

ALPHA 3000 INSTALLATION AND OPERATION MANUAL

Serial # _____

Winter 2002 Revision



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AND
LIMITATION OF LIABILITY

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

Alpha Marine Systems
Attn: Warranty Activation
6809 96th AVE. S.E.
Mercer Island, WA 98040

This allows the factory to:

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

Alpha Marine Systems, Inc. shall have no warranty obligation to repair or replace parts until and unless a signed, completed warranty form is on file.

Please note: We don't sell your information, so you will not receive junk-mail if you fill this in and send it to us.

Owner Copy:

Model #: _____

Serial #: _____

Dealer: _____

Date Purchased: ____/____/____

Installed By: _____
Dealer

Dealer Copy:
Model #: _____

Serial #: _____

Dealer: _____

Date Purchased: ____/____/____

Installed By: _____
Dealer

Owner's Name: _____

Address: _____

_____ ZIP _____

Phone: (____) _____ - _____

Boat Type: _____

Factory Copy:

Model # _____ Serial #: _____

Dealer: _____

Date Purchased: ____/____/____

Installed By: _____
Dealer

Owner's Name: _____

Address: _____

_____ ZIP _____

Phone: (____) _____ - _____

Boat Type: _____

Length: _____ (Feet)

Drive Unit: _____

Sea trial complete and satisfactory:

X _____
Owner's Signature



SECTION 1.0 OPERATION:

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.

COURSE SELECTOR

The course selector knob is calibrated in degrees and oriented so that course changes are natural, i.e. a course change to the left is made by turning the top of the knob to the left. Compass heading is calibrated in degrees magnetic and is portrayed as in a standard compass rose. Course changes may be made in any amount. The pilot will always turn the shortest direction to achieve the desired heading unless lead slowly with the knob.

AUTO-TRIM

This control turns the automatic trimming system On and OFF in the Control Unit. With the switch in the "OFF" position, the Autopilot will steer a course which is somewhat dependent on the wind and sea conditions. With AUTO-TRIM "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.

COMPASS GAIN

It is located on the rear of the main Control Unit. This adjusts the Compass for proper response on your vessel. To obtain maximum pilot performance, the compass gain should be adjusted until the vessel just stops "S" ing at the vessels top speed. Once set, no further adjustment should be required.

ENGAGE / DISENGAGE

Pulling the Morse Control handle OUT projects the engagement latch and rocking the wheel will engage the autopilot when alignment is correct. To disengage, PUSH the control handle IN while rocking the wheel to relieve the latch pressure. On pilots equipped with the optional EDL-1 electric drive link operator, the latch will be extended and retracted automatically in response to the ON and OFF buttons. SECTION 1.0 OPERATION:

OPERATION GUIDE:

1. Set Course Selector to match vessel heading.
2. Push POWER ON button to turn the pilot on.
3. Engage the Drive Link using the Morse Control and rock either the ships wheel or the Course knob to engage.
4. Trim course with Course Setting knob.
5. Switch the AUTO-TRIM "ON" for automatic trim correction.
6. To dodge around an obstacle, use the Course knob or the Remote Helm unit.
7. To turn the pilot OFF, press in on the Morse Latch Control while gently rocking the wheel to relieve pressure on the Latch. The power may be shut off later using the power "OFF" button.

*** * 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.

SECTION 2.0 INSTALLATION PLANNING

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 that 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. Trunion mounted units must be mounted below decks out of the direct weather, as with all premium electronics such as radios. The trunion-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 trunion 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.

SECTION 3.0 SYSTEM CONNECTION NOTES

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.

Before 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 before connecting any pilot component to the boats electrical service.

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 15 ft., #12 gage, 15 ft. to 30 ft., #10 gage, 30 ft. to 60 ft., #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.

SECTION 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 the planning section, determine exact unit locations and cable routing.

INITIAL DRIVE UNIT CENTERING

3. 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. 3.1 STBD EXTENSION.

Set the YAW Control to Full CW and AUTO TRIM to OFF. 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 effect correct Center Helm positioning.

When correct, push Power On. The Drive Unit should extend so that 7.0" to 7.5" on 12" stroke drives of stainless steel ram exposed and to 9.5" to 10" on 18" stroke drives. 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 both the drive unit cables to the Control Unit and connect the rudder feedback cable (three wires) and the motor power leads per Figure 3.1
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

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. Repeat step 3 to ensure Drive Unit position has not changed
-

SECTION 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 un-mounted 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 4 ea. 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. Use LOCKTITE (R) tread compound to secure the bolt.
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™
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 SDU Drive Units +/- 6.0").

SECTION 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 on the front and rear.

NOTE: The Sensor must be more than one foot from the Electronics. The cable from the sensor to the **electronics must not be altered in any way.**

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 #CC30X0 (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. Set the Compass knob to agree with the ships heading.
3. Press POWER ON and rotate the Compass knob and verify that wheel follows the Control with Helm corrections in the proper direction.
4. If the pilot Compass does not agree with the main ships Compass, rotate the Compass Sensor in its bracket until correct or loosen the two set screws on the Compass knob and rotate to agree.
5. If the pilot is equipped with a Remote Helm, select the Helm mode on the Remote Helm and test its operation.
6. Set the compass calibration to MIN (refer to fig. 3.7) and sea-test the system with the Yaw set to the mid-travel position. While sea testing, slowly turn the compass calibration pot toward MAX. When the boat starts to "S", back the adjustment toward MIN about 1/8 of a turn.
7. If required, install an optional Compass Compensator to reduce deviations per standard practice.

SECTION 4.0 MAINTINENCE

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.

TROUBLESHOOTING GUIDE FOR THE AMS 3000

Symptom

Problem and solution

Pilot does nothing

1. Check power input and polarity Check fuse and replace if necessary Check connection to drive unit Check wiring for broken leads

Sluggish response

2. Yaw setting at "MAX"
 - a) Adjust knob towards "MIN" Wheel lock engaged Drive system jammed Drive unit damaged
 - a) Return for repair Insufficient drive unit clearance
 - a) Check for correct installation Bent rudder stock

Steering off course

3. Drive link slipped on rudder stock
 - a) Check alignment of drive link Incorrect drive link installation
 - a) Re-drill rudder stock if necessary

Steers hard over

4. Poor wiring connections
 - a) Clean connections and tighten Reverse polarity has damaged control unit
 - a) Return for repair Rudder feedback not working
 - a) Check the following resistances:
10k Red to White
5k Green to Red
5k Green to White
(All above readings are to be taken at center helm with the control disconnected.)

Control gets hot

5. Overload condition
 - a) See sluggish response
6. Hits mechanical limit
 - a) Check drive unit alignment

If you are still having difficulties after consulting this guide, call the service department at (206) 275-1200 Monday through Friday, 9 am to 5 pm PST.