


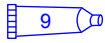

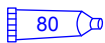
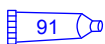
Drive System

Section 8A - Technodrive Transmissions


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Lubricants, Sealants, Adhesives

Tube Ref No.	Description	Where Used	Part No.
	Cleaning solvent	Transmission filter element	Obtain Locally
	Loctite 567 PST Pipe Sealant	Service port plug	92-809822
	Liquid Neoprene	Neutral start switch and fluid temperature switch wire connections	92- 25711 3
	SAE engine oil 30W	Transmission filter element O-ring	Obtain Locally
	Engine Coupler Spline Grease	Transmission input shaft splines and engine drive plate splines	92-802869A 1

Specifications

MODEL NO. <input type="text"/>		RATIO <input type="text"/>
BOM NO. <input type="text"/>		SERIAL NO. <input type="text"/>
OIL CAPACITY <input type="text"/> GAL.	MARINE TRANSMISSION	CUSTOMER NO. <input type="text"/>
<p>LUBRICATION:</p> <p>EVERY 10 SERVICE HOURS OR DAILY: _____ CHECK OIL LEVEL WITH ENGINE RUNNING AND MARINE TRANSMISSION IN NEUTRAL.</p> <p>EVERY 100 HOURS (WHERE A GREASE FITTING IS PROVIDED): _____</p> <p>LUBRICATE OUTPUT SHAFT SEALS WITH WATER PUMP GREASE TO PREVENT BILGE WATER ENTERING HOUSING.</p> <p>EVERY 1000 SERVICE HOURS OR 6 MONTHS, WHICHEVER COMES FIRST: _____ DRAIN AND REFILL HOUSING WITH CLEAN OIL. REMOVE AND REPLACE FILTER ELEMENT WHERE APPLICABLE. CLEAN SUCTION SCREEN.</p> <p>IMPORTANT: WARRANTY IS VOID UNLESS TRANSMISSION IS LUBRICATED AND MAINTAINED AS SPECIFIED IN THE SERVICE MANUAL AVAILABLE ON REQUEST. REFER TO "MARINE TRANSMISSION LUBRICANT" PLATE SHIPPED WITH UNIT.</p> <p>(BILL OF MATERIAL NO. MUST BE GIVEN WHEN ORDERING PARTS.)</p> <p>TWIN DISC INCORPORATED RACINE, WI. 53403 U.S.A.</p> <p>MADE IN U.S.A.</p> <p>204098C</p> <p>29956</p>		

Transmission ID and specifications plate

Operating Specifications	
Description	Specification
Operating Temperature	60° to 105° C (130° to 221° F)
Maximum shift speed	900 RPM
Maximum engine speed in trolling mode	1200 RPM

Pressure Specifications		
Description	Specification	
Shifting Pressure at 60° C (140° F)	Forward gear position (test port A)	1300 to 1500 kPa (188 to 217 PSI) at 1000 RPM
	Reverse gear position (test port B)	

Ratios and Part Numbers		
Ratio (Normal)	Technodrive	Mercury Marine Part Number
1.54 : 1	TM345A (Twin Disc MG-5005A)	
2.00 : 1		
2.47 : 1		

NOTE: All capacities are approximate fluid measures. ALWAYS use the dipstick to determine the exact fluid level.

Fluid Specifications			
Manufacturer	Model	Capacity	Fluid Type
Techodrive	TM345A (Twin Disc MG-5005A)	1.6 liters (1.7 U.S. qt.)	API Class CD SAE 20 or API Class CD SAE 30 engine oil

Important Information

Transmission Service Refer to the appropriate manufacture supplied service manual for detailed inboard transmission service information.

Engine All current production engines are left-hand rotation. Engine rotation is described when observed from the rear of the engine (transmission end) looking forward (water pump end). The Installed angle of the transmission and the engine should not exceed a maximum of 12 degrees deviation from a plane formed by the water line.

Propeller Propeller rotation is described when observed from the rear of the boat (stern) looking forward (bow). The term left-hand (LH) refers to rotation in a counterclockwise direction. The term right-hand (RH) refers to rotation in a clockwise direction. A LH propeller will move the boat forward when rotated counterclockwise. A RH propeller will move the boat forward when rotated clockwise.

Precautions

The transmission gear ratio is marked on the transmission identification plate, which is located on the top of the transmission. Transmission rotation is described when viewed from the rear of transmission.

- Do not start or crank the engine without fluid in the transmission.
- Except in an emergency, never shift the transmission at engine speeds above 1000 RPM
- Free wheeling of one propeller (in a twin-engine boat) at trolling speeds will not cause damage to the transmission; however, boat operation above trolling speed should be avoided. Ensure that proper fluid level exists before free wheeling the propeller.
- Always repair or replace the oil cooler and hoses after a transmission failure or prior to installing a new or rebuilt transmission. Metallic particles from a failure tend to collect in the cooler and hoses and will gradually flow back into the fluid system and damage the transmission.
- Always use the specified oil cooler, hoses, and fittings.

Transmission And Propeller Rotation

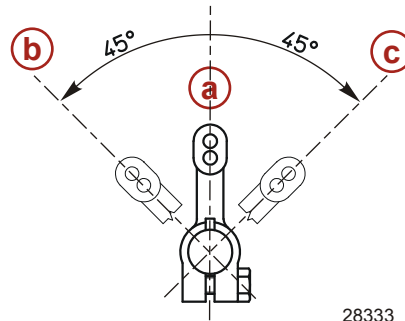
Refer to the appropriate Technodrive installation manual and the instructions provided with your remote control for additional information including shift cable installation instructions.

This Technodrive transmission will transmit full power in both forward and reverse gear, allowing the use of a standard LH rotation engine for either LH or RH propeller rotation. Propeller rotation is determined by the shift cable attachment at the remote control.

IMPORTANT: Remote control and shift cable installation must allow the transmission shift lever to travel through its full range of motion from a positive detent forward gear position, to the correct neutral position, and to a positive detent reverse gear position.

Forward gear (RH or clockwise output) is selected by rotating the shift lever counterclockwise from its neutral detent position.

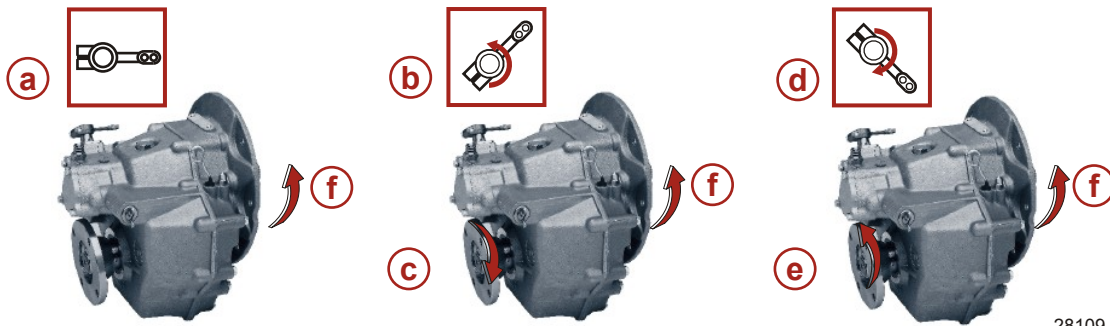
Reverse gear (LH or counterclockwise output) is selected by rotating the shift lever clockwise from its neutral detent position.



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a - Neutral gear position
b - Forward gear position

c - Reverse gear position



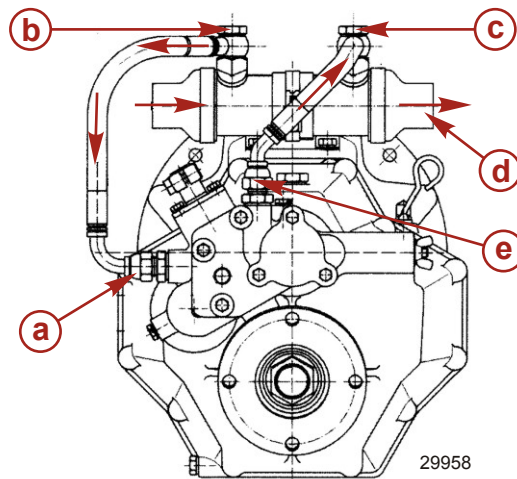
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TM 345 Technodrive

a - Neutral shift lever position (top view)
b - Forward gear shift lever position (top view)
c - Forward gear output shaft rotation (RH or clockwise)
d - Reverse gear shift lever position (top view)
e - Reverse gear output shaft rotation (LH or counterclockwise)
f - Transmission input shaft rotation direction (LH or counterclockwise)

Technodrive Transmission Fluid

Fluid Flow



Transmission fluid and coolant flow

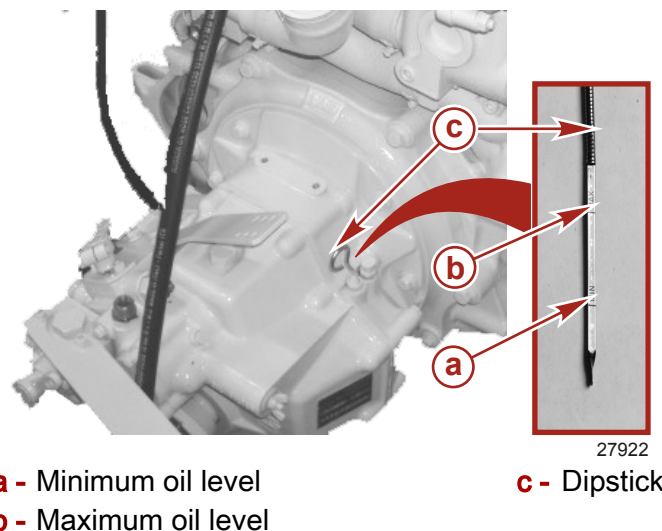
- | | |
|-------------------------------------|--------------------------------------|
| a - Transmission fluid inlet | d - Fluid cooler water flow |
| b - Fluid cooler outlet | e - Transmission fluid outlet |
| c - Fluid cooler inlet | |

Checking

1. Remove the dipstick.
2. Perform a preliminary check the oil level as indicated on the dipstick with the dipstick fully inserted into the dipstick receptacle.

NOTE: The oil level may be somewhat over the maximum mark, as some of the oil from the transmission oil cooler and hoses may have drained back into the transmission.

3. If the oil level is below the minimum mark on the dipstick, add transmission oil. See **Filling**.



- | | |
|------------------------------|---------------------|
| a - Minimum oil level | c - Dipstick |
| b - Maximum oil level | |

4. Clean and install the dipstick.

IMPORTANT: To ensure an accurate indication of the oil level, operate the engine at 1500 RPM for 2 minutes immediately before checking the oil level.

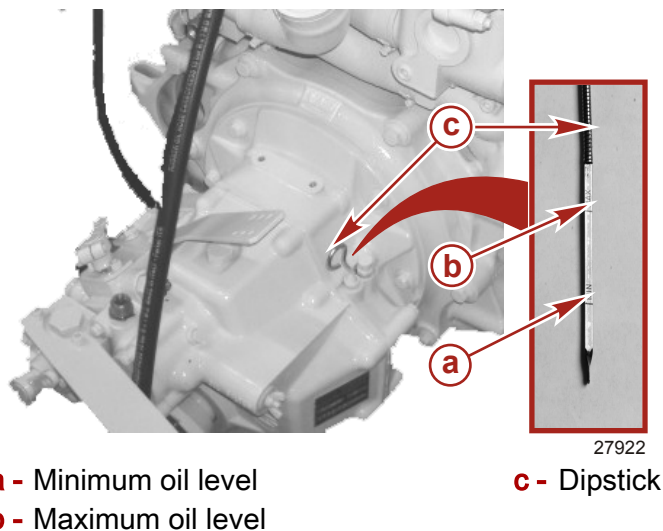
5. Start the engine and operate at 1500 RPM for 2 minutes to reach operating temperature and fill all of the transmission's hydraulic circuits.
6. Stop the engine and quickly check the oil level with the dipstick.
7. If the oil level is low, add transmission oil to bring the level up to the maximum mark on the dipstick. See **Filling**.

NOTE: If the transmission oil level was extremely low, see your local Cummins MerCruiser Diesel Authorized Repair Facility.

8. Clean and install the dipstick.

Filling

1. If necessary, add the specified transmission oil through the dipstick receptacle to bring the level up to the maximum mark on the dipstick.



NOTE: Always use the dipstick to determine the quantity of oil required.

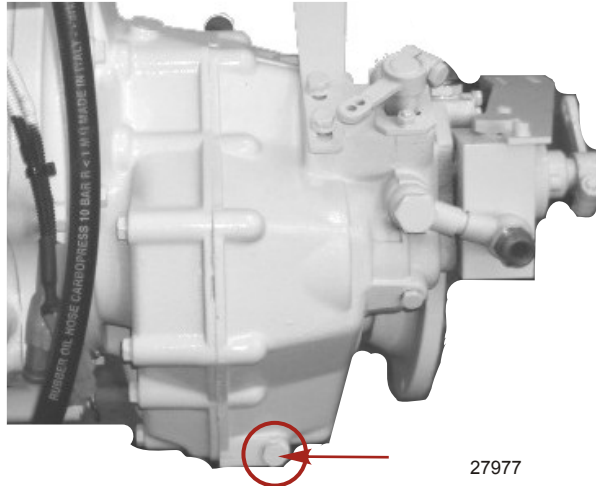
Model	Capacity	oil type	Part Number
Technodrive 345A	1.6 liters (2.7 qt.)	API Class CD SAE 20 or API Class CD SAE 30 engine oil	Obtain Locally

2. Clean and install the dipstick.
3. Check the oil level. See **Checking**.

Changing

1. Remove the dipstick.

2. Remove the transmission oil drain plug and drain the transmission into a suitable container.

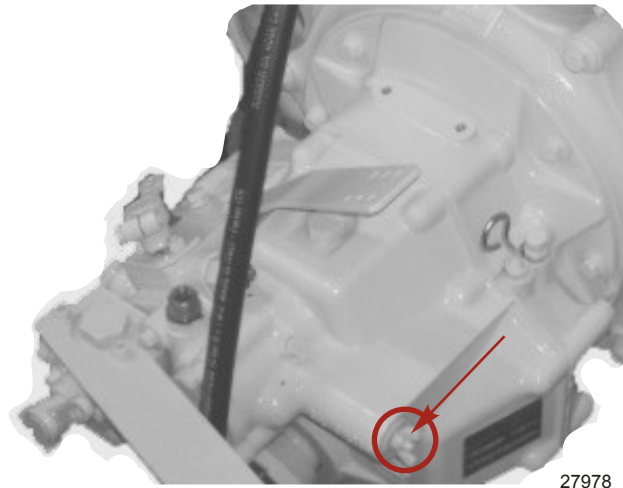


Transmission drain plug

3. Contain and dispose of the oil and oil waste according to applicable regulations.
4. Reinstall the transmission oil drain plug.
5. Torque the drain plug.


Description	Nm	lb. ft.
Transmission oil drain plug	17	12.5

6. Clean the exterior of the transmission around the oil filter assembly.
7. Loosen the retaining nut.




Transmission oil filter retaining nut

8. Remove the filter element.
9. Clean the oil filter element using the cleaning solvent.

Tube Ref No.	Description	Where Used	Part No.
	Cleaning solvent	Transmission filter element	Obtain Locally

10. Lubricate the oil filter O-rings.

Tube Ref No.	Description	Where Used	Part No.
 80	SAE engine oil 30W	Transmission filter element O-ring	Obtain Locally

11. Reinstall the filter element.

NOTICE

Improper installation of the transmission fluid filter assembly may cause the fluid to foam or leak out, resulting in decreased efficiency and damage to the transmission. Properly seat the transmission fluid filter during installation.

12. Tighten the retaining nut.

13. Fill the transmission to the proper level with the specified oil. See **Filling**.

Technodrive Transmission

Removal

⚠ WARNING

Performing service or maintenance without first disconnecting the battery can cause product damage, personal injury, or death due to fire, explosion, electrical shock, or unexpected engine starting. Always disconnect the battery cables from the battery before maintaining, servicing, installing, or removing engine or drive components.

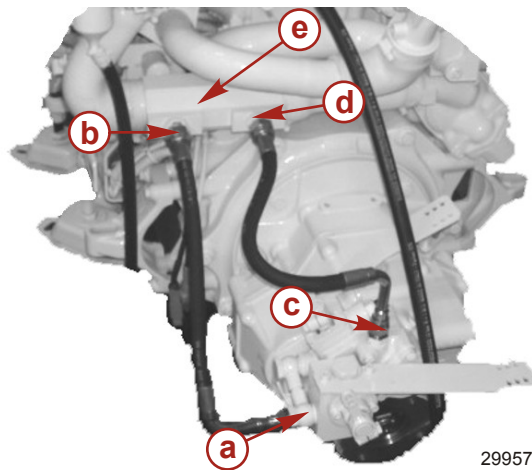
NOTICE

Discharge of oil, coolant, or other engine/drive fluids into the environment is restricted by law. Use caution not to spill oil, coolant, or other fluids into the environment when using or servicing your boat. Be aware of the local restrictions governing the disposal or recycling of waste, and contain and dispose of fluids as required.

NOTE: The following procedure describes removal of the transmission without removing the engine. If the engine must be removed, see **Section 2**.

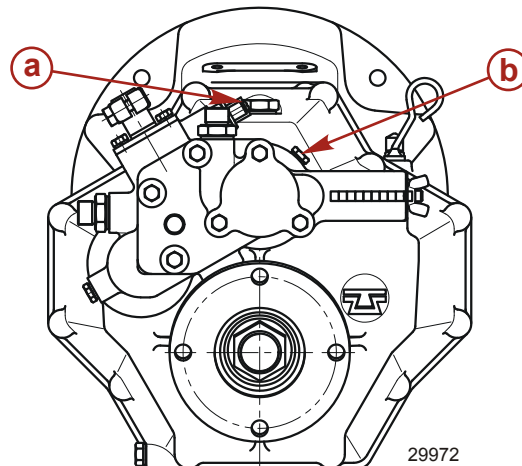
1. Disconnect the battery cables from the battery.
2. If required, drain the transmission fluid.

3. Disconnect the transmission fluid cooler hoses.



- a** - Transmission fluid inlet
- b** - Fluid cooler outlet
- c** - fluid cooler inlet
- d** - Transmission fluid outlet
- e** - Fluid cooler

4. Disconnect the shift cable from the transmission.
5. Disconnect the wires from the neutral start switch.



- a** - Neutral start switch
- b** - Temperature switch (optional)

6. Disconnect the wires from the transmission fluid temperature switch (optional).
7. Loosen the trunnion clamping fasteners on the engine mounts (port and starboard).
8. Remove the nuts and bolts from the coupling and separate the propeller shaft coupler from the transmission output flange.
9. Remove the four rear engine mount to engine bed fasteners and hardware.
10. Support the rear part of the engine using a suitable hoist, or put wooden blocks under the flywheel housing.
11. Support the transmission with a hoist or by other suitable means through the lifting eye on the transmission case.
12. Remove the port and starboard rear mount brackets (with base and trunnion) from the transmission.

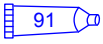
NOTICE

The weight of an unsupported transmission can bend the transmission input shaft or damage the engine coupler. Do not permit the splines of the input shaft or coupler to support the weight of the transmission. Completely support the transmission during removal, and until the attaching hardware is secured during installation.

13. Remove all hardware attaching the transmission to the flywheel housing.
14. Pull the transmission straight back and away from the engine to completely disengage the splines on the input shaft.
15. Carefully lift out the transmission.

Installation

1. Check the transmission output shaft rolling torque.
2. Apply lubricant to the transmission input shaft splines and engine drive plate splines.

Tube Ref No.	Description	Where Used	Part No.
 91	Engine Coupler Spline Grease	Transmission input shaft splines and engine drive plate splines	92-802869A 1

3. Using a suitable hoist, position the transmission in the boat and align the transmission splines with the drive plate splines.
4. Push the transmission into place and secure with attaching hardware.

Description	Nm	lb. ft.
Transmission to flywheel housing fasteners	61	45

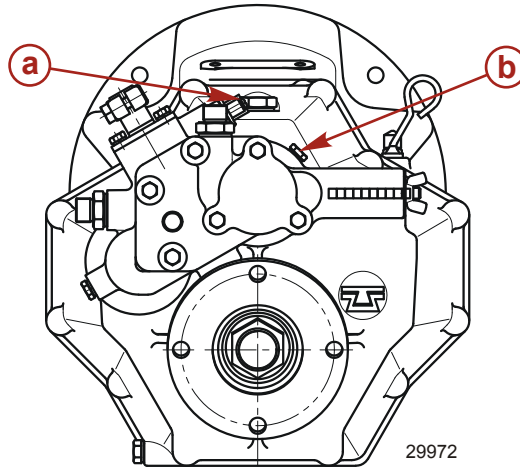
5. Remove the hoist.
6. Install the rear mount brackets to the transmission. Torque the fasteners and hardware.

Description	Nm	lb. ft.
Rear mount brackets to transmission fasteners	61	45


7. Using a hoist, raise the engine and transmission to remove blocks, if employed.
8. Lower the assembly to the engine bed.
9. Relieve hoist tension.
10. Securely tighten the four rear engine mount to bed fasteners with hardware.
11. Install the transmission fluid cooler hoses. Torque the hose fittings at the transmission housing.

Description	Nm	lb. ft.
Transmission fluid cooler hose fitting	34	25

12. Connect the neutral start switch and fluid temperature switch wiring. Coat the connections with sealant.



- a** - Neutral start switch
b - Fluid temperature switch (optional)

Tube Ref No.	Description	Where Used	Part No.
 25	Liquid Neoprene	Neutral start switch and fluid temperature switch wire connections	92- 25711 3

IMPORTANT: Improper shift cable adjustment can cause premature clutch failure.

13. Connect and adjust shift cables. See **Section 2C**.
 14. Check engine final alignment. See **Section 2C**.

IMPORTANT: All coupler bolts must be SAE Grade 8 (Metric Grade 10.9) or better, with a shoulder (grip length) long enough to pass through the face mating plane of couplers.

15. After final engine and coupler alignment has been properly set (with the boat in the water), connect the propeller shaft coupler to the transmission output flange with bolts, lockwashers, and nuts. Torque the bolts.

Description	Nm	lb. ft.
Propeller shaft coupler to transmission output flange bolt	68	50

IMPORTANT: Be certain to torque the trunnion clamping fasteners on the engine mounts (port and starboard) that were loosened during removal.

16. Torque the trunnion clamping bolts on the engine mounts (port and starboard) that were loosened during removal.

Description	Nm	lb. ft.
Trunnion clamping bolts	57	42

17. Refill the transmission with the specified fluid. See **Filling**.
 18. Connect the battery cables.
 19. Check for leaks and check the fluid level after the first engine start-up.

Shift Control Cables

Removal

IMPORTANT: For removal of the remote control end of the shift cable and remote control service in general, refer to the instructions provided by the boat or the remote control manufacturer.

1. Detach the cable barrel from the transmission cable bracket.
2. Detach the cable end guide from the transmission shift lever.

Cleaning

1. Remove any accumulated dirt and lubricant from the shift cable and shift cable housing.
2. Clean exposed shift cable with a clean shop towel.
3. Lubricate the shift cable. See **Section 1 B—Maintenance - Lubrication**.

Inspection

1. Inspect the shift cable housing for breaks, splits, or cracks.
2. Inspect the shift cable for loose ends or cable fraying.
3. Replace the shift cable assembly if damaged or worn.
4. Check the tightness of all shift cable anchor and attaching hardware.

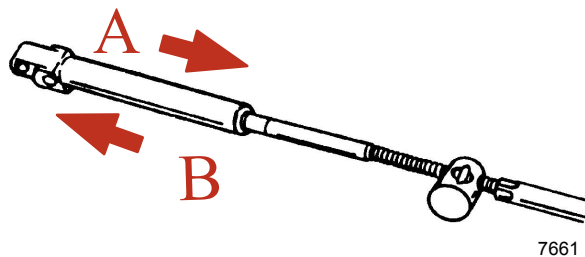
Adjustment

1. Confirm that shift cable operation allows the transmission shift lever to properly detent into neutral and both forward and reverse gear positions.
2. If the shift cable is out of adjustment the transmission end must be removed, the cable centered, and reinstalled. See **Installation**.

Installation

For right-hand propeller rotation: the control cable must be installed in the remote control so that the cable end will move in direction "A" when the shift handle is placed in the forward position.

For left-hand propeller rotation: the control cable must be installed in the remote control so that the cable end will move in direction "B" when the shift handle is placed in the forward position.



Forward approach shown

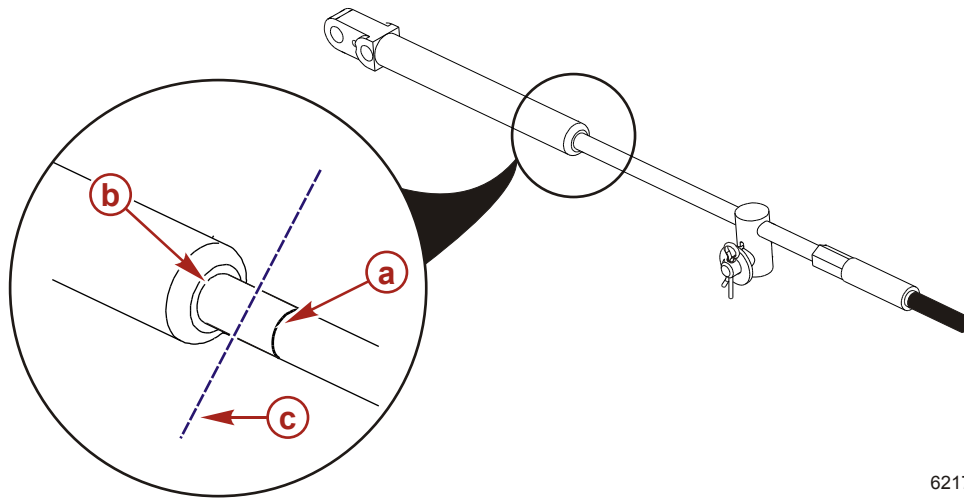
Rear approach reversed

IMPORTANT: When installing shift cables, ensure that the cables are routed to avoid sharp bends and/or contact with moving parts. Do NOT fasten any items to the shift cables.

NOTE: On models with other than Quicksilver shift cables, refer to the shift cable manufacturer's instructions.

1. Place the remote control shift lever and transmission shift lever in the neutral position.
2. Remove the nuts and washers from the shift cable attaching studs.
3. Locate the center of the remote control and control shift cable play (backlash), as follows:

- a. Ensure that the remote control is in the neutral position.
- b. Push in on the control cable end with enough pressure to remove play; mark position "a" on the tube.
- c. Pull out on the control cable end with enough effort to remove play; mark position "b" on the tube.
- d. Measure the distance between marks "a" and "b;" mark position "c" halfway between marks "a" and "b."



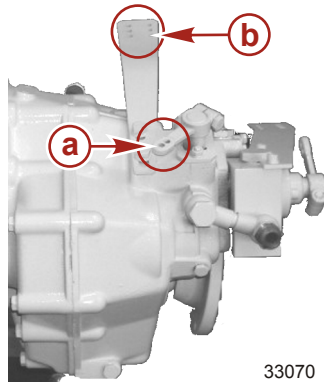
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4. Center the cable-end play, then adjust the cable barrel to align the holes in the barrel and in the cable end guide with the attaching points on the transmission.
5. Temporarily install the shift cable. Do not secure at this time.

IMPORTANT: The transmission is fully in gear when the shift lever comes to a stop, in either direction.

6. Place the remote control shift lever in the forward gear position. Ensure that the transmission is fully in gear, as follows:
 - a. Hold the shift lever in position.
 - b. Carefully slide the shift cable off of the anchor points.
 - c. Attempt to move the shift lever further.
 - d. Temporarily install the shift cable. Do not secure the cable at this time.
7. Place the remote control shift lever in the reverse gear position. Ensure that the transmission is fully in gear as follows:
 - a. Hold the shift lever in position.
 - b. Carefully slide the shift cable off of the anchor points.
 - c. Attempt to move the shift lever further.
 - d. Temporarily install the shift cable. Do NOT secure the cable at this time.

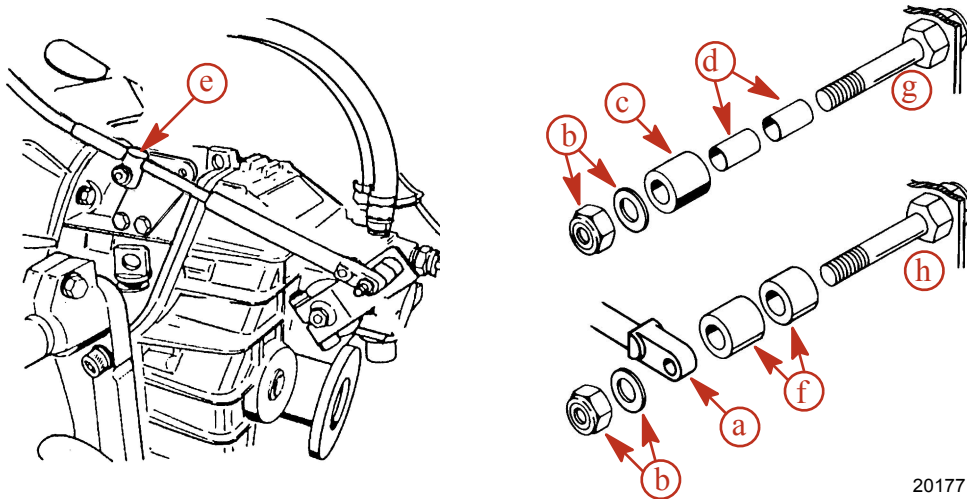
8. If the transmission shift lever will position properly in one gear, but not in the other, recheck the shift cable adjustment. If the transmission shift lever will not position properly in either gear, move the transmission shift lever stud from the top hole in the shift lever to the bottom hole and recheck for proper positioning. If proper positioning is still not obtained, the remote control does not provide sufficient shift cable travel and must be replaced.



- a** - Shift lever stud mounting
b - Cable anchor mounting

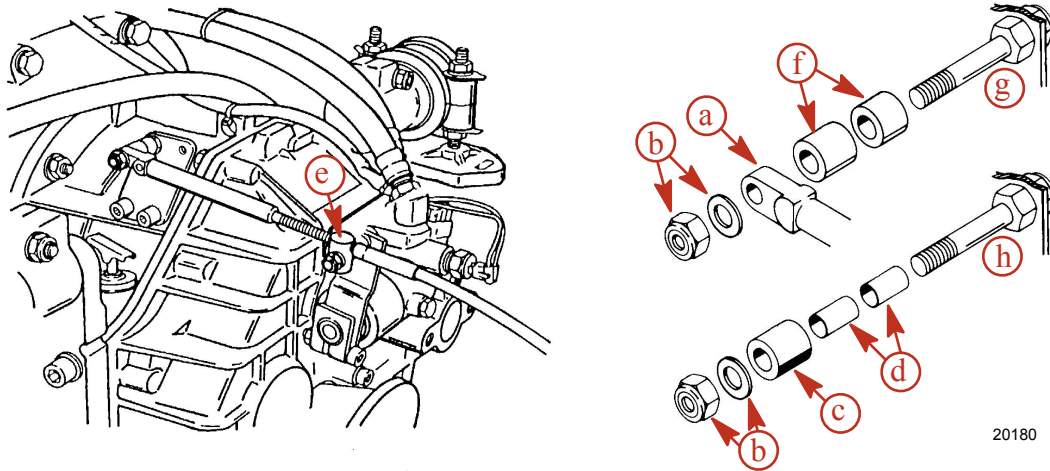
9. Install the locknut and washer to the cable end guide stud. Tighten until the nut seats, then loosen 1/2 turn.
10. Install the locknut and washer to the cable barrel stud. Tighten until the nut seats, then loosen 1/2 turn.

NOTE: To change the cable approach direction on single or dual station installations, only the spacers or bushings have to be switched to the opposite stud. The studs are identical.



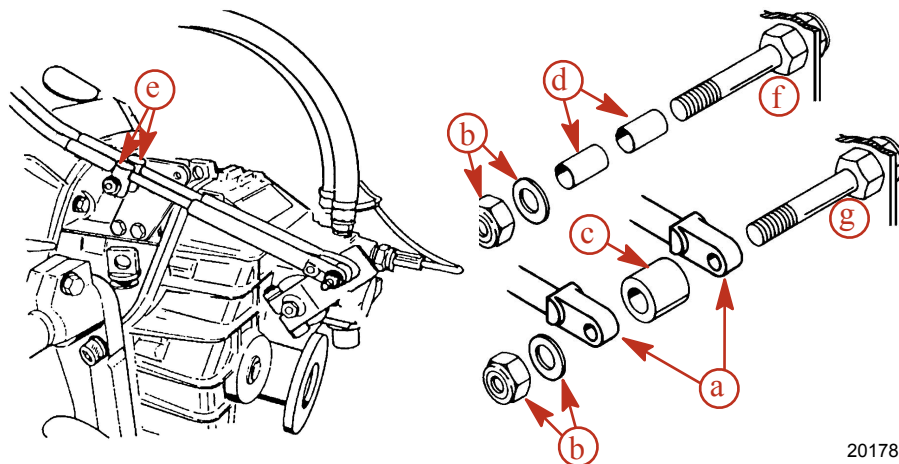
Typical single cable installation—forward approach

- | | |
|--|-------------------------------------|
| a - Cable end guide | e - Cable barrel |
| b - Locknut and washer | f - Spacers (fits over stud) |
| c - Spacer (fits over bushings) | g - Cable barrel stud |
| d - Bushing | h - Cable end guide stud |



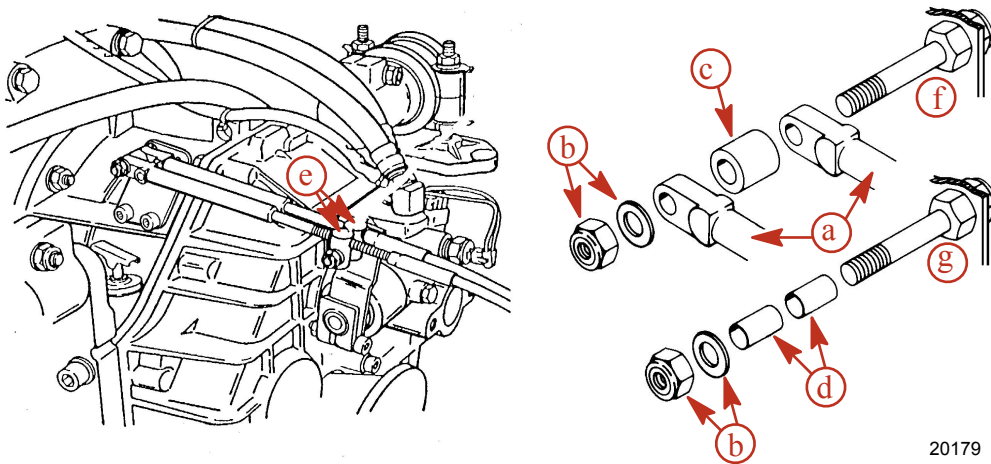
Typical single cable installation—rear approach

- | | |
|--|-------------------------------------|
| a - Cable end guide | e - Cable barrel |
| b - Locknut and washer | f - Spacers (fits over stud) |
| c - Spacer (fits over bushings) | g - Cable end guide stud |
| d - Bushing | h - Cable barrel stud |



Typical dual cable installation—forward approach

- | | |
|------------------------------------|---------------------------------|
| a - Cable end guide | e - Cable barrel |
| b - Locknut and washer | f - Cable barrel stud |
| c - Spacer (fits over stud) | g - Cable end guide stud |
| d - Bushing | |



Typical dual cable installation—rear approach

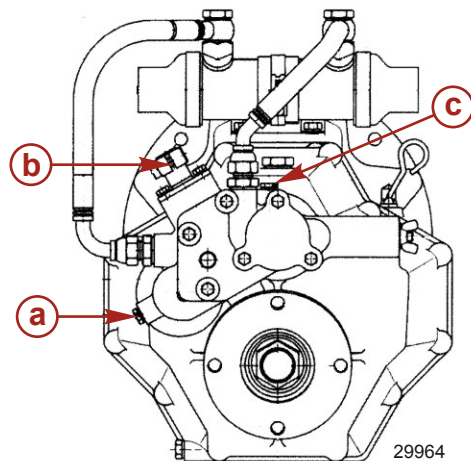
- | | |
|------------------------------------|---------------------------------|
| a - Cable end guide | e - Cable barrel |
| b - Locknut and washer | f - Cable barrel stud |
| c - Spacer (fits over stud) | g - Cable end guide stud |
| d - Bushing | |

Technodrive Trolling Valve Cable Installation and Adjustment

Refer to the appropriate transmission installation manual accompanying the particular gear for trolling valve cable installation and adjustment procedures.

Transmission Pressure Test

1. Remove the pressure service port plug from Port A.
2. Connect a suitable pressure gauge to Port A.
3. Remove the pressure service port plug from Port B.
4. Connect a suitable pressure gauge to Port B.



TM345A

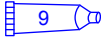
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|--------------------------------------|--------------------------------------|
| a - Reverse pressure (Port A) | c - Forward pressure (Port B) |
| b - Gear select lever | |

5. Operate the boat with a normal load until the engine and transmission reach normal operating temperature.

6. Confirm fluid temperature and shifting pressure against specifications.

Description	Specification	
Operating temperature	60° to 105° C (130° to 221° F)	
Shifting pressure	Reverse pressure (Port A)	1300 to 1500 kPa (188 to 217 PSI) at 1000 RPM
	Forward pressure (Port B)	

7. Repair or replace the transmission if measurements are not as specified. See the appropriate **manufacturer supplied transmission service manual**.
8. Remove the pressure gauges.
9. Apply sealant to the threads of the service port plugs.

Tube Ref No.	Description	Where Used	Part No.
 9	Loctite 567 PST Pipe Sealant	Service port plug	92-809822

10. Install and securely tighten the service port plugs.
11. Upon first operation, check for leaks.

Notes: