

MARINE AUTOPILOT

MAY 1988

Serial # _____

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TABLE OF CONTENTS

WARRANTY

- 1.0 OPERATION
- 2.0 INSTALLATION PLANNING
- 3.0 INSTALLATION INSTRUCTIONS
- 4.0 MAINTENANCE & TROUBLE SHOOTING
- 5.0 ACCESSORIES

I. WARRANTY AND LIMITATION OF LIABILITY CM.01

"The goods sold by Alpha Marine Systems Inc. are warranted to be free from defects in workmanship and materials for a period of two years for parts and one year for labor on recreational vessels and ninety (90) days for commercial vessels upon completion and return of warranty registration card to ALPHA MARINE SYSTEMS Inc., NO OTHER EXPRESS WARRANTY IS GIVEN AND THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER OBLIGATIONS ON THE PART OF ALPHA MARINE SYSTEMS Inc. OR ITS EMPLOYEES AND REPRESENTATIVES. No agent, employee or representative of ALPHA MARINE SYSTEMS Inc. has any authority to modify the terms of this warranty.

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Manufacturer, ALPHA MARINE SYSTEMS Inc. is not responsible for installation of its products nor for any damages to the product caused by faulty installation. Purchaser assumes the responsibility of proper installation of the product. If the product is not installed, by an authorized Alpha Marine Systems Dealer, strictly in accordance with manufacturer's instructions, this warranty shall be null and void in its entirety.

To activate your warranty, please complete the forms on this page and return to factory

ALPHA MARINE SYSTEMS, Inc.
996 Hanson Ct.
Milpitas, CA 95035

This allows the factory to

- Start your service warranty
- Keep you abreast of new peripheral equipment and retrofit updates.
- Register your serial number for theft recovery.

Owner Copy

MOD#

SER#

Dlr Name:

Date Purchased:

Installed By:

Dealer Copy

MOD#

SER#

Dlr Name:

Date Purchased:

Installed By:

Owners Name:

Address:

Phone #:

Boat Type:

Factory Copy

MOD#

SER#

Dlr Name:

Date Purchased:

Installed By:

Owners Name:

Address:

Phone #:

Boat Type:

Length:

Drive Unit Type:

Sea Trial Complete & Satisfactory:

Owners Signature:

II. OPERATION 4K.50

Your autopilot has been specifically designed for ease and simplicity of operation and as a result has very few controls. The function and proper use of each of these controls are discussed below.

POWER

Pilot power is controlled by a pair of push buttons on the Control Unit. POWER ON switches the pilot On and selects that station for control in multiple station systems. POWER OFF shuts Off the entire system.

MODE SELECTOR

The Mode Selector selects:

- MANUAL HELM Mode, Full Power Steering from the Control Unit;
- PILOT MODE, Steering from the Compass; and
- AUTO-TRIM(TM) Mode, where the steering information originates at the Compass and is modified by the AUTO-TRIM(TM) circuitry to maintain an accurate heading.

With the switch in the Pilot mode the autopilot will steer a course which is somewhat dependent on the wind and sea conditions. With AUTO-TRIM(TM) On, the Control Unit will continually compute a trim correction for the vessel, thus maintaining a far more accurate course. This dynamic trim compensation is important because the trim correction is dependent on wind and sea conditions and thus ever-changing.

****CAUTION****

During course changes, AUTO-TRIM should be turned OFF if the change is large or requires a change of tack, since a tack change requires a trim correction in the opposite direction.

****NOTE****

Trim may be left on but vessel heading will vary for approximately 1 to 2 minutes.

YAW

The Yaw Control permits the helmsman to adjust the response of the autopilot and select the maximum amount of yaw permissible. Each vessel is different, but in general a mid-range setting will be found to provide adequate helm response and low power consumption. In heavy following seas the response may be quickened by turning the Control toward MIN. However, this will increase the power consumption. It may be adjusted toward MAX in a head sea to allow the vessel to ride easier to the sea.

HELM CONTROL

The Helm Control steers the vessel in the same sense as the wheel does and can provide full power steering in the Helm Mode. In the Pilot Mode the Helm Control sets the direction for a course correction when activating the Course Set button. Each push of the Course Set button changes the

course one degree. NOTE: Course correction in 1 degree increments is not available at the Remote Helm Control. This function is available only at the Main or Auxiliary Control Units.

AREA CAL

On Compass Electronics to be set according to Fig. 1.1 for your location.

MANUAL HELM

The Manual Helm functions just like the full power steering. It may be selected at any Control Unit, simply by selecting the helm position on that Control Unit or Remote Helm.

****NOTE****

Only one Manual Helm can be active at a time. The Remote Helm will override all other commands, so be sure it is left in the Pilot position when not in use.

With the Control Knob straight up the Rudder is in the amid-ships position. Rotating the knob to Port or Starboard repositions the rudder to turn the vessel in that direction. Turning the knob further decreases the turn radius.

Placing the control switch on the Remote Helm in the Helm position automatically overrides any other input and puts the Remote Helm in control. Switching to Pilot causes the autopilot to resume its original heading and reinserts the previous helm correction from the AUTO-TRIM(TM) compensation system.

COMPASS CONTROL

The Compass is controlled by switching a control unit to the Helm position and momentarily pressing Course Set. This commands the Compass to align itself with the ships present heading. This course is then steered when the Mode Selector is returned to the Pilot position.

The Main and Auxiliary Control Units have the added capability of making small course changes. When in the Pilot Mode pressing Course Set button changes course one degree for each depression. The direction of course change is selected by the Helm Knob. To alter course to Port, rotate the Helm Knob all the way to Port and press Course Set. To alter course to Starboard set the knob full to Starboard and press Course Set. A Five degree change will require five depressions of the Course Set button.

ENGAGE/DISENGAGE

Pulling the Morse Control handle OUT projects the engagement latch and rocking the wheel will engage the autopilot when alignment is correct.

*** * CAUTION * ***

DO NOT drive the autopilot drive unit with the wheel, as damage to the Control Unit may result.

*** * CAUTION * ***

An autopilot can take away the drudgery of continuous helm attendance but is NO substitute for an attentive watch. Therefore, the unit should not be used in narrow or congested waterways or in close proximity to other vessels.

1. SYSTEM OPERATION

All Function selectors must be left in the PILOT position. Only the one being currently used may be in the HELM position.

1.1 TO TURN THE PILOT ON:

1. Be sure the Drive Link is DISENGAGED (Control pushed IN).
2. Select HELM on Control Unit and set HELM CONTROL to mid-position.
3. Set YAW to mid-travel (or whatever setting is best for your boat).
4. Push pilot power ON.
5. Engage Drive Link Latch using Morse Control and rock either Ship's wheel or Helm Control to engage.
6. Using the HELM CONTROL, steer vessel to desired heading and push COURSE SET (course setting is almost instantaneous).
7. Switch from HELM to PILOT and the previously set course will be steered.
8. On Control Unit set AUTO-TRIM to ON for automatic trim correction.
9. To dodge around an obstacle, the pilot need not be disconnected. Simply switch to HELM and steer using the Helm Control. When the switch is returned to the PILOT position the previously selected course will be resumed.
NOTE: The pilot may have less helm range than the wheel does. Therefore, you should familiarize yourself with its capabilities.
10. To change course, switch to HELM: Steer to the new heading using the Helm Control and push COURSE SET then return to the PILOT position and the new heading will be steered.
NOTE: If a large heading change is made, especially one in which the tack changes (wind or sea from the opposite side of the vessel) the AUTO-TRIM should first be turned OFF and then returned to ON after the new course is set, since its correction may be in the wrong direction.
For small course changes, leave in PILOT mode, use Helm Control to select PORT or STBD turn direction, push Course Set for each degree of desired heading change (5 degrees=5 pushes).
11. To turn the autopilot OFF, press IN on the Morse Latch Control while gently rocking the wheel to relieve pressure on the latch. The power switch may be shut off later since it will provide no steering with the latch disengaged and thus consumes minimal power.

2. INSTALLATION PLANNING

CM.2

Alpha Marine Systems autopilots are of a desirably modular design providing great installation flexibility. The installation should be planned so that the various units will be located within the vessel for optimum operational ease. Each unit, however, has its own installation limitations.

COMPASS UNIT

The Compass Unit is a linear flux-sensing type and thus responsive to magnetic fields. As with all magnetic compasses it should be located at least three feet from any other compass, as they will influence each other. In addition, the Compass Unit should not be mounted in close proximity to any large magnetic steel or iron object or to current carrying wires, as these produce local magnetic fields which may alter the course output signal. The Compass Sensor should be mounted low in the boat and about mid-way between Bow and Stern to prevent acceleration errors. Additionally, the Compass Unit should be mounted as nearly vertical as possible with the connector facing upwards. It should be mounted in its mounting bracket and attached to a sturdy support with non-magnetic screws or bolts.

The Compass Unit is internally gimballed and allows up to forty-five degrees of heel. If greater angles are anticipated, it is suggested that an external gimbal be used.

*** * CAUTION * ***

The Compass is liquid-filled and therefore must not be opened, nor should holes be drilled in the case. DO NOT try to rotate the black can relative to the top as seals may be damaged.

CONTROL UNIT

The Control Unit has been constructed of the finest quality components and has sealed controls to prevent moisture intrusion. Flush mounted units must be caulked to the mounting surface and tested for leakage. Trunnion mounted units must be mounted below decks out of the direct weather, as with all premium electronics such as radios.

The trunnion mounted units have been provided with a mounting bracket which may be utilized either by itself or in conjunction with custom fabricated brackets.

WARNING: In no case may additional holes be drilled in the Control Unit case and only the four existing screws supplied or 10/32 screws not exceeding 1/2" in length may be used for trunnion mounting the Control Unit. The mounting bracket may be drilled to suit the installation.

*** * CAUTION * ***

The Control Unit has heat dissipating components and **MUST** be mounted with adequate ventilation. It must not be mounted in a compartment with other sources of extreme heat such as engine compartments, as loss of operation or damage may result.

3. SYSTEM CONNECTION

CM.300

Interconnection of various units should be done carefully, in accordance with interconnection diagrams (fig. 3.1 & 3.7), or damage to units may result. Particular attention and care should be exercised in connecting input power to ensure that polarity is observed and that the supply matches the 12 Volt DC Pilot requirements.

Prior to Pilot Installation vessel's electrical system must be checked for proper transient voltage suppression. Particularly, transients produced by alternator and starter motor during engine start and shutdown to see that voltage never exceeds +/- 50V where pilot will be connected. Also check any high current motor.

Electric Motor Driven systems, Power Windless, Refrigeration, Macerators, etc. produce excessive transients. An electrical survey and any required corrections must be performed prior to connecting any pilot component to electrical service in boat.

Since efficiency is the keynote of this unit, cabling from the battery must be of adequate size to prevent excessive voltage drop and power loss. The following wire schedule is recommended. Power cable length to 15ft., #12 gage, 15ft. to 30ft., #10 gage, 30ft. to 60ft., #8 gage. All above specified wires are stranded copper and tinned. If drive unit power cables are extended, use above table in calculating wire gage.

All Alpha Pilots should be served with a power source protected by an appropriately rated circuit breaker, transient and reverse polarity protection, on the load side of the circuit breaker.

3.1 AUTOPILOT INSTALLATION INSTRUCTIONS

- 1) Make a two-way powered run, in each direction mark Center Helm position (this is best done on a day with light winds and calm seas). Split the difference between these two marks with a third mark. This is operational Center Helm position. Retain this mark for use later in Drive Unit alignment.
- 2) Plan installation as outlined in planning section, determine exact unit locations and cable routing.
- 3) INITIAL DRIVE UNIT CENTERING
Your Drive Unit will be received in its full retracted position for shipping. To position the Drive Unit at Center Helm for installation, temporarily connect the Drive Unit and power to the Control Unit as shown in Fig. 3.1 for the selected extension sense.

****CAUTION****

WHEN SELECTING PROPER DRIVE UNIT CONNECTION MAKE SURE MOTOR
LEAD CONNECTION IS IN AGREEMENT WITH RUDDER FEEDBACK
CONNECTION.

****NOTE****

Drive units may be installed in numerous configurations. However, the resulting steering action when drive unit extends from Center position is to either steer the vessel to Port or STBD. The Control Unit must know which way it is installed so it may steer correctly. When the Drive Unit is installed to turn to PORT when it extends, wire Drive Unit to Control Unit (Shown in Fig 3.1 PORT EXTENSION). When Drive Unit is installed to turn to STBD when extended, install as shown in Fig.

Place the selector switch in Pilot position, YAW Full C.W. Make sure the shipping cord leads straight from the outer housing through the end fitting and back to the housing with no twists. If not correct, rotate ram until you get a straight lead.

****CAUTION****

Misalignment will affect correct Center Helm positioning.

When correct push Power On. The Drive Unit should extend 9.5" to 10" (SDU Drive Units should extend approximately 7.0" to 7.5") of stainless steel ram exposed. This is the correct Center Helm position. Shut OFF the Power and use the extended Drive Unit in subsequent installation steps.

****CAUTION****

If the Ram tries to retract shut OFF Power and correct wiring. If the Drive extends to beyond Center Position shut OFF Power and correct wiring.

- 4) Mount the Control Unit through a bulkhead on flush mounted units or in its bracket for trunnion mounted unit.
- 5) Route the drive unit cables to the Control Unit and connect the rudder feedback cable (three wires).
- 6) Measure the input power cable length needed to connect the Control Unit to the battery disconnect switch.
- 7) Determine the correct wire gage for the power input cable from section 3.0 and route the cable.
- 8) Install Spade Lugs on the power cable (DO NOT connect to the Control Unit).
- 9) Connect the power cable to the power source.
- 10) Check the polarity of the power at the spade lugs.

****CAUTION****

Reverse polarity can cause serious damage to the unit.

- 11) Shut OFF the input power and connect both the Drive Unit and input power leads to J1. (17 Pin Terminal Strip as shown in Fig. 3.1)

NOTE: BE SURE THE RUDDER FEEDBACK CABLE IS CONNECTED AS IN FIG. 3.1.

- 12) Mount the Control Unit in its mounting bracket with four screws or secure the flush mounted unit and caulk to the bulkhead.
- 13) With the YAW control in the MAX position, turn the battery disconnect switch ON and recheck the input power polarity at J1.
- 14) Place the Mode Selector switch in the PILOT position with NO compass cable connected.
- 15) Repeat step 3 to ensure Drive Unit position has not changed.

3.2 Drive Unit Installation

After completing section 3.1 proceed with the following Drive Unit installation.

- 1) Assemble the Morse Cable on the rudder drive link as shown in the assembly drawing Fig 3.4.
- 2) Adjust the threaded sleeve and stop nut to provide proper adequate latch engagement and disengagement.
- 3) Test the assembly to ensure freedom of operation.
- 4) Install the rudder drive link on the rudder stock with the Helm locked in the operational Center position. Leave the whole assembly loose on the rudder stock so that it may be correctly positioned later. (See Fig. 3.5)
- 5) Hold the Drive Unit in place with the Pilot ON as in section 3.1 step 3. (The ball joint bolt may be used to ensure alignment.)

****CAUTION****

DO NOT allow the Drive Unit to hang unmounted on the Drive Arm.

- 6) Check Fig. 3.5 for proper mounting alignment and mounting angles. Be sure that the Drive Unit is at 90 degrees to the Drive Link.
- 7) Find the proper mounting location for the Drive Unit and make a bracket to provide support or mark this location if there is an existing structure.
- 8) Attach the drive unit mounting plate to the boat or fabricated bracket using 4ea. 1/4"-20 SST bolts or lag bolts.

- 9) Mount the Drive Unit on the mounting plate using the rubber mount and a 1/2" x 2" bolt, as shown in Fig. 3.6.
- 10) Swing the end of the Drive Unit to the end of the Drive Arm and verify that it is properly aligned with the Drive Arm. If so, install the 3/8" bolt & washer then secure with an elastic stop nut.
- 11) Tighten the clamp bolts on the rudder stock clamp and spot drill for the drive link set screw. Remove rear half of clamp for drilling.
- 12) Reinstall the clamp and install the drive link screw. Secure with Lock-Tite(TM).
- 13) With the Morse Control engage the Drive Link with the Autopilot in the OFF position. Swing the helm slowly through the Autopilot operating range while observing the unit to ensure sufficient clearance. The Drive Unit MUST NOT touch anything along its entire length. This must be done slowly or damage to the Drive Unit may occur. See caution note below.
With the Drive Unit fully retracted, disengage latch and swing Helm hard over to hard over and check clearance. With the Drive Unit fully extended disengage latch and swing Helm hard over to hard over while checking for clearance.
- 14) Install the Morse control head at the chosen location per instructions included with it and check for proper latch motion.
- 15) Recheck that the Drive Unit centers the Helm. Minor adjustments may be made by screwing the ram in or out up to one full turn. If further adjustment is necessary the rear mounting bracket must be moved.
- 16) Lubricate the Drive Unit Ball Joint with marine grease as this is shipped dry.

Proceed with the Compass installation section if all of the above tests are satisfactory.

*** * CAUTION * ***

The Drive Unit moves toward the rudder stock when the Helm is put hard over manually. It MUST be given clearance or great stress will be placed on the Drive Unit with possible damage resulting.

DO NOT attempt to move the Drive Unit beyond its normal operating range of +/- 9" (On the SDU Drive Units +/- 6.00").

3.3 Compass Installation

The installation of the pilot compass shares many things with the installation of any compass, except that visibility and access are of minimal importance. For optimum steering precision and

heading accuracy, the compass should be mounted away from magnetic objects such as engines or current carrying wires, both of which can produce local magnetic fields.

The optimum compass placement is at the common intersection of the Roll, Pitch and Yaw axes of the vessel. This means the compass is located amid-ships, over the keel and at approximately water line level. This location is not always possible but should serve as a guide to good placement. The vessel extremes, Bow and Stern, should always be avoided.

The basic compass consists of two units; the sensor and the electronics.

INSTALLATION

1. Lay out all components as required by the vessel design.
2. Locate all components with particular attention to the Sensor. This unit must be mounted with the connector uppermost and the canister mounted vertically. It is internally gimballed to 45 degrees in roll and pitch and is the only magnetically sensitive component.
3. The sensor mounting bracket may be mounted using either SST screws or bolts. In either case they must be non-magnetic.
4. The Sensor is next mounted in the bracket with the heading reference toward the Bow (The exact direction of vessel travel).

****CAUTION****

DO NOT Use force on, or twist the black compass case to position compass as this may damage internal seals and cause the Compass to leak.

****CAUTION****

The Compass Electronics case must NOT be drilled for mounting as this may cause internal damage.

5. Mount the Compass Electronics on a bulkhead in a locker using the angle brackets supplied. These may be attached to any corner of the unit by removing a screw from the unit and replacing the screw with the bracket underneath. Many mounting configurations are possible.
NOTE: The Sensor must be more than one foot from the Electronics. The cable from Sensor to Electronics must not be altered.

6. Interconnect the units as shown in Fig. 3.7.

- A. Connect the Sensor to the Compass Electronics using the cable exiting the lower rear of the electronics housing.

CAUTION: This cable may not be cut or extended.

- B. Connect the Compass Electronics to the Control Unit using AMS cable #CC44X0 (X0 denotes cable length in feet and are available in 10'

increments to 90 feet). The compass end is secured using two screws in the connector and must be fully seated for reliable contact. The control unit end is connected as shown in Fig. 3.7.

CAUTION: This is 100% shielded cable and must not be extended.

7. Any auxiliary units may now be connected to the system according to the directions supplied with them.
8. Carefully check the installation and verify that all connections have been made correctly.

SYSTEM TEST

1. Engage the Drive Link Latch using the Morse Control while rocking the wheel.
2. Select HELM MODE on the Control Unit.
3. Press POWER ON and rotate Helm Control and verify that wheel follows control. Stop at Center Helm position.
4. Press the COURSE SET button to set the compass heading.
5. Switch Control Unit to PILOT MODE (Wheel should remain near center).
6. Either boat or Compass Sensor may now be rotated and wheel should produce a corrective motion.
7. Set AREA CAL. according to local field strength as shown in Fig. 1.1.
8. Sea test entire system.
9. If required, install optional Compass Compensator and reduce deviations per standard practice.

4. MAINTENANCE

CM.6

Every component has been thoroughly tested and component materials have been chosen for inherent resistance to the marine environment. The electronic units should require no maintenance in normal service. If the occasion should arise it is suggested that they be returned to the factory for service. If this is not practical, any competent marine electronics technician should be able to effect repairs.

Every effort has been made in the design of this unit to utilize commercially available components. However, whenever possible replacement parts should be obtained from the factory to ensure optimum performance. Some system components are available only from Alpha Marine Systems because of their custom nature.

The mechanical drive unit has seals. However, the extending and retracting nature of the drive piston causes the internal volume of the unit to change, making a total seal impractical. Therefore, to prevent water intrusion, none of the drive unit parts should be submerged in bilge accumulations.

Your autopilot has been designed to be basically maintenance free. However, occasional lubrication of the Drive Link, Latch, Swivel and Ball Joint is recommended. Inspection and adjustment of latch for proper engagement and disengagement is also recommended.

Wherever the unit is mounted, it should be kept clean and all bolts checked for tightness.

The Compass Unit requires no maintenance other than to keep it clean and give it the care you would any precision compass assembly. The compass is liquid-filled and sealed and contains no user serviceable parts, therefore, if the compass should need repair it must be returned to the factory for this work.

The Control Unit uses sealed controls for protection from the salt and moisture environment, therefore, it also must not be opened. If the unit needs repair, it is recommended that it be returned to the factory. If this is impractical, the entire unit should be taken to a competent marine electronics technician.

If you should experience difficulty, make sure the unit is wired according to the information contained in the Installation Sections.

Occasionally rodents get aboard a boat. These creatures seem to have an appetite for electrical insulation and of course they frequent the less visible areas. If unexplained performance problems arise, particularly of an intermittent nature, all wiring should be carefully examined for this type of damage and chafe from vibration, as well as for loose connection.

A trouble shooting guide is on the following page. The purpose is to isolate what unit is causing the problem and is not intended as a repair manual. Consult the factory or authorized AMS Dealers for service.

4.1 AUTOPILOT TROUBLE SHOOTING GUIDE FOR ALPHA 4404 & 3000 UNITS

SYMPTOM	PROBLEM & SOLUTION
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Pilot does nothing	1) Check power input and polarity 2) Check fuse and replace fuse if necessary 3) Check connection to Drive Unit 4) Check wiring for broken leads
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Sluggish Response	1) Yaw setting at "MAX" a. Adjust Yaw towards "MIN" 2) Wheel lock engaged 3) Drive system jammed 4) Drive Unit damaged a. Return for Repair 5) Insufficient Drive Unit Clearance a. Check for correct installation 6) Bent Rudder Stock
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Steering Off Course	1) Drive Link slipped on Rudder Stock a. Check alignment of Drive Link 2) Incorrect Drive Link installation a. Redrill rudder stock if necessary
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Steers Hard Over	1) Poor wiring connections a. Clean connections and tighten 2) Reverse Polarity has damaged Control Unit a. Return for Repair 3) Rudder Feedback not working a. Check 10K Red to White Check 5K Green to Red Check 5K Green to White All above readings at Center Helm (Control Disconnected)
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Control Gets Hot	1) Over Load Condition a. See Sluggish Response 2) Hits Mechanical Limit a. Check Drive Unit alignment
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ALPHA 4404 SYSTEMS

Will not accept a new course	1) Remote Helm switched in Helm position a. Check Remote Helm & Compass Wiring
------------------------------	---

- 2) Broken Switch
 - a. Return for repair

- Loses Set Course
- 1) Intermittent power connection or Extreme Noise Condition
 - a. Check Power and Ground
 - b. Check and tighten all connections
 - c. Bad circuit breaker
 - d. Low Battery

5. ACCESSORIES

WU-2 WIND VANE INSTRUCTIONS

INSTALLATION

The wind sensor cable is in two sections. The section attached to the vane itself simply plugs into the second section. Section two should be wired in to the boat to provide cockpit or desk connection of the vane when vane steering is desired. This cable has a weather proof cap to cover the connector when the vane is not in use.

Connect the end of the second cable with spade lugs on it to the control unit as shown below:

Wire Color	4404 Pilots Pin #	3000 Pilots Pin #
Red	3	3
White	13	10
Green	10	12
Black	12	13
Brown	9	11

VANE ASSEMBLY

1. Unscrew 6-32 setscrew in black Delrin cap so the vane will drop on pivot and turn free.
2. Screw in the setscrew until the vane just starts to drag, then unscrew only enough for the vane to rotate freely.
3. Holding the unit in the horizontal position, proceed to balance the vane. Return to vertical position, ensure that the fin on the vane is also vertical then, lock in place.
4. Mount the unit on the pulpit in the most obstruction-free area. Lead it's cable to mate with second cable connector.

OPERATION

1. Rotate the wind sensor until the red arrow faces in to the wind on the point of sail you wish to maintain.
2. Plug the wind sensor plug into the socket, control unit automatically selects wind vane steering.
3. Trim the wind angle with small rotational adjustments of sensor body position.

NOTE: Unplugging the wind vane returns pilot operation to compass mode and whatever course is presently set.

MODEL DS-1 DISPLAY INSTALLATION
PILOTS DS1.1

11-86

4404

Installation of the DS-1 Liquid Crystal Heading Display may be accomplished as follows:

1. Install the display module wherever required using the mounting template below and 4ea. #8-32 stainless bolts.
2. Verify that the compass unit has an N+1 interface driver installed (model #4404 N+1) for factory installed units.
3. Make up a three conductor cable to run from the display to the compass unit.
4. Connect the following to +12v (this should be the power service to instrument systems and will turn the compass on and off when the pilot is not operating).

Red lead from display

Pin 2 of the 25 pin compass connector

Pin 6 of the 25 pin compass connector (if no Sat-Nav connected)

5. Green display lead to pin 7 of the 25 pin compass connector.
6. Black display lead to pin 22, 23, or 24. Power Ground.

NOTE: If NO pilot is used with the compass connect pin 17 to pin 22, 23, or 24.

N+1 CODE INTERFACE MANUAL

The "N+1" compass interfaces an absolute heading system. That is, the information supplied by the Compass is a complete "statement" of the current vessel heading. The information consists of n pulses where N = the heading in degrees plus one pulse so that no heading equals zero. This pulse string is transmitted at least six times per second unless the vessel heading is changing rapidly, in which case no information will be output since it would be in error. As soon as the vessel turn rate decreases the heading information will resume.

When the Autopilot is being used, the heading output will be the heading that the autopilot is steering. Typically the pilot will hold this heading within plus or minus one degree with Auto-Trim (TM) system ON. The Auto-Trim (TM) system will integrate short-term heading changes and vessel trim and over a period of five minutes or more, provide accurate course guidance. The demonstrated accuracy of this system is an error of less than 0.2nm/hr. When the autopilot is not operating the vessel's instantaneous heading will be output.

SYSTEM OPERATION

The Compass System should be wired so that it operates, when either the Autopilot or Sat-Nav is turned ON. When only the Sat-Nav is ON, the Compass will operate as a conventional electronic compass.

COURSE CHANGES

While interfaced to the Sat-Nav, you may change course one of two ways.

1. Steer the new heading using the Helm Knob. With the pilot in Helm Mode, push Course Set and switch to Pilot.
2. You may track the course change by switching to Helm Mode then holding the Course Set switch "IN", steer to the desired heading. Release Course Set and switch to Pilot. This type of course set will continually update the Sat-Nav of course changes.

"N+1" SAT-NAV INTERFACE VER 1.05

To connect the 4404 Compass to the Sat-Nav use the following wiring list (ALL CONNECTIONS TO THE COMPASS ARE TO BE MADE AT THE 25 PIN "D" CONNECTOR LOCATED ON THE COMPASS ELECTRONICS UNIT, NO CONNECTIONS ARE TO BE MADE TO THE SENSOR OR IT'S CABLE):

WIRE COLOR	FUNCTION	AMS PIN #
BLACK	GROUND	22, 23 OR 24
GREEN	DATA OUT	7
WHITE	POWERS INTERFACE	6 *SEE NOTE 2
RED	+12VDC	2 (EXTERNAL POWER See Note 1)

On field installed N+1 INTERFACES:

Two wires in the Compass Electronics - to - control unit cable must be changed.

	From Pin	To Pin
Orange	11	4
Blue	12	5

It is recommended that the interface be bench-tested prior to installation because changes beyond our control may affect exact wiring and operation. This interface has been factory tested and operates as specified.

NOTE 1: If the Sat-Nav has a switched +12v available it may be used to power the Compass and will automatically turn on the Compass whenever the Sat-Nav is in use. This line may be tied to the input power line to the Sat-Nav and the Compass will be active whenever the circuit breaker to the Sat-Nav is ON.

NOTE 2: The voltage supplied to pin 6 will set the out put voltage for the Data Output on pin 7. If the signal level required is 5V, supply 5V to pin 6. If 12V is acceptable, connect pin 6 to the supply providing power to pin 2.

NOTE 3: If NO pilot is used with the Compass connect pin 17 to pin 22, 23 or 24.

NOTE 4: To remove pins from the 25 pin cable socket use a proper pin extractor AMP Products P/N 91067-2 or equal.