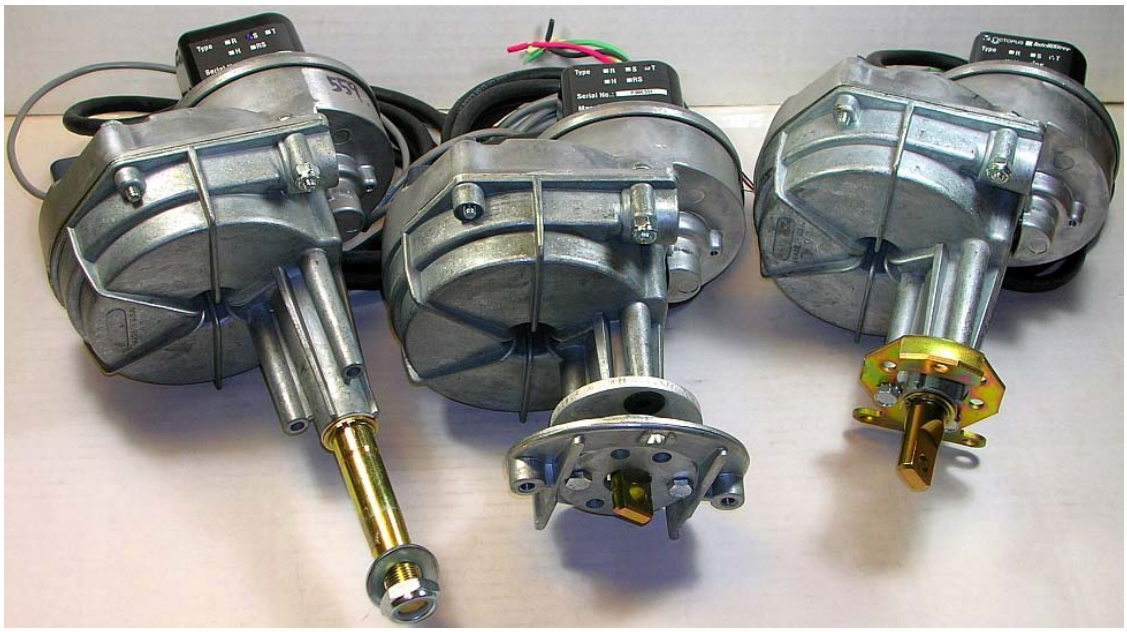
ComNav® marine ltd

Cable Drive

Types S, MST, T, TST & R

Installation Manual



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PN 29010022 V1.6

Welcome

Congratulations on your purchase of a ComNav Marine Cable Drive! At ComNav, we are proud of our prominence as a leader in the design and manufacture of marine autopilot systems. Our dedication to performance and reliability will ensure your satisfaction with your new Cable Drive.

ComNav Marine Ltd.

Warning

This unit produces a magnetic field which may cause compass deviations. Proper placement of your compasses should be considered.

General Notice

This document, ComNav part number 29010022 Version 1 Revision 6, is the approved Installation and Operation Manual for use with ComNav Cable Drives, Types S, MST, T, TST & R. Where versions of this manual exist in other languages, the English version shall be considered authoritative.

Note:

Octopus Precision Products builds all the drives described in this manual, to ComNav's custom specifications.

All information on these drives is the responsibility of ComNav. However, the detailed Mechanical Installation Instructions are the same as for Octopus' own standard versions of these drives. A copy of the Octopus Selection & Installation Guide is supplied with this drive.

Please note that all warranty, service and other inquires regarding these ComNav-branded drives should be directed to ComNav.

Document History

Revision	Date	By	Description
1R0, 1R1	**Prior to 1999**	**R&D staff**	• **first release**
1R2	**March 1999**	**R&D staff**	• **additional drive types**
1R3	**September 2003**	**R&D staff**	• **new installation instructions & parts diagrams** • **some drive types removed**
1R4	**28 June 2004**	**R&D staff**	• **additional drive types**
1R5	**26 April 2007**	**DTO**	• **drive types & nomenclature changed** • **new cable colour coding** • **added this Document History table**
1R6	**20 August 2008**	**DTO**	• **updated for Drive Types MTS & TST** • **new logo for ISO 9001** • **used new standard formatting**

About this Manual

This manual provides essential information for the safe and reliable installation of the ComNav Cable Drives, Types S, MST, T, TST & R. You are urged to read this manual in its entirety before you install & use your new Cable Drive, and to keep it handy for future reference.

Manual Format

This manual has been formatted to be printed on both sides of the pages of the manual, and on standard Letter-sized paper (8.5" x 11").

If you have obtained this manual as a soft-copy, please note that it is in Adobe® Portable Document Format ("pdf"), and so may be viewed & printed with Adobe Reader®, or compatible pdf-format viewers.

When printing this manual with Reader, you should select "duplex printing" (or the equivalent term used by your printer's software driver), in order to print it double-sided on the paper. If your printer does not have built-in duplexing capability, you can still print this manual double-sided by following the instructions that came with your printer for doing "hand duplexing".

You should also select the Auto-Rotate and Centre option in the Print Dialog box, de-select the Choose Paper Source by PDF page size option, and set Page Scaling to None (normally, Reader's default setting is Shrink to Printable Area, and is printer-dependant, usually ~95%, but that is not needed here).

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Installation

This section describes the installation of five types of ComNav Cable Drives:

- Type ‘S’ (PN 20910002),: straight shaft style, mounted behind the steering dashboard (at either 90° or 20° to it), replacing the mechanical push-pull unit of a Morse Straight Shaft cable steering system.
- Type ‘MTS’ (PN 20910003): a variant of the Type S, but with a titled shaft, for use with Morse Tilt Shaft systems.
- Type ‘T’ (PN 20910004: tilt shaft style, mounted behind the steering dashboard, replacing the mechanical push-pull unit of a Teleflex Performance Tilt cable steering system.
- Type ‘TST’ (PN 20910005): a variant of the Type T, with a different shaft, for use with a Teleflex Standard Tilt steering systems.
- Type ‘R’ (PN 20910009): for use when the cable drive is to be mounted somewhere remote from the dashboard, and drives the steering cable in parallel to the boat’s steering wheel.

Drive Generations

This manual covers two generations of ComNav Cable Drives; they can be distinguished by the number of cables which are used to connect to the autopilot:

- Drives manufactured before April 2007 all have a single cable; they are referred to in this manual as “single-cable”.
- Drives manufactured from April 2007 onwards have two cables; they are referred to in this manual as “two-cable”.

Drive Type Names

In April 2007, there were some changes in the nomenclature used for the drive types, and in the availability of certain drive types:

- Type S replaces the former MDR40-MSS drive (also referred to as Morse Straight Shaft).
- Type MTS replaces the former MDR40-MTS drive (also referred to as Morse Tilt Shaft). It is a non-stocked item; it can also be made up from a Type S drive & an ‘MT’ Retrofit Kit (available on special order).
- Type T replaces the former MDR40-TPT drive (also referred to as Teleflex Performance Tilt).
- Type TST replaces the former MDR40-TST drive (also referred to as Teleflex Standard Tilt). It is a non-stocked item; it can also be made up from a Type T drive & a ‘TS’ Retrofit Kit (available on special order).
- Type R replaces the former MDR40-R or -RE drives (also referred to as Morse Remote).

Overview

The following paragraphs give a brief overview of the steps required in a typical cable drive installation.

Refer to the **Octopus Precision Products Selection & Installation Guide** supplied with this drive for complete installation details.

All Drive Types - Preparation

- There must be sufficient room to mount your new drive at the location where you intend to install it.
  - ⇒ For Drive Types S, MTS, T & TST, this will be behind your boat's dashboard, at the location of the existing mechanical drive unit that is coupled to your steering wheel.
  - ⇒ For Drive Type R, this will be at some convenient location near to the rudder (or outboard or I/O drive leg), and/or where the existing steering cables are run.
- Allowance must be made for the plastic motor cover at the back of the new drive. Room to move the unit into place is also required, as well as room to work.
- Check that the cables in your boat's existing mechanical push-pull cable steering system are compatible with your new ComNav cable drive unit.
- Mount the new drive as required (see specific items for each drive type, next).

Mounting Drive Types S, MTS, T & TST

- Remove the existing mechanical drive unit from the dashboard mounting bracket by removing the steering wheel and the mounting bolts.
  - ⇒ Note which opening the cable from the old drive unit is coming out of.
  - ⇒ Note that the two bolts with nuts are used to secure the end of the cable sheath, and the end of the grease tube, by passing through the "U-groove" around their ends.
- Detach the cable so that the old drive unit can be removed. This can be done by either:
  - ⇒ Opening the cable drive section (four bolts in housing) and removing the cable.
  - ⇒ Or by removing only the two bolts with nuts in the housing, removing the grease tube and turning the steering shaft (with the steering wheel or other) until the cable is removed from the housing.
- Check that the new cable drive unit will fit properly in the space behind the dashboard. Do not mount it yet. If using an optional cable adaptor, it should be fitted to the new drive.
- Now, insert the cable into the new cable drive unit by either of the methods mentioned above, and then re-install the bolts and nuts.
  - ⇒ Note that the two bolts with nuts enter the housing from the front (steering wheel end) of the unit and the other two bolts (without nuts) enter the housing from the back.
- Mount the new drive unit temporarily, in the dashboard or elsewhere, so that the steering wheel can be installed on the shaft.
- Perform the mechanical calibration procedure, as described below.
- Mount the drive unit to the dashboard. Add the steering wheel.

Mounting Drive Type R

- Select a suitable installation site.
- Attach the desired “second cable” to the new drive unit, and to an appropriate point on the existing steering system. If using an optional cable adaptor, it should be fitted first.
- Mount the new drive unit.
- Perform the mechanical calibration procedure, as described below.

Mechanical Calibration Procedure

- Turn the steering wheel to Port & then to Starboard, going to the stops. Confirm that the rudder (or outboard or I/O drive leg) moves in the correct direction.
- Check the steering is as responsive as before. Note that on power-assisted steering systems, you may need to run the engine to be able to move the outboard drive or rudder.
- Next, turn the wheel so that the rudder (or outboard or I/O drive leg) is in the Dead Ahead position.
- Remove the feedback potentiometer at the back of the new drive unit, by removing the two Philips screws which mount the pot to the body of the drive.
- For correct operation of the cable drive with your ComNav autopilot, the red marks on the feedback pot’s shaft-mounted gear and the pot’s case must be aligned; if necessary, turn the gear until the marks are aligned. See the picture below.

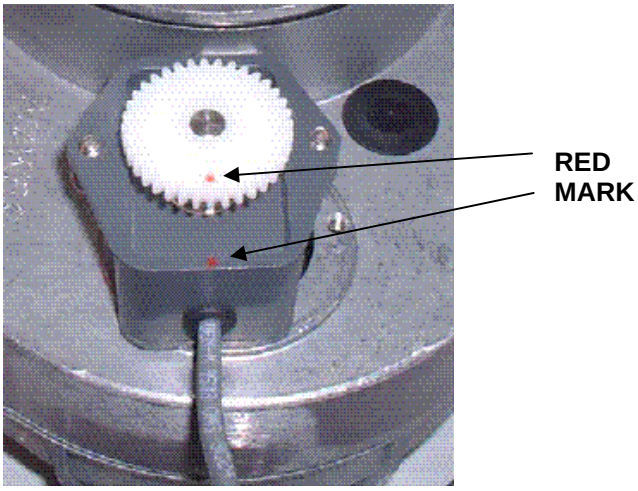

Figure 1 - Feedback Pot, showing correct gear alignment

- Making sure that the rudder (or outboard or I/O drive leg) is still dead ahead, and that the red marks are aligned, re-insert the pot into the housing so that the gears mesh and the pot bracket fits flush to the housing (it fits only one way). **Be very careful to insure that the marks remain aligned**. This centres the rudder feedback potentiometer’s range of resistance for the autopilot. Re-install the Phillips screws.
  - ⇒ To confirm the pot is centred, use a multi-meter to measure the total resistance across the Power & Common wires of the pot cable, or of the combination cable for single-cable drives (see the cable colour codes in Table 1, below); the resistance should be 4 KΩ.
  - ⇒ Next, measure the resistance between the Position wire and each of the Power and Common wires. If the pot is correctly centred, each resistance measured should be approximately equal: 2KΩ.
  - ⇒ If the pot is not centred, remove it and re-align the marks, then repeat this whole step.

All Drive Types – Autopilot Wiring & Setup

- Refer to your ComNav autopilot manual for the connection of the drive's power & signal wires to the autopilot. The colour-codes for the cable wires are shown in Table 1.
- Refer to the autopilot manual for installation, set-up and testing of your autopilot with your new Cable Drive.

Wire Colour (single-cable drives)	Cable Type & Wire Colour (two-cable drives)	Autopilot Signal Name
White	Thin Grey – Red	Rudder Feedback Power
Green	Thin Grey – White	Rudder Feedback Position
Black	Thin Grey – Black	Rudder Feedback Common
Brown	Thick Black – White	Clutch -
Red	Thick Black – Green	Clutch +
Blue	Thick Black – Black	Motor 1
Orange	Thick Black – Red	Motor 2

Table 1 – Drive Cable Colour Codes