rx – B leg) Source

ADC_RXA   J1-45----------⌒----------------------------Input from ADC RS-422 (Tx – A leg) Source

ADC_RXB   J1-65----------⌄----------------------------Input from ADC RS-422 (Tx – B leg) Source

Two Shielded Pair -----------Shield Common

429RX_3A   J1-09----------⌒----------------------------Air Data ARINC 429 Input (Line A)

429RX_3B   J1-28----------⌄----------------------------Air Data ARINC 429 Input (Line B)

Shielded Pair------------------Shield Common

Pin Designation	Pin No.	Destination

Air Temperature (OAT) Probe

CHASSIS GND	J1-38 ----------⌉ Jumper	OAT Common
OAT_L	J1-19 ----------⌋ ------------⌒------------------500 Ω Air Temperature (-)
		‖
OAT_H	J1-39 ----------⌉ -------------⌣------------------500 Ω Air Temperature (+)
OAT_REF	J1-20 ----------⌋ Jumper	OAT Reference (+2.5VDC)
	Shielded Pair---Shield Common	

Output Signals

429TX_1A	J1-68 ----------⌒----------------------------------EGPWS ARINC 429 Output (Line A)
	‖
429TX_1B	J1-49 ----------⌣----------------------------------EGPWS ARINC 429 Output (Line B)
	Shielded Pair------------------Shield Common
GPS_TXA	J1-05 ----------⌒----------------------------------GPS RS-232 / 422 Output (A leg)
	‖
GPS_TXB	J1-25 ----------⌣----------------------------------GPS RS-232 / 422 Output (B leg)
	Shielded Pair------------------Shield Common
ADC_TXA	J1-44 ----------⌒----------------------------------ADC RS-232 / 422 Output (A leg)
	‖
ADC_TXB	J1-64 ----------⌣----------------------------------ADC RS-232 / 422 Output (B leg)
	Shielded Pair------------------Shield Common

Mag. Hdg. & Roll

429RX_4A	J1-48 ----------⌒----------------------------------429RX_4A
	‖
429RX_4B	J1-67 ----------⌣----------------------------------429RX_4B
	Shielded Pair------------------Shield Common

Reserved & Unused

GSE_PRES#	J1-51 ---GSE Present
RS232RXD_GAMMA	J1-24 ----------⌒----------------------------------Reserved GAMMA RS-232 (Rx)
	‖
RS232TXD_GAMMA	J1-04 ----------⌣----------------------------------Reserved GAMMA RS-232 (Tx)
CHASSIS GND	J1-70 _____⌋	Reserved GAMMA RS-232 Common – Connect to Aircraft Ground
GND_DISC_08	J1-53 ---Reserved
GND_DISC_14	J1-54 ---Reserved

DISABLE_TEMP#	J1-55 (Test connection only)	Do not use
N/C for pins	J1-07, 11, 22, 23, 31, 36,	N/C
	J1-37, 40, 50, 56, 57 & 69	N/C

Notes:
1) The GA-EGPWC can accept a variety of Position and Altitude inputs sources. The source used is determined during system configuration so multiple input connections are not necessary.
2) Pins that are labeled "*CHASSIS GND*" should be connected to aircraft ground if they aren't otherwise connected. These include pins J1-02, 29, 38, 46, 58, 62 & 70.

TABLE 3-1: PINOUTS LISTED BY DESIGNATION

3.10.2 Pinouts Listed by pin number

Connector - Pin	Channel Designation Reference	Signal Usage Summary
J1-01	AIRCRAFT POWER	Power Input: 28 VDC (+)
J1-02	CHASSIS GND	Chassis Ground
J1-03	MON_OUT_1	EGPWS /TAD / TCF INOP Output (monitor)
J1-04	RS232TXD_GAMMA	
J1-05	GPS_TXA	GPS RS-232 / 422 Output (A leg)
J1-06	GPS_RXA	GPS RS-232 / 422 Input (A leg)
J1-07	n/c	
J1-08	429RX_2A	GPS ARINC 429 Input (A leg)
J1-09	429RX_3A	Air Data ARINC 429 Input (A leg)
J1-10	KCPB_1B	Terrain Display Output Data #1 (B leg)
J1-11	n/c	
J1-12	GND_DISC_06	Gray Code A1
J1-13	GND_DISC_10	Gray Code C2
J1-14	GND_DISC_03	Gray Code B1
J1-15	GND_DISC_07	Self Test Discrete (Ground)
J1-16	+5VSC	Configuration Module +5VDC (CM wire: Vio)
J1-17	SPICLK_CM	Configuration Module Serial Clock (CM wire: Red)
J1-18	SPISEL_CM#	Configuration Module Serial Select (CM wire: Wht)
J1-19	OAT_L	Air Temperature (-)
J1-20	OAT_REF	Air Temperature Reference (+2.5VDC)
J1-21	AIRCRAFT PWR RET	Power Input: 28 VDC (return)
J1-22	n/c	
J1-23	n/c	
J1-24	RS232RXD_GAMMA	
J1-25	GPS_TXB	GPS RS-232 / 422 Output (B leg)
J1-26	GPS_RXB	GPS RS-232 / 422 Input (B leg)
J1-27	429RX_2B	GPS ARINC 429 Input (B leg)
J1-28	429RX_3B	Air Data ARINC 429 Input (B leg)
J1-29	CHASSIS GND	GPS / ADC RS-232 / 422 Common
J1-30	KCPB_1A	Terrain Display Output Data #1 (A leg)
J1-31	n/c	
J1-32	GND_DISC_11	Gray Code C1
J1-33	GND_DISC_04	Gray Code A4
J1-34	GND_DISC_02	Gray Code B2
J1-35	GND_DISC_15	Terrain Awareness Inhibit Discrete (Ground)
J1-36	n/c	
J1-37	n/c	
J1-38	CHASSIS GND	Chassis Ground
J1-39	OAT_H	Air Temperature (+)
J1-40	n/c	
J1-41	DISC_OUT_02	Alert Lamp
J1-42	DISC_OUT_04	Audio On Discrete
J1-43	RS232TXD_MON	EGPWS Monitor Port (RS-232 Transmit)

Connector - Pin	Channel Designation Reference	Signal Usage Summary
J1-44	ADC_TXA	ADC RS-232 / 422 Output (A leg)
J1-45	ADC_RXA	ADC RS-232 / 422 Input (A leg)
J1-46	CHASSIS GND	GPS / ADC RS-232 / 422 Common
J1-47	429RX_1A	Display Range ARINC 429 Input (A leg)
J1-48	429RX_4A	Magnetic Heading / Roll ARINC 429 Input (A leg)
J1-49	429TX_1B	EGPWS ARINC 429 Output (B leg)
J1-50	n/c	
J1-51	GSE_PRES#	GSE Present
J1-52	GND_DISC_05	Gray Code A2
J1-53	GND_DISC_08	Reserved
J1-54	GND_DISC_14	Reserved
J1-55	DISABLE_TEMP#	(Test connection only – not to be used)
J1-56	n/c	
J1-57	n/c	
J1-58	CHASSIS GND	Chassis Ground
J1-59	AUD_LL_H	Low Level Audio Output - 600 Ω (+)
J1-60	DISC_OUT_01	Warning Lamp
J1-61	DISC_OUT_03	Wx/EGPWC Display Select Discrete
J1-62	CHASSIS GND	EGPWS Monitor Common
J1-63	RS232RXD_MON	EGPWS Monitor Port (RS-232 Receive)
J1-64	ADC_TXB	ADC RS-232 / 422 Output (B leg)
J1-65	ADC_RXB	ADC RS-232 / 422 Input (B leg)
J1-66	429RX_1B	Display Range ARINC 429 Input (B leg)
J1-67	429RX_4B	Magnetic Heading / Roll ARINC 429 Input (B leg)
J1-68	429TX_1A	EGPWS ARINC 429 Output (A leg)
J1-69	n/c	
J1-70	CHASSIS GND	GAMMA RS-232 Common
J1-71	GND_DISC_12	Display Select Discrete #1
J1-72	GND_DISC_09	Gray Code C4
J1-73	GND_DISC_01	Gray Code B4
J1-74	GND_DISC_13	Reserved
J1-75	CHASSIS GND	Configuration Module +5VDC Return (CM wire: Blu)
J1-76	SPIMISO	Configuration Module Serial Input (CM wire: Orn)
J1-77	SPIMOSI_CM	Configuration Module Serial Output (CM wire: Blk)
J1-78	AUD_LL_L	Low Level Audio Output – 600 Ω (-)

TABLE 3-2: PIN ASSIGNMENT FOR FRONT CONNECTORS - SORTED BY PIN NUMBER

3.11 Front View
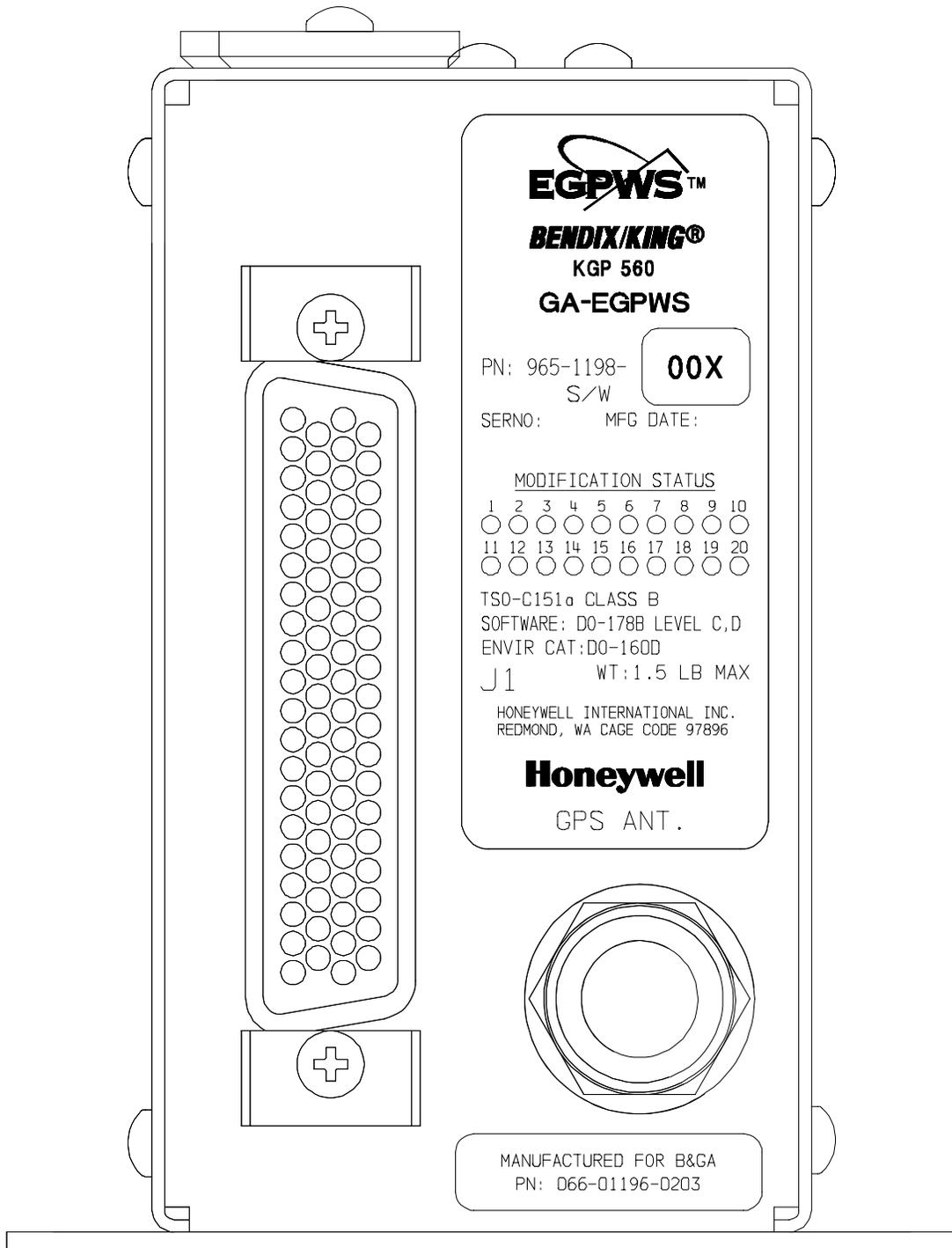
FIGURE 3-1: FRONT PANEL CONNECTOR ORIENTATION – J1 & GPS ANT
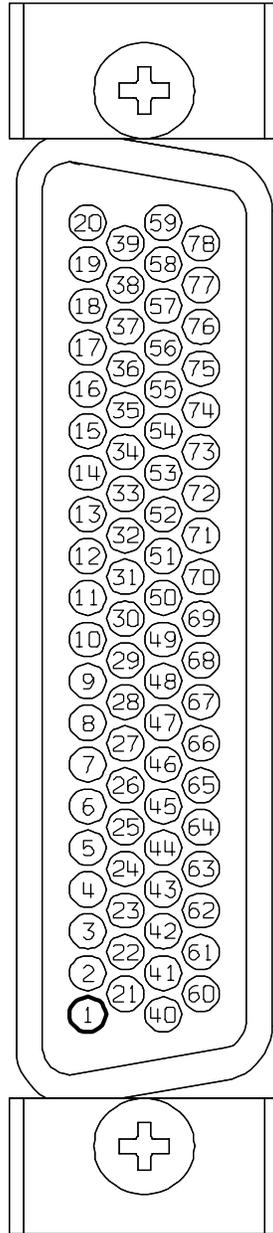
FIGURE 3-2: REAR VIEW OF J1 CONNECTOR & PIN LOCATION

3.12 Typical System Interconnect Wiring Diagram

The following installation diagram shows a GA-EGPWS installation interfaced to a dedicated blind encoder and individual lights and switches.
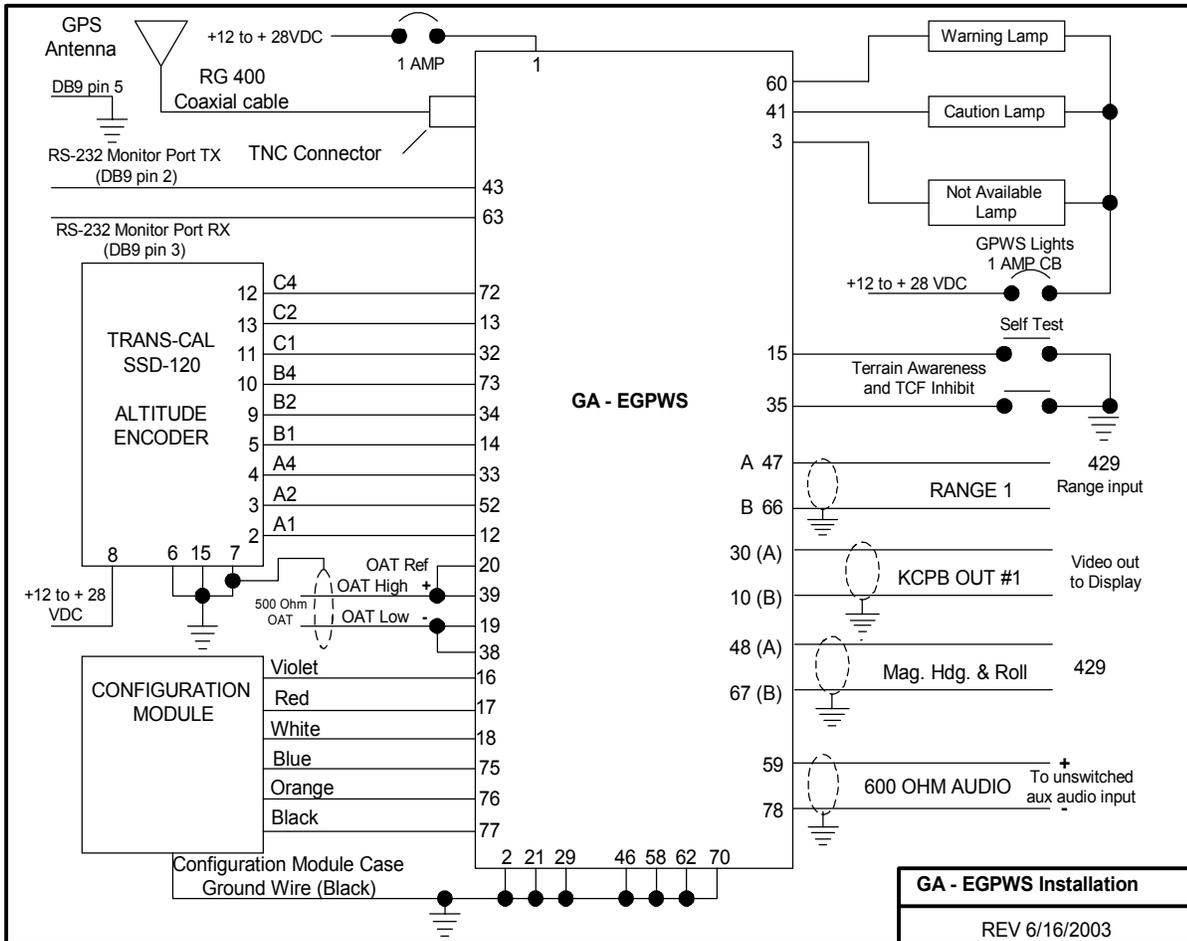
FIGURE 3-3: TYPICAL SYSTEM INTERCONNECT WIRING DIAGRAM

3.13 Interconnect Diagram

BENDIX/KING
KGP 560
GA-EGPWS
965-119X-00X

1 AMP   P5601   P5601

+14 to   01   Power Input
+28 VDC   21   Power Return
                                29   Chassis Gnd
                                38   etc.
                                46   etc.   Audio Output
                                58   etc.   600Ω (+)   59
                                62   etc.   600Ω (-)   78
                                70   etc.   Audio
         Note 3   Panel

Config.   16   Vilot
Module   17   Red
                                18   White
                                75   Blue
                                76   Orange
                                77   Black
700-1710-002   02   Case Ground Wire
         Note 4

                                     Diagnostic Computer   DB09
                                         RS 232 TX   43   02
                                         RS 232 Rx   63   03
                                          Common   62   05

                                                                    Diagnostic PC
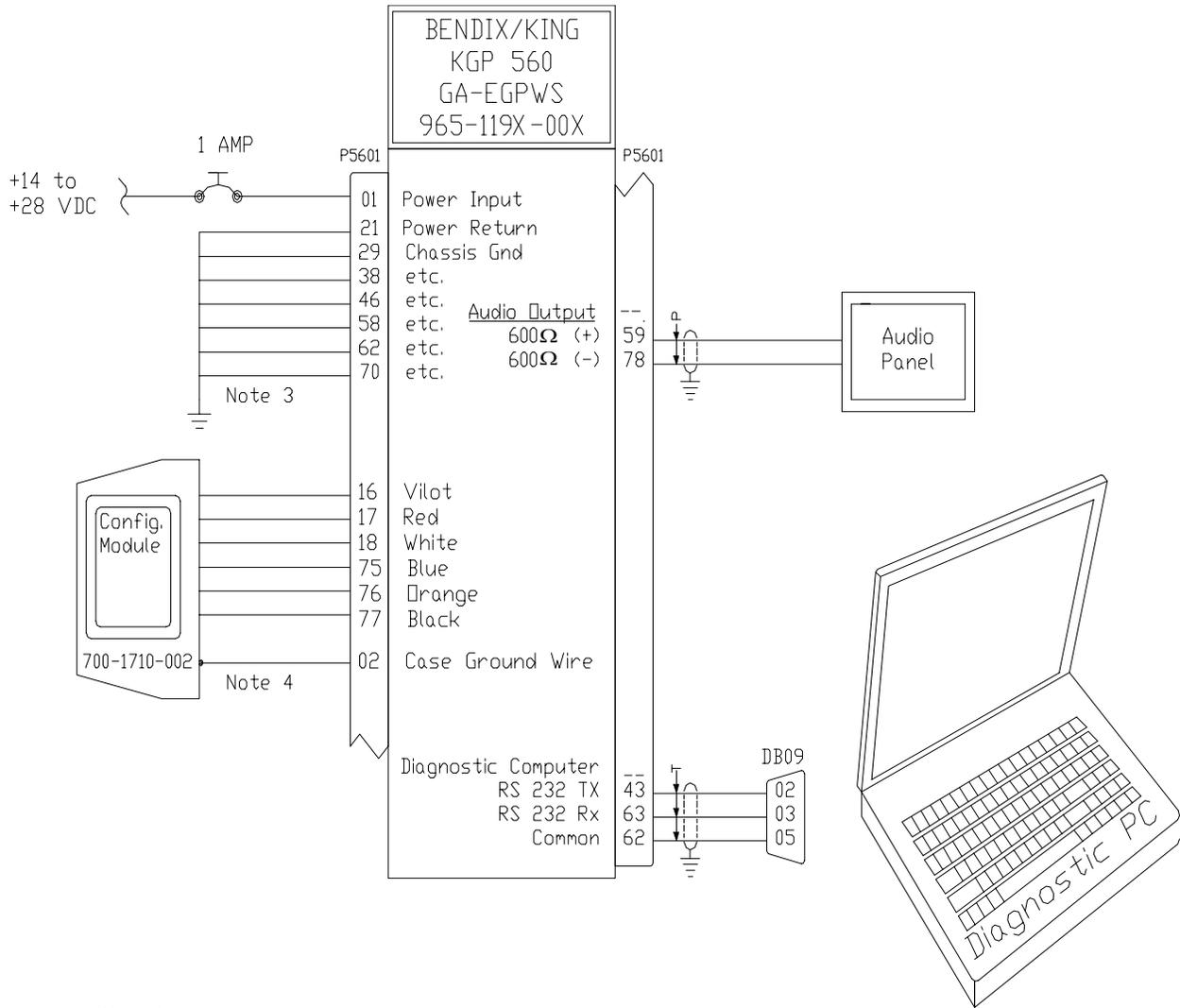
NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
    All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
    All wires are 22 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit
     pin with as short a conductor as practical.
3. Connect all un-used Chassis Grounds to Aircraft Ground.
4. Mount to mating connector backshell. Do not
     lengthen wires.

FIGURE 3-4: BASIC GA-EGPWS INTERCONNECT

AIRDATA COMPUTER	B&D 2600	B&D 2800	B&D 90004	B/K KAD 280 KDC 281	B/K KAD 480 KDC 481			BENDIX / KING KGP 560 GA-EGPWS 965-119X-00X
		P201		P2811	P4811		P5601	
LS ARINC 429/575 (A)	6	11	27	5	U	P	09	AIRDATA LS 429/575 Rx A
LS ARINC 429/575 (B)	8	28	09	6	I		28	AIRDATA LS 429/575 Rx B
See Category 2 Configuration Section for RS-422 Connection Details								
RS-422 (A)						P	45	AIRDATA RS-422 Rx A
RS-422 (B)							65	AIRDATA RS-422 Rx B
See Category 2 Configuration Section for RS-232 Connection Details								
RS-232 (Tx)							45	AIRDATA RS-232 Rx
RS-232 (Cm)							46	AIRDATA RS-232 Cm (Chassis Gnd)

GRAY CODE (Gillham) ALTITUDE	KEA 130A	KEA 346	SSD 120	AR 850	8140 B			
	P1	P1						
D4	1	A				N/C		
A1	2	B					12	A1
A2	3	C					52	A2
A4	4	M	Trans-Cal Industries	Narco	Aero Mechanisms Inc.		33	A4
B1	5	N					14	B1
B2	9	P					34	B2
B4	10	D					73	B4
C1	11	L					32	C1
C2	13	U					13	C2
C4	12	V					72	C4
SIGNAL COMMON	6	R					38	SIGNAL COMMON

500-ohm OAT probe			
	P	20	OAT Reference
		39	OAT Hi (+)
	P	19	OAT Lo (-)
		38	OAT COMMON

FIGURE 3-5: ALTITUDE SENSOR INTERCONNECT

GPS RECEIVER						BENDIX / KING KGP 560/860 GA-EGPWS 965-119X-00X
	UNS-1C P1	UNS-1D MP	UNS-1K MP	UNS-1M P2	GNS-XLS P101	P5601
LS ARINC 429 (A)	a	10J	4C	K	N5	08 GPS LS 429 Rx A
LS ARINC 429 (B)	b	10K	4D	L	N6	27 GPS LS 429 Rx B
	GNS 430/530		KLN 900	KLN 94		
RS-232 (Tx)	56		13	6		06 GPS RS-232 Rx
RS-232 (Cm)						29 GPS RS-232 Cm (Chassis Gnd)
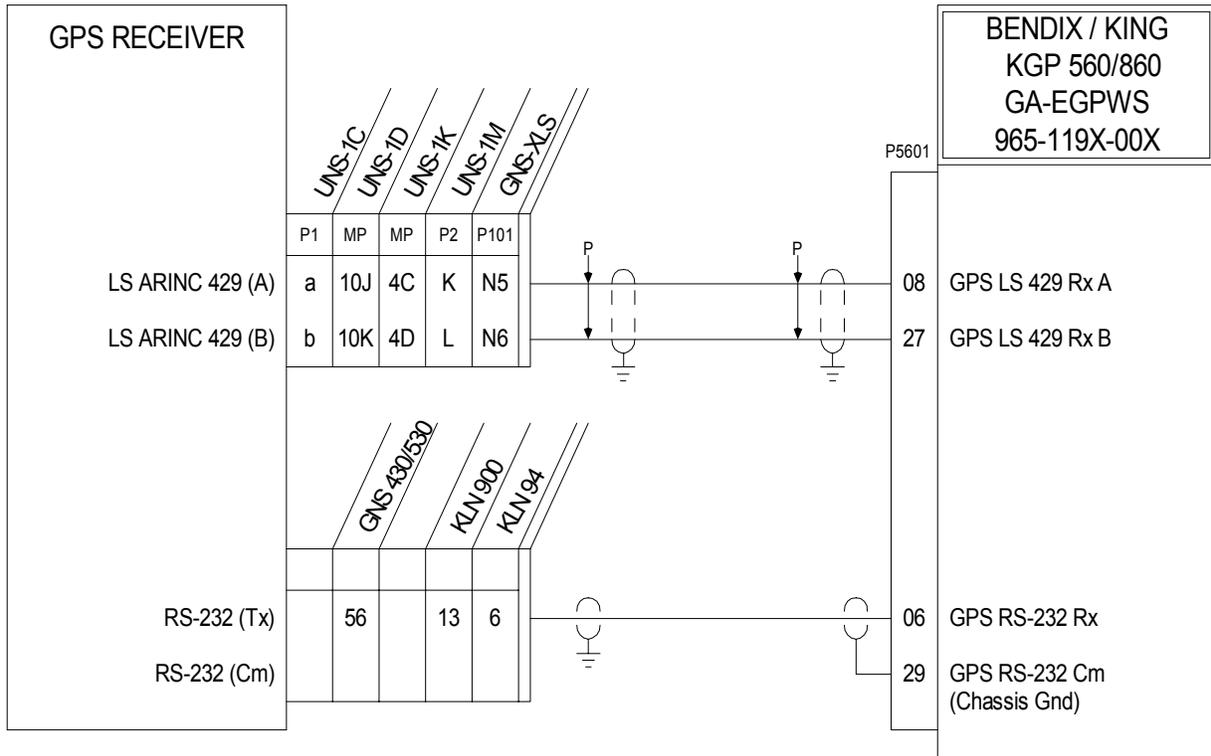
NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
    All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
    All wires are 24 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit pin with as short a conductor as practical.
3. Refer to the appropriate Installation Manual for complete instructions.
4. Low Speed ARINC 429 ONLY is accepted by the GA-EGPWS.
    Confirm that the required LS 429 labels are available from the sensor unit.

FIGURE 3-6: GPS POSITION SENSOR INTERCONNECT

Eaton 582 'C1' Series
Annunciator Switches

Bendix/King P/N 031-00810-XXXX

LEGEND
DFA = Deadface, Amber upon illumination
DFG = Deadface, Green upon illumination
DFR = Deadface, Red upon illumination
DFW = Deadface, White upon illumination
VW = Visable White Legend
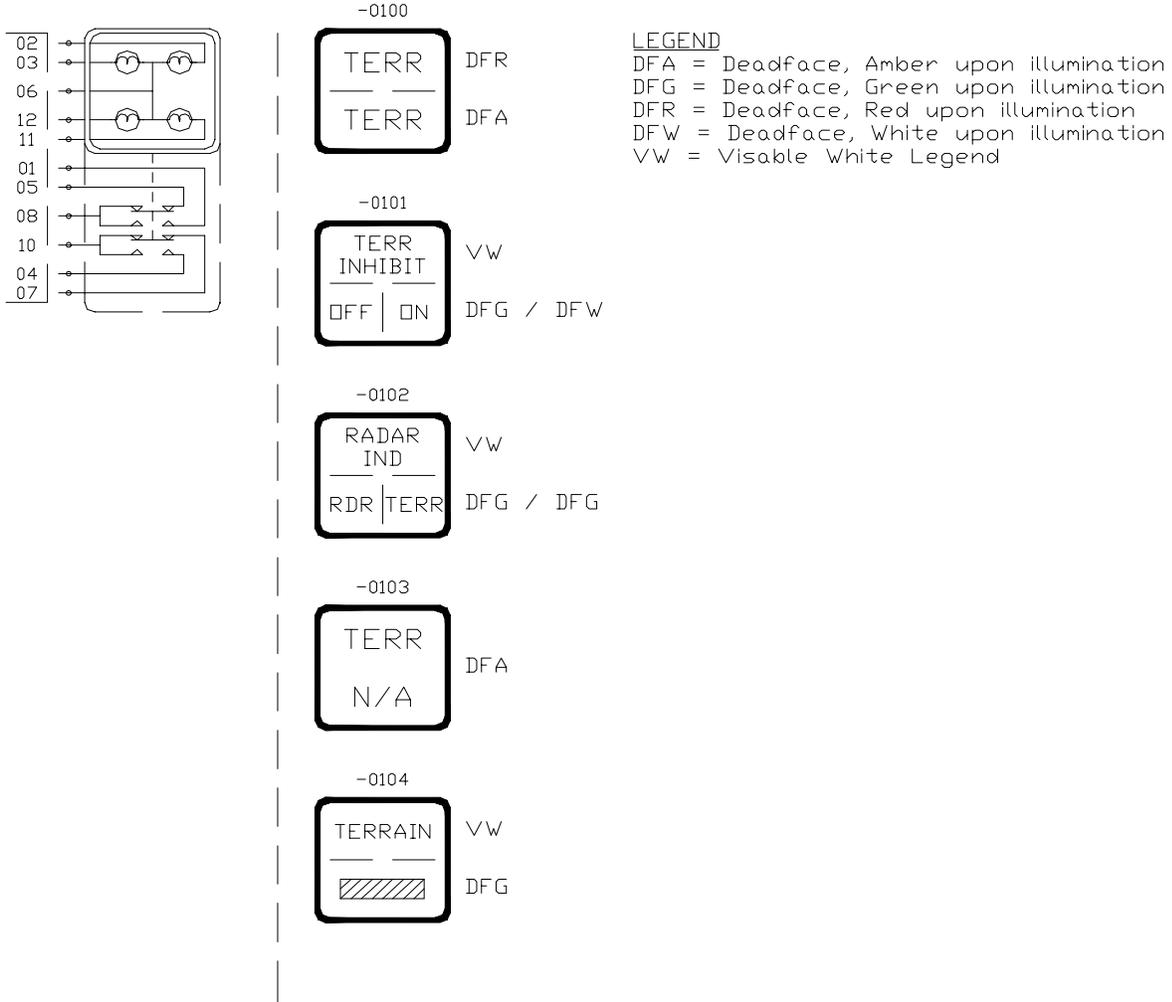
NOTES:
1. See drawing 031-00810-01 for additional details.

FIGURE 3-7: EATON ANNUNCIATOR SWITCHES
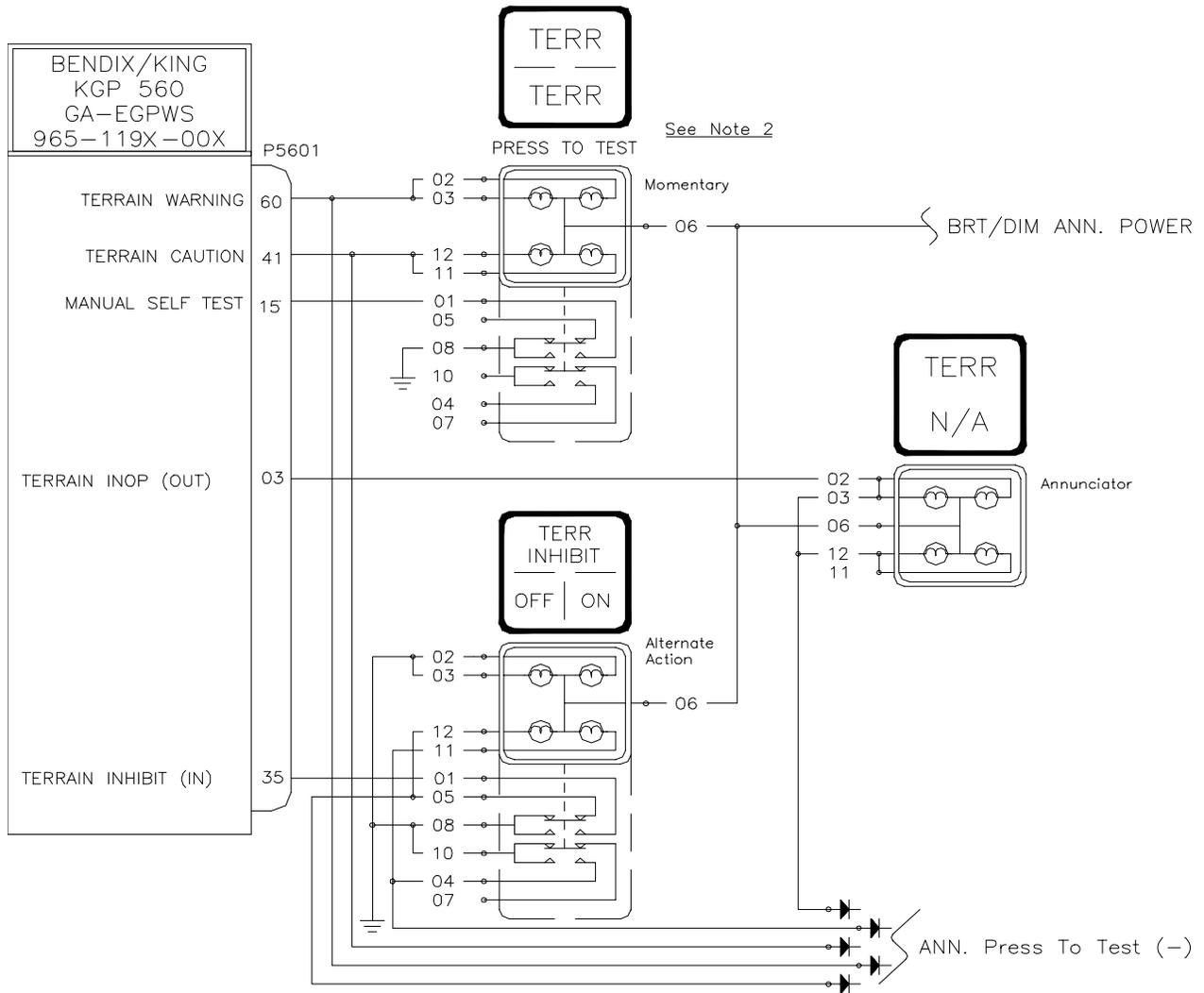
NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
    All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
    All wires are 22 gauge unless otherwise noted.
2. A momentary self test switch can be used with the
    TERR (R) / TERR (A) annunciator.
    Label the panel "PRESS TO TEST" or "GPWS TEST."

FIGURE 3-8: TERRAIN ANNUNCIATOR & SWITCHES INTERCONNECT
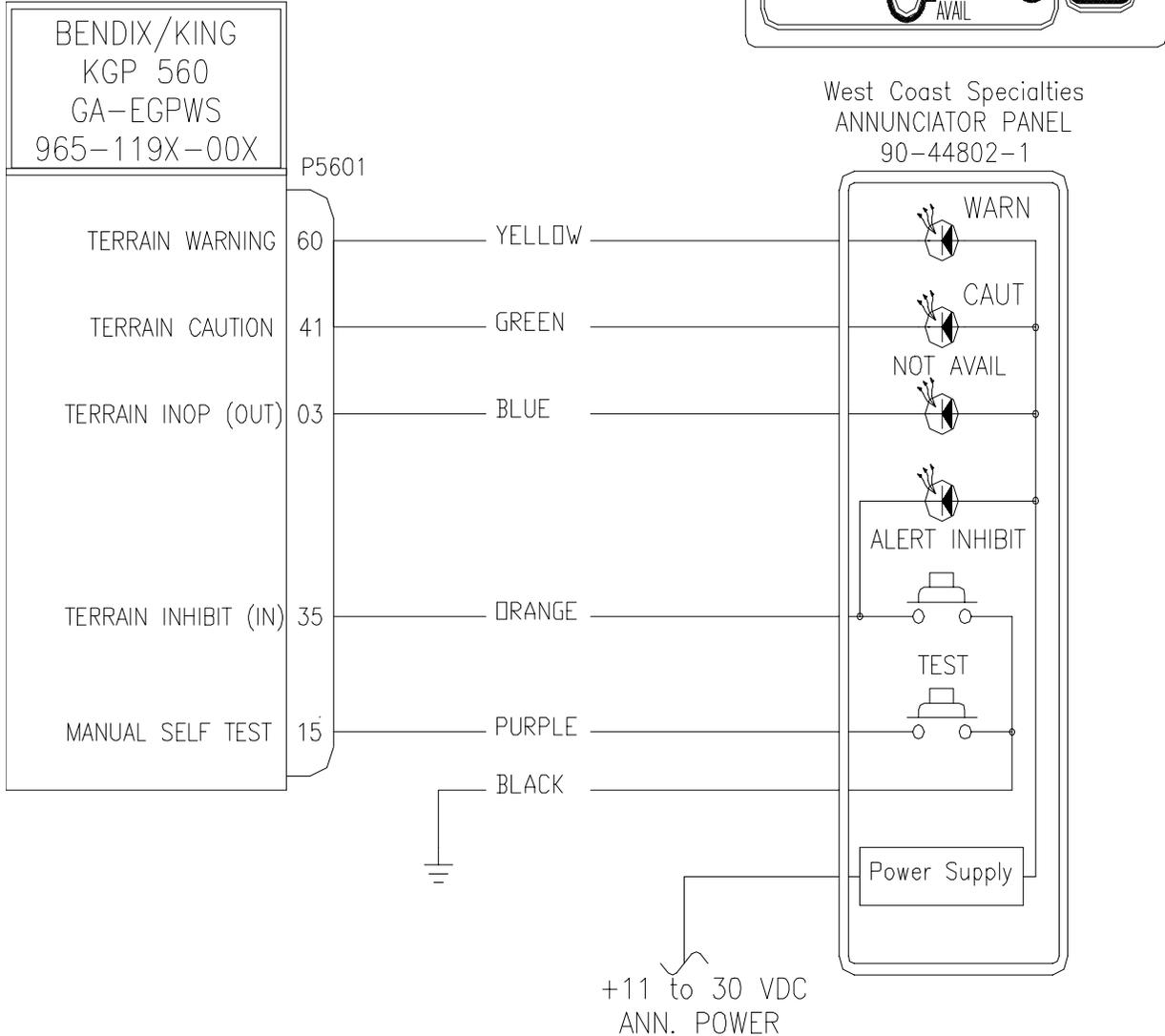
FIGURE 3-9: WEST COAST SPECIALTIES ANNUNCIATOR INTERCONNECT

NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
   All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
   All wires are 22 gauge unless otherwise noted.

TERR N/A

TERR

TERR

TEST

TERR
INHB

TERR
INHB

Mid-Continent Instrument
TERRAIN AWARENESS CONTROL UNIT
MD 41-1208

BENDIX/KING
KGP 560
GA-EGPWS
965-119X-00X

P5601

TERRAIN WARNING (OUT)	60	11
TERRAIN CAUTION (OUT)	41	05
TERRAIN INOP (OUT)	03	10
MANUAL SELF TEST (IN)	15	19
TERRAIN INHIBIT (IN)	35	20
WX/TERR SELECT (IN)	71	18
WX/TERR SELECT (OUT)	61	04

25 SHIELD GROUND
24 SHIELD GROUND
23 SHIELD GROUND
22 SHIELD GROUND
21 POWER GROUND

12 INTERNAL DIM OUT
09 LIGHTING LOW
08 0-28VDC PNL LIGHTING
07 BRT/DIM ANN. INPUT
06 ANN. PRESS TO TEST (IN)

13 +28 ANN. POWER INPUT
17 +28 EGPWS POWER INPUT

SEE NOTE 3

+28 VDC
POWER

+28 ANN.
POWER

ANNUNCIATOR
PRESS TO TEST
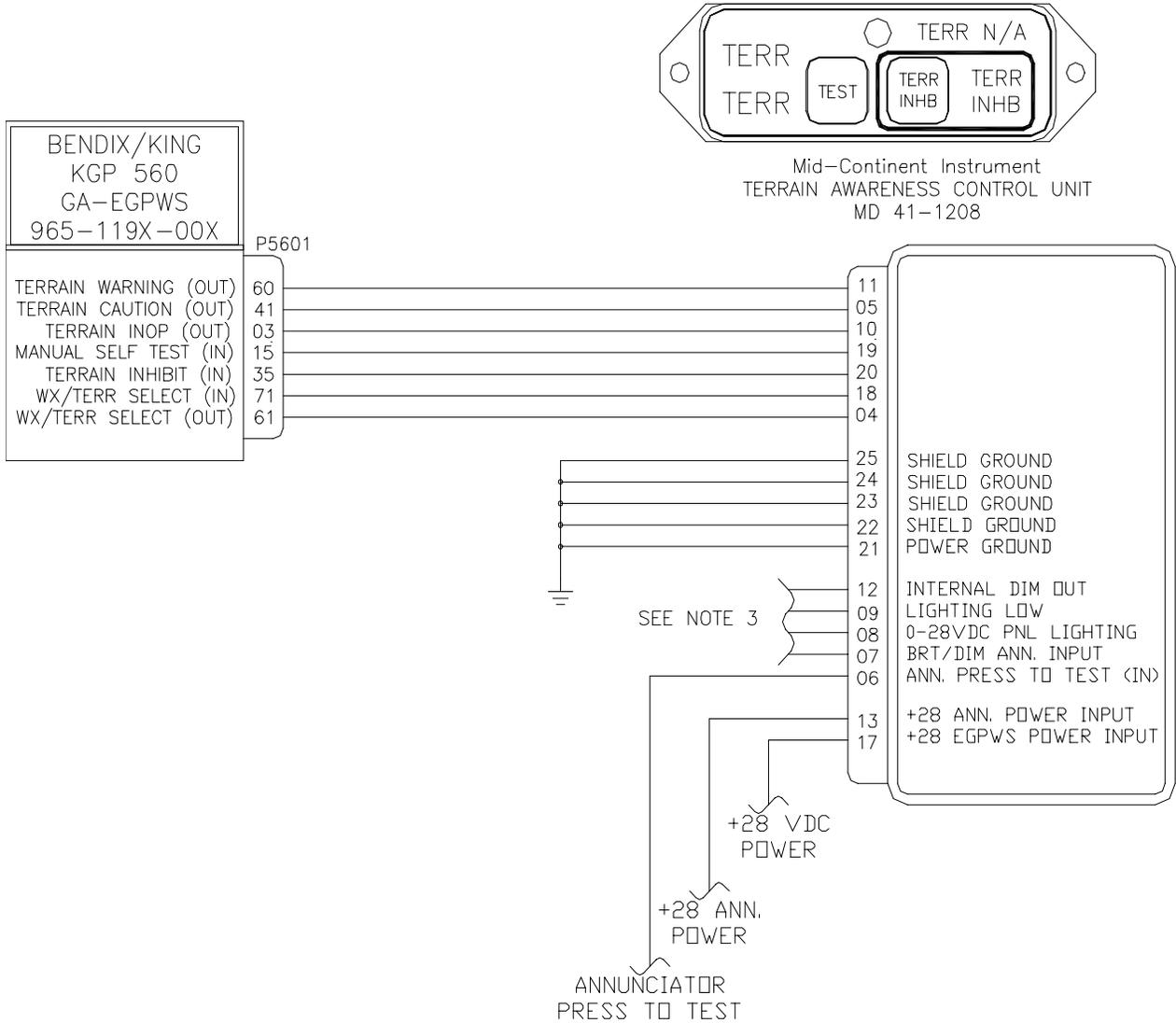
NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
   All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
   All wires are 22 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit
   pin with as short a conductor as practical.
3. Refer to the appropriate Data Sheets & Installation Manuals
   for complete details.

FIGURE 3-10: MID-CONTINENT MD 41-1208 INTERCONNECT
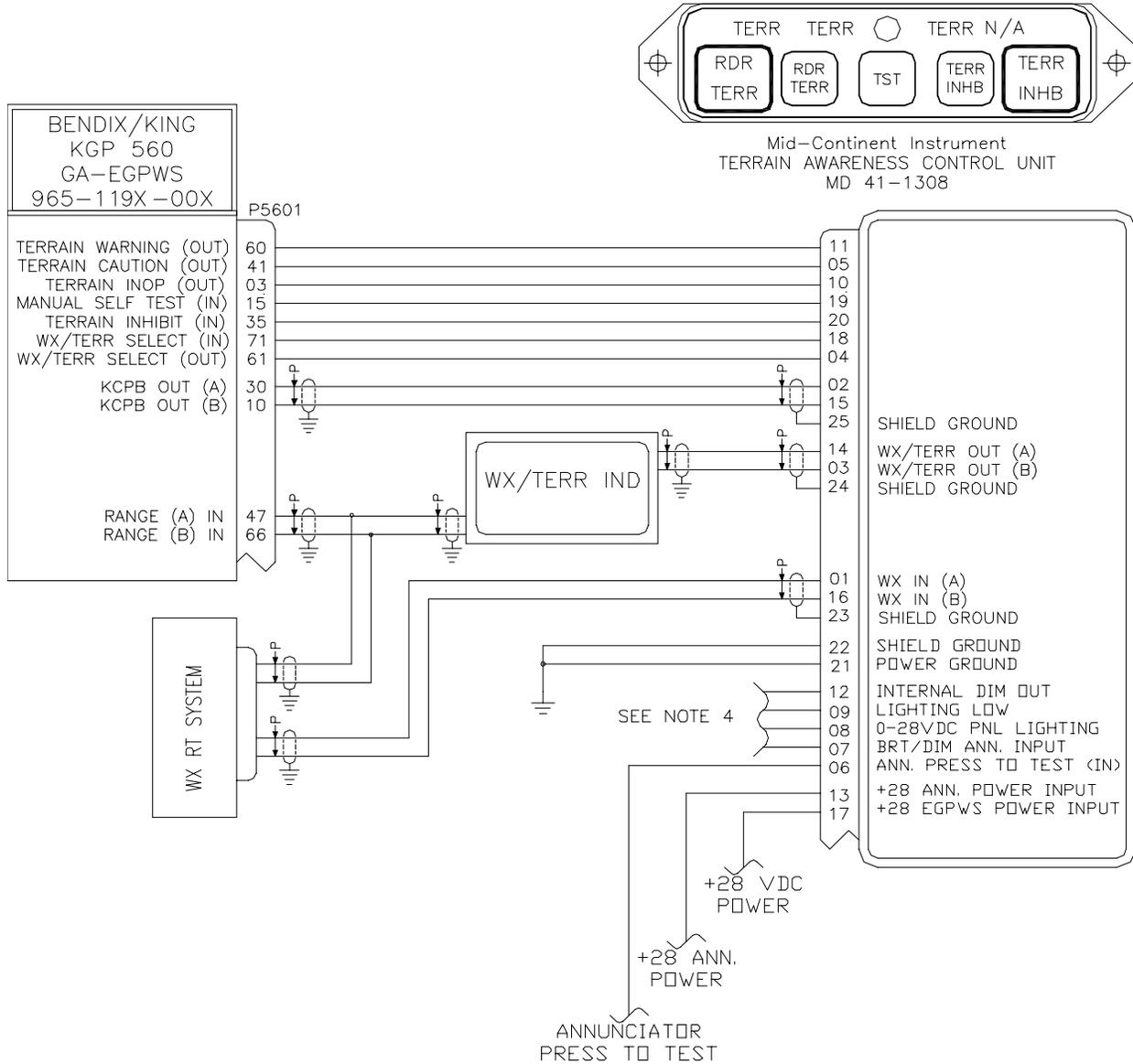
FIGURE 3-11: MID-CONTINENT MD 41-1308 INTERCONNECT

NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
   All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
   All wires are 22 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit
   pin with as short a conductor as practical.
3. Use M17/00002 wire per MIL-C-17/176D spec. or equivalent
   for the KCPB interface.
4. Refer to the appropriate Data Sheets & Installation Manuals
   for complete details.
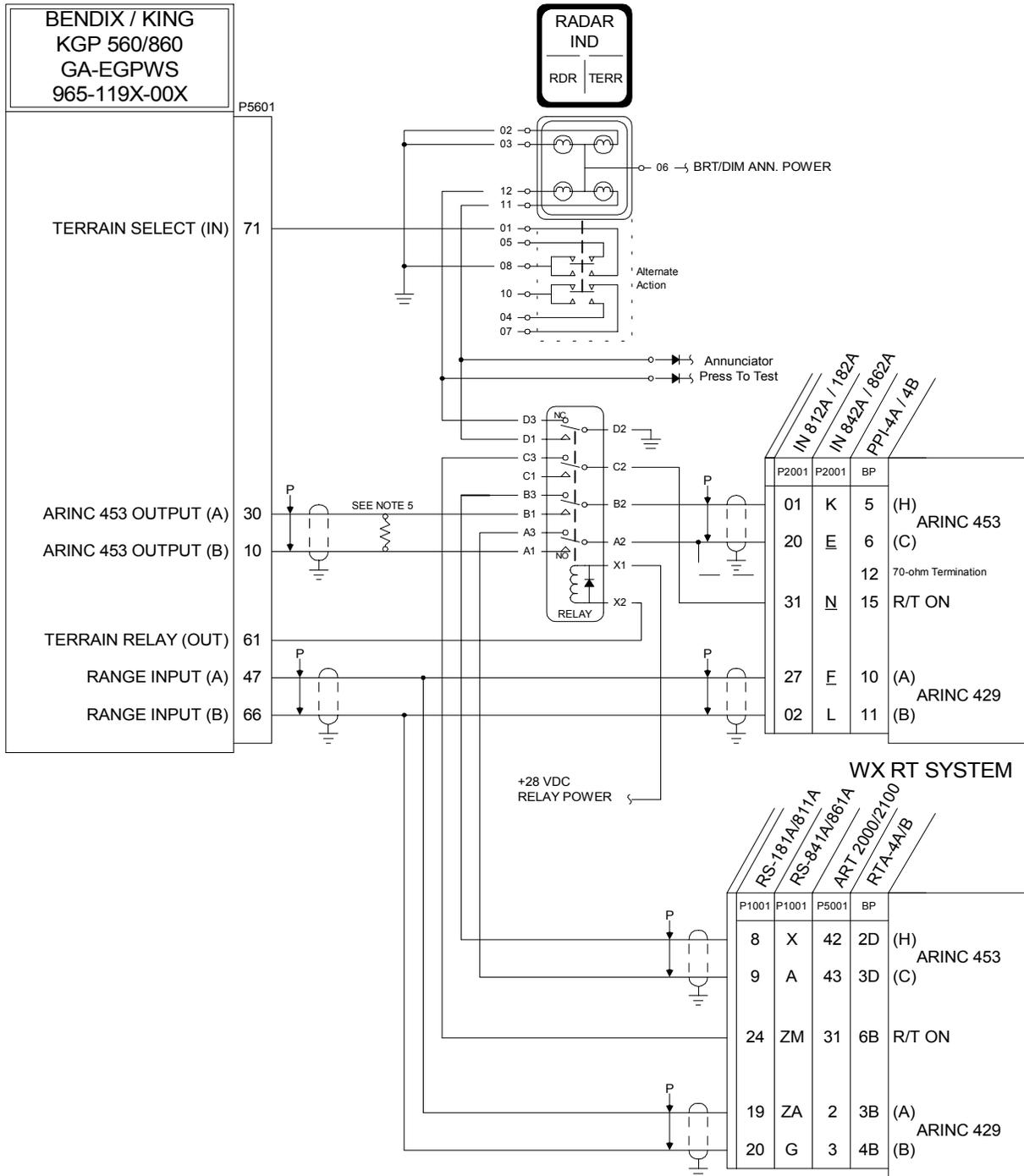
FIGURE 3-12: BENDIX/KING WX RADAR INDICATOR INTERCONNECT

```
┌─────────────────────┐                              ┌─────────────────────┐
│   BENDIX/KING       │                              │   BENDIX/KING       │
│    KGP 560          │                              │    KMD 540          │
│   GA-EGPWS          │                              │ MULTI-FUNCTION      │
│  965-119X-00X       │ J1                           │    DISPLAY          │
├─────────────────────┤                              ├─────────────────────┤
│ KCPB OUTPUT (A)  30 │────────────────────────── 12 │ KCPB INPUT (A)      │
│ KCPB OUTPUT (B)  10 │────────────────────────── 13 │ KCPB INPUT (B)      │
│                     │                           31 │ KCPB SHIELD         │
│                     │                              │                     │
│ RANGE INPUT (A)  47 │────────────────────────── 29 │ RANGE OUTPUT (A)    │
│ RANGE INPUT (B)  66 │────────────────────────── 30 │ RANGE OUTPUT (B)    │
│                     │                           11 │ RANGE SHIELD        │
└─────────────────────┘                              └─────────────────────┘
```

NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
   All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
   All wires are 22 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit
   pin with as short a conductor as practical.
3. Use M17/00002 wire per MIL-C-17/176D spec. or equivalent
   for the KCPB interface.
4. Refer to the appropriate Installation Manual
   for configuration setup instructions.
5. The KMD 540 must have the KAC 502 EGPWS card
   installed for the Terrain Display function.

FIGURE 3-13: KMD 540 MULTI-FUNCTION DISPLAY INTERCONNECT

```
┌─────────────────────┐                              ┌─────────────────────┐
│   BENDIX/KING       │                              │   HONEYWELL         │
│    KGP 560          │                              │    TRA 45A          │
│   GA-EGPWS          │                              │ TERRAIN DISPLAY     │
│  965-119X-00X       │ J1                           │  80-5145-X-X        │
├─────────────────────┤            NOTE 5 ────────┬──┼─────────────────────┤
│                     │                        02 │  │ KCPB INPUT (B)      │
│ KCPB OUTPUT (A)  30 │────────────────────────── 01 │ KCPB INPUT (A)      │
│ KCPB OUTPUT (B)  10 │────────────────────────── 03 │ KCPB INPUT (B)      │
│                     │                              │                     │
│ RANGE INPUT (A)  47 │────────────────────────── 28 │ RANGE OUTPUT (A)    │
│ RANGE INPUT (B)  66 │────────────────────────── 13 │ RANGE OUTPUT (B)    │
└─────────────────────┘                              └─────────────────────┘
```

NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
   All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
   All wires are 22 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit
   pin with as short a conductor as practical.
3. Use M17/00002 wire per MIL-C-17/176D spec. or equivalent
   for the KCPB interface.
4. Refer to the appropriate Installation Manual
   for complete instructions.
5. See the TRA Installation Manual when installing more than
   one Terrain Display. Pin 3 is a terminated impedance for
   the video bus and pin 2 is un-terminated.

FIGURE 3-14: TRA 45A TERRAIN/RAD ALT DISPLAY INTERCONNECT

```
┌─────────────────────┐                                              ┌─────────────────────┐
│    BENDIX/KING       │                                              │     AVIDYNE          │
│     KGP 560          │                                              │   5RR-MFC-XXX        │
│    GA-EGPWS          │                                              │  FLIGHTMAX FSD       │
│   965-119X -00X      │                                              │                      │
├─────────────────┐ J1 │                                           P5 ├──────────────────────┤
│                 │    │                                              │                      │
│ KCPB OUTPUT (A) │ 30 │────────────────────────────────────────── 04 │ KCPB INPUT (A)       │
│ KCPB OUTPUT (B) │ 10 │────────────────────────────────────────── 22 │ KCPB INPUT (B)       │
│                 │    │                                              │                      │
│ RANGE INPUT (A) │ 47 │────────────────────────────────────────── 17 │ RANGE OUTPUT (A)     │
│ RANGE INPUT (B) │ 66 │────────────────────────────────────────── 35 │ RANGE OUTPUT (B)     │
│                 │    │                                              │                      │
└─────────────────┘    │                                              └──────────────────────┘
```

NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
   All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
   All wires are 22 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit
   pin with as short a conductor as practical.
3. Use M17/00002 wire per MIL-C-17/176D spec. or equivalent
   for the KCPB interface.
4. Refer to the appropriate Installation Manual
   for complete instructions.

FIGURE 3-15: AVIDYNE 850/750 FSD INTERCONNECT
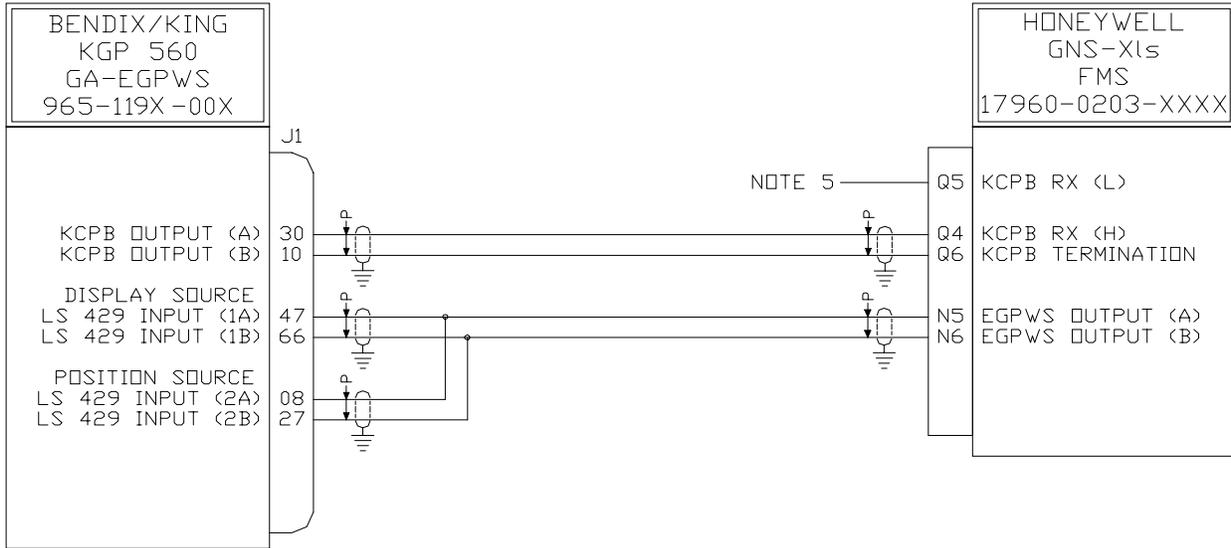
```
┌─────────────────────┐                                              ┌─────────────────────┐
│    BENDIX/KING       │                                              │     HONEYWELL        │
│     KGP 560          │                                              │     GNS-Xls          │
│    GA-EGPWS          │                                              │       FMS            │
│   965-119X -00X      │                                              │  17960-0203-XXXX     │
├─────────────────┐ J1 │                                              ├──────────────────────┤
│                 │    │                           NOTE 5 ────────── Q5 │ KCPB RX (L)          │
│                 │    │                                              │                      │
│ KCPB OUTPUT (A) │ 30 │────────────────────────────────────────── Q4 │ KCPB RX (H)          │
│ KCPB OUTPUT (B) │ 10 │────────────────────────────────────────── Q6 │ KCPB TERMINATION     │
│                 │    │                                              │                      │
│ DISPLAY SOURCE  │    │                                              │                      │
│ LS 429 INPUT(1A)│ 47 │────────────────────────────────────────── N5 │ EGPWS OUTPUT (A)     │
│ LS 429 INPUT(1B)│ 66 │────────────────────────────────────────── N6 │ EGPWS OUTPUT (B)     │
│                 │    │                                              │                      │
│ POSITION SOURCE │    │                                              │                      │
│ LS 429 INPUT(2A)│ 08 │                                              │                      │
│ LS 429 INPUT(2B)│ 27 │                                              │                      │
│                 │    │                                              └──────────────────────┘
└─────────────────┘    │
```

NOTES:
1. All stranded wire shall conform to MIL-W-22759/16 or equivalent.
   All shielded wire shall conform to MIL-C-27500 spec. or equivalent.
   All wires are 22 gauge unless otherwise noted.
2. Connect the shield to aircraft chassis or unit
   pin with as short a conductor as practical.
3. Use M17/00002 wire per MIL-C-17/176D spec. or equivalent
   for the KCPB interface.
4. Refer to the appropriate Installation Manual
   for complete instructions.
5. See the GNS-Xls Install Manual when installing more than one
   terrain display. Pin Q6 is a terminated impedance for the
   video bus and pin Q5 is un-terminated.

FIGURE 3-16: GNS-XLS INTERCONNECT
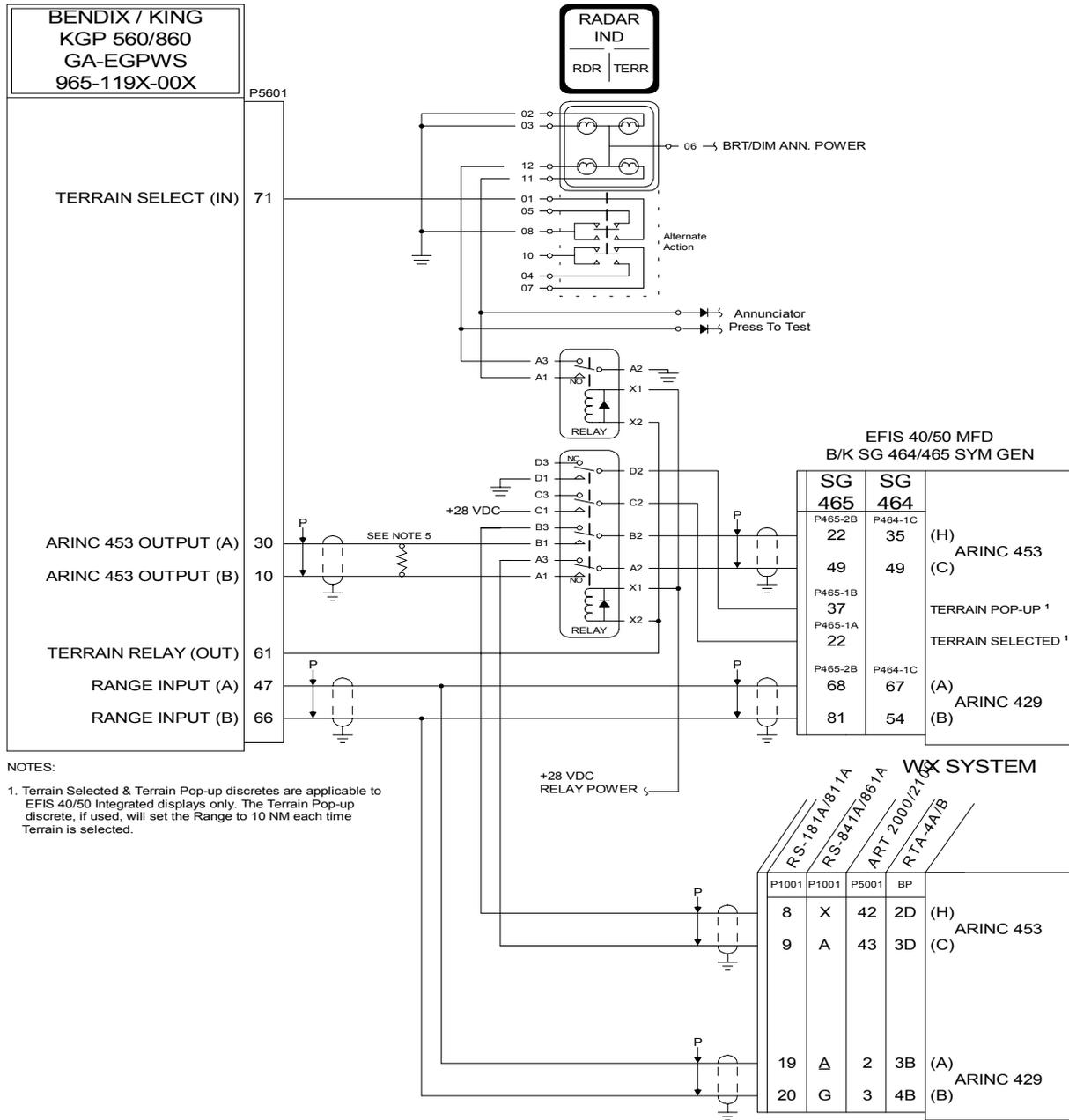
FIGURE 3-17: BENDIX/KING EFIS 40/50 INTERCONNECT

NOTES:

1. Terrain Selected & Terrain Pop-up discretes are applicable to EFIS 40/50 Integrated displays only. The Terrain Pop-up discrete, if used, will set the Range to 10 NM each time Terrain is selected.

4 SECTION IV – SYSTEM INSTALLATION DESIGN

4.1 Introduction

For proper operation the KGP-560 GA-EGPWS must be programmed to select optional configuration items. This section will present the detail necessary to make the required configurable selections. The KGP-560 has numerous configurable Categories. A selection ID from each of these Categories must be identified and then programmed into the configuration module per the procedure in Section 5. It is recommended that the Category ID Selection Table (Section 4.3) be filled out and available for reference during the Configuration Module programming (Section 5.4.6).

4.2 Configuration Types (Categories)

The selection of the basic interfaces to the GA-EGPWS can be found in the following categories:

Aircraft / Mode Type	Category 1
Air Data Input Type	Category 2
Position Input Type	Category 3
Terrain Display Type	Category 4
I / O Discretes Type	Category 5
Audio Menu Type	Category 6
Audio Output Level Type	Category 7
Altitude Monitor / MSL Select Type	Category 8
Options Select Type	Category 9
Attitude & Heading Select Type	Category 10
Display Options Type	Category 11

4.3 Design/Planning System Configuration Identification (ID) Selection

These following sections define how the Category ID's are selected for the interface to aircraft sensors and how to select GA-EGPWS performance options. This section and its sub-sections define the specific aircraft applications of the GA-EGPWS. The method to select the Configuration Identification (ID) for each Category Type on a given aircraft installation is with the information in this document and the following table. This table provides the procedure to determine the Configuration ID selection required for any given aircraft installation.

Category	Signal Selection	Instructions		Ident No.
1	Selects: a) Aircraft Type b) Mode Type	Using Table 4-2 and any sub-tables contained within, locate the Aircraft / Mode Type.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
2	Selects: a) Air Data Source	Using Table 4-3 and any sub-tables contained within locates the desired Air Data signal type.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
3	Selects: a) Position Source	Using Table 4-18 and any sub-tables contained within locates the desired Position signal type.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
4	Selects: a) Display Config.	Using Table 4-24 and any sub-tables contained within, locate the desired Display indicator type / range bus type.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
5	Selects: a) Input Discrete Functions b) Output Discrete Functions	Using Table 4-25 and any sub-tables contained within, locate the desired I / O Discrete type.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
6	Selects: a) Audio Menu	Using **Error! Not a valid result for table.** and any sub-tables contained within, locate the desired Audio Menu type.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
7	Selects: a) Audio Output Level	Using Table 4-27 and any sub-tables contained within locates the desired Volume type.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
8	Selects: a) Geo. Alt. Display Label Text b) Altitude Monitor Display Disable c) Altitude Monitor Callout Disable d) Altitude Monitor Display Disable	Using Table 4-28 and any sub-tables contained within, select the desired True or False condition for Altitude Monitor Display Disable, Altitude Monitor Callout Disable, and Altitude Monitor Disable.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
9	Selects: a) TA&D Alternate Pop Up	Using Table 4-29 and any sub-tables contained within, select the desired True or False condition for TA&D Alternate Pop Up.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
10	Selects: Attitude and Heading source	Using Table 4-30 and any sub-tables contained within, select the desired Roll and Heading sources	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #
11	Selects: Display Options	Using Table 4-39 and any sub-tables contained within, select the desired display operation.	Record the Ident (ID No.) on the space available on Ident column of this table.	_____ ID #

TABLE 4-1: CATEGORY ID SELECTION TABLE

4.3.1 Configuration Selection Tables

The category columns define a category (or group) of functions or input devices that are selected through ID numbers. The Category number identifies the subsection where the details are defined. For example Air Data, Category 2, is defined in Section 4.3.1.2 and Position Input Source, Category 3, is defined in Section 4.3.1.3.

4.3.1.1 Category 1, Aircraft / Mode Type Select

The following table provides identification of the basic mode types and associated parameters. In this category only the following parameters are to be defined:

- Basic mode alert and warning thresholds and Mode 4 curve set (gear & flap alerts).

ID	Aircraft / Mode Type	Description	SW Effectivity
0	0	TSO-C151b Class B curve set	-001
1	1	TSO-C151b Class C curve set	-001
2	2	TSO-C151b Class B curve set with Mode 4	-005
3	3	TSO-C151b Class C curve set with Mode 4	-005

Note: When selecting ID 0 or 2, Category 6 (Audio Menu Select) must select ID #1 (Alternate) in order to be in compliance with TSO-C151b.

TABLE 4-2: AIRCRAFT / MODE TYPE SELECT

4.3.1.2 Category 2, Air Data Input Select

The following table provides identification of the Air Data source type. In this category only the following parameters are to be defined:

- Gillham/Gray coded altitude, uncorrected altitude or Baro altitude in an ARINC 429 or RS-232/422 format. OAT Temperature probe, Static Air Temperature (SAT) or additional items available from certain air data systems.

Note: Data update rates listed in the tables below are the slowest acceptable rate.

ID	Air Data Type See Tables Below	Static Air Temperature Type See Tables Below	Description	SW Effectivity
0	1	None	Altitude Encoder (9 wire Gillham/Gray coded altitude)	-001
1	1	T1	Altitude Encoder (9 wire Gillham/Gray coded altitude) with 500Ω OAT Temperature Probe	-001
2	2	T2	Digital – ARINC 429 (Baro Alt & SAT)	-001
3	3	T2	Digital – ARINC 429 (Baro Alt, Baro Rate, Corrected Altitude, & SAT)	-001
4	2	None	Digital – ARINC 429 (Baro Alt)	-003
5	3	None	Digital – ARINC 429 (Baro Alt, Baro Rate, & Corrected Altitude)	-003
6	4	None	Digital – ARINC 429 (Baro Alt & Baro Rate)	-003
7	4	T2	Digital – ARINC 429 (Baro Alt, Baro Rate, & SAT)	-003
8	5	None	RS-232/422 Air Data Computer (Shadin 200)	-003
9	5	T3	RS-232/422 Air Data Computer (Shadin 200) with SAT	-003
10	6	None	RS-232 Encoded Altitude (Shadin Digitizers For UPS/Appollo at 1200 bps)	-003
11	6	T1	RS-232 Encoded Altitude ((Shadin Digitizers For UPS/Appollo at 1200 bps) with 500Ω OAT Temperature Probe	-003
12	7	None	RS-232 Encoded Altitude (Shadin 17 Byte at 9600 bps)	-003
13	7	T1	RS-232 Encoded Altitude (Shadin 17 Byte at 9600 bps) with 500Ω OAT Temperature Probe	-003
14	8	None	RS-232 Encoded Altitude (ICARUS Altitude (10 Byte) at 9600 bps)	-003
15	8	T1	RS-232 Encoded Altitude (ICARUS Altitude (10 Byte) at 9600 bps) with 500Ω OAT Temperature Probe	-003
16	9	None	RS-232 Encoded Altitude (Northstar/Garmin at 2400 bps)	-003
17	9	T1	RS-232 Encoded Altitude (Northstar/Garmin at 2400 bps) with 500Ω OAT Temperature Probe	-003
18	10	None	RS-232 Encoded Altitude (Magellan at 1200 bps)	-003
19	10	T1	RS-232 Encoded Altitude (Magellan at 1200 bps) with 500Ω OAT Temperature Probe	-003
20	11	None	RS-232 Encoded Altitude (ARNAV at 9600 bps)	-003
21	11	T1	RS-232 Encoded Altitude (ARNAV at 9600 bps) with 500Ω OAT Temperature Probe	-003

TABLE 4-3: AIR DATA INPUT SELECT

PIN FUNCTION	CONNECTION	PIN TYPE	CHANNEL DESIGNATION REFERENCE	Polarity/Configuration
Gray Code C4	J1-72	Input	GND_DISC_09	GND = Active <not> GND = Inactive
Gray Code C2	J1-13	Input	GND_DISC_10	GND = Active <not> GND = Inactive
Gray Code C1	J1-32	Input	GND_DISC_11	GND = Active <not> GND = Inactive
Gray Code B4	J1-73	Input	GND_DISC_01	GND = Active <not> GND = Inactive
Gray Code B2	J1-34	Input	GND_DISC_02	GND = Active <not> GND = Inactive
Gray Code B1	J1-14	Input	GND_DISC_03	GND = Active <not> GND = Inactive
Gray Code A4	J1-33	Input	GND_DISC_04	GND = Active <not> GND = Inactive
Gray Code A2	J1-52	Input	GND_DISC_05	GND = Active <not> GND = Inactive
Gray Code A1	J1-12	Input	GND_DISC_06	GND = Active <not> GND = Inactive

TABLE 4-4: AIR DATA TYPE 1

CHANNEL 429RX_3	CONNECT TO: ADC #1 Format: ARINC 429 (Low Speed)	Fault Designation: AIR DATA BUS Bus Type: Basic					
A = J1-9 B = J1-28	Data Uncorrected. Baro. Alt	Label 203	Sig. Bits 17	Range ±131,072 FT	Signal Type Basic	Resolution 1.0	Rate (ms) 1000

TABLE 4-5: AIR DATA TYPE 2

CHANNEL 429RX_3	CONNECT TO: ADC #1 Format: ARINC 429 (Low Speed)	Fault Designation: AIR DATA BUS Bus Type: Basic					
A = J1-9 B = J1-28	Data Uncorrected. Baro. Alt Corrected Baro. Alt Barometric Rate	Label 203 204 212	Sig. Bits 17 17 11	Range ±131,072 FT ±131,072 FT ±32678 FPM	Signal Type Basic Basic Basic	Resolution 1.0 1.0 16.0	Rate (ms) 1000 1000 1000

TABLE 4-6: AIR DATA TYPE 3

CHANNEL 429RX_3	CONNECT TO: ADC #1 Format: ARINC 429 (Low Speed)	Fault Designation: AIR DATA BUS Bus Type: Basic					
A = J1-9 B = J1-28	Data Uncorrected. Baro. Alt Barometric Rate	Label 203 212	Sig. Bits 17 11	Range ±131,072 FT ±32678 FPM	Signal Type Basic Basic	Resolution 1.0 16.0	Rate (ms) 1000 1000

TABLE 4-7: AIR DATA TYPE 4

CHANNEL ADC_RXA ADC_RXB	CONNECT TO: ADC Format: RS-422 (9600 BPS 8bit None)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RXA = J1-45 RXB = J1-65	Data Pressure Altitude Pressure Alt Checksum Barometric Rate Baro Rate Checksum	ID/byte 64-69 70 94-98 99	Sig. Bits N/A N/A N/A N/A	Range -1000 – 55K N/A ± 100 FPS N/A	Signal Type Basic Basic Basic Basic	Resolution 1 foot N/A 1 FPS N/A	Rate (ms) 1600 1600 1600 1600

TABLE 4-8: AIR DATA TYPE 5

CHANNEL ADC_RXA CHA_GND	CONNECT TO: ADC Format: RS-232 (1200 BPS 8bit None)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RX = J1-45 Com = J1-46	Data Uncorrected. Baro. Alt	ID/byte #AL<sp>	Sig. Bits 5	Range -1000 – 30000	Signal Type Basic	*Resolution 1 foot	Rate (ms) 1000

* Indicates scaling resolution. Actual altitude resolution may be as coarse as 100 feet.

TABLE 4-9: AIR DATA TYPE 5

CHANNEL ADC_RXA CHA_GND	CONNECT TO: ADC Format: RS-232 (9600 BPS 8bit None)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RX = J1-45 Com = J1-46	Data Uncorrected. Baro. Alt	ID/byte RMS<sp>	Sig. Bits 5	Range -1000 – 30000	Signal Type Basic	*Resolution 1 foot	Rate (ms) 1000

* Indicates scaling resolution. Actual altitude resolution may be as coarse as 100 feet.

TABLE 4-10: AIR DATA TYPE 7

CHANNEL ADC_RXA CHA_GND	CONNECT TO: ADC Format: RS-232 (9600 BPS 8bit None)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RX = J1-45 Com = J1-46	Data Uncorrected. Baro. Alt	ID/byte ALT	Sig. Bits 5	Range -1000 – 30000	Signal Type Basic	*Resolution 1 foot	Rate (ms) 1000

* Indicates scaling resolution. Actual altitude resolution may be as coarse as 100 feet.

TABLE 4-11: AIR DATA TYPE 8

CHANNEL ADC_RXA CHA_GND	CONNECT TO: ADC Format: RS-232 (2400 BPS 8bit None)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RX = J1-45 Com = J1-46	Data Uncorrected. Baro. Alt	ID/byte ALT	Sig. Bits 5	Range -1000 – 30000	Signal Type Basic	*Resolution 1 foot	Rate (ms) 1000

* Indicates scaling resolution. Actual altitude resolution may be as coarse as 100 feet.

TABLE 4-12: AIR DATA TYPE 9

CHANNEL ADC_RXA CHA_GND	CONNECT TO: ADC Format: RS-232 (1200 BPS 7bit Odd)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RX = J1-45 Com = J1-46	Data Uncorrected. Baro. Alt	ID/byte $MGL	Sig. Bits 5	Range -1000 – 30000	Signal Type Basic	*Resolution 1 foot	Rate (ms) 1000

* Indicates scaling resolution. Actual altitude resolution may be as coarse as 100 feet.

TABLE 4-13: AIR DATA TYPE 10

CHANNEL ADC_RXA CHA_GND	CONNECT TO: ADC Format: RS-232 (9600 BPS 8bit None)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RX = J1-45 Com = J1-46	Data Uncorrected. Baro. Alt	ID/byte $PASHS	Sig. Bits 5	Range -1000 – 30000	Signal Type Basic	*Resolution 1 meter	Rate (ms) 1000

* Indicates scaling resolution. Actual altitude resolution may be as coarse as 100 feet.

TABLE 4-14: AIR DATA TYPE 11

SIGNAL	CONNECTION	SUMMARY DATA
Outside Air Temp Total Air Temperature Probe element Excitation: OAT_REF Temp Input (probe element): Ground:	 2.5 V = J1-20 (+) = J1-39 (-) = J1-19 GND = J1-38	Format: DC Input Type: Basic Fault Designation: STATIC AIR TEMPERATURE FAULT Note: Nominal 500 Ω Temperature Probe only. Resistance @ 0°C: 500Ω ± 0.6Ω
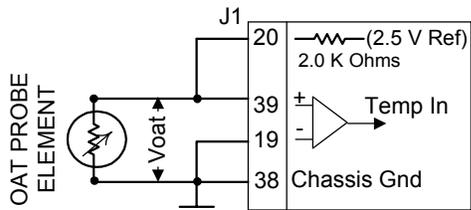
Note: With this configuration internal temperature is available.

TABLE 4-15: STATIC AIR TEMPERATURE TYPE 1

CHANNEL 429RX_3	CONNECT TO: ADC #1 Format: ARINC 429 (Low Speed)	Fault Designation: AIR DATA BUS Bus Type: Basic					
A = J1-9 B = J1-28	Data Static Air Temperature	Label 213	Sig. Bits 11	Range ±512 Degrees	Signal Type Basic	Resolution 0.25	Rate (ms) 1000

TABLE 4-16: STATIC AIR TEMPERATURE TYPE 2

CHANNEL ADC_RXA ADC_RXB	CONNECT TO: ADC Format: RS-422 (9600 BPS 8bit None)	Fault Designation: AIR DATA BUS Bus Type: Basic					
RXA = J1-45 RXB = J1-65	Data Static Air Temperature SAT Checksum	ID/byte 104-106 107	Sig. Bits N/A N/A	Range ± 60° C N/A	Signal Type Basic Basic	Resolution 1 degree C N/A	Rate (ms) 1600 1600

TABLE 4-17: STATIC AIR TEMPERATURE TYPE 3

4.3.1.3 Category 3, Position Input Select

The following provides identification of the Position source signals for this category, only the following POSITION signals are to be defined:

• Altitude	• Sensor Status
• Date	• Track Angle
• Ground Speed	• Universal Time Correlation
• Horizontal Figure of Merit (HFOM)	• Vertical Figure of Merit (VFOM)
• Horizontal. Integrity Limit	• Vertical Velocity
• Latitude Position	• N/S Velocity
• Longitude Position	• E/W Velocity

ID	Position Input Type (See Tables Below)	Description	GPS Altitude Reference (Note 1)	SW Effectivity
0	0	GPS, Internal GPS-PXPRESS RS-232	MSL	-001
1	1	GPS, External RS-232 (GPS-PXPRESS format)	MSL	-001
2	2	GPS, ARINC 429 low speed, 743A format	MSL	-001
3	3	GPS, ARINC 429 low speed, 743 format	MSL	-001
4	4	GPS, ARINC 429 low speed, 743 format (GPS Altitude referenced to WGS-84)	WGS-84	-001

TABLE 4-18: POSITION INPUT SELECT

Note 1: The GPS Altitude Reference MSL or WGS-84 must be properly applied for the appropriate GPS Position type. At the time of release of this document, all GPS sources except the Universal UNS-1 GPS are of MSL type. The Universal UNS-1 GPS (GPS-1000 engine in the UNS-1C, -1D, -1K and –1M) sources are of WGS-84 type.

CHANNEL	Internal GPS	Fault Designation: INTERNAL GPS Bus Type: Basic					
Internal		Data	ID/byte	Sig. Bits	Range	Signal Type	Resolution	*Rate (ms)
		Latitude	15/1-4	32	±180 Degrees	Basic	real single-precision	1000
		Longitude	15/5-8	32	±180 Degrees	Basic	real single-precision	1000
		HP Error	15/9-12	32	meters	Basic	real single-precision	1000
		Altitude	16/1-4	32	meters	Basic	real single-precision	1000
		VP Error	16/5-8	32	meters	Basic	real single-precision	1000
		Ground Speed	17/1-4	32	meters/sec	Basic	real single-precision	1000
		Track Angle	17/5-8	32	360 Degrees	Basic	real single-precision	1000
		Vertical Speed	18/9-12	32	meters/sec	Basic	real single-precision	1000
		East Velocity	18/1-4	32	meters/sec	Basic	real single-precision	1000
		North Velocity	18/5-8	32	meters/sec	Basic	real single-precision	1000
		GPS State	1C/0	8	Discrete Wd	Basic	n/a	1000
		Integrity State	1C/1	8	Discrete Wd	Basic	n/a	1000
		Error Status	1C/6-7	8	Discrete Wd	Basic	n/a	1000

* Slowest acceptable update rate in milliseconds.

TABLE 4-19: POSITION INPUT TYPE 0

CHANNEL GPS_RXA CHA_GND	CONNECT TO: GPS Format: RS-232 (9600 baud)	Fault Designation: GPS BUS Bus Type: Basic					
External	Data	ID/byte	Sig. Bits	Range	Signal Type	Resolution	*Rate (ms)
J1-6 (Rx)	Latitude	15/1-4	32	±180 Degrees	Basic	real single-precision	1000
J1-29 (cm)	Longitude	15/5-8	32	±180 Degrees	Basic	real single-precision	1000
	HP Error	15/9-12	32	meters	Basic	real single-precision	1000
	Altitude	16/1-4	32	meters	Basic	real single-precision	1000
	VP Error	16/5-8	32	meters	Basic	real single-precision	1000
	Ground Speed	17/1-4	32	meters/sec	Basic	real single-precision	1000
	Track Angle	17/5-8	32	360 Degrees	Basic	real single-precision	1000
	Vertical Speed	18/9-12	32	meters/sec	Basic	real single-precision	1000
	East Velocity	18/1-4	32	meters/sec	Basic	real single-precision	1000
	North Velocity	18/5-8	32	meters/sec	Basic	real single-precision	1000
	GPS State	1C/0	8	Discrete Wd	Basic	n/a	1000
	Integrity State	1C/1	8	Discrete Wd	Basic	n/a	1000
	Error Status	1C/6-7	8	Discrete Wd	Basic	n/a	1000

* Slowest acceptable update rate in milliseconds.

TABLE 4-20: POSITION INPUT TYPE 1

CHANNEL 429RX_2	CONNECT TO: GPS Format: ARINC 429 (Low Speed) ARINC 743A-2	Fault Designation: GPS BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	*Rate (ms)
A = J1-8	Latitude - Normal	110	20	±180 Degrees	Basic	0.00017166137695	1000
B = J1-27	Longitude - Normal	111	20	±180 Degrees	Basic	0.00017166137695	1000
	GPS Hor. Int. Limit	130	17	16 nm	Basic	0.00012207	1000
	Altitude	076	20	±131,072 FT	Basic	0.125	1000
	VFOM	136	18	32768 ft	Basic	0.125	1000
	HFOM	247	18	16 nm	Basic	0.000061035	1000
	Ground Speed	112	15	±4096 Knots	Basic	0.125	1000
	Track Angle	103	15	±180 Degrees	Basic	0.0054931640625	1000
	Vertical Velocity	165	15	±32768 Ft/Min	Basic	1	1000
	North/South Velocity	166	15	±4096 Knots	Basic	0.125	1000
	East/West Velocity	174	15	±4096 Knots	Basic	0.125	1000
	Sensor Status	273	19	Discrete Wd	Basic	n/a	1000
	**UTC	125	19	Discrete Wd	Basic	0.1 min	1000
	**Date	260	19	Discrete Wd	Basic	1 day	1000
	**This label is not required. Data used if present						

*Slowest acceptable update rate in milliseconds.

TABLE 4-21: POSITION INPUT TYPE 2

CHANNEL 429RX_2	CONNECT TO: GPS Format: ARINC 429 (Low Speed) Per ARINC 743	Fault Designation: GPS BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	*Rate (ms)
A = J1-8	Latitude – Normal	110	20	±180 Degrees	Basic	0.00017166137695	1000
B = J1-27	Longitude – Normal	111	20	±180 Degrees	Basic	0.00017166137695	1000
	GPS Hor. Int. Limit	130	17	16 nm	Basic	0.00012207	1000
	Altitude	076	20	±131,072 FT	Basic	0.125	1000
	VFOM	136	15	1024 meters	Basic	0.03125	1000
	HFOM	247	15	1024 meters	Basic	0.03125	1000
	Ground Speed	112	15	±4096 Knots	Basic	0.125	1000
	Track Angle	103	15	±180 Degrees	Basic	0.0054931640625	1000
	Vertical Velocity	165	15	±32768 Ft/Min	Basic	1	1000
	North/South Velocity	166	15	±4096 Knots	Basic	0.125	1000
	East/West Velocity	174	15	±4096 Knots	Basic	0.125	1000
	Sensor Status	273	19	Discrete Wd	Basic	n/a	1000
	**UTC	125	19	Discrete Wd	Basic	0.1 min	1000
	**Date	260	19	Discrete Wd	Basic	1 day	1000
	**This label is not required. Data used if present						

*Slowest acceptable update rate in milliseconds.

TABLE 4-22: POSITION INPUT TYPE 3

CHANNEL 429RX_2	CONNECT TO: GPS Format: ARINC 429 (Low Speed) per ARINC 743	Fault Designation: GPS BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	*Rate (ms)
A = J1-8	Latitude – Normal	110	20	±180 Degrees	Basic	0.00017166137695	1000
B = J1-27	Longitude – Normal	111	20	±180 Degrees	Basic	0.00017166137695	1000
	GPS Hor. Int. Limit	130	17	16 nm	Basic	0.00012207	1000
	Altitude	076	20	±131,072 FT	Basic	0.125	1000
	VFOM	136	15	1024 meters	Basic	0.03125	1000
	HFOM	247	15	1024 meters	Basic	0.03125	1000
	Ground Speed	112	15	±4096 Knots	Basic	0.125	1000
	Track Angle	103	15	±180 Degrees	Basic	0.0054931640625	1000
	Vertical Velocity	165	15	±32768 Ft/Min	Basic	1	1000
	North/South Velocity	166	15	±4096 Knots	Basic	0.125	1000
	East/West Velocity	174	15	±4096 Knots	Basic	0.125	1000
	Sensor Status	273	19	Discrete Wd	Basic	n/a	1000
	**UTC	125	19	Discrete Wd	Basic	0.1 min	1000
	**Date	260	19	Discrete Wd	Basic	1 day	1000
	**This label is not required. Data used if present						

*Slowest acceptable update rate in milliseconds.

TABLE 4-23: POSITION INPUT TYPE 4

4.3.1.4 Category 4, Terrain Display Select

The following table has an identification number (ID) associated with each Terrain Display configuration. Each of the ID rows has a group number for the Display *Configuration*, the *Input Control.* The *TA&D Pop-Up Disable* function is defined by a Boolean.

In this category the ID number configures the following signals:

Signal Name	Signal Type	Defined By
Terrain Display Bus:	KCPB or ARINC 453	Display *Configuration* Group
Range Bus:	ARINC 429	Display *Input Control* Group
TA&D Alternate Pop Up	Boolean	Defined directly in Table

ID	Display Config. Group	Display Input Control Group	Output 429 Bus Group	Application Notes	SW Effectivity
0	0	0	0	KCPB	-001
1	NONE	NONE	0	No Display	-001
2	1	1	0	Bendix IN-182A, IN-812A	-001
3	2	1	0	Bendix IN-842A, IN-862A	-001
4	3	2	0	Bendix RDR 4A/B PPI (with blue waters modification)	-001
5	4	1	0	EFIS 40/50 Non-Integrated	-003
6	5	1	0	EFIS 40/50 Integrated	-003

TABLE 4-24: TERRAIN DISPLAY SELECT

4.3.1.5 Category 5, Input / Output Discrete Type Select

The following table provides identification of the Input/Output Discrete Type. IDs 1 and 2 allow ARINC 429 interfacing to MFD displays for discrete input / output. This allows capable MFDs to replace annunciators and switches. The basic (hardware) discrete inputs are also operational with all ID selections.

ID	Input/Output Discrete Type	Description	SW Effectivity
0	0	Basic input / output discretes (Lamp Format 2)	-001
1	1	Basic input / output discretes (Lamp Format 2) with 429 discretes	-003
2	2	Basic input / output discretes (Lamp Format 2) with 429 discretes except Terrain Inhibit	-003

Note: If a single cockpit lamp is desired for Terrain Cautions and Warnings, J1-60 and J1-41 can be diode OR'd together to drive one lamp.

TABLE 4-25: INPUT/OUTPUT DISCRETE TYPE SELECT

4.3.1.6 Category 6, Audio Menu Select

The following table provides identification of the Voice Menu type

ID	Audio Menu Type	Description	SW Effectivity
0	0	Non-TSO General Aviation	-001
1	1	Basic, Class B and Class C	-001
2	2	Alternate, Class B and Class C	-005

Note: If Category 1 selected ID #0 (TSO C151b Class B curve set) Category 6 ID #1 (Basic) or ID #2 (Alternate) must be selected to be in compliance with the TSO requirements.

TABLE 4-26: AUDIO MENU TYPE

4.3.1.7 Category 7, Audio Output Level

The following table provides identification of the Audio Output Level type. Each entry in the ID column corresponds to a particular nominal alert output level selection (Max, -6 dB, -12 dB, -18dB and –24dB). The nominal "Max" output is 100 mW rms for the 600-ohm output. The output power level will be the nominal maximum output of 100 mW reduced by the selected volume type.

ID	Volume Type	SW Effectivity
0	Maximum ($600\Omega \approx 100mW$)	-001
1	- 6 dB	-001
2	-12 dB	-001
3	-18 dB	-001
4	-24 dB	-001

TABLE 4-27: AUDIO OUTPUT LEVEL

4.3.1.8 Category 8, Altitude Monitor Options

The following table provides identification of the Altitude Monitor Options. Each entry in the ID column corresponds to a particular combination of Altitude Monitor Display Disable, Altitude Monitor Callout Disable, and Altitude Monitor Disable. In addition it allows the selection of the Geometric Altitude display tag, either MSL (Mean Sea Level) or GSL (Geodetic Sea Level).

ID	GeoAlt Display Label Text (Note 1)	Altitude Monitor Disable	Altitude Monitor Callout Disable	Altitude Monitor Display Disable	SW Effectivity
0	MSL	False	False	False	-003
1	MSL	False	False	True	-003
2	MSL	False	True	False	-003
3	MSL	False	True	True	-003
4	MSL	True	True	True	-003
5	GSL	False	False	False	-003
6	GSL	False	False	True	-003
7	GSL	False	True	False	-003
8	GSL	False	True	True	-003
9	GSL	True	True	True	-003

TABLE 4-28: ALTITUDE MONITOR OPTIONS

Note 1: The GeoAlt Display Label Text configuration item only controls the display of the MSL text on those display in which the GA-EGPWC is drawing the text on the display.

4.3.1.9 Category 9, Terrain Display Alternate Pop Up Option

The following table provides identification of the Terrain Display Alternate Pop Up Option. TA&D Alternate Pop Up = False allows automatic Pop Up On Caution or Warnings. TA&D Alternate Pop Up = True disables the automatic Pop Up feature. To select terrain display pop up option the display and / or system installation must be compatible.

ID	TA&D Alternate Pop Up Disable	SW Effectivity
0	False	-001
1	True	-001

Note: Select False if Pop Up is desired.

TABLE 4-29: TERRAIN DISPLAY ALTERNATE POP UP DISABLE OPTION

4.3.1.10   Category 10, Attitude and Heading Select

The following table provides identification of the Attitude and Heading type. Each entry in the Attitude and Heading column has a corresponding table that provides detailed information on the configuration. For example, the details for Attitude and Heading Type #1 are found in Table 4-31.

The selection of a Heading type other than ID#0 (No Heading or Roll) will allow the KGP-560 to produce the terrain display oriented to the current heading. Honeywell recommends providing a Heading input to the KGP-560 if an appropriate input is available.

The selection of a Roll Attitude type other than IDS# 0, 2, 4, 5, 6, 7, 8 will allow the KGP-560 to use the current Roll Attitude as input to it's various alerting algorithms.

In this category, only the following signals are defined:

- Roll Attitude

- Magnetic Heading

ID	Attitude and Heading Type (See Tables Below)	Description	SW Effectivity
0	N/A	No Heading or Roll	-003
1	1	Digital ARINC 429 Roll and Mag Heading (High Speed)	-003
2	2	Digital ARINC 429 Magnetic Heading (High Speed)	-003
3	3	Digital ARINC 429 Roll and Mag Heading (Low Speed)	-003
4	4	Digital ARINC 429 Magnetic Heading (Low Speed)	-003
5	5	Reserved	N/A
6	6	Digital RS-232 Magnetic Heading from Shadin 200 ADC	-003
7	7	Digital ARINC 429 Magnetic Heading (Low Speed) from Shadin 2000 ADC	-003
8	8	Digital RS-232 Magnetic Heading from Shadin 937600	-003

Note: If at Category 4 (Terrain Display Select) you selected ID 5 or 6 (EFIS 40/50) you must select a Category 10 (Attitude & Heading Type) ID with Heading.

TABLE 4-30: ATTITUDE AND HEADING TYPE

CHANNEL 429RX_4	CONNECT TO: AHRS Format: ARINC 429 (High Speed)	Fault Designation: AHRS BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	Rate (ms)
A = J1-48	Roll Angle	325	14	±180 degrees	Basic	0.010986328125	10-20
B = J1-67	Magnetic Heading	320	15	±180 degrees	Basic	0.0054931640625	25-50

TABLE 4-31: ATTITUDE AND HEADING INPUT SELECT TYPE 1

CHANNEL 429RX_4	CONNECT TO: AHRS Format: ARINC 429 (High Speed)	Fault Designation: AHRS BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	Rate (ms)
A = J1-48 B = J1-67	Magnetic Heading	320	15	±180 degrees	Basic	0.0054931640625	25-50

TABLE 4-32: ATTITUDE AND HEADING INPUT SELECT TYPE 2

CHANNEL 429RX_4	CONNECT TO: AHRS Format: ARINC 429 (Low Speed)	Fault Designation: AHRS BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	Rate (ms)
A = J1-48	Roll Angle	325	14	±180 degrees	Basic	0.010986328125	10-20
B = J1-67	Magnetic Heading	320	15	±180 degrees	Basic	0.0054931640625	25-50

TABLE 4-33: ATTITUDE AND HEADING INPUT SELECT TYPE 3

CHANNEL 429RX_4	CONNECT TO: AHRS Format: ARINC 429 (Low Speed)	Fault Designation: AHRS BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	Rate (ms)
A = J1-48 B = J1-67	Magnetic Heading	320	15	±180 degrees	Basic	0.0054931640625	25-50

TABLE 4-34: ATTITUDE AND HEADING INPUT SELECT TYPE 4

TYPE 5 RESERVED

TABLE 4-35: ATTITUDE AND HEADING INPUT SELECT TYPE 5

CHANNEL ADC_RXA CHA_GND	CONNECT TO: ADC (Shadin 200) Format: RS-232 (9600 BPS)	Fault Designation: AIR DATA BUS Bus Type: Basic					
	Data	ID/byte	Sig. Bits	Range	Signal Type	Resolution	Rate (ms)
RXA = J1-45	Magnetic Heading	101-102	N/A		Basic	1 degree C	1600
RXB = J1-46	Magnetic Heading Checksum	103	N/A		Basic	N/A	1600

Note: This configuration MUST be used in combination with Air Data ID 8 or 9.

TABLE 4-36: ATTITUDE AND HEADING INPUT SELECT TYPE 6

CHANNEL 429RX_3	CONNECT TO: ADC (Shadin 2000) Format: ARINC 429 (Low Speed)	Fault Designation: AIR DATA BUS Bus Type: Basic					
	Data	Label	Sig. Bits	Range	Signal Type	Resolution	Rate (ms)
A = J1-9 B = J1-28	Magnetic Heading	320	15	±180 degrees	Basic	0.0054931640625	100

Note: This configuration MUST be used in combination with Air Data ID 2…7.

TABLE 4-37: ATTITUDE AND HEADING INPUT SELECT TYPE 7

CHANNEL AHRS_RX CHA_GND	CONNECT TO: SHADIN 937600 Format: RS-232 (1200 baud)	Fault Designation: AHRS BUS Bus Type: Basic				
	Data	Format	Sig. Bits	Range	Resolution	*Rate (ms)
RX = J1-24 Com = J1-70	Magnetic Heading	See Shadin 937600 manual	n/a	360 Degrees	0.1 deg	1000

- Slowest acceptable update rate in milliseconds.

Note: The input from this converter (synchro to RS-232) to the KGP-560 does NOT provide validity. If the compass system fails and does not supply active synchro input to this converter, the converter continues to supply non-valid data. It is HIGHLY recommended that the validity output of the compass system be tied to a relay supplying power to this converter.

TABLE 4-38: ATTITUDE AND HEADING INPUT SELECT TYPE 8

4.3.1.11   Category 11, Display Option Select

The following table provides identification of the Display Option type. Each entry in this Category (ID) has a corresponding table that provides detailed information on the configuration (i.e. how the terrain display operates). This Category primarily allows the selection of how the terrain display operates at slower speeds. The various speeds, selectable below, allow terrain display operation to meet varying operator demands.

This Category selects the output type (orientation) and function of the KGP-560's terrain display. More specifically this selection will determine the operation of the terrain display output when on the ground.

Upon startup and when the KGP-560 system finishes initializing (given a non-INOP condition) it will provide a terrain display image. This image, depending upon this Category selection, will be oriented to North-Up, oriented to Track-up or oriented Heading up.

If you have selected an Attitude & Heading type (Category 10) with a heading input (IDs 1-4 and 6-8) and given the heading input to the KGP-560 is valid, the terrain display will be oriented to the aircraft's current heading. **Note: If you have selected a Category 10 (Attitude & Heading type) with a heading input it is required to select either ID 2 or 3 for this category.**

If a selection of the Attitude & Heading type (Category 10) does not provide the KGP-560 with Heading (i.e. ID 1) the terrain display will either be North UP or Blank w/ message until (depending upon selection below) a valid ground speed is supplied and the aircraft reaches the selected speed. This is for aircraft for without a usable heading input to the KGP-560.

When the input of ground speed (with hysteresis) is below the selected value (note the values of the various IDs below) the terrain display will either be Blank w/message or North Up (depending upon the selection of Category 10). For example, if you select ID 0 below, the terrain display will be North Up until the aircraft's ground speed reaches 45 kts. The display will then transition to Track Up and remains Track Up until the aircraft transitions below 15 kts.

The North Up Display Blanking selection (below) will provide a terrain display oriented to North regardless of aircraft heading (remember below the ground speed selected below). The `Blank w/message' terrain display will output a blank display with the message `DISPLAY UNAVAIL'.

In this category, the following signals are defined:
- Track Display Hysteresis limits and Display Blanking option

ID	Display Option Type (See Tables Below)	Track Hysteresis	Display Blanking	SW Effectivity
0	0	Classic Fixed Wing (45 kts valid/ 15 kts invalid)	North Up	-003
1	1	"	Blank w/message	-003
2	2	No limit (-1 kts valid; i.e. always)	North Up	-003
3	3	"	Blank w/message	-003
4	4	10 Kts (15 kts valid / 5 kts invalid)	North Up	-003
5	5	"	Blank w/message	-003
6	6	15 Kts (20 kts valid / 10 kts invalid)	North Up	-003
7	7	"	Blank w/message	-003
8	8	20 Kts (25 kts valid / 15 kts invalid)	North Up	-003
9	9	"	Blank w/message	-003
10	10	25 Kts (30 kts valid / 20 kts invalid)	North Up	-003
11	11	"	Blank w/message	-003
12	12	30 Kts (35 kts valid / 25 kts invalid)	North Up	-003
13	13	"	Blank w/message	-003

TABLE 4-39: DISPLAY OPTION TYPE

5 SECTION V - INSTALLATION CONFIGURATION & CHECKOUT

5.1 Introduction

The procedures for programming the Configuration Module, ground testing the KGP-560 GA-EGPWS after it is installed in the aircraft and installing the Regional Terrain Database card are described in the following sections.

Configuration is explained in the first part of this section. The configuration process and the tools needed are described below.

The Post-Installation Checkout, Section 5.5, verifies the proper operation of the KGP-560 GA-EGPWS system. These procedures are used after the units have been installed and the configuration module has been programmed. Thereafter, these procedures can be used as an operational check. These tests are performed on the ground.

While many of these tests can be performed indoors, the aircraft may need to be outdoors, away from signal obstructions, so that GPS is able to receive satellites before the system can be fully tested.

The process for installing or changing the Regional Terrain Database card is described in this section. The appropriate Database card must be installed for the system to operate normally.

5.1.1 Installation Sequence

This section will describe the normal sequence for new installations of the KGP-560 GA-EGPWS system. Honeywell recommends following this sequence until achieving a comfortable level of experience with the KGP-560 system.

Installation Sequence:

1. Perform system installation design per Section 4 to select configurable items and ready Table 4-1: Category ID Selection Table.
2. Ensure KGP-560 system and aircraft installation is ready for installation per the details in Section 2.
3. Perform Installation Wiring Verification per instructions in Section 5.2.
4. Perform Terrain Database Installation & Verification per Section 5.3.
5. Perform Configuration Module programming per Section 5.4.4.
6. Perform Post Installation Ground Test / Checkout per Section 5.5.
7. Perform System Self Test per Section 5.6

5.2 Installation – Aircraft Wiring Verification

1. With all units disconnected and aircraft power off, do a point to point wiring check using an Ohm meter to verify proper wiring interconnect.

2. With all units disconnected, apply aircraft DC power and verify that power is supplied to the power input pins.

3. Remove DC power and install KGP-560.

5.3 Regional Terrain Database Card

Please read this section and the Notes carefully before proceeding with Terrain Database card installation.

The KGP-560 system contains a terrain, obstacle and runway database required for system operation. This database is supplied separately from the unit to ensure the most recent database is shipped with each system.

The Regional Terrain Database Card is a CompactFlash® data card that resides in a slot beneath a soft plastic cover on the top of the KGP-560 unit. See Figure 2-1: GA-EGPWS Computer Outline Drawing for a location diagram.

The terrain database card is removed and installed when power is NOT applied to the system.

The GA-EGPWS computer may be removed from the aircraft to extract and install database cards if the mounting location does not provide enough clearance.

See the Pilot's Guide for a complete description of the Regional Terrain Database.

Note: During the first startup after loading a new terrain database card the KGP-560 goes through a terrain validation routine. This routine will take approximately 7 - 10 minutes.

5.3.1 Regional Terrain Database Card Installation

Upon first time installation of the KGP-560 LRU into the aircraft the following procedures should be performed. Similarly, follow these procedures when changing or updating the Regional Terrain Database card.

Installing the Regional Terrain database card is accomplished by:
1. Remove DC power
2. Carefully unpack the KGP-560 CompactFlash® database card from the shipping container.
3. Check that the number on the database card is appropriate to the region.
4. Open the top of the KGP-560 computer by moving the plastic cover to the side.
5. Press the ejector button located within the unit to remove the existing database card, if installed.
6. Ensure proper alignment of the new database card per the labeled alignment points.
7. Insert the database card firmly into the unit.
8. Replace the cover and ensure a complete seal of the database cover.
9. Apply DC power and allow approximately 7 – 10 minutes for database verification.

Note: When the database card is updated it is highly recommended that the database verification procedure be followed.

5.3.2 Regional Terrain Database Card Verification

Note: **If the unit has went through the initial database verification process, See Section 5.3.1 (when power is first applied after database load) then the verification process in this section need not be performed.**

1. After Configuration Module programming, use the *WinViews* diagnostic port interface to perform the following commands: (Please see attachment "*WinViews* for the KGP-560 GA-EGPWS")
2. At the *WinViews* command prompt type:
    >FHE <enter>
    (Then type Y immediately after pressing <enter>)

This procedure will validate the contents of the terrain database and should take approximately 7 - 10 minutes to complete. Upon successful completion of this test the system is ready to perform the ground test procedure. This procedure is highly recommended anytime that the database is updated.

5.3.3 Regional Terrain Database Card Updates

Regional Terrain databases can be ordered for card updates or another region by contacting; Honeywell International Inc. See Section 1.11 for contact details.

5.4 Configuration Setup & Programming

The KGP-560 GA-EGPWS reads the aircraft's installation configuration from the configuration module, which is installed on the unit mating connector. The configuration module must have the aircraft-specific equipment configuration ID (identification) string written to it before the GA-EGPWS is operational. Once the configuration module is programmed, the KGP-560 can be removed and replaced without re-programming. This section will detail the configuration options, configuration instructions, and initial configuration of a new configuration module for the KGP-560 GA-EGPWS.

The aircraft-specific configuration items include selecting choices for the type of aircraft operation, the altitude source, the position source, the type of terrain display, type of lamp discretes, audio menus and volume output levels and some special operational features.

5.4.1 Equipment Needed

1. KGP-560 GA-EGPWS Installed And Operating.
    The Regional Terrain Database should be installed. See Section 5.3 for complete instructions.
2. IBM or Compatible PC with an available RS-232 serial port
3. Interconnect Cable between the GA-EGPWS and PC (see Figure 3-4)
4. WinViews – a diagnostic program that runs in Windows on a PC

5.4.2 WinViews

WinViews is an acronym for (Windows Virtual Interface to the Enhanced Warning System). WinViews is a software tool developed by Honeywell to communicate with the EGPWS. WinViews provides a detailed status of the software configuration and input signals, which enables quick identification of system configuration, and is utilized for programming the system.

WinViews runs on a diagnostic PC with Windows 3.1 or higher and communicates with the EGPWC by a serial cable (com port) connection. WinViews automatically configures the communications port of the PC. A User's Guide to WinViews is included with the software package. The software package consists of the executable file, a help file and sample command files.

WinViews HELP, as well as many other menu items are active even though the program is fully operational when communications is established with the GA-EGPWS.

Please see "*WinViews* for the EGPWS" for additional information.

To obtain a copy of the WinViews software, go to http://www.egpws.com or contact:

      Honeywell Aerospace Electronic Systems

      BR&GA Product Support,

      KGP-560 Product Specialist

      Phone: 800-257-0726

      Fax: 913-712-1306

5.4.3 WinViews Operation

1. Connect the PC to the EGPWC using an RS-232 cable.
2. Start the PC, ensuring Windows 3.1, or higher is running
3. Apply power to the KGP-560.
   (Note: If the Terrain Database has not been validated by the KGP-560 during this first system startup the KGP-560 goes through a validation routine. This routine can take approximately 7 – 10 minutes. After validation is complete the KGP-560 will continue with system startup and accept the Ctrl Z command and provide the > command prompt.)
4. Start the WinViews.exe program, ensure the correct port is selected and connected to the KGP-560; type Ctrl Z
5. Use **F6** to switch between Terminal and Display mode. Various commands are available in both modes.
6. Type "HELP" or "?" (then press Enter) for a list of the commands available.

5.4.4 Configuration Module Programming Instructions

The Configuration Module Programming is completed via the RS-232 port connected to a PC running WinViews. The application code is capable of loading the Configuration Module with new data.

This programming is achieved by using the WinViews software. In WinViews, the GA-EGPWS will accept valid commands. To prevent inadvertent access to the Configuration Module's EEPROM the keyboard monitor is set up with a tiered menu. The keyboard monitor command "CFG" is used to gain access to the Configuration Monitor.

The command to program the memory with the Configuration String is "CUW". This command takes a pre-configured String (defined below) containing the new memory contents and a CRC (written by the GA-EGPWS) and writes them to the Configuration Module's EEPROM. **Note: Configuration string contents are defined during system installation design, see Section 4.3, Table 4-1**)

5.4.5 Configuration String Format

The GA-EGPWS requires a string of configuration information to be written to the Configuration Module memory when requested from the keyboard monitor.

Example String: = C U W 0 / 1 1 0 1 0 0 0 0 2 2 0 1 0/
(Place a space after CUW, after each Category and after each number if there is no separator)

Where the first 0 reflects the string version, the next number is the number of categories and the remaining numbers before the second separator reflect the ID for each of the categories.

String Breakdown Explanation:
CUW	=	The command to write
0	=	String version
/	=	Separator
9	=	the number of categories
0	=	Category #1 ID = 0 (TSO-C151a Class B curve set)
1	=	Category #2 ID = 1 (Altitude Encoder with 500 OHM Temperature Probe)
0	=	Category #3 ID = 0 (GPS, Internal GPS Express R-S232)
0	=	Category #4 ID = 0 (Display select = KCPB)
0	=	Category #5 ID = 0 (I/O Discrete Type Select = Basic, Lamp format 2)
0	=	Category #6 ID = 0 (Audio Menu Select = Basic)
2	=	Category #7 ID = 2 (Audio Output Level = -12dB)
2	=	Category #8 ID = 2 (Altitude Monitor Option Select = Disable)
0	=	Category #9 ID = 0 (TA&D Alternate Pop Up = False)
1	=	Category #10 ID = 1 (Digital ARINC 429 Magnetic Heading (High Speed)
0	=	Category #11 ID = 0 (Classic Fixed Wing)
/	=	End of Data String Separator

5.4.6 Configuration Module Programming Procedure

1. Turn the GA-EGPWS system power on.
2. Bring up the WinViews program.   Select Connect. Type Ctrl Z
3. One of the messages should be *'Configuration Module not initialized'*.
4. At the WinViews prompt type "CFG". Press the ENTER key.
5. Type in the pre-configured STRING using the command "CUW". Press the ENTER key.
6. After loading this string in WinViews the `CFG>' cursor will not be displayed, Win Views is waiting for an answer "Y" or "N".
7. Type "Y"

   Note: At this point the GA-EGPWS will reboot itself.
8. When, the System comes back up Type Ctrl "Z" then Type "PS" (Present Status) <ENTER>.
9. Check the Status information displayed. Confirm that your Configuration input write is accurate.

5.5 Post Installation Checkout

5.5.1 Information

This Ground Test Procedure is designed to minimize potential equipment damage and verify proper operation of the Honeywell GA-EGPWS as installed in the aircraft. Due to the small size and even smaller markings on the 78-pin D-subminiature connector used on the GA-EGPWS, wiring errors are very easy to make. A few minutes spent checking wiring can save you considerable time later on.

Please see "*WinViews* for the EGPWS" for more information

Note: ***WinViews* software is available from Honeywell (see Section 5.4.2). A User's Guide to WinViews is included in the software package. The software consists of the executable file, a help file and sample command files.**

5.5.2 WinViews Command File Creation

WinViews is an Enhanced GPWS diagnostic communications program that runs from Windows on a PC that is connected to the GA-EGPWC. WinViews HELP, as well as many other menu items are active even though the program is fully operational when communications is established with the GA-EGPWC. You should create a Command File and name it GAgndtst.cmd for this procedure. This file is created via a text editor. The format for this WinViews command file is:

1. ASCII text only; no spaces.
2. A CVT item as specified in this test procedure.
3. Each CVT item Name is followed by a <return> or <enter>.
   (single file, not as shown below)

CrwyApt	`	TAInop2	
CrwyDist		TAWxRng1	
GillhamAlt		GPSCH1TRK	
TerrDis		GPSCH2TRK	
RawBAlt1		GPSCH3TRK	
TASAT		GPSCH4TRK	
GPSLatude1		GPSCH5TRK	
GPSLngude1		GPSCH6TRK	
RawGAlt1		GPSCH7TRK	
RawHFOM1	`	GPSCH8TRK	
RawVFOM1		RawRoll1	
TAInop		RawlMhd1	
TAInop1			

(Sample command files (*.cmd) are included in the WinViews software package).

Review your aircraft installation drawings against the manufactures data sheets and verify that all necessary connections are included on your drawings and that the pin numbers are in agreement.

5.5.3 Adding WinViews CVT Items

If additional CVTs are needed this section will describe the process to add WinViews CVT items.

Note: **To add a CVT during test use the following instructions: added CVT using this method are not added to the .cmd file and are stored in the KGP-560 until power is removed. To make the CVT items permanent you must add them to the .cmd file using a text editor.**
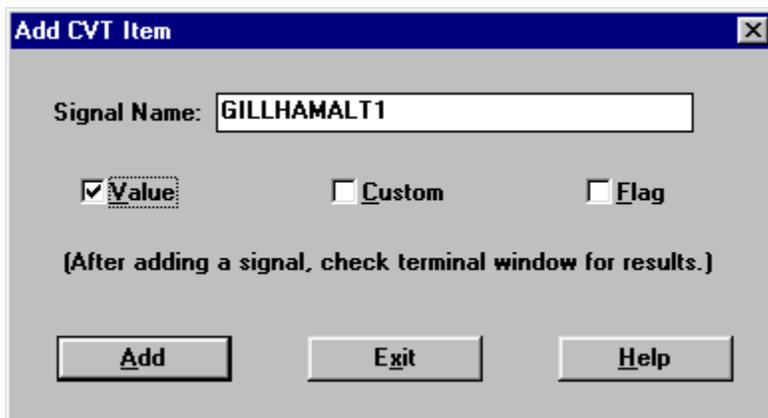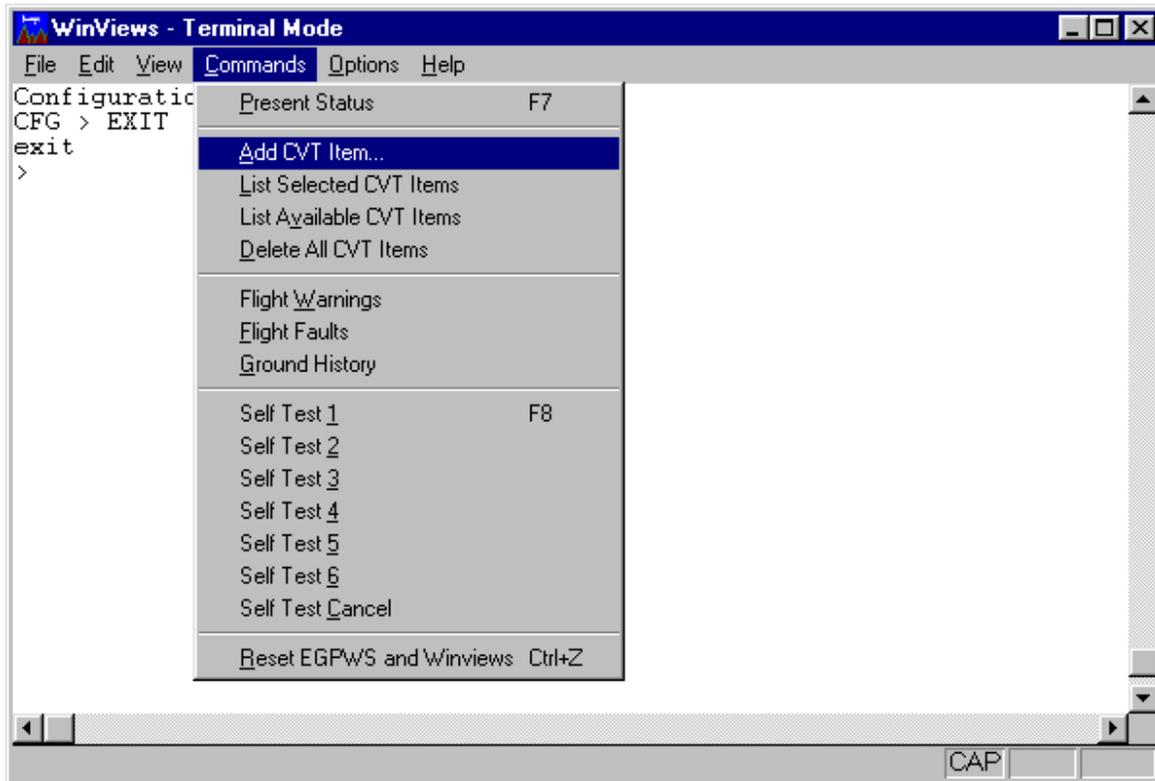
5.5.4 Post Installation Checkout

1. Connect a PC to the RS-232 communications port of the GA-EGPWS unit.
2. Power up the PC, start "WinViews" and select connect.

   Note: **Ensure GPS coverage is available to the Internal GPS card/receiver or to the GPS system providing GPS input to the KGP-560. You may need to move the aircraft away from hangar (in a good GPS reception area) or provide GPS information via an in-hangar GPS repeater.**

3. Power up the avionics in the aircraft. You should note the "Not Available" or "GPWS INOP" light ON and you should see INITIALIZATION messages coming from the GA-EGPWS on your PC. When the WinViews messages quit (could be as long as 3+ minutes for the first application of power (If the system has not performed the Terrain Database verification procedure this will take approximately 7 – 10 minutes)) press Control 'Z' on your keyboard. The PC display should show a "**>**".
4. Type 'PS' and the 'Return' key on your PC. You should receive several lines of status messages from the GA-EGPWS. Until the PS information shows `Current Faults: No Faults' the system is not operating properly.  If there are system faults the PS information, under `Current Faults' will identify the faulty sensor or input.
5. With your PC communicating with the GA-EGPWS, select 'File' at the top of the WinViews screen. Select 'Load Command File' and then select the file named gagndtst.cmd (This file is the file created by the text editor above).
6. Select the Display Data mode by pressing the function key F6 on your keyboard. This will bring up the WinViews screen to view system inputs and internal values.
7. Set the aircraft's altimeter to 29.92 in. Hg. And note the altitude displayed on the altimeter. Now look at the PC screen and locate the CVT item named **GillhamAlt** (for encoder) or **RawBAlt1** (for Air data) and verify that the altitude shown agrees with the aircraft altimeter, $\pm$ 200 feet. If it does not, troubleshoot the encoding altimeter / wiring or Air data source.
8. Provide a source of GPS signals to the GPS antenna. This can be accomplished by using a GPS repeater inside a hanger, or by taking the aircraft outside where it has a clear view of the sky.
9. Press function key F6 to return to the Terminal Mode of WinViews. Type in "GPS" followed by the 'Return/Enter' key to view the status of the GPS receiver. Typing Control 'R' on the keyboard will re-issue the last command sent and allow you to continue to monitor GPS status. Once the GPS has acquired its satellites the status message "*Not Navigating*" will change to "Navigation with possible data collection". The Not Available lamp should turn off and if a display is being used, a terrain display provided by the KGP-560 GA-EGPWS system should be shown on the display.
10. Press the 'Self Test' switch and verify that the unit lights all lamps, produces audio and the display, if installed, shows a test pattern (refer to the system self test Section 5.6). The GA-EGPWS self test function will identify any problems with interfaces or with the GA-EGPWS computer. Troubleshoot any problem reported during the self test.

If installed, press the Terrain Inhibit switch and verify that the CVT item named TerrDis switches between true and false on your PC's display.

5.5.5 GPS Quick Check

On the PC, select the Display Data Mode by using F6. With the system receiving GPS signals and no faults reported, you should now verify that the system has correctly identified your closest airport. Look at the following CVT items on the PC's display:

CrwyApt   The letter/number identifier of the closest airport;
– Only public airports with runways 2,000 feet or longer

CrwyDist   The distance in nm to the reference point of the airport;
– Verify that the displayed information agrees with your geographic location

5.5.6 Air Data Check

This section will perform the necessary checks to ensure proper system input of pressure altitude.

1. Connect a pitot-static test set to the aircraft static system. Only persons trained in its use should perform operation of the pitot-static test set. Additionally, if the aircraft static system was opened or modified to add an encoder, the static system must be tested and approved by licensed mechanic or authorized repairman. Improper use of the pitot-static test set can result in damage to altimeters, vertical speed indicators etc.

2. Start with the pitot-static test set at current field elevation. Set the reference altimeter in the test set for 29.92 in. Hg.

5.5.6.1 Altitude Encoder (9 wire Gillham/Graycode altitude) Check

Note: This test is applicable if Air Data Input Select ID is #0 or 1.
Record the pressure altitude indicated on the pilot altimeter -   **_____PA**

VERIFY the KGP-560 CVT "GillhamAlt" corresponds to pressure altitude ($\pm$200ft.). **<< Pass/Fail _____ >>**

Using an aircraft Pitot/Static System Test Set, repeat the altitude check for the current pressure altitude +500 ft and +1000 ft.

Note: If configured an aural _"CHECK ALT"_ will be heard during this test. A "CHECK ALT" annunciation will also appear on the indicator. This alert occurs due to the split between the altitude input from the encoding altimeter and the KGP-560 geometric altitude.

Record the pressure altitude indicated on the pilot altimeter - _____PA + 500
VERIFY the KGP-560 CVT "GillhamAlt" corresponds to indicated altitude ($\pm$200ft.). **<< Pass/Fail _____ >>**

Record the pressure altitude indicated on the pilot altimeter - _____PA + 1000
VERIFY the KGP-560 CVT "GillhamAlt" corresponds to pressure altitude ($\pm$200ft.). **<< Pass/Fail _____ >>**

VERIFY if configured, the aural altitude compare message, _"CHECK ALT",_ is enunciated and also appears on the terrain display. **<< Pass/Fail _____ >>**

5.5.6.2 Digital Air Data Input Check

Note: This test is applicable if Air Data Input Select ID are #2,…21.
Record the pressure altitude indicated on the pilot altimeter   -_____**PA**

VERIFY the KGP-560 CVT "RawBAlt1" corresponds to pressure altitude (±200ft.). **<< Pass/Fail ____ >>**

Using an aircraft Pitot/Static System Test Set, repeat the altitude check for the current pressure altitude +500 ft and +1000 ft.

Note: If configured, an aural *"CHECK ALT"* will be heard during this test. A "CHECK ALT" annunciation will also appear on the indicator. This alert occurs due to the split between the altitude input from the encoding altimeter and the KGP-560 geometric altitude.

Record the pressure altitude indicated on the pilot altimeter - _____PA + 500
VERIFY the KGP-560 CVT "RawBAlt1" corresponds to indicated altitude (±200ft.).**<< Pass/Fail _____ >>**

Record the pressure altitude indicated on the pilot altimeter - _____PA + 1000
VERIFY the KGP-560 "RawBAlt1" corresponds to pressure altitude (±200ft.)   **<< Pass/Fail ____ >>**

VERIFY If configured, the aural altitude compare message, *"CHECK ALT",* is enunciated and also appears on the terrain display.   **<< Pass/Fail _____ >>**

Return the static test set and aircraft static system to local ambient pressure.

5.5.7   Outside Air Temperature Check

(IF OAT PROBE IS INSTALLED)
Note or add the CVT item – "TASAT"
Record the current outside air temperature   **- _____ °C**
Record the value of "TASAT"   **- _____ °C**

VERIFY the KGP-560 "TASAT" corresponds to the recorded OAT ±5°C .**<< Pass/Fail _____ >>**

5.5.8   Internal GPS Receiver Check

Note: Position indications from the internal GPS receiver are provided in the form of W $x^Oy.z'$ or N $x^Oy.z'$.

The EGPWS stores position as $\pm x.xxx^O$. For reference, in the EGPWS CVT item, West and South are designated as "-" (negative) values while North and East are designated as "+" (positive) values. To convert $x^Oy.z'$ to $x.xxx^O$ divide the y.z' by 60 and add that value to the leading x^O. For example, W 119° 36.6' is equivalent to the KGP-560 value –119.610 (or 119 + 36.6/60).

Note or add the CVT items – "GPSLatude1", "GPSLngude1", "RawGAlt1", "RawHFOM1" and "RawVFOM1".

Record the current GPS Present Position Latitude   **- _____($x^Oy.z'$) / _____(±x.xxx^O)**

Record the value of "GPSLatude1"   **- _____(±x.xxx^O)**

VERIFY the KGP-560 "GPSLatude1" corresponds to the present latitude ±0.008°.   **<< Pass/Fail _____ >>**

Record the current GPS Present Position Longitude **- _____(x^{o}y.z') / _____(±x.xxx^{o})**

Record the value of "GPSLngude1" **- _____(±x.xxx^{o})**

VERIFY the KGP-560 "GPSLngude1" corresponds to the present longitude ±0.008$^{°}$. **<< Pass/Fail _____ >>**

Record the Mean Sea Level (MSL) altitude of the current aircraft location **- _____MSL**

Record the value of "RawGAlt1" **- _____ ft**

VERIFY the KGP-560 "RawGAlt1" corresponds to the MSL altitude ±500ft. **<< Pass/Fail _____ >>**

Record the value of "RawHFOM1" **- _____ nm**

VERIFY the KGP-560 "RawHFOM1" is <0.3 nm. **<< Pass/Fail _____ >>**

Record the value of "RawVFOM1" **- _____ ft**

VERIFY the KGP-560 "RawVFOM1" is <0600 ft. **<< Pass/Fail _____ >>**

5.5.9 DISPLAY RANGE INPUT CHECK

Note: If the Terrain Display Select ID (Category 4, Section 4.3.1.4) is 0 (KCPB) this check of range input may not work. Certain KCPB displays, i.e. – GNX-XIs, use line select key presses to range up and down. If the value of "TAWxRng1" does not change and the display correctly responds to range commands, this check need not be performed.

Note or add the CVT item – "TAWxRng1"
Select the Terrain Display on the Display (Radar Indicator or MFD)

Using the range buttons on the display, select the EGPWS Range of 10 NM.
VERIFY the KGP-560 "TAWxRng1" is equal to 10 NM. **<< Pass/Fail _____ >>**

Using the range buttons on the display, select the EGPWS Range of 20 NM.
VERIFY the KGP-560 "TAWxRng1" is equal to 20 NM. **<< Pass/Fail _____ >>**

Using the range buttons on the display, select the EGPWS Range to the maximum value allowed by the display.
VERIFY the KGP-560 "TAWxRng1" is equal to the max. value in NM. **<< Pass/Fail _____ >>**

Using the range buttons on the display, select the EGPWS Range to the minimum value allowed by the display.
VERIFY the KGP-560 "TAWxRng1" is equal to the min. value in NM. **<< Pass/Fail _____ >>**

5.5.10   GPS/COM SUSCEPTIBILITY CHECK

To verify that the internal GPS receiver of the KGP-560 has adequate isolation from the harmonic interference of the existing VHF communication transceivers each VHF transmitter will be tuned to the frequencies listed below and the mic keyed for a period of 20 seconds while observing the KGP-560 system status. Ensure the INOP lamp does not illuminate during each frequency check.

Tune COMM X (1, 2, 3… if installed) to each of the frequencies listed below and key the mic for 20 seconds.

VERIFY the KGP-560 System Status does not go `INOP'
121.150 MHz   << Pass/Fail _____   >>
121.175 MHz   << Pass/Fail _____   >>
121.200 MHz   << Pass/Fail _____   >>
131.250 MHz   << Pass/Fail _____   >>
131.275 MHz   << Pass/Fail _____   >>
131.300 MHz   << Pass/Fail _____   >>
Repeat check for each VHF Communication radio installed in the aircraft.

5.5.11   ATTITUDE & ROLL

(Note: If the Cat 10 Attitude & Heading Select ID is 0 this check need not be performed)

Varying the inputs of the Attitude system and comparing CVT Item readout to the source checks wiring to the Attitude system.

1.   **VERIFY** the Attitude Roll input per the following table:

Signal	CVT Item	Test Value	Expected Value	Observed Value	Pass	Fail
Roll Angle	**RawRoll1**	0°	0 ± 5°			
Roll Angle	**RawRoll1**	15° Right Bank	+15 ± 5°			
Roll Angle	**RawRoll1**	10° Left Bank	-10 ± 5°			

Note: The test operator may choose the test value to be used. Record actual value used.
Note: Positive Roll values correspond to a "Left Wing Up/Bank Right" condition.

5.5.12   MAGNETIC HEADING CHECK

Note: If the Cat. 11 Display Option Select ID is 0 this check need not be performed.

Comparing the CVT Item readout to the magnetic heading source checks the wiring to the Magnetic Heading system

1.   **VERIFY** the digital Magnetic Heading input per the following table:

Signal	CVT Item	Test Value	Expected Value	Observed Value	Pass	Fail
Magnetic Heading	**RawlMHd1**	Mag Heading	MH ± 5°			

Note: The CVT Item for Magnetic Heading is displayed as ± 180°. If the aircraft heading is 350 degrees, the CVT Item will read –10 degrees, if the aircraft heading is 240 degrees, the CVT Item will read –120 degrees. If the aircraft heading is 155 degrees the CVT Item will read 155 degrees.

5.6 System Self-Test Procedure

This section defines the expected information self-tests to validate the operation/installation of the KGP-560 GA-EGPWS. A high level of confidence in the KGP-560 GA-EGPWS installation can be achieved by initiating a self-test.

5.6.1 Self-Test Initiation

Self-test is initiated by pressing the TERR Test or the Self-Test switch in the pilot's instrument panel for less than 2 seconds.

Note: The self-test aural volume is 6dB lower than the warning aural volume.

5.6.1.1 Self-Test Short and Long Cancel

Short cancel is accomplished by pressing and holding the test switch for less than 2 seconds.

Long cancel is accomplished by pressing and holding the test switch for 2 to 8 seconds.

5.6.2 Level 1 Self-Test

This test applies to all installations. If the installation you are testing does not include the display interface option, skip to the next item.
1. Verify that all of the required aircraft and avionics systems are powered and functioning.
2. If the KGP-560 is interfaced to a display, select a range of 40NM. If the KGP-560 is interfaced through a Terrain/Weather Radar switch ensure Terrain is selected.

Select the cockpit speaker on the audio control panel(s).
Initiate the terrain self-test using the SELF-TEST switch.

VERIFY the following sequence.

1. The amber TERRAIN N/A (or TERR N/A or NOT AVAIL) light illuminates.   **_____(verified)**

2. The red WARN or TERR light illuminates.   **_____(verified)**

3. An aural *"EGPWS SYSTEM OK"* message is enunciated over cockpit speaker. **_____(verified)**

4. The red WARN or TERR light extinguishes.   **_____(verified)**

5. The amber CAUT or TERR light illuminates.   **_____(verified)**

6. A terrain self-test pattern appears on the indicator.   **_____(verified)**

7. The amber CAUT or TERR light and the amber TERRAIN N/A (or TERR N/A or NOT AVAIL) lights extinguish.   **_____(verified)**

8. The terrain self-test pattern disappears (note that the terrain display may remain on for approximately 10 seconds after the lights extinguish).   **_____(verified)**

5.6.3 Level 2 Self-test

Note: The TERRAIN N/A (or TERR N/A) light will be illuminated throughout this test. The Level 2 Self-test follows the Level 1 Self-test such that the Level 1 Self-test must be performed to initiate the Level 2 Self-test. The KGP-560 "Terrain Not Available" lamp must initially be off to perform this test.

Initiate the EGPWS self-test (Level 1) using the SELF-TEST switch. Once the Level 1 self-test audio sequence begins, press and hold the test switch for less than 2 seconds. This will start Self-test Level 2.

1) _VERIFY_ the following aural messages are announced.

    1. "*CURRENT FAULTS*"   **_____(verified)**

    2. "*NO FAULTS*"   **_____(verified)**

    3. "*PRESS TO CONTINUE*"   **_____(verified)**

Note: If a GA-EGPWS computer or system faults exist, the fault(s) will be enunciated as GPWS internal faults and/or GPWS external faults. The aural message will provide a description of the fault(s). Any faults that are announced must be cleared prior to continuing the tests.

5.6.4 Self-test Level 3 – System Configuration

Note: The TERRAIN N/A light will be illuminated throughout this test.
"X" denotes a number, letter, the word "point" or no enunciation. Any of these annunciations are acceptable where "X" is listed below, e.g. the serial number may be annunciated as *"SERIAL NUMBER "316".)*

1. Initiate the self-test (Level 1) using the test switch. Once the Level 1 self-test audio sequence begins, press and hold the test switch for less than 2 seconds. This will start Self-test Level 2.

Within 3 seconds after the *"PRESS TO CONTINUE"* message is enunciated at the end of the Level 2 self-test, press the test switch for less than 2 seconds.
VERIFY the following aural messages are enunciated.

    1. "*SYSTEM CONFIGURATION*"   **_____(verified)**
    2. "*PART NUMBER 965-1198-XXX*"   **_____(verified)**
    3. "*MOD STATUS X*"   **_____(verified)**
    4. "*SERIAL NUMBER XXX*"   **_____(verified)**
    5. "*APPLICATION SOFTWARE VERSION XXX*"   **_____(verified)**
    6. "*TERRAIN DATABASE VERSION XXXX*"   **_____(verified)**
    7. "BOOT CODE VERSION XXX"   **_____(verified)**
    8. "*AIRCRAFT TYPE X*"   **_____(verified)**
    9. "*AIR DATA TYPE X*"   **_____(verified)**
    10. "POSITION INPUT TYPE X"   **_____(verified)**
    11. "TERRAIN DISPLAY TYPE X"   **_____(verified)**
    12. "*I.O. DISCRETE TYPE X*"   **_____(verified)**
    13. "*AUDIO MENU X*"   **_____(verified)**
    14. "*VOLUME SELECT X*"   **_____(verified)**
    15. "ALTITUDE MONITOR TYPE X"   **_____(verified)**
    16. "TERRAIN DISPLAY POP-UP TYPE X"   **_____(verified)**
    17. "ATTITUDE HEADING TYPE X"   **_____(verified)**
    18. "DISPLAY OPTIONS TYPE X"   **_____(verified)**
    19. "*PRESS TO CONTINUE*"   **_____(verified)**

6 SECTION VI – OPERATION

6.1 General Information

Refer to Section 5 of this manual for the operating instructions relating to the post installation checkout. Refer to the KGP-560 GA-EGPWS Pilot's Guide, P/N 006-18254-0001 or the aircraft's flight manual supplement for an explanation of the operating controls.

7 SECTION VII – CERTIFICATION INFORMATION

7.1 Introduction

This section outlines the procedures necessary to obtain proper certification, licensing and maintain airworthiness for the KGP-560 GA-EGPWS System.

7.2 Certification Procedure

7.2.1 Equipment Compatibility

Careful consideration must be paid to the electrical characteristics of existing equipment or possible additions that will be interfaced with the KGP-560 GA-EGPWS System, in order to ensure system compatibility. Section 3 and Section 4 of this manual provide system planning guidelines, and define the electrical characteristics of KGP-560 GA-EGPWS System. The installing agency should contact Honeywell International Inc. Product Support at (800) 257-0726, for information regarding the compatibility of equipment not listed in Section 4. Normal business hours are 8:00 AM to 5:00 PM Central Time, Monday through Friday.

7.2.2 Equipment Location

The KGP-560 GA-EGPWS System and associated indicators, annunciators and switches should be clearly visible and within easy reach of the pilot. Refer to Section 2 of this manual for installation information.

7.2.3 TSO Category

The KGP-560 GA-EGPWS complies with TSO-C151a Class B. The system must be configured for Helicopter operation.

7.2.4 Geometric Altitude

Geometric Altitude is the KGP-560 internally calculated altitude used to determine alerts and provide the terrain display. Detail regarding the inputs and calculations used to create Geometric Altitude are included in the KGP-560 Pilot's Guide.

7.2.4.1 Geometric Altitude Background

On some terrain displays, Geometric Altitude can be displayed as MSL or GSL. This altitude is the reference altitude for the display and the terrain awareness algorithm. This reference altitude is based on internally calculated Geometric Altitude and NOT corrected barometric altitude that must be used when navigating within the National Airspace System.

Geometric Altitude is the height above mean sea level (MSL) derived from the GPS receiver, filtered by the vertical figure of merits from the same GPS and complemented by short term variations in barometric altitude. It represents the aircraft's calculated true height above MSL and serves as the reference altitude for color-coding of the terrain display and the altitude input to the look-ahead algorithm.

Because it is primarily comprised of GPS altitude, this reference altitude will often differ from cockpit displayed corrected barometric altitude. **The geometric altitude is not to be used for navigation.** It is presented to provide the crew with additional situational awareness of true height above sea level upon which terrain alerting and display is based.

GPS altitude is an altitude above mean-sea-level and it is the geodetic height above the WGS-84 ellipsoid corrected by the geoid height in the GPS receiver itself. With Selective Availability turned off as currently, the accuracy is usually better than 75 feet and with Selective Availability turned on, short term accuracy is in the order of 400 feet, but the geometric altitude should be within 100 feet.

7.2.5 FAA Requirements

The installing agency should contact a local FAA Inspector (GADO, FSDO, ACDO, MIDO, or ACO) who will determine whether the installation may be approved by submitting FAA Form 337,or whether a Supplemental Type Certificate (STC) will be required. If FAA Form 337 is determined to be sufficient, the installing agency should determine the acceptability of the procedures defined within this manual. If the FAA Inspector determines that an STC is required, the installing agency will need to contact the nearest Aircraft Certification Office (ACO) to obtain acceptable procedures.

The FAA Northwest Mountain Region Aircraft Certification Office, Seattle ACO, has on file an approved report regarding the KGP-560 GA-EGPWS System. This report contains the bench test data and DO-160D environmental test data required to demonstrate the KGP-560 GA-EGPWS System's compliance.

7.2.6 FAA Form 337

FAA Form 337 (if applicable) must be completed and submitted to the FAA.

7.2.7 Flight Manual Revision

A Flight Manual Supplement is normally required for approval. A sample is described in Section 10 and can be used as a guide to an acceptable content and format, it is not intended to apply to all installations. It is the responsibility of the installing agency to prepare an appropriate Flight Manual Supplement, and obtain FAA approval.

7.2.8 Pilot Briefing

The installing agency should carefully review the Flight Manual Supplement and the KGP-560 Pilot Guide, P/N 006-18254-0001, with the owner/operator of the aircraft.

7.3 License Requirements

There are no licensing requirements for the KGP-560 GA-EGPWS.

7.4 Instructions for Continued Airworthiness

FAR Part 23.1529 and 25.1529 Instructions for Continued Airworthiness is met per the following Instructions:

Design and manufacture of the equipment will provide for installation so as not to impair the airworthiness of the aircraft.

7.4.1 KGP-560 GA-EGPWS

If the unit should require maintenance, remove the unit and have it repaired by an appropriately rated Honeywell approved Instrument Service Center. If the aircraft is to fly with the KGP-560 re-moved, secure the connector(s) as necessary and placard the aircraft accordingly. After reinstallation of the unit, accomplish the appropriate Post Installation/Ground Test Checkout in Section 5.5.

During each annual or 100 hour inspection of the aircraft, perform a Level 2 Self Test of the KGP-560 as defined in the Post Installation/Ground Test Checkout in Section 5.6.

7.4.2 Wires/Coax Cables

During ON-Condition or regularly scheduled maintenance, inspect the wires and coax cables following the guidelines listed in AC 43.13-1B Chapter 11 as necessary.

7.4.3 Annunciators/Relays

If an annunciator bulb needs replacement, use a bulb with the same type and voltage rating as originally installed. If a relay malfunctions, replace it with an airworthy relay having the same part number. If a combination annunciator/relay unit is used, e.g. MD41-1208/1308, remove the unit and have it repaired by a factory-rated service center. If the aircraft is to fly with a relay or annunciator removed, secure the connector(s) as necessary and placard the aircraft accordingly. After re-installation of the unit, accomplish the appropriate Post Installation/Ground Test Checkout in Section 5.5.

7.4.4 GPS Antenna

If the GPS Antenna should fail, replace it with an airworthy antenna having the same part number. Verify good electrical bonding surfaces before installing the antenna. Ensure that antenna radome is clean and not covered with paint. After re-installation of the antenna, accomplish the appropriate Post Installation/Ground Test Checkout in Section 5.5.

7.4.5 Temperature Probe

If the KGP-560 Self Test indicates a failure of the temperature probe, replace the temperature probe with an airworthy temperature probe having the same part number. After installation of the temperature probe, accomplish the appropriate Post Installation/Ground Test Checkout in Section 5.

7.4.6 Regional Terrain Database Updates

Regional Terrain databases can be ordered for card updates or another region by contacting:
>
> Honeywell International Inc.
> Aerospace Electronic Systems
> One Technology Center
> 23500 West 105th Street
> Olathe, Kansas 66061 USA
> Attn: Navigation Services MS-66
>
> Telephone: (800) 247-0230 within the United States or Canada
> (913) 712-3145 outside of the United States or Canada
> Fax: (913) 712-3904
>
> e-mail: nav.database@honeywell.com

See Section 5.3 for Regional Terrain Database installation and verification procedures.

8 SECTION VIII – ABBREVIATIONS, ACRONYMS & DEFINITIONS

Abbreviations, Acronyms and Definitions used in this manual.

Abbreviations/Acronyms	Meaning
AGL	above ground level
aka	also known as
ANSI	American National Standards Institute
ARINC	Aeronautical Radio Incorporated
ART	Antenna Receiver/Transmitter
ASPB	aka KCPB EGPWS Picture Bus Interface
ASCII	American Standard Code for Information Interchange
Cat	Category
CCW	Counter-clockwise
Config., CFG	Configuration
Ctrl, CTRL	Control
CVT	Current Value Table for WinViews
CW	Clockwise
EEPROM	Electrically Erasable Programmable Read Only Memory
EFIS	electronic flight instrument system
EGPWS	Enhanced Ground Proximity Warning System (aka TAWS)
FAA	Federal Aviation Administration (United States)
FAR	Federal Aviation Requirements
FIS	Flight Information Services
fpm, FPM	feet per minute
ft, FT	Feet
GA-EGPWS	General Aviation Enhanced Ground Proximity Warning System
GPS	Global Positioning System
GSL	Geodetic Sea Level (MSL) Geometric Altitude
HIRF	High Intensity Radiated Field
Hz	Hertz
ICAO	International Civil Aviation Organization
ID	Identification
IEEE	Institute of Electrical and Electronics Engineering
IFR	Instrument Flight Rules
in.	inches
KCPB	EGPWS Picture Bus Interface
lbs.	Pounds
LCD	Liquid Crystal Display
LED	Light Emitting Diode
RMS LRU	Line Replaceable Unit
MFD	Multi-Function Display
msec	Millisecond
MSL	Mean Sea Level
mW	milliwatt
N.A., N/A	Not Applicable
nm, n.m., NM	Nautical miles
NTSC	National Television Standards Committee
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association

Abbreviations/Acronyms	Meaning
PN	Part Number
RF, rf	Radio Frequency
rms	Root mean square
RTCA	Radio Technical Commission for Aeronautics
RTS	Return To Service (test)
sec	second
SW	Software
TAWS	Terrain Awareness and Warning System (aka EGPWS)
TBD	To Be Determined
TSO	Technical Standard Order
VAC	Volts Alternating Current
VDC	Volts Direct Current
VFR	Visual Flight Rules
WinViews	Windows Virtual Interface to the Enhanced Warning System
WX, Wx	Weather

TABLE 8-1 LIST OF ABBREVIATIONS, ACRONYMS & DEFINITIONS

9 SECTION IX – ENVIRONMENTAL QUALIFICATION

The KGP-560 GA-EGPWC conforms to the categories of RTCA/DO-160D
"Environmental Conditions and Test Procedures for Airborne Electronic, Electrical
Equipment and Instruments" as identified below.

Environmental Test	DO160D Section	Category	Comments
Temperature (High/Low)	4.0	B1	Operating : -40°C to +55°C Ground Survival: -55°C to +85°C
In-Flight Loss of Cooling	4.5.4		No cooling required
Altitude	4.6.1	F2	55,000 feet
Decompression	4.6.2	A2	25,000 feet
Overpressure	4.6.3	A2	-15,000 feet
Temperature Variation	5.0	B	5°C / min
Humidity	6.0	A	48 Hours @ 85% RH 38 – 50 °C, non-operating
Shock-Operating	7.0	C	Normal: 6g, 11 msec sawtooth, Low freq.: 6g, 20 msec sawtooth
Shock-Crash Safety	7.0	C	20g 11 msec sawtooth 20g sustained
Vibration	8.0	S-M R2-B1	Sinusoidal: 0.1"p-p @ 5-15Hz; 0.01"p-p @ 15-55Hz, Decaying to 0.0001"p-p @ 500Hz, random 2.09grms
Explosion Proofness	9.0	E	(certification)
Waterproofness	10.0	X	No test required
Fluids Susceptibility	11.0	X	No test required
Sand and Dust	12.0	X	No test required
Fungus Resistance	13.0	F	No test (certification of non-nutrient material)
Salt Spray	14.0	X	No test required
Magnetic Effect	15.0	Z	Less than 0.3m
Power Input	16.0	B - *	Normal: **10.0 – 30.3** VDC Abnormal (5 minutes): 10.0 – 32.2 VDC Emergency (30 minutes): 18 VDC Interrupt for 200msec Normal Surge (30msec): 15 - 40VDC Abnormal Surge: 100msec @ 46.3VDC, 1sec @ 37.8VDC
Voltage Spike	17.0	A	600VDC, 10µsec, 50Ω source impedance
AF Conducted Susceptibility (Power Lines)	18.0	Z	0.20 Vrms 10-200 Hz; 0.56 Vrms, 200 – 1000 Hz 1.40 Vrms, 1000 – 15,000 Hz 0.20 down to .001 Vrms, 15 kHz – 150 kHz.
Induced Signal Susceptibility	19.0	Z	Magnetic, unit: 20 Arms a 400Hz Magnetic, cables: 30 A-m @400Hz down to 0.8 A-m @ 15KHz Electric, cables: 1800 V-m, 380 – 420 Hz Induced Spikes: 600 V p-p, 2-10µsec rate, 3 meters
RF Conducted Susceptibility	20.0	R	10 kHz – 500 kHz: 0.6mA – 30.0 mA; 500 kHz – 400 MHz: 30.0 mA
RF Radiated Susceptibility	20.0	RR	20 V/m, 0.1 – 0.4 GHz, SW & CW; 150 V/m, 0.4 – 8 GHz, Pulse
RF Conducted Emissions	21.0	M	Power: 53 – 20 dBµA @ 0.15 – 2 MHz, 20 dBµA @ > 2 MHz Cables: 73 – 40 dBµA @ 0.15 – 2 MHz, 40 dBµA @ > 2 MHz
RF Radiated Emissions	21.0	M	Complex curves with notches (see DO160D Fig. 21-5)
Lightning Transient Susceptibility	22.0	A3 E3	Pin: 600V/24A, 300V/60A Cable: 300V/600A, 600V/120A
Lightning Direct Effects	23.0	X	No test required
Icing Test	24.0	X	No test required
Electrostatic Discharge Test	25.0	A	15,000 volts

* DO-160D Section 16.0 Power Input Category B requires normal operation to 9.0 Vdc, the KGP-560 operates down
  to 10.0 Vdc

10 SECTION X– CERTIFICATION DOCUMENTATION REFERENCES

The KGP-560 GA-EGPWS system is certified by Honeywell – AES in Redmond, WA. Certification documentation is available on the EGPWS website - http://www.egpws.com or contact:

Honeywell Aerospace Electronic Systems

BR&GA Product Support,

KGP-560 Product Specialist

Phone: 800-257-0726

11 SECTION XI– APPROVED SENSORS

11.1 Encoding Altimeters And Blind Encoders

The following encoding altimeters and blind encoders have been tested for compatibility with the GA-EGPWS.

Encoder Manufacturer	Model No.	Comments
Honeywell (Bendix/King)	KEA 130A	Encoding Altimeter
Narco	AR 850	Both 15 pin & 25 pin D versions
Trans-Cal Industries	SSD 120	Blind Encoders
AERO Mechanisms Inc.	8140B	Encoding Altimeter

TABLE 11-1 GA-EGPWS COMPATIBLE ENCODING ALTIMETERS & BLIND ENCODERS

Note: Various encoders have failed to pass our tests. Use of sensors other than from the above list is recommended only after confirmation of operation via the included ground test procedure.

11.2 GPS Sensors

The KGP-560 includes a built in GPS sensor. This is the preferred interface method to provide the KGP-560 system with position information. Many other GPS sensors may also produce an adequate GPS data set to drive the system as well.

The KGP-560 GA-EGPWS will accept GPS data as an external input thus eliminating the need to add an additional GPS antenna if a GPS system is already installed on the aircraft. However the specific GPS data required by the KGP-560 currently minimizes the type of GPS systems that are compatible.

Subsequent releases of various GPS systems may facilitate adequate detail to drive the KGP-560. Upon that time this document will be updated to reflect the approved systems.

GPS Manufacturer	Model No.	GPS Data Output	Required Format	Comments
Honeywell (Bendix/King)	KLN series	Xpress Card Data (RS-232)	RS-232	KLN providing direct GPS Xpress card output.
Garmin	GNS series	RS-232	RS-232	Ensure proper Garmin software version level.
Misc.	Misc.	ARINC 429	ARINC 743	GPS data must be supplied via ARINC 429 in ARINC 743 format.
Misc.	Misc.	ARINC 429	ARINC 743A	GPS data must be supplied via ARINC 429 in ARINC 743A format
Misc.	Misc.	ARINC 429	ARINC 743 (WGS-84 referenced)	GPS, ARINC 429 low speed, 743 format (GPS Altitude referenced to WGS-84)

TABLE 11-2 GA-EGPWS COMPATIBLE GPS SYSTEMS

11.3 Supported Displays

This Appendix previously defined the displays compatible with the KGP-560 GA-EGPWS. Please refer to Table 4-24 for the list of supported display types. The KGP-560 supports one output display bus.

It is possible that a display will work with the KGP-560 that is not on the table. If the display manufacturer has implemented our open architecture KCPB picture bus protocol the system may work. If the display is ARINC 453 or ARINC 708 compatible it may also operate.