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Autohelm™

AH800

AUTOPILOT
Operation and
Installation

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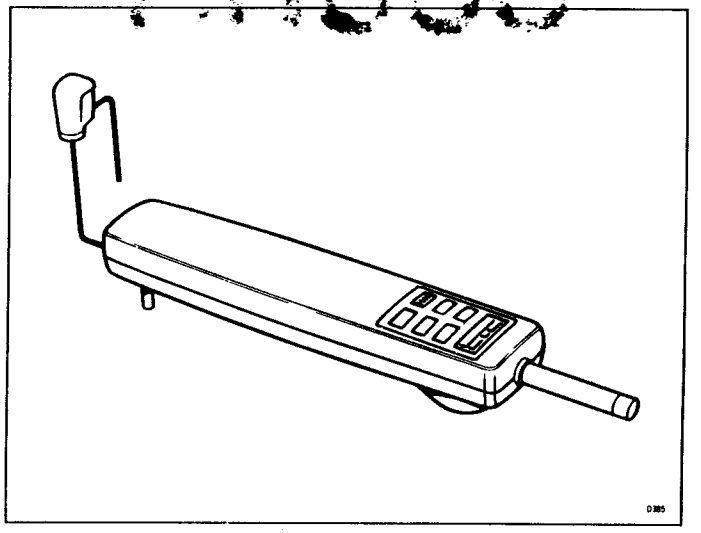


AH800 Autopilot

Contents

Specifications

- Power Supply
  - 10 to 15V d.c.
- Current consumption
  - Standby: 65mA
  - Auto: between 0.5A and 1.5A depending on boat trim, helm load and sailing conditions
- Operating temperature
  - 0°C to +70°C
- 6 button digital keypad
- Precision fluxgate compass
- LED status indicator

Introduction

Your Autohelm AH800 is a totally self contained autopilot designed for tiller steered yachts. The autopilot is mounted between the tiller and a single attachment point on the yacht's structure. It is designed for owner installation and after connection to the yacht's 12 volt electrical system will be ready for use.

Important Note

The AH800 is recommended for tiller steered vessels upto 7,000 lbs (3,200kg) displacement. Above this limit and for heavy duty applications, such as single handed racing or long distance ocean sailing, one of the more powerful Autohelm autopilots (ST1000,ST2000 Linear) is advised.

Safety

Passage making under autopilot can greatly increase the pleasure of the voyage and ensure the crew can relax. However, this can lead to a dangerous lack of attention to basic seamanship. The following rules should always be observed:

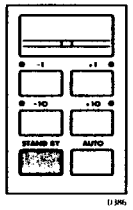
- Maintain a permanent watch and check regularly all round for other vessels and obstacles to navigations. No matter how clear the sea may appear a dangerous situation can develop rapidly
- Maintain an accurate record of the vessel's position either by use of a radio navigation receiver or visual bearings.
- Maintain a continuous plot of position on a current chart. Ensure the locked autopilot heading steers you clear of all obstacles. Make proper allowance for Tidal Set–the autopilot cannot!
- **Ensure that all members of crew are familiar with the procedures required to disengage the autopilot**

Your Autohelm AH800 will add a new dimension to your boating enjoyment. However, it is the responsibility of the skipper to ensure the safety of the vessel at all times by careful observance of these basic rules.

Operation

1.2 Operator controls

Standby

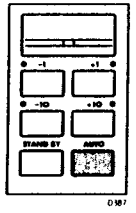


- Push to disengage the autopilot for hand steering

  The previous auto heading is memorised and can be recalled using the **Auto** key (see 'Auto').

  In 'Standby' the status LED flashes once a second.

Auto



- Push to engage automatic steering and maintain current heading

  In 'Auto' the status LED is constantly illuminated.

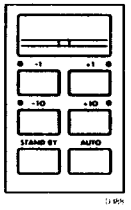
  If for any reason the vessel is steered away from the selected locked heading (e.g. Dodge manoeuvre or selecting 'Standby') then:

- Push and hold down **Auto** for 1 second

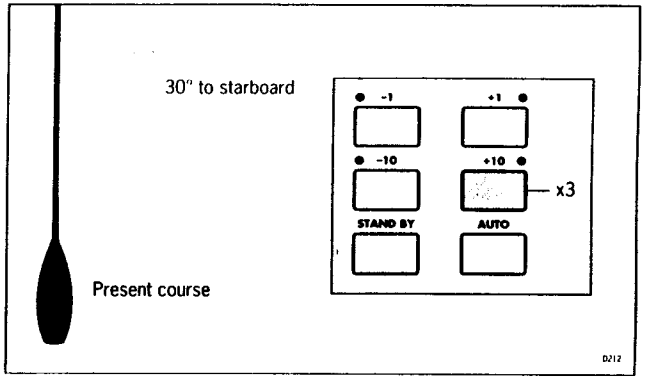
  To select the old heading, and resume the original course, press the **Auto** key once within 10 seconds.

  Also see 'Dodge' – page 10.

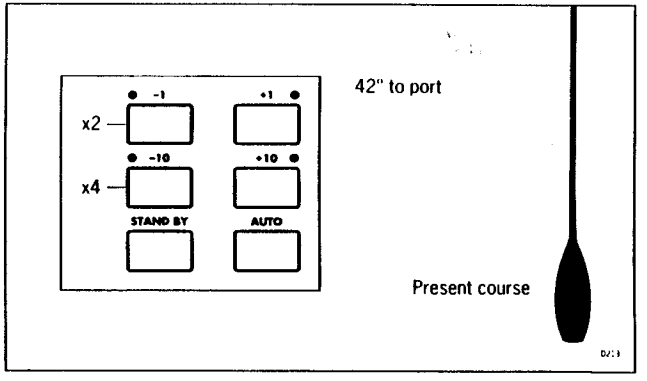
Course changes (–1, +1, –10, +10)



- Push to alter course to Port (–) and Starboard (+) in increments of 1° and 10°



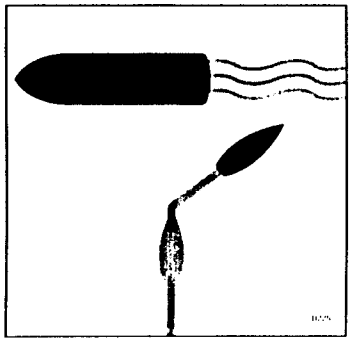
30° course change to Starboard

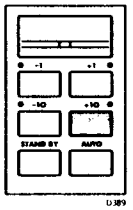


42° course change to Port

Dodge

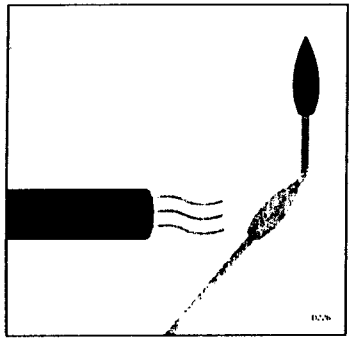
In order to avoid an obstacle under autopilot control select a course change in the appropriate direction (say starboard 30° = 3 x +10°).

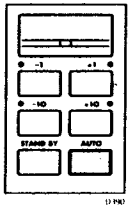




When safely clear of the obstacle press and hold down **Auto** for 1 second.

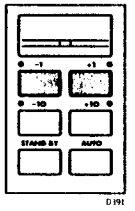
The previous locked heading can now be selected by pressing **Auto** within 10 seconds.





Alternatively the previous course change can be reversed via the key pad example: 3 x –10°.

Automatic Deadband Control (Auto seastate)



- Press the **+1** and **–1** degree course change keys together to toggle between auto deadband and fixed minimum deadband.

  This can only be done with the Autopilot in 'Auto' mode.

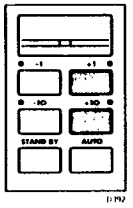
  'Automatic deadband' (Auto seastate) will cause the pilot to gradually neglect repetitive movements of the vessel and only respond to true variations in course. This provides the best compromise between power consumption and course keeping accuracy by neglecting unnecessary rudder movements.

  'Minimum deadband' will always provide the tightest course keeping possible but at the expense of increased power consumption and drive unit activity.

Automatic Tack (Autotack)

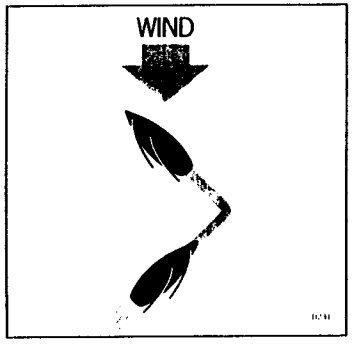
The AH800 has a built in automatic tack facility which will turn the vessel through 100° in the required direction.

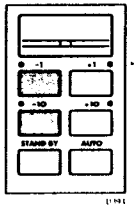
- Press the **+1** and **+10** degree keys together to Tack through 100° to starboard



Or:

- Press the **–1** and **–10** degree keys together to Tack through 100° to port





Off Course Alarm

The off course alarm will sound if the locked autopilot heading and the vessels current heading differfor greater than 20 seconds, by more than 20°.

To cancel the off course alarm push **Standby** to return to hand steering.

If the off course alarm sounds it is usually an indication that the vessel is carrying too much sail, or that the sails are badly balanced. In this case a significant improvement in course keeping can usually be obtained by improving sail balance.

1.3 Operating hints

It is very important to understand the effect of sudden trim changes on steering performance. When a sudden trim change occurs, due for example to weather helm or sail imbalance, there will be a delay before the automatic trim applies rudder to restore the locked heading. This correction can take up to one minute. Large course changes which change the apparent wind direction can produce large trim changes. In these cases the autopilot will not immediately assume the new automatic heading, and will only settle onto course when the automatic Trim has been fully established.

To minimise the time delay the following procedure may be adopted for large course changes.

- Note required new heading
- Select **Standby,** remove the autopilot from the tiller pin, and steer manually
- Bring vessel onto new heading
- Place the autopilot on the tillerpin, select **Auto** and let vessel settle onto course
- Bring to final course with 1° increments

It is sound seamanship to make major course changes only whilst steering manually. In this way any obstructions or other vessels may be cleared properly and due account taken of the changed wind and sea conditions on the new heading prior to engaging the autopilot.

In gusting conditions the course may tend to wander slightly, particularly with badly balanced sails. In the latter case, a significant improvement in

course keeping can always be obtained by improving sail balance. Bear in mind the following important points:

- Do not allow the yacht to heel over excessively
- Ease the mainsheet traveller to leeward to reduce heeling and weather helm
- If necessary reef the mainsail a little early

It is also advisable whenever possible to avoid sailing with the wind dead astern in very strong winds and large seas.

Ideally, the wind should be brought at least 30° away from a dead run and in severe conditions it may be advisable to remove the mainsail altogether and sail under headsail only. Provided these simple precautions are taken the autopilot will be able to maintain competent control in gale force conditions.

Installation

Contents

Chapter 2: Installation

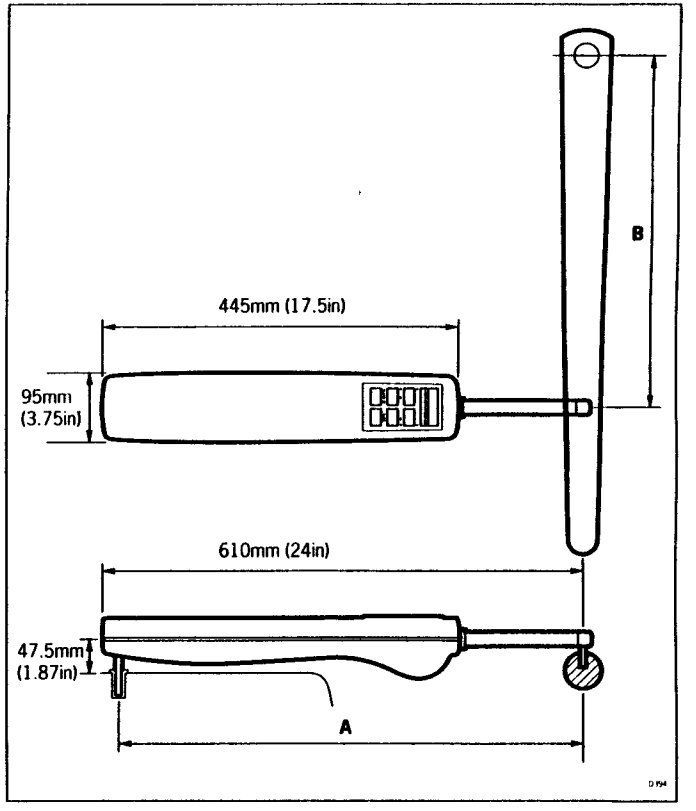
Introduction

Your Autohelm is a totally self contained magnetic sensing automatic pilot.

The autopilot is mounted between the tiller and a single attachment point on the yacht's structure. After connection to the yacht's 12 volt electrical system the unit becomes operational.

Since the autopilot incorporates a magnetic sensing device, it is advisable to ensure that the yacht's steering compass is situated at least 750mm (2ft 6in) away to avoid deviation.

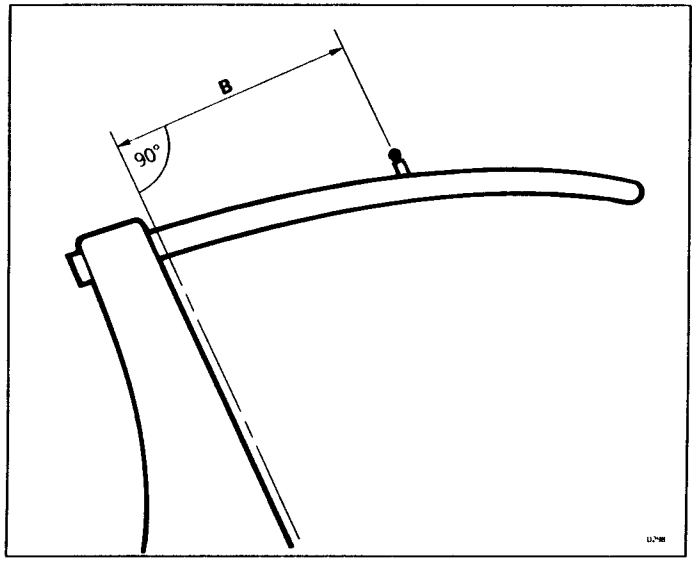
For correct installation two basic dimensions are critical:



Dimension A = 589mm (23.2in)
mounting socket to tiller pin

Dimension B = 460mm (18in)
rudder stock centre line to tiller pin

Clamp the tiller on the yacht's centre line and mark off dimensions **A** and **B** (**A** is measured on the starboard side of the cockpit) using masking tape to locate the fixing points. Ensure the measurements are at right angles as shown.



The autopilot must be mounted **horizontally**.

In certain circumstances it may be more convenient to mount the unit on the porthand side. This is perfectly acceptable so long as the dimensions shown for both **A** and **B** are correct.

Note: The unit will require programming for port hand operation by reversing its operating sense. This will be covered during the initial functional test in Chapter 3.

2.1 Basic installation

After establishing the three control dimensions the autopilot can be mounted directly onto the **starboard** cockpit seat.

Proceed as follows.

Tiller pin (cat no D001)

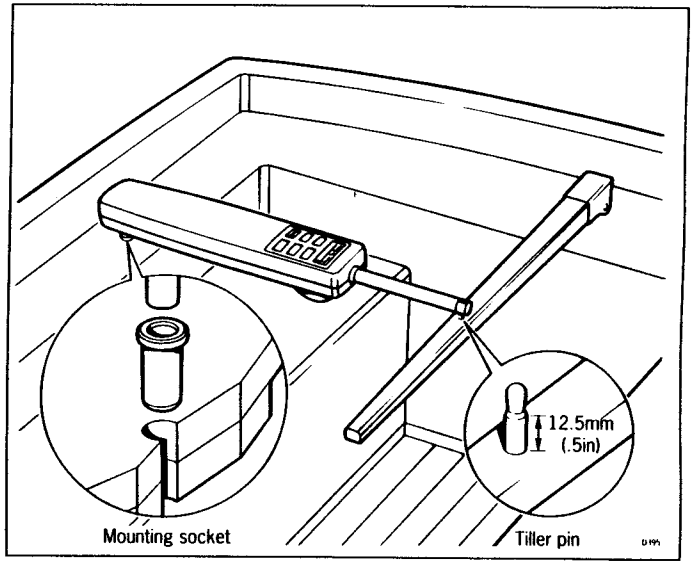
- Drill 6mm (1/4in) hole x 25mm (1in) deep at point marked on tiller
- Using a two part epoxy such as Araldite, epoxy the tiller pin into place
- Position the shoulder of the pin 12.5mm (0.5in) above the tiller surface

Mounting socket (cat no D002)

- Drill 12.5mm (1/4in) hole x 25mm (1in) deep into the starboard cockpit seat
- If the thickness of the mounting position is less than 25mm (1in) carefully reinforce the under surface with a plywood plate epoxied into position
- Install the mounting socket using two part epoxy.

Note: The autopilot is capable of generating high pushrod loads. ensure that:

- The epoxy is allowed to harden thoroughly before applying any loads
- All holes are drilled to correct size and where necessary reinforcing is provided



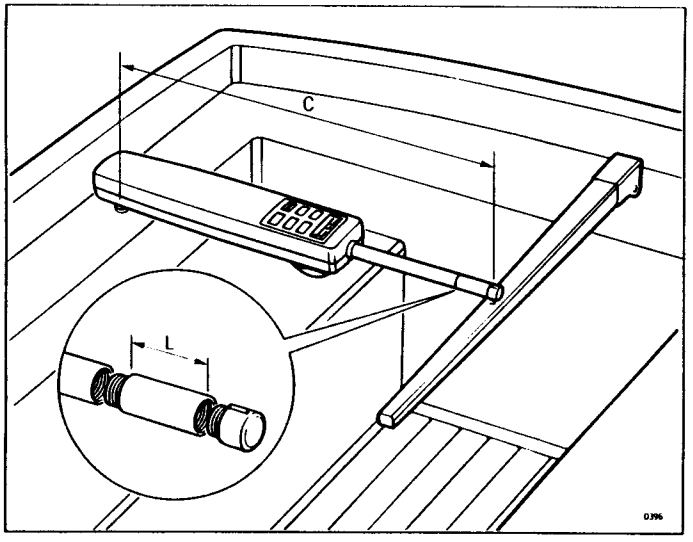
2.2 Installation Accessories

If it is not possible to install your autohelm directly onto the the cockpit seat/tiller as described one of the followng accessories (or combination) will ensure a perfect installation.

Pushrod extensions

The pushrod length may be simply extended using one of the standard pushrod extensions. dimension **A** is modified as follows:

Dimension C	Pushrod extension length L	Cat no
589mm (23.2in)	Std dimension	–
615mm (24.2in)	25mm (1in)	D003
640mm (25.2in)	51mm (2in)	D004
665mm (26.2in)	76mm (3in)	D005
691mm (27.2in)	102mm (4in)	D006
716mm (28.2in)	127mm (5in)	D007
742mm (29.2in)	152mm (6in)	D008



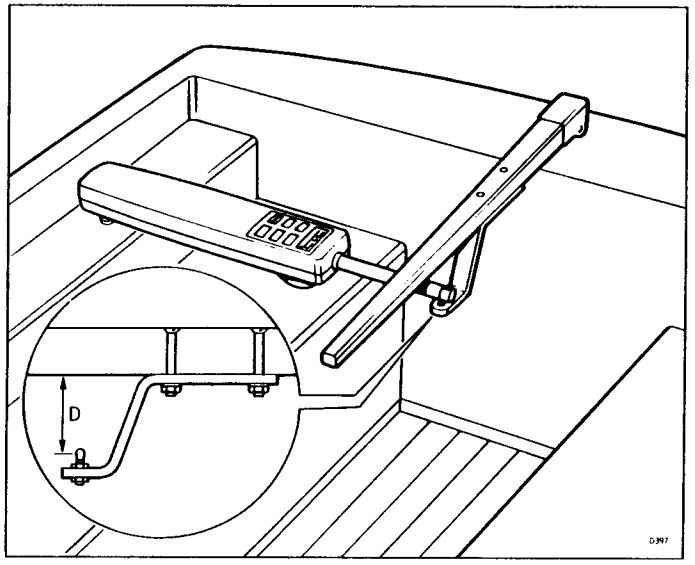
Tiller brackets

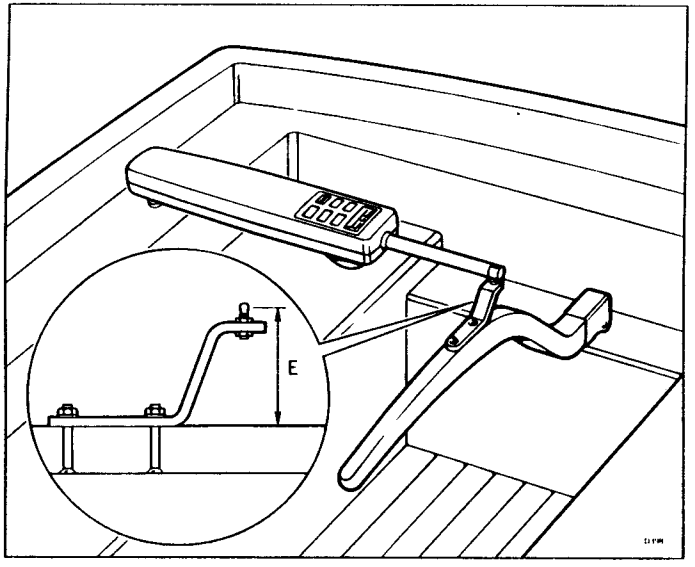
Where the height of the tiller above or below the cockpit seat or mounting plane is such that standard mounting is not practical a range of tiller brackets allows the tiller pin offset to be varied.

Installation

- Position the tiller bracket on the centre line (upper/lower) of the tiller and establish control dimensions **A** and **B**
- Mark off the position of the centres of the two fixing bolt holes
- Drill two holes 6mm (1/4in) diameter through the centre line of the tiller
- Install the tiller bracket using 2 x 6mm (1/4in) diameter bolts, nuts and washers
- Epoxy the fixing bolts in place and fully tighten the nuts

Dimension D (below tiller)	Dimension E (above tiller)	Cat no
25mm (1in)	51mm (2in)	D009
51mm (2in)	76mm (3in)	D010
76mm (3in)	102mm (4in)	D011
102mm (4in)	127mm (5in)	D012
127mm (5in)	152mm (6in)	D013





Cantilever mounting

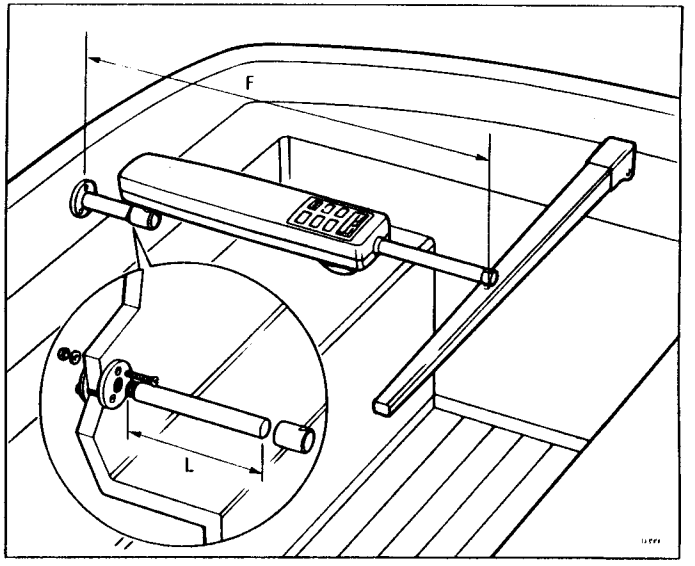
Where it is necessary to attach the autopilot to a vertical face such as the cockpit sidewall a cantilever socket assembly is used.

The maximum extension offset is 254mm (10in) and the cantilever length can be cut to the exact length necessary during mounting.

Installation

- Clamp the tiller on the yacht's centre line
- Measure dimension **F** (actual)
- Refer to table to establish cutting length for cantilever rod. (double check measurements **before** cutting)

Dimension F	Cut length L
654mm (25.75in)	51mm (2in)
705mm (27.75in)	102mm (4in)
743mm (29.75in)	152mm (6in)
806mm (31.75in)	203mm (8in)
832mm (32.75in)	229mm (9in)



- Cut cantilever rod to length **L** using a hacksaw. **Measure from threaded end**
- Remove burrs with file
- Temporarily assemble the cantilever by screwing the rod into the mounting flange
- Ensure the Autohelm body is **horizontal** and mark off the location of the mounting flange
- Mark and drill 3 x 6mm (1/4in) holes (ignore the two inner holes)
- Mount the flange using 3 x 6mm (1/4in) diameter bolts with nuts and washers. Be sure to install the backing plate correctly. Bed the flange on a thin coat of silicone sealant
- Screw the rod firmly into place using a tommy bar
- Roughen the end of the rod and the inside of the cap to provide a key
- Apply the two part epoxy adhesive provided to the rod end and cap and place the cap over the rod end.
- Ensure the hole for the Autohelm mounting pin is facing **up**
- Allow the epoxy 30 minutes to fully harden before applying any load

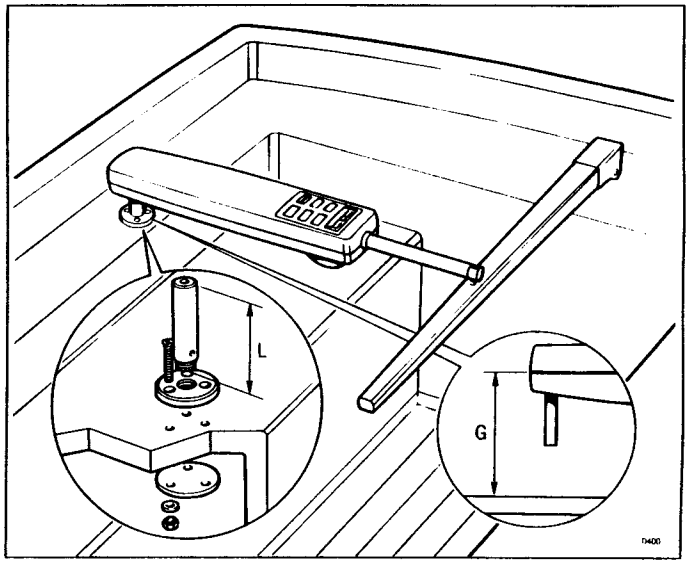
When the Autohelm is not in use the complete rod assembly may be unscrewed, leaving the cockpit uncluttered.

Pedestal socket mounting

It may be necessary to raise the height of the Autohelm mounting socket above the mounting surface. For this a pedestal socket assembly is used.

Selection

- Lock the tiller on the yacht's centre line
- Establish the standard control dimensions **A** (589mm (23.2in)) and **B** (460mm (18in))
- Measure dimension **G** ensuring the Autohelm actuator is **horizontal**



- Select the appropriate pedestal socket assembly from the table shown
- Mark off the position of the mounting flange on the cockpit seat or counter
- Ensure that control dimensions **A** and **B** are correct
- Mark and drill 3 x 6mm (1/4in) diameter holes (ignore the two inner holes)
- Mount the flange using 3 x 6mm (1/4in) diameter bolts, nuts and washers, being sure the back plate is installed correctly. Bed the flange on a thin coat of silicone sealant
- Screw the mounting socket firmly into place

When the Autohelm is not in use the mounting socket may be unscrewed to leave the cockpit uncluttered.

Dimension G	Pedestal socket length L	Cat no
64mm (2.5in)	Std dimension	–
102mm (4.0in)	38mm (1.5in)	D026
114mm (4.5in)	50mm (2.0in)	D027
128mm (5.0in)	64mm (2.5in)	D028
140mm (5.5in)	76mm (3.0in)	D029
153mm (6.0in)	89mm (3.5in)	D030

Tiller pins

For certain non-standard installations a range of tiller pins are available

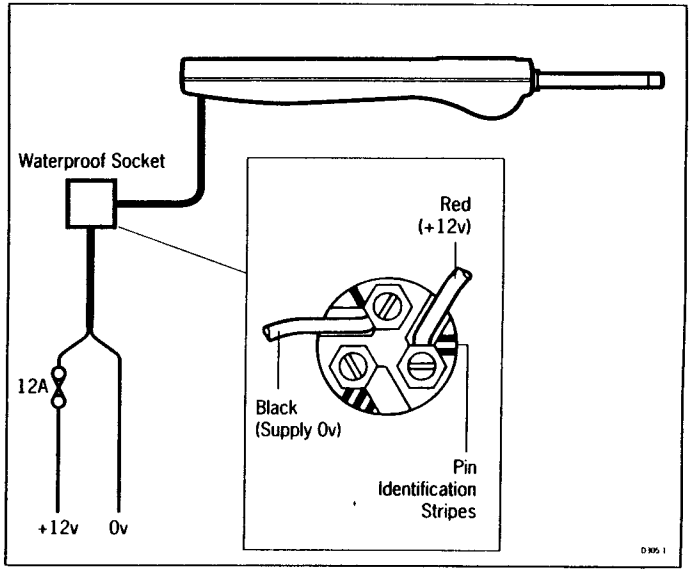
Description	Size	Cat no
Small threaded tiller pin	25mm (1in)	D014
Extra length tiller pin	72mm (2.8in)	D020
Extra length threaded tiller pin	72mm (2.8in)	D021

2.3 Cabling and Socket installation

Power is supplied to the AH800 via a custom waterproof plug and socket. The plug comes ready assembled and the socket can be mounted in the cockpit area adjacent to the autopilot.

Cabling

Power should be routed directly from the vessels central distribution panel and protected via a 12A fuse or circuit breaker as shown:



The following table shows the minimum cable size acceptable for the power supply:

Cable length	Copper area	AWG
Up to 2.5 m (8ft)	1.5mm2	16
Up to 4.0m (13ft)	2.5mm2	14

Important

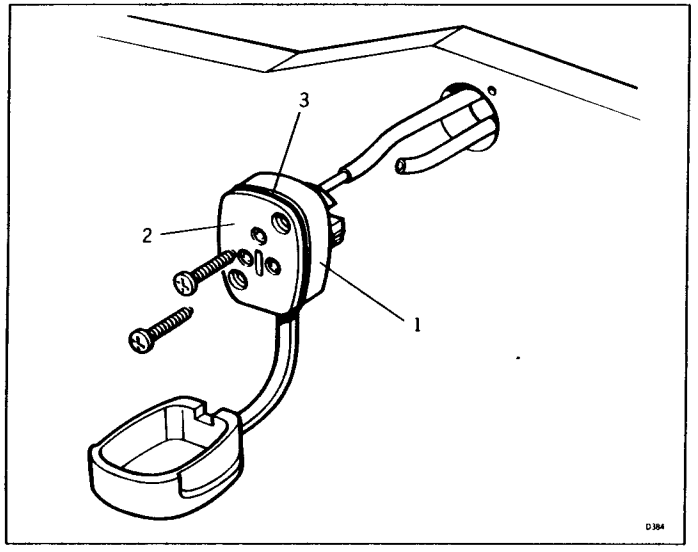
Correct cable size is critical for correct autopilot operation.

The cable you choose may meet the required current specification but, if too small, will drop voltage between the supply and the autopilot. This will reduce the power at the tiller.

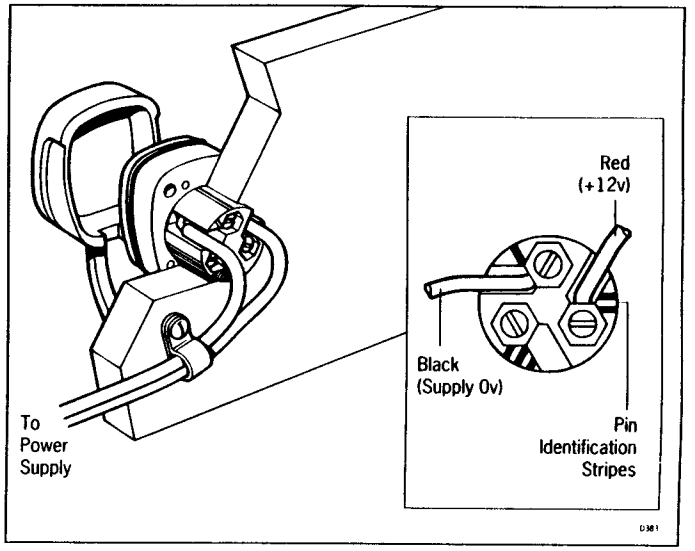
Mounting

The socket is assembled as follows:

- Fix the self adhesive template onto the bulkhead at the selected socket location
- Carefully drill the 18mm (23/32in) clearance hole and 2.4mm (3/32in) pilot holes. Remove the template
- Fit the plug cap (**1**) to the socket body (**2**) as shown
- Locate the 'O' ring seal (**3**) into the groove between the plug cap and socket body



- Thread the cable through the bulkhead hole and wire into the socket as shown making sure the wires are connected to the correct pin



- Attach the socket to the bulkhead using the two self tapping screws supplied
- Restrain cables as shown

Chapter 3: Functional Test and Initial Sea Trial

This section of the handbook consists of a set of simple tests followed by a short sea trial. This will confirm that the system is wired correctly and is also set-up to suit your type of boat.

3.1 Functional test

Switch on

Having installed your AH800 autopilot, switch on the main power breaker.

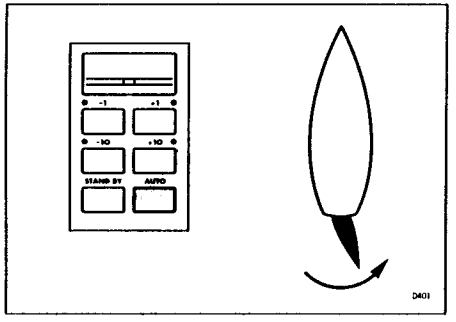
The autopilot should beep and the status LED flash once a second. This shows the autopilot is active. If it does not beep please refer to chapter 5 – 'Fault finding'.

Operating sense

The operating sense of the autopilot defines the direction helm will be applied when a course change button is pressed or the vessel goes off course. It can be checked as follows:

- Place the pilot over the tiller pin
- Press **+10°**

The helm should move to produce a turn to Starboard. .

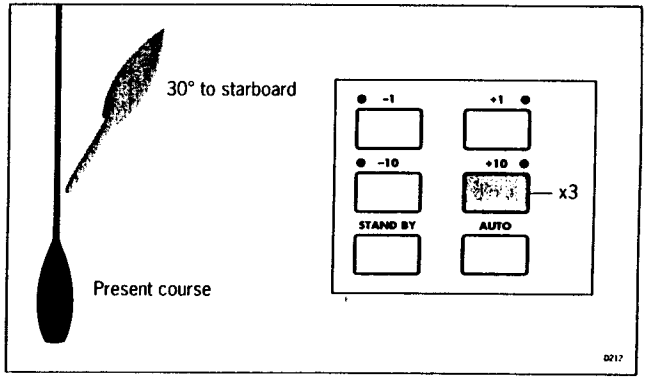


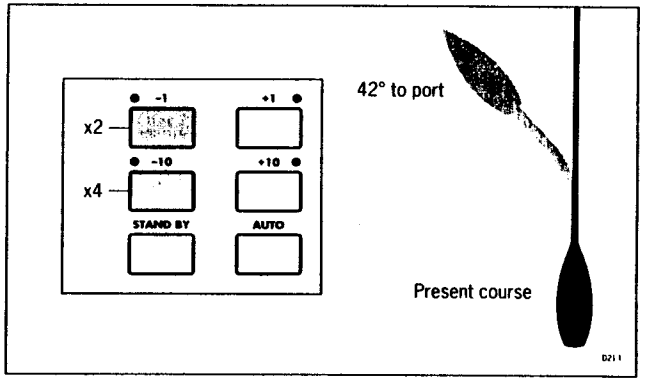
If it moves to port then please refer to page 32 – Operating sense reversal – for instructions on how to reverse the sense.

Autopilot operation

Having installed the autopilot the following proceedure is recommended to familiarise yourself with its operation:

- Steer onto a compass heading and hold the course steady
- Place the autopilot over the tiller pin
- Push **Auto** to lock onto the current heading. In calm sea conditions a constant heading will be achieved
- Alter course to port or starboard in multiples of 1° and 10°





- Push **Standby** and lift the pilot off of the tiller pin to return to hand steering

Operating sense reversal

The operating sense of the Autopilot can be reversed as follows:

- Press the **+1** and **–1** keys together for 5 seconds.

Chapter 4: Maintenance

- Never use any chemical or abrasive materials to clean your AH800. If it becomes dirty wipe clean with a damp cloth

Cabling

- Avoid running cables through bilges where possible and secure any coiled lengths at regular intervals
- Avoid running cables close to flurescent lights,engines,radio transmitting equipment etc
- Check cabling for chafing or damage to outer casing, replace where necessary and re-secure

Advice

Should any difficulties arise, please consult Nautech's Product Support department in the U.K. or your own National Distributor who will be able to provide expert assistance.

The working parts of the drive system are sealed and lubricated for life during manufacture and therefore do not require servicing.

Before the unit is returned please double check that the power supply cable is sound and that all connections are tight and free from corrosion. Then refer to the fault finding section of this manual. If the fault cannot be traced then please contact your nearest Autohelm dealer or Service center for advice.

Always quote the serial number, which is printed on the label on the underside of the autopilot.

Chapter 5: Fault Finding

All Autohelm 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
Autopilot status LED does not flash when pilot is switched on	No supply	Check supply. Check Fuse/breaker. Return pilot for repair
Autopilot steers helm hard over as soon as Auto is engaged	Drive phase set incorrectly	Refer to chapter 3 and carry out the functional test.

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