

Distributed by
Raymarine

Any reference to Raytheon or RTN in this manual should be interpreted as Raymarine. The names Raytheon and RTN are owned by the Raytheon Company.

Universal I/O Drive Installation Guide

Drives covered:

E12026 Universal I/O (Stern) Drive 12 V

Document number: 81180-3

March 2001

Raymarine
ON BOARD



Important information

Safety notices

WARNING: Product installation

This equipment must be installed and operated in accordance with the instructions contained in this handbook. Failure to do so could result in poor product performance, personal injury and/or damage to your boat.

Because correct performance of the boat's steering is critical for safety, we **STRONGLY RECOMMEND** that an Authorized Raymarine Service Representative fits this product.

WARNING: Navigation aid

Although we have designed this product to be accurate and reliable, many factors can affect its performance. As a result, it should only be used as an aid to navigation and should never replace commonsense and navigational judgement. Always maintain a permanent watch so you can respond to situations as they develop.

EMC conformance

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment. The design and manufacture of Raymarine equipment and accessories conform to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised.

Handbook information

To the best of our knowledge, the information in this handbook was correct when it went to press. However, Raymarine cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications without notice. As a result, Raymarine cannot accept liability for any differences between the product and the handbook.

Introduction

Product description

Welcome to the installation guide for the Raymarine universal inboard/outboard drive (also known as an I/O or stern drive). This product is intended to operate the boat’s steering mechanism as part of a Raymarine autopilot system.

CAUTION:

This drive is only designed to drive cable operated, power assisted steering systems. Any attempt to install an I/O drive to a non-compatible engine type may void the warranty on both the drive and the engine.

The drive operates the power steering valve in the same way as the steering cable. When you disengage the autopilot, a clutch disengages the I/O drive so you can steer the boat manually.

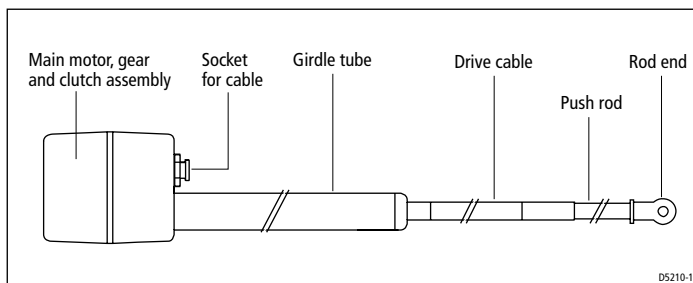


Figure 1: Main parts of the universal I/O drive

Contents

This guide contains:

1	Product specifications	page 4
2	Installation instructions	page 5
3	Maintenance information	page 14

Specifications

Drive specifications

Table 1: Drive specifications

Performance (at nominal voltage)	Universal I/O drive E12026 (12 V)
Drive method	Electromechanical
Maximum thrust	50 kg (110 lb)
Maximum stroke	214 mm (8.3 in)
Hardover to hardover time	8.8 sec
Other information	
protected for use in engine compartments	
CE approvals - conforms to: 89/336/EC (EMC), EN60945:1997 94/25/EC (RCD), EN28846:1993	

Drive dimensions

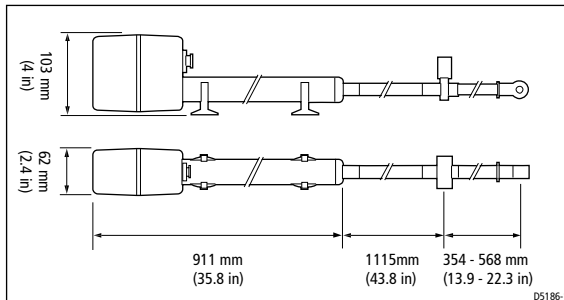


Figure 2: Universal I/O drive dimensions

Installation instructions

Parts required

To install the I/O drive the following parts are supplied:

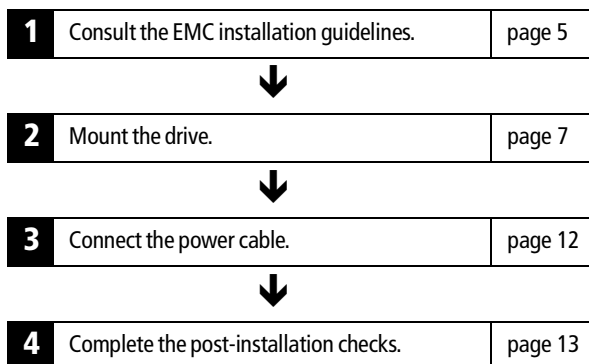
- universal I/O drive unit
- power cable
- adaptor pins for Mercruiser and Volvo engines
- hexagonal bracket, securing bolts (x2), lock washers (x2)
- fixing clamps (x2), self-tapping screws (x2) and tie-wraps (x2)

Installation steps

WARNING: Electrical safety

Make sure you have switched off the power supply before you start installing this product.

Follow these steps to install your I/O drive unit:



1. EMC installation guidelines

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment.

Their design and manufacture conforms to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised. Although every effort has been taken to ensure that

they will perform under all conditions, it is important to understand what factors could affect the operation of the product.

The guidelines given here describe the conditions for optimum EMC performance, but it is recognized that it may not be possible to meet all of these conditions in all situations. To ensure the best possible conditions for EMC performance within the constraints imposed by any location, always ensure the maximum separation possible between different items of electrical equipment.

For **optimum** EMC performance, it is recommended that **wherever possible**:

- Raymarine equipment and cables connected to it are:
 - At least 3 ft (1 m) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 7 ft (2 m).
 - More than 7 ft (2 m) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The equipment is supplied from a separate battery from that used for engine start. Voltage drops below 10 V, and starter motor transients, can cause the equipment to reset. This will not damage the equipment, but may cause the loss of some information and may change the operating mode.
- Raymarine specified cables are used. Cutting and rejoining these cables can compromise EMC performance and must be avoided unless doing so is detailed in the installation manual.
- If a suppression ferrite is attached to a cable, this ferrite should not be removed. If the ferrite needs to be removed during installation it must be reassembled in the same position.

Suppression ferrites

Figure 3 shows typical cable suppression ferrites used with Raymarine equipment. Use the ferrites supplied by Raymarine.

Connections to other equipment

If your Raymarine equipment is to be connected to other equipment using a cable not supplied by Raymarine, a suppression ferrite **MUST** always be attached to the cable near to the Raymarine unit.

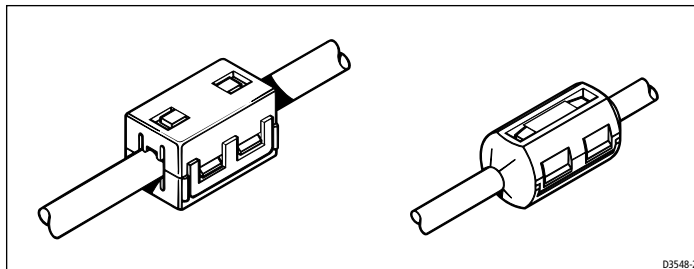


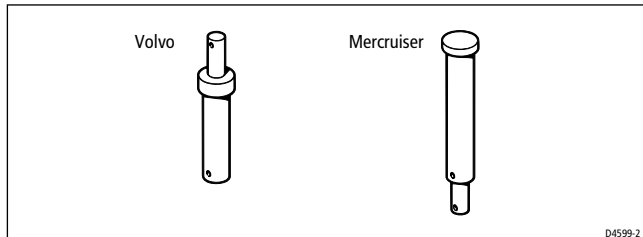
Figure 3: Typical Suppression Ferrites

2. Mounting the drive

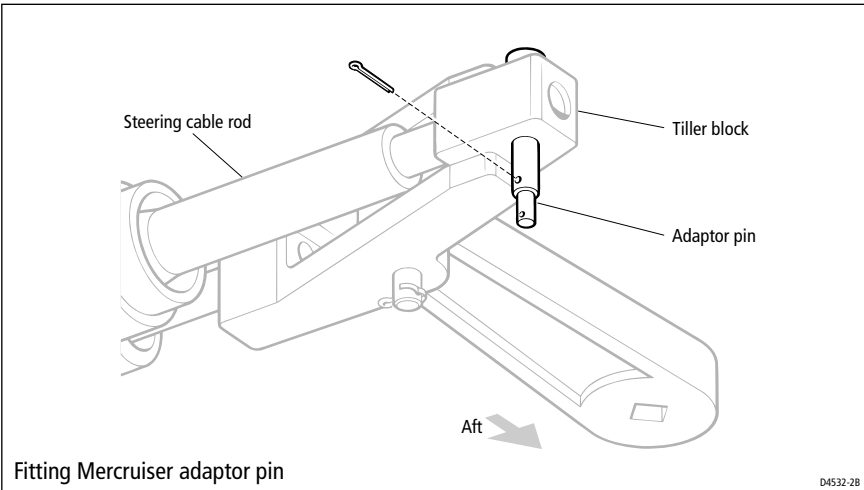
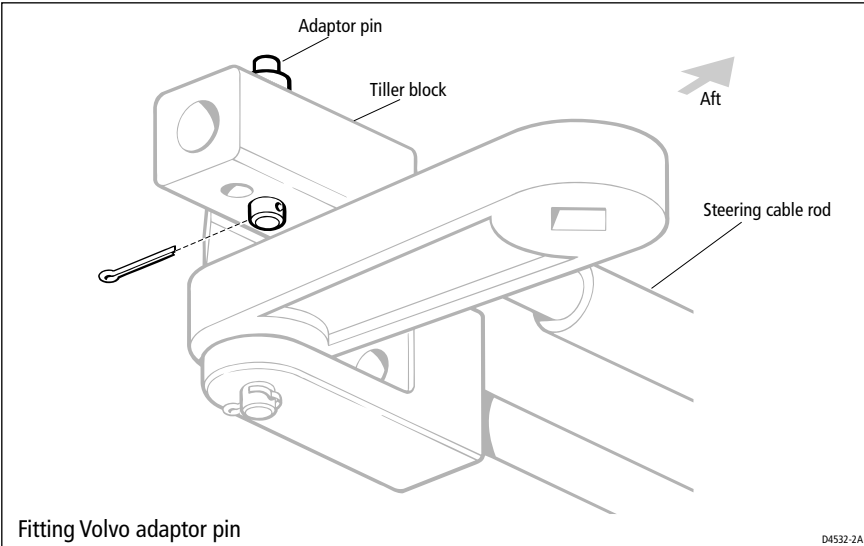
CAUTION:

I/O drives are affected by substantial vibration during use. When installing this I/O drive, make sure that you fully tighten all bolts and use lock washers. Using a suitable thread-locking compound on the threads will help keep the bolts securely tightened.

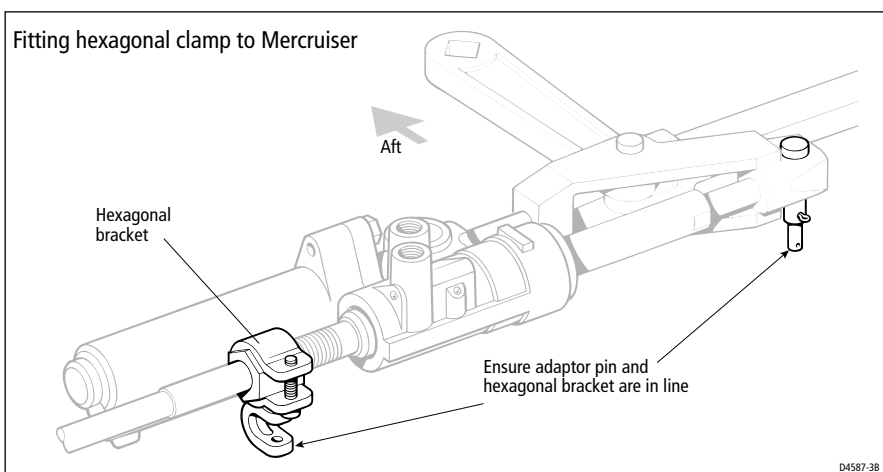
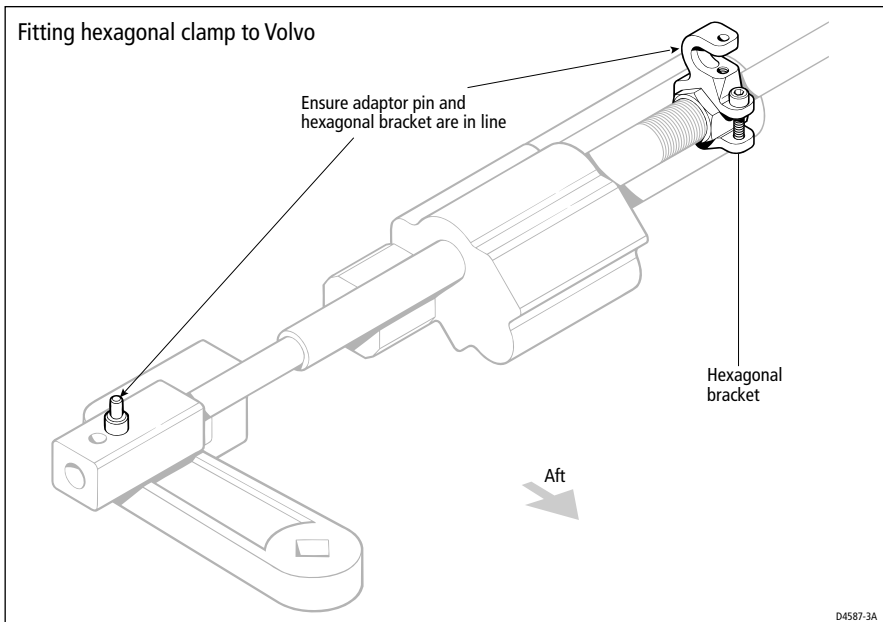
1. Select the correct adaptor pin for your engine type.



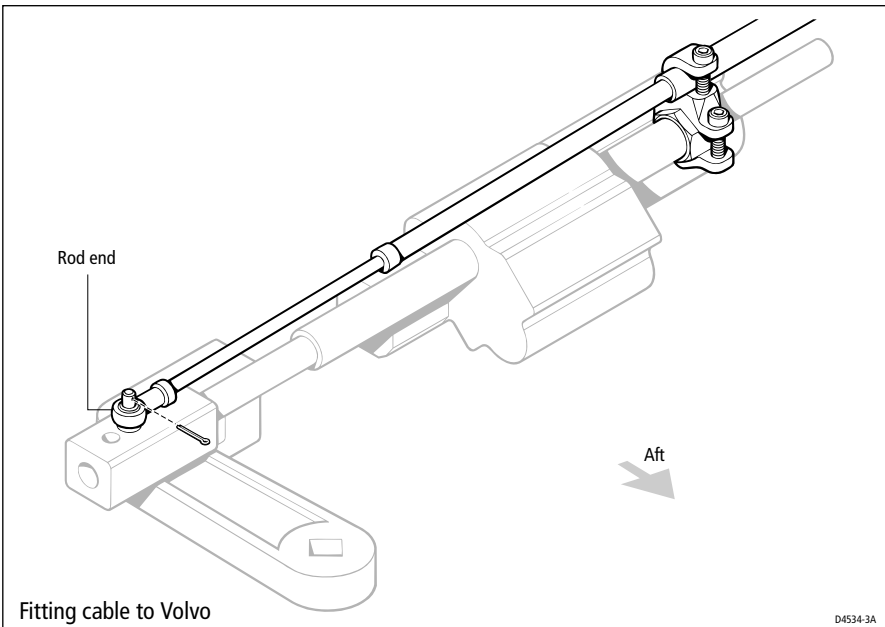
2. Remove the locating pin that attaches the steering cable rod to the tiller block.
3. Replace it with the adaptor pin supplied, using the split pin to hold it in place (see following figures).

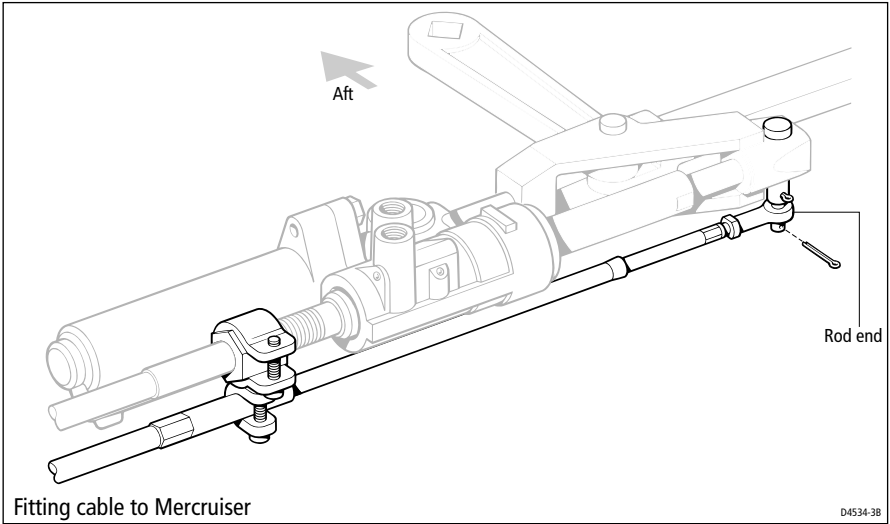


4. Fit the supplied hexagonal bracket centrally on the existing steering cable securing nut (see following figures). Secure the bracket with one of the securing bolts and lock washers supplied, ensuring that it is correctly aligned with the adaptor pin.



5. Insert the metal cable end of the I/O drive into the clamp on the hexagonal bracket:
 - make sure the groove on the cable end fits onto the ridge inside the clamp
 - secure the clamp with the remaining securing bolt and lock washer
6. Extend the I/O drive cable until the rod end is aligned with the adaptor pin, then:
 - fit the rod end onto the adaptor pin
 - secure the rod end with the split pin supplied (see following figures)

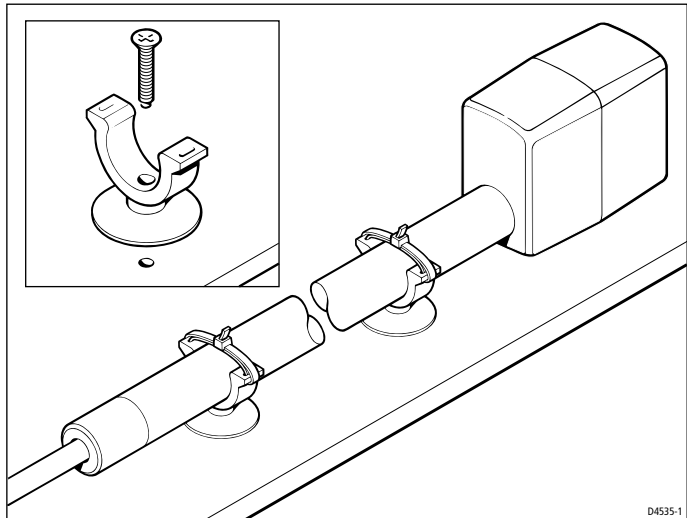




7. Use the clamps and tie-wraps supplied to mount the main body of the I/O drive in a suitable, safe position, remote from the engine.

CAUTION:

You can bend the drive cable when mounting the I/O drive, but the bend radius must always be more than 100 mm (4 in).



8. Complete a hardover to hardover check:
 - Slowly turn the steering system from hardover to hardover.
 - Make sure that the steering system operates freely and that the drive unit and drive cable make **no contact** with any part of the engine or boat.

Mounting in a restricted area

If an obstruction prevents you from installing the universal I/O drive unit as supplied, rotate the girdle tube relative to the drive cable:

1. Loosen the grub-screws at the end of the girdle tube
2. Rotate the drive cable as required.
3. Remove the grub-screws one at a time, put thread-locking compound on the thread, then replace and tighten the grub-screw.
4. Complete another hardover to hardover check.

3. Electrical connections

WARNING: Electrical safety

Make sure the power supply is switched off before you make any electrical connections.

When you have fitted the I/O drive to the steering system, connect it to the course computer as follows:

1. Plug in the power cable (supplied) into the socket on the drive unit. Lock the connector in place by turning the locking ring clockwise.
2. Route the cable to the course computer, taking into account the EMC installation guidelines (see *page 5*).
3. Connect the motor cables (thicker blue and brown cables) and the clutch cables (thinner red and black cables) to the connections on the course computer as shown in *Figure 4*.
4. Secure the cable close to the I/O drive unit, making sure there is enough free length to allow the drive unit to move.
5. Complete another hardover check: use the steering wheel to move the rudder from hardover to hardover, and check that the cable does not catch on any part of the boat or its fittings.

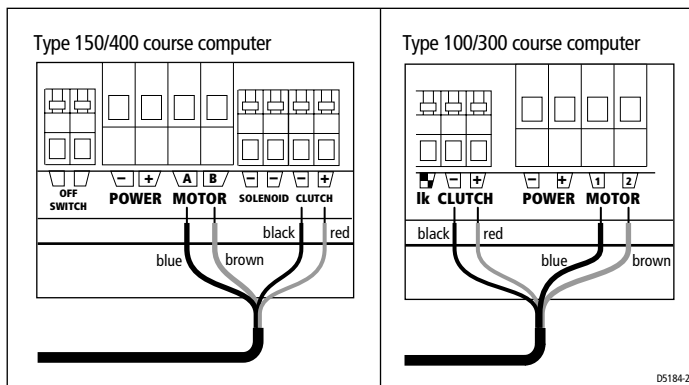


Figure 4: Connections at course computer

4. Post-installation check

WARNING:

Keep clear of moving steering systems at all times. Protect moving parts from access during normal use.

WARNING:

Only operate the autopilot system with the engines running and power-assisted steering operating.

Check the following points after installing the drive:

1. Is the drive unit securely attached to the steering system (with all brackets, bolts, split pins, etc. secure)?
2. Is the drive unit correctly aligned?
3. Are the motor and clutch cables correctly routed and securely connected to the course computer?
4. Complete a hand-steering check: Are you sure there is no contact between the drive unit and any part of the engine, steering system or boat's structure when the push rod moves in and out?

Note: When you have installed the entire autopilot system, you will need to complete an autopilot steering check. Refer to the control unit handbook for more details.

Maintenance

On a regular basis:

- check all connections and mountings are secure
- check drive alignment
- check cables for signs of wear or damage

EMC servicing and safety guidelines

- Raymarine equipment should be serviced only by authorized Raymarine service technicians. They will ensure that service procedures and replacement parts used will not affect performance. There are no user serviceable parts in any Raymarine product.
- Some products generate high voltages, so never handle the cables/connectors when power is being supplied to the equipment.
- When powered up, all electrical equipment produces electromagnetic fields. These can cause adjacent pieces of electrical equipment to interact with one another, with a consequent adverse effect on operation. In order to minimize these effects and enable you to get the best possible performance from your Raymarine equipment, guidelines are given in the installation instructions, to enable you to ensure minimum interaction between different items of equipment, i.e. ensure optimum Electromagnetic Compatibility (EMC).
- Always report any EMC-related problem to your nearest Raymarine dealer. We use such information to improve our quality standards.
- In some installations, it may not be possible to prevent the equipment from being affected by external influences. In general this will not damage the equipment but it can lead to spurious resetting action, or momentarily may result in faulty operation.

Product support

Raymarine products are supported by a worldwide network of distributors and Authorized Service Representatives.

If you encounter any difficulties with this product, please contact either your national distributor, or your service representative, or the **Raymarine Technical Services Call Center**. Refer to the back cover or the Worldwide Distributor List for contact details.

Raymarine Ltd

Anchorage Park
Portsmouth, Hampshire
England PO3 5TD
Telephone +44 (0)23 9269 3611
Fax +44 (0)23 9269 4642
www.raymarine.com

Raymarine Inc

22 Cotton Road, Suite 280
Nashua
NH 03063-4219, USA
Telephone +1 603 881 5200
Fax +1 603 864 4756
www.raymarine.com

**Raymarine Technical Services Call Center**

UK: +44 (0)23 9271 4713 or
+44 (0)23 9269 3611 ext. 1083

USA: +1 603 881 5200 or
1-800-539-5539 ext. 2333