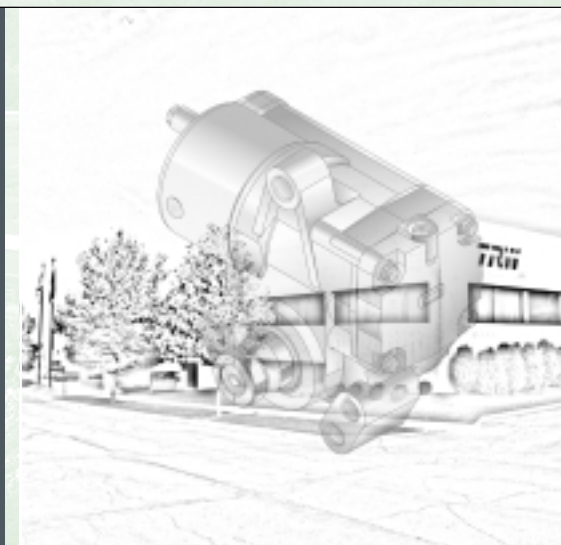




RCS Rotary Cylinder Service Manual

RCS 40,55,65, AND 85 SERIES



Hazard Warning Definitions

 WARNING	A warning describes hazards or unsafe practices which could result in severe personal injury or death.
 CAUTION	A caution describes hazards or unsafe practices which could result in personal injury or product or property damage.
NOTE	A note gives key information to make following a procedure easier or quicker.

Disclaimer

This Service Manual has been prepared by TRW Commercial Steering Division for reference and use by mechanics who have been trained to repair and service steering components and systems on heavy commercial vehicles. TRW Commercial Steering Division has exercised reasonable care and diligence to present accurate, clear and complete information and instructions regarding the TRW Commercial Steering RCS Series Rotary Cylinders. Since this is a general Service Manual, the photographs and illustrations may not look exactly like the rotary cylinder being serviced. The procedures, therefore, must be carefully read and understood before servicing.

If inspection or testing reveals evidence of abnormal wear or damage to the RCS rotary cylinder, or if you encounter circumstances not covered in the Manual, **Stop - Consult the vehicle manufacturer's Service Manual and warranty. Do not try to repair or service an RCS rotary cylinder which has been damaged or includes any part that shows excessive wear unless the damaged and worn parts are replaced with original TRW replacement and service parts and the unit is restored to TRW's specifications for the RCS rotary cylinder.**

It is the responsibility of the mechanic performing the maintenance, repairs or service on a particular RCS rotary cylinder to (a) inspect the rotary cylinder for abnormal wear and damage, (b) choose a repair procedure which will not endanger his/her safety, the safety of others, the vehicle, or the safe operation of the vehicle, and (c) fully inspect and test the RCS rotary cylinder and the vehicle steering system to ensure that the repair or service of the rotary cylinder has been properly performed and that the rotary cylinder and system will function properly.

Patents

TRW Commercial Steering Division RCS rotary cylinders are covered by several United States and foreign patents, either issued or pending.

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WARNING

All steering mechanisms are safety critical items. As such, it is imperative that the instructions in this booklet be followed to the letter. Failure to observe the procedures set forth in this pamphlet may result in a loss of steering.

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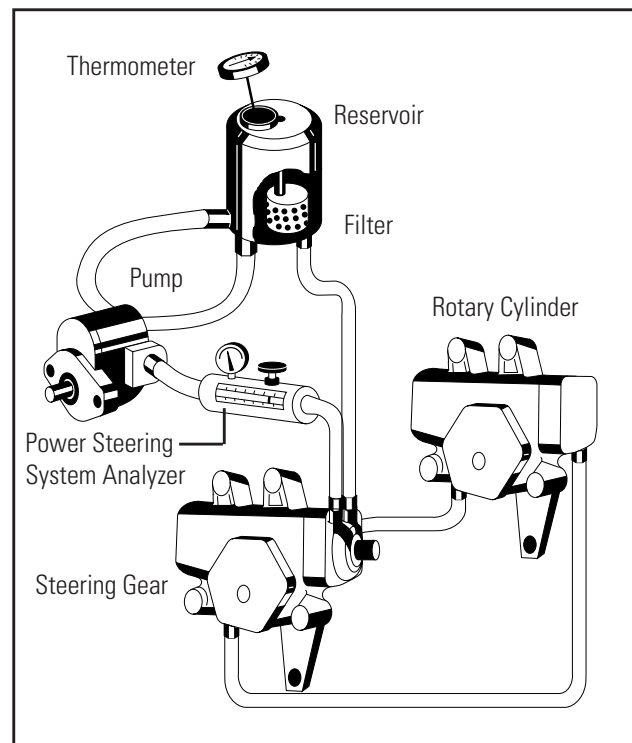
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Chart Your Way to Easy Steering Directory

Chart Your Way to Easy Steering is a separate publication (actually a Manual, Flow Charts and two Videotapes) that facilitates troubleshooting steering system complaints. If while using this tool, your system has failed one or more tests, you probably have been directed to this Service Manual for repairs. The following directory will help you locate the specific repairs you will need to make to proceed with the Chart Your Way to Easy Steering process.

Use Example: The driver of the vehicle you are working on complains of "Steering Wheel Kick". You have attempted to air bleed the system (using Chart Your Way to Easy Steering) test #12, but found that there still may be air trapped in your auxiliary rotary cylinder. Follow the chart below, which will direct you to the appropriate section of this Manual for proper air bleeding of the RCS unit.



Failed Test	Problem	Solution	Section
Test 12	Air in hydraulic system	Bleed system	3
External Leakage	Porosity in housing, side cover or valve assy	Replace porous parts / reseal	4
	Output shaft seal	Reseal	4
	Side cover seal, vent plug, bolts, gaskets	Replace parts / reseal	4
	End cover sealing area	Remove nicks or replace / reseal	4
	Poppet screw or sealing nut	Replace with poppet adjusting screw kit / Reset poppets	3

Introduction

The three-column format used in this Service Manual will help make it easy for you to service a RCS rotary cylinder. Column 1 illustrates the procedure with photographs, column 2 gives a brief key as well as tools to be used for each procedure, and column 3 explains in detail the procedure you should follow. **Pay special attention to the notes, cautions and warnings.**

Item numbers on the exploded view correspond with item numbers used throughout the Service Manual.


As you gain experience in servicing RCS rotary cylinders, you may find that some information in this Service Manual could be clearer and more complete. If so, let us know about it. Don't try to second-guess the Service Manual; if you do not understand a procedure, or are stuck, contact our Service Department at 765.423.5377 (USA only). Servicing RCS series rotary cylinders should be safe and productive.

Approved Hydraulic Fluids

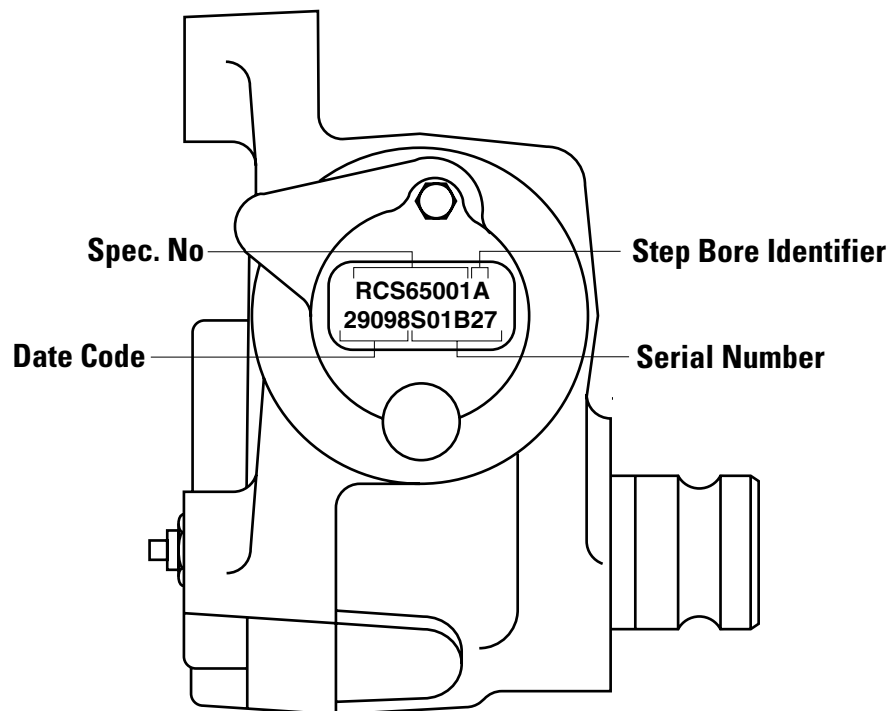
Automatic Transmission Fluid Dexron II
Automatic Transmission Fluid Type "E" or "F"
Chevron 10W-40
Chevron Custom 10W-40 Motor Oil
Chevron Torque 5 Fluid
Exxon Nuto H32 Hydraulic Fluid
Fleetrite PSF (Can #990625C2)
Ford Spec. M2C138CJ
Mack EO-K2 Engine Oil

Mobil ATF 210
Mobil Super 10W-40 Motor Oil
Premium Blue 2000 - SAE 15W-40
*Shell Rotella T30W
*Shell Rotella T SAE 30
Texaco 10W-40
Texaco TL-1833 Power Steering Fluid
Union 10W-40
Union 15W-40
Unocal Guardol 15W-40 Motor Oil

The steering system should be kept filled with one of the above fluids. Fluids marked with an asterisk (*) have not been approved for use with TRW's pump.

 WARNING	Completely flush the steering system with one of the recommended fluids above only. Do not mix oil types. Any mixture or any unapproved oil could lead to seal deterioration and leaks. A leak could ultimately cause the loss of fluid, which could result in a loss of power steering assist.
--	--

Specification Numbers



The cylinder specification number and date code are stamped on a machined surface under the poppet stop screw of every RCS cylinder. Newer cylinders include a serial number.

An example date code would be 29097; this means the cylinder was built on the 290th day of 1997.

An "A" included at the end of the specification number indicates a step bore housing.

Torque Chart

Part Name	Item #	Torque Range Dry	Torque Range Lubricated
Ball return guide cap bolts (alt)	31	14-22 lbf•ft (19-29 N•m)	
Manual bleed screw	50	27-33 lbf•in. (3.1-3.7 N•m)	
Plug, auto bleed	51	38-58 lbf•ft (52-79 N•m)	
Poppet sleeve assembly	22	16-20 lbf•ft (22-27 N•m)	
Poppet sealing nut, service	60	33-37 lbf•ft (45-50 N•m)	
Poppet fixed stop screw	52	38-42 lbf•ft (52-57 N•m)	
Poppet fixed stop screw	52A	38-58 lbf•ft (52-79 N•m)	
Sector shaft adjusting screw jam nut	47	40-45 lbf•ft (54-61 N•m)	
Side cover bolts (RCS40)	48		108-128 lbf•ft (147-174 N•m)
Side cover bolts (RCS55, 65, 85)	48		160-180 lbf•ft (217-244 N•m)
End cover bolts (RCS40, 55, 65)	1		75-85 lbf•ft (102-115 N•m)
End cover bolts (RCS85)	1		108-128 lbf•ft (147-174 N•m)

Item numbers referenced are shown on the exploded views, pages 8 and 10.

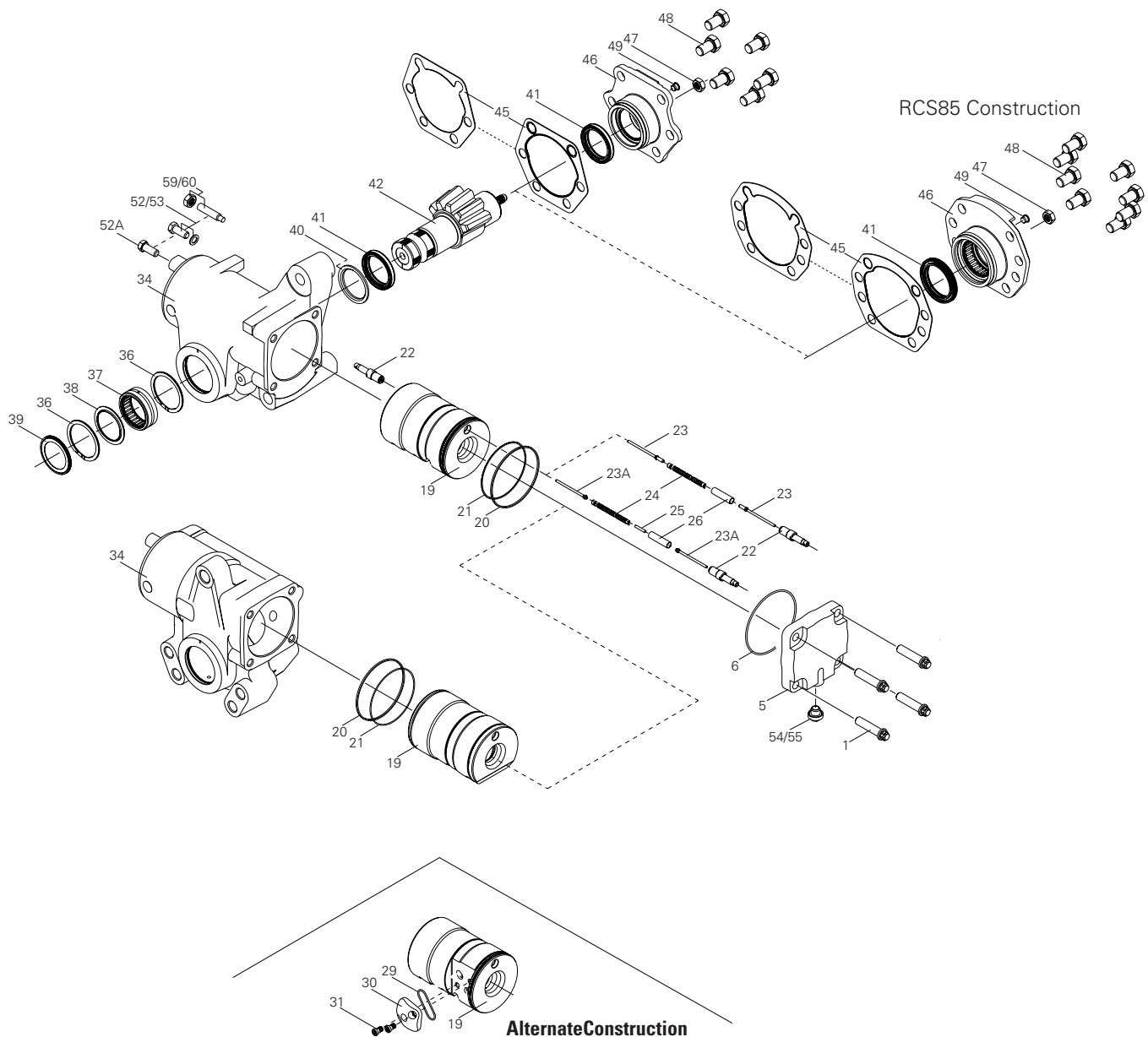
Special tools can be purchased through:

SPX Corporation
Kent-Moore Tool Group
28635 Mound Road
Warren, MI 48092
1-800-328-6657

OR

SPX Australia Pty. Ltd.
7 Expo Court
Mount Waverley 3149
Phone: (03) 9544-6222
Fax: (03) 9544-5222

RCS Series Exploded View -- Standard



Item Description

1	Bolts (4-End Cover)	34	Housing	47	Jam Nut
5	End cover	35	Grease Fitting (not shown)	48	Special Bolts (6 or 8-Side Cover)
*6	Seal Ring (End Cover)	36	Retaining Ring (2)	*49	Vent Plug (Side Cover)
19	Rack Piston	37	Roller Bearing	50	Bleed Screw (Manual)(not shown)
*20	Teflon Seal Ring	*38	Dirt Seal	51	Plug (Auto Bleed)(not shown)
*21	O-ring (Back up; Rack Piston)	*39	Dirt and Water Seal (Trunnion)	52	Fixed Stop Screw (Poppet)
22	Poppet Seat and Sleeve Assy. (2)	40	Washer (Spacer)	52A	Fixed Stop Screw (Poppet-Alt)
23	Poppet (2)	*41	Seal (2-Output)	53	Washer (Stop Screw)
24	Poppet Spring	42	Sector Shaft	54	Port Plug (2)
25	Spacer Rod	43	Adjusting Screw (Sector Shaft)	*55	O-ring (2- Port Plug)
26	Push Tube	44	Retainer (Adjusting Screw)	59	Service Poppet Adjusting Screw
29	Seal (Alt)	*45	Gasket (Side Cover)	60	Service Sealing Jam Nut
30	Ball Return Guide (Alt)	46	Side Cover Assembly		
31	Torx Screws (2-Alt)				

*These items are included in complete seal kits along with 406038 lubricant and a service bulletin.

Service Parts List - Standard

Common Parts

Item	Description	Part Number
1	Bolts (4-Valve Housing)	020251
29	Seal (Alt)	478042
30	Ball Return Guide (Alt)	400161
31	Torx Screws (2-Alt)	020228
35	Grease Fitting	037032
43	Adjusting Screw (Sector Shaft)	021200
44	Retainer (Adjusting Screw)	062005
47	Jam Nut	025150
49	Vent Plug (Side Cover)	036201
50	Bleed Screw (Manual)	213705
51	Plug (Auto Bleed)	021397
52A	Fixed stop screw	021426
54	Auxiliary Port Plug (2)	415437-A1
55	O-ring (2-Aux. Port Plug)	032229
59	Service Poppet Adjusting Screw	021407
60	Service Sealing Jam Nut	025119

Kits

Items	Description	Part Number
54 & 55	Port Plug & O-ring	415437-A1
59 & 60	Adj. Screw & Jam Nut	021407-X1

Parts Vary by Specification*

Item Description

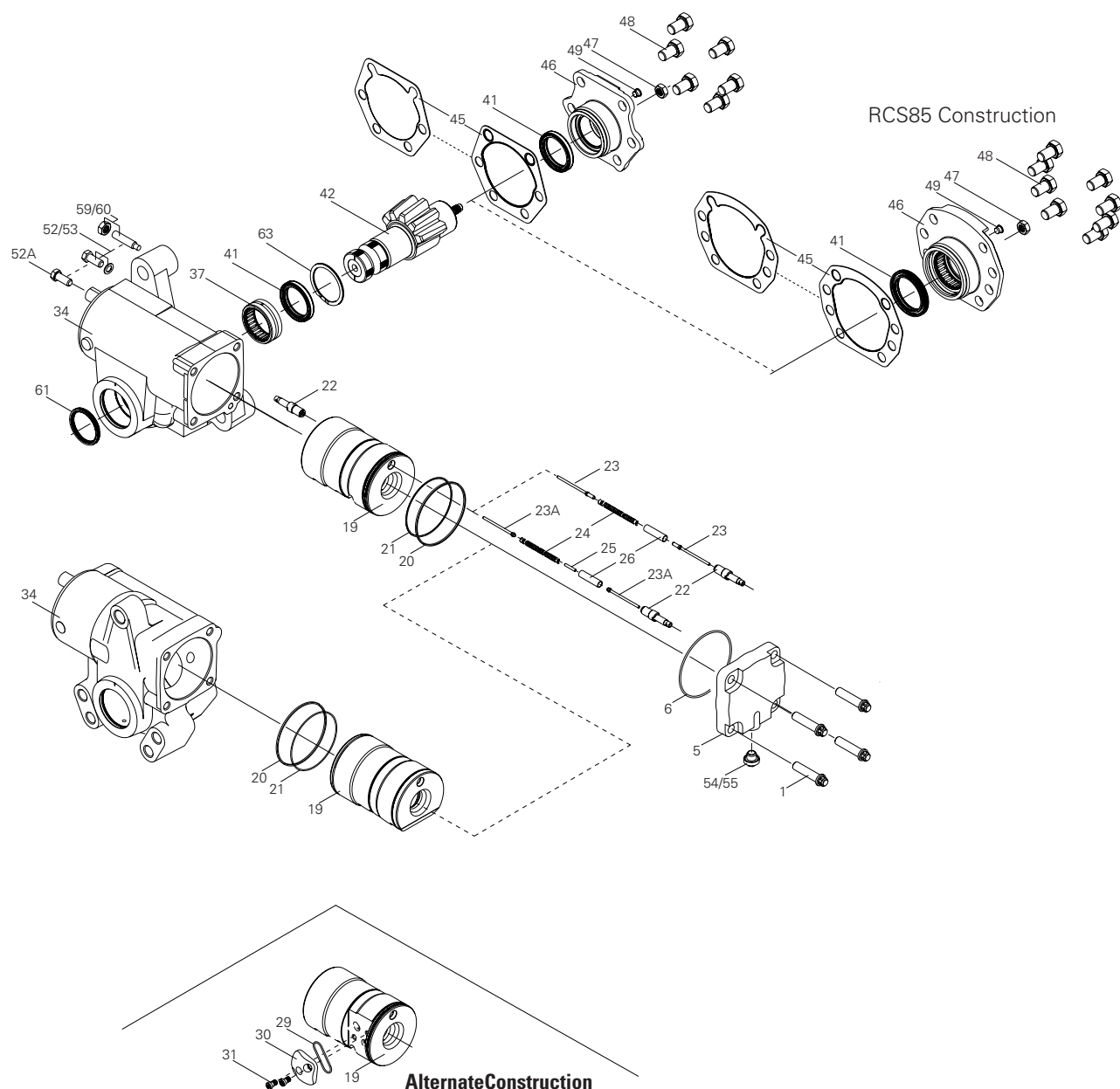
5	End cover
19	Rack Piston
34	Housing
42	Sector Shaft
46	Side Cover Assembly

*Contact Service/Sales for part numbers

Parts Vary by Gear Size

Item	Description	RCS40	RCS55	RCS65	RCS85
6	Seal Ring (End Cover)	032829	032829	032616	032834
20	Teflon Seal Ring	032828	032830	032590	032547
21	O-ring (Back up; Rack Piston)	032827	032831	032615	032556
22	Poppet Seat and Sleeve Assy. (2)	409118-A2	409118-A2	409118-A2	409118-A6
23	Poppet (2-old design)	040210	040210	040210	040217
23A	Poppet (2-new design)	040248	040248	040248	040249
24	Poppet Spring	401662	401662	401662	401684
25	Spacer Rod	040209	040209	040209	040218
26	Push Tube	080154	080154	080154	080158
36	Retaining Ring (2)	401674	401650	401650	401685
37	Roller Bearing	070028	071025	071020	072003
38	Dirt Seal	478052	478041	478041	478057
39	Dirt and Water Seal (Trunnion)	478053	478045	478045	478059
40	Washer (Spacer)	028527	028519	028519	028534
41	Seal (2-Output)	478051	478040	478040	478084
45	Gasket (Side Cover)	HFB529000	HFB649000	HFB649000	TAS859000
48	Special Bolts (6 or 8-Side Cover)	021277	021434	021434	021434

RCS Series Exploded View -- Step Bore



Item Description

1	Bolts (4-End Cover)	31	Torx Screws (2-Alt)	*49	Vent Plug (Side Cover)
5	End Cover	34	Housing	50	Bleed Screw (Manual) (not shown)
*6	Seal Ring (End Cover)	35	Grease Fitting (not shown)	51	Plug (Auto Bleed) (not shown)
19	Rack Piston	37	Roller Bearing	52	Fixed Stop Screw (Poppet)
*20	Teflon Seal Ring	*41	Seal (2-Output)	52A	Fixed Stop Screw (Poppet-Alt)
*21	O-ring (Back up; Rack Piston)	42	Sector Shaft	53	Washer (Stop Screw)
22	Poppet Seat and Sleeve Assy. (2)	43	Adjusting Screw (Sector Shaft)	54	Port Plug (2)
23	Poppet (2)	44	Retainer (Adjusting Screw)	*55	O-ring (2- Port Plug)
24	Poppet Spring	*45	Gasket (Side Cover)	59	Service Poppet Adjusting Screw
26	Push Tube	46	Side Cover Assembly	60	Service Sealing Jam Nut
29	Seal (Alt)	47	Jam Nut	*61	Dirt & Water Seal (Trunnion)
30	Ball Return Guide (Alt)	48	Special Bolts (6 or 8-Side Cover)	*63	Retaining Ring

*These items are included in complete seal kits along with 406038 lubricant and a service bulletin.

Service Parts List - Step Bore

Common Parts

Item	Description	Part Number
1	Bolts (4-Valve Housing)	020251
29	Seal (Alt)	478042
30	Ball Return Guide (Alt)	400161
31	Torx Screws (2-Alt)	020228
35	Grease Fitting	037032
43	Adjusting Screw (Sector Shaft)	021200
44	Retainer (Adjusting Screw)	062005
47	Jam Nut	G9419666
49	Vent Plug (Side Cover)	036201
50	Bleed Screw (Manual)	213705
51	Plug (Auto Bleed)	021397
52A	Fixed stop screw	021426
54	Auxiliary Port Plug (2)	G9410358
55	O-ring (2-Aux. Port Plug)	032229
59	Service Poppet Adjusting Screw	021407
60	Service Sealing Jam Nut	025119

Kits

Items	Description	Part Number
54 & 55	Port Plug & O-ring	415437-A1
59 & 60	Adj. Screw & Jam Nut	021407-X1

Parts Vary by Specification*

Item	Description
5	End Cover
19	Rack Piston
34	Housing
42	Sector Shaft
46	Side Cover Assembly

*Contact Service/Sales for part numbers

Parts Vary by Gear Size

Item	Description	TAS40	TAS55	TAS65	TAS85
6	Seal Ring (End Cover)	032829	032829	032616	032834
20	Teflon Seal Ring	032828	032830	032590	032547
21	O-ring (Back up; Rack Piston)	032827	032831	032615	032556
22	Poppet Seat and Sleeve Assy. (2)	409118-A2	409118-A2	409118-A2	409118-A6
23	Poppet (2-old design)	040210	040210	040210	040217
23A	Poppet (2-new design)	040248	040248	040248	040249
24	Poppet Spring	401662	401662	401662	401684
26	Push Tube	080154	080154	080154	080158
37	Roller Bearing	070028	071025	071020	072003
41	Seal (2-Output)	478051	478040	478040	478084
45	Gasket (Side Cover)	HFB529000	HFB649000	HFB649000	TAS859000
48	Special Bolts (6 or 8-Side Cover)	021277	G223734	G223734	G223734
61	Dirt & Water Seal (Trunnion)	K301963	478095	478095	478096
63	Retaining Ring	401674	401650	401650	401685



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