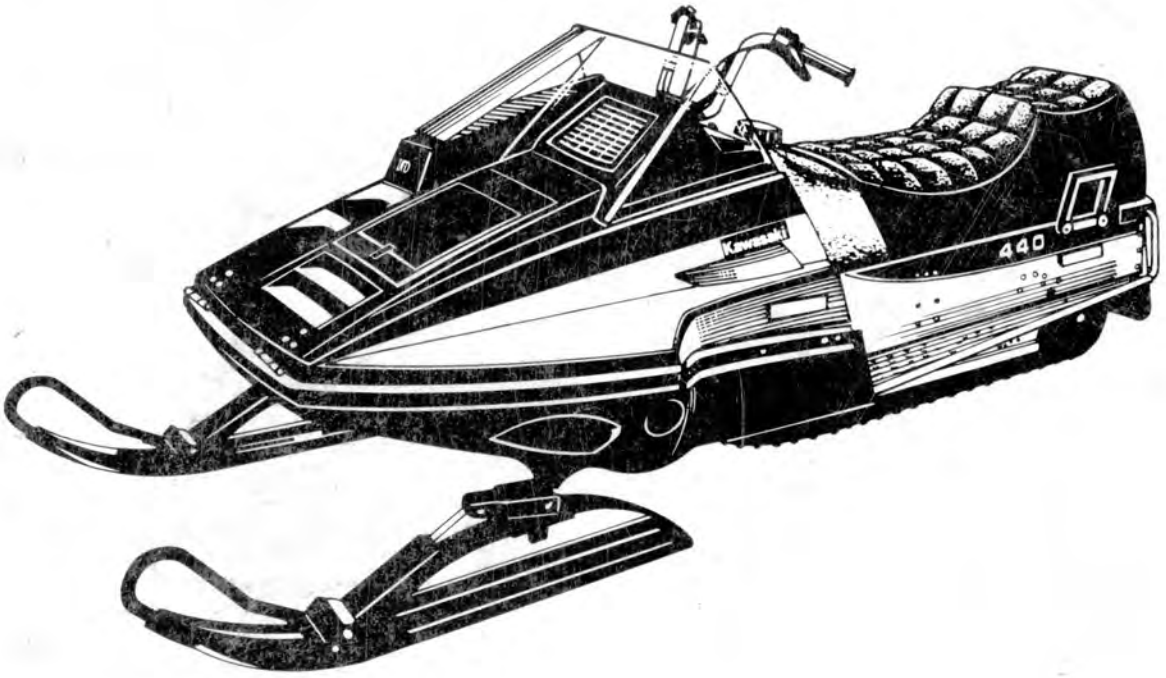
Kawasaki

LTD 440

1982

1-13-82



SNOWMOBILE SHOP MANUAL

QUICK REFERENCE GUIDE

This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired section number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic or procedure required.

SPECIFICATIONS

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GENERAL SPECIFICATIONS

General	LTD 440 (manual)		LTD 440 (electric)
Length	103 in. (2616 mm)		103 in. (2616 mm)
Width	40.5 in. (1029 mm)		40.5 in. (1029 mm)
Height (with windshield)	35.8 in. (909 mm)		35.8 in. (909 mm)
Weight (approximate dry)	455 lb (206 kg)		481 lb (218 kg)

Engine	LTD 440 (manual)		LTD 440 (electric)
Model Number	TC440D-A201		TC440D-A204
Displacement	26.6 C.I. (436 cc)		26.6 C.I. (436 cc)
Bore X Stroke	2.677 X 2.362 in. (68 X 60 mm)		2.677 X 2.362 in. (68 X 60 mm)
Number of Cylinders	2		2
RPM - Full Throttle	8,200		8,200
RPM - Idle	2,500		2,500
Starter	Manual rewind		Electric

Carburetor

Make	Keihin
Model	BD 40-36 with Accelerator Pump
Identification Marking	B 36 AL (left side) B 36 AR (right side)
Type of Carburetor	Open Vent
Pilot Jet	70
Main Jet	98
Power Jet (fuel)	180
Power Air Jet	180
Idle Screw (fuel)	2.5 Turns Open
Accelerator Pump Lever Screw	Flush with Bottom of Lever
Float Valve Seat	0.047 in. (1.2 mm) orifice diameter
Enrichener System	Dual Position Cable
Idle Speed Screw	2,500 RPM (final adjustment)
Float Height	0.590 in. (15 mm) - Carburetor tilted 20° to 30° from vertical to avoid compressing float valve spring. Measured from top of float to carburetor gasket surface.

Drive Converter

Engagement Speed	4,400 RPM (approximate)
Spring P/N and Color	92081-3011 - White (standard) 92081-3001 - Yellow (optional) 92081-3002 - Black (optional) 92081-3004 - Pink (optional) 92081-3005 - Red (optional) 92081-3006 - Blue (optional)
Weight Part Numbers (each ramp)	110G0628 - Bolt, Silver 7.3 grams 92019-008 - Nut 2.3 grams 13042-3001 - Washers (1) 0.5 gram 13042-3002 - Washers (1) 1.0 gram
Ramp Part Number	39152-3007 - Marked "F" 46.5 grams
Total Gram Weight (each ramp)	57.6 grams

Belt	LTD 440 (manual)		LTD 440 (electric)
Part Number	59011-3502		59011-3502
Outside Circumference	46.69±0.19 in. (1,185.9±4.8 mm)		46.69±0.19 in. (1,185.9±4.8 mm)
Width of Top Surface	1.25±0.03 in. (31.7±0.8 mm)		1.25±0.03 in. (31.7±0.8 mm)
Thickness (overall)	0.53±0.03 in. (13.5±0.8 mm)		0.53±0.03 in. (13.5±0.8 mm)
Belt Taper Angle	30° ± 2°		30° ± 2°

Gearing	LTD 440 (manual)		LTD 440 (electric)
Top Sprocket	22 Teeth		22 Teeth
Lower Sprocket	38 Teeth		38 Teeth
Sprocket Overall Ratio	1.73 to 1		1.73 to 1
Chain (Silent Type)	66 Pitch		66 Pitch
Chain Tensioner Spring	Green		Green
Drive Chain Tension	Self Adjusting		Self Adjusting

Electricical Components	LTD 440 (manual)		LTD 440 (electric)
Type	12 VAC, 120 W		12 VDC, 120 W
Headlight-part number	92069-3507		92069-3507
-type	12 V 60/55 W quartz		12 V 60/55 W quartz
Tail/Brake Light	G.E. No. 1157		G.E. No. 1157
Instrument Lights-temperature	G.E. No. 363		G.E. No. 363
-speedometer	G.E. No. 1816		G.E. No. 1816
-tachometer	G.E. No. 1816		G.E. No. 1816
Battery	N/A		12 VOLT 22 ampere hour capacity at 10 hour discharge rate
Electrolyte Volume	N/A		1.5 quarts (1.4 liters)

SERVICE SPECIFICATIONS

Engine

Effective Compression Ratio	7.1 to 1
Piston Pin Diameter	0.7085 - 0.7087 in. (17.995 - 18.000 mm)
Piston Ring End Gap (Top)	0.008 - 0.016 in. (0.2 - 0.4 mm)
Piston Ring End Gap (Bottom)	0.008 -0.016 in. (0.2 - 0.4 mm)
Piston Pin Bore	0.4713 - 0.4803 in. (11.97 - 12.20 mm)
Piston Skirt Clearance	0.002 - 0.004 in. (0.05 - 0.10 mm)
Piston Skirt Diameter	2.6744 - 2.6752 in. (67.931 - 67.950 mm)
Connecting Rod Radial Play	0.0008 - 0.001 in. (0.02 - 0.03 mm)
Connecting Rod Side Clearance	0.016 - 0.020 in. (0.4 - 0.5 mm)
Connecting Rod Small End Diameter	0.9056 - 0.9060 in. (23.003 - 23.014 mm)
Crankshaft End Play (Maximum)	0.008 in. (0.2 mm)
Crankshaft Run Out (Maximum)	0.002 in. T. I. R. (0.05 mm)
Cylinder Bore	2.6774 - 2.6781 in. (68.005 - 68.023 mm)
Cylinder Head Capacity*	18.6cc ± 0.4 cc

*Measured with standard spark plug installed.

Ignition

Spark Plug Gap	0.024 in. (0.6 mm)
Ignition Timing (Dynamic)	21° at 6,500 RPM (engine cold)
Ignition Timing (B.T.D.C.)	0.102 in. (2.61 mm)

MAGNETO RESISTANCE TESTS

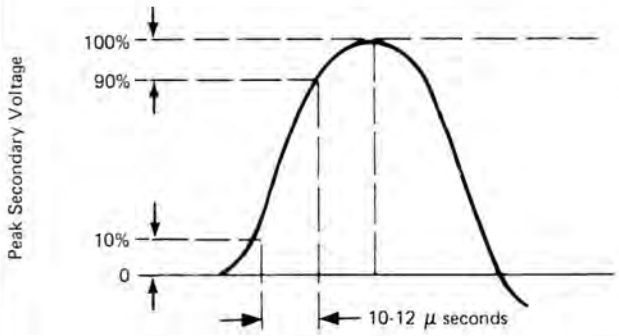
Item	Ohmmeter Leads Connected Between	Resistance
Lighting Coil	Yellow-Yellow	0.19 ohms ± 20%
Exciter Coil	Red-Ground	165 ohms ± 20%
Pulser Coil	Red-White	18.5 ohms ± 20%

IGNITION COIL RESISTANCE TESTS

Item	Ohmmeter Leads Connected Between	Resistance
Primary Winding	Blue-Ground	0.19 ohms ± 20%
+Secondary winding	High Tension-High Tension	6,000 ohms ± 20%

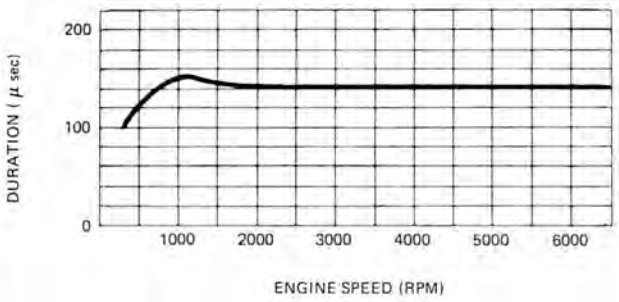
+NOTE: Defective coils cannot always be detected using this test alone. Use of a coil tester which simulates operating conditions is the recommended test method.

IGNITION RISE TIME

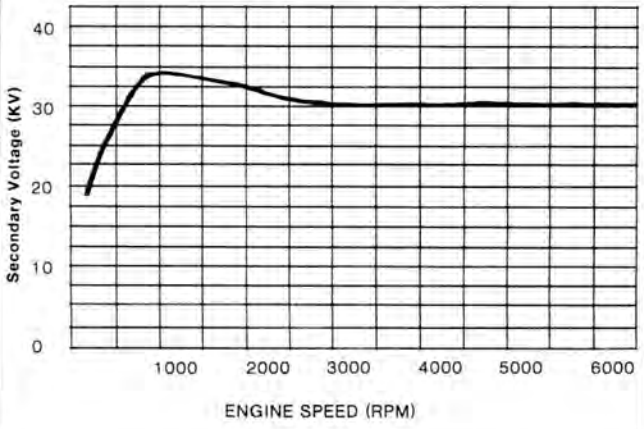


Rise time = time between 10% and 90% of secondary peak voltage

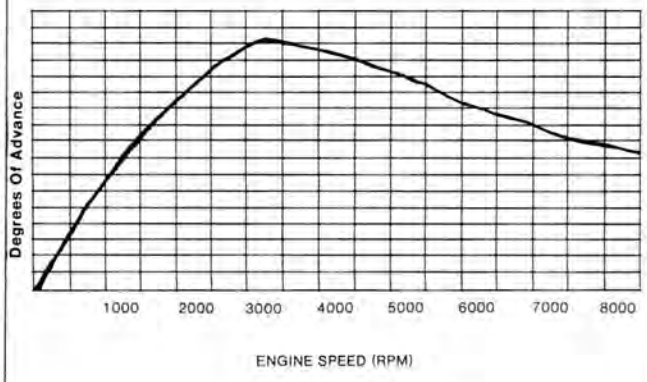
SPARK ARC DURATION



SECONDARY VOLTAGE OUTPUT



IGNITION TIMING CURVE



Chassis

Converter Offset Distance	0.525 to 0.588 in. (13.3 to 14.9 mm)
Converter Center Distance	12 in. (305 mm)
Drive Chain Tension	Self Adjusting
Brake Lever Movement	Self Adjusting
Track Tension	3/4 in. (19 mm) maximum deflection (5 to 8 lb pull)
Steering Alignment	Skis parallel or 1/8 in. toe out
Tie Rod End Adjustment Stud Jam Nut Dimension	1-1/4 in. (32 mm) maximum

Engine Torques	LTD 440 (manual)		LTD 440 (electric)
Cylinder Head	19 ft lb (2.6 kg-m)		19 ft lb (2.6 kg-m)
Cylinder	16 ft lb (2.2 kg-m)		16 ft lb (2.2 kg-m)
Crankcase-6 mm size	70 in. lb (0.8 kg-m)		70 in. lb (0.8 kg-m)
-8 mm size	16 ft lb (2.2 kg-m)		16 ft lb (2.2 kg-m)
Flywheel	72 ft lb (10.0 kg-m)		72 ft lb (10.0 kg-m)
Recoil Starter	70 in. lb (0.8 kg-m)		70 in. lb (0.8 kg-m)
Carburetor Holder to Cylinder	45 in. lb (0.5 kg-m)		45 in. lb (0.5 kg-m)
Gearcase Mounting-6 mm size	60 in. lb (0.7 kg-m)		60 in. lb 0.7 kg-m)
-8 mm size	12 ft lb (1.7 kg-m)		12 ft lb (1.7 kg-m)

TORQUE CHART

DESCRIPTION	QUANTITY LTD 440	SIZE	TORQUE
CONTROLS AND SWITCHES			
Brake lever locking - allen screw	1	8 mm	25 in. lb (0.3 kg-m)
Ignition switch mounting - face nut	1	—	30 in. lb (0.35 kg-m)
Throttle lever locking - allen screw	1	8 mm	25 in. lb (0.3 kg-m)
CABLES			
Brake cable - jam nuts	2	5/16	50 in. lb (0.6 kg-m)
Enrichener cable - jam nut	2	6 mm	20 in. lb (0.2 kg-m)
Enrichener lever mounting - nut	1	—	Hand tighten
Oil pump cable - jam nuts	2	6 mm	20 in. lb (0.2 kg-m)
Speedometer cable	2	—	Hand tighten
Throttle cable - jam nut	1	6 mm	20 in. lb (0.2 kg-m)
HOOD			
Headlamp housing holder to hood - screws	4	#10	25 in. lb (0.3 kg-m)
Hinge bracket to housing holder - screws	4	#10	50 in. lb (0.6 kg-m)
Hood hinge to hood - screws	6	1/4	25 in. lb (0.3 kg-m)
Hood latch band mounting - nuts	4	1/4	Compress rubber
SEAT AND CONSOLE			
Control panel bracket to chassis - nuts	3	1/4	95 in. lb (1.1 kg-m)
Control panel to bracket - screws	2	#10	20 in. lb (0.2 kg-m)
Fuel level gauge panel mounting - screws	4	#10	20 in. lb (0.2 kg-m)
Oil level gauge panel mounting - screws	4	#10	20 in. lb (0.2 kg-m)
Seat to tunnel - bolts	4	1/4	35 in. lb (0.4 kg-m)
STEERING			
Handlebar holder - allen screws	4	1/4	105 in. lb (1.2 kg-m)
Handlebar holder to steering column - bolt	1	3/8	35 ft lb (4.8 kg-m)
Steering arm to spindle - bolt	2	3/8	30 ft lb (3.9 kg-m)
Steering column mount to chassis - bolt	4	5/16	20 ft lb (2.8 kg-m)
Tie rod end - jam nuts	4	3/8	120 in. lb (1.4 kg-m)
Tie rod end to steering arm - nuts	3	3/8	30 ft lb (3.9 kg-m)
Tie rod end to steering column - nut	1	3/8	30 ft lb (3.9 kg-m)
SKI AND SPINDLE			
Shock absorber to ski - nut	2	3/8	31 ft lb (4.0 kg-m)
Shock absorber to ski saddle - nuts	2	3/8	31 ft lb (4.0 kg-m)
Ski saddle to spindle - nut	2	3/8	46 ft lb (5.7 kg-m)
Ski skeg to ski - nuts	6	5/16	120 in. lb (1.4 kg-m)
Ski spring to saddle - nuts	4	3/8	46 ft lb (5.7 kg-m)
Ski spring to ski, front - nut	2	3/8	25 in. lb (0.3 kg-m)
Ski spring to ski, rear - nut	2	3/8	31 ft lb (4.0 kg-m)

TORQUE CHART (CONTINUED)

DESCRIPTION	QUANTITY LTD 440	SIZE	TORQUE
SUSPENSION			
Front pivot shaft to tunnel - bolt	2	3/8	25 ft lb (3.5 kg-m)
Idler wheel shaft mounting - bolt	2	3/8	25 ft lb (3.5 kg-m)
Limiter strap to swing arm - nuts	4	1/4	45 in. lb (0.5 kg-m)
Rail wear strip retaining - nut	2	1/4	25 in. lb (0.3 kg-m)
Rear axle adjusting bolt - jam nut	2	3/8	120 in. lb (1.4 kg-m)
Rear axle locking - bolt	2	3/8	25 ft lb (3.5 kg-m)
Rear limiter strap to pivot arm - nut	1	1/4	45 in. lb (0.5 kg-m)
Rear pivot shaft to tunnel - bolt	2	3/8	25 ft lb (3.5 kg-m)
Rear suspension arm to pivot arm assembly - bolt	2	3/8	25 ft lb (3.5 kg-m)
Idler wheels to rail brackets - nut	4	3/8	25 ft lb (3.5 kg-m)
Rear suspension arm to rail bracket - bolt	2	3/8	25 ft lb (3.5 kg-m)
Suspension brackets to rail - nuts	38	1/4	120 in. lb (1.4 kg-m)
Front spring cam mounting, front - bolt	2	3/8	35 in. lb (0.4 kg-m)
Front spring cam mounting, rear - bolt	2	3/8	120 in. lb (1.4 kg-m)
Rear spring cam mounting - nuts	4	5/16	45 in. lb (0.5 kg-m)
Suspension shock absorber mounting, front - bolt	1	3/8	25 ft lb (3.5 kg-m)
Suspension shock absorber mounting, rear - nut	1	3/8	15 ft lb (1.9 kg-m)
Suspension brace shaft - bolts	2	3/8	25 ft lb (3.5 kg-m)
DRIVE SHAFT			
Bearing housing to tunnel - nuts	3	5/16	12 ft lb (1.7 kg-m)
Locking collar - set screw	2	1/4	70 in. lb (0.8 kg-m)
CHAINCASE AND JACKSHAFT			
Lower sprocket to driveshaft - bolt	1	1/2	35 ft lb (4.8 kg-m)
Top sprocket to jackshaft - bolt	1	5/8	50 ft lb (6.9 kg-m)
Chain tensioner mounting - bolts	2	1/4	70 in. lb (0.8 kg-m)
Chaincase cover mounting - bolts	6	1/4	70 in. lb (0.8 kg-m)
Chaincase drain plug - bolt	1	—	Judgement
Chaincase to chassis - nuts	4	5/16	18 ft lb (2.6 kg-m)
Jackshaft bearing retainer adjusting bolt - jam nut	1	3/8	20 ft lb (2.8 kg-m)
Jackshaft bearing retainer housing - nuts	2	1/4	18 ft lb (2.5 kg-m)
Jackshaft bearing retainer to chassis, front - bolt	1	3/8	19 ft lb (2.6 kg-m)
Jackshaft bearing retainer to chassis, rear - bolt	1	3/8	31 ft lb (4.1 kg-m)
Speedometer drive adaptor	1	—	120 in. lb (1.4 kg-m)
BRAKE			
Brake caliper to chaincase - nuts	2	3/8	35 ft lb (4.8 kg-m)
DRIVEN CONVERTER			
Coupling to fixed sheave - bolts	6	6 mm	120 in. lb (1.4 kg-m)
Cover to movable sheave - screws	16	6 mm	50 in. lb (0.6 kg-m)
Driven converter to jackshaft - bolt	1	5/8	50 ft lb (6.9 kg-m)

TORQUE CHART (CONTINUED)

DESCRIPTION	QUANTITY LTD 440	SIZE	TORQUE
DRIVE CONVERTER			
Cover to movable sheave - bolts	6	6 mm	120 in. lb (1.4 kg-m)
Drive converter to crankshaft - bolt	1	1/2	70 ft lb (9.7 kg-m)
Ramp and pin assembly mounting - bolts	6	6 mm	96 in. lb (1.1 kg-m)
Roller and pin assembly mounting - bolts	6	6 mm	120 in. lb (1.4 kg-m)
Weight ramp assembly - nut (special)	3	6 mm	60 in. lb (0.7 kg-m)
ENGINE MOUNT AND EXHAUST			
Engine mount to chassis, recoil side - nuts	2	3/8	35 ft lb (4.8 kg-m)
Engine to engine mount - allen screws	4	8 mm	12 ft lb (1.7 kg-m)
Exhaust mount damper to bracket - nuts	5	5/16	60 in. lb (0.7 kg-m)
Mount damper to engine mount plate - nuts	6	1/4	120 in. lb (1.4 kg-m)
Exhaust manifold - nuts	4	8 mm	120 in. lb (1.4 kg-m)
CHASSIS			
Bumper trim clamp to brace - nuts	2	1/4	70 in. lb (0.8 kg-m)
Bumper and hood guide to pan - nuts	4	1/4	70 in. lb (0.8 kg-m)
Bumper and hood hinge to pan - nuts	4	1/4	70 in. lb (0.8 kg-m)
Bumper to pan - nuts	7	1/4	70 in. lb (0.8 kg-m)
Fuel pump to tunnel - nuts	2	1/4	35 in. lb (0.4 kg-m)
Outer guide and brace to pan - nuts	4	#10	20 in. lb (0.2 kg-m)
Outer guide and inner guide to pan - nuts	4	#10	20 in. lb (0.2 kg-m)
Rear stay to tunnel - bolt	2	3/8	19 ft lb (2.7 kg-m)
Snow flap spacer mounting - nut	2	1/4	50 in. lb (0.6 kg-m)
Passenger handle grips - nuts	4	5/16	120 in. lb (1.4 kg-m)
HEAT EXCHANGER AND DUCT			
Heat exchanger (radiator) to duct - nuts	4	1/4	45 in. lb (0.5 kg-m)
Radiator duct brace to chaincase - bolt	1	1/4	60 in. lb (0.7 kg-m)
Radiator duct brace to chassis - bolts	2	5/16	18 ft lb (2.5 kg-m)
Radiator duct to brace - nut	4	1/4	95 in. lb (1.1 kg-m)
Heat exchanger cover	26	#10	50 in. lb (0.6 kg-m)
ENGINE GEARCASE			
Gearcase drain plug - bolt	1	6 mm	50 in. lb (0.6 kg-m)
Gearcase fill plug - bolt	1	8 mm	96 in. lb (1.1 kg-m)
Gearcase mounting - bolts	3	6 mm	60 in. lb (0.7 kg-m)
Gearcase mounting - bolts	2	8 mm	12 ft lb (1.7 kg-m)
ENGINE LIQUID COOLING SYSTEM			
Thermostat housing mounting - bolts	3	6 mm	60 in. lb (0.7 kg-m)
Thermostat housing vent plug - bolt	1	8 mm	12 ft lb (1.7 kg-m)

TORQUE CHART (CONTINUED)

DESCRIPTION	QUANTITY LTD 440	SIZE	TORQUE
ENGINE LUBRICATION SYSTEM			
Elbow fitting to oil tank	3	–	Judgement
Oil pump inlet plate mounting - screws	4	4 mm	13 in. lb (0.15 kg-m)
Oil pump mounting - bolts	3	6 mm	60 in. lb (0.7 kg-m)
Oil pump outlet nozzles	3	8 mm	50 in. lb (0.6 kg-m)
CYLINDER HEAD AND CYLINDER			
Carburetor holder to cylinder - bolts	4	8 mm	45 in. lb (0.5 kg-m)
Cylinder head mounting - bolts	12	8 mm	19 ft lb (2.6 kg-m)
Cylinder mounting - bolts	8	8 mm	16 ft lb (2.2 kg-m)
CRANKCASE			
Lower crankcase to upper - bolt	1	6 mm	70 in. lb (0.8 kg-m)
Lower crankcase to upper - bolt	9	8 mm	16 ft lb (2.2 kg-m)
Lower crankcase to upper - nut	4	8 mm	16 ft lb (2.2 kg-m)
PISTON AND CRANKSHAFT			
Flywheel mounting - nut	1	18 mm	72 ft lb (10.0 kg-m)
RECOIL STARTER			
Pawl retainer to rope reel - bolt	1	8 mm	11 ft lb (1.6 kg-m)
Recoil assembly mounting - bolt	3	6 mm	70 in. lb (0.8 kg-m)
Starter pulley to flywheel - bolts	3	6 mm	70 in. lb (0.8 kg-m)
MAGNETO			
CDI igniter mounting	2	1/4	60 in. lb (0.7 kg-m)
Ignition coil mounting - screws	4	6 mm	70 in. lb (0.8 kg-m)
Stator plate mounting - screw	2	5 mm	30 in. lb (0.35 kg-m)

GEAR RATIO CHART

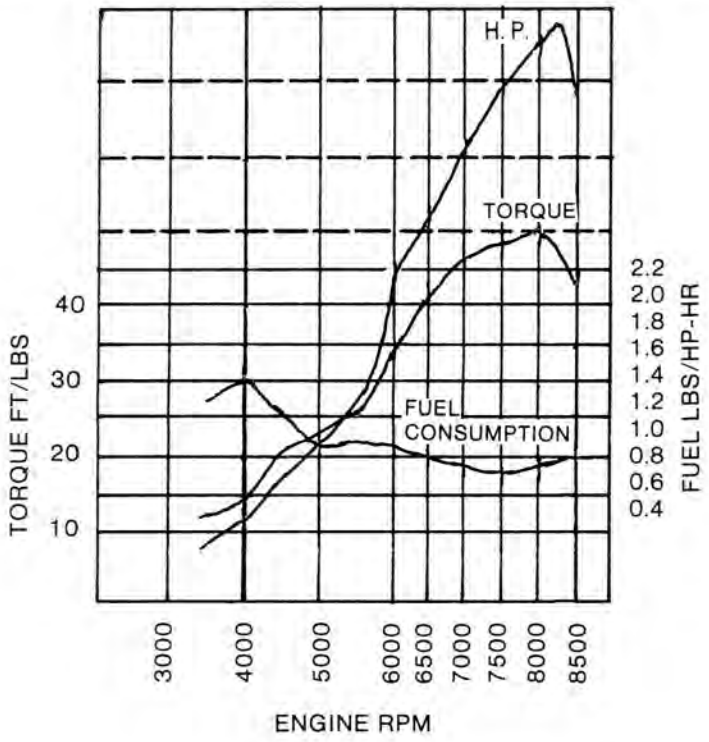
DRIVEN SPROCKET – NUMBER OF TEETH	Drive Sprocket - Number of Teeth						
	17	18	19	20	21	22	
36			1.90 *86 MPH 64 Red	1.80 *91 MPH 64 Pink			Gear Ratio Speed Chain Pitch Tensioner Spring
37	2.18 *75 MPH 64 Red	2.06 *79 MPH 64 Pink	1.95 *84 MPH 64 Green		1.76 *93 MPH 66 Red	1.68 *97 MPH 66 Pink	Gear Ratio Speed Chain Pitch Tensioner Spring
38	2.24 *73 MPH 64 Pink	2.11 *77 MPH 64 Green		1.90 *86 MPH 66 Red	1.81 *90 MPH 66 Pink	1.73 *94 MPH 66 Green (Standard)	Gear Ratio Speed Chain Pitch Tensioner Spring
39			2.05 *80 MPH 66 Red	1.95 *84 MPH 66 Pink	1.86 *88 MPH 66 Green		Gear Ratio Speed Chain Pitch Tensioner Spring
40	2.35 *69 MPH 66 Pink	2.22 *73 MPH 66 Pink	2.11 *77 MPH 66 Green	2.00 *82 MPH 66 Green			Gear Ratio Speed Chain Pitch Tensioner Spring

*Theoretical MPH at 8,200 R.P.M.
NOTE: All top speeds based on .96 overdrive in converter and engine RPM at 8,200.

CHAIN TENSIONER SPRINGS

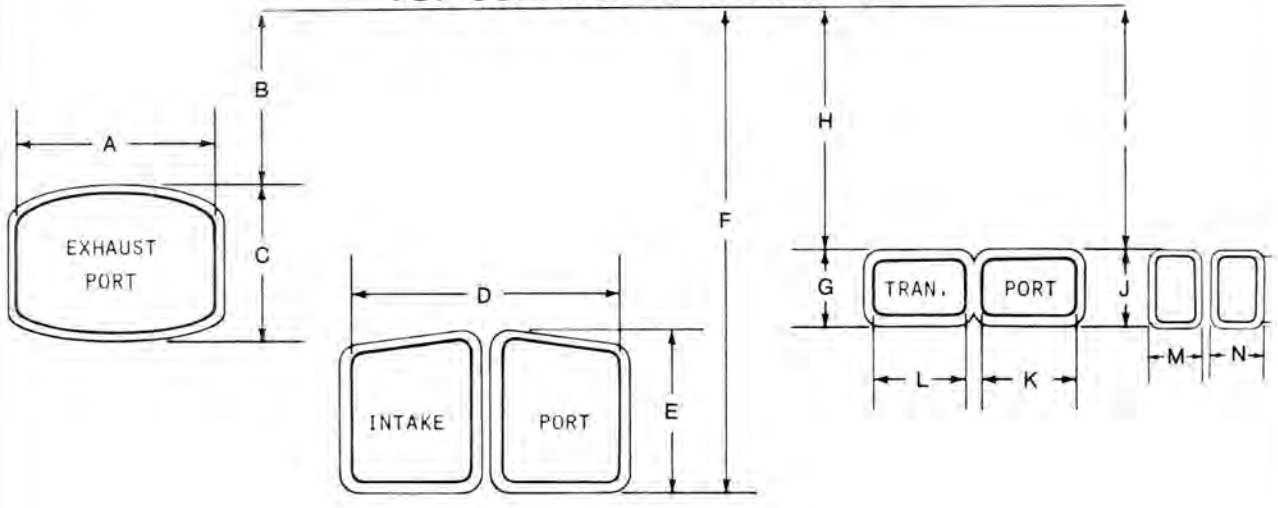
Color	Length	Wire Dia.
Black	2.50 in. (63.50 mm)	0.049 in. (1.245 mm)
White	2.50 in. (63.50 mm)	0.055 in. (1.397 mm)
Red	3.00 in. (76.20 mm)	0.049 in. (1.245 mm)
Orange	3.00 in. (76.20 mm)	0.055 in. (1.397 mm)
Pink	3.38 in. (85.85 mm)	0.049 in. (1.245 mm)
Yellow	3.38 in. (85.85 mm)	0.055 in. (1.397 mm)
Green	3.75 in. (95.25 mm)	0.049 in. (1.245 mm)
Blue	3.75 in. (95.25 mm)	0.055 in. (1.397 mm)

ENGINE PERFORMANCE CURVE



PORT DIMENSIONS

TOP SURFACE OF CYLINDER



A = 1.575 in. (40.0mm)
B = 1.169 in. (29.7mm)
C = 1.283 in. (32.6mm)
D = 1.969 in. (50.0mm)
E = 1.343 in. (34.1mm)
F = 3.929 in. (99.8mm)
G = 0.575 in. (14.6mm)

H = 1.878 in. (47.7mm)
I = 1.878 in. (47.7mm)
J = 0.575 in. (14.6mm)
K = 0.650 in. (16.5mm)
L = 0.551 in. (14.0mm)
M = 0.441 in. (11.2mm)
N = 0.307 in. (7.8mm)

NOTE: Port width does not include the chamfer. Port height and height location includes the chamfer. Port Chamfer = 0.031 in. (0.8 mm)

MAINTENANCE

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MAINTENANCE CHART

Operation / Frequency	Beginning of Each Season	First 80 to 160 km 5-10 Hours Use	Every 480 km or 20 Hours Use	Every 960 km or 40 Hours Use	Every 1450 km or 60 Hours Use	End of Each Season
Spark Plugs - replace	X					
Carburetor - check adjustment	X	X				
Throttle cable - adjust	X	X		X		
Oil Pump cable - adjust	X	X		X		
Enrichener cable - adjust	X	X		X		
Filters, fuel & oil - replace	X					
Ignition timing - check		X				
Drive belt - replace	X			X		
Converter alignment - check	X				X	
Converter bushing wear - check					X	
Converters - clean & inspect						X
Drive converter mount bolt - Torque	X	X		X		
Chain tensioner guides - check	X				X	
Chaincase lubricant - check	X		X			
Track, tension & alignment - check	X	X	X			
Ski alignment - check	X			X		
Brake adjustment - check		X	X			
Ski skegs - check wear	X		X			
Coolant pump/gearcase - lubricant level & vent hole - check	X		X			
Coolant pump/gearcase - change lubricant		X				X
Fasteners - check torque (Use torque chart as guide)	X				X	
Suspension wear strips - check	X		X			
Suspension spring cams - replace					X	
Headlight - adjust	X					
Coolant level & freeze protection - check	X	X	X			X
Cylinder head - check torque	X	X				
Battery electrolyte level - check	X		X			X
Battery - charge (once a month during storage)	X					X
Tune Up						X

BRAKE SYSTEM

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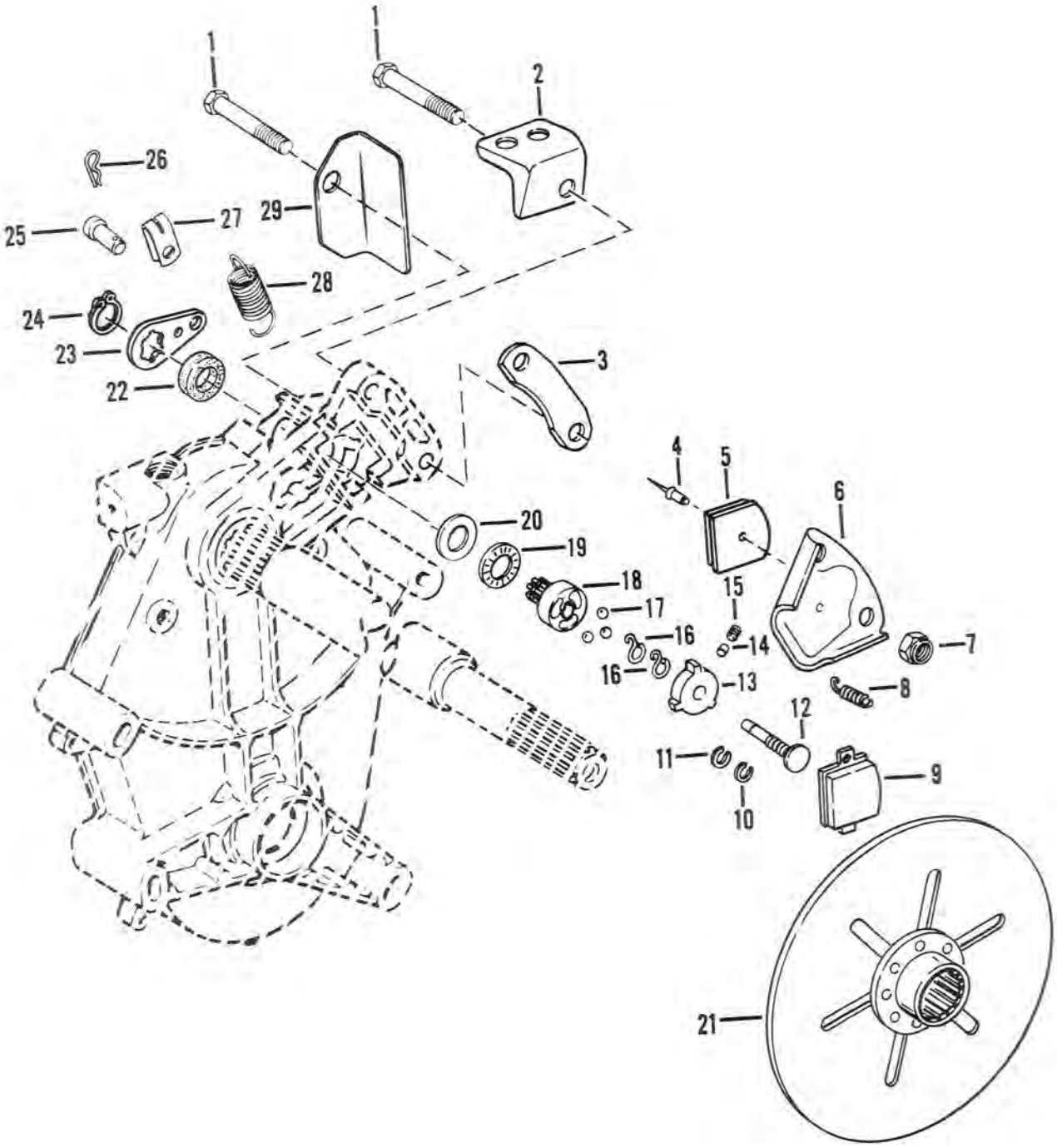
BRAKE



1 BOLT, 3/8-24 x 2.00
2 BRACKET, brake cable
3 SPACER, caliper
4 RIVET
5 PAD
6 CALIPER
7 NUT, insert, 3/8-24
8 SPRING, pad return
9 PAD, movable
10 RING
11 RING, retaining
12 SHAFT, brake
13 STATOR
14 PLUG, friction
15 SCREW, friction plug
16 SPRING, torsion
17 BALL
18 ROTOR
19 BEARING, thrust
20 WASHER, thrust
21 DISC ASSY, brake
22 WASHER, special neoprene
23 LEVER, brake
24 RING, snap
25 PIN, clevis
26 PIN, hair
27 RETAINER, clevis
28 SPRING, brake return
29 GUARD, brake disc

BRAKE

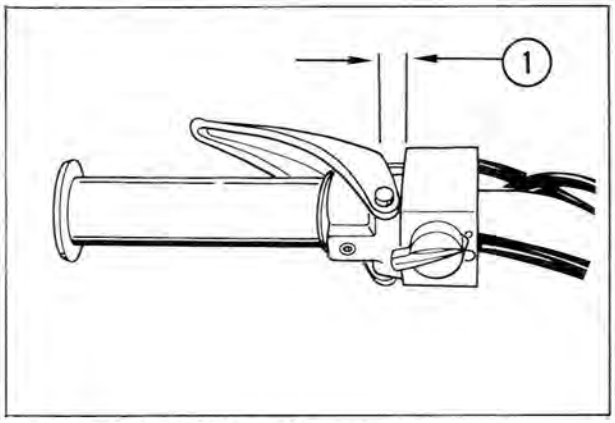
Braking action is applied to the brake disc by a mechanically operated caliper. The brake disc and hub assembly float (free left to right movement) on the jackshaft to maintain proper alignment between the brake caliper pads. This movement may cause a rattling sound during vehicle operation which is normal.

Brake Adjustment

WARNING **Improper brake adjustment may cause brake failure leading to possible personal injury and damage to snowmobile or its components.**

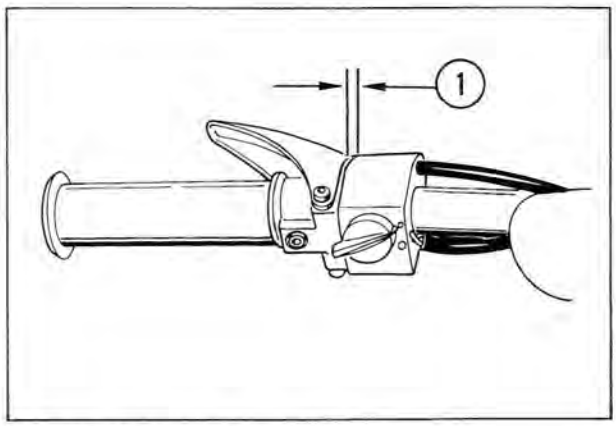
This model is equipped with a self-adjusting disc brake. To check for proper adjustment:

1. Apply the brake firmly and measure the lever movement which should be no greater than 3/4 in. (19mm).



1. 3/4 in. (19 mm) Brake Applied.

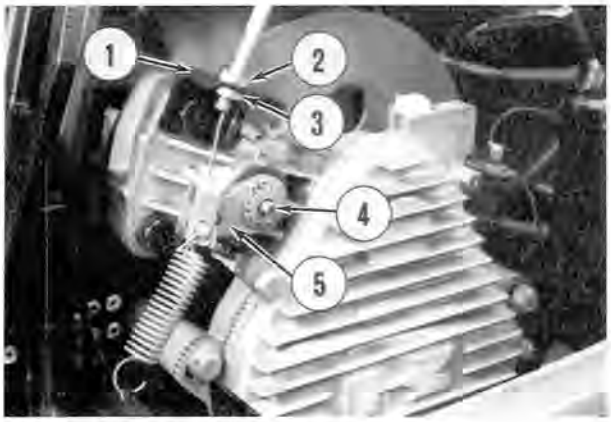
2. Release the brake handle and measure distance.
   - This dimension should be no greater than 1/8 in. (3.2 mm).



1. 1/8 in. (3.2 mm) Brake Released.

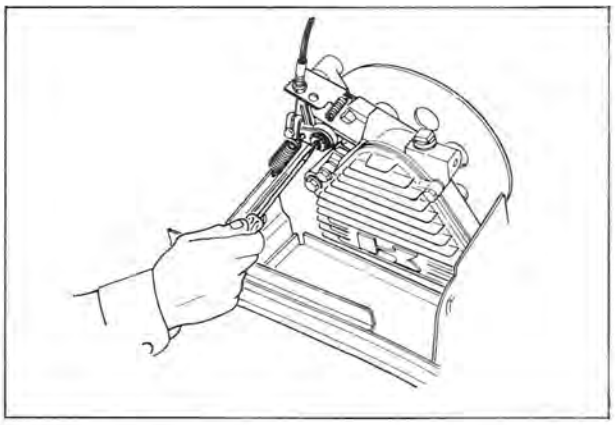
If necessary, adjust brake as follows:

1. Back both brake cable jam nuts away from bracket about 1/4 in. (6.4 mm).



1. Brake Cable Bracket.
2. Upper Jam Nut.
3. Lower Jam Nut.
4. Adjusting Screw
5. Brake Lever

2. Remove cable slack.
   - Pull brake cable upward without moving brake cam lever and snug upper jam nut to bracket.
3. Turn lower jam nut up to bracket and torque both jam nuts to 50 in.lb (0.6 kg-m).
4. Check handlebar brake lever for correct dimension with brake released.
5. Apply brake firmly and turn manual adjuster until correct measurement of 3/4 in. (19 mm) at brake lever is achieved.

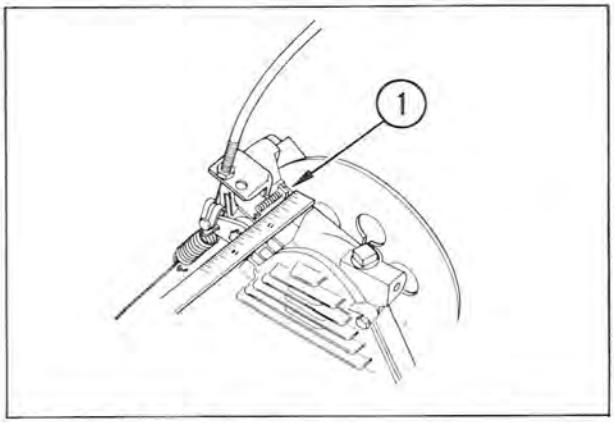


NOTE: Clockwise rotation of the adjuster screw increases the handlebar brake lever measurement, and counter-clockwise rotation decreases the measurement.

6. Perform Brake Pad Wear Inspection.

Brake Pad Wear Inspection

1. Measure movable brake pad thickness.
   - Apply brake firmly.
   - Measure pad thickness from outer surface of brake pad tab to brake disc.



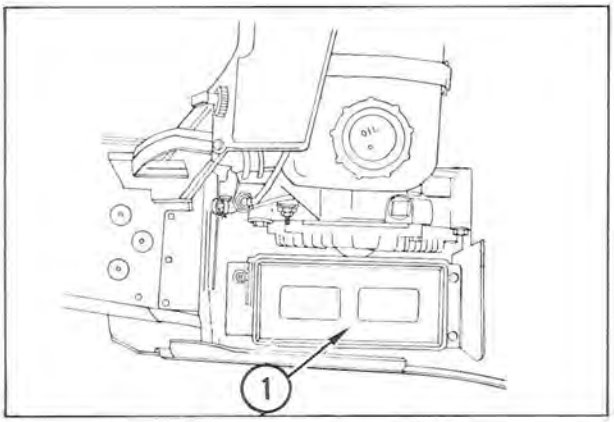
1. 1/4 in. (6.4 mm) Minimum.

2. If measurement is less than 1/4 in. (6.4 mm) replace both brake pads.
   - Refer to Brake Pad Replacement procedure.

Brake Disassembly

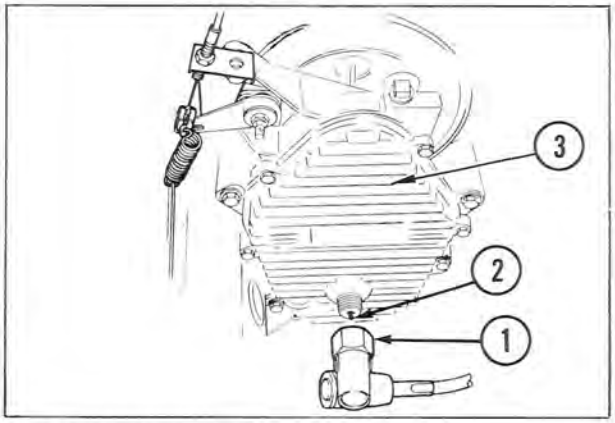
NOTE: Before disassembling self adjusting brake, check brake pad wear. Refer to Brake Pad Wear Inspection procedure.

1. Remove battery (electric start models only).
   - Refer to Battery Removal procedure.
2. Remove lower battery bracket.
   - Unfasten mounting bolts.



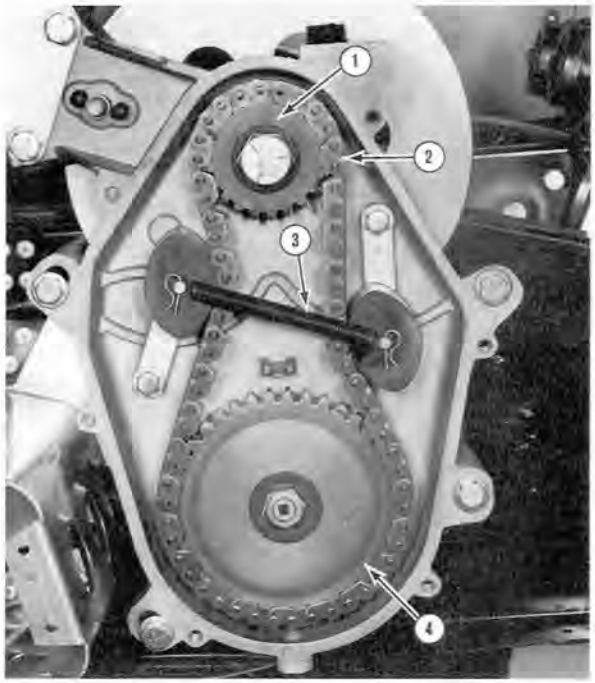
1. Lower Battery Bracket

3. Unfasten speedometer drive adapter and remove key.



1. Speedometer Adapter.
2. Key.
3. Chaincase Cover.

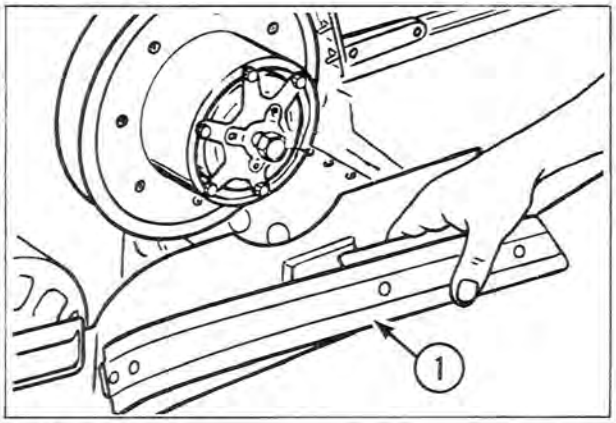
4. Drain chaincase lubricant.
   - Place oil drain pan under hole in lower pan.
   - Unscrew chaincase cover mounting bolts and remove cover.
5. Unhook chain tensioner spring.



1. Top Sprocket.
2. Chain.
3. Tensioner Spring.
4. Lower Sprocket.

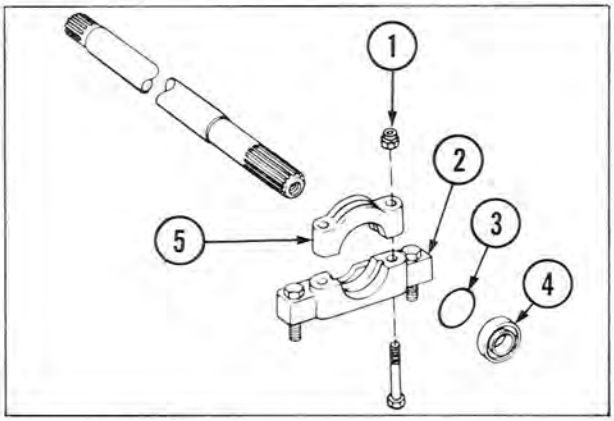
6. Remove upper sprocket and spacer.
   - Unfasten sprocket bolt.
   - Pull sprockets off shaft and slide off spacers found behind sprocket.
7. Remove air silencer.
   - Refer to Silencer Removal procedure.
8. Remove drive belt.
   - Refer to Belt Removal procedure.

9. Unfasten left side trim from lower pan to provide clearance for driven converter removal.



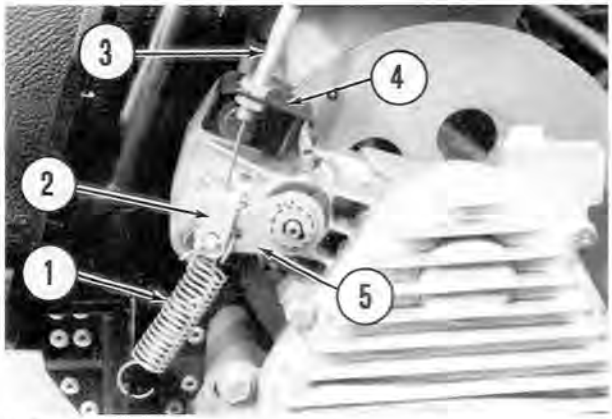
1. Trim.

10. Remove brake disc.
    - Unfasten jackshaft bearing retainer cap.
    - Slide jackshaft out of chaincase far enough to remove brake disc.



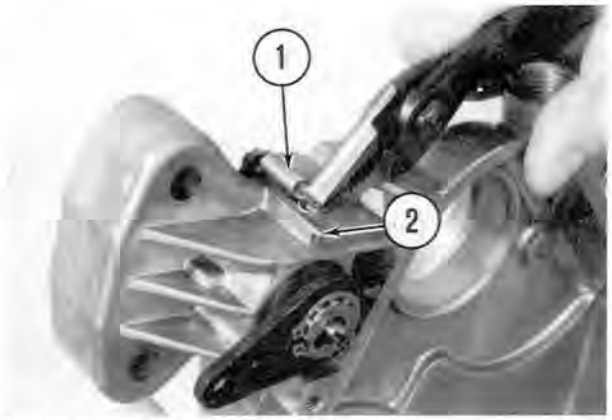
1. Bearing Cap Nut.
2. Bearing Retainer.
3. O-Ring.
4. Bearing.
5. Bearing Cap.

11. Disconnect brake cable.
    - Unhook brake return spring.
    - Pull hair pin from clevis pin.
    - Remove clevis pin.
    - Unfasten jam nuts and remove cable from bracket.



1. Return Spring.
2. Retainer.
3. Brake Cable.
4. Brake Cable Bracket.
5. Brake Lever.

12. Unbolt caliper from chaincase.
    - Remove brake cable bracket, caliper spacer, and disc guard.
13. Remove movable pad.
    - Place a rag behind chaincase under brake mechanism to catch parts if they should be dropped.
    - Unhook movable brake pad springs from chaincase pegs and remove pad.

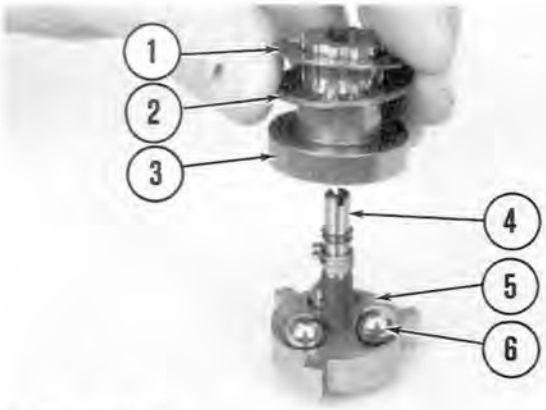


1. Top Brake Pad Spring.
2. Peg.

14. Remove brake lever and neoprene washer.
    - Unfasten snap ring.
    - Slide lever and washer from rotor shaft.

NOTE: Be careful not to lose the three steel balls when removing self-adjusting mechanism.

15. Remove self-adjusting mechanism.
    - As an assembly, push mechanism out of chaincase.
16. Slide thrust bearing and thrust washer off of rotor.

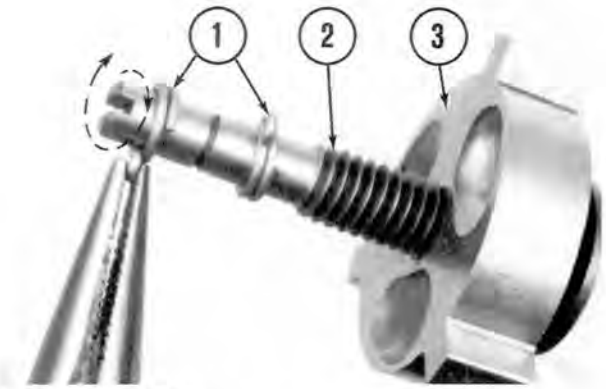


1. Thrust Washer.
2. Thrust Bearing.
3. Rotor.
4. Brake Shaft.
5. Stator.
6. Steel Ball.

17. Separate rotor and three steel balls from stator and shaft.
18. Remove brake shaft from stator.
    - Remove retaining rings from shaft.

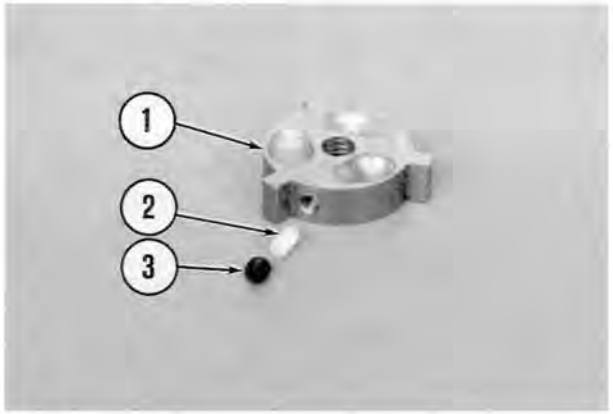
1. Stator.
2. Torsion Springs.
3. Brake Shaft.
4. Retaining Rings.

- Remove torsion springs from shaft by turning as shown. Be careful not to distort springs.



1. Torsion Springs.
2. Brake Shaft.
3. Stator.

- Remove set screw from stator.
- Thread shaft out of stator (LH thread).



1. Stator.
2. Friction Plug.
3. Set Screw.

- Use a scribe or another suitable tool to push friction plug out of stator.

Brake Inspection

WARNING **Do not subject brake pads to solvent, oil, or grease. Braking action will be impaired by oily or greasy pads.**

1. Clean all metal parts in cleaning solvent.
2. Inspect steel balls, thrust bearing, and thrust washer.
   - If any parts show pitting or discoloration, replace them.
3. Check stator and rotor.
   - If ball pockets are worn, replace stator and rotor.
4. Inspect brake shaft.
   - If threads are damaged, replace shaft.
5. Examine torsion springs.
   - If springs are distorted, replace them.
6. Check brake pad wear.
   - If pads are worn unevenly, replace pad set.
   - If movable pad measures less than 0.25 in. (6.3 mm) overall thickness (including metal backing), replace pad set.

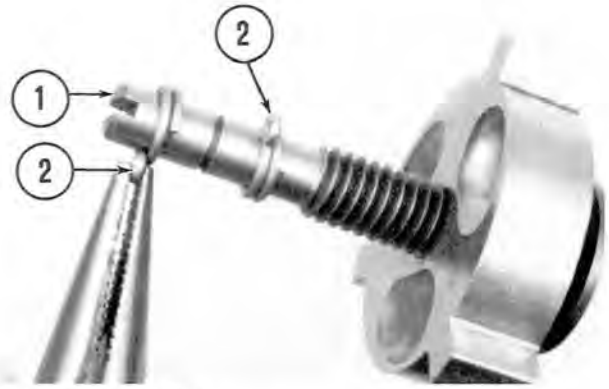
Brake Assembly

1. Thread stator onto brake shaft.
   - Screw stator until approximately two-thirds of brake shaft extends through stator.

NOTE: Parts have LH thread.

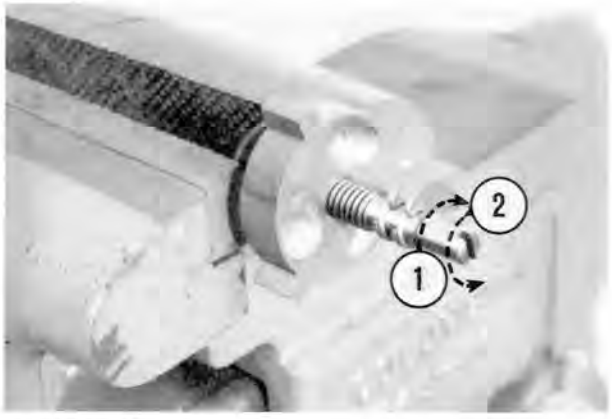
WARNING **Torsion springs must be installed as shown. Incorrect installation of springs will result in loss of braking.**

2. Position torsion springs on brake shaft.
   - Eyes on spring ends must face slotted end of brake shaft.



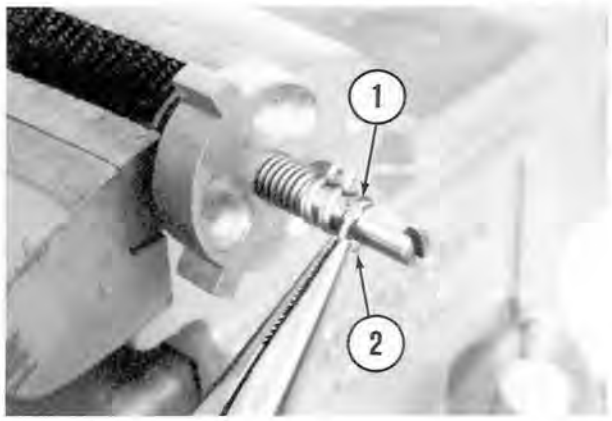
1. Brake Shaft Slot.
2. Torsion Spring "Eyes".

3. Test torsion springs for correct installation and tension.



1. Springs Turn.
2. Springs Won't Turn.

   - Hold brake shaft in vice.
   - Turn torsion springs by hand in direction 1. The torsion springs should turn on shaft.
   - Attempt to turn springs by hand in direction 2. If torsion springs will turn, replace them.
4. Position rings on brake shaft.
   - Install full circle ring first.
   - Slide C-type ring into groove on shaft.

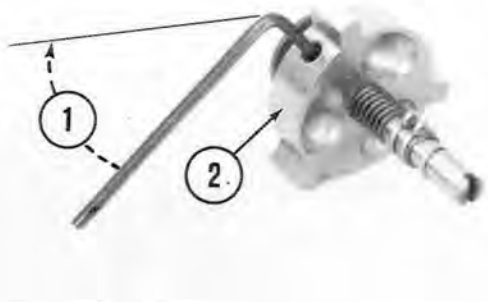


1. Ring (Full Circle).
2. Ring (C-Type).

NOTE: Brake shaft turning resistance is critical to the operation of the self-adjusting mechanism. If set screw is too loose, the brake will not self adjust. If set screw is too tight, the brake will not release properly, which will result in the brake overheating and the brake light staying on.

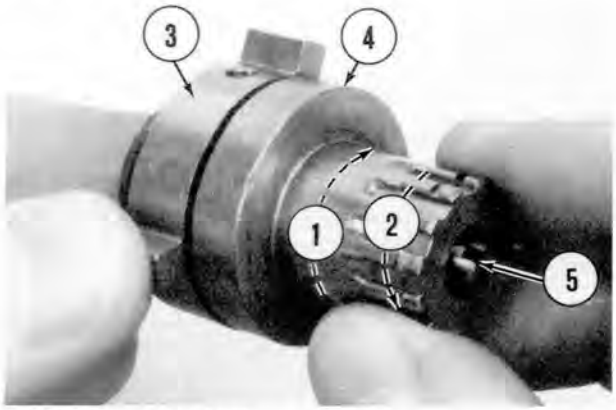
5. Install friction plug and set screw into stator. Use one of the following methods to adjust set screw.
   - Torque set screw to 1.9 in.lb.

   or
   - Turn set screw in until it bottoms on friction plug, then tighten an additional 1/8 turn. DO NOT overtighten set screw.



1. Tighten 1/8 Turn.
2. Stator.

6. Test for proper set screw torque.
   - Temporarily install rotor on brake shaft, without the steel balls.
   - While holding the stator, turn rotor in alternating directions.
   - When turning the rotor in direction 1, the shaft must not turn. If the shaft turns, set screw is too loose.



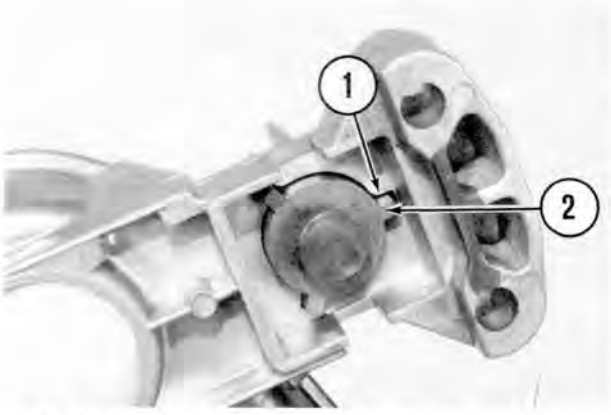
1. Shaft Must Not Turn.
2. Shaft Must Turn.
3. Stator.
4. Rotor.
5. Brake Shaft.

- When turning the rotor in direction 2, the shaft must turn. If the shaft does not turn, the set screw is too tight.
- If necessary, adjust set screw to meet above requirements.

7. Slide rotor off of brake shaft.
8. Thread stator completely onto brake shaft.
9. Lubricate rotor and stator.
   - Lightly coat ball pockets with lithium grease.
10. Position steel balls in stator ball pockets.
11. Mount rotor onto stator assembly.
    - Guide torsion spring tab into slot of rotor.
    - Turn rotor until balls fit into deepest part of ball pockets.

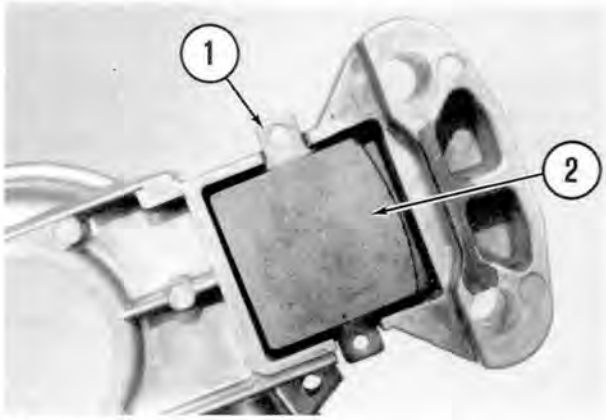
NOTE: Place a rag behind the chaincase, beneath the brake mounting area. The rag will catch any parts that may drop during assembly.

12. Position rotor/stator assembly in chaincase.
    - Align tabs on stator with slots in chaincase.
    - Slide rotor/stator assembly into place.

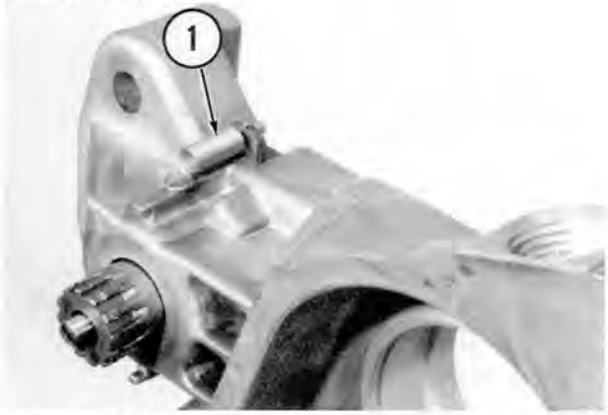


1. Chaincase Slots
2. Stator Tabs.

13. Assemble movable brake pad and springs as shown.

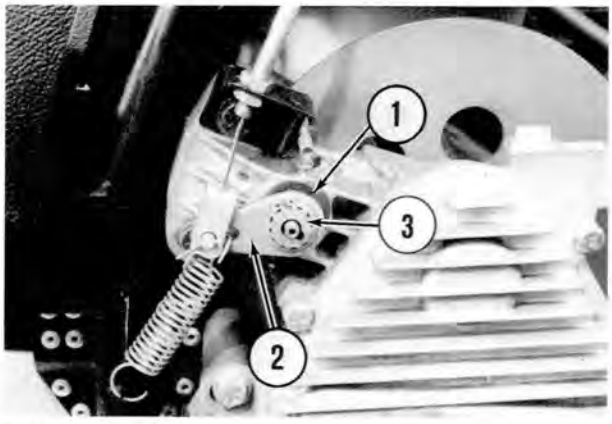


1. Brake Pad.
2. Pad Radius.



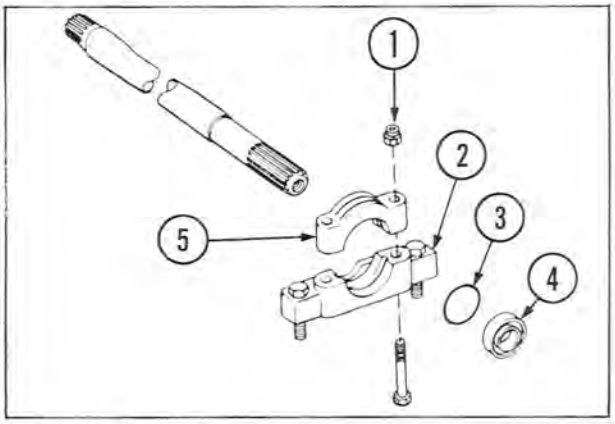
1. Return Spring.

14. Install neoprene washer, brake lever, and snap ring.
    - Note correct position of brake lever.



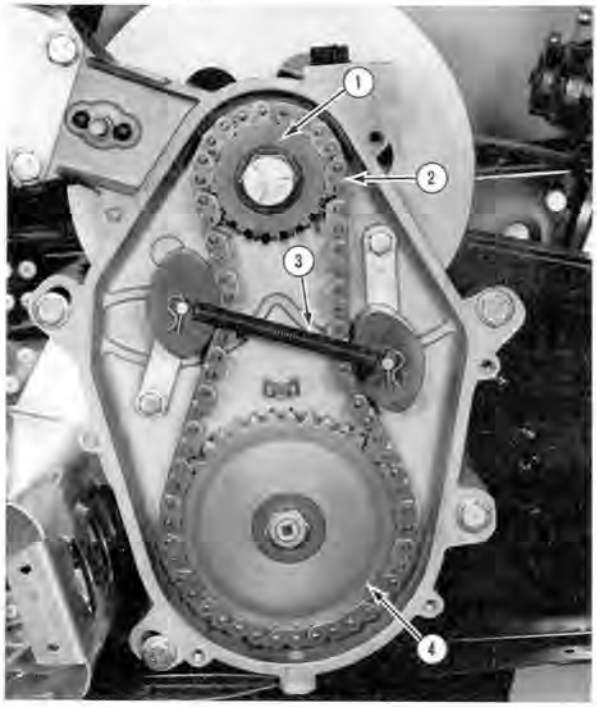
1. Neoprene Washer.
2. Brake Lever.
3. Snap Ring.

15. Mount brake caliper, caliper spacer, brake cable bracket, and disc guard to chaincase.
    - Torque bolts to 35 ft lb (4.8 kg-m).
16. Install bearing retainer O-ring on bearing.
17. Slide jackshaft through disc into chaincase.
    - Apply coating of NEVER-SEEZ to brake disc splines.
    - Position brake disc between brake pads.
    - Slide jackshaft into position.
    - Fit bearing retainer O-ring into groove of bearing retainer.



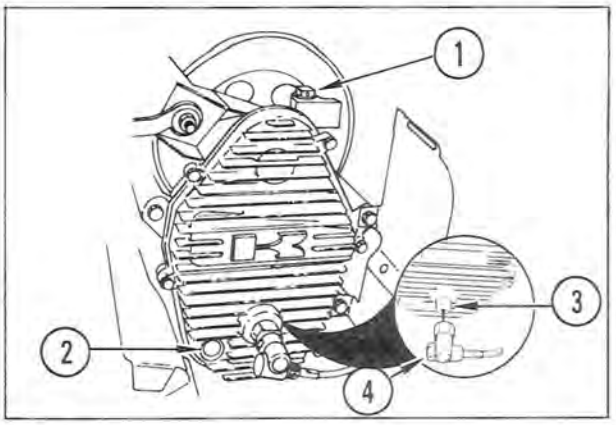
1. Bearing Cap Nut.
2. Bearing Retainer.
3. O-Ring.
4. Bearing.
5. Bearing Cap.

18. Install top sprocket and spacer.
    - Torque sprocket bolt to 50 ft lb (6.9 kg-m).



1. Top Sprocket.
2. Chain.
3. Tensioner Spring.
4. Lower Sprocket.

19. Mount jackshaft bearing retainer cap.
    - Fit O-ring into cap groove.
    - Torque nuts to 70 in. lb (0.8 kg-m).
20. Install left side trim on lower pan.
21. Install tensioner spring and hair pin retainers.
22. Mount chaincase cover.
    - Use new O-ring seal.
    - Torque bolts to 70 in. lb (0.8 kg-m).
23. Add chaincase lubricant.
    - Use Dexron II automatic transmission fluid.
    - Add lubricant until level is between center and top of sight gauge.



1. Chaincase Fill Plug.
2. Sight Gauge.
3. Speedometer Key.
4. Drive Adapter.

WARNING **Prevent oil mist from coating brake components, which may reduce braking action, by installing the fill plug with vent hole pointed away from brake disc.**

24. Insert speedometer key through chaincase cover hole while rotating key to align with square hole in lower sprocket mount bolt.

NOTE: Speedometer key should be centered within chaincase cover hole and cannot be rotated when properly engaged with lower sprocket mount bolt.

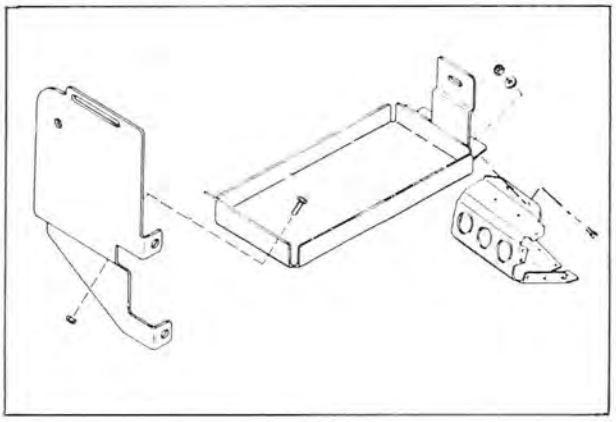
25. Connect speedometer drive adapter.
    - Hold drive adapter near mounting threads on chaincase cover.
    - Insert end of flexible key into square hole of adapter.
    - Slide adapter into position on cover. Do not use force during assembly. When components are properly aligned, adapter will slide easily into position.
26. Mount brake cable in brake cable bracket.
    - Thread one locknut onto cable.
    - Insert cable through bracket.
    - Install second locknut on cable.

WARNING **To avoid possible brake malfunction, install clevis pin, hair pin, and clevis retainer as follows:**

27. Install clevis pin, hair pin, and clevis retainer.
    - Mount clevis retainer so that slotted side is toward chaincase.
    - Insert clevis pin from chaincase side of clevis.
    - Install hair pin in clevis pin.

1. Retainer.
2. Hair Pin.
3. Clevis Pin.

28. Mount lower battery bracket.
    - Secure battery bracket to footrest and heat shield bracket with mounting hardware installed in sequence shown.



29. Install battery.
    - Refer to Battery Installation procedure.

Brake Pad Replacement

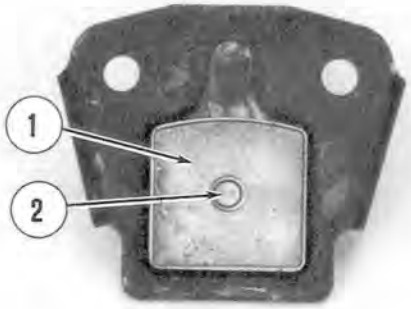
WARNING **The fixed and movable brake pads have been designed to require replacement at the same time. Always replace brake pads as a set to insure good braking action.**

BRAKE PAD DISASSEMBLY

1. Refer to Brake Disassembly procedure.
    - Perform steps 1 through 13.

FIXED PAD REPLACEMENT

1. Drill out brake pad rivet.
    - Use a 5/32 in. (4 mm) drill.



1. Fixed Brake Pad.
2. Rivet.

2. Position new brake pad on caliper as shown.
3. Rivet new pad to caliper.
    - Use a drift to support the head of a new rivet.
    - Spread the rivet with a punch.

1. Rivet.

BRAKE PAD ASSEMBLY

1. Refer to Brake Assembly procedure.
    - Perform steps 13 through 29.

CABLES

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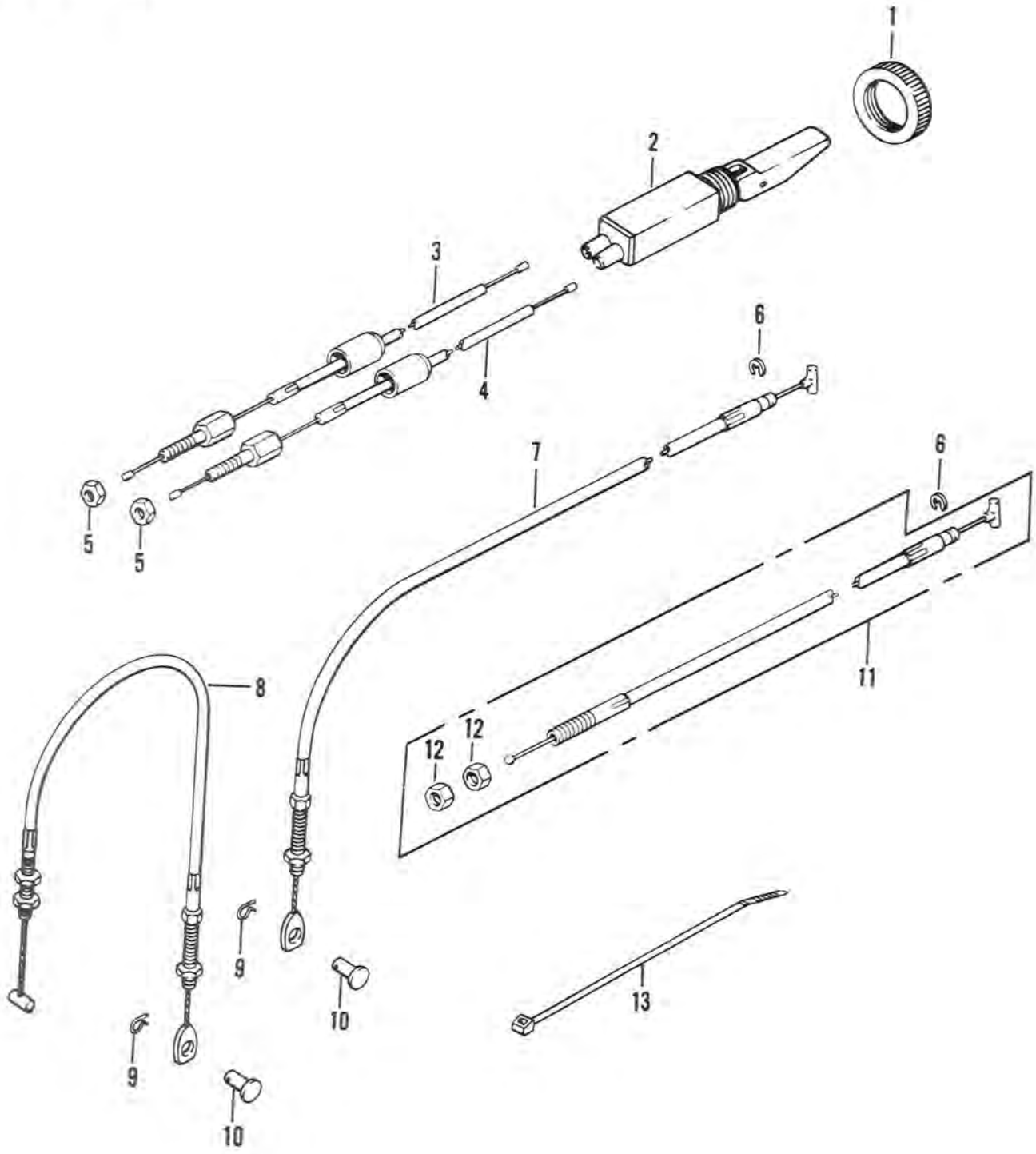
CABLES



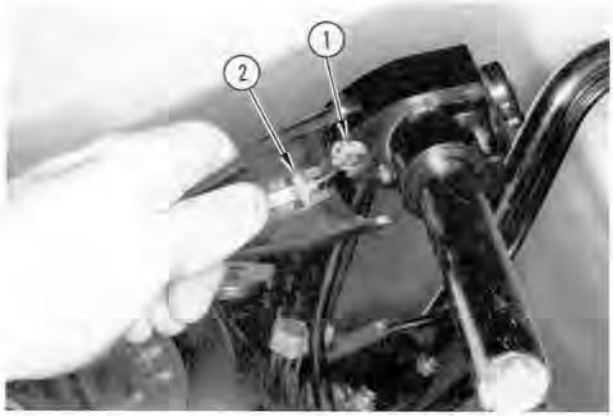
1 NUT, enrichener mounting.
2 HOUSING ASSY, enrichener
3 CABLE, RH carb enrichener
4 CABLE, LH carb enrichener
5 NUT, special jam
6 RING, snap
7 CABLE, throttle
8 CABLE, oil pump
9 PIN, hair
10 PIN, cable
11 CABLE ASSY, brake
12 NUT, jam, 5/16-24
13 BAND, cable tie

BRAKE CABLE

Brake Cable Removal

1. Separate cable end from clevis retainer.
   - Remove hair pin.
   - Slide clevis pin out.
   - Unhook cable end from clevis retainer.

2. Unscrew locknuts from cable.
3. Disconnect cable end from brake lever.
   - Remove snap ring.
   - Unhook cable end from lever.



1. Snap Ring.
2. Cable End.

4. Note routing of cable and remove from snowmobile.

Brake Cable Inspection

1. Check cable operation.
   - Cable should move freely within casing. If not, replace cable.
2. Inspect cable ends.
   - If there are any signs of fraying or kinking, replace cable.
3. Examine cable casing.
   - If protective coating is damaged or casing is kinked, replace cable.

Brake Cable Installation

1. Attach cable to brake lever.
   - Hook cable end onto brake lever.
   - Install snap ring.
2. Mount cable in brake cable bracket.
   - Thread one locknut onto cable.
   - Insert cable through bracket.
   - Install second locknut on cable.

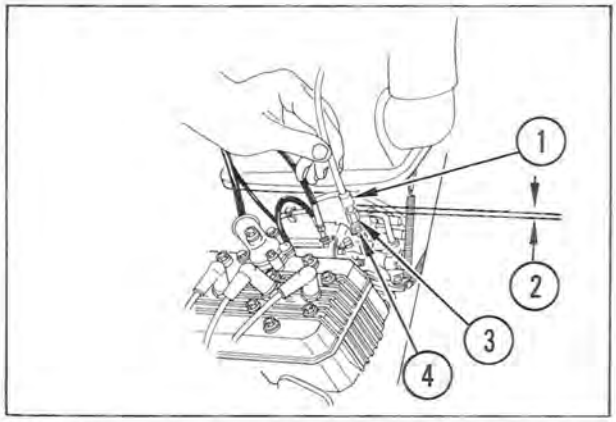
WARNING **To avoid possible brake malfunction, install clevis pin, hair pin, and clevis retainer as follows:**

3. Connect clevis assembly.
   - Mount clevis retainer so that slotted side is toward chaincase.
   - Insert clevis pin from chaincase side of clevis.
   - Install hair pin in clevis pin.
4. Check cable routing.
   - Cable must apply and return freely with handlebar in any steering position.
   - Be certain cable casing has no sharp bends or kinks.
   - Secure cable with tie bands as needed to prevent chafing of outer casing, which may lead to malfunction.
5. Adjust brake.
   - Refer to Brake Adjustment procedure.

ENRICHENER CABLE

Enrichener Cable Adjustment

1. Check enrichener cable free movement.
   - Set enrichener lever in off position (down).
   - Slide boot up cable, off of adjuster.
   - Cable casing should have 1/16 in. (1.5 mm) free movement when raised as shown.



1. Boot.
2. Free Movement.
3. Adjuster.
4. Lock Nut.

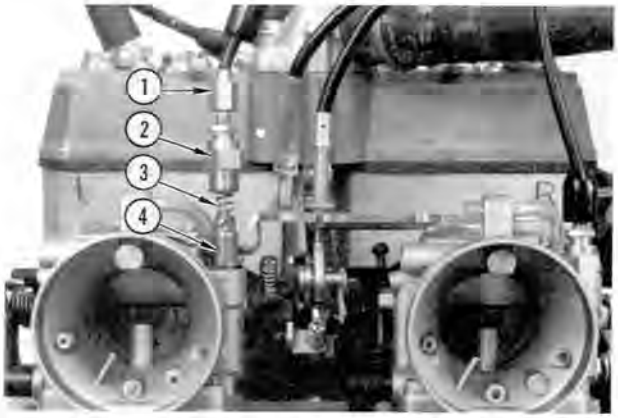
2. If necessary, adjust enrichener cable.
   - Loosen locknut.
   - Turn adjuster to obtain 1/16 in. (1.5 mm) free movement.
   - Tighten locknut.
3. Reposition boot over enrichener adjuster to prevent foreign material from entering enrichener system.

Enrichener Cable Removal

1. Separate enrichener lever assembly from control console.
   - Place enrichener lever in "cold start" (full up) position to allow mounting nut removal.
   - Unscrew enrichener mounting nut.

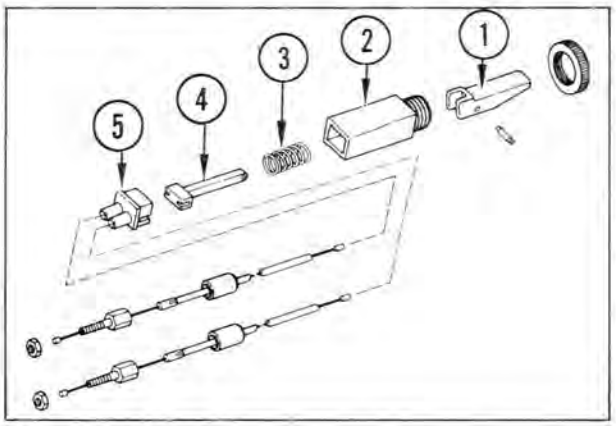
1. Cold Start Position.

2. Remove enrichener plunger assembly from carburetor.
   - Unscrew enrichener plunger cap.



1. Cable Adjuster.
2. Plunger Cap.
3. Spring.
4. Plunger.

3. Disconnect plunger from enrichener cable.
   - Compress plunger spring.
   - Slide cable end from plunger.
4. Unscrew plunger cap from cable adjuster.
5. Remove cables from control lever.
   - Tap spring pin from lever with drift.



1. Enrichener Lever.
2. Housing.
3. Spring.
4. Plunger.
5. Cap.

   - Carefully pull cap from enrichener housing. Plunger will pull out of housing with cap and cables.
   - Pull cables from cap.

Enrichener Cable Inspection

1. Check cable operation.
   - Cable should move freely within casing. If not, replace cable.
2. Inspect cable ends.
   - If there are any signs of fraying or kinking, replace cable.
3. Examine cable casing.
   - If protective coating is damaged or casing is kinked, replace cable.

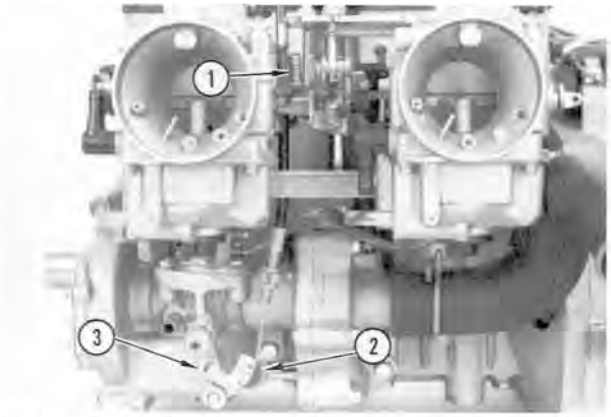
Enrichener Cable Installation

1. Thread plunger cap onto cable adjuster.
2. Connect plunger and spring to cable.
3. Attach cables to control lever.
   - Insert cables into cap. Note correct installation of cap. The longer cable must be installed on the left side of the cap to reach the left side carburetor.
   - Check to see that spring is in position in housing.
   - Position cable ends in plunger.
   - Slide plunger into housing. Be certain cable ends remain in position in plunger.
   - Insert spring pin securing control lever to plunger as shown.
4. Mount enrichener lever assembly on instrument panel.
   - Position lever assembly in panel.
   - Set control lever in "full up" position to allow mounting nut installation.
   - Tighten mounting nut snugly with pliers.
5. Attach plunger cap to carburetor.
   - Position plunger in carburetor body.
   - Tighten enrichener plunger cap.
6. Adjust enrichener cable.
   - Refer to Enrichener Cable Adjustment Procedure.

OIL PUMP CABLE

Oil Pump Cable Adjustment

1. Remove silencer.
   - Refer to Silencer Removal procedure.
2. Adjust LH carburetor to fully closed position.
   - Turn idle speed screw on LH carburetor counterclockwise until LH butterfly completely closes carburetor bore.
   - If LH butterfly will not close completely, refer to Throttle Cable Adjustment procedure.

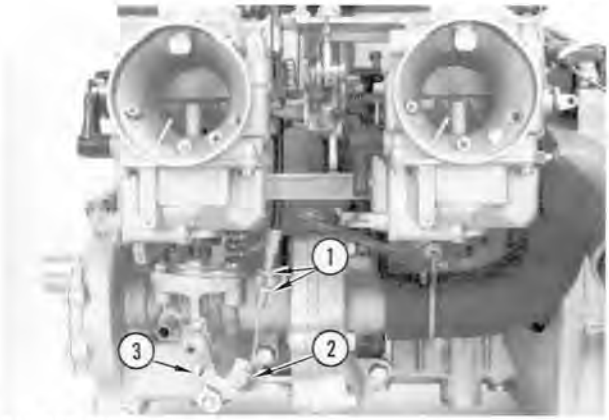


1. Idle Speed Screw.
2. Oil Pump Lever.
3. Stop Pin.

3. Position oil pump lever in "full off" position.
   - Push pump lever until it contacts stop pin.
   - It may be necessary to loosen cable adjustment to allow lever to contact pin.

WARNING **When adjusting oil pump cable, measure amount the oil pump cable housing extends below upper carburetor brackets. If distance is greater than 1/16 in. (1.6 mm), loosen upper lock nut and adjust cable to dimension given. Failure to adjust this cable properly could result in improper engine idle speed adjustment, resulting in damage to the snowmobile or personal injury to the operator.**

4. Adjust oil pump cable.
   - Loosen lock nuts on pump cable.
   - Hold pump lever against stop pin and adjust lock nuts to remove all slack from inner cable.
   - Torque lock nuts to 20 in. lb (0.2 kg-m).
   - Check adjustment. Adjustment is correct when oil pump lever and throttle butterfly in LH carburetor move simultaneously as throttle lever is activated.

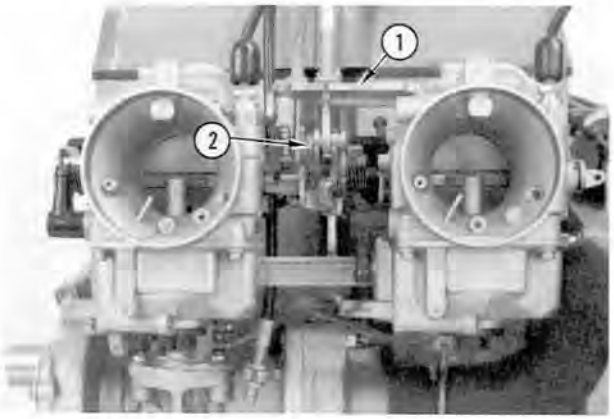


1. Lock Nuts.
2. Oil Pump Lever.
3. Stop Pin.

5. Reinstall silencer.
   - Refer to Silencer Installation procedure.
6. Adjust idle speed.
   - Refer to Carburetor Adjustment procedure.

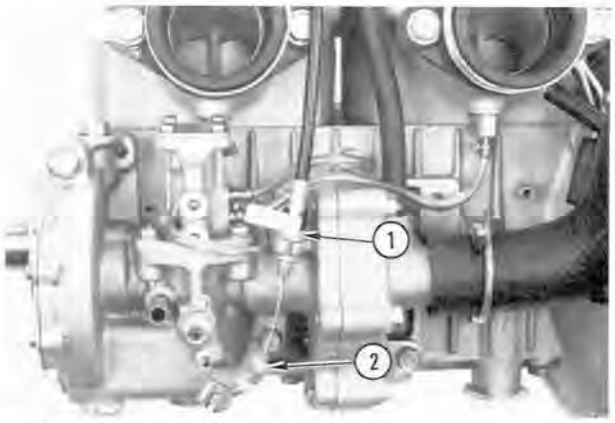
Oil Pump Cable Removal

1. Remove air silencer from carburetors.
   - Refer to Silencer Removal procedure.
2. Disconnect oil pump cable from carburetor linkage.
   - Pull hair pin from pump cable pin.
   - Remove cable pin from carburetor linkage.



1. Top Bracket.
2. Hair Pin.

3. Unfasten cable adjuster from top carburetor bracket.
   - Loosen lock nut.
   - Unscrew adjuster.
4. Unhook cable end from oil pump control lever.



1. Upper Jam Nut.
2. Control Lever.

5. Remove cable adjuster from housing boss.
   - Mark location of upper cable adjusting nut with tape, as shown.
   - Loosen lower adjusting nut and remove cable from housing boss.

Oil Pump Cable Inspection

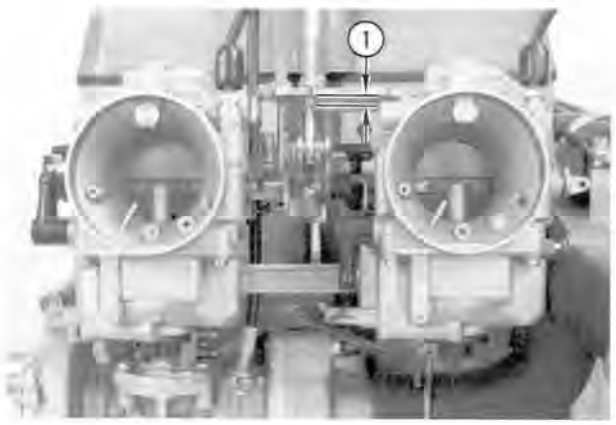
1. Check cable operation.
   - Cable should move freely within casing. If not, replace cable.
2. Inspect cable ends.
   - If there are any signs of fraying or kinking, replace cable.
3. Examine cable casing.
   - If protective coating is damaged or casing is kinked, replace cable.

Oil Pump Cable Installation

1. Mount adjuster onto housing boss.
   - Position upper adjusting nut as closely as possible to original position.
   - Finger tighten lower adjusting nut.
2. Hook cable end onto pump control lever.

WARNING **When adjusting oil pump cable, measure amount the oil pump cable housing extends below upper carburetor bracket. If distance is greater than 1/16 in. (1.6 mm), loosen upper jam nut and adjust cable to dimension given. Failure to adjust this cable properly could result in improper engine idle speed adjustment, resulting in damage to the snowmobile or personal injury to the operator.**

3. Fasten cable adjuster to top carburetor bracket.
   - Screw adjuster into top bracket until the adjuster extends 1/16 in. (1.6 mm) maximum below top bracket.
   - Tighten lock nut.



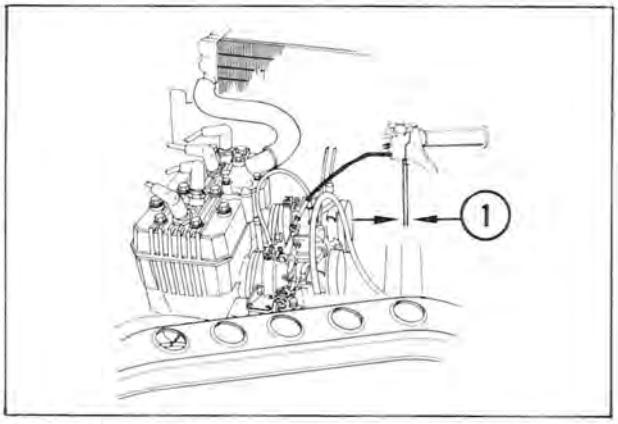
1. 1/16 in. (1.6 mm).

4. Connect oil pump cable to carburetor linkage.
   - Install cable pin.
   - Insert hair pin retainer into cable pin.
   - Secure cable with tie bands as needed to prevent chafing of outer casing, which may lead to malfunction.
5. Synchronize oil pump with carburetors.
   - Refer to Oil Pump Cable Adjustment.

THROTTLE CABLE

Throttle Cable Adjustment

1. Set idle speed.
   - Refer to Carburetor Adjustments procedure.
2. Adjust throttle cable.
   - With throttle ever on handle bar control at idle position, there should be 1/16 in. (1.6 mm) free play between lever and housing
   - To adjust free play, loosen lock nut and turn cable adjuster. Retighten lock nut when free play is correct.



1. Free Movement.

Throttle Cable Removal

1. Disconnect cable from carburetor linkage.
   - Pull hair pin from throttle cable pin.
   - Remove cable pin from carburetor linkage.
2. Unfasten cable adjuster from top carburetor bracket.
   - Loosen lock nut.
   - Unscrew adjuster.

1. Cable Adjuster.
2. Hair Pin.

3. Remove cable from throttle control lever on handlebar.
   - Pull snap ring from cable casing.
   - Unhook cable end from throttle lever.
4. Carefully pull cable through instrument panel hole.

Throttle Cable Inspection

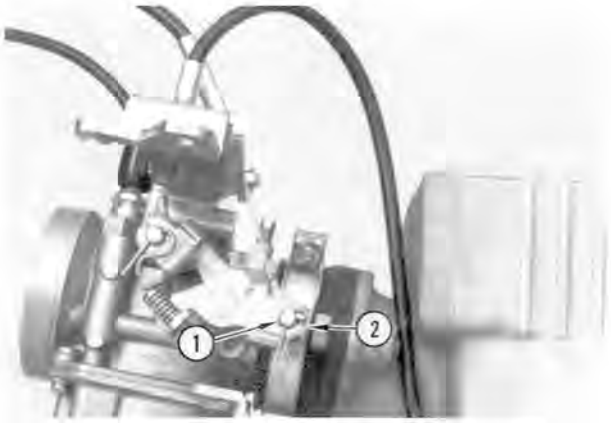
1. Check cable operation.
   - Cable should move freely within casing. If not, replace cable.
2. Inspect cable ends.
   - If there are any signs of fraying or kinking, replace cable.
3. Examine cable casing.
   - If protective coating is damaged or casing is kinked, replace cable.

Throttle Cable Installation

1. Position throttle cable.
   - Route cable through instrument panel in front of steering pole.
2. Connect cable to throttle lever on handlebar control.
   - Hook cable end onto throttle lever.
   - Slide cable casing into control assembly.
   - Attach snap ring to cable casing.
3. Install cable adjuster.
   - Screw adjuster into top carburetor bracket.
   - Do not tighten lock nut at this time.

WARNING **Throttle cable pin must be installed as shown to avoid possible interference between hair pin and carburetor holder bolts. Throttle malfunction may otherwise result, causing personal injury.**

4. Connect throttle cable to carburetor linkage.
   - Insert cable pin as shown.
   - Attach hair pin to cable pin.



1. Pin.
2. Hair Pin.

5. Check cable routing.
   - Cable must operate without binding and return freely with handlebar in any steering position.
6. Adjust throttle cable.
   - Refer to Throttle Cable Adjustment procedure.

CARBURETOR

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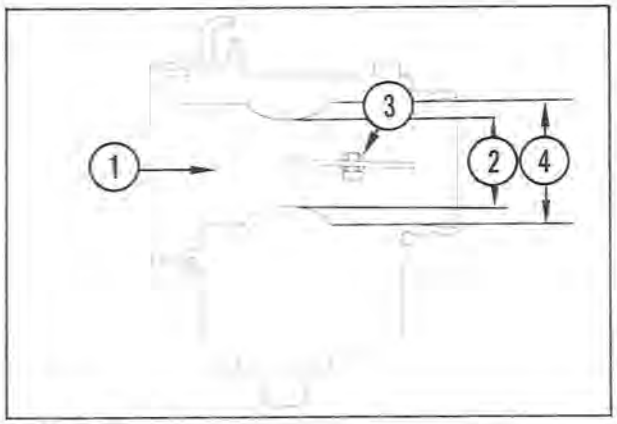
CARBURETOR

CARBURETOR THEORY OF OPERATION

The carburetor used on this model is a Keihin BD40-36. It has a 40 mm throttle bore and a 36 mm venturi. The BD40-36 has a butterfly throttle and an accelerator pump.

The carburetor's job is to mix fuel and air in the amounts required for efficient combustion. The carburetor also allows the rider to control the speed and power output of the engine. The carburetor's throttle is controlled by a cable to a lever on the handlebar. When the rider moves the lever, the throttle is opened or closed. If it is opened, more fuel and air enter the engine and it runs faster and puts out more power. If the throttle is closed, less fuel and air enter the engine and it slows down.

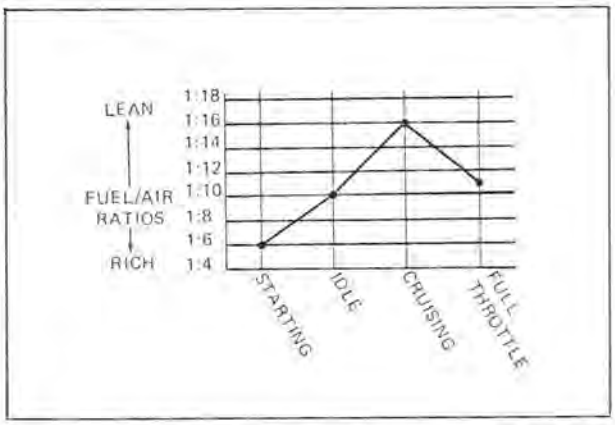


1. Air Flow.
2. Venturi.
3. Throttle Valve.
4. Throttle Bore.

The fuel/air mixture ratio needed by the engine does not remain constant. The ideal burning ratio is about one part of fuel to 14.7 parts of air. This ratio is only delivered to the engine a fraction of the time it is running. Incomplete vaporization at low speeds and the extra fuel required at high speeds mean that the operational fuel/air ratio is usually richer.

Within the acceptable fuel/air ratios that can be burned in the engine, a balance between power and economy must be reached. The amount of air entering the engine for combustion is the limiting factor for maximum performance. To take advantage of the limited amount of air available for combustion, it is necessary to surround each air molecule with enough fuel molecules to insure that all of the air is utilized. Maximum power is obtained by gaining maximum burning efficiency of the available air. Maximum economy is gained by surrounding each molecule of fuel with several molecules of air to insure maximum use from a given quantity of fuel. Maximum economy is maximum burning efficiency of the available fuel.

Somewhere between maximum power and maximum economy is where most snowmobiles are usually ridden. The range of fuel/air ratios that the engine receives at one time or another ranges from an extremely rich 1:6 to a very lean 1:17. At very slow engine speeds the flow of air through the carburetor is slow and the fuel is broken up into small droplets. If the engine is cold, these droplets of fuel will not vaporize as they would in a warm engine. It is necessary to provide a very rich mixture to insure that some of the fuel will be burned.



When warmed up, the engine speed at idle is low, and air flow through the carburetor is so low that incomplete atomization of the fuel occurs. The mixture at idle is rich, about 1:10. Under hard acceleration, when maximum power is being developed, the mixture ratio might be around 1:12. The actual amounts of fuel and air are much greater for high power operation. This is why fuel economy drops rapidly when a snowmobile is ridden at full throttle much of the time. At cruising speeds, air flow through the carburetor is substantial, but the fuel is metered sparingly. This results in a slightly lean mixture.

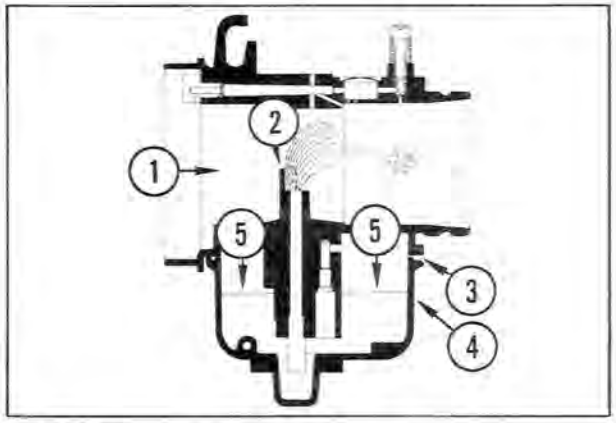
The carburetor must have the ability to meter the fuel and air for extremes of power or economy and somewhere in between. The carburetor responds to the rider's needs by supplying fuel and air to the engine in the exact quantities demanded by speed and load.

Carburetor operation is based on the basic principles of fluid dynamics. These principles state that when a fluid (such as air) is flowing through a tube and encounters an area of smaller diameter (known as a venturi), the fluid will undergo an increase in velocity and a decrease in pressure as it passes through it.

A carburetor has a venturi inside it that produces a low-pressure area when air flows through it into the engine. Under average conditions, the pressure in the venturi will be only 60% of the pressure at the mouth of the carburetor, which is almost at outside atmospheric pressure. The difference between outside atmospheric pressure and venturi pressure is what forces the fuel to mix with the air flowing through the carburetor.

CARBURETOR SYSTEM FUNCTIONS

To supply the widely differing needs of the engine for fuel and air, the carburetor has six separate systems. They are 1) the float bowl, 2) the cold start enrichener, 3) the pilot system, 4) the main system, 5) the power jet system, and 6) the accelerator pump. All six systems work together to supply the engine with the fuel/air mixture it needs under all speed and load conditions.



1. Air Flow.
2. Reduced Pressure.
3. Vent.
4. Fuel Level.
5. Atmospheric Pressure.

1. Float Bowl

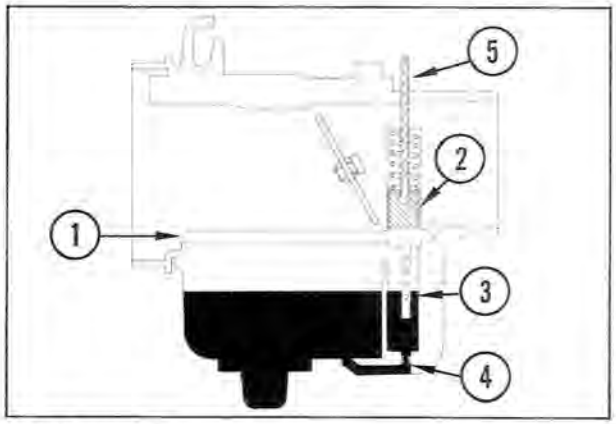
The float bowl is the fuel supply for the other five carburetor systems. Fuel flows into the float bowl through the float valve when the fuel lever in the bowl drops allowing the valve to open. As the fuel flows in, the float rises and closes the valve. This system maintains the fuel at a predetermined level in the float bowl.

The fuel level affects how rich or lean the engine will run throughout its entire range. The reason for this is the drop in pressure that occurs in the venturi. The float bowl is vented to the atmosphere, so there is a pressure of 14.7 psi pushing down on the surface of the fuel in the float bowl. When the engine is stopped, this pressure is on the surface of all the fuel in the float bowl, including the fuel inside the "feed tubes" which lead into the venturi. When the engine is running, the pressure in the venturi is less, and the pressure in the feed tubes is also less. The atmospheric pressure acting on the surface of the fuel in the bowl is much greater than the pressure acting on the fuel in the feed tube. Therefore, the level of fuel in the feed tube rises as the fuel is pushed up into the venturi where it is released into the air stream as tiny droplets.

The fuel level is most important at low speeds. If too low, the decreased pressure in the venturi would not be able to pull enough fuel up out of the bowl and into the air stream. This would cause hard starting and lean mixtures. If the fuel level is too high, too much fuel is pulled into the venturi and the engine would run too rich. The fuel level is adjusted by changing the float level. Always set the fuel level correctly.

2. Cold Start Enrichener

When the engine is cold, the fuel spraying into it from the carburetor does not atomize as well as when the engine is warmer. To be sure of getting an atomized fuel/air mixture that will burn, extra fuel must be fed to the engine. The cold start enrichener system has a plunger valve that allows a very rich mixture into the engine. When the valve is opened, air flows through a passage connecting the mouth of the carburetor and the throat downstream of the throttle. The air moving through the passage draws fuel up from a reservoir on the side of the float bowl, mixes with it, and both fuel and air pass into the engine. The reservoir is refilled from the float bowl through a small hole. It is designed so that the initial shot of mixture from the enrichener system is very rich and during following operation it is leaner (though still rich).

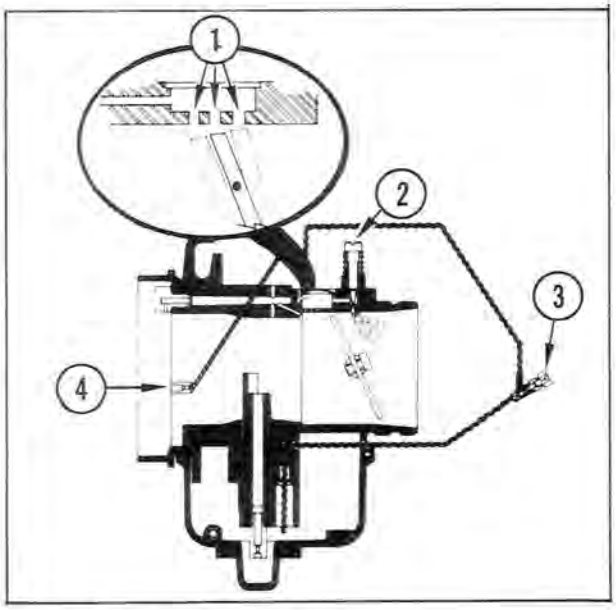


1. Air Passage.
2. Enrichener Plunger Open.
3. Reservoir.
4. Orifice.
5. Enrichener Cable.

3. Pilot System

The pilot system supplies fuel to the engine when it is idling, at very small throttle openings and low engine speeds. At very low engine speeds, the engine uses little air and the air flow speed through the carburetor is very low. The pilot system has very small passages to supply fuel under these conditions. Also, fuel atomization is incomplete because of very low air velocities and turbulence. To counter this, the pilot system is tuned to supply a fairly rich mixture.

Air for the pilot system comes through the pilot air jet in the mouth of the carburetor. Fuel is drawn from the float bowl and passes through the pilot jet. The air and fuel passages join just past the pilot jet and from there the fuel/air mix flows to the pilot chamber in the top of the carburetor. The pilot chamber has three exits into the carburetor throat upstream of the throttle plate (when it is closed) and one downstream, which is controlled by a needle valve called the idle adjust screw. When the throttle plate is closed, the three upstream exits (called by-pass holes) allow air to enter the pilot chamber. This air mixes with the fuel going into the carburetor throat past the idle adjust screw. As the throttle plate begins to open, a number of things happen. The engine speed rises as more air flows around the throttle plate. The flow direction in the by-pass hole closest to the throttle plate reverses and the hole becomes a fuel outlet instead of an air inlet. As the throttle plate opens further, the same flow reversal happens in the other two by-pass holes, allowing more and more fuel to mix with the air rushing around the throttle plate and into the engine. This flow reversal in the pilot by-pass holes is important to the transition from the pilot system to the main system.



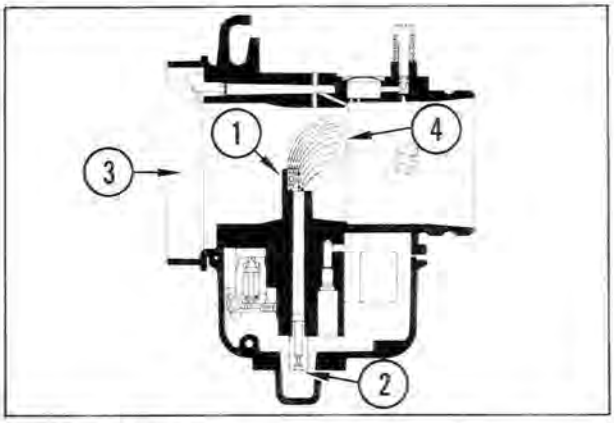
1. Pilot By-Pass Holes.
2. Idle Adjust Screw.
3. Pilot Jet.
4. Air Passage.

The small size of the pilot system passages and jets limit the amount of fuel and air that can flow through it. At small throttle openings, the pilot system reaches its maximum flow. At large throttle openings, the total flow through the carburetor is so great that the contribution of the pilot system is a very small percentage of that flow.

4. Main System

At intermediate to large throttle openings, the main system supplies a large part of the fuel needed. The main system has a main jet that picks up fuel near the bottom of the float bowl. A vertical passage dumps the fuel into the carburetor throat upstream of the throttle valve behind a primary choke. The primary choke is a "wall" around the front of the fuel outlet in the carburetor throat. It increases fuel flow at high engine speeds. The main system reaches maximum fuel output at just over 1/4 throttle.

The main system may be rejetted by changing the main jet. Be very careful when changing the main jet. Engine damage could result from overheating caused by a main jet that is too small. It is best to change main jets only one size at a time. Be sure to use only Keihin main jets of the same type as originally installed. There is no air jet in the main system.

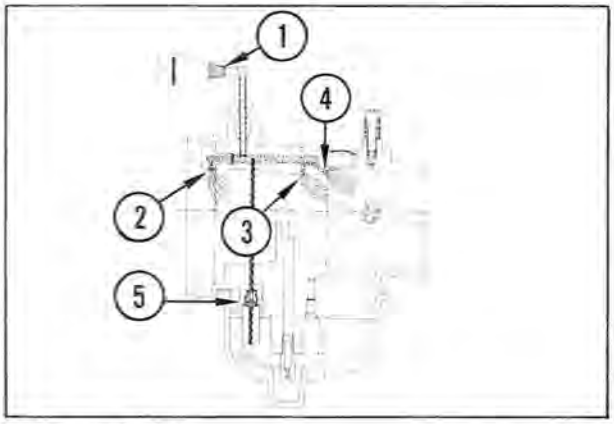


1. Primary Choke.
2. Main Jet.
3. Air.
4. Air/Fuel Mixture.

5. Power System

The power system takes over when the main jet reaches maximum output. At just over 1/4 throttle, the power system starts to contribute, and at wide open throttle and peak engine speed, it is pouring in about 65% of the total fuel needed by the engine. The power system takes fuel from the bottom of the float bowl, meters it through a jet in the main carburetor body, mixes it with air which comes through an air jet above the carburetor mouth, and dumps it into the carburetor throat through three outlets spaced along the roof of the throat.

Outlets three and two are near the throttle valve and outlet one is in the mouth of the carburetor. Outlet three starts flowing first, then outlet two at higher speeds. At high engine speeds and wide open throttle, there is enough air flow to make outlet one flow as well.



1. Power Air Jet.
2. Power Port 1.
3. Power Port 2.
4. Power Port 3.
5. Power Jet (fuel).

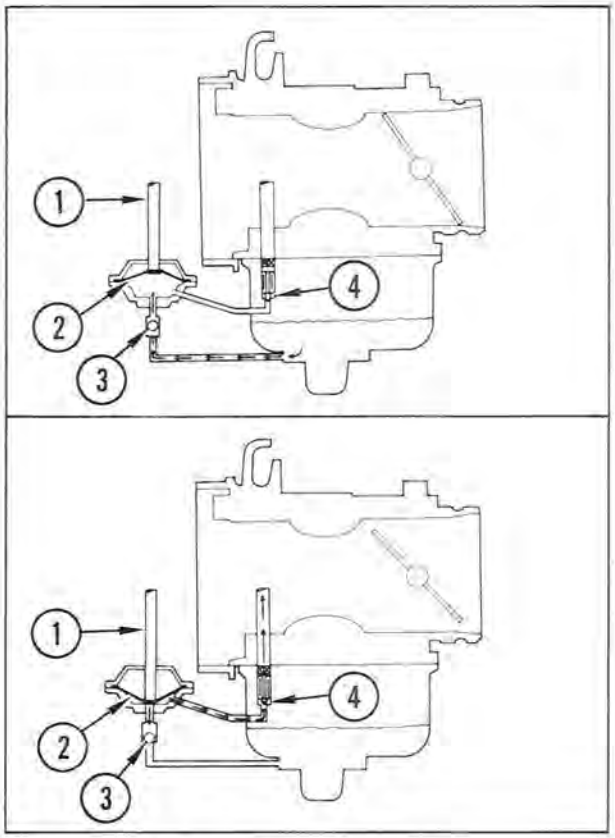
The power system may be rejetted by changing either the fuel jet or the air jet. Note that changing the air jet not only changes the mixture ratio, but it also changes the engine speed and throttle opening at which the system begins to work. Increasing the air jet size pushes the power system cut-in up the rpm and throttle opening scales. Decreasing the air jet size makes the power system start to flow at lower speeds and smaller throttle openings. As with the main system, be very cautious when changing jet sizes to avoid engine damage from overheating.

POWER SYSTEM ADJUSTMENT

JET	CHANGE	MIXTURE	SYSTEM START POINT
Air	Larger	Leaner	Higher
	Smaller	Richer	Lower
Fuel	Larger	Richer	No Change
	Smaller	Leaner	No Change

6. Accelerator Pump

When the throttle is opened from an idle, the mixture going into the engine is too lean for an instant. The accelerator pump squirts a little extra fuel into the carburetor throat under these conditions. The accelerator pump is a small diaphragm using one ball check valve and one needle check valve. The ball check valve prevents fuel back-flow into the float bowl when the system is activated. The needle check valve prevents fuel back-flow into the diaphragm chamber. This keeps a charge of fuel near the outlet, ready to be squirted into the engine. It also prevents air from being sucked into the system on the return stroke of the pump. Finally, without the needle check valve, fuel could siphon out of the system while the engine is running. Note that the accelerator pump will work only if the throttle is almost closed and then opened. From about 1/4 throttle and above, if the throttle is opened farther, the accelerator pump will not be activated.



1. Accelerator Pump Rod.
2. Diaphragm.
3. Ball Check Valve.
4. Needle Check Valve.

CARBURETOR TROUBLESHOOTING

Carburetor related malfunctions can be identified as too rich or too lean a fuel mixture. Symptoms are as follows:

When the fuel/air mixture is TOO RICH:

1. Engine noise is dull and intermittent.
2. The condition grows worse when the engine is hot.
3. The condition grows worse when the enrichener is opened.
4. The condition may improve slightly when the air silencer is removed.
5. Exhaust gases are heavy.
6. Spark plugs become fouled.

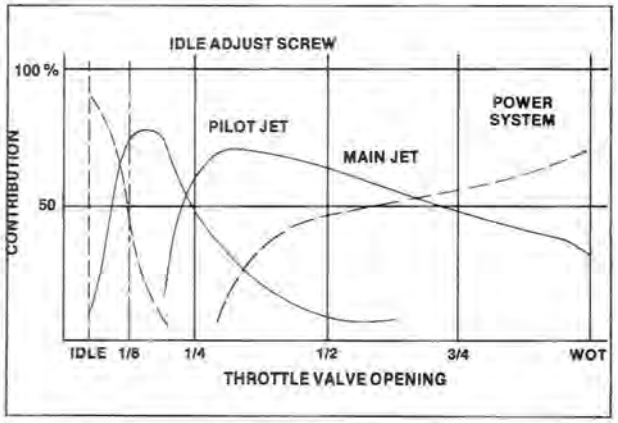
When fuel/air mixture is TOO LEAN:
1. The engine becomes overheated.
2. The condition improves when the enrichener is opened.
3. Acceleration is poor.
4. Spark plugs burn.
5. The revolutions of the engine fluctuate and lack of power is noticed.

If a carburetor is experiencing too rich or too lean fuel mixture problems, first check to see that the throttle is working properly. Then disassemble and clean the carburetor. A rich or lean fuel mixture is usually caused by a clogged air or fuel passage. If cleaning does not improve carburetor performance, carburetor tuning may be necessary.

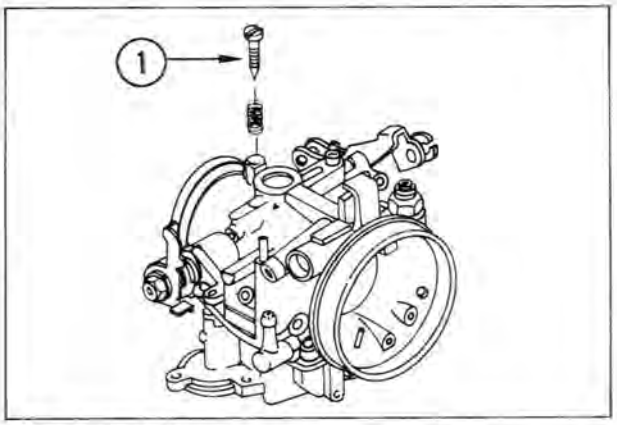
CARBURETOR TUNING

Different fuel metering components function according to the throttle setting:
1. Idle Adjust Screw — from closed throttle to just over 1/8 throttle.
2. Pilot Jet — from just off idle to 1/2 throttle.
3. Main Jet — from just below 1/4 throttle to full throttle.
4. Power System — from just above 1/4 throttle to full throttle.
5. Accelerator Pump — from just off idle to about 1/4 throttle, when the throttle is opened.

Tuning enables adjustment of the fuel/air mixture at any throttle setting by replacing the standard fuel metering devices with parts designed to meter more or less fuel than standard. Because a change in one fuel metering system can affect the performance of other systems, all systems should be checked whenever a change is made to one fuel metering system.



Idle Adjust Screw — regulated fuel/air mix flowing from the idle outlet port closest to the engine. Turning the idle adjust screw out richens the mixture. Turning it in leans the mixture. If it is necessary to use less than one turn out or more than three turns out to get a proper idle, check the pilot jet.

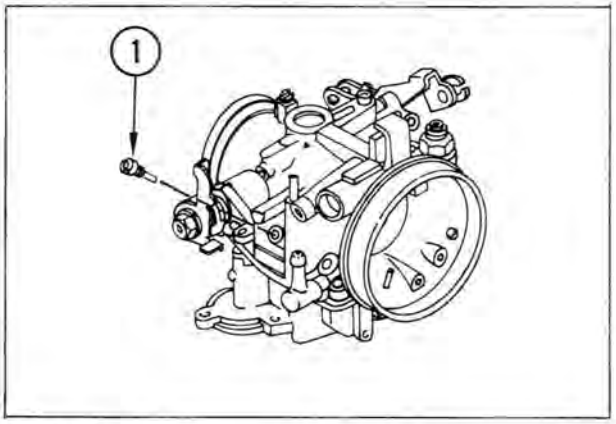


1. Idle Adjust Screw.

Pilot Jet — controls the flow of all the fuel to the pilot system. If the engine idles properly with the idle adjust screw less than one turn out, decrease the size of the pilot jet. If more than three turns out of the idle adjust screw are needed for a good idle, increase the size of the pilot jet. Always change jets in one size steps.

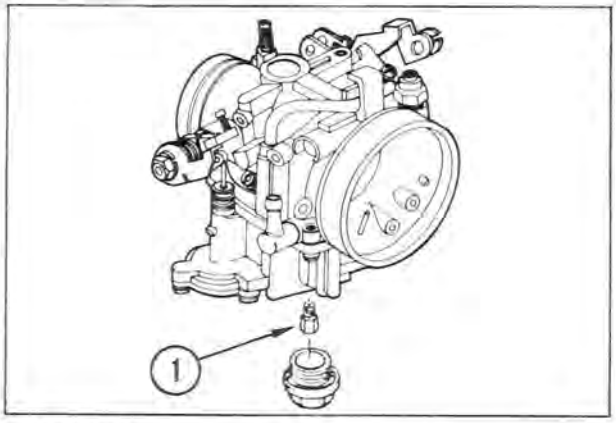
PILOT SYSTEM ADJUSTMENT

Idle Adjust Screw	Pilot Jet
Less than 1 Turn Out	Decrease Size
1 to 3 Turns Out	Size OK
More than 3 Turns Out	Increase Size



1. Pilot Jet.

Main Jet — regulates all the fuel from the main system. There is no main air jet, so many adjustments must be made to the main jet itself. Change the main jet only one size at a time to help prevent engine damage from overheating.

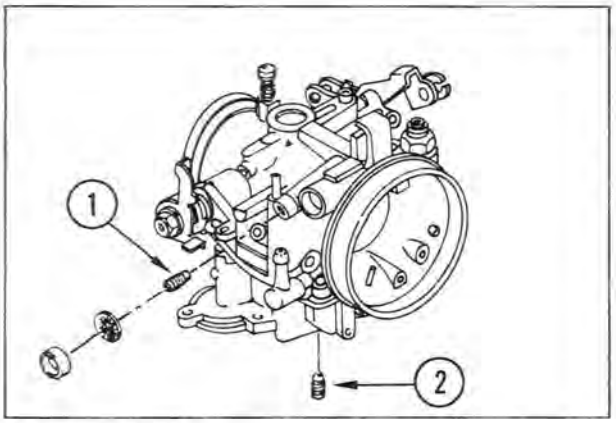


1. Main Jet.

Power System — has two identical jets, one for fuel and one for air. Both jets can be changed for tuning. Changing the fuel jet changes the mixture ratio over the entire power system operating range. Changing the air jet not only changes the mixture ratio, it moves the operating range as well. A larger air jet not only makes the mixture leaner, but also moves the system starting point higher in the RPM range. A smaller air jet makes the mixture richer, and moves the power system starting point to a lower engine speed.

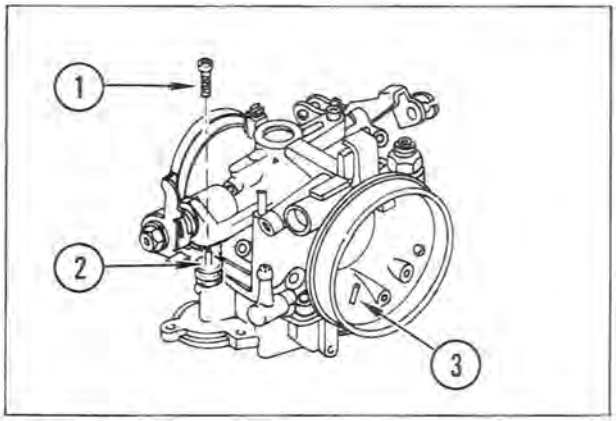
POWER SYSTEM ADJUSTMENT

JET	CHANGE	MIXTURE	SYSTEM START POINT
Air	Larger	Leaner	Higher
	Smaller	Richer	Lower
Fuel	Larger	Richer	No Change
	Smaller	Leaner	No Change



1. Power Air Jet.
2. Power Jet (fuel).

Accelerator Pump — squirts a little extra fuel into the mouth of the carburetor when the throttle is opened. The system works from idle to about 1/4 throttle. The standard setting has the tips of the adjuster screws even with the surface of the plastic pump lever. To richen the system (increase fuel output), turn the adjuster screws three turns in. This increases the accelerator pump stroke so that more fuel is drawn into the pump chamber and discharged. Thus, the low end is richer.

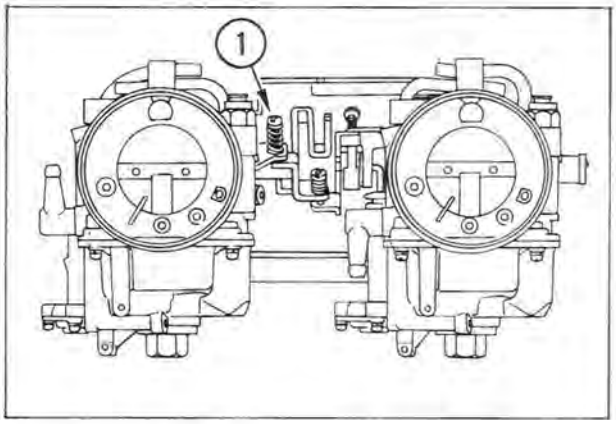


1. Adjuster Screw.
2. Accelerator Pump Rod.
3. Outlet.

CARBURETOR SERVICING

Carburetor Adjustments

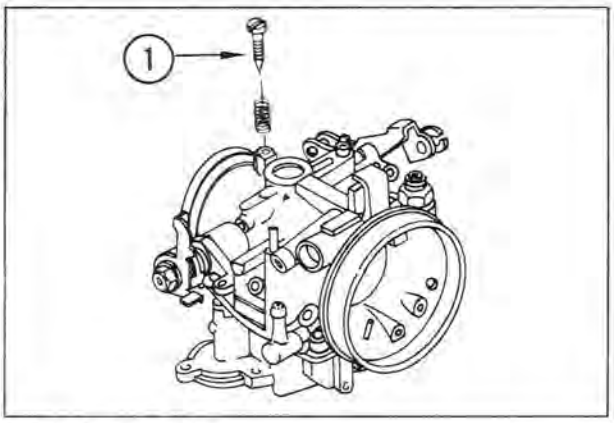
1. IDLE SPEED SCREW
   - Initial adjustment — Unscrew idle speed screw so that it does not contact throttle shaft linkage. Then, turn screw inward approximately 1-1/2 turns after it makes contact with the throttle linkage.
   - Final adjustment is achieved with engine warm, by turning idle speed screw to obtain the recommended engine idle RPM. Use tachometer to monitor engine speed.



1. Idle Speed Screw.

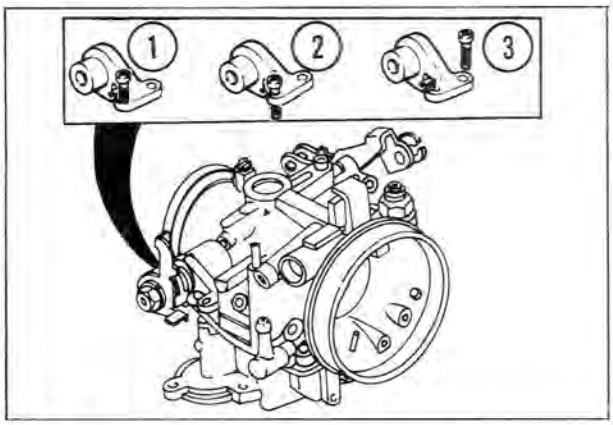
NOTE: It is important that both throttle valves operate in unison for correct power output balance between LH and RH cylinders. The recommended method of carburetor synchronization is with a Kawasaki Mercury Synchro Tuner, Special Tool P/N 57001-3510. Refer to Carburetor Synchronization procedure.

2. IDLE ADJUST SCREW.
   - Initial adjustment — Turn idle adjust screw into carburetor until lightly seated. Then, unscrew 2-1/2 turns.
   - Final adjustment is obtained with engine warm nd operating at the recommended idle RPM. Use a tachometer to monitor engine idle speed and adjust idle speed screw if required. Turn idle adjust screw on each carburetor equally to achieve stable idle as well as good acceleration response. To lean out fuel delivery, close (clockwise) screw. Open (counterclockwise) screw to richen fuel delivery.



1. Idle Adjust Screw.

3. ACCELERATOR PUMP SCREW.
   - Normal Position — End of adjuster screw flush with bottom of lever.
   - Increase Accelerator Pump Output — Turn adjusting screw inward (1 to 3 complete turns) so that tip of screw extends beyond bottom of lever. More than 3 turns will not provide additional fuel output.
   - Decrease Accelerator Pump Output — Insert screw into lever hole shown. Turn screw inward to reduce fuel output to obtain desired result.



1. Normal.
2. Increase output.
3. Decrease output.

Carburetor Synchronization

It is extremely important that both carburetors function in unison. For maximum power and efficiency, both cylinders must work equally. The most effective method of synchronizing carburetors is to use a Mercury Synchro Tuner (special tool). If Synchro Tuner is not available, perform procedure for Carburetor Synchronization, Mechanical.

The Mercury Synchro Tuner measures vacuum within the engine intake system. Measurement of this vacuum will vary depending on the position of the carburetor throttle valve. Opening the throttle valve reduces the restriction on air flow, resulting in a lower vacuum measurement. Closing throttle valve restricts air flow, which causes a higher vacuum measurement.

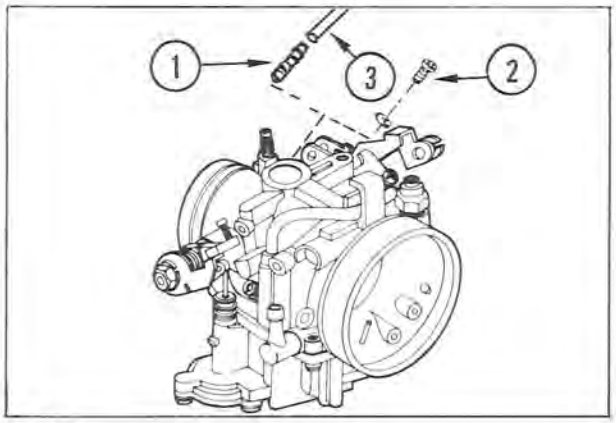
Adjust throttle valve balance so that vacuum measures equally at idle speed for both carburetors by performing the following procedure.

CAUTION **Air silencer assembly should be properly installed. Secure converter guard in position with clip pins.**

1. Warm up engine.
   - For proper adjustment and ease of restarting, start engine and allow it to run for several minutes.

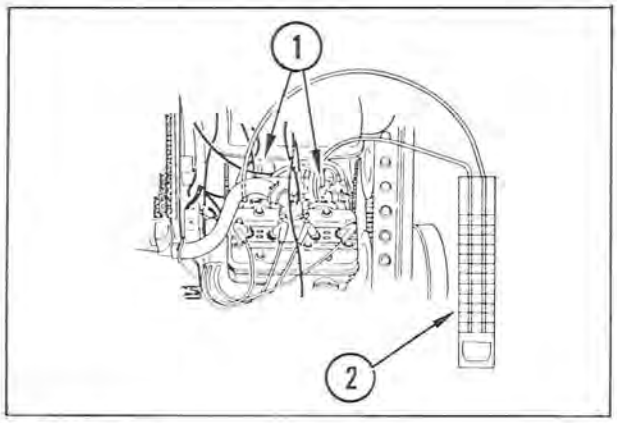
WARNING **Avoid personal injury. Do not touch rotating or hot engine parts.**

2. Install vacuum pickup fitting (P/N 92005-3509) in each carburetor.
   - Turn off engine.
   - Remove screw plugs from vacuum pickup holes.
   - Screw pickup adapters into carburetors.



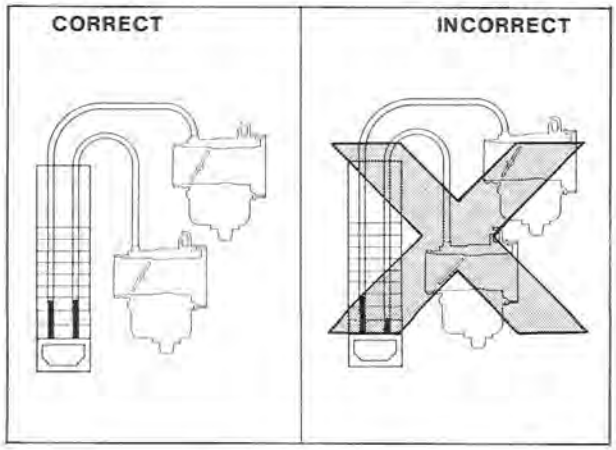
1. Fitting.
2. Vacuum Screw Plug.
3. Tubing (3/32 in.).

3. Connect Synchro Tuner to carburetors.
   - Attach one tube from Synchro Tuner to each pick up adapter.
   - It may be necessary to install a short piece of 3/32 in. tubing into the Synchro Tuner tubing ends to insure a good seal with adapters.

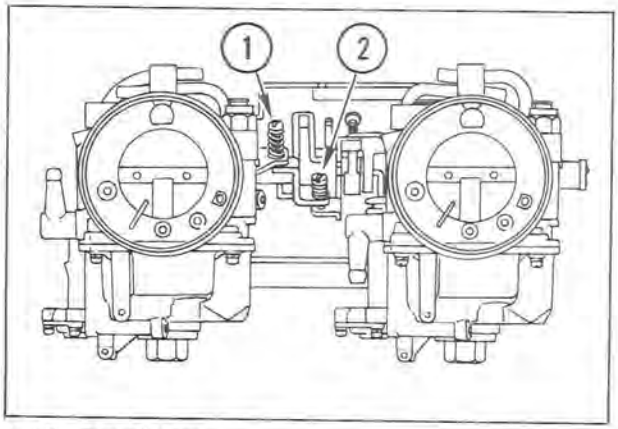


1. Carburetors.
2. Mercury Synchro Tuner.

4. Check carburetor synchronization at idle speed.
   - With engine idling, observe vacuum readings on Synchro Tuner.



5. If necessary, synchronize carburetors.
   - Adjust RH carburetor synchronizing screw to equalize vacuum readings. Turn screw inward to reduce vacuum or outward to increase vacuum.



1. Idle Speed Screw.
2. Synchronizer Screw.

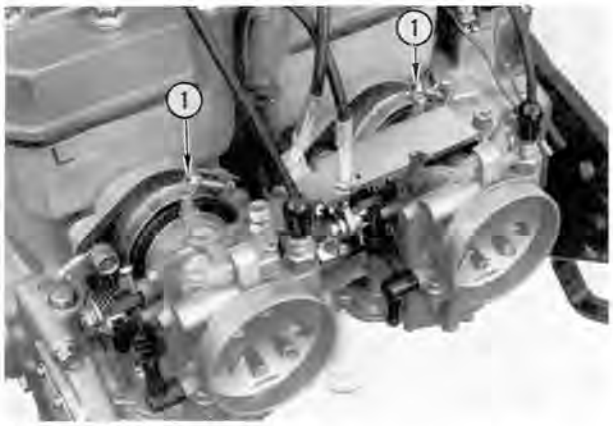
6. Adjust idle speed.
   - Turn idle speed screw to obtain recommended idle RPM.
7. Disconnect Synchro Tuner.
   - Pull tubes from pick up fittings.
   - Remove pick up fittings.
   - Install screw plugs and washers.

Carburetor Synchronization, Mechanical

1. Remove air silencer from carburetors.
   - Refer to Silencer Removal procedure.

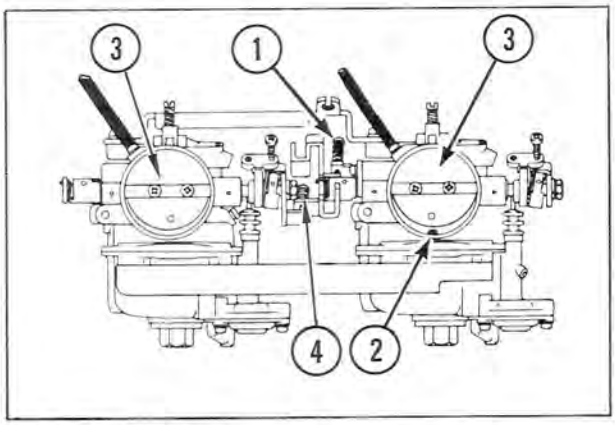
WARNING **Use care not to kink or damage control cables. Component failure or throttle malfunction could result, causing personal injury.**

2. Remove carburetors.
   - Loosen carburetor holder clamps.
   - Pull off carburetor assembly.
   - Cover carburetors to prevent dirt from entering.



1. Holder Clamp.

3. Adjust throttle valves to fully closed position.
   - Loosen idle speed screw until LH throttle valve is fully closed.
   - If RH throttle valve is not fully closed, loosen carburetor synchronizing screw.
4. Set LH carburetor throttle opening to 1/16 in. (1.6 mm).
   - Open LH carburetor throttle valve and insert a 1/16 in. (1.6 mm) drill bit in space between bottom of carburetor bore and throttle valve. release the valve slowly and let it seat on drill bit.
   - With carburetor throat facing downward, slowly turn idle speed screw in until the drill bit falls out.



1. Idle Speed Screw.
2. Drill Bit.
3. Throttle Valve.
4. Synchronizer Screw.

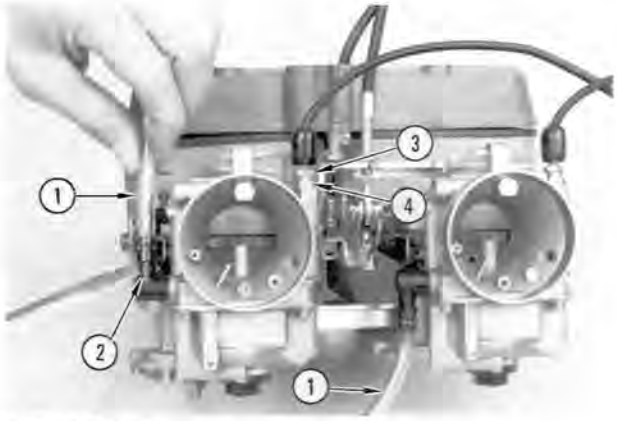
5. Set RH carburetor throttle opening to 1/16 in. (1.6 mm).
   - Repeat procedure given for LH carburetor, using carburetor synchronizing screw to set RH carburetor.
6. Position carburetors in holders.
   - Tighten carburetor holder clamps.
7. Synchronize oil pump with carburetors.
   - Refer to Oil Pump Cable Adjustment procedure.
8. Install air silencer.
   - Refer to Silencer Installation procedure.
9. Set engine idle speed.
   - Refer to Carburetor Adjustments procedure.

Carburetor Removal

1. Remove air silencer.
   - Refer to Silencer Removal procedure.

WARNING **Gasoline fumes are heavier than air and can become explosive if exposed to a pilot light from a furnace, hot water heater, clothes dryer, etc. Perform maintenance only in an area that is well ventilated and free from pilot lights, flames and sparks.**

2. Disconnect fuel tube from inlet fitting of each carburetor.
   - Push on end of tubes during removal to avoid damage to carburetor fittings.
   - Plug fuel tube ends to prevent possible siphoning action from fuel tank.



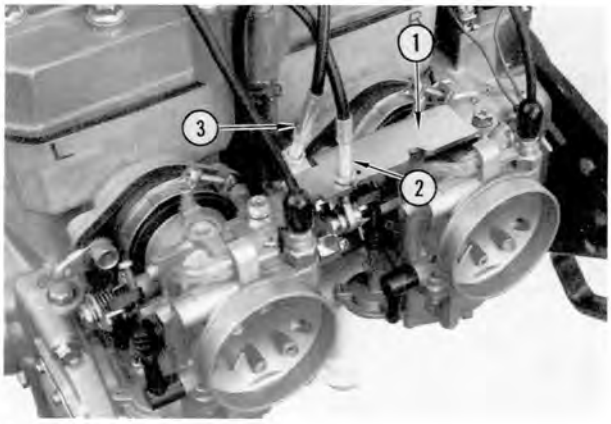
1. Fuel Tubes.
2. Push On End.
3. Enrichener Locknut.
4. Enrichener Cap.

3. Remove enrichener cable from each carburetor.
   - Loosen adjuster lock nut.
   - Unscrew enrichener plunger cap.
4. Disconnect oil pump cable and throttle cable from carburetor assembly.

WARNING **Use care not to kink or damage control cables. Component failure or throttle malfunction could result, causing personal injury.**

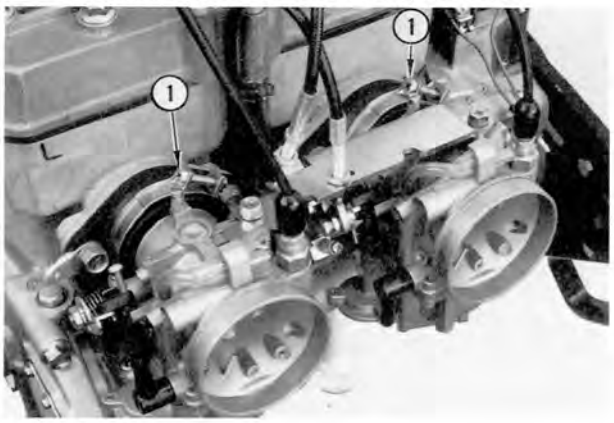
NOTE: During removal, do not disturb throttle cable or oil pump cable adjustments. If adjustments are disturbed, readjusting will be necessary during assembly.

   - Pull hair pins from throttle cable pin and oil pump cable pin.
   - Remove top carburetor bracket (with cables attached).

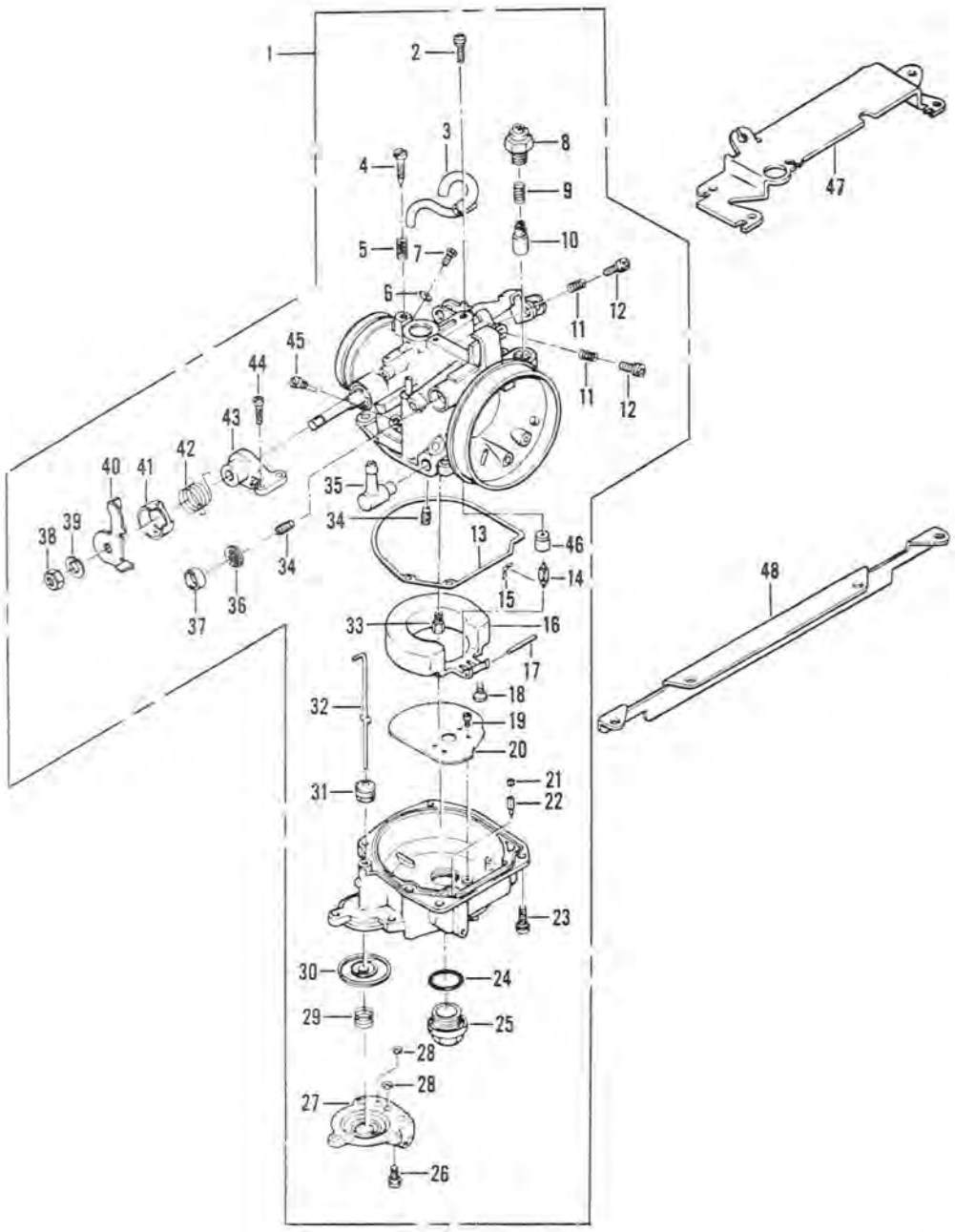


1. Top Bracket.
2. Oil Pump Cable.
3. Throttle Cable.

5. Remove carburetors from holders.
   - Loosen both holder clamp screws.



1. Holder Clamp.



1 CARBURETOR ASSY
2 SCREW, pan head, 5 x 14mm
3 TUBE, air vent
4 SCREW, idle adjust
5 SPRING, idle screw
6 WASHER
7 SCREW
8 CAP, enrichener plunger
9 SPRING, enrichener plunger
10 PLUNGER, enrichener
11 SPRING
12 SCREW
13 O-RING
14 VALVE, float
15 CLIP, float valve
16 FLOAT
17 PIN, float pivot
18 SCREW
19 SCREW, pan head, 3 x 5mm
20 BAFFLE
21 RETAINER, check valve
22 VALVE, check
23 SCREW, pan head 4 x 16mm
24 O-RING, cover
25 COVER, main jet
26 SCREW, pan head 4 x 12mm
27 HOUSING, accelerator pump
28 SEAL
29 SPRING, diaphragm
30 DIAPHRAGM
31 CAP, accelerator pump
32 ROD, accelerator pump
33 JET, main
34 JET, power
35 FITTING, fuel inlet
36 SCREEN, power jet
37 RETAINER, screen
38 NUT, 6mm
39 WASHER, spring, 6mm
40 LEVER, left throttle
LEVER, right throttle
41 COLLAR, spring
42 SPRING
43 LEVER, accelerator pump
44 SCREW, pan head, 4 x 16mm
45 JET, pilot
46 SEAT, float valve
47 BRACKET, top carburetor
48 BRACKET, bottom carburetor

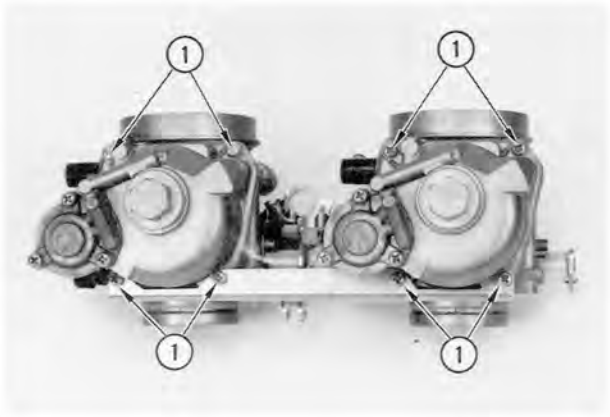
Carburetor Disassembly

CAUTION **Do not remove any throttle linkage or throttle valve parts. These parts are aligned during manufacture and if they are misaligned the engine may not run properly.**

1. Select a clean work area for disassembling the carburetor. Most carburetor problems are caused by dirt in the system.
2. Clean the outside of the carburetor with a high flash-point solvent and blow dry with compressed air.

CAUTION **Do not blow high pressure air through the carburetor until it is completely disassembled or the float may be damaged.**

3. Separate the carburetors.
   - Remove the two brackets by taking the four screws with lock washers out of each brace.



1. Float Bowl Screws.

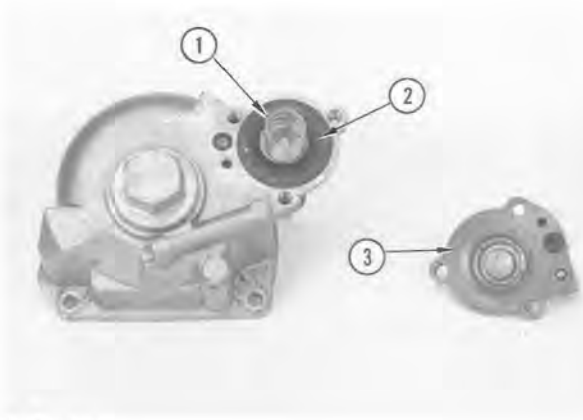
4. Remove the float bowl.
   - Unhook the accelerator pump push rod and lift the bowl straight off the carburetor body.

1. Accelerator Pump Lever.
2. Accelerator Pump Rod.
3. Cap.

5. Unfasten float bowl baffle by removing the screw.

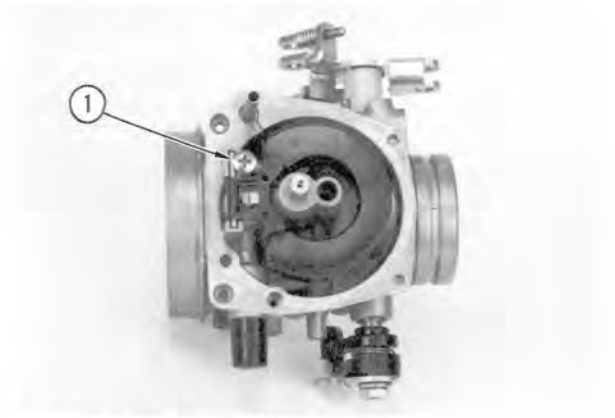
1. Baffle Screw.

6. Remove accelerator pump housing.
   - Be careful not to lose the spring between the pump housing and the diaphragm or the two O-rings between the housing and float bowl.
   - Pull the push rod and rubber cap free of the float bowl.



1. Spring.
2. Diaphragm.
3. Housing.

7. Lift out the float with the float valve needle attached.
   - Unscrew the float pivot pin retaining screw.
   - To remove the needle from the float, unsnap the wire clips.

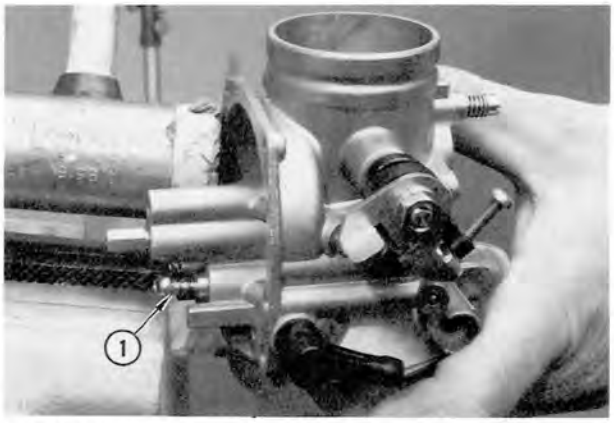


1. Pivot Pin Retaining Screw.

8. It is not necessary to remove the float valve seat for cleaning. However, if it is damaged or worn, it should be removed.

CAUTION **Excessive turning of seat can damage carburetor body which may create leakage (flooding) when new seat is installed.**

- Tighten self-tapping screw into valve seat until seat begins to rotate within carburetor body.
- Clamp self-tapping screw head in a vise.
- Alternately tap on each side of carburetor body, using a mallet.



1. Self-tapping Screw.

- Blow any metal chips from the valve seat area with compressed air directed through fuel inlet fitting.

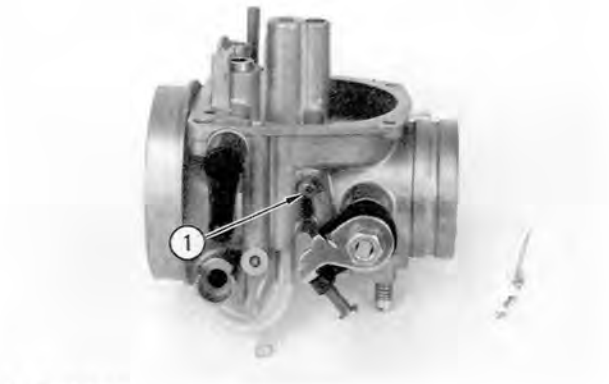
9. Unscrew the main jet.

1. Main Jet.

10. Remove the power jet.

1. Power Jet (fuel).

11. Unscrew the pilot system jet.

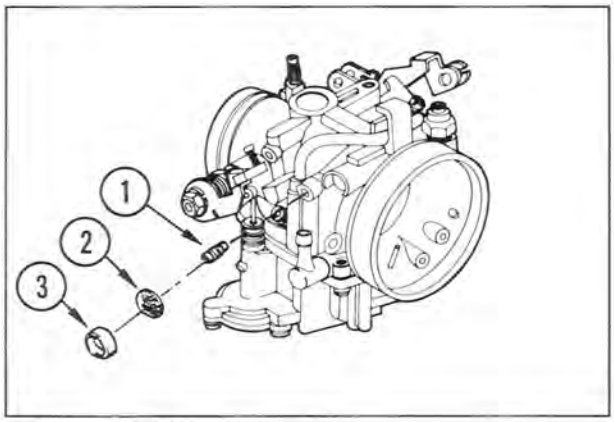


1. Pilot Jet.

12. Take out the idle adjust screw and its spring.

1. Idle Adjust Screw.

13. Remove the power air jet.
    - Pull out retainer and screen.



1. Power Air Jet.
2. Screen.
3. Retainer.

Carburetor Cleaning

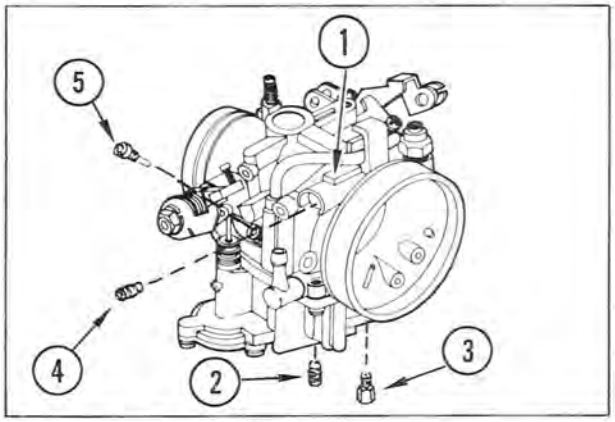
Thoroughly clean all parts with a mild solvent or fuel/oil mixture. Inspect all drilled holes, openings and fuel passages in the body. Blow compressed air through the passages. Remove any sediment from the fuel bowl.

Use of carburetor cleaners may be necessary to remove gum and varnish build-up from the jets and float chamber. DO NOT USE DRILLS OR WIRES to clean the jets or damage to the jets will result.

Inspect the float valve needle tip for wear or damage in the sealing (tapered) area. Replace the float valve assembly if the needle shows signs of wear or damage, such as grooves or scratches.

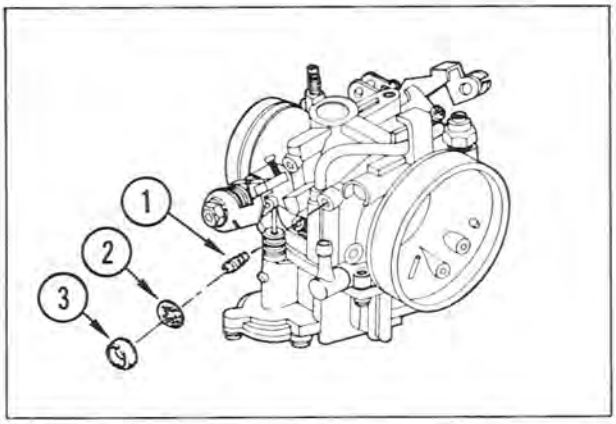
Carburetor Assembly

Check all the carburetor parts for proper identification markings prior to reassembly. If the correct components are not installed, the carburetor cannot be calibrated properly.



1. Carburetor Body Marking (B36AL left - B36AR right).
2. Power Jet (fuel) #180.
3. Main Jet #98.
4. Power Air Jet #180.
5. Pilot Jet #70.

1. Screw in the power air jet and tighten securely.
    - Push the screen and retainer into the air jet hole.



1. Power Air Jet.
2. Screen.
3. Retainer.

2. Install the idle adjust screw with its spring.
    - Screw it all the way in until it bottoms lightly and then back it out the specified number of turns. Refer to Carburetor Adjustments.

1. Idle Adjust Screw.

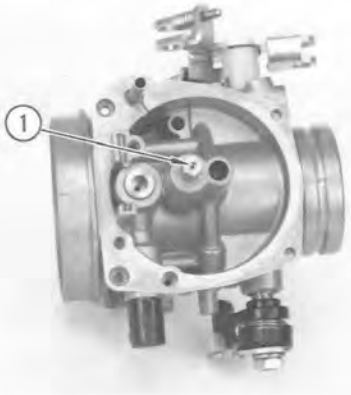
3. Screw in the pilot jet.

1. Pilot Jet.

4. Replace the power jet.

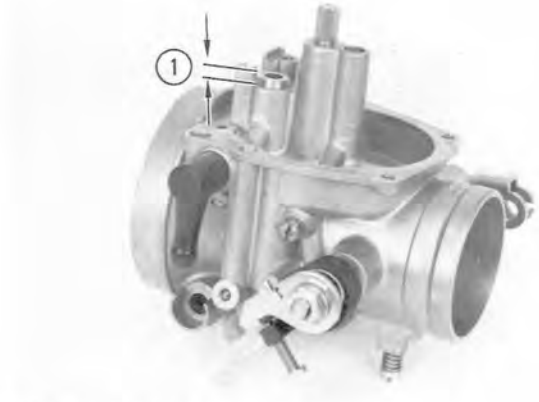
1. Power Jet (fuel).

5. Install the main jet.
   - Do not overtighten or threads in the carburetor body may be stripped.



1. Main Jet.

6. If the float valve seat was removed, press the new one in with the special tool (P/N 57001-3520).
   - If the tool is not available, press the seat in until it extends 0.083 in. (2.1 mm) from the carburetor body.

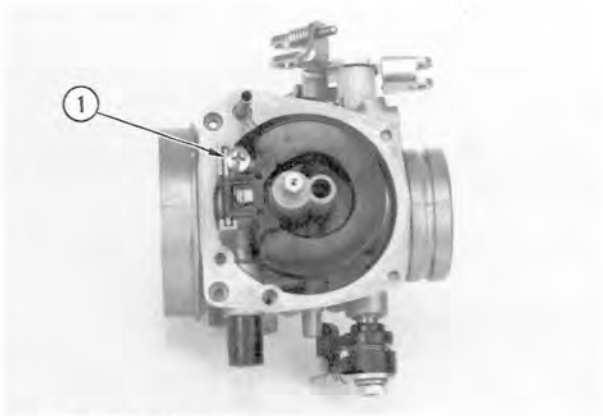


1. 0.083 in. (2.1 mm).

7. Use the small wire clip to hang the float valve on the float arm.

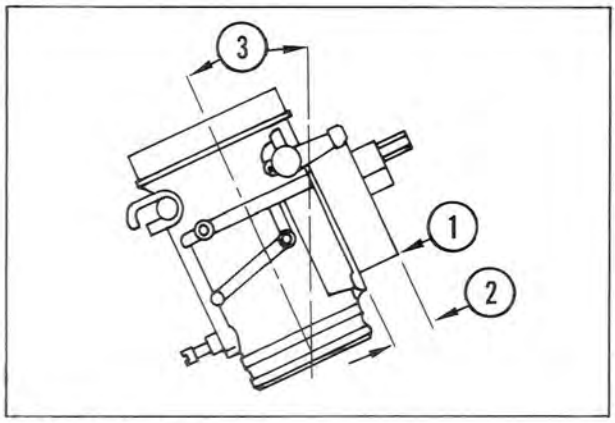
1. Clip.
2. Float Valve.
3. Arm.

8. Position the float in the carburetor body with the float valve in the seat.
   - Slide the float pivot pin into the float.
   - Tighten the pivot pin retaining screw.



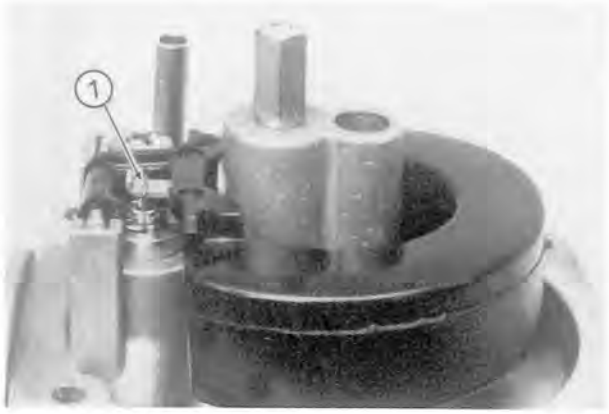
1. Pivot Pin Retaining Screw.

9. Check float level adjustment.
   - Observe float level with carburetor tilted 20°-30° from vertical to avoid compressing float valve spring.
   - Adjustment is correct if edge of float is 0.512 to 0.670 in. (13 to 17 mm) above carburetor surface when measured in location shown.



1. Edge of Float.
2. 0.512 to 0.670 in. (13 to 17 mm).
3. 20° to 30° From Vertical.

   - If adjustment is required, bend metal tab on float arm to obtain correct setting.

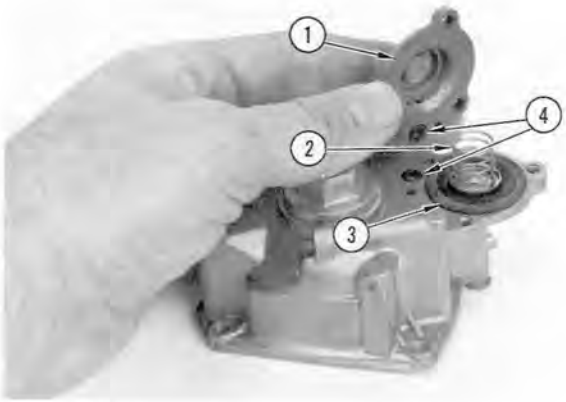


1. Bend Tab With Screwdriver.

10. Lay the diaphragm against the float bowl so that the lip is in the groove.

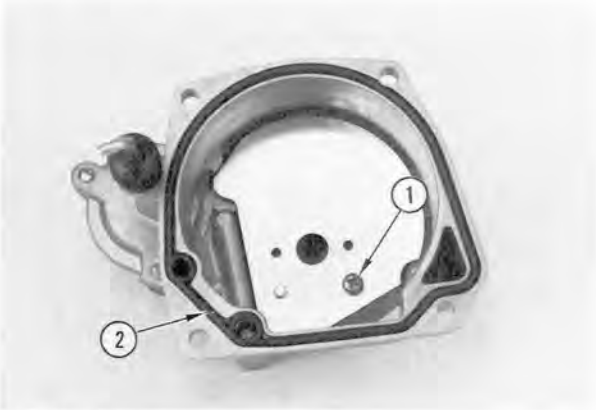
1. Lip.
2. Groove.

11. Install accelerator pump components.
   - Shake the accelerator pump housing to be sure the ball valve is free.
   - Be sure the two O-rings are in place, one in the accelerator pump housing and one in the float bowl.
   - Set the spring in place, and carefully put the housing over the spring and diaphragm.
   - Tighten the screws securely.
   - Slip the rubber cap into place.



1. Housing.
2. Spring.
3. Diaphragm.
4. O-rings.

12. Secure the float bowl baffle in position by tightening the screw securely.

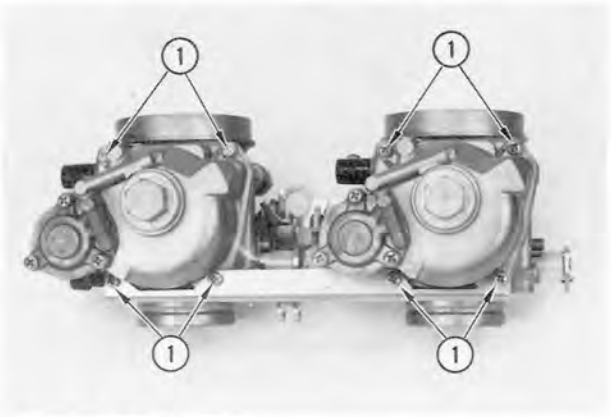


1. Baffle Screw.
2. Float Bowl O-ring.

13. Install float bowl onto carburetor body.
   - Hook the accelerator pump push-rod to the throttle linkage.
   - Be sure the large O-ring is in place and fit the float bowl onto the carburetor body so that the accelerator pump push-rod fits into the rubber cap as shown.
   - Insert the two screws with lockwashers nearest the mouth of the carburetor, but do not tighten them yet.

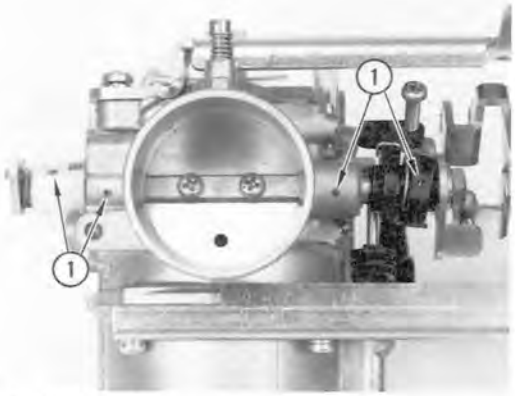
1. Accelerator Pump Rod.
2. Cap.
3. Accelerator Pump Lever.

14. Rejoin the carburetors with the two brackets.
    - Tighten all of the float bowl screws.



1. Float Bowl Screws.

15. Grease the throttle shafts through the holes shown with a non-freezing type grease.

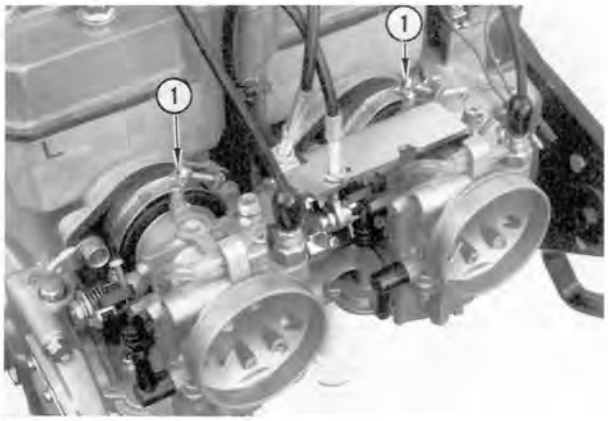


1. Apply Grease Here.

16. Check carburetors for proper synchronization.
    - If Mercury Synchro Tuner (special tool) is available, synchronize carburetors after installation is completed.
    - If Mercury Synchro Tuner (special tool) is not available, perform Carburetor Synchronization, Mechanical at this time.

Carburetor Installation

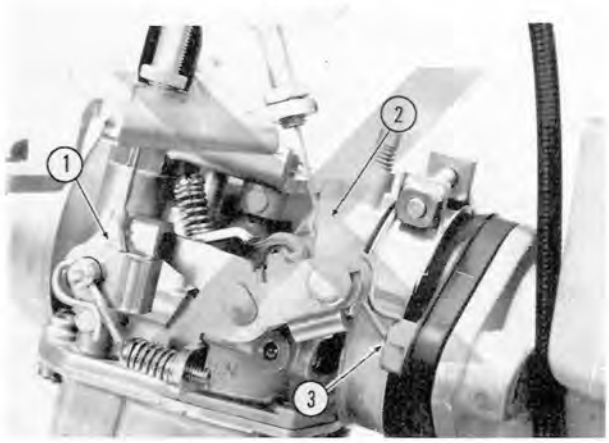
1. Position carburetors in holders.
    - Tighten both holder clamp screws.



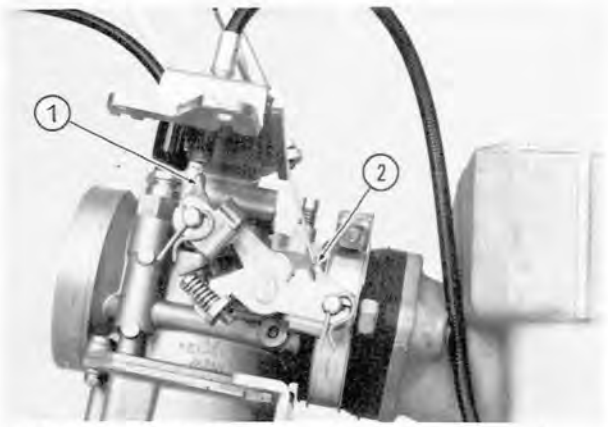
1. Holder Clamp.

WARNING **Throttle cable pin and oil pump cable pin must be installed as shown to avoid possible interference between hair pins and carburetor holder bolts. Throttle malfunction may result, causing personal injury.**

INCORRECT



CORRECT



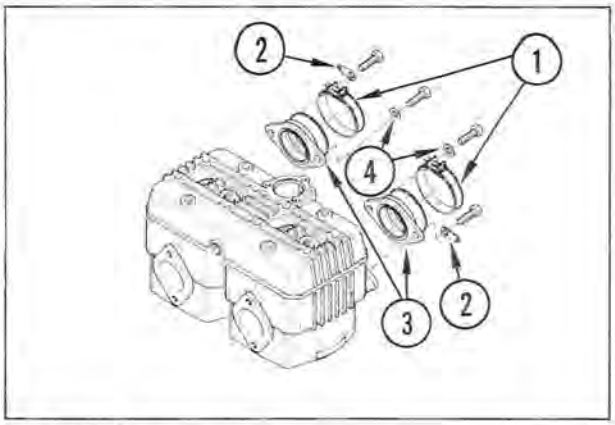
1. Oil Pump Cable.
2. Throttle Cable.
3. Interference Problem.

2. Connect oil pump cable and throttle cable to carburetor assembly.
   - Secure top carburetor bracket to carburetors.
   - Install throttle cable pin and oil pump cable pin as shown.
   - Insert hair pin retainers into cable pins.
3. Check oil pump to carburetor synchronization.
   - Refer to Oil Pump Cable Adjustment procedure.
4. Secure enrichener cables to carburetors.
   - Insert enrichener plunger into carburetor and tighten plunger cap.
   - Check enrichener cable adjustment. Refer to Enrichener Cable Adjustment procedure.
5. Connect fuel tube to inlet fitting on each carburetor.
6. Install air silencer assembly.
   - Refer to Silencer Installation procedure.
7. Check carburetor synchronization.
   - Refer to Carburetor Synchronization procedure.

CARBURETOR HOLDERS

Carburetor Holder Removal

1. Remove silencer.
   - Refer to Silencer Removal procedure.
2. Disconnect carburetors from holders.
   - Loosen both holder clamp screws.
3. Unbolt carburetor holders from cylinders.
   - Remove carburetor holder mounting bolts.
   - Pull holder and silencer spring washer from each cylinder.



1. Holder Clamp.
2. Silencer Spring Washer.
3. Holder.
4. Plain Washer.

Carburetor Holder Inspection

1. Carefully examine carburetor holders.
   - If holders show any signs of cracking or deteriorating, replace them.

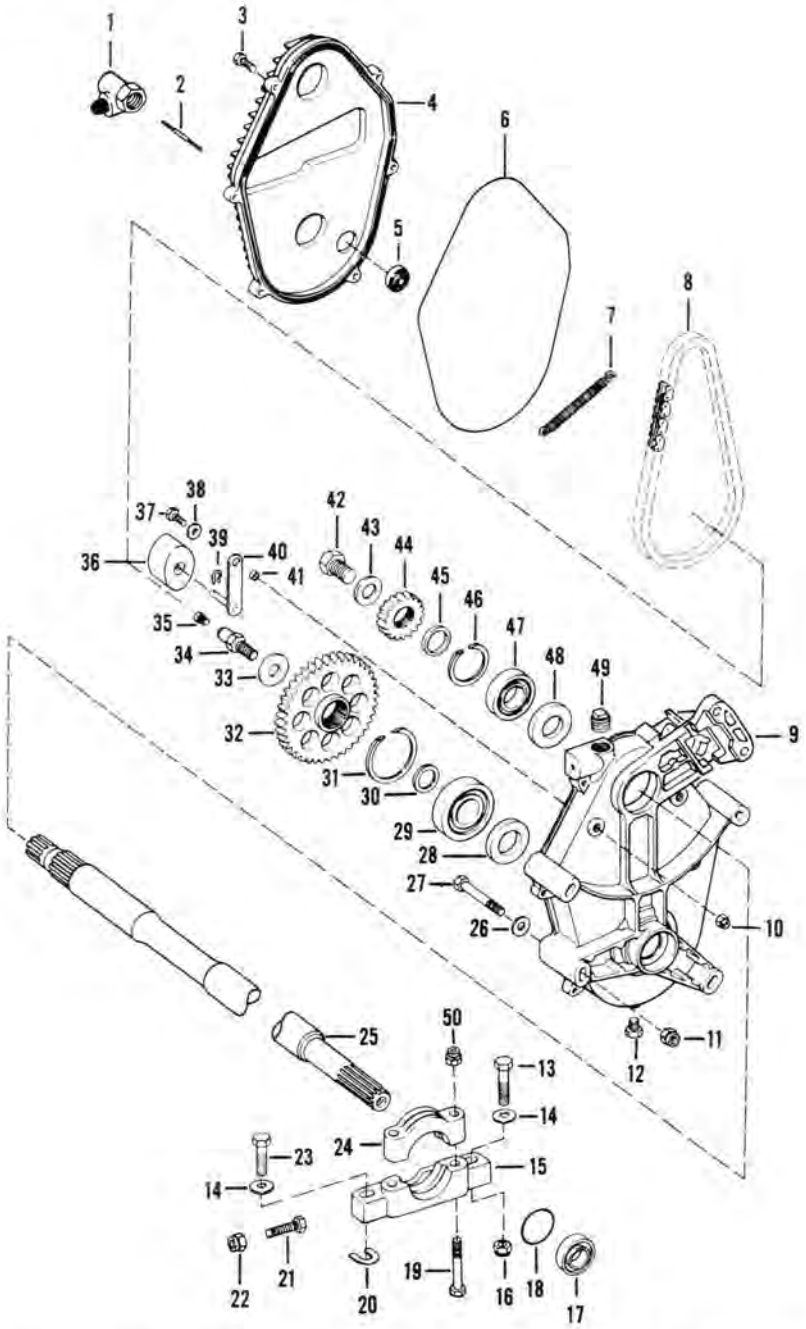
Carburetor Holder Installation

1. Be sure mounting surfaces of carburetor holders and cylinder flanges are clean and dry.
2. Mount holders on cylinders.
   - Position silencer spring washers on outside mounting bolt of each holder.
   - Torque bolts to 45 in. lb (0.5 kg-m).
3. Reinstall carburetors.
   - Refer to Carburetor Installation procedure.
4. Install air silencer assembly.
   - Refer to Silencer Installation procedure.

CHAINCASE/JACKSHAFT

Table of Contents

CHAINCASE & JACKSHAFT

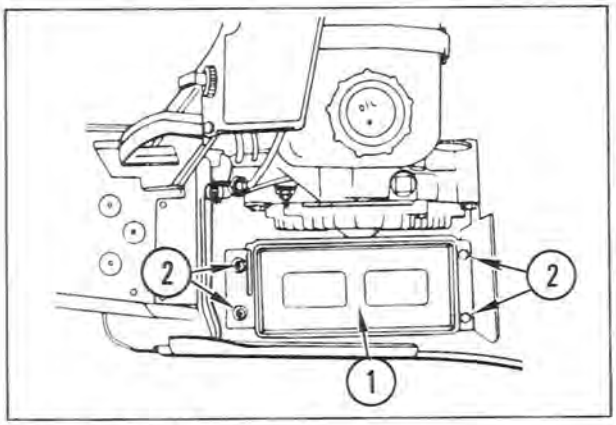


1 ADAPTOR, speedometer drive
2 KEY, speedometer adaptor
3 BOLT, 1/4-20 x 1.00
4 COVER, chain case
5 GAUGE, oil level
6 SEAL, "O" ring
7 SPRING, green tensioner
8 CHAIN
9 CHAINCASE
10 NUT, insert, 1/4-28
11 NUT, insert, 5/16-24
12 PLUG, drain
13 BOLT, 3/8-24 x 1.75
14 WASHER, plain, 3/8"
15 RETAINER, bearing
16 NUT, insert, 3/8-24
17 BEARING
18 SEAL "O" ring
19 BOLT, 1/4-28 x 2.50
20 SHIM, bearing retainer
21 BOLT, 3/8-24 x 1.25
22 NUT, jam, 3/8-24
23 BOLT, 3/8-24 x 1.50
24 CAP, bearing retainer
25 JACKSHAFT
26 WASHER, special
27 BOLT, 5/16-24 x 3.25
28 SEAL, lower oil
29 BEARING, lower ball
30 SPACER, driven sprocket
31 RING, bearing retainer
32 SPROCKET, 38 tooth driven
33 WASHER
34 BOLT, special
35 ADAPTOR, speedometer key
36 GUIDE, chain
37 BOLT, 1/4-28 x .88
38 WASHER, plain, 1/4"
39 PIN, hair
40 TENSIONER ARM
41 SLEEVE, tensioner arm
42 BOLT, 5/8-18 x 1.00
43 WASHER, special
44 SPROCKET, 22 tooth drive
45 SPACER, drive sprocket
46 RING, bearing retainer
47 BEARING, upper ball
48 SEAL, upper oil
49 PLUG, fill
50 NUT, insert 1/4-28

CHAIN

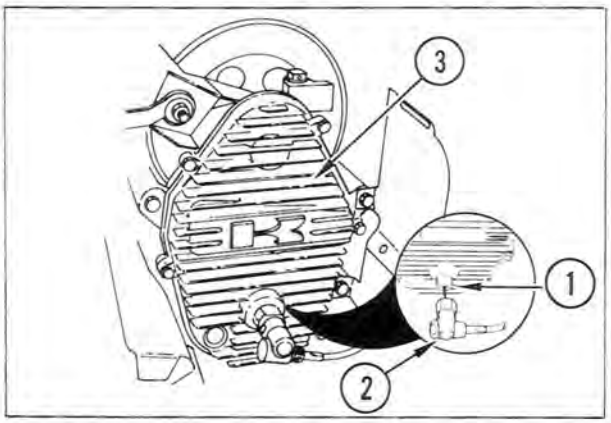
Chain Removal

1. Remove battery (electric start models only).
   - Refer to Battery Removal procedure.
2. Remove lower battery case.
   - Unfasten mounting bolts.



1. Lower Battery Case.
2. Mounting Bolts.

3. Unfasten speedometer drive adapter and remove key.

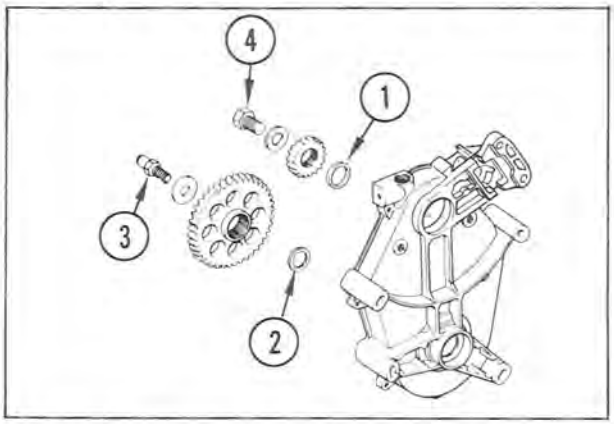


1. Key.
2. Adapter.
3. Chaincase Cover.

4. Drain chaincase lubricant.
   - Place oil drain pan under hole in lower pan.
   - Unscrew chaincase cover mounting bolts and remove cover.
5. Remove tensioner spring.
   - Pull out hair pin.
   - Unhook spring from tensioner arm.
6. Remove chain and sprockets.
   - Unscrew sprocket mounting bolts and slide sprockets off.
   - Remove spacer found behind each sprocket.

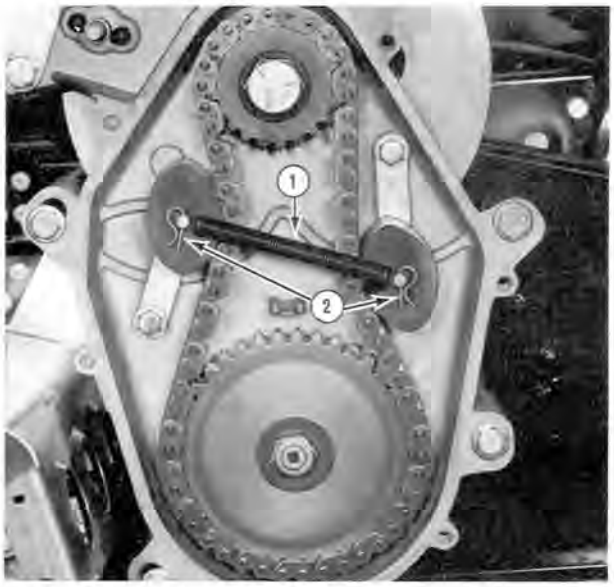
Chain Installation

1. Install sprocket spacers.
   - Thick spacer on top shaft.
   - Thin spacer on bottom shaft.
2. Mount sprockets and chain.
   - Lip on lower sprocket goes toward bearing.
   - Torque lower sprocket bolt to 35 ft lb (5.0 kg-m).
   - Torque upper sprocket bolt to 50 ft lb (7.0 kg-m).



1. Thick Spacer.
2. Thin Spacer.
3. Lower Sprocket Bolt.
4. Upper Sprocket Bolt.

3. Install chain tensioner spring.
   - Refer to Chain Tension procedure for chain guide positioning.
   - Hook spring onto tensioner arm.
   - Install hair pin.

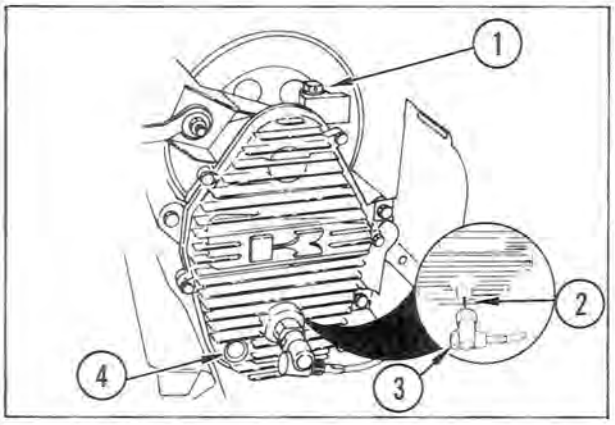


1. Tensioner Spring.
2. Hair Pin.

4. Mount chaincase cover.
   - Use new O-ring seal.
   - Torque cover bolts to 70 in. lb (1.0 kg-m).
5. Add chaincase lubricant.
   - Use DEXRON II automatic transmission fluid.
   - Add lubricant until level is between center and top of sight gauge.

WARNING **Prevent oil mist from coating brake components, which may reduce braking action, by installing fill plug with vent hole pointed away from brake disc.**

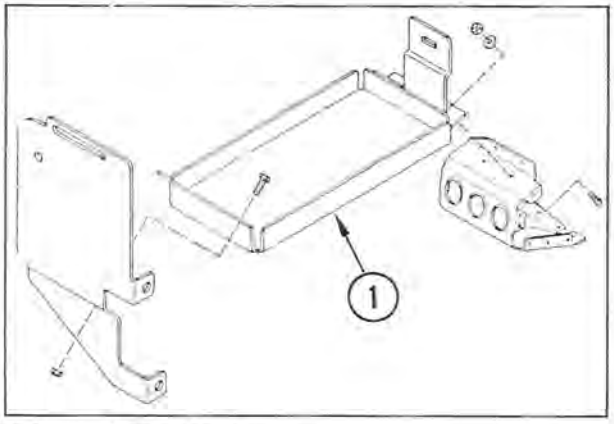
6. Insert speedometer key through chaincase cover hole while rotating key to align with square hole in lower sprocket mounting bolt.



1. Fill Plug Vent Hole.
2. Key.
3. Adapter.
4. Sight Gauge.

NOTE: Speedometer key should be centered within chaincase cover hole and cannot be rotated when properly engaged with lower sprocket mount bolt.

7. Connect speedometer drive adapter.
   - Hold drive adapter near mounting threads on chaincase cover.
   - Insert end of flexible key into square hole of adapter.
   - Slide adapter into position on cover. Do not use force during assembly. When components are properly aligned, adapter will slide easily into position.
8. Mount lower battery case.
   - Secure battery case to footrest and heat shield bracket with mounting hardware installed in sequence shown.



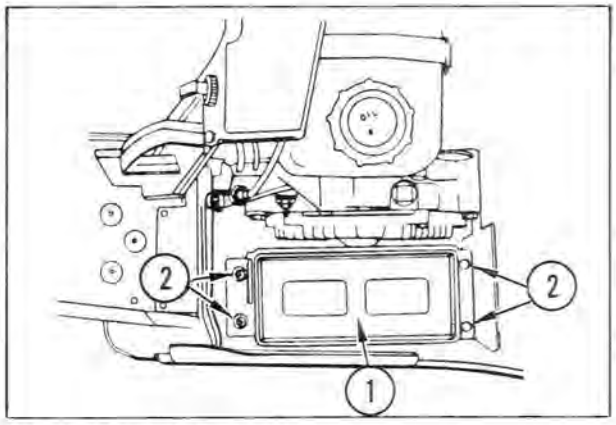
1. Lower Battery Case.

9. Install battery.
   - Refer to Battery Installation procedure.

CHAINCASE

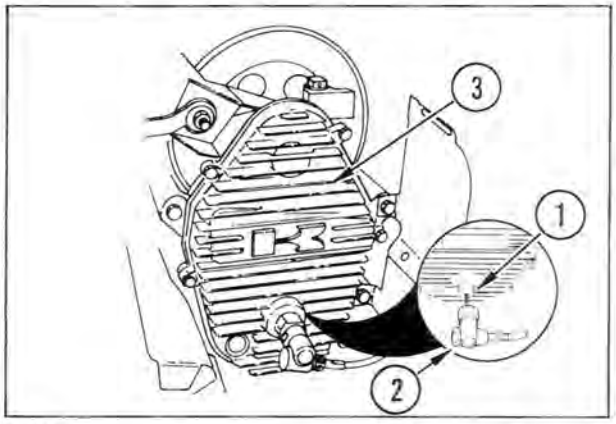
Chaincase Removal

1. Remove battery (electric start models only).
   - Refer to Battery Removal procedure.
2. Remove lower battery case.
   - Unfasten mounting bolts.



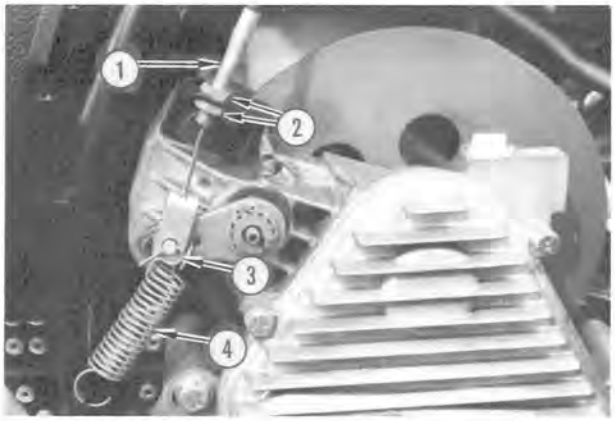
1. Lower Battery Case.
2. Mounting Bolts.

3. Unfasten speedometer drive adapter and remove key.



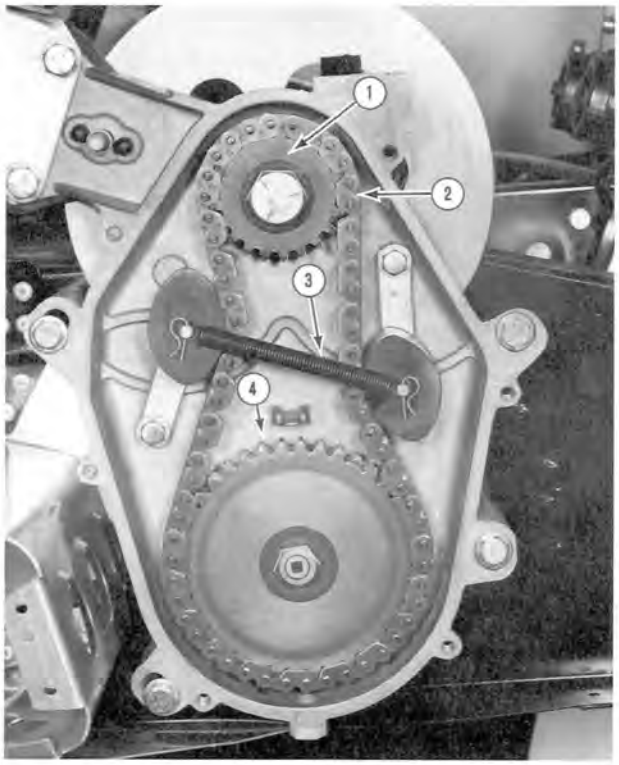
1. Key.
2. Adapter.
3. Chaincase Cover.

4. Drain chaincase lubricant.
   - Place oil drain pan under hole in lower pan.
   - Unscrew chaincase cover mounting bolts and remove cover.
5. Disconnect brake cable.
   - Unhook brake return spring.
   - Pull hair pin from clevis pin.
   - Remove clevis pin.
   - Unfasten lock nuts and remove cable from bracket.



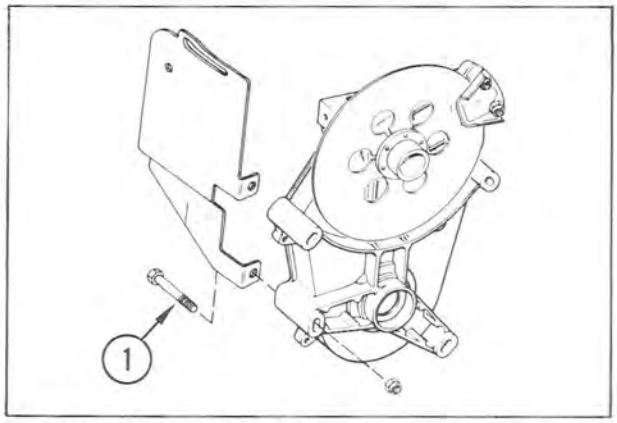
1. Brake Cable.
2. Locknuts.
3. Hair Pin.
4. Return Spring.

6. Loosen track tension.
   - Refer to Track Adjustment procedure.
7. Remove tensioner spring, chain, and sprockets.
   - Unhook spring from tensioner arms.
   - Unscrew sprocket mounting bolts and slide sprockets off.
   - Remove spacer found behind each sprocket.



1. Top Sprocket.
2. Chain.
3. Tensioner Spring.
4. Lower Sprocket.

8. Remove chaincase.
   - Remove chaincase mounting bolts and battery heat shield bracket.
   - Pull chaincase away from frame.

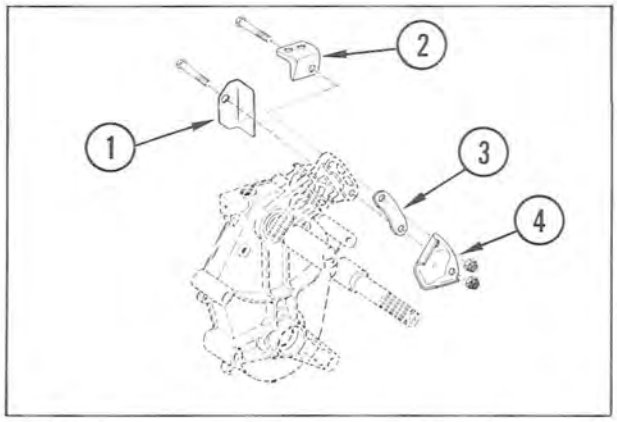


1. Chaincase Mounting Bolts.

   - Brake disc will slide off of jackshaft along with chaincase.

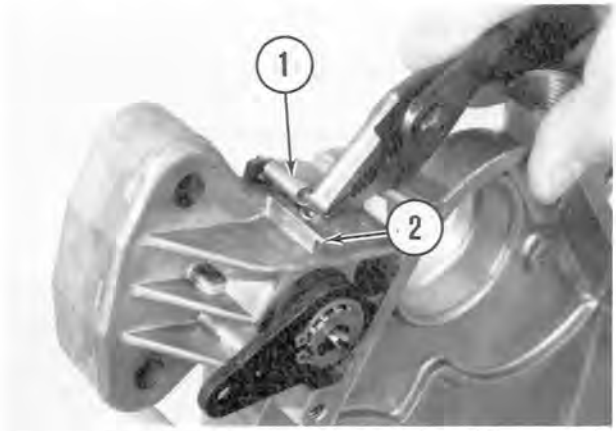
Chaincase Disassembly

1. Unbolt caliper from chaincase.
   - Remove brake cable bracket, caliper spacer, and disc guard.



1. Guard.
2. Bracket.
3. Caliper Spacer.
4. Caliper.

2. Remove movable pad.
   - Unhook movable brake pad springs from chaincase pegs and remove pad.



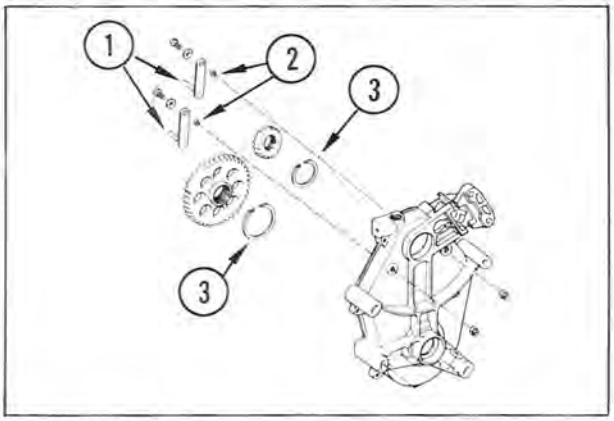
1. Brake Pad Spring.
2. Pegs.

3. Remove brake lever and neoprene washer.
   - Unfasten snap ring.
   - Slide lever and washer from rotor shaft.

1. Brake Lever.

NOTE: Be careful not to lose the three steel balls when removing self-adjusting mechanism.

4. Remove self-adjusting brake mechanism.
   - As an assembly, push mechanism out of chaincase.
5. Remove tensioner arms with chain guides.
   - Unscrew tensioner arm mounting bolts.
   - Be careful not to lose tensioner arm pivot sleeves.



1. Tensioner Arms.
2. Sleeves.
3. Retainer Rings.

6. Remove upper and lower bearing retainer rings.
   - Pry ends of retaining rings with a suitable tool.

NOTE: It is not recommended to remove bearings or seals unless replacement is required. Bearings and seals are press fitted and repeated removal may damage the bearings and seals or the chaincase. Heating chaincase with a high intensity light, heat gun, or small propane torch will ease removal of bearings.

7. If required, remove bearings and seals.
   - Use an appropriate puller.
   - Bearings must be removed toward chaincase cover.

Chaincase Inspection

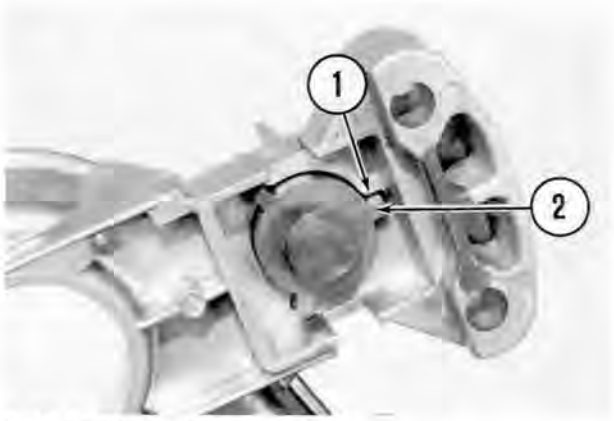
1. Clean metal parts in cleaning solvent.
2. Examine bearings.
   - If bearings show signs of scoring or excessive wear, replace them.
3. Examine sprockets and splined shafts.
   - If parts have any chipped, broken, or missing teeth or splines, replace them.

Chaincase Assembly

1. If removed, install new seals and bearings.
   - Heat chaincase with a high intensity light, heat gun, or small propane torch to ease bearing installation.
2. Insert bearing retainer rings.
   - Be certain rings are fully seated in chaincase grooves.

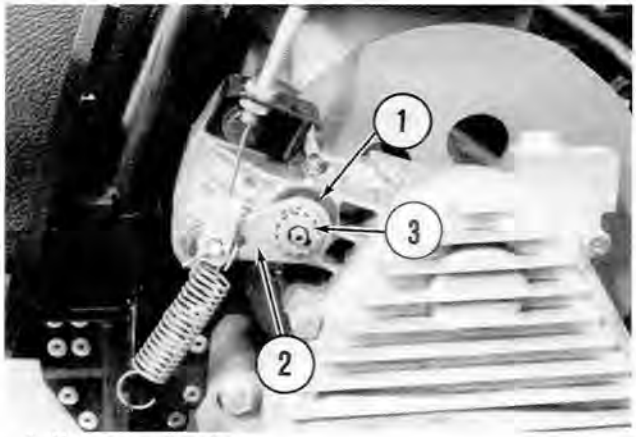
NOTE: The lower chaincase seal is a double lip type. Pack area between the lips with grease to prevent excessive driveshaft wear.

3. Mount tensioner arms.
   - Position sleeves in tensioner arms.
   - Torque bolts to 40 in. lb (0.5 kg-m).
   - Be certain arms swing freely after tightening bolt.
   - Bend tensioner arm, if necessary, to insure free movement.
4. Position self-adjusting mechanism in chaincase.
   - Align tabs on stator with slots in chaincase.



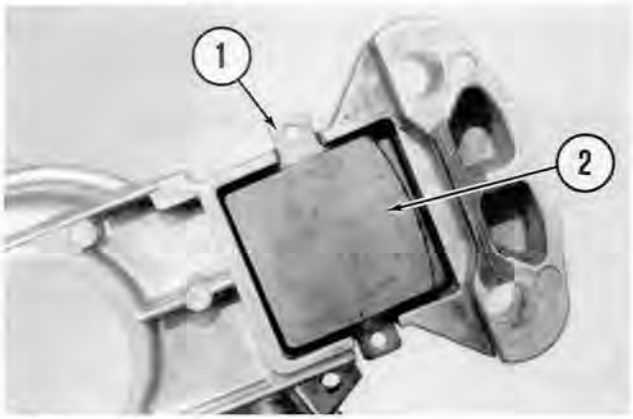
1. Chaincase Slots.
2. Stator Tabs.

5. Install brake lever, neoprene washer, and snap ring.
   - Note correction position of brake lever.



1. Neoprene Washer.
2. Brake Lever.
3. Snap Ring.

6. Assemble movable brake pad and springs as shown.

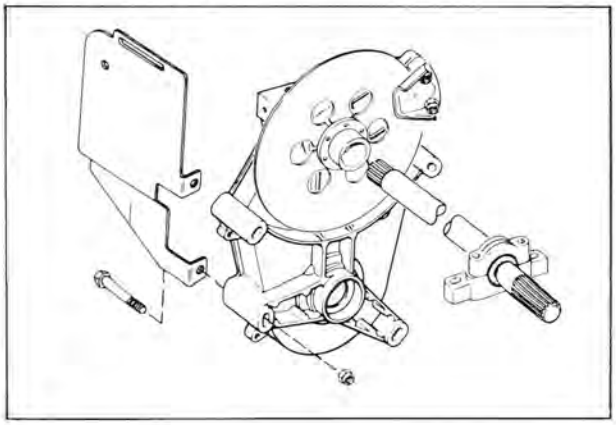


1. Moveable Brake Pad
2. Brake Pad Radius

7. Mount brake caliper, caliper spacer, brake cable bracket, and disc guard to chaincase.
8. Torque caliper bolts to 35 ft lb (4.8 kg-m).

Chaincase Installation

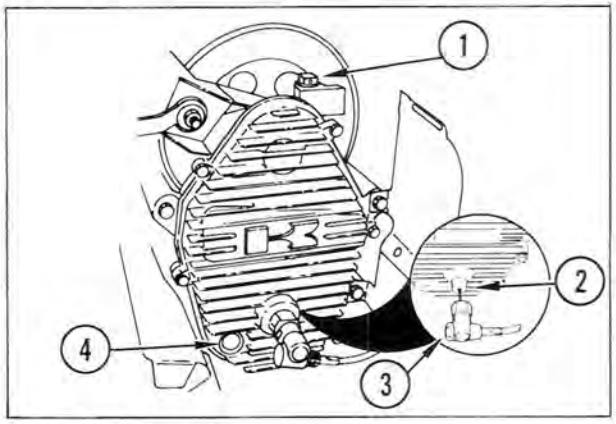
1. Position brake disc in caliper and slide disc and chaincase onto jackshaft as an assembly.
   - Position battery heat shield bracket on chaincase.
   - Torque chaincase mounting bolts to 18 ft lb (2.5 kg-m).



2. Install sprocket spacers.
   - Thick spacer on top shaft.
   - Thin spacer on bottom.
3. Mount sprockets and chain.
   - Lip on lower sprocket goes toward bearing.
   - Torque lower sprocket bolt to 35 ft lb (5.0 kg-m).
   - Torque upper sprocket bolt to 50 ft lb (7.0 kg-m).
4. Install chain tensioner spring.
   - Refer to Chain Tension procedure for chain guide positioning.
   - Hook spring onto tensioner arms.
   - Install hair pins.
5. Mount chaincase cover.
   - Use new O-ring seal.
   - Torque cover bolts to 70 in. lb (0.8 kg-m).
6. Add chaincase lubricant.
   - Use DEXRON II automatic transmission fluid.
   - Add lubricant until level is between center and top of sight gauge.

WARNING **Prevent oil mist from coating brake components, which may reduce braking action, by installing fill plug with vent hole pointed away from brake disc.**

7. Insert speedometer key through chaincase cover hole while rotating key to align with square hole in lower sprocket mount bolt.



1. Fill Plug Vent Hole.
2. Key.
3. Adapter.
4. Sight Gauge.

NOTE: Speedometer key should be centered within chaincase cover hole and cannot be rotated when properly engaged with lower sprocket mount bolt.

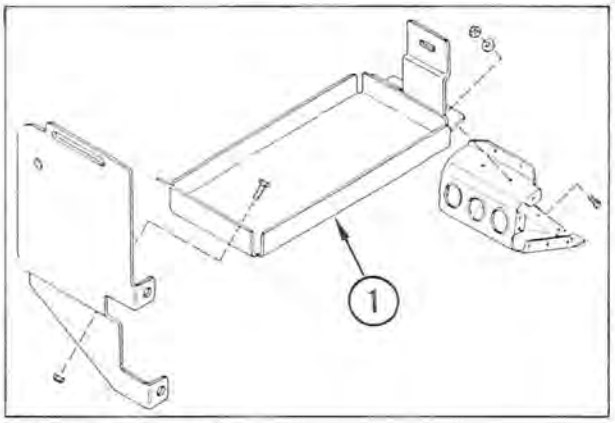
8. Connect speedometer drive adapter.
   - Hold drive adapter near mounting threads on chaincase cover.
   - Insert end of flexible key into square hole of adapter.
   - Slide adapter into position on cover. Do not use force during assembly. When components are properly aligned, adapter will slide easily into position.
9. Mount brake cable in brake cable bracket.
   - Thread one locknut onto cable.
   - Insert cable through bracket.
   - Install second lock nut on cable.

WARNING **To avoid possible brake malfunction, install clevis pin, hair pin, and clevis retainer as follows:**

10. Install clevis pin, hair pin, and clevis retainer.
    - Mount clevis retainer so that slotted side is toward chaincase.
    - Insert clevis pin from chaincase side of clevis.
    - Install hair pin in clevis pin.

1. Retainer.
2. Hair Pin.
3. Pin.

11. Mount lower battery case.
    - Secure battery case to footrest and heat shield bracket with mounting hardware installed in sequence shown.



1. Lower Battery Case.

12. Install battery.
    - Refer to Battery Installation procedure.
13. Adjust track tension and alignment.
    - Refer to Track Adjustment procedure.

JACKSHAFT

Jackshaft Removal

1. Remove drive belt.
   - Refer to Belt Removal procedure.
2. Remove driven converter.
   - Refer to Driven Converter Removal procedure.
3. Remove chain.
   - Refer to Chain Removal procedure.

NOTE: It will not be necessary to remove bottom sprocket for chain removal.

4. Remove jackshaft bearing retainer cap.
   - Unscrew nuts and lift off cap.
5. Slide jackshaft from chaincase.
6. Remove brake disc from brake caliper.

Jackshaft Cleaning and Inspection

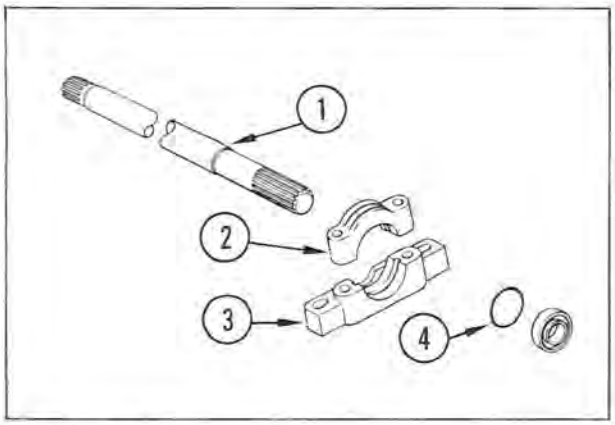
1. Check jackshaft bearing.
   - Turn bearing by hand.
   - If bearing binds, has excessive end play, or is rough, replace it.
   - Bearing is a press fit onto shaft. Replace bearing after determining that jackshaft is okay.

NOTE: Reduce effort required to install new bearing by placing bearing on a hot light bulb to expand inner race. Press bearing onto shaft until it contacts shoulder to insure correct positioning.

2. Inspect brake disc.
   - Clean disc with cleaning solvent and dry.
   - If disc is scored or warped, replace it.
3. Check jackshaft for straightness.
   - Shaft must roll easily and smoothly on a flat surface.
   - If shaft is bent, repair or replace it.
4. Inspect shaft splines and threads.
   - If there are any signs of cracking or distortion, replace shaft.

Jackshaft Installation

1. Install bearing retainer O-ring on bearing.
2. Position disc in brake caliper.
3. Slide jackshaft through disc into chaincase.
   - Apply coating of NEVER-SEEZ to brake disc splines.
   - Slide jackshaft into position.
   - Fit O-ring into bearing retainer groove.
4. Install chain.
   - Refer to Chain Installation procedure.
5. Mount jackshaft bearing retainer cap.
   - Fit O-ring into cap groove.
   - Torque nuts to 70 in. lb (0.8 kg-m).



1. Jackshaft.
2. Retainer Cap.
3. Bearing Retainer.
4. Bearing O-Ring.

6. Install driven converter.
   - Torque converter bolt to 50 ft lb (6.9 kg-m).
7. Check converter alignment.
   - Refer to Converter Alignment procedure.
8. Install drive belt.
   - Refer to Belt Installation procedure.
9. Mount left side trim on lower pan.

CHASSIS

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CHASSIS

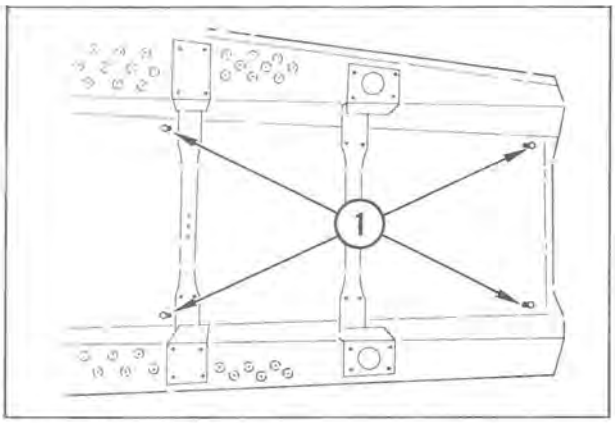
SEAT

Seat Removal

1. Disconnect tail lamp wiring.
   - Unfasten tail lamp to main harness connector located in front of fuel tank.

1. Tail Lamp Connector.

2. Remove seat mounting bolts.
   - Mounting bolts are located under tunnel.



1. Seat Mounting Bolts.

3. Lift seat assembly from snowmobile.
   - Carefully pull tail lamp wiring free, from under fuel tank.

Seat Installation

1. Connect tail lamp wiring.
   - Slide connector under fuel tank.
   - Attach tail lamp connector to main harness.
2. Position seat assembly on snowmobile.
   - Be certain tail lamp wiring is not pinched between seat frame and tunnel.

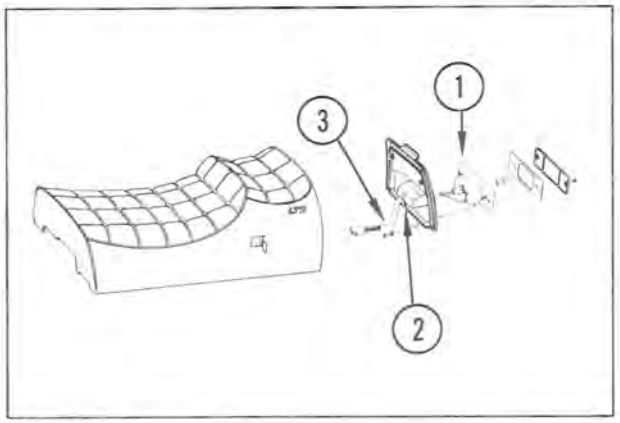
CAUTION **Do not overtighten seat mounting bolts as "blind nuts" used in seat can be easily stripped. If blind nuts are stripped, replacement of seat frame is required.**

3. Secure seat.
   - Torque mounting bolts to 35 in. lb (0.4 kg-m).

TAIL LAMP

Tail Lamp Removal

1. Remove seat assembly.
   - Refer to Seat Removal procedure.
2. Unfasten tail lamp body assembly.



1. Tail Lamp.
2. Cover Hole.
3. Outer Sleeve.

3. Pull lamp body from storage compartment cover.
   - Carefully pull tail lamp wiring through cover.

Tail Lamp Installation

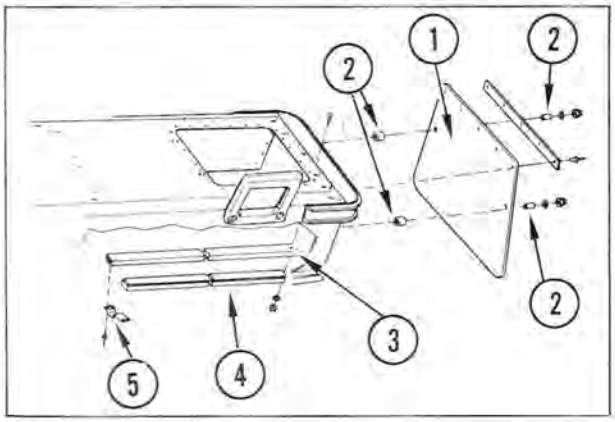
1. Mount lamp body in storage compartment cover.
   - Guide tail lamp wiring through hole in cover.
   - Slide outer sleeve on wiring rearward to protect wires from chafing on cover.
   - Tighten lamp body mounting nuts.
2. Mount seat assembly on snowmobile.
   - Refer to Seat Installation procedure.

TUNNEL RUB STRIP

Rub strips should be replaced when thickness of material measures 1/8 in. (3 mm) or less at any point along its length.

Tunnel Rub Strip Removal

1. Separate seat from tunnel.
   - Remove seat mounting bolts from under tunnel.
   - Lift seat sufficiently to place sideways on tunnel, being careful not to pull tail lamp wiring.
2. Remove rub strip from rail.
   - Unscrew nut securing rub strip at rear of tunnel.
   - Remove snow flap nuts and lift flap for access to rub strips.
   - Slide rub strip rearward while pulling downward to clear rear tunnel bulkhead.



1. Snow Flap.
2. Spacers.
3. Rail.
4. Wear Strip.
5. Bracket (Long arm toward outside).

NOTE: If rub strip does not slide off rail easily, it will be necessary to swing rear suspension out of tunnel for access. Refer to Ride Adjustment procedure to relieve spring tension from rear suspension arm.

Tunnel Rub Strip Installation

1. Lubricate rub strips to reduce effort required for installation.
2. Slide rub strips forward until they contact front rail strip bracket.
3. Tighten nuts securing rail at rear of tunnel.
4. Install snow flap spacers, washers, and nuts.
   - Torque nuts to 50 in. lb (0.6 kg-m).
5. Mount seat on tunnel.
   - Refer to Seat Installation procedure.
6. If removed, reinstall rear suspension arm and springs.
   - Refer to Suspension Installation procedure.

COOLING SYSTEM

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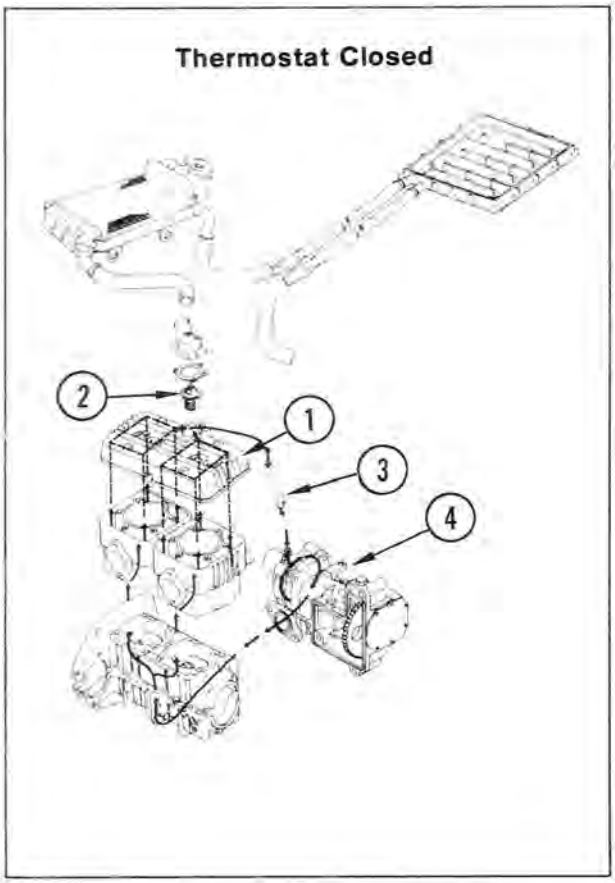
COOLING SYSTEM

COOLANT FLOW - THERMOSTAT CLOSED

When the engine is cold (thermostat closed), coolant flow to the heat exchangers is prevented, causing coolant temperature to increase as it is contained and recirculated within the engine assembly.

A small by-pass hose is provided to permit coolant flow from cylinder head outlet back to the water pump, which reduces the flow rate allowing coolant to climb to selected thermostat temperature setting. The thermostat begins to open when coolant reaches the predetermined temperature.

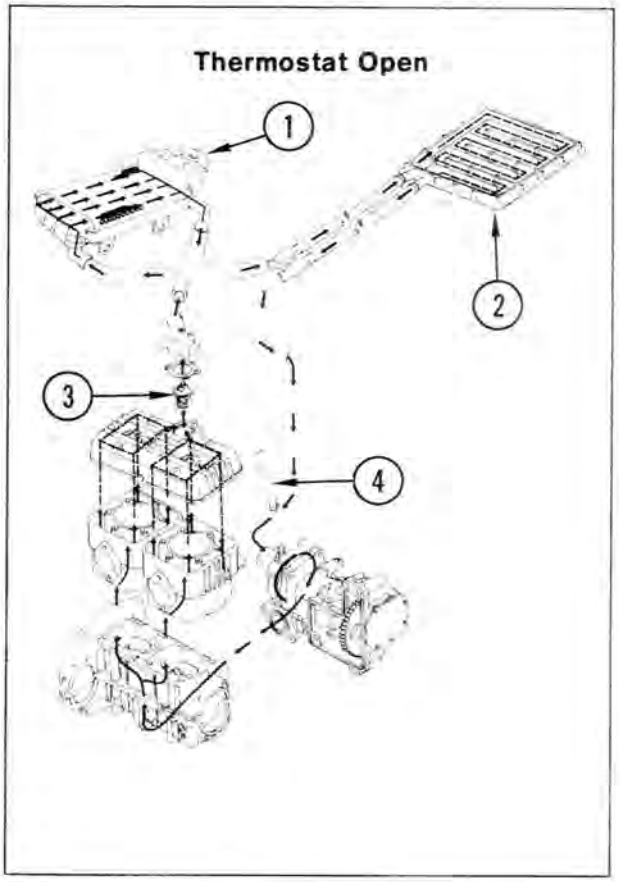


1. Cylinder Head
2. Thermostat
3. By-Pass Hose
4. Water Pump

COOLANT FLOW - THERMOSTAT OPEN

Once the thermostat has opened, coolant flows through the heat exchangers (where it is cooled down) and returns to the water pump inlet, ready to be recycled again. Due to the restriction created by its small size, very little coolant flows through the by-pass hose when the thermostat is opened.

Thermostat operation cycles between opened and closed to maintain a nearly constant engine coolant temperature.



1. Radiator
2. Heat Exchanger
3. Thermostat
4. By-Pass Hose

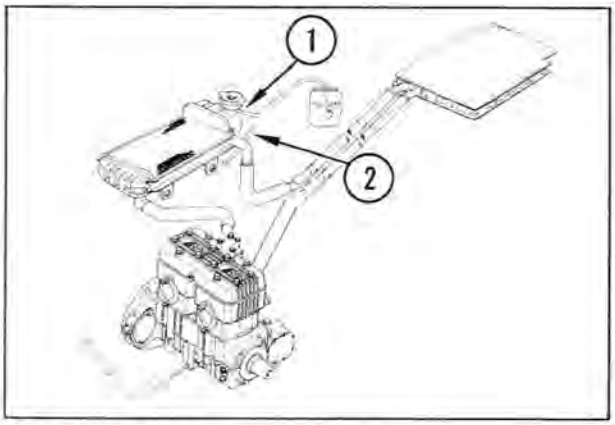
COOLING SYSTEM PRESSURE TEST

Proper pressure must be maintained in the cooling system to provide desired boilover protection of the factory recommended antifreeze water mixture. Low pressure will reduce the boiling point of coolant mixture and may result in:

- Loss of coolant through overflow hose (during boilover) lowering cooling system level.
- Extensive internal engine damage due to improper coolant level.

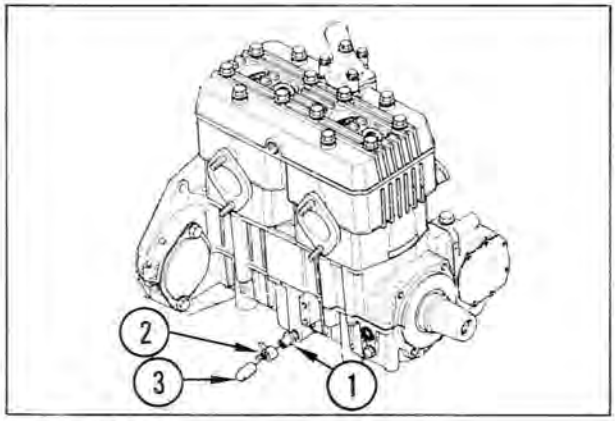
Pressure test the cooling system as follows:

1. Disconnect overflow tube from radiator fitting.
2. Install test tube to overflow fitting.
   - Using a short piece of tubing, connect one end to overflow fitting and place other end into container of water.



1. Radiator Fitting.
2. Overflow Tube.

3. Connect a hand held pressure tester to coolant drain valve at front of engine.
   - Remove cap from drain valve fitting.

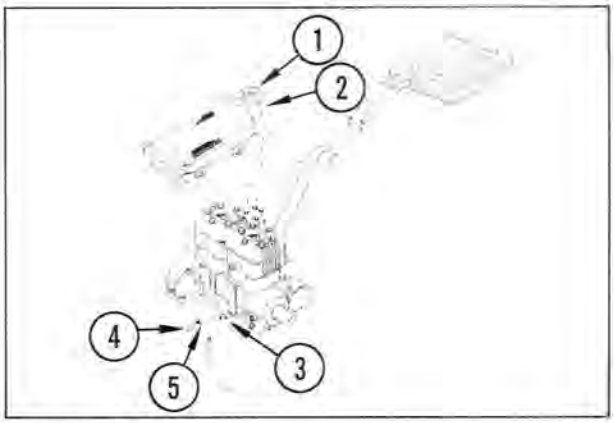


1. Drain Valve.
2. Clamp.
3. Cap.

4. Open drain valve and apply 15 psi (1.0 kg-cm^2) pressure to system while observing gauge. Any pressure drop indicates leakage and must be eliminated.
   - If bubbles appear in container of water, pressure cap is defective. Replace cap and retest.
   - If no bubbles are observed in container of water, pressure cap is good. Spray soapy water along all sealing surfaces of engine and cooling system components to pinpoint leakage. Repair as necessary and retest.
5. Disconnect pressure tester.
   - Close drain valve. Torque to 45 in. lb (0.5 kg-m).
   - Install cap on fitting and secure with clamp.
6. Reconnect original overflow tube to radiator.
   - Remove test tubing from fitting.

DRAINING COOLANT

1. Place drain pan under snowmobile.
   - Coolant will be drained out through radiator overflow hose.
   - System capacity is 1.2 gallons (4.5 liters).
2. Connect drain hose to coolant drain valve.
   - Remove radiator overflow hose from filler neck fitting.
   - Route hose underneath engine to drain valve located on front of lower crankcase section.
   - Remove clamp and cap from drain valve.
   - Slide overflow hose onto drain valve.
   - Loosen drain valve 3 turns.



1. Radiator Cap.
2. Radiator Overflow Fitting.
3. Drain Valve.
4. Cap.
5. Clamp.

3. Remove radiator cap to allow coolant to drain more freely.
4. Lift rear of snowmobile slightly to allow coolant to drain from heat exchanger.
5. Close drain valve.
   - Remove overflow hose from drain valve and reconnect to radiator fitting.
   - Torque drain valve to 45 in. lb (0.5 kg-m).
   - Install cap and clamp on drain valve.

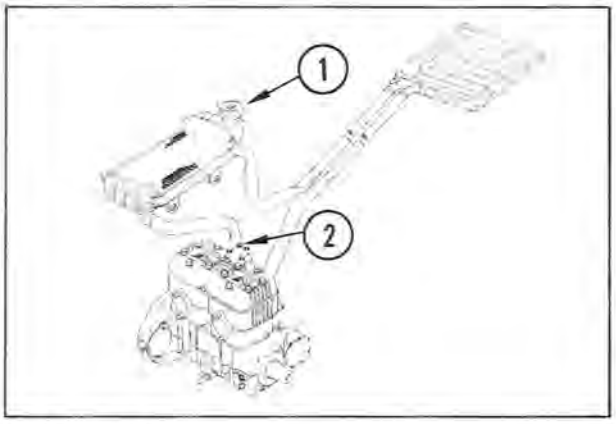
FILLING COOLING SYSTEM

Use a 55/45 mixture of antifreeze and water (55% ETHYLENE GLYCOL base antifreeze and 45% water) when filling cooling system. This recommended mixture will protect against freezing down to approximately -50° F (-45° C). A major brand of antifreeze (such as Prestone II or Dowgard) is recommended. The coolant level must be within 1/4 to 1/2 in. (6 to 12 mm) of the tank top when cool.

WARNING **Do not remove pressure cap when engine is hot or severe burns could result. Remove pressure cap from radiator only after cooling system has had adequate time to cool and temperature gauge needle has returned to the peg at bottom left area of green zone.**

CAUTION **Do not use 100% antifreeze or water. 100% antifreeze will freeze at a warmer temperature than a 55/45 mixture of antifreeze and water.**

1. Fill cooling system.
   - Loosen vent plug at top of thermostat cover.
   - Remove cap from radiator.
   - Pour coolant in slowly.
   - Capacity is 1.2 gallons (4.5 liters).
   - When coolant appears at vent opening in thermostat cover, torque vent plug to 12 ft lb (1.7 kg-m), and continue filling.
   - Fill until level is 1/4 to 1/2 in. (6 to 12 mm) below radiator filler neck.



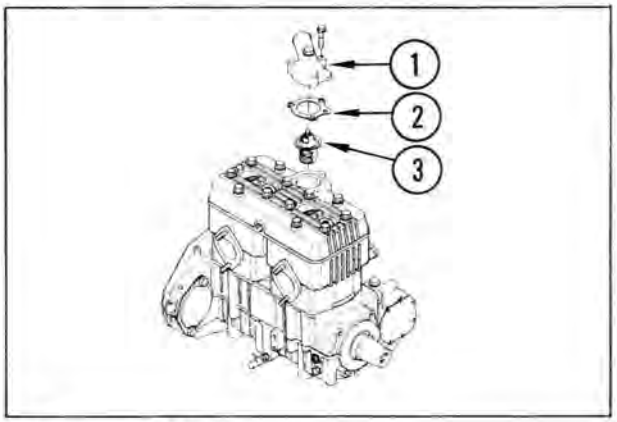
1. Radiator Cap.
2. Vent Plug.

2. Reinstall pressure cap.
3. Run engine for several minutes, allow it to cool, and recheck coolant level.

THERMOSTAT

Thermostat Removal

1. Drain coolant from system.
   - Refer to Draining Coolant procedure.
2. Disconnect coolant hose from thermostat cover.
3. Separate thermostat cover from cylinder head.
   - Unscrew cover mounting bolts.



1. Thermostat Cover.
2. Gasket.
3. Thermostat.

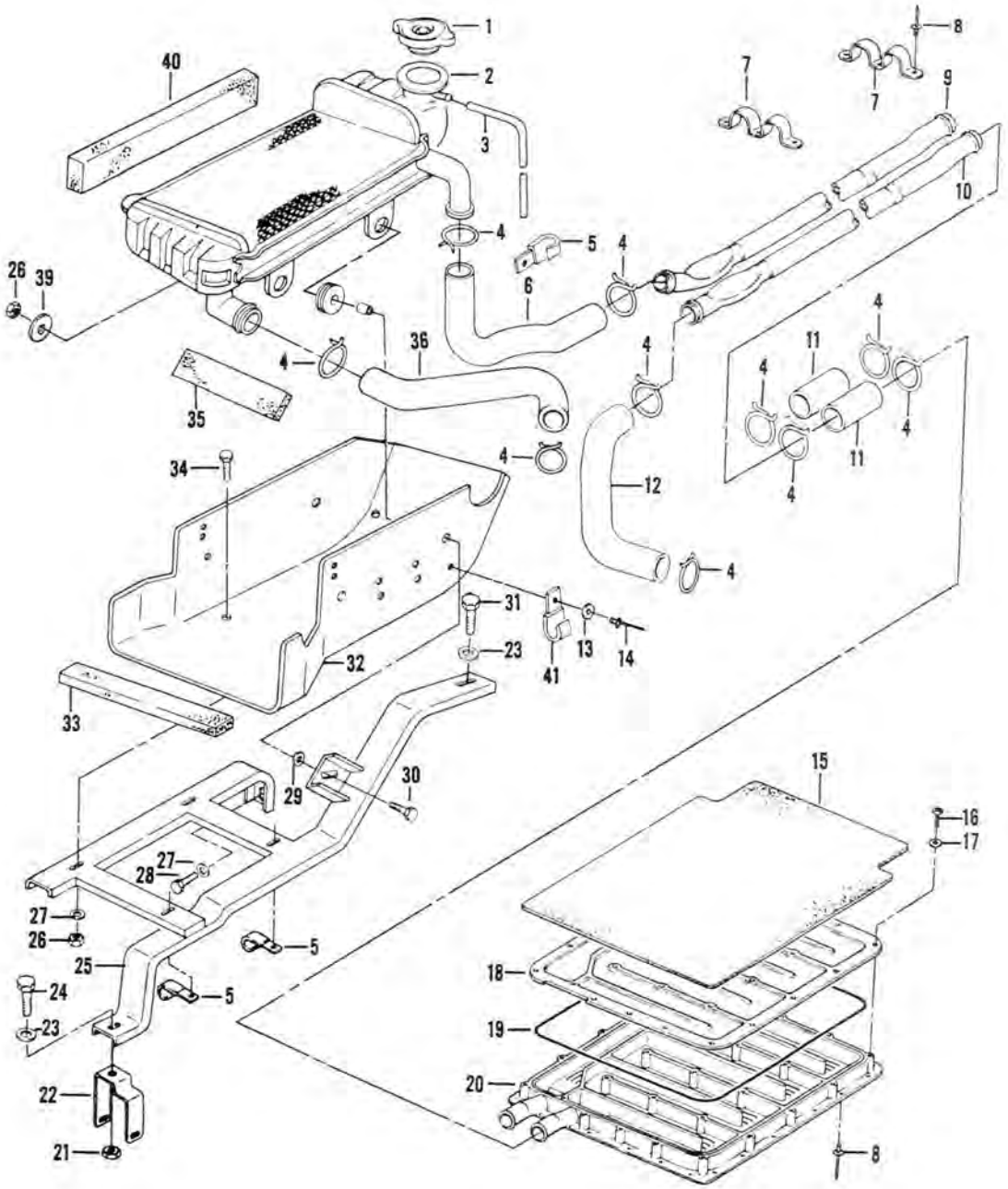
4. Lift thermostat out of cylinder head.
   - Remove thermostat cover gasket.

Thermostat Inspection

Heat thermostat in a pan of water. Using a thermometer, check to see that thermostat opens at 108° F (42° C). Replace thermostat if it fails to open at this temperature, or if it is damaged in any way.

Thermostat Installation

1. Position thermostat in cylinder head.
   - Install so that thermostat spring is in cylinder head.
2. Install thermostat cover on cylinder head.
   - Apply silicone sealer to both sides of cover gasket.
   - Position cover gasket.
   - Install cover.
   - Torque bolts to 60 in. lb (0.7 kg-m).
3. Connect coolant hose to thermostat cover.
4. Pressure test cooling system.
   - Refer to Cooling System Pressure Test procedure.
5. Fill cooling system.
   - Refer to Filling Cooling System procedure.

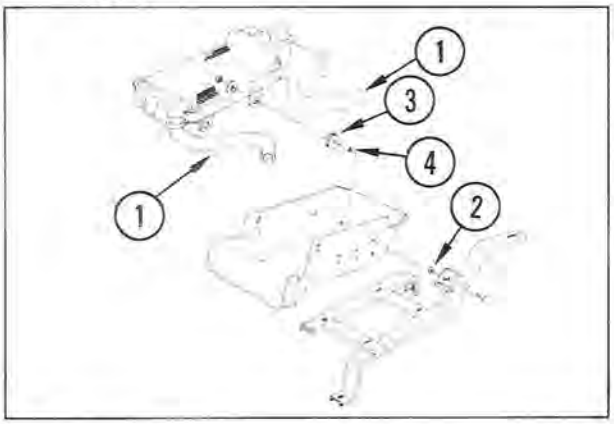


1 CAP, pressure
2 EXCHANGER, heat
3 TUBE, 1/4 x 24.00
4 CLAMP, hose
5 CLAMP
6 HOSE, coolant
7 CLAMP, pipe
8 RIVET, 3/16"
9 PIPE, coolant
10 PIPE, coolant
11 HOSE, coolant
12 HOSE, coolant
13 WASHER, special
14 RIVET, 3/16
15 PAD, exchanger
16 SCREW, special, 10-24 x .50
17 WASHER, seal
18 COVER, heat exchanger
19 O-RING, heat exchanger
20 EXCHANGER, heat
21 NUT, insert, 5/16-24
22 BRACKET, radiator brace
23 WASHER, plain, 5/16"
24 BOLT, 5/16-24 x .62
25 BRACE ASSY
26 NUT, insert, 1/4-28
27 WASHER, plain, 1/4"
28 BOLT, special, 1/4-20 x .62
29 WASHER, plain, 1/4"
30 BOLT, 1/4-28 x 1.00
31 BOLT, special, 5/16-24 x .62
32 DUCT ASSY
33 PAD, radiator to duct
34 BOLT, 1/4-28 x .62
35 PAD
36 HOSE, coolant
37 BUSHING, grommet
38 GROMMET, mounting
39 WASHER, special
40 PAD
41 CLAMP

RADIATOR (HEAT EXCHANGER)

Radiator Removal

1. Drain coolant from system.
   - Refer to Draining Coolant procedure.
2. Disconnect coolant hoses from radiator.
   - Unfasten radiator-to-exchanger hose at radiator.
   - Unfasten engine-to-radiator hose at radiator.
   - Pull overflow tube from radiator filler neck.



1. Hoses.
2. Shim Washer.
3. Grommet.
4. Bushing.

3. Remove radiator mounting bolts.
   - Note number of shim washers between radiator duct and rear LH mounting bracket.
   - Be careful not to lose radiator mounting hardware.

CAUTION **Radiator tubes and fins are fragile and easily damaged. Be very careful of radiator during removal, and store radiator in a safe place.**

4. Lift radiator from duct.

Radiator Inspection

1. Flush radiator with clean water.
2. Check radiator for leaks or damage.
   - Repair as necessary.

Radiator Installation

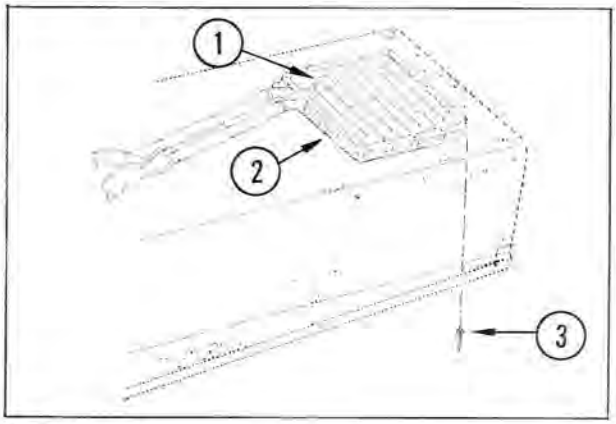
1. Mount radiator in duct.
   - Install any shim washers in original position.
   - Check to see that radiator duct is centered in hood outlet opening. Add or remove shims as required.
   - Torque mounting bolts to 50 in. lb (0.6 kg-m).
2. Connect coolant hoses to radiator.
   - Attach radiator-to-exchanger hose.
   - Attach engine-to-radiator hose.
   - Slide overflow tube onto radiator fitting.
3. Pressure test cooling system.
   - Refer to Cooling System Pressure Test procedure.
4. Fill cooling system.
   - Refer to Filling Cooling System procedure.

HEAT EXCHANGER

Heat Exchanger Removal

NOTE: O-Ring Replacement procedure may be performed without removing heat exchanger from tunnel.

1. Drain coolant from system.
   - Refer to Draining Coolant procedure.
2. Remove seat assembly.
   - Refer to Seat Removal procedure.
3. Drill out rivets (3/16 in.) securing heat exchanger to tunnel.
4. Using a sharp knife, cut sealer between exchanger and tunnel.



1. Exchanger.
2. Cut Sealer Away.
3. Rivets.

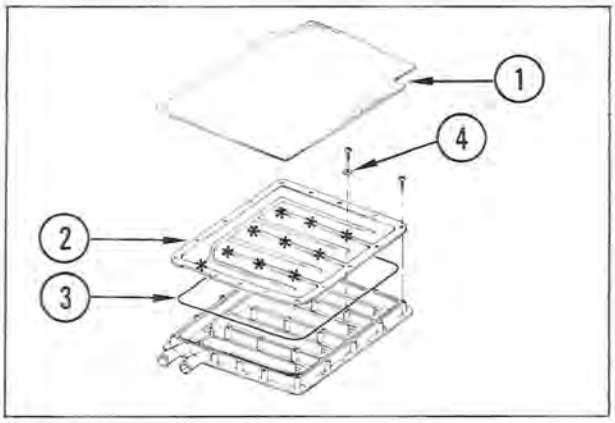
5. Disconnect coolant hoses and lift exchanger from tunnel.

Heat Exchanger Inspection

1. Examine all hoses and pipes.
   - Check for cuts, cracks, or deterioration.
   - Replace as required.
2. Flush out heat exchanger with clean water.
3. If there are signs of heat exchanger O-ring leakage, replace O-ring.

Heat Exchanger O-Ring Replacement

1. Remove heat exchanger cover.
   - Carefully peel insulating pad from heat exchanger edges.
   - Remove heat exchanger screws.
   - Lift off cover and remove O-ring.



1. Pad.
2. Cover.
3. O-Ring.
4. Seal Washers Required (*).

2. Install new O-ring.
   - Coat O-ring with a thin film of silicone sealer to help keep O-ring in position.
   - Press O-ring into heat exchanger groove.
3. Mount cover on heat exchanger.
   - Use new seal washers on bolts indicated in illustration.
   - Torque heat exchanger bolts to 50 in. lb (0.6 kg-m).
4. Pressure test cooling system.
   - Refer to Cooling System Pressure Test procedure.

Heat Exchanger Installation

CAUTION **Do not apply sealant between heat exchanger and tunnel, except sealant will insulate exchanger from tunnel and reduce cooling efficiency.**

1. Connect coolant hoses between heat exchanger and pipes.
2. Pressure test cooling system.
   - Refer to Cooling System Pressure Test procedure.
3. Secure heat exchanger to tunnel.
   - Use 3/16 in. rivets.
4. Seal heat exchanger to tunnel.
   - Apply continuous bead of silicone sealant along bottom edge of exchanger.
5. Position pad on heat exchanger.
   - Use silicone sealer to secure pad to heat exchanger.
6. Install seat assembly.
   - Refer to Seat Installation procedure.
7. Fill cooling system.
   - Refer to Filling Cooling System procedure.

DRIVESHAFT

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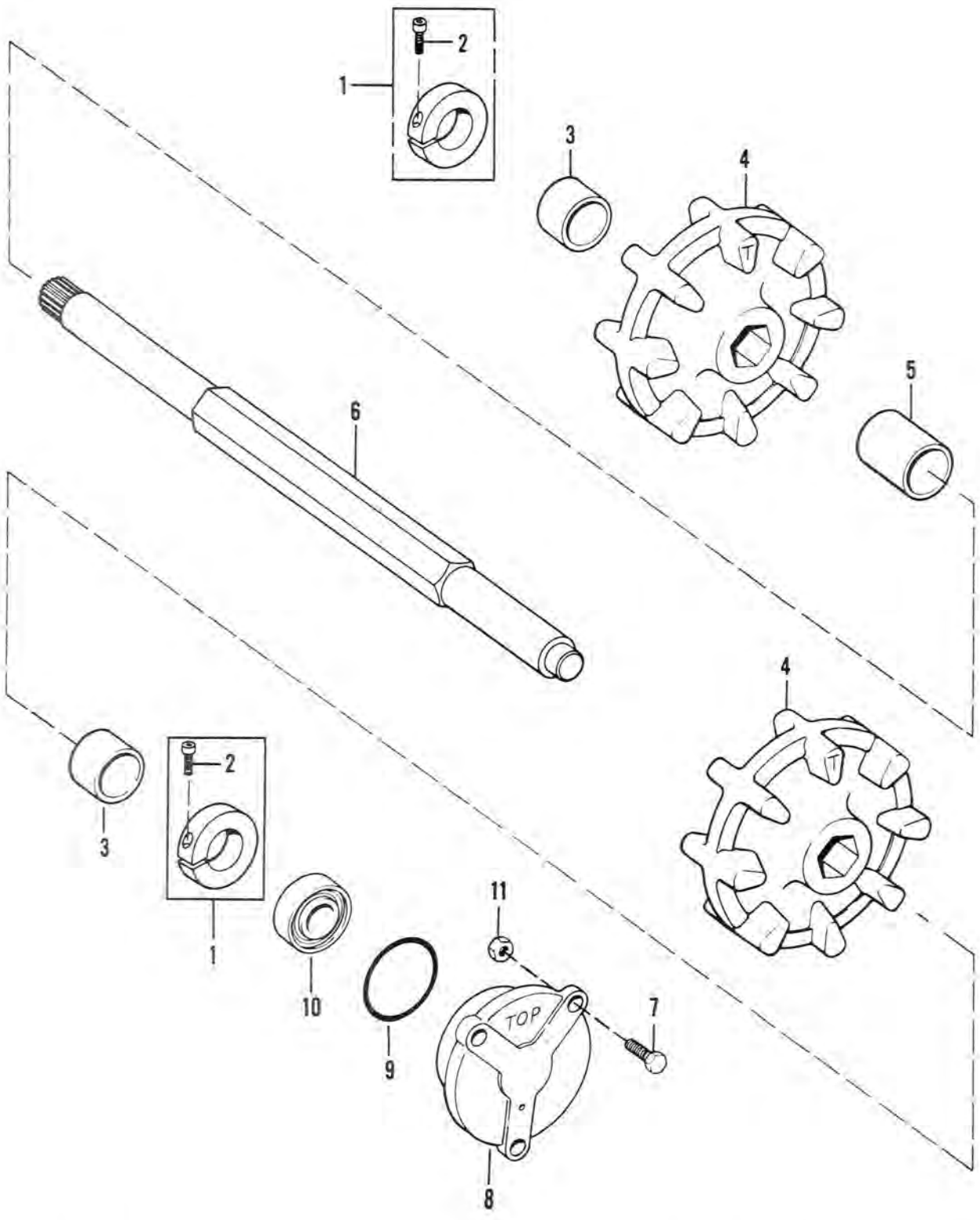
DRIVESHAFT



1 COLLAR ASSY
2 SCREW, 1/4-28 x .62
3 PIPE, outer spacer
4 SPROCKET, track drive
5 PIPE, center spacer
6 SHAFT, track drive
7 BOLT, 5/16-24 x .88
8 HOUSING, bearing
9 SEAL, "O" ring
10 BEARING
11 NUT, insert, 5/16-24

DRIVESHAFT

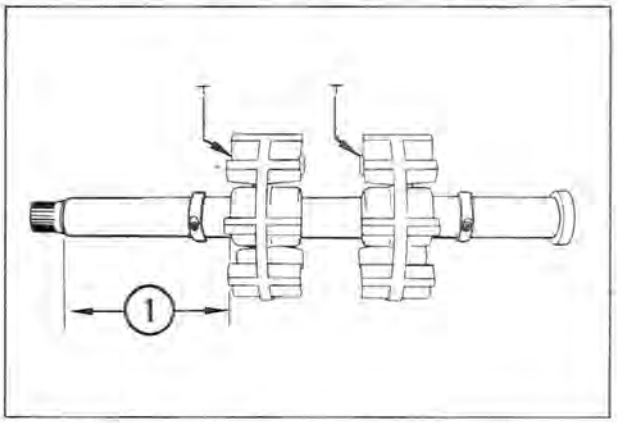
DRIVESHAFT SERVICING

Driveshaft Removal

1. Remove battery (electric start models only).
   - Refer to Battery Removal procedure.
2. Remove suspension.
   - Refer to Suspension Removal procedure.
3. Remove driveshaft bearing housing.
4. Remove chain.
   - With snowmobile positioned on its side, it is not necessary to drain chaincase lubricant.
   - Refer to Chain Removal procedure.
5. Remove driveshaft.
   - Slide driveshaft from chaincase.

Driveshaft Repair

1. Check bearing.
   - Turn bearing by hand. If bearing binds, has excessive end play, or is rough, replace it.
2. Inspect driveshaft.
   - Check straightness with a straight edge. If shaft is bent, repair or replace it.
   - Check shaft for chipped or broken splines.
3. Check drive sprockets for excessive wear.
   - To remove sprockets, loosen collar assembly and tap sprockets lightly with a mallet while supporting driveshaft on a block of wood to prevent damage to shaft.
   - When reassembling drive sprockets, be sure to align index marks as shown.
   - Install sprockets, spacers, and washers as shown.
   - Position sprocket onto shaft at dimension shown.
   - Place collar assembly against spacer and tighten screw to 70 in. lb (0.8 kg-m).



1. 6.59 ± 0.04 in.

Drive Shaft Installation

NOTE: The lower chaincase seal is a double lip type. Be sure area between lips is packed with grease to prevent premature driveshaft wear.

1. Position driveshaft in chaincase, within track.
   - Place driveshaft bearing through hole in front frame, then carefully guide splined end of shaft into chaincase, being careful not to damage seal.
2. Install bearing housing.
   - Lubricate O-ring inside bearing housing with grease.
   - Position bearing housing with word "TOP" facing upward.
   - Slide housing onto bearing.
   - Torque bolts to 12 ft lb (1.7 kg-m)
3. Install chain.
   - Refer to Chain Installation procedure.
4. Install suspension.
   - Refer to Suspension Installation procedure.
5. Reinstall battery (electric start models only).
   - Refer to Battery Installation procedure.

ELECTRICAL SYSTEM

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ELECTRICAL SYSTEM

The snowmobile electrical system consists of a battery and the necessary circuits to operate lights, instruments, battery charging and electric starter.

BATTERY

WARNING **NEVER RUN ENGINE WITH BATTERY CABLES OR ELECTRICAL CONNECTORS DISCONNECTED. Doing so may damage the voltage regulator/rectifier. Sparks that may occur could cause a fire which may cause severe personal injury.**

The battery stores electrical energy, 12 volts direct current (12 VDC), in a chemical form which is used for starter motor operation and serves as a back-up source of power for lights when the engine is not running. When the engine is running, electrical energy from the charging circuit is sent to the battery (to replace current used to start engine) and to lighting system circuit.

With proper care, the battery can be expected to last several years, but it may be completely ruined long before that if it is mistreated. Following a few simple rules will greatly extend the life of the battery.

1. When the level of the electrolyte in the battery is low, add only distilled water to each cell until the level is at the upper level line marked on the outside of the battery. Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.
2. Never add sulphuric acid solution to the battery. This will make the electrolyte solution too strong and will ruin the battery within a very short time.
3. Avoid quick-charging the battery. A quick-charge will damage the battery plates.
4. Never let a good battery stand for more than 30 days without giving it a supplemental charge, and never let a discharged battery stand without charging it. If a battery stands for any length of time, it slowly self-discharges. Once it is discharged, the plates sulphate (turn white) and the battery will no longer take a charge.
5. Keep the battery well-charged during cold weather so that the electrolyte does not freeze and crack open the battery. The more discharged the battery becomes, the more easily it freezes.
6. Always keep the battery vent hose free of obstruction, and make sure it does not get pinched or crimped shut. If battery gases cannot escape through this hose, they will explode the battery.
7. DON'T INSTALL THE BATTERY BACKWARDS, electrical system damage could result. The negative side is grounded.
8. Do not install unapproved accessories. Certain items cause excessive drain on battery that charging circuit cannot replace.

WARNING **Do not attempt to "jump" start snowmobile with a booster battery and jumper cables. The battery generates hydrogen gas which can be flammable and explosive under certain conditions. Sparks from jumper cables may ignite this gas causing severe personal injury.**

Battery Testing

WARNING **Battery electrolyte contains sulfuric acid which is poisonous and causes severe burns. When installed in the battery, electrolyte generates hydrogen gas which under certain conditions is flammable and explosive. Keep all flames and sparks (cigarettes, etc.) away and always wear eye protection when working on or near the battery.**

POISON/DANGER
KEEP OUT OF REACH OF CHILDREN

ANTIDOTE

EXTERNAL - Flush with water for at least 5 minutes.
INTERNAL - Drink large quantity of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil.
CALL PHYSICIAN IMMEDIATELY.
EYES - Flush with water for 15 minutes.
GET PROMPT MEDICAL ATTENTION.

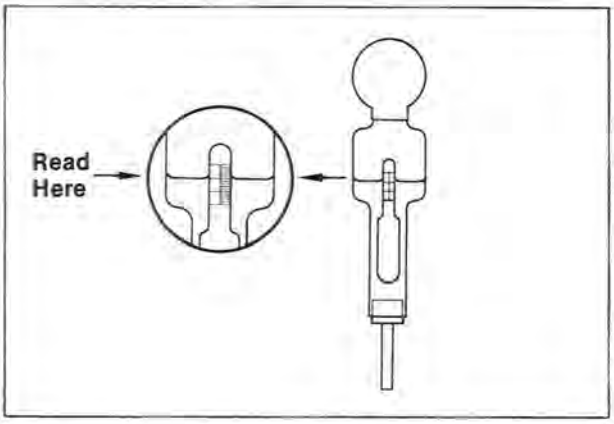
The electrolyte is diluted sulphuric acid. Water in this solution changes to a gaseous mixture due to chemical action in the battery and escapes, which concentrates the acid in a charged battery. Consequently, when the level of the electrolyte becomes low, only distilled water should be added. If sulphuric acid is added, the solution will become too strong for proper chemical action and will damage the plates. Metal from the damaged plates collects in the bottom of the battery. This sediment will eventually cause an internal short circuit.

Specific gravity of the electrolyte is measured with a hydrometer and is the most accurate indication of battery condition. Specific gravity varies with temperature due to expansion and contraction of electrolyte, and must therefore be measured using a hydrometer with a built-in thermometer to determine electrolyte temperature.

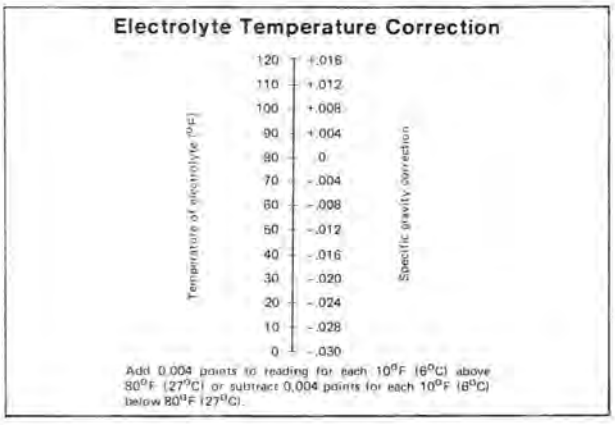
Test specific gravity of each battery cell by:

NOTE: Do not check specific gravity immediately after adding water to battery as incorrect readings will result.

1. Insert hydrometer into cell.
   - Be sure tube is vertical to prevent float from rubbing inside of tube, and draw only enough electrolyte into tube to permit float to raise freely.
2. Remove hydrometer and observe specific gravity of electrolyte.
   - Hold hydrometer at eye level and take reading at bottom of meniscus (curved surface of fluid).

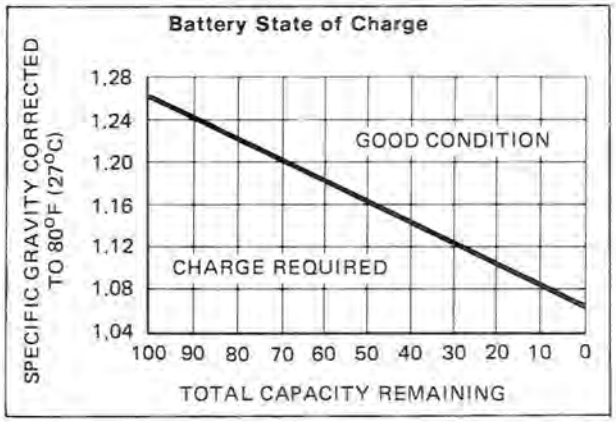


3. Observe temperature of electrolyte and correct reading.



4. Interpret readings as follows:
   - 1.260 or above, battery is good and should perform correctly.
   - All cell readings uniform and above 1.200, battery is serviceable but requires charging.
   - All cell readings uniform and below 1.200, battery must be charged and retested.
   - Variation of more than 50 points (0.050) between any cells means serviceability is questionable. Charge battery and retest. If 50 point variation remains, replace battery.

NOTE: If plates inside battery are sulphated (turned white) it will no longer accept and hold a charge.



Battery Charging

WARNING **Battery electrolyte contains sulfuric acid which is poisonous and causes severe burns. When installed in the battery, electrolyte generates hydrogen gas which under certain conditions is flammable and explosive. Keep all flames and sparks (cigarettes, etc.) away and always wear eye protection when working on or near the battery.**

POISON/DANGER
KEEP OUT OF REACH OF CHILDREN

ANTIDOTE

EXTERNAL - Flush with water for at least 5 minutes.
INTERNAL - Drink large quantity of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil.
CALL PHYSICIAN IMMEDIATELY.
EYES - Flush with water for 15 minutes.
GET PROMPT MEDICAL ATTENTION.

NOTE: Remove battery to prevent spillage of electrolyte during charging. Refer to Battery Removal procedure.

1. Check electrolyte level.
   - If electrolyte level is low in any cell, add distilled water as necessary to raise level to lower line on battery case. Do not overfill battery as level will raise during charging.

2. Cover filler openings with a cloth, paper towel, etc., to prevent splashing of electrolyte during charging.

CAUTION **Charging battery at higher rate than specified may damage the battery. The higher charging rate causes excess heat, which can warp the plates creating internal short circuits. Also, the plates may shed active material, accumulating deposits that cause internal short circuits.**

3. Connect 12 volt charger to battery.
   - Set charging rate at 3 to 4 amps and charge between 3 and 5 hours.

NOTE: If electrolyte temperature rises above 115°F (45°C) during charging, reduce charge rate to lower the temperature. Increase charging time.

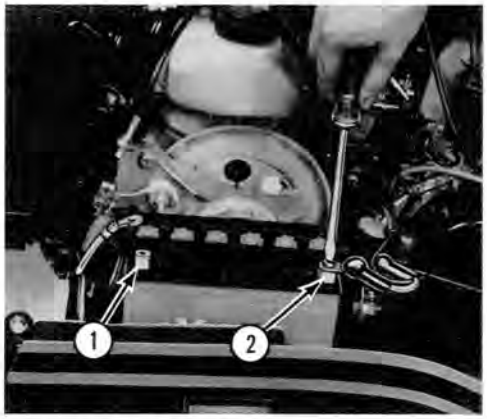
4. Disconnect charger and test battery.
   - The voltage should be 12 or 13 volts.
   - Check specific gravity of each cell with a hydrometer. A hydrometer reading of 1.26 or above is good. A lower indication means additional charging is necessary.
5. Install battery as outlined in Installation procedure.

Battery Removal

1. Unfasten clamp and remove battery cover assembly.

WARNING **Prevent possible personal injury and damage to electrical components by always removing negative (-) cable from battery first, then positive (+) cable.**

2. Remove battery.
   - Disconnect cables from terminals of battery.
   - Carefully lift battery out of mounting bracket.



1. Negative (-) Terminal
2. Positive (+) Terminal

3. If corrosion or dirt are present on terminals and top surface of battery, follow recommended cleaning procedures.

Battery Cleaning

Accumulation of dirt on top surface of battery and corrosion on terminals can shorten battery life and reduce its performance. Always keep outside of battery as clean and dry as possible.

To clean battery proceed as follows:

1. Remove battery from snowmobile.
   - If battery is not removed, damage may occur to chassis components.
2. Clean heavy corrosion from terminals of battery and cable ends with a wire brush.
   - Finish cleaning by applying solution of one part baking soda to four parts water, but use care to prevent cleaning solution from entering cells of battery.
3. Rinse entire battery with clear water.
4. Completely dry outer surface of battery.

Battery Installation

Prior to battery installation be sure terminals are free of corrosion, outer surface is clean and dry and battery is fully charged.

1. Be sure protective pads are properly positioned under battery and hold down cover assembly.
2. Lower battery into mounting case assembly.
   - Guide vent tube downward through chaincase drain plug hole.

CAUTION **Incorrect routing of battery vent tube could result in corrosion of chassis components from expelled electrolyte.**

1. Battery Vent Tube

3. Secure battery by fastening clamp of cover assembly.

CAUTION **Do not reverse battery connections or damage to the voltage regulator/rectifier will result.**

4. Connect battery cables.
   - Secure RED cable and fuse wire to positive (+) terminal.
   - Connect BLACK cable to negative (-) terminal.
   - Coat terminals with grease to prevent corrosion.
   - Slide boot over terminal for protection.

CHARGING AND INSTRUMENT CIRCUITS

Charging and Instrument circuits consist of the following components.

1. Flywheel - contains four permanent magnets, evenly spaced about the circumference, which provide the magnetic field required to produce electrical energy in a magneto system.
2. Lighting Coil - a large coil of wire mounted on a plate near the flywheel magnets, which will produce single phase alternating current (AC), as the magnets pass by during flywheel rotation.
3. Tachometer - used to measure engine speed in revolutions per minute (RPM). Power to operate the tachometer is supplied by magneto lighting coil output (AC).
4. Regulator/Rectifier - converts AC from magneto lighting coil into DC to charge the battery. Monitors and controls battery voltage to predetermined safe level.
5. 12 VDC Battery - provides power necessary during electric starting of engine and operates lighting system when engine is not running.
6. Fuse - prevents damage to wiring harness and components by limiting current flow within system to 10 amps.
7. Wiring and Connectors - used to interconnect and complete the circuits of items in charging system.

Charging and Instrument Circuits Operation

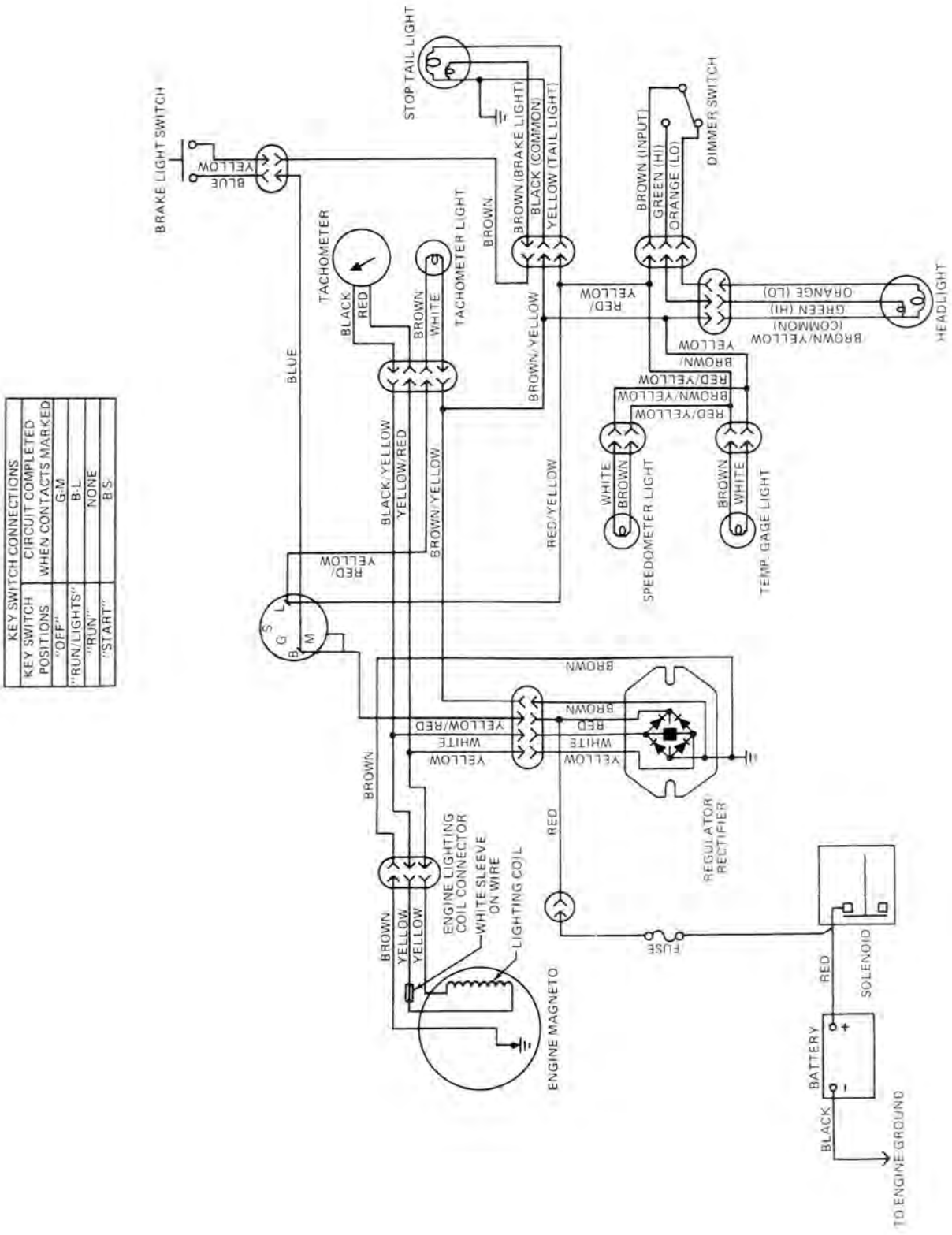
As the flywheel rotates, magnetic fields surrounding the magnets cut through lighting coil windings, which generate alternating current with two cycles per flywheel revolution.

Current leaves the lighting coil and is sent to a solid-state Regulator/Rectifier. At low engine RPM a small charging voltage is generated and enters the Regulator/Rectifier where it is converted to DC, sent to the battery, and returns back to lighting coil. As engine RPM increases, charging voltage also increases. Left unchecked, this voltage supply would soon exceed the battery's capacity causing it to overcharge and boil. Instead, when battery voltage reaches 14 to 14.5 volts, the regulator circuit is activated which by-passes the battery and sends the excess current directly back to lighting coil reducing charge available to battery. Since there are no contacts or moving parts, the Regulator/Rectifier never needs to be adjusted.

Current flow from the Regulator/Rectifier varies depending on key switch position as follows:

- Run position - current from charging system is available to charge battery, at B terminal of key switch and at brake light switch.
- Run/Lights position - current is available as described for Run position in addition to supplying power to all lights connected to L terminal of key switch.

CHARGING & INSTRUMENT CIRCUITS



Regulator/Rectifier Tests

WARNING **NEVER RUN ENGINE WITH BATTERY CABLES OR ELECTRICAL CONNECTORS DISCONNECTED. Doing so may damage the voltage regulator/rectifier. Sparks that may occur could cause a fire which may cause severe personal injury.**

NOTE: A worn out or badly sulphated battery will produce numerous problems that cannot be corrected until the battery is replaced. **ALWAYS CHECK BATTERY CONDITION BEFORE CONDEMNING OTHER PARTS OF THE SYSTEM. A FULLY CHARGED BATTERY IS A MUST FOR CONDUCTING ACCURATE SYSTEMS TESTS.** Refer to Battery Testing procedure to evaluate condition.

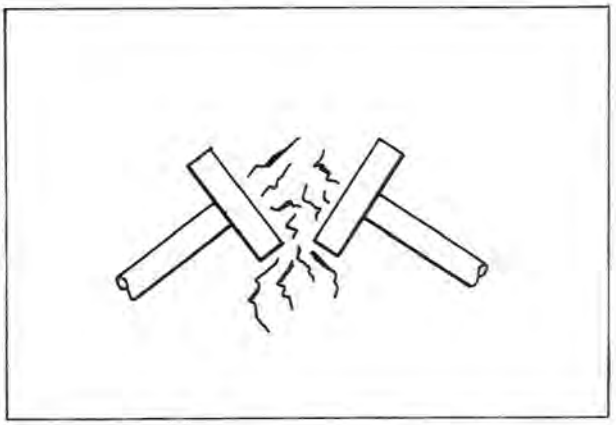
Output from the charging system supplies power to operate tachometer, charge battery and illuminate lights. Defects in any of preceding components will reduce charging system output which is usually described as an uncharged battery. Perform the following tests in the sequence provided to determine if charging system is operating properly.

Three separate tests must be conducted to determine proper operation of regulator/rectifier.

1. LEAKAGE TEST
   - Place key switch in OFF position.
   - Disconnect holder and remove fuse at regulator/rectifier.

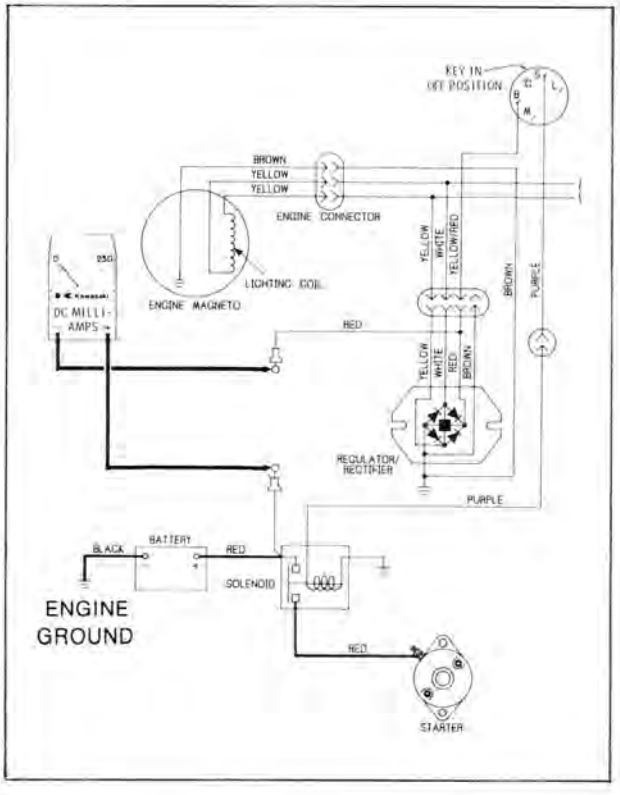
1. Fuse Holder
2. Regulator/Rectifier

   - Momentarily touch fuse terminals inside holder together to detect possible arcing as terminals make and break contact. If any sparks are observed, replace regulator/rectifier.



CAUTION **If meter leads are connected backwards (reversed polarity) meter damage will result.**

   - Connect DC milliampere meter (250 milliamp range) to terminals at fuse holder observing polarity as shown.



- Meter needle should remain at zero (0). Any needle movement indicates leakage which will drain battery charge when engine is not running. Replace regulator/rectifier if necessary.
- Perform Current Output Test.

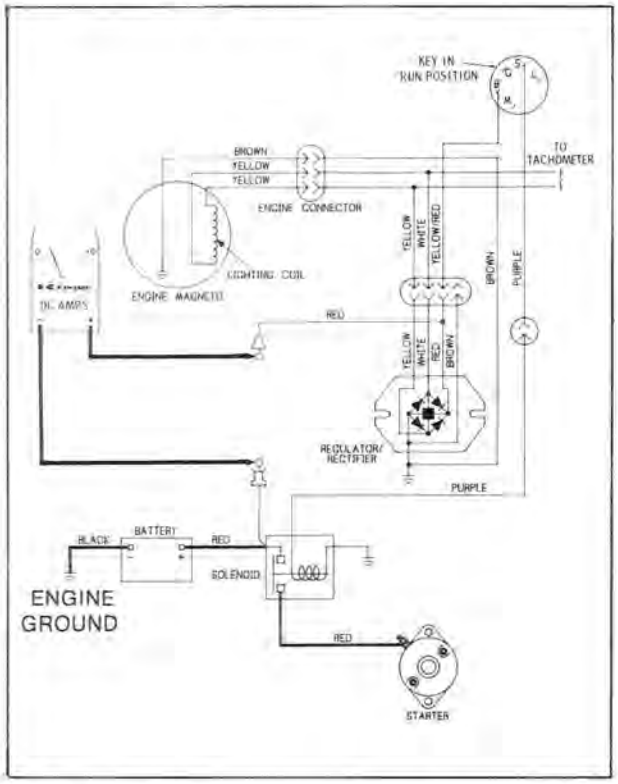
2. CURRENT OUTPUT TEST

NOTE: This procedure requires engine to operate at high RPM. Remove drive belt and secure converter guard in normal position with clip pins.

- Perform Leakage Test procedure.
- Disconnect holder and remove fuse at regulator/rectifier.

CAUTION **If meter leads are connected backwards (reversed polarity) meter damage will result.**

- Connect DC ammeter (10 amp range) to terminals at fuse holder observing polarity as shown.



- Place key switch in RUN position (no lights).

CAUTION **Do not use electric starter to crank engine as damage to meter will result.**

- Manually start engine and operate at 5,000 RPM.
- Observe system output and interpret meter indication as follows:
  - * 2 to 3 amps - current output is good, perform Voltage Control Test.
  - * 5 to 7 amps - battery state of charge low. Install new or fully charged battery and retest. Output remains high, perform Voltage Control Test.
  - * No Output -
  - ☐ Unplug tachometer and retest.
  - ☐ Check Lighting Coil.
  - ☐ Inspect main wiring harness for broken (open) or pinched (shorted) wire between main engine connector terminals and regulator/rectifier connector.
- Insert fuse and secure with holder cap.
- Perform Voltage Control Test.

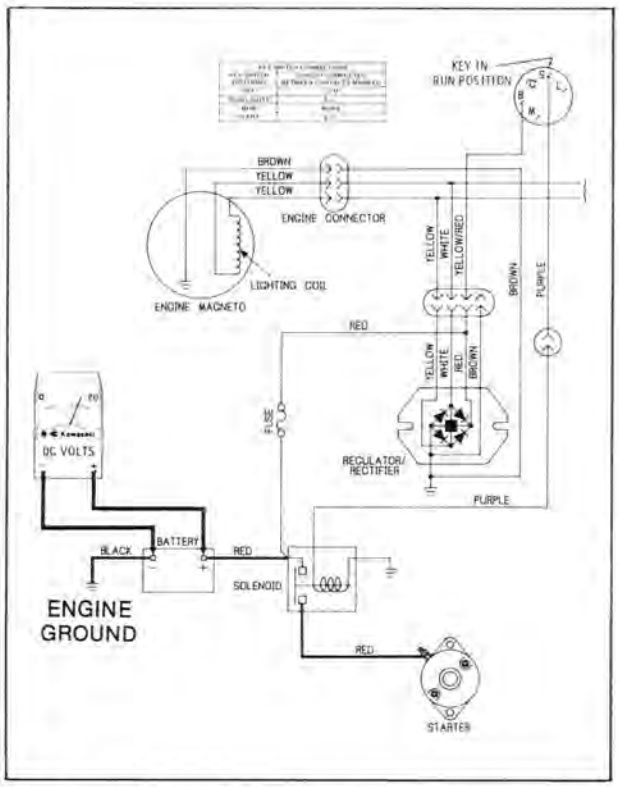
3. VOLTAGE CONTROL TEST

NOTE: This procedure requires engine to operate at high RPM. Remove drive belt and secure converter guard in normal position with clip pins.

- Perform Leakage Test and Current Output Test procedures.

CAUTION **If meter leads are connected backwards (reversed polarity) meter damage will result.**

- Connect DC voltmeter (20 volt range) to battery terminals as shown.

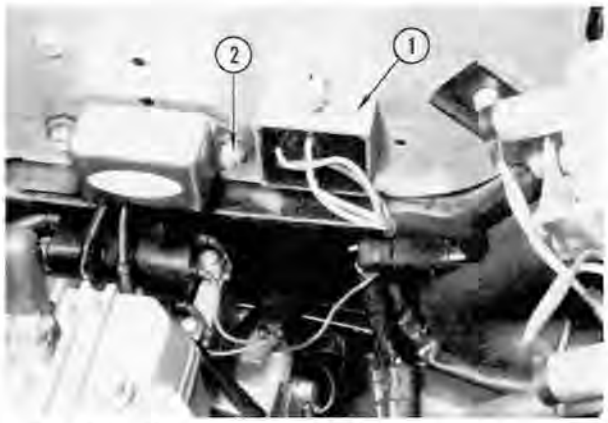


- Start engine and operate at 5,000 RPM.
- Place key switch in RUN position (no lights).

- Observe voltage and interpret indication as follows:
  * 14 to 15 volts - voltage control circuit is good. Charging System operating normal.
  * Above 15.5 volts - voltage control circuit defective. Replace regulator/rectifier assembly and retest.
  * Below 13.5 volts - voltage control circuit defective. Replace regulator/rectifier assembly and retest.
- Disconnect voltmeter and reinstall drive belt.

Regulator/Rectifier Replacement

1. Disconnect the regulator/rectifier connector from the main harness.
2. Remove regulator/rectifier.
   - Unscrew locknut, and remove the regulator/rectifier.

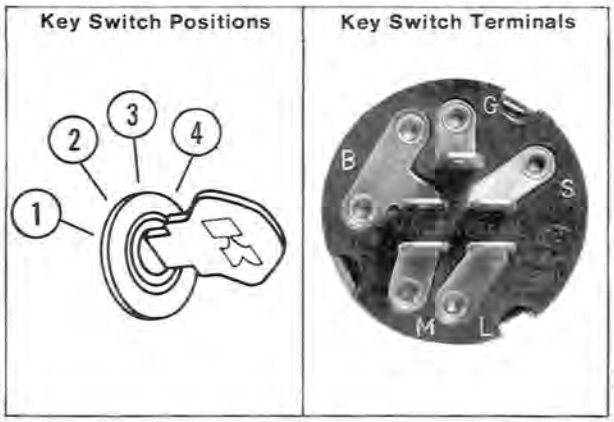


1. Regulator/Rectifier.
2. Main Harness Ground Wire.

3. Install regulator/rectifier in reverse order of removal.
   - Place regulator/rectifier onto duct as shown.
   - Position main wiring harness ground wire terminal on mounting bolt.
   - Install plain washer and locknut. Tighten nut to 95 in. lb (1.0 kg-m).
   - Reconnect regulator/rectifier connector to main wiring harness.

KEY SWITCH TESTS

The G and M terminals of the key switch control the RUN and OFF circuit of the ignition system. Lights are operated through terminals marked B and L. Starter solenoid is activated through terminals B and S.



1. Off
2. Run/Lights
3. Run
4. Start

To test the key switch:

NOTE: Prior to performing key switch tests follow the procedure for Key Switch Removal to obtain access at terminals on switch.

1. Remove the main wiring harness connector from the key switch terminals.
2. Test switch G and M terminals.
   - Set the ohmmeter to high ohm scale (X100).
   - Connect one ohmmeter lead to the key switch G terminal and the other ohmmeter lead to M.
   - With the key switch in the RUN position, the ohmmeter should show open circuit (∞). Replace the switch if the needle moves off of infinity (∞).
   - Turn the key switch to OFF position. Meter should now indicate closed circuit (0). Replace the switch if the needle does not move to 0.
3. Test switch B and L terminals.
   - Set the ohmmeter to low ohm scale (X1).
   - Connect one ohmmeter lead to the key switch B terminal and the other lead to L.
   - Turn the key switch to RUN/LIGHTS position. The ohmmeter should indicate a closed circuit (0). Replace the key switch if the meter does not indicate 0.
   - With the key switch positioned in RUN or OFF, the ohmmeter must indicate an open circuit (∞). Replace the key switch if ∞ is not observed.
4. Test S terminal of switch.
   - With ohmmeter still on low ohm scale (X1), connect one ohmmeter lead to B terminal and other lead to S.
   - Turn the key switch to START position. The ohmmeter should indicate a closed circuit (0). Replace the key switch if the meter does not indicate 0.

- With the key switch position in OFF, RUN, or RUN/LIGHTS, the ohmmeter must indicate an open circuit (∞). Replace the key switch if ∞ is not observed.

5. Reconnect the main wiring harness connector to switch terminals and refer to Key Switch Installation.

LIGHTING CIRCUIT

Lighting circuit components consist of:

1. 12 VDC battery - power supply for system when engine is not running.
2. Fuse - prevents damage to wiring harness and components by limiting current flow within system to 10 amps.
3. Key Switch - controls operation of lighting circuit by switching current flow ON or OFF.
4. Instrument Lights - illuminates numbered face of instrument.
5. Brake Light Switch - controls operation of brake light by allowing current to flow when brake lever on handlebar is activated.
6. Tail/Brake Light - tail light operates whenever key switch is in Run/Lights position. Brake light illuminates whenever brake light switch is closed.
7. Headlight Dimmer Switch - depending upon selected position, allows current flow to either HI or LOW beam of headlight. Current is available at dimmer switch only when key switch is in Run/Lights position.
8. Headlight - illuminates area ahead of snowmobile.
9. Wiring and Connectors - used to interconnect and complete the circuits of items in lighting system.

Lighting Circuit Operation

During engine operation the charging system supplies current to illuminate all lights as well as charge the battery. All lights will operate when the engine is not running, however, continued use will reduce battery state of charge to a point which may cause the battery to become unserviceable (discharged).

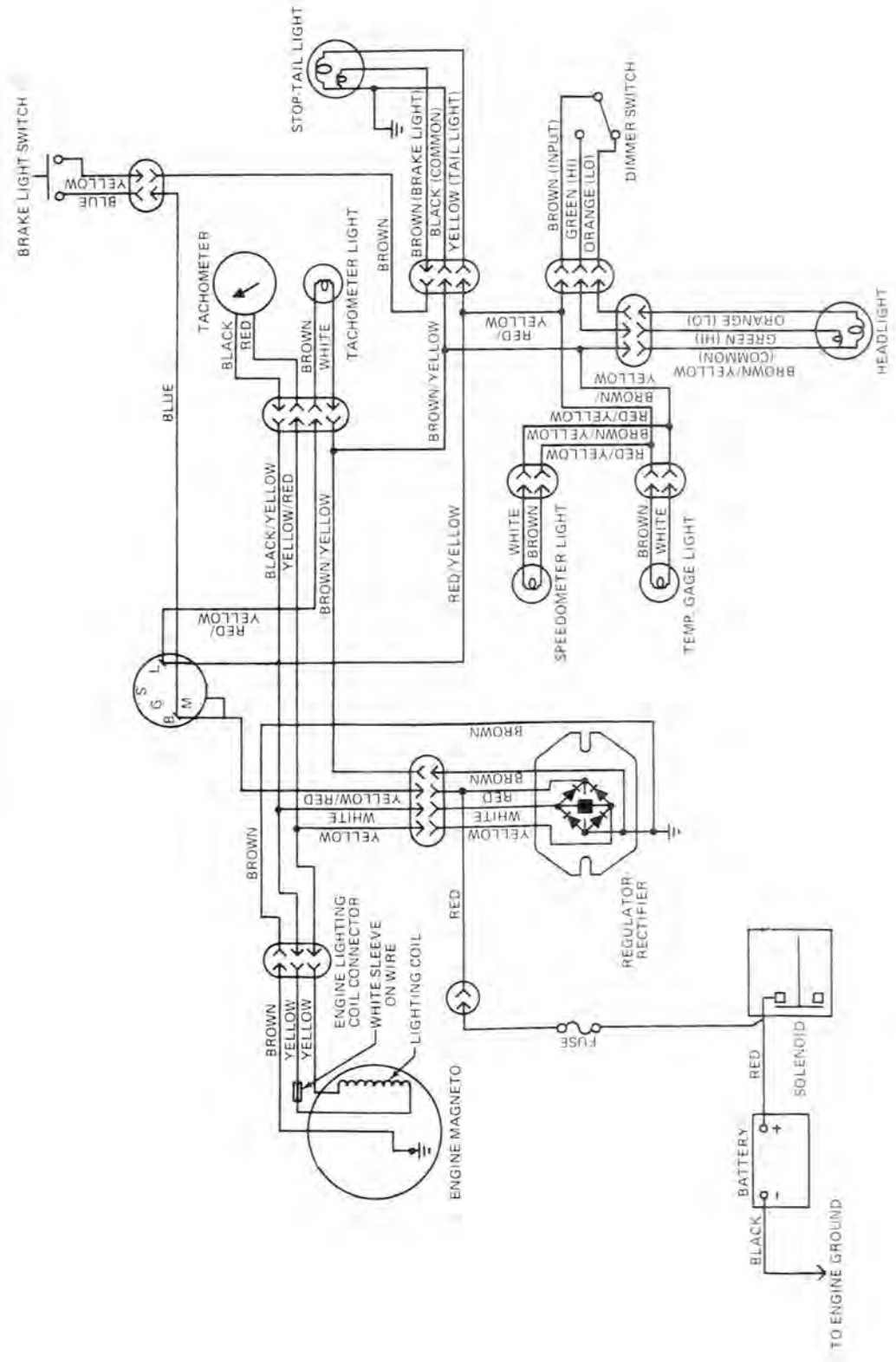
Brake light operation is independent from other lights and will illuminate anytime the brake light switch is activated. All other lights require that key switch be placed in Run/Lights position for operation.

If failure should occur to the 10 amp fuse, battery power will be disconnected from key switch and the lights will not operate when engine is not running. If engine is manually started, lights will operate from power received from charging system. Continued operation in this manner may overstress the electrical system components resulting in premature failure as well as permanently damaged battery. Troubleshoot electrical system as soon as possible to determine cause of fuse failure.

When key switch is placed in Run/Lights position, circuit is complete between contacts marked B and L, and power is available (from battery or charging system) for lights.

LIGHTING CIRCUIT

KEY SWITCH CONNECTIONS	
KEY SWITCH POSITIONS	CIRCUIT COMPLETED WHEN CONTACTS MARKED
"OFF"	G-M
"RUN/LIGHTS"	B-L
"RUN"	NONE
"START"	B-S



Lighting Coil Tests

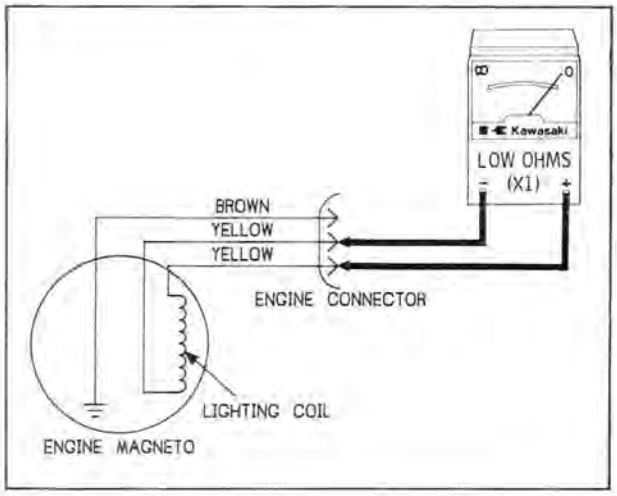
A defective lighting coil may result in any of the following conditions:

- Inoperative or erratic tachometer.
- Battery consistently undercharged or dead.
- Lights will not illuminate or dim.

Test lighting coil for two conditions, continuity through wires and that no wires contact ground (shorted).

CONTINUITY

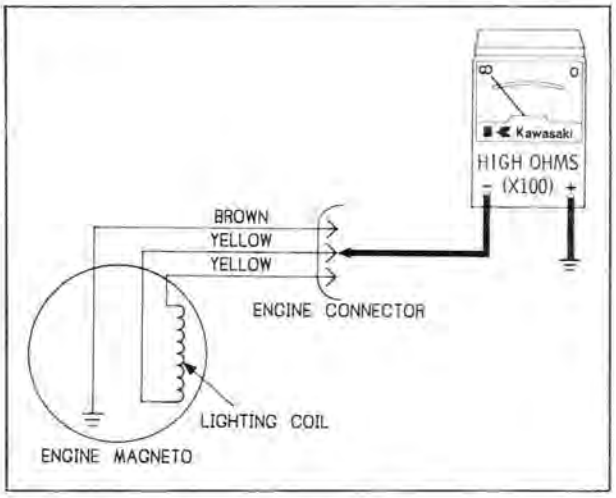
1. Separate main engine connector.
2. Test lighting coil with ohmmeter.
   - Set ohmmeter to low ohm scale (X1).
   - Connect one ohmmeter lead to a yellow wire in engine half of connector.



   - Connect remaining ohmmeter lead to other yellow wire in engine half of connector and observe meter reading.
     * Resistance of 0.18 ± 20%, lighting coil has good continuity, check for shorts to ground.
     * No resistance reading (∞), very high reading, or (0) indication means lighting coil should be replaced.
3. Perform shorts to ground test.

SHORTS TO GROUND

1. Complete continuity test prior to proceeding.
2. Test lighting coil with ohmmeter.
   - Set ohmmeter to high ohm scale (X100).
   - Connect one ohmmeter lead to a yellow wire in engine half of connector.



   - Connect remaining ohmmeter lead to engine ground and observe meter.
     * No needle movement (indicates ∞), lighting coil wires are not contacting ground and coil is good.
     * Needle moves off of infinity (∞), indicates coil or wires are touching ground. Repair wires or replace coil.
3. Reconnect main engine connector.

Lighting Circuit Tests

Defects in the lighting circuit such as an open (broken) wire or shorts could result in any of the following conditions.

- Fuse in regulator/rectifier fails when lights are turned on.
- Dim lights or lights do not illuminate.
- Intermittent operation of lights.

A simple test can be conducted on the lighting circuit to determine defective component by using a portable battery charger meeting these minimum requirements:

- 12 volts 7 amps output capacity.
- Self tapering (reducing) charge.
- Built-in automatic reset circuit breaker.
- Built-in ammeter.

NOTE: If battery charger is not available, a 12 volt battery and jumper leads with an ammeter can be used as a substitute. Be sure to install a fuse (10 amp) in one of the jumper leads to prevent damage to ammeter and vehicle wiring harness during test.

Perform lighting circuit test as follows:

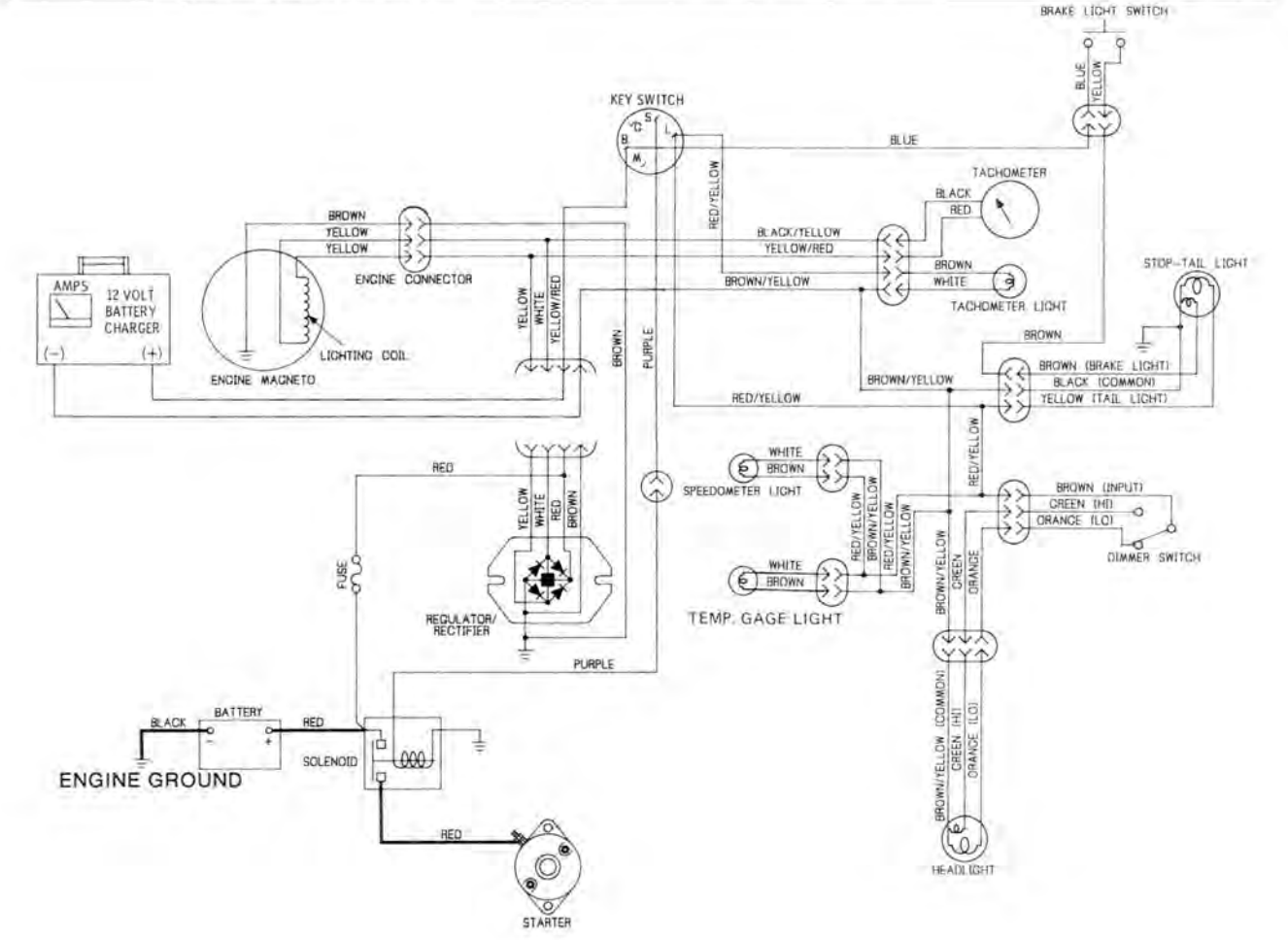
1. Place key switch in RUN position.
2. Disconnect four wire connector to separate voltage regulator/rectifier from main wiring harness.

1. Voltage Regulator Connector

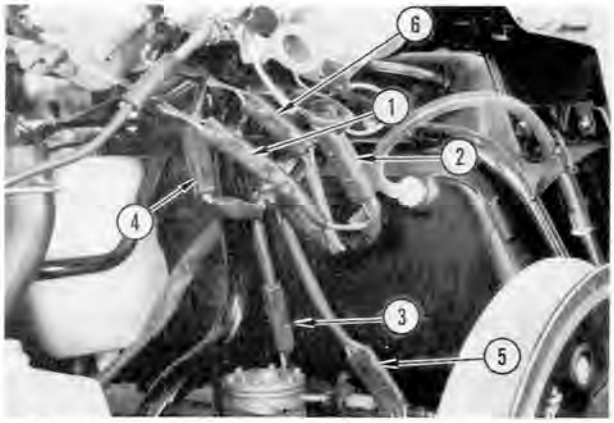
3. Connect battery charger leads to main wiring harness half of regulator/rectifier connector as shown.

NOTE: Be sure positive (+) and negative (-) leads from power source are connected to correct wires of main wiring harness.

4. Observe ammeter indication and interpret as follows:
   - Meter indicates (0), proceed to next step.
   - Meter indicates amps or circuit breaker fails, proceed to step 7.
5. Activate brake light switch, observe ammeter and interpret as follows:
   - Meter indicates 2 amps (approximately) proceed to next step.
   - No meter indication or circuit breaker fails, proceed to step 7.
6. Turn key switch to RUN/LIGHTS, observe ammeter and interpret as follows:
   - Meter indicates 5 amps (approximately), all lights illuminate, lighting circuit is good. Pull and twist on wiring harnesses and connectors while watching ammeter for intermittent indications. Refer to Lighting Coil and Regulator/Rectifier tests for defects.
   - Lights do not operate, meter indicates (0), problem is key switch or broken wire in main harness. Refer to Key Switch tests.
   - Dim lights (low ammeter reading) indicates high resistance in key switch or main harness. Refer to Key Switch tests.
   - Circuit breaker (high amps) indicates shorted wiring harness or key switch. Proceed to next step.

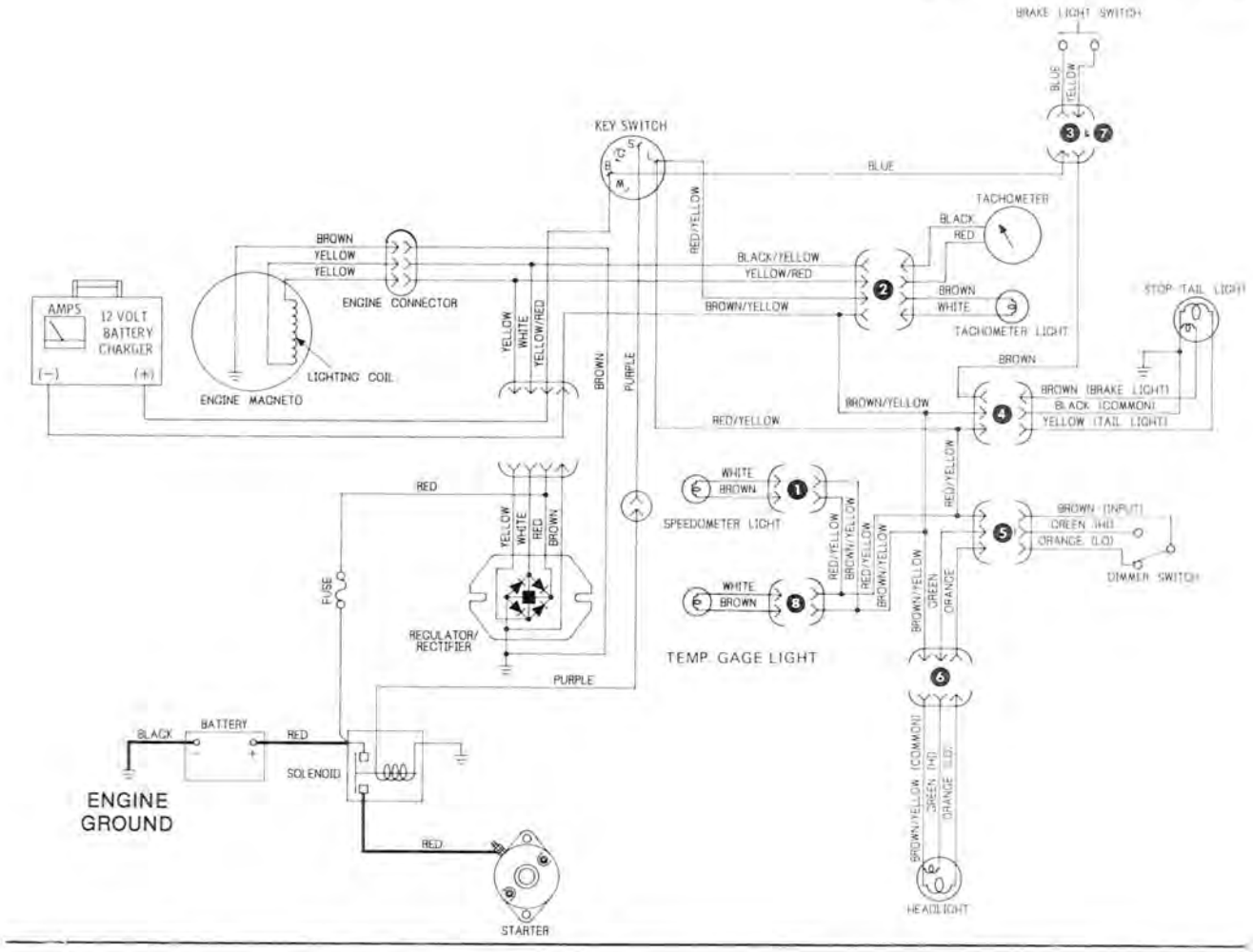


7. Turn key switch to RUN position and disconnect the following component connectors from the main wiring harness.
   - Speedometer light.
   - Tachometer light.
   - Temperature gauge light.
   - Brake light switch.
   - Tail/brake light harness.
   - Headlight dimmer switch.
   - Headlight harness.



1. Speedometer Light
2. Tachometer Light
3. Tail/Brake Light Harness
4. Headlight Dimmer Switch
5. Headlight Harness
6. Temperature Gauge Light

8. Turn key switch to RUN/LIGHTS position, observe ammeter and interpret as follows:
   - Circuit breaker fails (high amps) indicates shorted main wiring harness or key switch. Refer to Key Switch test.
   - Meter indicates (0), proceed to next step.
9. Plug in connectors one at a time in the sequence shown (begin with connector No. 1, then add No. 2, then add No. 3 etc.) and compare current draw with amps shown in chart after completing each connection.
   - Current draw higher than recommended or circuit breaker fails indicates component connected has short circuit. Refer to appropriate test procedure to determine cause.
   - If circuit breaker fails when dimmer switch or brake light switch is activated, short circuit exists either in switch leads or main harness. Refer to appropriate switch test to determine cause.
   - No current draw indicates open circuit (broken wire) in lead to component connected.
10. Remove battery charger and reconnect regulator/rectifier connector.



COMPONENT CONNECTION SEQUENCE

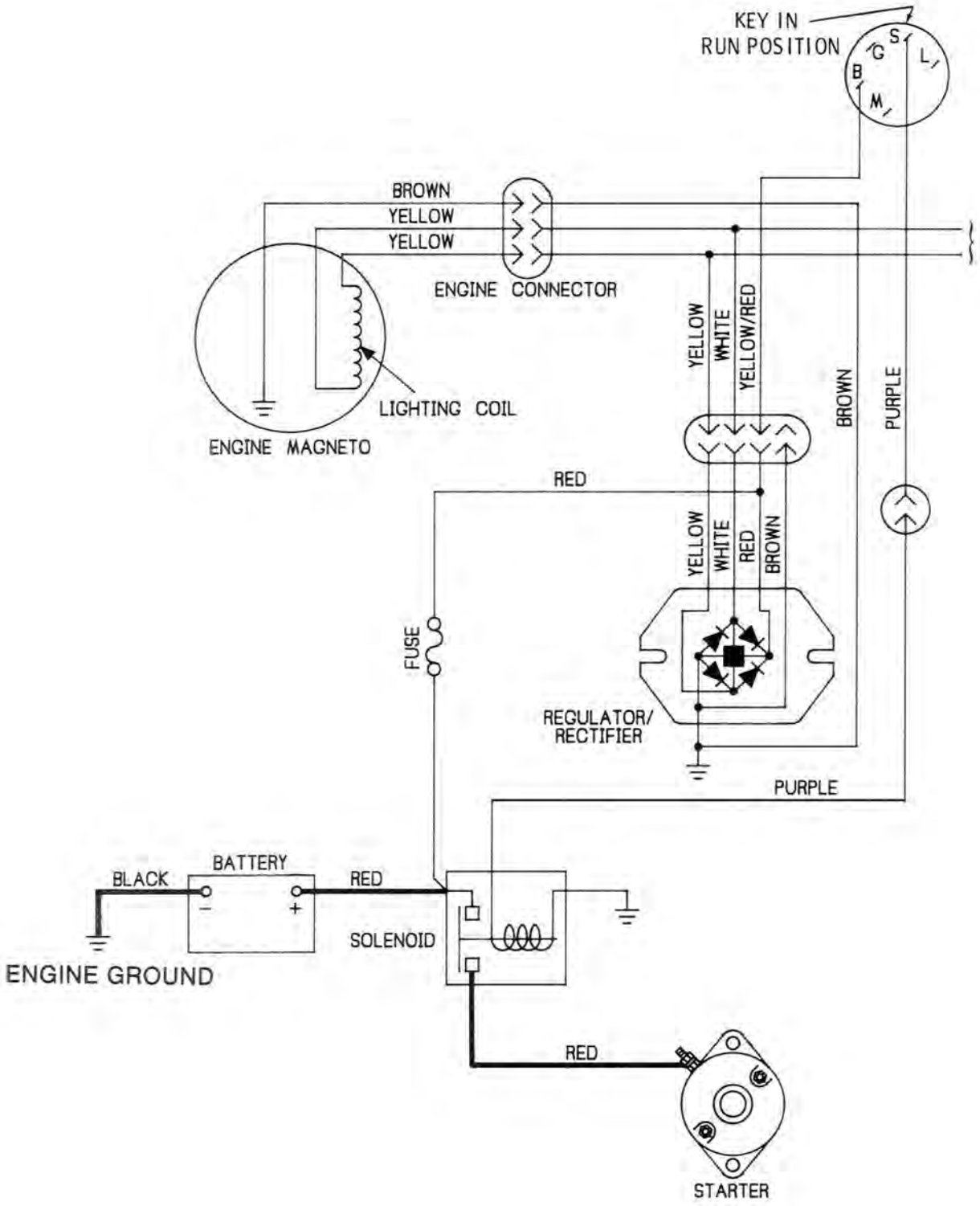
	❶ Speed-ometer Light	❷ Tachometer Light	❸* Brake Light Switch	❹ Tail Light	❺* Dimmer Switch	❻ Headlight Harness Low or High Beam	❼ Brake Light	❽ Temp Gauge Light
Approximate Current Draw (amps) of Each Component	0.25							
		0.25						
			0					
				0.5				
					0			
						3.5		
							2.0	
								0.25
Total Current	0.25	0.50	0.50	1.0	1.0	4.5	6.5	6.75

*Connect and activate switch

STARTER CIRCUIT

Electric starter system components consist of:

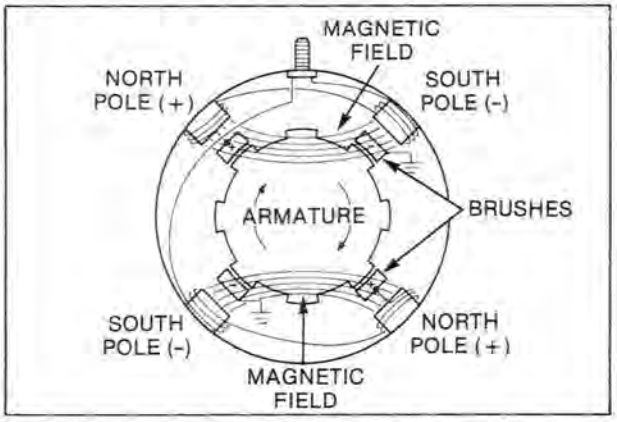
1. 12 VDC Battery - provides power to operate electric starting circuit.
2. Fuse - prevents damage to wiring harness and components by limiting current flow within system to 10 amps.
3. Key Switch - controls current flow to energize starter solenoid switch.
4. Starter Solenoid Switch - controls current flow between battery and starter motor.
5. Starter - converts electrical energy from battery to mechanical power for engine rotation.
6. Wiring and Connectors - used to interconnect and complete the circuits of items in starter system.
7. Flywheel Ring Gear - means to temporarily join pinion gear of starter with flywheel to permit engine rotation for starting electrically.



Starter Circuit Operation

When the key switch is turned to START position it completes a circuit between B and S terminals of the switch. This allows a small amount of current flow from battery, through key switch, to solenoid switch. Current flow within solenoid windings magnetize the plunger, causing plunger to move against the contacts. The closed contacts complete a circuit between battery and starter motor allowing the motor to turn. Solenoid switch is required because of the high current flow requirement of starter motor. Since it is not practical to use a heavy duty switch with very large wires mounted on instrument panel, the key switch is designed to carry the low current necessary to energize the solenoid windings with heavy duty contacts inside the solenoid to carry the starter motor current.

Starter motor operation depends upon magnetic attraction and repulsion, which is determined by field windings, armature windings (commutator segments) and brushes. Direction in which wire is wound (wrapped) to form a coil and placement of each starter component with relationship to others, controls the effects of magnetic fields within the starter.



When current is applied to the field windings, it causes magnetic lines of force to pass from one field winding (North pole) through the armature core to the opposite field winding (South pole). At the same time, current passes through the brushes to armature winding conductors which generates a second magnetic field. The magnetic field around each armature conductor (being of the same polarity as the field winding) strongly repell each other resulting in armature rotation away from the magnetic force of field windings. As each armature conductor (commutator segment) exits the force from one field winding, it approaches a force of opposite polarity from the adjoining field winding. The specific placement of brushes and commutator segments reverses the flow of current in the armature conductors which reverses the magnetic field and will continue to contribute its force to the cranking power output.

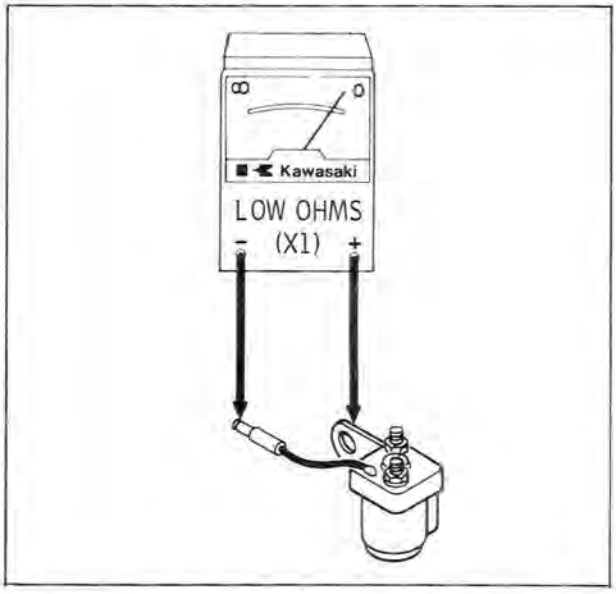
During armature rotation, the pinion gear is moved away from starter motor assembly and engages with flywheel ring gear to crank the engine. After the engine has started, the ring gear drives pinion assembly faster than armature shaft is rotating which causes the pinion to move out of mesh with the flywheel. An overrunning clutch is incorporated in pinion assembly to assist in preventing damaged gears if key switch is held in start position after engine has started.

WARNING **Do not attempt to "jump" start snowmobile with a booster battery and jumper cables. The battery generates hydrogen gas which can be flammable and explosive under certain conditions. Sparks from jumper cables may ignite this gas causing severe personal injury.**

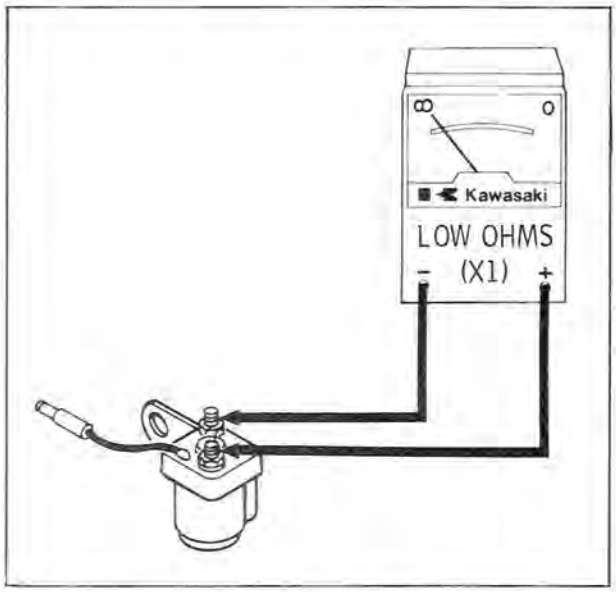
CAUTION **DO NOT operate the starter continuously for more than 15 seconds or starter will overheat. After each 15 seconds of operation, allow starter to cool for 15 seconds. Never turn key switch to start position when engine is running or starter is still spinning. This will hasten wear and may cause starter to jam.**

Solenoid Switch Test

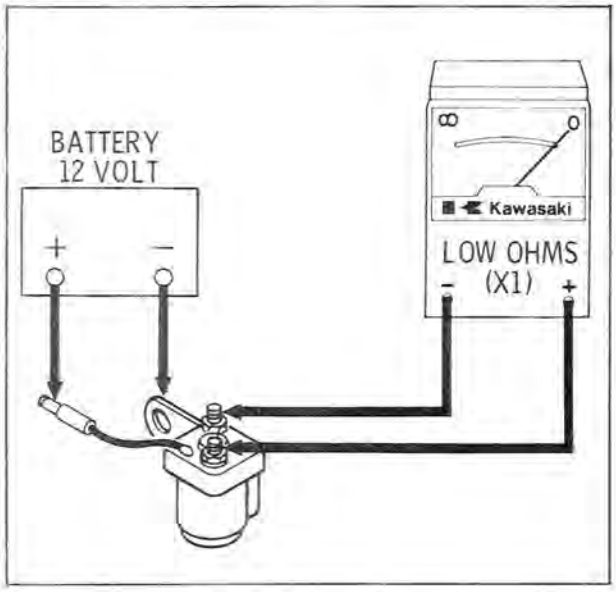
1. Disconnect cable from battery negative (-) terminal.
2. Unplug small (purple) wire connector to separate solenoid switch from main wiring harness.
3. Remove wires from both terminals on top of solenoid switch.
4. Test solenoid windings.
   - Set ohmmeter to low ohm scale (X1).
   - Connect meter leads to solenoid coil winding as shown.



5. Observe meter indication and interpret as follows:
   - 3.5 ohms (±0.4) - solenoid coil winding is good, proceed to next step.
   - If resistance reading is other than specified, replace solenoid switch.
6. Test Solenoid Terminals.
   - With ohmmeter still on low ohm scale (X1), connect meter leads to solenoid terminals as shown.



7. Observe meter indication and interpret as follows:
   - Open circuit (∞) - contacts in off position, solenoid good, proceed to next step.
   - Meter indicates low resistance - solenoid defective, will not turn off current to electric starter motor. Replace solenoid.
8. Activate solenoid and test operation.
   - With ohmmeter still on low ohm scale (X1), connect leads to solenoid terminals as shown.
   - Activate solenoid winding by connecting battery as shown.



9. Interpret results as follows:
   - Solenoid clicks and ohmmeter indicates closed circuit (0), solenoid assembly is good.
   - Meter indicates open circuit (∞), solenoid is defective and must be replaced.
10. Reconnect cable to battery negative (-) terminal.

STARTER MOTOR

WARNING **Do not attempt to "jump" start snowmobile with a booster battery and jumper cables. The battery generates hydrogen gas which can be flammable and explosive under certain conditions. Sparks from jumper cables may ignite this gas causing severe personal injury.**

CAUTION **DO NOT operate the starter continuously for more than 15 seconds or starter will overheat. After each 15 seconds of operation, allow starter to cool for 15 seconds. Never turn key switch to start position when engine is running or starter is still spinning. This will hasten wear and may cause starter to jam.**

Starter Motor Circuit Tests

Poor starter motor performance in many cases results from HIGH RESISTANCE at wire connections or within component contacts. High resistance is usually caused by loose or corroded connections.

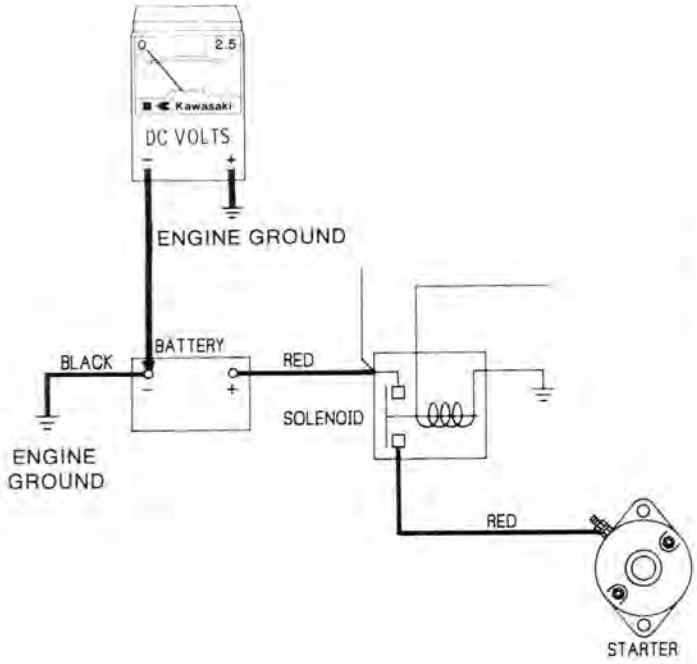
The following procedure provides a systematic approach to test entire starting circuit to detect defective wires or components.

Preliminary Steps

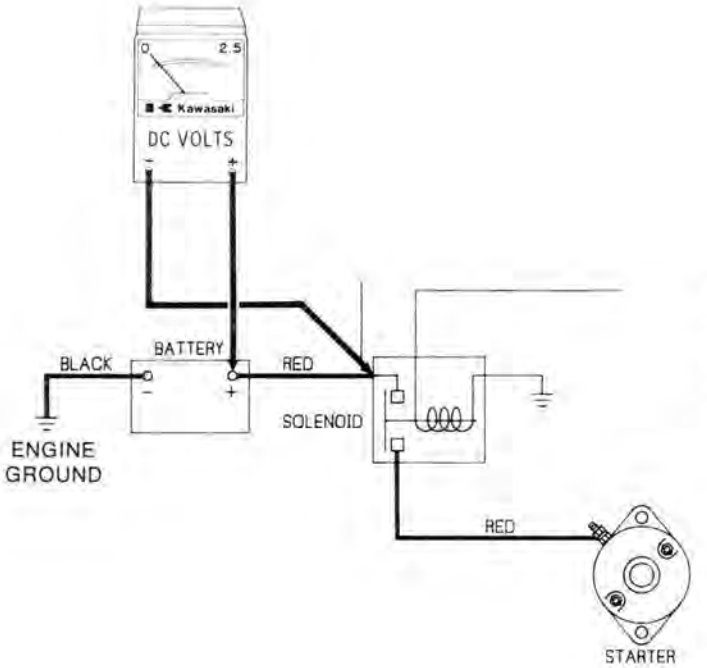
1. Place emergency stop switch to STOP position to prevent engine from starting during test.
2. Attach voltmeter leads to threaded terminal studs rather than to connector on end of wire to detect presence of high resistance.
3. Battery must be fully charged. Refer to Battery Charging procedure if battery measures less than 12 volts.

CAUTION **If meter leads are connected backwards (reversed polarity) meter damage will result.**

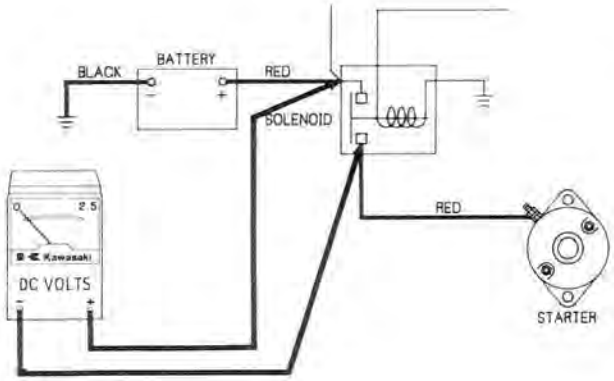
4. If voltage drop is greater than specified:
   - Clean and retighten connection.
   - Replace cable or component having high internal resistance.
5. Set voltmeter to DC volts, low range (2.5) and proceed as follows:



TEST 1 OF 4
1. Connect meter as shown.
2. Turn key to crank engine and observe voltage indication.
3. If voltage exceeds 0.25 volt, clean connections or replace battery ground cable.



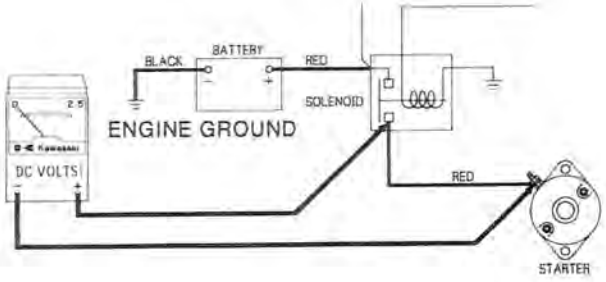
TEST 2 OF 4
1. Connect meter as shown.
2. Turn key to crank engine and observe voltage indication.
3. If voltage exceeds 0.25 volt, clean connections or replace battery positive cable.



TEST 3 OF 4

CAUTION **To prevent meter damage connect leads to solenoid switch only WHILE engine is cranking and remove leads before disengaging electric starter.**

1. Connect meter (+) lead to solenoid as shown.
2. Attach meter (-) lead to solenoid while engine is cranking and remove lead before disengaging electric starter. Observe voltage indication.
3. If voltage exceeds 0.25 volt, replace solenoid switch assembly.

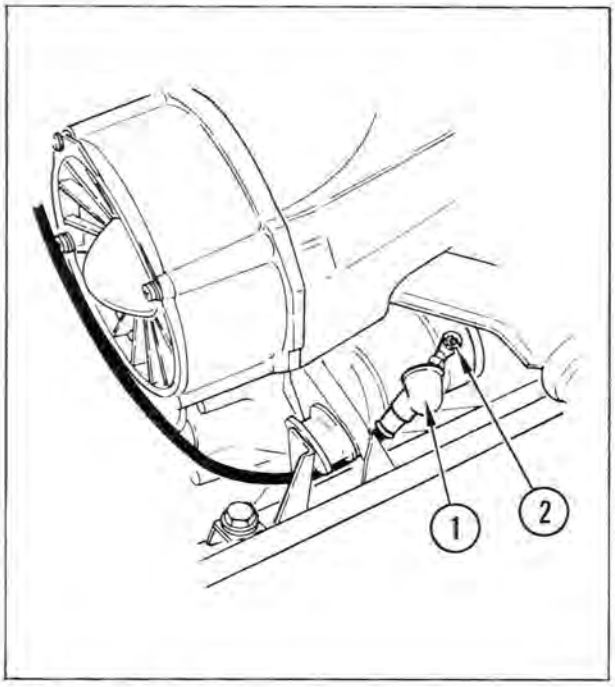


TEST 4 OF 4

1. Connect meter as shown.
2. Turn key to crank engine and observe voltage indication.
3. If voltage exceeds 0.25 volt, clean connections or replace solenoid to starter cable.

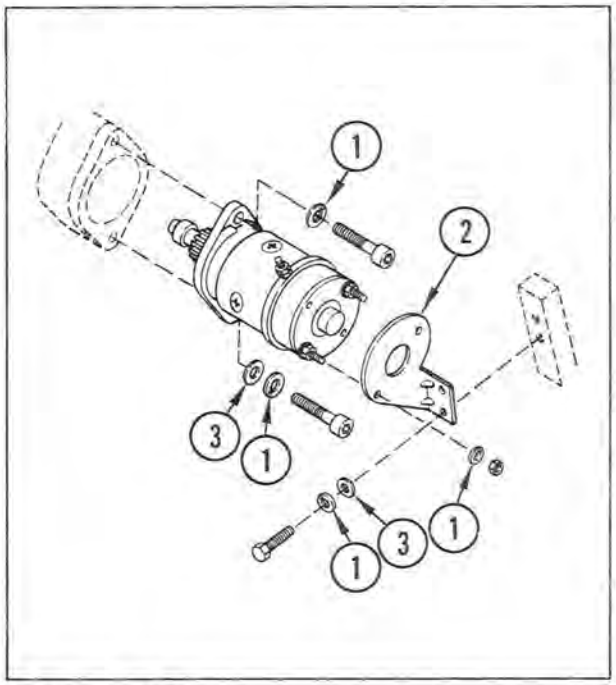
Starter Motor Removal

1. Slide boot off from terminal and disconnect solenoid to starter motor cable.



1. Protector Boot.
2. Starter Motor Terminal.

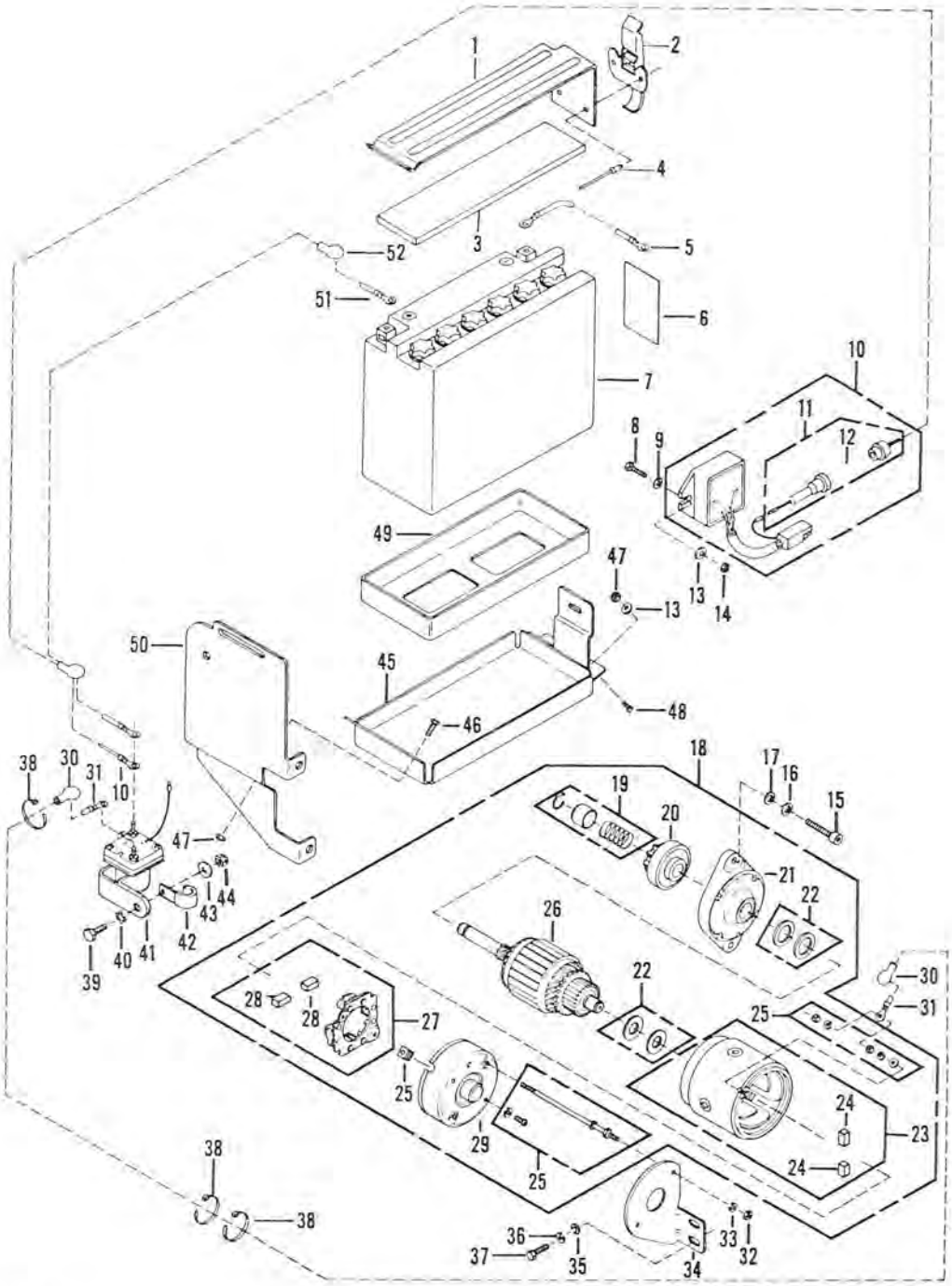
2. Remove bolts securing rear starter motor bracket to crankcase.
3. Unscrew bolts (use care not to lose washers) and slide starter out from engine boss.



1. Spring Washer.
2. Rear Bracket.
3. Plain Washer.

Starter Motor Installation

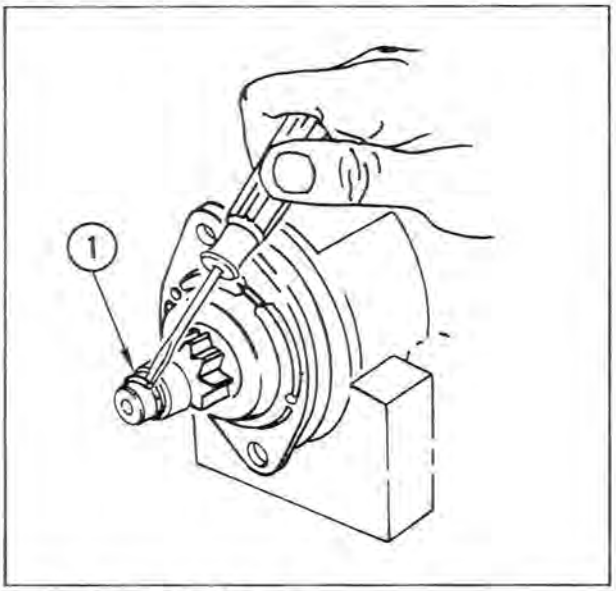
Install starter motor by reversing removal procedure.



1 COVER, battery
2 LATCH, battery cover
3 PAD, battery cover
4 RIVET, 3/16"
5 CABLE, black, 6 gauge x 24.00"
6 LABEL, warning
7 BATTERY ASSY, 12 volt
8 BOLT, 1/4-28 x .75
9 WASHER, special
10 REGULATOR/RECTIFIER ASSY, voltage
11 HOLDER, fuse
12 FUSE, AGC 10
13 WASHER, plain, 1/4"
14 NUT, insert, 1/4-28
15 BOLT, 8 x 25mm
16 WASHER, spring, 8mm
17 WASHER, plain, 8mm
18 STARTER ASSY, electric
19 STOPPER ASSY, pinion
20 PINION ASSY
21 COVER, front
22 PART GROUP, washer kit
23 YOKE ASSY
24 BRUSH, positive
25 PART GROUP, bolt kit
26 ARMATURE
27 HOLDER, brush
28 BRUSH, negative
29 COVER, rear
30 BOOT
31 CABLE, red, 6 gauge x 29.00"
32 NUT, 5mm
33 WASHER, spring, 5mm
34 BRACKET, starter motor
35 WASHER, plain, 6mm
36 WASHER, spring, 6mm
37 BOLT, 6 x 16mm
38 BAND, cable tie
39 BOLT, 5/16-24 x .75
40 WASHER, special
41 SWITCH ASSY, solenoid
42 CLAMP
43 WASHER, plain, 5/16"
44 NUT, 5/16-24
45 CASE ASSY, battery
46 BOLT, 1/4-20 x .50
47 NUT, insert, 1/4-20
48 SCREW, 1/4-20 x .50
49 DAMPER
50 BRACKET, heat shield
51 CABLE, red, 6 gauge x 8.50"
52 BOOT

Starter Motor Disassembly

1. Remove pinion stopper retaining ring.
   - Slide pinion stopper collar rearward on armature shaft to expose retaining ring. If necessary, use an appropriate size socket and hammer to initially move collar.
   - While holding collar rearward, pry retaining ring from armature groove using a small screwdriver.

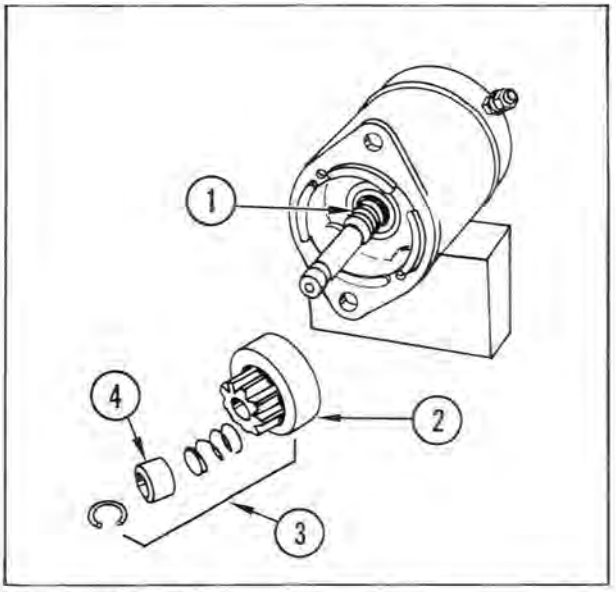


1. Chamfered End of Collar

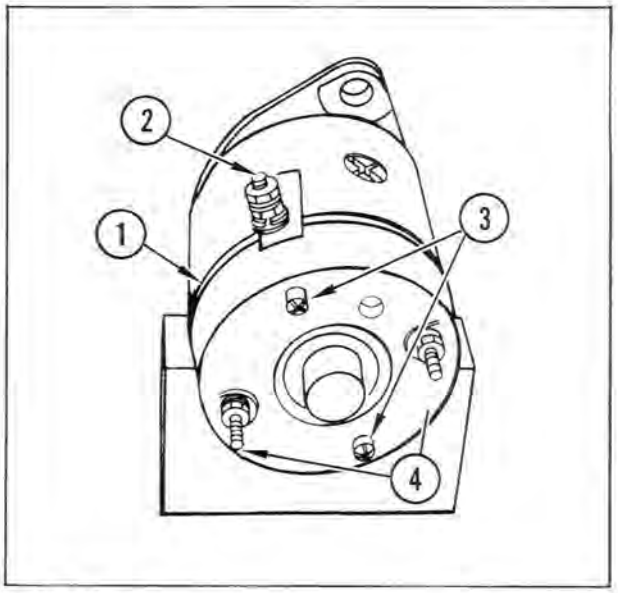
2. Remove pinion gear and stopper assembly from starter motor.
3. Unscrew nuts and remove bracket from rear cover.
4. Remove screws securing rear cover to brush holder.
5. Front cover can be removed by unscrewing through bolts.

CAUTION **To prevent damaging field terminal during rear cover removal, cut sealer around insulator using a sharp utility knife.**

6. Remove rear cover from yoke.
   - Lightly tap cover along mating edge with a drift and small mallet.

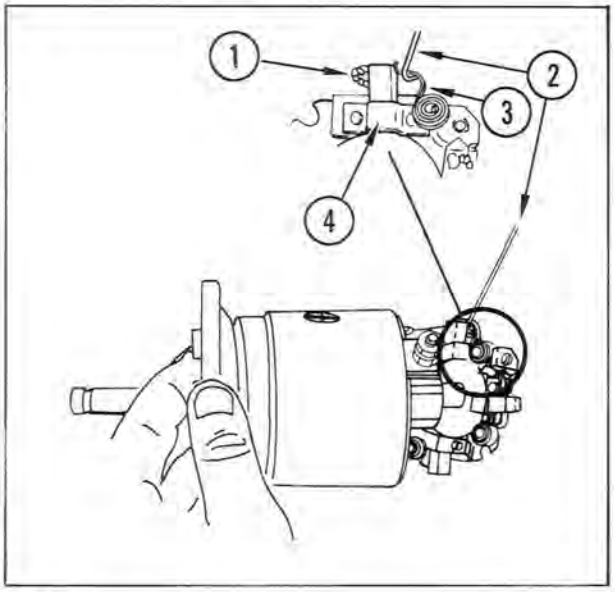


1. Pinion Gear Helix.
2. Pinion Gear.
3. Pinion Stopper.
4. Chamfer Toward End of Shaft.



1. Tap Here.
2. Field Terminal Stud.
3. Cover to Brush Holder Screws.
4. Through Bolts.

7. Slide positive brushes (brushes fastened to yoke) out of holder.
   - Use a hooked wire to release spring tension from brush.

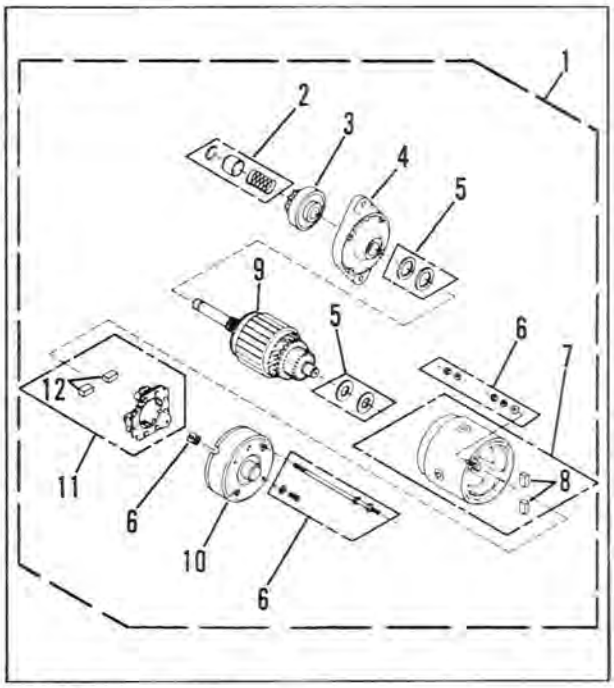


1. Brush.
2. Hooked Wire.
3. Brush Spring.
4. Holder Guide.

8. Remove thrust washers from rear of armature shaft.
   - Washers may have come off when removing rear cover. Inspect inside rear cover if necessary.
9. Slide armature out of yoke (field housing).
10. Perform Inspection procedure.

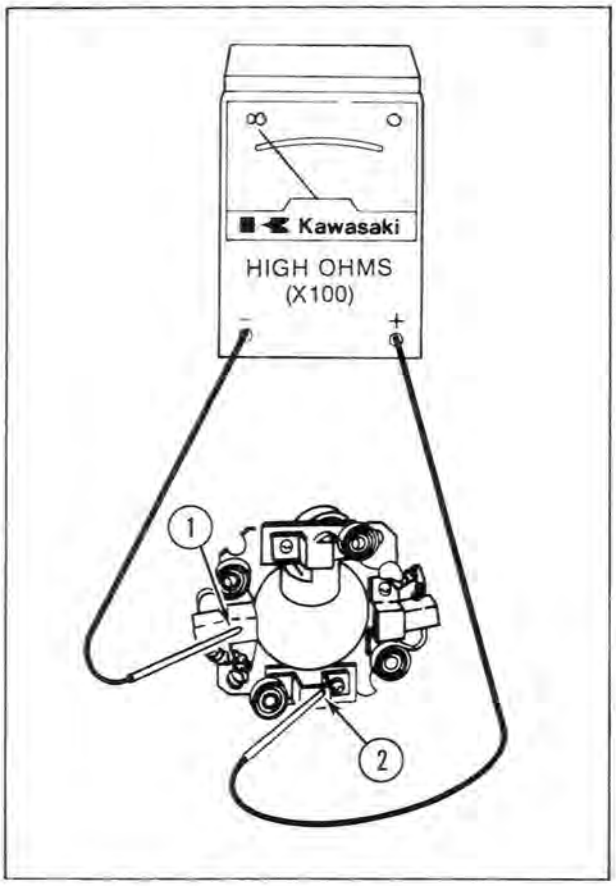
Starter Motor Inspection

1. Inspect brushes.
   - Worn brushes or weak springs will result in poor contact with armature commutator segments, which causes poor starter performance.
   - Replace brushes when they measure 1/14 in. (6.3 mm) or less.



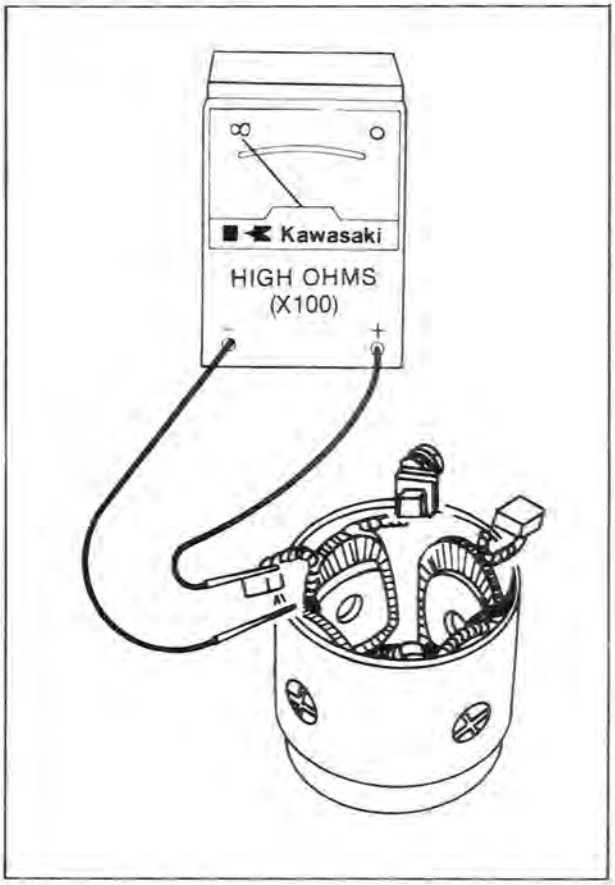
1. Starter Assembly.
2. Pinion Stopper.
3. Pinion Gear.
4. Front Cover.
5. Washer Kit.
6. Bolt Kit.
7. Yoke.
8. Positive Brush Set.
9. Armature.
10. Rear Cover.
11. Brush Holder Assembly.
12. Negative Brush Set.

2. Thoroughly clean holder of all brush dust etc. and inspect as follows:
   - Spring tension is considered good if it will snap brush firmly into place.
   - Set ohmmeter to high ohm scale (X100).
   - Connect one meter lead to positive holder (insulated) and other meter lead to negative brush.
     * Any needle movement indicates faulty insulation and holder must be replaced.
     * No needle movement (∞) indicates brush holder is good.
   - Repeat procedure for remaining two brush holders.

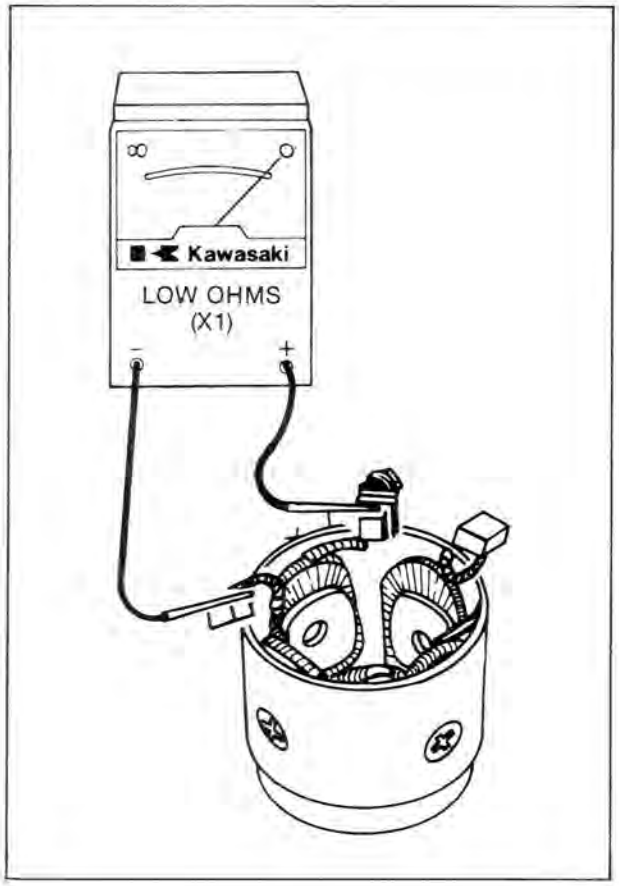


1. Negative Brush.
2. Positive Brush Holder (Insulated).

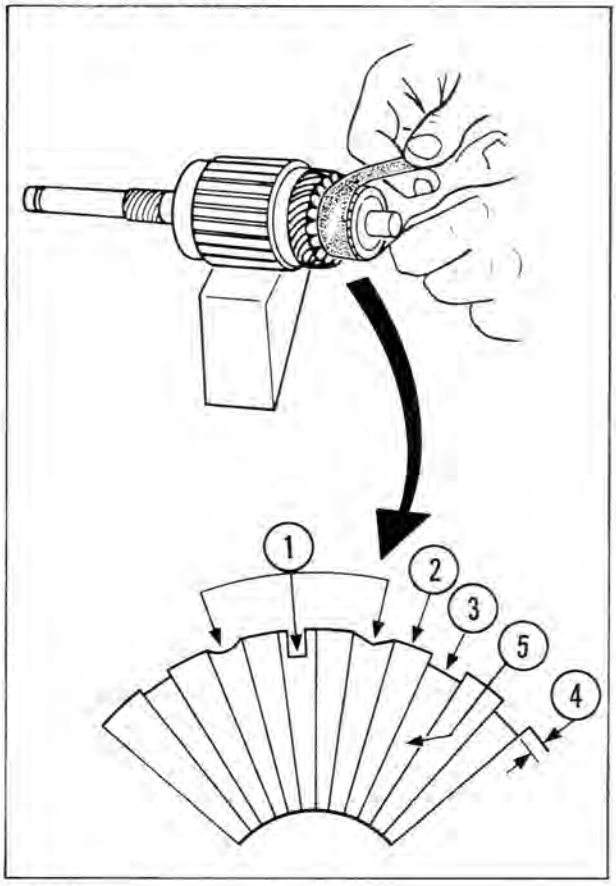
3. Test yoke field windings as follows:
   - Set ohmmeter to high ohm scale (X100).
   - Connect one meter lead to housing (ground) and other meter lead to positive brush.
     * Any needle movement indicates a short to ground and yoke assembly must be replaced.



- Repeat procedure for other positive brush.
- Set ohmmeter to low ohm scale (X1).
- Secure one meter lead to field terminal stud with other meter lead to a positive brush.
  * Needle movement indicates good continuity.
  * No needle movement indicates open circuit (broken wire) and yoke assembly must be replaced.

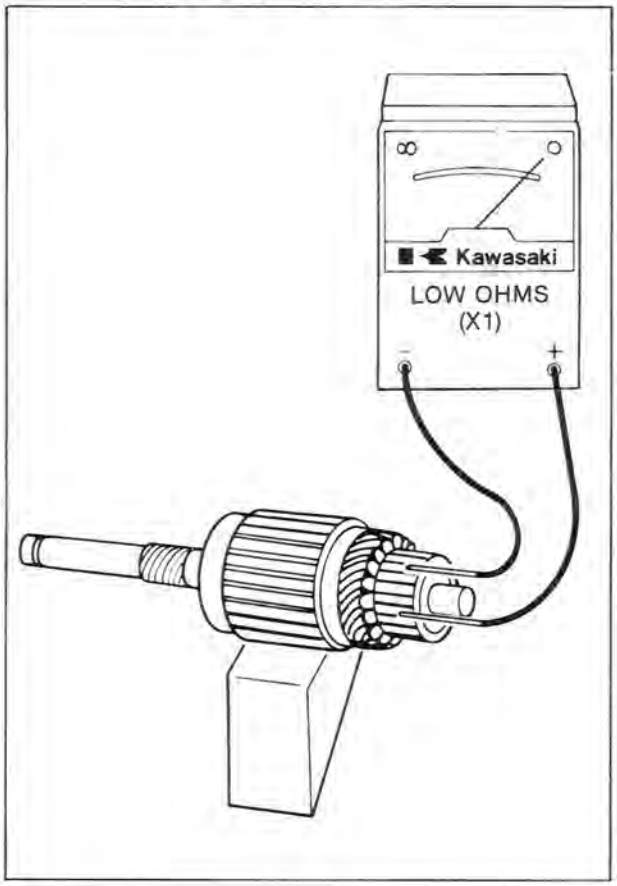


4. Armature Commutator - A dirty or damaged commutator will result in poor brush contact and cause the brushes to wear down quickly. In addition, particles from brush wear accumulating between commutator segments may cause partial shorts.
   - Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves as illustrated.
   - Determine as accurately as possible the depth of the grooves between commutator segments. Replace the armature with a new one if the groove depth is less than 0.008 in. (0.2 mm).

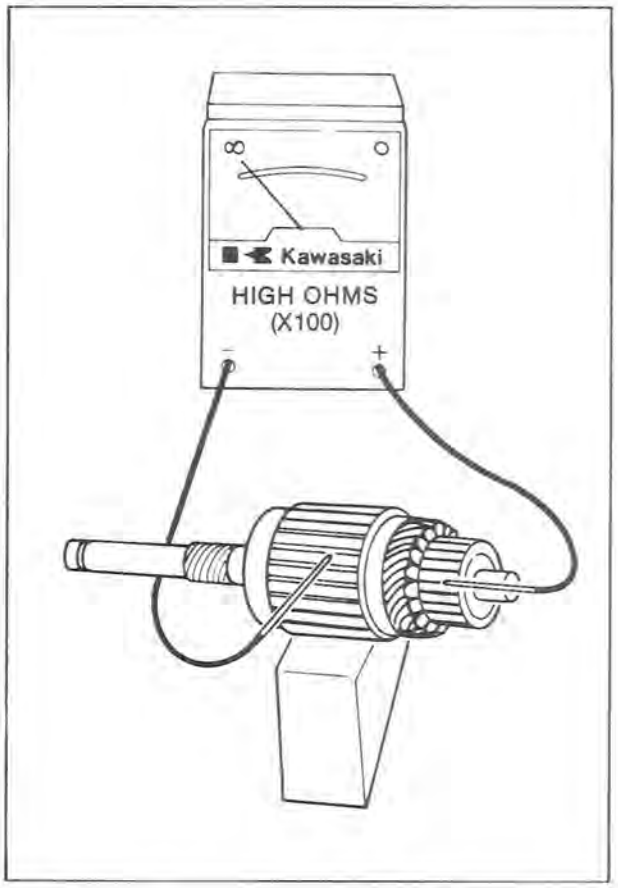


1. Bad.
2. Segment.
3. Good.
4. 0.008 in. (0.2 mm).
5. Mica.

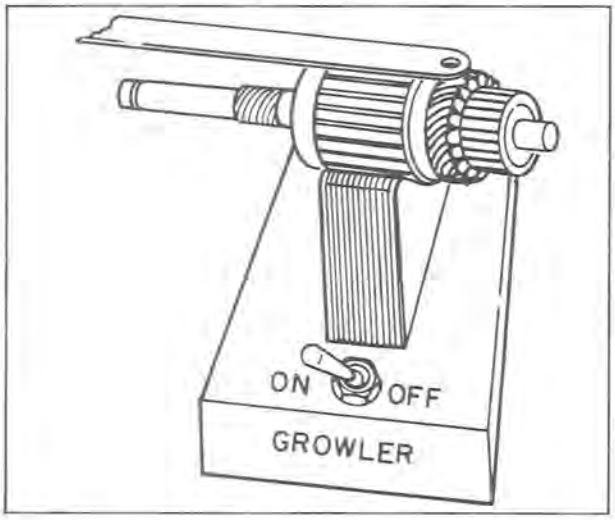
- Set ohmmeter to low ohm scale (X1).
- Touch meter leads on any two commutator segments.
  * No needle movement (∞) indicates open winding and armature must be replaced.
  * Repeat procedure by moving meter leads until all commutator segments have been tested.



- Set ohmmeter to high ohm scale (X100).
- Touch one meter lead to any commutator segment and other meter lead armature core or shaft.
  * Any needle movement indicates grounded (shorted) winding and armature must be replaced.



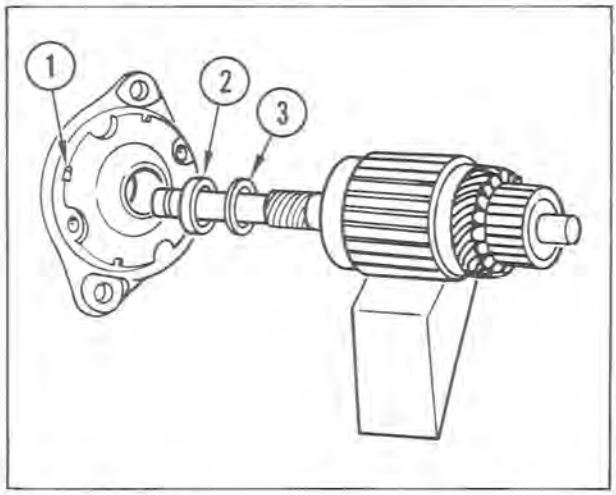
- Test armature windings for shorts.
  * Place armature on growler.
  * Hold a thin metal strip (hack saw blade) on top of armature.
  * Turn on growler and rotate armature one complete turn. If the metal strip vibrates, windings are internally shortened to each other and armature must be replaced.



Starter Motor Assembly

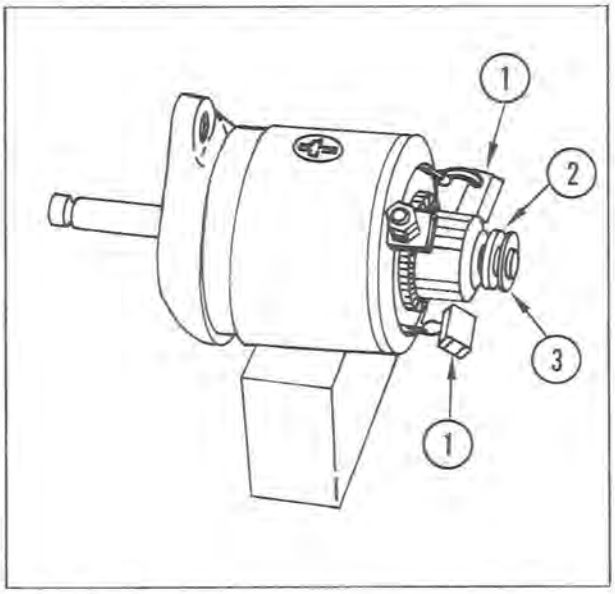
NOTE: If brushes require replacement, use a large capacity soldering gun (300 to 400 watts) with 60-40 ROSIN CORE type solder. Acid core (flux) is corrosive and should not be used on electrical connections.

1. Check armature shaft end play as follows:
   - Install front cover and washers onto armature as shown.
   - While inserting front cover and armature into yoke, align notch in cover with boss on yoke housing to insure correct assembly indexing.



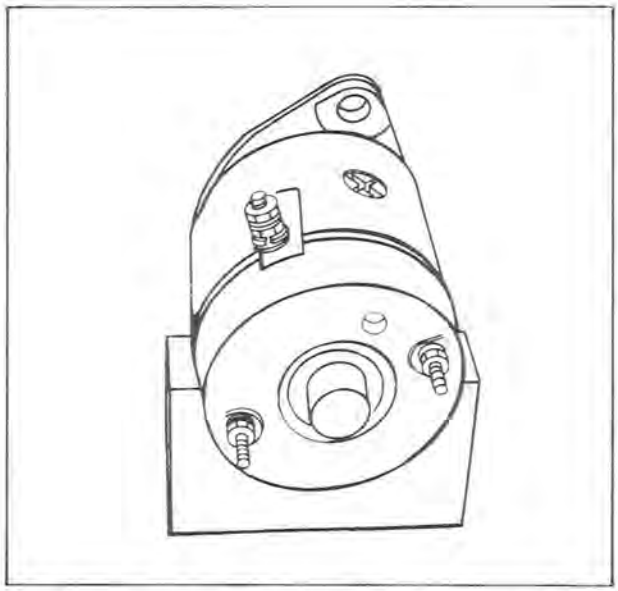
1. Notch in Cover.
2. Phenolic Washer.
3. Steel Washer (Large I.D.).

   - Place shims on rear armature shaft as shown.



1. Positive Brushes.
2. Thick Steel Washer (Small I.D.).
3. Thin Steel Washer (Small I.D.).

   - Install rear cover and secure with long through bolts.



   - End play is correct if armature shaft total movement (pushed completely inward then pulled completely outward) is 0.001 to 0.007 in. (0.02 to 0.18 mm).
     * If necessary to adjust end play, add or remove thin steel washer from rear of armature shaft.

2. Reassemble starter motor by reversing disassembly procedures along with the following:
   - After step 8, push negative brushes outward through holder guide for clearance when installing holder over armature. Position spring on side of brush to simplify installation.

- After step 7, push brushes into proper position against commutator segments.
- After step 6, apply silicone sealer along field terminal stud insulator to prevent moisture from entering starter motor.
- During step 5, install washers onto armature front shaft and align notch in front cover with boss on yoke housing to insure correct assembly indexing.
- During step 2, lightly lubricate pinion helix grooves on armature shaft and install stopper collar with chamfered edge facing front end of armature shaft.
- After step 1, slide collar forward to cover retaining ring.

3. When reassembly is complete, check that:
   - Pinion gear moves smoothly when rotated towards end of shaft and springs back into rest position when released.
   - Armature must rotate freely and smoothly by hand pressure only.

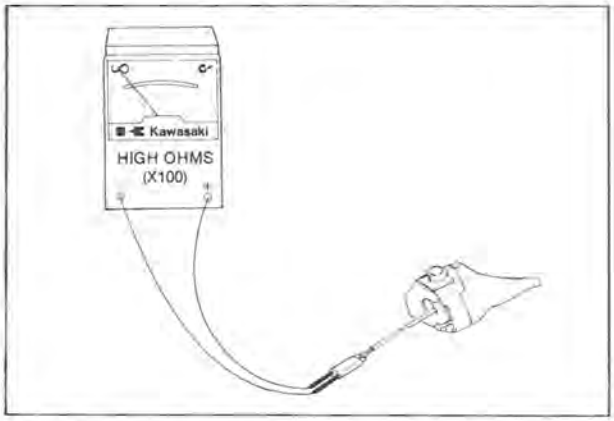
SWITCHES

Emergency Stop Switch Test

The emergency switch is used to stop the engine quickly in an emergency, and operated independent of the key switch. Both the key switch and emergency stop switch must be ON for the engine to operate. To stop the engine, turn the emergency stop switch to STOP.

To test the Emergency Stop Switch:

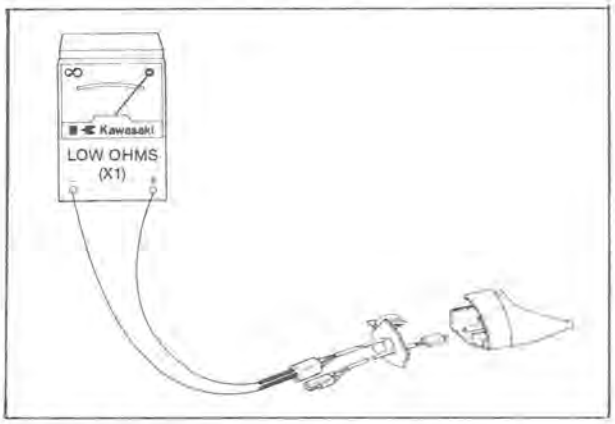
1. Disconnect the molded connector between the key switch and emergency stop switch.
   - Connector is located to the rear of air silencer assembly.
2. Connect ohmmeter to emergency stop switch leads.
   - Set ohmmeter to high ohm scale (X100).
   - Connect meter leads to switch leads.



3. Position switch on ON.
   - Meter should indicate open circuit (∞).
   - Replace switch if meter needle moves off of infinity (∞).
4. Place switch in STOP position.
   - Meter should indicate closed circuit (0).
   - If meter does not indicate closed circuit (0), replace emergency stop switch.
5. Repeat step number 4 for other STOP position of switch.
6. Reconnect molded connector between the emergency stop switch and key switch.

Dimmer Switch Test

1. Disconnect the dimmer switch from the main harness.
   - Connector is located at the rear of air silencer assembly.
2. Test dimmer switch LOW BEAM circuit.
   - Set ohmmeter to low ohm scale (X1).
   - Connect one ohmmeter lead to brown wire terminal in the dimmer switch half of connector.
   - Connect other lead to orange wire terminal in connector.

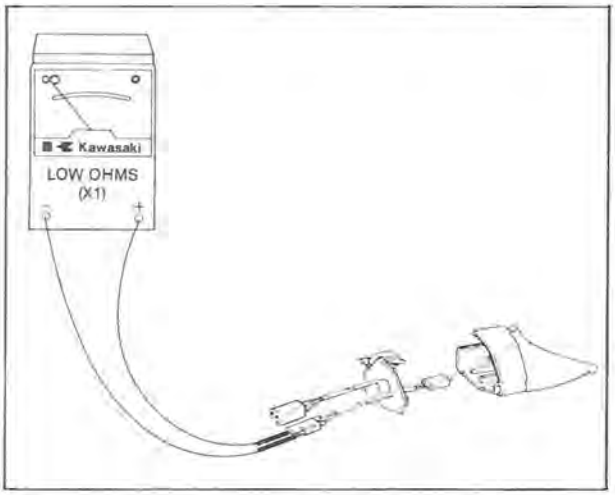


   - Turn dimmer switch to low beam position.
     * Meter should indicate closed circuit (0).
     * Replace switch if meter does not indicate (0).
   - Turn dimmer switch to high beam position.
     * Meter should indicate open circuit (∞).
     * Replace switch if meter does not indicate (∞).
3. Test dimmer switch HIGH BEAM circuit.
   - Set ohmmeter to low ohm scale (X1).
   - Connect one ohmmeter lead to brown wire terminal in the dimmer switch half of connector.
   - Connect other lead to green wire terminal in the dimmer switch half of connector.
   - Turn dimmer switch to high beam position.
     * Meter should indicate closed circuit (0).
     * Replace switch if meter does not indicate (0).
   - Turn dimmer switch to low beam position.
     * Meter should indicate open circuit (∞).
     * Replace switch if meter does not indicate (∞).
4. Reconnect dimmer switch to main wiring harness.

Brake Switch Test

Before proceeding with this test, make sure the brake is adjusted so that brake lever makes good contact with the switch located in the handlebar housing assembly.

1. Disconnect the brake switch from the main harness.
   - Connector is located to the rear of air silencer assembly.
2. Connect ohmmeter to brake switch leads.
   - Set ohmmeter to low ohm scale (X1).
   - Connect meter leads to switch leads.



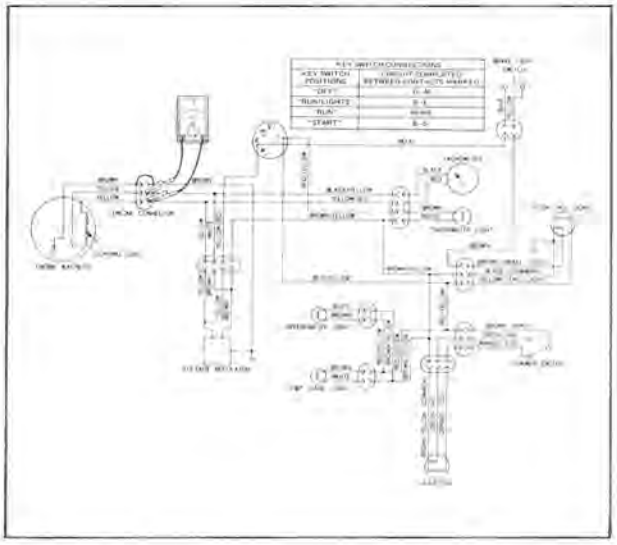
3. Test switch operations as follows:
   - Brake off (lever released).
     * Meter should indicate open circuit (∞).
     * Replace switch if meter does not indicate (∞).
   - Brake applied (lever squeezed on).
     * Meter should indicate closed circuit (0).
     * Replace switch if meter does not indicate (0).
4. Reconnect brake switch to main wiring harness.

VOLTAGE REGULATOR TESTS (Manual Start Model)

These tests should be conducted if the bulbs burn out consistently or all the lights are extremely dim (filaments barely light). Bulbs which fail due to over-voltage usually have melted filaments rather than broken ones.

1. Remove drive belt.
   - Refer to Belt Removal procedure.
2. Connect multimeter to lighting coil wires.
   - Set multimeter to measure 25 volts AC.
   - Connect meter leads to lighting coil yellow leads.

NOTE: DO NOT separate engine lighting coil connector during this test.



3. Turn the key switch to RUN position.
   - Do not activate the brake light during test.
4. Measure regulated voltage output.
   - Start engine and operate at 2,000 RPM.
   - Interpret meter results as follows:
     * If meter indicates 8 to 11 volts, lighting coil and voltage regulator are good.
     * If the meter indicates higher, the voltage regulator may be open and not working. Increase the RPM slowly. DO NOT EXCEED 3,000 RPM. If the voltage reading did not stabilize or exceeded 22 volts, the regulator should be replaced. (Before replacing the regulator, make sure the connector on the regulator to the main harness is in good condition and that the case is properly grounded.)
     * If meter indicates less than 8 volts AC, proceed to step 5.
5. Measure unregulated voltage output.
   - With the engine still running at 2,000 RPM, disconnect the voltage regulator from the main wiring harness.
   - Interpret meter results as follows:
     * Meter should indicate 14 to 20 volts.
     * If voltage does not increase, problem is in lighting coil circuit. Refer to Lighting Coil Test procedure.
     * If voltage does increase, problem may be:
       a. voltage regulator shorted — replace.
       b. tachometer shorted — unplug tachometer connector from main harness and repeat test.
       c. main wiring harness shorted — repair shorted wire or replace main wire harness assembly.
6. Install drive belt.
   - Refer to Belt Installation procedure.

ENGINE

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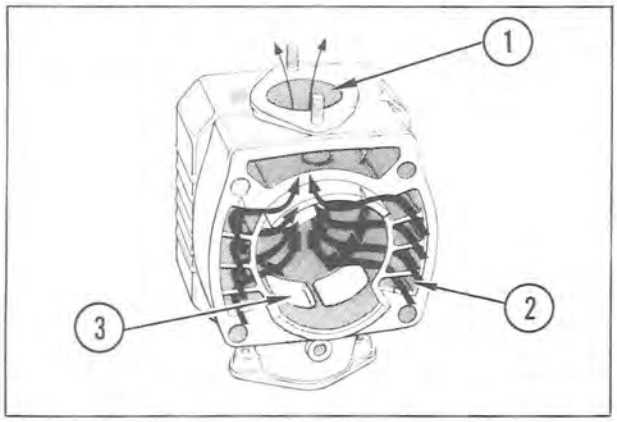
TRANSFER PORT THEORY

The number of transfer ports, as well as their placement size and shape, are very important for efficient scavenging.

This model features cylinders using an EIGHT transfer port design, resulting in the following advantages:



1. Exhaust Port.
2. Transfer Ports.
3. Intake Ports.

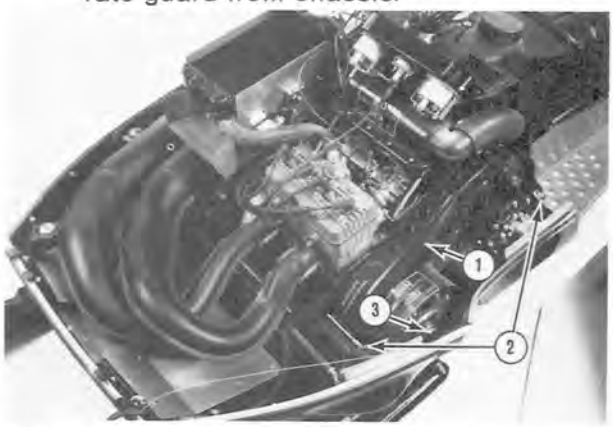
- Increased volume provides more density to fuel/air charge for combustion.
- Improved flow within cylinder after combustion reduces possibility of trapped air pockets to effectively purge exhaust gases which reduced pollution of incoming charge.

After manufacturing, limited modifications are possible, but major changes to original port designs usually are not permitted due to insufficient cylinder material thickness.

ENGINE SERVICING

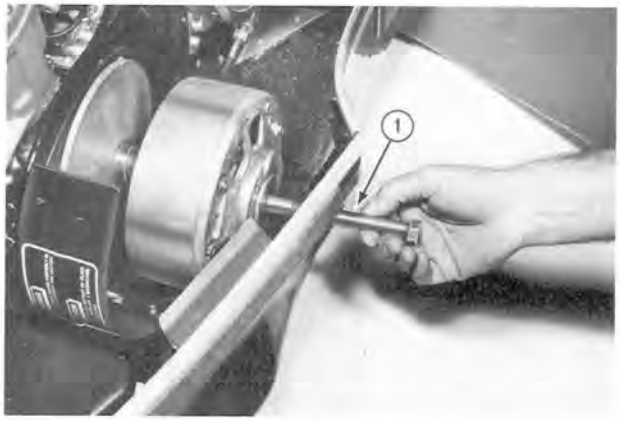
Engine Removal

1. Disconnect battery ground cable (electric start models only).
   - Remove cable from negative (-) battery terminal.
2. Drain cooling system.
   - Refer to Draining Coolant procedure.
3. Remove converter guard.
   - Pull retaining pins at each end to separate guard from chassis.



1. Converter Guard.
2. Retaining Pins.
3. Converter Mounting Bolt.

4. Remove drive converter mounting bolt.
   - Use strap wrench to hold converter.
5. Remove drive converter from engine.
   - Use special puller bolt.
   - Hold converter with strap wrench.



1. Special Puller Bolt.

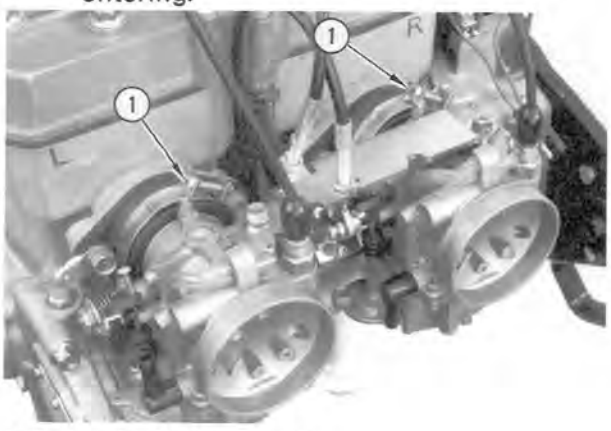
6. Unscew bolts from LH engine mount.

1. Engine Mount Bolts.

7. Remove air silencer from carburetors.
   - Refer to Silencer Removal procedure.

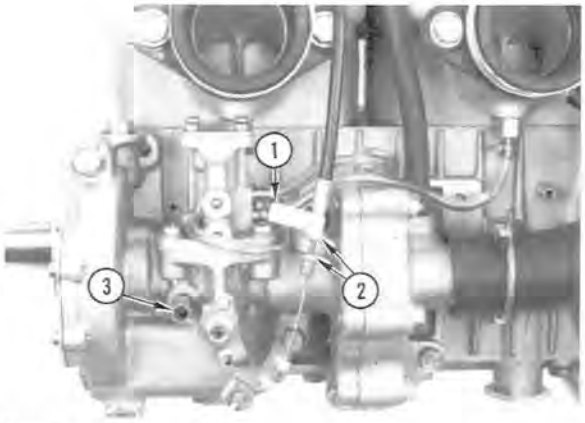
WARNING **Use care not to kink or damage carburetor control cables. Component failure or throttle malfunction could result, causing personai injury.**

8. Remove carburetors.
   - Loosen carburetor holder clamps.
   - Pull off carburetor assembly.
   - Cover carburetors to prevent dirt from entering.



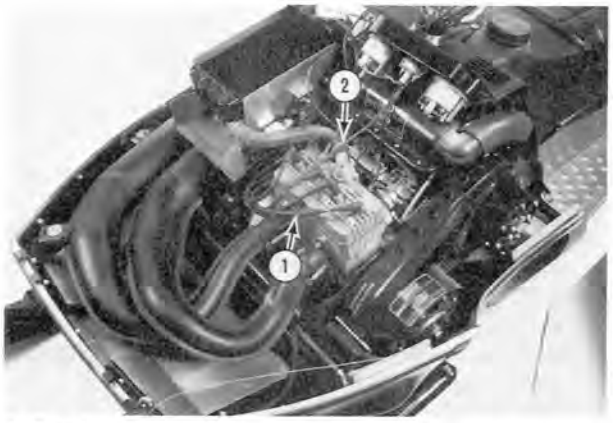
1. Carburetor Holder Clamps.

9. Disconnect oil pump control cable.
   - Unhook cable from oil pump control lever.
   - Mark location of upper cable adjusting nut with tape, as shown.
   - Loosen lower adjusting nut and remove cable from water pump housing.



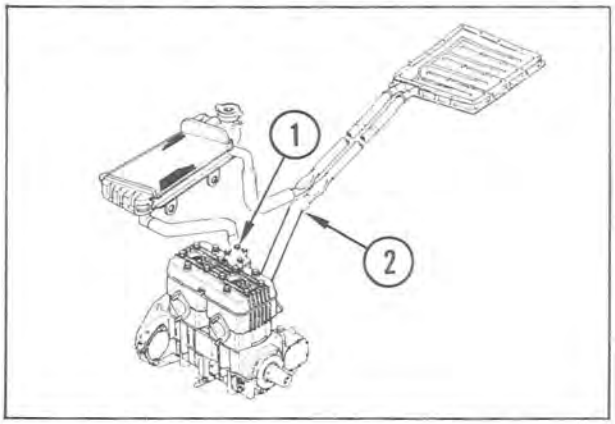
1. Tape.
2. Adjusting Nuts.
3. Oil Inlet Tube.

10. Temporarily store carburetor assembly under instrument panel.
    - Be careful to avoid kinking control cables.
11. Remove oil inlet tube from oil pump.
    - Plug inlet tube to prevent leakage.
12. Remove temperature gauge sending unit.
    - Cut cable tie band at coolant hose.
    - Do not kink sending unit tube, as it is easily damaged.



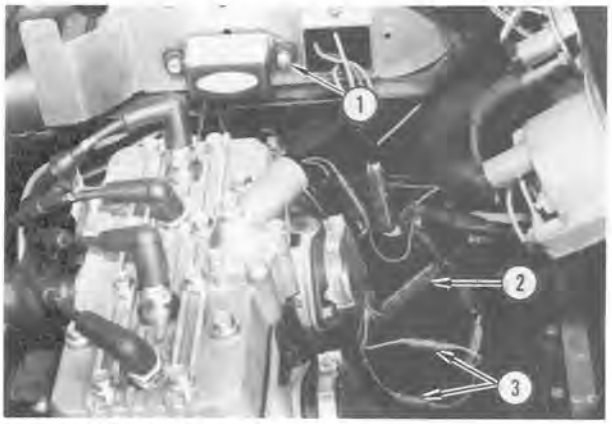
1. Sending Unit.
2. Cable Tie Band.

13. Unfasten hoses from radiator assembly.
    - Separate coolant hose from thermostat cover.
    - Separate coolant hose from heat exchanger pipe.



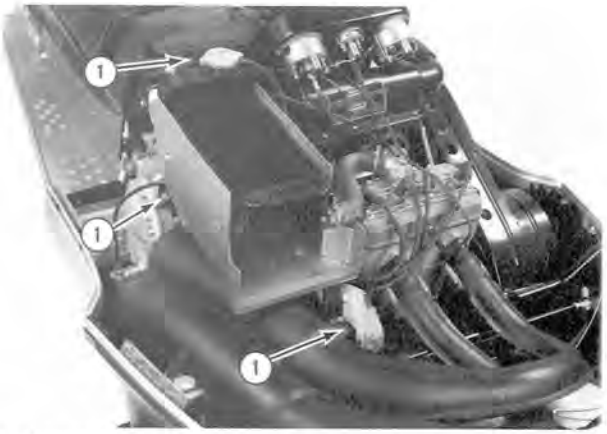
1. Thermostat Cover.
2. Heat Exchanger Pipes.

14. Disconnect electrical wiring.
    - Unfasten main wiring harness ground wire from radiator duct.
    - Unplug lighting coil connector from main harness.
    - Separate pulser and exciter coil connectors from C.D. igniter.



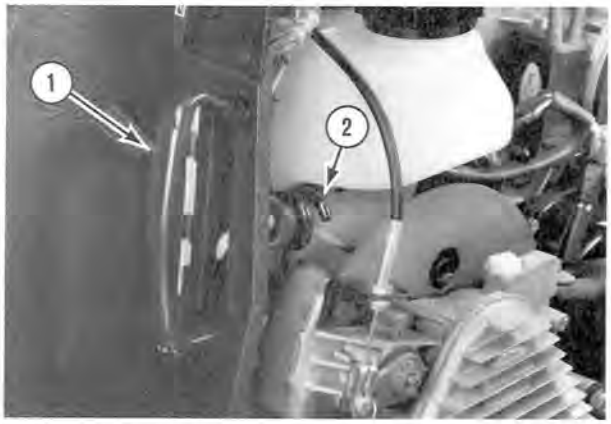
1. Main Harness Ground.
2. Lighting Coil Connector.
3. Pulser and Exciter Leads.

    - Remove battery ground cable from engine plate mounting bolt (electric start model only).
    - Unfasten solenoid switch assembly from radiator duct (electric start model only).
    - Remove solenoid to starter motor cable from terminal on starter motor (electric start model only).
    - Free solenoid to starter motor cable from "J" clamps beneath radiator duct brace (electric start model only).
15. Remove radiator and duct assembly from chassis.
    - Store radiator where it cannot be damaged.



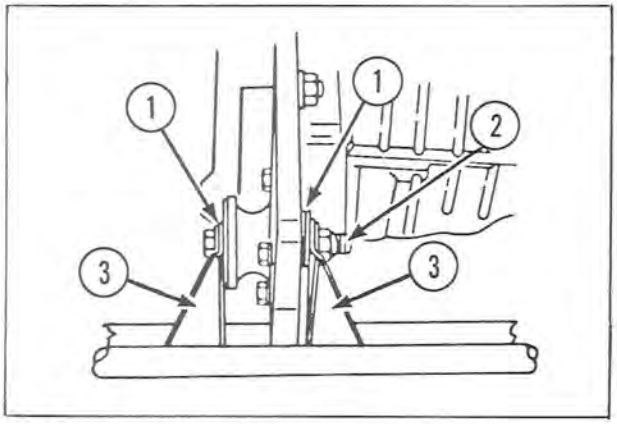
1. Mounting Bolts.

16. Disconnect heat exchanger to coolant pump hose.
    - Separate at heat exchanger pipe.
17. Guide starter handle through control console and coil guide.



1. Starter Handle.
2. Rope Coil Guide.

18. Remove mufflers.
    - Refer to Muffler Removal procedure.
19. Remove RH motor mount bolts.
    - Note location of shims for proper reassembly.



1. Shims (as required).
2. Mount Bolt.
3. Mounting Brackets.

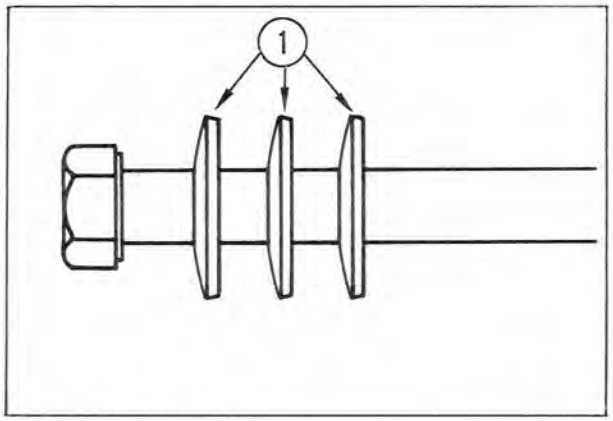
20. Disconnect fuel pump pulse tube.
    - Separate at crankcase fitting.

1. Pulse Tube Fitting.

21. Lift engine from chassis.

Engine Installation

1. Position engine in LH engine mount.
    - Apply Loctite (blue) to mounting bolts.
    - Torque bolts to 12 ft lb (1.7 kg-m)
2. Mount drive converter on crankshaft.
    - Clean tapers (inside converter and on crankshaft) of any oil or dust to insure proper seating.
    - Place conical washers on converter bolt as illustrated.



1. Conical Washers (3).

    - Torque converter bolt to 70 ft lb (10.0 kg-m).
3. Install bolts, shims, and forward radiator brace bracket to RH engine mount.
    - Place shims in original locations.
    - Tighten nuts.
    - Perform Converter Parallelism procedure.
4. Attach fuel pump pulse tube.
    - Connect to crankcase fitting.
5. Check coolant pump/gearcase lubricant level.
    - Refer to Coolant Pump/Gearcase Filling procedure.
6. Mount exhaust system.
    - Refer to Muffler Installation.
7. Position recoil starter handle.
    - Guide handle through coil guide and control console.

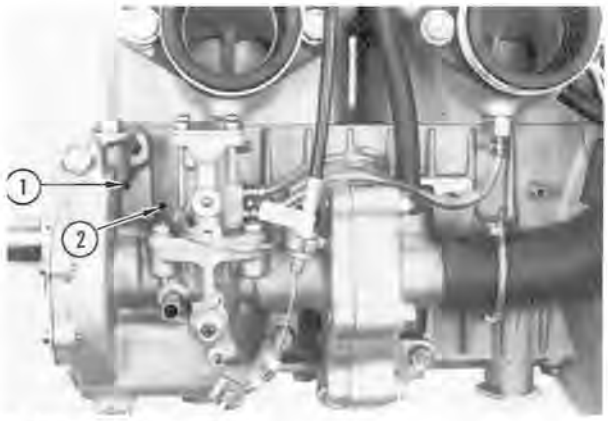
8. Attach water coolant pump hose to heat exchanger pipe.
   - Tighten hose clamps.
9. Install radiator and duct assembly in chassis.
10. Connect electrical wiring.
    - Position solenoid to starter motor cable in "J" clamps beneath radiator duct brace (electric start model only).
    - Attach solenoid to starter motor cable to terminal on starter motor (electric start model only).
    - Mount solenoid switch assembly on radiator duct (electric start model only).
    - Connect battery ground cable to engine plate mounting bolt (electric start model only).
    - Attach pulser and exciter coil connectors to C.D. igniter.
    - Plug lighting coil connector into main harness.
    - Fasten main wiring harness ground wire to radiator duct.
11. Connect radiator hoses.
    - Attach rear coolant hose to heat exchanger pipe.
    - Attach front coolant hose to thermostat cover.
12. Install water temperature sending unit.
    - Secure temperature gauge hose to coolant hose with cable tie band.
13. Pressure test cooling system.
    - Refer to Cooling System Pressure Test procedure.
14. Fill cooling system.
    - Refer to Filling Cooling System procedure.
15. Connect oil pump inlet tube.
16. Bleed oil injection system.
    - Refer to Oil Injection System Bleeding procedure.
17. Attach control cable to oil pump.
18. Position carburetors in holders.
    - Tighten carburetor holder clamps.
19. Synchronize carburetors and oil pump.
    - Perform Oil Pump Cable Adjustment procedure.
20. Install air silencer.
    - Refer to Silencer Installation procedure.
21. Synchronize carburetors.
    - Refer to Carburetor Synchronization procedure.
22. Install drive belt.
    - Refer to Drive Belt Installation procedure.
23. Mount converter guard.
    - Install retaining pins at each end of guard.
24. Connect battery ground cable.
    - Secure cable to negative (-) terminal on battery.

COOLANT PUMP/GEARCASE

Coolant Pump/Gearcase Lubricant

Components inside the gearcase drive the oil injection pump and coolant pump.

CAUTION **Inspect the vent holes for the gearcase, located near the oil fill plug. The holes must remain clear for proper operation of the seal between crankcase and gearcase, or gearcase damage will result.**



1. Gearcase Vent Hole.
2. Seal Vent Hole.

Engine gearcase oil should be drained after the first 100 miles of engine operation, and at the end of each season, to remove any impurities or foreign matter present in gearcase.

Coolant Pump/Gearcase Lubricant Draining

1. Raise rear of snowmobile several inches to completely drain gearcase.
2. Place container under drain plug.

1. Drain Plug.

3. Remove gearcase drain plug.
   - Located on lower front of crankcase, just below oil level sight gauge.

4. Prepare snowmobile for refilling gearcase.
   - Lower rear of snowmobile.
   - Install gearcase drain plug. Torque to 60 in. lb (0.7 kg-m).
   - Wipe oil from inside of lower pan.
   - Remove drain pan.

Coolant Pump/Gearcase Lubricant Filling

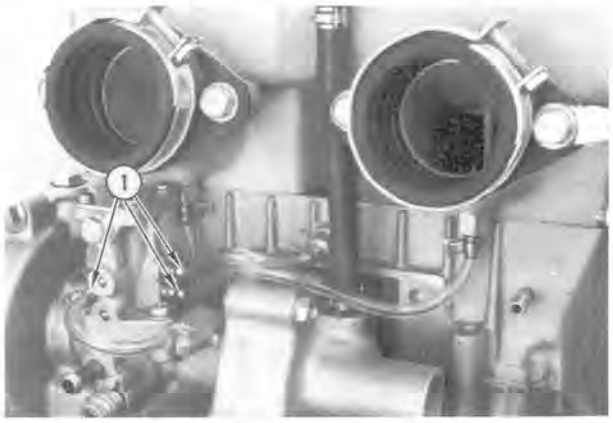
1. Remove fill plug.
   - Located on top of gearcase housing.

1. Fill Plug.
2. Sight Gauge.

2. Add oil to gearcase.
   - Use KAWASAKI ENGINE GEARCASE OIL, or a 10W-40 motor oil that meets or exceeds API service SE specifications, such as Shell FIRE AND ICE.
   - Capacity is 2.7 oz. (80 cc).
   - Oil level is correct when level appears between center and top of sight gauge.
3. Replace fill plug.
   - Torque to 96 in. lb (1.1 kg-m).

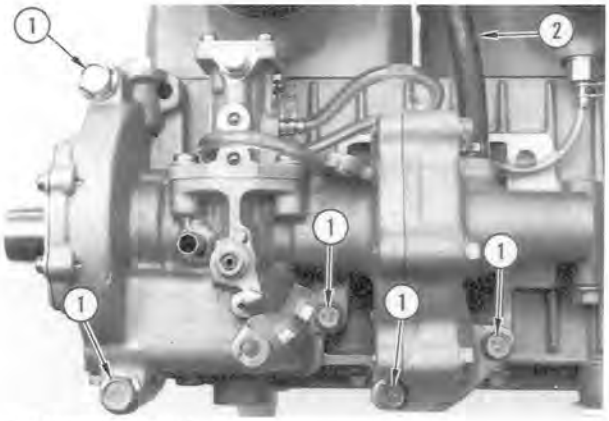
Coolant Pump/Gearcase Removal

1. Remove engine.
   - Refer to Engine Removal procedure.
2. Drain coolant pump/gearcase lubricant.
   - Refer to Coolant Pump/Gearcase Draining Lubricant procedure.
3. Disconnect oil injection tubes.
   - Release clamp tension and pull tubes from oil pump fittings.
   - Cover tubes to prevent contamination.



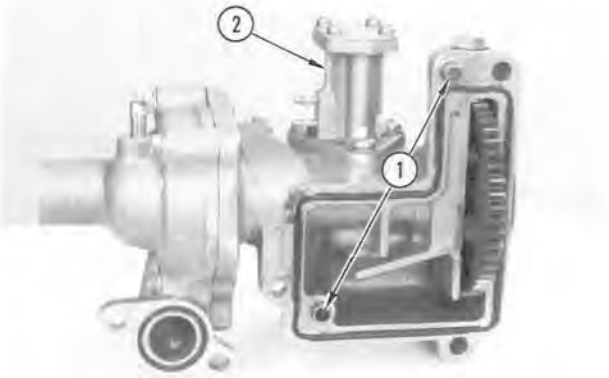
1. Oil Injection Tubes.

4. Remove coolant pump/gearcase.
   - Unscrew mount bolts.
   - Disconnect by-pass hose.



1. Mounting Bolts.
2. By-Pass Hose.

5. Pull coolant pump/gearcase assembly straight off of engine to avoid damage to alignment dowels.



1. Alignment Dowels.
2. Oil Pump.

6. Remove oil pump.
   - Store oil pump in a clean plastic bag to prevent contamination.

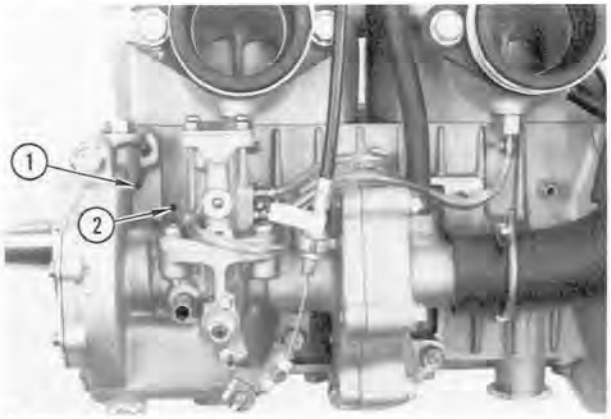
Coolant Pump/Gearcase Inspection

1. Look for signs of coolant leakage into oil pump cavity.
   - If water pump seal is leaking, replace pump assembly.
2. Check bearing condition.
   - Pump shaft should be free to rotate, with no looseness or roughness.
3. Inspect pump drive and driven gears.
   - Check gear teeth for chipping or abnormal wear.

Coolant Pump/Gearcase Installation

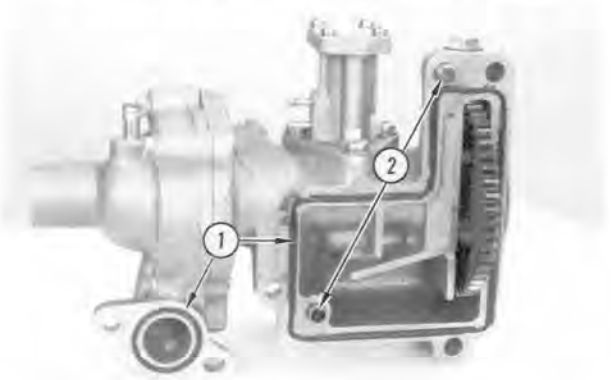
1. Install Oil Pump.
   - Refer to Oil Pump Installation procedure.

CAUTION **Failure to clean obstructions from vent holes may cause excessive oil consumption, resulting in extensive engine damage.**



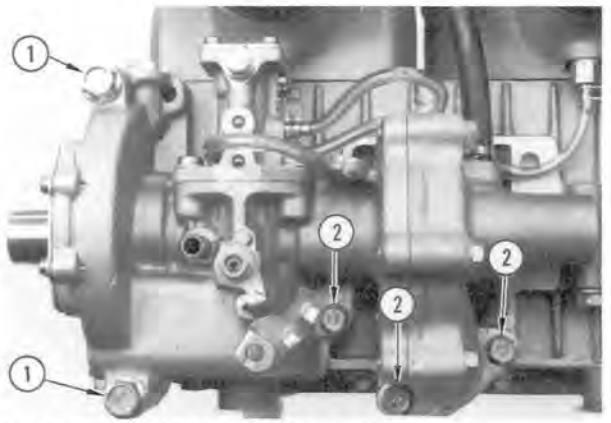
1. Gearcase Vent Hole.
2. Seal Vent Hole.

2. Mount coolant pump/gearcase assembly.
   - Position O-rings on coolant pump/gearcase assembly. Apply silicone sealer in housing grooves to hold O-rings in place during assembly.
   - Insert alignment dowels into gearcase.



1. O-Rings.
2. Alignment Dowels.

   - Be certain that gearcase vent hole is clear after coolant pump/gearcase installation.
   - Tighten mounting bolts.

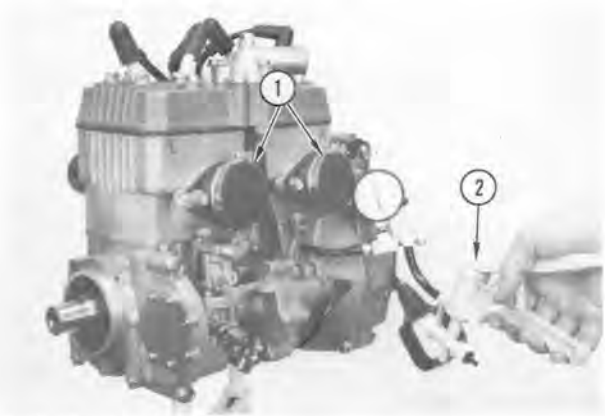


1. Torque to 144 in. lb (1.7 kg-m).
2. Torque to 60 in. lb (0.7 kg-m).

   - Install by-pass hose and secure it with clamp.
   - Install oil injection tubes and secure with clamps.
3. Add coolant pump/gearcase lubricant.
   - Refer to Coolant Pump/Gearcase Lubricant Filling procedure.
4. Install engine in chassis.
   - Refer to Engine Installation procedure.

CRANKCASE PRESSURE TEST

1. Seal intake and exhaust passages.
   - Position rubber gasket (cut from old inner tube) on cylinder in place of exhaust gasket. Refer to Muffler Removal procedure.
   - Place a 1-3/4 in. (44.5 mm) plug in each carburetor holder and secure by tightening clamp screws. Refer to Carburetor Removal procedure.



1. Carburetor Holders.
2. Pressure Tester.

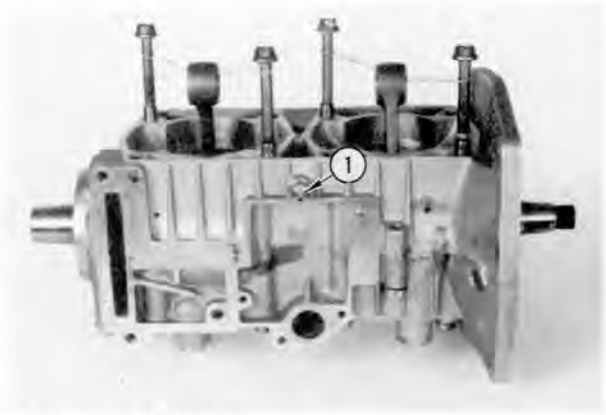
2. Connect pressure tester to fuel pump pulse tube nipple on crankcase.
3. Apply 7 to 10 psi (0.5 to 0.7 kg-cm^2) pressure to crankcase and observe gauge.
   - If pressure is maintained for two minutes, crankcase is okay.
   - Any pressure drop observed within two minutes indicates leakage, which must be eliminated.
4. If leakage is indicated, determine location of leak.
   - Spray soapy water mixture along all sealing surfaces and on gearcase vent hole.
5. Repair any leaks as required.
   - Always re-test crankcase sealing after performing repairs.
6. Connect intake and exhaust systems.
   - Install new exhaust flange gaskets. Torque flange nuts to 120 in. lb (1.4 kg-m).
   - Replace mufflers. Refer to Muffler Installation procedure.

- Remove carburetor holder plugs.
- Mount carburetors. Refer to Carburetor Installation procedure.

CRANKSHAFT

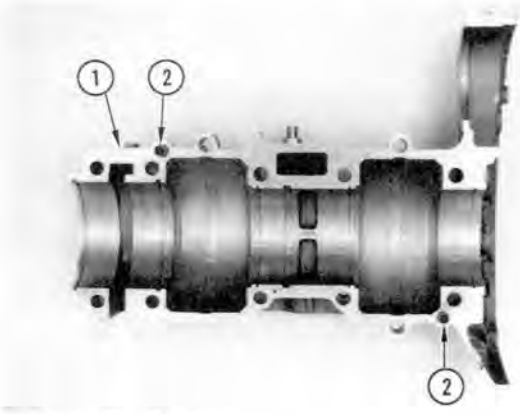
Crankshaft Removal

1. Remove engine.
   - Refer to Engine Removal procedure.
2. Remove stator assembly.
   - Refer to Stator Removal procedure.
3. Remove pistons.
   - Refer to Piston Removal procedure.
4. Remove coolant pump/gearcase.
   - Refer to Coolant Pump/Gearcase Removal procedure.
5. Remove electric starter (electric start model only).
6. Remove oil injection nozzle from crankcase.
   - Store nozzle and other oil injection components where they will not be contaminated.



1. Crankcase Nozzle.

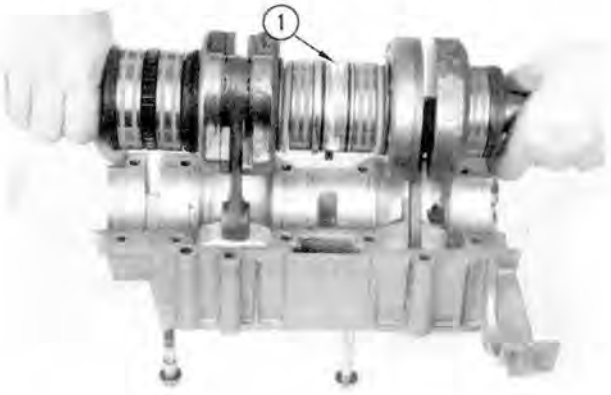
7. Unscrew crankcase bolts.
8. Split crankcase halves.
   - With engine inverted, lift lower crankcase half straight up and off from upper half.
   - Use a mallet or soft hammer to carefully separate crankcase halves. Do not lose the alignment dowel pins.



1. Lower Crankcase.
2. Alignment Dowels.

CAUTION **To avoid crankcase damage, lift crankshaft equally at each end during removal.**

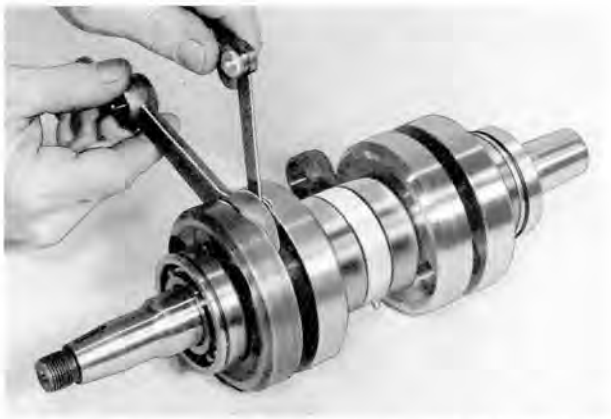
9. Lift crankshaft assembly from crankcase.
   - With engine inverted, pull crankshaft straight up and out of crankcase.



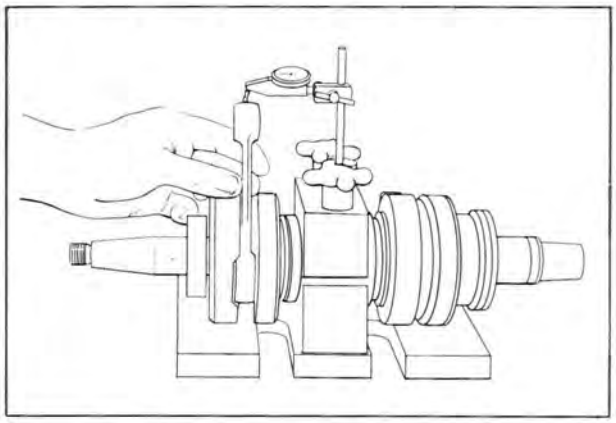
1. Crankshaft.

Crankshaft Inspection

1. Measure connecting rod side clearance.
   - Check side clearance with a feeler gauge as illustrated.



   - If side clearance on either rod is less than 0.016 in. (0.4 mm), or greater than 0.020 in. (0.5 mm), replace crankshaft assembly.
2. Check connecting rod radial clearance.
   - Set up crankshaft assembly and dial indicator as illustrated.

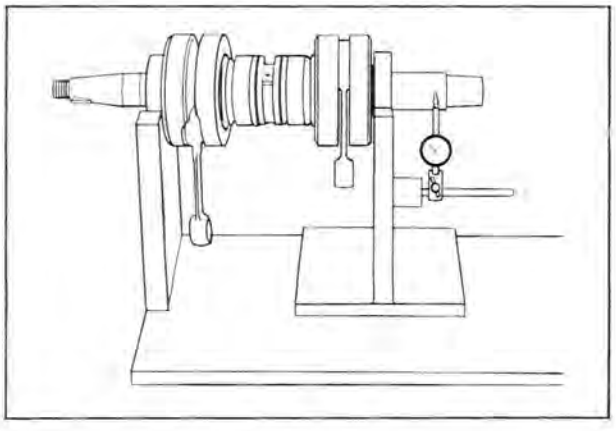


- With the connecting rod held vertically, move the rod up and down while noting the readings on the dial.
- The difference between the two readings is connecting rod radial clearance.
- If radial clearance on either rod is less than 0.0008 in. (0.02 mm), greater than 0.001 in. (0.03 mm), replace crankshaft assembly.

3. Inspect crankshaft main bearings.
   - If center bearings have any noticeable looseness or rough spots, replace crankshaft assembly.
   - If outer bearings have any looseness or rough spots, replace the bearings. Refer to Bearing Replacement procedure.
4. Check condition of labyrinth seal O-rings.
   - If O-rings show any signs of cracking or tearing, replace them.

1. O-Rings (3).
2. Drive Gear.

5. Examine coolant pump/gearcase drive gear for abnormal wear.
   - If drive gear requires replacement, refer to Bearing Replacement for procedure.
6. Check crankshaft alignment.
   - Set up crankshaft as illustrated with V-blocks and a dial indicator.
   - If runout exceeds 0.002 in. (0.05 mm), replace crankshaft assembly.



Crankshaft Bearing Replacement

NOTE: The center main bearings are not replaceable. If these bearings show any noticeable looseness or rough spots, the crankshaft assembly must be replaced.

BEARING REMOVAL

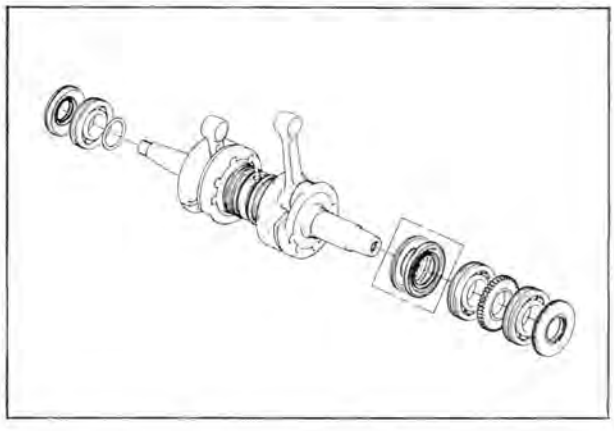
1. Pull off main bearing(s) as required.
   - Use a bearing puller of the type illustrated.

   - Coolant pump drive gear will come off with converter-side inner bearing.
   - Leave shim in place on crankshaft behind flywheel-side main bearing.

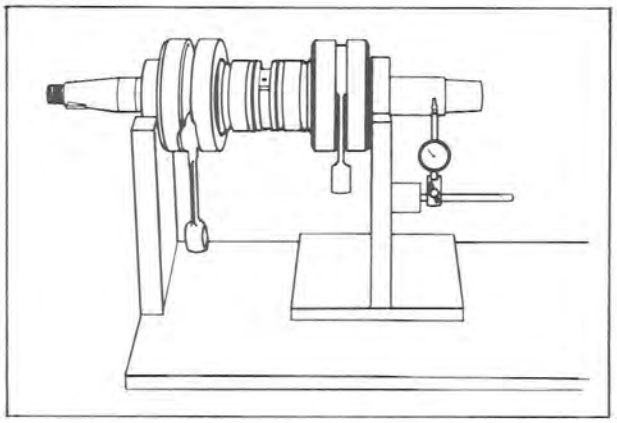
BEARING INSTALLATION

NOTE: If converter-side bearings have been removed, renew converter-side inner seal as a precautionary measure.

1. Install converter-side inner seal.
   - Pack area between seal lips with grease to prevent crankshaft damage.
2. Heat bearings (and gear, if removed) to ease installation.
   - Use a heat gun or place parts on a light bulb.
3. Slide parts onto crankshaft.



4. Check crankshaft alignment.
   - Set up crankshaft as illustrated with V-blocks and a dial indicator.

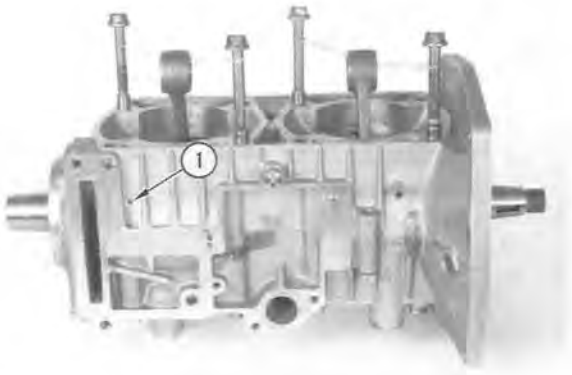


   - If runout exceeds 0.002 in. (0.05 mm) replace crankshaft assembly.

Crankshaft Installation

CAUTION **Failure to clean obstructions from seal vent hole may cause excessive oil consumption, resulting in extensive engine damage.**

1. Check crankcase seal vent hole.
   - Be sure hole is clear of any obstructions.

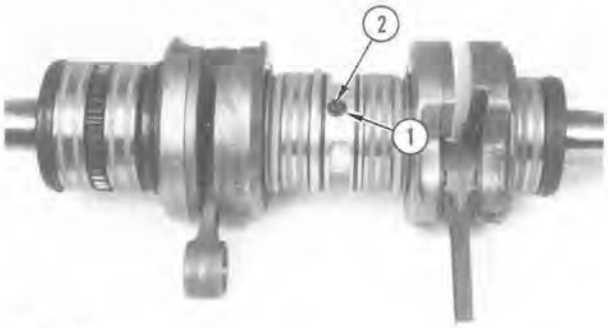


1. Seal Vent Hole.

CAUTION **Failure to lubricate the crankshaft outer seals will result in damage to the crankshaft. Without lubrication, the seal outer lip will run dry, grooving the crankshaft and causing leakage.**

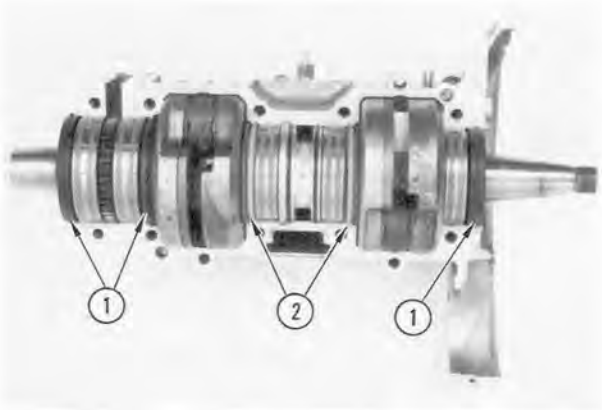
2. Lubricate crankshaft outer seals.
   - Pack area between seal lips with grease.

3. Place crankshaft assembly into upper crankcase half.
   - Apply a liberal amount of Kawasaki Snowmobile Oil to all bearings on crankshaft assembly.
   - Install new O-ring in labyrinth seal at dowel pin.



1. O-Ring.
2. Dowel Pin.

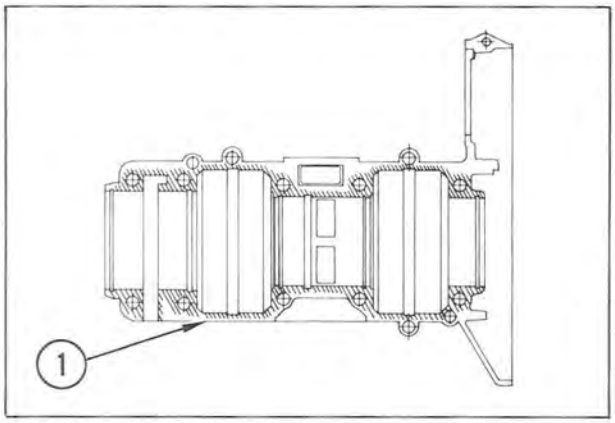
   - Be certain that alignment pin in labyrinth seal is properly located in upper crankcase half.
   - Check to see that outer lips of oil seals and oil slingers are properly seated in crankcase grooves.



1. Oil Seal Lips.
2. Oil Slingers.

NOTE: When using Kawasaki Liquid Gasket Sealer, parts should be assembled and torqued three to five minutes after application of sealant to insure proper adhesion.

4. Apply thin, continuous film of Kawasaki Liquid Gasket Sealer to crankcase area specified in illustration.



1. Sealer.

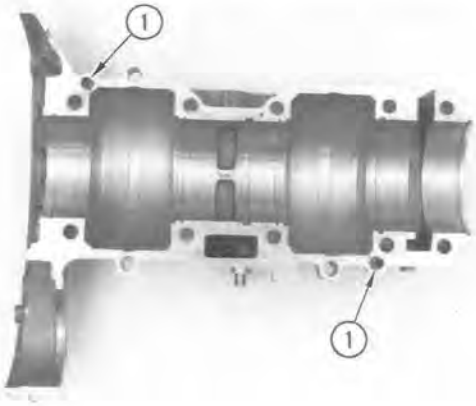
5. Position gasket in coolant passage recess of upper crankcase half.
   - Notice the different ridge patterns on either side of gasket.

CORRECT

INCORRECT

- Be certain ridge pattern matches coolant passage in each crankcase half.

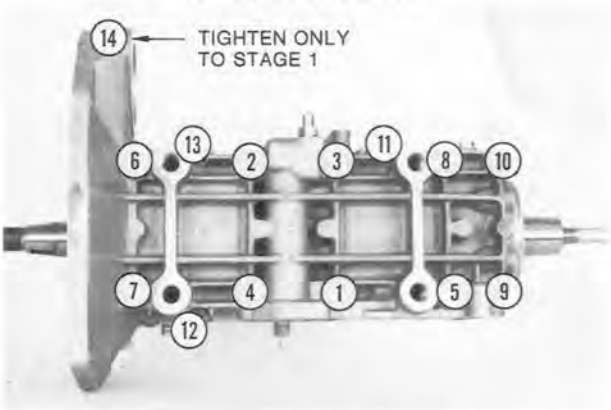
6. Install lower crankcase half.
   - Position case halves on alignment dowels.



1. Alignment Dowels.

7. Torque crankcase bolts in sequence, in three stages.
   - Stage 1: 6 ft lb (.82 kg-m).
   - Stage 2: 11 ft lb (1.5 kg-m).
   - Stage 3: 16 ft lb (2.2 kg-m).

TORQUE SEQUENCE



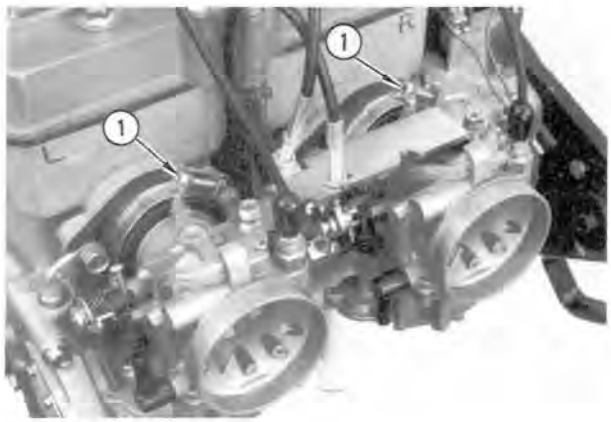
8. Replace crankcase oil injection nozzle and gasket.
   - Torque to 52 in. lb (0.6 kg-m).
9. Install pistons.
   - Refer to Piston Installation procedure.
10. Mount coolant pump/gearcase assembly.
    - Refer to Coolant Pump/Gearcase Installation procedure.

11. Replace electric starter (electric start model only).
12. Install stator and flywheel.
    - Refer to Stator Assembly Installation procedure.
13. Install engine assembly.
    - Refer to Engine Installation procedure.

CYLINDER

Cylinder Removal

1. Remove cylinder head.
    - Refer to Cylinder Head Removal procedure.
2. Remove muffler assemblies.
    - Refer to Muffler Removal procedure.
3. Remove air silencer.
    - Refer to Silencer Removal procedure.
4. Disconnect carburetor assembly from holders.
    - Loosen carburetor holder clamps.
    - Pull off carburetor assembly.



1. Holder Clamps.

WARNING **Use care not to kink or damage control cables. Component failure or throttle malfunction could result, causing personal injury.**

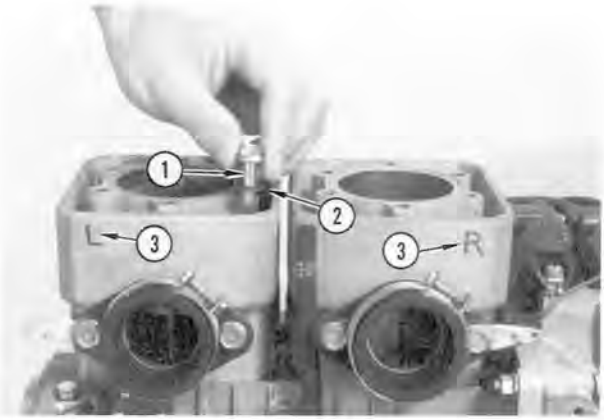
- Temporarily store carburetor assembly under the instrument panel, being careful not to kink the control cables.
- Cover carburetors to prevent dirt from entering.

5. Disconnect oil injection tubes from cylinder nozzles.
    - Loosen tube clamps.
    - Pull tubes from cylinder nozzles.
    - Cover the tubes to prevent dirt from entering the system.

1. Oil Injection Tubes.

CAUTION **When working with "wearing" parts, be sure to rematch original components for reassembly. These parts "break in" with each other and may not function properly with other used parts.**

6. Mark cylinders for proper reinstallation.
    - With a scribe, mark right cylinder "R" and left cylinder "L".
7. Remove the cylinders.
    - Take out cylinder bolts and washers found in cylinder water jackets.



1. Cylinder Bolt.
2. Seal Washer.
3. Identification Mark.

- Gently tap around bottom of each cylinder with a mallet to ease removal of cylinders.
- Before lifting cylinders completely from pistons, place a rag around each connecting rod in the crankcase opening to prevent dirt, snap rings, etc. from entering crankcase.

1. Rag.
2. Base Gasket.
3. Oil Injection Nozzle.
4. Nozzle Gasket.

- Lift off cylinders.
- Remove base gaskets.

8. Remove oil injection nozzle and gasket from each cylinder.
   - Store nozzles and gaskets in a container to prevent contamination or damage.

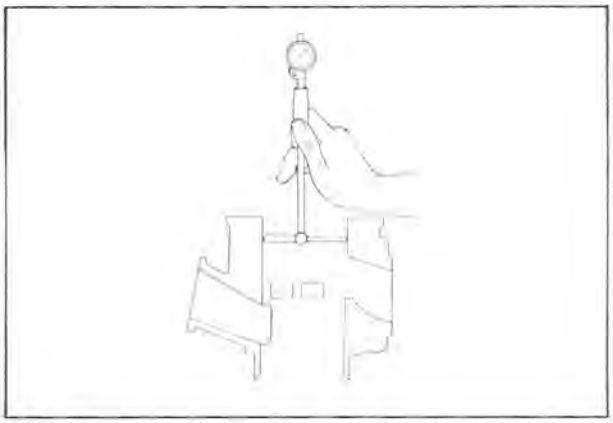
Cylinder Inspection

NOTE: Before performing any inspection, all parts must be thoroughly cleaned. Remove all dirt, grease, carbon, gaskets, etc. to allow for accurate measurement and/or visual inspection.

1. Check all coolant passages and remove any obstructions.
2. Carefully clean all carbon deposits from exhaust ports and cylinder walls.
   - Use care not to damage cylinder wall surface.
3. Check the cylinder walls for scoring.
   - If scoring can be felt with your fingernail, replace cylinder.

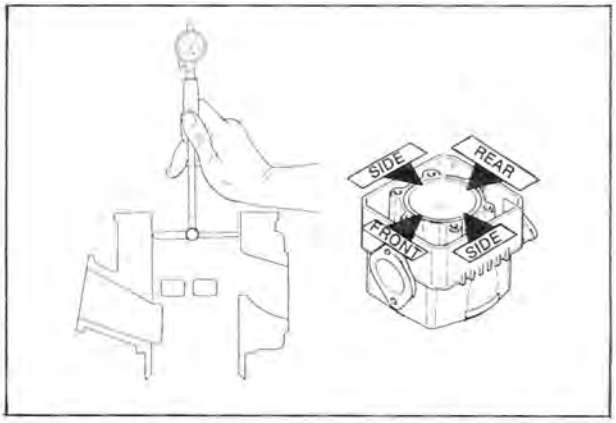
NOTE: Cylinders in this engine are aluminum with chrome plated bores. They should not be honed or rebored.

4. Check cylinder bore for wear with a bore gauge.
   - If the largest measured diameter of cylinder bore exceeds dimension shown under "Service Limit," replace cylinder.

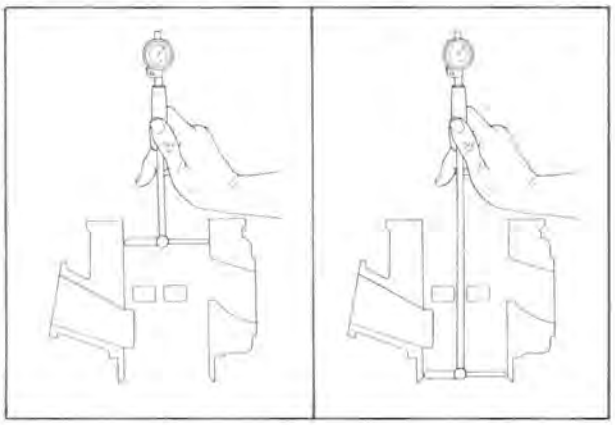


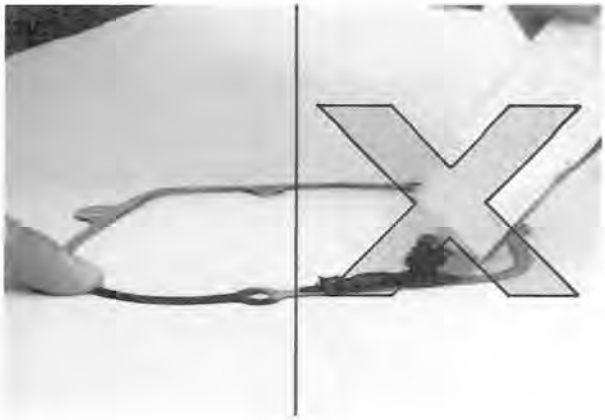
CYLINDER BORE DIAMETER TOLERANCES	
STANDARD (NEW)	SERVICE LIMIT (USED)
2.6774 - 2.6781 in. (68.005 - 68.023 mm)	2.681 in. (68.10 mm)

- To check cylinder bore out-of-round, the bore diameter is measured in the front-to-rear direction, and then in the side-to-side direction. The difference between the two measurements must not exceed 0.002 in. (0.05 mm)



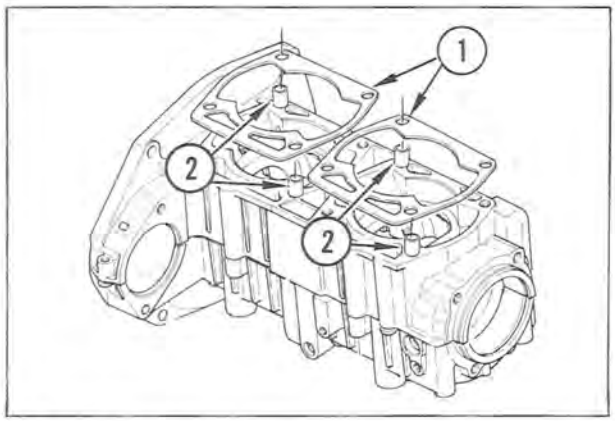
- To check cylinder bore taper, bore diameter is measured in the front-to-rear direction at top of piston ring travel area, and then at the bottom (un-worn) area of the bore. The difference between the two measurements must not exceed 0.002 in. (0.05 mm).





Cylinder Installation

1. Test oil injection nozzle check valve.
   - Refer to Check Valve Test procedure.
2. Install oil injection nozzle and gasket in each cylinder.
   - Torque to 52 in. lb (0.6 kg-m).
3. Lubricate cylinder bores, pistons, piston rings, and connecting rod big-end bearings with Kawasaki Snowmobile Oil.
4. Position new cylinder base gaskets over alignment pins on crankcase.

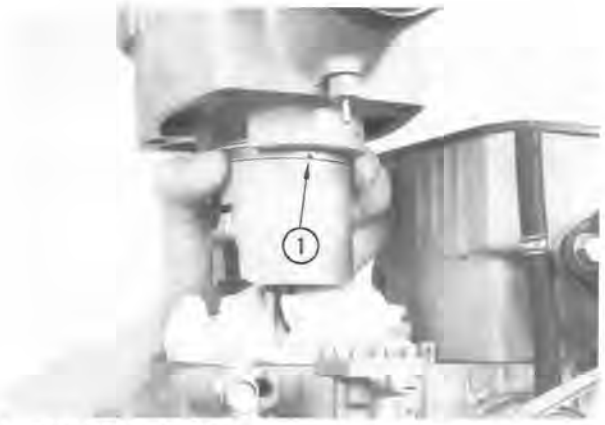


1. Base Gasket.
2. Alignment Pins.

CAUTION **Always replace both cylinder base gaskets, never just one. If the gaskets are not made from the same material batch, they may be of different thickness, resulting in uneven cylinder height and possible head gasket leakage.**

- Apply a thin, even film of silicone sealer to both sides of gasket to prevent leakage. DO NOT apply excessive sealant.

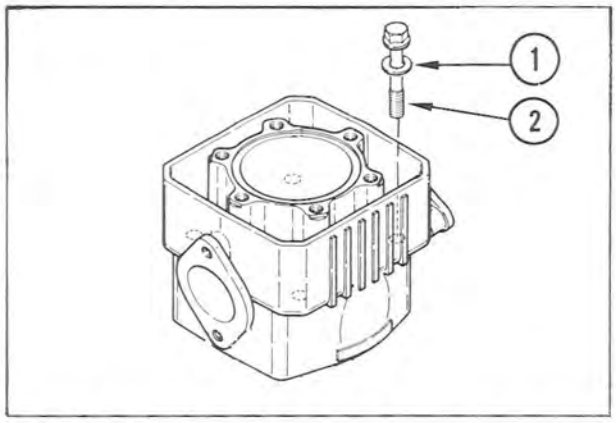
5. Install cylinders.
   - Be sure intake ports are facing coolant pump side (rear) of crankcase.
   - Position ring end-gaps over locating pins in ring grooves.
   - Compress rings with fingers while carefully sliding cylinders downward.



1. Piston Ring End Gap.

NOTE: Check for possible ring damage after cylinder in installed. Push on ring with your thumb, through the exhaust port. If ring springs back when released, it is okay. If ring does not spring back, remove cylinder to determine problem.

6. Make certain cylinders are completely seated on alignment pins in crankcase.
7. Install cylinder bolts with new seal washers through cylinder water jackets. Do not tighten bolts at this time.
   - Prior to inserting bolt, apply silicone sealer to threads after seal washer is installed to prevent possible corrosion.



1. Seal Washer.
2. Apply Sealer Here.

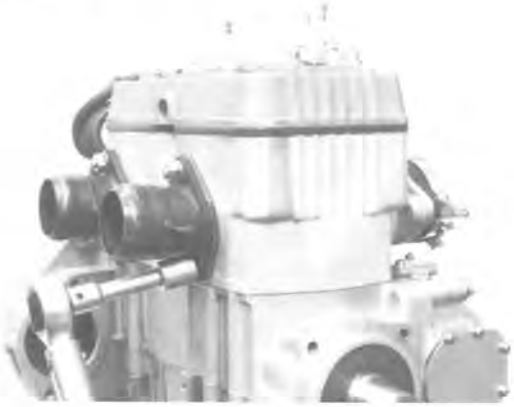
8. Align cylinders.
   - Place a straight-edge across both exhaust flange mounting surfaces to assure cylinder alignment.

1. Straight Edge.

9. Torque cylinder bolts.
   - Tighten cylinder bolts in a crisscross pattern.
   - Torque bolts to 16 ft lb (2.2 kg-m).

10. Re-check cylinder alignment.
11. Install cylinder head.
    - Refer to Cylinder Head Installation procedure.

12. Mount exhaust manifold flanges.
    - Use new gaskets.
    - Install flanges as shown.

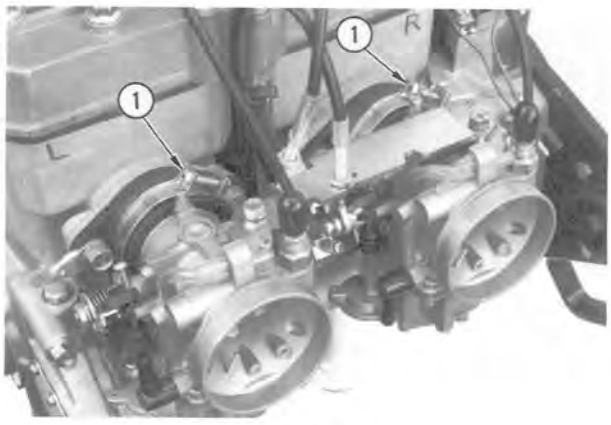


   - Torque nuts to 120 in. lb (1.4 kg-m).

13. Connect oil injection tubes to cylinder nozzles.
    - Secure with tube clamps.

1. Tube.
2. Clamp.

14. Pressure check crankcase.
    - Refer to Crankcase Pressure Test procedure.
15. Remove air from oil injection system.
    - Refer to Oil Injection System Bleeding procedure.
16. Mount carburetor assembly.
    - Tighten carburetor holder clamps.



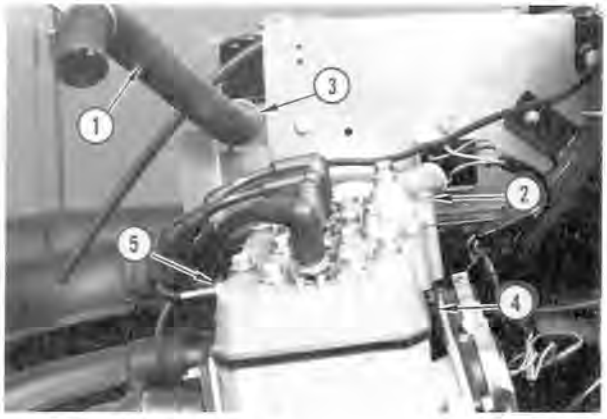
1. Carburetor Holder Clamps.

17. Replace air silencer.
    - Refer to Silencer Installation procedure.
18. Install muffler assemblies.
    - Refer to Muffler Installation procedure.

CYLINDER HEAD

Cylinder Head Removal

1. Drain coolant from system.
    - Refer to Coolant Draining procedure.
2. Separate coolant hose from thermostat cover.
    - Cut cable tie securing temperature gauge tube to coolant hose.
    - Position end of hose up, and out of the way, by twisting hose at radiator fitting end.

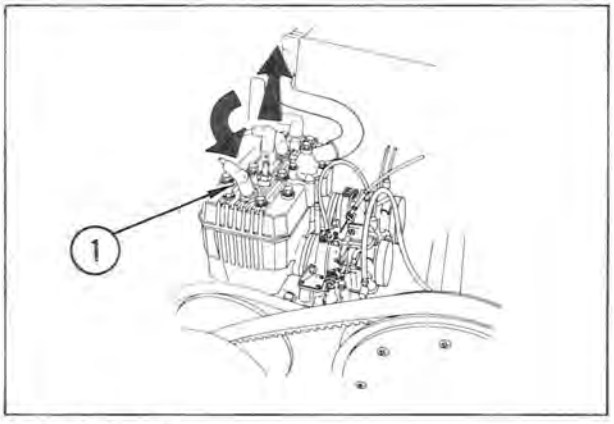


1. Coolant Hose.
2. Thermostat Cover.
3. Radiator Fitting.
4. By-Pass Hose.
5. Sending Unit.

3. Disconnect coolant by-pass hose from cylinder head.

CAUTION **Do not remove the spark plug caps by pulling on lead wire, as this will damage the connector.**

4. Carefully remove spark plug caps.
    - Twist cap back and forth while pulling straight upward to remove.

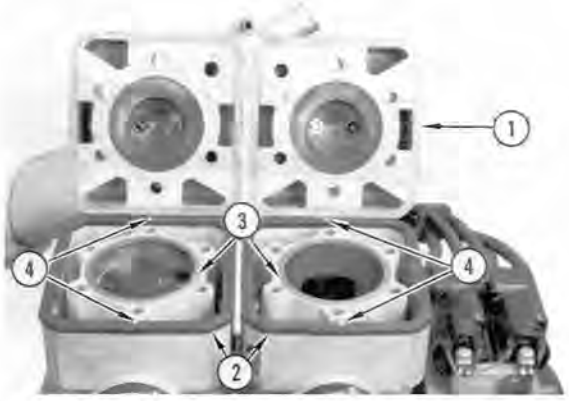


1. Spark Plug Cap.

5. Remove temperature gauge sending unit from cylinder head.
    - Do not kink sending unit tube, as it is easily damaged.
6. Remove head bolts and washers.

CAUTION **When handling the cylinder head and cylinders, be very careful not to damage the gasket sealing surfaces, or leakage will occur.**

7. Lift off cylinder head and gaskets.



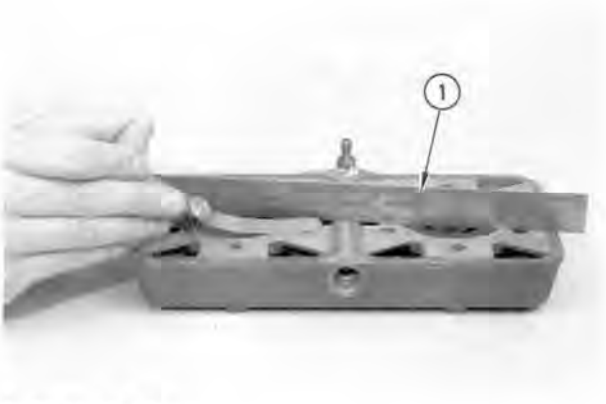
1. Cylinder Head.
2. Rubber Gasket.
3. Copper Ring.
4. "O" Marks.

Cylinder Head Inspection

NOTE: Before performing any inspection, all parts must be thoroughly cleaned. Remove all dirt, grease, carbon, gaskets, etc. to allow for accurate measurement and/or visual inspection.

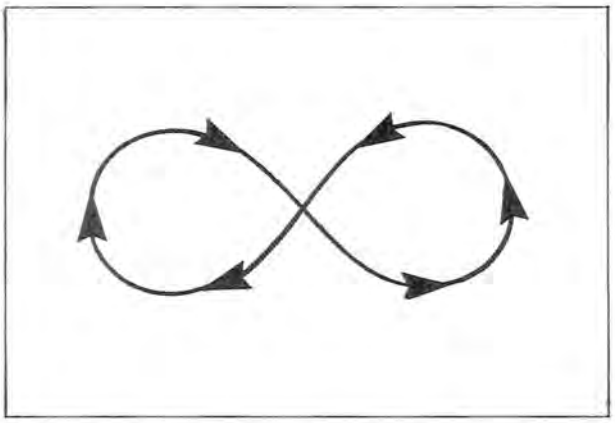
WARNING **Use only a "high flash point" solvent for cleaning. This is a "safety" solvent (such as Stoddard Solvent, a generic name) which is somewhat less flammable than many other cleaning solutions. Never use gasoline for cleaning. Gasoline is highly flammable, poisonous to the skin, and may present an explosion hazard.**

1. During every engine teardown, remove all carbon from cylinder head.
2. Check all coolant passages in cylinder head and remove any obstructions.
3. Check cylinder head gasket surfaces for flatness.
    - Use a straight-edge and a 0.002 in. (0.05 mm) feeler gauge. The feeler gauge must not fit between straight-edge and head gasket surface.



1. Straight-Edge.

- If the head is warped, it can be corrected by placing a sheet of No. 400 sandpaper on a flat surface and sliding the head back and forth in a figure-8 motion on the sandpaper until the entire surface is polished. Dull spots (unsanded areas) indicate low areas or warpage. Do not be concerned with areas of head surface which do not contact a gasket.



Cylinder Head Installation

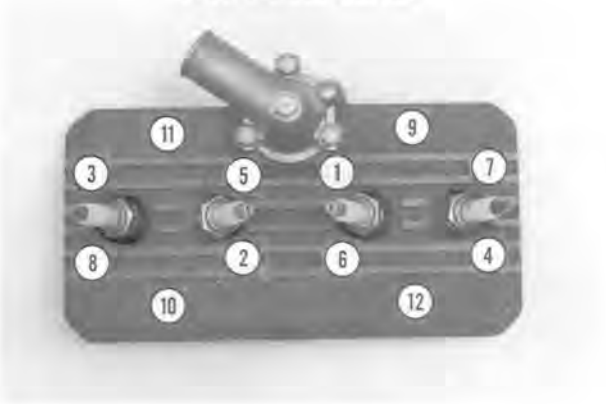
NOTE: Do not re-use copper head gaskets or combustion leakage may occur. Rubber head gaskets may be re-used if there is no sign of cracking or checking.

1. Carefully install head gaskets.
   - Use no sealant.
   - "O" marks on rubber gaskets must be positioned front and rear.

2. Place cylinder head on cylinders.
   - Be sure thermostat cover is toward intake side (rear).
3. Insert head bolts and special washers.

NOTE: Head bolts must be tightened in proper sequence, in three steps, or leakage may occur.

TORQUE SEQUENCE



   - Tighten head bolts to 11 ft lb (1.5 kg-m).
   - Tighten head bolts to 19 ft lb (2.6 kg-m).
   - In sequence, retorque bolts number 1, 2, 5, and 6 to 19 ft lb (2.6 kg-m).
4. Connect plug caps to spark plugs.
5. Secure coolant by-pass hose onto fitting in cylinder head.
   - Position hose clamp.
6. Connect coolant hose to thermostat cover.
   - Twist hose down, into position.
   - Position hose clamps.
7. Replace temperature gauge sending unit.
8. Secure temperature gauge tube.
   - Fasten tube to upper radiator hose with cable tie band.
9. Pressure check cooling system.
   - Refer to Cooling System Pressure Test procedure.
10. Refill cooling system.
    - Refer to Cooling System Filling procedure.

PISTON

Piston Removal

1. Remove cylinder.
   - Refer to Cylinder Removal procedure.

CAUTION **When working with "wearing" parts, be sure to rematch original components for reassembly. These parts "break-in" with each other and may not function properly with other used parts .**

2. Mark pistons for proper reinstallation.
   - With a scribe, mark right piston dome "R", and left piston dome "L".

3. Remove piston pin from piston.
   - Use scribe or small screwdriver to remove piston pin circlip.

NOTE: If a burr was formed during circlip removal, it will be necessary to carefully remove burr with a de-burring tool. A special piston pin puller may be needed.

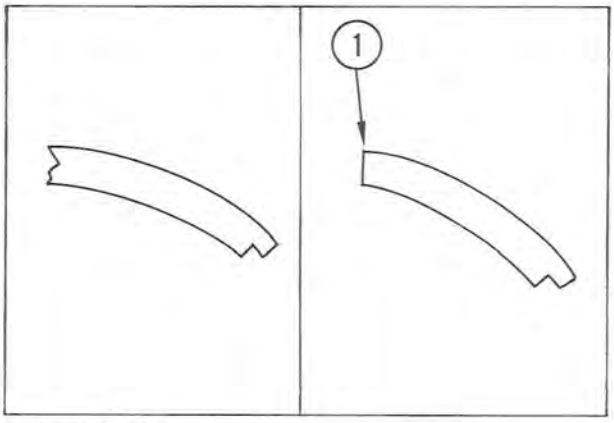
4. Lift piston from connecting rod.
5. Slide needle bearing from connecting rod.

6. Remove piston rings.
   - Carefully spread rings open and lift off of piston.

Piston Inspection

NOTE: Before performing any inspection, all parts must be thoroughly cleaned. Remove all dirt, grease, carbon, gaskets, etc. to allow for accurate measurement and/or visual inspection.

1. Remove all carbon from piston dome and ring groove.
   - Clean piston dome with carbon scraper and No. 400 sandpaper.
   - Clean ring grooves with a broken ring (smooth broken end on a grinder).



1. Smooth Edge.

2. Visually inspect piston.
   - If piston scoring can be felt with your fingernail, or piston is cracked, replace piston.

3. Measure piston.
   - Measure piston diameter at 0.4 in. (10 mm) above bottom of piston skirt.

   - If piston skirt is not within service limits, replace piston.

PISTON SKIRT DIAMETER TOLERANCES	
STANDARD (NEW)	SERVICE LIMIT (USED)
67.931-67.950 mm (2.6744-2.6752 in.)	67.820 mm (2.6701 in.)

4. Calculate piston-to-cylinder wall clearance.
   - Find smallest inside diameter of cylinder bore.
   - Measure piston diameter at 0.4 in. (10 mm) above bottom of piston skirt.
   - If difference between the measurements is less than 0.002 in. (0.05 mm) or more than 0.004 in. (0.10 mm), replace piston.
   - Example:

2.678	Smallest cylinder bore diameter
-2.674	Piston skirt diameter
0.004	Clearance

5. Check piston pin bore.
   - Measure diameter of pin bore in up-and-down direction.

   - If measurement exceeds service limit, replace piston.

PISTON PIN BORE DIAMETER TOLERANCES	
STANDARD (NEW)	SERVICE LIMIT (USED)
11.97-12.20 mm (0.4713-0.4803 in.)	12.273 mm (0.4832 in.)

6. Inspect piston pin.
   - Measure pin diameter at center and near each end.

   - If any measurement is less than service limit, replace pin.

PISTON PIN-DIAMETER TOLERANCES	
STANDARD (NEW)	SERVICE LIMIT (USED)
17.995-18 .000 mm (0.7085-0.7087 in.)	17.593 mm (0.7068 in.)

7. Measure connecting rod small end bore.
   - Measure diameter of small end bore in up-and-down direction.

- If diameter exceeds service limit, replace the crankshaft and connecting rod assembly.

CONNECTING ROD SMALL END BORE DIAMETER TOLLERANCES	
STANDARD (NEW)	SERVICE LIMIT (USED)
23.003-23.014 mm (0.9056-0.9061 in.)	23.040 mm (0.9071 in.)

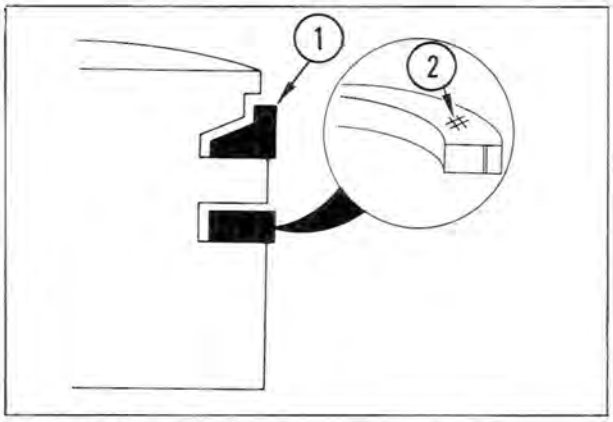
8. Inspect needle bearing.
   - If needles show any pitting, replace needle bearing.
9. Check piston ring end-gap.
   - Place piston ring in cylinder horizontally.
   - Use a piston to "square" the ring in the cylinder.
   - Insert a feeler gauge in opening between ends of piston ring.

- Measure ring end-gap at bottom and top of cylinder.
- If either measurement exceeds service limits, replace ring set.

PISTON RING END GAP TOLERANCES	
STANDARD (NEW)	SERVICE LIMIT (USED)
0.2-0.4 mm (0.008-0.016 in.)	0.7 mm (0.028 in.)

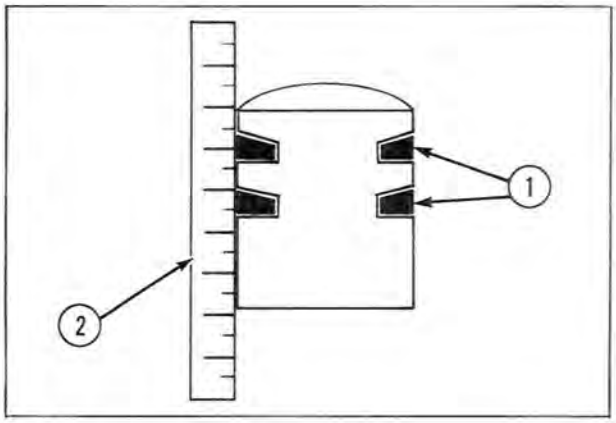
Piston Installation

1. Install rings onto piston.
   - Flat ring in lower groove with identification markings toward top of piston.



1. Upper Ring.
2. Lower Ring.

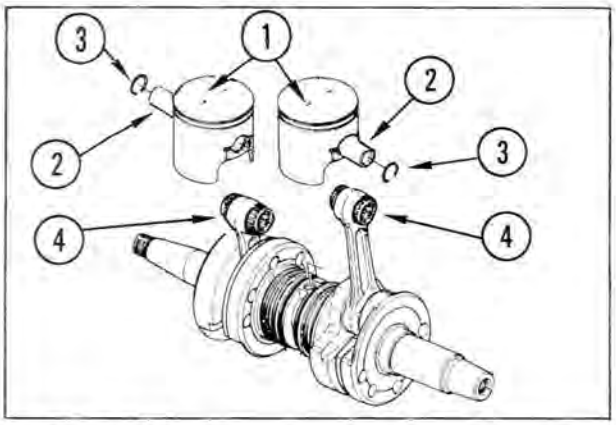
   - "L" shaped ring in upper groove with leg of the "L" toward top of piston.
2. Check ring fit on piston.
   - Verify that ring type installed matches groove shape in piston.
     * Install rings on piston with end gaps positioned over the ring alignment pins.
     * Hold straight edge on side of piston as shown.



1. Rings.
2. Straight-Edge.

     * Insure that rings do not extend out beyond outer diameter of piston or component failure could occur.
   - Compress each ring with your fingers and check to see that ring ends can touch each other, over alignment pin, completely eliminating end gap.
3. Insert needle bearing in connecting rod.
   - Lubricate bearing with Kawasaki Snowmobile Oil.
4. Attach piston and ring assemblies to connecting rods.

NOTE: Install piston so that letter "E" and arrow are toward the exhaust side (front) of engine.

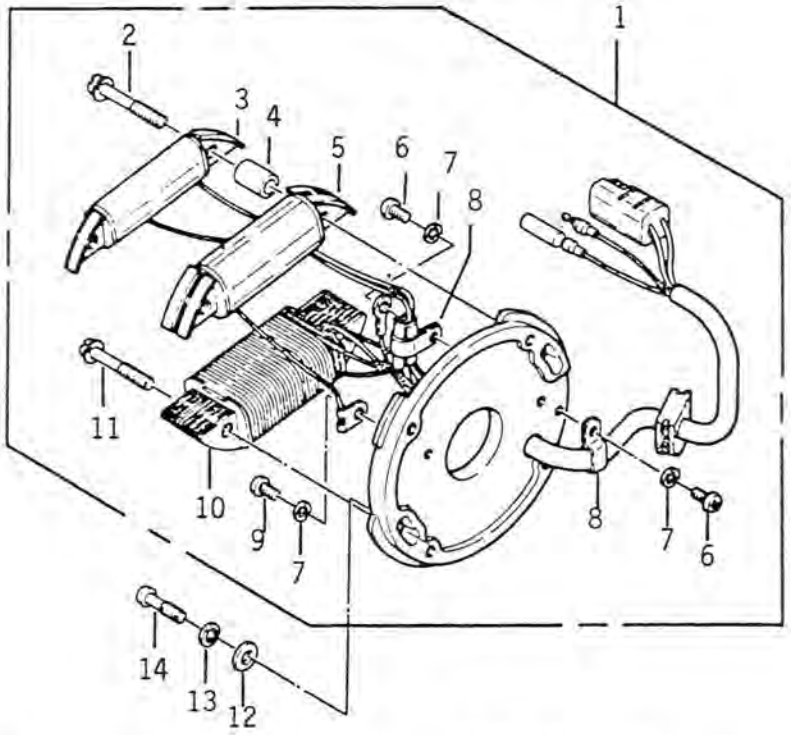


1. Piston Marks.
2. Piston Pin.
3. Circlip Gap Down.
4. Piston Pin Bearing.

- Insert piston pins.
- Install new piston pin circlips in the recommended position.

5. Install cylinders.
   - Refer to Cylinder Installation procedure.

STATOR



1 STATOR ASSY
2 SCREW, panhead, 5 x 36mm
3 COIL, pulsing
4 COLLAR, coil spacer
5 COIL, exciting
6 SCREW, pan head, 4 x 8mm
7 WASHER, spring, 4mm
8 CLAMP
9 SCREW, pan head, 4 x 6mm
10 COIL, lighting
11 SCREW, pan head, 5 x 34mm
12 WASHER, plain, 5mm
13 WASHER, spring, 5mm
14 SCREW, pan head, 5 x 20mm

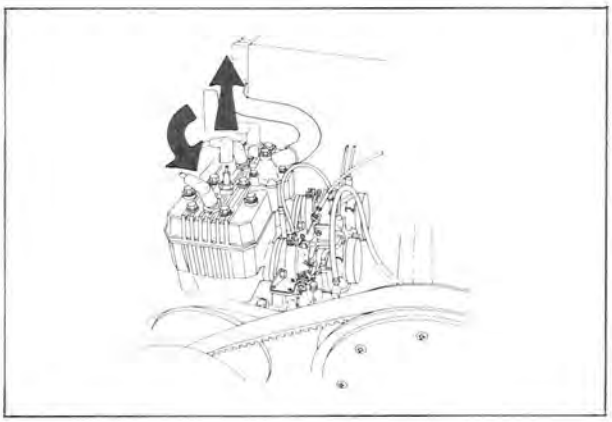
STATOR ASSEMBLY

Stator Removal

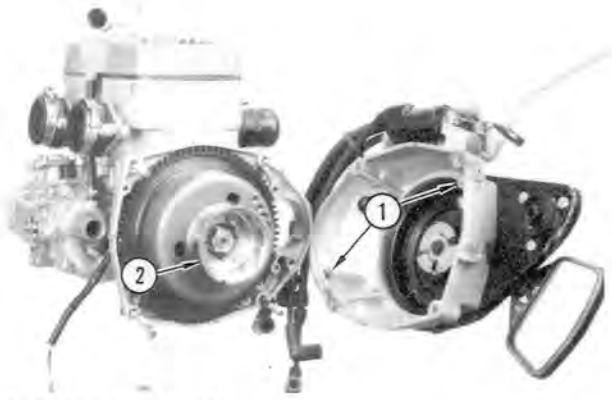
1. Remove engine.
   - Refer to Engine Removal procedure.

CAUTION **Do not remove the spark plug caps by pulling on lead wire, as this will damage the connector.**

2. Carefully remove spark plug caps.
   - Twist cap back and forth while pulling straight off of spark plug.



3. Pull off magneto cover.
   - Remove mounting bolts.
   - Separate magneto cover from crankcase.
   - Do not lose cover alignment dowel pins.

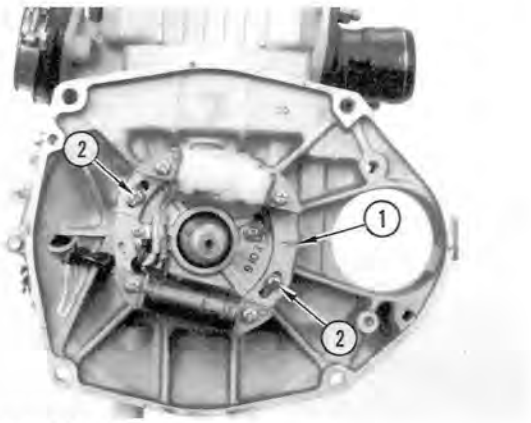


1. Alignment Dowels.
2. Starter Pulley.

4. Unbolt starter pulley from flywheel.
5. Unscrew flywheel nut.
   - Use a blunt punch to bend lockwasher tabs away from nut.
   - Hold flywheel with a strap wrench.

6. Pull flywheel.
   - Fasten flywheel puller (special tool) to flywheel with special bolts.

7. Notice alignment mark on stator plate.
   - Mark should be aligned with split-line (seam) between crankcase halves.



1. Alignment Mark.
2. Mounting Screws.

8. Remove stator plate mounting screws.
9. Slide out stator assembly.
   - Carefully remove stator wiring harness and grommet from crankcase.

Stator Inspection

1. Inspect woodruff key, crankshaft keyway, and flywheel keyway for damage.

2. Check flywheel magnets.
   - Thoroughly clean magnet areas to remove any metal particles attracted to magnets.
   - Make sure magnets are mounted securely in position on flywheel.
3. Examine all wires for fraying and cracks or breaks in insulation.

Stator Installation

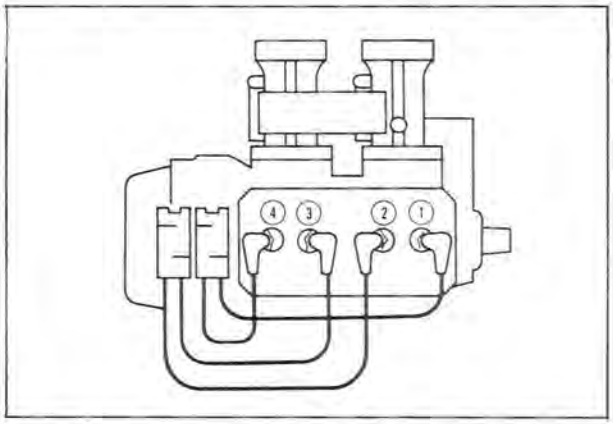
1. Mount stator assembly on crankcase.
   - Align timing mark on stator plate with crankcase split-line (seam).
   - Torque stator mounting screws to 30 in. lb (0.35 kg-m).
2. Be certain that stator wiring harness and grommet are positioned properly.
   - Route wiring harness to insure that rotating flywheel does not rub and damage wires.
3. Insert woodruff key in crankshaft.

CAUTION **When installing flywheel, do not hammer on flywheel for any reason as damage may result. Also, avoid contact between flywheel and stator coils to prevent damage to coils or magnets.**

4. Slide flywheel onto crankshaft.
   - Be certain that woodruff key stays in place.
   - Check to see that stator wiring harness does not contact flywheel.
5. Install new flywheel lock washer.

1. Lockwasher Tab In Key Way Groove.
2. Bend Tabs Against Nut.

6. Torque flywheel nut to 72 ft lb (10 kg-m).
   - Hold flywheel with a strap wrench.
7. Bend flywheel lockwasher tabs against flywheel nut to prevent loosening.
8. Secure starter pulley to flywheel.
9. Mount magneto cover.
   - Position cover on alignment dowel pins.
10. Connect spark plug wires.
    - Refer to diagram for proper spark plug wire sequence.



   - Push cap onto spark plugs.
11. Install engine in chassis.
    - Refer to Engine Installation procedure.
12. Check ignition timing.
    - Refer to Ignition Timing procedure.

PULSER COIL

Pulser Coil Removal

1. Remove Stator.
   - Refer to Stator Removal procedure.
2. Carefully chip insulation material from coil terminals to expose soldered connections.
   - Be careful not to break wires.

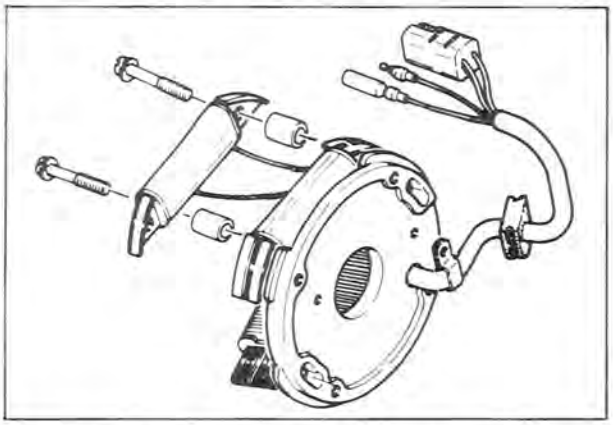
CAUTION **To prevent damage to coil windings from overheating, do not use a soldering gun larger than 40 watts.**

3. Unfasten wires from coil terminals using soldering gun.
4. Unscrew mounting hardware and remove pulser coil.

Pulser Coil Installation

CAUTION **To prevent damage to coil windings from overheating, do not use a soldering gun larger than 40 watts.**

1. Clean old solder from lead wires.
2. Mount pulser coil on stator plate.
   - Replace mounting hardware.

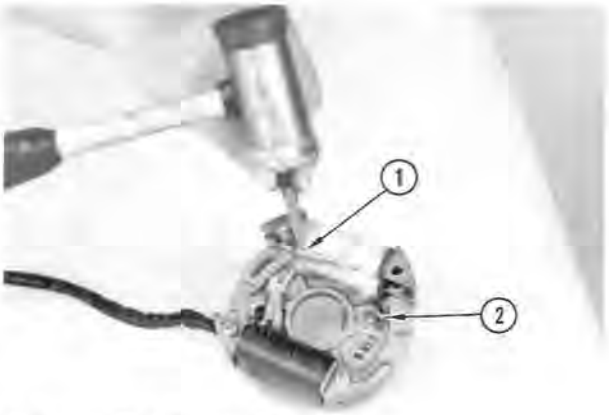


3. Solder lead wires to pulser coil terminals.
   - Use 60/40 ROSIN CORE solder.
4. Insulate pulser coil terminal connections.
   - Cover connections with silicone sealant or suitable substitute.
5. Install stator.
   - Refer to Stator Installation procedure.

EXCITER COIL

Exciter Coil Removal

1. Remove stator.
   - Refer to Stator Removal procedure.
2. Carefully chip insulation material from positive terminal to expose soldered connection.
   - Be careful not to break wires.



1. Exciter Coil Positive Terminal.
2. Ground Wire.

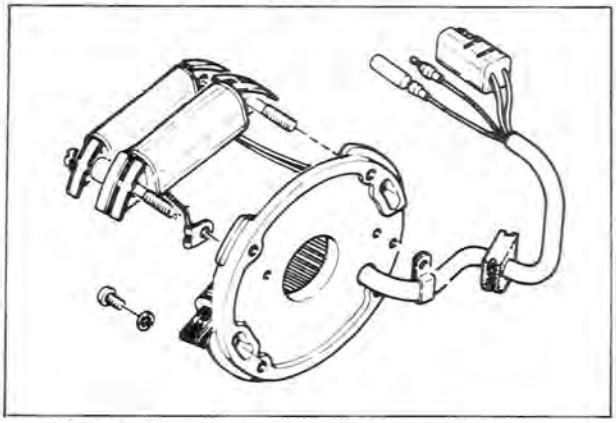
CAUTION **To prevent damage to coil windings from overheating, do not use a soldering gun larger than 40 watts.**

3. Unfasten wires from coil terminal using soldering gun.
4. Unscrew mounting hardware and ground wire.
5. Remove exciter coil.

Exciter Coil Installation

CAUTION **To prevent damage to coil windings from overheating, do not use a soldering gun larger than 40 watts.**

1. Clean old solder from lead wires.
2. Mount exciter coil on stator plate.
   - Replace mounting hardware.
   - Secure ground wire.

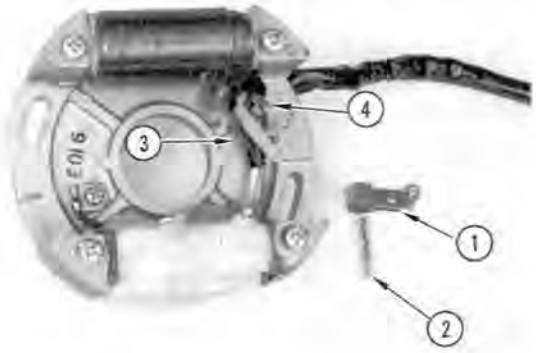


3. Solder lead wires to exciter coil terminals.
   - Use 60/40 ROSIN CORE solder.
4. Insulate exciter coil terminal connection.
   - Cover connection with silicone sealant or suitable substitute.
5. Install stator.
   - Refer to Stator Installation procedure.

LIGHTING COIL

Lighting Coil Removal

1. Remove stator.
   - Refer to Stator Removal procedure.
2. Unfasten lighting coil connector clamp.



1. Clamp.
2. Cut Insulator Entire Length.
3. Unsoldered Wire Here.
4. Ground Wire.

3. Remove insulation from lead wire connectors.
   - Split insulators with a sharp knife or razor blade as shown.
4. Disconnect lighting coil wires from connectors with a soldering gun.
5. Unscrew lighting coil mounting screws.
6. Remove lighting coil.

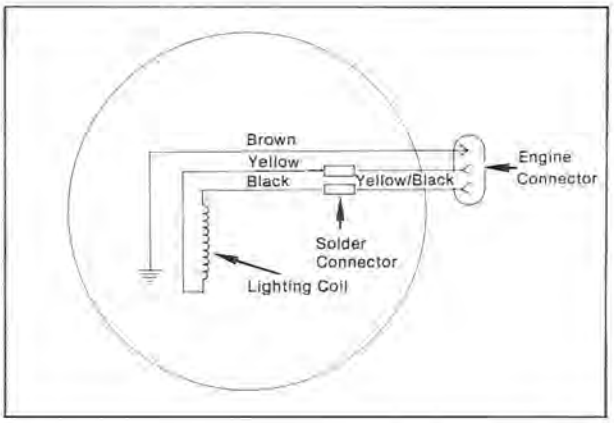
Lighting Coil Installation

1. Mount lighting coil on stator plate.
   - Tighten coil mounting screws.

2. Clean old solder from lead wires.
3. Connect coil lead wires to harness lead wires observing proper polarity.

CAUTION **The lighting coil must be polarized (properly connected) with regulator to prevent possible loss of magnetism to flywheel magnets.**

- Position lighting coil lead wires in connectors, matching with harness wire colors shown.



- Solder connections with 60/40 ROSIN CORE solder.
4. Insulate lead wire connections.
   - Use shrink tubing or suitable substitute.
5. Mount lighting coil connector clamp.
   - Position connectors in clamp.
   - Secure ground wire with clamp mounting screw.
6. Install Stator.
   - Refer to Stator Installation procedure.

FUEL SYSTEM

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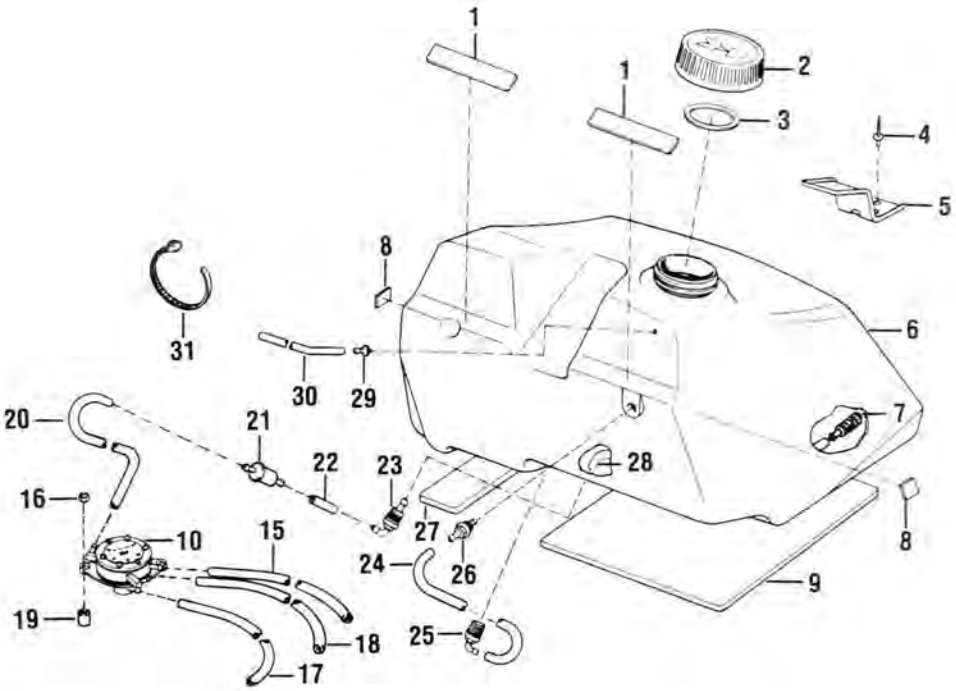
FUEL SYSTEM

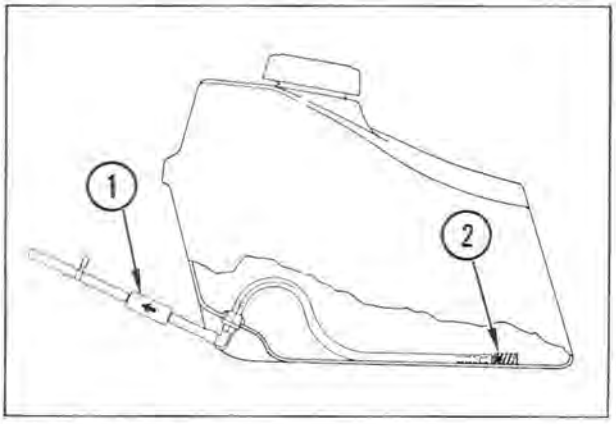


1. PAD, hoop, 4.50" long
2. CAP, tank
3. GASKET, cap
4. RIVET, 3/16"
5. BRACKET, fuel tank
6. TANK, fuel
7. FILTER, fuel
8. PAD, hoop, 1.00" long
9. PAD, fuel tank
10. PUMP ASSY, fuel
11. PART GROUP, rebuild kit
12. GROMMET
13. VALVE
14. SCREW
15. TUBE, 7/32 x 22.0
16. NUT, insert, 1/4-20
17. TUBE, 7/32 x 14.00
18. TUBE, 7/32 x 9.50
19. SPACER, fuel pump
20. TUBE, 7/32 x 3.50
21. FILTER, fuel
22. TUBE, 7/32 x 1.50
23. FITTING, lower
24. TUBE, 7/32 x 27.00
25. FITTING, lower
26. FITTING, upper
27. PAD, fuel tank
28. TUBE, 7/32 x 12.00
29. FITTING, vent
30. TUBE, 1/8 x 15.00
31. BAND, cable tie

FUEL FILTERS

Water or dirt anywhere in the fuel system can cause hard starting, loss of power, or the engine to run a few minutes, then stop. An in-line fuel filter and a filter screen located in the fuel tank have been installed to prevent foreign material from entering the carburetor.

In-line Filter – Replace at beginning of each season, or when contamination within filter is observed. Be sure filter is installed with arrow pointing towards fuel pump.

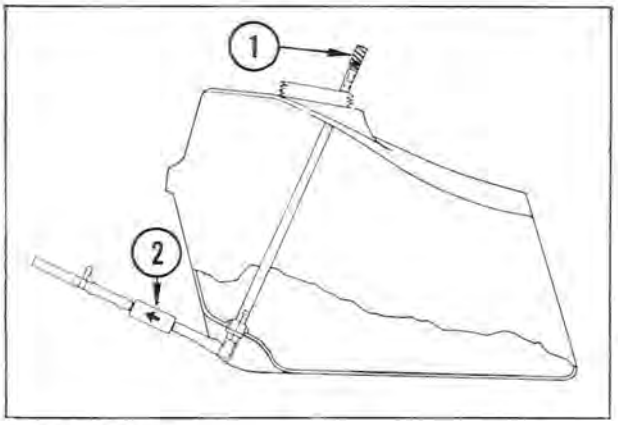


1. In-Line Filter
2. Filter Screen

Tank Filter Screen – Clean filter screen at beginning of each season.

FILTER SCREEN CLEANING

1. Remove filter screen.
   - With a stiff wire, reach into fuel tank through filler neck and hook pick-up tube.
   - Pull tube up through filler neck.
   - Hold pick-up tube firmly and pull filter screen unit from tube.



1. Filter Screen
2. In-Line Filter

2. Clean screen.
   - If screen is clogged with sludge, soak in carburetor cleaner.
   - Rinse screen in cleaning solvent and blow through tube fitting with compressed air.
3. Replace screen unit.
   - Slide unit into pick-up tube and drop into fuel tank.

FUEL PUMP

Fuel is drawn from fuel tank and delivered to the carburetors by a diaphragm type fuel pump. A pulse tube connects engine crankcase to fuel pump. Pressure pulses within crankcase (caused by up and down movement of piston) are applied to fuel pump diaphragms which create the pumping action.

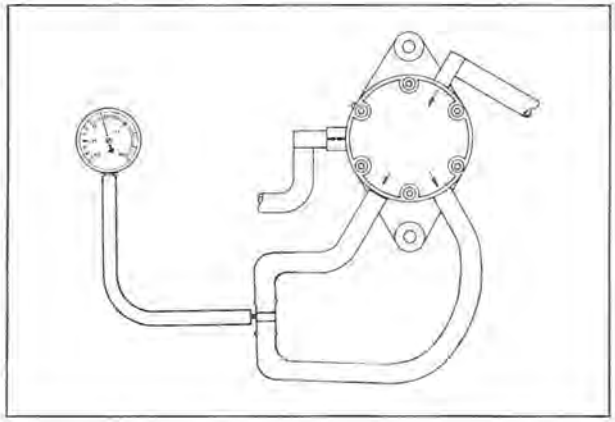
Fuel pump output will be reduced by any of the following conditions:

- Loose fitting fuel tubes.
- Sharp bends (kinks in fuel tube due to incorrect routing or length).
- Fuel tank not venting.
- Fuel filter contaminated.
- Defective diaphragm (pinched or hole).
- Check valves in fuel pump not seating.

Fuel Pump Pressure Test

WARNING **Gasoline fumes are heavier than air and can become explosive if exposed to a pilot light from a furnace, hot water heater, clothes dryer, etc. Perform maintenance only in an area that is well ventilated and free from pilot lights, flames and sparks.**

1. Disconnect fuel pump output (fuel supply) tube from each carubretor.
2. Connect both output tubes to pressure gauge using T fitting.



3. Run engine at idle speed for approximately 15 seconds, then stop engine and observe pressure gauge.
   - Gauge should indicate more than 4 psi (0.28 kg-cm²) pressure.
   - Pump should maintain recommended pressure for minimum of one minute.
   - Any pressure drop observed within one minute after test indicates internal fuel pump leakage. Repair fuel pump as required to eliminate leakage.
4. Reconnect fuel pump outlet tubes to carburetor inlet fittings.

Fuel Pump Output Test

WARNING **Gasoline fumes are heavier than air and can become explosive if exposed to a pilot light from a furnace, hot water heater, clothes dryer, etc. Perform maintenance only in an area that is well ventilated and free from pilot lights, flames and sparks.**

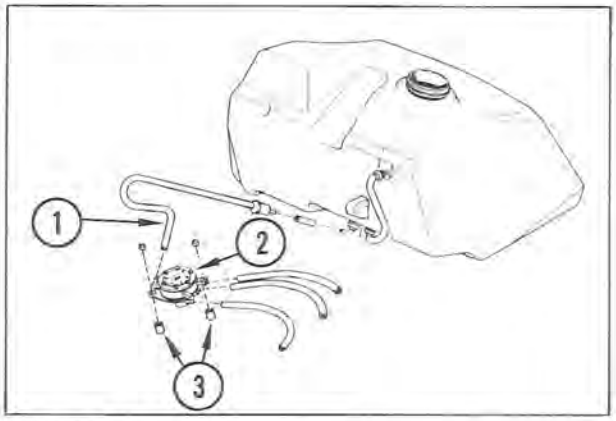
1. Perform Fuel Pump Pressure Test to determine condition of internal components.
2. Disconnect fuel pump output (fuel supply) tube from each carburetor.
3. Place end of tubes into 1 quart (1 liter) container.
4. Run engine at idle speed for approximately 30 seconds, then stop engine and measure fuel in container.
   - Fuel pump output is okay if volume measured is 16 oz. (473 cc) or more.
   - If amount measured is less than 16 oz. (473 cc), inspect filters, fuel tank fittings and tubes for obstructions.
5. Reconnect fuel pump outlet tubes to carburetor inlet fittings.

Fuel Pump Removal

1. Raise fuel tank pick-up tube above fuel level in tank.
   - With a stiff wire, reach into fuel tank through filler neck and hook pick-up tube.
   - Pull tube up through filler neck and secure with wire to prevent fuel from draining from tank.
2. Remove air silencer from carburetors.
   - Refer to Silencer Removal procedure.

WARNING **Gasoline fumes are heavier than air and can become explosive if exposed to a pilot light from a furnace, hot water heater, clothes dryer, etc. Perform maintenance only in an area that is well ventilated and free from pilot lights, flames and sparks.**

3. Disconnect fuel inlet tube from fuel pump.
   - Use a suitable container to catch the small amount of fuel that will drain from tube.



1. Inlet Tube
2. Fuel Pump
3. Spacers

4. Remove remaining tubes from fuel pump.
5. Unfasten fuel pump mounting nuts.
6. Lift fuel pump from mounting studs.
   - Be sure pump mounting spacers stay in place on mounting studs.

Fuel Pump Disassembly

1. Remove pump retainer screws.
2. Lift off body cover.
3. Remove upper gasket and diaphragm.
4. Lift off pump body.

NOTE: Once removed, the grommets are not reuseable. Be sure to have replacements on hand before removing them.

5. Remove grommets and check valves from body only if damaged or required for thorough cleaning.
6. Remove lower diaphragm and gasket.

Fuel Pump Cleaning

CAUTION **Do not clean rubber diaphragms with solvent. Damage to diaphragms will occur.**

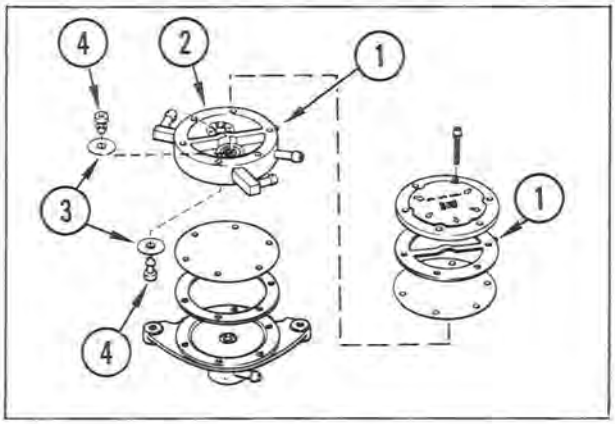
Be sure all tube fittings are clear of any obstructions, or fuel starvation may occur, causing engine damage.

1. Clean body castings with mild solvent.
2. Be sure all passages and holes are clear.

Fuel Pump Assembly

1. If removed, install check valves with new grommets into pump body.
2. Assemble pump components, with new gaskets and diaphragms, in sequence as illustrated.

- Note that upper gasket has a rib across the diameter which must be positioned over rib in pump body.
- Be certain pump body and cover are properly indexed on pump bottom.

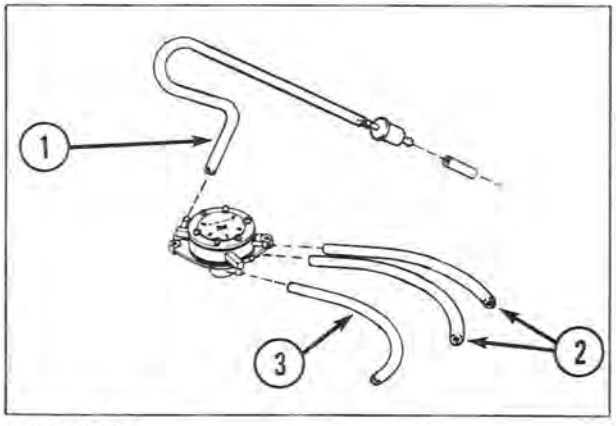


1. Rib
2. Pump Body
3. Check Valve
4. Grommet

3. Install retaining screws.
   - Tighten in a crisscross pattern.

Fuel Pump Installation

1. Position fuel pump on mounting studs.
   - Be certain pump mounting spacers are in position on studs.
2. Tighten pump mounting nuts.
   - Torque to 35 in. lb (0.4 kg-m).
3. Attach tubes to pump fittings.
   - Pulse tube goes on bottom fitting.
   - Note arrows on pump cover indicating flow direction.



1. Inlet Tube
2. Outlet Tubes
3. Pulse Tube

4. Mount air silencer on carburetors.
   - Refer to Silencer Installation procedure.
5. Return fuel pick-up tube to bottom of tank.

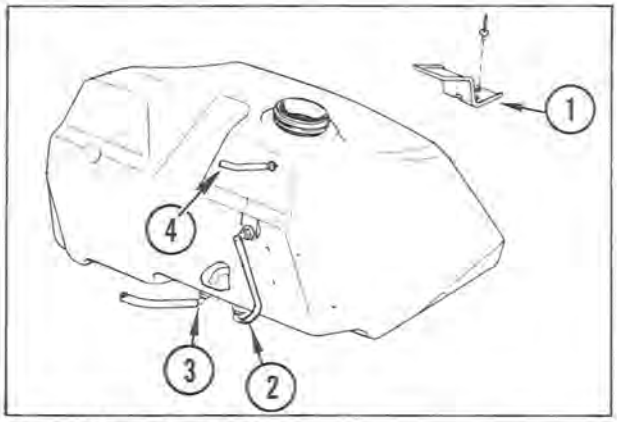
FUEL TANK

Fuel Tank Removal

1. Remove seat.
   - Refer to Seat Removal procedure.

WARNING **An electric drill motor produces sparks which may ignite any gasoline fumes in the area. Before drilling tank bracket rivets, be certain tank cap is tightened securely and there is no gasoline spilled or drained on or around snowmobile.**

2. Remove tank mounting bracket.
   - Drill rivets securing bracket to chassis.



1. Tank Mounting Bracket
2. Fuel Level Tube
3. Tank Outlet Fitting
4. Vent Tube

3. Drain fuel tank.
   - Lift tank slightly to allow access to outlet fitting at lower front of tank.
   - Disconnect tank-to-fuel filter tube, and connect another suitable length of tubing to allow fuel to drain into a proper container.

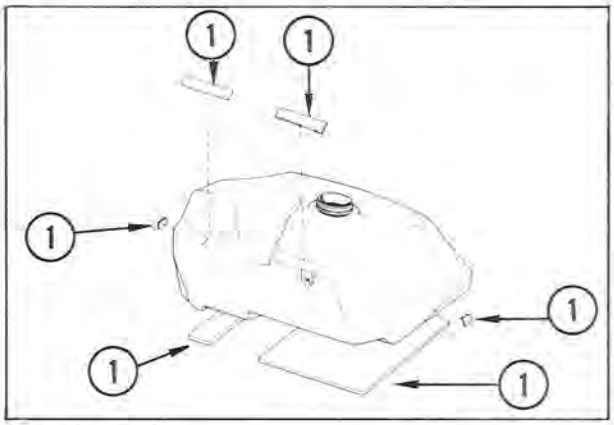
4. Disconnect remaining tubes.
   - Remove fuel level tube from upper and lower tank fittings.
   - Disconnect vent tube from tank fittings.
5. Lift tank from snowmobile.

Fuel Tank Installation

1. Position tank on chassis.
2. Reconnect fuel tank tubes.
   - Attach vent tube to tank fitting.
   - Connect fuel level tube to top and bottom tank fittings.
   - Attach fuel filter tube to tank outlet fitting.

WARNING **If protective pads are not located properly on fuel tank, contact between fuel tank and steering hoop may result in a fuel and fire hazard.**

3. Check for correct positioning of rubber pads on fuel tank.



1. Rubber Pads

4. Secure tank mounting bracket to chassis.
   - Use 3/16 in. rivets.
5. Install seat.
   - Refer to Seat Installation procedure.

IGNITION SYSTEM

Table of Contents

IGNITION SYSTEM THEORY

Ignition system components consist of:

- Flywheel (containing four magnets).
- Exciter coil.
- CDI (capacitor discharge ignition) igniter unit.
- Pulser coil.
- Ignition coils (2).
- Spark plugs (2 each cylinder).
- Switches (key and emergency stop) and associated wiring.

Rotation of the flywheel causes the magnetic field surrounding each magnet to induce current within the coils mounted on the stator plate.

Alternating current (A.C.) generated by the exciter coil travels to the CDI igniter where it is converted to direct current (D.C.) and stored in capacitors. The amount of charge delivered from exciter coil to capacitors will effect intensity of spark at the plugs.

A signal current (A.C.), generated by the pulser coil, triggers the CDI igniter to release its stored capacitor charge to the ignition coil. The pulser coil governs when spark at the plugs will occur and therefore controls ignition timing. The pulser coil has no effect on the intensity of the spark. Its sole purpose is to signal the capacitors when to release their charge to the ignition coils.

Within the ignition coil, high voltage is generated, which causes a spark to arc across the plug electrodes. Once ignition timing is correctly adjusted, no change or readjustment is necessary unless pulser, exciter, or CDI igniter components are replaced.

Two switches (emergency stop and key) are connected to CDI igniter leads which comprise the STOP circuit. Each switch functions independently of the other, and when positioned to STOP, will complete a circuit preventing charge of the capacitors in the CDI igniter. If no charge is applied to the capacitors, there is no output from the CDI igniter to ignition coils resulting in no spark at the plugs.

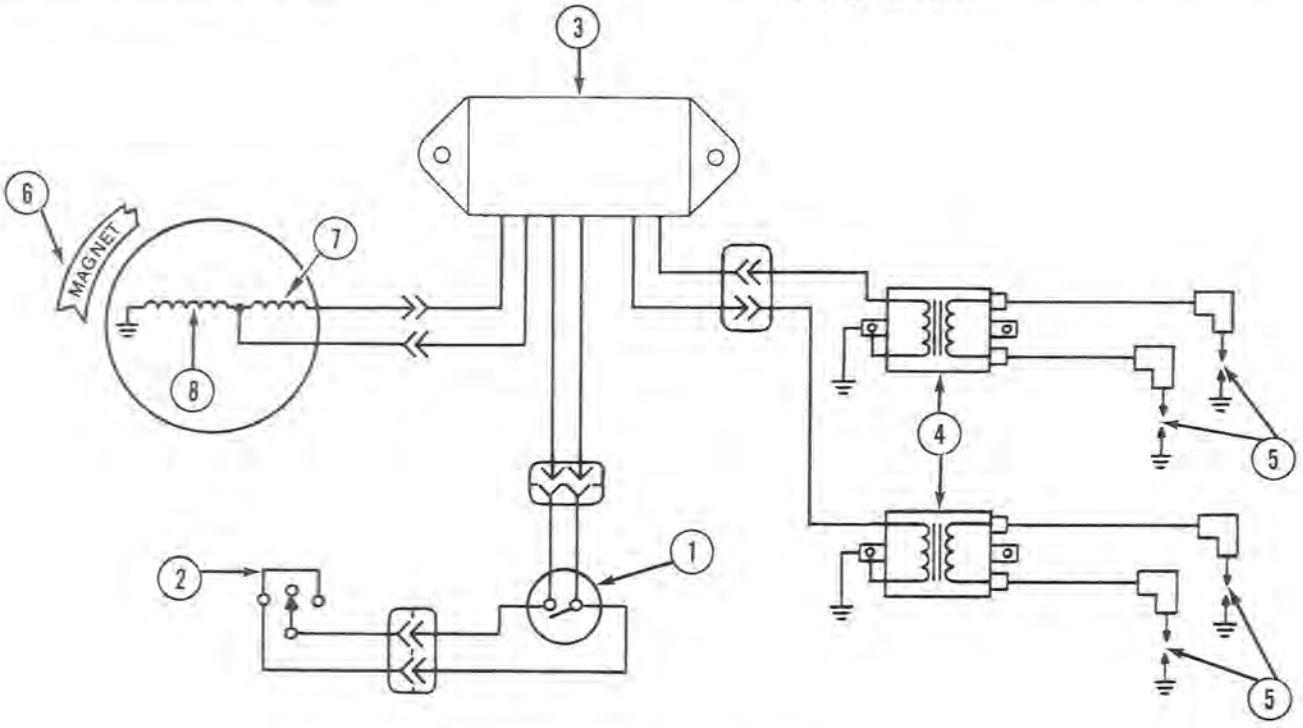
THIS HIGH SPEED RETARD type ignition system incorporates very rapid spark advance at low to mid-range engine speeds while reducing spark advance at high engine RPM. A spark curve of this type results in the following benefits:

- Improved startability.
- Better mid-range response (acceleration).
- Increased fuel economy at cruising speed.
- Reduces possibility of abnormal combustion (detonation) associated with excessively advanced timing at high engine RPM.

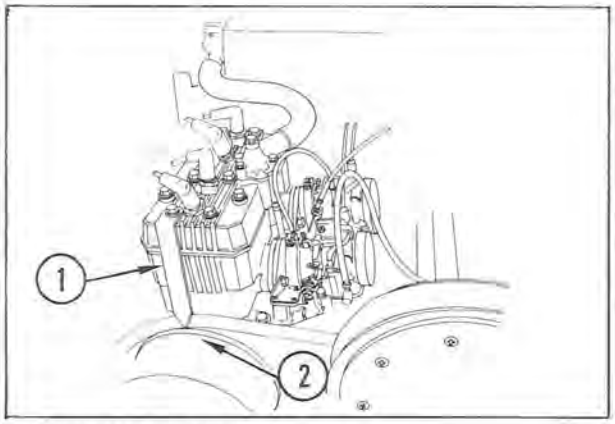
Automatic retarding timing characteristics occur due to unique circuits within the CDI igniter unit. An "electrical interference" exists as engine RPM is increased, resulting in a delay of the pulser coil triggering signal.

IGNITION TIMING CHECK

1. Install a fabricated timing pointer onto the engine.
   - For accuracy, it is important to attach pointer to the engine rather than chassis so that pointer can move with the engine during operation.



1. Key Switch.
2. Emergency Stop Switch.
3. CDI Igniter Unit.
4. Ignition Coils.
5. Spark Plug.
6. Flywheel.
7. Pulser Coil.
8. Exciter Coil.



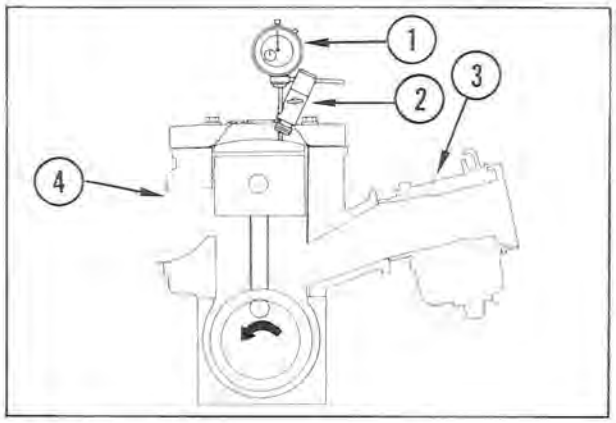
1. Fabricated Pointer.
2. Drive Converter Fixed Sheave.

2. Remove all spark plug caps.
   - Refer to Spark Plug Cap Removal procedure.
3. Install dial indicator with angle adapter kit (special tool) into LH cylinder spark plug hole.
   - Remove all spark plugs.

WARNING **To avoid possible severe burns or a potential fire hazard, NEVER attempt to start or turn over engine with only one of the two spark plugs removed from a cylinder.**

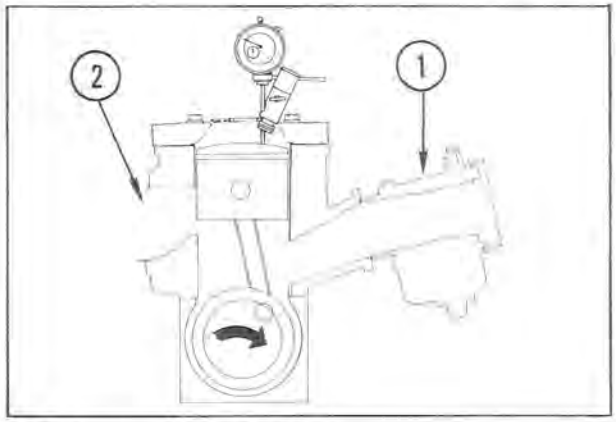
NOTE: Dial indicator adaptor kit P/N 99970-3543 must be used with a dial indicator to obtain correct measurements. Installing the dial indicator on an angle will lead to incorrect timing adjustments that may cause poor engine performance.

4. Calibrate dial indicator with piston.
   - Rotate drive converter (crankshaft) toward front of engine until piston is at TDC.
   - Index dial indicator scale to "O" with piston at TDC.



1. Dial Indicator.
2. Angle Adapter.
3. Carburetor (Rear of Engine).
4. Exhaust Port (Front of Engine).

5. Mark drive converter for timing reference at specified dimension.
   - Rotate drive converter (crankshaft) toward rear of engine until needle indicates 0.102 in. (2.61 mm) BTDC.



1. Carburetor (Rear of Engine).
2. Exhaust Port (Front of Engine).

   - Mark drive converter fixed sheave opposite timing pointer.
6. Remove dial indicator and angle adapter.
7. Install spark plugs.
   - Check that spark plugs are properly gapped to 0.024 in. (0.66 mm).
   - Be sure washer is installed on plug and the seat on the cylinder head is clean.
   - Torque plugs to 20 ft lb (2.8 kg-m).
8. Connect spark plug caps.
   - Refer to Spark Plug Cap Installation procedure.
9. Remove drive belt.
   - Refer to Belt Removal procedure.
   - Be sure converter guard is secured in position with clip pins.

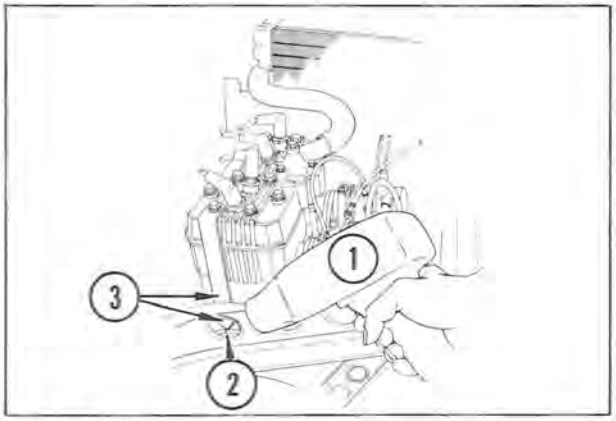
WARNING **Do not touch the spark plug leads while engine is running, as they will transmit a powerful electrical shock. Do not touch the hot exhaust system. A severe burn would result.**

10. Verify ignition timing (with engine cold) within one minute after starting engine.

WARNING **Be sure converter guard is secured into normal position to prevent possible contact with rotating engine components.**

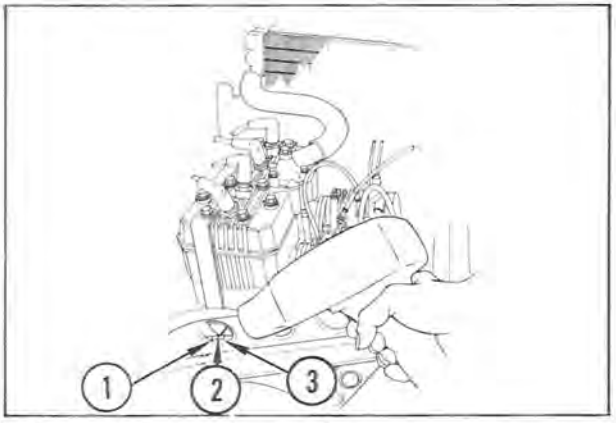
   - Connect timing light.
   - Turn key switch to RUN/LIGHTS position.

- Run engine at 6,500 RPM.
- Direct timing light through opening in the converter guard directly over timing pointer and observe position of mark on converter as timing light flashes.



1. Timing Light.
2. Mark on Drive Converter.
3. Timing Pointer.

- Timing is correct when the mark on the converter aligns with the pointer.



1. Retarded Timing (Incorrect).
2. Correct Timing.
3. Advanced Timing (Incorrect).

11. If timing is incorrect, stator plate must be adjusted to correct the timing.
    - Refer to Ignition Timing Adjustment procedure.
12. If timing is good:
    - Remove timing light.
    - Install drive belt. Refer to Belt Installation procedure.
    - Remove fabricated timing pointer.

IGNITION TIMING ADJUSTMENT

1. Perform Ignition Timing Check procedure to verify timing.
2. Remove mufflers.
    - Refer to Muffler Removal procedure.
3. Remove starter pulley from flywheel.
    - Refer to Recoil Starter Removal procedure.
4. Loosen stator plate mounting screws through openings in the flywheel.

1. Flywheel.

CAUTION **When adjusting the stator plate, take care not to damage the coil windings.**

5. Turn stator plate as required to correct timing.
    - To Advance Timing — Rotate stator plate toward rear of engine.
    - To Retard Timing — Rotate stator plate toward front of engine.
6. Tighten stator plate screws.
    - Torque screws to 30 in. lb (0.35 kg-m).
7. Verify ignition timing.
    - Temporarily position mufflers onto exhaust manifold.
    - Start engine using emergency starter rope.
    - Check timing and readjust if necessary.
8. Install recoil starter pulley.
    - Refer to Recoil Starter Installation procedure.
9. Install mufflers.
    - Refer to Muffler Installation procedure.

IGNITION TROUBLESHOOTING

WARNING **To avoid possible severe burns or a potential fire hazard, NEVER attempt to start or turn over engine with only one of the two spark plugs removed from a cylinder.**

Ignition Troubleshooting Preliminary Procedures

NOTE: The following tips may help isolate ignition problems quickly.

1. A defective exciter coil, CD igniter, ignition coil, key switch or emergency stop switch can be the cause of no spark, weak spark or intermittent spark.
2. A defective pulser coil may cause no spark or intermittent spark but not a weak spark.

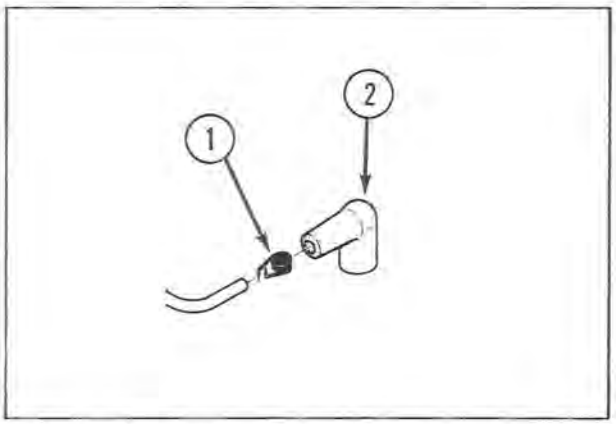
When an ignition problem is present, prior to performing elaborate troubleshooting try to solve problems by performing the easy tests first as follows:

- Spark Plug Cap Inspection procedure.
- Spark Test procedure.
- Ground Wire Test procedure.
- Stop Circuit Elimination Test procedure.

SPARK PLUG CAP

Spark Plug Cap Removal

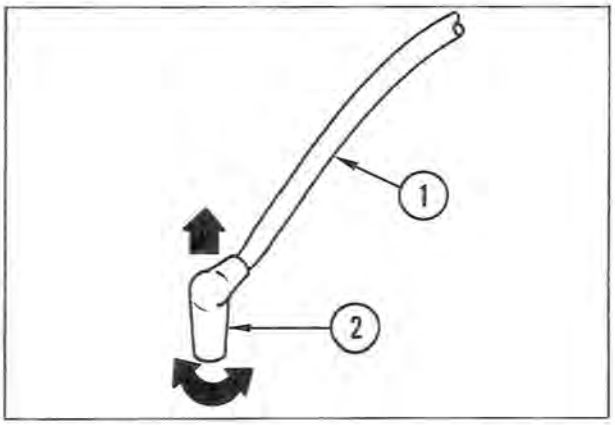
Each ignition coil lead is secured to spark plug tip by a small spring terminal inside the spark plug cap. Incorrect spark plug cap removal will damage the terminal which may result in ignition system malfuncion or premature component failure.



1. Terminal.
2. Cap.

CAUTION **Do not twist or force spark plug cap off by pulling on lead wire as this will damage the connection.**

1. Twist cap back and forth while pulling straight upward to remove from spark plug.

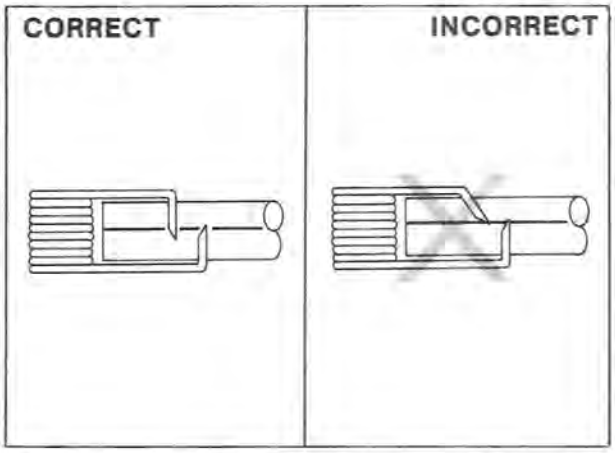


1. Lead Wire.
2. Spark Plug Cap.

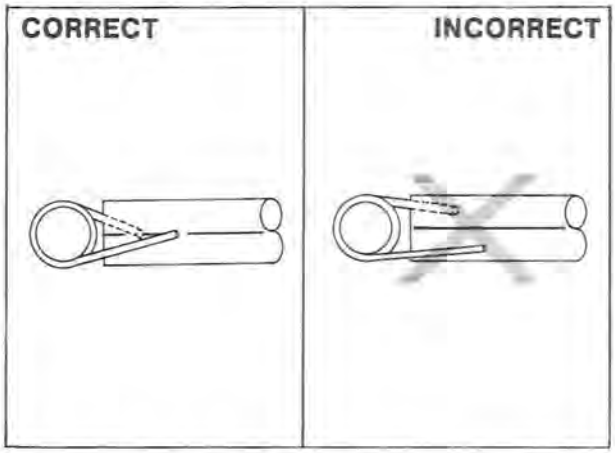
Spark Plug Cap Inspection

Check spring terminal for correct installation to ignition coil lead as follows:

1. Slide cap off lead wire.
   - Push cap off from lead wire, do not pull cap.
2. Ends of spring terminal must be at 90° angle to insure correct engagement with inner wire.



3. Both arms of spring terminal must enter ignition coil lead at centerline to insure contact with inner wire.



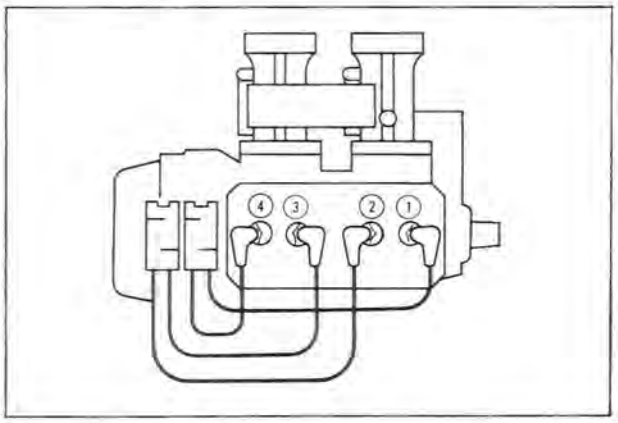
4. Slide spark plug cap onto ignition coil lead to cover spring terminal.
   - Lubricate spark plug cap with LPS or WD-40 to ease installation.

CAUTION **To prevent ignition system malfunction, do not apply oil or grease to spark plug cap during installation.**

Spark Plug Cap Installation

1. Be sure spring terminal is properly positioned inside cap.
   - Look inside cap opening to insure spring terminal coil is completely aligned with opening.

2. Secure cap onto spark plugs in sequence shown.
   - Push cap down firmly onto spark plug so that spring terminal completely seats around tip of spark plug.



SPARK TEST

NOTE: Fabricate test spark plug by removing ground electrode. This increases distance spark must jump from center electrode to ground, giving a better indication of ignition system output.

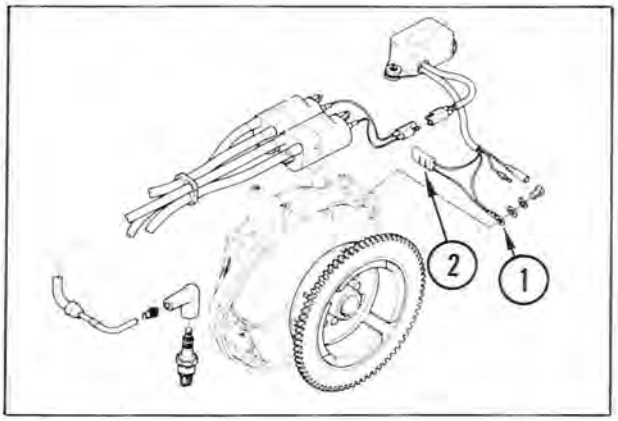
CAUTION **Do not turn over the engine without properly grounding the test spark plugs. If the ignition system is not properly grounded, damage to the ignition coils may result.**

1. Connect test spark plug to each spark plug cap.
   - Be certain each spark plug is properly grounded on engine.

2. Crank engine and observe each spark.
   - Blue colored sparks should be observed jumping gaps of test plugs indicating that ignition system should start and run engine if timing is correct.
   - If no spark is observed, continue troubleshooting procedure.

GROUND WIRE TEST

1. Inspect BROWN and GRAY ground wires at the magneto cover connection.
   - Be certain wires are in good condition and mounting bolt is secure.
   - A loose connection will cause intermittent spark, while a broken connection will result in no spark.



1. Ground Wire.
2. Engine Ignition Connector.

STOP CIRCUIT ELIMINATION TEST

1. Eliminate key switch and emergency stop switch circuits from ignition system.
   - Disconnect engine ignition connector. Ignition connector has gray and black wires, and is located near the magneto cover.
2. Crank engine and check for spark.
   - If spark occurs with ignition connector separated, the defect is in the key switch, emergency stop switch, or the wiring. Refer to Key Switch Test and Emergency Stop Switch Test procedures.
   - If no spark is observed with ignition connector separated, perform Ignition System Test Sequence. Refer to Ignition Troubleshooting Using CD Ignition Tester procedure.

IGNITION TROUBLESHOOTING USING CD IGNITION TESTER

Tester Description

The Kawasaki Ignition Tester P/N T56019-201 is an electrical energy measuring device capable of measuring the peak energy output of the CD igniter, magneto exciter, and pulser coils.

Ignition energy output pulses are of very short duration and cannot be accurately measured by a voltmeter. The Kawasaki Ignition Tester P/N T56019-201 is solid state construction capable of measuring energy peaks of less than one microsecond in duration.

The Kawasaki Ignition Tester P/N T56019-201 performs as a comparator. The energy output values for all CD Ignition components were derived from tests conducted by Kawasaki. Using this tester, it can be determined if each ignition component is functioning properly. The test results can be compared with the standard values given.

Tester Controls

HIGH-LOW RANGE SWITCH

This tester is not intended to measure specific voltage or amperage values. The tester measures output in units (0-100) which can be compared to specifications.

The tester has two ranges, high and low, selected by a toggle switch.

Select the range called for in the test procedures.

INDICATOR DIAL

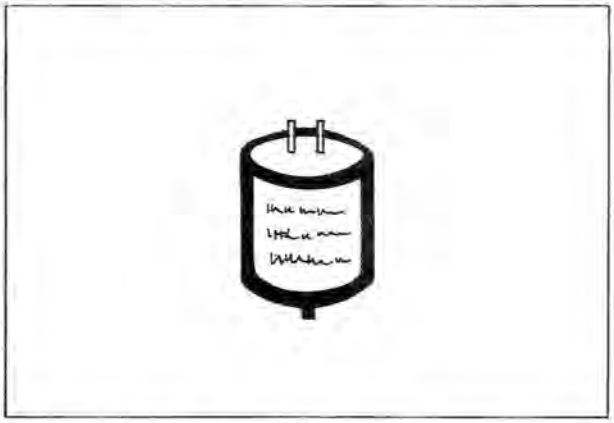
The ignition energy output is referenced against a 0-100 scale on the tester. The greater the energy output, the greater the value indication on the scale. The indication is in the form of an incandescent lamp that lights when the scale dial is set at the position corresponding to the energy output.

- Verify indicator dial calibration alignment.Check indicator dial alignment by turning the dial to the full clockwise position. The white mark on the dial must line up with the 100 on the face. If the mark does not line up with the 100, loosen the dial setscrew, remove the dial, turn the indicator dial shaft fully clockwise, replace the dial lining up the mark on the dial with the 100, and tighten the setscrew. Do not force the dial to turn without first loosening the setscrew. Due to manufacturing tolerances, do not be concerned if the white mark on the dial, when turned fully in the counterclockwise direction, does not align exactly with the zero.

Tester Accessories

TEST SIMULATOR

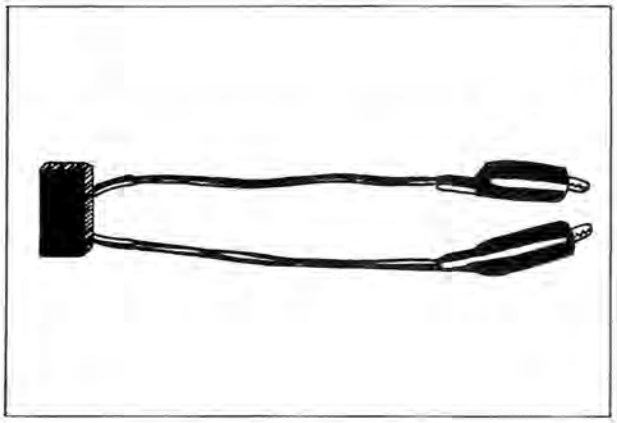
The test simulator is used as a source of energy for testing the high range of the ignition tester. It is charged up by being plugged into a 115 VAC outlet.



Do not touch the plug pins on the simulator while depressing the button. A mild shock will result. For each test performed by the simulator, it must be recharged. The tester will not be damaged if the test switch is placed in the Low position and high voltage output tests are made.

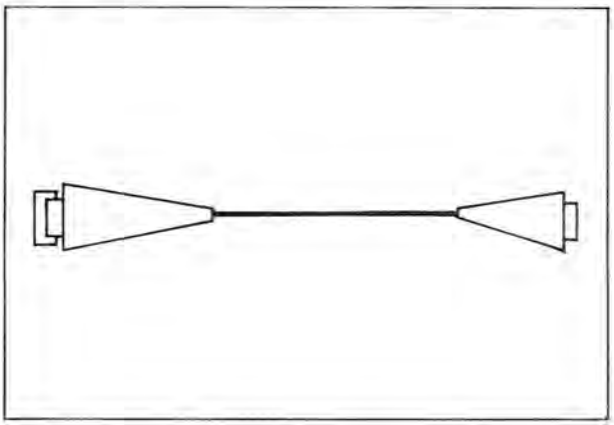
LOAD CELL

The CD ignition load cell is used in conjunction with the tester and is designed to provide an output load for the CD igniter unit. The load coil will cause a marginal capacitor to malfunction, but will not affect a good unit.



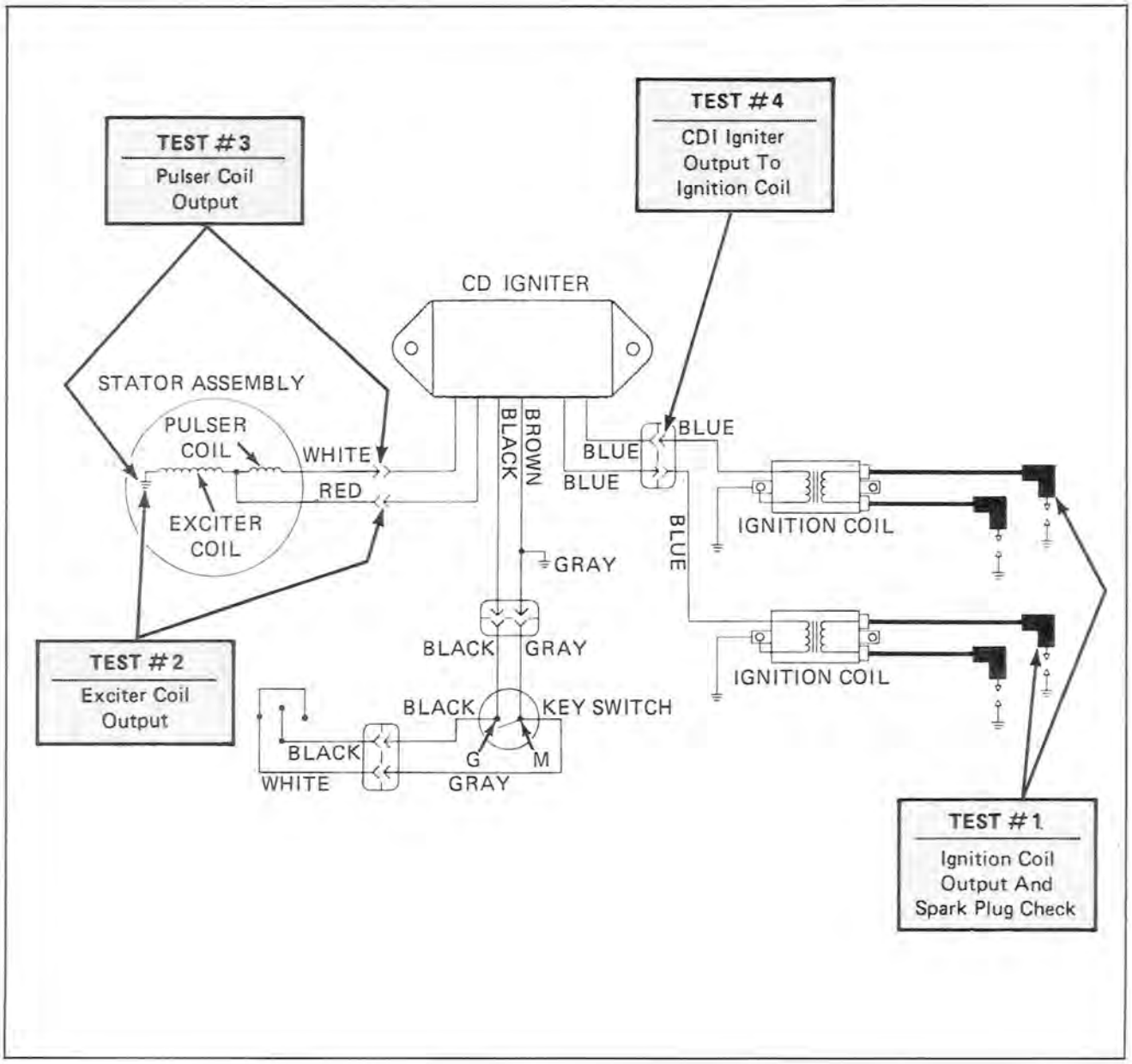
MM-1 CLIP

The MM-1 clip is used to determine the relative amount of energy present in the spark plug wires.



Test Sequence - Using CD Ignition Tester P/N T56019-201

NOTE: Perform Ignition Troubleshooting Preliminary Procedures first, then refer to following pages for detailed testing procedures.



TEST NO. 1		TEST NO. 2		TEST NO. 3		TEST NO. 4	
RANGE	DIAL SETTING	RANGE	DIAL SETTING	RANGE	DIAL SETTING	RANGE	DIAL SETTING
Low	65	High	55	High	55	High	60

Checking Tester Operation

HIGH SCALE TEST:

- Plug the test simulator into a 115 VAC electric outlet for ten seconds.
- Place toggle switch of the tester in the High position.
- Remove the simulator from the outlet, and connect the P and N leads from the tester to the simulator as indicated on the bottom of the simulator.
- Set the tester dial to 50, or below. Depress the button on the simulator. The indicator lamp on the tester should light.

LOW SCALE TEST:

- Place switch in Low position.
- Set tester dial to 50, or below.
- Connect yellow lead to negative terminal of 12 volt battery. Connect red lead to positive terminal. Indicator lamp should light.

If lamp does not light in either the High or Low scale tests, check tester battery installation. Check the clip leads for faulty connections. If no faults can be found, refer to the warranty statement for instructions in sending the tester back to Electro-Specialties, Inc. for repair.

General Test Instructions

WARNING **Magneto and CDI igniter output voltages are high enough to cause an uncomfortable shock. Always see that clip lead insulators cover the clips so they do not contact the operator or vehicle frame.**

CAUTION **Never perform tests on the CDI igniter without the ignition coil or the tester connected to the output connections. This will prevent internal damage to the CDI igniter.**

CAUTION **Never connect the tester directly to the coil secondary output (spark plug). Always use the MM-1 clip when testing the ignition coil output.**

CRANKING ENGINE

Always crank engine vigorously, as in actual starting. Key switch and emergency stop switch must be in the "on" position. Spark plugs must be installed for all tests.

ANALYSIS OF TEST RESULTS.

- Indicator Lamp Lights at Specified Setting.
  - * Component being tested is okay. Reset indicator circuit by depressing Reset button.
- Indicator Lamp Does Not Light Unless Dial is Turned Downscale From Specified Setting.
  - * This indicates that the output is less than that designed to operate the engine in a satisfactory manner. The engine may run at a lower setting, but be subject to hard starting and/or misfiring. Be certain that correct engine cranking conditions were met.
- Indicator Lamp Does Not Light.
  - * Output of the system is too low to operate tester indicator circuit. Replace component being tested.

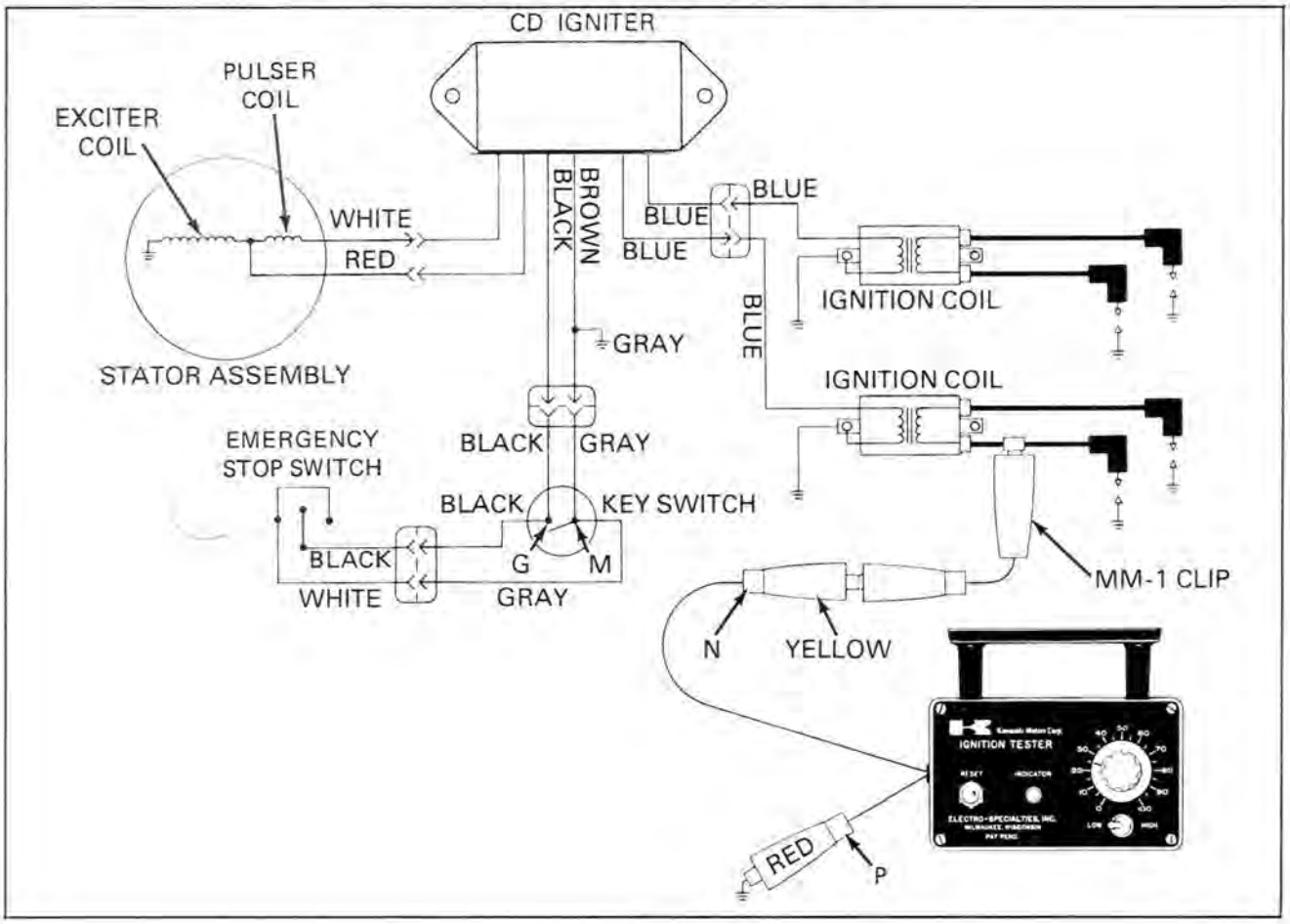
MULTIPLE OR INTERMITTENT IGNITION PROBLEMS

There is no easy way of dealing with intermittent ignition problems. Problems that occur only during hot engine operation will have to be tested on a hot engine. In some cases of temperature and/or vibration failure, only parts replacement can solve the problem as most of these failures return to normal at engine shut off.

Low test readings indicate ideal conditions for engine misfire and hard starting.

There is always the possibility of more than one component of the ignition system failing. Careful repeat of the test procedures and troubleshooting of the accessory circuits will uncover any additional problems.

TEST NO. 1 - IGNITION COIL OUTPUT AND SPARK PLUG CHECK



Test Connections

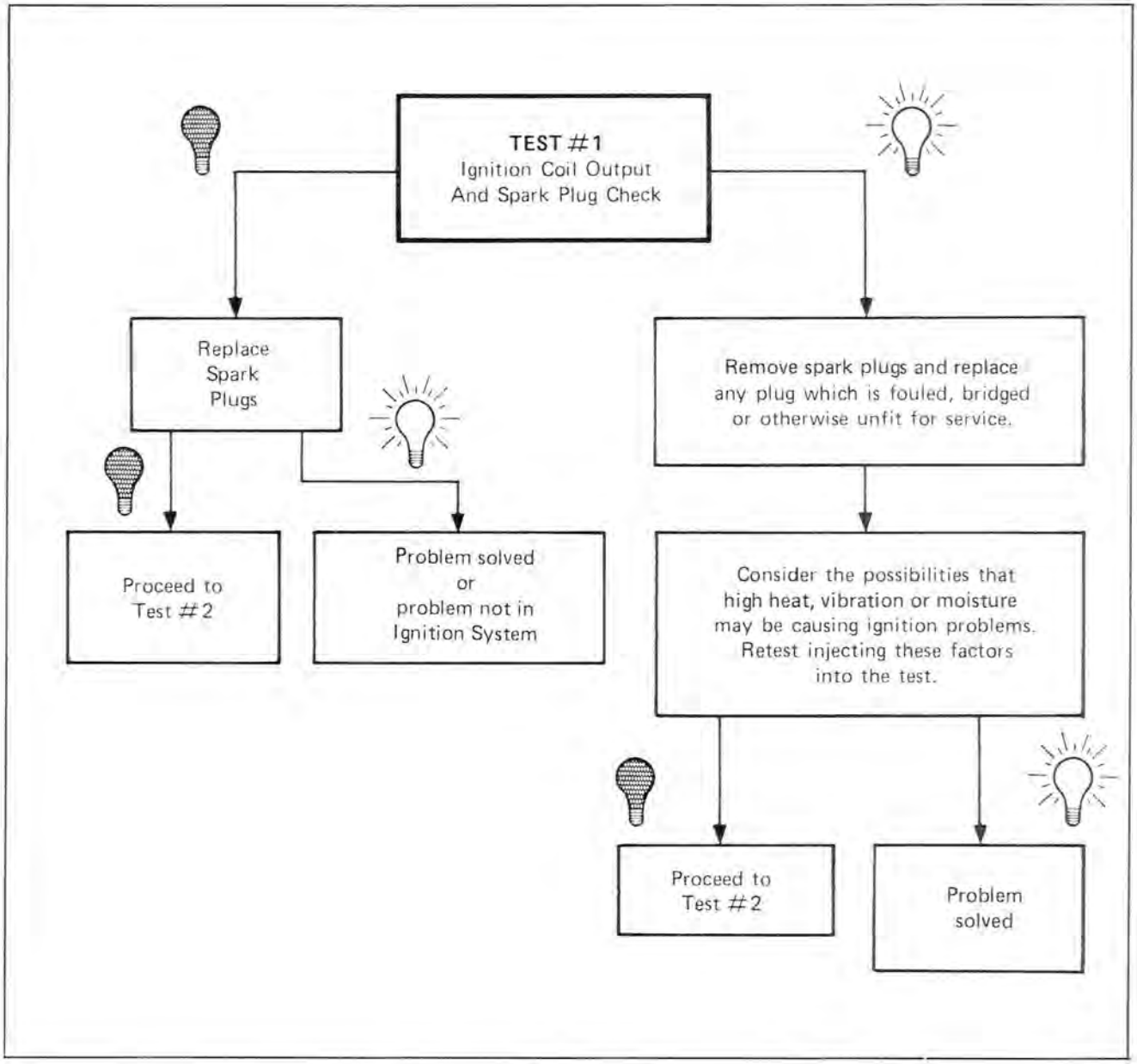
1. Connect the MM-1 adaptor to the tester N (yellow) lead wire.
2. Connect the tester P (red) lead wire to a good ground on the engine.
3. Clamp the MM-1 adaptor around either spark plug wire as close to the spark plug as possible.
   - If insulation sleeving is over the spark plug wire, push the sleeving back so that the clip encircles the spark plug wire directly.
   - Do not allow any metal portion of the MM-1 clip to touch the engine.

Test Procedure

NOTE: After each test that lights the Indicator Lamp, push the Reset button to turn the lamp off in preparation for the next test.

1. Set the toggle switch to the Low range.
2. Set the tester dial to 65.
3. Crank engine and observe results.
   - Pull the recoil starter handle to turn the engine over. If the engine starts, allow it to idle only.
   - Repeat this test three times to verify consistent output.
   - Interput results as follows:
     * If the lamp lights consistently at or above 65 on the scale, the ignition system up to the spark plugs is operating properly. Remove the spark plugs and replace any plug which is fouled, bridged, or otherwise unfit for service. Consider the possibilities that high heat, vibration, or moisture may be causing ignition problems and repeat Test No. 1 incorporating these factors into the test.
     * If the lamp does not light consistently above the specified value or does not light at all, follow the steps on the next page.

TEST NO. 1



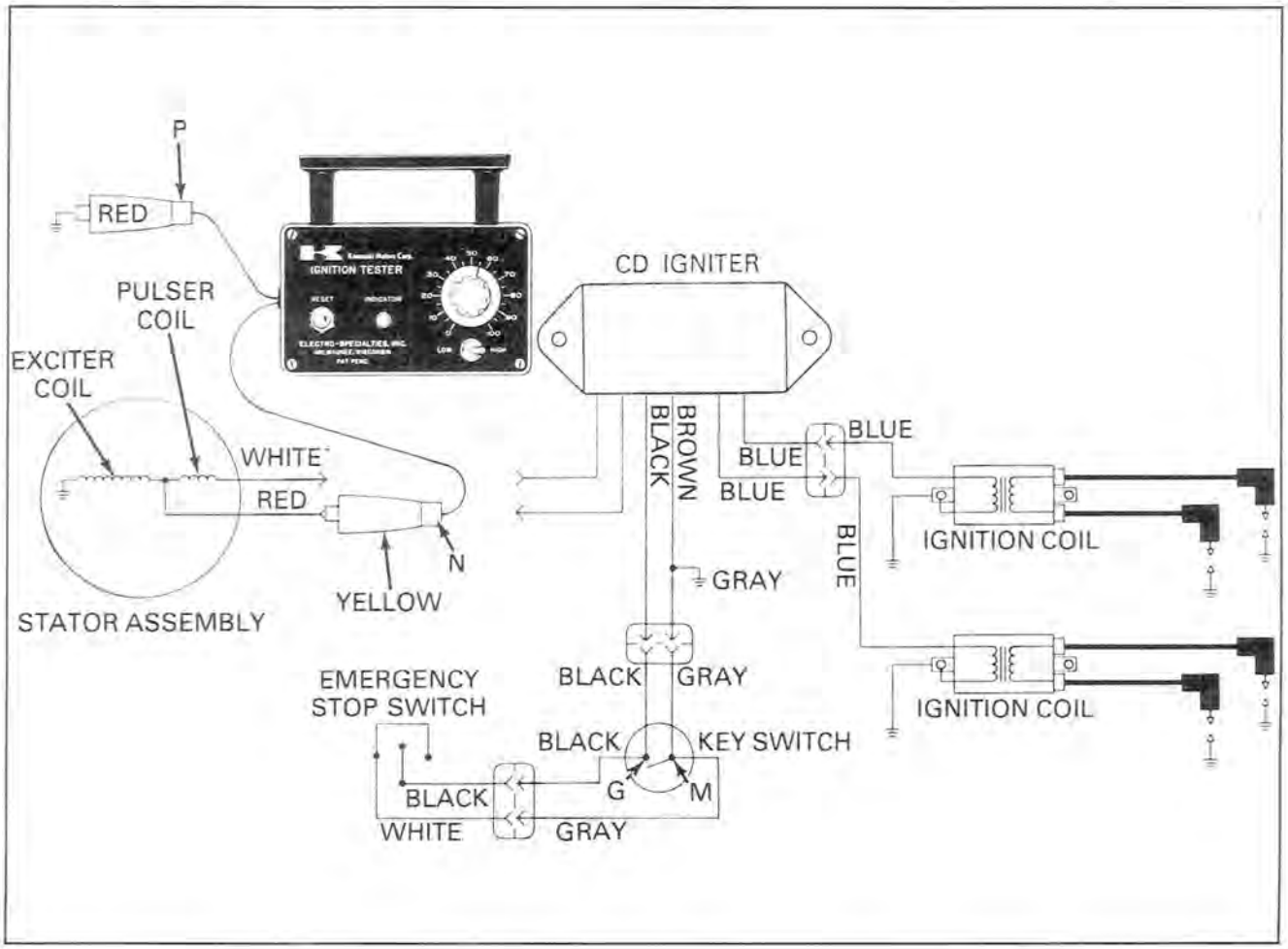
No Lamp or Low/Inconsistent Reading

Lamp Lights at Specified Value

STANDARD VALUE TEST NO. 1

RANGE	VALUE
Low	65

TEST NO. 2 - EXCITER COIL OUTPUT



CAUTION **Do not turn over the engine unless either coil or tester is connected to the CD igniter.**

Test Connections

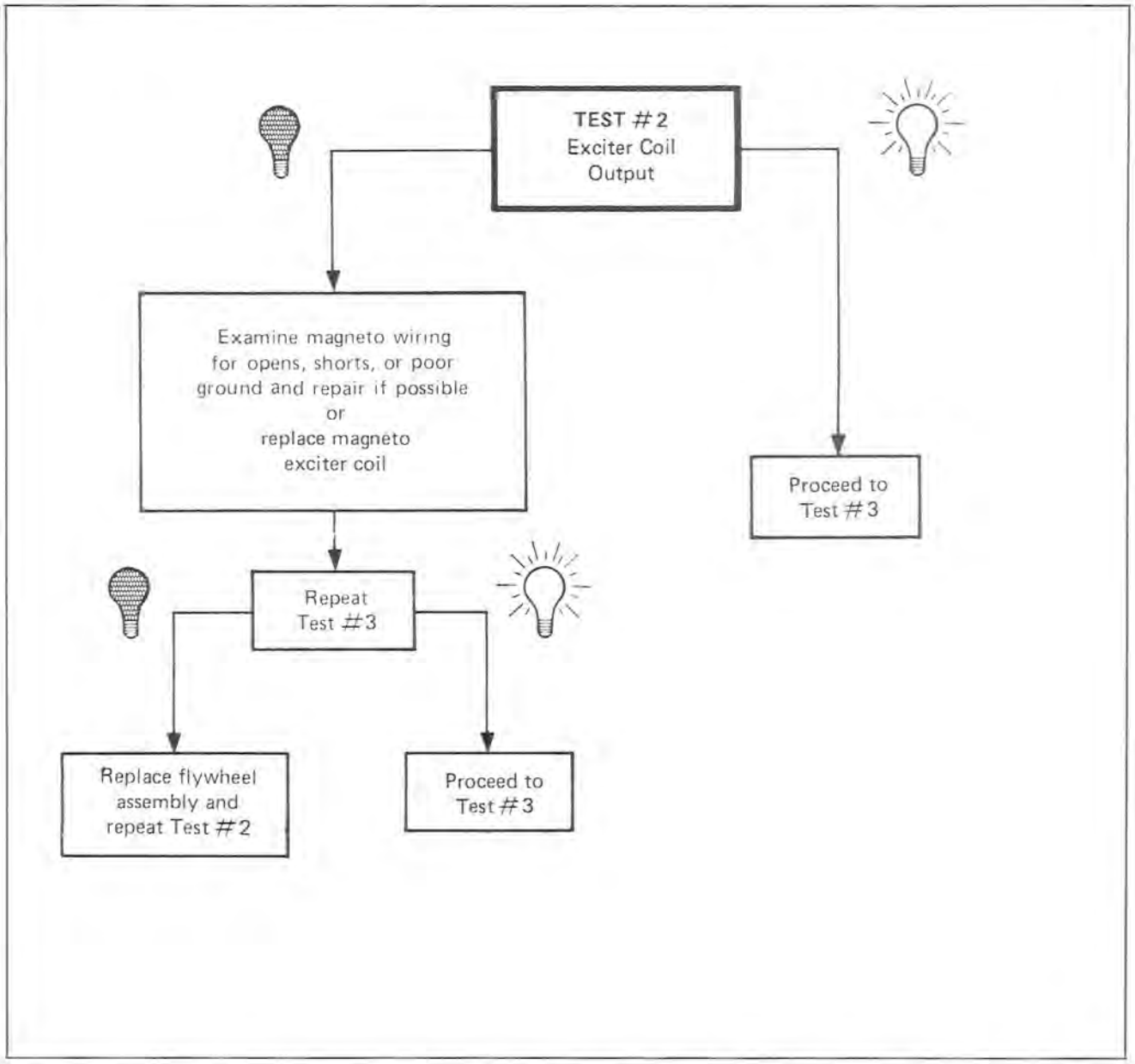
1. Disconnect the red and white wires between the stator assembly and the CD igniter.
2. Connect the tester N (yellow) lead wire to the red wire on the magneto end of the connector.
3. Connect the tester P (red) lead wire to a good engine ground.

Test Procedure.

1. Set the toggle switch to the High range.
2. Set the tester dial to 55.
3. Turn over the engine while observing the Indicator Lamp on the tester.
   - If the lamp lights, push the Reset button to turn the lamp off and repeat Test No. 2 three times. If the lamp lights consistently at 55, magneto exciter coil is good, proceed to test No. 3.
   - If the Indicator Lamp gives inconsistent readings at any dial setting or does not light at all, this indicates the following:
     * A defective exciter coil (check the ohms). Replace the exciter coil.
     * Defective wiring. Check the wiring.
     * Defective flywheel magnets. Replace the magnets.

Follow the steps in the chart on the next page.

TEST NO. 2



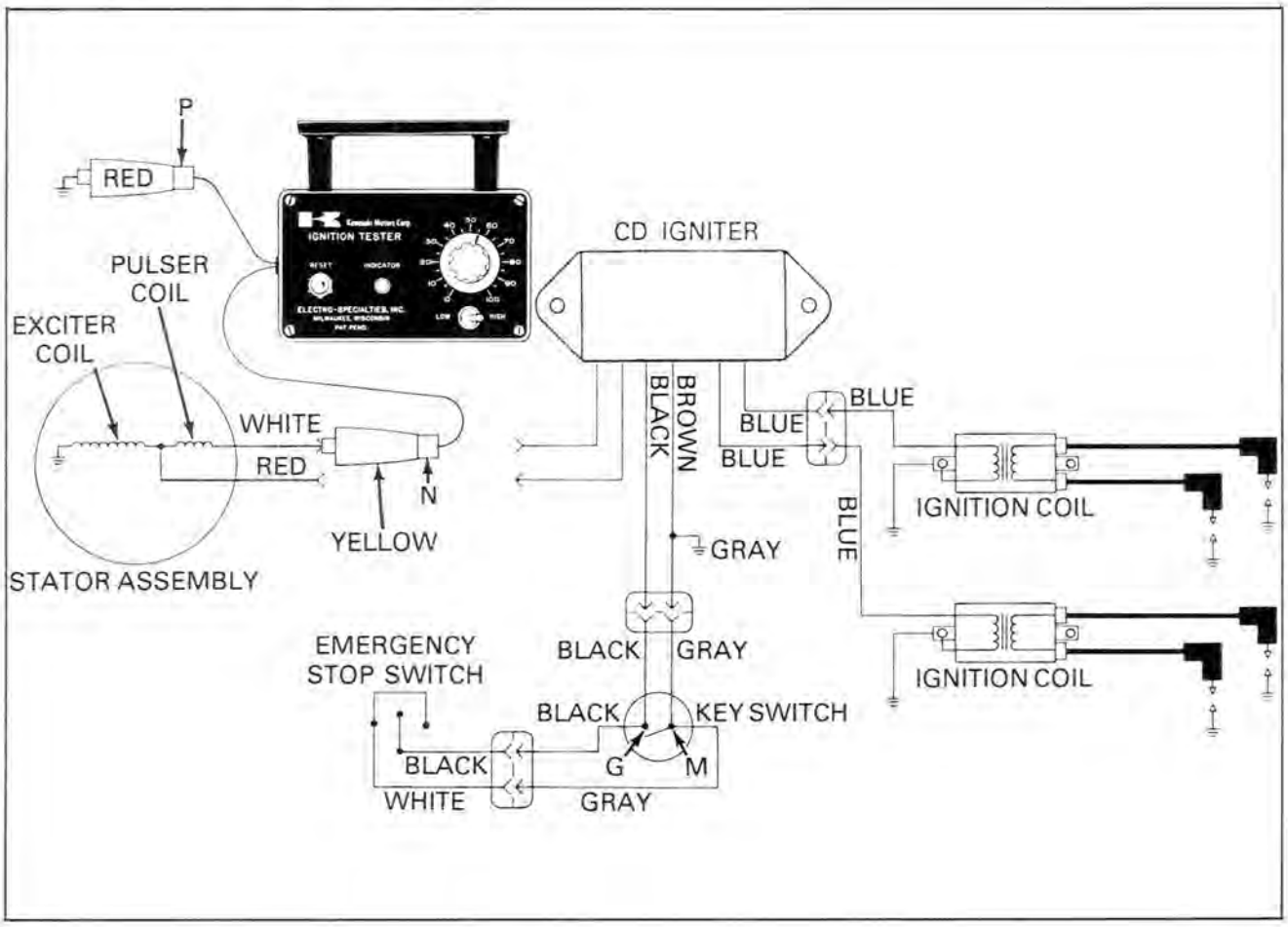

No Lamp or Low/Inconsistent Reading


Lamp Lights at Specified Value

STANDARD VALUE TEST NO. 2

RANGE	VALUE
High	55

TEST NO. 3 - PULSER COIL OUTPUT



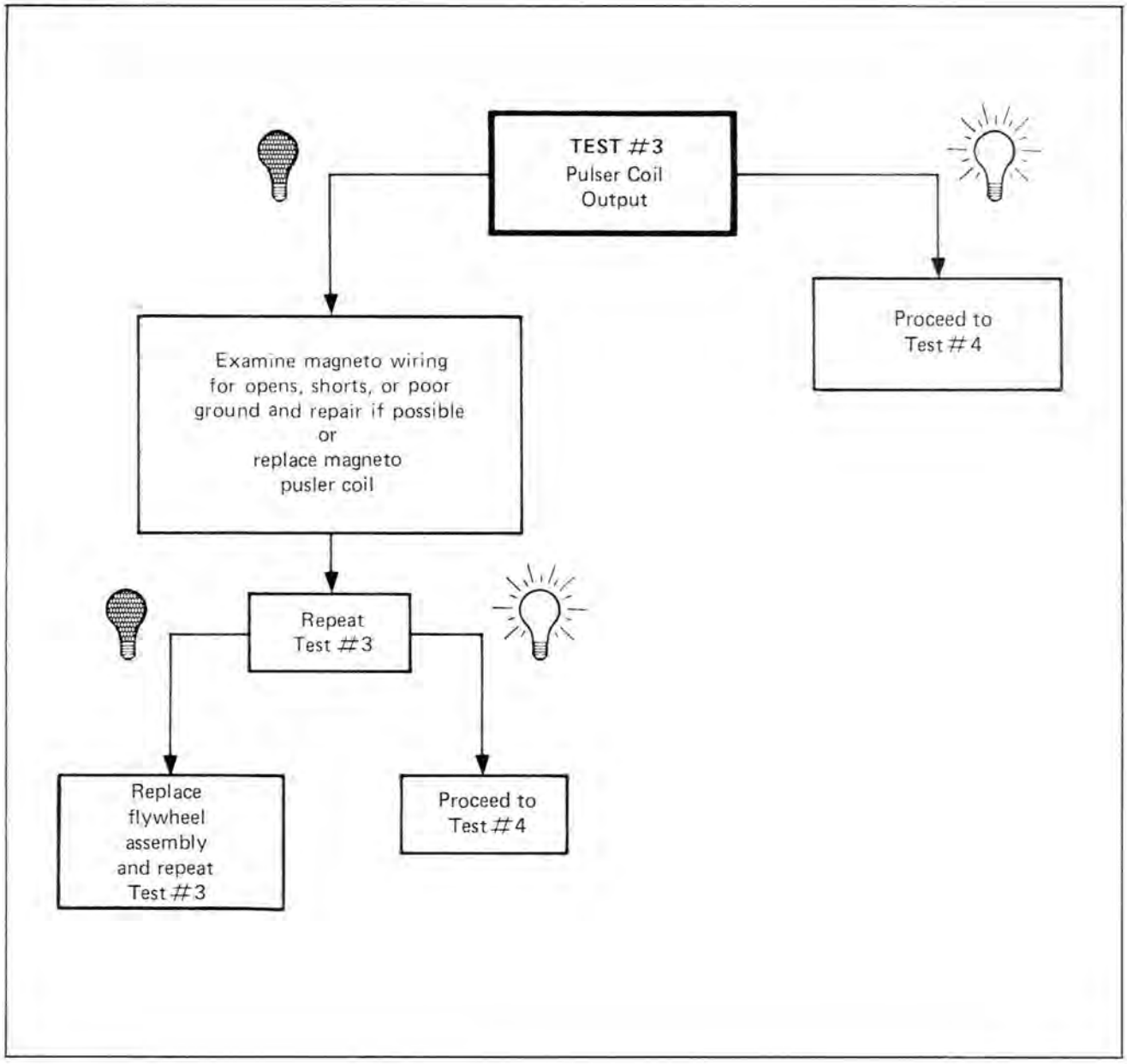
Test Connections

1. With both the red and white wires still disconnected, connect the tester N (yellow) lead wire to the white wire on the stator end of the connector.
2. Connect the tester P (red) lead wire to a good engine ground.

Test Procedure

1. Set the toggle switch to the High range.
2. Set the tester dial to 55.
3. Turn over the engine while observing the Indicator Lamp on the tester.
   - If the Indicator Lamp lights, push the Reset button to turn the lamp off and repeat Test No. 3 three times. If the lamp lights consistently at 55, the pulser coil is good, proceed to Test No. 4.
   - If the Indicator Lamp gives inconsistent readings or does not light at all, follow the steps on the next page.

TEST NO. 3



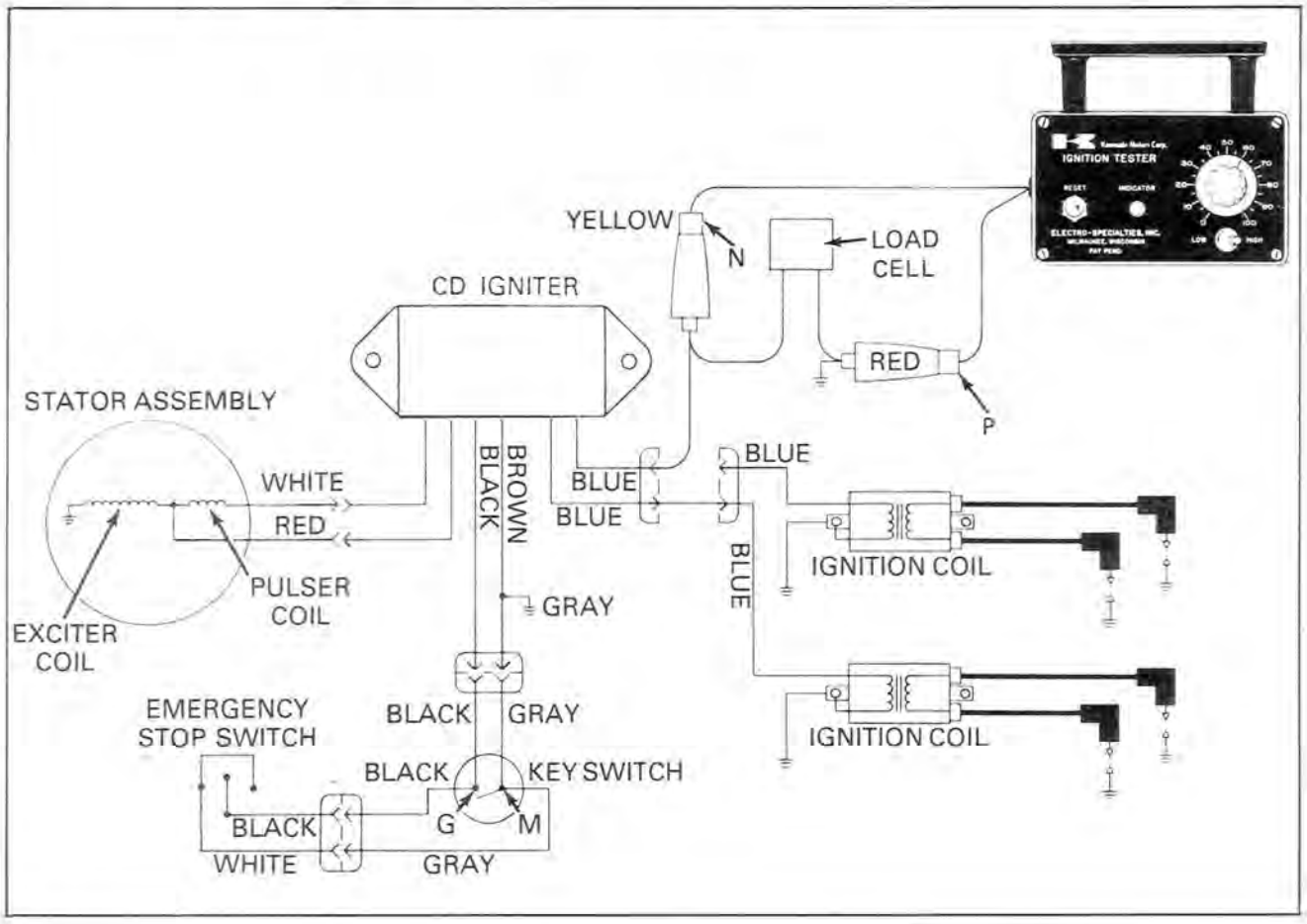
No Lamp or Low/Inconsistent Reading

Lamp Lights at Specified Value

STANDARD VALUE TEST NO. 3

RANGE	VALUE
High	55

TEST NO. 4 - CDI IGNITER OUTPUT TO IGNITION COILS



Test Connections

CAUTION **Never perform tests on the CDI igniter without the ignition coil or the tester connected to the output connections. This will prevent internal damage to the CDI igniter.**

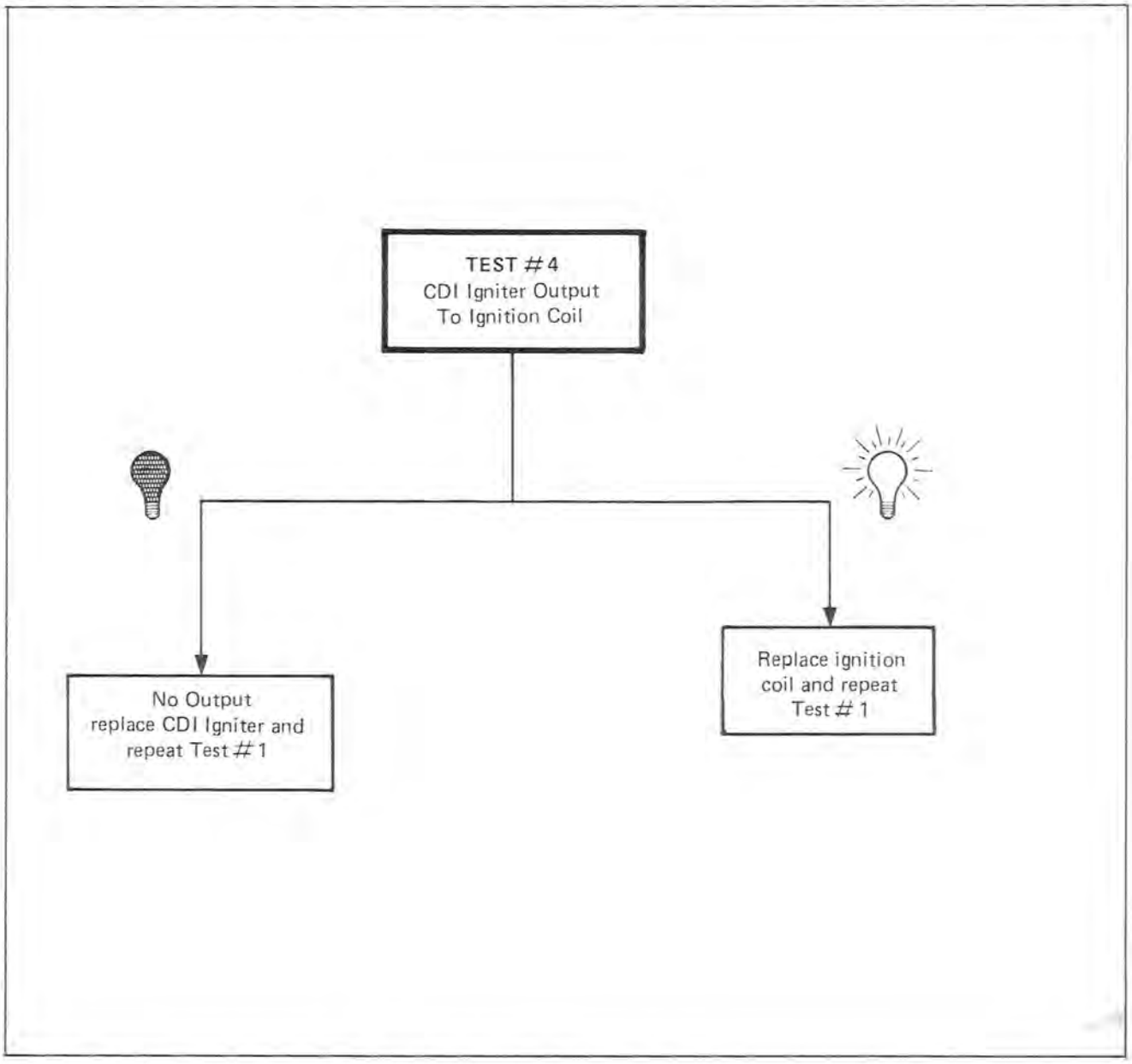
NOTE: Be sure red and white wires between the stator assembly and CD igniter are reconnected prior to performing this test.

1. Disconnect two wire connector between CD igniter and ignition coils.
2. Connect one ignition coil blue wire to a CD igniter blue wire my mis-aligning the two wire connector.
3. Connect load cell to CD igniter.
   - One load cell lead to blue wire from CD igniter.
   - Other load cell lead to ground.
4. Attach tester leads.
   - Secure tester P (red) lead to ground.
   - Connect N (yellow) lead to CD igniter blue wire with load cell.

Test Procedure

1. Set toggle switch to High range.
2. Set tester dial to 60.
3. Turn over the engine while observing the Indicator Lamp on tester.
   - If Indicator Lamp lights, push Reset button to turn lamp off and repeat Test No. 4 three times. If lamp lights consistently at 60, the CD igniter output to one ignition coil is good. Reverse connections at blue wires of CD igniter and repeat Test No. 4 three times. If lamp lights consistently at 60, CD igniter is good. Replace defective ignition coil and repeat Test No. 1.
   - If Indicator Lamp gives low/inconsistent readings or does not light at all, replace the CD igniter.

TEST NO. 4



No Lamp or Low/Inconsistent Reading

Lamp Lights at Specified Value

STANDARD VALUE TEST NO. 4

RANGE	VALUE
High	60

IGNITION TROUBLESHOOTING USING AN OHMMETER

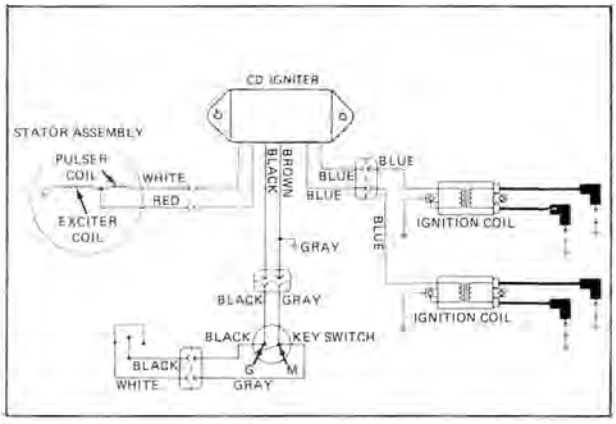
General Description

If the Kawasaki CD ignition tester is not available, the exciter coil, pulser coil and ignition coil may be checked using an ohmmeter. This type of test is not as accurate or sophisticated as using the Kawasaki CD tester, and the results are not 100% conclusive.

NOTE: Exercise care to prevent an electrical shock from the CD igniter. Handle the CD igniter carefully. If you should drop it, the incorporated electronic components will be damaged.

The following test procedures are alternate checks designed for locating ignition system malfunction using an ohmmeter.

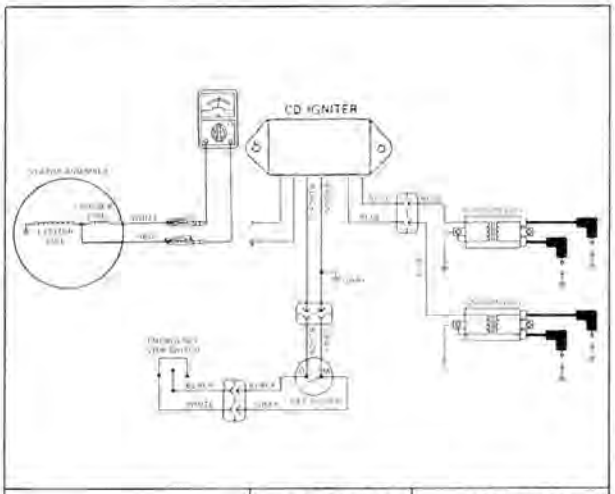
Wiring Connections — Check all wiring connectors to insure connections are clean, secure, and correct.



Exciter and Pulser Coils — To locate the cause of trouble (broken wire, short circuit, etc.), measure the resistance of each coil winding and check AC voltage output as specified.

- Repair defective wire or replace coil not within specifications.

CAUTION **Do not use an improper tester (insulation resistance testers or other testers with a battery of large capacity). The use of a large capacity tester may ruin components during test.**



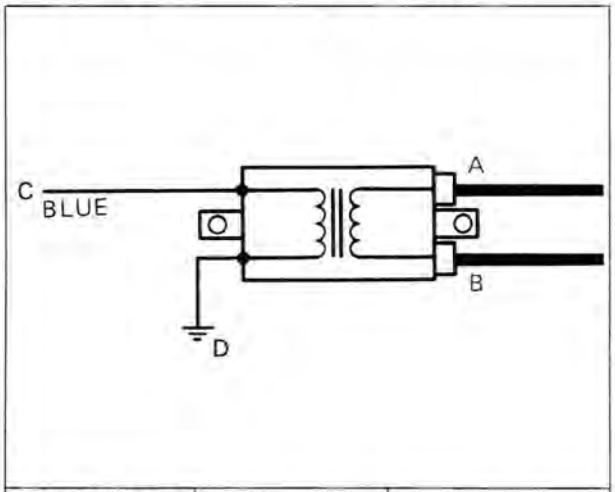
	EXCITER COIL	PULSER COIL
OHMMETER LEADS CONNECTED BETWEEN	RED AND BROWN (GROUND)	WHITE AND RED
RESISTANCE Ω	165Ω± 20%	18.5 ± 20%
*VOLTAGE AC	40 VAC	4 VAC

*Measure at cranking speed with spark plugs installed.

Ignition Coil — Measure resistance of ignition coil primary and secondary windings as specified.

- Repair defective wire or replace coil not within specifications.

CAUTION **Do not use an improper tester (insulation resistance testers or other testers with a battery of large capacity). The use of a large capacity tester may ruin components during test.**



OHMMETER LEADS CONNECTED BETWEEN	PRIMARY WINDING C—(GROUND D)	SECONDARY WINDING A—B
RESISTANCE*	0.19Ω ± 20%	6KΩ ± 20%

* Defective coils cannot always be detected using this test alone. Use of coil tester which simulates operating condition is the most reliable test method.

INSTRUMENTS

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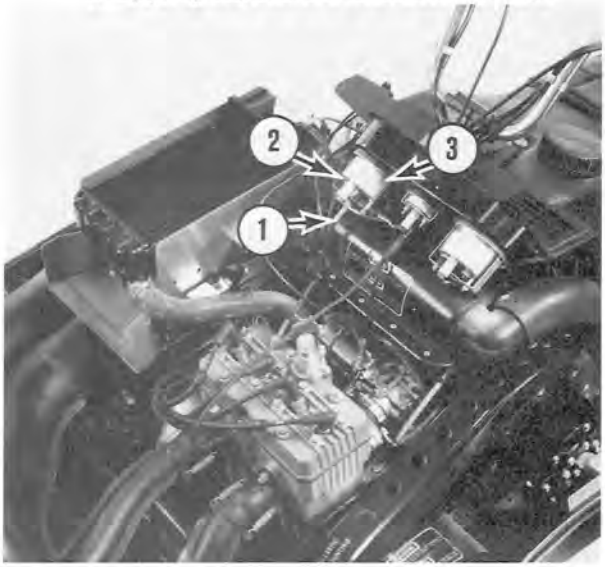
SPEEDOMETER

Speed and mileage (odometer) indications are calibrated in Kilometers.

The speedometer cable should be lubricated once a year. Remove the cable from the rear of the speedometer and lubricate the cable with graphite.

Speedometer Removal

1. Disconnect cable from speedometer.
   - Prevent nut from sliding down cable by wrapping tape around cable casing.



1. Speedometer Cable.
2. Light Plug.
3. Bracket.

2. Unplug light from speedometer.
3. Remove trip odometer reset knob.
   - Loosen mounting screw through end of reset knob.
   - Pull reset knob from speedometer, being careful not to lose mounting screw.

1. Reset Knob.
2. Screw Inside.

4. Unfasten speedometer mounting bracket.
   - Remove mounting nuts and washers.
5. Slide speedometer from instrument panel.

Speedometer Installation

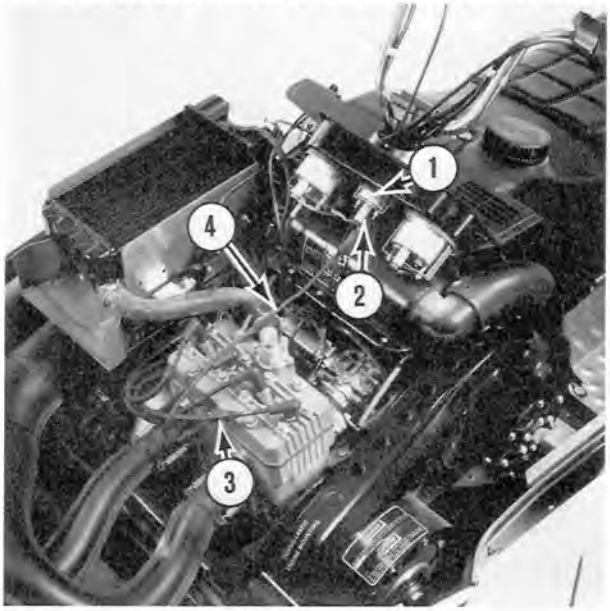
1. Mount speedometer in instrument panel.
   - Position speedometer in panel.
   - Install speedometer mounting bracket.
   - Torque mounting bracket nuts to 11 in. lb (0.1 kg-m).
2. Install trip odometer reset knob.
   - Align flats on shaft and reset knob.
   - Tighten reset knob mounting screw.
3. Plug light into speedometer.
4. Connect cable to speedometer.
   - Tighten cable retaining nut.

TEMPERATURE GAUGE

Temperature Gauge Removal

CAUTION **Be careful not to kink temperature gauge tube, as it is easily damaged.**

1. Drain cooling system.
   - Refer to Draining Coolant procedure.
2. Disconnect sending unit from engine.
   - Be careful not to damage capillary tube.



1. Bracket.
2. Light Plug.
3. Sending Unit.
4. Capillary Tube.

3. Cut cable tie securing temperature gauge tube to radiator hose.
4. Pull out light bulb assembly.
5. Unfasten gauge bracket and remove gauge from panel.

Temperature Gauge Inspection

Test temperature calibration by submerging sending unit into boiling water.

- Needle should move upward to approximately the point indicated. End of green zone equals 230°F (110°C).

1. 212°F (100°C).

Temperature Gauge Installation

1 Mount gauge in instrument panel.
   - Torque bracket mount nuts to 11 in. lb (0.1 kg-m).
2. Connect light bulb.
3. Install sending unit in engine.
   - Torque sending unit nut to 20 ft lb (2.7 kg-m).
4. Secure temperature gauge tube to radiator hose with cable tie.
5. Fill cooling system.
   - Refer to Filling Cooling System procedure.

MUFFLER

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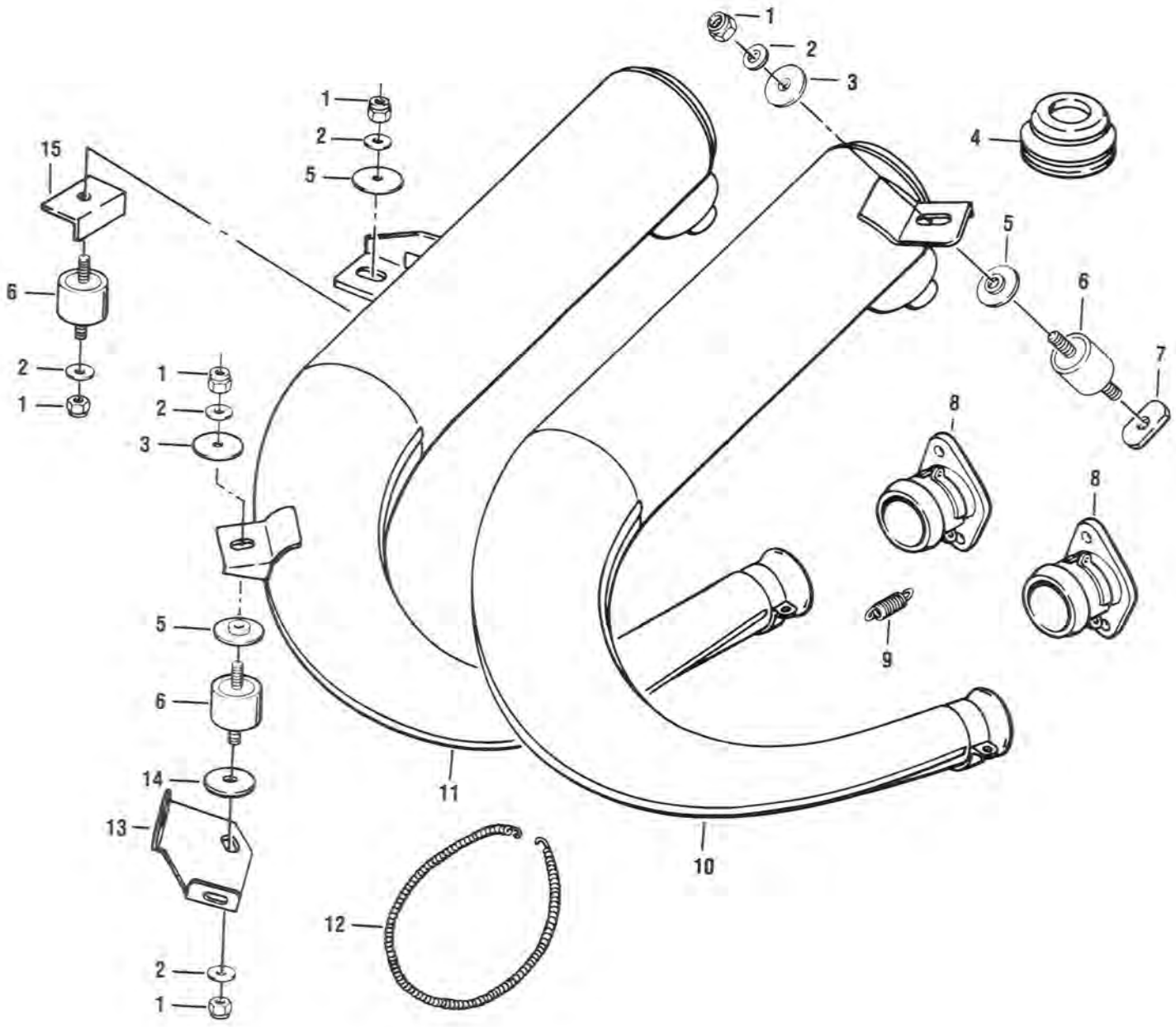
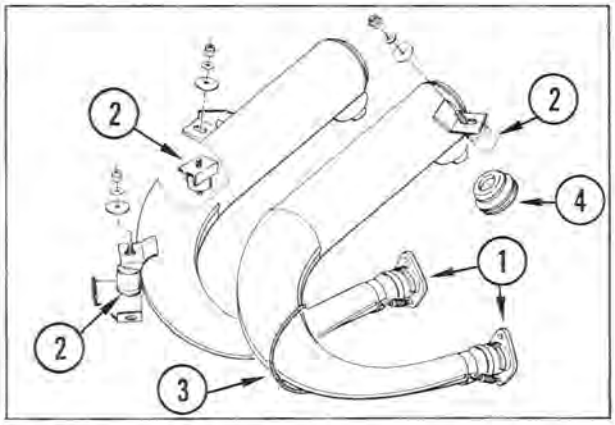


1 NUT, insert, 5/16-18
2 WASHER, plain, 5/16"
3 WASHER, insulating flat
4 BOOT, exhaust outlet
5 WASHER, insulating shoulder
6 DAMPER, exhaust mount
7 NUT, special
8 MANIFOLD, exhaust
9 SPRING, exhaust joint
10 MUFFLER ASSY, tuned LH
11 MUFFLER ASSY, tuned RH
12 SPRING, RH to LH muffler
13 BRACKET, muffler
14 WASHER, special (shim muffler away from pan)
15 INSULATOR, muffler mount

MUFFLER SERVICING

Muffler Removal

1. Disconnect springs from exhaust flanges.



1. Exhaust Flanges.
2. Dampers (3).
3. Spring.
4. Exhaust Boots.

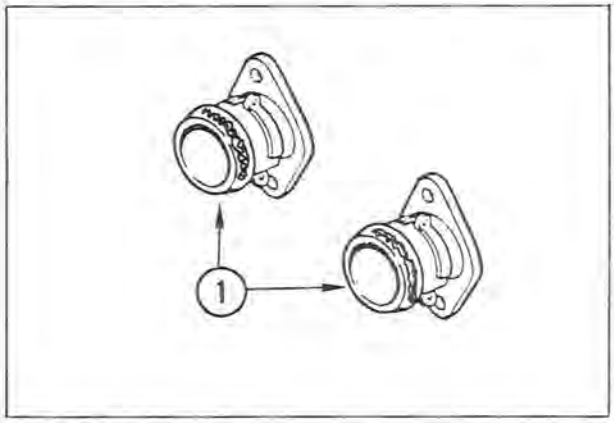
2. Remove muffler mounting nuts and washers from mount dampers.
3. Unfasten spring securing mufflers together at front.
4. Remove mufflers from snowmobile.
   - Lift rear of mufflers to free outlet pipes from exhaust outlet boots.
   - Pull mufflers forward to separate ball joints at exhaust flanges.
   - Lift mufflers out of engine compartment.

Muffler Inspection

1. Inspect mufflers for cracks and leakage.
   - Repair cracks by welding as required.
2. Check mufflers for loose internal components.
   - Tap muffler on floor and listen for rattling or ringing inside muffler.
   - If loose internal components are suspected, replace muffler.
3. Inspect inlet and outlet pipes for restrictions.
   - Remove excessive carbon deposits with a suitable scraper.

Muffler Installation

1. Apply a continuous bead of high temperature silicone sealer on ball joint of each exhaust flange before installing mufflers to prevent leakage.



1. Apply Sealer Here.

2. Position mufflers in engine compartment.
   - RH muffler fits beneath LH muffler.
   - Slide both mufflers onto exhaust flanges.
   - Insert outlet pipes into exhaust boots.
3. Fasten spring securing mufflers together at front.
4. Install muffler mounting nuts and washers on mount dampers.
   - Connect retaining springs to exhaust manifold flanges.
   - Be certain that RH exhaust pipe does not touch lower pan. If pipe touches pan, add shim washers under front exhaust mount damper until pipe clears pan.
   - Torque nuts to 55 in. lb (0.6 kg-m).

OIL INJECTION SYSTEM

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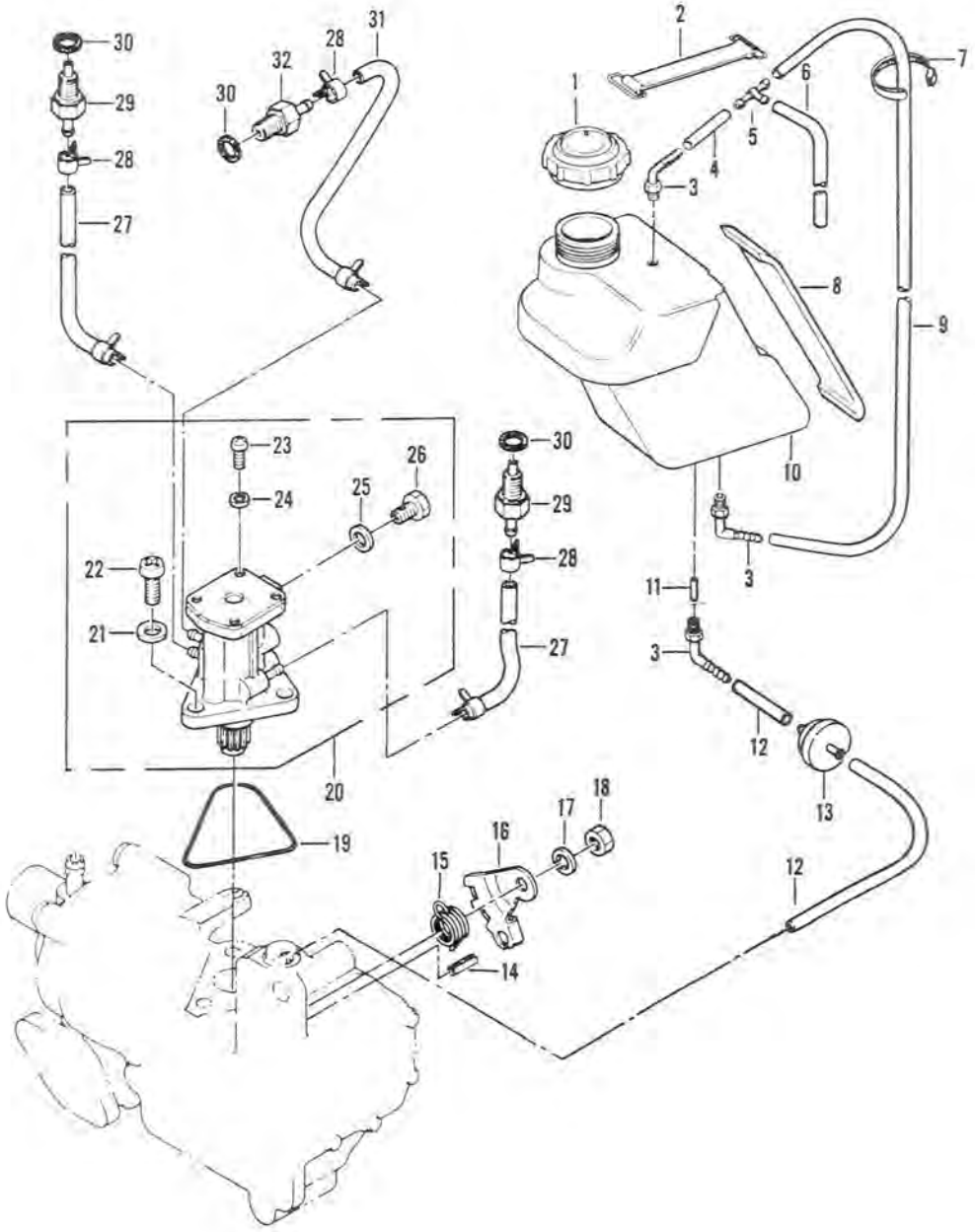


1 CAP, oil tank
2 BAND, oil tank
3 FITTING, elbow
4 TUBE, 7/32 x 1.50"
5 FITTING, T
6 TUBE, 1/8 x 15.00"
7 BAND, cable tie
8 PAD, oil tank
9 TUBE, 7/32 x 15.00"
10 TANK, oil
11 PIPE, pick-up
12 TUBE, 7/32 x 12.00"
13 FILTER, oil
14 PIN, spring, 3 x 14mm
15 SPRING, lever return
16 LEVER, control
17 WASHER, spring, 6mm
18 NUT, 6mm
19 O-RING, oil pump
20 OIL PUMP ASSY
21 WASHER, plain, 6mm
22 SCREW, pan head, 6 x 16mm
23 SCREW, pan head, 4 x 8mm
24 WASHER, spring, 4mm
25 WASHER, 6.5 x 12 x 1.0mm
26 BOLT, special air vent
27 TUBE, 3 x 6 x 160mm
28 CLAMP, oil tube
29 VALVE, check
30 GASKET, 8.2 x 12 x 1mm
31 TUBE, 3 x 6 x 100mm
32 VALVE, check

OIL INJECTION SYSTEM

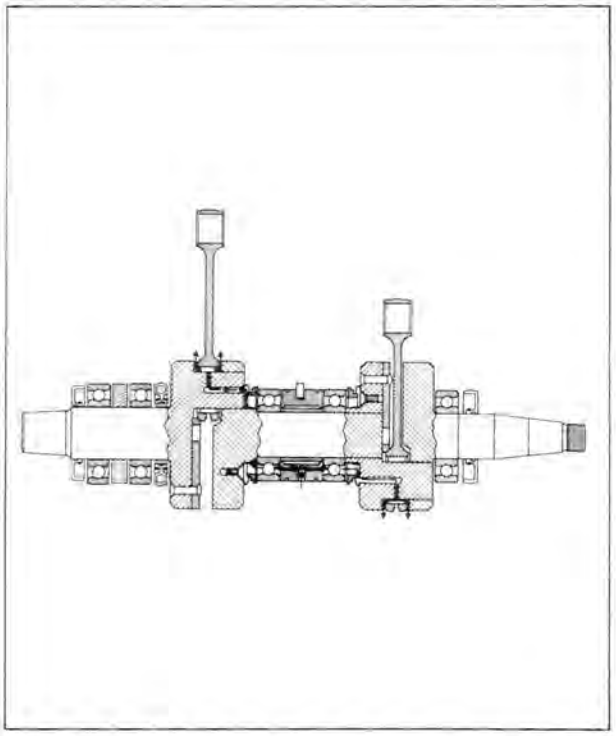
ENGINE LUBRICATION

These snowmobile engines are automatically lubricated by a variable pump which may change the mixture from about 200 to 1 to about 25 to 1, depending on engine speed and throttle opening. When the engine needs less oil, as at an idle, it gets less oil.

Under full throttle, the engine will be fed more oil. Automatic oiling is economical because it gives the engine only as much oil as it needs. This also cuts down on visible exhaust emissions.

In the Kawasaki Injectolube System, oil is kept in a tank separate from the engine and pumped by an oil pump to the engine. It is then mixed with the fuel/air mixture from the carburetor, supplied directly to the crankshaft main bearings, and the connecting rod big end bearings.

The rate at which the oil is pumped is controlled by both throttle opening and engine speed. The quantity of oil will vary with the engine's requirements. With the ideal lubrication that results, engine performance is vastly improved. The fresh, high viscosity oil, supplied directly to the crankshaft bearings and connecting rod big end, increases engine durability.

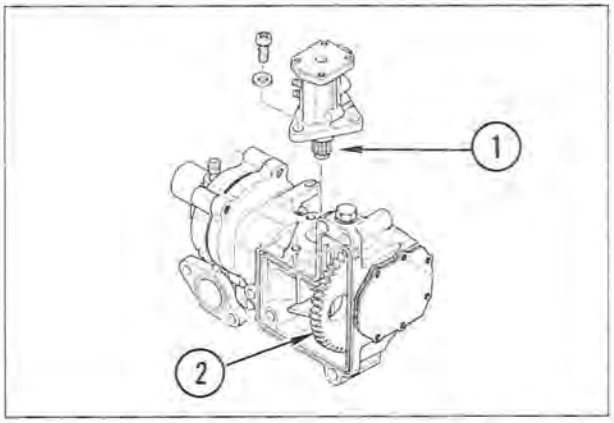


OIL PUMP

The oil pump for the engine lubrication system is a plunger type. In this system, the oil pump output is controlled to regulate the ratio of oil to fuel/air mixture so that proper lubrication is achieved at all engine speeds and loads.

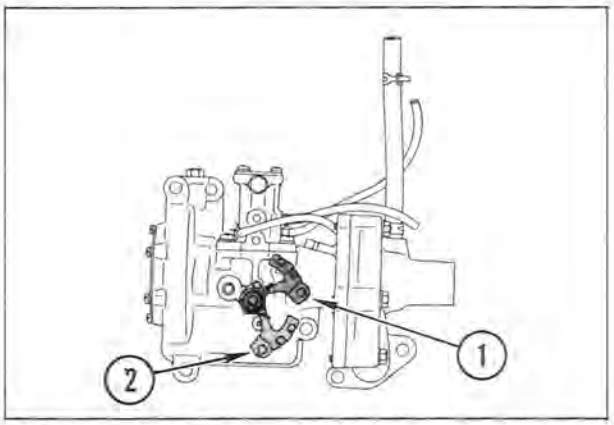
Oil pump output is controlled partially by the number of plunger strokes per minute. The number of plunger strokes is determined by the speed of oil pump shaft rotation. Since crankshaft rotation is transmitted directly to the oil pump shaft, the oil pump output changes in direct proportion to engine RPM.

There are two high points on the plunger cam face, which cause two complete pumping cycles for each revolution of the oil pump plunger.



1. Plunger Connected to Driven Gear Shaft.
2. Driven Gear.

Another factor that controls oil pump output is the plunger stroke length. This length is determined by the oil pump control lever, which is positioned by the throttle lever, through the oil pump cable.

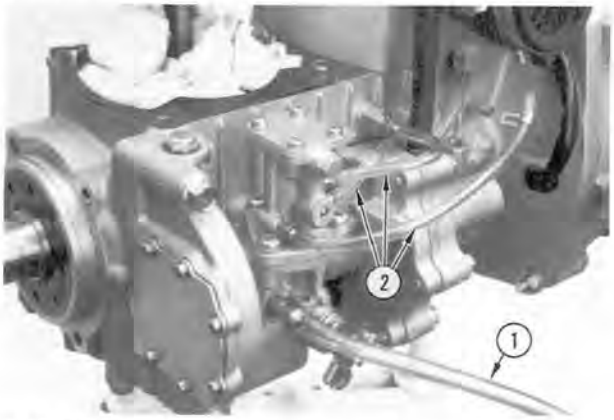


1. Control Lever Full Flow.
2. Control Lever at Idle.

As the control lever is opened towards FULL FLOW position, plunger stroke increases, causing greater oil pump output volume. When the control lever returns to idle position, plunger stroke decreases, reducing oil pump output.

Oil Pump Removal

1. If engine is in chassis, remove cylinders.
   - Refer to Cylinder Removal procedure.
2. Remove oil inlet tube from oil pump.
   - Plug inlet tube to prevent leakage.



1. Inlet Tube.
2. Injection Tubes.

3. Disconnect injection tubes.
   - Release clamp tension and pull tubes from oil pump fittings.
4. If engine is out of chassis, remove coolant pump/gearcase assembly.
   - Refer to Coolant Pump/Gearcase Removal procedure.
5. Remove oil pump.
   - Unfasten pump mounting screws.

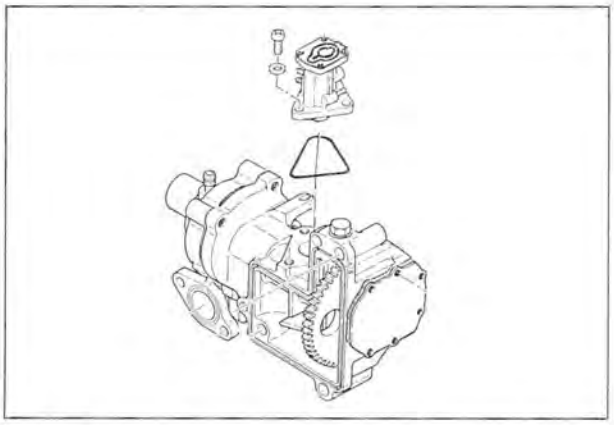
Oil Pump Installation

CAUTION **Perform oil pump service in clean environment only. Because of precision tolerances, work area and hands must be free from contamination, or oil pump malfunction can occur.**

1. Disassemble oil pump.
   - Remove cover plate screws.
   - Lift out pump spring.
   - Slide out plunger/cam assembly.
   - Note position of cam rollers.

1. Cam Groove (long).
2. Cam Rollers.
3. Cam Groove (short).

2. Mount oil pump body on coolant pump/gearcase housing.
   - Position new O-ring in pump body bottom groove.



3. Slide plunger/cam assembly into pump body.
   - Check to see that cam rollers remain in position.
   - Be certain that cam is below pump body upper surface to verify plunger gear engagement. If plunger gear is not engaged, lift and rotate plunger/cam assembly to align gear teeth. When teeth are aligned, plunger/cam assembly will slide completely into position.

1. Cam Rollers (2).
2. Alignment Pin Groove.
3. Cover O-Ring.

4. Install cam alignment pin.
   - Align groove in pump bore with either of the longer grooves in cam, as shown.
   - Insert pin.

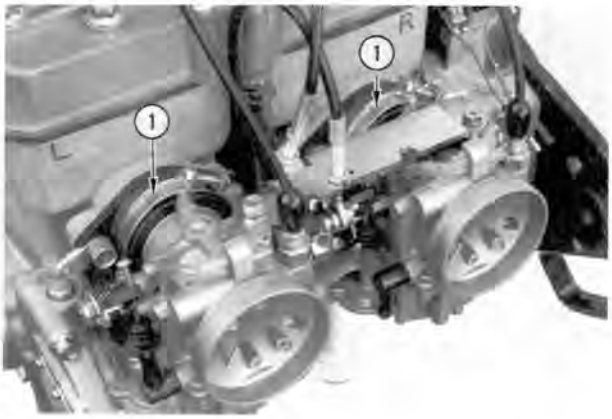
1. Cam Below Housing Surface.
2. Alignment Pin Installed.
3. Spring.

5. Position new O-ring in top surface of pump body.
6. Set pump spring into position.
7. Mount cover plate.
   - Rounded edge goes toward engine.
8. If removed, fasten coolant pump/gearcase assembly to engine.
   - Refer to Coolant Pump/Gearcase Installation procedure.
9. If removed, replace cylinders and cylinder head.
   - Refer to Cylinder Installation procedure.
10. Connect oil inlet tube to oil pump fitting.
11. Test oil pump output.
    - Refer to Oil Pump Output Test procedure.
12. Connect injection outlet tubes to proper nozzles on oil pump.
    - Position tube clamps on nozzles.

Oil Pump Supply Tube Bleeding

CAUTION **Failure to bleed out air trapped in the oil tube can cause severe engine damage.**

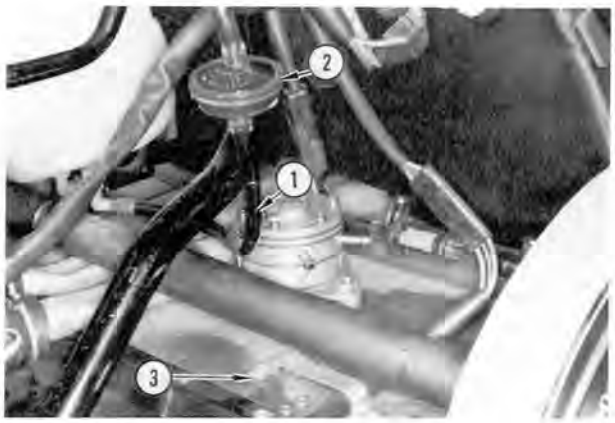
1. Remove the air silencer assembly.
   - Refer to Silencer Removal procedure.
2. Remove carburetors from holders.
   - Loosen carburetor holder clamps.
   - Pull off carburetor assembly.



1. Carburetor Holders.

WARNING **Use care not to kink or damage control cables. Component failure or throttle malfunction could result, causing personal injury.**

   - Temporarily store carburetor assembly under the instrument panel, being careful not to kink the control cables.
   - Cover carburetors to prevent dirt from entering.
3. Remove oil supply tube from oil pump inlet fitting.
4. Pull tube out from underneath fuel tube cover.
5. Bleed air from supply tube.
   - Hold oil supply tube and filter in a vertical position until oil completely fills the tube and filter.
   - Be sure all air in filter has been removed.



1. Oil Supply Tube.
2. Oil Filter.
3. Fuel Tube Cover.

6. Quickly reinstall oil supply tube under fuel tube cover.
7. Reconnect oil supply tube to oil pump inlet fitting.
   - Pinch off oil supply tube with pliers to prevent excessive spillage.
8. Bleed air from oil pump.
   - Loosen bleed bolt (do not remove) on oil pump and allow oil to drain until all air bubbles are removed from oil filter and inlet tube.
   - Visually check entire length of the tube to be sure that all air has been removed.
   - Tighten bleed bolt to 70 in. lb (0.7 kg-m).

1. Bleed Bolt.

9. Install carburetors.
   - Tighten carburetor holder clamps.
10. Remove air from oil pump outlet tubes.
    - Refer to Outlet Tube Purging procedure.

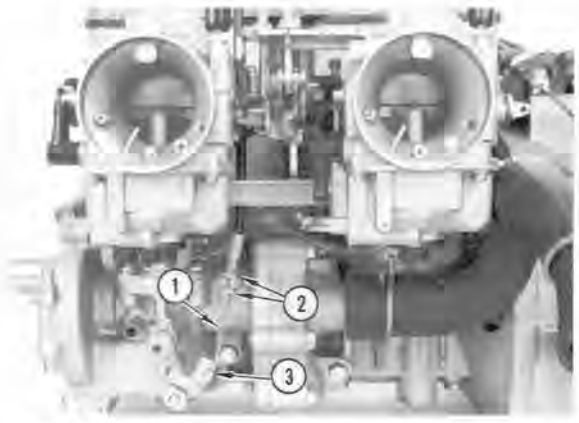
Oil Pump Outlet Tube Purging

CAUTION **Any air bubbles in the oil pump outlet tubes will cause serious internal engine damage. Purge air from these tubes as follows:**

1. Be sure all air is removed from oil pump supply tube.
   - Perform Oil Pump Supply Tube Bleeding procedure.

WARNING **Failure to disconnect oil pump control cable when performing this procedure may damage the cable. A damaged oil pump control cable could prevent the throttle from returning to idle position, resulting in automatic clutch engagement when engine is started, which may lead to personal injury.**

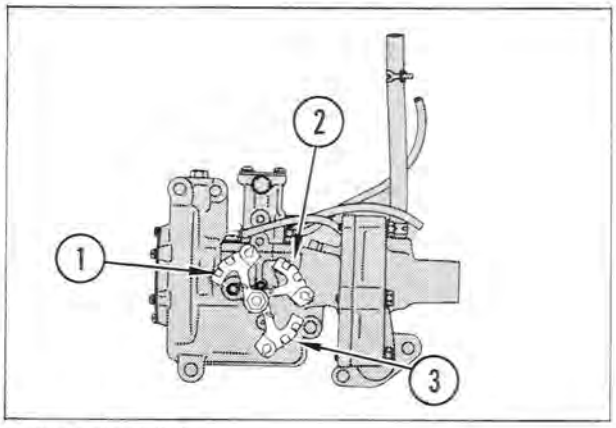
2. Disconnect cable from oil pump lever.
   - Remove inner control cable from control lever on oil pump to prevent damage to cable.
   - Do not disturb cable locknuts when removing the inner cable.



1. Inner Control Cable.
2. Locknuts.
3. Oil Pump Lever.

3. Position control lever to "FULL FLOW" position.

CAUTION **Do not open control lever beyond the "FULL FLOW" position (1/2 of available lever travel) or internal component failure will occur, rendering pump inoperative.**



1. Wide Open (X).
2. Full Flow (✓).
3. Idle Position (✓).

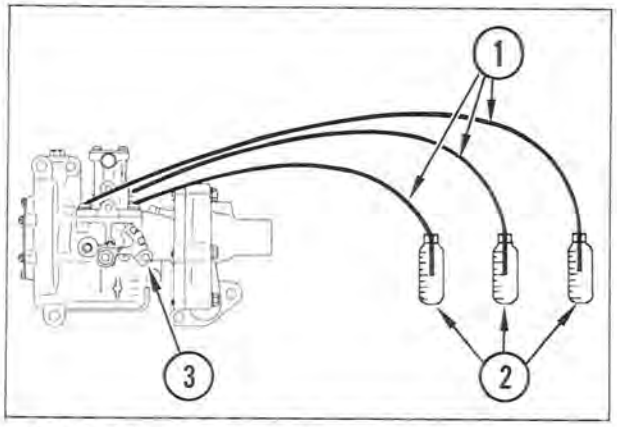
   - Attach rubber band to hold oil pump control lever in "FULL FLOW" position.
   - This position causes maximum oil flow through outlet tubes.

CAUTION **Never run engine with air silencer removed from the carburetors. Poor engine performance and engine damage will result.**

4. Temporarily position air silencer onto carburetors.
5. Purge air from outlet tubes.
   - Run engine at idle speed for one minute.
   - This is ample time to purge all air from oil pump outlet tubes.
6. Reconnect oil pump cable.
   - Remove air silencer assembly.
   - Release rubber band from control lever.
   - Reconnect oil pump inner control cable to lever.
   - Be sure to check for correct operation of oil pump control lever and cable by activating throttle control lever on handlebar.
7. Install air silencer onto carburetors.
   - Refer to Silencer Installation procedure.

Oil Pump Output Test

1. Premix gasoline and oil at 40:1 ratio for test.
   - Mix 1 pint (0.47 liter) Kawasaki Snowmobile Oil with 5 gallons (18.9 liters) gasoline.
2. Connect fuel pump inlet tube to premix container, or drain fuel tank and add premix.
3. Disconnect oil pump outlet tubes at oil pump fittings.
4. Attach test tubing to pump.
   - Remove carburetors from Holders for access to oil pump outlet fittings.
   - Cut three pieces of suitable length tubing 1/8 in. (3 mm) diameter for use during test.
   - Slide one end of each test tube onto the oil pump outlet fittings.
   - Insert loose end of each test tube into its own calibrated container capable of measuring 5 cc.



1. Test Tubing.
2. Calibrated Containers.
3. FULL FLOW Position.

5. Purge test tubes.
   - Secure oil pump control lever in "FULL FLOW" position.
   - Start engine.
   - Adjust idle to 3000 RPM.
   - Run engine until all air is pumped from test tubes.

6. Measure pump output.
   - Operate engine for 1 minute at 3000 RPM.
   - Measure pump output in each calibrated container.

7. Compare pump output with the following specifications:
   - Oil pump to crankcase tube = 1.68 to 2.03 cc per minute (each outlet).
   - Oil pump to crankcase tube = 3.35 to 4.06 cc per minute.

8. If output does not meet specifications, replace pump.
   - Refer to Oil Pump Removal procedure.

9. If output meets specifications, remove test equipment.
   - Disconnect test tubes.
   - Free oil pump control lever.
   - If removed, connect fuel pump inlet tube to fuel tank outlet.
   - Install carburetors and secure with holder clamps.

NOTE: If premix was put in snowmobile fuel tank, it will not harm the engine and does not require draining.

10. Connect original outlet tubes to oil pump fittings.

1. To LH Cylinder.
2. To Crankcase.
3. To RH Cylinder.

11. Purge outlet tubes.
    - Refer to Oil Pump Outlet Tube Purging procedure.
12. Adjust idle speed.
    - Refer to Carburetor Adjustment procedure.

CHECK VALVE

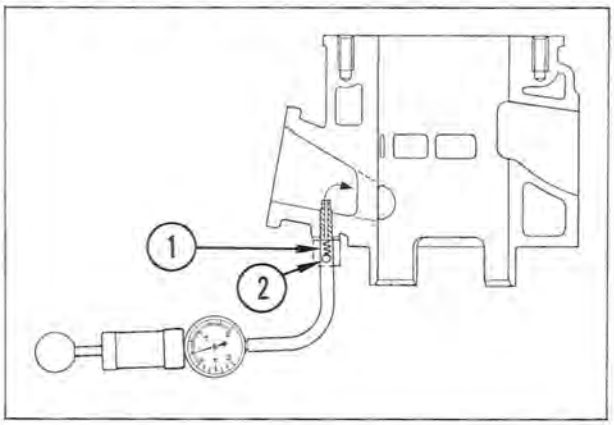
A check valve is installed in the oil pump outlet tubes to prevent oil from bleeding back to the pump when engine is not running. The check valve retains oil in the outlet tubes to assure lubricant is immediately available to engine when it is restarted.

Check Valve Test

1. Remove air silencer.
   - Refer to Silencer Removal procedure.
2. Remove carburetors from holders.
   - Pull carburetor back, out of the way, for access to oil pump outlet tubes.
3. Disconnect oil outlet tubes from pump fittings.
4. Attach pressure tester to outlet tube.
   - A small capacity, hand held pressure tester is recommended for testing check valve operation.

CAUTION **Do not use high pressure compressed air on the check valve. High pressure air will damage the valve which will result in engine failure.**

5. Apply pressure and observe pressure gauge indications.
   - Check valve should open (allowing flow) when applied pressure is between 3 to 6 psi (0.21 to 0.42 kg/cm^2).



1. Spring.
2. Ball (check valve).

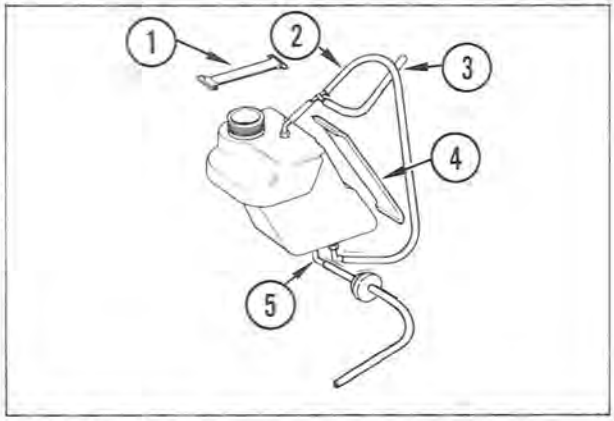
* Replace check valve if less than 3 psi (0.21 kg/cm²) opens check valve.
* Replace check valve if more than 6 psi (0.42 kg/cm²) is required to open check valve.

6. Remove all air from oil injection system.
   - Perform Supply Tube Bleeding procedure.
   - Perform Outlet Tube Purging procedure.

OIL TANK

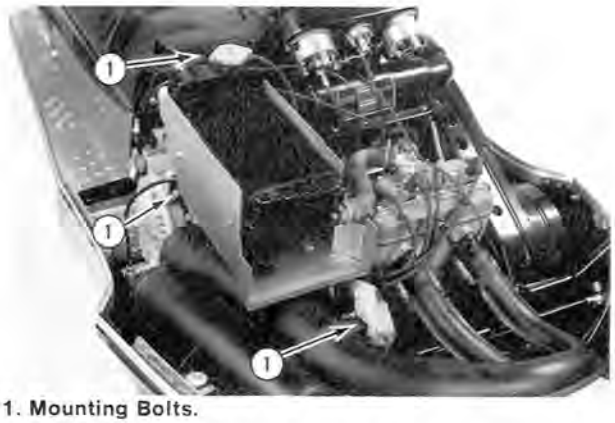
Oil Tank Removal

1. Drain oil tank.
   - Pull oil level tube from fitting at top of tank and drain oil into a suitable container. Capacity is 2-1/2 quarts (2.37 liters).



1. Oil Tank Band.
2. Oil Level Tube.
3. Oil Tank Vent Tube.
4. Protective Pad.
5. Supply Tube (outlet).

2. Unfasten radiator mounting brace assembly.
   - Remove brace assembly mounting bolts.



1. Mounting Bolts.

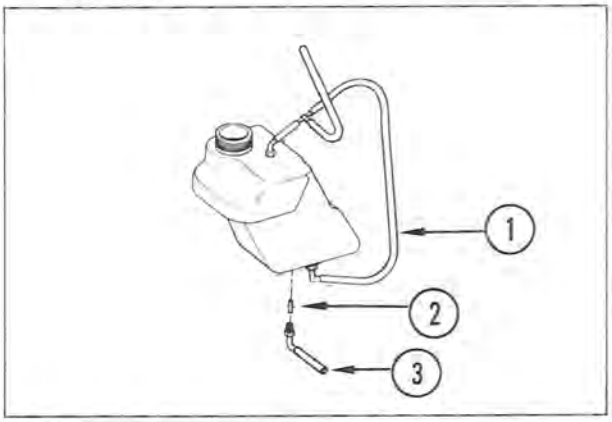
3. Remove oil tank retaining band.
4. Remove oil tank.
   - Swing radiator and duct assembly out of the way to raise oil tank slightly.
   - Disconnect tubes from bottom oil tank fittings.

Oil Tank Inspection

1. Clean oil and residue from tank with mild solvent.
2. Examine tank for cracks or leaks.
   - Repair or replace as necessary.

CAUTION **If pick-up pipe is not installed in tank outlet fitting, foreign matter may enter oil pump resulting in engine failure.**

3. Be sure pick-up pipe is installed in tank outlet fitting.



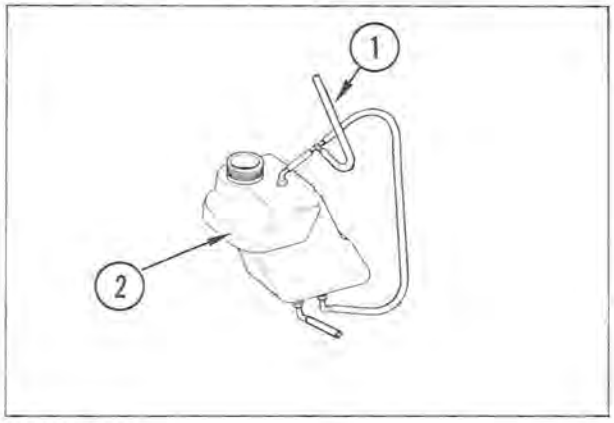
1. Oil Level Tube.
2. Pick-Up Pipe.
3. Outlet Tube.

Oil Tank Installation

1. Connect vent, level, and supply tubes.

CAUTION **Be certain oil filter is properly installed to prevent possible oil pump failure. Refer to Oil Filter Replacement procedure.**

2. Check tube positioning.
   - Be certain tubes have no kinks or sharp bends which may restrict oil flow.
   - Check to see that tubes are not pinched by tie bands.
   - Be certain vent tube end is away from brake disc. Vent tube end must be higher than top of oil tank to prevent possible siphoning.



1. Vent Tube.
2. Oil Tank.

3. Secure tank retaining band.
   - Be sure protective pad is properly positioned behind tank.
4. Mount radiator mounting brace assembly.
   - Torque chaincase bolt (1/4 in.) 70 in. lb (0.8 kg-m).
   - Torque chassis bolts (5/16 in.) 18 ft lb (2.5 kg-m).

CAUTION **Failure to bleed air from oil injection system will result in severe engine damage.**

5. Bleed injection system.
   - Fill oil tank with Kawasaki Snowmobile Oil.
   - Refer to Oil Injection Pump Supply Tube Bleeding procedure.

OIL FILTER

Oil Filter Removal

1. Disconnect oil supply tubes from oil filter.
   - Push on ends of tubes to ease removal.
   - Plug tube ends to prevent oil drainage.

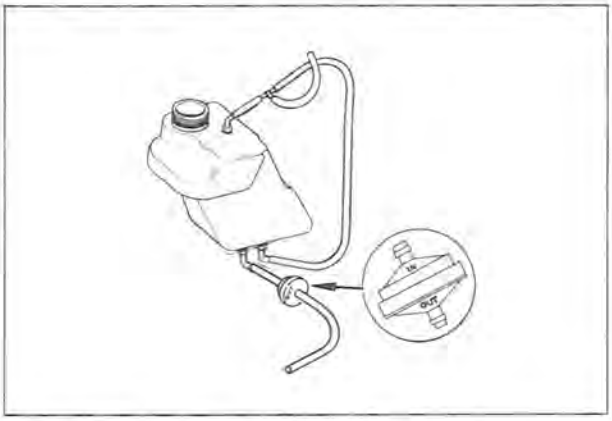
Oil Filter Inspection

1. Examine oil filter.
   - If filter shows any signs of leakage or has foreign particles accumulated on screen, replace the filter.
   - Replace the filter at the beginning of each season as a precautionary measure.

Oil Filter Installation

CAUTION **Failure to install filter in proper direction will cause oil pump failure. Foreign particles trapped in screen will be released during use, entering the oil pump and causing pump failure.**

1. Attach oil supply tubes to correct fittings on filter.
   - Supply tube coming from oil tank must attach to filter fitting marked "IN".
   - Supply tube leading to oil pump must attach to filter fitting marked "OUT".



2. Bleed oil pump supply tube.
   - Refer to Oil Pump Supply Tube Bleeding procedure.

SILENCER

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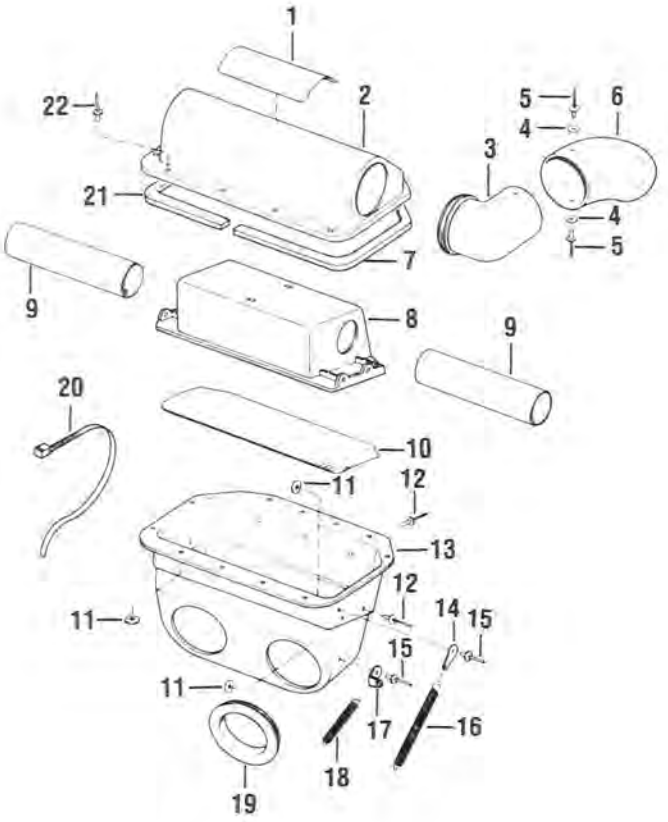


1 LABEL, warning
2 COVER, silencer
3 PIPE, elbow
4 WASHER
5 RIVET, 3/16"
6 DUCT, intake
7 GASKET, cover to housing
8 BAFFLE, pipe mounting
9 PIPE, plastic
10 BAFFLE, perforated
11 WASHER, back-up
12 RIVET, 5/32"
13 HOUSING, silencer
14 PLATE, spring
15 RIVET, special, 5/32"
16 SPRING, 4.50" long
17 BRACKET, spring
18 SPRING, 3.00" long
19 SEAL, silencer
20 BAND, cable tie
21 GASKET, cover to housing
22 RIVET, 5/32"

SILENCER

SILENCER SERVICING

Silencer Removal

1. Disconnect springs securing air silencer to carburetors.

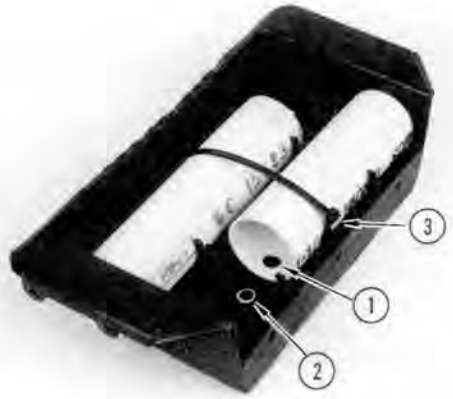
1. Silencer.
2. Support Bracket.

2. Guide silencer from engine compartment.
   - Slide silencer rearward, off of carburetors.
   - Lift silencer up and away from rear support bracket.
   - Remove silencer from converter side of snowmobile.

CAUTION **Never run the engine with the air intake silencer removed from the carburetors. Poor engine performance and engine damage will result.**

Silencer Inspection

Normally, silencer repairs are not required. However, if malfunction is suspected, check the following:



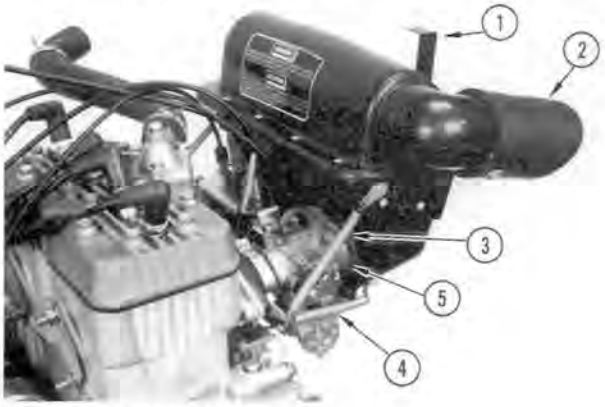
1. Intake Pipe Hole.
2. Locating Pin.
3. Tie Band.

1. Inspect perforated baffle for hole restrictions.
   - Inspect condition of baffle holes by looking through carburetor hole openings.
   - Clean baffle using compressed air.
2. Verify intake pipe positioning.
   - Hole in each pipe should be positioned over locating pin in pipe mounting baffle to insure proper "tuning" effect.
   - Pipes should be secured in position with tie band.
3. If intake pipe blockage is suspected, remove silencer cover from silencer housing.
   - Drill out 5/32 in. rivets securing cover to housing.
   - Lift off silencer cover.
   - Use a small mirror to inspect intake pipes.

WARNING **If pipe mounting baffle is removed for any reason, be certain to reinstall baffle using special closed-end rivets. The nail in a standard pop rivet could find its way through the intake system, causing throttle malfunction and possible personal injury.**

Silencer Installation

1. Position air silencer on carburetors.
   - Be sure rubber seals fit securely on carburetors.
   - Be certain air silencer is positioned properly on rear support bracket.



1. Support Bracket.
2. Intake Hose.
3. Long Spring.
4. Short Spring.
5. Seals.

2. Attach silencer retaining springs.
   - Use longer springs on upper brackets.
   - Install short springs on lower brackets.

CAUTION **While installing the air intake silencer, check that:**

- Rubber seals between silencer body and carburetors are properly positioned and fit securely.
- Intake hose is directed rearward.

Failure to comply with the above steps may cause engine failure.

STARTER, RECOIL

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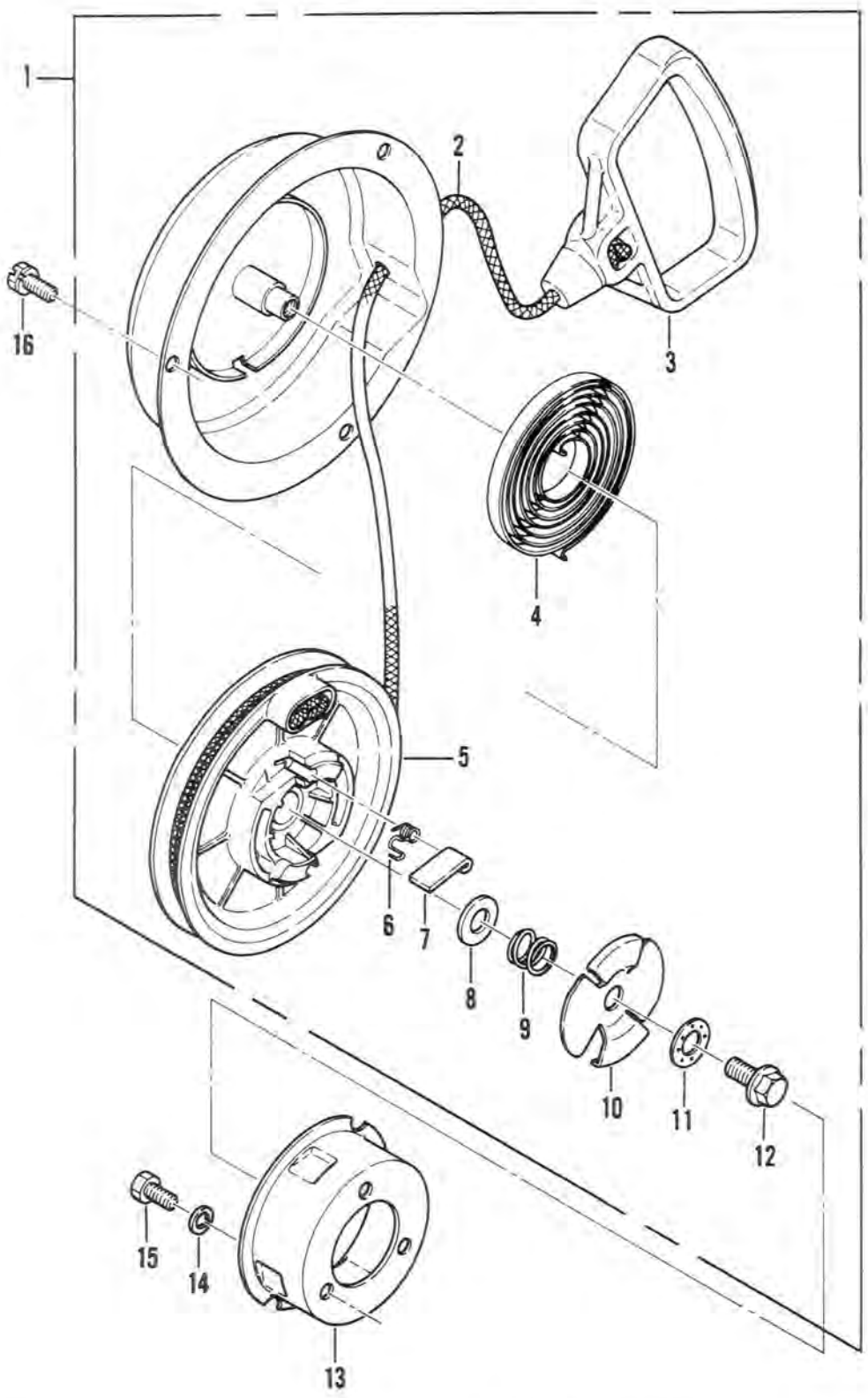


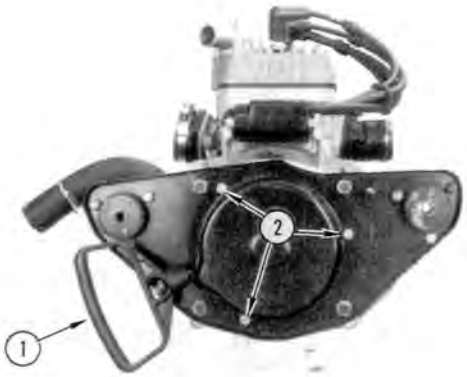
1. STARTER ASSY, recoil
2. ROPE, recoil
3. GRIP, recoil rope
4. SPRING, spiral
5. REEL, recoil rope
6. SPRING, pawl return
7. PAWL
8. WASHER, thrust
9. SPRING, friction
10. RETAINER, recoil
11. WASHER, thrust
12. BOLT, flanged, 8 x 18mm
13. PULLEY, starter
14. WASHER, spring, 6mm
15. BOLT, 6 x 14mm
16. BOLT, 6 x 16mm

STARTER, RECOIL

STARTER SERVICING

Starter Removal

1. Remove muffler assemblies.
   - Refer to Muffler Removal.
2. Free starter handle.
   - Guide starter handle through control console and rope guide.
3. Remove starter assembly.
   - Unscrew starter mounting bolts.



1. Starter Handle.
2. Starter Mounting Bolts.

Starter Inspection (Assembled)

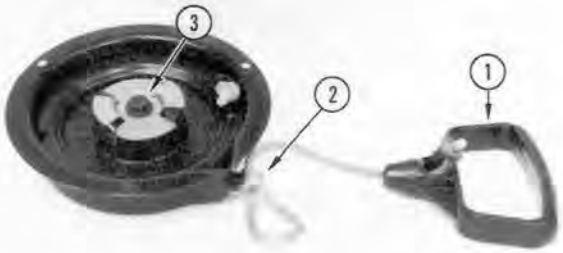
1. Examine starter pawls for chips or excessive wear.
   - Pull starter rope out 5 in. (127 mm) to view starter pawls.

1. Starter Pawls.

2. As starter rope is pulled, listen for any grinding noise which might indicate a broken or worn starter spring.
3. Check starter rope for excessive wear or fraying.

Starter Disassembly

1. Release recoil spring tension.
   - Tie slipknot in starter rope as shown to ease handle removal.
   - Remove handle.
   - Untie slipknot and allow recoil reel to unwind slowly.



1. Handle.
2. Slipknot.
3. Retaining Bolt.

WARNING **Be certain that all recoil spring tension is released to prevent spring from accidentally disengaging and causing personal injury.**

2. Remove retaining bolt.

WARNING **"Wiggle" the rope reel as it is lifted from housing to avoid accidental recoil spring release.**

3. Lift out recoil reel assembly.

1. Recoil Reel.
2. Spring.

4. If necessary, remove recoil spring from starter housing as follows:
   - Holding housing as shown, hit sharply onto bench top to safely remove spring.

3. Apply light coat of grease to spring and housing.
   - Use extreme pressure (ep) type grease mixed 50/50 with Kawasaki Snowmobile Oil to ensure proper operation in cold weather.
4. Install rope on recoil reel.
   - Be certain that rope is properly secured in reel by knot.
5. Insert reel assembly into starter housing.
   - Reel assembly must engage with spring hook near center of housing.
   - It may be necessary to bend spring hook slightly to allow engagement with reel.

Starter Inspection (Disassembled)

1. Check condition of return spring, friction spring, and pawl springs.
   - Inspect springs for breaks, rust, distortion, or weakened condition.
2. Look for signs of fraying or excessive wear on starter rope.
   - Replacement length is 75 in. (190.5 mm).
3. Inspect recoil reel.
   - Check pawl area for cracking or chipping.

1. Spring Hook.

Starter Assembly

1. Thoroughly clean all parts removed prior to reassembling starter.
2. Position recoil spring (if removed) in starter housing.
   - Insert outside spring hook into housing slot, and carefully wind spring in direction shown, while applying pressure with fingers to prevent spring from jumping out of housing.

1. Spring Hook.

6. Assemble thrust washer, friction spring and pawl springs into recoil reel.

1. Thrust Washer.
2. Friction Spring.
3. Pawl Spring.

7. Position pawls into reel behind pawl springs.

1. Pawl.

8. Install recoil retainer and bolt as shown.

1. Retainer Bolt and Washer.

9. Adjust recoil preload.
   - Starter rope should extend approximately 1.0 in. (25.4 mm) through recoil housing for correct preload.
   - To adjust preload, place rope in reel notch as shown.

1. Notch.

   - Turn reel counter-clockwise to adjust preload.
10. Secure handle to rope.
    - Use slipknot in rope to ease handle installation.
11. Pull starter handle and check starter assembly for proper operation.
    - Pull handle - starter pawls should extend.
    - Release tension - starter pawls must retract.

Starter Installation

1. Bolt starter assembly to engine.
   - Torque mounting bolts to 70 in. lb (0.8 kg-m).
2. Guide starter rope through rope guide and control console.
3. Install muffler assemblies.
   - Refer to Muffler Installation procedure.

STORAGE

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STORAGE

PREPARATION FOR STORAGE

- ☐ Thoroughly clean the snowmobile by hosing off all dirt and grime from suspension and engine compartment.

WARNING **Gasoline fumes are heavier than air and can become explosive if exposed to a pilot light from a furnace, hot water heater, clothes dryer, etc. Perform maintenance only in an area that is well ventilated and free from pilot lights, flames and sparks.**

- ☐ Siphon fuel from fuel tank.

WARNING **To avoid personal injury while engine is running, stay clear of moving parts and hot exhaust system components.**

- ☐ Lubricate internal engine parts.
  - Remove air intake silencer from carburetor. Refer to Silencer Removal procedure.
  - Start engine. With engine running at idle speed, slowly inject KAWASAKI Snowmobile Oil into each carburetor opening. Stop engine when excessive smoking from muffler outlet pipe is noticed.

CAUTION **Failure to drain fuel from carburetors prior to long term storage may cause restrictions in carburetor passageways and jets. This can lead to lean fuel-air intake mixtures and severe engine damage.**

- ☐ Drain fuel from carburetors.
  - Place a drain pan beneath drain holes in lower pan assembly.
  - Remove main jet cover from bottom of each carburetor.
  - Actuate throttle lever several times until no fuel is squirted from accelerator pump.
  - When all fuel is drained, replace main jet covers.
- ☐ Replace air intake silencer.
  - Refer to Silencer Installation procedure.
- ☐ Plug openings of intake silencer and muffler outlet to prevent foreign material from entering.
  - Use rags or tape to seal openings.
- ☐ Fill coolant tank to 1/4 in. (6.35 mm) below top of tank.
  - Refer to Filling Cooling System procedure.
- ☐ Check chaincase lubricant level.
  - Refer to Lubrication Chart.
- ☐ Remove drive belt.
  - Refer to Belt Removal procedure.

CAUTION **Do not lubricate drive converter or driven converter.**

- ☐ Change engine gearcase lubricant.
  - Refer to Coolant Pump/Gearcase draining and filling.
- ☐ Remove weight from suspension.
  - Block rear of snowmobile off the ground.
- ☐ Relieve track tension.
  - Loosen rear axle locking bolt on each end of rear axle.
  - Loosen adjusting nuts to relieve track tension.
- ☐ Service hood and chassis.
  - Use touch-up paint where needed.
  - Wax hood and chassis with an automotive-type wax.
- ☐ Cover snowmobile to protect it from dirt and dust.
- ☐ Protect track clips from rusting.
  - Apply a moisture remover or anti-rust product (such as WD-40 or LPS) to exposed areas of each track clip.
- ☐ Prepare battery for storage.
  - Remove battery. Refer to Battery Removal procedure.
  - Clean battery exterior with a solution of baking soda and water. Rinse thoroughly with water.
  - Check electrolyte and fill to upper level mark with distilled water, if necessary.
  - Check battery condition and recharge if necessary.
  - Coat both battery terminals with grease.
- ☐ Store Battery.
  - Keep battery in a cool, dry place.
  - Do not expose battery to freezing temperatures.

NOTE: Recharge battery once a month. A neglected battery will gradually lose its charge and begin to sulfate (plates turn white). Once this reaction has begun, the battery usually cannot be salvaged.

REMOVAL FROM STORAGE

- ☐ Replace oil and fuel filters.
  - Both filters are in-line type, located just behind fuel pump.
- ☐ Fill fuel tank with fresh fuel.
- ☐ Fill oil tank with Kawasaki Snowmobile Oil.
- ☐ Check tube connecting oil tank to oil pump for air bubbles.
  - If any air is present, bleed injection system. Refer to Oil Injection System Bleeding procedure.
- ☐ Check Coolant Pump/Gearcase lubricant level.
  - Refer to Coolant Pump/Gearcase Lubricant procedure.

- ☐ Check drive chain tensioner guides.
  - Refer to Chain Tension procedure.
- ☐ Check coolant level.
  - Refer to Filling Cooling System procedure.
- ☐ Remove plugs (rags or masking tape) from intake silencer and muffler outlet.
- ☐ Clean converter sheaves.
  - Use a suitable solvent.
  - Sheaves must be clean and dry.
- ☐ Check converter alignment.
  - Refer to Converter Alignment procedures.
- ☐ Install a new drive belt.
  - Keep the belt previously removed as a spare.
- ☐ Check carburetor to oil pump synchronization.
  - Refer to Oil Pump Cable Adjustment procedure.
- ☐ Check throttle cable adjustment.
  - Refer to Throttle Cable Adjustment procedure.
- ☐ Check enrichener cable adjustment.
  - Refer to Enrichener Cable Adjustment procedure.
- ☐ Check ski alignment.
  - Refer to Ski Alignment procedure.
- ☐ Inspect ski skegs for wear.
- ☐ Measure wear of slide rail wear strips.
  - Replace when material measures 1/8 in. (3.0 mm) or less at any point along its length.
- ☐ Adjust headlight.
  - Refer to Headlight Adjustment procedure.
- ☐ Adjust track tension.
  - Refer to Track Adjustment procedure.
- ☐ Check battery electrolyte level.
  - Refer to Battery Charging procedure.
- ☐ Charge battery.
  - Refer to Battery Charging procedure.
- ☐ Install battery.
  - Refer to Battery Installation procedure.
- ☐ Tighten drive converter mounting bolt.
  - Torque to 70 ft lb (9.7 kg-m).
- ☐ Tighten cylinder head bolts.
  - Torque to 16 ft lb (2.2 kg-m).
- ☐ Check all fasteners for tightness.
  - Refer to torque chart.

WARNING **Never raise rear of snowmobile by hand or stand behind the vehicle when engine is running or track is rotating. A rotating track can fling objects rearward at great velocity. This may cause severe personal injury. Remove all tools and foreign matter from track area before starting engine.**

- ☐ Start engine and rotate track several revolutions, at low speed only, then stop engine and check track alignment.
  - Refer to Track Adjustments procedure.
- ☐ Lower snowmobile from blocks.
- ☐ Check carburetor adjustment.
  - Refer to Carburetor Adjustments procedure.
- ☐ Operate snowmobile with old spark plugs for the first 1/2 hour of operation. This will allow the oil in the engine for storage to collect on the old spark plugs.
- ☐ Install new spark plugs after 1/2 hour of operation.
  - Refer to specifications for heat range and gap adjustment.
  - Torque spark plugs to 20 ft lb (2.8 kg-m).

SUSPENSION

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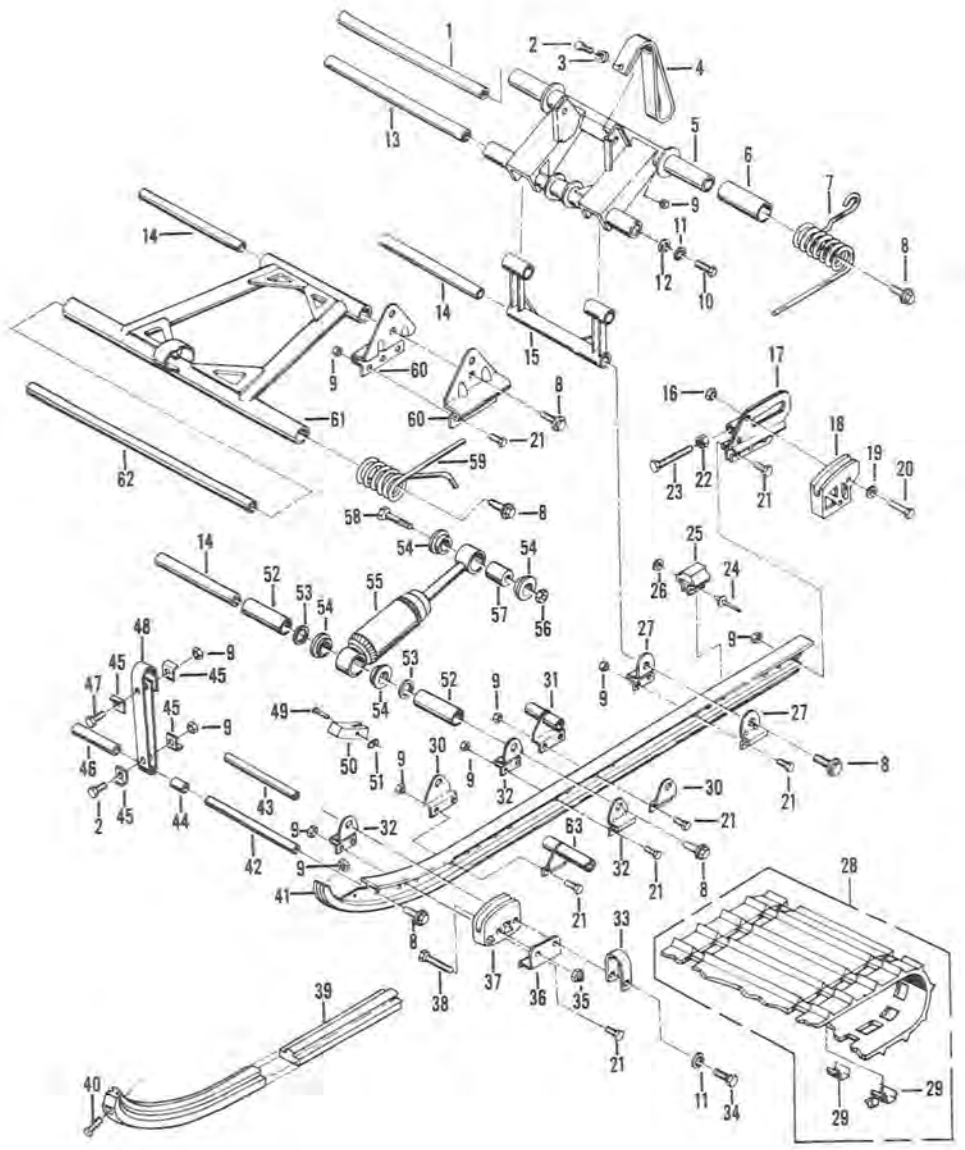
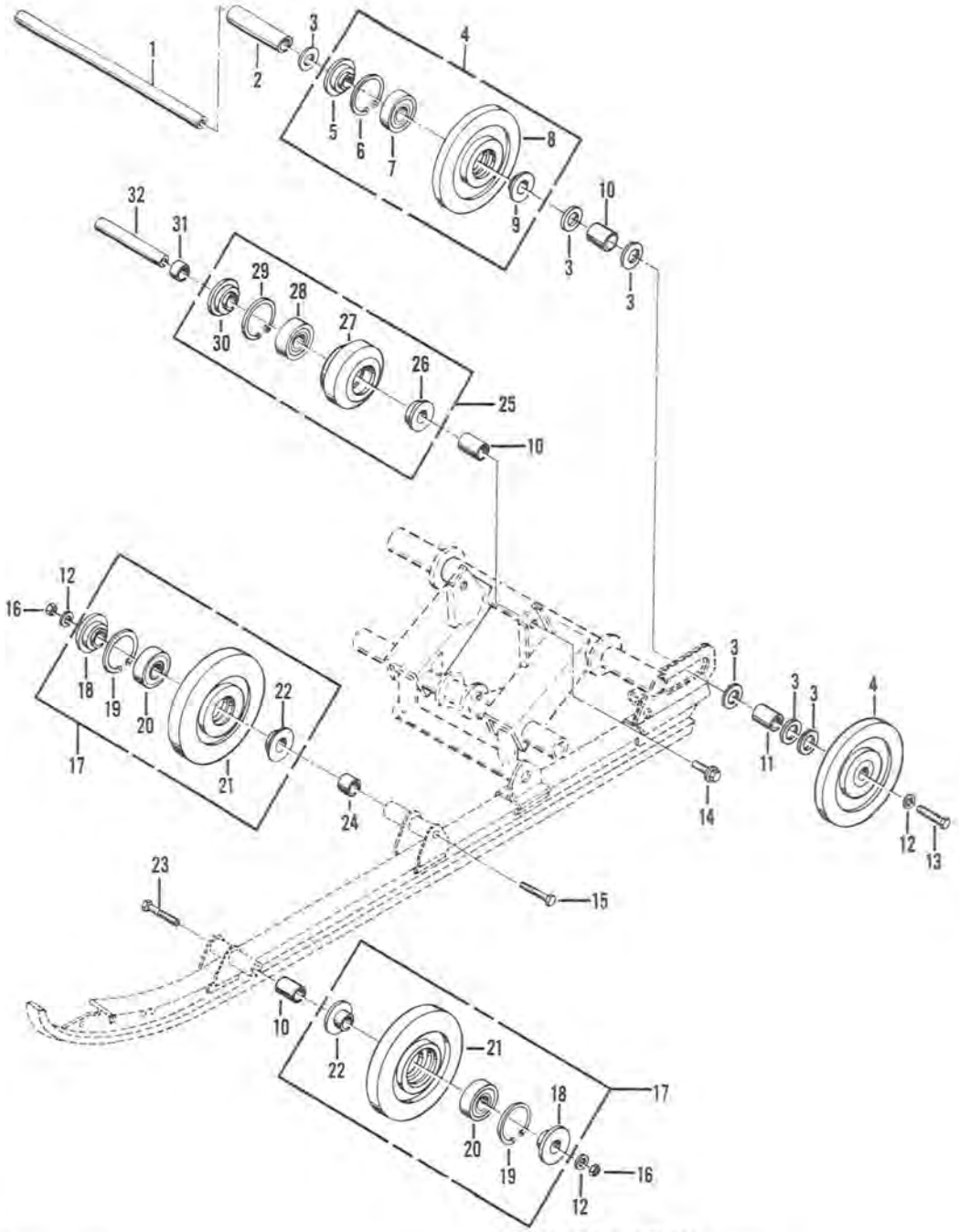


1 SHAFT, rear arm
2 BOLT, 1/4-28 x 1.00
3 WASHER, plain 1/4"
4 LIMITER, rear suspension
5 PIVOT ASSY, rear arm
6 SLEEVE, rear suspension spring
7 SPRING, right rear
SPRING, left rear
8 BOLT, special, 3/8-16 x 1.00
9 NUT, insert, 1/4-28
10 BOLT, 3/8-16 x 1.00
11 WASHER, spring lock, 3/8"
12 WASHER, special
13 SHAFT, pivot
14 SHAFT, pivot
15 ARM ASSY, rear suspension
16 NUT, insert, 5/16-24
17 BRACKET ASSY, rear axle
BRACKET ASSY, rear axle
18 CAM, rear spring
19 WASHER, plain, 5/16"
20 BOLT, 5/16-24 x 1.75
21 BOLT, 1/4-28 x .75
22 NUT, 3/8-16
23 BOLT, special, 3/8-16 x 3.75
24 RIVET, 3/16"
25 BUMPER, rear
26 WASHER, plain, 3/16"
27 BRACKET, rear suspension arm
28 TRACK ASSY, snow 15 x 121
29 SHOE, track clip
30 BRACKET, idler wheel
31 BRACKET ASSY, idler wheel
32 BRACKET
33 GUARD, spring arm
34 BOLT, 3/8-16 x 2.25
35 NUT, insert, 3/8-24
36 BRACKET, front cam
37 CAM, front spring
38 BOLT, 3/8-24 x 1.50
39 STRIP, rail wear
40 SCREW, special, 1/4-28 x 1.25
41 RAIL, left suspension
RAIL, right suspension
42 BRACE
43 BRACE
44 SPACER, short
45 WASHER, special limiter
46 SPACER, long
47 BOLT, 1/4-28 x 1.12
48 LIMITER, front suspension
49 PIN
50 BUMPER, front
51 RETAINER, bumper pin
52 SPACER
53 WASHER, special
54 BUSHING
55 SHOCK ABSORBER
56 NUT, insert, 3/8-16
57 SLEEVE
58 BOLT, 3/8-16 x 1.75
59 SPRING, left front
SPRING, right front
60 BRACKET, swing arm
61 ARM ASSY, swing
62 SHAFT, front arm
63 BRACKET ASSY, idler wheel

SUSPENSION



1 AXLE, rear
2 SPACER, rear axle
3 WASHER, special
4 WHEEL ASSY
5 SPACER, large O.D.
6 RING, snap
7 BEARING
8 WHEEL
9 SPACER, small O.D.
10 SPACER
11 SPACER, rear axle
12 WASHER, plain, 3/8"
13 BOLT, 3/8-16 x 1.25
14 BOLT, special, 3/8-16 x 1.00
15 BOLT, 3/8-24 x 4.00
16 NUT, insert, 3/8-24
17 WHEEL ASSY
18 SPACER, large O.D.
19 RING, snap
20 BEARING
21 WHEEL
22 SPACER, small O.D.
23 BOLT, 3/8-24 x 4.25
24 SPACER
25 WHEEL ASSY
26 SPACER, small O.D.
27 WHEEL
28 BEARING
29 RING, snap
30 SPACER, large O.D.
31 SPACER
32 SHAFT, idler wheel

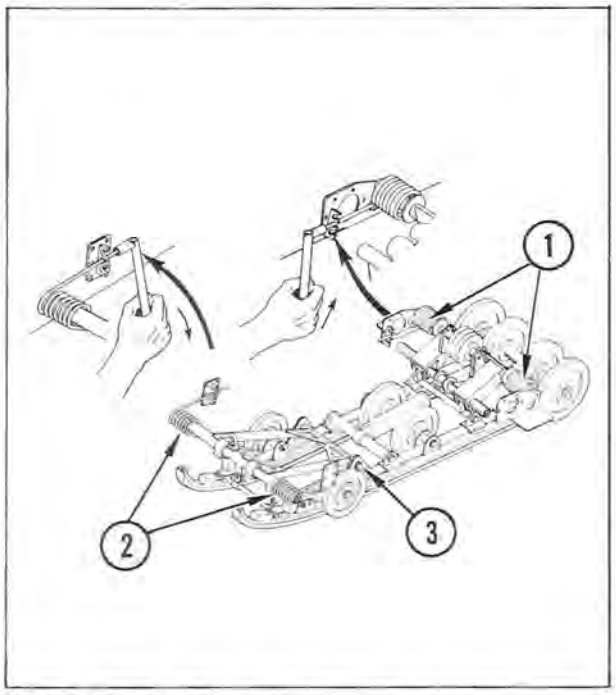
SUSPENSION SERVICING

Suspension Adjustments

The slider suspension is fully adjustable for rider comfort.

Three suspension adjustments are provided:

1. Ride Adjustment.
2. Handling Adjustment.
3. Front Swing Arm Adjustment.



1. Ride Adjustment.
2. Handling Adjustment.
3. Front Swing Arm Adjustment.

RIDE ADJUSTMENT

The rear springs, located on each side of the rear pivot arm, control the ride by pushing downward on the suspension to hold vehicle up.

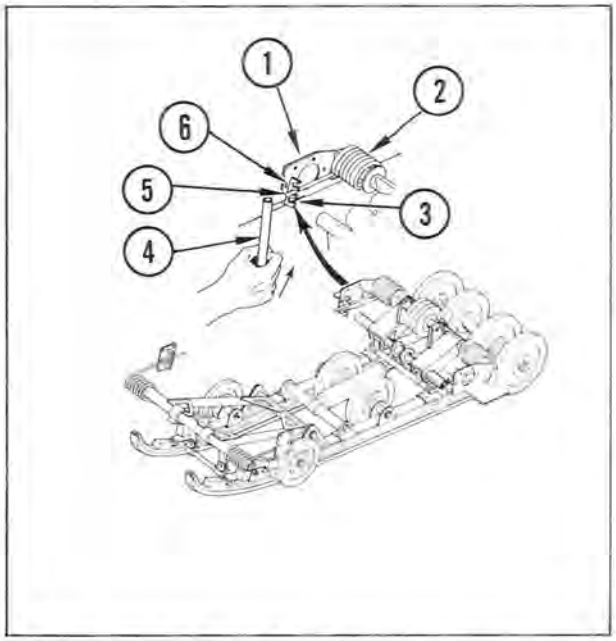
- Increasing rear spring tension will stiffen the ride allowing more driver or passenger weight.
- Decreasing tension creates a softer ride for lighter loads and improves weight transfer during hard acceleration.

To change rear spring tension:

WARNING **Suspension springs are under heavy spring load. Improper adjusting techniques may result in personal injury.**

CAUTION **Spring Tension (pre-load) of springs must be equal on each side of suspension (front to front, rear to rear). Higher tension adjustment on one spring can cause spring breakage or excessive slide wear strip wear.**

1. Position spring adjustment tool (special tool) onto end of spring.



1. Rear Spring Retaining Bracket.
2. Suspension Rear Spring.
3. Low Tension Position.
4. Spring Adjusting Tool P/N 57001-3507.
5. Mid Tension Position.
6. High Tension Position.

2. Release spring arm from bracket detent.
   - Apply firm grip on adjusting tool with both hands.
   - Carefully force spring out of retainer detent.
   - Be prepared to accept heavy spring load as spring is released from retainer detent.
3. Position spring to obtain desired tension.
   - Install into upper detent to increase tension.
   - Lower detent reduces tension on spring.
4. Repeat procedure on other rear spring to make tension equal on both sides of suspension (rear to rear).

HANDLING ADJUSTMENT

The front springs, located on each side of the front swing arm, control handling (steering response). The amount of pressure on the skis directly affects steering effort and response.

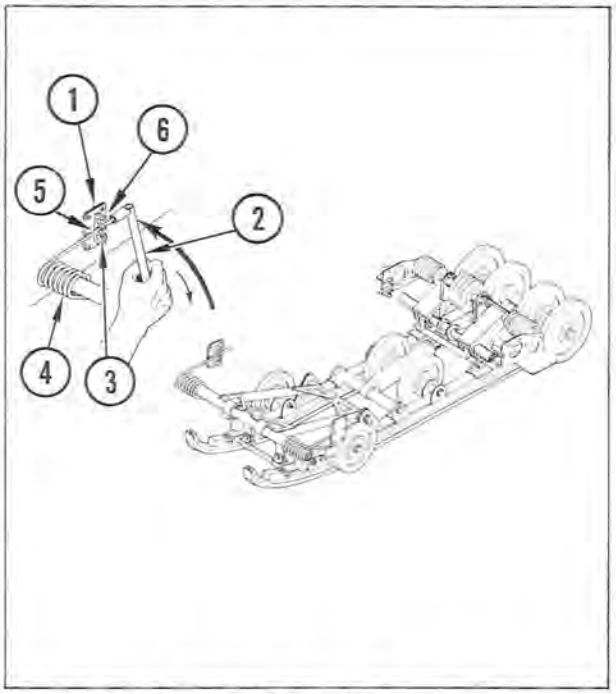
- Increasing spring tension forces the front of the suspension to lift more, shifting weight or pressure from skis to the suspension. Less ski pressure means easier effort but less response.
- Reducing spring tension causes less suspension lift, increasing pressure on skis. More ski pressure means increased steering response and effort.

To change front spring tension:

WARNING **Suspension springs are under heavy spring load. Improper adjusting techniques may result in personal injury.**

CAUTION **Spring tension (pre-load) of springs must be equal on each side of suspension (front to front, rear to rear). Higher tension adjustment on one spring can cause spring breakage or excessive slide wear strip wear.**

1. Position spring adjusting tool (special tool) onto end of spring.



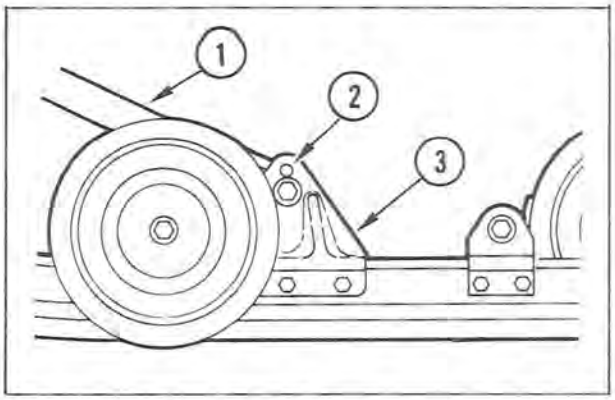
1. Front Spring Retaining Bracket.
2. Spring Adjusting Tool P/N 57001-3507.
3. High Tension Position.
4. Suspension Front Spring.
5. Mid Tension Position - as produced.
6. Low Tension Position.

2. Release spring arm from bracket detent.
   - Apply firm grip on adjusting tool with both hands.
   - Carefully force spring out of retainer detent.
   - Be prepared to accept heavy spring load as spring is released from retainer detent.
3. Position spring to obtain desired tension.
   - Install spring into lower detent to increase tension.
   - Upper detent reduces tension on spring.
4. Repeat procedure on other front spring to make tension equal on both sides of suspension (front to front).

FRONT SWING ARM ADJUSTMENT

The front swing arm is positioned in lower hole of suspension front bracket for best overall acceleration and ride characteristics.

- Changing swing arm to upper hole location causes less weight transfer from skis to suspension during acceleration. Less weight transfer decreases ski lift allowing increased steering stability during acceleration.



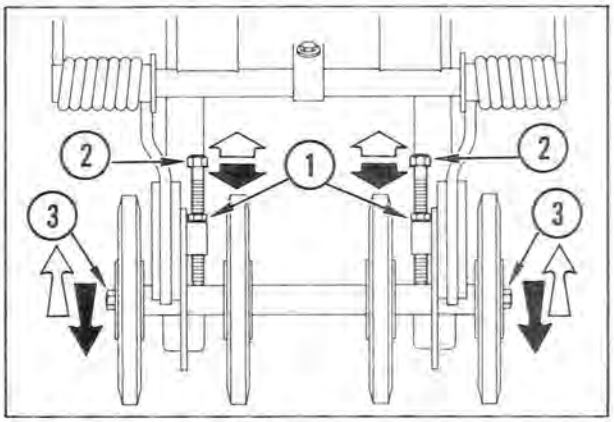
1. Suspension Front Swing Arm.
2. Upper Hole Location.
3. Suspension Front Bracket.

NOTE: Applying maximum front arm spring tension will not improve ski lift during acceleration. It is impossible for the front springs to lift the snowmobile during acceleration. Snowmobile (ski) lift results from rear arm collapsing and front swing arm extending (lifting) which can only occur with adequate traction (very little track spin).

To change swing arm position:

WARNING **Suspension front swing arm is under heavy spring load. Improper service techniques may result in personal injury.**

1. Relieve spring tension from front swing arm.
   - Refer to Handling Adjustment procedure.
2. Relieve track tension.
   - Loosen rear axle locking bolts.
   - Back off rear axle adjusting bolt lock nuts.
   - Unscrew both adjusting bolts to reduce track tension.



1. Adjusting Bolt Lock Nuts.
2. Adjusting Bolts.
3. Rear Axle Locking Bolts.

3. Place swing arm into desired position.
   - Remove swing arm to bracket mounting bolts.

- Secure swing arm to desired bracket position, then tighten bolts to 25 ft lb (3.5 kg-m).

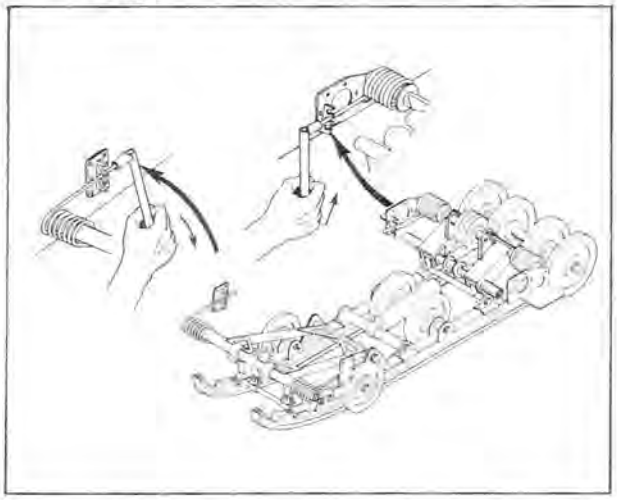
4. Apply spring tension to front swing arm.
   - Refer to Handling Adjustment procedure.
5. Adjust track tension and alignment.
   - Refer to Track Adjustments procedure.

Suspension Removal

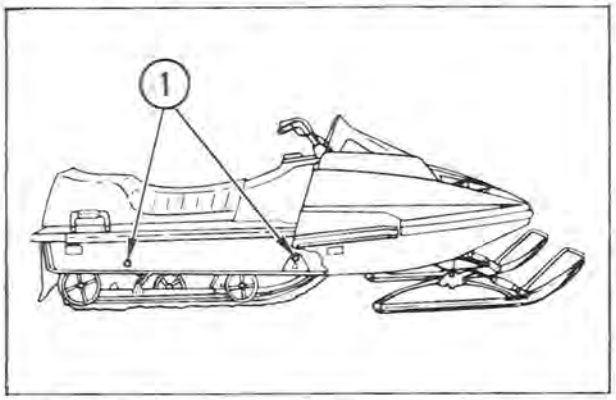
1. Place snowmobile on its side.
   - Be sure to provide a protected surface to prevent marring finish of snowmobile.
2. Relieve spring tension from front and rear suspension arms.

WARNING **Suspension springs are under heavy spring load. Improper adjusting techniques may result in personal injury.**

- Refer to Ride and Handling Adjustment procedures for detail of special tool usage.



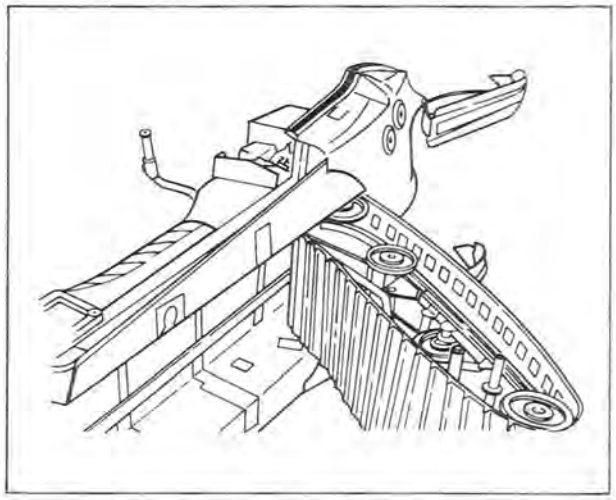
3. Remove suspension from chassis.
   - Remove four bolts (two on each side of snowmobile) securing suspension to chassis.



1. Special Bolt.

- Swing track and suspension out from chassis (approximately 90°) then lift suspension (rear end first) from track.

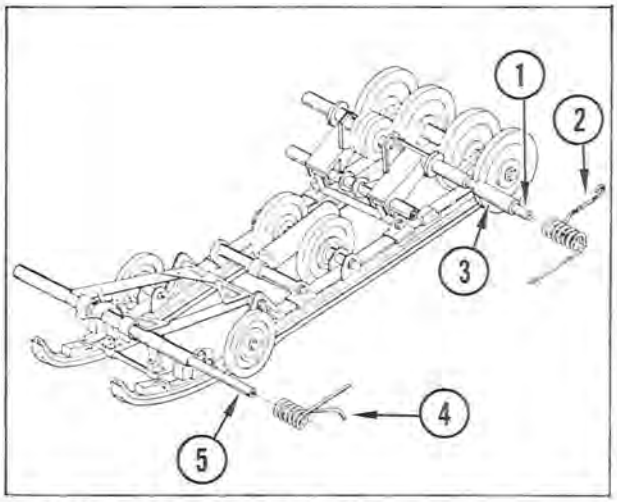
NOTE: To reduce removal effort, carefully guide pivot shafts and suspension springs around chassis brackets and rivets to prevent interference between components.



Suspension Installation

NOTE: Check suspension for correct assembly by measuring distance between slide rails several places along their length. If they are not parallel within 1/8 in. (3.2 mm), check spacers, shafts, brackets and washers for correct placement. Replace or straighten slide rails if assembly sequence is correct.

1. Apply a low temperature ep (extreme pressure) type grease on front and rear pivot shafts.
2. Install pivot shafts.
   - Insert long pivot shaft in front swing arm.
   - Slide short pivot shaft into rear arm assembly.



1. Shaft, 17.57 in. (426.28 mm) Long.
2. Off-Set Rear Arm.
3. Sleeve.
4. Place in Cam Groove.
5. Shaft, 18.00 in. (457.2 mm) Long.

3. Install suspension springs.
   - Place front spring onto suspension with bent spring arm end in cam.
   - Slide spring sleeves onto rear arm assembly.
   - Position rear spring over sleeve with offset spring arm in cam.

NOTE: Hold springs into position during suspension installation by stretching rubber band across suspension between arms of springs.

4. Place snowmobile on its side and swing track out from chassis approximately 90°.
5. Align drive lugs on track to properly mate with lugs on drive sprockets.

6. Insert suspension inside track.
7. Secure front swing arm to tunnel.
   - Align front swing arm pivot shaft with mounting hole in tunnel.

NOTE: To reduce installation effort, carefully guide pivot shaft and suspension springs around chassis brackets and rivets to prevent interference between components.

   - Install front arm mounting bolts.
   - Torque bolts to 25 ft lb (3.5 kg-m).
8. Mount rear suspension arm assembly to tunnel.
   - Move rear suspension arm into tunnel to align pivot shaft with mounting hole in tunnel.

NOTE: To reduce installation effort, carefully guide pivot shaft and suspension springs around chassis brackets and rivets to prevent interference between components.

   - Install rear mounting bolts.
   - Torque bolts to 25 ft lb (3.5 kg-m).
9. Adjust front and rear suspension spring tension.

WARNING **Suspension springs are under heavy spring load. Improper adjusting techniques may result in personal injury.**

   - Refer to Ride and Handling Adjustment procedures for details of special tool usage.
10. Check track adjustments.
    - Refer to Track Tension and Track Alignment procedures.

WEAR STRIPS (HI-FAX)

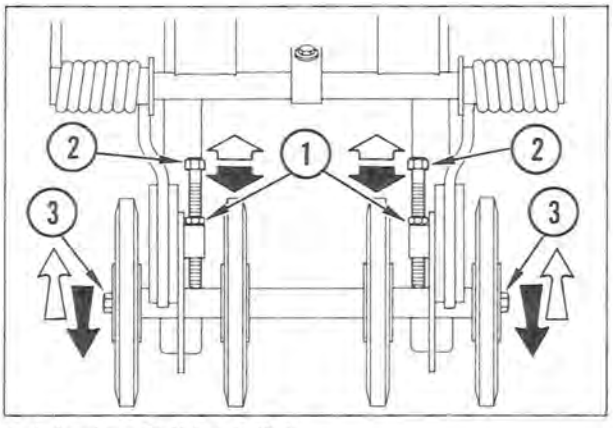
Slide bar wear strips should be replaced when thickness of material measures 1/8 in. (3 mm) or less at any point along its length.

Wear Strip Removal

1. Raise rear of snowmobile off ground.
   - Securely brace the snowmobile so it cannot fall.

WARNING **When raising rear of snowmobile off ground, place ski tips against a stationary object and be sure the vehicle is properly secured to prevent personal injury.**

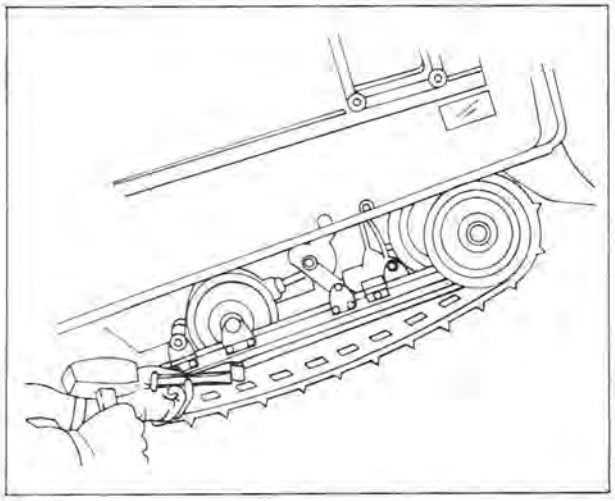
2. Relieve track tension.
   - Loosen rear axle locking bolts.
   - Back off rear axle adjusting bolt lock nuts.
   - Unscrew both adjusting bolts to reduce track tension.



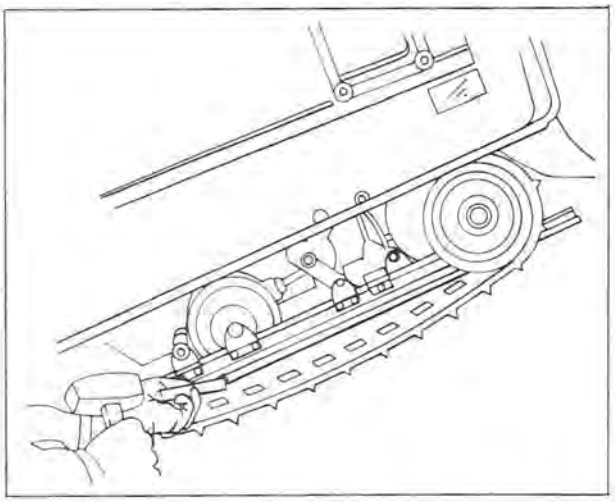
1. Adjusting Bolt Lock Nuts.
2. Adjusting Bolts.
3. Rear Axle Locking Bolts.

3. Remove screw and nut securing wear strip to front of slide rail.
4. Notch side of wear strip, near front end of suspension, using hammer and chisel.

CAUTION **Use care when cutting wear strips to prevent damage to slide rails.**



5. Remove wear strips.
   - Align track opening (space between clips) with wear strip at rear of suspension.
   - Tap wear strip rearward, off from slide rail.



Wear Strip Installation

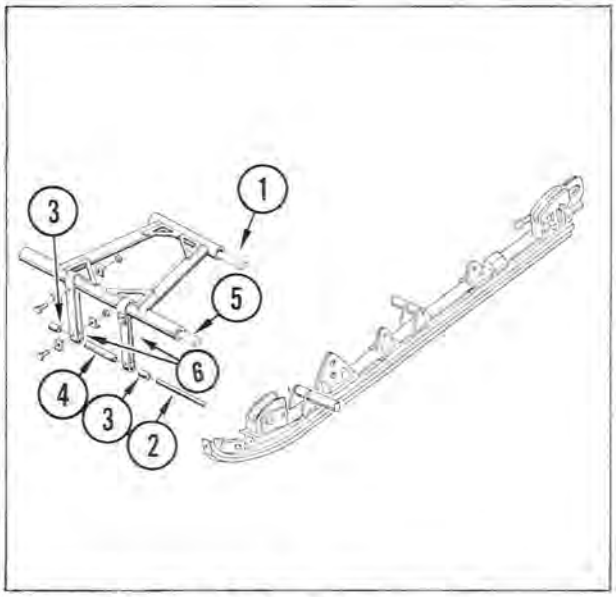
NOTE: Be sure track tension has been loosened to provide clearance necessary between track bars for wear strip installation.

1. Insert wear strip through track openings at rear of suspension onto slide rails.
   - Reduce effort required during installation by lubricating wear strip and slide rail.
2. Tap wear strip forward until holes between wear strip and slide rail are aligned.
3. Secure wear strip to slide rail by installing screw and nut.
   - Torque nut to 25 in. lb (0.3 kg-m).
4. Adjust track tension.
   - Refer to Track Tension procedure.

FRONT SWING ARM

Front Swing Arm Removal

1. Remove suspension.
   - Refer to Suspension Removal procedure.
2. Separate front swing arm from suspension assembly.
   - Unscrew limiter strap brace bolts.
   - Remove rear pivot shaft bolts.

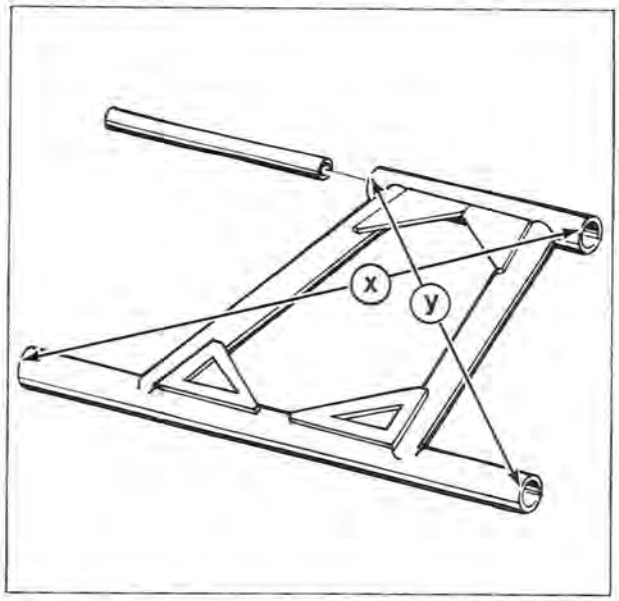


1. **Shaft, 8.31 in. (211.07 mm) Long.**
2. **Limiter Strap Brace.**
3. **Spacer (short).**
4. **Spacer (long).**
5. **Shaft, 18.00 in. (457.2 mm) Long.**
6. **Limiter Strap.**

3. Remove limiter straps from swing arm.
   - Unscrew limiter strap mounting hardware.

Front Swing Arm Inspection

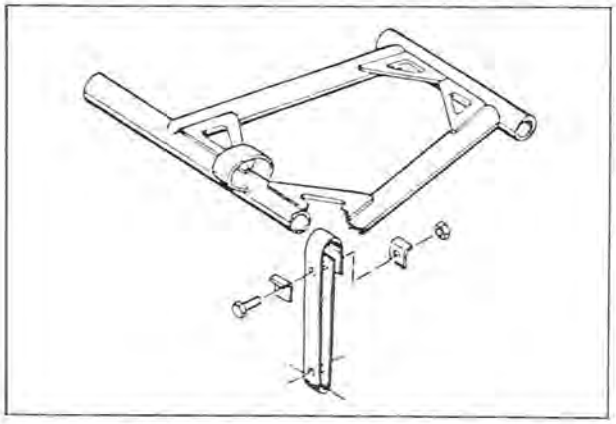
1. Check pivot shafts for straightness by placing on a flat surface. Shafts must roll easily and smoothly. Straighten or replace bent shaft.
2. Inspect swing arm for broken or cracked welds along brackets and pipes (tubing). Repair or replace as necessary.
3. Check straightness of swing arm pipes (tubes) by inserting a good pivot shaft into pipe openings. If pivot shaft slides through pipe easily from one end to the other, swing arm pipes are good. If pivot shaft binds, repair or replace front arm.



4. Measure swing arm as shown. If dimension "X" is different than dimension "Y" by 1/8 in. (3.2 mm) or more, repair or replace front arm.
5. Inspect limiter straps for deterioration. Replace straps if necessary.

Front Swing Arm Installation.

1. Secure limiter straps to front swing arm.
   - Torque nuts to 45 in. lb (0.6 kg-m).



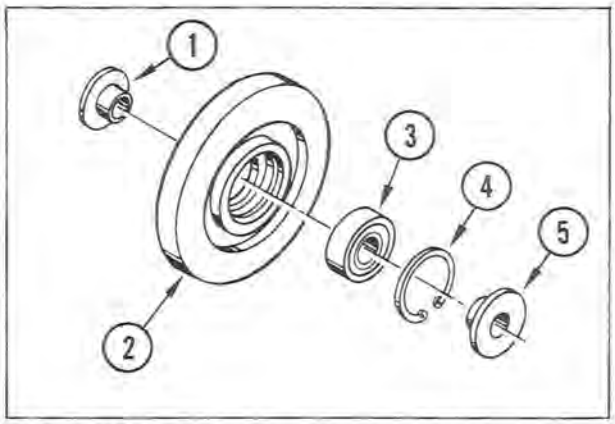
2. Apply low temperature ep (extreme pressure) type grease to pivot shafts.
3. Secure rear pivot shaft to suspension rail brackets.
   - Torque bolts to 25 ft lb (3.5 kg-m).
4. Fasten front limiter strap brace to suspension slide rails.
   - Torque bolts to 25 ft lb (3.5 kg-m).
5. Install suspension.
   - Refer to Suspension Installation procedure.

IDLER WHEELS

Idler Wheel Inspection

1. Replace idler wheel if rubber is excessively worn.
2. Spin wheel and check for noise or binding.
   - Wheel should rotate freely. Replace bearing if necessary.
3. Check for worn plastic spacers by wobbling wheel from side to side while wheel assembly is mounted.
   - Excessive movement indicates worn spacers or shaft. Replace defective item.

Idler Wheel Repair



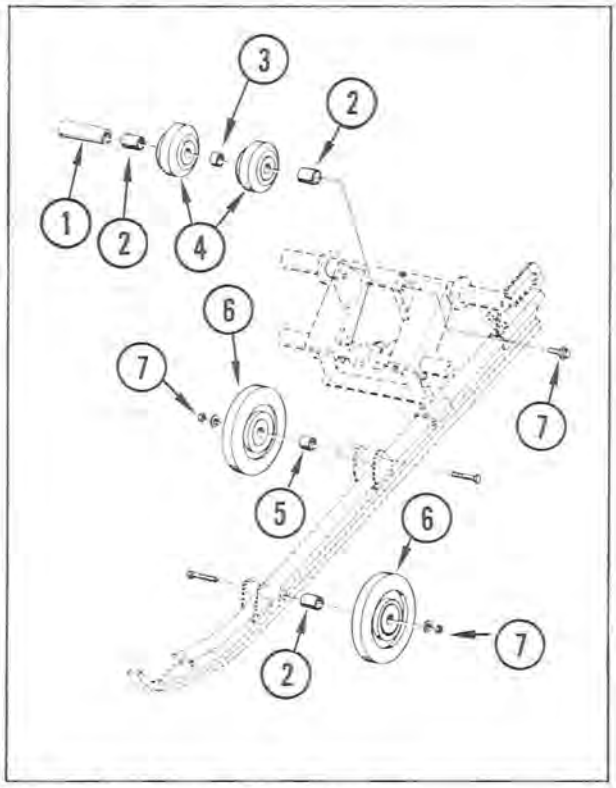
1. Small O.D. Spacer
2. Wheel
3. Bearing
4. Snap Ring
5. Large O.D. Spacer (Bearing Side)

1. Remove wheel spacers.
   - Using a punch, evenly tap large and small spacers from center of wheel.
2. Remove snap ring retaining bearing inside wheel.
3. Tap bearing out of wheel hub.
   - Support wheel hub to prevent damage while removing bearing.

NOTE: Effort required to install bearing can be reduced by placing wheel on light bulb to expand bearing bore.

4. Press bearing into wheel hub.
   - Support wheel hub to prevent damage during installation.
5. Install snap ring to retain bearing.
   - Be sure ring is fully seated in groove of wheel hub.
6. Tap large and small spacers into bearing.

NOTE: When installing wheels on suspension, position large diameter spacer outward for wheels mounted outside slide rails. Wheels mounted between slide rails must have small diameter spacer facing outward.

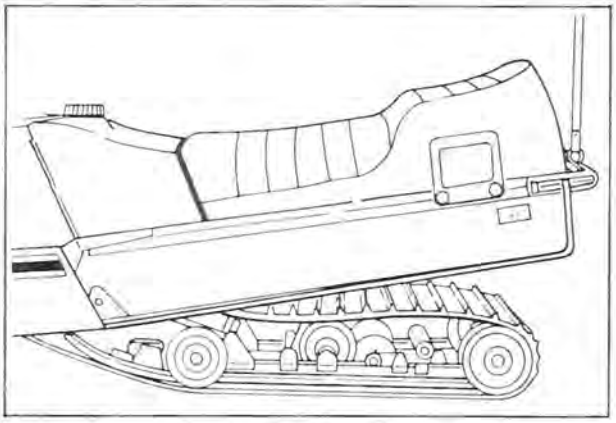


1. Shaft, 4.60 in. (116.84 mm) Long
2. Spacer, 1.19 in. (30.23 mm) Long
3. Spacer, 0.31 in. (7.87 mm) Long
4. Wheel, 3.25 in. (82.55 mm) O.D.
5. Spacer, 0.62 in (15.75 mm) Long
6. Wheel, 6.38 in. (162.05 mm) O.D.
7. Torque 25 ft lb (3.5 kg-m)

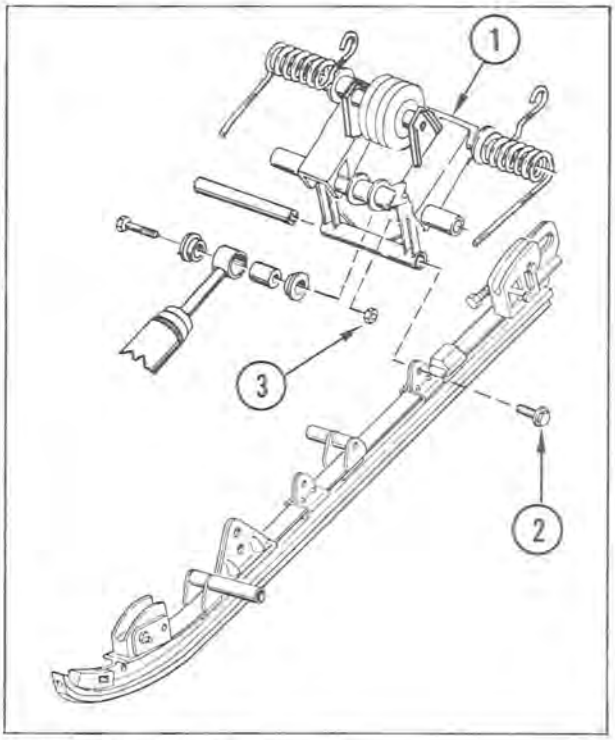
REAR ARM

Rear Arm Removal

1. Remove spring tension from rear suspension arm.
   - Refer to Ride Adjustment procedure for details of special tool usage.
2. Separate rear suspension from chassis.
   - Unscrew rear suspension mounting bolts from each side of snowmobile.
   - Raise rear of vehicle.
   - Be sure to securely brace snowmobile so it cannot fall.



3. Disconnect shock absorber from rear suspension arm.

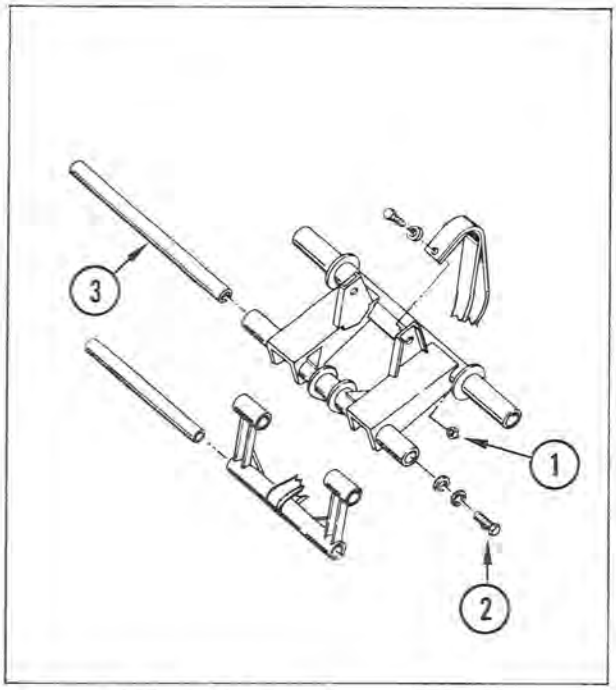


1. Rear Arm Assembly
2. Torque 25 ft lb (3.5 kg-m)
3. Torque 15 ft lb (1.9 kg-m)

4. Remove rear suspension arm mounting bolts from rail brackets.
   - Lift assembly from vehicle.

Rear Arm Inspection

1. Remove limiter strap.
   - Unscrew limiter strap bolt from suspension arm.
   - Inspect limiter strap for deterioration. Replace strap if necessary.
2. Disassemble rear arm by removing pivot shafts.
3. Check pivot shafts for straightness by placing on a flat surface.
   - Shafts must roll easily and smoothly. Straighten or replace bent shaft.
4. Inspect rear suspension arms for broken or cracked welds along brackets and pipes (tubing).
   - Repair or replace as necessary.
5. Check straightness of rear arm pipes (tubes) by inserting a good pivot shaft into all pipe openings.
   - If pivot shaft slides through pipe easily from one end to the other, rear arm is good. If pivot shaft binds, repair or replace rear arm.
6. Reassemble rear arm and tighten pivot shaft bolt to 25 ft lb (3.5 kg-m).
   - Apply low temperature ep (extreme pressure) type grease to shaft.
7. Install limiter strap.
   - Tighten limiter strap nut to 45 in. lb (0.5 kg-m).



1. Torque 45 in. lb (0.6 kg-m)
2. Torque 25 ft lb (3.5 kg-m)
3. Shaft, 12.78 in. (324.61 mm) Long

Rear Arm Installation

1. Install rear arm assembly to suspension rail brackets.
   - Grease rear arm pivot shaft with low temperature ep (extreme pressure) type grease.
2. Connect shock absorber to rear arm.
3. Secure rear suspension arm to tunnel.
   - Tighten bolts to 25 ft lb (3.5 kg-m).
4. Apply tension to rear arm springs.
   - Refer to Ride Adjustment procedure for details of special tool usage.

REAR AXLE

Rear Axle Removal

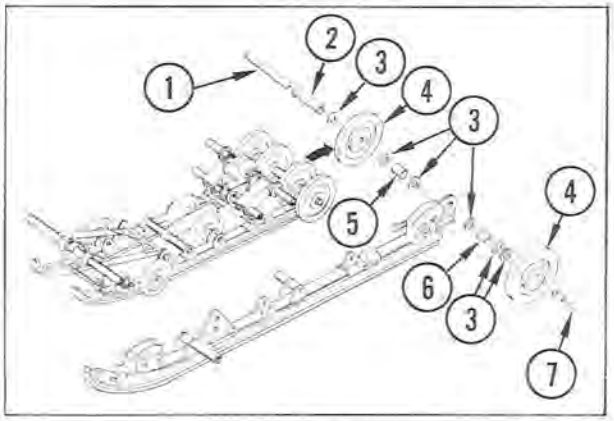
1. Remove suspension.
   - Refer to Suspension Removal procedure.
2. Unscrew bolt from either end of rear axle.
3. Tap rear axle from suspension.
   - Insert small diameter rod or punch into end of rear axle (be careful not to damage threads) then tap rear axle from suspension using a heavy hammer.

Rear Axle Inspection

1. Inspect idler wheels.
   - Refer to Idler Wheel Repair procedure if necessary.
2. Check shaft for straightness by placing on a flat surface.
   - Shaft must roll easily and smoothly. Straighten or replace bent shaft.

Rear Axle Installation

1. Assemble rear axle in sequence shown.



1. Shaft, 14.12 in. (358.65 mm) Long
2. Spacer, 3.75 in. (95.25 mm) Long
3. Washer (12 required)
4. Wheel Assembly (4 required)
5. Spacer, 1.19 in. (30.23 mm) Long
6. Spacer, 1.69 in. (42.93 mm) Long
7. Torque 25 ft lb (3.5 kg-m)

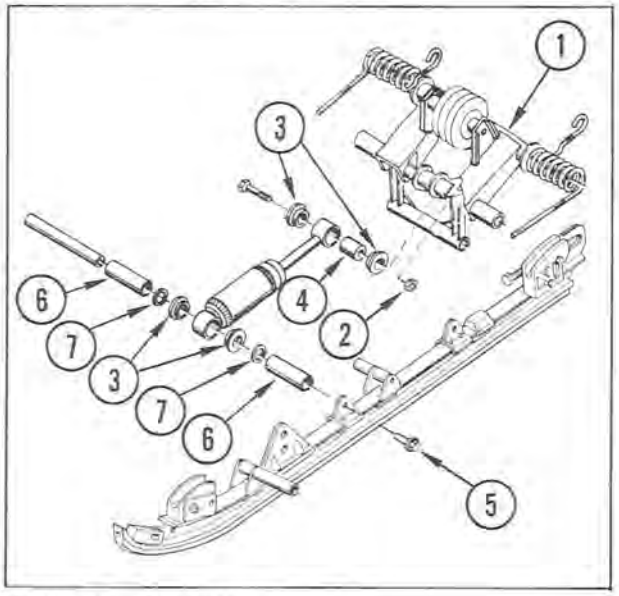
NOTE: During reassembly, be sure spacers and washers are properly placed to insure parallelism between suspension rails and to prevent premature idler wheel failure or track alignment problems.

2. Install suspension.
   - Refer to Suspension Installation procedure.
3. Perform Track Adjustments.
   - Refer to Track Adjustments procedure.

SHOCK ABSORBER

Shock Absorber Removal

1. Place snowmobile on its side.
   - Use a blanket or mat to prevent marring vehicle finish.
2. Remove shock absorber.
   - Disconnect shock absorber from rear arm assembly.
   - Remove bolts securing pivot shaft to suspension rail brackets at front of shock absorber.



1. Rear Arm Assembly
2. Torque 15 ft lb (1.9 kg-m)
3. Bushing
4. Sleeve
5. Torque 25 ft lb (3.5 kg-m)
6. Spacer, 3.60 in. (91.44 mm) Long
7. Washers

Shock Absorber Inspection

1. Examine shock body.
   - If there are any signs of leakage or shaft corrosion, replace shock absorber.
2. If bushings or sleeve are worn or deteriorated, they must be replaced.
3. Check pivot shaft for straightness.
   - Shaft should roll smoothly on a flat surface.
   - Straighten or replace bent shaft.

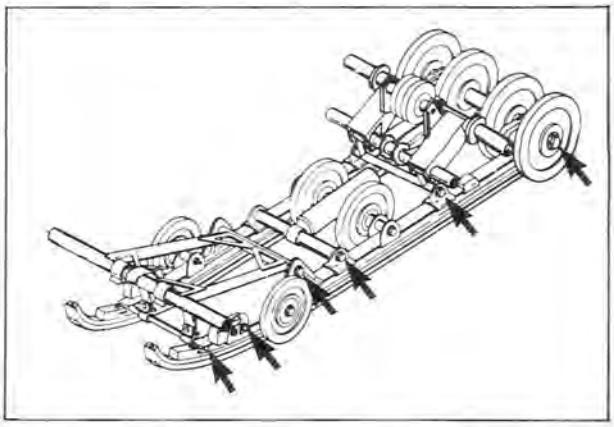
Shock Absorber Installation

1. Attach shock sbsorber to suspension rail brackets.
   - Position bushings, washers, and spacers as shown.
   - Torque bolts to 25 ft lb (3.5 kg-m).
2. Fasten shock absorber to rear arm assembly.
   - Position bushings and sleeve as shown.
   - Torque nut to 15 ft lb (1.9 kg-m).
3. Carefully lay snowmobile on track.

SUSPENSION RAILS

Suspension Rail Disassembly

1. Remove suspension.
   - Refer to Suspension Removal procedure.
2. Unscrew bolts securing slide rail to suspension assembly.



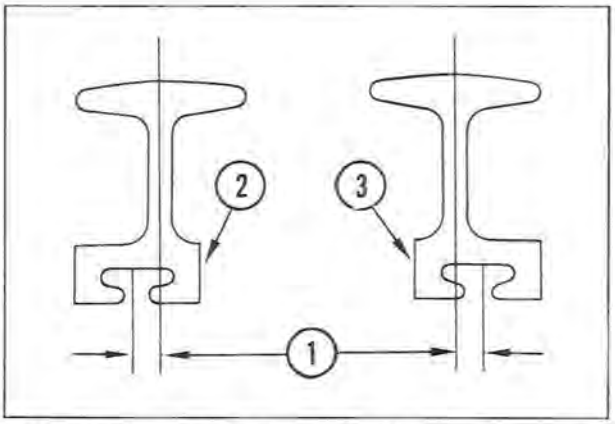
3. Remove brackets, bumpers and cams from rail.
   - Remove mounting hardware as required.

Suspension Rail Inspection

- Check rail I beam and all brackets for distortion or cracks.
- Inspect bumpers for wear and deterioration.
- Repair or replace damaged item.

Suspension Rail Assembly

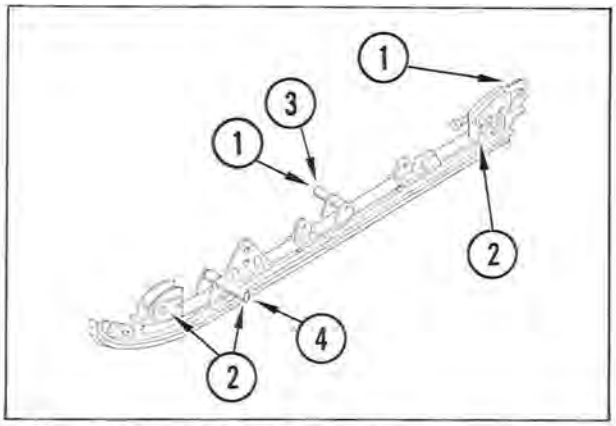
NOTE: Left and Right suspension rails are not interchangeable since I beam portion of rail is offset.



1. Offset (Viewed from rear to front)
2. LH Suspension Rail
3. RH Suspension Rail

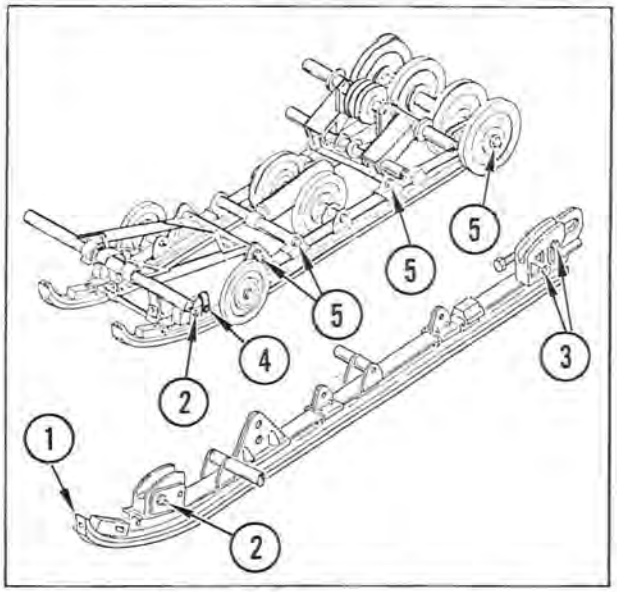
1. Assemble brackets, cams and bumpers onto left or right suspension rail as shown.

NOTE: Left hand rail assembly sequence shown.



1. Mounted toward INSIDE on each rail
2. Mounted toward OUTSIDE on each rail
3. Pipe 3.0 in. (76.2 mm) Long
4. Pipe 3.5 in. (88.9 mm) Long

2. Mount slide rail to suspension assembly.
   - Torque slide rail component mounting hardware to the value indicated.



1. Torque to 25 in. lb (0.3 kg-m)
2. Torque to 35 in. lb (0.4 kg-m)
3. Torque to 50 in. lb (0.6 kg-m)
4. Torque to 120 in. lb (1.4 kg-m)
5. Torque to 25 ft lb (3.5 kg-m)

3. Tighten bracket to slide rail mounting bolts to 120 in. lb (1.4 kg-m).
4. Tighten all idler wheel mounting bolts to 25 lb ft (3.5 kg-m).
5. Install suspension.
   - Refer to Suspension Installation procedure.

STEERING SYSTEM

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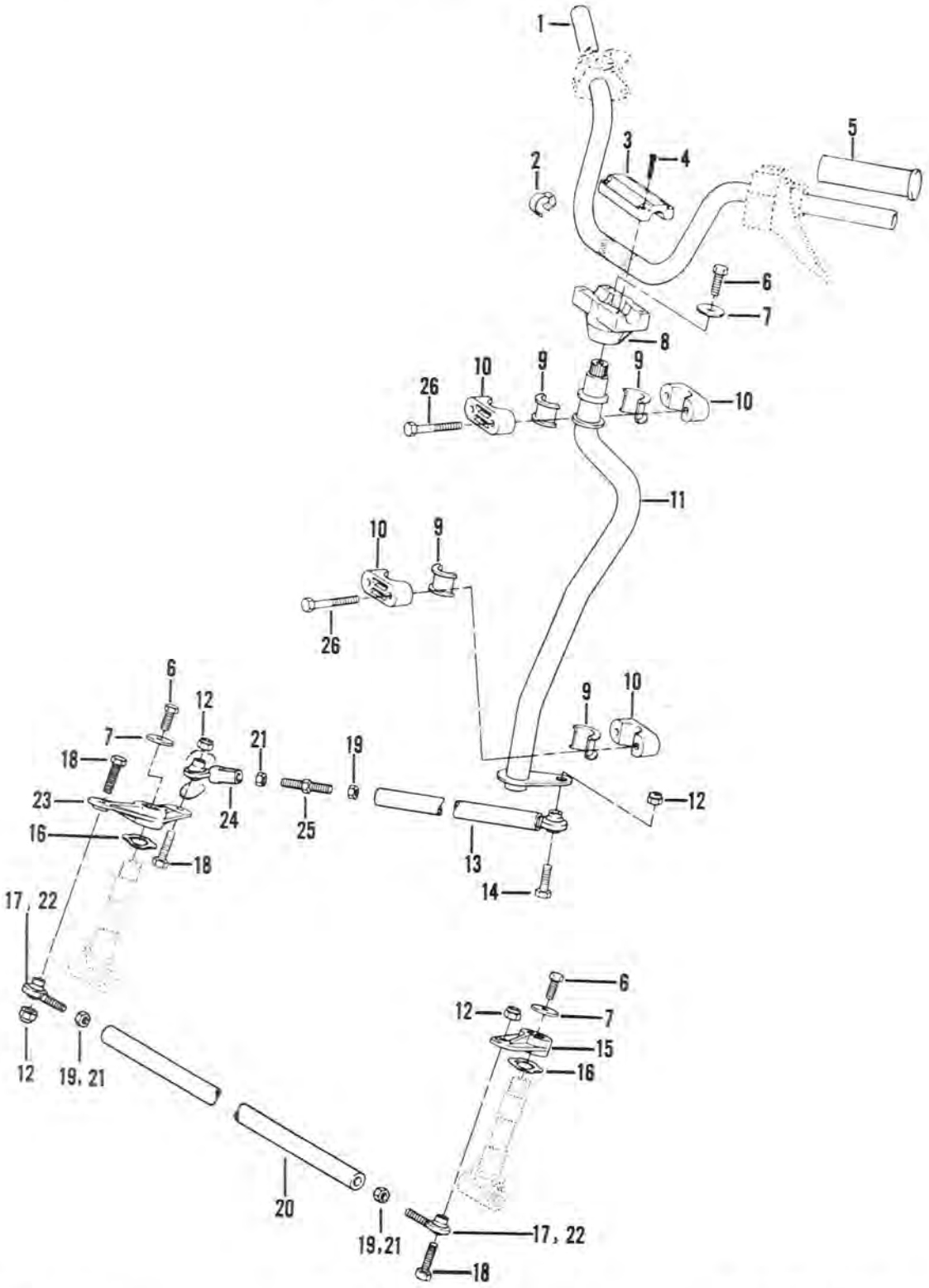
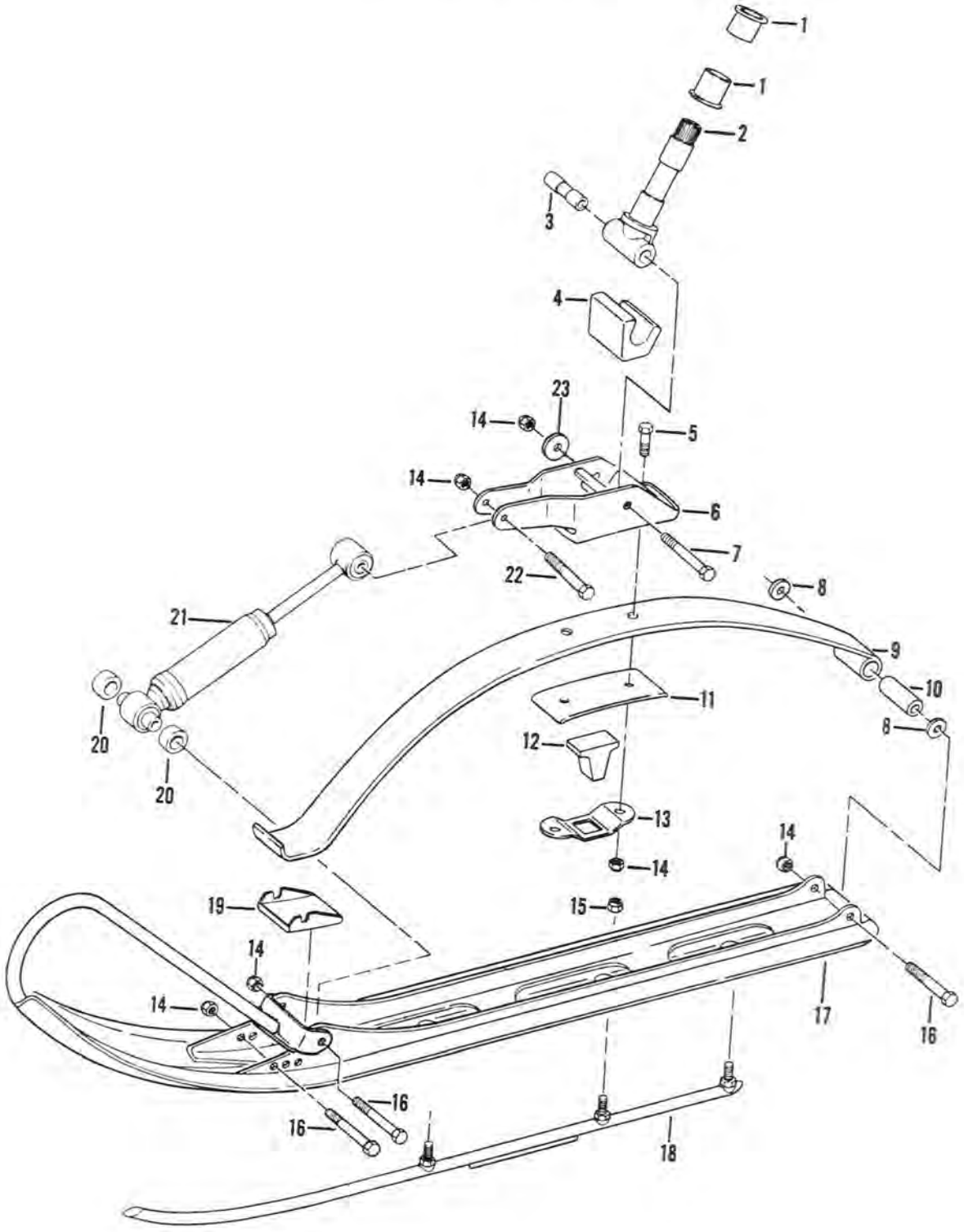
STEERING SYSTEM



1. HANDLE, steering
2. CLAMP, wire
3. HOLDER, handle
4. SCREW, 1/4-20 x 1.00
5. GRIP, handle
6. BOLT, 3/8-24 x 1.00
7. WASHER, special
8. HOLDER, handle
9. BUSHING
10. BLOCK, mount
11. POLE ASSY, steering
12. NUT, insert, 3/8-24
13. ROD, tie
14. BOLT, 3/8-24 x 1.37
15. ARM, left steering
16. WASHER, wave
17. ROD END, tie
18. BOLT, 3/8-24 x 1.50
19. NUT, 3/8-24
20. ROD, tie
21. NUT, special, 3/8-24
22. ROD END, tie
23. ARM, right steering
24. ROD END, tie
25. STUD, adjusting
26. BOLT, 5/16-24 x 2.50

STEERING SYSTEM



1. BUSHING, spindle
2. SPINDLE, ski
3. SLEEVE, spindle
4. DAMPER
5. BOLT, 3/8-24 x 1.25
6. SADDLE, ski
7. BOLT, 3/8-24 x 3.50
8. WASHER, special
9. SPRING, monoleaf
10. SLEEVE, spring
11. PLATE, back-up
12. BUMPER, ski
13. RETAINER, bumper
14. NUT, insert, 3/8-24
15. NUT, insert, 5/16-18
16. BOLT, 3/8-24 x 3.50
17. SKI
18. SKEG, carbide
19. STRIP, rub
20. SPACER, shock absorber
21. SHOCK ABSORBER, ski
22. BOLT, 3/8-24 x 2.00
23. WASHER, special

WARNING **Certain fasteners used in the steering system are grade 8, self-locking types. Use of substitute hardware may result in steering system failure causing personal injury.**

SKI SKEGS

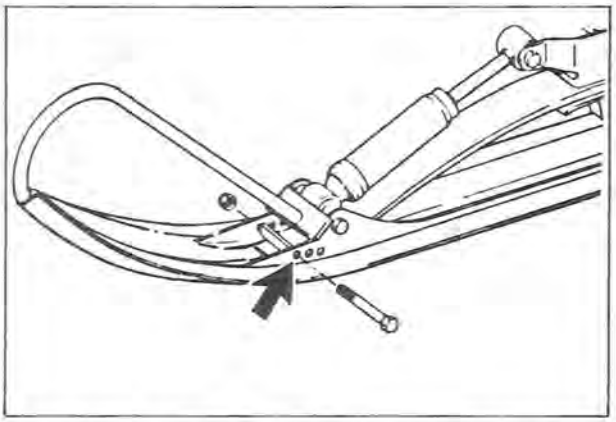
The ski skegs on the bottom of each ski are equipped with carbide inserts for improved turning capability and durability. As the carbide inserts wear down, steering ability may be reduced. The wear rate will depend on the surfaces snowmobile is operated on. Although steering and handling are affected, replacement of skegs is not necessary if only carbide is worn. Skegs must be replaced whenever they are worn more than 3/4 of their diameter at any point along their length.

STEERING SYSTEM SERVICING

Ski Spring Preload Adjustment

Three positions are provided for front ski spring mounting bolt.

NOTE: Always mount the front ski spring bolt into the same position on each ski.



FRONT HOLE POSITION — For maximum stability during high speed operation.

- Positions spring to reduce spring arch.
- Increases spring tension preload, resulting in a firmer ride with less spring travel.

CENTER HOLE POSITION — For moderate speeds and trail riding.

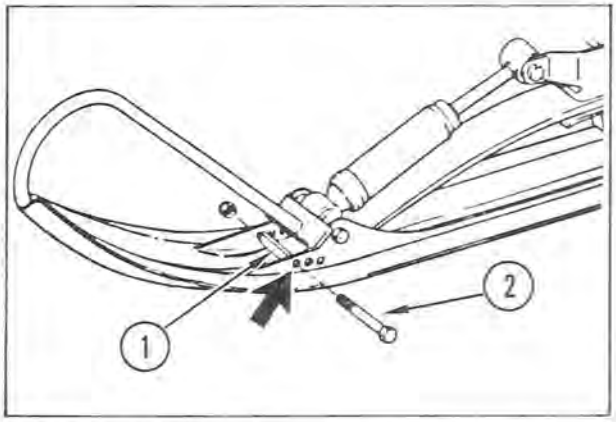
- Allows more spring arch.
- Reduces spring preload, resulting in a softer ride.

REAR HOLE POSITION — For deep snow operation or slow speed trail riding only.

- Provides maximum spring arch.
- Reduces spring preload (minimum) resulting in a much softer ride.

To change the preload of the ski spring, be sure weight of snowmobile is on skis, and proceed as follows:

1. Remove nut from front spring mounting bolt.
2. Apply weight to front bumper.
   - Open hood and with assistance from another person, stand on front bumper to relieve spring tension from mounting bolt.
3. Reposition bolt to obtain desired spring preload.
   - With weight still on front bumper, remove bolt.
   - Slide spring rub strip to align with desired hole position of ski.



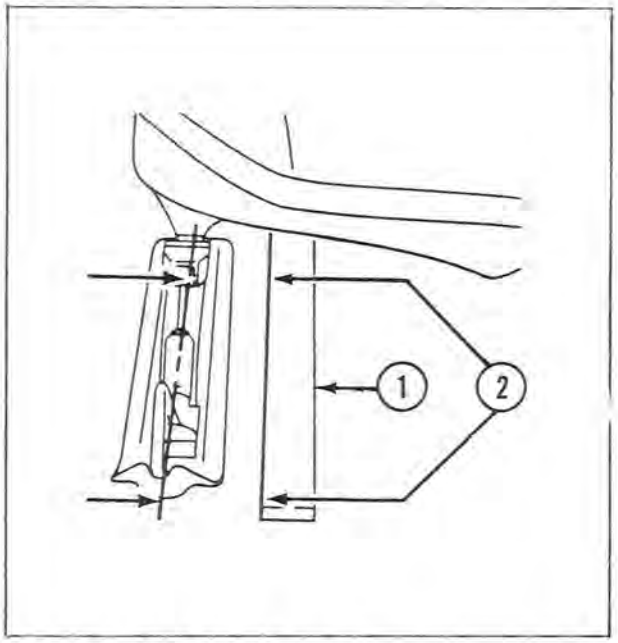
1. Spring rub strip
2. Spring bolt

   - Insert bolt and install nut.
     * torque nut to 25 in. lb (0.3 kg-m).

Steering Alignment

Check ski alignment and handlebar centering.

1. Place long board (or suitable straight edge) against right hand edge of the track.
2. Measure distance between board and center line of the ski.
   - Position ski so distance measured between ski center line and board edge is the same at front and rear of ski.

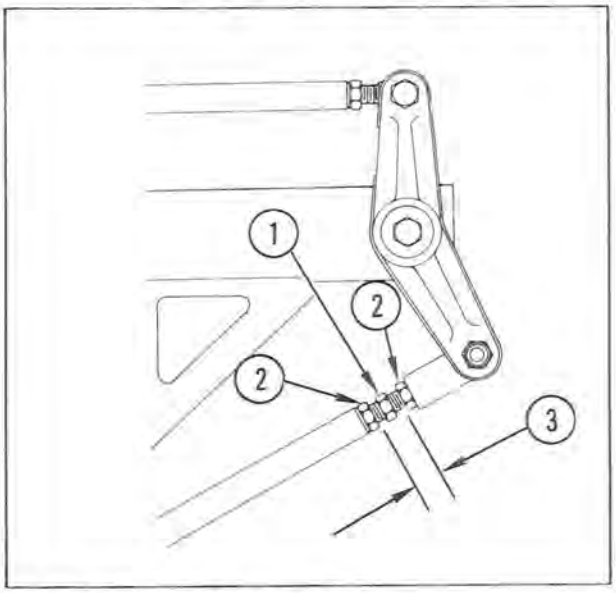


1. Straight Edge Against Track
2. Measure Distance Here

3. Check handlebar centering.
   - With ski center line parallel to outside edge of the track, check steering handlebar for centering. The handlebar holder should be parallel to lower edge of control panel.
   - To center handlebar:
     * remove right hand muffler mount nuts and springs.
     * force muffler upward for access to tie rod adjusting stud.
     * loosen lock nuts and turn tie rod adjusting stud in the direction necessary to center handlebar.

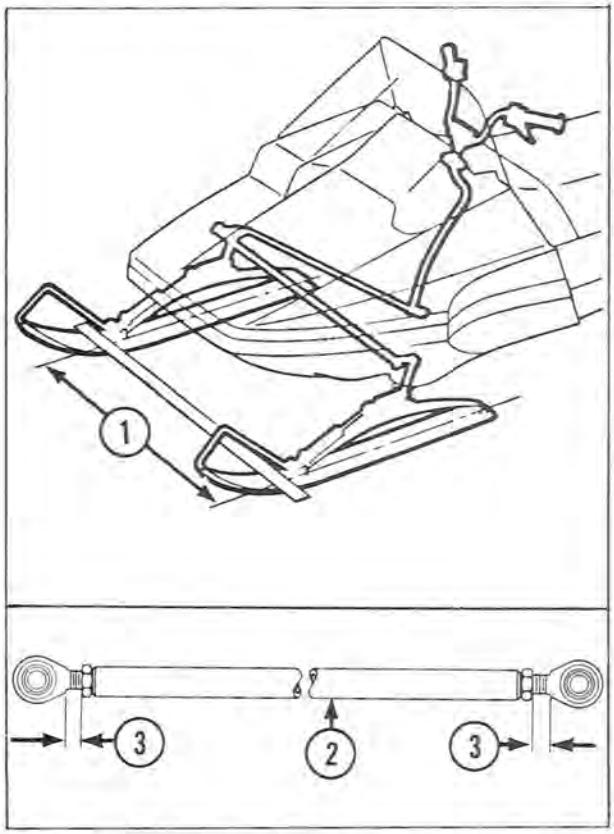
NOTE: Be sure center line of ski remains parallel to straight edge while turning tie rod length adjusting stud.

WARNING **To prevent possible steering linkage failure, adjusting stud must remain centered between two jam nuts and the measurement between the jam nuts must not exceed 1-1/4 in. (32 mm).**



1. Tie Rod Length Adjusting Stud
2. Lock Nuts
3. 1-1/4 in. (32 mm) Maximum

     * tighten lock nuts to 120 in. lb (1.4 kg-m) torque.
4. Align left ski to right ski.
   - Move both ski tips towards center of the snowmobile to remove steering linkage play.
   - Loosen tie rod lock nuts.
   - Turn tie rod to obtain an equal distance from ski center to ski center when measured at the front and rear of the skis.



1. Equal Distance Front And Rear
2. Tie Rod
3. Exposed Threads - 1/2 in. (12.7 mm) Maximum

WARNING **After proper alignment is obtained, the number of exposed threads at each rod end must be equal and not exceed 1/2 in. (12.7 mm) when measured from the jam nuts, or possible steering linkage failure may occur.**

5. Tighten all hardware (nuts, bolts, etc.) in steering system.
   - Torque lock nuts on tie rod assemblies 120 in. lb (1.4 kg-m).
   - Refer to Torque Chart for recommended torque values of other fasteners in the steering system.
6. Reposition muffler and install mounting nuts and spring.

NOTE: Be sure insulation washer lip is properly positioned in slotted muffler bracket and special insulating shield is properly located before tightening muffler mounting nuts.

TORQUE CONVERTER SYSTEM

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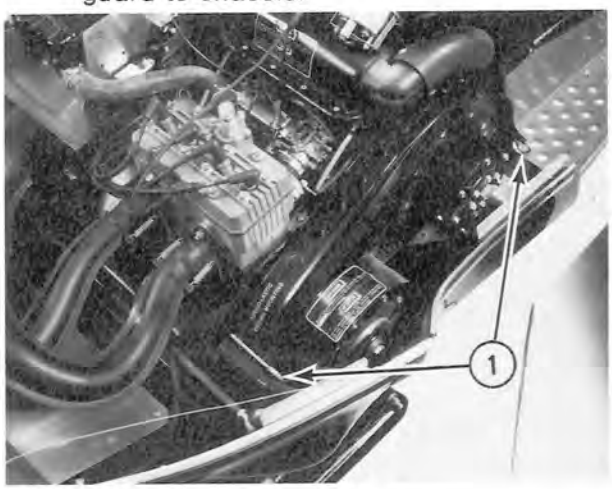
BELT

Inspect the drive belt for worn areas, cracks between the teeth, or ply separations. Replace the belt when worn 0.125 in. (3.18 mm) from new specifications.

Belt Removal

NOTE: Prior to removal, observe markings on belt so that it may be installed on converters to rotate in the same direction as original installation.

1. Remove belt guard.
   - Remove retaining pins securing belt guard to chassis.



1. Retaining Pins

2. Belt must be removed from driven converter first, then from drive converter.
   - Rotate movable half of driven converter towards rear of vehicle while pushing it towards the steering post. Assistance of another person may be required to apply the brake while rotating sheave.

WARNING **Use caution when removing the drive belt from the driven converter sheave since it is under a heavy spring load. Keep fingers and hands clear when releasing sheave.**

   - Roll drive belt up and off of driven converter, then slowly release the movable sheave.

   - Work drive belt past driven converter hub, then remove it from the drive converter.

Belt Installation

NOTE: Always reinstall belt so it will rotate in the same direction as it did originally.

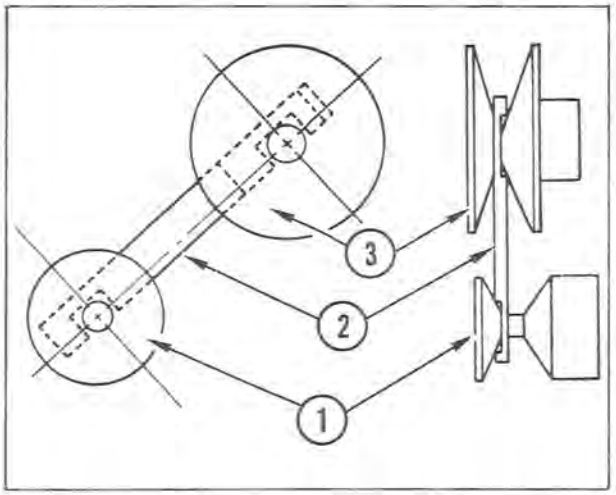
1. Position belt around drive converter.
2. Install belt in driven converter.
   - Work belt past driven converter hub.
   - Open the driven converter movable sheave to ease installation of the drive belt.
   - Roll the drive belt over the top of the sheave, being careful not to pinch your fingers, and into position in the driven converter.
   - Place drive belt into "low gear ratio" by working belt around drive and driven converter. This procedure prevents excessive wear to sides of the belt during initial drive converter engagement.
3. Install belt guard.
   - Secure guard with retaining pins.

CAUTION **Be certain the intake silencer hose is directed to the rear after the belt guard is reinstalled, as incorrect position may result in engine damage.**

CONVERTER SERVICING

Converter Alignment

Correct converter alignment is obtained using alignment gauge (special tool) positioned between drive and driven converters as shown.



1. Drive Converter
2. Alignment Gauge P/N 57001-3503
3. Driven Converter

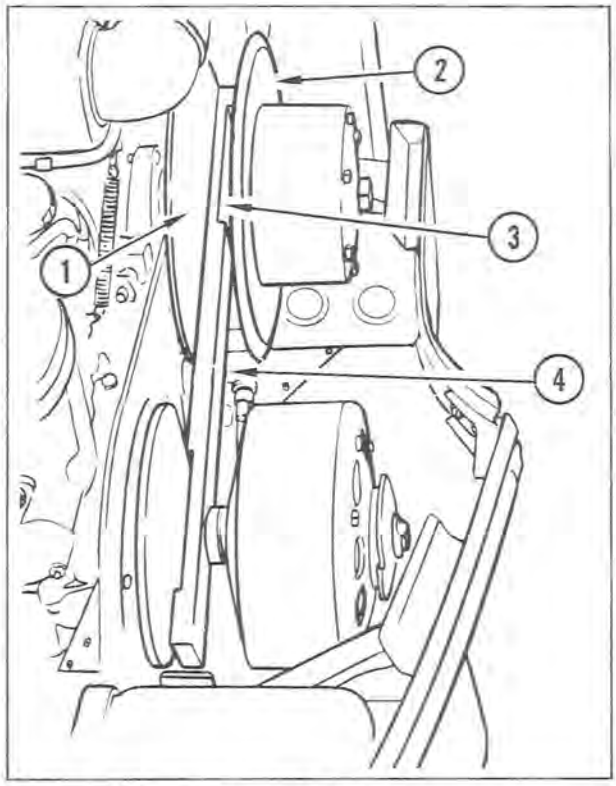
NOTE: Improper handling or misuse of alignment gauge will result in inaccurate converter alignment. Check flatness of alignment gauge with straight edge prior to each use.

To insure proper relationship and function of the drive belt with the converters, three specific alignment checks are necessary:

- Converter Center-to-Center
- Converter Offset
- Converter Parallelism

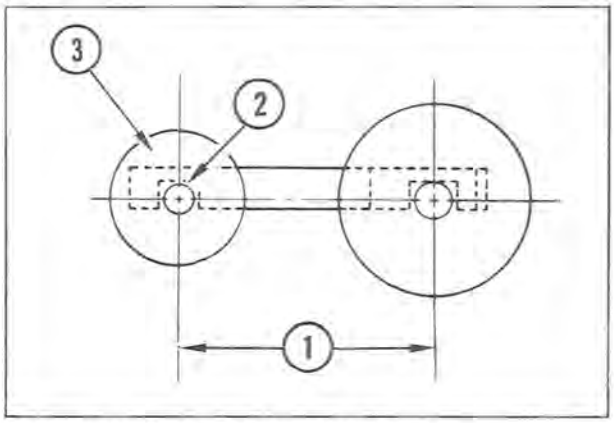
CONVERTER CENTER-TO-CENTER DISTANCE

1. Remove drive belt.
   - Refer to Belt Removal procedure.
2. Position alignment gauge (special tool) onto converters.
   - Rotate driven converter movable sheave clockwise, and insert alignment gauge between sheaves with deep notch facing the stationary sheave.
   - Carefully release movable sheave, allowing spring tension to keep gauge in position between the stationary and movable sheaves.



1. Driven Converter Movable Sheave
2. Driven Converter Stationary Sheave
3. Alignment Gauge Deep Notch
4. Alignment Gauge P/N 57001-3503

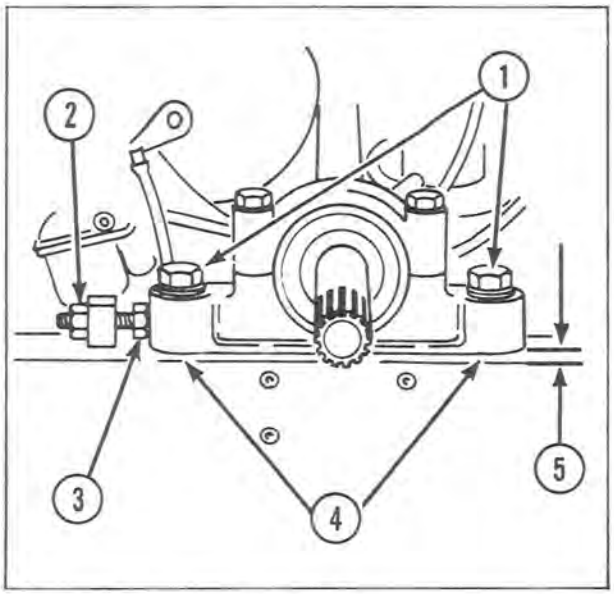
3. Center distance is correct if notch in alignment gauge fits over shaft on the drive converter.



1. Center Distance 12.0 in. (304.8 mm)
2. Notch
3. Drive Converter

If adjustment to converter center distance is required:

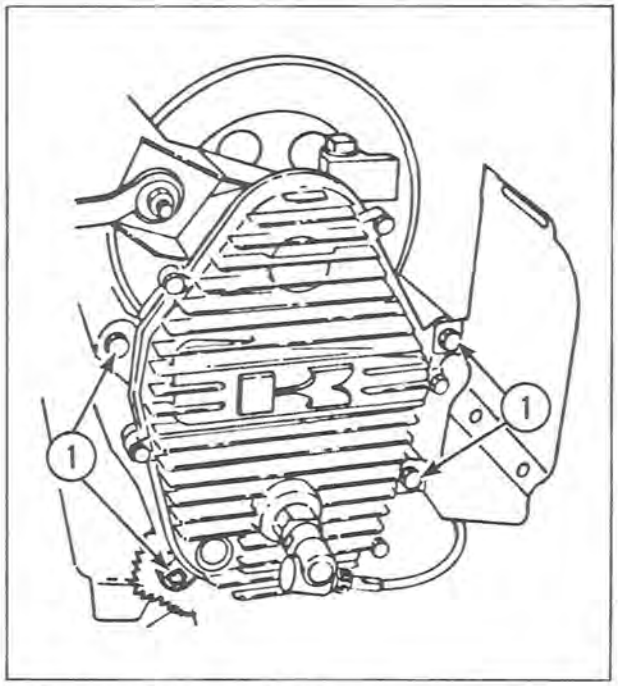
1. Reposition chaincase and jackshaft bearing retainer to obtain correct center distance.
   - Loosen the following mounting bolts to permit movement of jackshaft.
     * jackshaft bearing retainer mounting bolts.
     * adjusting bolt lock nut.



1. Bearing Retainer Mounting Bolts
2. Adjusting Bolt Locknut
3. Adjusting Bolt
4. Bearing Retainer Shims
5. Parallel

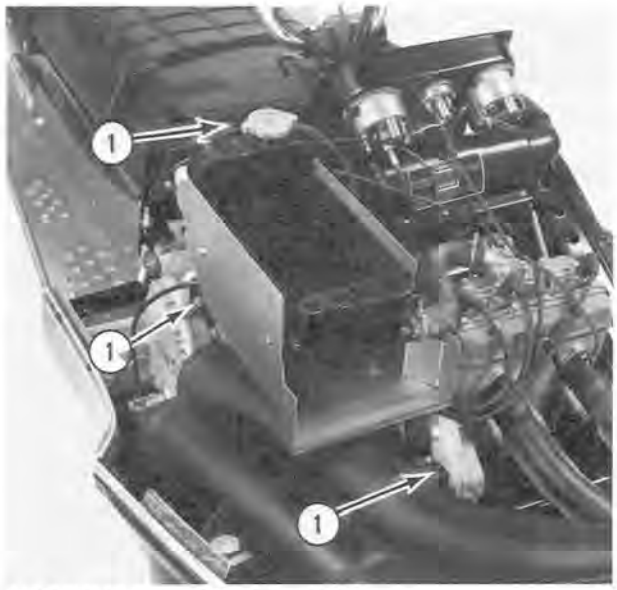
* chaincase mounting bolts.

NOTE: Models equipped with electric start, remove lower battery bracket for access to chaincase mounting bolts.



1. Chaincase Mounting Bolts

* radiator brace mounting bolts.



1. Radiator Brace Mounting Bolts

- Move the jackshaft bearing retainer and chaincase forward or rearward, as required, to obtain correct center distance.
- To insure correct center distance is maintained, turn adjusting bolt so head of the bolt contacts jackshaft bearing retainer flange, and tighten locknut.
- Tighten all bolts and nuts for chaincase and radiator brace bracket assembly.

NOTE: On models equipped with electric start, reinstall lower battery bracket. Install special round head screws upward through footrest with washers and nuts toward battery case.

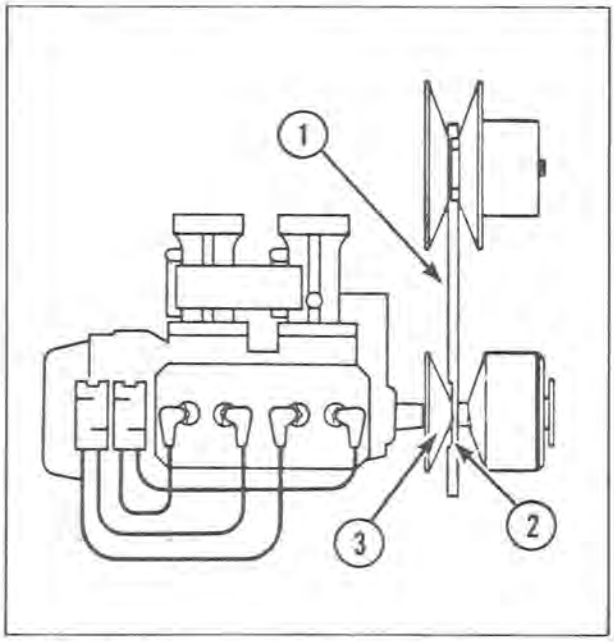
CAUTION **To prevent premature jackshaft bearing failure, reshim the bearing retainer after changing center distance.**

2. Perform Jackshaft Bearing Retainer Shimming procedure.

CONVERTER OFFSET DISTANCE

After checking center-to-center distance, inspect for proper converter offset.

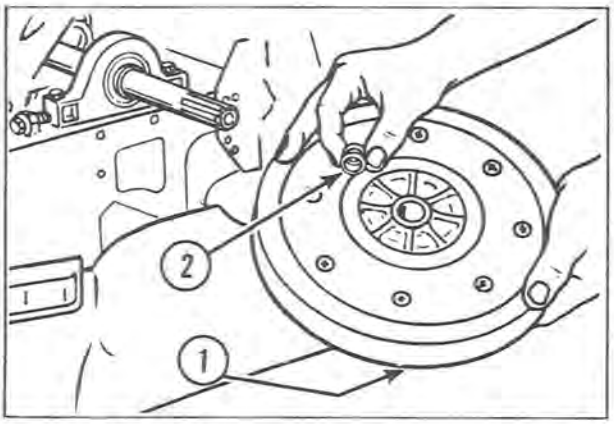
Correct offset distance is obtained when surface of shallow notch on alignment gauge contacts the base of the drive converter fixed sheave.



1. Alignment Gauge
2. Alignment Gauge Shallow Notch
3. Drive Converter Fixed Sheave

If adjustment to the offset distance is required:

1. Remove driven converter from jackshaft.
   - Remove left side aluminum trim from lower pan.
   - Unscrew bolt securing driven converter to jackshaft.
   - Slide converter from jackshaft.
2. Adjust offset distance.
   - Add or remove shims, as required, from the bore of the driven converter to obtain correct converter offset.



1. Driven Converter
2. Shims

AVAILABLE SHIMS

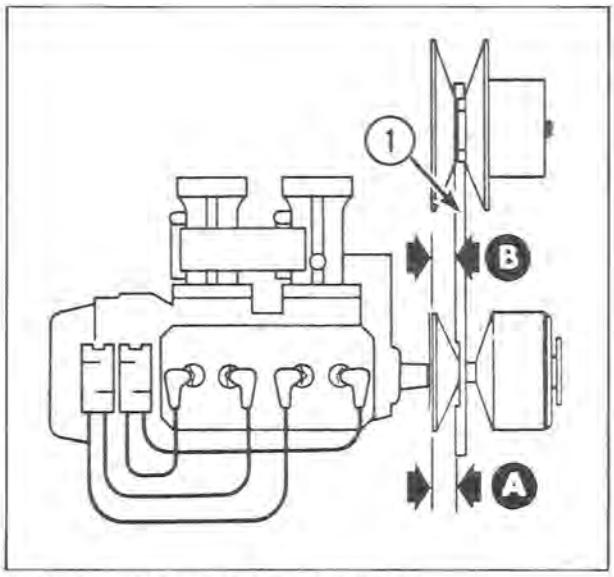
P/N	THICKNESS
92025-3501	.032 in. (0.8 mm)
92025-3502	.063 in. (1.6 mm)
92025-3503	.100 in. (2.5 mm)

3. Install driven converter.
   - Slide converter, with selected shims, onto jackshaft.
   - Torque mounting bolt to 50 ft lb (6.9 kg-m).
   - Position aluminum trim onto lower pan and secure with screws and nuts. Be sure special washers are installed under the head of each screw to prevent damaging decal pattern on aluminum trim.
4. Perform Converter Parallelism procedure.

CONVERTER PARALLELISM

After checking center-to-center and offset distance, parallelism must be checked.

1. Measure dimension A and B as shown.



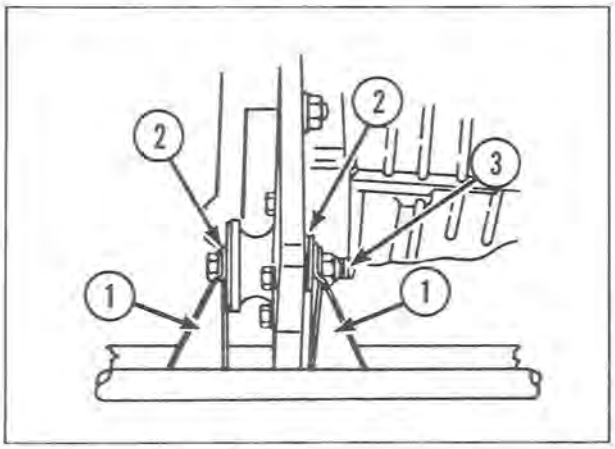
1. Alignment Gauge P/N 57001-3503

2. Compare dimensions A and B against NOTE I and II.

NOTE I: Dimension A must be equal to or more than dimension B.

NOTE II: Dimension A must never exceed dimension B by more than 0.02 in. (0.5 mm).

3. If dimension A is less than dimension B, parallelism between drive and driven converters is not correct. Parallelism must be adjusted as follows:
   - Loosen large bolt in each of two engine mounts on right side of the engine.



1. Engine Mounting Bracket
2. Shims
3. Engine Mount Bolt

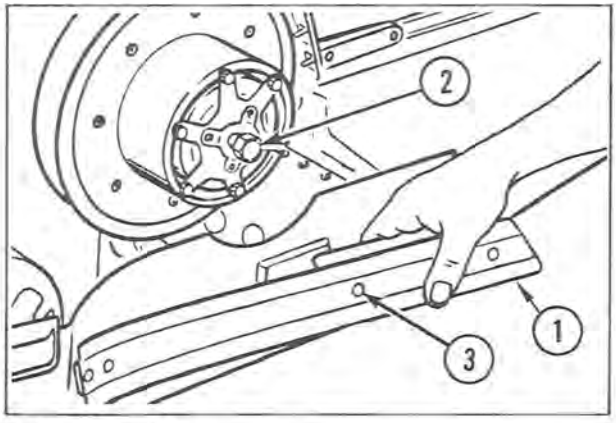
- Move recoil starter end of engine forward or rearward as necessary to make converters parallel.
- Install U-shaped shims on either side of both engine mounts to fill gaps between engine mounts and mounting brackets on the frame.
- Securely tighten large bolts in the two engine mounts after parallelism is obtained.

4. Install drive belt.
   - Refer to Belt Installation procedure.

Jackshaft Bearing Retainer Shimming

After adjusting center-to-center distance, shim the jackshaft bearing retainer as follows:

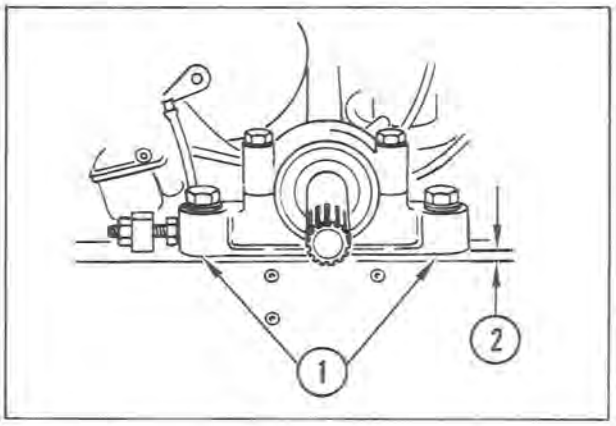
1. Remove driven converter from jackshaft.
   - Remove left side aluminum trim from lower pan.
   - It is not necessary to remove the screw indicated.



1. Aluminum Trim
2. Retaining Bolt
3. Do Not Remove This Screw

   - Unscrew bolt securing driven converter to the jackshaft.
   - Slide converter from jackshaft.

2. Shim jackshaft bearing retainer.
   - Remove existing shims below the bearing retainer.



1. Bearing Retainer Shims
2. Parallel

   - Position bottom of the retainer parallel to top surface of the chassis.

CAUTION **Bearing retainer should be shimmed until jackshaft center line is 6.62 in. (168.22 mm) above the track drive shaft center line.**

   - Install U-shaped shims, as required, to fill the space between the retainer bottom and chassis top. This procedure prevents excessive jackshaft bearing preload.

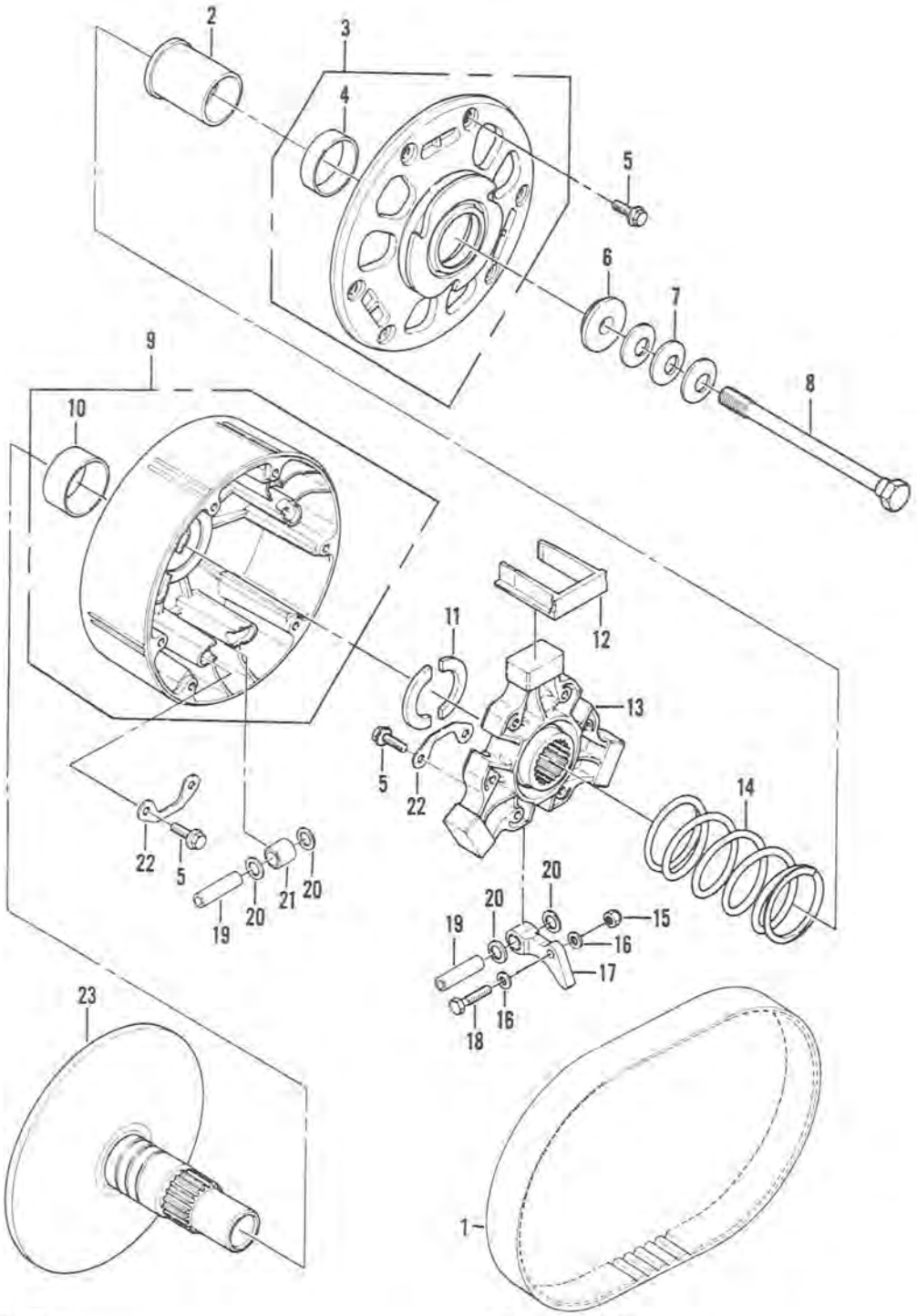
3. Tighten nuts on the jackshaft bearing retainer.
4. Position driven converter onto the jackshaft and check Converter Offset Distance.

Converter Lubrication

CAUTION **DO NOT LUBRICATE THE DRIVE OR DRIVEN CONVERTER. Any lubricant applied to the drive or driven converters will drastically change the shifting characteristics, resulting in converter failure and reduced drive belt life.**

Clean the drive and driven converter sheave surfaces once a year. Use a rag dipped in acetone liquid cleaner to remove water and oil. Remove rust or rubber with No. 260 or No. 320 emery cloth and polish with No. 400 emery cloth.

DRIVE CONVERTER



1. DRIVE BELT
2. SLEEVE
3. COVER ASSEMBLY
4. BUSHING
5. BOLT
6. SLEEVE WASHER
7. CONICAL WASHER
8. BOLT
9. MOVEABLE SHEAVE ASSEMBLY
10. BUSHING
11. SPLIT WASHER
12. WEAR GUIDE
13. SPIDER
14. WHITE SPRING
15. LOCK NUT
16. WEIGHT
17. RAMP WEIGHT
18. BOLT
19. PIN
20. SPACER
21. ROLLER
22. WASHER
23. FIXED SHEAVE

DRIVE CONVERTER

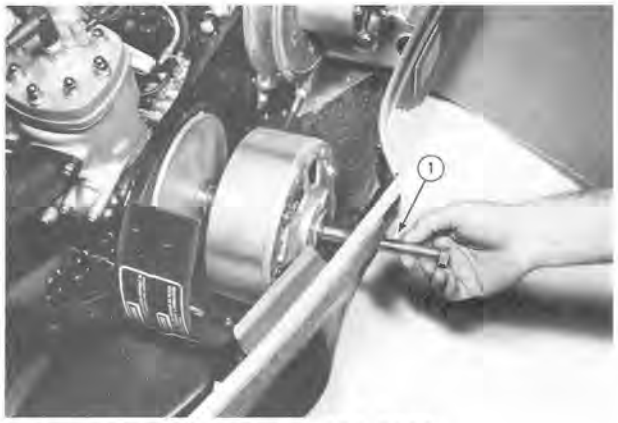
Drive Converter Removal

1. Remove drive belt.
   - Refer to Belt Removal procedure.
2. Unscrew drive converter mounting bolt.
   - Use strap wrench to hold converter.

3. Pull drive converter from engine.

CAUTION **Be sure to use special puller bolt with METRIC threads to remove converter. Incorrect puller will result in converter damage.**

- Use puller bolt (special tool).
- Hold converter with strap wrench.



1. Special Puller Bolt P/N 57001-3502

Drive Converter Disassembly

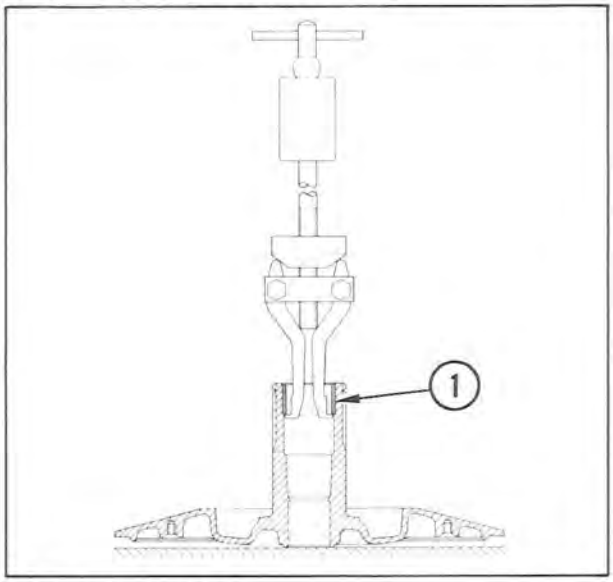
1. Remove cover assembly.

WARNING **Do not let go of the cover suddenly as the cover can pop up and cause personal injury.**

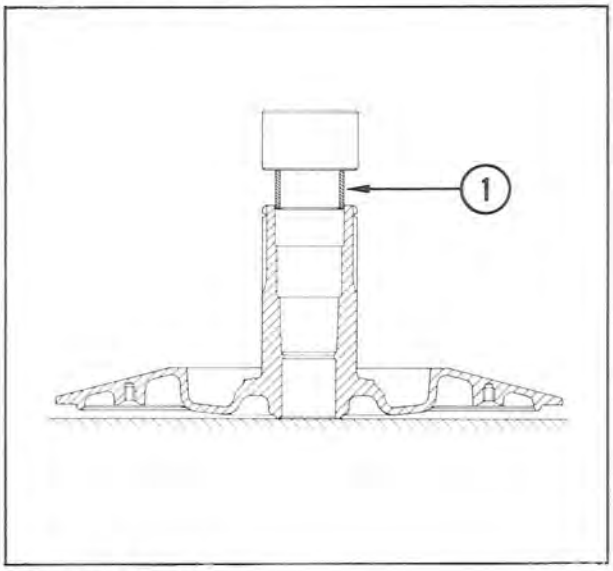
- Apply a firm grip on the cover to prevent the spring from pushing the cover off.
- Remove the bolts that secure the cover on the converter.

2. Check cover bushing for excessive wear.
   - A quick check can be made by placing the cover over the sleeve, if excessive wobbling is noticed, the bushing should be replaced.
   - For an accurate check, measure the outside diameter of the sleeve and the inside diameter of the bushing with micrometer.
   - If the difference between the two readings is 0.02 in. (0.5 mm) or larger, replace the bushing.

NOTE: Bushings used in converter are split type. During inspection do not mistake bushing split line as a cracked bushing.

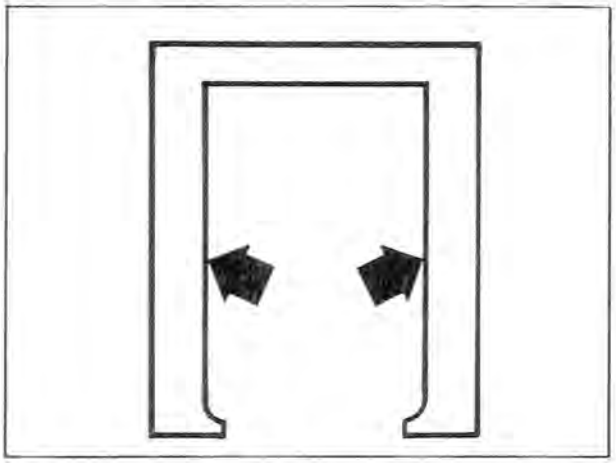


1. Removing Bushing



1. Installing Bushing

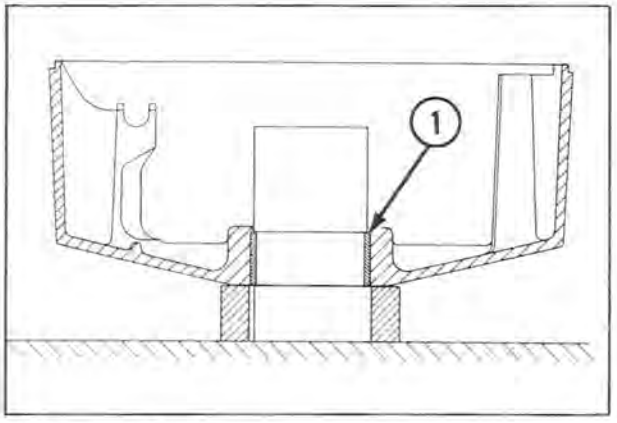
3. Remove the spring.
4. Lift the sleeve out from the converter.
5. Pull out spider assembly.
6. Remove wear guides.
7. Inspect guides for excessive wear.



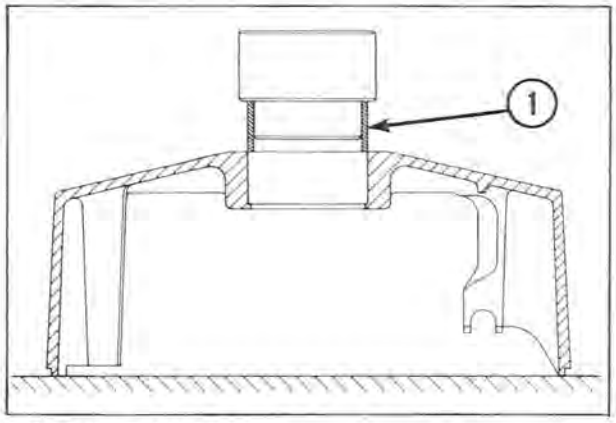
- Maximum wear allowed is 0.008 in. (0.2 mm) on each arm.

8. Slide split washers from shaft.
9. Inspect movable sheave bushing wear.
   - Wobble sheave from side to side. If excessive movement is noticed, replace the bushing.
   - For an accurate measurement, remove movable sheave and measure diameter of the shaft on the fixed sheave and the inside diameter of the bushing in the movable sheave.
   - If the difference between the two readings is 0.02 in. (0.5 mm) or larger, replace the bushing.

NOTE: Bushings used in converter are split type. During inspection do not mistake bushing split line as a cracked bushing.



1. Removing Bushing



1. Installing Bushing

10. Disassemble movable sheave components.
    - Remove washer tabs, pins, spacers and rollers from movable sheave.
    - Replace any part that has excessive wear.
      * Spacers — measure thickness with a micrometer. They should measure 0.032 ± 0.004 in. (0.8 ± 0.1 mm). Replacement is required when the measurement is 0.016 in. (0.4 mm) or less.
      * Pins and Rollers — Maximum clerance allowed between pin and roller is 0.02 in. (0.5 mm).
11. Disassemble spider components.
    - Remove washer tabs, pins, spacers and ramp weights from spider assembly.
    - Replace any part that has excessive wear.
      * Spacers — measure thickness with a micrometer. They should measure 0.032 ± 0.004 in. (0.8 ± 0.1 mm). Replacement is required when they measure 0.016 in. (0.4 mm) or less.
      * Pins and Ramp Weights — Maximum clearance allowed between pin and ramp bushing is 0.02 in. (0.5 mm).

Drive Converter Cleaning

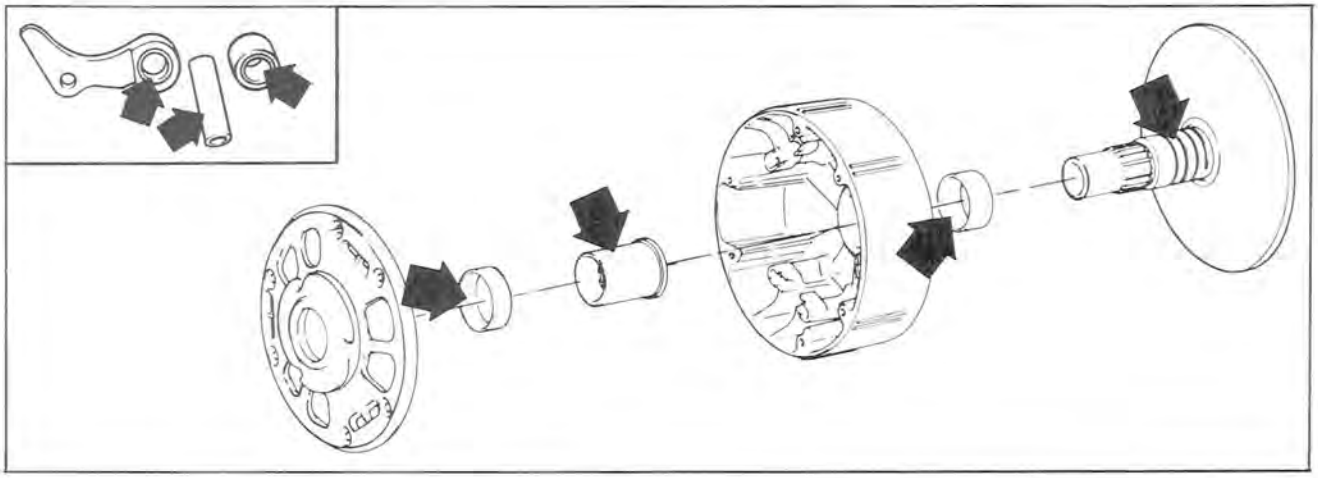
NOTE: Accumulation of foreign matter on sliding surfaces or moving components within converter will alter the shifting characteristics, which will affect vehicle performance throughout the shifting range. Contamination on converter components may cause the vehicle to display any of the following symptoms.

- Bog (hesitation) during acceleration.
- Poor back shift.
- Low top speed.

1. Remove all grease and dirt by wiping the components with a rag dipped in cleaning solvent. Dry parts with compressed air or a clean cloth.

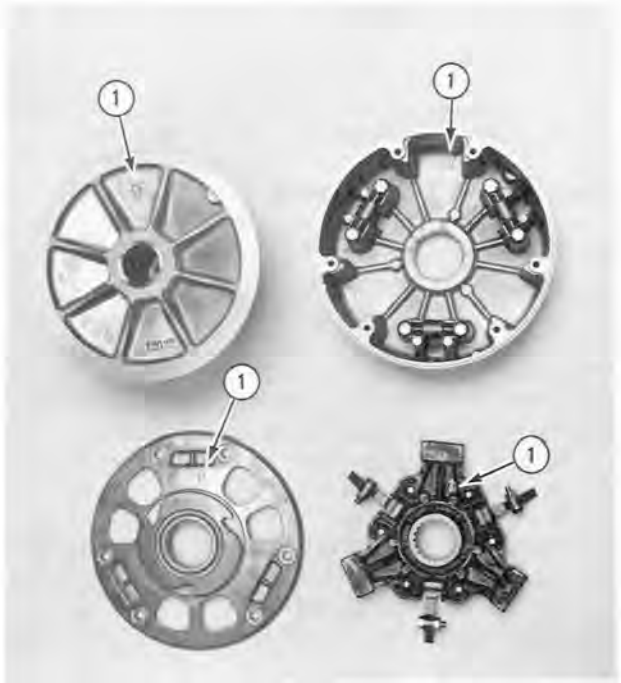
CAUTION **DO NOT soak components with bushings in cleaning solvents since some solvents can damage the bushings resulting in converter failure.**

2. Remove drive belt accumulations from the stationary sheave and movable sheave with cleaning solvent.
3. Remove rust and drive belt accumulations from the steel shaft of the stationary sheave with cleaning solvent or a fine grade steel wool.
4. Thoroughly clean pins and bushings for roller and ramp weight assemblies.



Drive Converter Assembly

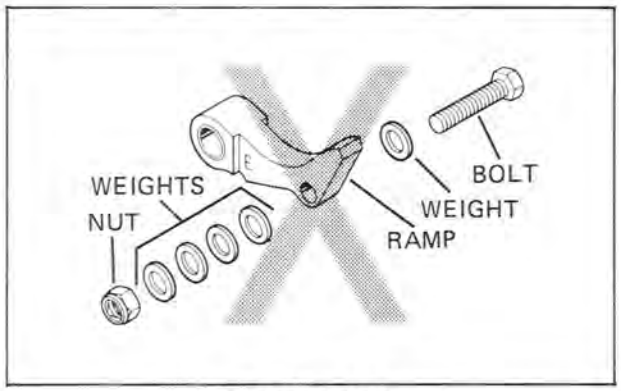
NOTE: All of the major components have arrows cast into them. It is very important during reassembly to insure that all of the arrows are in line so that the balance of the converter will not be disturbed.



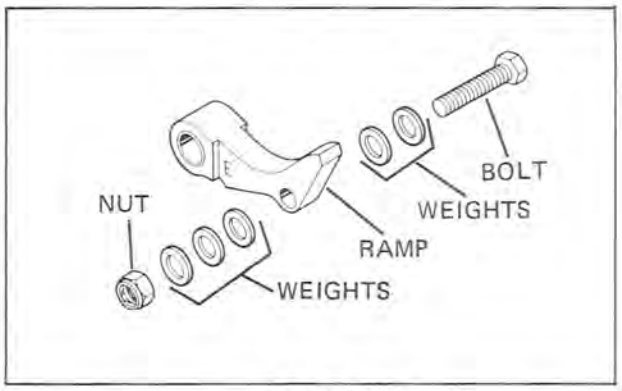
1. Align Arrows During Assembly

1. Assemble components to movable sheave.
   - Install roller and spacers onto pivot pins.
   - Insert pivot pin assemblies into groove of movable sheave.
   - Secure pivot pins in movable sheave with washer tabs and bolts.
   - Tighten bolts 8 to 10 ft lb (1.1 to 1.4 kg-m) torque.
   - After torquing the bolts, check that the roller can rotate freely.
2. Assemble components to spider.
   - Install washer weights onto each ramp.

NOTE: Installed weight positioning must not exceed 0.5 gram difference on each side of ramp as shown in illustration.



INCORRECT



CORRECT

- Torque bolts 4 to 5 ft lb (0.5 to 0.7 kg-m).
- Insert pivot pin through ramp bushing.
- Position spacer onto pivot pin, one on each side of ramp.
- Install ramp and pin assembly into groove of spider.
- Secure pivot pins in spider with washer tabs and bolts.
- Tighten bolts 6 to 8 ft lb (0.8 to 1.1 kg-m) torque.
- After torquing the bolts, check that ramp pivots freely.

3. Place the fixed sheave on a work bench with shaft up.
4. Install movable sheave.
   - Align the arrows between fixed and movable sheaves, then place the movable sheave over the shaft of the fixed sheave.
   - Coat the splined portion of the shaft and the ID of split washer with NEVER-SEEZ.
   - Install the split washer and check to be sure it seats completely in the groove.
5. Install spider assembly.
   - Position plastic guides onto spider.
   - Apply NEVER-SEEZ to bottom portion of the spider which contacts the split washer.
   - Hold the three ramp weights up, align arrows between spider and movable sheave, then install the spider over splined portion of shaft.
   - After locating spider, push plastic guides into correct position.

NOTE: Due to the indexing of the splines, the arrows may not align perfect. Align as close as possible.

6. Position sleeve onto fixed sheave shaft.
   - Apply NEVER-SEEZ to the oil groove area filling the grooves and the bottom surface of the sleeve.
7. Install the spring into the groove in the spider.
8. Secure cover into proper position.
   - Align the arrow on the cover with the other arrows in the assembly and press cover down onto sheave.
   - Securely hold cover onto the sheave assembly and install mounting bolts.
   - Tighten bolts 8 to 10 ft lb (1.1 to 1.4 kg-m) torque.
9. Install sleeve washer.
   - Check to be sure cover surface is approximately flush with sleeve washer. If sleeve washer extends beyond cover surface, push sleeve down into proper position.

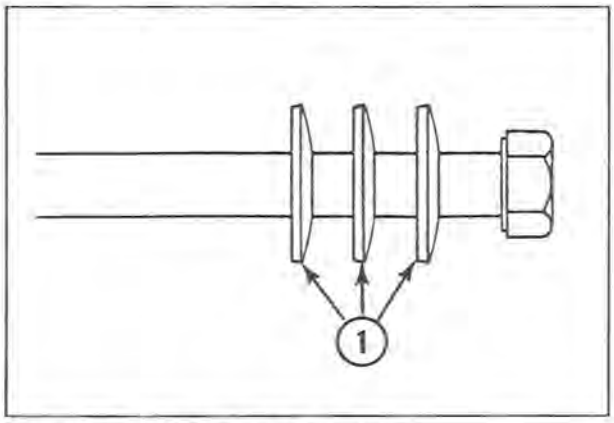
WARNING **If sleeve washer extends out beyond cover surface, misassembly of drive converter is indicated which may cause failure or malfunction during operation resulting in personal injury. Check split washer and spider assembly to insure they are properly seated on fixed sheave shaft.**

1. Washer Flush With Cover

10. Apply approximately 110 lb (50 kg) of force to cover assembly while checking for smooth shifting action (movement) of converter.

Drive Converter Installation

WARNING **In order to maintain proper torque on bolt and to prevent possible bolt failure or converter malfunction, install the THREE conical washers on converter mounting bolt as shown.**



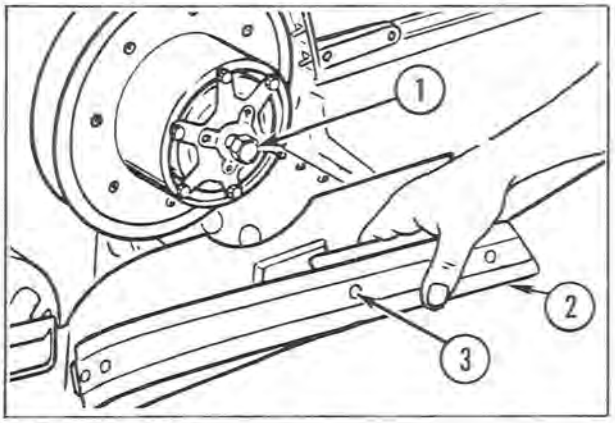
1. Conical Washer Properly Positioned.

1. Clean taper inside converter and on crankshaft to remove oil, dust, etc. Tapers must be clean and dry.
2. Secure drive converter to crankshaft.
   - Be sure three conical washers are properly positioned.
   - Tighten mounting bolt to 70 ft lb (10.0 kg-m) torque.
3. Check converter alignment.
   - Refer to Converter Alignment procedure.

DRIVEN CONVERTER

Driven Converter Removal

1. Remove left side aluminum trim from lower pan.
   - It is not necessary to remove the screw indicated.

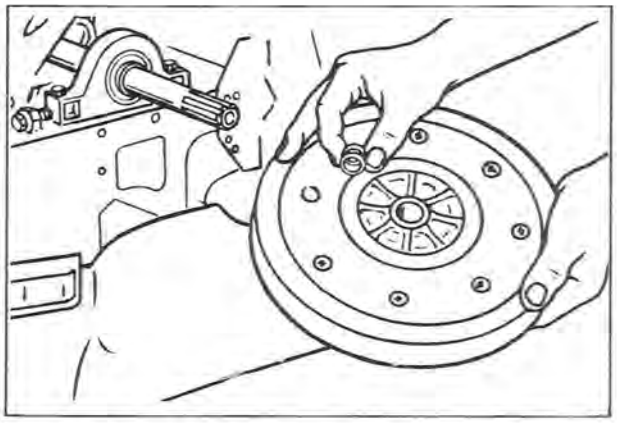


1. Retaining Bolt.
2. Aluminum Trim.
3. Do Not Remove this Screw.

   - Lift trim up and off of lower pan.

NOTE: Lower pan is notched to allow driven converter removal .

2. Unscrew bolt securing driven converter to jackshaft.
3. Slide converter from jackshaft.
   - Use care not to lose the shims inside converter bore.



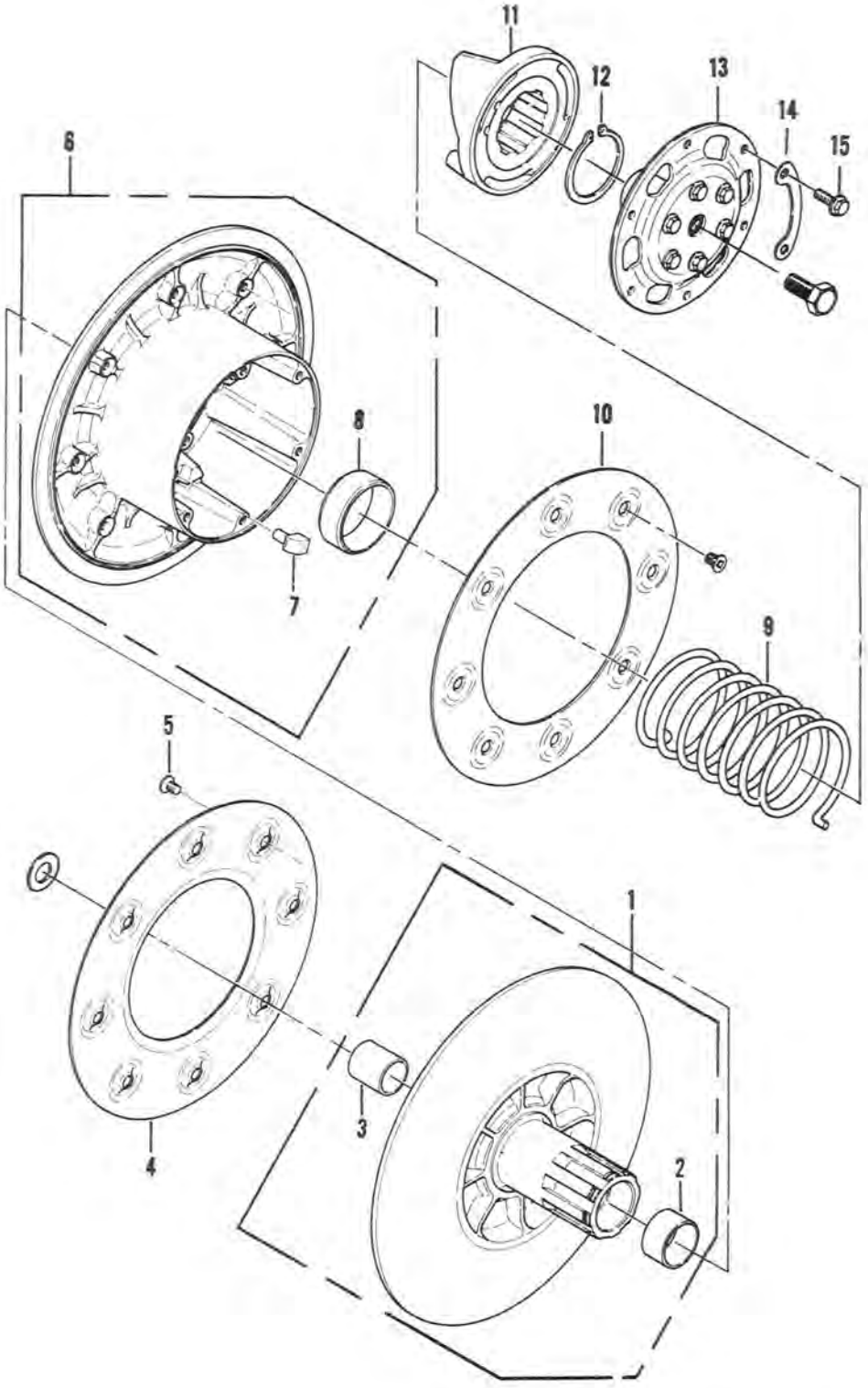
Driven Converter Installation

Refer to Converter Offset Distance procedure.

Driven Converter Spring Test

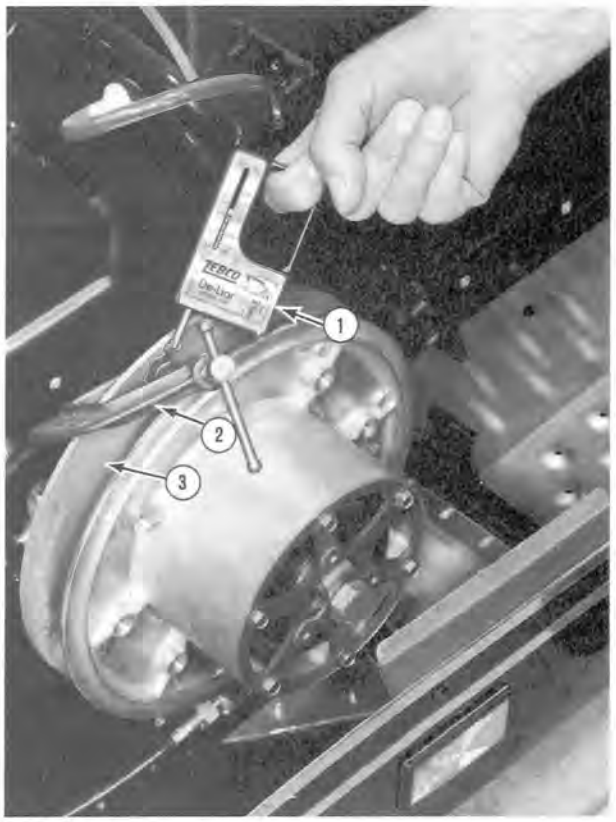
NOTE: Driven converter spring test is based on production setting for movable sheave twist (preload). Standard twist setting is 150° (spring tabs positioned in holes identified as B-2 or C-1).

DRIVEN CONVERTER



1. MOVABLE SHEAVE ASSEMBLY
2. BUSHING
3. BUSHING
4. MOVABLE SHEAVE COVER
5. SCREW
6. FIXED SHEAVE ASSEMBLY
7. WEAR SHOE
8. BUSHING
9. DRIVEN CONVERTER SPRING
10. FIXED SHEAVE COVER
11. RAMP CAP
12. CIRCLIP
13. COUPLING
14. COUPLING BALANCER
15. FLANGED BOLT

1. Attach pull-type scale to movable sheave.
   - Place "C" clamp onto movable sheave approximately 1/8 in. (3.2 mm) in from the outer edge.
   - Pull scale in direction shown and observe force required when sheave begins to move.

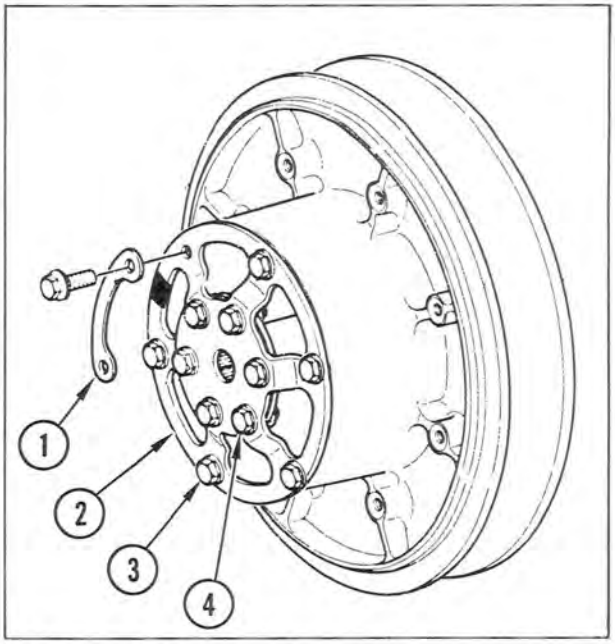


1. Scale.
2. C Clamp.
3. Movable Sheave.

   - Preload is correct if 12 ± 1/2 lb was required to begin sheave movement.
     * If force was lower, increase spring preload or replace spring.
     * If force required was higher, verify spring is placed in standard setting, then thoroughly clean driven converter components and check for bushing wear.

Driven Converter Disassembly

NOTE: Some driven converters have a balancer plate installed under the coupling mounting bolts. The balancer plate, installed during production assembly, is required in some applications to maintain correct driven converter balance. Mark balancer location prior to disassembly to insure correct positioning during reassembly.



1. Balancer Plate.
2. Plate.
3. Outer Bolts.
4. Inner Bolts.

1. Remove coupling.
   - Unscrew outer bolts only.
   - DO NOT remove inner coupling bolts as converter unbalance will result. If bolts were loosened inadvertently, refer to Coupling Assembly procedure.
2. Remove ramp cap.

NOTE: Apply a reference mark (magic marker, machinist dye, etc.) onto the splined shaft of movable sheave. Align reference mark with arrows cast into fixed sheave and ramp cap.

1. Mark on Movable Sheave Shaft.

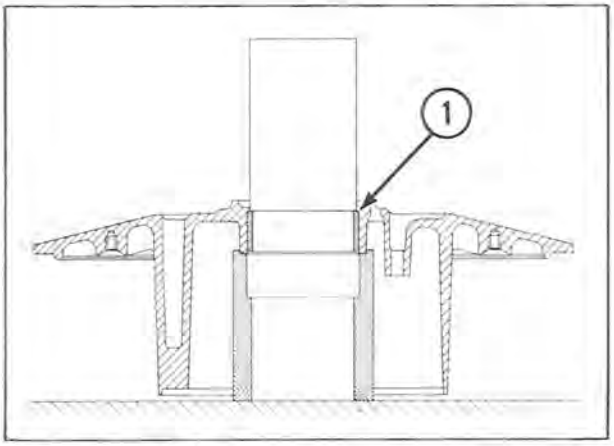
- Twist the fixed sheave counterclockwise and the movable sheave clockwise, then securely hold converter in this position.
- Press and hold the ramp down slightly, then remove the retainer ring.

WARNING **Do not release the ramp suddenly as personal injury could result.**

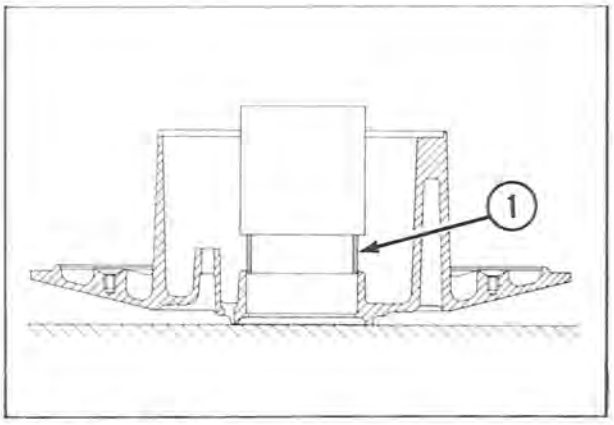
- Slowly release pressure and remove ramp cap.

3. Inspect fixed sheave bushing for wear.
   - Wobble sheave from side to side to check for worn bushing. If there is excessive movement, replace the bushing.
   - For an accurate check, remove fixed sheave and measure outer diameter of shaft on movable sheave and inside diameter of the bushing with micrometer.
   - If the difference between the two readings is 0.02 in. (0.5 mm) or more, replace the bushing.

NOTE: Bushings used in converter are split type. During inspection do not mistake bushing split line as a cracked bushing.

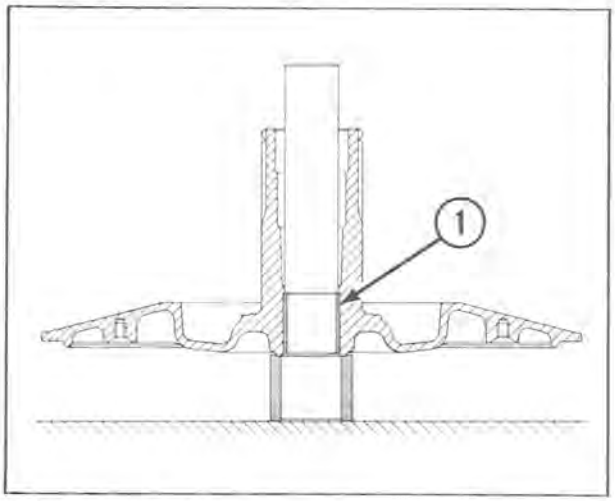


1. Removing Bushing.

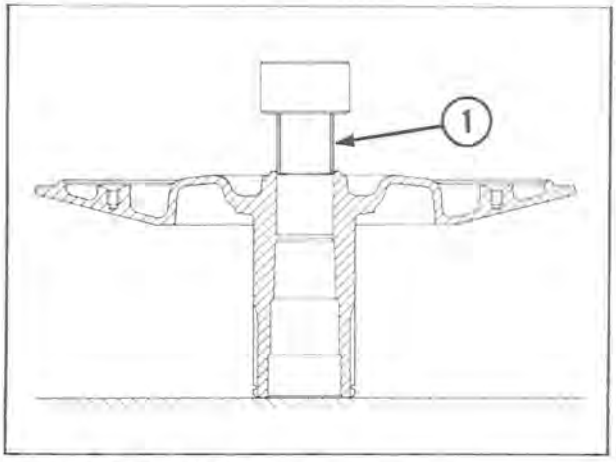


1. Installing Bushing.

4. Inspect movable sheave bushings for wear.
   - Measure inside diameter of small bushing in the movable sheave and outer diameter of the jackshaft.
   - If the difference between the readings is 0.02 in. (0.5 mm) or greater, replace the bushing.



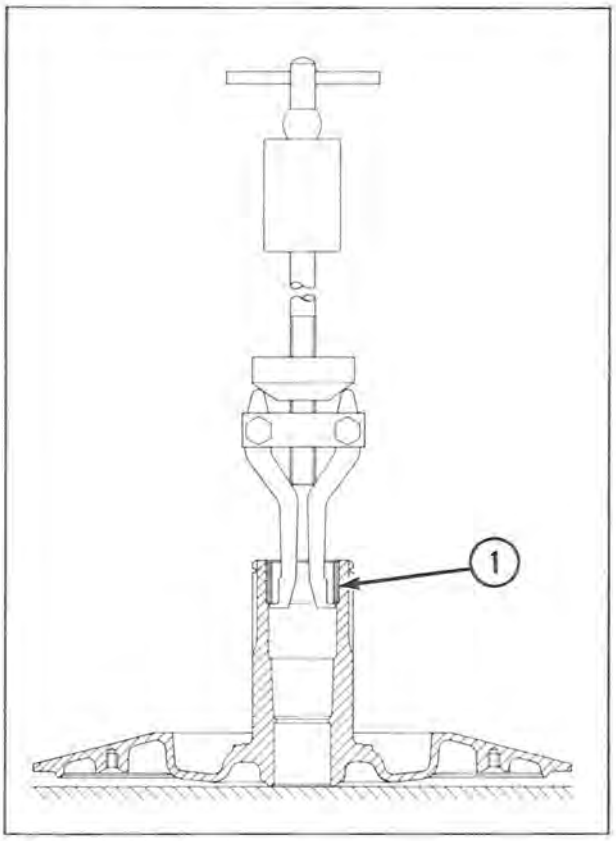
1. Removing Bushing.



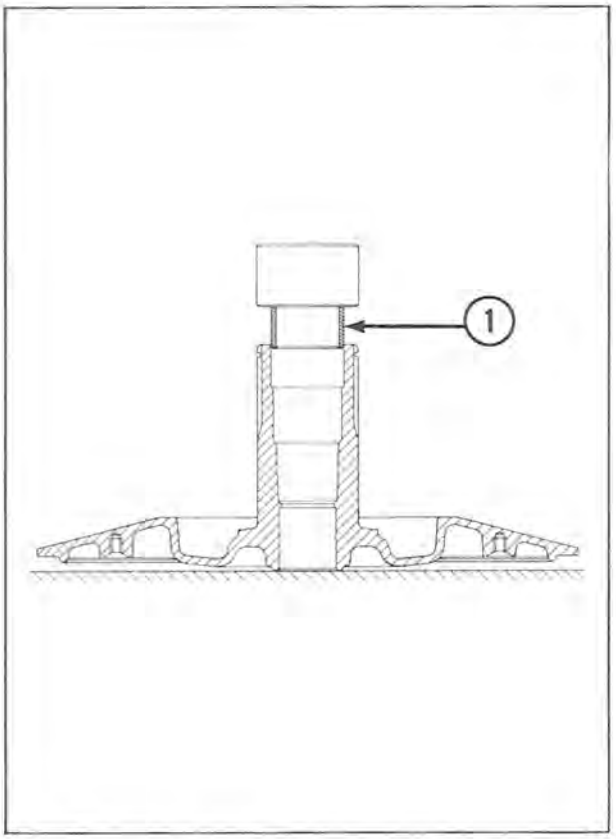
1. Installing Bushing.

- Insert coupling shaft into large bushing of movable sheave.
- Wobble coupler assembly from side to side and replace bushing if excessive movement exists.
- For an accurate check, measure outside diameter of coupling shaft and inside diameter of the bushing with micrometer.
- If the difference between the two readings is 0.02 in. (0.5 mm), replace the bushing.

NOTE: Bushings used in converter are split type. During inspection do not mistake bushing split line as a cracked bushing.

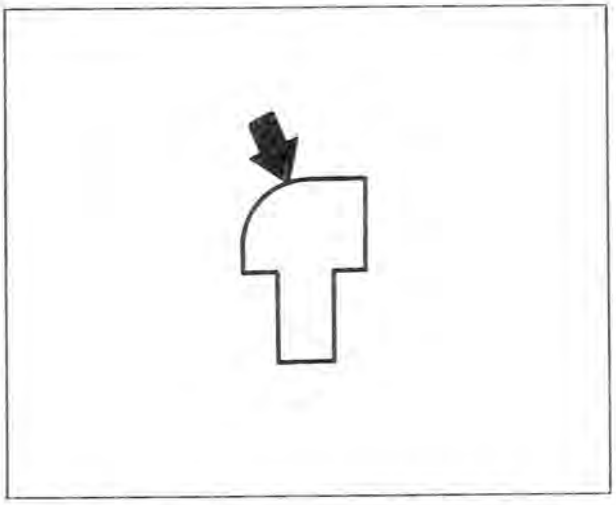


1. Removing Bushing.



1. Installing Bushing.

5. Check wear shoes for worn spots.
   - Replace shoes if worn area exceeds 0.06 in. (1.5 mm).



- Push the wear shoes out from the back of the fixed sheave with a hammer and punch.

Driven Converter Cleaning

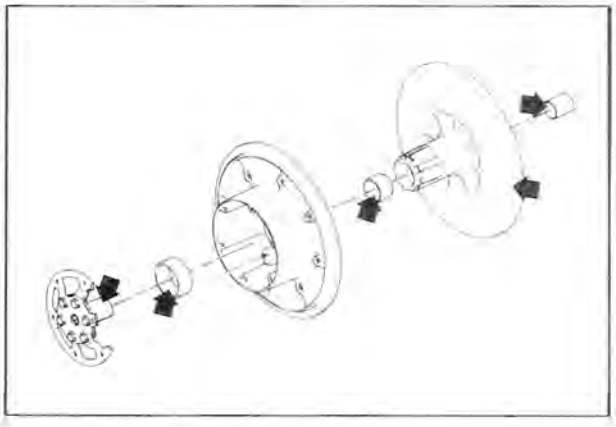
NOTE: Accumulation of foreign matter on sliding surfaces or moving components within converter will alter the shifting characteristics, which will affect vehicle performance throughout the shifting range. Contamination of converter components may cause the vehicle to display any of the following symptoms:

- Bog (hesitation) during acceleration.
- Poor back shift.
- Low top speed.

1. Remove all grease and dirt by wiping the components with a rag dipped in cleaning solvent. Dry parts with compressed air or a clean cloth.

CAUTION **DO NOT soak components with bushings in cleaning solvents since some solvents can damage the bushing resulting in converter failure.**

2. Remove drive belt accumulations from the stationary sheave and movable sheave with cleaning solvent.



3. Thoroughly clean rust and drive belt accumulations from coupling assembly, converter bushings, and jackshaft surfaces.

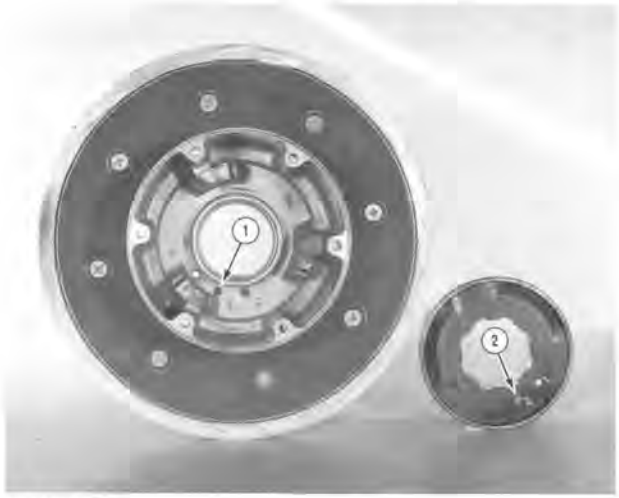
Driven Converter Assembly

1. Install wear shoes into fixed sheave.
   - Start the wear shoes in by hand, then press shoe in until it bottoms on the sheave casting.
2. Assemble fixed sheave onto movable sheave.
   - Very Important: Locate the small oval protrusion on the back side of movable sheave located along the outer ridge.

   - Oval protrusion is approximately 0.06 in. (1.5 mm) wide and 0.12 in. (3.0 mm) long and should be in line with the reference mark applied to splined shaft during disassembly. Use reference mark to simplify assembly process.

NOTE: Use care when assembling sheave not to scratch and nick its face.

   - Place fixed sheave onto the movable sheave.
   - Position arrow on the fixed sheave 150° clockwise from the oval protrusion (or reference mark on the shaft of movable sheave) when viewing from the splined end.
3. Insert spring into fixed sheave.
   - Place tang of spring into hole marked "B" in the fixed sheave.



1. Hole B.
2. Hole 2.

   - Apply NEVER-SEEZ to the splines in the ramp cap.
   - Insert tang on other end of spring into hole number 2 in the ramp cap. This is the standard specification for this converter.

NOTE: To increase top end RPM move spring to position C-2, which increases twist to 180°. To decrease top to end RPM move spring to A-2 (120°) or A-1 (90°) decrease of twist. See chart below.

A-1	= 90°
A-2	= 120°
B-1	= 120°
B-2	= 150°
C-1	= 150°
C-2	= 180°

4. Install ramp cap.
   - Align the arrow on the ramp cap with the oval protrusion (or reference mark) on the movable sheave.
   - Match splines nearest this position and lower the ramp cap 3/8 in. (10 mm) onto splined area of movable sheave.
   - Secure movable sheave onto workbench and turn the fixed sheave counterclockwise approximately 150° to 160° to align oval protrusion (or reference mark) on movable sheave with arrow of the fixed sheave.

NOTE: Be sure to twist the sheave in the correct direction.

   - Push the ramp all the way down and install the retainer ring. Install the retainer ring with the sharp or square edges out and make sure it seats completely into the groove.

NOTE: The 35° ramp is standard. A 30° ramp for high altitudes is available, which produces a quicker downshift and a slower upshift.

5. Install coupling.
   - Be sure to align the arrow on the coupling with the arrows on the assembly.

1. Arrows Aligned.
2. Balancer Plate Mark.

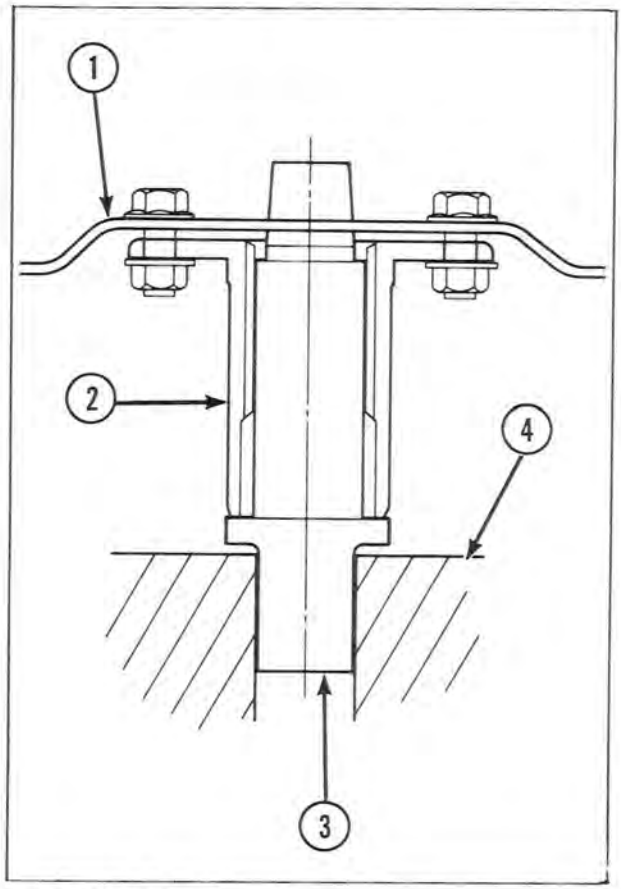
CAUTION **Position balancer plate onto coupling at location identified during disassembly. DO NOT use balancer plate unless installed during production assembly or vibration during operation will result.**

- Install bolts and torque 8 to 10 ft lb (1.1 to 1.4 kg-m).
- Check to see if the fixed sheave will return properly when it is turned counterclockwise.

Driven Converter Coupling Assembly

If the inner bolts on the coupling assembly have been loosened or removed, then centering pilot (special tool P/N 57001-3506) must be used for reassembly to insure correct concentricity (alignment) between shaft hub and coupler plate. Align coupler assembly as follows:

1. Loosen the six inner nuts.
2. Position shaft hub and coupler plate on centering pilot as shown.



1. Coupler Plate.
2. Shaft Hub.
3. Centering Pilot.
4. Vise.

3. Tighten bolts 8 to 10 ft lb (1.1 to 1.4 kg-m).

NOTE: Concentricity between outside diameter of coupler plate and outside diameter of shaft hub must be within 0.016 in. (0.40 mm) total indicated reading.

TRACK

Table Of Contents

TRACK SERVICING

Track Adjustments

For optimum performance and for long track life, proper adjustments must be maintained. Since the track is made of rubber and subjected to high torque loads, a certain amount of track stretch is expected. Track tension will compensate for stretch. Once correctly tensioned, the track must be aligned in the chassis to prevent wear to one side of the track.

TRACK TENSION

1. Raise rear of snowmobile so track is off the ground for its entire length.
   - Securely brace the snowmobile so it cannot fall.

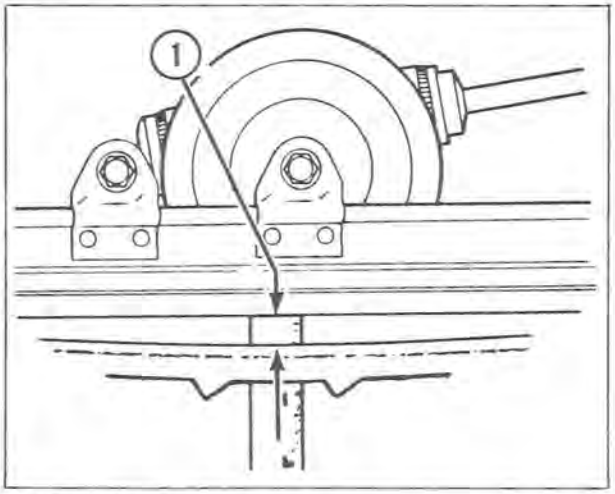
WARNING **When raising rear of the snowmobile off ground, place ski tips against a stationary object and be sure the vehicle is properly secured to prevent personal injury.**

NOTE: Do not position snowmobile on its side to tension track as incorrect adjustment will result.

2. Measure track tension.

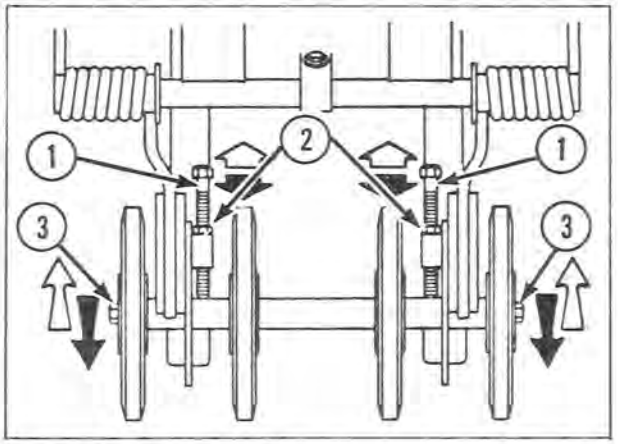
WARNING **To prevent personal injury, never perform track adjustment procedures with the engine running.**

   - Hang an 8 lb (3.6 kg) weight from the track below the center set of idler wheels.
   - At a point below center idler wheel, measure the distance from track upper surface to the wear strip bottom surface.



1. 3/4 in. (19 mm)

   - Correct track tension dimension is 3/4 in. (19 mm).
   - If tension is correct:
     * remove weight from track.
     * perform Track Alignment procedure.
   - If tension is incorrect, adjust tension as follows:
     * loosen rear axle locking bolts.
     * back off rear axle adjust bolt lock nuts.



1. Adjusting Bolts
2. Adjusting Bolt Lock Nuts
3. Rear Axle Locking Bolts

     * turn adjusting bolts equally to attain proper tension. As a good starting point for track alignment, be sure both adjusting bolts measure the same length from bolt head to bracket.
     * remove weight from track.
     * perform Track Alignment procedure.

TRACK ALIGNMENT

NOTE: Perform Track Tension procedure prior to alignment check.

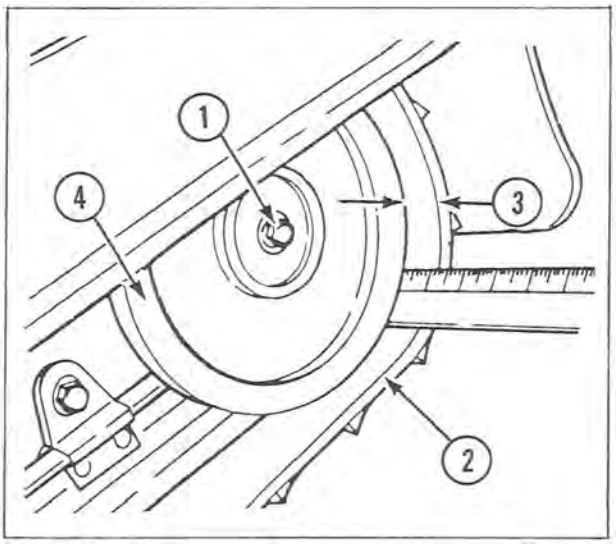
1. Raise rear of snowmobile so track is off the ground for its entire length.
   - Securely brace the snowmobile so it cannot fall.

WARNING **Never raise rear of snowmobile by hand or stand behind the vehicle when engine is running or track is rotating. A rotating track can fling objects rearward at great velocity. This may cause severe personal injury. Remove all tools and foreign matter from track area before starting engine.**

2. Rotate track using the engine.
   - Start engine and push on throttle lever only enough to turn the track slowly a few revolutions, then stop engine.

WARNING **Always stop the engine and allow track to coast to a stop before measuring track alignment.**

3. Measure track alignment.
   - Track alignment is correct when measurements from the rear idler wheel to the outside edge of the track are equal on both sides of the machine.



1. Rear Axle Locking Bolts
2. Edge of Track
3. Dimension Equal on Both Sides
4. Idler Wheel

- If alignment is correct:
  * return rear of vehicle to ground.
- If alignment is incorrect:
  * start engine and apply throttle to turn track slowly a few revolutions. Let track coast to a stop and measure alignment.
  * loosen rear axle locking bolts.
  * back off rear axle adjusting bolt lock nuts.
  * tighten rear axle adjusting bolt, on the same side with the larger measurement, about 1/2 turn.
  * restart engine and recheck alignment. Repeat adjustment as necessary until alignment is correct.

CAUTION **If track alignment requires considerable adjustment, track tension should be rechecked to prevent damage to drive or suspension system.**

  * tighten rear axle adjusting bolt lock nuts.
  * torque rear axle locking bolts to 25 ft lb (3.5 kg-m).

NOTE: After rear axle bolts have been tightened, check to be sure that spacers (tubing) over the rear axle squeeze against slide rail brackets, preventing the spacers from rotating. Loose spacers will permit the rear axle to float and proper track alignment cannot be maintained.

Track Removal

1. Remove driveshaft.
   - Refer to Driveshaft Removal procedure.
2. Pull track from tunnel.

Track Repair

1. Inspect track.
   - If track is torn, cracked, or gouged, it must be replaced.
   - Check for broken, worn, or missing track clips.
2. Remove any defective track clips.

NOTE: It is not necessary to drill completely through clip. Small indentations are sufficient to permit clip to split.

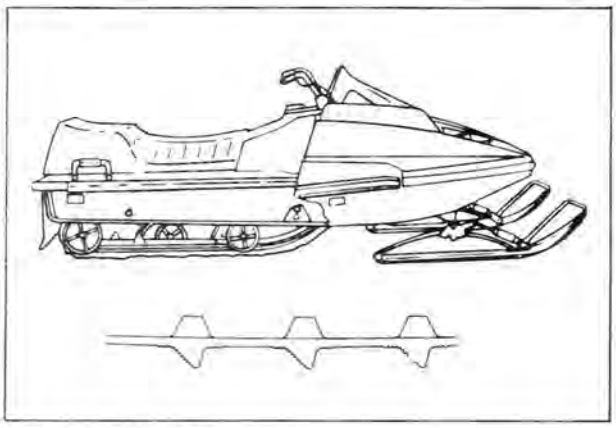
   - Drill a series of indentations across top of clip.
   - Split clip along indentations with a hammer and chisel.

3. Install new clips.
   - Position clips on track as shown.
   - Compress with track clip assembly tool (P/N 57001-3519) as shown.

Track Installation

1. Position track in tunnel. Track may be installed to rotate in either direction. In determining which way track will be installed, consider the following:

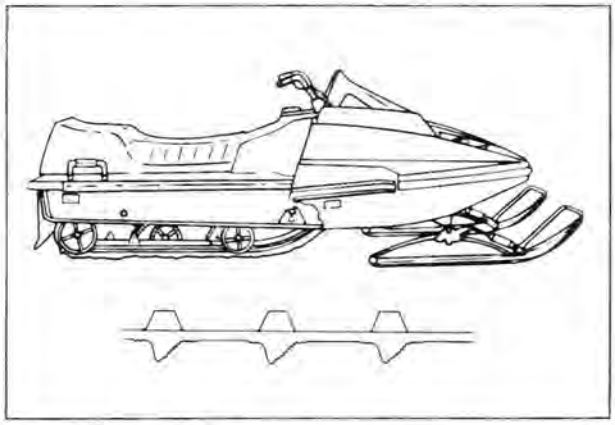
With the track installed as shown, the following performance results:



1. Angle Side to Rear

- Air turbulence inside the tunnel (and horsepower loss) is reduced, resulting in higher top speed.
- Float in soft snow is better.
- Track damage from abuse is minimized.

With the track installed as shown, the following performance results:



1. Angle Side to Front

- Improved acceleration traction on hard packed snow.
- Possible track rib damage in marginal snow conditions.
- Reduced float in soft snow.

2. Install driveshaft.
   - Refer to Driveshaft Installation procedure.

APPENDIX

Table Of Contents

FUEL AND OIL RECOMMENDATIONS

WARNING **Gasoline is extremely flammable and highly explosive under certain conditions. Insure adequate ventilation when fueling the snowmobile and never smoke or allow sparks or open flame near fuel system.**

Your Kawasaki Snowmobile uses a two cycle engine which means oil must be mixed with the gasoline to provide proper internal engine lubrication and cooling.

Oil

We recommend using Kawasaki Snowmobile Oil. This oil is specially formulated to give minimum piston ring varnish and combustion chamber deposits along with excellent lubrication qualities.

In an emergency situation when Kawasaki Snowmobile Oil is not available, a B.I.A. certified TC-W oil may be substituted. All certified oils will indicate the TC-W rating on the container. If the B.I.A. certification does not appear on the container, THE OIL MUST NOT BE USED.

The use of lubricants such as "tune-up tonics" and "super oils" is NOT RECOMMENDED.

The oil tank has no filter. DO NOT ALLOW DIRT TO ENTER WHILE FILLING. Oil tank capacity is 2-1/2 quarts (2.37 liters).

Check the oil tank vent tube for:

1. Proper Routing - Sharp bends or kinks in the vent tube will reduce oil flow to the oil pump.
2. Tie Band Installation - Tie band may pinch off tube, reducing oil flow to the oil pump, if installed to tight.
3. Vent Tube Position - To prevent siphoning action possible under certain conditions position end of vent tube higher than top of oil tank and away from brake components (disc and pads.)

Fuel

Use leaded gasoline only, with a minimum PUMP POSTED OCTANE NUMBER OF 89. DO NOT USE GASAHOL.

WARNING **Gasoline fumes are heavier than air and can become explosive if exposed to a pilot light from a furnace, hot water heater, etc. Fill the fuel tank only in an area that is well ventilated and free from pilot lights and sparks.**

Before removing filler cap from the fuel tank, remove any ice, snow, or water from around the fuel tank opening to prevent contamination of fresh fuel mixture.

Fill the fuel tank slowly and pour the fuel into the tank using a funnel with a fine mesh screen.

CAUTION **Each time the fuel tank is filled, gasoline antifreeze must be added to the fuel system. Moisture contained in fuel system components (fuel tank, lines, fuel pump or carburetor) may freeze causing engine malfunction or damage.**

A major brand of Gasoline Antifreeze (such as Heet) should be added to the fuel tank by following the manufacturer's recommendations on the container for proper mix ratio of gasoline with antifreeze.

Fuel/Oil Mixture (Ratio)

These snowmobile engines are automatically lubricated by a variable pump which may change the mixture from about 110 to 1 to about 25 to 1, depending on engine speed and throttle opening. When the engine needs less oil, as at an idle, it gets less oil.

Under full throttle, the engine will be fed more oil. Automatic oiling is economical because it

gives the engine only as much oil at it needs. This also cuts down on visible exhaust emissions.

CAUTION **Each time gas tank is filled, check for adequate oil level in the oil tank. A full oil tank assures proper fuel/oil ratio will be maintained to prevent serious engine damage.**

BREAK-IN PROCEDURE

NOTE: To insure adequate lubrication of internal engine components during early break-in, a 25-to-1 gasoline-to-oil ratio is recommended for the first three (3) gallons of gasoline. This ratio can be obtained by thoroughly mixing 1 pint (0.47 liter) of Kawasaki Snowmobile Oil with three (3) gallons (11.4 liters) of gasoline. Pre-mixing gasoline and oil will no longer be required after the initial three gallons of gasoline and oil mix have been consumed.

25 to 1 Gasoline to Oil Mixture, Break-in Only	
Oil	Gasoline
1 pint (U.S.)	3 gal. (U.S.) 2.6 gal. (Imp.)
1 pint (Imp.)	3 gal. (Imp.) 3.75 gal. (U.S.)

During the first 10 hours of operation, do not subject the snowmobile engine to continued full speed, do not ride with passengers in deep snow, and do not break trail.

For proper engine break-in, run machine on hard packed snow at approximately 3/8 to 1/2 throttle, with occasional bursts to full speed. Limit the full speed operation to 1-1/2 to 2 minutes then return to cruising speed for 10 to 15 minute intervals. After 10 hours of operation, or 2 tanks of gasoline are used, break-in is complete.

ENGINE OPERATION

CAUTION **Improper engine warm-up could result in extensive engine damage.**

Engine Warm Up — To warm up the engine idling is not recommended. It is better to drive the snowmobile about five minutes at slow speeds before any sustained full throttle operation. Liquid cooled engines need time to warm up the coolant, allowing pistons and cylinders to obtain proper clearance.

Coolant Temperature

Operating speed, loads, snow conditions and air temperature directly affect engine temperature. The radiator needs air flowing through it to transfer heat from the coolant. The heat exchanger, mounted below the seat, transfers heat by melting snow thrown on its fins by the track.

On hard packed snow or ice where little snow contacts the exchanger, the radiator cools the engine. In deep snow where high speeds are not possible and there is little air flow, the heat exchanger cools the engine.

Both systems require vehicle movement. Faster operating speed means more cooling air flow through the radiator and more snow contacting the exchanger. Low speed operation on hard packed or marginal snow and/or unseasonably warm weather may cause the engine to run above normal temperature.

Engine temperature is "NORMAL" when the temperature gauge needle is in the green zone. The snowmobile may be operated if the needle enters the yellow zone but the temperature gauge should be monitored more frequently. If the gauge needle begins to enter the red zone, increase the speed or ride the sled into deep snow that can be thrown onto the exchanger. If it remains in the red zone, stop the engine and inspect cooling system for proper operation.

CONVERSION CHART/Fraction Inch to Decimal Inch to mm

Frac. Inch	Dec. Inch	mm.	Frac. Inch	Dec. Inch	mm.	Frac. Inch	Dec. Inch	mm.	Frac. Inch	Dec. Inch	mm.
	.000400	.0100	13/32	.406250	10.3187		.984259	25.0000		1.800000	45.7196
	.000800	.0200	27/64	.421875	10.7156	63/64	.984375	25.0031		1.811037	46.0000
	.001200	.0300		.433074	11.0000	1	1.000000	25.4001	1-13/16	1.812500	46.0376
	.001600	.0400	7/16	.437500	11.1125		1.023629	26.0000	1-27/32	1.843750	46.8313
	.002000	.0500		.450000	11.4300	1-1/32	1.031250	26.1938		1.850000	46.9896
	.002400	0600	29/64	.453125	11.5094		1.050000	26.6699		1.850407	47.0000
	.002800	.0700	15/32	.468750	11.9062	1-1/16	1.062500	26.9876	1-7/8	1.875000	47.6251
	.003100	.0800		.472444	12.0000		1.062999	27.0000		1.889777	48.0000
	.003500	.0900	31/64	.484375	12.3031	1-3/32	1.093750	27.7813		1.900000	48.2596
	.003900	.1000	1/2	.500000	12.7000		1.100000	27.9397	1-29/32	1.906250	48.4188
1/128	.007900	.2000		.511814	13.0000		1.102369	28.0000		1.929147	49.0000
	.011800	.3000	33/64	.515625	13.0969	1-1/8	1.125000	28.5751	1-15/16	1.937500	49.2126
1/64	.015625	.3969	17/32	.531250	13.4937		1.141739	29.0000		1.950000	49.5296
	.015700	.4000	35/64	.546875	13.8906		1.150000	29.2097		1.968522	50.0000
	.019700	.5000		.550000	13.9700	1-5/32	1.156250	29.3688	1-31/32	1.968750	50.0063
	.023600	.6000		.551184	14.0000		1.181113	30.0000	2	2.000000	50.8001
	.027600	.7000	9/16	.562500	14.2875	1-3/16	1.187500	30.1626		2.007892	51.0000
1/32	.031250	.7937	37/64	.578125	14.6844		1.200000	30.4797	2-1/32	2.031250	51.5939
	.031500	.8000		.590554	15.0000	1-7/32	1.218750	30.9563		2.047262	52.0000
	.035400	.9000	19/32	.593750	15.0812		1.220483	31.0000		2.050000	52.0695
	.039370	1.0000		.600000	15.2400	1-1/4	1.250000	31.7501	2-1/16	2.062500	52.3876
3/64	.046875	1.1906	39/64	.609375	15.4781		1.259853	32.0000		2.086632	53.0000
	.050000	1.2700	5/8	.625000	15.8750	1-9/32	1.281250	32.5438	2-3/32	2.093750	53.1814
1/16	.062500	1.5875		.629924	16.0000		1.299223	33.0000		2.100000	53.3395
5/64	.078125	1.9844	41/64	.640625	16.2719		1.300000	33.0197	2-1/8	2.125000	53.9751
	.078740	2.0000		.650000	16.5100	1-5/16	1.312500	33.3376		2.126002	54.0000
3/32	.093750	2.3812	21/32	.656250	16.6687		1.338593	34.0000		2.150000	54.6095
	.100000	2.5400		.669294	17.0000	1-11/32	1.343750	34.1313	2-5/32	2.156250	54.7688
7/64	.109375	2.7781	43/64	.671875	17.0656		1.350000	39.2897		2.165372	55.0000
	.118110	3.0000	11/16	.687500	17.4625	1-3/8	1.375000	34.9251	2-3/16	2.187500	55.5626
1/8	.125000	3.1750		.700000	17.7800		1.377963	35.0000		2.200000	55.8795
9/64	.140625	3.5719	45/64	.703125	17.8594		1.400000	35.5597		2.204712	56.0000
	.150000	3.8100		.708664	18.0000	1-13/32	1.406250	35.7188	2-7/32	2.218750	56.3564
5/32	.156250	3.9687	23/32	.718750	18.2562		1.417333	36.0000		2.244112	57.0000
	.157418	4.0000	47/64	.734375	18.6531	1-7/16	1.437500	36.5126	2-1/4	2.250000	57.1501
11/64	.171875	4.3656		.748034	19.0000		1.450000	36.8297	2-9/32	2.281250	57.9439
3/16	.187500	4.7625	3/4	.750000	19.0500		1.456703	37.0000		2.283482	58.0000
	.196850	5.0000	49/64	.765625	19.4469	1-15/32	1.468750	37.3063		2.300000	58.4195
	.200000	5.0800	25/32	.781250	19.8437		1.496073	38.0000	2-5/16	2.312500	58.7376
13/64	.203125	5.1594		.787409	20.0000	1-1/2	1.500000	38.1001		2.322852	59.0000
7/32	.218750	5.5562	51/64	.796875	20.2406	1-17/32	1.531250	38.8938	2-11/32	2.343750	59.5314
15/64	.234375	5.9531		800000	20.3200		1.535443	39.0000		2.350000	59.6895
	.236220	6.0000	13/16	.812500	20.6375		1.550000	39.3696		2.362226	60.0000
1/4	.250000	6.3500		.826779	21.0000	1-9/16	1.562500	39.6876	2-3/8	2.375000	60.3251
17/64	.265625	6.7469	53/64	.828125	21.0344		1.574817	40.0000		2.400000	60.9594
	.275590	7.0000	27/32	.843750	21.4312	1-19/32	1.593750	40.4813		2.401596	61.0000
9/32	.281250	7.1437		.850000	21.5900		1.600000	40.6396	2-13/32	2.406250	61.1189
19/64	.296875	7.5406	55/64	.859375	21.8281		1.614187	41.0000	2-7/16	2.437500	61.9126
	.300000	7.6200		.866149	22.0000	1-5/8	1.625000	41.2751		2.440966	62.0000
5/16	.312500	7.9375	7/8	.875000	22.2250		1.650000	41.9096		2.450000	62.2294
	.314960	8.0000	57/64	.890625	22.6219		1.653557	42.0000	2-15/32	2.468750	62.7064
21/64	.328125	8.3344		.900000	22.8600	1-21/32	1.656250	42.0688		2.480336	63.0000
11/32	.343750	8.7312		.905519	23.0000	1-11/16	1.687500	42.8626	2-1/2	2.500000	63.5001
	.350000	8.8900	29/32	.906250	23.0187		1.692927	43.0000		2.519706	64.0000
	.354330	9.0000	59/64	.921875	23.4156		1.700000	43.1796	2-17/32	2.531250	64.2939
23/64	.359375	9.1281	15/16	.937500	23.8125	1-23/32	1.718750	43.6563		2.550000	64.7694
3/8	.375000	9.5250		.944889	24.0000		1.732297	44.0000		2.559076	65.0000
25/64	.390625	9.9219		.950000	24.1300	1-3/4	1.750000	44.4501	2-9/16	2.562500	65.0876
	.393704	10.0000	61/64	.953125	24.2094		1.771667	45.0000	2-19/32	2.593750	65.8814
	.400000	10.1600	31/32	.968750	24.6062	1-25/32	1.781250	45.2438		2.598446	66.0000

CONVERSION CHART/Fraction Inch to Decimal Inch to mm (cont.)

Frac. Inch	Dec. Inch	mm.	Frac. Inch	Dec. Inch	mm.	Frac. Inch	Dec. Inch	mm.	Frac. Inch	Dec. Inch	mm.
	2.600000	66.0394		2.952780	75.0000	3-5/16	3.312500	84.1377		3.661449	93.0000
2-5/8	2.625000	66.6751	2-31/32	2.968750	75.4064	3-11/32	3.343750	84.9314	3-11/16	3.687500	93.6627
	2.637816	67.0000		2.992150	76.0000		3.346485	85.0000		3.700000	93.9792
	2.650000	67.3094	3	3.000000	76.2002		3.350000	85.0892		3.700819	94.0000
2-21/32	2.656250	67.4689	3-1/32	3.031250	76.9939	3-3/8	3.375000	85.7252	3-23/32	3.718750	94.4564
	2.677186	68.0000		3.031520	77.0000		3.385855	86.0000		3.740189	95.0000
2-11/16	2.687500	68.2626		3.050000	77.4693		3.400000	86.3592	3-3/4	3.750000	95.2502
	2.700000	68.5794	3-1/16	3.062500	77.7877	3-13/32	3.406250	86.5189		3.779559	96.0000
	2.716556	69.0000		3.070890	78.0000		3.425225	87.0000	3-25/32	3.781250	96.0439
2-23/32	2.718750	69.0564	3-3/32	3.093750	78.5814	3-7/16	3.437500	87.3127		3.800000	96.5192
2-3/4	2.750000	69.8501		3.100000	78.7393		3.450000	87.6292	3-13/16	3.812500	96.8377
	2.755930	70.0000		3.110260	79.0000		3.464595	88.0000		3.818929	97.0000
2-25/32	2.781250	70.6439	3-1/8	3.125000	79.3752	3-15/32	3.468750	88.1064	3-27/32	3.843750	97.6314
	2.795300	71.0000		3.149635	80.0000	3-1/2	3.500000	88.9002		3.850000	97.7891
	2.800000	71.1194		3.150000	80.0093		3.503965	89.0000		3.858299	98.0000
2-13/16	2.812500	71.4376	3-5/32	3.156250	80.1689	3-17/32	3.531250	89.6939	3-7/8	3.875000	98.4252
	2.834670	72.0000	3-3/16	3.187500	80.9627		3.543339	90.0000		3.897669	99.0000
2-27/32	2.843750	72.2314		3.189005	81.0000		3.550000	90.1691		3.900000	00.0591
	2.850000	72.3893		3.200000	81.2793	3-9/16	3.562500	90.4877	3-29/32	3.906250	99.2189
	2.874040	73.0000	3-7/32	3.218750	81.7564		3.582709	91.0000		3.937043	100.0000
2-7/8	2.875000	73.0251		3.228375	82.0000	3-19/32	3.593750	91.2814	3-15/16	3.937500	100.0130
	2.900000	73.6593	3-1/4	3.250000	82.5502		3.600000	91.4392		3.950000	100.3291
2-29/32	2.906250	73.8189		3.267745	83.0000		3.622079	92.0000	3-31/32	3.968750	100.8060
	2.913410	74.0000	3-9/32	3.281250	83.3439	3-5/8	3.625000	92.0752		3.976413	101.0000
2-15/16	2.937500	74.6126		3.300000	83.8192		3.650000	92.7092	4	4.000000	101.6000
	2.950000	74.9293		3.307115	84.0000	3-21/32	3.656250	92.8639			

DRILL SIZES
Inch Decimal Equivalent

80	.0135	61	.039	42	.0935	23	.154	4	.209		
79	.0145	60	.040	41	.096	22	.157	3	.213		
78	.016	59	.041	40	.098	21	.159	2	.221		
77	.018	58	.042	39	.0995	20	.161	1	.228	O	.316
76	.020	57	.043	38	.1015	19	.166			P	.323
75	.021	56	.0465	37	.104	18	.1695	A	.234	Q	.332
74	.0225	55	.052	36	.1065	17	.173	B	.238	R	.339
73	.024	54	.055	35	.110	16	.177	C	.242	S	.348
72	.025	53	.0595	34	.111	15	.180	D	.246	T	.358
71	.026	52	.0635	33	.113	14	.182	E	.250	U	.368
70	.028	51	.067	32	.116	13	.185	F	.257	V	.377
69	.02925	50	.070	31	.120	12	.189	G	.261	W	.386
68	.031	49	.073	30	.1285	11	.191	H	.266	X	.397
67	.032	48	.076	29	.136	10	.1935	I	.272	Y	.404
66	.033	47	.0785	28	.1405	9	.196	J	.277	Z	.413
65	.035	46	.081	27	.144	8	.199	K	.281		
64	.036	45	.082	26	.147	7	.201	L	.290		
63	.037	44	.086	25	.1495	6	.204	M	.295		
62	.038	43	.089	24	.152	5	.2055	N	.302		

CONVERSIONS ENGLISH TO METRIC

METRIC EQUIVALENTS

m indicates one meter
cm indicates one hundredth of a meter
mm indicates one thousandth of a meter
km indicates one thousand meters

LENGTH

1 mm. = 0.03937 In.
Cm. = 0.3937 In.
Meter = 3.28 Ft.
Meter = 1.094 Yd. (39.37 In.)
Kilom. = 0.621 Mile

In. = 2.54 Cm.
Ft. = 0.3048 Meter
Yd. = 0.9144 Meter
Mile = 1.61 Kilom.

AREA

Sq. Cm. = 0.1550 Sq. In.
Sq. M. = 10.76 Sq. Ft.

Sq. In. = 6.45 Sq. Cm.
Sq. Ft. = 0.0929 Sq. M.

VOLUME

Cu. Cm. = 0.061 Cu. In.
Cu. M. = 35.315 Cu. Ft.

Cu. In. = 16.38 Cu. Cm.
Cu. Ft. = 0.028 Cu. M.

CAPACITY

Liter = 0.0353 Cu. Ft.
Liter = 0.2642 Gallons (U.S.)
Liter = 61.023 Cu. In.
Liter = 2.202 lb. of fresh water at 62°F.
Liter = 1,000 CC
Liter = 35.19 Fl. Oz. (Imp.)
Liter = 33.82 Fl. Oz. (U.S.)

Gal. (U.S.) = 3.785 Liters
Gal. (Imp.) = 4.546 Liters
Cu. Ft. = 28.32 Liters
Cu. In. = 0.0164 Liter
Fl. Oz. (U.S.) = 29.57 CC
Fl. Oz. (Imp.) = 28.41 CC

WEIGHT

Gram = 15.432 Grains
Gram = 0.0353 Oz.
Kilogram = 2.2046 lbs.
Kilogram = 0.0011 Ton (Sht)
Met. Ton = 1.1025 Ton (Sht)
Grain = 0.0648 Gram

Oz. = 28.35 Gram
Lb. = 0.454 Kilgm.
Ton (Sht) = 907.18 Kilgm.
Ton (Sht) = 0.907 Metric Ton
Ton (Sht) = 2000 lb.

PRESSURE

1 Kilogram per Sq. Cm. = 14.2233 Lbs. per Sq. In.
1 Lb. per Sq. In. = 0.070307 Kilgms. per Sq. Cm.
1 Kilogram per Sq. Meter = 0.20482 Lbs. per Sq. Ft.
1 Lb. per Sq. Ft. = 4.8824 Kilgms. per Sq. Meter
1 Kilgm. per Sq. Cm. = 0.96784 Standard Atmosphere
1 Standard Atmosphere = 1.033228 Kilgm. per Sq. Cm.
1 Metric Atmosphere = 1.033228 Kilgm. per Sq. Cm.
1 Std. Atmosphere = 4.6959 Lbs. per Sq. In.

CONVERSION TABLES

	GALLON	QUART	PINT	LITER
U.S.	1	= 4	= 8	= 3.785
	1/4	= 1	= 2	= 0.946
	1/8	= 1/2	= 1	= 0.473
	0.264	= 1.056	= 2.113	= 1
IMP.	1	= 4	= 8	= 4.546
	1/4	= 1	= 2	= 1.136
	1/8	= 1/2	= 1	= 0.568
	0.220	= 0.880	= 1.760	= 1

U.S.
1 Gallon = 128 oz. = 3,785.41 cc 1 Quart = 32 oz. = 946.35 cc 1 Pint = 16 oz. = 473.18 cc
IMP.
1 Gallon = 160 oz. = 4,546.09 cc 1 Quart = 40 oz. = 1,136.52 cc 1 Pint = 20 oz. = 568.26 cc

CONVERSION FACTORS

Inches to centimeters (cm) ..... Multiply by 2.54
Meters (m) to yards ..... Multiply by 70 and divide by 64
Kilometers (km) to miles ..... Multiply by 5 and divide by 8
Cubic inches to cubic centimeters ..... Multiply by 16.39
Grams to ounces ..... Multiply by 567 and divide by 20
Liters to U.S. pints ..... Multiply by 95 and divide by 20
Degrees Centigrade to degrees Fahrenheit ..... Multiply by 9, divide by 5 and add 32
Degrees Fahrenheit to degrees Centigrade ..... Subtract 32, multiply by 5 and divide by 9

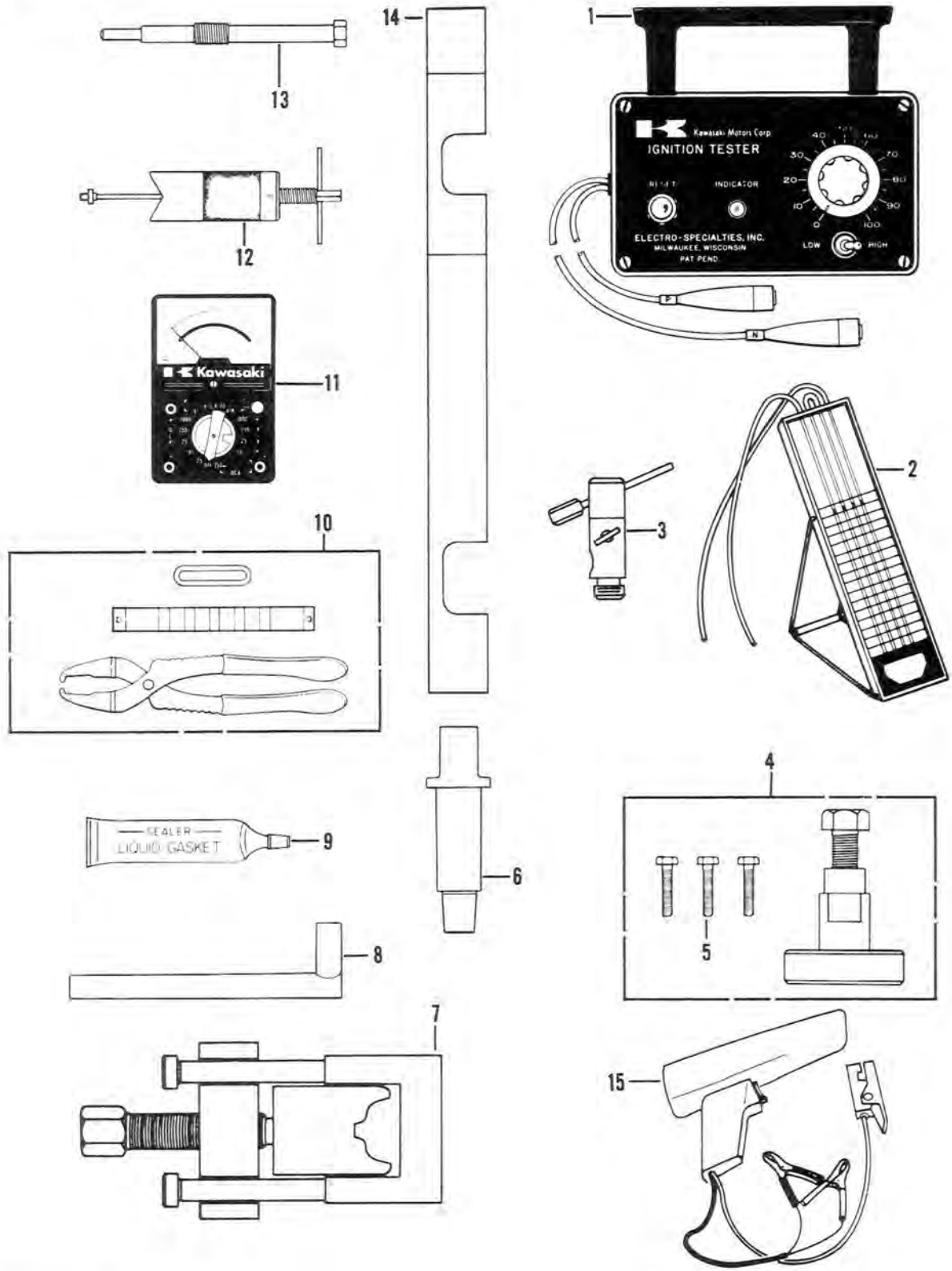
CONVERSION TABLE

cc	x	.0610	=	cu.in.
cc	x	.03519	=	fl.oz. (imp.)
cc	x	.03381	=	fl.oz. (U.S.)
cu. in.	x	16.39	=	cc
fl. oz.(imp.)	x	28.41	=	cc
fl. oz.(U.S.)	x	29.57	=	cc
ft-lbs	x	12	=	in-lbs
ft-lbs	x	.1383	=	kg-m
gal. (imp.)	x	4.546	=	liters
gal. (imp.)	x	1.201	=	gal. (U.S.)
gal. (U.S.)	x	3.7853	=	liters
gal. (U.S.)	x	.8326	=	gal. (imp.)
grams	x	.03527	=	oz.
in.	x	25.40	=	mm
in-lbs	x	.0833	=	ft-lbs
in-lbs	x	.0115	=	kg-m
kg	x	2.2046	=	lb.
kg	x	35.274	=	oz.
kg-m	x	7.233	=	ft-lbs
kg-m	x	86.796	=	in-lbs
kg/cm^2	x	14.22	=	lbs/sq.in.
km	x	.6214	=	miles
lb.	x	.4536	=	kg
lb/sq. in.	x	.0703	=	kg/cm^2
liter	x	35.19	=	fl.oz. (imp.)
liter	x	33.81	=	fl.oz. (U.S.)
liter	x	.8799	=	qt. (imp.)
liter	x	1.0567	=	qt. (U.S.)
meter	x	3.281	=	ft.
mile	x	1.6093	=	km
mm	x	.03937	=	in.
oz.	x	28.35	=	grams
qt. (imp.)	x	1.1365	=	liters
qt. (imp.)	x	1.201	=	qt. (U.S.)
qt. (U.S.)	x	.9463	=	liters
qt. (U.S.)	x	.8326	=	qt. (imp.)
fl. oz. (U.S.)	x	1.04	=	fl. oz. (imp.)

ABBREVIATIONS

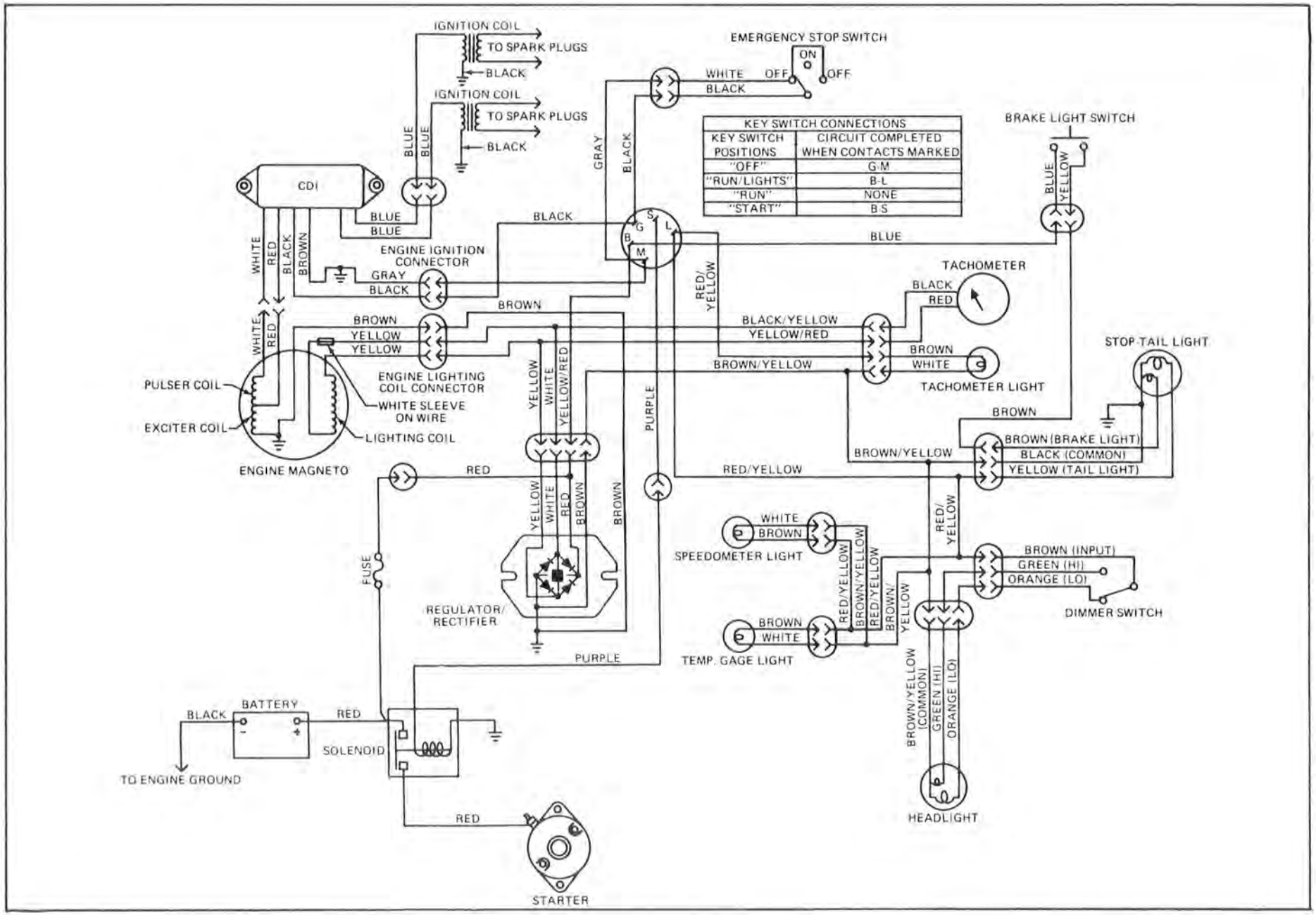
ABDC	after bottom dead center
ATDC	after top dead center
BBDC	before bottom dead center
BDC	bottom dead center
BTDC	before top dead center
cc	cubic centimeters
cu. in.	cubic inches
fl. oz.	fluid ounces
ft.	foot, feet
ft-lbs	foot-pounds
gal.	gallon, gallons
hp	horsepower
in.	inch, inches
in-lbs	inch-pounds
kg	kilogram, kilograms
kg/cm^2	kilograms per square centimeter
kg-m	kilogram-meters
km	kilometer
kph	kilometers per hour
lb., lbs.	pound, pounds
lbs/sq.in.	pounds per square inch
ℓ	liter
m	meter, meters
mi.	mile, miles
mm	millimeters
mph	miles per hour
oz.	ounce, ounces
psi	pounds per square inch
qt.	quart, quarts
r.p.m.	revolutions per minute
sec.	second, seconds
SS	standing start
TDC	top dead center
"	inch, inches

TOOLS, SPECIAL



1. TESTER, CD ignition
2. TUNER ASSY
3. ADAPTER, angle
4. PULLER, flywheel
5. BOLT, flywheel puller
6. PILOT, centering
7. TRACK CLIP TOOL ASSY
8. ADJUSTER
9. SEALER, liquid gasket
10. COMPRESSOR SET, piston ring
11. MULTIMETER
12. PULLER, piston pin
13. PULLER, drive converter
14. GAUGE, converter alignment
15. TIMING LIGHT

Wiring Diagram - (Electric Start)



Wiring Diagram (Manual Start)