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Safety Alerts and Notices

Throughout this publication, "Warnings" and "Cautions," accompanied by the international HAZARD symbol , are used to alert the technician to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. Observe these safety alerts carefully.

These safety alerts alone can not eliminate the hazards they signal. Strict compliance to these special instructions when performing the service, and common sense operation are major accident prevention measures.

WARNING

WARNING—indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

CAUTION—indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or property damage. It may also be used to alert against unsafe practices.

IMPORTANT: Indicates information or instructions that are necessary for a particular step or action.

***NOTE:** Indicates information that helps in the understanding of a particular step or action.*

Approved Practices and Procedures

CAUTION

Avoid personal injury or property damage. Personal safety is dependent upon using proper service procedures, the correct tools and appropriate parts. The procedures in this manual are safe and effective when performed properly. Some of the procedures require special tools, specifically designed for the purpose. If part replacement is required, use only replacement parts that are manufactured or sold by Mercury Marine. Anyone who chooses to use procedures, tools or parts not recommended by Mercury Marine assumes full responsibility for the results.

IMPORTANT: Use of procedures, tools, or parts not recommended by Mercury Marine may void the Mercury Marine Limited Warranty.

This manual is written to aid our dealers and company service personnel in the proper installation or service of our products. Persons who are not familiar with these or similar products produced by Mercury Marine, and who have not been trained in the recommended servicing or installation procedures should have the work performed by an authorized Mercury Marine dealer technician. Improper installation or servicing of this product could result in damage to the product or personal injury.

This document details safe service and diagnostic procedures. Mercury Marine cannot caution against all potentially hazardous service methods. For safety reasons, follow procedures as described in this document.

Manual Revisions and Current Information

Mercury Marine reserves the right to make changes to this manual without prior notification. Information contained in this document supersedes all information issued before the publication date of this manual. Refer to dealer service bulletins; operation, maintenance, and warranty manuals; and installation manuals for other pertinent information concerning the products described in this manual.

Related Service Bulletin List

Use the following table to record any future service bulletins that affect or add to the information in this manual. List the bulletin numbers and affected sections or pages in this manual for your reference.

Bulletin Type	Service Bulletin	Bulletin Description/Title	Section/Page Affected

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Section 1 - Alpha Sterndrive Tools



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Alpha Sterndrive Tools

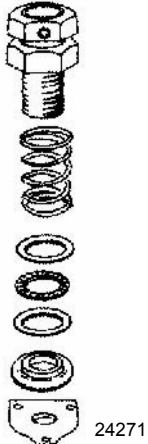

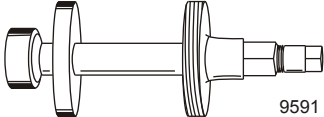
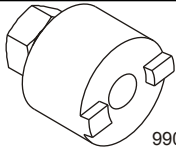
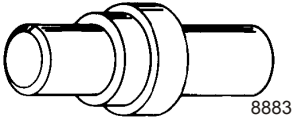
Alpha Sterndrive Tool Application Chart

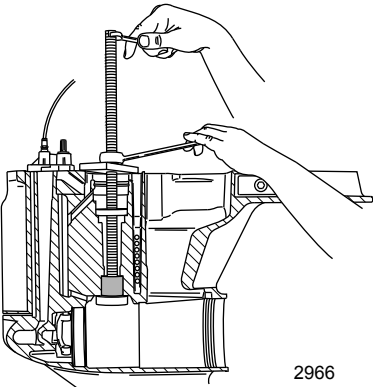





Part No.	Description	Alpha One Gen II	MC-1, R-MR Alpha One
91-12037	Shift Cable Tool	X	X
91-14311A2	Drive Shaft Bearing Preload Tool	X	X
91-17256	Bearing Retainer Wrench	X	X
91-18605A2	Bearing Adapter Installation Tool	X	X
91-31107T	Shift Shaft Bushing Tool		X
91-31108T	Oil Seal Driver	X	X
91-31229A7	Bearing Removal and Installation Tool Assembly	X	X
91-33489	Needle Bearing Driver		X
91-33491	Needle Bearing Driver		X
91-33492T	Needle Bearing Driver		X
91-33493T	Bearing Cup Driver		X
91-34379T	Bearing Cup Driver		X
91-34569A1	Slide Hammer Puller	X	X
91-36577T	Bearing Cup Driver		X
91-37240A1	Snap Ring Pliers		X
91-37241	Universal Puller Plate	X	X
91-37299Q2	Lube Gun	X	X
91-38053A4	Power Steering Gauge Kit	X	X
91-38277A2	Tab Washer Pliers		X
91-38756	U-joint Adapter	X	X
91-38918T	Bearing Cup Driver		X
91-38919	Swivel Pin Puller		X
91-43506T	Drive Shaft Bearing Retainer Wrench	X	X
91-38918T	Bearing Adapter	X	X
91-43693A2	Transom Cutout and Drill Fixture	X	X
91-44110T	Seal Driver	X	X
91-44357Q2	Flushing Device	X	X
91-45497A1	Bellows Expander Tool	X	X
91-46086A1 / 91-85716	Puller Jaws Assembly / Puller Bolt	X	X
91-52915A6	Trim Pump Test Gauge Kit	X	X
91-78473	Backlash Indicator	X	X
12-54048	Belleville Washer	X	X
91-56048T	Pinion Gear Shimming Tool	X	X
91-56775T	Drive Shaft Adapter	X	X
91-58222A1	Dial Indicator	X	X
91-60523	Shimming Tool, Drive Gear	X	X
91-60526T	Shimming Tool, Driven Gear	X	X
91-61067A3	Pinion Nut Wrench	X	X
91-61069T	Bearing Carrier Retainer Nut Wrench	X	X

Part No.	Description	Alpha One Gen II	MC-1, R-MR Alpha One
91-61077T	Propeller Shaft Adapter	X	X
91-63209	Torch Lamp	X	X
91-66274	Torque Wrench, lb-in.	X	X
75104A7	Shift Shaft Tool		X
91-78310	Hinge Pin Tool	X	X
91-78473	Backlash Indicator	X	X
91-805057A2	Bushing Installation Tool	X	X
91-805475A1	Alignment Tool Assembly	X	X
91-806908A1	Power Steering Adapter	X	X
91-806908A1	Seal and Bushing Installation Kit	X	
91-807944T	Needle Bearing Installation Tool, Reverse Gear	X	
91-808053T	Bearing Cup Driver	X	X
91-83155	Dial Indicator Adapter Kit	X	
91-809815A1	Shift Shaft Stabilizer	X	X
91-815850	Forward Gear Assembly Tube	X	X
91-816242	Puller Jaw	X	X
91-816246	Guide Plate	X	X
91-816244	Reverse Gear Needle Bearing Driver	X	X
91-816245	Needle Bearing Remover	X	X
91-817569T	Carrier Seal Driver	X	
91-817570T	Upper Drive Shaft Housing Seal Driver	X	
91-818162	Sleeve Installation Tool	X	
91-818169T	Sleeve Removal Tool	X	
91-821571A1	Water Pump Alignment Pins	X	
91-821709T	Spanner Wrench	X	X
91-83155	Dial Indicator Adapter Kit	X	
91-854377	Shimming Tool, Driven Gear	X	
91-877528-1	MCM Tool Overlay Kit	X	X
91-89897	Dial Indicator Holding Tool	X	X
91-95639	Pipe Tap		X



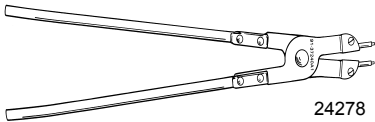
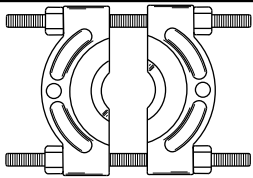
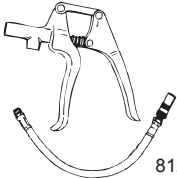


Shift Cable Tool	91-12037
 10815	Installs and removes shift cable into the bell housing of the transom assembly.

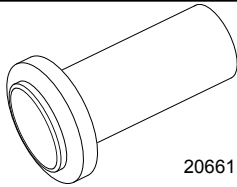


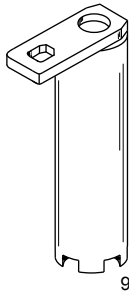

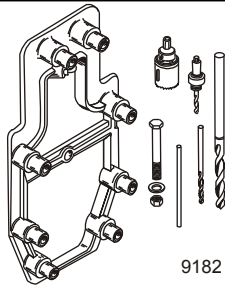
Section 1 - Alpha Sterndrive Tools

Drive Shaft Bearing Preload Tool	91-14311A2
 <p>24271</p>	Preloads the drive shaft bearing when checking pinion height and backlash.
Drive Shaft Bearing Preload Tool	91-14311A2
 <p>10482</p>	Installs and torques the U-joint retainer nut.
Bearing Cup and Adaptor Installation Tool	91-18605A 2
 <p>9591</p>	Installs the forward gear bearing race on a standard gearcase. Presses the reverse gear bearing adapter into the gear housing on a counter-rotating gearcase.
Shift Shaft Bushing Tool	91-31107T
 <p>9906</p>	Aids in the removal and installation of the shift shaft bushing on Alpha One excluding Gen II.
Oil Seal Driver	91-31108T
 <p>8883</p>	Installs bearing carrier oil seals.


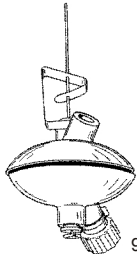

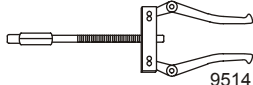



Bearing Removal and Installation Kit	91-31229A7
 <p>2966</p>	<p>Installs and removes the bearings in all gearcases. 91-31229A7 tool assembly includes the following components: 11-24156 Hex Nut 12-34961 Washer 91-15755T Bearing Carrier 91-29310 Plate 91-29610 Pilot Plate 91-30366T1 Mandrel 91-31229 Puller Shaft 91-32325T Driver Head 91-32336 Driver Needle Bearing 91-36379 Puller/Head Gear 91-36569T Driver Head 91-36571T Pilot Washer 91-37292 Roller Bearing 91-37311 Driver Head 91-37312 Driver Head 91-37323 Driver Head Rod 91-37324 Pilot Washer 91-37350T Pilot Mandrel 91-38628T Puller/Driver Head 91-52393 Driver Needle Bearing 91-52394 Head Pull Rod</p>
Bearing Driver	91-33489
 <p>10769</p>	<p>Installs the small roller bearing into the gimbal housing.</p>
Needle Bearing Driver	91-33491
 <p>9443</p>	<p>Installs the needle bearing in the forward gear. Removes and installs the seals and bearing in the gimbal housing.</p>
Needle Bearing Driver	91-33492T
 <p>10789</p>	<p>Removes and installs the lower swivel pin bearing in the gimbal ring.</p>
Bearing Cup Driver	91-33493T
 <p>10764</p>	<p>Installs the upper driveshaft bearing cup into the driveshaft housing.</p>
Bearing Cup Driver	91-34379T
 <p>10765</p>	<p>Installs the driveshaft bearing cup into the gear housing.</p>

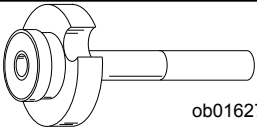
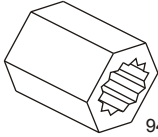
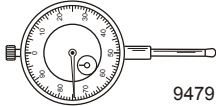
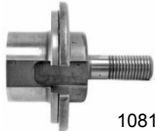

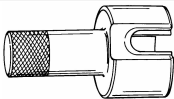
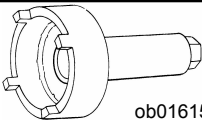

Section 1 - Alpha Sterndrive Tools

Slide Hammer	91-34569A 1
 6761	Aids in the removal of various drive components. Use with puller jaws (91-34570).
Bearing Cup Driver	91-36577T
 10766	Installs the forward gear bearing cup into a the gear housing of the with a bearing cup outside diameter of 89 mm (3.500 in.).
Snap Ring Pliers	91-37240A1
 24278	Removes the snap ring located at the gimbal housing bearing.
Universal Puller Plate	91-37241
 8505	Removes bearings from gears and the driveshaft.
Grease Gun	91-37299Q 2
 8120	Aids in the lubrication of key areas on the drive and transom. Allows easy access to grease fittings.
Power Steering Test Gauge Kit	91-38053A05
 10804	Tests the power steering system pressure.
Tab Washer Pliers	91-38277A2
 10827	Bends the propeller tab washers off of the tab nut.

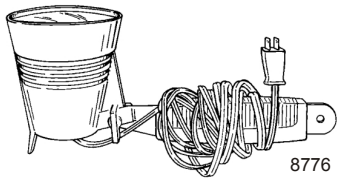




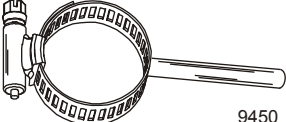

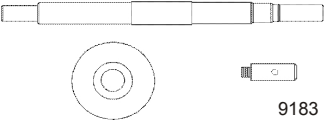
U-joint Adaptor	91-38756
 <p>20661</p>	Supports the yoke when disassembling the U-joint.
Bearing Cup Driver	91-38918T
 <p>10767</p>	Installs the bearing cup in the top cover of the driveshaft housing.
Puller Head	91-38919
 <p>10806</p>	Removes the swivel pin from the gimbal rings.
Driveshaft Bearing Retainer Wrench	91-43506T
 <p>9520</p>	Removes and installs the threaded driveshaft bearing retainer.
Seal Driver	91-43591T
 <p>10812</p>	Installs the upper driveshaft oil seal.
Transom Cutout and Drill Fixture	91-43693A 2
 <p>9182</p>	Cuts and drills the boat transom for sterndrive installation.



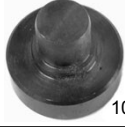

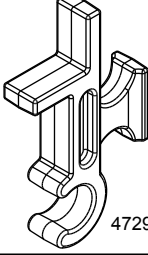
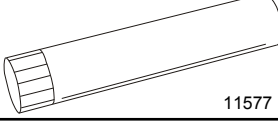

Section 1 - Alpha Sterndrive Tools

Seal Driver	91-44110T
 <p>10814</p>	Installs the oil seals in the water pump base on older Alpha product.
Flushing Device	91-44357Q 2
 <p>9192</p>	Attaches to the water intakes; provides a fresh water connection when flushing the cooling system or operating the engine.
Bellows Expander Tool	91-45497A1
 <p>10483</p>	Aids in the removal and installation of the exhaust bellows.
Puller Jaws Assembly Puller Bolt	91-46086A1 91-85716
 <p>9514</p>	Removes the bearing carrier.
Power Trim Test Gauge Kit	91-52915A6
 <p>3753</p>	Tests circuit pressures for various trim pumps.
Backlash Indicator Rod	91-53459
 <p>10452</p>	Aids in checking gear backlash.
Belleville Washer	12-54048
 <p>10772</p>	Use with the Pinion Nut Adapter (91-61067A3) and a propeller nut to check the reverse gear backlash.

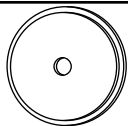


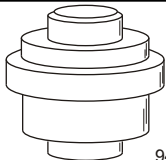
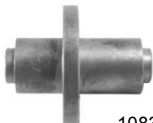


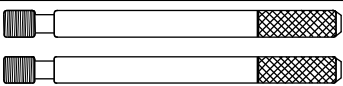
Pinion Gear Locating Tool	91-56048001
 <p>ob01627</p>	Measures pinion gear height.
Driveshaft Holding Tool	91-56775T
 <p>9448</p>	Provides a wrench surface to turn the driveshaft. Also used to hold driveshaft for pinion gear installation.
Dial Indicator	91-58222A1
 <p>9479</p>	Measures distance, movement, and runout; used for drive system assembly and engine setup.
Drive Gear Shimming Tool	91-60523
 <p>10819</p>	Measures the U-joint pinion gear clearance.
Driven Gear Shimming Tool	91-60526T
 <p>10820</p>	Aids in measuring the upper driven gear clearance.
Pinion Nut Wrench	91-61067003
 <p>ob01639</p>	Holds the pinion nut when removing the pinion gear and driveshaft.
Bearing Carrier Retainer Nut Wrench	91-61069T
 <p>ob01615</p>	Installs and removes the bearing carrier retainer nuts.
Propeller Shaft/Driveshaft Adapter	91-61077T
 <p>10805</p>	Provides a wrench surface to turn the propeller shaft.

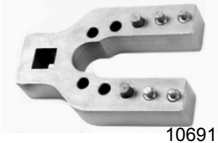
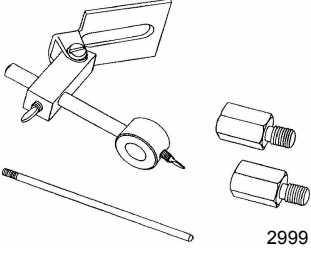
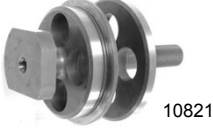


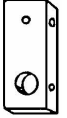

Section 1 - Alpha Sterndrive Tools

Torch Lamp	91-63209
 <p>8776</p>	Heats surfaces to aid in the removal and installation of interference fit engine components.
Puller Head	91-63616T
 <p>10678</p>	Removes the upper swivel shaft on gimbal rings.
Torque Wrench, lb. in.	91-66274
 <p>10829</p>	Dial-type torque wrench that sets torque from 9 to 150 lb. in.; 3/8 in. drive.
Shift Shaft Lever	75104A7
 <p>10818</p>	Assists in shifting the gear housing when the gear housing is separated from the driveshaft housing.
Hinge Pin Tool	91-78310
 <p>10672</p>	Removes and installs the hinge pins.
Backlash Indicator Rod	91-78473
 <p>9450</p>	Aids in checking gear backlash.
Bushing Installation Tool	91-805057A2
 <p>10773</p>	Installs the upper shift shaft bushings into the transom assembly.
Alignment Tool Assembly	91-805475A 1
 <p>9183</p>	Used to align the engine to the standard Bravo transom assembly for sterndrive installation.

Power Steering Adapter Kit	91-806908A02
 <p>10803</p>	Adapts power steering test gauge (91-38053A05) to test power steering control valves.
Seal and Bushing Installation Tool	91-806928A1
 <p>10811</p>	Installs the shift shaft bushings in the Alpha One Gen. II drives with serial number 0F094775 and above.
Needle Bearing Installation Tool	91-807944T
 <p>10792</p>	Aids in the installation of the needle bearing in the reverse gear of a counter-rotating gearcase.
Bearing Cup Driver	91-808053T
 <p>10768</p>	Aids in the installation of a new smaller outside diameter top cover bearing.
Shift Shaft Slide Stabilizer	91-809815A1
 <p>4729</p>	Holds the Alpha shift shaft slide in the proper position as the sterndrive is installed onto the bell housing studs
Forward Gear Assembly Tube	91-815850
 <p>11577</p>	Removes and installs the forward gear and bearing adapter assembly for counter rotation gearcases.
Puller Jaws	91-816242
 <p>10681</p>	Use with either the two-prong or three-prong puller on all drives.

Section 1 - Alpha Sterndrive Tools

Guide Plate	91-816243
 4481	Centers the rod used to drive in the forward gear bearing on a standard rotation gearcase, and the reverse gear bearing on a counter rotation gearcase.
Reverse Gear Needle Bearing Driver	91-816244
 10810	Installs the needle bearings into the reverse gear of a counter-rotating gearcase.
Needle Bearing Removal Tool	91-816245
 10793	Removes the needle bearings from the back adapter of a counter-rotating gearcase.
Carrier Seal Driver	91-817569T
 9481	Removes and installs the bearing carrier seals. Installs seals in the driveshaft seal carrier.
Upper Driveshaft Housing Seal Driver	91-817570T
 10833	Install the seals in the upper driveshaft housing.
Sleeve Installation Tool	91-818162
 10823	Installs the aluminum sleeve into the U-joint bellows.
Sleeve Removal Tool	91-818169T
 10824	Removes the aluminum sleeve from the U-joint bellows.
Water Pump Alignment Pins	91-821571A 1
 9482	Aligns the water pump during installation.

Trim Cylinder End Cap Tool	91-821709T
 <p>10691</p>	Allows easy removal of the trim cylinder end caps. Required if tilt limit spacers are to be installed or if the trim in limit spacer is to be removed (to allow additional trim in range).
Dial Indicator Adapter	91-83155
 <p>2999</p>	Dial indicator holding fixture.
Driven Gear Shimming Tool	91-854377
 <p>10821</p>	Use to shim the driven gear on the Alpha One Gen. II starting with Serial Number 0L100009 and above. Can be identified by the letters 'A, B, C.'
Seal Driver	91-864497
 <p>25951</p>	Installs double lip seal in driveshaft housing.
MCM Tool Overlay Kit	91-877528-1
 <p>24523</p>	MCM Tool Overlay Kit (sheet numbers 10-20) contains 11 overlay sheets and hooks indicating locations for all the Mercury MerCruiser gasoline engine and sterndrive active service tools
Dial Indicator Holding Tool	91-89897
 <p>ob01631</p>	Secures the dial indicator to the gear housing when checking backlash.
Pipe Tap	91-95639
 <p>10802</p>	Taps the bell housing for shift cable installation.

Notes:

Section 2 - Bravo Sterndrive Tools

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2

Bravo Sterndrive Tools

Bravo Sterndrive Tool Application Chart

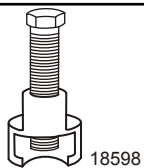
Part No.	Description	Bravo One	Bravo Two	Bravo Three	Blackhawk
91-12427	Shift Cable Adjustment Tool	X	X	X	X
91-17256	Bearing Retainer Wrench	X	X	X	X
91-17257	Bearing Carrier Retainer Tool		X		
91-17262A1	Shift Cable Anchor Adjustment Tool	X	X	X	X
91-17273	Bushing Removal Tool	X	X	X	
91-17275A1	Bearing and Seal Installation Tool	X	X	X	X
91-17301T1	Clutch Assembly Stand	X	X	X	X
91-17302	Shift Handle Tool	X	X		
91-31106T	Bearing Cup Driver	X	X		
91-31229A7	Bearing Removal and Installation Tool Assembly	X	X	X	X
91-34569A1	Slide Hammer Puller	X	X	X	X
91-37241	Universal Puller Plate	X	X	X	X
91-37299Q2	Lube Gun	X	X	X	X
91-38053A4	Power Steering Gauge Kit	X	X	X	X
91-38756	U-joint Adapter	X			X
91-42840T	Drive Shaft Pinion Gear Shimming Tool	X			
91-43559T	Clamp Plate	X	X	X	
91-43578A1	Bushing / Bearing / Seal Driver	X	X	X	X
91-43579	Tapered Insert Tool	X	X	X	X


Part No.	Description	Bravo One	Bravo Two	Bravo Three	Blackhawk
91-43693A2	Transom Cutout and Drill Fixture	X	X	X	X
91-44357Q2	Flushing Device	X	X	X	X
91-45497A1	Bellows Expander Tool	X	X	X	X
91-52915A6	Trim Pump Test Gauge Kit	X	X	X	X
91-53459	Backlash Indicator Rod	X	X		
91-55916	Oil Seal Driver	X	X		
91-55918	Bearing Driver	X	X	X	
91-58222A1	Dial Indicator	X	X	X	X
91-61069T	Bearing Carrier Retainer Nut Wrench	X	X	X	
91-61077T	Propeller Shaft/ Driveshaft Adapter	X	X	X	X
91-63209	Torch Lamp	X	X	X	X
91-63616T	Puller Head	X	X	X	X
91-63626	Bearing Cup Driver		X		
91-63638T	Bearing Driver	X	X	X	
91-66274	Torque Wrench, lb-in.	X	X	X	X
91-76675T1	Reference Electrode	X	X	X	X
91-78310	Hinge Pin Tool	X	X	X	X
91-805347	Bearing Driver, Bearing Adapter				X
91-805352T	Bearing Driver, Outer Propeller Shaft Bearing			X	X
91-805356	Bearing Carrier Tool			X	X
91-805358T	Seal Driver, Outer Propeller Shaft			X	X
91-805372	Seal Driver, Bearing Carrier Seal			X	X
91-805374	Bearing Carrier Tool			X	X
91-805374-1	Bearing Carrier Tool			X	
91-805382T	Bearing Retainer Tool			X	


Section 2 - Bravo Sterndrive Tools

Part No.	Description	Bravo One	Bravo Two	Bravo Three	Blackhawk
91-805451	Driveshaft Bolt Tightening Tool				X
91-805453	Driveshaft Race Tool				X
91-805454	Driver Handle	X		X	X
91-805455	Driveshaft Retaining Nut Tool				X
91-805456T	Bearing Adapter Tool				X
91-805457T1	Propeller Nut Tool			X	X
91-805458	Vertical Guide Tool	X	X	X	X
91-805462T	Shimming Tool			X	X
91-805466	Pinion Inspection Tool				X
91-805470	Front Bearing Guide	X	X	X	X
91-805471T	Needle Bearing Installation Tool				X
91-805472	Needle Bearing Removal Tool				X
91-805473	Guide Insert	X	X	X	X
91-805474	Vertical Shaft Service Tool	X	X	X	X
91-805475A1	Alignment Tool Assembly	X			X
91-805481	Backlash Indicator Rod			X	X
91-805482	Backlash Indicator Rod			X	X
91-805485	Vertical Driver				X
91-805573T	Holding Fixture				X
91-806192	Spline Backlash Tool			X	X
91-806908A1	Power Steering Adapter	X	X	X	X
91-813653T	Seal Driver	X	X	X	
91-816242	Puller Jaw	X	X	X	X
91-818162	Sleeve Installation Tool	X			
91-818836A1	Drill Bushing Tool Kit	X	X		
91-821709T	Spanner Wrench	X			X
91-83155	Dial Indicator Adapter Kit	X	X	X	







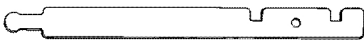

Part No.	Description	Bravo One	Bravo Two	Bravo Three	Blackhawk
91-840965A1	Integrated Transom Alignment Assembly	X	X	X	X
91-84996T1	Flushing Kit	X	X	X	X
91-862064A1	Seal Removal Tool			X	X
91-862546	Retention Sleeve Removal Tool	X	X	X	X
91-863738	Driveshaft Retaining Tool			X	
91-864220	Driver Head	X	X	X	
91-881150Q1	Dual Water Pick-Up Gear Case Flush Seal Kit	X			
91-883983	MCM Tool Board Overlay Update Kit	X	X	X	X
91-89865	Bearing Seal and Cup Driver	X	X		
91-89867T	Bearing Driver	X	X	X	
91-90244A1	Puller/Drive Assembly	X	X	X	X
91-90338A1	Puller Bar	X	X		
91-96512	Gear Case Pinion Shimming Tool		X		


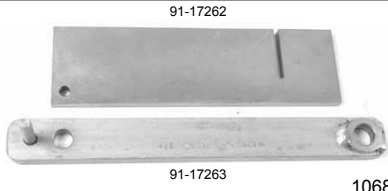


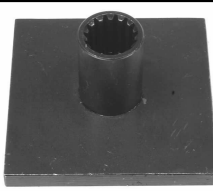



Power Steering Pump Pulley Remover	Kent Moore J-25034-C
 <p>18598</p>	Removes the pulley on the power steering pump on Saginaw pumps only.

Power Steering Pump Pulley Remover	Kent Moore J-21239-1
 <p>25952</p>	Removes the pulley on the DHB power steering pumps and water pumps with smaller shafts.

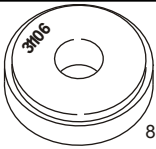

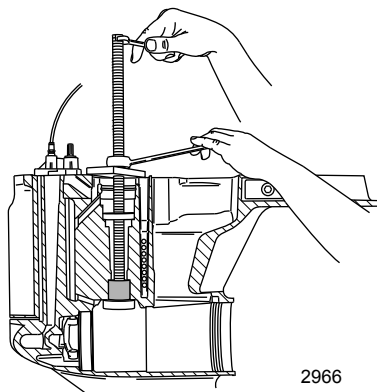

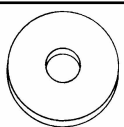
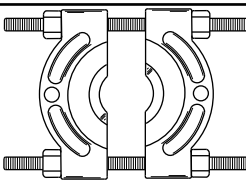
Expanding Rod	Snap-On CG40-4
 <p>12538</p>	Aids in the removal of gears and bearings; use with Snap-On CG40A-6.

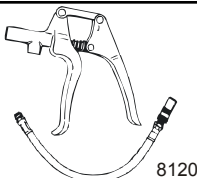
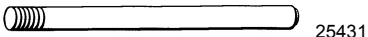

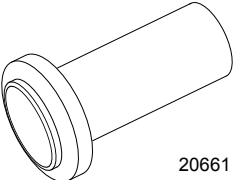

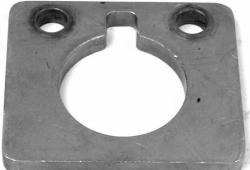

Section 2 - Bravo Sterndrive Tools

Collet	Snap-On CG40A-6
 12534	Aids in the removal of gears or bearings; use with Snap-On CG40-4.
Collet	Snap-On CG40A10
 21601	Aids in the removal of bearings; use with expanding rod.
Expanding Rod	Snap-On CG45-4
 17771	Aids in the removal of the upper swivel shaft lower bearing in the gimbal housing. Use with Snap-On Collet (CG45-15).
Collet	Snap-On CG45-15
 10774	Aids in the removal of the upper swivel shaft lower bearing in the gimbal housing. Use with Snap-On Expanding Rod (CG-45-4).
Hex Nut	11-24156
 18650	A 5/8 in. x 18 in. hex nut that aids in the removal and installation of various engine components. May use with Puller Shaft (91-31229); also included in the Bearing Removal and Installation Kit (91-31229A 7).
Washer	12-34961
 10834	Use on the threaded puller rod between the nut and plate when removing bearings.
Shift Cable Adjustment Tool	91-12427
 9186	Attaches over the shift cable, and aids in proper shift cable adjustment at the shift plate.
Bearing Retainer Wrench	91-17256
 10482	Removes and installs the u-joint bearing retainer nut.


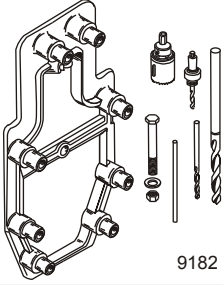
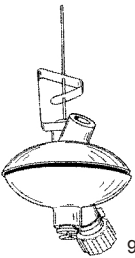

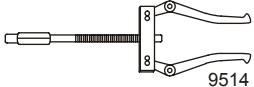


Bearing Carrier Retainer Tool  10465	91-17257 Loosens and tightens the bearing carrier retainer nut on Bravo Two.
Shift Cable Anchor Adjustment Tool  10687	91-17262A1 Use to set the shift cable adjustments after shift cable installation. Includes the following components: 91-17262A1 Core Wire Locating Tool 91-17263 Shift Cable Anchor Adjustment Tool
Bushing Removal Tool  10485	91-17273 Aids in the removal of the shift shaft bushing.
Bearing and Seal Installation Tool  10461	91-17275A1 Installs the shift shaft bushings and oil seal.
Clutch Assembly Stand  10515	91-17301T1 Holds the clutch assemblies for servicing.
Shift Handle Tool  10688	91-17302 Positions and removes the shift shaft.
Hex Nut  18650	11-24156 A 5/8 in. x 18 in. hex nut which aids in the removal and installation of various engine components. May use with Puller Shaft (91-31229); also included in the Bearing Removal and Installation Kit (91-31229A 7).
Puller Plate  18600	91-29310 Aids in the removal and installation of the gimbal bearing, as well as various bearings in the gear housing. Also included in the Bearing Removal and Installation Kit (91-31229A 7).



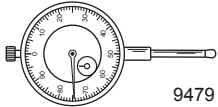
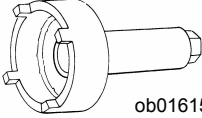

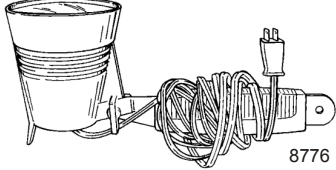


Section 2 - Bravo Sterndrive Tools

<p>Bearing Cup Driver</p>  <p>8882</p>	<p>91-31106T</p> <p>Installs the driven gear bearing cup.</p>
<p>Puller Shaft</p>  <p>18604</p>	<p>91-31229</p> <p>A 5/8 in. x 18 in. (15.875 mm) long threaded rod which aids in the removal and installation of various engine components. Also included in the Bearing Removal and Installation Kit (91-31229A 7).</p>
<p>Bearing Removal and Installation Kit</p>  <p>2966</p>	<p>91-31229A7</p> <p>Installs and removes the bearings in all gearcases. 91-31229A7 tool assembly includes the following components:</p> <ul style="list-style-type: none"> 11-24156 Hex Nut 12-34961 Washer 91-15755T Bearing Carrier 91-29310 Plate 91-29610 Pilot Plate 91-30366T1 Mandrel 91-31229 Puller Shaft 91-32325T Driver Head 91-32336 Driver Needle Bearing 91-36379 Puller/Head Gear 91-36569T Driver Head 91-36571T Pilot Washer 91-37292 Roller Bearing 91-37311 Driver Head 91-37312 -Driver Head 91-37323 Driver Head Rod 91-37324 Pilot Washer 91-37350T Pilot Mandrel 91-38628T Puller/Driver Head 91-52393 Driver Needle Bearing 91-52394 Head Pull Rod
<p>Slide Hammer</p>  <p>6761</p>	<p>91-34569A 1</p> <p>Aids in the removal of various engine components. Use with puller jaws (91-34570).</p>
<p>Pilot Washer</p>  <p>ob01619</p>	<p>91-36571T</p> <p>Used in pinion gear and pinion bearing installation.</p>
<p>Universal Puller Plate</p>  <p>8505</p>	<p>91-37241</p> <p>Removes bearings from gears and the driveshaft.</p>




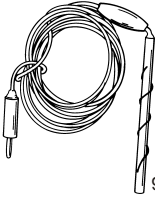



Grease Gun	91-37299Q 2
	Aids in the lubrication of key areas on the engine. Allows easy access to grease fittings.
Driver Rod	91-37323
	Aids in the removal and installation of various bearings and bearing races
Power Steering Test Gauge Kit	91-38053A05
	Tests the power steering system pressure.
U-joint Adapter	91-38756
	Supports the yoke when disassembling the U-joint.
Driveshaft Pinion Gear Shimming Tool	91-42840T
	Assists in determining the driveshaft pinion gear shims.
Clamp Plate	91-43559T
	Installs onto the gear housing while separated from the driveshaft housing and holds a preload while checking the the gear backlash and bearing preload.
Bushing/Bearing/Seal Driver	91-43578A1
	Installs the transom assembly bushings, bearings, and seals.







Section 2 - Bravo Sterndrive Tools

Tapered Insert Tool	91-43579
 <p>9197</p>	Removes and installs the tapered insert retainer into the water inlet hose.
Transom Cutout and Drill Fixture	91-43693A 2
 <p>9182</p>	Cuts and drills the boat transom for sterndrive installation.
Flushing Device	91-44357Q 2
 <p>9192</p>	Attaches to the water intakes; provides a fresh water connection when flushing the cooling system or operating the engine.
Bellows Expander Tool	91-45497A1
 <p>10483</p>	Aids in the removal and installation of the exhaust bellows.
Puller Jaws Assembly Puller Bolt	91-46086A1 91-85716
 <p>9514</p>	Removes bearing carrier and bearing races.
Power Trim Test Gauge Kit	91-52915A6
 <p>3753</p>	Tests circuit pressures for various trim pumps.
Backlash Indicator Rod	91-53459
 <p>10452</p>	Aids in checking gear backlash.









Oil Seal Driver	91-55916
 10848	Installs the bearing carrier oil seals.
Bearing Driver	91-55918
 10476	Aids in the removal and installation of the bearing carrier needle bearings.
Dial Indicator	91-58222A1
 9479	Measures distance, movement, and runout; used for drive system assembly and engine setup.
Bearing Carrier Retainer Nut Wrench	91-61069T
 ob01615	Installs and removes the bearing carrier retainer nuts on Bravo One.
Propeller Shaft/Driveshaft Adapter	91-61077T
 10805	Provides a wrench surface to turn the propeller shaft or the driveshaft.
Torch Lamp	91-63209
 8776	Heats surfaces to aid in the removal and installation of interference fit engine components.
Puller Head	91-63616T
 10678	Removes the upper swivel shaft on gimbal rings.
Bearing Cup Driver	91-63626
 10473	Installs the bearing cup into the bearing carrier.




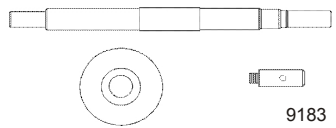




Section 2 - Bravo Sterndrive Tools

Bearing Driver	91-63638 1
 10477	Removes and installs the lower driveshaft pinion bearing.
Torque Wrench, lb. in.	91-66274
 10829	Dial type torque wrench that sets torque from 9 to 150 lb. in.; 3/8 in. drive.
Bearing Cup Driver	91-67443T
 10838	Installs the driveshaft bearing cup into the gear housing, and the bearing cup into the bearing carrier.
Reference Electrode	91-76675T 1
 9188	Senses and electrical current in the water when testing the MerCathode system. Use to check hull potential.
Hinge Pin Tool	91-78310
 10672	Removes and installs the hinge pins.
Outer Propeller Shaft Bearing Driver	91-805352T
 10479	Installs the roller bearing into the outer propeller shaft.
Bearing Carrier Tool	91-805356
 10469	Aids in the installation of the bearing carrier needle bearing.




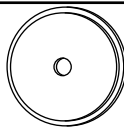


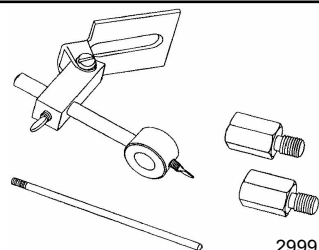
Outer Propeller Shaft Seal Driver	91-805358T
 <p>10684</p>	Installs the seals in the outer propeller shaft.
Bearing Carrier Seal Driver	91-805372
 <p>10683</p>	Aids in the installation of seals into the bearing carrier.
Bearing Carrier Tool	91-805374
 <p>10470</p>	Aids in the removal and installation of the outer propeller shaft bearing carrier on the Bravo Three. Also used with Bearing Retainer Tool (91-805382T) to remove propeller shaft retainer nut.
Bearing Carrier Tool	91-805374-1
 <p>10471</p>	Removes and installs the driveshaft bearing carrier on the Bravo Three.
Driveshaft Retaining Tool	91-805381
 <p>10843</p>	Used to hold the bearings and the lower driveshaft while checking backlash.
Bearing Retainer Tool	91-805382T
 <p>10481</p>	Removes and installs the outer propeller shaft bearing retainer.


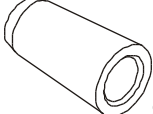
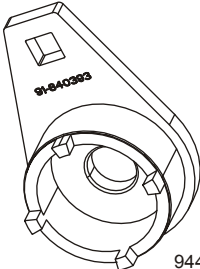


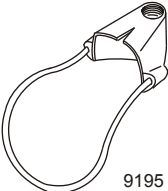

Section 2 - Bravo Sterndrive Tools

Driveshaft Race Tool	91-805453
 <p>10587</p>	Aids in the installation of the lower driveshaft bearing race.
Driver Handle	91-805454
 <p>10590</p>	Use with Front Bearing Guide (91-805470) for installation of the front bearing.
Driveshaft Retaining Nut Tool	91-805455
 <p>10588</p>	Removes and installs the lower driveshaft retaining nut.
Bearing Adapter Tool	91-805456T
 <p>10459</p>	Removes and installs the bearing adapter.
Propeller Nut Tool	91-805457T 1
 <p>10677</p>	Aids in the removal and installation of the front propeller nut.
Shimming Tool	91-805462T
 <p>10689</p>	Aids in measuring the pinion height.
Pinion Inspection Tool	91-805466
 <p>10675</p>	Draws the driveshaft into the bearing taper to facilitate the pinion height measurement.
Front Bearing Guide	91-805470
 <p>10701</p>	Guides the installation of the front bearing into the drives.







Needle Bearing Installation Tool	91-805471T
 <p>10673</p>	Installs the pinion gear needle bearings into the lower driveshaft bores.
Needle Bearing Removal Tool	91-805472
 <p>10674</p>	Aids in the removal of the pinion gear needle bearings.
Guide Insert Tool	91-805473
 <p>20864</p>	Inserts into the Bearing Cup Driver (91-31106T) when installing the front driven gear bearing cup.
Alignment Tool Assembly	91-805475A 1
 <p>9183</p>	Used to align the engine to the standard Bravo transom assembly for sterndrive installation.
Backlash Indicator Rod	91-805481
 <p>10453</p>	Indicates the inner propeller shaft backlash.
Backlash Indicator Rod	91-805482
 <p>10455</p>	Indicates the outer propeller shaft backlash.
Vertical Driver	91-805485
 <p>10854</p>	Use with various drivers to remove the drive bearings.
Spline Backlash Tool	91-806192
 <p>10692</p>	Measures the propeller-shaft-to-gear-spline backlash on V-blocks.

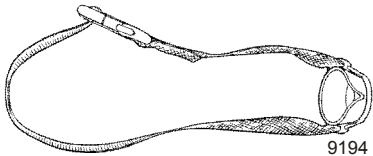








Section 2 - Bravo Sterndrive Tools

Power Steering Adapter Kit	91-806908A02
 <p>10803</p>	Adapts power steering test gauge (91-38053A05) to test power steering control valves.
Seal Driver	91-813653T
 <p>10852</p>	Installs the U-joint oil seal into the bearing carrier. Also used to pilot the puller rod for the installation of the gear housing needle bearing.
Puller Jaws	91-816242
 <p>10681</p>	Use with either the two-prong or three-prong puller on all drives.
Guide Plate	91-816243
 <p>4481</p>	Centers the rod used to drive in the forward gear bearing on a standard rotation gearcase, and the reverse gear bearing on a counter rotation gearcase.
Sleeve Installation Tool	91-818162
 <p>10823</p>	Installs the aluminum sleeve into the U-joint bellows.
Trim Cylinder End Cap Tool	91-821709T
 <p>10691</p>	Allows easy removal of the trim cylinder end caps. Required if tilt limit spacers are to be installed or if the trim in limit spacer is to be removed (to allow additional trim in range).
Dial Indicator Adapter	91-83155
 <p>2999</p>	Dial indicator holding fixture.








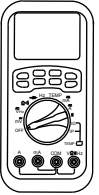
Bearing Carrier Oil Seal Installer	91-840385
 <p>10698</p>	Installs the needle bearing and oil seals into the bearing carrier.
Bearing Carrier Installation Tool	91-840388
 <p>9518</p>	Protects the seals when installing the bearing carrier onto the propeller shaft.
Bearing Carrier Retainer Nut Wrench	91-840393
 <p>9449</p>	Installs the bearing carrier retainer nut on heavy-duty propeller shafts.
Propeller Shaft Tool Kit	91-840393A1
 <p>10702</p>	Aids in the installation of the bearing carrier retainer with a heavy-duty propeller shaft installed on the lower unit.
ITS Alignment Tool	91-840965A1
 <p>15539</p>	Used to align the engine to the integrated or standard Bravo transom assembly for sterndrive installation.
Flushing Kit	91-849996T 1
 <p>9195</p>	Use for flushing gearcases with low water inlets.
Seal Removal Tool	91-862064A 1
 <p>10685</p>	Aids in the removal of the bearing carrier oil seals.





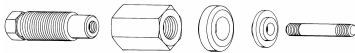

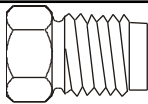
Section 2 - Bravo Sterndrive Tools

Spanner Wrench for L-18 U-joint Bearing Retainer	91-862219A1
 10705	Removes and installs the driveshaft bearing retainer.
Bearing Installation Tool	91-862530
 10855	Aids in the installation of the needle bearing and outer radial bearing.
Steel Bearing Adapter Socket	91-862531
 10706	Removes and installs the steel bearing adapter.
Retention Sleeve Removal Tool	91-862546
 10851	Removes the aluminum sleeve from the U-joint bellows of all the Bravo sterndrives, serial number 0L999999 and below.
Driveshaft Retaining Tool	91-863738
 10843	Holds the bearings and the lower driveshaft while checking backlash.
Needle Bearing and Outer Race Installation Tool	91-864220
 10458	Aids in the installation the needle bearing and the outer radial bearing on new style gears in the older Bravo drives (1999 and earlier).

Dual Water Pick-up Flush Gearcase Seal Kit	91-881150K 1
 9194	Blocks off the front water inlet holes on the dual water inlet gearcases.
Seal Driver Tool	91-865050
 10775	Aids in the removal and installation of the U-joint oil seal of the bearing retainer nut.
Gear Lash Flag 27/32	91-865080
 10799	Aids in checking the gear lash for 27/32 tooth gears in the driveshaft housing.
Gear Lash Flag 27/29	91-865081
 10800	Aids in checking the gear lash for 27/29 tooth gears in the driveshaft housing.
Gear Lash Flag 23/30	91-865082
 10872	Aids in checking the gear lash for 23/30 tooth gears in the driveshaft housing.
Stub Shaft for Bravo X Series	91-865083
 10795	Replaces the U-joint assembly during the shimming process of the driveshaft housing.
Stub Shaft for Standard Bravo	91-865084
 10782	Replaces the U-joint assembly during the shimming process of the driveshaft housing.
Clamp Block and Handle Tool	91-865085
 10779	Used to move the stub shaft when reading the gear lash on the driveshaft housing.
Adapter Rod Tool	91- 865086
 10464	Holds the measuring tools for shimming the driveshaft housing.

Section 2 - Bravo Sterndrive Tools

Dial Indicator Holding Block	91-865097
 <p>10781</p>	Secures the dial indicator tool in proper location when shimming the driveshaft housing.
Pinion Gear Shimming Tool	91-865114
 <p>10778</p>	Measures the pinion (drive) gear depth of the driveshaft housing.
Driven Gear Clamping Tool	91-865115
 <p>10472</p>	Prevents driven gear movement when measuring the gear lash of the driveshaft housing.
Gear Lash Flag 16/19	91-865116
 <p>10844</p>	Aids in checking the gear lash for 16/19 tooth gears in the driveshaft housing.
Snap-Ring Driver	91-866107
 <p>21565</p>	Aids in the removal of the cross bearing snap rings. Part of the Cross Bearing Removal and Installation Kit (91-866107A01).
Cross Bearing Mandrels	91-866108
 <p>21572</p>	Aids in the removal and installation of the bearing caps on the cross bearings.
Cross Bearing Press	91-866109
 <p>21566</p>	Aids in the removal and installation of the bearing caps on the cross bearings.
DMT 2004 Digital Multimeter	91-892647A01
 <p>4516</p>	Measures RPM on spark ignition (SI) engines, ohms, amperes, AC and DC voltages; records maximums and minimums simultaneously, and accurately reads in high RFI environments.

Bearing Seal and Cup Driver	91-89865
 <p>10467</p>	<p>Aids in the installation of the bearing carrier seals and bearing cup.</p>
Bearing Driver	91-89867T
 <p>10478</p>	<p>Aids in the installation of the driveshaft needle bearings.</p>
Puller/Drive Assembly	91-90244A1
 <p>10849</p>	<p>Removes and installs the driveshaft housing bearings and sleeves. Assembly includes the following and can be purchased separately:</p> <ul style="list-style-type: none"> 91-90777T1 Puller Jaws 91-90774 Puller Guide 91-90775 Puller Bolt 91-90244T Driver Guide 91-90773T Driver Head
Puller Bar	91-90338A1
 <p>10457</p>	<p>Aids in the removal of the bearing carrier.</p>
Pulley Pusher Installer	91-93656A1
 <p>10047</p>	<p>Installs the pulley onto the power steering pump.</p>
Gearcase Pinion Shimming Tool	91-96512
 <p>10670</p>	<p>Aids in measuring the gearcase pinion height.</p>
Plug	922-38609
 <p>8862</p>	<p>Aids in bleeding the in/down circuit on the remote trim pump.</p>

Notes:

Section 3 - TR/TRS Sterndrive Tools


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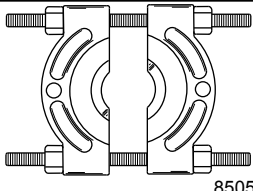


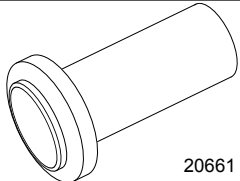
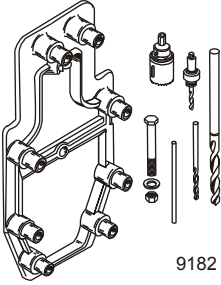
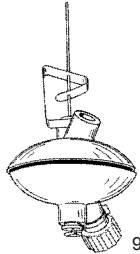
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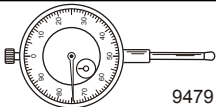
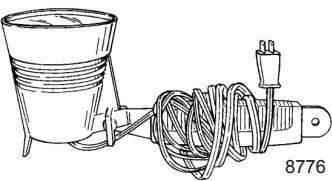
TR/TRS Sterndrive Tools







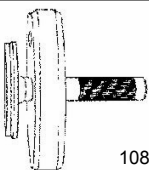
TR / TRS Sterndrive Tool Application Chart

Part No.	Description	TR	TRS
91-34569A1	Slide Hammer Puller	X	X
91-37241	Universal Puller Plate	X	X
91-38053A4	Power Steering Gauge Kit	X	X
91-38277A2	Tab Washer Pliers	X	X
91-38756	U-joint Adapter	X	X
91-43693A2	Transom Cutout and Drill Fixture	X	X
91-44357Q2	Flushing Device	X	X
91-52915A6	Trim Pump Test Gauge Kit	X	X
91-53459	Backlash Indicator Rod	X	
91-55916	Oil Seal Driver	X	
91-55918	Bearing Driver	X	X
91-55919	Bearing Driver	X	X
91-58222A1	Dial Indicator	X	X
91-63209	Torch Lamp	X	X
91-63619T	Seal / Bearing Driver	X	X
91-63620A1	Bearing Nut Wrench and Drive Shaft Socket	X	X
91-63625T	Bearing Holder	X	X
91-63626	Bearing Cup Driver	X	
91-63638T	Bearing Driver	X	X
91-66274	Torque Wrench, lb-in.	X	X
91-67441	Gear Housing Pinion Gear Shimming Tool		X
91-67443T	Bearing Cup Driver	X	X
91-68891T	Bearing Driver		X
91-78310	Hinge Pin Tool	X	X
91-805475A1	Alignment Tool Assembly		X
91-806192	Spline Backlash Tool	X	X
91-806908A1	Power Steering Adapter	X	X
91-89897	Dial Indicator Holding Tool	X	X
91-98171T	Driveshaft Housing Gear Shimming Tool	X	X


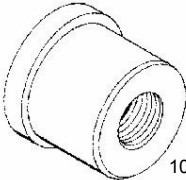

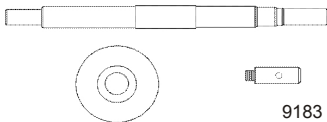


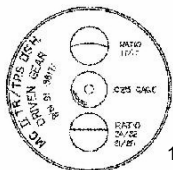
Slide Hammer	91-34569A 1
 6761	Aids in the removal of various engine components. Use with puller jaws.

Universal Puller Plate	91-37241
 <p>8505</p>	Removes bearings from gears and the driveshaft.
Power Steering Test Gauge Kit	91-38053A05
 <p>10804</p>	Tests the power steering system pressure.
Tab Washer Pliers	91-38277A2
 <p>10827</p>	Bends the propeller tab washers off of the tab nut.
U-joint Adapter	91-38756
 <p>20661</p>	Supports the yoke when disassembling the U-joint.
Transom Cutout and Drill Fixture	91-43693A 2
 <p>9182</p>	Cuts and drills the boat transom for sterndrive installation.
Flushing Device	91-44357Q 2
 <p>9192</p>	Attaches to the water intakes; provides a fresh water connection when flushing the cooling system or operating the engine.

Power Trim Test Gauge Kit	91-52915A6
 <p>3753</p>	Tests circuit pressures for various trim pumps.
Backlash Indicator Rod	91-53459
 <p>10452</p>	Aids in checking gear backlash.
Oil Seal Driver	91-55916
 <p>10848</p>	Installs the bearing carrier oil seals.
Bearing Driver	91-55918
 <p>10476</p>	Aids in the removal and installation of the bearing carrier needle bearings.
Driver Head	91-55919
 <p>10476</p>	Removes bearings and seals; installs needle bearings into the bearing carrier.
Dial Indicator	91-58222A1
 <p>9479</p>	Measures distance, movement, and runout; used for drive system assembly and engine setup.
Torch Lamp	91-63209
 <p>8776</p>	Heats surfaces to aid in the removal and installation of interference fit engine components.

Seal / Bearing Driver	91-63619T
 <p>10865</p>	Installs the driveshaft bearing cup and U-joint oil seal in the drive shaft housing of the TR and TRS sterndrives. Also installs the TR drive unit propeller shaft bearing cup.
Bearing Nut Wrench and Driveshaft Socket	91-63620A1
 <p>10861</p>	Remove and installs the upper driveshaft bearing nut.
Bearing Holder	91-63625T
 <p>10860</p>	Supports the drive gear bearing when removing and installing the U-joint nut.
Bearing Cup Driver	91-63626
 <p>10473</p>	Installs the bearing cup into the bearing carrier.
Bearing Driver	91-63638 1
 <p>10477</p>	Removes and installs the lower driveshaft pinion bearing.
Torque Wrench, lb. in.	91-66274
 <p>10829</p>	Dial-type torque wrench that sets torque from 9 to 150 lb. in.; 3/8 in. drive.
Gear Housing Pinion Gear Shimming Tool	67441
 <p>10864</p>	Determines the pinion gear clearance in the TRS gear housings.

Section 3 - TR/TRS Sterndrive Tools

Bearing Cup Driver	91-67443T
 <p>10838</p>	<p>Installs the driveshaft bearing cup into the gear housing, and the bearing cup into the bearing carrier.</p>
Bearing Driver	91-68891T
 <p>10859</p>	<p>Removes lower driveshaft bearing from the gear housing of the TRS sterndrives.</p>
Hinge Pin Tool	91-78310
 <p>10672</p>	<p>Removes and installs the hinge pins.</p>
Alignment Tool Assembly	91-805475A 1
 <p>9183</p>	<p>Used to align the engine to the standard Bravo transom assembly for sterndrive installation.</p>
Power Steering Adapter Kit	91-806908A02
 <p>10803</p>	<p>Adapts power steering test gauge (91-38053A05) to test power steering control valves.</p>
Dial Indicator Holding Tool	91-89897
 <p>ob01631</p>	<p>Secures the dial indicator to gear housing when checking backlash.</p>
Driveshaft Housing Gear Shimming Tool	91-98171T
 <p>10862</p>	<p>Determines the driveshaft housing drive gear clearance on the TR and TRS sterndrives.</p>

Section 4 - Gasoline Engine Tools

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Gasoline Engine Tools

Gasoline Engine Tool Application Chart

Part No.	Description	GM	Ford	4 Cyl (3.7L)
91-14822	Oil Pump Alignment Tool			X
91-18078	Fuel Fitting Connector	X		X
91-24697	Piston Ring Expander	X	X	X
91-35547	Engine Coupler Wrench	X		X
91-38053A4	Power Steering Gauge Kit	X	X	X
91-42447	Microfiche Viewer (120v)	X	X	X
91-42460	Microfiche Viewer (240v) International	X	X	X
91-52024A1	Remote Starter Switch	X	X	X
91-52344	Flywheel Holder	X	X	X
91-59339	Tachometer / Dwell Meter	X	X	X
91-63209	Torch Lamp	X	X	X
91-63998A1	Spark Chamber Assembly	X	X	X
91-66273	Rocker Stopper	X		
91-66274	Torque Wrench, lb-in.	X	X	X
91-805475A1	Alignment Tool Assembly	X	X	X
91-805918A1	Fuel Shut-Off Tool	X		
91-806141A1	Probe Assembly	X		
91-806141A2	Probe Assembly	X		
91-806794A1	Installation Jig	X		
91-806901	Fuel Pressure Tee	X		X
91-806908A1	Power Steering Adapter	X	X	X
91-809711	ES Torx Driver	X		
91-809929	Oil Pump Pickup Installer	X		
91-809938	Oil Pump Pickup Installer	X		
91-815234	Dyno Model 4000	X	X	X
91-818812A1	Ignition Timing (EST)	X		
91-828363A1	Tool Drill Fixture	X	X	X
91-830230T	Spark Air Gap Tool	X		

Part No.	Description	GM	Ford	4 Cyl (3.7L)
91-854009A3	DMT 2000A Tachometer / Multimeter	X	X	X
91-861540A1	DDT Adapter Harness (Carb Thunderbolt V)	X		
91-86197	Idle Mixture Socket	X		
91-863375A1	Alignment Hook	X		
91-877528-1	MCM Tool Overlay Kit	X		
91-881833A2	Fuel Pressure Gauge Kit	X	X	X
91-883502	Air Line Cutter	X		
91-883983	MCM Tool Overlay Update Kit	X		
91-93656A1	Pulley Pusher Installer	X	X	X
91-99379	Portable Timing Light	X	X	X
91-99750A1	DVA / Multimeter Kit	X	X	X


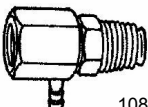
EFI/MPI Engine Tool Application Chart

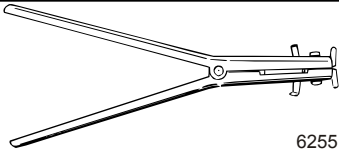
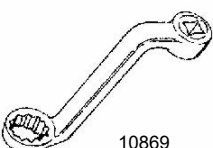





Part No.	Description	4.3L	5.0L	5.7L 350	6.2L	454 7.4L	502
91-18078	Fuel Fitting Connector		X	X			
91-803135	Fuel Pressure Gauge Adapter	X	X	X	X	X	X
91-803999	Mercury MerCruiser DDT Cartridge v2.0 (MEFI)	X	X	X	X	X	X
91-805747A 2	Timing Tool (MEFI)	X	X	X	X	X	X
91-805918A 1	Fuel Shut-Off Tool	X	X	x	X	X	X
91-806901	Fuel Pressure Tee	X	X	X		X	
91-822560A 2	DDT Harness Assembly (MEFI)			X	X	X	X
91-881833A 2	Fuel Pressure Gauge Kit	X	X	X	X	X	X
91-99379	Portable Timing Light	X	X	X	X	X	X
91-99750A1	DVA / Multimeter Kit	X	X	X	X	X	X

ECM/PCM Engine Tool Application Chart

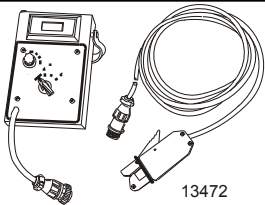
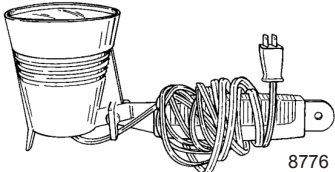
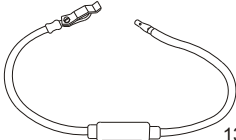


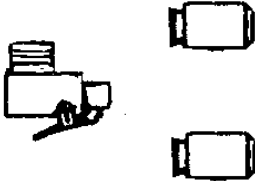
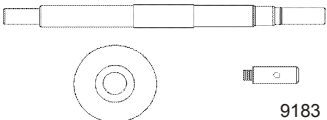
Part No.	Description	4.3L MPI	5.0L MPI	350 MPI Horizon	6.2L MX MPI Horizon	496 / 8.1L MPI
91-803135	Fuel Pressure Gauge Adapter	X	X	X	X	X
91-805918A1	Fuel Shut-Off Tool	X	X	x	X	X
91-822560T12	DDT Adapter Harness (555)	X	X	X	X	X
91-822560A13	DDT Harness Assembly (555)	X	X	X	X	X
91-854009A3	DMT 2000A Tachometer / Multimeter Kit	X	X	X	X	X
91-880118A2	Mercury MerCruiser DDT Cartridge v1.2 (555)	X	X	X	X	X
91-881833A2	Fuel Pressure Gauge Kit	X	X	X	X	X
91-99379	Portable Timing Light	X	X	X	X	X
91-99750A1	DVA / Multimeter Kit	X	X	X	X	X

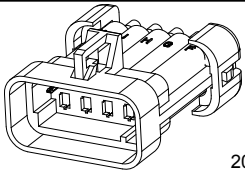
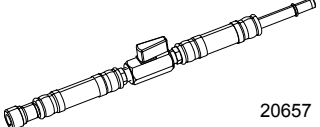
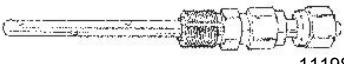

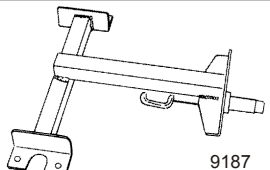


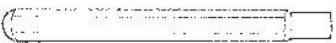
Gasoline Engine and EFI/MPI Tools

Oil Pump Alignment Tool	91-14822
 <p>10878</p>	Use to align the oil pump during installation of the 4-cylinder Mercury Mercruiser (224) cid engines only.
Fuel Fitting Connector	18078
 <p>10871</p>	Installed between the fuel line and the carburetor on 2-barrel MerCab and 4-barrel Weber carburetors.

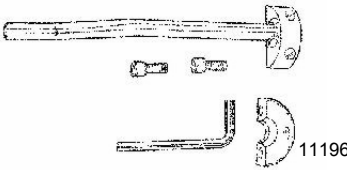
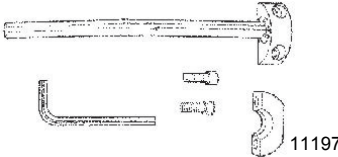
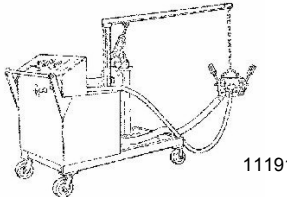
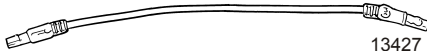
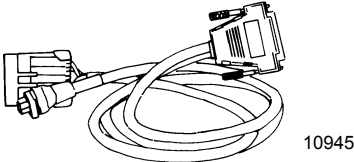

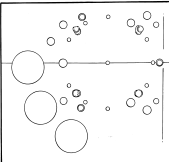
Piston Ring Expander	91-24697
 6255	Expands piston rings for removal and installation.
Engine Coupler Wrench	91-35547
 10869	Installs and removes the engine coupler and torques the bolts on the couplers that mount directly to the crankshaft; 1/2 in. drive.
Power Steering Test Gauge Kit	91-38053A05
 10804	Tests the power steering system pressure.
Microfiche Viewer (120v)	91-42447
 11194	Views the microfiche parts lists.
Microfiche Viewer (240v) International	91-42460
 11194	Views the microfiche parts lists.
Remote Starter Switch	91-52024A1
 10882	Provides a remote starter button to crank the engine when performing service procedures.
Flywheel Holding Tool	91-52344
 4738	Holds or turns the flywheel while making engine repairs, also used to torque the flywheel or the engine coupler.

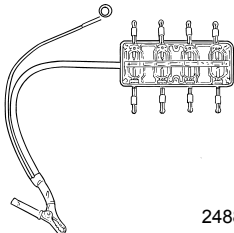





Section 4 - Gasoline Engine Tools

Service Tachometer/Dwell Meter	91-59339
 <p>13472</p>	Aids in checking engine RPM (0–10,000); also checks the dwell on breaker point ignition systems.
Torch Lamp	91-63209
 <p>8776</p>	Heats surfaces to aid in the removal and installation of interference fit engine components.
Spark Gap Tester	91-63998A 1
 <p>13488</p>	Provides a visual indication of spark/coil efficiency.
Rocker Stopper	91-66273
 <p>10884</p>	Plugs the oil holes in the rocker arms to eliminate oil spray while adjusting the valve lash.
Torque Wrench, lb. in.	91-66274
 <p>10829</p>	Dial-type torque wrench that sets torque from 9 to 150 lb. in.; 3/8 in. drive.
Fuel Pressure Gauge Kit	91-803135
 <p>10943</p>	Allows an older fuel pressure gauge to attach to either GM or Mercury MerCruiser Schrader valve.
Alignment Tool Assembly	91-805475A 1
 <p>9183</p>	Used to align the engine to the Standard Bravo Transom Assembly for sterndrive installation.

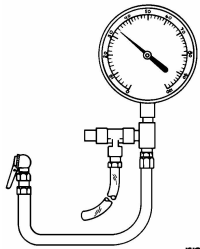
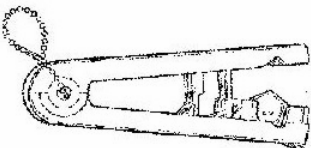

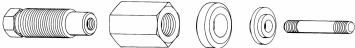


Timing Jumper Plug	91-805747A2
 <p>20654</p>	Locks the electronic spark trigger ignition system in base timing mode to set the initial ignition timing; also used as a jumper lead for testing various circuits.
Fuel Shut-Off Tool	91-805918A1
 <p>20657</p>	Used to perform fuel system pressure tests.
Probe assembly	91-806141A1
 <p>11198</p>	Measures SAV-regulated emissions on early models with a test port mounted to the side of the exhaust elbow.
Probe Assembly	91-806141A2
 <p>11199</p>	Measures SAV-regulated emissions on models with a test port mounted to the top of the exhaust elbow.
Installation Jig	91-806794A02
 <p>9187</p>	Locates the engine mounts when installing engine.
Fuel Pressure Tee	91-806901
 <p>10873</p>	The Fuel Pressure Tee has a Schrader valve that can be used on MerCarb, Weber, or TBI models.
Power Steering Adapter Kit	91-806908A02
 <p>10803</p>	Adapts power steering test gauge (91-38053A05) to test power steering control valves.
ES Torx Driver	91-809711
 <p>11192</p>	Removes the screws that hold the solenoid on Delco PG260 starter motors.

Section 4 - Gasoline Engine Tools

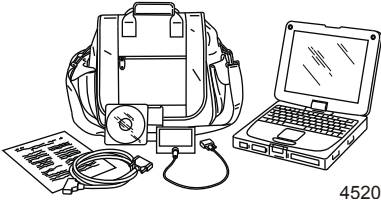




Oil Pump Pickup Installer	91-809929
	Installs the 5/8 in. (16 mm) diameter oil pickup tube and screen into the engine's oil pump.
Oil Pump Pickup Installer	91-809938
	Installs the 3/4 in. (19 mm) diameter oil pickup tube and screen into the engine's oil pump.
Dyno Model 4000	91-815234
	Connects to the propeller shaft on sterndrive models and operated the engine simulating a loaded condition while the boat is on a trailer. Dyno maximum hp is 575 hp.
Ignition Timing Cable	91-818812A 1
	Locks the electronic spark trigger ignition system in base timing mode to set the initial ignition timing; also used as a jumper lead for testing various circuits.
DDT Harness Assembly (MEFI)	91-822560A2
	Harness connects to DDT Scan Tool Kit. Use with MEFI 1, MEFI 2, and MEFI 3 ECM models.
Adapter Harness	84-822560A13
	Data link harness between engine and Computer Diagnostic System (CDS).
Tool Drill Fixture	91-828363A1
	Aids in the mounting of the following Panel Mount Controls: Commander300, 3000 Classic, Commander 2000.

Spark Air Gap Tool	91-830230T
 <p>24886</p>	Checks engine spark.
DMT 2000A Tachometer / Multimeter Kit	91-854009A3
 <p>10867</p>	Measures RPM on both 2-cycle and 4-cycle marine engines, records the maximums and minimums simultaneously, and will read accurately in high RFI environments.
Idle Mixture Socket	91-86197
 <p>10874</p>	Turns the idle mixture screws on Rochester 4-barrel carburetors.
Alignment Hook	91-863375A 1
 <p>9190</p>	Assists during engine alignment.
TKS Carburetor Mixture Adjusting Tool	91-866201
 <p>25739</p>	Adjusts idle mixture screw on TKS MerCarb.
MCM Tool Board Overlay Kit	91-877528-1
 <p>24523</p>	MCM Tool Overlay Kit (sheet numbers 10–20) contains 11 overlay sheets and hooks indicating locations for all the Mercury MerCruiser gasoline engine and sterndrive active service tools



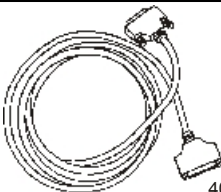
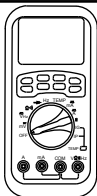


Section 4 - Gasoline Engine Tools

Fuel Pressure Gauge Kit  rms32	91-881833A03 Tests the fuel pump pressure; can be used to relieve fuel pressure.
Air Line Cutter  24887	91-883502 Prevents collapsing when cutting the air lines for the water drain system on 496/8.1 and Mercury MerCruiser models equipped with the air-actuated water drain system.
MCM Tool Board Overlay Update Kit  24888	91-883983 Updates the original MCM Tool Board Overlay Kit 91-877528. This sheet has 12 additional tools for the Bravo XR, XZ, and Bravo Three stern drives.
Pulley Pusher Installer  10047	91-93656A1 Installs the pulley onto the power steering pump.
Timing Light  11561	91-99379 Allows a technician to check ignition timing.
DVA/Multimeter Kit  3460	91-99750A 1 Tests the electrical and ignition systems; consists of a VOA meter with built-in direct voltage adapter.

CDS System Kits and Components

Computer Diagnostic System (CDS)	Order through SPX
 <p>4520</p>	<p>Monitors all electrical systems for proper function, diagnostics, and calibration purposes. For additional information, pricing, or to order the Computer Diagnostic System contact:</p> <p>SPX Corporation 28635 Mound Rd. Warren, MI 48092 or call: USA - 1-800-345-2233 Canada - 800-345-2233 Europe - 49 6182 959 149 Australia - (03) 9544-6222</p>
Breakout Box	SPX P/N MM-46225
 <p>5974</p>	<p>Connects to the Propulsion Control Module (PCM) to test engine circuits and components without probing wires. May be used with a Computer Diagnostic System (CDS).</p>
SmartComms Interface Box	SPX P/N MM-46944
 <p>25405</p>	<p>Interface between the computer and engine ECM or PCM. Can also be programmed to function as a stand-alone water test data recorder.</p>
Terminal Test Probe Kit	SPX P/N MM-46523
 <p>7915</p>	<p>Test probes adapt test meter leads to harness connections without damaging harness terminals. May be used with a Computer Diagnostic System (CDS).</p>
Water Test Trigger Cable	SPX P/N MM-46952
 <p>25459</p>	<p>Used for manually triggering a recording during a water test session when an engine problem occurs.</p>

Section 4 - Gasoline Engine Tools





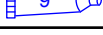

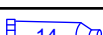


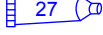


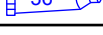
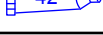
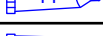
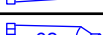
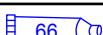


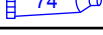
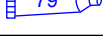
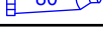

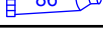
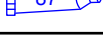
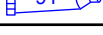
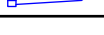


AC/DC Adapter for SmartComms Interface Box	SPX P/N MM-46953
 <p>25458</p>	Used to set up a SmartComms Interface Box for a water test session or to power up the box to download water test data when no 12 v DC source is available.
PCMCIA Card and Cable Kit	SPX P/N MM-47095
 <p>25460</p>	For serial connection to the DMT 2004 Digital Multi-meter or the Electronic Dual Input Pressure Gauge.
Extension Cable	84-825003A1
 <p>4012</p>	Data link extension harness (3.05 m [10 ft.]) between the adapter harness and the Digital Diagnostic Terminal or Computer Diagnostic System (CDS).
DMT 2004 Digital Multimeter	91-892647A01
 <p>4516</p>	Measures RPM on spark ignition (SI) engines, ohms, amperes, AC and DC voltages; records maximums and minimums simultaneously, and accurately reads in high RFI environments.
Digital Pressure Meter	91-892651A01
 <p>5786</p>	Connects to the fuel system/manifold and can be used in conjunction with Computer Diagnostic System (CDS).
DTS Command Module Breakout Box	91-898254
 <p>25457</p>	Connects in-series with connectors at the command module.

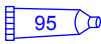
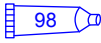
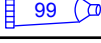
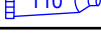
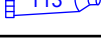
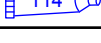
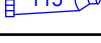
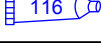
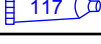
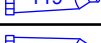
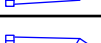

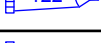
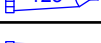

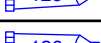
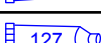
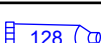
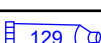
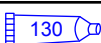
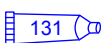


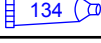
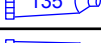
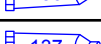
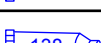
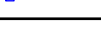

Section 5 - Lubricants/Sealants/Adhesives

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LSA Table

Tube Ref No.	Description	Where Used	Part No.
		-	Obtain Locally
	Needle Bearing Assembly Lubricant	-	92-802868A1
	Dielectric Grease	-	92-823506-1
	Loctite 271 Threadlocker	-	92-809819
	Loctite 567 PST Pipe Sealant	-	92-809822
	Loctite 277	-	Obtain Locally
	Loctite Master Gasket Kit	-	92-12564-2
	2-cycle Premium Outboard Oil	-	92-802813A1
	Perfect Seal	-	92-34227-1
	Liquid Neoprene	-	92-25711-3
	Bellows Adhesive	-	92-86166Q1
	Loctite 680 Retaining Compound	-	92-809833
	Special Lubricant 101	-	92-802865A1
	P80 Rubber Lubricant	-	Obtain Locally
	U-joint and Gimbal Bearing Grease	-	92-802870A1
	HI-Pressure Grease	-	Obtain Locally
	Loctite 222 Threadlocker	-	92-809818
	Cyanacrylate Adhesive	-	Obtain Locally
	Loctite 242 Threadlocker	-	92-809821
	Loctite 290	-	Obtain Locally
	Loctite 609	-	Obtain Locally
	Loctite 405	-	Obtain Locally
	MerCruiser 4-cycle 25W40 Engine Oil	-	92-802837A1
	SAE Engine Oil 30W	-	Obtain Locally
	Premium Gear Lubricant	-	92-802846A1
	Loctite 262	-	Obtain Locally
	High Performance Gear Lubricant	-	92-802854A1
	Engine Coupler Spline Grease	-	92-802869A1
	Anti-Corrosion Grease	-	92-802867A1

Tube Ref No.	Description	Where Used	Part No.
 95	2-4-C Marine Lubricant with Teflon	-	92-802859A1
 98	Optimol White T Grease	-	92-847206
 99	Isopropyl Alcohol	-	Obtain Locally
 110	4 Stroke 10W30 Outboard Oil	-	92-802833A1
 113	Loctite Moly Paste (Molybdenum Disulfide Grease)	-	Obtain Locally
 114	Power Trim and Steering Fluid	-	92-858074K01
 115	Premium Plus 2-cycle TC-W3 Outboard Oil	-	92-802824A1
 116	RTV 587 Ultra Blue Silicone Sealer	-	92-809825
 117	Loctite 7649 Primer N	-	92-809824
 119	Storage Seal Rust Inhibitor	-	92-802878-56
 120	Corrosion Guard	-	92-802878-55
 121	15W40 4-cycle Diesel Engine Oil	-	92-877695K1
 122	Extended Life Antifreeze/ Coolant	-	92-877770K1
 123	Marine Engine Coolant	-	92-813054A2
 124	Fuel System Treatment & Stabilizer	-	802875A1
 125	Heat Transfer Compound	-	92-805701
 126	Liquid Gasket	-	92-808137
 127	T442 Sealant	-	92-862258
 128	Loctite 5900 Ultra Black RTV Silicone Sealant	-	92-809826
 129	Loctite Gasket Remover	-	92-809828-1
 130	Sealer Kit, Two Part Epoxy	-	92-65150-1
 131	Loctite 5920 Ultra Copper Hi Temp RTV Silicone	-	Obtain Locally
 132	Alpha 2000 HD with Moly	-	Obtain Locally
 133	CT-C30A Lubricating Grease	-	Obtain Locally
 134	Loctite 380	-	Obtain Locally
 135	Three Bond 1217F	-	Obtain Locally
 136	Lubriplate SPO 255	-	Obtain Locally
 137	Three Bond Adhesive TB-1530	-	Obtain Locally
 138	Synthetic Power Steering Fluid SAE 0W-30	-	92-858002K01

Section 5 - Lubricants/Sealants/Adhesives

Tube Ref No.	Description	Where Used	Part No.
 139	Synthetic Blend 4-Stroke Outboard Oil 25W-40	-	92-883722K01

Section 6 - Tool Manufacturers

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Tool Manufacturers

Cole-Palmer Instrument Company
800-323-4340
847-549-7600
847-247-2929 FAX
847-549-1700 International FAX

Fluke Corporation
P.O. Box 9090
Everett, WA 98206-9090
800-443-5853

Kent-More Tools/SPX Corporation
(J-Tools)
29784 Little Mack
Roseville, MI 48066
800-345-2233
Fax 810-578-7375

OTC Tools/SPX Corporation
655 Eisenhower Drive
Owatonna, MN 55060
800-533-0492
Fax 800-283-5665

Rinda Technologies
4563 N. Elston Avenue
Chicago, IL
773-736-6633
Fax 773-736-2950

SPX Service Repair
2800 Park Drive
Owatonna, MN 55060
800-344-4013

Stephens Instruments
111 Greenwood Avenue
Waukegan, IL 60079-9375
847-336-9375
Fax 847-662-6808