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Autohelm™

GPS TRANSDUCER

Operation and
Installation

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Chapter 1: Specification

Receiver

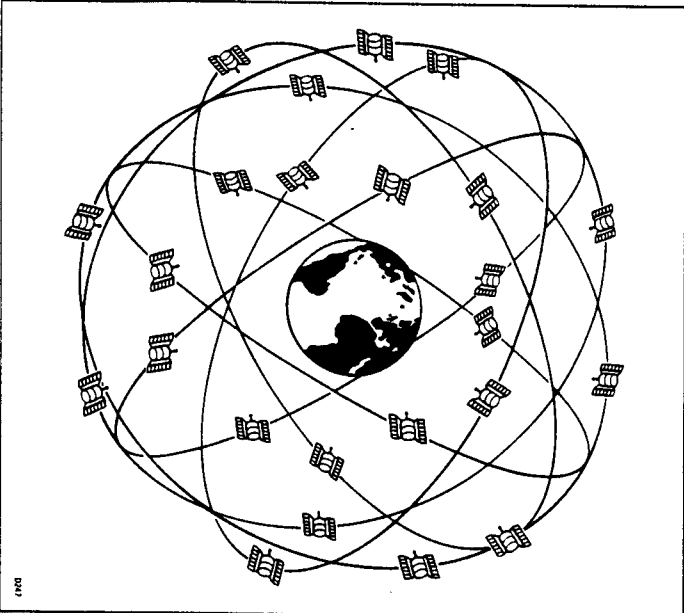
- Receiver type
 - Single Channel high-speed multiplex
- Frequency
 - 1575.42 MHz
- Sensitivity
 - 143 dBm
- Signal Acquisition
 - Automatic (Computer controlled)
- Tracked Satellites
 - 5 Maximum
- Almanac update
 - Automatic
- Datum
 - WGS 84
- Fix update interval
 - 1 per second
- Position Accuracy
 - 15m RMS (with HDOP < 2.5 and without SA)
- Data Output
 - NMEA0183
- Memory backup
 - Internal battery
- Supply voltage
 - 10 to 15V d.c.
- Operating Temp
 - –20°C to +70°C
- Size
 - 198mm (7.75in) x 161mm (6.4in) x 27mm (1.05in)
- Weight
 - 0.85kg (1.87 lb)

Antenna

- Polarisation
 - Circular
- Operating Temp
 - –25°C to +70°C
- Size
 - 230mm (9in) x 49mm (2in)
- Weight
 - 0.45kg (1 lb)

Chapter 2: Introduction

GPS is the latest Navigation system available for marine craft. It uses 24 satellites grouped into six separate orbits around the earth. Each satellite transmits a unique signal. The GPS receiver resolves the vessels position by measuring the time delay between arrival of signals from upto five satellites.



Once all satellites are launched the system will be capable of giving a vessels position any where in the world 24 hours a day.

The Autohelm GPS is a complete 'stand alone' receiver taking signals transmitted from visible satellites, processing their output, and then transmitting navigation information to NMEA 0183 standard.

This transmission includes:

- Course over the ground
- Speed over the ground
- Latitude and longitude
- Time

- Signal status
- Day/Month/Year
- Antenna height

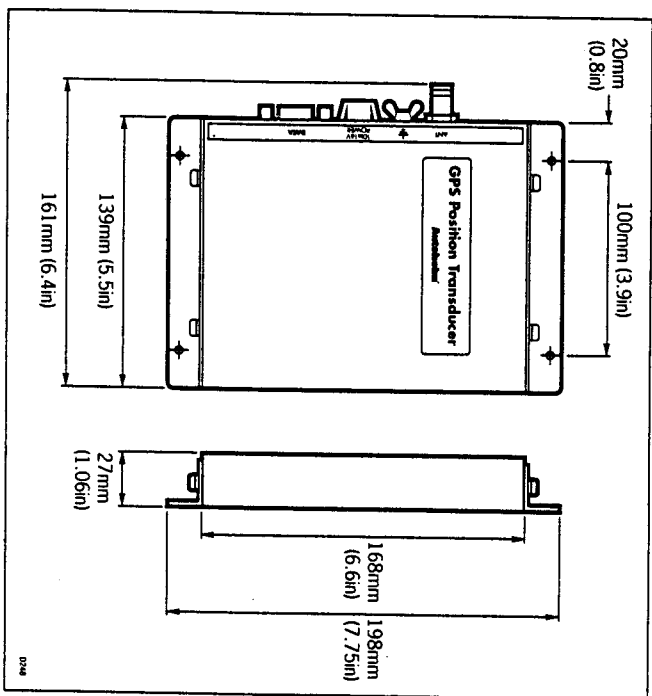
It can be connected directly to an ST50 Navdata Instrument or ST50 Navcenter via the data port. Alternatively the Autohelm GPS receiver can be connected to any electronic chart plotter setup to receive NMEA 0183 navigation data.

Warranty period is 1 year from date of purchase.

We strongly advise you to fill in the card supplied in the warranty booklet. This is for our records only and will help to provide the minimum of inconvenience should you require service at any of our world wide service centers.

Chapter 3. Installation

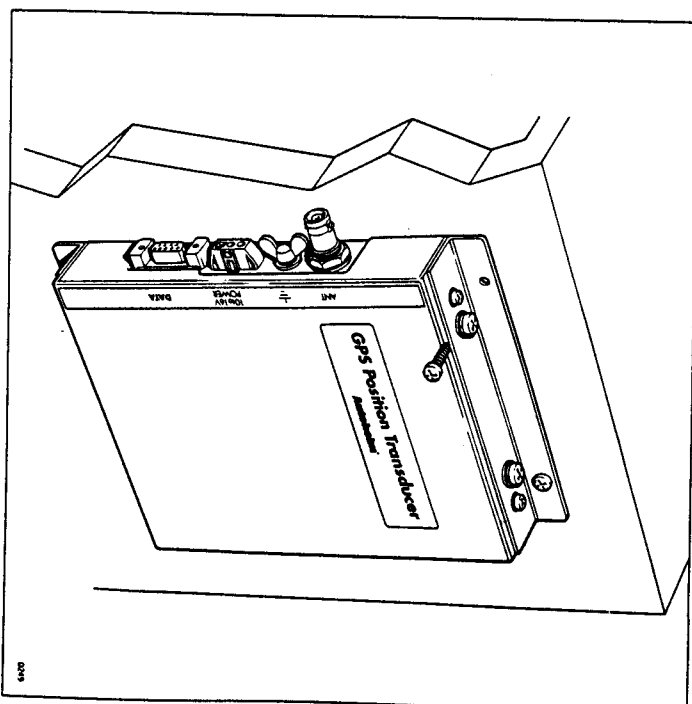
3.1 Receiver



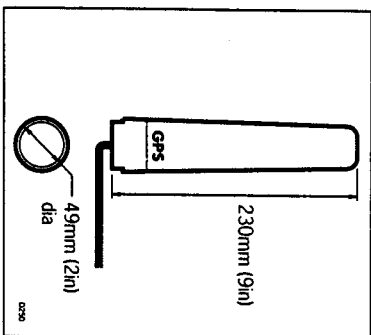
The Autohelm GPS receiver is not waterproof and must be mounted below decks in a protected location. Observe the following points when selecting a suitable mounting position:

- Avoid mounting near a magnetic Compass (1m (3.25ft) at least)
- Avoid mounting in direct sunlight
- Position where it is reasonably well protected from physical damage

The receiver can be mounted horizontally or vertically using the self tapping screws supplied as shown below.



3.2 Antenna

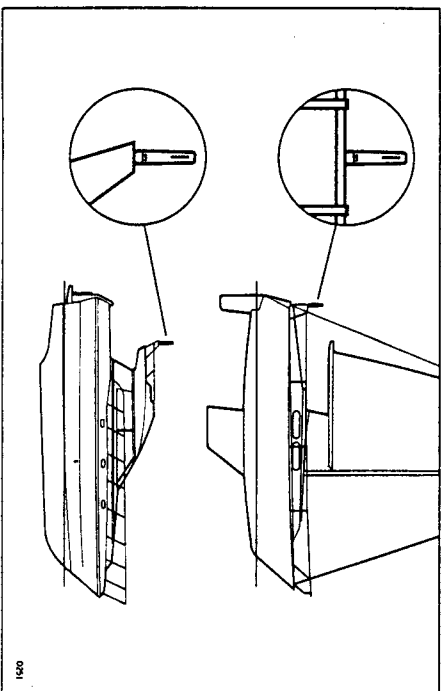


The antenna should be mounted vertically on a guard rail or coach roof using a suitable bracket. The antenna base has a 1.0 in NPT thread which is compatible with most mounting brackets. It should also be sighted clear of the cockpit giving minimum interruption to the line of sight between antenna and horizon.

Ensure that it is:

- Away from an active MF/HF/VHF antenna
- At least 3m (9.85ft) from a DF loop antenna
- At least 5m (16.4ft) from an Inmarsat antenna
- Mounted out of any radar beam.

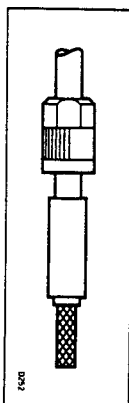
The antenna is supplied with 10m (39.4ft) of cable which should be fed down to the receiver and cut to length.



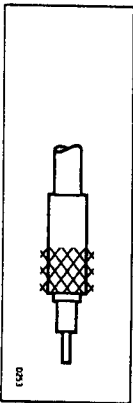
3.3 BNC connector

Once the antenna cable has been fed down to the receiver the BNC connector should be fitted as follows:

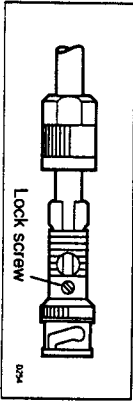
- Slide the plug housing along the cable and then strip back 12mm (0.5in) of the outer protective sheath. Slide on the supplied rubber sleeve as shown.



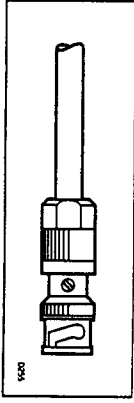
- Fold back the cable screen as shown and strip off 6mm of the inner conductor insulator.



- Slide the cable into the main BNC housing making sure the inner conductor locates into the center pin.



- Tighten the lock screw to secure the center conductor



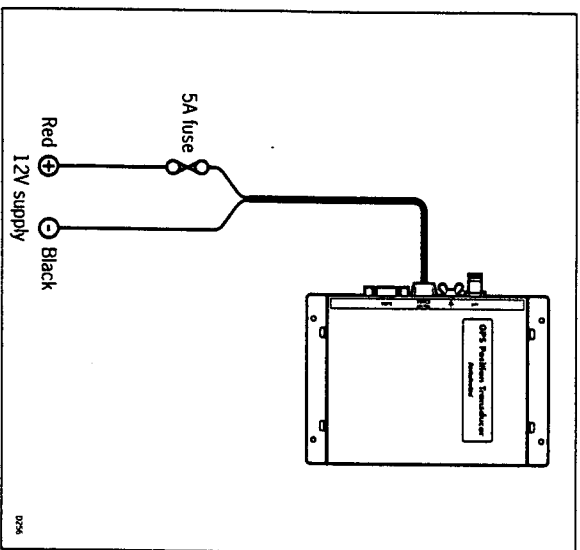
- Tighten the locknut to secure the assembly

With a general purpose multimeter check the resistance between the centre core and screen. It should read between 50 and 150ohms. Connect the BNC connector to the antenna socket on the side of the receiver.

3.4 Receiver power cable

The receiver requires a DC power supply in the range 10 to 15V. A power supply lead is supplied which is plugged into the receiver and then connected to the vessels central distribution panel via a 5A fuse.

- Red -- +12V
- Black -- 0V

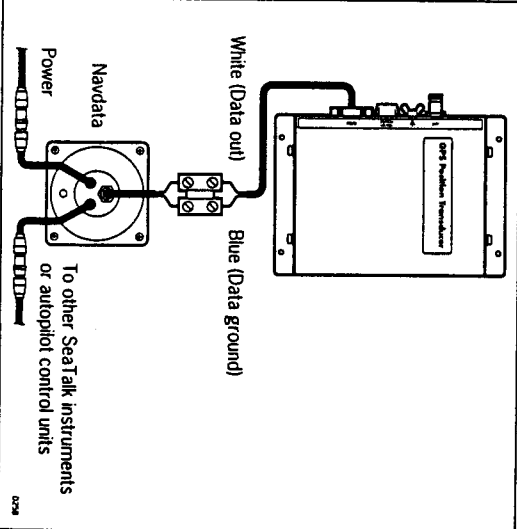
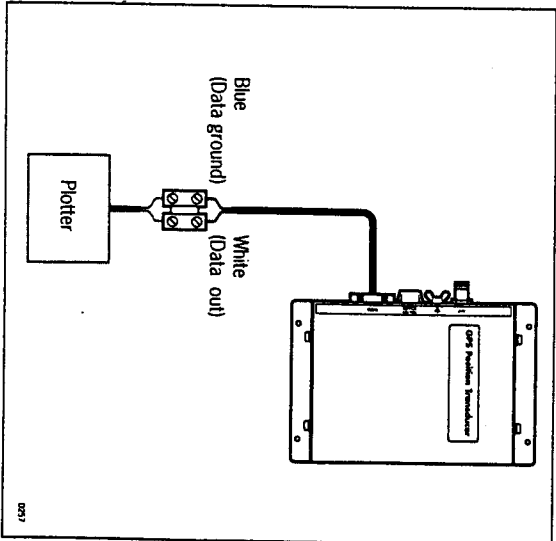


3.5 NMEA data cable

The NMEA data output is available on the 9 pin 'D' connector which is fitted to the side of the receiver case

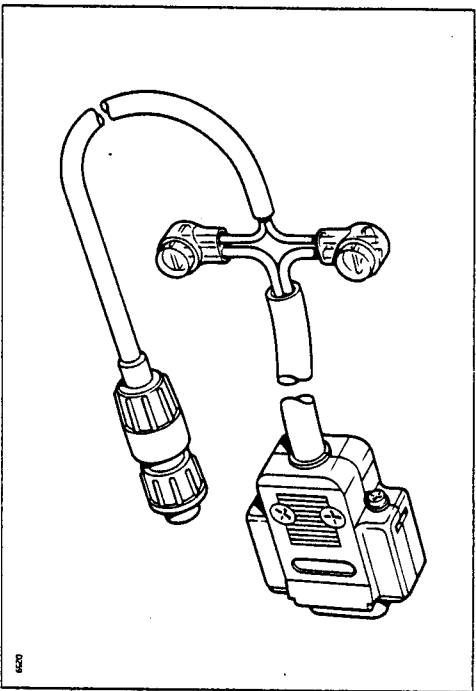
- Pin 3 -- Data out (white)
- Pin 5 -- Data ground (blue)

This can be connected to a plotter or ST50 Navdata as shown.

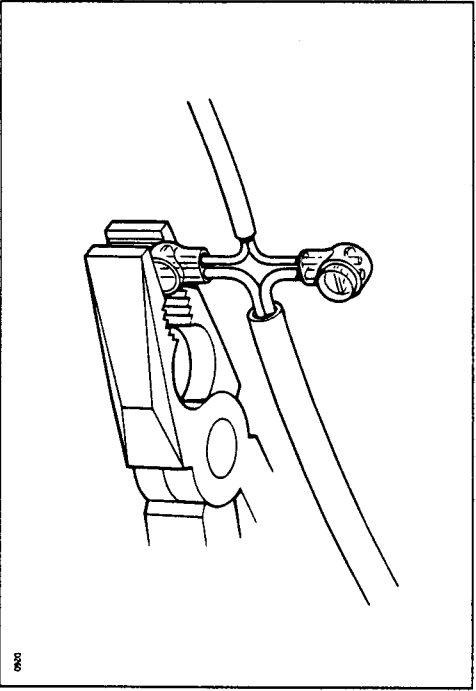


Use the crimp connectors supplied to connect the NMEA output (1 crimp per core) as follows:

- Cut off any stripped conductor ends.
- Place the two cable ends to be joined into the connector block as shown.

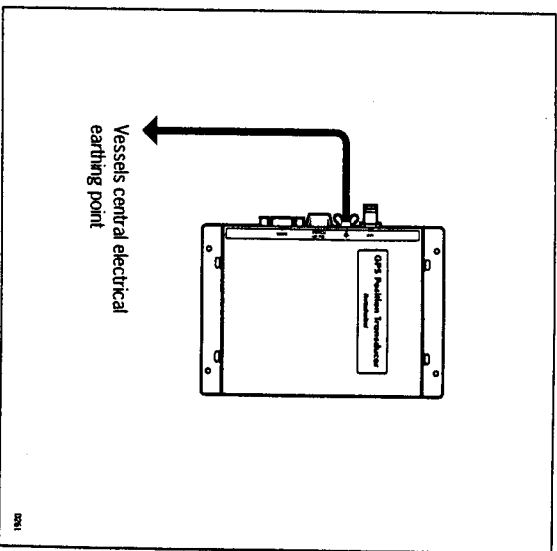


- Compress the connector block with a pair of pliers until the two cables are firmly restrained in the housing.



3.6 Case ground

A connection should be made between the earthing nut on the side of the receiver and the vessel's main electrical grounding point.



Chapter 4. Transmitted NMEA Sentences

The following NMEA 0183 sentences are transmitted from the receiver after it has successfully locked onto at least 3 satellites.

Latitude and Longitude	GLL,RMC,GGA
Course over the Ground	VTG,RMC
Speed over the Ground	VTG,RMC
Signal status	RMC
Time	RMC,GGA
GPS Quality (Fix/NoFix)	GGA
Number of satellites in use	GGA
HDOP	GGA
Antenna height (Above sea level)	GGA
Geoidal height	GGA
Day	GGA
Month	GGA
Year	GGA

Each sentence is transmitted every 1 second.

WDLGS

Chapter 5. Operation

5.1 Start-up

1. Initial start-up (Cold Start)

On power-up the Autohelm GPS will execute one of the following routines:
As supplied the GPS receiver requires a period of upto 20 minutes after switch on in which it will establish its position and verify the status of available satellites etc. This is the 'Cold Start' procedure. It is recommended that prior to the first sea trial the unit is switched on, allowed to initialise and its position readout verified with a known location. The unit is then ready to use.

2. Normal start

After initialisation the GPS receiver memorises the last position before powerdown. This is retained in memory, even after power is removed. Provided that the GPS receiver is switched on within 60nm from the last position held in memory it will start to transmit valid navigation data within 3 minutes of powering up.

3. Start-up outside 60nm from last position.

If the receiver is switched on at a position greater than 60nm from the last position in memory it will go through the 'Cold start' routine requiring upto 20 minutes to re-establish its position and status.
If operating with an ST50 Navdata or ST50 Navcenter please refer to the relevant Autohelm handbook for further details on operation.
If operating with any other electronic chartplotter refer to the manufacturers handbook.

5.2 Accuracy and Satellite Status

Selective Availability

The GPS system is capable of positioning the vessel to within a few metres if the satellite geometry is good (indicated by the HDOP value) and if selective availability is not switched on. Selective availability is an operating mode which can be switched on at any time by the US Department of Defence. It was designed to degrade the accuracy of the GPS system to prevent hostile forces having the advantage of GPS positioning.

When switched on it will give positioning errors of up to 100m (330ft). Unfortunately there is no way to tell if it is switched on or of correcting for it. If you notice that the positioning accuracy is changing it will be due to selective availability

Satellite Distribution (HDOP).

Just like a 3 point fix, the accuracy of the GPS position also depends on the distribution of the satellites. The HDOP value indicates how good the distribution is, the lower the better. For a value less than 3, the RMS error due to the satellite distribution will be less than 15m (50ft).

Satellite Availability (SATs)

In most cases, the GPS satellites provide continuous worldwide coverage, and this needs a minimum of 3 satellites in view to provide a position fix. Until the end of 1992 there may be short periods when 3 satellites are not in view. The SATs display gives the number of satellites in view, up to a maximum of 5. Basically, the more satellites in view, the better the position fix.

Position Datum

The GPS Receiver transmits position to the world standard WGS 84 datum. If you plot the GPS position on a chart which uses a different datum you may notice a small error (it can be up to 300m (990ft)). If an accurate position is known a correction can be entered to allow for the different chart datum.

Chapter 6. Fault finding

All Authelm products are subject to a comprehensive test procedure prior to packing and shipment. In the unlikely event that a fault does arise the following check list should help cure the problem.

Fault	Cause	Action
No transmission from unit after 30 minutes operation	No supply	Check supply switched on Check fuse/breaker Check power connector
	No received signal	Check antenna connection (especially for shorts in BMC connector) Check resistance between centre core and screen. This should read between 50 and 150ohms. Check antenna is mounted vertically and its mounting is secure. Also the antenna must have clear line of sight to the horizon in all directions