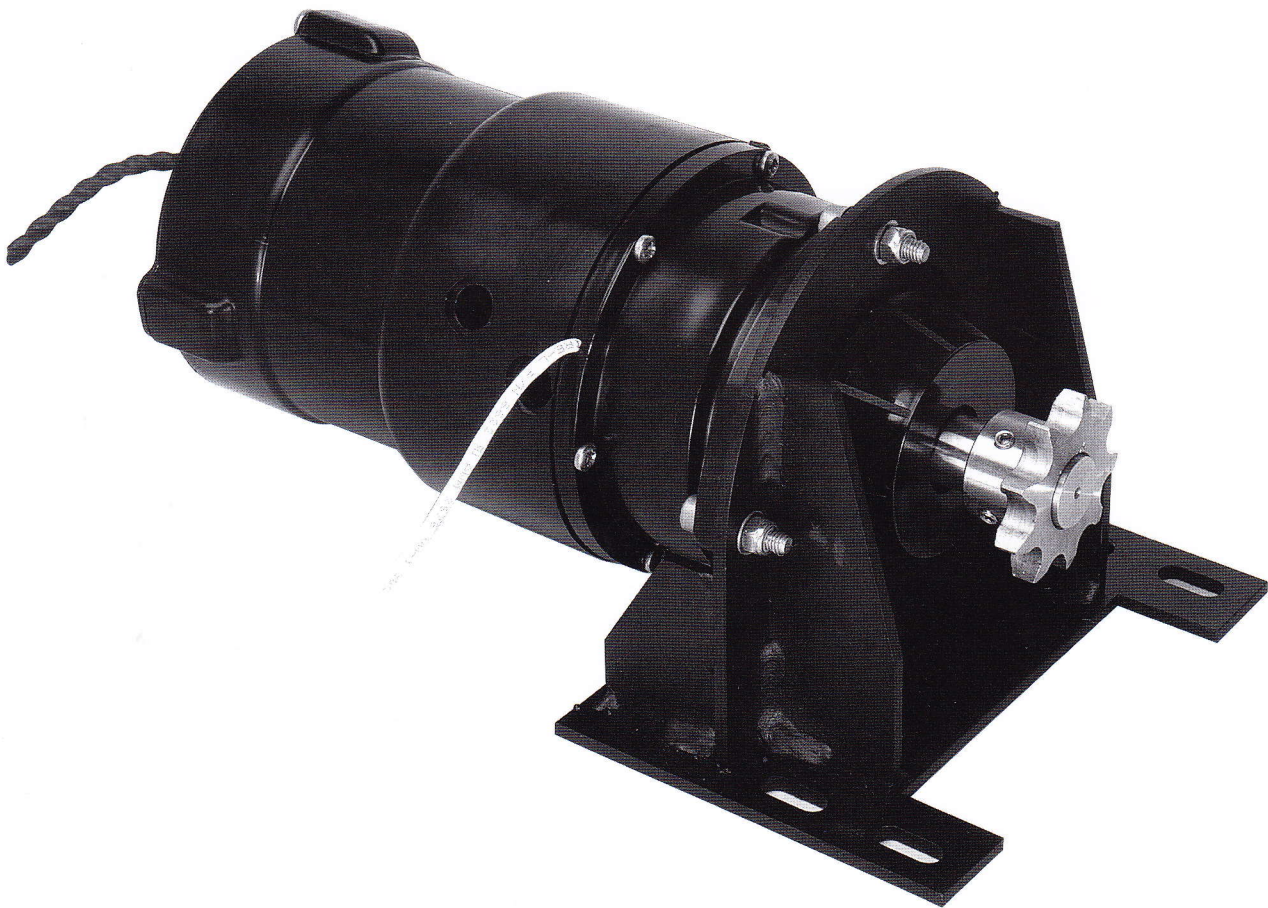


# Lewmar Integra Autopilot Drive

B12596 Issue 2

Owner's Installation, Operation & Basic Servicing Manual



**LEWMAR<sup>®</sup>**

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# LEWMAR®

## DECLARATION OF CONFORMITY DRIVE UNITS

I, Graham Smith of  
Lewmar Limited - Steering Division,  
Unit 1, Block B, Portenway, Laporte Way, Luton,  
Bedfordshire LU4 8EF, United Kingdom

Confirm that the following apparatus, when fitted in accordance with  
these installation instructions, will meet the requirements of the

CE approvals: 89/336/EC (EMC), BS EN60945:1997  
94/25/ec (RCD), BS EN28846:1993

1/8 hp 12 V motor gearboxes

1/4 hp 12 V and 24 V motor gearboxes

1/2 hp 24 V motor gearboxes

1 hp 24 V motor gearboxes



Signed.....

Graham Smith

Product Manager - Steering Division



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GB

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To the best of our knowledge, the information in this handbook was correct when it went to press. However, LEWMAR 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, LEWMAR cannot accept liability for any differences between the product and the handbook.

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 This manual forms part of the product and **MUST BE RETAINED** along with, **OR** incorporated into, the Owner's Manual for the vessel to which the drive unit is fitted.

# Introduction

Welcome to the Lewmar 89300111 Autopilot Drive installation guide. The product is intended to operate the boat's steering mechanism as part of an electronic manufacturer's, autopilot system. It is designed for boats with existing chain and wire steering systems.

## Product support

Lewmar products are supported by a worldwide network of distributors and Authorised Service Representatives. If you encounter any difficulties with this product, please contact your national distributor, or your local Lewmar Dealer.

[www.lewmar.com](http://www.lewmar.com)

## Important information about this manual

Throughout this manual, you will see safety and product damage warnings. You must follow these warnings carefully to avoid possible injury or damage.

The type of warnings, what they look like, and how they are used in this manual are explained as follows:

**Warning!**  
This is a warning against anything which may cause injury to people if the warning is ignored. You are informed about what you must or must not do in order to reduce the risk of injury to yourself and others.

**Safety Symbol**  
When you see the safety symbol it means: "Do not..."; "Do not do this"; or "Do not let this happen".

# Safety notices

## General

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, Lewmar STRONGLY RECOMMEND that a competent marine installation technician fit this product.

## Electrical Safety

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

## Fitting

- This equipment must be installed and operated in accordance with the instructions contained in this manual. Failure to do so could result in poor product performance, personal injury and/or damage to your boat.
- Consult the boat manufacturer if you have any doubt about the strength or suitability of the mounting location.

## Electrical

- Make sure you have switched off the power before you start installing this product.
- If in doubt about installing electrical equipment please seek advice from a suitably qualified electrical engineer.

## EMC Recommended guidelines

All Lewmar equipment and accessories are designed to conform to the appropriate Electromagnetic Compatibility (EMC) standards. Correct installation is required to ensure that performance is not compromised.

The guidelines given here describe the conditions for optimum EMC performance, but it is recognised 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 Lewmar 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 7ft (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° 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.

## Other information

**Protected for use in engine compartments CE approvals – conforms to:**

89/336/EC (EMC), BS EN60945:1997

94/25/ec (RCD), BS EN28846:1993

# 1. Installation

## 1.1 Preparation

### General position:

- Refer to the EMC installation guidelines (page 4)
- Make sure the drive will be accessible for future servicing.

### Environment:

- This drive is not waterproof, so you should mount it in a dry location, clear of any bilge water.

### Structural strength:

- This drive produces a considerable amount of force, so you must mount it on a solid structure (i.e. a substantial frame member) in the boat. In some cases you may need to build a special frame to mount the drive unit.
- To prevent excess noise and vibration, do not attach this drive to any structures that support cabins.

## 1.2 Identifying the Constellation Autopilot Drive

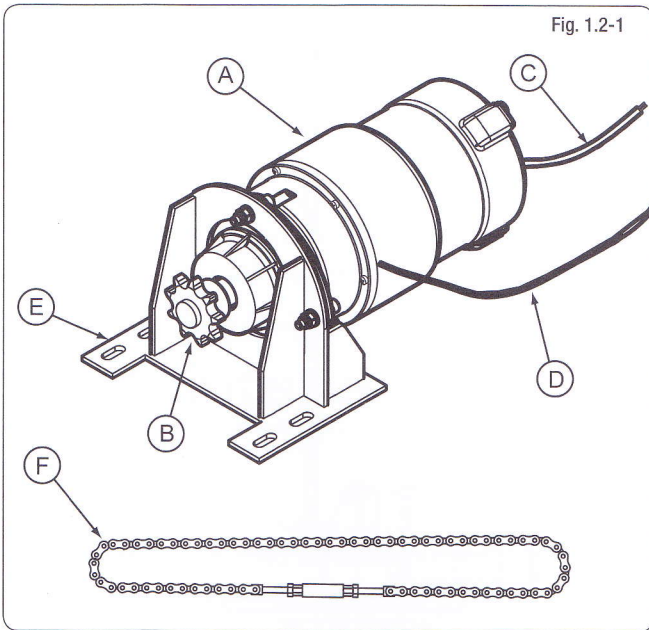


Fig 1.2-1 Constellation Autopilot Drive

A	Motor Gearbox and Clutch Assembly
B	Drive Sprocket
C	Motor Cable
D	Clutch Cable
E	Mounting Bracket
F	Chain Kit

## 1.3 Chain and Sprocket Installation

### Chain size

- The chain kit, 5/8" pitch is suitable for most applications.

### Sprocket sizes

- The standard sprocket size fitted to the Drive unit is a 5/8" pitch 9 tooth sprocket.
- If the steering shaft does not already have a second, or assigned, autopilot sprocket an additional sprocket will be required, size 5/8" pitch to be determined depending upon steering system. (See table on page 6)

### Sprocket for Steering Shaft

- Due to the large variation in sprocket sizes, Lewmar recommend obtaining a steering sprocket from the steering manufacturer. The sprocket will have to be attached to the steering shaft, in alignment to the sprocket on the autopilot drive.
- The additional sprocket must be keyed and screwed to the shaft with a grub screw and secured with thread-locking compound.

**CAUTION:** To stop the drive sprocket rotating on the drive shaft, the shaft has a 5 mm square projection (a feather key) that fits into a notch (or keyway) at the centre of the sprocket. Use only Lewmar approved drive sprocket, its bore and keyway dimensions must fall within the ranges specified in Figure 1.3-1 for it to lock correctly to the drive shaft.

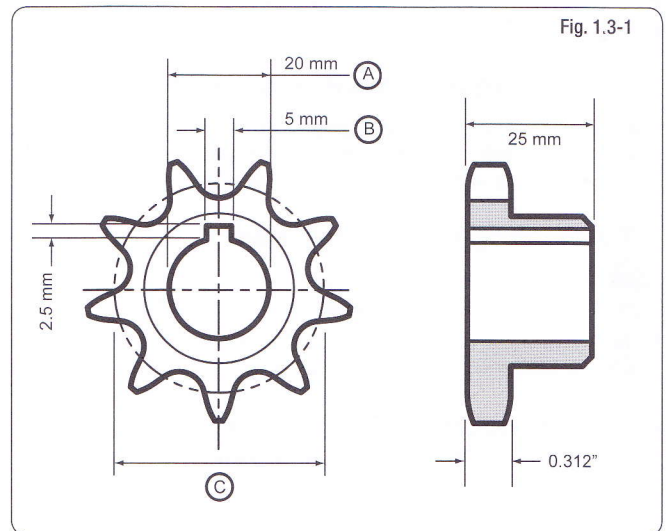


Fig 1.3-1 Sprocket bore & keyway dimensions

A	Bore
B	Keyway
C	1.8" PCD - 9 tooth, 5/8" pitch

## 1.4 Constellation P sprocket

- The Constellation Drive Unit is fitted with a 9T  $\frac{5}{8}$ " P sprocket.

To determine the sprocket size required for the steering shaft, follow the procedure below:

Count the number of times the steering shaft turns when the rudder is moved from hard over to hard over.

Use the table below to determine the sprocket size required at the steering shaft by matching number of turns hard over to hard over.

No. of turns lock to lock	Driving sprocket (std)	Driven sprocket
1 Turn	9T	15T
1.2 Turns		13T
1.5 Turns		11T

- **Note:** This Drive Unit is supplied with a chain kit suitable for a sprocket centre distance of 560 - 600 mm. If the distance between your two sprockets are greater you will need to increase the chain length by inserting extra links. The sprocket sizes shown in the table above provide good steering performance for most boats. If you think your boat may have unusual steering characteristics, contact Lewmar's Technical Services or an authorized service representative for advice.

## 1.5 Mounting the drive and connecting to the steering system

- Attach the drive to a suitable mounting position with M8 bolts, washers and lock nuts
- A thread-locking compound is recommended
- Check sprocket alignment and chain tension
- Attach chain

## 1.6 Sprocket alignment and chain tension

Both sprockets must be accurately aligned to run in the same plane when viewed from the side. Check for correct alignment by holding a 'straight edge' between the edges of the sprockets (see Figure 1.6-1).

## 1.7 Adjusting the chain tension

Adjust the chain tension until it is just tight, so there is minimal lost motion between the drive sprocket and the rudder stock.

- To adjust chain tension use the turnbuckle to take up the slack. Ensure the locknuts are tightened afterwards to maintain this position
- **Note:** If the chain tension is not set correctly, the resulting lost motion will impair steering performance.

## 1.8 Steering check

When you have tensioned the chain correctly, turn the steering wheel from hard over to hard over to check that the chain and sprockets move freely and are correctly aligned.

Check that the rudder can travel lock to lock freely and that the chain tensioning turnbuckle does not interfere with either the driving or driven sprocket.

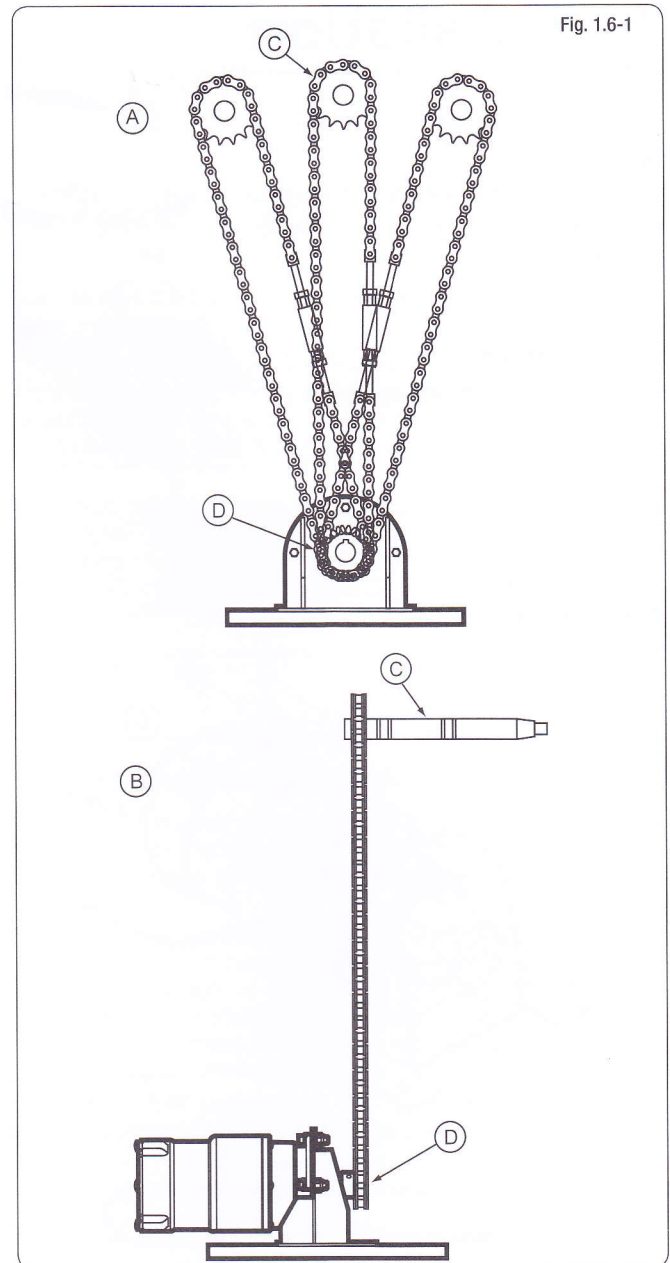


Fig 1.6-1 Sprocket alignment

A	End view
B	Side view
C	Steering sprocket
D	Drive sprocket

## 1.9 Post installation checks

- Is the drive securely mounted?
- Are the drive and steering sprockets in line when viewed side-on?
- Have you securely locked both sprockets to the shafts?
- Have you tensioned the chain correctly?
- Are the motor and clutch cables correctly routed and securely connected to the course computer?
- Complete a hand-steering check: Do the chain and sprockets move freely and in correct alignment from hard-over to hard-over?
- Complete an autopilot steering check. (Refer to the course computer handbook for details).

## 2. Electrical installation

### 2.1 Connecting to the course computer

**Warning!**  
 Electrical safety. Make sure the power supply is switched off before you make any electrical connections.

#### The drive has electrical connections for:

- Drive motor: two single-core cables, twisted as a pair, sleeved with Black (+) and Blue (-) cores
- Clutch: a two core cable with Black (+) and White (-) cores.

#### Follow these steps to connect the drive to the course computer:

1. Measure the total distance of cable run from the drive unit to the course computer:
  - use table below to identify the appropriate motor cable size.
  - use at least 1.5 mm<sup>2</sup> (16 AWG) copper cable for the clutch.
2. Join these cables to the drive cables using appropriate electrical connectors or junction boxes at the correct power rating.
3. Route the cables back to the course computer, taking into account the EMC installation guidelines (See page 4).
4. Fit circuit breakers as specified on page 8 between the Course Computer and the Drive Unit.
5. Connect the cables to the course computer (See manufacturer's manual for full information)
  - CLUTCH terminals: black core to +VE, white core to -VE.
  - MOTOR terminals: at this stage you can connect either motor cable to either terminal.

Drive Unit 89300111			
Cable Length		Cable Size	
m	ft	mm <sup>2</sup>	AWG
2	6.5	1.5	16
4	13	2.5	14
6	20	4	12
8	26	4	12
10	33	4	12

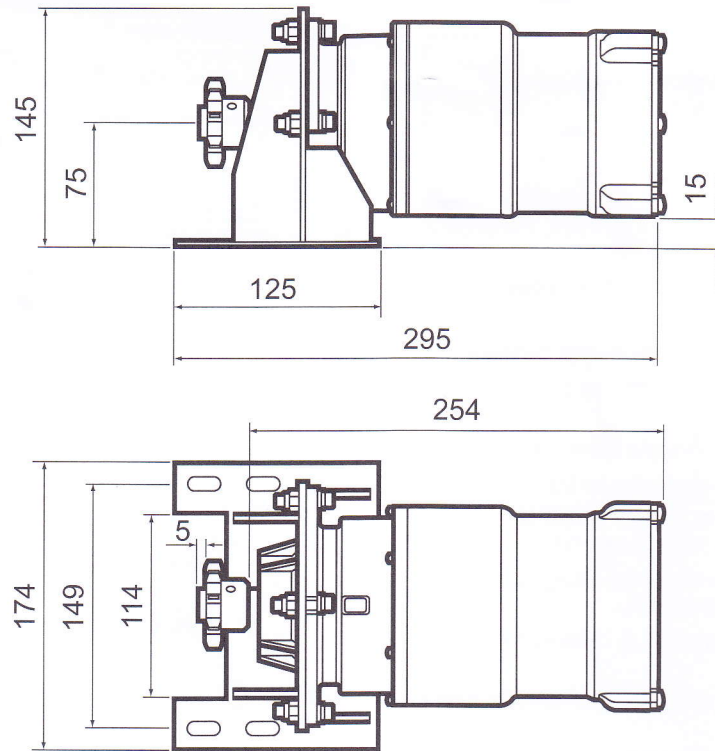
## 3. Maintenance

#### On a regular basis:

- Check all connections and mountings are secure.
- Check chain and sprockets are correctly aligned and tensioned.
- Lightly grease chain and sprockets.
- Check cables for signs of wear or damage.

## 4. Dimensions

Fig. 4.1-1



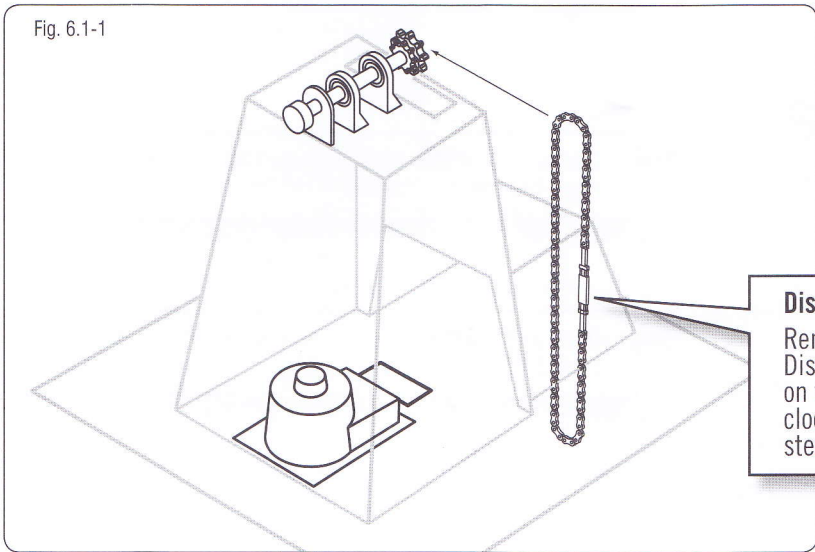
## 5. Specification

Part Number	89300111	
Description	Integra Constellation AP CW Brkt + chain	
Sprocket size	ANS150 9T	
Horse Power	1/8	
Voltage	12 VDC	
Maximum Output	lbf ft	70
	Nm	95
No Load Speed	rpm	10
Average Current Consumption	4 A	
Circuit Breaker	Motor	16 A
	Clutch	2 A
Weight	lb	12
	kg	5.5
Guide to boat size	Up to 11.6 m (38 ft)	

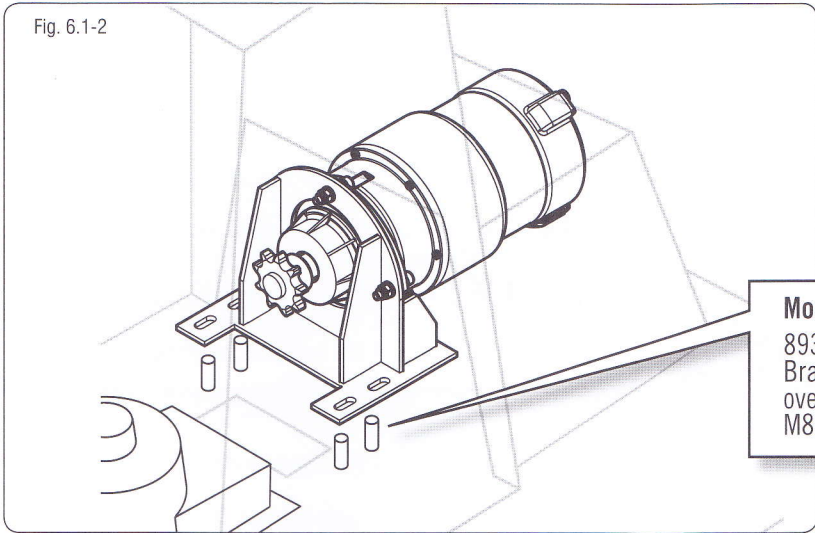


# 6. Appendix - Bavaria Models

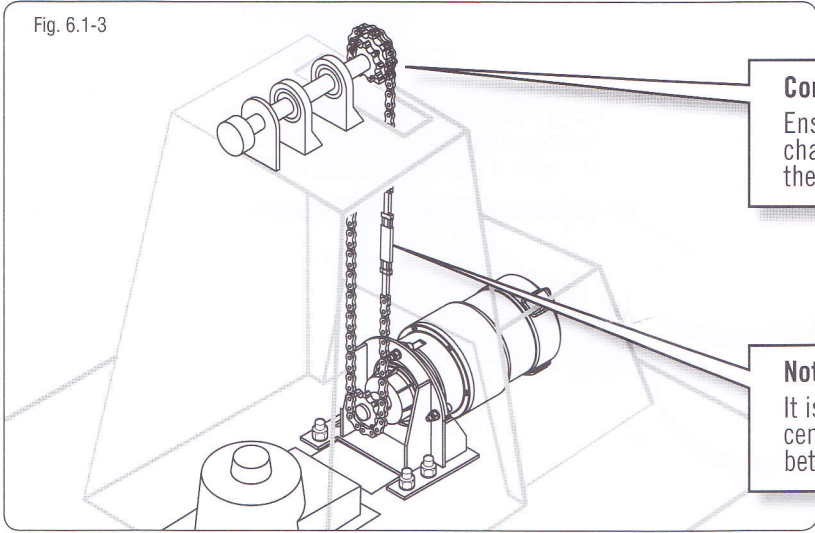
## 6.1 Bravia models 30, 33, 37 & 39 (from 2005) installation



**Disconnect steering chain**  
Remove control panel & pedestal head from console. Disconnect the steering chain by undoing the two nuts on the chain tensioner, then rotate the central body clockwise. Remove the chain kit completely from the steering unit.



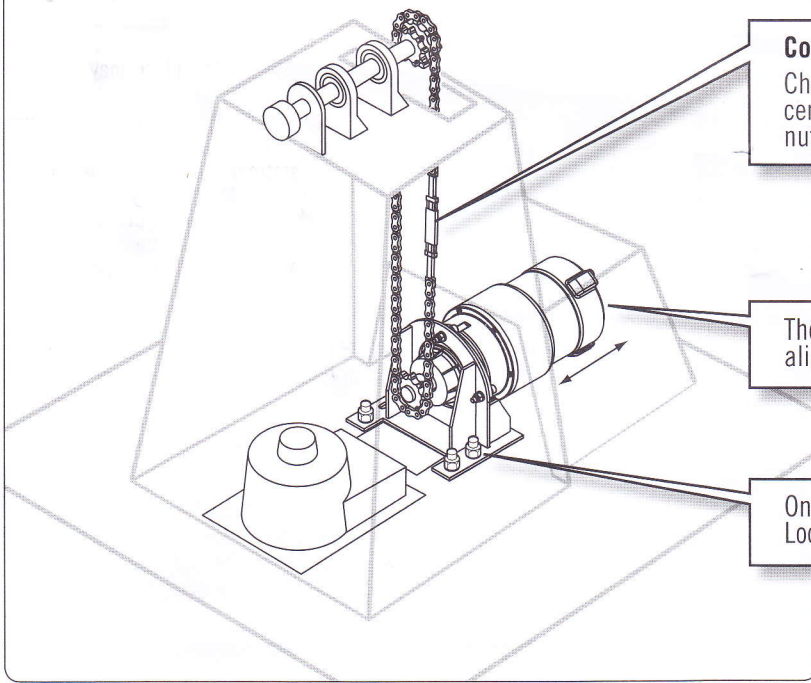
**Mount drive to base plate**  
89300111 – Constellation Drive Kit with Mounting Bracket & Chain kit. Position the mounting bracket over the studs on the base plate & secure lightly with M8 nuts and washers.



**Constellation drive chain installation**  
Ensure rudder is at Mid-Ship position. Assemble the chain by looping round the 15T sprocket on the helm & the 9T sprocket on the Drive Unit.

**Note**  
It is important to mount the chain tensioner at a central position so there is an equal amount of chain between the two sprockets.

Fig. 6.1-4



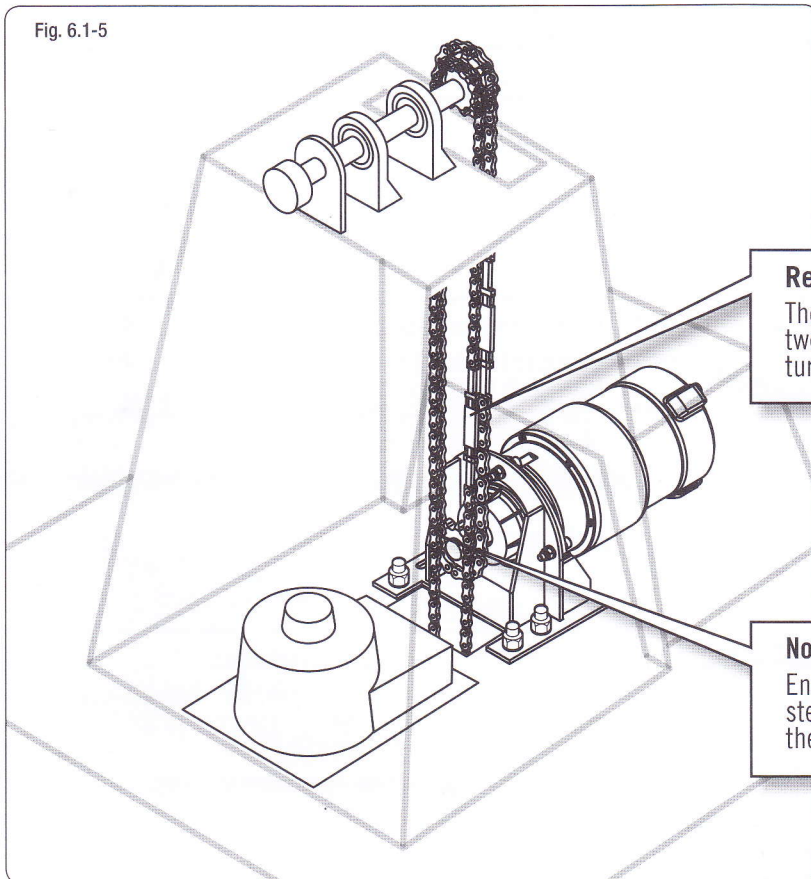
**Constellation drive adjustment**

Chain tensioner should be tightened by turning the central body anti-clockwise then secure with the lock-nuts on each side of the tensioner body.

The Drive Unit can slide Fore and Aft +/- 6 mm to align the chain sprockets.

Once aligned the fasteners can be secured. Use Loctite™ or similar on threads.

Fig. 6.1-5



**Re-assemble steering chain**

The chain tensioner should sit central between the two sprockets. Tighten the steering chain using the turnbuckle and secure the locknuts when complete.

**Note**

Ensure the rudder is at Mid-Ships. Re-assemble the steering chain by looping round the 11T sprocket on the helm & the 11T sprocket on the base unit.

# 8. Lewmar limited warranty

## Limited warranty and key terms of supply by Lewmar

Lewmar warrants that in normal usage and with proper maintenance its products will conform with their specification for a period of five years from the date of purchase by the end user, subject to the conditions, limitations and exceptions listed below. Any product, which proves to be defective in normal usage during that five-year period, will be repaired or, at Lewmar's option, replaced by Lewmar.

### A Conditions and limitations

- i Lewmar's liability shall be limited to the repair or replacement of any parts of the product which are defective in materials or workmanship.
- ii Responsibility for the selection of products appropriate for the use intended by the Buyer shall rest solely with the Buyer and Lewmar accepts no responsibility for any such selection.
- iii Lewmar shall not be liable in any way for Product failure, or any resulting loss or damage which arises from:
  - a use of a product in an application for which it was not designed or intended;
  - b corrosion, ultra violet degradation or wear and tear;
  - c a failure to service or maintain the product in accordance with Lewmar's recommendations;
  - d faulty or deficient installation of the product (unless conducted by Lewmar);
  - e any modification or alteration of the product;
  - f conditions that exceed the product's performance specifications or safe working loads.
- iv Product subject to a warranty claim must be returned to the Lewmar outlet which supplied the product for examination unless otherwise agreed by Lewmar in writing.
- v This warranty does not cover any incidental costs incurred for the investigation, removal, carriage, transport or installation of product.
- vi Service by anyone other than authorised Lewmar representatives shall void this warranty unless it accords with Lewmar guidelines and standards of workmanship.
- vii Lewmar's products are intended for use only in the marine environment. Buyers intending to use them for any other purpose should seek independent professional advice as to their suitability. Lewmar accepts no liability arising from such other use.

### B Exceptions

Cover under this Warranty is limited to a period of one year from the date of purchase by the end user in the case of any of the following products or parts of products:

- Electric motors and associated electrical equipment
- Electronic controls
- Hydraulic pumps, valves and actuators
- Weather seals
- Products used in "Grand Prix" racing applications

### C Liability

- i Lewmar's liability under this warranty shall be to the exclusion of all other warranties or liabilities (to the extent permitted by law). In particular (but without limitation):
  - a Lewmar shall not be liable for:
    - Any loss of anticipated turnover or profit or indirect, consequential or economic loss ;
    - Damages, costs or expenses payable to any third party;
    - Any damage to yachts or equipment;
    - Death or personal Injury (unless caused by Lewmar's negligence).

Some states and countries do not allow the exclusion or limitation of incidental

or consequential damages, so the above limitation or exclusion may not apply to you.

- b Lewmar grants no other warranties regarding the fitness for purpose, use, nature or satisfactory quality of the products.
- ii Where applicable law does not permit a statutory or implied warranty to be excluded, then such warranty, if permitted by that state or country's law, shall be limited to a period of one year from the date of purchase by the end user. Some states and countries do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you.

### D Procedure

Notice of a claim for service under this warranty shall be made promptly and in writing by the end user to the Lewmar outlet which supplied the product or to Lewmar at Southmoor Lane, Havant, Hampshire, England PO9 1JJ.

### E Severance clause

If any clause of this warranty is held by any court or other competent authority to be invalid or unenforceable in whole or in part, the validity of the remaining clauses of this warranty and the remainder of the clause in question shall not be affected.

### F Other rights

This warranty gives you specific legal rights, and you may also have other legal rights, which vary, from state to state and country to country.

In the case of European States a Consumer customer (as defined nationally) has legal rights under the applicable national law governing the sale of Consumer Goods; this Warranty does not affect those rights.

### G Law

This warranty shall be governed by and read in accordance with the laws of England or the state or country in which the first end user is domiciled at the time of purchase of the product.

### H Disputes

Any dispute arising under this warranty may, at the option of the end-user, be referred to alternative dispute resolution under the rules of the British Marine Federation or to the Courts of the State whose law shall govern the warranty or to the Courts of England and Wales.

The British Marine Federation may be contacted at Marine House, Thorpe Lea Road, Egham, England, TW20 8BF

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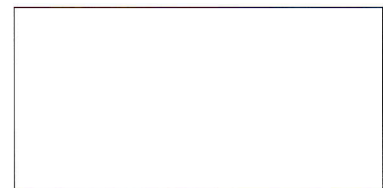
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## 89300148 - Autopilot Drive Clutch Relay

This relay & loom assembly is supplied for use with a Lewmar Autopilot Drive when being installed in conjunction with a Raymarine XPS10 course computer.

Install this relay assembly in a suitable dry location close to the course computer and power supply.

Make electrical connections as shown below, extending wires as necessary matching size and grade where appropriate.

**WARNING:** Disconnect all power before commencing any work on electrical installations

Refer to installation manuals of all equipment involved and perform work to meet all relevant standards.

