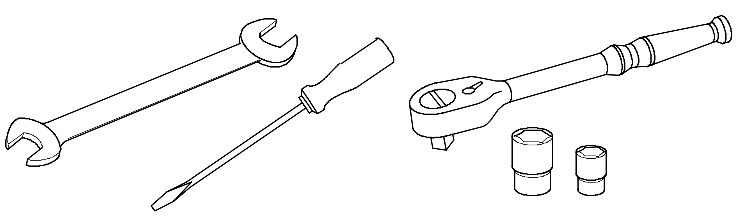
ATV and Light Utility Hauler



SERVICE MANUAL

PN 9912004

ATV AND LIGHT UTILITY HAULER SERVICE MANUAL

Foreword

This manual is designed primarily for use by ATV service technicians in a properly equipped shop. Since a certain knowledge of mechanical theory, tool use, and shop procedures is necessary to perform the service work safely, all operations should be performed by qualified service personnel only. In order to perform the work efficiently and prevent costly errors, the technician should read the text, thoroughly familiarizing him/herself with procedures before starting the work. Cleanliness of parts and tools as well as the work area is of primary importance.

This manual includes procedures for maintenance operations, component identification and unit repair, along with service specifications for the 1985 through 1995 model Polaris ATVs. The section index tabs enable the user to quickly locate the component unit section desired. In addition, a table of contents is placed at the beginning of each section for location of specific page numbers and service information. Keep this manual available for reference in the shop area.

To keep this manual current it is important that it is updated yearly with new model information and specifications. Annual update packet part numbers are found in Chapter 1.

At the time of publication all information contained in this manual was technically correct. However, all materials and specifications are subject to change without notice.

Comments or suggestions about this manual may be directed to: Engineering Services, Supervisor, Technical Publications, Polaris Industries, Route 1 Box 35A, Roseau, MN 56751, or call (218) 463-2312.

Technical Training Center
Roseau, Mn 56751
1985-1995 Service Manual (PN 9912004)

PRINTED IN U.S.A.

UNDERSTANDING SAFETY LABELS AND INSTRUCTIONS:

Throughout these instructions, important information is brought to your attention by the following symbols:

⚠ The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

DANGER

Failure to follow DANGER instructions will result in severe injury or death to the operator, passenger, bystander or person inspecting or servicing the ATV.

WARNING

Failure to follow WARNING instructions could result in severe injury or death to the operator, passenger, bystander or person inspecting or servicing the ATV.

CAUTION

A CAUTION indicates special precautions that must be taken to avoid minor personal injury or ATV or property damage.

NOTE

A NOTE provides key information to clarify instructions.

Polaris acknowledges the following products mentioned in this manual:

Table of Contents

9912004

1

CHAPTER 1

GENERAL PRODUCT INFORMATION

DESCRIPTION	PART NO.	MICROFICHE
1985-1993 Service Manual (Includes Binder)	9912004	9912386
1991 Service Manual Update - Includes info. to update PN 9912004 to 1991 Specification	9911974	N/A
1992 Service Manual Update - Includes info. to update manual to 1992 specs. (PN 9911974 must be inserted prior to this update)	9912195	N/A
1993 Service Manual Update - Includes info to update manual to 1993 specs. (PN's 9911974 and 9912195 must be inserted prior to this update)	9912477	N/A
1994 Dealer ATV Tech. Update Packet (Incl. Service/Warranty Manual Update & Wallcharts)	9912717	N/A
1994 ATV Service Bulletin Packet	9911421	9911769

YEAR	MODEL	MODEL NO.	PARTS BOOK PN	OWNER'S MANUAL PN
1985	Scrambler	W857027	9911098	9911056
1985	Trail Boss	W857527		
1986	Scrambler	W867027	9911170	9911167
1986	Trail Boss	W867527		
1986	Scrambler	W862027	9911199	9911197
1986	Trail Boss	W867627		
1987	Trail Boss	W877527	9911349	9911267
1987	Cyclone	W877828	9911350	9911324
1987	Trail Boss 4x4	W878027	9911351	9911277
1987	Trail Boss 4x4	W878127	9911352	9911353
1987	Trail Boss 4x4	W878327	9911475	9911451
1988	Trail Boss 2x4	W887527	9911477	9911441
1988	Trail Boss 4x4	W888127	9911476	9911427
1988	Trail Boss 250 R/ES	X888528	9911478	9911433
1988	Trail Boss 250 R/ES	W888528	9911489	9911488
1989	Trail Boss	W898527	9911633	9911641
1989	Trail Boss 2x4	W897527	9911634	9911642
1989	Trail Boss 4x4	W898127	9911635	9911643
1989	Big Boss 4x6	X898627	9911595	9911573
1989	Big Boss 4x6	W899627	9911636	9911644
1990	Trail Blazer	W907221	9911841	9911857
1990	Trail Boss 250	W908527	9911771	9911762
1990	Trail Boss 2x4	W907527	9911772	9911764
1990	Trail Boss 2x4 350L	W907539	9911853	9911855
1990	Trail Boss 4x4	W908127	9911773	9911765
1990	Trail Boss 4x4 350L	W908139	9911854	9911856
1990	Big Boss 4x6	W908627	9911774	9911766
1991	Trail Blazer	W917221	9911976	9911901
1991	Trail Boss 250	W918527	9911977	9911905
1991	Trail Boss 2x4	W917527	9911978	9911877
1991	Trail Boss 2x4 350L	W917539	9911982	9911908
1991	Trail Boss 4x4	W918127	9911979	9911880
1991	Trail Boss 4x4 350L	W918139	9911983	9911894
1991	Big Boss 4x6	W918627	9911980	9911898
1991	Big Boss 6x6	W918727	9911981	9911883
1992	Trail Blazer	W927221	9912285	9912042
1992	Trail Boss 250	W928527	9912289	9912042
1992	Trail Boss 2x4	W927527	9912286	9912060
1992	Trail Boss 2x4 350L	W927539	9912288	9912060
1992	Trail Boss 4x4	W928127	9912287	9912049
1992	Trail Boss 4x4 350L	W928139	9912283	9912049
1992	Big Boss 4x6	W928627	9912290	9912036
1992	Big Boss 6x6	W928727	9912284	9912056

SERVICE PUBLICATIONS

YEAR	MODEL	MODEL NO.	OWNER'S MANUAL PN	PARTS MANUAL PN	PARTS MICRO-FICHE PN	ASSEMBLY INST. PN
1993	250 2x4	W937527	9912426	9912402	9912410	9912427
	350 2x4	W937539	9912426	9912403	9912411	9912430
	250 4x4	W938127	9912397	9912404	9912412	9912431
	350 4x4	W938139	9912397	9912405	9912413	9912428
	Sportsman	W938039	9912635	9912638	9912639	9912636
	250 6x6	W938727	9912398	9912409	9912417	9912432
	350 6x6	W938739	9912553	9912406	9912414	9912429
	Trail Boss	W938527	9912399	9912407	9912415	9912427
	Trail Blazer	W937221	9912399	9912408	9912416	9912427
1994	300 2x4	W947530	9912660	9912674	9912687	9912655
	400 2x4	W947540	9912660	9912675	9912688	9912661
	300 4x4	W948130	9912653	9912676	9912689	9912665
	400 4x4	W948140	9912653	9912677	9912690	9912656
	300 6x6	W948730	9912664	9912679	9912692	9912666
	400 6x6	W948740	9912664	9912680	9912693	9912667
	Trail Boss 2W	W948527	9912650	9912682	9912697	9912655
	Trail Blazer 2W	W947221	9912650	9912683	9912698	9912655
	Sportsman 4x4	W948040	9912827	9912684	9912704	9912828
	Sport	W948540	9912660	9912723	9912724	9912721
1995	300 2x4	W957530	9912998	9913005	9913006	9913007
	400 2x4	W957540	9912998	9913009	9913010	9912999
	300 4x4	W958130	9913017	9913018	9913019	9913020
	Xplorer 4x4	W959140	9913017	9913022	9913023	9913024
	400 6x6	W958740	9913026	9913027	9913028	9913029
	Trail Boss	W958527	9913031	9913032	9913033	9913034
	Trail Blazer	W957221	9913031	9913036	9913037	9913034
	Sportsman 4x4	W958040	9912966	9913040	9913041	9912965
	Scrambler	W957840	9912727	9912725	9913044	9912728
	Magnum 2x4	W957544	9912730	9912685	9913045	9912997
	Magnum 4x4	W958144	9912730	9912686	9913046	9912731
	Sport	W958540	9912998	9913013	9913014	9913015

The following is an index of ATV service bulletins. If you need a bulletin packet or individual bulletins, please contact your area service representative or the Roseau Service Department at #218-463-4400.

The machine model number must be used with any correspondence regarding warrant or service. When ordering service parts be sure to use the correct Parts Manual.

Machine Model Number Identification

W 87 80 27

Year Designation (87) — Basic Chassis Designation (80) — Engine Designation (27)

Some model numbers begin with the letter X which designates production pilot build machines.

Basic Chassis Designation Numbers and Description

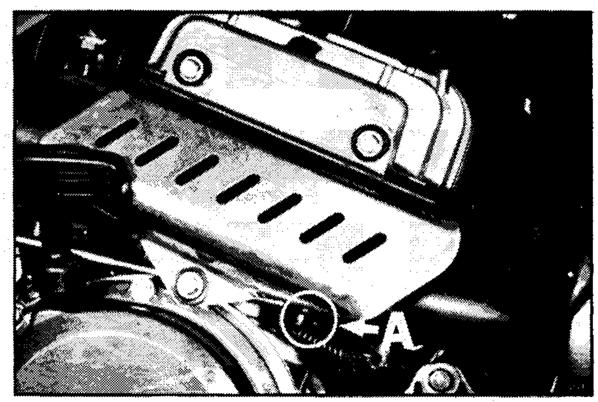
70 ... Scrambler Three Wheels
72* ... Trail Blazer
75* ... Trail Boss (1985-87) or Trail Boss 2x4, First Production of Given Year; Magnum 2x4
76 ... Trail Boss, Second Production of Given Year
78* ... 1987 Cyclone; 1995 Scrambler
80 ... Trail Boss 4x4, First Production of a Given Year
81* ... Trail Boss 4x4, Second Production of a Given Year; Magnum 4x4
83 ... Trail Boss 4x4, Third Production of a Given Year
85* ... Trail Boss R/ES (1988) and newer Trail Boss, First Production of a Given Year
86* ... Big Boss 4x6, 250
87* ... Big Boss 6x6, 250, 350L
91* .... Xplorer 4x4
* Currently used Chassis Nos.

Engine Designation Numbers and Description

21 EC25PF-07*,09* .... Single, Free Air, Oil Injected, 22 h.p. @6000 RPM
27 EC25PF-01,03,05,08 ..... Single, Free Air, Oil Injected, 22 h.p. @6000 RPM, Electric Start
28 EC25PF-02 .... Single, Free Air, Oil Injected, 30 h.p. @7000 RPM
EC25PF-04 .... Single, Free Air, Oil Injected, 27 h.p. @6600 RPM
39 EC35PL-02* .... Single, L/C, Oil Injected, 32 h.p. @5800 RPM, Electric Start
EC28PF-01* .... Single, F/A, Oil Injected, 24 h.p. @5600 RPM, Electric Start
40 EC38PL-01* .... Single, L/C, Oil Injected, 35 h.p. @5700 RPM, Electric Start
44 EH42PL-01* .... Single, L/C, SOHC 4 Stroke, 26 h.p. @ 6000 RPM, Electric Start
* Currently used Engine Nos.

Engine Model Number and Serial Number Location

Whenever corresponding about an engine, be sure to call out the engine model number and serial number. You can find this information on the crankcase. See A.



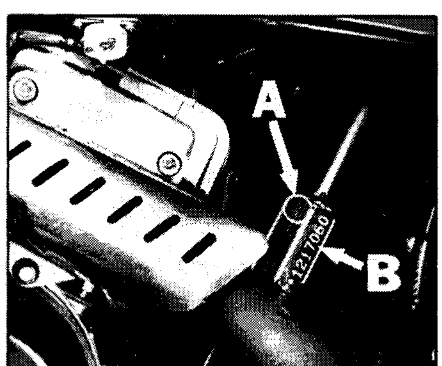
Machine Model Number and Serial Number Location

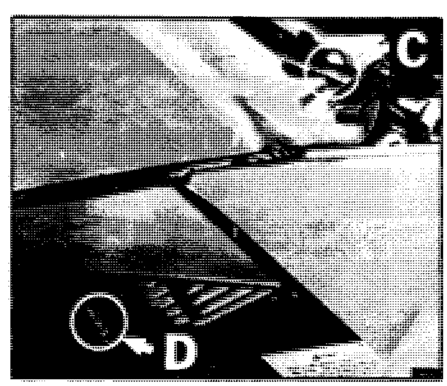
1985 & 1986 Models:
Model Number, see A
Serial Number, see B

1989 & Newer Models
(with square tube frame):
Serial Number, see B

1987 & 1988 Models:
Model Number, see C
Serial Number, see D

1988 R/ES Model:
Model and Serial Number, see D

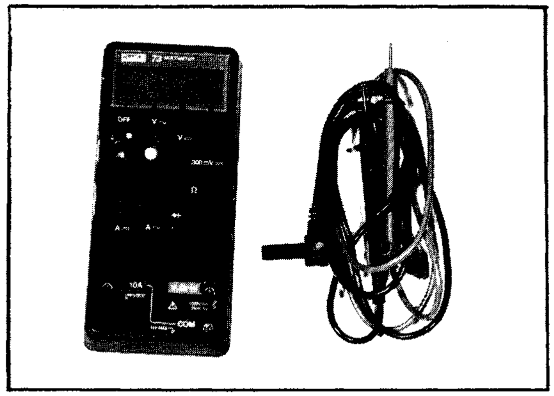




SERVICE TOOLS

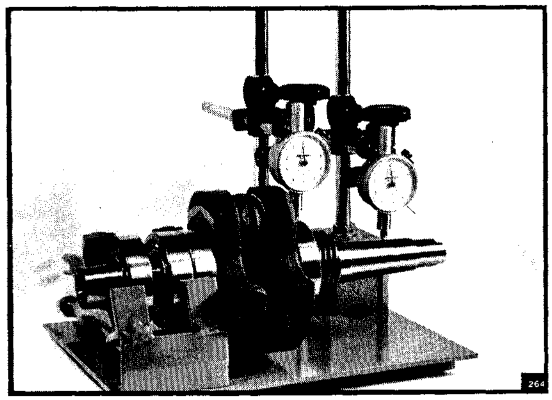
Fluke 73 Analog/Digital Multitester

Tests all electrical circuits and components.
PN 2870659



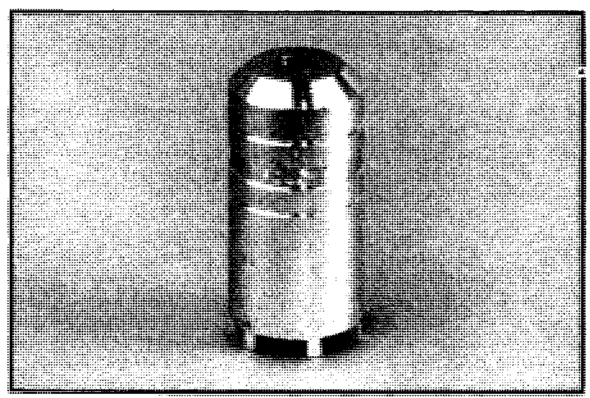
Crankshaft Alignment Fixture

Holds shaft while checking runout. Indicators not included.
PN 2870710



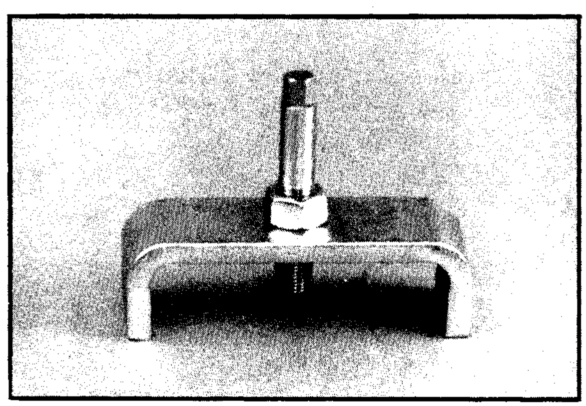
Slotted Nut Socket

This special socket must be used to remove the slotted nut on the crankshaft mag end of the 350L engine.
PN 2870967

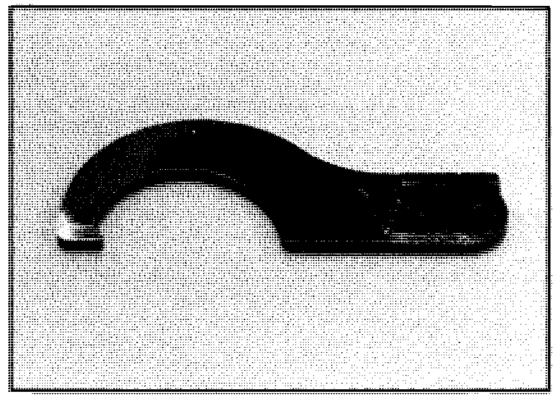


Counter Balancer Puller

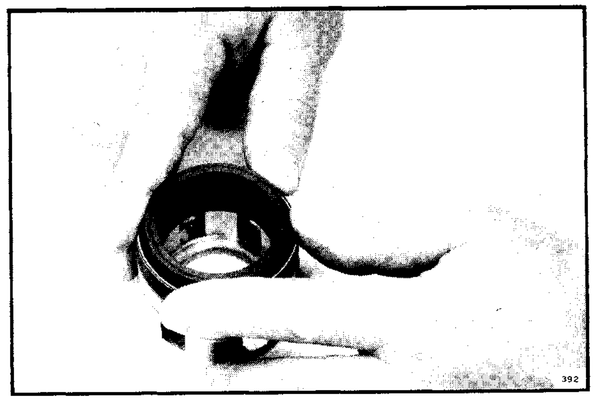
This special puller is used to remove the counterbalancer shaft from the 350/400L engine for service, replacement, or during engine disassembly.
PN 2870968



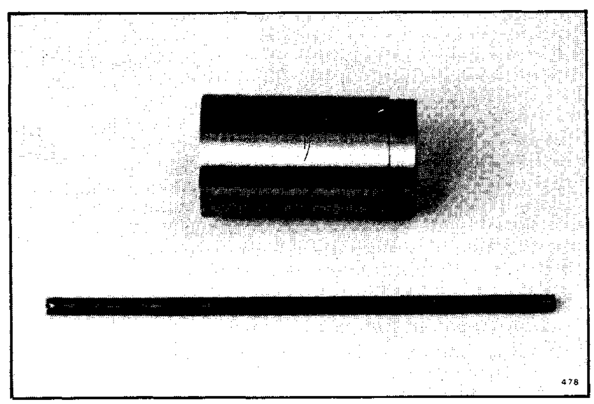
Spanner Wrench
Used to adjust shock spring pre-load settings.
PN 2870872



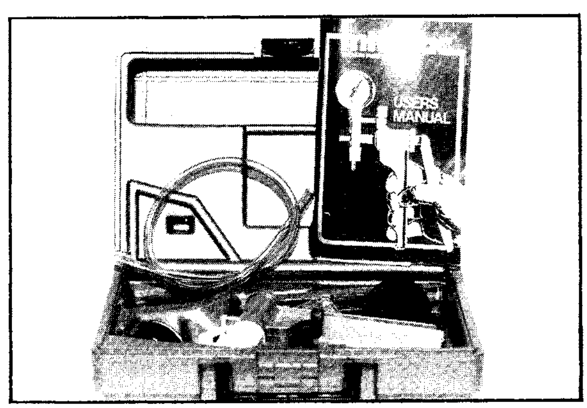
Hilliard Clutch
Garter spring installation tool.
PN 2870888



Master Cylinder Service Tool Kit
This kit must be used to disassemble and reassemble 1989 and newer Polaris built master cylinders.
PN 2870962

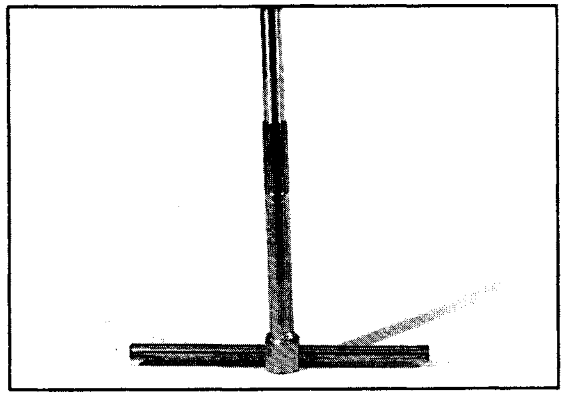


Mity Vac™ Pump Kit
This tool is used for many service functions on Polaris ATV's including, but not limited to: brake bleeding, cooling system pressure testing, carb needle and seat testing, oil system check valve testing and filling the transmission and 350/400L counterbalance reservoirs with oil.
PN 2870975

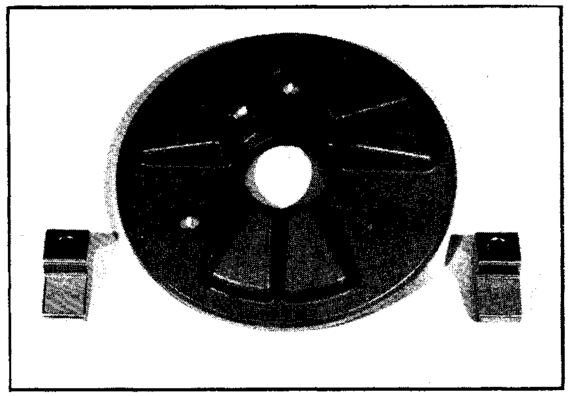


SERVICE TOOLS

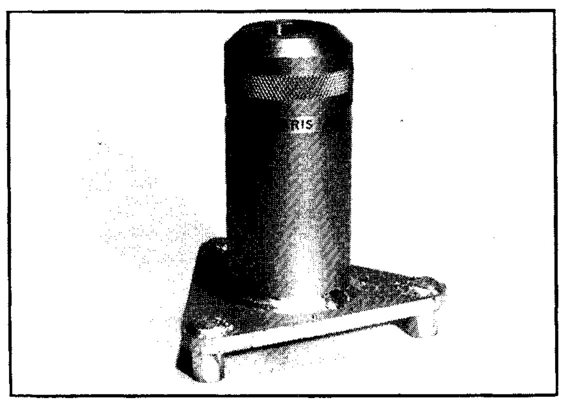
T-Handle Drive Clutch Puller
PN 2870506



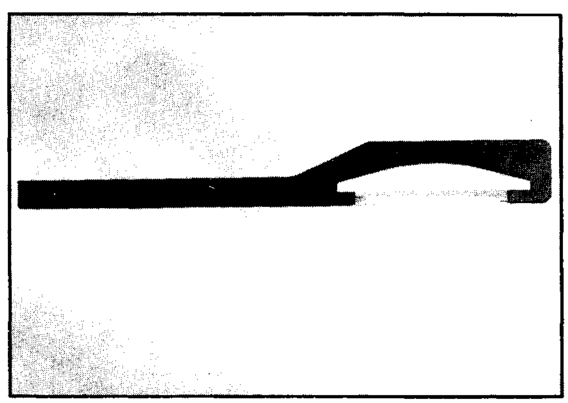
Drive Clutch Holding Fixture
Used for disassembly and reassembly of the drive clutch.
PN 2870547



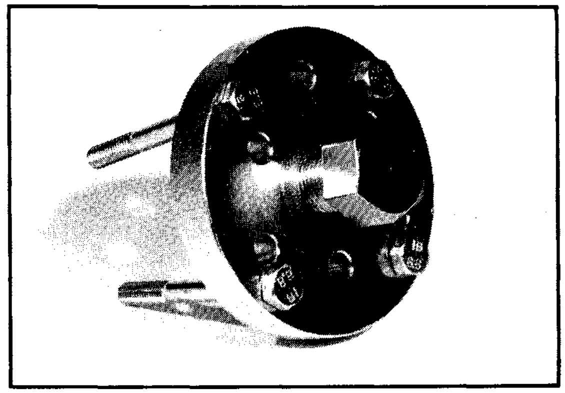
Drive Clutch Spider Tightening Tool
For removal and retorquing of the clutch spider.
PN 2870341



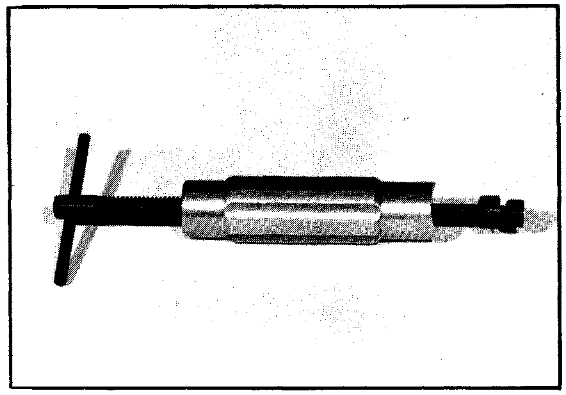
Convertor Offset Tool
Establishes the correct 1/2″ offset convertor alignment.
PN 2870654



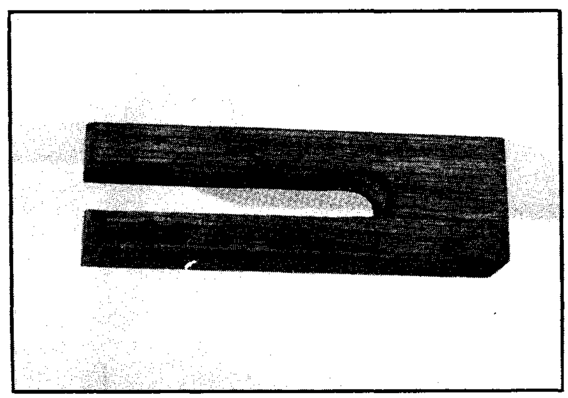
Flywheel Puller
PN 2870159



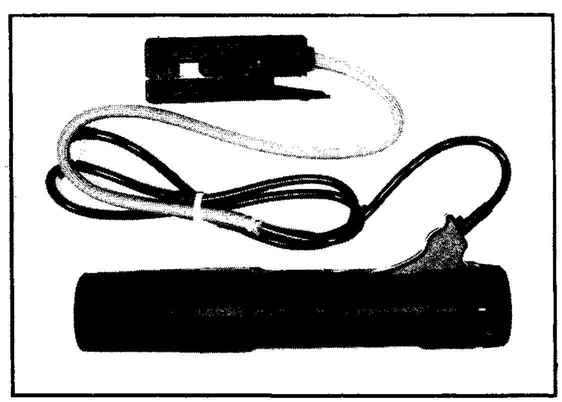
Piston Pin Puller
For removing tight wrist pins
PN 2870386



Piston Support Block
Supports piston and prevents piston skirt damage during cylinder installation
PN 2870390



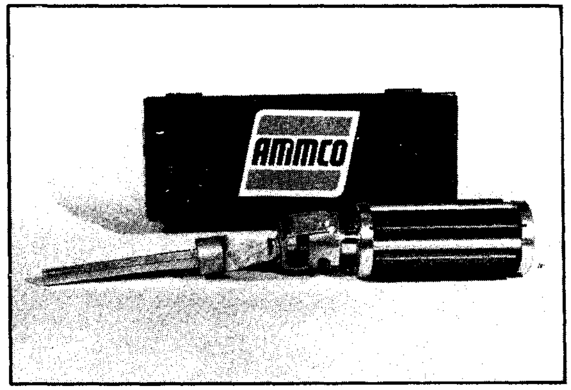
Strobe Timing Light
High intensity strobe, works on all types of ignition systems (self-contained).
PN 2870630



SERVICE TOOLS

Cylinder Hone (Ammco Model No. 3950)

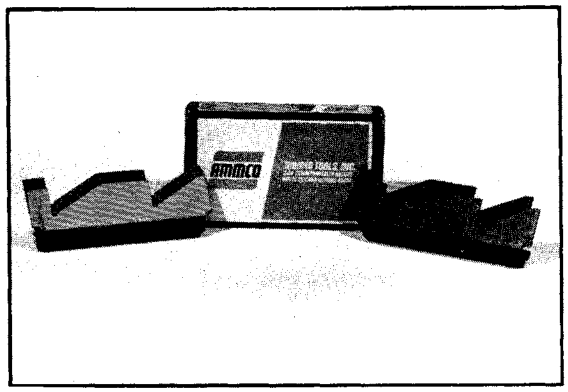
Rigid cylinder hone for deglazing and truing heat distorted cylinders.
PN 2870303



Replacement Ammco Hone Sets

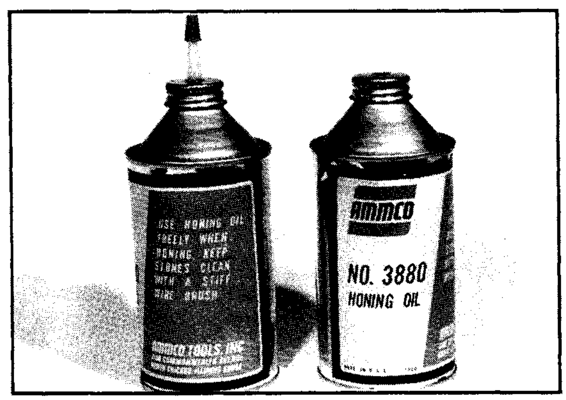
Cylinder Hone Fine Stone Set Std. (Ammco No. 3952)
PN 2870305
Cylinder Hone Course Stone Set Std. (Ammco No. 3951)
PN 2870304
Cylinder Hone Fine Stone Set O.S. (Ammco No. 3954)
PN 2870307
Cylinder Hone Course Stone Set O.S. (Ammco No. 3953)
PN 2870306

NOTE: O.S. Stone Sets range from 2 1/2″ to 3 3/8″



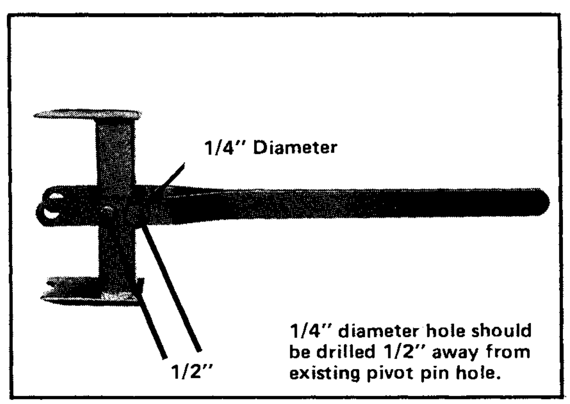
Honing Oil

Improves hone operation and prevents stone loading.
PN 2870588

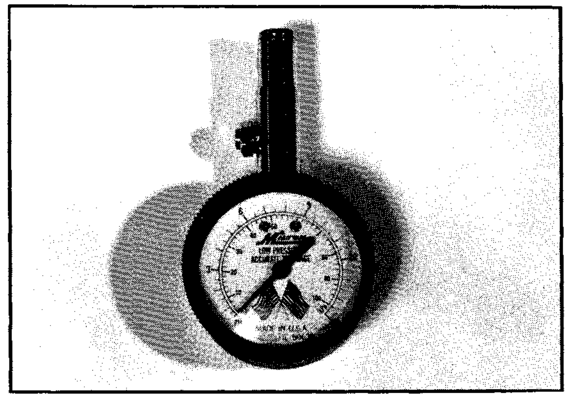


Shock Absorber Spring Compression Tool

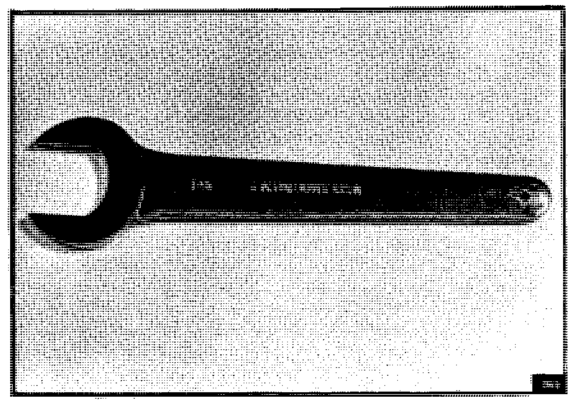
PN 2870623



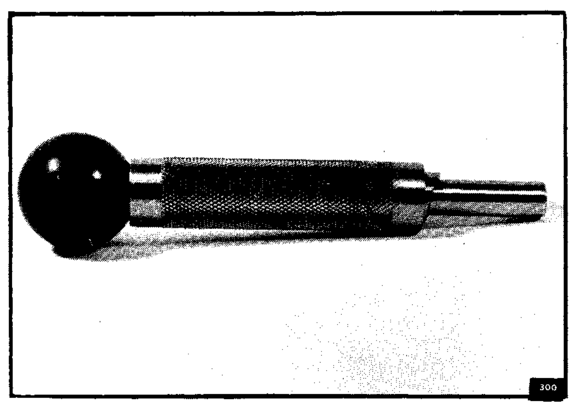
Precision Air Gauge
For accurate low pressure readings.
PN 2870658



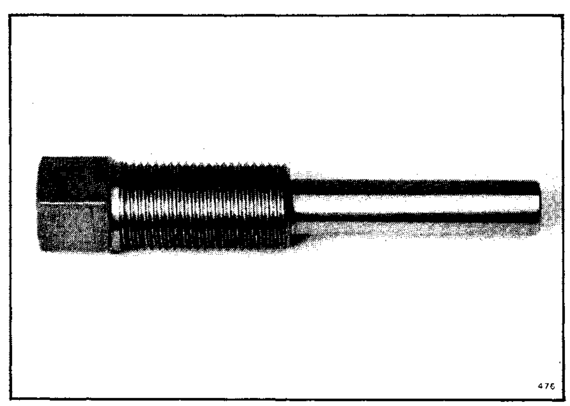
Special Axle Nut Wrench 1 3/4″ Size
Used when servicing rear axle assembly.
PN 2870772



Piston Wrist Pin Keeper Installation Tool
Used to install “C” shaped spring keepers
PN 2870773

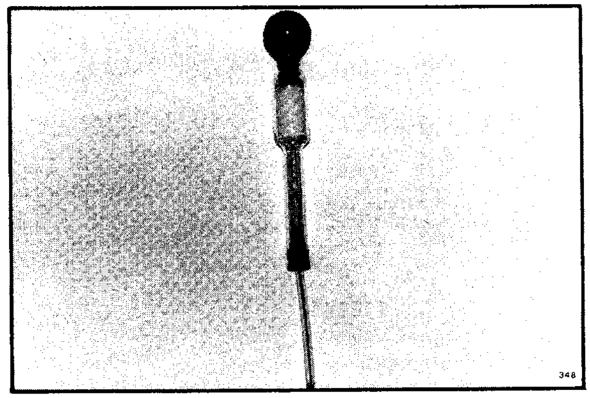


Driven Clutch Puller
Used to remove 1990 and newer driven clutches form the transmission input shaft
PN 2870913



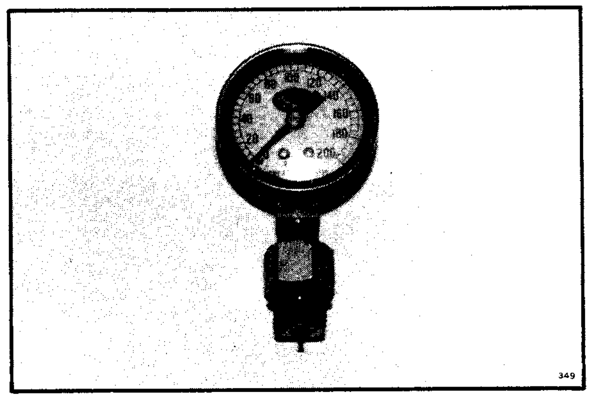
Small sized Hydrometer

Measures the percentage of acid in the battery electrolyte in terms of specific gravity. Specially designed for small batteries.
PN 2870836



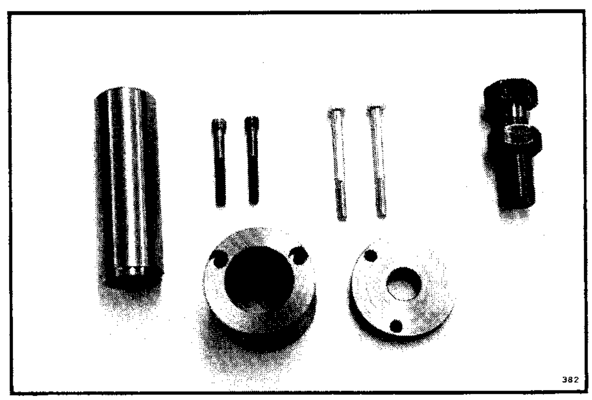
Compression Tester

A special design to allow testing to be made on ATV's. Can also be used for many other small engine applications. **NOTE:** Two O-rings are used on air-cooled engines to clear the fins.
PN 2870852

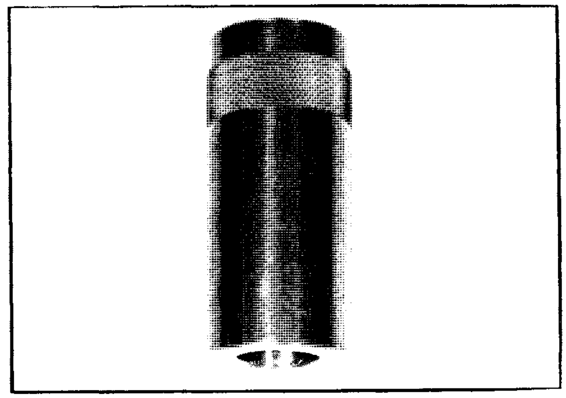


Ball Joint Replacement Tool

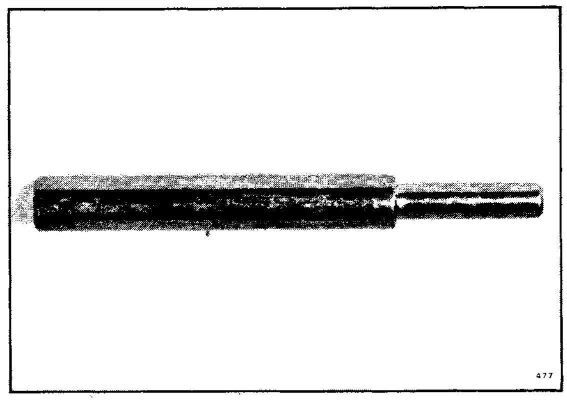
Used for removal and reinstallation of lower ball joints on models with front strut castings and pressed-in ball joints.
PN 2870871



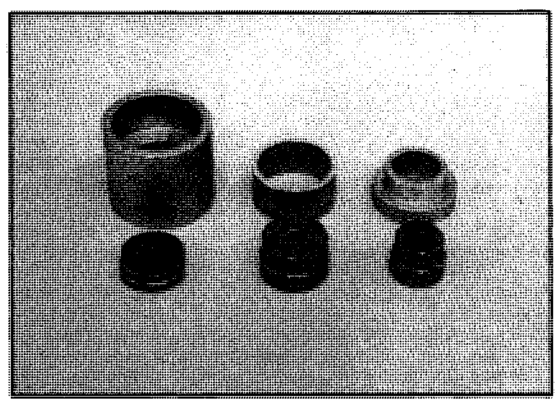
Transmission Seal/Bearing Driver
For installing bearings and case seals during transmission gearcase overhaul.
PN 2870702



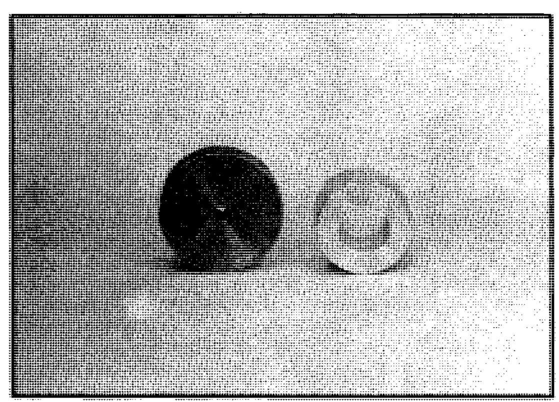
Clutch Spider Roller Installation Tool
Used as a guide for spider roller and thrust washer installation.
PN 2870910



Clutch Bushing Replacement Tool Kit
For removal and installation of clutch bushings.
PN 2871226



Seal Sleeve Installation Tool Set
For removal and installation of seal sleeve on front hub strut of all 4x4 and 6x6 models.
PN 2871199



ATV SPECIAL SERVICE TOOLS AND SUPPLIES

Part No.	Tool Description
2870159	Flywheel Puller
2870303	Cylinder Hone
2870304	Cylinder Hone Stone Set Std. Course No. 3951
2870305	Cylinder Hone Stone Set Std. Course No. 3952
2870306	Cylinder Hone Stone Set O.S. Course No. 3953
2870307	Cylinder Hone Stone Set O.S. Fine No. 3954
2870341	Drive Clutch Spider Tightening Tool
2870386	Piston Pin Puller
2870390	Piston Support Block
2870464	Gearcase Oil (1 Gal.)
2870465	Oil Pump for Gearcase Oil
2870506	Drive Clutch Puller, T-Handle
2870510	Clutch/Cable Lube, case
2870547	Drive Clutch Holding Fixture
2870584	Loctite™ RC 680-10cc Retaining Compound
2870587	515 Gasket Eliminator
2870588	Honing Oil
2870601	Loctite™ Chisel Gasket Remover
2870616	4 oz. High Temp. Lube
2870623	Shock Absorber Spring Compression Tool
2870630	Strobe Engine Timing Light
2870654	Convertor Offset Tool
2870658	Precision Air Low Pressure Tire Gauge
2870659	Analog/Digital Multitester Fluke™ 73
2870661	RTV Silicone Sealer
2870702	Transmission Seal/Bearing Driver
2870706	Flywheel Puller Bolts
2870710	Crankshaft Alignment Fixture
2870769	Engine Seal to Crankcase
2870772	Axle Nut Wrench, 1 3/4″ Size
2870773	Piston Wrist Pin Keeper Installation Tool
2870791	Fogging Oil
2870836	Small Battery Hydrometer
2870852	Engine Compression Tester
2870871	Ball Joint Replacement Tool
2870872	Shock Spanner Wrench
2870888	Garter Spring Tool - Hilliard™ Clutch
2870910	Clutch Spider Roller Installation Tool
2870913	Driven Clutch Puller
2870962	Master Cylinder Disassembly/Overhaul Tool Kit
2870967	350L Crankshaft Slotted Nut Socket
2870968	350L Counter Balancer Shaft Puller
2870975	Mity Vac™ Pump Kit
2870990	DOT3 Brake Fluid
2871027	Anti-Corrosive Lube
2871282	Transmission Bearing Seal Driver
2871293	Slotted Nut Socket, Magnum

Model	Scrambler (3 Wheels)	Trail Boss (4 Wheels)
Model Number	W857027	W857527
Height	42″	42″
Width	43″	43″
Length	74″	74″
Wheel Base	48″	48″
Seat Height	33.5″	33.5″
Foot Pad Height	9.5″	9.5″
Ground Clearance	5.75″	5.75″
Weight	380 lbs.	440 lbs.
Front Suspension Travel	Forks/5.1″	Strut/6.25″
Rear Suspension	6″	6″
Front Tire	22x11x8	22x8x10
Rear Tire	22x11x10	22x11x10
Front Tire PSI	3	4
Rear Tire PSI	3	3
Front Brake	Mech. Drum	Mech. Drum
Rear Brake	Mech. Disc	Mech. Disc
Fuel Capacity (U.S. Gallons)	4	5
Oil Capacity (U.S. Quarts)	2	2
Head Lamp	45W	45W
Tail Lamp	5W	5W
Gear Box	F/R/N	F/R/N
Drive Belt	1 3/16″/40.87 O.D.	1 3/16″/40.87 O.D.
Drive Chain	520 O-ring	520 O-ring
Sprockets & Chain	13/42	13/38
Alternator Output	100W	100W
Battery	12V 14Amp/Hr	12V 14Amp/Hr
Electric Start	Std.	Std.
Front Rack	Std.	Std.
Rear Rack	Std.	Std.
Hitch	Std.	Std.

SPECIFICATIONS 1986

Model	Scrambler (3 Wheels)	Trail Boss (4 Wheels)
Model Number	W867027	W867527 (BL)(RD) W867627
Height	42″	42″
Width	43″	43″
Length	74″	74″
Wheel Base	46″	46″
Seat Height	33.5″	33.5″
Foot Pad Height	9.5″	9.5″
Ground Clearance	5.75″	5.75″
Weight	380 lbs.	440 lbs.
Front Suspension Travel	Forks/5.1″	Strut/6.25″
Rear Suspension Travel	6″	6″
Front Tire	22x11x8	22x8x10
Rear Tire	22x11x10	22x11x10
Front Tire PSI	3	4
Rear Tire PSI	3	3
Front Brake	Mech. Drum	Mech. Drum
Rear Brake	Mech. Disc	Mech. Disc
Fuel Capacity (U.S. Gallons)	4	5
Oil Capacity (U.S. Quarts)	2	2
Head Lamp	45W	45W
Tail Lamp	5W	5W
Gear Box	F/R/N	F/R/N
Drive Belt	1 3/16″/40.87 O.D.	1 3/16″/40.87 O.D.
Drive Chain	520 O-ring	520 O-ring
Sprockets & Chain	13/42 74P	13/42 74P
Alternator Output	100W	100W
Battery	12V 14 Amp/Hr	12V 14 Amp/Hr
Electric Start	Std.	Std.
Front Rack	Std.	Std.
Rear Rack	Std.	Std.
Hitch	Std.	Std.

Model	Trail Boss 250	Trail Boss 2x4	Trail Boss 4x4
Model Number	W877527	W877828	W878027 W878127
Height	43″	43″	46″
Width	43.5″	43.5″	44.5
Length	70″	78″	70″
Wheel Base	45.5″	50″	47.5″
Seat Height	33″	33″	35.5″
Foot Pad Height	9.5″	9.5″	11″
Ground Clearance	6″	6″	6.75″
Weight	440 lbs.	400 lbs.	490 lbs.
Front Suspension Travel	6.25″	6.25″	6.25″
Rear Suspension	6″	6″	6″
Front Tire	22x8x10	22x8x10	22x8x10
Rear Tire	22x11x10	22x11x10	24x11x10
Front Tire PSI	4	4	4
Rear Tire PSI	3	3	3
Front Brake	Mech. Drum	Mech. Drum	Hydr. Disc
Rear Brake	Mech. Disc	Mech. Disc	Hydr. Disc
Fuel Capacity (U.S. Gallons)	4	5	5
Oil Capacity (U.S. Quarts)	2	2	2
Head Lamp	45W	45W	45W
Tail Lamp	5W	5W	5W
Gear Box	F/R/N	F/R/N	Hi/Lo & R & N
4 Wheel Drive	n/a	n/a	Electro Mech.
Drive Chain	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/42 74P	13/42 74P	12/42 74P (Final)
Center Drive	n/a	n/a	11/22 76P
Front Drive	n/a	n/a	11/24 64P
Alternator Output	100W	100W	100W
Battery	12V 14 Amp/Hr	12V 14 Amp/Hr	12V 14 Amp/Hr
Electric Start	Std.	n/a	Std.
Front Rack	Opt.	Opt.	Std.
Rear Rack	Std.	n/a	Std.
Hitch	Std.	n/a	Std.

SPECIFICATIONS 1988

Model	Trail Boss 2x4	Trail Boss 250 R/ES	Trail Boss 4x4
Model Number	W887527	W888528	W888127
Height	43″	44″	46″
Width	43.5″	43.5″	44.5″
Length	70″	73.2″	70″
Wheel Base	49.5″	49.5″	49.5″
Seat Height	33″	33″	35.5″
Foot Pad Height	9.5″	11.5″	11″
Ground Clearance	6″	5.5″	6.75″
Weight	440 lbs.	400 lbs.	490 lbs.
Front Suspension Travel	6.25″	6.25″	6.25″
Rear Suspension	6″	8.5″	6″
Front Tire	22x8x10	22x8x10	22x8x10
Rear Tire	22x11x10	24x11x10	24x11x10
Front Tire PSI	3	3	4
Rear Tire PSI	3	3	3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc
Fuel Capacity (U.S. Gallons)	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2
Head Lamp	12V 45/45W	12V 60/60W	12V 45/45W
Tail Light	12V 5W	12V 5W	12V 5W
Gear Box	H/L/R	F/R	Hi/Lo & R
4 Wheel Drive	n/a	n/a	Electro Mech.
Drive Chain	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/38 72P	13/42 88P	12/42 74P (Final)
Center Drive	n/a	n/a	11/22 76P
Front Drive	n/a	n/a	11/22 64P
Alternator Output	100W	100W	100W
Battery	12V 14 Amp/Hr	12V 14 Amp/Hr	12V 14 Amp/Hr
Electric Start	Std.	Std.	Std.
Front Rack	Std.	Opt.	Std.
Rear Rack	Std.	Std.	Std.
Hitch	Std.	Std.	Std.

Model	Trail Boss 250	Trail Boss 2x4	Trail Boss 4x4	Big Boss 4x6
Model Number	W898527	W897527	W898127	W898627
Height	44″	44″	46″	44″
Width	44″	44″	44.5″	44.5″
Length	73.2″	73.2″	73.2″	97.5″
Wheel Base	49.5″	49.5″	49.5″	75″
Seat Height	33″	33″	34″	33.5″
Foot Pad Clearance	11.5″	11.5″	11.5″	11.5″
Ground Clearance	5.5″	5.5″	6″	4.6″
Weight	400 lbs.	440 lbs.	490 lbs.	650 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	5.25″
Front Tire	22x8x10	22x8x10	22x8x10	22x8x10
Rear Tire	22x11x10	24x11x10	24x11x10	22x11x10
Front Tire PSI	3	3	4	4
Rear Tire PSI	3	3	3	5
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Hydr. Disc
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Head Light	12V 60/60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V 5W	12V 5W	12V 5W	12V 5W
Gear Box	F/R/N	Hi/Lo & R & N	Hi/Lo & R & N	Hi/Lo & R & N
4 Wheel Drive	n/a	n/a	Electro Mech.	Mech. Rear 4 Wheels
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/42 88P	13/38 86P	12/42 88P (Final)	12/42 88P (Front Axle)
Center Drive	n/a	n/a	11/22 70P	30/30 108P (Axle to Axle)
Front Drive	n/a	n/a	11/22 64P	n/a
Turning Circle (Unloaded)	89″	89″	89″	162″
Spark Plug	BR8ES (NGK) RN4YC (Champ)	BR8ES (NGK) RN4YC (Champ)	BR8ES (NGK) RN4YC (Champ)	BR8ES (NGK) RN4YC (Champ)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective
Timing Degrees	25@3000	25@3000	25@3000	25@3000
Carburetion	VM30SS Mikuni	VM30SS Mikuni	VM30SS Mikuni	VM30SS Mikuni
Main Jet	145	145	145	145
Pilot Jet	40	40	40	40
Jet Needle	5DP7-3	5DP7-3	5DP7-3	5DP7-3
Needle Jet	0-4 (169)	0-4 (169)	0-4 (169)	0-4 (169)
Cutaway	2.0	2.0	2.0	2.0
Air Screw	1 Turn	1 Turn	1 Turn	1 Turn
Electric Start w/Recoil Back-Up	Std.	Std.	Std.	Std.
Front Rack	Opt.	Opt.	Opt.	Opt.
Rear Rack	Std.	Std.	Std.	Std.
Cargo Load Capacity (Frt/Rear)	na/125 lbs.	75/125 lbs.	75/125 lbs.	75/650 lbs.

SPECIFICATIONS 1990

Model	Trail Blazer	Trail Boss 250	Trail Boss 2x4	Trail Boss 4x4
Model Number	W907221	W908527	W907527	W908127
Height	44″	44″	44″	46″
Width	44″	44″	44″	44.5″
Length	73.2″	73.2″	73.2″	73.2″
Wheel Base	49.5″	49.5″	49.5″	49.75″
Seat Height	33″	33″	33″	34″
Foot Pad Clearance	11.5″	11.5″	11.5″	11.75″
Ground Clearance	5.5″	5.5″	5.5″	6″
Weight	390 lbs.	425 lbs.	440 lbs.	490 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tire	22x8x10	22x8x10	22x8x10	22x8x10
Rear Tire	22x11x10	22x11x10	24x11x10	24x11x10
Front Tire PSI	3	3	3	4
Rear Tire PSI	3	3	3	3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Head Light	12V 60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V 5W	12V 5W	12V 5W	12V 5W
Gear Box	Forward Only	F/N/R	Hi/Lo F/N/R	Hi/Lo F/N/R
4 Wheel Drive	n/a	n/a	n/a	Electro Mech
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/42 88P	13/34 84P	13/38 86P	12/42 88P
Center Drive	n/a	n/a	n/a	11/22 70P
Front Drive	n/a	n/a	n/a	11/22 64P
Turning Circle (Unloaded)	89″	89″	89″	89″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective
Timing Degrees	25@3000	25@3000	25@3000	25@3000
Carburetion	(1) VM30SS	(1) VM30SS	(1) VM30SS	(1) VM30SS
Main Jet	145	145	145	145
Pilot Jet	40	40	40	40
Jet Needle	5DP7-3	5DP7-3	5DP7-3	5DP7-3
Needle Jet	0-4 (169)	0-4 (169)	0-4 (169)	0-4 (169)
Cutaway	2.0	2.0	2.0	2.0
Air Screw	1 Turn	1 Turn	1 Turn	1 Turn
Electric Start w/Recoil Back-Up	Recoil Only	Std.	Std.	Std.
Front Rack	n/a	Accessory	Std.	Std.
Rear Rack	Accessory	Std.	Std.	Std.
Cargo Load Capacity (Frt/Rear)	na/125 lbs.	75/125 lbs.	75/125 lbs.	75/650 lbs.
Coolant Capacity (U.S. Qts.)	n/a	n/a	n/a	n/a

Model	Big Boss 4x6	Trail Boss 2x4 350L	Trail Boss 4x4 350L
Model Number	W908627	W907539	W908139
Height	44″	44″	46″
Width	44.5″	44″	44.5″
Length	97.5″	77″	77″
Wheel Base	75″	49.75″	49.75″
Seat Height	33.5″	33″	34″
Foot Pad Clearance	11.5″	11.5″	11.5″
Ground Clearance	4.6″	5.5″	6″
Weight	650 lbs.	490 lbs.	560 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″
Rear Suspension	5.25″	8.5″	8.5″
Front Tire	22x8x10	22x8x10	22x8x12
Rear Tire	22x11x10	24x11x10	25x12x10
Front Tire PSI	5	4	4
Rear Tire PSI	5 (Both Axles)	3	3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Hydr. Disc	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2
Head Light	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V 5W	12V 5W	12V 5W
Gear Box	Hi/Lo F/N/R	Hi/Lo F/N/R	Hi/Lo F/N/R
4 Wheel Drive	Mech 4 Rear Wheels	n/a	Electro Mech.
Drive Chain	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	12/42 88P Front Axle	13/34 84P	13/34 88P
Center Drive	30/30 108P Axle to Axle	n/a	11/22 70P
Front Drive	n/a	n/a	12/22 64P
Turning Circle (Unloaded)	162″	120″	113″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W
Compression Ratio	6.1/1 Effective	6.7/1 Effective	6.7/1 Effective
Timing Degrees	25@3000	23.5@3000	23.5@3000
Carburetion	(1) VM30SS	(1) VM34SS	(1) VM34SS
Main Jet	145	220	220
Pilot Jet	40	30	30
Jet Needle	5DP7-3	6DH29-3	6DH29-3
Needle Jet	0-4 (169)	0-6 (480)	0-6 (480)
Cutaway	2.0	1.5	1.5
Air Screw	1 Turn	1.5 Turn	1.5 Turn
Electric Start w/Recoil Back-Up	Std.	Std.	Std.
Front Rack	Std.	Std.	Std.
Rear Rack	n/a	Std.	Std.
Cargo Load Capacity (Frt/Rear)	75/650 lbs.	75/125 lbs.	75/125 lbs.
Coolant Capacity (U.S. Qts.)	n/a	2	2

SPECIFICATIONS 1991

Model	Trail Blazer	Trail Boss 250	Trail Boss 2x4	Trail Boss 4x4
Model Number	W917221	W918527	W917527	W918127
Height	44″	44″	44″	46″
Width	44″	44″	44″	44.5″
Length	73.2″	73.2″	73.2″	73.2″
Wheel Base	49.5″	49.5″	49.5″	49.75″
Seat Height	33″	33″	33″	34″
Foot Pad Clearance	11.5″	11.5″	11.5″	11.75″
Ground Clearance	5.5″	5.5″	5.5″	6″
Weight	390 lbs.	425 lbs.	440 lbs.	490 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tire	22x8x10	22x8x10	22x8x10	22x8x10
Rear Tire	22x11x10	22x11x10	24x11x10	24x11x10
Front Tire PSI	3	3	3	4
Rear Tire PSI	3	3	3	3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Transmission Oil Cap. (US oz/cc)	16.9/500	16.9/500	16.9/500	16.9/500
Head Light	12V 60/60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V 5W	12V 5W	12V 5W	12V 5W
Gear Box	F/N/R	F/N/R	Hi/Lo F/N/R	Hi/Lo F/N/R
4 Wheel Drive	n/a	n/a	n/a	Electro Mech
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/34 84P	13/34 84P	13/38 86P	12/42 88P
Center Drive	n/a	n/a	n/a	11/22 70P
Front Drive	n/a	n/a	n/a	11/22 64P
Turning Circle (Unloaded)	120″	120″	120″	113″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective
Timing Degrees	25@3000	25@3000	25@3000	25@3000
Carburetion	(1) VM30SS	(1) VM30SS	(1) VM30SS	(1) VM30SS
Main Jet	145	145	145	145
Pilot Jet	40	40	40	40
Jet Needle	5DP7-3	5DP7-3	5DP7-3	5DP7-3
Needle Jet	0-4 (169)	0-4 (169)	0-4 (169)	0-4 (169)
Cutaway	2.0	2.0	2.0	2.0
Air Screw	1 Turn	1 Turn	1 Turn	1 Turn
Electric Start w/Recoil Back-Up	Recoil Only	Std.	Std.	Std.
Front Rack	n/a	Accessory	Std.	Std.
Rear Rack	Accessory	Std.	Std.	Std.
Cargo Load Capacity (Frt/Rear)	na/125 lbs. (Accessory)	Accessory/125 lbs.	75/125 lbs.	75/650 lbs.
Coolant Capacity (U.S. Qts.)	n/a	n/a	n/a	n/a

Model	Trail Boss 2x4 350L	Trail Boss 4x4 350L	Big Boss 4x6	Big Boss 6x6
Model Number	W917539	W918139	W918627	W918727
Height	44″	46″	44″	46″
Width	44″	44.5″	44.4″	45.7″
Length	77″	77″	97.5″	97.5″
Wheel Base	49.75″	49.75″	75″	75″
Seat Height	33″	34″	33.5″	34″
Foot Pad Clearance	11.5″	11.75″	11.5″	11.5″
Ground Clearance	5.5″	6″	4.6″	5″
Weight	490 lbs.	560 lbs.	650 lbs.	750 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	5.25″	5.25″
Front Tire	22x8x10	25x8x12	22x8x10	22x8x10
Rear Tire	24x11x10	25x12x10	22x11x10	22x11x10
Center Tire (6 Wheel Models)	n/a	n/a	22x11x10	22x11x10
Front Tire PSI	4	4	5	5
Rear Tire PSI	3	3	5 (Both Axles)	5 (Both Axles)
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Hydr. Disc	Hydr. Disc
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Transmission Oil Cap. (US oz/cc)	16.9/500	16.9/500	16.9/500	16.9/500
Head Light	12V 60/60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V 5W	12V 5W	12V 5W	12V 5W
Gear Box	Hi/Lo F/N/R (Locking)	Hi/Lo F/N/R	Hi/Lo F/N/R (Locking)	Hi/Lo F/N/R (Locking)
All Wheel Drive	n/a	Electro Mech.	Mech 4 Rear Wheels	Electro Mech. Front Mech. 4 Rear Wheels
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/34 84P	13/34 88P	12/42 88P	12/42 88P
Center Drive	n/a	11/22 70P	n/a	11/24 72P
Front Drive	n/a	12/22 64P	n/a	11/22 64P
Axle to Axle	n/a	n/a	30/30 108P	30/30 108P
Turning Circle (Unloaded)	120″	113″	162″	156″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.7/1 Effective	6.7/1 Effective	6.1/1 Effective	6.1/1 Effective
Timing Degrees	23.5@3000	23.5@3000	25@3000	25@3000
Carburetion	(1) VM34SS	(1) VM34SS	(1) VM30SS	(1) VM30SS
Main Jet	220	220	145	145
Pilot Jet	30	30	40	40
Jet Needle	6DH29-3	6DH29-3	5DP7-3	5DP7-3
Needle Jet	0-6 (480)	0-6 (480)	0-4 (169)	0-4 (169)
Cutaway	1.5	1.5	2.0	2.0
Air Screw	1 Turn	1 Turn	1 Turn	1 Turn
Electric Start w/Recoil Back-Up	Std.	Std.	Std.	Std.
Front Rack	Std.	Std.	Std.	Std.

SPECIFICATIONS 1992

Model	Trail Blazer	Trail Boss 250	Trail Boss 2x4	Trail Boss 4x4
Model Number	W927221	W928527	W927527	W928127
Height	44″	44″	44″	46″
Width	44″	44″	44″	44.5″
Length	73.2″	73.2″	73.2″	73.2″
Wheel Base	49.5″	49.5″	49.5″	49.75″
Seat Height	33″	33″	33″	34″
Foot Pad Clearance	11.5″	11.5″	11.5″	11.75″
Ground Clearance	5.5″	5.5″	5.5″	6″
Weight	390 lbs.	425 lbs.	440 lbs.	490 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tire	22x8x10	22x8x10	22x8x10	22x8x10
Rear Tire	22x11x10	22x11x10	24x11x10	24x11x10
Front Tire PSI	3	3	3	4
Rear Tire PSI	3	3	3	3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Transmission Oil Cap.(US oz/cc)	16.9/500	16.9/500	16.9/500	16.9/500
Head Light	12V 60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V/8.25W	12V/8.25W	12V/8.25W	12V/8.25W
Gear Box	F/N/R	F/N/R	Hi/Lo F/N/R	Hi/Lo F/N/R
4 Wheel Drive	n/a	n/a	n/a	Electro Mech
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/42 84P	13/34 84P	13/38 86P	12/42 88P
Center Drive	n/a	n/a	n/a	11/22 70P
Front Drive	n/a	n/a	n/a	11/22 64P
Turning Circle (Unloaded)	120″	120″	120″	113″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective
Timing Degrees	25@3000	25@3000	25@3000	25@3000
Carburetion	(1) VM30SS	(1) VM30SS	(1) VM30SS	(1) VM30SS
Main Jet	145	145	145	145
Pilot Jet	40	40	40	40
Jet Needle	5DP7-3	5DP7-3	5DP7-3	5DP7-3
Needle Jet	0-4 (169)	0-4 (169)	0-4 (169)	0-4 (169)
Cutaway	2.0	2.0	2.0	2.0
Air Screw	1 Turn	1 Turn	1 Turn	1 Turn
Electric Start w/Recoil Back-Up	Recoil Only	Std.	Std.	Std.
Front Rack	n/a	Accessory	Std.	Std.
Rear Rack	Accessory	Std.	Std.	Std.
Cargo Load Capacity (Frt/Rear)	na/125 lbs. (Accessory)	Accessory/125 lbs.	75/125 lbs.	75/650 lbs.
Coolant Capacity (U.S. Qts.)	n/a	n/a	n/a	n/a
Rear Rack	Std.	Std.	34x41x8 Cargo Box	34x41x8 Cargo Box
Cargo Load Capacity (Frt/Rear)	75/125 lbs.	75/125 lbs.	75/650 lbs. Box	75/650 lbs. Box
Coolant Capacity (U.S. Qts.)	2	2	n/a	n/a
Cutaway	2.0	2.0	2.0	2.0

Model	Trail Boss 2x4 350L	Trail Boss 4x4 350L	Big Boss 4x6	Big Boss 6x6
Model Number	W927539	W928139	W928627	W928727
Height	44″	46″	44″	46″
Width	44″	44.5″	44.4″	45.7″
Length	77″	77″	97.5″	97.5″
Wheel Base	49.75″	49.75″	75″	75″
Seat Height	33″	34″	33.5″	34″
Foot Pad Clearance	11.5″	11.75″	11.5″	11.5″
Ground Clearance	5.5″	6″	4.6″	5″
Weight	490 lbs.	560 lbs.	650 lbs.	750 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	5.25″	5.25″
Front Tire	22x8x10	25x8x12	22x8x10	22x8x10
Rear Tire	24x11x10	25x12x10	22x11x10	22x11x10
Center Tire (6 Wheel Models)	n/a	n/a	22x11x10	22x11x10
Front Tire PSI	4	4	5	5
Rear Tire PSI	3	3	5 (Both Axles)	5 (Both Axles)
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Hydr. Disc	Hydr. Disc
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Transmission Oil Cap. (US oz/cc)	16.9/500	16.9/500	16.9/500	16.9/500
Head Light	12V 60/60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V 5W	12V 5W	12V 5W	12V 5W
Brake Light	12V/26.9W	12V/26.9W	12V/26.9W	12V/26.9W
Gear Box	Hi/Lo F/N/R (Locking)	Hi/Lo F/N/R (Locking)	Hi/Lo F/N/R	Hi/Lo F/N/R (Locking)
All Wheel Drive	n/a	Electro Mech.	Mech 4 Rear Wheels	Electro Mech. Front Mech. 4 Rear Wheels
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain Pitch (Final)	13/34 84P	13/34 84P	12/42 88P	12/42 88P
Center Drive	n/a	11/22 70P	n/a	11/24 72P
Front Drive	n/a	12/22 64P	n/a	11/22 64P
Axle to Axle	n/a	n/a	30/30 108P	30/30 108P
Turning Circle (Unloaded)	120″	113″	162″	156″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.7/1 Effective	6.7/1 Effective	6.1/1 Effective	6.1/1 Effective
Timing Degrees	23.5@3000	23.5@3000	25@3000	25@3000
Carburetion	(1) VM34SS	(1) VM34SS	(1) VM30SS	(1) VM30SS
Main Jet	220	220	145	145
Pilot Jet	30	30	40	40
Jet Needle	6DH29-3	6DH29-3	5DP7-3	5DP7-3
Needle Jet	0-6 (480)	0-6 (480)	0-4 (169)	0-4 (169)
Cutaway	1.5	1.5	2.0	2.0
Air Screw	3/4 Turn	3/4 Turn	1 Turn	1 Turn
Electric Start w/Recoil Back-Up	Std.	Std.	Std.	Std.
Front Rack	Std.	Std.	Std.	Std.
Rear Rack	Std.	Std.	34x41x8 Cargo Box	34x41x8 Cargo Box
Coolant Capacity (U.S. Qts.)	2	2	n/a	n/a

SPECIFICATIONS 1993

Model	Trail Blazer	Trail Boss 250	2x4 250	2x4 350L
Model Number	W937221	W938527	W937527	W937539
Height	44″	44″	44″	44″
Width	44″	44″	44″	44″
Length	73.2″	73.2″	73.2″	77″
Wheel Base	49.5″	49.5″	49.5″	49.5″
Seat Height	33″	33″	33″	33″
Ground Clearance	5.5″	5.5″	5.5″	5.5″
Weight	390 lbs.	425 lbs.	440 lbs.	490 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tire	22x8x10	22x8x10	22x8x10	22x8x10
Rear Tire	22x11x10	22x11x10	24x11x10	24x11x10
Front Tire PSI	3	3	3	4
Rear Tire PSI	3	3	3	3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Coolant Capacity (U.S. Qts.)	n/a	n/a	n/a	2
Gearcase Oil Cap (oz) 30wt.	16.9	16.9	16.9	16.9
Head Light	12V 60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V/8.26W	12V/8.26W	12V/8.26W	12V/8.26W
Gear Box	F/N/R	F/N/R	Hi/Lo F/N/R	Hi/Lo F/N/R
4 Wheel Drive	n/a	n/a	n/a	n/a
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/34 84P	13/34 84P	13/38 86P	13/34 84P
Center Drive	n/a	n/a	n/a	n/a
Front Drive	n/a	n/a	n/a	n/a
Turning Radius (Unloaded)	60″	60″	60″	60″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective	6.1/1 Effective
Timing Degrees	25@3000	25@3000	25@3000	25@3000
Carburetion	(1) VM30SS	(1) VM30SS	(1) VM30SS	(1) VM34SS
Main Jet	145	145	145	200
Pilot Jet	40	40	40	30
Jet Needle	5DP7-3	5DP7-3	5DP7-3	6DH29-2
Needle Jet	0-4 (169)	0-4 (169)	0-4 (169)	0-6 (480)
Cutaway	2.0	2.0	2.0	1.5
Air Screw	1 Turn	1 Turn	1 Turn	3/4 Turn
Electric Start w/Recoil Back-Up	Recoil Only	Std.	Std.	Std.
Front Rack	n/a	Accessory	Std.	Std.
Rear Rack	Accessory	Std.	Std.	Std.
Cargo Load Capacity (Frt/Rear)	na/125 lbs. (Accessory)	Accessory/125 lbs.	75/175 lbs.*	75/175 lbs.*

* See Owner's Manual for rack load recommendations and restrictions.

Model	Trail Boss 4x4 250	Trail Boss 4x4 350L/Sportsman	Big Boss 6x6 250	Big Boss 6x6 350L
Model Number	W938127	W938139	W938727	W938739
Height	46″	46″	46″	46″
Width	44.5″	44.5″	45.7″	45.7″
Length	73.2″	77″	97.5″	103″
Wheel Base	49.75″	49.75″	75″	75″
Seat Height	34″	34″	34″	37″
Ground Clearance	6″	6″	5″	5.5″
Weight	490 lbs.	560 lbs.	750 lbs.	820 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tire	22x8x10	25x8x12	22x8x10	25x8x10
Rear Tire	24x11x10	25x12x10	22x11x10	25x12x10
Center Tire (6 Wheel Models)	n/a	n/a	22x11x10	25x12x10
Front Tire PSI	4	4	5	5
Rear Tire PSI	3	3	5 (Both Axles)	5 (Both Axles)
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Hydr. Disc	Hydr. Disc
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Transmission Oil Cap. (US oz/cc)	16.9/500	16.9/500	16.9/500	16.9/500
Head Light	12V 60/60W	12V 60/60W	12V 60/60W	12V 60/60W
Tail Light	12V 8.26W	12V 8.26W	12V 8.26W	12V 8.26W
Brake Light	12V/26.9W	12V/26.9W	12V/26.9W	12V/26.9W
Gear Box	Hi/Lo R/N	Hi/Lo R/N	Hi/Lo R/N	Hi/Lo R/N
All Wheel Drive	n/a	Electro Mech.	Mech 4 Rear Wheels	Electro Mech. Front Mech. 4 Rear Wheels
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain Pitch (Final)	12/42 88P	12/34 84P	12/42 88P	13/42 88P
Center Drive	11/22 70P	11/22 70P	11/22 70P	11/22 70P
Front Drive	11/22 64P	12/22 64P	11/22 64P	11/22 64P
Axle to Axle	n/a	n/a	30/30 108P	30/30 116P
Turning Circle (Unloaded)	57″	57″	81″	98″
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Compression Ratio	6.1/1 Effective	6.7/1 Effective	6.1/1 Effective	6.7/1 Effective
Timing Degrees	25@3000	23.5@3000	25@3000	23.5@3000
Carburetion	(1) VM30SS	(1) VM34SS	(1) VM30SS	(1) VM34SS
Main Jet	145	200	145	200
Pilot Jet	40	30	40	30
Jet Needle	5DP7-3	6DH29-2	5DP7-3	6DH29-2
Needle Jet	0-4 (169)	0-6 (480)	0-4 (169)	0-6 (480)
Cutaway	2.0	1.5	2.0	1.5
Air Screw	1 Turn	3/4 Turn	1 Turn	3/4 Turn
Electric Start w/Recoil Back-Up	Std.	Std.	Std.	Std.
Front Rack	Std.	Std.	Std.	Std.
Rear Rack	Std.	Std.	Cargo Bed	
Coolant Capacity (U.S. Qts.)	n/a	2	n/a	2

SPECIFICATIONS 1994

Model	Trail Blazer	Trail Boss 250	2x4 300	Sport 400L
Model Number	W947221	W948527	W947530	W948540
Height	44″	44″	44″	44″
Width	44″	44″	44″	44″
Length	73.2″	73.2″	73.2″	72″
Wheel Base	49.5″	49.5″	49.5″	49.75″
Seat Height	33″	33″	33″	33″
Ground Clearance	5.5″	5.5″	5.5″	5.5″
Weight	390 lbs.	425 lbs.	483 lbs.	479 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tires	22x8x10	22x8x10	22x8x10	22x8x10
Rear Tires	22x11x10	22x11x10	24x11x10	22x11x10
Center Tires	N/A	N/A	N/A	N/A
Front/Rear/Center Tire PSI	3/3	3/3	3/3	4/3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Gearcase Oil Capacity (oz)	16	16	20	16
Engine Counter Balancer Oil Capacity (10W/30)	N/A	N/A	N/A	100cc
Main Head Light	12V 60W	12V 60/60W	12V 60/60W	12V 60/60W
Grill Mounted Lights	N/A	N/A	N/A	N/A
Tail Light	12V/8.26W	12V/8.26W	12V/8.26W	12V/8.26W
Gear Box	F/R/N	F/R/N	Hi/Lo/R/N	F/R/N
Gear Reduction Low	N/A	N/A	6.72/1	N/A
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	11/40 86P	11/40 86P	13/38 86P	12/34 84P
Center Drive	N/A	N/A	N/A	N/A
Front Drive	N/A	N/A	N/A	N/A
Axle to Axle	N/A	N/A	N/A	N/A
Turning Radius (Unloaded)	60″	60″	60″	60″
Displacement	244cc	244cc	283cc	378cc
Engine Model Number	EC25PF-09	EC25PF-08	EC28PF-01	EC38PL-01
Compression Ratio (Effective)	6.1/1	6.1/1	6.1/1	6.9/1
Bore and Stroke	72x60	72x60	74.5x65	83x70
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Timing Degrees	25@3000	25@3000	TBA	24@3000
Carburetion	(1) VM30SS	(1) VM30SS	(1) VM30SS	(1) VM34SS
Main Jet	145	145	155	200
Pilot Jet	40	40	40	30
Jet Needle	5DP7-3	5DP7-3	5DP7-3	6DH29-3
Needle Jet	0-4 (169)	0-4 (169)	0-4 (169)	0-6 (480)
Cutaway	2.0	2.0	2.0	1.5
Air Screw	1 Turn	1 Turn	1 Turn	1.5 Turn
* See Owner's Manual for rack load recommendations and restrictions.				

Model	2x4 400L	4x4 300	4x4 400L	Sportsman 4x4
Model Number	W947540	W948130	W948140	W948040
Height	44″	46″	46″	46″
Width	44″	44.5″	46″	46″
Length	77″	73.2″	77″	77″
Wheel Base	49.75″	49.75″	49.75″	49.75″
Seat Height	33″	34″	34″	34″
Ground Clearance	5.5″	6″	6″	6″
Weight	512 lbs.	538 lbs.	572 lbs.	585 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tires	22x8x10	22x8x10	25x8x12	25x8x12
Rear Tires	24x11x10	24x11x10	25x12x10	25x12x10
Center Tires	N/A	N/A	N/A	N/A
Front/Rear/Center Tire PSI	4/3	4/3	4/3	4/3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Gearcase Oil Capacity (oz)	20	20	20	20
Engine Counter Balancer Oil Capacity (10W/30)	100cc	N/A	100cc	100cc
Main Head Light	12V 60/60W	12V 60/60W	12V 60/60W	12V 60/60W
Grill Mounted Lights	Accessory	N/A	2,12V 37.5W	2,12V 37.5W
Tail Light	12V/8.26W	12V/8.26W	12V/8.26W	12V/8.26W
Gear Box	HI/LO/R/N	HI/LO/R/N	HI/LO/R/N	HI/LO/R/N
Gear Reduction Low	6.72/1	6.72/1	6.72/1	6.72/1
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/34 84P	12/42 88P	13/34 84P	13/34 84P
Center Drive	N/A	11/22 70P	11/22 70P	11/22 70P
Front Drive	N/A	11/22 64P	12/22 64P	12/22 64P
Axle to Axle	N/A	N/A	N/A	N/A
Turning Radius (Unloaded)	60″	57″	65″	65″
Displacement	378cc	283cc	378cc	378cc
Engine Model Number	EC38PL-01	EC28PF-01	EC38PL-01	EC38PL-01
Compression Ratio (Effective)	6.9/1	6.1/1	6.9/1	6.9/1
Bore and Stroke	83x70	74.5x65	83x70	83x70
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	200W	150W	200W	200W
Timing Degrees	24@3000	TBA	24@3000	24@3000
Carburetion	(1) VM34SS	(1) VM30SS	(1) VM34SS	(1) VM34SS
Main Jet	200	155	200	200
Pilot Jet	30	40	30	30
Jet Needle	6DH29-3	5DP7-3	6DH29-3	6DH29-3
Needle Jet	0-6 (480)	0-4 (169)	0-6 (480)	0-6 (480)
Cutaway	1.5	2.0	1.5	1.5
Air Screw	1.5 Turn	1 Turn	1.5 Turn	1.5 Turn
* See Owner's Manual for rack load recommendations and restrictions.				

SPECIFICATIONS 1994

Model	Big Boss 6x6 300	Big Boss 6x6 400L
Model Number	W948730	W948740
Height	46″	46″
Width	45.7″	45.7″
Length	97.5″	103″
Wheel Base	75″	75″
Seat Height	34″	37″
Ground Clearance	5″	5.5″
Weight	823 lbs.	857 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″
Rear Suspension	8.5″	8.5″
Front Tires	22x8x10	25x8x12
Rear Tires	22x11x10	25x12x10
Center Tires	22x11x10	25x12x10
Front/Rear/Center Tire PSI	5/5/5	5/5/5
Front Brake	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Hydr. Disc	Hydr. Disc
Fuel Capacity (U.S. Gallons)	4	4
Oil Capacity (U.S. Quarts)	2	2
Gearcase Oil Capacity (oz)	20	20
Engine Counter Balancer Oil Capacity (10W/30)	N/A	100cc
Main Head Light	12V 60/60W	12V 60/60W
Grill Mounted Lights	N/A	2,12V 37.5W
Tail Light	12V/8.26W	12V/8.26W
Gear Box	HI/LO/R/N	HI/LO/R/N
Gear Reduction Low	6.72/1	6.72/1
Drive Chain	520 O-ring	520 O-ring
Sprockets & Chain	12/42 88P	13/42 88P
Center Drive	11/22 70P	11/22 70P
Front Drive	11/22 64P	12/22 64P
Axle to Axle	30/30 108p	30/30 116p
Turning Radius (Unloaded)	81″	98″
Displacement	283cc	378cc
Engine Model Number	EC28PF-01	EC38PL-01
Compression Ratio (Effective)	6.1/1	6.9/1
Bore and Stroke	74.5X65	83x70
Spark Plug	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	200W
Timing Degrees	TBA	24@3000
Carburetion	(1) VM30SS	(1) VM34SS
Main Jet	155	200
Pilot Jet	40	30
Jet Needle	5DP7-3	6DH29-3
Needle Jet	0-4 (169)	0-6 (480)
Cutaway	2.0	1.5
Air Screw	1 Turn	1.5 Turn
* See Owner's Manual for rack load recommendations and restrictions.		

Model	Trail Blazer	Trail Boss	2x4 300	Sport 400L
Model Number	W957221	W958527	W957530	W958540
Height	44″	44″	44″	44″
Width	44″	44″	44″	44″
Length	73.2″	73.2″	73.2″	72″
Wheel Base	49.5″	49.5″	49.75″	49.75″
Seat Height	33″	33″	33″	33″
Ground Clearance	5.5″	5.5″	5.5″	5.5″
Weight	390 lbs.	425 lbs.	483 lbs.	479 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tires	22x8x10	22x8x10	22x8x10	23x7x10
Rear Tires	22x11x10	22x11x10	24x11x10	22x11x10
Center Tires	N/A	N/A	N/A	N/A
Front/Rear/Center Tire PSI	3/3	3/3	3/3	4/3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Gearcase Oil Capacity (oz)	16	16	20	16
Engine Counter Balancer Oil Capacity (10W/30)	N/A	N/A	N/A	100cc
Main Head Light	12V 60W	12V 60/60W	12V 60/60W	12V 60/60W
Grill Mounted Lights	N/A	N/A	N/A	N/A
Tail Light	12V/8.26W	12V/8.26W	12V/8.26W	12V/8.26W
Gear Box	F/R/N	F/R/N	HI/LO/R/N	F/R/N
Gear Reduction Low	N/A	N/A	6.64/1	N/A
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	12/42 88P	12/42 88P	13/38 86P	12/34 84P
Center Drive	N/A	N/A	N/A	N/A
Front Drive	N/A	N/A	N/A	N/A
Axle to Axle	N/A	N/A	N/A	N/A
Turning Radius (Unloaded)	60″	60″	60″	60″
Displacement	244cc	244cc	288cc	378.7cc
Engine Model Number	EC25PF09	EC25PF08	EC28PF01	EC38PL02
Compression Ratio (Effective)	6.1/1	6.1/1	6.1/1	6.9/1
Bore and Stroke	72x60	72x60	74.5x65	83x70
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	150W	150W	150W	150W
Timing Degrees	25@3000	25@3000	25@3000	23.5@3000
Carburetion	(1) VM30SS	(1) VM30SS	(1) VM30SS	(1) VM34SS
Main Jet	145	145	155	200
Pilot Jet	40	40	40	30
Jet Needle	5DP7-3	5DP7-3	5DP7-3	6DH29-3
Needle Jet	0-4 (169)	0-4 (169)	0-4 (169)	0-6 (480)
Cutaway	2.0	2.0	2.0	1.5
Air Screw	1 Turn	1 Turn	1 Turn	1.5 Turn

* See Owner's Manual for rack load recommendations and restrictions.

SPECIFICATIONS 1995

Model	2x4 400L	4x4 300	Xplorer 4x4	Sportsman 4x4
Model Number	W957540	W958130	W959140	W958040
Height	46″	44.5″	47″	46″
Width	44″	44.5″	46″	46″
Length	77″	73.2″	77″	77″
Wheel Base	49.75″	49.75″	49.75″	49.75″
Seat Height	33″	34″	34″	34″
Ground Clearance	5.5″	6″	6″	6″
Weight	512 lbs.	538 lbs.	570 lbs.	585 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tires	22x8x10	22x8x10	25x8x12	25x8x12
Rear Tires	24x11x10	24x11x10	25x12x10	25x12x10
Center Tires	N/A	N/A	N/A	N/A
Front/Rear/Center Tire PSI	4/3	4/3	4/3	4/3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Mechanical	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	4	4
Oil Capacity (U.S. Quarts)	2	2	2	2
Gearcase Oil Capacity (oz)	20	20	20	20
Engine Counter Balancer Oil Capacity (10W/30)	100cc	N/A	100cc	100cc
Main Head Light	12V 60/60W	12V 60/60W	12V 60/55W	12V 60/60W
Grill Mounted Lights	Accessory	N/A	2,12V 37.5W	2,12V 37.5W
Tail Light	12V/8.26W	12V/8.26W	12V/8.26W	12V/8.26W
Gear Box	HI/LO/R/N	HI/LO/R/N	HI/LO/R/N	HI/LO/R/N
Gear Reduction Low	6.64/1	6.64/1	6.64/1	6.64/1
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/34 84P	13/40 88P	13/34 84P	13/34 84P
Center Drive	N/A	11/22 70P	11/22 70P	11/22 70P
Front Drive	N/A	12/22 64P	13/22 64P	13/22 64P
Axle to Axle	N/A	N/A	N/A	N/A
Turning Radius (Unloaded)	60″	57″	65″	65″
Displacement	378.7cc	288cc	378.7cc	378.7cc
Engine Model Number	EC38PL01	EC28PF01	EC38PL01	EC38PL01
Compression Ratio (Effective)	6.9/1	6.1/1	6.9/1	6.9/1
Bore and Stroke	83x70	74.5x65	83x70	83x70
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)	BR8ES (NGK)
Alternator Output	200W	150W	200W	200W
Timing Degrees	23.5@3000	25@3000	23.5@3000	23.5@3000
Carburetion	(1) VM34SS	(1) VM30SS	(1) VM34SS	(1) VM34SS
Main Jet	200	155	200	200
Pilot Jet	30	40	30	30
Jet Needle	6DH29-3	5DP7-3	6DH29-3	6DH29-3
Needle Jet	0-6 (480)	0-4 (169)	0-6 (480)	0-6 (480)
Cutaway	1.5	2.0	1.5	1.5
Air Screw	1.5 Turn	1 Turn	1.5 Turn	1.5 Turn

* See Owner's Manual for rack load recommendations and restrictions.

Model	Scrambler	6x6 400L	Magnum 2x4	Magnum 4x4
Model Number	W957840	W958740	W957544	W958144
Height	47″	47″	47″	46″
Width	45.5″	46″	46.5″	46″
Length	74.5″	103″	77″	77″
Wheel Base	48.5″	75″	49.75″	49.75″
Seat Height	33″	37″	33″	34″
Ground Clearance	6″	5.5″	5.5″	6″
Weight	490 lbs.	857 lbs.	534 lbs.	595 lbs.
Front Suspension Travel (McPherson Strut)	6.25″	6.25″	6.25″	6.25″
Rear Suspension	8.5″	8.5″	8.5″	8.5″
Front Tires	23x7x10	25x8x12	23x7x10	25x8x12
Rear Tires	22x11x10	25x12x10	24x11x10	25x12x10
Center Tires	N/A	25x12x10	N/A	N/A
Front/Rear/Center Tire PSI	4/3	5/5/5	4/3	4/3
Front Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Rear Brake	Hydr. Disc	Hydr. Disc	Hydr. Disc	Hydr. Disc
Auxiliary Brake	Mechanical	Hydr. Disc	Mechanical	Mechanical
Fuel Capacity (U.S. Gallons)	4	4	3.5	3.5
Oil Capacity (U.S. Quarts)	2	2	2 0W40 Engine Oil	2 0W40 Engine Oil
Gearcase Oil Capacity (oz)	20	20	20	20
Engine Counter Balancer Oil Capacity (10W/30)	100cc	100cc	N/A	N/A
Main Head Light	12V 75/75W	12V 60/60W	12V 60/60W	12V 60/60W
Grill Mounted Lights	N/A	2,12V 37.5W	Acc.	2,12V 37.5W
Tail Light	12V/8.26W	12V/8.26W	12V/8.26W	12V/8.26W
Gear Box	F/R/N	HI/LO/R/N	HI/LO/R/N	HI/LO/R/N
Gear Reduction Low	N/A	6.64/1	6.64/1	6.64/1
Drive Chain	520 O-ring	520 O-ring	520 O-ring	520 O-ring
Sprockets & Chain	13/38 84P	13/42 88P	12/38 86P	12/38 86P
Center Drive	11/22 70P	11/22 70P	11/22 70P	11/22 70P
Front Drive	12/22 64P	12/22 64P	11/22 68P	11/22 68P
Axle to Axle	N/A	30/30 116p	N/A	N/A
Turning Radius (Unloaded)	60″	98″	60″	65″
Displacement	378.7cc	378.7cc	425cc	425cc
Engine Model Number	EC38PL03	EC38PL01	EH42PL01	EH42PL01
Compression Ratio (Effective)	6.9/1	6.9/1	9.2/1	9.2/1
Bore and Stroke	83x70	83x70	87.9x70	87.9x70
Spark Plug	BR8ES (NGK)	BR8ES (NGK)	BKR6ES (NGK)	BKR6ES (NGK)
Alternator Output	150W	200W	200W	200W
Timing Degrees	23.5@3000	23.5@3000	30@3500	30@3500
Carburetion	(1) VM34SS	(1) VM34SS	(1) BST34 (CV type)	(1) BST34 (CV type)
Main Jet	240	200	140	140
Pilot Jet	30	30	42.5	42.5
Jet Needle	6DH29-2	6DH29-3	5F81-3	5F81-3
Needle Jet	0-6 (480)	0-6 (480)	P-8	P-8
Cutaway	2.0	1.5	N/A	N/A
Air Screw	1.5 Turn	1.5 Turn	1 3/8 Turn	1 3/8 Turn
* See Owner's Manual for rack load recommendations and restrictions.				

	1989-94	1989-94	1989-94	1993-94	1990-94	1990-94	1990-94	1993-94	1994	1994
Accessory Description	Trail Boss	250/300 2x4	250/300 4x4	250/300 6x6	Trail Blazer	350/400L 2x4	350/400L 4x4	350/400L 6x6	Sport 400L	Sports-man 4x4
46" Snow/Dirt Blade	2870819	2870819	2870819	2870819	n/a	2870819	2870819	2870819	n/a	2870819
60" Snow Blade	2871014	2871014	2871014	2871014	n/a	2871014	2871014	2871014	n/a	2871014
Blade Mounting & Hdwr. Kit	2870890	2870890	2870890	2870890	n/a	2870940	2870940	2870940	n/a	2870940
10 hp Mower	2870713	2870713	2870713	2870713	n/a	2870713	2870713	2870713	n/a	2870713
8 hp Mower	2870824	2870824	2870824	2870824	n/a	2870824	2870824	2870824	n/a	2870824
Mower Mount Kit	2870849	2870849	2870889	2870946	n/a	2870941	2870946	2870946	n/a	2870946
14 Gal. Sprayer & Spray Gun	2871087	2871087	2871087	n/a	n/a	2871087	2871087	n/a	n/a	n/a
Sprayer Mounting Kit	2871090	2871090	2871090	n/a	n/a	2871090	2871090	n/a	n/a	n/a
42" Spray Boom (80") Spray	2871088	2871088	2871088	n/a	n/a	2871088	2871088	n/a	n/a	n/a
123" Spray Boom (144") Spray	2871089	2871089	2871089	n/a	n/a	2871089	2871089	n/a	n/a	n/a
20 MPH Speedometer ***	n/a	n/a	n/a	n/a	n/a	2871085	2871085	2871085	n/a	n/a
Winch (1000 lb.) & Mounting Kit	2870893	2870893	2870893	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Warn 2000 lb. Free Wheeling Winch & Mount Kit**	2870927	2870927	2870927	2870937	n/a	2870937	2870937	2870937	2870927	2870937
Three Point Hitch	2870865	2870865	2870865	TBA	n/a	2870865	2870865	TBA	n/a	2870865
Blade for 3 Pt. Hitch	2870866	2870866	2870866	TBA	2870866	2870866	2870866	TBA	n/a	2870866
V-Bar Chains Rear	2870684	2870790	2870790	2870948	2870684	2870790	2870948	2870948	2870684	2870948
Mud Skirt (Extended Fenders) Kit	2871106	2871106	2871106	2871106	2871106	2871106	2871106	2871106	2871106	2871106
Windshield/Fairing	2870864	2870864	2870864	2870864	2870864	2870864	2870864	2870864	2870864	2870864
Front Utility Rack	2870775	Std.	Std.	Std.	n/a	Std.	Std.	Std.	2870775	Std.
Enclosed Chainguard	2870868	2870868	2870868	n/a	2870868	2870868	2870868	n/a	2870868	2870868
Hourmeter	2871011	2871011	2871011	2871011	n/a	2871011	2871011	n/a	2871011	2871011
Reverse Warning Kit	2870991	2870991	2870991	2870991	n/a	2870991	2870991	2870991	2870991	2870991
Fan Cooling Kit	2870869	2870869	2870869	Std.	n/a	Std.	Std.	Std.	Std.	Std.
Safety Whip Flag	2870799	2870799	2870799	n/a	n/a	2870799	2870799	n/a	2870799	2870799
Aluminum Rim Front	2870736	2870736	2870736	n/a	2870736	2870736	n/a	n/a	n/a	n/a
Aluminum Rim Rear	2870771	2870771	2870771	2870771	2870771	2870771	2870771	n/a	n/a	n/a

ATV ACCESSORY FIT CHART

	1989-94	1989-94	1989-94	1993-94	1990-94	1990-94	1990-94	1993-94	1994	1994
Accessory Description	Trail Boss	250/300 2x4	250/300 4x4	250/300 6x6	Trail Blazer	350/400L 2x4	350/400L 4x4	350/400L 6x6	Sport 400L	Sports-man 4x4
Standard Storage Cover	2870796	2870796	2870796	TBA	2870796	2870796	n/a	TBA	2870796	n/a
Camouflage Cover	2870797	2870797	2870797	TBA	2870797	2870797	TBA	n/a	n/a	TBA
Dust Cover	2871084	2871084	2871084	n/a	2871084	2871084	2871084	n/a	2871084	2871084
Gun Scabbard & Mount Kit	2870854	2870854	2870854	n/a	n/a	2870854	2870854	n/a	n/a	2870854
Front Bumper	2870921	2870921	2870922	2870921	n/a	Std.	Std.	Std.	Std.	Std.
Rear Bumper	2870923	2870923	2870923	TBA	2870923	2870923	2870923	TBA	2870923	n/a
Rear Rack Extender	2870918	2870918	2870918	n/a	n/a	2870942	2870942	n/a	n/a	Std.
Front Rack Extender	2870931	2870931	2870931	2870931	n/a	2870931	2870931	2870931	n/a	2870931
Hand Brush Guards	2870722	2870722	2870722	2870722	2870722	2870722	2870722	2870722	2870722	2870722
Dual Heat Handlebar Warmers	2870856	2870856	2870856	2870856	n/a	2870856	2870856	2870856	2870856	2870856
Tool Box	TBA	TBA	TBA	2871082	n/a	TBA	TBA	2871082	n/a	n/a
Wooden Stake Side Kit for 6x6	n/a	n/a	n/a	2871081	n/a	n/a	n/a	2871081	n/a	n/a
Metal Box Sides & Tailgate for 6x6	n/a	n/a	n/a	2871091	n/a	n/a	n/a	Std.	n/a	n/a
Power Lift for 6x6	n/a	n/a	n/a	2871083	n/a	n/a	n/a	2871083	n/a	n/a
Hitch Weldment Kit	Std.	Std.	Std.	Std.	1040162 -067	Std.	Std.	Std.	1040162 -067	Std.
Rear Rack Kit	Std.	Std.	Std.	n/a	2870932	Std.	Std.	n/a	n/a	Std.

*250 6x6 may utilize the mud skirt kit but will have no need for the rear fender skirts.

**350L warn winch kit utilizes a state of the art roller system for maximum winch performance. This winch mounting cannot be used in conjunction with the mower mount kit (2870937).

***20 MPH speedometer is speedo head only. To utilize, a standard or accessory speedo drive is necessary, When operating at low speed for extended periods of time auxiliary cooling is recommended on air cooled models.

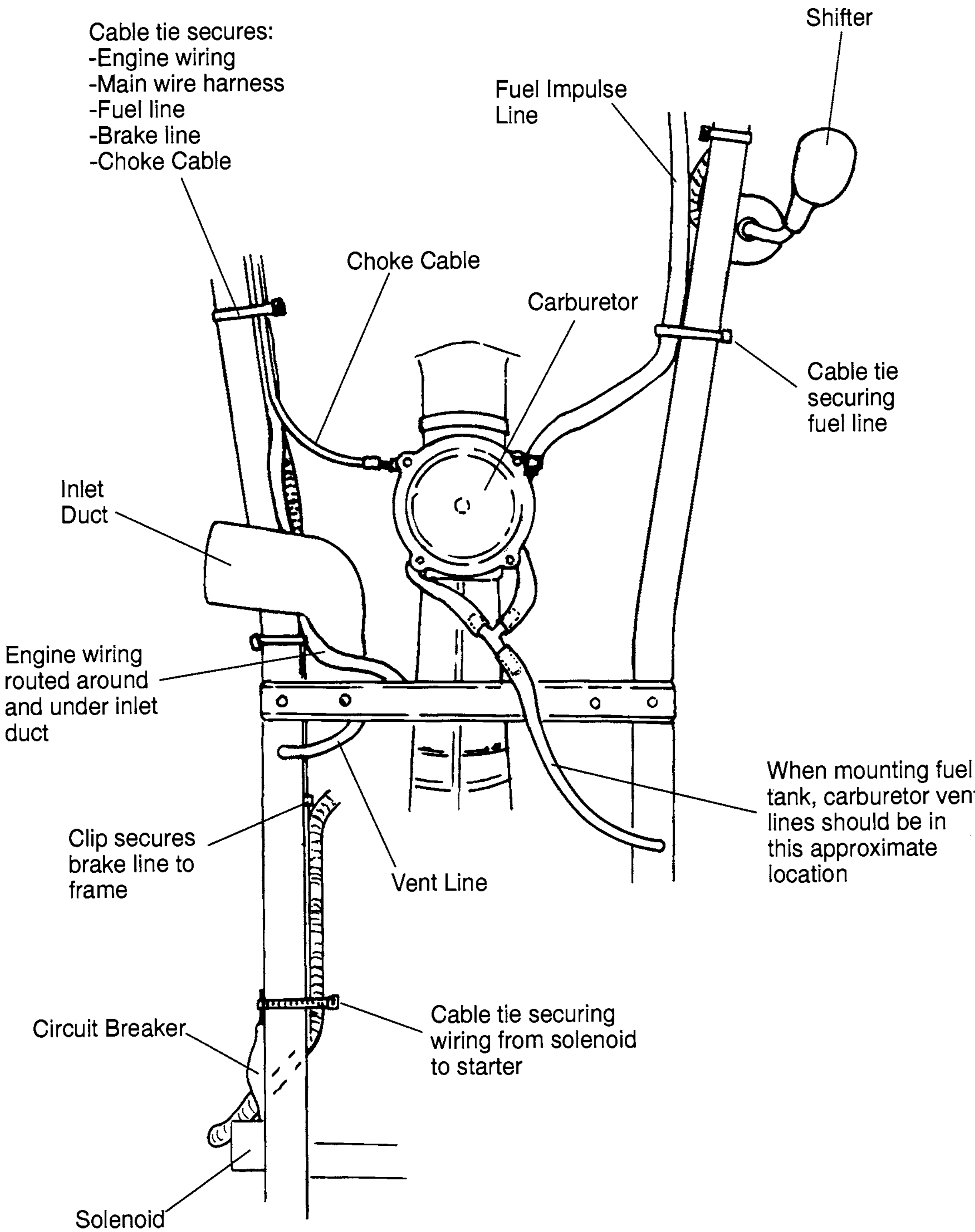
	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995
Accessory Description	Trail BLazer	Trail Boss	Sport	300 2x4	400 2x4	300 4x4	Magnum 2x4	Magnum 4x4	Xplorer 4x4	Sports-man 4x4	Scramb-ler	400 6x6
46° Snow/Dirt Blade	N/A	2870819	N/A	2870819	2870819	2870819	2870819	2870819	2870819	2870819	N/A	2870819
V-Plow	N/A	2871187	N/A	2871187	2871187	2871187	2871187	2871187	2871187	2871187	N/A	2871187
60″ Snow Blade	N/A	2871014	N/A	2871014	2871014	2871014	2871014	2871014	2871014	2871014	N/A	2871014
Blade Mntg. & Hdwre. Kit	N/A	2870890	N/A	2870890	2870940	2870890	2871298	2871298	2871320	2870940	N/A	2870940
B&S 10 HP Mower	N/A	2870713	N/A	2870713	2870713	2870713	2870713	2870713	2870713	2870713	N/A	2870713
B&S 8 HP Mower	N/A	2870824	N/A	2870824	2870824	2870824	2870824	2870824	2870824	2870824	N/A	2870824
Mower Mount Kit	N/A	2870849	N/A	2870849	2870941	2870889	2870941	2870849	N/A	2870946	N/A	2870946
B&S 12.5 HP Pull Behind Mower	N/A	2871220	N/A	2871220	2871220	2871220	2871220	2871220	2871220	2871220	N/A	2871220
Seeder Spreader (Electric)	N/A	2871219	N/A	2871219	2871219	2871219	2871219	2871219	2871219	N/A	N/A	N/A
14 Gal. Sprayer & Gun	N/A	2871087	N/A	2871087	2871087	2871087	2871087	2871087	2871087	N/A	N/A	N/A
Boom Mntg. Kit	N/A	2871090	N/A	2871090	2871090	2871090	2871090	2871090	2871090	N/A	N/A	N/A
42″ Spray Boom	N/A	2871088	N/A	2871088	2871088	2871088	2871088	2871088	2871088	N/A	N/A	N/A
123″ Spray Boom	N/A	2871089	N/A	2871089	2871089	2871089	2871089	2871089	2871089	N/A	N/A	N/A
20MPH Speedo Head ***	N/A	N/A	N/A	N/A	2871085	N/A	2871085	2871085	N/A	2871085	N/A	2871085
Winch (1000 lb) & Mount	2870893	2870893	N/A	2870893	N/A	2870893	N/A	N/A	N/A	N/A	N/A	N/A
Warn 2000 lb Free Wheeling Winch & Mount **	2870927	2870927	N/A	2870927	2870937	2870927	2870937	2870937	2871321	2870937	N/A	2870937
Three Point Hitch	N/A	N/A	N/A	N/A	N/A	2870865	N/A	2870865	2870865	N/A	N/A	N/A
Spring Tooth for 3 Point Hitch	N/A	N/A	N/A	N/A	N/A	2871317	N/A	2871317	2871317	N/A	N/A	N/A
Blade for 3 Point Hitch	N/A	N/A	N/A	N/A	N/A	2870866	N/A	2870866	2870866	N/A	N/A	N/A
V-Bar Chains Rear	2870684	2870684	2870684	2870790	2870790	2870790	2870684	2870948	2870948	2870948	2870684	2870948
Handlebar Speedo/ Odometer	TBA	TBA	2870795	2870776	STD	2870795	STD	STD	STD	STD	TBA	STD
Speedo Protector	N/A	N/A	N/A	N/A	2871316	N/A	N/A	2871316	2871316	STD	N/A	2871316
CV Protectors	N/A	N/A	N/A	N/A	N/A	2871234	N/A	2871234	2871234	STD	N/A	2871234

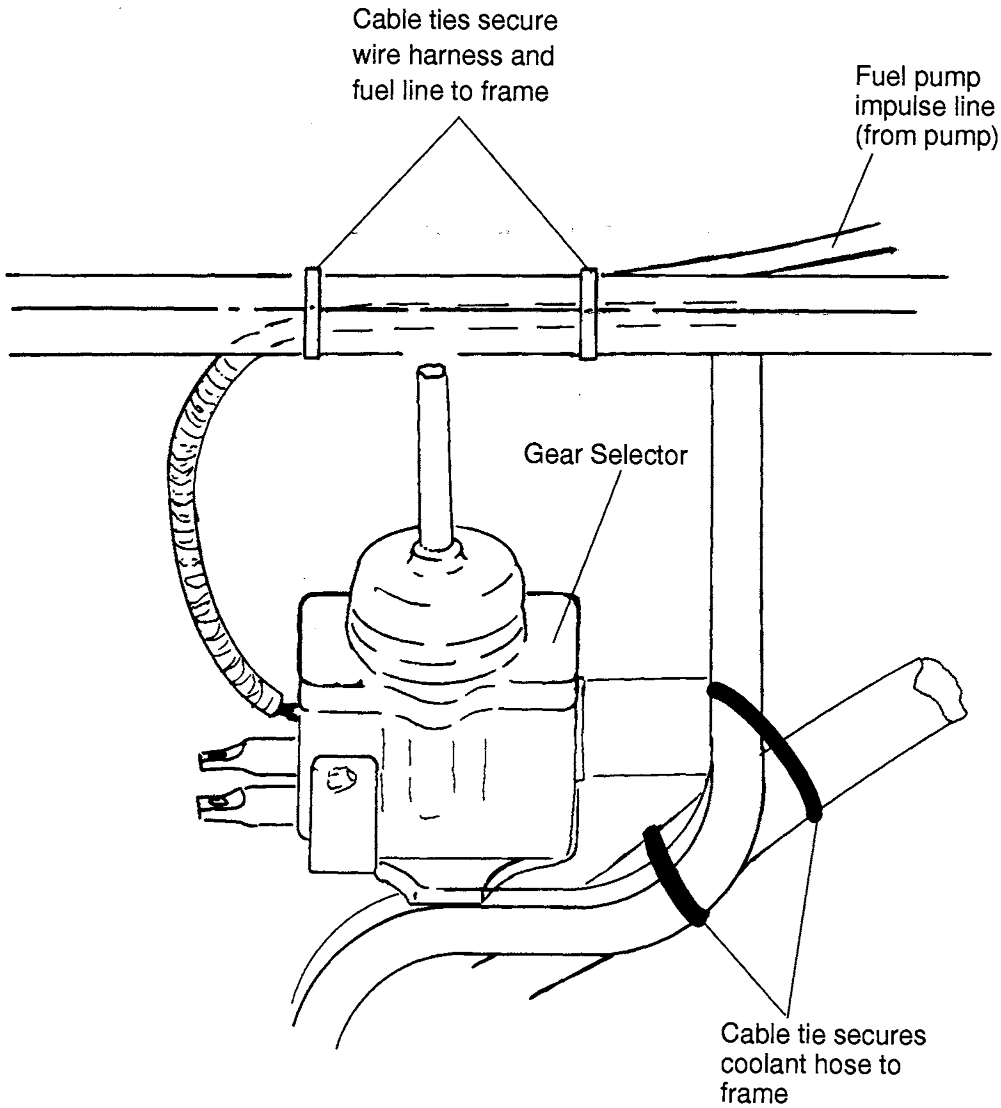
** Warn Winch Kit utilizes a state of the art roller system for maximum winch performance. This winch mounting cannot be used in conjunction with the Mower Mount Kit (PN 2870937).

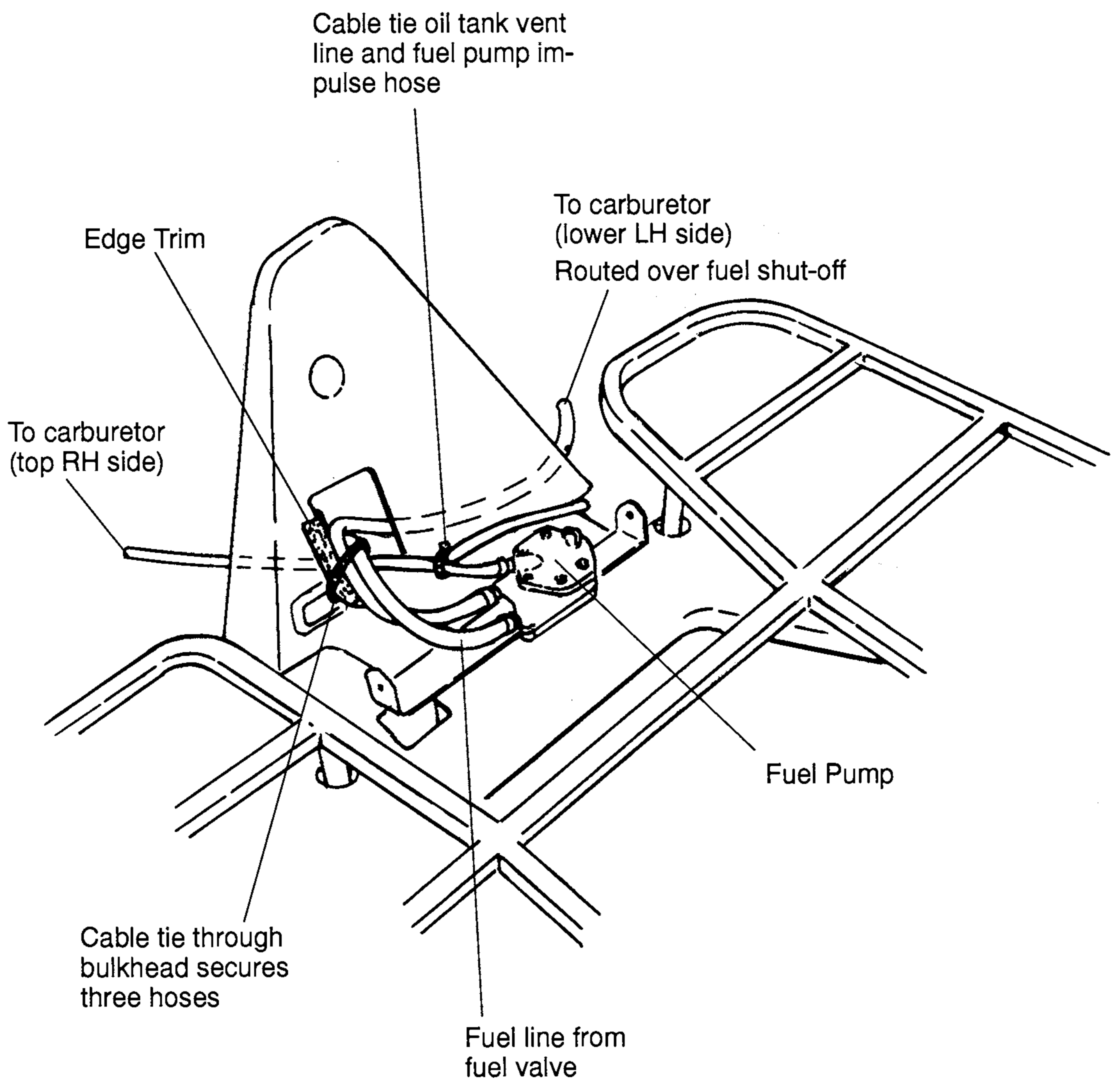
*** 20 MPH speedometer is speedo head only. To utilize, a standard or accessory speedo drive is necessary. When operating at low speed for extended periods of time auxiliary cooling is recommended on air cooled models.

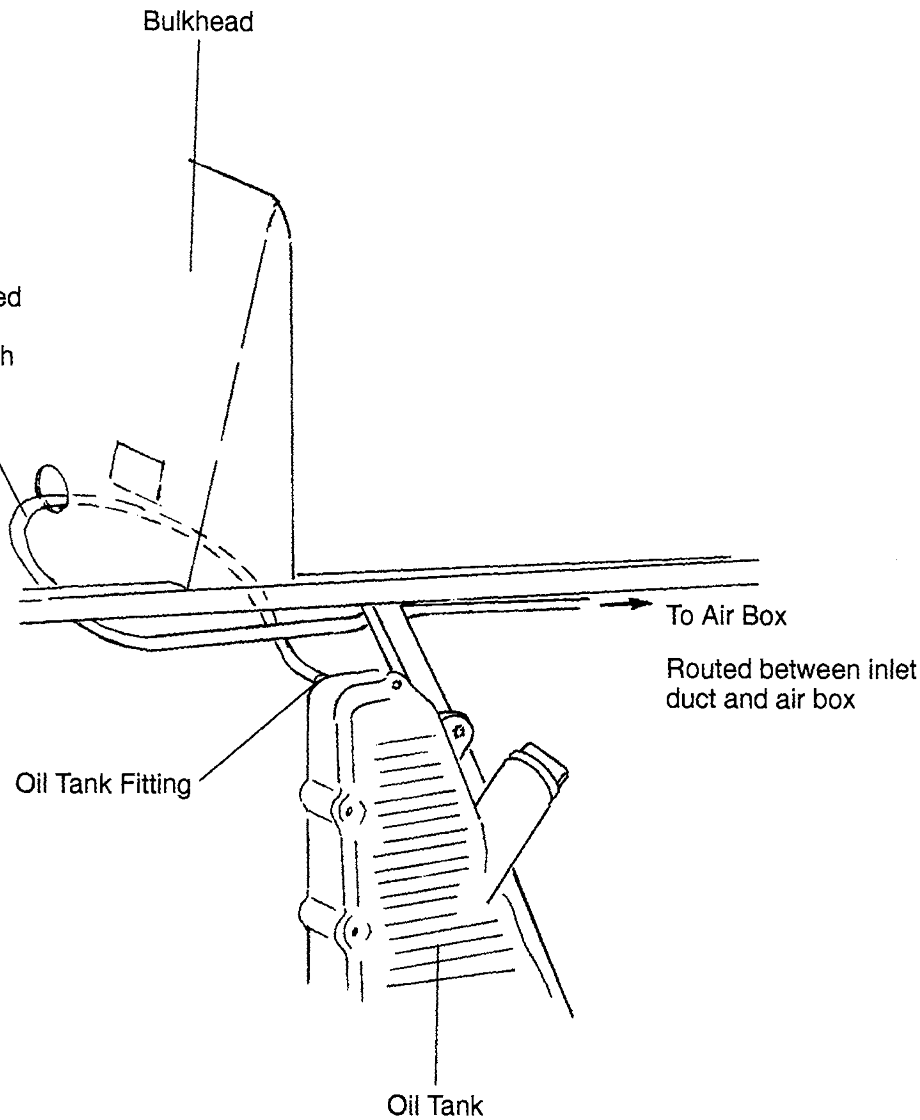
1995 ATV ACCESSORY FIT CHART

	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995	1995
Accessory Description	Trail BLazer	Trail Boss	Sport	300 2x4	400 2x4	300 4x4	Magnum 2x4	Magnum 4x4	Xplorer 4x4	Sports-man 4x4	Scramb-ler	400 6x6
Mud Skirt	2871106	2871106	2871106	2871106	2871106	2871106	2871106	2871106	N/A	STD	N/A	STD
Dual Running Headlight	N/A	N/A	N/A	N/A	2870936	N/A	2870936	STD	STD	STD	STD	STD
Windshield /Fairing	2870864	2870864	2870864	2870864	2870864	2870864	2870864	2870864	2871324	2870864	N/A	2870864
Handlebar Mirror	2871217	2871217	2871217	2871217	2871217	2871217	2871217	2871217	2871217	2871217	2871217	2871217
Front Rack	N/A	2870775	N/A	STD	STD	STD	STD	STD	STD	STD	N/A	STD
Rear Rack	2870932	STD	2870932	STD	STD	STD	STD	STD	STD	STD	TBA	N/A
Forward Mounted Power Plug	N/A	2871189	2871189	2871189	2871189	2871189	2871189	2871189	2871189	STD	N/A	2871189
Hourmeter	N/A	2871011	2871011	2871011	2871011	2871011	2871011	2871011	2871011	2871011	N/A	2871011
Reverse Warning	2870991	2870991	2870991	2870991	2870991	2870991	2870991	2870991	2870991	2870991	2870991	2870991
Fan Cooling	2870869	2870869	STD	STD	STD	STD	STD	STD	STD	STD	STD	STD
Safety Whip Flag	2870799	2870799	2870799	2870799	2870799	2870799	2870799	2870799	2870799	2870799	2870799	N/A
Standard Storage Cover	2870796	2870796	2870796	2870796	2870796	2870796	2870796	2870796	2870796	2870796	2870796	2870930
Dust Cover (Camo)	2871084	2871084	2871084	2871084	2871084	2871084	2871084	2871084	2871084	2871084	2871084	2871215
Gun Scabbard & Mount	N/A	2870854	N/A	2870854	2870854	2870854	2870854	2870854	2870854	2870854	N/A	N/A
Front Bumper	N/A	2870921	STD	2870921	STD	2870921	STD	STD	STD	STD	N/A	STD
Rear Bumper	2870923	2870923	2870923	2870923	2870939	2870923	2870939	2870939	N/A	N/A	N/A	2870924
Front Rack Bag (Must be used w/ acc lights)	N/A	N/A	N/A	N/A	2871216	N/A	2871216	2871216	2871216	2871216	N/A	2871216
Pack Rack	N/A	2871315	N/A	2871315	2871315	2871315	2871315	2871315	2871315	2871315	N/A	2871315
Rear Rack Extender	N/A	2870918	N/A	2870918	2870942	2870918	2870942	2870942	2871319	N/A	N/A	N/A
Front Rack Extender	N/A	N/A	N/A	2870931	2870931	2870931	2870931	2870931	2871318	2870931	N/A	2870931
Hand Brush Guards	2871218	2871218	2871218	2871218	2871218	2871218	2871218	2871218	2871218	2871218	2871218	2871218
Throttle Heater	2871314	2871314	2871314	2871314	2871314	2871314	2871314	2871314	2871314	2871314	2871314	2871314
Dual Heat Handlebar Warmers	2870586	2870586	2870586	2870586	2870586	2870586	2870586	2870586	2870586	2870586	2870586	2870586
Tool Box	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2871082
Wooden Stake Side	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2871081
Power Lift	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2871083
Front Tow Hitch	N/A	N/A	N/A	N/A	2871178	2871178	2871178	2871178	N/A	STD	N/A	2871178
Hitch Weldment	1040162 -067	STD	1040162 -067	STD	STD	STD	STD	STD	STD	STD	1040162 -067	STD

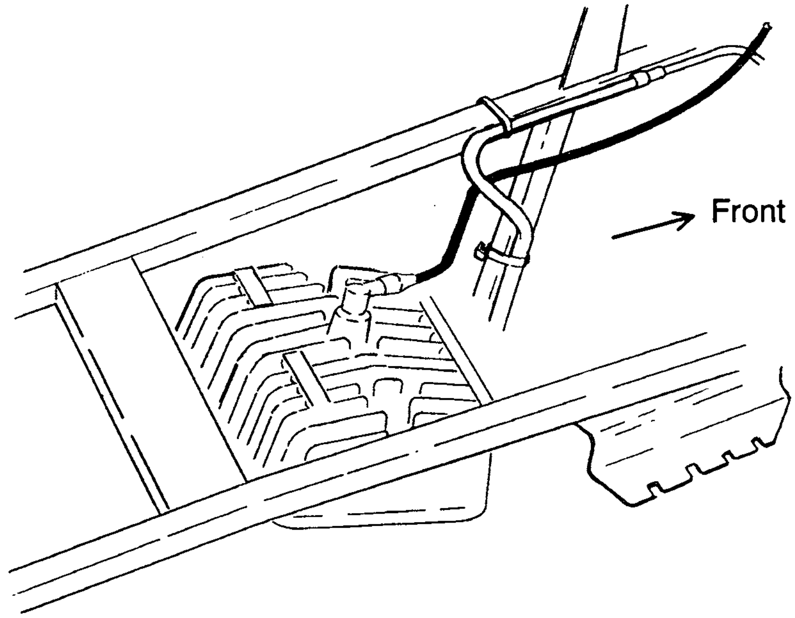

Cable tie secures:
-Engine wiring
-Main wire harness
-Fuel line
-Brake line
-Choke Cable
Shifter
Fuel Impulse Line
Choke Cable
Carburetor
Cable tie securing fuel line
Inlet Duct
Engine wiring routed around and under inlet duct
When mounting fuel tank, carburetor vent lines should be in this approximate location
Clip secures brake line to frame
Vent Line
Circuit Breaker
Cable tie securing wiring from solenoid to starter
Solenoid


Cable ties secure
wire harness and
fuel line to frame
Fuel pump
impulse line
(from pump)
Gear Selector
Cable tie secures
coolant hose to
frame


Cable tie oil tank vent line and fuel pump impulse hose
Edge Trim
To carburetor (lower LH side)
Routed over fuel shut-off
To carburetor (top RH side)
Fuel Pump
Cable tie through bulkhead secures three hoses
Fuel line from fuel valve

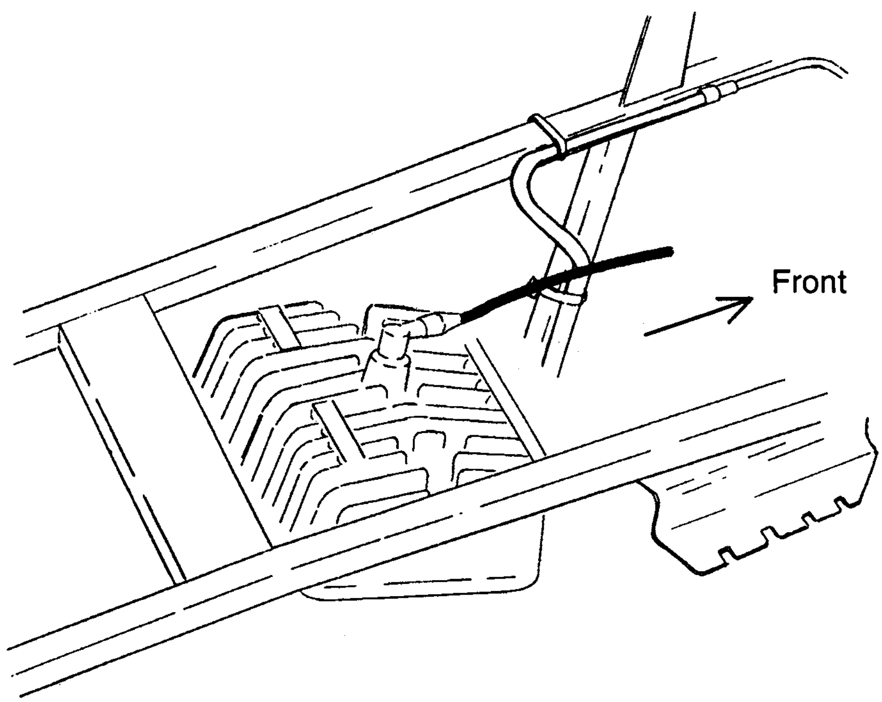

Bulkhead
Vent line routed forward and looped through bulkhead
To Air Box
Routed between inlet duct and air box
Oil Tank Fitting
Oil Tank

300's



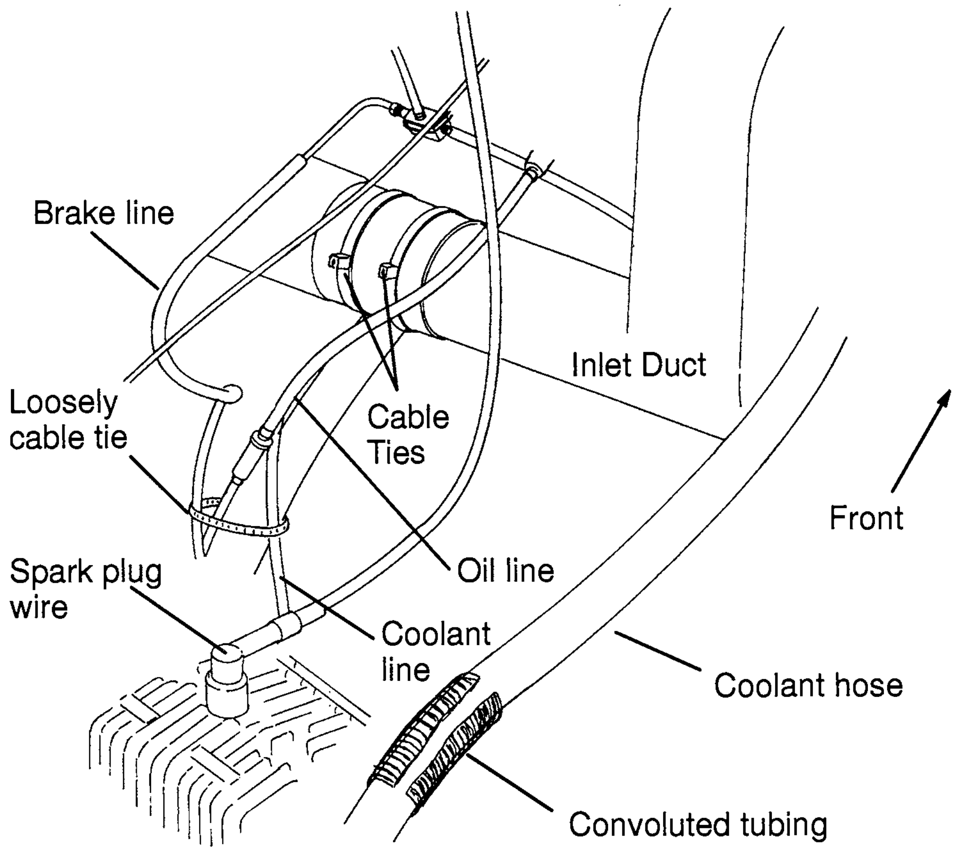
Spark plug wire should be routed toward L.H. frame and go around brake line toward front of machine.

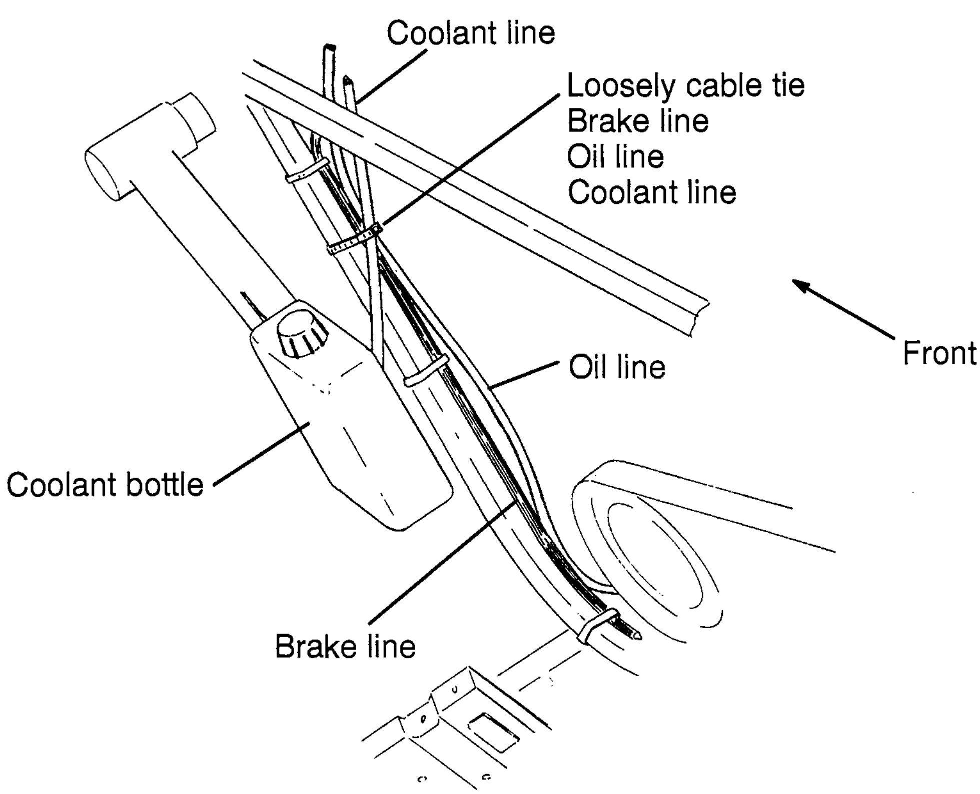
400's



Spark plug wire should be routed straight forward, in center of frame.

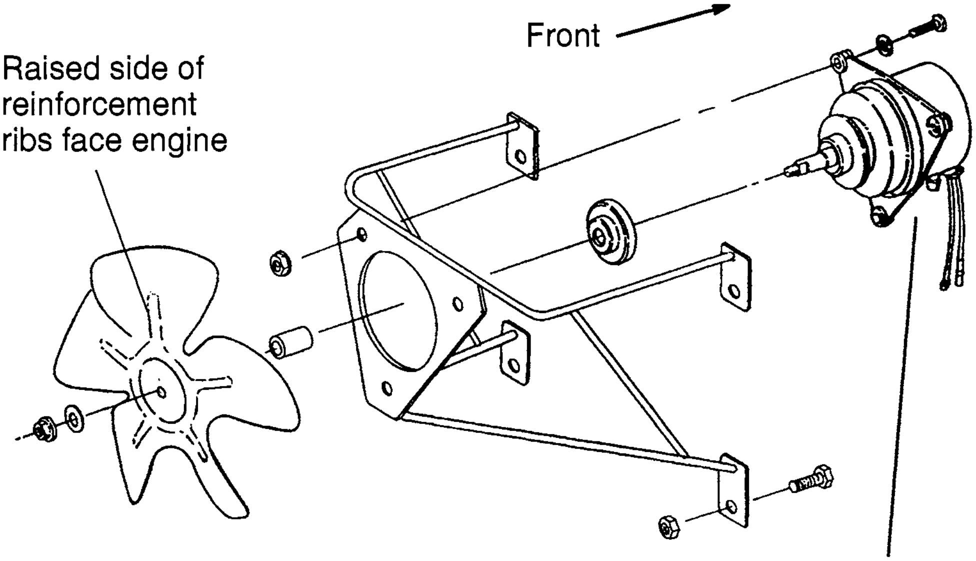
400s


Brake line
Loosely
cable tie
Cable
Ties
Inlet Duct
Front
Spark plug
wire
Oil line
Coolant
line
Coolant hose
Convoluted tubing


Coolant line
Loosely cable tie
Brake line
Oil line
Coolant line
Front
Oil line
Coolant bottle
Brake line

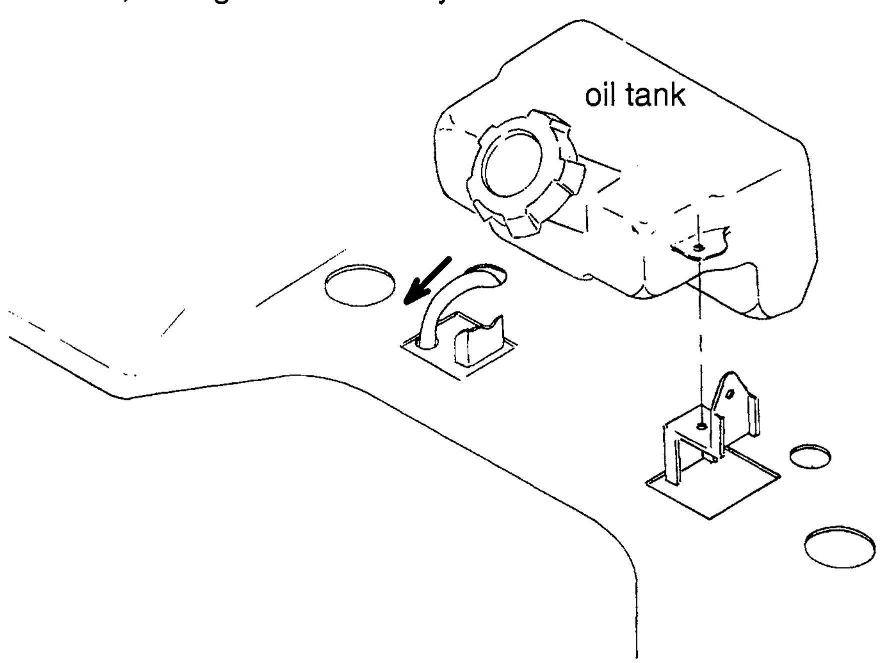
Front

Raised side of reinforcement ribs face engine

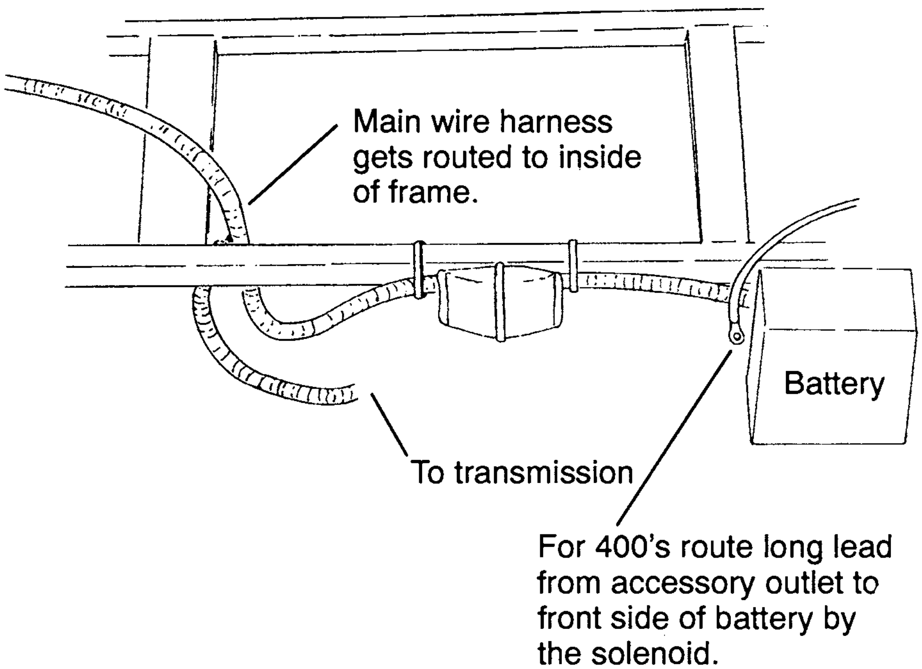


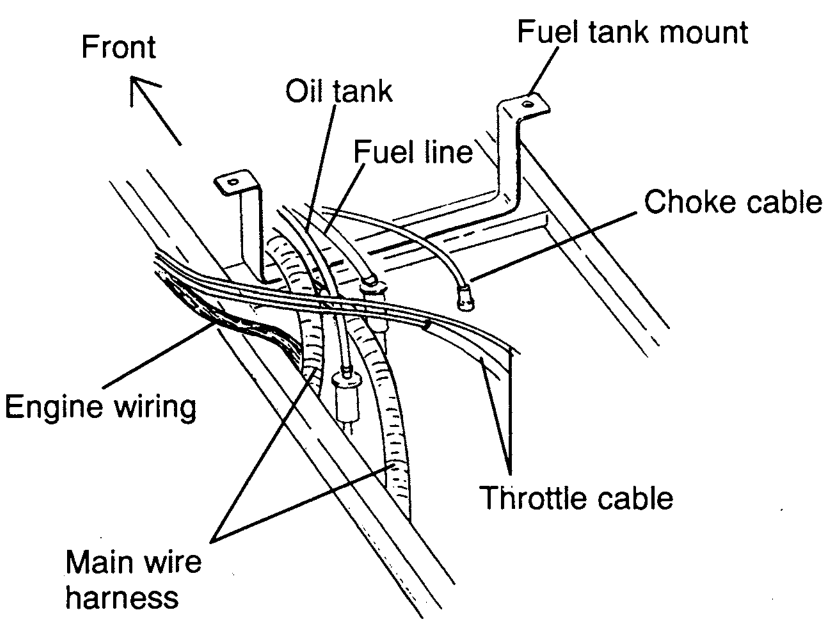
Orient fan motor so wiring and vent line are on bottom.

Fan motor vent line should come straight up from motor between the two large coolant lines, through cab assembly and back down into frame as shown.



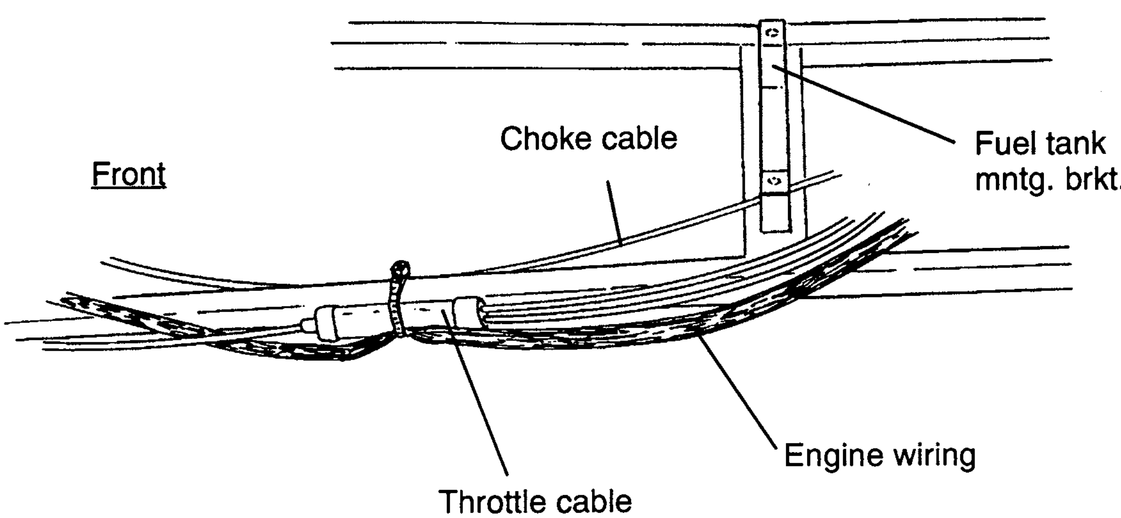
Wiring Harness



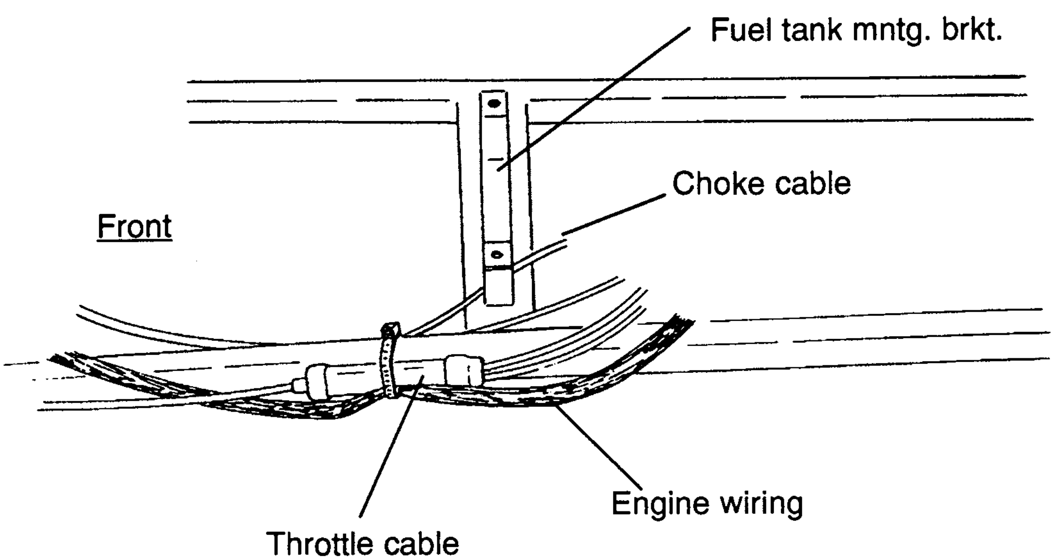


Engine wiring and throttle cable should be routed to the outside of the fuel tank.

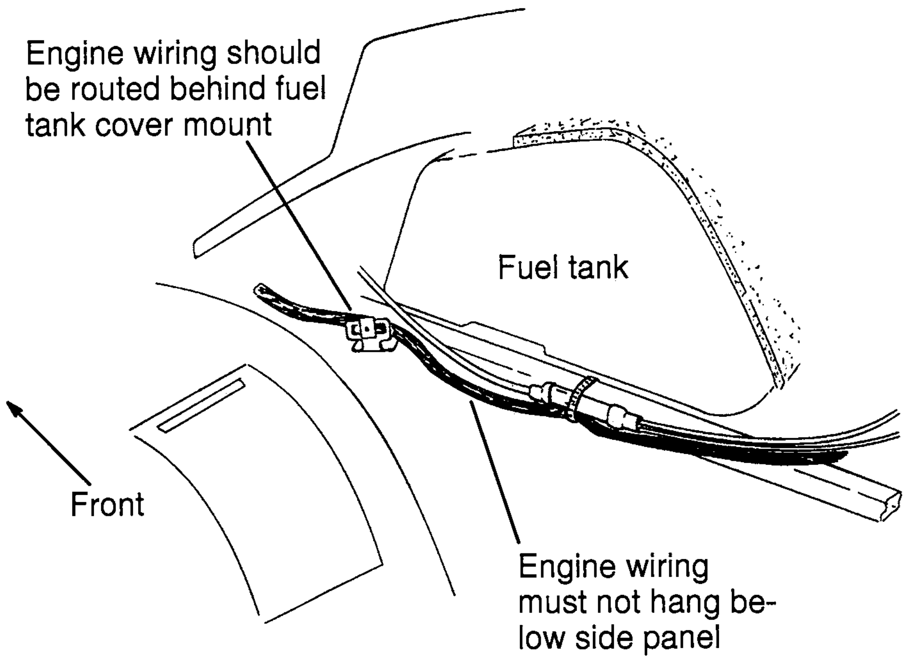
400's

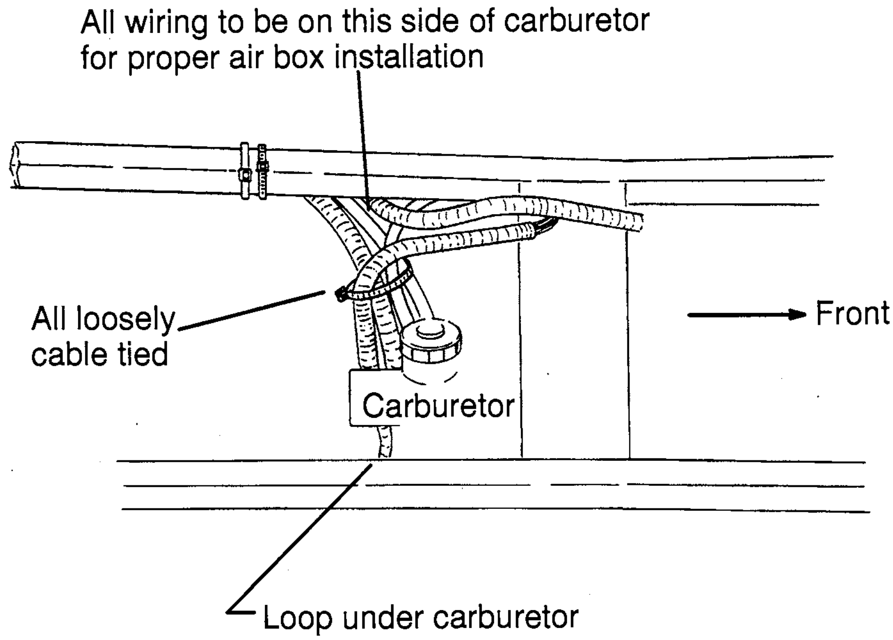

Front
Choke cable
Fuel tank
mntg. brkt.
Engine wiring
Throttle cable

300's

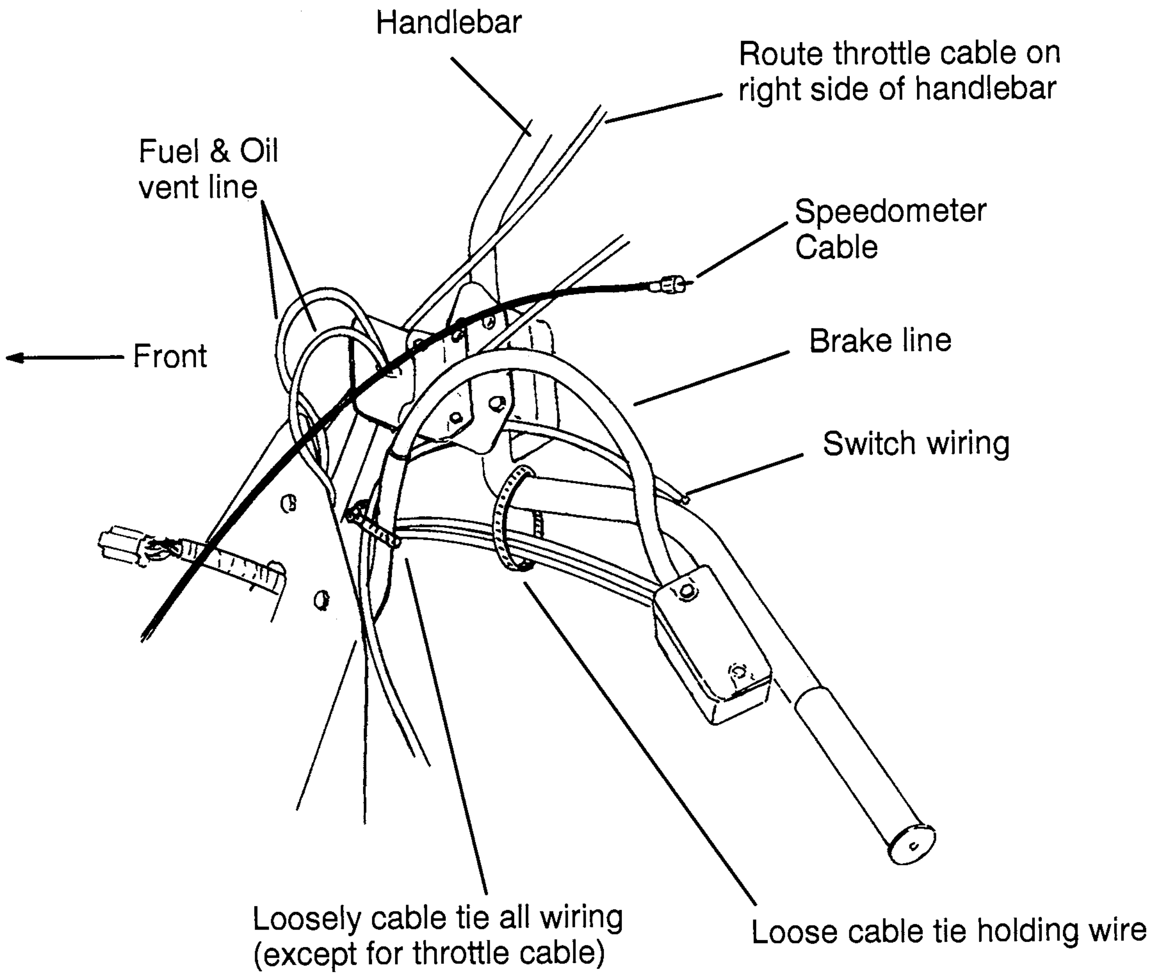

Fuel tank mntg. brkt.
Choke cable
Front
Engine wiring
Throttle cable

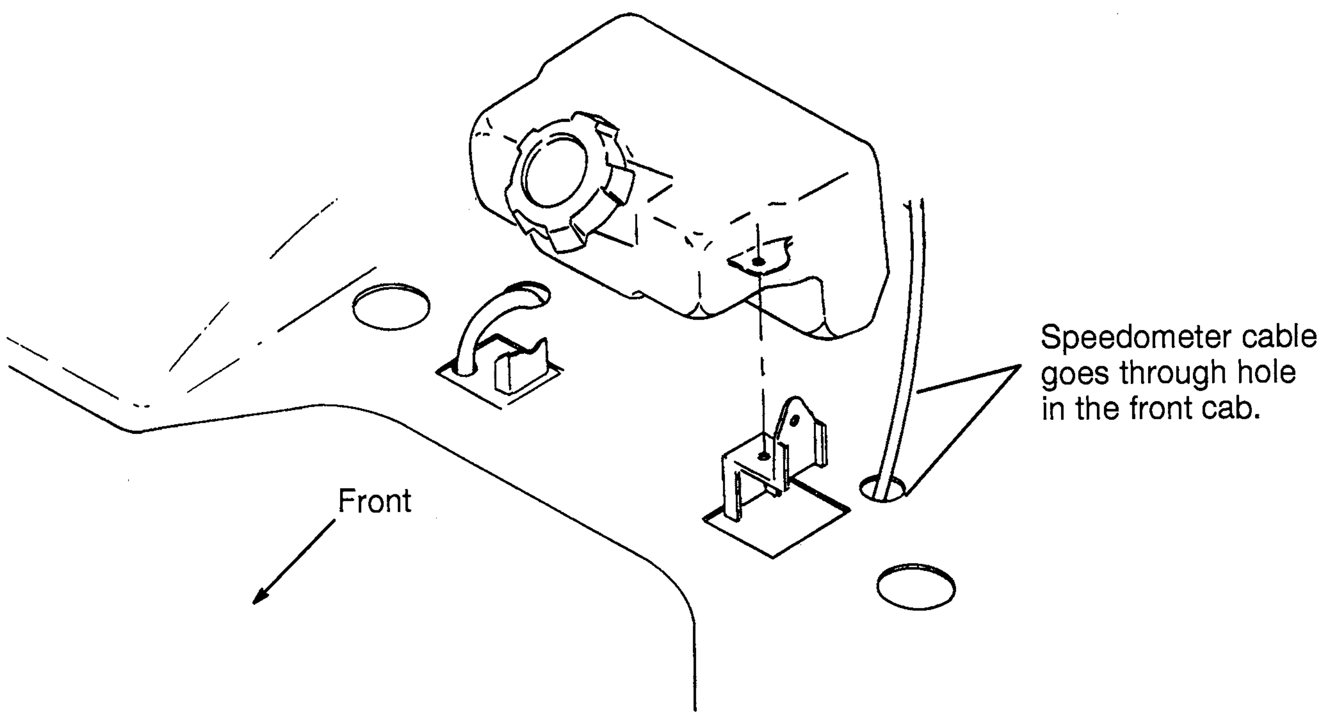
ALL MODELS


Engine wiring should be routed behind fuel tank cover mount
Fuel tank
Front
Engine wiring must not hang be-low side panel


All wiring to be on this side of carburetor for proper air box installation
All loosely cable tied
Front
Carburetor
Loop under carburetor

350s

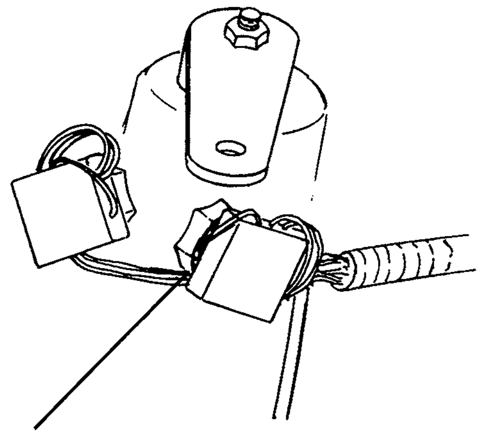

Handlebar
Route throttle cable on right side of handlebar
Fuel & Oil vent line
Speedometer Cable
Front
Brake line
Switch wiring
Loosely cable tie all wiring (except for throttle cable)
Loose cable tie holding wire


Speedometer cable goes through hole in the front cab.
Front

Transmission Switch/Brake Light Switch

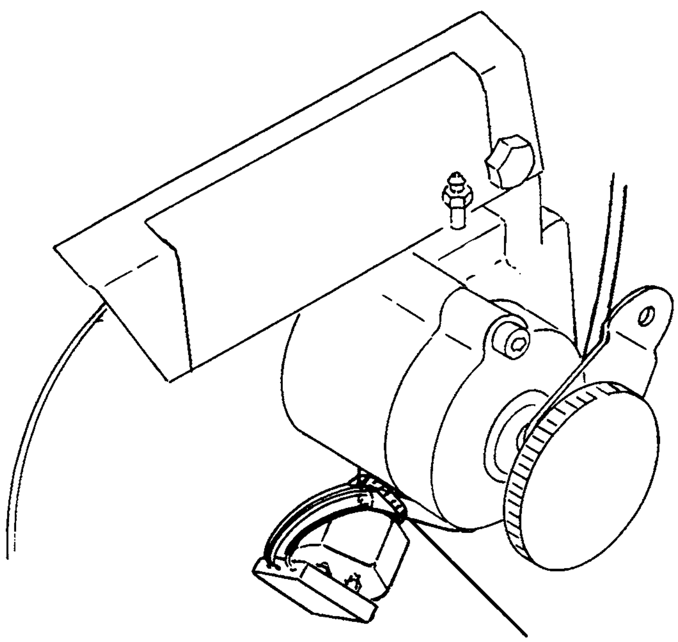
Typical wire routing-
Transmission switch

Connect , route, and
secure as shown.



Cable Tie

Rear caliper mounted
brake light switch



Cable Tie

Connect , route, and
secure as shown.

Switch connector wiring should be secured to mounting boss with a cable tie.

Even the best service center will occasionally need to deal with a disgruntled customer. Here are some tips on how to handle a service complaint:

• **REMAIN CALM AND LISTEN** until the customer has finished talking. This gives the customer the courtesy they deserve. It helps them to feel you really care about their problem. Also, by taking the time to listen, you give yourself a chance to think and to prepare to solve the problem.

• **ASK, "WHAT WOULD YOU LIKE ME TO DO?"**. By asking the customer what they expect, you will catch them off guard. If they feel you are genuinely trying to help them, they will be more agreeable to your suggestions. Often a customer will call simply to "blow off steam", never really expecting anyone to do anything.

• **YOUR TONE OF VOICE** is very important. Be calm. Always be courteous. Do not speak too quickly. Resist the temptation to use humor or sarcasm. Friendly comments will help to defuse tension.

• **DEFUSE ANGER** by listening to the customer and empathizing. Don't debate the facts, jump to conclusions, or make hasty admissions, decisions or concessions before all of the facts are known. Allow yourself time to make a thorough investigation. Apologize and acknowledge the customer's anger. Be calm and respectful. The customer is not angry with you, but with the product.

• **COMPLY** with the customer's wishes if they are reasonable and within accepted policy guidelines.

• **RESOLVE COMPLAINTS QUICKLY** after you and the customer have reached a decision. Don't make the customer feel they are being talked into something.

• **IF YOU CAN'T** do what the customer wishes, or if you haven't had enough time to thoroughly review the problem, tell them you will resolve the problem as quickly as possible. Tell them you are concerned with the problem, but that you need to look into the matter further to see what options are available. Take their telephone number and CALL THEM BACK!

• **KEEP THE CUSTOMER INFORMED** of your progress. If there is no progress, tell them that as well. No communication leaves the customer feeling that nothing is being done and that nobody cares. This impression can be easily cleared up if a service representative who knows the situation and what is happening can truthfully relate the facts to the customer.

• **DO NOT IGNORE A COMPLAINT** in the hope that it will go away. It won't. Every customer's concern or complaint is important.

A dealer's image is often reflected in how customer complaints are handled. The fact that you cared enough to listen and were willing to try to solve their problem can mean the difference between losing a customer or keeping them, their friends and their relatives as long-term customers.

All complaints must be addressed within your own policies and guidelines. Anyone handling customer service relationships should be familiar with these policies.

Service Tips

In order to perform service work efficiently and to prevent costly errors, the technician should read the text in this manual, thoroughly familiarizing him/herself with procedures before beginning. Pictures and illustrations have been included with the text as an aid. Notes, cautions and warnings have also been included for clarification of text and safety concerns. However, a knowledge of mechanical theory, tool use and shop procedures is necessary to perform the service work safely and satisfactorily. Use only genuine Polaris service parts.

⚠ Cleanliness of parts and tools as well as the work area is of primary importance. Dirt and foreign matter will act as an abrasive and cause damage to precision parts. Clean the vehicle before beginning service. Clean new parts before installing.

⚠ Watch for sharp edges which can cause personal injury. Protect hands with gloves when working with sharp components.

⚠ If difficulty is encountered in removing or installing a component, look to see if a cause for the difficulty can be found. If it is necessary to tap the part into place, use a soft face hammer and tap lightly.

⚠ Some of the fasteners were installed with locking agents. Use of impact drivers or wrenches will help avoid damage to fasteners.

⚠ Always follow torque specifications as outlined throughout this manual. Incorrect torquing may lead to serious machine damage or, as in the case of steering components, can result in injury or death for the rider(s).

⚠ If a torquing sequence is indicated for nuts, bolts or screws, start all fasteners in their holes and hand tighten. Then, following the method and sequence indicated in this manual, tighten evenly to the specified torque value. When removing nuts, bolts or screws from a part with several fasteners, loosen them all about 1/4 turn before removing them.

⚠ If the condition of any gasket or O-Ring is in question, replace it with a new one. Be sure the mating surfaces around the gasket are clean and smooth in order to avoid leaks.

⚠ Some procedures will require removal of retaining rings or clips. Because removal weakens and deforms these parts, they should always be replaced with new parts. When installing new retaining rings and clips use care not to expand or compress them beyond what is required for installation.

⚠ Because removal damages seals, replace any oil or grease seals removed with new parts.

⚠ Polaris recommends the use of Polaris lubricants and greases, which have been specially formulated for the top performance and best protection of our machines. In some applications, such as the engine, warranty coverage may become void if other brands are substituted.

⚠ Grease should be cleaned from parts and fresh grease applied before reassembly of components. Deteriorating grease loses lubricity and may contain abrasive foreign matter.

⚠ Whenever removing or reinstalling batteries, care should be taken to avoid the possibility of explosion resulting in serious burns. Always disconnect the negative (black) cable first and reconnect it last. Battery electrolyte contains sulfphuric acid and is poisonous! Serious burns can result from contact with the skin, eyes or clothing. **ANTIDOTE:** External - Flush with water. Internal - Drink large quantities or water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately. Eyes - Flush with water for 15 minutes and get prompt medical attention.

LIMITED WARRANTY

Polaris Industries L.P., 1225 Highway 169 North, Minneapolis, Minnesota 55441, gives a SIX MONTH LIMITED WARRANTY on all components of the Polaris All Terrain Vehicle (ATV) against defects in material or workmanship. Polaris also gives a one year limited warranty on the final drive chain for failure due to defects. The warranty begins on the date of purchase. This warranty is transferrable to another consumer during the warranty period through a Polaris dealer. There is a charge of $25.00 for a transfer.

A warranty registration must be completed by your dealer and submitted to Polaris by the dealer at the time of sale. Be sure that you receive your copy of the Warranty Registration from your dealer as this is your entitlement to warranty repairs. UNLESS YOUR ATV IS REGISTERED WITH POLARIS NO WARRANTY COVERAGE WILL BE ALLOWED.

WARRANTY COVERAGE AND EXCLUSIONS:

LIMITATIONS OF WARRANTIES AND REMEDIES

This warranty also covers the parts and labor charges relating to repair or replacement of defective parts which are covered by this warranty.

This warranty does not cover accidental damage, normal wear and tear, abuse or improper handling. This warranty also does not cover any ATV that has been altered structurally, neglected, improperly maintained, used for racing, or used for purposes other than for which it was manufactured, or for any damages which occur during trailer transit or as a result of unauthorized parts. In addition, this warranty does not cover physical damage to paint or finish, tearing or puncturing of upholstery material, corrosion, or defects in parts, components or ATVs due to fire, explosions or any other cause beyond Polaris' control. Warranty on tires, shock dampeners and drive chains is also excluded.

The exclusive remedy for breach of this warranty shall be, at Polaris' exclusive option, repair or replacement of any defective materials, components or products. THE REMEDIES SET FORTH IN THIS WARRANTY ARE THE ONLY REMEDIES AVAILABLE TO ANY PERSON FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY DESCRIPTION, WHETHER ARISING OUT OF WARRANTY (INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) OR ANY OTHER CONTRACT, NEGLIGENCE, OR OTHER TORT OR OTHERWISE. Some states do not permit the exclusion or limitation of incidental or consequential damages or implied warranties, so the above limitations or exclusions may not apply to you if inconsistent with controlling state law.

ALL IMPLIED WARRANTIES (INCLUDING BUT NOT LIMITED TO) THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IF UNEXCLUDABLE UNDER CONTROLLING STATE LAW ARE LIMITED IN DURATION TO THE ABOVE SIX MONTH WARRANTY PERIOD. POLARIS FURTHER DISCLAIMS ALL EXPRESS WARRANTIES NOT STATED IN THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you if inconsistent with controlling state law.

HOW TO OBTAIN WARRANTY SERVICE

After you have purchased your ATV your dealer must send the Warranty Registration Form to Polaris. If your ATV requires warranty service, you must take it to an Authorized Polaris Servicing Dealer. When requesting warranty service you must present your copy of the Warranty Registration Form to the dealer. THE COST OF TRANSPORTATION TO AND FROM THE DEALER IS YOUR RESPONSIBILITY. Polaris suggests that you use your original selling dealer; however, you may use any Authorized Polaris Servicing Dealer to perform warranty service.

If any of the above terms are void because of state or federal law, all other warranty terms will remain in effect.

Engine Oil

1. Always use Polaris engine oil.

2. Never substitute or mix oil brands as serious engine damage and voiding of warranty can result.

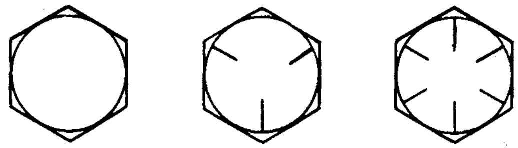
CHAPTER 2

BODY, STEERING AND SUSPENSION

2

STANDARD TORQUE SPECIFICATIONS

The following torque specifications are to be used as a general guideline. There are exceptions in the steering, suspension, and engine areas. Always consult the torque deviation chart and the specific manual section for torque values of fasteners.



Bolt Size	Threads/Inch (MM/Thread)	Grade 2	Grade 5	Grade 8
		Torque in. lbs. (kgm)		
#10	24	27 (.31)	43 (.50)	60 (.69)
#10	32	31 (.36)	49 (.56)	68 (.78)
		Torque ft. lbs. (kgm)*		
1/4	20	5 (.7)	8 (1.1)	12 (1.6)
1/4	28	6 (.8)	10 (1.4)	14 (1.9)
5/16	18	11 (1.5)	17 (2.3)	25 (3.5)
5/16	24	12 (1.6)	19 (2.6)	29 (4.0)
3/8	16	20 (2.7)	30 (4.0)	45 (6.2)
3/8	24	23 (3.2)	35 (4.8)	50 (6.9)
7/16	14	30 (4.0)	50 (6.9)	70 (9.7)
7/16	20	35 (4.8)	55 (7.6)	80 (11.0)
1/2	13	50 (6.9)	75 (10.4)	110 (15.2)
1/2	20	55 (7.6)	90 (12.4)	120 (16.6)

*To convert ft. lbs. to kgm multiply foot pounds by .138.
*To convert kgm to N/m move the decimal to the right one position.

TORQUE DEVIATION CHART

Some of the fasteners that require a deviation from standard torque values are listed in the following chart.

ENGINE Refer to engine section.

SUSPENSION

Front A-Arm Attaching Bolt	30	ft. lbs.	(4.1)
Tie Rod End Jam Nut	12-14	ft. lbs.	(1.6-1.9)
Tie Rod End Attaching Bolt	25-30	ft. lbs.	(3.5-4.1)
Swingarm Pivot Bolt	55	ft. lbs.	(7.6)
Rear Axle Nut (special)	150	ft. lbs.	(13.8)

STEERING

Handlebar Adjuster Block	11-13	ft. lbs.	(1.5)
Master Cylinder	45-55	in. lbs.	(.52-.63)

FRONT SPINDLE NUTS/BRAKES

Refer to the Final Drive and Brake section for specific spindle nut and brake system component torque specifications and procedures.

BODY, STEERING AND SUSPENSION
Torque Specifications and Special Tools

Suspension

Front A-Arm Attaching Bolt	30 ft. lbs. (4.14 kgm)
Front A-Arm Ball Joint Stud Nut	25 ft. lbs. (3.45 kgm)
Tie Rod End Jam Nut	12-14 ft. lbs. (1.66-1.93 kgm)
Tie Rod End Castle Nut	23-24 ft. lbs. (3.18-3.31 kgm)
Tie Rod End Attaching Bolt	25-30 ft. lbs. (3.45-4.14 kgm)
Swing Arm Pivot Bolt	55 ft. lbs. (7.59 kgm)
Rear Axle Nut (special)	150 ft. lbs. (20.7 kgm)
Rear Shock Bolt (upper)	25 ft. lbs. (3.45 kgm)
Rear Shock Bolt (lower)	25 ft. lbs. (3.45 kgm)
Top Strut Nut	15 ft. lbs. (2.07 kgm)
Strut Casting Pinch Bolt	15 ft. lbs. (2.07 kgm)

Steering

Handlebar Adjuster Block	8-10 ft. lbs. (1.52-1.79 kgm)
Master Cylinder	45-55 in. lbs. (.52-.63 kgm)

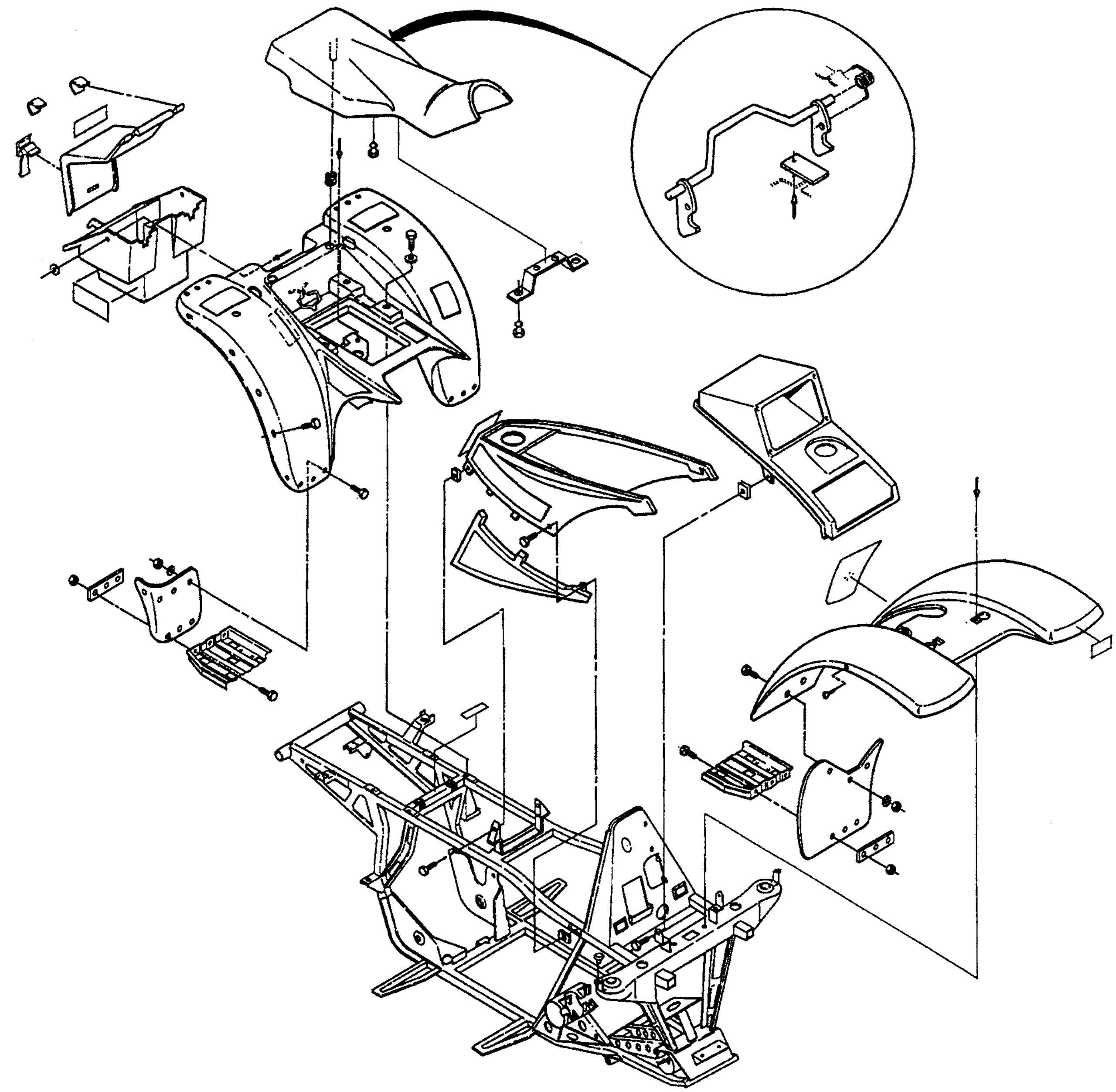
Special Tools

Description	Part No.
Driven Clutch Puller	2870913
Strut and Ball Joint Tool Set	2870871
Shock Spanner Wrench	2870872
Shock Spring Compressor Tool	2870623

METRIC EQUIVALENTS

To Convert	Multiply By	To Obtain
inch	25.4	mm
	2.54	cm
	.0254	meter
foot	.305	meter
	30.48	cm
mile	1.609	km
mm	.0394	inch
cm	.3937	inch
m	39.37	inch
km	.6214	mile
U.S. gallon	.8327	Imp. gallon
Imp. gallon	1.2009	U.S. gallon
m/hr	1.61	km/hr
km/hr	.621	m/hr

Body Assembly Exploded View (Except Magnum, Xplorer, and Scrambler)

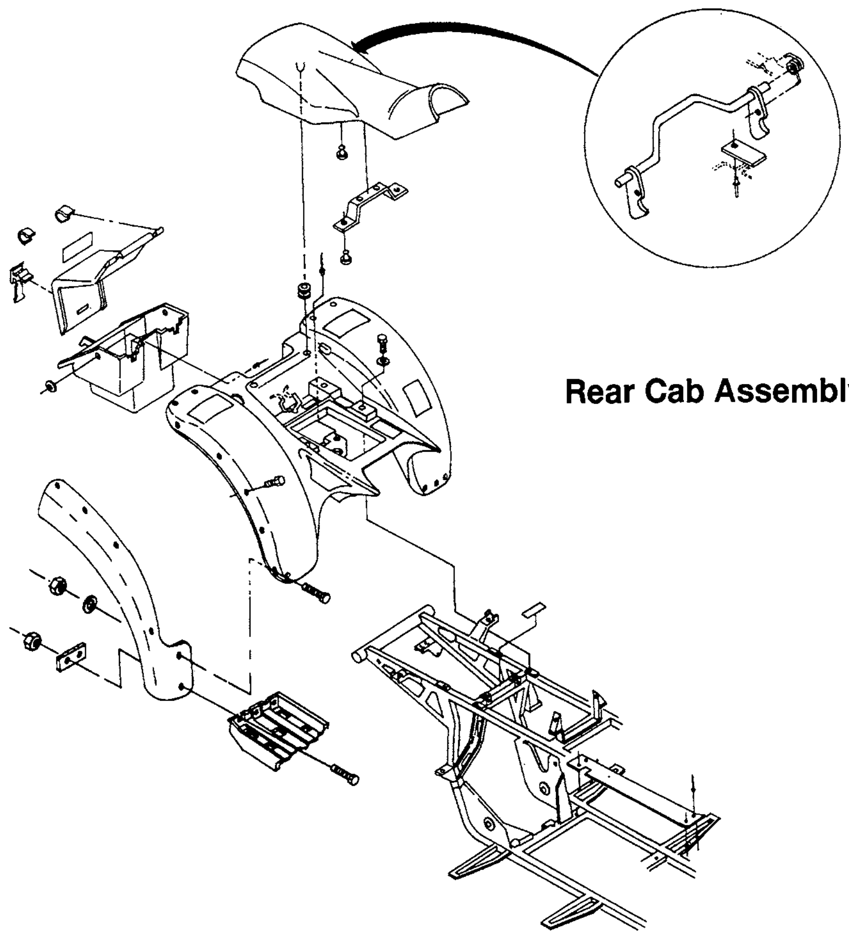


Locating tabs (A) snap into slots on front of fuel tank cover to make removal and replacement easier.

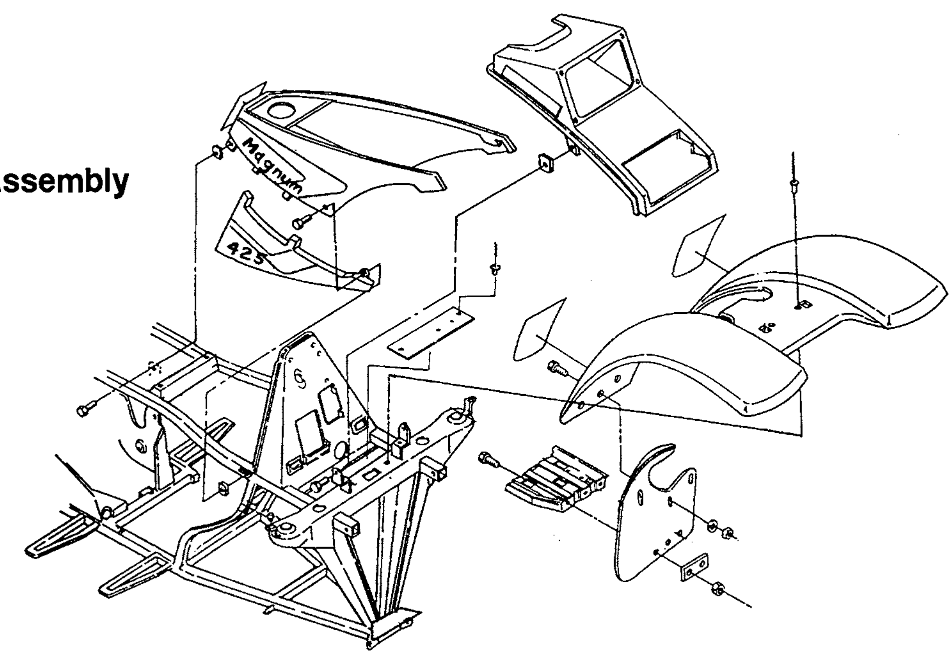
Seat latch (B) located at rear of seat.

All warning information labels must be in place when body parts are assembled.

BODY, STEERING AND SUSPENSION
Body Assembly Exploded View, Magnum



Rear Cab Assembly

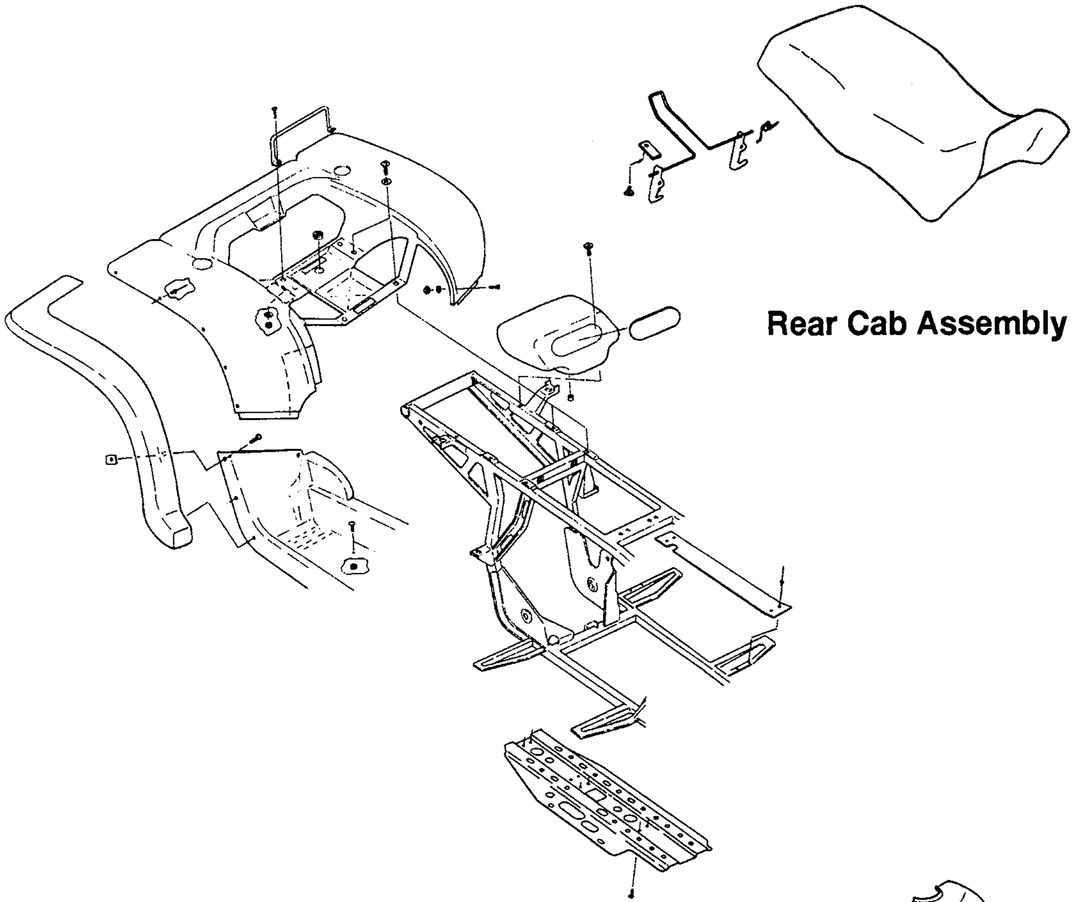


Front Cab Assembly

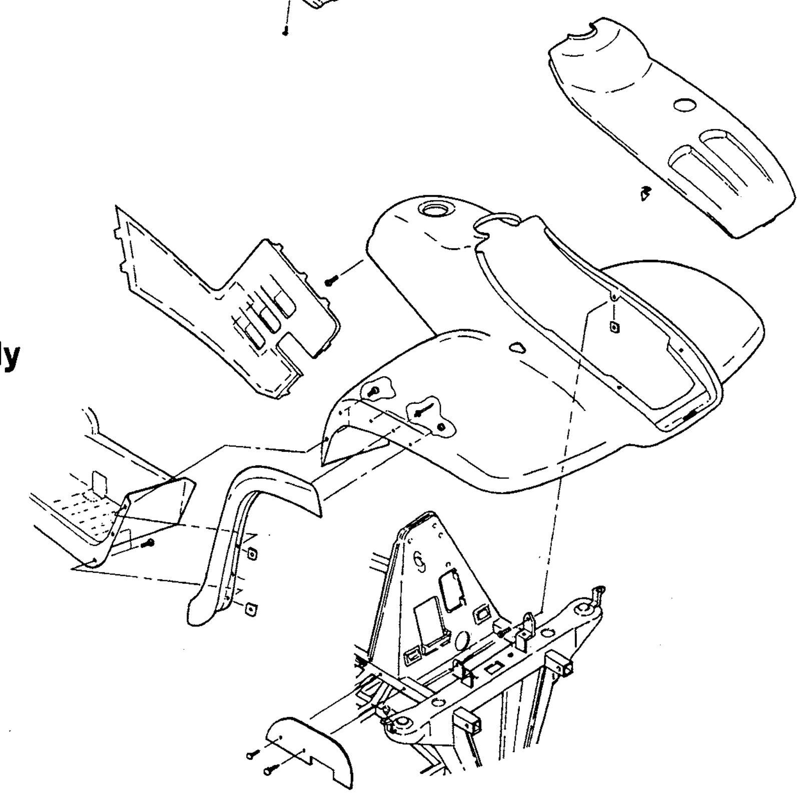
All warning information labels must be in place when body parts are assembled.

To Remove:	Perform These Steps:
Seat	Pull release lever at the rear of the seat Lift and pull seat rearward, disengaging seat from tabs at the rear of the fuel tank
Fuel tank cover	Disengage seat latch at rear of seat Disengage seat from fuel tank tabs Remove: Seat Ignition key Side panels Fuel cap 2 retaining screws at rear of fuel tank cover 2 retaining screws at side of fuel tank cover Disengage tabs at front of cover on left and right side
Side covers	Remove: Seat 1 screw on left side front 1 screw on right side front
Headlight cover	Remove: Seat Fuel tank cover 2 Torx™ screws at rear of cover 1 screw on left front 1 screw on right front Disconnect headlamp wiring harness
Radiator cap access panel	Turn fastener at front 1/4 turn
Rear rack	Remove: Seat 2 bolts, nuts and washers at rear of rack 2 bolts, nuts and washers at front of rack
Rear cab assembly	Remove: Seat Rear rack 3 screws, nuts and washer plate at rear of left footrest 2 screws, nuts and washer plate at rear of right footrest 6 bolts and flat washers from top of cab assembly 2 screws at front of muffler guard
Front rack	Remove: 4 bolts, nuts and washers
Front cab assembly	Remove: Seat Fuel tank cover Headlight cover Front rack Fuel pump bracket 3 screws, nuts and washers from left footrest 2 screws, nuts and washers from right footrest 2 rivets at top of cab beneath fuel pump bracket

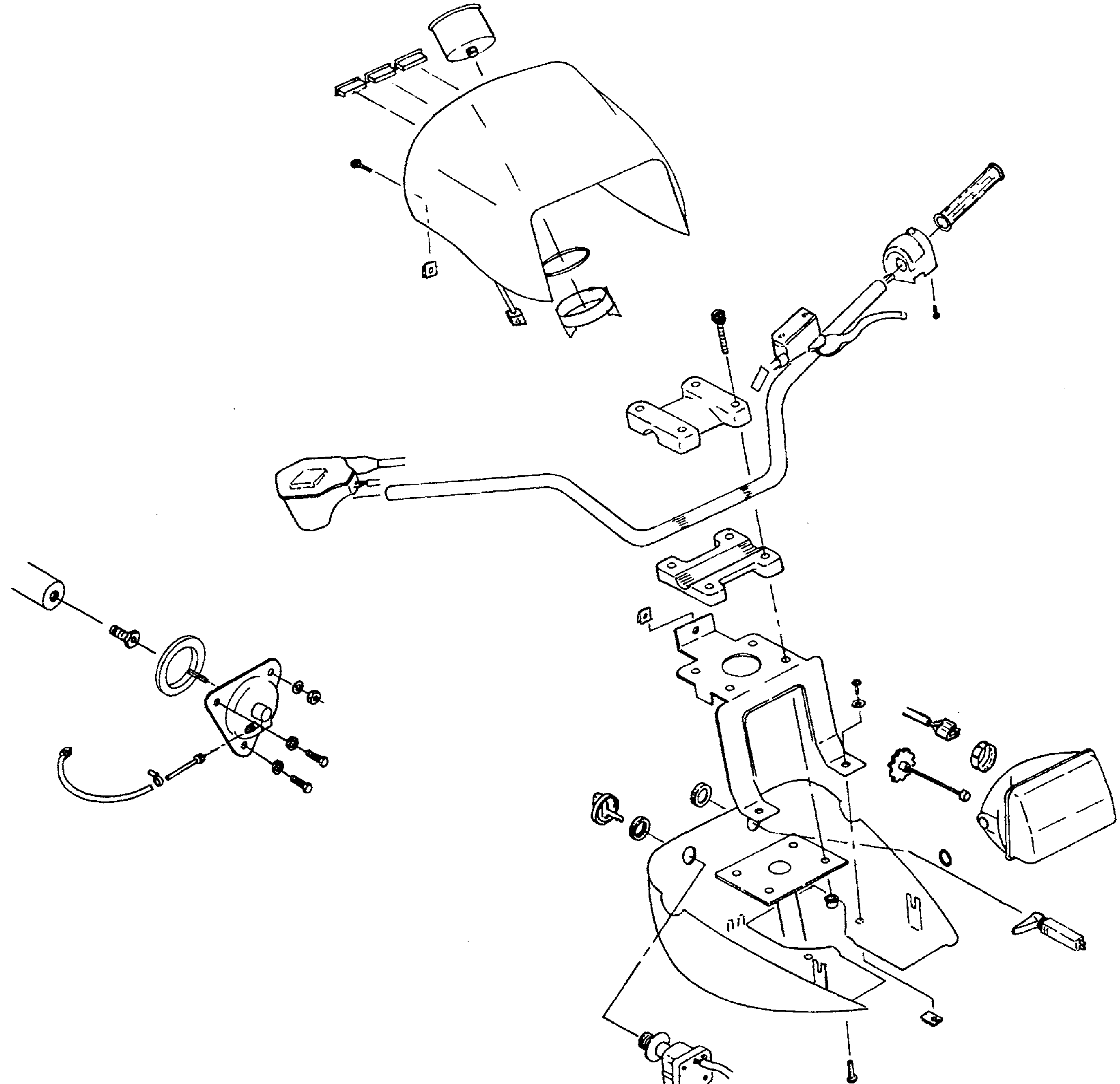
Body Assembly Exploded View, Xplorer



Rear Cab Assembly



Front Cab Assembly

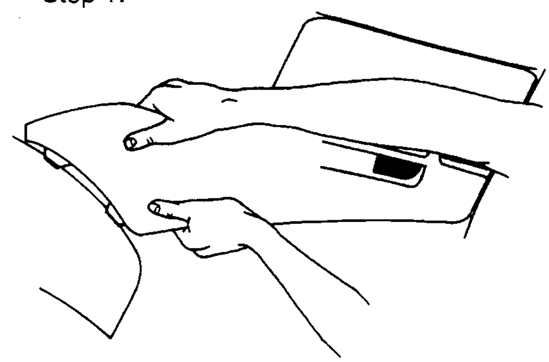


Xplorer Side Panel Removal

Side panel removal may be difficult until the locking tabs and receivers have been snapped and unsnapped a few times.

1. Remove seat. Grasp rear of side panel near rear cab. With a quick and firm motion, pull the panel forward and outward to disengage the two rear tabs.

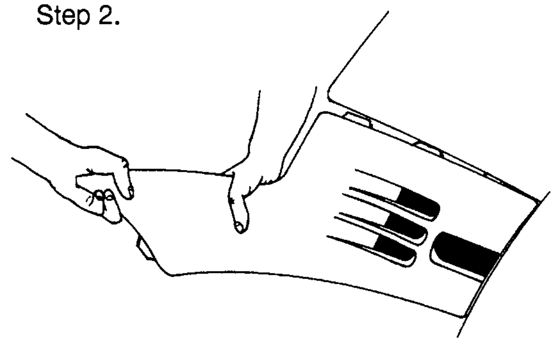
Step 1.



Pull forward and out to disengage two rear tabs.

2. Place hand on top of side panel behind the fuel tank. With a quick and firm motion, push down on the side panel to disengage the top rear two tabs. Then pull up on side panel to disengage front upper and lower tab.

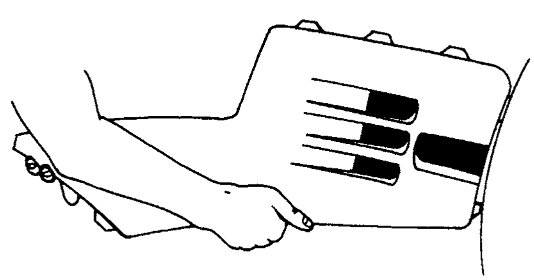
Step 2.



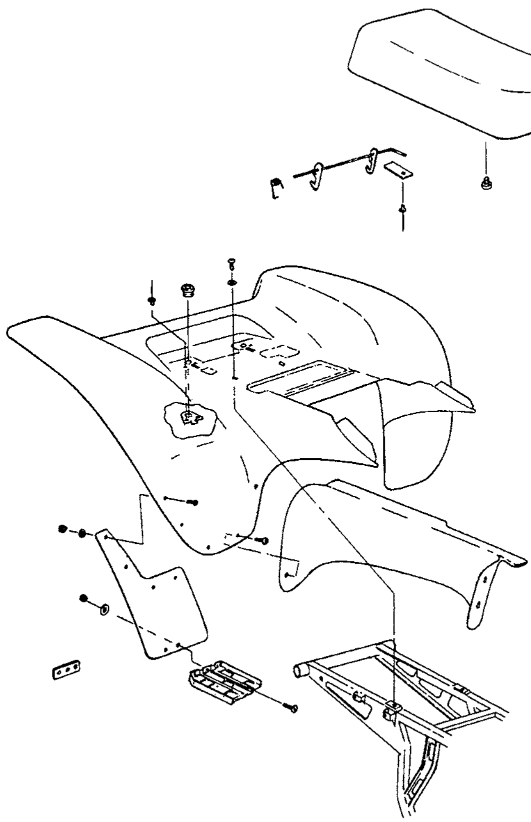
Push down to disengage top rear two tabs.

3. To reinstall side panel, align panel tabs with slots on front cab. Push panel upward and forward until tabs lock. Bend rear of side panel and insert the two tabs into the rear cab.

Step 3.

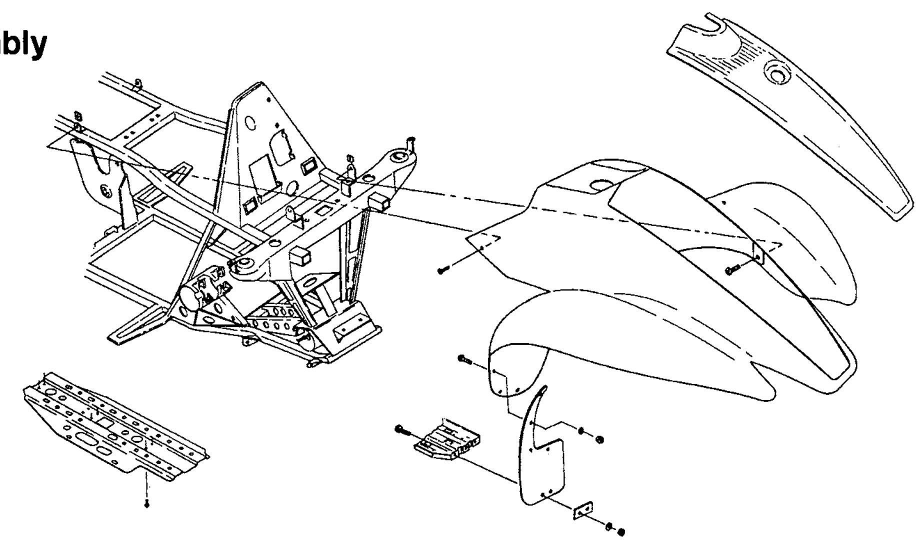


To reinstall, align panel tabs with slots. Push upward and forward until tabs lock.



Rear Cab Assembly

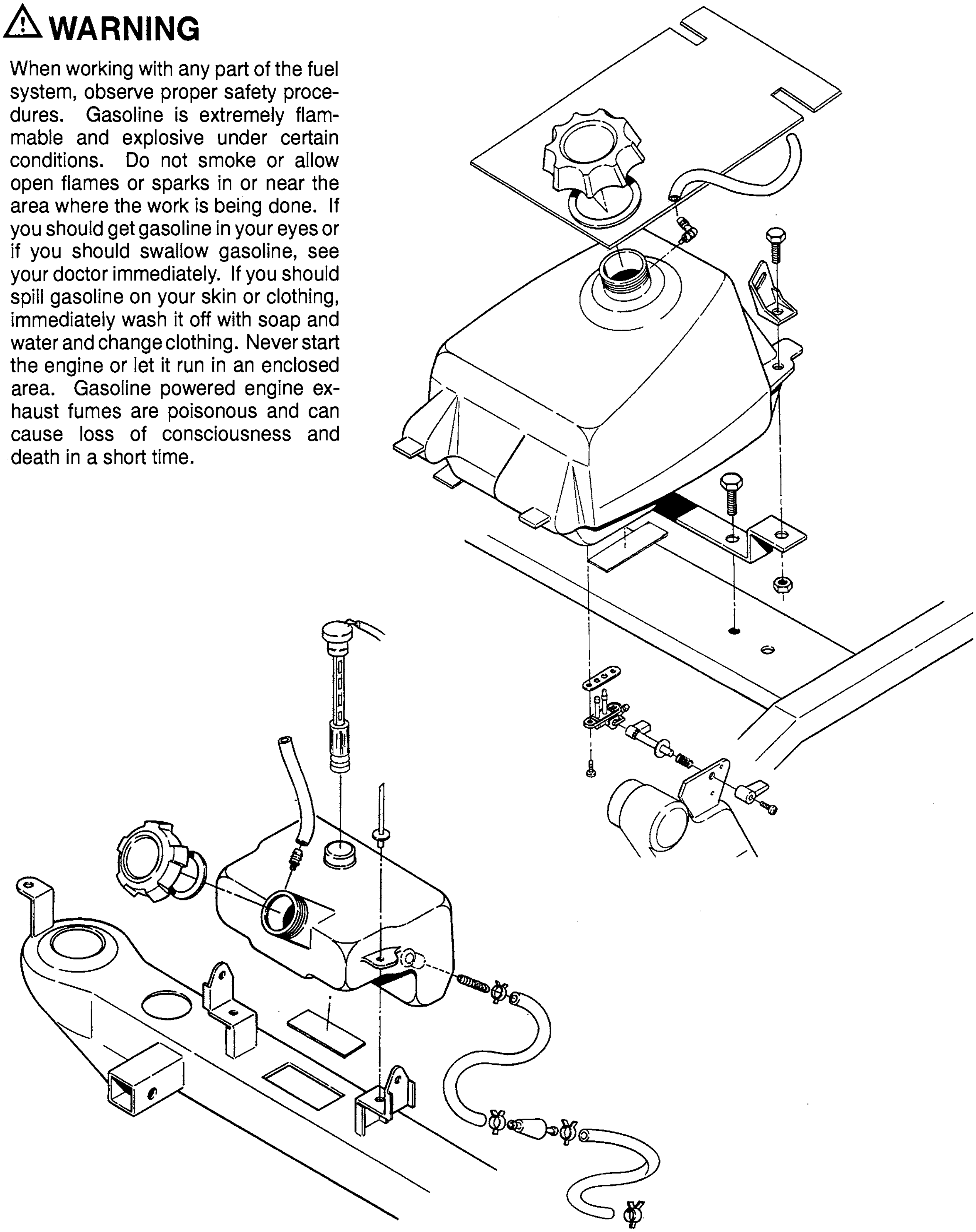
Front Cab Assembly



Oil Tank and Fuel Tank Assembly (Except Magnum and Scrambler)

⚠ WARNING

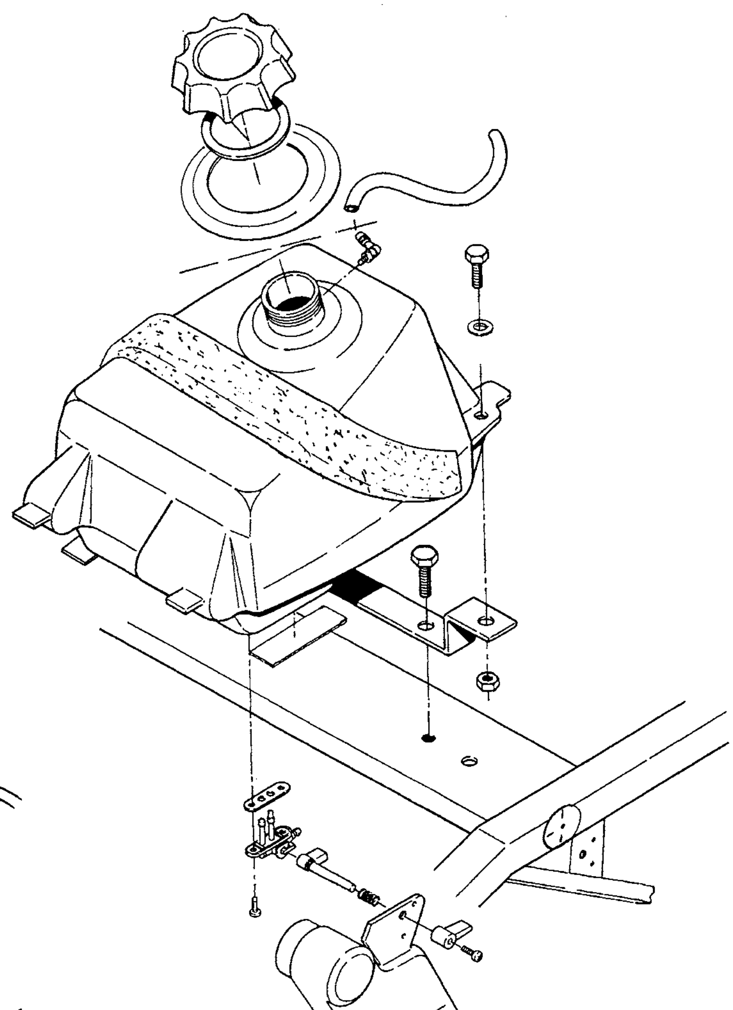
When working with any part of the fuel system, observe proper safety procedures. Gasoline is extremely flammable and explosive under certain conditions. Do not smoke or allow open flames or sparks in or near the area where the work is being done. If you should get gasoline in your eyes or if you should swallow gasoline, see your doctor immediately. If you should spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing. Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

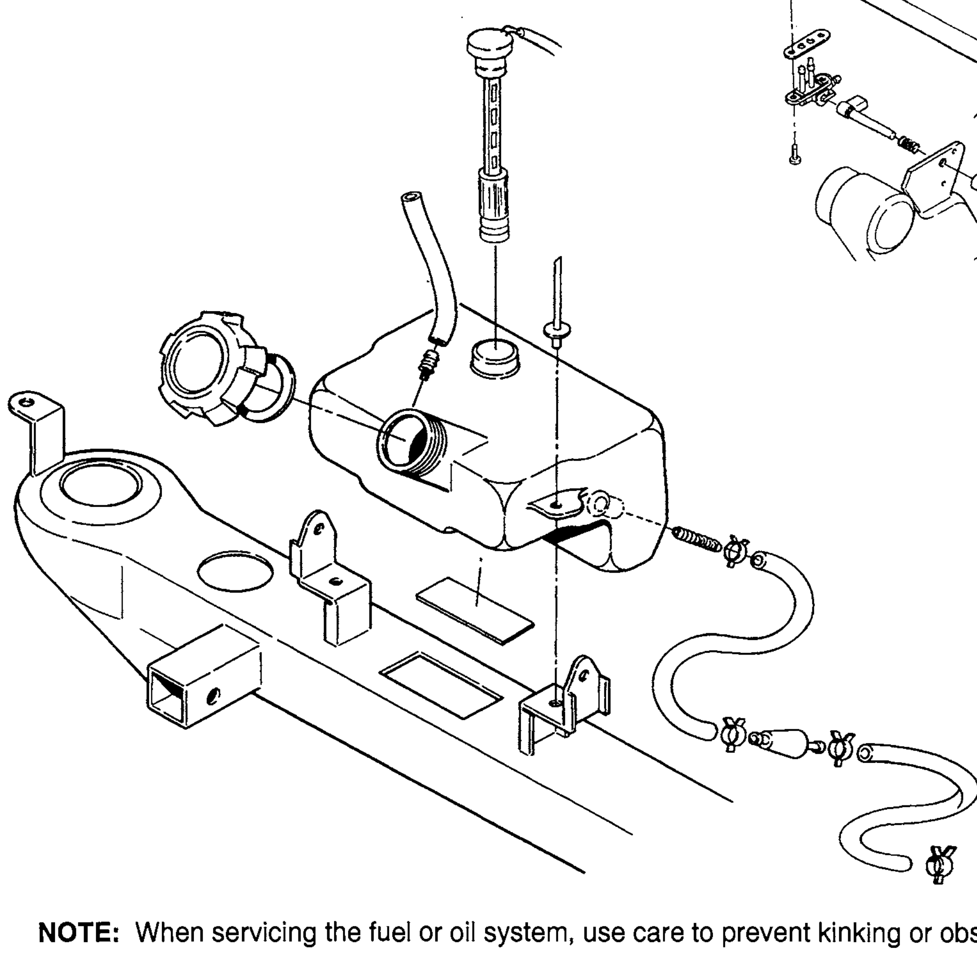


NOTE: When servicing the fuel or oil system, use care to prevent kinking or obstructing vent lines.

⚠ WARNING

When working with any part of the fuel system, observe proper safety procedures. Gasoline is extremely flammable and explosive under certain conditions. Do not smoke or allow open flames or sparks in or near the area where the work is being done. If you should get gasoline in your eyes or if you should swallow gasoline, see your doctor immediately. If you should spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing. Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

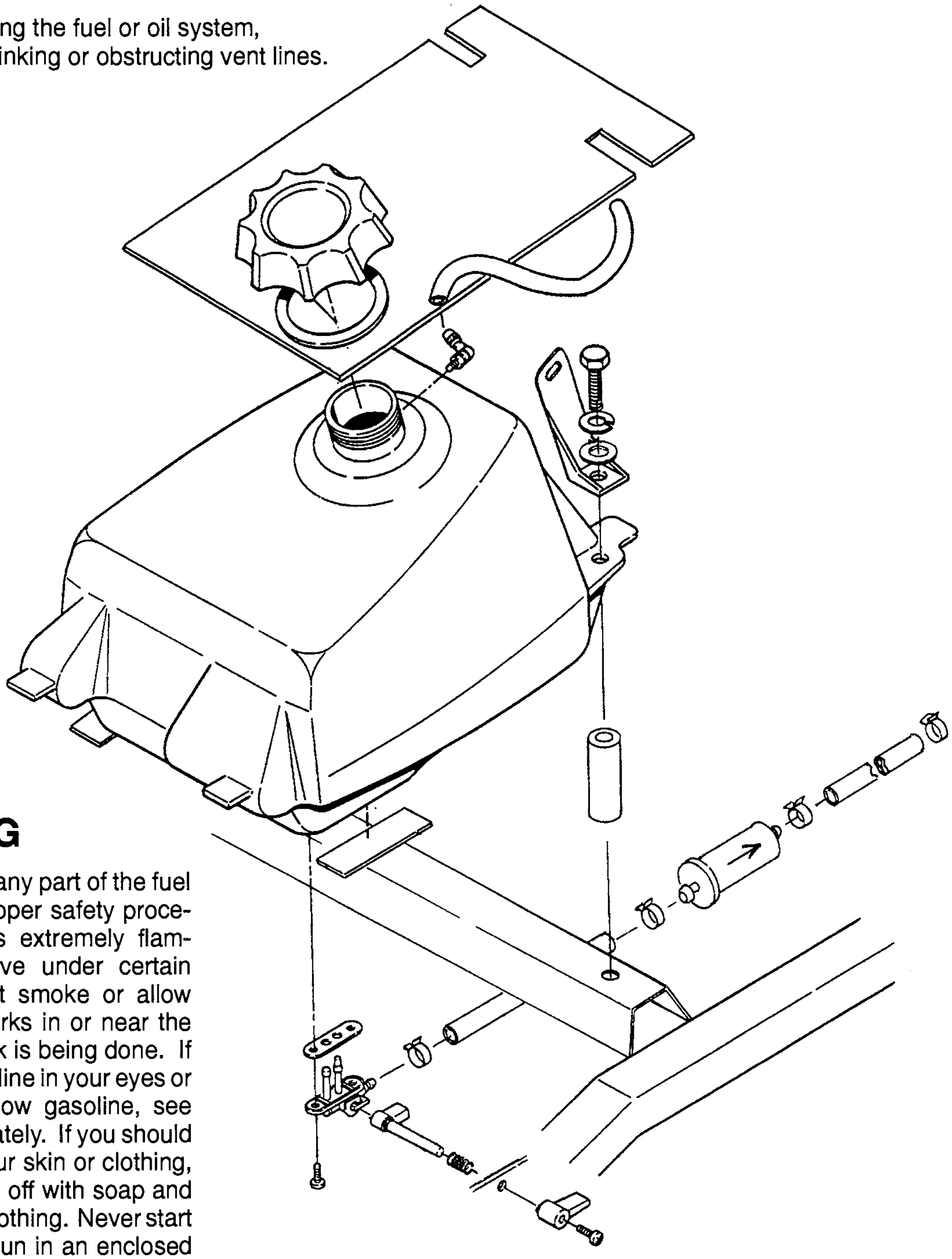




NOTE: When servicing the fuel or oil system, use care to prevent kinking or obstructing vent lines.

Fuel Tank Assembly, Magnum

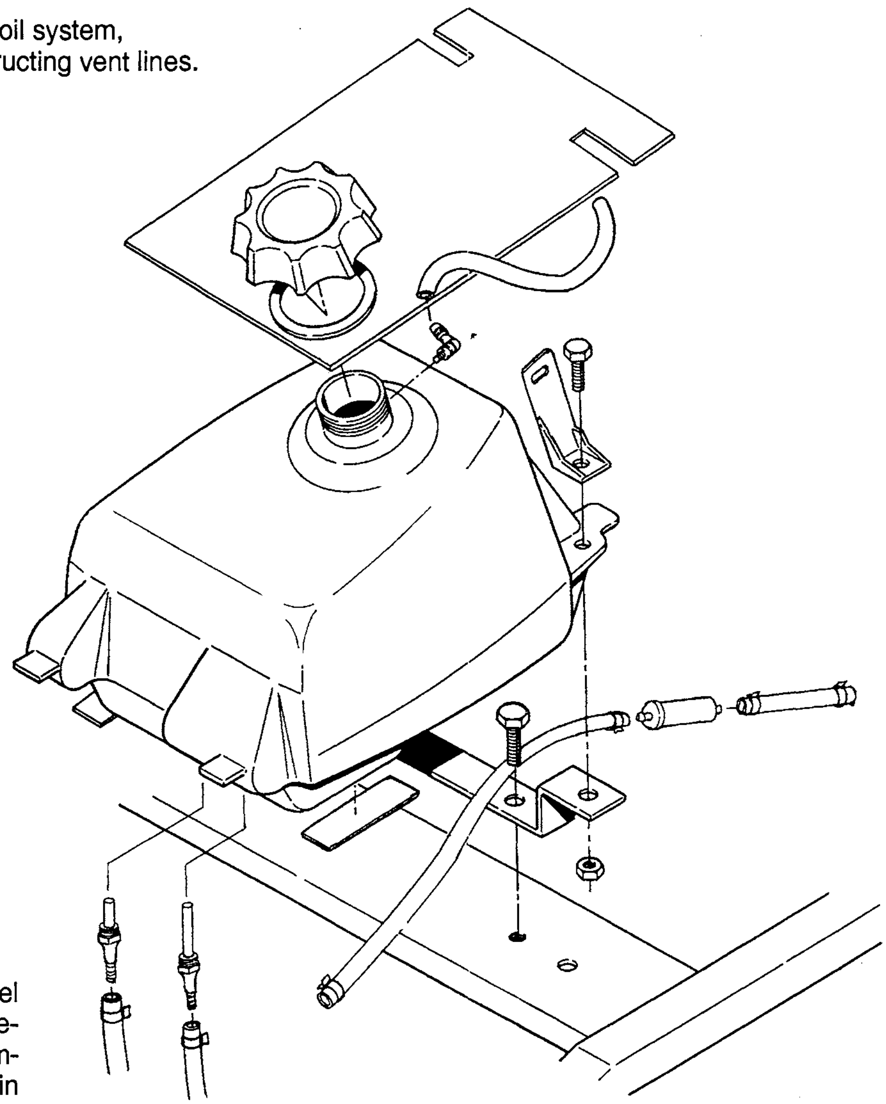
NOTE: When servicing the fuel or oil system, use care to prevent kinking or obstructing vent lines.



⚠ WARNING

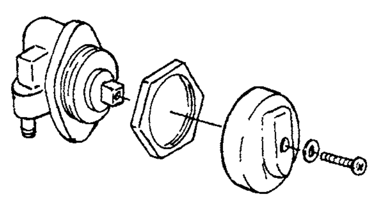
When working with any part of the fuel system, observe proper safety procedures. Gasoline is extremely flammable and explosive under certain conditions. Do not smoke or allow open flames or sparks in or near the area where the work is being done. If you should get gasoline in your eyes or if you should swallow gasoline, see your doctor immediately. If you should spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing. Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

NOTE: When servicing the fuel or oil system, use care to prevent kinking or obstructing vent lines.



⚠ WARNING

When working with any part of the fuel system, observe proper safety procedures. Gasoline is extremely flammable and explosive under certain conditions. Do not smoke or allow open flames or sparks in or near the area where the work is being done. If you should get gasoline in your eyes or if you should swallow gasoline, see your doctor immediately. If you should spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing. Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.



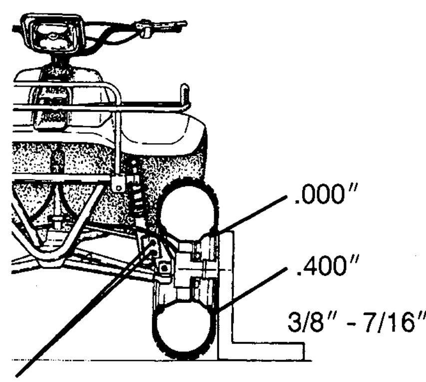
Camber and Caster Adjustment

NOTE: Camber and caster on 1989 to current models is not adjustable.

Camber Adjustment 1985, 1986, 1987 Two Wheel Drive Models

Before proceeding with this adjustment be sure tires are properly inflated. Place machine on a smooth level surface. Set handlebars in a straight ahead position and adjust tie rods to a visually close setting on toe alignment. **NOTE:** The steering frog can be used as an indicator of whether the handlebars are straight. The frog should always point straight back from the steering post.

4. Place a carpenters square along side the wheel as shown.
5. Loosen strut to spindle attaching bolts and adjust wheel inward or outward so there is a difference of approximately .400″ (1 cm) between top and bottom measurements as shown in drawing. **NOTE:** This equals 2° positive camber.
6. After adjusting, re-torque attaching bolts to 50 ft. lbs. (6.9 kgm).
7. Repeat procedure on opposite wheel.



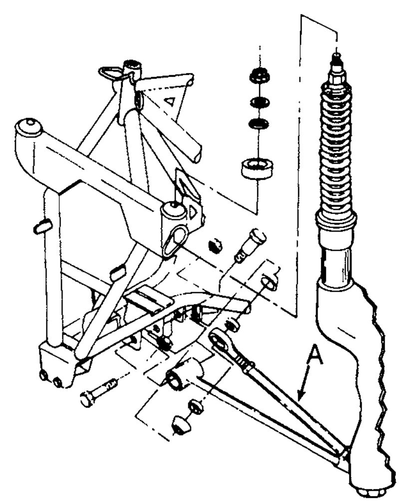
Strut to Spindle Attaching Bolts
Torque to 50 ft. lbs. (6.9 kgm)

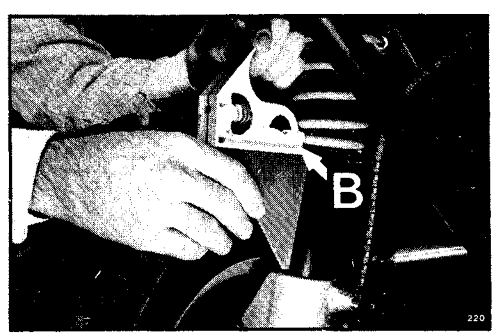
Caster Adjustment 1987 and 1988 4 Wheel Drive Models

Before proceeding with this adjustment be sure tires are properly inflated. Place machine on a smooth, level surface. Set handlebars in a straight ahead position and adjust tie rods to a visually close setting on toe alignment. **NOTE:** The steering frog can be used as an indicator of whether the handlebars are straight. The frog should always point straight back from the steering post.

Use of a caster gauge (PN 2870732) and a level will adjust caster angle to 2°.

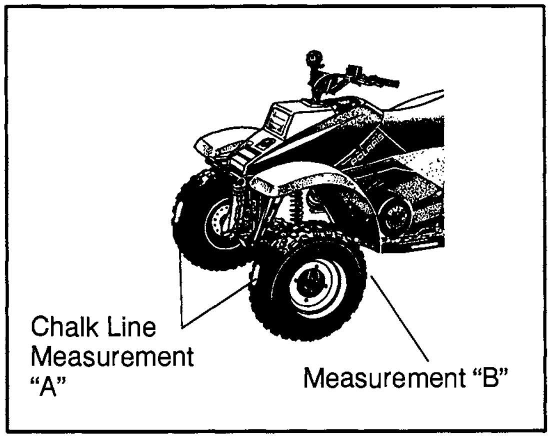
8. Check toe alignment. If necessary, adjust alignment as described later in this chapter.
9. Place caster gauge (PN 2870732) onto strut shock housing as shown in illustration; parallel with strut cartridge.
10. Place a small level on top of tool and adjust trailing strut rod (A) until bubble is centered in level (B).
11. Loosen rod end jam nuts and adjust strut rod. Re-tighten jam nuts. **NOTE:** Trailing strut has left and right hand threaded rod ends.
12. Recheck toe alignment. Adjust if necessary.





CAUTION: Due to the critical nature of the procedures outlined in this chapter, Polaris recommends steering component repair and adjustment be performed by an authorized Polaris Dealer.

13. Place machine on a smooth level surface.
14. Set handlebars in a straight ahead position and secure handlebars in this position. **NOTE:** The steering frog can be used as an indicator of whether the handlebars are straight. The frog should always point straight back from the steering post.
15. Place a chalk mark on the face of the front tires approximately 10″ (25.4 cm) from the floor as close to the horizontal center line as possible. Call this measurement "A". **NOTE:** It is important that both marks be equally positioned from the ground in order to get an accurate measurement.

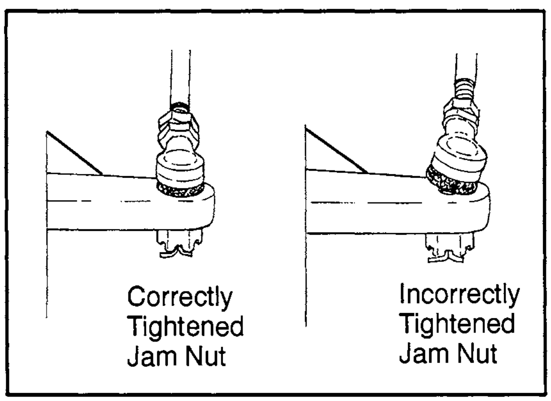


16. Measure the distance between the marks.
17. Rotate the tires 180° by moving vehicle forward or backward. Position chalk marks approximately 10″ (25.4 cm) from the floor. Call this measurement "B".
18. Again measure the distance between the marks. Subtract measurement "B" from measurement "A". The difference between measurements "A" and "B" is called vehicle toe alignment. The recommended vehicle toe tolerance is 1/8″ to 1/4″ (.3 to .6 cm) toe out. This means the measurement at the front of the tire (A) is 1/8″ to 1/4″ (.3 to .6 cm) wider than the measurement at the rear (B).
19. If this measurement needs to be adjusted, measure the distance between vehicle center and each wheel. This will tell you which tie rod needs adjusting. **NOTE:** Be sure handlebars are straight ahead before determining which tie rod(s) need adjustment.

CAUTION: During tie rod adjustment it is very important that the following precautions be taken when tightening tie rod end jam nuts. If the rod end is positioned incorrectly it will not pivot, and may break.

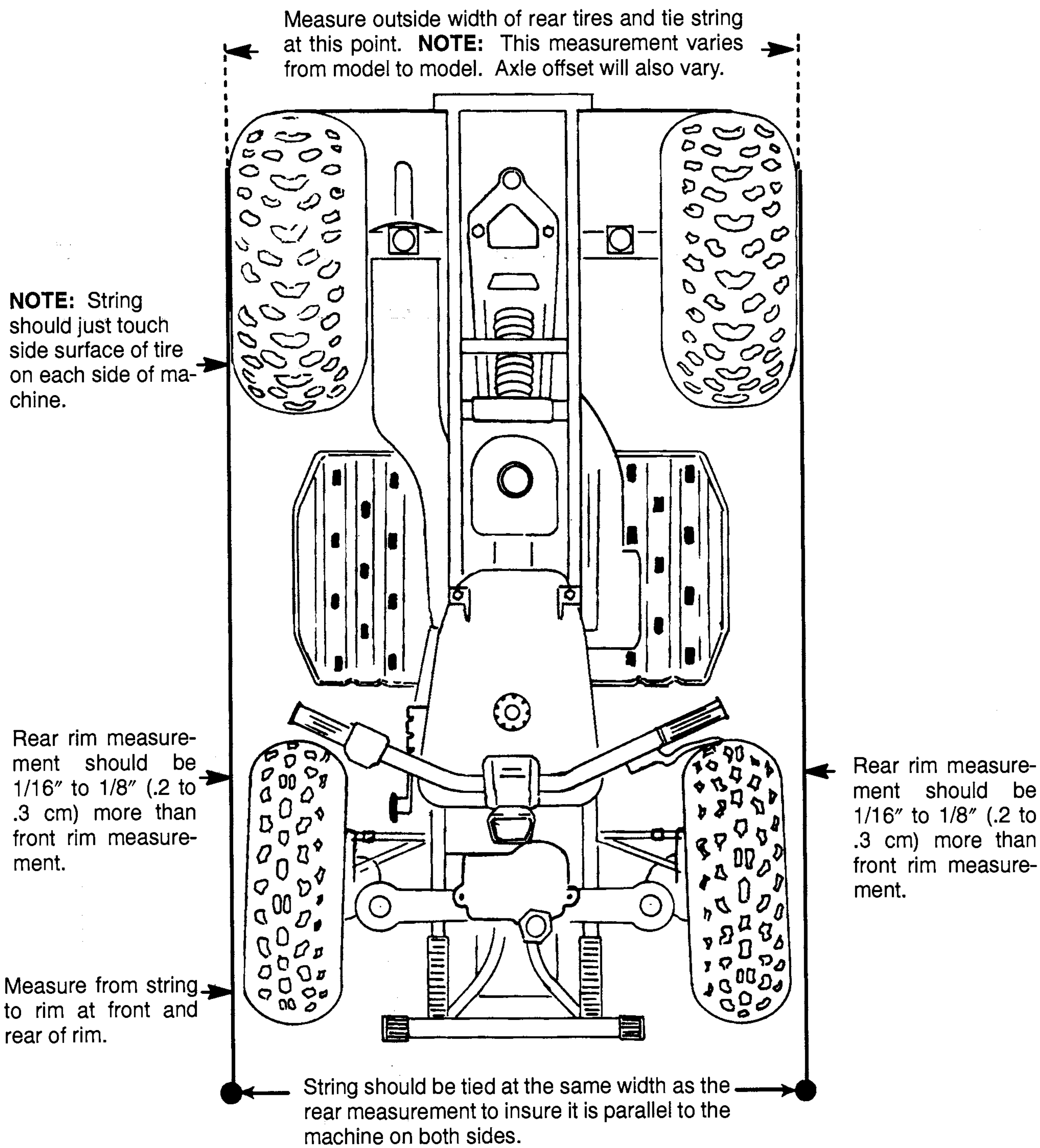
- To adjust toe alignment, the jam nuts must be loosened and the tie rod either shortened or lengthened for proper toe setting.
- When the tie rod end jam nuts are tightened, be sure to hold tie rod ends so they are parallel with the steering arm or the steering frog, respectively.

20. After alignment is complete, torque jam nuts to 12-14 ft. lbs. (1.66-1.93 kgm).



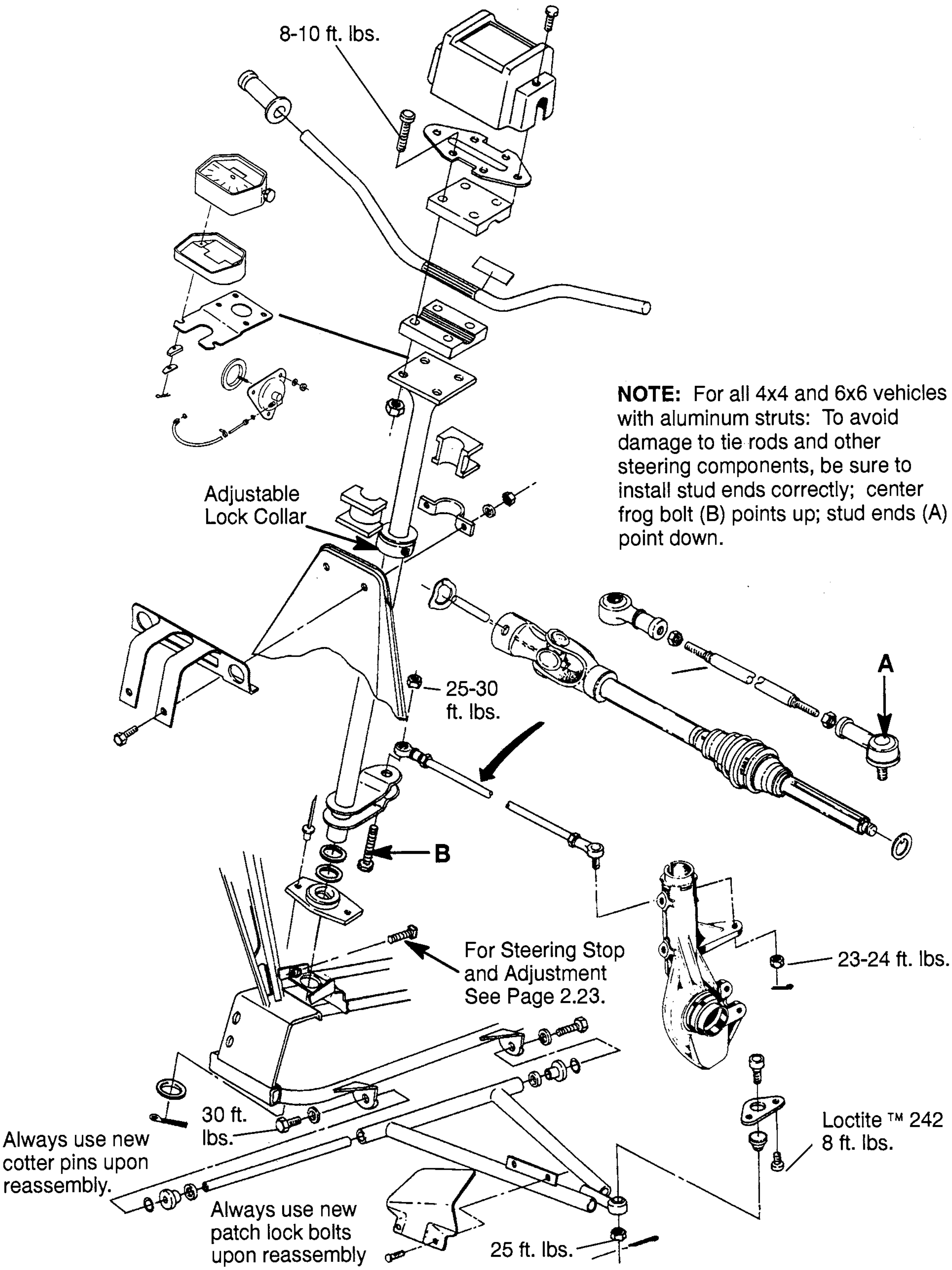
Optional Method

Allow about 10 feet (3 m) from where string is tied to front of machine to aid in keeping string parallel to machine. Be sure to keep handlebars centered.

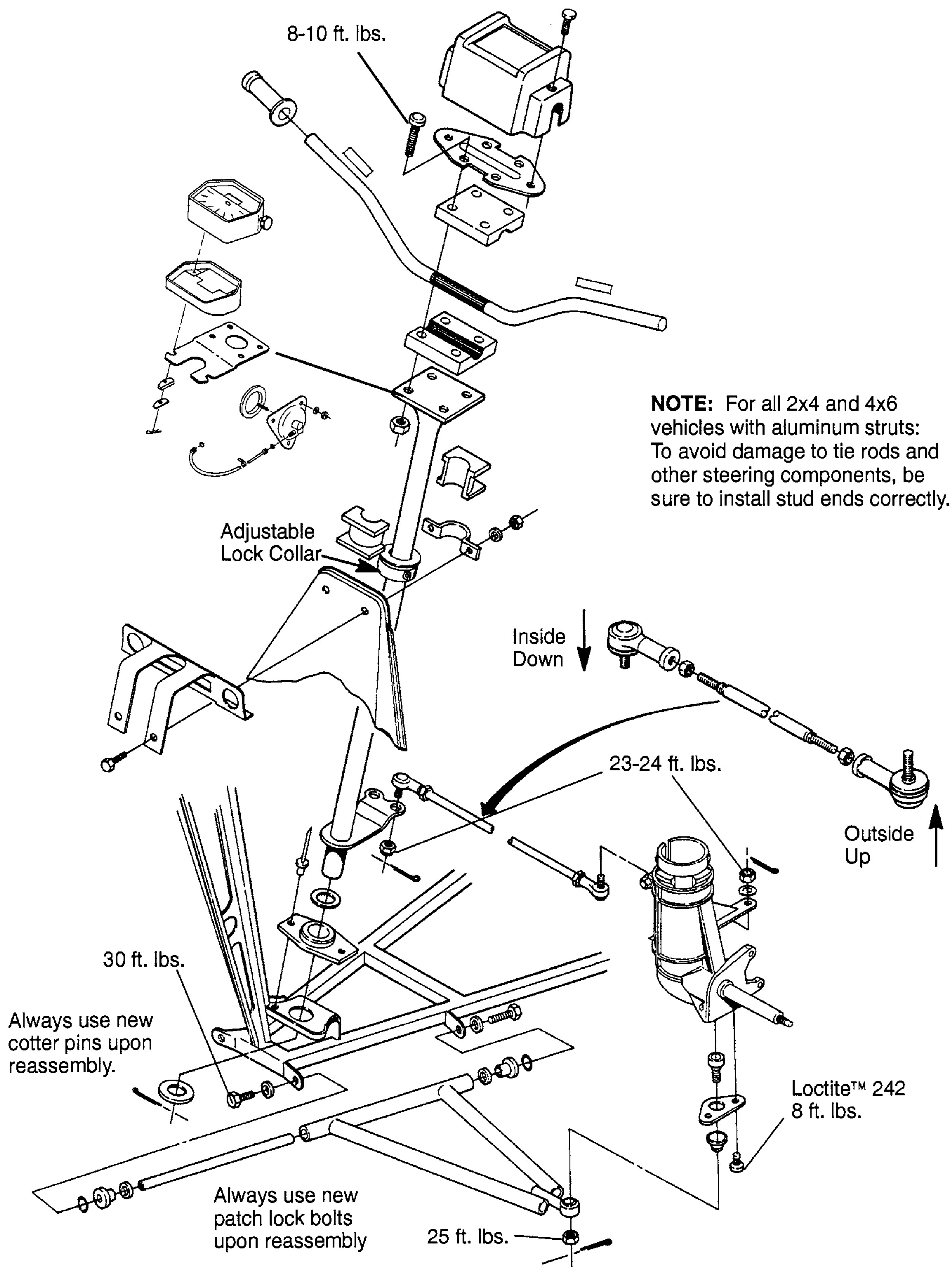


NOTE: The steering frog can be used as an indicator of whether the handlebars are straight. The frog should always point straight back from the steering post.

Typical Steering Assembly, Exploded View, 4x4 (1988 to 1992 Models)

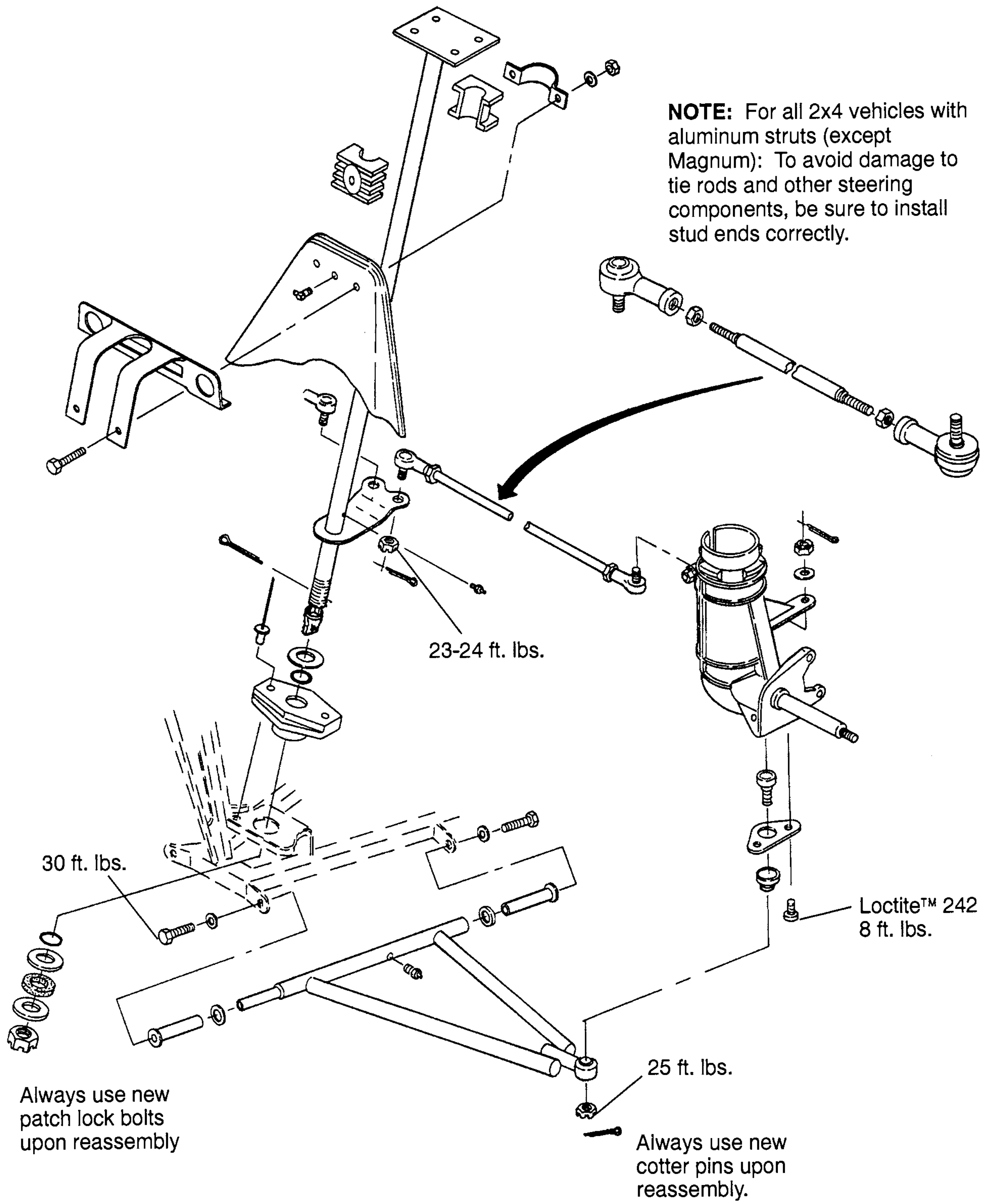


Typical Steering Assembly, Exploded View, 2x4 (1988 to 1992 Models)

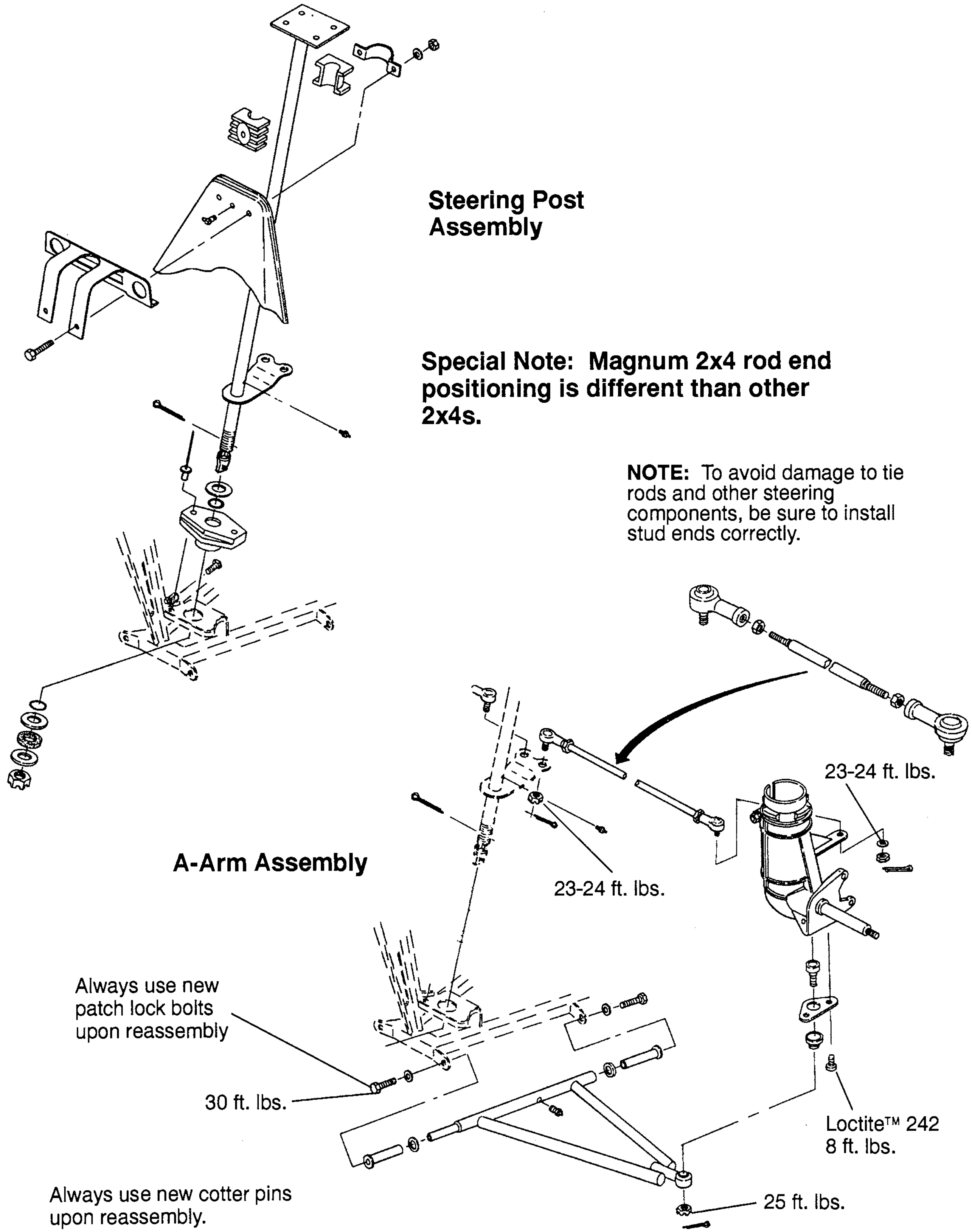


NOTE: For all 2x4 and 4x6 vehicles with aluminum struts: To avoid damage to tie rods and other steering components, be sure to install stud ends correctly.

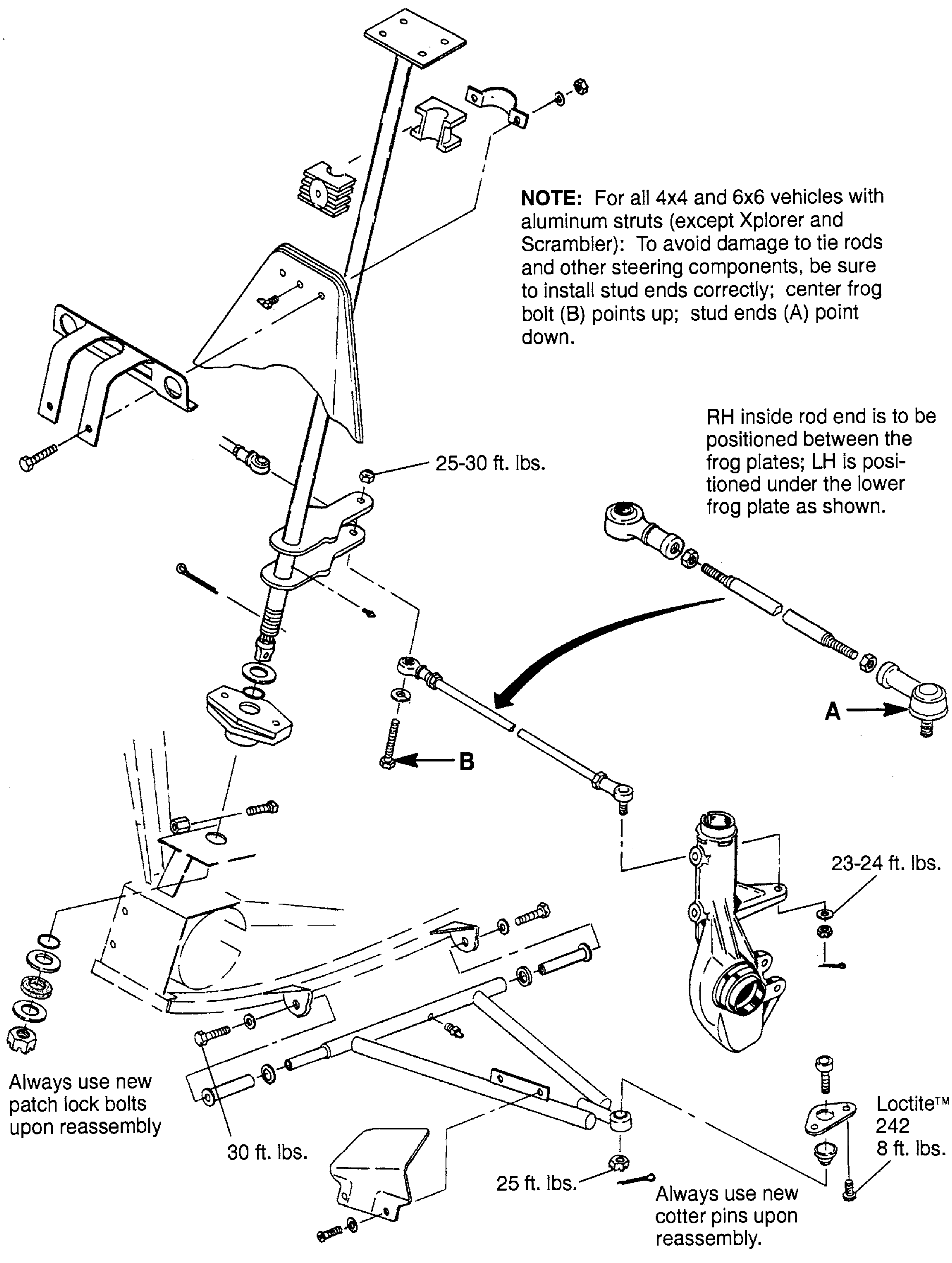
Typical Steering Assembly, Exploded View, 2x4 (1993 to Present Models Except Magnum)



BODY, STEERING AND SUSPENSION
Steering Assembly, Exploded View, Magnum 2x4

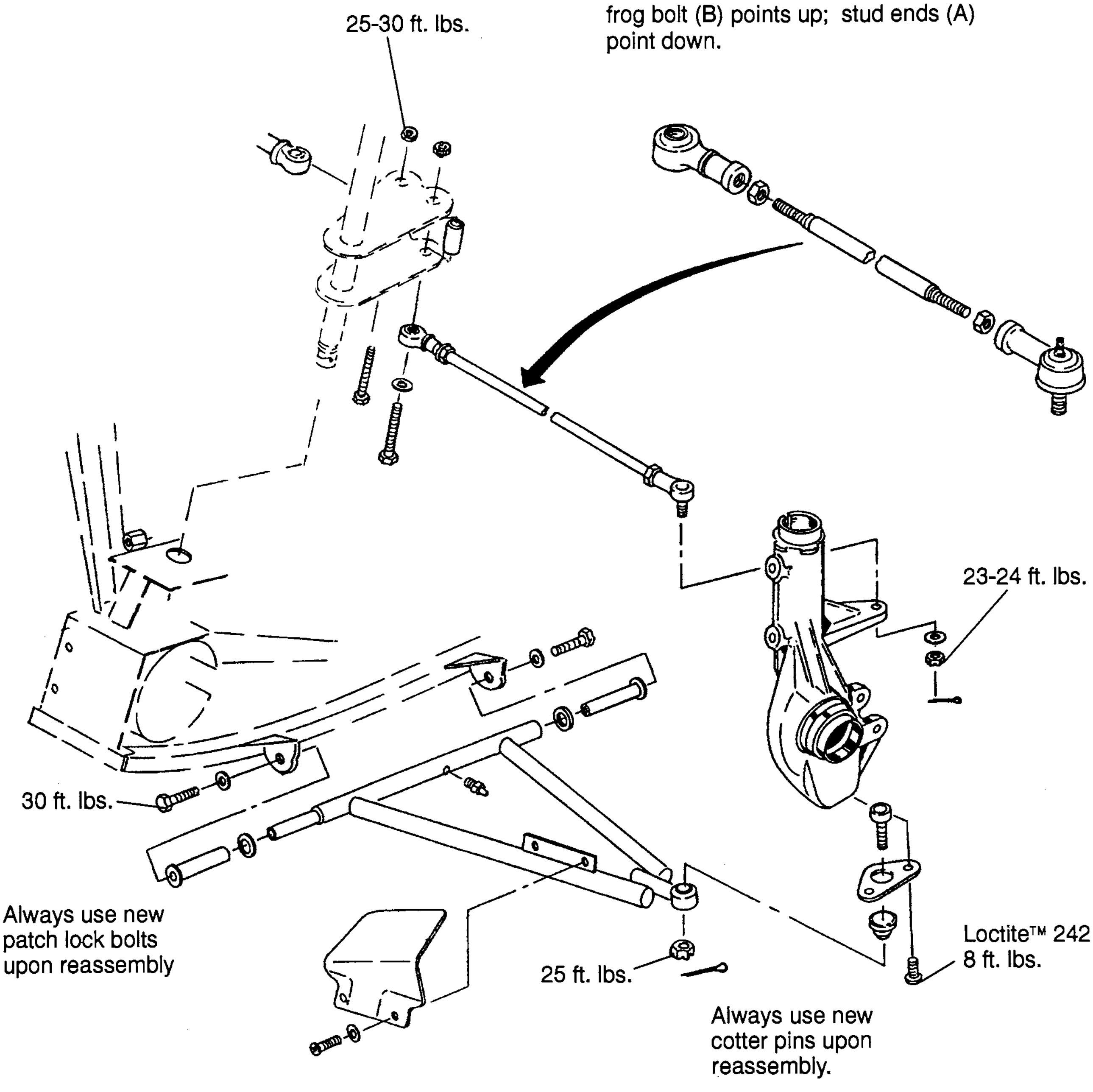


Typical Steering Assembly, Exploded View, 4x4 (1993 to Present Models Except Xplorer and Scrambler)



Steering Assembly, Exploded View, Xplorer and Scrambler

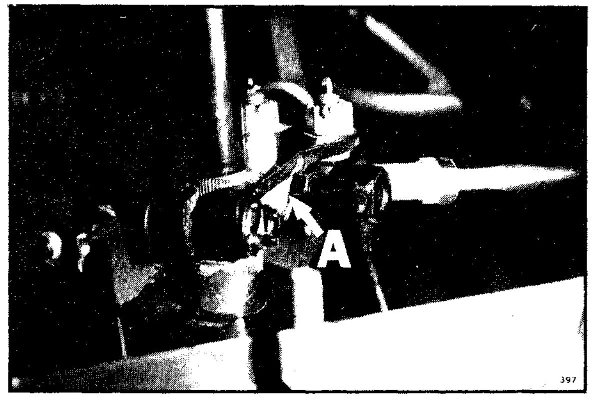
NOTE: For all 4x4 and 6x6 vehicles with aluminum struts: To avoid damage to tie rods and other steering components, be sure to install stud ends correctly; center frog bolt (B) points up; stud ends (A) point down.



NOTE: Some late production models may have the tie rod ends mounted side by side on the steering frog. On these models the bushing is not used.

Steering Stops

Adjust steering stops (A) so that the wheels turn a *maximum* of 40° from the straight ahead position.



Rear Axle Bend

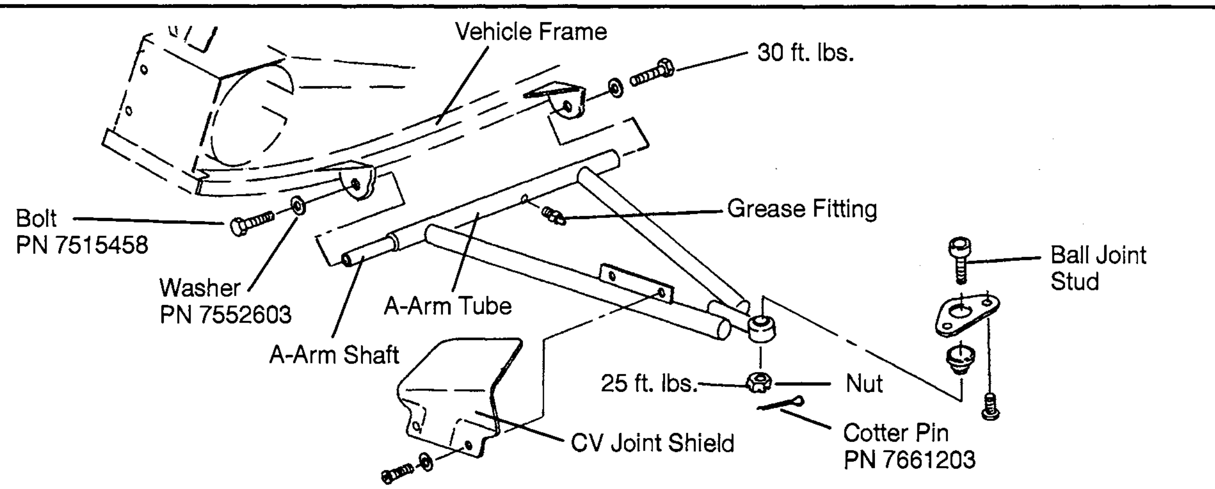
The rear axle shaft is hardened to approximately 3″ to 4″ (7.6 to 10 cm) from the outer ends. This allows the shaft to bend in case of impact or accident. Small amounts of axle runout can be straightened using V blocks, a hydraulic press, and a dial indicator. **CAUTION:** Do not use heat on any part of the axle. Heat will destroy the temper and cause the shaft to become brittle.

A-Arm Replacement

1. Lay a pad or tarp on floor and carefully tip vehicle onto its side with the A-arm to be replaced in the upright position. **NOTE:** To be sure fuel spillage does not occur, only perform this operation when the fuel tank is half full or less.
2. Remove cotter pin from ball joint stud at wheel end of A-arm and loosen nut until it is flush with end of stud.
3. Using a soft face hammer, tap nut to loosen A-arm from bolt. Remove nut and A-arm from hub strut assembly.

CAUTION: On 4x4 models, when removing the A-arm from the ball joint stud, *do not* over extend the CV axle assembly. Over extension may disengage the CV joint. If the CV joint is disengaged, it must be disassembled and repaired. To prevent over extension, tie a wire between the lower strut casting pinch bolt and the inner axle universal joint.

4. Loosen two bolts on A-arm tube by alternating each about 1/3 of the way until A-arm can be removed.
5. Examine A-arm shaft. Replace if worn. Discard hardware.
6. Insert A-arm shaft into new A-arm. **NOTE:** On 4x4 models the CV joint shields will need to be attached to the A-arm. See Ill.



7. Install new A-arm assembly onto vehicle frame. Torque bolts to 30 ft. lbs. (4.14 kgm) **WARNING:** The locking features on the existing bolts were destroyed during removal. DO NOT reuse old bolts. Serious injury or death could result if fasteners come loose during operation.
8. Attach A-arm to hub strut assembly. Tighten ball joint nut to 25 ft. lbs. (3.45 kgm). If cotter pin holes are not aligned, tighten nut slightly to align. Install a new cotter pin with open ends toward rear of machine. Bend both ends in opposite directions around nut.
9. Locate grease fitting in center of A-arm tube and pump A-arm full of grease.
10. Carefully return vehicle to upright position.

A-arm Attaching Bolt Torque:

30 ft. lbs. (4.14 kgm)

Ball Joint Stud Nut Torque:

25 ft. lbs. (3.45 kgm)

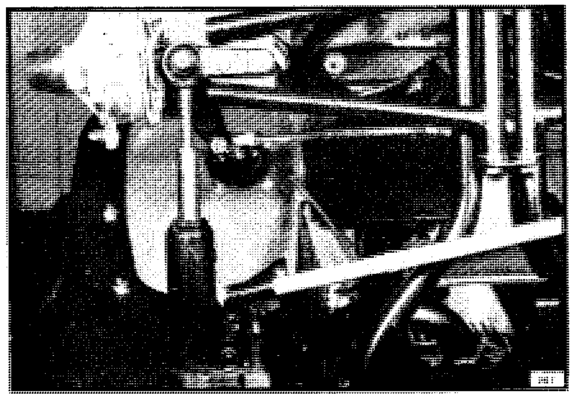
WARNING: Upon A-arm installation completion, test vehicle at low speeds before putting into regular service.

Frame Straightening and Reinforcement

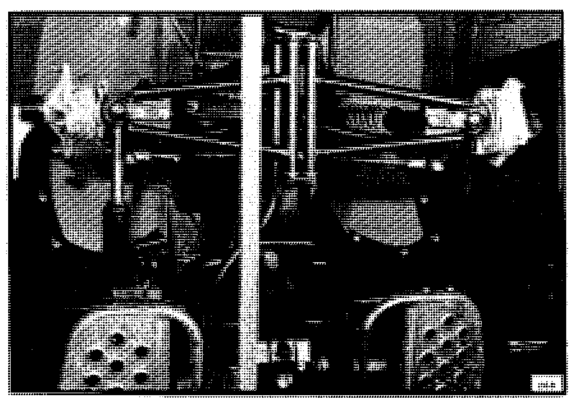
Because the frame is hidden beneath all of the fenders, fuel tank covers, seat, etc., very little attention is usually paid to it. Most owners and technicians never think about it because it requires so little maintenance. However, the frame is the base of the ATV, and if it ever needs any attention, knowing something about it and how it relates to the rest of the machine can be very helpful. The purpose of the frame is 1) to hold all of the parts in correct relationship with each other so proper steering and handling can result, and 2) to deliver power to the ground in a straight, smooth manner. If a damaged ATV enters the shop, inspect the frame carefully for cracks or bends in the tubing and welded areas.

NOTE: This procedure is for returning a slightly bent frame to its original strength. Severe bending will require frame replacement. If the machine will be subjected to extremely heavy use this reinforcement should be installed prior to vehicle delivery. Brace Kit PN 2870730 will fit model numbers W857527, W867527, W867627, W877527, W877828 and W887527.

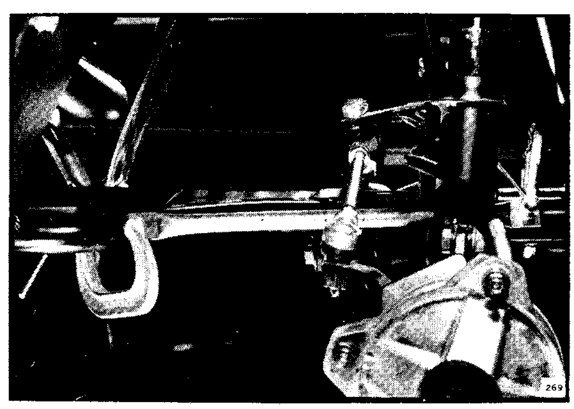
1. Remove the fuel tank.
2. Drain the carburetor.
3. Remove the battery.
4. Invert the vehicle as shown.
5. Remove the front wheels.
6. Remove the strut spring on the side the jack will be positioned.



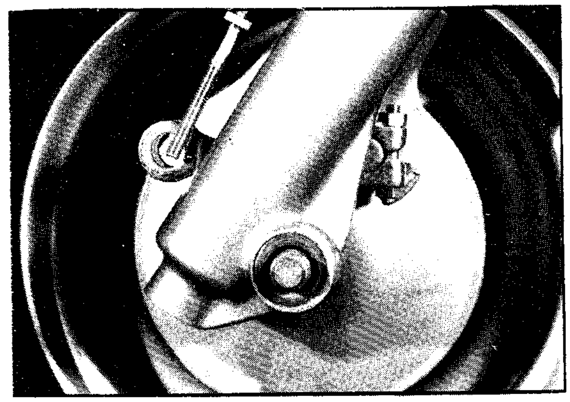
7. Position a small hydraulic jack under the A-arm ball joint as shown.
8. Place a straight edge along the frame as shown. Jack up the front end of the machine until the frame is straight.



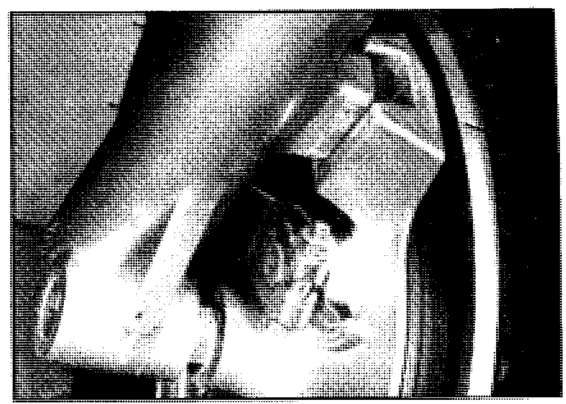
9. Position the brace as shown, making sure brace tubes are flush with top of frame. Clamp and weld.
10. Remove the jack.
11. Paint tubes.
12. Reassemble unit.



Front Wheel Removal - 1985-86 Scrambler Models



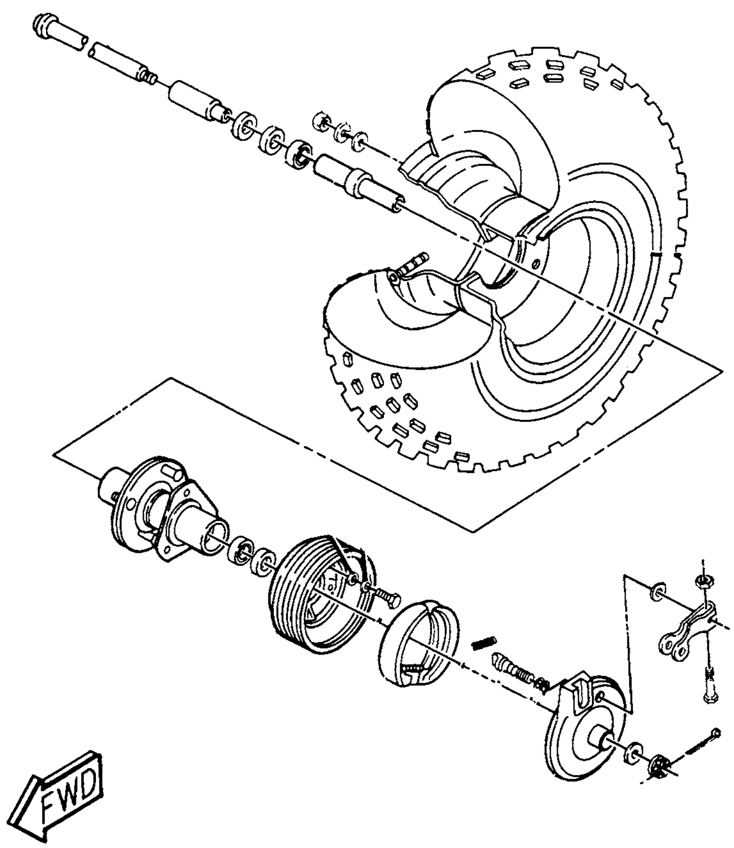
1. Place the transmission in gear.
2. Loosen all cable adjusters.
3. Remove cable from handlebar lever and brake shoe lever.
4. Remove cotter pin from front wheel axle nut and remove nut.
5. Carefully support front wheel using a suitable stand under each footrest. **CAUTION:** Serious injury may result if machine tips or falls.
6. Remove the front axle, collar and wheel from the fork.



Installation

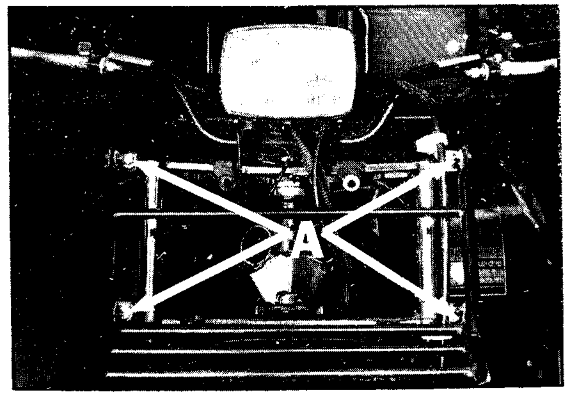
Reverse the removal procedure for wheel installation making sure to:

- Check for proper entry of fork tube boss into slot on brake shoe plate.
- Torque axle nut to 36 ft. lbs. (5 kgm).
- Always install a new cotter pin into the axle nut.

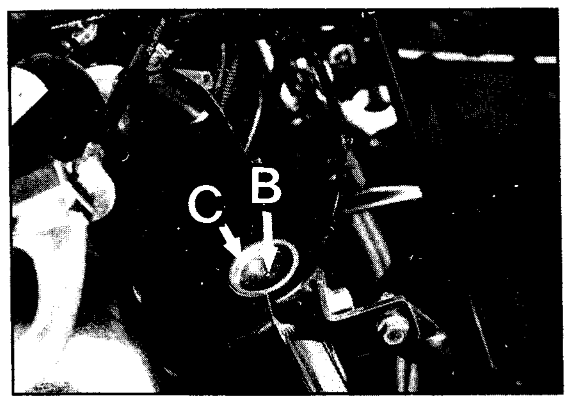


Front Fork Service - 1985-86 Scrambler Models

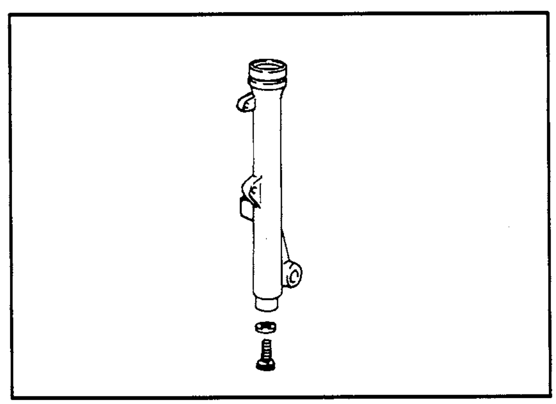
1. Carefully support front wheel using a suitable stand under each footrest. **CAUTION:** Serious injury may result if machine tips or falls.
2. Remove front wheel assembly and front fender.
3. Loosen pinch bolts and remove brake cable holder securing bolts (A). Remove fork(s).
4. Loosen dust boot clamp screws and remove the dust boot from each fork.



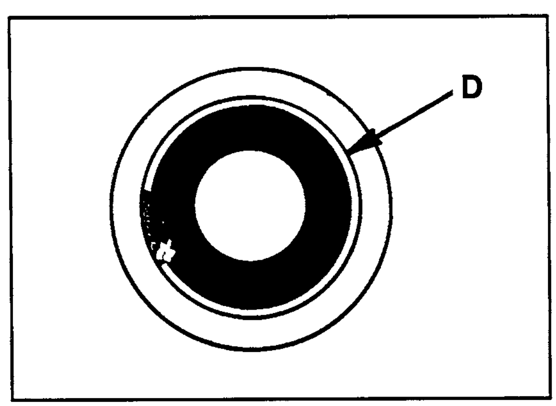
5. The spring seat (B) and fork spring are retained by a stopper ring (spring wire circlip) (C). Depress the spring seat and fork spring to remove the stopper ring. Remove the stopper ring by carefully prying out one end with a small screwdriver. Remove rubber cap and stopper ring from top of each fork.



6. Remove the fork spring.
7. Remove the cylinder securing bolt from the bottom of the fork assembly.
8. Remove the damper rod assembly and inner fork tube.



9. Remove the retaining clip from the outer fork tube, (D) and pry out the fork seal. Be careful not to damage the fork tube surface.

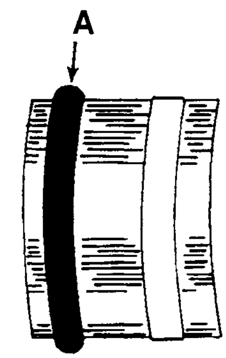


Inspection

10. Examine the inner fork tube. If it is severely scratched or bent, it should be replaced.

CAUTION: Do not attempt to straighten a bent fork tube as this may dangerously weaken the tube.

11. Inspect the outer surface of the fork seal seat in the outer fork tube. If this surface is damaged, replace the outer fork tube. If it is not damaged, replace the fork seal.
12. Check the outer fork tubes for dents. Replace tube if dented.
13. Check the free length of the springs. Fork spring free length limit: 19.73″ (50.1 cm).
14. Check the O-ring on the spring seat (A). Replace if damaged.

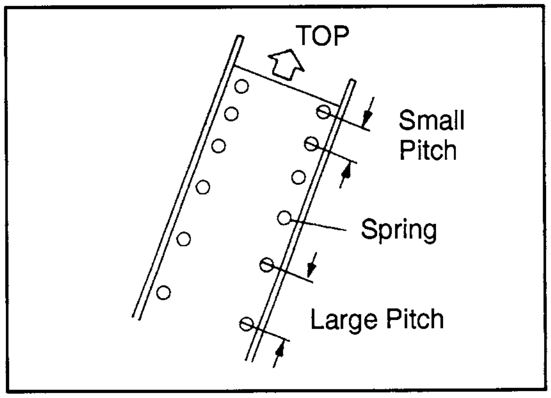


CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.

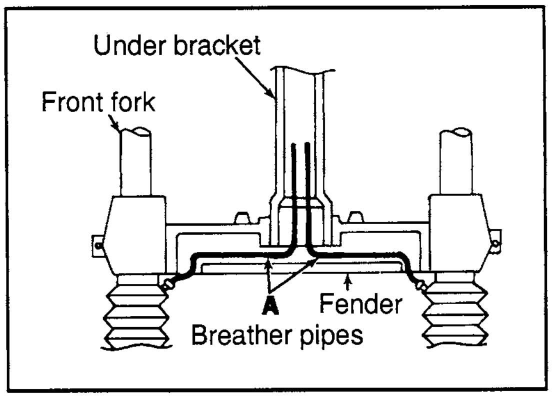
Reassembly

15. Make sure all components are clean before reassembling.
16. Apply oil to the fork seal. Install by pressing it in with a large socket. **NOTE:** Do not reuse seals. Always install a new fork seal.
17. Reinstall the retaining clip.
18. Reinstall the damper rod assembly into the inner fork tube. Hold the damper rod of the front fork cylinder.
19. Put taper spindle on damper rod.
20. Holding inner fork tube, carefully install outer fork tube over taper spindle.
21. Apply Loctite 680 to the cylinder securing bolt. Install bolt and a copper washer into the outer fork tube. Torque bolt to 17 ft. lbs. (2.3 kgm).
22. Pour the specified amount of fork oil into the inner fork tube.
    - Fork oil capacity: 3.96 oz./4.12 Imperial oz./117 cubic cm
    - Fork oil level (from top of inner tube fully compressed without spring): 16.5″/42 cm
    - Recommended oil: 10 wt or equivalent

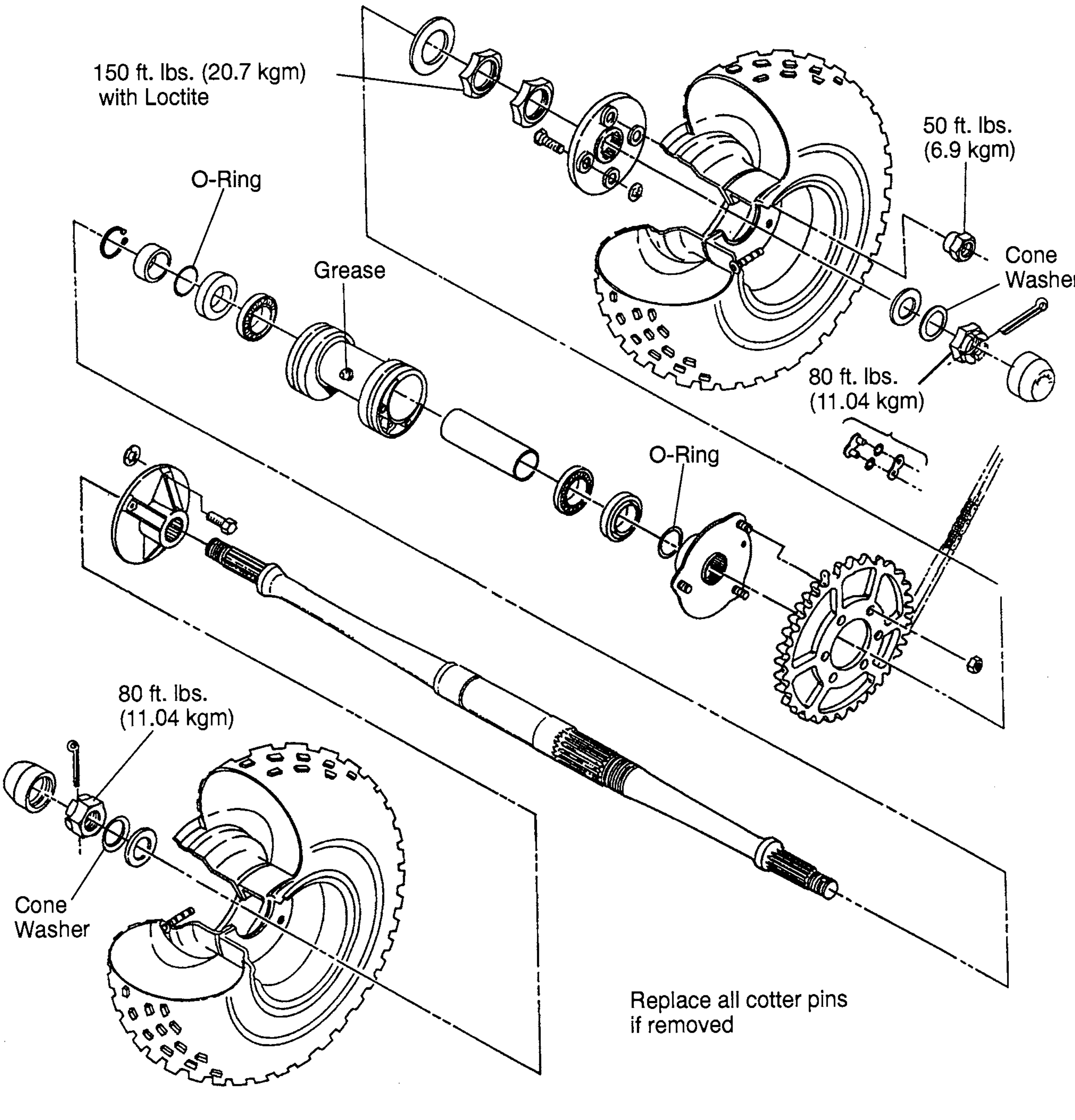
23. Reinstall the fork spring, spring seat and stopper ring into the inner tube. **NOTE:** The fork spring must be installed with the smaller pitch side facing upward as shown. Always use a new stopper ring (spring wire circlip). Be sure the stopper ring is properly seated in the fork tube groove.



24. Reinstall dust boot onto outer tube. Do not tighten screws yet.
25. Reinstall fork into brackets. Make the top of the inner fork tube level with the top of the handle crown.
26. Torque bolts under bracket and inner fork tube to 22 ft. lbs. (3 kgm).
27. Torque steering crown and inner fork tube bolts to 14 ft. lbs. (2 kgm).
28. Tighten dust boot clamps.
29. Reinstall front fender and front wheel. **NOTE:** When reinstalling front fender make sure breather pipes (A) are properly connected and routed.

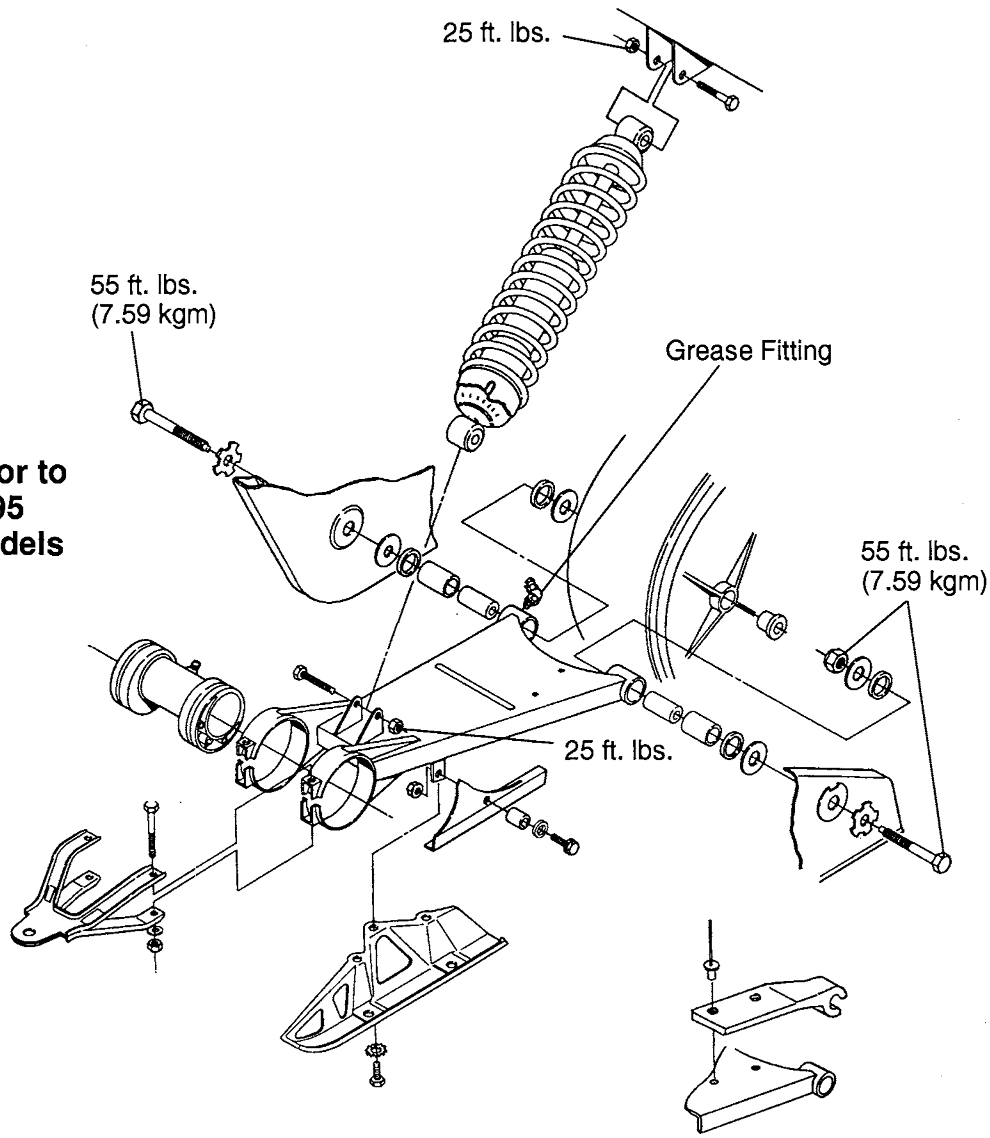


NOTE: Check appropriate parts manual for correct assemblies.

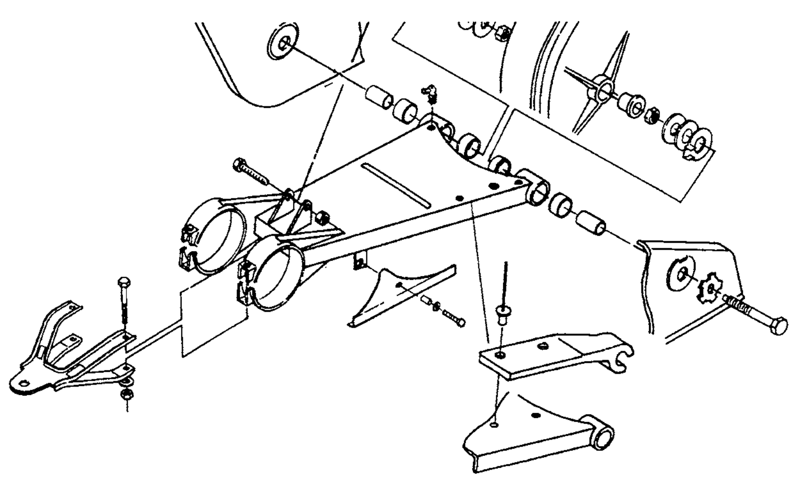


Swing Arm and Rear Suspension Exploded View - 2x4, 4x4

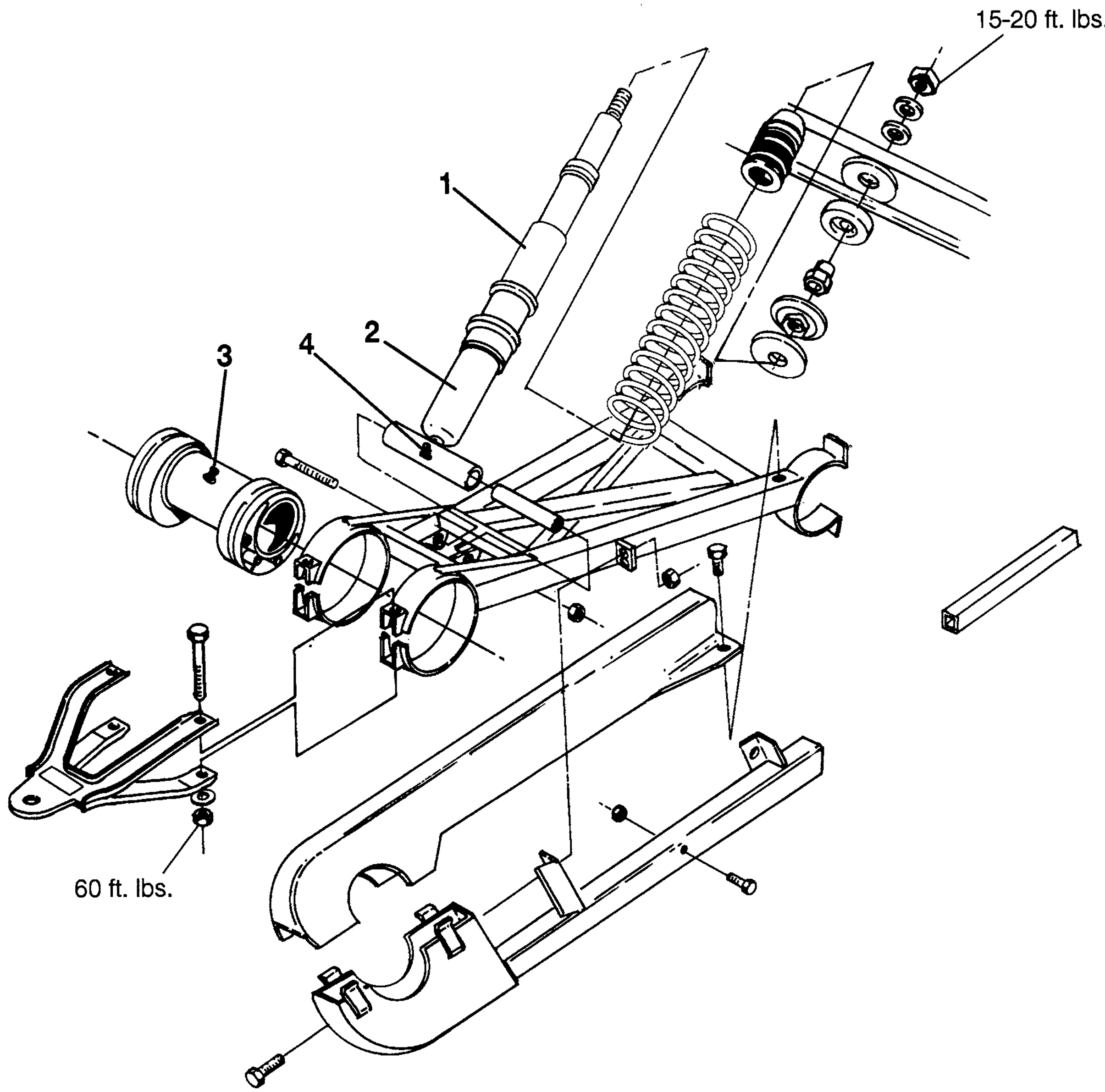
NOTE: When servicing, check model number for correct replacement parts.



Prior to 1995 Models

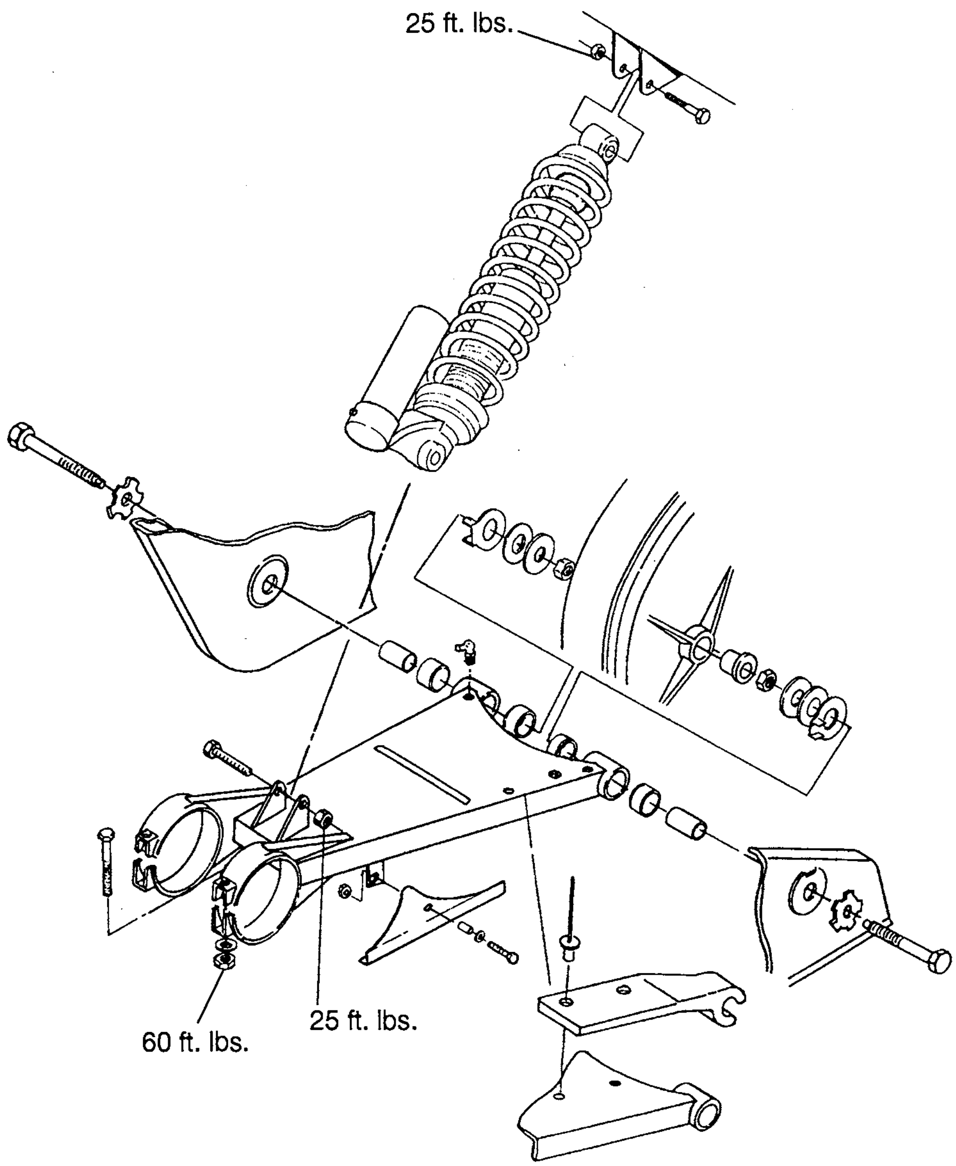


1995 Models

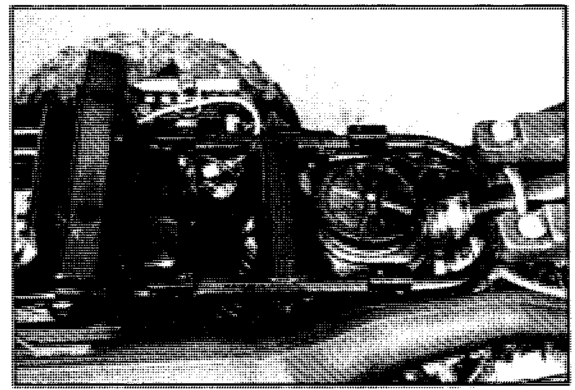


- Rear strut (1) and weldment (2) can only be replaced as an assembly. They are pressed and welded together at the factory and cannot be disassembled.
- Grease fittings (3 and 4). Check lubrication guide for service intervals.

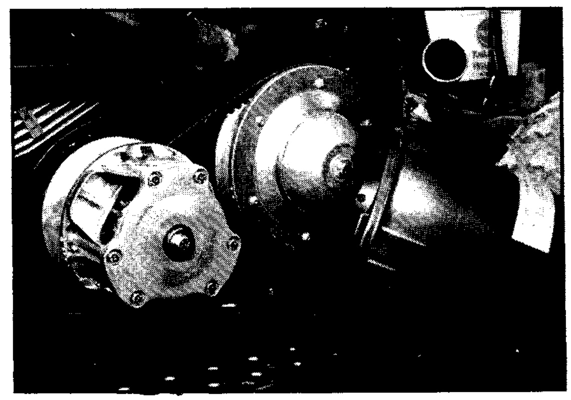
Swing Arm and Rear Suspension Exploded View, 1995 Scrambler



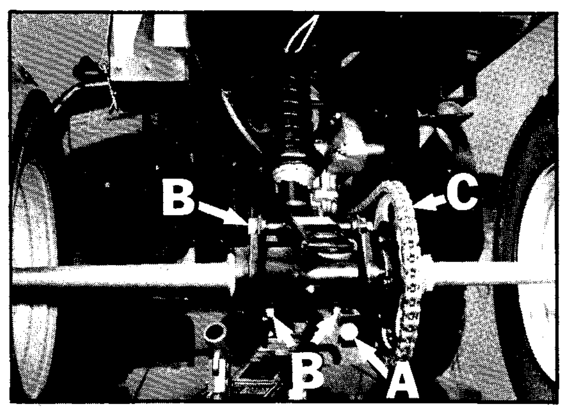
1. Remove rear rack and rear cab (fender).



2. Remove PVT system outer cover. Remove driven clutch. **NOTE:** On 1990 and later models it will be necessary to use the driven clutch puller because the input shaft and inside clutch bore have an interference fit.

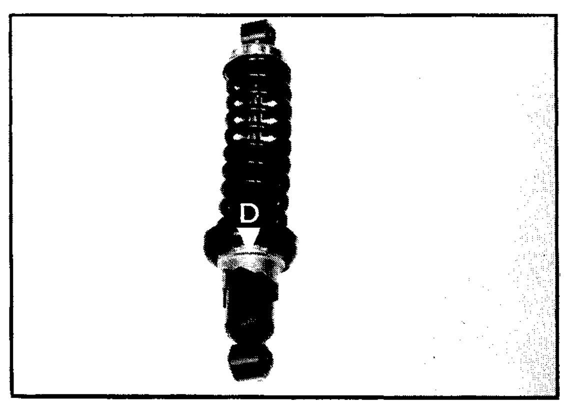


3. Carefully support the rear of the vehicle off the ground. **CAUTION:** Severe personal injury may result if vehicle tips or falls.
4. Loosen chain adjuster (A).
5. Remove pinch bolts (B).
6. Remove chain clip, master link and drive chain (C).

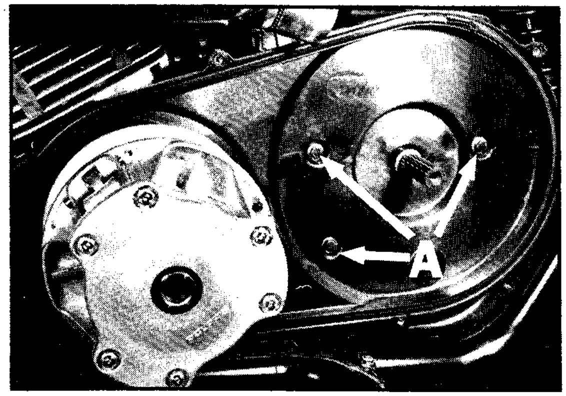


7. Remove rear shock assembly(s). **CAUTION:** Suspension damage may result from severe use of the vehicle in rough terrain if the cam is set in the softest position. Use spanner wrench for cam adjustment (D).

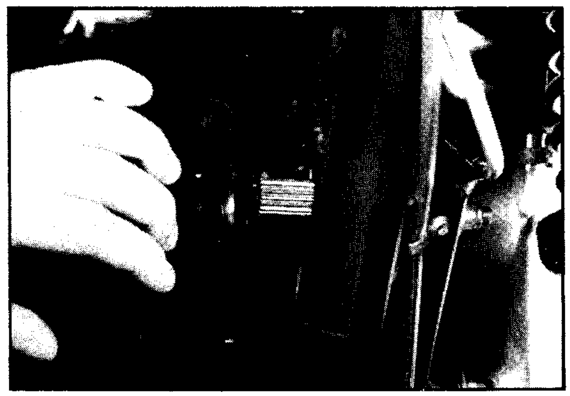
NOTE: On 350L models, a spacer of up to 1″ (2.5 cm) may be used under the spring to stiffen the ride.



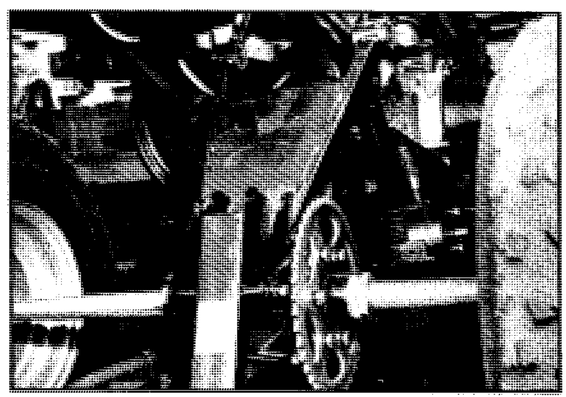
8. Remove the three rear cover mounting bolts (A). **NOTE:** Most models will have spacers and O-rings located between the inner cover and the cover attaching points. The spacers are of different lengths. When removing and re-installing spacers and O-rings it is important to note their positions.



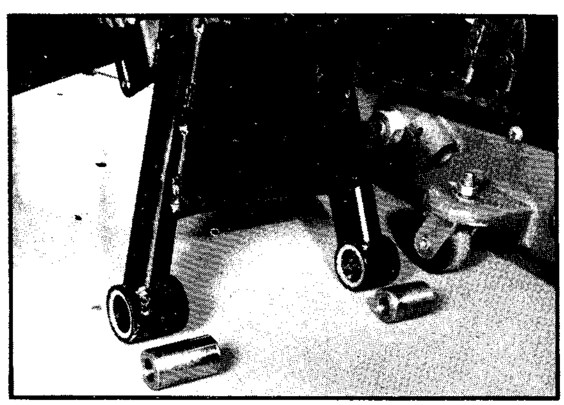
9. Move the rear cover outward, to reach the left side front swing arm bolt. The swing arm pivot relies on bushings and thrust washers to prevent excessive side play and requires periodic lubrication to minimize premature wear. See page 2.43 for correct lubricant.



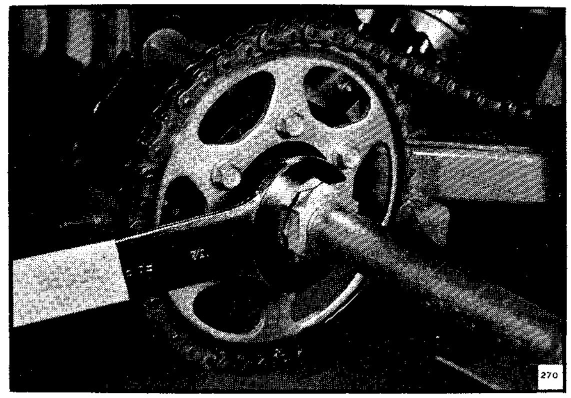
10. The swing arm assembly can be removed from the main frame by pivoting it back and forth.



11. Remove the swing arm bushings. Inspect and replace if necessary. **NOTE:** Bushing length, sealing, inner bushing design, etc. may vary by model. Reference the specific Parts Manual for repair parts and proper assembly sequence.

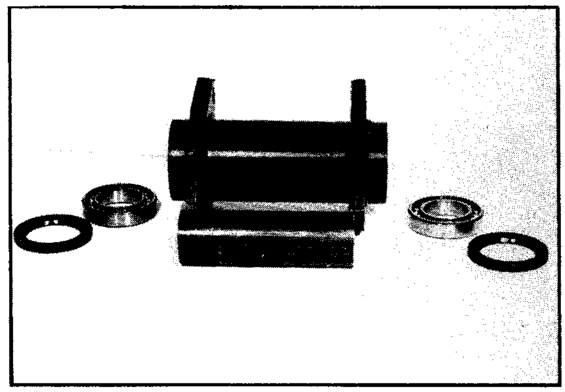


12. Remove rear axle housing from swing arm.
13. Remove axle from housing. **NOTE:** Axle nuts are 1 3/4″ (4.4 cm)
14. Remove sprocket from axle housing.

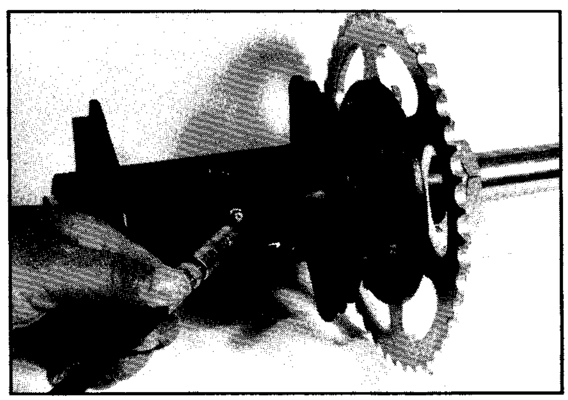


15. Inspect axle housing, seals and bearings. Replace parts if necessary.

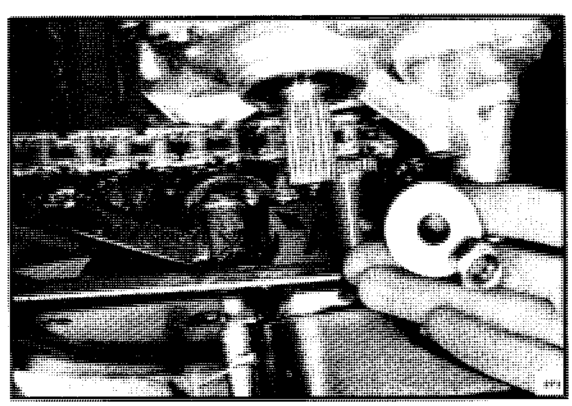
CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.



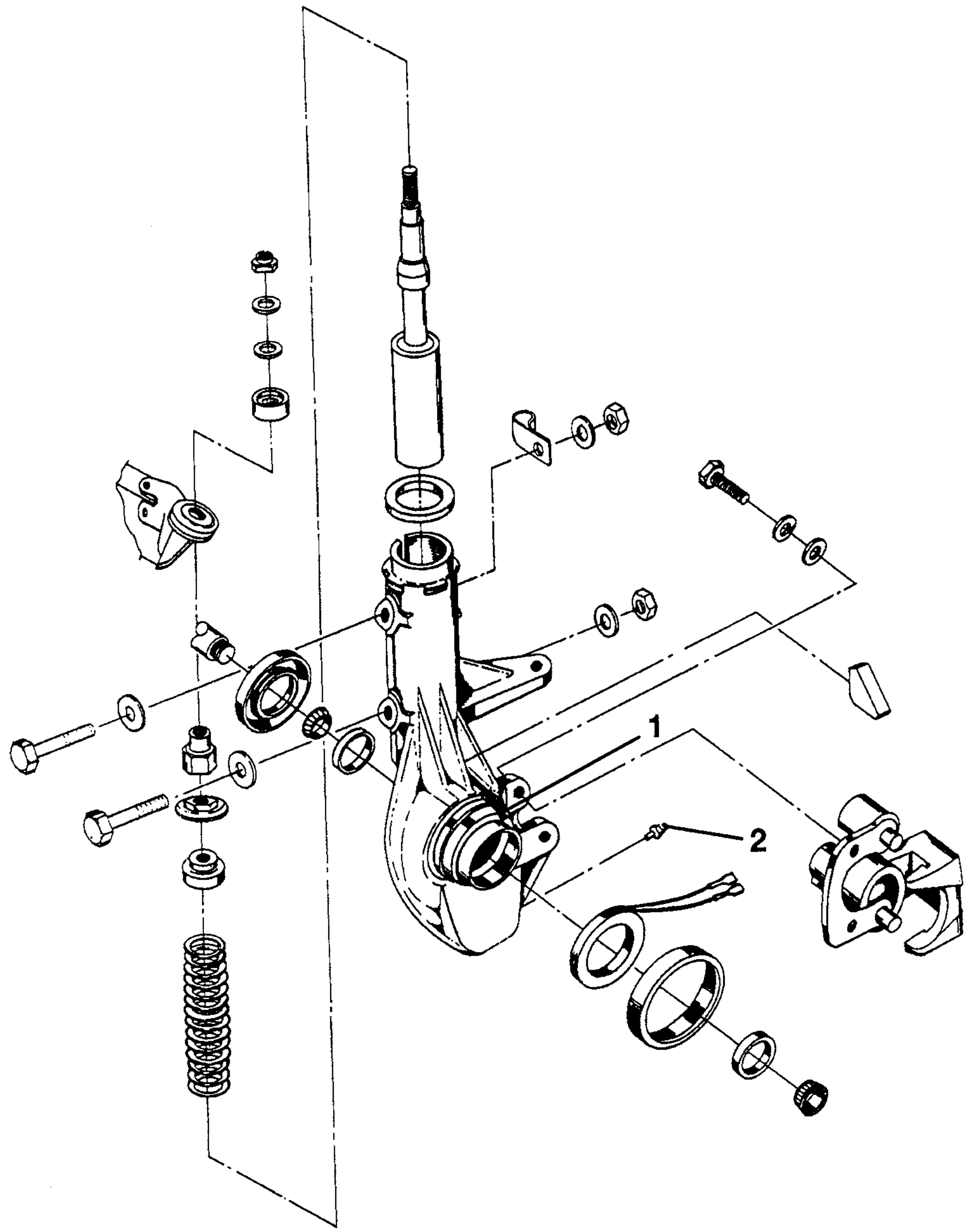
16. Reassemble axle housing, seals and bearings.
17. Using all-purpose automotive chassis lube, fill housing until grease purges from seal.
18. Apply blue Loctite to the axle nut threads. Torque nuts to 150 ft. lbs. (20.7 kg/m).



19. Reassemble swing arm by reversing disassembly procedure.
20. Position thrust washers as shown to remove swing arm side play. If swing arm side play is excessive it is recommended to add washers to right side swing arm as shown (A). **NOTE:** Make sure the bushing is centered in the thrust washer. Torque pivot bolt nut to 55 ft. lbs. (7.6 kg/m).



Strut Assembly - 350/400L 4x4, Magnum 4x4

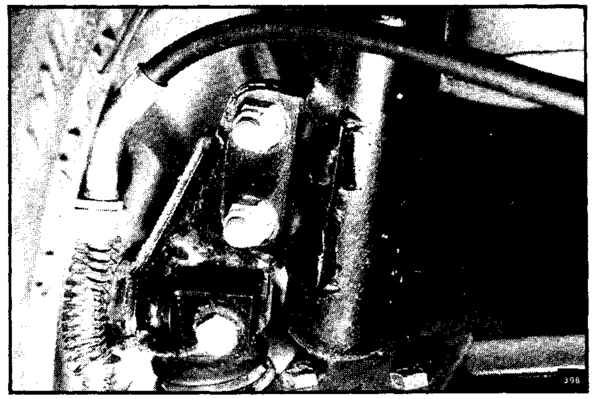


NOTE: Be sure steel insert notch (1) and strut casting notch are lined up and provide a channel for the magnetic coil wires to lie in. If insert and strut do not match, strut replacement will be necessary.

Grease fitting (2) location. Check lubrication guide for recommended service intervals.

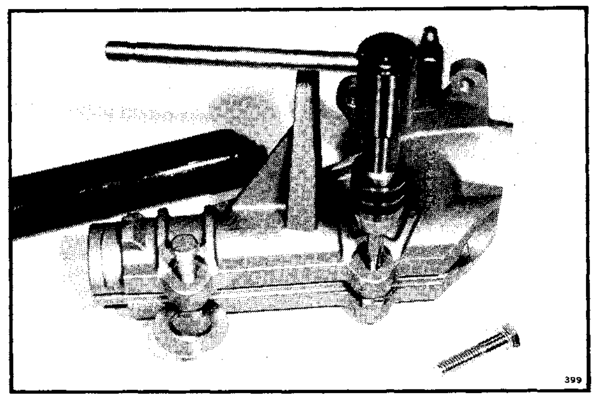
1995 Models have Ø pole gap.

1. Remove lower strut attaching bolts.
2. Remove upper pivot assembly and spring.
3. Install new assembly.
4. Adjust camber and torque retaining bolts to 50 ft. lbs. (6.9 kgm).
5. Check toe alignment.



Front Strut Cartridge Replacement

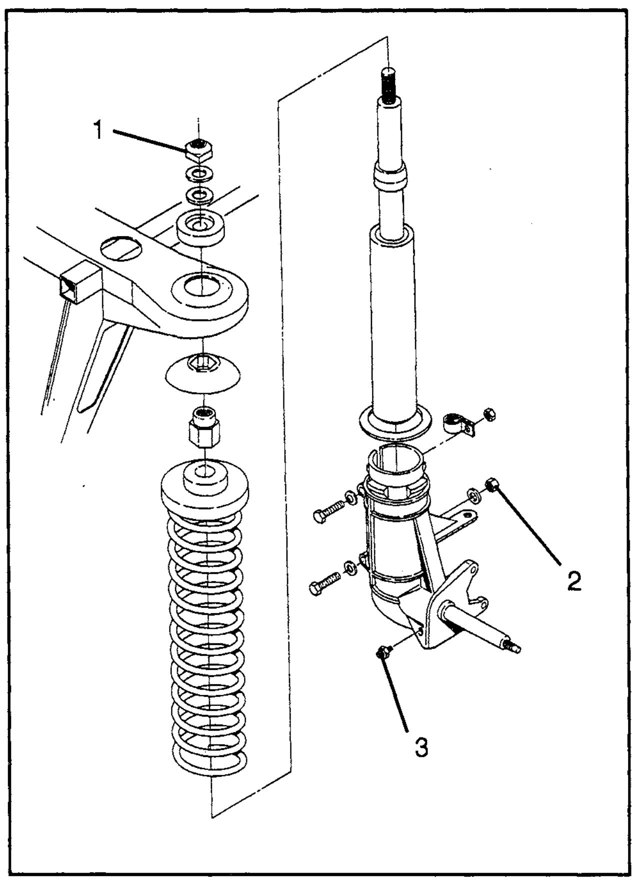
1. Remove upper strut pivot assembly.
2. Remove coil spring and collapse strut cartridge.
3. Remove two pinch bolts and tap upper and bottom pinch bolts with a 3/8″-16 tap.
4. Install a large, thick flat washer as shown.
5. Spread the strut casting just enough to allow the old cartridge to be removed and the new one to be installed.
6. Torque pinch bolts to 15 ft. lbs. (2 kgm).
7. Reassemble spring and top pivot assembly.



Strut Assembly - 350/400L 2x4

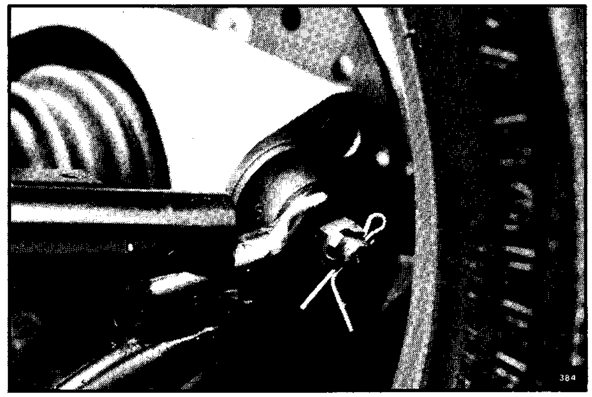
Self locking nuts (1 and 2) should not be reused as the locking properties will be destroyed. If these nuts are removed, make sure to replace with new nuts.

Grease fitting location (3). Check lubrication guide for recommended service intervals.

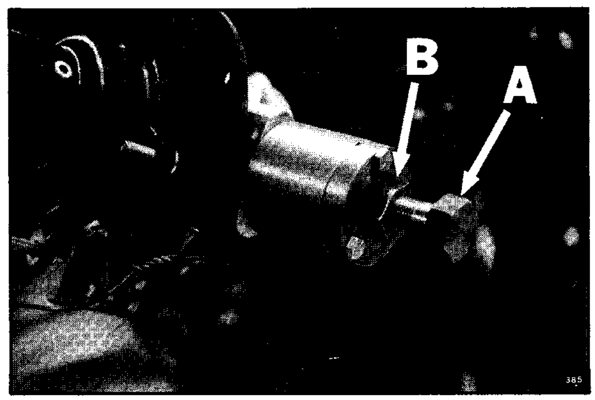


Front Strut Ball Joint Replacement

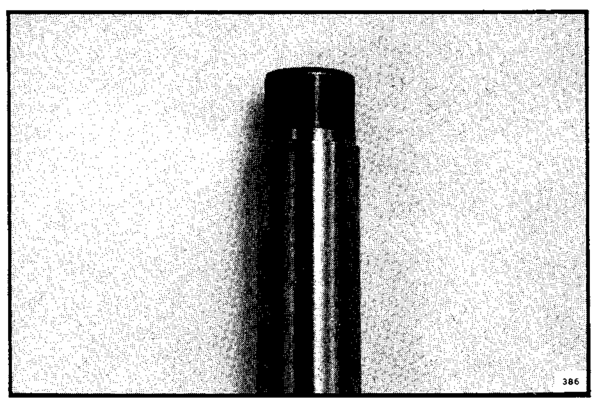
1. Remove front wheel, cotter pin, castle nut and A-arm. **NOTE:** On 4x4 models be sure to wire A-arm to disc as shown in photo 2. This will prevent CV joint disengagement.



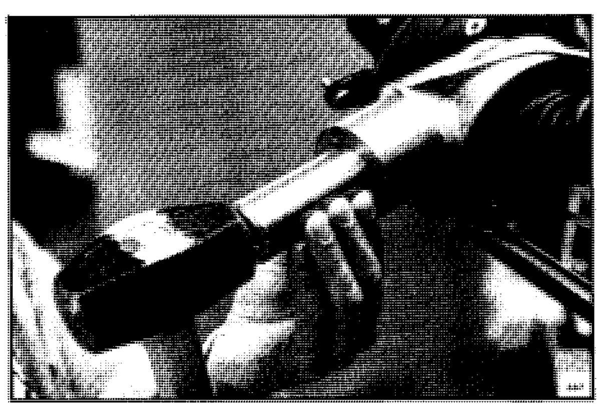
2. Remove ball joint retaining plate.
3. Install ball joint puller as shown.
4. To pull ball joint out, hold bolt head (A) while tightening jam nut (B).



5. To reinstall ball joint, position new joint onto driver as shown.



6. Install sleeve with top plate removed, as shown.
7. Using a large hammer, drive ball joint in until it bottoms in casting bore.
8. Reinstall retaining plate cap and A-arm.
9. Torque A-arm ball joint castle nut to 25 ft. lbs. (3.5 kgm).
10. Reinstall cotter pin with open ends toward rear of machine.



2x4 Front Hub Bearing Removal/Inspection

1. Stop engine, place machine in gear and set parking brake.
2. Loosen front wheel nuts slightly.
3. Elevate and support machine under footrest/frame area.

CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing and installing bearings and seals.

4. Remove wheel nuts and wheels.
5. Check bearings for play by grasping hub firmly and checking for movement. Rotate the hub. It should rotate smoothly without binding or rough spots.
6. Remove hub cap, cotter pin, front spindle nut, and washer. Remove the hub.
7. Rotate each bearing by hand and check for smooth rotation. Visually inspect bearing and spindle for moisture, dirt, corrosion, or wear. Replace bearing if moisture, dirt, corrosion, or roughness is evident. Replace spindle if worn or damaged.

Bearing Removal/Repacking

NOTE: If bearings are removed, they must be replaced.

1. Pry seal out of back of hub. The bearings can be repacked at this point by applying Polaris Premium Marine Grease (PN 2871066).
2. Using a brass drift, tap bearing spacer to one side enough to expose inner race. Drive bearing out using a drift through the opposite side of the hub.
3. Remove spacer and drive other bearing out.
4. Clean hub and spacer thoroughly.
5. Inspect spacer for wear or damage. Measure length of spacer and replace if worn beyond service limit.

Recommended Bearing Packing:
Polaris Premium Marine Grease
(PN 2871066)

Bearing Spacer Length:
Service Limit: 2.1850″ (5.55 cm)

Bearing Installation

1. Pack bearings with Polaris Premium Marine Grease (PN 2871066). Drive one of the bearings into rear of hub using a 1.180 (46 mm) bearing driver. **CAUTION:** *Do not* drive on the inner race of the bearing.
2. Coat bearing spacer with grease and install into hub. Drive other bearing into hub until seated.
3. Install seal into hub (with numbers facing out) until flush with end of seal bore.
4. Apply grease to washer and install with spindle nut. Torque nut to 40 ft. lbs. (5.52 kg/m) and install cotter pin. Tighten nut slightly if necessary to align cotter pin holes. Bend both ends of cotter pin around nut in opposite directions.

Spindle Nut Torque:
40 ft. lbs. (5.52 kg/m)

5. Inspect O-Rings on hub cap for wear, cracks or damage and replace if necessary.
6. Apply a light film of grease to hub cap and install until fully seated.
7. Rotate the hub. It should rotate smoothly without binding or rough spots.
8. Install wheel and wheel nuts and torque evenly in a cross pattern to 15 ft. lbs. (2.07 kgm).

Fox™ Shock Maintenance

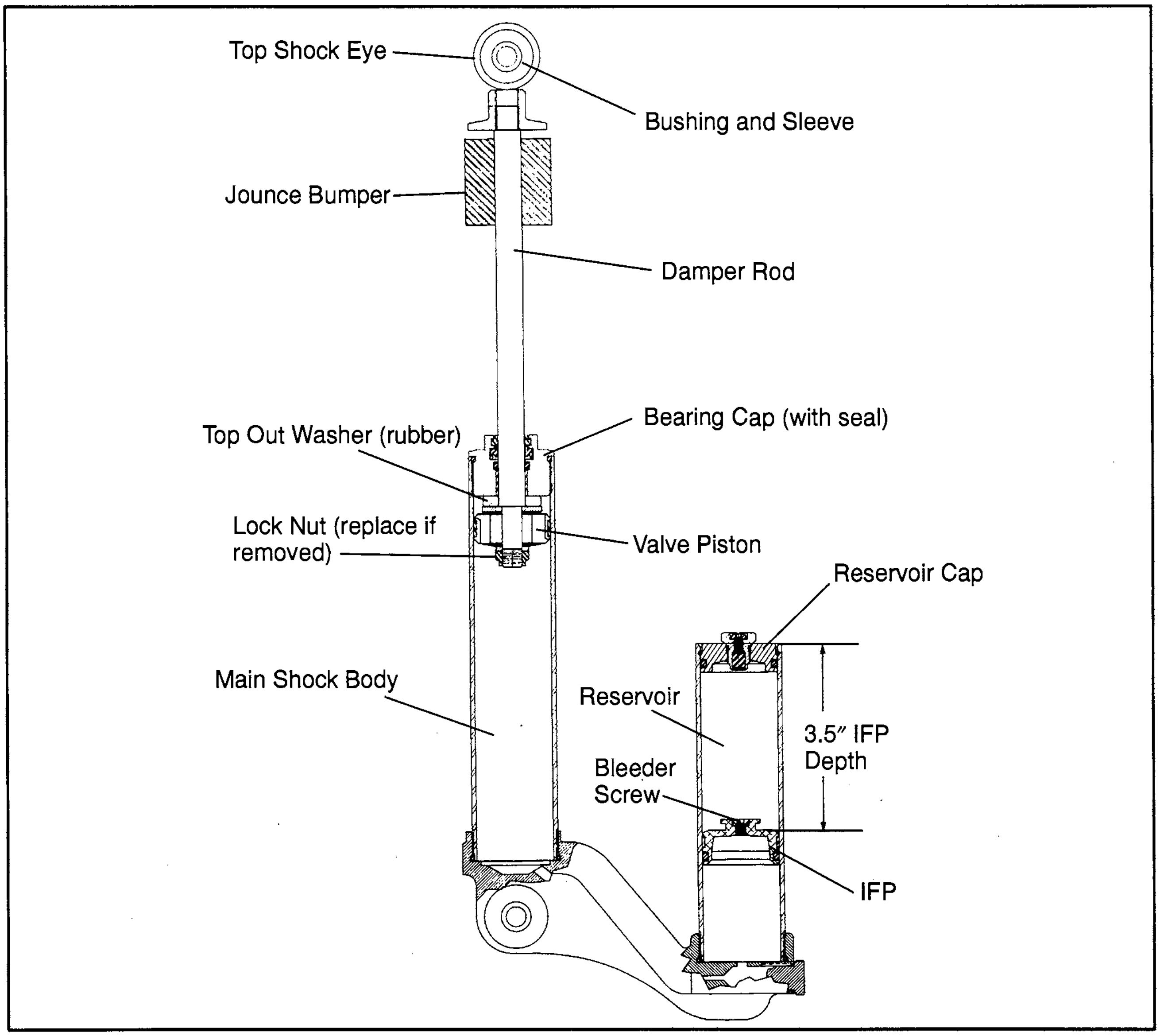
Oil in the Fox™ shock should be changed annually to maintain a high level of performance, minimize wear, and prevent corrosion of internal components. When performing maintenance on Fox™ shocks, use the Gas Shock Recharging Kit (PN 2200421). It consists of the necessary valves, pressure gauge, and fittings to deflate and pressurize the shocks.

WARNING: Fox™ shocks contain high pressure nitrogen gas. Extreme caution must be used while handling and working with Fox™ shocks and the related high pressure service equipment. The pressure must be released from the shock before disassembly. We strongly recommend you wear safety glasses and ear protection during service of these shocks.

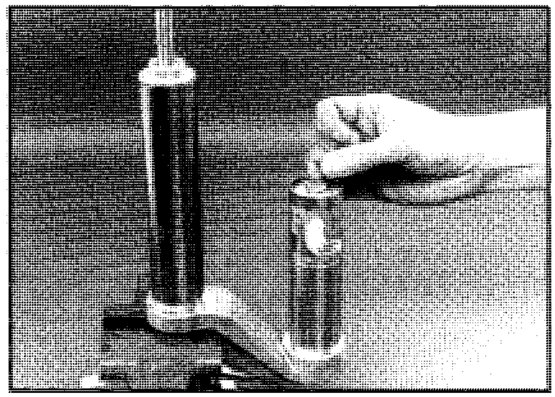
CAUTION: Extreme cleanliness is of utmost importance during all disassembly and reassembly operations to prevent dirt or foreign particles from entering the shock.

Tools Required:

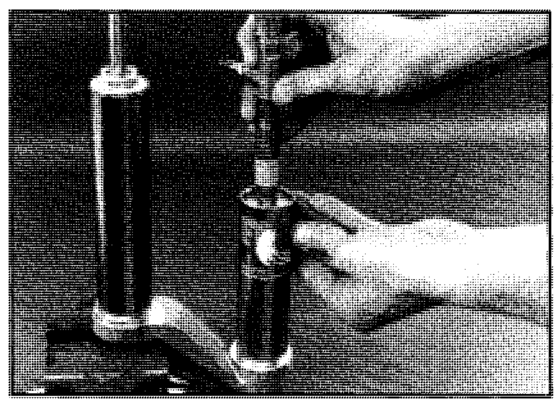
- Body Holding Tool (PN 2871017)
- Shock Spring Compressor Tool (PN 2870623)
- Damper Rod Holding Tool (PN 2871352)
- Safety Needle (PN 7052069)
- Gas Shock Recharging Kit (PN 2200421)
- Fox™ Shock IFP Tool (PN 2871351)



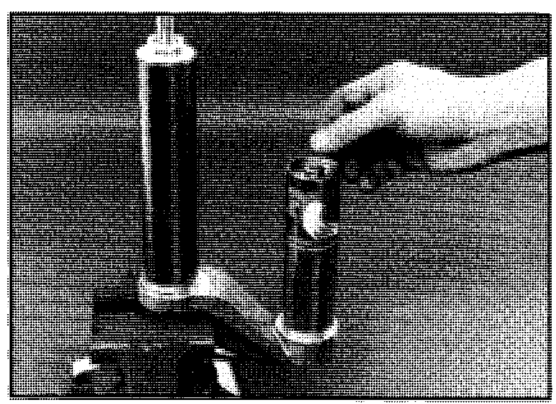
1. Clean shock thoroughly to remove all dirt, oil, and grease. Dry completely with compressed air.
2. Inspect the upper and lower shock bushings and inner sleeves for wear or damage and replace if necessary. Remove the lower shock bushings and sleeve.
3. Position and clamp lower shock mount in a soft jawed vise with reservoir and shock body upright.
4. Install shock spring compressor tool (PN 2870623). Compress spring and remove spring retainer, spring, and protector sleeve from shock body.
5. Remove cap screw from pressure valve located in the reservoir cap.



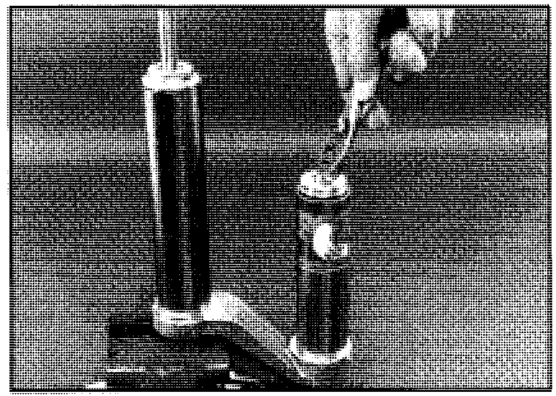
6. Install safety needle into pressure gauge assembly. Install red fitting (on the end of the safety needle assembly) squarely into the pressure valve recess.
7. With valve outlet pointed in a safe direction, depress and hold the safety release detent pin on safety needle and push gauge assembly forward to compress the unit. This will fully insert the needle through the rubber core of the pressure valve. **NOTE:** Be sure to hold the gauge assembly at a 90° angle to the pressure valve to avoid damage to the safety needle. When pressure gauge registers zero, the shock has been de-pressurized.



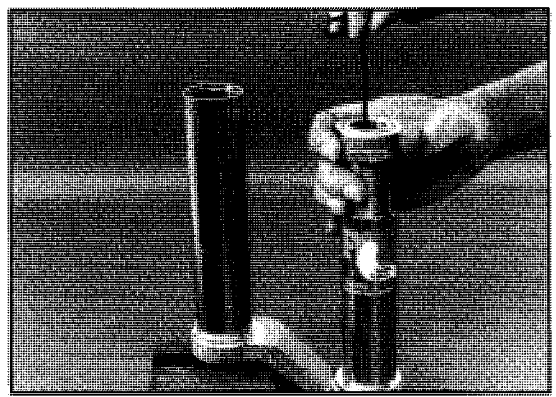
8. Push the reservoir cap down just enough to expose the retaining circlip. Remove the circlip being careful not to damage the reservoir chamber bore or circlip groove.

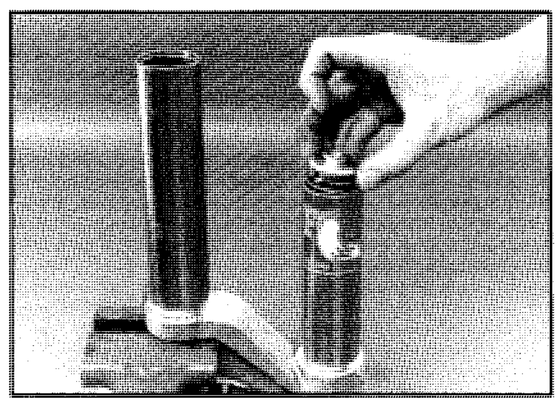


9. Remove the reservoir cap carefully with a pliers.

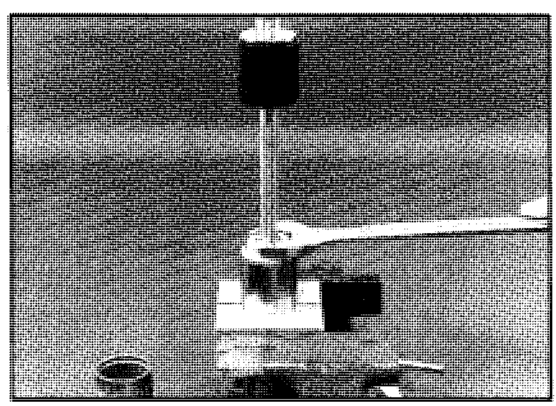


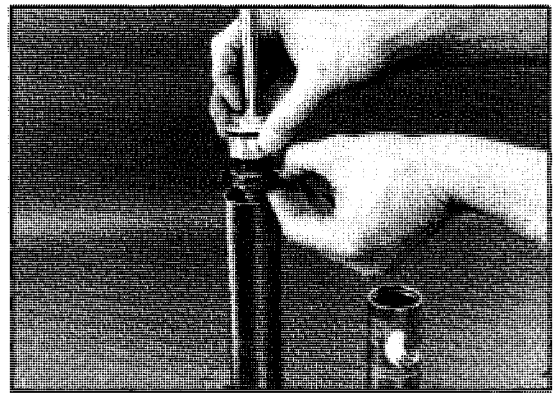
10. Remove bleeder screw from internal floating piston (IFP) using IFP Holding Tool (PN 2871351) and a 1/8″ hex wrench. To remove IFP from reservoir, install holding tool, rotate tool 1/4 turn, and pull the piston slowly upward. Be prepared to catch IFP piston ring when piston is remove from reservoir.



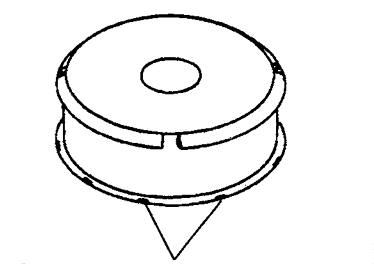


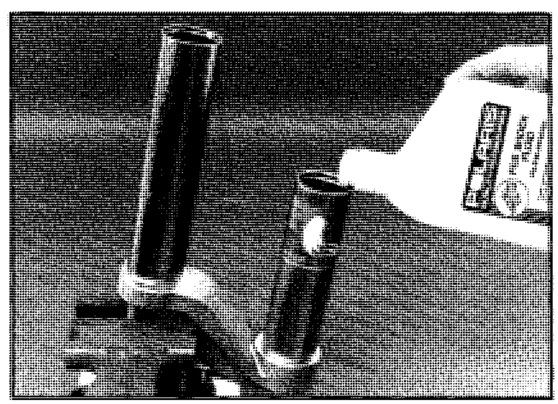
11. Using a 1″ wrench, loosen shaft bearing cap. **NOTE:** If the shock body starts to unscrew from the reservoir casting, install body holding tool (PN 2871071). Position the tool approximately 1 1/2″ below the bearing cap as shown, tighten securely in the vise and loosen the bearing cap.



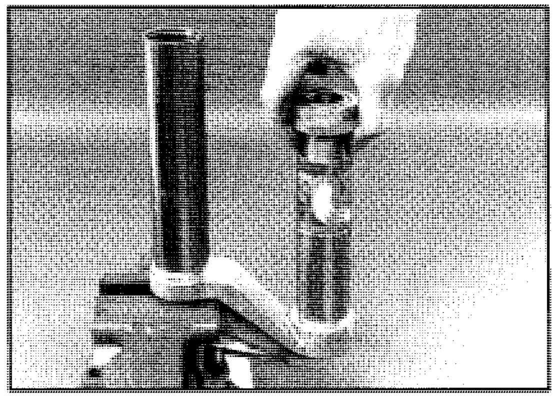


12. Unscrew the bearing cap completely and pull shock rod and piston straight out to avoid seal or valve damage. **NOTE:** Be prepared to catch the valve assembly piston ring. It may fall out when the valve assembly is removed from the shock body.
13. Remove shock from vise, drain oil from shock body and dispose of properly.
14. Clean shock body with clean high flash point solvent and dry thoroughly with compressed air. Inspect walls of shock and reservoir body for wear or damage.
15. To clean the damper valve assembly, slide the jounce bumper away from the top shock eye toward the valve assembly. Position the holder with the valve assembly facing upward. **CAUTION:** Be sure the shaft and tool are clean and free of debris before installing the tool, or shaft damage may result.
16. Remove the valve assembly locknut to allow thorough cleaning of individual valving washers. Clean with solvent and dry thoroughly with compressed air. **CAUTION:** Pay close attention to the order of valving washers and the direction of the holes in the valve piston. All parts must be replaced in the same order as removed to maintain proper dampening characteristics.
17. Remove and clean all valve washers and valve piston with solvent and dry thoroughly with compressed air. Assemble in the same order as removed.
18. Replace lock nut with a new one (PN 1500016) and tighten to 18 ft. lbs. **CAUTION:** Locking properties of nut will be reduced when nut is loosened or removed. Replace lock nut before reassembly. Do not re-use old nut.
19. Mount shock in vise a t a10° to 15° angle. Pour oil (PN 2870995 only) down the side of reservoir *slowly* until level is equal in main shock body. Continue to fill reservoir within 1/4″ from top, and set the shock upright in vise.

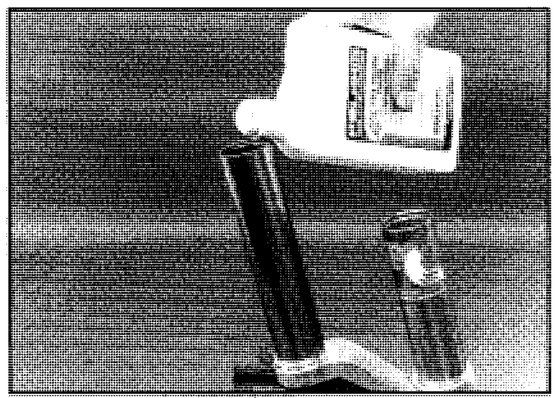




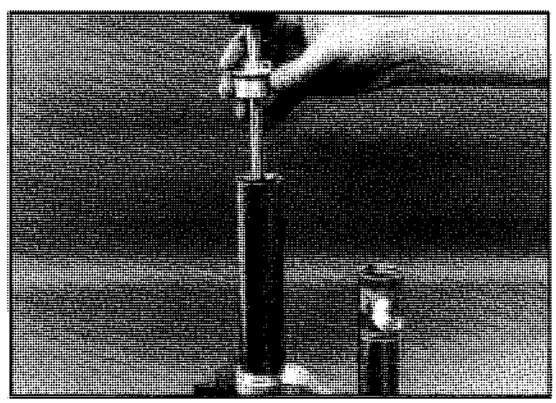
20. Lubricate O-Ring and piston ring on IFP with clean shock oil. Compress the piston ring and install carefully in reservoir
21. Push piston into reservoir slowly, allowing air to escape from beneath piston through bleed hole as piston is installed. Continue to push piston into reservoir approximately 2″. Piston will be submerged in oil.
22. Inspect bleeder screw O-Ring for damage and replace if necessary. Install bleeder screw and O-Ring lightly in piston. Do not tighten at this point.



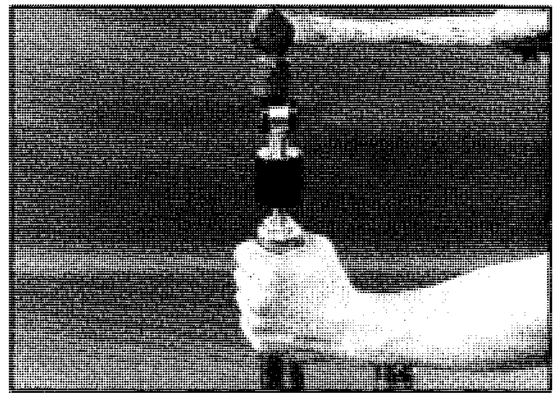
23. Tip shock to a 15° angle and fill main shock body to 1 1/2″ from top. Always add oil slowly to minimize air bubbles in oil.
24. Slide jounce bumper to top of damper rod and position bearing cap in middle of rod.
25. Compress piston ring and insert rod into shock body until half submerged in oil. Rotate rod and wiggle piston and rod to help disperse air from valve piston.



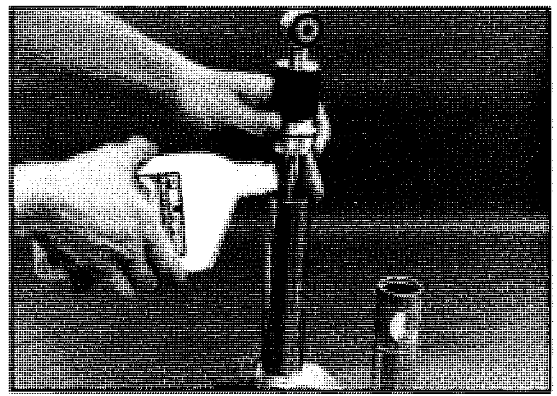
26. Continue to slide piston in until completely submerged. Tip shock upright.
27. Slowly push rod and valve piston assembly into shock body and screw bearing cap in until O-Ring touches shock body.



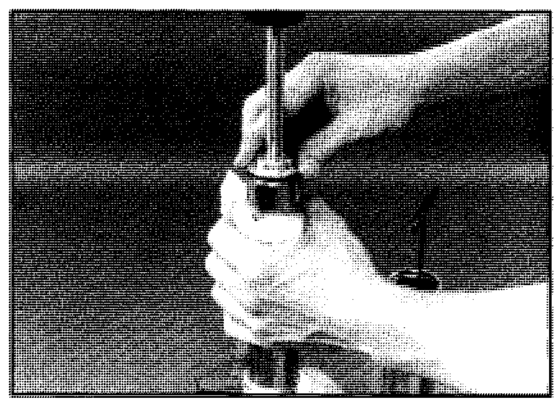
28. Support shock with one hand and strike top shock eye with a soft face hammer two to three times. This will force oil through the valve piston and push remaining air out.
29. Unscrew bearing cap and lift rod slowly upward, adding oil as necessary to keep the valve piston assembly submerged in oil. **IMPORTANT:** Do not allow valve piston assembly to come out of the oil.



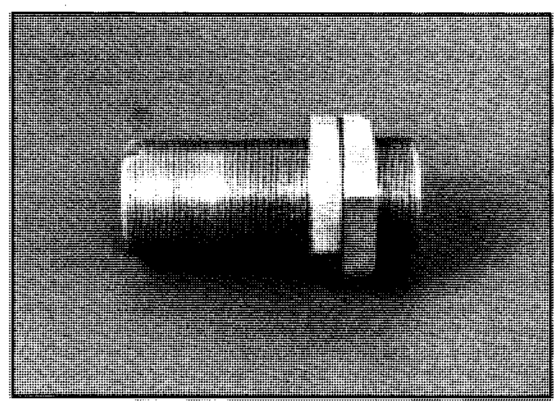
30. Add oil as rod is lifted upward until valve piston is just below threads in shock body. fill shock completely and wrap a shop cloth around the shock body. If air bubbles are present, wipe them away or push them over the edge of shock body.



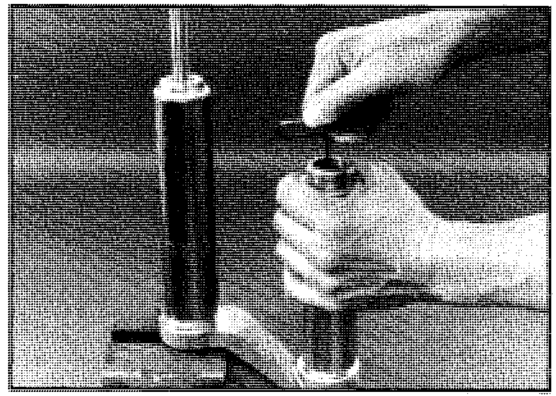
31. Screw bearing cap into shock body. Tighten cap to 8 ft. lbs. using a 1″ crowfoot wrench.
32. Extend shock damper rod completely.
33. Remove bleeder screw from IFP.



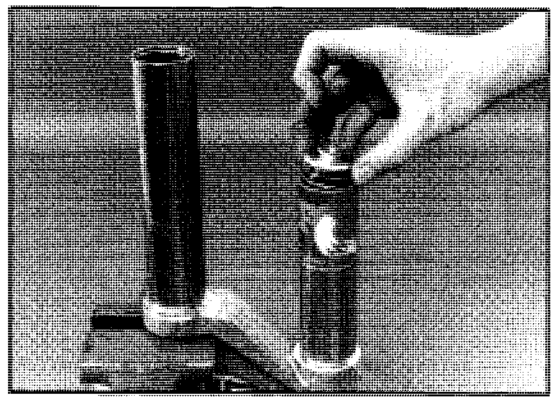
34. Set depth gauge on IFP holder tool to specified depth.



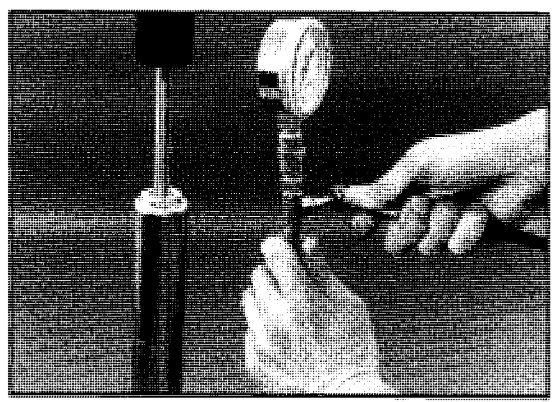
35. Install holder tool in reservoir and push IFP in slowly until depth gauge contacts reservoir body. Hold IFP with tool and tighten bleeder screw securely.
36. Drain and clean residual oil from reservoir.



37. Install reservoir cap and retaining circlip. **CAUTION:** Be sure circlip is in good condition and firmly seated in groove.



38. Install safety needle and pressurize shock with nitrogen to 200 PSI.
39. Install cap screw in pressure valve.



WHAT	LUBE RECOMMENDED	METHOD	WHEN
1. Rear Axle Bearing	Grease *	Grease gun, fitting	Semi ** Annually - 50 hrs.
2. Front Wheel Bearings (2WD)	Grease *	Remove, clean, hand pack	Semi ** Annually - 50 hrs.
3. Front Wheel Bearings (4WD)	ATF Type F	Remove, clean, and refill to 4:00 level	Semi Annually - 50 hrs.
4. Swing Arm Bushings	Grease *	Grease gun, fitting	Semi ** Annually - 50 hrs.
5. Ball Joints	Grease *	Grease gun, fitting on back side of struts	Semi ** Annually - 50 hrs.
6. Front A Arm Pivot Shafts	Grease *	Grease gun, fitting	Semi ** Annually - 50 hrs.
7. Tie Rod Ends	Grease *	Lift boot up, apply grease	Semi ** Annually - 50 hrs.
8. Steering Post Bushings	Grease *	Grease gun, fitting or remove cotter pin, slide up post, hand grease and reassemble	Semi *** Annually - 50 hrs. or 1000 miles; whichever comes first
9. Engine Oil	Polaris Injection Oil	Fill oil tank	When refueling
(Magnum)	Polaris 0W40	Fill oil tank to proper level	When refueling
10. Type I Chain Type Transmission	Polaris Chaincase Oil	To check plug	Change Annually - 100 hrs.
11. Type II Gear Type Transmission	SAE 30W Oil	Fill to full level on dipstick	Change Annually - 100 hrs.
12. Type III Chain Gear Type Transmission	Polaris Chaincase Oil	Fill to full level on dipstick	Change Annually - 100 hrs.
13. Cables (Throttle, Choke Speedo and Shift)	Polaris Cable Lube	Lube into cable housing	Semi Annually - 50 hrs.
14. Drive Chain	Polaris Chain Lube	Lube under rollers and between plate of moving chain	As Required
15. Brake Fluid	DOT 3 Only	Type I - 1/8″ (3.5mm) from top of reservoir	2 years
16. Brake Fluid	DOT 3 Only	Type II- 1/4″ (7 mm) from top of reservoir	2 years
17. Engine Counterbalancer (350L)	10W30 Oil	Fill to bottom of fill hole threads	Change Annually -Housing 100 hrs.
(400L)	10W30 Oil	70 to 75 CCs as indicated on dipstick	Change Annually -Housing 100 hrs.
18. Transmission Output Shaft (4WD)	Grease *	Grease gun, fitting	Semi Annually - 50 hrs.

* Grease - Conforming to NLG1NO.2 - such as Conoco Superlube M or Mobilgrease Special, Polaris High Temp.
** More often under severe use, such as dirty or wet conditions.
***Apply grease if bushings start to squeak or if steering effort increases; more often under severe use, such as dirty or wet conditions.
Hrs. are based on a 10 mph average.

Optional Suspension Springs

Although your Polaris ATV suspension has the capability of providing you with the best ride possible, the following accessory springs are available to better suit your individual riding preference. **NOTE:** Optional springs may be a different color than standard springs. Owner may paint springs to desired color using Polaris touch up paint, available through your dealer.

1994	SOFT ←		→ FIRM
Trail Blazer - Rear Compression Spring	7041204-194 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
Trail Blazer - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-194 STANDARD 81 lb/in	N/A
Trail Boss - Rear Compression Spring	7041204-179 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
Trail Boss - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-179 STANDARD 81 lb/in	N/A
250/300 2x4 - Rear Compression Spring	7041204-157 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
250/300 2x4 - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-157 STANDARD 81 lb/in	N/A
Sport - Rear Compression Spring	7041204-093 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
Sport - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-093 STANDARD 81 lb/in	N/A
350/400L 2x4 - Rear Compression Spring	7041204-093 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
350/400L 2x4 - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-093 STANDARD 81 lb/in	N/A
250/300 4x4 - Rear Compression Spring	7041204-195 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
250/300 4x4 - Front Strut Spring	7041238-195 STANDARD 61 lb/in	7041161-157 OPTION 81 lb/in	N/A
350/400L 4x4 - Rear Compression Spring	7041204-093 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
350/400L 4x4 - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-093 STANDARD 81 lb/in	N/A
250/300 6x6 - Rear Compression Spring	7041204-157 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
250/300 6x6 - Front Strut Spring	7041238-157 STANDARD 61 lb/in	7041161-157 OPTION 81 lb/in	N/A
350/400L 6x6 - Rear Compression Spring	7041204-157 OPTION 190 lb/in	7041303-093 STANDARD 250 lb/in	7041299-132 OPTION 300 lb/in
350/400L 6x6 - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-093 STANDARD 81 lb/in	N/A
Sportsman 350/400L 4x4 - Rear Compression Spring	7041204-067 STANDARD 190 lb/in	7041303-093 OPTION 250 lb/in	7041299-132 OPTION 300 lb/in
Sportsman 350/400L 4x4 - Front Strut Spring	7041238-157 OPTION 61 lb/in	7041161-093 STANDARD 81 lb/in	N/A

1995	SOFT ◄		► FIRM
Trail Blazer - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 OPTION 190 lb/in	7041303-067 OPTION 250 lb/in
Trail Blazer - Front Strut Spring	7041238-067 STANDARD 61 lb/in	7041161-067 OPTION 81 lb/in	7041450-067 OPTION 101 lb/in
Trail Boss - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in
Trail Boss - Front Strut Spring	7041238-067 STANDARD 61 lb/in	7041161-067 OPTION 81 lb/in	7041450-067 OPTION 101 lb/in
300 2x4 - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in
300 2x4 - Front Strut Spring	7041238-067 STANDARD 61 lb/in	7041161-067 OPTION 81 lb/in	7041450-067 OPTION 101 lb/in
Sport - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in
Sport - Front Strut Spring	7041238-067 OPTION 61 lb/in	7041161-067 STANDARD 81 lb/in	7041450-067 OPTION 101 lb/in
400 2x4 - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in
400 2x4 - Front Strut Spring	7041238-067 OPTION 61 lb/in	7041161-067 STANDARD 81 lb/in	7041450-067 OPTION 101 lb/in
300 4x4 - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in
300 4x4 - Front Strut Spring	7041238-067 STANDARD 61 lb/in	7041161-067 OPTION 81 lb/in	7041450-067 OPTION 101 lb/in
Xplorer 4x4 - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in
Xplorer 4x4 - Front Strut Spring	7041238-067 OPTION 61 lb/in	7041375-067 STANDARD 64/113 lb/in	7041450-067 OPTION 101 lb/in
Scrambler 4x4 - Rear Compression Spring	7041389-067 STANDARD 175 lb/in	7041204-067 OPTION 190 lb/in	7041303-067 OPTION 250 lb/in
Scrambler 4x4 - Front Strut Spring	7041238-067 OPTION 61 lb/in	7041376-067 STANDARD 52/131 lb/in	7041450-067 OPTION 101 lb/in
400 6x6 - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 OPTION 190 lb/in	7041303-067 STANDARD 250 lb/in
400 6x6 - Front Strut Spring	7041238-067 OPTION 61 lb/in	7041375-067 STANDARD 64/113 lb/in	7041450-067 OPTION 101 lb/in
Sportsman - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 OPTION 190 lb/in	7041303-067 STANDARD 250 lb/in
Sportsman - Front Strut Spring	7041238-067 OPTION 61 lb/in	7041375-067 STANDARD 64/113 lb/in	7041450-067 OPTION 101 lb/in

Optional Suspension Springs

1995	SOFT ◄		► FIRM
Magnum 2x4 - Front Strut Spring	7041238-067 OPTION 61 lb/in	7041376-067 STANDARD 52/131 lb/in	7041450-067 OPTION 101 lb/in
Magnum 2x4 – Rear Compression spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in
Magnum 4x4 – Front Strut Spring	7041238-067 OPTION 61 lb/in	7041375-067 STANDARD 64/113 lb/in	7041450-067 OPTION 101 lb/in
Magnum 4x4 - Rear Compression Spring	7041389-067 OPTION 175 lb/in	7041204-067 STANDARD 190 lb/in	7041303-067 OPTION 250 lb/in

MODEL	PAINTED PART	COLOR DESCRIPTION	DITZLER NUMBER	POLARIS NUMBER
Trail Blazer	Springs	Purple Velvet	51467	8520160
	Rims	Bright White	2185	8520153
Trail Boss	Springs	Aqua Marine	46975	8520159
	Rims	Bright White	2185	8520153
Sport 400	Springs	Fire Red	72060	8520149
	Rims	Bright White	2185	8520153
300 2x4	Springs	Bonnie Blue	12908	8520148
	Rims	Brushed Aluminum	N/A	N/A
	Rack	Light Gray	N/A	8520161
400 2x4	Springs	Fire Red	72060	8520149
	Rims	Brushed Aluminum	N/A	N/A
	Rack	Bonnie Blue	12908	8520148
300 4x4	Springs	Eddie Bauer Green	44931	8520150
	Rims	Brushed Aluminum	N/A	N/A
	Rack	Eddie Bauer Green	44931	8520150
Xplorer 4x4	Springs	Fire Red	72060	8520149
	Rims	Brushed Aluminum	N/A	N/A
Scrambler 4x4	Springs	Lavender	N/A	8520157
	Rims	Bright White	2185	8520153
Sportsman	Springs	Black	9440	8520147
	Rims	Black	9440	8520147
	Rack	Black	9440	8520147
400 6x6	Springs	Eddie Bauer Green	44931	8520150
	Rims	Brushed Aluminum	N/A	N/A
	Rack	Eddie Bauer Green	44931	8520150
	Box	Eddie Bauer Green	44931	8520150
Magnum 2x4	Springs	Eddie Bauer Green	44931	8520150
	Rims	Brushed Aluminum	N/A	N/A
	Rack	Steel Gray	N/A	8520056
Magnum 4x4	Springs	Bonnie Blue	12908	8520064
	Rims	Brushed Aluminum	N/A	N/A
	Rack	Bonnie Blue	12908	8520064

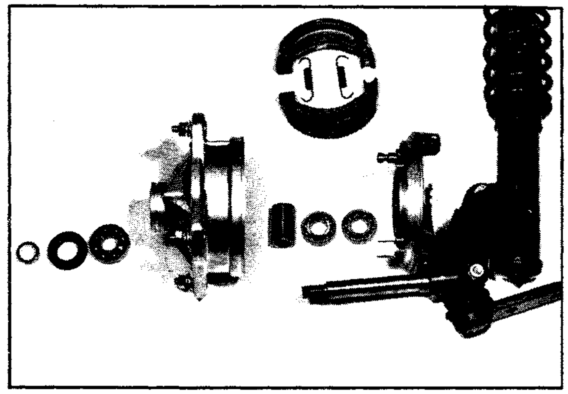
CHAPTER 3

BRAKE SERVICE

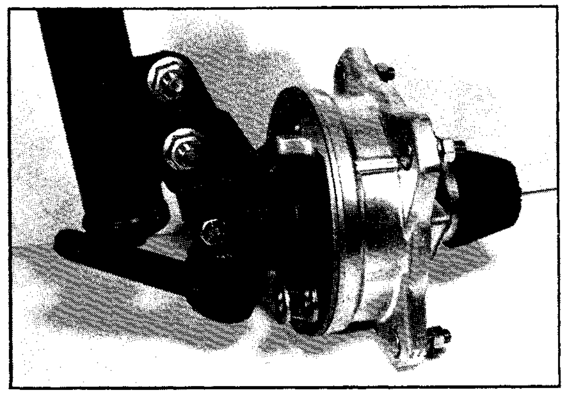
Polaris ATVs have utilized different braking systems on their various models. To assist with identification and repair procedures, the following brake systems are identified by type and model year the type was used on. To make repairs, be sure to identify the model number being repaired and refer to the correct parts manual when ordering parts.

1. Remove dust cap, cotter pin and castle nut.
2. Pull hub and brake assembly off spindle.
3. Inspect brake shoes, bearings and seals. Replace worn or damaged parts.

CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.



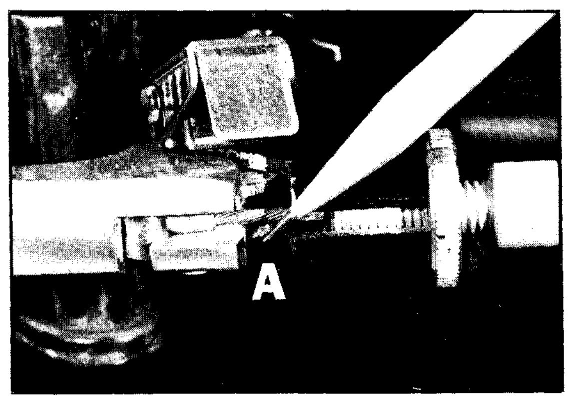
4. Reassemble brake assembly and brake drum and install onto spindle.
5. Torque spindle castle nut to 40 ft. lbs. (5.5 kg/m) and install new cotter pin. **NOTE:** Always install a new cotter pin if the nut is removed.



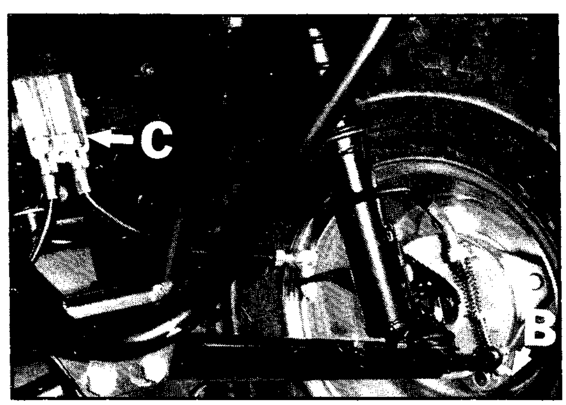
Front Brake Adjustment

The front brake cable should be adjusted so there is .2″ to .3″ (.5 to .8 cm) of free play at the handlebar lever.

1. Loosen locknut on brake lever holder and turn adjuster in fully for greater free play (A).

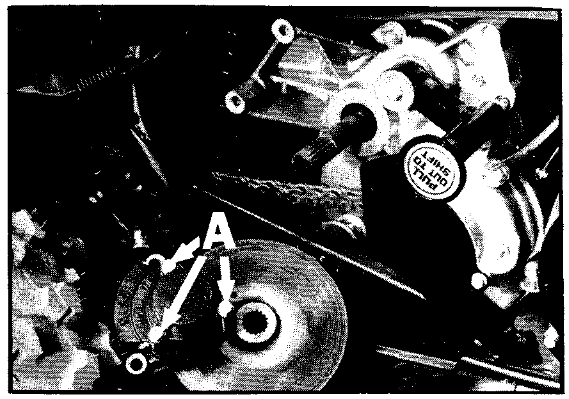


2. With front wheels safely supported off the floor, turn the adjuster on each brake shoe lever until a slight drag is noted when rotating the wheel. Then back off the adjuster slightly (B).
3. Continue adjustment until cable joint is horizontal when brake is applied (C).
4. Adjust lever for correct free play and tighten locknut.

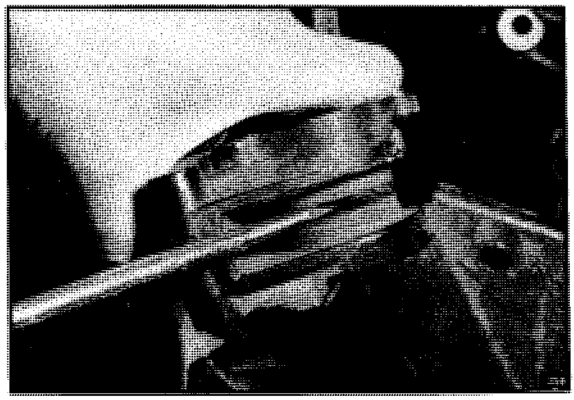


BRAKE SERVICE
Type I Mechanical Rear Brake Service

1. Remove rear brake caliper assembly from gearcase.
2. Remove three caliper bolts (A).
3. Disconnect and remove cable from ratchet arm assembly.



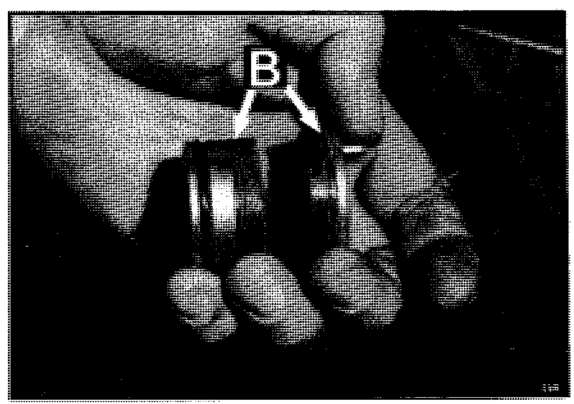
4. Remove ratchet adjuster assembly from caliper housing and push out brake pad as shown.



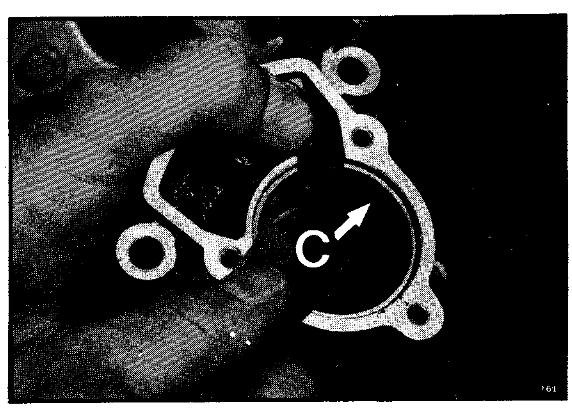
5. Inspect brake pad for wear and corrosion. Replace if worn to wear indicator groove (B).

CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.

6. Clean moveable piston and apply a light coating of brake grease.

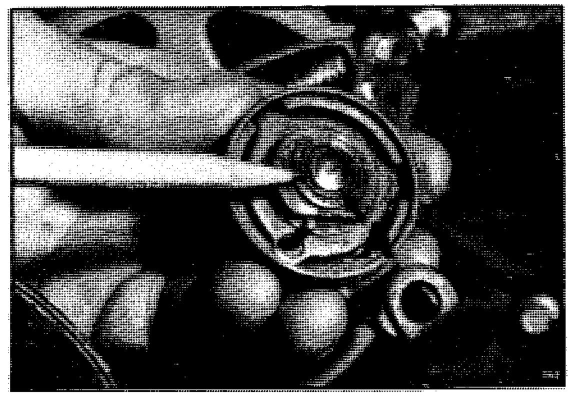


7. Polish piston bore (C) with crocus cloth and grease lightly.
8. Reinstall brake pads into caliper.



9. Reinstall ratchet. Rotate clockwise until it returns to its original position, flush with housing (A).

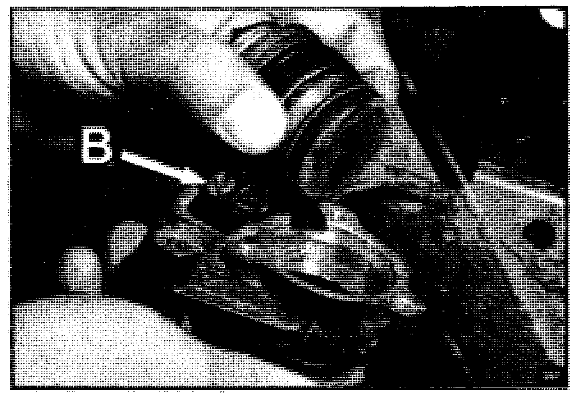
10. Reinstall cable into housing and ratchet arm.



11. Install pad and ratchet adjuster unit into the housing as an assembly (B).

12. Insert three caliper assembly bolts and reinstall onto transmission.

NOTE: Rear caliper components and brake cables change from model to model. Not all parts are interchangeable. Always order replacement parts from the correct parts book to be sure they will fit properly.



Rear Brake Adjustment

1. Loosen knurled jam nut (C).

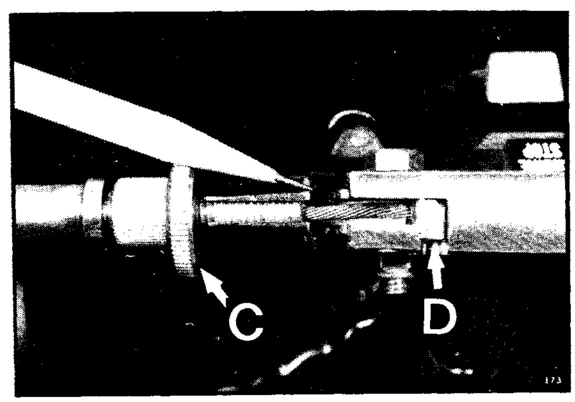
2. Rotate cable adjuster inward for greater free play (D).

3. Pump the brake lever 15 to 20 times.

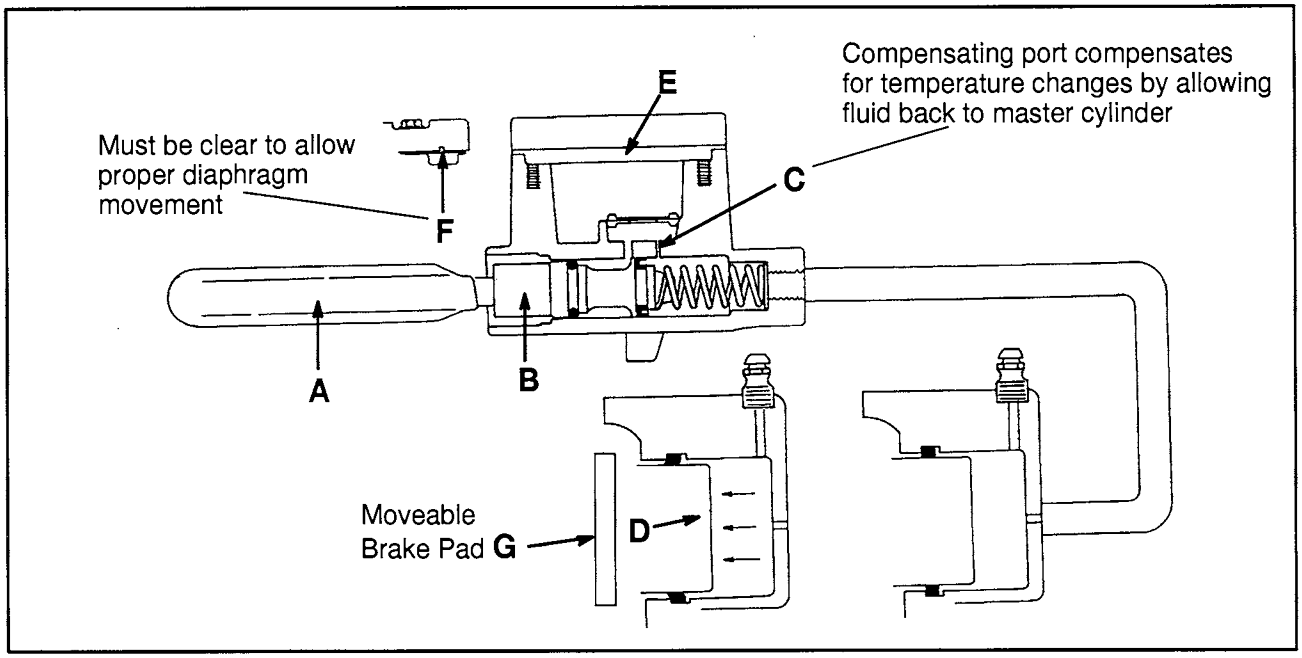
4. With the transmission in gear, roll the vehicle back and forth and apply the rear brake. Braking action should be noticed as the ratchet mechanism applies tension to the moveable brake puck.

5. Rotate cable adjuster until 1/4" (.6 cm) of lever free play exists.

6. Tighten jam nut.



Hydraulic Brake System Operation



The Polaris brake system consists of the following components or assemblies: brake lever; master cylinder; hydraulic hose; brake calipers (slave cylinder); brake pads; and brake discs, which are secured to the drive line.

When the hand activated brake lever (A) is applied it contacts a piston (B) within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port) (C) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the piston (D) located in the brake caliper moves outward and applies pressure to the moveable brake pad. This pad contacts the brake disc and moves the caliper in its floating bracket, pulling the stationary side pad into the brake disc. The resulting friction reduces brake disc and vehicle speed. As the lever pressure is increased, the braking affect is also increased.

The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper moves further outward and becomes self adjusting. Fluid from the reservoir fills the additional area created when the caliper piston moves outward.

Brake fluid level is critical to proper system operation. Too little fluid will allow air to enter the system and cause the brakes to feel spongy. Too much fluid could cause brakes to lock up due to fluid expansion.

Located within the master cylinder is the compensating port (C) which is opened and closed by the master cylinder piston assembly. The port is open when the lever is released and the master cylinder piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion (heated fluid) or contraction (cooled fluid). During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for fluid expansion. **Never overfill the reservoir!** Fill to 1/4″ (.64 cm) from top of cylinder for Type II, 1/8″ (.3 cm) from top of cylinder for Type I. **NOTE:** Refer to Table of Contents page for assistance in determining brake system type.

This system also incorporates a diaphragm (E) as part of the cover gasket; and a vent port (F) located between the gasket and the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Make sure the vent is open and allowed to function. If the reservoir is over filled or the diaphragm vent is plugged the expanding fluid may build pressure in the brake system leading to brake failure.

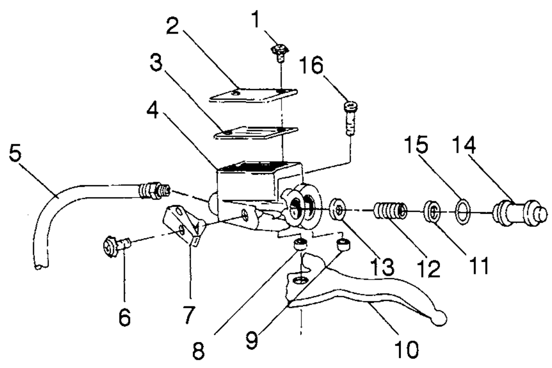
When servicing Polaris ATV brake systems use only Polaris DOT 3 high temperature brake fluid (PN 2870990). Polaris brake fluid is sold in 5.5 oz. bottles. **WARNING:** Once a bottle is opened, use what is necessary and discard the rest. Do not store or use a partial bottle of brake fluid. Brake fluid is hygroscopic, meaning it rapidly absorbs moisture from the air. This reduces the boiling temperature of the brake fluid, which can lead to early brake fade and the possibility of serious injury.

NOTE: Refer to Table of Contents page for assistance in determining brake system type.

Overhaul Procedure

CAUTION: Brake levers *are not* interchangeable between master cylinder assemblies. Be sure to identify brake levers for proper reinstallation.

1. Remove master cylinder from handlebar. **NOTE:** On models without a swivel fitting at the master cylinder brake line it will be necessary to remove the throttle block, switch block, and four bolts securing handlebar to handlebar block.



1. Cover Screw
2. Cover
3. Cover Gasket
4. Cylinder Casting
5. Brake Hose
6. Lock Attaching Screw
7. Lock Plate
8. Bushing
9. Set Screw
10. Brake Lever
11. U-Pack Seal
12. Spring
13. Spring Seat
14. Piston
15. O-Ring
16. Lever Screw

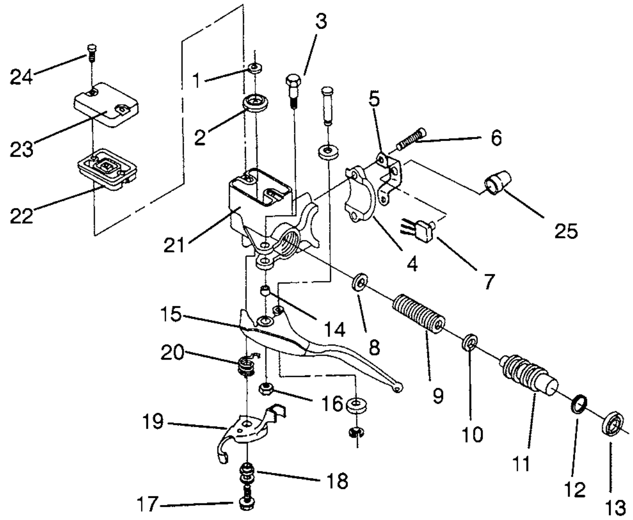
2. Loosen master cylinder set screw (9) and slide handlebar through master cylinder. **NOTE:** Use air pressure to remove and reinstall handgrip. Plug one grip end and blow air through the opposite grip.
3. Loosen brake line and rotate master cylinder off the line. **CAUTION:** Wipe up any spilled fluid with a shop cloth. Brake fluid will damage plastic and/or painted surfaces.
4. Remove brake lever screw (16), brake lever (10) and pivot bushing (8).
5. Remove and disassemble piston assembly (11, 14, 15).
6. Remove spring (12) and spring seat washer (13).
7. Remove cover. Discard cover gasket, U-pack seal and O-ring.
8. Inspect cylinder and piston for scores, scratches or corrosion. Clean and/or replace as required.
9. Polish any discolored or stained area with crocus cloth only. **NOTE:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. Do not use any other type of abrasive or abrasive cloth.
10. Clean piston and cylinder bore with denatured alcohol. Wipe dry with a clean, lint free cloth and blow with air.
11. Check ports in cylinder to be sure they are clean and open.

Reassembly Procedure

1. Make sure all parts are clean. Inspect for damage or wear and replace as necessary.
2. Coat piston assembly and cylinder bore with brake fluid. **NOTE:** Dip all parts into clean brake fluid before reassembly.
3. Install spring seat washer, spring and piston assembly into cylinder bore.
4. Use care to see that the new U-pack seal is undamaged and is installed properly.
5. Reinstall the brake lever, bushing and attaching screw.
6. Rotate master cylinder and reattach brake hose.
7. Reinstall cylinder onto handlebar and reassemble controls.
8. Fill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket.
9. Stroke the lever several times, slowly. This will allow the air to rise up and out of the master cylinder. Check fluid level. Fluid level should be maintained at 1/8″ (.3 cm) from the top of the reservoir. **WARNING:** Do not overfill master cylinder. Fluid expansion could cause brakes to lock, resulting in severe injury or death.
10. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.

Type II Master Cylinder Service

NOTE: Refer to Table of Contents page for assistance in determining brake system type.



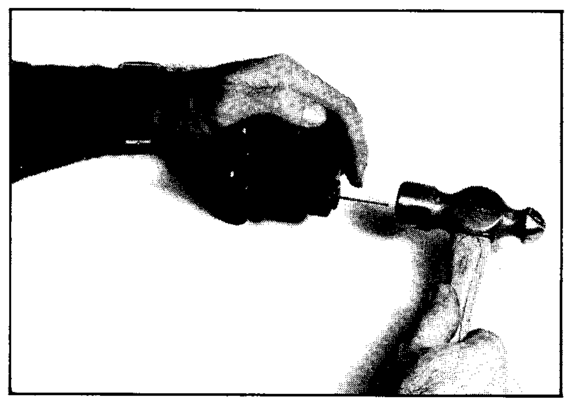
1. Baffle Washer
2. Baffle
3. Bolt, Brake Lever
4. Clamp, Master Cylinder
5. Bracket, Override Switch
6. Bolt
7. Switch, Override
8. Washer
9. Compression Spring
10. Seal, U-Pack
11. Piston, master Cylinder
12. O-Ring
13. Seal
14. Bushing, brake Lever
15. Brake Lever
16. Nut
17. Screw
18. Bushing, Park Brake
19. Park Brake Lever
20. Spring, Park Brake
21. Housing
22. Gasket
23. Cover
24. Screw
25. Boot

NOTE: Items 5,7, and 25 are used only on 1992 and prior units.

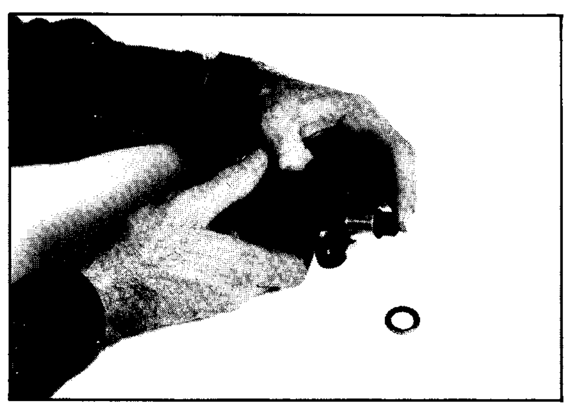
Overhaul Procedure

CAUTION: Brake levers *are not* interchangeable between master cylinder assemblies. Be sure to identify brake levers for proper reinstallation.

1. Remove the master cylinder from the handlebar. Be sure to use a shop cloth to catch any spilled fluid. Spilled fluid will damage plastic and/or painted surfaces. Loosen the brake line and rotate the master cylinder off of the line. Remove the cover, gasket and all brake fluid.
2. Remove the brake lever bolt, brake lever and pivot bushing (3,15,14). Inserting the push rod from the master cylinder service tool (2870962) in the hose end of the master cylinder, push the piston and seals out. NOTE: Use an arbor press or large vise to push the piston out. If these are not available, drive it out with a hammer. Inspect the master cylinder bore and piston for damage. Remove and discard the piston U-pack seal, O-ring and dust seal (10, 12, 13). Clean all parts with denatured alcohol. Polish any discolored parts with crocus cloth. When polishing the cylinder bore, rotate the cloth, do not push it in and out, as linear scratches may cause cylinder leakage. Check the compensating port in the master cylinder for obstruction. Blow all parts clean with compressed air.



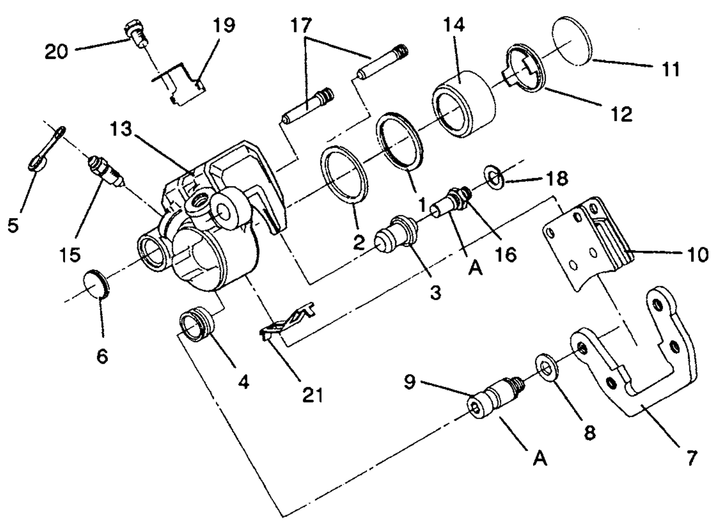
3. Install a new U-pack seal and O-ring on the piston. Lubricate the piston with brake fluid and push it into the installation tool with the U-pack seal on the undercut end of the tool. Place the washer (8) in the master cylinder and the spring (9) in the piston. Slide the tool, with piston and spring into the end of the master cylinder and push the piston onto the bore. Assure that the return spring and washer are properly positioned. Install a new dust seal (13) lip out and press into place with the non-undercut end of the installation tool. Reinstall the lever. Reinstall the master cylinder on the machine.



NOTE: Torque mounting bolts to 45-55 in. lbs. (6.2-7.6 kg/m).

Brake lines should not be over-tightened. Tighten to finger-tight, then turn in with a wrench two turns beyond. If the line leaks, remove it and apply pipe thread compound to the threads only and reassemble.

4. Fill the master cylinder to within 1/4" of the top of the reservoir and properly bleed the system. Check for any system fluid leaks. Field test the unit for proper brake operation.



1. Dust Seal
2. Piston Seal
3. Boot Busing
4. Boot
5. Bleeder cap
6. Dust Plug
7. Bracket
8. Friction SPG
9. Slide Pin
10. Brake Pad
11. Insulator
12. Plate Insulator
13. Caliper Housing
14. Piston
15. Bleeder
16. Pin Bolt
17. Hanger Pin
18. Wave washer
19. Plate Stopper
20. Screw
21. Pad Spring

A - Use brake grease

NOTE: Replace all four front brake pads when any portion of any pad's friction lining is worn to 1/2 its original thickness, or .075" (.2cm) (about the thickness of a nickel).

WARNING: Avoid getting any grease, oil, brake fluid, or similar compounds on the brake pad friction lining. They are a porous metallic material and will absorb oil and grease. **If a pad is contaminated it must be replaced.** Cleaning the pad is not acceptable.

Brake Pad Replacement

1. Remove the wheel and caliper attaching bolts.
2. Remove the two hanger pins (17) and remove the brake pads. Loosen the bleed screw and force the piston inward.
3. Install new pads, check pad spring placement (21). Torque hanger pins to 12 ft. lbs. (1.7 kg/m).
4. Install caliper. Torque caliper attaching bolts to 18 ft. lbs. (2.5 kg/m).
5. Install front wheels and torque retaining nuts to 15 ft. lbs. (2.1 kg/m).
6. Pump the brake lever lightly several times to seat new pads. Field test for proper braking action.

Caliper Overhaul

Disassembly

1. Remove the wheel and caliper brake line. Note the position of the brake line routing and washers for proper reassembly. Also, before removing the caliper, mark them right and left.

   CAUTION: Protect your eyes from brake fluid.

2. Remove the caliper bolts and disassemble the caliper on a clean bench. Open the bleed screw and drain out the old brake fluid, tighten bleed screw.
3. Remove the brake pad hanger pins, brake pads, and pad spring.
4. Place caliper with piston down and remove piston from piston casting by applying compressed air to the hydraulic inlet port.

   CAUTION: Use just enough air to do the job. Use extra care not to damage the piston or piston bore.

5. Using a small wooden or plastic stick, work out piston seals from their groove in the piston bore. Discard old seals.

   CAUTION: To avoid scratching the piston or burring edge of seal groove, do not use a metal tool such as a screwdriver.

Cleaning And Inspecting

Check all parts for wear or damage and replace any found defective.

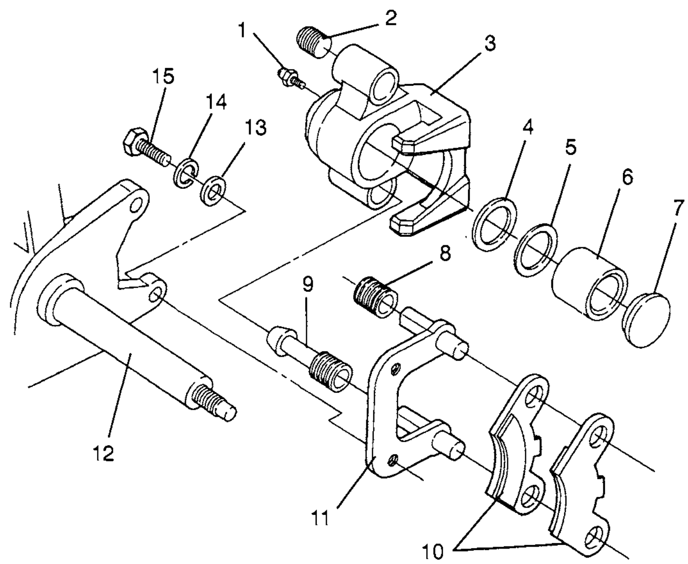
1. Clean all parts, except brake pads, with denatured alcohol and wipe dry with a clean, lint-free cloth. Using an air hose, blow out the drilled passages and bores.
2. Inspect casting cylinder bore for scoring, pitting, or corrosion. A corroded or deeply scored casting should be replaced; light scores and stains may be removed.
3. Polish any discolored or stained areas with crocus cloth only. Use finger pressure and rotate the crocus cloth in the cylinder bore. Do not slide the cloth in and out of the bore under pressure. Do not use any other kind of abrasive or abrasive cloth.
4. Check piston to see if it is pitted, scored, or worn. If so, discard and replace the piston. Do not attempt to polish or sand piston.
5. Clean piston with denatured alcohol and wipe dry with a clean, lint-free cloth. Using an air hose, blow dry.
6. Check inlet and bleeder hole threads for damage.

Caliper Assembly

Reassembly is basically the reverse of disassembly. Be sure that all parts are clean and serviceable before reassembling the unit.

1. Dip new piston seals in clean brake fluid and place in groove in the cylinder bore. Seals should be positioned at one point in the groove and then gently worked around the groove by hand until properly seated. Never use old seals.
2. Install the piston into cylinder bore as follows. Coat piston thoroughly with brake fluid and carefully work piston down the bore until bottomed.

   CAUTION: Apply force uniformly to avoid cocking piston in bore.
3. Examine pads for wear or damage. If any portion of any pad's friction lining is worn to less than half of the original thickness, .075″ (.2cm) (the thickness of a nickel) install a full set of new pads, new hanger pins and pad spring. If pads are okay, they may be reused. Be sure pads are installed in their original positions. If pads are replaced, replace in sets. Torque hanger pins to 12 ft. lbs. (1.7 kg/m).
4. Reinstall the caliper assembly to the units. Torque the caliper mounting bolts to 18 ft. lbs. (2.5 kg/m).
5. Reinstall the brake lines with new sealing washers. Fill the master cylinder with brake fluid.
6. Bleed the caliper assemblies as described in the brake bleeding pages of this chapter.
7. After bleeding, replace master cylinder cover gasket and add brake fluid in master cylinder no more than 1/8″ (.3cm) below reservoir top.
8. Field test the unit for proper braking action. Inspect system for leaks.



1. Bleeder Screw
2. Socket Set Screw
3. Caliper Housing
4. Square Ring
5. Square Ring
6. Caliper Piston
7. Insulator
8. Pin Boot Seal
9. Boot Bushing
10. Brake Pads
11. Mounting Bracket
12. Spindle and Brake Support
13. Washer Flat
14. Lock Washer
15. Retaining Bolt

Replacing Brake Pads

1. Remove the wheel and caliper attaching bolts.

   CAUTION: Always protect your eyes from brake fluid.

2. Remove the set screw (2), press and hold the mount assembly fully toward the piston and remove brake pad. Loosen the bleed screw and force the piston inward. Close bleeder after piston is compressed.
3. Install new pads.
4. Install caliper. Torque caliper attaching bolts to 18 ft. lbs. (2.5 kg/m)
5. Install the set screw and tighten until the brake pads rub on the disc when the wheel hub is rotated; then back off the set screw just until the disc rotates freely (approximately 1/2 turn).
6. Install front wheels and torque retaining nuts to 15 ft. lbs. (2.1 kg/m).
7. Pump the brake lever lightly several times to seat new pads. Check fluid level and fill to appropriate level. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.

Caliper Overhaul

Disassembly

1. Remove the wheel and the brake caliper, leaving the hydraulic line attached. Remove the brake pads as described above. Slowly pump the master cylinder to force the piston out of the bore. NOTE: If servicing both front calipers, allow both pistons to pump out equally.

   CAUTION: Always protect your eyes from brake fluid.

2. Remove the brake lines and disassemble the caliper on a clean bench.
3. Using a small wooden or plastic stick, work out piston seals from their groove in the piston bore. Discard old seals.

   CAUTION: To avoid scratching piston or burring edge of seal groove, do not use a metal tool such as a screwdriver.

Type II Hydraulic Caliper Service Front
Also 4x6 and 6x6 Rear

Cleaning And Inspecting

Check all parts for wear or damage and replace any found defective.

1. Clean all parts, except brake pads, with denatured alcohol and wipe dry with a clean, lint-free cloth. Using an air hose, blow out the drilled passages and bores.
2. Inspect casting cylinder bore for scoring, pitting, or corrosion. A corroded or deeply scored casting should be replaced; light scores and stains may be removed.
3. Polish any discolored or stained areas with crocus cloth only. Use finger pressure and rotate the crocus cloth in the cylinder bore. Do not slide the cloth in and out of the bore under pressure. Do not use any other kind of abrasive or abrasive cloth.
4. Check piston to see if it is pitted, scored, or worn. If so, discard and replace the piston. Do not attempt to polish or sand piston.
5. Clean piston with denatured alcohol and wipe dry with a clean, lint-free cloth. Using an air hose, blow dry.
6. Check inlet and bleeder hole threads for damage.

Caliper Assembly

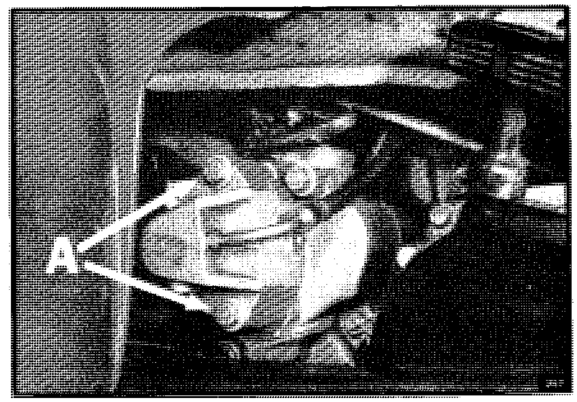
Reassembly is basically the reverse of disassembly. Be sure that all parts are clean and serviceable before reassembling the unit.

1. Dip new piston seals in clean brake fluid and place in groove in the cylinder bore. Seals should be positioned at one point in the groove and then gently worked around the groove by hand until properly seated. Never use old seals.
2. Install the piston into cylinder bore as follows. Coat piston thoroughly with brake fluid and carefully work piston down the bore until bottomed.

   CAUTION: Apply force uniformly to avoid cocking piston in bore.
3. Examine pads for wear or damage. If any portion of any pad's friction lining is worn to less than half of the original thickness, .075″ (.2 cm) (the thickness of a nickel) install a full set of new pads, new hanger pins and pad spring. If pads are in good condition, they may be reused. Be sure pads are installed in their original positions. If pads are replaced, replace in sets. Torque hanger pins to 12 ft. lbs. (1.7 kg/m).
4. Reinstall the caliper assembly to the units. Torque the caliper mounting bolts to 18 ft. lbs. (2.5 kg/m).
5. Reinstall the brake lines with new sealing washers. Fill the master cylinder with brake fluid.
6. Bleed the caliper assemblies as described in the brake bleeding pages of this chapter.
7. After bleeding, add brake fluid to no more than 1/8″ (.3 cm) below reservoir top on Type I master cylinders; 1/4″ (.6 cm) below reservoir on Type II master cylinders. Replace cover using new cover gasket.
8. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.

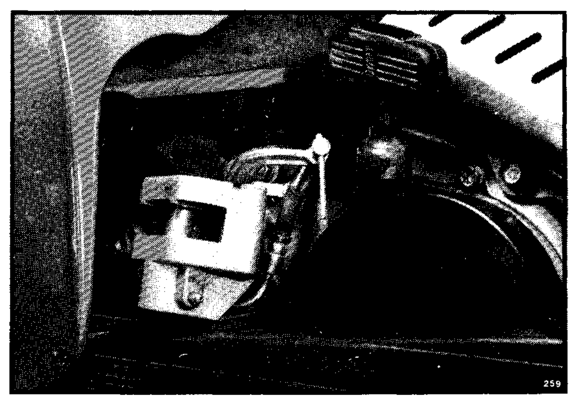
CAUTION: Wear goggles to protect eyes from brake fluid. If you get brake fluid in your eyes, contact your physician at once. Brake fluid will cause damage to painted surfaces. Use a shop towel to collect any spilled brake fluid.

1. Remove caliper attaching bolts (A).
2. Remove caliper assembly from disc.



3. Remove screw holding pin retaining clip.
4. Using brake pad, apply pressure to piston until flush with caliper. Remove brake pad retaining pins and pads. **NOTE:** The use of penetrating fluid may be necessary on corroded or rusted assemblies.

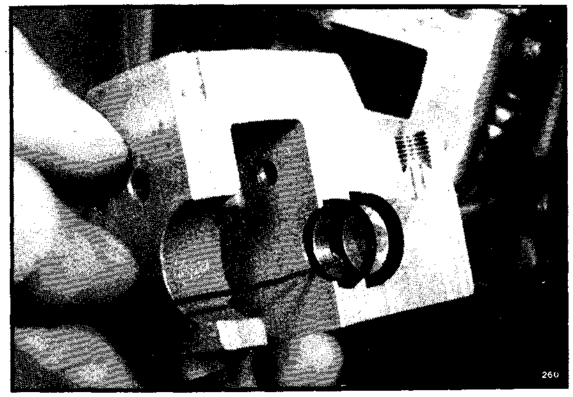
5. Squeeze master cylinder lever slowly for three full strokes.
6. Using a C clamp, clamp off brake hose as shown.
7. Loosen slave cylinder bleed valve and remove piston. Then tighten bleed valve securely.



8. Straighten a large paper clip and form a hook on one end. Polish the end of the clip so there are no sharp edges. **CAUTION:** Extreme care must be used to avoid scratching the cylinder bore seal ring groove surfaces.

9. Position the clip in the cylinder bore as shown. With a pushing, twisting action remove the large inside seal and small outer dust seal.

10. **Important:** Flush the cylinder bore with brake fluid and blow clean with compressed air.



11. Inspect cylinder bore for scoring, pitting, or corrosion. A corroded or scored casting should be replaced; light scores and stains may be removed by polishing. Polish any discolored or stained area with crocus cloth only. **NOTE:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. Do not use any other type of abrasive or abrasive cloth.

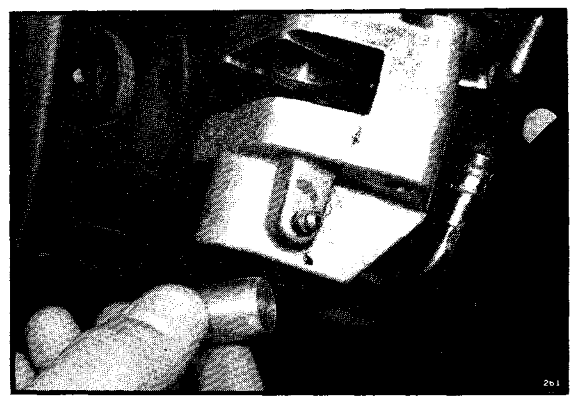
12. Lubricate new seals with brake fluid and install into cylinder bore.

13. Open bleed valve and fill bore with brake fluid.

14. Slide new piston into cylinder, large beveled end first. **NOTE:** Cover the bleed valve with a shop cloth while installing piston to prevent fluid spillage.

15. Close bleed valve.

16. Remove C clamp from brake hose.



Inspect for leaks using the following procedures. **NOTE:** Fluid can sometimes accumulate between the dust seal and the main seal. This does not necessarily indicate a leak.

1. Place both pads in the caliper to act as a piston stop.

2. Pump the handle 10 to 15 times to purge any fluid which may have accumulated between the seals during assembly.

3. Thoroughly wipe the piston and caliper dry.

4. Pressurize the brake system for approximately one minute. **NOTE:** The parking brake may be used to hold the pressure.

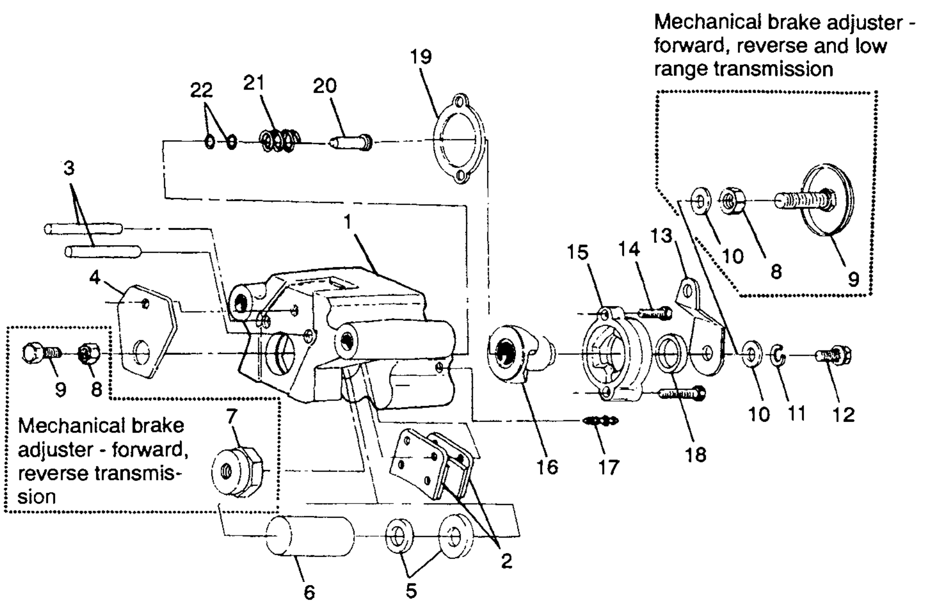
5. Check for "low pressure" leaks by lightly pumping the handle 5 to 10 times.

6. Reassemble caliper to disc. Torque retainer bolts to 15 ft. lbs. (2.1 kg/m).

7. Fill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type I cylinders should be filled to 1/8" (.3 cm) from the top; Type II cylinders should be filled to 1/4" (.6 cm) from the top. Type III cylinders should be filled to 1/4" -5/16" (.6-.8 cm) from the top.

8. Check lever travel. If soft or spongy, re-bleed system.

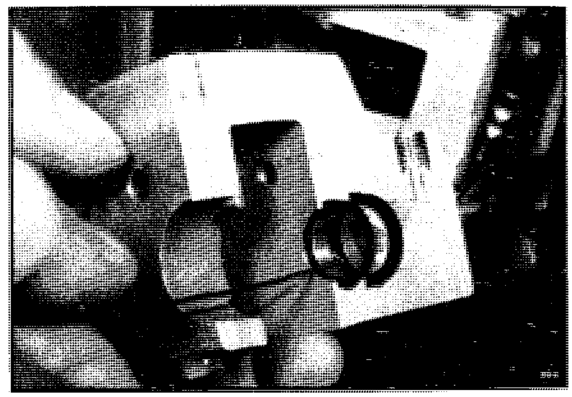
9. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes.



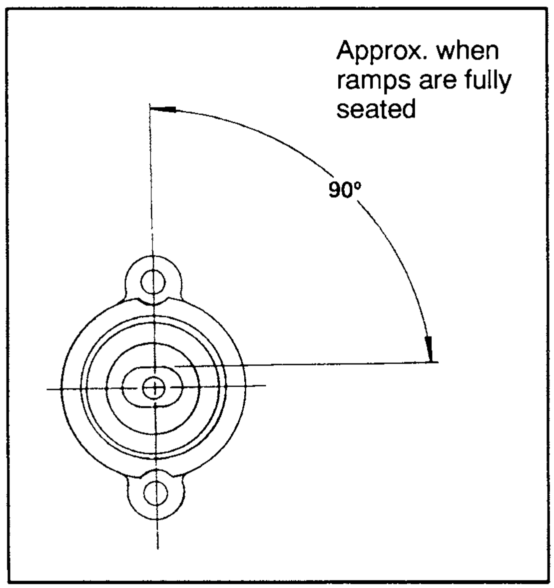
1. Brake Caliper
2. Brake Pads
3. Pad Pin Hangers
4. Pin Retainer Plate
5. Piston Seal Rings
6. Piston
7. Adjuster Nut
8. Jam Nut
9. Adjuster Bolt
10. Washer
11. Lock Washer
12. Bolt
13. Actuator
14. Bolt
15. Stationary Ramp
16. Moveable Ramp
17. Bleeder Screw
18. Seal
19. Gasket
20. Brake Apply Pin
21. Compression Spring
22. O-Rings

CAUTION: Wear goggles to protect eyes from brake fluid. If you get brake fluid in your eyes, contact your physician at once. Brake fluid will cause damage to painted surfaces. Use a shop towel to collect any spilled brake fluid.

1. Disconnect foot brake linkage and remove the two caliper attaching bolts.
2. Loosen adjuster bolt jam nut (8) and remove adjuster bolt (9).
3. Remove pin retaining plate (4), two pad retaining pins (3) and brake pads (2).
4. Remove caliper piston (6) by slowly squeezing master cylinder lever three full strokes.
5. Pinch off brake hose using a small C clamp or smooth faced locking pliers.
6. Loosen slave cylinder bleed screw (17) and remove piston (6).
7. Remove mechanical brake ramp assembly and brake apply pin (20).



8. Straighten a large paper clip and form a hook on one end. Polish the end of the clip so there are no sharp edges. **CAUTION:** Extreme care must be used to avoid scratching the cylinder bore seal ring groove surfaces.
9. Position the clip in the cylinder bore as shown. With a pushing, twisting action remove the large inside seal and small outer dust seal.
10. **Important:** Flush the cylinder bore with brake fluid and blow clean with compressed air.
11. Inspect cylinder bore for scoring, pitting, or corrosion. A corroded or scored casting should be replaced; light scores and stains may be removed by polishing. Polish any discolored or stained area with crocus cloth only. **NOTE:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. Do not use any other type of abrasive or abrasive cloth.
12. Lubricate new seals with brake fluid and install into cylinder bore.
13. Reinstall compression spring and push in brake apply pin.
14. Lubricate all sliding surfaces of brake ramps with a thin coat of grease.
15. Inspect ramp seal. Replace if necessary.
16. Using a new gasket, assemble ramp to brake caliper. **NOTE:** Moveable ramp must be positioned so the flats securing the brake arm are approximately 90° from the center line of the bolt holes in the flange when the ramps are fully seated together. See illustration.
17. Assemble the brake arm to the moveable ramp using the exploded view on the preceding page for proper positioning. **NOTE:** On low range transmissions, install the adjuster assembly with the adjuster backed off. On high range reverse transmissions, install the arm attaching hardware and tighten.
18. Open bleed screw and fill bore with brake fluid.
19. Slide new piston into cylinder, large beveled end first. **NOTE:** Cover the bleed screw with a shop cloth while installing piston to prevent fluid spillage.
20. Close bleeder screw and remove C clamp.

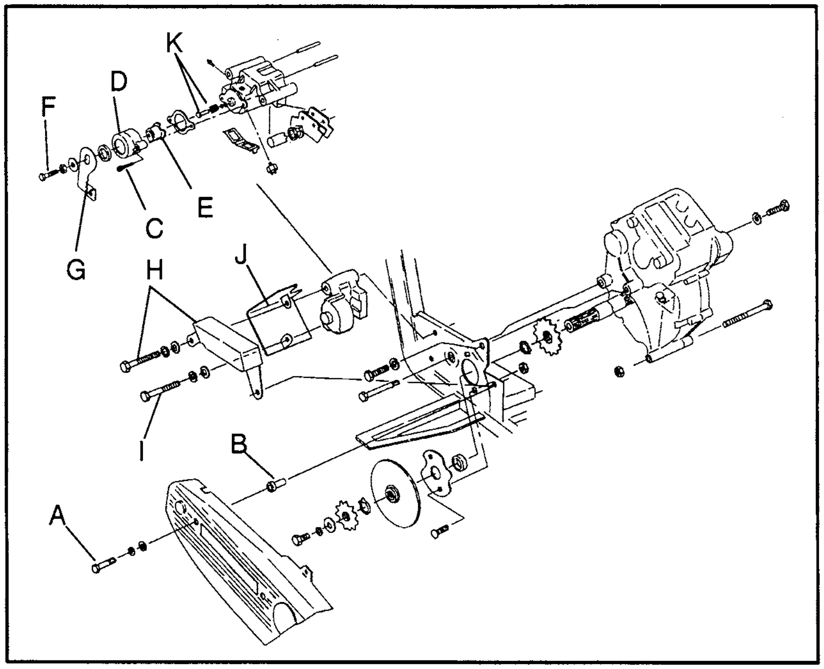


21. On models with high range transmission the adjuster assembly may now be installed, leaving the adjuster loose.
22. Place both pads and pad retaining hardware in the caliper to act as a piston stop.
23. Pump the handle 10 to 15 times to purge any fluid which may have accumulated between the seals during assembly.

24. Thoroughly wipe the piston and caliper dry.
25. Pressurize the brake system for approximately one minute. **NOTE:** The parking brake may be used to hold the pressure.
26. Check for "low pressure" leaks by lightly pumping the handle 5 to 10 times.
27. Force pads apart and reassemble caliper to disc. Torque the two retainer bolts to 15 ft. lbs. (2.1 kg/m).
28. Reconnect brake rod linkage.
29. Place transmission in neutral. Adjust foot brake by tightening adjuster bolt until brake pads rub on the disc. Then back off the adjuster bolt approximately 1/2 turn to allow free disc rotation.
30. Tighten jam nut and recheck disc movement. **NOTE:** A small amount of intermittent disc rubbing is permissible.
31. Check foot pedal travel. If movement is excessive, adjust as necessary.
32. Fill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type I cylinders should be filled to 1/8" (.3 cm) from the top; Type II cylinders should be filled to 1/4" (.6 cm) from the top. Type III cylinders should be filled to 1/4" -5/16" (.6-.8 cm) from the top.
33. Check lever travel. If soft or spongy, re-bleed system.
34. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes.

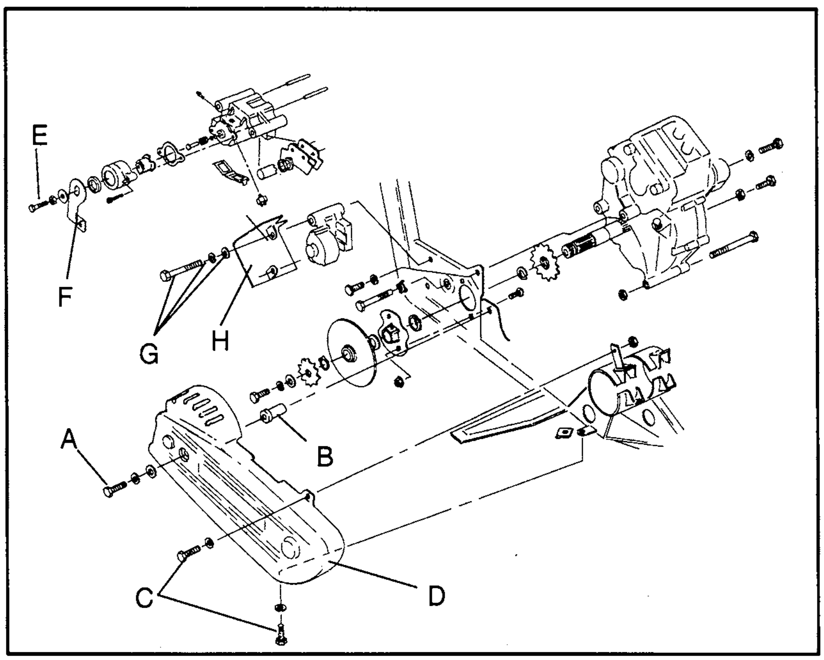
Output Shaft Caliper Removal

(1993 Sportsman)



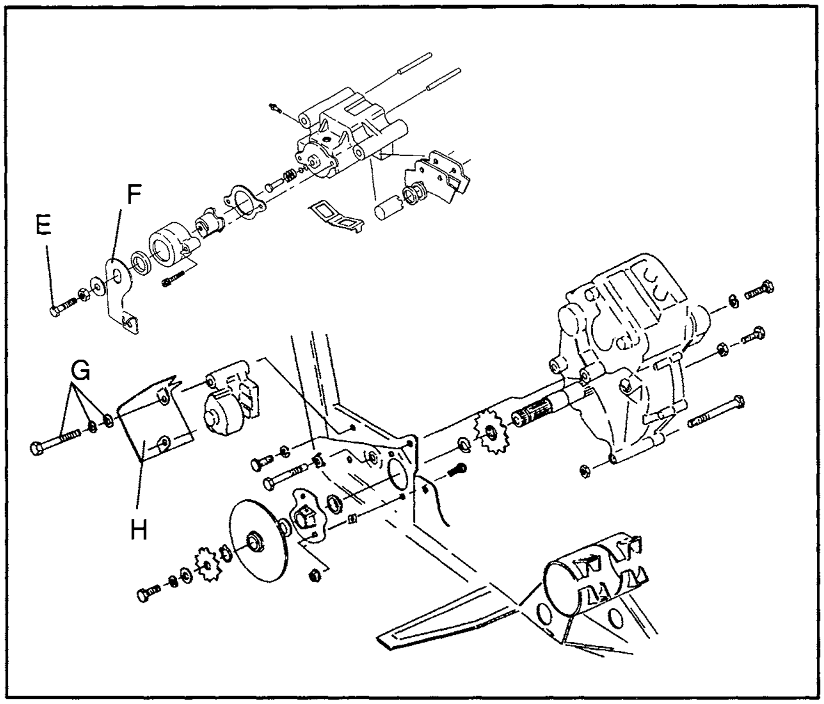
1. Remove right rear mud flap bolt from footrest.
2. Loosen brake line fitting. **CAUTION:** Brake fluid will leak out when this fitting is loosened. Brake fluid will damage painted surfaces. Protect vehicle and floor with shop cloths. Wipe up any spills at once.
3. Remove the rear-most middle chain guard bolt (A). **NOTE:** Spacer (B) may fall out when bolt is removed. Do not lose spacer.
4. Loosen jam nut and remove adjuster bolt (F).
5. Remove brake arm (G).
6. Remove disk cover bolt and disk cover (H).
7. Remove lower rear caliper mount bolt (I).
8. Remove caliper shield (J).
9. Rotate brake caliper assembly from 9 o'clock position to 11 o'clock and slide caliper upward to remove.

(1994 to Current 4x4 Models Except Xplorer and Scrambler)



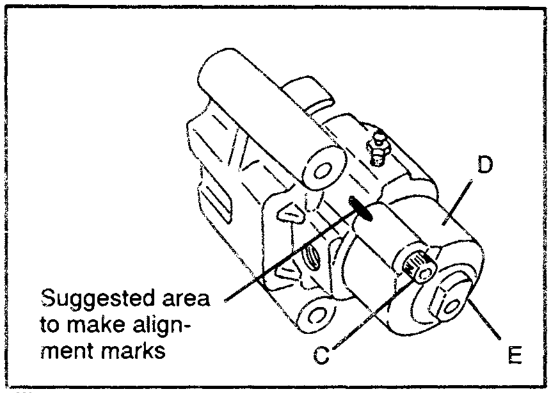
1. Remove right rear mud flap bolt from footrest.
2. Loosen brake line fitting. **CAUTION:** Brake fluid will leak out when this fitting is loosened. Brake fluid will damage painted surfaces. Protect vehicle and floor with shop cloths. Wipe up any spills at once.
3. Remove the rear-most middle chain guard bolt (A) and spacer (B). Remove remaining middle chain guard bolts (C). Remove middle chain guard (D).
4. Loosen jam nut and remove adjuster bolt (E). Remove auxiliary brake arm (F).
5. Remove upper and lower bolts, lock washers and flat washers (G) from disk cover and remove disk cover (H).
6. Cut cable tie securing brake line to frame.
7. Rotate brake caliper assembly from 9 O'clock position to 11 O'clock position and slide caliper upward to remove.

Xplorer 4x4 Models



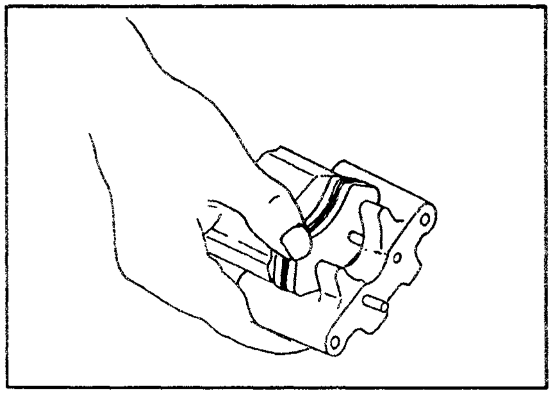
1. Remove foot well bolts from rear fender, front fender, and foot well support mounts. Remove the footwell.
2. Loosen brake line fitting. **CAUTION:** Brake fluid will leak out when this fitting is loosened. Brake fluid will damage painted surfaces. Protect vehicle and floor with shop cloths. Wipe up any spills at once.
3. Loosen jam nut and remove adjuster bolt (E). Remove auxiliary brake arm (F).
4. Remove upper and lower caliper bolts, lock washers and flat washers (G) from disk cover and remove disk cover (H).
5. Cut cable tie securing brake line to frame.
6. Rotate brake caliper assembly from 9 O'clock position to 11 O'clock position and slide caliper upward to remove.

1. Make alignment marks on stationary cam and caliper housing as indicated on illustration.
2. Remove stationary ramp attaching screws (C) and stationary ramp assembly (D). **NOTE:** The moveable ramp should come off with the stationary (E).
3. Remove brake caliper pin and spring (B) from caliper. Empty brake fluid from caliper and dispose of properly. See illustration 3.



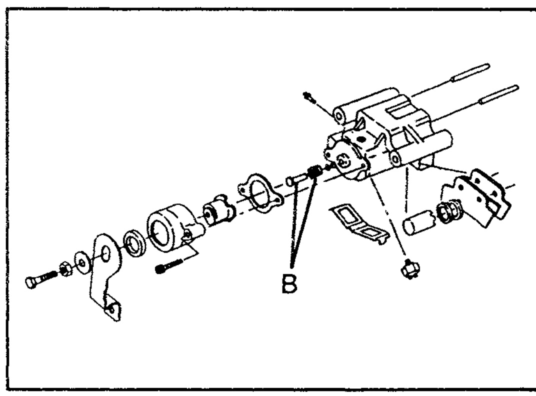
Ill. 1

4. Apply downward pressure on brake pads directly over retaining pin, releasing pin pressure. Shake pin out of caliper. **NOTE:** If pins are corroded it may be necessary to spray penetrating oil on pins.
5. Remove pins and brake pads.
6. Install brake caliper pin (B) and tap with a soft face hammer until seated. This will drive out the caliper piston. See illustration 3.
7. By hand, walk caliper piston back and forth until it can be pulled out of caliper.



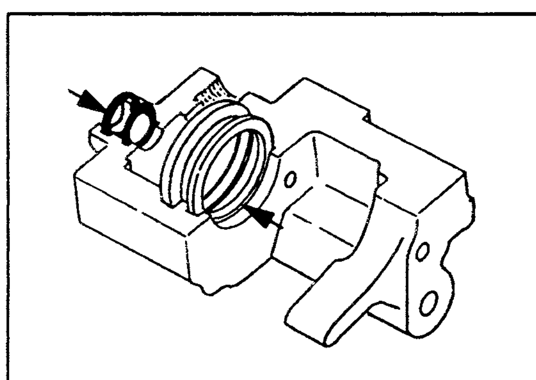
Ill. 2

8. Straighten a large paper clip and form a small hook on one end. Polish the end of the clip so there are no sharp edges. **CAUTION:** Extreme care must be used to avoid scratching the cylinder bore seal ring groove surfaces.
9. Position the clip in the cylinder bore as shown. With a pushing, twisting action remove the large inside seal and small outer dust seal and two small O-ring seals from the brake caliper pin hole.



Ill. 3

10. **Important:** Flush the cylinder bore with brake fluid and blow clean with compressed air.
11. Inspect cylinder bore for scoring, pitting, or corrosion. A corroded or scored casting should be replaced; light scores and stains may be removed by polishing. Polish any discolored or stained area with **crocus cloth only.** **NOTE:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. **Do not use any other type of abrasive or abrasive cloth.**

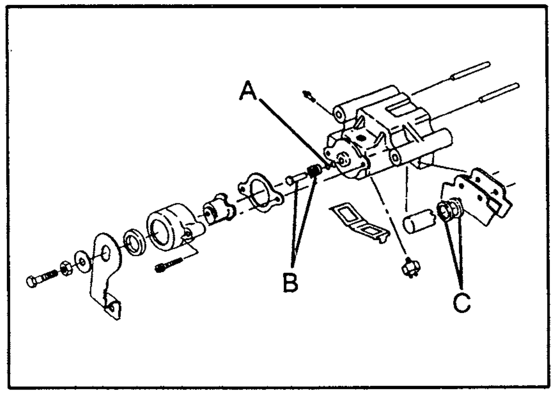


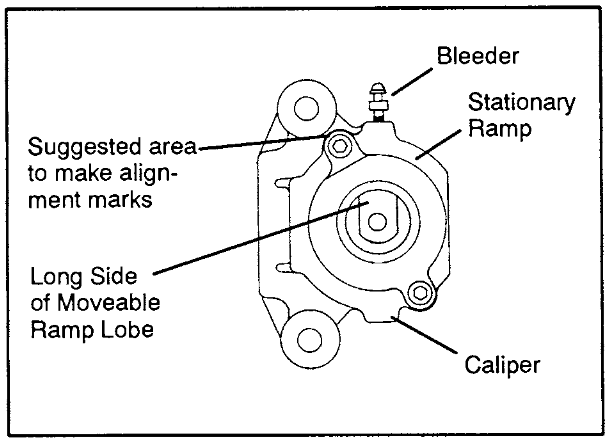
Ill. 4

Output Shaft Caliper Service (Auxiliary Brake Models)

Reassembly Note: Clean and inspect all components before reassembling.

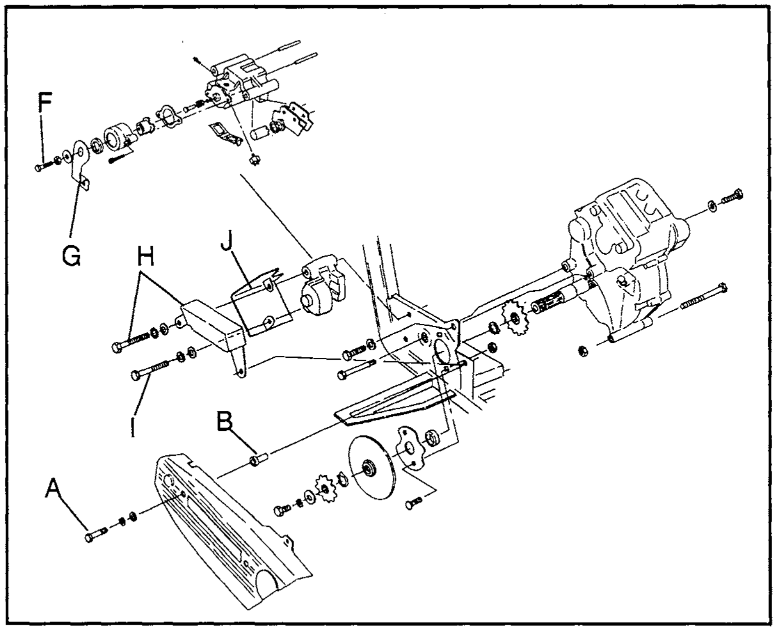
12. Lubricate new O-rings (A) with brake fluid and install into caliper pin bore.
13. Reinstall compression spring and push in the brake apply pin (B).
14. Lubricate new seals (C) with brake fluid and install into caliper.
15. Inspect ramp seal. Replace if necessary.
16. Lubricate all sliding surfaces of stationary and moveable brake ramps with a thin coat of Polaris high temp grease (PN 2870616).
17. Using a new gasket, assemble ramp to brake caliper. **NOTE:** Align marks of stationary and caliper made in step 1. Moveable cam must be positioned so long side of lobe is in the up position and in direct alignment with bleeder fitting, as shown in illustration. Alignment marks must be matched and cam positioned correctly, as there are six possible combinations.
18. Hold caliper so that the brake line fitting hole can be covered with your finger. Close bleeder fitting and add approximately 1/4 ounce of brake fluid to piston bore. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
19. Lubricate piston with brake fluid and install in caliper piston bore, flat beveled end first.
20. Compress piston until seated in caliper and wipe off excess brake fluid from piston area.
21. Attach brake line to caliper assembly and tighten fitting. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
22. Reinstall spring plate, brake pads and pad pins to caliper.
23. Pump the handle 10 to 15 times to purge any fluid which may have accumulated between the seals during assembly. **NOTE:** Fluid can sometimes accumulate between the dust seal and the main seal. This does not necessarily indicate a leak.
24. Thoroughly wipe the piston and caliper dry.
25. Pressurize the brake system for approximately one minute. **NOTE:** The parking brake may be used to hold the pressure.
26. Check for "low pressure" leaks by lightly pumping the handle 5 to 10 times.
27. Compress piston into caliper until seated.





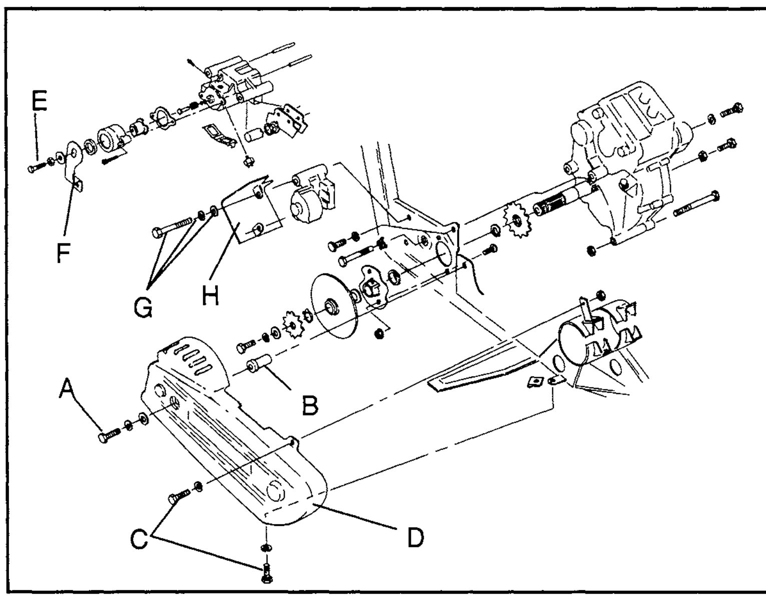
NOTE: The brake pads will need to be spread enough to accept the brake disc when reinstalling the caliper assembly.

Caliper Installation (1993 Sportsman)



1. Reinstall caliper assembly onto brake disk.
2. Reinstall lower rear caliper mount bolt (I) with caliper shield (J). Reinstall disc cover bolt and disc cover (H).
3. Torque caliper mount bolts to 10 - 12 ft. lbs. (1.4 - 1.7 kg/m).
4. Reinstall brake arm (G), adjuster bolt (F) and jam nut.
5. Adjust foot pedal at 1/2″ to 3/4″ travel of the pedal and tighten the jam nut.
6. Reinstall the rear-most middle chain guard bolt (A). **NOTE:** Make sure spacer (B) is reinstalled.
7. Reinstall right rear mud flap bolt in footrest.
8. Refill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type III cylinders should be filled to 1/4″ to 5/16″ (.6 to .8 cm) from the top of the cylinder. Refer to Table of Contents page for assistance in determining brake system type.
9. Refer to brake bleeding instructions in this chapter and bleed system.
10. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.

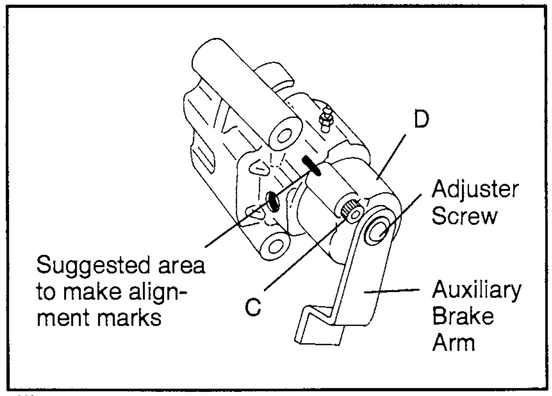
Caliper Installation (1994 to Current 4x4 Models Except Xplorer and Scrambler)



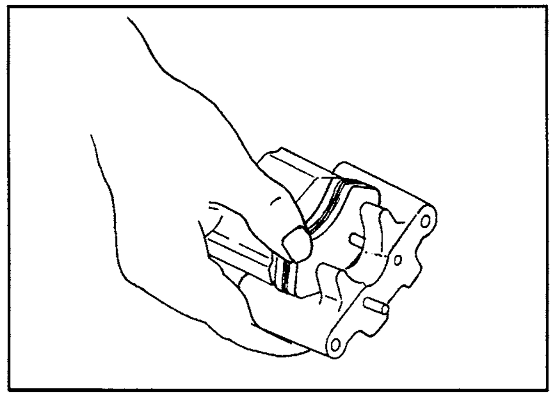
1. Reinstall caliper assembly onto brake disk.
2. Install upper and lower bolts, lock washers, and flat washers (G) to disk cover (H) and secure caliper assembly to its mounting.
3. Torque caliper mount bolts to 10 - 12 ft. lbs. (1.4 - 1.7 kg/m).
4. Reinstall brake arm (F), adjuster bolt (E) and jam nut.
5. Adjust foot pedal at 1/2″ to 3/4″ travel of the pedal and tighten the jam nut.
6. Reinstall the middle chain guard (D) with rear most bolt, lock washer, flat washer (A) and spacer (B). Bolt the forward end of chain guard to the mounting brackets with hardware (C).
7. Reinstall right rear mud flap bolt in footrest.
8. Refill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type III cylinders should be filled to 1/4″ to 5/16″ (.6 to .8 cm) from the top of the cylinder. Refer to Table of Contents page for assistance in determining brake system type.
9. Refer to brake bleeding instructions in this chapter and bleed system.
10. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.

Scrambler Output Shaft Caliper Service (Auxiliary Brake)

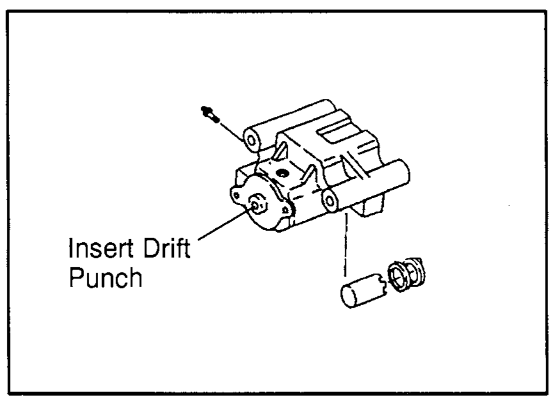
1. Make alignment marks on stationary ramp and caliper housing as indicated on illustration.
2. Remove cotter key and washer from pedal rod at brake arm.
3. Remove stationary ramp attaching screws (C) and stationary ramp assembly (D).
4. Remove ramp assembly. It is not necessary to remove auxiliary brake arm unless brake arm or piston pin are being replaced. **NOTE:** To remove auxiliary brake arm or piston pin, turn the adjuster screw clockwise with a 3/16″ Allen wrench until the piston pin falls out. To remove brake arm, insert a deep well socket into moveable cam to hold lock nut while backing out the adjuster screw.
5. Apply downward pressure on brake pads directly over retaining pin, releasing pin pressure. Shake pin out of caliper. **NOTE:** If pins are corroded it may be necessary to spray penetrating oil on pins.
6. Remove pins and brake pads.
7. Insert a drift punch in piston pin hole and tap with a soft face hammer. This will drive out the caliper piston. See illustration 3.
8. By hand, walk caliper piston back and forth until it can be pulled out of caliper.
9. Straighten a large paper clip and form a small hook on one end. Polish the end of the clip so there are no sharp edges. **CAUTION:** Extreme care must be used to avoid scratching the cylinder bore seal ring groove surfaces.
10. Position the clip in the cylinder bore as shown. With a pushing, twisting action remove the large inside seal and small outer dust seal and two small O-ring seals from the brake caliper pin hole.
11. **Important:** Flush the cylinder bore with brake fluid and blow clean with compressed air.
12. Inspect cylinder bore for scoring, pitting, or corrosion. A corroded or scored casting should be replaced; light scores and stains may be removed by polishing. Polish any discolored or stained area with **crocus cloth only.** **NOTE:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. **Do not use any other type of abrasive or abrasive cloth.**



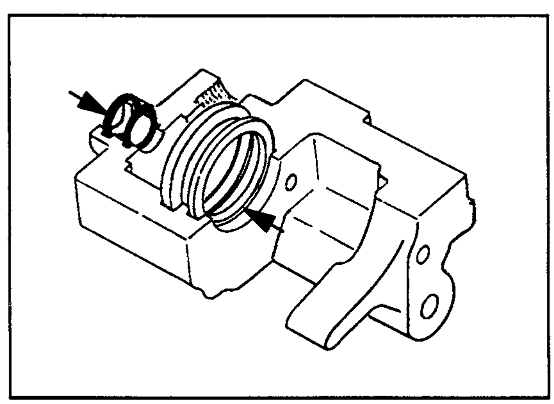
Ill. 1



Ill. 2

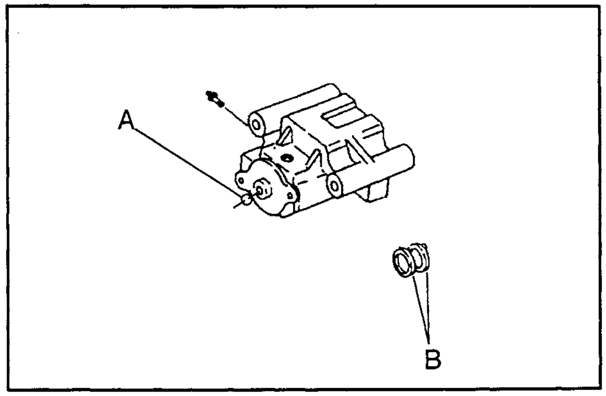


Ill. 3

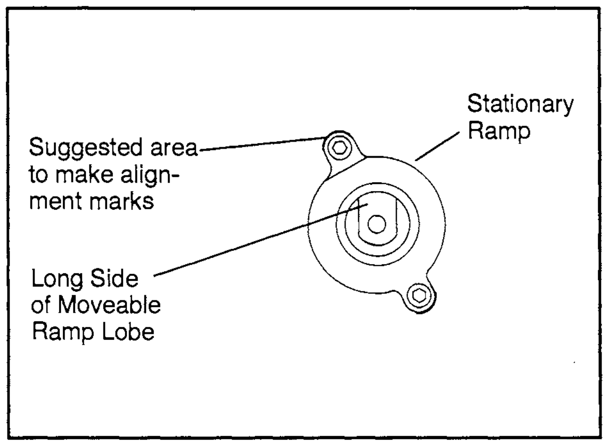


Ill. 4

Reassembly Note: Clean and inspect all components before reassembling.



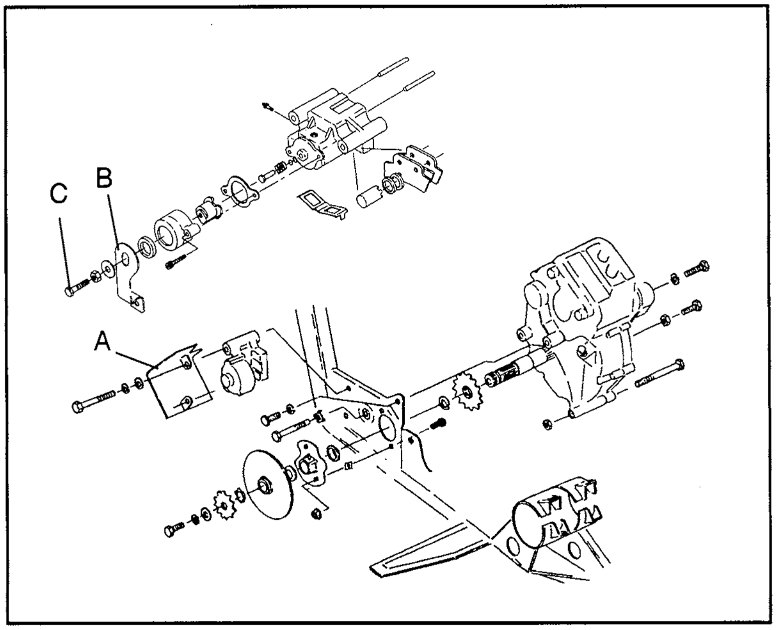
13. Lubricate new O-rings (A) with brake fluid and install into caliper pin bore.
14. Lubricate new seals (B) with brake fluid and install into caliper.
15. If piston pin or axillary brake arm were removed, lubricate all sliding surfaces of stationary and moveable brake ramps with a thin coat of Polaris high temp grease (PN 2870616).
16. Align mark of stationary and moveable cam so long side of lobe is in the up position and just to the right of mark on stationary. Alignment marks must be matched and cam positioned correctly, as there are six possible combinations.
17. Reassemble adjuster screw through arm and moveable cam. Install washer on screw inside of cam. Reinstall lock nut and tighten until seated, then turn an additional 1/2 turn tighter.



18. Using a new gasket, assemble ramp to brake caliper. **NOTE:** Align marks of stationary and caliper made in step 1. Torque bolts to 5-6 ft. lbs.
19. Hold caliper so that the brake line fitting hole can be covered with your finger. Close bleeder fitting and add approximately 1/4 ounce of brake fluid to piston bore. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
20. Lubricate piston with brake fluid and install in caliper piston bore, flat beveled end first.
21. Compress piston until seated in caliper and wipe off excess brake fluid from piston area.
22. Attach brake line to caliper assembly and tighten fitting. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
23. Reinstall spring plate, brake pads and pad pins to caliper.
24. Pump the handle 10 to 15 times to purge any fluid which may have accumulated between the seals during assembly.
25. Thoroughly wipe the piston and caliper dry.
26. Pressurize the brake system for approximately one minute. **NOTE:** The parking brake may be used to hold the pressure.
27. Check for "low pressure" leaks by lightly pumping the handle 5 to 10 times.
28. Compress piston into caliper until seated.

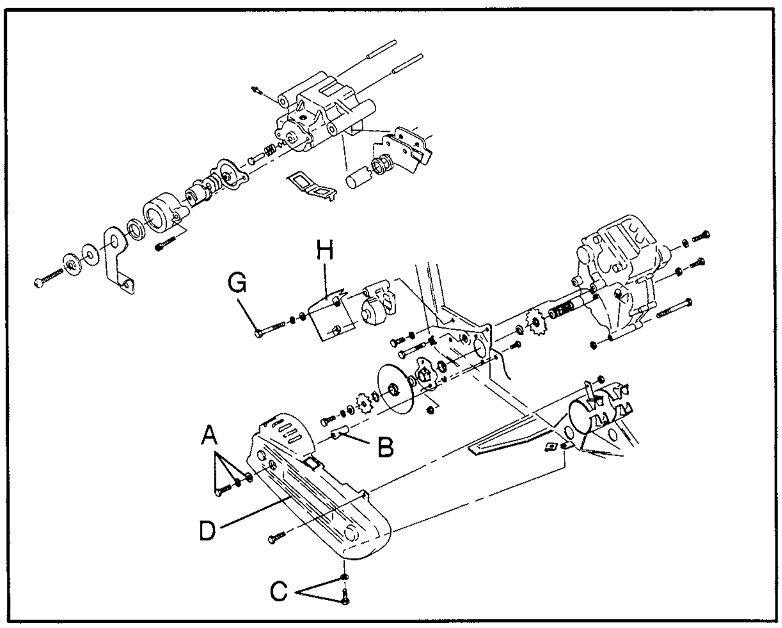
NOTE: The brake pads will need to be spread enough to accept the brake disc when reinstalling the caliper assembly.

Caliper Installation (Xplorer)



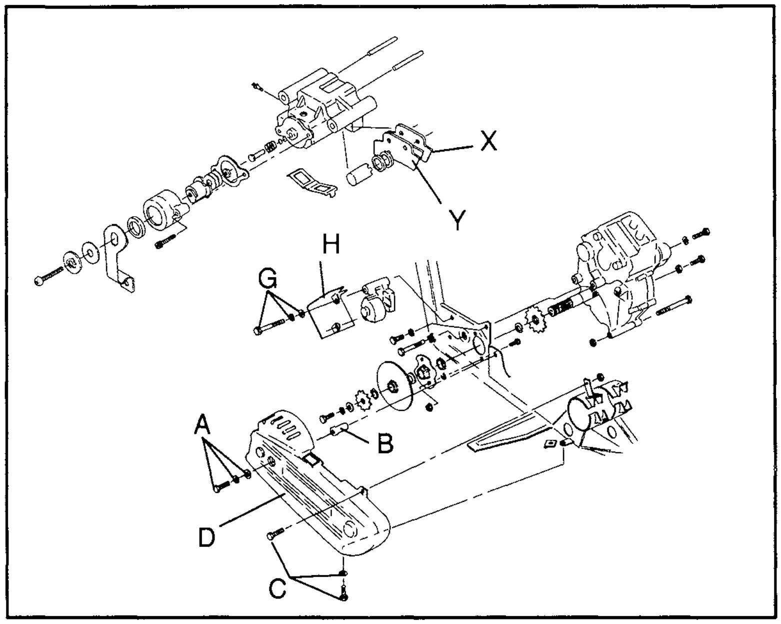
1. Reinstall caliper assembly onto brake disk.
2. Reinstall lower rear caliper mount bolt with caliper shield (A). Reinstall disc cover bolt and disc cover.
3. Torque caliper mount bolts to 10 - 12 ft. lbs. (1.4 - 1.7 kg/m).
4. Reinstall brake arm (B).
5. Reinstall adjuster bolt (C) and washer.
6. Adjust foot pedal at 1/2″ to 3/4″ travel of the pedal and tighten the jam nut.
7. Reassemble foot well to unit and fasten to foot well support brackets and fenders.
8. Refill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type III cylinders should be filled to 1/4″ to 5/16″ (.6 to .8 cm) from the top of the cylinder.
9. Refer to brake bleeding instructions in this chapter and bleed system.
10. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.

Caliper Installation (Scrambler)



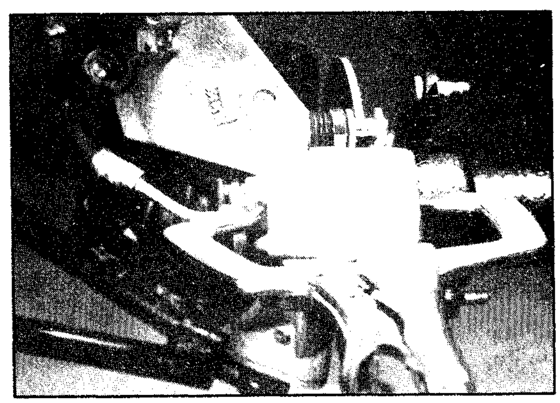
1. Reinstall caliper assembly onto brake disk.
2. Install upper and lower caliper bolts, lock washers, and flat washers (G) to caliper shield (H) and secure caliper assembly to its mounting.
3. Torque caliper mount bolts to 10 - 12 ft. lbs. (1.4 - 1.7 kg/m).
4. Install pedal rod on brake arm with existing washer and a new cotter key.
5. Adjust foot pedal at 1/2″ to 3/4″ travel of the pedal by turning adjuster screw clockwise.
6. Reinstall the middle chain guard (D) with rear most bolt, lock washer, flat washer (A) and spacer (B). Bolt the forward end of chain guard to the mounting brackets with hardware (C).
7. Reinstall right front and rear mud flap bolt in footrest.
8. Refill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type III cylinders should be filled to 1/4″ to 5/16″ (.6 to .8 cm) from the top of the cylinder.
9. Refer to brake bleeding instructions in this chapter and bleed system.
10. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.

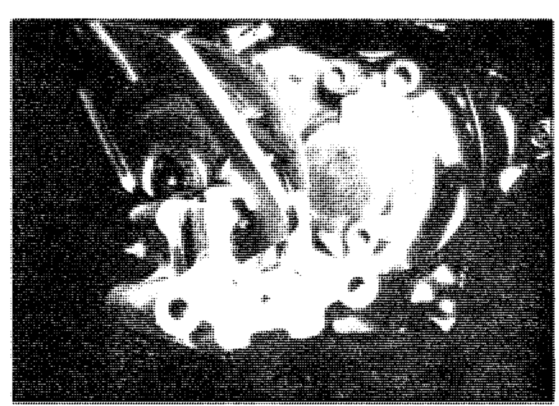
Scrambler



11. Remove right front and rear mud flap bolts from foot rest.
12. Remove rear-most middle chain guard bolt, lock washer, flat washer (A) and spacer (B). Remove remaining guard bolts (C). Remove middle guard (D). Remove cotter key and washer from pedal rod. Remove rod from auxiliary brake arm. Remove upper and lower bolts, lock washers and flat washers (G) from caliper shield. Remove caliper shield (H). Cut cable tie securing brake line to frame. Rotate brake caliper assembly from 9 o'clock position to 11 o'clock position and slide caliper upward to remove. Turn adjuster screw counterclockwise to retract piston pin until it comes to a stop. Move stationary pad (X) until flush with moveable pad (Y) and install C-clamp vise grip on caliper assembly. See illustration 2, page 3.28. Remove right front C-clamp vise grip. Proceed to step 13.
13. Loosely replace diaphragm and cover over master cylinder reservoir, holding them in place, actuate the brake lever several times to begin bleeding the system. Actuate and hold the brake handle firmly. A second mechanic will then be required to open the bleed valve located on the brake caliper assembly, (right front brake caliper assembly or left front if following step 15.), hold brake lever until bleeder valve has been tightened.

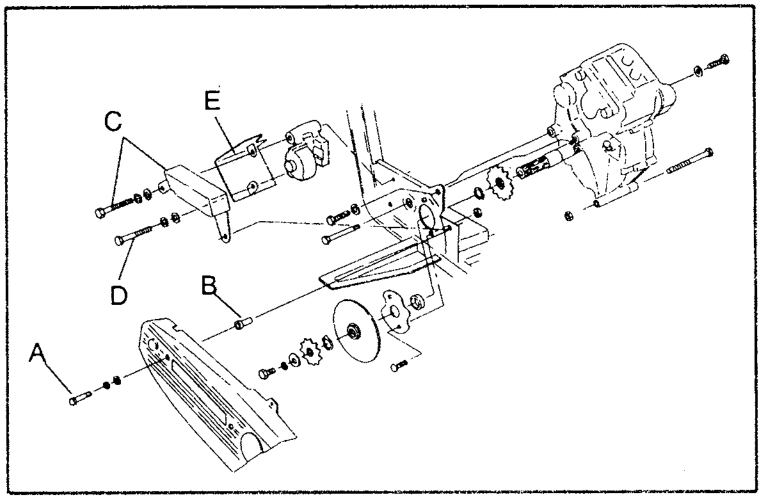
Continue this procedure until all air has been forced from this caliper. Check and maintain proper fluid levels while bleeding the system. DO NOT allow air to enter the brake line.



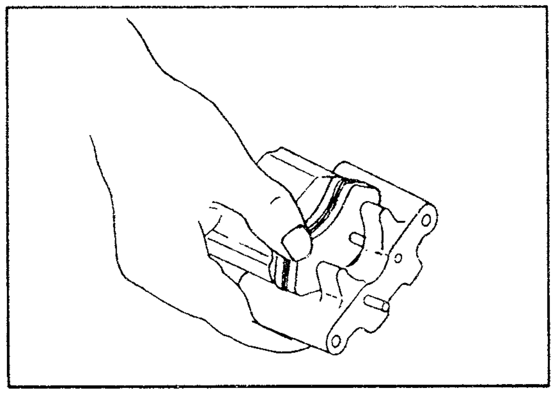


14. Position and clamp vise grip C-clamp on the right front caliper and remove C-clamp from left front.
15. Repeat Step 13.
16. If after the bleeding process has been completed, a spongy brake lever is encountered, follow these steps.
17. With the rear caliper assembly removed from the transmission mounting, clamp the front caliper assemblies and actuate the left brake lever to bring the rear caliper piston to maximum stroke. Position a C-clamp vise grip on the stationary brake pad and caliper assembly. Be sure to center the C-clamp on the brake pad.
18. Compress the piston back into the caliper assembly. Remove the C-clamp and actuate the brake lever once again. Clamp the brake pad and caliper assembly to again compress the piston into the caliper system. This will increase the force to move any air bubbles out of the system and up through the master cylinder assembly. Lubrication of the caliper walls will also be accomplished, assuring smooth action of the caliper piston. Continue until no air bubbles are present in master cylinder reservoir.

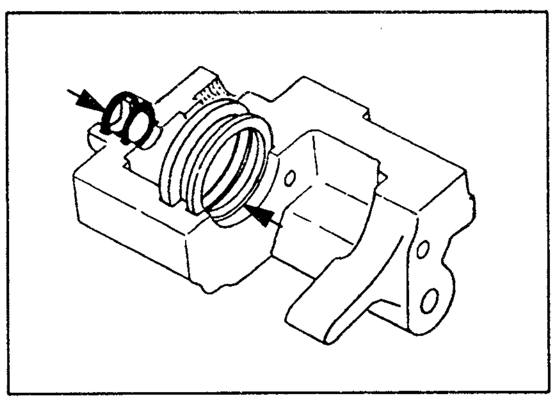
Output Shaft Brake Caliper Service, 1993 350L 6x6



1. Remove right rear mud flap bolt from footrest.
2. Remove the rear-most middle chain guard bolt (A). **NOTE:** Spacer (B) may fall out when bolt is removed. Do not lose spacer.
3. Remove disk cover bolt and disk cover (C). Remove lower rear caliper mount bolt (D). Remove caliper shield (E).
4. Rotate brake caliper assembly from 9 o'clock position to 11 o'clock and slide caliper upward to remove.
5. Apply downward pressure on brake pads directly over retaining pin, releasing pin pressure. Shake pin out of caliper. **NOTE:** If pins are corroded it may be necessary to spray penetrating oil on pins.



6. Remove pins and brake pads.
7. Place a piece of .125" (.3 cm) thick steel plate on stationary side of caliper assembly as if it were the stationary brake pad.
8. Pump master cylinder until piston just makes contact with the plate. Do not over apply pressure. Fluid may leak by piston, buckling steel plate and causing piston to wedge in caliper.
9. Remove brake line from caliper assembly. **CAUTION:** Brake fluid will leak from the line. Be prepared to catch this fluid in shop cloths. Brake fluid will damage painted surfaces. Wipe up any spills at once.
10. Remove steel plate and piston from caliper. Properly dispose of brake fluid inside caliper.



11. Straighten a large paper clip and polish the end of the clip so there are no sharp edges. Form a small hook on one end. **CAUTION:** Extreme care must be used to avoid scratching the cylinder bore seal ring groove surfaces.
12. Position the clip in the cylinder bore as shown. With a pushing, twisting action remove the large inside seal and small outer dust seal.
13. **Important:** Flush the cylinder bore with brake fluid and blow clean with compressed air.
14. Inspect cylinder bore for scoring, pitting, or corrosion. A corroded or scored casting should be replaced; light scores and stains may be removed by polishing. Polish any discolored or stained area with **crocus cloth only.** **NOTE:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. **Do not use any other type of abrasive or abrasive cloth.**

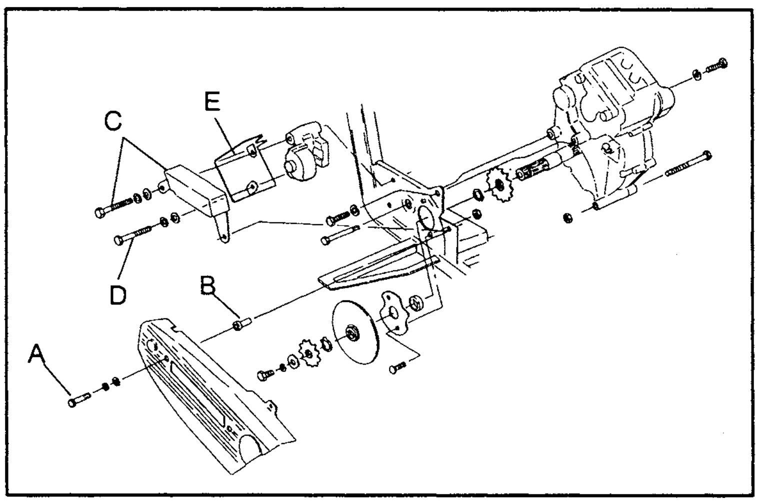
Reassembly Note: Clean and inspect all components before reassembling.

15. Lubricate new seals with brake fluid and install into caliper.
16. Hold caliper so that the brake line fitting hole can be covered with your finger. Close bleeder fitting and add approximately 1/4 ounce of brake fluid to piston bore. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
17. Lubricate piston with brake fluid and install caliper piston bore, flat beveled end first.
18. Compress piston until seated in caliper and wipe off excess brake fluid from piston area.
19. Attach brake line to caliper assembly and tighten fitting.
20. Reinstall spring plate, brake pads and pad pins to caliper.
21. Pump the handle 10 to 15 times to purge any fluid which may have accumulated between the seals during assembly. **NOTE:** Fluid can sometimes accumulate between the dust seal and the main seal. This does not necessarily indicate a leak.
22. Thoroughly wipe the piston and caliper dry.
23. Pressurize the brake system for approximately one minute. **NOTE:** The parking brake may be used to hold the pressure.
24. Check for "low pressure" leaks by lightly pumping the handle 5 to 10 times.
25. Compress piston into caliper until seated.

NOTE: The brake pads will need to be spread enough to accept the brake disk when reinstalling the caliper assembly.

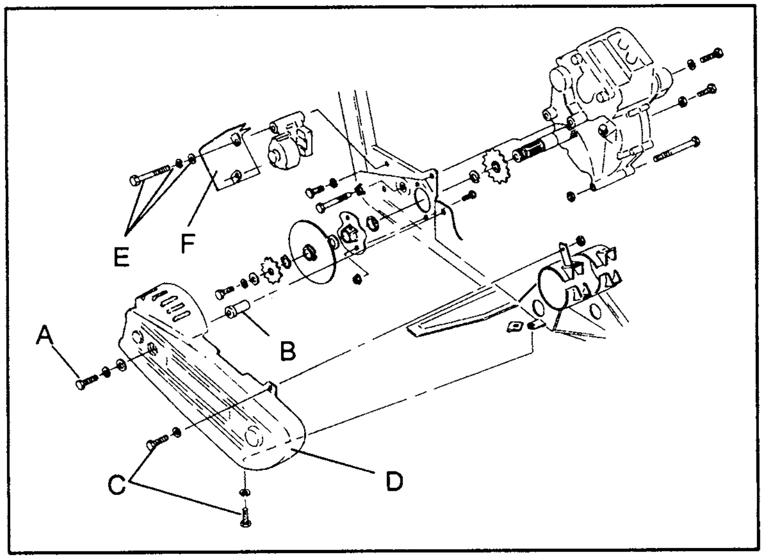
Caliper Installation for 1993 6x6

1. Reinstall caliper assembly onto brake disk.
2. Reinstall lower rear caliper mount bolt (D) and caliper shield (E).
3. Reinstall disk cover bolt and disk cover (C).
4. Torque caliper mount bolts to 10 - 12 ft. lbs. (1.4 - 1.7 kg/m).
5. Reinstall the rear-most middle chain guard bolt (A) with spacer (B). Torque to 16 - 18 ft. lbs. (2.2 - 2.5 kg/m). **NOTE:** Make sure spacer is reinstalled.
6. Reinstall right rear mud flap bolt in footrest.

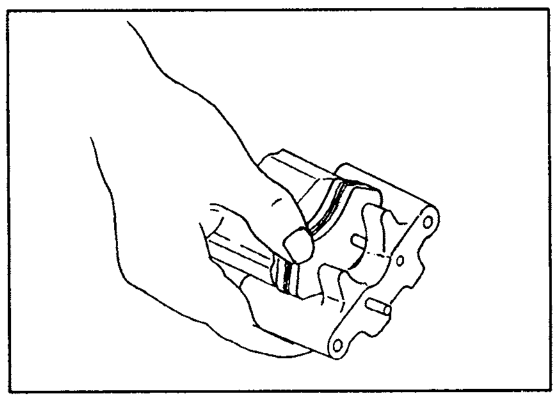


7. Refill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type III cylinders should be filled to 1/4" - 5/16" (.6 - .8 cm) from the top of the cylinder.
8. Check lever travel. If soft or spongy, refer to brake bleeding instructions in this chapter and bleed system.
9. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes.

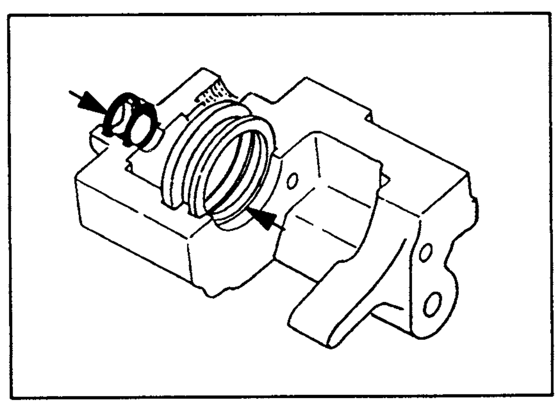
Output Shaft Brake Caliper Service, 1994 300/400L 6x6



1. Remove right rear mud flap bolt from footrest.
2. Remove the rear-most middle chain guard bolt (A) and spacer (B). Remove remaining guard bolts (C). Remove middle chain guard (D).
3. Remove upper and lower bolts (E) from disk cover and remove disk cover (F).
4. Rotate brake caliper assembly from 9 o'clock position to 11 o'clock and slide caliper upward to remove.
5. Apply downward pressure on brake pads directly over retaining pin, releasing pin pressure. Shake pin out of caliper. **NOTE:** If pins are corroded it may be necessary to spray penetrating oil on pins.
6. Remove pins and brake pads.



7. Place a piece of .125″ (.3 cm) thick steel plate on stationary side of caliper assembly as if it were the stationary brake pad.
8. Pump master cylinder until piston just makes contact with the plate. Do not over apply pressure. Fluid may leak by piston, buckling steel plate and causing piston to wedge in caliper.
9. Remove brake line from caliper assembly. **CAUTION:** Brake fluid will leak from the line. Be prepared to catch this fluid in shop cloths. Brake fluid will damage painted surfaces. Wipe up any spills at once.
10. Remove steel plate and piston from caliper. Properly dispose of brake fluid inside caliper.



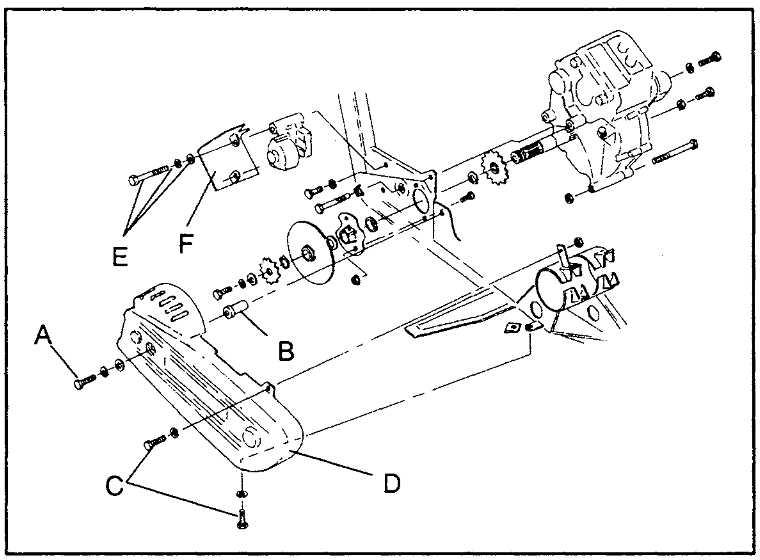
11. Straighten a large paper clip and polish the end of the clip so there are no sharp edges. Form a small hook on one end. **CAUTION:** Extreme care must be used to avoid scratching the cylinder bore seal ring groove surfaces.
12. Position the clip in the cylinder bore as shown. With a pushing, twisting action remove the large inside seal and small outer dust seal.
13. **Important:** Flush the cylinder bore with brake fluid and blow clean with compressed air.
14. Inspect cylinder bore for scoring, pitting, or corrosion. A corroded or scored casting should be replaced; light scores and stains may be removed by polishing. Polish any discolored or stained area with **crocus cloth only.** **NOTE:** If you are cleaning the cylinder bore, use finger pressure and rotate the cloth. Do not slide the cloth in or out of bore while applying pressure as scratches may result. **Do not use any other type of abrasive or abrasive cloth.**

Reassembly Note: Clean and inspect all components before reassembling.

15. Lubricate new seals with brake fluid and install into caliper.
16. Hold caliper so that the brake line fitting hole can be covered with your finger. Close bleeder fitting and add approximately 1/4 ounce of brake fluid to piston bore. **CAUTION:** Brake fluid will cause damage to painted surfaces. Wipe up any spills at once.
17. Lubricate piston with brake fluid and install caliper piston bore, flat beveled end first.
18. Compress piston until seated in caliper and wipe off excess brake fluid from piston area.
19. Attach brake line to caliper assembly and tighten fitting.
20. Reinstall spring plate, brake pads and pad pins to caliper.
21. Pump the handle 10 to 15 times to purge any fluid which may have accumulated between the seals during assembly. **NOTE:** Fluid can sometimes accumulate between the dust seal and the main seal. This does not necessarily indicate a leak.
22. Thoroughly wipe the piston and caliper dry.
23. Pressurize the brake system for approximately one minute. **NOTE:** The parking brake may be used to hold the pressure.
24. Check for "low pressure" leaks by lightly pumping the handle 5 to 10 times.
25. Compress piston into caliper until seated.

NOTE: The brake pads will need to be spread enough to accept the brake disk when reinstalling the caliper assembly.

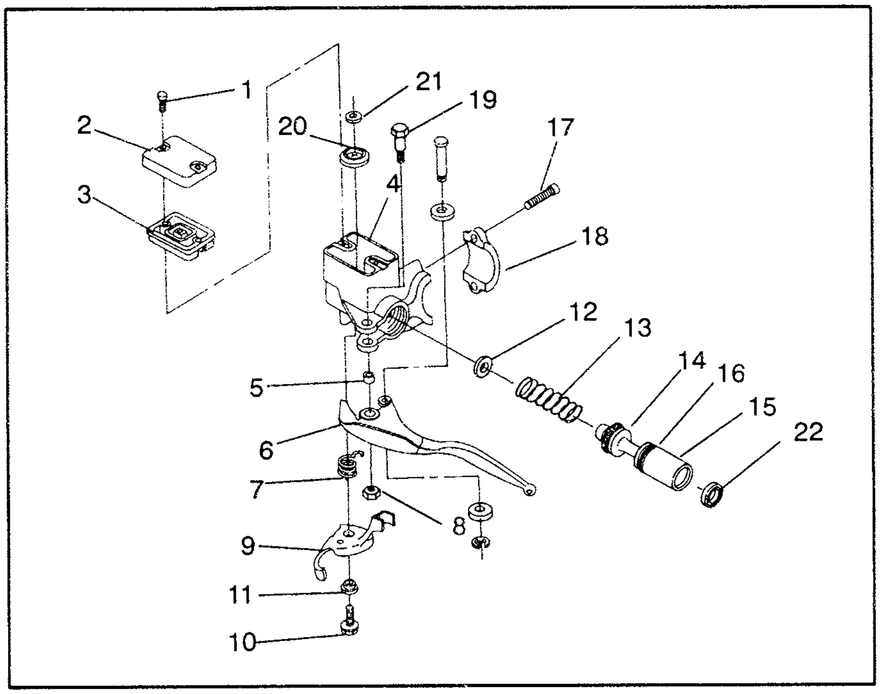
Caliper Installation for 1994 300 6x6/400L 6x6



1. Reinstall caliper assembly onto brake disk.
2. Reinstall upper and lower bolts (E) with the disk cover (F) to caliper mounting.
3. Torque caliper mount bolts to 10 - 12 ft. lbs. (1.4 - 1.7 kg/m).
4. Reinstall the middle chain guard (D) with bolt (A) and spacer (B).
5. Complete securing middle chain guard with bolts (C).
6. Reinstall right rear mud flap bolt in footrest.
7. Refill master cylinder with DOT 3 brake fluid (PN 2870990) and reinstall cover with new cover gasket. **NOTE:** Type III cylinders should be filled to 1/4" - 5/16" (.6 - .8 cm) from the top of the cylinder.
8. Check lever travel. If soft or spongy, refer to brake bleeding instructions in this chapter and bleed system.
9. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes.

Type III Master Cylinder Overhaul

1. Cover Screw
2. Cover
3. Cover Gasket
4. Cylinder Housing
5. Brake Lever Bushing
6. Brake Lever
7. Park Lever Return Spring
8. Pivot Bolt Nut
9. Park Lever
10. Park Lever Pivot Bolt
11. Park Lever Pivot Bushing
12. Spring Seat Washer
13. Compression Spring
14. U-Pack Seal
15. Piston
16. O-Ring Seal
17. Clamp Bolt
18. Attaching Clamp
19. Lever Pivot Bolt
20. Baffle
21. Baffle Washer
22. Dust Seal



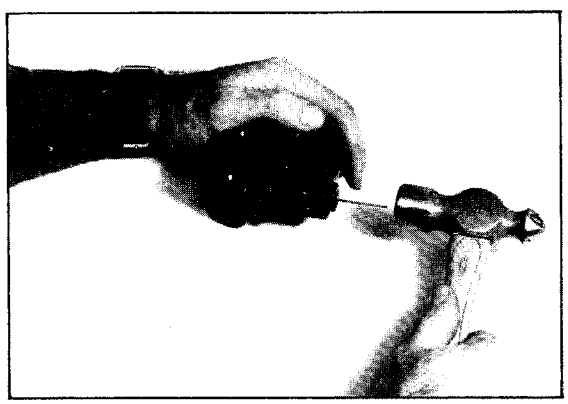
Removal

1. Position clean shop cloths to catch spilled fluid and remove brake line. **CAUTION:** Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

2. Remove park brake lever (Item 9) and brake master cylinder lever (Item 6), noting position of bushing, spring, etc., for proper reassembly.

3. Remove brake clamp attaching bolts (Item 17). Remove master cylinder.

4. Using special service tool PN 2870962, position push rod through small hole in spring seat washer (Item 12) as shown. Remove piston assembly, spring and washer.



Inspection

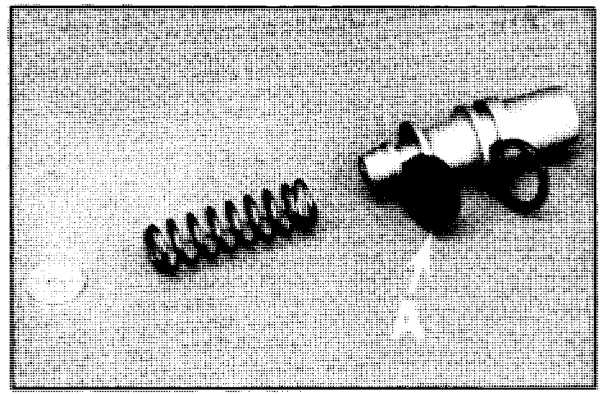
NOTE: Due to the critical nature of these parts and procedures, be sure you have thoroughly read and understand Hydraulic Brake Operation, page 3.4.

1. Thoroughly clean all brake parts with hot soapy water. Rinse with isopropyl alcohol. Inspect piston for wear or scratches and replace if any are noticed. Check master cylinder bore for scratches or score marks and replace if any are noticed.

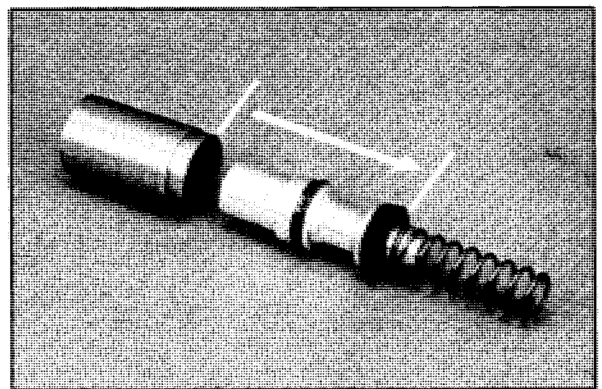
CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.

Reassembly

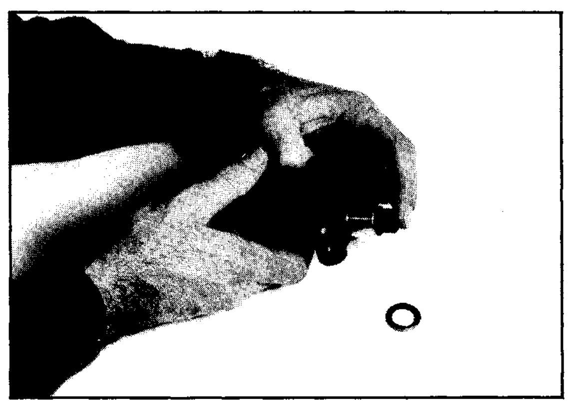
1. Always replace O-Ring seal, U-pack seal and cover gasket.
2. Apply clean brake fluid onto piston, piston seals and cylinder bore. Install seals onto piston positioning U-pack lip (A) towards spring. Snap spring into place on piston.



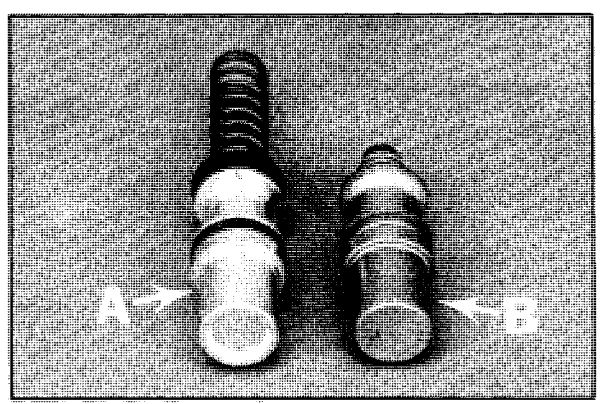
3. Install piston assembly into special service tool PN 2870962 until U-pack seal is covered by tool as shown. **NOTE:** This tool is used to guide the lip seal into the cylinder bore without damage.



4. Install spring seat washer into bore. Insert piston, still installed in tool, and seat in bore. Push piston through special tool. Remove tool.
5. Reinstall brake lever with bushing, bolt and nut.
6. It is possible to bench bleed master cylinder before installing it on machine. Attach a short, flexible hose from outlet fitting back into reservoir. Fill reservoir. Slowly squeeze and release lever until air bubbles no longer appear in reservoir.



7. Reinstall master cylinder onto handlebar and reconnect brake line. Adjust master cylinder to a level position centered on handlebar. Torque clamp screws to 45-55 in. lbs.
8. Re-bleed brake system. Check fluid level in reservoir. The Type 3 Master Cylinder should be 1/4" - 5/16" (.6 - .8 cm) below lip of reservoir opening.
9. Field test machine before putting into service. Check for proper braking action and lever reserve. With lever firmly applied, lever reserve should be no less than 1/2" (1.3 cm) from handlebar.
10. Check brake system for any possible fluid leaks.



WARNING: Although snowmobile and ATV master cylinder pistons are very similar, they are not interchangeable. Piston (A) is a snowmobile piston. Piston (B) is an ATV piston. Notice the difference on the lever end of the piston. Using the wrong piston will cause a build up of pressure in the brake system and could result in a fire.

Brake Bleeding Procedure (2x4 And 4x4 Models)

1. Cover all areas that could be damaged by spilled brake fluid with shop cloths.
2. Remove master cylinder cover and diaphragm. Inspect cover vents to insure they are clear of obstructions. Inspect diaphragm for damage and correct installation.
3. Check brake fluid level in the master cylinder and fill to appropriate levels. For Type I systems (1987-1988 Models), fluid should be 1/8″ (.3 cm) from the top of the reservoir. Type II systems (1989 to current models) the fluid level should be 1/4″ (.6 cm) from the top of the reservoir.

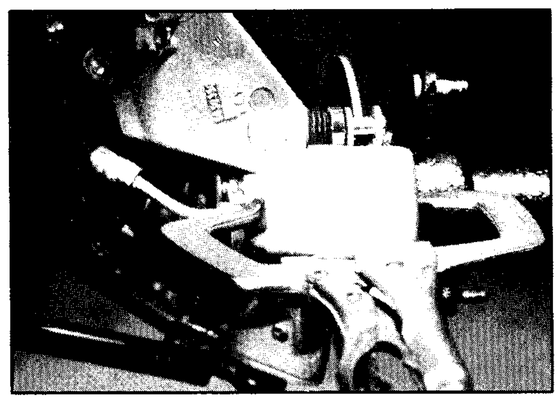
NOTE: Only use Polaris DOT3 brake fluid (PN 2870990). This brake fluid is specially formulated for high temperature application and should not be substituted.

Make sure brake fluid being used is fresh and has not been allowed to stand in an open container. Brake fluid will attract moisture in an open container and could cause brakes to fade.

Brake fluid may become discolored in the reservoir. This is normal as dye from the brake line may bleed and mix with the fluid.

Moisture contamination in fluid is not necessarily visible. As moisture content in the fluid increases, the boiling point of the fluid decreases. This will cause the brakes to fade after extreme use. As the moisture content increases, brake fade will become more evident. If this condition exists, change the brake fluid.

NOTE: It is recommended that brake fluid be changed every two years.



4. Carefully lift and support the front of the ATV. Remove the front wheels. Position and clamp (2) vise grip C-clamps to the front brake caliper assemblies as shown; one on each brake caliper.

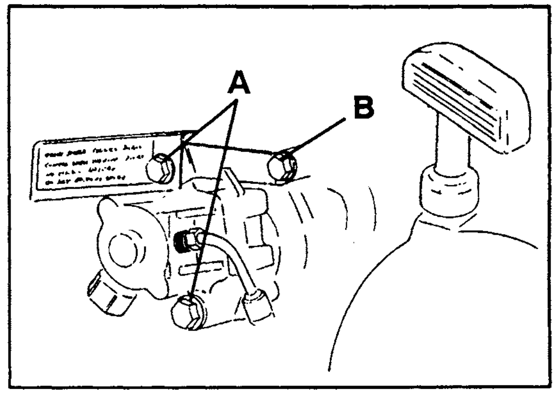
   When the C-clamp is installed as shown, the caliper pistons are compressed and movement is restricted. This will allow the rear caliper assembly to be thoroughly bled.

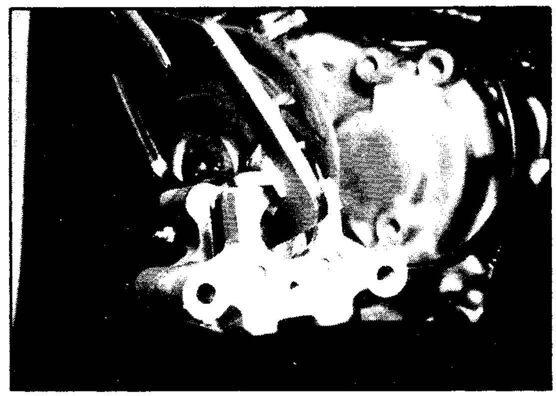
5. Loosely replace the diaphragm and cover over master cylinder reservoir, holding them in place, actuate the brake lever several times to begin the bleeding procedure. Actuate and hold the brake handle firmly. A second mechanic will then be required to open the bleeder fitting located on the **rear brake caliper assembly**. Hold brake lever until bleeder fitting has been tightened.

   Continue this procedure until all air has been forced from the caliper. Check and maintain proper brake fluid level while bleeding the system. DO NOT allow air to enter the brake line. On models equipped with auxiliary brake, loosen jam nut and remove adjuster knob and actuating arm.

1989 to 1993 250 4x6/6x6 Models

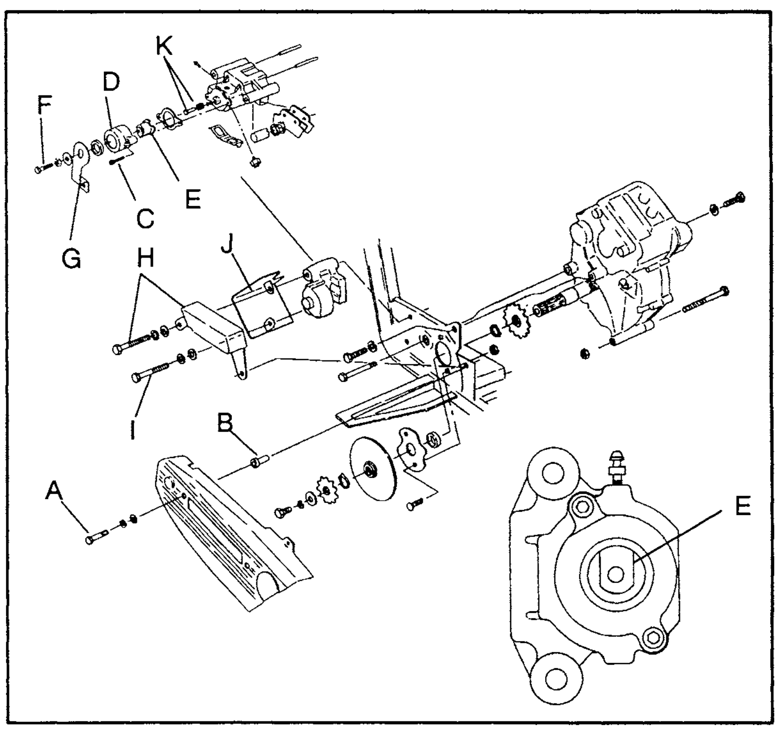
6. Remove the rear caliper mounting bolts (A) and loosen the support bracket retaining bolt (B). Tip the support bracket out of the way and remove the caliper. Remove pin plate and screw from the back side of the caliper assembly. Position and clamp vise grip C-clamp on the caliper assembly as shown. Remove right front C-clamp vise grip. Proceed to step 7.





1993 Sportsman

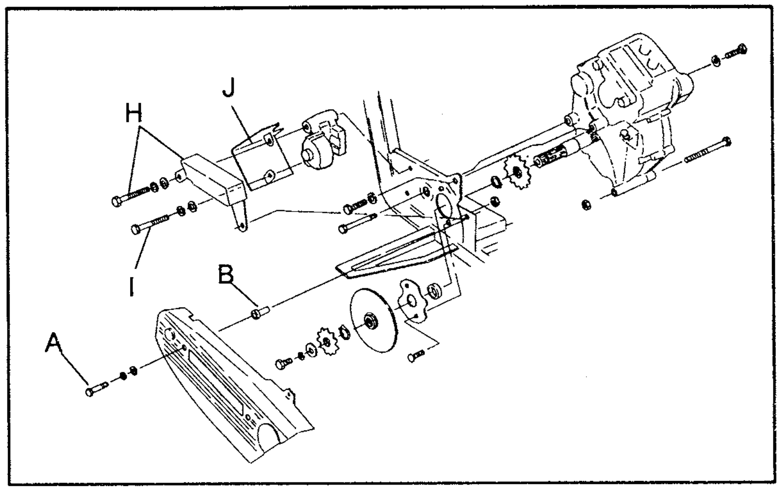
Remove right rear mud flap bolt from footrest. Remove the rear-most middle chain guard bolt (A) and spacer (B). Loosen jam nut and remove adjuster bolt (F). Remove auxiliary brake arm (G). Remove disk cover bolt and disk cover (H). Remove lower caliper mount bolt (I) and caliper shield (J). Cut cable tie securing brake line to frame. Rotate brake caliper assembly from 9 o'clock position to 11 o'clock position and slide caliper upward to remove. Rotate moveable ramp lobe (E) to full unload position. Move stationary pad (X) until flush with moveable pad (Y) and install C clamp vise grip on caliper assembly. See illustration 2, page 3.28. Remove right front C-clamp vise grip. Proceed to step 7.



Brake Bleeding Procedure Cont.

1993 350L 6x6

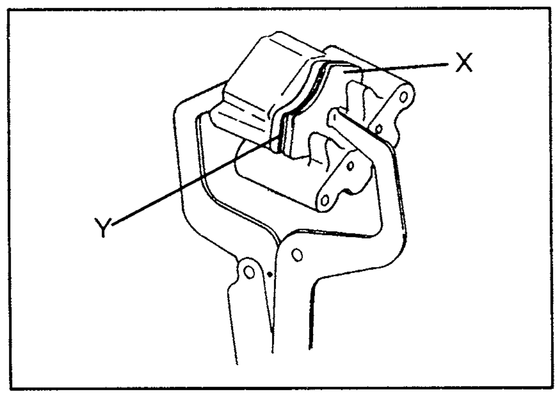
Remove right rear mud flap bolt from footrest. Remove rear-most middle chain guard bolt (A) and spacer (B). Remove disk cover bolt and disk cover (H). Remove lower caliper mount bolt (I) and caliper shield (J). Cut cable tie securing brake line to frame. Rotate brake caliper assembly from 9 o'clock position to 11 o'clock position and slide caliper upward to remove. See illustration 1. Move stationary pad (X) until flush with moveable pad (Y) and install C-clamp vise grip on caliper assembly. See illustration 2. Remove right front C-clamp vise grip. Proceed to step 7.



Ill. 1

1994 2 Wheel Drive Models

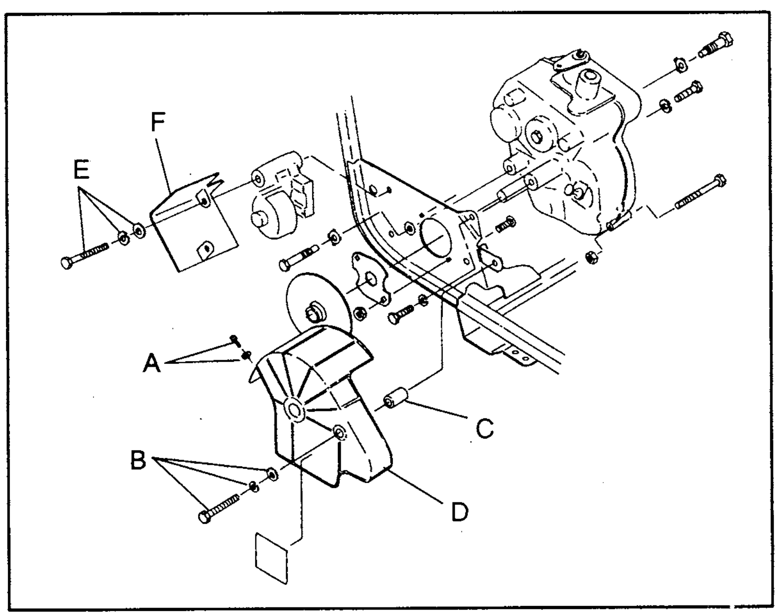
Remove fender to disk guard screw and washer (A). Remove guard retaining bolt, lock washer and flat washer (B) and spacer (C). Remove guard (D). Remove upper and lower bolts, lock washers and flat washers (E). Remove disk cover (F). Cut cable tie securing brake line to frame. Rotate brake caliper assembly from 9 o'clock positions to 11 o'clock position and slide caliper upward to remove. See illustration 3. Move stationary pad (X) until flush with moveable pad (Y) and install C clamp vise grip on caliper assembly. See illustration 2. Remove right front C-clamp vise grip. Proceed to step 7.



Ill. 2

1994 6x6 Models

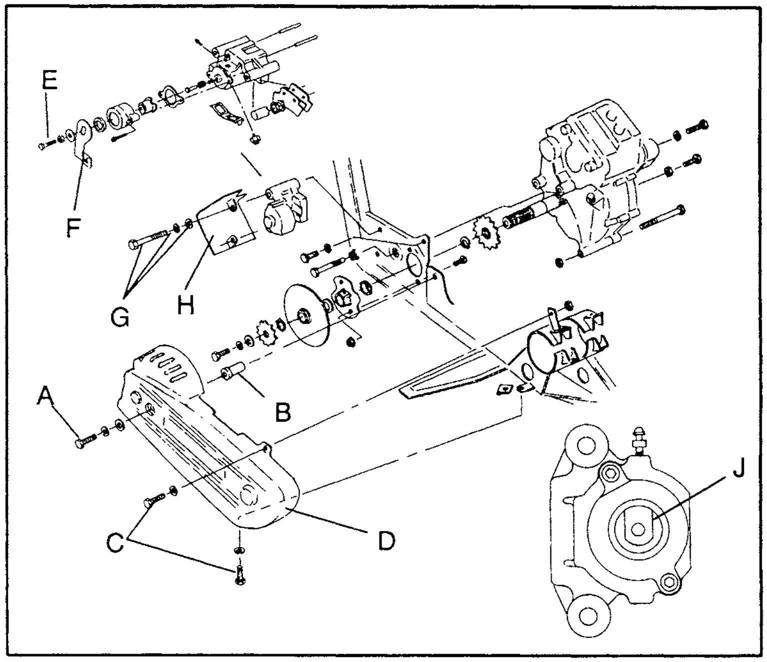
Remove rear-most middle chain guard bolt, lock washer, flat washer (A) and spacer (B). Remove remaining guard bolts (C). Remove middle chain guard (D). Remove upper and lower bolts, lock washers and flat washers (G) from disk cover. Remove disk cover (H). Cut cable tie securing brake line to frame. Rotate brake caliper assembly from 9 o'clock position to 11 o'clock position and slide caliper upward to remove. **See illustration 4, page 3.29**. Move stationary pad (F) until flush with moveable pad (G) and install C clamp vise grip on caliper assembly. See illustration 2. Remove right front C-clamp vise grip. Proceed to step 7.



Ill. 3

1994 4x4 Models

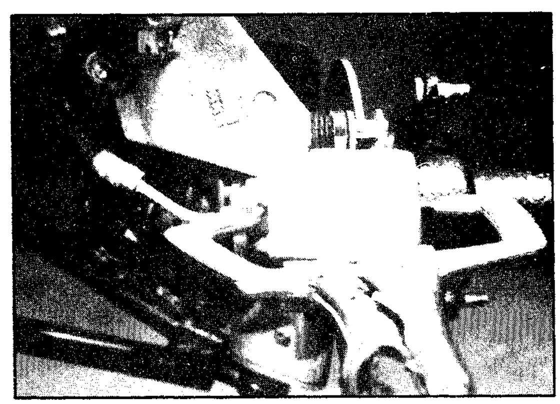
Remove rear-most middle chain guard bolt, lock washer, flat washer (A) and spacer (B). Remove remaining guard bolts (C). Remove middle guard (D). Loosen jam nut and remove adjuster bolt (E). Remove auxiliary brake arm (F). Remove upper and lower bolts, lock washers and flat washers (G) from disk cover. Remove disk cover (H). Cut cable tie securing brake line to frame. Rotate brake claiper assembly from 9 o'clock position to 11 o'clock position and slide caliper upward to remove. Rotate moveable ramp lobe (J) to full unload position. See illustration 4. Move stationary pad (X) until flush with moveable pad (Y) and install C-clamp vise grip on caliper assembly. See illustration 2, page 3.28. Remove right front C-clamp vise grip. Proceed to step 7.



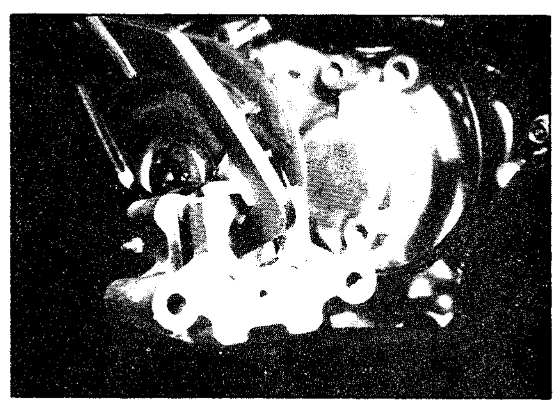
Ill. 4

7. Loosely replace diaphragm and cover over master cylinder reservoir, holding them in place, actuate the brake lever several times to begin bleeding the system. Actuate and hold the brake handle firmly. A second mechanic will then be required to open the bleed valve located on the brake caliper assembly, (right front brake caliper assembly or left front if following step #9), hold brake lever until bleeder valve has been tightened.

   Continue this procedure until all air has been forced from this caliper. Check and maintain proper fluid levels while bleeding the system. DO NOT allow air to enter the brake line.



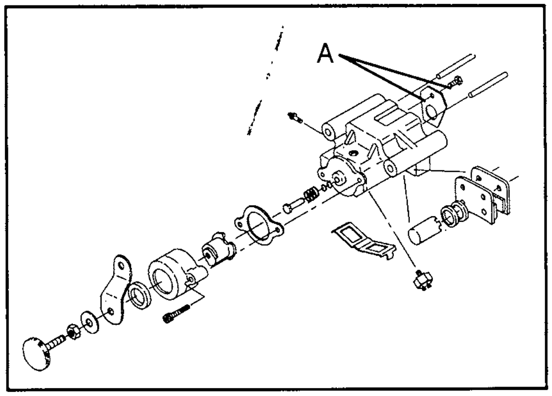
8. Position and clamp vise grip C-clamp on the right front caliper and remove C-clamp from left front.
9. Repeat Step 7.
10. If after the bleeding process has been completed, a spongy brake lever is encountered, follow these steps.
11. With the rear caliper assembly removed from the transmission mounting, clamp the front caliper assemblies and actuate the left brake lever to bring the rear caliper piston to maximum stroke. Position a C-clamp vise grip on the stationary brake pad and caliper assembly. Be sure to center the C-clamp on the brake pad.



12. Compress the piston back into the caliper assembly. Remove the C-clamp and actuate the brake lever once again. Clamp the brake pad and caliper assembly to again compress the piston into the caliper system. This will increase the force to move any air bubbles out of the system and up through the master cylinder assembly. Lubrication of the caliper walls will also be accomplished, assuring smooth action of the caliper piston. Continue until no air bubbles are present in master cylinder reservoir.

Brake Bleeding Procedure Cont.

1989-1993 Models Installation of Rear Caliper



19. Assemble pin plate and screw (A) to caliper assembly and secure. Assemble the rear caliper to transmission, actuate brake lever to push caliper piston out for alignment purposes. Torque mounting bolts to 15 ft. lbs. (2 kg/m). On models equipped with auxiliary brake, reinstall adjuster knob and actuating arm. (1993 Sportsman and 1994 4x4 models, reinstall adjuster bolt and auxiliary brake arm.) Check brakes to be sure they are not dragging. Readjust pedal deflection if necessary.

1989-1993 Models with Auxiliary Brake

20. Check and adjust foot brake if required. With the transmission in neutral, adjust the foot brake by tightening the adjuster bolt until the brake pads rub on the disc. Then back off the adjuster bolt just enough to allow free disc rotation (approximately 1/2 turn). Tighten the jam nut and check for disc movement. Check foot pedal travel. If movement is excessive, re-adjust as necessary. Check brakes to be sure they are not dragging. Readjust pedal deflection if necessary.

1993 Sportsman, 1994 to Current Models with Auxiliary Brake

21. Assemble the rear brake assembly to its mounting and torque mounting bolts to 15 ft. lbs. Reassemble auxiliary brake arm with adjuster bolt, jam nut and washer. Adjust auxiliary brake at 1/2″ to 3/4″ travel of the pedal and tighten the jam nut while holding the bolt. Check brakes to be sure they are not dragging. Readjust pedal deflection if necessary.

1995 Scrambler

22. Assemble the rear brake assembly to its mounting and torque mounting bolts to 15 ft. lbs. Reassemble auxiliary brake rod to arm with washer and a new cotter key. Adjust brake at 1/2″ to 3/4″ travel of the pedal by turning adjuster screw clockwise.
23. Remove right front C-clamp. Remove the **right front caliper assembly**. DO NOT remove the brake line.

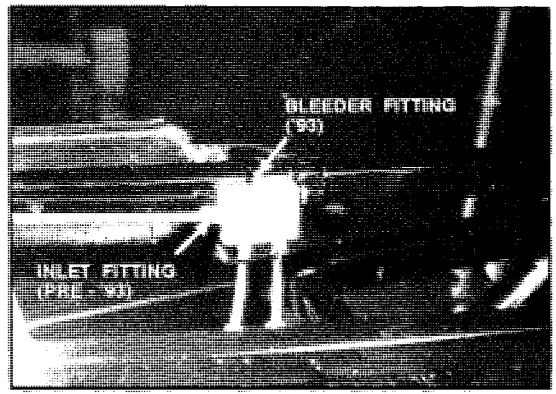
24. Actuate the left brake lever to push out the caliper piston to maximum stroke. Position a C-clamp vise grip centered on the stationary pad and caliper assembly as shown.
25. Compress the piston back into the caliper assembly. Remove the C-clamp and actuate the brake lever once again. Clamp the brake pad and caliper assembly to again compress the piston into the caliper system. This will increase the force to move any air bubbles out of the system and up through the master cylinder assembly. Lubrication of the caliper walls will also be accomplished, assuring smooth action of the caliper piston. Continue until no air bubbles are present in master cylinder reservoir.
26. Assemble the caliper assembly to rotor mount. Torque caliper attaching bolts to 18 ft. lbs.
27. Clamp right front caliper assembly and **remove the left front C-clamp**. Remove the left front caliper assembly. DO NOT remove the brake line.
28. Repeat Steps 24. -26.
29. Replace front wheels and torque to 15 ft./lbs. (2 kg/m). Remove ATV from jack stands. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever/pedal is released. If the brake drags, re-check assembly, installation and adjustment.
30. Replace shield and chain guard as required.

Brake Bleeding Procedure (4x6 And 6x6 Models)

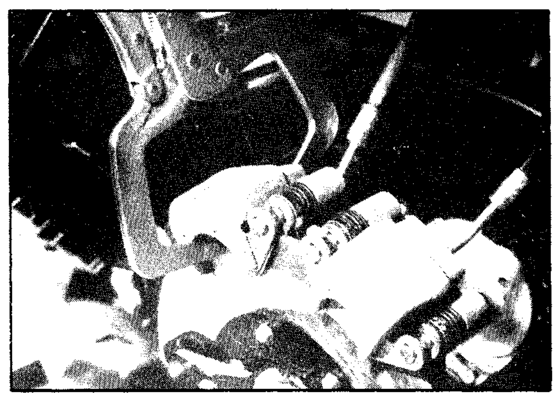
The brake bleeding procedures are the same as 2x4 and 4x4 models for the left hand brake system.

The right hand system for the middle axle is bled as follows:

1. Cover and protect all areas which could be damaged by spilled brake fluid with shop cloths.
2. Lift and pivot cargo box/bed assembly to obtain access to bleeder junction block as shown.



3. With a C-clamp vise grip, position and clamp the forward brake caliper assembly as shown.



4. Begin bleeding by actuating the right hand brake lever several times, then hold firmly and open bleeder fitting on the junction block. Tighten the fitting and release the handle.

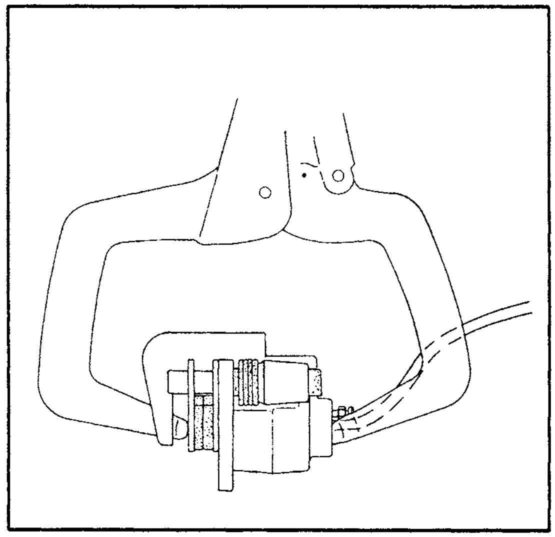
NOTE: On models prior to 1993, there is no bleeder fitting, therefore it will be necessary to loosen the line fitting on the inlet side of the block to release trapped air.

5. Check and maintain brake fluid levels in the master cylinder assembly to assure no air is allowed back into the system. Use only Polaris DOT3 brake fluid (PN 2870990).
6. Bleed the rear caliper. Actuate brake lever several times and hold firmly. Open bleeder fitting when handle has collapsed completely, tighten bleeder fitting, then release handle. Repeat this procedure until firm lever is obtained. Check and fill fluid as required during the process.
7. Remove C-clamp from forward caliper assembly and place it on the rear caliper assembly.
8. Bleed the forward caliper. Actuate brake lever several times and hold firmly. Open bleeder fitting when handle has collapsed completely, tighten bleeder fitting, then release handle. Repeat this procedure until firm lever is obtained. Check and fill fluid as required during the process.
9. After the system has been bled, bleed the junction block again to assure no air is trapped in the system. Repeat Step 4.

Brake Bleeding Procedure (Continued)

10. If after bleeding the system, a spongy brake lever is still evident, remove one caliper from its mounting. **DO NOT disconnect the brake line.** Position and clamp a C-clamp vise grip on the other caliper assembly.
11. Actuate the brake lever several times. This will force the caliper piston out fully. With a C-clamp vise grip positioned on the center of the stationary pad and back side of the caliper assembly, compress the piston back into the caliper. Repeat this procedure a couple of times.
12. Replace the caliper assembly to mount and torque to 18 ft. lbs. (2.4 kg/m). Position and clamp a C-clamp vise grip to hold this caliper assembly firmly in place.
13. Repeat steps 10 and 11.
14. Replace caliper assembly to mount and torque to 18 ft. lbs. (2.4 kg/m). Check and maintain brake fluid level. Replace diaphragm and cover and tighten screws.

NOTE: Do not purchase brake fluid in large containers. Brake fluid should be used immediately once the container is opened.



CHAPTER 4

TRANSMISSION SERVICE

Polaris ATVs have utilized different transmissions in various models. To assist with identification and repair procedures, use the following guide. **NOTE:** When ordering replacement parts, always reference the applicable parts manual by model number.

Designation	Used	Model No.	Comment
Side Shift	1985 to 1st 1/2 of 86	W867627	15 Link Wide Chain w/tensioner
	2nd 1/2 of 86	W877527	11 Link Wide Chain
Side Shift		W877828	
		X888528	
No Shift		W888528	
		W898527	
		W907221	11 Link Chain

Number	Used	Part No.	Comment
—	87 4x4	1341036	Sandcast
ME25P	87 4x4	1341039	Die Cast, 2nd Build
ME25PR	88 2x4	1341044	Die Cast
ME25P3	88 4x4	1341047	Oval Indicator Light On Dash
ME25P3A	89 4x4	1341056	1200 Pcs. Long Shaft w/o Speedo
ME25P5	89 4x4	1341057	Adapter
ME25P6	89 2x4	1341058	Speedo Drive Long Shaft Big
ME25P10	90-93 Trail Boss	1341064	Bearings
	91-93 Trail Blazer		New Input Shaft Speedo Drive
ME25P8	90-92 4x6	1341065	New Input/Speedo/H/N/R Only
	90-93 2x4		
ME25P7	90-93 4x4	1341066	New Input/Speedo
ME35P1	90-93 4x4 350L	1341080	
	91-93 6x6 250		New Input/Speedo
ME25P2	91-93 2x4 350L	1341081	Locking Type
	93 6x6 350L (Early Build)		Locking Type

	Used	Part No.	Comment
	93-95 6x6		Late Build 1993 EZ Shift
	93-94 Sportsman	1341136	Late Build 1993 EZ Shift
	95 Sportsman	1341146	
	94-95 2x4 300	1341125	
	94-95 2x4 400	1341123	
	94-95 4x4 300	1341136	
	94-95 4x4 400	1341146	
	95 Xplorer	1341146	
	94-95 Trail Boss	1341124	
	94-95 Trail Blazer	1341124	
	94-95 Sport	1341124	
	95 Scrambler	1341140	
	95 Magnum 2x4	1341139	
	95 Magnum 4x4	1341132	

Gear Ratios	Forward	Reverse	Low
Polaris Chain Type	3.33/1	2.5/1	—
Polaris Gear Type, Fuji	3.34/1	3.66/1	6.72/1
Output Shaft Brake Type	—	—	—
Polaris Gear/Chain USA H/L/R	3.29/1	5.13/1	6.64/1
H/R	2.68/1	3.42/1	

Torque Specifications

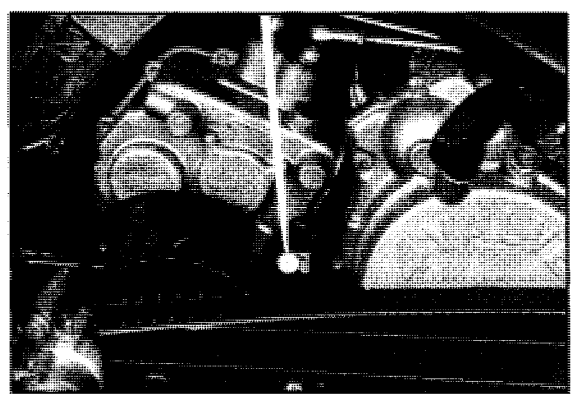
Transmission Case Bolts .... 12 ft. lbs. (1.66 kg/m)
Bell Crank Nut .... 14 ft. lbs. (1.93 kg/m)
Transmission Drain Plug .... 14 ft. lbs. (1.93 kg/m)
Speedometer Angle Drive .... 11 ft. lbs. (1.52 kg/m)
Transmission Mounting Bolts .... 25 ft. lbs. (3.45 kg/m)
Drive Sprocket Bolt .... 17 ft. lbs. (2.35 kg/m)
Output Shaft Bearing Mounting Nuts ... 12 ft. lbs. (1.66 kg/m)
Swing Arm Pivot Bolts .... 55 ft. lbs. (7.59 kg/m)

Lubrication

ITEM	TYPE	APPROX. CAPACITY	NOTES
Type I Transmission	Polaris Chaincase Lubricant	16 oz.	Use level plug to check
Type 2 Transmission	SAE 30	16 oz.	Dipstick
Type 3 Transmission	Polaris Chaincase Lubricant	High/Reverse 16 oz. High/Low/Reverse 19 oz.	Dipstick
Shift Selector (EZ Shift)	Polaris 0W40	-	Fill selector box to middle of shift selector slide. Do not overfill. Shift slides may hydrolock.

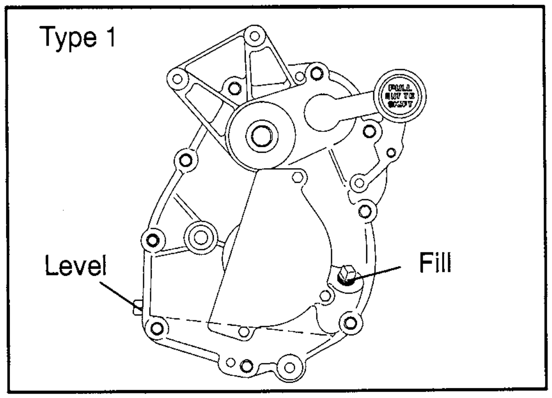
Transmission Oil Change

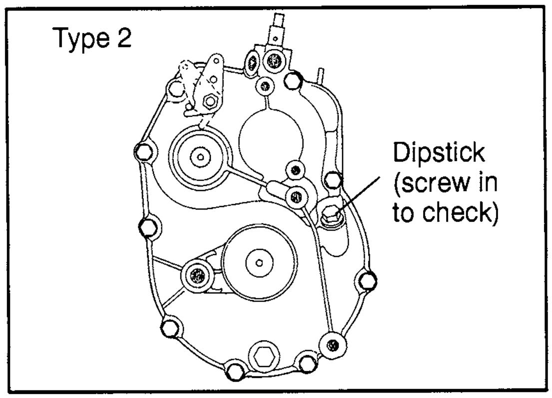
1. Place a drain pan beneath the transmission oil drain plug area.
2. Remove the drain plug and wipe the magnetic end clean to remove accumulated metallic filings.
3. After the oil has drained completely, install a new sealing washer and install the drain plug. Torque to 14 ft. lbs. (1.93 kg/m).
4. Remove dipstick or fill plug and clean accumulated metallic filings from the magnetic end. Remove level check plug on Type 1 transmissions.

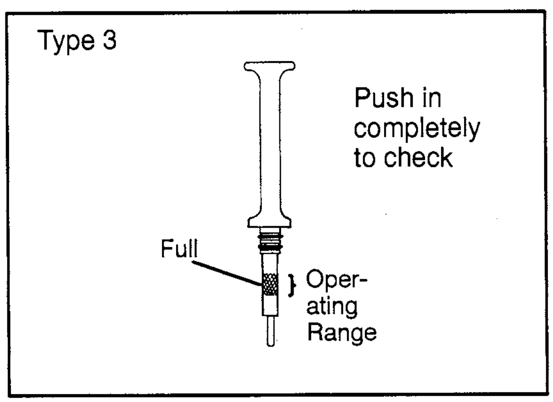


TRANSMISSION SERVICE
Specifications

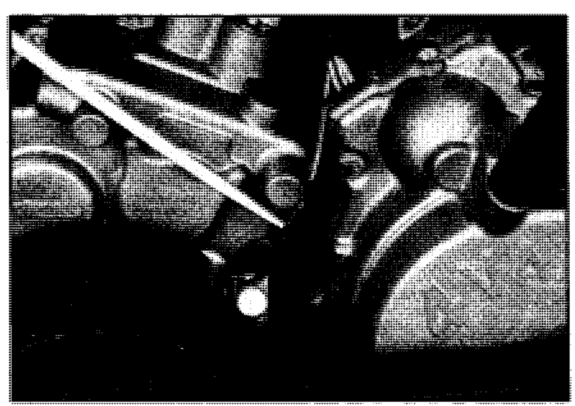
5. Add recommended amount of lubricant (see chart on page 4.1 for type and approximate amount) through fill plug or dipstick hole. Insert the dipstick all the way, remove, and check the level on the stick. Add lubricant if necessary until the level is between the upper and lower limits of the knurled portion of the dipstick (Type 2 and 3); or until it flows from the check plug hole (Type 1). Do not overfill.



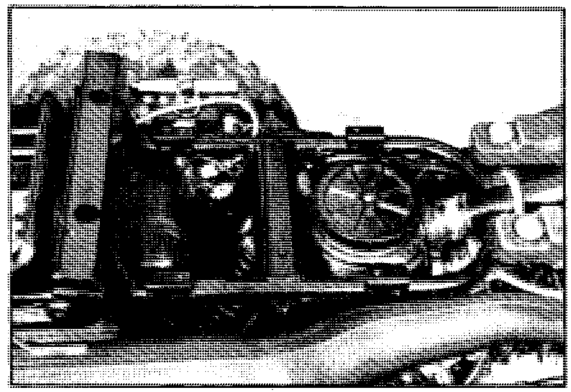




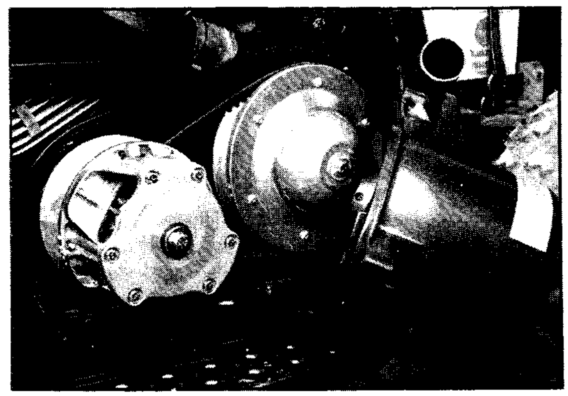
6. Check the transmission vent line for proper routing, cracks or damage. Be sure the vent line is not kinked or pinched.



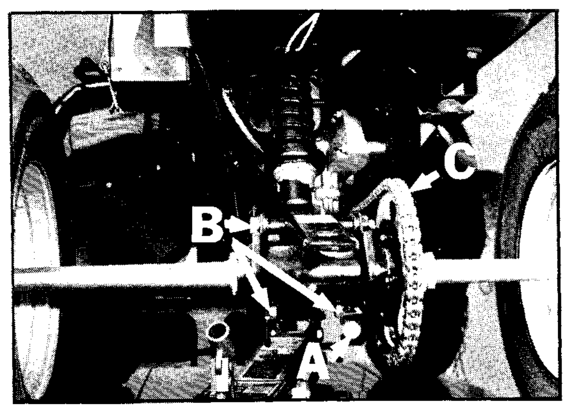
1. Remove rear rack and rear cowling.



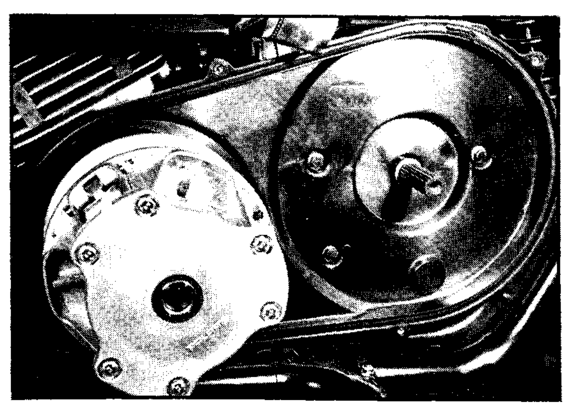
2. Remove outer cover.
3. Remove driven clutch.



4. Loosen chain adjuster (A) and pinch bolt (B).
5. Remove chain clip and drive chain (C).

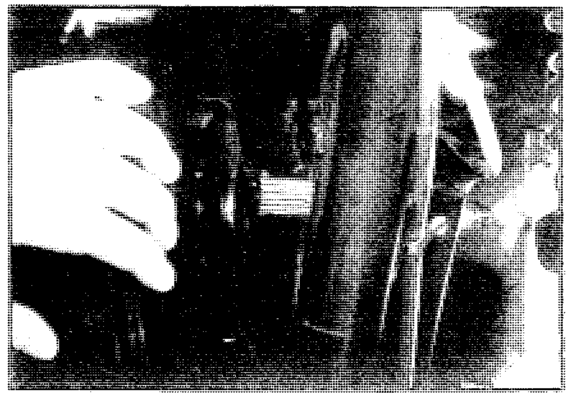


6. Remove three rear cover bolts.



TRANSMISSION SERVICE
Type I Disassembly

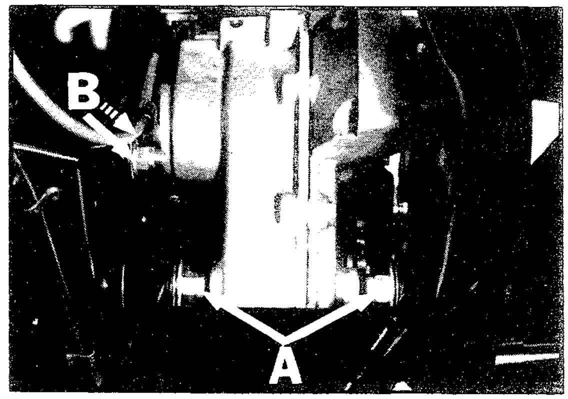
7. Move the back part of the rear cover outward as shown to access the front swing arm bolt on the left side.



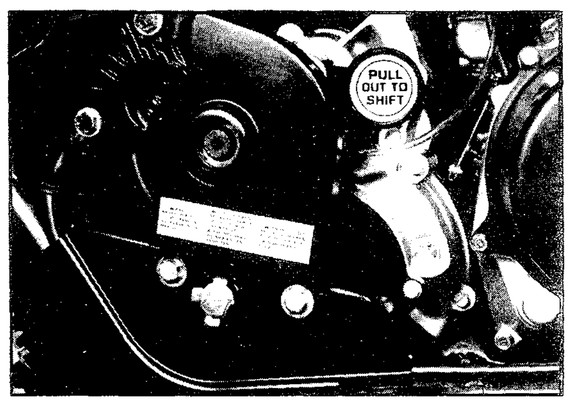
8. Loosen left and right swing arm bolts (A) just enough for the transmission to clear the mount.

9. Remove two left side bulkhead retainer bolts (B).

10. Remove bottom transmission retainer bolt.

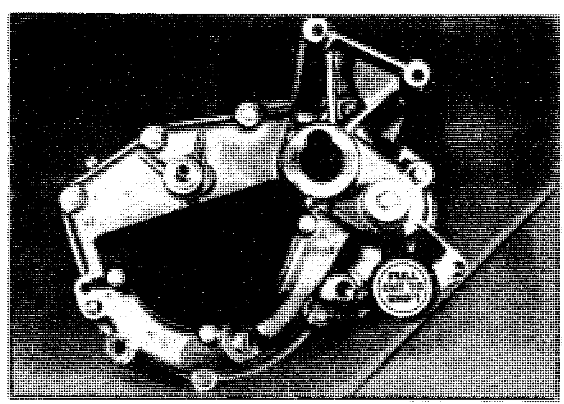


11. Remove brake disc cover and caliper assembly bolts. Slide brake disc and caliper assembly over splined shaft from transmission.

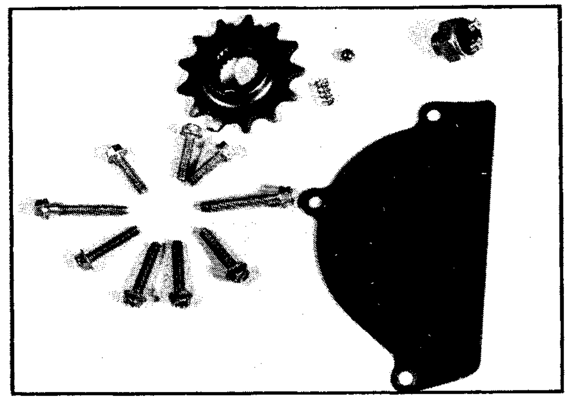


12. Remove air box assembly from carburetor and inlet frame tube.

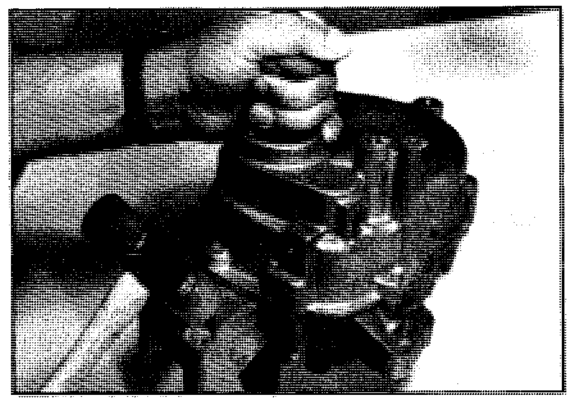
13. Remove transmission from chassis and prepare for disassembly.



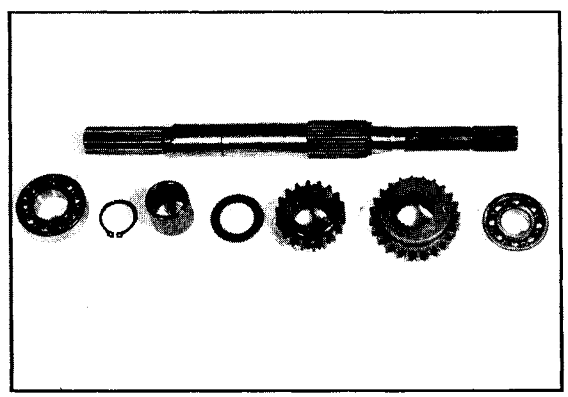
14. Drain all oil from gearcase and remove case half retaining bolts.
15. Remove detent ball and spring, and reverse switch.
16. Remove chain sprocket guard and sprocket.



17. Split the case by tapping and prying in areas where damage to seals will not occur. **CAUTION:** The case halves must come apart evenly to avoid damaging internal bearing surface.

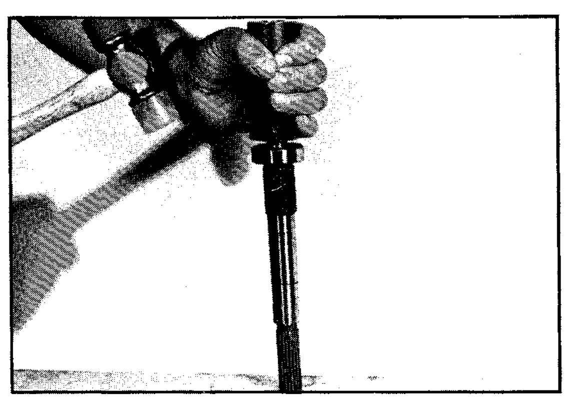


18. Disassemble the input shaft by pressing both outer bearings off and removing the snap ring. Inspect the sliding bearing gear, engagement shift dogs and other components at this time.

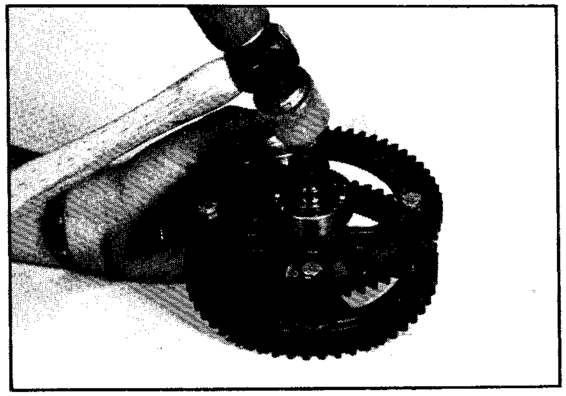


Type I Reassembly

1. Reassemble the shaft using new parts where required. Use Polaris bearing/seal driver (PN 2870676) to install outer bearings.

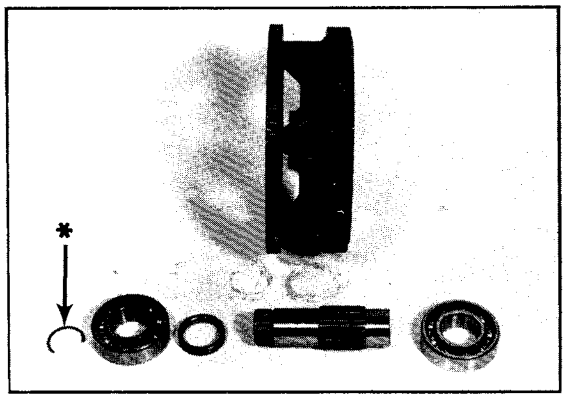


2. Remove the bearings from the output shaft.

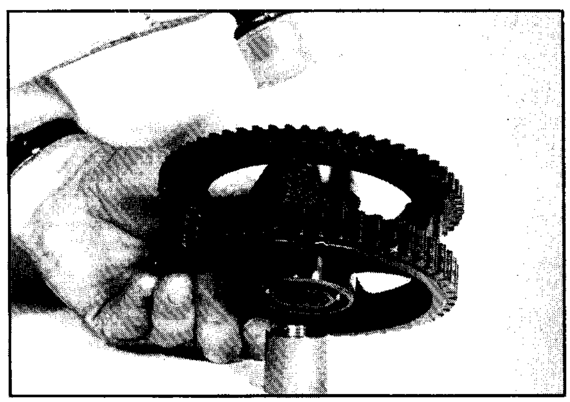


3. Inspect the output shaft and outer end bearings.

*1985 models only - see photo.

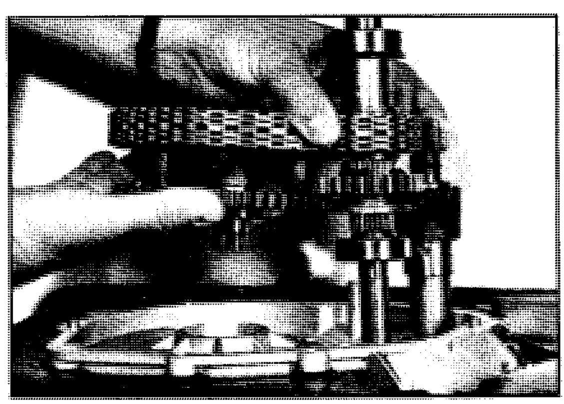


4. Reassemble the output shaft into the forward and reverse gear assembly. Install the spacer where used. Install the bearings. Drive the bearings onto the output shaft, using the bearing seal driver tool (PN 2870676).



NOTE: Support the inner race of the bottom bearing when installing. Install the snap ring to the output shaft.

5. Before reassembly, clean the internal parts and case halves thoroughly. Oil case half bearing surfaces. Install the right side case half into the holding fixture (PN 2870674). Assemble the forward and reverse gear, the input shaft assembly, the primary chain and the shifter fork into a cluster. Install the cluster into the half.

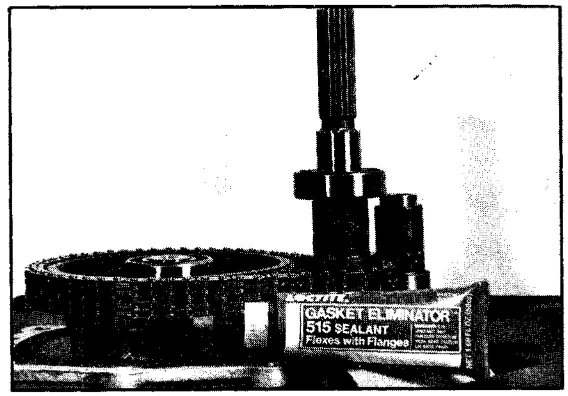


NOTE: All 1985 and 1986 models having "75" as their 3rd and 4th digits (e.g. W867527) require a 15 link wide chain. All 1986 models having "76" as their 3rd and 4th digits (e.g. W867627) require an 11 link wide chain.

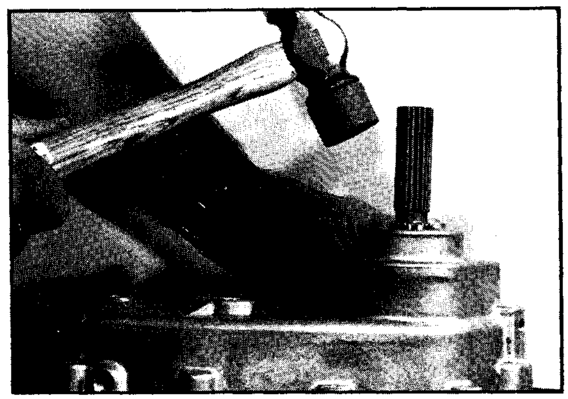
The following models require an 11 link wide chain:

W877527	W888528
W877828	W898527
X888528	W907221

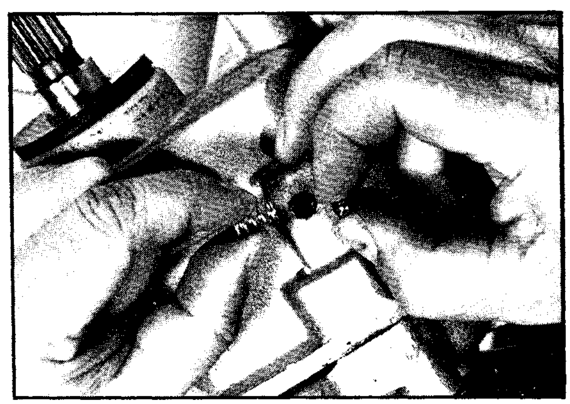
6. To prevent binding, the input and output shafts and the shifter shaft must be installed into their respective bearing locations at the same time.
7. Apply a light coating of Loctite 515 (PN 2870587) gasket eliminator to one of the case halves.
8. Reinstall the chain tightener.



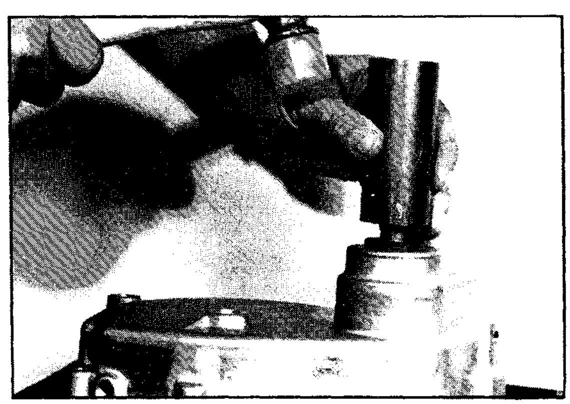
9. Reinstall the left side cover carefully, insuring correct shaft bearing mating.
10. Once the shafts have entered the bearing bores, lightly tap the outer cover to fully seat the two halves.
11. Reinstall cover retaining bolts and torque to 4 ft. lbs. (.6 kg/m).



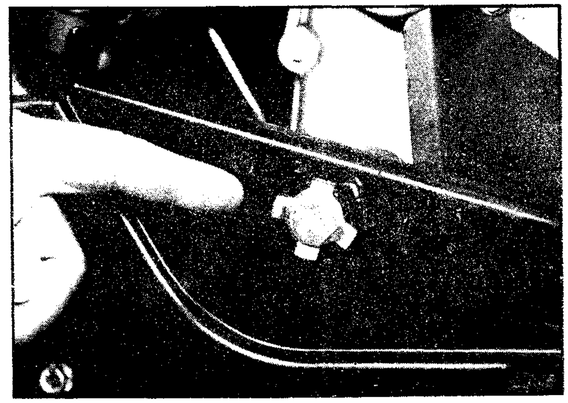
12. Reinstall detent ball, spring and set screw if used on this model.
13. Reinstall reverse switch and shifter lever.



14. Before installing seals, grease shaft radius thoroughly to prevent seal damage.
15. Install seal by hand over radius. With inner seal lip properly positioned over radius, seat seal using bearing seal driver (PN 2870676).
16. Fill transmission with Polaris chaincase lubricant (PN 2870464). Do not mix or use other types of lubricants.

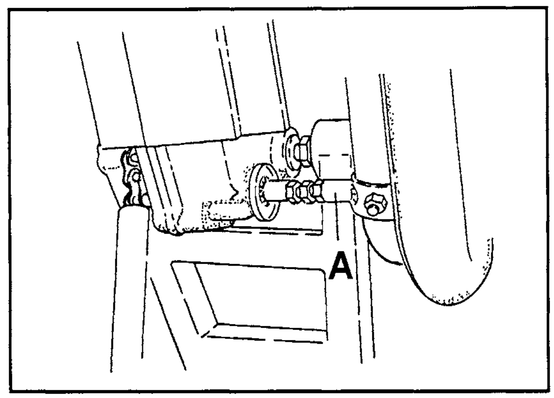


7. Install the transmission into the vehicle using the opposite procedure for removal. Torque the swing arm transmission support bolt to 55 ft. lbs. (7.6 kg/m). Re-bend the bolt locking tabs. See Chapter 2 for swing arm side play adjustment.



8. Some 1985-86 models may have an optional transmission torque stop kit (PN 2870707) installed. If the unit is equipped with this kit (A) adjust the stop until it contacts the transmission and then further lengthen it 1 1/2 turns. Tighten the jam nuts.

9. On 1987 to present models, adjust the stop until it contacts the transmission and then further lengthen it 1/2 turn. Tighten the jam nut.



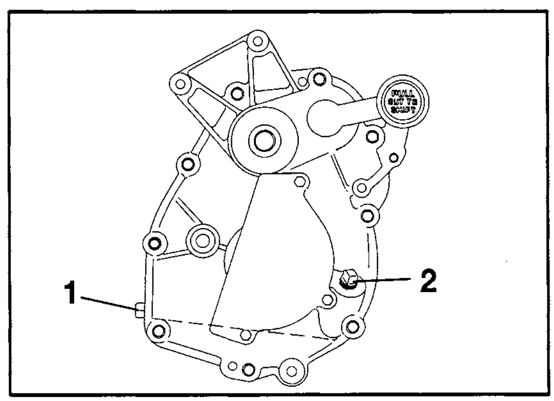
1985-1990 Type I Fluid Level

1. The transmission lubricant level is checked by removing the check plug (1).

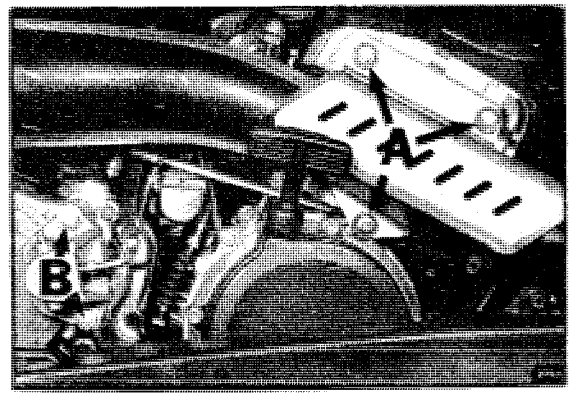
2. Add lubricant through fill hole (2) until it flows from the check plug hole.

Use only Polaris Chaincase Lubricant.

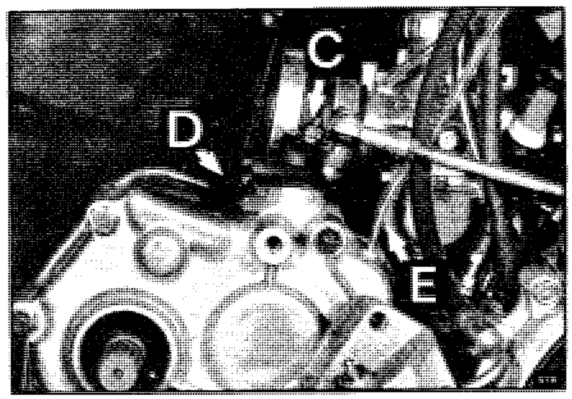
NOTE: When lubricant is added or changed, clean the magnetic check plug of metal particles.



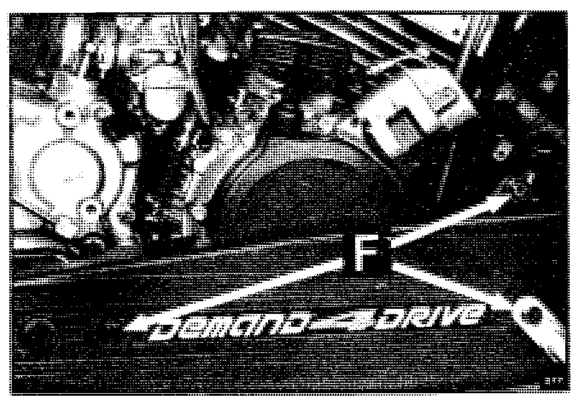
1. Remove the seat.
2. Remove rear cab and rack as an assembly.
3. Remove air silencer filter assembly.
4. Remove exhaust shield (A), rear portion of exhaust system, brake caliper (B), and disc.



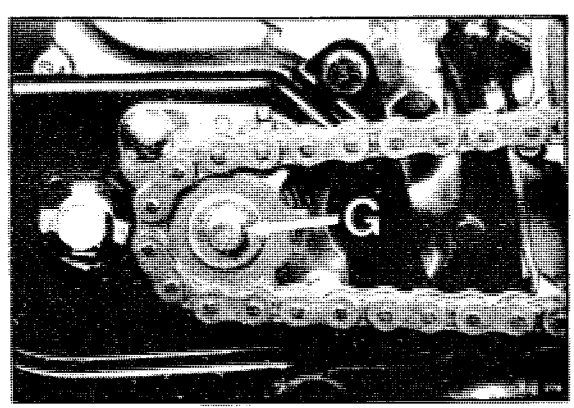
5. Remove shift arm attaching nut (C) and set shift assembly aside.
6. Remove neutral light switch wires (D) and transmission vent line (E).



7. Remove chain guard attaching bolts (F).
8. Remove foot pad and chain guard.

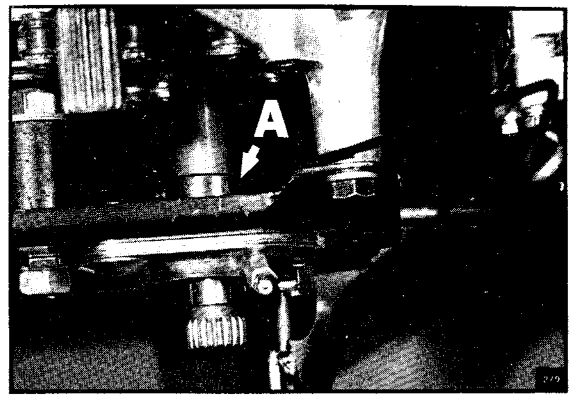


9. Remove primary forward gear attaching bolt and washers (G).
10. Slide gear and chain off output shaft.



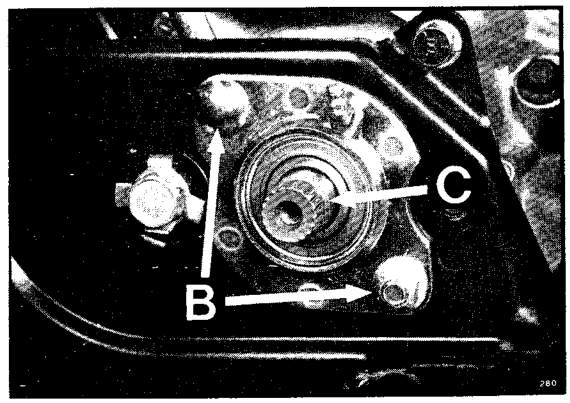
Type II Disassembly

3. On models with a lock collar, loosen the locking collar set screw (A). Rotate the collar out and away from the bearing inner race. **NOTE:** Late models use a bushing carrier instead of a flangette retained bearing.



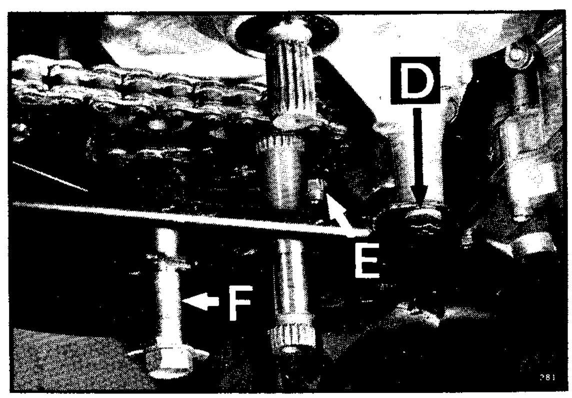
4. Remove the bolts securing the bearing flange to the frame member (B).

5. Clean end of output shaft (C) thoroughly. Remove output shaft support bearing. **NOTE:** It may be necessary to heat the inner race of the bearing to remove it from the shaft.



6. Remove transmission side mounting bolt (D) and lower mounting bolt (E).

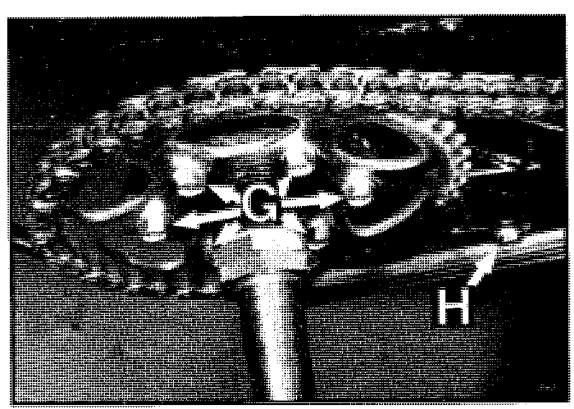
7. Loosen swing arm bolt (F) and swing outward, but not all the way out.



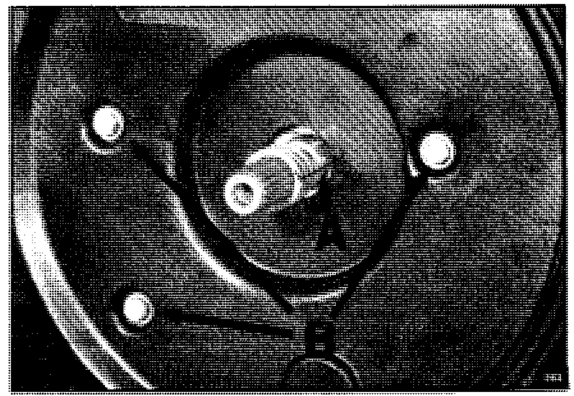
8. Remove the bolts (G) securing the final drive gear to the hub.

9. Remove chain guard attaching bolt (H).

10. Roll chain to outside of transmission gear.

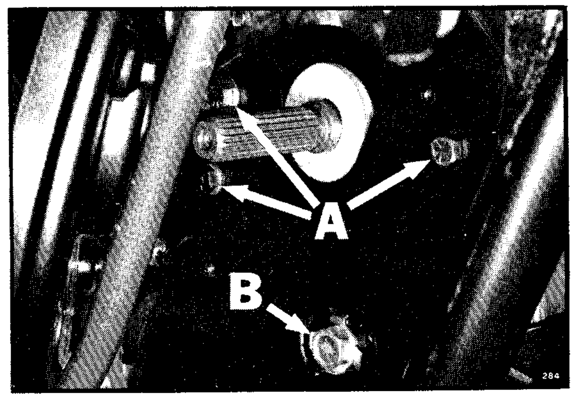


19. Remove the PVT cover drive belt, driven clutch, driven clutch offset washers (A), and the bolts that secure the inner cover to the transmission (B).



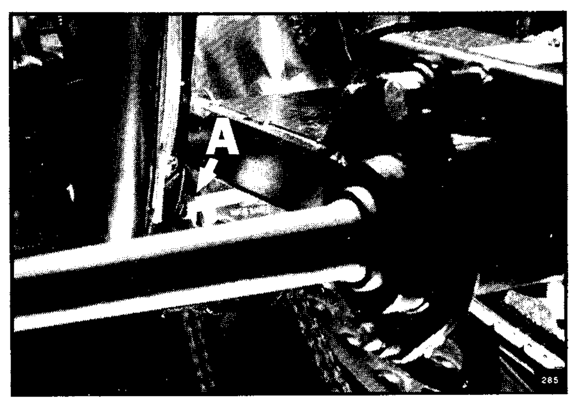
NOTE: 350L models require spacers and O-rings behind the cover.

20. Flex the inner PVT cover outward as shown and remove the bolts (A). Loosen the swing arm bolt and slide it outward (B).

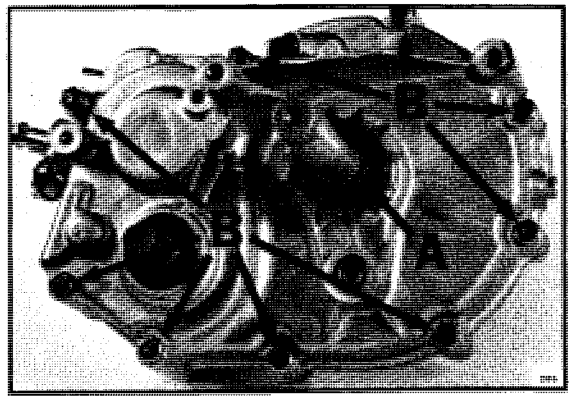


21. Slide the transmission out of the lower mounting brackets, position it to the right side of the frame and remove the torque stop bolt (A).

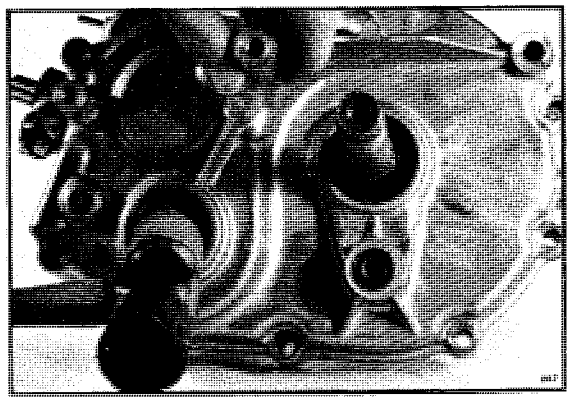
22. The transmission can now be lifted up and out of the unit. After removal, thoroughly clean the transmission. Be sure to leave the support for holding the PVT inner cover outward. Reinstall for reassembly.



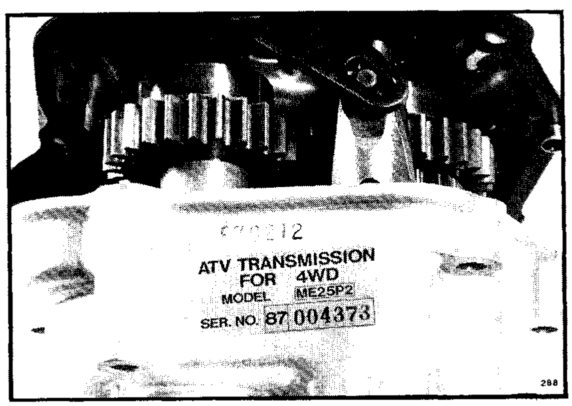
23. Remove the snap ring and rear drive gear (A). Remove the bolts securing the transmission housings (B). During reassembly torque these bolts to 17 ft. lbs. (2.3 kg/m).



24. Separate the case halves by lifting upward on the housing as shown and tapping with a soft hammer on the brake disc shaft and the output shaft.



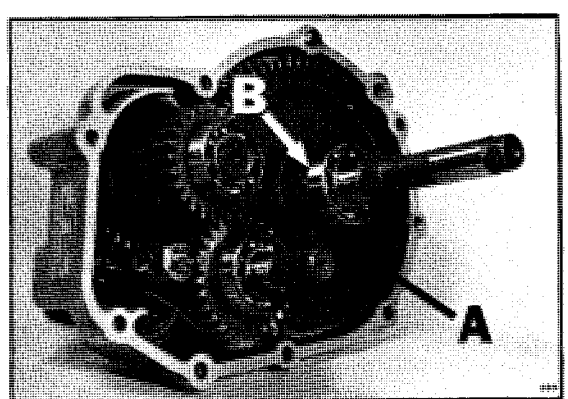
25. When the case halves have been separated to approximately this position, adjust the housing so the inner shift arm can be removed from the shifting fork pin. Finish separating the case halves.



26. Remove the large output gear assembly (A). **NOTE:** After gear assembly is removed check clearance at (B) with a feeler gauge to determine how much shimming is required.

    Add shims as required to eliminate gear deflection (sideplay) on the spline. See the correct parts book for shim sizes. **NOTE:** Shims should be added between the bearing and gear on the short stub side of the shaft.

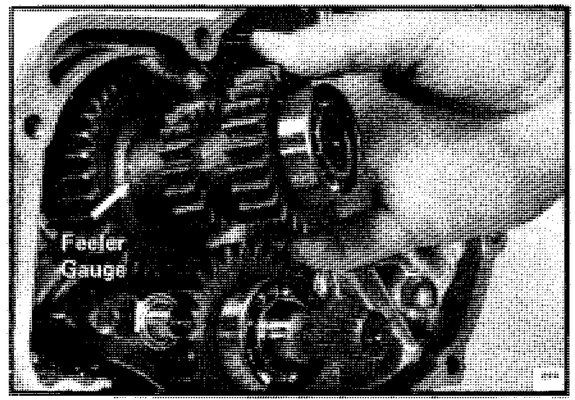
    .3mm/.012″ PN3231562
    .1mm/.004″ PN3231563



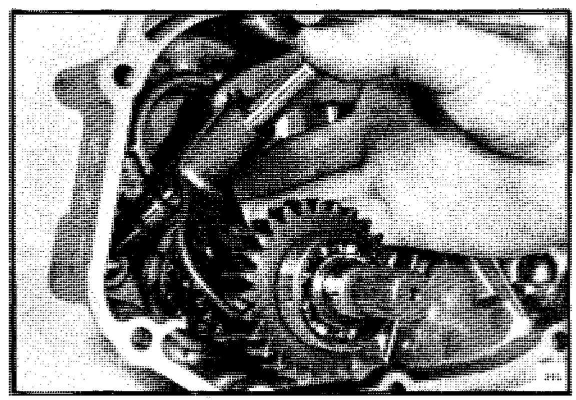
27. Remove the forward gear cluster assembly.
NOTE: After the forward gear cluster is removed check the distance between the collar and gear with a feeler gauge to determine the spacer shims required to reduce sideplay to as close to zero as possible.

    Shims may be added between bearing and gear, at either end.

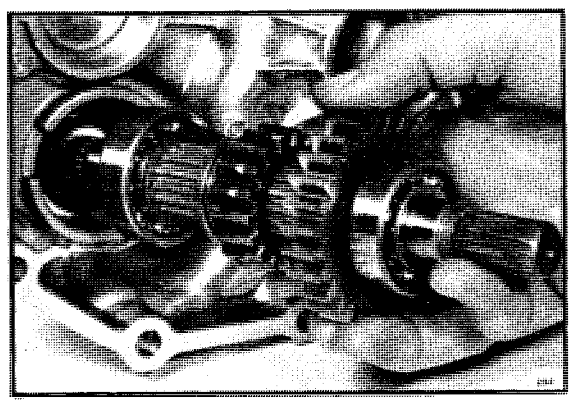
    .3mm/.012″ PN3231564
    .1mm/.004″ PN3231565



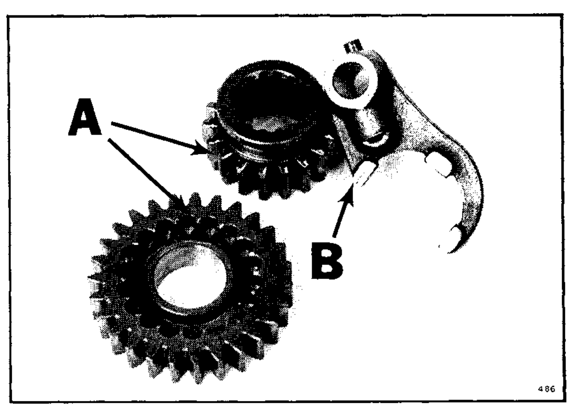
28. Remove the shift fork and fork support shaft.



29. Remove the input shaft and sliding gear assembly.

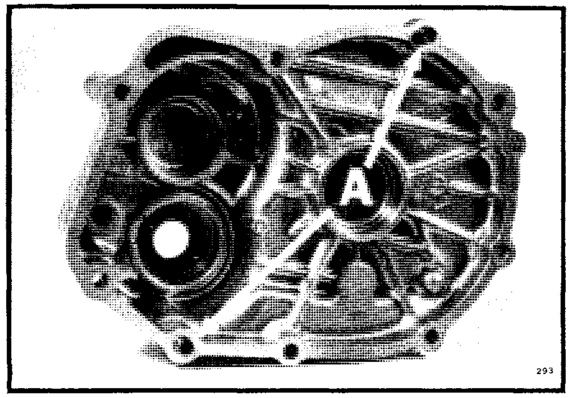


30. Inspect the transmission components for wear. Any rounding of the gear engagement area (A) or wear on the shift fork (B) requires component replacement.



Transmission Service Tips

1. During disassembly and reassembly be aware of the two case hole locating sleeves (A). These must be in position during reassembly.



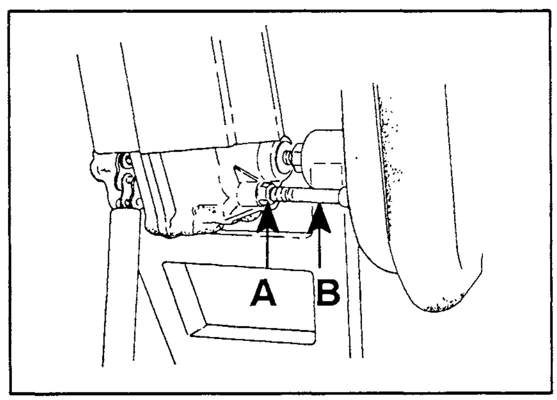
2. Before reassembly be sure the case half mating surfaces are clean and free of any nicks or scratches. Always install a new gasket and use Loctite gasket eliminator on both case halves.

3. Bearings, spacers and gears are assembled until they bottom on each other or a shoulder. Use seal and bearing driver PN 2870676 for reassembly.

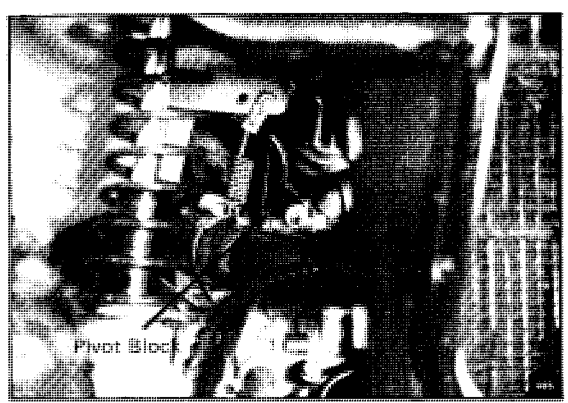
4. Seals can be installed flush with case half outer surfaces before final assembly. Be sure to grease the inner lips of the seals and also be sure the leading edge of the seal to shaft mating surface is free of any nicks or scratches which may damage the seal during reassembly.

5. This transmission is equipped with a dipstick which has low level and full level marks. Fill the transmission to the upper mark with SAE 30W oil.

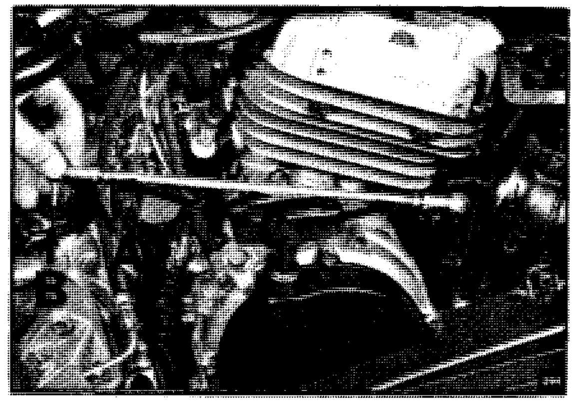
6. Adjust the transmission torque stop. Loosen the jam nut (A) and adjust the bolt (B) until it touches the frame and then an additional 1/2 turn. Tighten the jam nut (A).



7. On all square tube frame machines, tighten the shift lever pivot block to remove all side play between the pivot block and the nut on the pivot shaft.

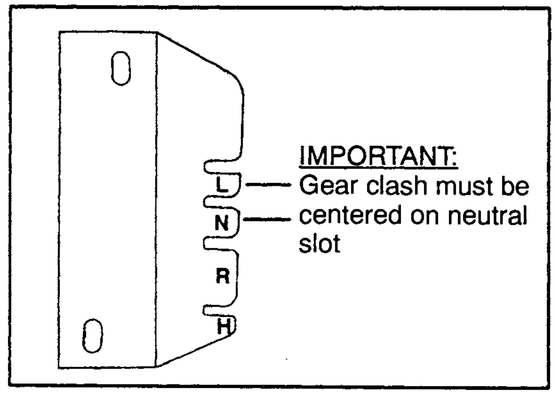


8. On all 1987 and 1988 Hi/Lo transmissions, shift linkage adjustment is done by removing the tie rod end (A), shifting the transmission to neutral and then the shift rod to the neutral position. Next, adjust the tie rod length so the tie rod end just enters the transmission shift arm (B). Tighten the tie rod end jam nuts (C). **NOTE:** Replace rod ends when excess end play occurs.



9. On 1989 and newer Hi/Lo transmissions, adjust the shift linkage as follows: Start the engine. Slowly shift from neutral to low, noting where gear clash begins. Shift toward reverse, noting where the gear clash begins in this direction. The two points must be centered on the neutral slot. If they are not centered, adjust the shift rod length until they are.

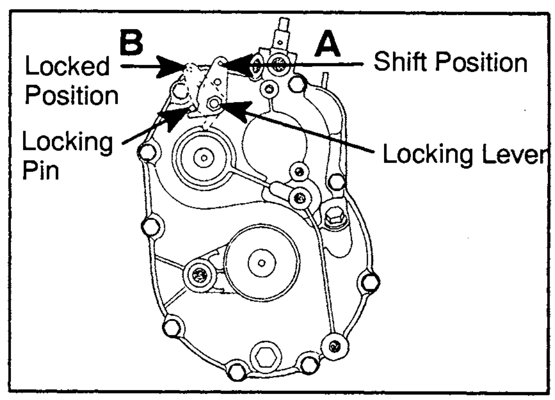
IMPORTANT: Gear clash must be centered on neutral slot



Shift Loc Adjustment

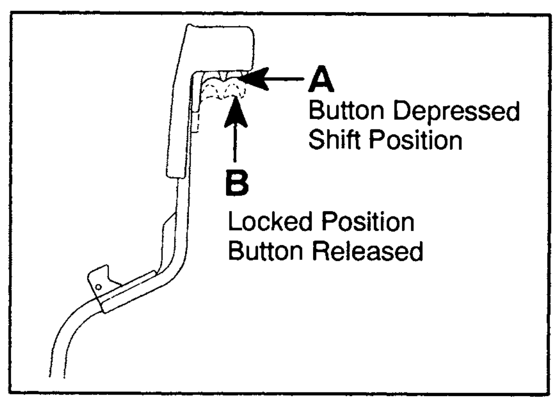
CAUTION: Severe transmission damage will result if this procedure is not followed properly.

Vehicles equipped with the locking transmission require proper adjustment to ensure they do not slip out of gear. Use the following procedure:



Depress the shift lever button into the shift position (A). The locking lever should touch the locking pin. Adjust cable if necessary.

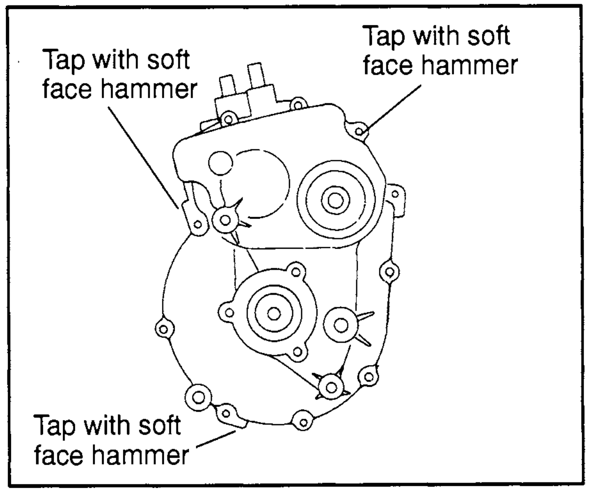
Release the shift lever button into the locking position (B). At this position the locking lever should also touch the locking pin. Adjust the cable longer if necessary so that it does touch. Lube the cable periodically to insure smooth operation. Use Polaris cable lube PN 2870510.



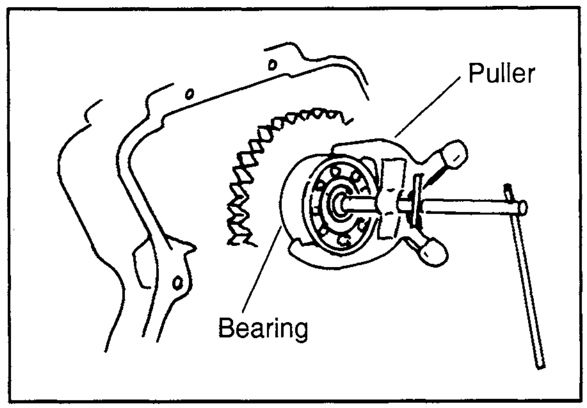
CAUTION: If this procedure is not followed properly, severe damage to the transmission will result!

TRANSMISSION SERVICE
Type III EZ Shift Disassembly

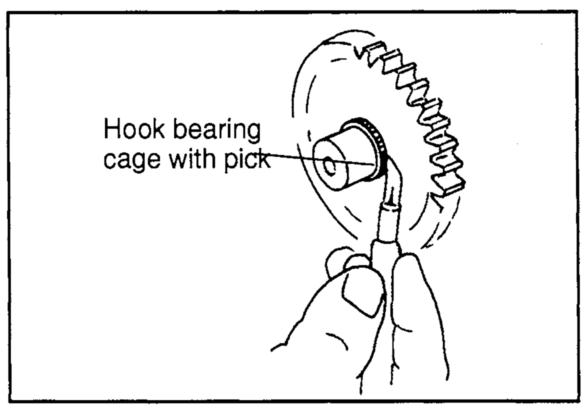
1. Remove transmission from ATV. Remove speedometer angle drive and outer gears and snap rings. Drain transmission oil. Remove drain plug and dipstick and check for metal filings. **NOTE:** Some metal filings are normal. However, chips of teeth or large deposits should alert you to thoroughly inspect all components. Remove the transmission cover bolts.With a soft face hammer tap on the cover bosses and carefully walk the cover off.



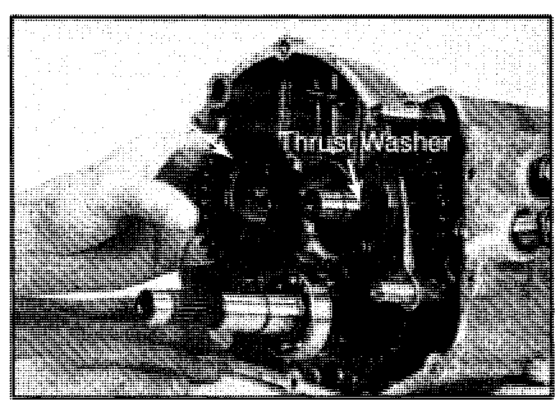
2. Sometimes the bearing will stay on the shaft, requiring a puller to remove it. Remove the bearing thrust washer behind the bearing.



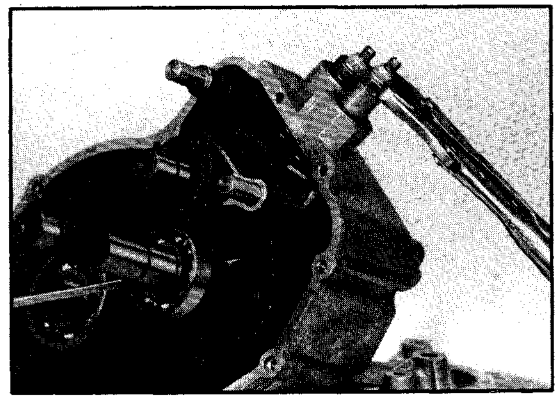
3. Remove the needle bearing from the inside of the low range gear. Hook the bearing cage with an O-ring pick or dental type pick and pull it out of the gear.



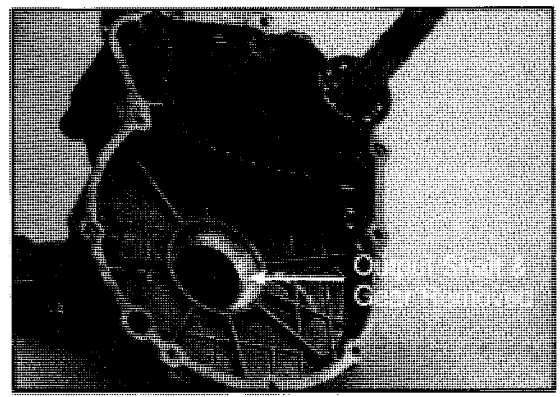
4. Remove the low gear and thrust washer.



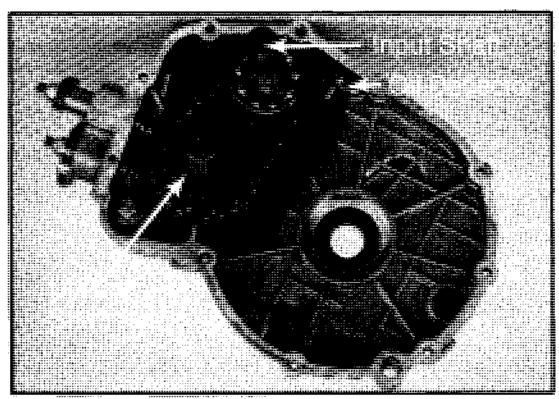
5. Use a locking plier to help turn the shift arm when removing the shifter shaft. **NOTE:** The shift fork dowel is between the spring tails.



6. Remove the output shaft gear assembly from the gear case. The output shaft assembly is the largest gear.

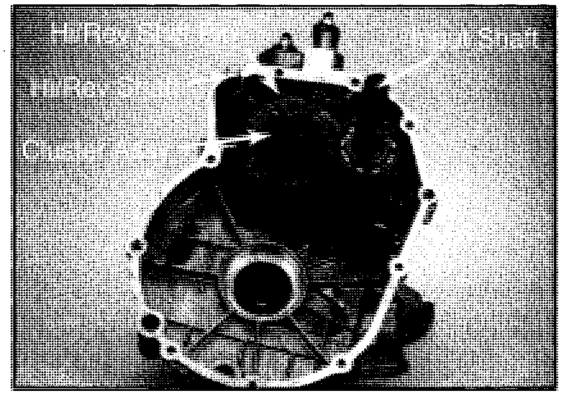


7. The high/reverse shaft assembly and input shaft must be removed together as a unit. Turning the shift arm shaft with a locking plier will aid in removal. The input shaft will have to be moved around slightly to clear the oil deflector. *Do not remove the oil deflector.*

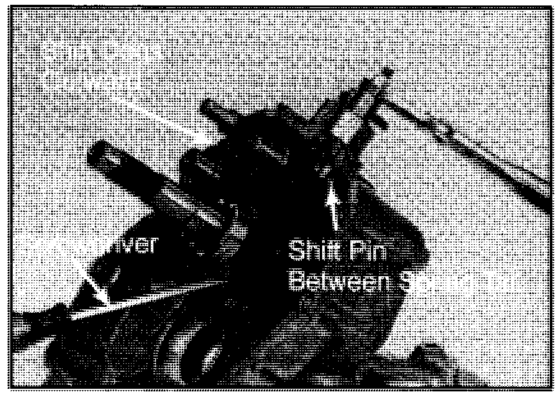


8. Clean all parts in parts solution and inspect for abnormal wear. Replace any questionable parts. Replace shaft seals last; after the transmission has been reassembled.

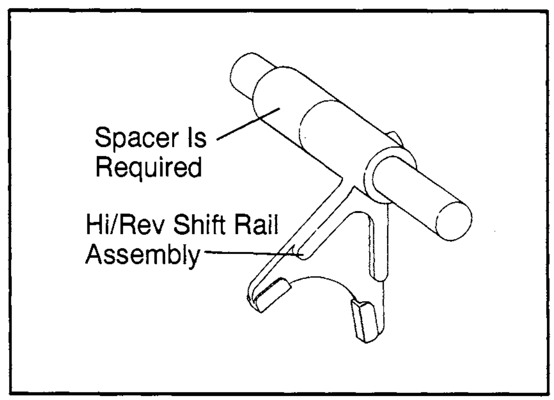
9. To reassemble this transmission, carefully install as a unit the high/reverse sliding shaft, the cluster assembly, and the input shaft with chain. Tap the shaft ends lightly to make sure they are fully engaged in their bearing housings. Make sure the high/reverse shift pin is located between the spring tail ends. Shift this shaft into neutral. **NOTE:** The shaft must be in neutral to finish reassembly. Install the output shaft gear assembly.



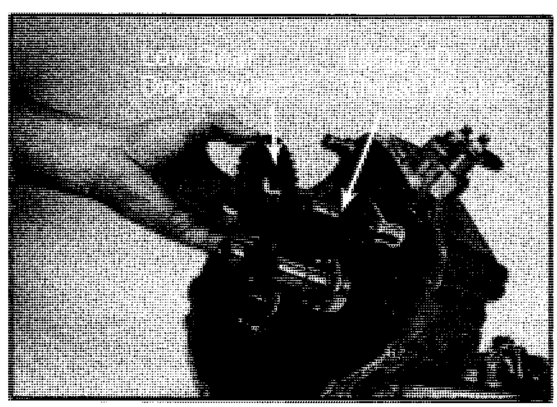
10. Install the engagement shift dog onto the low range shift shaft. **NOTE:** Dogs must be positioned outward, toward you. Slide the shift dog over the spline, and the low range shift shaft into the detent lock. Make sure the shift shaft pin is located between the spring tail ends. Remove the screwdriver holding the lock open.



CAUTION: When installing Shift Kit (PN 2200596) for High-Lo-Reverse transmissions, be sure to include the spacer on the shift rail shaft as shown in the illustration at right. **NOTE:** Later 1995 model shift fork will have an integral spacer.



11. Install the larger I.D. washer onto the sliding gear dog shaft. Install the low gear (dogs inward) onto the shaft. Position the needle bearing inside the low range gear. Install the remaining smaller I.D. washer onto the shaft and then the bearing. **NOTE:** The bearing and shaft should be flush with each other. Prior to installing the cover, make sure the surfaces are clean, and that a light film of Loctite 515 or 518 is applied to the mating surfaces. Torque mounting bolts to 12 ft. lbs. (1.7 kg/m). Fill the transmission to the proper level using Polaris chaincase lube (PN 2870464).

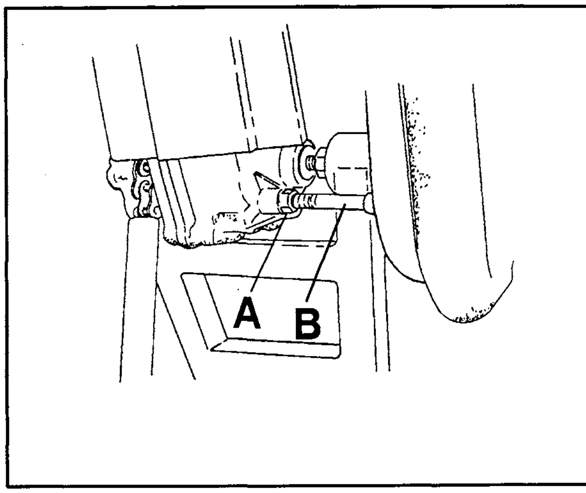


Adjust the torque stop:

- Prior to shift linkage adjustment;
- When shifting difficulties are encountered;
- If transmission has been removed from the frame.

NOTE: The torque stop is located on the bottom left hand side of the transmission.

1. Loosen jam nut (A).
2. Turn adjuster bolt (B) until it touches the frame, and then an additional 1/2 turn.
3. Tighten the jam nut securely while holding the adjuster bolt.



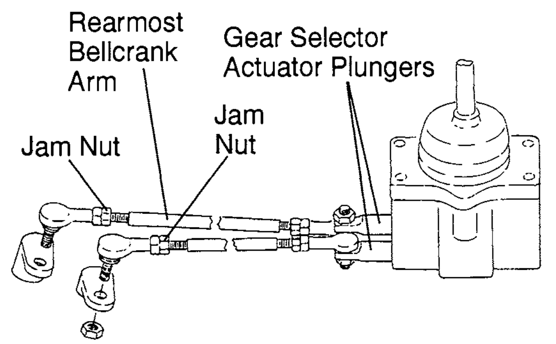
Shift Linkage Adjustment

Proper adjustment of the Polaris EZ Shift transmission is the first step in diagnosis of shifting problems or transmission noise. Linkage rod adjustment is necessary when symptoms include:

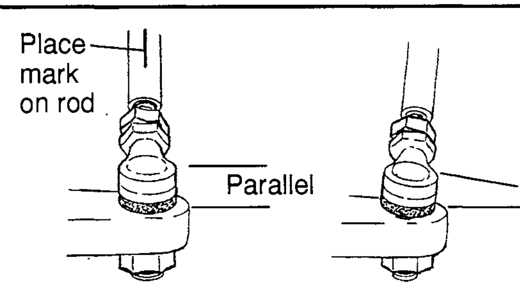
- Noise on deceleration;
- Inability to engage a gear;
- Excessive gear clash; or
- Shift selectors moving out of desired range.

NOTE: When adjusting linkage, always adjust both linkage rods. The adjustment of one rod affects the other. Remove necessary components to gain access to shift linkage rod ends (i.e. exhaust heat shield, exhaust pipe, etc.).

1. Perform torque stop adjustment.
2. Check shift linkage tie rod ends for wear, and replace if worn or damaged. Lubricate the tie rod ends with Polaris Cable Lube PN 2870510.
3. Loosen all rod end jam nuts.
4. Remove the rod ends from the transmission bell cranks.
5. Position shift selector in neutral. (In neutral, the shift box actuator slide ends should be even.) Position the transmission bell cranks into the neutral position detents. (The bell cranks will be perpendicular to the transmission case parting line.)
6. With the shift linkage rods still firmly attached to the shift selector slides, adjust the low range (inside) rod so the rear rod end is centered on the rearmost transmission bell crank. Install the lock nut to the rod end and torque to 35 in. lbs.
7. Rotate the linkage rod clockwise until resistance is felt. Mark the rod so revolutions can be easily counted. See illustration.
8. Rotate the linkage rod counterclockwise until the same resistance is felt, counting the revolutions as the rod is turned.
9. Turn the rod clockwise again one half of the revolutions counted.
10. Tighten the rod end jam nuts securely while holding the rod end. the jam nuts must be tightened with rod ends parallel to each other. (See illustration.) If jam nuts are properly tightened, the rod should rotate freely 1/4 turn without binding.



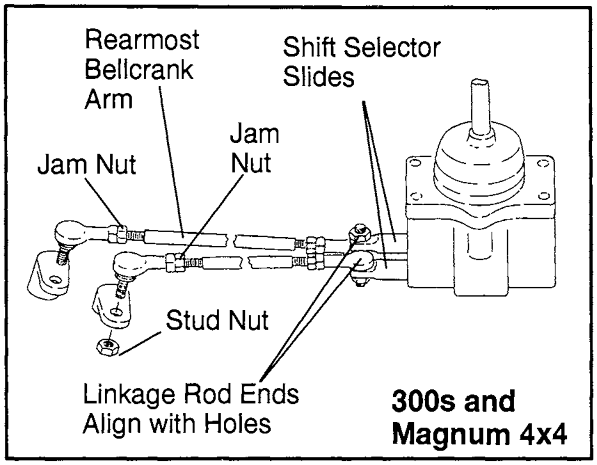
NOTE: Rod end positioning depends on model. See chart on page 4.17a for proper positioning.



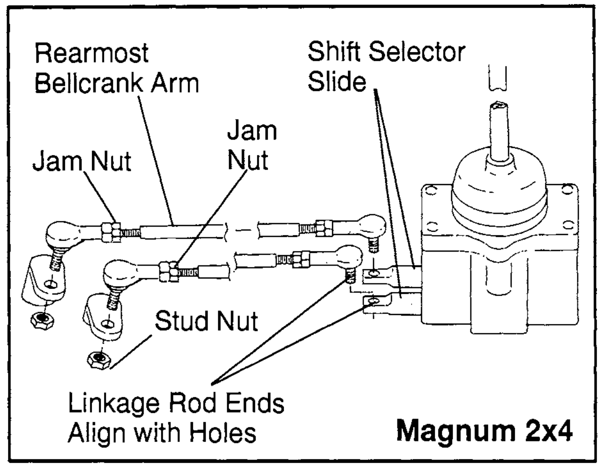
Correctly Tightened Jam Nut

Incorrectly Tightened Jam Nut

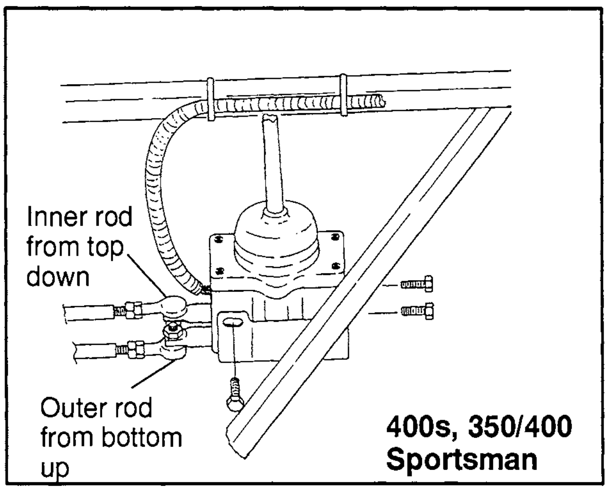
11. Repeat the adjustment procedure for the high/reverse gear (outside) linkage rod.



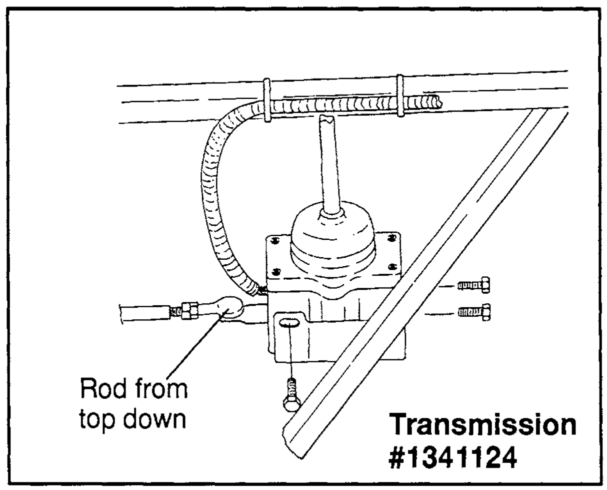
300s and Magnum 4x4



Magnum 2x4



400s, 350/400 Sportsman



Transmission #1341124

Shift Rod End Positioning

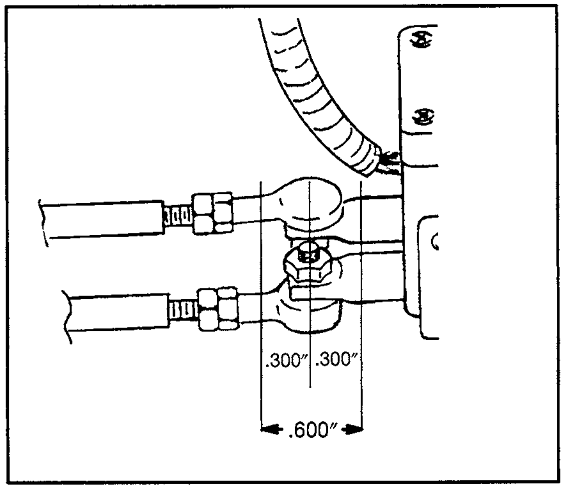
Model	Transmission Bellcrank	Shift Selector Slide
All 400s 350/400 Sportsman	From top down (nut on bottom)	(inner rod) from top down (nut on bottom) (outer rod) from bottom up (nut on top)
All 300s Magnum 4x4	From top down (nut on bottom)	(inner rod) from bottom up (nut on top) (outer rod) from top down (nut on bottom)
Magnum 2x4	From top down (nut on bottom)	(inner and outer rod) from top down (nut on bottom)
Trail Blazer Trail Boss #1341124	From top down (nut on bottom)	From top down (nut on bottom)
400 Sport	Clevis (or rod end from top down)	From top down (nut on bottom)

If shifting difficulty is still encountered after adjustment, perform the following steps:

12. Disconnect shift rods from bellcrank. Check torque required to move bellcrank (should be 10 ft. lbs.). Select gear and *hold 10 ft. lbs. torque on bellcrank.* Roll machine in the opposite direction of the gear selected (roll machine backward if a forward gear is selected - roll machine forward if reverse is selected). **NOTE:** Be sure to hold torque on bellcrank while rolling until the transmission gears are fully engaged.

13. Start machine and test ride. If transmission operation is satisfactory during the test ride shifting problem is outside the transmission. Check travel of the shift selector slides, re-check transmission adjustment, fasteners, torque stop, etc.

    - Travel of shift selector slides should be .600″ (15.2 mm) full movement, or .300″ (7.6 mm) one way.



Troubleshooting

Check the following items when shifting difficulty is encountered.

- Transmission oil type/quality
- Torque stop adjustment
- Loose fasteners on rod ends
- Loose fasteners on selector box
- Worn rod ends or clevis pin on clevis type linkage rods
- Linkage rod adjustment and rod end positioning
- Shift selector rail travel
- Worn, broken or damaged internal transmission components

NOTE: To isolate transmission disconnect linkage rods from bell cranks, manually select gear ranges and test ride vehicle. If it functions properly, the problem is outside the transmission.

Selector and Wiring Harness Removal (Typical)

Wiring Harness Removal

1. Remove fuel tank.
2. Cut cable ties securing gear shift selector switch wiring harness to frame.
3. Disconnect wiring harness from terminal board, noting the color of wires and location on the terminal board.
4. Pull the wiring harness through to the gear shift selector side of the machine.

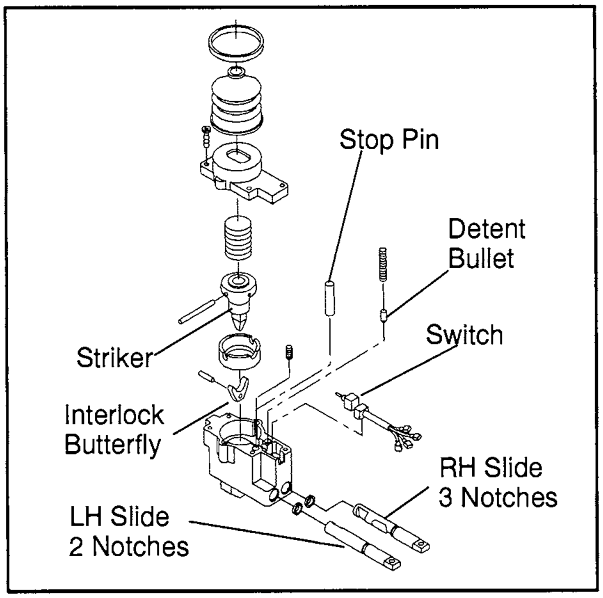
Gear Shift Selector Removal

1. Disconnect the two linkage rods from the gear shift selector slides.
2. Remove three bolts attaching gear shift selector to the mounting bracket.
3. Lift gear selector out of mounting bracket and away from frame.

CAUTION: Read each step completely before proceeding. Essential parts may be lost or damaged if you do not heed this caution!

Gear Shift Selector Disassembly (Fluid Change)

1. Slowly tilt gear shift selector body sideways to drain oil. **NOTE:** *Do not* tip gear shift selector body upside down or detent bullets and stop pin may fall out. Check for signs of moisture in the selector body. Inspect shift boot closely if moisture is present in selector box.
2. Tap gear shift selector body, top down, against a hard, smooth, flat surface to jar the stop pin and two detent bullets loose. Pull the detent bullets and the stop pin out of the gear shift selector body.
3. Hold the interlock butterfly out of the way and remove the two slides, one at a time. **NOTE:** The LH slide has two notches and the RH slide has three. The slides must be replaced in the proper channels for the shifter to function properly.
4. Inspect O-rings for damage. Replace if any damage is found.
5. Flush housing with parts washer fluid or penetrating oil to remove all moisture.
6. Dry all gear shift selector parts and remove any corrosion with a wire brush.



NOTE: 1995 models have one piece shift lever and striker.

Gear Shift Selector Assembly

1. Insert slides into gear shift selector body, taking care not to cut or tear O-rings in the process. **NOTE:** The LH slide has two notches and the RH side has three. The slides must be replaced in the proper channels for the shifter to function properly.
2. Replace detent bullets, stop pin, springs and white plastic bearing cup by reversing steps 5 - 7 of Gear Shift Selector Disassembly above.
3. Clamp gear shift selector body lightly in a soft jawed vise.
4. Fill selector body with 0W40 oil (PN 2871271). The oil level should be at one half the height of the slides. **CAUTION:** Too much oil could cause the selector to hydrolock.
5. Carefully reinstall the gear shift selector switch. Switch must be properly positioned or AWD may not be engaged in forward gear.
6. Wipe gear selector dry, clean surfaces of cover and selector box with Loctite Primer T and place a bead of Loctite 515 Gasket Eliminator completely around the edge of the gear shift selector body.
7. *Carefully* reattach cover/rod assembly to gear shift selector body. The switch toggle will sit inside the hole in the striker. **CAUTION:** Be very careful not to damage the selector switch while assembling these parts. Torque screws to 12 ft. lbs. (1.7 kg/m).

Selector Installation

1. Place gear shift selector back into the mounting bracket and replace three bolts.
2. Reconnect linkage rods to gear shift selector slides. Adjust as required. See linkage adjustment procedures.
3. Route gear shift selector switch wiring harness properly and secure in place with cable ties.
4. Reconnect the wiring harness leads to the terminal board. Follow the color codes when installing wire leads to terminal board.
5. Using cable ties (PN 7080138), secure the gear shift selector switch wiring harness to the frame.
6. Install fuel tank.
7. Replace the fuel tank cover and side panels.
8. Remount the exhaust pipe using high temp silicone to seal joints.
9. Connect the springs.
10. Replace rear cab and heat shield. Reattach cab to frame.
11. Secure heat shield to frame with two screws.

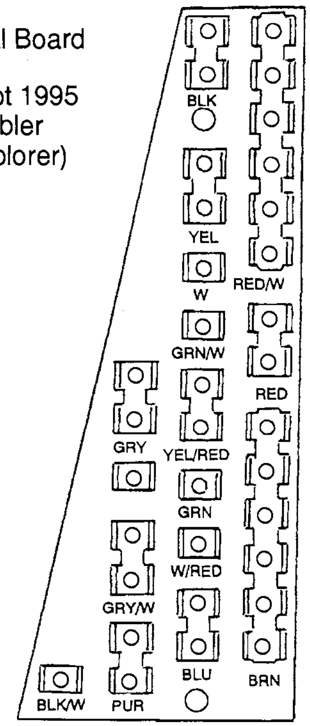
Boot Replacement

NOTE: If the selector boot is damaged, or if moisture is found in the gear shift selector the boot should be replaced.

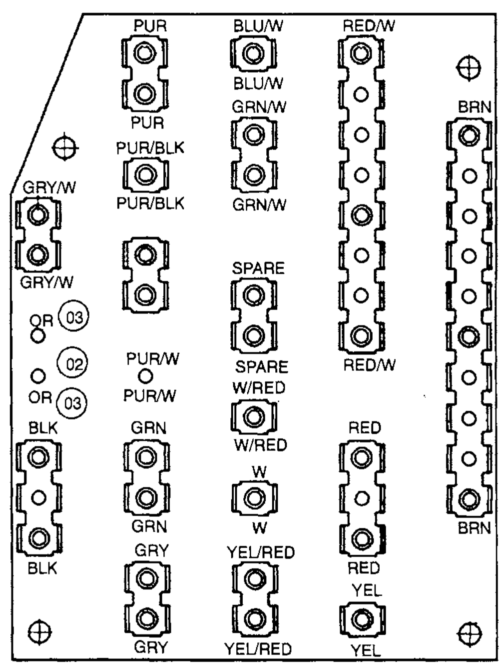
1. Using a small screwdriver, remove cover from gear shift knob.
2. Remove screw securing knob to selector rod.
3. Pull selector knob off selector rod.
4. Cut off plastic cable tie at top of rubber boot.
5. Loosen band clamp at base of rubber boot.
6. Slide boot off selector rod.
7. Install new boot on selector rod.
8. Place band clamp around base of boot and tighten.
9. Apply RTV silicone to selector rod to seal top of boot.
10. Place cable tie around top of boot and tighten. Push rubber boot toward base of gear shift rod.
11. Replace shift knob, securing it to selector rod with screw removed in step 2.
12. Push shift knob cover back into place. Allow approximately 12 hours for RTV silicone to cure.

Terminal Board

(Except 1995 Scrambler and Xplorer)

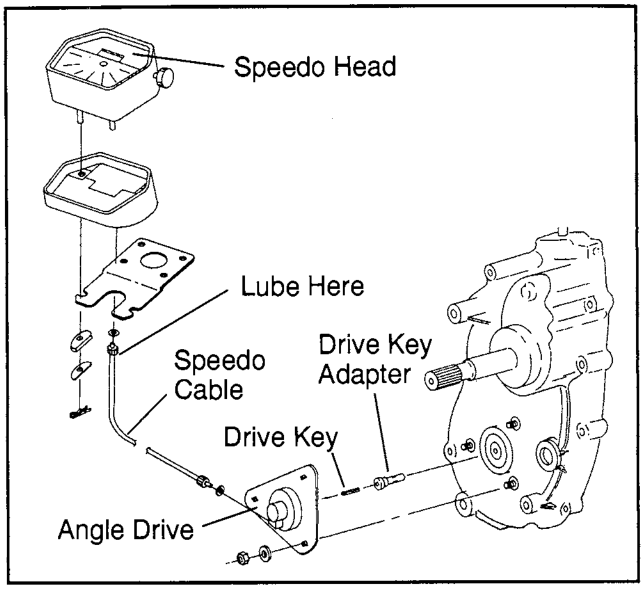


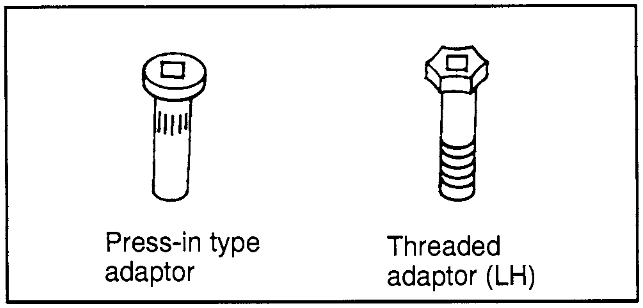
Terminal Board - Scrambler and Xplorer

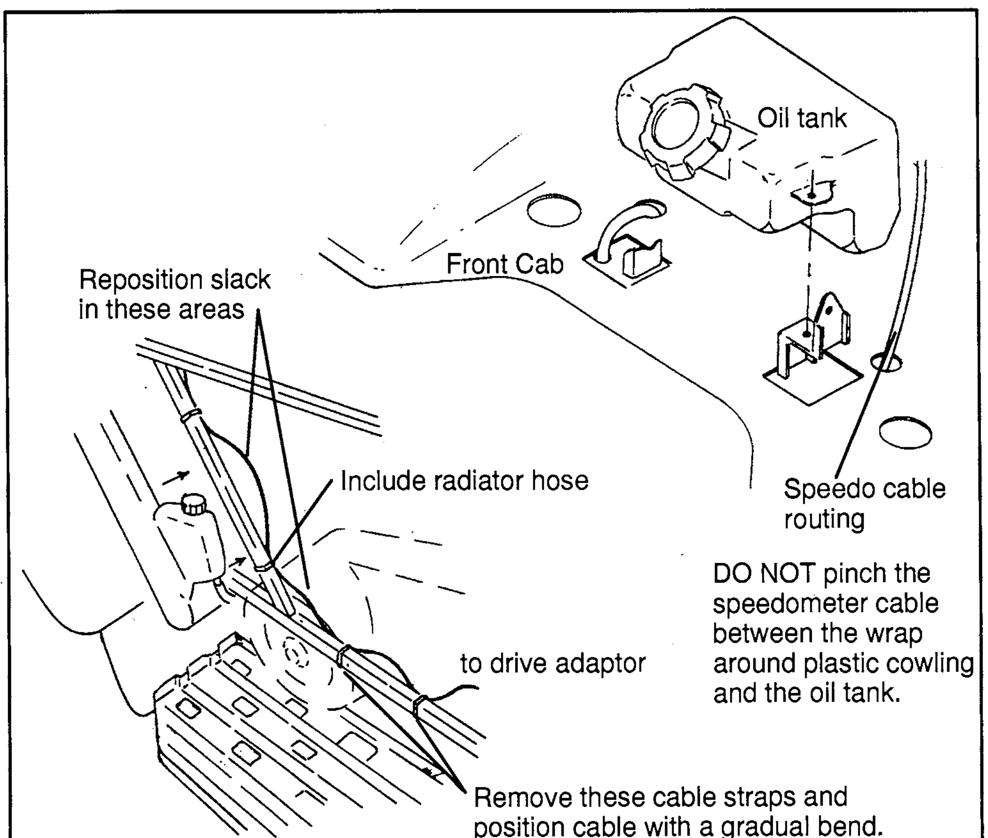


Speedometer Service

1. Remove speedometer cable from the speedometer head and lubricate it periodically with Polaris cable lube (PN 2870510).
2. Use a generous bend (radius) when installing cable. Do not kink cable.
3. If cable routing is binding or incorrect, the small drive key may twist off at the drive adaptor. It will be necessary to fray the remainder of the drive key in the drive adaptor so a needle nose plier can be used to remove it. Turning a small drill bit (carefully) will fray the key. If this is not successful, the drive key adaptor will have to be drilled out or broken out of the transmission shaft, or unscrewed. **NOTE:** Left hand thread.
4. After replacing a speedometer cable or drive key, be sure to check the cable for the proper routing. Some ATVs may have a cable routed in a manner which places additional load on the cable or drive key. Check for kinks or damage to the outer housing preventing smooth rotation of the inner cable.
5. The cable should be routed as shown in the illustration below. Excess length should be taken up by producing long gradual curves in the areas shown.
6. Be sure the cable is routed through the hole in the front cab, and is not pinched by the plastic cowling in the area next to the oil tank.
7. Use Polaris Clutch and Cable Lube (PN 2870510) to lubricate speedometer cables.







CHAPTER 5

FINAL DRIVE SYSTEM SERVICE

Final Drive Torque Specifications

Front Hub Nut 4x4 .... Refer to page 5.17 for torque procedure

Front Hub Nut 2x4 .... 40 ft. lbs. (5.52 kg/m)

Wheel Nuts, Front .... 15 ft. lbs. (2.07 kg/m)

Wheel Nuts, Rear .... 50 ft. lbs. (6.9 kg/m)

Rear Axle Hub Nut .... 80 ft. lbs. (11.04 kg/m)

Rear Axle Nut .... 150 ft. lbs. (20.7 kg/m)

Sprocket, Middle Drive .... 17 ft. lbs. (2.35 kg/m)

Sprocket, Middle Driven .... 30 ft. lbs. (4.14 kg/m)

Sprocket, Front Drive .... 30 ft. lbs. (4.14 kg/m)

☆Sprocket, Rear .... 35 ft. lbs. (4.8 kg/m)

☆Eccentric Pinch Bolts, Rear .... 60 ft. lbs. (8.28 kg/m)

☆Eccentric Pinch Bolts, Center .... 48 ft. lbs. (6.62 kg/m)

☆Eccentric Pinch Bolts, Front .... 48 ft. lbs. (6.62 kg/m)

☆Rolling Torque

The torque values indicated with a ☆ do not include rolling torque values of self-locking nuts. The locking features of these nuts create resistance when installing the nut, called rolling torque. It is necessary to determine the rolling torque of these fasteners and add it to the torque specification listed above. For example, if a self-locking nut has 5 ft. lbs. of resistance, and a torque specification of 35 ft. lbs., the formula would be:

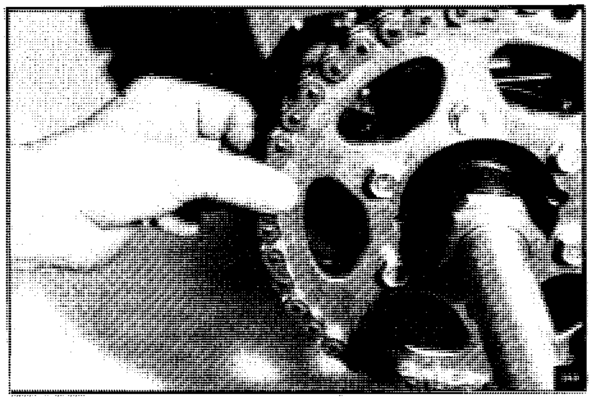
Torque specification	= 35 ft. lbs.
Plus rolling torque	= 5 ft. lbs.
Final nut torque	= 40 ft. lbs.

NOTE: Rolling torque values are only accurate if threads are clean and not damaged. Checking rolling torque on a damaged fastener may cause final torque to exceed recommended value. Always replace worn or damaged fasteners.

CAUTION: Locking nuts should be replaced if removed. The self-locking properties of the nut are destroyed during removal.

FINAL DRIVE SYSTEM SERVICE
Chain And Sprocket Service

When servicing Polaris ATVs always inspect chain condition. If the O-rings are missing or damaged the chain should be replaced. DO NOT wash the chain with a high pressure washer, gasoline or solvents, as damage to the O-rings may occur. Lubricate the chain with Polaris O-ring chain lubricant (PN 2871079).



Sprocket Inspection

To check sprocket wear, pull outward on the chain as shown. Replace sprocket if movement when pulling outward exceeds 1/4″ (.6 cm).

NOTE: When chain is replaced, new sprockets should also be installed.

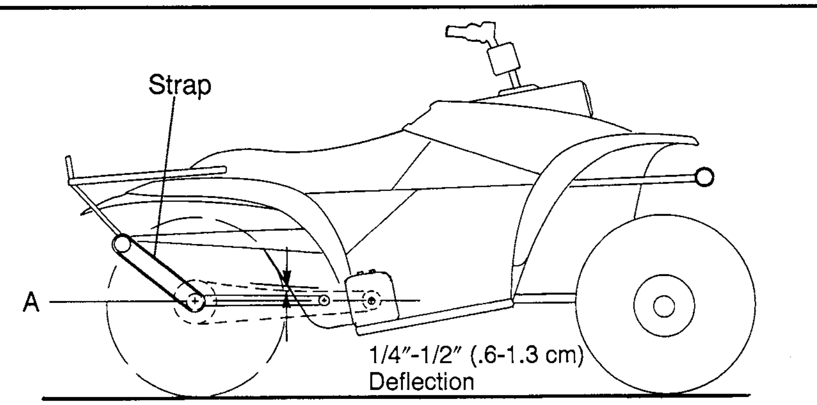
Chain Inspection

The chain must be replaced when it reaches 3% elongation. Twenty pitches measure 12.5″ (32 cm) when new, therefore it must be replaced when measurement reaches 12.875″ (32.7 cm) when fully stretched. If O-rings are missing or connector plates are loose the chain must be replaced.

Chain Adjustment Inspection

Chains that are connected to the transmission and suspension (rear swing arm) change tension as the vehicle height changes. Because of this a static chain deflection measurement will not always be correct. The best way to check chain deflection is to collapse the rear suspension while checking deflection. At the tightest position the chain should have 1/4″- 1/2″ (.6-1.3 cm) deflection.

⚠ **CAUTION:** Never operate the vehicle with the rear drive chain too loose or too tight as severe damage to the transmission and drive components can result.



IMPORTANT: Suspension must be compressed as shown.

Check the amount of chain slack by moving the vehicle slightly forward to gain slack at the top side of the rear chain. Chain tension may then be checked by collapsing the rear suspension to establish a straight line (A) connecting the axle, swing arm pivot and output shaft on the transmission. This establishes the tightest chain position. At this point the chain should have 1/4″-1/2″ (.6-1.3 cm) deflection.

Collapse the suspension by using an adjustable (buckle type) trailer tie down. Fasten the strap around the axle and rear bumper tube. Tighten until a straight line (A) can be drawn from the axle to the transmission output shaft intersecting the swing arm pivot. If the chain needs adjustment, use the following procedure.

Chain Deflection Specification

Chains that do not require the suspension collapsed to check chain deflection (and deflection specifications) follow:

<u>4x6, 6x6 Final Drive Chain Adjustment</u>

Transmission to Rear Axle = 1 1/2″ (3.8 cm) deflection with 10 lbs. (4.5 kg) of force at center of chain

<u>6x6 Models</u>

Axle to Axle = 1/4-1/2″ (.6-1.2 cm) deflection with 18 lbs. (8 kg) of force at center of chain

<u>All Wheel Drive Models</u>

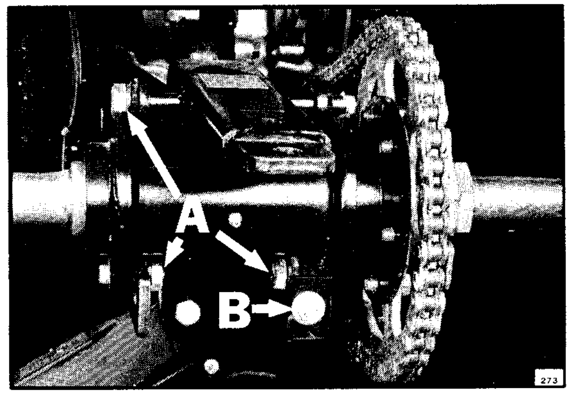
Transmission to Center Eccentric = 1/4-1/2″ (.6-1.2 cm) deflection with 18 lbs. (8 kg) of force at center of chain

Center Eccentric to Front Drive = 1/4-1/2″ (.6-1.2 cm) deflection with 18 lbs. (8 kg) of force at center of chain

Drive Chain Adjustment Procedures

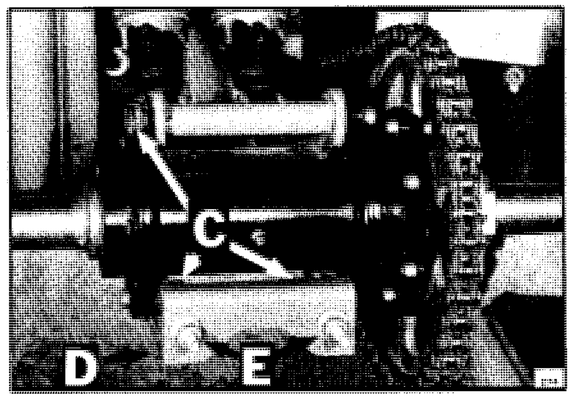
Chain adjustment single adjuster (Early models)

1. Loosen the three pinch bolts (A).
2. Turn the adjuster bolt nut to achieve correct deflection (B)
3. Torque pinch bolts (A) to 70 ft. lbs. (9.7 kg/m).
4. Adjust chain guard.



Chain adjustment with twin adjuster (Cyclone models)

1. Loosen the three pinch bolts (C).
2. Loose the jamb nut located behind the left side adjuster bolt nut (D).
3. Turn adjuster bolt nuts (E) until chain deflection and axle alignment are correct, then tighten left side jam nut and torque pinch bolts to 70 ft. lbs. (9.7 kg/m).
4. Adjust chain guard.



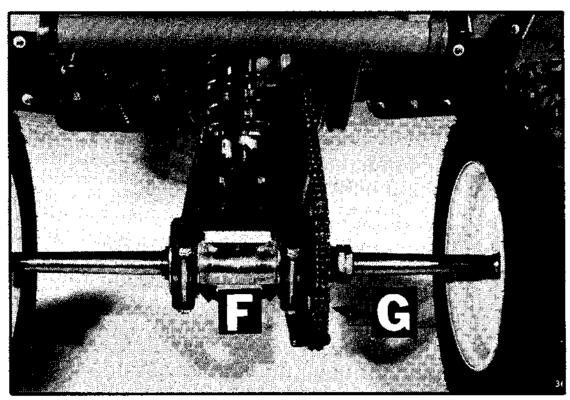
Chain adjustment eccentric axle housing

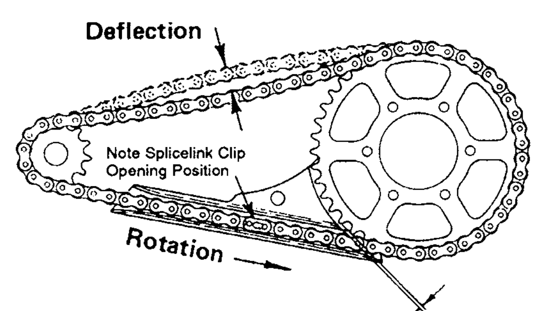
1. Loosen the two eccentric locking bolts (F). Note: These bolts must be very loose.
2. Insert a pin punch through the sprocket hub and into the eccentric axle housing (G).
3. Roll the machine ahead or back to rotate the eccentric and loosen or tighten the chain.
4. Tighten the eccentric locking bolts to 48 ft. lbs. (6.6 kg/m).

NOTE: 1993 to current models with hitch plate and Grade 8 bolts require 60 ft. lbs. (8.3 kg/m) of torque on the eccentric locking bolts.

5. Adjust the plastic chain guard.

CAUTION: On all models - After chain adjustment, check deflection as the rear suspension is collapsed. Be sure the chain does not over-tighten.





Chain Guard Clearance 1/8" (.3 cm)

1987 & 1988 4x4 Center And Forward Chain Adjustment

Chain tension should be checked whenever a machine enters your shop for routine maintenance checks. At the same time be sure to check sprockets, chains, and chain O-rings. Lubricate with Polaris O-ring chain lubricant (PN 2871079).

Center Chain

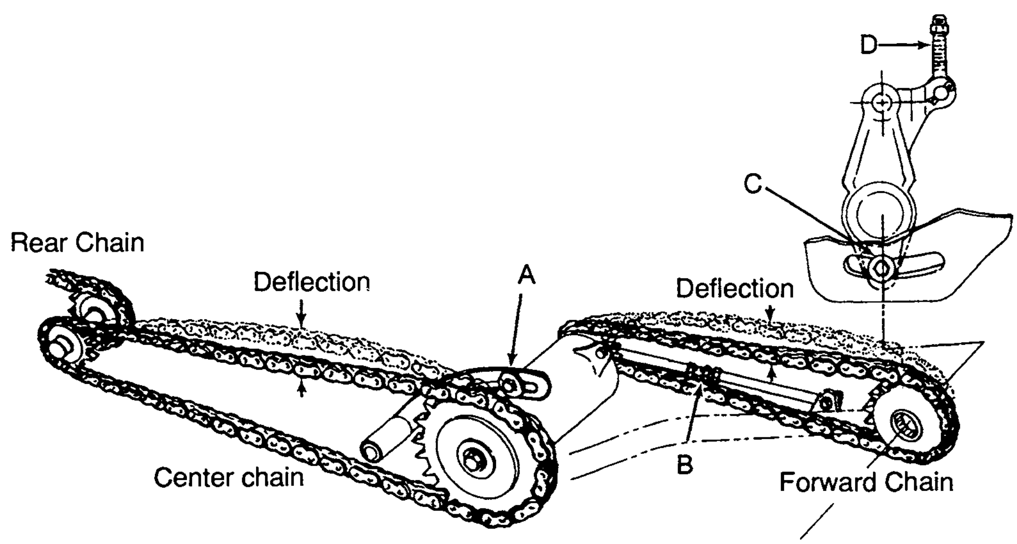
NOTE: Always adjust the center chain first as its adjustment will affect the forward chain.

Overhaul Procedure

1. Remove the forward and center chain guards.
2. Loosen the bolt (A) that holds the housing.
3. Loosen the two jam nuts on the adjuster rod (B). Lengthen or shorten this rod until chain deflection is 1/8″ (.3 cm) with 10 lbs. (4.5 kg) of force at the center of the chain.
4. Tighten the jam nuts (B) and the housing bolt (A).

Forward Chain

1. Loosen the two bolts (C) located on each side holding the front axle housing.
2. Loosen or tighten the adjuster (D) until chain deflection is 1/8″ (.3 cm) with 10 lbs. (4.5 kg) of force at the center of the chain.
3. Tighten the housing attaching bolts.
4. Install the chain guards.



FINAL DRIVE SYSTEM SERVICE
1989 To Present - All-wheel Drive Models

Polaris ATV drive chains are equipped with O-ring sealed permanently greased pins and rollers.

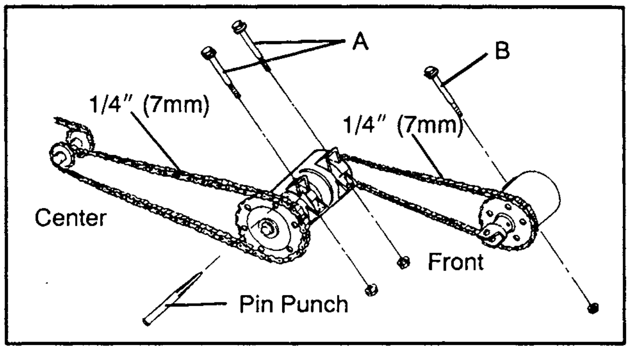
CAUTION: Never wash the chain with a high pressure washer or gasoline. Damage to the O-rings will result, causing premature wear and drive chain failure.

Always inspect the drive chain, checking for damaged or missing O-rings, rollers and correct slack adjustment. Stone guard to rear sprocket clearance should be 1/8" (.3 cm).

Regularly lubricate the drive chain with Polaris O-ring chain lube PN 2871079.

The center chain should be adjusted first since this adjustment affects the front chain slack. After the recommended center chain adjustment is made, proceed to the front chain. **NOTE:** This procedure should be performed while the vehicle is empty (i.e. no one sitting on the machine).

Center/Front Drive Chain Inspection/Adjustment



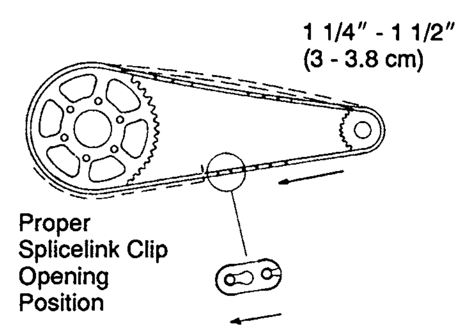
1. Remove cotter pin and washer connecting brake pedal linkage to caliper actuating arm. Remove linkage from arm.
2. Remove right front fender mud flap foot board attaching hardware.
3. Remove center chain guard attaching hardware. Press brake pedal downward and remove guard.
4. Remove forward chain guard attaching bolts and guard.
5. Loosen center chain eccentric clamp bolts (A).
6. Rotate vehicle forward or rearward until one of gear holes aligns with hole provided in eccentric.
7. Insert a large punch or screwdriver through gear and into eccentric hole. Rotate vehicle rearward to tighten chain. Chain deflection should be 1/4" (.6 cm) with 25 lbs. (11 kg) of force at center of chain.
8. Tighten eccentric clamp bolts to 60 ft. lbs. (8.3 kg/m). **NOTE:** This does not include nut rolling torque. Check chain tension.
9. Loosen forward chain eccentric clamp bolt (B) by grasping the nut through the hole in the skid plate. A tab on this bolt will prevent it from spinning while the nut is being loosened or tightened. **NOTE:** This flag bolt will retrofit all pre-1993 models. Order PN 7512577. Install punch as was done previously and adjust chain to 1/4" (.6 cm) deflection with 25 lbs. (11 kg) of force at center of chain.
10. Tighten forward eccentric clamp bolt to 48 ft. lbs.(6.6 kg/m). **NOTE:** This does not include nut rolling torque. When this bolt is tightened the chain deflection may change. Check deflection and adjust again if needed.

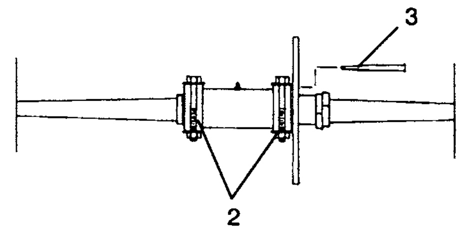
CAUTION: Never adjust or operate the vehicle with the rear drive chain slack out of the 1 1/4″ to 1 1/2″ (3 to 3.8 cm) specification as severe damage to the transmission and drive components can result.

Check the amount of chain slack by moving the vehicle slightly forward to gain slack at the top side of the rear chain. Then pull up and down on the chain. Total slack should be 1 1/4″ to 1 1/2″ (3 to 3.8 cm). If slack is not within specification, it must be adjusted.

1. Loosen chain guard.
2. Loosen two eccentric locking bolts.
3. Insert a pin punch through the sprocket hub and into the eccentric axle housing.
4. Roll the vehicle ahead or back to adjust chain slack to the proper dimension. Correct chain slack adjustment is 1 1/4″ to 1 1/2″ (3 to 3.8 cm) total at the midpoint.
5. Tighten the eccentric locking bolts to 60 ft. lbs. (8.3 kg/m).
6. Reinstall chain guard.

NOTE: When rear suspension is fully collapsed, rear chain deflection should be 1/4″ (.6 cm). Reposition chain guide to allow 1/8″ (.3 cm) clearance between sprocket and guide.





Rear Drive Chain Adjustment

Rear Axle Removal

1. Stop engine. Place machine in gear and set parking brake.
2. Loosen rear wheel nuts slightly.
3. Elevate and support machine under footrest/frame area.
4. Remove wheel nuts. Remove wheels.
5. Remove both hub caps, cotter pins, nuts, cone washers, and flat washers. Remove hubs.
6. Remove rear axle lock nut using 1 3/4″ axle nut wrench PN 2870772.
7. Remove axle nut and washer.
8. Remove drive chain master link and drive chain.
9. Place a block of wood on the end of the axle and drive the axle out from right to left. **CAUTION:** Wear eye protection during this procedure.
10. Tap locating collar on left side of axle toward the right enough to expose the circlip retainer. Remove retainer and locating collar.

Rear Axle Installation

1. Slide locating collar on left end of axle with recess facing outward.
2. Install a new circlip.
3. Tap locating collar back towards left end of axle until it covers circlip.
4. Apply a light coat of Polaris Marine Grease (PN 2871066) to the axle and install a new O-Ring.
5. Insert axle from left to right.
6. Install O-Ring, sprocket hub, and washer.
7. Clean axle nut threads. Apply Loctite 242 to threads and install axle nut. Torque to 150 ft. lbs. (20.7 kg/m).
8. Tighten lock nut to 150 ft. lbs. (20.7 kg/m). Rotate axle and check for smooth operation.
9. Lightly grease splines of axle and install wheel hubs, flat washers, and cone washers with concave side facing flat washer.
10. Torque hub nuts to 80 ft. lbs. (11.04 kg/m) and install cotter pin, bending one leg of cotter pin inward and one outward against end of axle.
11. Install hub cap.
12. Install wheels and lub nuts with tapered side facing in. Torque evenly to specifications.

Rear Eccentric Removal

1. Remove rear axle.
2. Remove rear eccentric pinch bolts.
3. Rotate eccentric hub until projections line up with slots in swingarm housing.
4. Remove hub assembly.

Rear Axle Retaining Nut:
150 ft. lbs. (20.7 kg/m)

Rear Hub Retaining Nut:
80 ft. lbs. (11.04 kg/m)

Rear Wheel Nuts:
50 ft. lbs. (6.9 kg/m)

Rear Eccentric Disassembly

CAUTION: Wear eye protection when performing this procedure.

NOTE: Bearings must be replaced if removed.

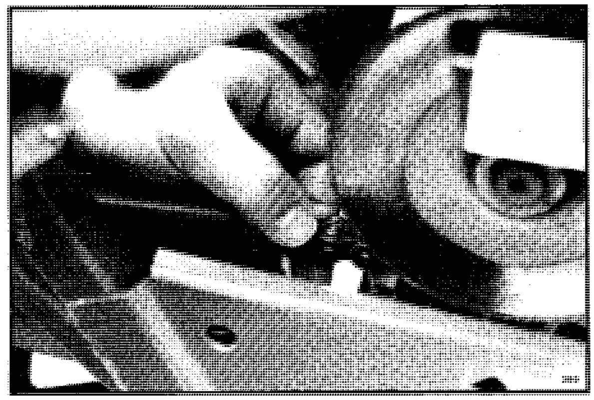
1. Pry out the drive axle seals. Be careful not to damage the seal bore or eccentric housing.
2. Using a brass flat punch and a hammer, tap the bearing spacer sideways until loose.
3. Drive bearing outward from opposite end of housing, driving on the inner bearing race. **NOTE:** Remove spacer. Check spacer length. Replace spacer if worn or damaged, or if the spacer length is less than 5.200″ (13.208 cm).

Minimum Spacer Length:
5.200″ (13.208 cm)

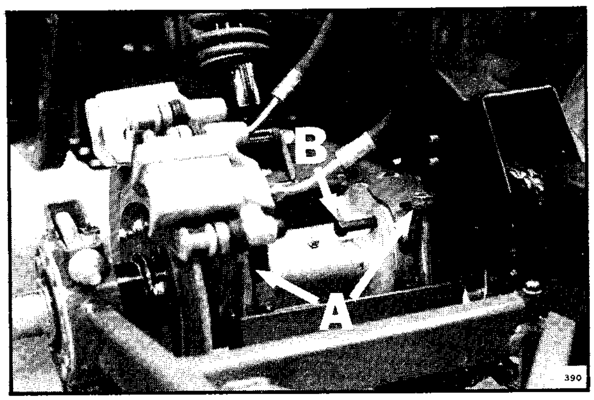
6 Wheel Models Chain Adjustment

NOTE: When checking chain deflection make sure the vehicle is not loaded.

Chain adjustment on 6 wheel models is similar to other models with some minor exceptions. Any adjustments made to the transmission to front axle chain will affect the axle-to-axle chain adjustment. The rear chain pivots around the axle and therefore it needs very little deflection.

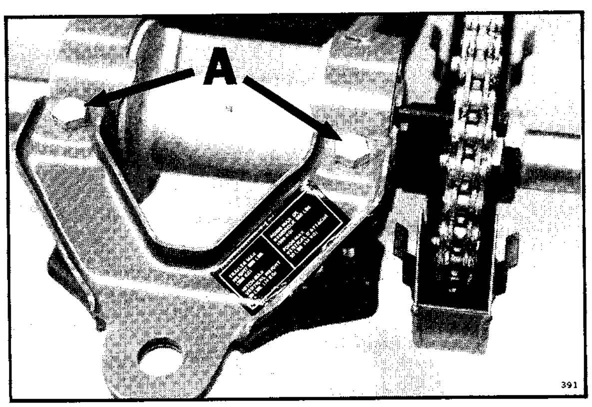


1. Inspect the transmission-to-axle chain for deflection in the area shown. At this location, the chain must have no less than 1″ (2.5 cm) deflection. This will equal 1 1/2″ (3.8 cm) when checked near the center of the chain.



2. To adjust the transmission-to-axle chain, loosen the eccentric clamp bolts (A). **NOTE:** These bolts must be very loose to allow the housing to rotate. Install a 5/16″ bolt into the opening in the housing (B). Rotate the sprocket by pushing the vehicle either forward or rearward until the bolt engages with the hole in the sprocket hub.

   Once the bolt has engaged, push the vehicle forward or rearward to rotate the housing and adjust the chain. After the chain is adjusted, torque the clamp bolts to 48 ft. lbs. (6.6 kg/m) and remove the 5/16″ bolt from the housing.

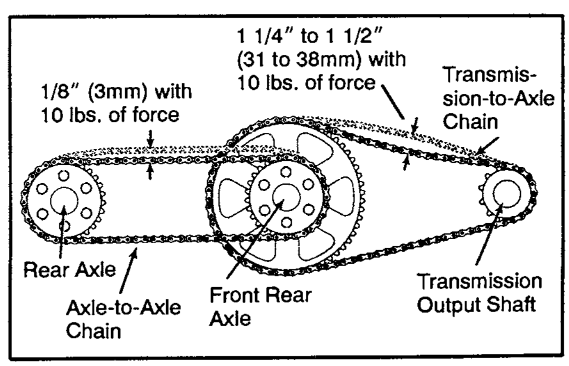


3. Axle-to-axle chain adjustment is again changed by rotating the housing eccentric. Again, be sure the clamp bolts are very loose (A). Install a 5/16″ diameter bolt through the hole in the gear and into the eccentric. Rotate the vehicle forward or rearward to adjust chain. This chain should have 1/8″ (.3 cm) deflection. Torque the clamp bolts to 48 ft. lbs. (6.6 kg/m) and remove 5/16″ bolt.

   NOTE: On 1993 ATV's equipped with the new trailer hitch, the rear axle eccentric locking bolts should be torqued to 60 ft. lbs. (8.3 kg/m). (Prior to '93 the torque spec was 48 ft. lbs. (6.6 kg/m). The increased torque is required because the new hitch is "stiffer" than the previous one.

   The increased torque will also be required when retro-fitting pre-1993 ATV's with the new hitch. The hitch kit will include new grade 8 bolts; 1993 models come standard with grade 8 bolts.

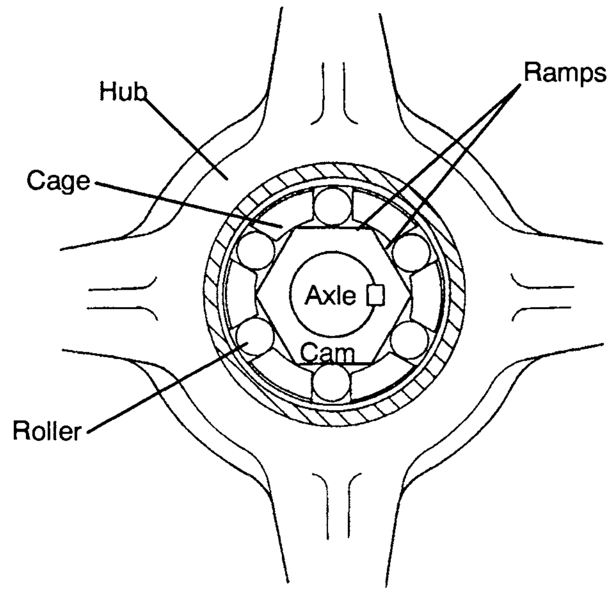
   NOTE: Add nut rolling torque to all torque values.



Demand 4 Operation - Mechanical Hubs, 1987-1988

In the Polaris Demand 4 Drive System, the machine operates as a two wheel drive vehicle as long as the front wheel rotational speed remains greater than the front drive axle speed. If the rear wheels lose traction the front wheel rotational speed will decrease, causing the front axle speed to become greater than the front wheel speed. The roller cage plungers contact the strut ramps, restricting the rotation of the roller cage and causing front wheel engagement. The rollers will then climb the ramps, becoming squeezed between the ramps and the ring in the hub, and engaging the hub. Once the wheel hub, Demand 5 clutch assembly and axle are engaged, the front wheels will drive and will stay engaged until the rear wheel traction is regained. When rear wheel traction is regained, the front wheels will overdrive the front drive shaft, pushing the clutch rollers toward the lower part of the cam and disengaging the Demand 4 clutch.

WARNING: It is important that the front and rear axle drive ratio and tire size are not changed. Changing this ratio will cause erratic engagement, which could result in serious injury or death.

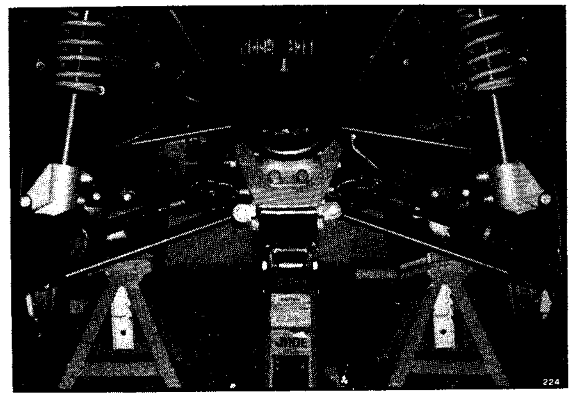


Demand 4 Operation - Electric Hubs, 1989 to Current

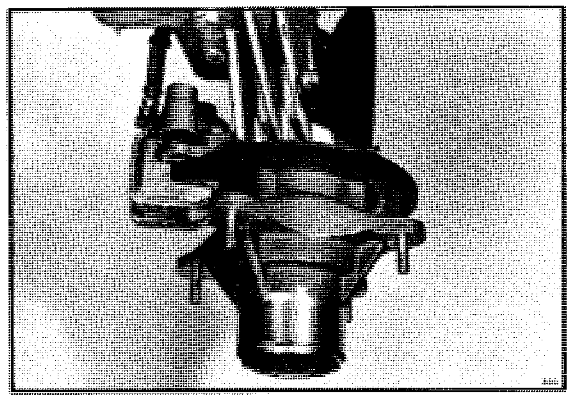
The electric hubs operate in much the same manner as the mechanical system described above. The only difference is that the clutch engages by means of an electro magnet and armature plate instead of plungers, springs and ramps. The electro magnet and armature plate restrict the rotation of the Demand 4 drive roller clutch assembly. The advantage of this system over the mechanical is that when the 4 wheel drive switch is turned off the machine will have the steering ease of a 2 wheel drive unit; and with the switch turned on, 4 wheel drive will be engaged.

FINAL DRIVE SYSTEM SERVICE
Front Hub Disassembly

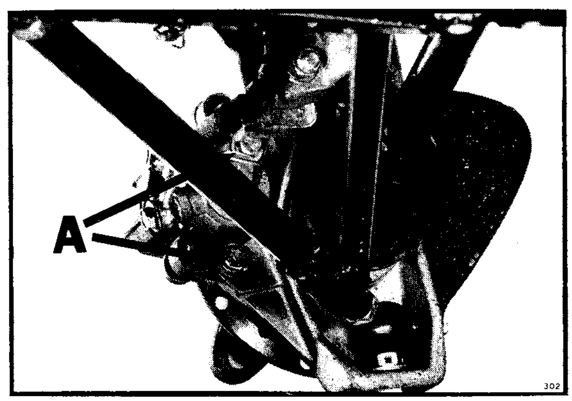
1. Carefully lift and support the front end of the machine as shown with the jack stands under the front end of the foot rests. **CAUTION:** Make sure the machine is solidly supported before proceeding. Serious injury could occur if the machine tips or falls.



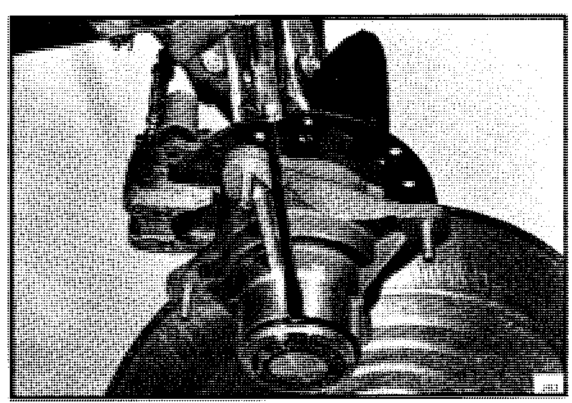
2. Remove the front wheels and thoroughly clean the area around the hub, strut casting, brake caliper and disc.



3. Remove the two brake caliper attaching bolts (A).



4. Place a catch pan beneath the front hub and remove the hub cap.

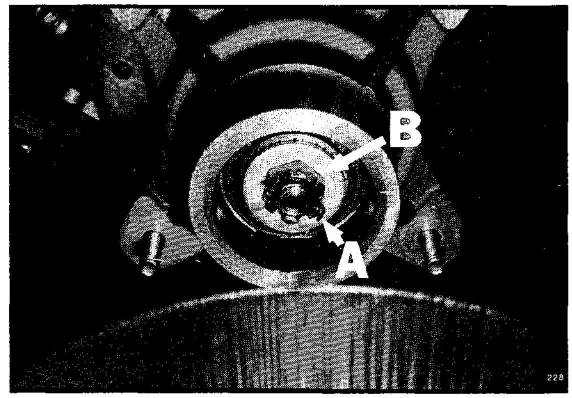


4x4 Model W878027

4. Remove spindle nut safety wire (A) and spindle nut (B).

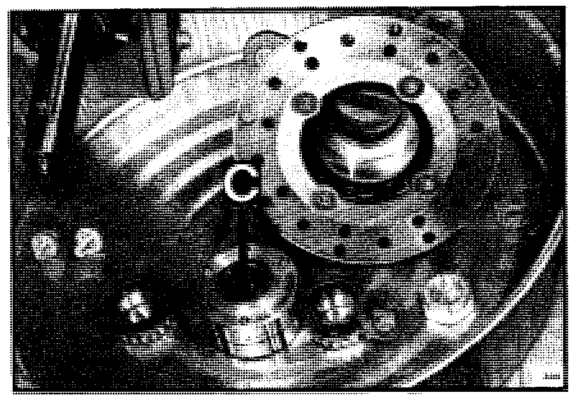
4x4 Model W878127

5. Remove FlexLoc nut.



All Wheel Drive Models W878327 to Current

6. Remove spindle nut. **NOTE:** Some 1994 and all 1995 to current models have left hand threaded spindle on left front axle. **CAUTION:** Do not attempt to open the staked area on a stake nut as the locking features will be destroyed. Thoroughly clean keyway cut and spindle threads. Never re-use a stake nut. Replace stake nuts with FlexLoc nuts.
7. Remove front hub, bearings, and Hilliard clutch assembly, taking care not to lose plungers (C), plunger springs and spring support rubbers. On 1989 to current models, be sure to note the proper positioning of the armature plate for reassembly.



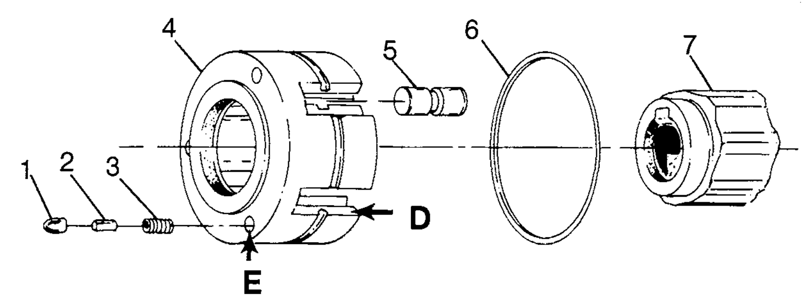
Demand 4 Roller Clutch Inspection, 1987 - 1988

1. Disassemble the roller clutch and thoroughly clean all parts.

NOTE: On some models the cam is not stamped left or right. In this case the cams are interchangeable.

2. Inspect roll cage sliding surface (D). This surface must be clean and free of nicks, burrs or scratches. Use a small file or emery cloth to remove any imperfections.
3. Inspect rollers (5). The rollers must slide up and down freely within the roller cage sliding surfaces.

1. Plunger
2. Spring Support (Rubber)
3. Compression Spring
4. Roll Cage
5. Roller
6. Garter Spring
7. 1 - Right Cam
   1 - Left Cam



4. Inspect plunger bores (E). These bores must be clean and free of nicks, burrs or scratches.
5. Inspect plungers (1).
6. Inspect garter spring (6). The coils of the spring must be consistent. If not, replace the spring.

Demand 4 Roller Clutch Inspection, 1989 to Current

1. Disassemble the roller clutch and thoroughly clean all parts. **CAUTION:** Do not remove the garter spring. If the spring is removed it will become over stressed and will require replacement.

2. Inspect roll cage sliding surface (A). This surface must be clean and free of nicks, burrs or scratches. Use a small file or emery cloth to remove any imperfections.

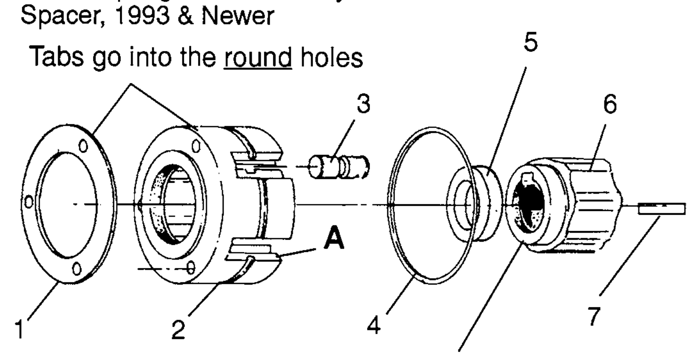
3. Inspect rollers (3). The rollers must slide up and down freely within the roller cage sliding surfaces.

4. Without removing the garter spring, inspect the coils for consistency. If coils are not consistent, cut the old spring with a side cutter to remove it, and replace it.

WARNING: 1989 to current all wheel drive models have a heavier garter spring than previous 4x4s. These springs are very similar in appearance to those used on earlier models. If the old, lighter springs were installed on a machine requiring the heavier spring the front wheels may engage at high speed, possibly resulting in serious injury or death. **Do not mix these springs. Check springs before installation. Check removed spring wire diameter, verify new spring to ensure proper spring replacement has been made. Refer to next page for spring identification.**

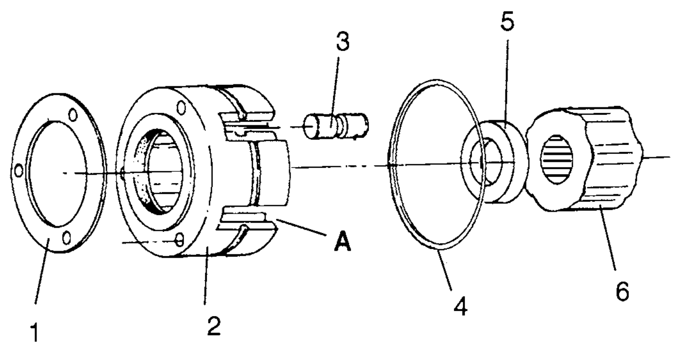
1. Armature Plate **NOTE:** Armature plate is positioned with tabs in round holes of cage.
2. Roll Cage
3. Roller
4. Garter Spring
5. Spacer, 1993 & Newer
6. Engagement Cam
7. Key

Tabs go into the round holes

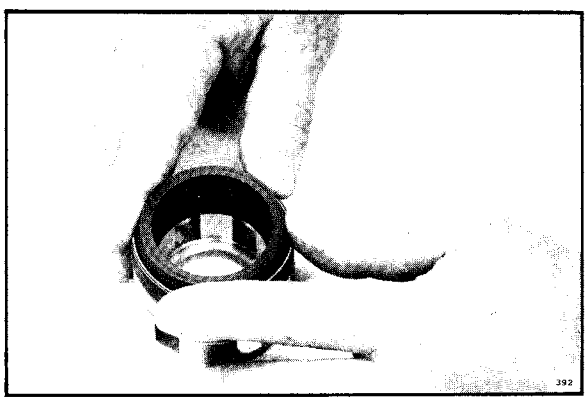


NOTE: No shoulder 1993 to current

1995 to Current
1. Armature Plate
2. Roll Cage
3. Roller
4. Garter Spring
5. Spacer
6. Engagement Cam



5. If garter spring replacement is necessary, it is very important that the correct installation procedure and special tool be used. Gently and evenly roll the spring down the tapered tool (PN 2870888) and into the groove of the roller clutch cage. **WARNING:** If this procedure is not followed the spring will be over stressed and lose it's retention. Springs with incorrect tension may allow rollers to move outward at high vehicle speeds. If the rollers move outward, the front hub(s) will engage and cause vehicle instability, which could result in serious injury or death. See photo at right.

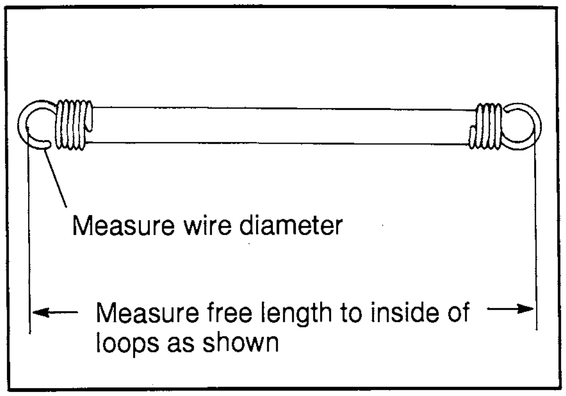


Garter Spring Application and Identification

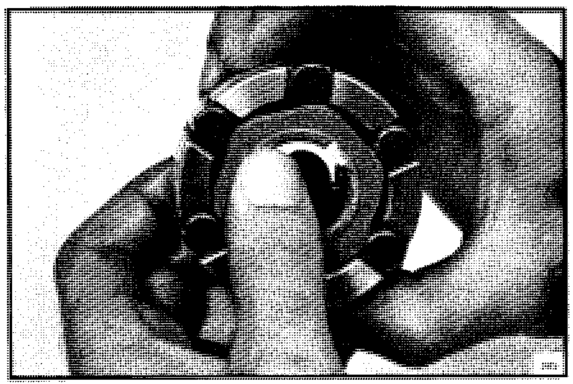
1987 to 1988 mechanically engaged; spring PN 3250021; wire diameter .012″ (.03 cm); spring free length end to end inside hooks 6.85″ (17.3 cm).

1989 to 1994 electro mechanical; spring PN 3250022; wire diameter .015″ (.038 cm); spring free length end to end inside hooks 6.63″ (16.8 cm).

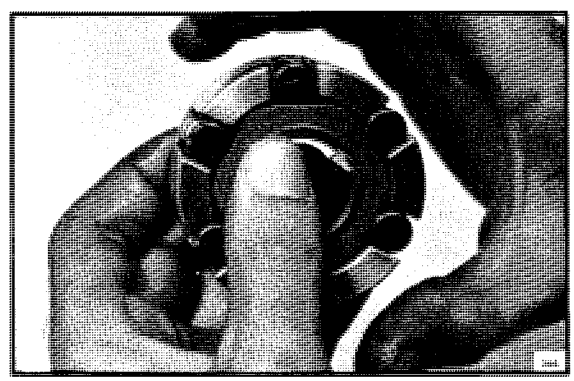
1995 to current electro mechanical; spring PN 3250032; wire diameter .018″ (.045 cm); spring free length end to end inside hooks 6.968″ 17.7 cm).



1. Reassemble Hilliard clutch assembly and lubricate with Type F Automatic Transmission Fluid. **WARNING:** Make sure the rollers move up and down freely in the roll cage. If they do not move freely the front hubs may not engage or disengage properly, causing vehicle instability.
2. Hold clutch as shown and rotate roller cage to simulate clutch engagement. **NOTE:** The roller is now in the engaged position on the cam ramp and the garter spring tension against the roller has increased.

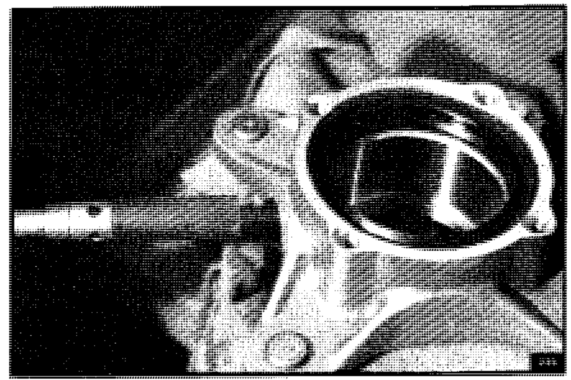


3. Release the roller cage to simulate clutch disengagement. When the cage is released the roller should move down the ramp and into its neutral position. If this does not happen, check the following:
   - Roll cage to roller sliding surfaces.
   - Roll cage to cam mating surfaces, including the cam shoulder and cage to cam mating surfaces.
   - Garter spring condition. Spring must have more than enough tension to pull rollers to neutral.



Wheel Hub Seal Replacement

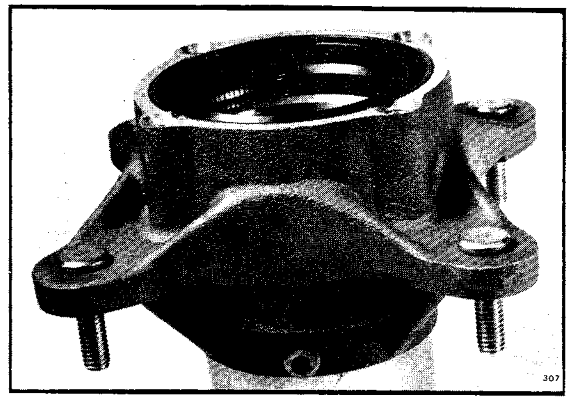
1. Remove brake disc attaching bolts and brake disc. Clean brake disc. **NOTE:** If the attaching bolts are difficult to remove, it may be helpful to heat the outer surfaces of the hub in the area shown. Using valve grinding compound on the end of the Allen wrench will also aid in bolt removal.



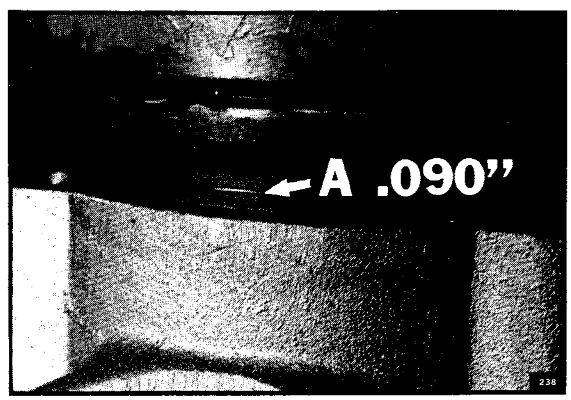
Wheel Hub Seal Replacement, Cont.

1. When the hub becomes too hot to touch, pry out the old seal as shown. Clean the hub in the seal mating area.

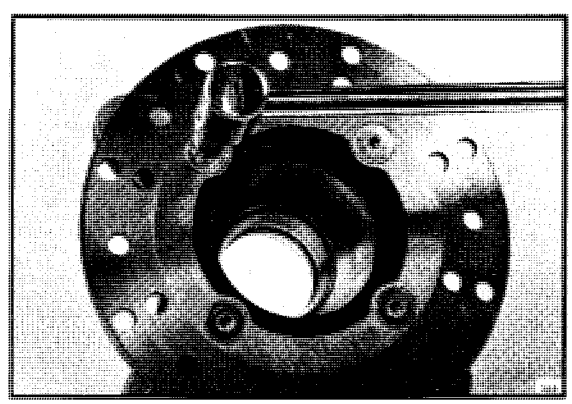
2. Insert the spring side of the new seal into the casting first, pressing it in until it is flush with the brake disc mating surface. **CAUTION:** Do not use a hammer as damage to the seal will result.



NOTE: On Model W878027 models only, the seal must be pressed in an additional .080″ - .110″ (.2 - .3 cm). Scribe several lines on one of the removed seals .090″ (.23 cm) from the edge (A). Press the new seal in an additional .090″ (.23 cm) by using the old seal as an installation tool and the scribed lines as a gauge. After installation, seal depth should be between .080″ and .110″ (.2 and .3 cm) lower than the brake disc surface. From side to side the seal should not vary more than .010″ (.03 cm).



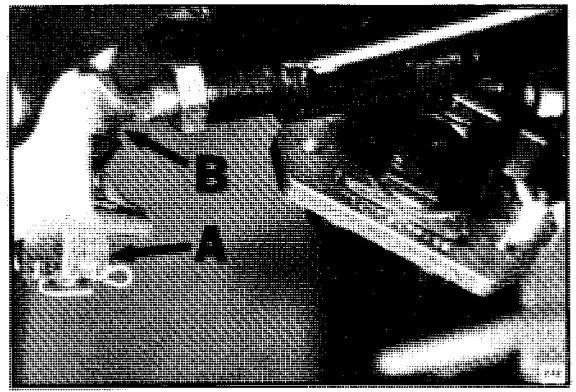
3. Thoroughly clean the brake disc with brake cleaner or heat to boil out any oils. It is very important that the brake disc be free of any oil or solvents.
4. Reinstall the brake disc.
5. Apply a medium strength thread locking compound to the bolts.
6. Reinstall attaching bolts and torque to 18 ft. lbs. (2.5 kg/m).



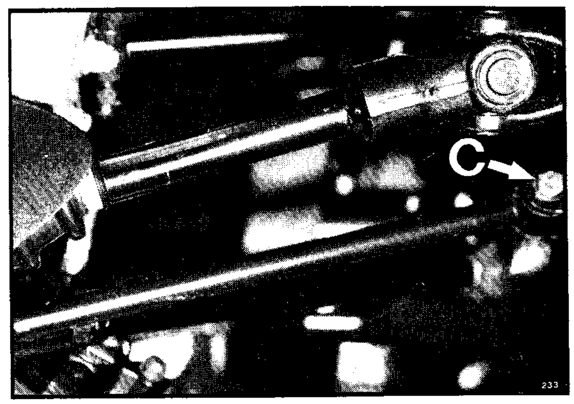
1. Remove the cotter pin and castle nut (A) from trailing arm rod end (B).

CAUTION: On 1989 to present models when the A-arm ball joint is removed the CV joint can become disengaged. Take care during this procedure not to disengage the drive shaft CV joint.

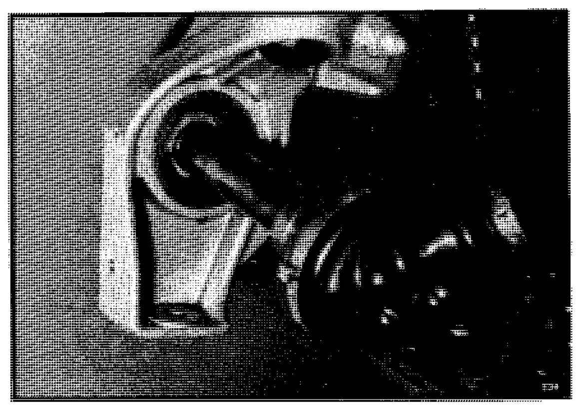
NOTE: If the shaft becomes disengaged from the CV joint, the boot must be removed to verify ball placement before the shaft and CV joint are reassembled.



2. On 1987 and 1988 models, remove the support arm attaching bolt (C). Remove the trailing arm rod end from the strut casting.



3. Remove the spindle and axle assembly from the strut casting bearing by pulling the strut outward as shown. Drive out the old seal, taking care not to damage the tapered roller bearing. Install the new seal until it bottoms against the shoulder in the strut casting.
4. Apply grease to the seal inner lip, reinstall the spindle and axle assembly.

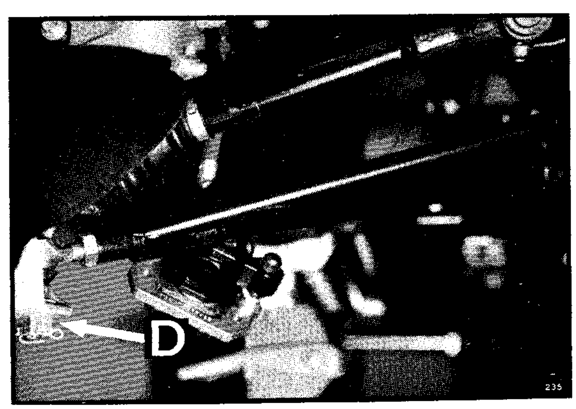


5. Reinstall the trailing arm to the strut casting. Also install the support arm. Torque the trailing arm rod end castle nut (D) and install the cotter pin.

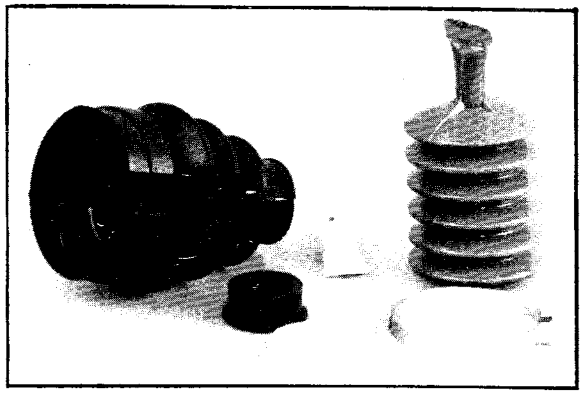
Install the strut casting tapered roller bearing using the following specifications:

W878027
W878127
W878327
W888127 .... 70 ft. lbs. (9.7 kg/m)
W888127 to present ..... 25 ft. lbs. (3.5 kg/m)

NOTE: If the cotter pin hole does not align at the above torque, continue tightening until the cotter pin hole aligns and properly install the pin.



Drive Shaft Boot Replacement

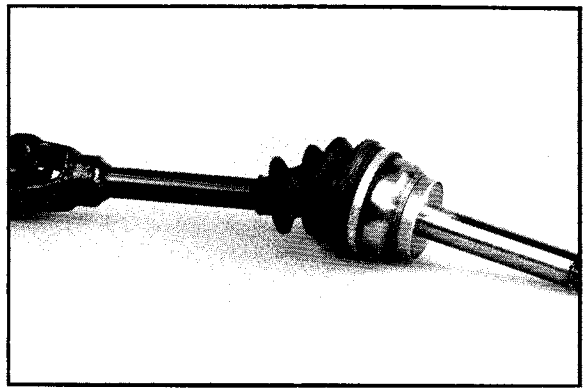


1987, 1988 Models CV Joint

When boot replacement is necessary (the axle cannot be disassembled to replace the boot) Polaris offers a split boot replacement kit PN 3260108. Follow the instructions in the kit for installing the replacement boot.

CAUTION: Do not get any grease in the boot seam splice area or the adhesive will not hold the seam together properly.

1989 to Present:



The boot on all wheel drive driveshafts can be replaced with the original equipment boot by disassembling the axle. To replace the boot, remove the wheel, brake caliper and wheel hub. Next, disconnect the A frame from the strut, slide the strut off the end of the axle and tie it up out of the way of the axle.

NOTE: Be careful not to damage the wheel coil wires when positioning the strut.

Remove the clamps from the rubber boot being careful not to pull the splined shaft out of the CV joint. Remove the large end of the boot from the CV joint, slide the boot back and remove the wheel spindle and CV joint from the axle, by pulling it out, away from the axle.

Remove the small clamp and boot from the axle. Before installing the new boot, remove the grease from the shaft and CV joint banding areas. Slide the new boot (small end first) over the splined shaft, then slide the CV joint into the splines of the axle.

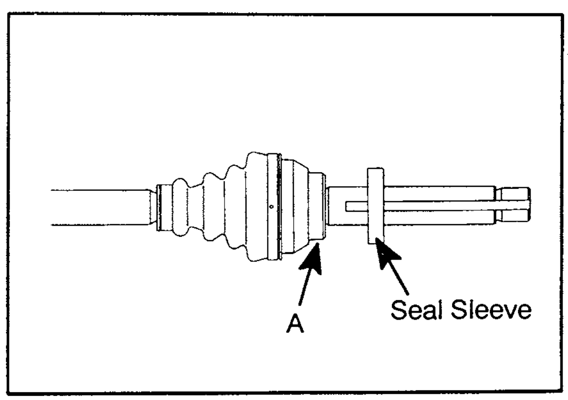
Position the large end of the boot on the CV joint and install the clamps.

NOTE: Before assembly, make sure the CV joint has a sufficient quantity of grease. The grease will aid in assembly by holding the internal parts of the CV joint in place. If the ATV has been operated with the damaged boot, the CV joint grease may be contaminated. The CV joint must be thoroughly cleaned and the grease replaced. Use replacement grease PN 3260110 and CV joint cleaner PN 2870770.

Assemble the strut in the opposite way in which it was disassembled.

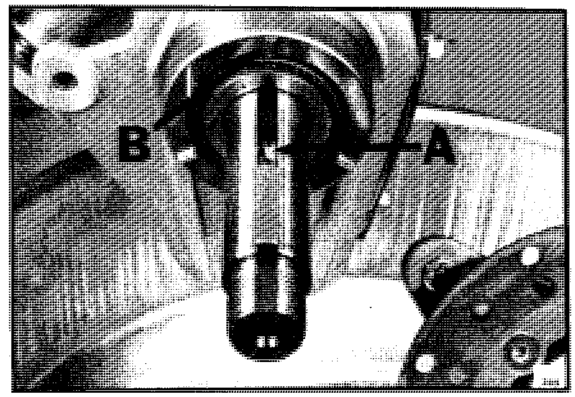
Front Axle Seal Sleeve Replacement

If front axle sleeves become damaged they are replaceable. Using a hammer and drift punch, remove the seal sleeve by driving it off evenly being careful not to nick or damage the sleeve mounting area (A).

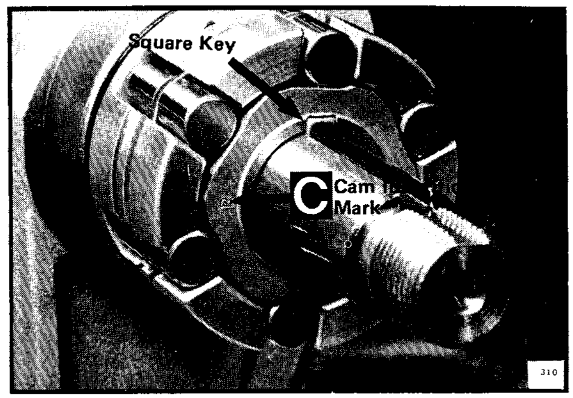


Coat the sleeve mounting area (A) with silicone and using extreme care, press the new seal sleeve onto area (A) until it bottoms. Allow 12 hours for silicone to cure.

1. Carefully raise rear wheels off the floor.
2. Rotate rear wheels and front axles until the axle keyway cut is straight up in a 12:00 position on both front axles (A).
3. Check Hilliard engagement ramp height (B). Ramps worn to half their original height should have the strut casting assembly replaced.

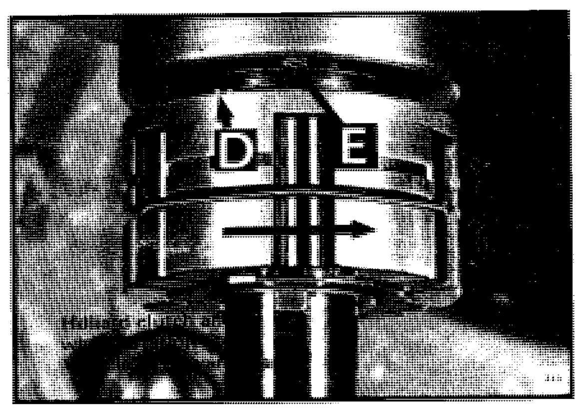


4. Install the square key and the Hilliard clutch assembly. **CAUTION:** The clutch cam must float freely on the spindle or bearing preload will be affected. **NOTE:** On some models cams are not interchangeable. These cams will be identified with L for the left side and R for the right side (C). Right and left is always determined from a seated position on the machine.

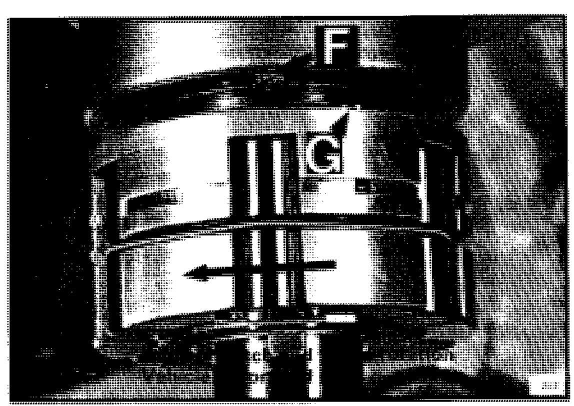


Hilliard Clutch Timing, Non-Electric Models

1. Right side: Position the roll cage so the plunger (D) is just about to engage on the strut ramp (E) during forward rotation.

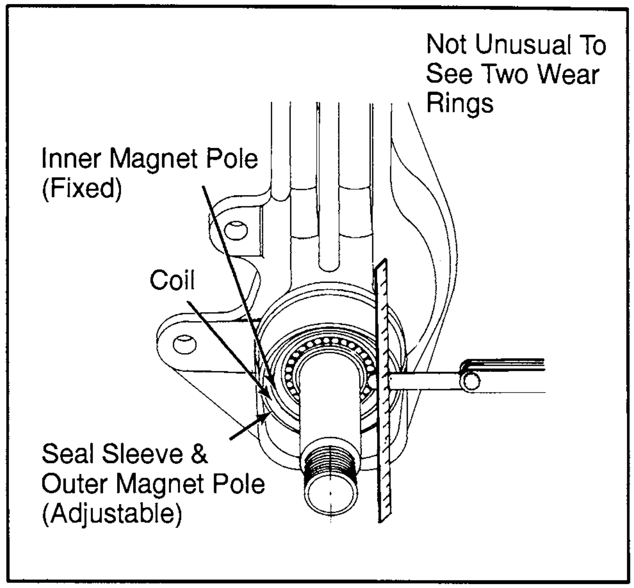


2. Left side: Position the roll cage so the plunger (F) is just about to engage on the strut ramp (G) during forward rotation.



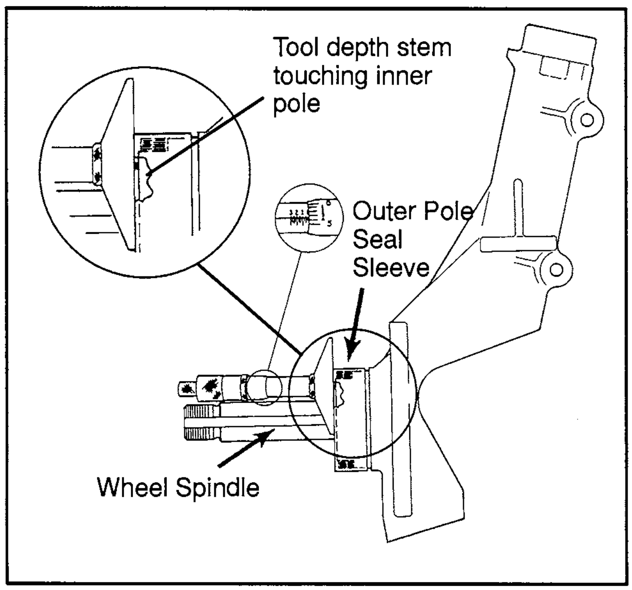
Front Clutch Re-assembly

When servicing the all-wheel drive strut assembly (replacing seal sleeve or installing new coils) it is important that the inner and outer poles of the electrically engaged front drive system be properly adjusted.



As the armature plate is engaged, it should contact the outer magnet pole (seal sleeve) and may contact the inner magnet pole. Also, the armature plate must be flat when placed on a flat surface. Bent armature plates must be replaced. It is not unusual to see a double wear ring on the armature plate.

To check the gap between the inner and outer poles place a straight edge on the outer pole so that it just intersects with the inner pole. This measurement should be checked in three different positions around the pole assemblies. The three measurements must be within .001″ (.025 mm) of each other. If the gap is narrow the front drive system may not disengage, and if the gap is excessive, it may not engage at all. **NOTE:** Erratic engagement can also be an electrical problem or a low battery. Be sure to check the electrical circuits and battery when diagnosing hub engagement problems.



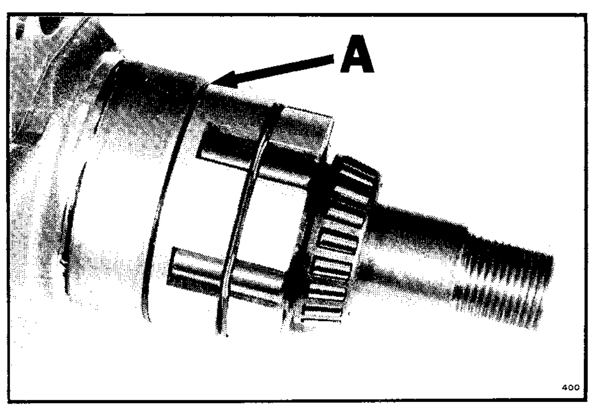
The outer magnet pole (seal sleeve) is adjustable by either tapping inward or placing a small punch to the inside edges and tapping the outer pole (sleeve) outward.

Pole Gap Specifications

1989 to 1994 - .002″ to .004″ (.05 - .1 mm)

1995 to current - .000″ to .001″ (0 - .025 mm)

1989 to present all-wheel drive models with the electrically engaged front hubs do not require timing as did previously produced 4x4's.

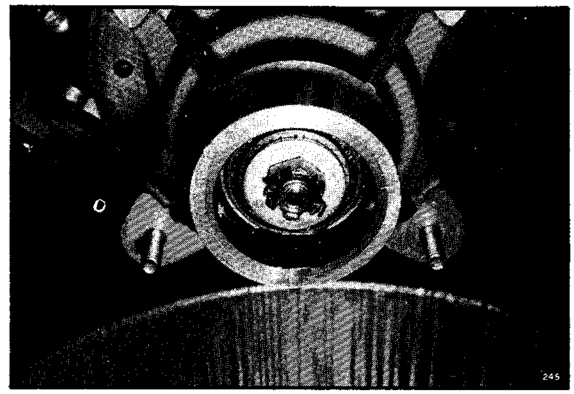


Install the roller clutch assembly and be sure the armature plate (A) is positioned properly. Also, when installing the hub assembly, be sure the armature plate tabs remain engaged with the roller clutch cage.

CAUTION: After the hub is installed, the slightest movement outward with the hub may cause the armature plate tabs to disengage from the roller clutch cage. If the unit is driven with the armature plate out of position it will cause roller clutch damage.

1. Thoroughly inspect the hub internally. If the hub sleeve is damaged or shows signs of movement, the hub assembly must be replaced. When the sleeve is pressed into the hub it should be flush with the outside surface of the hub.
2. Grease hub seal to allow it to slide over roller clutch components.
3. Install wheel hub inner bearing. **NOTE:** All bearings must slide freely onto the spindle. If bearings do not slide freely, wheel bearing torque will be affected.
4. Install wheel hub, outer bearing, washer, and attaching nut. **NOTE:** On models with electrically engaged hubs it is very important that the hub is not moved outward once installed, or the seal on the hub will disengage the armature plate.

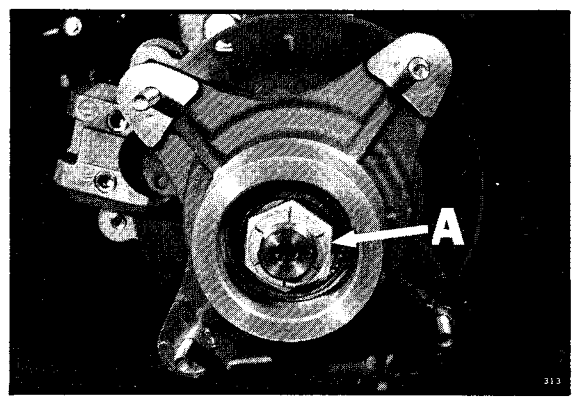
WARNING: The following bearing adjustments are very important. Incorrect adjustment will increase bearing wear, reduce braking action, and may affect front drive hub engagement, which could result in serious personal injury or death.



Model W878027

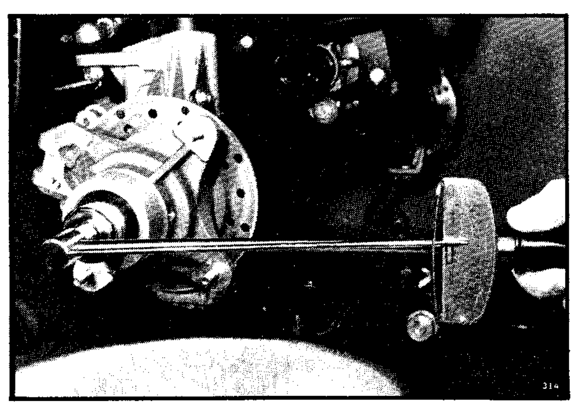
1. Torque spindle nut to 100 inch lbs.
2. Rotate wheel hub several revolutions.
3. Rotate front axle several revolutions and torque spindle nut to 75 inch lbs. **NOTE:** To rotate front axles, raise rear of machine and rotate rear wheels.
4. Install safety wire.

NOTE: Final spindle nut torque should be between 50 and 100 inch lbs.



4x4 Models with FlexLoc Nut

1. Torque spindle nut (A) to 400 inch lbs. more than rolling torque and back nut off 1/2 turn. **NOTE:** Some 1994 and all 1995 to current models have left hand threads on left spindle.
2. Tighten nut again and read the force it takes to rotate the lock nut (nut rolling torque). **NOTE:** Rolling torque on FlexLoc nuts should be 75 to 400 inch lbs. If the rolling torque is less than 75 inch lbs. the nut should be replaced. To achieve the final torque, add the nut rolling torque plus 100 inch lbs.

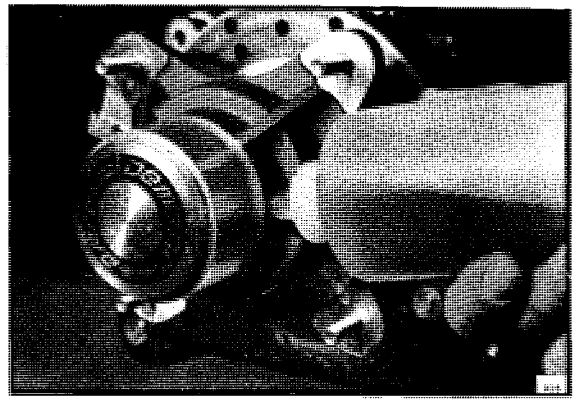


Example:

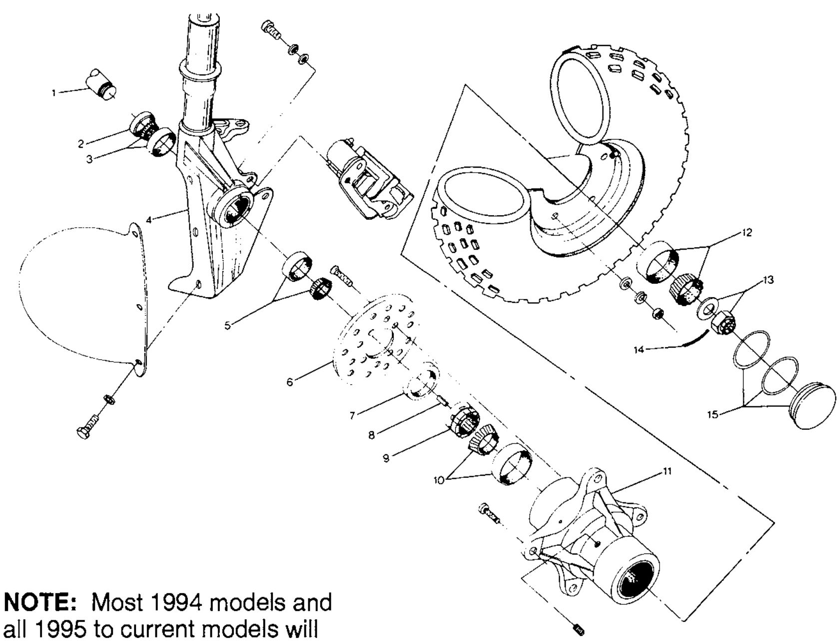
Rotating nut torque	= 125 inch lbs.
Plus bearing preload	= 100 inch lbs.
Final nut torque	= 225 inch lbs.

3. Rotate the hub and front drive axle. Re-torque to the reading recorded in step 2.
4. Some models will have a stake nut. Never re-use a stake nut. Replace with a FlexLoc™ nut. **NOTE:** A FlexLoc™ nut is shown in the center photo (A).

FINAL DRIVE SYSTEM SERVICE
Front Hub Installation



1. Reinstall hub cap.
2. Remove fill check plug and rotate hole to either 3:00 or 9:00 position.
3. Fill with Type F Automatic Transmission Fluid until fluid trickles out. **NOTE:** Do not force the oil into the hub under pressure. This can cause seal damage and leaking.
4. Reinstall plug.
5. Reinstall brake caliper assembly. Torque retaining bolts to 18 ft. lbs. (2.5 kg/m).
6. Reinstall front wheels. Torque retaining nuts to 20 ft. lbs. (2.8 kg/m). **NOTE:** Units equipped with flanged wheel nuts should be torqued to 15 ft. lbs. (2.1 kg/m).
7. Carefully lower vehicle.
8. Field test vehicle for proper operation of brake system and 4 wheel drive operation.



1. Spindle and axle assembly
2. Strut casting seal
3. Inner strut bearing and cone
4. Strut casting assembly
5. Outer strut bearing and cone
6. Brake disc
7. Wheel hub seal
8. Square key (early models)
9. Hilliard™ clutch assembly
10. Inner hub bearing and cone
11. Wheel hub
12. Outer hub bearing and cone
13. Spindle washer and castle nut
14. Safety wire (some models)
15. Hub cap and O-rings

NOTE: Most 1994 models and all 1995 to current models will have a splined cam and no square key. (Item 8)

CHAPTER 6

PVT SYSTEM

SPECIAL SERVICE TOOLS AND SUPPLIES

Description	Part Number
Drive Clutch Puller	2870506
Clutch Holding Fixture	2870547
Spider Removal Tool	2870341
Offset Alignment Tool	2870654
RTV Silicone Sealer	2870661
Loctite/Chisel Gasket Remover	2870601
Driven Clutch Puller	2870913
Spider Pin Tool	2870910
401 Loctite	2870769
Clutch Bushing Removal & Installation	2871226
Above Tool Used with Piston Pin Puller	2870386
Clutch Bushing Removal and Installation	2871226
Above Tool Used with Piston Pin Puller	2870386

TORQUE SPECIFICATIONS

Drive Clutch Retainer Bolt	40 ft. lbs. (5.52 kg/m)
Driven Clutch Retainer Bolt	17 ft. lbs. (2.35 kg/m)
Inner Cover Bolts	12 ft. lbs. (1.66 kg/m)
Spider	200 ft. lbs. (27.6 kg/m)
Cover Screws	90 in. lbs. (1.04 kg/m)

6

1985 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Clutch Part No.	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Scrambler Trail Boss	EC25PF-01	6000	1321468	Blue Green	5 45 gr.	40° 2-3

Above 6000 ft. wind driven to tightest setting and/or change to a number 16 mod shift weight, 40 grams, PN 5630280.

1986 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Clutch Part No.	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Scrambler Trail Boss	EC25PF-01	6000	1321476	Blue Green	16 43 gr.	40° 2-3

Above 6000 ft. wind driven to tightest setting and/or change to a number 16 mod shift weight, 40 grams, PN 5630280.

1987 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Clutch Part No.	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Trail Boss Trail Boss 4x4	EC25PF-01 EC25PF-03	6000	1321476	Blue Green	16 43 gr.	40° 2-3
Cyclone	EC25PF-02	7000	1321479	Brown	16 43 gr.	44° 36° 2-3

Trail Boss/Trail Boss 4x4: Above 6000 ft. wind driven to tightest setting and/or change to a number 16 mod shift weight, 40 grams, PN 5630280.

1988 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Clutch Part No.	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Trail Boss 2x4 Trail Boss 4x4	EC25PF-03	6000	1321476	Blue Green	16 43 gr.	40° 2-2
Trail Boss R/ES	EC25PF-04	6600	1321495	Yellow	16 43 gr.	44° 36° 2-2

Above 6000 ft. wind driven to tightest setting and/or change to a number 16 mod shift weight, 40 grams, PN 5630280.

1989 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Clutch Part No.	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
All 1989 Models	EC25PF-05	6000	1321476	Blue Green	16 43 gr.	40° 2-2

Above 6000 ft. wind driven to tightest setting and/or change to a number 16 mod shift weight, 40 grams, PN 5630280.

PVT SYSTEM
Drive Clutch and Driven Clutch Data
1990 & 1991 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Trail Boss 250, 2x4, 4x4, 4x6, 6x6 & Trail Blazer	EC25PF-05, 07	6000	Blue Green	16 43 gr.	40° 2-2
350L Trail Boss 2x4, 4x4	EC35PL-02	5800	Blue Green	S 53 gr.	40° 2-2

High altitude recommendations above 6000 ft.:

- EC25PF engine equipped models, wind the driven clutch spring to its tightest position and/or change the drive clutch weights to 16 mod
- EC35PL engine equipped models, wind the driven clutch spring to its tightest position

1992 & 1993 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Trail Boss 250, 2x4, 4x4, 4x6, 6x6 & Trail Blazer	EC25PF-05/08, 07/09	6000	Blue Green	16 43 gr.	40° 2-2
350L Trail Boss 2x4, 4x4, 6x6	EC35PL-02	5800	Blue Green	S 53 gr.	40° 2-2

High altitude recommendations above 6000 ft.:

- EC25PF engine equipped models, wind the driven clutch spring to its tightest position and/or change the drive clutch weights to 16 mod
- EC35PL engine equipped models, 5000 - 9000 ft. change drive clutch weights to Cs, 9000 ft. and wind the driven clutch spring to its tightest position

1994 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Trail Blazer/ Trail Boss	EC25PF-09 EC25PF-08	6000	Blue/Green	16 43 gr	40° 2-2
300's	EC28PF-01	5600	Blue/Green	G 48 gr	44°-36°
400's	EC38PL-01	5700	Blue/Green	S-55 55 gr	44°-36°

1994 Clutch Recommendations for Altitude

	250	300	350	400	Meters/Feet
Weight	16 43 gr	G 48 gr	S 53 gr	S55 55 gr	0-900 0-3000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-2	2-2	2-2	2-2	
Weight	16 43 gr	G 48 gr	S 53 gr	S55 55 gr	900-1800 3000-6000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-2 or 2-1	2-2 or 2-1	2-2 or 2-1	2-2 or 2-1	
Weight	16 mod 40 gr	F 45 gr	C 50 gr	S 53 gr	1800-2700 6000-9000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-1	2-1	2-1	2-1	
Weight	16 mod 40 gr	F 45 gr	C 50 gr	S 53 gr	2700-3700 9000-12000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-1	2-1	2-1	2-1	

1995 Production Specifications

Machine Model	Engine Model	Operating RPM +/- 200	Drive Clutch Spring Color	Shift Wt. I.D. and Gram Wt.	Driven Clutch Helix Angle Spring Position
Trail Blazer/ Trail Boss	EC25PF-09 EC25PF-08	6000	Blue/Green	16 43 gr	40° 2-2
300s	EC28PF-01	5600	Blue/Green	G 48 gr	44°-36°
400s Except Scrambler	EC38PL-01-02	5700	Blue/Green	S-55 55 gr	44°-36°
Scrambler	EC38PLE-03	6000	White	S-55 55 gr	40° 2-2
425s (Magnums)	EH42PLE-01	6000	Blue/Green	10MH 50 gr	40° 2-2

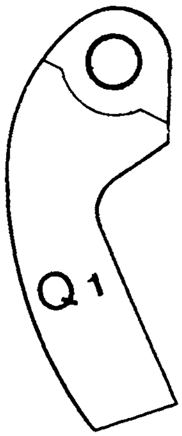
1995 Clutch Recommendations for Altitude

	250	300	350	400 Except Scrambler	Meters/Feet
Weight	16 43 gr	G 48 gr	S 53 gr	S55 55 gr	0-900 0-3000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-2	2-2	2-2	2-2	
Weight	16 43 gr	G 48 gr	S 53 gr	S55 55 gr	900-1800 3000-6000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-2 or 2-1	2-2 or 2-1	2-2 or 2-1	2-2 or 2-1	
Weight	16 mod 40 gr	F 45 gr	C 50 gr	S 53 gr	1800-2700 6000-9000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-1	2-1	2-1	2-1	
Weight	16 mod 40 gr	F 45 gr	C 50 gr	S 53 gr	2700-3700 9000-12000'
Spring	Blue/Green	Blue/Green	Blue/Green	Blue/Green	
Driven Spring	2-1	2-1	2-1	2-1	

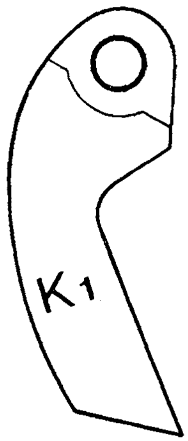
	Scrambler	425s (Magnums)	Meters/Feet
Weight	S55 - 55 gr	10MH 50 gr	0-900 0-3000'
Spring	White	Blue/Green	
Driven Spring	2-2	2-2	
Weight	S55 - 55 gr	F or 10MB	900-1800 3000-6000'
Spring	White	Blue/Green	
Driven Spring	2-1	2-2	
Weight	S 53 gr	10MW	1800-2700 6000-9000'
Spring	White	Blue/Green	
Driven Spring	2-1	2-1	
Weight	S or C	10MR	2700-3700 9000-12000'
Spring	White	Blue/Green	
Driven Spring	2-1 or 2-2	2-1	

PVT SYSTEM
Shift Weights

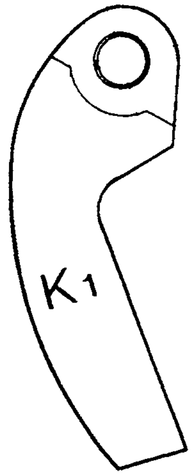
Shown below are the shift weights which have been designed for, or which may be used in the PVT system. These shift weights have many factors designed into them for controlling engagement RPM and shifting patterns. Some of these weights require modifications to spider spacing when installed, and will affect clutch balance. Shift weights should not be changed or altered without first having a thorough understanding of their positioning and the effects they may have on belt to sheave clearance, clutch balance and shifting pattern.



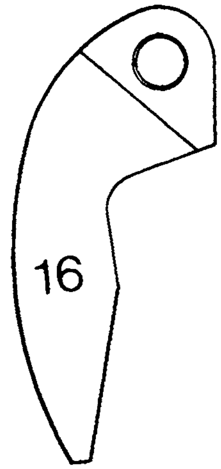
PN 5630295
35.5
Mod.



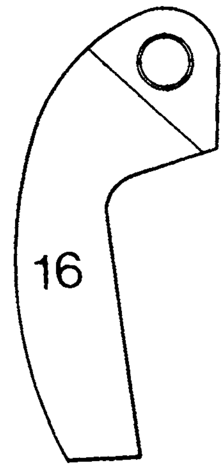
PN 5630292
38.5
Mod.



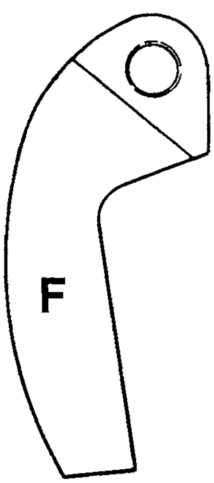
PN 5630144
39G



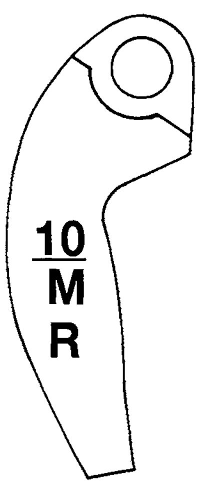
PN 5630280
40G
Mod.
(High Alt.)



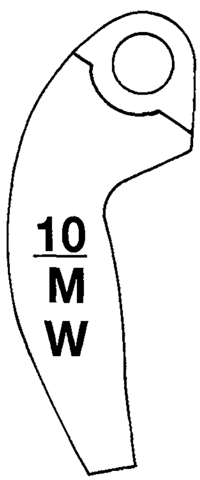
PN 5630279
43G



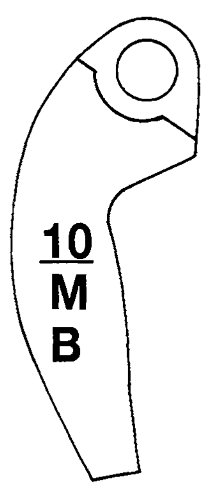
PN 5630515
45g
(High Alt.)



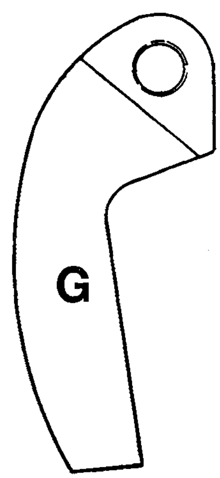
PN 1321530
44 gr
(High Altitude)



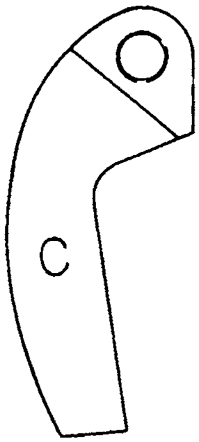
PN 1321527
46 gr
(High Altitude)



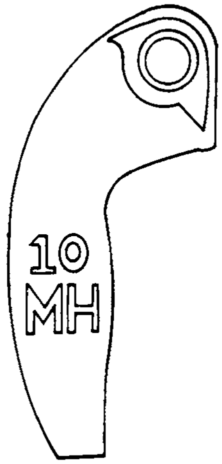
PN 1321529
47.5 gr
(High Altitude)



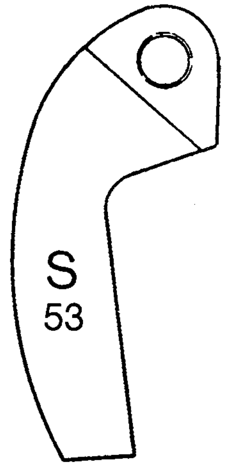
PN 5630514
48GR



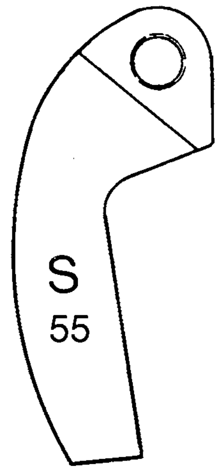
PN 5630418
50G
(High Alt. 350L)



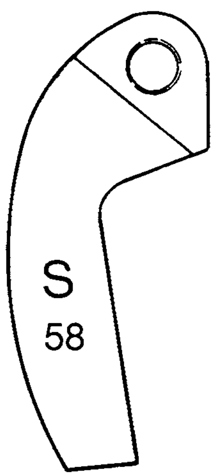
PN 5630513
50.5 gr



PN 5630095
53G



PN 5630509
55GR



PN 5630581
58G

PVT SYSTEM
Drive Clutch Spring Specs

The drive clutch spring has two primary functions:

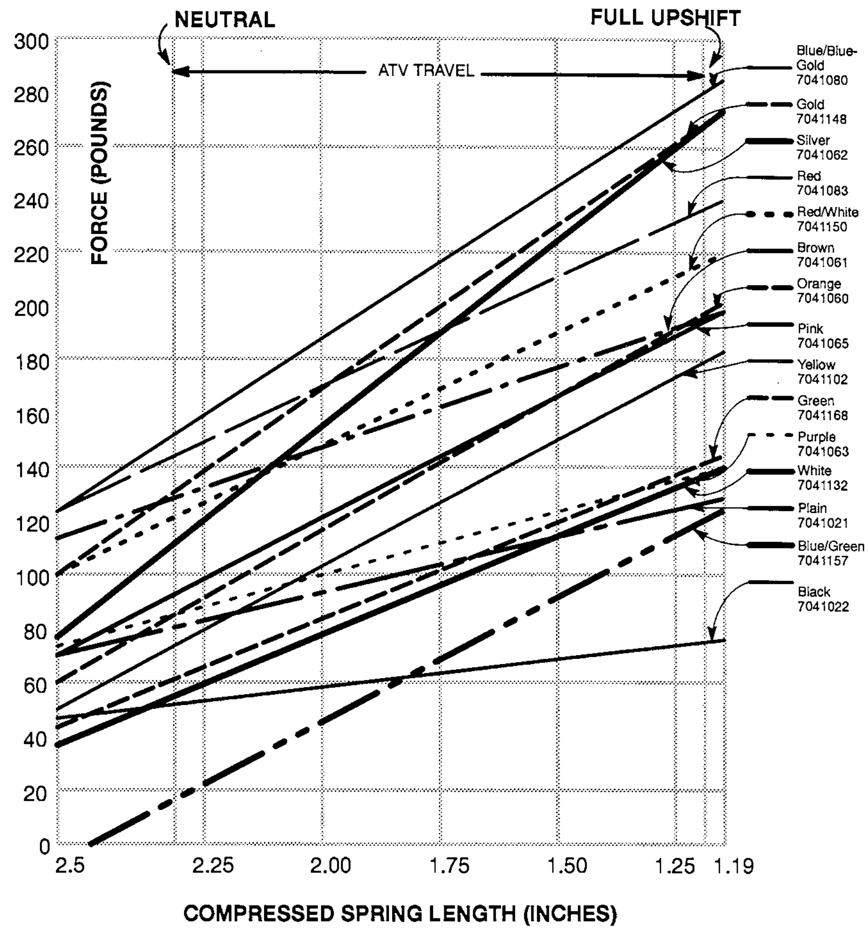
1. **To control clutch engagement RPM.** The springs which have a higher rate when the clutch is in neutral will increase clutch engagement RPM.

2. **To control the rate at which the drive belt moves upward in the drive clutch sheaves.** This is referred to as drive clutch upshift.

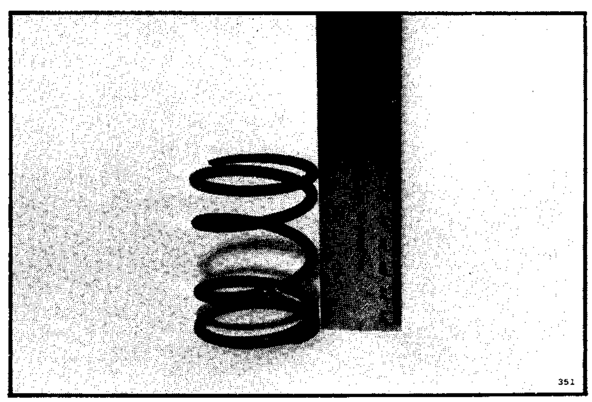
There are other components which control upshift, but the spring is one of the primary components in insuring optimum performance. It is very important that the spring is of the correct design and is in good condition.

CAUTION: Never shim a drive clutch spring to increase its compression rate. This may result in complete stacking of the coils and subsequent clutch cover failure.

The drive clutch spring is one of the most critical components of the PVT system. It is also one of the easiest to service. Due to the severe stress the spring is subject to during operation, it should always be inspected for tolerance limits during any clutch operation diagnosis or repair.



With the spring resting on a flat surface, measure its free length from the outer coil surfaces as shown. Refer to the spring specification chart for specific free length measurements and tolerances. Also check to see that spring coils are parallel to one another. Distortion of the spring indicates stress fatigue, requiring replacement.



PART NUMBER	COLOR CODE	WIRE DIAMETER	FREE LENGTH ±.125″
7041021	Plain	.157″	4.38″
7041022	Black	.140″	4.25″
7041063	Purple	.168″	4.37″
7041062	Silver	.208″	3.12″
7041065	Pink	.177″	4.69″
7041060	Orange	.196″	3.37″
7041080	Blue/Gold	.207″	3.50″
7041083	Red	.192″	3.77″
7041102	Yellow	.192″	2.92″
7041061	Brown	.200″	3.06″
7041132	White	.177″	2.92″
7041168	Green	.177″	3.05″
7041148	Gold	.207″	3.25″
7041150	Red/White	.192″	3.59″
7041157	Blue/Green	.177″	2.53″

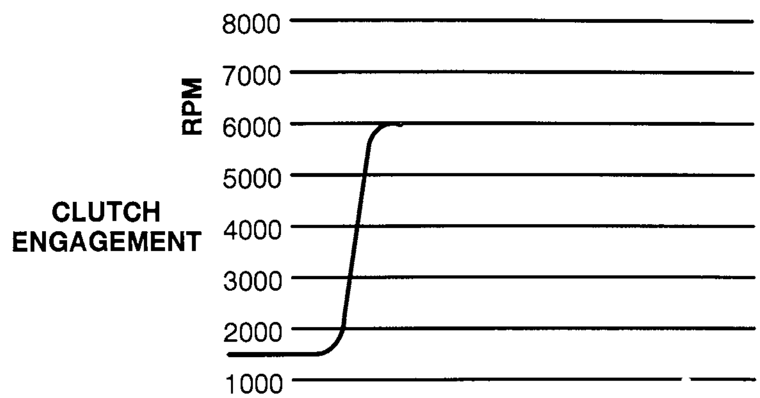
Relationship of Drive Clutch Weights and Spring in Maintaining Operating RPM

The drive clutch is an RPM and torque sensing unit designed to transfer the maximum amount of horsepower from the engine to the ground. This is accomplished through weights and a spring inside the unit which react to the centrifugal force applied to the clutch from the engine RPM.

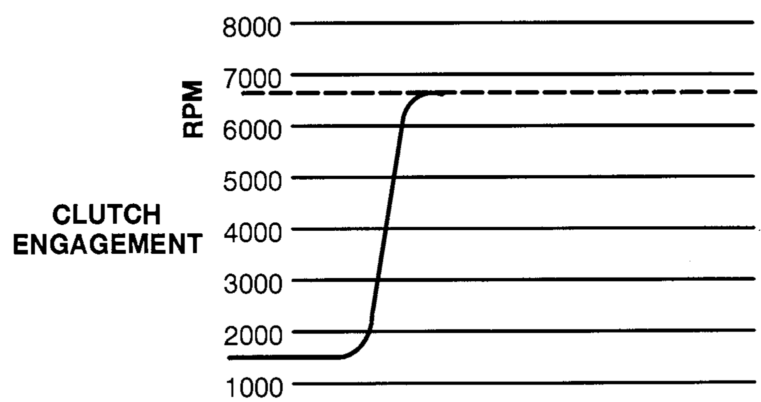
The spring and weights work in combination. In a properly set up clutch, the maximum desired operating RPM will be reached immediately after clutch engagement, under full throttle conditions. To gain optimum power this RPM should be maintained. As centrifugal force pushes the weights against the rollers, the moveable sheave will force the belt to climb up the drive clutch sheave and increase vehicle speed.

If the weights and spring are matched properly, the engine RPM will go to the desired range and remain there on both the upshift and backshift.

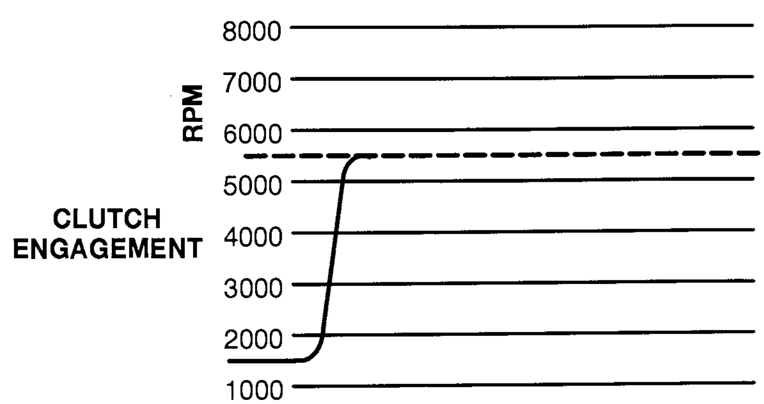
Example : Engine Operating RPM 6000 ±200



If the weights are too light, or the spring rate too high, the maximum RPM will be too great and the drive belt will not move into high gear at the top of the clutch.



If the weights are too heavy, or the spring rate too low, the engine RPM will be low and the drive clutch will upshift too fast, keeping the engine out of its power band.



PVT SYSTEM

PVT System Introduction

The Polaris variable transmission (PVT) consists of three major assemblies: 1) drive clutch; 2) drive belt; and 3) driven clutch. The internal components of the drive clutch and driven clutch control clutch engagement (for initial vehicle movement), clutch upshifting and backshifting. During the development of an ATV, the PVT system is matched first of all to the engine power curve; then to average riding conditions and to vehicle design usage. Modifications to the PVT or variations of components at random are never recommended. Proper PVT system setup and careful inspection of existing components must be the primary objective when troubleshooting and tuning.

⚠ All PVT system maintenance repairs must be performed only by an authorized Polaris service technician who has attended a Polaris sponsored service training seminar and understands the proper procedures as outlined in this manual. **Because of the critical nature and precision balance incorporated into the PVT system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures.**

Drive Clutch Operation

The drive clutch primarily senses engine RPM. The two major components which control its shifting function are the shift weights and the coil spring. When the engine RPM is increased, the centrifugal force of the shift weights working against the coil spring increases. When this force reaches a force higher than the preload in the spring, the moveable sheave of the drive clutch will move inward, contacting the drive belt. The force will pinch the belt between the spinning sheaves and cause the drive belt to move. This movement in turn rotates the driven clutch.

At light throttle settings the drive belt will stay low in the drive clutch and high in the driven clutch. As engine RPM increases, so does the centrifugal force on the shift weights, causing the drive belt to be forced upward in the drive clutch and downward into the driven clutch. The forces in the driven clutch will now affect the upshift.

Driven Clutch Operation

The driven clutch primarily senses torque. It opens and closes according to the forces applied to it from the drive belt and the transmission input shaft. If the torque resistance on the input shaft is greater than the load from the drive belt, it will keep the drive belt outward at the top of the driven clutch sheaves. As the throttle setting and engine horsepower increase, there will be a greater load on the drive belt, pulling the belt down into the driven clutch and up on the drive clutch. This action, which increases the driven clutch speed, is called upshifting.

If the throttle setting remains the same and the vehicle is subjected to a heavier load, the driven clutch senses this load, moving the belt back up on the sheaves of the driven clutch and down into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called downshifting.

In situations where loads vary (such as uphill and downhill) and throttle settings are constant, the drive and driven clutches are continually shifting to maintain optimum engine RPM. At full throttle a perfectly matched PVT system will hold the engine RPMs at the peak of the power curve. This RPM should be maintained during clutch upshift and backshift. In this respect the PVT system is similar to a power governor. Rather than change throttle position, as a governor does, the PVT system changes engine load requirements by either upshifting or downshifting.

PVT Maintenance/Inspection

Under normal operation the PVT system will provide years of trouble free operation. Periodic inspection and maintenance is required to keep the system operating at peak performance. The following list of items should be inspected and maintained to ensure maximum performance and service life of PVT components.

1. **Belt Tension, Drive to Driven Clutch Offset, Belt Width.** To ensure proper performance these items must be periodically inspected and maintained.

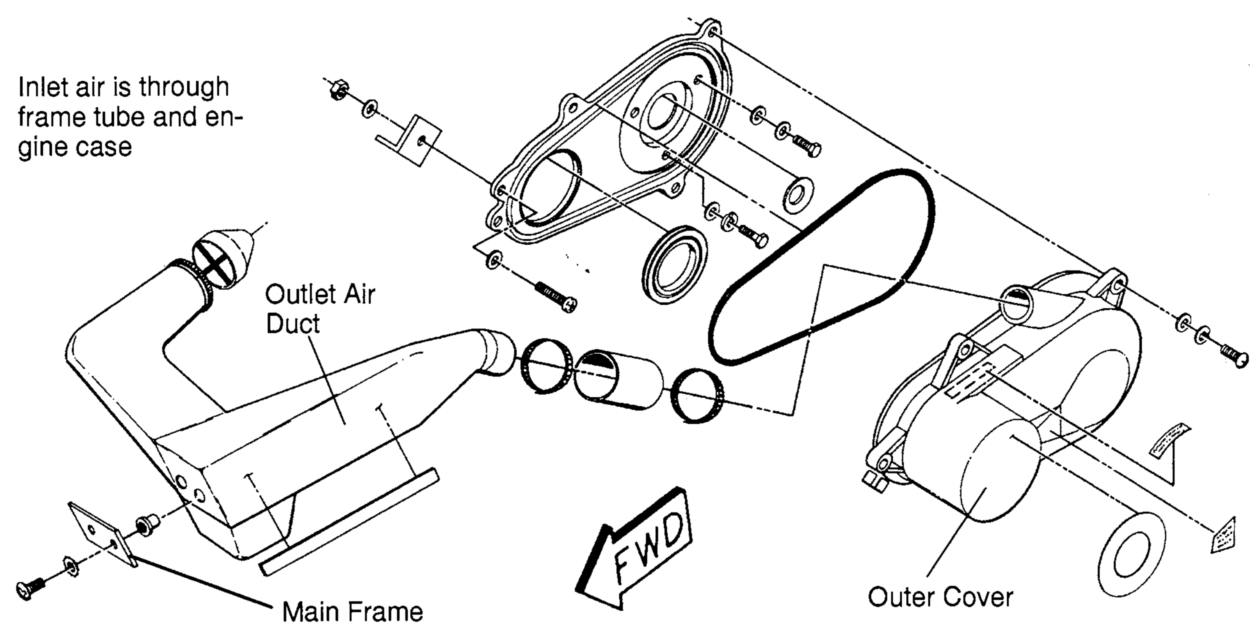
2. **Drive and Driven Clutch Buttons and Bushings, Drive Clutch Shift Weights and Pins, Drive Clutch Spider Rollers and Roller Pins, Drive and Driven Clutch Springs.** These items must be periodically inspected for wear and replaced if necessary.

3. **PVT System Sealing.** The PVT system is air cooled by fins on the drive clutch stationary sheave. The fins create a low pressure area in the crankcase casting, drawing air into the system through an intake duct. The opening for this intake duct is located beneath the fuel tank of the ATV. It draws fresh air through a vented cover. The connecting air ducts from the crankcase upward must be properly sealed to ensure clean air is being used for cooling the PVT system. The system must also be sealed well enough to keep out water, particularly on units subjected to frequent water forging. If water is ingested, shift transmission to neutral and rev engine slightly to expel the moisture and air dry the belt and clutches. Allow engine RPM to settle to idle speed, shift transmission to low range and test for slippage. Operate ATV in low range for a short period of time until PVT system is dry.

   Also, during routine maintenance or whenever PVT system overheating is noticed, it's important to check the inlet ducting and the outlet ducting for obstructions. Obstructions in the ducting will significantly increase the PVT system operating temperatures.

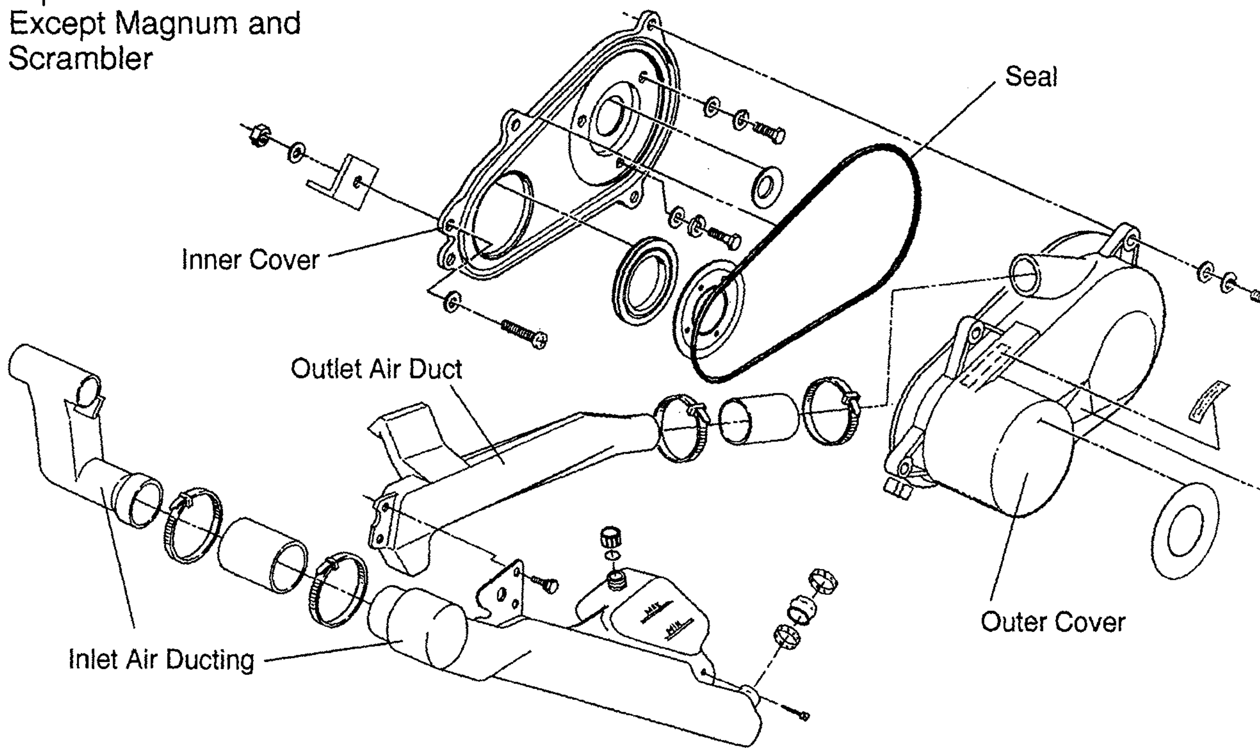
Typical PVT Sealing and Ducting Components

Round Tube Frames

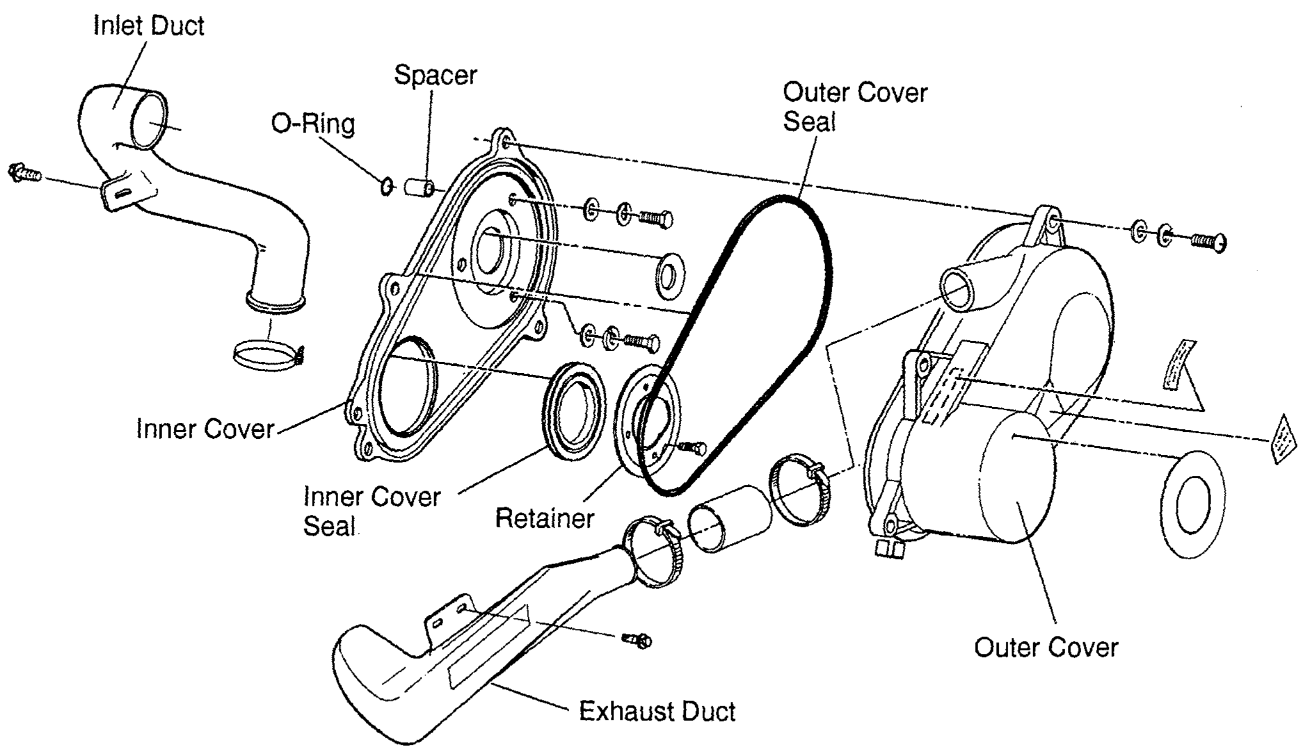


Typical PVT Sealing and Ducting Components

Square Tube Frames Except Magnum and Scrambler

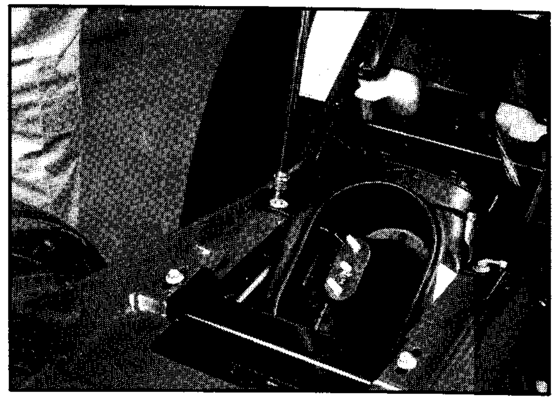


Typical Magnum



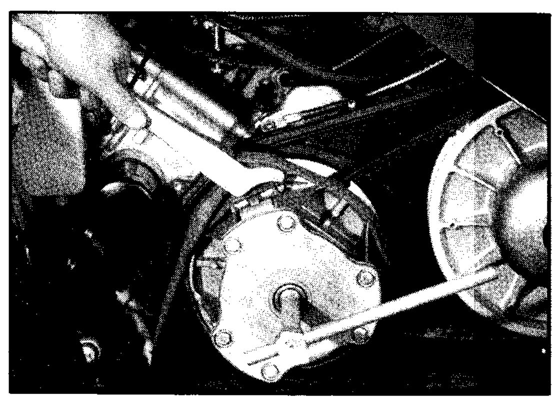
Typical PVT Disassembly

NOTE: Some fasteners and procedures will vary. Refer to the appropriate parts manual for proper fasteners and fastener placement.

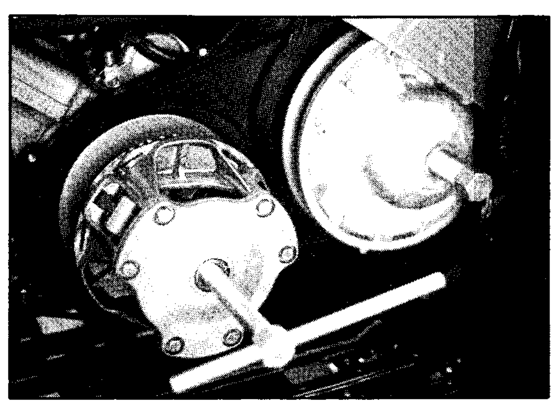


1. Remove seat.
2. Remove six bolts and washers from the top of the rear cab assembly.
3. Remove three screws, nuts and backing plate from the left footrest.
4. Remove screws, retainer clips, and cable tie from PVT air outlet duct, Remove outer cover.

5. Mark the drive belt direction of rotation and remove drive belt. The belt is normally installed so the numbers can be easily read.



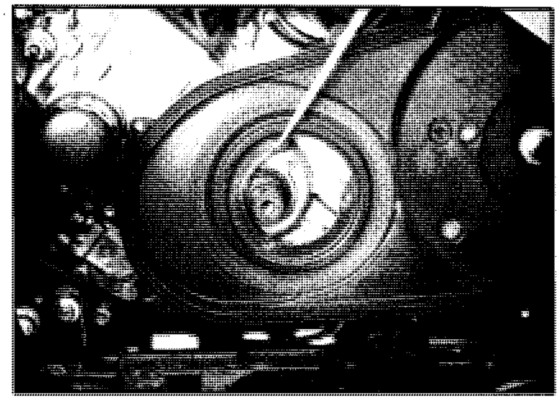
6. Remove drive clutch retaining bolt and remove drive clutch using puller PN 2870506.



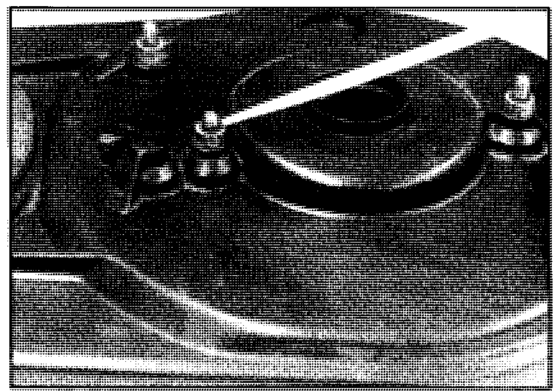
7. Remove driven clutch retaining bolt and driven clutch using puller PN 2870913 (A).
8. Remove driven clutch offset spacers from the transmission input shaft.

9. Bend back retainer tabs on three screws at the front of the inner cover and remove screws and retainer plate.

10. Loosen three inner cover retaining bolts at the rear of the cover only enough to allow cover removal.



11. Remove cover. **NOTE:** Do not lose spacers or spacer retaining O-rings located on the inside of the inner cover.



PVT Assembly

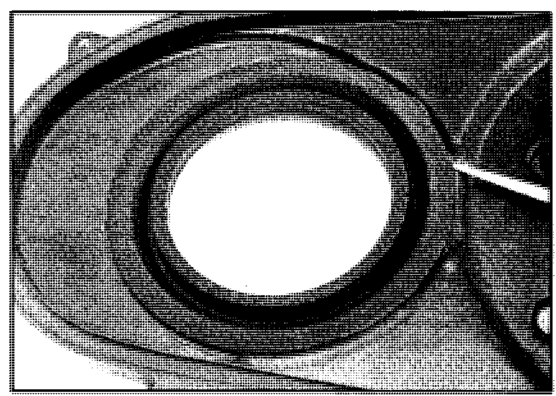
1. Inspect PVT inner cover seal. Replace if cracked or damaged.

2. Use RTV silicone to ensure a water tight fit between the seal and the cover. Surfaces must be clean to allow proper adhesion of the silicone sealant.

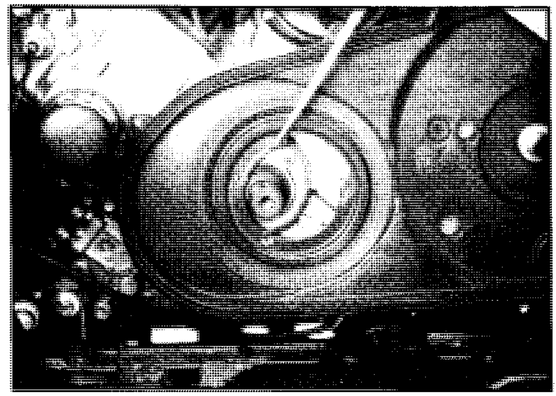
3. Make sure the spacers and O-rings are in place on the inner cover rear bolts.

4. Reinstall cover and tighten rear cover bolts just enough to hold it in place.

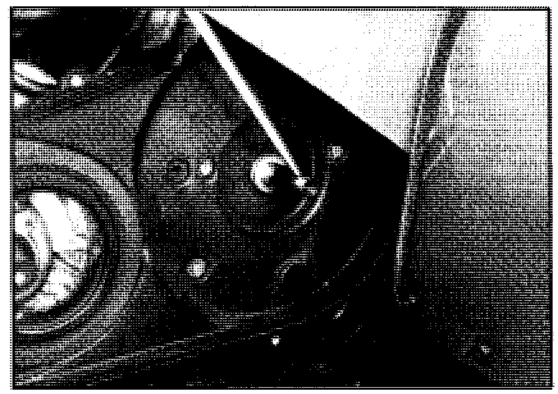
5. Fit lip of inner cover seal to engine. Install seal retainer plate and tighten screws.



6. Bend screw retainer tabs over screws.
7. Torque inner cover bolts to 12 ft. lbs. (1.66 kg/m).



8. Install clutch offset spacers on transmission input shaft.
9. Clean splines inside driven clutch and on the transmission input shaft.
10. Apply a light film of grease to the splines on the shaft.
11. Install the driven clutch, aligning the boss spline on the input shaft.
12. Install retaining bolt, washer, and lock washer. Torque to 17 ft. lbs. (2.35 kg/m).
13. Clean the end of the taper on the crankshaft and taper bore inside the drive clutch.
14. Install the drive clutch and torque the retaining bolt to 40 ft. lbs. (5.5 kg/m).
15. Reinstall drive belt noting direction of rotation. If a new belt is installed, install so numbers can be easily read.
16. Inspect PVT outer cover rubber gasket for cracks or damage. Replace if necessary. When installing a new gasket, position the ends at the top rear of the inner cover (highest point) and apply a small amount of RTV silicone to the ends. **NOTE:** The square side of the gasket faces the outer cover.
17. Reinstall PVT outer cover and secure with screws and clips.
18. Reinstall rear cab assembly and seat.

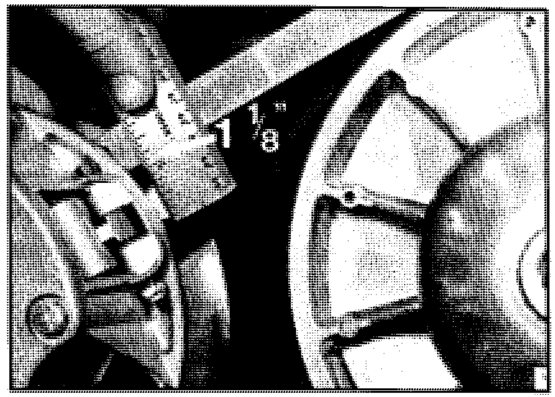


Inner Cover Bolt Torque:
12 ft. lbs. (1.66 kg/m)

Driven Clutch Retaining Bolt Torque:
17 ft. lbs. (2.35 kg/m)

Drive Clutch Retaining Bolt Torque:
40 ft. lbs. (5.5 kg/m)

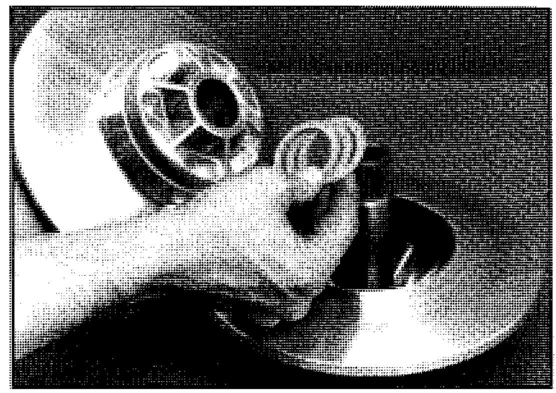
Drive Belt Tension



1. Remove PVT outer cover. See PVT Disassembly, page 6.11.
2. Place a straight edge on top of the belt between drive and driven clutch.
3. Push down on drive belt until it is lightly tensioned.
4. Measure belt deflection as shown in photo.

Belt Deflection (Tension):

1 1/8″ (2.9 cm) - 1 1/4″ (3.2 cm)



If belt deflection is out of specification, adjust by removing or adding shims between the driven clutch sheaves.

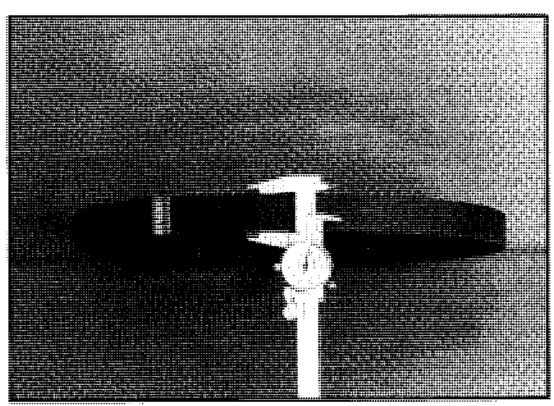
- Remove shims to decrease belt deflection
- Add shims to increase belt deflection

See Driven Clutch Disassembly/Inspection, pages 6.16 - 6.17.

NOTE: At least one shim must remain between the inner and outer sheave of the driven clutch. If proper belt deflection cannot be obtained, measure drive belt width, length, and center distance of drive and driven clutch, outlined in this section; all have an effect on belt deflection.

Drive Belt Removal/Inspection

1. Remove outer PVT cover as described in PVT Disassembly, page 6.11.
2. Mark direction of rotation of drive belt so that it can be installed in the same direction. **NOTE:** Normally positioned so part numbers are easily read.
3. To remove drive belt, apply brake, open driven clutch sheaves, push down on belt to hold sheaves open, and slip belt over driven clutch outer sheave.
4. Inspect belt width, measuring across the top of the belt with a dial caliper.

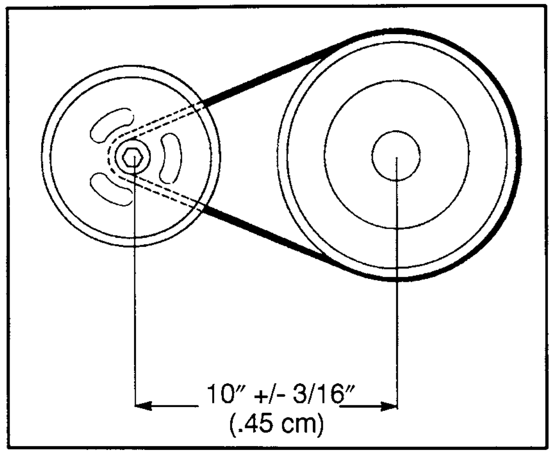


Belt Width:

New 1.188″ (3.02 cm)

Wear Limit 1.125″ (2.86 cm)

5. Measure belt length with a tape measure around the outer circumference of the belt. Belts which measure longer than nominal length may require driven shimming or engine adjustment for a longer center distance to obtain proper belt deflection. Belts which measure shorter than nominal length may require driven shimming or a shorter center distance. *Remember, proper belt deflection is the desired goal – not a specific center distance.*
6. Replace belt if worn past the service limit. Belts with thin spots, burn marks, etc., should be replaced to eliminate noise, vibration, or erratic PVT operation. See Troubleshooting Chart at the back of this chapter for possible causes. **NOTE:** If a new belt is installed, check belt deflection. Install so part numbers are easily read.



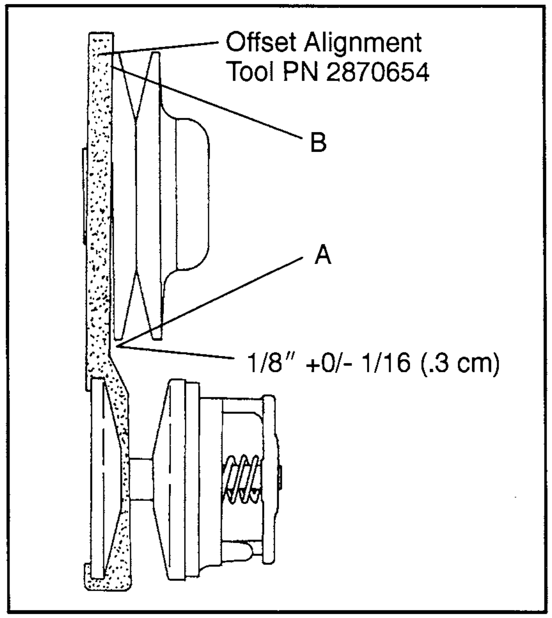
Clutch Alignment

1. Install offset/alignment tool as shown.
2. With tool touching rear of driven clutch inner sheave, the distance at point "A" should be 1/8″.

If the distance is greater than 3/16″ or less than 1/16″, clutch alignment must be adjusted as follows:

3. Remove drive and driven clutch. See PVT Disassembly, page 6.11.
4. Remove PVT inner cover.
5. Loosen the upper and lower front engine mounts, and the slotted rear mount.
6. Adjust engine until distance at point "A" is 1/8″ greater than point "B".
7. Measure belt deflection and offset and adjust if necessary.

NOTE: Minor adjustments can be made by adding shims between the frame and front lower left engine mount to increase the distance at point "A". If a shim is present, it can be removed to decrease the distance at point "A". Major adjustments must be made by loosening all engine mounts and repositioning engine in the frame.



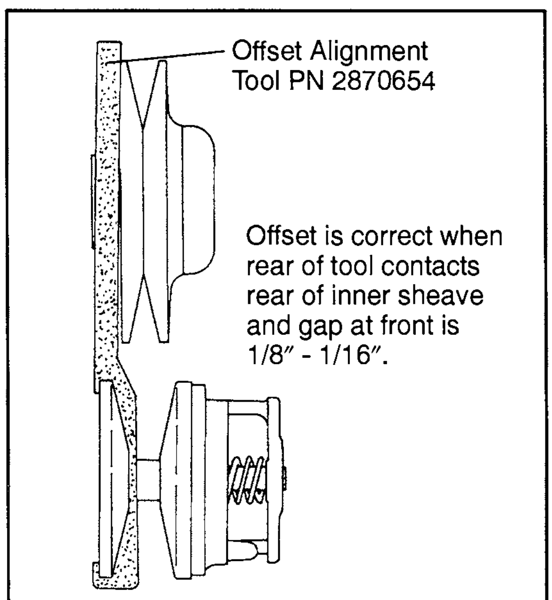
Shim Kit PN 2200126

Clutch Offset

Important: Inspect clutch alignment and center distance before adjusting offset.

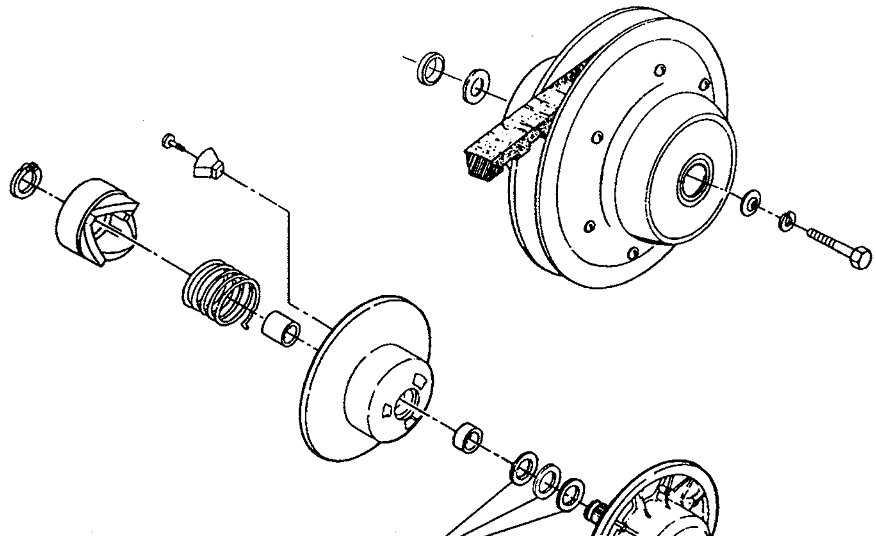
1. Install offset alignment tool as shown.

Offset is correct when rear of tool contacts rear of inner sheave. Adjust offset by adding or removing spacer washers between driven clutch and bearing as shown.



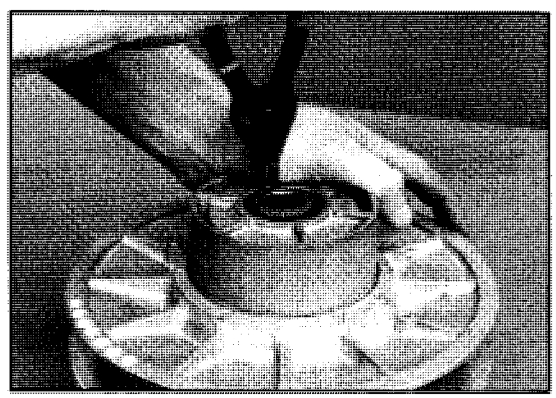
Spacer Washer PN 7556401

Driven Clutch Disassembly

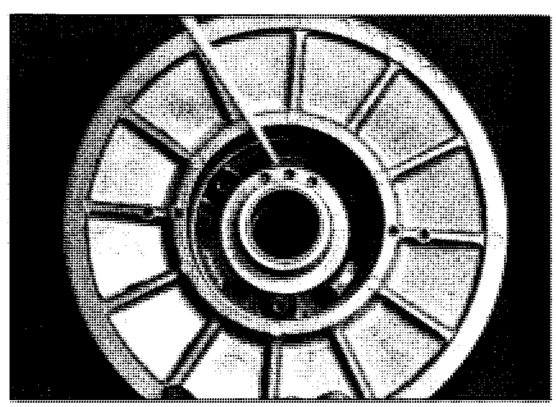


CAUTION: Wear eye protection when removing snap ring to prevent serious personal injury.

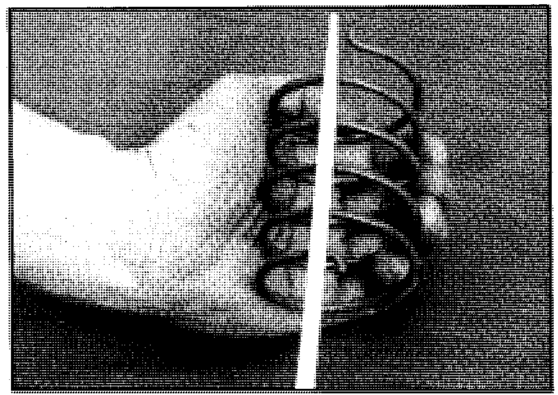
1. Apply and hold downward pressure on the helix.
2. Remove snap ring retainer.



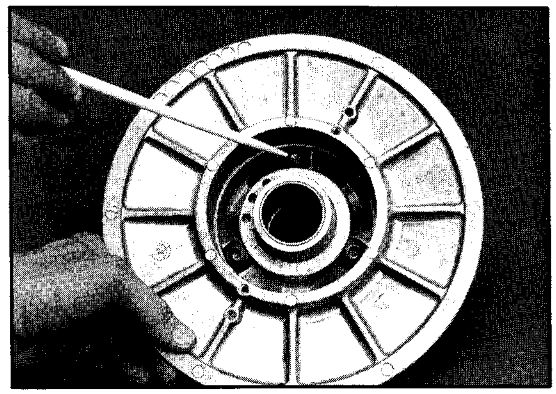
3. Note location of spring and remove helix.
4. Note location of spring in the moveable sheave, and remove the spring.



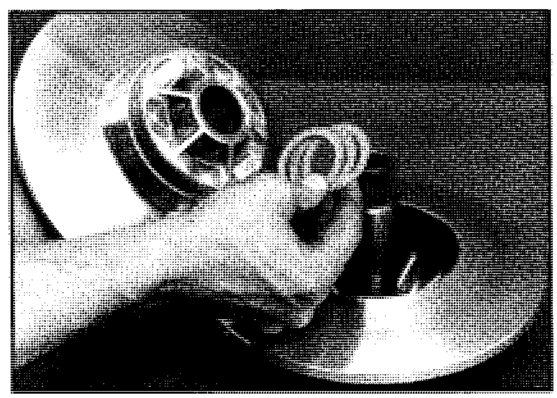
5. Check alignment of tabs on spring. Replace the spring if tabs are misaligned or the spring coils are distorted.



6. Inspect ramp buttons in the moveable sheave and replace if worn. **NOTE:** The ramp buttons are secured by Torx™ screws. The buttons can be turned 180° to provide a new wear surface. When both are worn, they must be replaced.



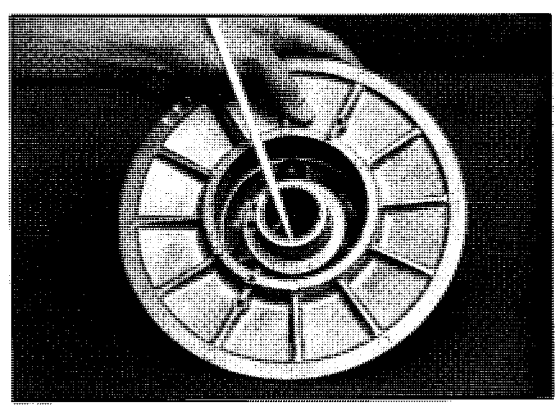
7. Remove moveable sheave and note the number of spacer washers. One spacer must remain between the sheaves when adjusting belt deflection.



8. Inspect the Teflon™ coating on the moveable sheave bushing.

Moveable Sheave Bushing Inspection:

Replace the bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

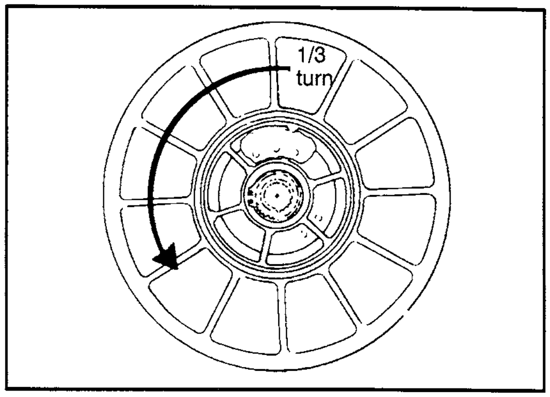


9. Inspect driven clutch faces for wear or damage.

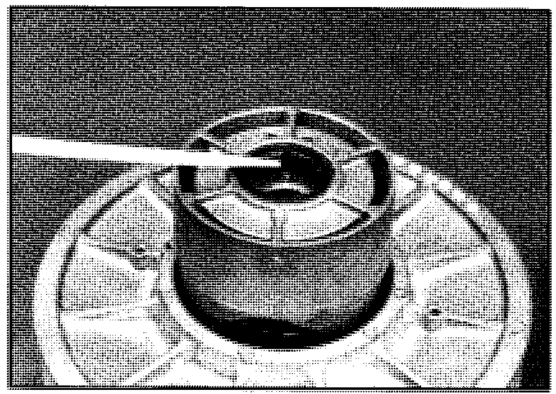
10. Clean and inspect splines on helix and transmission input shaft.

11. Lube splines with a light film of grease.

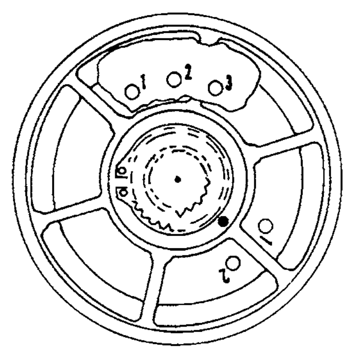
1. Install moveable sheave with spacer washers. **Important:** At least one spacer washer must be installed.
2. Install spring, inserting spring tab into proper hole in moveable sheave.
3. Insert spring tab into proper hole in helix.



4. Line up boss spline and push helix down until it engages the splines 1/2″ to 3/4″.
5. While holding downward pressure on helix, wind moveable sheave counterclockwise approximately 1/3 turn (120°).
6. Push helix into place and install snap ring.

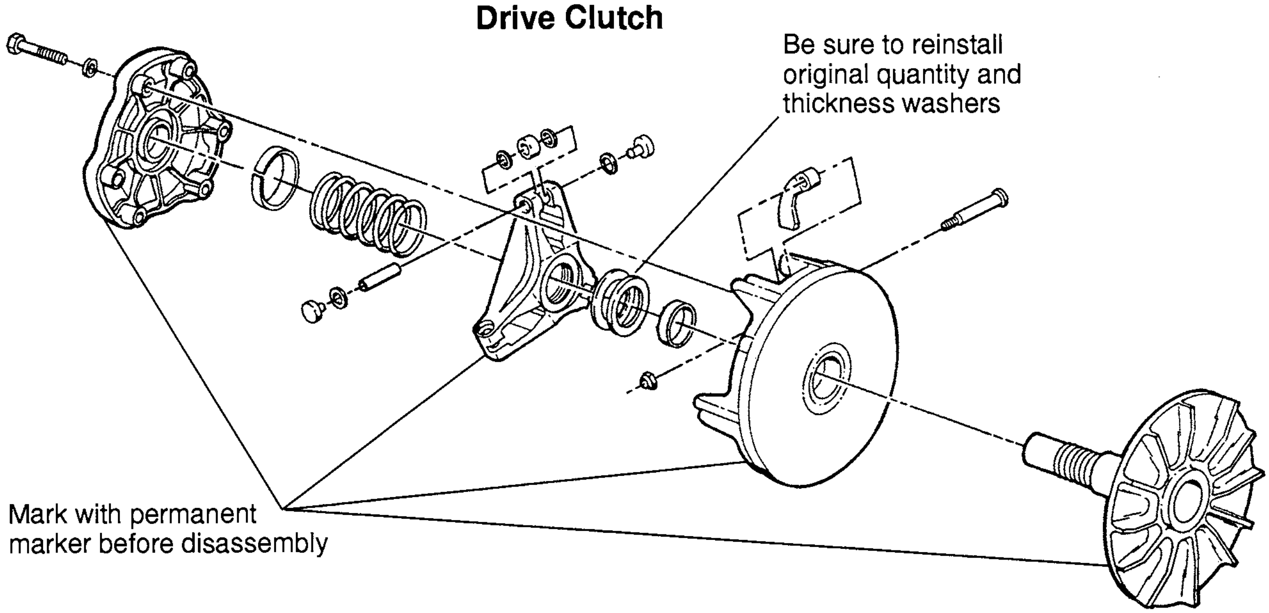


The driven clutch, helix/moveable assembly has several different spring locations which affect clutch shifting and RPMs. The greatest amount of spring tension will raise engine RPMs during clutch upshift and allow quicker backshift or downshift when pulling or negotiating a hill, for example. The least amount of tension will create a slower downshift and a harder upshift.



Example:	Helix		Moveable Sheave	Spring Tension
	2	–	1	Heavy
Spring/	2	–	2	↑
Position	1	–	1	
	2	–	3	
	1	–	2	↓
	1	–	3	Soft

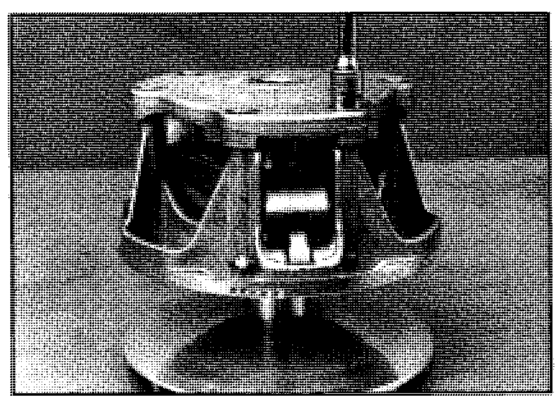
Production settings are 2-3 from 1985 to 1987
Production settings are 2-2 from 1988 to present



Drive Clutch Disassembly

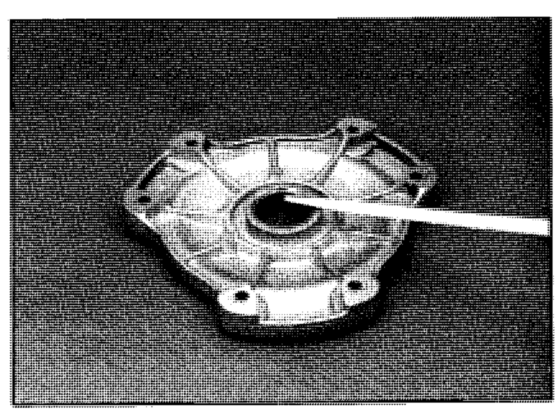
1. Using a permanent marker, mark the cover, spider, and moveable and stationary sheaves to verify balance after assembly. See illustration above.

2. Remove cover bolts evenly in a criss-cross pattern, and remove cover plate.



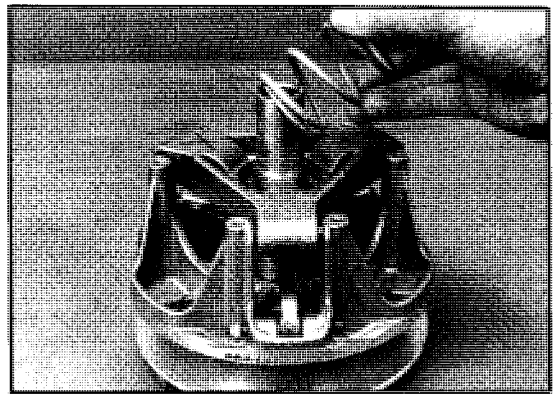
3. Inspect cover bushing. The outer cover bushing is manufactured with a Teflon™ coating. Bushing wear is determined by the amount of Teflon™ remaining on the bushing.

> **Cover Bushing Inspection:**
>
> **Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.**

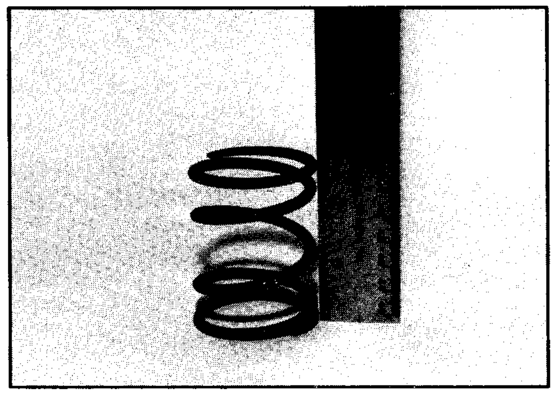


4. Inspect area on shaft where bushing rides for wear, galling, nicks, or scratches. Replace clutch assembly if worn or damaged.

5. Remove and inspect spring.



With the spring resting on a flat surface, measure its free length from the outer coil surfaces as shown. Refer to the spring specification chart for specific free length measurements and tolerances. Also check to see that spring coils are parallel to one another. Distortion of the spring indicates stress fatigue, requiring replacement.

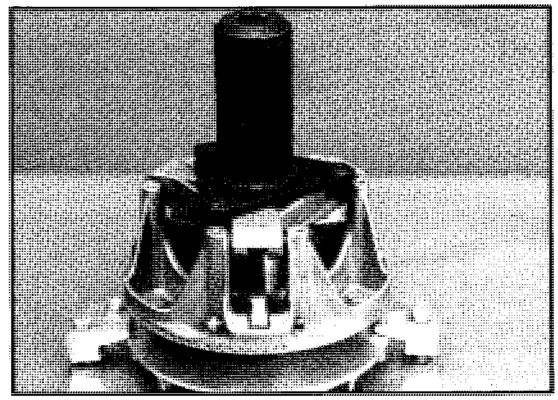


Spring Specifications

PART NUMBER	COLOR CODE	WIRE DIAMETER	FREE LENGTH ±.125″
7041021	Plain	.157″	4.38″
7041022	Black	.140″	4.25″
7041063	Purple	.168″	4.37″
7041062	Silver	.208″	3.12″
7041065	Pink	.177″	4.69″
7041060	Orange	.196″	3.37″
7041080	Blue/Gold	.207″	3.50″
7041083	Red	.192″	3.77″
7041102	Yellow	.192″	2.92″
7041061	Brown	.200″	3.06″
7041132	White	.177″	2.92″
7041168	Green	.177″	3.05″
7041148	Gold	.207″	3.25″
7041150	Red/White	.192″	3.59″
7041157	Blue/Green	.177″	2.53″

Spider Removal

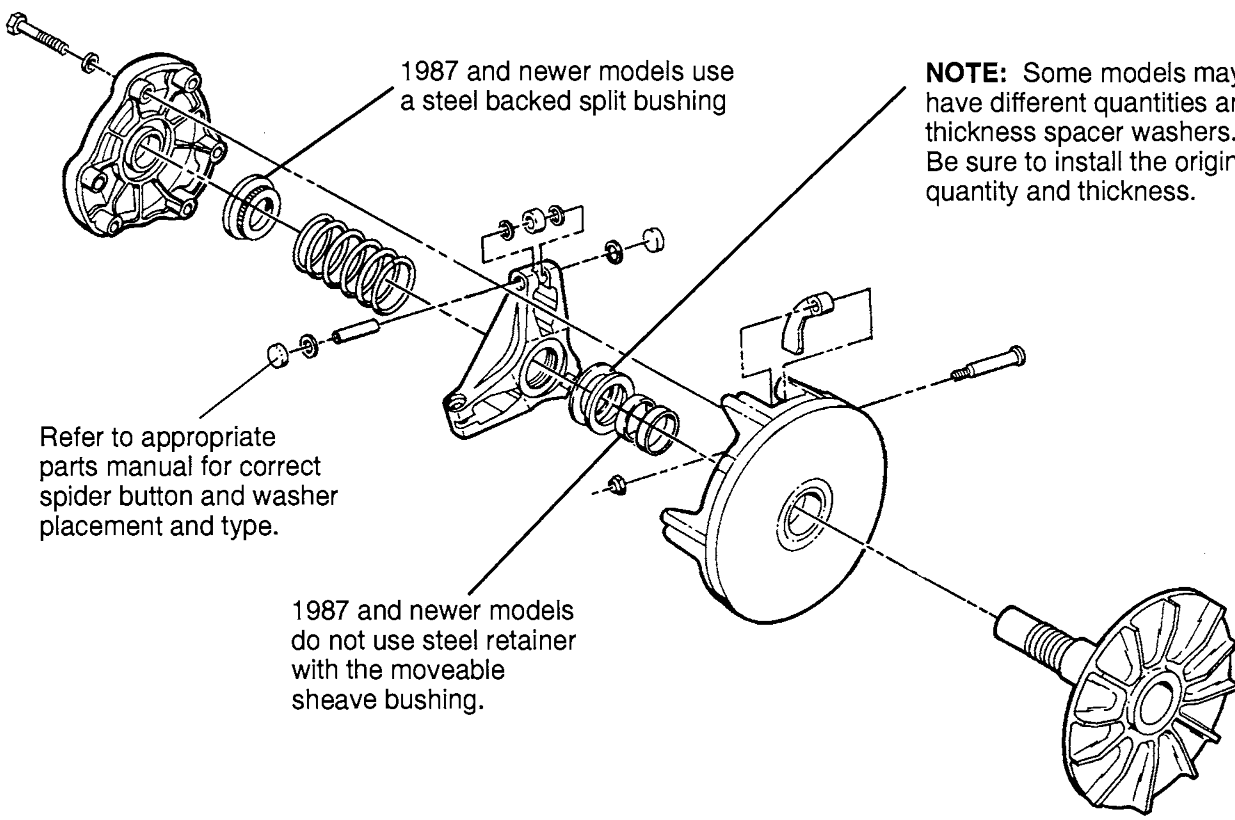
1. Install clutch in holding fixture PN 2870547 and loosen the spider using spider removal tool PN 2870341.



Clutch Holding Fixture: PN 2870547
Spider Removal Tool: PN 2870341

2. To remove, turn spider counterclockwise.

NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. Be sure to note the number and thickness of these washers.



Moveable Sheave Bushing Inspection

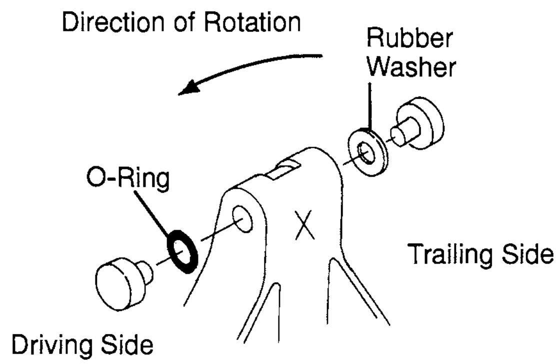
3. Inspect the Teflon™ coating on the moveable sheave bushing.

Moveable Sheave Bushing Inspection:
Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

IMPORTANT – 350 L ONLY (1990-1992 Models)

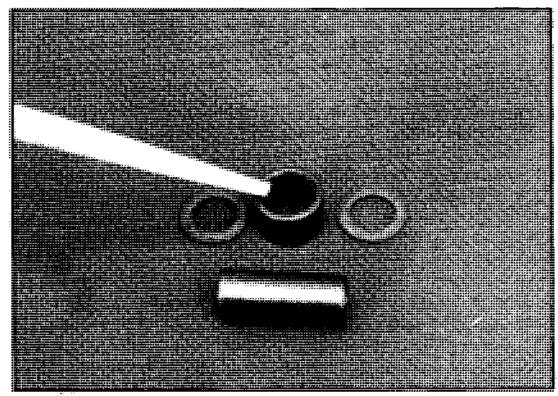
PVT Drive Clutch Spider Assembly Information

Service Technicians - Be aware of the proper placement of the spider O-rings and washers during spider rebuilding. If the washer is positioned incorrectly (on the driving side of the spider leg) premature wear and excessive button/tower clearance can occur. Another symptom is excessive noise. Always position the washer on the trailing side and the O-ring on the driving side as shown.

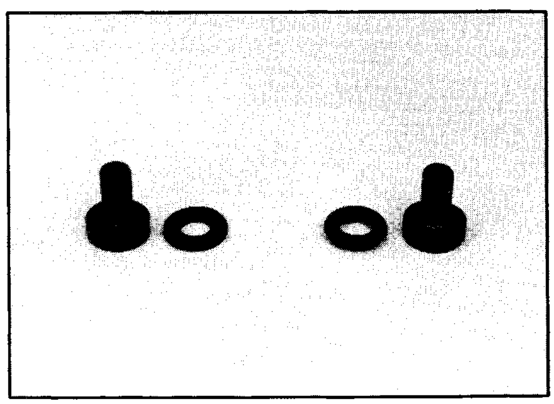


Roller, Pin and Thrust Washer Inspection

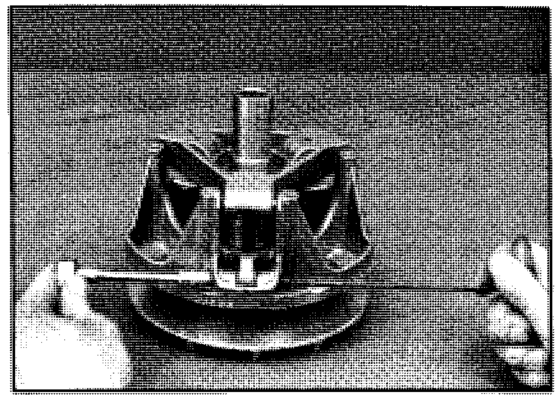
4. Turn roller with your finger. If you notice resistance, galling, flat spots, or excessive bushing clearance, replace rollers, pins and thrust washers in sets of three. Use pin removal tool PN 2870910 to replace rollers and pins. Take care not to damage roller bushing or bearing surface of the new pin during installation.

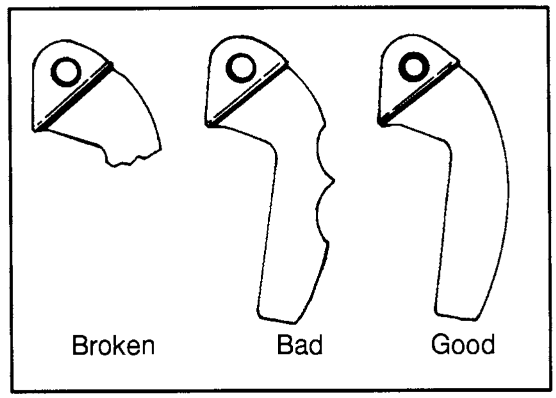


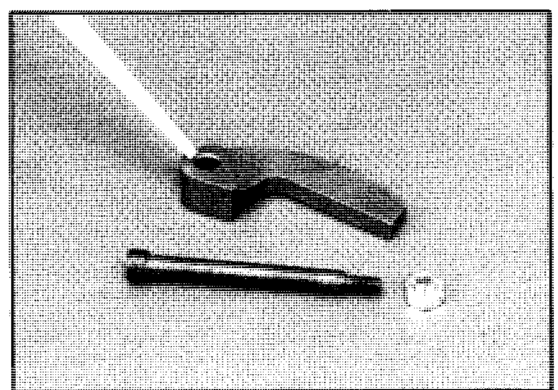
5. Shown at right is a typical spider button and button O-Ring. Some models will have a different style button or damping device (O-Ring). Please refer to the appropriate parts manual for proper placement and part numbers.



6. Remove shift weight bolts and weights. Inspect as shown. The contact surface of the weight should be smooth and free of dents or gall marks. Inspect the weight pivot bore and pivot bolts for wear or galling. If weights or bolts are worn or broken, replace in sets of three with new bolts. **NOTE:** A damaged shift weight is usually caused by a damaged or stuck roller in the spider assembly. See roller inspection, page 6.22.



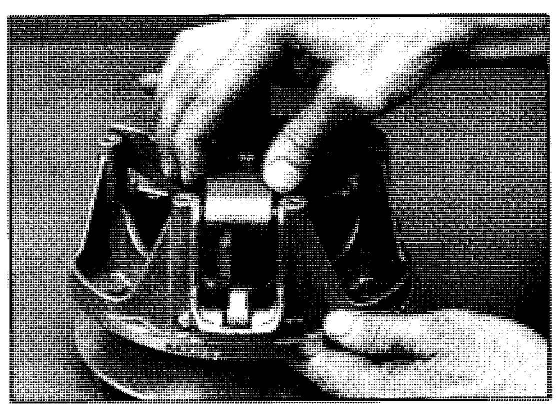




7. Inspect spider button to tower clearance. If clearance exists, replace all buttons and O-rings. The leading edge button has an O-Ring behind it. The trailing edge button has a flat rubber washer behind it. See spider removal.

8. Inspect sheave surfaces. Replace the *entire service clutch* if worn, damaged or cracked.

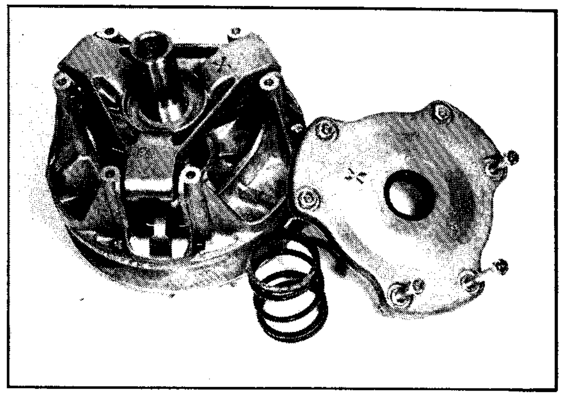
WARNING: The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!



⚠ All PVT system maintenance repairs must be performed only by an authorized Polaris service technician who has attended a Polaris sponsored service training seminar and understands the proper procedures as outlined in this manual. **Because of the critical nature and precision balance incorporated into the PVT system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures.**

Drive Clutch Assembly

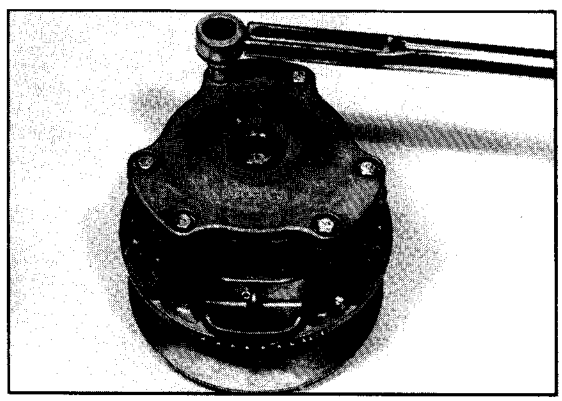
NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly.



1. Reassemble drive clutch in the following sequence, making sure the "X" marks are aligned:
   1) "X" mark cover
   2) spider, making sure spacer washers are installed underneath spider
   3) "X" mark under weight
2. Install moveable sheave.
3. Install spider, making sure spacers installed are the same quantity and thickness, and that "X" mark on spider aligns with "X" mark in moveable sheave.
4. Torque spider to 200 ft. lbs. (27.6 kg/m) using the holding fixture and spider tool. **CAUTION:** Be sure the spider spacer washers are fully seated in the recessed area in the spider. Any misalignment will alter clutch balance. Inverting the clutch while tightening the spider will help position the washers.
5. Install shift weights using new lock nuts on the bolts.
6. Reinstall clutch spring.
7. Reinstall cover, aligning "X" mark with other marks. Torque cover bolts evenly to 90 in. lbs. (1.04 kg/m).

Spider Torque:
200 ft. lbs. (27.6 kg/m)

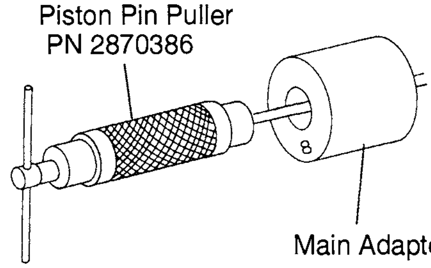
Cover Screw Torque:
90 in. lbs. (1.04 kg/m)



Polaris Kit PN 2871226

Item	Qty.	Part Description	Part No.
2	1	P-90 Drive Clutch and Driven Clutch Bushing Installation Tool	5020628
3	1	Drive Clutch Cover Bushing Removal and Installation Tool (for all drive clutches)	5020629
5	1	P-90 Driven Clutch Bushing Removal Tool	5020631
8	1	Main Puller Adapter	5020632
9	1	Adapter Reducer	5010279
10	1	Number Two Puller Adapter	5020633

Drive Clutch Moveable Sheave - Bushing Removal



1. Install handle end of piston pin puller (PN 2870386) securely into bench vise and lightly grease puller threads.
2. Remove nut from puller rod and set aside.
3. Install main adapter (Item 8) onto puller.
4. Working from inside of moveable sheave, insert removal tool (Item 2) into center of sheave. With towers pointing away from vise, slide sheave onto puller rod.
5. Install nut removed in step 2 onto end of puller rod and hand tighten. Turn puller barrel to increase tension on sheave if needed.
6. Turn sheave counterclockwise on puller rod until it comes free.
7. Remove nut from puller rod and set aside.
8. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

Drive Clutch Moveable Sheave - Bushing Installation

9. Place main adapter (Item 8) on puller.
10. Push bushing (PN 3576504) into center of sheave on tower side by hand.
11. Insert installation tool (Item 2) into center of sheave and with towers pointing toward vise, slide sheave onto puller rod.
12. Install nut on puller rod and hand tighten. Turn barrel to apply additional tension if needed.
13. Turn sheave counterclockwise until bushing is seated.
14. Remove nut from puller rod and set aside.
15. Remove sheave from puller.
16. Remove installation tool.

Drive Clutch Cover - Bushing Removal

17. Install main adapter (Item 8) on puller.
18. From outside of clutch cover, insert removal tool (Item 3) into cover bushing.
19. With inside of cover toward vise, slide cover onto puller.
20. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.
21. Turn clutch cover counterclockwise on puller rod until bushing is removed and cover comes free.
22. Remove nut from puller rod and set aside.
23. Remove bushing and bushing removal tool from puller. Discard bushing.

Drive Clutch Cover - Bushing Installation

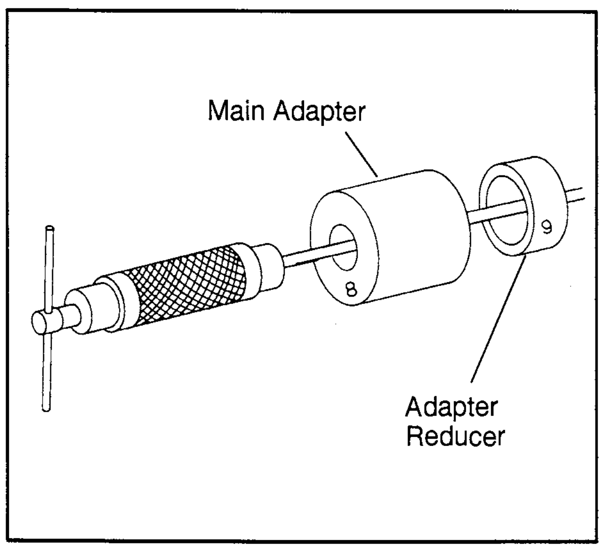
24. Working from inside of cover, insert bushing (PN 3576510) and bushing installation tool into center of clutch cover.
25. With main adapter on puller, insert cover onto puller rod, placing outside of cover toward vise.
26. Install nut on rod and hand tighten. Turn puller barrel to apply more tension if needed.
27. Turn clutch cover counterclockwise on puller rod until bushing is seated.
28. Remove nut from puller rod and take installation tool and clutch cover off rod.

Driven Clutch Moveable Sheave - Bushing Removal

NOTE: Bushings are installed at the factory using Loctite. In order to remove the bushing it will be necessary to apply heat.

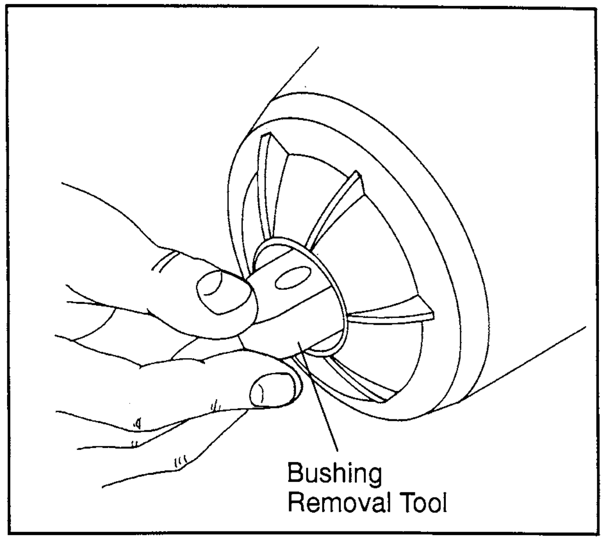
29. Install main adapter (Item 8) onto puller. See Ill. 1.
30. Insert adapter reducer (Item 9) onto puller, sliding it inside the main adapter. See Ill. 1.
31. Using a hand held propane torch, apply heat around outside of bushing until tiny smoke tailings appear.

CAUTION: Clutch components will be hot! In order to avoid serious burns, wear some type of insulated gloves for the rest of the removal process.



Ill.1

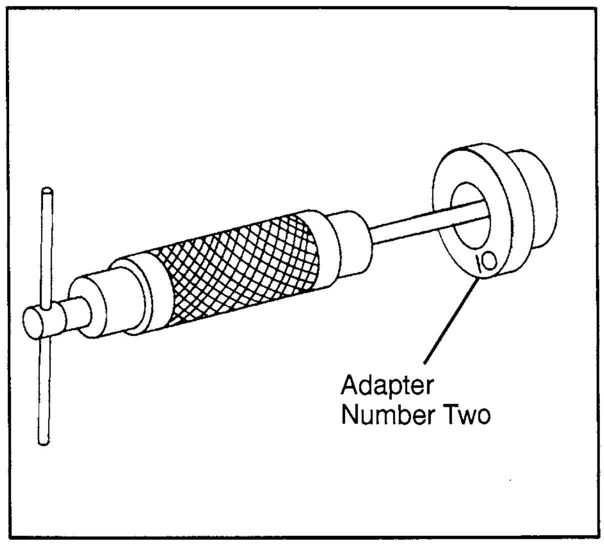
32. Working from the top, install bushing removal tool (Item 5) into center of clutch sheave. See Ill. 2.
33. Install sheave onto puller.
34. Install nut onto puller rod and tighten by hand. Turn puller barrel for further tension if needed.
35. Turn clutch sheave counterclockwise until bushing is removed and sheave comes free.
36. Remove nut from puller rod and set aside.
37. Remove adapters from puller.
38. Remove bushing and removal tool from adapters. Discard bushing.



Ill. 2

Driven Clutch Moveable Sheave - Bushing Installation

39. Working from the top, insert adapter number two (Item 10) into clutch sheave. See Ill. 3.
40. Install sheave onto puller.
41. Place bushing (PN 3576511 - 1″; or PN 3576504 - 1/2″) over installation tool (Item 2) and slide both onto puller rod, inserting bushing into center of sheave.
42. Install nut onto puller rod and hand tighten against installation tool.
43. Turn clutch sheave counterclockwise until bushing is seated.
44. Remove nut from puller rod and set aside.
45. Remove installation tool and clutch sheave from puller.



Ill. 3

Situation	Probable Cause	Remedy
Engine RPM below specified operating range, although engine is properly tuned.	-Wrong or broken drive clutch spring.	-Replace with recommended spring.
	-Drive clutch shift weight too heavy.	-Install correct shift weight kit to match engine application.
	-Driven clutch spring broken or installed in wrong helix location.	-Replace spring; refer to proper installation location.
	-Converter sheaves greasy; belt slippage.	-Install new belt and/or adjust belt tension.
Erratic engine operating RPM during acceleration or load variations.	-Drive clutch binding.	a. Disassemble drive clutch; inspect shift weights for wear and free operation. b. Clean and polish stationary shaft hub; reassemble clutch without spring to determine problem area.
	-Belt worn unevenly - thin/burnt spots	Replace belt
	-Driven clutch malfunction.	a. Replace ramp buttons. b. Inspect movable sheave for excessive bushing clearance/replace.
	-Sheave face grooved.	-Replace the clutch.
Engine RPM above specified operating range.	-Incorrect drive clutch spring (too high spring rate).	-Install correct recommended spring.
	-Drive clutch shift weights incorrect for application (too light).	-Install correct recommended shift weights.
	-Drive clutch binding.	-Disassemble and clean clutch, inspecting shift weights and buttons. Reassemble without the spring and move sheaves through entire range to further determine probable cause.
	-Driven clutch binding.	-Disassemble, clean, and inspect driven clutch, noting worn sheave bushing and ramp buttons and helix spring location.
Harsh drive clutch engagement.	-Drive belt worn too narrow.	-Replace belt.
	-Excessive belt/sheave clearance with new belt.	-Perform belt/sheave clearance adjustment with shim washers beneath spider.
Drive belt turns over	-Wrong belt for application.	-Replace with correct belt.
	-Clutch alignment out of spec.	-Adjust alignment offset.
	-Engine mount broken or loose.	-Inspect/adjust or replace.
PVT cover overheating (melting)	-Plugged air intake or outlet	-Clear obstruction.
	-Belt slippage due to water, oil, grease, etc., rubbing on cover	-Inspect system. Clean , repair or replace as necessary. Seal PVT system.
	-Clutches or weight being applied to cover while in operation	-Remove weight. Inform operator.
Water ingestion	-Cover seals or ducts leaking	-Find leak and repair as necessary.
Belt slippage	-Belt worn out	-Replace belt.
	-Belt deflection excessive	-Adjust belt deflection.
	-Water ingestion	-Inspect and seal PVT system.
	-Belt contaminated with oil or grease	-Inspect and clean.
Belt burnt, thin spots	-Abuse (continued throttle application when vehicle is stationary, excess load	-Caution operator to use low gear when pulling heavy loads, and operate machine within guidelines.
	-Dragging brake	-Vehicle operated with park brake on. Inspect brake system.
PVT noise	-Belt worn or separated, thin spots, loose belt (too much deflection)	-Replace or adjust belt.
	-Broken or worn clutch components, cover hitting clutches	-Inspect and repair as necessary.
Engagement erratic or stabby	-Thin spots on belt, worn belt	-Replace belt. Adjust belt deflection.
	-Sticking drive clutch bushings	-Inspect and repair clutches.

CHAPTER 7

ENGINES

ENGINES/CARBURETION

SPECIAL SERVICE TOOLS AND SUPPLIES

Description	Part Number
Cylinder Hone	2870303
Honing Oil	2870588
Oversize Stone/Coarse	2870306
Oversize Stone/Fine	2870307
Piston Pin Keeper Installation Tool	2870773
Piston Support Block	2870390
Piston Pin Puller	2870386
Flywheel Puller	2870159
Puller Bolts	3080706
Crankshaft Alignment Fixture	2870710
515 Gasket Eliminator	2870587
Loctite Gasket Chisel	2870601
Compression Tester	2870852
350L Spanner Nut Service Tool	2870967
350L Counterbalance Puller	2870968
Mity Vac®	2870975

1985 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. CC's	Bore MM	Bore Inches	Stroke MM	Stroke Inches	Piston Ring	Ring End Gap In.	Piston Clearance Total In.	Engine Operating RPM
Scrambler Trail Boss	EC25PF-01	244	72	2.835	60	2.362	2 1.5mm Keystone	.008 to .016	.0014 to .0028 new	6000

1985 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet Size	Pilot Jet Size	Air Screw Adjust	Jet Needle Number & E Clip Position	Needle Jet	Throttle Valve Cutaway	Engine Idle RPM
EC25PF-01	VM30SS Zinc	155	30	1/2	5DP7-3	0-6 (169)	2.5	800

1986 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. CC's	Bore MM	Bore Inches	Stroke MM	Stroke Inches	Piston Ring	Ring End Gap In.	Piston Clearance Total In.	Engine Operating RPM
Scrambler Trail Boss	EC25PF-01	244	72	2.835	60	2.362	2 1.5mm Keystone	.008 to .016	.0014 to .0028 new	6000

1986 Carburetor Specifications, Use 1985 Carburetor Specs. for Model #W867527

Engine Model	Carburetor Type	Main Jet Size	Pilot Jet Size	Air Screw Adjust	Jet Needle Number & E Clip Position	Needle Jet	Throttle Valve Cutaway	Engine Idle RPM
EC25PF-01	VM30SS Zinc	145	50	1	5DP7-3	O-0 (169)	2.5	800

1987 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. CC's	Bore MM	Bore Inches	Stroke MM	Stroke Inches	Piston Ring	Ring End Gap In.	Piston Clearance Total In.	Engine Operating RPM
Trail Boss T.B. 4x4	EC25PF-01/03	244	72	2.835	60	2.362	2 1.5mm Keystone	.008 to .016	.0014 to .0028 new	6000
Cyclone	EC25PF-02	244	72	2.83	60	2.362	2 1.5mm Keystone	.008 to .016	.0014 to .0028 new	7000

1987 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet Size	Pilot Jet Size	Air Screw Adjust	Jet Needle Number & E Clip Position	Needle Jet	Throttle Valve Cutaway	Engine Idle RPM
EC25PF-01 /03	VM30SS Zinc	145	50	1	5DP7-3	O-0 (169)	2.5	800
EC25PF-02	VM34SS Zinc	200	40	1	6DH5-3	O-4 (166)	2.0	800

ENGINES

1988 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. CC's	Bore MM Inches		Stroke MM Inches		Piston Ring	Ring End Gap In.	Piston Clearance Total In.	Engine Operating RPM
T.B. 2x4 T.B. 4x4	EC25PF-03	244	72	2.835	60	2.362	2 1.5mm Keystone	.008 to .016	.0014 to .0028 new	6000
T.B. R/ES	EC25PF-04	244	72	2.83	60	2.362	2 1.5mm Keystone	.008 to .016	.0014 to .0028 new	6600

1988 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet Size	Pilot Jet Size	Air Screw Adjust	Jet Needle Number & E Clip Position	Needle Jet	Throttle Valve Cutaway	Engine Idle RPM
EC25PF-03	VM30SS Zinc	145	35	1	5DP7-3	O-4 (169)	2.0 (Chrome)	800
EC25PF-04	VM38SS Aluminium	230	45	1.5	6DH4-3	O-2 (247)	3.0 (Chrome)	800

1989 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. CC's	Bore MM Inches		Stroke MM Inches		Piston Ring	Ring End Gap In.	Piston Clearance Total In.	Engine Operating RPM
Trail Boss T.B. 2x4 T.B. 4x4 T.B. 4x6	EC25PF-05	244 Single	72	2.835	60	2.362	2 1.5mm Keystone	.008 to .016	.0014 to .0028 new	6000 +/- 200

1989 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet Size	Pilot Jet Size	Air Screw Adjust	Jet Needle Number & E Clip Position	Needle Jet	Throttle Valve Cutaway	Engine Idle RPM
EC25PF-05	VM30SS Zinc	145	40	1	5DP7-3	O-4 (169)	2.0	800

1990 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. cc's	Bore mm/in.	Stroke mm/in.	Ring Type	Ring End Gap (in.)	New Piston Clrnc (in.)	Piston Svc. Limit (in.)	Engine Operating RPM
Trail Blazer Trail Boss 250 2x4, 4x4, 4x6	EC25PF-07 EC25PF-05	244	72/2.8346	60/2.362	Key-st one	.008 to .016	.0014 to .0028	.006	6000 +/- 200
Trail Boss 350L 2x4, 4x4	EC35PL-02	352	80/3.152	70/2.758	Key-st one	.008 to .016	0.60-0.95 .0024 -.0037	.006	5500 +/- 200

1990 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet	Pilot Jet	Air Screw Turns Out	Jet Needle & E-Clip Position	Needle Jet	Throttle Valve Cutaway	Engine Idle RPM
EC25PF-05, 07	VM30SS Zinc	145	40	1.0	5DP7-3	0-4(169)	2.0	700
EC35PL-02	VM34SS Zinc	200	30	1.5	6DH29-2	0-6(480)	1.5	700

1991-93 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. cc's	Bore mm/in.	Stroke mm/in.	Ring Type	Ring End Gap (in.)	New Piston Clrnc (in.)	Piston Svc. Limit (in.)	Engine Operating RPM
Trail Blazer Trail Boss 250 2x4, 4x4, 4x6, 6x6	EC25PF-07, 09 EC25PF-05, 08	244	72/2.8346	60/2.362	Keystone (2) 1.5mm	0.23-0.46 .009-.018	0.28-0.53 .0011-.0021	0.15 .006	6000 +/- 200
Trail Boss 350L 2x4, 4x4	EC35PL-02	352	80/3.152	70/2.758	Keystone (2) 1.5mm	0.26-0.53 .010-.021	0.60-0.95 .0024-.0037	0.15 .006	5500 +/- 200

1991-93 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet	Pilot Jet	Air Screw Turns Out	Jet Needle & E-Clip Position	Needle Jet	Throttle Valve Cutaway	Engine Idle RPM
EC25PF-05, 07, 08, 09	VM30SS Zinc	145	40	1.0	5DP7-3	0-4(169)	2.0	700
EC35PL(E)-02 (1991-1993)	VM34SS Zinc	200	30	.75	6DH29-2	0-6(480)	1.5	700

1994 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. cc's	Bore mm/ in.	Stroke mm/in.	Ring Type	Ring End Gap (in.)	New Piston Clrnc (in.)	Piston Svc. Limit (in.)	Engine Operating RPM
Trail Blazer Trail Boss	EC25PF-09 EC25PF-08	244	72/2.8346	60/2.362	Keystone	.009-.018	.0011-.0021	.006	6000
300 2x4 300 4x4 300 6x6	EC28PF-01	283	74.5/2.935	65/2.561	Keystone	.012-.022	.0012-.0026	.006	5600
400 2x4 400 4x4 Sportsman Sport 400 6x6	EC38PL-01	379	83/3.270	70/2.758	Keystone	.007-.015	.0023-.0037	.006	5700

1994 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet	Pilot Jet	Air Screw Turns Out	Jet Needle & E-Clip Position	Needle Jet	Throttle Valve Cut-away	Engine Idle RPM
EC25PF-08/09	VM30SS	145	40	1.0	5DP7-3	0-4 (169)	2.0	700
EC28PF-01	VM30SS	155	40	1.5	5DP7-3	0-4 (169)	2.0	700
EC38PL-01	VM34SS	200	30	1.5	6DH29-3	0-6 (480)	1.5	700

1995 Engine Specifications

Machine Model	Engine Model	Cyl. Disp. cc's	Bore mm/ in.	Stroke mm/in.	Ring Type	Ring End Gap (in.)	New Piston Clrnc (in.)	Piston Svc. Limit (in.)	Engine Operating RPM
Trail Blazer Trail Boss	EC25PF-09 EC25PF-08	244	72/2.8346	60/2.362	Keystone	.009-.018	.0011-.0021	.006	6000
300 2x4 300 4x4 300 6x6	EC28PFE-01	283	74.5/2.935	65/2.561	Keystone	.012-.022	.0012-.0026	.006	5600
400 2x4 Xplorer 4x4 Sportsman 400 6x6 Sport Scrambler	EC38PLE-01 EC38PLE-02 EC38PLE-03	379	83/3.270	70/2.758	Keystone	.007-.015	.0023-.0037	.006	5700 5700 6000
Magnum 2x4 Magnum 4x4	EH42PLE-01	425	87.9/3.4606	70/2.758	Std.	.008-.015	.0006-.0018	.0024	6000

1995 Carburetor Specifications

Engine Model	Carburetor Type	Main Jet	Pilot Jet	Air Screw Turns Out	Jet Needle & E-Clip Position	Needle Jet	Throttle Valve Cut-away	Engine Idle RPM ±100
EC25PF-08/09	VM30SS	145	40	1.0	5DP7-3	0-4 (169)	2.0	700
EC28PFE-01	VM30SS	155	40	1.5	5DP7-3	0-4 (169)	2.0	700
EC38PLE-01/02	VM34SS	200	30	1.5	6DH29-3	0-6 (480)	1.5	700
EC38PLE-03	VM34SS	240	30	1.5	6DH29-2	0-6 (480)	1.5	700
EH42PLE-01	CVBST34	140	42.5	1 3/8	5F81-3	P-8	N/A	1200

Piston Identification

Correct installation of the piston and rings during assembly is required to prevent ring breakage and seizure. Note the directional and identification marks when viewing the pistons from the top. The letter "F", "→", or "▶" must always be toward the flywheel side of the engine. The other numbers are used for identification as to diameter, length and design. Be sure that pistons are not interchanged as damage and performance losses may occur. Rings are keystone design (except Magnum) and the numbers or letters must be positioned upward (including Magnum). Use the information below to identify pistons and rings.

Engine Model No.	Standard Piston ID	Standard Piston PN	Standard Ring PN
All EC25PF (except following)	1W, 2W, 5W	3083942	3083546
EC25PF-04	3W, 4W	3083901	3083546
EC28PFE-01	28	3084806	3084809
EC35PL-02	35B	3084161	3084164
EC38PLE-01, 02, 03	38A	3084734	3084737
EH42PL-01	B	3084885	3084887

Oversized Piston And Ring Chart

Pistons and rings marked 25 equal .25mm (.010") oversized
Pistons and rings marked 50 equal .50mm (.020") oversized
Pistons and rings marked 10 equal 1.0mm (.040") oversized

Engine Model No.	Piston Length	Piston ID	Oversize (mm)	Piston Part No.	Ring Part No.
EC38PLE	78 mm	38A	.25 .50	3084735 3084736	3084738 3084739
All EC35PL	78 mm	35B 35B	.25 .50	3084162 3084163	3084165 3084166
EC28PFE	70 mm	28	.25 .50	3084807 3084808	3084810 3084811
All EC25PF (except following)	70mm	1W-2W-5W 1W-2W-5W 1W-2W-5W	.25 .50 1.0	3083943 3083944 3083972	3083678 3083717 3083974
EC25PF-04	68mm	3W-4W 3W-4W 3W-4W	.25 .50 1.0	3083902 3083903 3083973	3083678 3083717 3083974
EH42PL	66mm	B	.25 .50	3084995 3084996	3084888 3084889

Magnum EH42PL-01 Service Data

Rocker Arm	Rocker arm ID			.8669-.8678" (22.020-22.041 mm)
	Rocker shaft OD			.8656-.8661" (21.987-22.0 mm)
	Clearance between shaft and arm		Std	.0008-.0021" (.020-.054 mm)
			Limit	.0039" (.10 mm)
Camshaft	Cam lobe height	In	Std	1.2884-1.2924" (32.726-32.826 mm)
			Limit	1.2766" (32.426 mm)
		Ex	Std	1.2884-1.2924" (32.726-32.826 mm)
			Limit	1.2766" (32.426 mm)
	Camshaft journal OD		Mag	1.4935-1.4941" (37.935-37.950 mm)
			PTO	1.4935-1.4941" (37.935-37.950 mm)
	Camshaft journal bore ID		Mag	1.4963-1.4970" (38.005-38.025 mm)
			PTO	1.4963-1.4970" (38.005-38.025 mm)
	Oil clearance		Std	.0022-.0035" (.055-.090 mm)
			Limit	.0039" (.10 mm)
Cylinder Head	Surface warpage limit			.0020" (.05 mm)
	Standard height			3.870" (98.3 mm)
Valve Seat	Contacting width	In	Std	.028" (.7 mm)
			Limit	.055" (1.4 mm)
		Ex	Std	.039" (1.0 mm)
			Limit	.071" (1.8 mm)
Valve Guide	Inner diameter			.2362-.2367" (6.0-6.012 mm)
	Protrusion above head			.689-.709" (17.5-18.0 mm)
Valve	Margin thickness	In	Std	.039" (1.0 mm)
			Limit	.031" (.8 mm)
		Ex	Std	.047" (1.2 mm)
			Limit	.031" (.8 mm)
Valve	Stem diameter		In	.2343-.2348" (5.950-5.965 mm)
			Ex	.2341-.2346" (5.945-5.960 mm)
	Stem oil clearance	Std	In	.0014-.0024" (.035-.062 mm)
			Ex	.0016-.0026" (.040-.067 mm)
		Limit		.0059" (.15 mm)
	Overall length		In	3.976" (101.0 mm)
			Ex	3.984" (101.2 mm)

Magnum Service Data

Valve Spring	Free length	Orange Paint	Std	1.7342″ (44.05 mm)
			Limit	1.656″ (42.05 mm)
		Yellow Paint	Std	1.654″ (42.0 mm)
			Limit	1.575″ (40.0 mm)
	Squareness			.075″ (1.9 mm) 2.5°
Cylinder	Surface warpage limit (mating with cylinder head)			.0020″ (.05 mm)
	Cylinder bore		Std	3.4606-3.4614″ (87.900-87.920 mm)
	Taper limit			.0020″ (.050 mm)
	Out of round limit			.0020″ (.050 mm)
	Piston clearance		Std	.0006-.0018″ (.015-.045 mm)
			Limit	.0024″ (.060 mm)
	Boring limit			.020″ (.5 mm)
Piston	Outer diameter	Std		3.4596-3.460″ (87.875-87.885 mm)
		.0098″ (.25 mm) OS		3.4695-3.4699″ (88.125-88.135 mm)
		.0197″ (.50 mm) OS		3.4793-3.4797″ (88.375-88.385 mm)
	Standard inner diameter of piston pin bore			.9055-.9057″ (23.0-23.006 mm)
Piston Pin	Outer diameter			.9053-.9055″ (22.994-23.0 mm)
	Standard clearance between piston pin and bore in piston			.0002-.0003″ (.004-.008 mm)
	Degree of fit			Piston pin must be fitted into position with thumb at 68° F (20° C)
Piston Ring	Piston ring installed gap	Top ring	Std	.0079-.0138″ (.20-.36 mm)
			Limit	.039″ (1.0 mm)
		Second ring	Std	.0079-.0138″ (.20-.36 mm)
			Limit	.039″ (1.0 mm)
		Oil ring	Std	.0079-.0276″ (.20-.70 mm)
			Limit	.059″ (1.5 mm)
Piston Ring	Clearance between piston ring and piston ring groove	Top ring	Std	.0016-.0031″ (.040-.080 mm)
			Limit	.0059″ (.15 mm)
		Second ring	Std	.0012-.0028″ (.030-.070 mm)
			Limit	.0059″ (.15 mm)
Connecting Rod	Connecting rod small end ID			.9058-.9063″ (23.007-23.020 mm)
	Connecting rod small end radial clearance		Std	.0003-.0010″ (.007-.026 mm)
			Limit	.0020″ (.05 mm)
	Connecting rod big end side clearance		Std	.0039-.0256″ (.1-.65 mm)
			Limit	.0315″ (.80 mm)
	Connecting rod big end radial clearance		Std	.0004-.0015″ (.011-.038 mm)
			Limit	.0020″ (.05 mm)
Crankshaft	Crankshaft runout limit			.0024″ (.06 mm)

KEY - Std: Standard; OS: Oversize; ID: Inner Diameter; OD: Outer Diameter; Mag: Magneto Side; PTO: Power Take Off Side

Magnum EH42PL Engine Torque Specifications

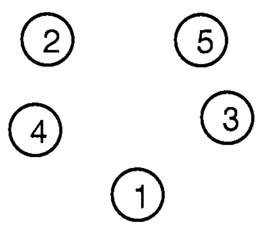
Cylinder Head Bolts	11mm	See Engine Assembly for torque procedure, page 7.102.		
	6mm	See Engine Assembly for torque procedure, page 7.102.		
Cylinder Base Bolts	10mm	45-49 ft. lbs.	6.21-6.76 kgm	62.1-67.6 N-m
	6mm	5-6 ft. lbs.	.69-.828 kgm	6.9-8.28 N-m
Crankcase	8mm	14-15 ft. lbs.	1.93-2.07 kgm	19.3-20.7 N-m
Cam Chain Drive Sprocket	28mm	35-51 ft. lbs.	4.83-7.04 kgm	48.3-70.4 N-m
Cam Chain Driven Sprocket	6mm	5-6 ft. lbs.	.69-.828 kgm	6.9-8.28 N-m
Cam Chain Tensioner	6mm	5-6 ft. lbs.	.69-.828 kgm	6.9-8.28 N-m
Cam Chain Tensioner Plug	11mm	14-19 ft. lbs.	1.93-2.62 kgm	19.3-26.2 N-m
Rocker Arm Shaft Support	8mm	8-9 ft. lbs.	1.10-1.24 kgm	11.0-12.4 N-m
Rocker Arm Adjuster Nut	6mm	6-7 ft. lbs.	.828-.966 kgm	8.28-9.66 N-m
Water Pump Impeller	6mm	5-6.5 ft. lbs.	.69-.897 kgm	6.9-8.97 N-m
Water Pump Cover	6mm	5-6.5 ft. lbs.	.69-.897 kgm	6.9-8.97 N-m
Carburetor Flange	8mm	12-14 ft. lbs.	1.66-1.93 kgm	16.6-19.3 N-m
Oil Pump Mount Bolts	6mm	5-6.5 ft. lbs.	.69-.897 kgm	6.9-8.97 N-m
Oil Pump Case Screws	5mm	2 ft. lbs.	.276 kgm	27.6 N-m
Union (Breather)	1/8 PT	6.5-11 ft. lbs.	.897-1.52 kgm	8.97-15.2 N-m
Union (Oil Hose)	1/8 PT	6.5-11 ft. lbs.	.897-1.52 kgm	8.97-15.2 N-m
Union (Oil Filter)	20mm	36-43 ft. lbs.	4.97-5.93 kgm	49.7-59.3 N-m
Oil Pressure Blind Plug	1/8 PT	6.5-11 ft. lbs.	.897-1.52 kgm	8.97-15.2 N-m
Oil Delivery Pipe	12mm	18-25 ft. lbs.	2.48-3.45 kgm	24.8-34.5 N-m
Oil Drain Bolt (Crankcase)	14mm	14-17 ft. lbs.	1.93-2.35 kgm	19.3-23.5 N-m
Plug (One Way Valve)	11mm	14-19 ft. lbs.	1.93-2.62 kgm	19.3-26.2 N-m
Stator Plate	6mm	5-6.5 ft. lbs.	.69-.897 kgm	6.9-8.97 N-m
Flywheel	16mm	58-72 ft. lbs.	8.00-9.94 kgm	80.0-99.4 N-m
Starter Motor	6mm	5-6.5 ft. lbs.	.69-.897 kgm	6.9-8.97 N-m
Recoil Housing	6mm	5-6.5 ft. lbs.	.69-.897 kgm	6.9-8.97 N-m
Spark Plug (New)		8.7-11 ft. lbs.	1.20-1.52 kgm	12.0-15.2 N-m
Spark Plug (Old)		17-20 ft. lbs.	2.35-2.76 kgm	23.5-27.6 N-m

Engine Torque Specifications (Except Magnum)

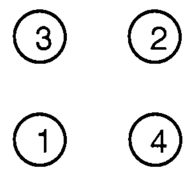
	Ft. Lbs.	kgm
Cylinder Head, 8mm	18-20	2.4-2.7
Cylinder Base, 10mm	25-29	3.4-4.0
Crankcase, 8mm	17-18	2.3-2.4
Crankcase, 6mm	6-8	.8-1.1
All Other 6mm	6-8	.8-1.1
Clutch Bolt	40	5.5
350/400L Slotted Nut	29-44	4.0-6.0
350/400L Flywheel	29-44	4.0-6.0
250/300 Flywheel	44-62	6.0-8.5

ENGINES
Engine Torque Specifications/Fluid Capacity

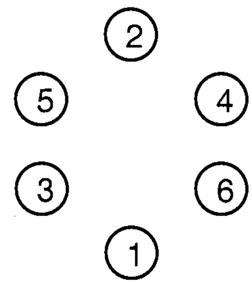
When torquing nuts, bolts and screws, a specific pattern should be followed to ensure that all parts are tightened evenly. The correct amount of turning force or tightness is determined by a torque wrench which is broken down into either inch or foot pounds.



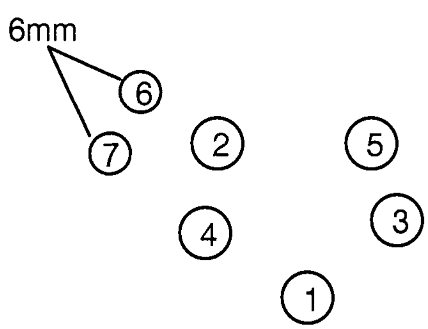
244 Crankcase



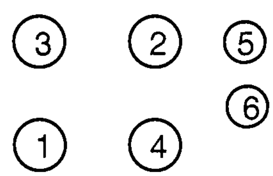
All Cylinder Base Studs



6 Stud Cylinder Head



Liquid Crankcase
(350/400)



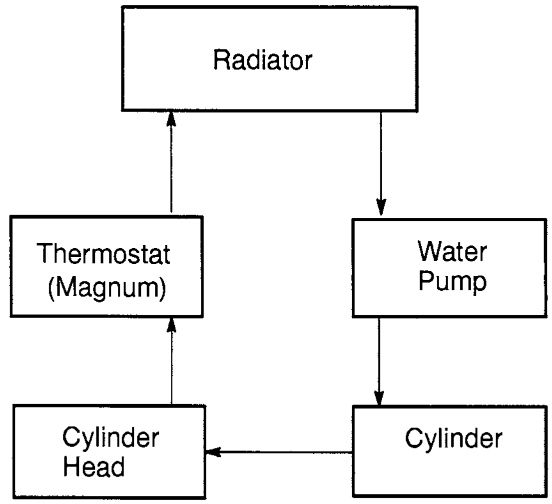
425 Cylinder Base

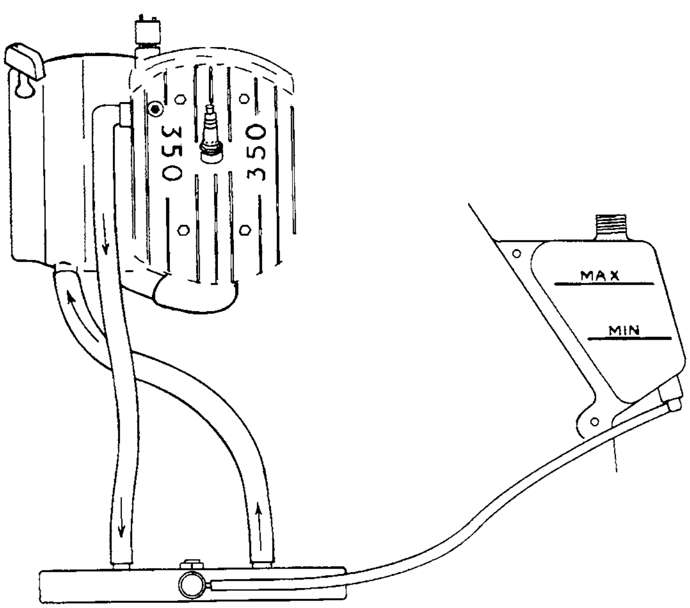
Fluid Capacity

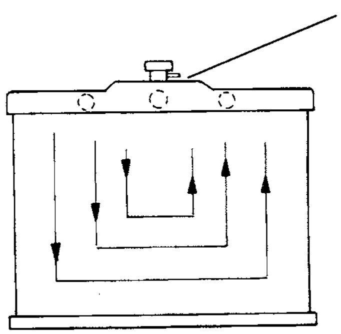
Model	Fuel Tank	Injector Oil	Coolant System	Engine Oil	Counterbalance
250/300	4 U.S.Gallons	2 Quarts	N/A	N/A	N/A
350L/400L	4 U.S. Gallons	2 Quarts	2 Quarts	N/A	All 350L- Fill with 10W30* to bottom of threads All 400L Fill with 10W30 as indicated by knurled area on dipstick
Magnum	3.5 U.S. Gallons	N/A	2.25 Quarts	2.0 Quarts	N/A

*Refer to page 7.13 for counterbalance lubrication procedure.

WARNING: Never remove radiator cap when engine is hot. The cooling system is under pressure and serious burns may result. Allow the engine and cooling system to cool before servicing.







System Pressure Test

1. Remove radiator cap access panel from front of headlamp housing.
2. Remove recovery bottle hose from radiator.
3. Connect a Mity Vac™ (PN 2870975) to radiator and pressurize system to 10 lbs. The cooling system must retain 10 lbs of pressure for five minutes or longer. If pressure loss is evident within five minutes, check radiator, all cooling system hoses and clamps, or water pump seal.

Cooling System Specifications

	250/300	350/400	425 (Magnum)
Fan Off Fan On	210° F (99° C) ± 10° 235° F (113° C)	154° F (68° C) ± 5° 174° F (79° C)	175° F (79° C) ± 5° 190° F (88° C)
Hot Light On	–	205°F (96° C)	221° F (105° C)
System Capacity	–	2 Quarts	2.25 Quarts
Radiator Cap Relief Pressure	–	13 PSI	13 PSI

Recommended Coolant .... Use only high quality antifreeze/coolant mixed with *distilled* water in a 50/50 ratio. **CAUTION:** Using tap water in the cooling system will lead to a buildup of deposits which may restrict coolant flow, resulting in possible engine damage.

Magnum Cooling System

Radiator Draining

1. With engine and cooling system cold, loosen drain valve at lower right side of radiator.
2. Open radiator cap and drain coolant into suitable container.

Thermostat Removal/Inspection

1. Remove hose from thermostat cover and drain into suitable container.
2. Remove cover and thermostat.
3. Visually inspect thermostat for damage and distortion. It should be closed at room temperature.
4. Suspend thermostat in a 50/50 mixture of antifreeze and water.
5. Heat mixture slowly and monitor temperature. The thermostat should begin to open at 176° F (80° C) and fully open (approximately 8 mm/.315″) at 205° F (96° C). Replace thermostat if it fails to open or close completely or if it is distorted or damaged. Be sure to position thermostat air bleed hole next to top thermostat cover bolt hole.

Cooling System Draining/Filling

1. Wrap a shop towel around each of the coolant hoses leading to and from the radiator and close them with a locking pliers or clamp to prevent coolant flow. Be careful not to damage the hoses.
2. Loosen clamp and remove hose from thermostat cover.
3. Place a plug in the end of the thermostat cover. The plug must seal tightly to prevent coolant flow when performing the next step.
4. Loosen hose clamp on coolant outlet hose on water pump and remove hose.
5. Place end of hose in a clean container and remove plug from thermostat cover. Allow engine coolant to drain completely.
6. Install a section of radiator hose onto the water pump outlet and place the other end in a clean container.
7. Loosen locking pliers or clamp on coolant supply hose (right hand) from radiator and allow hose and water pump to drain completely.
8. To change coolant completely the radiator should be drained. See Radiator Draining above.

Cooling System Bleeding

When system is empty:

1. Fill coolant reservoir bottle to full mark.
2. Remove hose from thermostat cover and remove radiator cap.
3. Add coolant *slowly* until it flows from the thermostat cover outlet fitting.
4. Reinstall hose and tighten clamp.
5. Add coolant to radiator slowly until full.

Purge air from system as outlined in the following procedure:

WARNING: Never remove radiator cap when engine is hot. The cooling system is under pressure and serious burns may result. Allow the engine and cooling system to cool before servicing.

1. With radiator cap removed, start engine, allow air to purge and top off as necessary.
2. Install radiator cap and squeeze coolant lines to help force trapped air into radiator. Shut engine off and check level in radiator. Add coolant if necessary.
3. Run engine until it reaches operating temperature.
4. Allow engine and cooling system to cool completely and check level in reservoir. Add coolant to full line.

Impeller Removal and Inspection

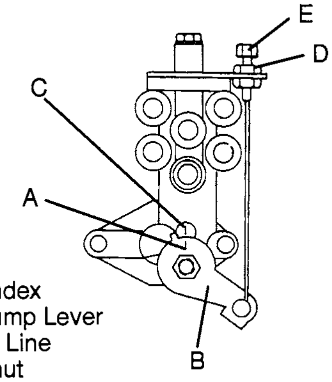
WARNING: Allow engine to cool before servicing cooling system. The system is under pressure and serious burns may result if system is serviced when engine is hot.

NOTE: The engine must be partially removed to access water pump impeller. Engine removal and disassembly is necessary to replace water pump mechanical seal or pump shaft oil seal.

1. Remove the following items:
   - Fuel Tank
   - Carburetor
2. Refer to Engine Removal procedures for the following items, pages 7.58 - 7.62:
   - Exhaust Pipe
   - Front Left Engine Mount Nut
   - Upper Right Engine Mount with Bracket
3. Refer to PVT Section for removal procedures for the following items:
   - PVT Outer Cover
   - Belt
   - Drive Clutch
   - Driven Clutch
   - Inner Cover
4. Move top of engine to left and support securely for water pump access.
5. Place drain pan beneath pump to catch coolant.
6. Loosen four 6x20 mm water pump cover bolts about 1/2 turn. Tap cover with a plastic mallet and drain coolant. **CAUTION:** To avoid damaging the pump cover, do not strike cover in the area of the inlet and outlet or bolt bosses.
7. Remove cover and gasket.
8. Inspect impeller blades for wear, damage or cracks. Replace if necessary.
9. Using a 10 mm socket, remove the impeller crown lock nut.
10. Remove water pump impeller and sealing washer behind impeller.
11. Reinstall impeller and crown lock nut. Torque to 5.1-6.5 ft. lbs. (.7-.9 kg/m).
12. Carefully reinstall cover and new gasket.
13. Reinstall four cover attaching bolts. Tighten in a criss-cross pattern to be sure cover is tightened evenly. Torque to 5.1-6.5 ft. lbs. (.7-.9 kg/m).
14. Reinstall hoses and clamps onto water inlet and outlet.

Oil Pump Adjustment Procedure (250/300 Engines)

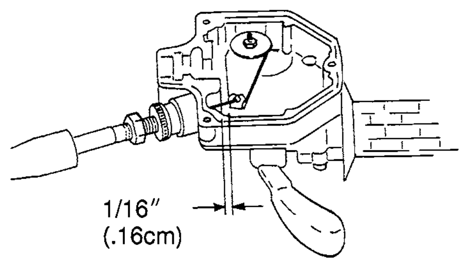
1. Before adjusting the oil pump, check engine idle RPM. Recommended RPM is 500 to 800. Adjust if necessary. Also check carburetor adjustments.
2. Start the engine and let it idle. Place very slight pressure on the throttle lever until all freeplay is removed from throttle cable to carburetor.
3. Loosen locknut (D) and align marks (A) and (C) by turning adjuster (E) up or down as needed.
4. When the marks are aligned, tighten locknut (D).



A. Idle Index
B. Oil Pump Lever
C. Static Line
D. Locknut
E. Cable Adjuster

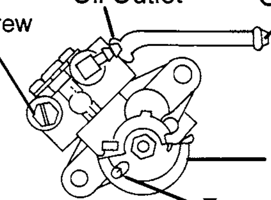
Oil Pump Adjustment Procedure (350/400L Engines)

1. Before adjusting the oil pump, check engine idle RPM. Recommended RPM is 500 to 800. Adjust if necessary. Also check carburetor adjustments.
2. Remove electronic throttle control (ETC) cover.
3. Loosen cable jam nut and turn adjuster in or out until there is 1/16″ (.16 cm) of throttle lever travel before throttle slide starts to open. **NOTE:** The throttle lever freeplay must be adjusted correctly to prevent backfiring.
4. Adjust oil pump cable until marks align (F) when throttle slide just begins to raise.
5. Tighten jam nuts.
6. Reinstall the ETC cover removed in step 2, making sure cover gasket is properly seated. If not, moisture will enter the ETC and damage the switch.

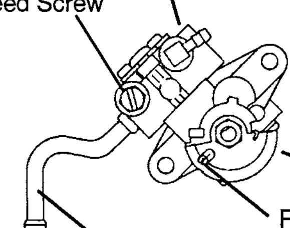


Oil Pump Bleeding Procedure

1. Fill the oil reservoir with Polaris injector oil.
2. Loosen the pump bleed screw one full turn. Allow oil to flow from the bleed screw for five to ten seconds. Tighten bleed screw. **CAUTION:** Never run the engine with the bleed screw loose. Loss of oil will cause serious engine damage.
3. Start the engine and lift the oil pump lever to its full up position. With the engine at idle, hold the lever up for ten to twenty seconds to make sure all air is out of the system.
4. (400) Start the engine and rotate actuator wheel (G) to the wide open position and hold for ten to twenty seconds to make sure all air is out of the system.
5. (350) Start the engine and rotate the actuator wheel (G) to the wide open position and hold for 1 1/2 minutes to make sure all air is out of the system.



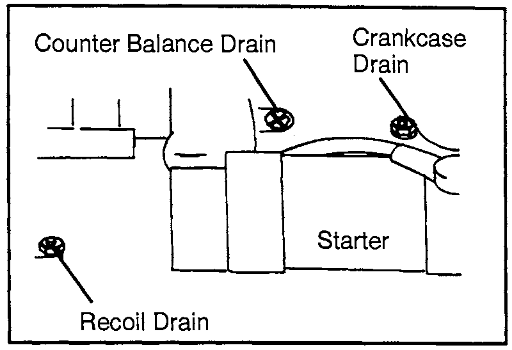
400 Oil Pump Adjustment



350 Oil Pump Adjustment

Any time oil starvation is suspected, proceed as follows:

1. With the oil reservoir full and the pump bled, remove the oil delivery line from the intake manifold.
2. Test the check valve in the oil delivery, filling with a low pressure pump and gauge. The valve will release at between 2 - 5 PSI. If not, replace the valve.
3. Start the engine and lift the oil pump lever to the full open position.
4. Oil should pulse from the delivery line every few seconds. If it does not, suspect one of the following:
   A. Inlet filter plugged/Oil tank vent line pinched or blocked
   B. Oil lines leaking or blocked
   C. Defective oil pump or drive mechanism



Recoil Housing

Drain the housing periodically to remove moisture.

Counterbalancer

Draining (350)

Remove the bottom chain guard to get access to the drain plug. Remove the drain plug and let the oil drain fully. Catch and discard used oil properly. Re-install the plug and chain guard.

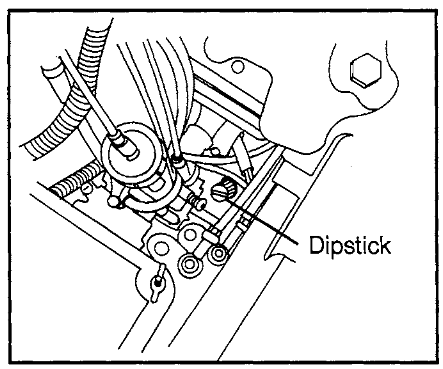
Refilling (350)

Refill at the counterbalancer fill plug until the level reaches the bottom of the threads.

Counterbalancer Lubrication (350/400)

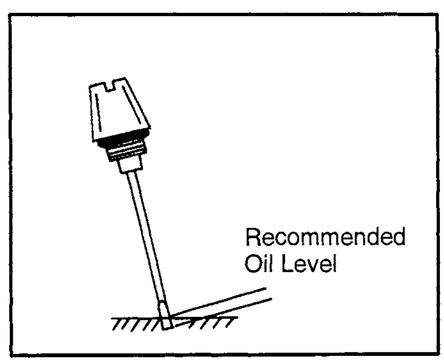
The counterbalance oil should be checked semi-annually, especially before off season storage. If the machine is used in wet conditions the oil should be checked more frequently. If the oil has a milky appearance it should be changed as soon as possible. Failure to properly maintain this important area can result in premature wear or possible failure of the counterbalancer components. Always use SAE 10W30 oil.

Procedure for Adding Oil (400)



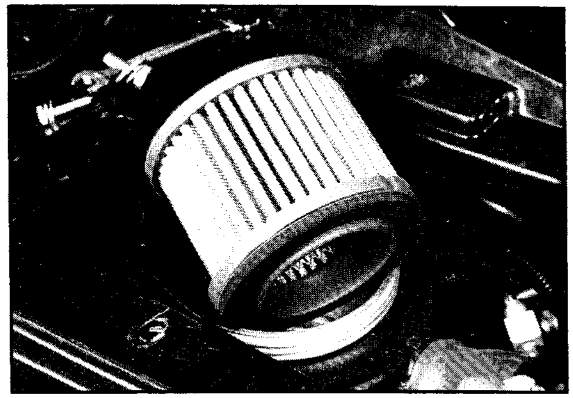
1. Remove seat and locate dipstick.
2. Remove dipstick. Oil level is shown on dipstick.
3. Add SAE 10W30 oil with a transmission fluid funnel. The recommended oil level is indicated by the knurled area on the dipstick. **NOTE:** Screw dipstick in fully and remove to check. Check with engine at room temperature. Do not overfill. If overfilled, excess oil will be expelled through the vent hose.
4. Reinstall dipstick. Do not over tighten.

Counter Balance Oil Changing Procedure



1. Remove seat. Locate and remove dipstick.
2. Remove drain plug and drain oil. Catch and discard used oil properly.
3. Clean and reinstall drain plug.
4. Fill housing with SAE 10W30 oil using a transmission fluid funnel. The recommended oil level is indicated by the knurled area on the dipstick. The dipstick should be screwed in fully to check. Do not overfill. If overfilled, excess oil will be expelled through the vent hose.
5. Reinstall dipstick.
6. Check for leaks.

Cleaning the Air Filter (1985-1986)



The filter should be cleaned after every 25 hours of operation. New filters should be installed after every 100 hours. The importance of a clean, serviceable air filter cannot be over emphasized. If the filter is not serviced regularly, poor performance, shortened engine life, and carburetor component wear may result.

Whenever the air filter is cleaned be sure to observe the following practices:

1. Never immerse the filter in water. Dirt can be transferred to the clean air side of the filter.

2. If compressed air is used, never exceed a pressure of 40 PSI. Always use a dispersion type nozzle to prevent filter damage. Clean from the *inside to the outside.*

Dust Contamination

Tap the filter lightly to remove large particles. **NOTE:** If the filter is contaminated with oil or water it must be replaced.

Filter Installation

NOTE: It is recommended that the air filter be replaced every 100 hours.

CAUTION: Never operate the vehicle with the air filter removed. Dust will enter the engine resulting in damage.

1. Inspect the gasket on the lower end of the filter. Replace if damaged.

2. Install the filter into the air cleaner.

3. Coat the top of the filter with a light film of grease.

4. Install the filter cover, tightening securely by hand.

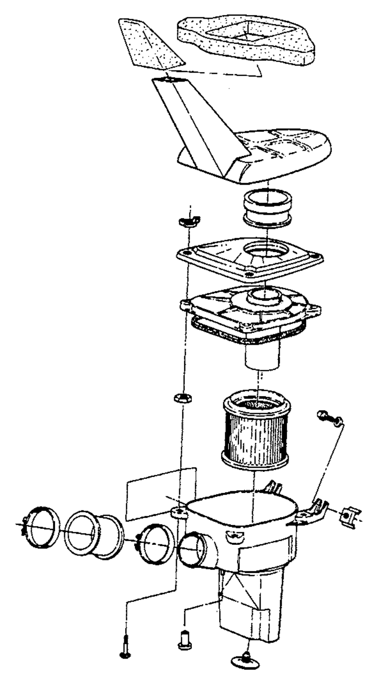
5. Reinstall the support bracket, taking care to note the correct entry of the bracket into the ribs on the air cleaner cover.

6. Reinstall the seat.

Air Cleaner Service 1987 to Current (Except Magnum and Scrambler)

Cleaning the Filter

The filter should be cleaned after every 25 hours of operation. New filters should be installed after every 50 hours (more frequently in severely dirty conditions). The importance of a clean, serviceable air filter cannot be over emphasized. If the filter is not serviced regularly, poor performance, shortened engine life, and carburetor component wear may result.



Whenever the air filter is cleaned be sure to observe the following practices:

1. Never immerse the filter in water. Dirt can be transferred to the clean air side of the filter.
2. If compressed air is used, never exceed a pressure of 40 PSI. Always use a dispersion type nozzle to prevent filter damage. Clean from the *outside to the inside.*
3. Always inspect the air box and cover for cracks or distortion from heat.

Dust Contamination

Tap the filter lightly to remove large particles. **NOTE:** If the filter is contaminated with oil or water it must be replaced.

Filter Installation

NOTE: It is recommended that the air filter be replaced every 50 hours.

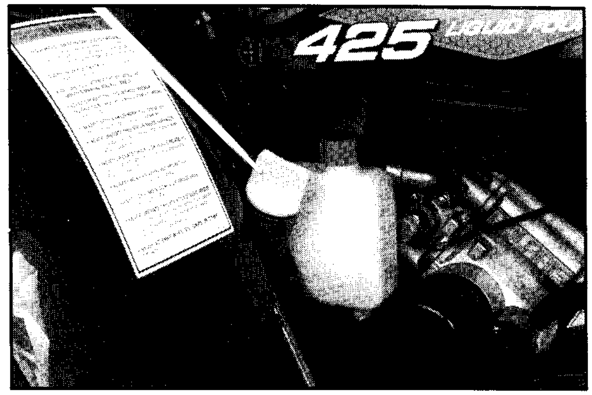
CAUTION: Never operate the vehicle with the air filter removed. Dust will enter the engine resulting in damage.

1. Replace the cover gasket whenever the filter is replaced.
2. Coat the top of the filter with a light film of grease.
3. Install the filter into the air box, making sure the filter element seats securely.
4. Install the cover and aluminum reinforcement plate.
5. Install the wing nuts and tighten until the cover corners contact the air box mounting bosses.

Check Engine Oil

The oil tank is located on the left side of the vehicle. To check the oil:

1. Set machine on a level surface.
2. Remove dipstick and wipe dry with a clean cloth.
3. Reinstall dipstick, screwing into place.



4. Remove dipstick and check to see that the oil level is between the safe and add marks. Add oil as indicated by the level on the dipstick. Do not overfill.

Maintain Oil Level In Normal Range

Screw in completely to check

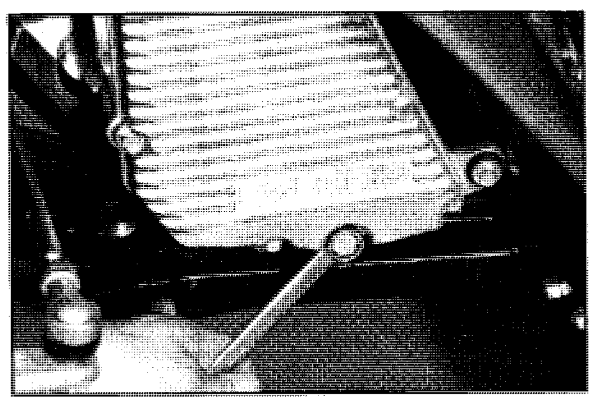
Recommended Engine Oil:

Polaris Premium 4 All Season Synthetic, 0W/40, PN 2871281

Ambient Temperature Range: -40° F to 120° F

Oil and Filter Change

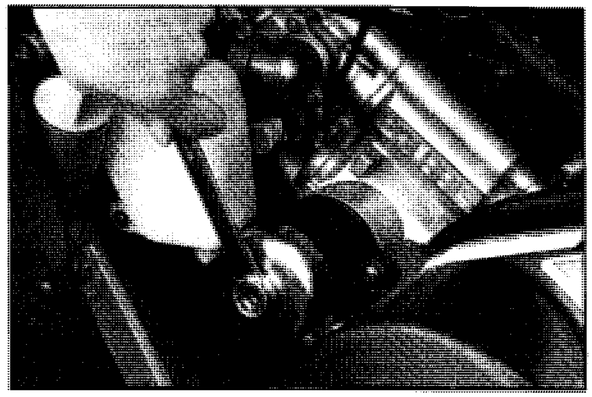
The recommended oil change interval is 100 hours, 1000 miles, or every six months, whichever comes first. Suggested break in oil change is at 20 hours, 500 miles, or one month, whichever comes first. Severe use, such as continuous duty in dirt, dust, or water, requires more frequent service. Be sure to change the oil filter whenever changing oil.

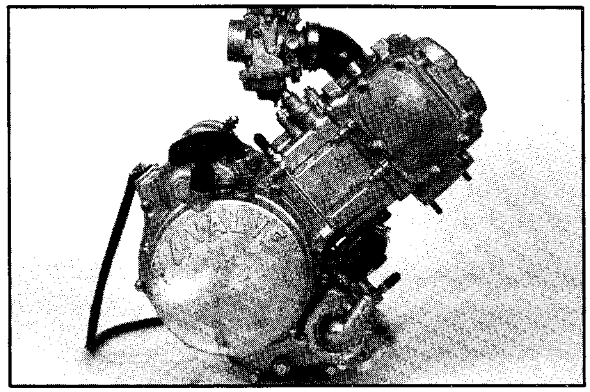


1. Place vehicle on a level surface.
2. Run engine for two to three minutes until warm. Shut engine off.
3. Clean area around drain plug at the bottom of the oil tank.
4. Place a drain pan beneath the oil tank and remove the drain plug. **CAUTION:** Oil may be hot. Do not allow hot oil to come into contact with skin as serious burns may result.
5. Allow oil to drain completely.
6. Replace sealing washer on oil drain plug. **NOTE:** The sealing surfaces on the drain plug and the oil tank should be clean and free of burrs, nicks or scratches.
7. Reinstall drain plug and torque to 14 ft. lbs. (1.9 kg/m).

Oil and Filter Change Cont.

8. Place shop towels beneath oil filter. Using an oil filter wrench, turn filter counterclockwise to remove.
9. Using a clean dry cloth, clean filter sealing surface on crankcase.
10. Lubricate O-ring on new filter with a film of engine oil. Check to make sure the O-ring is in good condition.
11. Install new filter and turn by hand until filter contacts gasket, then turn and additional 1/2 turn.
12. Approximately 1 cup of engine oil will remain in the crankcase. To drain, remove drain plug found on lower right side of crankcase. **NOTE:** The sealing surfaces on the drain plug and crankcase should be clean and free of burrs, nicks or scratches.
13. Reinstall drain plug.
14. Remove dipstick and fill tank with 2 quarts (1.9 l) of Polaris Premium 4 synthetic oil.
15. Place gear selector in neutral and set parking brake.
16. Start the engine and let it idle for one to two minutes. Stop the engine and inspect for leaks.
17. Re-check the oil level on the dipstick and add oil as necessary to bring the level to the upper mark on the dipstick.
18. Dispose of used filter and oil properly.





Oil Tank Drain Plug Torque:
14 ft. lbs. (1.93 kg/m)

Crankcase Drain Plug Torque:
14 ft. lbs. (1.93 kg/m)

Oil Filter Torque:
Turn by hand until filter contacts gasket, then turn an additional 1/2 turn

Oil Filter Wrench:
Snap On PN YA997 or equivalent

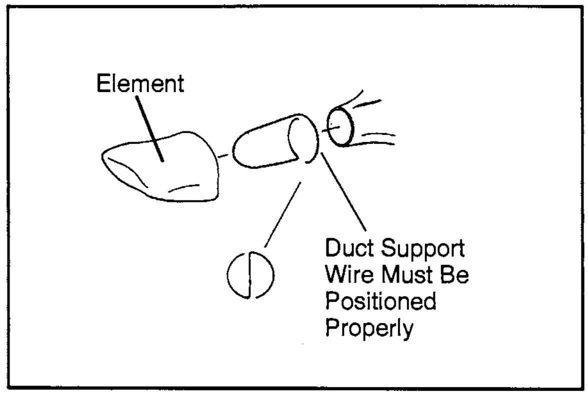
Air Filter

It is recommended that the air filter be replaced yearly. When riding in extremely dusty conditions replacement will be required more often.

The pre filter should be cleaned before each ride, using the following procedure.

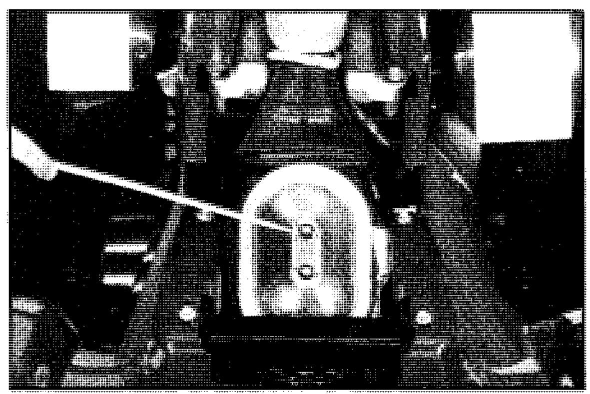
Pre-Filter Service

1. Lift up on the rear of the seat.
2. Pull the seat back and free of the tabs. **NOTE:** When reinstalling seat, make sure the slots in the seat engage the tabs in the fuel tank.
3. Remove splash guard foam securing pre-filter. Remove pre-filter element. Note position of duct support wire. It must be properly positioned before reinstalling pre-filter.
4. Clean the element with high flash point solvent, followed by hot soapy water.
5. Rinse and dry thoroughly.
6. Inspect element for tears or damage.
7. Apply foam filter oil or clean engine oil and squeeze until excess oil is removed.
8. Reinstall pre-filter element making sure duct support wire is in proper position. Secure splash guard foam removed in step 3. Do not allow splash guard foam to restrict air intake. Do not tuck the element under the noise baffle foam.

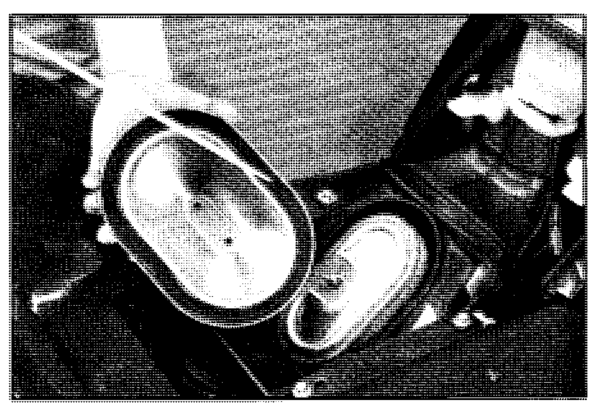


Air Filter Main Element

1. Remove the two wing nuts and washers securing the air filter access cover.

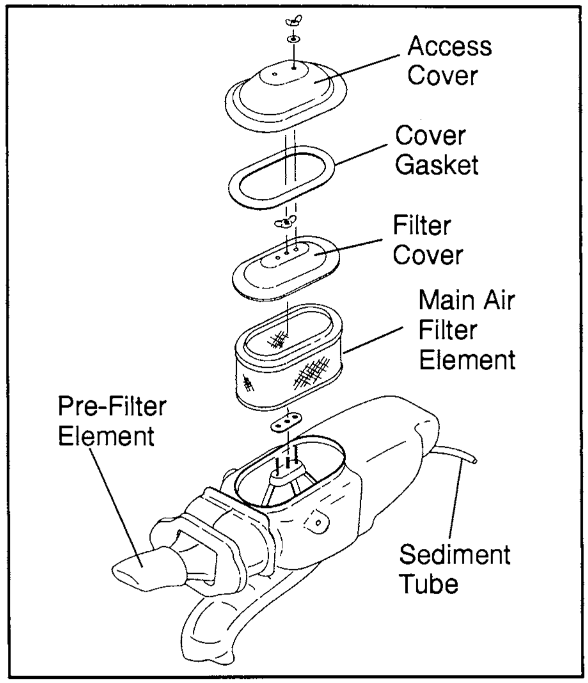


2. Remove the cover. Inspect the gasket. It should adhere tightly to the cover and seal all the way around.



3. Remove the wing nut and washer securing the filter cover. The cover should be straight and not distorted.

4. Remove the air filter. Inspect and replace if necessary. If the filter has been soaked with fuel or oil it must be replaced. **NOTE:** Apply a small amount of general purpose grease to the sealing edges of the filter before reinstalling.



Air Box Sediment Tube

Periodically check the air box drain tube located toward the rear of the machine. Drain whenever deposits are visible in the clear tube. **NOTE:** The sediment tube will require more frequent service if the vehicle is operated in wet conditions or at high throttle openings for extended periods.

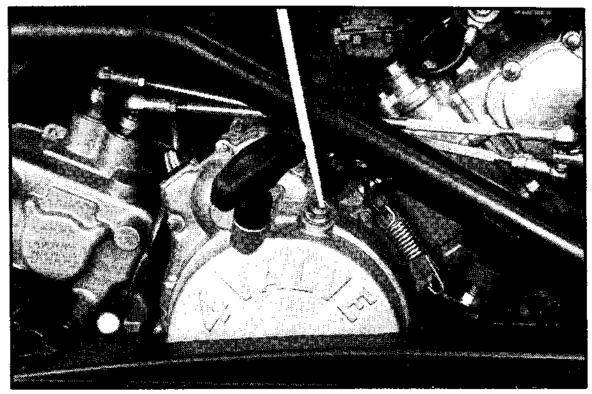
1. Remove drain plug from end of sediment tube.
2. Drain tube.
3. Reinstall drain plug.

Valve Clearance

Inspect and adjust valve clearance while the engine is cold and the piston positioned at Top Dead Center (TDC) on compression stroke.

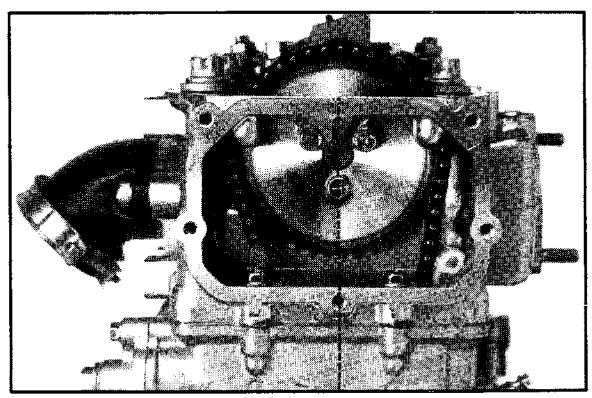
1. Lift up on the rear of the seat.
2. Pull the seat back and free of the tabs. **NOTE:** When reinstalling seat, make sure the slots in the seat engage the tabs in the fuel tank.
3. Remove the left and right side body panels and fuel tank cover. See Body Panel Removal, Chapter 2.
4. Remove the fuel tank. See page 7.130.
5. Remove the spark plug high tension lead and remove the spark plug. **CAUTION:** Place a clean shop towel into the spark plug cavity to prevent dirt from entering.
6. Remove the eight 6 x 20 mm bolts securing the rocker cover. Remove the cover and gasket. **NOTE:** It may be necessary to tap the cover lightly with a plastic hammer to loosen it from the cylinder head.
7. Remove the timing inspection plug from the recoil housing.

CAUTION: Failure to position the crankshaft exactly as shown (TDC on compression stroke) will result in improper valve adjustment.

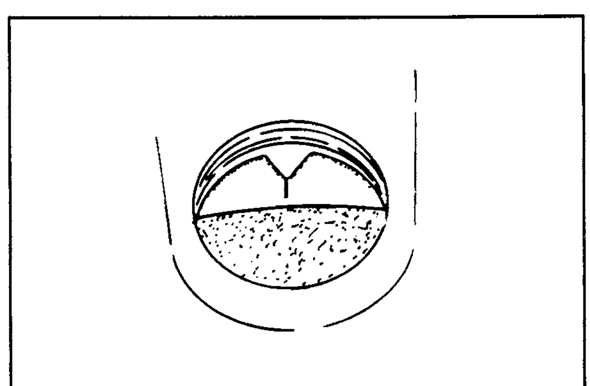


8. Rotate the engine slowly with the recoil rope, watching the intake valves open and close.

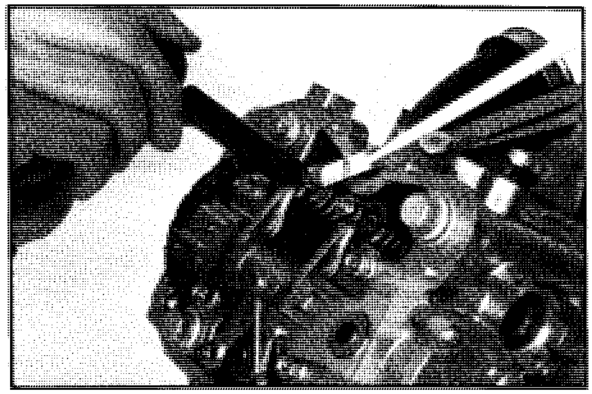
NOTE: At this point watch the camshaft sprocket marks and slowly rotate engine until marks are parallel to rocker cover gasket surface. The cam sprocket locating pin will be facing upward directly in line with the crankshaft to camshaft center line as shown. See photo at right.



9. Verify accurate TDC positioning by observing the mark aligned with the line in the timing inspection hole. In this position there should be clearance on all valves.



Intake Valve Clearance Adjustment

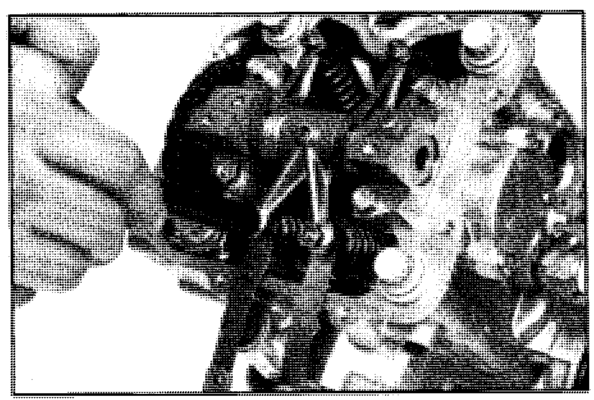


1. Insert a .006″ (.15 mm) feeler gauge between the end of the intake valve stem and the clearance adjuster screw as shown.
2. Using a 10 mm wrench and a screwdriver, loosen the adjuster lock nut and turn the adjusting screw until there is a slight drag on the feeler gauge.
3. Hold the adjuster screw and tighten the adjuster lock nut to a torque of 5.8 to 7.2 ft. lbs., using the 10mm flank drive torque adapter at a 90° angle to the torque wrench as shown. **NOTE:** The flank drive must be positioned at a 90° angle to the torque wrench to prevent over torquing.
4. Re-check the valve clearance.
5. Repeat adjustment procedure if necessary until clearance is correct.
6. Repeat this step for the other intake valve.

Valve Clearance - Engine Cold and Positioned at TDC on Compression Stroke:

.006″ (.15 mm)

Exhaust Valve Clearance Adjustment



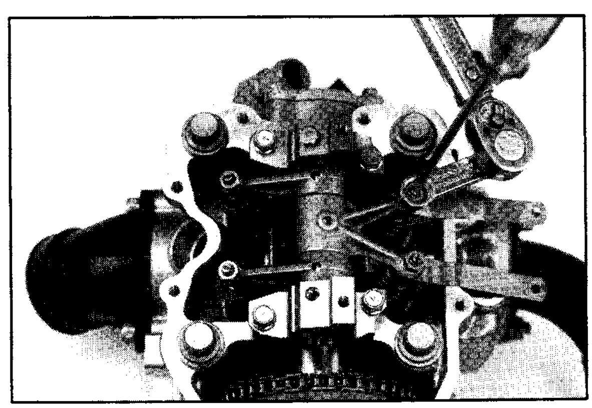
NOTE: The exhaust valves share a common rocker arm, and must be adjusted using two feeler gauges.

1. Insert a .006″ (.15 mm) feeler gauge between each of the exhaust valves and adjuster screws.
2. If adjustment is needed, loosen the locknuts and turn the adjuster screws until there is a slight drag on both feeler gauges. **NOTE:** Both feeler gauges should remain inserted during adjustment.

Valve Clearance - Engine Cold and Positioned at TDC on Compression Stroke:

.006″ (.15 mm)

3. When the clearance is correct, hold the adjuster screw and tighten the locknut to 5.8 to 7.2 ft. lbs., using the 10mm flank drive torque adapter at a 90° angle to the torque wrench as shown. **NOTE:** The flank drive must be positioned at a 90° angle to the torque wrench to prevent over torquing.
4. Re-check the valve clearance.
5. Repeat adjustment procedure if necessary until clearance is correct.
6. Scrape gasket surfaces to remove all traces of the old gasket. **CAUTION:** Use care not to damage the sealing surface of the cover or cylinder head.



Use torque adaptor for all valve adjuster locknuts.

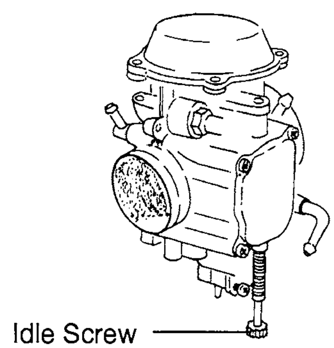
7. Reinstall the cover using a new gasket.
8. Torque cover bolts to 72 in. lbs.
9. Remove the shop towel from the spark plug cavity.
10. Reinstall the spark plug. Torque to 11 ft. lbs. (new), 18 ft. lbs. (used).
11. Reinstall the spark plug high tension lead.
12. Reinstall the fuel tank.
13. Reinstall the fuel tank shroud.
14. Reinstall the left and right body panels.

Cover Bolt Torque:	72 in. lbs.
Spark Plug Torque:	11 ft. lbs. new 18 ft. lbs. used

Idle Speed Adjustment

1. Start engine and warm it up thoroughly.
2. Adjust idle speed to 1200 RPM +/- 100 by turning the adjusting screw on the left side of the carburetor. See illustration at right.

NOTE: Adjusting the idle speed affects throttle cable freeplay and electronic throttle control. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.



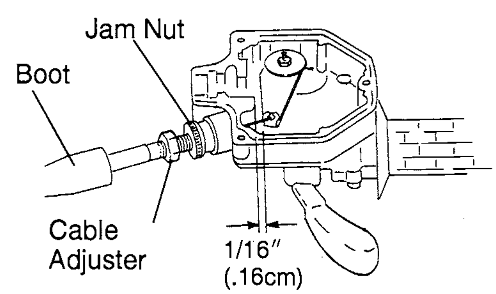
Idle Speed:
1200 +/- 100 RPM

Throttle Cable Adjustment

1. Slide boot off throttle cable adjuster and jam nut at throttle block.
2. Place shift selector in neutral and set parking brake.
3. Start engine and set idle to 1200 +/- 100 RPM.

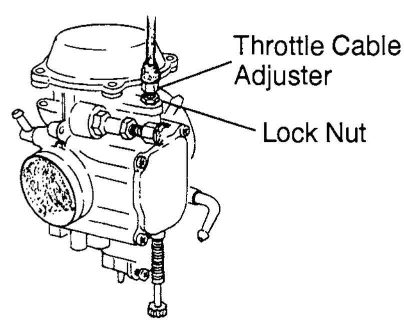
NOTE: Be sure the engine is at operating temperature. See Idle Speed Adjustment.

4. Loosen jam nut.
5. Turn cable adjuster out until engine RPM starts to increase.
6. Turn cable adjuster back in until throttle lever has 1/16″ (.16 cm) of travel before engine RPM increases.
7. Tighten jam nut securely.
8. Turn handlebars from left to right through the entire turning range. If idle speed increases, the throttle cable freeplay must be increased, or check for proper cable routing.



NOTE: If the proper freeplay cannot be obtained with the throttle block adjuster, adjust the cable at the carburetor using the following procedure.

1. Remove fuel tank. See page 7.130.
2. Slide boot off throttle cable adjuster and jam nut.
3. Loosen lock nut and turn adjuster until proper throttle lever freeplay is obtained.



Throttle Cable Adjustment, Cont.

4. Tighten locknut and slide boot back over adjuster.
5. Reinstall fuel tank.
6. Check for proper throttle operation and correct freeplay in all handlebar positions.

Throttle Cable Freeplay:

1/16″ (.16 cm) Throttle Lever Free Travel

Throttle Operation

Check for smooth throttle opening and closing in all handlebar positions. Throttle lever operation should be smooth and lever must return freely without binding. Replace the throttle cable if worn, kinked, or damaged.

Throttle Cable Lubrication

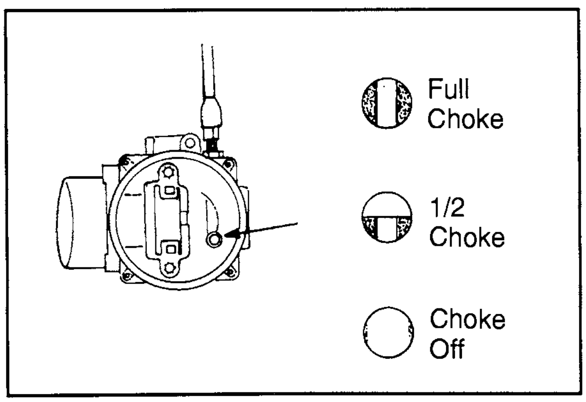
Lubricate throttle cable from the throttle block end.

1. Turn engine off.
2. Remove three throttle block cover screws.
3. Slide boot off throttle cable adjuster and jam nut.
4. Loosen cable adjuster jam nut.
5. Turn adjuster in to obtain maximum cable freeplay.
6. Open throttle and hold cable.
7. Carefully disconnect throttle cable from throttle lever. Do not kink or bend throttle cable.
8. Unscrew adjuster and remove cable.
9. Hold throttle cable up and lubricate with Polaris Cable Lube (PN 2870510).
10. Turn adjuster in to obtain maximum cable freeplay.
11. Reinstall cable onto throttle lever.
12. Perform throttle cable adjustment.

Choke Adjustment

Choke adjustment is performed with the choke lever in the 1/2 choke position.

1. Remove fuel tank. See page 7.130.
2. Remove diaphragm chamber cover, spring, and vacuum slide assembly. See carburetor disassembly, pages 7.134 - 7.136.
3. Lift choke lever to first position (1/2 choke).
4. Inspect choke plunger position in the air bleed hole. Loosen choke cable adjuster lock nut on carburetor. Turn adjusting screw in or out until choke plunger uncovers 1/2 of the air bleed hole.
5. Lift choke lever to full open position (full choke). The air bleed hole should now be uncovered completely.
6. Turn choke lever off.
7. Check for a small amount of freeplay at the lever before the choke plunger starts to move. Tighten cable adjuster lock nut.
8. Install diaphragm chamber cover, spring, and vacuum slide assembly. See carburetor assembly, pages 7.140 - 7.142.



Carburetor Float Bowl Draining

⚠ WARNING

Gasoline is extremely flammable and explosive under certain conditions.

⚠ Always stop the engine and refuel outdoors or in a well ventilated area.

⚠ Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

⚠ Do not overfill the tank. Do not fill the tank neck.

⚠ If you get gasoline in your eyes or if you swallow gasoline, see your doctor immediately.

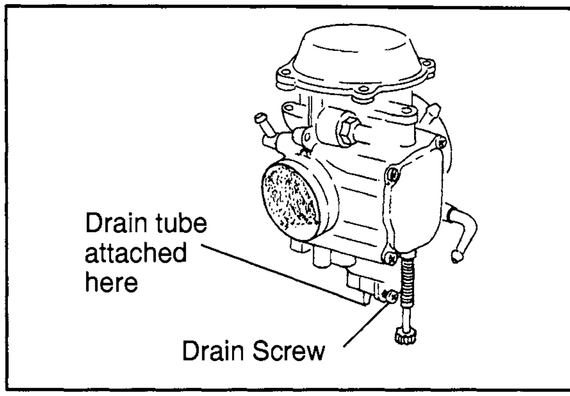
⚠ If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

⚠ Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

⚠ Never drain the float bowl when the engine is hot. Severe burns may result.

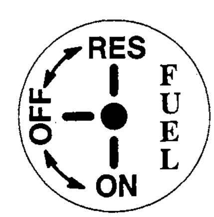
The carburetor float bowl should be drained periodically to remove moisture or sediment from the bowl, or before extended periods of storage.

NOTE: The bowl drain screw is located on the bottom left side of the float bowl.



1. Turn fuel valve to the off position.

2. Remove left side body panel. See Body Panel Removal, Chapter 2.
3. Place a clean container beneath the bowl drain spigot or bowl drain hose.
4. Turn drain screw out two turns and allow fuel in the float bowl and fuel line to drain completely.
5. Inspect the drained fuel for water or sediment.
6. Tighten drain screw.
7. Turn fuel valve to "on".
8. Start machine and check for leaks.



Fuel valve decal, located on left side of machine

Fuel Lines (See Routing Diagrams, Chapter 1)

1. Check fuel lines for signs of wear, deterioration, damage or leakage. Replace if necessary.
2. Be sure fuel lines are routed properly and secured with cable ties. **CAUTION:** Make sure lines are not kinked or pinched.
3. Replace all fuel lines every two years.

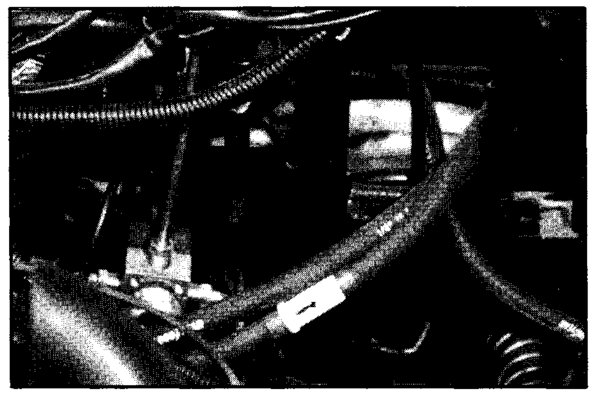
Vent Lines (See Routing Diagrams, Chapter 1)

1. Check fuel tank, carburetor, battery and transmission vent lines for signs of wear, deterioration, damage or leakage. Replace if necessary.
2. Be sure vent lines are routed properly and secured with cable ties. **CAUTION:** Make sure lines are not kinked or pinched. See routing diagrams, Chapter 1.

Fuel Filter

The fuel filter should be replaced periodically or whenever sediment is visible in the filter.

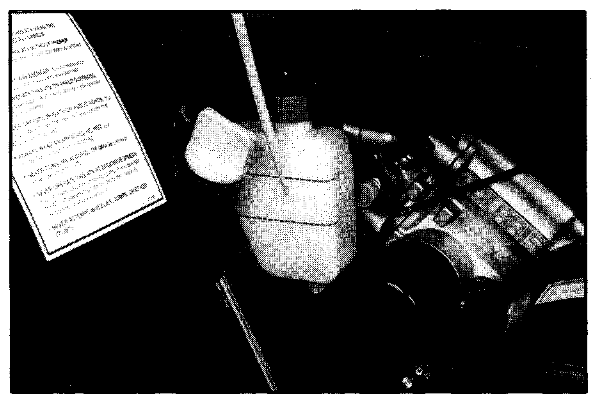
1. Remove fuel tank. See Fuel Tank Removal, page 7.130.
2. Remove line clamps at both ends of the filter.
3. Remove fuel lines from filter.
4. Install new filter and clamps onto fuel lines with arrow pointed in direction of fuel flow.
5. Install clamps on fuel line.
6. Start engine and inspect for leaks.
7. Reinstall fuel tank.



Coolant Level Inspection

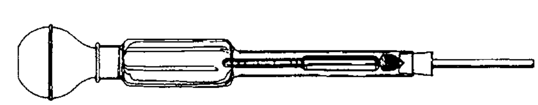
With the engine at operating temperature, the coolant level should be between the upper and lower marks on the recovery bottle. If not:

1. Remove recovery bottle cap.
2. Fill recovery bottle to upper mark with a 50/50 mixture of antifreeze and distilled water.
3. Reinstall cap.



Coolant Strength

Test the strength of the coolant using an antifreeze hydrometer. A 50/50 mixture of antifreeze and distilled water will provide the optimum cooling, corrosion protection, and antifreeze protection. Do not use tap water, straight antifreeze, or straight water in the system. Tap water contains minerals and impurities which build up in the system. Straight water or antifreeze will cause the system to freeze.



Antifreeze Hydrometer

Cooling System Hoses

1. Inspect all hoses for cracks, deterioration, abrasion or leaks. Replace if necessary.
2. Check tightness of all hose clamps.

Radiator

1. Check radiator air passages for restrictions or damage.
2. Straighten any bent radiator fins.
3. Remove any obstructions with compressed air or low pressure water.

Engine Mounts

1. Inspect all engine mounts for tightness or cracks. Replace if necessary.

Compression Test

NOTE: This engine is equipped with an automatic decompressor. Compression readings will vary in proportion to cranking speed during the test.

Smooth idle generally indicated good compression. Engine compression is rarely a factor in running condition problems above idle speed.

A cylinder leakage test is the best indication of engine condition. Follow manufacturer's instructions to perform a cylinder leakage test.

Spark Plug

1. Remove right body panel. See Body Panel Removal, Chapter 2.
2. Remove spark plug high tension lead.
3. Insert spark plug wrench provided in tool kit, or use a 5/8″ plug socket. Remove spark plug.
4. Inspect electrodes for wear and carbon buildup. Look for a sharp outer edge with no rounding or erosion of the electrodes.
5. Clean with electrical contact cleaner or a glass bead spark plug cleaner only. **CAUTION:** A wire brush or coated abrasive should not be used.
6. Measure gap with a wire gauge. Recommended spark plug gap is .024 - .028″ (.6-.7 mm) Adjust if necessary by bending the side electrode carefully.
7. If necessary, replace spark plug with NGK BKR6ES *only*. **CAUTION:** Severe engine damage may occur if the incorrect spark plug is used.
8. Coat spark plug threads with a small amount of anti-seize compound.
9. Install spark plug and torque to 18 ft. lbs. (used), 11 ft. lbs. (new).

Recommended Spark Plug:

NGK BKR6ES

Spark Plug Gap:

.024 - .028″ (.6-.7 mm)

Spark Plug Torque:

18 Ft. Lbs. (Used)
11 Ft. Lbs (New)

Ignition Timing

NOTE: Ignition timing must be checked with the engine at *room* temperature.

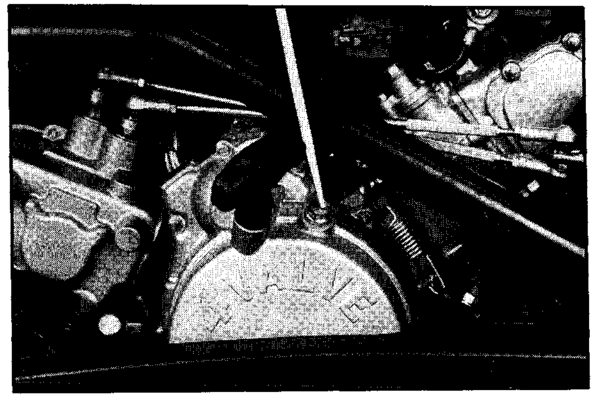
1. Remove ignition timing inspection plug from recoil starter housing.
2. Remove right side body panel. See Body Panel Removal, Chapter 2.
3. Connect a timing strobe light to spark plug high tension lead according to the manufacturer's instructions.
4. Install a tachometer in the manner described by the manufacturer.
5. Shift transmission to the neutral position and set parking brake.
6. Start engine, slowly increase engine speed to specified timing RPM while directing the strobe light at the timing marks in the inspection hole. The marks should align.
7. Check the ignition advance. It should advance smoothly from idle up to the specified timing RPM.

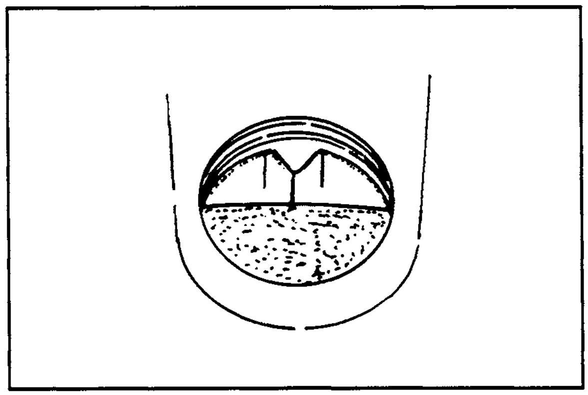
NOTE: If the marks do not align at the specified RPM, the timing must be adjusted using the following procedure:

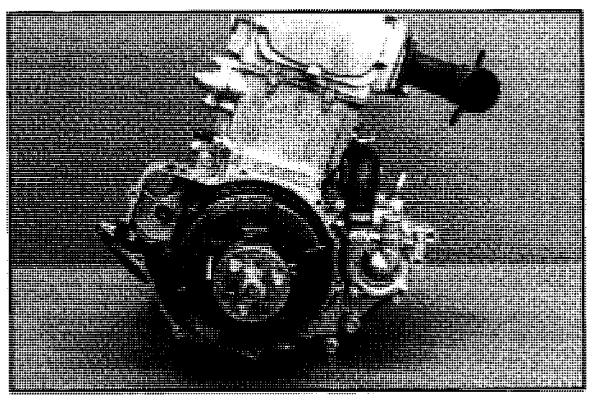
8. Remove recoil starter housing.
9. On 4x4 remove center chain guard, chain and sprockets.
10. Remove flywheel nut and washer.
11. Install flywheel puller (PN 2870159) and remove flywheel.
12. Loosen the five stator plate retaining bolts and rotate the stator plate in the same direction the flywheel mark must move to align. Move the plate approximately the same amount as the mark must move.
13. Tighten the stator plate bolts to 72 inch lbs.
14. Reinstall the recoil starter housing.
15. Re-check ignition timing using the procedure outlined in steps 6 and 7.
16. After timing procedure is complete, be sure to release parking brake.

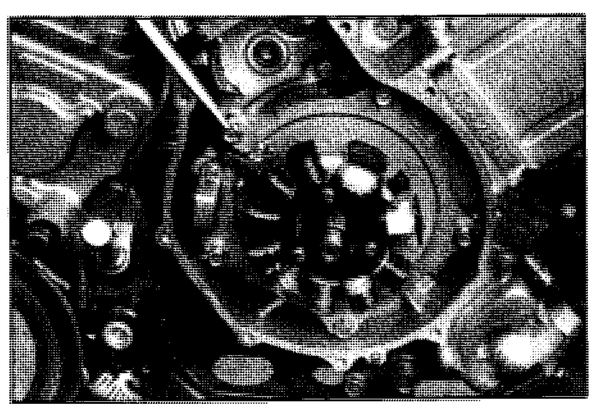
Ignition Timing:

30° +/- 2° BTDC @
3500 RPM

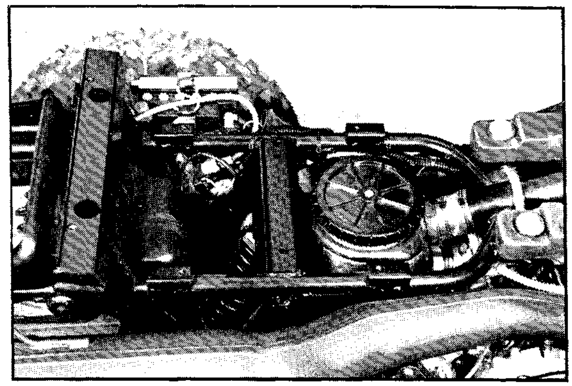




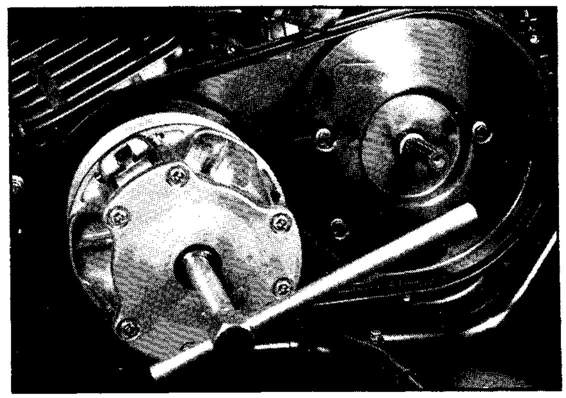




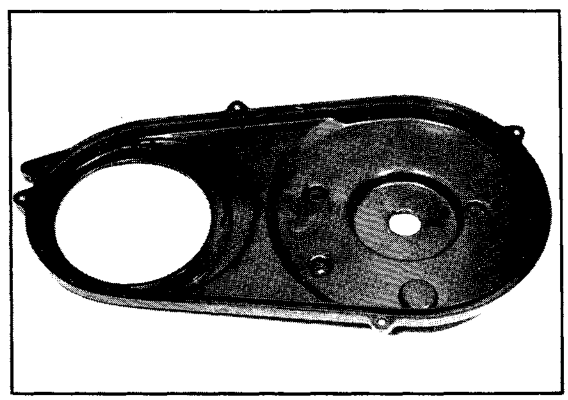
1. Remove rear rack and rear cab assembly.
2. Remove exhaust system.
3. Remove air box.



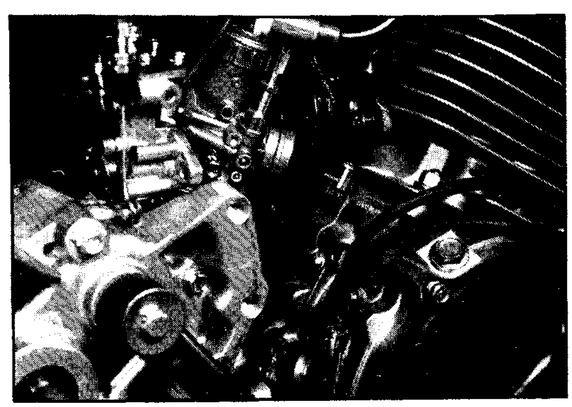
4. Remove outer clutch cover and both drive and driven clutches.



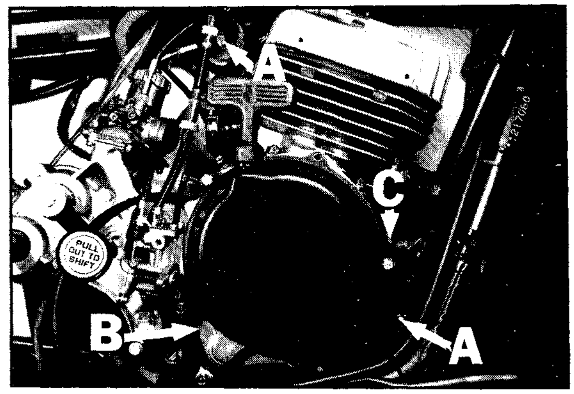
5. Remove inner cover.



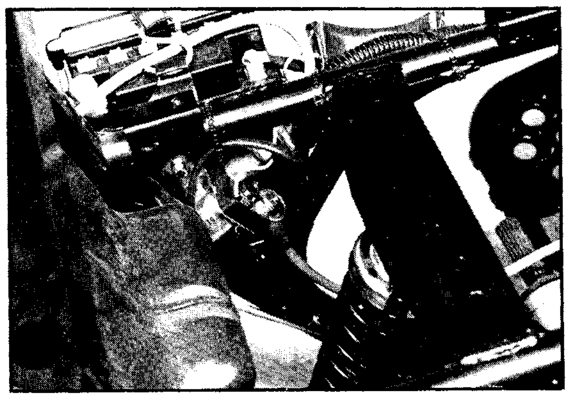
6. Remove carburetor and oil pump assemblies. **NOTE:** It is not necessary to disconnect cables on carburetor and oil pump.



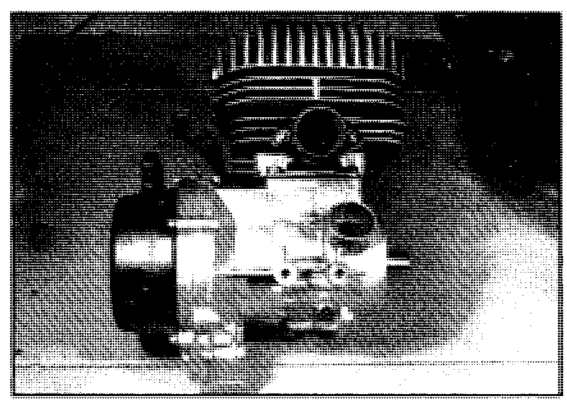
7. Remove motor mount nuts (A).
8. Loosen two bracket mount bolts (B) so the mount can swing down.
9. Slide PVT sealer boot (C) forward for easier removal and reinstallation.



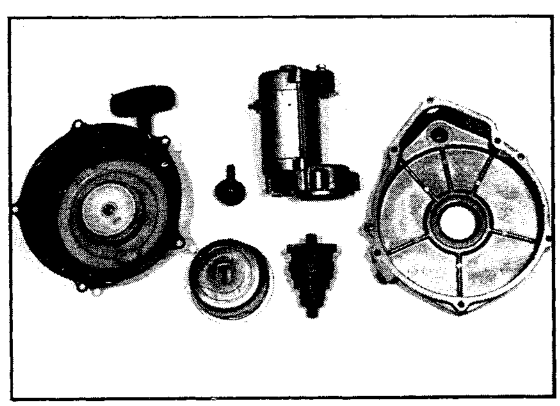
10. Unplug spark plug wire from spark plug.
11. Disconnect negative (-) cable lead from engine.
12. Disconnect positive (+) lead from solenoid. (Solenoid to starting motor)



13. Remove engine from frame.

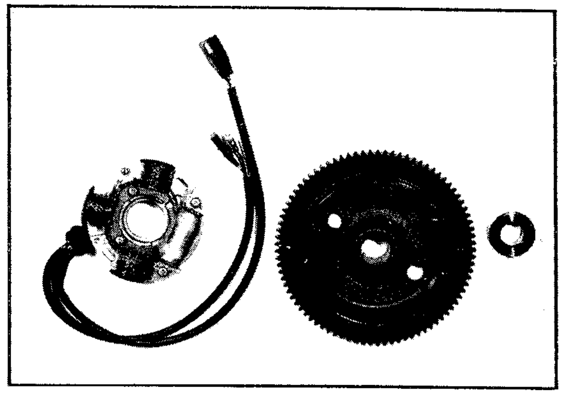


14. Remove recoil housing, recoil starting pulley and magneto housing. **NOTE:** On more current models the recoil and magneto housing must be removed as an assembly.
15. Remove starter motor from crankcase.

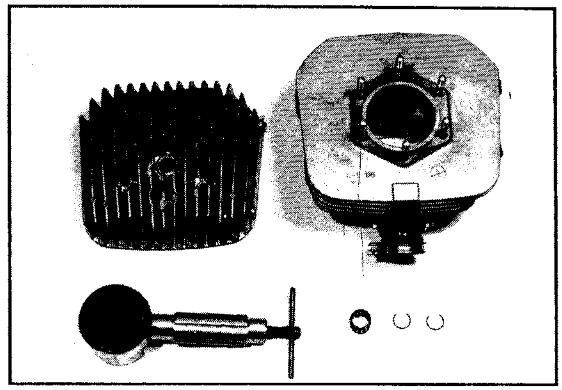


Engine Disassembly (Air Cooled 2 Stroke)

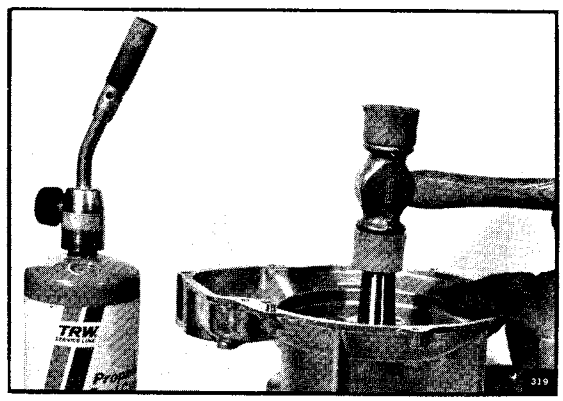
1. Remove the flywheel nut and flywheel with the Flywheel Puller (PN 2871043). Remove the magneto assembly.



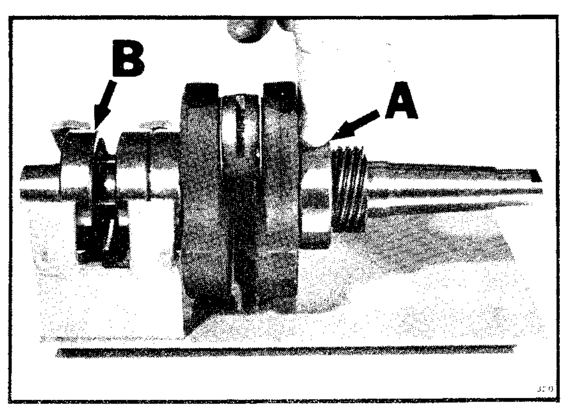
2. Remove the cylinder head and cylinder. Remove the piston pin clips. Use the Piston Pin Puller (PN 2870386) to remove the wrist pin from the piston.



3. Remove the crankcase half attaching bolts. Heat the crankcase in the bearing support areas. After applying heat, tap on the PTO end and the magneto end to separate the case half from the shaft.

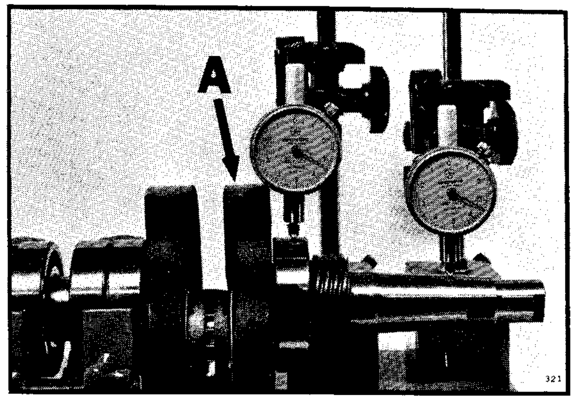


4. After removing the crankshaft, thoroughly clean the bearings and lubricate. Check bearing condition by pressing on and rotating the outer race (A). If the bearing(s) feel rough they must be replaced. Check the crankshaft runout by sliding a bearing onto the PTO end (B) and clamping the shaft into the special holding fixture (PN 2870710). The shaft should be straightened to .002″ (.05 mm) or less.

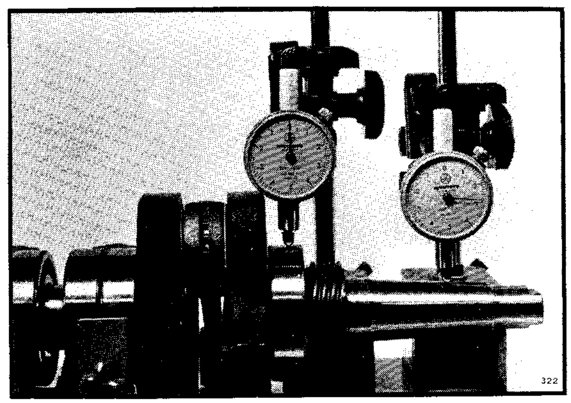


When the crankshaft runout exceeds .005″ (.15 mm) it must be straightened or replaced. To straighten a crankshaft the crank wheel(s) must be relocated on the lower rod pin. The four basic movements which need to be made to realign the crankshaft are listed below.

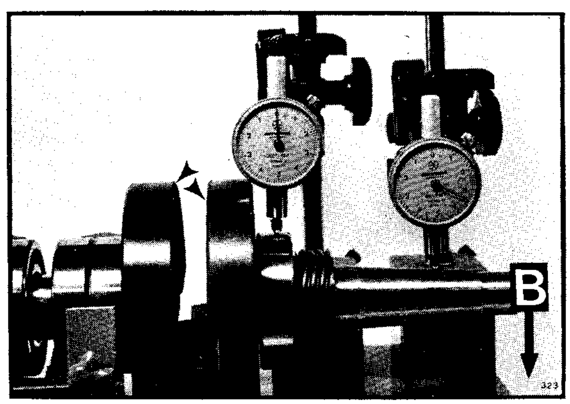
1. If the dial indicators are moving in the same direction and approximately the same amount while the shaft is rotated, the crankshaft has twisted on the lower rod pin. To correct this, remove the shaft from the fixture and strike the crank wheel on the high spot (A). This will rotate the wheel on the lower rod pin.



2. If the right side indicator is moving more than the left indicator while turning the shaft, and the high spot is found with the rod in this position (see photo at right), the crankshaft wheels will have to be squeezed together. Remove the shaft from the fixture. Locate the high spot and squeeze directly opposite from it using a large channel lock pliers or a vise. Arrows show direction of force to be applied.



3. If the right side indicator is moving more than the left indicator while turning the shaft, and the high spot is found with the rod in this position (see photo at right), the crankshaft wheels will have to be spread apart. Place a large chisel between the wheels and force the chisel downward. This will open the wheels and bring the end of the shaft down (B). Arrows show the direction of force to be applied.



4. If the indicators are moving in opposite directions while turning the shaft, the shaft is twisted. To correct this, remove the shaft from the fixture and strike the high spot found on the left side indicator.

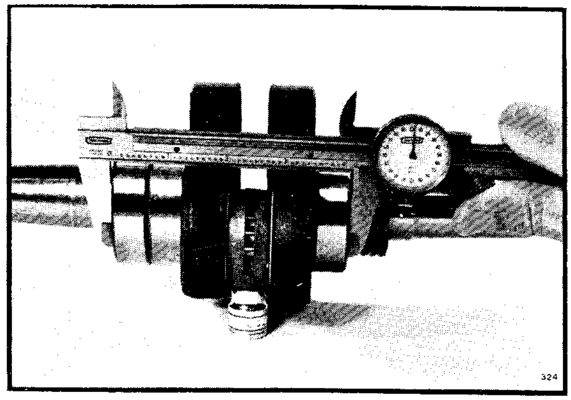
NOTE: Squeezing the crank wheels is always done opposite the high spot. Spreading the crank wheels is always done at the high spot. Twisting the crank wheel by striking it is always done at a right angle to the lower rod pin, and at the high spot.

Crankshaft and Crankcase Reassembly

Before reassembling the crankcase, the following steps should be performed to determine the amount of crankshaft end play. Excessive end play will cause the engine to be noisy at idle and slow speeds. Too little end play will side load the main bearings, which may cause premature bearing failure.

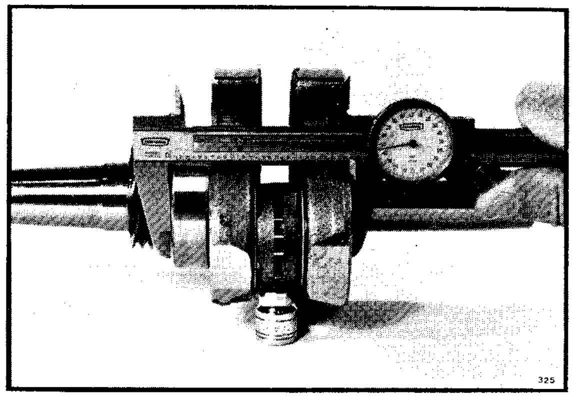
1. Measure distance from outer edge of PTO end bearing race to outer edge of mag side bearing race. Record reading.

If bearings and spacers are already installed, measure distance as shown in photo at right.



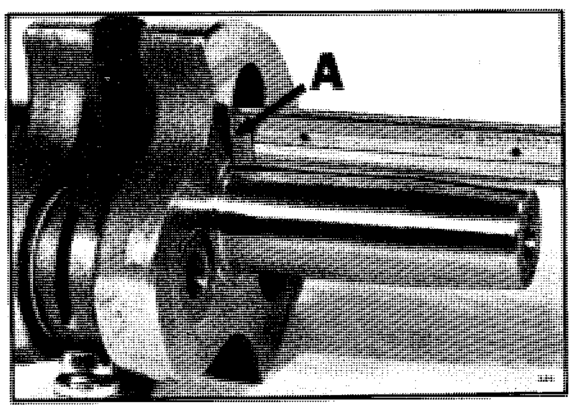
324

If PTO end bearings have not yet been installed, measure distance as shown in photo at right.



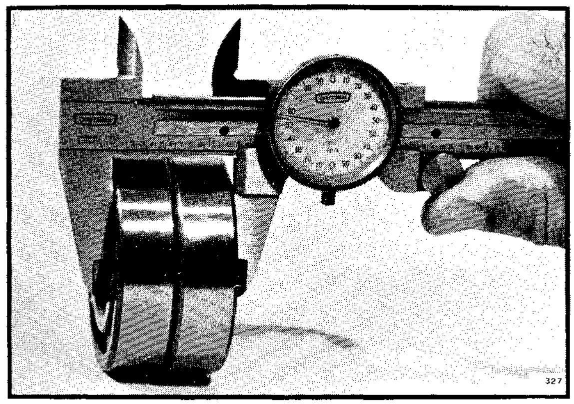
325

2. Measure distance from crank wheel to bearing seating surface (A). Record reading.
3. Measure clearance between lower rod and counterweights (B, above). Measurement should be between .008″-.018″ (.2-.45 mm).

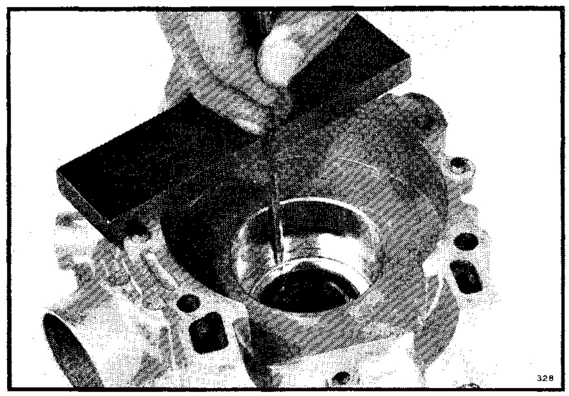


Correct crankshaft to crankcase end play is .008″ - .016″ (.02 - .04 cm). End play is adjusted by adding or subtracting spacer spacers from between the inner PTO end bearing and the crank wheel. Two different thickness spacers are available: PN 3083629 - .008″ (.02 cm); and PN 3083630 - .004″ (.01 cm).

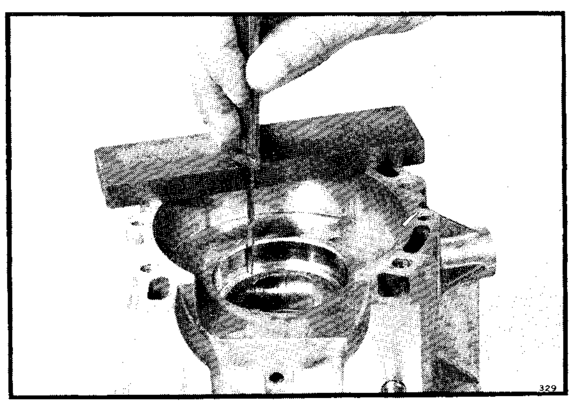
4. Measure width of main bearing outer races with bearings positioned as shown. Record reading.
5. Add recorded readings from steps 1, 2, and 3.



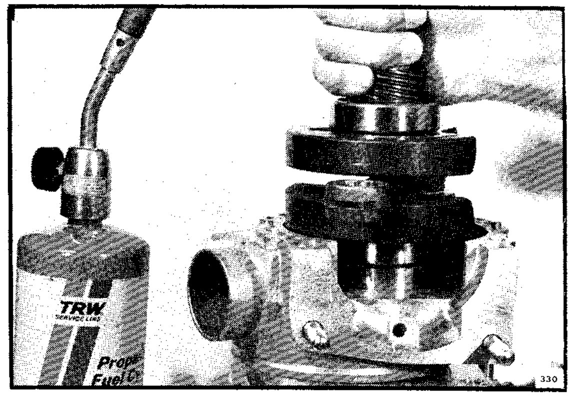
6. Measure crankcase half to determine internal bearing seating surface length. Place a piece of flat stock on the PTO side case half mating surface and measure from this surface to the bearing seating surface shoulder. Subtract flat stock thickness and record reading.



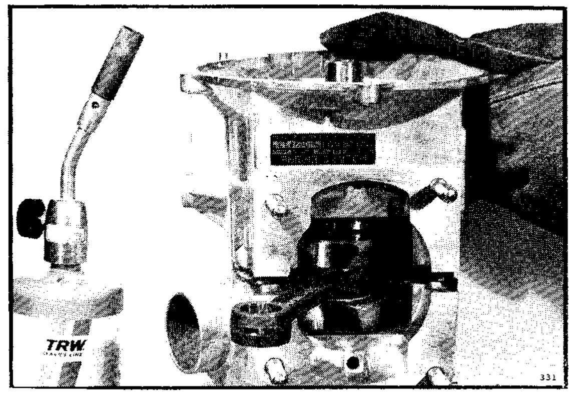
7. Measure magneto side case half using the same procedure. Record reading, making sure to subtract the thickness of the flat stock.
8. Add the readings from steps 5 and 6 and subtract this number from the reading recorded in step 4. The result is the amount of crankshaft end play.
9. If adjustment is required, determine the amount of spacers needed to achieve proper end play. Install spacers followed by bearings.



10. Remove crankcase end seals and thoroughly clean the case half mating surfaces.
11. Heat PTO side case half until it is hot to the touch.
12. Reinstall crankshaft into heated case.



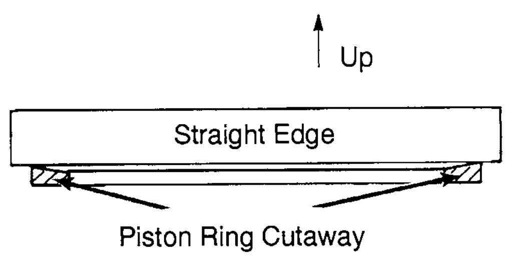
13. Heat mag side case half until it is hot to the touch.
14. Place Loctite 515 gasket eliminator on one of the case halves.
15. Reinstall the mag side half.



16. Torque case half attaching bolts to 17 ft. lbs. (2.3 kg/m).

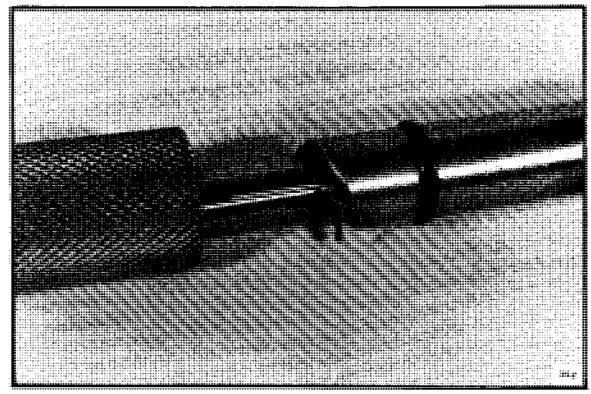
NOTE: Before proceeding, check piston to cylinder clearance and ring end gap.

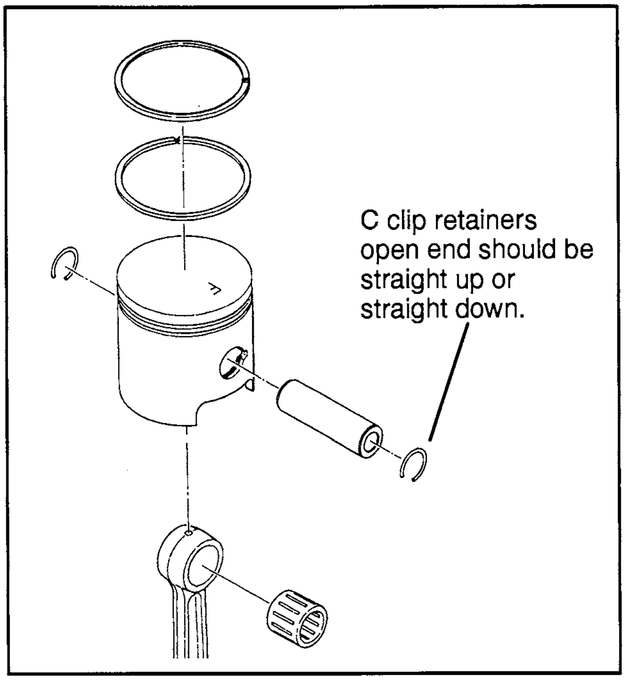
17. Install piston rings, beveled side up, onto piston. Keystone rings are beveled to the inside. This bevel must be toward the top of the piston.



Keystone Ring

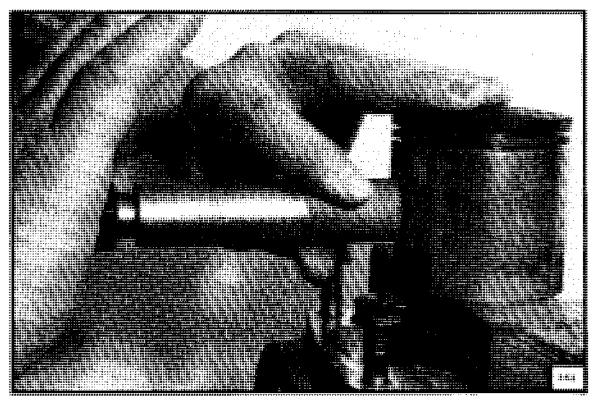
18. Position C clip onto driver (PN 2870773) with open end down as shown, Slide barrel over driver.





19. Install guide pin at the driver into the piston pin and position the barrel up against the piston. While holding the barrel against the piston, push the driver in until you hear the clip engage into the piston groove.

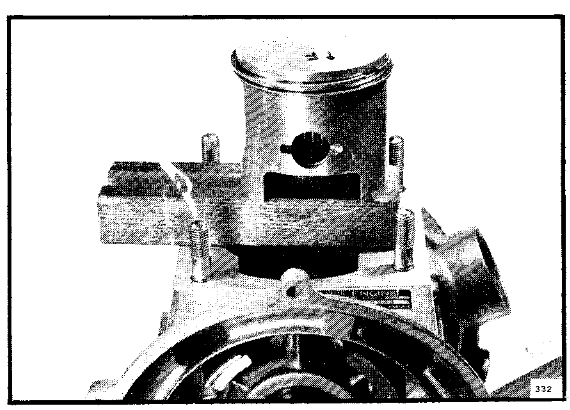
20. Rotate driver to complete engagement of clip.



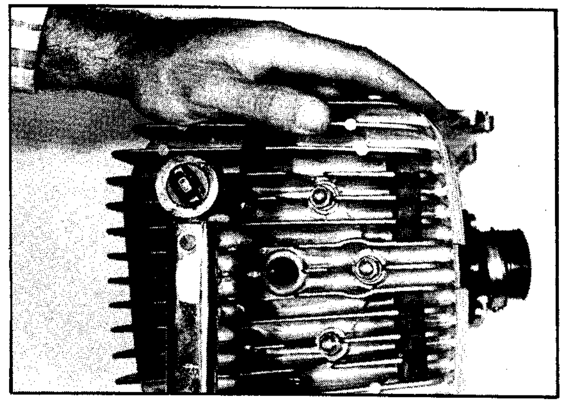
21. Reinstall piston onto rod with "F" mark or →toward the magneto side of the engine. Support with support block.

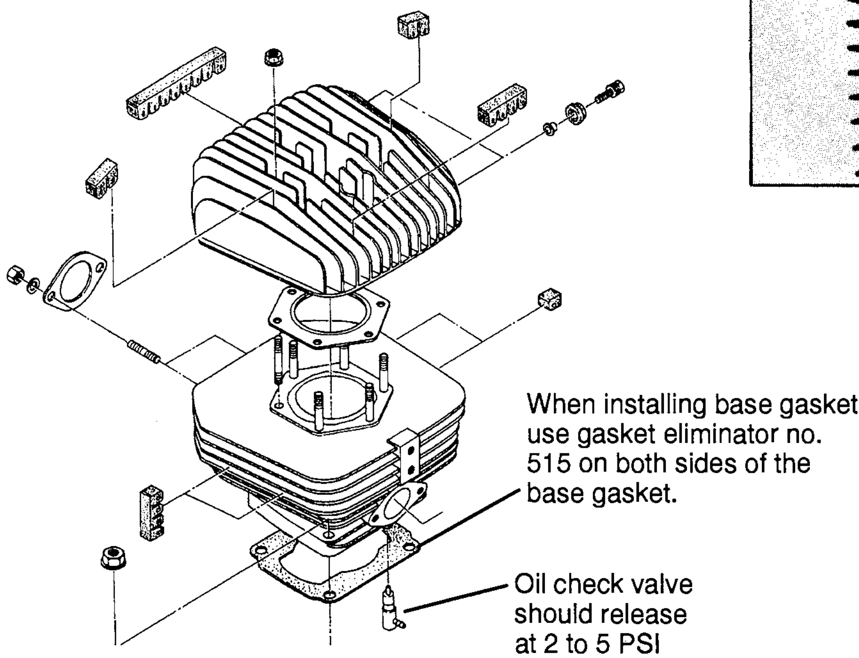
22. Lubricate wrist pin and wrist pin bearing.

23. Reinstall wrist pin.



24. Apply Loctite No. 515 Gasket Eliminator to both sides of the cylinder base gasket. Install the base gasket and cylinder. Torque the cylinder stud nuts to 28 ft. lbs. (3.9 kg/m). Install the head gasket and head. Torque nuts to 20 ft. lbs. (2.8 kg/m).





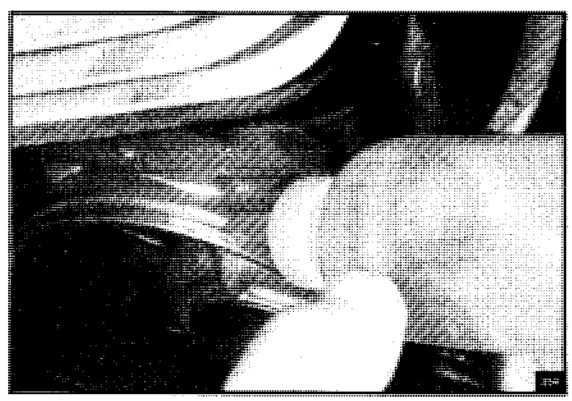
25. **NOTE:** The crankcase groove must be thoroughly cleaned before installing the seal. **TIP:** Gasket Chisel (PN 2870601) and a small wire wheel work well for cleaning the crankcase groove.

(1985-1992)

Place the correct sealer (Loctite 401™) into the groove of the crankcase and install the engine to the PVT inner cover seal. Rotate the seal back and forth several times to evenly distribute the sealer.

(1993 to Present)

On all 250 models the seal is attached with screws, therefore, no adhesive is required.



Fan Cooling Kits

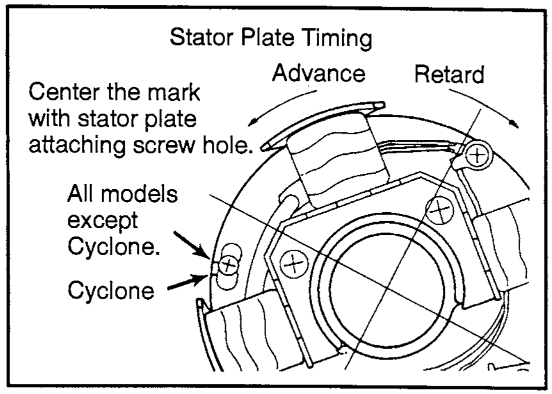
Installation of a fan cooling kit is recommended for all Polaris 250's (except 4x6 and 6x6) if the service application is:

- Constant low ground speeds;
- Pulling loads;
- Commercial use; or
- Agricultural use.

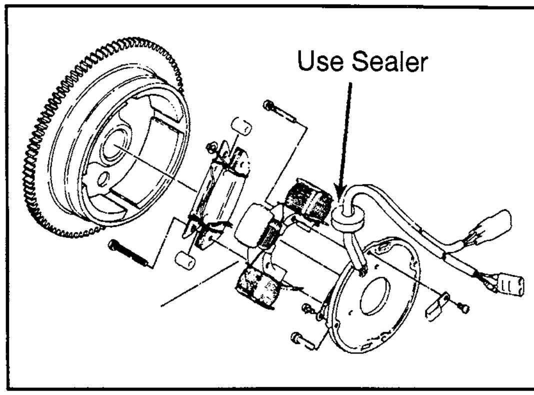
Fan Cooling Kit for Square Tube Frame (1989 to Present) PN 2870869.

Fan Cooling Kit for Round Tube Frame (1987 to 1988) PN 2870845.

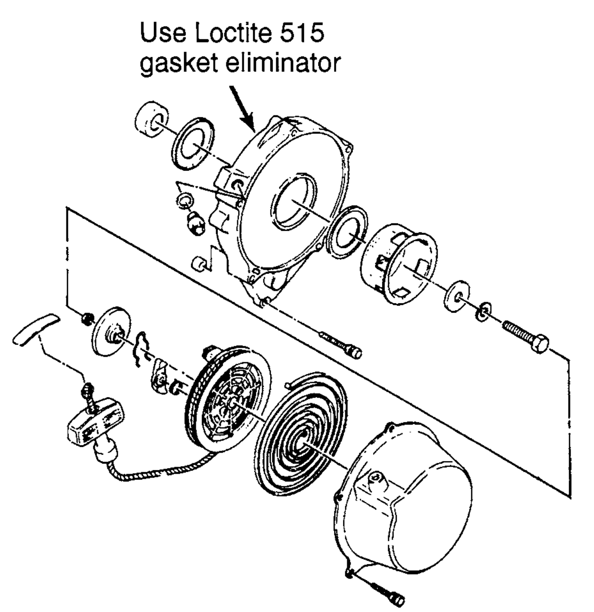
1. Reinstall stator plate and align timing marks.
2. Reinstall flywheel.
3. Reinstall magneto housing.
4. Torque flywheel bolt to 38 ft. lbs. (5.2 kg/m).
5. Reinstall recoil starter assembly.



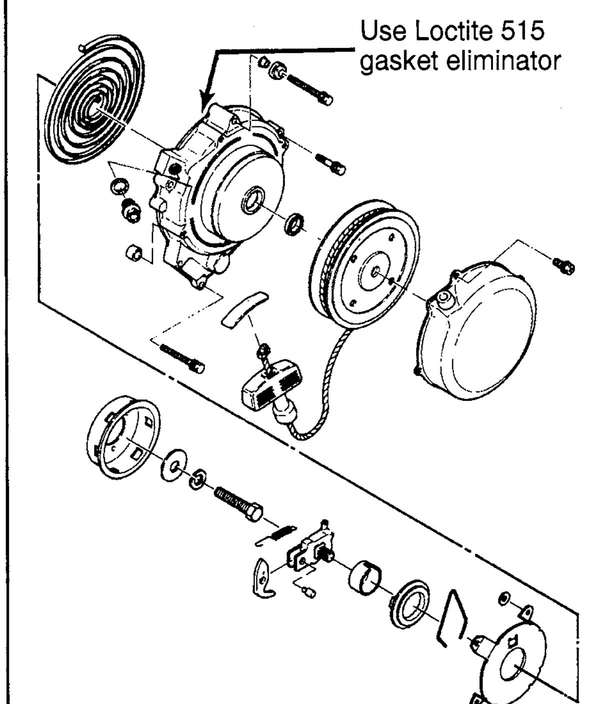
6. Seal wire harness grommet to crankcase using a waterproof sealer.
7. Refer to electrical section of this manual for starter motor inspection. Reinstall starter motor.



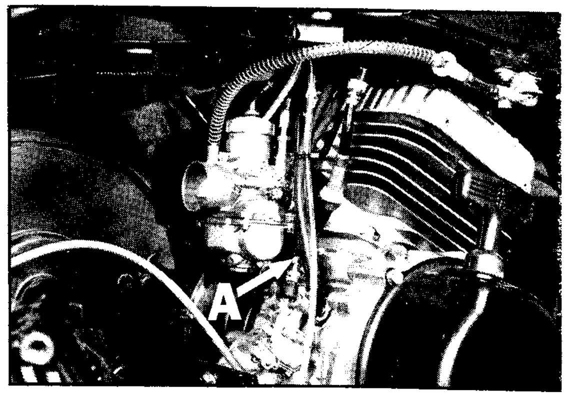
Recoil Assembly EC25PF-01-02



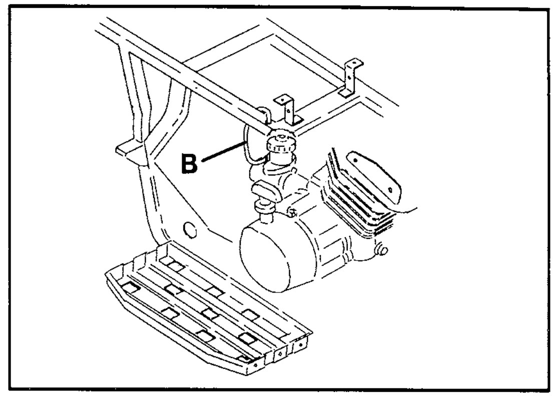
Recoil Assembly EC25PF-03-04



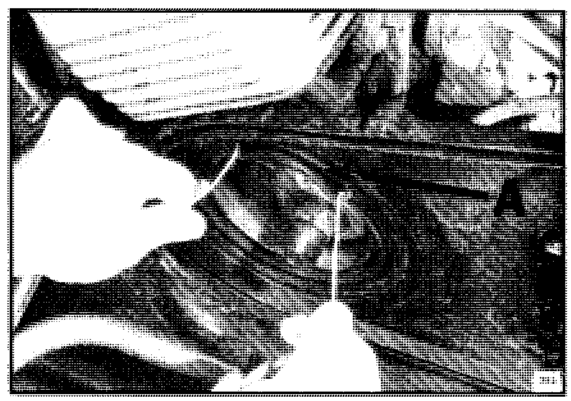
1. The engine can be reinstalled into the frame and secured. The oil pump and carburetor can also be assembled onto the engine. Bleed the oil pump of trapped air by loosening the bleed screw (A) for a few seconds, then tighten. Install the air box and filter element. **NOTE:** If the crankcase or oil pump have been replaced, check the oil pump and end play as outlined on page 7.49.



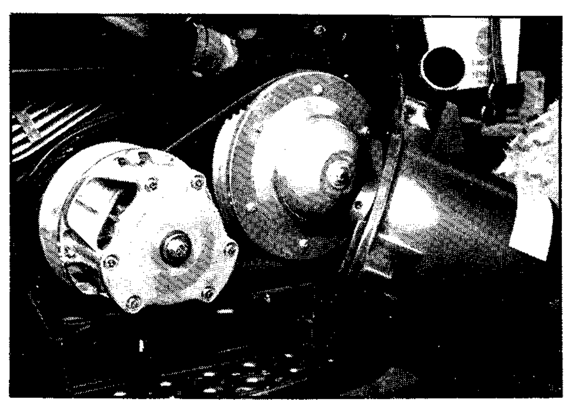
2. Make sure the vent line from the carburetor is routed to the upper part of the frame (B). Check the vent line and be sure it is not pinched or kinked.



3. Install a string around the outside of the seal and down into the seal lip. Position the inner cover against the seal and pull outward on the string. This action will engage the lip seal with the cover. Install silicone sealer between the engine seal and the inner clutch cover. Be sure to install the small seal behind the inner clutch cover at the transmission input shaft.

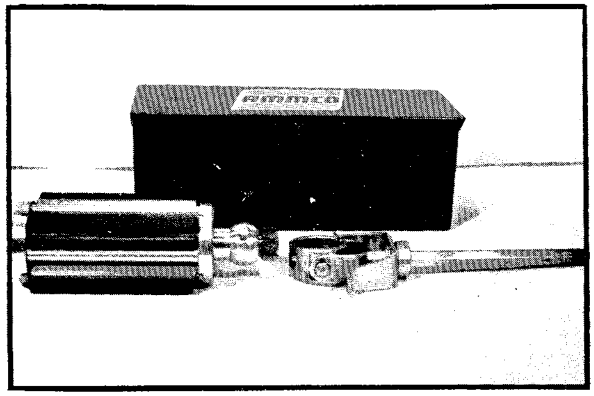


4. Install the drive system. Check clutch alignment and belt tension as outlined in Chapter 6, PVT section. Torque the drive clutch bolt to 40 ft. lbs. (5.5 kg/m). Use silicone sealer on the outer sealing area of the cover mating surfaces. Install the gasket with the flat side positioned against the inner cover. Join the air duct outlets with the sealing boot. Use a cable tie on the boot to insure proper sealing.



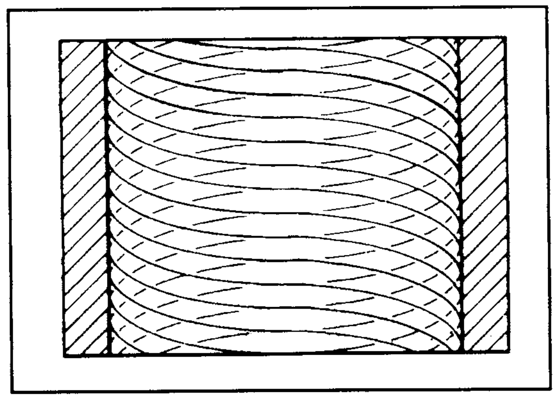
Selecting a hone which will straighten as well as remove material from the cylinder is very important. Using a common spring loaded finger type glaze breaker for honing is never advised. Polaris recommends using a rigid type hone which also has the capability of oversizing. Two manufacturers of this type of hone are Sunnen Products Company of St. Louis, Missouri and Ammco Tools, Inc., of North Chicago, Illinois.

The photo at right shows the Ammco No. 3950 hone. Roughing and finishing stone sets are available to service the large 75mm bore engines.

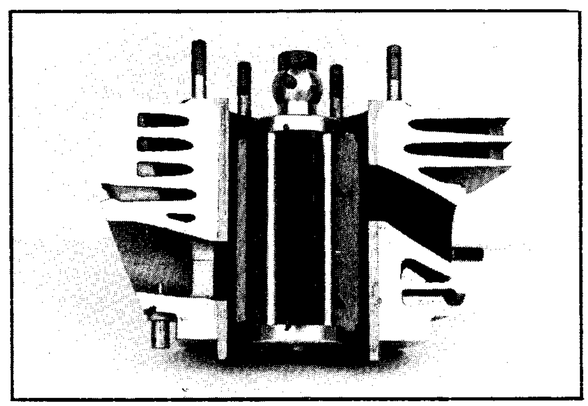


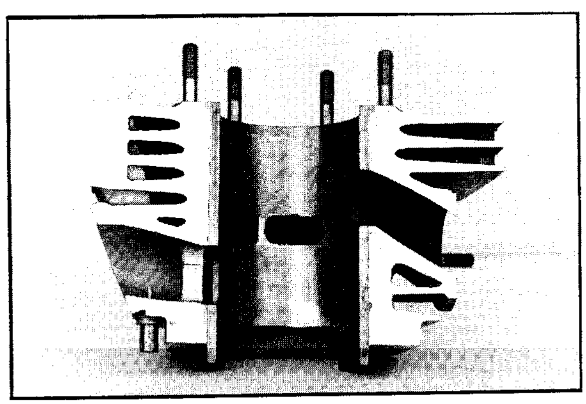
Cylinders may be wet or dry honed depending upon the hone manufacturer's recommendations. Wet honing removes more material faster and leaves a more distinct pattern in the bore.

A finished cylinder should have a cross-hatch pattern to aid in the retention of the fuel/oil mixture in the initial break in.



1. Wash cylinder with solvent.
2. Using a vise, clamp cylinder around the exhaust port studs. **NOTE:** Protect from vise jaw serrations with brass stock, wood or cardboard.
3. Place hone in cylinder. Tighten stone adjusting knob until the stone contacts the cylinder walls. **CAUTION:** Do not overtighten. Cylinder damage may result.
4. With a 1/2″ drill motor at a speed of 300-500 RPM, run the hone in and out of the cylinder rapidly until cutting tension decreases. Remember to keep the hone drive shaft centered and to bring the stone approximately 1/2″ (1.3 cm) beyond the bore at the end of each stroke.
5. Release the hone at regular intervals and inspect the bore to determine if it has been cleared, and to check piston fit. **NOTE:** Don't allow cylinder to heat up during honing. The thinner areas of the liner around the ports will expand causing uneven bore.
6. After honing has been completed inspect all port opening areas for rough or sharp edges. Some chamfer of these areas may be necessary.





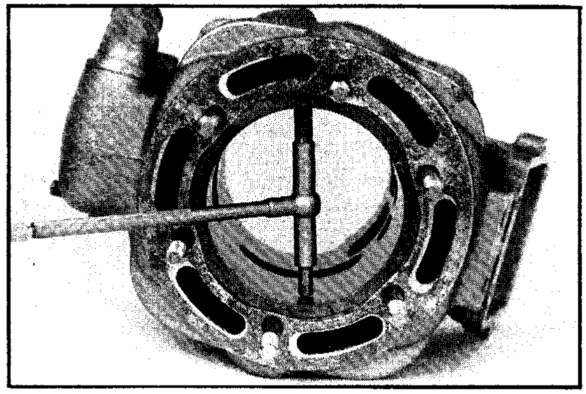
Piston/Cylinder Clearance

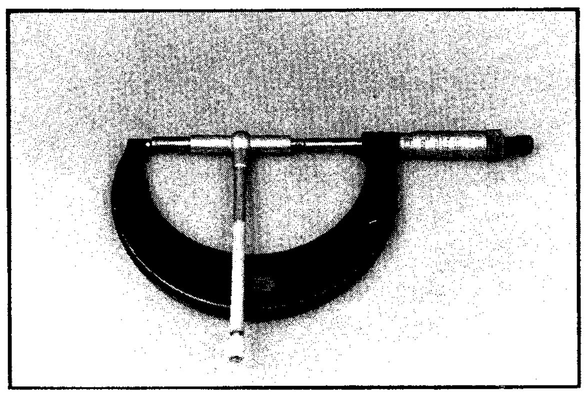
If the piston/cylinder clearance measures greater than that in the chart for a standard bore, it will be necessary to oversize the cylinder. This may be done either by boring or honing.

For oversize honing, always wet hone using honing oil and a coarse roughing stone. Hone until a check with a new piston indicates you are within .003″ (.08 mm) of the clearance recommended. Complete the sizing with fine grit stones to provide the proper cross-hatch finish and clearance.

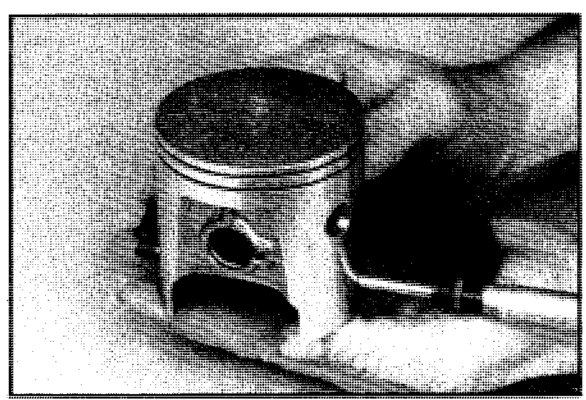
CAUTION: It is important that the cylinder be thoroughly cleaned after honing to remove all grindings which could cause piston or cylinder damage. Wash the cylinder in a solvent; then in hot soapy water; rinse; blow dry; and oil lightly.

Measure the cylinder for taper and out-of-round with a telescoping gauge or a dial bore gauge. Measure in two different directions (front to back and side to side) on three different levels (1/2″ down from top, in the middle, and 1/2″ up from bottom).





Whenever cylinders are honed or bore clearance checked, it is important to measure the piston diameter to determine its major dimension. Measure at right angles to the pin, 10 mm (1.2″) up from the bottom of the skirt as shown. Determine the largest diameter within this area.



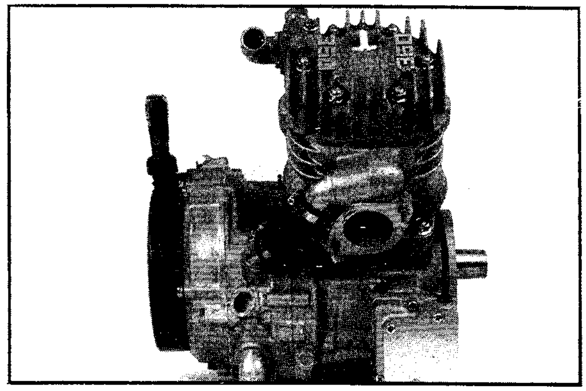
When installing oversized pistons refer to the engine specifications or wallchart for recommended clearance. The maximum service limit is .006″ (.15 mm).

The cylinder bore must be straight and concentric. Refer to the honing information outlined in this section for specific procedures.

CAUTION: Follow new engine break-in procedures after replacing piston/rings. Pre-mix the first tank of fuel. Bleed oil pump and warm engine thoroughly. Avoid sustained full throttle for the first two tanks of fuel.

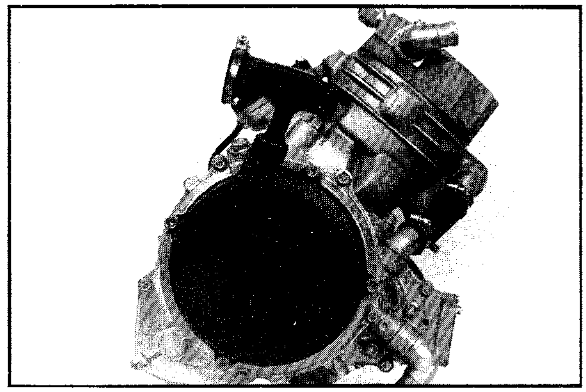
NOTE: To reassemble engine, reverse the following procedure, paying attention to reassembly notes as indicated.

1. Refer to page 7.28 and follow engine removal instructions. This engine will also require removal of coolant lines and the sending unit wire mounted at the rear of the cylinder head.

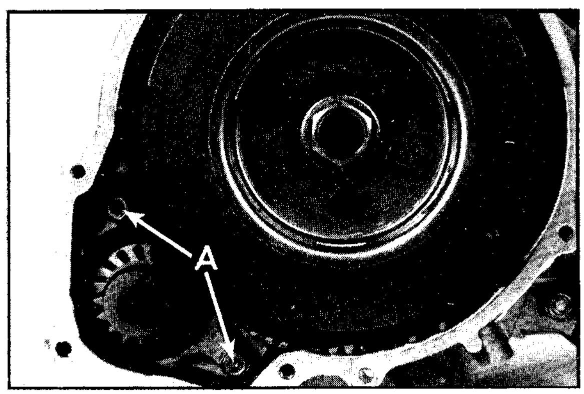


2. Remove the six bolts retaining the starter assembly and flywheel cover.

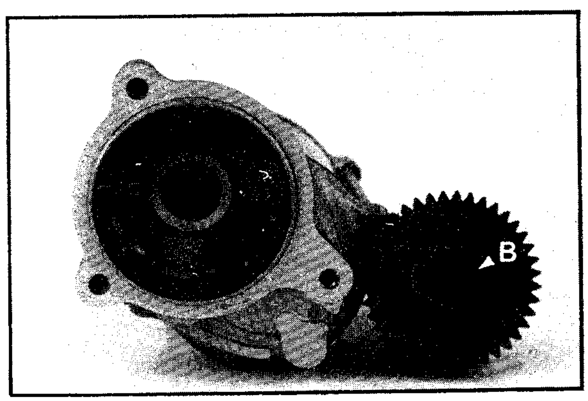
Reassembly Note: During reassembly apply Loctite 515 to mating surfaces of starter cover assembly and crankcase assembly.



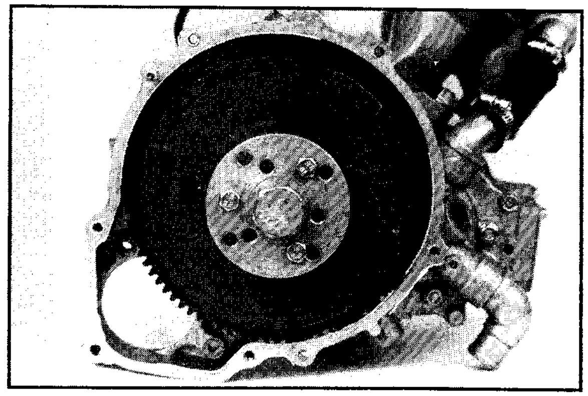
3. Remove starter pulley (350L only) and flywheel nut.
4. For starter removal, remove bolts retaining starter bracket on PTO side and two bolts (A) on mag side.



NOTE: If starter inspection is necessary, make sure during reassembly that the gear shaft washer (B) is in place between the gear shaft assembly and starter motor for reassembly. Starter damage will occur if this washer is not correctly positioned. For detailed service and repair of electric starters and starter drives, refer to Chapter 8 of this Service Manual.



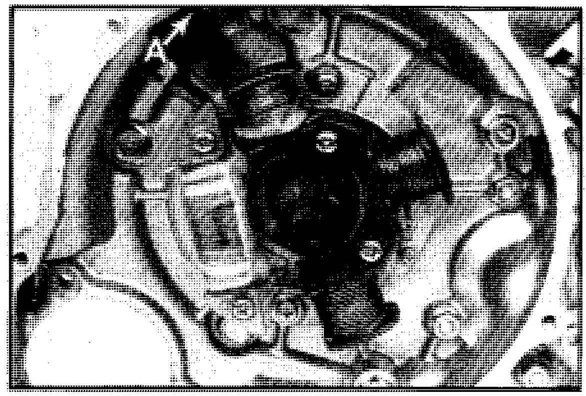
5. Remove flywheel using Polaris flywheel puller (PN 2871043).



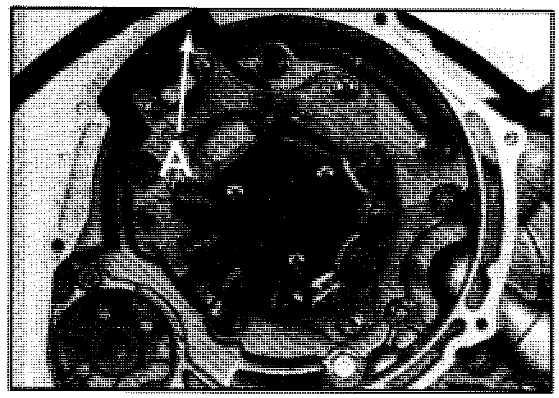
6. Remove stator assembly.

Reassembly Note: During reassembly be sure to seal rubber grommet (A) completely with silicone sealer to avoid water or dirt ingestion into stator assembly.

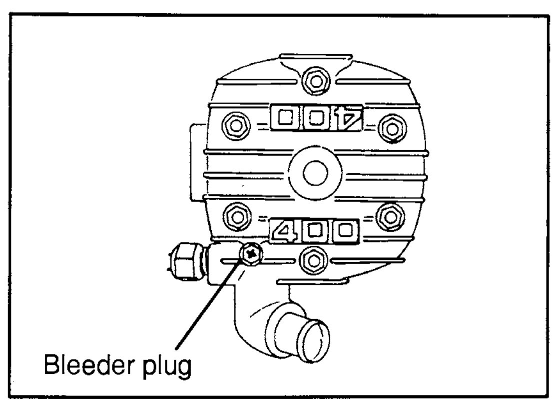
350L Stator pictured at right.



400L Stator pictured at right.

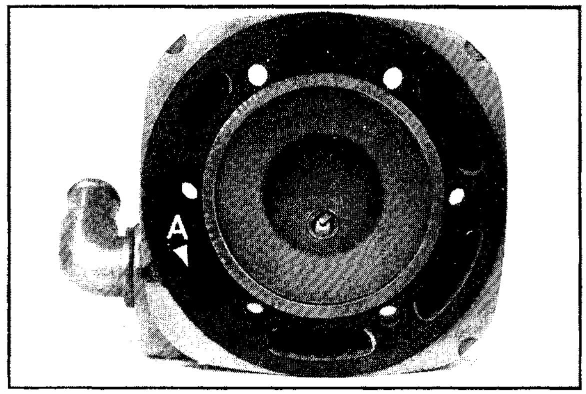


7. Remove six cylinder head bolts using a 12 mm socket. Note the position of the bleeder plug for the coolant system.



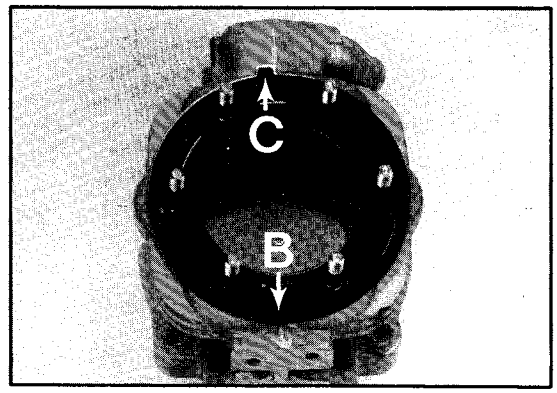
Reassembly Note: It is important to note that the 350L head gasket should be reinstalled with the wide side of the fire ring *down,* and the single round hole of gasket (A) *below* the coolant elbow cavity. The 400L head gasket should have the word *UP* (B) toward the cylinder head and the tab (C) toward the exhaust, matching the tab area on the cylinder.

350 Head Gasket pictured at right.



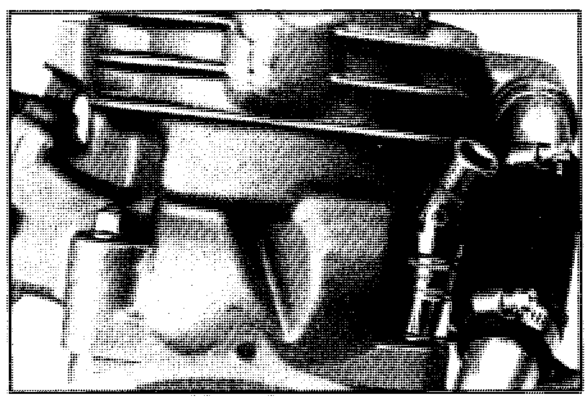
400 Head Gasket pictured at right.

NOTE: Small hole in cylinder above exhaust port is a decompression aid for starting.



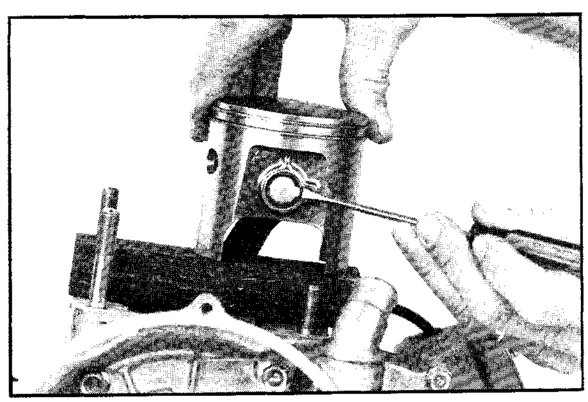
8. Loosen clamps retaining coolant transfer hose and remove the four cylinder nuts. **NOTE:** Use a 14 mm socket on the exhaust side. A 14 mm wrench will be necessary on the intake side.

Reassembly Note: Due to limited space you will need to use a crows foot adaptor for final torquing during reassembly.

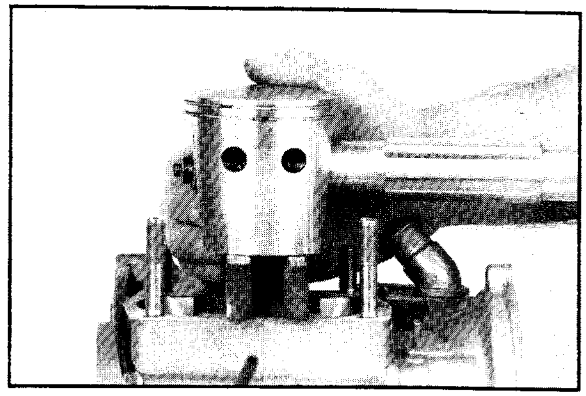


9. Install piston support block and remove C clips.

Reassembly Note: When reinstalling C clips, make sure that the open end of the retainer clip points either up or down, not to the side.

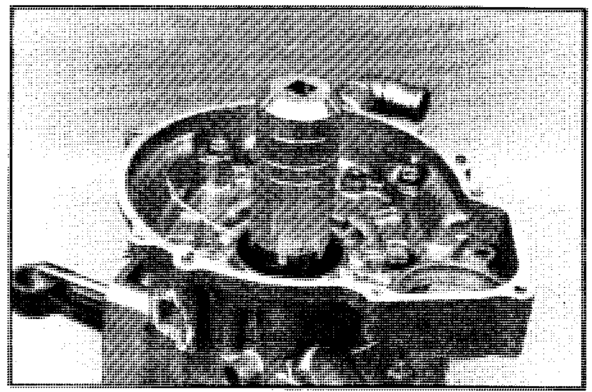


10. Remove piston pin using Polaris piston pin puller (PN 2870386).

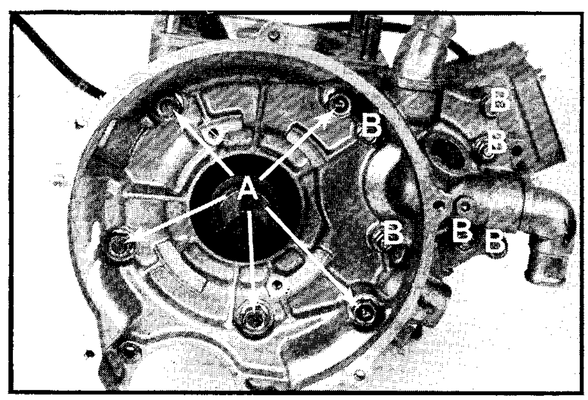


11. Remove slotted *left hand thread* crankshaft nut using Polaris tool (PN 2870967).

Reassembly Note: Reinstallation of this crankshaft nut will also require use of tool PN 2870967.

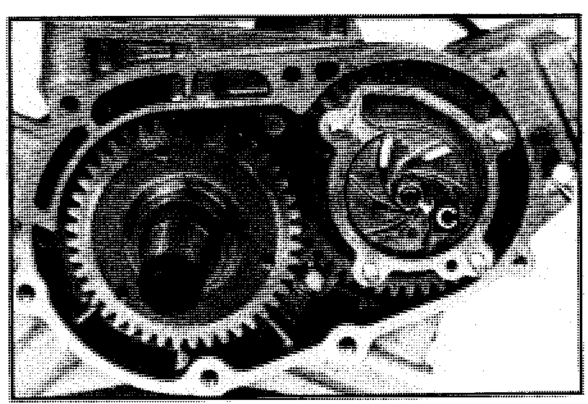


12. Remove five crankcase bolts (A) with a 12 mm socket.
13. Remove four nuts and two bolts (B) indicated in the photo at right with a 10 mm socket.
14. Remove cover, tapping lightly with a soft face hammer if necessary.



15. Using a 10 mm socket, remove the impeller nut (C).
16. Slide water pump assembly from counterbalance assembly.

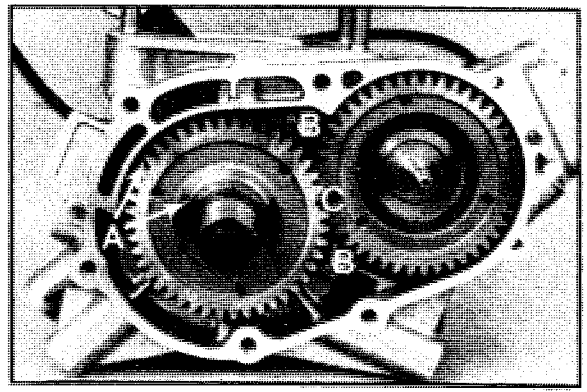
Reassembly Note: Watch for adjuster shims which may be between the impeller and pump housing. Make sure to reinstall any shims removed. Apply Loctite 242™ to impeller nut.

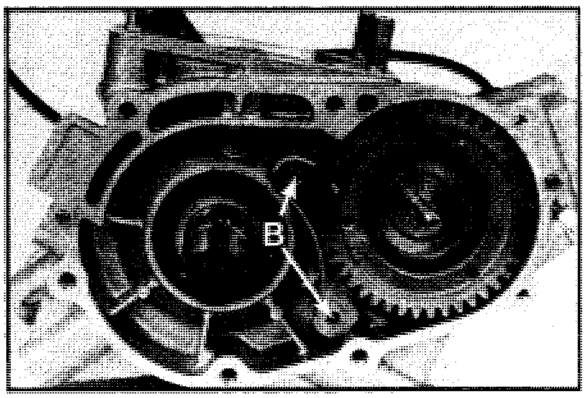


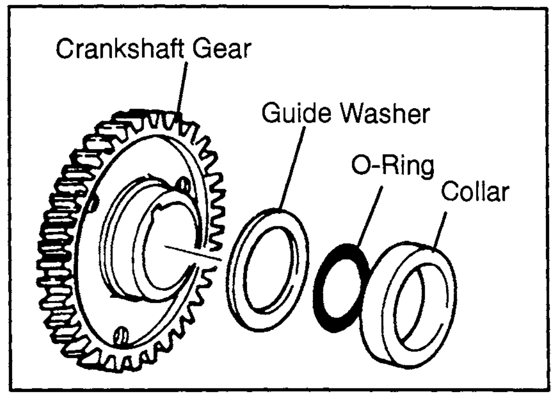
17. Remove collar, O-ring, guide washer and crankshaft gear (A). **NOTE:** A large screwdriver may be used to aid removal.

18. Remove two bolts retaining the counter balance bracket (B) using a 10 mm socket. **CAUTION:** Make no attempt to remove the counterbalance until steps 17 and 18 are complete, or damage may result to the counterbalance assembly.

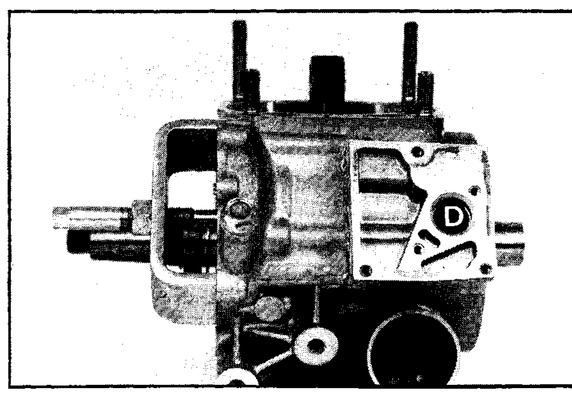
Reassembly Note: Punch marks (C) on both gears must be across from each other during reassembly. See photo three at right.





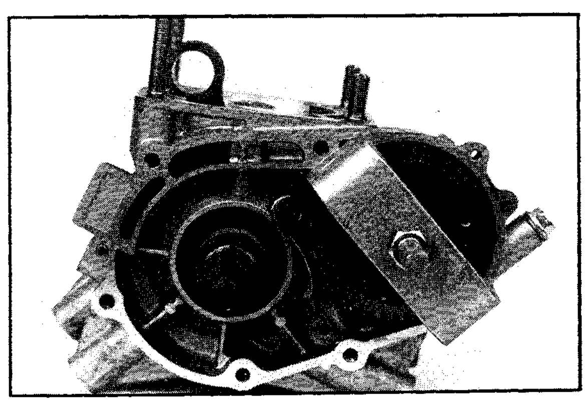


19. Remove oil pump assembly (D).



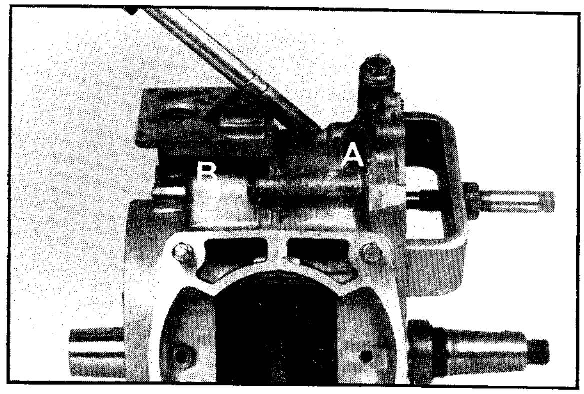
20. Attach counterbalance puller (PN 2870968) onto counter balance and position as shown in the picture at right.

Reassembly Note: The retainer bracket must be in position on the counterbalance assembly before the assembly is installed in the crankcase.



21. Heat areas (A) and (B) with a small propane torch for approximately one to two minutes, no closer than 1″ (2.5 cm) from case areas.

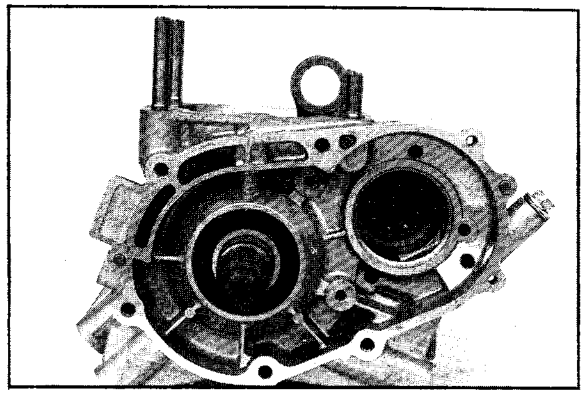
WARNING: Oil and gasoline are highly flammable and explosive under certain conditions. Use extreme caution when using a propane torch in this environment.



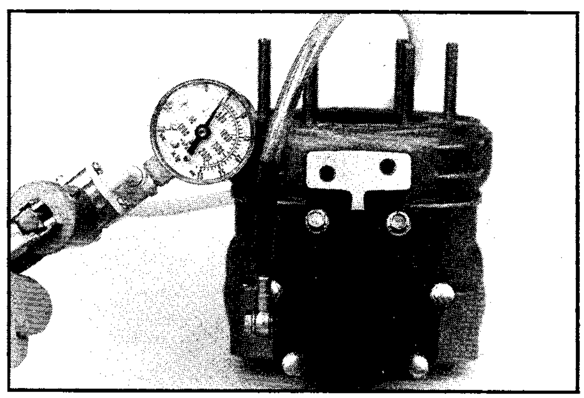
22. Once these areas are thoroughly heated, add tension to the puller by turning the large nut. Continue tensioning the puller until the counterbalance assembly is completely removed.

Reassembly Note: For reassembly of counterbalancer, heat areas (A) and (B) and press the balancer and bracket back into place.

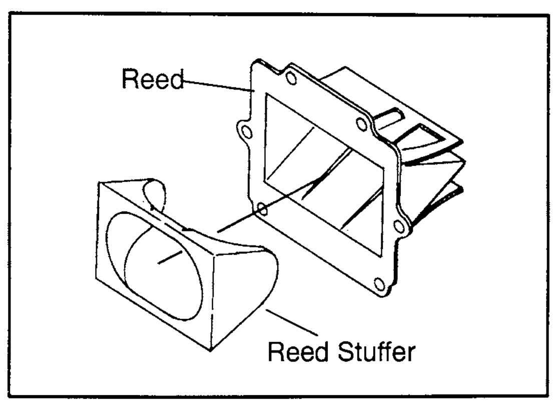
23. With counterbalance assembly removed, follow instructions for crankshaft service on pages 7.31 - 7.36.



24. The injection oil check valve is tested using the Mity Vac® (PN 2870975). With the Mity Vac in the pressure mode the check valve should release between 2 and 5 PSI.

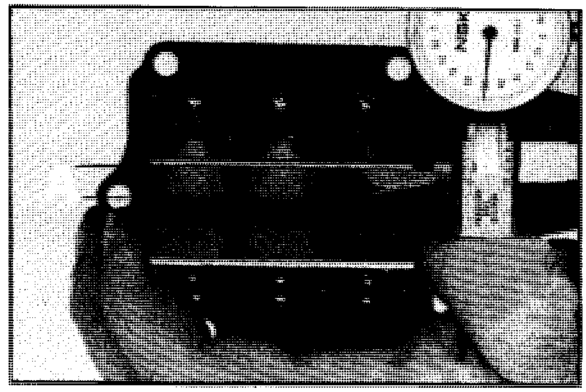


25. Remove the six bolts retaining the carb adapter and reed valve assembly using an 8 mm socket. **NOTE:** The reed stuffer is standard on the 400L models, and will retro-fit 350L engines.



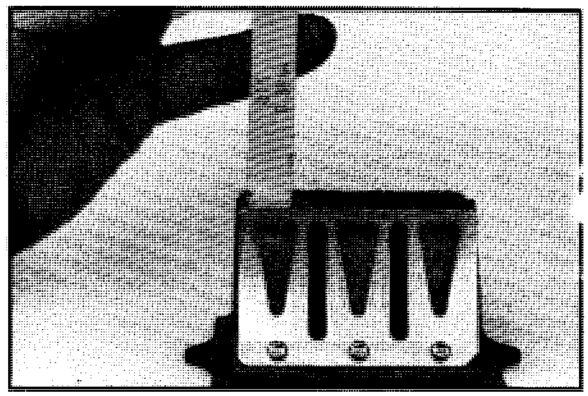
Reed Valve Assembly

26. Measure reed stop height in the area (A) indicated. Recommended stop height is .350″ (9 mm).



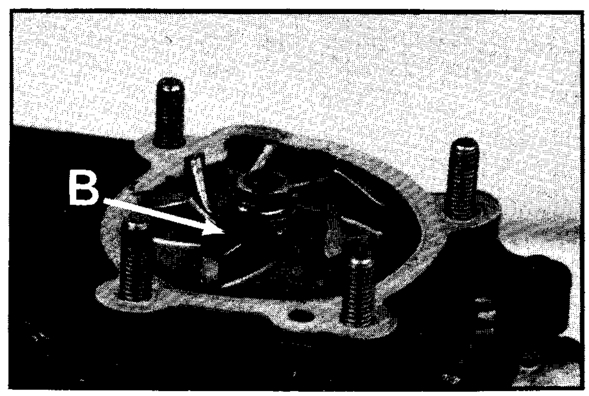
27. Measure the air gap of each reed valve petal as shown in the photo at right. The air gap should not exceed .015″ (.4 mm). **NOTE:** An early sign of reed valve failure may be hard starting.

28. Check each reed valve petal for white stress marks or missing material. Replace if necessary.

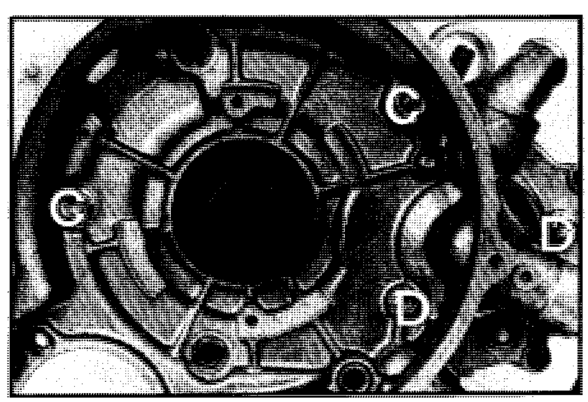


Whenever the counterbalance assembly is removed it is mandatory to verify impeller clearance. Following is a recommended procedure for measuring water pump impeller clearance.

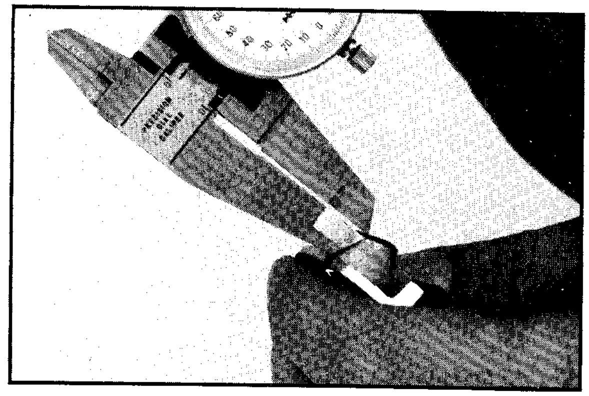
1. Apply a small amount of putty or clay to the top of one impeller blade (B).



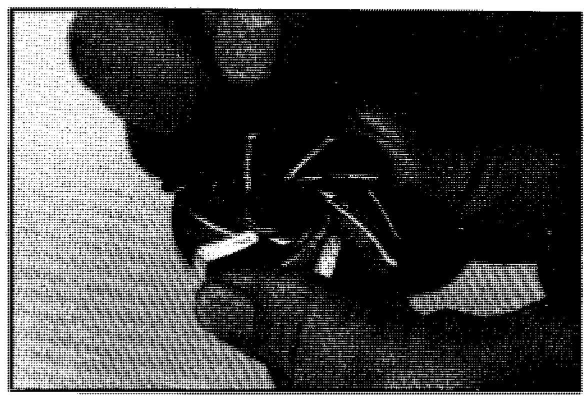
2. Reinstall case gasket and bolt case together at areas (C) and (D) as indicated on the photo at right.
3. Carefully remove case cover.



4. Remove water pump impeller and check clearance measurement. Acceptable clearance measured with a dial caliper is between .020″ - .040″ (.05 -.1 cm). **CAUTION:** If the clearance is less than .020″ (.05 cm) the impeller may grind against the case. If the clearance is more than .040″ (.1 cm) the water pump may cavitate.



5. The photo at right illustrates checking clearance measurement with a feeler gauge. This method may also be used to check thickness by removing half of the putty from the impeller blade.



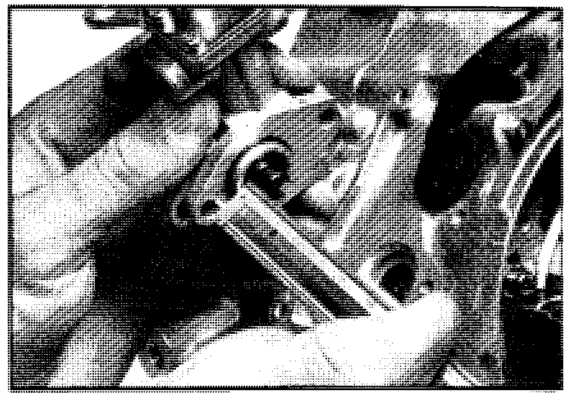
Spacer shim part numbers:

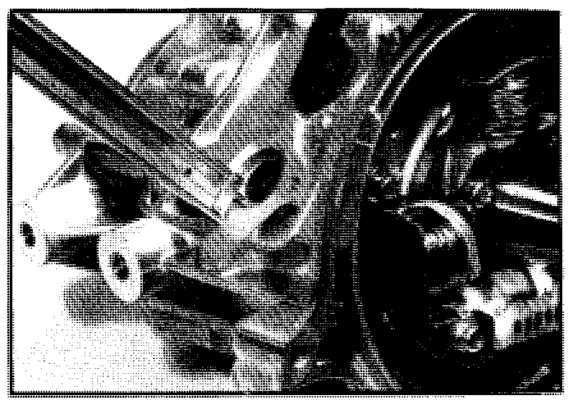
PN 3084188	0.1 mm/.004″
PN 3084189	0.2 mm/.008″

The oil pump is a positive displacement type pump. Whenever the oil pump, oil pump bushing, or crankcase are replaced, the end play clearance must be checked. A minimum of .008″ (.02 cm) is recommended between the oil pump boss and the bushing in the crankcase. If pump gear end play is excessive, a noticeable engine noise will occur at idle.

250/300 Models

1. Measure distance from pump shoulder, to pump, to crankcase mating surface. Record this reading.





2. Install pump gear thrust washer, pump gear, and pump bushing into crankcase. Make sure parts are completely seated.
3. Measure the distance from the pump bushing to the crankcase pump seating surface. Record this reading.
4. Subtract the measurement recorded in step 1 from the measurement recorded in step 3. The difference between these two measurements is the end play the pump bushings will have without spacers. Add spacers to adjust end play to .008″ - .016″ (.02 - .04 cm).

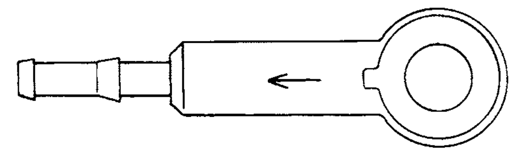
Spacer shim part numbers:

PN 3083671	.15 mm/.006″
PN 3083672	.3 mm/.012″
PN 3083673	.6 mm/.024″

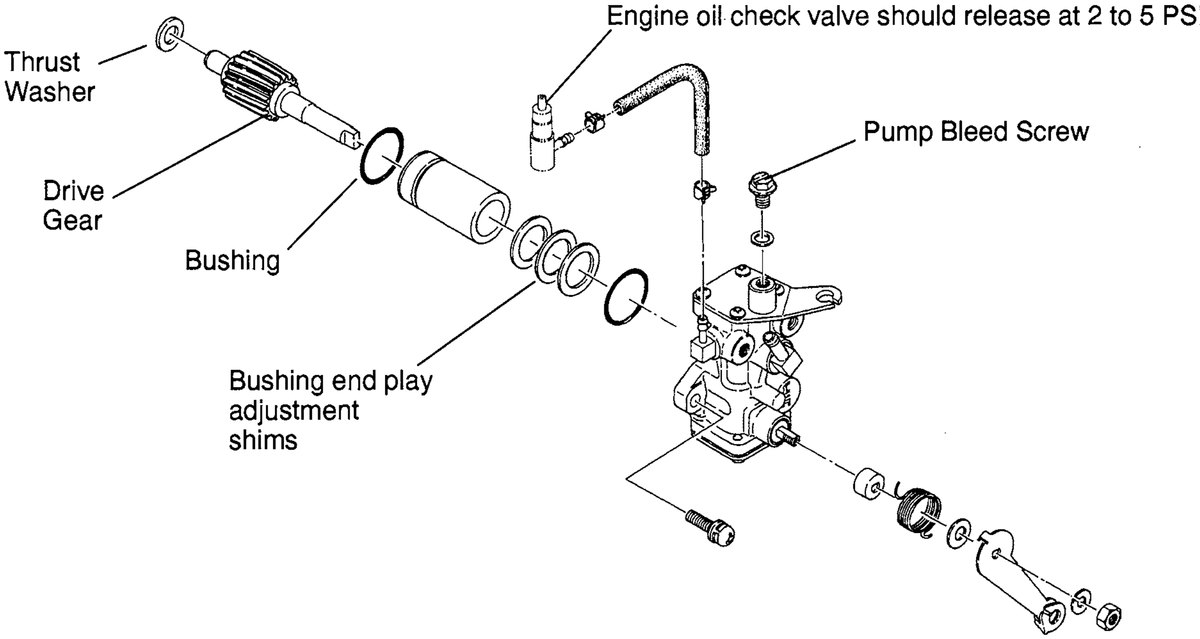
300 Oil Pump Check Valve Testing

The oil pump check valve on the EC28PF engine must be tested by applying 2 to 5 inches of mercury vacuum to the line spigot of the check valve.

Use a Mity Vac™ (PN 2870975) or similar vacuum tester.

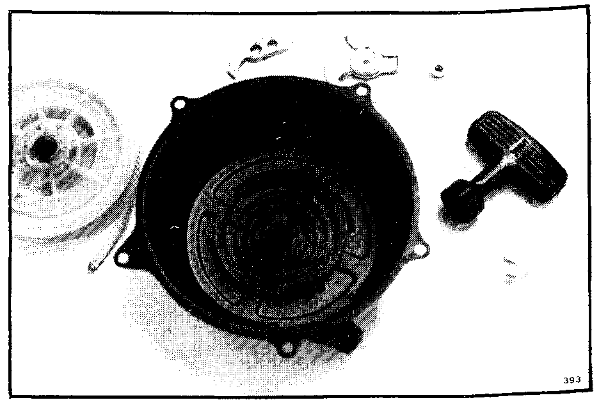


Check Valve



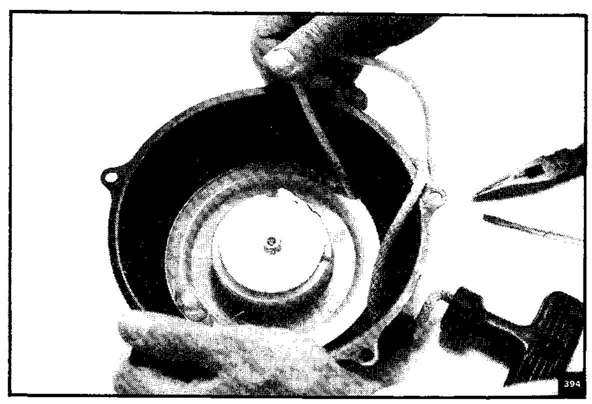
Recoil Disassembly (Early Style EC25PF-01/02 Engines)

1. Remove recoil handle. Allow rope to retract, and spring to totally unwind.
2. Remove retaining nut, ratchet friction plate and ratchet pawl from reel face.
3. Lift reel assembly straight up, out of housing. **NOTE:** If spring tension is relieved and reel is lifted straight out, the spring will stay in the housing.
4. Clean and inspect all parts. Repair or replace as required.



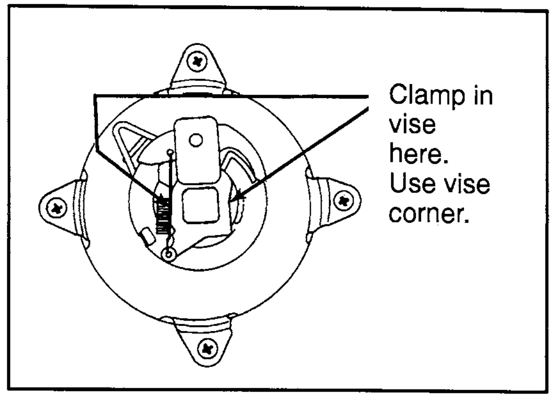
Recoil Reassembly

1. Reinstall spring if it was removed. The spring should spiral counterclockwise toward the center.
2. Lubricate center shaft and spring with Polaris low temperature grease.
3. Wind rope in a counterclockwise direction around outside of reel (as viewed from the ratchet side of the reel).
4. Pass end of rope through rope guide and slide reel down onto shaft and spring. **NOTE:** Make sure reel tab engages hook on end of spring.
5. Install rope handle.
6. Reinstall ratchet pawl onto reel face. **NOTE:** The ratchet spring holds the ratchet in.
7. Reinstall friction plate with one end of friction spring in the hole on the end of the ratchet pawl.
8. Reinstall flange nut and torque to 5 ft. lbs. (.7 kg/m).
9. Pull recoil rope to full extension and align notch on outside edge of reel with housing rope guide hole.
10. Using a needlenose pliers or hooked wire, pull a loop of rope through the notch and into the center of the housing.
11. Holding the side of the rope loop attached to the reel, wind the reel counterclockwise until coil bind is felt. Then unwind the reel between one and two turns.
12. Pull loop to outside of housing by pulling on rope handle.
13. Allow rope to fully retract and check for normal recoil and ratchet operation.

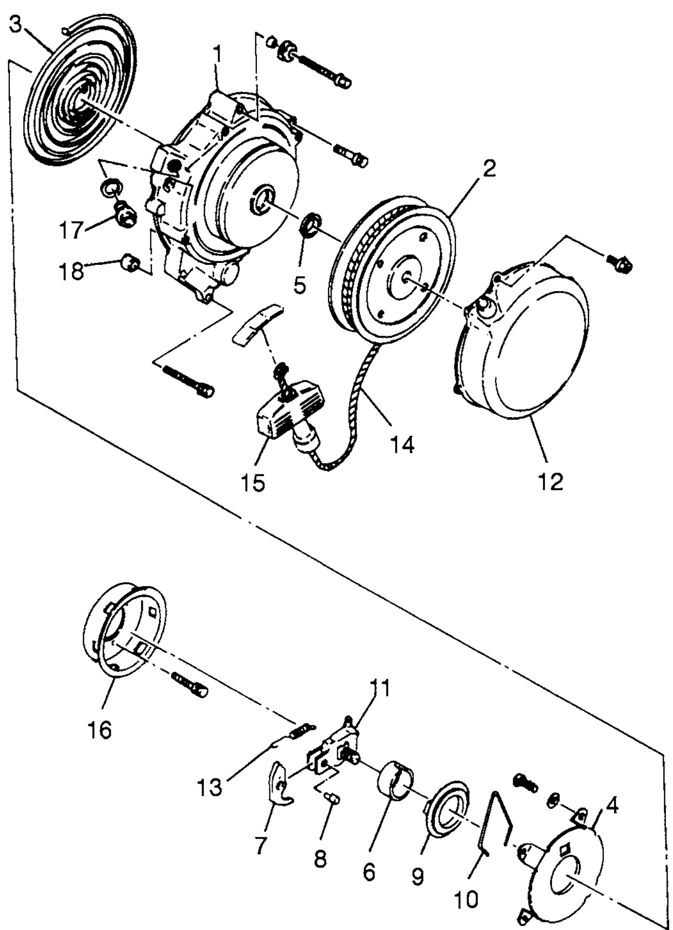


Recoil Disassembly (Late Style EC25PF-03 and Later Engines)

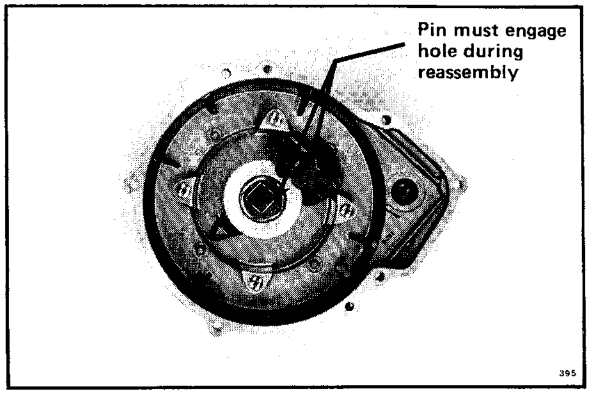
1. Remove four 6mm bolts securing reel housing to flywheel housing. **NOTE:** When the last bolt is removed, the reel housing will rotate, unwinding the recoil spring.
2. Remove reel housing. **NOTE:** If rope replacement is the only service necessary, it may be replaced without any further disassembly.
3. Remove pawl return spring.
4. Clamp sides of ratchet pawl bracket in the corner of the jaws of a vise.
5. Using a cloth belt type strap wrench wrapped around the outside edge of the reel, unscrew the reel counterclockwise to remove it from the ratchet pawl bracket shaft.
6. Remove the ratchet pawl bracket, spring hook, ratchet friction ring and friction spring. **NOTE:** It is not necessary to remove the spring retainer plate and spring unless it is damaged.
7. Clean and inspect all parts. Repair or replace as required.



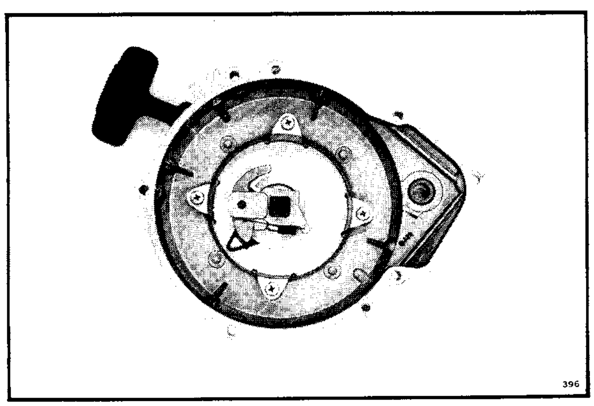
1. Flywheel Housing
2. Reel
3. Recoil Spring
4. Spring Retaining Plate
5. Seal
6. Spring Hook
7. Ratchet Pawl
8. Pawl Pin
9. Ratchet Friction Ring and Pawl Guide
10. Friction Spring
11. Ratchet Pawl Bracket
12. Reel Housing
13. Pawl Return Spring
14. Recoil Rope
15. Rope Handle
16. Recoil Cup
17. Timing Plug
18. Bushing



8. If the recoil spring was removed, reinstall it in its recess in the flywheel housing. The spring should spiral counterclockwise toward the center.
9. Grease spring with Polaris low temperature grease.
10. Install recoil spring retaining plate.
11. Grease and install spring hook, making sure it properly engages the spring end.
12. Install ratchet friction ring and friction spring assembly. The friction spring should engage the bent tab on the recoil spring retaining plate. The "L" on the friction ring should be positioned as shown in the photo at right.

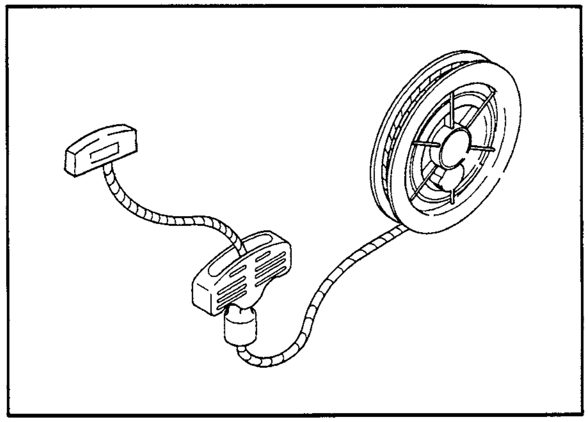


13. Grease the center hole and seal in the flywheel housing.
14. Install ratchet pawl bracket. The alignment pin and the square drive on the bracket shaft should properly align in the spring hook.
15. While holding the bracket tight against the spring hook, flip the flywheel housing over and thread the reel onto the pawl bracket shaft.
16. Clamp the ratchet pawl bracket in the corner of the jaws of a vise. Firmly hand tighten the reel.
17. If the rope was removed, or if a new rope is being installed, attach one end of the rope to the reel, pass the other end of the rope through the guide in the reel housing and attach it to the rope handle.
18. Install the rope housing over the reel.
19. Holding the flywheel housing with one hand, rotate the rope housing clockwise until the rope is completely re-wound.
20. Rotate the housing three more turns and reinstall bolts.
21. Reinstall pawl return spring.
22. Check recoil and ratchet operation.
23. When reinstalling assembly onto engine, use Loctite 515 Gasket Eliminator between the flywheel housing and crankcase.



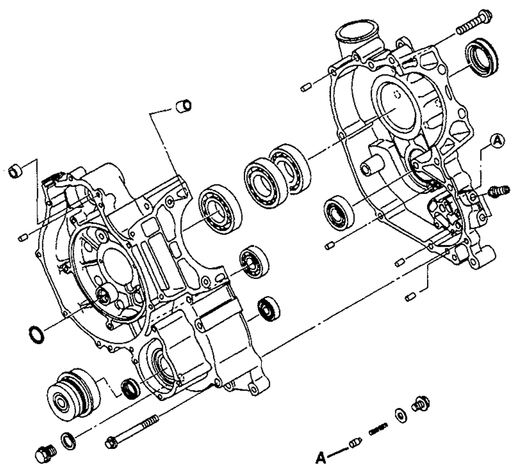
Recoil Reassembly EC28 and EC38 Engines

Beginning with 1994 300 and 400L engines, the recoil cup has been removed and incorporated onto the flywheel.

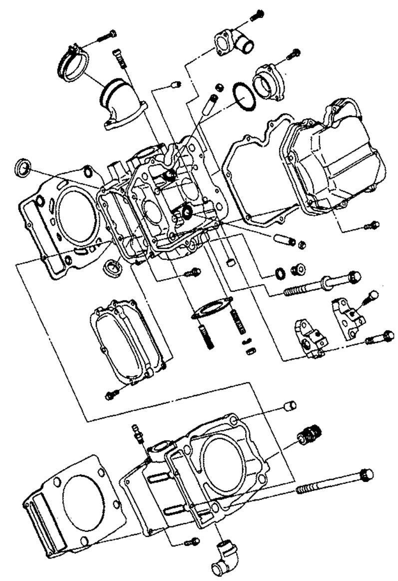


1. If the recoil rope was removed or if a new rope is being installed, attach one end of the rope to the reel, pass the other end of the rope through the guide in the reel housing and attach it to the rope handle.
2. Install the rope housing over the reel.
3. Holding the flywheel housing with one hand, rotate the rope housing clockwise until the rope is completely re-wound.
4. Rotate the housing three more turns and install the pawl return spring with the large end of the spring going into rope housing; reinstall retainer plate, lock washer and bolt.
5. Check recoil and ratchet operation.
6. When reinstalling assembly onto engine, use Loctite 515 Gasket Eliminator between the flywheel housing and crankcase.

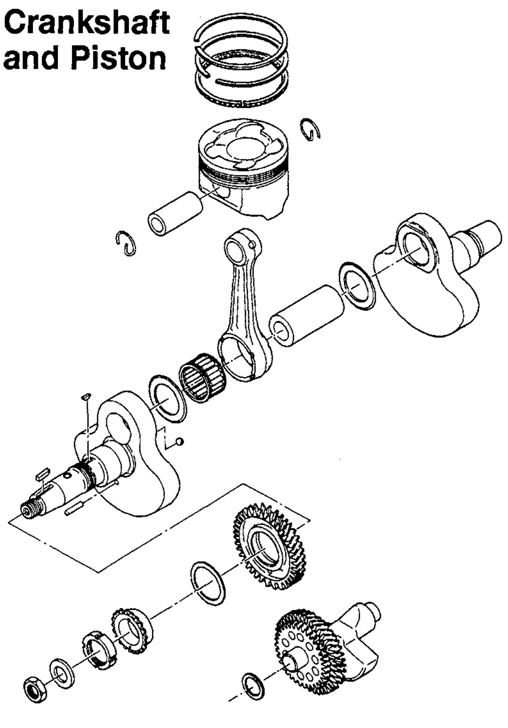
Crankcase



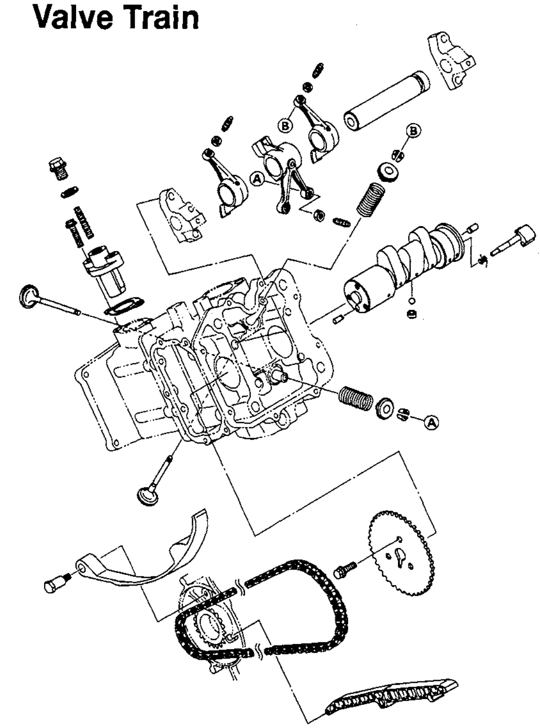
Cylinder/ Cylinder Head



Crankshaft and Piston



Valve Train



Engine Lubrication

Oil Type	Polaris Premium 4 Synthetic (PN 2871281); or API certified "SH" 5W30 oil
Capacity	2 U.S. Quarts (1.9 l)
Filter	PN 3084963
Filter Wrench	Snap On PN YA997 or equivalent
Drain Plug Torques	14 ft. lbs. (1.9 kg/m) tank and sump
Oil Pressure Specification	20 PSI @ 5500 RPM, Polaris 0W/40 Synthetic (Engine Hot)

Oil Flow

The chart on page 7.57 describes the flow of oil through the engine. Beginning at the oil tank, the oil flows through a screen fitting in the bottom of the tank and into the oil supply hose. The feed side of the oil pump draws oil through the hose and into the crankcase oil gallery, and then pumps the oil through another passage to the one way valve. (When the engine is off, the one way valve closes to prevent oil in the tank from draining into the crankcase.) The oil is pumped through a delivery pipe to the oil filter. If the oil filter is obstructed, a bypass valve contained in the filter allows oil to bypass the filter element.

At this point, the oil is diverted in two directions. Oil is supplied to the camshaft through the left front cylinder stud, and an oil passage in the head. Oil enters the camshaft through the PTO (L) journal. The camshaft journals, cam lobes, and rocker arms are lubricated through holes in the camshaft. The oil lubricates the cam chain and sprocket and drains to the sump.

The other oil path from the filter leads through a delivery pipe to the crankcase main oil gallery, which leads to the stator plate oil passage. Here it passes through the slotted friction bearing into the crankshaft. An oil seal on the stator plate prevents oil from entering the stator/flywheel area. Oil travels through the crankshaft to the crank pin, lubricating the connecting rod large end bearing directly. Oil also passes through an oil jet (drilled orifice) in the end of the crank pin to the PTO end main bearings and counterbalancer gears.

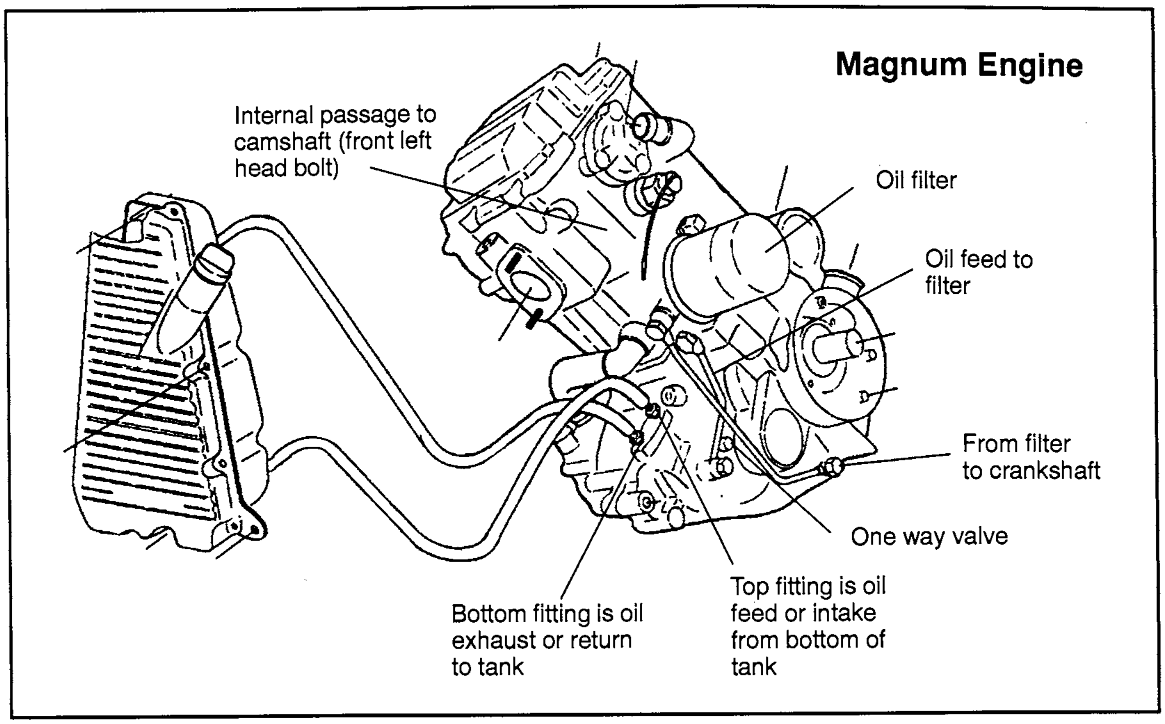
Residual oil from the lubrication of the crankshaft and connecting rod indirectly lubricates the cylinder wall, piston, rings, connecting rod small end bearing, piston pin, oil/water pump drive gears, cam chain and drive sprocket, and Magneto end crankshaft main bearing.

The one-way valve is located on the front left (PTO) side of the crankcase. The valve prevents oil in the tank from draining into the engine sump when the engine is off. The valve mechanism consists of a plunger, return spring, guide plug, and sealing washer. When the engine is running, oil pressure lifts the plunger off the seat, allowing oil flow. When the engine is off, spring pressure forces the plunger against the oil passage seat, preventing oil flow from the tank to the sump. The one–way valve requires very little maintenance. If engine oil drains into the sump when the engine is off, inspect the valve sealing surface for debris or damage. Inspect the return spring for distortion or damage.

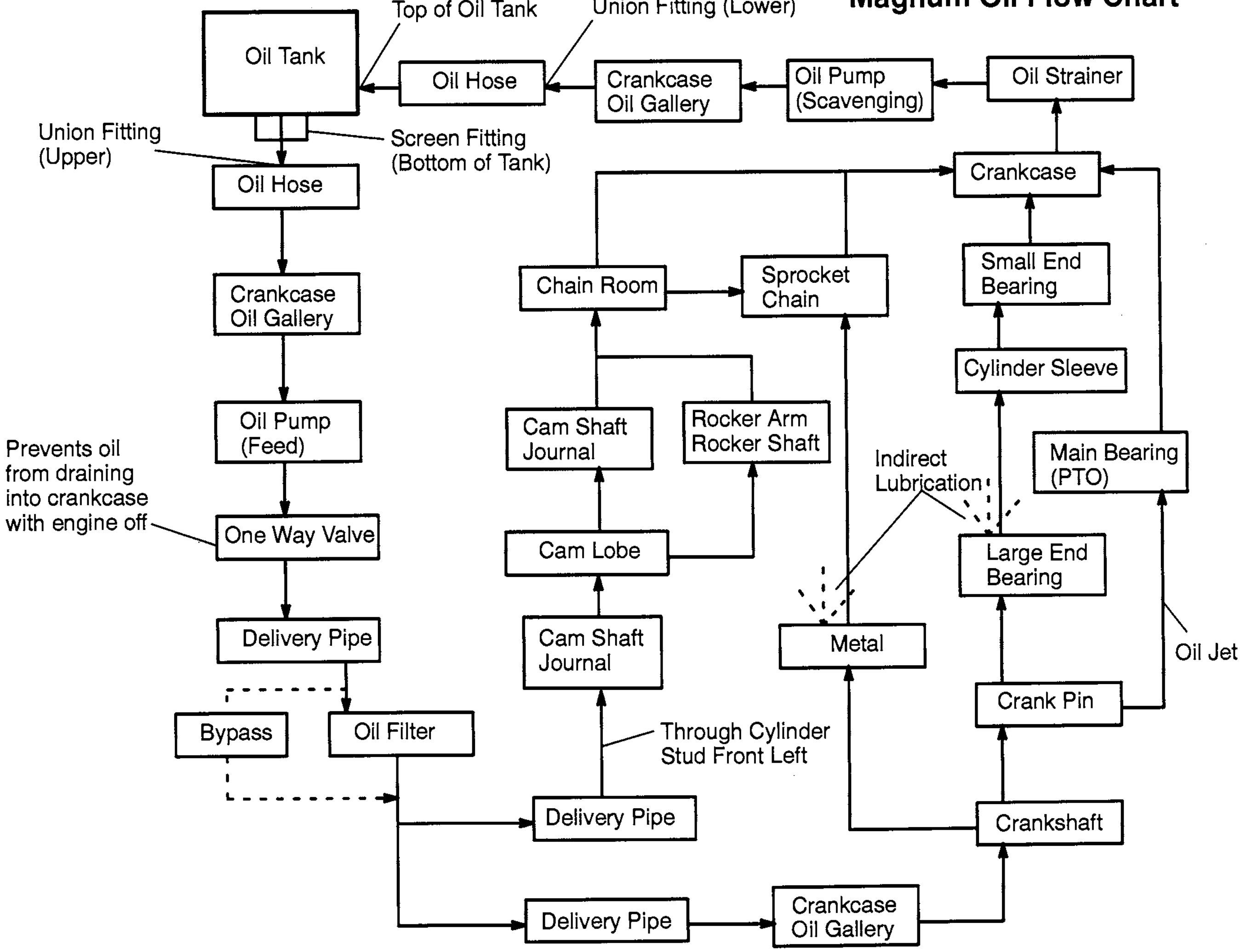
Oil Pressure Test

1. Remove blind plug on front left cylinder head.
2. Insert a 1/8 NPT oil pressure gauge adaptor into the cylinder head and attach the gauge.
3. Start engine and allow it to reach operating temperature, monitoring gauge indicator.

Oil Pressure at 5500 RPM (Engine Hot):
Standard: 20 PSI
Minimum: 12 PSI



Magnum Oil Flow Chart



Magnum Engine Removal

The following components can be serviced or removed with the engine installed in the frame:

- PVT System
- Flywheel
- Alternator/Stator
- Starter Motor/Starter Drive
- Camshaft
- Rocker Arms
- Cam Chain and Sprockets
- Cam Chain Tensioner and Guides
- Cylinder Head
- Cylinder
- Piston/RIngs

The following components require engine removal for service:

- Oil Pump
- Water Pump*
- Water Pump Mechanical Seal
- Counterbalancer Assembly
- Connecting Rod
- Crankshaft
- Crankshaft Main Bearings
- Crankcase

* Complete engine removal is not necessary to inspect or replace the water pump impeller.

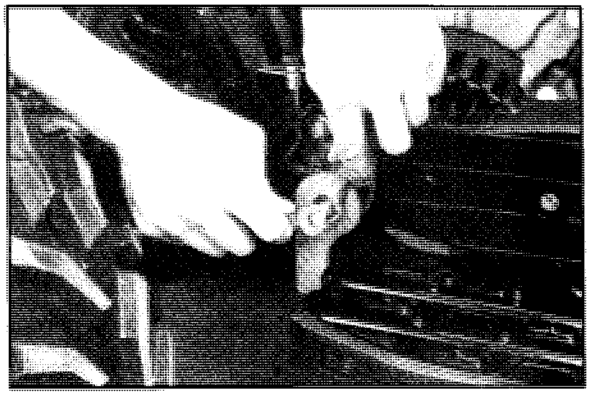
Engine Removal Preparation

1. Clean work area.
2. Thoroughly clean the ATV engine and chassis.
3. Disconnect battery negative (-) cable.
4. Drain oil tank and engine sump.
5. Remove the following parts. Refer to the Body Chapter for removal procedures.
   - Seat
   - Left and Right Side Covers
   - Fuel Tank Cover
   - Fuel Tank (see Fuel System Chapter)
   - Rear Rack
   - Rear Cab
6. Disconnect spark plug high tension lead.
7. Remove air pre-cleaner and duct.
8. Disconnect engine breather line from engine.
9. Hold plastic fitting on airbox LH side with a wrench, remove oil tank breather line clamp and remove line.
10. Loosen carburetor boot clamp and two bolts securing airbox. Remove airbox.

11. Remove carburetor. See page 7.130.
12. Insert a shop towel into the carburetor flange to prevent dirt from entering the intake port.
13. Remove springs from exhaust pipe and remove pipe.

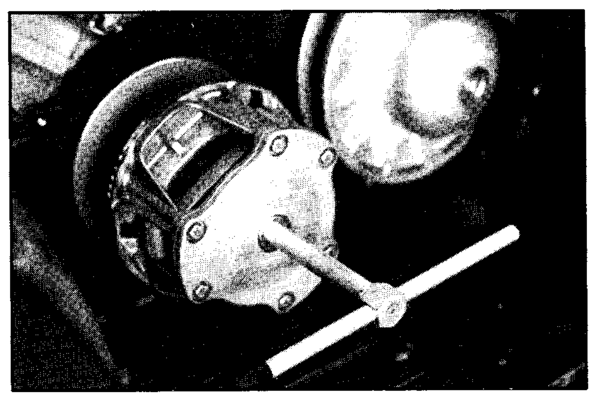
AWD Models:

14. Loosen auxiliary brake adjuster locknut, remove adjusting bolt and brake actuator arm.
15. Remove center chain guard bolt, two screws, and chain guard.
16. Remove center drive and driven sprocket bolts and remove chain and sprockets as an assembly.

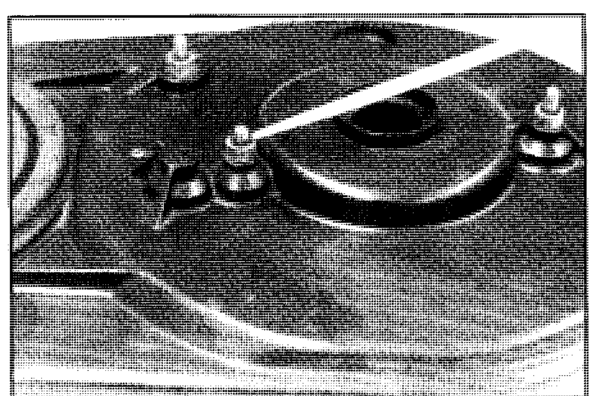


PVT Disassembly, All Models:

17. Remove the screws and retainer clips from PVT outer cover and remove cover.
18. Mark the drive belt direction of rotation and remove drive belt. The belt is normally installed so the numbers can be easily read.
19. Remove drive clutch retaining bolt and remove drive clutch using puller PN 2870506.



20. Remove driven clutch retaining bolt and driven clutch using puller PN 2870913.
21. Remove driven clutch offset spacers from the transmission input shaft.
22. Remove cable tie from PVT air outlet duct.
23. Bend back retainer tabs on three screws at the front of the inner cover and remove screws and retainer plate.
24. Loosen three inner cover retaining bolts at the rear of the cover only enough to allow cover removal.
25. Remove cover. **NOTE:** Do not lose spacers or spacer retaining O-rings located on the inside of the inner cover.



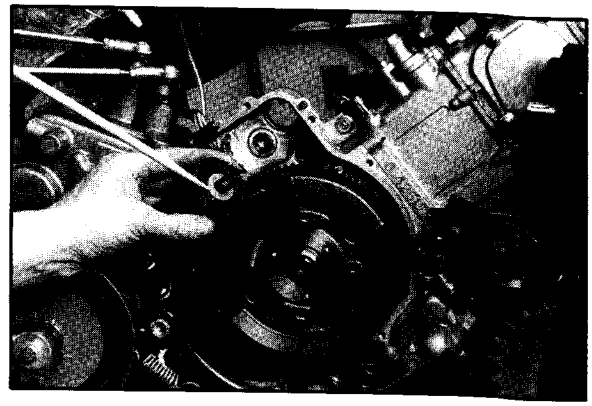
Recoil/Stator Removal

NOTE: Removal of the recoil flywheel and stator assembly will allow additional clearance for engine removal.

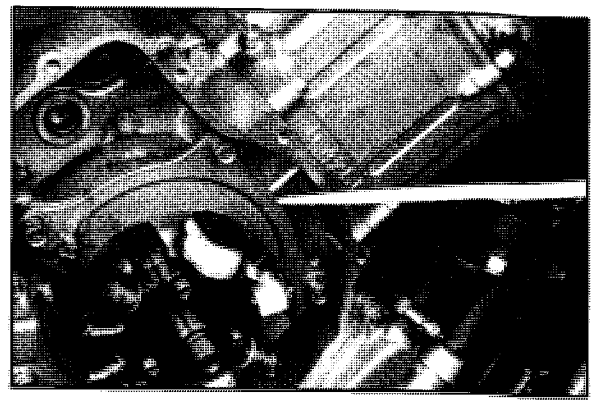
Remove:

- Recoil housing bolts and housing.
- Starter drive assembly. Note the thrust washer located at the rear of the drive mechanism.
- Flywheel nut and washer.

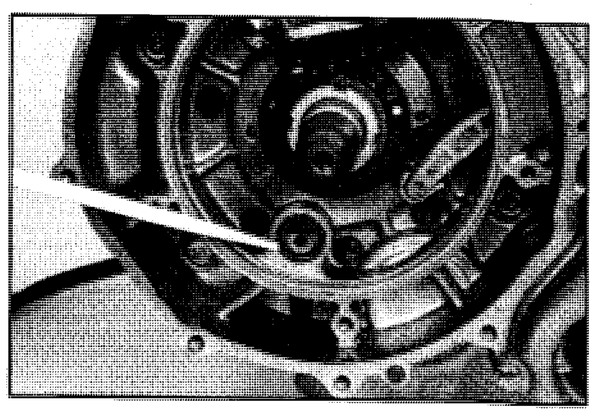
1. Install flywheel puller and remove flywheel. **CAUTION:** Do not thread the puller bolts into the flywheel more than 1/4″ (.63 cm) or stator coils may be damaged.



2. Mark or note position of stator plate on crankcase.
3. Remove bolts and carefully remove stator assembly, being careful not to damage the crankshaft bushing or oil seal on the stator plate.
4. Wrap stator in a shop towel and secure stator out of the way on top of frame.

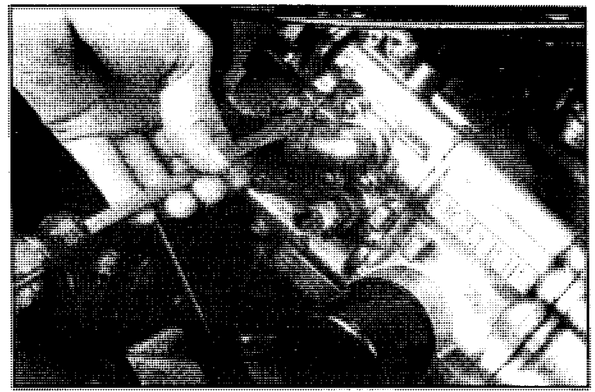


5. Remove oil passage O-Ring.
6. Place a shop towel in the cam chain area and over crankshaft oil passage.
7. Remove transmission linkage rods from shift selector and secure out of the way.
8. Remove PVT air intake duct.
9. Disconnect coolant temp sender wire.



Remove:

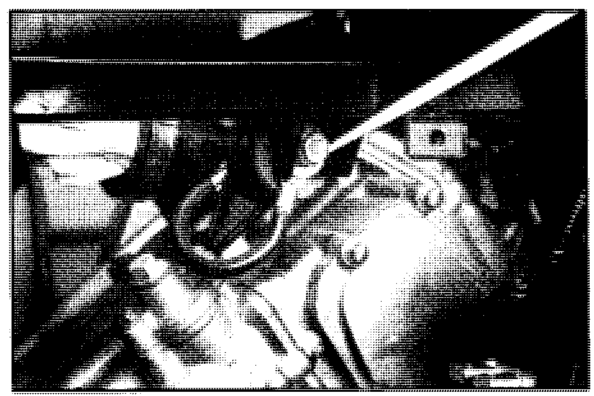
- Starter motor. Note ground cable location. Mark positive (+) cable mounting angle and remove cable.
- Oil tank bolts and oil tank, securing it out of the way.
- Oil filter. Cover oil filter area with a shop towel.



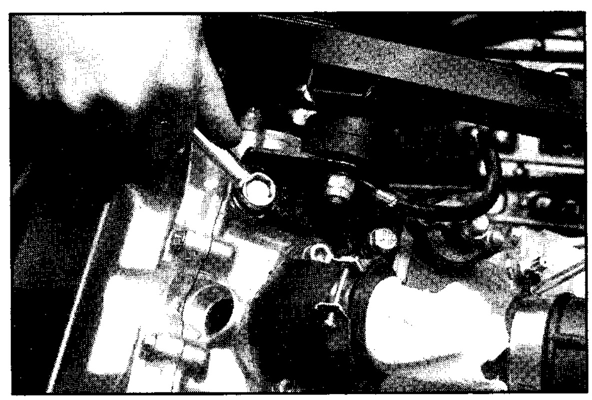
10. Loosen oil line hose clamps and remove oil lines. **NOTE:** The uppermost line is the oil feed from the bottom of the tank. Cover both oil lines to prevent dirt from entering the line.
11. Remove coolant tank Torx™ screws and remove tank. Secure out of the way.
12. Loosen clamp and remove coolant line from thermostat housing. Drain the line into a suitable container. Plug end of thermostat housing to minimize spillage.

NOTE: Mark the center of the engine mount studs in the frame for reference upon installation.

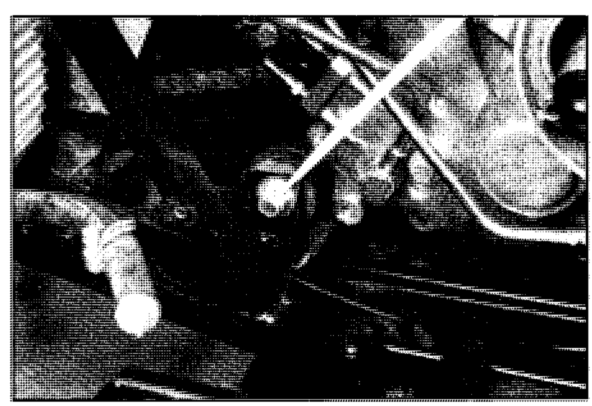
13. Remove nut, ground cable and washer from the upper right engine mount and mark the location of the center of the mount stud.



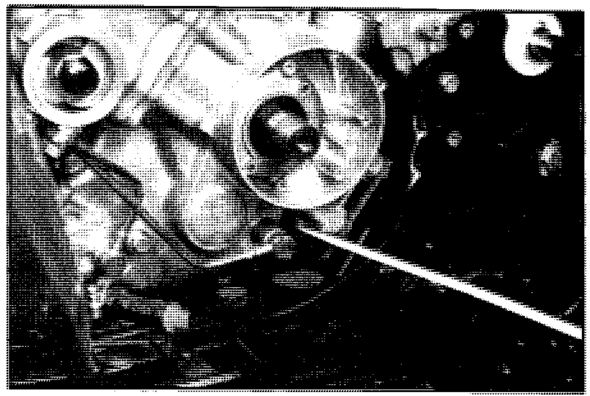
14. Remove the two upper engine mount plate bolts and remove the plate and ground cable.



15. Remove nut and washer from lower left engine mount and mark location of stud.

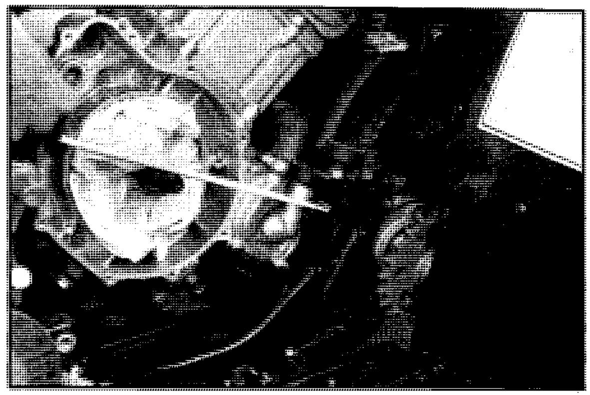


16. Loosen nut on slotted rear engine mount plate and back it out to the end of the stud.

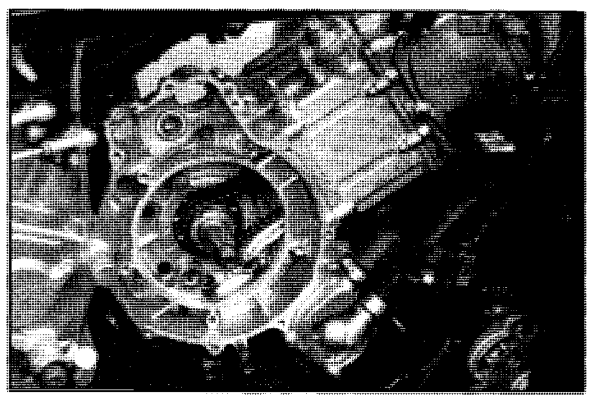


Final Coolant Draining/Engine Removal

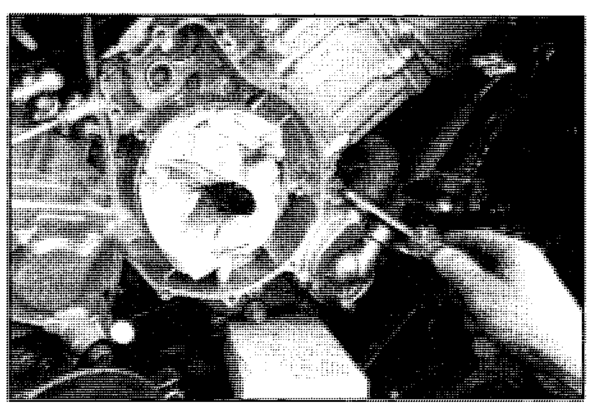
1. Move top of engine to left until the coolant supply hose clamp clears the frame at the water pump fitting.



2. Lift and twist engine clockwise until the lower left engine mount stud is clear of the frame mount and the lower right coolant hose clamp clears the frame tube.



3. Support engine in this position with a suitable support, such as a board or a 2x4.
4. Place a drain pan beneath area to catch coolant.
5. Clamp coolant inlet hose leading from radiator to pump to reduce coolant spillage.
6. Loosen hose clamp on upper water pump outlet coolant hose and remove hose, draining engine coolant into container. **NOTE:** Remove plug in thermostat housing to increase flow.
7. Reinstall hose and clamp.
8. Remove hose from water pump inlet and place in container. Release clamp from hose and allow hose to drain completely.
9. Lift back of engine while rotating front of engine clockwise and remove engine from left side of frame.



Engine Installation

1. Install engine from left side of frame, placing slotted rear engine plate in position with washer and nut on top of plate.
2. Attach water pump inlet hose and tighten clamp.
3. With engine in place on rear mount and inlet hose connected, tip top of engine to the left and rotate counterclockwise to engage lower left engine mount in frame.
4. Continue rotating engine making sure the hose clamp for the water pump inlet hose clears the frame at lower right side of engine near water pump.
5. Install upper engine mount bracket to engine and line up all reference marks.
6. Align engine by temporarily installing clutches and following alignment/offset procedure outlined in the PVT Chapter.
7. When engine is aligned properly, tighten all engine mounts and install all parts, reversing the order of disassembly. See engine installation notes.

Engine Installation Notes

Oil Supply

1. Before installing oil supply line, add Polaris Premium 4 0W/40 oil to the oil tank until oil flows from feed line.
2. Connect the lines to the pump inlet and outlet fitting and tighten securely. Be sure oil feed line is properly connected to the uppermost oil line fitting on the crankcase. Add oil until it is at the upper mark on dipstick.

Bleed Cooling System

1. Fill coolant reservoir tank to full mark.
2. With hose removed from thermostat housing, add coolant to radiator *slowly* until coolant begins to flow from thermostat housing.
3. Install hose on thermostat housing and tighten clamp. Continue to add coolant *slowly* until radiator is full.
4. Install radiator cap and squeeze coolant lines to force air out of system.
5. Remove cap and add coolant if necessary.
6. After reassembly is complete, start engine and observe coolant level in the radiator. Allow air to purge and top off as necessary. Reinstall radiator cap and bring engine to operating temp. Check level in reservoir tank after engine is cool and add coolant if necessary.

Transmission

1. Readjust transmission shift linkage as outlined in Transmission Chapter.

Exhaust

1. Seal all connections with high temp silicone seal.
2. Check to be sure all springs are in good condition.

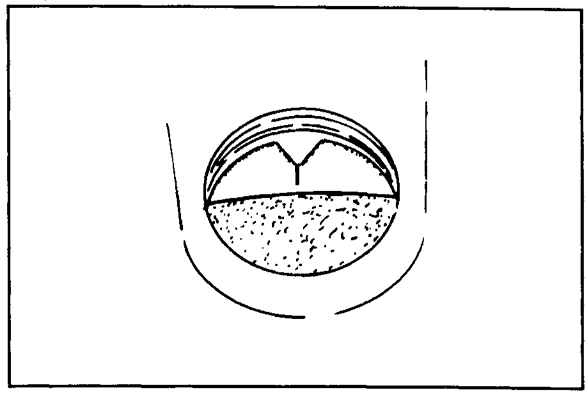
Engine Disassembly/Inspection

Cam Chain Tensioner/Rocker Arm/Camshaft Removal

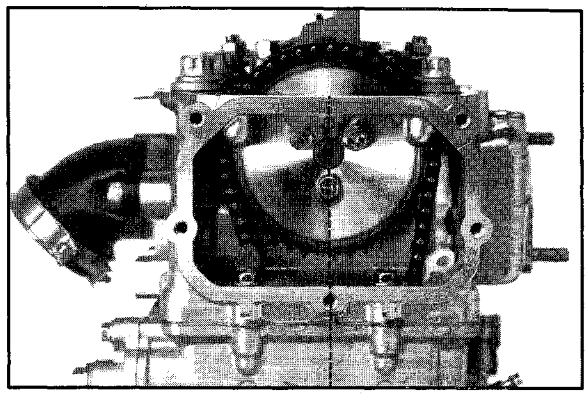
1. Remove fuel tank and spark plug high tension lead. If camshaft is to be removed, drain engine coolant. See cooling system draining/refilling, page 7.10.
2. Remove bolt securing rocker cover and remove cover and gasket.
3. Remove ignition timing inspection plug from recoil housing.

To position crankshaft at Top Dead Center (TDC) on compression stroke:

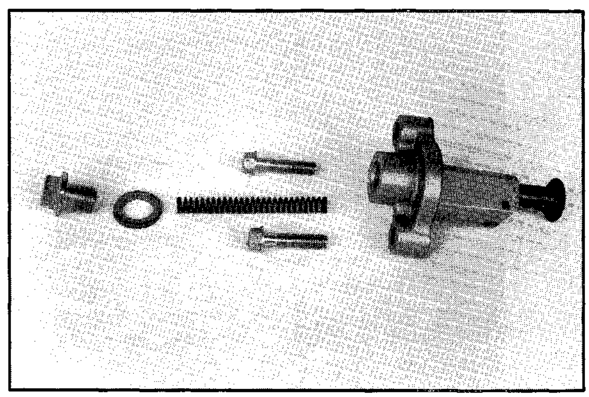
4. Rotate engine slowly in the direction of rotation watching intake valves open and start to close.
5. Continue to rotate engine slowly, watching camshaft sprocket marks and the mark in the timing inspection hole.



6. Align mark on flywheel with projection in inspection hole, and the cam sprocket pin (facing upward) aligned with the camshaft to crankshaft center line. **NOTE:** The cam lobes should be pointing down and all valves should have clearance at this point.

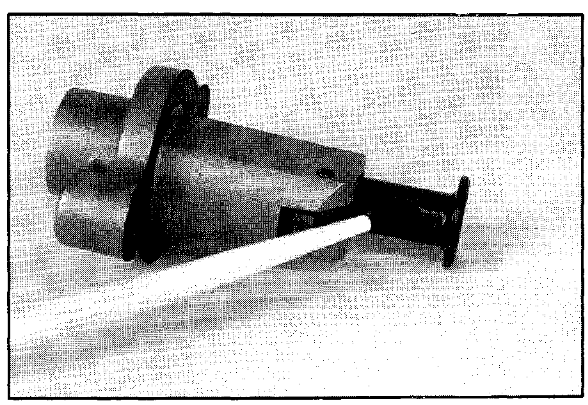


7. Remove cam chain tensioner plug, sealing washer, and spring. **CAUTION:** The plug is under spring tension. Maintain inward pressure while removing.
8. Remove the two 6x25 mm cam chain tensioner flange bolts.
9. Tap lightly on tensioner body with a soft face hammer and remove tensioner.

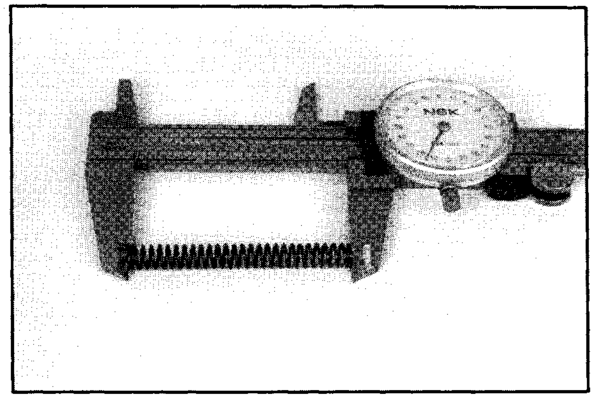


Cam Chain Tensioner Inspection

1. Pull cam chain tensioner plunger outward to the end of its travel. Inspect teeth on ratchet pawl and plunger for wear or damage.
2. Push ratchet pawl and hold it. The plunger should move smoothly in and out of the tensioner body.



3. Release ratchet pawl and push inward on plunger. It should remain locked in position and not move inward.
4. Measure free length of tensioner spring. Replace spring if excessively worn.

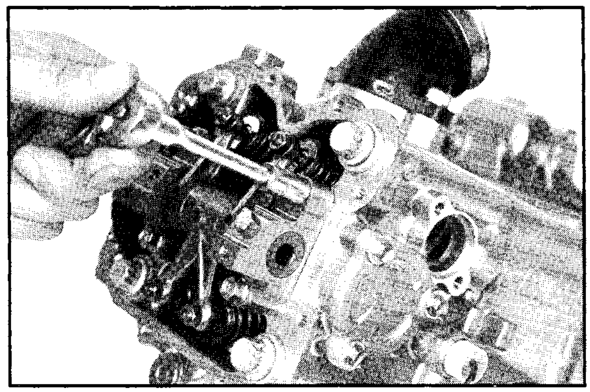


> **Tensioner Spring Free Length:**
>
> **Std. 2.320″ (5.9 cm)**

5. Replace entire tensioner assembly if any part is worn or damaged.

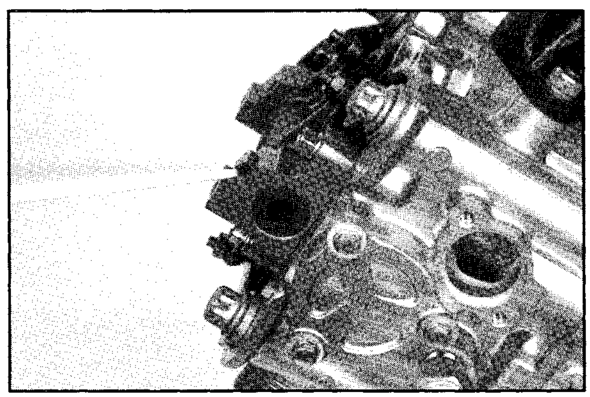
Rocker Arm/Shaft Removal

1. Loosen rocker shaft retaining bolt.
2. Remove the four bolts securing rocker shaft supports, and remove the supports, rocker shaft and rocker arms as an assembly, being careful not to drop the dowel pins into the engine.



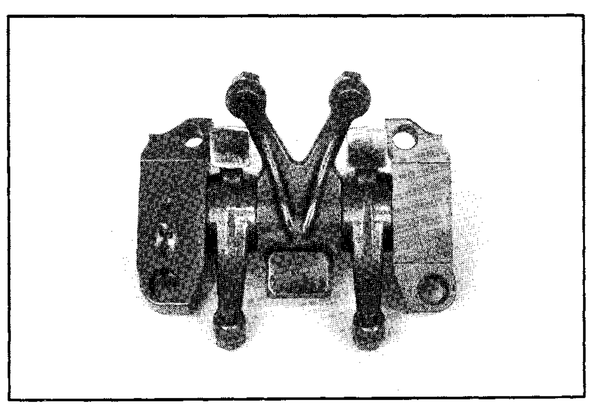
Rocker Arm/Shaft Inspection

1. Remove retaining bolt from the PTO (left) end rocker shaft support.
2. Mark or tag intake rocker arms so they can be installed in the same position.

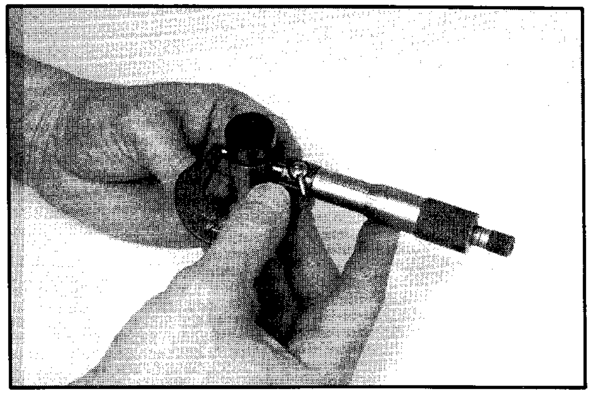


Rocker Shaft Retaining Bolt

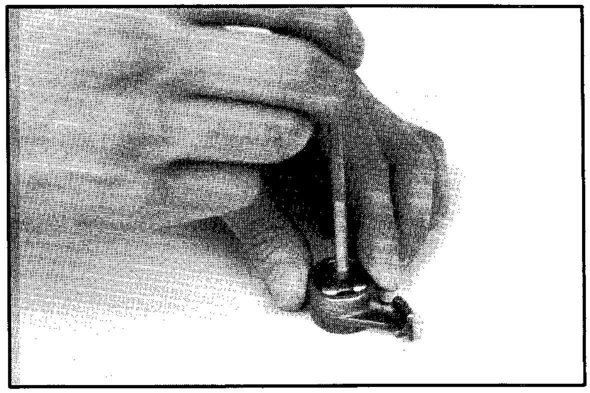
3. Inspect each rocker arm cam follower surface. If there is any damage or uneven wear, replace the rocker arm. **NOTE:** Always inspect camshaft lobe if rocker arms are worn or damaged.



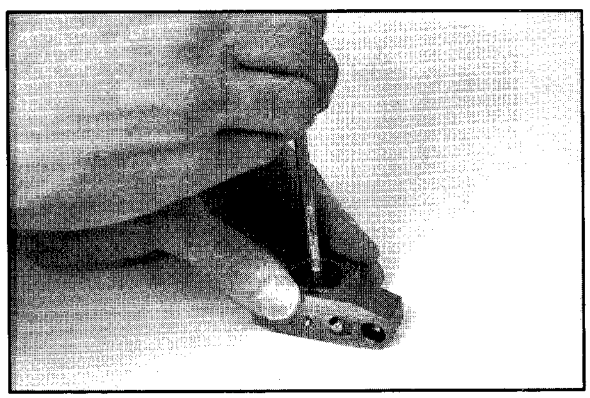
4. Measure O.D. of rocker shaft. Inspect it for wear or damage.



5. Measure I.D. of each rocker arm.



6. Measure I.D. of both rocker arm shaft supports and visually inspect surface.



Rocker Shaft OD:
.8656-.8661 (21.987-22.00 mm)

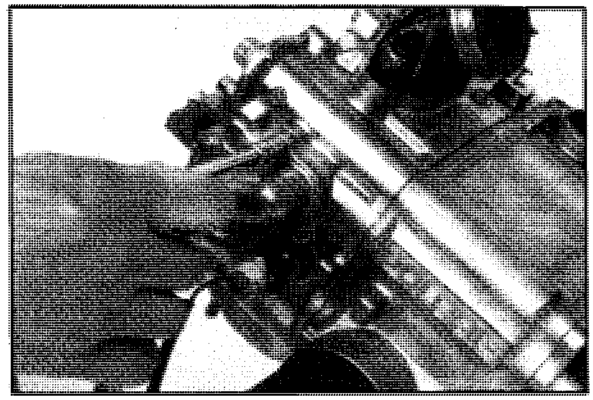
Rocker Arm ID and Shaft Support:
.8669-.8678 (22.020-22.041 mm)

Clearance-Rocker Arm to Rocker Shaft:
Std: .0008-.0021 (.020-.054 mm)
Service Limit: .0039 (.10 mm)

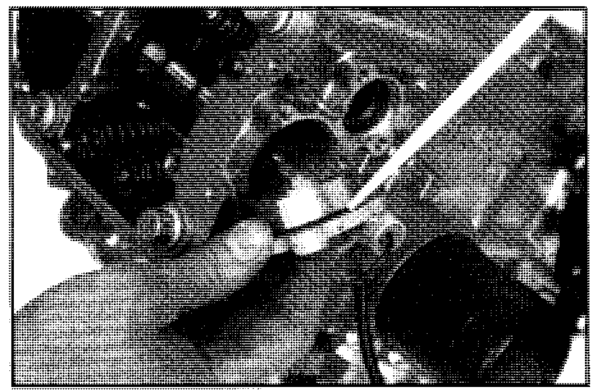
7. Inspect rocker adjuster screws for wear, pitting, or damage to threads of the adjuster or locknut. Replace all worn or damaged parts. **NOTE:** The end of the adjuster screw is hardened and cannot be ground or re-faced.

Camshaft Removal

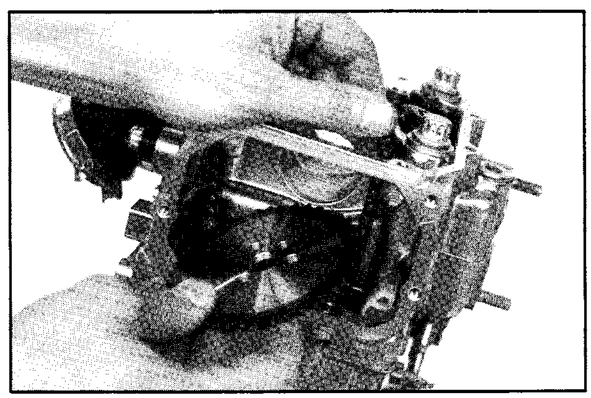
1. Remove camshaft sprocket inspection cover.
2. Loosen three camshaft sprocket bolts.
3. Remove thermostat housing and thermostat. Note the location of the air bleed holes in the thermostat. Upon reassembly, the thermostat bleed holes should be positioned next to the holes for the thermostat cover bolts.



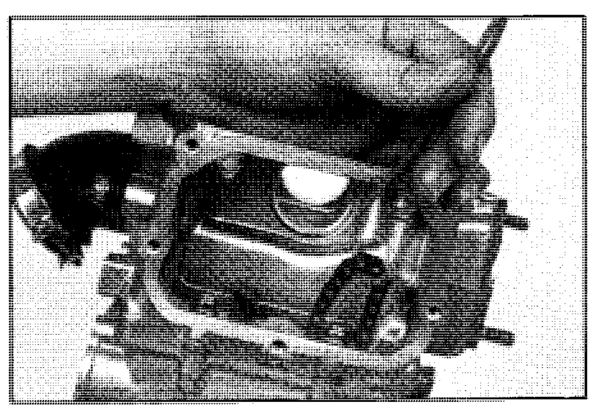
4. Remove camshaft end cap and O-Ring.
5. Place a clean shop towel in the area below cam chain sprocket and remove sprocket retaining bolts.



6. Slide camshaft inward to allow removal of cam sprocket and remove sprocket from camshaft and chain.



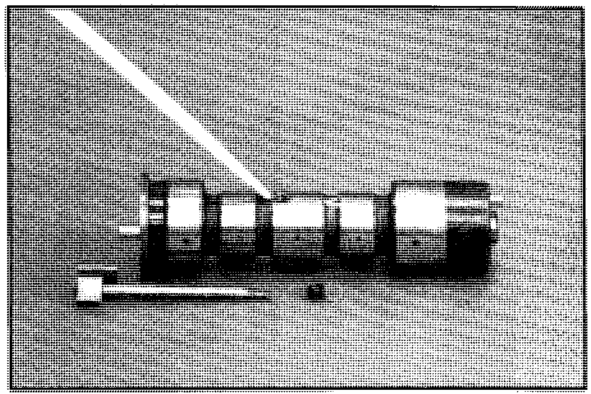
7. Secure cam chain with a wire to prevent it from falling into the crankcase.
8. Inspect cam sprocket teeth for wear or damage. Replace if necessary.
9. Slide camshaft out the PTO side of the cylinder head.



Automatic Compression Release Removal/ Inspection

NOTE: The automatic compression release mechanism can be inspected and serviced without removing the camshaft from the cylinder head. The actuator ball in the camshaft is not replaceable. Replace the camshaft as an assembly if the actuator ball is worn or damaged.

1. Check release lever shaft for smooth operation throughout the entire range of rotation. The spring should hold the shaft weight against the stop pin. In this position, the actuator ball will be held outward in the compression release mode.
2. Remove release lever shaft and return spring.
3. Inspect shaft for wear or galling.
4. Inspect lobe on end of release lever shaft and actuator ball for wear and replace if necessary.

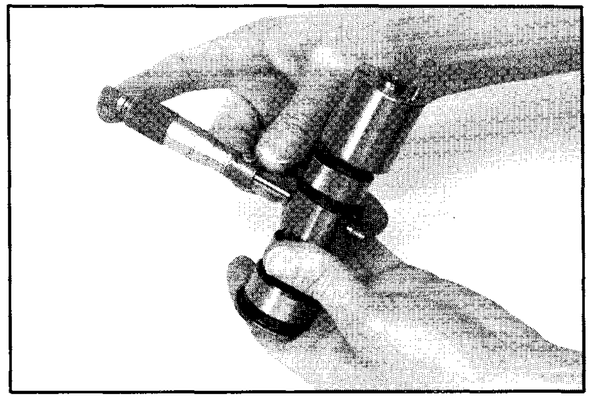


Automatic Compression Release Installation

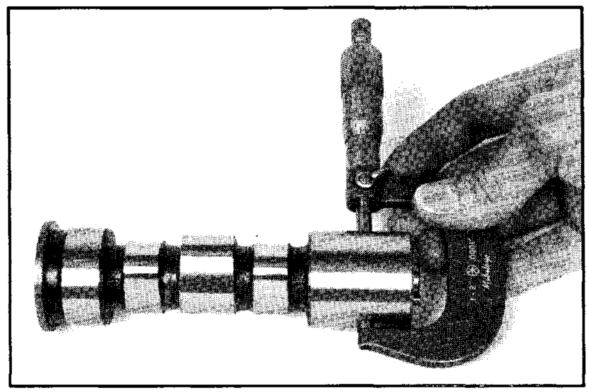
1. Slide spring onto shaft.
2. Apply engine oil to release lever shaft.
3. The actuator ball must be held outward to allow installation of the release lever shaft. If the camshaft is removed from the engine, turn the camshaft until the actuator ball is in the lowest position and install the release lever shaft, pre-winding the spring. If the camshaft is installed in the engine, use a small magnet to draw the actuator ball outward, or rotate the engine until the cam lobes face upward and install the shaft. **NOTE:** When the shaft is properly installed, the actuator ball will be held in the "out" position.
4. Check operation of mechanism as outlined in step 1 of Removal (above).

Camshaft Inspection

1. Visually inspect each cam lobe for wear, chafing or damage.
2. Thoroughly clean the cam shaft, making sure the oil feed holes are not obstructed.
3. Measure height of each cam lobe using a micrometer.



4. Measure camshaft journal OD.
5. Measure ID of camshaft journal bore.
6. Calculate oil clearance by subtracting journal OD from journal bore ID.



Intake Cam Lobe Height:

Std: 1.2884-1.2924 (32.726-32.826 mm)
Limit: 1.2766 (32.426 mm)

Exhaust Cam Lobe Height:
Std: 1.2884-1.2924 (32.726-32.826 mm)
Limit: 1.2766 (32.426 mm)

Camshaft Journal OD
Mag: 1.4935-1.4941 (37.935-37.950 mm)
PTO: 1.4935-1.4941 (37.935-37.950 mm)

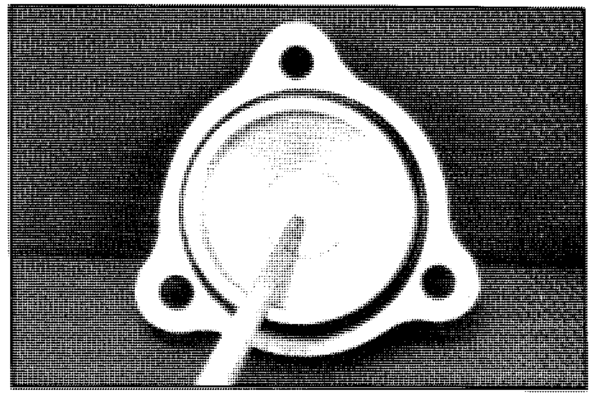
Camshaft Journal Bore ID
Mag: 1.4963-1.4970 (38.005-38.025 mm)
PTO: 1.4963-1.4970 (38.005-38.025 mm)

Oil Clearance
Std: .0022-.0035 (.055-.090 mm)
Limit: .0039 (.10 mm)

Replace camshaft if damaged or if any part is worn past the service limit.

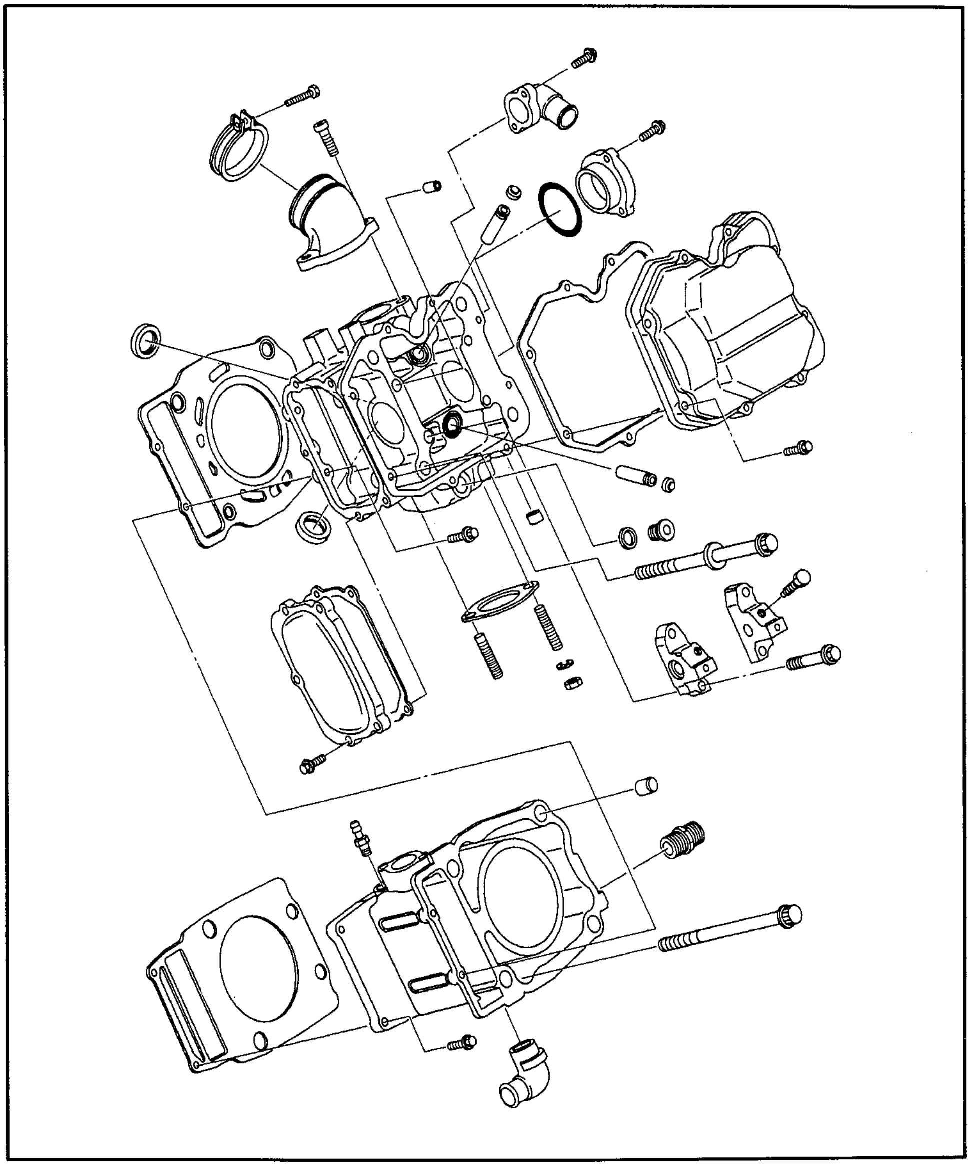
Replace cylinder head if camshaft journal bore is damaged or worn excessively.

7. Inspect camshaft end cap (thrust face) for wear. Replace if worn or damaged.

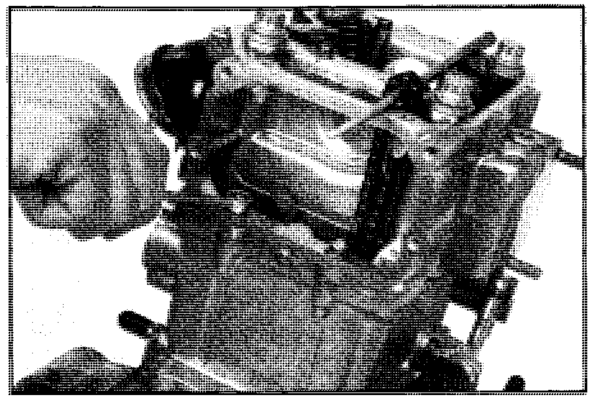


Cylinder Head Removal

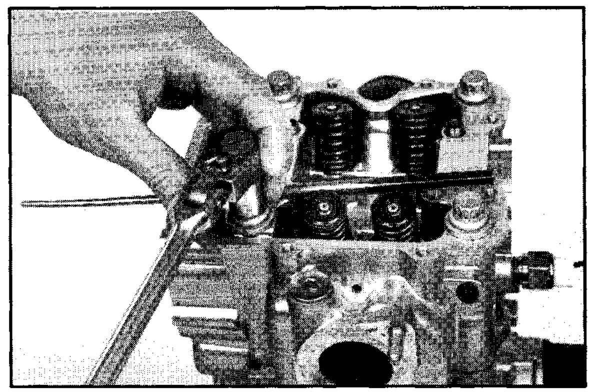
See appropriate chapter to remove the following: fuel tank, spark plug high tension lead, exhaust pipe, carburetor, and top engine mount plate. Drain coolant. Remove cam chain tensioner, camshaft, and rocker assembly.



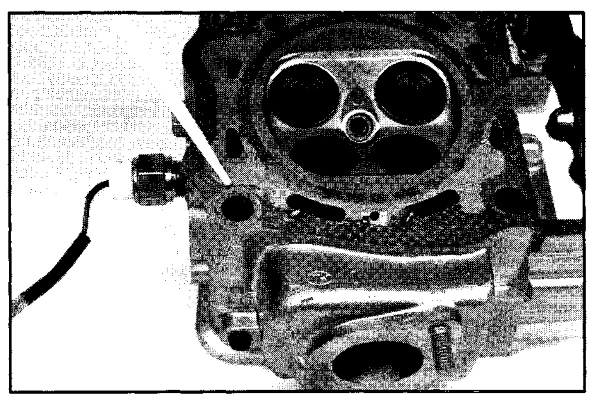
1. Remove the two 6x28 mm flange bolts from cylinder head.



2. Loosen each of the four 11x191 mm cylinder head bolts evenly 1/8 turn each time in a criss-cross pattern until loose.
3. Remove bolts and tap cylinder head lightly with a plastic hammer until loose. **CAUTION:** Tap only in reinforced areas or on thick parts of cylinder head casting to avoid damaging casting.

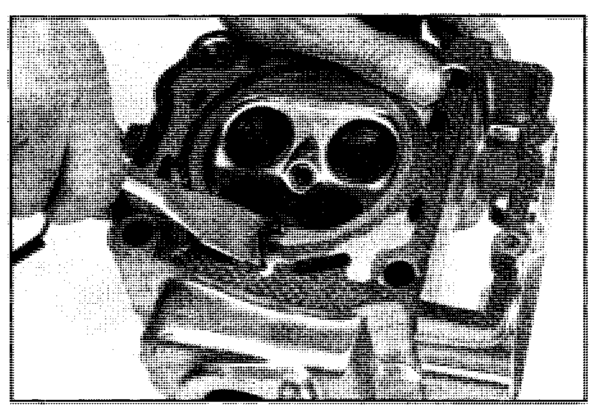


4. Remove cylinder head and head gasket. Note the O-Ring in the corner of the gasket which seals the front left cylinder stud. The O-Ring is part of the gasket.



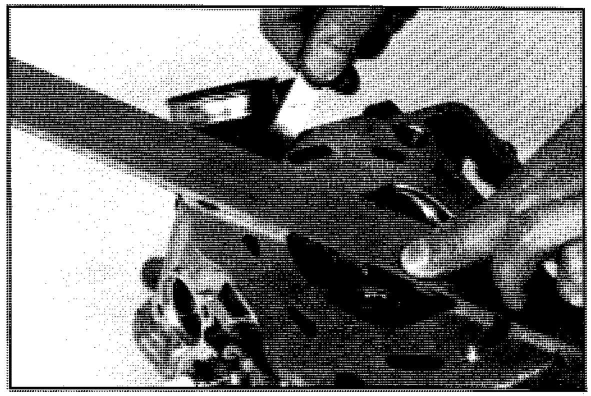
Cylinder Head Disassembly/Inspection

1. Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon. **CAUTION:** Use care not to damage sealing surface.



Cylinder Head Warpage

1. Lay a straight edge across the surface of the cylinder head at several different points and measure warpage by inserting a feeler gauge between the straight edge and the cylinder head surface. If warpage exceeds the service limit, replace the cylinder head.



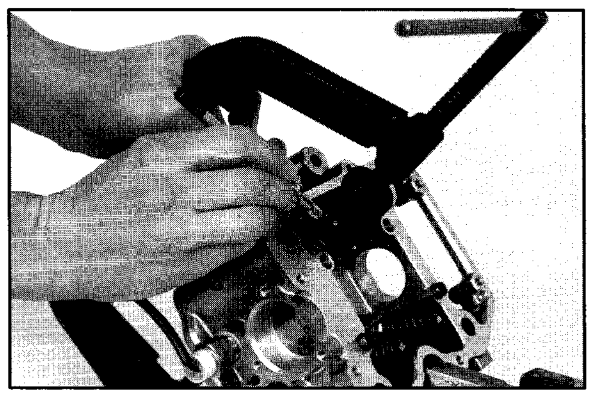
Cylinder Head Warpage Limit:
.002″ (.05 mm)

Cylinder Head Disassembly

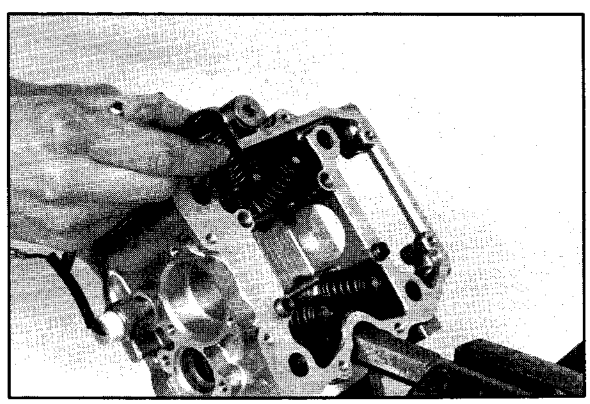
WARNING: Wear eye protection or a face shield during cylinder head disassembly and reassembly.

NOTE: Keep all parts in order with respect to their location in the cylinder head.

1. Using a valve spring compressor, compress the valve spring and remove the split keeper. **NOTE:** To prevent loss of tension, do not compress the valve spring more than necessary.



2. Remove spring retainer and spring. **NOTE:** The valve springs should be positioned with the tightly wound coils against the cylinder head.
3. Push valve out, keeping it in order for reassembly in the same guide.



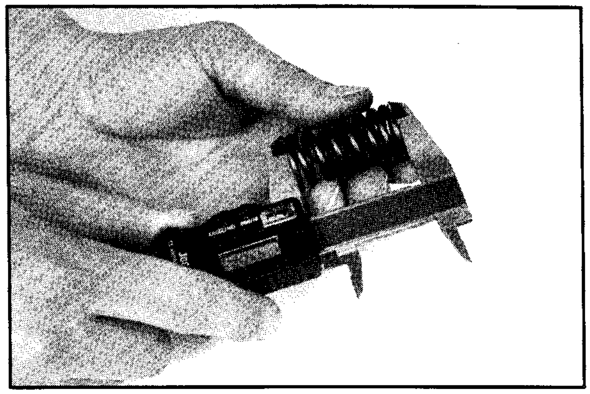
4. Measure free length of spring with a Vernier caliper. Check spring for squareness. Replace spring if either measurement is out of specification.

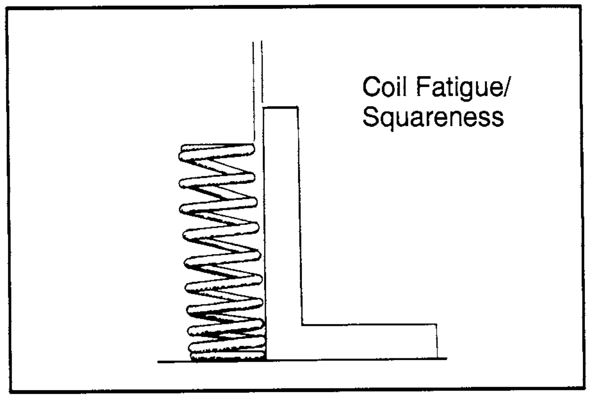
Valve Spring Free Length

Orange Std: 1.7342 (44.05 mm)
Orange Limit: 1.656 (42.05 mm)

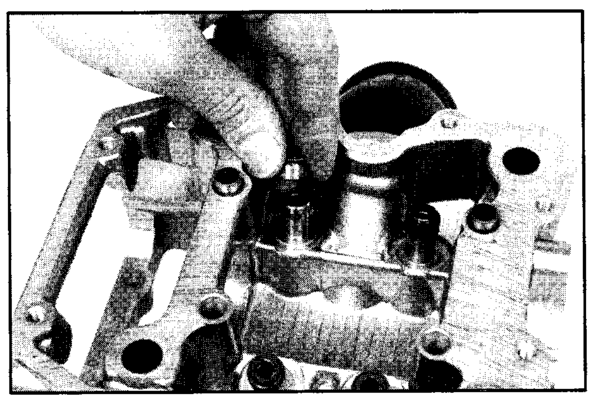
Yellow Std: 1.654 (42.0 mm)
Yellow Limit: 1.575 (40.0 mm)

Squareness: 2.5° (.075″) (1.9 mm)



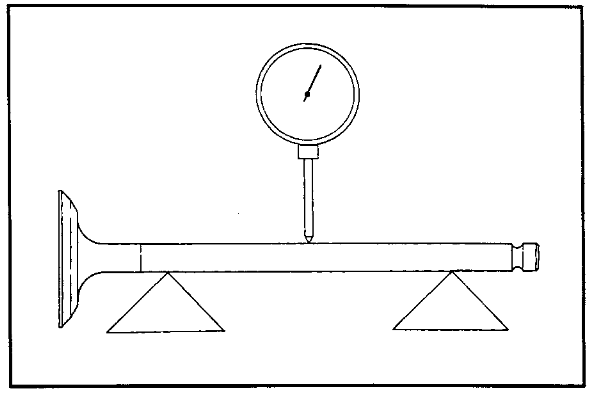


5. Remove valve seals. **CAUTION:** Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.

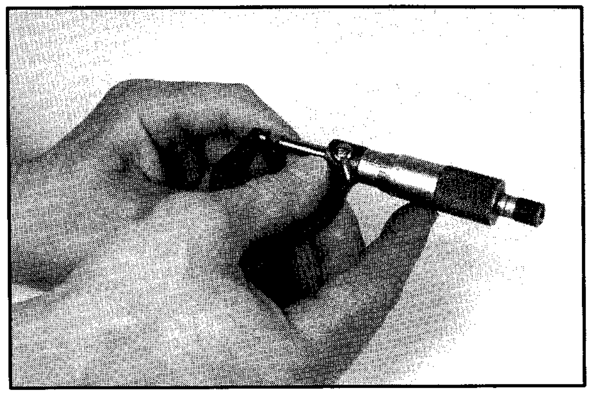


Valve Inspection

1. Remove all carbon from valve with a soft wire wheel.
2. Check valve face for runout, pitting, and burnt spots. To check for bent valve stems, mount valve in a drill or use "V" blocks and a dial indicator.

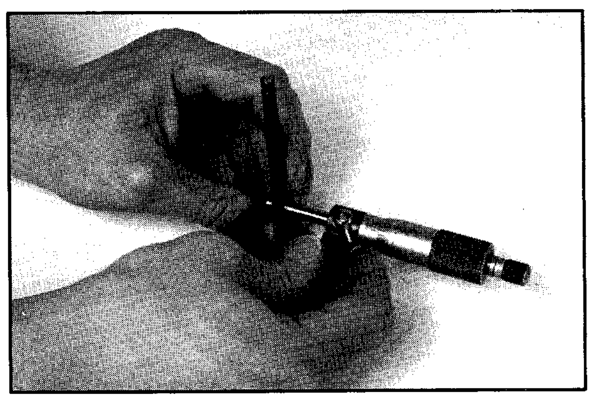


3. Check end of valve stem for flaring, pitting, wear or damage.
4. Inspect split keeper groove for wear or flaring of the keeper seat area. **NOTE:** The Stellite™ valves cannot be re-faced or end ground. They must be replaced if worn, bent, or damaged.



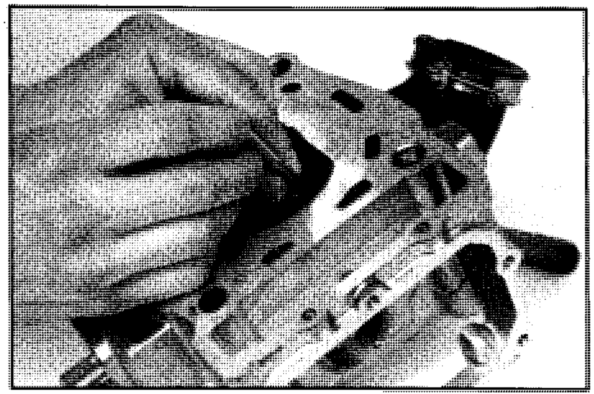
5. Measure diameter of valve stem with a micrometer in three places and in two different directions (six measurements total).

Valve Stem Diameter
Intake: .2343-.2348 (5.950-5.965 mm)
Exhaust: .2341-.2346 (5.945-5.960 mm)



6. Measure valve guide inside diameter at the top middle and end of the guide using a small hole gauge and a micrometer. Measure in two directions, front to back and side to side.
7. Subtract valve stem measurement to obtain stem to guide clearance. **NOTE:** Be sure to measure each guide and valve combination individually.
8. Replace valve and/or guide if clearance is excessive.

NOTE: If valve guides are replaced, valve seats must be reconditioned.

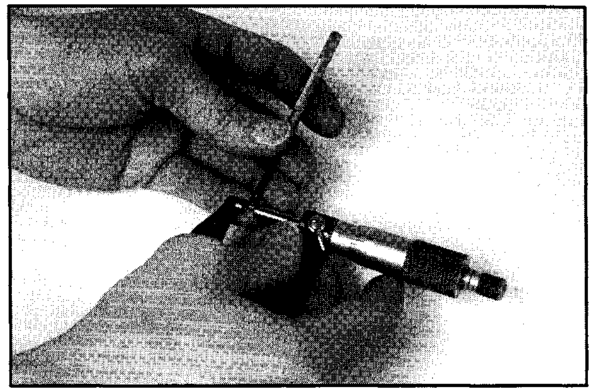


Valve Guide Inside Diameter:
.2362-.2367 (6.000-6.012 mm)

Stem to Guide Clearance:
Std. Intake: .0014-.0024 (.035-.062 mm)

Std. Exhaust: .0016-.0026 (.040-.067 mm

Limit: .0059 (.15 mm)



Combustion Chamber

Clean all accumulated carbon deposits from combustion chamber and valve seat area with a soft wire brush.

Valve Seat Inspection

Inspect valve seat in cylinder head for pitting, burnt spots, roughness, and uneven surface. If any of the above conditions exist, the valve seat must be reconditioned. See Valve Seat Reconditioning, page 7.76. *If the valve seat is cracked the cylinder head must be replaced.*

Cylinder Head Reconditioning

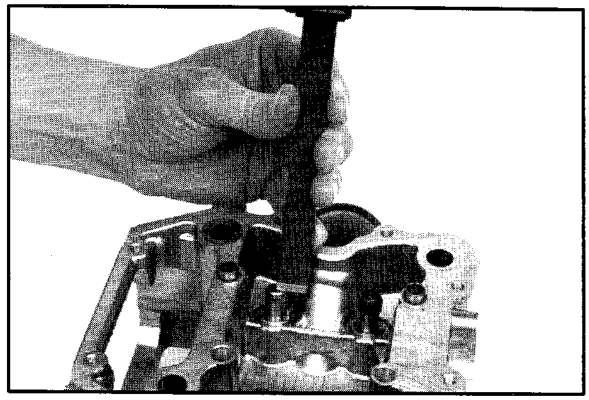
NOTE: Servicing the valve guides and valve seats requires special tools and a thorough knowledge of reconditioning techniques. Follow the instructions provided in the cylinder head service tool kit.

CAUTION: Wear eye protection when performing cylinder head service. Valve guide replacement will require heating of the cylinder head. Wear gloves to prevent burns.

Valve Guide Removal/Installation

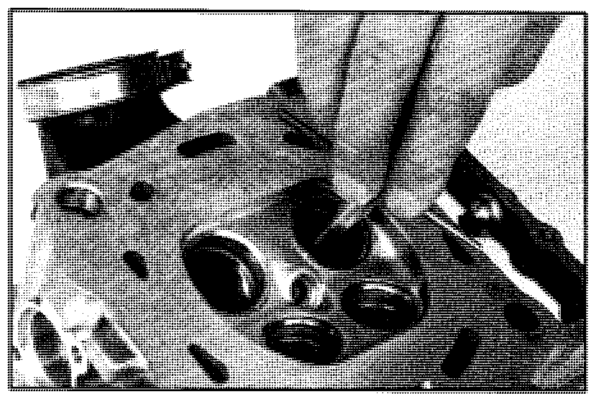
1. Remove all carbon deposits from the combustion chamber, valve seat and valve guide area before attempting to remove valve guides. **CAUTION:** Carbon deposits are extremely abrasive and may damage the valve guide bore when guides are removed.
2. Place new valve guides in a freezer for at least 15 minutes while heating cylinder head.
3. Heat cylinder head in an oven or use a hot plate to bring cylinder head temperature to 212° F (100° C). **CAUTION:** Do not use a torch to heat cylinder head or warpage may result from uneven heating. Head temperature can be checked with a pyrometer or a welding temperature stick.
4. When thoroughly heated, place cylinder head on blocks of wood which will allow the old guides to be removed.
5. Using valve guide driver, drive guides out of the cylinder head from the combustion chamber side. Be careful not to damage guide bore or valve seat when removing guides.

6. Place cylinder head on cylinder head table. **NOTE:** Be sure cylinder head is still at 212° F (100° C) before installing new guides.
7. Place a new guide in the valve guide installation tool and press guide in to proper depth. Check height of each guide above the cylinder head. **NOTE:** The guide can be driven in to the proper depth. Inspect the guide closely for cracks or damage if a driver is used.



Protrusion Above Head:
.689-.709 (17.5-18.0 mm)

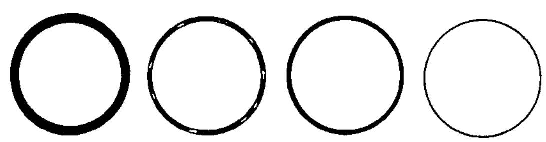
8. Allow cylinder head to cool to room temperature. Apply cutting oil to the reamer supplied with the cylinder head service kit. Guides should be reamed from the valve spring side of the cylinder head. Ream each guide to size by turning the reamer clockwise continually. Continue to rotate reamer clockwise during removal of the tool.
9. Clean guides thoroughly with hot soapy water and a nylon brush. Rinse and dry with compressed air. Apply clean engine oil to guides.



Valve Seat Reconditioning

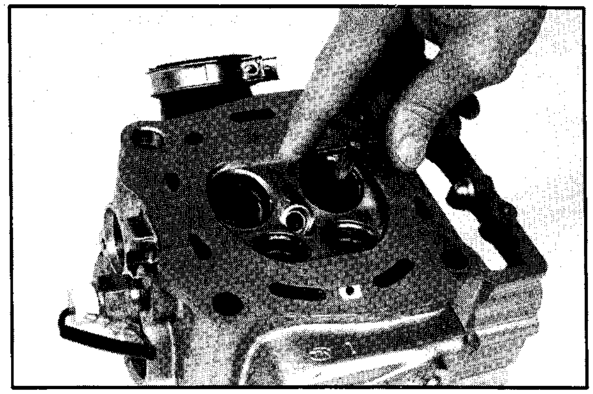
Follow the manufacturers instructions provided with the valve seat cutters in the Cylinder Head Reconditioning Kit (PN 2200634). Abrasive stone seat reconditioning equipment can also be used. Keep all valves in order with their respective seat.

NOTE: Valve seat width and point of contact on the valve face is very important for proper sealing. The valve must contact the valve seat over the entire circumference of the seat, and the seat must be the proper width all the way around. If the seat is uneven, compression leakage will result. If the seat is too wide, seat pressure is reduced, causing carbon accumulation and possible compression loss. If the seat is too narrow, heat transfer from valve to seat is reduced and the valve may overheat and warp, resulting in burnt valves.

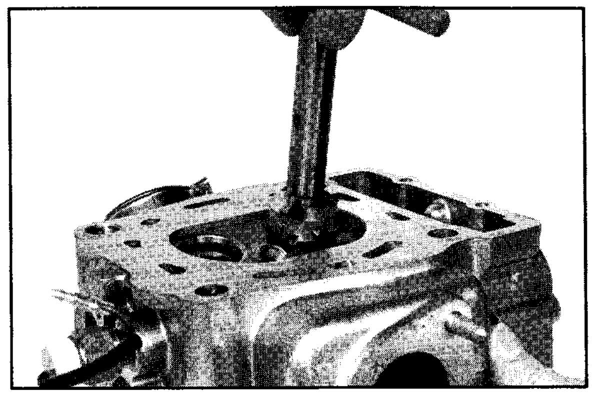


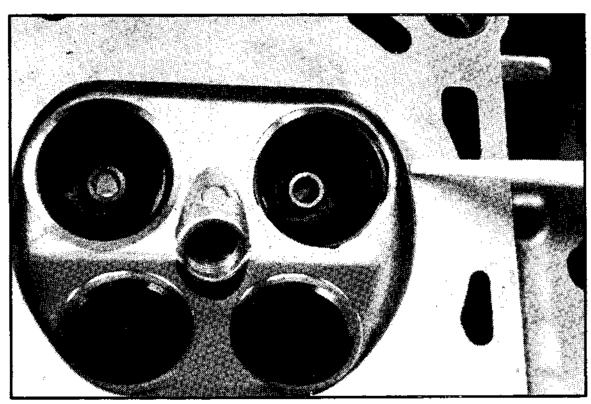
Valve Seat Reconditioning

1. Install pilot into valve guide.
2. Apply cutting oil to valve seat and cutter.

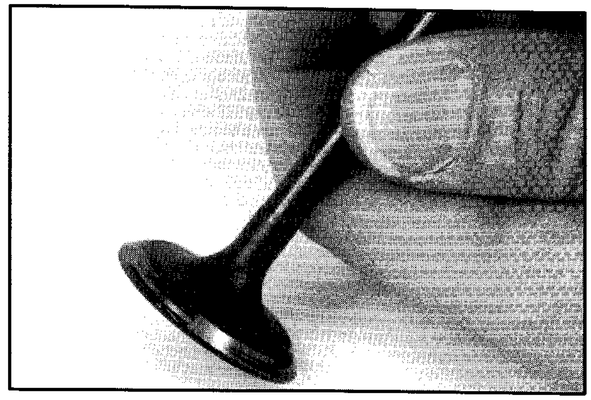


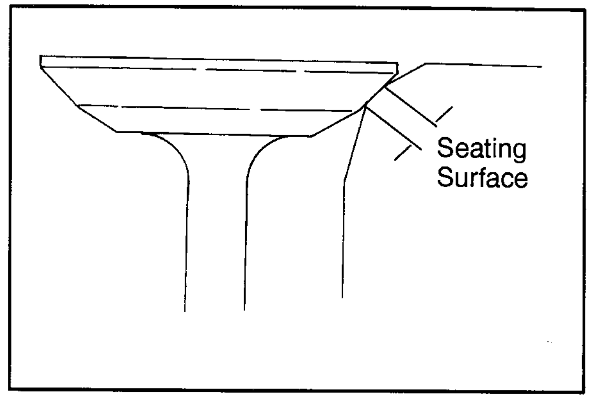
3. Place 46° cutter on the pilot and make a light cut.
4. Inspect the cut area of the seat.
   - If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.
   - If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or runout. If the pilot is bent it must be replaced.
   - If the contact area of the cutter is in the same place, the valve guide is distorted from improper installation and must be replaced. Be sure the cylinder head is at the proper temperature and replace the guide.
   - If the contact area of the initial cut is greater than 75%, continue to cut the seat until all pits are removed and a new seat surface is evident. **NOTE:** Remove only the amount of material necessary to repair the seat surface.
5. To check the contact area of the seat on the valve face, apply a thin coating of Prussian Blue™ paste to the valve seat.
6. Insert valve into guide and tap valve lightly into place a few times.

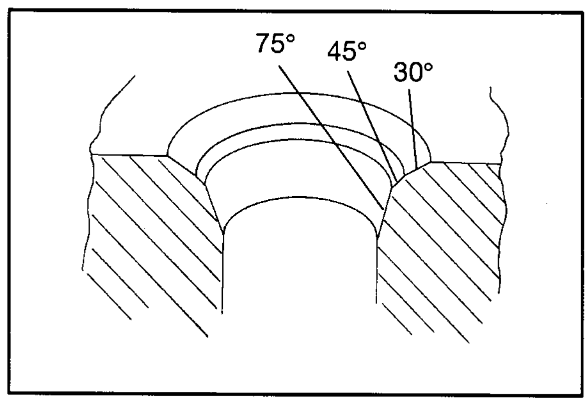




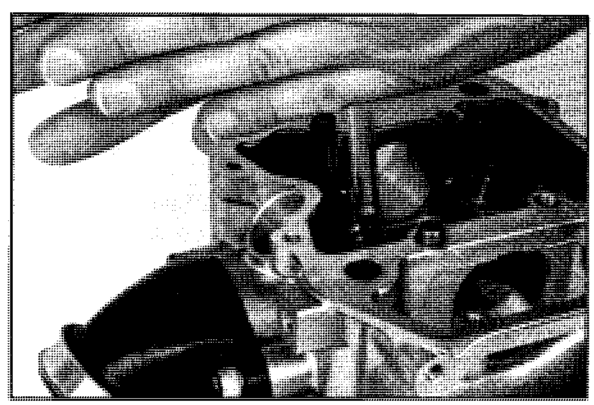
7. Remove valve and check where the Prussian Blue™ indicates seat contact on the valve face. The valve seat should contact the middle of the valve face and must be the proper width.
   - If the indicated seat contact is too high on the valve face, use the 30° or 31° cutter to lower the valve seat.
   - If too low use the 60° or 75° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.
   - If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.
   - If the seat is too narrow, widen using the 46° cutter and re-check contact point on the valve face and seat width after each cut.
8. Clean all filings from the area with hot soapy water, rinse, and dry with compressed air.
9. Lubricate the valve guides with clean engine oil, and apply oil or water based lapping compound to the face of the valve.



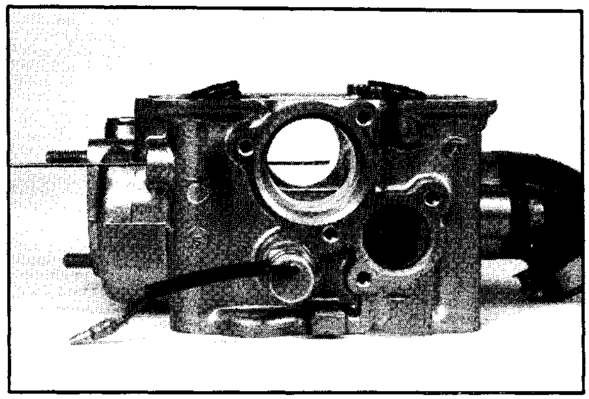




10. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.
11. Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this four to five times until the valve is fully seated, and repeat process for the other three valves.
12. Remove oil passage blind plug and thoroughly clean cylinder head and valves.



13. After cylinder head and oil passage are clean, apply 3 Bond 1215 or equivalent sealer to the threads of the blind plug and install, torquing to 8 ft. lbs. (1.1 kg/m). **CAUTION:** Do not allow sealer to enter oil passage.
14. Spray electrical contact cleaner into oil passage and dry using compressed air.



Cylinder Head Assembly

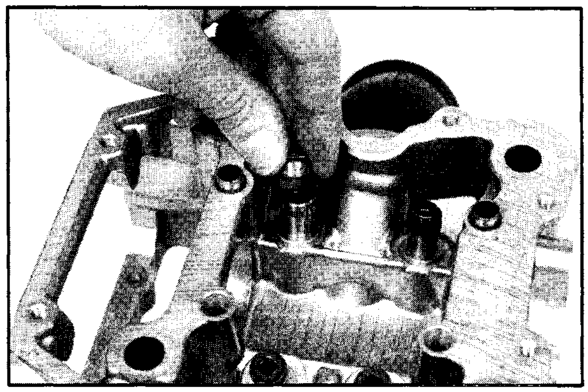
CAUTION: Wear eye protection during assembly.

NOTE: Assemble the valves one at a time to maintain proper order.

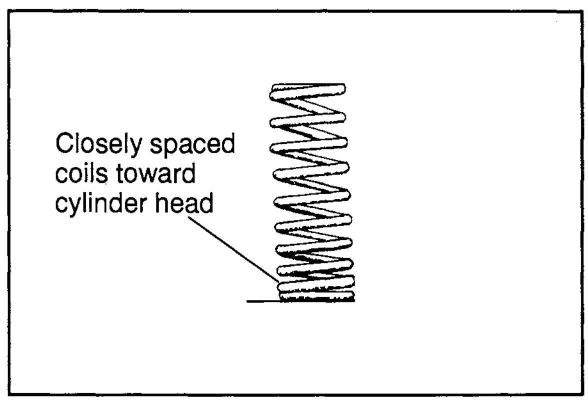
1. Install new valve seals on valve guides. **NOTE:** The intake and exhaust valve seals are different, and must be installed on the proper guide.

Intake Seal PN 3084857, Black

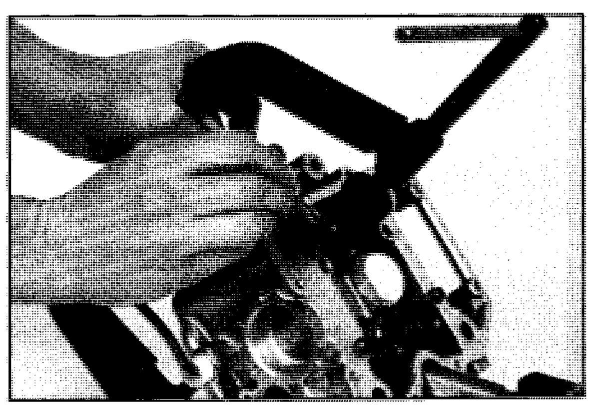
Exhaust Seal PN 3084859, Brown



2. Apply engine oil to valve guides and seats.
3. Coat valve stem with molybdenum disulfide grease.
4. Install valve carefully with a rotating motion to avoid damaging valve seal.
5. Dip valve spring and retainer in clean engine oil and install spring with closely spaced coils toward the cylinder head.



6. Place retainer on spring and install valve spring compressor. Compress spring only enough to allow split keeper installation to prevent loss of spring tension. Install split keepers with the gap even on both sides.
7. Repeat procedure for remaining valves.
8. When all valves are installed, tap lightly with soft faced hammer on the end of the valves to seat the split keepers.



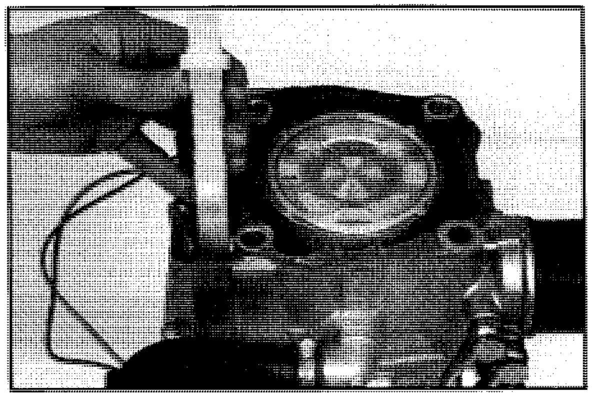
Valve Sealing Test

1. Clean and dry the combustion chamber area.
2. Pour a small amount of clean, high flash point solvent into the intake port and check for leakage around each intake valve. The valve seats should hold fluid with no seepage.
3. Repeat for exhaust valves by pouring fluid into exhaust port.

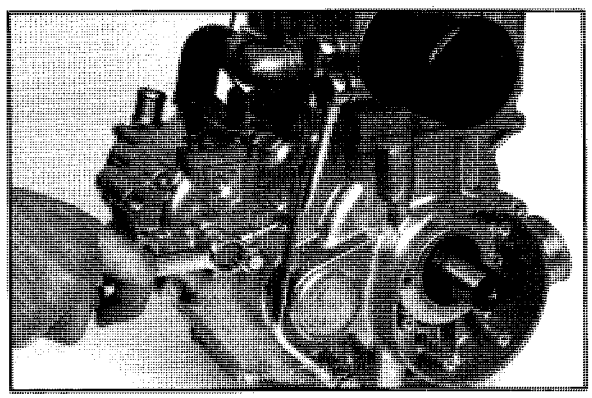
Cylinder/Piston Removal and Inspection

Follow engine disassembly procedures to remove valve cover, camshaft and rocker arms, and cylinder head.

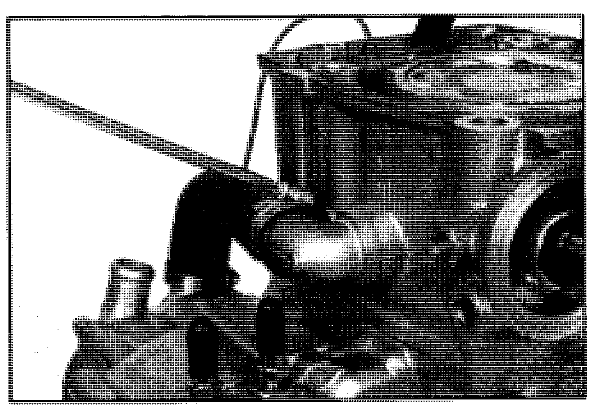
1. Remove cam chain guide at front of cylinder.



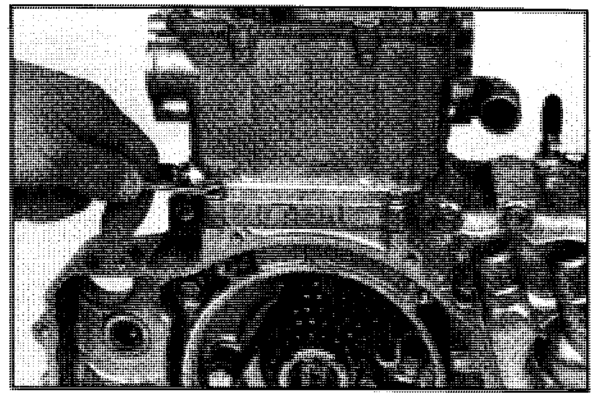
2. Loosen all four oil pipe banjo bolts and then remove the bolts and eight sealing washers. Remove the pipes.



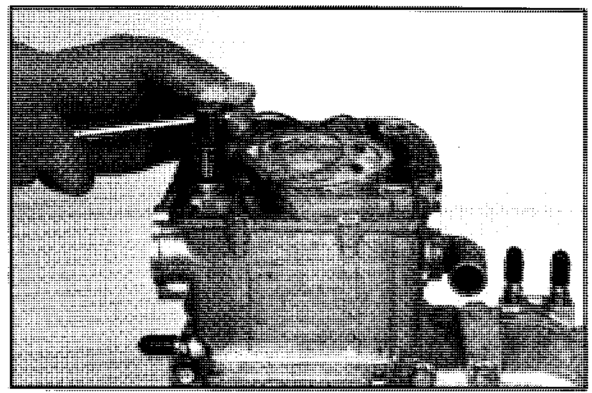
3. Loosen hose clamps on coolant inlet hose and remove hose.



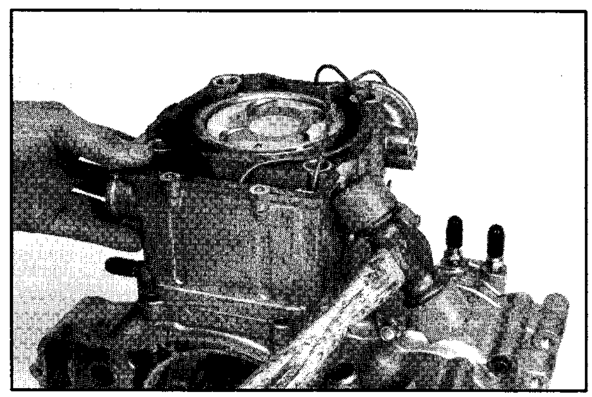
4. Remove the two 6 mm cylinder base bolts.



5. Loosen each of the four cylinder base bolts inside the water jacket 1/4 turn at a time in a criss-cross pattern until loose.
6. Remove the bolts.



7. Tap cylinder lightly with a plastic hammer in the reinforced areas only until loose.
8. Rock cylinder forward and backward and lift it from the crankcase, supporting piston and connecting rod. Support piston with piston support block PN 2870390.
9. Remove dowel pins from crankcase.

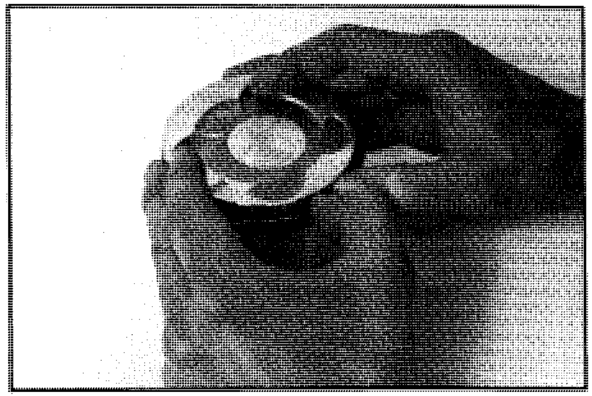


Piston Removal

1. Note piston directional arrow pointing toward the Magneto (right) side of the engine.
2. Remove piston circlip and push piston pin out of piston. If necessary, heat the crown of the piston *slightly* with a propane torch. **CAUTION:** Do not apply heat to the piston rings. The ring may lose radial tension.
3. Remove top compression ring.

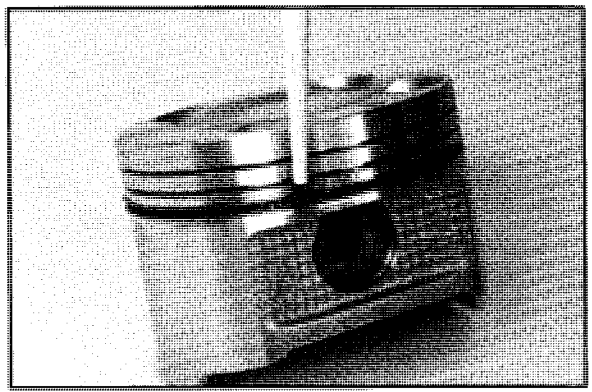
***Using a piston ring pliers:** Carefully expand ring and lift it off the piston. **CAUTION:** Do not expand the ring more than the amount necessary to remove it from the piston, or the ring may break.
***By hand:** Placing both thumbs as shown, spread the ring open and push up on the opposite side. Do not scratch the ring lands.

4. Repeat procedure for second ring.



The oil control ring is a three piece design consisting of a top and bottom steel rail and a center expander section. The top rail has a locating tab on the end which fits into a notch in the upper oil ring land of the piston.

5. Remove the top rail first followed by the bottom rail.
6. Remove the expander.

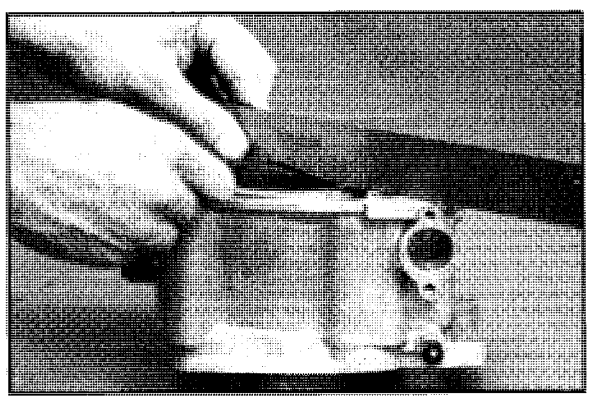


Cylinder Inspection

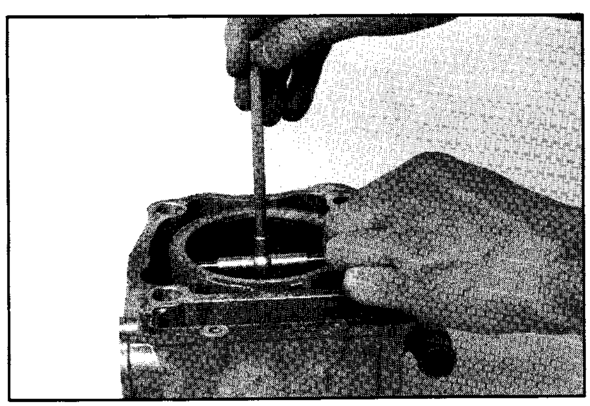
1. Remove all gasket material from the cylinder sealing surfaces.
2. Inspect the top of the cylinder for warpage using a straight edge and feeler gauge.

Cylinder Warpage:
.002″ (.05 mm)

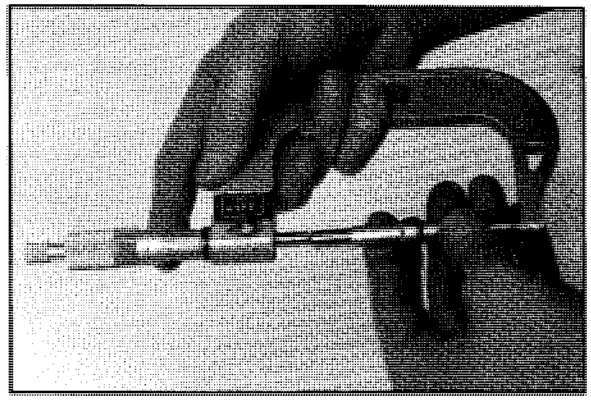
3. Inspect cylinder for wear, scratches, or damage.



4. Inspect cylinder for taper and out of round with a telescoping gauge or a dial bore gauge. Measure in two different directions, front to back and side to side, on three different levels (1/2″ down from top, in the middle, and 1/2″ up from bottom).



5. Record measurements. If cylinder is tapered or out of round beyond .002, the cylinder must be re-bored oversize, or replaced.

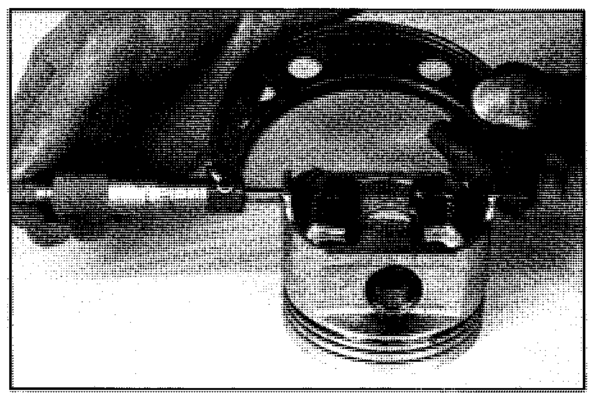


Cylinder Taper Limit: .002 Max.
Cylinder Out of Round Limit: .002 Max.

Standard Bore Size: 3.4606-3.4614 (87.900-87.920 mm)

Piston to Cylinder Clearance

1. Measure piston outside diameter at a point 5 mm up from the bottom of the piston at a right angle to the direction of the piston pin.
2. Subtract this measurement from the maximum cylinder measurement obtained in step 5 above.

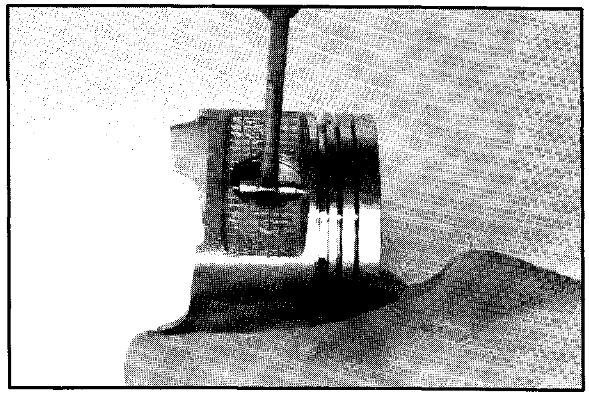


Piston to Cylinder Clearance
Std: .0006-.0018 (.015-.045 mm)
Limit: .0024 (.060 mm)

Boring Limit: .020 (.5 mm)

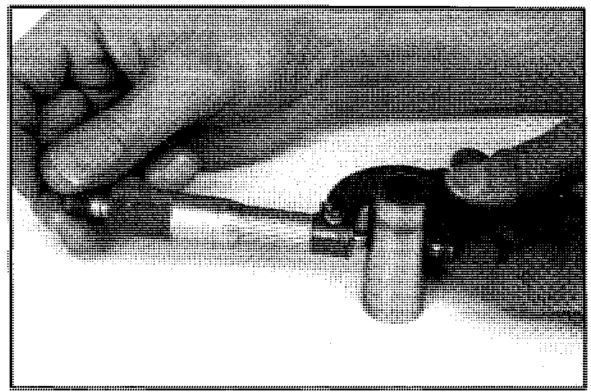
Piston O.D.:
Std: 3.4596-3.4600 (87.875-87.885 mm)
.25 mm (.0098) OS: 3.4695-3.4699 (88.125-88.135 mm)
.50 mm (.0197) OS: 3.4793-3.4797 (88.375-88.385 mm)

3. Measure piston pin bore.



Piston Pin Bore:
Std: .9055-.9057 (23.00-23.006 mm)

4. Measure piston pin O.D. Replace piston and/or piston pin if out of tolerance.



Piston Pin O.D.: .9063-.9055 (22.994-23.00 mm)
Std. Clearance Piston Pin to Pin Bore: .0002-.0003 (.004-.008 mm)
Degree of Fit: Piston Pin Must Be Fitted Into Position With Thumb at 20° C (68° F)

5. Measure connecting rod small end ID.

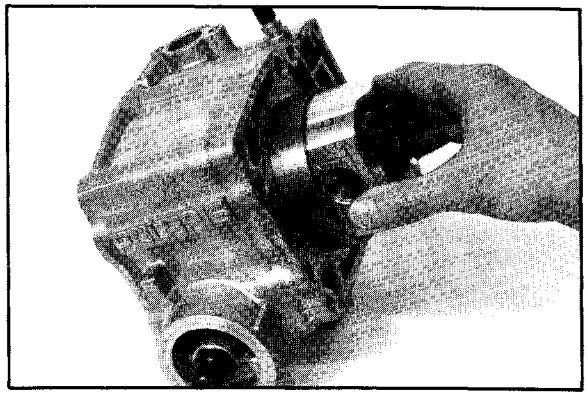
Connect Rod Small End ID:
.9058-.9063 (23.007-23.020 mm)

6. Measure piston ring to groove clearance by placing the ring in the ring land and measuring with a thickness gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.

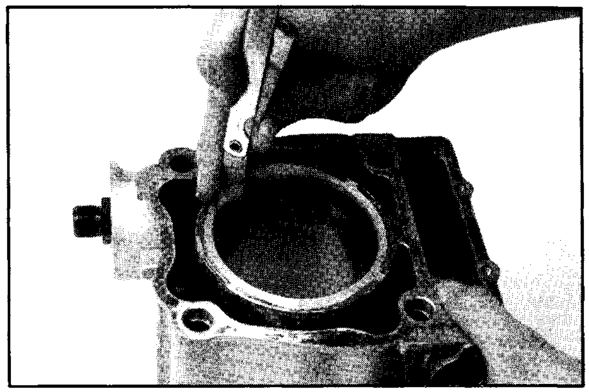
Clearance Between Piston Ring and Piston Ring Groove
Top Ring **Std: .0016-.0031 (.040-.080 mm)** **Limit: .0059 (.15 mm)**
Second Ring **Std: .0012-.0028 (.030-.070 mm)** **Limit: .0059 (.15 mm)**

Piston Ring Installed Gap

1. Place each piston ring inside cylinder using piston to push ring squarely into place.



2. Measure installed gap with a feeler gauge at both the top and bottom of the cylinder. **NOTE:** A difference in end gap indicates cylinder taper. The cylinder should be measured for excessive taper and out of round.
3. If the *bottom* installed gap measurement exceeds the service limit, replace the rings.



NOTE: Always check piston ring installed gap after reboring a cylinder or when installing new rings. A rebored cylinder should always be scrubbed thoroughly with hot soapy water, rinsed, and dried completely. Wipe cylinder bore with an oil rag immediately to remove residue and prevent rust.

Piston Ring Installed Gap

Top Ring
Std: .0079-.0138 (.20-.36 mm)
Limit: .039 (1.0 mm)

Second Ring
Std: .0079-.0138 (.20-.36 mm)
Limit: .039 (1.0 mm)

Oil Ring
Std: .0079-.0276 (.20-.70 mm)
Limit: .059 (1.5 mm)

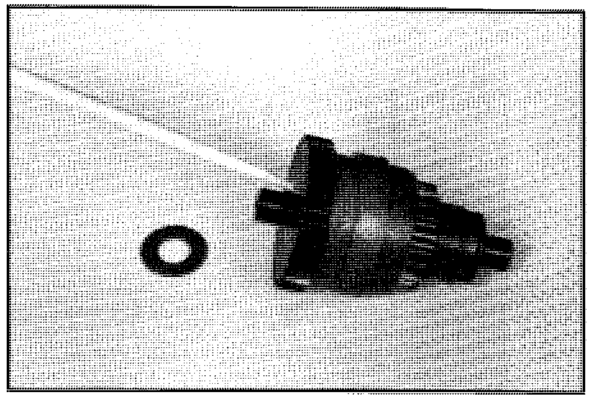
Crankcase Disassembly

NOTE: Engine must be removed from frame to disassemble crankcase. Refer to engine removal, pages 7.58 - 7.62. Remove the following components: cylinder head, cylinder, water pump impeller.

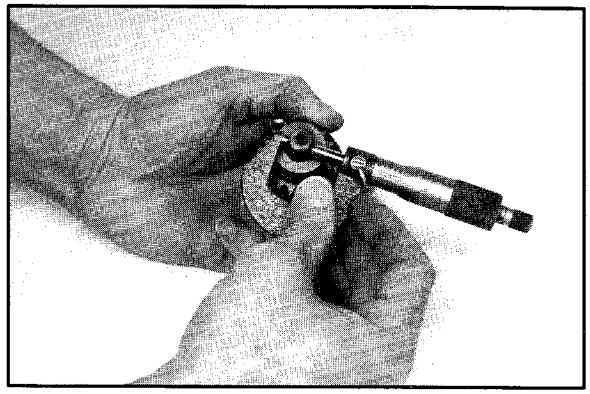
NOTE: The recoil starter, starter motor, starter drive, flywheel, stator, cam chain and sprockets can be serviced with the engine in the frame.

Starter Drive Removal/Inspection

1. Remove recoil housing bolts and remove housing.
2. Remove starter drive assembly. Note the thrust washer located at the rear of the drive mechanism.
3. Inspect the thrust washer for wear or damage and replace if necessary.



4. Measure the OD of the starter drive shaft on both ends and record.
5. Measure the ID of the bushing in the recoil housing and in the crankcase and record. Measure in two directions 90° apart to determine if bushing is out of round. Calculate bushing clearance. Replace bushing if clearance exceeds the service limit.



Std. Bushing ID:
.4735″-.4740″ (11.11-12.04 mm)

Std. Shaft OD:
.470″-.472″ (11.93-11.99 mm)

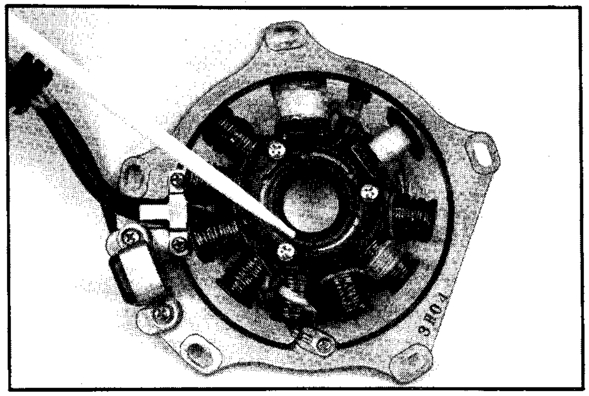
Starter Drive Bushing Clearance:
Std: .0015″-.004″ (.038-.102 mm)

Service Limit:
.008″ (.203 mm)

6. Inspect gear teeth on starter drive. Replace starter drive if gear teeth are cracked, worn, or broken.

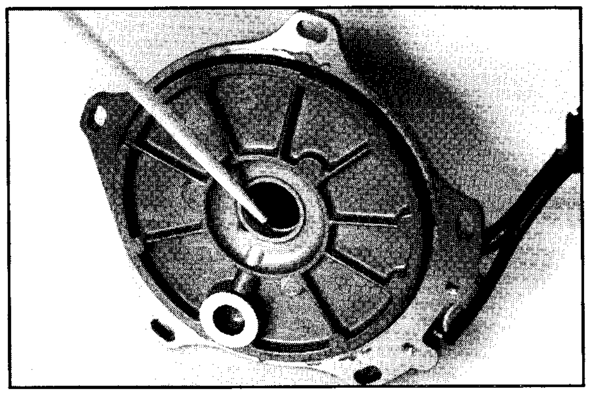
Flywheel/Stator Removal/Inspection

1. Remove flywheel nut and washer.
2. Install flywheel puller PN 2870159 and remove flywheel. **CAUTION:** Do not thread the puller bolts into the flywheel more than 1/4″ or stator coils may be damaged.
3. Mark or note position of stator plate on crankcase.
4. Remove bolts and carefully remove stator assembly, being careful not to damage crankshaft bushing or oil seal on stator plate.
5. Remove oil passage O-Ring.
6. Remove large sealing O-Ring from outer edge of stator plate.



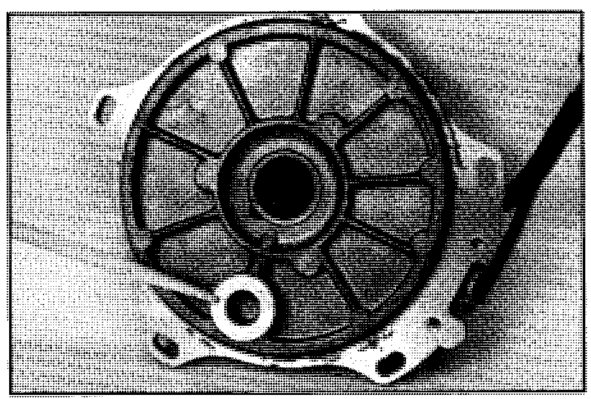
Cam Chain/Tensioner Blade

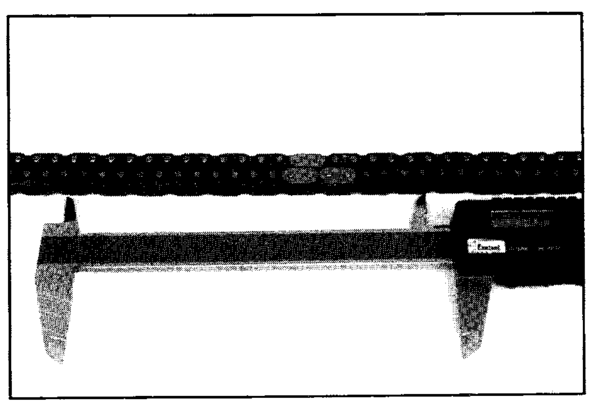
1. Remove bolt securing tensioner blade to crankcase.
2. Remove blade and inspect for cracks, wear, or damage.



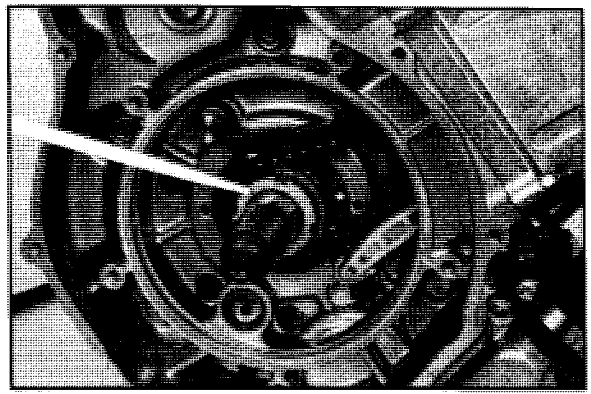
3. Remove cam chain. Inspect chain for worn or missing rollers or damage. Stretch chain tight on a flat surface and apply a 10 lb. (4.53 kg) load. Measure length of a 20 pitch section of chain. Replace if worn past service limit.

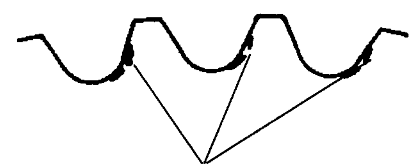
Chain Service Limit: 5.407″ (13.7 cm)





4. Using the special socket, remove the crankshaft slotted nut. **NOTE:** The slotted nut is a left hand thread.
5. Remove cam chain drive sprocket and Woodruff key from crankshaft.
6. Inspect sprocket teeth for wear or damage.
7. Inspect Woodruff key for wear.
8. Replace any worn or damaged parts.





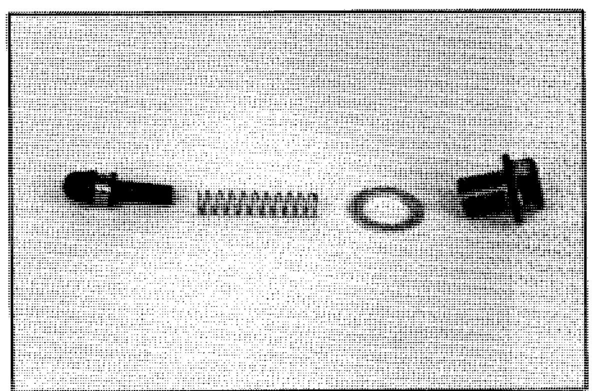
One Way Valve

The one way valve prevents oil from draining out of the oil tank and into the crankcase when the engine is off. It must be clean and have adequate spring pressure in order to seal properly.

9. Remove cap bolt, sealing washer, spring, and one way valve from PTO side crankcase.
10. Inspect free length of spring and check coils for distortion.

One Way Valve Spring Free Length:

Std: 1.450″ (3.68 cm)

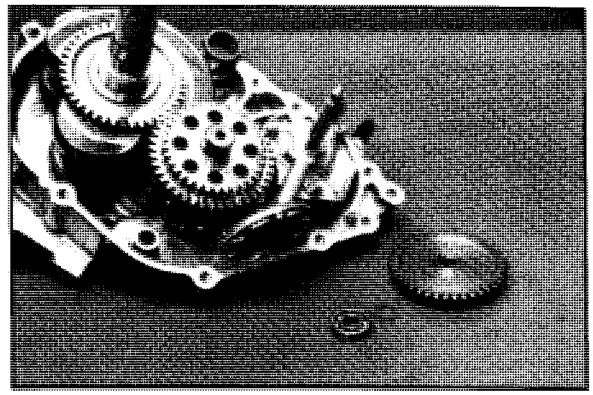


11. Inspect valve for wear.
12. Check seat area for nicks or foreign material that may prevent proper sealing of valve.

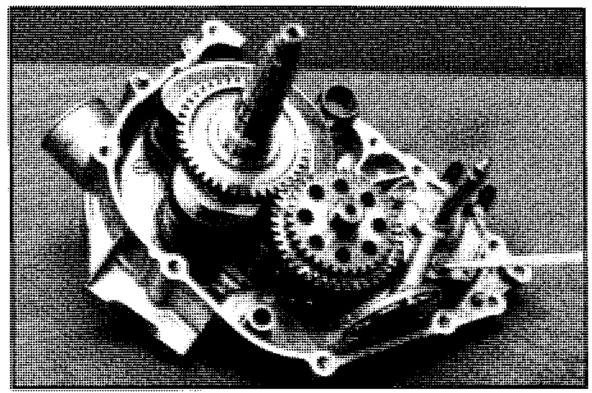
Crankcase Separation

1. Remove flange bolts (10) from magneto side crankcase evenly in a criss-cross pattern.
2. Install crankcase puller tool on magneto side crankcase with hole positioned over balancer gear. **NOTE:** The flywheel key must be removed before puller is installed.
3. Separate crankcase by tightening puller bolt in small steps and tapping on the pump shaft lightly with a plastic hammer.
4. Tap lightly on balancer gear with a brass drift through the hole in the puller if necessary to ensure the balancer shaft stays in the PTO side crankcase.
5. Continue to tighten puller center bolt while tapping on pump shaft and balancer shaft until cases are separated.

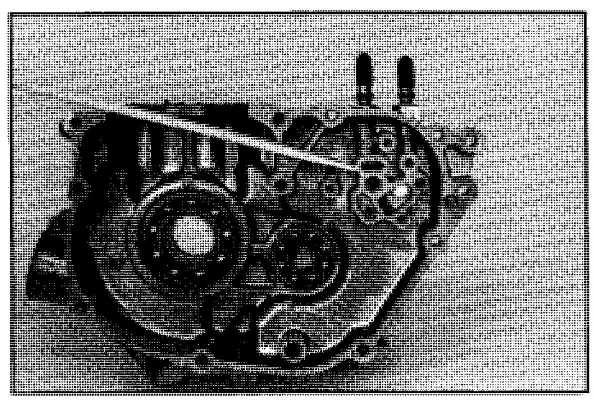
Oil Pump Removal/Inspection



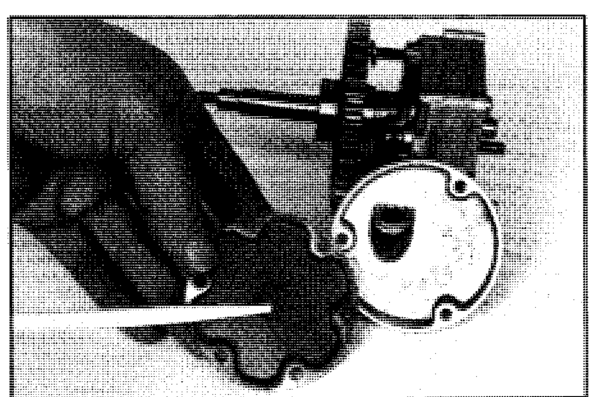
1. Remove thrust washer from pump shaft.
2. Remove pump drive gear.
3. Inspect drive gear teeth for cracks, damage or excessive wear.



4. Remove three oil pump retaining bolts and pump.

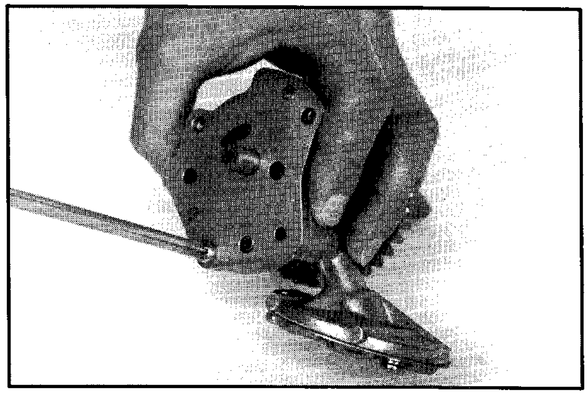


5. Inspect mating surface of crankcase and oil pump. Check for nicks, burrs, or surface irregularities.



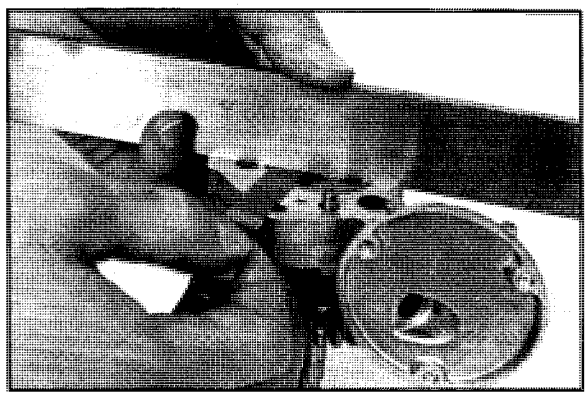
6. Remove the three screws and strainer screen from pump.
7. Clean screen thoroughly.

8. Remove pump body screw and feed chamber cover.



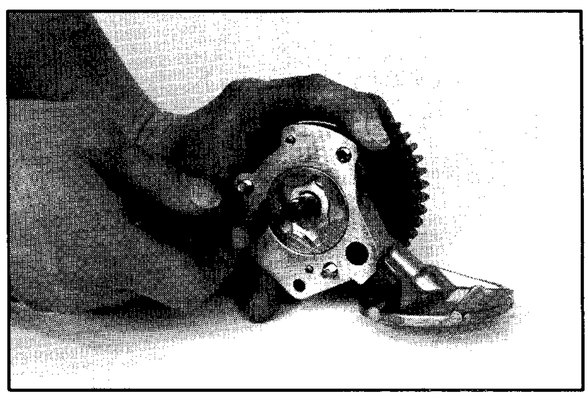
9. Measure pump end clearance using a thickness gauge and straight edge.

Pump End Clearance:
Std: .001-.003 (.0254-.0762 mm)
Wear Limit: .004 (.1016 mm)



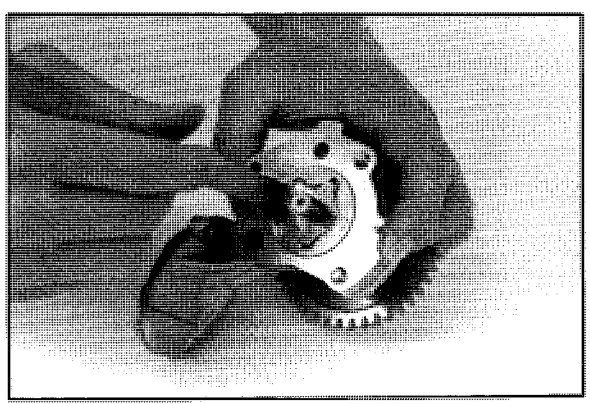
10. Measure clearance between outer feed rotor and pump body with a thickness gauge.

Outer Feed Rotor to Pump Body Clearance:
Std: .001-.003 (.0254-.0762 mm)
Wear Limit: .004 (.1016 mm)



11. Measure rotor tip clearance with a thickness gauge.

Rotor Tip Clearance:
Std: .005 (.127 mm)
Wear Limit: .008 (.2032 mm)



12. Remove inner and outer feed rotor and pump chamber body.
13. Repeat measurements for scavenge rotor.
14. Remove inner and outer scavenge rotor and inspect pump shaft for wear.

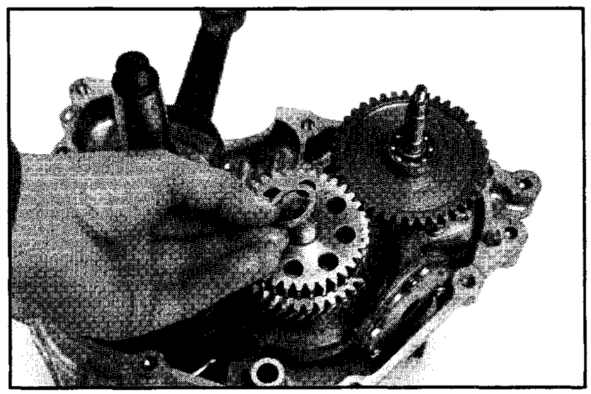
Oil Pump Assembly

1. Clean and dry all parts thoroughly. Apply clean engine oil to all parts. *Do not* use gasket sealer on the pump body mating surfaces or oil passages will become plugged.
2. Install pump shaft and scavenge rotor drive pin.
3. Install outer scavenge rotor, inner scavenge rotor, and scavenge casing.
4. Install outer feed rotor and inner feed rotor drive pin.
5. Install inner feed rotor and feed chamber cover with screw.
6. Tighten screw securely.
7. Install screen on pump body.
8. Install oil pump on crankcase and torque bolts to 6 ft. lbs. (.828 kg/m).

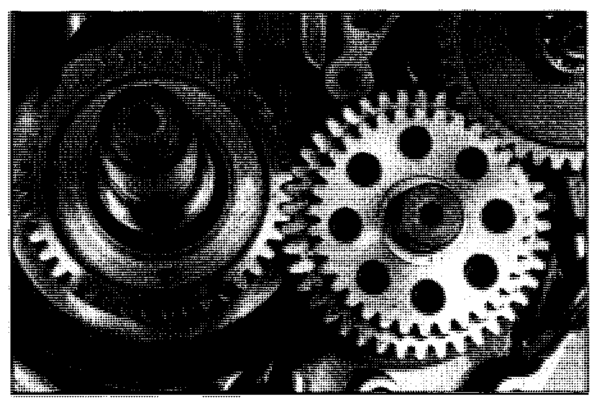
Oil Pump Attaching Bolt Torque:
6 ft. lbs. (.828 kg/m)

Counter Balancer Shaft Removal/Inspection

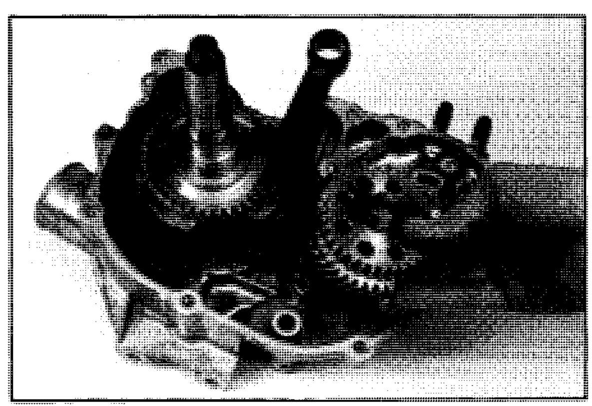
1. Remove the shim washer from the counter balancer shaft.



2. Note the alignment dots on the balancer and crankshaft gears, the marks must be aligned during reassembly.



3. Remove the balancer shaft from the crankcase.

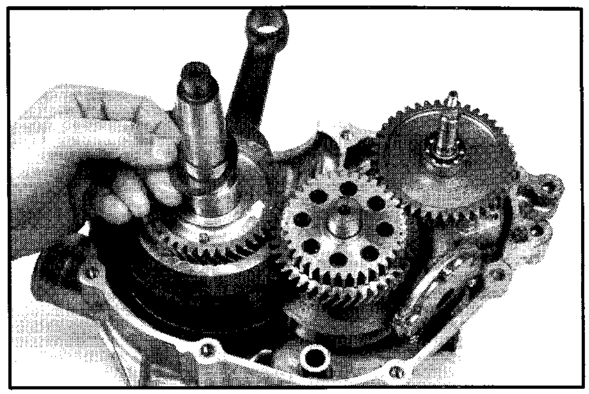


4. Inspect the balancer drive gear and pump shaft drive gear.
5. Replace the shaft if gear teeth are abnormally worn or damaged.
6. Inspect the balancer shaft bearings.

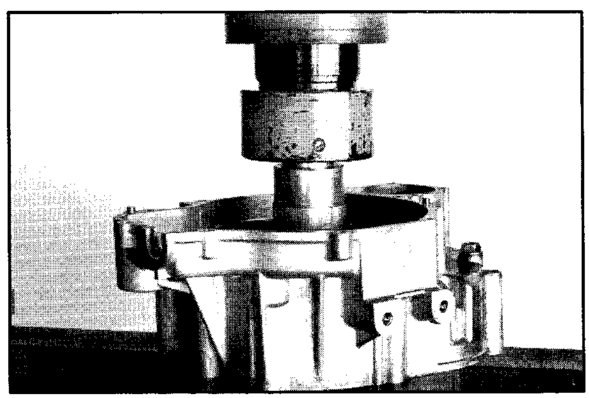
NOTE: Due to extremely close tolerances and minimal wear, the balancer shaft ball bearings must be inspected visually and by feel. Look for signs of discoloration, scoring or galling. Turn the inner race of each bearing. The bearings should turn smoothly and quietly. The outer race of each bearing should fit tightly in the crankcase. The inner race should be firm with minimal side to side movement and no detectable up and down movement.

Crankshaft Removal/Inspection

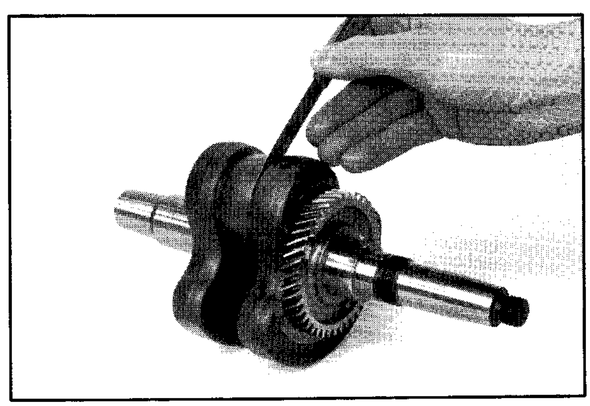
1. Remove the shim washer from the crankshaft.



2. Support the PTO side crankcase and crankshaft; press the crankshaft out. Be careful not to damage the crankcase mating surface or connecting rod.



3. Use a thickness gauge to measure the connecting rod big end side clearance.



Connecting Rod Big End Side Clearance:

Std: .0039-.0256 (.1-.65 mm)
Limit: .0315 (.80 mm)

4. Place the crankshaft in a truing stand or V-blocks and measure the runout on both ends with a dial indicator.

Runout: .0024″ (.06 mm)

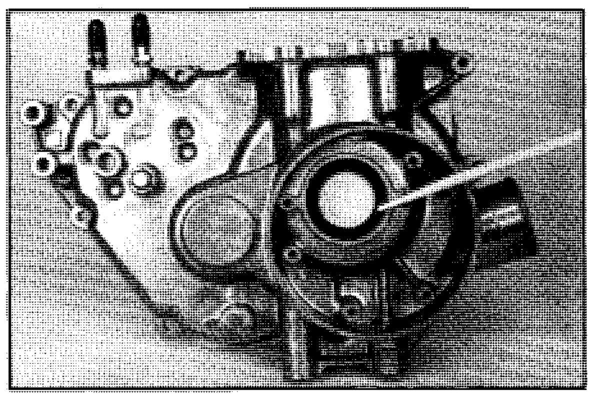
5. Measure the connecting rod big end radial clearance.

Big End Radial Clearance: **Std. .0004-.0015″ (.011-.038 mm)** **Limit .002″ (.05 mm)**

6. Inspect the crankshaft main bearing journals for scoring and abnormal wear.

Crankcase Bearing Inspection

1. Remove the seal from the PTO side crankcase.
2. Inspect the crankshaft main bearings, balancer shaft bearings, and pump shaft bearing.



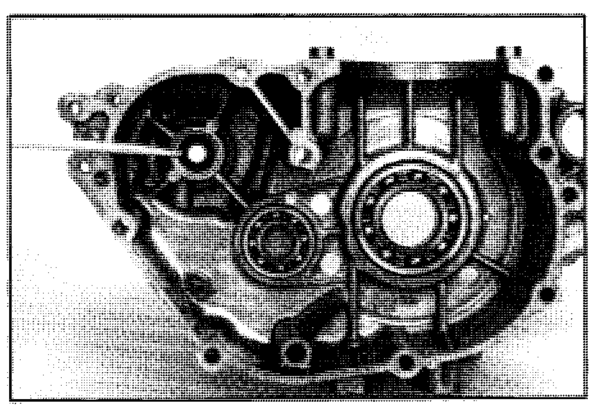
NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. Look for signs of discoloration, scoring or galling. Turn the inner race of each bearing. The bearings should turn smoothly and quietly. The outer race of each bearing should fit tightly in the crankcase. The inner race should be firm with minimal side to side movement and no detectable up and down movement.

3. Support the crankcase and drive or press the main bearings out of each crankcase.
4. To remove balancer shaft bearings and pump shaft bearing use a blind hole bearing puller.

NOTE: Bearings are stressed during the removal process and *should not* be re-used!

Pump Shaft Oil Seal/ Water Pump Mechanical Seal Removal

Replace the pump shaft seal and water pump mechanical seal whenever the crankcase is disassembled.



1. Remove the pump shaft bearing from the Magneto (right hand) side crankcase.
2. Pry out the oil seal, noting the direction of installation. See page 7.96 for seal installation.
3. Drive the water pump mechanical seal out of the crankcase from inside to outside. Note: The new mechanical seal must be installed <u>after</u> the crankcases are assembled. See Mechanical Seal Installation, page 7.97.

Crankcase Assembly

1. Remove all traces of gasket sealer from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.
2. Check the oil pump and oil gallery mating surfaces to be sure they are clean and not damaged.

Bearing Installation

NOTE: To ease bearing installation, warm the crankcase until hot to the touch. Place the bearings in a freezer.

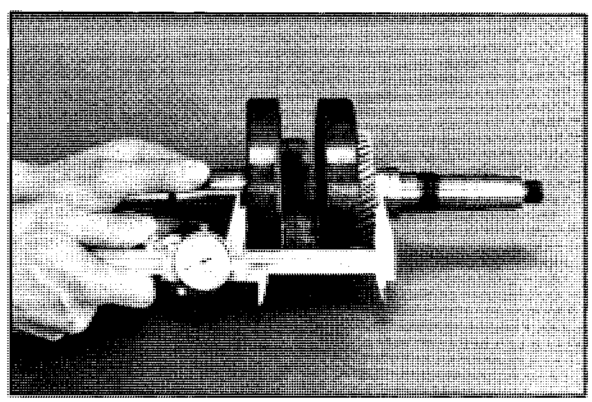
3. Install the bearings so the numbers are visible.
4. Drive or press new bearings into the crankcases, using the proper driver. **CAUTION:** Press only on outer race of bearing to prevent bearing damage.
   - 70mm (2.755″) driver- For crankshaft main bearings.
   - 46mm (1.810″) For counter balancer bearings.
   - 28mm (1.100″) For pump shaft bearing.

End Play Inspection/Adjustment

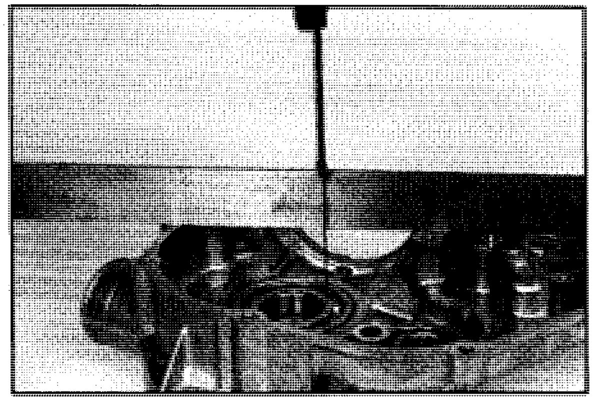
Before reassembling the crankcase,the following steps should be performed to determine the amount of crankshaft, counter balancer shaft, and pump shaft end play. Excessive end play may cause engine noise at idle and slow speeds. Too little play will side load the bearings which may lead to premature bearing failure.

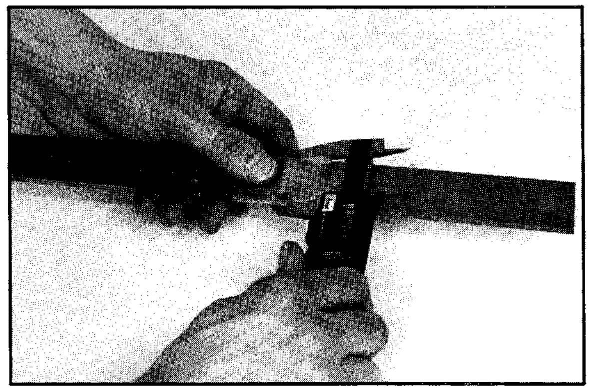
Crankshaft

1. Make sure all bearings are firmly seated in the crankcase.
2. Measure the width of the crankshaft at the bearing seats with a dial caliper or micrometer, and record reading.

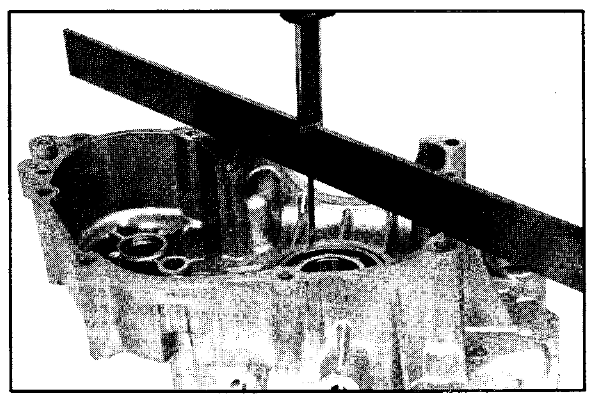


3. Measure the distance from the PTO crankcase mating surface to the main bearing using a dial caliper and a straight edge. Subtract the thickness of the straightedge and record.





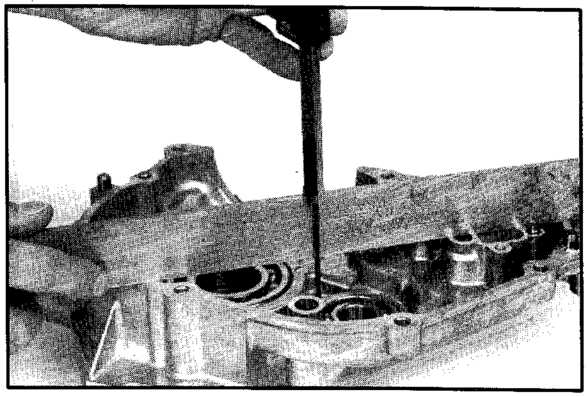
4. Measure the distance from the magneto crankcase mating surface to the main bearing using the same method. Remember to subtract the straightedge from the measurement, and record.
5. Add the readings obtained in step 3 and 4.
6. Subtract the crankshaft width measured in step 2 from the figure obtained in step 5.
7. Subtract the thickness of the existing shim from the result of step 6 to determine if a different shim is needed.

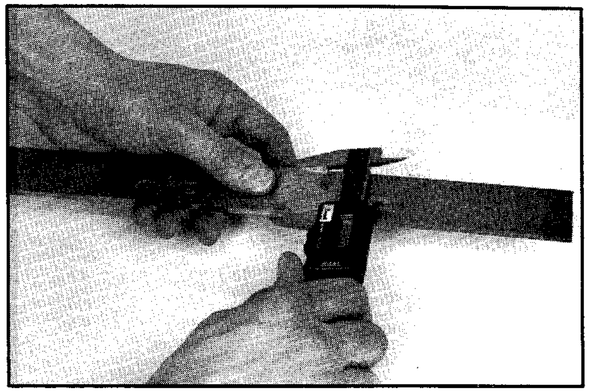


Crankshaft End Play:

.008″–.016″ (.02–.04 cm)

Counter Balancer





1. Make sure all bearings are firmly seated in the crankcase.
2. Measure the width of the counter balancer shaft at the bearing seats with a dial caliper or micrometer, and record reading.
3. Measure the distance from the PTO crankcase mating surface to the bearing using a dial caliper and a straight edge. Subtract the thickness of the straightedge and record.
4. Measure the distance from the magneto crankcase mating surface to the bearing using the same method.
5. Add the readings obtained in step 3 and 4.
6. Subtract the counter balancer shaft width measured in step 2 from the figure obtained in step 5.
7. Subtract the thickness of the existing shim from the result of step 6 to determine if a different shim is needed.

Counter Balancer Shaft End Play:

.008″-.016″ (.02-.04 cm)

Pump Shaft

1. Make sure the pump shaft bearing is firmly seated in the Magneto side crankcase.
2. Measure the distance from the magneto crankcase mating surface to the bearing using a dial caliper and a straight edge. Subtract the thickness of the straightedge and record.
3. Install the gear on the oil pump and measure the width of the pump and gear. Subtract this measurement from the measurement recorded in step 2.
4. Subtract the thickness of the existing shim from the result of step 3 to determine if a different shim is needed.

Pump Shaft End Play:

.008″-.016″ (.02-.04 cm)

Pump Shaft Oil Seal Installation

1. Install the seal from the outside of the crankcase (water pump side) with the spring facing inward, toward the pump shaft bearing.
2. Drive or press the seal into place using the 25mm (.985″) seal driver, until flush with the bottom of the mechanical seal bore.
3. Lubricate the seal lip with grease.

Crankshaft, Counter Balancer, and Oil Pump Installation

Lubricate all bearings with clean engine oil before assembly.

Use the crankshaft installation tool kit PN 2871283 to prevent damage to the crankshaft and main bearings during installation.

1. Install the crankshaft into the PTO side crankcase. Screw the threaded rod into the crankshaft until the threads are engaged a minimum of one inch (25.4mm).
2. Install the collar, washer, and nut onto the threaded rod. Hold the crankshaft and tighten the nut to draw the crankshaft into the main bearings until fully seated. Loosen the nut and remove the threaded rod from the crankshaft. If removal is difficult, install two nuts on the end of the threaded rod and tighten against each other.
3. Install the proper shim on the magneto end of the crankshaft.
4. Place the balancer shaft in the PTO crankcase aligning the timing marks on the crankshaft and balancer gears. Install the proper shim washer on the shaft.
5. Inspect the oil pump sealing surface on the crankcase. Apply a light film of engine oil to the surface and install the oil pump.

NOTE: Do not use gasket sealer on the pump mating surfaces.

Oil Pump Bolt Torque:
6. ft. lbs. (.828 kg/m)

6. Align the drive gear with the drive pin on the pump shaft and install the gear. Be sure the gear is fully seated and properly engaged.
7. Install the proper shim washer on the pump shaft.

Crankcase Assembly

1. Apply Loctite 515 or 518 Gasket Eliminator or 3 Bond 1215 to the crankcase mating surfaces. Be sure the alignment pins are in place.
2. Set the crankcase in position carefully to avoid damaging the pump shaft seal, and install the magneto end crankshaft installation tool. Draw the crankcase halves together by tightening the nut on the tool and tapping lightly in the pump shaft area with a soft faced hammer to maintain alignment. Continually check alignment of the cases during installation, closing the gap equally until the surfaces are tightly seated.
3. Remove the tool.
4. Install the crankcase flange bolts and tighten in 3 steps in a criss-cross pattern to specified torque.

Crankcase Bolt Torque:
14 ft. lbs. (1.932 kg/m)

Water Pump Mechanical Seal Installation

1. Clean the seal cavity to remove all traces of old sealer.
2. Place a new mechanical seal in the seal drive collar, and install on the pump shaft.
3. Screw the guide onto the end of the pump shaft.
4. Install the washer and nut and tighten to draw seal into place until fully seated.
5. Remove the guide adaptor using the additional nut as a jam nut if necessary.

Magnum Engine Assembly

One Way Valve Installation

Install the one way valve plunger, spring, and plug using a new sealing washer.

One Way Valve Plug Torque:
16 ft. lbs. (2.2 kg/m)

Cam Chain Drive Sprocket Installation

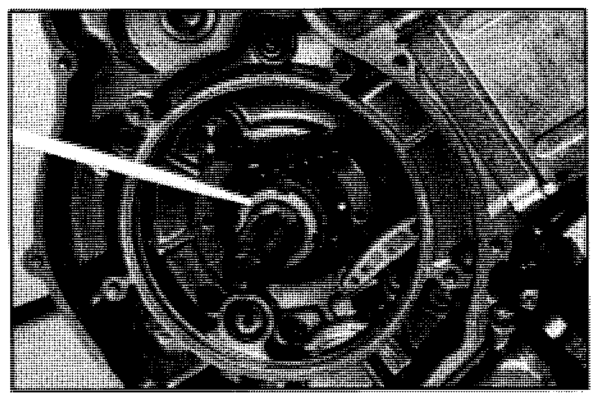
1. Install the Woodruff key, drive sprocket, and slotted nut. Tighten the nut to the specified torque.

Slotted Nut Torque:
35-51 ft. lbs. (4.71-6.86 kg/m)

Tensioner Blade Installation

1. Install the tensioner blade and tighten the mounting bolt to specified torque.

Tensioner Blade Mounting Bolt Torque:
6 ft. lbs. (.828 kg/m)

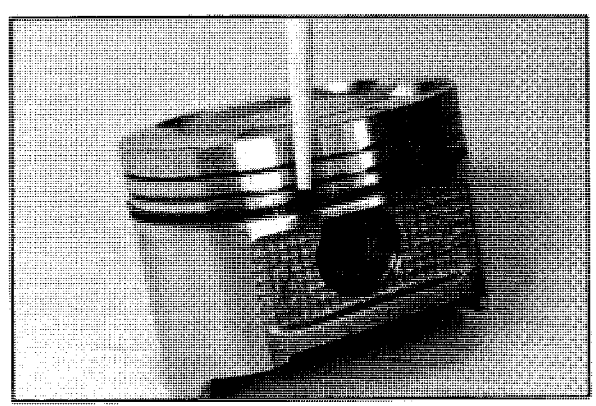


Piston Ring Installation

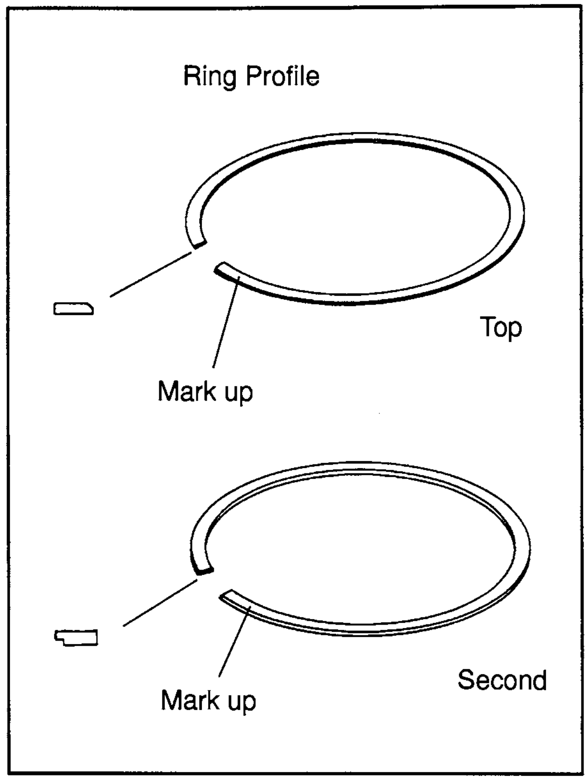
NOTE: Apply clean engine oil to all ring surfaces and ring lands. Always check piston ring installed gap before rings are installed on piston. See page 7.85. If the piston has been in service clean any accumulated carbon from the ring grooves and oil control ring holes.

1. Place the oil control ring expander in oil ring groove with the end gap facing forward. The expander has no up or down marking and can be installed either way. The ends should butt squarely together and must not overlap.
2. Install the oil ring top rail.

NOTE: The top rail has a locating tab to prevent rotation. The tab must be positioned in the notch on the side of the piston as shown.



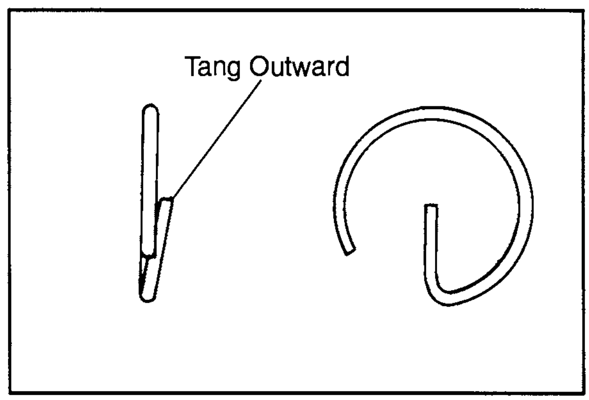
3. Install the bottom rail with the gap at least 30° from the end of the expander on the side opposite the top rail gap.(See Ill.).
4. Install the second ring with the "R" mark facing up. Position the end gap toward the rear (intake) side of the piston.
5. Install the top ring (chrome faced) with the "R" mark facing up and the end gap facing forward (toward the exhaust). (See Ill.).
6. Check to make sure the rings rotate freely in the groove when compressed.



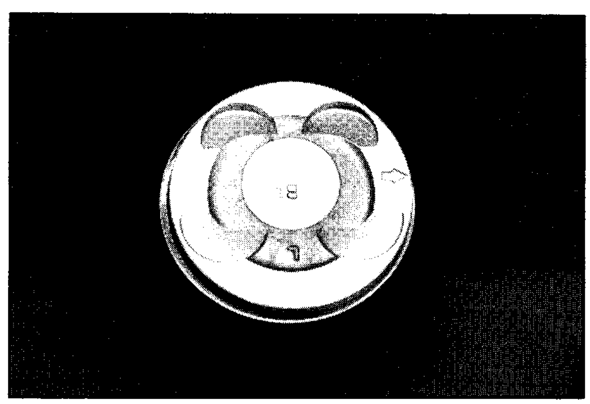
Piston Installation

1. Clean the gasket surfaces on the cylinder and crankcase. Remove all traces of old gasket material.
2. Make sure the cylinder mounting bolt holes are clean and free of debris.
3. Install a new circlip on one side of the piston with the end gap facing *up* or *down,* and tang outward.

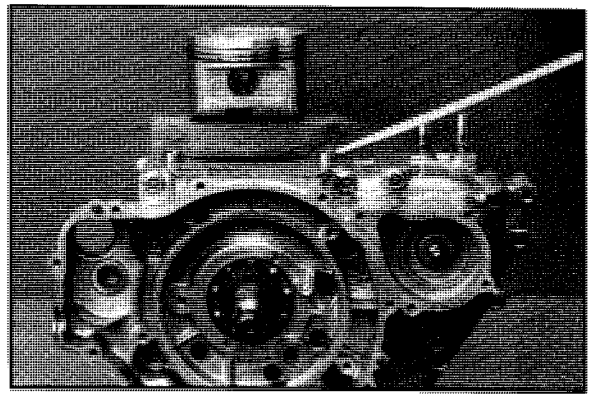
CAUTION: Circlips become deformed during the removal process. Do not re-use old circlips. Do not compress the new clip more than necessary upon installation to prevent loss of radial tension. Severe engine damage may result if circlips are re-used or deformed during installation.



4. Apply clean engine oil to the piston rings, ring lands, piston pin bore, piston pin, and piston skirt. Lubricate the connecting rod (both ends), balancer drive gear, and crankshaft main bearing area.
5. Install the piston on the connecting rod with the arrow facing the magneto (RH) end of the crankshaft. The piston pin should be a push fit in the piston.
6. Install the other circlip with the gap facing up or down and tang outward. (See Caution with step 3 above). Push the piston pin in both directions to make sure the clips are properly seated in the groove.

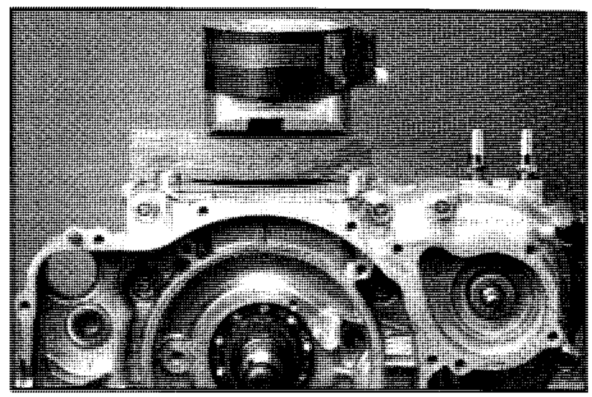


7. Place the dowel pins in the crankcase and install a new cylinder base gasket.

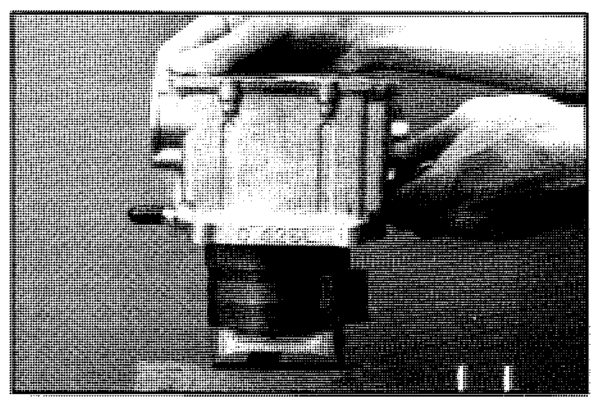


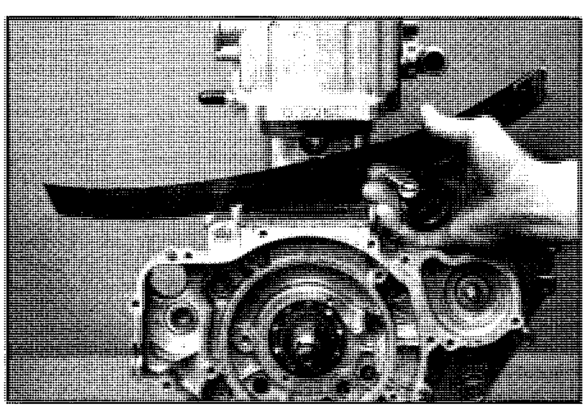
Cylinder Installation

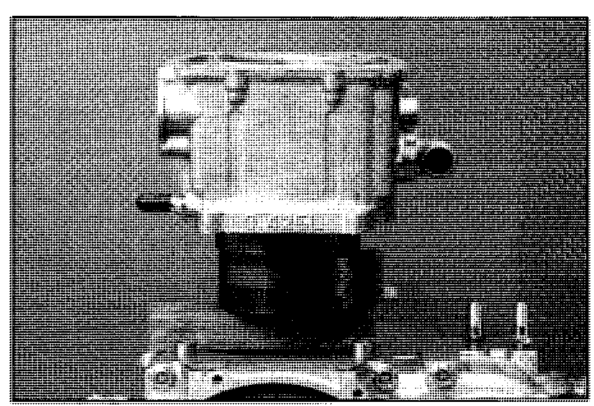
1. Position the piston support block PN 2870390 beneath the piston skirt to support the piston during cylinder installation.
2. Apply clean engine oil to the ring compressor (Snap On™ PN RCL30) and install the compressor following manufacturers instructions. **CAUTION:** Make sure the oil control ring upper rail tab is positioned properly in the notch of the piston. Verify all ring end gaps are correctly located.



3. Apply clean engine oil liberally to the cylinder bore and tapered area of the sleeve. Install the cylinder with a slight rocking motion until the rings are captive in the sleeve, and remove the ring compressor.



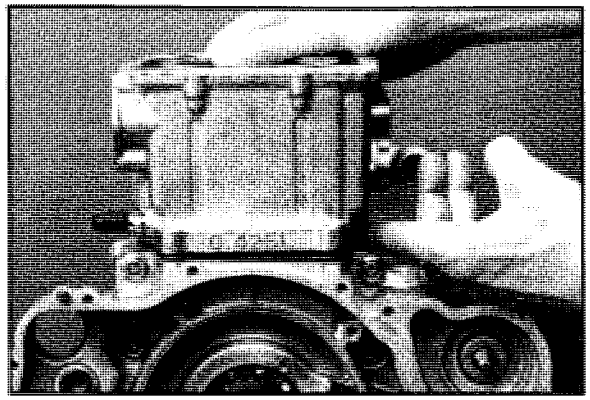




4. Push the cylinder downward until fully seated on the base gasket.
5. Apply a light film of oil to the threads and flange surface of the cylinder mounting bolts.
6. Install all four bolts finger tight. Rotate the engine and position the piston at BDC.

NOTE: If cam chain is installed, hold it up while rotating the engine to avoid damage to the chain, drive sprocket teeth, or tensioner blade.

7. Tighten the cylinder bolts in three steps in a criss cross pattern and torque to specifications.
8. Install the two 6mm bolts.



Cylinder Bolt Torque:

10mm - 46 ft. lbs. (6.348 kg/m)
6mm - 6 ft. lbs. (.828 kg/m)

Cylinder Head Installation

Clean the gasket surfaces on the cylinder head and cylinder. Remove all traces of old gasket material.

1. Install the cam chain tensioner guide. Be sure bottom end of guide is located properly in crankcase.
2. Install the two dowel pins and a new cylinder head gasket. The O-Ring must be positioned over the front PTO (LH) side cylinder head bolt hole.
3. Place the cylinder head on the cylinder. Apply a film of engine oil to the cylinder head bolt threads and washers, and hand tighten the bolts.

The following procedure must be used to torque the cylinder head properly:

Torque all bolts evenly in a criss cross pattern

***Torque bolts to 22 ft. lbs. (3.04 kgm)**

***Torque bolts to 51 ft. lbs. (7.04 kgm)**

***Loosen bolts evenly 180° (1/2 turn)**

***Loosen bolts again another 180° (1/2 turn)**

***Torque bolts to 11 ft. lbs. (1.52 kgm)**

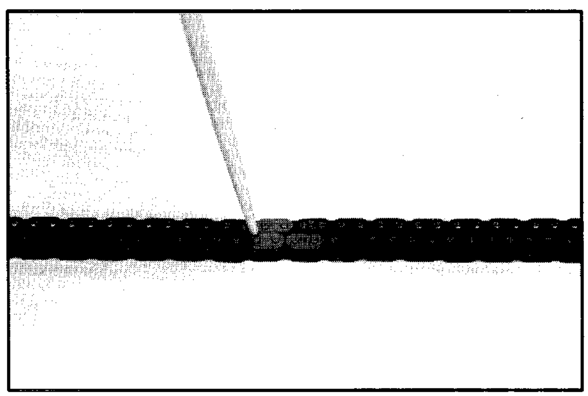
***From this point, tighten bolts evenly 90° (1/4 turn)**

***Finally, tighten another 90° (1/4 turn)**

***Install two 6mm bolts and torque to 6 ft. lbs. (.828 kgm)**

Cam Chain/Camshaft Installation

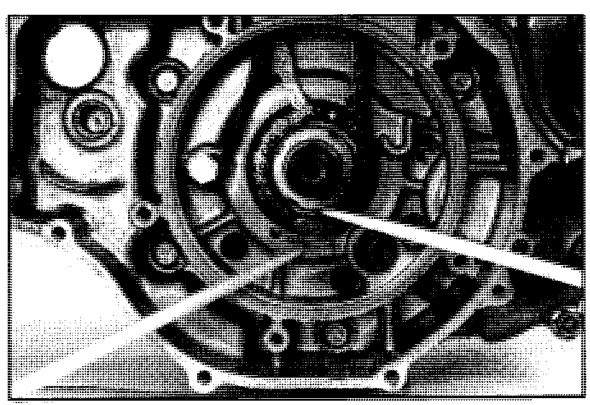
Install the cam chain over the crankshaft with the plated links facing outward.



CAUTION: Serious engine damage may result if the camshaft is not properly timed to the crankshaft.

IMPORTANT CAMSHAFT TIMING NOTE: In order to time the camshaft to the crankshaft, the piston must be precisely located at Top Dead Center (TDC). This can be accomplished using one of two methods.

When the stator assembly is removed, follow the procedure outlined in Method 1. This method uses the cam chain plated links to time the camshaft and the dot on the cam chain drive sprocket to establish TDC (see Method 1, page 7.103). It is important to note that this method can only be used when the stator is removed and the cam chain drive sprocket is in view. The plated links *are not* used to time the camshaft when the flywheel is installed.



When the stator assembly is installed use Method 2. This method establishes accurate Top Dead Center (TDC) by aligning the single mark on the flywheel with the notch in the timing inspection hole (see Method 2, page 7.105). The camshaft sprocket alignment pin faces upward and directly in line with the crankshaft to camshaft centerline.

Camshaft Installation – Timing Method 1.
Refer to Illustration, Page 7.104

If the stator assembly is removed: **NOTE:** Use this method only when the stator is removed and cam chain drive sprocket is in view.

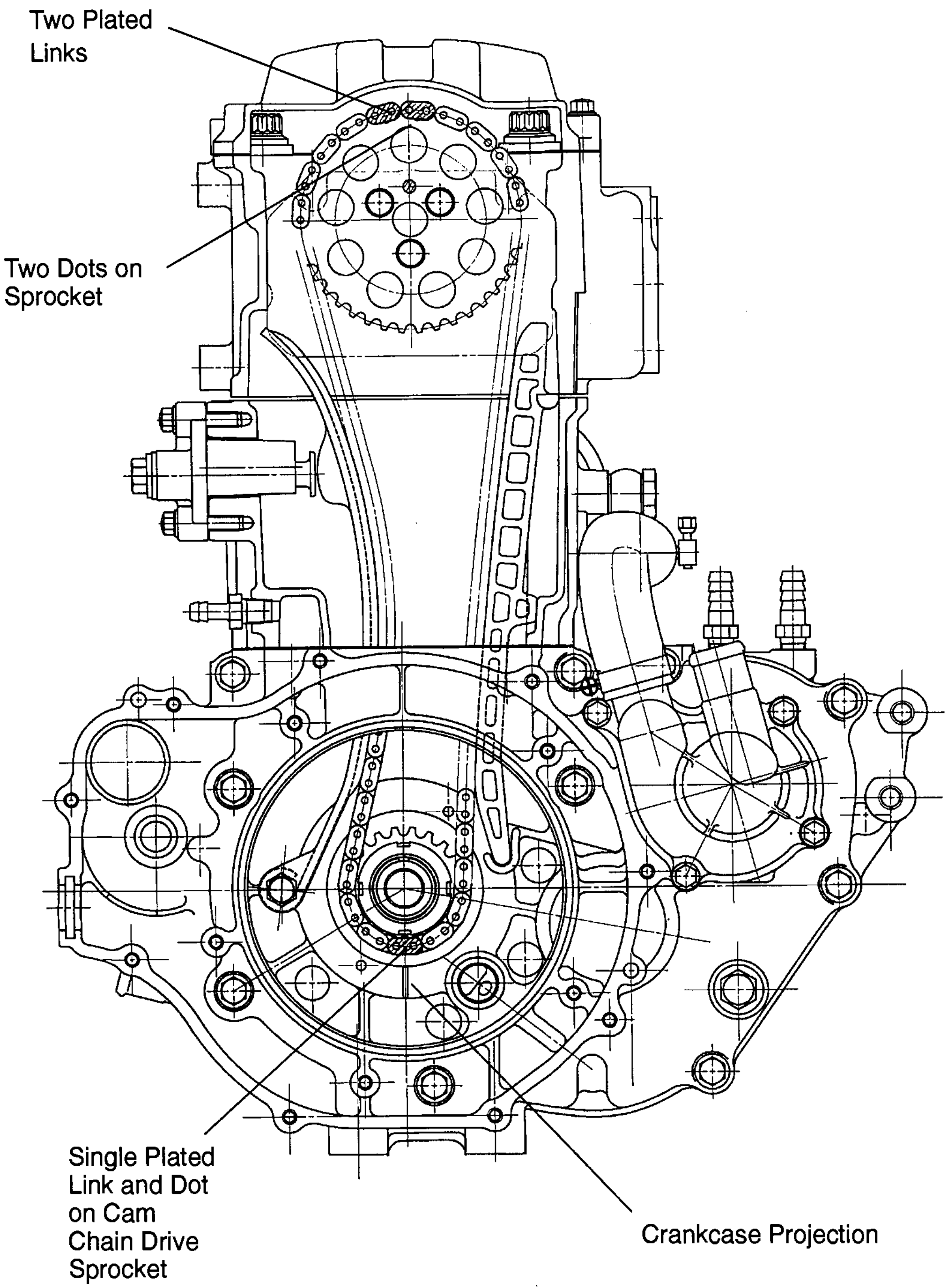
1. Rotate the crankshaft until the dot on the cam chain drive sprocket is aligned with the crankcase projection (dot facing downward).
2. Align the single plated link on the cam chain with the dotted tooth of the cam chain drive sprocket. Use a wire to pull the chain up through the cylinder and cylinder head, and secure it to hold the chain in place.
3. Apply Polaris Low Temp Grease PN 2870577, or moly grease to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil. (To install the compression release mechanism, refer to page 7.68).
4. Install the camshaft with the lobes facing downward and the sprocket alignment pin facing upward.
5. Disconnect the wire from the cam chain and install the cam sprocket with the two dots facing outward.
6. Loop the cam chain over the cam sprocket, aligning the two plated links on the chain with the two dots on the sprocket.
7. Install the sprocket on the camshaft. Apply Loctite 242 to the cam sprocket bolts and torque to specifications.

Cam Sprocket Bolt Torque:

6 ft. lbs. (.828 kg/m)

8. Apply Loctite 515 or 518 Gasket Eliminator to the camshaft end cap and install using a new O–ring.
9. Check all cam timing marks to verify proper cam timing, and install the cam chain tensioner. See Cam Chain Tensioner Installation page 7.107. **NOTE:** The plated links will not align after engine is rotated.

Method 1 - Camshaft Timing with Stator Removed



NOTE: Plated links will not align after engine is rotated.

Camshaft Installation – Timing Method 2.
Refer to Illustration, Page 7.106

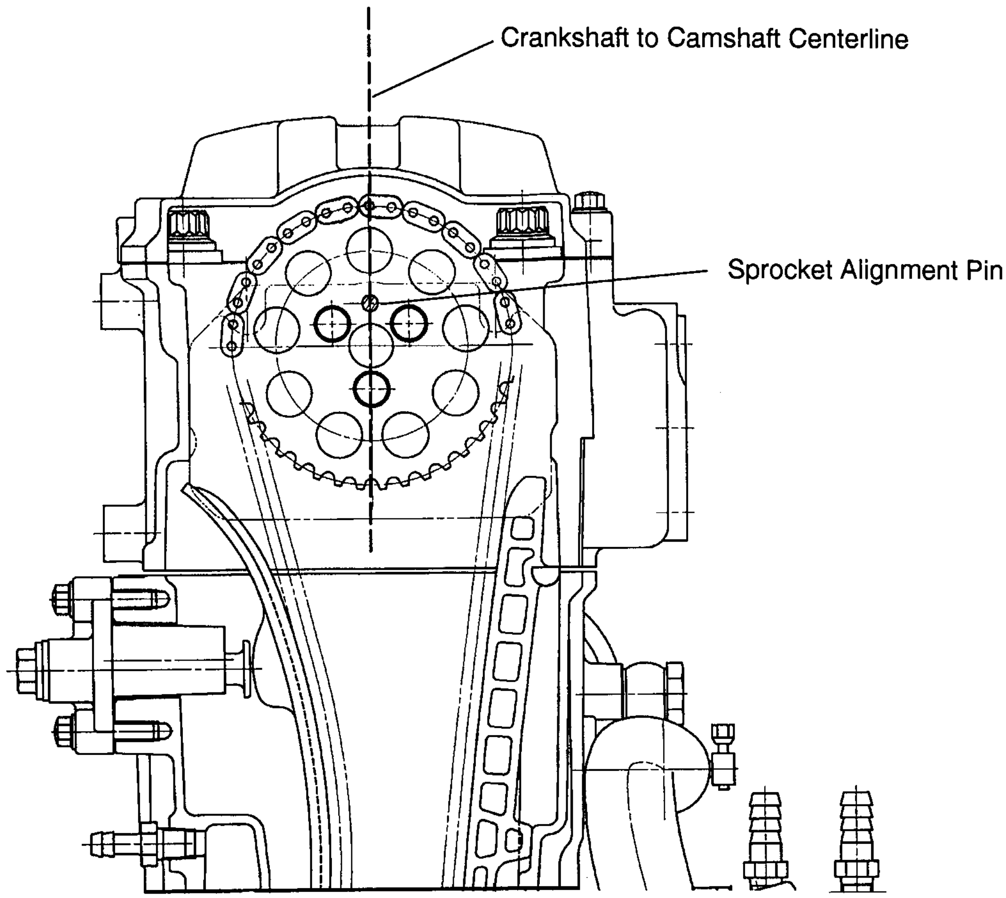
1. Apply Polaris Low Temp Grease PN 2870577, or molybdenum disulfide grease to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil. (To install the compression release mechanism, refer to page 7.68).
2. Install the camshaft with the lobes facing downward and the sprocket alignment pin facing upward.
3. Disconnect the wire from the cam chain and rotate the engine to align the single timing mark (Top Dead Center) on the flywheel with the notch in the timing inspection window.
4. Loop the cam chain on the cam sprocket with the dots on the sprocket facing outward and the alignment pin notch facing directly upward.
5. Before positioning the sprocket on the camshaft, check the position of the cam sprocket alignment pin. When the cam is positioned properly, the cam sprocket alignment pin is directly in line with the crankshaft/camshaft centerline.
6. Install the sprocket on the camshaft. Apply Loctite 242 to the cam sprocket bolts and torque to specifications.

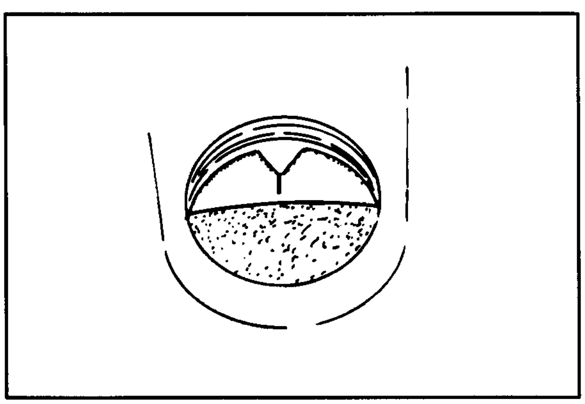
Cam Sprocket Bolt Torque:

6 ft. lbs. (.828 kg/m)

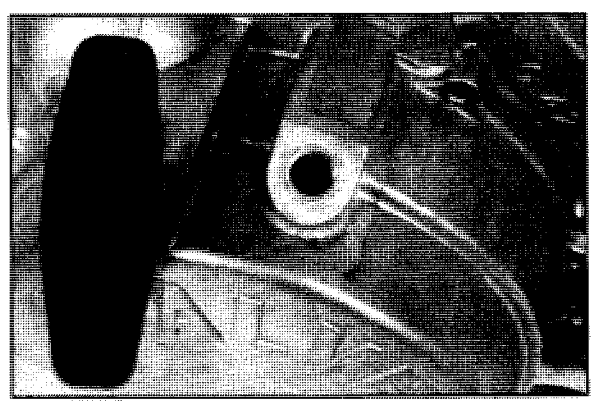
7. Apply Loctite 515 or 518 Gasket Eliminator, or 3 Bond 1215 to the camshaft end cap and install using a new O-Ring.
8. Check all cam timing marks to verify proper cam timing, and install the cam chain tensioner body with a new gasket.

Method 2 Camshaft Timing Using Flywheel TDC Mark





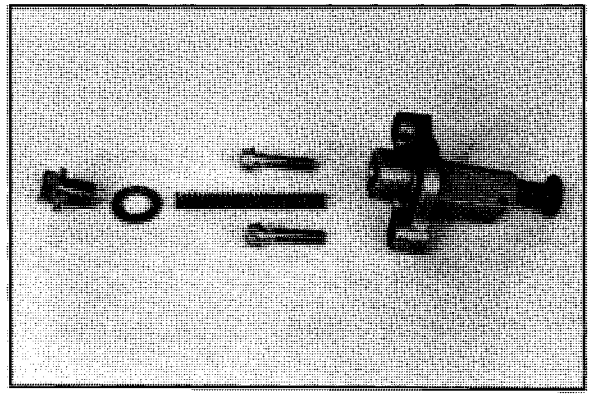
TDC Mark Aligned



Recoil Housing Timing Inspection Hole

Cam Chain Tensioner Installation

1. Release the ratchet pawl and push the tensioner plunger all the way into the tensioner body.
2. Install the tensioner body with a new gasket and tighten the bolts.



Tensioner Bolt Torque:

6 ft. lbs. (.828 kg/m)

3. Install the spring, new sealing washer, and tensioner plug.

Tensioner Plug Torque:

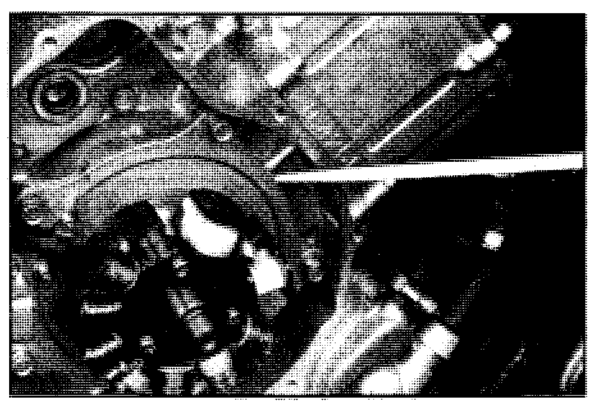
17 ft. lbs. (2.346 kg/m)

4. Slowly rotate engine two to three revolutions and re-check cam timing. **NOTE:** Plated links will not align after engine is rotated. Check crankshaft position by aligning dot on sprocket with crankcase projection (or TDC mark if flywheel is installed). Use cam sprocket locating pin (see Timing Method 2) to check camshaft position.

Stator, Flywheel and Starter Drive Installation

NOTE: The stator, flywheel, starter drive, and recoil can be assembled with the engine in the frame.

Stator

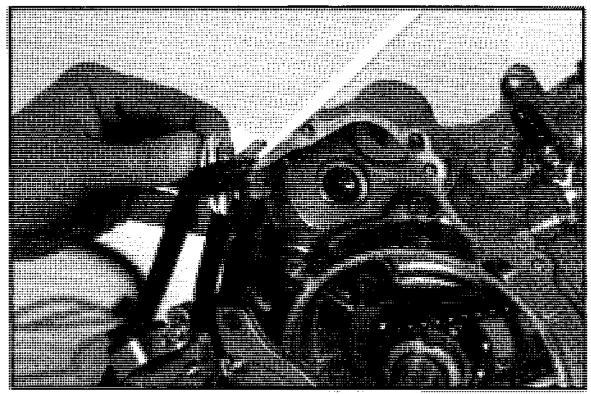


1. Apply a light film of grease to the crankshaft seal. Apply molybdenum disulfide grease or assembly lubricant to the crankshaft bushing.
2. Install a new O-Ring in the oil passage recess in the crankcase.
3. Apply 3 Bond 1215, Loctite 515 or 518, or an equivalent sealer to the stator plate outer surface and install a new O-Ring.
4. Install the stator plate being careful not to damage the seal. Align timing reference marks on the plate and crankcase. Be sure the plate is fully seated.

5. Torque bolts evenly to specification.

Stator Plate Bolt Torque:
5.1-6.5 ft. lbs. (.68-.88 kg/m)

6. Seal stator wire grommet with 3 Bond 1215 or equivalent sealer.



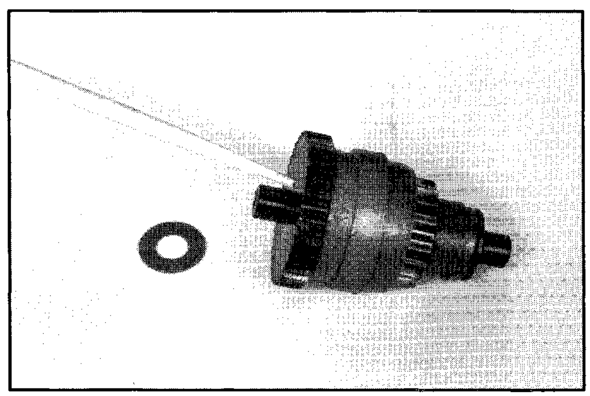
Flywheel

1. Install flywheel, washer, and nut. Torque flywheel to specification.

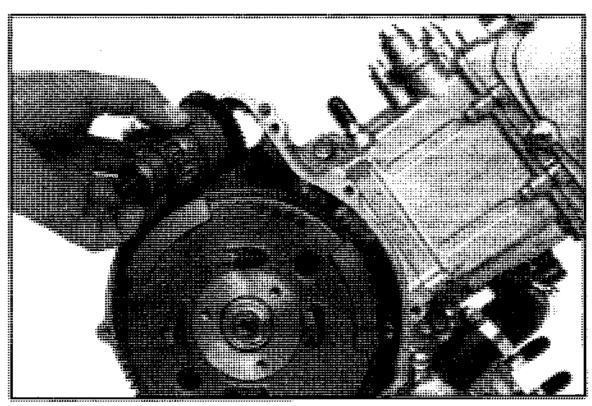
Flywheel Nut Torque:
58-72 ft. lbs. (7.85-9.81 kg/m)

Starter Drive

1. Be sure the washer is positioned on the back of the drive gear.



2. Apply grease to the drive bushing in the crankcase and install the starter drive mechanism.
3. Install recoil housing gasket and recoil housing.



Rocker Shaft/Rocker Arm Assembly Installation

1. Assemble rocker arms, rocker shaft, and shaft supports.
2. Install and tighten rocker arm shaft locating bolt.
3. Apply molybdenum disulfide grease to the cam lobes and cam follower surfaces.
4. Rotate the engine until the cam lobes are pointing downward.
5. Be sure the dowel pins are in place and install the rocker shaft assembly.
6. Apply a light film of engine oil to the threads of the bolts and tighten evenly.

Rocker Shaft Support Tower Bolt Torque:

9 ft. lbs. (1.242 kg/m)

Rocker Shaft Locating Bolt Torque:

6 ft. lbs. (.828 kg/m)

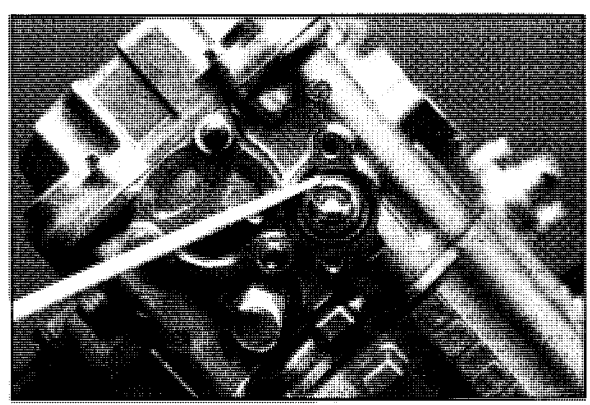
7. Adjust valves according to the valve adjustment procedure found on page 7.20.
8. Apply clean engine oil liberally to the valve springs, cam chain, rocker arms, and camshaft.
9. Place a new rocker cover gasket on the cylinder head and install the cover and bolts.

Rocker Cover Bolt Torque:

6 ft. lbs. (.828 kg/m)

Thermostat Installation

Install the thermostat with one of the air bleed holes positioned next to the upper thermostat cover bolt hole as shown.



Oil Pipes

Install the oil pipes with new sealing washers. Tighten all bolts evenly to specified torque.

Oil Pipe Bolt Torque:

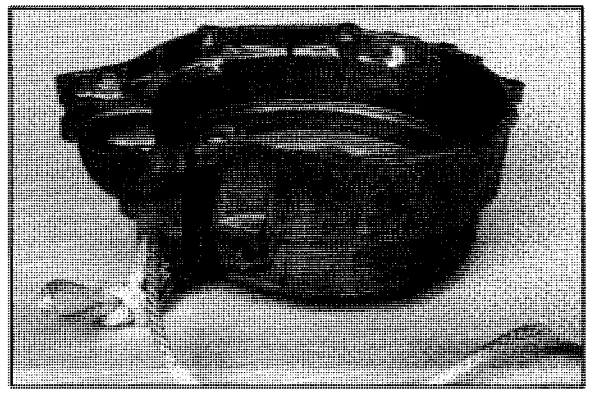
20 ft. lbs. (2.76 kg/m)

Recoil Disassembly/Inspection/Assembly

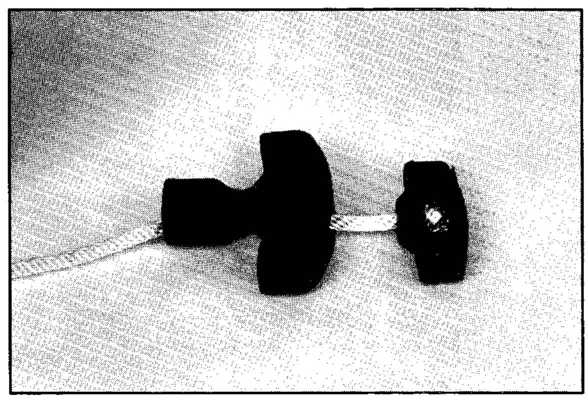
CAUTION: The recoil is under spring tension. A face shield and eye protection is required during this procedure.

Replace any parts found to be worn or damaged.

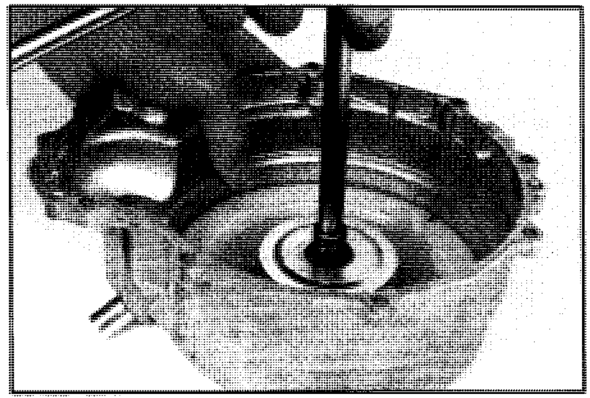
1. Remove bolts and recoil housing.
2. Pull recoil rope so it is fully extended and tie a loose knot at the rope guide bushing.
3. Remove inner portion of recoil handle.

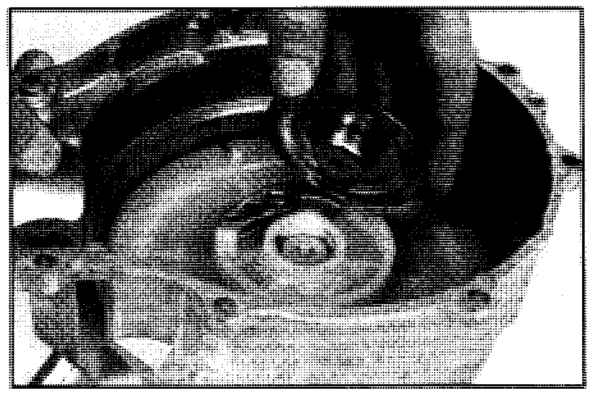


4. Remove tape from handle, pull knot out of handle and cut it off.
5. Remove handle sections from rope. Check handle for cracks or damage. **NOTE:** The handle must seal tightly on the recoil housing to prevent water from entering.
6. Hold rope securely and untie knot at rope guide bushing.

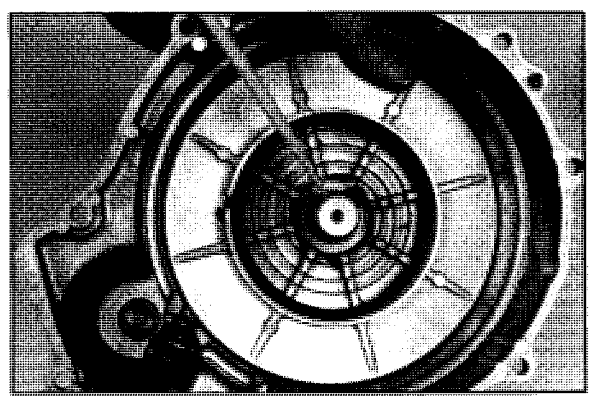


7. Slowly remove spring tension by rotating reel clockwise until all tension is removed.
8. Remove 6 mm bolt and spring washer securing friction plate. Remove friction plate. Inspect plate for wear or damage. Inspect plate friction spring for wear, damage, and proper tension. The spring should fit tightly on friction plate.
9. Remove ratchet pawl with spring and inspect. Replace spring or ratchet pawl if worn, broken, or damaged.





10. Slowly and carefully remove reel from recoil housing making sure the spring remains in the housing. Inspect the reel hub and bushing for wear.
11. Unwind rope and inspect for cuts or abrasions.
12. Inspect drive tab on hub return spring for damage. To remove hub return spring, hold outer coils in place with one hand and slowly remove spring one coil at a time from the inside out.



Recoil Assembly

CAUTION: Be sure to wear a face shield and eye protection when performing this procedure.

To install a new spring:

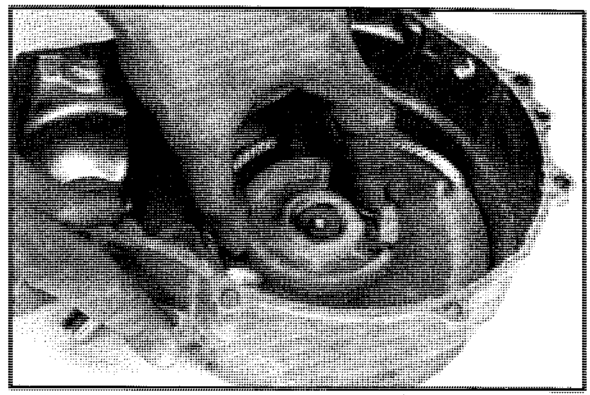
1. Place spring in housing with the end positioned so the spring spirals inward in a counterclockwise direction. See photo above.
2. Hold spring in place and cut retaining wire.

To reinstall an old spring:

1. Hook outer tab in place in recoil housing and wind spring in a counterclockwise direction one coil at a time while holding the installed coils in place. See photo on page 7.112.
2. Lubricate the spring with light lubricant such as Polaris Cable Lube (PN 2870510) or low temperature grease.

Rope/Hub Installation

1. Tie a secure knot in one end of the rope and install in the reel.
2. Wind rope counterclockwise onto the reel, as viewed from ratchet side of reel.
3. Lock rope into notch on outer edge of reel.
4. Apply a small amount of Polaris low temp grease or equivalent to the center post of the housing and the bushing.
5. Install reel into housing making sure the spring drive tab on the reel engages the spring and the reel is fully seated in the housing.
6. Apply downward pressure on the reel and pre-wind the spring four turns counterclockwise. Continue rotating counterclockwise until the rope on the outer edge aligns with the rope guide bushing.
7. Route the rope out of the housing through the bushing and again tie a knot at the guide bushing to hold the rope in place.
8. Install ratchet pawl and return spring.
9. Reinstall friction plate. **NOTE:** The friction plate must be positioned with both end tabs of the friction spring on the drive side of the ratchet.
10. Torque friction plate retaining bolt to 5-6 ft. lbs. (.69-.828 kg/m).
11. Thread rope back through the handle and handle insert. Tie a knot in the end of the rope. Test the knot to be sure it holds when pulling on the recoil.
12. Replace tape and reinstall handle insert.
13. Reinstall recoil housing using a new gasket.



Condition	Possible Cause	Action
Engine turns over but does not start	-No fuel	-Add fuel as required
	-Dirt in fuel line or filter	-Clean line, replace filter
	-Fuel will not pass through on-off valve (petcock)	-Clean or replace valve as necessary
	-Tank vent plugged	-Repair vent system
	-Carb starter circuit	-Clean or replace as needed
	-Engine flooded	-Turn off fuel and drain crankcase a. Inspect carb venting system for obstructions b. Inspect carb needle and seat
	-Low compression (below 100 PSI at sea level)	a. Inspect head gasket b. Inspect piston and cylinder (repair as required)
	-No spark	-Repair ignition system (refer to ignition trouble-shooting)
Engine does not turn over	-Dead battery	-Charge or replace battery (refer to battery testing)
	-Starter motor does not turn	-Repair starter (refer to starter testing)
	-Engine stuck	-Repair engine as required
Engine runs but will not idle	-Plugged carb pilot system	-Clean or replace pilot jet
	-Carb misadjusted	-Adjust as per specification
	-Choke not adjusted properly	-Adjust choke as per specification
	-Low compression	-Repair engine as required
	-Crankcase leak	-Repair crankcase as required
Engine idles but will not rev up	-Broken throttle cable	-Replace cable
	-Obstruction in air intake	-Clean or repair air intake
	-Incorrect carb jetting	-Jet as per jetting chart
	-ETC limiting speed (1989 and newer)	-Repair ETC (refer to ETC troubleshooting)
	-Reverse speed limiter limiting speed	-Repair reverse speed limiter (refer to reverse speed limiter troubleshooting chart)
	-Incorrect ignition timing	-Check and adjust ignition timing
	-Restricted exhaust system	-Repair or replace exhaust system
Engine has low power	-Cylinder, piston and ring wear or damage (check compression)	-Repair cylinder and piston as needed
	-PVT not operating properly	-Clean, repair or replace as required
	-Plugged exhaust	-Repair or replace exhaust system
Piston failure -Scoring	-Lack of lubrication	-Fill oil tank and bleed pump
		-Check pump for proper operation
-Melted piston top	-Engine overheating	-Repair engine, install fan if necessary
	-Lean air fuel ratio	-Clean carb and jet as per chart
	-Air leak in crankcase	-Repair as needed
	-Low octane fuel	-Use 87 octane minimum
	-Incorrect ignition timing	-Adjust timing as per specifications
-Skirt breakage	-Incorrect spark plug	-Install recommended spark plug
	-Piston fatigue from scoring	
Excessive smoke and carbon buildup	-Excessive piston-to-cylinder clear-ance	-Repair cylinder (Check air filter and air box)
	-Oil pump misadjusted	-Synchronize pump to carb (refer to oil pump bleed-ing and adjustment)
	-Oil pump cable not allowing pump to return to idle position	-Lubricate or replace cable
Excessive white smoke (Liquid cooled models)	-Engine coolant	-Retorque cylinder head
		-Inspect/replace head gasket
		-Inspect cylinder
Engine coolant found in counter balance assem-bly (Liquid cooled mod-els)	-Water pump gasket	-Inspect/replace gasket
	-Water pump seal	-Replace

4 Stroke Troubleshooting

Engine Turns Over But Fails to Start

- No fuel
- Dirt in fuel line or filter
- Fuel will not pass through fuel valve
- Fuel pump inoperative/restricted
- Tank vent plugged
- Carb starter circuit
- Engine flooded
- Low compression (high cylinder leakage)
- No spark (Spark plug fouled)

Engine Does Not Turn Over

- Dead battery
- Starter motor does not turn
- Engine stuck

Engine Runs But Will Not Idle

- Plugged carb pilot system
- Carb misadjusted
- Choke not adjusted properly
- Low compression
- Crankcase breather restricted

Engine Idles But Will Not Rev Up

- Spark plug fouled/weak spark
- Broken throttle cable
- Obstruction in air intake
- Incorrect carb jetting
- ETC limiting speed
- Reverse speed limiter limiting speed
- Carburetor vacuum slide sticking/diaphragm damaged
- Incorrect ignition timing
- Restricted exhaust system

Engine Has Low Power

- Spark plug fouled
- Cylinder, piston, ring, or valve wear or damage (check compression)
- PVT not operating properly
- Plugged exhaust
- Carburetor vacuum slide sticking/diaphragm damaged
- Dirty carburetor

Piston Failure - Scoring

- Lack of lubrication
- Dirt entering engine through cracks in air filter or ducts

Excessive Smoke and Carbon Buildup

- Excessive piston-to-cylinder clearance
- Wet sumping
- Worn rings, piston, or cylinder
- Worn valve guides or seals
- Restricted breather
- Air filter dirty or contaminated

Low Compression

- Decompressor stuck
- Cylinder head gasket leak
- No valve clearance or incorrectly adjusted
- Cylinder or piston worn
- Piston rings worn, leaking, broken, or sticking
- Bent valve or stuck valve
- Valve spring broken or weak
- Valve not seating properly (bent or carbon accumulated on sealing surface)
- Rocker arm sticking

Overheating

- Low coolant level - air in system
- Faulty pressure cap or system leaks
- Lean mixture (restricted jets, vents, fuel pump or fuel valve)
- Fuel pump output weak
- Restricted radiator (internally or cooling fins)
- Water pump failure
- Cooling system restriction
- Cooling fan inoperative
- Ignition timing misadjusted
- Low oil level
- Spark plug incorrect heat range
- Faulty hot light circuit
- Thermostat stuck closed

Backfiring

- ETC or speed limiter system malfunction
- Fouled spark plug or incorrect plug or plug gap
- Carburetion faulty - lean condition
- Exhaust system air leaks
- Ignition system faulty:
  - Spark plug cap cracked/broken
  - Ignition coil faulty
  - Ignition or kill switch circuit faulty
  - Ignition timing incorrect
  - Sheared flywheel key
- Poor connections in ignition system
- System wiring wet
- Valve sticking
- Air leaks in intake
- Lean condition

Magnum Cooling System Troubleshooting

Overheating

- Insufficient/wrong type coolant
- Air in system
- Thermostat stuck closed or not opening completely
- Radiator cap faulty (fails to pressurize)
- Restricted system (mud or debris in radiator fins or restriction to air flow, passages blocked in radiator, lines, pump, or water jacket)
- Water pump inoperative
- Fan motor inoperative

Temperature Too Low

- Thermostat stuck open

Leak at Water Pump Weep Hole

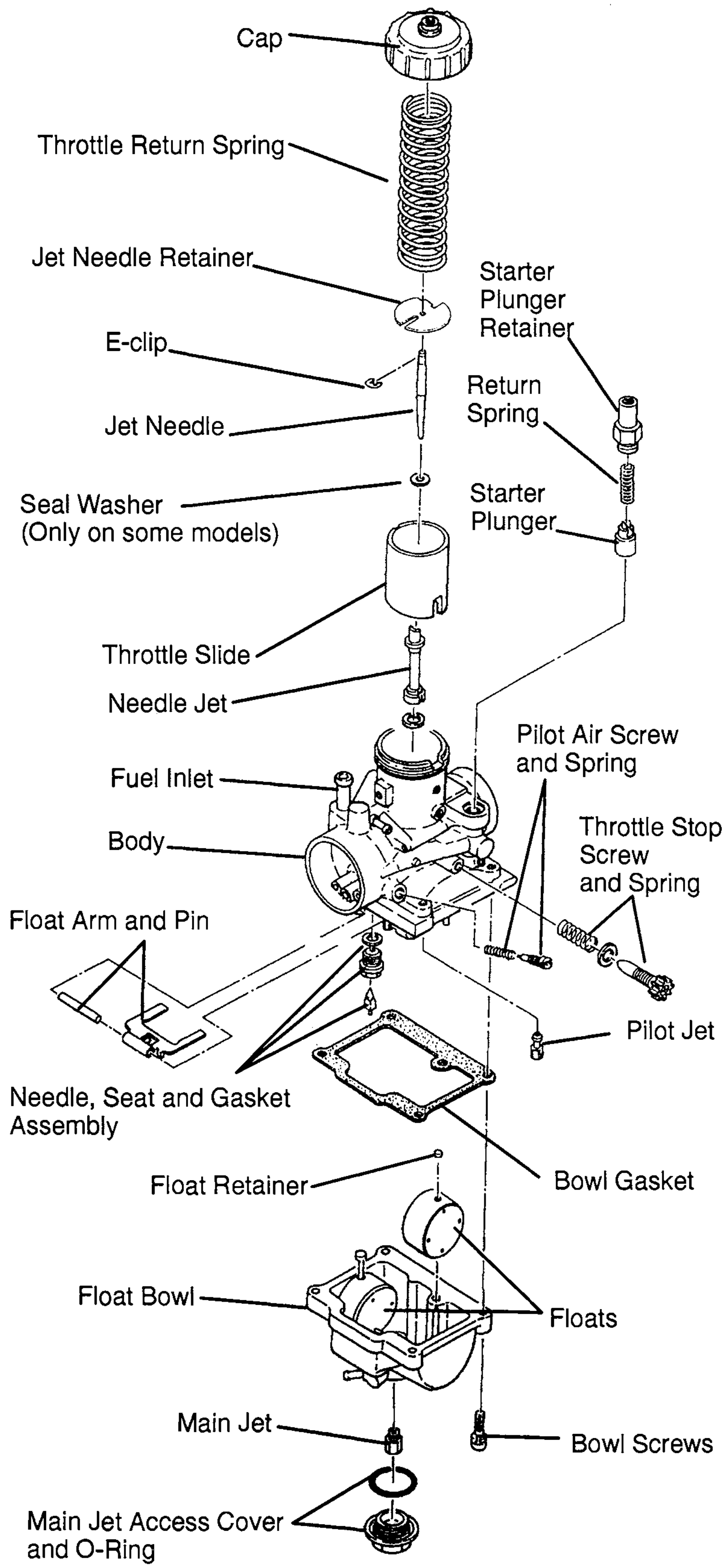
- Faulty water pump mechanical seal (coolant leak)
- Faulty pump shaft oil seal (oil leak)

Pilot Jets and Part Numbers

Jet No.	Part No.
30	3130331
35	3130066
40	3130067
45	3130068
50	3130069

Hex Main Jets and Part Numbers

Jet No.	Part No.
110	3130105
115	3130106
120	3130107
125	3130108
130	3130109
135	3130110
140	3130111
145	3130112
150	3130113
155	3130114
160	3130115
165	3130116
170	3130117
175	3130118
180	3130119
185	3130120
190	3130121
195	3130122
200	3130123
210	3130124
220	3130125
230	3130126
240	3130127
250	3130128
260	3130129
270	3130130

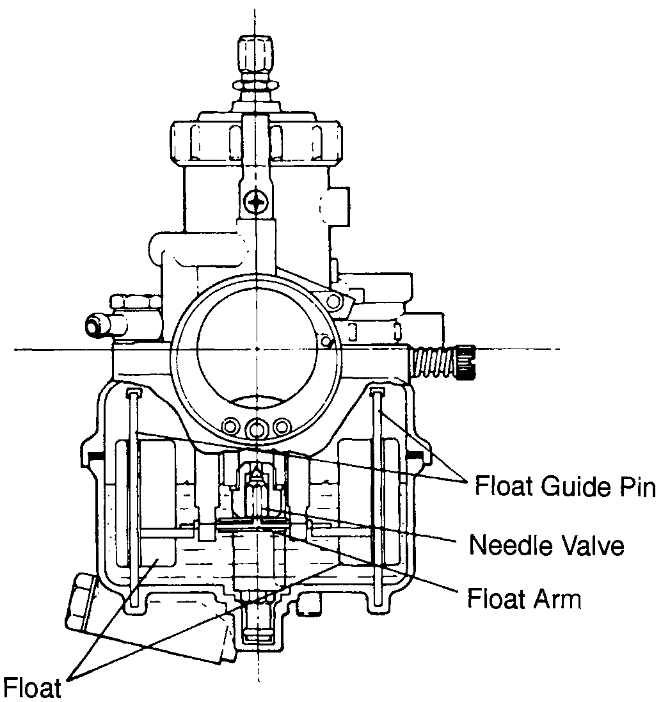


Function of VM Carburetor

The function of a carburetor is to produce a combustible fuel/air mixture by breaking fuel into tiny particles in the form of vapor. It then mixes the fuel with air in a proper ratio and delivers the mixture to the engine. A proper mixture ratio means an ideal air/fuel mixture which can burn without leaving an excess of fuel or air. Whether or not this mixture ratio is maintained is the key to efficient engine operation.

The engine is operated under a wide range of conditions from idling, with the throttle valve remaining almost closed; to full load, maximum output, with the throttle valve fully opened. In order to meet proper mixture ratio requirements under varying conditions, a low speed fuel system or pilot system, and a main fuel system are provided in Mikuni VM carburetors.

The Mikuni carburetor varies operations depending upon varying driving conditions. It consists of the float system, pilot system, main system, and starter system or initial starting device.

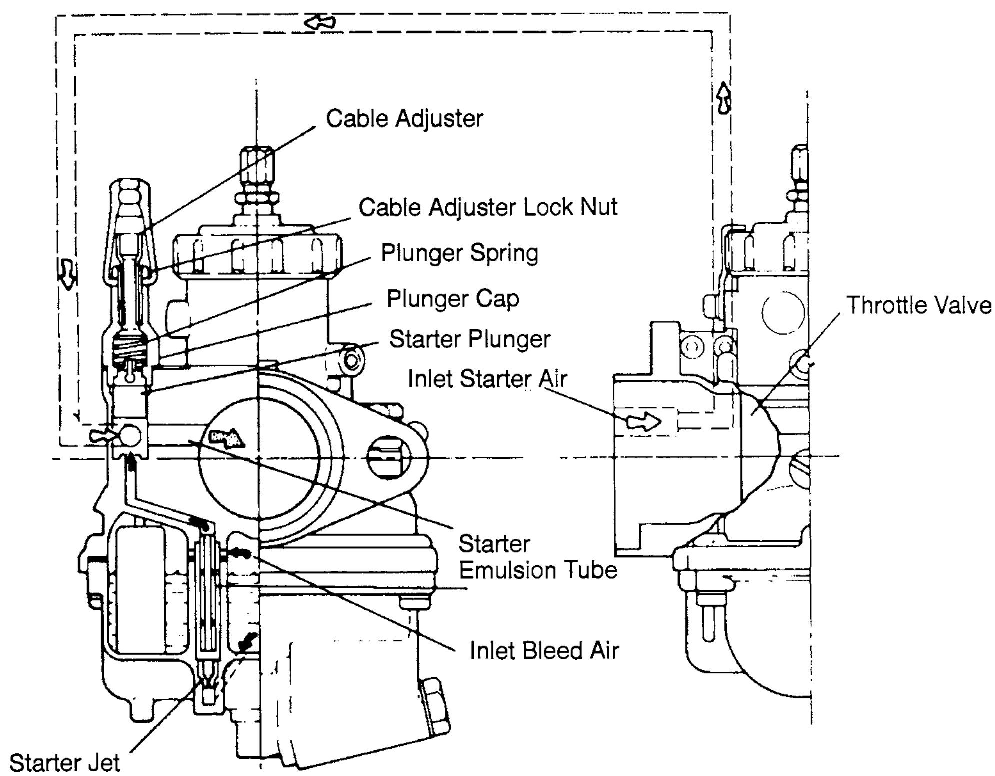


Float System

The float system is designed to maintain a constant height of gasoline during operation. When fuel flowing from the fuel pump through the needle valve into the float chamber reaches the constant fuel level, the floats rise. When the buoyancy of the float and the fuel pressure of the fuel pump balance, the needle valve sticks fast to the needle seat, preventing further delivery of gasoline. This ensures the standard level of gasoline is maintained.

The fuel level in the bowl controls the amount of fuel in the fuel mixture. A level which is too high allows more fuel than is needed to leave the nozzle, creating a rich mixture. A fuel level which is too low results in a leaner mixture, since not enough fuel leaves the nozzle. The bowl fuel level should not be changed arbitrarily.

The starter system replaces the choke in the Mikuni carburetor. Fuel and air for starting the engine are metered with entirely independent jets. The fuel metered in the starter jet is mixed with air and is broken into tiny particles in the emulsion tube. This mixture then flows into the plunger area, mixing again with air coming from the air intake port. It is then delivered to the engine in the optimum air/fuel ratio through the fuel discharge nozzle. The starter is opened and closed by the starter plunger. Since the starter type carburetor is designed to use the negative pressure of the inlet pipe, it is important that the throttle valve is closed when starting the engine.

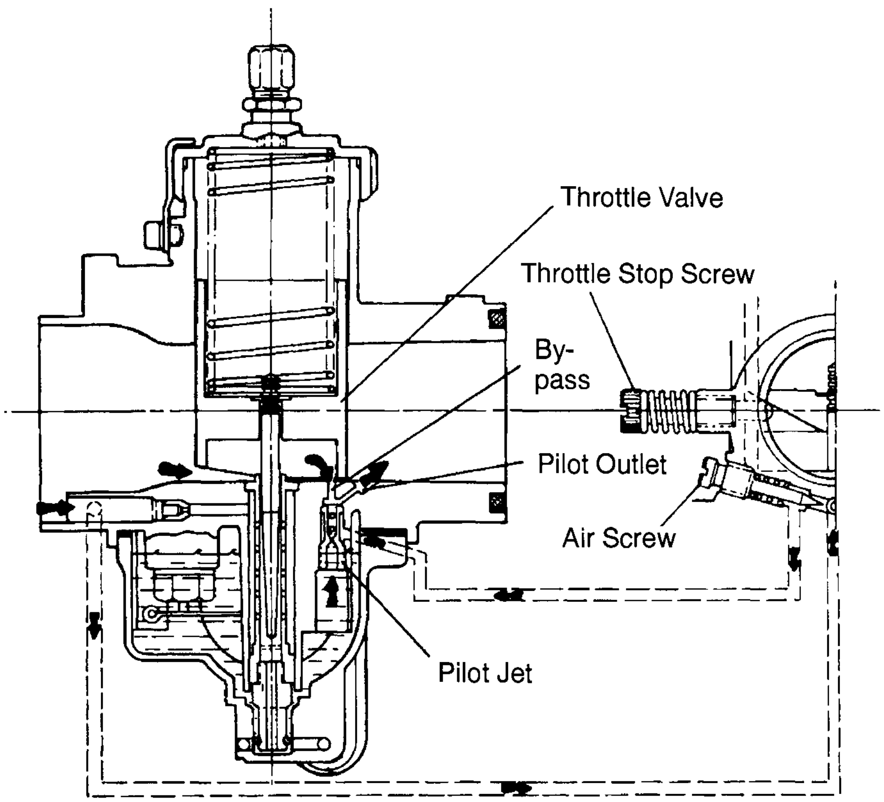


Pilot System

The pilot system's main function is to meter fuel at idle and low speed driving, although it feeds fuel continuously throughout the entire operating range.

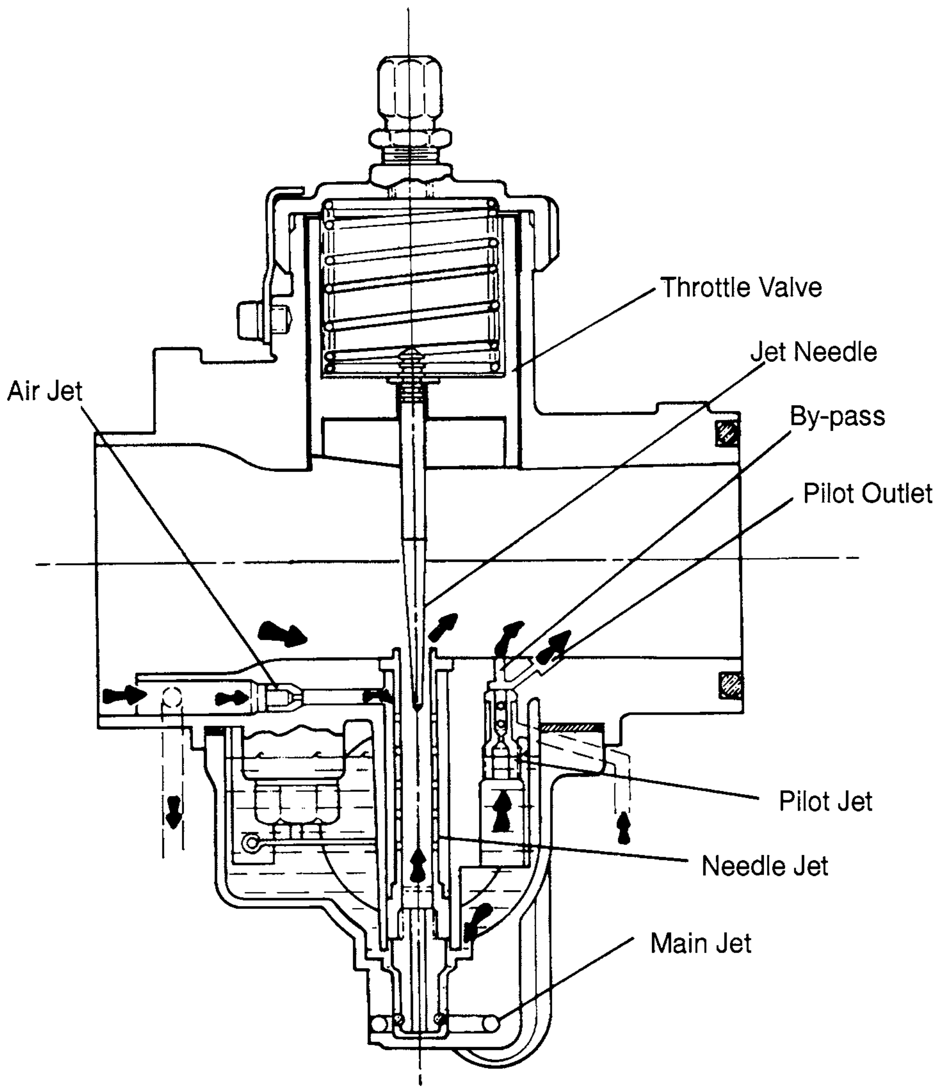
Fuel for the pilot jet is drawn from the float bowl, mixed with the air regulated by the air screw, and delivered to the engine through the pilot outlet.

The mixture is regulated to some degree by air screw adjustment. When the air screw is closed the amount of air is reduced, causing the fuel mixture to become richer. When the air screw is opened the amount of air is increased, causing the mixture to become leaner.



The main system is designed to deliver fuel between low speed and high speed operation. This system consists of the jet needle, needle jet, and main jet. The main system begins to take effect as soon as there is enough air flow into the carburetor venturi to draw fuel up through the main jet and needle jet assembly.

During low speed driving there is very little clearance between the jet needle and the needle jet, so very little fuel from the main jet can pass between the jet needle and the needle jet. As the throttle valve opening is increased, the tapered jet needle is raised farther out of the needle jet, allowing greater fuel flow. Under full throttle opening, the area of clearance between the jet needle and the needle jet becomes greater than the area of the main jet. When this occurs, the main jet takes control of the amount of fuel flow.



ENGINES/CARBURETION
Throttle Opening

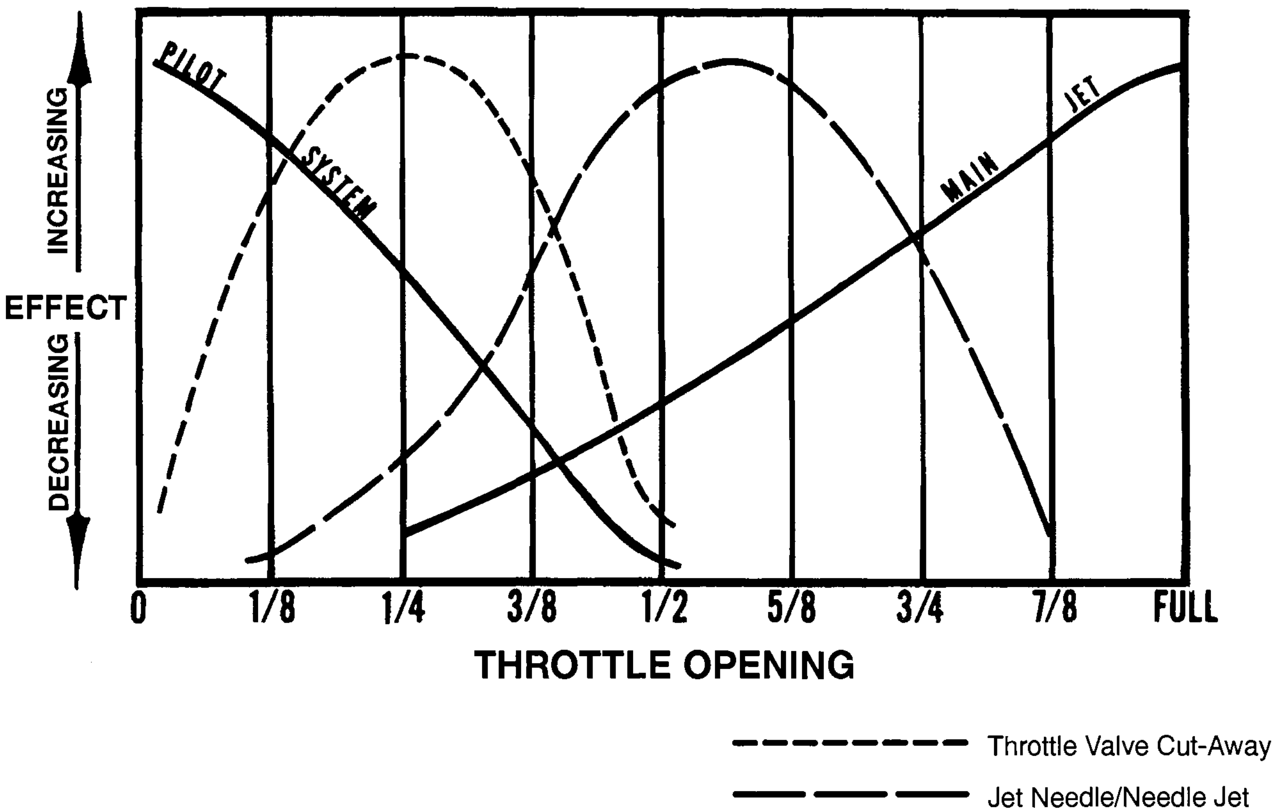
The chart shows the relationship of each carburetor component to fuel flow vs. throttle valve opening.

The pilot system's main function is that of a low speed jet. Its most effective range of fuel delivery is from idle to approximately 3/8 throttle valve opening.

The throttle valve controls the rate of engine air by its movement up and down in the carburetor venturi. At small throttle openings the air flow is chiefly regulated by the valve cutaway. Its greatest effectiveness is at 1/4 throttle opening. Throttle valves are numbered 1.0, 1.5, 2.0, etc., according to the size of the cutaway. Decreasing the cutaway number increases the amount of fuel delivered in the throttle valve's effective range.

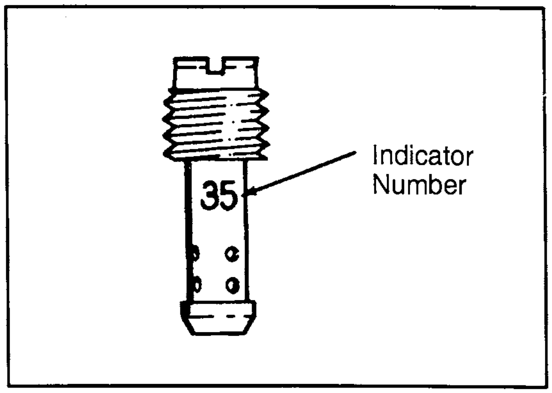
The jet needle and needle jet have an effective operating range from approximately 1/8 to 7/8 throttle opening. The amount of fuel delivered in this range depends upon the jet needle clip position, as well as the needle jet size and various other specifications.

The main jet affects fuel delivery at 1/4 throttle and increases consistently to full throttle opening.



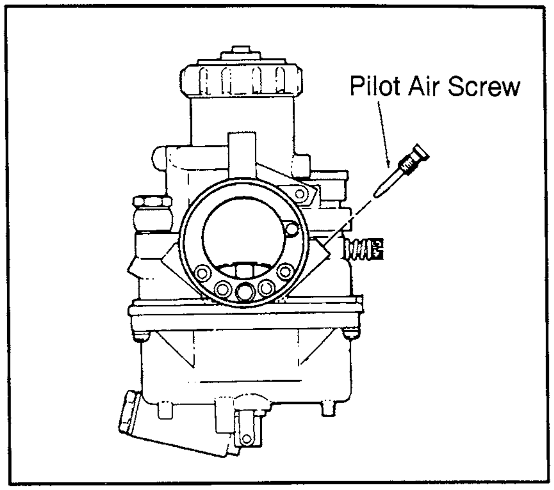
Pilot Jet

From idling to low speeds the fuel supply is measured mainly by the pilot jet. There are several air bleed openings in the sides of the pilot jet which serve the same purpose as the air bleed in the needle jet, reducing the fuel to mist. The number stamped on the jet is an indication of the cc's of fuel which pass through the jet during a one minute interval, under a given set of conditions.



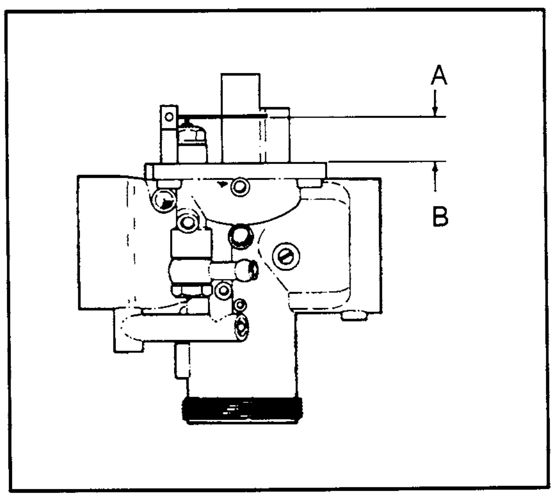
Pilot Air Screw

The air screw controls the fuel mixture from idling to low speeds. The tapered tip of the air screw projects into the air passage leading to the pilot jet air bleeds. By turning the screw in or out, the area of the air passage is varied, which in turn varies the pilot jet air supply and changes the mixture ratio.



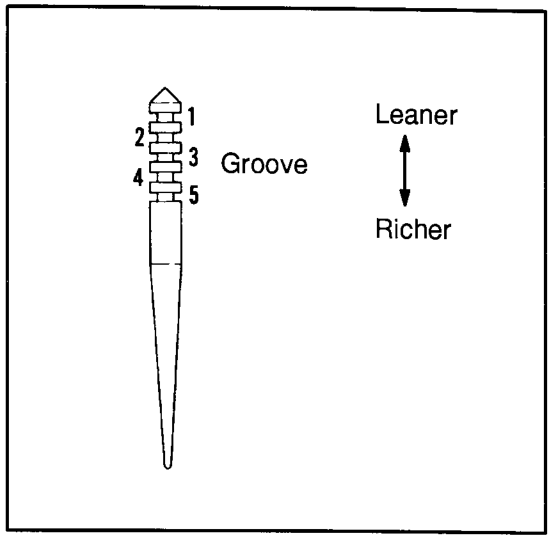
Adjustment of Float Level

To adjust the float level on a Mikuni carburetor it is necessary to remove the float bowl. With the carburetor in an inverted position, the float arm (A) should be parallel with the body (B) on the carburetor as shown in the illustration at right. **CAUTION:** Never bend the float arm itself. Always bend the tang which contacts the inlet needle.



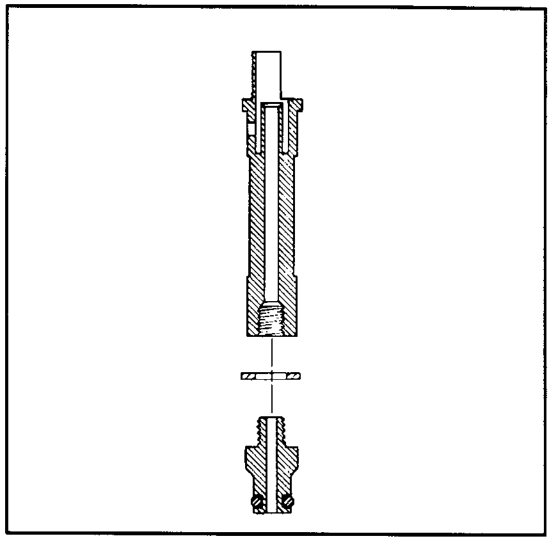
Jet Needle

The jet needle has five grooves for adjustment cut into the upper portion, and is tapered from approximately the middle of the needle to the lower end. The top is fixed to the center of the throttle valve by the needle clip, and the tapered end extends into the needle jet. Fuel flows through the space between the needle jet and jet needle. When the throttle reaches the 1/4 open point the tapered portion of the needle begins to move out of the jet. As the opening enlarges the fuel flow is affected. It follows that taper wear and the position of the needle clip in the grooves also affect fuel flow rate. If the needle clip is changed from the standard position to a lower groove, the needle taper starts coming out of the jet sooner, resulting in a richer mixture. Moving the clip to a higher position produces a leaner mixture.



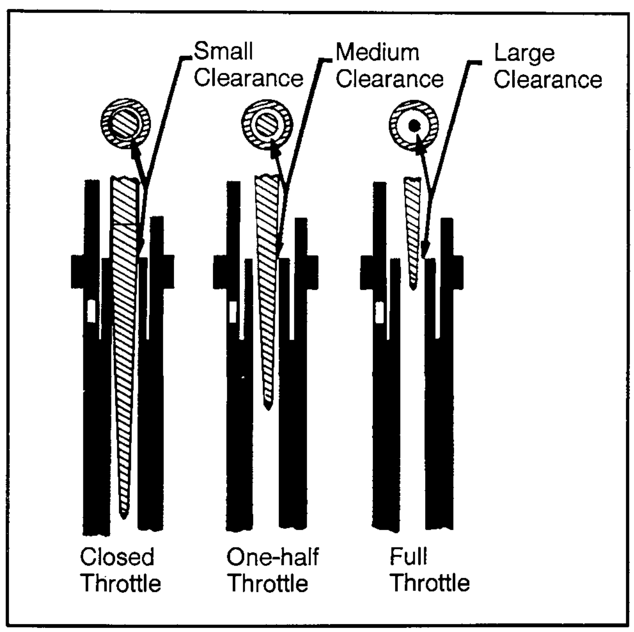
Needle Jet

The needle jet works in conjunction with the jet needle to regulate fuel flow rate. There is an air bleed opening in the side of the needle jet which brings in air measured by the air jet. This air initiates the mixing and atomizing process inside the needle jet. A projection at the needle jet outlet called the primary choke increases the mixing process. The code stamped on the jet indicates the jet inside diameter.

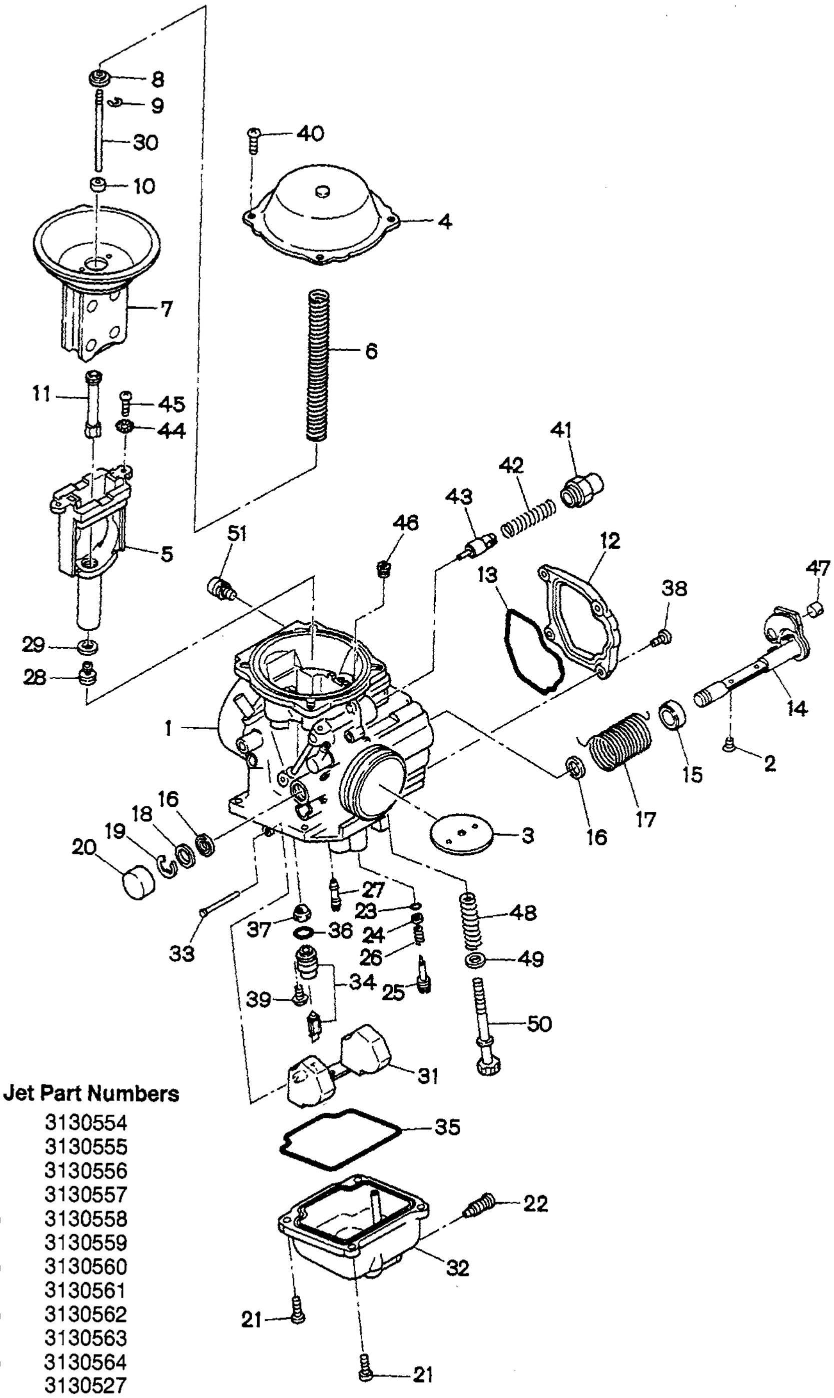


Throttle Opening vs Fuel Flow

In the full throttle condition the area between the jet needle and the needle jet is larger than the area of the main jet. Therefore, the main jet has greater control over fuel flow.



Mikuni BST 34 Carburetor Exploded View



Main Jet Part Numbers

112.5	3130554
115	3130555
117.5	3130556
120	3130557
122.5	3130558
125	3130559
127.5	3130560
130	3130561
132.5	3130562
135	3130563
137.5	3130564
140	3130527
142.5	3130566
145	3130567
147.5	3130568
150	3130569
152.5	3130570
155	3130571
157.5	3130572

Pilot Jet Part Number

42.5	3130526

1. Carburetor Assembly
2. Screw
3. Throttle Valve
4. Cover Assembly
5. Jet Block Assembly
6. Spring
7. Diaphragm Assembly
8. Ring
9. "E" Ring
10. Ring
11. Needle Jet
12. Cover
13. O-Ring
14. Throttle Shaft Assembly
15. Ring
16. Seal
17. Spring
18. Packing
19. "E" Ring
20. Cap
21. Screw
22. Screw
23. O-Ring
24. Washer
25. Adjuster
26. Spring
27. Pilot Jet
28 Main Jet
29. Washer
30. Jet Needle
31. Float Assembly
32. Float Body Assembly
33. Float Pin
34. Needle Valve
35. O-Ring
36. O-Ring
37. Filter
38. Screw
39. Screw
40. Screw
41. Guide Holder
42. Spring
43. Plunger Assembly
44. Spring Washer
45. Screw
46. Air Jet
47. Cable Guide
48. Spring
49. Ring
50. Adjust Screw
51. Screw and Washer Assy.

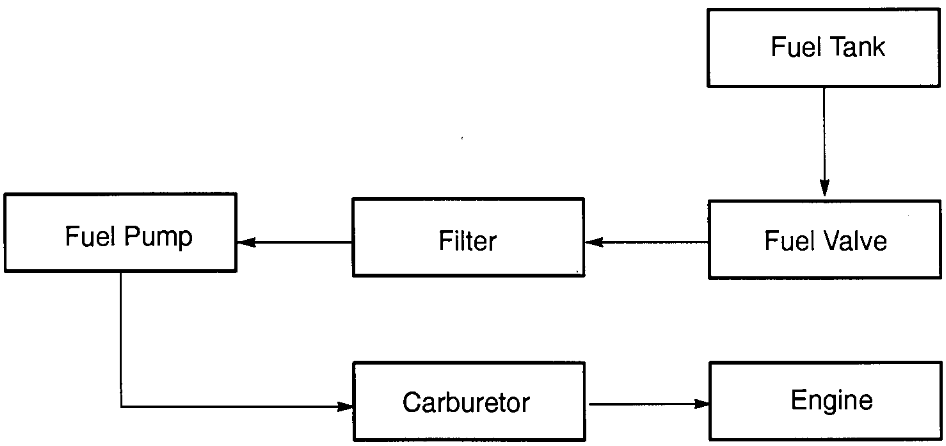
Magnum CV Carb Operation

The fuel supply system consists of the fuel tank, vent lines (carburetor and fuel tank), fuel valve, fuel lines, fuel filter, fuel pump, and carburetor.

The fuel tank vent line supplies atmospheric pressure to the fuel in the tank. It must be free of kinks and restrictions and be properly routed to allow fuel to flow from the tank and prevent contaminants from entering the tank.

The fuel valve has three positions: "On", "Off" and "Reserve". With the valve handle in the "Off" position no fuel will flow through the valve. When the "On" position is selected, fuel flows through a screen and into the longer of two standpipes attached to the fuel valve. When "Reserve" is selected, fuel flows through a screen and into the shorter of the two standpipes. Fuel flows from the valve through a filter and then to the fuel pump and carburetor.

Fuel Flow Diagram



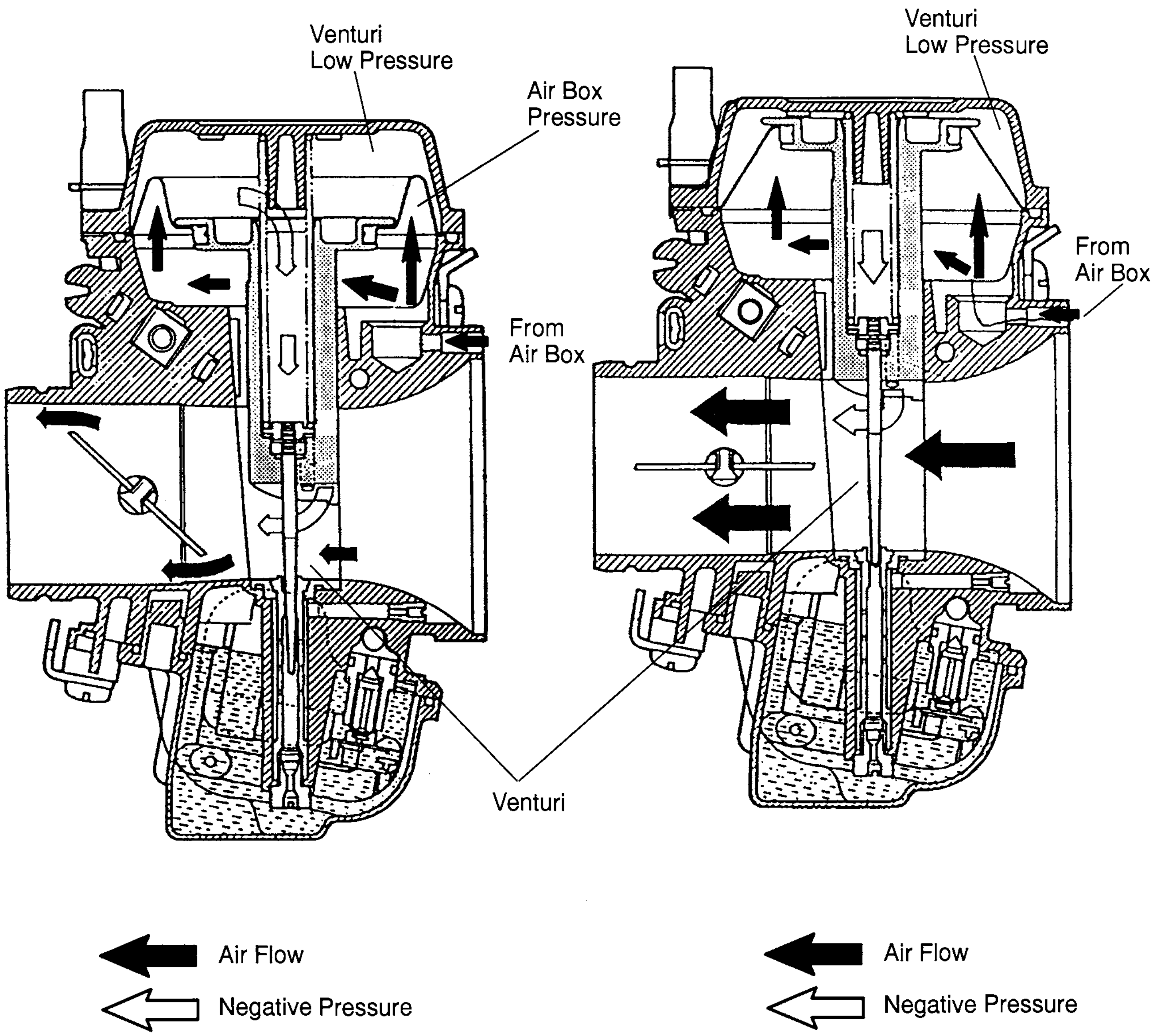
Fuel Pump Operation

The alternating positive and negative pressure impulse from the intake port of the engine is supplied to the fuel pump vacuum chamber through the impulse line. The vacuum chamber is sealed from the fuel chamber by a diaphragm. A one way check valve allows fuel into the pump chamber when there is a vacuum (low pressure) pulse on the impulse line during the engine intake stroke. The outlet check valve is closed at this time. When the impulse line delivers a positive pressure pulse to the pump after the intake valve closes, the inlet check valve is closed and the outlet is opened, and fuel is pumped through the line to the carburetor.

The constant velocity carburetor used on the Magnum provides a number of useful benefits. Among these are smooth acceleration, good throttle response, optimum fuel atomization and good fuel economy. The carburetor incorporates a mechanically operated throttle plate and a vacuum controlled slide valve (vacuum slide). The venturi cross-sectional area in the carburetor bore is increased or decreased automatically by the vacuum slide, which moves according to the amount of negative pressure (less than atmospheric) present in the venturi.

A diaphragm attached to the top of the vacuum slide is sealed to the slide and to the carburetor body forming two chambers. The chamber above the diaphragm is connected to the venturi area by a drilled orifice in the center of the vacuum slide. The chamber below the diaphragm is vented to atmospheric pressure by a passage on the air box side of the carburetor. A spring, installed in the center of the vacuum slide, dampens the slide movement and assists the return of the slide.

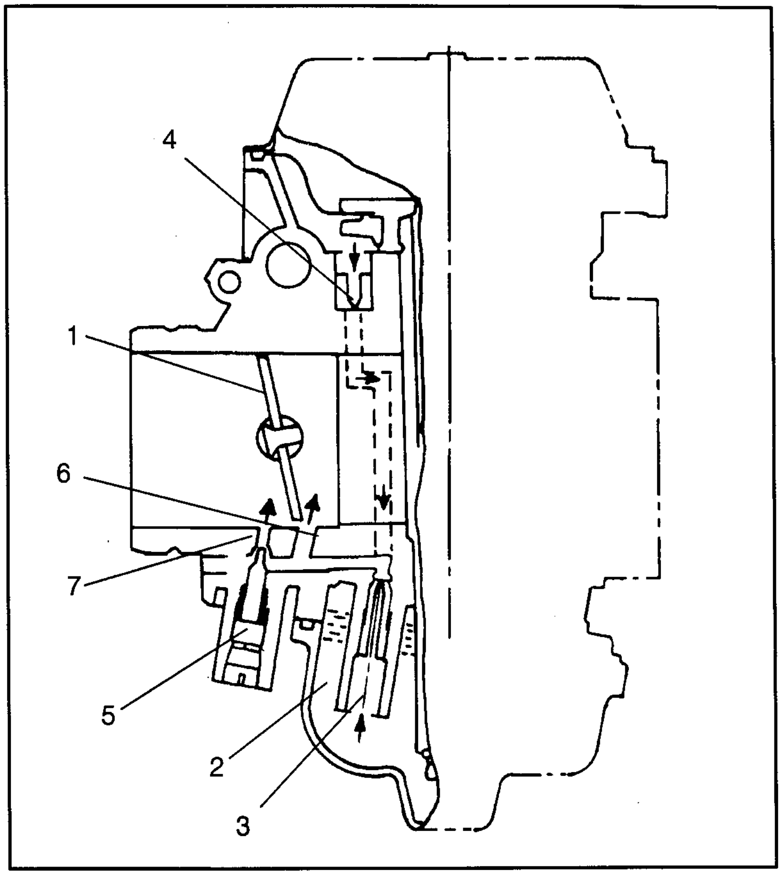
When the throttle plate is opened and engine speed begins to increase, the pressure in the venturi (and therefore in the chamber above the diaphragm) becomes significantly lower than atmospheric. Atmospheric pressure in the chamber below the diaphragm forces the diaphragm upward, raising the slide against spring pressure. When the pressure above and below the diaphragm are nearly equal, the slide moves downward under spring pressure. Raising or lowering the slide increases or decreases the cross sectional area in the venturi, and therefore the air velocity in the venturi is kept relatively constant. This provides improved fuel atomization and optimum fuel/air ratio.



Note: Diagrams are for explanation of theory only, and are not true representations of Mikuni BST 34 carburetor.

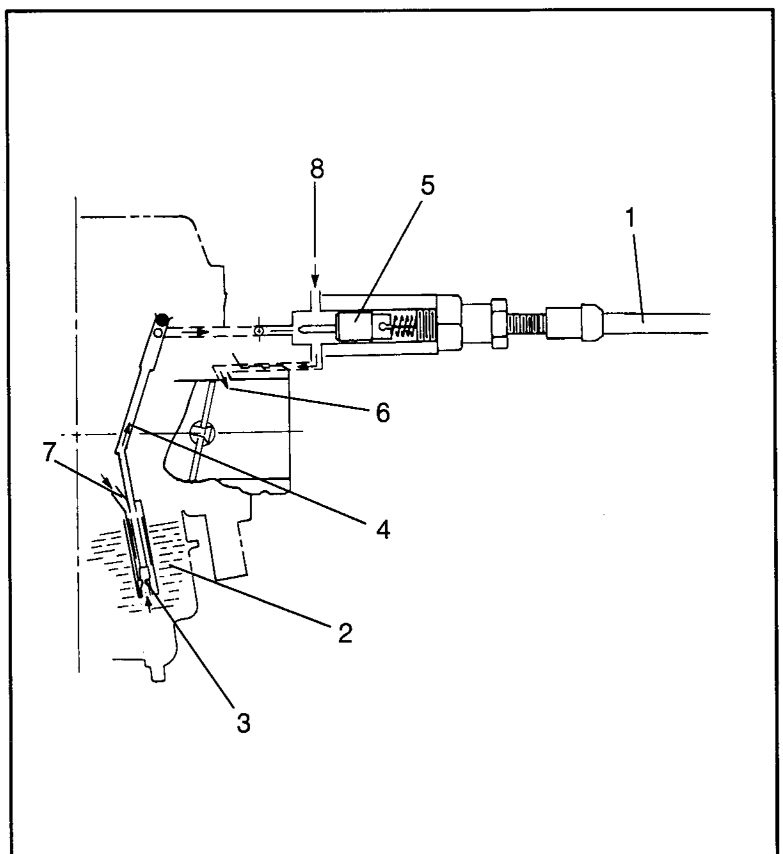
Pilot (Idle and Slow) System

This system supplies fuel during engine operation with throttle valve closed (1) or slightly opened. The fuel from float chamber (2) is metered by pilot jet (3) where it mixes with air coming in through pilot air jet (4). The mixture then goes up through pilot passage to pilot screw (5). A part of the mixture is discharged into the main bore out of bypass ports (6). The remainder is then metered by pilot screw and discharged into the main bore through pilot outlet (7).



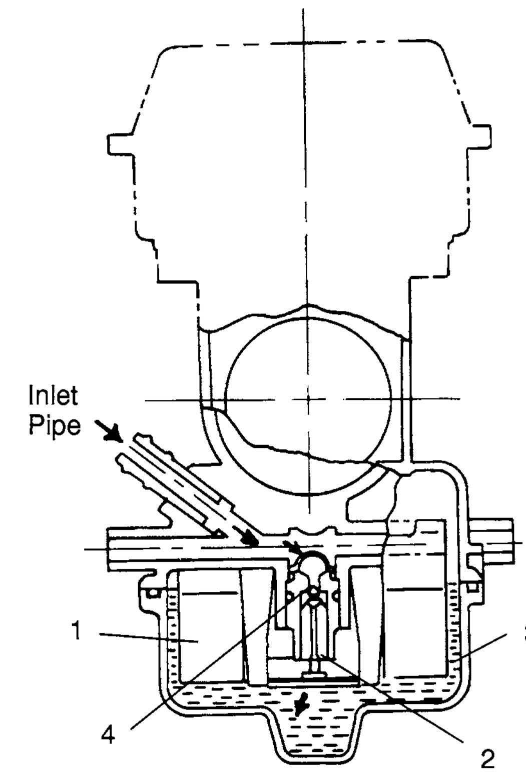
Starter System (Choke or Enrichment)

When the choke cable (1) is activated, the starter plunger (5) is lifted off the seat. Fuel is drawn into the starter circuit from the float chamber (2) through the starter jet (3). Starter jet meters this fuel, which then flows into starter pipe (4) and mixes with the air (7) coming from the float chamber. The mixture, rich in fuel content, reaches starter plunger and mixes again with the air coming through a passage (8) extending from underneath the diaphragm. The rich fuel/air mixture for starting is discharged through starter outlet (6) in the the main bore.



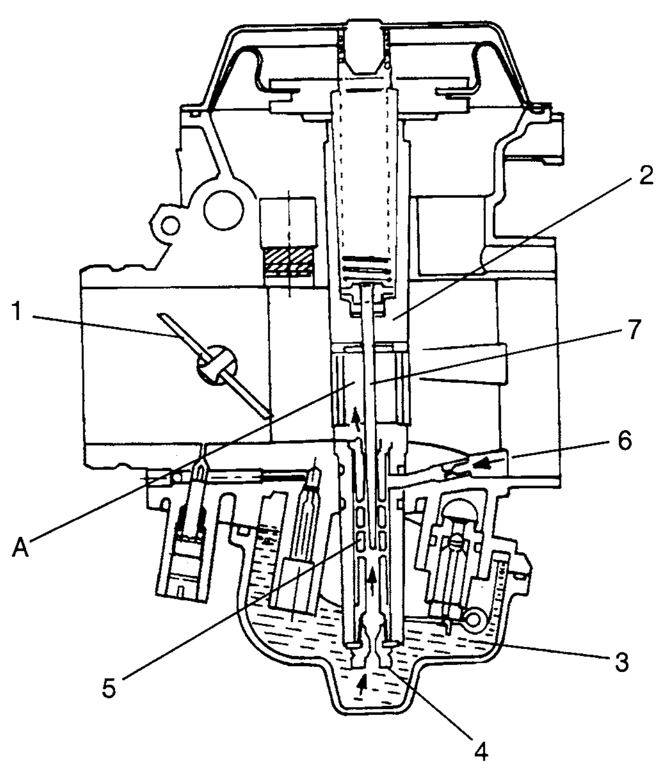
Float System

Fuel enters the float chamber (3) by means of the inlet pipe and passage, through a screen on the back of the inlet needle seat (4), and around the inlet needle (2). As the fuel fills the float chamber, the float (1) rises and forces the inlet needle against the seat, shutting off the orifice in the seat. When fuel level is up in float chamber, floats are up and needle valve remains pushed up against valve seat. Under this condition, no fuel enters the float chamber. As the fuel level falls, floats go down and needle valve unseats itself to admit fuel into the chamber. In this manner, the needle valve admits and shuts off fuel alternately to maintain a practically constant fuel level inside the float chamber.



Main System

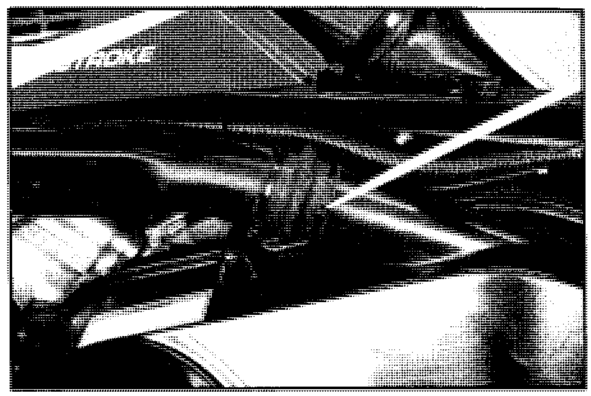
As throttle valve (1) is opened, engine speed rises, and this increases negative pressure in the venturi. Consequently the vacuum slide (2) moves upward. The fuel in float chamber (3) is metered by main jet (4), and the metered fuel enters needle jet (5), in which it mixes with the air admitted through main air jet (6) to form an emulsion. The emulsified fuel then passes through the clearance between needle jet (5) and jet needle (7), and is discharged into the venturi (A). Mixture proportioning is accomplished in needle jet (5); the clearance through which the emulsified fuel must flow is determined ultimately by throttle position and vacuum slide height.



Fuel Tank Removal

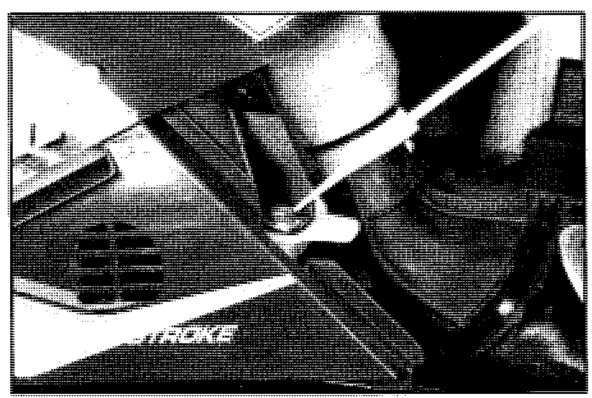
1. Turn fuel valve to "Off" position.
2. Remove the following items:
   - Seat
   - Ignition Key
   - Side Panels
   - Fuel Tank Cover

3. Remove cable tie on PVT exhaust duct.
4. Remove the two bolts securing the duct and remove the duct.
5. Disconnect fuel line from fuel valve and vent line from top of tank.
6. Remove the two Torx™ screws at the rear of the headlight pod until they no longer project into the tank area.
7. Remove the two bolts and spacers from the rear of the fuel tank.
8. Shift tank and position throttle cable below the PVT air inlet duct.
9. Pull and hold fuel valve selector lever out to clear fuel valve.
10. Lift and pull tank back.
11. Rotate rear of tank to left and remove tank. **CAUTION:** Be careful not to damage fuel valve.



Carburetor Removal

1. Remove fuel tank.
2. Loosen rear carburetor air duct clamp and slide rearward.
3. Remove two mounting bolts and remove air box.
4. Remove vent lines.
5. Remove impulse line clamp and carefully remove line.
6. Loosen carburetor flange clamp.
7. Remove two bolts securing rear of carb bracket to frame.
8. Remove carburetor. Place a shop towel in carb flange to prevent dirt from entering.
9. Remove fuel line clamp and fuel line.
10. Remove choke assembly with cable attached.
11. Remove four screws from throttle shaft cover.
12. Hold cable adjuster and loosen lock nut. Turn adjuster in if necessary to provide enough cable play to prevent damaging the throttle cable during removal.
13. Lift throttle shaft.
14. Remove throttle cable from throttle shaft.



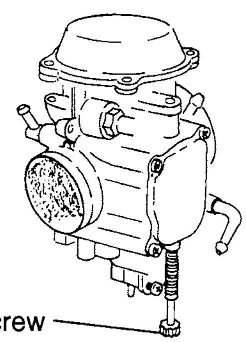
System	Main Components	Main Function	Main Affect
Float System (Fuel Level Control)	Inlet Pipe, Needle and Seat, Float, Float Pin	Maintains specified fuel level in float chamber (carburetor float bowl)	All systems All throttle ranges
Venting	Vent Passages in Carburetor, Vent lines (2) into (1) to frame	Supplies atmospheric pressure to fuel in float chamber	All systems All throttle ranges
Starter (Choke/Enrichment)	Choke Lever, Cable, Choke Plunger, Return Spring, Carb Passages (Starter Jet, Starter Bleed Pipe)	Supplies additional fuel air mixture necessary for cold starting	All throttle ranges Greatest effect at low throttle settings and idle
Pilot (Idle System)	Pilot Jet/Passageways, Pilot-Mixture Screw with Spring Washer and Sealing O-Ring, Bypass Ports (Behind Throttle Plate), Pilot Air Jet, Pilot Outlet, Throttle Plate	Primarily supplies fuel at idle and low throttle settings	Mainly idle to 1/4 throttle Minimal effect after 1/2 throttle
Main System	Main Jet, Main Air Jet, Main Air Passage, Needle Jet, Jet Needle, Vacuum Slide, Throttle Plate	Supplies fuel at mid-range and high throttle settings.	1/4 to full throttle

Carburetor Inspection and Adjustment

Idle Speed/Idle Mixture Adjustment

1. Start engine and warm to operating temperature.
2. Adjust idle speed to specification using the idle stop screw.

Idle Speed:
1200 +/- 100 RPM

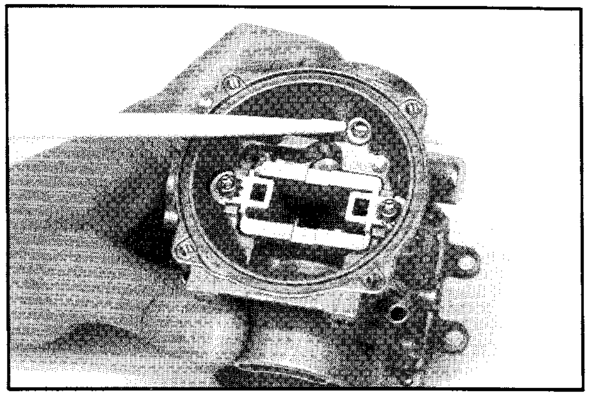


3. Turn idle mixture screw in (clockwise) until engine starts to lose RPM or miss.
4. Turn idle mixture screw out (counterclockwise) counting the turns of the screw until engine again starts to miss.
5. Center the idle mixture screw between the two points by turning clockwise 1/2 the number of turns counted in
step 4.
6. Readjust idle speed if not within specifications.

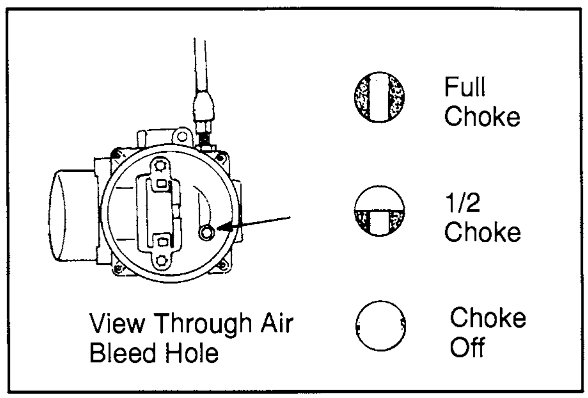
Choke Cable Adjustment

Choke adjustment is performed with the choke lever in the "off" position.

1. Remove fuel tank. See page 7.130.
2. Remove diaphragm chamber cover, spring, and vacuum slide assembly. See carburetor disassembly, pages 7.134 - 7.136.
3. Lift choke lever to first position (1/2 choke).
4. Inspect choke plunger position in the air bleed hole. Loosen choke cable adjuster lock nut on carburetor. Turn adjusting screw in or out until choke plunger uncovers 1/2 of the air bleed hole.
5. Lift choke lever to full open position (full choke). The air bleed hole should now be uncovered completely.
6. Turn choke lever off.
7. Check for a small amount of freeplay at the lever before the choke plunger starts to move. Tighten cable adjuster lock nut.
8. Install diaphragm chamber cover, spring, and vacuum slide assembly. See carburetor assembly, pages 7.140 - 7.142.



Air Bleed Hole



Inlet Needle Valve

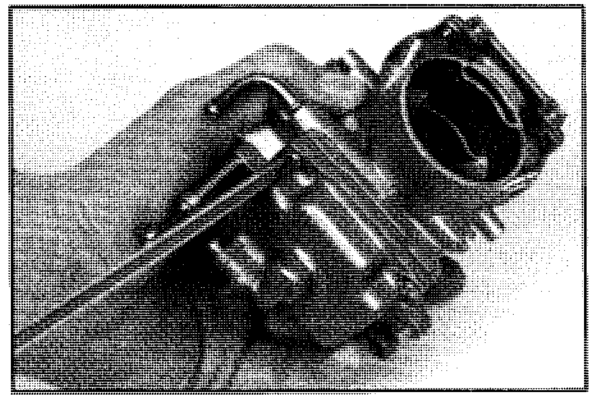
If foreign matter is caught between the sealing surfaces of the needle valve seat and needle valve, or if they are worn, the fuel will continue flowing and cause overflow.

Conversely, if the inlet needle sticks closed, the fuel will not flow into the float chamber. If overflow occurs, clean the float chamber, float parts and fuel passages, and inspect the needle and seat for wear or damage.

Inspect float height and pressure test needle and seat assembly prior to carb installation. See page 7.133.

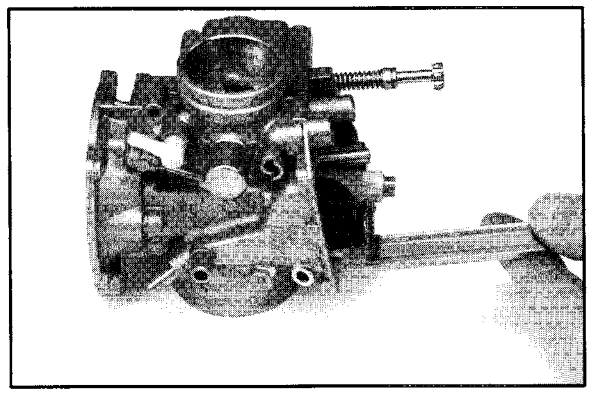
Float Height Check

1. Remove carburetor float bowl.
2. Place the carburetor on a level surface in the position shown. In this position, the float tongue will lightly contact the inlet needle valve pin without compressing the pin spring.



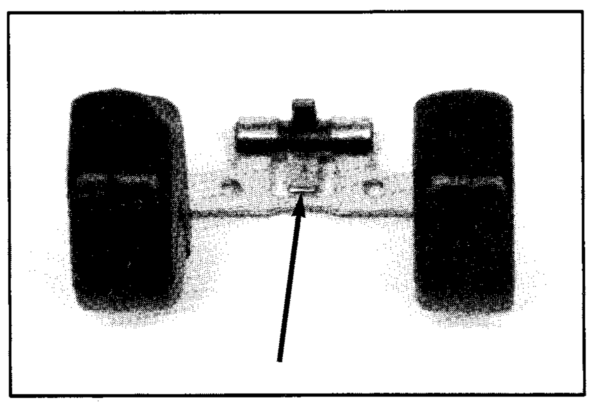
3. Measure the height from the float bowl mating surface on both sides of the float as shown. The floats should be parallel to each other. The measurement should be made at the end of the float arm just before the step (upper most point) using a vernier caliper. When measuring the height be sure the inlet needle valve spring is not compressed.

Float Height:
Std: .570 +/- .040″ (14.6 +/- 1 mm)



Measure at step in float

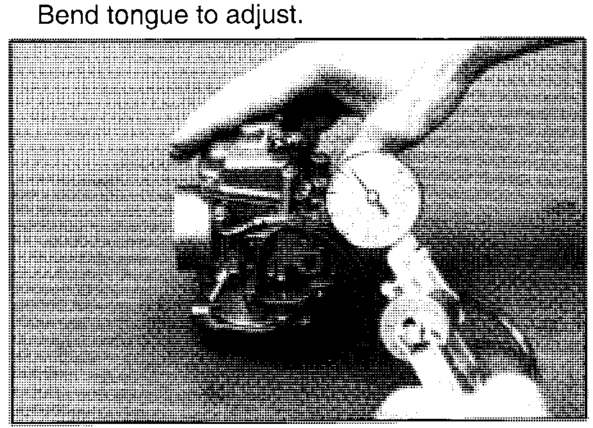
4. If adjustment is necessary, bend the tongue slightly.



Bend tongue to adjust.

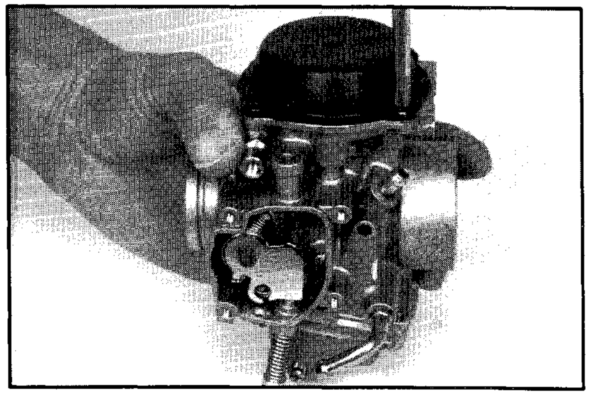
Needle and Seat Pressure Test

1. Invert the carburetor and install a Mity-Vac™ (PN 2870975) to the fuel inlet fitting. Apply 5 PSI pressure to inlet fitting. The needle and seat should hold pressure indefinitely. If not, inspect needle and seat.

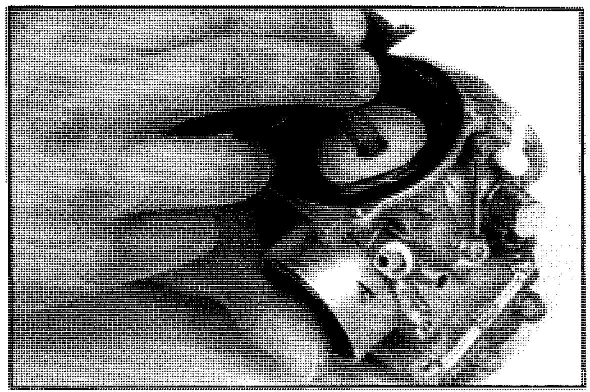


Carburetor Disassembly

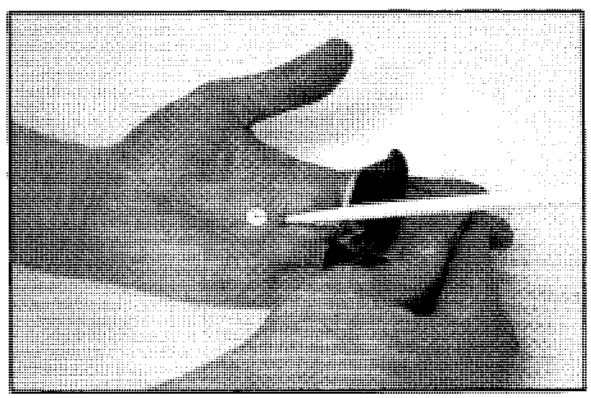
1. Remove carburetor diaphragm chamber cover.



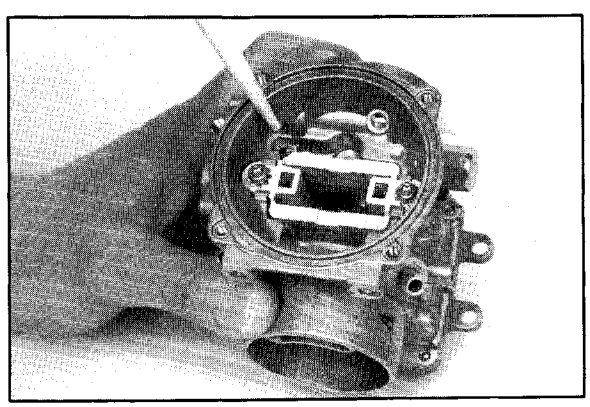
2. Remove return spring and vacuum slide.



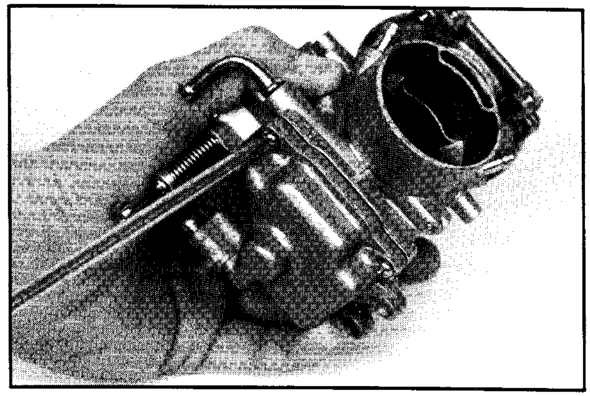
3. Invert vacuum slide and remove spring seat and jet needle from slide. Note position of "E" clip and washer.



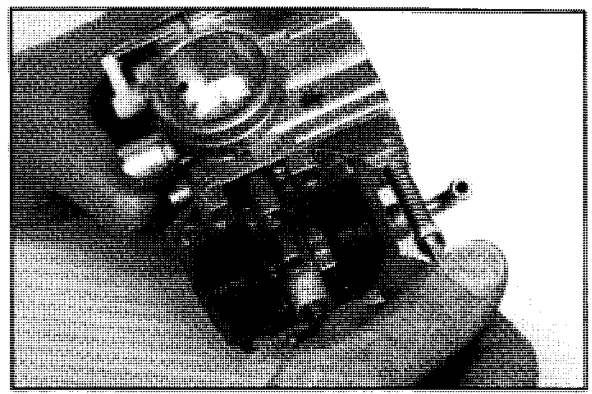
4. Remove pilot air jet.



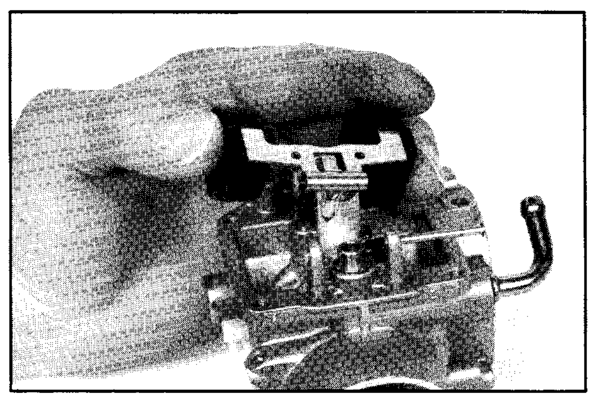
5. Remove carburetor float bowl.



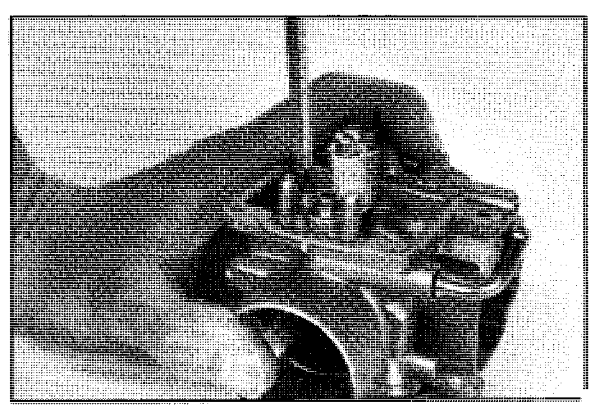
6. Remove idle stop screw, washer and spring.



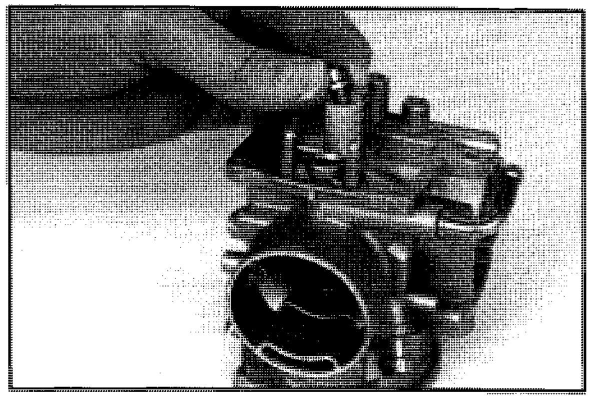
7. Using a small pin punch or a spring loaded automatic center punch, remove float pin, float, and inlet needle.



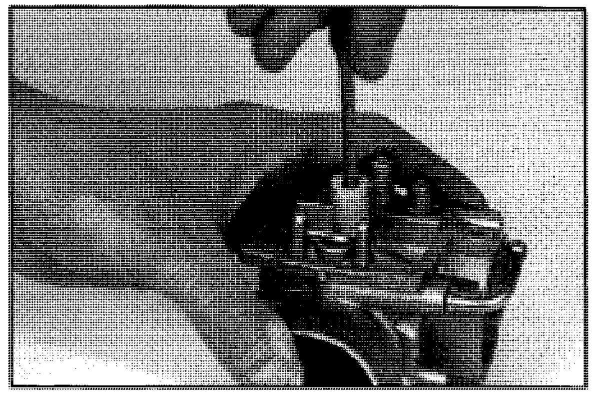
8. Remove inlet needle seat retaining screw along with plate, and carefully remove needle seat. **NOTE:** Do not use a pliers to remove the seat or damage may occur.



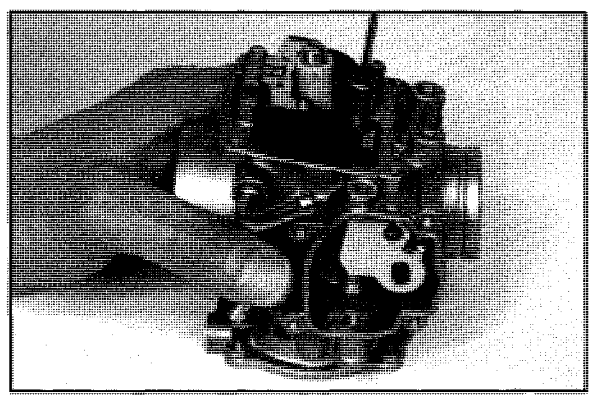
9. Remove main jet and washer.



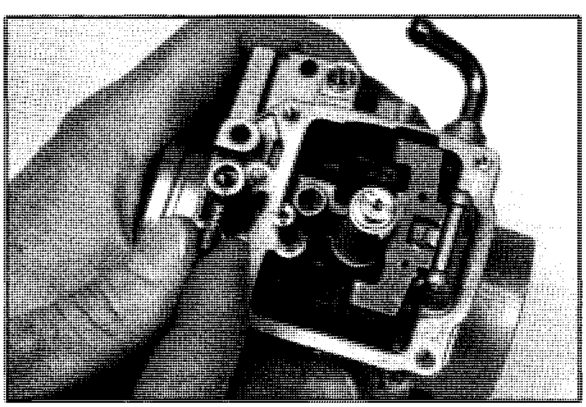
10. Remove needle jet by carefully pushing it out through the top of the carburetor from the float chamber side. Do not push on the inside of the needle jet or damage may occur to the main jet threads.



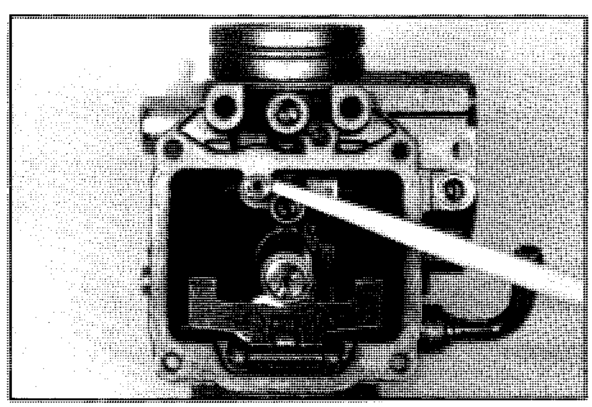
11. Remove pilot jet.



12. Remove the pilot mixture screw with spring, flat washer, and O-Ring.



NOTE: The starter jet is not removeable.



1. Thoroughly clean the carburetor body, jets, and all passages with carburetor cleaner or electrical contact cleaner.

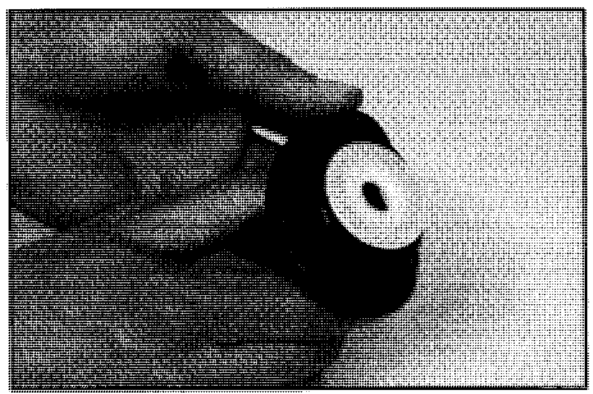
⚠ WARNING

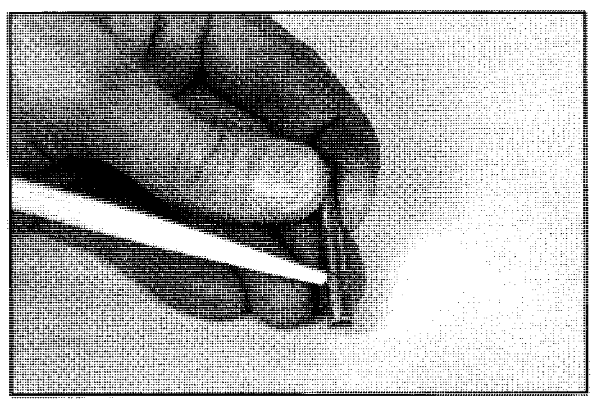
Protect eyes from contact with cleaner. If you should get cleaner in your eyes or if you should swallow cleaner, see your doctor immediately. Some carburetor cleaners are extremely caustic and extended periods of soaking can loosen the adhesive sealer on the passage drill-way plugs. *Do not* soak rubber or plastic components (such as the vacuum slide diaphragm, needle seat screen, or O-Rings in caustic cleaning solutions. Irreparable damage may occur. Do not use agitator type carburetor cleaning equipment. Rubber parts must be cleaned with mild detergent and hot water only.

2. If the carburetor is extremely dirty or contaminated with fuel residue and varnish, soak for short periods only in carburetor cleaner, and rinse in hot water.
3. Replace the jets if they are extremely dirty or have a buildup of fuel residue or bacterial growth. Even a small amount of residue will reduce the flow characteristics of the jet.
4. Verify all passages and jets are unobstructed by spraying electrical contact cleaner through the passages. **CAUTION:** Do not use wire or welding tip cleaners on the jets as the orifice size may be altered.
5. Use low pressure air to dry carburetor body and all components.

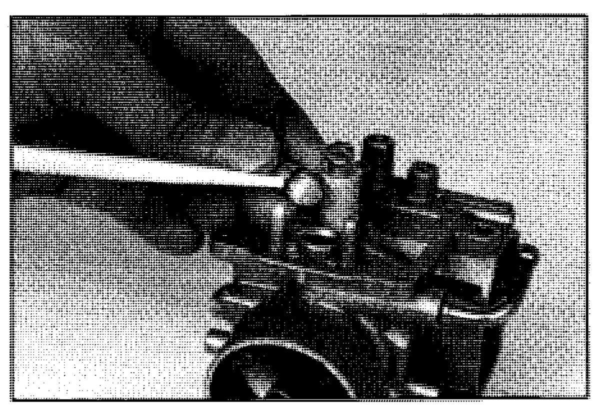
Carburetor Inspection

1. Inspect the diaphragm for holes, deterioration, or damage. Make sure the diaphragm is pliable but not swollen. The diaphragm should fit properly in the carburetor body. Replace diaphragm assembly if diaphragm is damaged.
2. Inspect the diaphragm return spring for damage or distortion of the coils.
3. Inspect the slide for wear, scratches, or damage. It should move freely in the jet block. Replace if necessary.
4. Inspect jet needle for wear, bending, or other damage.
5. Inspect needle jet. Air bleed holes must be clear. Check for wear at the top inside surface where the jet needle enters the needle jet.
6. Inspect the inlet needle seat for wear, damage and foreign material. Check the inside for abrasion or wear from the needle.

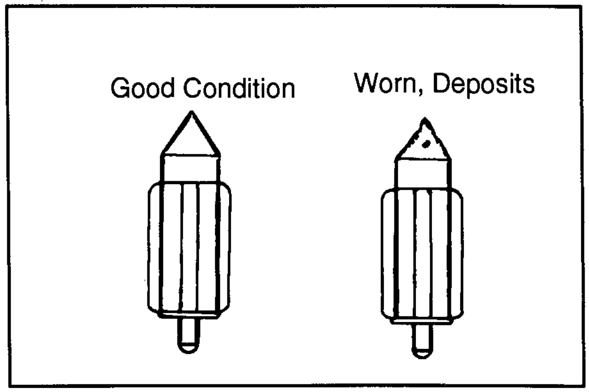




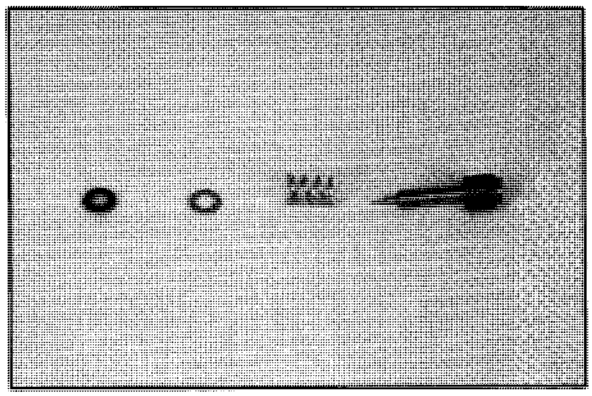
7. Inspect O-Ring for cuts, nicks and abrasions. The O-Ring must fit snugly on the needle seat and in the carburetor body to ensure a leak-free seal. The screen must be clean and fit snugly on the needle seat. Replace needle and seat assembly if necessary.

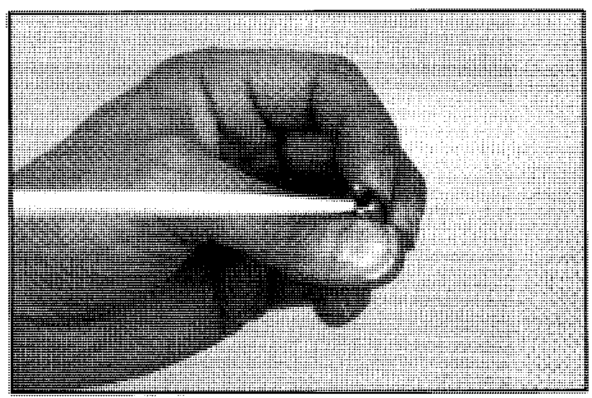


8. Inspect the inlet needle tapered surface for any sign of wear or damage. Be sure the spring loaded pin is free moving and returns freely when pushed. The inlet needle and seat should be pressure tested after assembly. See Carburetor Assembly/Adjustment, pages 7.14– - 7.142.

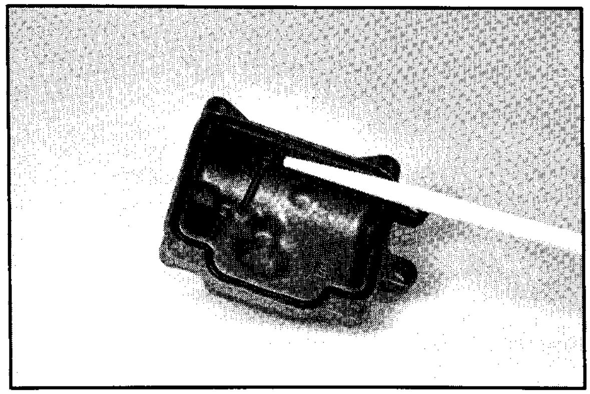


9. Inspect the pilot mixture screw for damage. Make sure the small tip is not bent or missing. The washer must be in place between the O-Ring and spring on reassembly. Check the O-Ring for cracks, damage or wear. Replace if necessary.
10. Inspect the float, float pin, and pin mounting boss for wear or damage. The float should pivot freely on the pin without binding. Replace the float assembly, pin, or carburetor body if worn.
11. Inspect the starter plunger for wear, cracks, foreign material or bending. Check the seating surface in the carburetor for damage, burrs, or foreign material. Inspect return spring, making sure it is not damaged or weak.

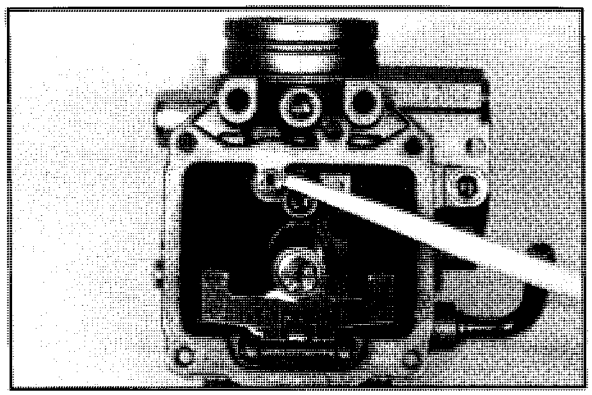




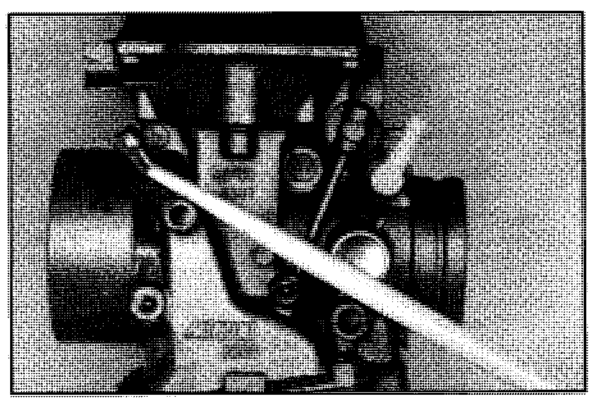
12. Check the overflow stand pipe in float bowl for cracks or bending. Be sure the pipe is clear. Fill the bowl with liquid and check for leakage out the drain orifice. If the bowl drain leaks, inspect tapered surface of the screw and seating surface. Check the bowl sealing O-Ring for damage or wear.



13. Check the starter jet to be sure it is clear.



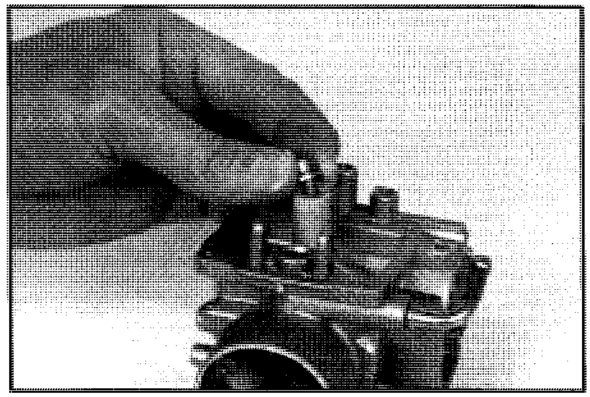
14. Check the vent passages and impulse source for cracks or obstructions.
15. Inspect the throttle shaft. It should return freely and completely when opened and released. Check the shaft for excess play or movement.
16. Inspect the throttle plate and retaining screws. Make sure the plate is closed all the way and is centered in the bore. Check to be sure the screws are tight.



Carburetor Assembly/Adjustment

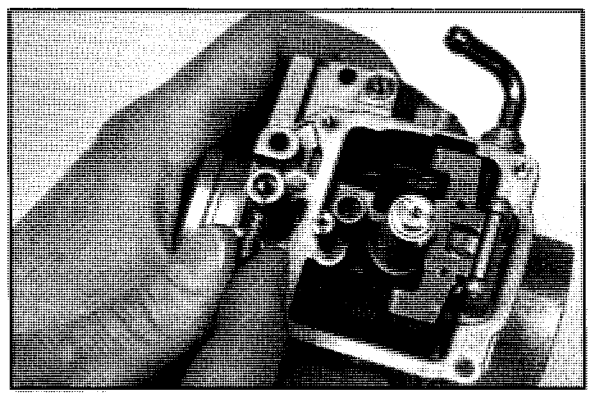
1. Install the needle jet making sure the slot is aligned with the tab in the jet block.

2. Install the main jet and washer.

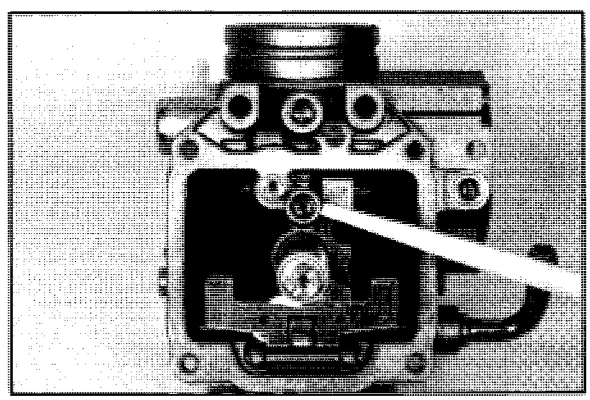


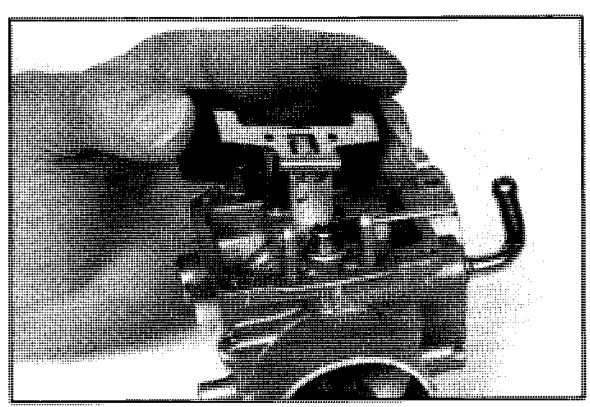
3. Install the pilot mixture screw, spring, washer, and O-Ring as an assembly. Lubricate the O-Ring with oil or light grease before installation. **CAUTION:** Do not damage the O-Ring during installation. Turn the screw in until it *lightly* contacts the seat. Back out the specified number of turns.

Idle Screw (Turns Out)
1 3/8



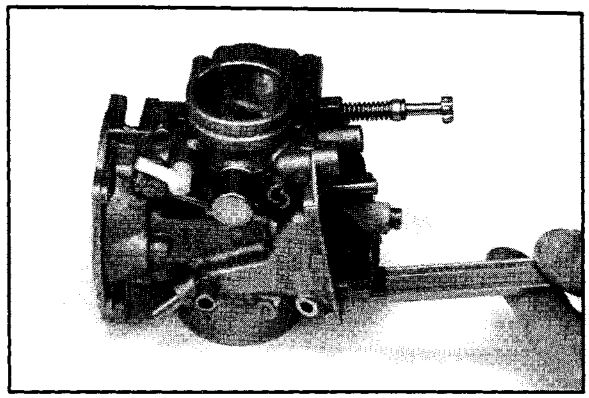
4. Install the pilot jet and pilot air jet.
5. Install the inlet needle seat with screen and O-ring. Lubricate the O-Ring with oil or a light film of grease.
6. Install the plate and retaining screw.
7. Install the float with inlet needle and install the pin. **CAUTION:** Do not bend the float during installation.





Carburetor Assembly/Adjustment, Cont.

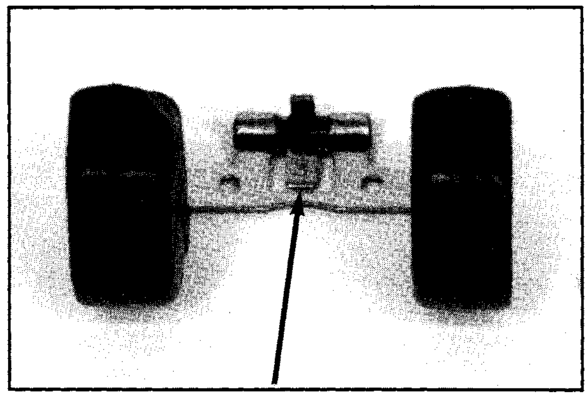
8. Place the carburetor on a level surface in the position shown. In this position, the float tongue will lightly contact the inlet needle valve pin without compressing the pin spring.



9. Measure the height from the float bowl mating surface on both sides of the float as shown. the floats should be parallel to each other. The measurement should be made at the mid-point on the top of the float using a vernier caliper. When measuring the height be sure the inlet needle valve spring is not compressed.

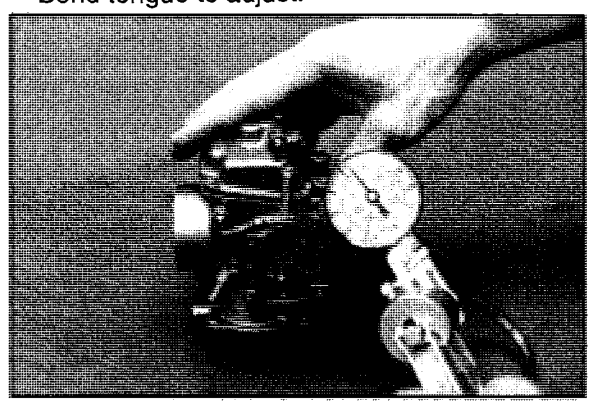
Float Height:
Std: .57 +/- .04″ (14.6 +/- 1 mm)

10. If adjustment is necessary, bend the tongue slightly.

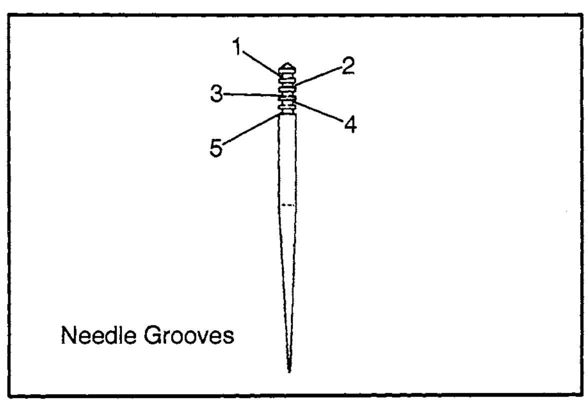


Bend tongue to adjust.

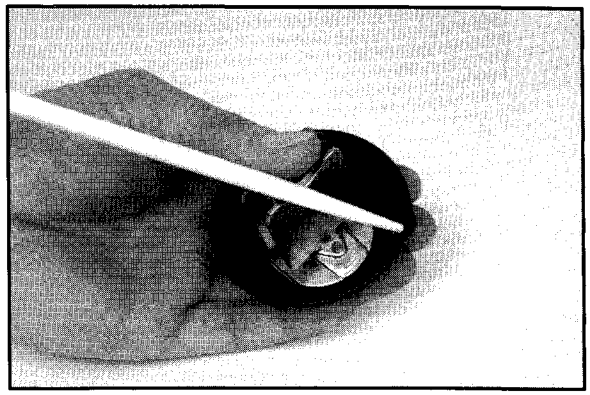
11. Install the float bowl. Invert the carburetor and install a Mity-Vac™ (PN 2870975) to the fuel inlet fitting. Apply 5 PSI pressure to inlet fitting. The needle and seat should hold pressure indefinitely. If not, inspect needle and seat.



12. Install the "E" clip on the jet needle in the proper position.



Carburetor Assembly/Adjustment, Cont.



13. Install the plastic spacer washer on the bottom of the needle and slide it up to the "E" clip.
14. Install the jet needle assembly into the vacuum slide and install the slide into the carburetor body. Be sure the tab on the outer edge of the diaphragm is positioned properly in the carburetor body.
15. Fit the diaphragm sealing lip into the groove in the carburetor body.
16. Install the spring seat washer and install the spring.
17. Install the diaphragm chamber cover and tighten the screws.
18. Check for free movement of the slide and make sure it returns smoothly and completely.
19. Install the idle stop screw with spring until it lightly contacts the throttle shaft stop arm. Turn the screw in 1 1/2 turns from this point. Move the throttle actuator arm to full open and make sure operation is smooth and arm returns quickly and completely to closed position.

Carburetor Installation

1. Install the throttle cable by screwing the adjuster into carburetor body completely. Lightly grease the end of the throttle cable and install the cable into the end of the throttle actuator arm.
2. Install the throttle shaft cover.
3. Apply a light film of oil to the choke plunger and install the plunger and cable assembly.
4. Install fuel line and fuel line clamp.
5. Remove the shop towel from the carburetor flange.
6. Install carb into flange and install rear air duct onto the back of the carburetor. Be sure carburetor is pushed completely into flange and tighten the clamp.
7. Loosely install two bolts into carburetor bracket. Do not tighten.
8. Install clamp on rear air duct and tighten.
9. Tighten bracket bolts.
10. Install impulse line and clamp.
11. Perform throttle cable adjustment and choke adjustment. See pages 7.22 - 7.23. Make sure throttle operates smoothly and returns completely.
12. Install fuel tank, cover, and panels, and re-check throttle operation.

Carburetor Installation, Cont.

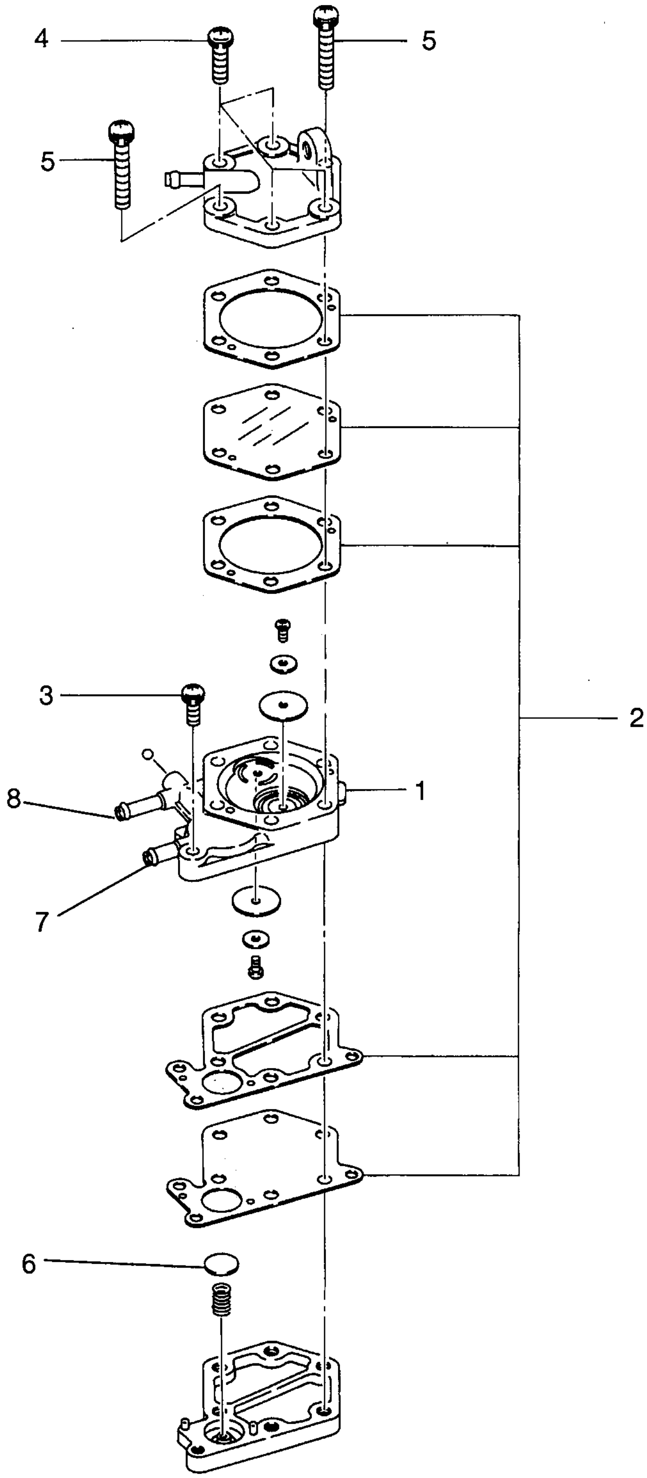
13. Turn handlebars completely left to right and check for free movement and full return to idle stop screw.
14. Set parking brake with gear selector in neutral.
15. Start engine and adjust idle speed when engine is warm. Check for fuel leaks.
16. Adjust idle mixture.

Idle Mixture Adjustment

1. Start engine and warm to operating temperature.
2. Adjust idle speed to specification.

> **Idle Speed:**
> **1200 +/- 100 RPM**

3. Turn idle mixture screw in (clockwise) until engine starts to lose RPM or miss.
4. Turn idle mixture screw out (counterclockwise) counting the turns of the screw until engine again starts to miss.
5. Center the idle mixture screw between the two points by turning clockwise 1/2 the number of turns counted in step 4.
6. Readjust idle speed if not within specifications.



Fuel Pump
Exploded View

1. Fuel Pump Assembly
2. Diaphragm, Gasket Set
3. Screw and Washer Assembly
4. Screw and Washer Assembly
5. Screw and Washer Assembly
6. Pressure Regulator
7. Fuel Inlet
8. Fuel Outlet

The fuel pump is located under the headlight cover at the front of the machine. To test the fuel pump:

1. Remove headlight cover.
2. Turn fuel off.
3. Disconnect impulse line from pump.
4. Connect Mity-Vac™ (PN 2870975) to the impulse line fitting on the pump.
5. Apply 5 inches of mercury vacuum to the pump fitting. The diaphragm should hold vacuum indefinitely.

If fuel is present in the impulse line or vacuum chamber of the pump, the diaphragm is ruptured and the pump must be replaced.

⚠ WARNING

Gasoline is extremely flammable and explosive under certain conditions.

⚠ Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

⚠ If you should get gasoline in your eyes or if you should swallow gasoline, see your doctor immediately.

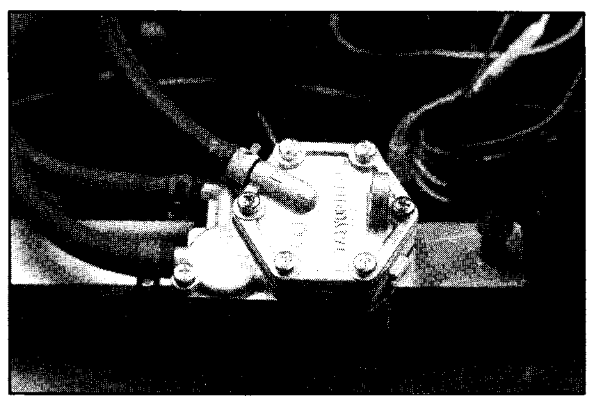
⚠ If you should spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

Fuel Pump Disassembly

1. Remove the screws from the pump diaphragm cover. Note the location of the two longer screws.
2. Remove the diaphragm cover gasket, diaphragm, and valve body gasket.
3. Remove the outlet check valve cover, diaphragm, and gasket.

Fuel Pump Inspection/Assembly

1. Inspect inlet and outlet check valves for cracks, warpage or damage. Inspect the diaphragms for cracks, holes or swelling.
2. To clean the valves or pump body, remove the set screw and washer. Remove the valve and wash with soap and water. Carburetor cleaner may be used to clean the pump body when the check valves are removed. **CAUTION:** Some carburetor cleaners are very caustic and should not be used to clean the non-metal parts of the fuel pump.
3. Check the sealing surfaces of the pump body and covers. Carefully remove all traces of old gasket and check the surfaces for damage. Replace diaphragms and gaskets as a set.
4. Reassemble the pump in the reverse order of disassembly. Tighten all screws evenly.



Fuel Starvation/Lean Mixture

Symptoms: Hard start or no start; Bogs, Backfires, Pops; Hesitation; Detonation; Low power; Spark plug erosion; Engine runs hot; Surging; Idles high, Idle varies.

- No fuel in tank
- Restricted tank vent, or routed improperly
- Fuel lines or fuel valve restricted
- Fuel filter plugged
- Carburetor vent line(s) restricted
- Plugged or restricted inlet needle and seat screen or inlet passage
- Clogged jets or passages
- Float stuck, holding inlet needle closed or inlet needle stuck
- Float level too low
- Fuel pump inoperative
- Air leak at impulse line
- Restricted impulse line (kinked, pinched)
- Intake air leak (throttle shaft, intake ducts, airbox or air cleaner cover)
- Ruptured vacuum slide diaphragm; Vacuum slide stuck closed or sticky
- Improper spring
- Jet needle position incorrect
- Incorrect pilot screw adjustment

Rich Mixture

Symptoms: Fouls spark plugs; Black, sooty exhaust smoke; Rough idle; Poor fuel economy; Engine runs rough/misses; Poor performance; Bogs; Engine loads up; Backfires, Pops.

- Air intake restricted
- Air filter dirty/plugged
- Choke plunger sticking, incorrectly adjusted choke
- Choke cable binding or improperly routed
- Incorrect pilot screw adjustment
- Faulty inlet needle and seat
- Faulty inlet needle seat O-Ring
- Float level too high
- Poor fuel quality (old fuel)
- Loose jets
- Worn carburetor parts
- Dirty carburetor (air bleed passages or jets)
- Weak or damaged vacuum piston return spring
- Fouled Spark Plug

Poor Idle

Symptoms: Idles too high.

- Idle adjusted improperly/idle mixture screw damaged
- Sticky vacuum slide
- Throttle cable sticking, improperly adjusted, routed incorrectly
- Choke cable sticking, improperly adjusted, routed incorrectly

Idle Too Low

- Choke cable bending or incorrectly adjusted
- Idle speed set incorrectly
- Idle mixture screw misadjusted or damaged
- Pilot mixture screw incorrectly adjusted
- Belt dragging
- Ignition timing incorrect

Erratic Idle

- Choke cable bending or incorrectly adjusted
- Throttle cable incorrectly adjusted
- Air leaks, dirty carburetor passages (pilot circuit)
- Pilot mixture screw damaged or adjusted incorrectly
- Tight valves
- Ignition timing incorrect
- Belt dragging
- Dirty air cleaner
- Engine worn
- Spark plug fouled
- Idle speed set incorrectly (speed limiter)

Jetting Compensation for Altitude and Temperature

Maximum engine efficiency and horsepower are directly related to proper carburetor settings. The following charts have been established as a guideline for selecting optimum jetting for varying temperature and altitude conditions. Air screw adjustments will affect the 0 to 1/8 throttle setting and should be adjusted as follows:

Turn the air screw in (clockwise) 1/4 turn for each 30° below 60° F. Turn the air screw out (counterclockwise) 1/4 turn for each 30° above 60° F.

IMPORTANT: The following guidelines must be followed when establishing a main jet setting:

1. Select the lowest anticipated temperature at which the machine will be operated.
2. Determine the lowest approximate altitude at which the machine will be operated.
3. Tracing down and across on the chart, use the intersecting main jet recommendation.

1985 Scrambler - Trail Boss

Engine Model Number - EC25PF-01
Carburetor Type - VM30SS

Main Jet - 155	Needle Jet - O-6
Pilot Jet - 30	Jet Needle - 5DP7-3
Air Screw - 1/2 turn	Cut Away - 2.5

Altitude-Meters (Feet)	-20-0	0-+20	+20-+40	+40-+60	+60-+80	+80-+100
0-900 (0-3000)	175	170	160	155	150	145
900-1500 (3000-5000)	170	160	155	150	145	140
1500-2200 (5000-7000)	160	150	145	140	135	130
2200-3000 (7000-9000)	145	140	135	130	125	120
3000-3400 (9000-11000)	140	135	130	125	120	115

1986 Scrambler - Trail Boss

Engine Model Number - EC25PF-01
Carburetor Type - VM30SS

Main Jet - 145	Needle Jet - O-0
Pilot Jet - 50	Jet Needle - 5DP7-3
Air Screw - 1 turn	Cut Away - 2.5

Altitude-Meters (Feet)	-20-0	0-+20	+20-+40	+40-+60	+60-+80	+80-+100
0-900 (0-3000)	170	160	155	150	145	140
900-1500 (3000-5000)	160	155	150	145	135	130
1500-2200 (5000-7000)	150	145	140	135	130	125
2200-3000 (7000-9000)	140	135	130	125	120	115
3000-3400 (9000-11000)	135	130	125	120	115	110

1987 Trail Boss 4x4

Engine Model Number - EC25PF-01/03
Carburetor Type - VM30SS

Main Jet - 145	Needle Jet - O-0
Pilot Jet - 50	Jet Needle - 5DP7-3
Air Screw - 1 turn	Cut Away - 2.5

Altitude-Meters (Feet)	-20-0	0-+20	+20-+40	+40-+60	+60-+80	+80-+100
0-900 (0-3000)	170	160	155	150	145	140
900-1500 (3000-5000)	160	155	150	145	135	130
1500-2200 (5000-7000)	150	145	140	135	130	125
2200-3000 (7000-9000)	140	135	130	125	120	115
3000-3400 (9000-11000)	135	130	125	120	115	110

1987 Cyclone

Engine Model Number - EC25PF-02
Carburetor Type - VM34SS

Main Jet - 200	Needle Jet - O-4
Pilot Jet - 40	Jet Needle - 6DH5-3
Air Screw - 1 turn	Cut Away - 2.0

Altitude-Meters (Feet)	-20-0	0-+20	+20-+40	+40-+60	+60-+80	+80-+100
0-900 (0-3000)	220	210	200	200	190	190
900-1500 (3000-5000)	210	210	200	190	180	180
1500-2200 (5000-7000)	200	190	190	180	170	170
2200-3000 (7000-9000)	190	190	180	170	160	160
3000-3400 (9000-11000)	180	180	170	160	150	150

1988 Trail Boss - Trail Boss 4x4
Engine Model Number - EC25PF-03
Carburetor Type - VM30SS

Main Jet - 145	Needle Jet - O-4
Pilot Jet - 35	Jet Needle - 5DP7-3
Air Screw - 1 turn	Cut Away - 2.0

Altitude-Meters (Feet)	-20- 0	0- +20	+20- +40	+40- +60	+60- +80	+80- +100
0-900 (0-3000)	170	160	155	150	145	140
900-1500 (3000-5000)	160	155	150	145	135	130
1500-2200 (5000-7000)	150	145	140	135	130	125
2200-3000 (7000-9000)	140	135	130	125	120	115
3000-3400 (9000-11000)	135	130	125	120	115	110

1988 Trail Boss 250 R/ES
Engine Model Number - EC25PF-04
Carburetor Type - VM38SS

Main Jet - 230	Needle Jet - O-4
Pilot Jet - 45	Jet Needle - 6DH4-3
Air Screw - 1.5 turn	Cut Away - 3.0

Altitude-Meters (Feet)	-20- 0	0- +20	+20- +40	+40- +60	+60- +80	+80- +100
0-900 (0-3000)	270	260	250	240	230	220
900-1500 (3000-5000)	250	240	240	230	220	210
1500-2200 (5000-7000)	240	230	220	210	210	200
2200-3000 (7000-9000)	220	220	210	195	195	185
3000-3400 (9000-11000)	210	200	195	190	180	175

All 1989 Models
Engine Model Number - EC25PF-05
Carburetor Type - VM30SS

Main Jet - 145	Needle Jet - O-4
Pilot Jet - 40	Jet Needle - 5DP7-3
Air Screw - 1 turn	Cut Away - 2.0

Altitude-Meters (Feet)	-20- 0	0- +20	+20- +40	+40- +60	+60- +80	+80- +100
0-900 (0-3000)	170	160	155	150	145	140
900-1500 (3000-5000)	160	155	150	145	135	130
1500-2200 (5000-7000)	150	145	140	135	130	125
2200-3000 (7000-9000)	140	135	130	125	120	115
3000-3400 (9000-11000)	135	130	125	120	115	110

All 1990 Models
Engine Model Number - EC25PF
Carburetor Type - VM30SS

Main Jet - 145	Needle Jet - O-4 (169)
Pilot Jet - 40	Jet Needle - 5DP7-3
Air Screw - 1 turn	Cut Away - 2.0

Altitude-Meters (Feet)	-20- 0	0- +20	+20- +40	+40- +60	+60- +80	+80- +100
0-900 (0-3000)	170	160	155	150	145	140
900-1500 (3000-5000)	160	155	150	145	135	130
1500-2200 (5000-7000)	150	145	140	135	130	125
2200-3000 (7000-9000)	140	135	130	125	120	115
3000-3400 (9000-11000)	135	130	125	120	115	110

All 1990 Models
Engine Model Number - EC35PL
Carburetor Type - VM34SS

Main Jet - 220	Needle Jet - O-6 (480)
Pilot Jet - 30	Jet Needle - 6DH29-3
Air Screw - 1.5 turn	Cut Away - 1.5

Altitude-Meters (Feet)	-20- 0	0- +20	+20- +40	+40- +60	+60- +80	+80- +100
0-900 (0-3000)	250	240	230	220	220	210
900-1500 (3000-5000)	240	230	220	210	210	200
1500-2200 (5000-7000)	220	220	210	200	200	190
2200-3000 (7000-9000)	210	200	200	190	190	180
3000-3400 (9000-11000)	200	190	190	180	180	170

ENGINES/CARBURETION

All 1991 Models

Engine Model Number - EC25PF
Carburetor Type - VM30SS

Main Jet - 145	Needle Jet - O-4 (169)
Pilot Jet - 40	Jet Needle - 5DP7-3
Air Screw - 1 turn	Cut Away - 2.0

Altitude-Meters (Feet)	-20-0	0-+20	+20-+40	+40-+60	+60-+80	+80-+100
0-900 (0-3000)	170	160	155	150	145	140
900-1500 (3000-5000)	160	155	150	145	135	130
1500-2200 (5000-7000)	150	145	140	135	130	125
2200-3000 (7000-9000)	140	135	130	125	120	115
3000-3400 (9000-11000)	135	130	125	120	115	110

All 1992 to Current Models with EC25PF Engines

Carburetor Type - VM30SS

Main Jet - 145	Needle Jet - O-4 (169)
Pilot Jet - 40	Jet Needle - 5DP7-3
Air Screw - 1 turn	Cut Away - 2.0

		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	+80° & Above °F 26° & Above °C
Altitude Meters (Feet)	0-900 (0-3000)	170	155	145	135
	900-1800 (3000-6000)	155	145	135	125
	1800-2700 (6000-9000)	140	130	120	115
	2700-3700 (9000-12000)	130	120	110	100

All 1991, 1992, and 1993 Models with EC35PL Engines (Revised)

Engine Model Number - EC35PL
Carburetor Type - VM34SS

Main Jet - 200	Needle Jet - O-6 (480)
Pilot Jet - 30	Jet Needle - 6DH29-3
Air Screw - 3/4 turn	Cut Away - 1.5

		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	+80° & Above °F 26° & Above °C
Altitude Meters (Feet)	0-900 (0-3000)	230	210	200	185
	900-1800 (3000-6000)	210	200	180	170
	1800-2700 (6000-9000)	190	180	160	150
	2700-3700 (9000-12000)	180	160	150	140

- Shaded zone should drop Jet Needle one position (raise E-Clip)

- Raise Jet Needle one position (Lower E-Clip) (01)

All 1994 To Current Models with EC28PF Engines

Carburetor Type - VM30SS

Main Jet - 155	Needle Jet - O-4 (169)
Pilot Jet - 40	Jet Needle - 5DP7-3
Air Screw - 1.5 turn	Cut Away - 2.0

		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	+80° & Above °F 26° & Above °C
Altitude Meters (Feet)	0-900 (0-3000)	180	170	155	145
	900-1800 (3000-6000)	165	150	140	130
	1800-2700 (6000-9000)	150	140	130	120
	2700-3700 (9000-12000)	135	125	115	110

- Shaded zone should drop Jet Needle one position (raise E-Clip)

- Turn in air screw 1/2 to 3/4 turn.

All 1994 to Current Models with EC38PL(E01) Engines

Carburetor Type - VM34SS

Main Jet - 200 | Needle Jet - O-6 (480)
Pilot Jet - 30 | Jet Needle - 6DH29-3
Air Screw - 1.5 turn | Cut Away - 1.5

		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	+80° & Above °F 26° & Above °C
Altitude Meters (Feet)	0-900 (0-3000)	230	220	200	190
	900-1800 (3000-6000)	210	200	180	175
	1800-2700 (6000-9000)	190	180	165	150
	2700-3700 (9000-12000)	170	160	145	135

- Shaded zone should drop Jet Needle one position (raise E-Clip)
- Turn in air screw 1/2 to 3/4 turn.

1995 Sport Models with EC38PLE02 Engines

Carburetor Type - VM34SS

Main Jet - 200 | Needle Jet - O-6 (480)
Pilot Jet - 30 | Jet Needle - 6DH29-3
Air Screw - 1.5 turn | Cut Away - 1.5

		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	+80° & Above °F 26° & Above °C
Altitude Meters (Feet)	0-900 (0-3000)	230	220	200	190
	900-1800 (3000-6000)	210	195	180	175
	1800-2700 (6000-9000)	190	175	165	150
	2700-3700 (9000-12000)	170	160	145	135

- Shaded zone should drop Jet Needle one position (raise E-Clip)
- Turn in air screw 1/2 to 3/4 turn.

1995 Scrambler Models with EC38PLE03 Engines

Carburetor Type - VM34SS

Main Jet - 240 | Needle Jet - O-6 (480)
Pilot Jet - 30 | Jet Needle - 6DH29-2
Air Screw - 1.5 turn | Cut Away - 1.5

		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	+80° & Above °F 26° & Above °C
Altitude Meters (Feet)	0-900 (0-3000)	270	250	240	230
	900-1800 (3000-6000)	250	230	220	210
	1800-2700 (6000-9000)	230	210	200	190
	2700-3700 (9000-12000)	210	190	180	170

- Shaded zone raise jet needle one position (Lower E Clip)

All 1995 Models with EH42PL01 Engines

Carburetor Type - BST34

Main Jet - 140 | Needle Jet - 5F81-3
Pilot Jet - 42.5 | Jet Needle - P-8
Pilot Screw - 1 3/8 turn
Valve Seat - 1.5

		AMBIENT TEMPERATURE			
		Below 0°F Below -18°C	0° to +40°F -18°to +5°C	+40°to +80°F +5° to +26°C	+80° & Above °F 26° & Above °C
Altitude Meters (Feet)	0-900 (0-3000)	150	145	140	135
	900-1800 (3000-6000)	145	140	132.5	122.5
	1800-2700 (6000-9000)	140	135	127.5	122.5
	2700-3700 (9000-12000)	132.5	125	120	115

- Shaded zone pilot screw in 1/2 turn

CHAPTER 8

ELECTRICAL

Wiring Schematics And Diagrams, Cont.

SPECIAL SERVICE TOOLS

Fluke 73 Multitester PN2870659

Strobe Timing Light PN2870630

Small Hydrometer PN2870836

1985-1987 Electrical Specifications

Model	Alternator Output	Headlight Wattage	Taillight Wattage	Battery
Scrambler Trail Boss Trail Boss 4x4	100 Watt	45 Watt 45/45 Stanley	5 Watt/GE 168	12V 14 Amp Hr.
Cyclone	100 Watt	45 Watt 45/45 Stanley	5 Watt/GE 168	n/a

1985-1987 Electrical Testing

Engine Model EC25PF	Ignition Coil Primary	Ignition Coil Secondary	Exciter	Pulser	Lighting	Spark Plug	Spark Plug Gap
Ohms Res.	.3Ω	6.3kΩ	120Ω	23Ω	0.47Ω	Champion RN4YC	.020″
Test Connections	Black/Yellow to Engine Ground	Sec. Cable to Engine Ground	Brown/White to White	Black/Red to Brown/White	Yellow/Red to Yellow	NGK BPR8ES	.020″

1985-1987 Ignition Timing All Models Except Cyclone
Engine Cold, Lights On

RPM	Degrees	Inches	MM
3000 RPM	25° +/- 2°	.137	3.482
6000 RPM	19.5° +/- 2°	.084	2.145

1985-1987 Ignition Timing Cyclone
Engine Cold, Lights On

RPM	Degrees	Inches	MM
3000 RPM	23° +/- 2°	.117	2.959
6000 RPM	17.5° +/- 2°	.068	1.729

1988 Electrical Specifications

Model	Engine Model No.	Alternator Output	Headlamp Wattage/No.	Taillight Wattage/No.	Battery	Spark Plug
Trail Boss 2x4 Trail Boss 4x4	EC25PF-03	100W	45 Watt 45/45 Stanley	5 Watt GE 168	12 Volt 14 Amp Hr.	RN4YC .025″ Gap
Trail Boss RES	EC25PF-04	100W	60 Watt 60/60 Stanley	5 Watt GE 168	12 Volt 14 Amp Hr.	RN4YC .025″ Gap

1988 Electrical Testing

Lighting Coil		Engine Stator Ignition Coil		Ignition Coil Cap Removed		Spark Plug Cap
Test Connections	Ohms Resistance	Test Connections	Ohms Resistance	Primary Resistance	Secondary Resistance	Ohms Resistance
Yellow/Red to Yellow	0.47	Black/Red to Brown White	120	0.3	6.3k	3700 to 6300

1988 Timing Specifications
Engine Cold, Lights On

	3000 RPM			6000 RPM		
Engine Model	Degrees	Inches	MM	Degrees	Inches	MM
EC25PF-03	25° +/- 2°	.137	3.482	19.5°	.084	2.145
EC25PF-04	29° +/- 2°	.183	4.646	19.5°	.084	2.145

ELECTRICAL
Specifications

1989 To Present

Polaris Engine	Alternator Output @ 4000 RPM	Instrument Lights Part No., Type & Wattage	Headlight Lamp Part No., Type & Wattage	Taillight Lamp Part No., Type & Wattage	Battery Part No., Type & Capacity
EC25PF EC28PF(E) EC35PL EC38PL(E)-01 EC38PL(E)-02/03	150 Watts 150 Watts 150 Watts 200 Watts 150 Watts	PN 4030042 Sylvania™ No. 12 POL 2 Watts	PN 4030028 Stanley™ No. BF120-59880 60 Watts	PN 4030040 GE™ No. 168 5 Watts	PN 4140006 Yuasa™ No. YB14A-A2 14 Amp/hr

1989 Ignition System Specifications

	Component Resistance Specifications					Timing Specifications Engine at Room Temperature 68°F (28°C)	
	Stator		Ignition Coil				
Spark Plug Type, Gap (in/mm)	Exciter Coil	Lighting Coil	Primary	Secondary	Spark Plug Cap Resistance	3000 RPM	6000 RPM
NGK BR8ES Champion RN4YC (.028"/.7mm)	120 Ohms Black/Red to Brown/White	.3 Ohms Yellow/Red to Yellow	.3 Ohms Primary Tab to Ground Tab	6300 Ohms Plug Wire (without cap) to Ground Tab	3700 to 6300 Ohms	25°	20°

1990 to Present Ignition System Specifications

		250	300	350/400 (150W)	400 (200W)	425 (200W)
		OHMS RESISTANCE				
Exciter	(R to Grn)	–	–	–	–	3.2
Exciter	(Blk/R to R)	–	–	–	226	450
Exciter	(Blk/R to Brn/W)	120	120	120	–	–
Pulser	(W/R to W)	–	–	–	97	97
Lighting	(Y to Y/R)	.3	.3	.3	.34	.34
Lighting	(Y to Y/Brn)	–	–	–	.17	.17
Primary	(Coil Tab to Coil Ground)	.3	.3	.3	.3	.3
Secondary	(Coil Tab to Plug Wire End) (Spark Plug Cap Removed)	6.3 K	6.3 K	6.3 K	6.3 K	6.3 K
Spark Plug Cap Resistance		3.7 K ––––––––– to ––––––––––– 6.3 K				5.0 K
Engine Timing @ 3000 RPM		25	25	23.5	23.5	30° (3500 RPM)
Engine Timing @ 6000 RPM		20	17	18	18	–
Spark Plug Type/Number		NGK/ BR8ES	NGK/ BR8ES	NGK/ BR8ES	NGK/ BR8ES	NGK/ BKR6ES
Spark Plug Gap		.028	.028	.028	.028	.025

(All OHMS resistance Values +/- 20% @ 68°F/20°C)

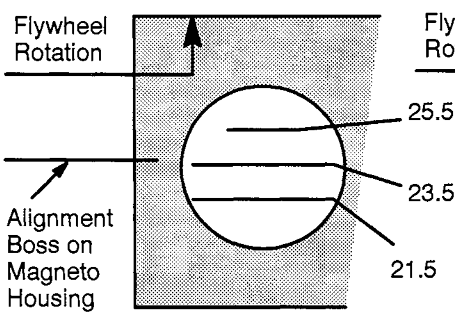
1. The ignition timing check hole is in the magneto housing. Remove the check plug.

NOTE: The ignition timing marks are stamped on the outside of the flywheel. Ignition timing must be inspected with the engine at room temperature.

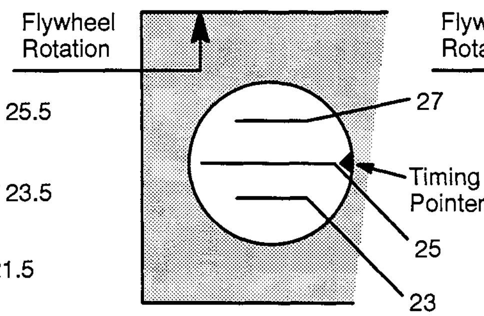
2. With the transmission in neutral, start the engine and set engine speed to 3000 +/- 200 RPM (3500 ± 200 RPM for EH42PL).

3. Direct the timing light at the ignition timing check hole and check the ignition timing. **NOTE:** Do not allow the engine to warm up. The timing will retard approximately 2° when the engine is warm.

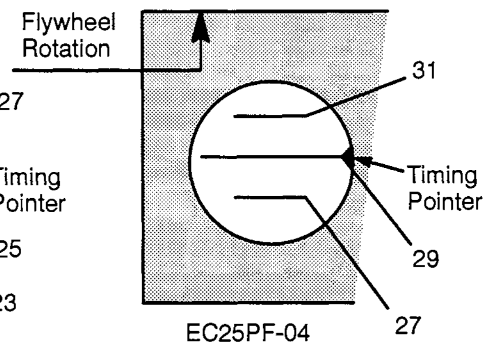
If the ignition timing is not within the specified range, adjust the stator plate position as described below.



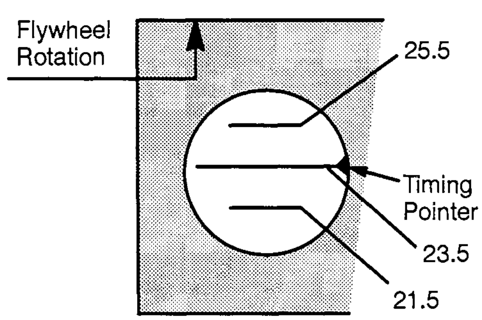
EC25PF-01-02
and early -03



Late EC25PF-03,
All EC25PF-05, 07,
08, 09
and EC28PF(E)-01

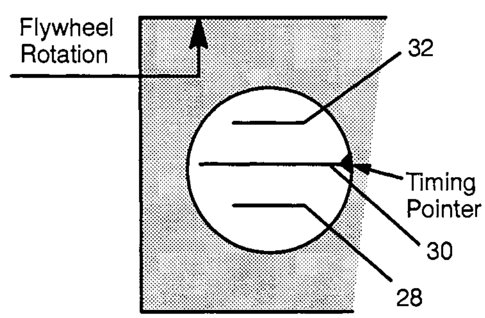


EC25PF-04
(Cyclone)



23.5°
B.T.D.C. at
3000 RPM

EC35-PL
EC38-PL



30°
B.T.D.C. at
3500 RPM

EH42PL

All Engines

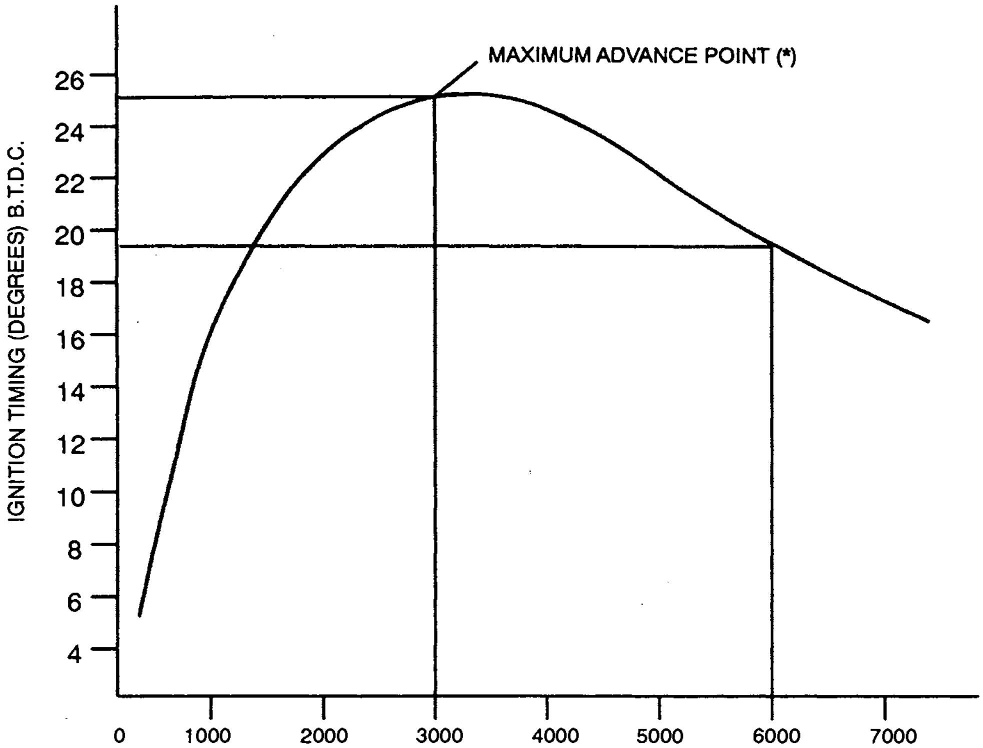
1. Remove the magneto housing.

2. Remove the flywheel.

3. Loosen the stator plate screws and adjust the stator plate position. **NOTE:** Moving the stator plate clockwise delays the ignition timing. Moving the plate counterclockwise advances it.

Typical Ignition Timing Curve

* Actual advance point may vary by several hundred RPM either above or below 3000. Use the point of maximum advance when checking ignition timing.

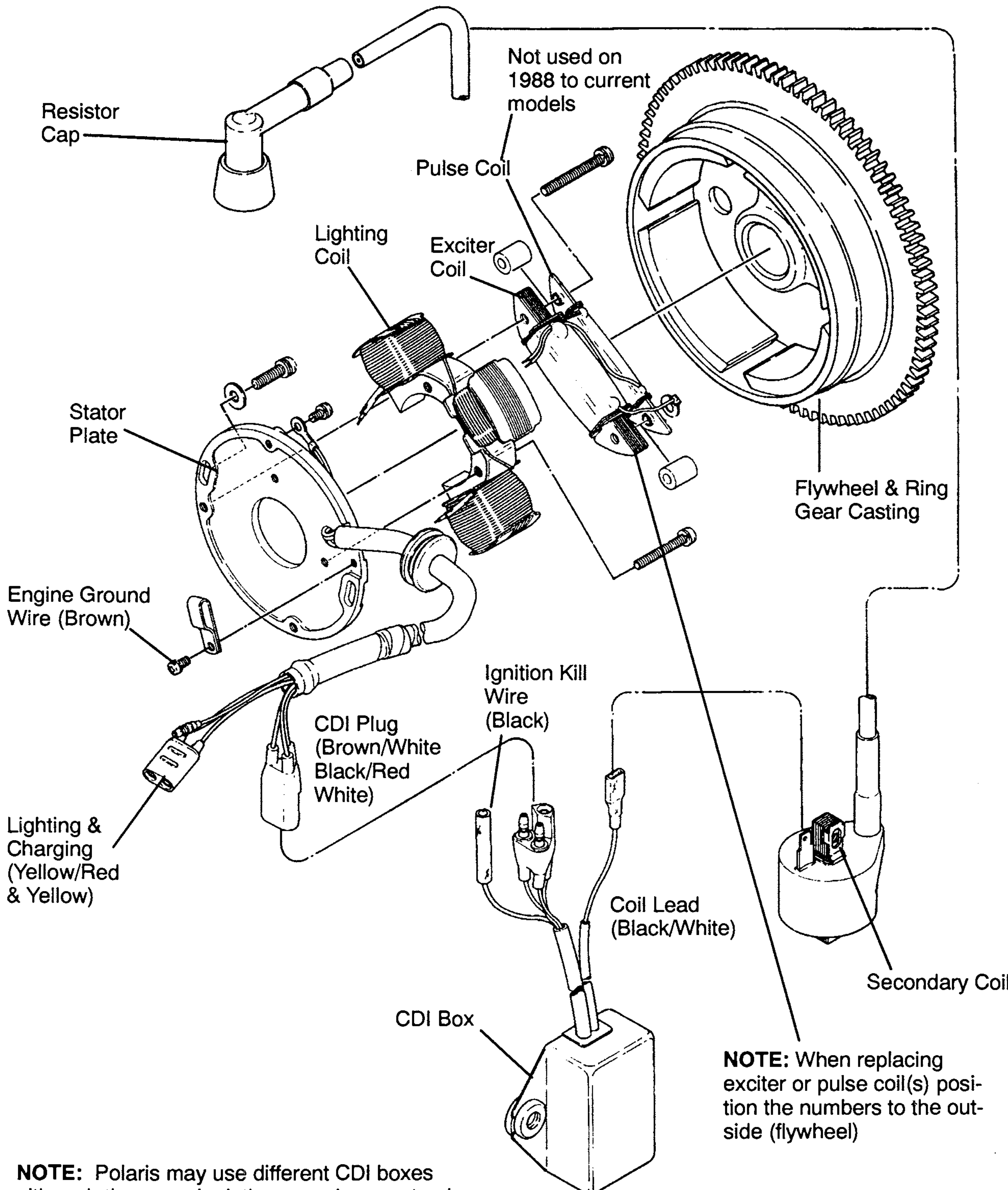


Crankshaft Degree to Piston Position Conversion Chart

Degree	120 MM Rod 60 MM Stroke EC25PF		120 MM Rod 65 MM Stroke EC28PF		130 MM Rod 70 MM Stroke EC35/38PL	
	MM	Inch	MM	Inch	MM	Inch
1	.006	.0002	.006	.0002	.007	.0003
2	.023	.0010	.025	.0010	.027	.0011
3	.051	.0020	.056	.0022	.061	.0024
4	.091	.0040	.100	.0040	.108	.0043
5	.143	.0060	.157	.0062	.169	.0070
6	.205	.0080	.226	.0089	.243	.0100
7	.279	.0110	.307	.0121	.331	.0130
8	.365	.0140	.401	.0158	.432	.0170
9	.461	.0180	.508	.0200	.546	.0220
10	.569	.0220	.626	.0247	.674	.0270
11	.688	.0270	.757	.0298	.815	.0320
12	.818	.0320	.900	.0355	.969	.0380
13	.959	.0380	1.055	.0416	1.136	.0450
14	1.111	.0440	1.223	.0482	1.316	.0520
15	1.274	.0500	1.402	.0552	1.509	.0590
16	1.447	.0570	1.593	.0627	1.714	.0680
17	1.632	.0640	1.796	.0707	1.933	.0760
18	1.827	.0720	2.011	.0792	2.164	.0850
19	2.033	.0800	2.238	.0881	2.407	.0950
20	2.249	.0890	2.476	.0975	2.663	.1050
21	2.475	.0970	2.725	.1073	2.931	.1150
22	2.712	.1070	2.985	.1175	3.211	.1260
23	2.959	.1170	3.257	.1282	3.504	.1380
24	3.216	.1270	3.540	.1394	3.808	.1500
25	3.482	.1370	3.633	.1509	4.124	.1620
26	3.759	.1480	4.138	.1629	4.451	.1750
27	4.045	.1590	4.453	.1753	4.790	.1890
28	4.341	.1710	4.778	.1881	5.140	.2020
29	4.646	.1830	5.114	.2013	5.501	.2170
30	4.960	.1950	5.459	.2149	5.872	.2310

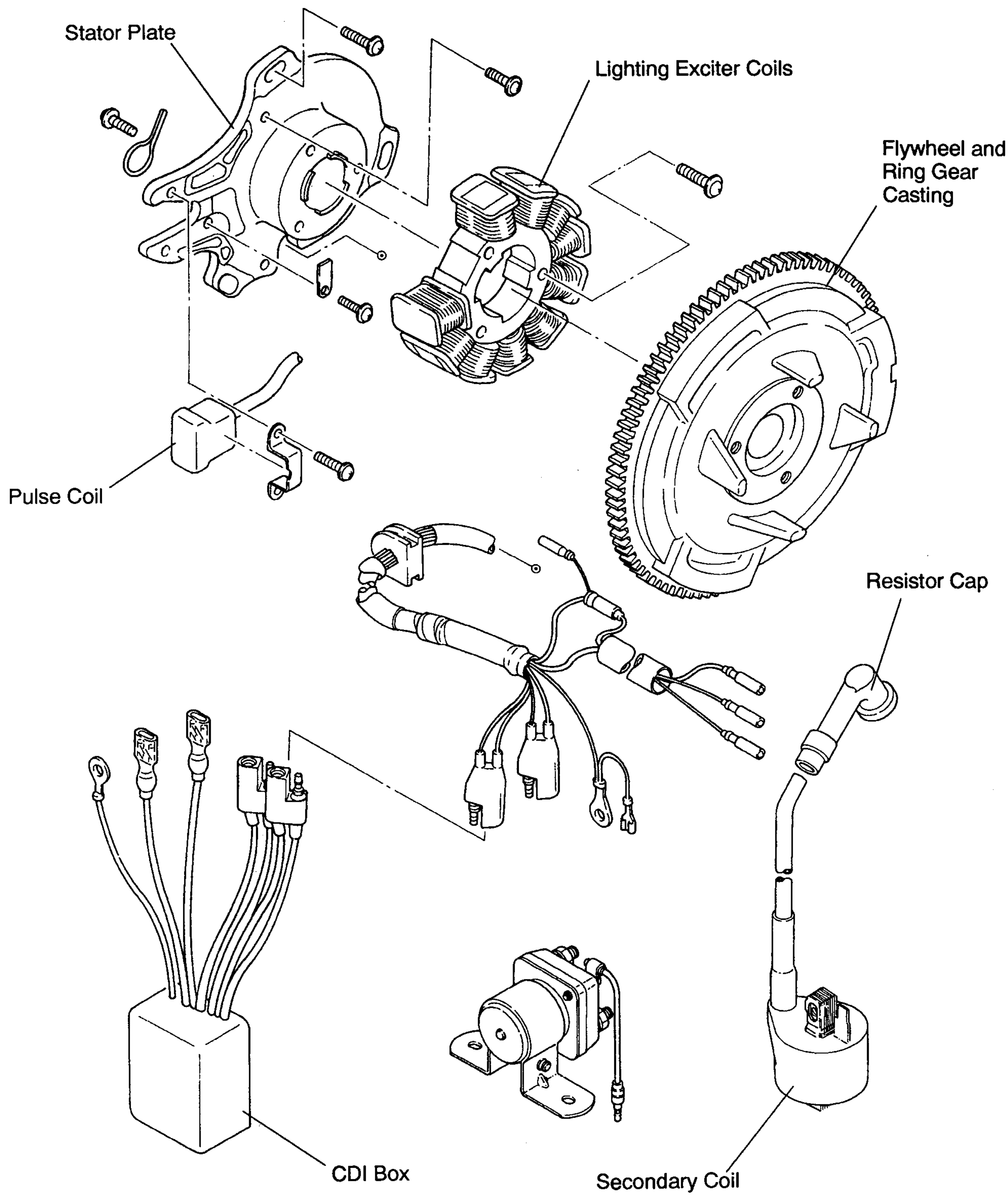
Components of Ignition System (Exploded View)

NOTE: Polaris may use different CDI boxes. Although they may look the same, they are not. Always use the correct CDI box part number.

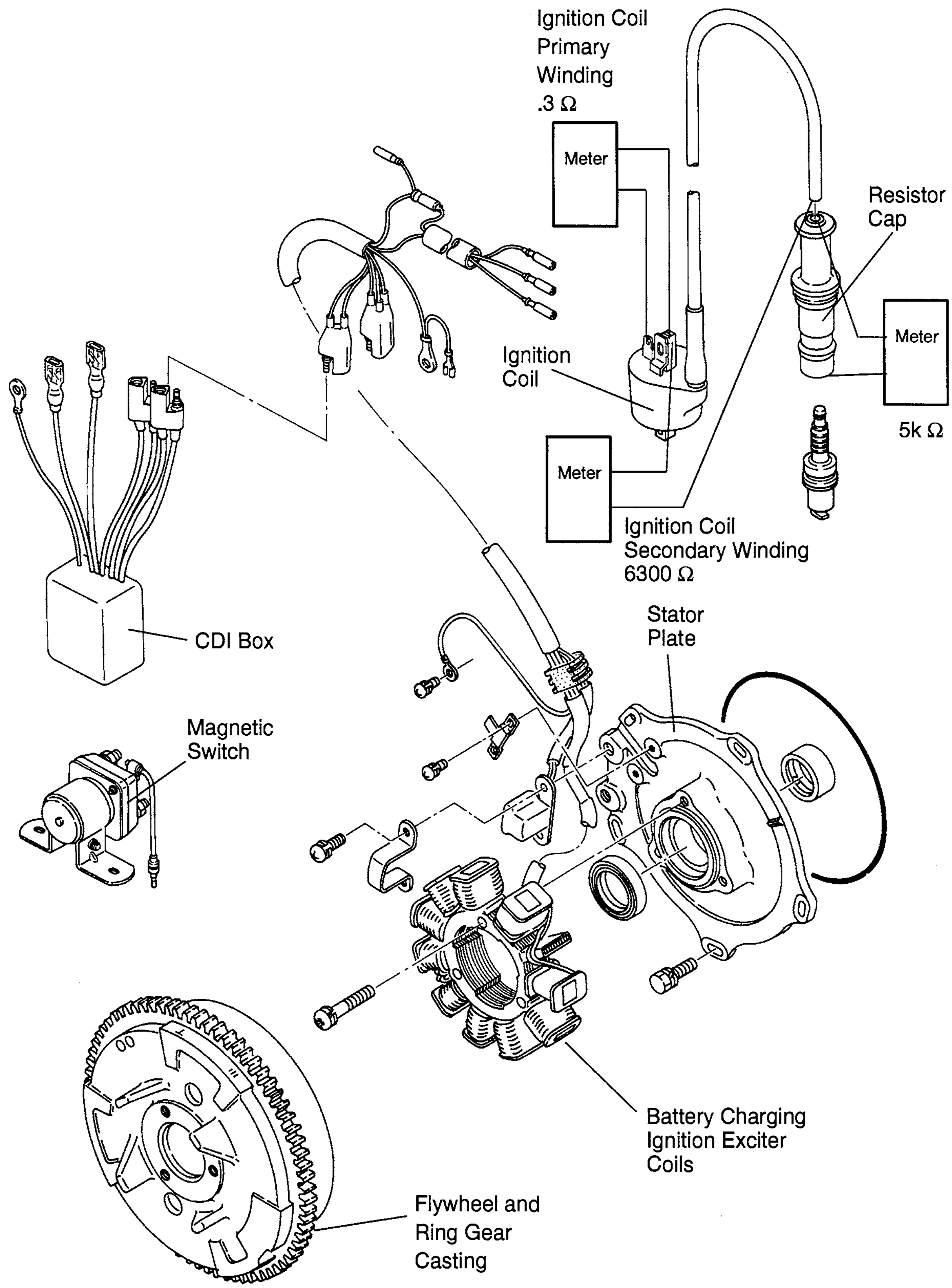


NOTE: Polaris may use different CDI boxes although they may look the same be sure to always use the correct CDI box part number.

Components of Ignition System (Exploded View) EC38PL



Components of EC42PL(E) Ignition System (Exploded View)



Ignition System Test Sequence

Whenever troubleshooting an electrical problem you should first check all terminal connections to be sure they are clean and tight. Also be sure that colors match when wires are connected. Use the following pages as a guide for troubleshooting. The resistance values are given on the specification pages. Install a new spark plug before troubleshooting system.

Condition: No Spark

Procedure

Disconnect the black wire at the CDI module to isolate the ignition from the kill system.

Does it have spark?

→ Yes → Test the ignition switch emergency kill switch and reverse speed limiters for shorts to ground.

↓ No

Disconnect the 3 wire connector between the engine and CDI module. Test the stator coils with a digital VOM. Compare to values listed on the specifications on page 8.2.

Are these values within a +/- 10% span?

→ No → Inspect connectors, wiring and grounds to the component in question. Replace the component if a problem cannot be found.

↓ Yes

Disconnect and check the secondary coil. Resistance values should be:

Primary Side	Secondary Side
Primary Tab to Ground Tab: .3 to .5 Ohms	High Tension Wire (Cap removed) to Ground Tab: 6300 Ohms +/- 10%

Are these values within specs?

→ No → Replace the ignition coil.

↓ Yes

If all of the above values are within specs, and all connections, grounds, and wire color coding have been inspected, replace the CDI module.

Ignition System Test Sequence Cont.

Condition: Weak Spark:

Spark will not jump a 3/8″ (1 cm) air gap. Symptoms of weak spark:
- -Hard starting
- -Plug fouling
- -Loss of power
- -Misfire

Perform the same tests used in the "No Spark" tests.

Intermittent Spark: Fuel, compression and ignition can all cause what sounds like an engine misfire. To determine whether the misfire is ignition related, connect a timing light to the ignition system and view the light while the engine is running. If the light is consistent while the engine is misfiring the problem is not spark related. If the light is intermittent while the engine is misfiring proceed with the following tests.

-Install a new spark plug and recheck.

-Disconnect the black wire at the reverse speed limiter and recheck.

Does it misfire? → No → Test and repair the reverse limiter system.

↓ Yes

Test the ignition coil. Primary resistance is .3 to .5 ohms. Secondary resistance is 6300 ohms. (Perform a coil power test if a tester is available).

Are the readings in a +/- 10% span? → No → Replace the coil.

↓ Yes

Test the RFI spark plug cap resistance. It should be between 3700 and 6300 ohms.

Is it? → No → Replace the cap.

↓ Yes

Test the stator coil(s) resistance. Compare to the specification on page 8.2.

Are the readings within a +/-10% span? → No → Replace the defective component.

↓ Yes

Replace the CDI module and check ignition timing.

CAUTION: When working with batteries, always wear safety glasses or a face shield and protective gloves. Battery electrolyte contains sulfuric acid and is poisonous! Serious burns can result from contact with the skin, eyes or clothing.

Preparing A New Battery For Service

To assure maximum service life and performance from a battery, it must have the correct initial servicing. Perform the following steps to properly service a new battery. **NOTE:** Do not service the battery unless it will be put into regular service within 30 days.

1. Remove the vent plug from the vent fitting.
2. Fill the battery with electrolyte to the upper level marks on the case.
3. Set the battery aside and allow it to cool and stabilize for 30 minutes.
4. Add electrolyte to bring the level back to the upper level mark on the case. **NOTE:** This is the last time that electrolyte should be added. If the level becomes low after this point, add only distilled water.
5. Charge the battery at 1/10 of its amp/hour rating.

Examples: 1/10 of 9 amp battery = .9 amp; 1/10 of 14 amp battery = 1.4 amp; 1/10 of 18 amp battery = 1.8 amp (recommended charging rates).

6. Check the specific gravity of each cell with a hydrometer to assure each has a reading of 1.270 or higher.

Battery Testing

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first.

There are three tests that can easily be made to determine the battery's condition: OCV Test, Specific Gravity Test and Load Test.

OCV - Open Circuit Voltage Test

Battery voltage should be checked with a digital multitester. Readings of 12.4 or less require further battery testing and charging.

NOTE: Lead-acid batteries should be kept at or near a full charge as possible. If the battery is stored or used in a partially charged condition, hard crystal sulfation will form on the plates, reducing their efficiency and could possibly ruin the battery.

Specific Gravity Test

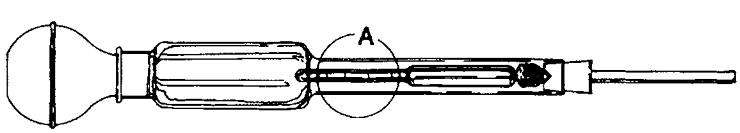
A tool such as a Battery Hydrometer (PN 2870836) can be used to measure electrolyte strength or specific gravity. As the battery goes through the charge/discharge cycle, the electrolyte goes from a heavy (more acidic) state at full charge to a light (more water) state when discharged. The hydrometer can measure state of charge and differences between cells in a multi-cell battery. Readings of 1.270 or greater should be observed in a fully charged battery. Differences of more than .025 between the lowest and highest cell readings indicate a need to replace the battery.

STATE OF CHARGE	CONVENTIONAL LEAD-ACID	YUMICRON TYPE
100% Charged	12.60V	12.70V
75% Charged	12.40V	12.50V
50% Charged	12.10V	12.20V
25% Charged	11.90V	12.0V
0% Charged	less than 11.80V	less than 11.9V

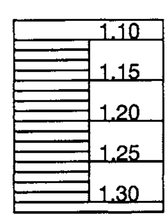
STATE OF CHARGE*	CONVENTIONAL LEAD-ACID	YUMICRON TYPE
100% Charged	1.265	1.275
75% Charged	1.210	1.225
50% Charged	1.160	1.175
25% Charged	1.120	1.135
0% Charged	less than 1.100	less than 1.115

* At 80°F

NOTE: Subtract .01 from the specific gravity reading at 40° F.



Detail A



Load Test

NOTE: This test can only be performed on machines with electric starters. This test cannot be performed with an engine or starting system that is not working properly.

A battery may indicate a full charge condition in the OCV test and the specific gravity test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered. To perform this test, hook a multitester to the battery in the same manner as was done in the OCV test. The reading should be 12.4 volts or greater. Engage the electric starter and view the registered battery voltage while cranking the engine. Continue the test for 15 seconds. During this cranking period, the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.4 or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

Battery Maintenance

Refilling a low battery: The normal charge/discharge cycle of a battery causes the cells to give off gases. These gases, hydrogen and oxygen, are the ingredients of water. Because of the loss of these gases and the lowering of the electrolyte level, it is necessary to add pure, clean distilled water to bring the fluid to the proper level. After filling, charge the battery to raise the specific gravity to the fully charged position (1.270 or greater).

Off season storage: To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

- Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning. **NOTE:** Do not get any of the baking soda into the battery or the acid will be neutralized.
- Using a wire brush or knife, remove any corrosion from the cables and terminals.
- Make sure that the electrolyte is at the proper level. Add distilled water if necessary.
- Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the electrolyte's specific gravity reaches 1.270 or greater.
- Store the battery either in the machine with the cables disconnected, or on a non-metal tray in a cool place. **NOTE:** Stored batteries lose their charge at the rate of 1% per day. They should be recharged to a full charge every 30 to 60 days during a non-use period. A battery will freeze at a higher temperature as the battery discharges. The chart at right indicates freezing points by specific gravity. Polaris Battery Tender® (PN 2871076) battery charger can be connected continually during storage periods without overcharging. Inspect electrolyte level periodically.

Charging Procedure: Charge the battery with a charger no larger than 1/10 of the battery's amp/hr rating* for as many hours as needed to raise the specific gravity to 1.270 or greater.

WARNING: The gases given off by a battery are explosive. Any spark or open flame near a battery can cause an explosion which will spray battery acid on anyone close to it. If battery acid gets on anyone, wash the affected area with large quantities of cool water and seek immediate medical attention.

*Standard production batteries for Polaris ATVs have a 14 amp/hr capacity rating.

Electrolyte Freezing Points	
Specific Gravity of Electrolyte	Freezing Point
1.265	-75° F
1.225	-35° F
1.200	-17° F
1.150	+5° F
1.100	+18° F
1.050	+27° F

Battery Installation

- Install battery in vehicle with positive terminal toward the front.
- Connect battery cables. **WARNING:** To avoid the possibility of explosion, connect positive (red) cable first and negative (black) cable last. Be sure key switch and electrical loads are off before connecting battery. Use Polaris anti-corrosive dielectric grease (PN 2871027) on all electrical connections.

NOTE: 1994 to current models are equipped with battery covers. After connecting the battery cables, install the cover on the battery and attach the hold down strap. On 400L 4x4 models, it will first be necessary to bend the power plug leads down so that the battery cover will fit properly.

- Install clear battery vent tube from vehicle to battery vent. **WARNING:** Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. Vent should be routed away from frame and body to prevent contact with electrolyte. Avoid skin contact with battery electrolyte, severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.
- Route cables so they are tucked away in front and behind battery.

Electric Starter System Test Sequence

Condition: Starter fails to turn motor. **NOTE:** Make sure engine crankshaft is free to turn before proceeding.

Dynamic testing of starter system. A digital multitester must be used for this test.

With the tester on the VDC position, place the tester's black lead on the battery negative and the red lead on the battery positive.

Reading should be 12.4 or greater.

→ No → Remove battery and properly service. Install fully charged shop battery to continue test. → Yes

↓ Yes

Disconnect White/Red engagement coil wire from the starter solenoid. Connect tester black wire to battery ground. Connect red tester lead to White/Red harness wire at solenoid. Turn on ignition switch and depress the starter button. Tester should read battery voltage.

→ No → Check voltage on both sides of circuit breaker, ignition switch and starter button. The voltage on both sides should be the same. **NOTE:** The ignition switch must be on and the starter button depressed. Replace the defective component.

↓ Yes

Reconnect the solenoid. Connect the tester black lead to the battery positive and the red lead to the solenoid end of the battery-to-solenoid wire. Depress starter button. Reading should be less than .1 V D.C.

→ No → Clean the battery-to-solenoid cable ends or replace the cable.

↓ Yes

Connect the black tester lead to solenoid end of battery-to-solenoid cable. Connect red tester lead to solenoid end of solenoid-to-starter cable. Depress starter button. Reading should be less than .1 V D.C.

→ No → Replace the starter solenoid.

↓ Yes

Connect the black tester lead to the solenoid end of the solenoid-to-starter cable. Connect the red tester lead to the starter end of the same cable. Depress the starter button. The reading should be less than .1 V D.C.

→ No → Clean the solenoid-to-starter cable ends or replace the cable.

↓ Yes

If all of these indicate a good condition, yet the starter still fails to turn, the starter must be removed for static testing and inspection.

Starter Motor Static Testing

Remove starter motor. Disassemble, clean and inspect brushes. **NOTE:** Some cleaning solvents may damage the insulation in the starter. Care should be taken when selecting an appropriate solvent. The brushes must slide freely in the brush holders and firmly contact the commutator. If the commutator needs cleaning, use only an electrical contact cleaner and/or a non-metallic grit sandpaper. Replace the brush assembly when the brushes are worn to 5/16″ (.8 cm) or less.

Starter Housing and Field Magnet Inspection

Using a digital multitester, measure the resistance between the starter input terminal and the insulated brushes. The reading should be .3 ohms or less. Measure the resistance between the input terminal and the starter housing with the brushes not touching the frame. The reading should be infinite. Inspect the permanent magnets in the starter housing to be sure they are not cracked and have not separated from the housing. **CAUTION:** Use care when handling the starter housing. Never drop or strike the housing with a hard object as magnet damage is possible. Any damage to the field magnets will require replacement of the starter assembly.

Armature Testing

Using a digital multitester, measure the resistance between each of the segments of the commutator. The reading should indicate .3 ohms or less. Measure the resistance between the commutator and armature shaft. The reading should be infinite. Place the armature in a growler. With the growler on, position a hack saw blade lengthwise 1/8″ (.3 cm) above the armature coil laminates. Rotate the armature 360°. If the hacksaw blade is drawn to the armature on any pole the armature is shorted and must be replaced.

1. If the brush plate has been removed, reinstall it on the starter housing. **NOTE:** The alignment tab on the brush plate must be positioned in its slot in the starter housing.
2. Install the brushes in the brush holders. Either remove the springs or use spring retainers to keep the brushes from sticking out of the holders.
3. If removed, reinstall armature on drive end frame.
4. With O-ring properly positioned, slide starter housing and brush plate assembly over armature.
5. Reinstall brush springs or remove retainers.
6. Reinstall armature thrust washers, large O-ring and brush end frame. **NOTE:** Use non-petroleum grease sparingly in the bushing.
7. Test starter operation before reinstalling on engine. **CAUTION:** Avoid excessive free spinning which will cause internal starter damage.

Pinion Gear - Anti Kick-out Shoe, Garter Spring Replacement

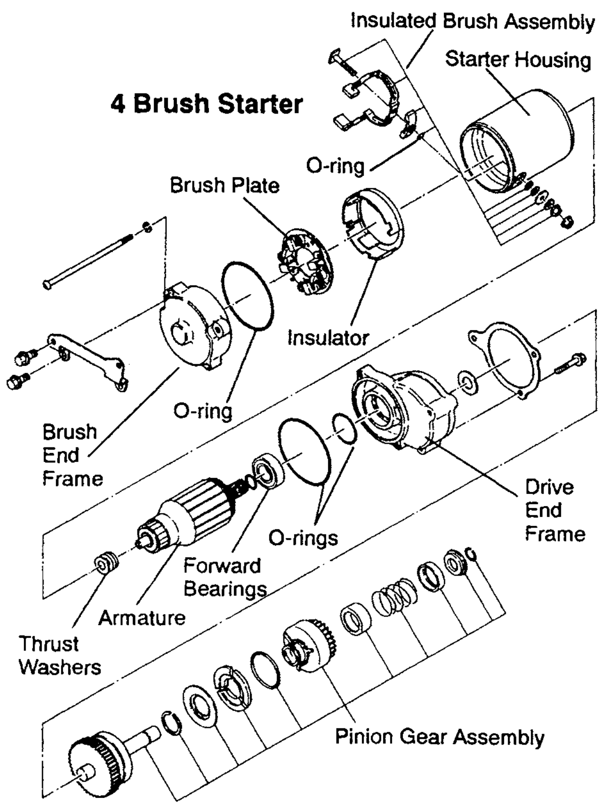
If the garter spring should become damaged, the overrun clutch may fail to return properly. The replacement spring is PN 7042039. Use either of the following methods to remove and install a new garter spring.

1. Screw the overrun clutch out to the engaged position on the pinion shaft assembly. Use a small piece of wire with the end bent in a hook and pick the old spring out of its channel. Slide it off the end of the shaft. Slide the new spring over the overrun clutch and into the spring groove. Make sure that the spring is positioned between the shoe alignment pins and the back flange of the anti kick-out shoes.
2. Remove the lock ring, end washer, spring retainers and clutch return spring. Screw the overrun clutch off the end of the pinion shaft. Remove the old spring and install a new one. Lightly grease the pinion shaft and reinstall the clutch, spring, retainers, end washer and lock ring in the reverse order. Make sure the end washer is positioned properly so that it will hold the lock ring in its groove.

Starter Solenoid Bench Test

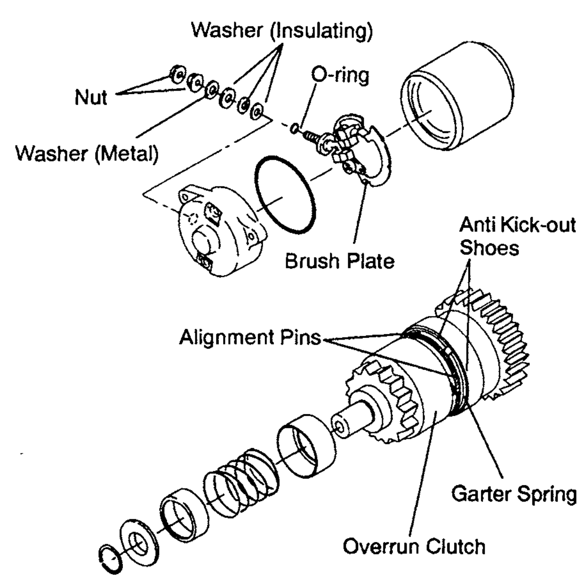
It is difficult to test the high amp side of the solenoid accurately on the bench. The only test which can be done on the bench is the pull-in coil resistance. The reading should be 3.4 ohms.

Starter Motor Exploded View

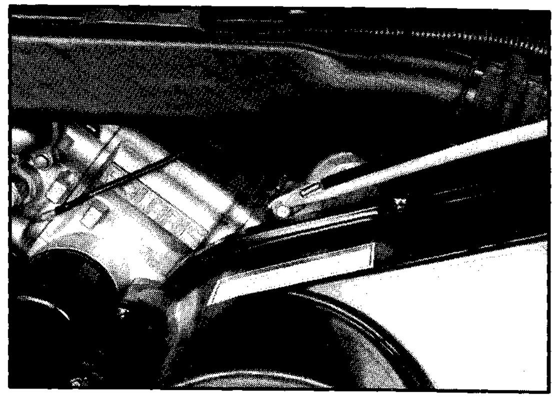


-or-

2 Brush Starter



Magnum Starter Motor Removal

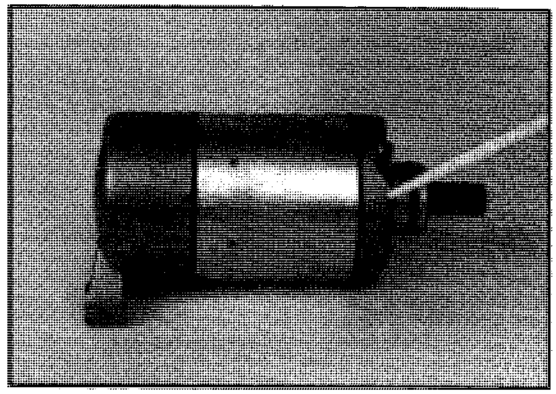


CAUTION: Turn ignition switch *off* and disconnect the battery ground (–) cable from the battery before removing the starter motor.

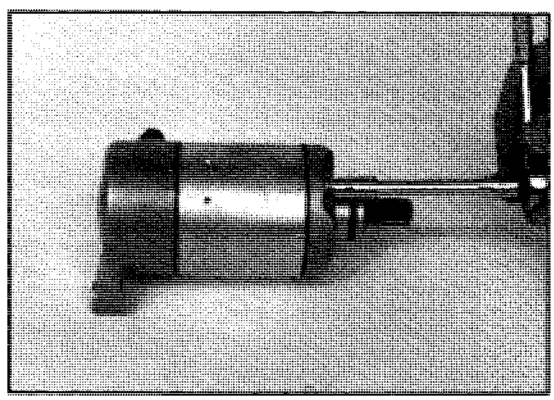
1. Remove the two 6mm starter motor mounting bolts. Note the position of the ground cable.
2. Disconnect starter motor positive (+) cable at the motor.
3. Remove starter motor.
4. Inspect the O-Ring on the end of the starter motor for wear, cracks, or damage. Replace if necessary.

Disassembly

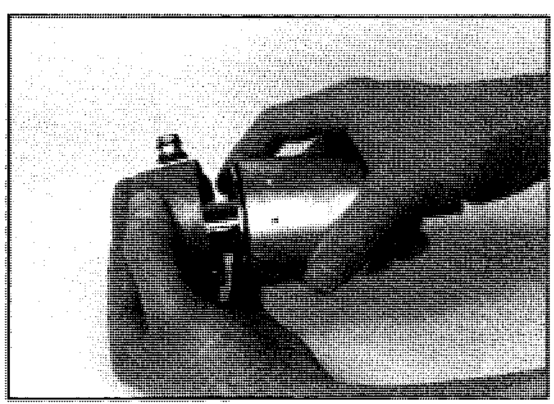
NOTE: Use electrical contact cleaner to clean starter motor parts. Some solvents may leave a residue or damage internal parts and insulation.



1. Note the alignment marks on both ends of the starter motor casing. These marks must align during reassembly.

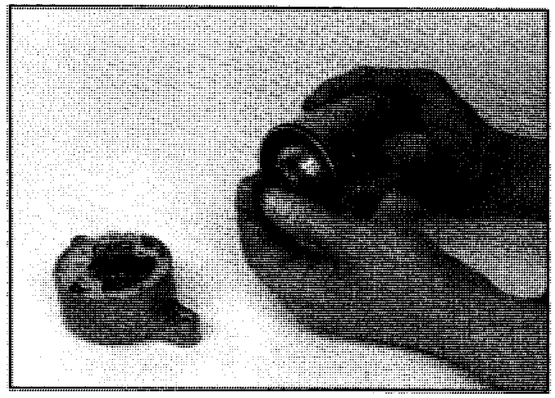


2. Remove the two bolts, washers, and sealing O-Rings. Inspect O-Rings and replace if damaged.



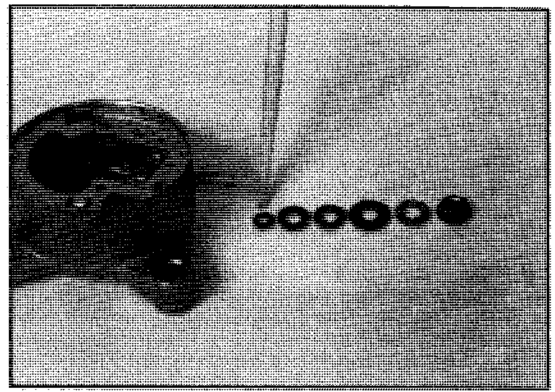
3. Remove brush terminal end of housing while holding other two sections together.

4. Remove shims from armature shaft. **NOTE:** All shims must be replaced during reassembly.



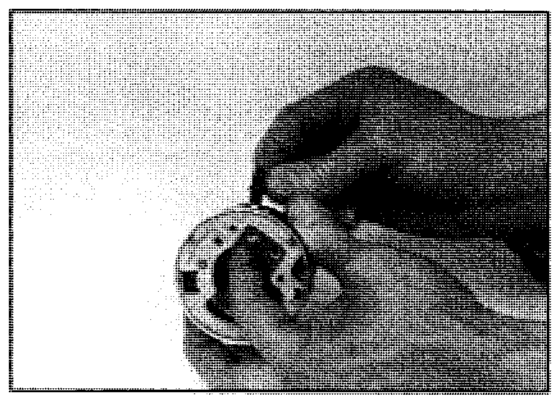
Brush Inspection/Replacement

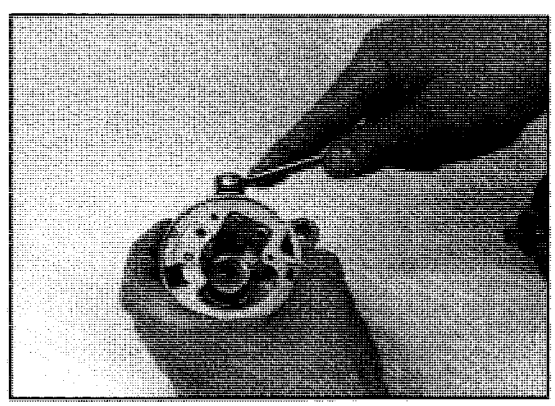
1. Using a digital multitester, measure the resistance between the cable terminal and the insulated brush. The reading should be .3 ohms or less. Measure the resistance between the cable terminal and brush housing. Make sure the brush is not touching the case. The reading should be infinite.
2. Remove nut, flat washer, large phenolic washer, two small phenolic washers, and O-Ring from brush terminal. Inspect the O-Ring and replace if damaged.
3. Remove brush plate and brushes. Measure length of brushes and replace if worn past the service limit. Replace springs if they are discolored or have inadequate tension.



Brush Length Service Limit:
5/16″ (.8 cm)

4. Install a new carbon brush assembly in the brush housing. **NOTE:** Be sure that the terminal bolt insulating washer is properly seated in the housing, and the tab on the brush plate engages the notch in the brush plate housing.
5. Place a wrap of electrical tape on the threads of the terminal bolt to prevent O-Ring damage during reinstallation.
6. Install the O-Ring over the bolt. Make sure the O-ring is fully seated.
7. Remove the electrical tape and reinstall the two small phenolic washers, the large phenolic washer, flat washer, and nut.





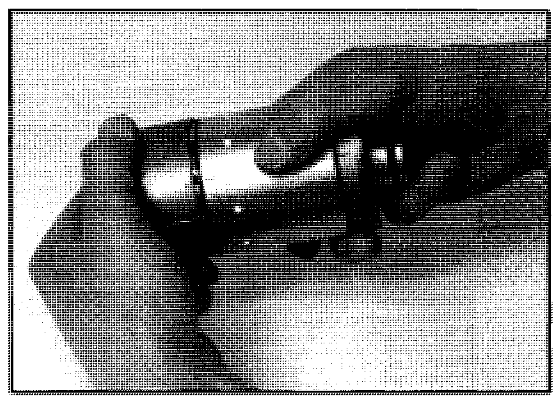
Armature Testing

1. Remove armature from starter casing. Note order of shims on drive end for reassembly.
2. Inspect surface of commutator. Replace if excessively worn or damaged.
3. Using a digital multitester, measure the resistance between each of the commutator segments. The reading should be .3 ohms or less.
4. Measure the resistance between each commutator segment and the armature shaft. The reading should be infinite (no continuity).
5. Check commutator bars for discoloration. Bars discolored in pairs indicate shorted coils, requiring replacement of the starter motor.
6. Place armature in a growler. Turn growler on and position a hacksaw blade or feeler gauge lengthwise 1/8″ (.3 cm) above armature coil laminates. Rotate armature 360°. If hacksaw blade is drawn to armature on any pole, the armature is shorted and must be replaced.
7. Inspect permanent magnets in starter housing. Make sure they are not cracked or separated from housing.

CAUTION: Use care when handling starter housing. Do not drop or strike the housing as magnet damage is possible. If magnets are damaged, starter must be replaced.

Starter Assembly

1. Place armature in field magnet casing.
2. Place shims on drive end of armature shaft with phenolic washer outermost on shaft. Engage tabs of stationary washer in drive end housing, holding it in place with a light film of grease.
3. Install case sealing O-Ring. Make sure O-Ring is in good condition and not twisted on the case. Lubricate needle bearing and oil seal with a light film of grease, and install housing, aligning marks.
4. Install O-Ring on other end of field magnet casing. Make sure it is in good condition and not twisted on the case.
5. Align casing marks and install housing, pushing back brushes while installing shaft in bushing.
6. Reinstall starter motor housing bolts. Make sure O-Rings are in good condition and seated in groove.



Starting System Troubleshooting

Condition	Possible Cause	Correction
Starter operates, but fails to engage the flywheel.	-Starter drive problem	-Repair or replace starter drive
	-Ring gear problem	-Repair or replace flywheel ring gear
	-Battery hooked up backwards	-Connect red battery cable to battery positive (+) terminal, black cable to battery negative (-) terminal
	-Battery charged backwards	-Use a multitester to determine battery polarity. If battery is charge backwards, totally discharge and recharge properly. **CAUTION:** If reverse polarity is connected to the electrical system, the charging system will be damaged.
Starter turns slowly. (Determine amp draw - should be between 25 - 50 amps. Higher numbers indicate an engine or starter problem. Lower numbers indicate a circuit problem.)	-Engine damage	-Make sure the engine turns freely
	-Battery at a low state of charge (check charging system)	-Refer to battery service unit
	-High resistance in starter circuit	-Refer to starting system dynamic test
	-Defective starter motor	-Refer to starter motor static test

CHARGING SYSTEM

Charging System Testing

Whenever charging system problems are suspected, proceed with the following system check.

Using a multitester set on D.C. volts, measure the battery open circuit voltage. It should be 12.4 volts or more

Is it?

→ No → Remove the battery and properly service. Reinstall the fully charged battery or a fully charged shop battery. → Yes

↓ Yes

With the transmission in neutral, start the engine and rev to between 3000 and 4000 RPM. Read the battery voltage with the multitester. Readings should be between 13.0 and 14.6 V D.C.

Are they?

→ No → Continue with test.

↓ Yes

System break even RPM -

The battery will continually discharge if operated below the "Break Even" RPM. Continued problems would warrant battery inspection, checking for owner modification, and discussion with the owner concerning their driving habits.

Continued from chart on page 8.14

Disconnect the Yellow/Red, Yellow, and Yellow/Brn (if applicable) wires from the regulator/rectifier. Using a multitester, measure the resistance between the wires from the stator. Compare to test specifications on page 8.2. Measure the resistance between all wires and the engine crankcase. This reading should indicate an open circuit (no continuity). If measured resistance is within specifications, perform an alternator output (AC amp) test. See test procedure inset on this page for procedure.

Are the readings and output within specification?

No → Inspect the wiring harness between the panel and the stator for damage. If no damage is found, remove the recoil and flywheel. Inspect the flywheel magnets, stator coils and stator wire harness for damage. Repair or replace any components found to be damaged.

Yes ↓

Reconnect the alternator wires.
Using a multitester set on VDC, read the voltage at the terminal where the red wire from the voltage regulator connects to the machine harness or circuit board. The reading should be battery voltage.

Is it?

No → Check the battery connections, circuit breaker and connecting wires. Repair or replace any components that are not operating properly.

Yes ↓

If all of the previous tests indicate a good condition, but the charging voltage does not rise above battery voltage or is low (below 13v) or high (above 15v), replace the voltage regulator.

Alternator Output Test (AC amp)

This test measures AC amperage from the alternator. Maximum alternator output will be indicated on the meter. It is *not* necessary to increase engine RPM above idle. Place the red lead on the tester in the 10A jack. Turn the selector dial to the AC amps (A~) position. Connect the meter leads to the Yellow and Yellow/Red wires leading from the alternator. Start the engine and let it idle. Reading should be a minimum of 5A at idle.

Current Draw - Key Off

CAUTION: Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to light bulbs and speed limiter.

Connect an ammeter in series with the negative battery cable. Check for current draw with the key off. If the draw is excessive, loads should be disconnected from the system one by one until the draw is eliminated. Check component wiring as well as the component for partial shorts to ground to eliminate the draw.

Current Draw - Key Off:
Maximum of .02 DCA (20 MA)

Charging System "Break Even" Test

CAUTION: Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to light bulbs and speed limiter.

The "break even" point of the charging system is the point at which the alternator overcomes all system loads (lights, etc.) and begins to charge the battery. Depending on battery condition and system load, the break even point may vary slightly. The battery should be fully charged before performing this test.

Connect an ammeter set to DC amps in series between the negative battery cable and terminal. Connect a tachometer according to manufacturer's instructions. Start engine with recoil *only.* Increase engine RPM and note RPM at which the battery starts to charge.

CAUTION: Never use the electric starter with the ammeter connected, or damage to the meter may result. Do not run test for extended period of time. Do not run test with high amperage accessories.

Lighting System Service (Non-Battery Models)

If the lights on a non-battery system should fail to operate properly and the problem is not in the control switch(es), proceed with the following test.

Disconnect the Yellow/Red and Yellow alternator wires from the machine harness or circuit board. Using a multitester, measure the resistance between the two wires. Readings should be between .45 and .6 ohms on 100 watt alternators and .25 to .35 ohms on 150 watt alternators. Measure the resistance between either wire and the engine crankcase. The reading should indicate an open circuit. Switch the multitester to VAC and connect it between the Yellow/Red and Yellow wires. Start the engine and rev it to approximately 3000 RPM. Meter readings should be above 25 volts A.C.

Are they?

No → Remove the recoil and flywheel. Inspect the flywheel magnets, stator coils and stator wire harness for damage. Repair or replace any component found to be damaged.

Yes ↓

Reconnect the alternator wires. Using a multitester set on VAC, read the system voltage at the Yellow harness wire. Start the engine, rev it to approximately 3000 RPM and check the reading.

Does it read between 11 and 15 volts A.C.?

No → Under voltage:
Disconnect the system's loads (lights) and retest. If the voltage readings are then normal, there may be a short circuit in that part of the lighting system. If the voltage is still low, replace the voltage regulator.
Over voltage:
Replace the regulator. **NOTE:** If the regulator is not properly mounted on the frame, an over voltage condition will result.

Yes ↓

The system is O.K.

Following are the limiter modules by year, model, type, function and part number:

YEAR	MODEL	TYPE	FUNCTION	PART NO.
1987 and retrofit to older models	Trail Boss	LR40	Reverse Limit - 3200 High Limit - 4800	4060079
1987	Cyclone	LR41	Reverse Limit - 4650 High Limit - WOT	4060081
1988	All except R/ES	LR42	Reverse Limit - 3400 High Limit - WOT	4060082
1988	R/ES	LR43	Reverse Limit - 3900 High Limit - WOT	4060084
1989 - 1993 1994	All except Trail Blazer Trail Boss & All 300's	LR44	Reverse Limit - 3600 High Limit - WOT ETC Limit - 1900	4060085
1990 and Early 1991	Trail Blazer (Forward Only Trans.)	LR41-1	ETC Limit - 1900	4060089
Late 1991 to 1994	Trail Blazer (F/N/R Trans.)	LR47	Reverse Limit - 3500 High Limit - WOT ETC Limit - 1900	4060093
1994 1995	Sport Scrambler	LR49	Reverse Limit - 2800 ETC Limit - 1200	4060114
1994 1995	All 400's (Except Sport, Scrambler and 425)	LR44-2	Reverse Limit - 3400 ETC Limit - 1200	4060112

The Speed Limiter system controls vehicle speed in reverse by electronically limiting engine RPM. When the module receives voltage through the reverse light circuit and the alternator output (engine RPM) reaches a predetermined point, the limiter begins grounding the ignition kill circuit (Black wire). The engine will experience a "miss" which prevents it from going above the set RPM. Below the set RPM, the engine will operate normally.

On 1989 to 1993 machines, the limiter also incorporates a throttle safety feature call the Electronic Throttle Control (ETC). When the throttle flipper is released the speed limiter receives voltage from a switch located in the throttle block. The engine will again experience a "miss" which prevents if from going above the set RPM.

On 1991 J to 1993 models, this throttle switch also incorporated a switch to engage and disengage the front hubs. When the throttle is released the voltage to the front hubs is disconnected.

Models without AWD use ETC switch (2 wire) PN 4110131.

Models 1991 J-1993 with AWD use ETC switch (3 wire) PN 4110132.

NOTE: On 1993 models (except Sportsman and 350L 6x6), the replacement switch wire needs to be soldered into the wire harness.

On 1994 to current models, the ignition is interrupted only when there is a mechanical problem in the throttle slide, cable, or mechanism, and the throttle flipper is released.

NOTE: All Wheel Drive Activation In Reverse, 1993 Sportsman, 1993 6x6 350L, 1994 to current AWD models: For AWD in reverse gear, the override button must be pushed in addition to selecting "All Wheel Drive". Power is delivered through the transmission switch, the override button, the AWD button, and then to the front wheel coils.

Test Procedure

Many problems which occur in an engine may sound like a spark-related "miss" and therefore may be blamed on the speed limiter system. To determine if the limit system is causing the problem, disconnect the black wire at the limiter module. The limiter system will then be disabled. If the problem still exists, the limit system is not the cause. If the problem goes away, reconnect the black wire and proceed with the following tests.

WARNING: The speed limiter is a safety feature and should never be disabled, except for testing purposes.

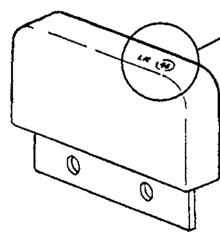
Reverse Speed Limiter (RSL) System Testing - Three Wire Module

The three wire module can be identified by module numbers LR40, 41, 42, 43, and 47.
The module has a:
Black wire - providing ignition control to CDI module.
Green wire - receiving reverse gear indicator light signal.
Yellow or white - receiving the engine speed/RPM signal.

Troubleshooting

Symptom	Cause	Cure
Limits in forward	-Circuit problem causing 12V on the green limiter wire in forward	-Repair circuit problem
	-Open circuit from green wire on RSL module, through override switch and reverse light bulb, to ground (LR40 only)	-Replace override button or reverse light bulb and check wire continuity
No limit in reverse	-No 12V to RSL green wire in reverse	-Repair reverse light indicator wire circuit
	-RSL black wire not connected to CDI box	-Check and repair circuit
	-No alternator output to inform RSL module of engine RPM	-Check and repair alternator system
	-Reverse override switch not closing (LR 41, 42, 43)	-Replace override switch
Limits at wrong RPM	-Wrong RSL module for unit	-Verify RSL module requirements and install correct part
	-Incorrect alternator output	-Check and repair alternator
	-Override button not closing (LR40 will limit at 4800 RPM only if override button does not close)	-Replace override button
No spark	-Defective RSL module	-Replace RSL module

4 Wire module can be identified by module number LR44 and wire connectors.



The module has a:
Black wire - providing ignition control to the CDI module.
Green wire - receiving reverse gear indicator light signal
White wire - receiving a closed throttle (12V) signal from the ETC
Yellow or Yellow/Red wire - receiving the engine speed/ RPM signal

TROUBLESHOOTING:

SYMPTOM	CAUSE	CURE
Limits in forward	-Voltage to green wire in forward gear -Voltage to white wire (even with switch Off) throttle depressed. NOTE: Most often caused by moisture in the ETC switch	-Check circuit to determine reason for voltage to green in forward gear -Clean, dry, repair or replace the ETC switch assembly as required
Engine miss at idle (Engine RPM increases or engine stops misfiring when the reverse override switch is depressed)	-Carb idle RPM is set too high	-Adjust idle RPM to specifications
Loud bang in the exhaust on deceleration that disappears when limiter is disconnected	-Carb idle RPM set too high -Excessively rich fuel-to-air ratio -Defective Limiter module -Defective ETC switch -Excessive throttle lever freeplay	-Adjust idle RPM to specifications -Properly adjust carb, clean air cleaner and precleaner -Replace the Limiter module -Dry out the switch with a penetrating oil to switch inside or replace switch -Adjust throttle lever freeplay to minimum specifications
No limit in reverse	-No 12V to green RSL wire -Black wire from Limiter module not connected to CDI module -Yellow or Yellow/Red wire from alternator not receiving an RPM signal -Override switch not closing -Defective limiter module	-Check and repair reverse light circuit -Repair black wire between limiter and CDI -Check wiring and alternator output -Check wiring or replace override switch -Replace module
Limits at wrong RPM	-Incorrect alternator output -Wrong limiter module for machine application -Defective limiter module	-Check wiring and alternator output -Check chart for proper application and replace module -Replace limiter module
No spark	-Defective limiter module	-Replace limiter module

Electric Demand 4 Drive Electrical Testing
(1989 - 1991, Except J Model, 1993 to Present Sportsman and 350L 6x6)

The 1989 and new 4x4 front hubs are electro-mechanical. If the system fails to perform as expected, it will first be necessary to determine whether the problem is electrical or mechanical and proceed to the appropriate section. To determine this, shift the machine to a forward gear, turn on the ignition and 4x4 switches and check for the 4x4 light on the light panel. If the light comes on, skip to the mechanical troubleshooting section. If the light fails to come on proceed with the following tests.

Remove the fuel tank cover and expose the circuit board.

With the multitester set on DCV, place the Red test lead on the board Red terminal and the Black lead on the board Brown terminal. Reading should be Battery Voltage.

→ No → Check circuit breaker, battery and battery ground.

↓ Yes

Turn ignition switch on and check between board Red/White and board Brown. Reading should be Battery Voltage.

→ No → Test ignition switch.

↓ Yes

Shift gear selector into either high or low forward and check between board Gray/White and board Brown. Reading should be Battery Voltage.

→ No → Test switches on shift selector.

↓ Yes

Turn Demand 4 Drive handlebar switch on and check voltage between board Gray and board Brown. Reading should be Battery Voltage.

NOTE: If Battery Voltage is present here, but 4x4 light does not come on, test bulb circuit.

→ No → Test Demand 4 Drive switch.

↓ Yes

Remove wheel coil wires from Gray and Brown board terminals. With multitester set on ohms, check coil resistance. Reading should be 28 Ohms for 1989 to 1994 models and 24 Ohms for 1995 models.

→ No → Check for wheel coil or wiring problem.

↓ Yes

If the coil resistance is normal, and there is Battery Voltage at the board Gray terminal, the problem can be assumed to be mechanical.

The coils are energized in forward gears through the switches on the shift selector. In reverse they are energized through the reverse override switch on the left handlebar.

With the machine in reverse (reverse light on), and the 4x4 switch depressed, does the 4x4 light come on?

No → If the coils passed the resistance test listed earlier, the reverse 4x4 electrics are functioning properly.

Yes ↓

Assuming there is 12V at the board Red/White, with the gear selector in reverse, read the voltage at the board Purple. Reading should be 12V.

Is it?

No → Make sure the transmission is in reverse and check reverse light switch and circuit.

Yes ↓

Depress reverse override button and check for voltage at board Gray/White. Reading should be 12V.

Is it?

No → Check reverse override switch.

Yes ↓

If the board Gray/White is energized with the button depressed, and the machine passed all the tests for 4x4 forward, the reverse system is functioning properly electrically.

Yes ↓

If the machine fails to function in 4 wheel drive after conducting these tests, a check should be made of the mechanical function of the wheel Hilliards.

1991 J and Later Electric Demand-4 Drive Electrical Troubleshooting Chart

Beginning with the 1991 J model all-wheel drive machines, the wheel coils will be energized when the Demand-4 Drive switch is turned on <u>and</u> the throttle flipper is opened. This system will de-energize the wheel coils every time the throttle is returned to the idle position. If the system fails to operate properly, proceed with the following chart to determine if the problem is electrical. **NOTE:** To obtain All Wheel Drive in REVERSE on the 1993 Sportsman, 1993 6x6 350, and all 1994 AWD models, the reverse override button must be pushed in addition to the AWD button.

Remove the fuel tank cover and expose the circuit board.

With an electrical multitester set on DC volts, place the Red tester lead on the circuit board Red terminal and the Black tester lead on the board Brown terminal. The reading should be 12 V or more. Is it?

→ No → Check the battery condition and state-of-charge, circuit breaker, ground and wires connecting the battery to the circuit board.

↓ Yes

Place the multitester Red lead on the circuit board Red/White terminal and the Black tester lead on the board Brown terminal. With the ignition switch off, the reading should be 0 volts and must read battery voltage with the switch on. Does it?

→ No → Check the ignition switch and its lead wires for proper terminal location. Repair, relocate or replace the switch as required.

↓ Yes

This step applies to 1991 J and 1992 models only: Place the multitester Red lead on the circuit board Gray/White terminal and the black tester lead on the board Brown terminal. Open and close the throttle flipper. With the throttle closed, the reading should be 0 volts and battery voltage with it open. Is it?

→ No → Check the ETC switch wires for proper board placement. Check continuity between the ETC switch Red/White and the Gray with a White tape wrap. This reading must be open at idle and closed off of idle. Repair or replace as necessary.

↓ Yes

Place the multitester Red lead on the circuit board Gray terminal and the Black lead on the board Brown terminal. Turn the Demand-4 Drive switch to the On position. With the throttle closed, the reading should be 0 volts and battery voltage with the throttle open. Is it?

→ No → Check the Demand-4 Drive switch wires for proper board placement. On 1991 J and 1992 models check continuity between the switch Gray and Gray/White wires. The reading should be an open circuit with the switch Off and less than .5 ohms with the switch On. Repair or replace if necessary.

↓ Yes

Remove the small Gray wheel coil wires from the circuit board. Measure the resistance between each of the Gray wires and the circuit board Brown terminal. The readings should be between 25 and 30 ohms. Measure the resistance between the Gray wire and the strut casting. This reading must be an open circuit. Is it?

→ No → Repair or replace the wheel coils as required. See the Demand-4 Drive section of Chapter 5 of this manual for coil replacement.

1991 J and Later Electric Demand-4 Drive Electrical Troubleshooting Chart (Cont'd)

If all of the electrical tests prove to be normal, it must be assumed that the problem with the system is not electrical. Proceed with mechanical service as described in Chapter 5 of this manual.

DEMAND-4 DRIVE 4x4 LIGHT TROUBLESHOOTING CHART

Check for voltage between the Red/White and Brown circuit board terminals, with the ignition switch On as previously described. The reading should be battery voltage. Is it?

Yes — 1993 to Present

No → Check the battery, circuit breaker, wiring and ignition switch as previously described. Repair or replace as necessary.

Yes

Place the red multitester lead on the Black/White circuit board terminal and the Black tester lead on the board Brown terminal. With the Demand-4 Drive switch On, the reading should be battery voltage. Is it?

No → Check the Demand-4 Drive switch wires for proper terminal board placement. Check the continuity between the switch Red/White and Black/White wires. Readings must be open with the switch off and closed with the switch on. Repair or replace as necessary.

Yes

Remove the light panel lens by flexing the lens upward in the middle with a small sharp knife. Remove the 4x4 light by slipping a small hose over the bulb and wiggling to pull the bulb from its socket. Check the voltage between the two bulb socket terminals. The reading should be battery voltage. Is it?

No → Check the wiring between the circuit board and the 4x4 light socket. Repair or replace as necessary.

Yes

Check the bulb. Replace as required.

1993 to Present: Remove the throttle block switch, check for voltage to switch, check bulb condition. Replace switch or bulb as needed.

Reverse Speed Limiter Operation, 1985 - 1987 Scrambler, Trail Boss, Trail Boss 4x4

When the transmission is shifted to reverse, the reverse light switch completes a circuit from the battery through the key switch and into the green wire of the reverse speed limiter module, which is located under the splash guard near the front of the fuel tank. Current also flows through the reverse light bulb and to the ground.

The applied voltage from the battery and alternator to the speed limiter module allows the reverse limiter to ground out the ignition kill wire when a predetermined voltage or signal is applied to the module from the yellow alternator wire. This signal from the alternator will interrupt the ignition by grounding out the black kill wire. The signal to ground out the ignition occurs at approximately 3200 RPM.

When the override switch circuit is opened by depressing the button on the handlebar, the module relies on the alternator voltage signal only. The ignition will now be interrupted at approximately 4800 RPM.

If the override switch is depressed or disconnected, the signal from the alternator will interrupt the ignition at 4800 RPM with the machine in reverse *or forward.* The condition of the reverse light bulb and connections must be good. If not, the engine will be limited to 4800 RPM in reverse *and forward.*

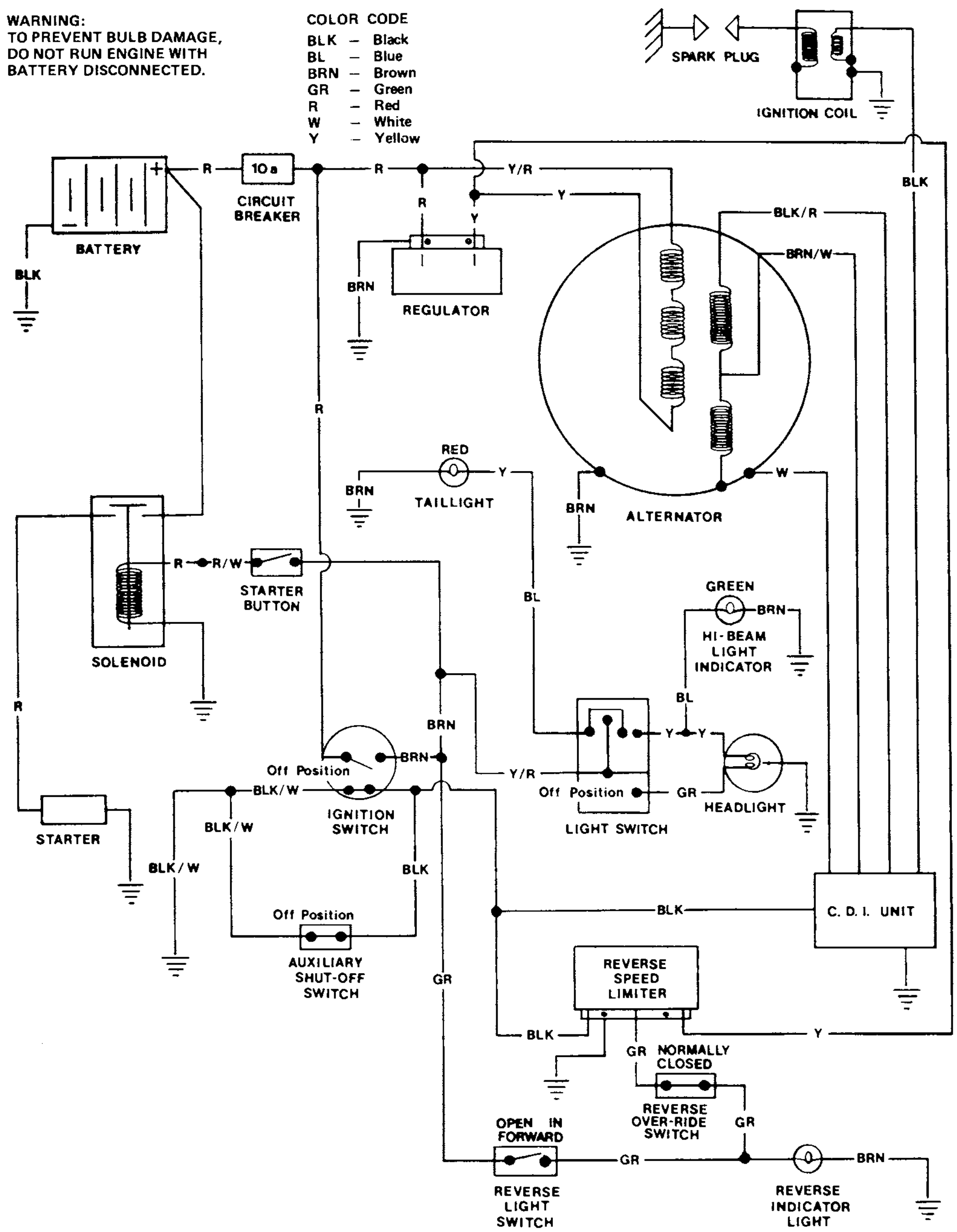
Reverse Speed Limiter Operation, 1987 Cyclone

When the transmission is shifted to reverse, the reverse light switch completes a circuit from the alternator output wire through the reverse override switch and into the reverse speed limiter module. Current also flows through the reverse light bulb and to ground.

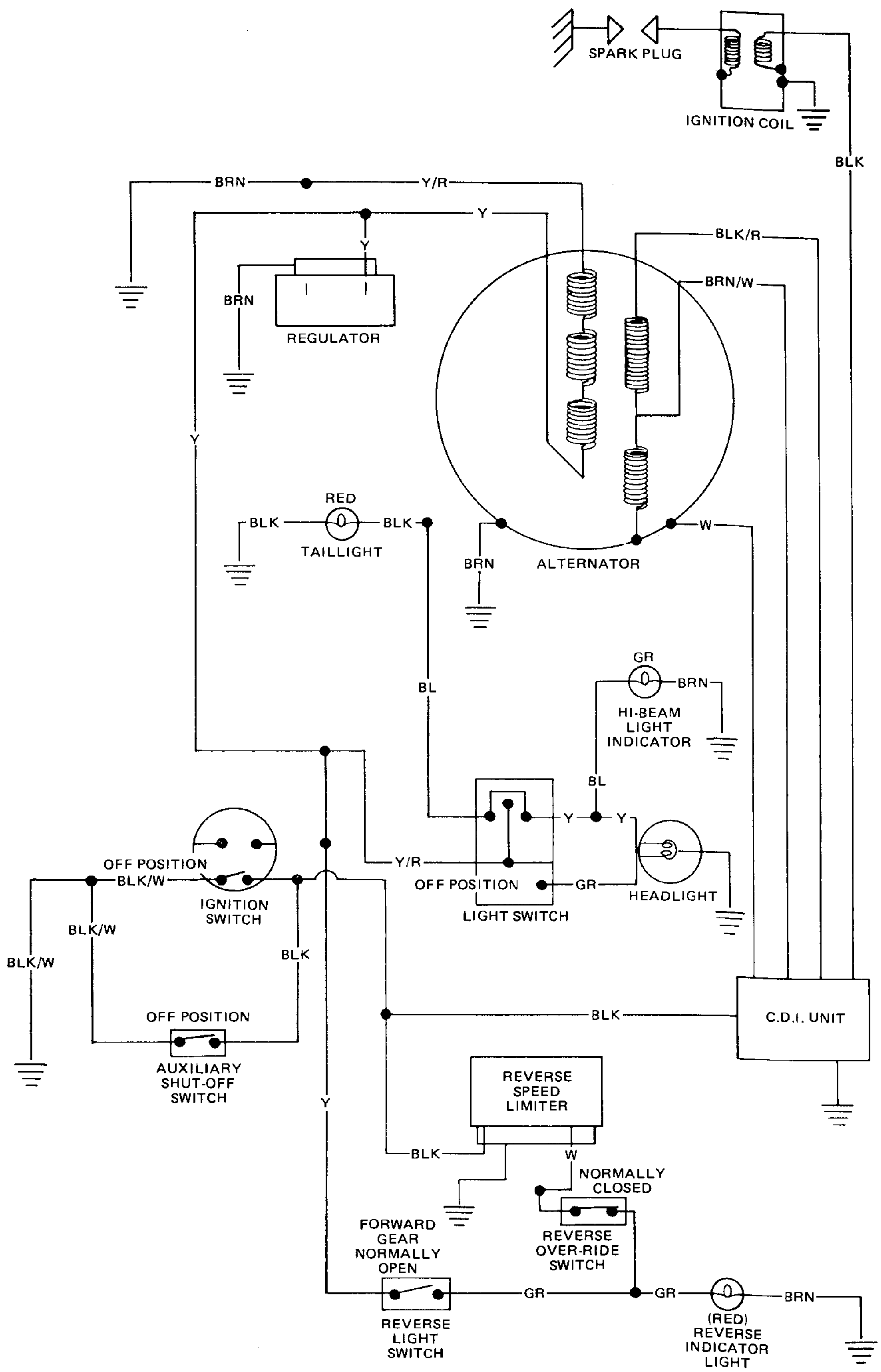
The voltage from the alternator to the speed limiter module allows the reverse limiter to ground out the ignition kill wire as a predetermined voltage or signal is applied to the module from the alternator. This signal from the alternator will interrupt the ignition at approximately 4600 RPM.

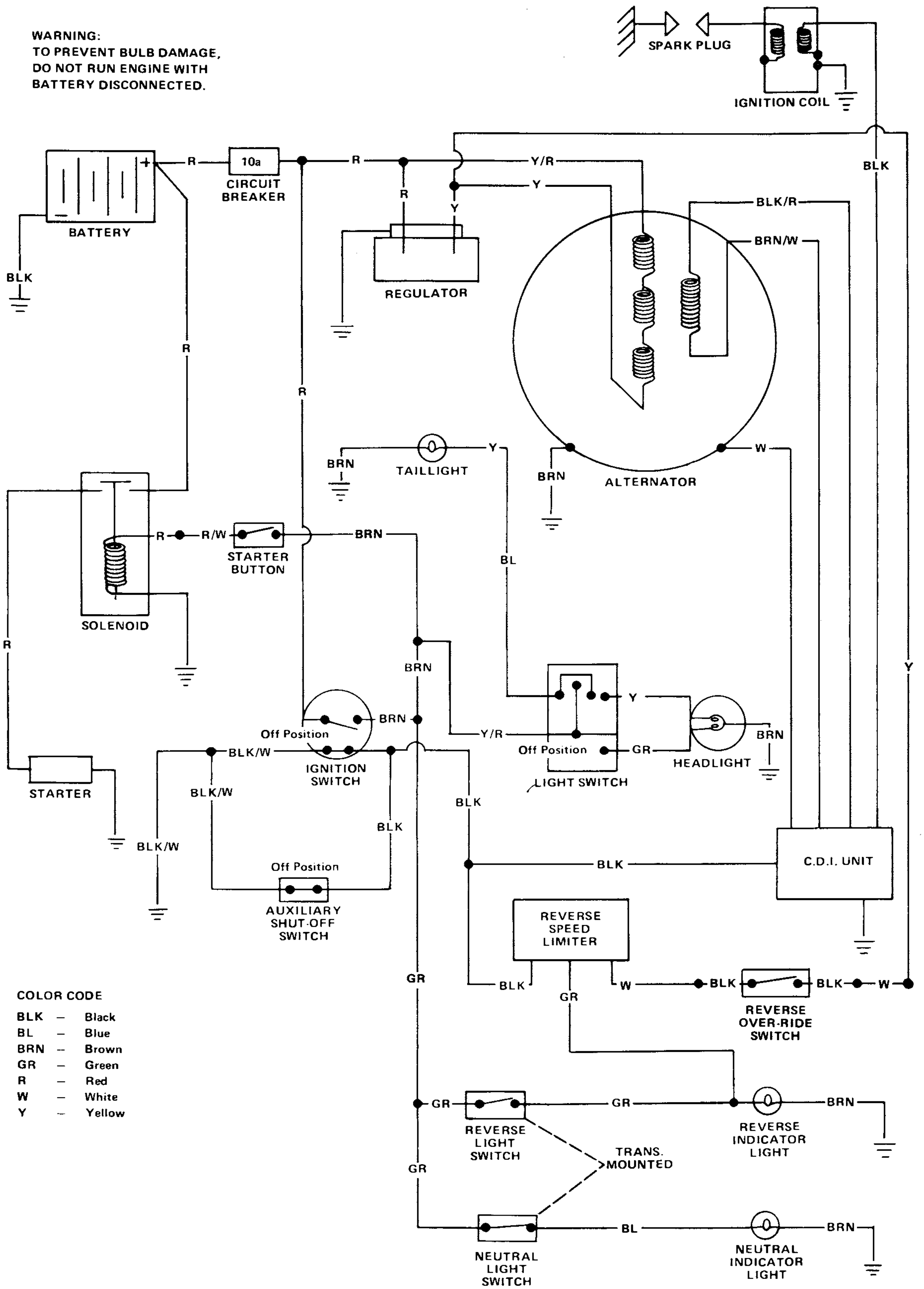
When the override switch circuit is opened by depressing the button on the handlebar, the module will not receive this signal and RPM will not be limited in reverse.

1985 - 1986 - 1987 - Scrambler, Trail Boss, Trail Boss 4x4 - Wiring Schematic

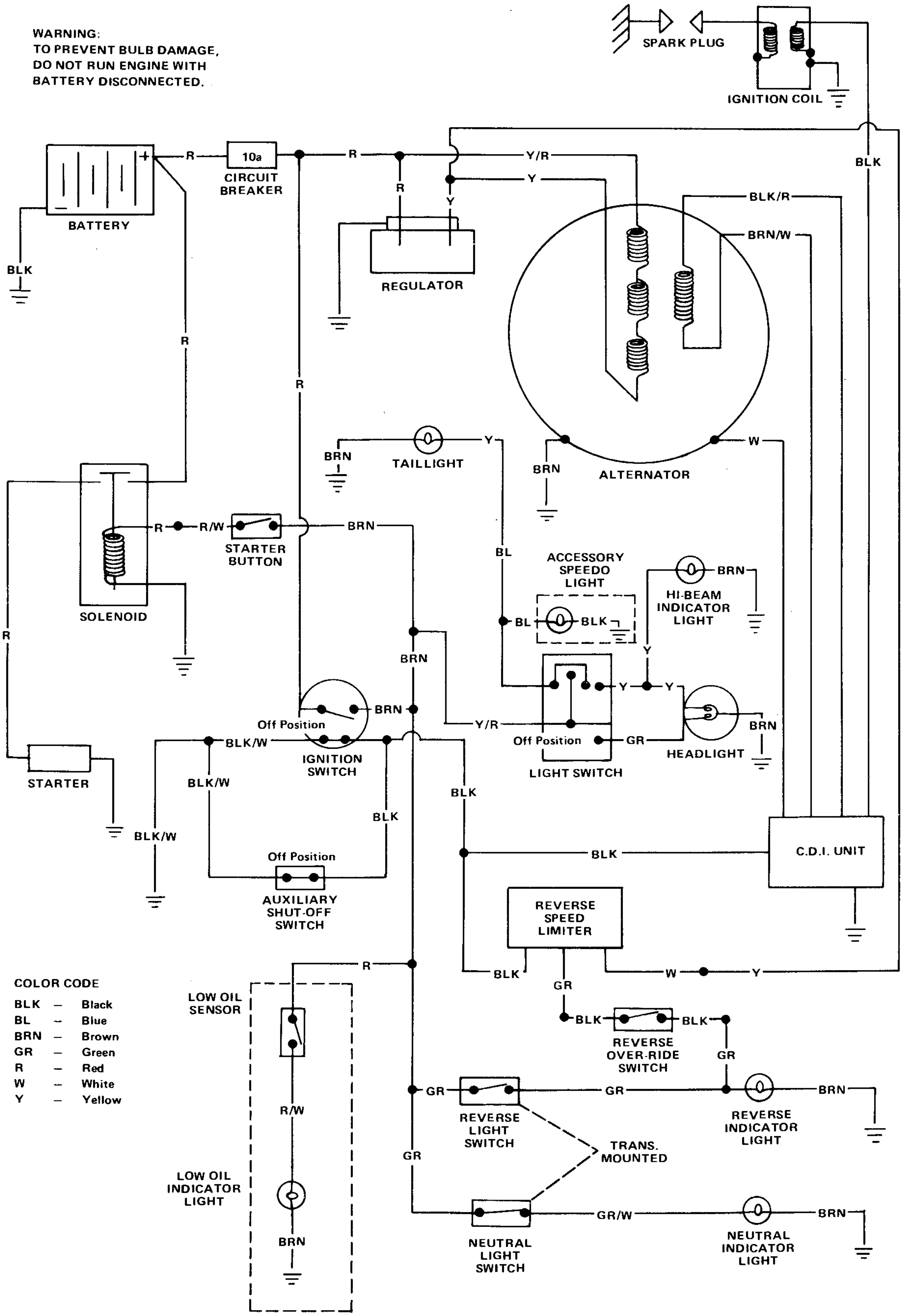


Wiring Schematic - 1987 Cyclone

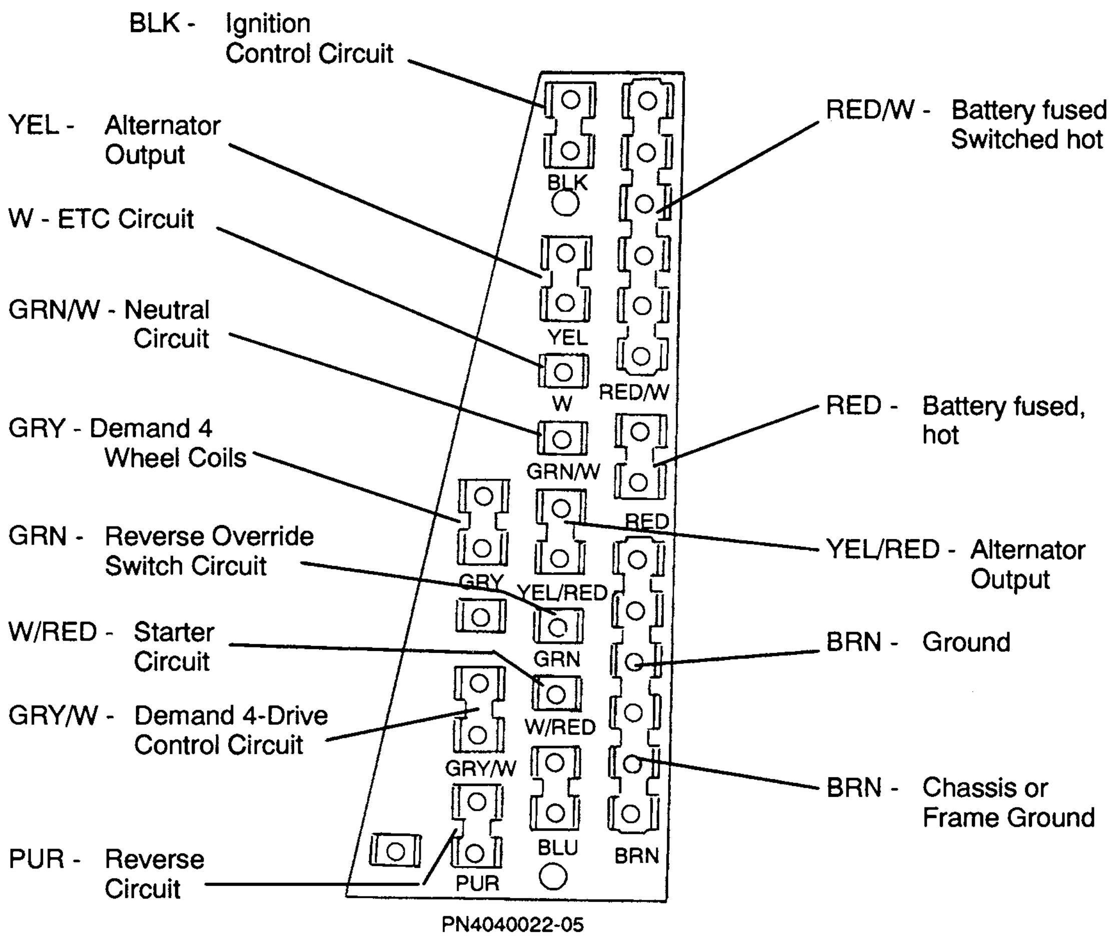



WARNING:
TO PREVENT BULB DAMAGE,
DO NOT RUN ENGINE WITH
BATTERY DISCONNECTED.
SPARK PLUG
IGNITION COIL
BATTERY
10a
CIRCUIT BREAKER
REGULATOR
ALTERNATOR
TAILLIGHT
SOLENOID
STARTER BUTTON
STARTER
IGNITION SWITCH
Off Position
AUXILIARY SHUT-OFF SWITCH
LIGHT SWITCH
HEADLIGHT
C.D.I. UNIT
REVERSE SPEED LIMITER
REVERSE OVER-RIDE SWITCH
REVERSE LIGHT SWITCH
TRANS. MOUNTED
REVERSE INDICATOR LIGHT
NEUTRAL LIGHT SWITCH
NEUTRAL INDICATOR LIGHT
R
R/W
Y/R
Y
BLK
BLK/R
BRN/W
BRN
BL
W
GR
BLK/W
COLOR CODE
BLK – Black
BL – Blue
BRN – Brown
GR – Green
R – Red
W – White
Y – Yellow

Wiring Schematic - 1988 Trail Boss 250 R/ES



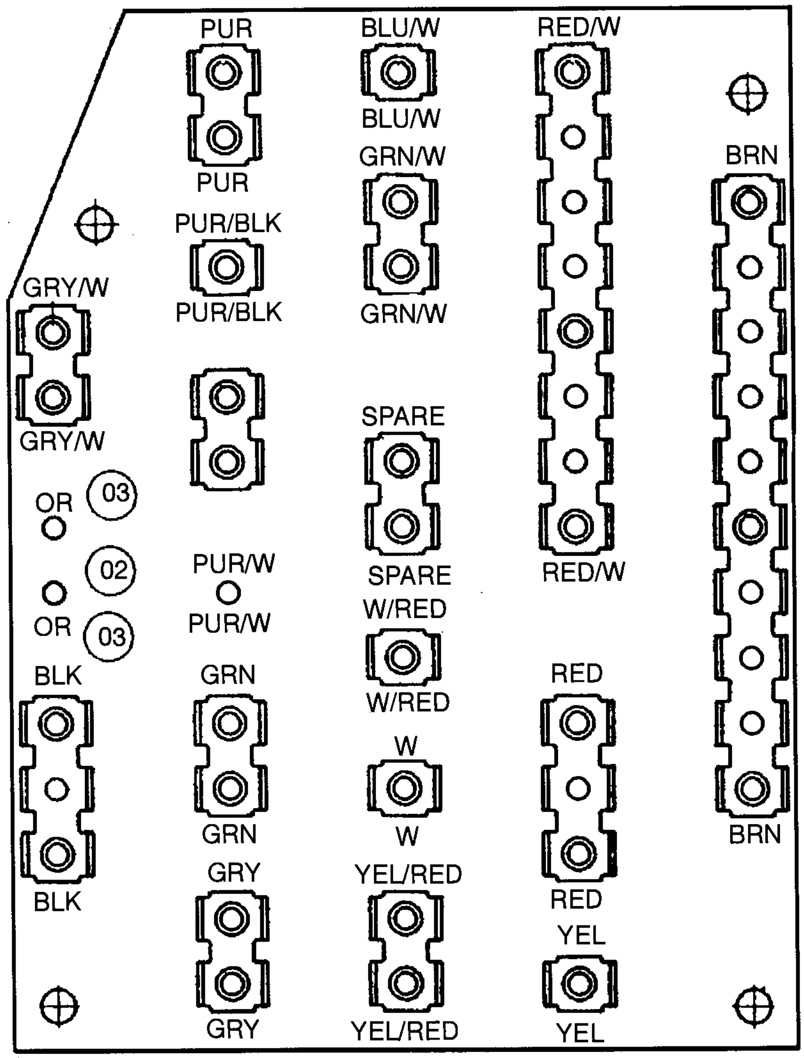
The 1989 and newer machines incorporate a circuit board junction panel on the left side of the steering support bulkhead. In addition, some of the wire color coding has been changed to allow more consistency throughout the machine. Shown is a drawing of the circuit board, listing of the wire colors and what that color wire does in the system. Most electrical troubleshooting can easily be performed at the circuit board.



CIRCUIT BOARD CODES

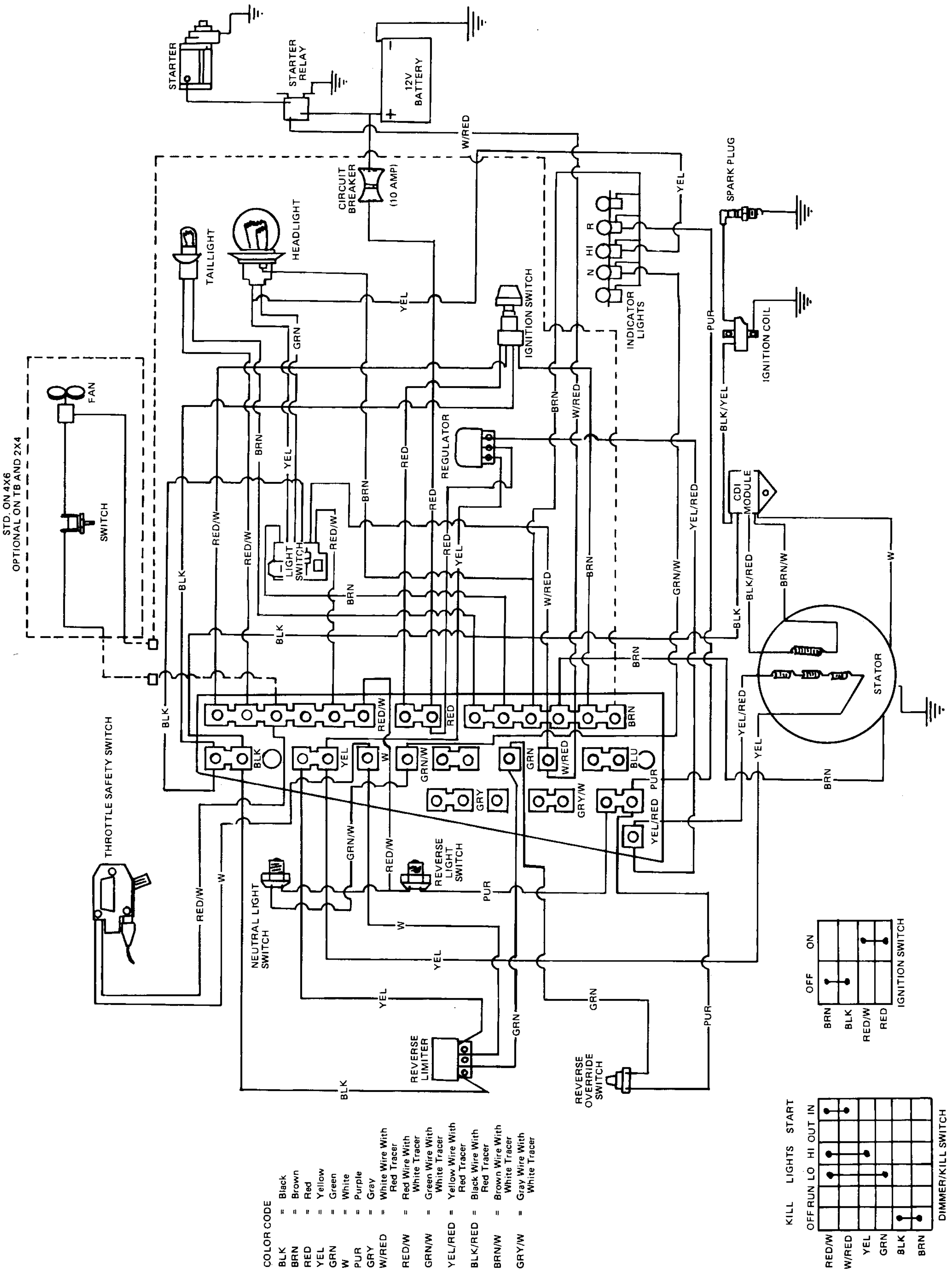
ELECTRICAL
Circuit Board And Wire Color Coding

The circuit board on the 1995 Scrambler and Xplorer models is located behind the front panel.

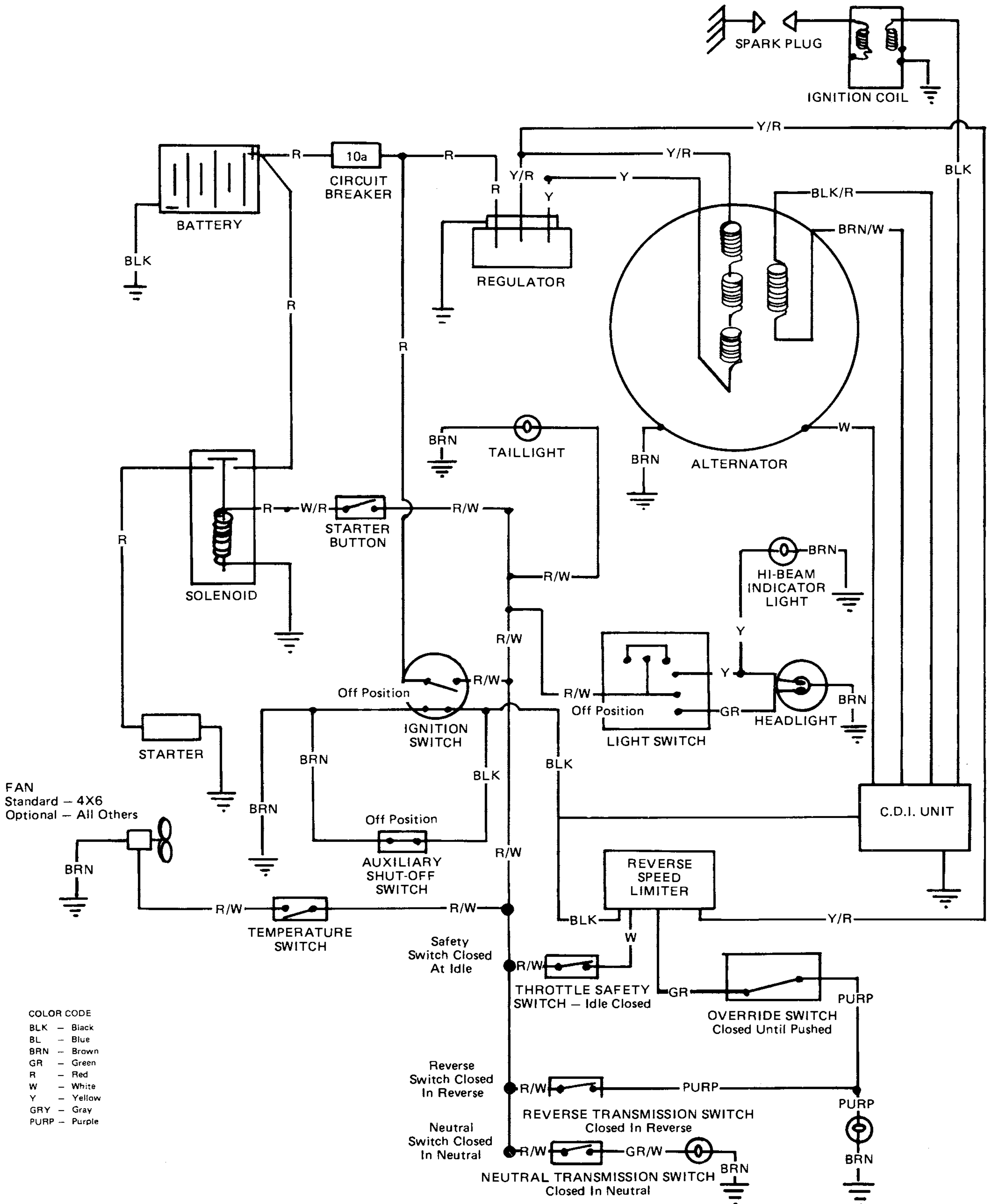


CIRCUIT BOARD CODES -
Scrambler and Xplorer

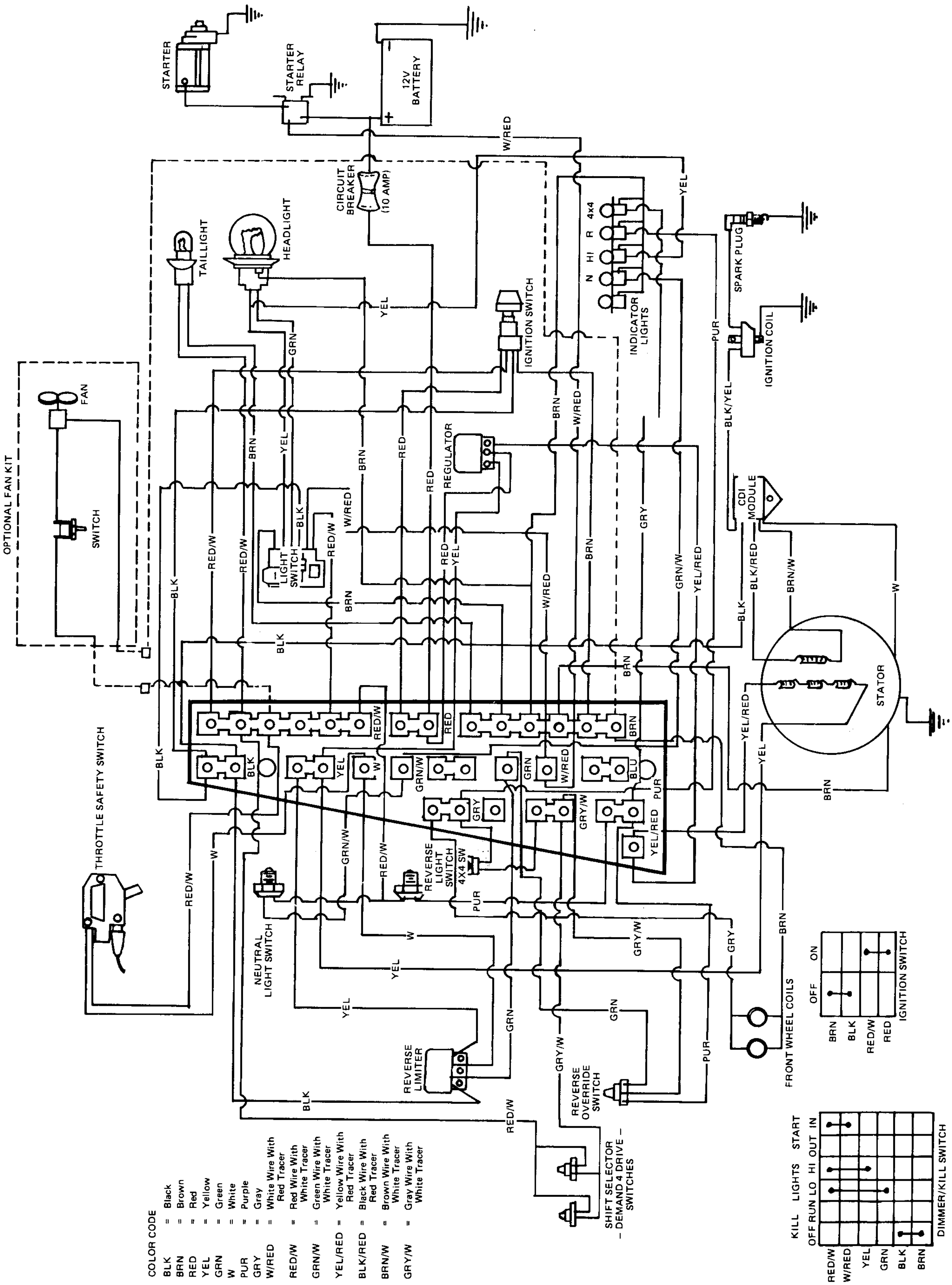
ELECTRICAL
Wiring Diagram - 1989 Trail Boss, Trail Boss 2x4, Big Boss 4x6

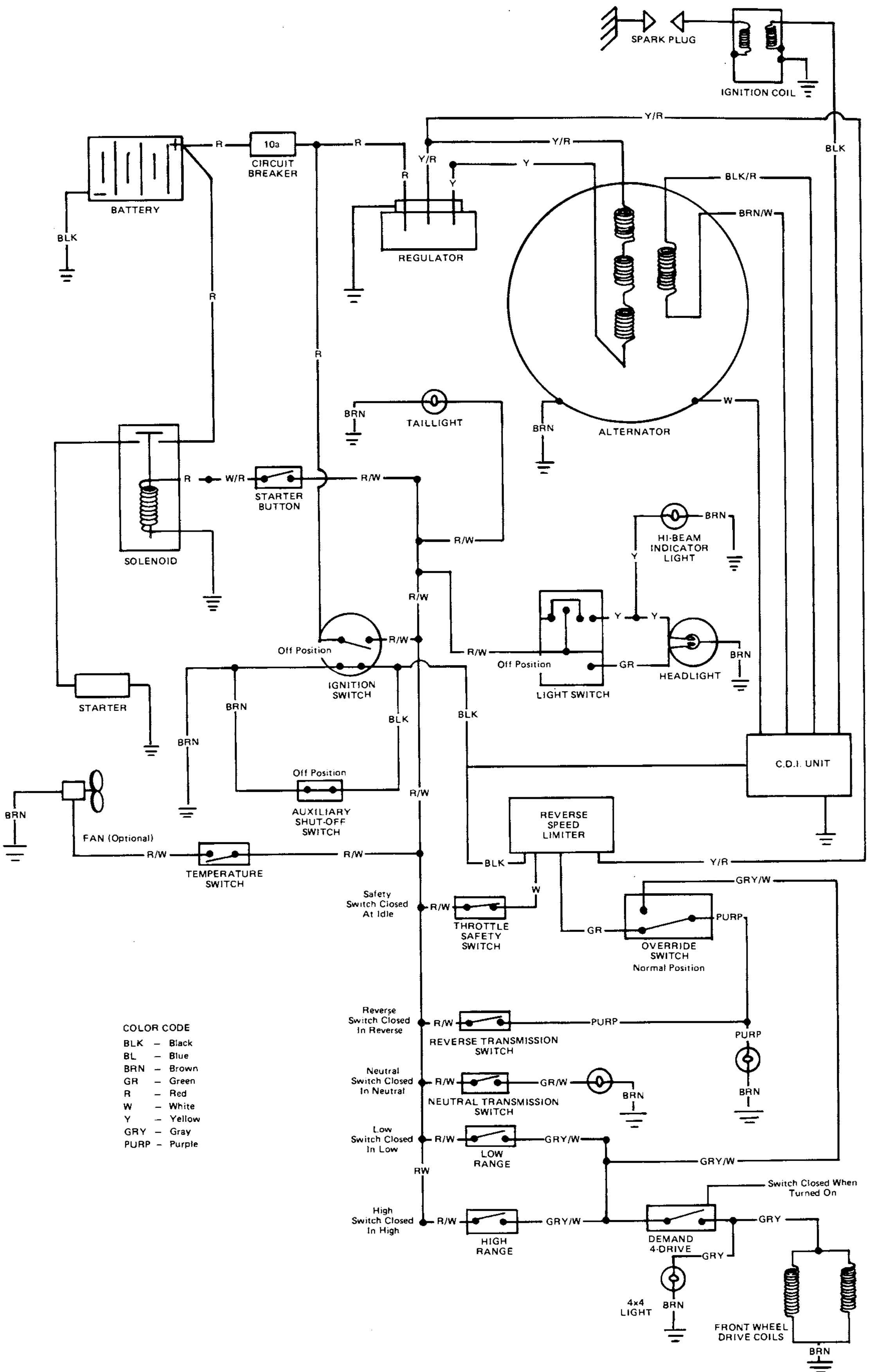


1989 Trail Boss, Trail Boss 2x4, Big Boss 4x6 - Wiring Schematic



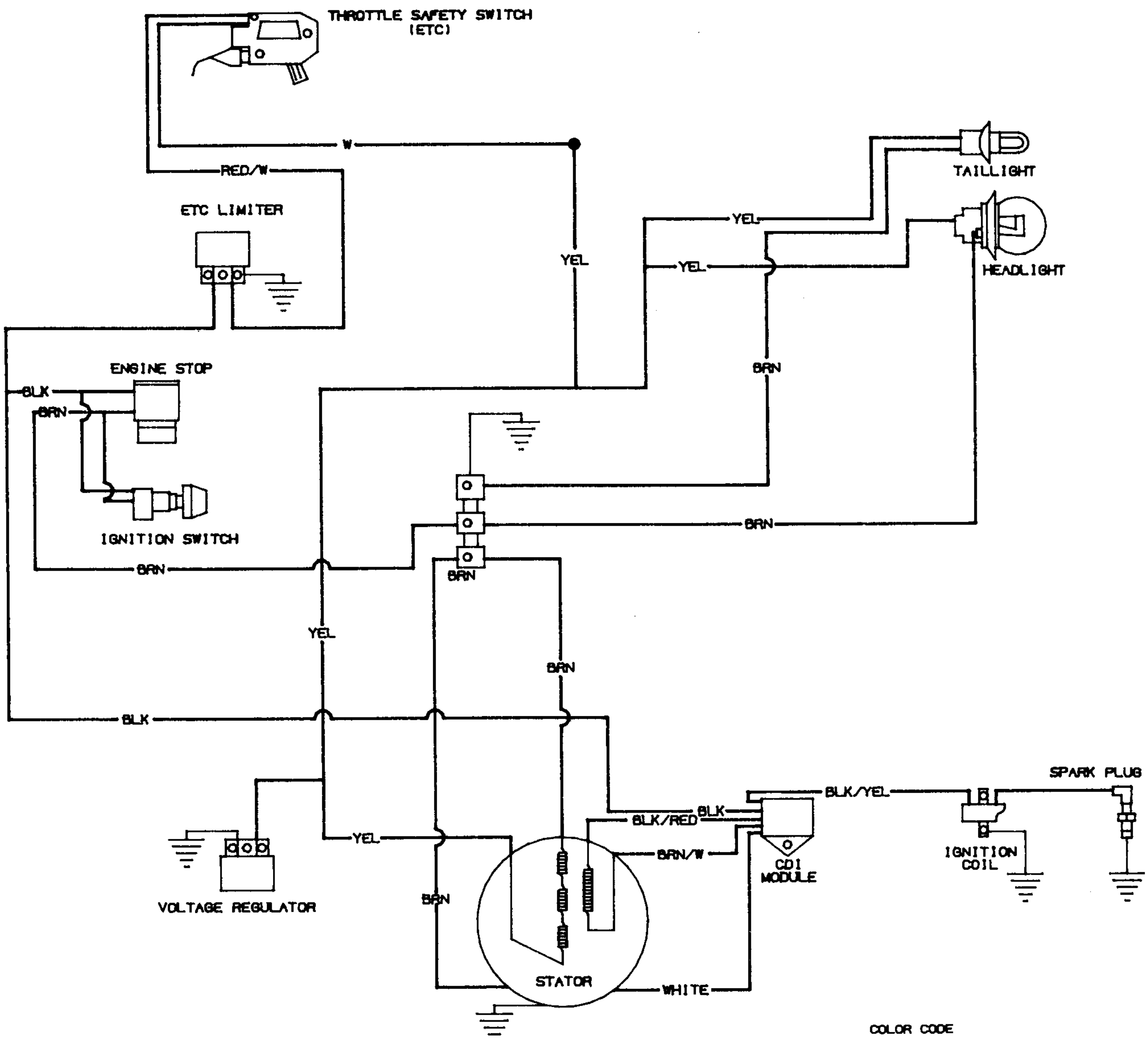
Wiring Diagram - 1989 Trail Boss 4x4

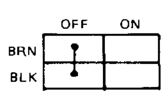




SPARK PLUG
IGNITION COIL
Y/R
BLK
R
10a
CIRCUIT BREAKER
BATTERY
REGULATOR
Y
BLK/R
BRN/W
ALTERNATOR
W
BRN
TAILLIGHT
SOLENOID
W/R
STARTER BUTTON
R/W
HI-BEAM INDICATOR LIGHT
Off Position
IGNITION SWITCH
LIGHT SWITCH
GR
HEADLIGHT
STARTER
C.D.I. UNIT
AUXILIARY SHUT-OFF SWITCH
FAN (Optional)
TEMPERATURE SWITCH
REVERSE SPEED LIMITER
GRY/W
Safety Switch Closed At Idle
THROTTLE SAFETY SWITCH
PURP
OVERRIDE SWITCH
Normal Position
Reverse Switch Closed In Reverse
REVERSE TRANSMISSION SWITCH
Neutral Switch Closed In Neutral
NEUTRAL TRANSMISSION SWITCH
GR/W
Low Switch Closed In Low
LOW RANGE
RW
High Switch Closed In High
HIGH RANGE
Switch Closed When Turned On
DEMAND 4-DRIVE
GRY
4x4 LIGHT
FRONT WHEEL DRIVE COILS
COLOR CODE
BLK – Black
BL – Blue
BRN – Brown
GR – Green
R – Red
W – White
Y – Yellow
GRY – Gray
PURP – Purple

Wiring Diagram - 1990 Trail Blazer

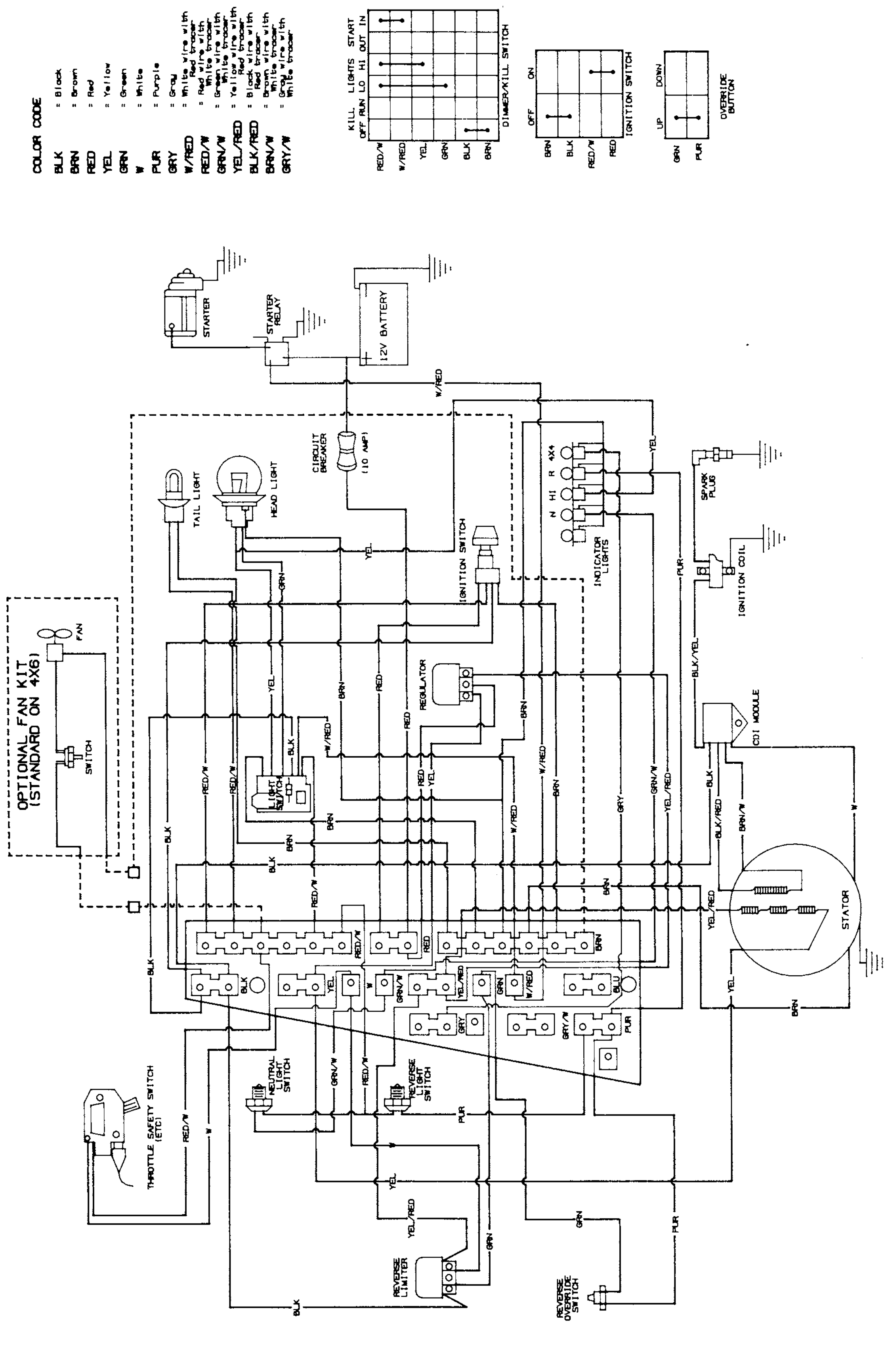




IGNITION AND ENGINE STOP SWITCHES

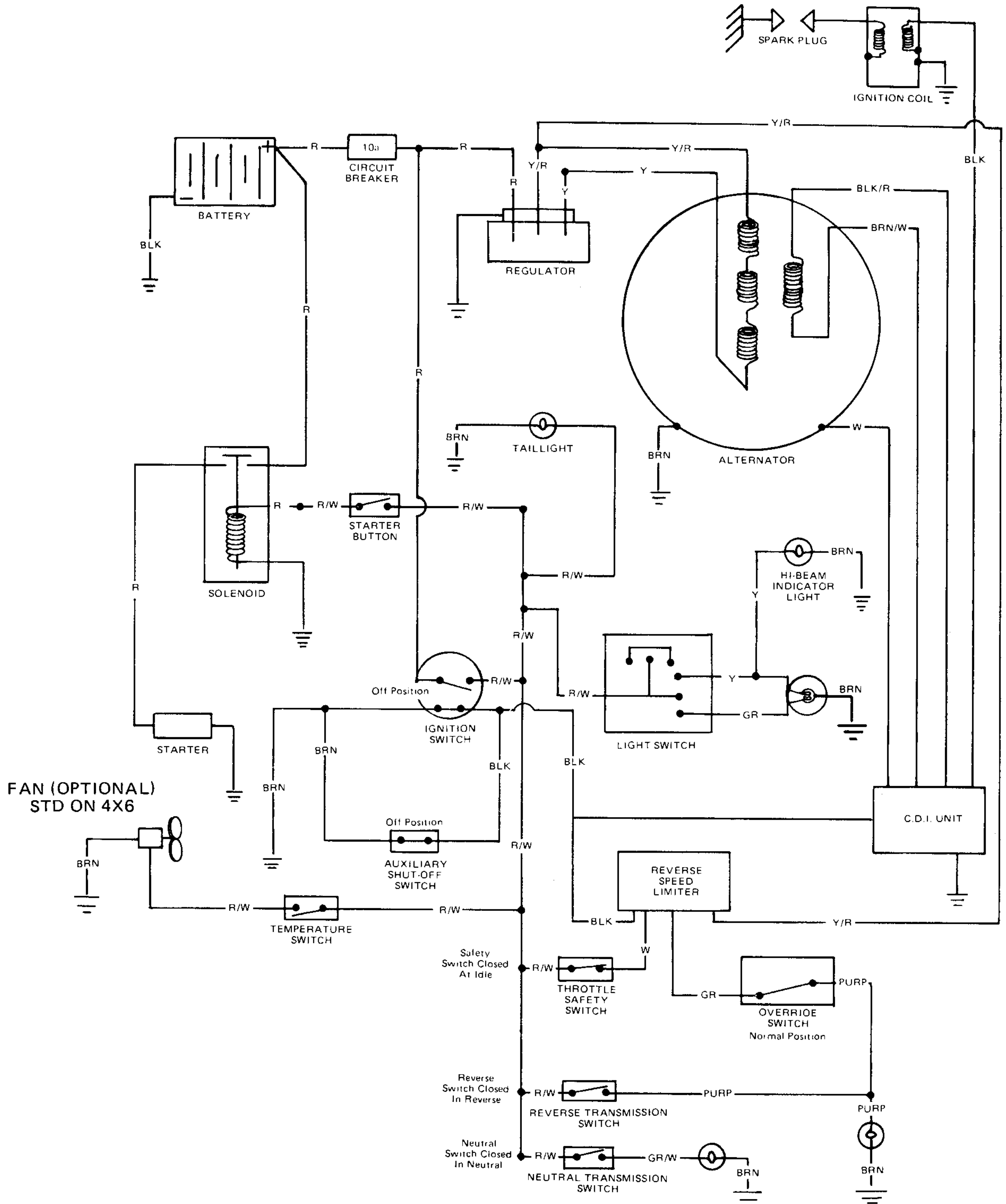
COLOR CODE

BLK	= Black
BRN	= Brown
RED	= Red
YEL	= Yellow
GRN	= Green
W	= White
PUR	= Purple
GRY	= Gray
W/RED	= White wire with Red tracer
RED/W	= Red wire with White tracer
GRN/W	= Green wire with White tracer
YEL/RED	= Yellow wire with Red tracer
BLK/RED	= Black wire with Red tracer
BRN/W	= Brown wire with White tracer
GRY/W	= Gray wire with White tracer

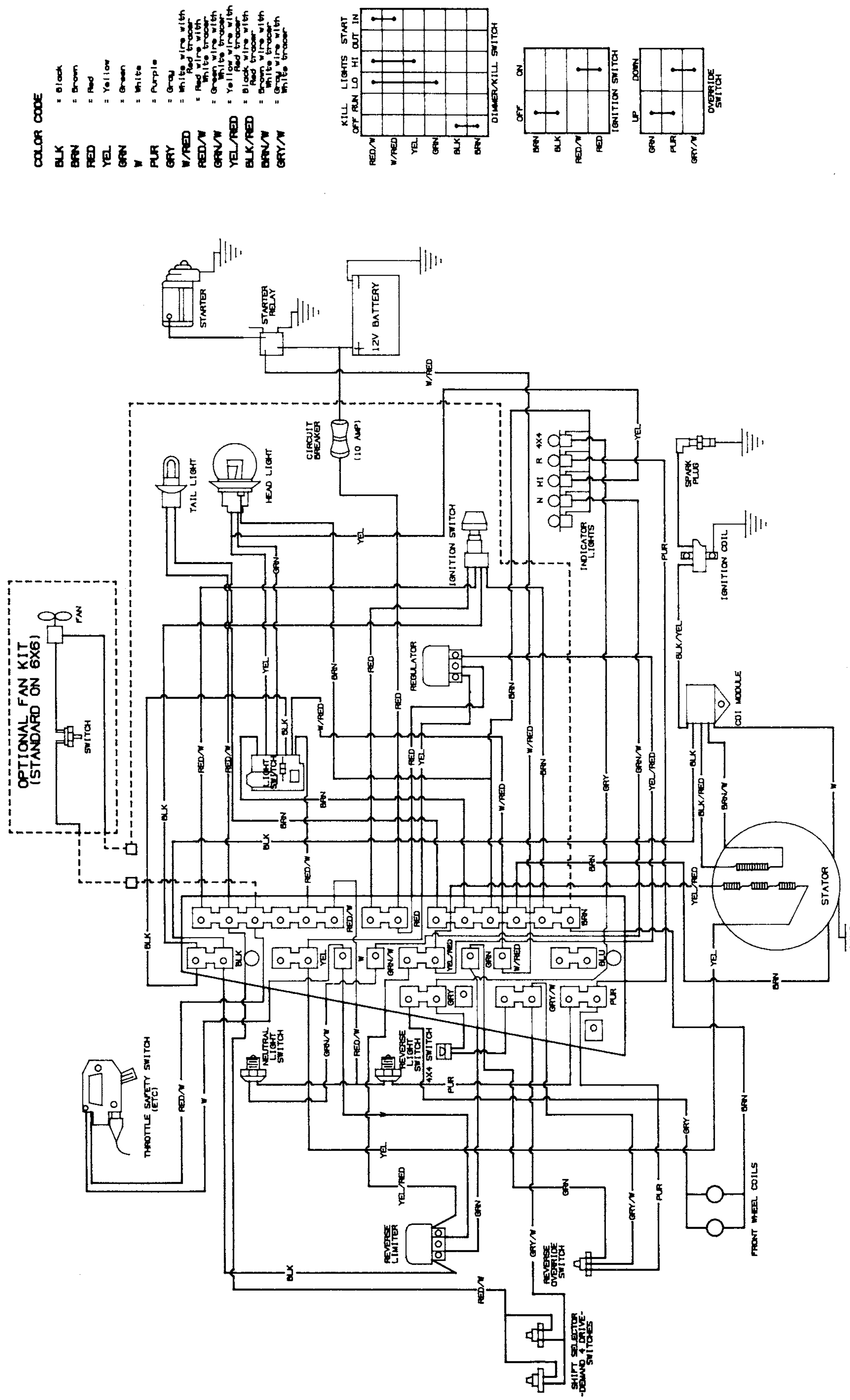


COLOR CODE
BLK : Black
BRN : Brown
RED : Red
YEL : Yellow
GRN : Green
W : White
PUR : Purple
GRY : Gray
W/RED : White wire with Red tracer
RED/W : Red wire with White tracer
GRN/W : Green wire with White tracer
YEL/RED : Yellow wire with Red tracer
BLK/RED : Black wire with Red tracer
BRN/W : Brown wire with White tracer
GRY/W : Gray wire with White tracer
KILL OFF RUN
LIGHTS LO HI
START OUT IN
DIMMER/KILL SWITCH
OFF ON
IGNITION SWITCH
UP DOWN
OVERRIDE BUTTON
STARTER
STARTER RELAY
12V BATTERY
CIRCUIT BREAKER (10 AMP)
TAIL LIGHT
HEAD LIGHT
IGNITION SWITCH
N HI R 4X4
INDICATOR LIGHTS
SPARK PLUG
IGNITION COIL
OPTIONAL FAN KIT (STANDARD ON 4X6)
FAN
SWITCH
REGULATOR
LIGHT SWITCH
CDI MODULE
STATOR
NEUTRAL LIGHT SWITCH
REVERSE LIGHT SWITCH
THROTTLE SAFETY SWITCH (ETC)
REVERSE LIMITER
REVERSE OVERRIDE SWITCH

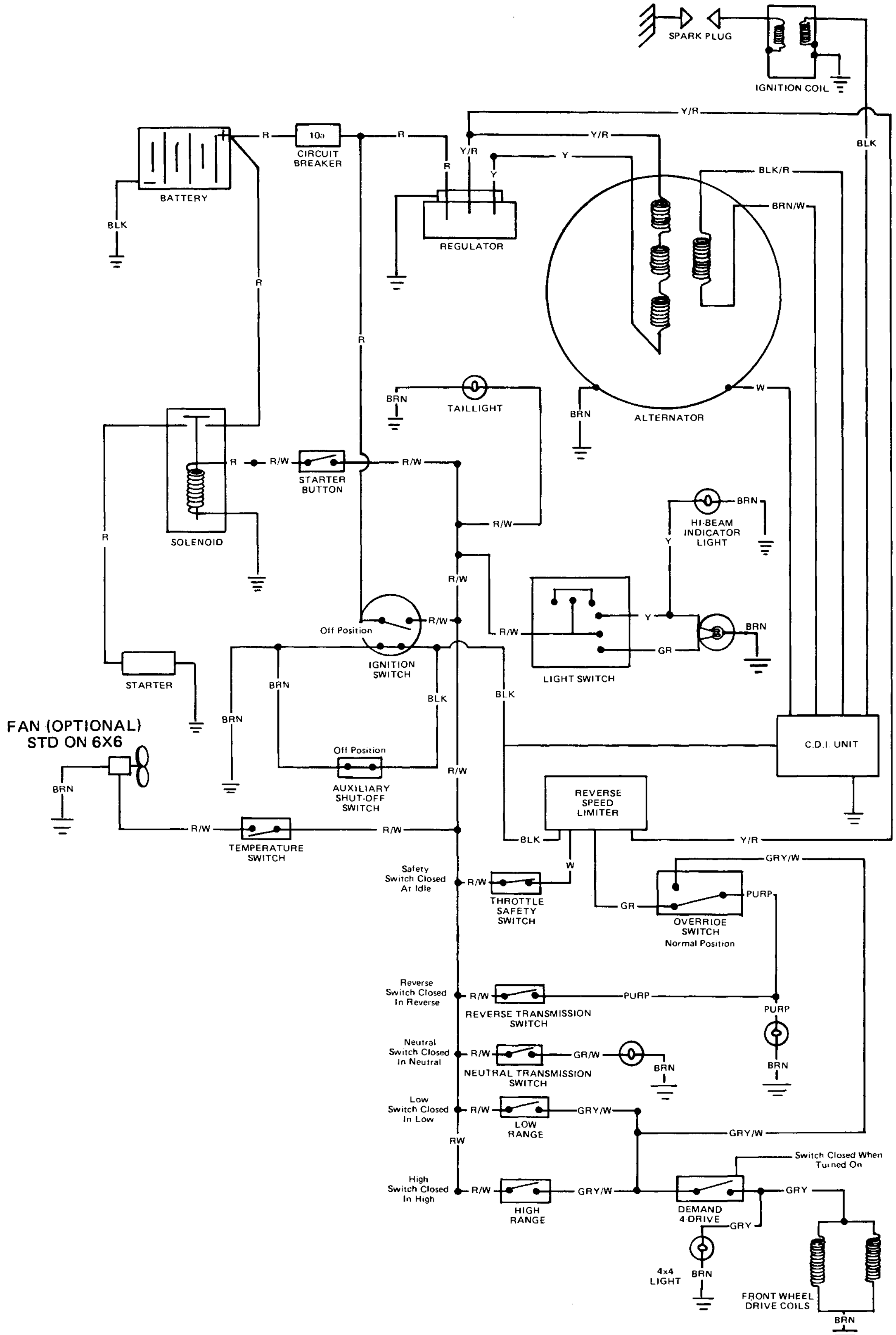
Wiring Schematic - 1990, 1991 Trail Boss, 2x4, 4x6



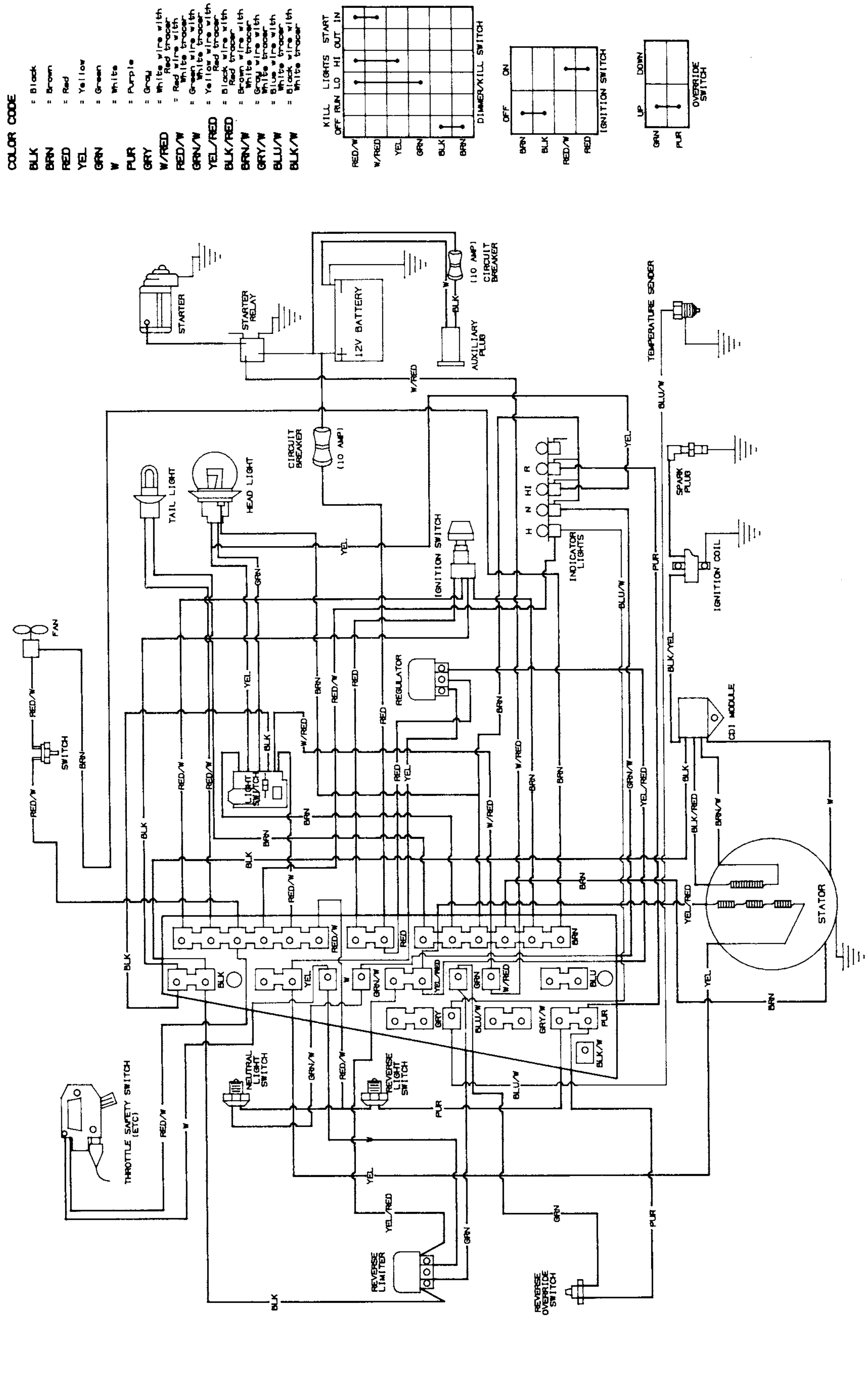
1990, 1991 Trail Boss 4x4 (Except J Model), 1991 Big Boss 6x6 - Wiring Diagram



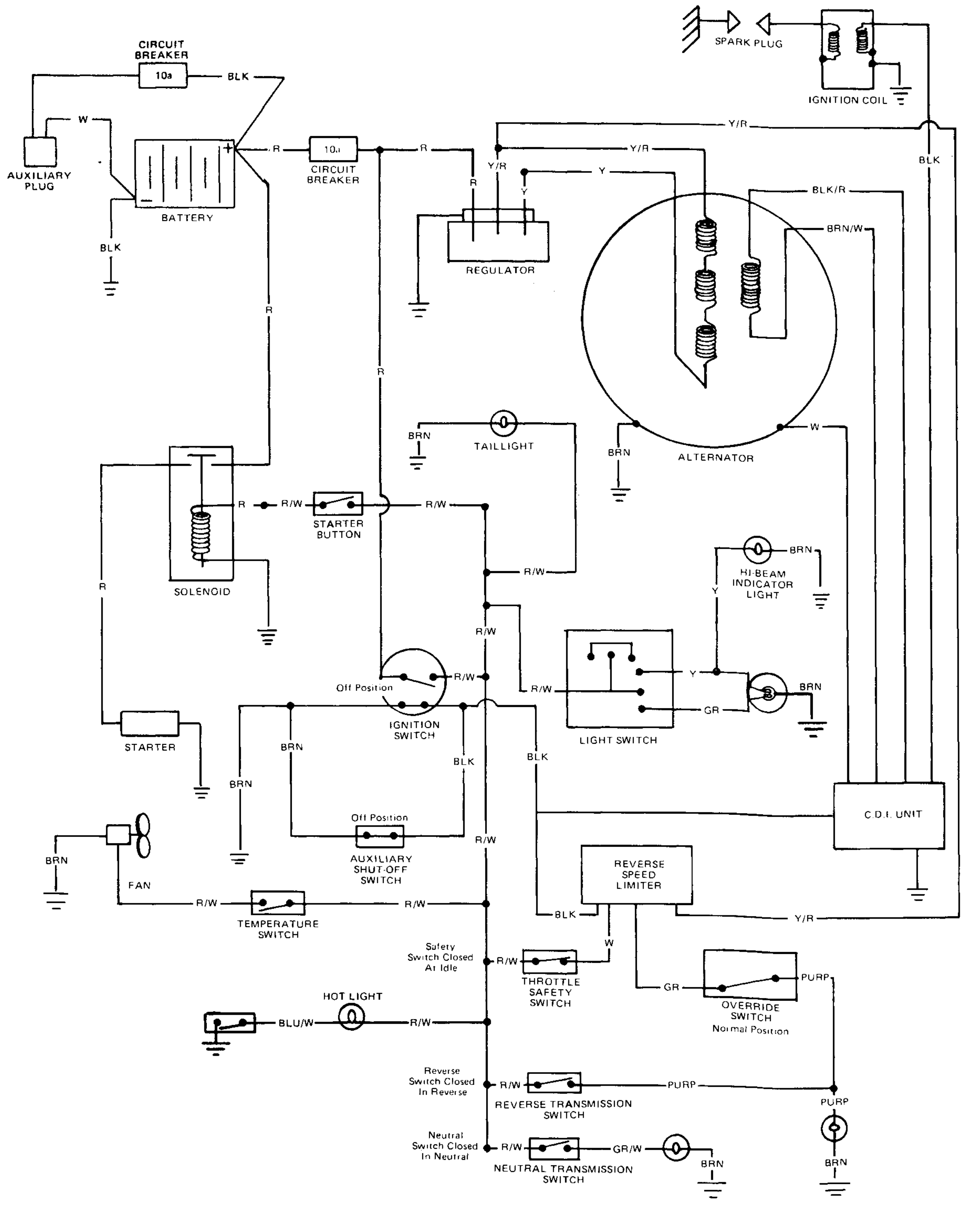
Wiring Schematic - 1990-91 Trail Boss 4x4 (Except 1991 J Model) 1991 Big Boss 6x6



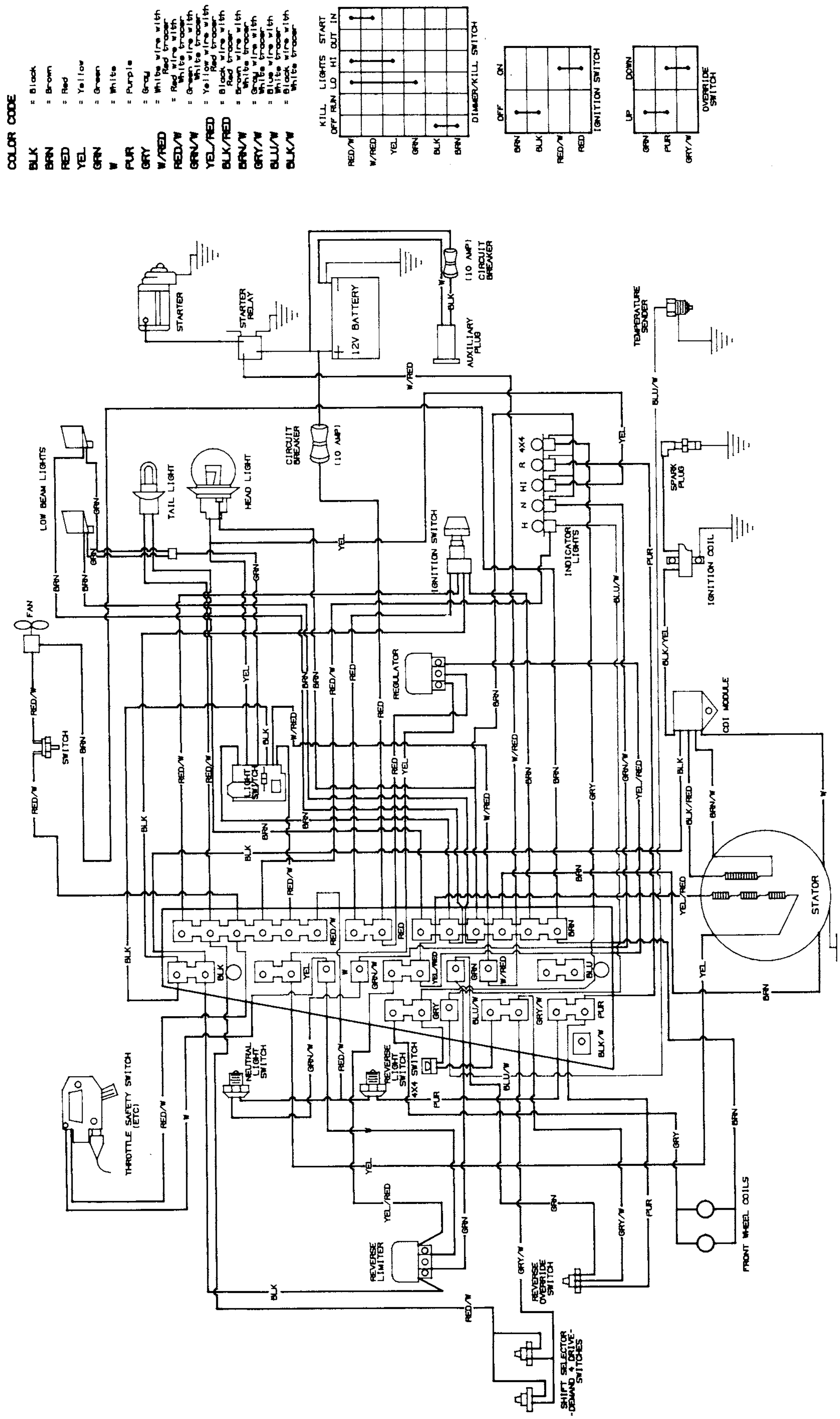
1990, 1991 Trail Boss 2x4-350L - Wiring Diagram



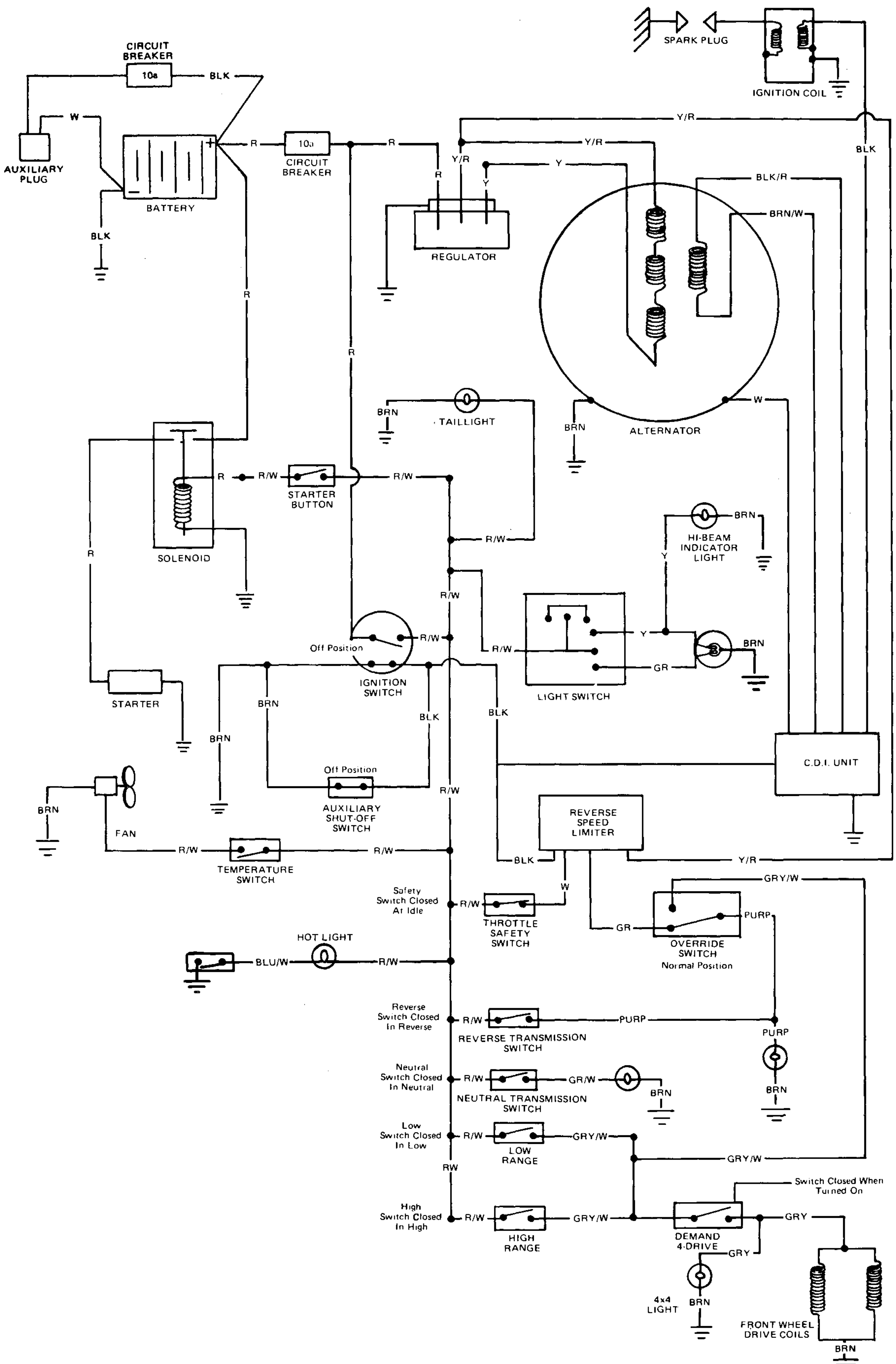
Wiring Schematic - 1990, 1991 350L 2x4



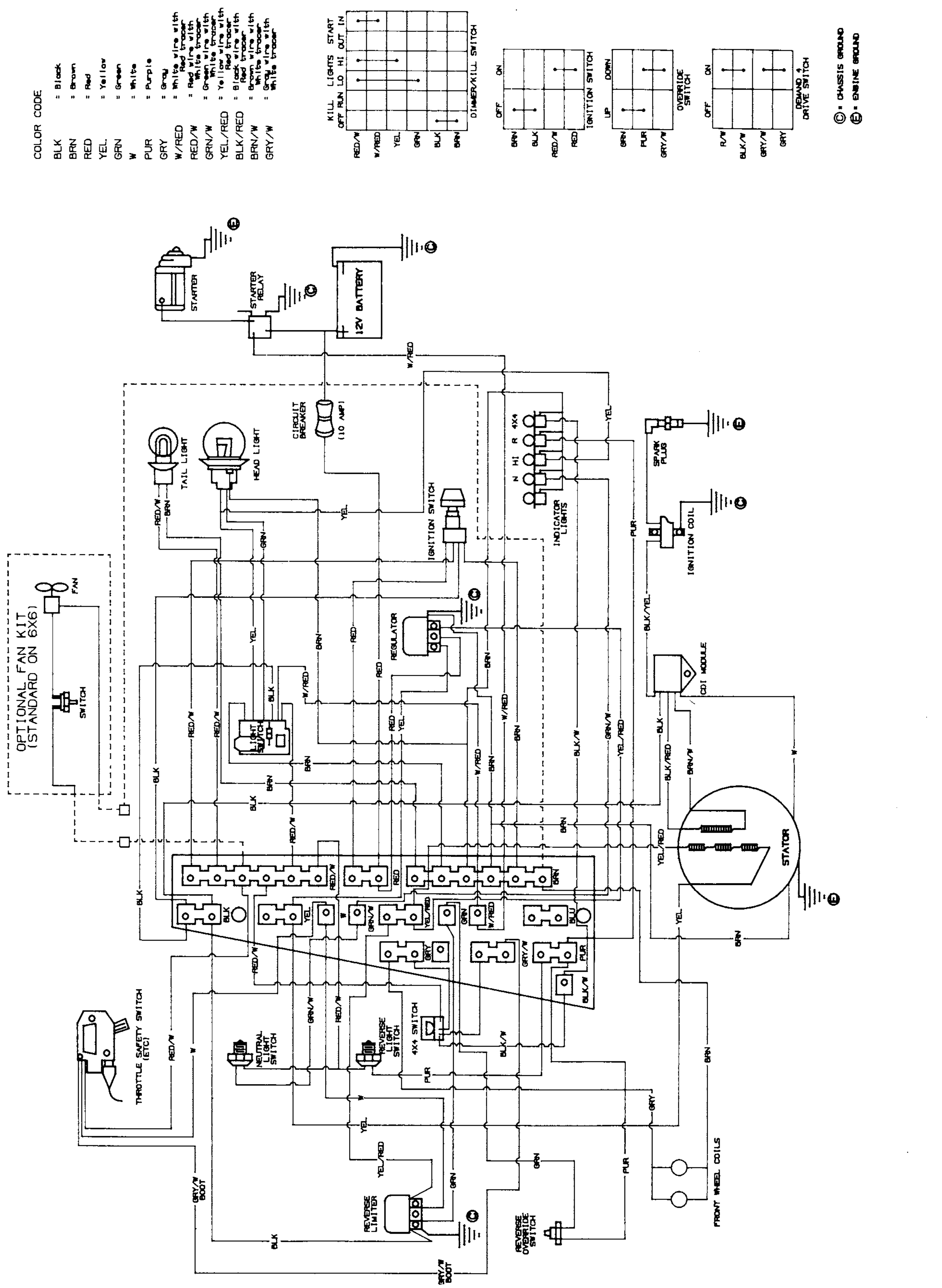
1990, 1991 Trail Boss 4x4-350L (Except 1991 J Model) - Wiring Diagram



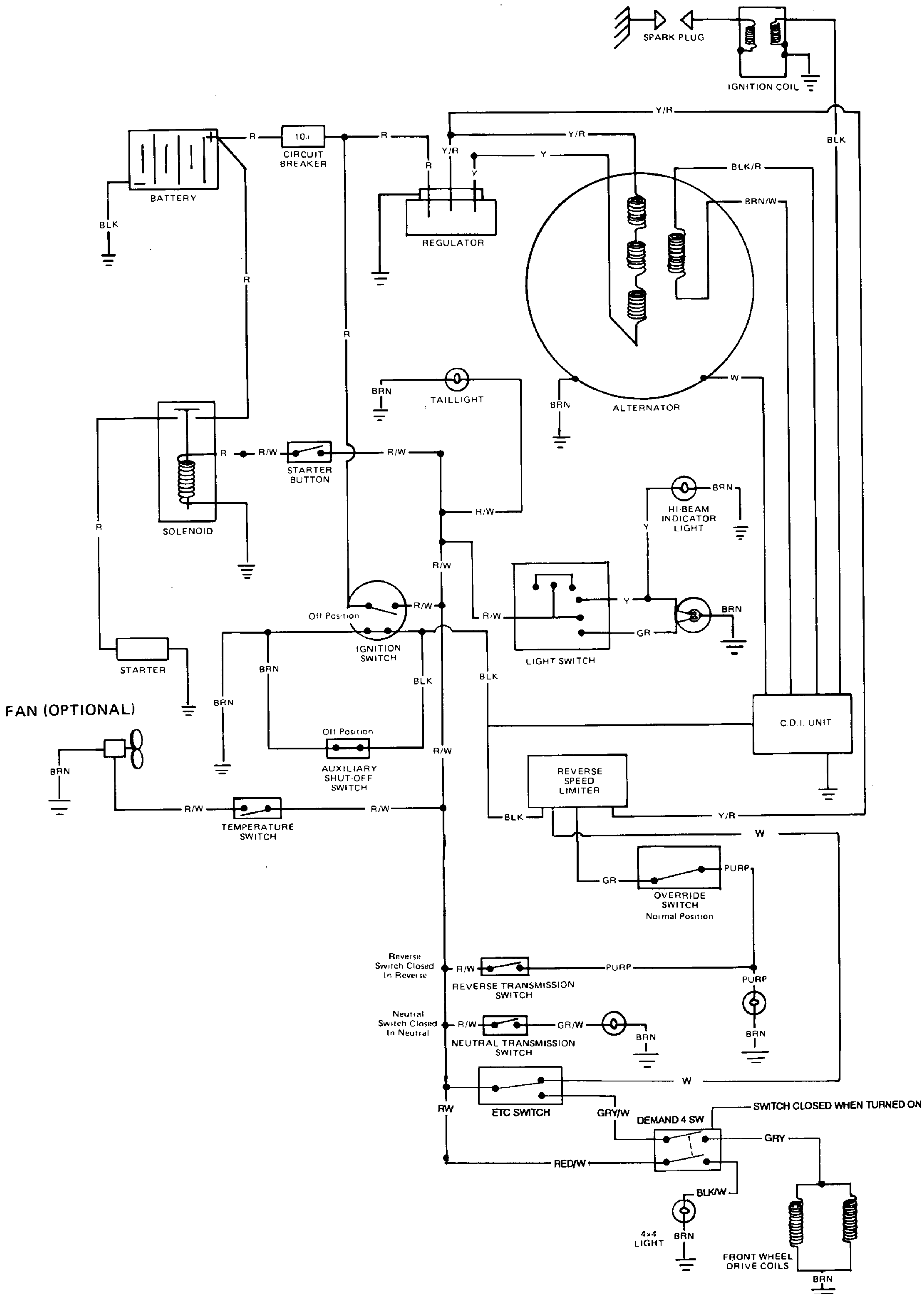
Wiring Schematic - 1990, 1991 350L 4x4 (Except 1991 J Model)



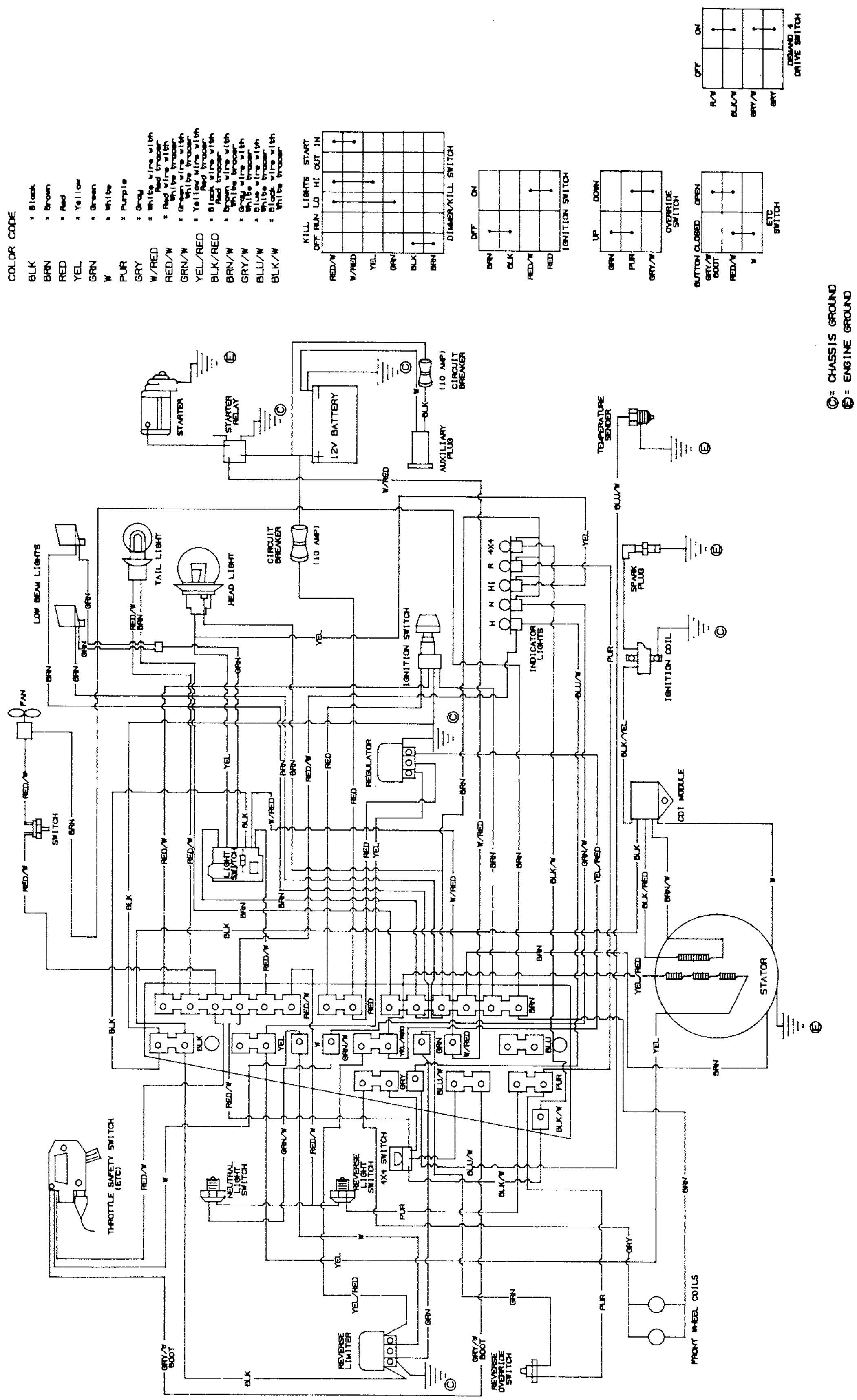
1991 Trail Boss 250 4x4 (J Model) - Wiring Diagram



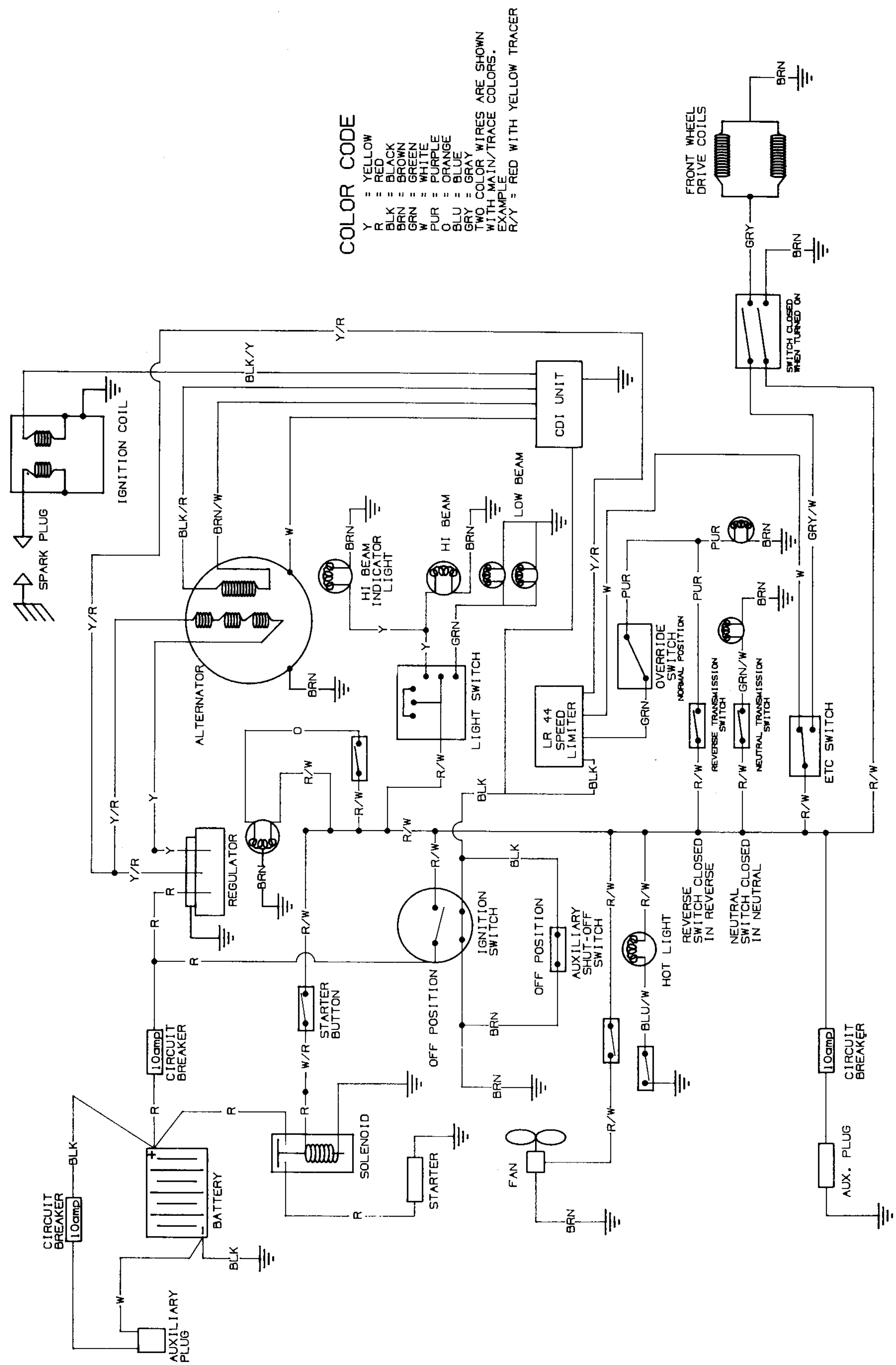
Wiring Schematic - 1991 Trail Boss 250 4x4 (J Model)

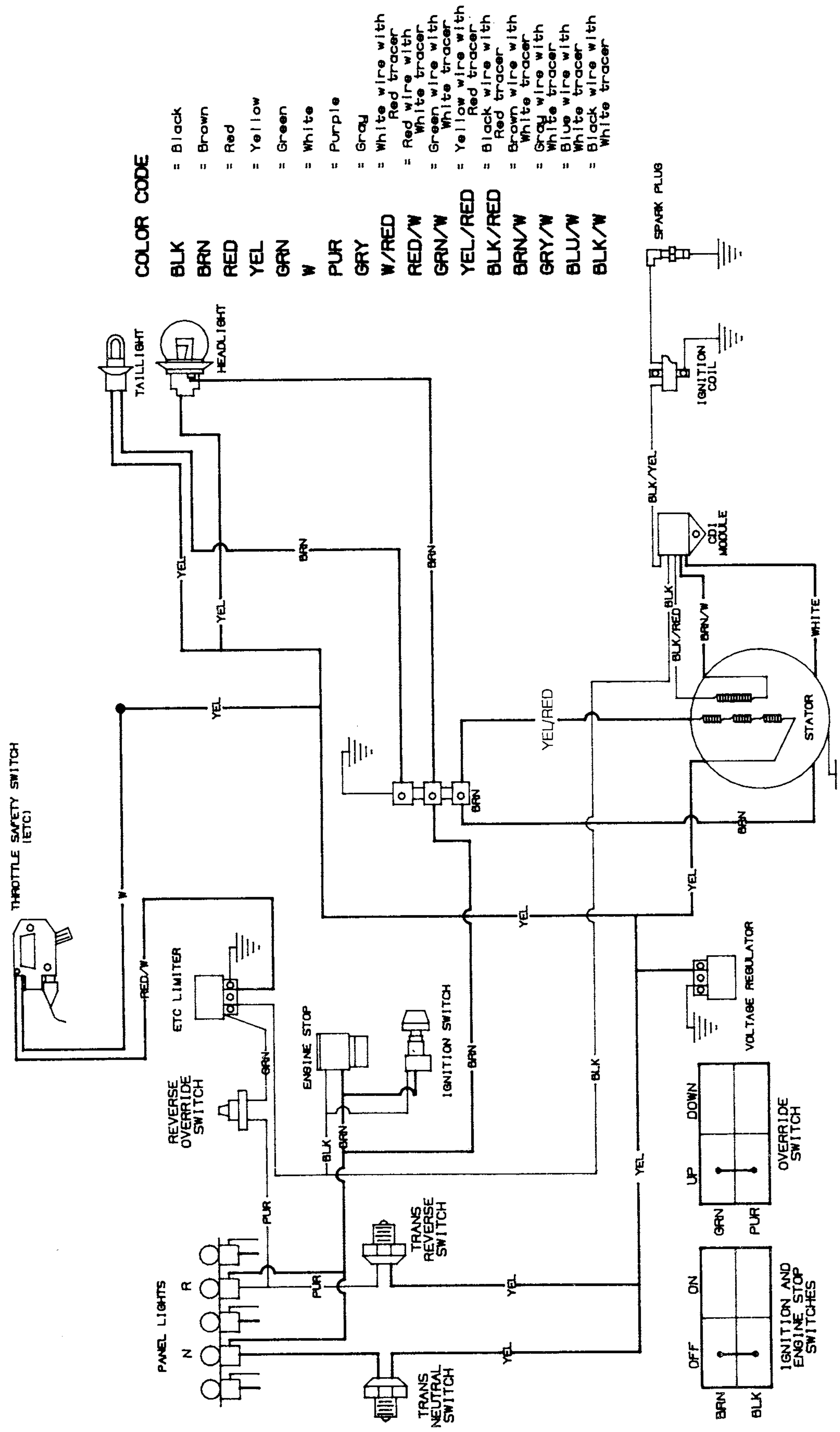


1991 4x4-350L (J Model) - Wiring Diagram

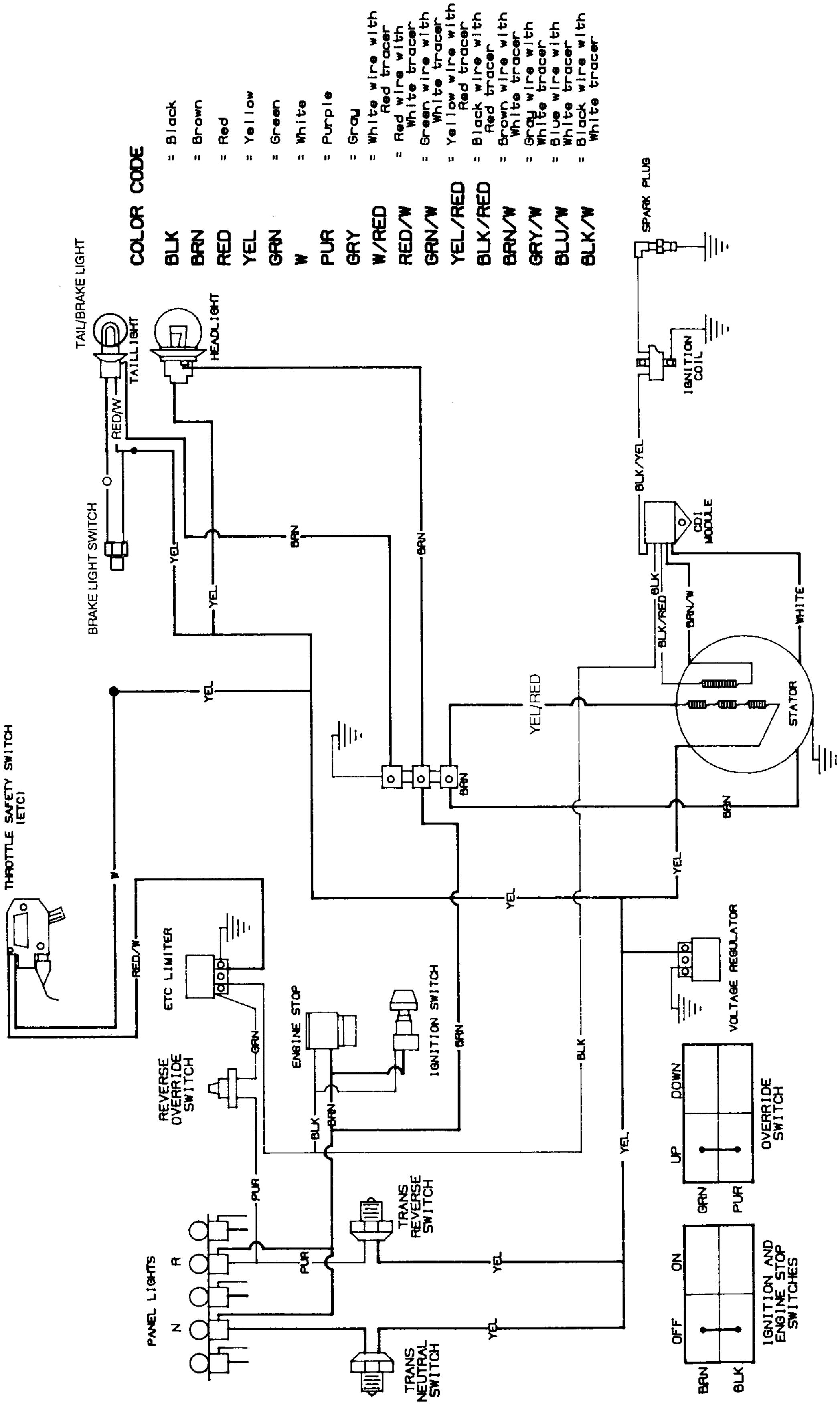


Wiring Schematic - 1991 350L 4x4 (J Model)

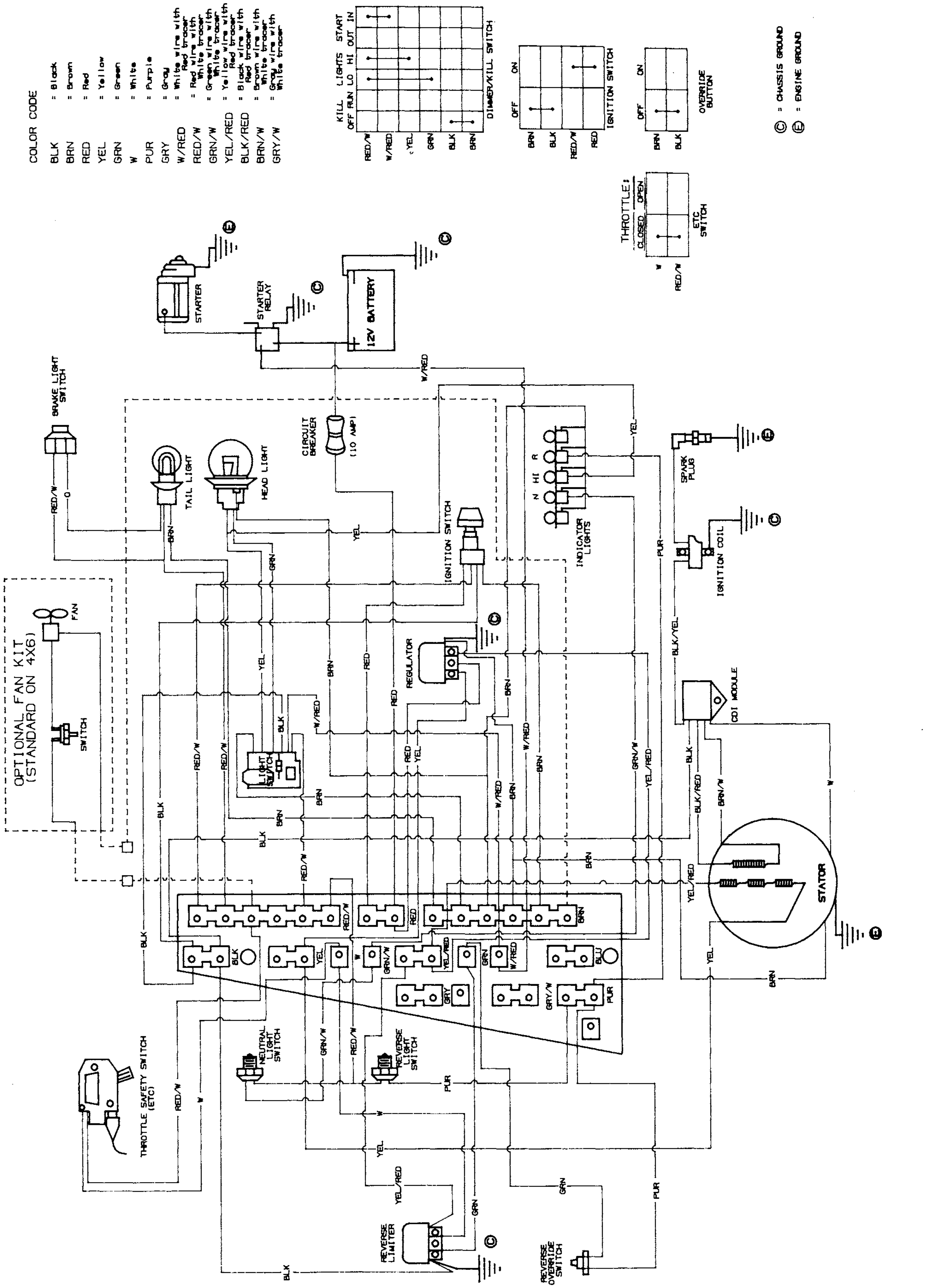



COLOR CODE
BLK = Black
BRN = Brown
RED = Red
YEL = Yellow
GRN = Green
W = White
PUR = Purple
GRY = Gray
W/RED = White wire with Red tracer
RED/W = Red wire with White tracer
GRN/W = Green wire with White tracer
YEL/RED = Yellow wire with Red tracer
BLK/RED = Black wire with Red tracer
BRN/W = Brown wire with White tracer
GRY/W = Gray wire with White tracer
BLU/W = Blue wire with White tracer
BLK/W = Black wire with White tracer
SPARK PLUG
IGNITION COIL
CDI MODULE
STATOR
TAILLIGHT
HEADLIGHT
THROTTLE SAFETY SWITCH (ETC)
ETC LIMITER
REVERSE OVERRIDE SWITCH
ENGINE STOP
IGNITION SWITCH
VOLTAGE REGULATOR
PANEL LIGHTS
R
N
TRANS REVERSE SWITCH
TRANS NEUTRAL SWITCH
OFF
ON
IGNITION AND ENGINE STOP SWITCHES
UP
DOWN
OVERRIDE SWITCH
BLK/YEL
WHITE
YEL/RED
RED/W
W
YEL
BRN
BLK
PUR
GRN

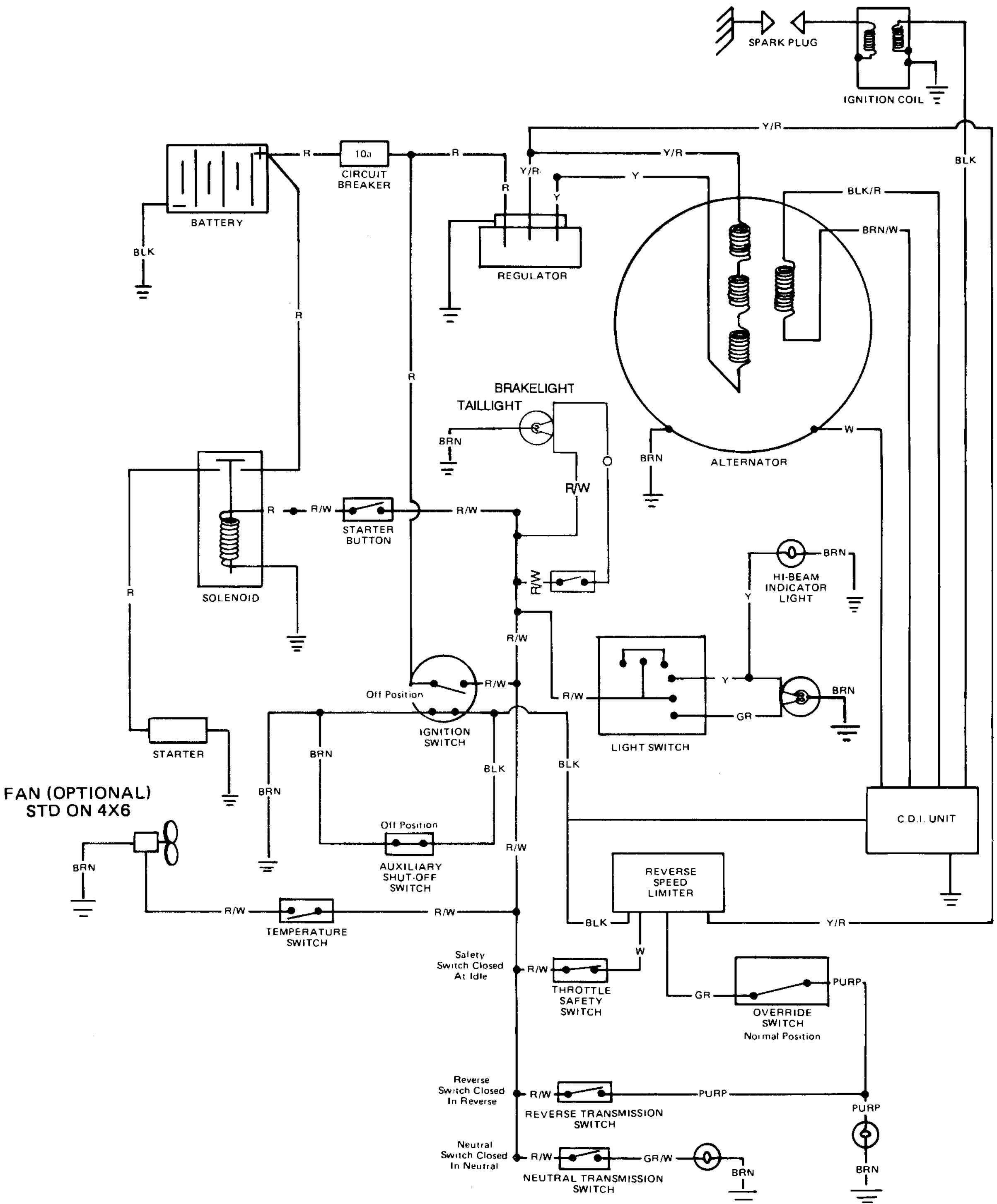
Wiring Diagram - 1992 Trail Blazer



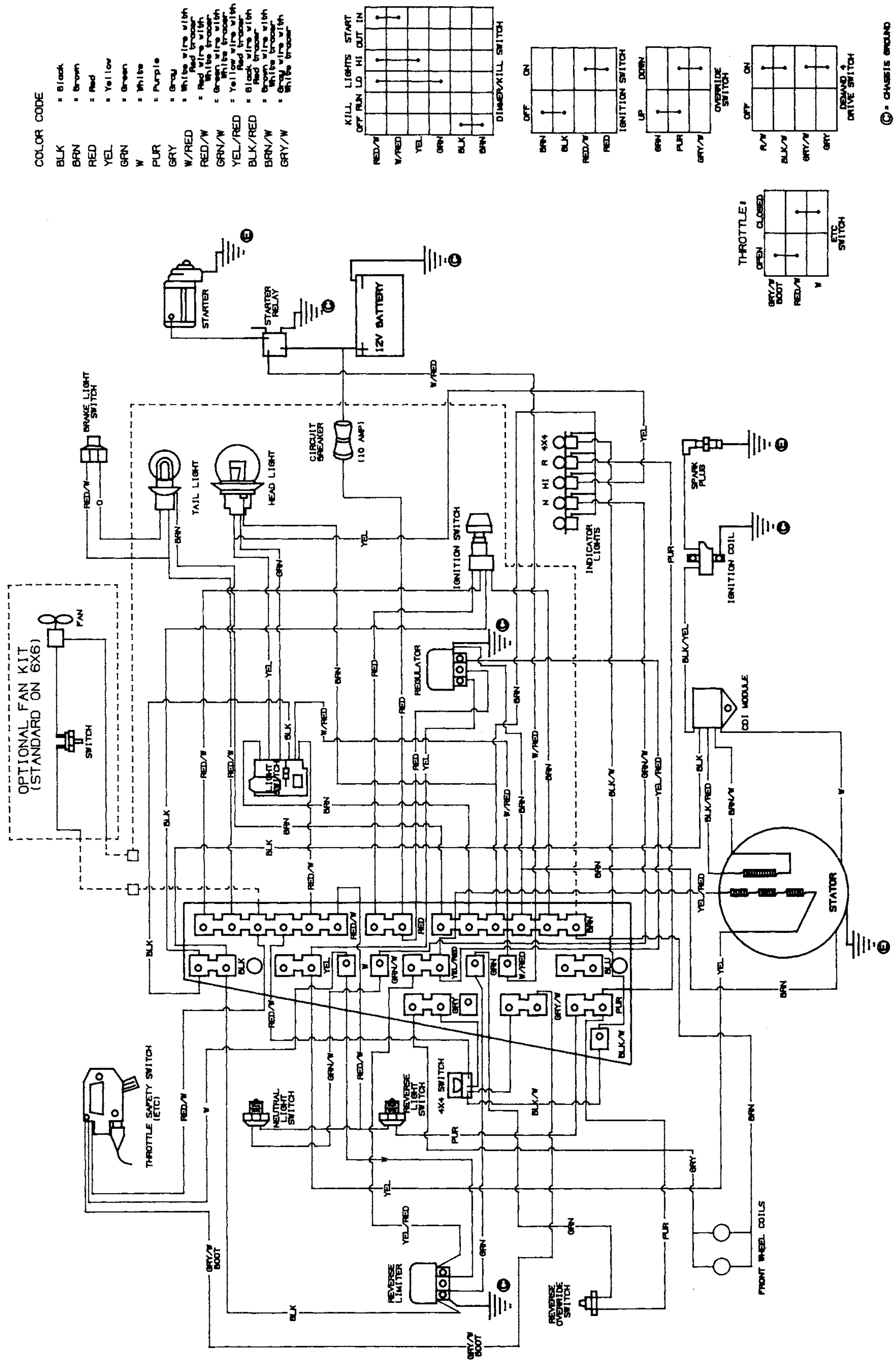
1992 Trail Boss, 2x4, 4x6 - Wiring Diagram



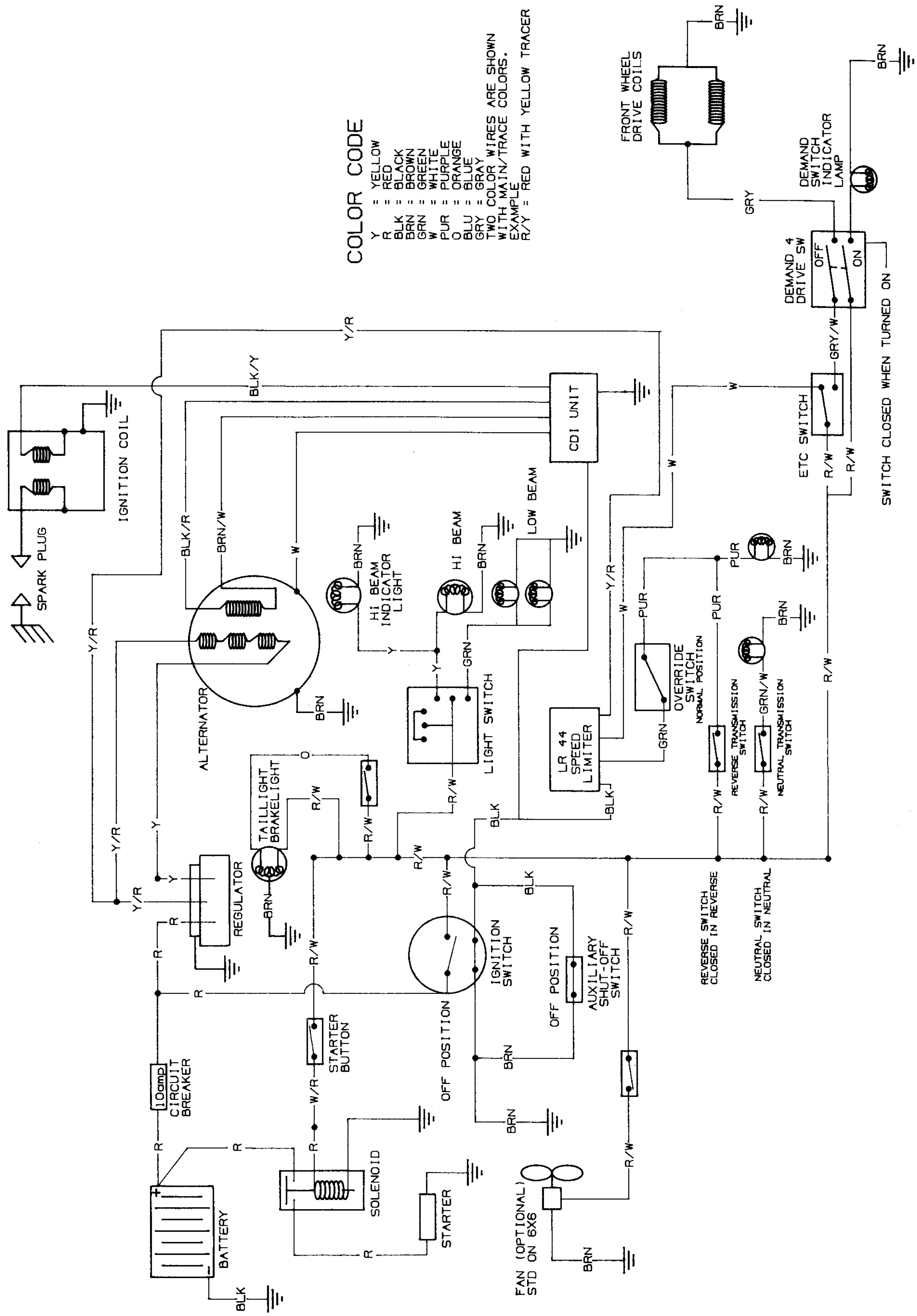
Wiring Schematic - 1992 Trail Boss, 2x4, 4x6



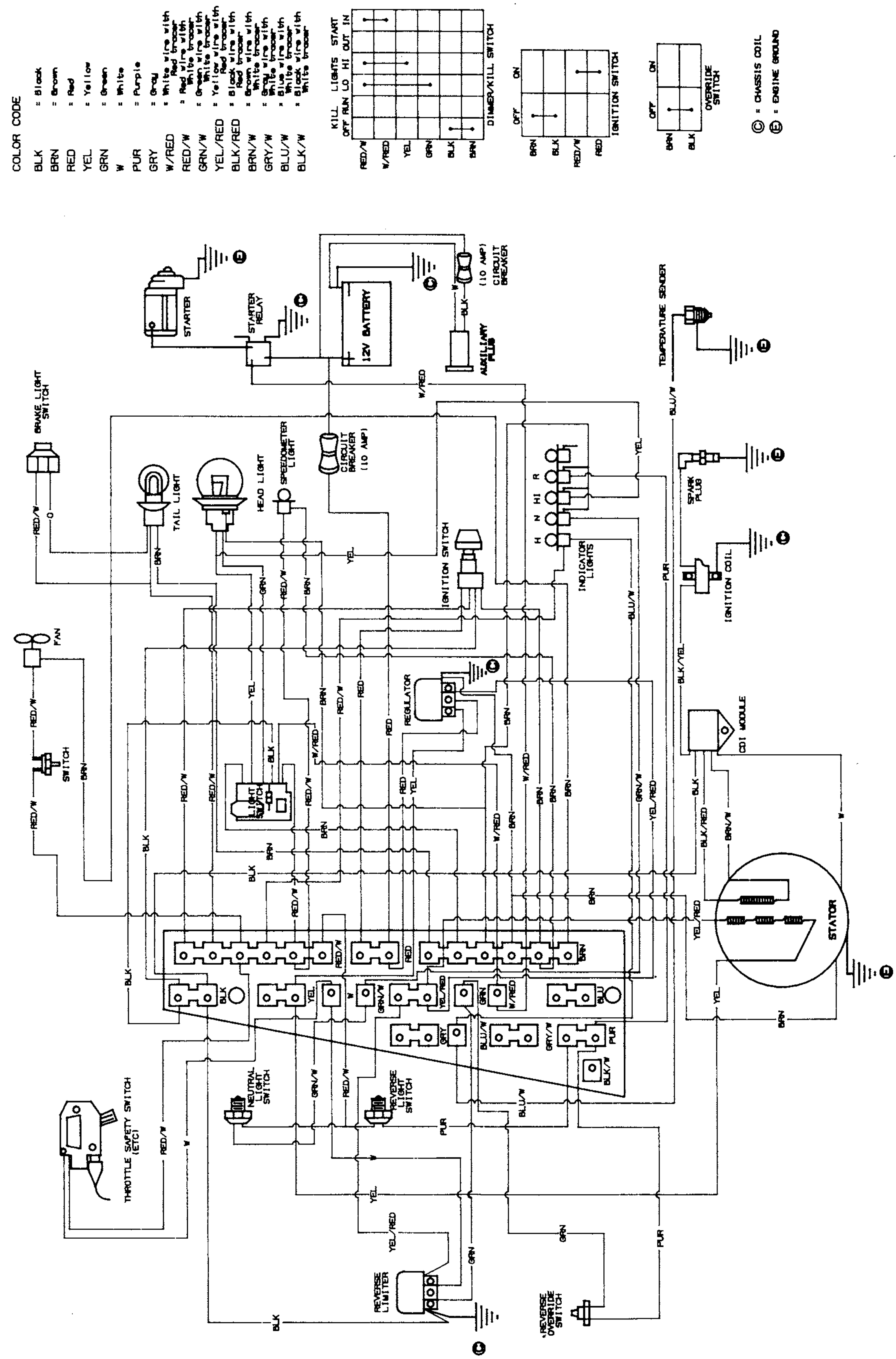
1992 Trail Boss 250 4x4 and Big Boss 6x6 - Wiring Diagram



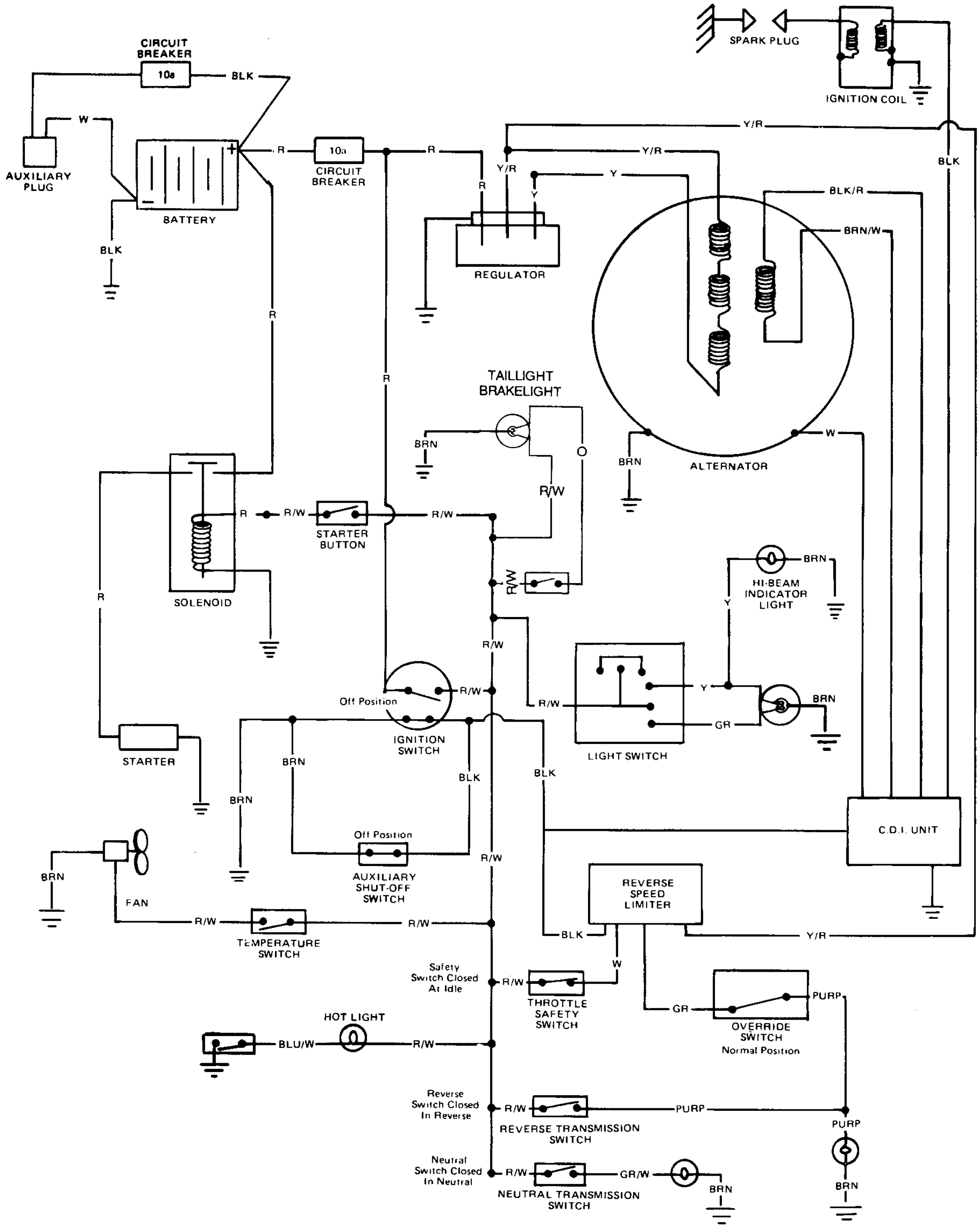
Wiring Schematic - 1992 Trail Boss 250 4x4 and Big Boss 6x6



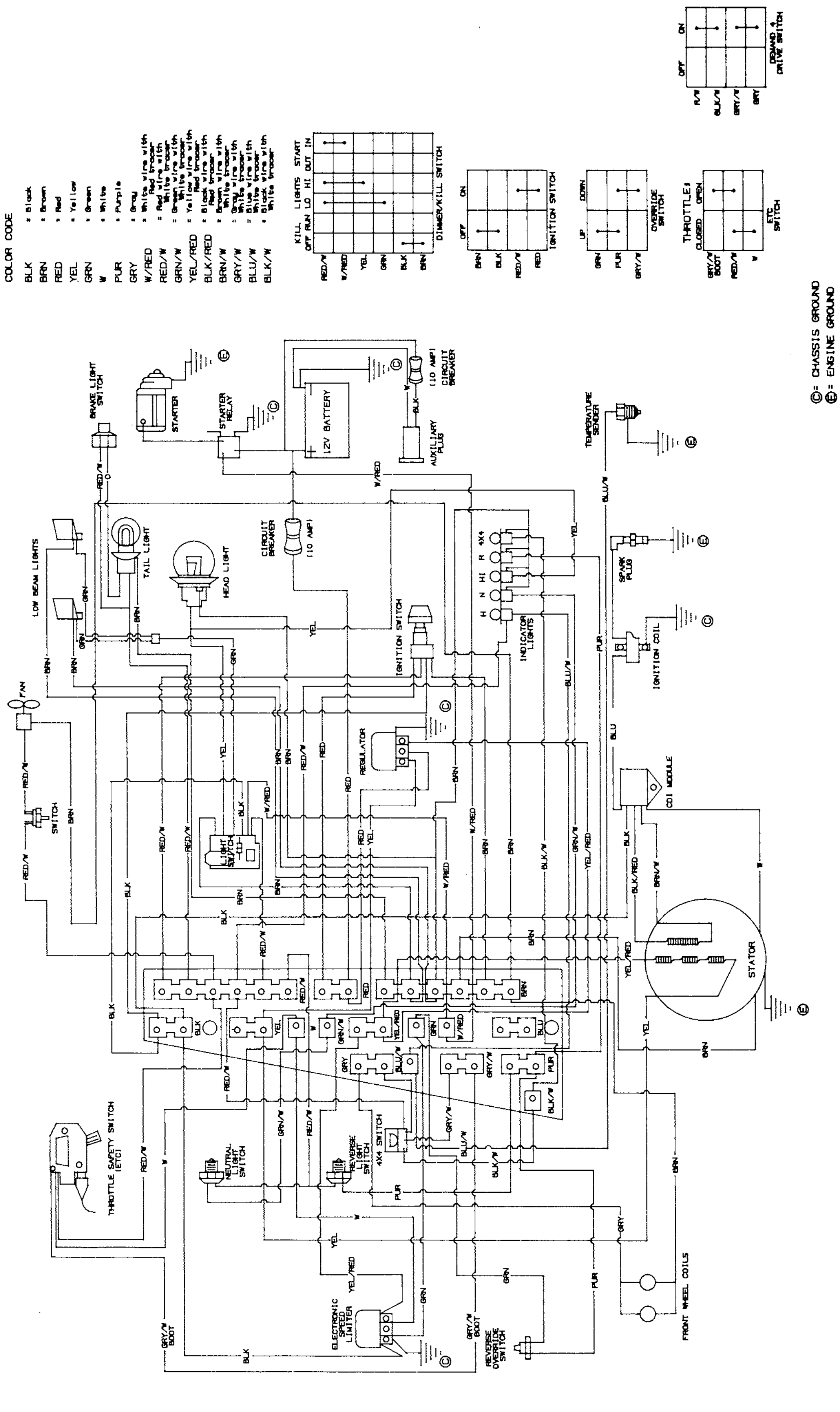
1992 350L 2x4 - Wiring Diagram



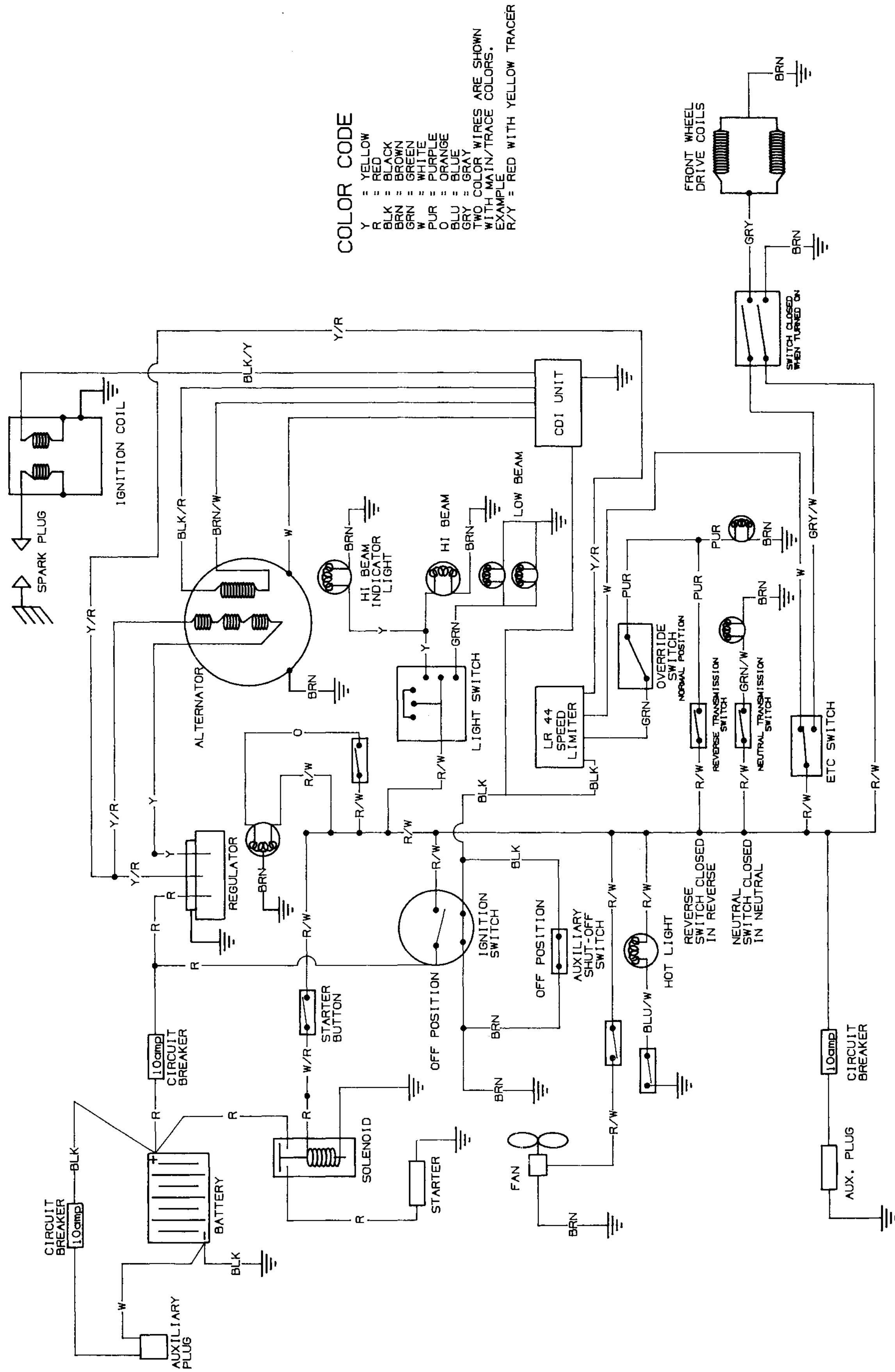
Wiring Schematic - 1992 350L 2x4



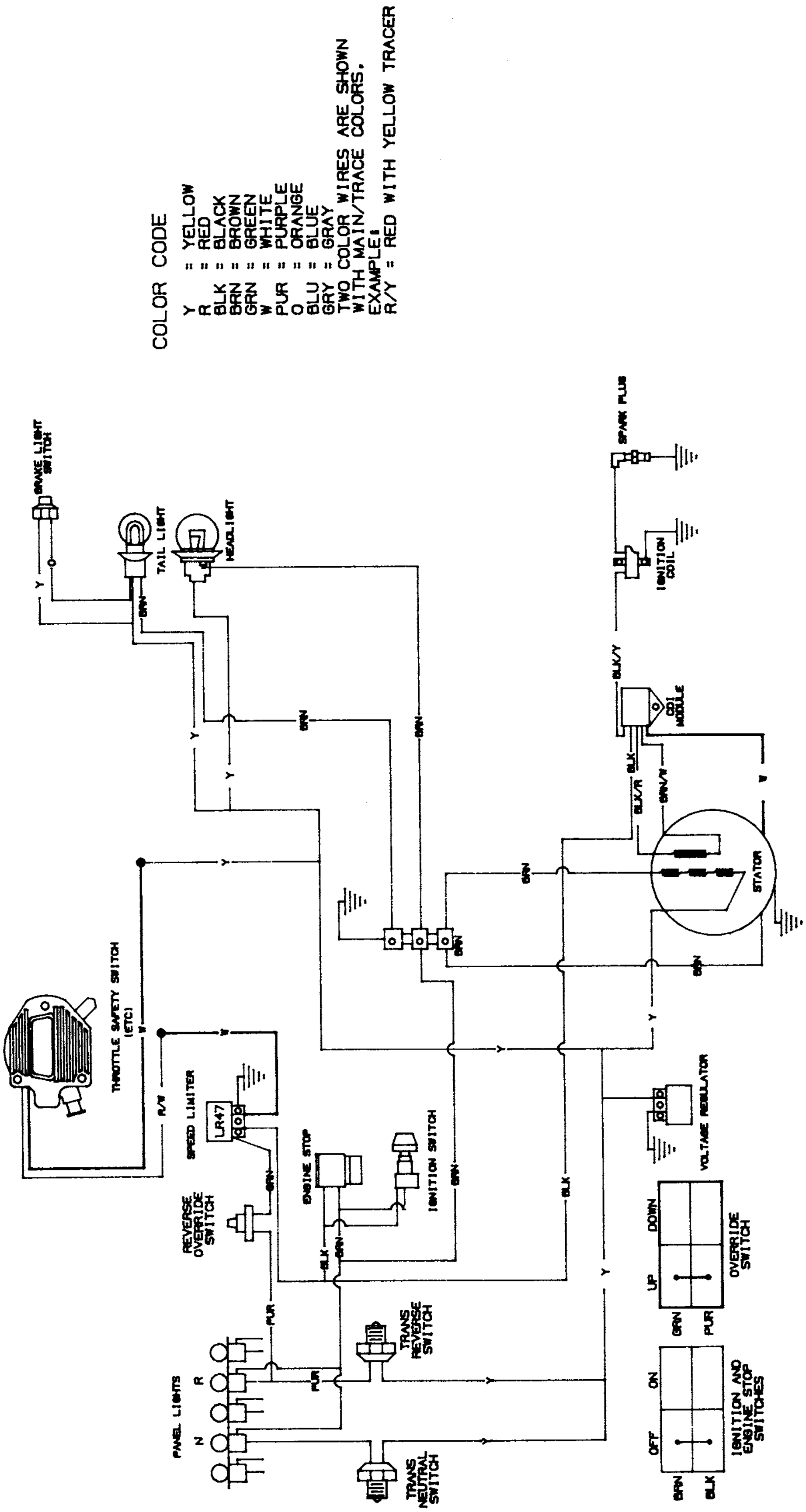
1992 350L 4x4 Trail Boss - Wiring Diagram



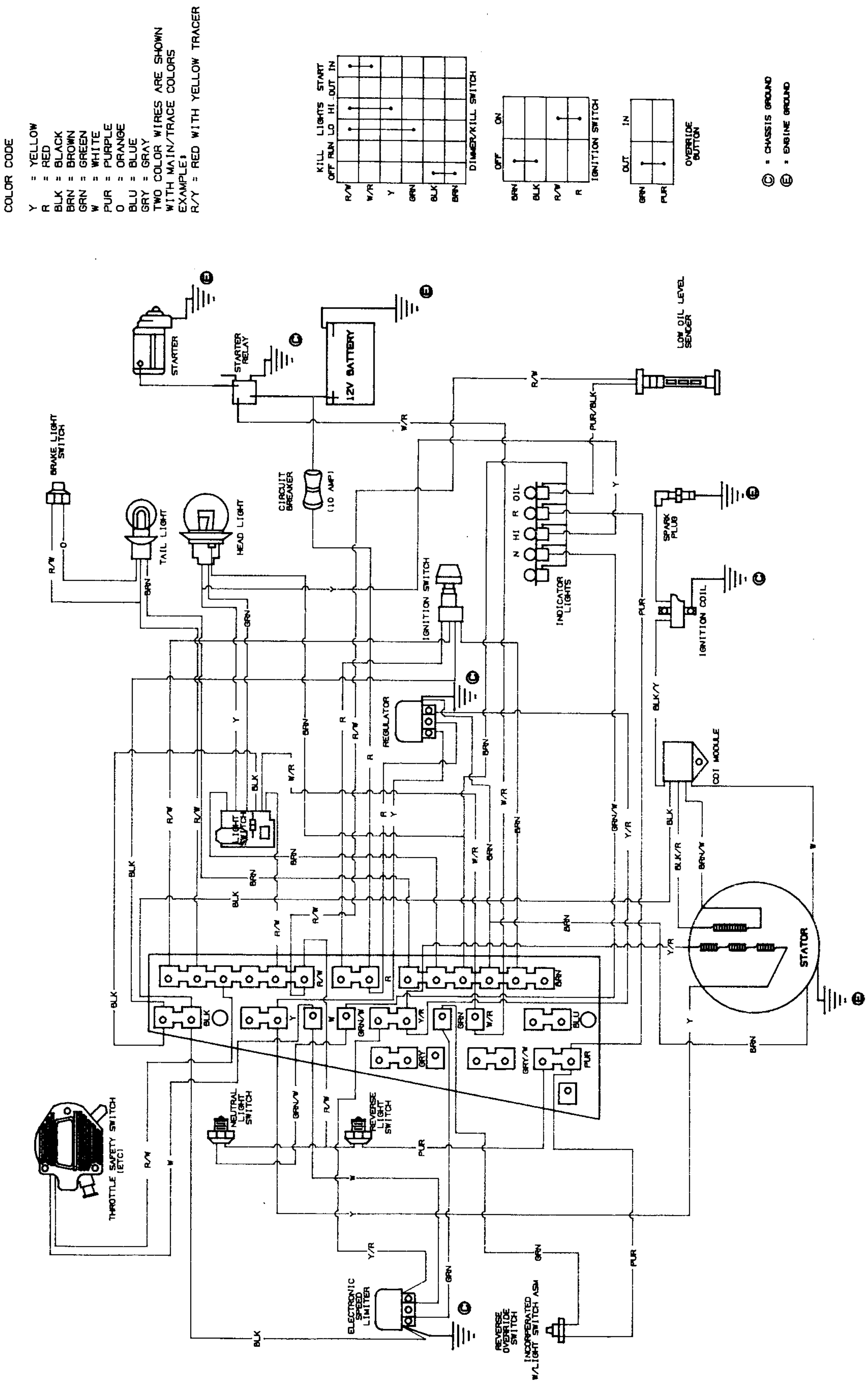
Wiring Schematic - 1992 350L 4x4 Trail Boss

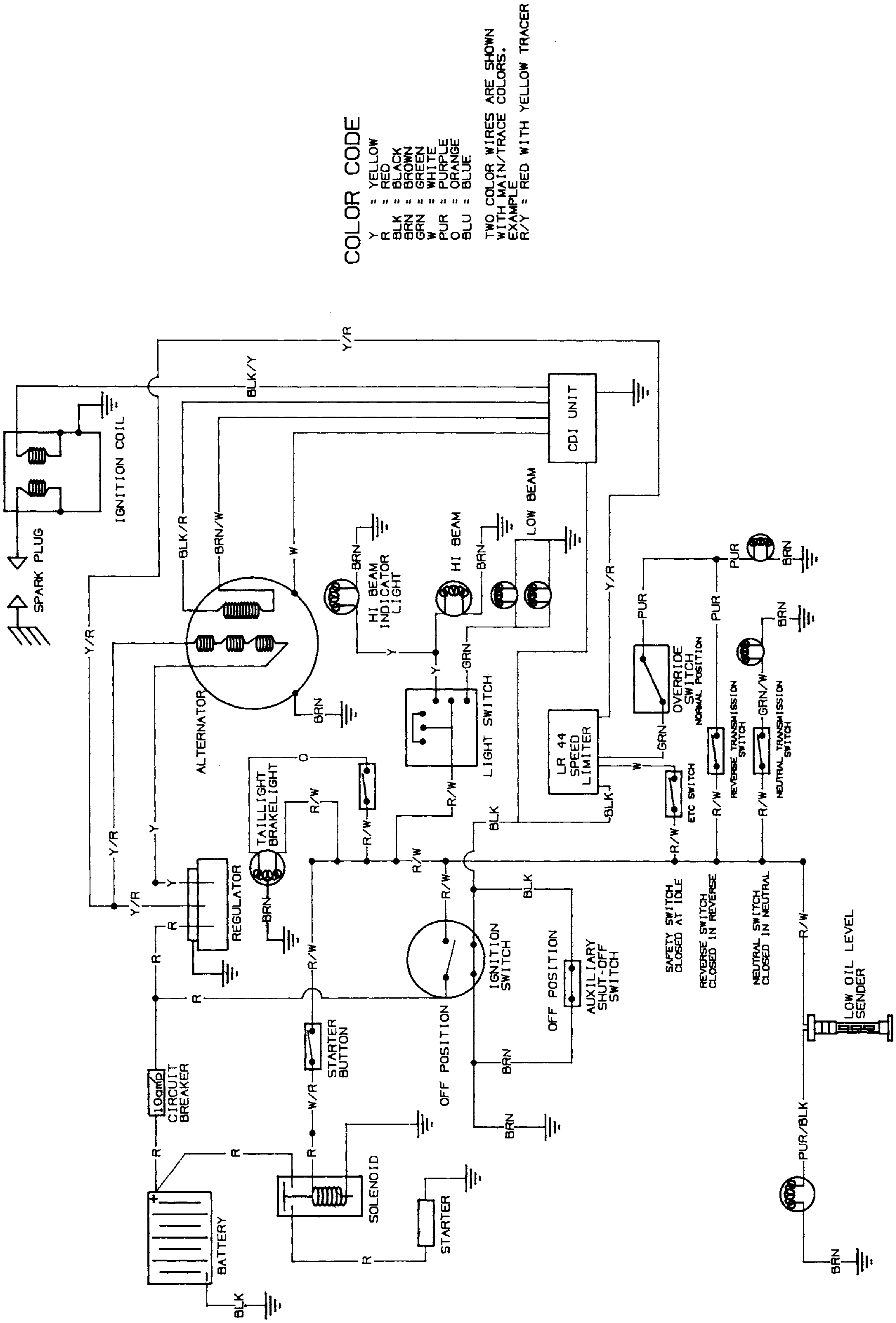


1993 Trail Blazer -Wiring Diagram



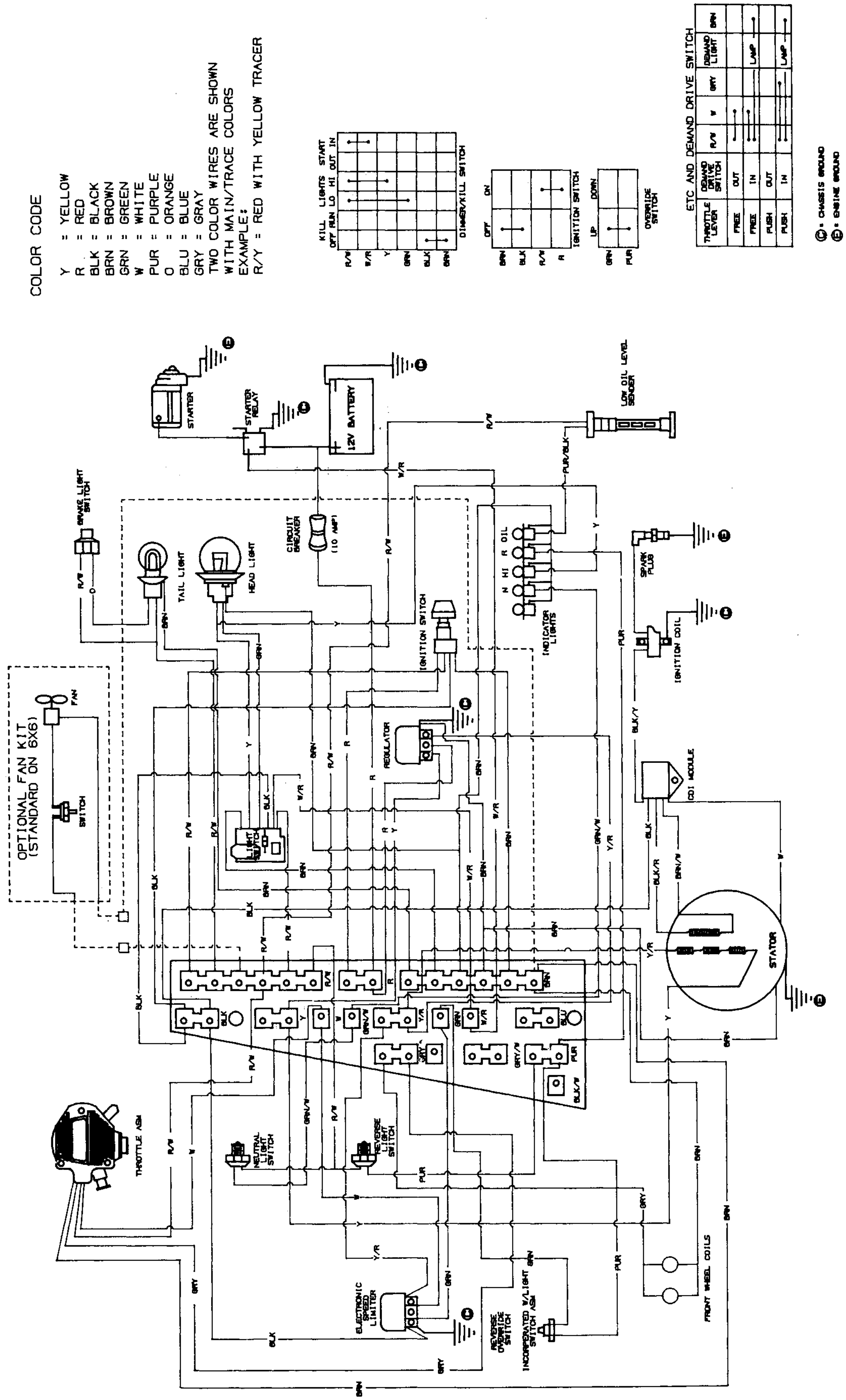
Wiring Diagram -1993 250 2x4 and Trail Boss



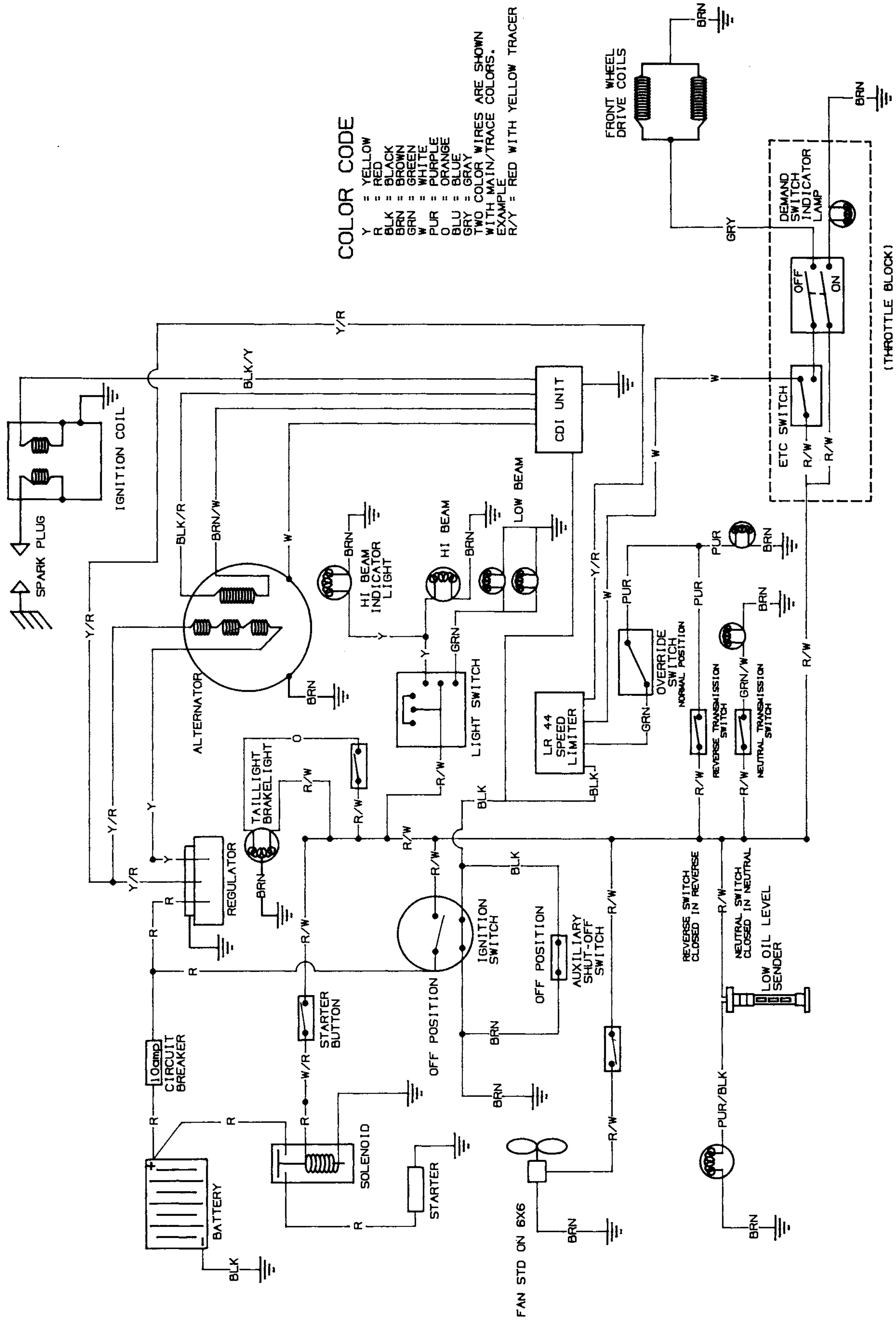


COLOR CODE
Y = YELLOW
R = RED
BLK = BLACK
BRN = BROWN
GRN = GREEN
W = WHITE
PUR = PURPLE
O = ORANGE
BLU = BLUE
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y = RED WITH YELLOW TRACER
SPARK PLUG
IGNITION COIL
CDI UNIT
ALTERNATOR
HI BEAM INDICATOR LIGHT
HI BEAM
LOW BEAM
LIGHT SWITCH
TAILLIGHT BRAKELIGHT
REGULATOR
LR 44 SPEED LIMITER
OVERRIDE SWITCH NORMAL POSITION
ETC SWITCH
REVERSE TRANSMISSION SWITCH
NEUTRAL TRANSMISSION SWITCH
SAFETY SWITCH CLOSED AT IDLE
REVERSE SWITCH CLOSED IN REVERSE
NEUTRAL SWITCH CLOSED IN NEUTRAL
LOW OIL LEVEL SENDER
IGNITION SWITCH
OFF POSITION
AUXILIARY SHUT-OFF SWITCH
OFF POSITION
STARTER BUTTON
10amp CIRCUIT BREAKER
SOLENOID
STARTER
BATTERY

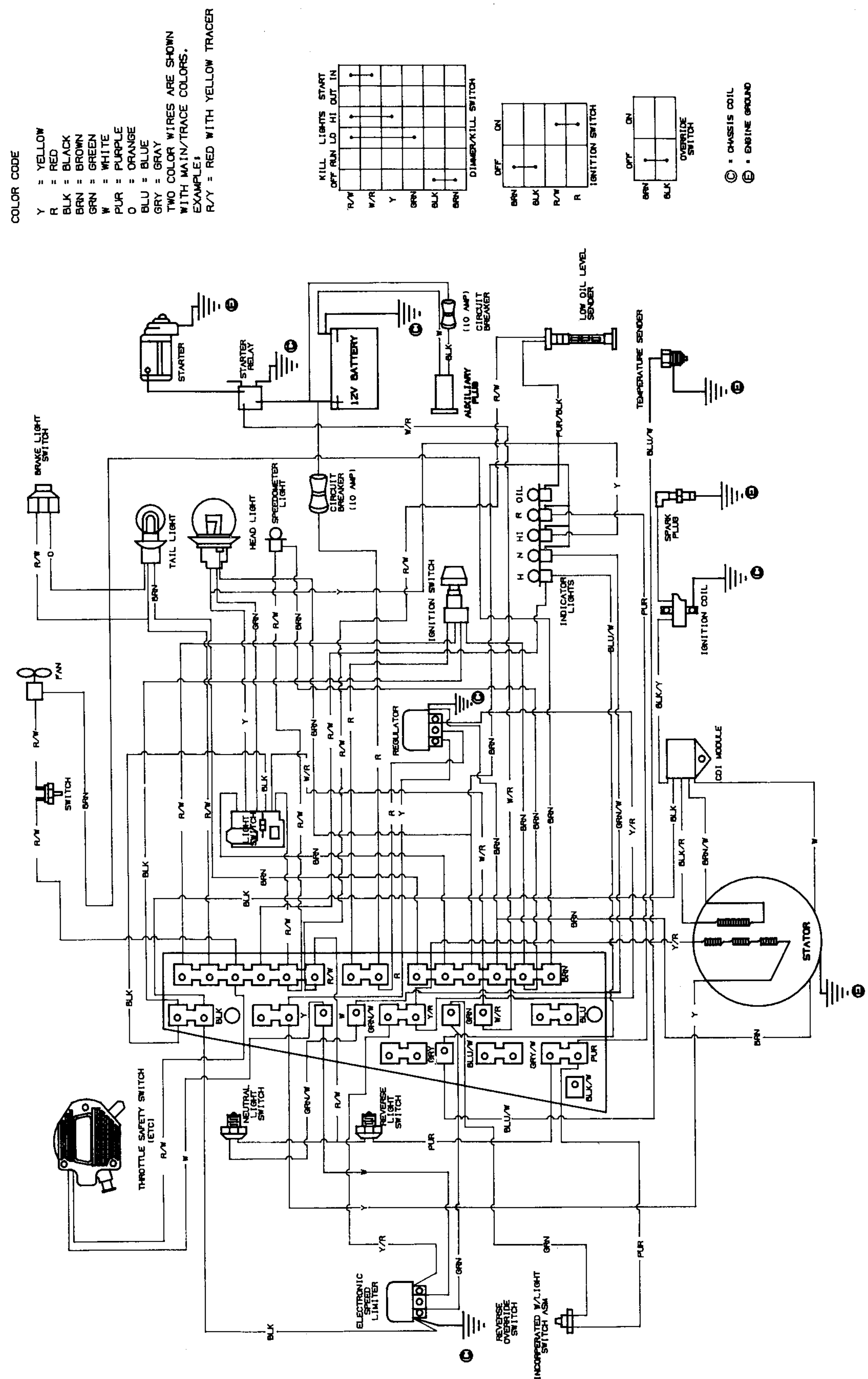
ELECTRICAL
Wiring Diagram - 1993 250 4x4 and 250 6x6

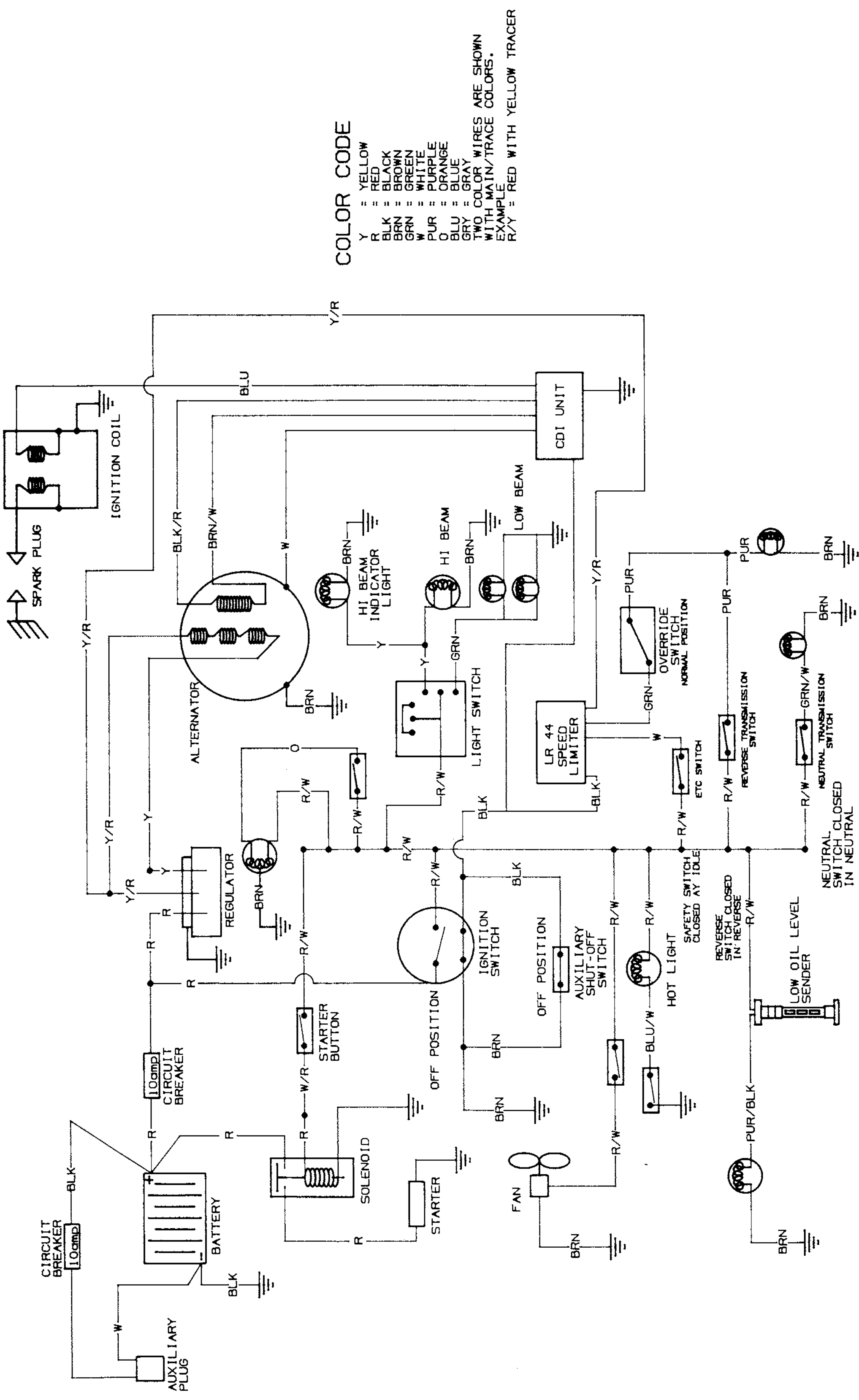


1993 250 4x4 and 250 6x6 - Wiring Schematic



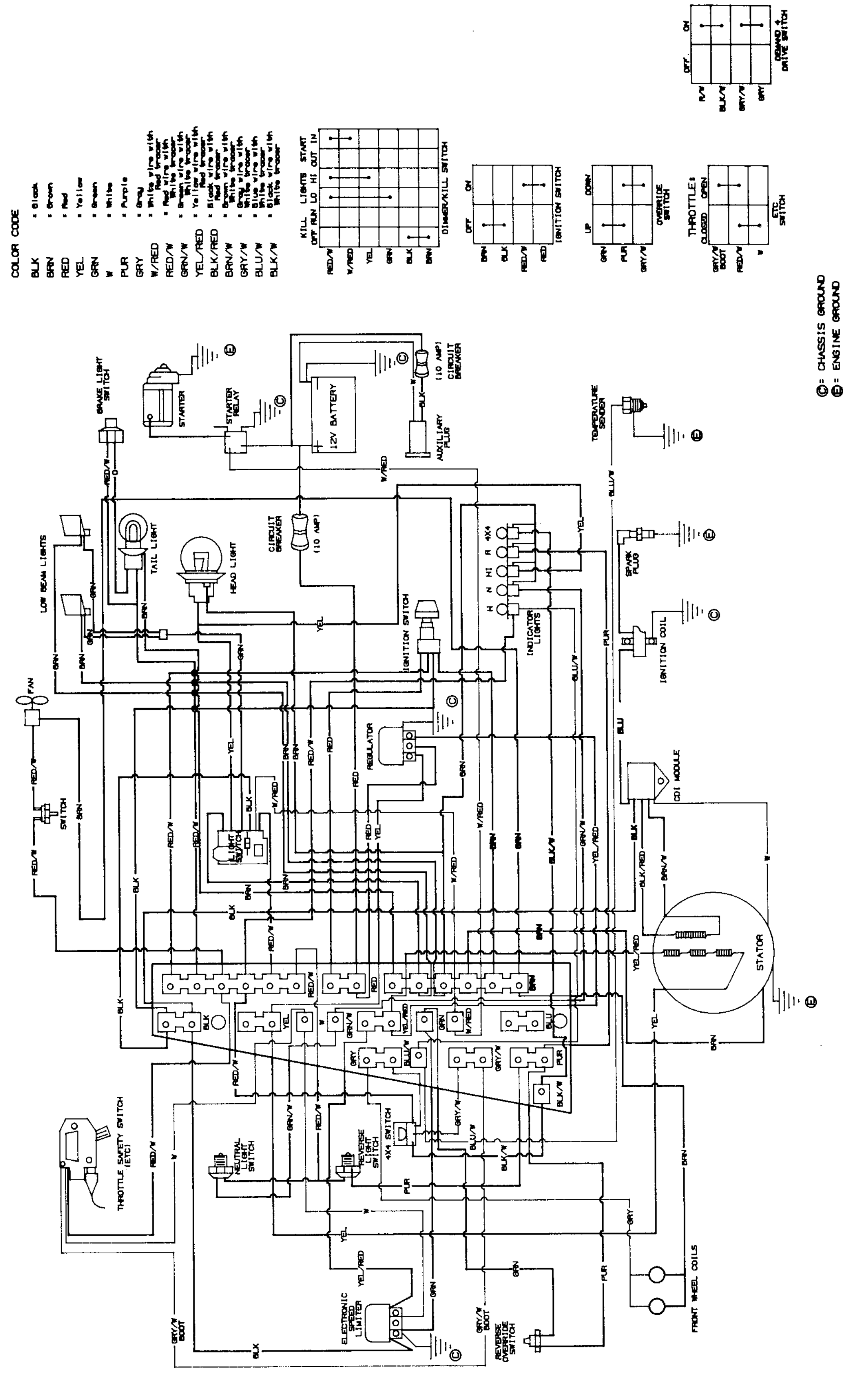
ELECTRICAL
Wiring Diagram - 1993 350 2x4



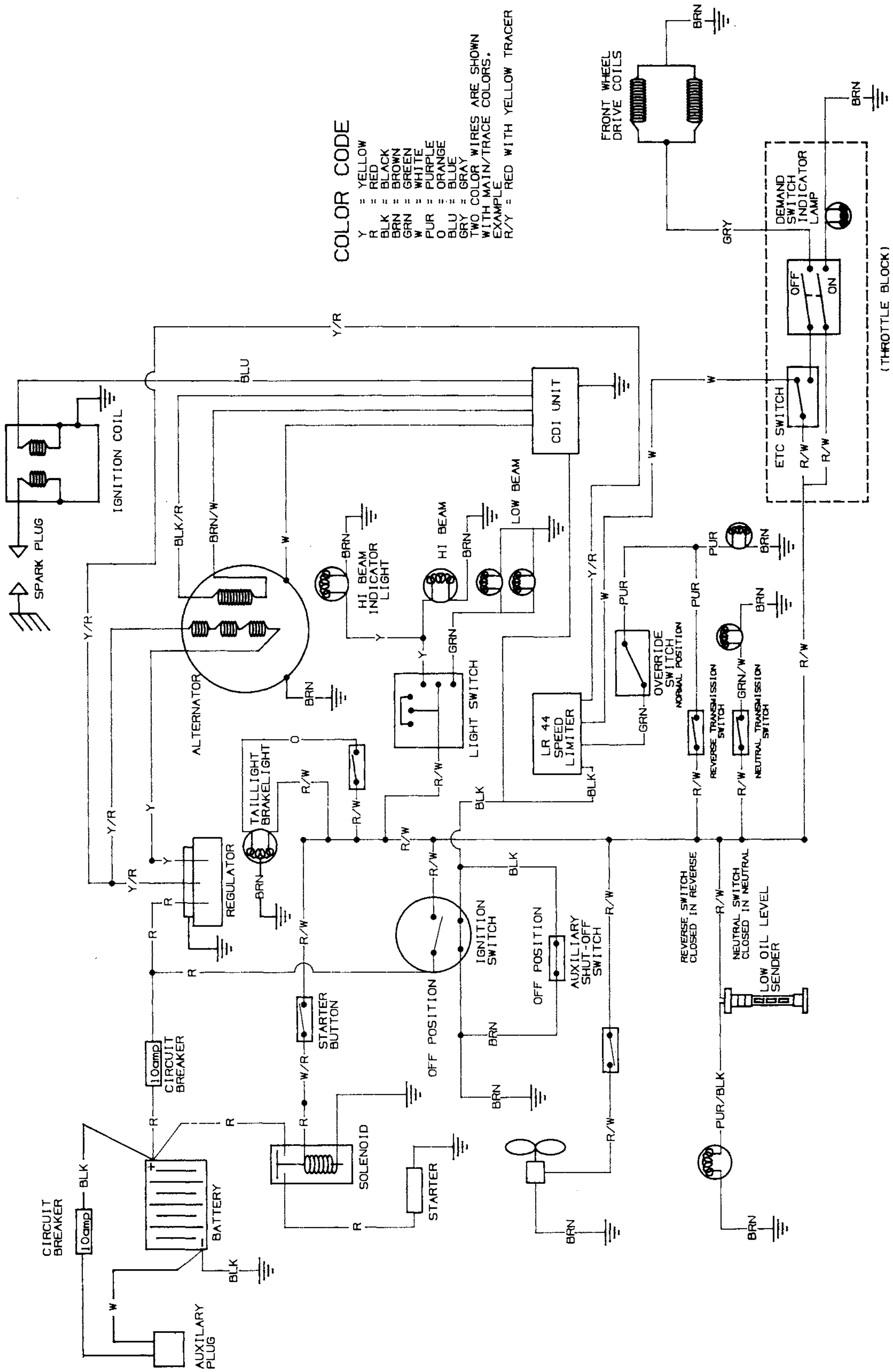


COLOR CODE
Y = YELLOW
R = RED
BLK = BLACK
BRN = BROWN
GRN = GREEN
W = WHITE
PUR = PURPLE
O = ORANGE
BLU = BLUE
GRY = GRAY
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y = RED WITH YELLOW TRACER
SPARK PLUG
IGNITION COIL
CDI UNIT
ALTERNATOR
HI BEAM INDICATOR LIGHT
HI BEAM
LOW BEAM
LIGHT SWITCH
LR 44 SPEED LIMITER
OVERRIDE SWITCH NORMAL POSITION
ETC SWITCH
REVERSE TRANSMISSION SWITCH
NEUTRAL TRANSMISSION SWITCH
NEUTRAL SWITCH CLOSED IN NEUTRAL
REGULATOR
IGNITION SWITCH
OFF POSITION
AUXILIARY SHUT-OFF SWITCH
HOT LIGHT
SAFETY SWITCH CLOSED AT IDLE
REVERSE SWITCH CLOSED IN REVERSE
LOW OIL LEVEL SENDER
STARTER BUTTON
CIRCUIT BREAKER
10amp
SOLENOID
STARTER
FAN
BATTERY
AUXILIARY PLUG

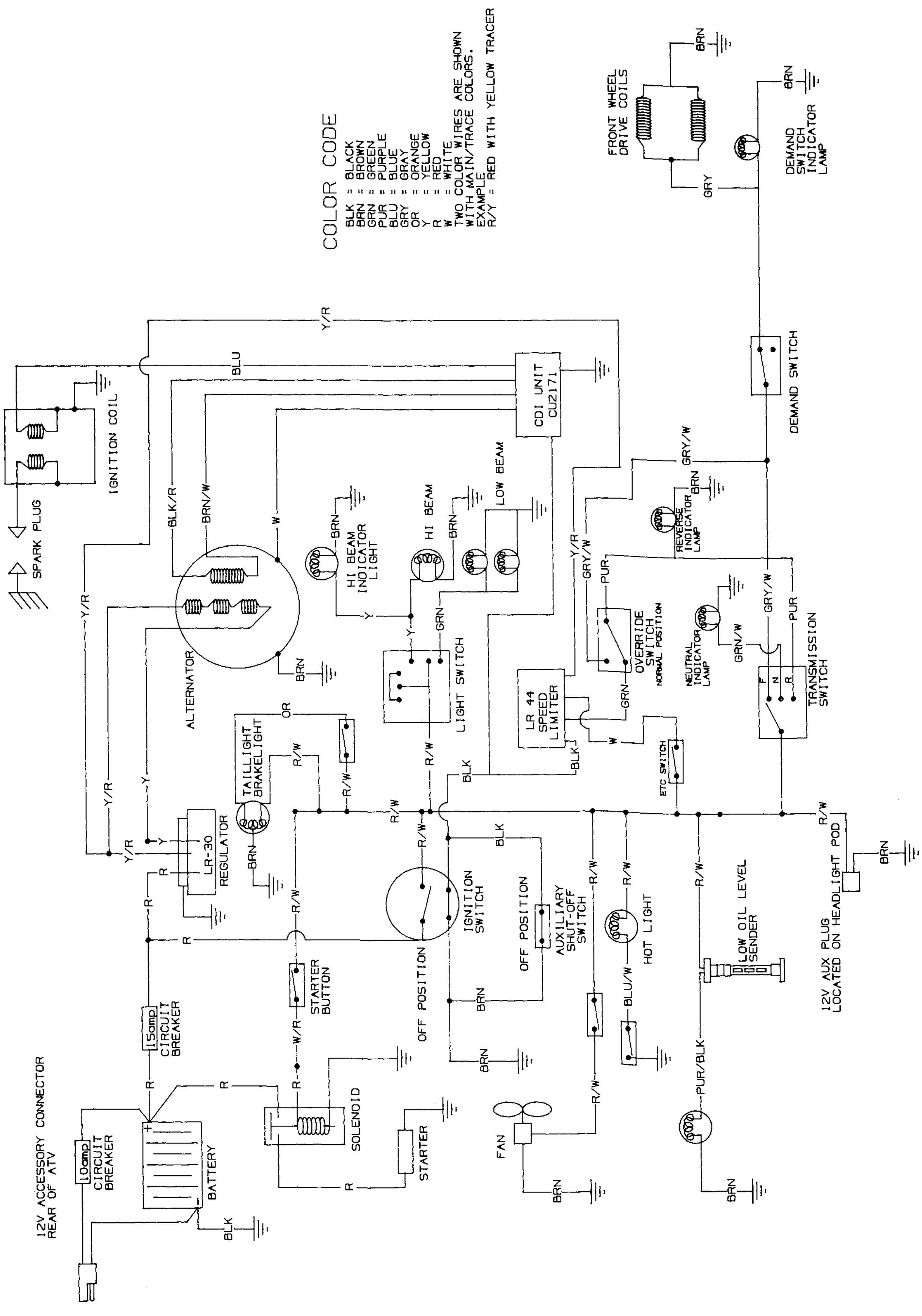
Wiring Diagram - 1993 350L 4x4

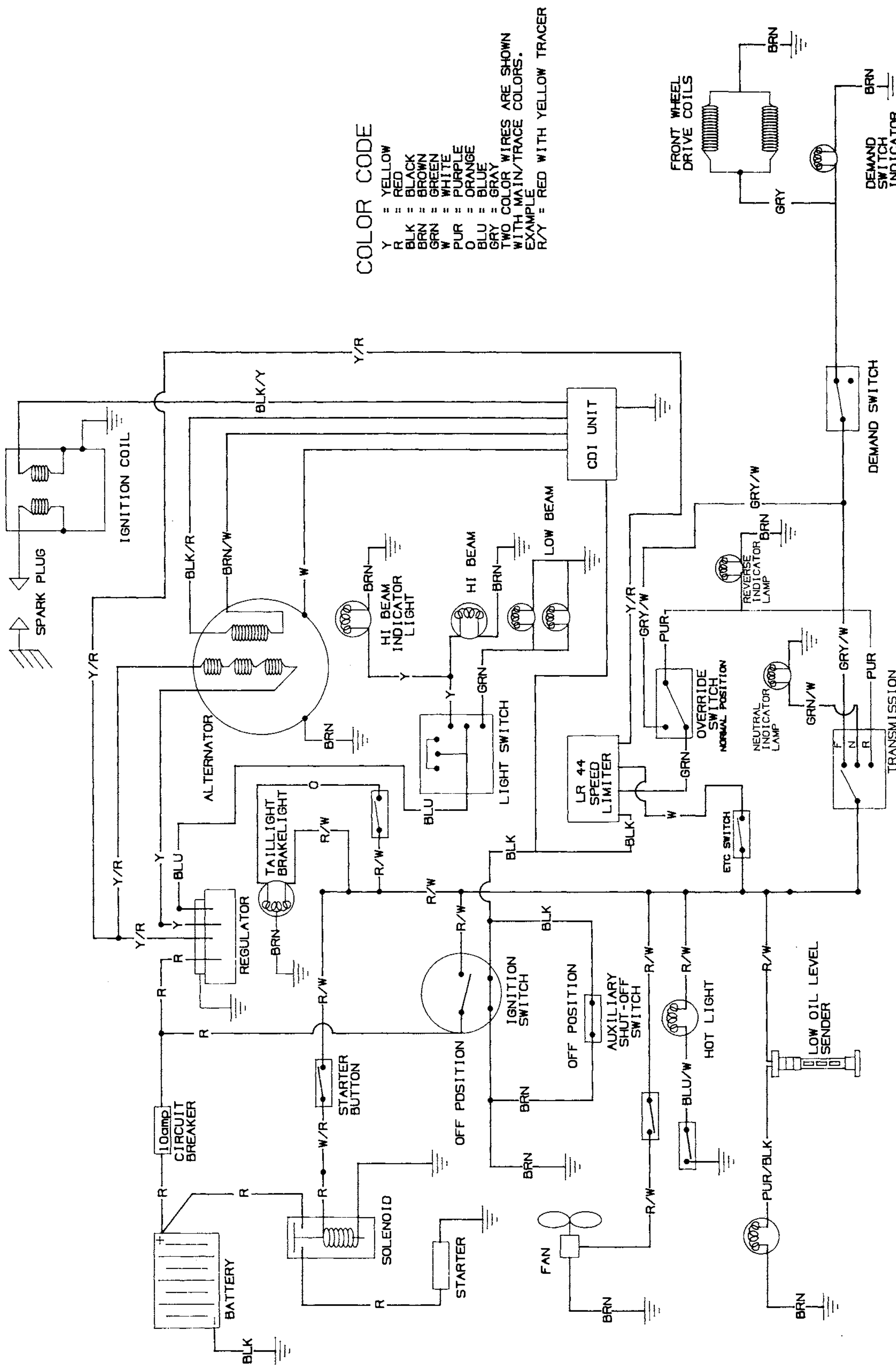


1993 350L 4x4 - Wiring Schematic

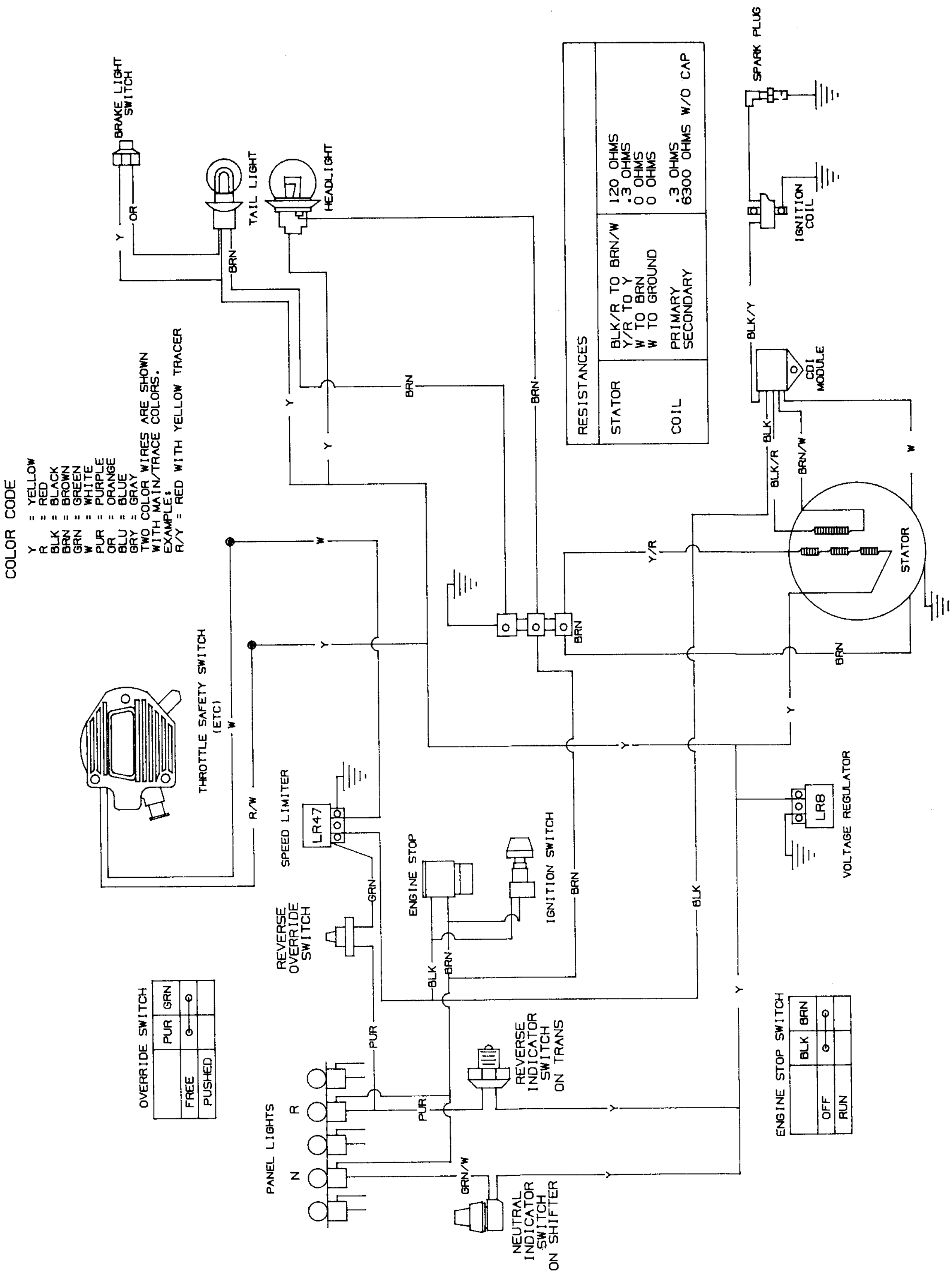


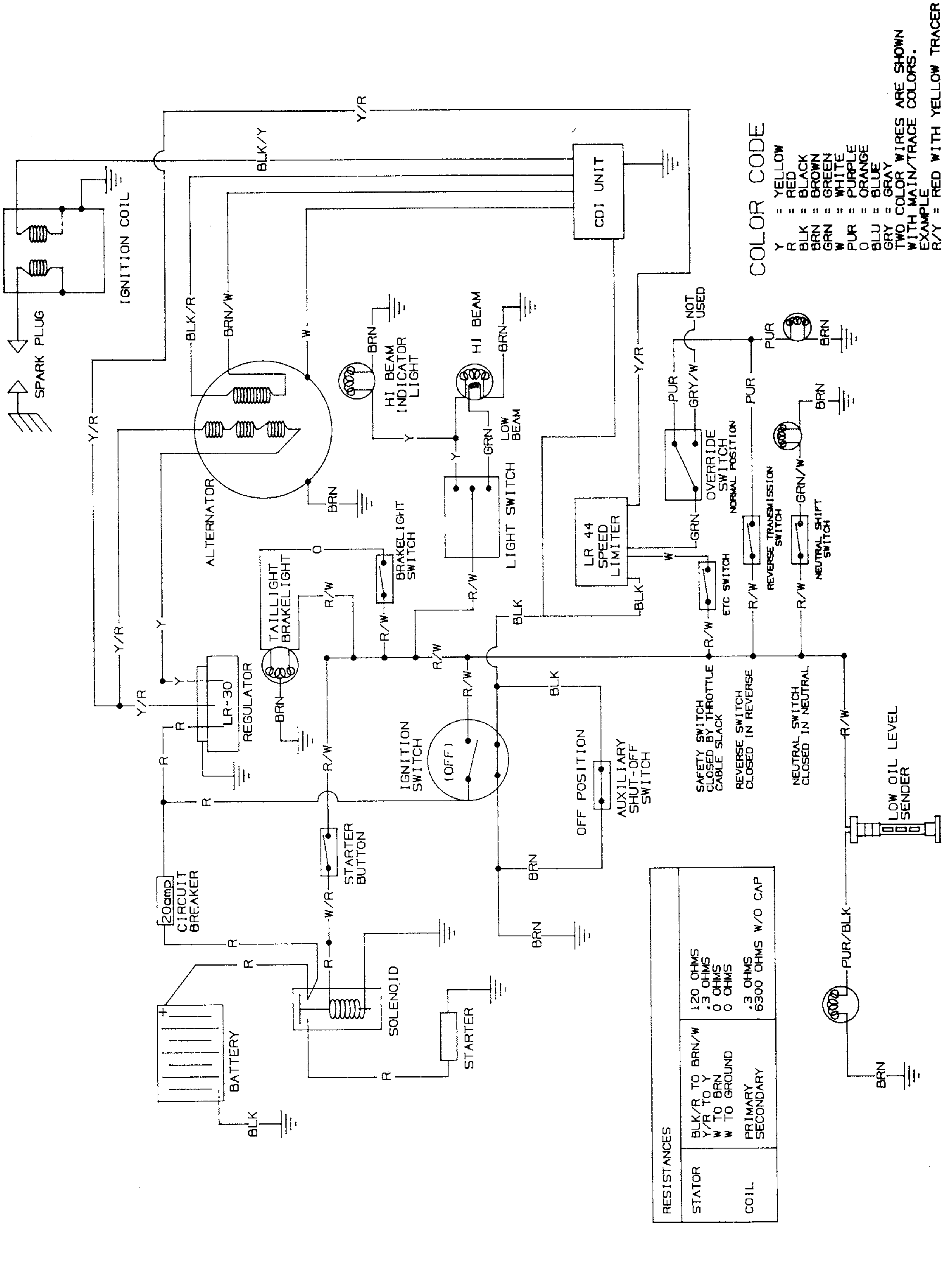
Wiring Schematic - 1993 Sportsman




COLOR CODE
Y = YELLOW
R = RED
BLK = BLACK
BRN = BROWN
GRN = GREEN
W = WHITE
PUR = PURPLE
O = ORANGE
BLU = BLUE
GRY = GRAY
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y = RED WITH YELLOW TRACER
FRONT WHEEL DRIVE COILS
DEMAND SWITCH INDICATOR LAMP
DEMAND SWITCH
CDI UNIT
IGNITION COIL
SPARK PLUG
ALTERNATOR
HI BEAM INDICATOR LIGHT
HI BEAM
LOW BEAM
LIGHT SWITCH
REVERSE INDICATOR LAMP
OVERRIDE SWITCH
NORMAL POSITION
NEUTRAL INDICATOR LAMP
TRANSMISSION SWITCH
LR 44 SPEED LIMITER
ETC SWITCH
TAILLIGHT BRAKELIGHT
REGULATOR
IGNITION SWITCH
OFF POSITION
AUXILIARY SHUT-OFF SWITCH
HOT LIGHT
LOW OIL LEVEL SENDER
10amp CIRCUIT BREAKER
STARTER BUTTON
SOLENOID
STARTER
BATTERY
FAN

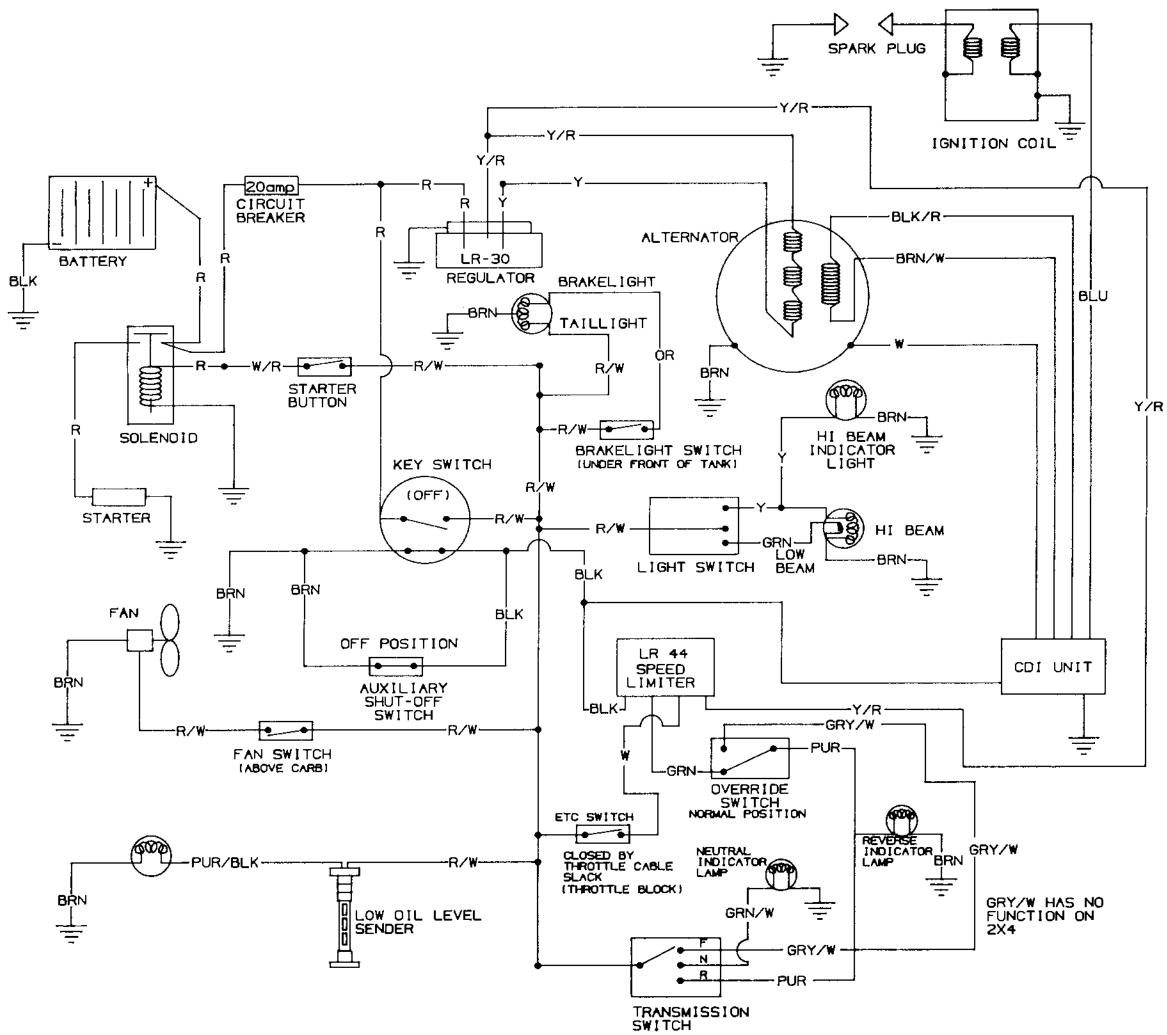
Wiring Schematic - 1994 Trail Blazer





RESISTANCES		
STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	.3 OHMS
	W TO BRN	0 OHMS
	W TO GROUND	0 OHMS
COIL	PRIMARY	.3 OHMS
	SECONDARY	6300 OHMS W/O CAP

Wiring Schematic - 1994 300 2x4



HEADLAMP SWITCH

	R/W	GRN	Y
OFF			
LO	●	●	
HI	●		●

OVERRIDE SWITCH

	PUR	GRY/W	GRN
FREE	●		●
PUSHED	●	●	

STARTER SWITCH

	R/W	W/R
FREE		
PUSHED	●	●

AUX SHUT OFF SWITCH

	BLK	BRN
OFF	●	●
RUN		

ETC SWITCH

	R/W	W
NORMAL		
FAULT	●	●

KEY SWITCH

	BLK	BRN	R/W	R
OFF	●	●		
ON			●	●

TRANSMISSION SWITCH

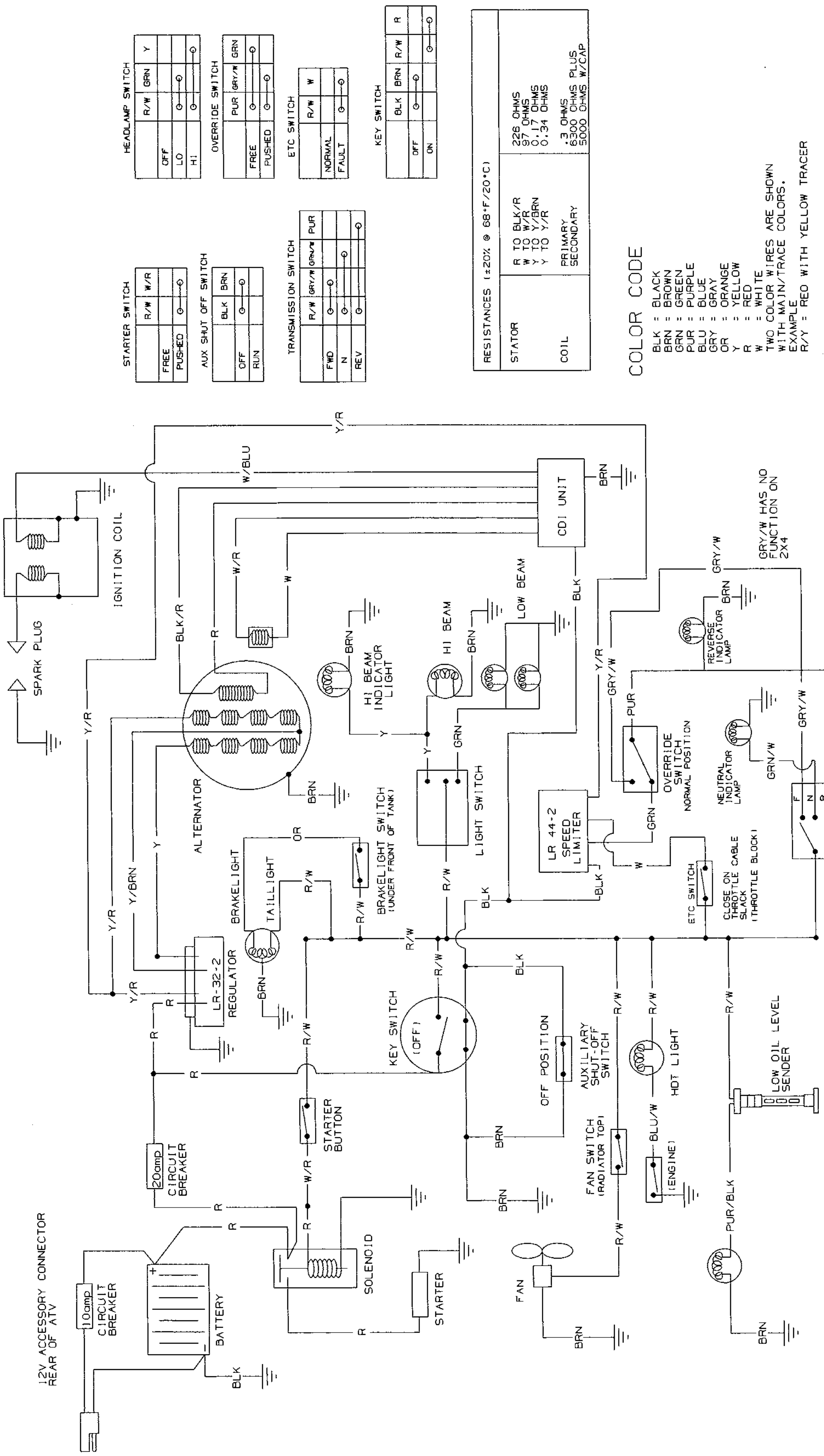
	R/W	GRY/W	BRN/W	PUR
FWD	●	●		
N	●		●	
REV	●			●

RESISTANCES (±20% @ 68°F/20°C)		
STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	.3 OHMS
	W TO BRN	0 OHMS
	W TO GROUND	0 OHMS
COIL	PRIMARY	.3 OHMS
	SECONDARY	6300 OHMS W/O CAP

COLOR CODE

BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y = RED WITH YELLOW TRACER

1994 400L 2x4 - Wiring Schematic

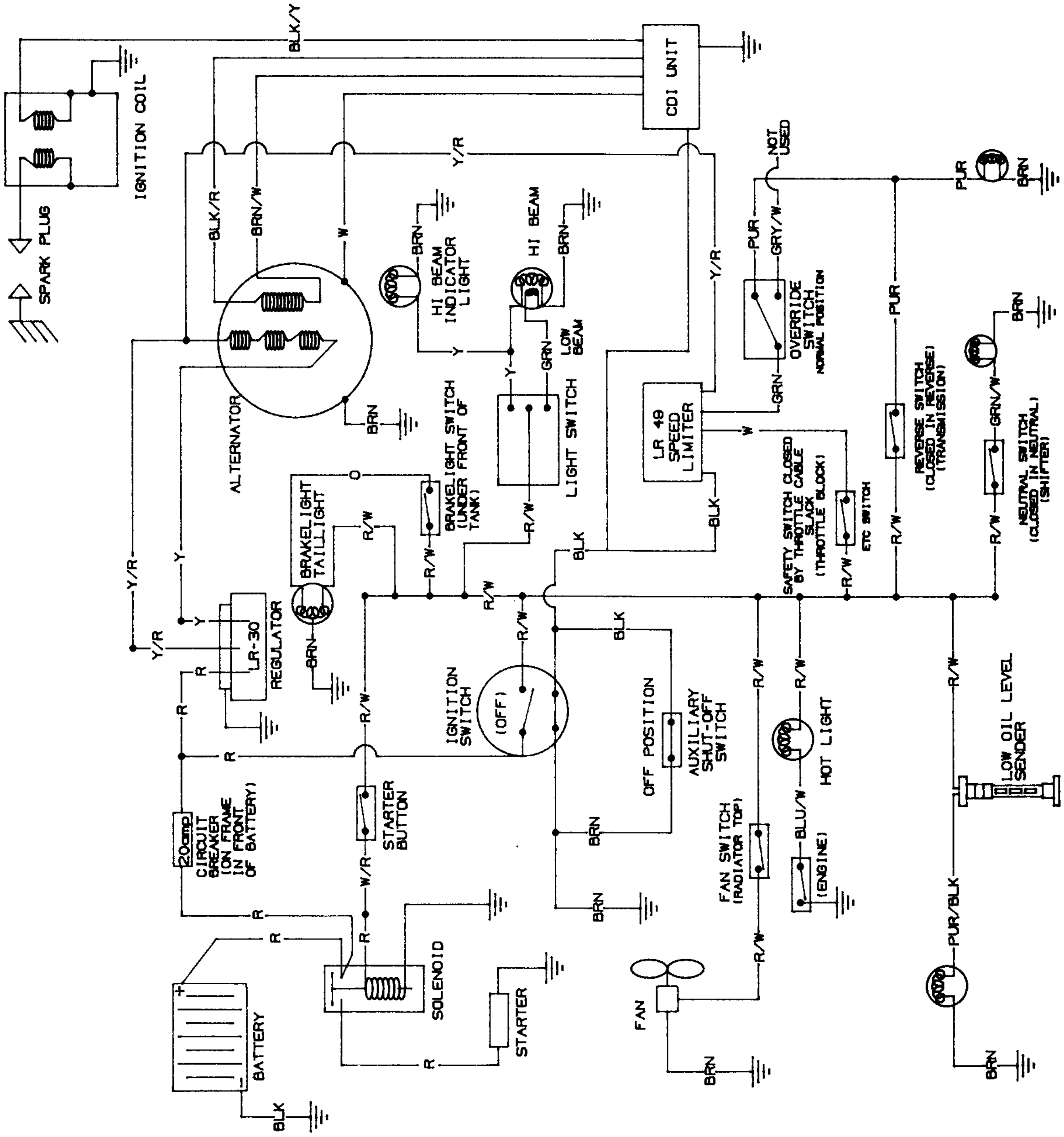


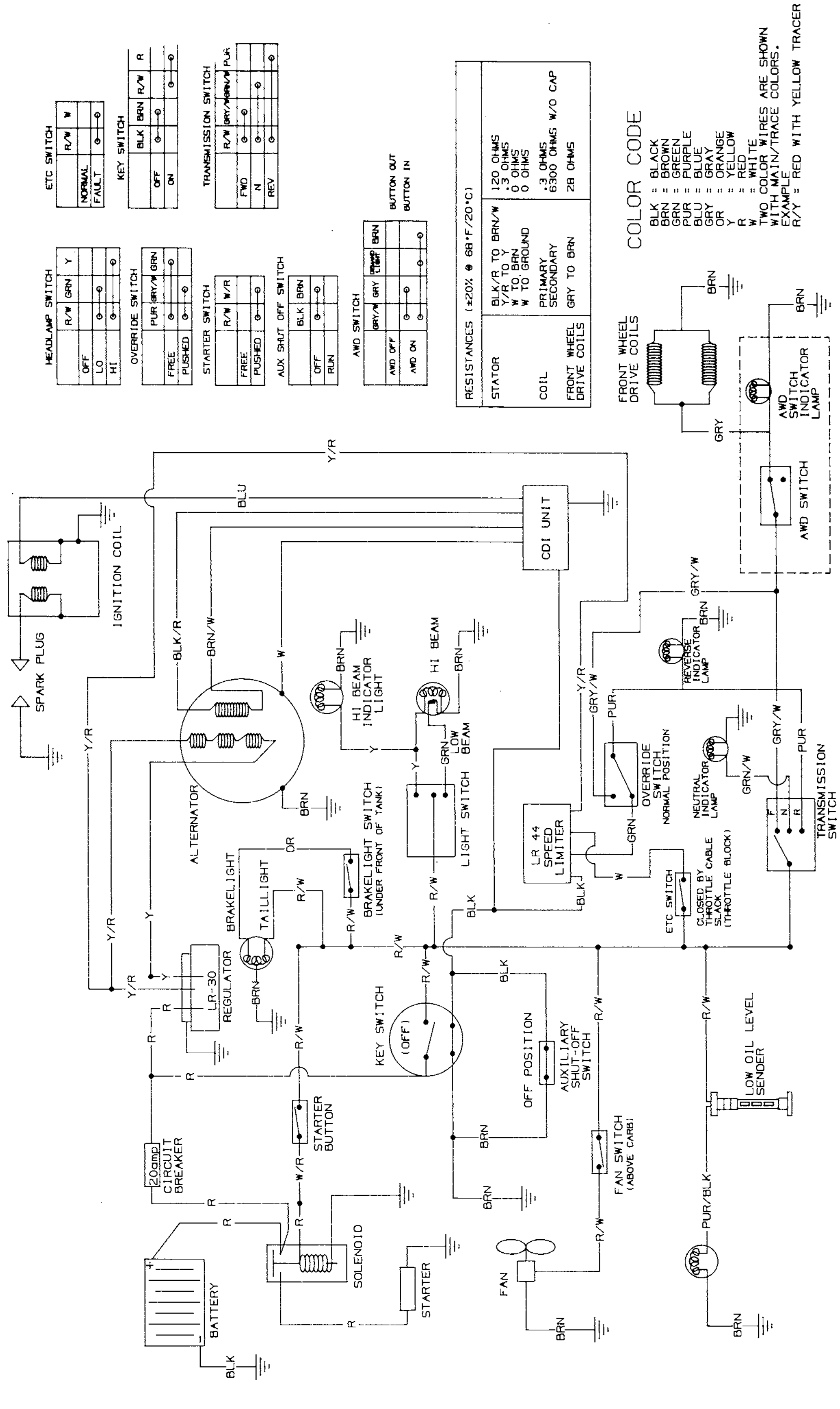
Wiring Schematic - 1994 400L Sport

RESISTANCES		
STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	.3 OHMS
	W TO BRN	0 OHMS
	W TO GROUND	0 OHMS
COIL	PRIMARY	.3 OHMS
	SECONDARY	6300 OHMS W/O CAP

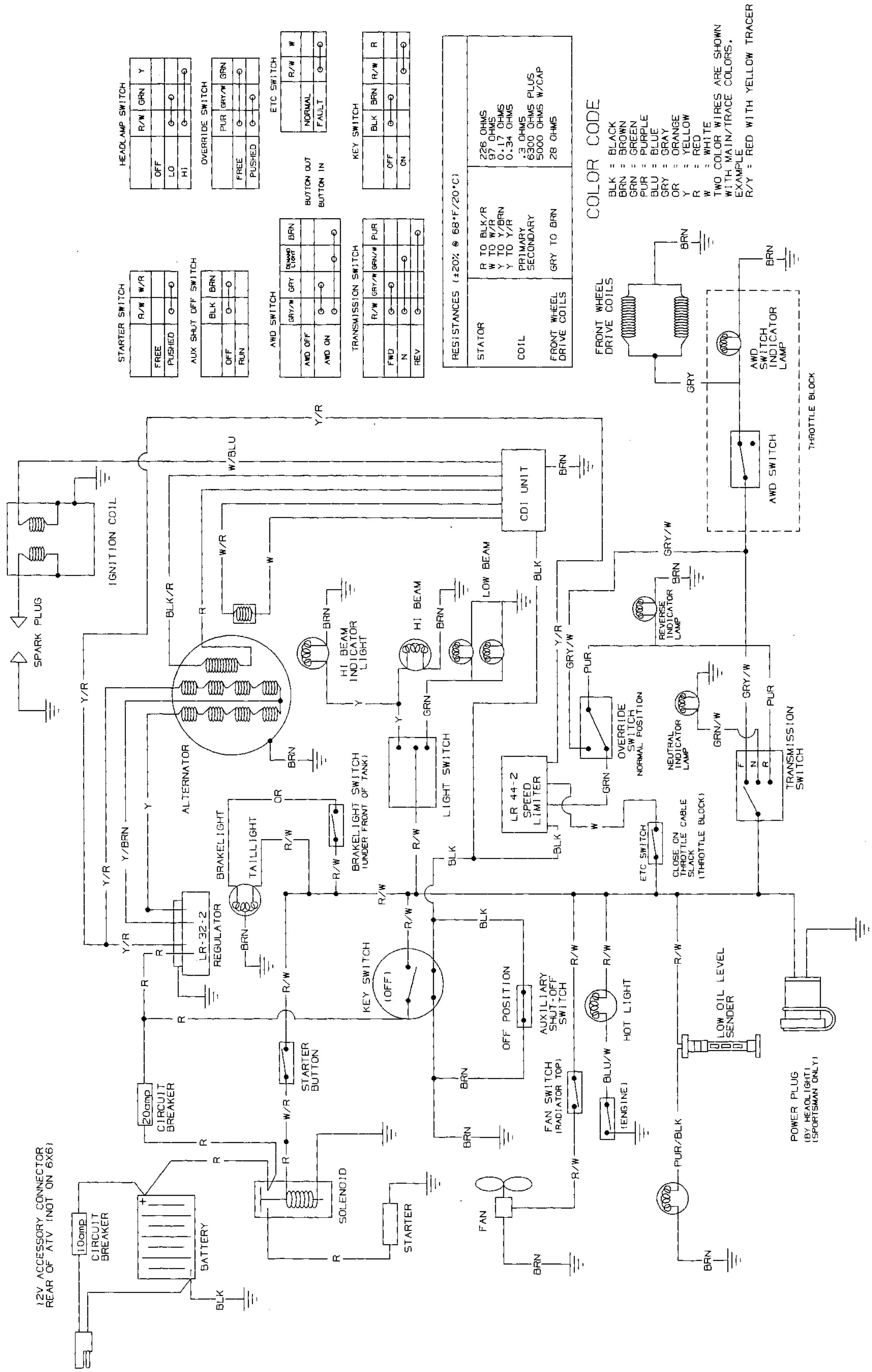
COLOR CODE

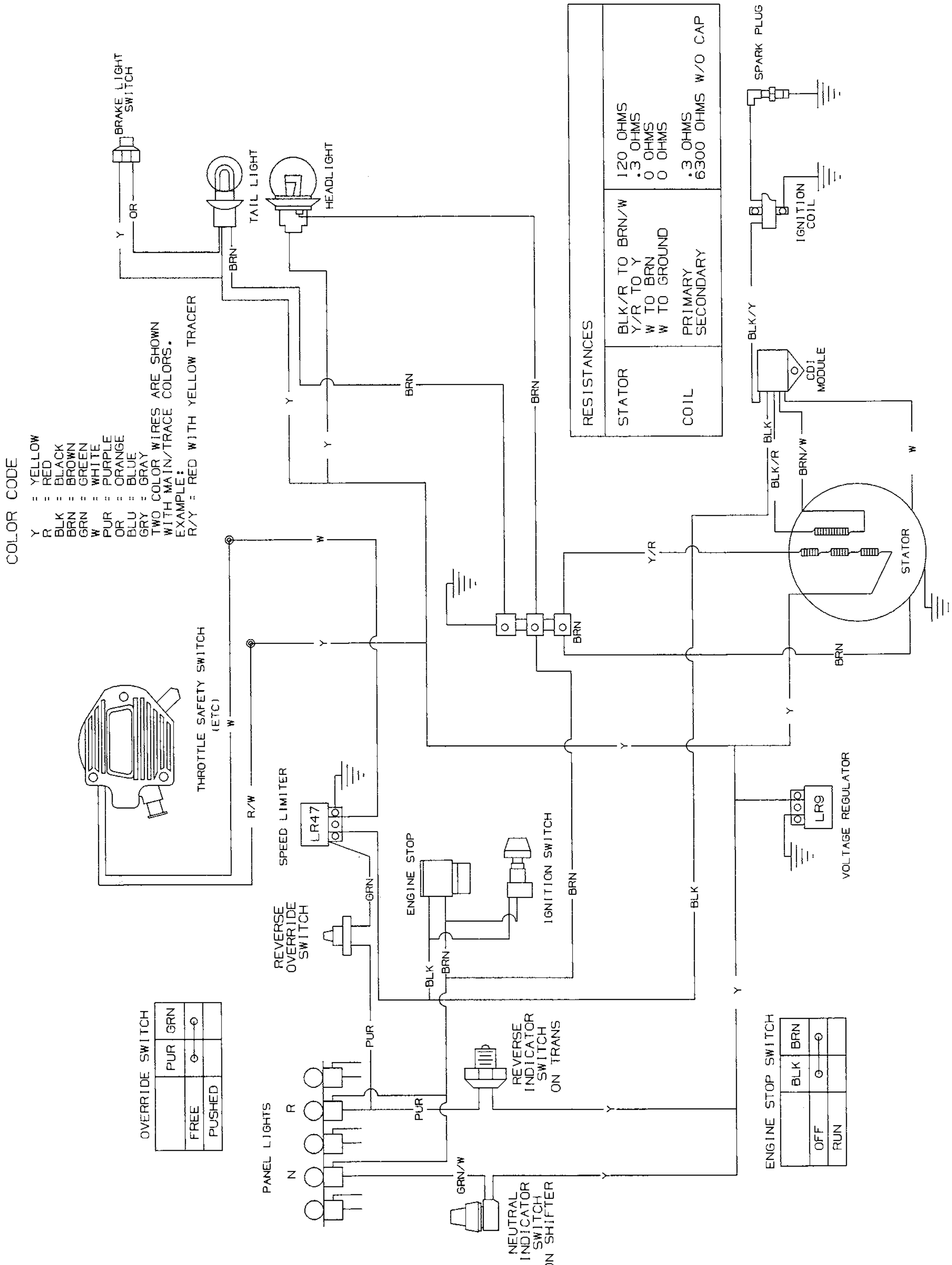
Y = YELLOW
R = RED
BLK = BLACK
BRN = BROWN
GRN = GREEN
W = WHITE
PUR = PURPLE
O = ORANGE
BLU = BLUE
GRY = GRAY
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y = RED WITH YELLOW TRACER




HEADLAMP SWITCH
OFF
LO
HI
R/W
GRN
Y
ETC SWITCH
NORMAL
FAULT
R/W
W
OVERRIDE SWITCH
PUR
GRY/W
GRN
FREE
PUSHED
KEY SWITCH
BLK
BRN
R/W
R
OFF
ON
STARTER SWITCH
R/W
W/R
FREE
PUSHED
TRANSMISSION SWITCH
R/W
GRY/W
GRN/W
PUR
FWD
N
REV
AUX SHUT OFF SWITCH
BLK
BRN
OFF
RUN
AWD SWITCH
GRY/W
GRY
DEMAND LIGHT
BRN
AWD OFF
AWD ON
BUTTON OUT
BUTTON IN
RESISTANCES (±20% @ 68°F/20°C)
STATOR
BLK/R TO BRN/W
Y/R TO Y
W TO BRN
W TO GROUND
120 OHMS
.3 OHMS
0 OHMS
0 OHMS
COIL
PRIMARY
SECONDARY
.3 OHMS
6300 OHMS W/O CAP
FRONT WHEEL DRIVE COILS
GRY TO BRN
28 OHMS
COLOR CODE
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
TWO COLOR WIRES ARE SHOWN
WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y = RED WITH YELLOW TRACER
SPARK PLUG
IGNITION COIL
BATTERY
20amp
CIRCUIT BREAKER
LR-30
REGULATOR
ALTERNATOR
BRAKELIGHT
TAILLIGHT
STARTER BUTTON
SOLENOID
STARTER
KEY SWITCH
(OFF)
BRAKELIGHT SWITCH
(UNDER FRONT OF TANK)
HI BEAM INDICATOR LIGHT
HI BEAM
LOW BEAM
LIGHT SWITCH
CDI UNIT
FAN
OFF POSITION
AUXILIARY SHUT-OFF SWITCH
LR 44 SPEED LIMITER
FAN SWITCH
(ABOVE CARB)
OVERRIDE SWITCH
NORMAL POSITION
ETC SWITCH
CLOSED BY THROTTLE CABLE SLACK
(THROTTLE BLOCK)
NEUTRAL INDICATOR LAMP
REVERSE INDICATOR LAMP
LOW OIL LEVEL SENDER
TRANSMISSION SWITCH
FRONT WHEEL DRIVE COILS
AWD SWITCH
AWD SWITCH INDICATOR LAMP
THROTTLE BLOCK

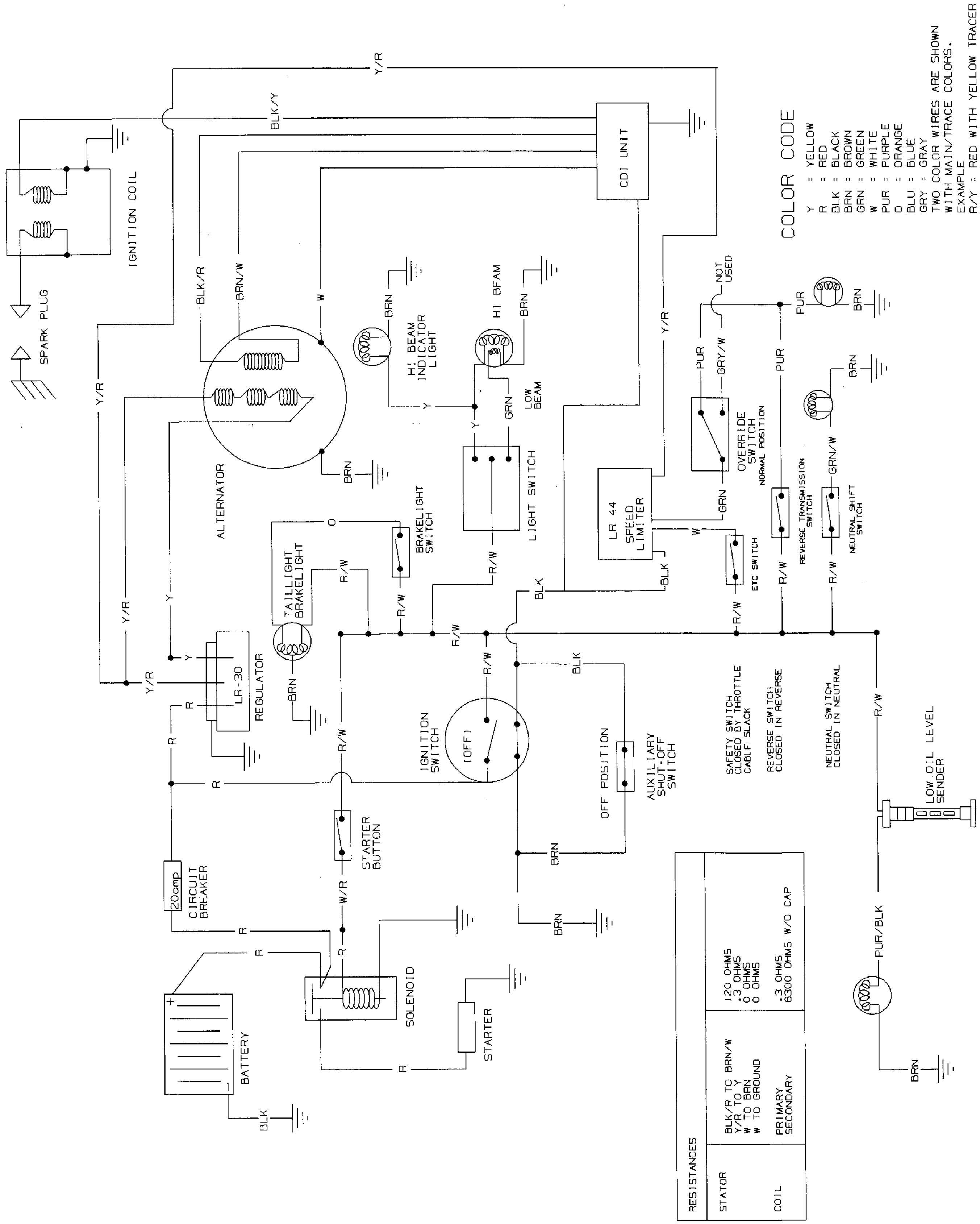
Wiring Schematic - 1994 400L 4x4, Sportsman, 6x6



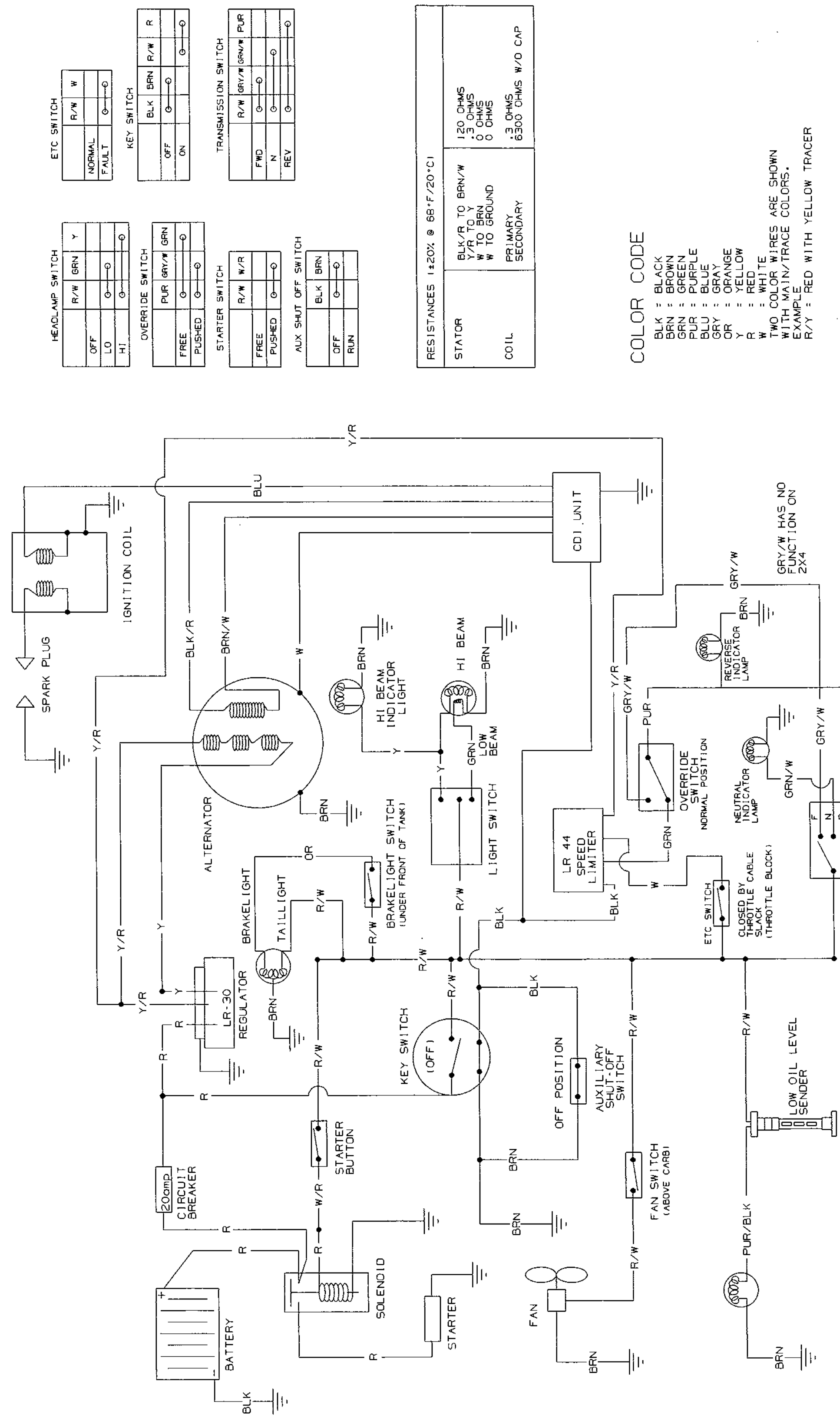


COLOR CODE
Y = YELLOW
R = RED
BLK = BLACK
BRN = BROWN
GRN = GREEN
W = WHITE
PUR = PURPLE
OR = ORANGE
BLU = BLUE
GRY = GRAY
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE:
R/Y = RED WITH YELLOW TRACER
RESISTANCES
STATOR
BLK/R TO BRN/W 120 OHMS
Y/R TO Y .3 OHMS
W TO BRN 0 OHMS
W TO GROUND 0 OHMS
COIL
PRIMARY .3 OHMS
SECONDARY 6300 OHMS W/O CAP
BRAKE LIGHT SWITCH
TAIL LIGHT
HEADLIGHT
SPARK PLUG
IGNITION COIL
CDI MODULE
STATOR
THROTTLE SAFETY SWITCH (ETC)
SPEED LIMITER
LR47
ENGINE STOP
IGNITION SWITCH
VOLTAGE REGULATOR
LR9
REVERSE OVERRIDE SWITCH
REVERSE INDICATOR SWITCH ON TRANS
NEUTRAL INDICATOR SWITCH ON SHIFTER
PANEL LIGHTS
R
N
OVERRIDE SWITCH
PUR GRN
FREE
PUSHED
ENGINE STOP SWITCH
BLK BRN
OFF
RUN

1995 Trail Boss - Wiring Schematic

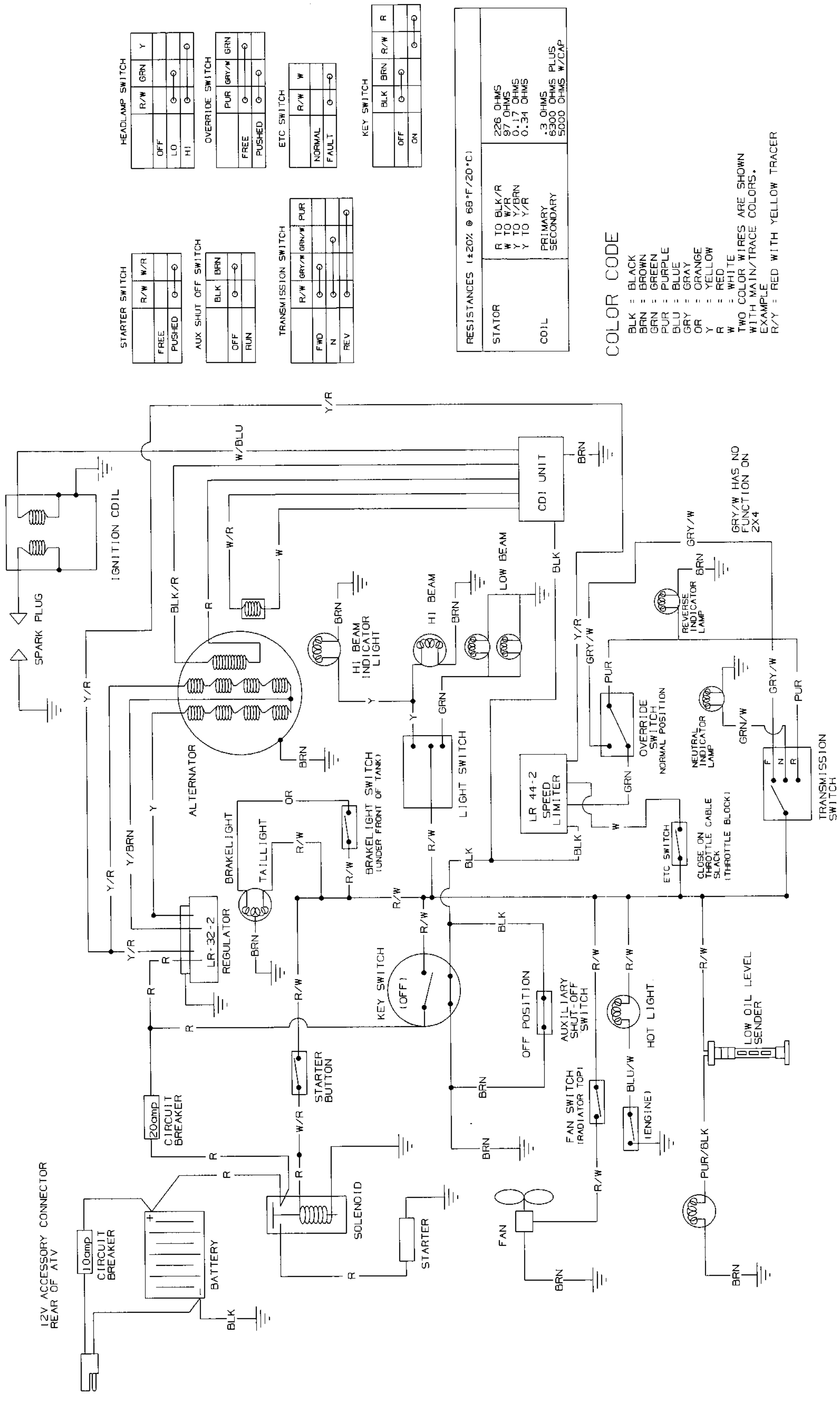


RESISTANCES		
STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	.3 OHMS
	W TO BRN	0 OHMS
	W TO GROUND	0 OHMS
COIL	PRIMARY	.3 OHMS
	SECONDARY	6300 OHMS W/O CAP



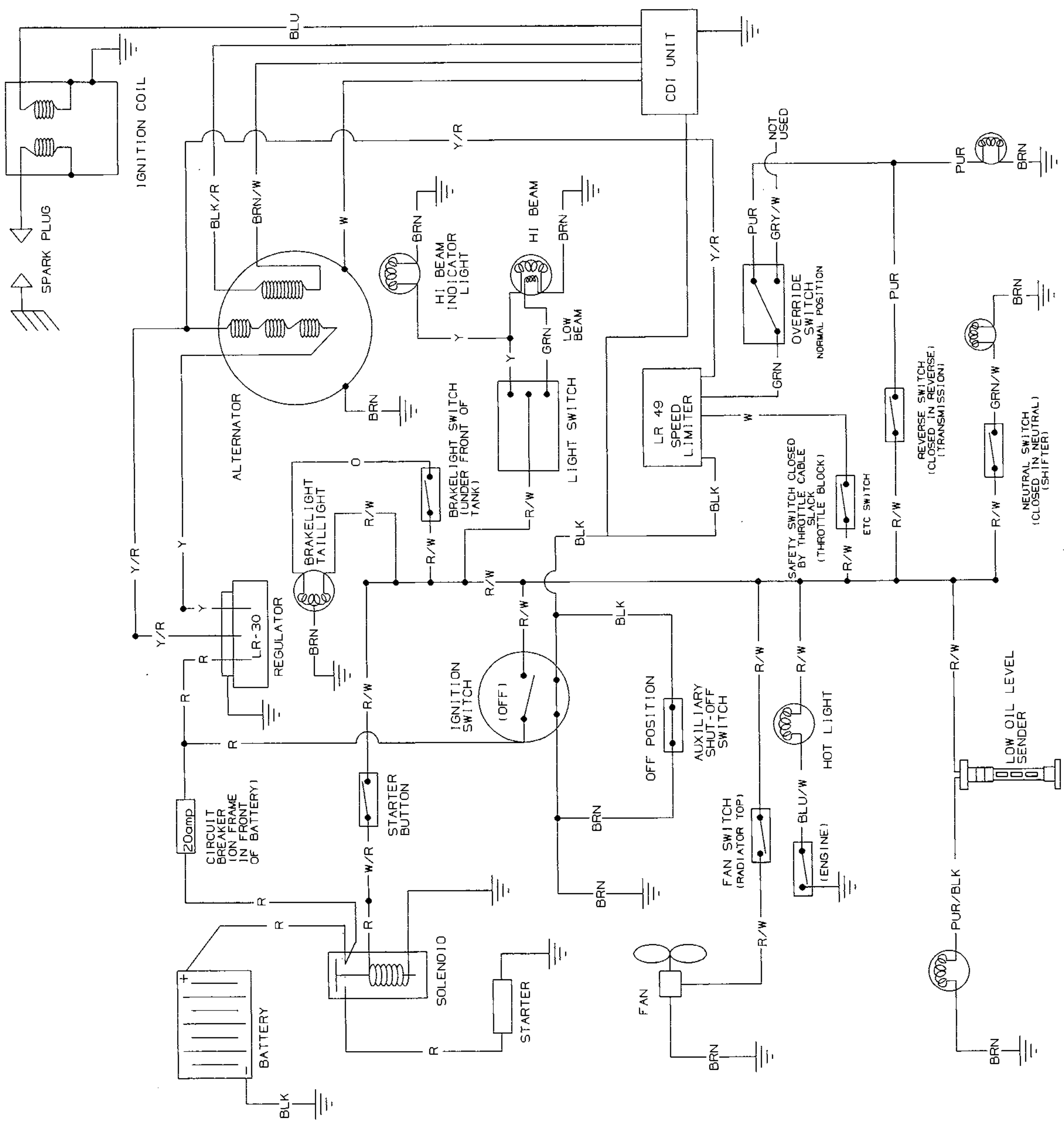
COLOR CODE
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y = RED WITH YELLOW TRACER
RESISTANCES (±20% @ 68°F/20°C)
STATOR
BLK/R TO BRN/W 120 OHMS
Y/R TO Y .3 OHMS
W TO BRN 0 OHMS
W TO GROUND 0 OHMS
COIL
PRIMARY .3 OHMS
SECONDARY 6300 OHMS W/O CAP
GRY/W HAS NO FUNCTION ON 2X4
ETC SWITCH
KEY SWITCH
TRANSMISSION SWITCH
HEADLAMP SWITCH
OVERRIDE SWITCH
STARTER SWITCH
AUX SHUT OFF SWITCH
CDI UNIT
IGNITION COIL
SPARK PLUG
ALTERNATOR
HI BEAM INDICATOR LIGHT
HI BEAM
LOW BEAM
LIGHT SWITCH
LR 44 SPEED LIMITER
REVERSE INDICATOR LAMP
NEUTRAL INDICATOR LAMP
OVERRIDE SWITCH NORMAL POSITION
BRAKELIGHT
TAILLIGHT
BRAKELIGHT SWITCH (UNDER FRONT OF TANK)
LR-30 REGULATOR
KEY SWITCH
AUXILIARY SHUT-OFF SWITCH
OFF POSITION
ETC SWITCH
CLOSED BY THROTTLE CABLE SLACK (THROTTLE BLOCK)
LOW OIL LEVEL SENDER
STARTER BUTTON
20amp CIRCUIT BREAKER
FAN SWITCH (ABOVE CARB)
SOLENOID
STARTER
FAN
BATTERY

1995 400 2x4 - Wiring Schematic

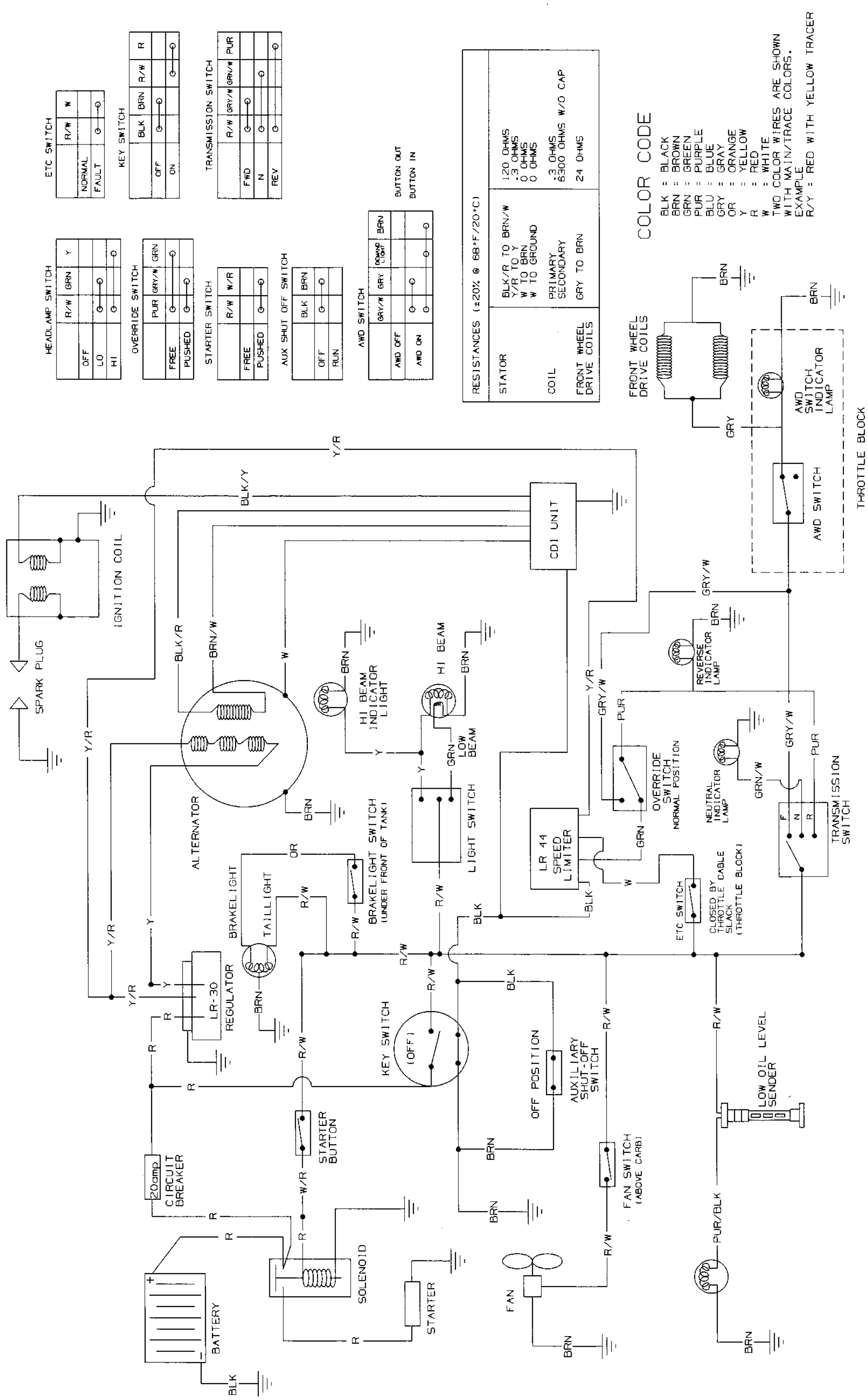


RESISTANCES		
STATOR	BLK/R TO BRN/W	120 OHMS
	Y/R TO Y	.3 OHMS
	W TO BRN	0 OHMS
	W TO GROUND	0 OHMS
COIL	PRIMARY	.3 OHMS
	SECONDARY	6300 OHMS W/O CAP

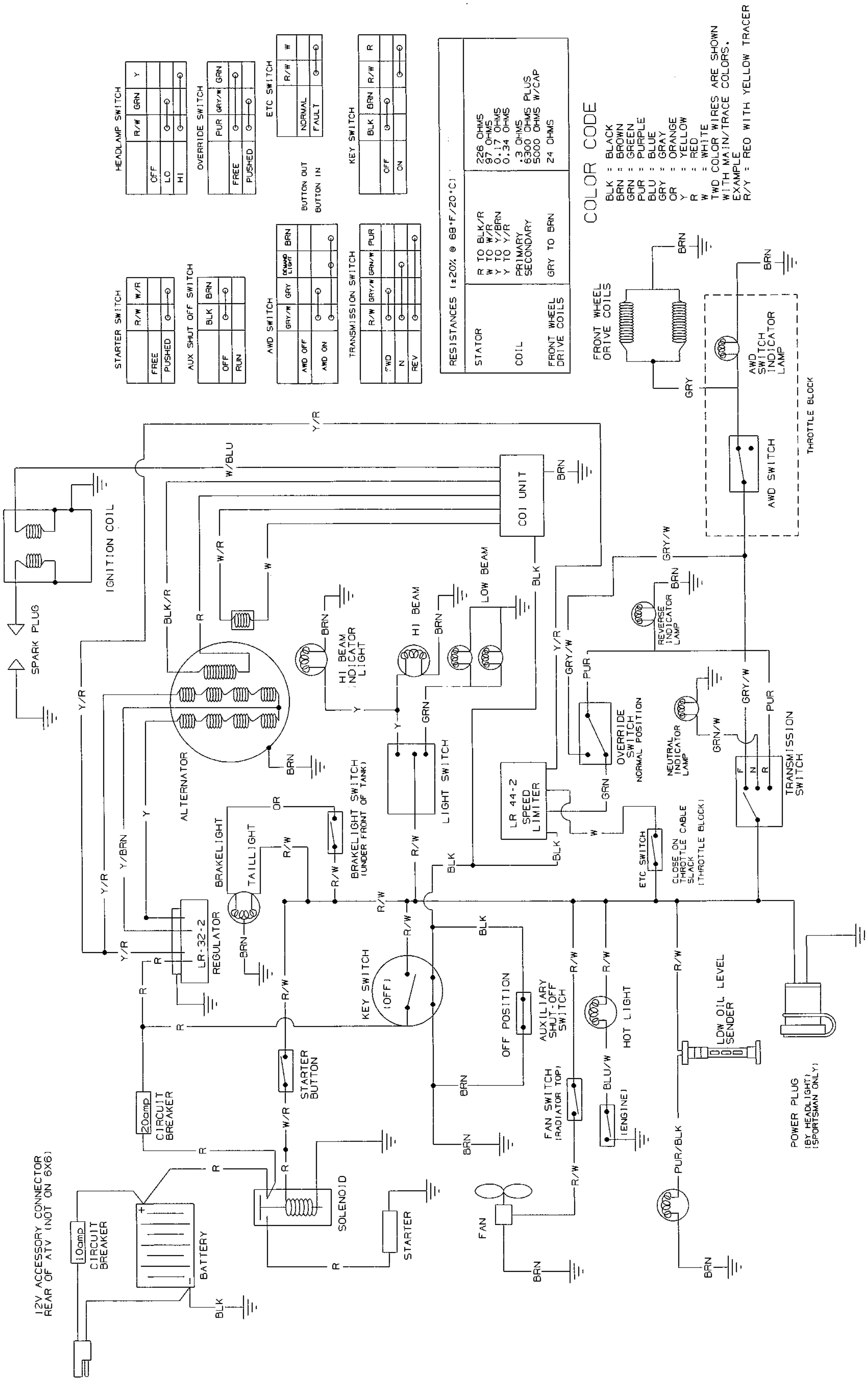
COLOR CODE
Y : YELLOW
R : RED
BLK : BLACK
BRN : BROWN
GRN : GREEN
W : WHITE
PUR : PURPLE
O : ORANGE
BLU : BLUE
GRY : GRAY
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS.
EXAMPLE
R/Y : RED WITH YELLOW TRACER



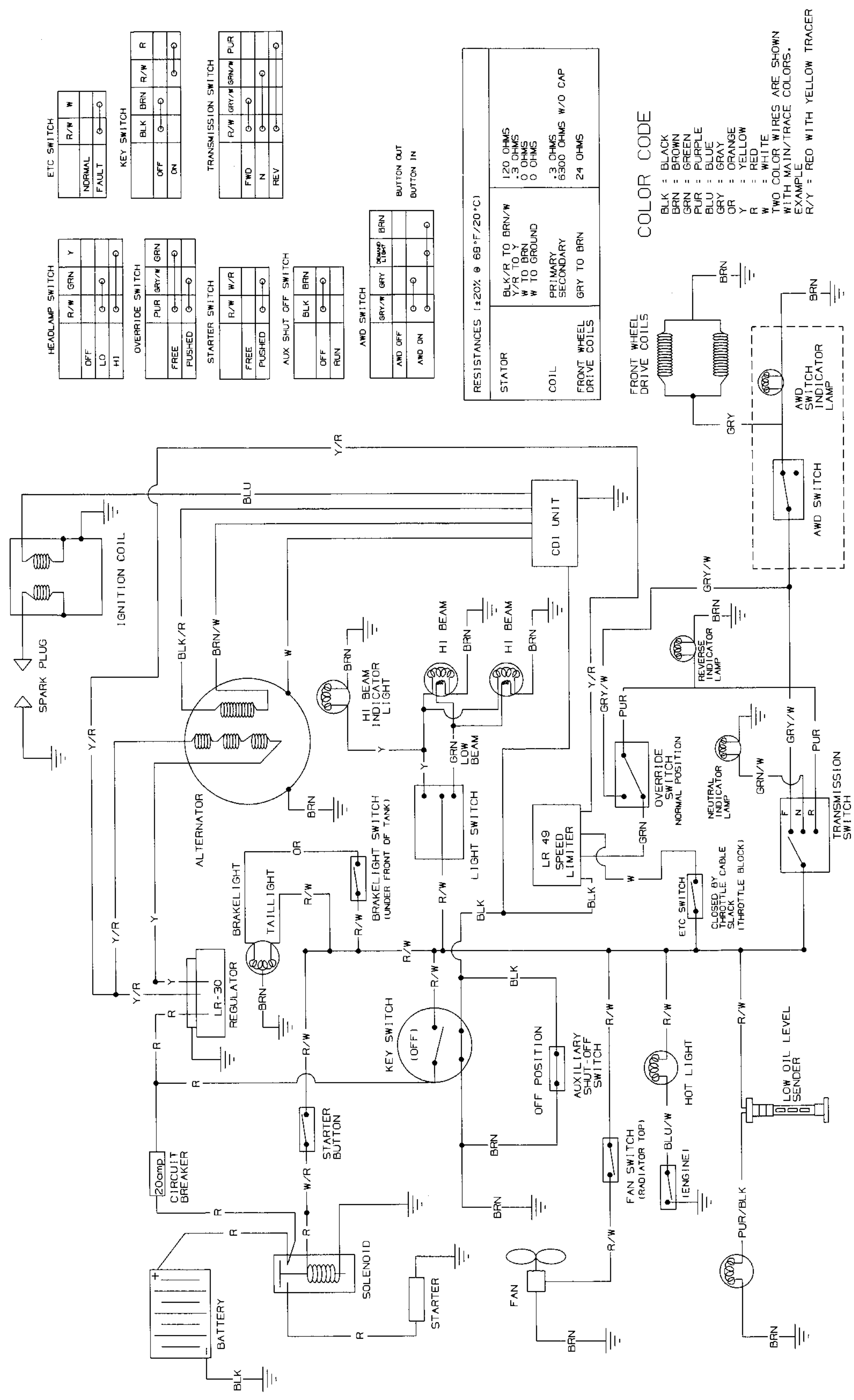
1995 300 4x4 - Wiring Schematic

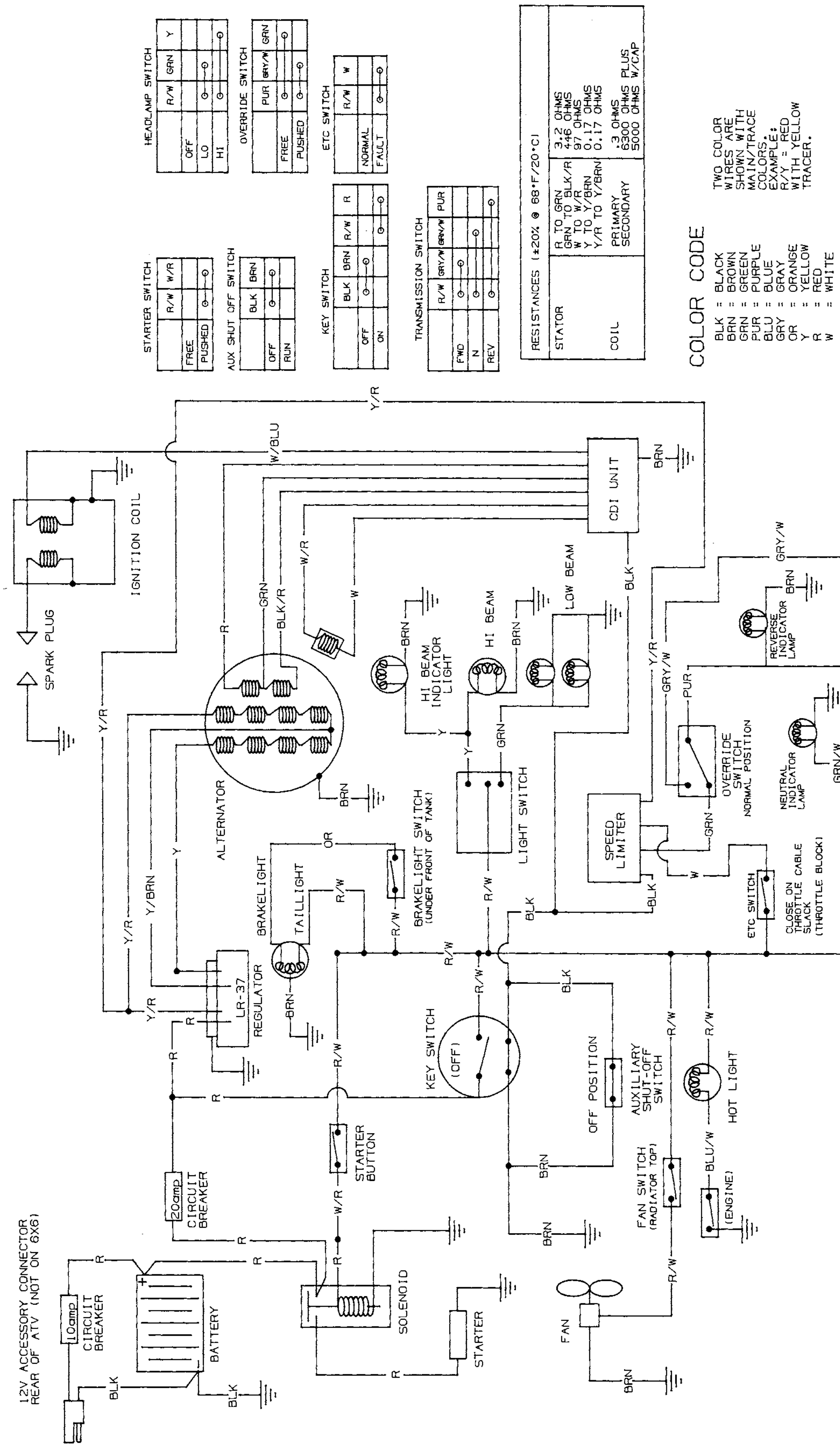


1995 Xplorer 4x4, Sportsman, 400 6x6 - Wiring Schematic



1995 Scrambler - Wiring Schematic




HEADLAMP SWITCH
OFF
LO
HI
OVERRIDE SWITCH
FREE
PUSHED
ETC SWITCH
NORMAL
FAULT
STARTER SWITCH
AUX SHUT OFF SWITCH
KEY SWITCH
TRANSMISSION SWITCH
FWD
N
REV
RESISTANCES (±20% @ 68°F/20°C)
STATOR
R TO GRN 3.2 OHMS
GRN TO BLK/R 446 OHMS
W TO W/R 97 OHMS
Y TO Y/BRN 0.17 OHMS
Y/R TO Y/BRN 0.17 OHMS
COIL
PRIMARY .3 OHMS
SECONDARY 6300 OHMS PLUS 5000 OHMS W/CAP
COLOR CODE
BLK = BLACK
BRN = BROWN
GRN = GREEN
PUR = PURPLE
BLU = BLUE
GRY = GRAY
OR = ORANGE
Y = YELLOW
R = RED
W = WHITE
TWO COLOR WIRES ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: R/Y = RED WITH YELLOW TRACER.
IGNITION COIL
SPARK PLUG
CDI UNIT
ALTERNATOR
HI BEAM INDICATOR LIGHT
HI BEAM
LOW BEAM
REVERSE INDICATOR LAMP
LIGHT SWITCH
SPEED LIMITER
OVERRIDE SWITCH NORMAL POSITION
NEUTRAL INDICATOR LAMP
TRANSMISSION SWITCH
ETC SWITCH
CLOSE ON THROTTLE CABLE SLACK (THROTTLE BLOCK)
BRAKELIGHT
TAILLIGHT
BRAKELIGHT SWITCH (UNDER FRONT OF TANK)
LR-37 REGULATOR
KEY SWITCH (OFF)
OFF POSITION
AUXILIARY SHUT-OFF SWITCH
HOT LIGHT
STARTER BUTTON
20amp CIRCUIT BREAKER
FAN SWITCH (RADIATOR TOP)
(ENGINE)
12V ACCESSORY CONNECTOR REAR OF ATV (NOT ON 6X6)
10amp CIRCUIT BREAKER
BATTERY
SOLENOID
STARTER
FAN

1995 Magnum 4x4 - Wiring Schematic