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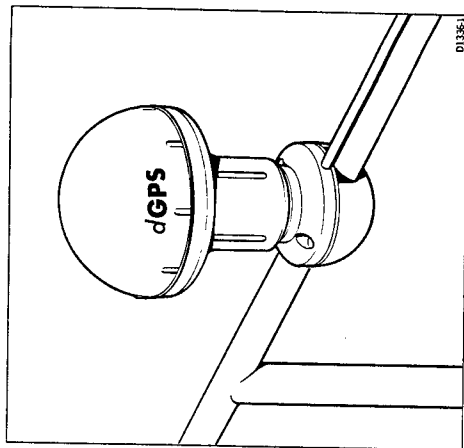
Autohelm[®]

ST 50

PLUS

*d*GPS &
**DIFFERENTIAL
BEACON RECEIVER
TRANSDUCERS**
Operation and
Installation

Autohelm[®]



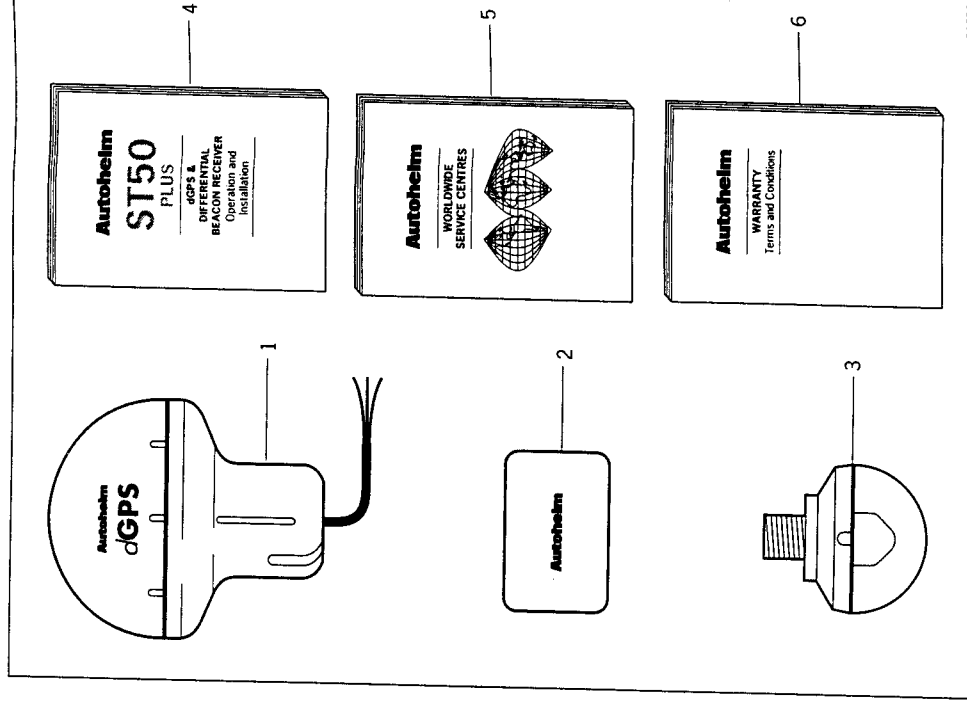
dGPS Transducer

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Package Contents

The following items are included in the ST50 Plus dGPS Transducer package:

1. dGPS transducer
2. Junction box and fixing kit
3. Combined rail clamp and surface mounting kit
4. Operation and Installation handbook
5. Worldwide Service Centre list
6. Warranty document



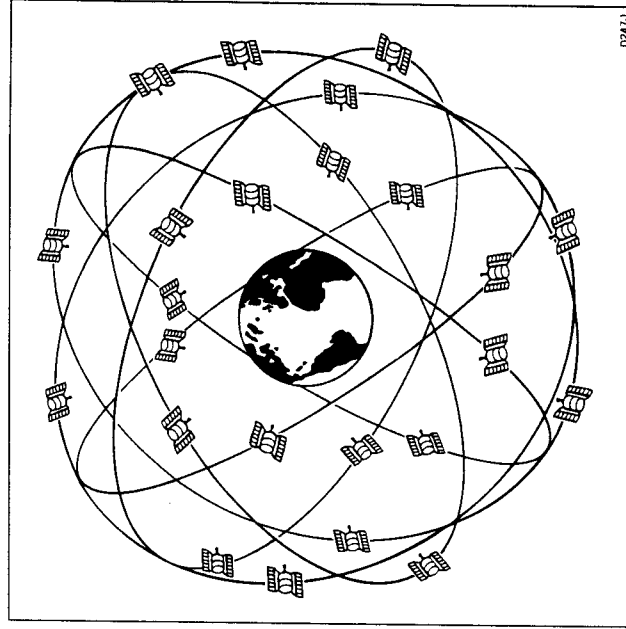
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Introduction

Congratulations on your purchase of the Autohelm dGPS transducer. The dGPS is a compact unit combining both the antenna and receiver in single housing, which can be rail or surface mounted using the kit supplied.

The GPS system comprises of 24 satellites (operating globally 24 hours a day) grouped into six separate orbits. Up to 8 of the 24 satellites are tracked at any one time, and the difference between the unique signal from each satellite is used by the dGPS receiver to calculate your exact position.



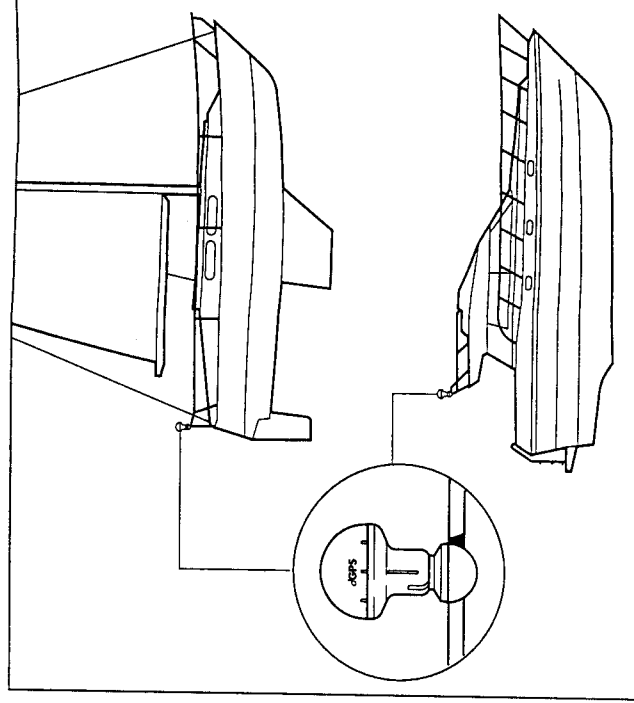
Some of the Autohelm equipment incorporates a security feature known as CodeLock. This feature is designed to protect instruments and equipment mounted in vulnerable areas, such as the cockpit or helm.

For even greater accuracy, the dGPS transducer can be used with the optional self-tuning Differential Beacon Receiver (catalogue number Z200). The receiver, when in range of differential beacons transmitting on 283.5 KHz to 325.0 KHz, greatly enhances the accuracy of the dGPS transducer to provide position fixes as close as 10 metres (32.5ft).

Chapter 1: dGPS Transducer Installation

The dGPS transducer is designed to receive signals in a direct path and should, therefore, be mounted vertically in a location that is clear of structures that might block the signal path.

For ideal reception, the dGPS transducer should be mounted vertically as high as possible. Also, make sure that the transducer is clear, at least 2m (7 ft), of metallic objects and other communication antennas.



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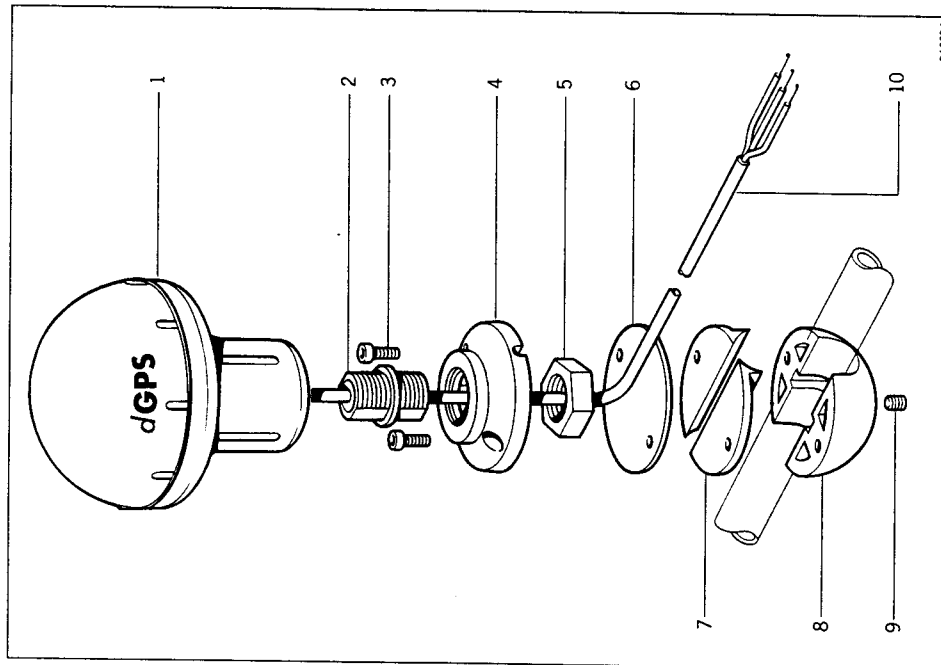
The dGPS antenna and receiver are combined in one unit. Power is received via the SeaTalk bus and, therefore, the unit does require a separate power supply connection.

1.1 Rail Mounting

3. Assemble the nut (5) to the retaining ring (4).
4. With the rail clamp (8) held below the rail, place the seal (6) on top the rail clamp.

Note: Use the packing pieces (7) for rails between 23mm and 25mm (7/8in and 1 in) diameter.

5. Secure the retaining ring to the rail clamp using the screws (3).
6. Screw the transducer (1) into the retaining ring (4), tightening by hand until secure.
7. Making sure that the transducer (1) is upright, tighten the grub screw (9) against the rail.

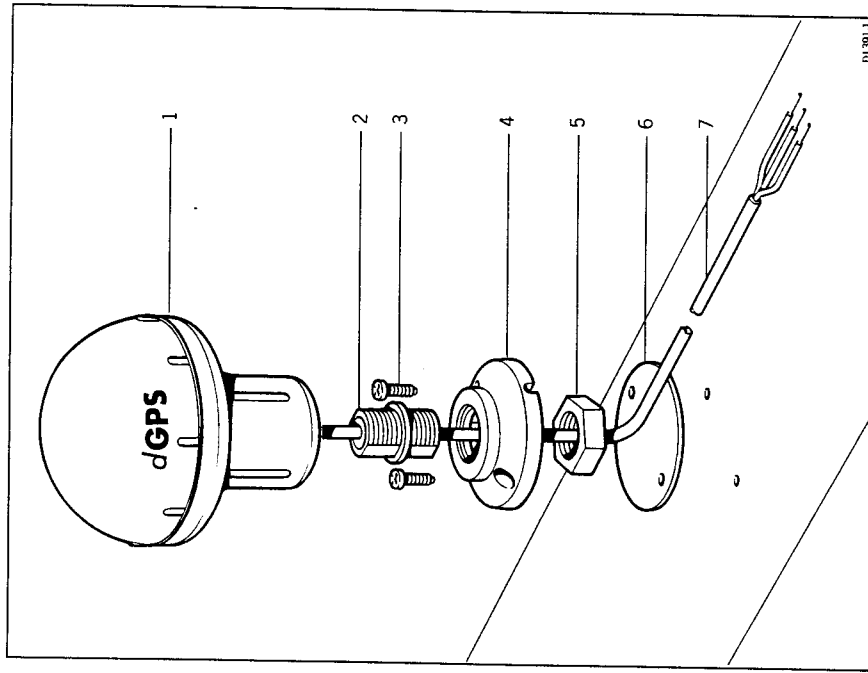


1 Transducer 2 Threaded connector 3 Screws 4 Retaining ring 5 Nut 6 Seal
7 Spacers 8 Rail clamp 9 Grub screw 10 Cable

1. Assemble the threaded connector (2), retaining ring (4) and the nut (5) to the cable (10).
2. Screw the threaded connector (2) fully into the transducer (1).

1.2 Surface Mounting

As an alternative to rail mounting, the dGPS transducer may be mounted to a flat surface as described below.

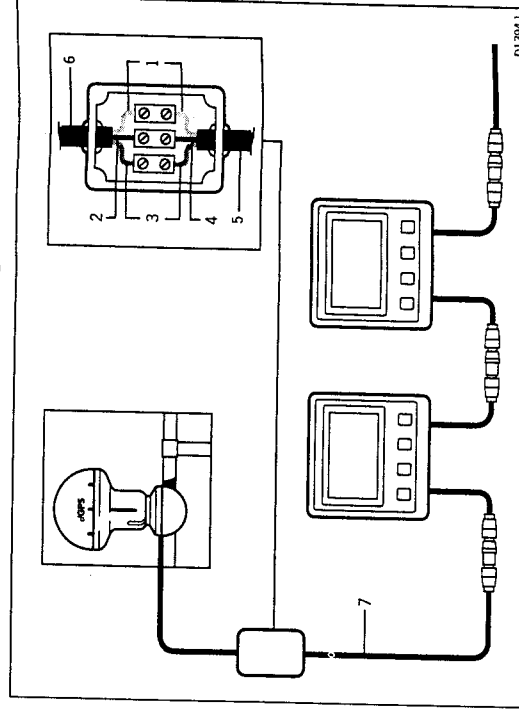


- 1 Transducer **2** Threaded connector **3** Screws **4** Retaining ring **5** Nut **6** Seal **7** Cable
1. Assemble the threaded connector (2), retaining ring (4) and the nut (5) to the cable (10).
2. Screw the threaded connector (2) fully into the transducer (1).
3. Assemble the nut (5) to the retaining ring (4).
4. Position the retaining ring (4) as required, outline the two screw holes and drill to 4mm diameter.

5. Position the seal (6) and secure the retaining ring with the two screws (3).
6. Screw the transducer (1) and the retaining ring (4) together, tightening by hand until secure.

1.3 Cabling

1. Secure the Junction Box in a suitable below decks location using the screws provided. The box should be positioned in a suitable location to allow electrical connection to the SeaTalk bus, either by splicing into the existing cable or connecting to a spare SeaTalk instrument tail using one of the range of extension cables.
2. Run the dGPS cable to the junction box and connect the green, red and yellow wires as shown in the following illustration.



- 1 Yellow **2** Green **3** Red **4** Screen **5** Cable to instruments **6** Cable to GPS **7** Extension cable

Chapter 2: Fault Finding and Maintenance

2.1 Fault Finding

All Autohelm products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programmes. However, if a fault arises with the ST50 Plus dGPS, the following table will help to identify the probable cause and provide the most likely cure.

Fault	Cause	Action
No position information 20 minutes after 'Cold Start'.	Poor cable connections.	Check that all cable connections are secure.
	Damaged transducer cable.	Repair/replace cable as necessary.
	Faulty transducer.	Return transducer to dealer for repair.
No position information available.	As above	As above
Positional errors as great as 100m (330ft)	Selective availability active.	Install Differential Beacon Receiver to improve overall accuracy.

2.2 Maintenance

Cabling

Periodically examine all cables for chafing or damage to the outer shield and, where necessary, replace and resecure.

Advice

For advice, or further information regarding the installation of this product, please contact the Autohelm product Support Department or your own National Distributor.

Chapter 3: Operation

The dGPS transducer automatically locks onto signals from upto 8 out of a possible 24 orbiting satellites.

When the dGPS is powered-on for the first time (cold start), it takes upto 20 minutes to acquire the first positional fix. Once the first fix has been acquired, future positional fixes at power-on will take less than 1 minute.

The rate at which positional fixes are normally updated when the dGPS system is operative is once every second.

Once the system is operational and the receiver has locked-on, the following information is transmitted on to the SeaTalk bus:

- Latitude and Longitude
- Course and speed over the ground
- Time
- Date

Selective Availability

Selective availability is an operating mode which can be switched on at a time by the US Department of Defence. It was designed to degrade the accuracy of the GPS system to prevent hostile forces taking advantage of GPS positioning.

The GPS system is capable of providing positioning fixes to within 15m (49ft) if the satellite geometry is good (indicated by the HDOP value on the GPS instrument) and if selective availability is not switched on.

When selective availability is switched on, errors upto 100m (330ft) can be present, however, the optional Differential Beacon Receiver has been designed to counteract selective availability as well as improving the GPS positional fixes (see Chapter 6).

Satellite Availability

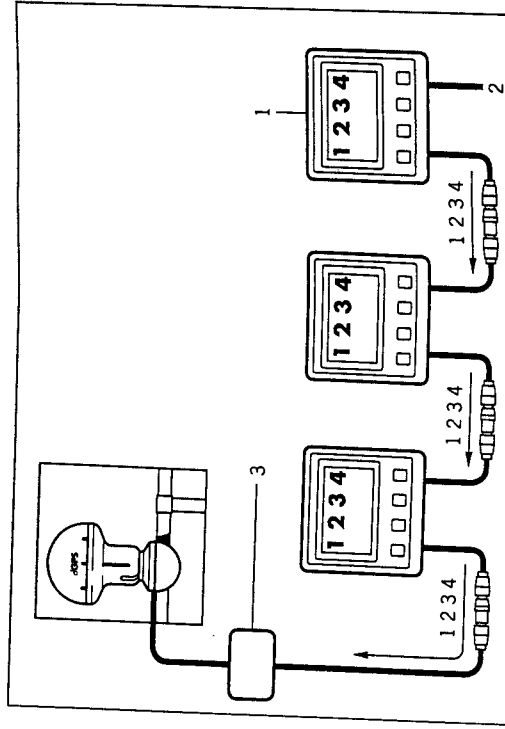
In most cases, the GPS system provides continuous worldwide coverage using a minimum of 3 satellites to provide a positional fix. The SATS display on your GPS instrument gives the number of satellites that are in view - the more satellites in view the more accurate the positional fix.

Chapter 4: CODE Lock Security

The ST50 Plus range of instruments and hardware incorporates an anti-theft feature called 'CodeLock'. Designed to protect individual instrument or complete systems in vulnerable areas, 'CodeLock' is a four digit number that you programme into the permanent memory of a selected 'master' instrument.

Note: A master instrument is a digital instrument, such as a ST50 Plus Speed, Depth, Multi etc.

The CodeLock security number, once it has been activated, is transmitted automatically or manually (the choice is yours) on the SeaTalk bus to all ST50 Plus compatible hardware.



1 Master ST50 Plus instrument 2 Power supply 3 Junction Box

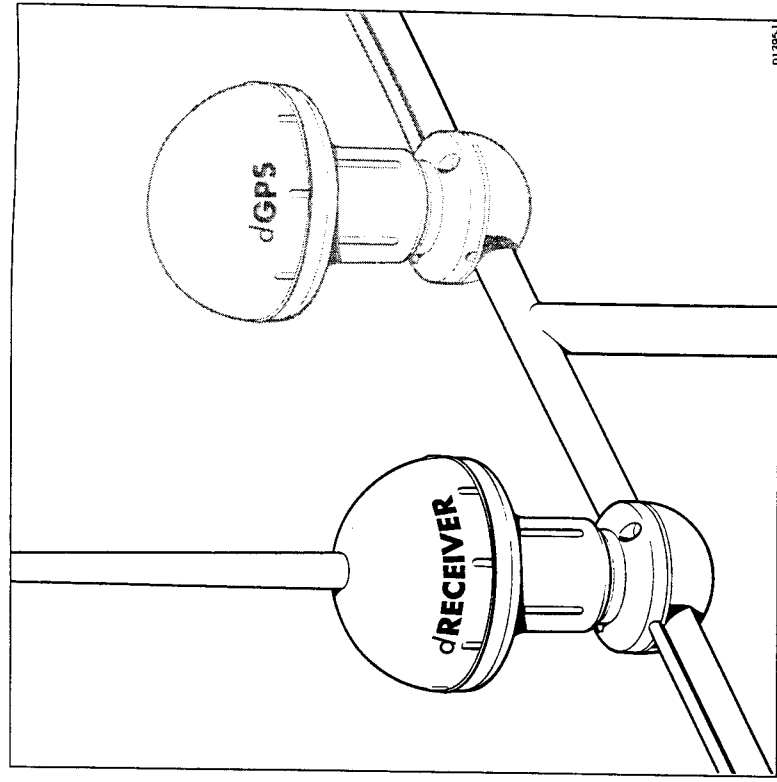
If you were unlucky enough to have CodeLock compatible equipment stolen, it would be totally useless when powered up as the hardware looks for the code number transmitted by the master instrument before it will operate.

The dGPS Transducer is CodeLock compatible. For more detailed information on the CodeLock system and instructions on how to set it up, please refer to a digital ST50 Plus instrument handbook.

Chapter 5: General Specification (dGPS)

Receiver type:	8 channels
Frequency:	1572.42 Mhz +/- 1 Mhz
Sensitivity:	-130dbm
Dynamic range:	25db
Signal acquisition:	Automatic
Number of tracked satellites:	8 (max)
Power requirements:	10.8 to 16 VDC - less than 3 watts (negative ground)
Geodetic* database:	More than 50 Geodetic datums
SeaTalk interface:	Built-in
Data input:	Differential available
Data output:	NMEA 0183 sentences to SeaTalk interface
Accuracy:	15m (49ft) - (no selective availability) (32.5ft) with Differential Beacon Receiver 1.0m
Memory back-up:	Lithium battery - 5 years
Dimensions:	Diameter - 110mm (4.5/16in) Height - 130mm (5.1/8in)
Operating temperature:	-20° to + 85° C

* A Geodetic datum is a scaling system, using worldwide points of reference, that calculates the Latitude and Longitude coordinate structure onto a chart for navigation.



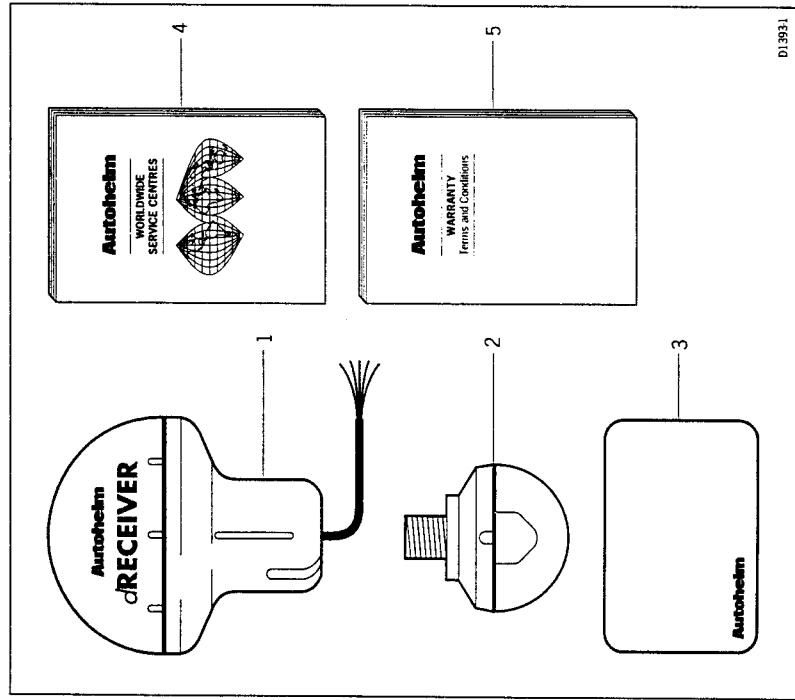
Differential Beacon Receiver

Differential Beacon Receiver Package Contents

The Differential Beacon Receiver package contains the following basic items:

1. Differential Beacon Receiver (excluding aerial)
2. Combined rail clamp and surface mounting kit
3. Junction box kit
4. Worldwide Service Centre list
5. Warranty leaflet

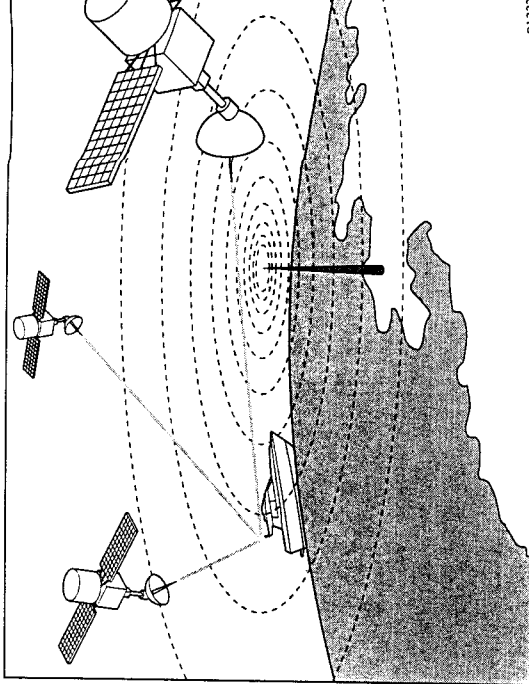
Note: The receiver requires a 1.3m stainless steel aerial with a 3/8 - 24 UNF screwthread. This is an 'off-the-shelf' item that can be purchased from your local dealer.



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Chapter 1: Introduction

The self-tuning Differential Beacon Receiver is used in conjunction with the dGPS transducer. When your vessel is in range of non-subscription differential beacons transmitting on 283.5 KHz to 325.0 KHz, the receiver greatly enhances the accuracy of the dGPS transducer to provide position fixes as close as 10 metres (32.5ft).



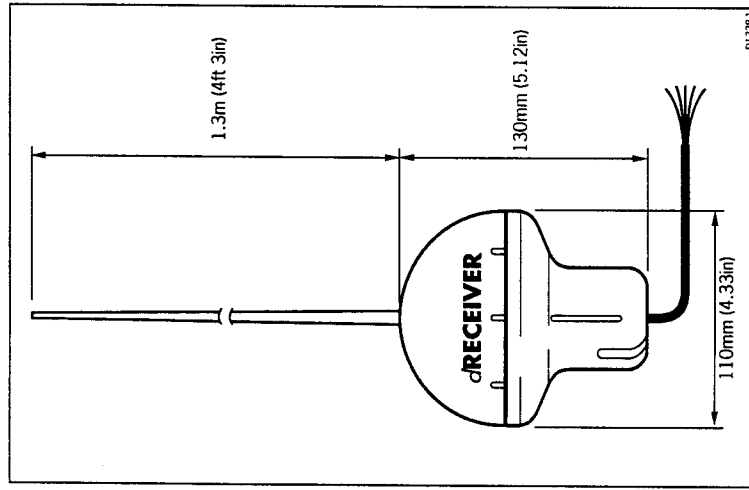
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Chapter 2: Installation

2.1 General

The receiver is designed to receive signals in a direct path and should, therefore, be mounted vertically in a location that is clear of structures that might block the signal path.

For ideal reception, the receiver should be mounted vertically and as high as possible in a location that is at least 2m (7ft) clear of metallic objects or other communication antennas.

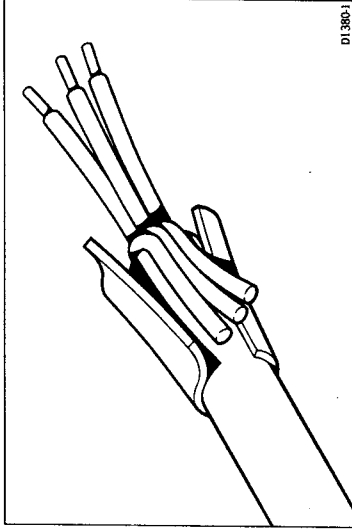


The rail and surface mounting procedures are identical to those for the dGPS receiver in Chapter 1, section 1.1 and 1.2.

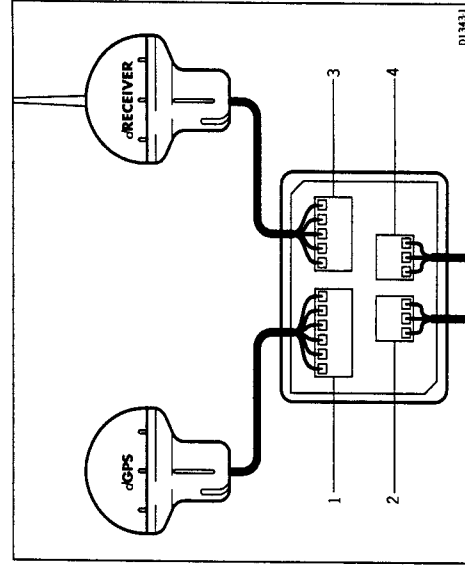
2.2 Mounting

2.3 Cabling

1. Attach the supplied junction box in a suitable below decks location using the screws supplied.
2. Remove the sleeve from the end of the dGPS cable to reveal the black, white and brown wires.



3. Connect the six wires (detailed below) to the corresponding dGPS junction-box terminals.
4. Connect the five wires from the receiver to the corresponding receiver SeaTalk Junction-Box terminals.



1 dGPS connector block 2 SeaTalk connector block 3 Differential Beacon Receiver connector block 4 SeaTalk connector block

5. Connect the SeaTalk bus to either SeaTalk connection (both if joining in the middle of a cable run).

Chapter 4: Operation

There are no switches or buttons on the Differential Beacon Receiver. The unit is controlled by the dGPS transducer, setting the receiving frequency (between 283.5 and 325.0 Khz), baud rate etc. automatically when the vessels power supply is turned on.

Chapter 5: Specification

Dimensions:	110mm Ø x 130mm H (with whip aerial 1.3m)
Signal source:	Non-subscription differential beacons
Signal frequency:	283.5 to 325.0 Khz
Signal acquisition:	Automatic
Maximum acquisition time:	1 second at 12 dB SNR
Minimum SNR:	12 dB
Adjacent channel rejection:	> 26 dB at 500 Hz offset
Frequency resolution:	100Hz
Local oscillator:	Direct digital synthesizer (DDS)
Minimum signal strength:	5 µV/m
Demodulation signal:	MSK (Minimum shift keying)
Data decoding:	Differential detector
RF bit rate(s):	25, 50, 100, 200 bps
Dynamic range:	> 90 dB
Interface level:	0V (Mark) and +5V (Space)
Transmission format:	Asynchronous serial data transmission (Start bit = 1, data bit = 8, parity bit = 0, stop bit = 1)
Command/data protocol:	6 of 8 format (* see note below)
Data transmission rate:	4800 bps
Operating temperature:	-20° to + 85°C
Power requirements:	10.8 to 16V DC
Power consumption:	2.4 Watts (maximum)