
**CONSTELLATION
STEERING
INSTALLATION AND
MAINTENANCE GUIDE**

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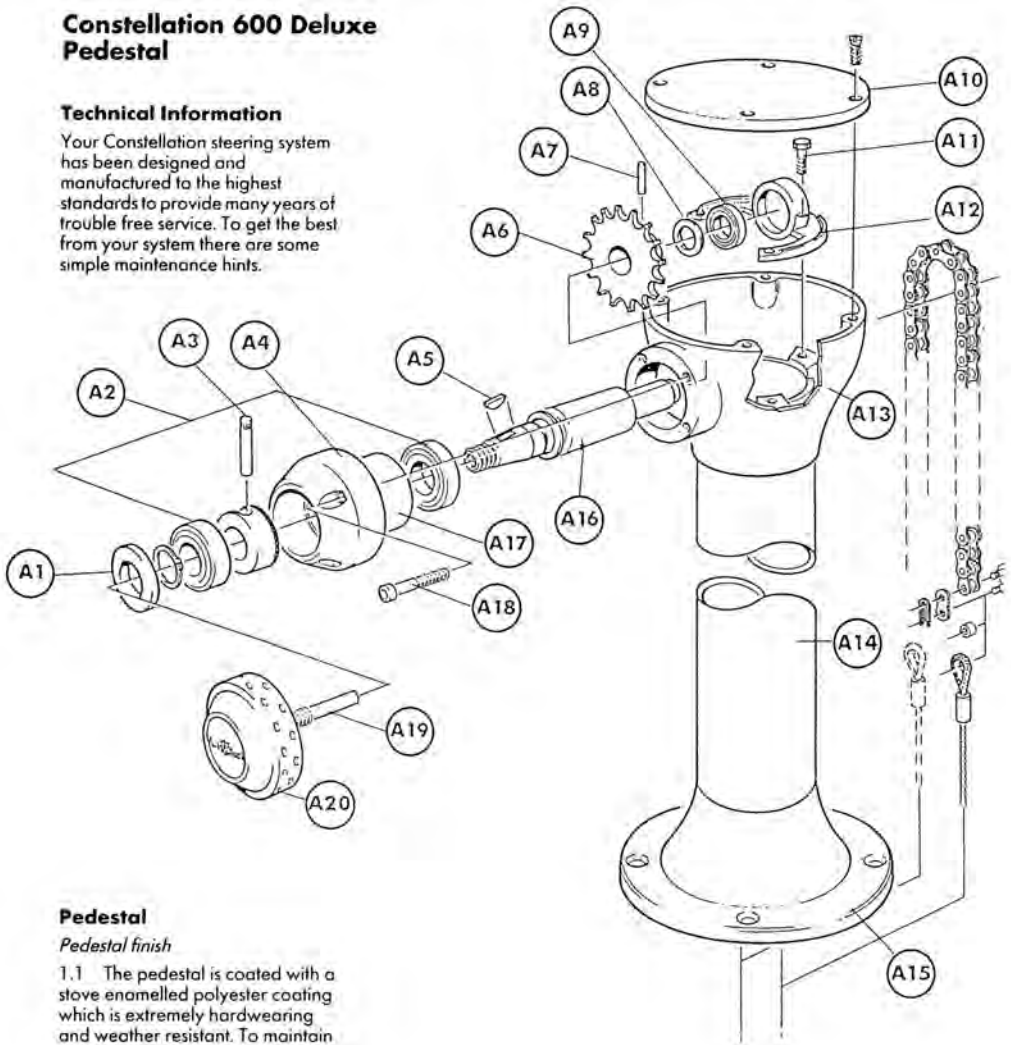
CONSTELLATION 600 DELUXE
CONSTELLATION 600 MONOCOLUMN
CONSTELLATION PREMIERE XL
CONSTELLATION MONARCH
Complies with ISO 8847

Maintenance Information for Constellation Steering Systems

Constellation 600 Deluxe Pedestal

Technical Information

Your Constellation steering system has been designed and manufactured to the highest standards to provide many years of trouble free service. To get the best from your system there are some simple maintenance hints.



Pedestal

Pedestal finish

1.1 The pedestal is coated with a stove enamelled polyester coating which is extremely hardwearing and weather resistant. To maintain the finish regularly wash down the pedestal with fresh water and apply a coat of good quality car wax polish.

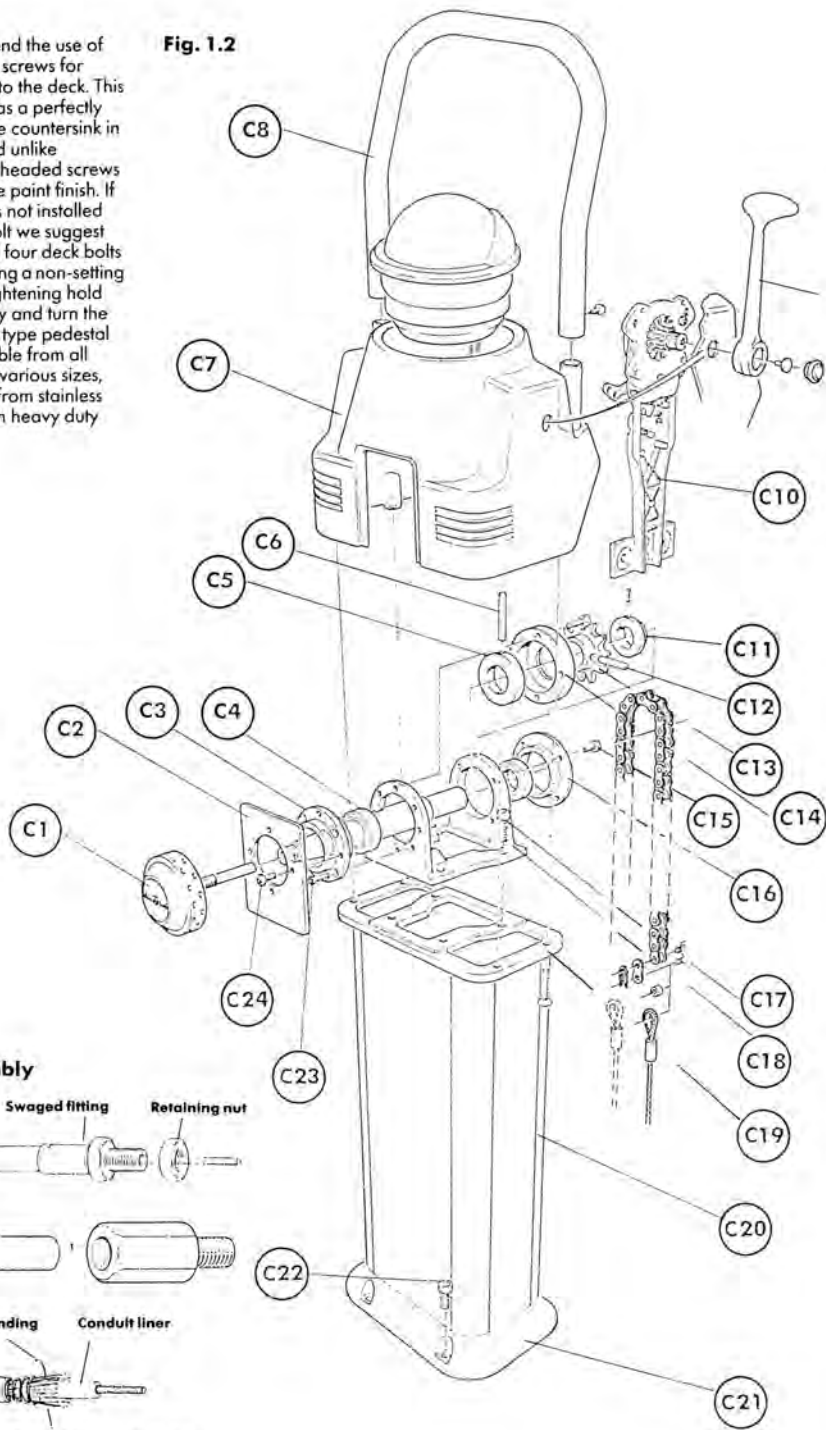
1.2 If any paint has been accidentally chipped, immediately rub down the area locally using a fine grade of wet and dry abrasive and touch in with yacht enamel designed for aluminium surfaces. International Yacht Paints have suitable products.

Fig. 1.1

1.3 We recommend the use of socket countersunk screws for fixing the pedestal to the deck. This type of deck bolt has a perfectly smooth seat into the countersink in the deck flange and unlike conventional cross headed screws will not damage the paint finish. If the boatbuilder has not installed this type of deck bolt we suggest that you slacken all four deck bolts and reseat them using a non-setting mastic. When re-tightening hold the screw stationary and turn the nut! Internal socket type pedestal bolt sets are available from all Whitlock agents in various sizes, are manufactured from stainless steel and come with heavy duty washer and nut.

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Fig. 1.2



**Constellation
Conduit Assembly**

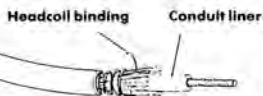
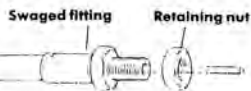
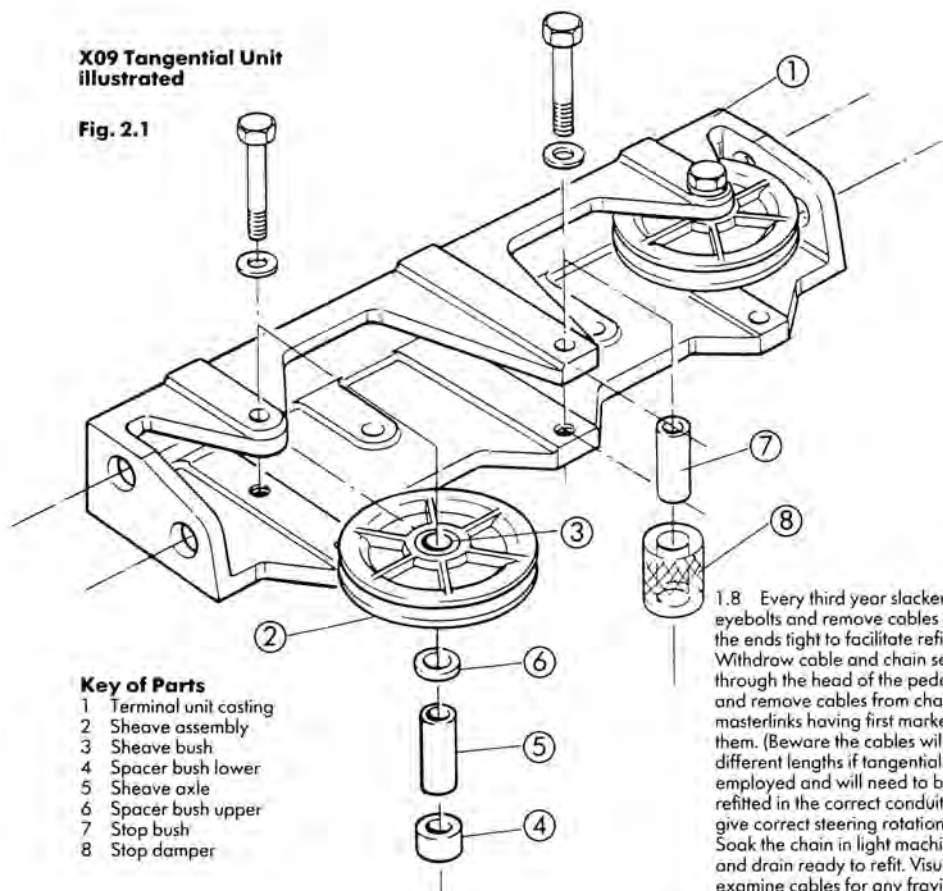


Fig. 1.3

High tensile reinforcement laywires

X09 Tangential Unit illustrated

Fig. 2.1



Key of Parts

- 1 Terminal unit casting
- 2 Sheave assembly
- 3 Sheave bush
- 4 Spacer bush lower
- 5 Sheave axle
- 6 Spacer bush upper
- 7 Stop bush
- 8 Stop damper

1.4 If the yacht is kept in a warm climate with high hours of sunlight it will help to maintain the pedestal if a canvas or plastic cover/awning is fitted when not in use.

1.5 The bearings fitted to the Constellation 600 pedestal are 1 off UHMWPE headed bush and 1 off 60042RS sealed high efficiency roller bearings. Neither of these bearings require lubrication but when the annual inspection is carried out please regrease the impregnated washer which abuts the 60042RS bearing. The Constellation 600 Deluxe and Premiere Constellation pedestals employ high efficiency bearings throughout. The only maintenance required is as for the Constellation 600 pedestal, but in addition there is a further impregnated washer on the second roller bearing. Should any wear occur in these bearings they should be replaced, spare parts are kept by all Whitlock agents.

Dismantling and reassembly is straightforward and is indicated in the exploded views on the previous page.

Pedestal and conduit mechanical maintenance

1.6 Once a season unscrew the four countersunk stainless screws which retain the top cover. Clean and refit using Whitlock anti-seize cream. The anti-seize cream was developed in the aircraft industry to facilitate the dismantling of stainless steel fasteners from aluminium sections. Once a season use will ensure that the top cover can be rapidly removed to gain access to pedestal mechanism.

1.7 Carry out the same procedure on the four stainless steel screws which retain the brake cover. Note it is necessary to remove the steering wheel to access these screws. Be careful not to lose the steering wheel key!

1.8 Every third year slacken eyebolts and remove cables taping the ends tight to facilitate refitting. Withdraw cable and chain set through the head of the pedestal and remove cables from chain via masterlinks having first marked them. (Beware the cables will be of different lengths if tangential unit is employed and will need to be refitted in the correct conduit to give correct steering rotation!) Soak the chain in light machine oil and drain ready to refit. Visually examine cables for any fraying or loose wires along their length. If any damage is found replace cables with new — you can retain the old set for emergency spares. The cable is stranded stainless steel wire type 7 x 19 prestretched. Depending on boat size the diameter will be 5 or 6 mm. Replacement cables can be obtained from your Whitlock Agent. Regrease the cable using a silicone based lubricant and refit.

1.9 The cable and conduit will eventually require replacement but the life expectancy will depend on a number of factors — boat size and type, annual usage, correct tensioning of cables, lubrication etc. As a general rule cables should be replaced every 3 to 5 years and conduits every 5 to 10 years. For charter boats in continuous use it may be necessary to halve this maintenance time. The conduit fittings can be reused — please refer to diagram explaining construction.

The conduit can only be obtained from official Whitlock agents/distributors or the original boatbuilder. Never replace with alternative conduit as this will almost certainly be of inferior strength to original and may not lock correctly with conduit fittings.

Quadrant & Terminal Unit Maintenance

2.1 The quadrant is clamped to the rudder shaft via 4 stainless steel bolts and nuts and should have been correctly set and torqued by the boatbuilder. Should it be necessary to remove the quadrant at any time please note the following when refitting.

- (a) Lightly pinch the 4 clamp bolts to allow the quadrant to be moved vertically to get correct alignment of cables into scores on quadrant face.
- (b) Alternatively tighten clamp bolts maintaining even gap on both sides of quadrant and cap.
- (c) **Do not overtighten** the clamp bolts. Maximum torque to tighten assembly = 30 ft.lbs/40nm.
- (d) Re-check cables are running in line with quadrant scores without chafing.

2.2 Periodically check that quadrant is correctly tightened to rudder shaft — see point 2.1(c) and that there is no visible signs of damage — hairline cracks on quadrant limbs or in vicinity of keyway in quadrant boss. Particularly in the event of a collision involving the rudder, grounding, letting go of the wheel when motoring astern etc.

Adjusting cable tension

3.1 The maintenance of correct tension of the cables fitted in the Constellation conduit type system is essential to the performance of the equipment and the longevity of the cables and conduit.

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Cable arrangement for correct steering system

View of pedestal from aft of boat

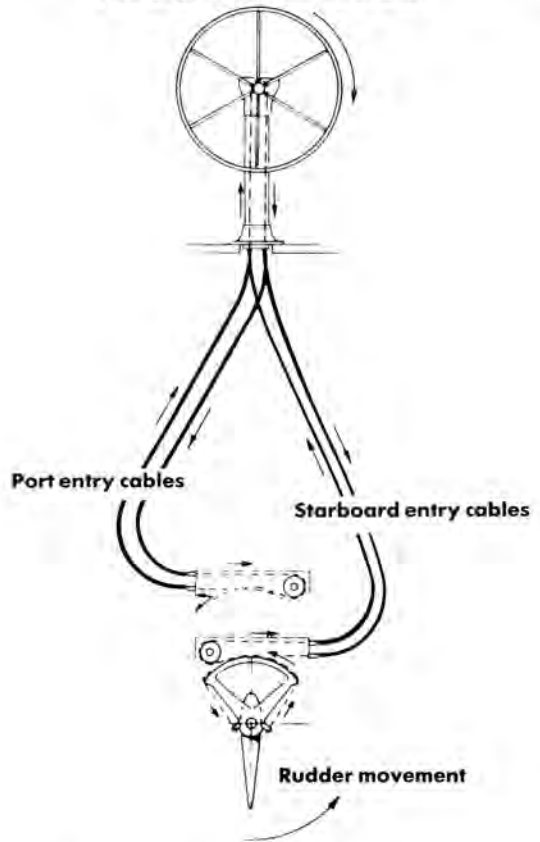


Diagram shows turn to starboard

See Section 1.8



Correct use of wire connections using bulldog grips

See Section 1.8

Overtensioning will result in heavy steering and 'lack of feel' at the wheel with excessive wear on the conduit. Under tensioning can result in the cables jumping the sheaves or quadrant and jamming. On a heavy reach the chain may also slip on the sprocket with a loud response and misalignment between wheel position and rudder will occur.

To correctly tension the cables follow these instructions —

3.2 Periodically during the season and before any long voyage check the cable tension.

- (a) Rotate the wheel to each lock and then centralise.
- (b) At the quadrant locate the two eyebolts. Slacken the locknuts and grasping the eyebolt firmly pull it to tension the cable. Whilst maintaining this tension spin up the primary eye bolt nut but do not set the locknut.
- (c) Swing the wheel from lock to lock again and carry out the same tensioning procedure on the other eyebolt.

If the above procedure has been carried out correctly the quadrant will respond to the steering wheel movement without lost motion. If there is any play present sufficient tension was not maintained whilst the primary nut was tightened. In this case tighten primary nut further by your fingers only. Rotate wheel 3 or 4 times from lock to lock and check whether it is possible to tighten the nuts further by finger pressure only.

- (d) Finally tighten the lock nuts to a torque of 30 ft.lbs/40nm.

Conduit/Sheave Adapters

4.0 Conduit/sheave adapters are used to improve the efficiency of wire-in-conduit systems and are essential in heavy displacement boats over 40' LOA to replace 90 degree bends in the conduit route. (See illustrations 4.1/4.2.)

4.2 Conduit/sheave adapters can be used with either conduit at each entry or conduit to one side and cable to the other. It is important to realise that when conduit is fitted to both sides of the unit the steering loads are self contained and no pressure is imparted to the mounting bracket.

Fig. 2.2
Typical Quadrant

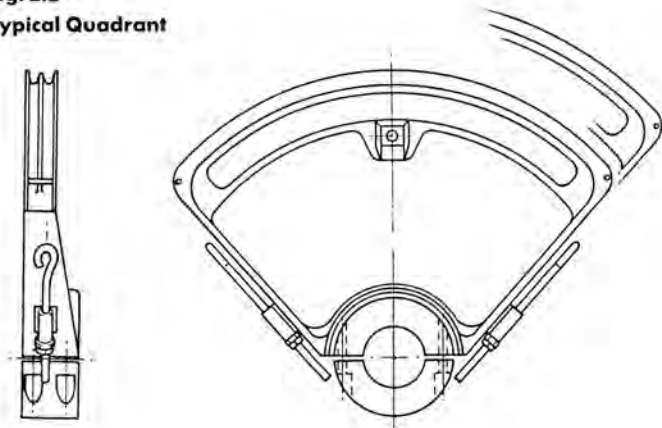


Fig. 2.3
See Section 3.2

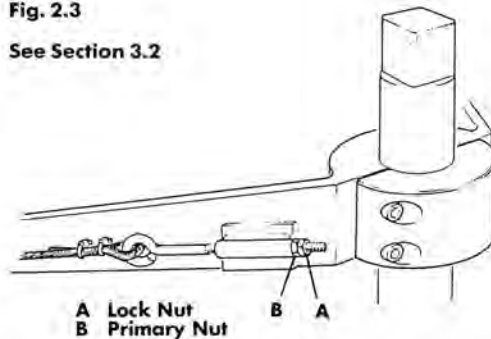
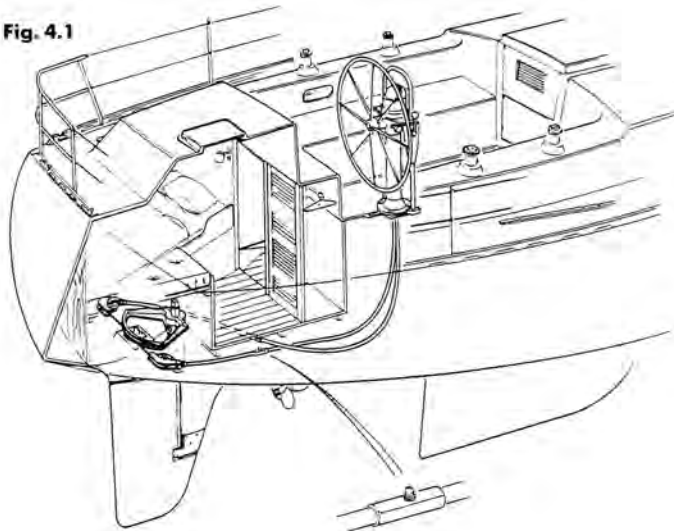


Fig. 4.1



Where open wire is led into the conduit/sheave adapter it results in the full steering loads being transmitted to the ship's structure via the mounting bracket and the boat must have suitable mounting re-inforcements to accept these substantial forces. To prevent the sheave assembly twisting underload, with an open wire situation it is essential that the anti-pivot locking nut is tightened. (Please see illustration 4.3.)

Conduit Lubrication

5.1 Lubricating the cable/conduit assembly regularly with the correct grease will greatly increase its life and reduce the friction in the system. On heavy displacement boats and yachts with long conduit runs we recommend fitting conduit greasers at a convenient point in the horizontal runs to facilitate this process. Whitlock have developed a special synthetic grease specifically for this purpose and it is available in 300 gram tubs from Whitlock agents. (Please see illustration 4.1.)

Open Wire Systems

6.1 The most popular open-wire system incorporates a cross-wire idler in conjunction with a radial quadrant. (Please see illustration 6.1.) Please remember that with open-wire systems the static tension on the cable must be higher than on conduit systems to ensure the cables do not drop off the sheave or quadrant when heavy loads are experienced on the steering system, particularly in strong beating conditions.

6.2 It is important that the cable tension is checked regularly and also the security and rigidity of all sheave mountings. Any flexure in the mountings or bending of the rudder stock under load could result in steering failure if the untensioned steering cable jumps its sheave or quadrant track.

6.3 The cross-wire idler is illustrated in Fig. 6.2 and should have been correctly aligned by the boatbuilder when fitting the steering system. Please check that the cable is running correctly in the sheave track without chafing. The sheave is locked in position by a securing grub screw which should be checked for tightness once a season and before any major

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Fig. 4.2

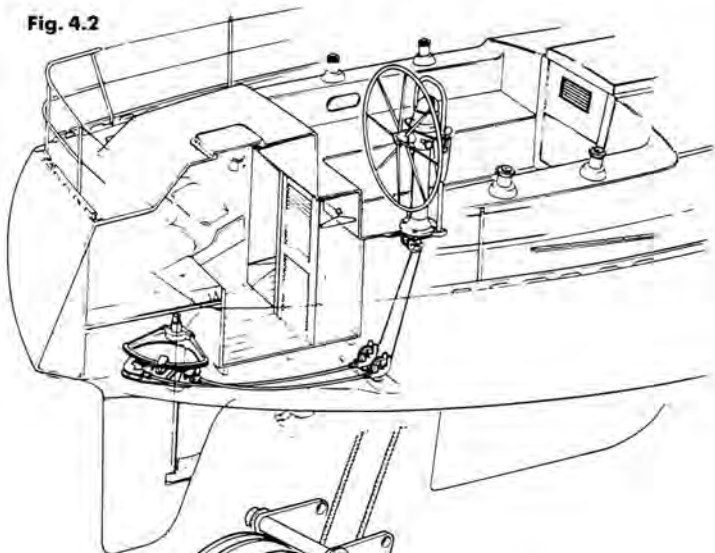


Fig. 4.3

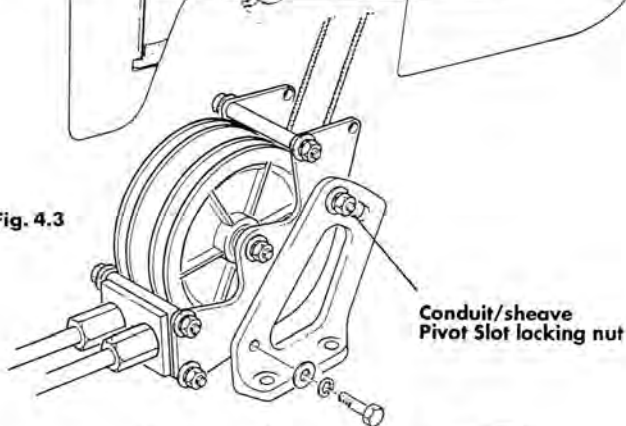
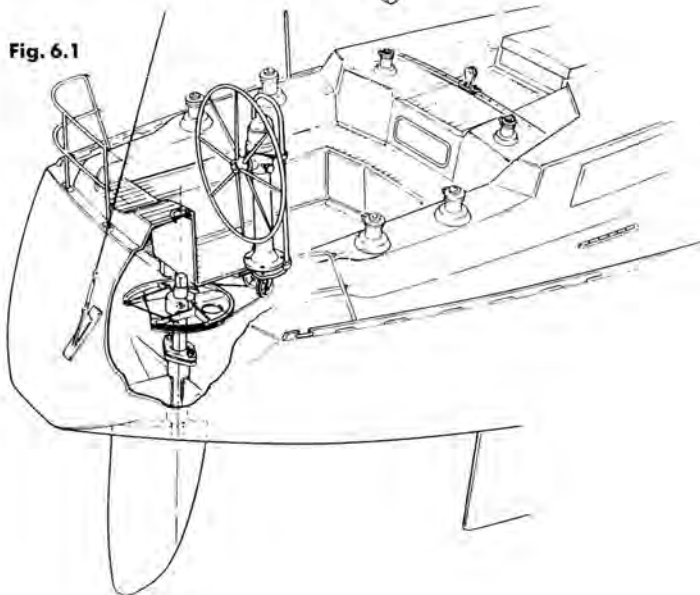


Fig. 6.1



voyage. You will notice that all Whitlock cross-wire idler plates have bevelled faces. This is to correctly align the sheaves to the angle of the wires which cross inside the pedestal or underneath the bulkhead steerer. (Please see Fig. 6.3.) The cross-wire idlers are available in 4", 5", 6" and 8" diameters and are all fitted with a sheave guard to help prevent the cable jumping off the sheave, even when the cables have not been correctly tensioned. Please ensure that this safety pin is fitted, but be aware that this does not offer 100% security and correct tension of the cables etc., as described in Section 6.2, should be adhered to.

X38 4" bevelled crossed wire idler

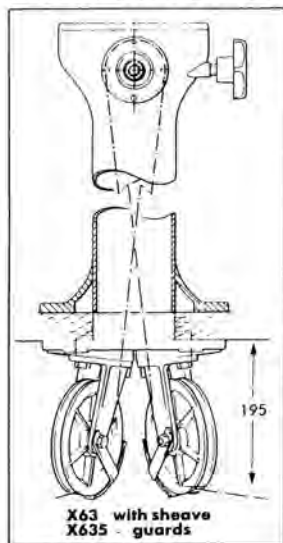
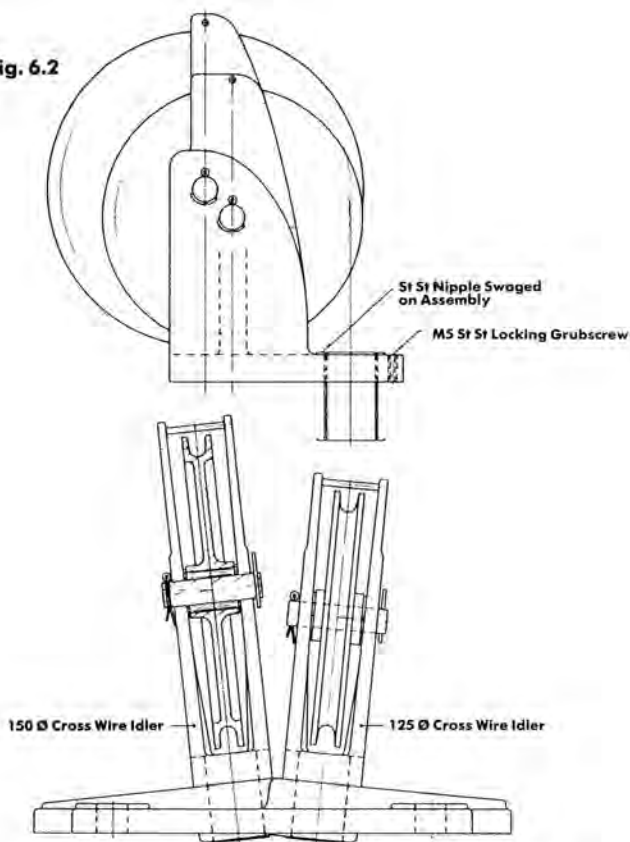


Fig. 6.3

6.4 Rudder stops on this type of system are not a built-in feature and have to be supplied by the boatbuilder. As in all yacht steerings it is absolutely essential that rigid rudder stops of adequate strength are installed. Failure to do so will result in steering failure and will invalidate our warrantee.

6.5 On centre cockpit boats with open-wire systems, there will be fitted a number of single or twin sheave assemblies. Each of these assemblies has to carry the full steering loads and they must

Fig. 6.2



therefore be strongly secured to a rigid surface. It is advisable to be able to locate and check these sheaves quickly to (1) ensure that they can be serviced and (2) replace a cable which may have become dislodged due to incorrect tensioning.

6.6 All sheave assemblies should be lubricated at least once a season with light machine oil. Use this opportunity to check the condition of the bearings and that the sheave assembly is fully tightened and properly secured to the boat mounting.

Cable Maintenance

7.1 Your system will have been fitted with pre-stretched 7 x 19 stranded stainless steel cables. Eventually, due to wear and fatigue, these cables will require replacement. It is not possible to specify the time scale appropriate for renewing cables due to the various factors such as boat displacement, tensioning of cables, tightness of cable bends, which

affect their lives. Careful visual examination should indicate damage to the cable. Alternatively, using a cloth moistened in light machine oil and running this along the length of the cable, will pick up any "snags" in the wire which indicate the failure of a strand of the cable.

Any such failure indicates that the cable is at the end of its useful life and should be replaced. *Under no circumstances* use cables of different construction or materials. Also, do not fit larger or smaller diameter cables than originally specified. Smaller diameter cables will obviously have a lower breaking strength. Larger diameter cables will also fail prematurely due to fatigue. The correct size of cables for sheave sizes are as follows:

4" dia.	5mm or 3/16"
5" and 6" dia.	6mm or 1/4"
8" dia.	8mm or 5/16"
10" dia.	8mm or 10mm or 5/16" or 3/8"