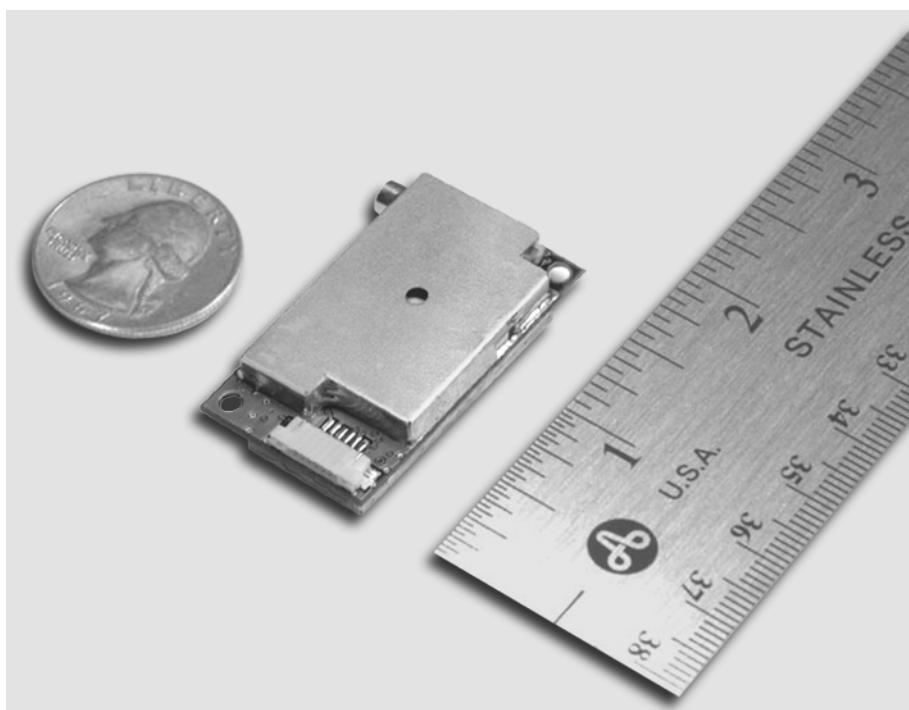




# **GPS 15 TECHNICAL SPECIFICATIONS**



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### **RECORD OF REVISIONS**

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## **TABLE OF CONTENTS**

1. INTRODUCTION	
1.1 CAUTIONS .....	1
1.2 LIMITED WARRANTY .....	2
1.3 OVERVIEW .....	3
1.4 FEATURES .....	3
1.5 TECHNICAL SPECIFICATIONS.....	4
2. PINOUT	
2.1 DESCRIPTION .....	6
2.2 DIAGRAMS .....	7
3. SOFTWARE INTERFACE	
3.1 RECEIVED NMEA 0183 SENTENCES.....	8
3.2 TRANSMITTED NMEA 0183 SENTENCES.....	10
4. MECHANICAL CHARACTERISTICS & MOUNTING.....	14
Appendix A. EARTH DATUMS.....	15

---

**LIST OF FIGURES**

FIGURE 1. COMPUTER SERIAL PORT INTERCONNECTION ..... 7  
FIGURE 2. PDA SERIAL PORT INTERCONNECTION ..... 7  
FIGURE 3. BASIC NMEA DEVICE INTERCONNECTION ..... 7  
FIGURE 4. GPS 15-F DIMENSIONS..... 14  
FIGURE 5. GPS 15-W OUTLINE DRAWING..... 14

**LIST OF TABLES**

TABLE 1. SIGNAL/WIRE DESCRIPTIONS ..... 6  
TABLE 2. NMEA 0183 OUTPUT SENTENCE ORDER..... 10

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# 1 INTRODUCTION

## 1.1 CAUTIONS

### CAUTION

The GPS system is operated by the government of the United States, which is solely responsible for its accuracy and maintenance. Although the GPS 15 is a precision electronic NAVigation AID (NAVAID), any NAVAID can be misused or misinterpreted, and therefore become unsafe. Use these products at your own risk. To reduce the risk, carefully review and understand all aspects of these Technical Specifications before using the GPS 15. When in actual use, carefully compare indications from the GPS to all available navigation sources including the information from other NAVAIDs, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

### FCC Compliance

The GPS 15 complies with Part 15 of the FCC interference limits for Class B digital devices FOR HOME OR OFFICE USE. These limits are designed to provide reasonable protection against harmful interference in a residential installation, and are more stringent than “outdoor” requirements.

Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The GPS 15 does not contain any user-serviceable parts. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate this device under Part 15 regulations.

---

## 1.2 LIMITED WARRANTY

This GARMIN product is warranted to be free from defects in materials or workmanship for one year from the date of purchase. Within this period, GARMIN will at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL GARMIN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you.

GARMIN retains the exclusive right to repair or replace the unit or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, contact your local GARMIN authorized dealer. Or call GARMIN Customer Service at one of the numbers shown below, for shipping instructions and an RMA tracking number. The unit should be securely packed with the tracking number clearly written on the outside of the package. The unit should then be sent, freight charges prepaid, to any GARMIN warranty service station. A copy of the original sales receipt is required as the proof of purchase for warranty repairs.

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---

## 1.3 OVERVIEW

The GPS 15 is part of GARMIN's latest generation of GPS sensor boards designed for a broad spectrum of OEM (Original Equipment Manufacture) system applications. Based on the proven technology found in other GARMIN 12-channel GPS receivers, the GPS 15 will track up to 12 satellites at a time while providing fast time-to-first-fix, one-second navigation updates and low power consumption. Its far-reaching capabilities meet the sensitivity requirements of land navigation as well as the dynamics requirements of high-performance aircraft.

These GPS designs utilize the latest technology and high-level circuit integration to achieve superior performance while minimizing space and power requirements. All critical components of the system including the RF/IF receiver hardware and the digital baseband are designed and manufactured by GARMIN to ensure the quality and capability of the GPS. The hardware capability combined with software intelligence makes the GPS 15 easy to integrate and use.

These are complete GPS receivers that require minimal additional components to be supplied by an OEM or system integrator. A minimum system must provide the GPS with a source of power, an active GPS antenna, and a clear view of the GPS satellites. The system may communicate with the GPS 15 via its CMOS-level serial port. The GPS 15 stores data such as satellite orbital parameters, last-known position, date and time in battery backed up SRAM. End user interfaces such as keyboards and displays are the responsibility of the application designer.

## 1.4 FEATURES

- 12-channel GPS receiver tracks and uses up to 12 satellites for fast, accurate positioning and low power consumption.
- Compact, rugged design ideal for applications with minimal space. May be remotely mounted in an out-of-the-way location. Receiver status information can be displayed directly on a chartplotter or PC.
- User initialization is not required. Once installed, unit will automatically transmit navigation data.
- User-configurable navigation mode (2-dimensional or 3-dimensional fix).
- Provision for external power to maintain the non-volatile SRAM and real-time clock.
- Optional on-board backup battery to maintain the non-volatile SRAM and real-time clock for up to 21 days.

---

## 1.5 TECHNICAL SPECIFICATIONS

Specifications are subject to change without notice.

### 1.5.1 Physical Characteristics

#### 1.5.1.1 Size

0.940" (23.88 mm) wide, 1.690" (42.93 mm) long, 0.309" (7.84 mm) high

#### 1.5.1.2 Weight

0.35 oz. (10 g)

#### 1.5.1.3 Available Connector Options

- GPS 15-F:  
GPS 15-F: 6-pin LIF connector, 1 millimeter pitch
- GPS 15-W:  
GPS 15-W: 6-pin JST connector, 1 millimeter pitch; mating wire harness included  
(NOTE: available in Asia, or by special order)

### 1.5.2 Electrical Characteristics

#### 1.5.2.1 Input Voltage

3.3 Vdc regulated,  $\pm 50$  mV ripple

#### 1.5.2.2 Input Current

85 mA peak, 80 mA nominal

#### 1.5.2.3 GPS Receiver Sensitivity

-165 dBW minimum

### 1.5.3 GPS Performance

#### 1.5.3.1 Receiver

- 12 parallel channel GPS receiver continuously tracks and uses up to 12 satellites to compute and update your position.

#### 1.5.3.2 Acquisition Times

- Reacquisition: Less than 2 seconds
- Warm: Approximately 15 seconds (all data known)
- Cold: Approximately 45 seconds (initial position, time and almanac known, ephemeris unknown)
- AutoLocate™: 5 minutes (almanac known, initial position and time unknown)
- SkySearch: 5 minutes (no data known)

#### 1.5.3.3 Update Rate

- 1 second

#### 1.5.3.4 Accuracy

- GPS Standard Positioning Service (SPS)  
Position: < 15 meters, 95% typical (100 meters with Selective Availability on)  
Velocity: 0.1 knot RMS steady state
- Dynamics: 999 knots velocity (only limited at altitude greater than 60,000 feet), 6g dynamics



---

## 1.5.4 Interfaces

### 1.5.4.1 Electrical Characteristics

#### 1.5.4.1.1 GPS 15

- CMOS level output for interfacing directly to a host microprocessor.
- Jumper settings determine baud rate. Factory setting is 4800 baud.

### 1.5.4.2 Port 1 Protocols

- NMEA 0183 Version 3.00
- ASCII output sentences GPGGA, GPGSA, GPGSV, and GPRMC (NMEA-approved sentences); PGRME, PGRMM, and PGRMT (GARMIN proprietary sentences)
- NMEA 0183 Outputs (see Section 3.2 for full protocol specifications)
  - Position, velocity and time
  - Receiver and satellite status
  - Geometry and error estimates
- NMEA 0183 Inputs (see Section 3.1 for full protocol specifications)
  - Initial position, date and time (not required)
  - Earth datum

## 1.5.5 Environmental Characteristics

- Temperature:            -30°C to +80°C (Operating); -40°C to +90°C (Storage)

---

## 2 PINOUT

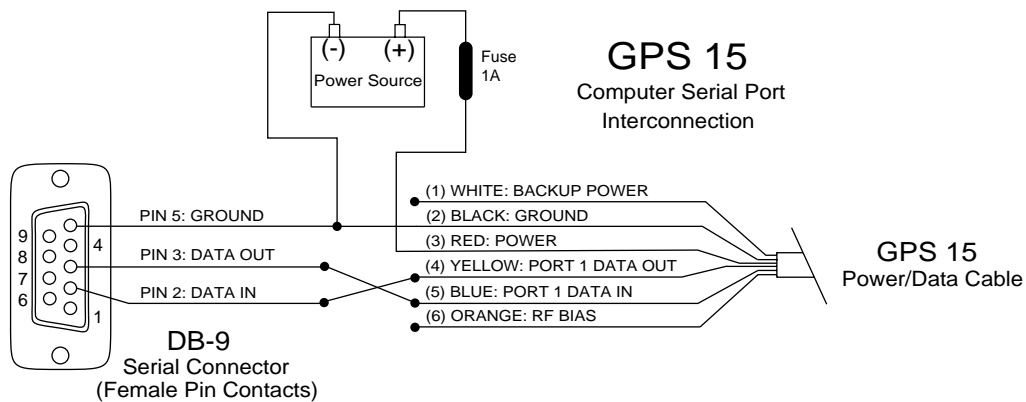
### 2.1 DESCRIPTION

The GPS 15-F utilizes a six-pin LIF connector. The GPS 15-W utilizes a six-pin JST connector with mating wire harness included.

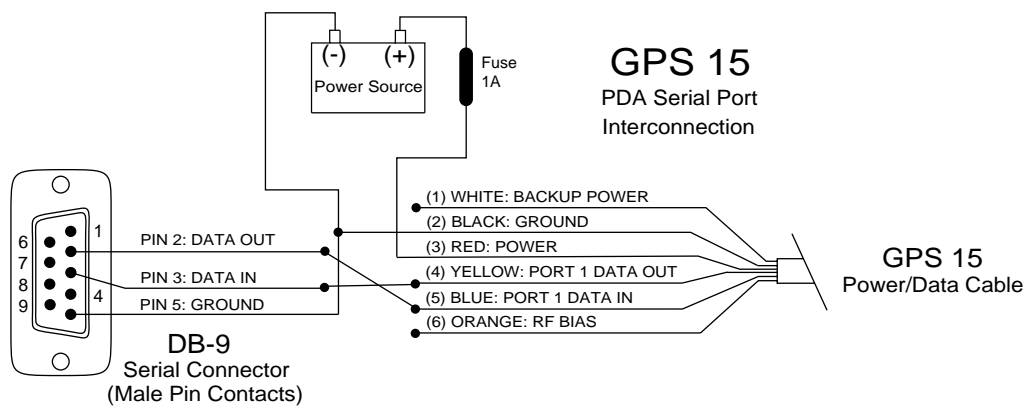
**Table 1. Signal/Wire Descriptions**

<b>GPS 15 Pin #</b>	<b>Signal Name</b>	<b>Description</b>
1	BACKUP POWER	This input provides external power to maintain the battery-backed SRAM and real-time clock. This enables the user to provide backup power if needed for longer than the optional on-board backup battery will provide (roughly 21 days). Input voltage must be between +2.8 and +3.4 Vdc.
2	GROUND	Power and Signal Ground
3	POWER	Regulated +3.3 Vdc input. Peak operating current is 85 mA. Nominal operating current is 80 mA.
4	PORT 1 DATA OUT	Serial Asynchronous Output. CMOS compatible output designed to interface directly with a host microprocessor. Provides serial data which is formatted per “ <i>NMEA 0183, Version 3.0</i> ”. The baud rate is set during production to 4800, but other rates are available.
5	PORT 1 DATA IN	First Serial Asynchronous Input. CMOS compatible input designed to interface directly with a host microprocessor. Maximum input voltage range of $0 < V < 3.3$ .
6	RF BIAS	This input allows the user to externally apply a RF bias to the active antenna. Units are shipped with this feature disabled. By default, the unit will use an internal voltage to power the active antenna.

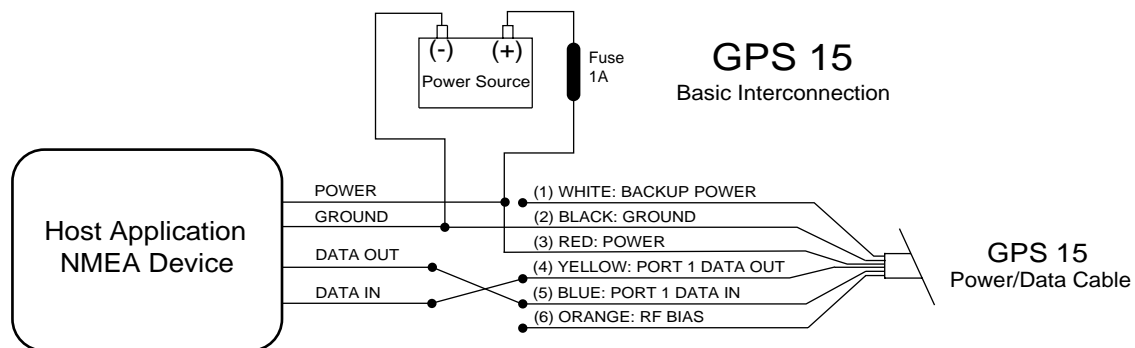
## 2.2 DIAGRAMS



**Figure 1. Computer Serial Port Interconnection**



**Figure 2. PDA Serial Port Interconnection**



**Figure 3. Basic NMEA Device Interconnection**

---

### 3 SOFTWARE INTERFACE

The GPS 15 interface protocol design on COM 1 is based on the National Marine Electronics Association's NMEA 0183 ASCII interface specification. This standard is fully defined in "NMEA 0183, Version 3.0" (copies may be obtained from NMEA, [www.nmea.org](http://www.nmea.org)).

The GPS 15 interface protocol, in addition to transmitting navigation information as defined by NMEA 0183, transmits additional information using the convention of GARMIN proprietary sentences.

The following sections describe the NMEA 0183 data format of each sentence transmitted and received by the GPS 15.

#### 3.1 RECEIVED NMEA 0183 SENTENCES

The subsequent paragraphs define the sentences that can be received on the GPS sensors' COM 1 port. Null fields in the configuration sentence indicate no change in the particular configuration parameter. All sentences received by the GPS sensor must be terminated with <CR><LF>, the ASCII characters for carriage return (0D hexadecimal) and line feed (0A hexadecimal). The checksum \*hh is used for parity checking data and is not required, but is recommended for use in environments containing high electromagnetic noise. It is generally not required in normal PC environments. When used, the parity bytes (hh) are the ASCII representation of the exclusive-or (XOR) sum of all the characters between the "\$" and "\*" characters, non-inclusive. Sentences may be truncated by <CR><LF> after any data field and valid fields up to that point will be acted on by the GPS sensor.

##### 3.1.1 Sensor Initialization Information (PGRMI)

The \$PGRMI sentence provides information used to initialize the GPS sensor's set position and time used for satellite acquisition. Receipt of this sentence by the GPS sensor causes the software to restart the satellite acquisition process. If there are no errors in the sentence, it will be echoed upon receipt. If an error is detected, the echoed PGRMI sentence will contain the current default values. Current PGRMI defaults (with the exception of the Receiver Command, which is a command rather than a mode) can also be obtained by sending \$PGRMIE to the GPS sensor.

\$PGRMI,<1>,<2>,<3>,<4>,<5>,<6>,<7>\*hh<CR><LF>

<1>	Latitude, ddmm.mmm format (leading zeros must be transmitted)
<2>	Latitude hemisphere, N or S
<3>	Longitude, dddmm.mmm format (leading zeros must be transmitted)
<4>	Longitude hemisphere, E or W
<5>	Current UTC date, ddmmyy format
<6>	Current UTC time, hhmmss format
<7>	Receiver Command, A = Auto Locate, R = Unit Reset

### 3.1.2 Sensor Configuration Information (PGRMC)

The \$PGRMC sentence provides information used to configure the GPS sensor's operation. Configuration parameters are stored in non-volatile memory and retained between power cycles. The GPS sensor will echo this sentence upon its receipt if no errors are detected. If an error is detected, the echoed PGRMC sentence will contain the current default values. Current default values can also be obtained by sending \$PGRMCE to the GPS sensor.

\$PGRMC,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>,<13>,<14>\*hh<CR><LF>

<1>	Fix mode, A = automatic, 2 = 2D exclusively (host system must supply altitude), 3 = 3D exclusively
<2>	Altitude above/below mean sea level, -1500.0 to 18000.0 meters
<3>	Earth datum index. If the user datum index (96) is specified, fields <4> through <8> must contain valid values. Otherwise, fields <4> through <8> must be null. Refer to Appendix A for a list of earth datums and the corresponding earth datum index.
<4>	User earth datum semi-major axis, 6360000.000 to 6380000.000 meters (.001 meters resolution)
<5>	User earth datum inverse flattening factor, 285.0 to 310.0 ( $10^{-9}$ resolution)
<6>	User earth datum delta x earth centered coordinate, -5000.0 to 5000.0 meters (1 meter resolution)
<7>	User earth datum delta y earth centered coordinate, -5000.0 to 5000.0 meters (1 meter resolution)
<8>	User earth datum delta z earth centered coordinate, -5000.0 to 5000.0 meters (1 meter resolution)
<9>	Not used.
<10>	Not used.
<11>	Velocity filter, 0 = No filter, 1 = Automatic filter, 2-255 = Filter time constant (e.g., 10 = 10 second filter)
<12>	Not used.
<13>	Not used.
<14>	Dead reckoning valid time 1-30 (sec)

All configuration changes take effect after receipt of a valid value.

### 3.1.3 Miscellaneous Commands (PGRMO)

The \$PGRMO sentence provides the ability to change between normal and power save modes, as well as select Garmin data format for the remainder of the power cycle.

\$PGRMO,<1>,<2>\*hh<CR><LF>

<1>	Not used.
<2>	Command, where: B = change to power save mode. G = change to Garmin proprietary data format for the remainder of the power cycle. N = change to normal (as opposed to power save) mode.

---

## 3.2 TRANSMITTED NMEA 0183 SENTENCES

The subsequent paragraphs define the sentences that can be transmitted on COM 1 by the GPS sensor.

### 3.2.1 Sentence Transmission Rate

The GPS sensor will transmit each sentence (except where noted in particular transmitted sentence descriptions) at a one-second rate. The GPS sensor will transmit the following sentences contiguously. The contiguous transmission starts at a GPS second boundary. The information transmitted by the GPS sensor is referenced to the GPS second boundary immediately preceding the GPRMC sentence.

**Table 2. NMEA 0183 Output Sentence Order**

Sentence	Output by Default?
GPRMC	✓
GPGGA	✓
GPGSA	✓
GPGSV	✓
PGRME	✓
PGRMT	Once per minute
PGRMM	✓

The maximum number of fields allowed in a single sentence is 82 characters including delimiters. Values in the table include the sentence start delimiter character "\$" and the termination delimiter <CR><LF>. The factory set defaults will result in a once per second transmission at the NMEA 0183 specification transmission rate of 4800 baud.

### 3.2.2 Transmitted Time

The GPS sensor outputs UTC (Coordinated Universal Time) date and time of day in the transmitted sentences. Prior to the initial position fix, the on-board clock provides the date and time of day. After the initial position fix, the date and time of day are calculated using GPS satellite information.

The GPS sensor uses information obtained from the GPS satellites to add or delete UTC leap seconds and correct the transmitted date and time of day. The transmitted date and time of day for leap second correction follow the guidelines in “*National Institute of Standards and Technology Special Publication 432 (Revised 1990)*” (for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, U.S.A.).

When a positive leap second is required, the second is inserted beginning at 23h 59m 60s of the last day of a month and ending at 0h 0m 0s of the first day of the following month. The minute containing the leap second is 61 seconds long. The GPS sensor would have transmitted this information for the leap second added December 31, 1989 as follows:

Date	Time
311289	235959
311289	235960
010190	000000

If a negative leap second should be required, one second will be deleted at the end of some UTC month. The minute containing the leap second will be only 59 seconds long. In this case, the GPS sensor will not transmit the time of day 23h 59m 59s for the day from which the leap second is removed.

### 3.2.3 Global Positioning System Fix Data (GGA)

\$GPGGA,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,M,<10>,M,<11>,<12>\*hh<CR><LF>

<1>	UTC time of position fix, hhmmss format
<2>	Latitude, ddmm.mmmm format (leading zeros will be transmitted)
<3>	Latitude hemisphere, N or S
<4>	Longitude, dddmm.mmmm format (leading zeros will be transmitted)
<5>	Longitude hemisphere, E or W
<6>	GPS quality indication, 0 = fix not available, 1 = Non-differential GPS fix available, 2 = Differential GPS (DGPS) fix available, 6 = Estimated
<7>	Number of satellites in use, 00 to 12 (leading zeros will be transmitted)
<8>	Horizontal dilution of precision, 0.5 to 99.9
<9>	Antenna height above/below mean sea level, -9999.9 to 99999.9 meters
<10>	Geoidal height, -999.9 to 9999.9 meters
<11>	Not used.
<12>	Not used.

### 3.2.4 GPS DOP and Active Satellites (GSA)

\$GPGSA,<1>,<2>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<4>,<5>,<6>\*hh<CR><LF>

<1>	Mode, M = manual, A = automatic
<2>	Fix type, 1 = not available, 2 = 2D, 3 = 3D
<3>	PRN number, 01 to 32, of satellite used in solution, up to 12 transmitted (leading zeros will be transmitted)
<4>	Position dilution of precision, 0.5 to 99.9
<5>	Horizontal dilution of precision, 0.5 to 99.9
<6>	Vertical dilution of precision, 0.5 to 99.9

### 3.2.5 GPS Satellites in View (GSV)

\$GPGSV,<1>,<2>,<3>,<4>,<5>,<6>,<7>,...<4>,<5>,<6>,<7>\*hh<CR><LF>

<1>	Total number of GSV sentences to be transmitted
<2>	Number of current GSV sentence
<3>	Total number of satellites in view, 00 to 12 (leading zeros will be transmitted)
<4>	Satellite PRN number, 01 to 32 (leading zeros will be transmitted)
<5>	Satellite elevation, 00 to 90 degrees (leading zeros will be transmitted)
<6>	Satellite azimuth, 000 to 359 degrees, true (leading zeros will be transmitted)
<7>	Signal to noise ratio (C/No) 00 to 99 dB, null when not tracking (leading zeros will be transmitted)

NOTE: Items <4>,<5>,<6> and <7> repeat for each satellite in view to a maximum of four (4) satellites per sentence. Additional satellites in view information must be sent in subsequent bursts of NMEA 0183 data. These fields will be null if unused.

### 3.2.6 Recommended Minimum Specific GPS/TRANSIT Data (RMC)

\$GPRMC,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>\*hh<CR><LF>

<1>	UTC time of position fix, hhmmss format
<2>	Status, A = Valid position, V = NAV receiver warning
<3>	Latitude, ddmn.mmm format (leading zeros will be transmitted)
<4>	Latitude hemisphere, N or S
<5>	Longitude, dddmm.mmm format (leading zeros will be transmitted)
<6>	Longitude hemisphere, E or W
<7>	Speed over ground, 000.0 to 999.9 knots (leading zeros will be transmitted)
<8>	Course over ground, 000.0 to 359.9 degrees, true (leading zeros will be transmitted)
<9>	UTC date of position fix, ddmmyy format
<10>	Magnetic variation, 000.0 to 180.0 degrees (leading zeros will be transmitted)
<11>	Magnetic variation direction, E or W (westerly variation adds to true course)
<12>	Mode indicator, A = Autonomous, D = Differential, E = Estimated, N = Data not valid

### 3.2.7 Estimated Error Information (PGRME)

\$PGRME,<1>,M,<2>,M,<3>,M\*hh<CR><LF>

<1>	Estimated horizontal position error (HPE), 0.0 to 999.9 meters
<2>	Estimated vertical position error (VPE), 0.0 to 999.9 meters
<3>	Estimated position error (EPE), 0.0 to 999.9 meters

### 3.2.8 Map Datum (PGRMM)

The GARMIN Proprietary sentence \$PGRMM gives the name of the map datum currently in use by the GPS sensor. This information is used by the GARMIN MapSource real-time plotting application.

\$PGRMM,<1>\*hh<CR><LF>

<1>	Name of map datum currently in use (variable length field, e.g., "WGS 84")
-----	--



---

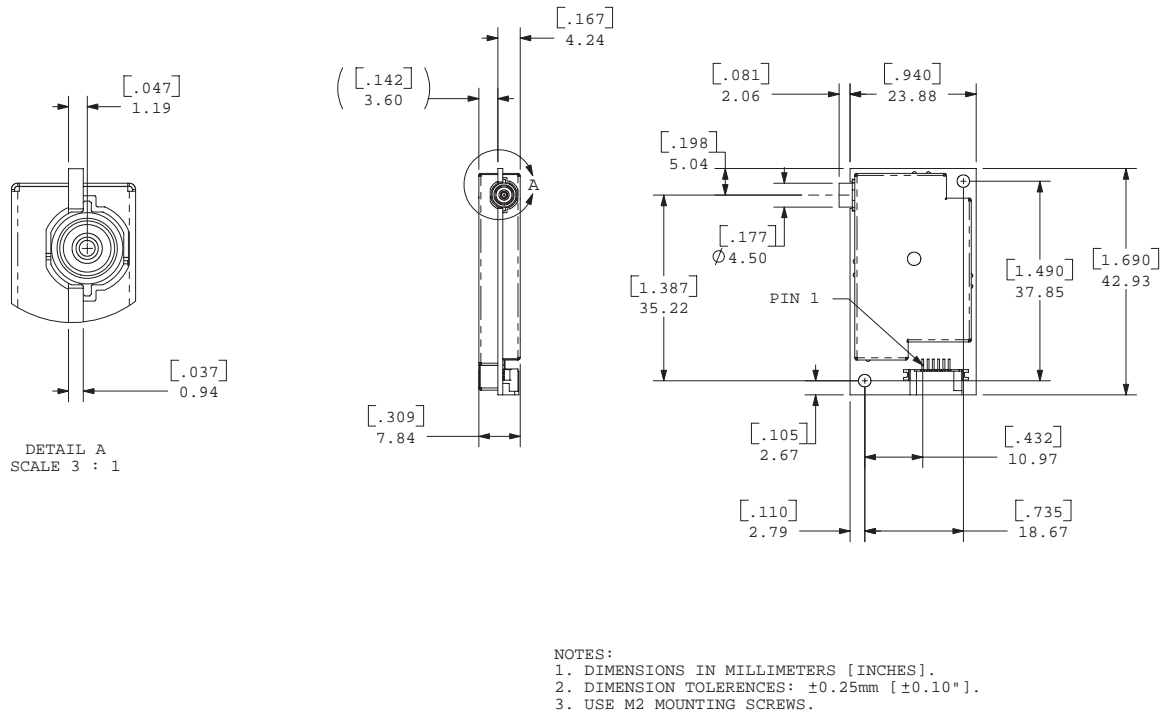
### 3.2.9 Sensor Status Information (PGRMT)

The GARMIN Proprietary sentence \$PGRMT gives information concerning the status of the GPS sensor. This sentence is transmitted once per minute regardless of the selected baud rate.

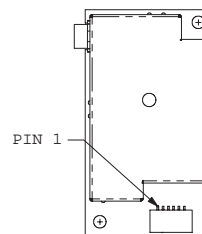
\$PGRMT,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>\*hh<CR><LF>

<1>	Product, model and software version (variable length field, e.g., "GPS 17 VER 2.05")
<2>	ROM checksum test, P = pass, F = fail
<3>	Receiver failure discrete, P = pass, F = fail
<4>	Stored data lost, R = retained, L = lost
<5>	Real time clock lost, R = retained, L = lost
<6>	Oscillator drift discrete, P = pass, F = excessive drift detected
<7>	Data collection discrete, C = collecting, null if not collecting
<8>	GPS sensor temperature in degrees C
<9>	Not used.

## 4 MECHANICAL CHARACTERISTICS & MOUNTING



**Figure 4. GPS 15-F Dimensions**



- NOTES:  
1. DIMENSIONS IDENTICAL TO GPS 15-F.  
2. USE M2 MOUNTING SCREWS.

**Figure 5. GPS 15-W Outline Drawing**

---

# Appendix A

## Earth Datums

The following is a list of the GARMIN GPS 15 earth datum indices and the corresponding earth datum name (including the area of application):

0	ADINDAN - Ethiopia, Mali, Senegal, Sudan
1	AFGOOYE - Somalia
2	AIN EL ABD 1970 - Bahrain Island, Saudi Arabia
3	ANNA 1 ASTRO 1965 - Cocos Island
4	ARC 1950 - Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe
5	ARC 1960 - Kenya, Tanzania
6	ASCENSION ISLAND 1958 - Ascension Island
7	ASTRO BEACON "E" - Iwo Jima Island
8	AUSTRALIAN GEODETIC 1966 - Australia, Tasmania Island
9	AUSTRALIAN GEODETIC 1984 - Australia, Tasmania Island
10	ASTRO DOS 71/4 - St. Helena Island
11	ASTRONOMIC STATION 1952 - Marcus Island
12	ASTRO B4 SOROL ATOLL - Tern Island
13	BELLEVUE (IGN) - Efate and Erromango Islands
14	BERMUDA 1957 - Bermuda Islands
15	BOGOTA OBSERVATORY - Colombia
16	CAMPO INCHAUSPE - Argentina
17	CANTON ASTRO 1966 - Phoenix Islands
18	CAPE CANAVERAL - Florida, Bahama Islands
19	CAPE - South Africa
20	CARTHAGE - Tunisia
21	CHATHAM 1971 - Chatham Island (New Zealand)
22	CHUA ASTRO - Paraguay
23	CORREGO ALEGRE - Brazil
24	DJAKARTA (BATAVIA) - Sumatra Island (Indonesia)
25	DOS 1968 - Gizo Island (New Georgia Islands)
26	EASTER ISLAND 1967 - Easter Island
27	EUROPEAN 1950 - Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
28	EUROPEAN 1979 - Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland
29	FINLAND HAYFORD 1910 - Finland
30	GANDAJIKA BASE - Republic of Maldives
31	GEODETIC DATUM 1949 - New Zealand
32	ORDNANCE SURVEY OF GREAT BRITAIN 1936 - England, Isle of Man, Scotland, Shetland Islands, Wales
33	GUAM 1963 - Guam Island
34	GUX 1 ASTRO - Guadalcanal Island
35	HJORSEY 1955 - Iceland
36	HONG KONG 1963 - Hong Kong
37	INDIAN - Bangladesh, India, Nepal
38	INDIAN - Thailand, Vietnam
39	IRELAND 1965 - Ireland
40	ISTS O73 ASTRO 1969 - Diego Garcia
41	JOHNSTON ISLAND 1961 - Johnston Island
42	KANDAWALA - Sri Lanka
43	KERGUELEN ISLAND - Kerguelen Island
44	KERTAU 1948 - West Malaysia, Singapore

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45	L.C. 5 ASTRO - Cayman Brac Island
46	LIBERIA 1964 - Liberia
47	LUZON - Mindanao Island
48	LUZON - Phillippines (excluding Mindanao Island)
49	MAHE 1971 - Mahe Island
50	MARCO ASTRO - Salvage Islands
51	MASSAWA - Eritrea (Ethiopia)
52	MERCHICH - Morocco
53	MIDWAY ASTRO 1961 - Midway Island
54	MINNA - Nigeria
55	NORTH AMERICAN 1927 - Alaska
56	NORTH AMERICAN 1927 - Bahamas (excluding San Salvador Island)
57	NORTH AMERICAN 1927 - Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua)
58	NORTH AMERICAN 1927 - Canal Zone
59	NORTH AMERICAN 1927 - Canada (including Newfoundland Island)
60	NORTH AMERICAN 1927 - Caribbean (Barbados, Caicos Islands, Cuba, Dominican Republic, Grand Cayman, Jamaica, Leeward Islands, Turks Islands)
61	NORTH AMERICAN 1927 - Mean Value (CONUS)
62	NORTH AMERICAN 1927 - Cuba
63	NORTH AMERICAN 1927 - Greenland (Hayes Peninsula)
64	NORTH AMERICAN 1927 - Mexico
65	NORTH AMERICAN 1927 - San Salvador Island
66	NORTH AMERICAN 1983 - Alaska, Canada, Central America, CONUS, Mexico
67	NAPARIMA, BWI - Trinidad and Tobago
68	NAHRWAN - Masirah Island (Oman)
69	NAHRWAN - Saudi Arabia
70	NAHRWAN - United Arab Emirates
71	OBSERVATORIO 1966 - Corvo and Flores Islands (Azores)
72	OLD EGYPTIAN - Egypt
73	OLD HAWAIIAN - Mean Value
74	OMAN - Oman
75	PICO DE LAS NIEVES - Canary Islands
76	PITCAIRN ASTRO 1967 - Pitcairn Island
77	PUERTO RICO - Puerto Rico, Virgin Islands
78	QATAR NATIONAL - Qatar
79	QORNOQ - South Greenland
80	REUNION - Mascarene Island
81	ROME 1940 - Sardinia Island
82	RT 90 - Sweden
83	PROVISIONAL SOUTH AMERICAN 1956 - Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, Venezuela
84	SOUTH AMERICAN 1969 - Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela, Trinidad and Tobago
85	SOUTH ASIA - Singapore
86	PROVISIONAL SOUTH CHILEAN 1963 - South Chile
87	SANTO (DOS) - Espirito Santo Island
88	SAO BRAZ - Sao Miguel, Santa Maria Islands (Azores)
89	SAPPER HILL 1943 - East Falkland Island
90	SCHWARZECK - Namibia
91	SOUTHEAST BASE - Porto Santo and Madeira Islands
92	SOUTHWEST BASE - Faial, Graciosa, Pico, Sao Jorge, and Terceira Islands (Azores)
93	TIMBALAI 1948 - Brunei and East Malaysia (Sarawak and Sabah)
94	TOKYO - Japan, Korea, Okinawa
95	TRISTAN ASTRO 1968 - Tristan da Cunha
96	User defined earth datum
97	VITI LEVU 1916 - Viti Levu Island (Fiji Islands)

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98	WAKE-ENIWETOK 1960 - Marshall Islands
99	WORLD GEODETIC SYSTEM 1972
100	WORLD GEODETIC SYSTEM 1984
101	ZANDERIJ - Surinam
102	CH-1903 - Switzerland
103	Hu - Tzu - Shan
104	Indonesia 74
105	Austria
106	Potsdam
107	Taiwan - modified Hu-Tzu-Shan
108	GDA - Geocentric Datum of Australia
109	Dutch

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