



OCTOPUS

SELECTION & INSTALLATION GUIDE

REV: C 30 May 2008



AUTOPILOT DRIVE UNIT – TYPE R – REMOTE MOUNTING

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A1 SYSTEM OVERVIEW:

1. The Octopus remote rotary mechanical autopilot drive (model MDR-40 Type R) is an automatic pilot drive system which makes it easy and economical to install an automatic pilot on smaller powerboats steered with mechanical push pull cable steering systems and small sailboats with access to a quadrant or tiller. The unit is powerful and fast - capable of delivering over 300lbs of cable thrust, with a normal H.O. to H.O. time of 15 seconds.
2. The type R drive unit can be installed in any convenient location; it requires the addition of a second steering cable and connection kit. It incorporates a drive motor, a solenoid clutch and offers rudder feed back (RFB) capability. The MDR40 Type R drive is based on the MORSE 290 rotary helm unit and accepts MORSE 304415 steering cables and Teleflex SSC52 steering cables without modification. Simple cable adapters are available to enable connection to other popular steering cables. When the helmsman is hand steering, the only the type R drive second steering cable is back driven due to the clutch. When the type R drive is steering, the manual steering cable and helm are back driven.

A2 PRODUCT LIMITATION:

The MDR40 drive will fit a large number of vessels, which were just difficult or economically not practical to fit automatic pilots to before. The product does have some limitations, which must be observed, please note the following:

1. The MDR40 type R drive unit is designed around the MORSE 290 Rotary Drive Helm manufactured by TFX-Morse of Limerick Pennsylvania, USA. To meet A.B.Y.C. regulations, this type of steering is recommended for use on vessels with a maximum speed of 40 m.p.h. The MDR40 type R drive should not be fitted to vessels, which exceed this speed.
2. The MDR40 type R drive unit should not be fitted to boats where the maximum horsepower of the engines exceeds the maximum horsepower rating for the vessel as stated on the vessel manufacturers tag.
3. If the existing steering system on the vessel is a **NFB** (no feed back) type, the MDR40 type R drive can **NOT** be fitted. The existing steering system **MUST** be capable of being back driven.
4. In the event of **UNCONTROLLED** automatic steering or other **EMERGENCY** situations, automatic return to **MANUAL** steering is provided through the operation of a built in slip clutch. It is **STRONGLY** advised that the helmsman be formally familiarized with this **MANUAL OVERRIDE** procedure.
5. The MDR40 type R drive is designed to produce a maximum cable push/pull of 300lbs, which requires a peak power of 60 watts. This makes the unit very capable of handling the vast majority of cable steered vessels. However some vessels fitted with push pull cable steering systems have very stiff steering or steering which is heavily loaded in one direction due to hull design and engine considerations. Generally speaking, the MDR40 type R drive will steer vessels that do not require more than a 15-lb force on the rim of a 14-inch diameter steering wheel to hold a course, this equals 105 in/pounds of torque. If the steering wheel input torque exceeds this figure, the MDR40 type R is not a satisfactory drive system and we would suggest that the vessel be fitted with a hydraulic linear actuator drive system such as our OCTOPUS 1212LAM12.

A3 4 – STEP INSTALLATION PLANNING:

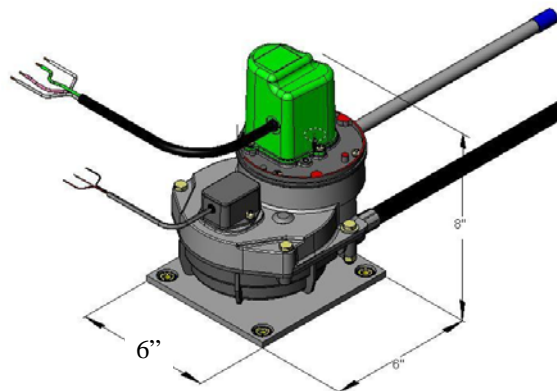
When planning an installation, it is recommended that you follow 4 steps:

- STEP 1: Ensure that there is adequate space available to accommodate the drive unit.
- STEP 2: Determine the type of cable connection kit required (see application tables).
- STEP 3: Determine the length of second steering cable required.
- STEP 4: System & Accessories Selection Review.

B1 STEP 1 – Determine Available Space

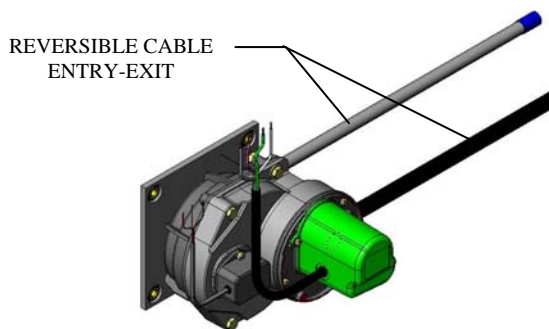
B1a Physical Envelope & Orientation

1. The selected installation site should provide adequate space to accommodate the drive envelope including the entry and exit points for the steering cable. The drive can be mounted at any angle. See detailed graphics of drive envelope and mounting samples below. Note that no access for maintenance purposes is required.

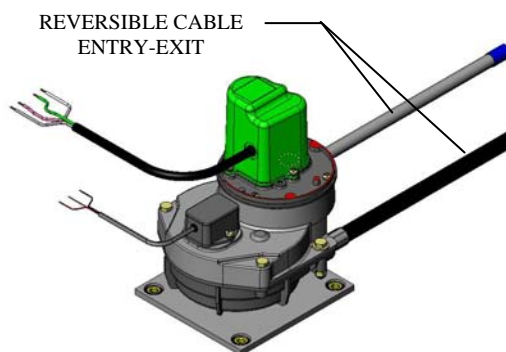


DRIVE ENVELOPE

2. The selection of the steering cable entry/exit port does **NOT** have a preference. To provide more flexibility for routing the steering cable, the entry/exit port arrangement can be reversed. If ports are reversed, the steering direction will also be reversed. To compensate for this, the autopilot software or motor wiring can be adjusted.



TYPICAL VERTICAL
MOUNT

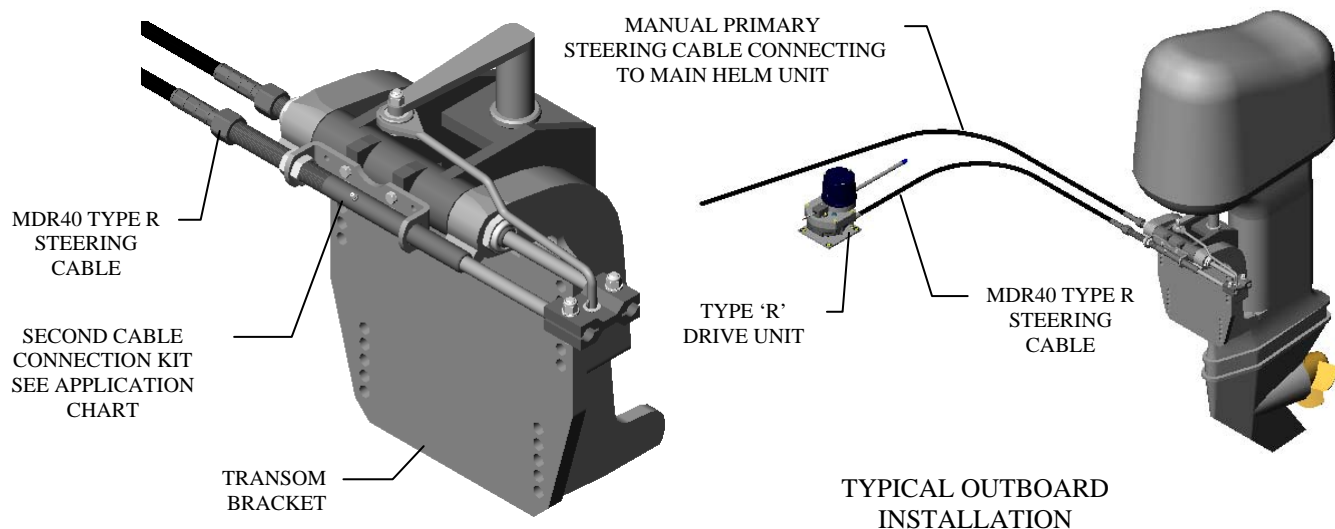


TYPICAL HORIZONTAL
MOUNT

C1 STEP 2 – Determine Type of Cable Connection Kit

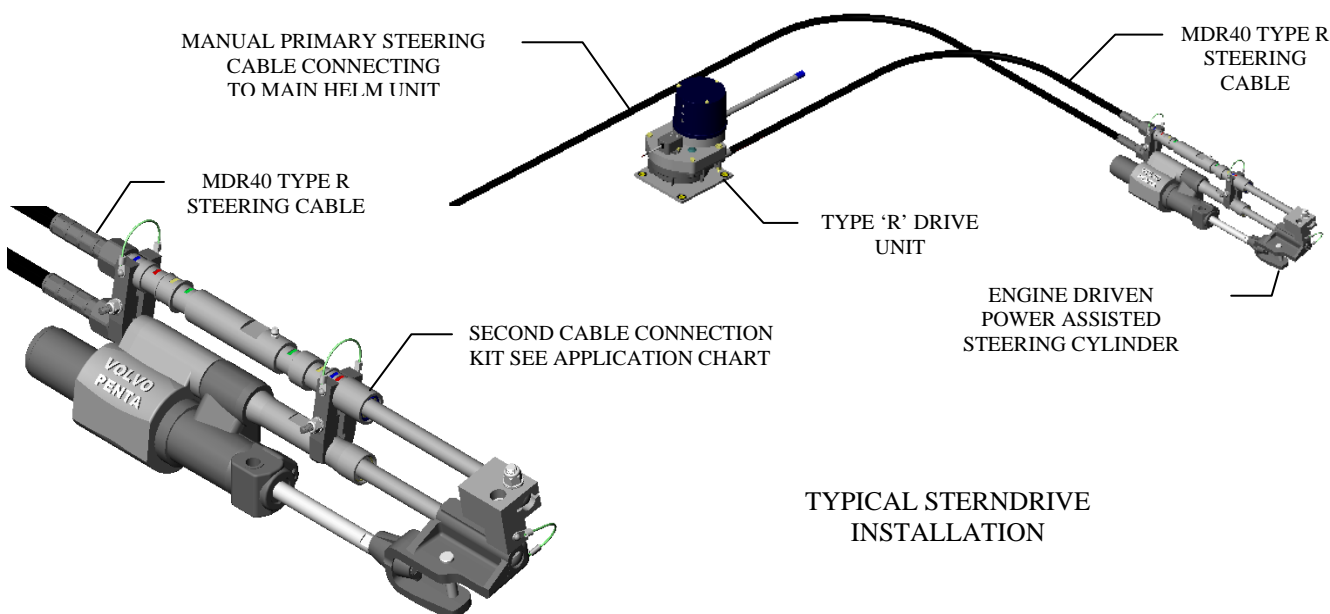
C1a OUTBOARDS

1. Starting at approximately 70 HP, most outboard engines can facilitate the addition of a second cable connection kit. The connection kit attaches to a bolt pattern on the front face of the tilting member of the transom bracket. A typical arrangement is shown in graphic below. See application chart for further details.



C1b STERNDRIVES

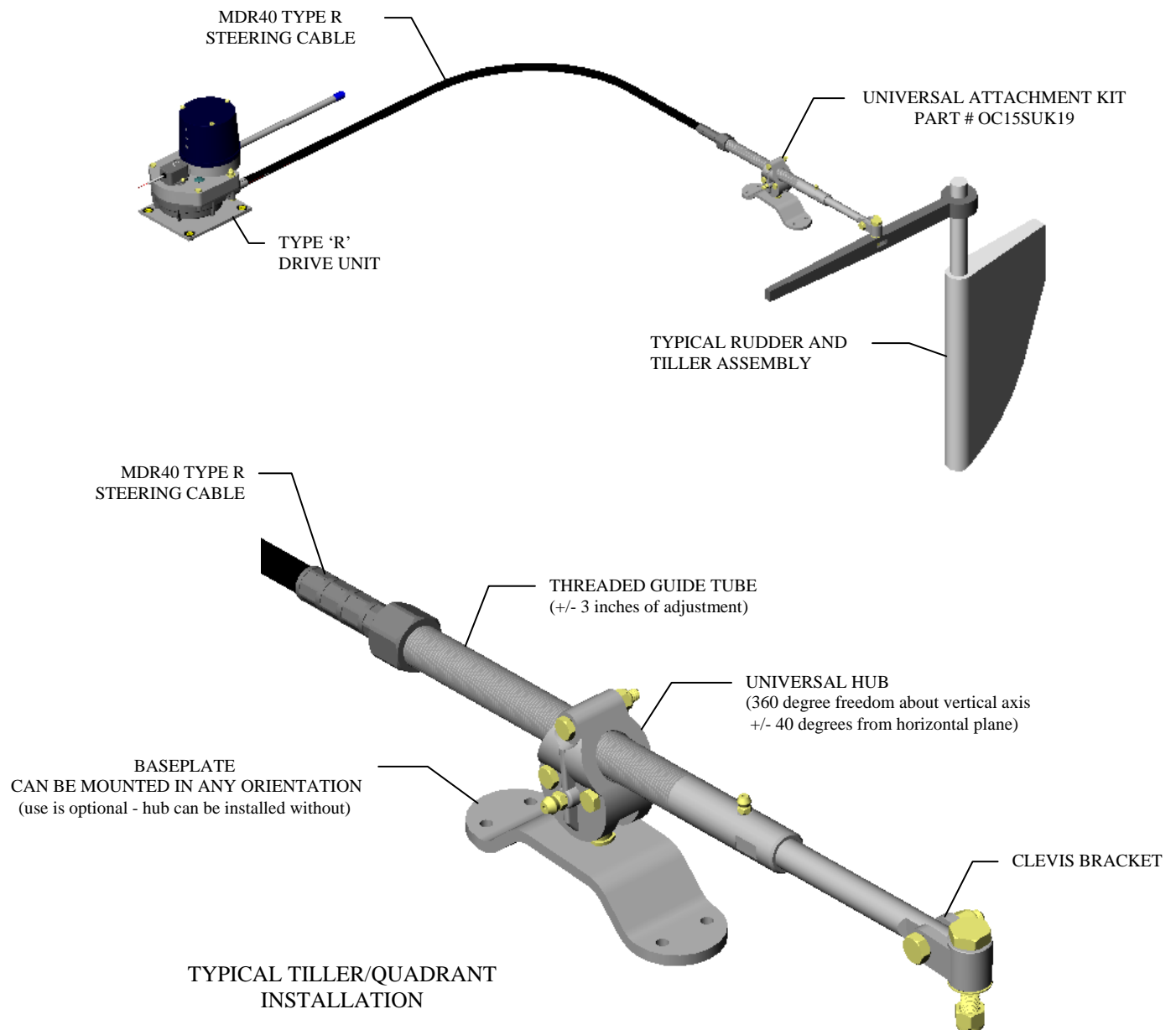
1. Sterndrives usually have engine driven power assisted hydraulic steering, which is CONTROLLED by a manual helm and push pull steering cable. Using a second cable connection kit, the MDR40 type R drive unit can be attached to most of the popular sterndrive steering cylinders. A typical arrangement is shown in the graphic below. See application guide for further details.



C1 STEP 2 – Determine Type of Cable Connection Kit (Continued)

C1c INBOARDS & SAILBOATS

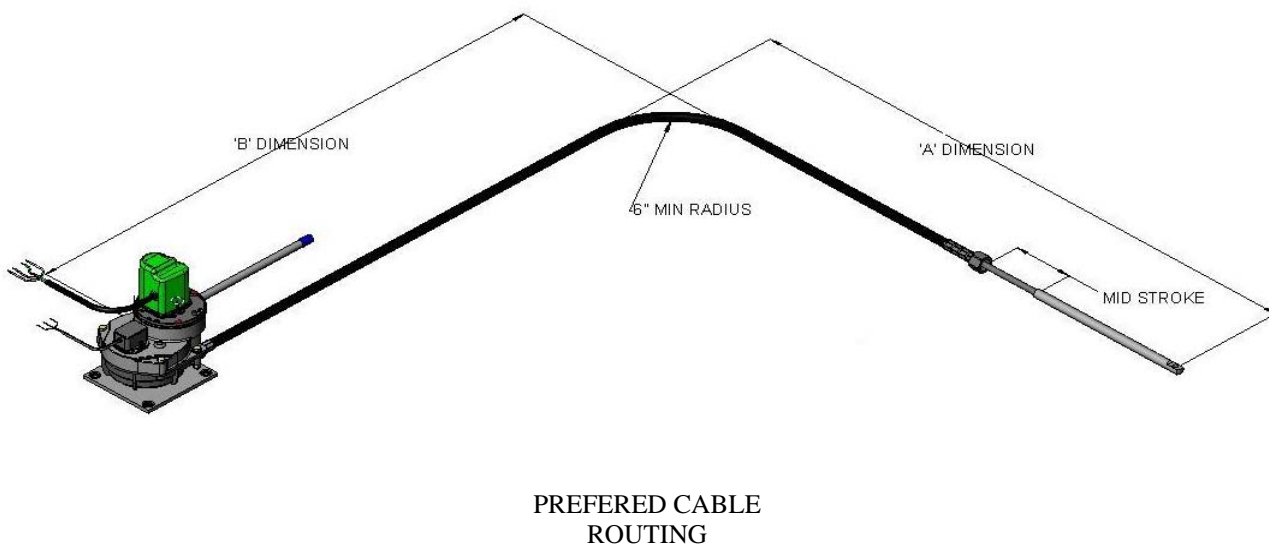
1. The MDR40 Type R drive can control mechanically steered smaller inboards or sailboats with access to a quadrant or tiller. In all cases the existing primary steering system **MUST** be capable of being **BACK DRIVEN**. Using a universal second cable connection kit, the type R drive can be attached in a variety of ways. Note that custom brackets may be required. A typical arrangement is shown in graphic below.



D1 STEP 3 – Determine Routing and Length of Steering Cable

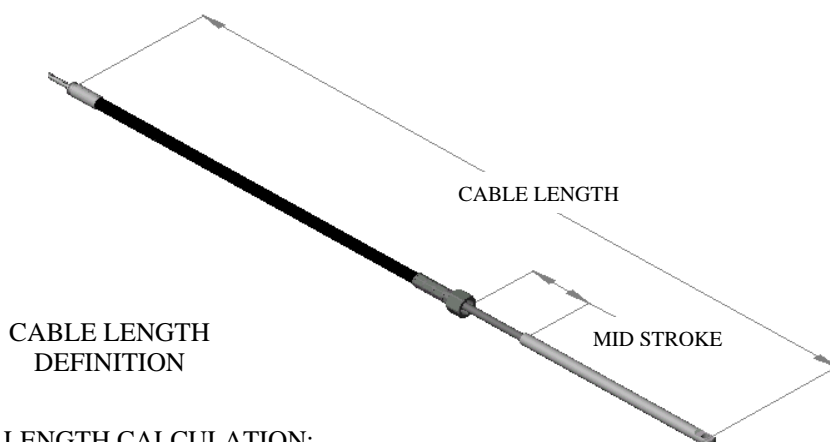
D1a Cable Routing

1. mdr40 type R Steering Cable must be determined.
2. The cable routing should take into consideration the extreme movements of the steering mechanism during HO to HO steering and also tilt movements on the outboards. Care should be taken to maximize the bend radius and to minimize the total number of bends. It is recommended that bends are no smaller than the minimum bend radius (6") and that the total angle of all bends combined be minimized and no larger than 270 degrees. See detailed graphic showing preferred routing and bend definition.



D1b. Cable Length Calculation

1. When the Steering Cable Routing has been determined, the required cable length can be measured.
2. Use a length of rope or electrical cable to simulate the routing, then measure the total length required. See graphic of cable length definition.



EXAMPLE OF STEERING CABLE LENGTH CALCULATION:

Add 'A' + 'B' dimensions and subtract 4" for a 90 degree bend. Round UP result to nearest full foot size.

For steering cable x length in feet order OC15109-XX

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E1 STEP 4 – Accessory Selection Review

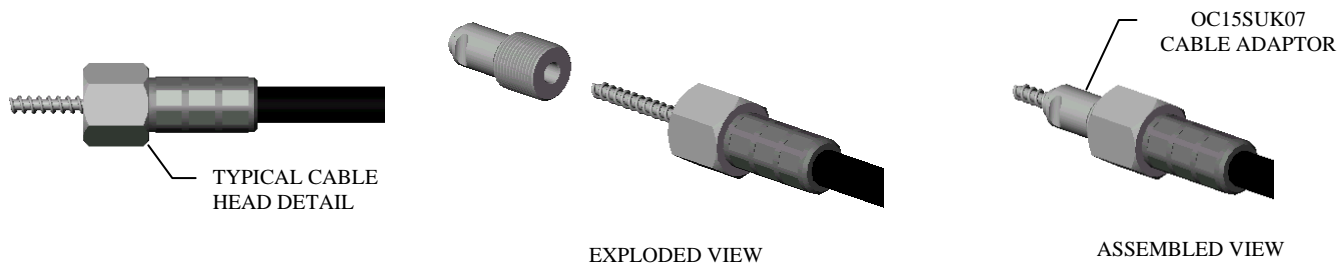
There are 2 types of accessory to be considered.

E1a RUDDER FEED BACK MECHANISM: All autopilot installations require a rudder angle feed back device. The Octopus mechanism is based upon a rotary potentiometer, attaches directly to the drive unit with 2 screws and the calibration procedure is simple. Alternate devices attach directly to the tiller arm using a linkage mechanism; they require hard wiring and adequate protection from the elements and in many cases from accidental damage due to poor stowage of equipment or simply being stepped on. See graphic E3 on page 8 for further details.

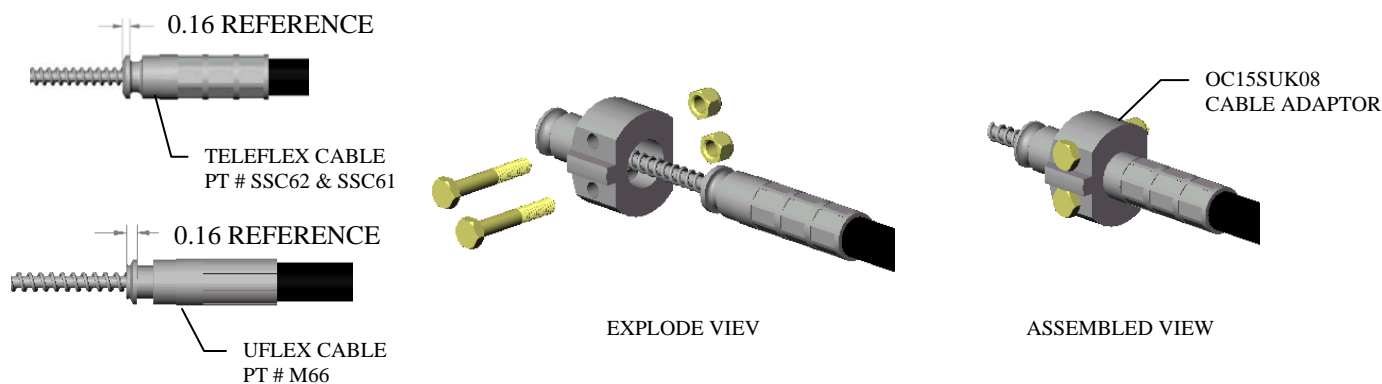
E1b STEERING CABLE ADAPTERS: Used when adapting steering cables designed to mate with different helms. The most popular types of rotary steering cable can be adapted to mate with the MDR40 type R drive unit. See graphics E2 below.

E2 Accessories - Steering Cable Adapters - Graphics

- a. For Morse Cable Pt # 304415 or Teleflex Cable Pt # SSC72 or Uflex Cable Pt # M47 - Order OC15SUK07



- b. For Teleflex Cable Part # SSC62 & SSC61 or Uflex Cable Part # M66. - Order 15SUK08



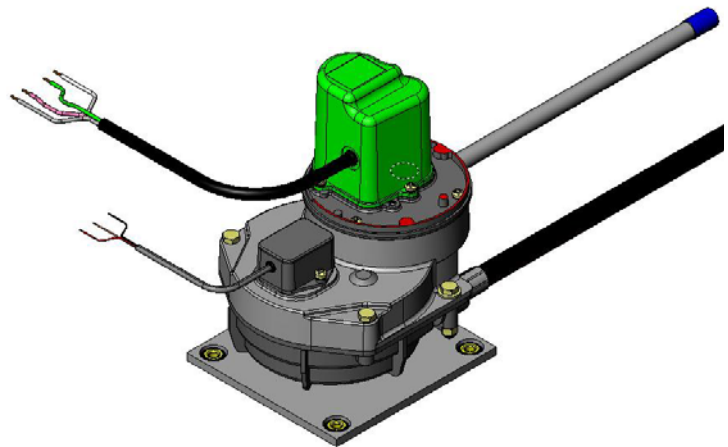
E3 Accessories – Rudder Feed Back Module - Graphics

REQUIRED PARTS:

- a. Octopus Part Number OC15SUK06A THRU F
(supply autopilot model & manufacturer)

MECHANICAL CALIBRATION PROCEDURE

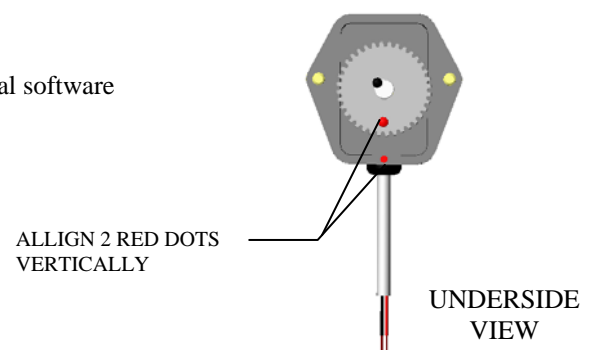
1. Before installing the drive unit into the vessel, disassemble the RFB module from the drive housing, by removing 2 attach screws.
2. Install the drive unit into the vessel and install the remote steering cable following the drive installation guide.
3. Complete the electrical hook up of the drive following the drive-autopilot installation guide.
4. Complete the electrical hook up of the RFB module following the drive-autopilot installation guide.
5. Center the gear on the RFB module by aligning the red paint mark on the gear with the red paint mark on the housing as shown in underside view graphic below.
6. By turning the steering wheel of the helm unit, centre the rudder. Note that on power assisted steering systems, you may need to run the engine to achieve this.
7. Reassemble the RFB module to the drive housing and install and tighten the 2 attach screws. Ensure that the mesh between the RFB module and the drive gear is not excessive.
8. See autopilot installation guide for instructions on additional software controlled RFB fine calibration and HO limitation.



COMPLETE INSTALLATION



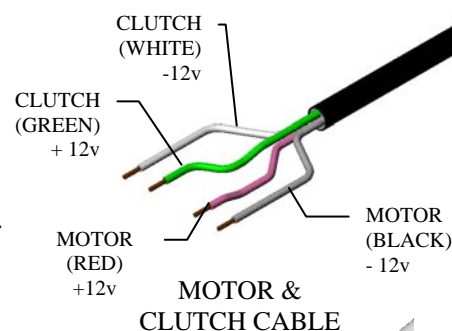
RFB MODULE



F1 Electrical Hook Up

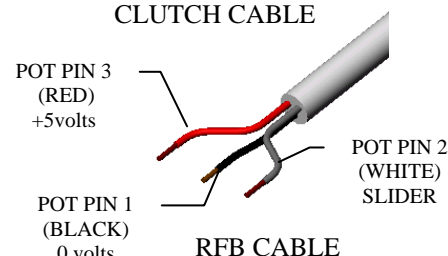
F1a Motor and Clutch Power Supply Cable

- Following Auto Pilot manufacturers installation guide and wiring diagram, connect 4 x16 AWG wires (supplied in jacketed cable from drive) with Auto Pilot junction box.
- Following Auto Pilot manufacturers installation guide, perform electrical tests.



F1b Rudder Feed Back Signal Cable

- Following Auto Pilot manufacturers installation guide and wiring diagram, connect 3 x 24 AWG wires + shield core (supplied in jacketed cable) from RFB module with Auto Pilot junction box.
- Following Auto Pilot manufacturers installation guide, perform electrical tests.



G1 System & Accessory Checklist

CHECKLIST 1					
MDR REMOTE MOUNT A/P DRIVE SYSTEM					
DESCRIPTION				PART NUMBER	ORDER
MANDATORY SELECT 1 DRIVE UNIT + 1 ENGINE CONNECTION KIT + 1 STEERING CABLE x LENGTH	BASIC SYSTEM	drive unit		AFMDRERW (with RFB - supply a/p make & model)	
				AFMDREW (without RFB)	
		engine connection kit	outboard	engine specific see application chart 8	
			sterndrive	drive specific see application chart 9	
			inboard	OC15SUK19	
		steering cable		OC15109-XX (length calculated from routing path)	
OPTIONAL ACCESSORY SELECTIONS	RUDDER FEED BACK	RFB potentiometer module (supply autopilot model & manufacturer)		OC15SUK06 A thru F	
	STEERING CABLE OPTIONS	adaptor for TFX SSC61		OC15SUK08	
		adaptor for TFX SSC62		OC15SUK08	
		adaptor for TFX SSC72		OC15SUK07	
		adaptor for MORSE 304415		OC15SUK07	
		adaptor for UFLEX M47		OC15SUK07	

H1 Outboard Engine Connection Kit Application Chart

APPLICATION CHART 8				
OUTBOARD ENGINE SECOND CABLE CONNECTION KIT				
DESCRIPTION			CONNECTION KIT PART #	ORDER
ENGINE MAKE	ENGINE TYPE	COMMENTS		
YAMAHA	70 hp upwards	1. Yamaha engines have metric threads	OC15SUK15A	
SUZUKI	DT75 - DT225 DF60 - DF140	1. All engines	OC15SUK15B	
HONDA	BF75 upwards	1. All engines	OC15SUK15B	
MERCURY MARINER	70 hp upwards	1. From 1985 & newer	OC15SUK15B	
FORCE	90 hp & 120 hp	1. From 1996 & newer	OC15SUK15B	
JOHNSON EVINRUDE	70 hp upwards	1. 2 stroke only . 3 cyl-V6, 1989 & newer except 88 hp & 112 hp.	OC15SUK15B	
JOHNSON	70 hp upwards	1. 4 Stroke only. (same application as Suzuki)	OC15SUK15B	
Note : 1. To accommodate a second cable bracket, there must be a 4 hole bolt pattern on the front of the tilting bracket (usually on a raised surface), just above the tilt tube. 2. Hydraulic steering is more common on engines starting at 110 hp upwards.				

H2 Sterndrive Connection Kit Application Chart

APPLICATION CHART 9				
STERNDRIVE SECOND CABLE CONNECTION KIT				
DESCRIPTION			CONNECTION KIT PART #	ORDER
STERNDRIVE MAKE	ENGINE/DRIVE TYPE	COMMENTS		
VOLVO	Gasoline & Diesel powered SX & DP-S drives from 1997	1. Gasoline power more common in N. American market 2. Diesel engines AD31 & KAD32 offered with SX & DP-S drives	OC15SUK12B	
MERCUISER	Alpha 1 gen II & Bravo drives from 1994	1. DHB power steering system fitted to all drives both gasoline and diesel powered since 1994	OC15SUK12B	
VOLVO	Diesel powered DP-E/G drives	1. Diesel engines more common outside North America	OC15SUK12C	
MERCUISER	Alpha 1 gen II & Bravo drives 1983 thru 1993	1. Saginaw power steering system fitted to all drives both gasoline and diesel powered since 1983	OC15SUK12C	

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