

# Stratomaster Maxi Single

## GPS-1

### GPS Navigation System



The GPS-1 is a powerful 16 channel GPS navigation system. It is a panel mount GPS which easily fits into a standard 3.5" cutout. The GPS-1 boasts most of the features only found in high end GPS navigation equipment.

Features amongst others include:

- **Panel mount 3.5" standard aviation footprint**
- **16 Channel highly sensitive GPS receiver**
- **WAAS (Wide Area Augmentation System) compatible**
- **20 user defined routes**
- **150 user defined waypoints**
- **Quick and easy to create and manage waypoints and routes**
- **Quick to find the nearest waypoint to the current position**
- **5 navigation and information displays**
- **Sunrise/Sunset calculator**
- **NMEA output to interface to other GPS based instrumentation**
- **TTFF (Time to First Fix) within 45 seconds**
- **Graphic LCD display with adjustable contrast**
- **Large non-reflective ultra high impact acrylic lens with rear backlight**
- **Active antenna for even higher sensitivity**
- **3.5" standard ABS enclosure**
- **Low power consumption**
- **PC interface to manage waypoints and routes**
- **CD included with various GPS applications**

## GPS Introduction

The GPS System was originally developed by the U.S. Department of Defense where the primary use was to provide accurate position data for military applications.

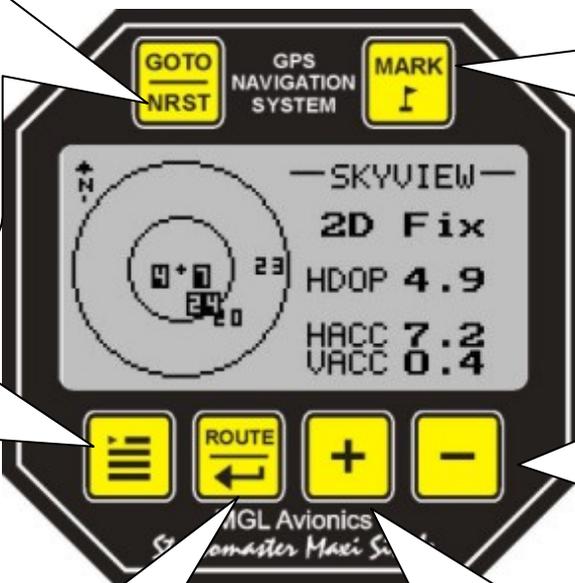
This system consists of a constellation of 24 satellites which orbit the earth twice a day. Each satellite accurately transmits its position and time data. All GPS satellites are synchronized so that these repeating signals are transmitted at the same instant. The GPS receiver receives these signals at slightly different times based on where the location of the satellite is. By using this information the receiver can work out exactly its position from the satellites and can achieve a position fix on the earth's surface to within 1m.

**Note:** Please be aware that the GPS-1 is for VFR only. Please make sure that you understand the instrument thoroughly before using it for navigation purposes

## The GPS-1 and WAAS (Wide Area Augmentation System)

The GPS-1 also supports WAAS. WAAS is a FAA funded project to improve the accuracy of GPS receivers. There are 2 satellites in a geo-stationary orbit currently over North America providing additional correction data. The GPS-1 receives these additional signals to make a more accurate computation of position. Please see <http://gps.faa.gov> for more information.

## Key Assignment



**Goto / Nearest Waypoint**  
Normal Operation:  
Press this key once to select a waypoint to navigate to. Press it twice to show the nearest waypoint to the current position.  
Menu Operation:  
No Function

**Screen Select Key**  
Normal Operation:  
Press this key to toggle between the various operating and navigation screens.  
Menu Operation:  
Used to cancel or exit the current menu.

**Enter / Route Key**  
Normal Operation:  
This key is used to select a route for navigation.  
Menu Operation:  
This key serves as an enter key.

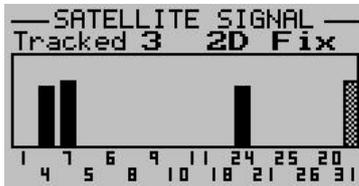
**Plus Key**  
Normal Operation:  
This key is used to go forward one waypoint within a route when a route is selected.  
Menu Operation:  
This key is used to go down through the menu system or to increment a value.

**Minus Key**  
Normal Operation: This key is used to go back one waypoint within a route when a route is selected.  
Menu Operation:  
This key is used to go up through the menu system or to decrement a value.

**Mark Waypoint**  
Normal Operation:  
Press this key to mark the current position as a new waypoint.  
Menu Operation:  
No function

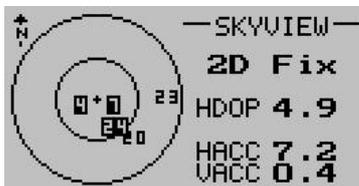
## Operating Screens

The GPS-1 has 6 individual display screens. There are 3 information screens, 2 navigation screens and 1 menu system screen.



### **Satellite Signal Screen (Information Screen)**

This screen shows information such as the number of satellites used in the fix data, the fix type, the satellite PRN (ID) number as well as the carrier to noise signal strength in dbHz.



### **SkyView Screen (Information Screen)**

This screen shows information such as the horizontal/vertical accuracies, PDOP (position dilution of precision) and satellite position relative to the current position and the fix type.



### **GPS Information Screen**

This screen is useful to display position data when no route or waypoint has been selected. It displays information such as a bearing tape, altitude, ground speed and latitude and longitude as well as time.



### **Primary Navigation Screen**

This screen is your primary navigation screen when a route or waypoint has been selected. Information such as waypoint name, current heading, ground speed, distance to waypoint, ETE (Estimate Time Enroute), as well as an arrow indicating your direction to the selected waypoint is displayed.



### **Secondary Navigation Screen**

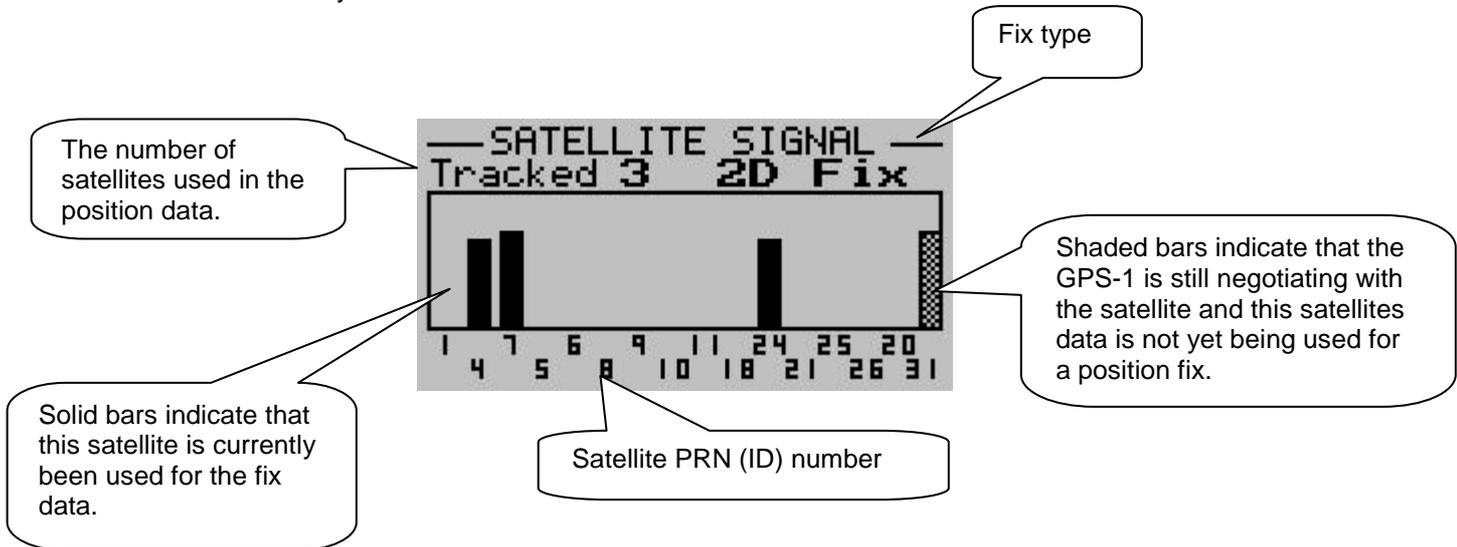
This screen is your secondary navigation screen displaying information such as waypoint name, current heading, distance to waypoint, current ground speed, ETE (Estimate Time Enroute), as well as your track and a CDI (Course Deviation Indicator).



### **Menu System**

## Satellite Signal Screen

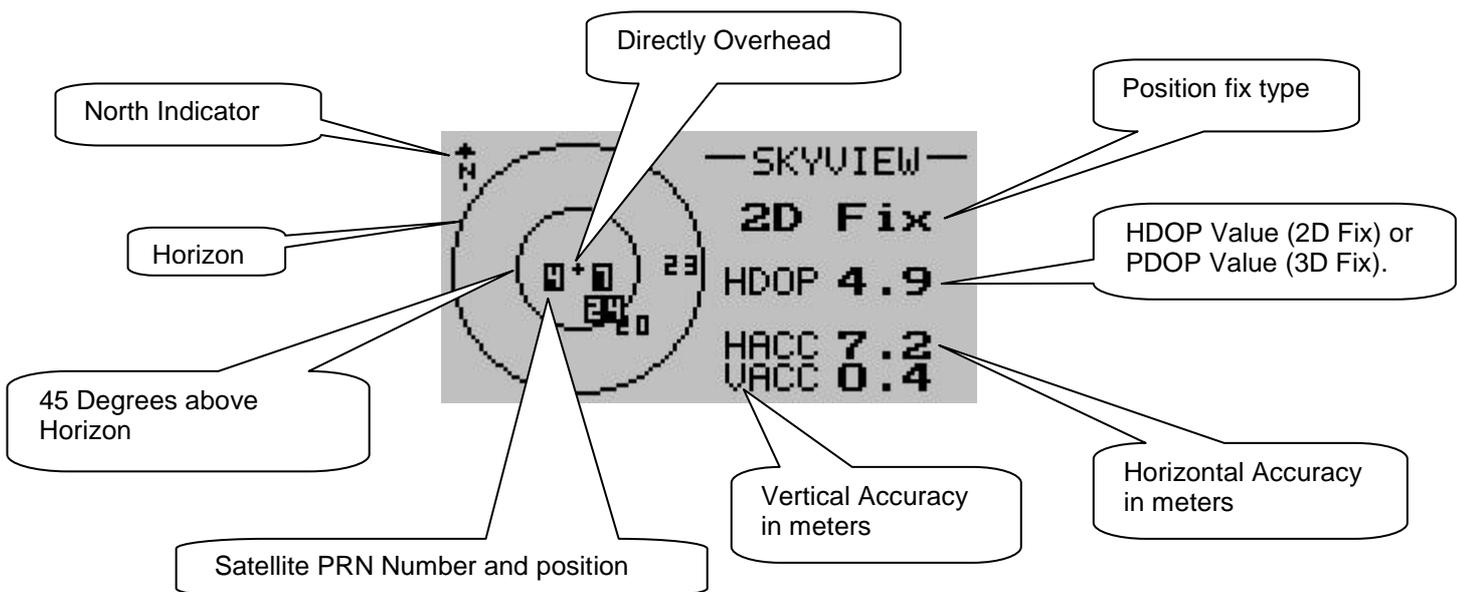
This screen shows the satellites carrier to noise ratio (Signal strength), PRN (ID) number as well as how many satellites are used in the fix data.



The bars height represents the carrier to noise ratio in dbHz (Signal Strength). This value can vary from 0 to 60 dbHz.

## Skyview Information Screen

This screen is useful to determine the satellites orientation in relation to the GPS-1.



## Description of items:

**North Indicator:** This is the direction of true north.

**Horizon, 45 Degrees above horizon and directly overhead:** These 3 rings show the elevation of the satellite from the horizon (outer ring).

**Horizontal Accuracy (HACC):** This is a value expressed in meters (m) indicating what the horizontal accuracy is of the position fix.

**Vertical Accuracy (VACC):** This is a value expressed in meters (m) indicating what the vertical accuracy is of the position fix.

**HDOP Value:** This is a unit less value representing the horizontal precision of dilution. A value of 1 indicates optimum satellite constellation and high-quality data. This value is shown when the GPS-1 does not have a 3D Fix.

**PDOP Value:** This is a unit less value representing the position precision of dilution which is a combination on the horizontal precision of dilution (HDOP) and the vertical precision of dilution (VDOP). A value of 1 indicates an optimum satellite constellation and high-data quality. This value is shown when a 3D fix is achieved. PDOP values in excess of 8 are considered poor.

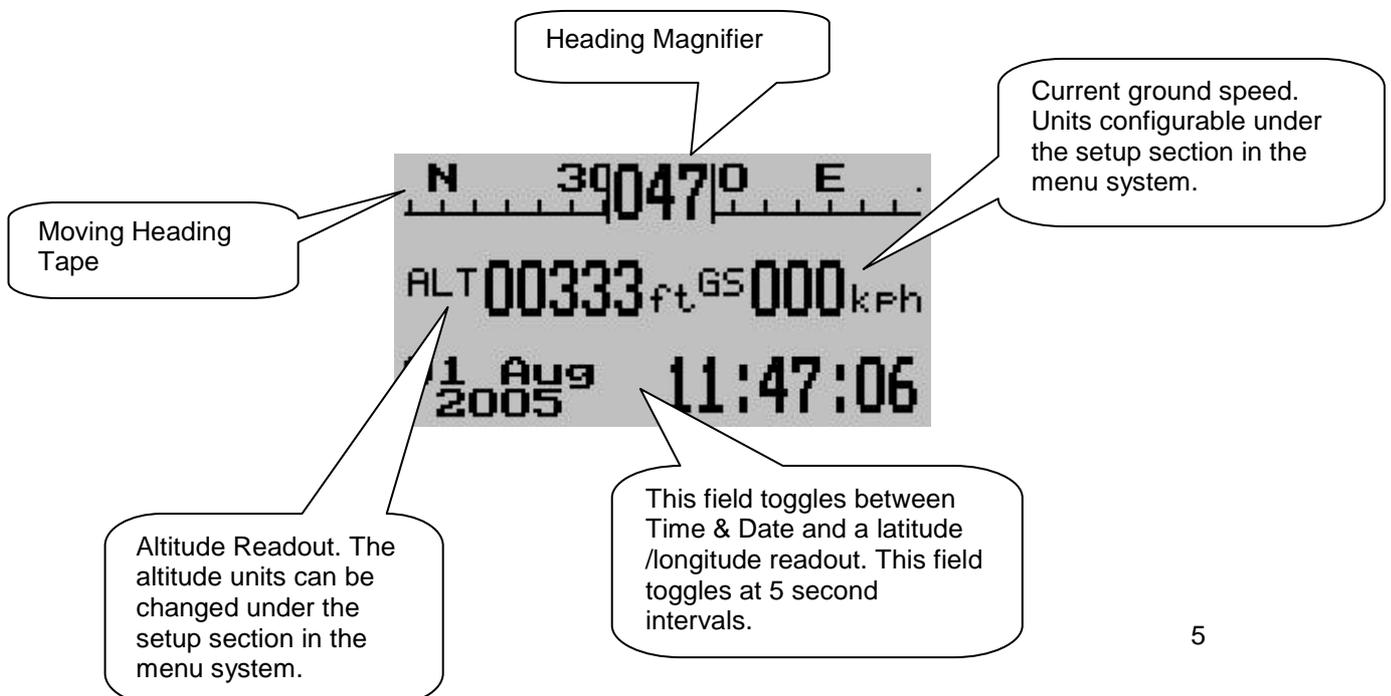
**Note:** A position fix with a PDOP of 30 could be as much as 150m from its true location. Satellites that are dispersed throughout the sky will achieve low PDOP values while satellites that are in a straight line will achieve a high PDOP value.

**Position Fix Type:** This can vary from “**Acquiring**” (When the GPS-1 is trying to obtain position fix data) to a **2D Fix** (No altitude data is valid) to a **3D Fix** (Altitude data is valid).

**Satellite PRN Number and Position:** The PRN (Pseudo-Random Number) number is the satellites ID number and the position within the circles is a function of the satellites elevation and azimuth.

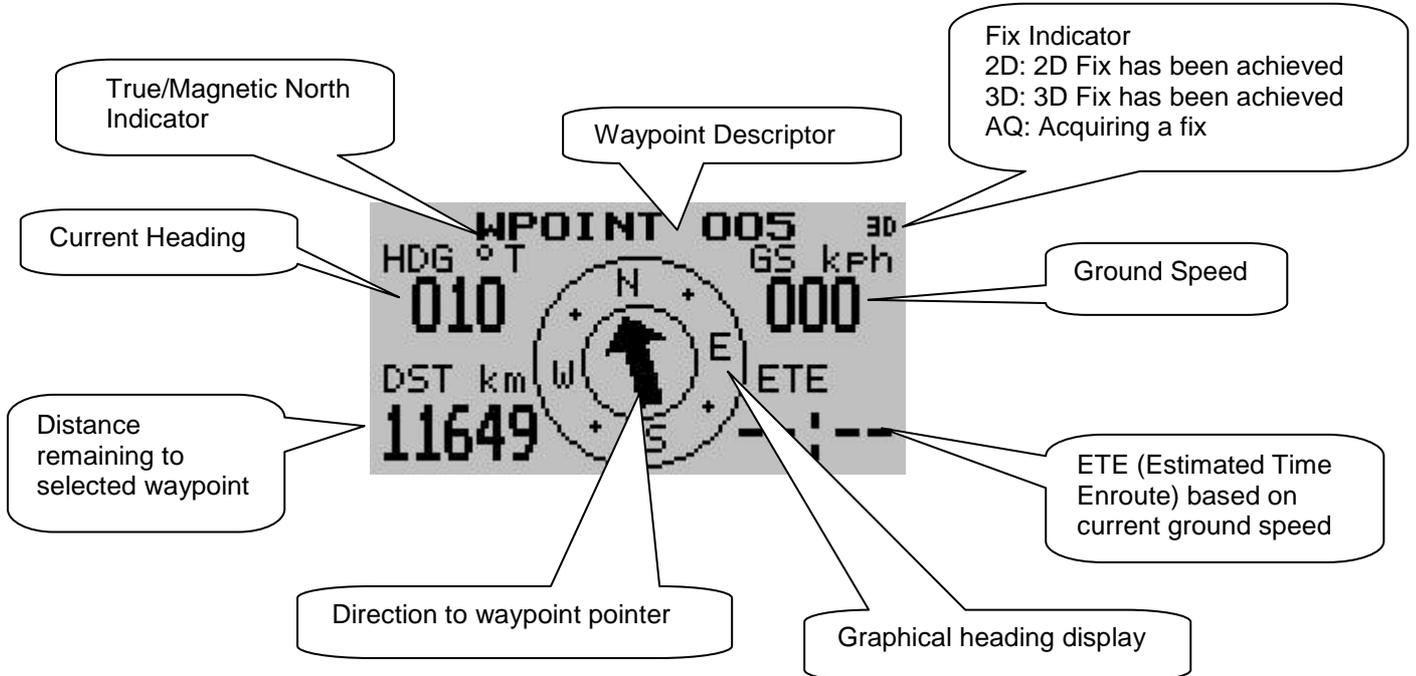
## GPS Information Screen

This screen is useful to display when no route or waypoint has been selected. It displays information such as a bearing tape, altitude, ground speed and latitude and longitude as well as time.



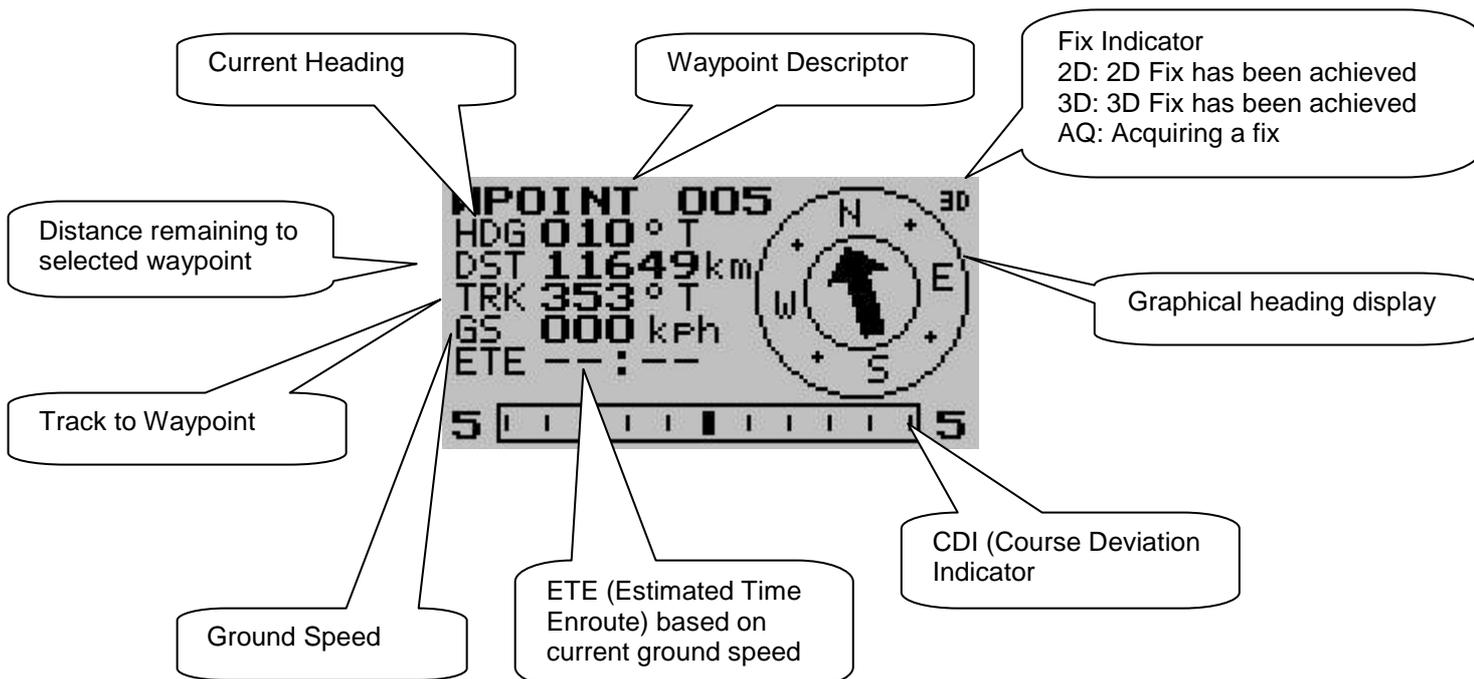
## Primary Navigation Screen

This screen is your primary navigation screen when a route or waypoint has been selected. Information such as waypoint name, current heading, ground speed, distance to waypoint, ETE (Estimate Time Enroute), as well as an arrow indicating the direction to your desired destination is displayed. **Note:** This screen will be automatically shown when the GPS-1 has a 2D or 3D fix.

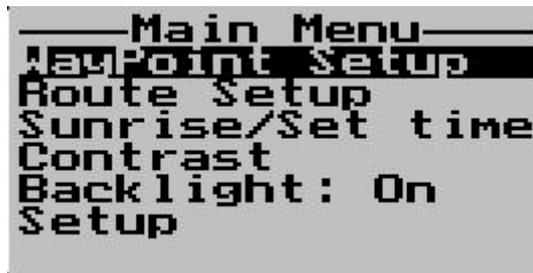


## Secondary Navigation Screen

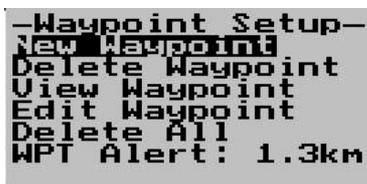
This screen is your secondary navigation screen displaying information such as waypoint name, current heading, distance to waypoint, current ground speed, ETE (Estimate Time Enroute), as well as your track and a CDI (Course Deviation Indicator).



## The Menu System



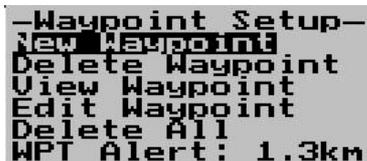
### Waypoint Setup



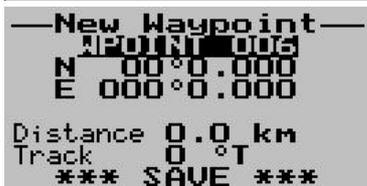
This menu allows the user to create and manage their waypoint database.

**Note:** The GPS-1 can store up to 150 waypoints.

### New Waypoint



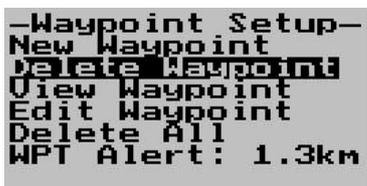
The user can create a new waypoint by entering a unique identifier up to 10 characters long. By default the latitude and longitude is the current position. The distance and track is referenced to the current position.



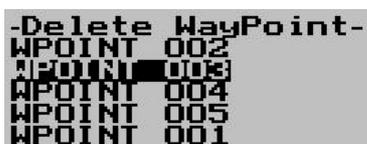
Move the highlight over **\*\*\*save\*\*\*** and press  to save once you have finished entering a waypoint name and latitude

and longitude. Press  to cancel and return to the waypoint menu.

### Delete Waypoint



Select "Delete Waypoint" to delete a waypoint.



Use the  and  keys to highlight the waypoint that must be deleted. Press  over the desired waypoint to be deleted.

**Note:** The waypoint will also be deleted out of the route memory if it is assigned to a route.

## View Waypoint

```
-Waypoint Setup-  
New Waypoint  
Delete Waypoint  
View Waypoint  
Edit Waypoint  
Delete All  
WPT Alert: 1.3km
```

Select "View Waypoint" to view a waypoint.

```
-View WayPoint-  
WPOINT 004  
WPOINT 005  
WPOINT 001
```

Use the  and  keys to highlight the waypoint that you want to view. Press  to view it. The distance and track is referenced to the current position.

```
WPOINT 002  
  
N 00°0.000  
E 000°0.000  
  
Distance 0.0 km  
Track 0 °T
```

## Edit Waypoint

```
-Waypoint Setup-  
New Waypoint  
Delete Waypoint  
View Waypoint  
Edit Waypoint  
Delete All  
WPT Alert: 1.3km
```

Select "Edit Waypoint" to edit a waypoint.

```
-Edit Waypoint-  
WPOINT 002  
WPOINT 003  
WPOINT 004  
WPOINT 005  
WPOINT 001
```

Use the  and  keys to highlight the waypoint that you want to edit. Press  to edit the waypoint.

```
-Edit Waypoint-  
WPOINT 005  
N 70°5.000  
E 000°0.000  
  
Distance 7.8E3 km  
Track 0 °T  
*** SAVE ***
```

Move the highlight over \*\*\*save\*\*\* and press  to save once you have finished editing the waypoint name and latitude and longitude. Press  to cancel and return to the waypoint menu. The distance and track is referenced to the current position.

## Delete All

```
-Waypoint Setup-  
New Waypoint  
Delete Waypoint  
View Waypoint  
Edit Waypoint  
Delete All  
WPT Alert: 1.3km
```

**Note:** Use this with caution. All waypoints and routes in the GPS-1 memory will be deleted.

```
Delete All  
Waypoints &  
Routes  
  
"+" = Yes
```

Press  to delete all waypoints and route information.

Press  to cancel and return to the waypoint menu.

## Waypoint Alert

```
-Waypoint Setup-
New Waypoint
Delete Waypoint
View Waypoint
Edit Waypoint
Delete All
WPT Alert: 1.3km
```

The GPS-1 will notify the user when he is approaching the selected waypoint. Use the  and  keys to adjust the distance to the waypoint when the message alert must appear.

## Marking a Waypoint

```
-Mark Waypoint-
WPOINT 001
S 34°3.793'
E 018°49.15'
Distance 0.0 km
Track 0 °T
*** SAVE ***
```

Use the  key during the normal operation to mark a waypoint. The mark waypoint menu will appear. This allows the user to enter a unique waypoint name up to 10 characters long and also allows the user to change the latitude and longitude if desired. The waypoint name will default to the next available number and the latitude and longitude will default to the present position on entering the function. The distance and track is relative to your current position.

## Goto a Waypoint

```
-Goto WayPoint-
WPOINT 002
WPOINT 003
WPOINT 004
WPOINT 005
```

Press the  key once during normal operation to go to a predefined waypoint. The goto waypoint menu will appear.

This will display all pre-stored waypoints. Use the  and  keys to scroll up and down and press  to select a waypoint.

**Note:** Any pre-selected route or waypoint will be ignored and the new selected waypoint will be used for navigation.

## Finding the nearest waypoint

```
-Nearest WPT-
WPOINT 004
N 00°0.000
E 000°0.000
Distance 4.3E3 km
Track 154 °T
```

Press the  key twice to display the nearest waypoint to the current position. The distance and track to the nearest waypoint is also shown.

## Arriving at a Waypoint

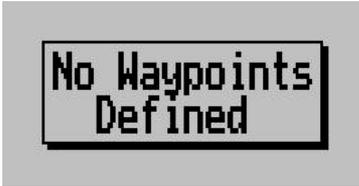
```
WPOINT 001
HDP 0 T 00 00 00
2 ARRIVING
WPOINT 001
DS:
0.0
```

The arriving message box will be displayed if the distance to the selected waypoint is less than the waypoint alert value.

Press the  key to acknowledge the message.

**Note:** The arriving at a waypoint message box will only appear when either of the navigation displays is shown.

## Waypoint Messages



This message box will appear when an operation on a waypoint is performed and there are no waypoints stored in the waypoint memory.

## Route Setup

### New Route

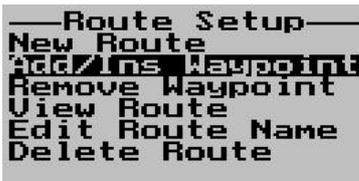


The user can create a new route by entering a unique identifier up to 10 characters long. A route can contain upto 30 waypoints.



Move the highlight over \*\*\*save\*\*\* and press  to save once you have finished entering a route name and latitude and longitude. Press  to cancel and return to the route menu.

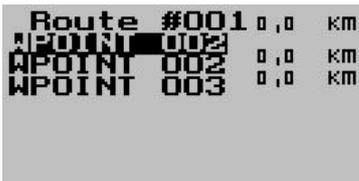
### Add/Insert Waypoint



Select "Add/Ins Waypoint" to add or insert a waypoint into a route.



Select a route to add/insert a waypoint into.



Use the  and  keys to select where to insert the waypoint into. Press  to insert the waypoint into the route.

## Remove Waypoint

```
—Route Setup—  
New Route  
Add/Ins Waypoint  
Remove Waypoint  
View Route  
Edit Route Name  
Delete Route
```

Select “Remove Waypoint” to remove a waypoint from a route.

```
—Select Route—  
Route #001
```

Select the route the waypoint is in.

```
Route #001 0.0 KM  
WPOINT 002  
WPOINT 002 0.0 KM  
WPOINT 003 0.0 KM
```

Use the  and  keys to highlight which waypoint is to be deleted. Press  to delete the waypoint from the route.

## View Route

```
—Route Setup—  
New Route  
Add/Ins Waypoint  
Remove Waypoint  
View Route  
Edit Route Name  
Delete Route
```

Select “View Route” to view a route.

```
—View Route—  
Route #001
```

Use the  and  keys to select the route to view. Press  to view the route.

```
Route #001 0.0 KM  
WPOINT 002  
WPOINT 002 0.0 KM  
WPOINT 003 0.0 KM
```

Use the  and  keys to view the waypoint in more detail.

```
WPOINT 002  
N 00°0.000  
E 000°0.000  
Distance 0.0 km  
Track 0 °T
```

The distance and track is referenced to the current position.

## Edit Route Name

```
—Route Setup—
New Route
Add/Ins Waypoint
Remove Waypoint
View Route
Edit Route Name
Delete Route
```

Select "Edit Route Name" to change the route name.

```
—Edit Route—
Route #001
```

Use the  and  keys to select the route name to edit.  
Press  to select.

```
—Edit Route—

Route #001

*** SAVE ***
```

Once finished editing the route name, move the highlight over  
\*\*\*save\*\*\* and press .

## Delete Route

```
—Route Setup—
New Route
Add/Ins Waypoint
Remove Waypoint
View Route
Edit Route Name
Delete Route
```

Select "Delete Route" to delete a route from the route memory.

```
—Delete Route—
Route #001
```

Use the  and  keys to select the route to be deleted.  
Press  to select.

**Note:** If all the waypoints are deleted, all the routes will be deleted automatically.

## Starting a route

Press  during the normal operation to select a route to navigate along.

```
—Start Route—
Route #001
```

Use the  and  keys to select the route to start navigating along. Press  to select.

```
-Route Direction-
Forward
Reverse
```

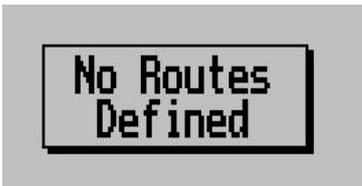
**Note:** The route can either be followed in the forward or reverse direction.

Use the  and  keys to select which direction to follow the route.



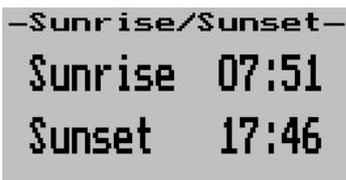
The route selected message box will appear.

### Route Messages



This message box will appear when an operation on a route is performed and there are no routes defined in the route memory.

### Sunrise/Sunset Calculator



This sunrise/sunset calculator uses a unique algorithm based on date and position to accurately determine the sunrise and sunset times. This feature can be useful to maximize your flying time.

### Contrast



Use the  and  keys to adjust the contrast.

### Backlight



Use the  key to turn the backlight on or off.

## Setup Menu

Select this menu to change various options such as North Reference, Magnetic Variation, position format, Distance/Altitude units, UTC (Universal Time Coordinate) offset and CDI (Course Deviation Indicator) Scaling .

### North Reference

```
-----Setup-----
North Ref: True
Mag Var: 000°W
Pos Fmt: d-m-s.s
Dst Unit: km/kph
Alt Unit: meters
UTC Offst: +02:00
CDI Scale: 5 km
```

This option allows the user to change all Bearing/Heading related data to reference either to True or Magnetic North. Magnetic North is what a compass needle points to. True North is the direction from your current position to the North Pole.

### Magnetic Variation

This is the angle between Magnetic and True North. Magnetic variation varies both from place to place, and with the passage of time.

```
-----Setup-----
North Ref: True
Mag Var: 000°W
Pos Fmt: d-m-s.s
Dst Unit: km/kph
Alt Unit: meters
UTC Offst: +02:00
CDI Scale: 5 km
```

This option is used in conjunction with the North Reference set to magnetic.

### Position Format

```
-----Setup-----
North Ref: True
Mag Var: 000°W
Pos Fmt: d-m-s.s
Dst Unit: km/kph
Alt Unit: meters
UTC Offst: +02:00
CDI Scale: 5 km
```

The GPS-1 can be setup to display all position data as degrees, minutes and seconds (d-m-s.s) or as decimal degrees (d-m.mmm). Use the  key to toggle this option.

### Distance Units

```
-----Setup-----
North Ref: True
Mag Var: 000°W
Pos Fmt: d-m.mmm
Dst Unit: km/kph
Alt Unit: meters
UTC Offst: +02:00
CDI Scale: 5 km
```

All distance/speed related data can be shown in either metric (km/kph), statute (sm/mph) or nautical (nm/kts). Use the  key to toggle this option.

### Altitude Unit

```
-----Setup-----
North Ref: True
Mag Var: 000°W
Pos Fmt: d-m-s.s
Dst Unit: km/kph
Alt Unit: meters
UTC Offst: +02:00
CDI Scale: 5 km
```

The altitude can be expressed either in meters or feet. Use the  key to toggle this option.

### UTC (Universal Time Coordinate) Offset



This option allows the user to change the UTC offset. Use the  and  keys to increment and decrement the time in 10 minute steps.

### CDI (Course Deviation Indicator) Scale



Use this function to adjust the CDI scale to either 1, 2 or 5.

Use the  key to toggle this option.

### GPS Fix Data



The GPS-1 will display a message box when trying to acquire a position fix. Once a 2D or 3D fix is achieved the message box will disappear.

### Obtaining a fix

Depending on the receiver's knowledge of last position, current time and ephemeris data, the GPS-1 will apply different strategies to startup.

#### **Coldstart**

In coldstart the GPS receiver has no knowledge of the last position or time. This is the case when no almanac or ephemeris data is available.

#### **Warmstart**

A warmstart is performed when the receiver has access to a valid almanac data and has not significantly moved since the last position has been taken. This is typically the case if the receiver has been shut down for more then 2 hours, but still has knowledge of its last position, time and almanac. However, because the ephemeris data is invalid, the receiver needs to wait till it has received this data.

#### **Hotstart**

A hotstart is performed when the receiver still has access to valid ephemeris data and precise time. The receiver can predict the currently visible satellites and therefore a position can be calculated quicker.

## NMEA Output

The GPS-1 supports the output of standard NMEA 0183 version 2.3 (compatible with 3.0) data using the auxiliary serial port on the rear DB9 connector. The settings are 9600 baud, 8 data bits and 1 stop bit. The outputting of this data can be useful when other avionics equipment needs a GPS data input.

### Pinout (Units with mmcX connector)

DB9 Pin 6 -> NMEA RXD  
DB9 Pin 7 -> NMEA TXD  
DB9 PIN 5 -> Ground

### Pinout (Units with SMA connector)

DB9 Pin 7 ->NMEA RXD  
DB9 PIN 8 ->NMEA TXD  
DB9 PIN 5 -> Ground

The following NMEA sentences will be outputted:

- GGA - Global positioning system fix data
- RMC – Recommended minimum specific GNSS data
- GSA – GNSS DOP and active satellites
- GSV – GNSS satellites in view
- GLL – Geographic position (Latitude/Longitude)
- VTG – Course over ground and ground speed
- ZDA – Time and Date
- GRS – GNSS range residuals
- GST – GNSS pseudo range error statistics

NMEA stands for the National Marine Electronics Association. For more information please visit [www.nmea.org](http://www.nmea.org).

## GPS Antenna's

Even the best GPS receiver in the world will become useless unless a proper antenna is chosen. The GPS-1 supports active antennas only. An active antenna contains the radiating element as well as a LNA (Low noise amplifier). Additional active antennas can be purchased from MGL Avionics if your antenna is rendered faulty. The GPS antenna is terminated in an mmcX/SMA connector.

### Built in Antenna Supervisor

A built in antenna supervisor is standard on the GPS-1. A message box will appear indicating the status of the antenna.

### Screen shots of the various antenna status messages



#### Short Circuit Message

Please attach an antenna to the unit, and then cycle the power.

**Note:** The GPS-1 turns the power to the antenna off to avoid damage to the internal antenna circuitry, therefore power to the unit needs to be cycled.



### Open Circuit Message

The message will disappear as soon as an antenna is attached to the unit.



### Initialising Antenna Message

The GPS-1 is busy initializing the antenna. This message will disappear as soon as this initialization has been completed.



### Antenna Problem

Please check the antenna and rear antenna connector for possible damage.

## Antenna Placement

As stated previously, the world's best GPS receiver can be rendered useless unless a correct antenna is chosen and the correct placement of the antenna is achieved.

**Note:** The GPS antenna must be positioned such that it always has a full view of the sky, and no metal objects are blocking its view.

Please see the connection diagram on the last page to see where to connect the GPS antenna.

## Resetting the GPS-1 to factory defaults

Press the  and  keys when applying power to the unit to reset the unit to the factory default settings. **Caution:** All waypoint and route information will be lost.

## Firmware Upgrades

Please check our website for the latest firmware. The GPS-1 firmware can be upgraded by running the GPS-1 upgrade program and connecting the GPS-1 to the PC via a serial cable.

## PC Connectivity

The GPS-1 can be connected to a PC to allow the user to manage their waypoints and routes. There are various PC programs supplied on the accompanied CD to do this. It is recommended that the user evaluate these programs and select the one that best suits his requirements. The communication settings is set as 9600,8,N,1

**Please note:** The GPS-1 is made to emulate a Magellan GPS Tracker. This allows the user to use a wider range of GPS application programs. Please be aware that the Magellan GPS

Tracker only uses 6 characters for the waypoint name. When uploading these points to a PC any waypoint names that are longer than 6 characters will be truncated. Please be aware that various GPS applications have slight differences when managing waypoints and routes. It is recommended that the user has fully tested these programs before navigating with the GPS-1.

### **Pinout**

DB9 Pin 2 -> GPS TXD  
DB9 Pin 3 -> GPS RXD  
DB9 Pin 5 -> Ground

## **GPS Terminology**

**2D Fix:** When 3 satellites are obtained, the GPS can determine a latitude/longitude position fix.

**3D Fix:** When 4 or more satellites are obtained, the GPS can determine a latitude/longitude as well as altitude fix.

**UTC Offset:** (Universal Time Coordinate). UTC was formally known as GMT (Greenwich Mean Time) but changed in 1986. This is difference in time between local and UTC time.

**NMEA:** NMEA stands for the National Marine Electronics Association. See [www.nmea.org](http://www.nmea.org)

**PRN:** (Pseudo- Random Number). This is the satellites identification number.

**ETE:** (Estimated Time Enroute). This is how long it will take to reach your destination traveling at the current speed.

**WAAS:** WAAS is a FAA funded project to improve the accuracy of GPS receivers. There are 2 satellites in a geo stationary orbit currently over North America providing additional correction data. The GPS receiver uses these additional signals to make a more accurate computation of position. See <http://gps.faa.gov>

**HDOP:** (Horizontal Dilution of Precision)

**PDOP:** (Precision Dillution of Precision)

**Azimuth:** This is the direction of a celestial object, measured clockwise around the observer's horizon from north.

## **Technical specifications:**

**Display temperature range (operational):** -20 to +80 degrees C

**Supply voltage:** +8 to +18V. +24/28V with optional pre regulator

**Supply current:** 80mA with active antenna

**GPS Receiver:** Self contained 16 channel receiver

**Update rate:** Once per second

**Antenna support:** active antennas only

**Antenna connector:** mmcX connector/SMA connector

**Keypad:** 6 button tactile feedback

**Protective lens:** non-reflective ultra high impact acrylic

**Backlight:** on or off (Green LED)

**Contrast:** Variable

**Weight:** 190 grams

## Warranty:

MGL Avionics warrants their products for a period of one year from date of purchase against faulty workmanship. Warranty is limited to the replacement of faulty components and includes the cost of labor. Shipping costs are for the account of the purchaser.

### **Note for operation on supplies with inductive loads:**

Any operation of electronic instrumentation on power supplies that are subject to high voltages caused by operation of inductive loads (starter motors, solenoids, relays) are required to be fitted with suitable protection.

All Maxi Singles are guaranteed to withstand temporary over voltage up to 40V without additional protection. We recommend that measures are taken to prevent voltage transients in excess of this limit.

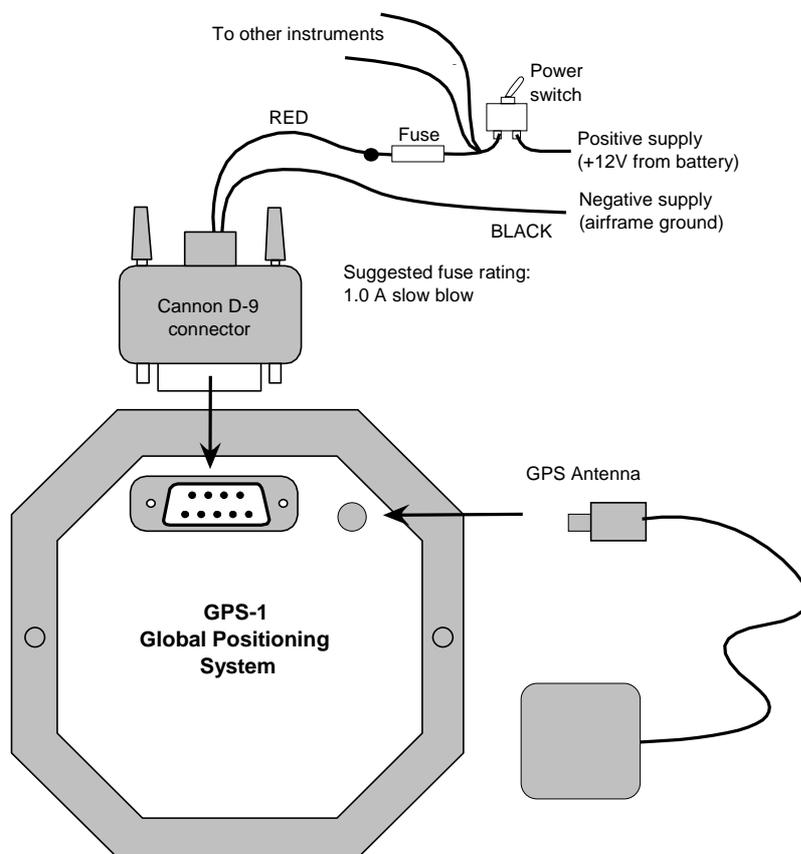
MGL Avionics recommends the fitment of a fuse in line with a 33V transorb (available from MGL Avionics) to protect electronic instruments, radios and intercom systems. Only one such arrangement is required for a cluster of instruments.

Please note that product warranty excludes damages caused by unprotected, unsuitable or incorrectly wired electrical supplies.

## Installing the GPS-1

The drawing on the following page shows the connections required to operate the GPS-1.

Power supply here assumes a 12V DC source. It is recommended to install suitable protection against over voltage such as can be generated by solenoids and starter motors.



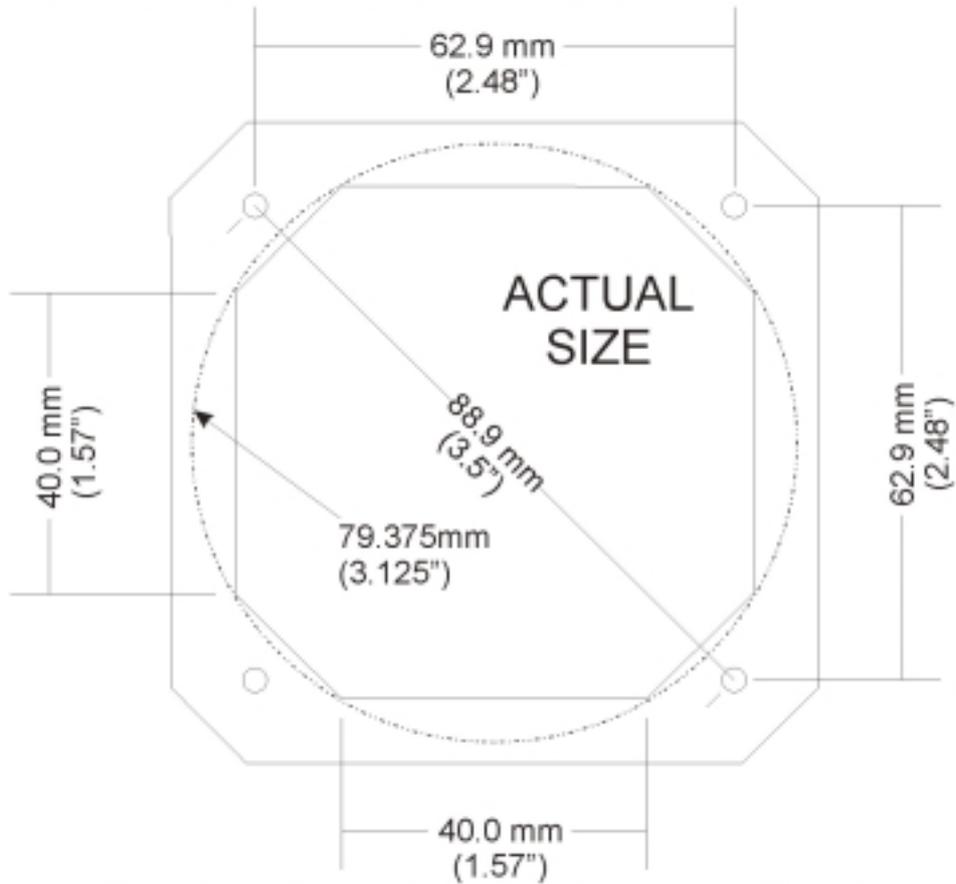
#### DB9 Connections (mxcx connector)

Pin 1----- Red ----- Positive Supply  
Pin 5----- Black ----- Negative Supply  
Pin 2----- GPS TXD  
Pin 3----- GPS RXD  
Pin 6----- NMEA RXD  
Pin 7----- NMEA TXD

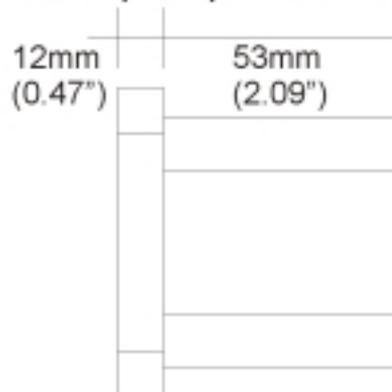
#### DB9 Connections (SMA connector)

Pin 6----- Red ----- Positive Supply  
Pin 1----- Black ----- Negative Supply  
Pin 2----- GPS TXD  
Pin 3----- GPS RXD  
Pin 7----- NMEA RXD  
Pin 8----- NMEA TXD

Hole template for Stratomaster Maxi Singles 3.5" range.  
 Drawing shows the outside dimensions of the rear octagonal panel cutout and the location of the mounting holes.  
 Note: The instrument can fit a standard round 3.125" cutout.



Note: 79.375mm (3.125") is a standard cutout, but due to manufacturing tolerances, 80.264mm (3.16") is found to be more desirable.



Side View (Not to scale)