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Autohelm 3000

Installation & Operating Handbook

AUTOHELM 3000

Autohelm 3000 is an up-to-the-minute digital autopilot which shares the same microprocessor technology built into our biggest and most sophisticated fully installed pilots. It will provide precise powerful steering for sailing yachts up to 12m (39') LOA.

The basic system comprises the main control unit, wheel drive unit and mounting fittings (Fig. 2). This can be extended by adding any of the following accessories.

- Windvane
- Radio navigation interface
- Hand held control unit

The full system is shown below (Fig. 1). The system is designed for owner installation which aided by the following guide should prove to be a simple and interesting job. After fitting the equipment it is only necessary to make a single adjustment to the control unit to match the autopilot's response to the steering characteristics of your vessel.

Good Sailing!

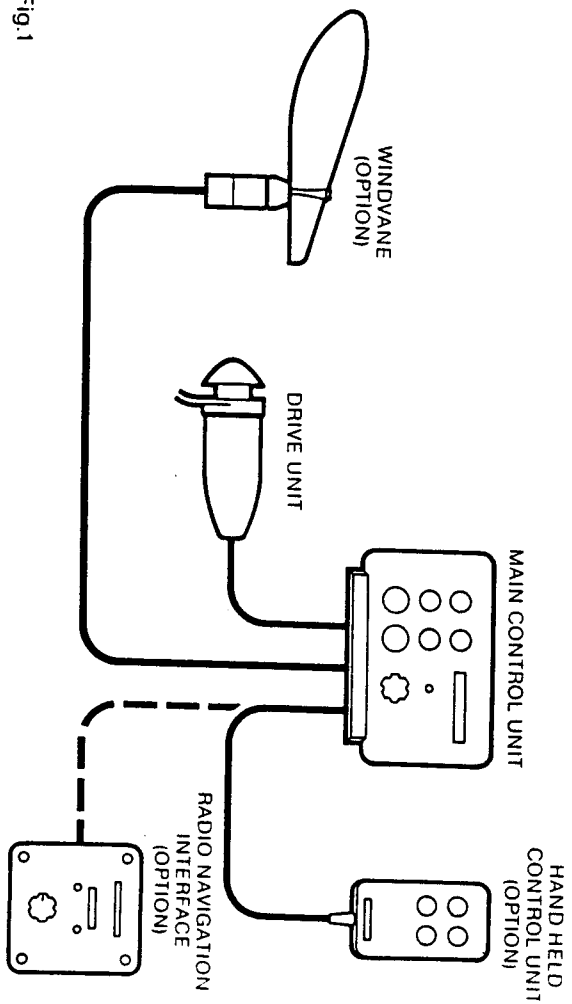
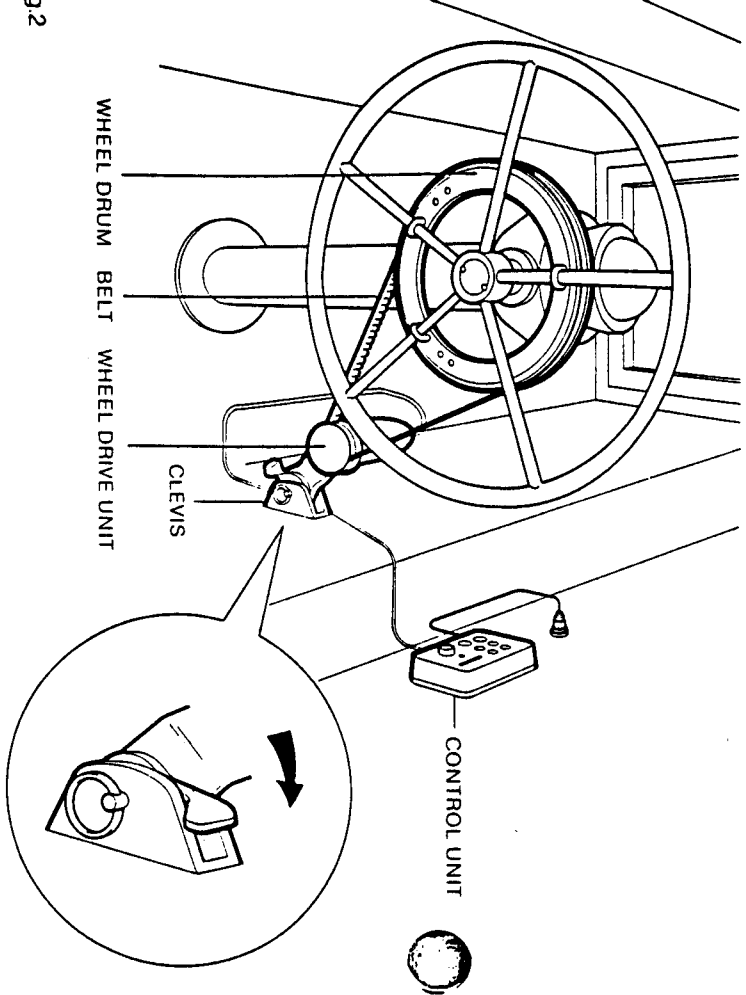


Fig. 1



The wheel drive unit (Fig. 2) is attached to a single pin to a clevis permanently mounted to the cockpit structure. Drive is transmitted to the wheel by a tensioned rubber belt. A lever operated eccentric arm in the drive unit mounting arm allows belt tension to be released to facilitate manual override by allowing the belt to slip. The drive disengagement system is both effective and reliable. The control unit is connected to the drive unit and is remotely mounted on a permanently fixed socket at a convenient location adjacent to the wheel. After connection to the yacht's 12 volt power supply the system is ready for use.

STEERING SYSTEM

The Autohelm 3000 is designed to operate with steering systems having between 1 and 3 turns lock to lock. Steering systems with more than 3 turns lock to lock may cause impaired steering performance due to reduced rate of rudder application.

Lost motion in the steering system must not exceed 2% of total movement. This is equivalent to 15° of free wheel movement for a system with 2 turns lock to lock. If lost motion exceeds this level, performance will be impaired.

WHEEL DRUM ATTACHMENT

The drum (Fig. 3) is clamped onto the wheel spokes using the three U-bolts provided and may be used on wheels with 3, 5, or 6 spokes (Fig. 4). For 4 spoke wheels, Nautech's Technical Sales Department should be contacted to obtain a specially drilled drum.

Holes - 3 and 6 spoke wheels
Holes - 5 spoke wheels

The O holes are for wheels with spoke diameter of 26mm and require special U-bolts (Cat. No. D103).

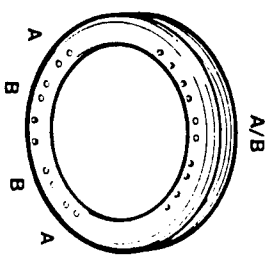


Fig. 3

The wheel drum should ideally be fitted behind the wheel (i.e. between the wheel and the pedestal Fig. 4). In this case it will be necessary to remove the wheel. If there is insufficient clearance behind the wheel the wheel drum may be fitted on the other side.

The drum attachment kit has three complete sets of spacers to compensate for differing spoke diameters. Marked alongside each spacer is the spoke diameter to which it relates. When fitting

the drum simply break off the appropriate spacers.

The wheel drum is clamped to the wheel spokes by the 'U' bolts provided. After roughly positioning the drum, the clamp nuts should be lightly tightened and concentricity checked by spinning the wheel. The drum should then be tapped central to achieve a total run-out of no more than 2mm (1/16") before the clamp's nuts are finally tightened.

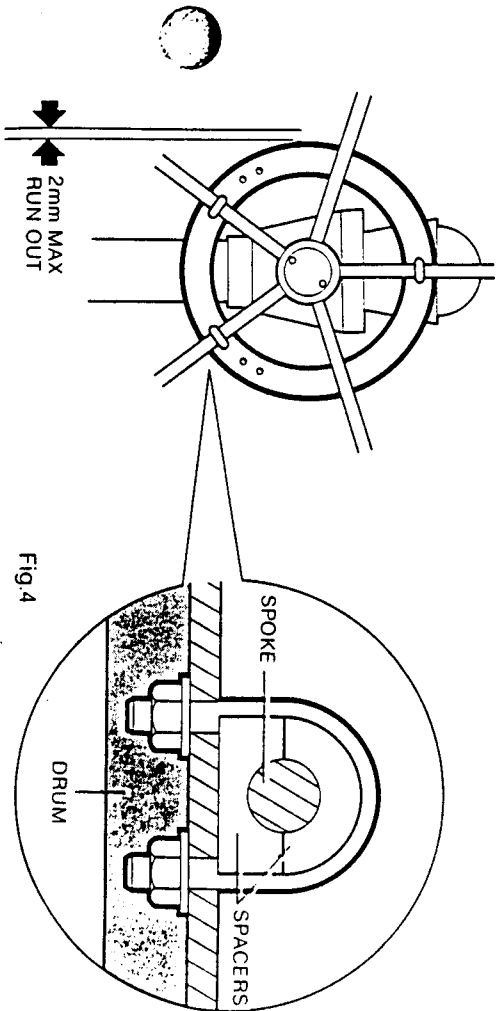


Fig. 4

DRIVE UNIT INSTALLATION

STANDARD INSTALLATION

The drive unit is normally mounted on the cockpit side wall (Fig. 2).

Alternative belt sizes are available to increase or decrease the radial offset of the mounting pin. These are used in cases where the standard belt does not allow a convenient location for the mounting clevis (Fig. 5).

| Belt Size | Radial Off-Set |
|---------------|----------------|
| B- | 512mm (20.1") |
| A- | 546mm (21.5") |
| Standard Belt | 598mm (23.6") |
| A+ | 717mm (28.2") |
| B+ | 850mm (33.5") |

The mounting clevis should be positioned as follows:-

- Attach the mounting clevis to the drive unit using the pin provided and loop the belt drive over both the drum and the drive sprocket.
- Offer the clevis against the vertical side wall after first rotating the eccentric clutch lever fully clockwise against its stop. (i.e. to the 'tight belt' position).

- Push the clevis downwards against the side wall until the belt is just taut and then adjust its fore-and-aft position until the belt lies parallel to the wheel. A long straight edge, such as a sail batten, will enable the parallel run of the belt to be easily checked. (Fig. 6).

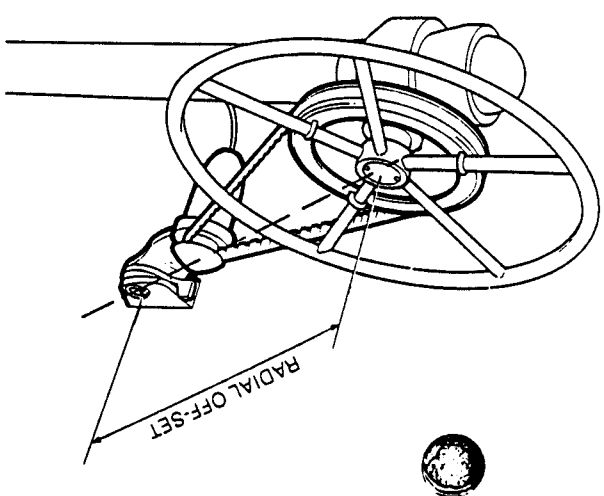


Fig. 5

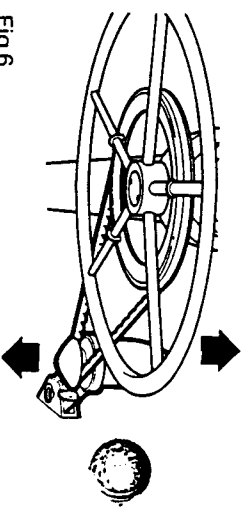


Fig. 6

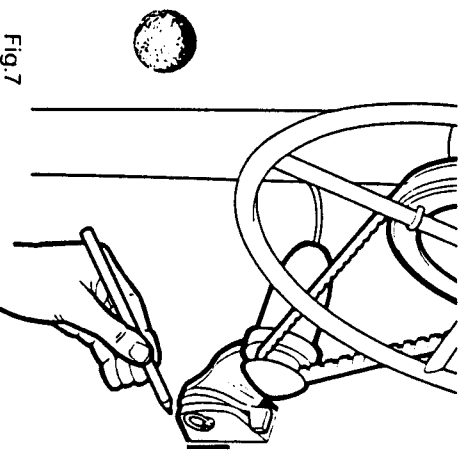
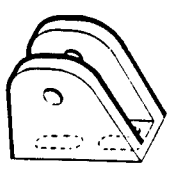


Fig. 7

- Having found the correct position for the clevis carefully mark round its base to record its position. (Fig. 7). Then remove the drive unit and mark round the inside of the elongated fixing holes. (Fig. 8)

Fig. 8



- Finally drill two 8mm (5/16") clearance holes for the clevis fixing bolts at the lower end of each elongated hole position (Fig. 9). This allows the belt to be subsequently tightened.

Note Before drilling the holes check that you have access to the other side of the mounting wall to attach the nut!

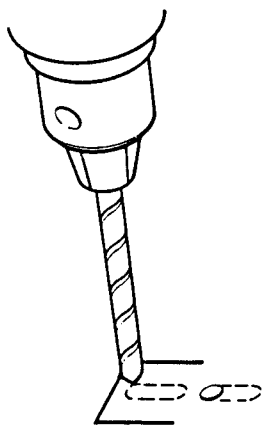


Fig. 9

The mounting clevis may now be bolted into position with the fixing bolts positioned **mid-way** in the elongated holes (Fig. 10). This will ensure that the belt is taut when it is tensioned by rotating the clutch lever fully clockwise. Re-assemble the complete drive system and check the operation of the clutch. The clutch lever may be repositioned on the splined eccentric brush if necessary to ensure that the lever can rotate 180° without obstruction.

When the belt is tensioned by rotating the clutch lever fully clockwise it should be possible to back wind the drive unit by slowly rotating the wheel. If belt slip occurs increase belt tension by reclamping the clevis in a slightly lower position. When the clutch lever is rotated fully anti-clockwise the wheel drum should slip easily against the belt. **Do not overtighten the belt.**

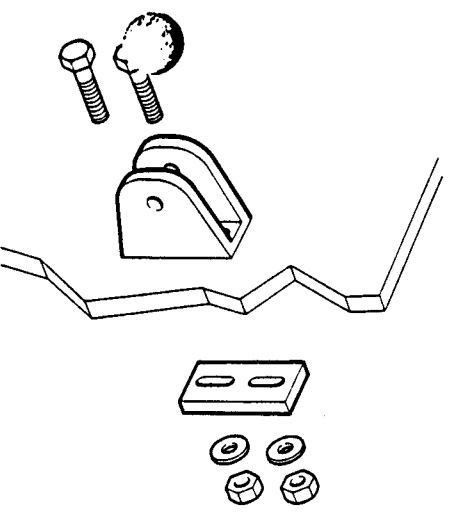


Fig. 10

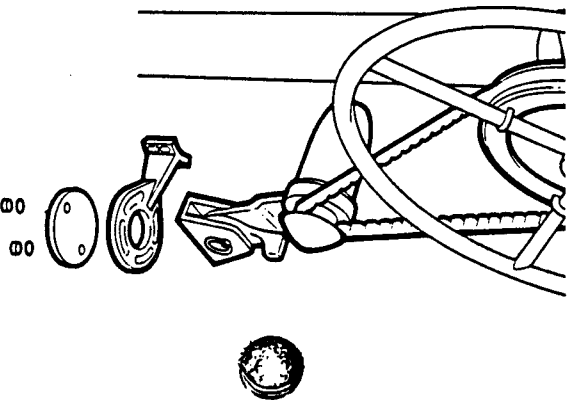
PEDESTAL MOUNTING BRACKET

A special mounting bracket is available to mount the drive unit directly onto the wheel pedestal (Fig. 11).

The bracket should be positioned as follows:-

- Loosely attach the mounting clevis to the pedestal bracket using the backing plate and the two bolts provided.
- Attach the mounting clevis to the drive unit using the pin provided and loop the belt drive over both the drum and the drive unit sprocket.
- Place the bracket onto the pedestal after first rotating the clutch lever fully clockwise against its stop.

Fig. 11



- Push the bracket downwards against the pedestal until the belt is just taut. By sliding the pedestal bracket around the pedestal and rotating the clevis bracket ensure that the belt lies parallel to the wheel (Fig. 12).

Fig. 12

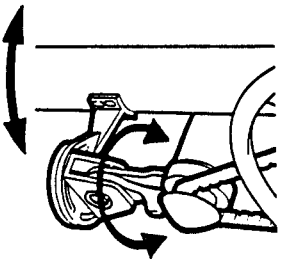
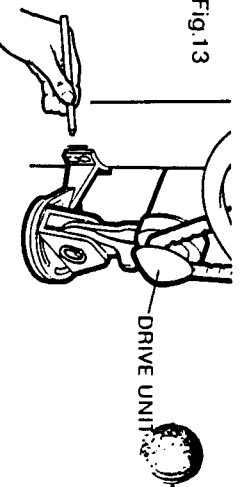


Fig. 13



- Having found the correct position for the clevis carefully mark round its base to record its position. Then remove the drive unit and mark round the inside of the elongated fixing holes (Fig. 13).

- Finally drill four 4.3mm (1/16") holes for the clevis fixing screws at the lower end of each elongated hole position. This allows the belt to be subsequently tightened (Fig. 14).

The mounting clevis may now be screwed into position with the self

lapping screws positioned **mid-way** in the elongated holes (Fig. 15). This will ensure that the belt is taut when it is

positioned by rotating the clutch lever fully

clockwise. Re-assemble the complete drive system and check the operation of the clutch. The clutch lever may be repositioned on the splined eccentric bush if necessary to ensure that the lever can rotate 180° without obstruction.

When the belt is tensioned by rotating the clutch lever fully clockwise it should be possible to back wind the drive unit by slowly rotating the wheel. If belt slip occurs increase belt tension by reclamping the clevis in a slightly lower position. When the clutch lever is rotated fully anti-clockwise the wheel drum should slip easily against the belt.

Do not over tighten belt.

Fig. 14

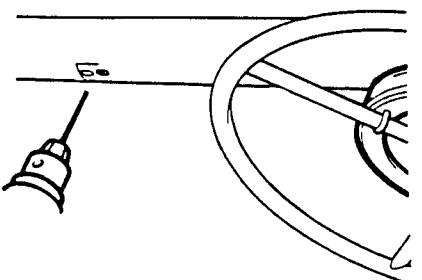
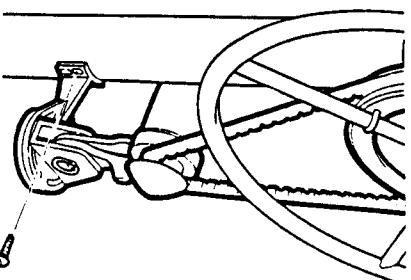


Fig. 15



ATTACHMENT TO ATHWARTSHIPS BULKHEADS

In cases where the steering wheel is

mounted on a bulkhead, special vision usually must be made to mount the clevis on a bulkhead as

shown. (Fig. 16).

Hardwood packing may be required to gain correct alignment to the wheel drum.

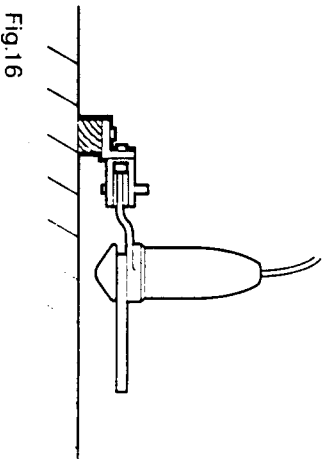


Fig. 16

ALTERNATIVE MOUNTING POSITIONS

The wheel drive unit may be positioned on either the port or starboard side of the wheel. The fluxgate compass is

calibrated to give correct steering sense when the drive unit sprocket is facing aft. Access to the clutch lever is also easier when the drive unit is mounted this way round.

If an obstruction precludes mounting

the drive unit with the drive sprocket facing aft it may be mounted the other way round. In this case it will be necessary to re-adjust the motor drive sense to regain correct steering as follows.

Use a screwdriver to rotate the changeover switch anti-clockwise until the endstop is reached (Fig. 17). Never force the changeover switch, light pressure only is required.

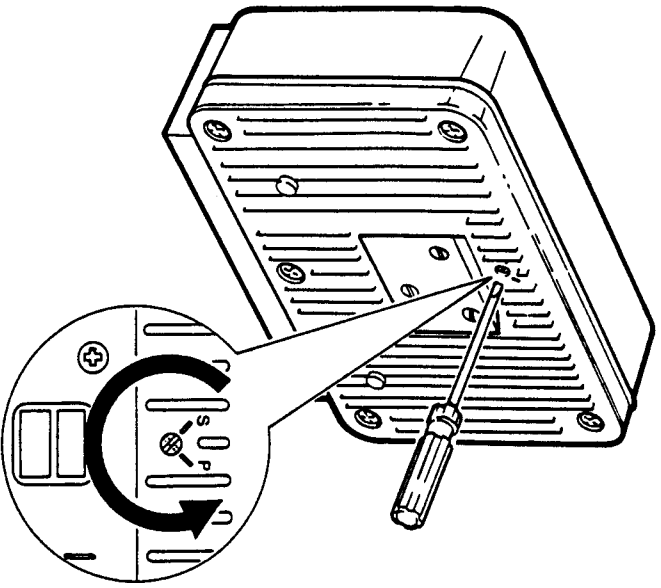


Fig.17

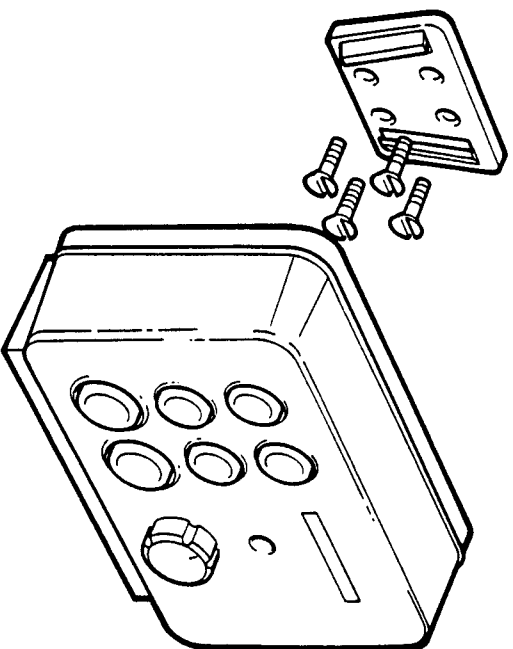


Fig.18

CONTROL UNIT

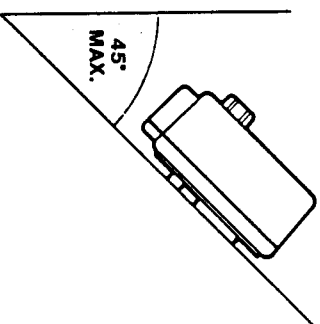
The control unit slots into a permanently mounted socket sited in the cockpit. It contains a gimballled fluxgate compass and therefore has some restrictions on mounting position.

The control unit should be sited where it can be operated easily from the steering position. It should also be positioned at least 80cm (2'6") away from the main steering compass to avoid deviation of both compasses.

Deviation of the control unit fluxgate compass is less important since headings are always adjusted by

reference to the main steering compass. Nevertheless, deviation should be avoided if possible and thus the control unit should be sited as far away from other magnetic or iron devices as practical.

Having selected the best mounting site, the mounting socket may be secured to a convenient wooden or glass fibre surface using the self tapping screws provided. The mounting surface may slope away from vertical by a maximum of 45°.



Battery Connection

The waterproof **Dril-Plug** supplied should be situated as close as possible to the Autohelm 3000 to minimise lead length. The Dril-Plug socket must be connected **indirectly** to the vessels electrical distribution panel and on no account paralleled into existing wiring for other equipment.

The Autohelm supply must be independently switched and protected by a 5 amp fuse or current trip. Since the autopilot is microprocessor based it is very important that voltage losses in supply cables are minimised.

Supply cables should therefore be as short as possible and of no less size than shown in the following table. The **brown** wire of the Autohelm 3000 lead should be connected to **positive**. If connections are accidentally reversed the Autohelm 3000 will not operate but no damage will result.

| Lead Length | Copper Area |
|------------------|--------------------|
| Up to 2.5m (8') | 1.0mm ² |
| Up to 4.0m (13') | 1.5mm ² |
| Up to 6.5m (22') | 2.5mm ² |

Installation Accessories

| Description | Cat No. |
|---|---------|
| 3 - Belt for 512mm (20.1") offset (514 x L050) | D037 |
| 1 - Belt for 546mm (21.5") offset (540 x L050) | D038 |
| Standard Belt 598mm (23.6") offset (580 x L050) | D039 |
| 1 + Belt for 717mm (28.2") offset (672 x L050) | D040 |
| 3 + Belt for 850mm (33.5") offset (770 x L050) | D041 |
| Pedestal Mounting Bracket | D044 |
| Bulkhead Mounting Bracket | D047 |
| Vesterly 506 Belt (pedestal) (506 x L050) | D052 |

Accessory Connection

A common with all the Autohelm 3000's accessories, the drive unit plugs into the control unit to facilitate slowing and servicing. To ensure reliable connection each plug incorporates a locking ring which should be turned clockwise to secure.

Although each accessory has a unique socket and cannot be disconnected, the drive unit should be connected to the socket marked **Helm**, the windvane to the socket marked **Vane** and the hand held remote to the socket marked **Remote**.

WINDVANE ATTACHMENT

The windvane attachment is normally mounted centrally on the after rail where it can be sited in clear wind on both tacks. The windvane mounting mast is clamped to the after rail by the two 'U' bolts provided (Fig.20). The interconnecting cable should be brought through the slot to allow the windvane head to be plugged into the top of the mast (Fig 21). The interconnecting cable can then be run back and plugged into the Autohelm 3000.

Note The windvane head is supplied with the vane detached for ease of packing. The vane is easily assembled to the head and secured by means of the circlip provided (Fig.22). Care should be taken to ensure that the small circlip is correctly located in the groove.

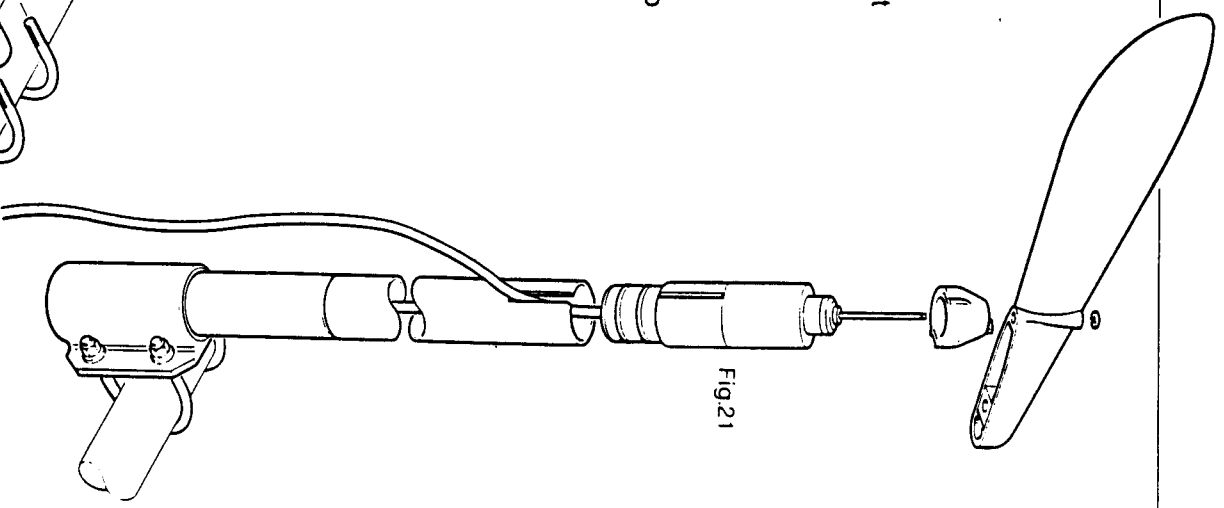


Fig 21

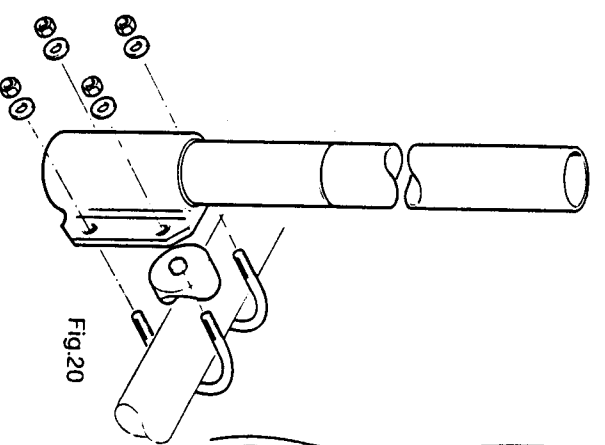


Fig 20

BASIC PRINCIPLES

The following description of the Autohelm 3000's principle of operation will help you to make full use of its advanced features.

The powerful combination of a fluxgate compass and microprocessor control provides "autolock" course selection together with precise push-button course adjustment.

Deviation from the set course is continuously monitored by the sensitive fluxgate compass and corrective rudder is applied to return the vessel to course. The applied rudder is proportional to course error at any time and thus when the course is restored the rudder will be neutralised.

When changes in vessel trim occur due to variations in wind pressure or engine throttle setting the course can only be maintained by the application of permanent rudder off-set (standing helm) to restore balance. If permanent rudder off-set is not applied to restore balance the vessel will bear on to a new heading. Under these circumstances the

Autohelm 3000 detects that the original course is not being restored and continues to apply additional rudder off-set in the appropriate direction until the vessel returns to the original heading. Automatic trimming capability ensures that the originally set course is held irrespective of any changes in balance that may occur during the course of a passage.

The Autohelm 3000's computer also continuously monitors the pattern of applied rudder correction and can distinguish unnecessary repetitive corrections caused by pitch and roll of the vessel from those necessary to maintain the selected heading. The computer will automatically neglect all unnecessary corrections so that autopilot activity and power consumption is continuously optimised at minimum levels.

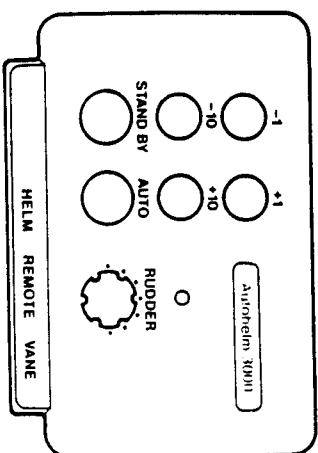
The high degree of control automation made possible by the micro computer simplifies user control to a series of push button operations.

KEYPAD OPERATION

Full control of the Autohelm 3000 is provided via a simple six button keypad. The basic control functions are as follows:-

When the autopilot is switched on it will always start up in **Stand by** mode.

In **Stand by** mode the wheel can be driven by pressing and holding down any of the four course change buttons.



Push **once** to engage the autopilot to maintain the current heading or push **twice** (within 2 seconds) to return to the previous automatic heading.

Push to alter course to port (-) or starboard (+) in increments of 1 and 10 degrees.

Push **once** to disengage the autopilot and return to **Stand by** mode. (The previous automatic heading will be memorised).

WINDVANE SYSTEM

Performance under windvane has been improved by the introduction of Wind Trim.

With Wind Trim the computer uses the fluxgate compass as the primary heading reference. However, as changes occur in the apparent wind angle the computer automatically adjusts the compass heading to maintain the original

apparent wind angle.

This system eliminates the effects of turbulence or short term wind variations and provides smooth precise performance under windvane with minimum current consumption.

When a windvane system is fitted, a new layer of control functions is automatically opened as follows:-

Push both red keys together **once** to engage the windvane and maintain the current apparent wind angle.
or
Push both red keys together **twice** to return to the previous apparent wind angle.

-1 **+1**
 
 
-10 **+10**
Push **once** to alter the vessel's heading relative to the apparent wind in increments of 1 or 10 degrees.
Note + keys always turn the vessel to starboard.

STAND BY



Push **once** to disengage the windvane for manual steering. (The previous apparent wind angle will be memorised).
or
Push **once** to change over to automatic compass heading control and maintain the current heading.



AUTO



AUTOTACK FUNCTION

The Autohelm 3000 has an automatic tacking function which operates in both compass and windvane mode as follows:-

-1

-10

Push **-1** and **-10** keys together **once** to initiate a tack to port.

+1

+10

Push **+1** and **+10** keys together **once** to initiate a tack to starboard.

The Auto Tack function operates by selecting a pre-set course change (100°) to bring the vessel onto the opposite tack.

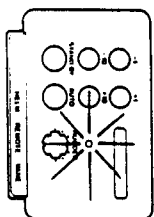
During the tack, the Off Course Alarm may sound. This indicates the autopilot is adjusting trim to acquire the new course.

On completing the tack and having sheeted and retrimmed the

sails, the vessel may be brought onto the desired apparent wind angle by fine adjustments to the course using the **+/-1°** keys. No adjustments should be made within 1 minute of completing the tack to allow the Autopilot to compensate for the helm trim on the new tack.

OPERATING MODE INDICATION

The operating mode of the Autohelm 3000 is indicated by a flashing LED as follows:-



OPERATING MODE

LED FLASHING CODE

STANDBY

Provides power steering.



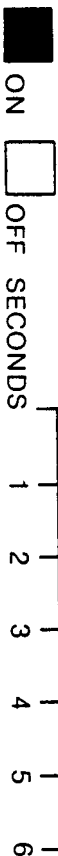
AUTO

Autopilot steers to maintain compass heading.



WINDVANE

Autopilot steers to maintain apparent wind angle. Windvane mode is also confirmed by a single beep tone emitted every 30 seconds.



Hand Held Control Unit

(Cat No. Z076)

An optional hand held control unit can be plugged into the control unit to provide full course change capability from anywhere on board. The unit duplicates the main control units four course change keys and may be used in both **Stand by** and **Auto** modes. The operation of the main control unit is unchanged when the hand held control unit is connected.

FUNCTIONAL TEST PROCEDURE

After completing the installation you should carry out the following functional test to familiarise yourself with the system before attempting sea trials.

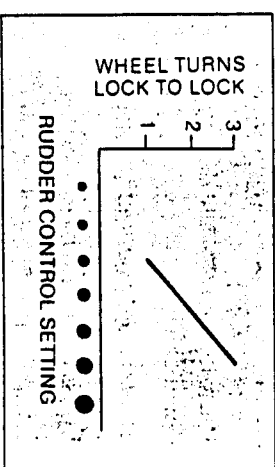
Plug the Autohelm 3000 into the power socket and switch on the electrical supply. The unit will emit a short beep tone to indicate that it is active and the LED will flash to indicate **Stand by** operating mode.

Engage the drive by rotating the clutch lever fully clockwise and press the + 10 key. The wheel should move to produce a turn to starboard. The unit will emit a short beep tone on each keypress to confirm valid entries. Should the wheel move to produce a turn to port the changeover switch is incorrectly set and must be adjusted as described on page 8.

Press **Auto** to place the autopilot under compass control. The LED will be lit constantly to indicate that the unit is in **Auto** mode. If the yacht is swinging about its mooring, you will see that small variations in heading cause the unit to apply corrective action to the rudder. Press **Stand by** to return the unit to **Stand by** mode.

Rudder Control Adjustment

Before attempting sea trials the rudder control must first be adjusted to suit the wheel reduction ratio of your particular vessel. The rudder control setting recommended for initial sea trials may be obtained from the following chart.



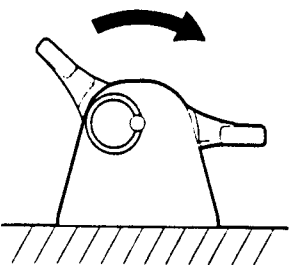
The setting recommendations above will provide stable control for initial sea trials and may, if necessary, be fine tuned later (see page 21).

Initial sea trials should be carried out in calm conditions with plenty of sea room. The previously conducted functional test will have verified that the autopilot is operating correctly and that you are familiar with all of its controls.

During first sea trials, the vessel will be constantly changing heading, and it is, therefore, very important to maintain a constant look-out.

The following initial trial procedure is recommended:-

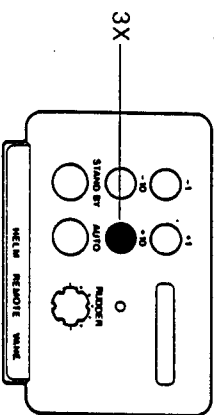
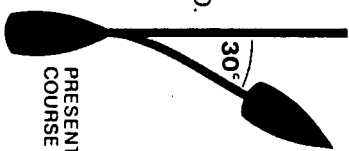
- Steer on to the desired heading and hold the course steady.
- Engage the drive by rotating the clutch lever fully clockwise to its end stops.



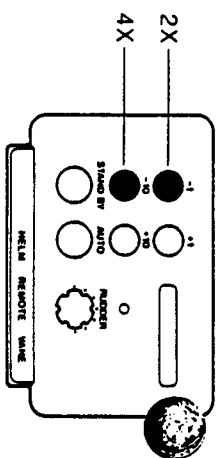
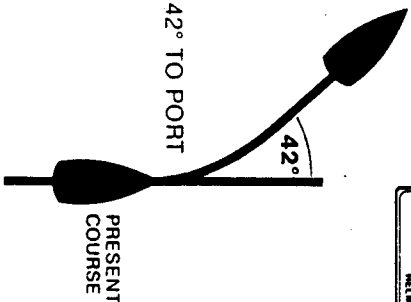
- Press **Auto** to lock on to the current heading. In calm sea conditions a perfectly constant heading will be maintained.

- Alter course to port or starboard in multiple increments of 1 and 10 degrees.

30° TO STBD.



42° TO PORT



Power Steering

- Press **Stand by** and practice power steering using the four course control keys.
- Press **Auto** twice (within 2 seconds) to return to the original automatic heading.

Hand Steering

- Press **Stand by** and rotate the clutch lever fully anticlockwise for return to hand steering.



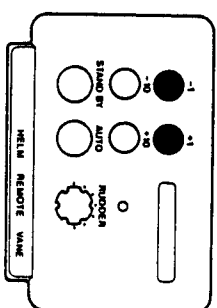
Automatic Sea State Control

During the sea trial, the operation of the automatic sea state control can be observed. When the autopilot is initially engaged in **Auto** mode the autopilot will respond to all pitch and roll movements. During the first minute of operation, it will be noticed that repetitive movements of the vessel are gradually neglected until finally the autopilot will respond only to true variations in course.

To ensure accurate course adjustment the sea state control is automatically reset whenever a 10 degree course change is executed.

Sea State Inhibit

Where maximum course keeping accuracy is required the automatic sea state control may be inhibited by pressing -1 and +1 keys together once



Autopilot activity and therefore power consumption will be increased but course keeping accuracy will be maximised.

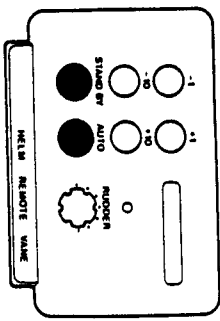
The automatic seastate control is restored by pressing the -1 and +1 keys together.

Note Engaging the autopilot (pushing **Auto**) or engaging the windvane (both red keys together) will always restore the automatic sea state control.

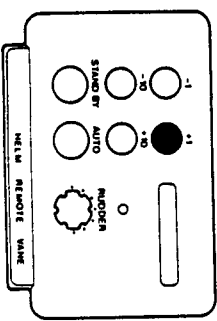
Auto-Tack Function

The following additional trial is recommended:

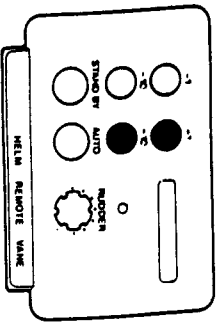
- Steer onto a constant heading approximately 10° free of close hauled
- Press **Auto** to lock onto the current heading or both red keys to lock onto the apparent wind if a vane is fitted.



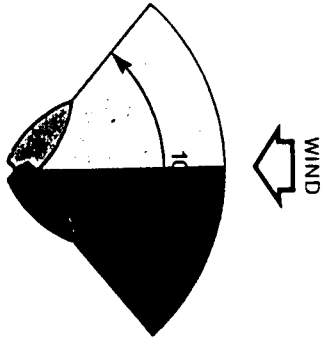
- Decrease the apparent wind angle (using the +1 key if on the starboard tack) until the yacht is sailing close hauled at optimum penetration.



- Prepare to tack and then press the +1 and +10 keys together (if on the starboard tack) to initiate a tack to starboard.



- The yacht will complete a 100° course change to bring it onto the opposite tack.



On completing the tack and having sheeted and retrimmed the sails, the vessel will be brought onto the desired apparent wind angle by fine adjustments to the course using the +1/-1° keys. No adjustments should be made within 1 minute of completing the tack to allow the Autopilot to compensate for the helm trim on the new tack.

Disengagement

When manual override is required the drive unit can be rapidly disengaged by operating the clutch lever to slacken the belt. If it is intended not to use the autopilot for a long period manual steering will be made easier by removing the belt altogether.

OFF-COURSE ALARM

When the autopilot is set to either **Auto** or **Standy** mode a built in off-course alarm is automatically set up. The off-course alarm will sound when the vessel deviates for any reason from the original course by more than 15 degrees for over 10 seconds. It is denoted by a continuous series of bleep tones.

The alarm will be silenced if the vessel returns to within 15 degrees of the original course.

In **Auto**, if the vessel does not return within these limits the alarm can only be silenced by selecting **Standby**.

In **Vane**, the alarm will sound when the wind direction changes by more than 15 degrees and may be accepted by pressing both red keys together. This will silence the alarm and advance the off course alarm datum to the current compass heading.

CURRENT LIMITING AND CUTOUT

If the autopilot is driven into its end stops, the drive will be pulsed to prevent overloading the motor. If the pilot is left in this condition for 30 seconds the microprocessor will automatically cut out power to the motor and sound the alarm continuously.

To restore the autopilot for normal operation the **standby** key must be pressed to put the unit in **standby** operating mode.

Rudder Control Adjustment

The rudder control setting recommended on page 17 will provide stable control for initial sea trials. However, sailing craft can vary widely in their response to the helm and further adjustment of the rudder control setting may improve the Autohelms steering characteristics.

An excessively high rudder control setting results in **oversteer** which can be recognised by the vessel swinging slowly from side to side of the automatic heading accompanied by excessive rudder movement. In addition, distinct overshoot will be observed when the course is changed. This condition can be corrected by reducing the rudder control setting (rotating rudder control anti-clockwise).

Similarly, an insufficient rudder control setting results in **understeer** which gives sluggish steering performance and is particularly apparent when changing course. This is corrected by increasing the rudder control setting (rotating rudder control clockwise). These tendencies are most easily recognised in calm sea conditions where wave action does not mask basic steering performance. The rudder control setting is not over critical and should be set to the lowest setting consistent with accurate course keeping. This will minimise actuator movements and hence reduce power consumption.

The Autohelm 3000's computer continuously optimises automatic steering performance eliminating the need for operator supervision.

It is, however, very important to understand the effect of sudden trim changes on steering performance. When a sudden change in trim occurs the automatic trim compensation system requires approximately 60 seconds to apply the necessary rudder off-set to restore the automatic heading. In gusting conditions, therefore, the course may tend to wander slightly, particularly in the case of a sailing yacht 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 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. Providing these simple precautions are taken the autopilot will be able to maintain competent control in gale force conditions.

It may be noticed that the autopilot tends to be a little less stable on northerly headings in the higher latitudes of the northern hemisphere (and conversely southerly headings in the southern hemisphere). This is caused by the increasing angle of dip of the earth's magnetic field at higher latitudes which has the effect of amplifying rudder response on northerly headings. The tendency towards northerly heading instability is usually more obvious at higher speeds and when it occurs can be corrected by reducing the rudder control setting.

Passage making under automatic pilot is a very pleasant experience which can lead to the temptation of relaxing permanent watch. This must always be avoided no matter how clear the sea may appear to be.

Remember, a large ship can travel two miles in five minutes - just the time it takes to make a cup of coffee!

TOTE BAG (Cat No. D089)

A special zip top padded bag made from tough PVC is available to protect and slow your Autohelm and is available from Autohelm stockists.

Warning

- Do not stow your Autohelm in a locker liable to flooding by the bilge water.
- Do not leave your Autohelm in a damp locker over the winter lay up period.

MAINTENANCE

All moving parts of the system have been lubricated for life at the factory. Therefore no maintenance whatsoever will be required. Should a fault develop the autopilot's plugability ensures that only the defective unit need be returned.

Before this is done please double check that the power supply cable is sound and that all connections are tight and free from corrosion.

Since the control unit is the most complex, there is a very high probability that if a fault has occurred it is in this unit

which should therefore be returned for repair, which will be carried out speedily and at moderate cost. The drive unit has proven to be extremely reliable and is very unlikely to develop a fault. If however the drive unit is suspected of being faulty it may be checked by connecting 12V across the sockets at the end of the drive unit cable and ensuring the motor runs normally.

In the case of a sailing yacht fitted with a windvane system if a fault occurs only in vane mode then it is likely that a fault has developed in the vane head.

LIMITED WARRANTY

Nautech or its appointed Distributors or Service Centres will, subject to the conditions below, rectify any failures in this product due to faulty manufacture which become apparent within two years of its purchase date.

Equipment used in the country of purchase should be sent directly to the authorised Distributor for that country or its appointed Service Centres. The product will then be serviced free of charge and returned promptly direct to the sender.

Equipment used outside the country of purchase can be either:-

- Returned to the Distributor or Dealer in whose country or from whom the equipment was originally purchased - it will then be serviced free of charge and promptly returned direct to the sender, or

- The product can be returned freight pre-paid to the authorised Distributor or its appointed Service Centres in the country in which the product is being used. It will then be serviced and returned direct to the sender or Service Centre will supply any parts used free of charge but the sender will be invoiced for the necessary labour and return shipment at the local rate.

CONDITIONS

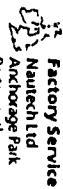
- The warranty is invalid if:-
 - The product has been misused, installed or operated not in accordance with the standards defined in this manual.
 - Repairs have been attempted by persons other than Nautech approved Service personnel.

AFTER SALES SERVICE

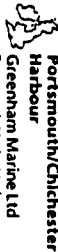
Should for any reason your Autohelm 3000 require attention ensure that you return it to one of the Authorised Service

Centres. You will find a list enclosed. Each service centre is trained and equipped to provide expert attention to your Autohelm 3000.

SERVICE CENTRES — UK, Eire and Channel Islands



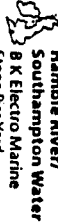
Factory Service
Nautarch Ltd
Anchorage Park
Portsmouth
Hampshire
0705 693611



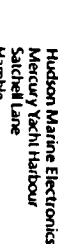
Portsmouth/Chichester Harbour
Greenham Marine Ltd
Emsworth Yacht Harbour
Thorney Road
Emsworth
Hampshire
0243 378314



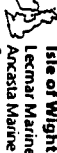
Penant Marine
Chichester Marina
Chichester
West Sussex
0243 511070



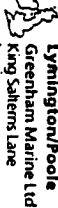
Hamble River/Southampton Water
B K Electro Marine
Stone Pier Yard
Shore Road
Watersham
Hampshire
048 95 2170



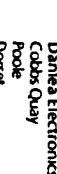
Hudson Marine Electronics
Mercury Yacht Harbour
Satchell Lane
Hamble
Hampshire
0703 455129



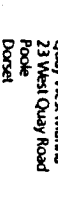
Isle of Wight
Lectmar Marine Electronics
Acerbia Marine
Cowes
Dorset
0983 293996



Lynton/Poolle
Greenham Marine Ltd
King Salterns Lane
Lynton
Hampshire
0590 75771



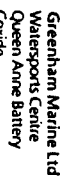
Danlea Electronics
Cobbs Quay
Poole
Dorset
0202 673880



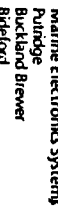
Greenham Marine Ltd
Quay West Marina
23 West Quay Road
Poole
Dorset
0202 676363



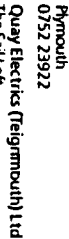
Devon
Burwin Marine Electronics
Island Street
Saxcombe
054 884 3321



Greenham Marine Ltd
Watersports Centre
Queen Anne Battery
Conde
Plymouth
0752 228114



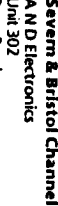
Marine Electronics Systems
Putidge
Buckland Brewer
Biddeford
North Devon
0805 22870



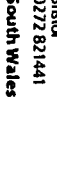
Ocean Marine Services
43 Beatonside
Plymouth
0752 23922



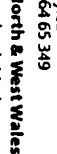
Quay Electrics (Teignmouth) Ltd
The Sail Loft
Pump Street
Bridham
080 45 3030



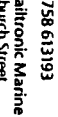
Cornwall
Mylor Marine Electronics
Mylor Yacht Harbour
Falmouth
Cornwall
0326 74001



Severn & Bristol Channel
A N D Electronics
Unit 302
Deer Road
Sevenside Trading Estate
Avonmouth
Bristol
0272 821441



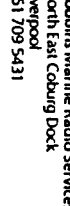
South Wales
Cantos Instrumentation Ltd
Lion Way
Enterprise Park
Llananel
Swansea
0792 797898



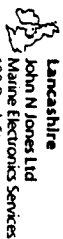
Dale Sailing Co Ltd
Dale
Haverford West
Dyfed
064 65 349



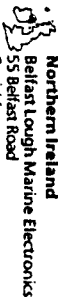
North & West Wales
Rowlands Marine
Electronics Ltd
The Outer Harbour
Pwllheli
0758 613193



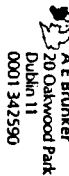
Saltironic Marine
Church Street
Glan Conwyn
Colwyn Bay
Cwm
0492 68 536



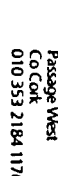
Lancashire
John N Jones Ltd
Marine Electronics Services
190 Dock Street
Hewwood
03917 5241



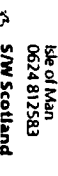
Northern Ireland
Belfast Lough Marine Electronics
55 Belfast Road
Carrickfergus
Co Antrim
09603 65565



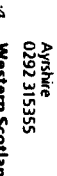
Eire
A E Brunker
20 Oakwood Park
Dublin 11
0001 342590



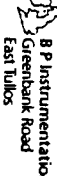
Rider Services
Glenbrook
Passage West
Co Cork
010 353 2184 1176



Isle of Man
Bevan Ltd
East Quay
Steampacket Building
Ramsay
Isle of Man
0624 812583



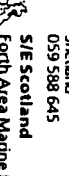
S/W Scotland
Boat Electrics & Electronics
145 Temple Hill
Troon
Ayrshire
0292 315355



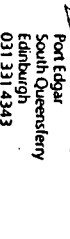
Western Scotland
Jeff Rutherford
Yacht Electrical and
Electronic Services
Largs Yacht Haven
Inver Road
Largs
Ayrshire
0475 686091



Northern Scotland
B P Instrumentation Ltd
Greenbank Road
East Tullos
Aberdeen
0224 874003



Shetland Isles
H Williamson & Sons
(Skalloway) Ltd
Main Street
Skalloway
Shetland
059 588 645



FORTH AREA MARINE ELECTRONICS
Robbins Marine Radio Services
North East Coburg Dock
Liverpool
051 709 5431

OVERSEAS REPRESENTATIVES

Humberide
Electronics Marine Ltd
W.M. Wright Dock
Hull
0482 25163

Norfolk/Suffolk
Greenham Marine Ltd
Woodroose Yard
Grangewick
Wingham
Norfolk
06053 2238

R & J Marine Electronics
2 Birch Avenue
Dovercourt Bay
Haverth
0255 502849

R & J Marine Electronics
c/o Suffolk Yacht Harbour
Levington
Ipswich
047 388 737

Essex
Mansbridge Marine Electronics
196 Spital Road
Malden
Essex
0621 53003

Kent
Heron Marine Services
12/9 Broadway
Herne Bay
Kent
0227 361255

East Sussex
D.M.S. Seatonics
Brighton Marina
Brighton
0273 605166

Channel Islands
Boatworks +
Castle Employment
St Peter Port
Guernsey
0481 26071

Jersey Marine Electronics
Unit 2
La Feller
St Helier
Jersey
0534 21603

Mainbridge Ltd
Inver Harbour
Braze
Alderney
048 182 2772

Argentina

Trimer S.A.
Fray J.S.M. de Oco 2030/40
1425 Buenos Aires

Argentina
Tel: (010 54 1) 774 3728/4470
Telex: 007 33 23653 TRIMER AR

Australia

Solo Marine Pty Ltd
11 Green Street
Revelby NSW 2212

Australia
Tel: (010 61 2) 774 5255
Telex: 007 71 127045 SOLMAR AA
Fax: (010 61 2) 7745291

Austria

Werner Ober-Yachtelektronik
A-6890 Lustenau
Rechtsstrasse 38

Austria
Tel: (010 43) 5577 2419
Fax: (010 43) 5577 24195

Barbados

C.O. Williams Electrical Co. Ltd
Warens
St Michael
Barbados
Tel: (010 1 809) 425 2250
Telex: 007 392 2366 COW WB
Fax: (010 1 809) 424 0374

Belgium

West Diep Yachting Centre SPRL
B-8450 Nieuwpoort
Louvain 2

Belgium
Tel: (010 32 58) 23 40 61
Fax: (010 32 58) 5823 9248

Bermuda

Marine Communications
72 Pitts Bay Road
Pembroke HM 06
Bermuda
Tel: (010 1 809) 295 0558
Telex: 007 290 3795 MARCO BA
Fax: (010 1 809) 292 0079

Brazil

Fast Yachts
Central S.A.
Industria E. Comercio
P.O. Box 12700
Sao Paulo - SP
Brazil
Tel: (010 55) 11 5211944
Telex: 007 38 11 24612 CNTO BR
Fax: (010 55) 11 5482070

British Virgin Islands
Cay Electronics
P.O. Box 345
Road Town
Tortola
British Virgin Islands
Tel: (010 1 809 49) 42400
Telex: 007 255 5110 100 6891 ESL LD
Fax: (010 1 809 49) 44707

Canada

Tom Taylor Co. Ltd.
72 Fraser Avenue
Toronto M6K 3E1

Canada
Tel: (010 1 416) 530 1811
Telex: 007 21 06524392 TOMTAYCO TOR
Fax: (010 1 416) 530 4345

Canary Islands

Nordest
C/S Juan Bautista 57
Santa Cruz de Tenerife
Canary Islands
Tel: (010 34 22) 284 871
Telex: 007 52 92230 COCHWE
Fax: (010 34 22) 287 3111

Cyprus

Mercury Divers Co. Limited
53 Spruce Asozou Street
P.O. Box 469
Limassol
Cyprus
Tel: (010 357 51) 65492
Telex: 007 605 4976 MERICDVE CY

Finland

Oy Marifin AB
Vesentekijantie 1
SF - 00210 Helsinki
Finland
Tel: (010 358) 0 673331
Telex: 007 57 124788 MARFIN SF
Fax: (010 358) 0 6927917

France

S.D. Marine Electronique
17-25 Rue Baran
78500 Sartrouville
France
Tel: (010 33) 1 3914 6833
Telex: 007 42 698347 SDMELEC
Fax: (010 33) 1 3913 3022

Gibraltar

Bond Instrumentation
The Dockyard
Gibraltar
Tel: (010 350) 73701
Telex: 007 405 2373 GIBREP GK
Fax: (010 350) 73726

Greece

H. Sheppard & Co.
Waterport
Gibraltar
Tel: (010 350) 77183
Telex: 007 405 2324 MAABINA GK

Greenland

Pireaus Electronic
46 Atini Moutsoupolou
Marina Zeas
185 36 Piraeus
Greece
Tel: (010 301) 453 10 27418 17 97
Telex: 007 601 241219 DORN GR
Fax: (010 301) 418 10 91

Holland

Boormans's Handelsmaatschappij B.V.
P.O. Box Nr. 50128
1305 AC Almere Haven
Holland
Tel: (010 31 3240) 11574
Telex: 007 44 70121 GBBON NL
Fax: (010 31 3240) 11519

Hong Kong

Fat East Yacht Specialists Limited
M2 Floor
Basterville House
22 Ke House Street
Hong Kong
Tel: (010 852) 5 257015/5 229394
Telex: 007 802 65925 KREWA HK

Iceland

Berco Ltd
Lagnula 7
125 Reykjavik
Iceland
Tel: (010 354) 84077
Telex: 007 501 2334 BOLTX IS
Fax: (010 354) 259323

Israel

Britza Yacht & Marine Supply
Tel Aviv P.O. Box 99232
Israel
Tel: (010 972) 320 259913284432
Telex: 265871
(Quote ref: 137AUR) MOHREF G

Italy

Deck Marine
Viale Certosa 155
20151 Milano
Italy
Tel: (010 392) 308 7229
Telex: 007 43 353147 DECK I
Fax: (010 392) 301 3398

Japan

J.M.J. Limited
2F Inago Bldg 370
Hayama - Miiki
Miyagi
Karagawa
Japan
Tel: (010 81) 468 76 1511
Telex: 007 72 3852532 JMIJPN J
Fax: (010 81) 468 76 1044

Malta

Ripard Larvan & Ripard
156 la-Xbeke Seafront
Yacht Marina
Majla
Tel: (010 356) 35591
Telex: 007 406 994 YOITS MW

Netherlands Antilles

St. Maarten
Netherlands Antilles
Tel: (010 599) 522589
Fax: (010 599) 522589

New Caledonia

Marine Corail Pacifique
BP 848 Noumea
New Caledonia
Tel: (010 687) 27 58 48
Telex: 007 706 31 20 COMRANS NM
Fax: (010 687) 27 68 43

New Zealand

Lundy & Blundell Limited
89 Wairau Road
Takapuna
Auckland 10
New Zealand
Tel: (010 64 9) 444 3675
Telex: 007 74 60324 LUSTY NZ
Fax: (010 64 9) 444 3798

Norway

Seatronic A/S
Harald Haarregregt 5
1500 Moss
Norway
Tel: (010 47) 9 272733/27272835
Telex: 007 56 76542 STRONN
Fax: (010 47) 9 274152

Portugal

A. Pereira Jordao
Rua de Jose Falcao 152-156
4000 Porto Codex
Portugal
Tel: (010 351 2) 209479
Telex: 007 404 22308 KORDDAO P
Fax: (010 351 2) 314169

Singapore

Communications Systems
Engineering Pte Ltd
67 Ayer Rajah Crescent 07-01
Singapore 0513
Tel: (010 65) 77 65191
Telex: 007 87 23036 DEBEGPL
Fax: (010 65) 77 66795

South Africa

Central Boating Pty Limited
81 Bree Street
Cape Town 8001
South Africa
Tel: (010 27 21) 24802678
Telex: 007 955 26712 SA
Fax: (010 27 21) 242564

Spain

Strelca
Muntaner 44
Barcelona 11
Spain
Tel: (010 34 3) 323 4315
Telex: 007 52 54718 SRE E
Fax: (010 34 3) 323 5062

Sweden

Ahede & Hansson
Nyva Varvet
S-421 71V, Frolunda
Sweden
Tel: (010 46 31) 291111
Telex: 007 54 21447 AXVHA S
Fax: (010 46 31) 292789

Switzerland

Yachting Systems
General Wille Strasse 10
8002 Zurich Erge
Switzerland
Tel: (010 41 1) 207 8044
Telex: 007 45 816598 YASH CH
Fax: (010 41 1) 202 8064

Taiwan

Ing Hai Company Limited
P.O. Box 9-54
Tapei
Taiwan
Tel: (010 88 62) 5312 088
Telex: 007 785 13951 VIRA GO
Fax: (010 88 62) 5976 531

Turkey

Turimpex
M. Buharierli Tekdog
Haraytin Kilitli Cad. 1-7
80680 Beşiktaş
Istanbul
Tel: (010) 160 46 88/61 01 32
Telex: 007 607 26613 TRIM TR

USA

Service
Autroline America
New Windsor Street
Guilford, CT 06437
USA
Tel: (010 1 203) 453 8753
Telex: 007 230 643 BDA BA4
Fax: (010 1 203) 453 6109

West Germany

Ferropilot GmbH
2084 Neulagen
Sternstrasse 35
West Germany
Tel: (010 49 4101) 301740
Telex: 007 41 2189160 FER D
Fax: (010 49 4101) 301214

West Indies

The Signal Locker
81 Bree Street
Nelson's Dockyard
Antigua
West Indies
Tel: (010 1 809) 46 31528
Telex: (007 993) 21427119
DYNRIBHT AKVYACTHS AK
Fax: (010 1 809) 46 31524

Yugoslavia

Mare Notatum
Yachting Consulting
Bouti Gar-san
M.Tina 85
Yugoslavia
Tel: (010 38 51) 713506
Telex: 007 62 24215 TEHR YU