

# **SERVICE MANUAL**

Number 11

**Bravo Sterndrives**


# **MerCruiser #11 Bravo Sterndrives**

90-17431--4

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## Notice

Throughout this publication “Warnings” and “Cautions” (accompanied by the International HAZARD symbol ) are used to alert the mechanic to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly - OBSERVE THEM CAREFULLY! These “Safety Alerts” alone cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the service, plus “common sense” operation, are major accident prevention measures.

### **WARNING**

**WARNING - Hazards or unsafe practices which COULD result in severe personal injury or death.**

### **CAUTION**

**CAUTION - Hazards or unsafe practices which could result in minor personal injury or product or property damage.**

**IMPORTANT:** Indicates information or instructions that are necessary for proper operation and/or maintenance.

## Notice To Users of This Manual

This service manual has been written and published by the service department of the manufacturer to aid our dealers' mechanics and company service personnel when servicing the product described herein. It is assumed that these personnel are familiar with the servicing procedures of this product, or like or similar products. That they have been trained in the recommended servicing procedures of these products which includes the use of mechanics' common hand tools from other suppliers.

We could not possibly know of and advise the service trade of all conceivable procedures by which a service might be performed and of all possible hazards and/or results of each method. We have not undertaken any such wide evaluation. Therefore, anyone who uses a service procedure and/or tool which is not recommended by the manufacturer, first must completely satisfy himself that neither his nor the product's safety will be endangered by the service procedure selected.

All information, illustrations, and specifications contained in this manual are based on the latest product information available at time of publication.

As required, revisions to this manual will be sent to all dealers contracted by us to sell and/or service these products.

## Replacement Parts

### WARNING

Electrical system components on gasoline engines and MerCruiser Sterndrives are designed and manufactured to comply with U.S. Coast Guard Rules and Regulations to minimize risks of fire or explosion.

Use of replacement electrical systems components, which do not comply to these rules and regulations, could result in a fire or explosion hazard and should be avoided.

When servicing electrical systems, it is extremely important that all components are properly installed and tightened. If not, any electrical component opening would permit sparks to ignite fuel vapors from fuel system leaks, if they exist or develop.

### WARNING

Electrical system components on diesel engines are not external ignition protected. **DO NOT STORE OR UTILIZE GASOLINE ON BOATS EQUIPPED WITH THESE ENGINES, UNLESS PROVISIONS HAVE BEEN MADE TO EXCLUDE GASOLINE VAPORS FROM ENGINE COMPARTMENT (ref: 33 CFR).** Failure to comply could result in fire, explosion and/or severe personal injury.

## Models Covered in This Manual

MODEL	SERIAL NUMBER
Bravo One Sterndrive Unit	B664190 and Above
Bravo Two Sterndrive Unit	B892613 and Above
Bravo Three Sterndrive Unit	D763691 and Above
Bravo Transom Assembly (Standard) *	B673048 and Above
Bravo Transom Assembly (High Performance)	D796083 and Above
Bravo Transom Assembly (Magnum)	K104738 and Above

\* Some "Standard" Bravo Transom Assemblies could have been converted to "High Performance" Transom Assemblies by use of a High Performance Gimbal Ring Kit (822374A2). Refer to Transom Assembly sections of this manual for identification information.

### NOTICE

**Refer to appropriate engine service manual for engine repair.**

# Service Manual Outline

## Section 1 - General Information

- A - Important Information
- B - Maintenance
- C - Troubleshooting

## Section 2 - Removal, Installation and Adjustments

- A - All Models

## Section 3 - Sterndrive Unit

- A - Drive Shaft Housing
- B - Gear Housing - Bravo One
- C - Gear Housing - Bravo Two
- D - Gear Housing - Bravo Three

## Section 4 - Transom Assembly

- A - Service Procedures Requiring Minor Disassembly
- B - Service Procedures Requiring Major Disassembly

## Section 5 - Power Trim

- A - Oildyne Power Trim Pump
- B - Trim Cylinders
- C - Dual Power Trim Control
- D - Auto Trim II

## Section 6 - Steering Systems

- A - All Models

## Section 7 - Corrosion Protection

- A - All Models

## Section 8 - Accessories

- A - All Models

Important Information	<b>1</b>
Removal, Installation and Adjustment	<b>2</b>
Sterndrive Unit	<b>3</b>
Transom Assembly	<b>4</b>
Power Trim	<b>5</b>
Steering Systems	<b>6</b>
Corrosion Protection	<b>7</b>
Accessories	<b>8</b>

# Table of Contents

## GENERAL INFORMATION

### Section 1A - Important Information

How To Use This Manual . . . . .	1A-2	Sterndrive Unit 10-Hour Break-In Period (New or With Replacement Gears) . . . . .	1A-5
How To Read Parts Manual . . . . .	1A-3	Serial Number Locations and Engine Designation Decal . . . . .	1A-5
Introduction . . . . .	1A-4		
Directional References . . . . .	1A-4		
Propeller Rotation . . . . .	1A-4		

### Section 1B - Maintenance

Maintenance Schedules . . . . .	1B-2	Models With Gear Lube Monitor . . . . .	1B-9
Maintenance Intervals . . . . .	1B-2	Checking Lubricant for Water . . . . .	1B-10
Scheduled Maintenance That Can Be Performed By Owner/Operator . . . . .	1B-2	Changing Lubricant . . . . .	1B-12
Scheduled Maintenance That Can Be Performed by Dealer . . . . .	1B-3	General Maintenance . . . . .	1B-14
Specifications . . . . .	1B-5	Maintaining Power Package Exterior Surfaces . . . . .	1B-14
Torque Specification . . . . .	1B-5	Steering Head and Remote Control Maintenance . . . . .	1B-14
Quicksilver Maintenance Products . . . . .	1B-5	Checking Quicksilver MerCathode System . . . . .	1B-14
Fluid Capacities . . . . .	1B-5	Maintaining Anodic Trim Tab or Plate .	1B-14
Lubricating Shift Cable Pivot Points . . . . .	1B-6	Checking Optional Quicksilver Anti-Corrosion Anode Kit . . . . .	1B-15
Lubricating Propeller Shaft . . . . .	1B-6	Boat Bottom Care . . . . .	1B-15
Lubricating Steering System . . . . .	1B-6	Antifouling Paint . . . . .	1B-15
Lubricating Tie Bar Pivot Points . . . . .	1B-7	Maintaining Ground Circuit Continuity	1B-15
Models With Control Valve Mounted On Starboard Transom Assembly . . . . .	1B-7	Power Package Layup (Out of Season Storage) . . . . .	1B-16
Models With Control Valve Mounted On Port Transom Assembly . . . . .	1B-7	Engine . . . . .	1B-16
Lubricating Transom Gimbal Housing Assembly Swivel Shaft and Gimbal Bearing . . . . .	1B-7	Sterndrive . . . . .	1B-16
Checking and Adding Sterndrive Oil . . . . .	1B-8	Power Package Recommissioning . . . . .	1B-16
Models Without Drive Unit Gear Lube Monitor . . . . .	1B-8	Engine . . . . .	1B-16
		Sterndrive . . . . .	1B-16

### Section 1C - Troubleshooting

Sterndrive Unit Troubleshooting . . . . .	1C-2	Propeller Ventilating/Cavitating . . . . .	1C-8
Sterndrive Unit Will Not Slide Into Bell Housing . . . . .	1C-2	Poor Boat Performance And/Or Poor Maneuverability-Bow Too Low . . . . .	1C-9
Drive Unit Does Not Shift Into Gear; Remote Control Shift Handle Moves . . . . .	1C-2	Poor Boat Performance And/Or Poor Maneuverability-Bow Too High . . . . .	1C-9
Drive Unit Does Not Shift Into Gear; Remote Control Shift Handle Does Not Move . . . . .	1C-3	Power Steering . . . . .	1C-10
Drive Unit Shifts Hard . . . . .	1C-3	Hard Steering - RideGuide Steering System . . . . .	1C-10
Drive Unit In Gear, Will Not Shift Out Of Gear . . . . .	1C-3	Hard Steering (Engine Running) - Power Steering System . . . . .	1C-10
Gear Housing Noise . . . . .	1C-4	Power Steering System External Fluid Leaks . . . . .	1C-10
Drive Shaft Housing Noise . . . . .	1C-4	Power Trim Electrical System . . . . .	1C-11
Bravo Power Shift . . . . .	1C-7	Power Trim System Wiring Diagram . . . . .	1C-15
System Does Not React . . . . .	1C-7	Power Trim Hydraulic System . . . . .	1C-16
System Binds . . . . .	1C-7	Power Trim Hydraulic Schematic . . . . .	1C-19
Performance Troubleshooting . . . . .	1C-8	Auto Trim Electrical System . . . . .	1C-20
Low Full-Throttle Engine RPM . . . . .	1C-8	Auto Trim II System Wiring Diagram . . . . .	1C-26
High Full-Throttle Engine RPM . . . . .	1C-8	Corrosion Protection . . . . .	1C-27

# REMOVAL, INSTALLATION AND ADJUSTMENTS

## Section 2A - All Models

Installation Specifications	2A-2	Sterndrive Unit Removal	2A-6
Torque Specifications	2A-2	Transom Assembly Removal	2A-8
Lubricants/Sealers/Adhesives	2A-2	Transom Assembly Installation	2A-15
Special Tools	2A-2	Sterndrive Unit Installation	2A-27
Transom Specifications	2A-3	Shift Cable Installation and Adjustment	2A-34
Checking Transom Thickness	2A-3	Troubleshooting Shift Problems	2A-38
Special Information	2A-4		
Bravo Three Notice: Trim-In Limit Blocks or Limit Spacer	2A-4		

## STERNDRIVE UNIT

### Section 3A - Drive Shaft Housing

Specifications	3A-2	Gear, Clutch and Shifter Kits	3A-20
Torque Specifications	3A-2	Cone Clutch and Cam Kit	3A-22
Special Tools	3A-2	Yoke and Cam Kit	3A-23
Bearing Preloads	3A-2	Drive Shaft Housing Disassembly	3A-25
Lubricants/Sealers/Adhesives	3A-3	Shifter Repair	3A-29
Drive Shaft Housing Exploded View	3A-4	Shifter Inspection	3A-31
Complete Housing	3A-4	Shifter Reassembly	3A-32
Exploded Parts View (Clutch)	3A-6	U-Joint and Pinion Gear Inspection, Disassembly and Reassembly	3A-36
Exploded Parts View (Shifter)	3A-7	Inspection	3A-36
U-Joint Assembly	3A-8	Disassembly	3A-37
Drive Shaft Housing and Gear Case Separation	3A-9	Reassembly	3A-39
Drive Unit Gear Ratio Identification	3A-9	Clutch Disassembly, Inspection and Reassembly	3A-43
Bravo One	3A-9	Disassembly	3A-43
U-Joint Identification	3A-9	Inspection	3A-46
Number Of Teeth Per Gear - Drive Shaft Housing	3A-9	Reassembly	3A-46
Bravo Two	3A-9	Drive Shaft Housing and Top Cover - Bearings and Bearing Sleeves	3A-49
U-Joint Identification	3A-9	Inspection	3A-49
Number Of Teeth Per Gear - Drive Shaft Housing	3A-10	Bearing Sleeve Removal (Top Cover)	3A-49
Bravo Three	3A-10	Bearing Sleeve Removal (Drive Shaft Housing)	3A-50
U-Joint Identification	3A-10	Roller Bearing Removal	3A-51
Number Of Teeth Per Gear - Drive Shaft Housing	3A-10	Bearing Sleeve Installation	3A-52
Bravo Drive/Unit Housing Comparison and Identification	3A-10	Roller Bearing Installation	3A-53
Changes	3A-10	Drive Shaft Housing Reassembly	3A-54
Identification	3A-11	Torque Conversion Chart For U-joint Retainer	3A-57
Drive Shaft Housing	3A-11	Torquing Bravo U-joint Bearing Retainer Nut	3A-57
Gear Housing	3A-11		
Separate Housings	3A-17		
Special Information - Latest Changes to Gear Assembly, Cone Clutch and Shifter Assembly	3A-20		

## Section 3B - Bravo One Gear Housing

Specifications . . . . .	3B-2	Bearing Carrier Inspection . . . . .	3B-19
Torque Specifications . . . . .	3B-2	Bearing Carrier Servicing . . . . .	3B-19
Preloads . . . . .	3B-2	Propeller Shaft Inspection . . . . .	3B-21
Lubricants/Sealers/Adhesives . . . . .	3B-2	Propeller Shaft Bearing Removal . . . . .	3B-21
Special Tools . . . . .	3B-3	Propeller Shaft Bearing Installation . . . . .	3B-22
Gear Ratio - Teeth per Gear (Gear Housing) . . . . .	3B-3	Driven Gear Bearing Removal and Inspection . . . . .	3B-22
Bravo One Gear Housing Exploded View . . . . .	3B-4	Driven Gear Bearing Removal . . . . .	3B-22
Drive Shaft Components . . . . .	3B-4	Driven Gear Bearing Installation . . . . .	3B-23
Propeller Shaft Components . . . . .	3B-6	Driven Gear Bearing Cup Removal and Inspection . . . . .	3B-23
Pre-Disassembly Inspection . . . . .	3B-8	Driven Gear Bearing Cup Installation . . . . .	3B-24
Drive Shaft Housing and Gear Housing Separation . . . . .	3B-8	Speedometer Water Tube Pickup Inspection and Cleaning . . . . .	3B-24
Gear Housing Disassembly . . . . .	3B-10	Speedometer Water Tube Seal Replacement . . . . .	3B-25
Component Servicing . . . . .	3B-15	Gear Housing Reassembly and Shimming . . . . .	3B-26
Drive Shaft and Pinion Bearing Inspection and Cleaning . . . . .	3B-15	Driven Gear Shimming for Models with Shims . . . . .	3B-32
Drive Shaft Disassembly . . . . .	3B-15	Driven Gear Shimming for Models with Load Ring . . . . .	3B-37
Pinion Bearing Removal . . . . .	3B-16		
Pinion Bearing Installation . . . . .	3B-17		
Drive Shaft Reassembly . . . . .	3B-18		

## Section 3C - Bravo Two Gear Housing

Specifications . . . . .	3C-2	Pinion Bearing Installation . . . . .	3C-15
Torque Specifications . . . . .	3C-2	Drive Shaft Reassembly . . . . .	3C-16
Preloads . . . . .	3C-2	Bearing Carrier Inspection . . . . .	3C-17
Lubricants/Sealers/Adhesives . . . . .	3C-2	Bearing Carrier Servicing . . . . .	3C-18
Special Tools . . . . .	3C-3	Propeller Shaft Inspection . . . . .	3C-20
Gear Ratio - Teeth per Gear (Gear Housing) . . . . .	3C-3	Propeller Shaft Bearing Removal . . . . .	3C-21
Bravo Two Gear Housing Exploded View . . . . .	3C-4	Propeller Shaft Bearing Installation . . . . .	3C-22
Drive Shaft and Propeller Shaft Components . . . . .	3C-4	Driven Gear Bearing Removal and Inspection . . . . .	3C-22
Pre-Disassembly Inspection . . . . .	3C-6	Driven Gear Bearing Installation . . . . .	3C-23
Drive Shaft Housing and Gear Housing Separation . . . . .	3C-7	Driven Gear Bearing Cup Removal and Inspection . . . . .	3C-23
Gear Housing Disassembly . . . . .	3C-8	Driven Gear Bearing Cup Installation . . . . .	3C-24
Component Servicing . . . . .	3C-13	Speedometer Water Tube Pickup Inspection and Cleaning . . . . .	3C-24
Drive Shaft and Pinion Bearing Inspection and Cleaning . . . . .	3C-13	Speedometer Water Tube Seal Replacement . . . . .	3C-25
Drive Shaft Disassembly . . . . .	3C-13	Gear Housing Reassembly and Shimming . . . . .	3C-25
Pinion Bearing Removal . . . . .	3C-14		



## Section 3D - Bravo Three Gear Housing

Specifications . . . . .	3D-2	Bearing Carrier Inspection . . . . .	3D-18
Torque Specifications . . . . .	3D-2	Bearing Carrier Servicing . . . . .	3D-18
Lubricants/Sealers/Adhesives . . . . .	3D-2	Propeller Shaft Inspection . . . . .	3D-19
Bearing Preloads . . . . .	3D-2	Outer Propeller Shaft Servicing . . . . .	3D-19
Gear Ratio - Teeth per Gear (Gear Housing) . . . . .	3D-3	Front and Rear Driven Gear and Bearing Inspection . . . . .	3D-20
Special Tools . . . . .	3D-3	Front and Rear Driven Gear Bearing Replacement . . . . .	3D-21
Torquing Outer Prop Shaft Bearing Retainer and Bearing Carrier . . . . .	3D-5	Front Driven Gear Bearing Cup Removal and Inspection . . . . .	3D-21
Bravo Three Gear Housing Exploded View Drive Shaft and Propeller Shaft Components . . . . .	3D-6	Propeller Shaft Spline Lash Check . . . . .	3D-22
Pre-Disassembly Inspection . . . . .	3D-8	Front Driven Gear Bearing Cup Installation . . . . .	3D-23
Gear Housing Disassembly . . . . .	3D-9	Speedometer Water Tube Pickup Inspection and Cleaning . . . . .	3D-23
Component Servicing . . . . .	3D-13	Speedometer Water Tube Seal Replacement . . . . .	3D-24
Drive Shaft and Pinion Bearing Inspection and Cleaning . . . . .	3D-13	Gear Housing Reassembly and Shimming . . . . .	3D-24
Drive Shaft Disassembly . . . . .	3D-14	Checking Backlash . . . . .	3D-31
Pinion Bearing Removal . . . . .	3D-14	Installing Gear Housing On Drive Shaft Housing . . . . .	3D-36
Pinion Bearing Installation . . . . .	3D-15	Propeller Installation . . . . .	3D-38
Drive Shaft Reassembly . . . . .	3D-16		
Propeller Shaft Disassembly . . . . .	3D-17		

## TRANSOM ASSEMBLY

### Section 4A - Service Procedures Requiring Minor Disassembly

Bravo Transom Assembly Specifications . . . . .	4A-2	Inspection . . . . .	4A-17
Torque Specifications . . . . .	4A-2	Removal . . . . .	4A-18
Lubricants/Sealers/Adhesives . . . . .	4A-2	Installation . . . . .	4A-19
Special Tools . . . . .	4A-2	Shift Cable . . . . .	4A-20
Bravo Transom Assembly Exploded Views . . . . .	4A-3	Removal . . . . .	4A-20
Inner Transom Plate Components . . . . .	4A-3	Shift Cable Installation . . . . .	4A-22
Bell Housing Components . . . . .	4A-4	Replacing Earlier Model Shift Cables with Later Model Shift Cables . . . . .	4A-26
Gimbal Ring Components . . . . .	4A-5	Exhaust Bellows (If Equipped) . . . . .	4A-28
Gimbal Housing Components . . . . .	4A-7	Removal . . . . .	4A-28
Special Information . . . . .	4A-9	Cleaning and Inspection . . . . .	4A-29
Trim Limit Switch . . . . .	4A-9	Installation . . . . .	4A-29
Trim Position Sender . . . . .	4A-9	Exhaust Tube (If Equipped) . . . . .	4A-31
Removal . . . . .	4A-10	Removal . . . . .	4A-31
Installation . . . . .	4A-12	Cleaning and Inspection . . . . .	4A-31
Trim Limit Switch Adjustment . . . . .	4A-16	Installation . . . . .	4A-32
High Performance Transom Assembly - Without Electrical Trim Sender and Trim Limit Switch . . . . .	4A-17	Water Hose and Water Fitting . . . . .	4A-33
Gimbal Bearing . . . . .	4A-17	Removal . . . . .	4A-33
		Installation . . . . .	4A-34

## Section 4B - Service Procedures Requiring Major Disassembly

Bravo Transom Assembly Specifications . . . . .	4B-2	Gimbal Housing Servicing . . . . .	4B-26
Torque Specifications . . . . .	4B-2	U-joint Bellows Replacement . . . . .	4B-26
Lubricants/Sealers/Adhesives . . . . .	4B-2	Shift Cable Bellows Replacement . . . . .	4B-28
Special Tools . . . . .	4B-2	Exhaust Bellows Replacement . . . . .	4B-32
Bravo Transom Assembly Exploded Views . . . . .	4B-4	Speedometer Hose Replacement . . . . .	4B-34
Inner Transom Plate Components . . . . .	4B-4	Gear Lube Monitor System	
Bell Housing Components . . . . .	4B-5	Components . . . . .	4B-36
Gimbal Ring Components . . . . .	4B-6	Trim Position Sender and Trim Limit	
Gimbal Housing Components . . . . .	4B-8	Switch Wire Replacement . . . . .	4B-39
Bell Housing Removal . . . . .	4B-10	Gimbal Ring/Swivel Shaft/and Steering	
Access Plug Kit Installation . . . . .	4B-15	Lever Installation . . . . .	4B-40
Gimbal Ring, Swivel Shaft and Steering		Bell Housing Installation . . . . .	4B-46
Lever Removal . . . . .	4B-17	Shift Cable Installation . . . . .	4B-52
Gimbal Ring Servicing . . . . .	4B-20	Bravo Access Plug Drilling Template . . . . .	4B-56

## POWER TRIM

### Section 5A - Oildyne Trim Pump

Trim Pump Specifications . . . . .	5A-2	Hydraulic Repair . . . . .	5A-23
Valve Pressure Specifications . . . . .	5A-2	Disassembly . . . . .	5A-23
Electrical Specification . . . . .	5A-2	Filter Replacement . . . . .	5A-24
Torque Specification . . . . .	5A-2	UP Pressure Relief Valve	
Special Tools . . . . .	5A-2	Replacement . . . . .	5A-25
Lubricants/Adhesives/Sealers . . . . .	5A-2	DOWN Pressure Relief Valve	
Trim Pump Exploded View . . . . .	5A-3	Replacement . . . . .	5A-26
Oildyne Trim Pump . . . . .	5A-3	Thermal Relief Valve Replacement . . . . .	5A-27
Maintaining Power Trim Pump Oil Level . . . . .	5A-4	Pump Replacement . . . . .	5A-28
Air Bleeding Power Trim System . . . . .	5A-5	Adapter Replacement . . . . .	5A-29
Bleeding OUT/UP Trim Circuit . . . . .	5A-5	Adapter Repair . . . . .	5A-30
Bleeding IN/DOWN Trim Circuit . . . . .	5A-6	Pump Shaft Oil Seal Replacement . . . . .	5A-33
Testing Power Trim Pump . . . . .	5A-7	Motor Repair . . . . .	5A-35
Test Gauge . . . . .	5A-7	Disassembly . . . . .	5A-35
Internal Restriction Test . . . . .	5A-8	Armature Tests . . . . .	5A-38
OUT/UP Pressure Test . . . . .	5A-8	Continuity Test . . . . .	5A-38
IN/DOWN Pressure Test . . . . .	5A-10	Test for Shorts . . . . .	5A-39
Trim Pump Hydraulic System . . . . .	5A-11	Cleaning Commutator . . . . .	5A-39
Trim Cylinder Internal Leak Test . . . . .	5A-12	Field Tests . . . . .	5A-39
Trim Cylinder Shock Piston Test . . . . .	5A-14	Test for Open Circuit . . . . .	5A-39
Motor and Electrical Bench Tests . . . . .	5A-15	Test for Short in Field . . . . .	5A-40
Trim Pump Motor Test (In Boat) . . . . .	5A-15	Thermal Switch Continuity Test . . . . .	5A-41
Trim Pump Motor Test (Out of Boat) . . . . .	5A-16	Brush Replacement . . . . .	5A-42
Solenoid Test (Pump In Boat) . . . . .	5A-17	Reassembly . . . . .	5A-44
Solenoid Test (Pump Out of Boat) . . . . .	5A-18	Trim Pump Installation . . . . .	5A-50
110 Amp Fuse Test (Pump in Boat) . . . . .	5A-20	Trim Pump Wiring Diagrams . . . . .	5A-51
110 Amp Fuse Test		Model With Three-Button Trim/Trailer	
(Pump Out of Boat) . . . . .	5A-21	Panel . . . . .	5A-51
20 Amp Fuse Test . . . . .	5A-21	Model With Trim In Handle and Trailer	
Trim Pump Removal . . . . .	5A-22	Switch Separate . . . . .	5A-52

## Section 5B - Trim Cylinders

<p>Specifications ..... 5B-2</p> <p>    Torque Specifications ..... 5B-2</p> <p>    Lubricants/Sealers/Adhesives ..... 5B-2</p> <p>Special Tools ..... 5B-2</p> <p>Trim Cylinder Exploded Views ..... 5B-3</p> <p>    Bravo Trim Cylinders ..... 5B-3</p> <p>    Bravo Trim System Components ..... 5B-4</p> <p>Power Trim Hydraulic Schematic ..... 5B-5</p> <p>Special Information ..... 5B-6</p> <p>    Bravo Three Notice: Trim "In" Limit     Blocks or Limit Pin ..... 5B-6</p>	<p>Trim "In" Limit Blocks - Removal, Installation or Adjustment ..... 5B-7</p> <p>Trim Cylinder Internal Leak Test ..... 5B-9</p> <p>Trim Cylinder Shock Piston Test ..... 5B-9</p> <p>Trim Cylinder Repair ..... 5B-9</p> <p>    Removal ..... 5B-9</p> <p>    Disassembly ..... 5B-10</p> <p>    Reassembly ..... 5B-14</p> <p>    Installation ..... 5B-19</p>
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## Section 5C - Dual Power Trim System

<p>Important Information ..... 5C-2</p> <p>Testing Dual Power Trim System ..... 5C-2</p> <p>    Relay Test ..... 5C-2</p> <p>    Diode Module Test ..... 5C-3</p> <p>    Trailer Switch Test ..... 5C-4</p> <p>    Starboard Trim Switch Test ..... 5C-4</p> <p>    Port Trim Switch Test ..... 5C-4</p> <p>Dual Power Trim System Component Repair ..... 5C-5</p>	<p>Important Information ..... 5C-5</p> <p>Relay Replacement ..... 5C-5</p> <p>Diode Module Replacement ..... 5C-7</p> <p>Trim Control Panel Switch(es) Replacement ..... 5C-8</p> <p>Wiring Diagrams ..... 5C-9</p> <p>    Dual Trim Harnesses ..... 5C-9</p> <p>    Electrical Box Wiring ..... 5C-10</p>
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## Section 5D - Auto Trim II

<p>Auto Trim II System ..... 5D-2</p> <p>    Description ..... 5D-2</p> <p>Auto Trim II Operation ..... 5D-2</p> <p>    Auto Mode Operation ..... 5D-3</p> <p>    "Manual" Mode Operation ..... 5D-4</p> <p>Electrical System Overload Protection ... 5D-6</p>	<p>Auto Trim Limit Adjustment ..... 5D-6</p> <p>    Adjusting Drive Unit Trim Angle ..... 5D-7</p> <p>Control Module Adjustment ..... 5D-9</p> <p>Trim Position Indicator Adjustment ..... 5D-10</p> <p>Wiring Diagram ..... 5D-11</p>
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# STEERING SYSTEMS

## Section 6A - Power Steering

Specifications . . . . .	6A-2	Selection . . . . .	6A-17
Special Tools . . . . .	6A-2	Removal . . . . .	6A-17
Lubricants/Adhesives/Sealers . . . . .	6A-2	Installation . . . . .	6A-17
Description . . . . .	6A-2	Installation . . . . .	6A-19
Earlier Style Control Valve . . . . .	6A-3	Power Steering Pump Lugging Test . .	6A-20
Later Style Control Valve . . . . .	6A-3	Power Steering System Pressure Test .	6A-22
Earlier Model Power Steering System . . . .	6A-4	Pump Pressure Test . . . . .	6A-24
Right Turn . . . . .	6A-4	Booster Cylinder Test . . . . .	6A-25
Earlier Model Power Steering System . . . .	6A-5	Power Steering Component Repair . . . .	6A-27
Left Turn . . . . .	6A-5	Power Steering Unit . . . . .	6A-27
Earlier Model Power Steering System . . . .	6A-6	Cable Guide Tube (Early Style Only) .	6A-30
Neutral . . . . .	6A-6	Control Valve (Early Style Only) . . . .	6A-34
Later Model Power Steering System . . . .	6A-7	Booster Cylinder (Early Style Only) . .	6A-46
Right Turn . . . . .	6A-7	Power Steering Pump . . . . .	6A-50
Later Model Power Steering System . . . .	6A-8	Removal . . . . .	6A-50
Left Turn . . . . .	6A-8	Flow Control Valve Servicing . . . . .	6A-50
Later Model Power Steering System . . . .	6A-9	Pump Shaft Oil Seal Replacement . . .	6A-51
Neutral . . . . .	6A-9	Disassembly . . . . .	6A-54
Steering Helm and Cable . . . . .	6A-10	Cleaning And Inspection . . . . .	6A-56
Steering Cable Specifications . . . . .	6A-11	Reassembly . . . . .	6A-56
Filling and Air Bleeding Power Steering		Multiple Sterndrive Steering Tie Bar	
System . . . . .	6A-12	Arrangements . . . . .	6A-62
Balancing Power Steering Control Valve	6A-13	Determining Tie Bar Length . . . . .	6A-63
Steering Cable Selection, Removal and		Selection . . . . .	6A-64
Installation . . . . .	6A-17	Installation . . . . .	6A-64

# CORROSION PROTECTION

## Section 7A - All Models

Specifications . . . . .	7A-2	Connect Electrical Leads to Controller	
Special Tools . . . . .	7A-2	Assembly . . . . .	7A-15
Lubricants/Sealers/Adhesives . . . . .	7A-2	Wiring Diagrams . . . . .	7A-16
Continuity Circuit . . . . .	7A-2	MerCathode Monitor . . . . .	7A-16
Anodic Block . . . . .	7A-5	Mercathode Controller . . . . .	7A-17
Trim Cylinder Anodes . . . . .	7A-8	Quicksilver Isolator . . . . .	7A-18
Anodic Trim Tab or Plate . . . . .	7A-9	Corrosion Protection Testing and	
Bravo One Drive Units . . . . .	7A-9	Troubleshooting . . . . .	7A-18
Bravo Two Drive Units . . . . .	7A-11	Test Equipment Set-Up . . . . .	7A-21
Bravo Three Drive Units . . . . .	7A-11	Low Readings . . . . .	7A-22
Integral MerCathode System . . . . .	7A-12	Low Readings (continued) . . . . .	7A-23
Removing Electrode Assembly . . . . .	7A-12	High Reading . . . . .	7A-24
Installing Electrode Assembly . . . . .	7A-13	Normal Reading But Corrosion is	
		Evident . . . . .	7A-25

# ACCESSORIES

## Section 8A - All Models

Specifications .....	8A-2	Reassembly .....	8A-9
Torque Specifications .....	8A-2	Shift Cable Replacement and	
Lubricants/Sealers/Adhesives .....	8A-2	Adjustment .....	8A-13
Power Shift (P/N 38638A4) .....	8A-2	Installation Preparation .....	8A-13
Description .....	8A-2	Shift Cable Barrel Adjustment .....	8A-13
General Information .....	8A-3	Installing Input Cable .....	8A-14
Checking Vacuum Drop-Off .....	8A-5	Installing Output Cable .....	8A-14
Power Shift Cylinder Repair .....	8A-6	Attach Dust Cover .....	8A-15
Removal .....	8A-6	Mounting Power Shift Cylinder .....	8A-15
Disassembly .....	8A-6	Connecting Vacuum Hose to Engine .	8A-15

# GENERAL INFORMATION

## Section 1A - Important Information



### Table of Contents

---

How To Use This Manual .....	1A-2	Sterndrive Unit 10-Hour Break-In Period	
How To Read Parts Manual .....	1A-3	(New or With Replacement Gears) .....	1A-5
Introduction .....	1A-4	Serial Number Locations and Engine	
Directional References .....	1A-4	Designation Decal .....	1A-5
Propeller Rotation .....	1A-4		

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# How To Use This Manual

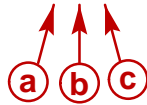
This Manual is divided into sections which represent major components and systems. Some sections are further divided into parts which more fully describe the component. Sections and parts are listed at front of this manual.

## Page Numbering

Two number groups appear at the bottom of each page. Following is an example and description.

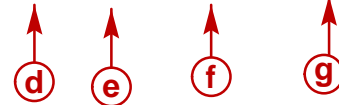
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Page 1A-2



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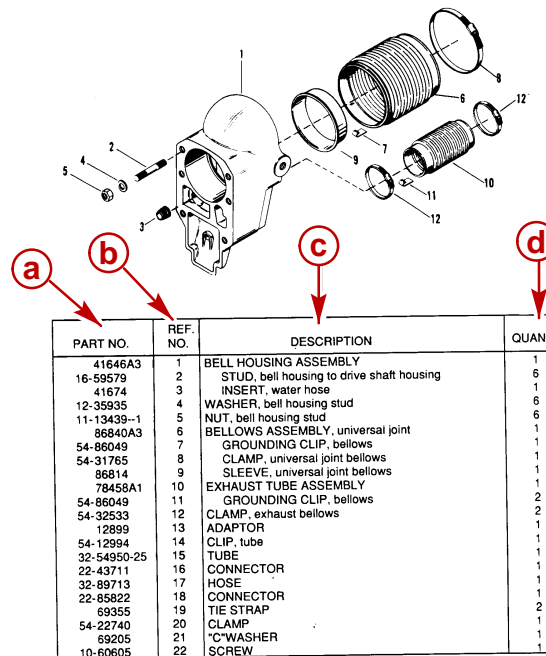
90-17431--4 FEBRUARY 1998



- a - Section Number
- b - Section Part
- c - Page Number
- d - Manual Part Number
- e - Revision Number
- f - Month Printed
- g - Year Printed

# How To Read Parts Manual

## Bell Housing



**Part Number (a):** part must be ordered by complete part number.

**Reference Number (b):** number of part on exploded parts view.

**Description (c):** this column provides important information.

- (1.) Description of part: Reference 1, on the parts list, is a BELL HOUSING ASSEMBLY; reference 12 is an exhaust bellows clamp, and reference 19 is a TIE STRAP.
- (2.) What parts are included: Reference 1, on the parts list, is "Bell Housing Assembly". Parts listed under the assembly are indented, which indicates that they are included. So, if Part No. 41646A3 is ordered, you will receive the Bell Housing Assembly, including 6 studs, and one water hose insert.
- (3.) Serial number break: If serial number is listed, check product serial number to ensure that correct part is ordered.
- (4.) Special Information: Will often appear after the description, i.e.: "O-ring on DSH," "O-ring on top cover," "Casting #1641-8293C1," etc. This information enables you to select correct parts.

**Quantity (d):** specifies quantity which must be ordered.

**Special Information Block:** provides additional information, part numbers for gasket sets, etc.

**GEAR HOUSING  
SEAL KIT  
26-76868A1  
INDICATED BY (\*)**

Access Hole Plug Kit 22-88847A1  
Contains all necessary parts to allow  
removal of swivel shaft without  
removing gimbal housing.



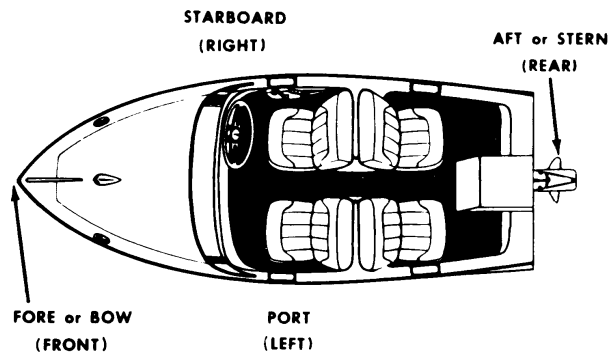
# Introduction

This comprehensive overhaul and repair manual is designed as a service guide for the Mer-Cruiser models previously listed. It provides specific information, including procedures for disassembly, inspection, assembly and adjustment, to enable dealers and service mechanics to repair these products.

Before attempting repairs, it is suggested that procedure first be read through to gain knowledge of the methods and tools used and the cautions and warnings required for safety.

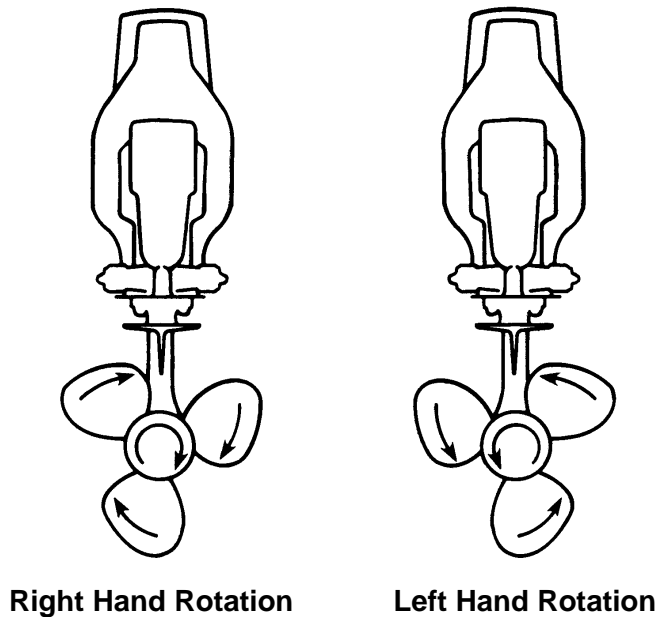
## Directional References

Front of boat is bow; rear is stern. Starboard side is right side; port side is left side. In this service manual, all directional references are given as they appear when viewing boat from stern, looking toward bow.



## Propeller Rotation

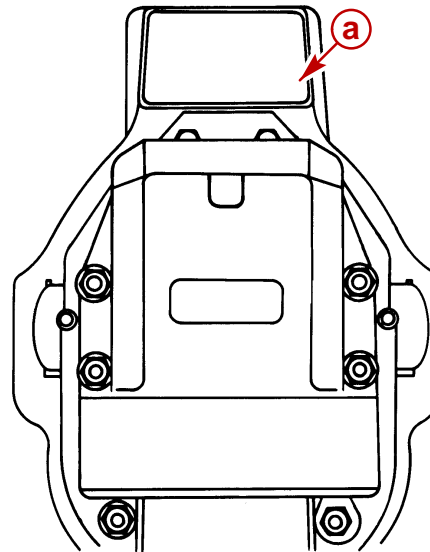
Propeller rotation for sterndrive can be right hand or left hand rotation as viewed from the aft end of the propeller.



## Sterndrive Unit 10-Hour Break-In Period (New or With Replacement Gears)

1. Avoid full throttle starts.
2. DO NOT operate at any one constant speed for extended periods of time.
3. DO NOT exceed 75% of full throttle during the first 5 hours. During the next 5 hours, operate at intermittent full throttle.
4. Drive unit should be shifted into forward gear a minimum of 10 times during break-in, with run-in time at moderate RPM after each shift.

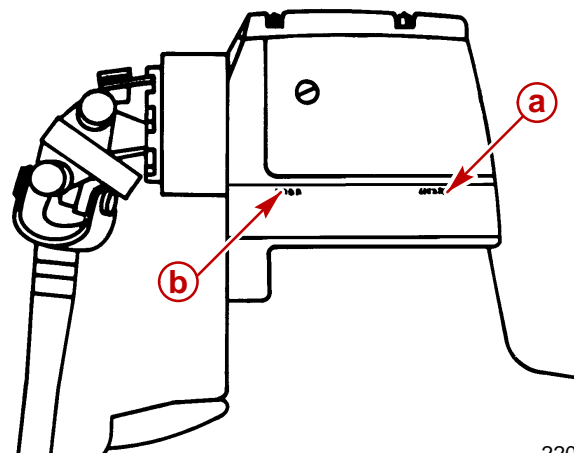
## Serial Number Locations and Engine Designation Decal



22031

### Transom Assembly Serial Number Location

a - Transom Assembly Serial Number



22026

### Sterndrive Unit Serial Number Location - Port Side Decal

a - Sterndrive Unit Serial Number  
 b - Sterndrive Unit Gear Ratio

# GENERAL INFORMATION

## Section 1B - Maintenance

**1  
B**

### Table of Contents

Maintenance Schedules . . . . .	1B-2	Models With Gear Lube Monitor . . . . .	1B-9
Maintenance Intervals . . . . .	1B-2	Checking Lubricant for Water . . . . .	1B-10
Scheduled Maintenance That Can Be		Changing Lubricant . . . . .	1B-12
Performed By Owner/Operator . . . . .	1B-2	General Maintenance . . . . .	1B-14
Scheduled Maintenance That Can Be		Maintaining Power Package Exterior	
Performed by Dealer . . . . .	1B-3	Surfaces . . . . .	1B-14
Specifications . . . . .	1B-5	Steering Head and Remote Control	
Torque Specification . . . . .	1B-5	Maintenance . . . . .	1B-14
Quicksilver Maintenance Products . . . . .	1B-5	Checking Quicksilver MerCathode	
Fluid Capacities . . . . .	1B-5	System . . . . .	1B-14
Lubricating Shift Cable Pivot Points . . . . .	1B-6	Maintaining Anodic Trim Tab or Plate .	1B-14
Lubricating Propeller Shaft . . . . .	1B-6	Checking Optional Quicksilver	
Lubricating Steering System . . . . .	1B-6	Anti-Corrosion Anode Kit . . . . .	1B-15
Lubricating Tie Bar Pivot Points . . . . .	1B-7	Boat Bottom Care . . . . .	1B-15
Models With Control Valve Mounted On		Antifouling Paint . . . . .	1B-15
Starboard Transom Assembly . . . . .	1B-7	Maintaining Ground Circuit Continuity	1B-15
Models With Control Valve Mounted On		Power Package Layup (Out of Season	
Port Transom Assembly . . . . .	1B-7	Storage) . . . . .	1B-16
Lubricating Transom Gimbal Housing		Engine . . . . .	1B-16
Assembly Swivel Shaft and Gimbal		Sterndrive . . . . .	1B-16
Bearing . . . . .	1B-7	Power Package Recommissioning . . . . .	1B-16
Checking and Adding Sterndrive Oil . . . . .	1B-8	Engine . . . . .	1B-16
Models Without Drive Unit Gear Lube		Sterndrive . . . . .	1B-16
Monitor . . . . .	1B-8		

# Maintenance Schedules

## Maintenance Intervals

Maintenance intervals and the tasks to be performed, as shown in this current schedule, or as found in a previously printed schedules, are generally based on an average boating application and environment. However, individual operating habits and personal maintenance preferences can have an impact on the suggested intervals. In consideration of these factors, MerCruiser has adjusted some maintenance intervals and corresponding tasks to be performed. In some cases, this may allow for more individual tasks to be performed in a single visit to the serving dealer, rather than multiple visits. Therefore, it is very important that the boat owner and servicing dealer discuss the current Maintenance Schedule and develop appropriate maintenance intervals to coincide with the individual operating habits, environment, and maintenance requirements.

### Scheduled Maintenance That Can Be Performed By Owner/Operator

**NOTE:** Only perform maintenance which applies to your particular power package.

Task	Interval
Engine Crankcase Oil - Check level	Weekly
Closed Cooling Coolant - Check level	
Power Steering Fluid - Check level	
Sterndrive Unit Oil - Check level	
Battery - Check level and inspect for damage	
Fuel Pump Sight Tube (If Equipped) - Check that no fuel is present	
Power Trim Pump Oil - Check level	
Anodes - Inspect for erosion	
Gear Housing Water Pickups - Check for marine growth or debris	
Drive Belt(s) - Inspect condition and check tension	
Propeller Shaft - Lubricate	<b>Saltwater Use:</b> Every 50 hours of operation or 60 days, whichever occurs first.
Power Package - Exterior Surfaces - Spray with rust preventative	<b>Freshwater Use:</b> Every 100 hours of operation or 120 days, whichever occurs first.
Power Package Exterior Surfaces - Clean and paint	Once a year
Cooling System - Flush seawater section	<b>Saltwater Use:</b> After every use.

## Scheduled Maintenance That Can Be Performed by Dealer

**NOTE:** Only perform maintenance which applies to your particular power package.

Task	Interval
Seawater Pickup Pump - Disassemble and inspect	Whenever insufficient seawater flow is suspected. (If operating temperature exceeds normal range.)
Crankcase Oil and Filter - Change	End of first boating season and thereafter, every 100 hours of operation or once yearly, whichever occurs first.
Ignition system - Clean and inspect condition	
Flame Arrestor and Crankcase Ventilation Hose - Clean and inspect	
Positive Crankcase Ventilation (PCV) Valve (If Equipped) - Change	
Sterndrive Unit Oil - Change	
<b>Gimbal Ring Clamping Screws</b> - Retorque to 40 ft. lb. (54 N·m)	
<b>Rear Engine Mounts</b> - Ensure torque is 30-40 ft. lb. (47-54 N·m)	
Gimbal Bearing - Lubricate	
Cooling System - Clean and inspect	
Engine Alignment - Check	
Engine Coupling Universal Joint Shaft Splines - Lubricate	
Steering System - Lubricate and inspect for loose, damaged or missing parts	
Electrical System - Check for loose or damaged wiring	
Cooling System Hoses and Clamps - Inspect for damage and deterioration. Check clamps for tightness.	
Closed Cooling System Pressure Cap - Clean, inspect and test	
Continuity Circuit - Check components for loose connections, broken or frayed wires	
Shift and Throttle Cable and Linkage - Lubricate and inspect for loose, damaged or missing parts	

## Scheduled Maintenance That Can Be Performed by Dealer (Continued)

**NOTE:** Only perform maintenance which applies to your particular power package.

Task	Interval
Engine Exhaust System - Inspect externally for damage, deterioration and restrictions. Check for tightness.	End of first boating season and thereafter, every 100 hours of operation or once yearly, whichever occurs first.
Ignition System - Check timing and adjust as needed	
Steering Head and Remote Control - Inspect and lubricate	
Carburetor (If Equipped) - Inspect and adjust	
Throttle Body (EFI Models) - Inspect	
Fuel Filters - Replace	Once a Year
Quicksilver Mercathode System - Test output	
Closed Cooling Coolant - Test for Alkalinity	
Heat Exchanger - Clean seawater section	
Drive Unit Bellows and Clamps - Inspect	
Universal Joint Cross Bearings- Inspect and grease	End of first boating season and thereafter, every 200 hours of operation or once yearly, whichever occurs first.
Closed Cooling Coolant - Replace	Every Five Years or 1,000 hours of operation <sup>1</sup>

<sup>1</sup>Only if Extended Life 5/100 Ethylene Glycol Antifreeze/Coolant is used. If any non-compatible coolant is added to this coolant, coolant must be changed every 2 years or 400 hours, whichever occurs first. All coolants other than Extended Life 5/100 Ethylene Glycol Antifreeze/Coolant must be changed every 2 years or 400 hours, whichever occurs first.

# Specifications

## Torque Specification

Drive Unit Fill/Drain Plug	30-50 lb. in. (3.39-5.56 N·m)
Drive Unit Vent Plug	30-50 lb. in. (3.39-5.56 N·m)

## Quicksilver Maintenance Products

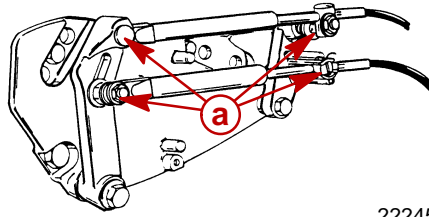
We recommend the use of Quicksilver Maintenance Products where specified.

## Fluid Capacities

**NOTICE**  
**UNIT OF MEASUREMENT: U.S. Fluid Ounces**  
**(Milliliters)**  
**All capacities are approximate fluid measures.**

MODEL	BRAVO ONE	BRAVO TWO	BRAVO THREE
Drive Unit Oil Capacity (With Square Gear Lube Monitor)	88 (2603)	104 (3076)	96 (2839)
Drive Unit Oil Capacity (With Round Gear Lube Monitor)	96 (2840)	112 (3313)	104 (3076)

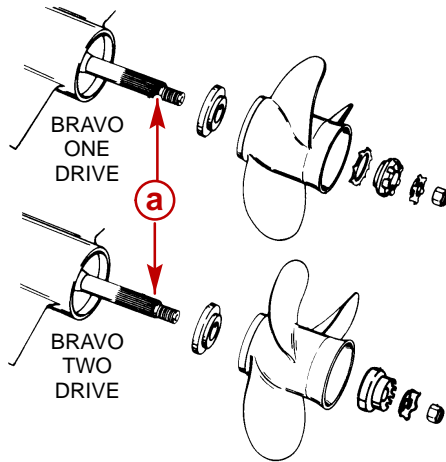
# Lubricating Shift Cable Pivot Points



22245

a - Lubricate with SAE 20 or 30 Engine Oil

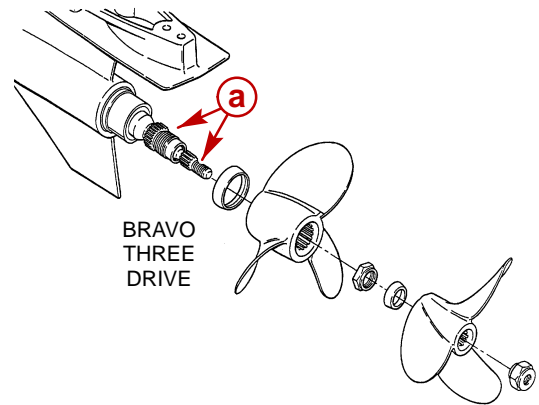
# Lubricating Propeller Shaft



BRAVO ONE DRIVE

BRAVO TWO DRIVE

24727



BRAVO THREE DRIVE

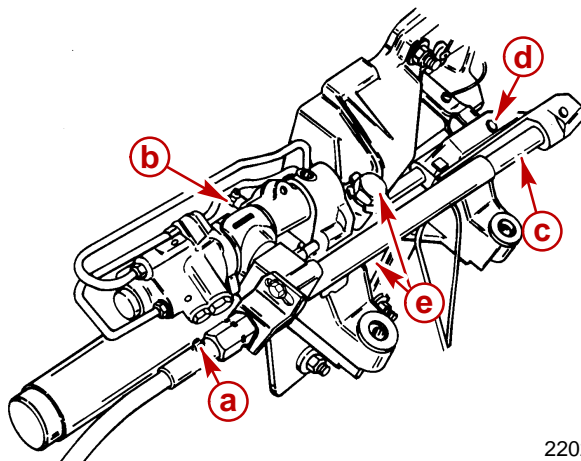
72239

a - Propeller Shaft - Lubricate with Special Lubricant 101, Anti-Corrosion Grease, 2-4-C Marine Lubricant with Teflon (Listed in Order of Effectiveness).

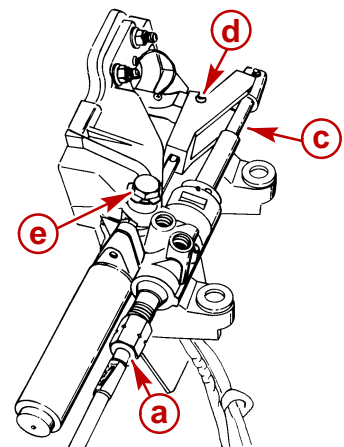
# Lubricating Steering System

**WARNING**

Transom end of steering cable **MUST BE** fully retracted into cable housing when lubricating cable. If cable is lubricated while extended, hydraulic lock of cable could occur.



22023



71901

## Earlier Style Control Valve

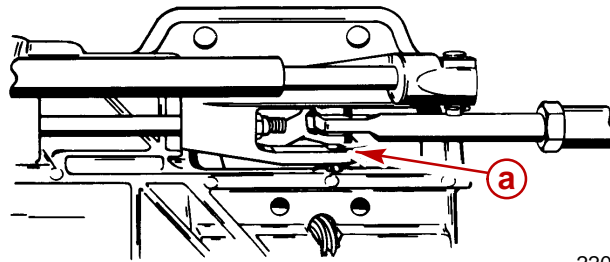
## Later Style Control Valve

- a - Steering Cable Grease Fitting - 2-4-C Marine Lubricant with Teflon (See Warning Above)
- b - Control Valve Grease Fitting - 2-4-C Marine Lubricant with Teflon
- c - Steering Cable End - Special Lubricant 101
- d - Pivot Point - SAE 20 or 30 Engine Oil
- e - Pivot Bolts - Special Lubricant 101



# Lubricating Tie Bar Pivot Points

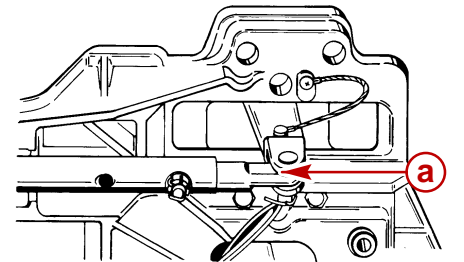
## Models With Control Valve Mounted On Starboard Transom Assembly



22079

**Starboard Engine**

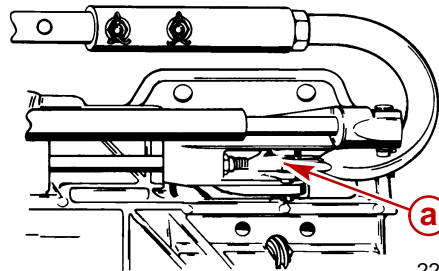
a - SAE 20 or 30 Engine Oil



22079

**Port Engine**

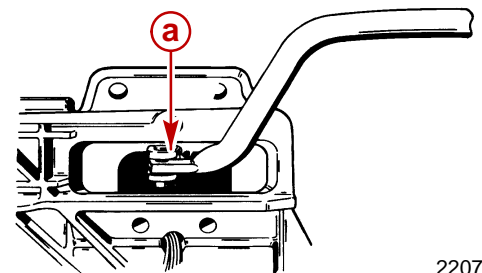
## Models With Control Valve Mounted On Port Transom Assembly



22079

**Port Engine**

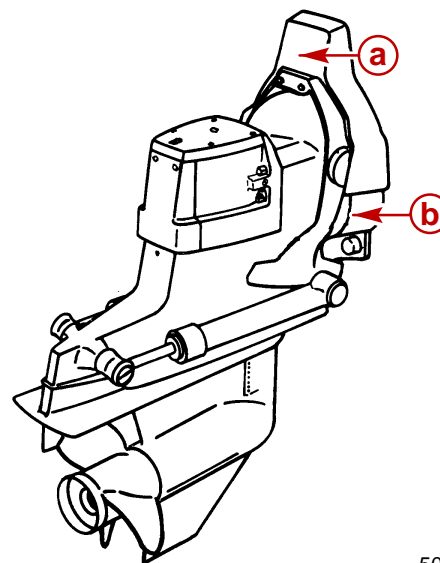
a - SAE 20 or 30 Engine Oil



22079

**Starboard Engine**

# Lubricating Transom Gimbal Housing Assembly Swivel Shaft and Gimbal Bearing



50072

a - Swivel Shaft Grease Fitting - 2-4-C Marine Lubricant with Teflon (On Earlier Models)  
 b - Gimbal Bearing Grease Fitting - Quicksilver U-Joint and Gimbal Bearing Grease



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