



*CLIPPER*  
**GPS  
REPEATER**

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## **INTRODUCTION**

The Clipper GPS Repeater is supplied with 10 metres of cable, a nine-pin RS232 adaptor, and a 12Volt power cable. The unit will repeat the data sent by any GPS receiver set up to send NMEA 0183 output at 4800 baud.

## **INSTALLING THE DISPLAY**

Select a convenient position for the display on a panel or bulk-head. The site must be flat and the cavity behind the panel must remain dry at all times. (The cable entry is deliberately not sealed to ensure adequate ventilation. This prevents misting of the display).

Cut a hole in the panel 67mm high and 87mm wide. Bring the wiring through the hole in the panel and pass the 10 metre cable through the hole.

Unscrew and remove the two wing nuts from the rear of the instrument and remove the stainless steel clamping bracket. Fit the "O" ring seal into the groove in the panel mounting face of the instrument. Ensure that it is correctly lying in its groove before fitting the instrument to the panel, which provides the watertight seal for the display.

Fit the instrument into the panel, fit the stainless clamp over the studs, fit and tighten the two wing nuts finger tight only.

It is important that the O-ring rubber seal makes good contact with the panel to prevent water getting behind the unit and entering the cavity behind the panel.

It is good practice to run the cables vertically downwards from the unit, even if they later have to rise to connect to the vessel's supplies. Doing so prevents any water that might get onto the cables from running back along the cables and into the unit.

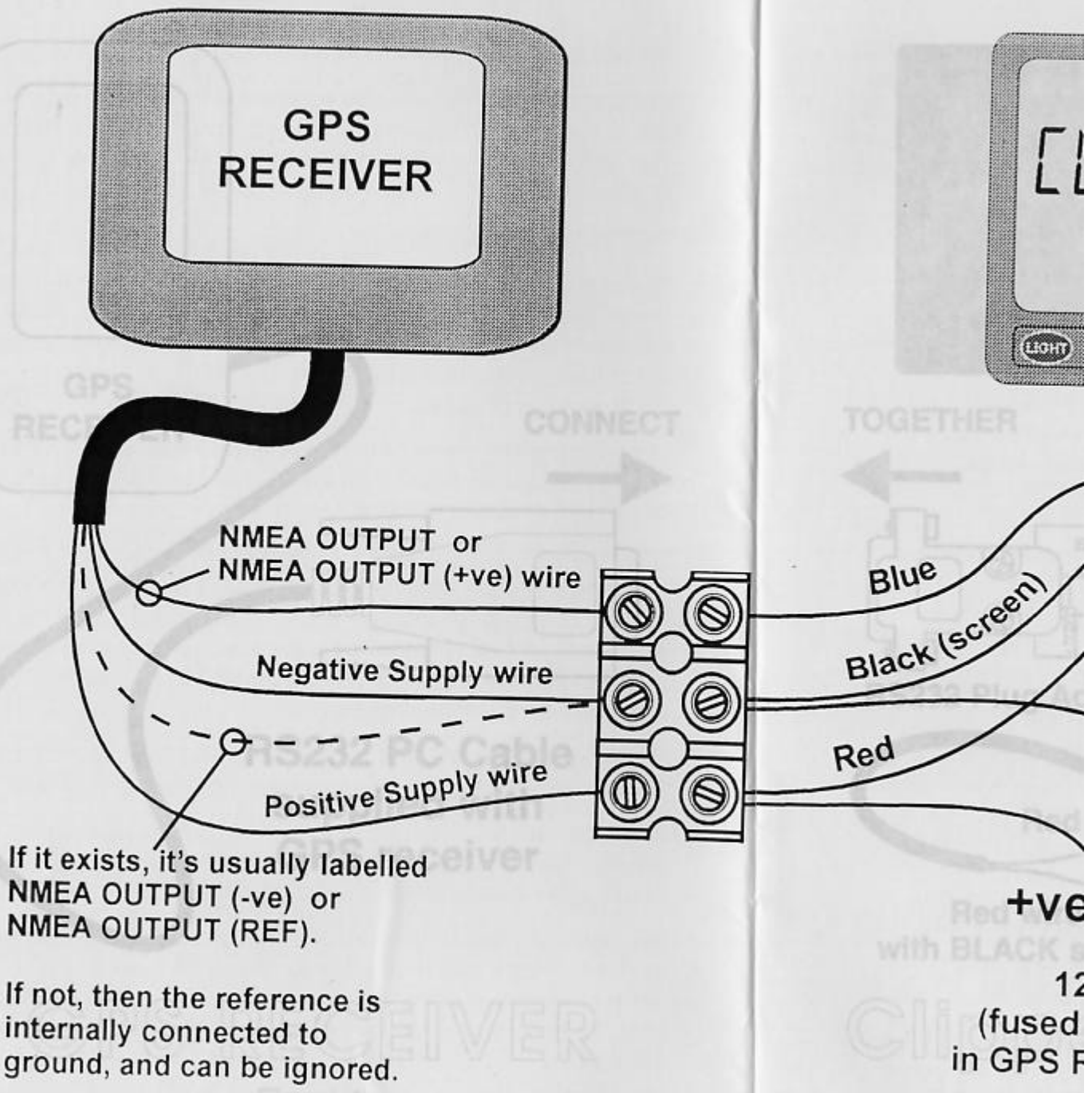


Figure 1

Uncoil the cable and install it on a convenient run to the GPS receiver position. If it is necessary to pass the cable through small bulkhead openings, the RS232 Plug Adaptor can be removed by loosening the three screws in the connector block. Ensure that the wires are correctly re-connected to the RS232 adaptor: Red next to the power socket, Black/Screen in the centre and Blue nearest the edge. The correct connections are printed on the adaptor.

Refer to Figures 1 and 2. Plug the GPS Receiver's PC data cable, which is supplied with the GPS (and which has an RS232 socket on the end), into the Repeater's RS232 Plug Adaptor. Connect the 12 Volt power cable to the 12 Volt ship's supply or a 12 Volt battery. Plug the GPS Receiver's PC data cable into the GPS receiver itself, and the system is ready to go.

## GETTING OPERATIONAL

Switch on the GPS receiver. Refer to the manufacturer's handbook, and set up the unit to send NMEA version 2.0 (or later version) at 4800 Baud. When the GPS Repeater is powered on, the words Clipper GPS appear momentarily on the screen. Note that the words are shown in a mixture of Upper case (capitals) and lower case characters.

This is because the numerical display is also used to display text. The International Seven-bar Substitution Character Set (ISBSCS, usually shortened to ISCS) is used to represent the Upper-case alpha-numeric characters used by most GPS receivers, as shown below.

ABCDEF GHIJK LMNOPQR  
AbCdEfGhIjKlMnOpQr  
STUVWXYZ 0123456789 -  
StUvWxYz 0123456789 -

On some GPS receivers, no NMEA output is sent until lock onto the satellites is achieved. If so, the Repeater displays the message "No GPS Signal" as a warning. When the GPS Receiver has acquired lock, the current position (Latitude and Longitude) will be displayed on the Repeater.

Regardless of the settings on the GPS Receiver, the repeater always displays distances in Nautical miles, speeds in knots, and all bearings in magnetic. Latitude and Longitude is shown in degrees, minutes and tenths, hundredths and thousands of a minute.

## **USING THE REPEATER**

Press POSN. at any time, and the repeater will display the current position (Lat and Long) after a brief pause while it collects the fresh NMEA data from the receiver. Unless a waypoint is selected on the receiver, this is usually all the data available to the repeater.

Select a waypoint ( a destination) on the GPS receiver and press STEER. The repeater will show the Speed over the ground (SOG) screen. This screen shows the road, the speed over the ground (the course made good), track, and distance and bearing to the waypoint.

A second press of STEER shows the cross-track error (CTE) screen. This replaces the speed over ground with the Cross-track error, and leaves the other values as before. Pressing STEER alternates between the CTE and SOG screens.

Press DEST. to display the name of the next waypoint (which has been entered into the GPS receiver) and the direction to steer to reach it. If the destination is within 30° of astern, "Astern" is displayed.

Press LIGHT to switch the backlight on at low level, and again to switch the backlight to full brightness. Another press switches the backlight off again.

## USING THE ROADWAY DISPLAY

The roadway display is available on the DEST and COG and CTE screens.

Steering guidance is represented on the roadway display. The display indicates the direction to steer to reach the destination waypoint from the present position. It does not indicate cross-track error from the track between the departure and destination waypoints stored in the GPS receiver.

If the cross-track (CTE) is being displayed, the cross-track error includes a Left (L) or Right (r) indication, which indicates the direction to steer to rejoin the desired track between departure and destination waypoints.

The roadway display always shows the best direction to turn, even if the vessel is moving away from the destination waypoint (and see above). If the vessel is going away from the destination, this is shown by the large difference between the bearing to waypoint (destination) and the Track.

The roadway displays are shown opposite, for all track and bearing differences.

**"Ahead"**

Track within  $3^\circ$  of bearing to destination



Steer left

(Track  $> 3^\circ$  off bearing to destination)



Steer right



Steer left

(Track  $> 6^\circ$  off bearing to destination)



Steer right



Steer left

(Track  $> 9^\circ$  off bearing to destination)



Steer right



Steer left

(Track  $> 12^\circ$  off bearing to destination)



Steer right



Steer left

(Track  $> 15^\circ$  off bearing to destination)



Steer right





## TECHNICAL INFORMATION

The GPS Repeater offers full functionality only when the GPS receiver is set up to send NMEA 2.0 (or later) messages at 4800 baud. NMEA Message types RMB, RMC, and GSA are required to fulfil all the repeater's functions.

The repeater always shows the status of the signals it is getting from the GPS receiver. If no NMEA data are being received, a "No GPS Signal" message is displayed.

Some GPS receivers send NMEA data before full satellite acquisition is achieved, but others wait until full acquisition is achieved before sending any data over the NMEA connection. If position (POSN.) is requested, and none is available from the GPS, "No GPS POSN." is displayed. If no Cross-track Error or Speed over Ground information is available, appropriate messages are shown.

The Repeater always displays magnetic bearings, using the magnetic offset sent by the GPS receiver. If true bearings are wanted on the Repeater, it is necessary to set the GPS Receiver to Magnetic, and set the magnetic deviation manually to zero.

The cable to the Repeater has two wires, Red and Blue, and an outer screen. The screen is negative, and the red wire is connected to +12 Volts. The Blue wire carries the NMEA data from the GPS Receiver. The cable can be shortened or extended up to 20 metres if desired.

Supply voltage:	8-16Volts D.C.
Current	3 mAmps (backlight Off)
Current	25 mAmps (backlight On)

## TROUBLE SHOOTING

<b>PROBLEM</b>	<b>LIKELY CAUSE</b>	<b>REMEDY</b>
Repeater is totally dead.	No power to Repeater.	Check 12V supply, fuse, and connections between RS232 Plug Adaptor and 10m cable. Check cable for damage.
Repeater reports "NO GPS Signal".	Not getting NMEA from the GPS Receiver.	Check GPS Receiver is set up to send NMEA version 2.0 (or higher) at 4800 Baud.
Repeater reports "NO GPS Signal".	Not getting NMEA from the GPS Receiver.	Check GPS Receiver is on and has acquired lock. Check connections to RS232 Plug Adaptor.
Repeater shows "No GPS DEST" or "No GPS SOG" or "No GPS CTE".	No Waypoint selected on GPS Receiver.	Select waypoint.
Repeater shows "No GPS POSN".	Receiver still acquiring position.	Wait for acquisition.
Information on Repeater appears different to GPS Receiver.	The Receiver has not updated its NMEA output.	Wait for update.

## TROUBLE SHOOTING

<b>PROBLEM</b>	<b>LIKELY CAUSE</b>	<b>REMEDY</b>
Information on Repeater appears different to GPS Receiver.	The Receiver is not set to display knots, nautical miles, etc.	Reset Receiver to show Nautical units.
Bearings are different on the Repeater.	The Receiver is not set to magnetic.	Set the Receiver to read Magnetic bearings. If true readings are desired, set Receiver to magnetic, and set zero magnetic deviation.
Left and Right symbols are reversed.	Difference in convention. Some receivers show direction TO desired track, others show your position RELATIVE to desired track.	Remember the convention in use.