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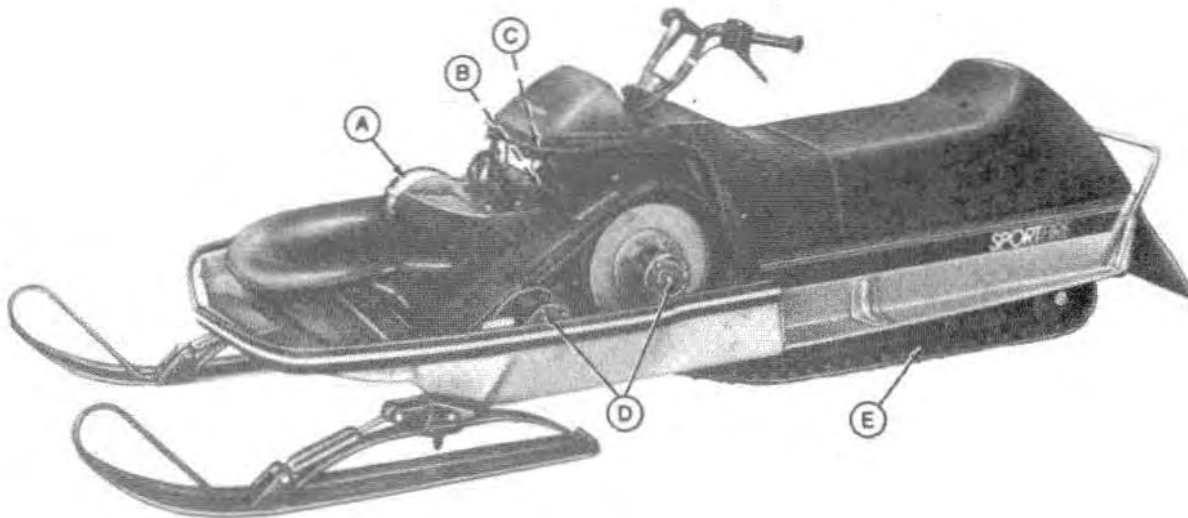
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(All information, illustrations and specifications contained in this technical manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.)

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INTRODUCTION



A—Section 20 - Engine
B—Section 30 - Fuel System

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System

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This technical manual contains service and maintenance information on the John Deere SPORTFIRE Snowmobile.

The manual is divided into sections and groups, pertaining to a component or operational system.

Emphasis is placed on diagnosing malfunctions, analysis and testing. Diagnosing malfunctions lists possible troubles and their causes. The troubles are analyzed to help you understand the problem, so it can be corrected rather than just replace the parts.

Specifications are in the last group of each section. Section 70 covers the special tools.

Hood, tunnel and pan repair are not covered in this technical manual. Minor cracks or holes in the fiberglass can be repaired using patching kits. These kits are available at local auto supply stores.



This safety alert symbol identifies important safety messages. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

NOTE: Metric equivalents have been included, where applicable, throughout this technical manual.

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MACHINE SERIAL NUMBER

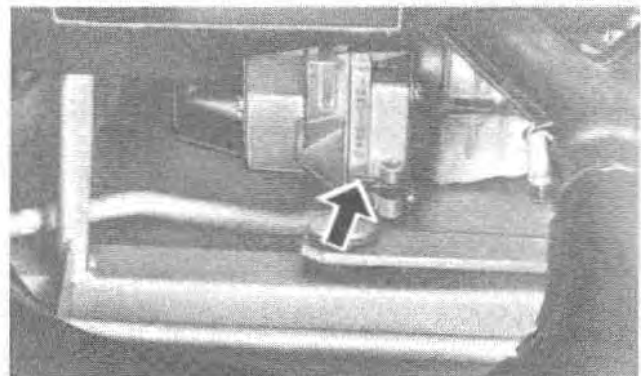
The machine serial number is stamped into the right-hand side of the tunnel.



2A7:M25440 M22:1005C A 051081

ENGINE SERIAL NUMBER

The engine serial number is stamped into the top of the fan housing.



2A7:M25441 M22:1005C B 051081

VINTAGE INFORMATION

1980 Model Year

Snowmobile	440 SPORTFIRE
Serial Number	J44SJ 120,001M
Code No. (type)	J44SJ
Engine Manufacturer	John Deere FIREBURST™*
Engine Model No.	TA440B Piston-Ported

1981 Model Year

Snowmobile	440 SPORTFIRE
Serial No.	J44SK 155,001M
Code No. (type)	J44SK
Engine Manufacturer	John Deere FIREBURST™*
Engine Model No.	TA440B Piston-Ported

1982 Model Year

Snowmobile	440 SPORTFIRE
Serial No.	J44SL 190,001M
Code No. (type)	J44SL
Engine Manufacturer	John Deere FIREBURST™*
Engine Model No.	TA440B Piston-Ported

**Manufactured for John Deere by Kawasaki Heavy Industries, Japan.*

2A7: M22:1005C C 051081

Machine Identification

MACHINE SPECIFICATIONS

FUEL SYSTEM

Fuel Tank Capacity (U.S. Gallons)	28.4 L) 7.5 gals.
Mixing Ratio	50:1*
Oil Tank Capacity	(1.7 L) 3-1/2 pints
Filters	Two located in pick-up line
Fuel Pump:	
Mikuni	Impulse-type located in the inlet line
Oil Pump:	
Mikuni	Reciprocating-plunger driven by the engine
Carburetor	Mikuni

ELECTRICAL SYSTEM

Charge System	Flywheel Alternator
Capacity	120 Watts
Ignition System	Capacitor Discharge
Ignition Timing	Align Mark on Stator with Mark on Crankcase
Plug Gap	(0.635 mm) 0.025-in.
Electric Start (Optional)	12-Volt DC

*Use 50:1 mix in Sportfire (Serial No. 190,001-)
for first tank of fuel and at temperatures of (-29°C)
-20°F.

POWER TRAIN

Drive Sheave	John Deere (Comet) 102 C*
Secondary Sheave	John Deere
Final Drive	Enclosed Chain
Standard Ratio	1.86:1
Brake	Mechanical Disk
Stop Light	Standard

SUSPENSION

Suspension	Slide Rail
Drive Sprockets	Compression-Molded Polyethylene
Track Material	Rubber
Track Width	15 in.
Track Drive	Involute

CHASSIS AND BODY

Tunnel	Aluminum
Pan	Steel and Thermoplastic Rubber
Hood	Sheet-Molded Compound
Windshield	Polycarbonate
Overall Length	(259 cm) 102 in.
Overall Width	(94 cm) 37 in.
Overall Height	(94 cm) 37 in.
Weight (Approx.)	(175 kg) 385 lbs.

*Manufactured for John Deere by Comet Industries,
Richmond, Indiana

247; MZZ1010C A 051081

ENGINE SPECIFICATIONS

Item

Engine Model	TA440B Piston-Ported
Engine Manufacturer	John Deere FIREBURST™*
Type of Engine	Two-Stroke, Air-Cooled
Number of Cylinders	Two
Cylinder Sleeve	Chrome
Bore (mm)	68
Stroke (mm)	60
Displacement (cc)	436
Compression Ratio	7.3:1
Ignition Type	Capacitor Discharge
Ignition Manufacturer	Kokusan
Lighting Coil Output	120-Watt
Carburetor Manufacturer	Mikuni
Carburetor Model	VM34/231
Starting System	Recoil Start (12-Volt Electric Optional)

**Manufactured for John Deere by Kawasaki Heavy Industries, Japan.*

TAT: M22:1010C B 051001

TUNE-UP AND ADJUSTMENT**TUNE-UP GUIDE**

Operation	Specification	Reference
Replace Spark Plugs	Test for spark Champion QN-2 or N-2 DO NOT regap - replace	Section 40, Group 10
Time ignition system	Align mark on stator with crankcase separation	Sec. 40, Group 10
Adjust carburetor	Select main jet Adjust choke plunger Adjust throttle slide Adjust float height Adjust idle screw Adjust air jet	Sec. 30, Group 10
Recondition Carburetor	Clean carburetor and install carburetor kit	Sec. 30, Group 10

2A7; M22:1015C A 051001

ADJUSTMENTS

Adjustment	Specification	Reference
Brake	Sec. 50, Group 35
Sheave Alignment	Sec. 50, Group 25
Track	Sec. 60, Group 15
Skis	Sec. 60, Group 20

2A7; M22:1015C B 051001

SPARK PLUG RECOMMENDATION

The only spark plugs recommended for the SPORTFIRE Snowmobile engine is a Champion QN-2 (AM55044) or N-2 (AM52640).

2A7; M22:1015C C 051001

BREAK-IN PERIOD

Do not exceed (64 km/h) 40 mph for the first (40 km) 25 miles or force the machine at full throttle in deep snow. An occasional short burst of power on hard packed snow will not be harmful.

2A7: M22:1020C A 051081

FUEL

1. Use regular (leaded or unleaded) gasoline with an anti-knock index of 88 or higher. Snowmobiles (Serial No. 120,001-190,000) use a 40:1 pre-mix (gasoline and oil) for the first tank of fuel and a 50:1 pre-mix thereafter. Oil must meet BIA (Boating Industry Association) test qualification TCW.

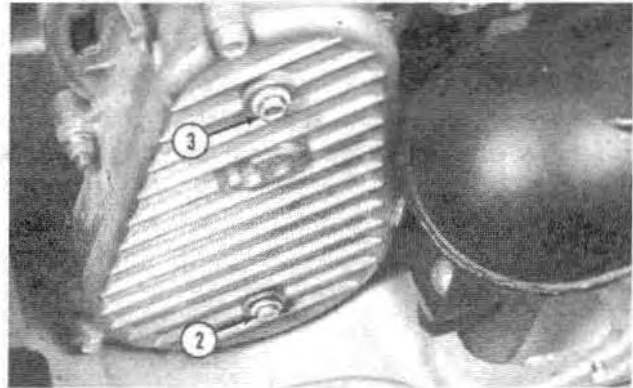
2. Snowmobiles (Serial No. 190,001-) for the first tank of fuel, pre-mix gasoline and oil and fill fuel tank. Fill oil tank with John Deere 2-cycle oil. After break-in use only gasoline in fuel tank and 2-cycle oil in the oil tank.

IMPORTANT: Oil must meet BIA (Boating Industry Association) test qualification TCW. At temperatures of (-29°C) -20°F and below use a 50:1 pre-mix in the fuel tank and fill oil tank with oil. **DO NOT** run straight gasoline in fuel tank. Oil injection system may not function efficiently at (-29°C) -20°F and this could cause engine failure.

2A7: M22:1020C B 051081

LUBRICANTS

1. Park snowmobile on a level surface.
2. Remove lower plug. If oil flows from this hole, oil level is satisfactory.
3. To add oil, remove upper plug and add API-GL5 (SAE 90) gear oil until it flows from lower hole.
4. Replace plugs.



2A7/M25A67 M22/1020C C 051081

CAPACITY AND SERVICE INTERVALS

Fuel tank	(28.4 L) 7.5 U.S. gals
Oil tank	(1.7 L) 3-1/2 U.S. pints
Chain Case (Oil Change	200 hours, 2 years or (1609 kms) 1000 miles.

2A7/ M22/1020C C 051081

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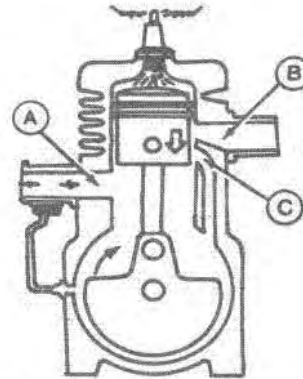
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POWER STROKE

NOTE: Power, exhaust and fuel transfer all occur on the downstroke and compression and intake occur on the upstroke.

Slightly before top-dead center (TDC) ignition occurs. Pressure of the burning gases pushes the piston down providing power to turn the crankshaft.

As the piston moves down it exposes the exhaust (B) and transfer ports (C). The intake port (A) remains closed.

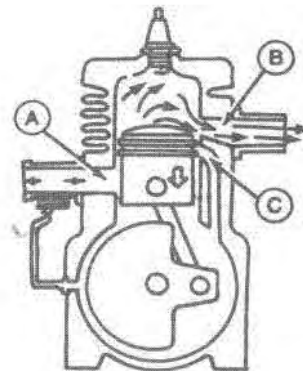


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EXHAUST STROKE

The exhaust port, is uncovered first. Hot gases, under pressure from combustion, escape through the open exhaust port.

A—Intake Port
B—Exhaust Port
C—Transfer Port



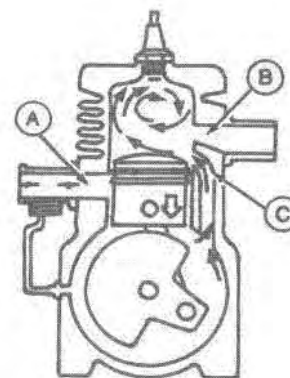
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FUEL TRANSFER STROKE

After uncovering the exhaust port, the piston moves down, exposing the transfer port. The intake port is still closed.

The downward movement of the piston pressurizes the crankcase and forces the fuel-air mixture in the crankcase up and out the transfer port into the combustion chamber. This new charge of fuel and air helps drive out any remaining exhaust gases.

A—Intake Port B—Exhaust Port C—Transfer Port

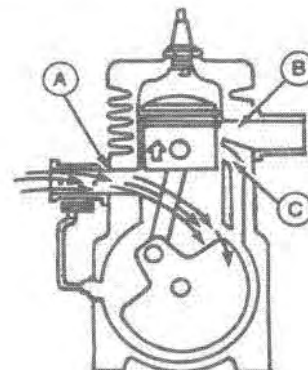


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COMPRESSION AND INTAKE STROKE

As the piston moves up it closes off the transfer (C) and exhaust port (B) and opens the intake port (A). This also creates a partial vacuum in the crankcase. Atmospheric pressure forces a new charge of fuel and air from carburetor through intake port to the crankcase.

The piston moving up also compresses the fuel-air mixture in the combustion chamber. Just before the piston reaches TDC, a spark from the spark plug ignites the mixture and it starts to burn.



2A8/M26437 M22:2005 G 220581

DIAGNOSE MALFUNCTIONS

Engine Will Not Start

Carburetor and/or fuel pump faulty.
Spark plugs faulty.
Fuel lines obstructed.
Head gasket leaking.
Electrical connections loose.

Engine Starts With Difficulty

Carburetor out of adjustment.
Choke not functioning properly.
Spark plugs fouled.
Ignition coil weak.
Fuel mixture incorrect.
Ignition out of time.
Water in fuel system.

Engine Won't Crank

Piston seized.
Crankshaft seized to bearings.
Connecting rod broken.
Faulty recoil starter.

Engine Will Not Idle Properly

Carburetor idle adjustments incorrect.
Air screw on carburetor not adjusted.
Head gasket leaking.
Fuel mixture incorrect.
Crankshaft seal leaking.
Impulse tube to fuel pump obstructed or leaking.

Engine Misses At High Speeds

Ignition out of time.
Fuel pump faulty.
Head gasket leaking.
Ignition coil weak.
Incorrect main jet in carburetor.
Impulse tube to fuel pump obstructed or leaking.

Engine Overheated

Wrong main jet in carburetor.
Ignition out of time.
Air leak in intake system or crankcase.
Cooling fan drive belt broken or slipping.
Cooling fins obstructed or damaged.
Cooling fan broken or damaged.

Engine Runs Rough and Smokes

Improper fuel mixture.
Choke plunger not seated.
Muffler obstructed.
Water in fuel.

Engine Kicks Back and Backfires

Ignition out of time.

Engine Loses Power or Acceleration

Carburetor out of adjustment.
Engine overheating.
Ignition out of time.
Ignition coil weak.
Fuel mixture incorrect.
Muffler obstructed.
Running on one cylinder.
Restricted in-line fuel filter.

Recoil Starter Pawls Not Extending When Rope Is Pulled

Friction spring broken allowing friction plate to rotate.
Retaining nut loose.

Recoil Starter Pawls Not Returning When Rope Is Released

Return spring broken.
Return spring not assembled properly.

Recoil Starter Rope Not Returning

Main spring broken or unhooked.
No lubrication between friction plate and washer.

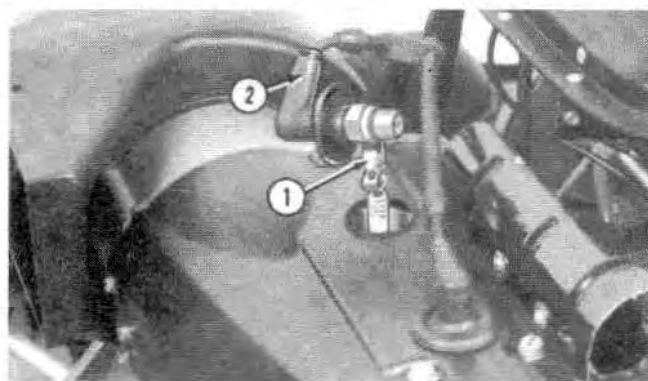
ENGINE SPARK TEST

1. Ground JDM-74A-5 Tester Plug to the engine spark plug.
2. Connect high tension lead to the tester plug.
3. Turn the key switch to the "ON" position.
4. Pull the recoil start rope and check tester plug for spark.
5. Check both cylinders.
6. If CDI system cannot fire the tester plug, ignition system difficulties exist.



CAUTION: High energy ignition systems can produce injurious electrical shock. **DO NOT** hold spark plugs, leads or connectors in your hand to check for spark.

7. If spark is good and engine does not start, make compression test and check fuel supply.



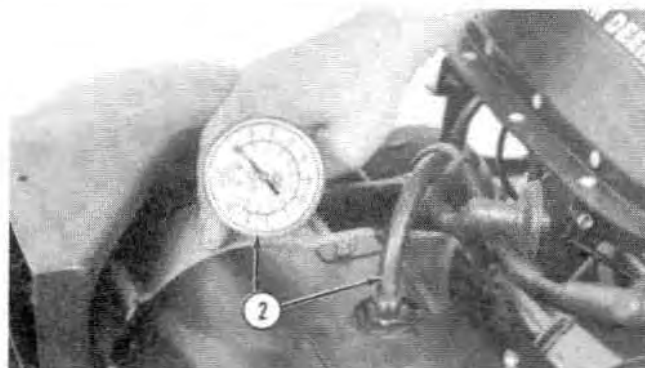
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COMPRESSION TEST

1. Remove spark plugs.
2. Install compression gauge in one of the spark plug holes.
3. With choke "OFF," hold throttle in open position.
4. Pul recoil start rope and crank engine vigorously. Test both cylinders for compression.
5. Compression pressure should be as follows:
(896 to 1069 kPa) 130 to 155 psi.

Pressure should not vary more than (69 kPa) 10 psi between cylinders. Minimum pressure for a used engine is (689 kPa) 100 psi.

6. If compression pressure is low, check for head gasket leakage, worn or stuck piston rings, damaged pistons or damaged cylinder walls.



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General Information

REMOVE ENGINE

1. Remove clutch.
2. Disconnect carburetor from intake manifold.
3. Remove muffler.

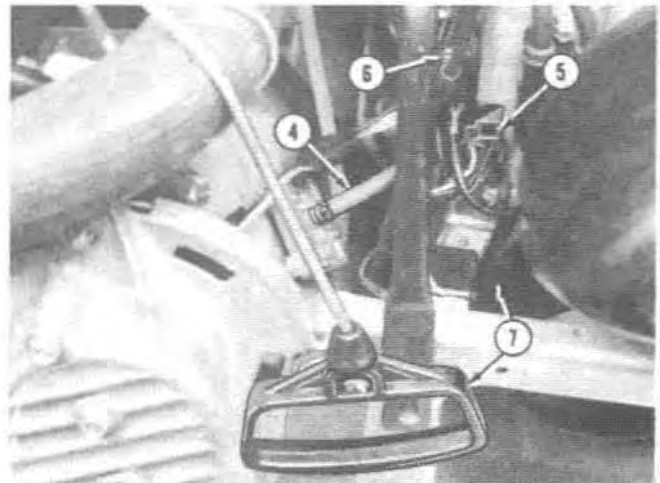


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4. Disconnect impulse line from fuel pump.
5. Disconnect wiring harness from engine.
6. Remove wiring harness from clamp.

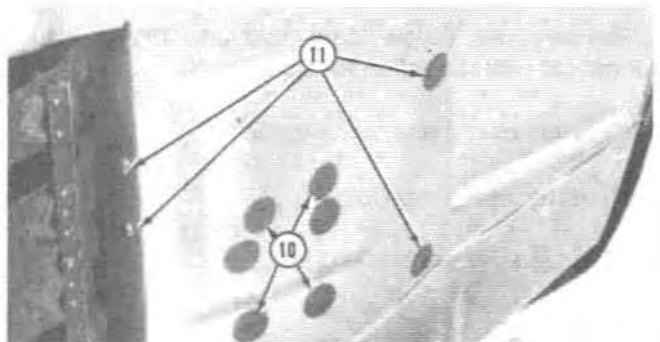
NOTE: On Snowmobiles beginning with Serial No. 190,001, remove oil line and control cable from oil injection pump. Remove injection pump.

7. Tie a knot in recoil start rope to hold it and remove handle.
8. Disconnect drag link from right-hand steering arm. Turn steering all the way to the left. This moves drag link out of the way and allows access to the engine mount bolts.



2A7-M21842 M22-2010C B 081081

9. Remove air intake duct and fan cover.
10. Remove plugs on bottom of pan. Remove bolts and lift engine out.
11. If engine mount must be replaced, remove these four bolts.

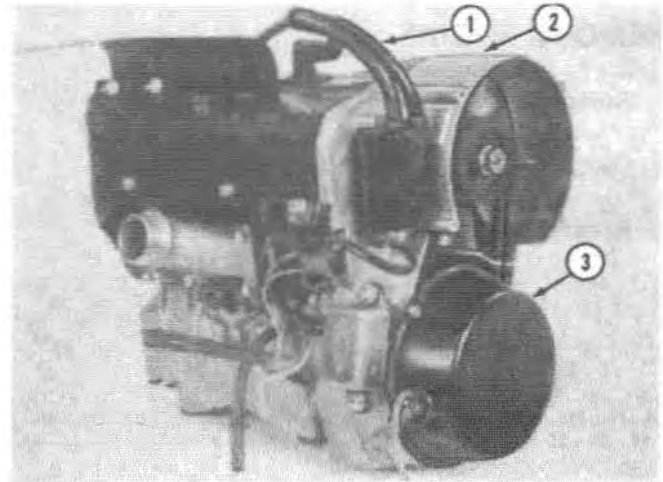


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REMOVE EXTERIOR COMPONENTS

1. Disconnect spark plug leads. Disconnect oil injection lines from intake manifold (Serial No. 190,001 - up).
2. Remove top shroud.
3. Remove recoil starter.

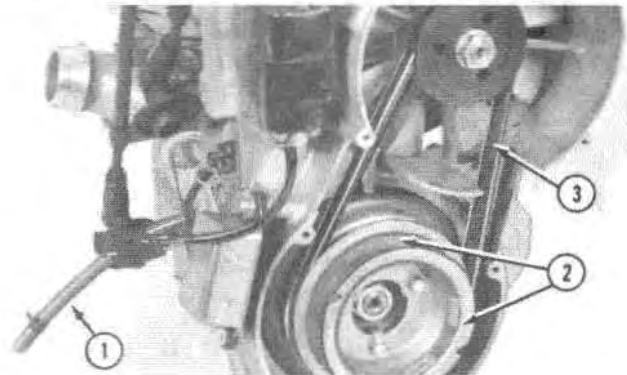
NOTE: Beginning with Serial No. 190,001, remove oil injection pump before removing recoil starter.



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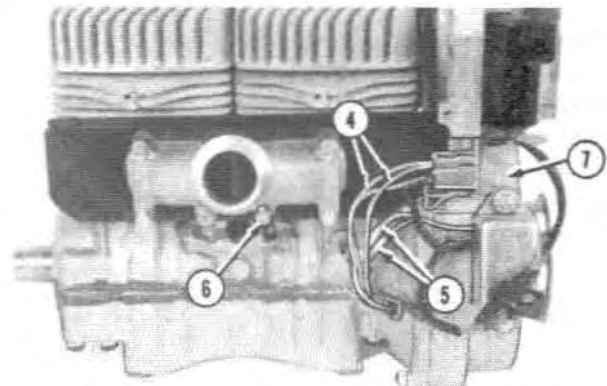
REMOVE FLYWHEEL HOUSING

1. Remove impulse line.
2. Remove starter cup and flywheel pulley. Oil injection pump drive hub comes off with flywheel pulley beginning with Serial No. 190,001.
3. Remove fan belt.



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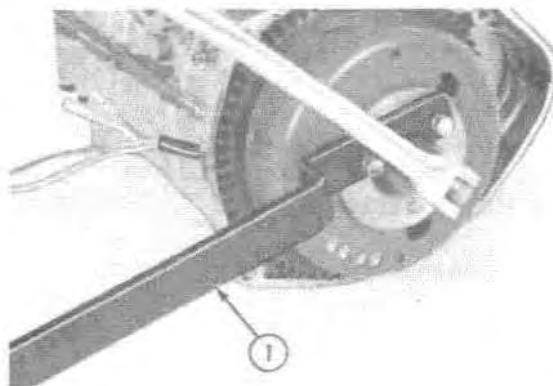
4. Remove two yellow leads and one brown lead from connector. Mark location for reassembly.
5. Disconnect red and white leads.
6. Remove intake manifold.
7. Remove flywheel housing.



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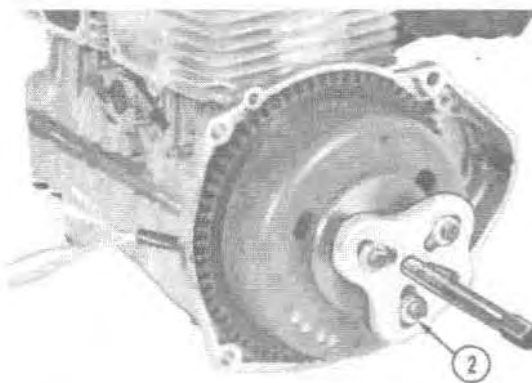
REMOVE FLYWHEEL

1. Use JDM-64-1 Flywheel Holding Tool while removing flywheel nut and washer.



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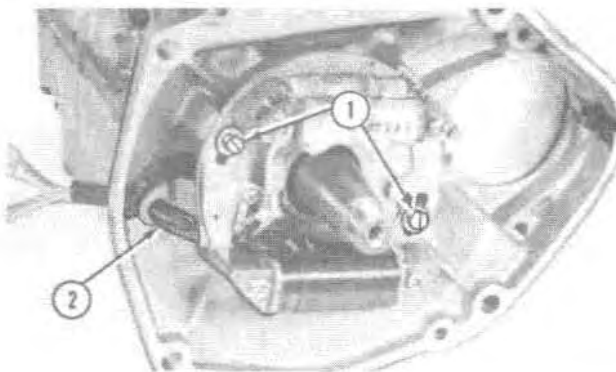
2. Remove flywheel with an air or electric impact wrench and JDM-9 Puller.



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REMOVE STATOR

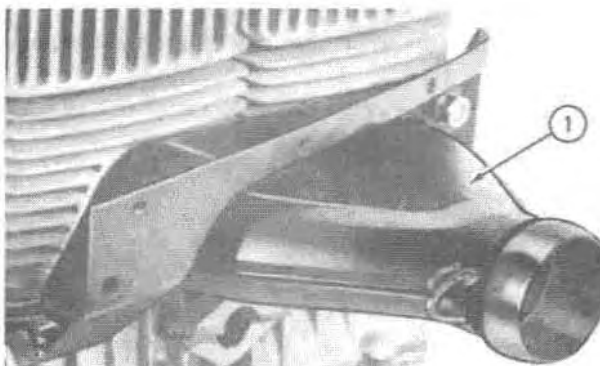
1. Remove stator screws.
2. Remove stator with leads and grommet.



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REMOVE EXHAUST MANIFOLD

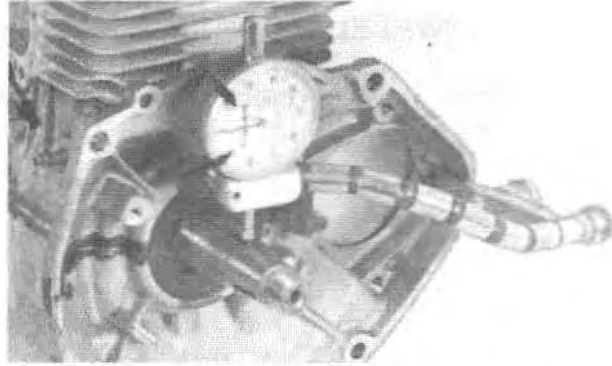
1. Remove exhaust manifold, sheet metal and gaskets.



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CHECK CRANKSHAFT RUNOUT

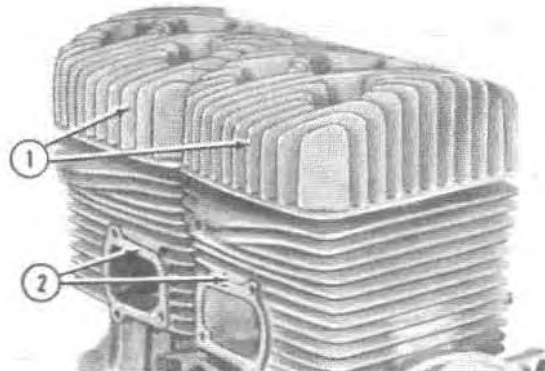
1. Remove spark plugs.
2. Install a dial indicator at the taper on PTO end of crankshaft. Rotate crankshaft.
3. Replace crankshaft if runout exceeds (0.05 mm) 0.002 in.



2A7/M25851 M22/2010C K 081081

REMOVE CYLINDERS AND HEADS

1. Remove cylinder heads and gaskets.
2. Remove cylinders and gaskets.



2A7/M25852 M22/2010C L 081081

REMOVE PISTONS

1. Remove piston pin retainer with an awl.

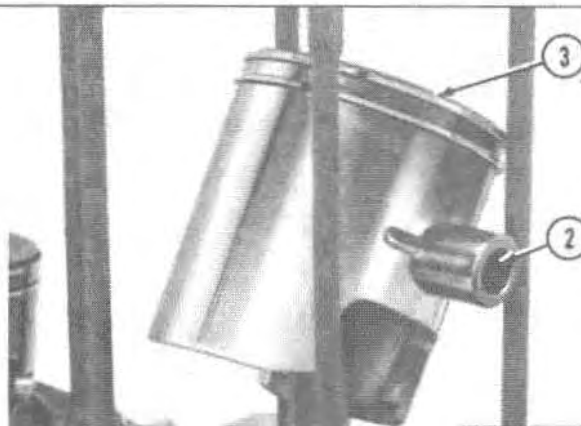


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2. Warm piston with your hands and push piston pin out.

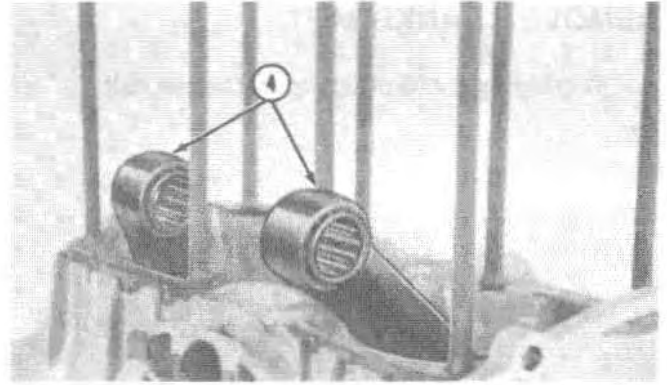
NOTE: If pin can't be pushed out by hand, use JDM-7 Tool Set with JDM-32 Guide.

3. Remove piston.



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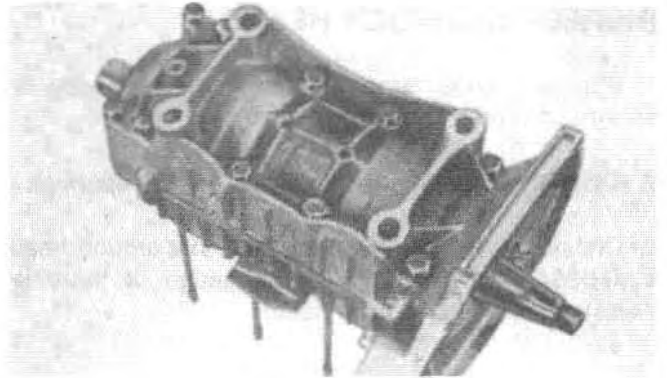
4. Remove piston pin needle bearings.



2A7/M25857 M22/3010C Q 081081

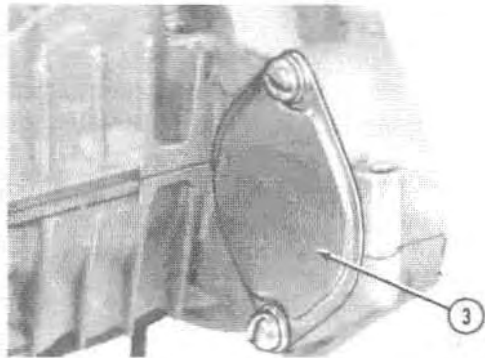
SEPARATE CRANKCASE

1. Set crankcase on a bench.
2. Remove crankcase bolts.



2A7/M25858 M22/3010C P 081081

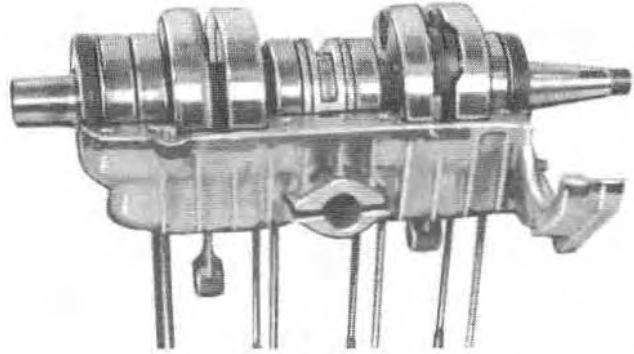
3. Remove plate.
4. Separate crankcase halves.



2A7/M25859 M22/3010C Q 081081

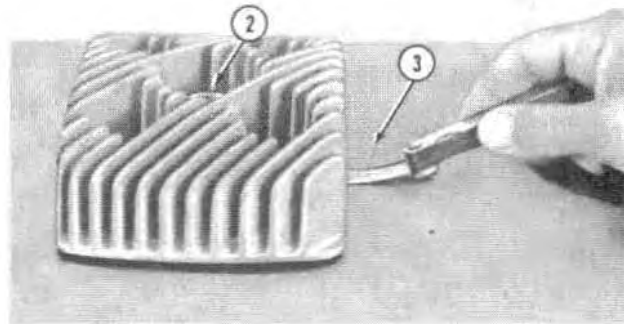
REMOVE CRANKSHAFT

1. Lift crankshaft out of upper crankcase half.



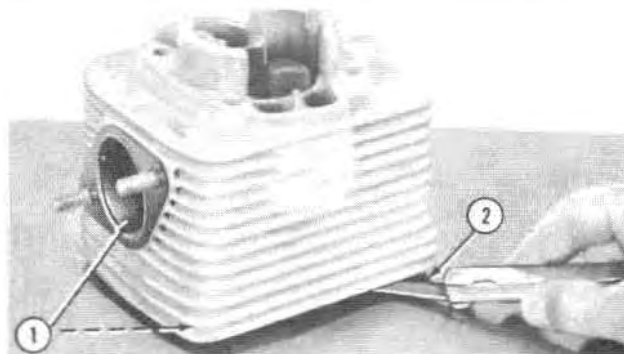
INSPECT CYLINDER HEADS

1. Scrape carbon deposits from cylinder heads with a soft-metal (non-ferrous) scraper.
2. Clean spark plug threads with a (14 mm) spark plug tap.
3. Check cylinder head at various points around head with a (0.0254 mm) 0.001 in. feeler gauge. If there is any distortion, replace cylinder head.



INSPECT CYLINDERS

1. Use a soft metal (non-ferrous) scraper to clean carbon and gasket material from cylinder surface and exhaust port.
2. Check at various points around cylinder with a (0.0254 mm) 0.001 in. feeler gauge. If there is any distortion, replace cylinder.

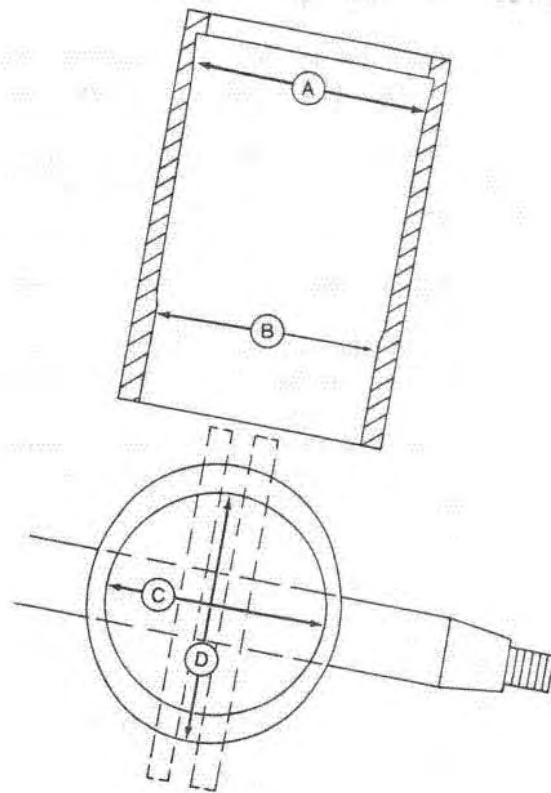


3. Measure cylinder bore at (C) and (D) in position (A) of cylinder. Measure cylinder bore at (C) and (D) in position (B) of cylinder.

4. If any dimension exceeds (68.12 mm) 2.6818 in., the cylinder must be replaced.

IMPORTANT: Do not hone or rebore cylinder. It is chrome-plated and must be replaced if out of specification.

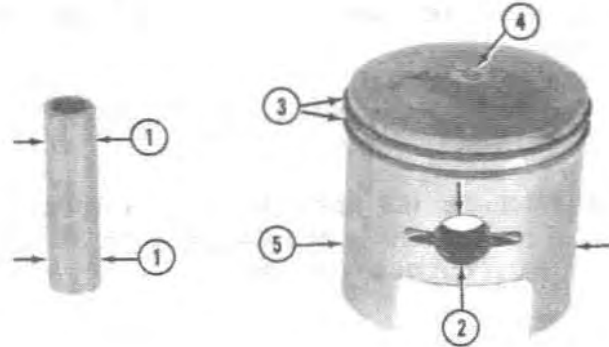
A—Top of Ring Travel Zone C—Parallel to Crankshaft
B—Bottom of Ring Travel Zone D—Right Angle to Crankshaft



2A7/M23493 M22/2010C U 081081

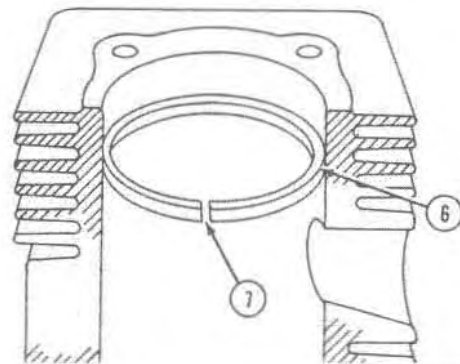
INSPECT PISTONS AND RINGS

1. Measure piston pin in the two locations shown. If dimension is less than (15.96 mm) 0.6281 in., replace it.
2. Measure piston pin bore dimension on both sides of piston. If either dimension exceeds (15.92 mm) 0.6267 in., replace the piston.
3. Remove the piston rings and clean ring grooves.
4. Check piston for pitting, scoring or corrosion. Replace if necessary. Clean carbon deposit from top of piston.
5. Measure the piston diameter at a right angle to the piston pin bore. If dimension is less than (67.80 mm) 2.6693 in., replace the piston.



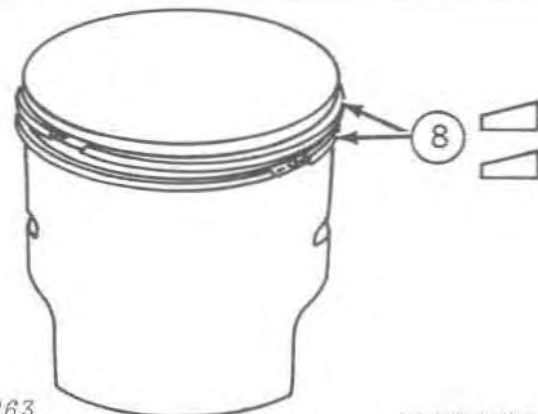
2A7:M25494 M22:2010C V 081081

6. Use a piston to push the ring into a cylinder that has been inspected and proven correct. Push ring into bore (25.4 mm) one inch below top of bore.
7. Measure ring end gap for (0.2032 to 0.4064 mm) 0.008 to 0.016 inch clearance. If end gap is incorrect, replace the ring.



2A7:M25495 M22:2010C W 081081

8. Install both half keystone rings with bevel up.
9. Be sure both rings are located with pins of the piston in the end gaps and widest part of ring gap is up.

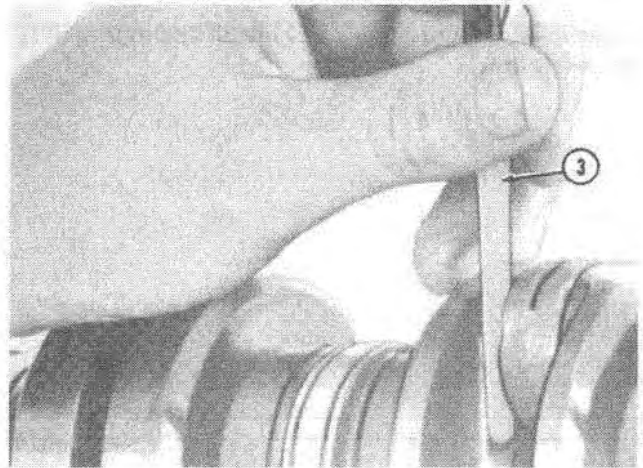


M25863

2A7:M25863 M22:2010C X 081081

INSPECT CRANKSHAFT

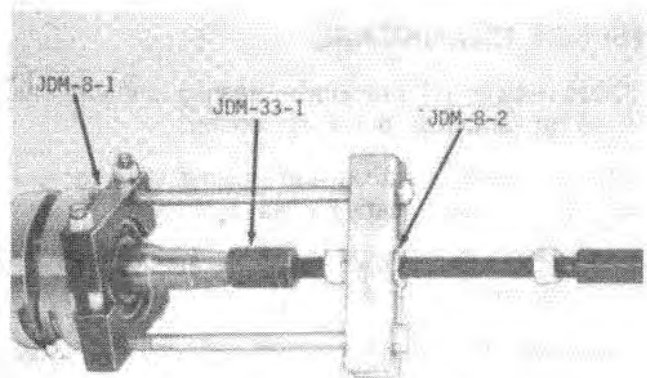
1. Remove crankshaft seals and retainers. Replace seals if they are damaged.
2. Measure I.D. of connecting rod. If I.D. exceeds (20.05 mm) 0.7894 in., replace crankshaft assembly.
3. Move the connecting rod to one side and measure the clearance on opposite side with a feeler gauge. If clearance exceeds (0.70 mm) 0.0276 in., replace the crankshaft.
4. Rotate the five crankshaft bearings. If any rotate roughly or are frozen, they are damaged. The outside bearings can be replaced but the inner bearings cannot be replaced. If inner bearings are damaged, replace the crankshaft.



2A7:M25398 M22:2010C Y 081081

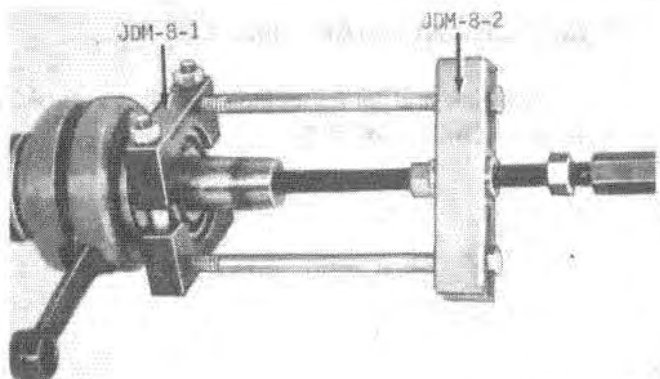
REPLACE OUTER CRANKSHAFT BEARINGS

1. Install JDM-33-1 Adapter on crankshaft.
2. Use JDM-8-1 and JDM-8-2 to remove bearing from flywheel end of crankshaft.



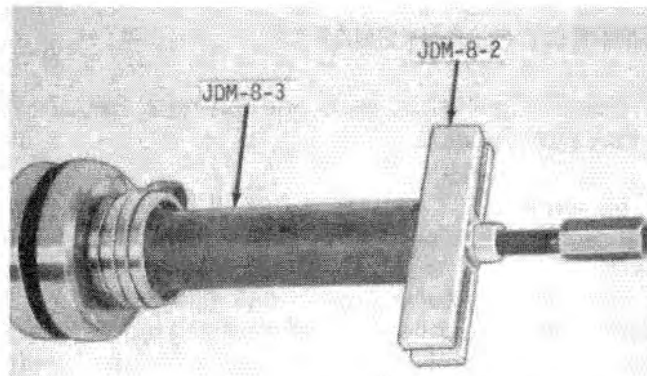
2A7:M25499 M22:2010C Z 081081

3. Use JDM-8-1 and JDM-8-2 to remove bearings from PTO end of crankshaft.



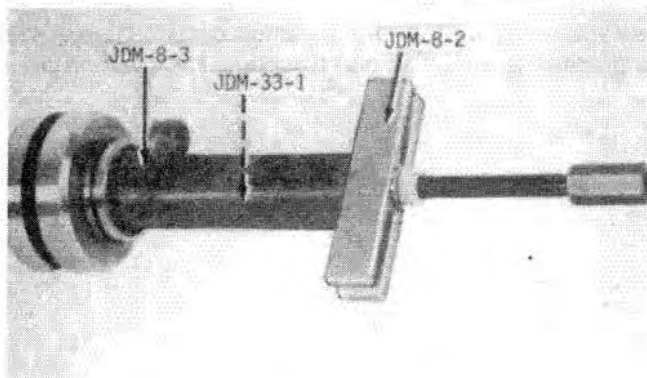
2A7:M25500 M22:2010C AA 081081

4. Use JDM-8-3 and JDM-8-2 to install bearings on PTO end of crankshaft.



2A7/M23501 M22/2010C AB 081081

5. Install JDM-33-1 Adapter on crankshaft.
6. Install JDM-8-3 and JDM-8-2 to install bearing on flywheel end of crankshaft.



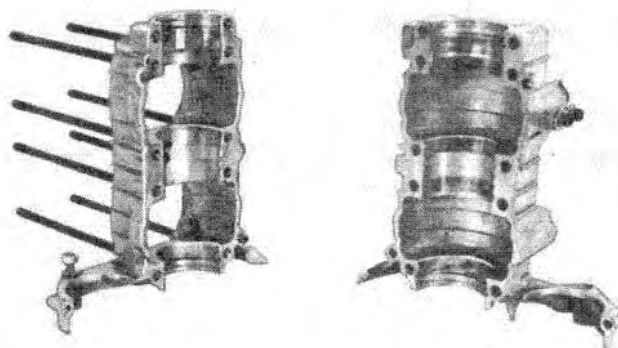
2A7/M23502 M22/2010C AC 081081

INSPECT CRANKCASE

1. Clean sealer off crankcase sealing surface. Inspect surface for scratches, pitting or scoring.
2. Check bearing surfaces and retainer slots for wear or conditions that could cause leaks.

NOTE: Minor indication of bearing outer race rotation is normal.

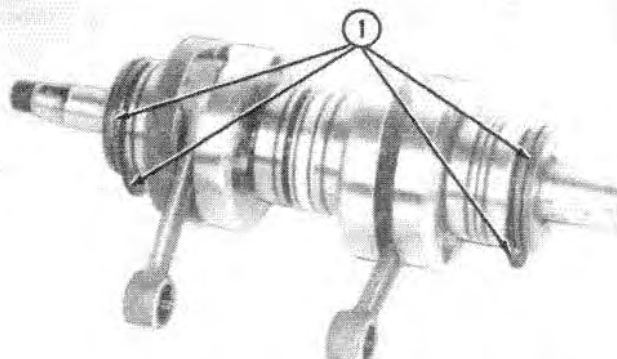
3. Crankcase halves are available only as a matched set.



2A7/M23503 M22/2010C AD 081081

INSTALL CRANKSHAFT SEALS

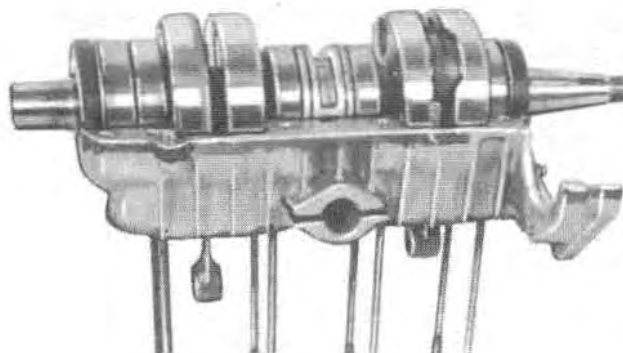
1. Place retainers and oil seals (lip inward) on crankshaft. Lubricate seals with 2-cycle oil.



2A7/M23504 M22/2010C AE 081081

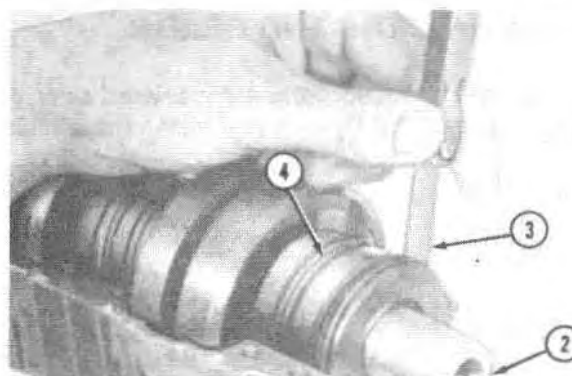
INSTALL CRANKSHAFT

1. Place upper crankcase half on bench and install crankshaft.
2. Be sure locating pin on the center spacer fits into the slot in the upper crankcase half.



2A7/M25865 M22/3030C AF 081081

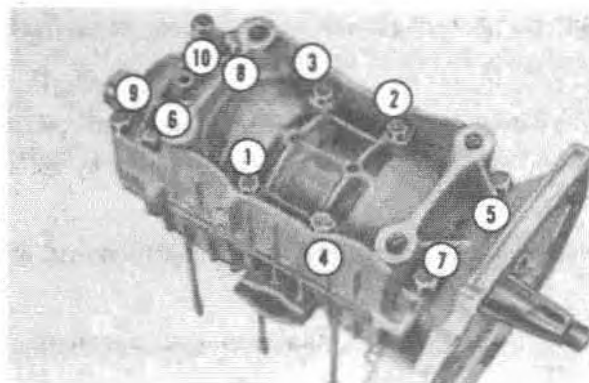
2. Tap crankshaft toward flywheel end of crankcase with a plastic mallet.
3. Check clearance between outer PTO bearing and retainer with a feeler gauge.
4. If end play exceeds (1.016 mm) 0.040 in. shims must be added between the two outer bearings on the PTO end of crankshaft. Shims are available in (0.1 mm) 0.004 in. and (0.3 mm) 0.010 in. thicknesses.



2A7/M25865 M22/3030C AG 081081

INSTALL LOWER CRANKCASE HALF

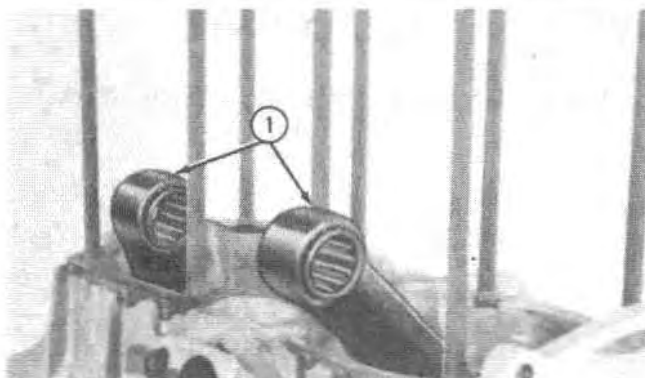
1. Apply an even coat of M64850 Silicon Rubber Adhesive to sealing surfaces of both crankcase halves. Do not allow sealer to enter interior of crankcase halves.
2. Install lower crankcase half and torque nuts to (22 N·m) 16 ft-lbs in sequence shown.



2A7/M25864 M22/3030C AH 081081

INSTALL PISTONS

1. Place needle bearings in connecting rod.

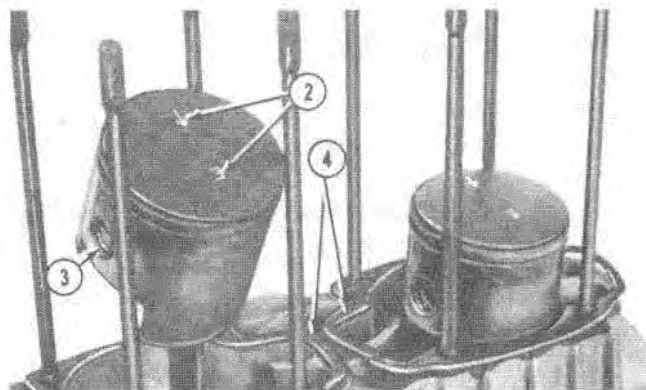


2A7/M25865 M22/3030C AI 081081

2. Set piston over connecting rod with arrow on piston toward the exhaust side.

3. Push piston pin into piston and connecting rod and install new retainers.

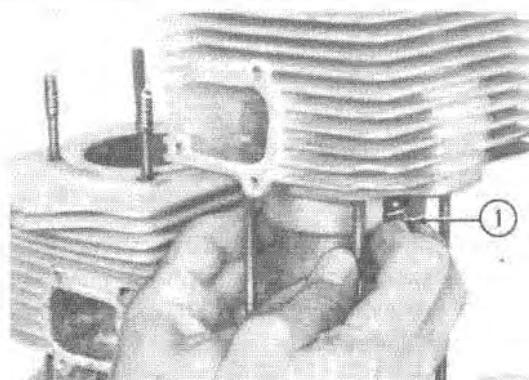
4. Place new cylinder gaskets on crankcase. Make sure they are correctly installed.



2A7,M25866 M22/2010C AJ 081081

INSTALL CYLINDERS AND HEADS

1. Be sure piston ring end gaps are centered over pins. Compress rings with your fingers and install the cylinder.



2A7,M25867 M22/2010C AK 081081

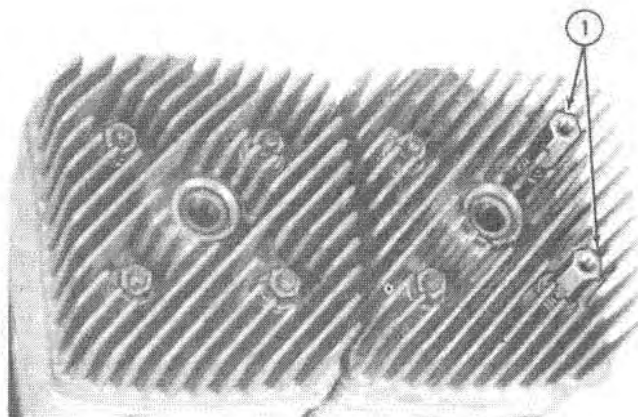
2. Install cylinder heads with long cylinder head nuts on head as shown. DO NOT tighten hardware.

3. Install exhaust manifold, sheet metal and gaskets. Tighten hardware to (6 to 8 N·m) 4 to 6 ft-lbs torque. Installing exhaust manifold aligns the cylinders.

4. Tighten cylinder head hardware to (22 N·m) 16 ft-lbs torque.

NOTE: Use a criss-cross pattern when tightening hardware.

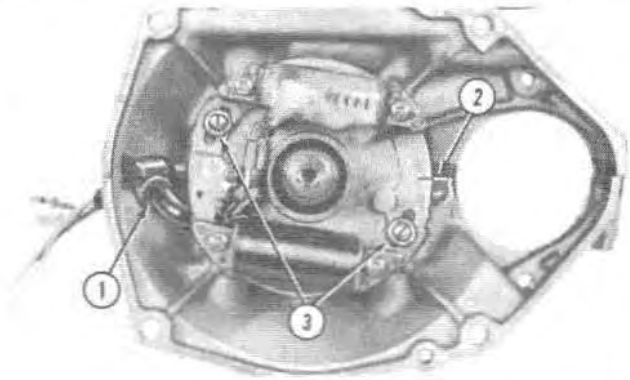
5. Install spark plugs. Tighten spark plugs to (27 N·m) 20 ft-lbs torque.



2A7,M25868 M22/2010C AL 081081

INSTALL STATOR (TIMING IGNITION)

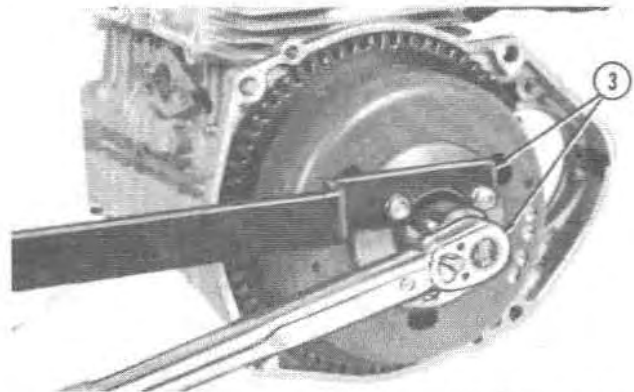
1. Guide stator leads with grommet through hole in crankcase halves. Set stator in place against the crankcase.
2. Align mark on stator with top of ridge on crankcase.
3. Tighten stator screws.



2A7/M2584V M22/2610C AM 061061

INSTALL FLYWHEEL

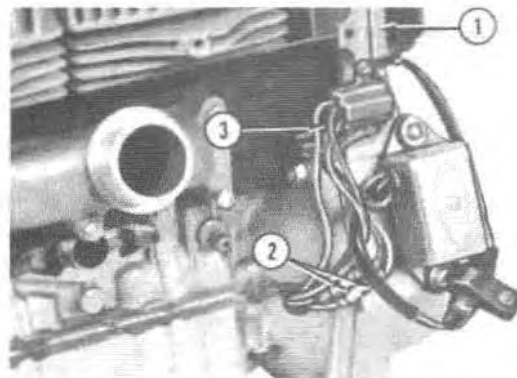
1. Install flywheel key in crankshaft keyway.
2. Install flywheel lockwasher and nut.
3. Hold flywheel with JDM-64-1 Flywheel Holding Tool and tighten nut to (81 N·m) 60 ft-lbs.
4. Bend tabs on lock washer to secure nut.



2A7/M2587D M22/2610C AN 061061

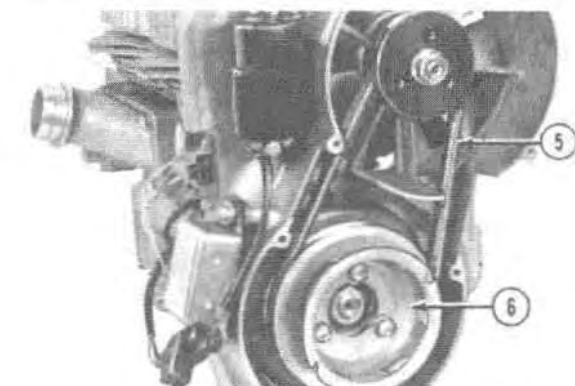
INSTALL FLYWHEEL HOUSING

1. Install flywheel housing.
2. Connect red and white leads.
3. Install two yellow leads and one brown lead in connector as marked when removed.
4. Install intake manifold.



2A7/M2587J M22/2610C AD 061061

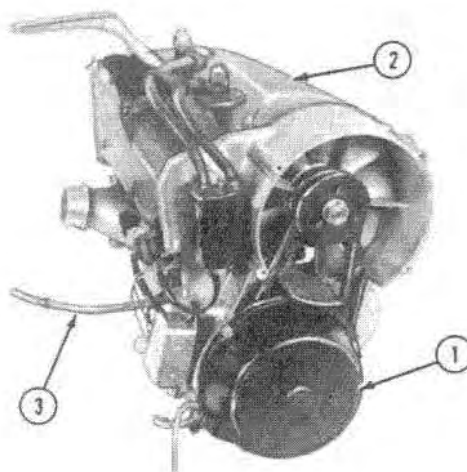
5. Install fan belt.
6. Install flywheel pulley and starter cup. Beginning with Serial No. 190,001 - up, install oil injection pump drive hub and drive shaft.
7. Check and adjust fan belt tension.



2A7/M2587Z M22/2610C AP 061061

INSTALL EXTERIOR COMPONENTS

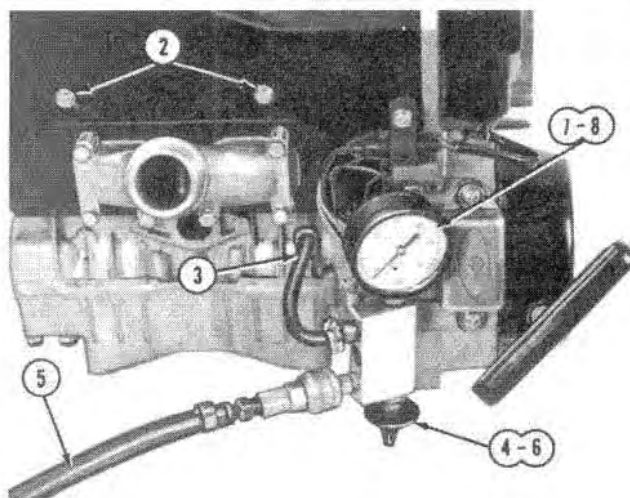
1. Install recoil starter. Be sure oil injection pump drive shaft (Serial No. 190,001 - up) engages properly in oil injection pump.
2. Install top shroud.
3. Install impulse line.
4. Connect oil injection pump lines (Serial No. 190,001 - up) to fittings on intake manifold.



2A7/M25873 M22/2010C AQ 081061

PRESSURE TEST ENGINE

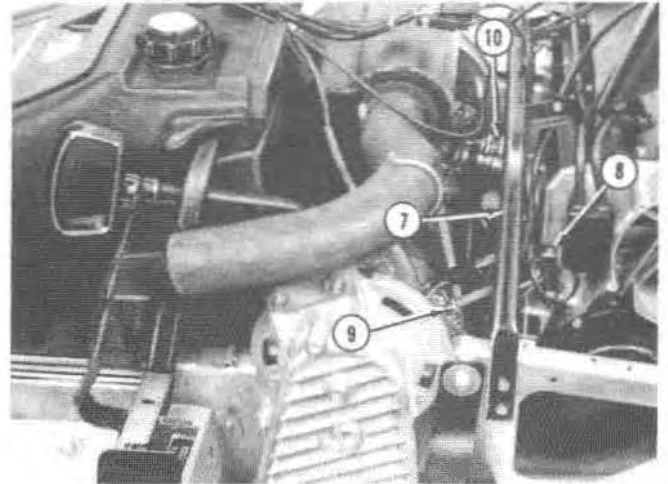
1. Place a rubber sheet between exhaust manifold and cylinders.
2. Place a rubber sheet between intake manifold and cylinders.
3. Connect pressure regulator (JDM-44) to impulse fitting.
4. Close regulator valve.
5. Connect shop air to regulator.
6. Open valve until gauge reads (48.3 kPa) 7 psi. Then close valve.
7. Gauge needle should not drop below (34.5 kPa) 5 psi for at least 10 seconds.
8. If needle drops before 10 seconds, open valve to maintain (48.3 kPa) 7 psi. Apply a liquid soap solution to seals and seams to locate leaks.



2A7/M25874 M22/2010C AR 081081

INSTALL ENGINE

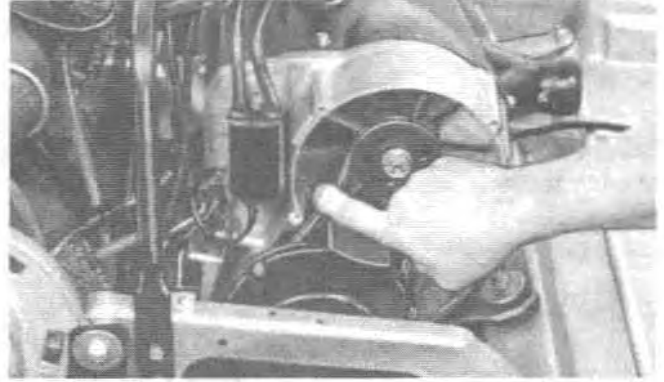
1. Place engine in snowmobile.
2. Install engine mounting bolts until they are just snug.
3. Install primary clutch and check alignment.
4. Torque mounting bolts to (68 N·m) 50 ft-lbs and install rubber plugs in pan.
5. Connect drag link to right-hand steering arm.
6. Install handle and release knot in recoil start rope.
7. Place wiring harness in clamp.
8. Connect wiring harness to engine connector.
9. Connect impulse line to fuel pump.
10. Connect carburetor to intake manifold. Beginning with Serial No. 190,001 - up, connect oil line to oil injection pump and control cable to injection pump control arm. Check adjustments on carburetor and oil injection pump control cables.
11. Install air intake duct and fan cover.
12. Install muffler.



2AT-W21875 M22/2010C AS 081081

CHECK FAN BELT TENSION

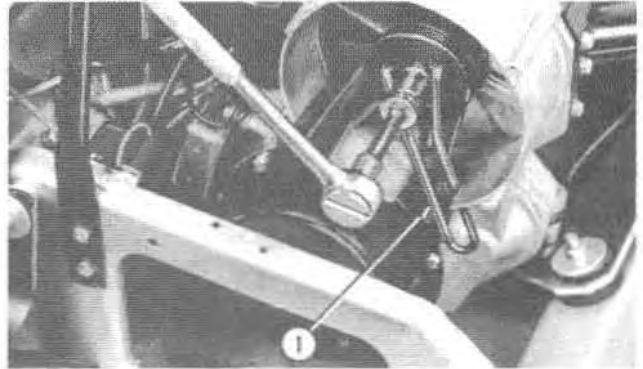
1. Remove air intake duct and fan cover.
2. If fan belt can be deflected more than (9.52 mm) 3/8-in. with your finger, adjust belt tension. If belt is frayed, worn or damaged, replace it.



2A7-M26043 M22-2015C A 061081

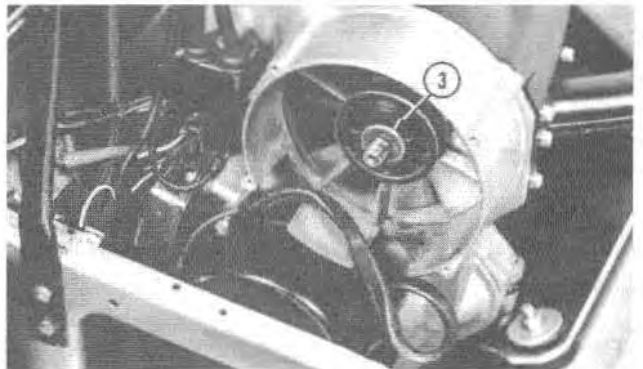
ADJUST FAN BELT TENSION

1. Hold fan belt sheave with JDM-112 Holding Tool and remove nut.
2. Remove outer sheave half.



2A7-M26044 M22-2015C B 061081

3. Remove shims to increase belt tension. Add shims to decrease belt tension.
4. Reinstall outer sheave half. Place left-over shims on shaft and install lock washer and nut.
5. Hold sheave with JDM-112 Holding Tool and tighten nut to (64 N·m) 47 ft-lbs torque.
6. Recheck belt tension.



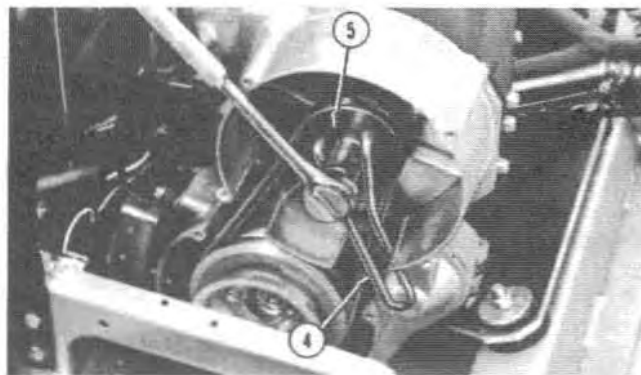
2A7-M26045 M22-2015C C 061081

REPLACE FAN BELT

1. Remove air intake duct and fan cover.
2. Tie a knot in recoil start rope and remove handle.
3. Beginning with Serial No. 190,001 - up, remove control cable, inlet oil line and oil injection lines from oil injection pump. Remove oil injection pump and recoil starter.

2A7-M26046 M22-2015C D 061081

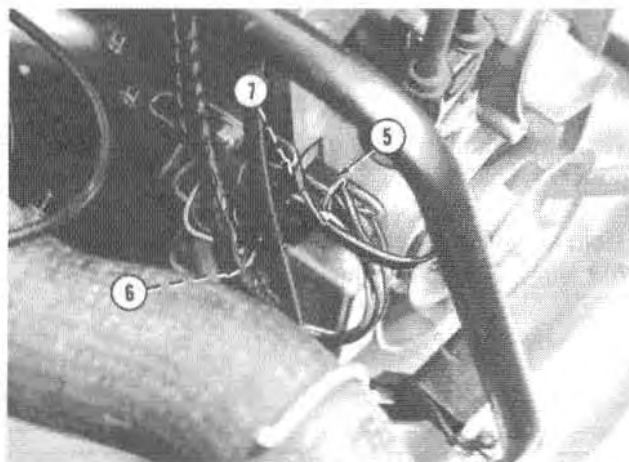
4. Hold fan sheave with JDM-112 Holding Tool and remove nut and washer.
5. Remove outer sheave half. If any shims have been previously removed to adjust belt tension, place between sheave halves.
6. Replace belt.
7. Install outer sheave half, lock washer and nut.
8. Hold fan sheave with holding tool and tighten nut to (64 N·m) 47 ft-lbs.
9. Check belt tension.
10. Install recoil starter. Reinstall control cable and oil lines to oil injection pump (Serial No. 190,001 - up).
11. Install fan cover and air intake duct.
12. Install recoil start handle and release knot in rope.



2A7/R21047 M222015C E 081081

REPLACE FAN OR BEARINGS

1. Remove air intake duct and fan cover.
2. Tie a knot in recoil start rope and remove handle.
3. Beginning with Serial No. 190,001 - up, remove control cable, inlet oil line and oil injection lines from oil injection pump. Remove injection pump.
4. Remove recoil starter, outer sheave and fan belt.
5. Remove plug wires from plugs and wiring harness at engine connector.
6. Disconnect red and white ignition wires.
7. Remove two yellow wires and one brown wire from engine connector.
8. Remove four shroud screws.
9. Remove fan housing from engine.

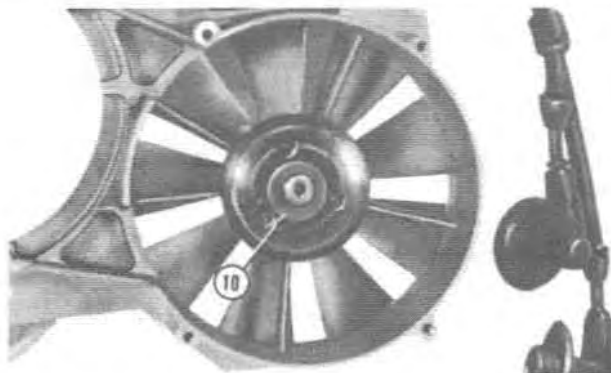


2A7/M25048 M222015C F 091083

10. Remove shims, inner sheave half and key.

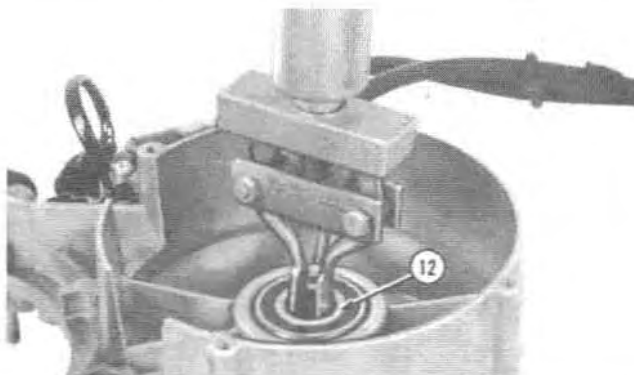
11. Push fan out of housing.

NOTE: Bearings should be replaced even if only one is damaged.



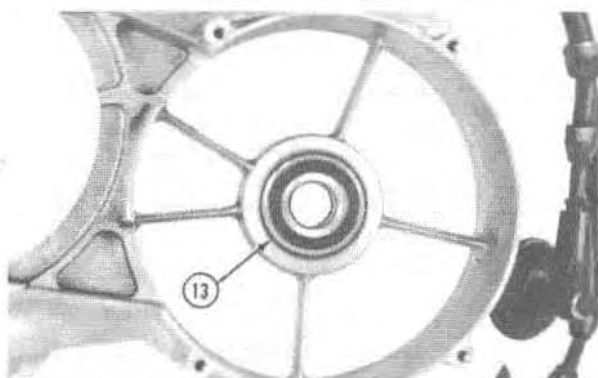
2A7/M26049 M22/2015C G 091081

12. Remove bearing with a puller. Inspect the two washers between the two bearings. Replace them if damaged.



2A7/M26050 M22/2015C H 091081

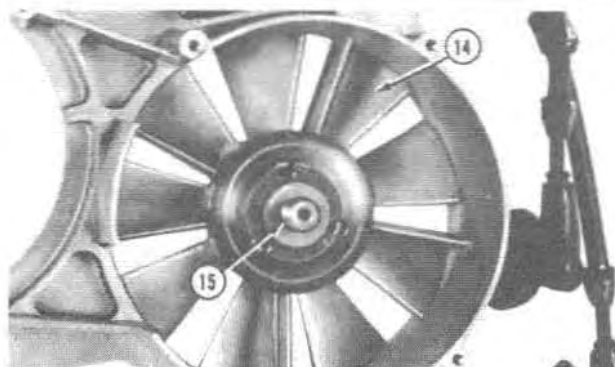
13. Press bearings into housing until seated.



2A7/M26051 M22/2015C I 091081

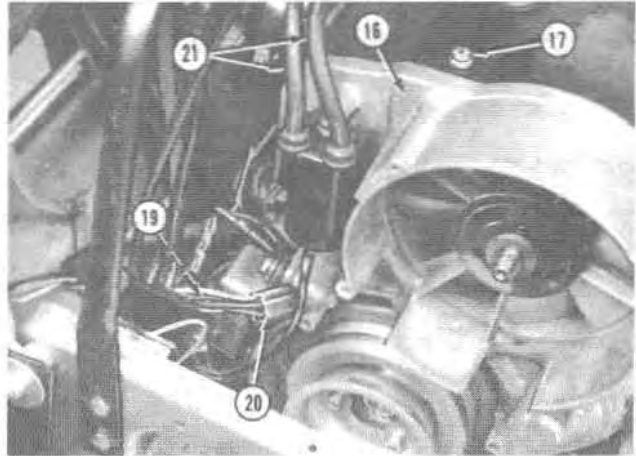
14. Place fan in housing.

15. Install inner sheave half, shims and key.



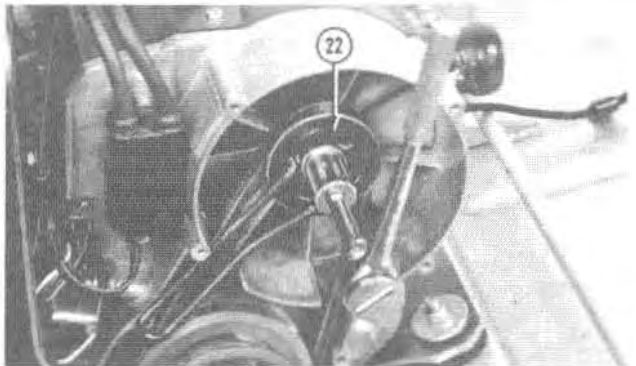
2A7/M26052 M22/2015C J 091081

16. Install fan housing on engine.
17. Install four shroud screws.
18. Install two yellow wires and one brown wire to engine connector.
19. Connect red and white ignition wires.
20. Connect wiring harness to engine connector.
21. Install plug wires to plugs.



247M36053 M220150 K 09/08

22. Place belt in inner sheave half, install outer sheave half, lock washer and nut.
23. Hold sheave with JDM-112 Holding tool and torque nut to (64 N·m) 47 ft-lbs.
24. Check belt tension.
25. Install recoil starter and oil injection pump. Install control cable and oil lines to oil injection pump (Serial No. 190,001 - up).
26. Install handle and remove knot in recoil start rope. Install fan cover and air intake duct.



242M2694 M220150 L 09/08

REMOVE RECOIL STARTER

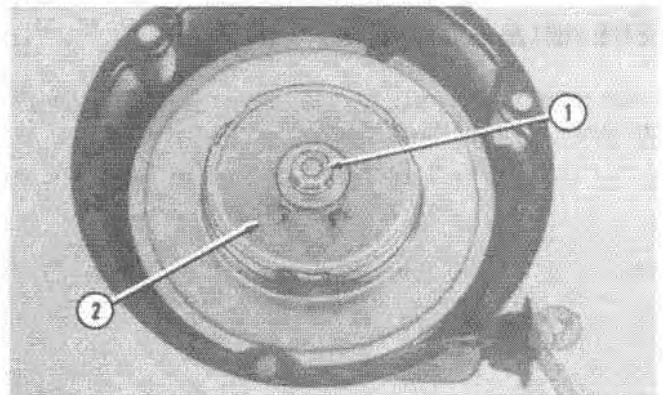
1. Tie a knot in recoil start rope and remove handle.
2. Remove control cable and oil injection lines from oil injection pump (Serial No. 190,001 - up). Remove injection pump.
3. Remove recoil starter.

2A7-M22020C A 091081

DISASSEMBLE RECOIL STARTER

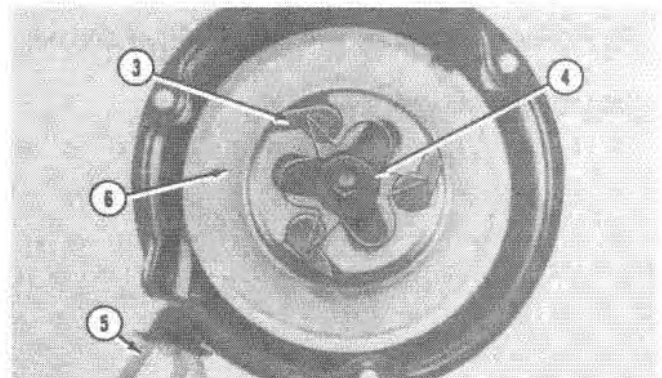
CAUTION: Recoil starter parts are under spring pressure. Wear safety glasses and use care during disassembly and assembly.

1. Press down on retainer cover and remove nut, lock washer and large washer.
2. Slowly lift off retainer cover.



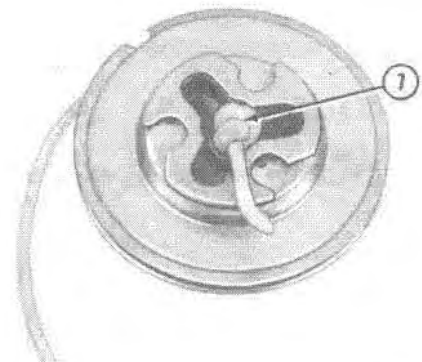
2A7-M23533 M22-2020C B 091081

3. Remove pawls and pawl springs.
4. Remove return spring, center spring and washer.
5. Untie knot in rope and release it.
6. Rotate recoil reel back and forth to release spring and slowly remove reel from housing.



2A7-M23534 M22-2020C C 121081

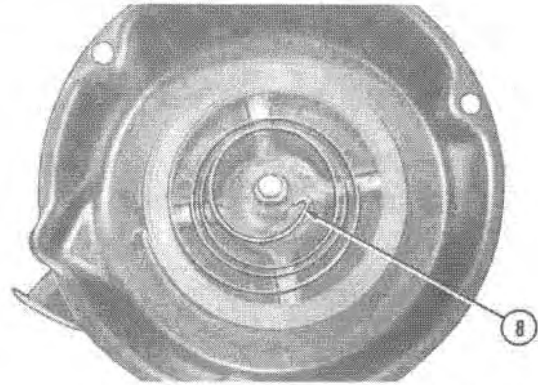
7. Pull on knotted end of rope to remove it.



2A7-M23535 M22-2020C D 121081

IMPORTANT: Inspect the recoil spring for damage. Do not remove it unless it must be replaced. Spring will unwind during removal.

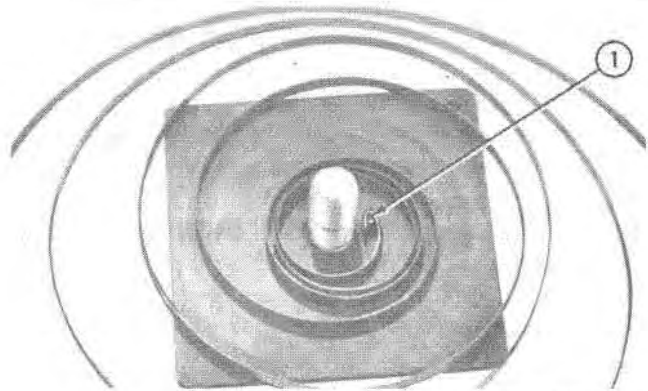
8. Use a long screwdriver to pry up on center of spring until it is free of housing.



2A7/M23536 M22/2020C E 121081

ASSEMBLE STARTER

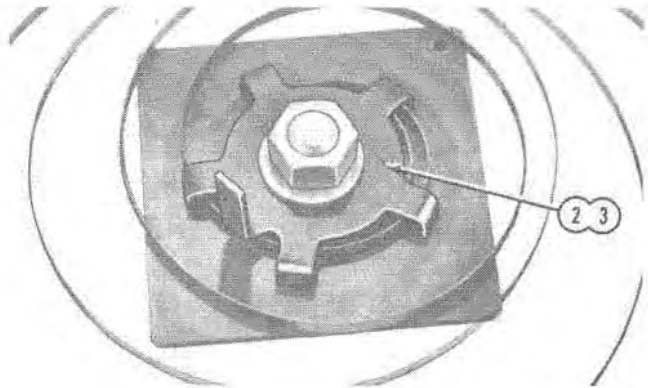
1. Set recoil spring on JDM-113 Starter Spring Winding Tool with inner bend hooked on pin.



2A7/M23537 M22/2020C F 121081

2. Set retainer over spring and install washer and nut.

3. Start rotating retainer clockwise.

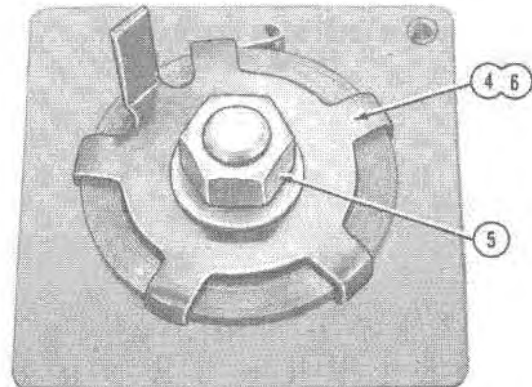


2A7/M23538 M22/2020C G 121081

4. Continue winding spring until it is completely gathered in the retainer. Then, release retainer and allow it to spin freely.

5. Remove nut and washer.

6. Carefully lift retainer (with spring encased) from Winding Tool Plate.

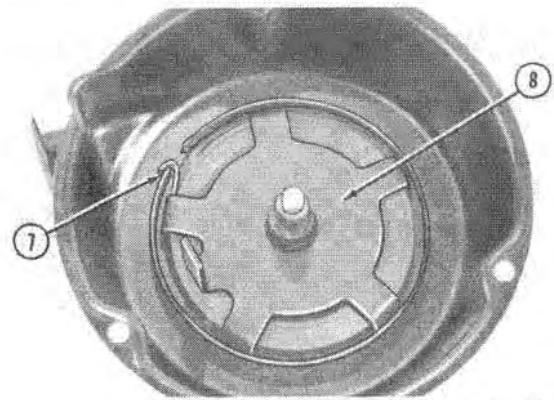


2A7/M23539 M22/2020C H 121081

Recoil Starter

7. Set recoil spring in housing and connect bent end to notch.

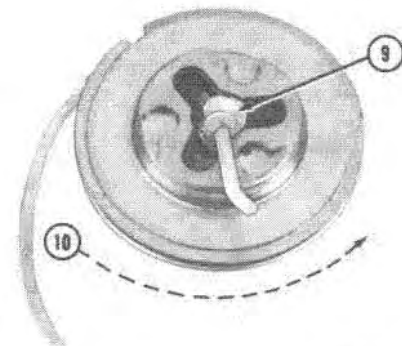
8. Hold spring down and remove retainer.



2A7:M23540 M22:2020C I 121081

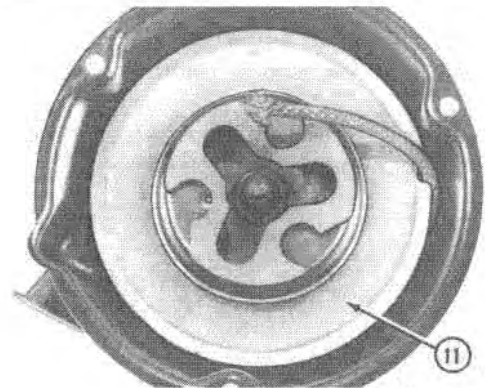
9. Tie a knot in one end of rope and guide the other end through hole in recoil reel until knot is seated.

10. Wind rope counterclockwise around recoil reel.



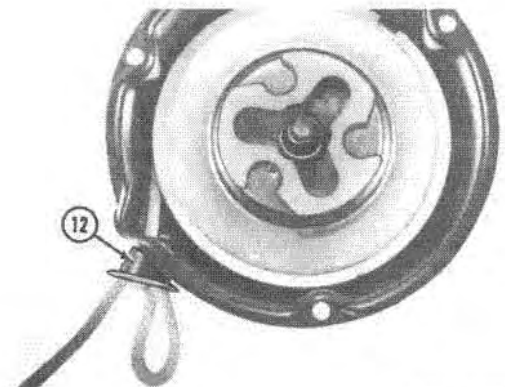
2A7:M23541 M22:2020C J 121081

11. Hold end of rope in notch and install recoil reel. Rotate reel back and forth until you feel it catch in recoil spring and fall into position.



2A7:M23542 M22:2020C K 121081

12. Rotate recoil at least one full turn counterclockwise. Then, guide rope through hole and tie a knot to hold rope in place.

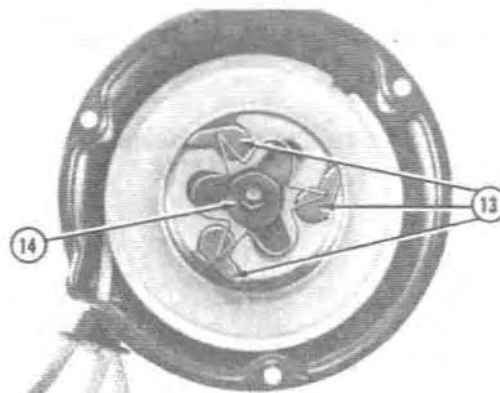


2A7:M23543 M22:2020C L 121081

Recoil Starter

13. Place starter pawls on reel and install pawl springs.

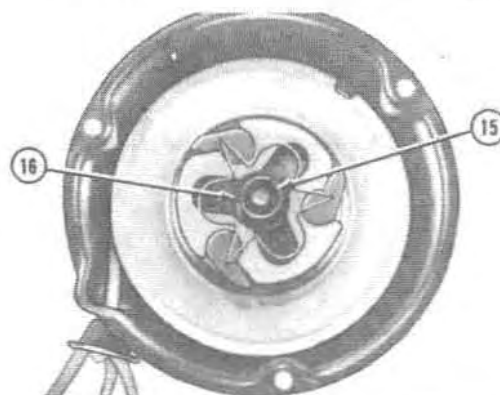
14. Install washer over center post.



2A7/M27544 M222010C M 121081

15. Set center spring over post.

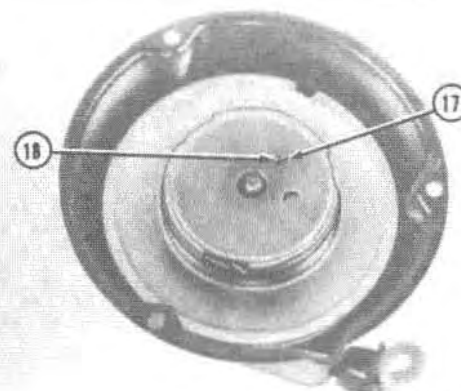
16. Set return spring over center spring and connect the straight end to a hole in the reel.



2A7/M25945 M222020C R 121081

17. Set spring cover in a position so that the notch shown aligns with the curved end of return spring.

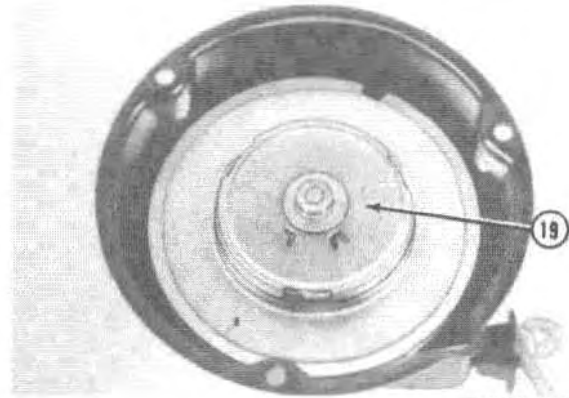
18. Use a wire or small screwdriver to connect the curved end of return spring in the notch.



2A7/M2546 M222010C D 121081

Recoil Starter

19. Do not press down. Carefully rotate the spring cover counterclockwise until notches align with starter pawls. Then, press down and install flat washer (dimpled side down) lock washer and nut. Tighten nut.



2AT:M21547 M22:3020C P 121081

INSTALL RECOIL STARTER

1. Install recoil starter.
2. Install oil injection pump to recoil starter beginning with Serial No. 190,001 - up.
3. Guide end of rope through rope guide and install handle. Release knot in rope.
4. Install oil injection pump control cable and oil lines to oil injection pump (Serial No. 190,001 - up).

2AT: M22:3020C Q 121081

Recoil Starter

ENGINE SPECIFICATIONS

Item	New Part Dimension	Wear Tolerance
Cylinder Bore	(68.005 to 68.025 mm) 2.6774 to 2.6781 in. .	(0.0939 mm) 0.0037 in.
Connecting Rod Small End	(20.003 to 20.014 mm) 0.7875 to 0.7880 in. .	(0.0483 mm) 0.0019 in.
Connecting Rod Side Clearance . . .	(0.4 to 0.5 mm) 0.0157 to 0.0197 in.	(0.3022 mm) 0.0119 in.
Crankshaft Runout	(0.05 mm) 0.002 in.	
Crankshaft End Play	(1.016 mm) 0.040 in.	
Piston at Skirt	(67.931 to 67.950 mm) 2.6744 to 2.6752 in. .	(0.1295 mm) 0.0051 in.
Piston Pin Bore	(15.999 to 16.005 mm) 0.6299 to 0.6301 in. .	(0.0813 mm) 0.0032 in.
Piston Pin Diameter	(15.994 to 16.000 mm) 0.6297 to 0.6299 in. .	(0.0406 mm) 0.0016 in.

2AF; M22-2025C A 121001

SPARK PLUG SPECIFICATION

Champion N-2 (AM52640)
Champion QN-2 (AM55044)

2AF; M22-2025C B 121001

TORQUE SPECIFICATIONS

Location	Torque
Crankcase	(22 N·m) 16 ft-lbs
Cylinder-to-Crankcase	(22 N·m) 16 ft-lbs
Cylinder Head	(22 N·m) 16 ft-lbs
Intake Manifold	(6 to 8 N·m) 4 to 6 ft-lbs
Flywheel to Crankshaft	(81 N·m) 60 ft-lbs
Fan Pulley Nut	(64 N·m) 47 ft-lbs
Spark Plug	(27 N·m) 20 ft-lbs
Carburetor Rubber Flange	(4.7 N·m) 3.5 ft-lbs
Engine Mount Bolts	(68 N·m) 50 ft-lbs

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CHOKE SYSTEM

The choke system consists of a non-replaceable starter jet (E) and choke plunger (A). This system eliminates the need for a choke plate in the carburetor bore.

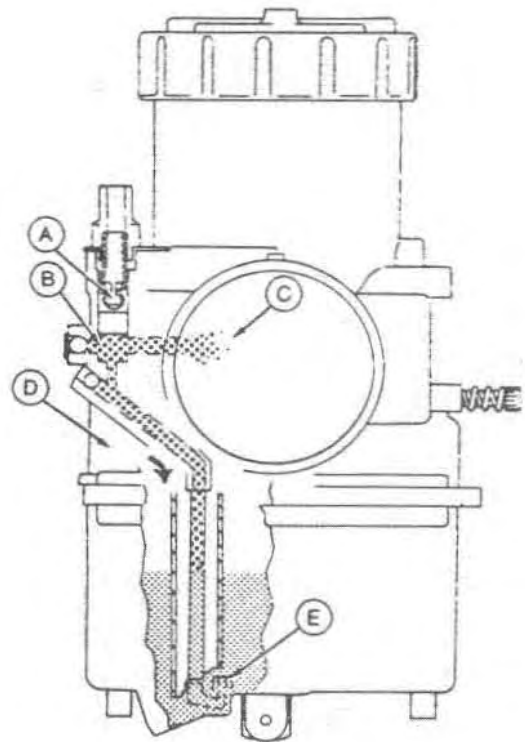
NOTE: The throttle valve must be closed for starting; otherwise, the fuel-air mixture will be too lean and will result in hard starting.

The system is opened and closed by the choke plunger (A). Moving the choke lever up lifts the choke plunger and opens the choke system.

Fuel is metered through the starter jet (E) and mixed with air in the emulsion tube. The air flow through the starter air intake creates a suction on the emulsion tube and draws the fuel-air mixture from the bowl into the chamber below the plunger. Here it is mixed with the air from the air intake and is then drawn into the engine.

A—Choke Plunger
B—Air
C—Fuel-Air Mixture

D—Atmospheric Air
E—Starter Jet



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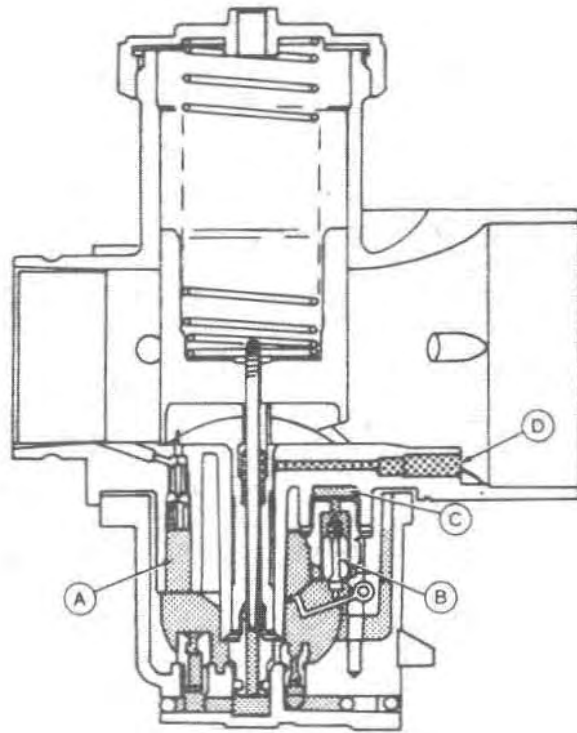
FLOAT SYSTEM

The float system consists of two independent floats and a needle valve. The system maintains fuel at a constant level in the float chamber.

A fuel level drop in the float chamber causes the floats and float arm to drop. Fuel under pressure from the fuel pump is forced around the needle valve (B) and into the float chamber.

As fuel in the fuel chamber approaches the correct level, the floats raise, contacting the float arm. The float arm moves the needle valve against the valve seat stopping the fuel flow into the float chamber.

Under operating conditions, the fuel level and floats position themselves so that inward flow of fuel to the carburetor float bowl is equal to the outward flow of fuel to the engine.



A—Fuel Level
B—Inlet Needle Valve

C—Fuel Inlet
D—Air

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PILOT SYSTEM (IDLE AND SLOW SPEED)

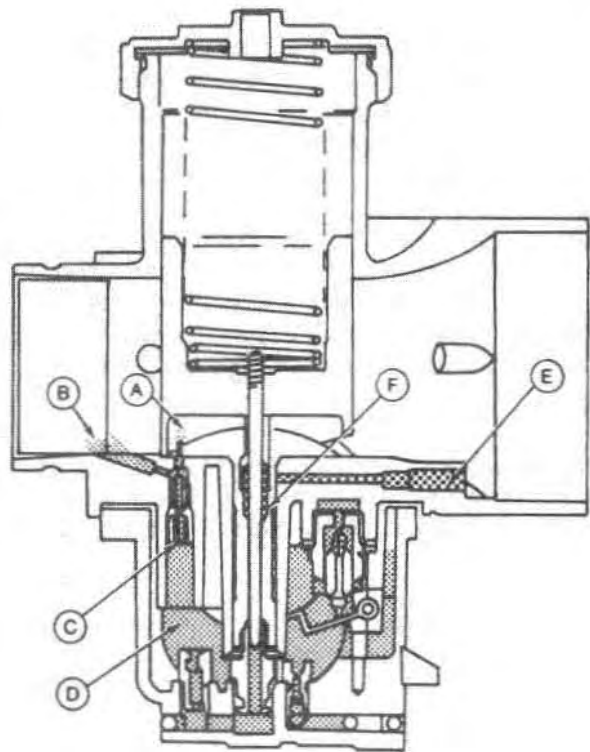
The pilot system consists of the pilot jet (C), air screw, pilot outlet (B), and pilot bypass (A). The ratio of fuel-air mixture for idling and slow speed is controlled by the pilot jet and air screw.

The system controls the fuel-air mixture from idle (or closed throttle position) until the throttle valve is opened sufficiently to allow the main system to function.

At idle speed the throttle valve is closed and the air velocity across the needle jet (F) is low. This low pressure is not enough to draw fuel from the main system.

Fuel during idle is supplied by the pilot outlet (B) and bypass (A). Fuel metered by the pilot jet (C) is mixed with air (E) from the air intake and bypass (B) before the fuel enters the carburetor bore.

As the throttle valve is opened slightly for low-speed operation, the pilot jet (C) cannot supply the required fuel. The fuel then enters the carburetor bore through the bypass (A) as well as the pilot jet (C).



A—Pilot Bypass
B—Pilot Outlet
C—Pilot Jet

D—Fuel
E—Air
F—Needle Jet

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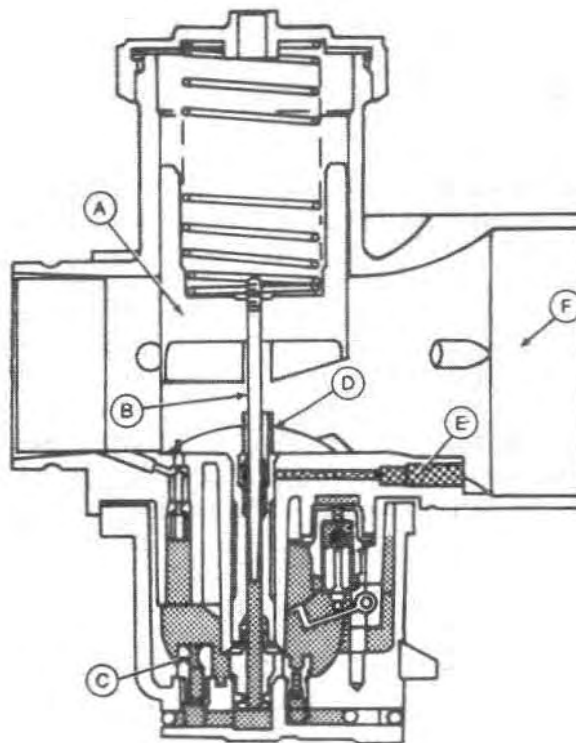
MAIN SYSTEM

The main system starts to function when the throttle valve (A) is opened about 1/4 of the way. Opening the throttle valve causes the jet needle (B) to move up. This increases air flow across the needle jet (D), which causes a sucking action to take place.

From 1/4 to 3/4 open throttle, the fuel enters the carburetor bore through the main jet (C) and is metered in the clearance between the needle jet (D) and jet needle (B). The fuel is atomized by the air of the air intake (E) and this mixture then mixes with the air coming through the venturi (F) before entering the engine.

During this operation, the cutaway (slant) of the throttle valve (A) controls the air flow across the needle jet (D), thereby regulating the amount of fuel that is drawn through the main jet.

When the throttle valve is fully opened for high speed operation, fuel is metered by the main jet and power jet.



A—Throttle Valve
B—Jet Needle
C—Main Jet

D—Needle Jet
E—Air
F—Venturi

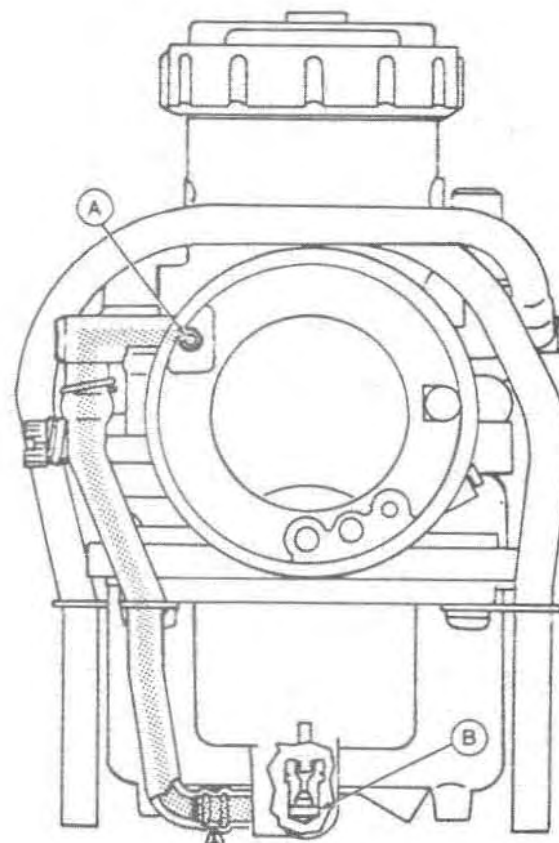
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POWER JET SYSTEM

The power jet system is similar to and works in conjunction with the main system. The power jet (B) system only flows fuel when there is enough air flow through the venturi to draw fuel from the system.

The power jet system starts to function at engine speeds of 5000 rpm and above. This gives better engine performance at high engine speeds and better fuel economy at lower engine speeds. When the power jet system is functioning, it supplies approximately 40 per cent of the fuel requirement while the main jet supplies 60 per cent.

The power jet stops feeding fuel at 1/2 throttle or 5000 rpm due to reduced air flow through the venturi.

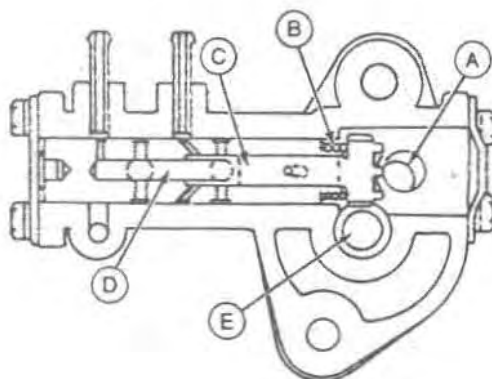


A—Outlet

B—Power Jet

7A8W2534 M27-5005A E 300981

OIL INJECTION PUMP



A—Control Shaft
B—Spring

C—Plunger

D—Differential Plunger

E—Drive Shaft

Fig. 8 - Oil Injection Pump

The oil injection pump consists of a drive shaft (E), a plunger (C), a differential plunger (D), a spring (B) and a control shaft with lever (A).

The pump drive shaft is driven by a gear that meshes with a gear on the engine crankshaft. Engine crankshaft rotation is transmitted directly to the oil pump drive shaft, which controls oil pump output, in direct proportion to engine rpm.

The other end of the drive shaft has a worm gear that meshes with a worm gear on the plunger. As the drive shaft turns, the plunger also turns, producing a pumping action (or strokes) simultaneously with rotation. The number of plunger strokes is determined by the drive shaft rotation speed.

The other factor that controls oil pump output is the length of the plunger stroke. The plunger stroke is controlled by the control shaft that contacts the end of the plunger cam. The plunger is in constant contact with the control shaft because of spring pressure against the plunger from the opposite end.

When the throttle lever is pressed, the cable connected to the control shaft lever, moves the control shaft increasing plunger stroke.

When the control shaft is turned from the minimum flow position (engine idle) to the maximum flow position (WOT), the plunger is allowed more travel, thereby pumping more oil. The plunger cam has two high points which allow two pumping cycles for each revolution of the plunger.

The plunger has a notch which connects alternately to the inlet port and the three discharge ports. When the notch aligns with the inlet port, oil is drawn into the pump. When the notch aligns with the discharge ports, the oil is discharged. Two of the discharge ports are connected to the intake manifold and the third port is connected to the engine crankcase for oiling the crankshaft center main bearing.

The pumping action that takes place in the annular area of the pump body is due to different diameters of the plunger and differential plunger.

The oil pump output is controlled to regulate the amount of oil to the carburetor fuel/air mixture so that proper lubrication is possible at all engine speeds and loads.

DIAGNOSE MALFUNCTIONS

Carburetor Too Rich

- Float Level incorrect.
- Dirt under inlet needle valve.
- Silencer restricted.
- Wrong main jet.
- Choke system adjusted incorrectly.
- Jet needle clip positioned incorrectly.
- Air jet restricted.

Carburetor Too Lean

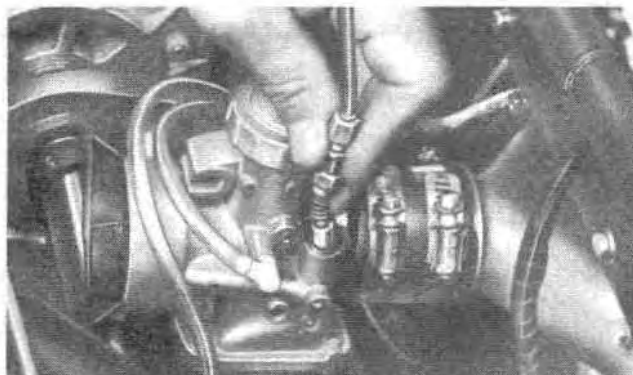
- In-line fuel filter plugged or restricted.
- Dirty fuel pick-up strainer in fuel tank.
- Fuel pump impulse line plugged.
- Hole in fuel pump impulse line.
- Jet needle clip positioned incorrectly.
- Wrong main jet.
- Faulty fuel pump.
- Pinched fuel lines.
- Hole in intake silencer boot.
- Head gasket leaking.
- Operating with air intake silencer removed.
- Air leakage at intake manifold gaskets.
- Air leakage at crankshaft seals or crankcase mating surfaces.
- Inlet needle valve restricted.

248; M22-300C S 051081

General Information

REMOVE CARBURETOR

1. Remove air silencer.
2. Disconnect fuel line from carburetor.
3. Remove choke plunger assembly.



ZAT.M2605R M22/3010C A 011081

4. Remove throttle valve assembly.
5. Remove carburetor.



ZAG.M2533B M22/3010A B 011081

DISASSEMBLE CARBURETOR

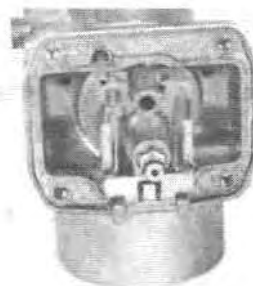
1. Remove vent lines and power jet line.
2. Remove idle screw and air screw.
3. Loosen screws on float bowl and drain fuel from float chamber.



CAUTION: Use care when draining fuel. Avoid fires due to smoking or careless maintenance practices.

ZAR.M243010A C 011081

4. Remove float chamber.

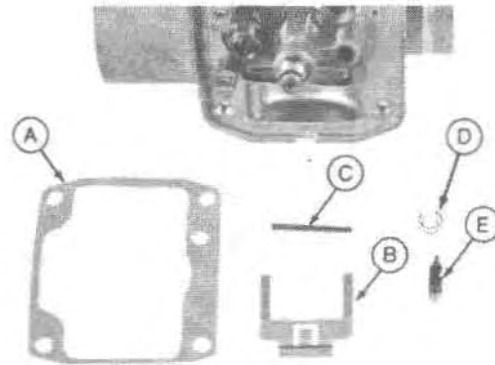


ZAR.M2533R M22/3010A D 011081

5. Remove float arm pin (C), float arm (B), and inlet needle valve (E).

A—Gasket
B—Float Arm
C—Float Arm Pin

D—Retainer
E—Inlet Needle Valve

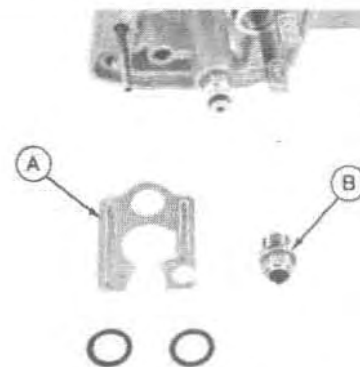


ZAB/M25340 M22/3010A E 011081

6. Remove inlet valve seat (B) and baffle (A).

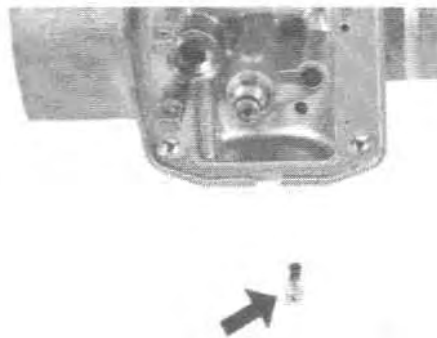
A—Baffle

B—Inlet Valve Seat



ZAB/M25341 M22/3010A F 011083

7. Remove pilot jet.



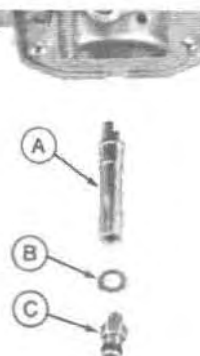
ZAB/M25342 M22/3010A G 011085

8. Remove needle jet.

9. Remove power jet, main jet and floats from float chamber.

A—Needle Jet
B—Washer

C—Needle Jet Holder



ZAB/M25343 M22/3010A H 011087

CLEAN CARBURETOR

IMPORTANT: Never clean jets or passages with small drills or wires.

1. Place carburetor parts in PT503 Cleaner or its equivalent. Do not put gaskets in cleaner.
2. Parts should remain in cleaner for 1 to 2 hours. Remove and rinse with solvent.
3. Dry parts with compressed air. Be sure all holes are open. DO NOT use rags or paper towels to dry parts. Lint may plug jets or passages.

NOTE: Rinse mixing chamber body and float chamber in hot water. This neutralizes the corrosive action of the cleaner on the aluminum.

2AR, MZZ3010A J 011061

INSPECT CARBURETOR

1. Check mixing chamber body and float chamber for cracks or damage.
2. Check all springs for damage or distortion.
3. Check throttle stop screw and air screw for seating surface damage or stripped threads.

NOTE: Main jet, power jet and pilot jet should be clean and shiny. Any abrasions may cause a lean fuel-air mixture and possible engine damage.

5. Check seating surface on inlet valve and seat for damage. Retainer should not bind movement of the inlet valve.

6. Check needle jet and jet needle for damage. Jet needle should slide freely within the needle jet.

7. Install floats in float chamber. Be sure floats are not binding on guides.

8. Be sure float arm and float pin are not binding.

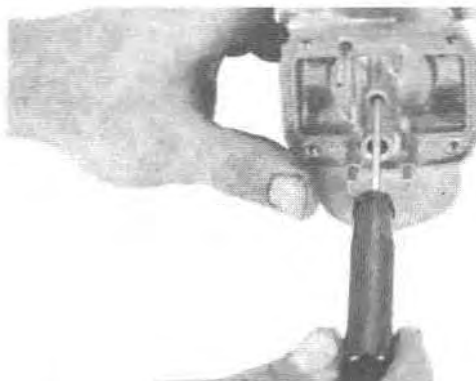
9. Check choke plunger for free movement in passage.

10. Place throttle valve in mixing chamber body. Move valve up and down to check for sticking or wear. Be sure guide pin in mixing chamber body is not broken off. This would allow throttle valve to rotate, causing erratic engine operation.

2AR, MZZ3010A J 011061

INSTALL PILOT JET

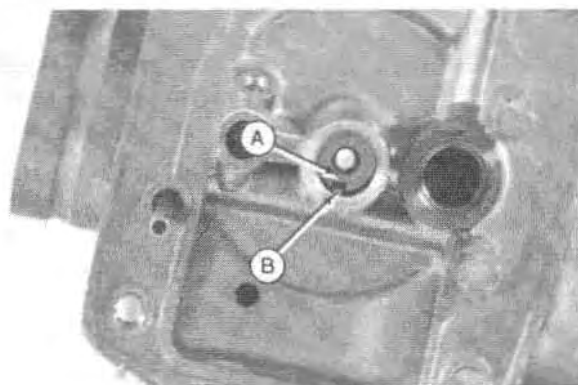
1. Install and tighten pilot jet.



ZAB/M25344 M22:3010A K 011081

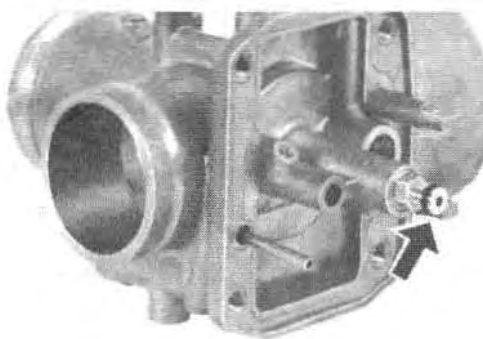
INSTALL NEEDLE JET

1. Install needle jet with notch of needle jet (A), aligned with pin (B) in bore.



ZAB/M25345 M22:3010A L 011081

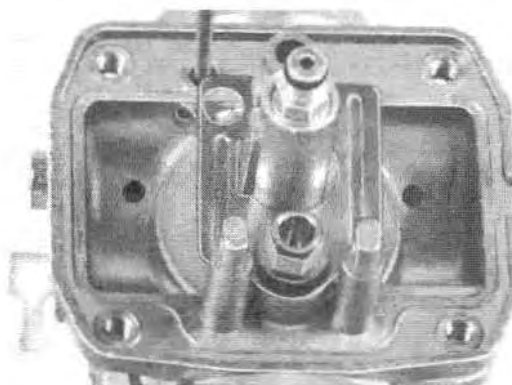
2. Secure needle jet with washer and needle jet holder. Use a NEW O-ring on the holder.



ZAB/M25346 M22:3010A M 011081

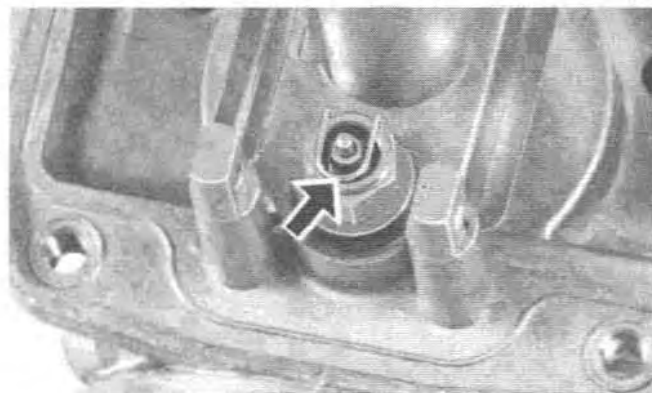
INSTALL NEEDLE VALVE AND FLOAT ARM

1. Install baffle plate and needle valve seat. There should be a gasket under and over the baffle plate. Tighten seat securely.



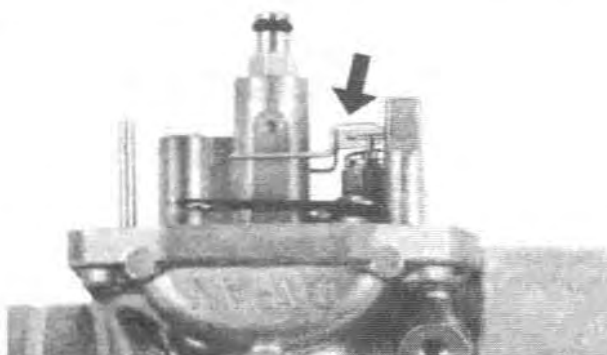
ZAB/M25347 M22:3010A N 011081

2. Install needle valve and spring retainer.



2AR:M2534E M22:3010A C 011081

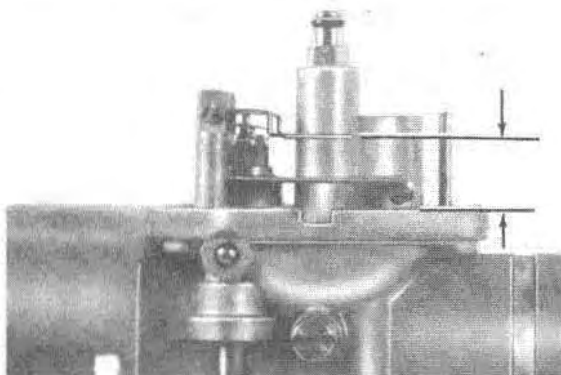
3. Install float arm and float arm pin. Legs on float arm should be as shown. Pin is installed from left to right.



2AR:M2534V M22:3010A P 011081

FLOAT LEVEL ADJUSTMENT

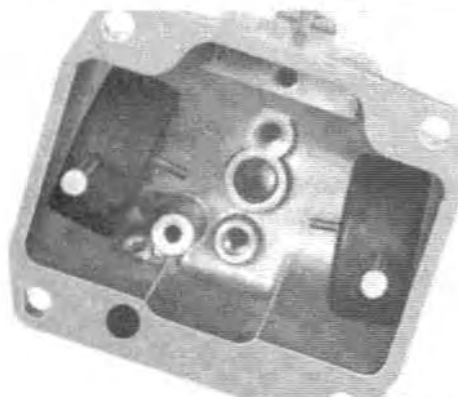
1. With carburetor inverted, the edge of the body should be parallel with the float arm.
2. If adjustment is necessary, bend only the actuating tab, not the float arm.



2AS:M2045B M22:3010A G 011081

INSTALL FLOATS

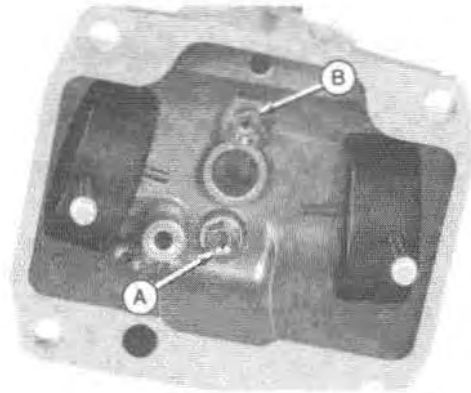
1. Install floats with pins on floats down and to the inside of the float chamber. Install plastic retainers on float pins.



2AR:M25350 M22:3010A H 011081

INSTALL MAIN JET AND POWER JET

2. Install main jet (A) and power jet (B) in float chamber.



2AR-M25551 M22-3010A S 011001

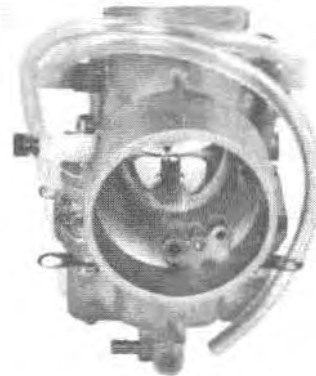
INSTALL AIR SCREW AND THROTTLE STOP SCREW

1. Install air screw with spring. Turn screw in until it just seats. Do not force it.
2. Back air screw out 1-1/2 turns.
3. Install throttle stop screw with spring. Turn screw in until it is flush with inside of bore.

2AR-M22-3010A T 011001

INSTALL FLOAT BOWL AND VENT LINES

1. Connect vent lines to carburetor.
2. Install gasket and float bowl on mixing chamber. Position clips and lines as shown.
3. Connect power jet line to carburetor.



2AR-M25552 M22-3010A U 011001

INSTALL CARBURETOR

1. Position carburetor in rubber mount and secure with clamp.

NOTE: Be sure carburetor with red dot on 1982 Models is installed on magneto side of engine.

2. Connect fuel line to carburetor.

2AR-M22-3010A V 011001

INSTALL THROTTLE VALVE

1. Install E-ring and plastic washer in correct groove of jet needle. Plastic washer goes between E-ring and throttle valve.
2. Guide throttle cable through cap, spring and slot in throttle valve.
3. Install plate between spring and throttle valve with tab on plate in slot of throttle valve.
4. Install cap on mixing chamber body.

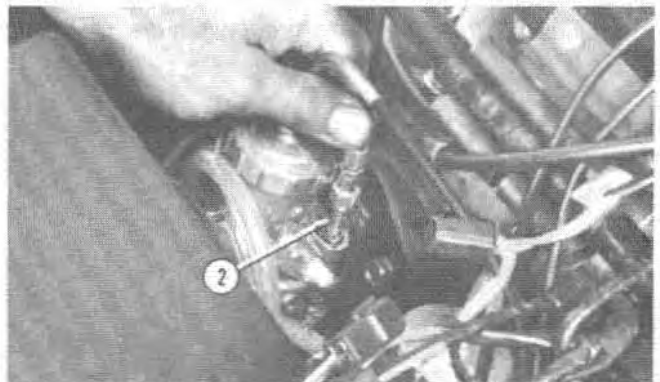


ZAR/M25513 M22:5010A W 011041

INSTALL CHOKE PLUNGER

1. Be sure choke lever is down (no choke position).
2. Guide choke cable through cap and spring. Hook end button in choke plunger and install assembly.

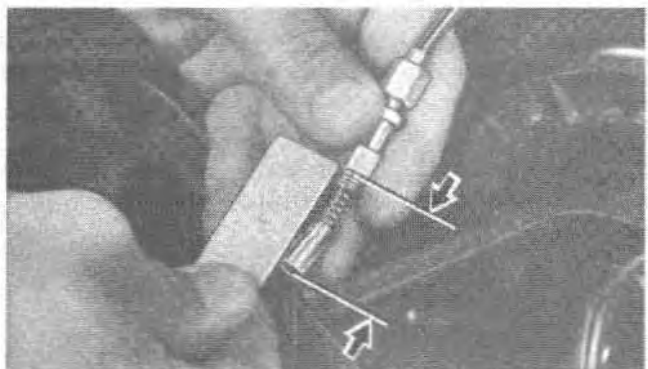
NOTE: Adjust the choke before installing the choke assembly.



ZAR/M25514 M22:5010A X 011041

ADJUST CHOKE PLUNGER

1. Leave choke lever down (no choke position).
2. Loosen jam nut securing adjusting sleeve to brass choke adapter.
3. Turn adjusting sleeve (in or out) to obtain a dimension of (32 to 33 mm) 1.25 to 1.30 in. from the bottom of choke plunger to bottom of brass choke adapter. Tighten jam nut against adapter.
4. Install washer and choke assembly in carburetor.



ZAT/M86062 M22:5010C Y 051041

5. Place the choke lever on instrument panel in the down position. Use a 0.762 mm (0.030-in.) feeler gauge to check clearance between choke lever and instrument panel. This is the minimum required clearance between the choke lever and instrument panel.



ZAR/M24939 M22:5010A Z 011041

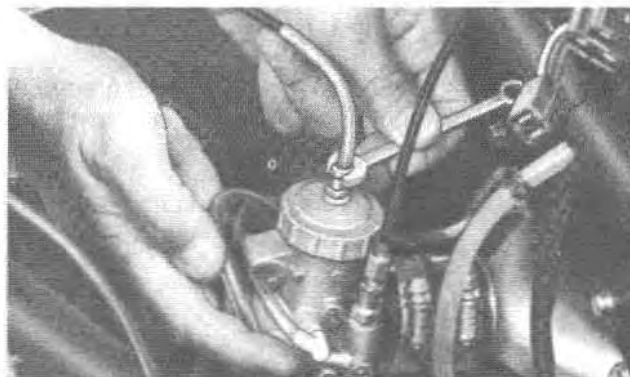
ADJUST THROTTLE CABLE

IMPORTANT: Oil injection pump must be synchronized with carburetor throttle valve. (Serial No. 190,001-up).

1. Lock throttle lever against handgrip with a strong rubber band or clamp.
2. Place your finger in the carburetor throat. Loosen jam nut and turn adjusting sleeve until the back side of throttle valve is flush with the bore. Tighten jam nut.

NOTE: No part of the throttle valve should restrict air flow through the carburetor throat when the throttle valve is in the wide open position.

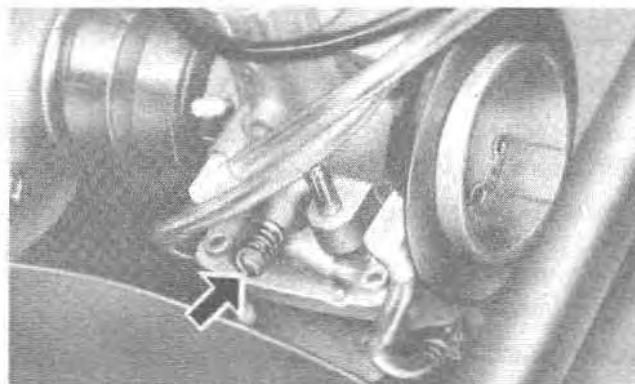
3. Remove rubber band or clamp from throttle lever. This allows throttle valve to fully seat in bore.



2A7/M26064 M22/3010C AA 051081

4. Turn idle adjusting screw in (clockwise) until the screw contacts throttle valve. Turn screw clockwise three additional turns. This gives preliminary idle speed.

5. Look into carburetor throat slowly compress the throttle lever on the handgrip. Throttle valve should begin to rise. If not, repeat Steps 1 through 4.

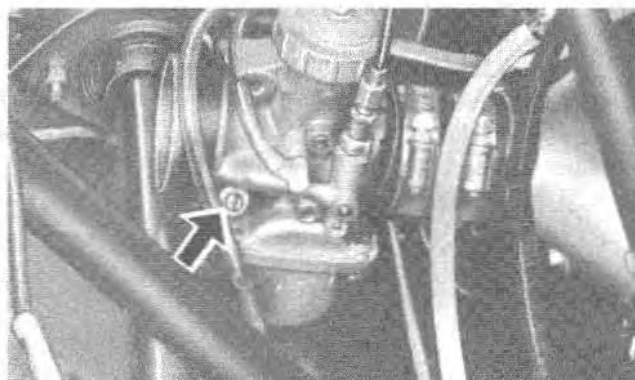


2A7/M26065 M22/3010C AB 051081

6. Turn air screw clockwise (in) until a slight seating resistance is felt.

7. Back air screw out (counterclockwise 1-1/2 turns).

IMPORTANT: Lubricate throttle cable once each season with LPS or WD-40. Hold the throttle lever against the handgrip and allow lubricant to run down cable. DO NOT use engine oil or silicon spray. These lubricants may destroy the throttle cable or cause cable to stick in cold temperatures.



2A7/M26066 M22/3010C AC 051081

SET ENGINE IDLE SPEED

1. Install air intake silencer and run engine until operating temperature is obtained.

IMPORTANT: DO NOT use the air screw at any time to set engine idle speed. Air screw should be adjusted as explained in Steps 6 and 7.

2A7; M22-3010C AB 051081

CHECK CHOKE ADJUSTMENT

1. After engine is warmed up and idle speed is correct, check choke adjustment.
2. Flip choke lever up to the first position and the engine should stop. This indicates the choke is operating properly.
3. Repeat choke adjustment if necessary.

2A7; M22-3010C AE 051081

CARBURETOR RECOMMENDATIONS FOR ALTITUDE AND TEMPERATURE

Temperature	Component	Sea Level to 4000 ft. (1 219 m) (Factory Installed)	4000 ft. (1 219 m) to 6000 ft. (1 829 m)	6000 ft. (1 829 m) and above
Below 0°F (−18°C)	Main Jet	210	200	180
Above 0°F (−18°C)	Main Jet	200*	190	170
	Power Jet	170*	170	170
	Jet Needle	6F27-3**	6F27-3**	6F27-3**
	Needle Jet	159-Q0	159-Q0	159-Q0
	Throttle Valve	3.0	3.0	3.0
	Pilot Jet	25	25	25
All Temperatures	Air Screw	1-1/2 Turns Open	1-1/2 Turns Open	1-1/2 Turns Open
	Idle Speed	2400-2700 rpm	2600-3000 rpm	2600-3000 rpm

*Factory

**Example 6F27-3. The last number (3) indicates E-ring position on the jet needle, that is 3rd groove down from the top.

2A7; M22-3010C AF 051081

TEST OIL INJECTION PUMP

1. Disconnect the in-line fuel filter from the fuel line. Plug fuel line to prevent leakage.

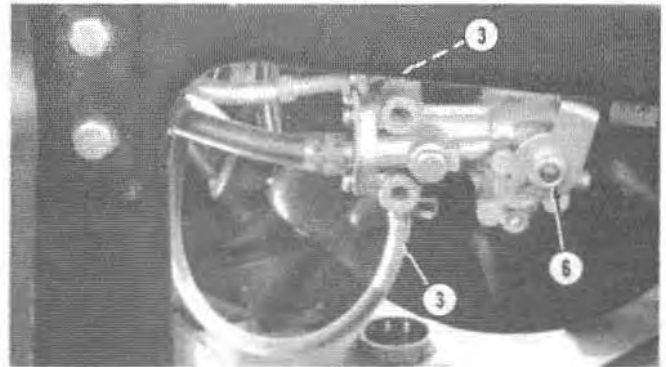


CAUTION: When disconnecting in-line filter, avoid fires due to smoking or careless maintenance practices.

2. Connect auxilry fuel tank (with 50:1 pre-mix fuel) to the in-line filter.

2A7; M22; 9013C A 051091

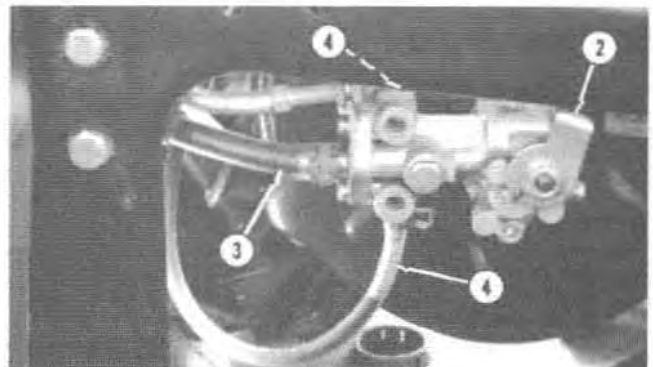
3. Disconnect oil pump output lines at pump.
4. Install separate oil lines to each outlet and place end of each in a separate container.
5. Start and run engine at 3000 rpm.
6. Hold pump lever in the WIDE OPEN POSITION. The output from each port should be 2.25 to 2.75 cc per minute. Replace pump if output is below these specifications.
7. Shut-off engine.
8. Connect lines to pump discharge ports.
9. Remove auxiliary fuel tank and connect in-line filter.



2A7; M24362 M22; 9013C B 051081

REMOVE OIL INJECTION PUMP

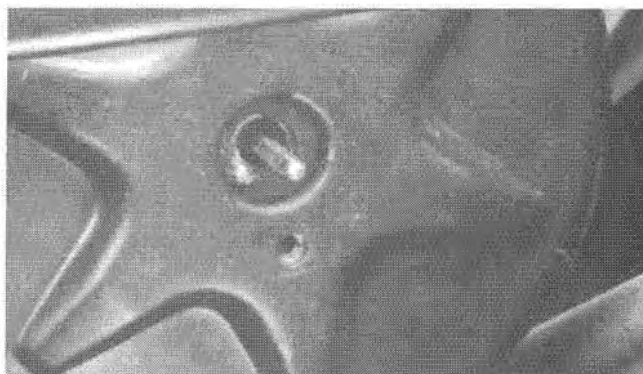
1. Remove muffler air duct and fan cover.
2. Remove oil injection pump control cable from pump.
3. Remove inlet oil line from pump and plug line to prevent leakage.
4. Remove discharge port oil lines from pump.
5. Remove pump from recoil starter. Remove pump drive shaft.



2A7; M24363 M22; 9013C C 051081

INSTALL OIL INJECTION PUMP

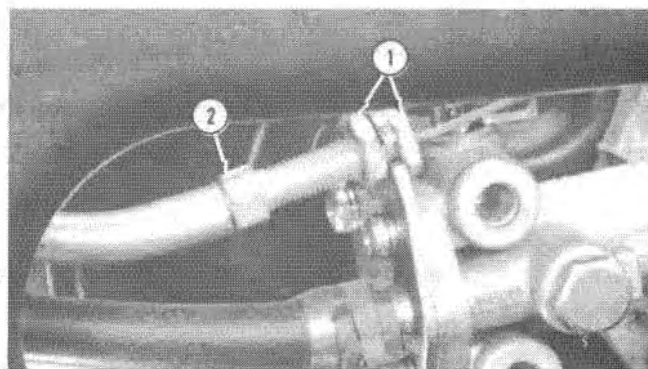
1. Coat drive shaft with AT30408 high temperature grease and install in drive hub.
2. Install oil injection pump on recoil starter.
3. Install inlet oil line and discharge port oil lines to pump.
4. Install control cable to pump control lever. Do not install muffler air duct and fan cover until control cable has been adjusted.



2A7/M29364 M22/3015C D 051081

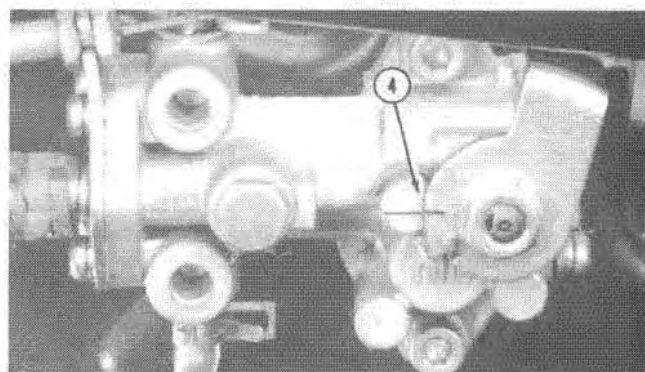
ADJUST CONTROL CABLE

1. Loosen the two jam nuts securing the oil injection pump control cable adjusting sleeve.
2. Back sleeve out to tighten cable or turn into loosen cable. Cable should have slight free-play; it should not be stretched tight.
3. Press the throttle lever on the handgrip and observe throttle valve and oil injection pump control lever. The throttle valve and lever should all start to move at exactly the same time.



2A7/M29365 M22/3015C E 051081

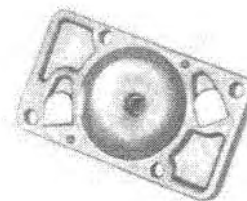
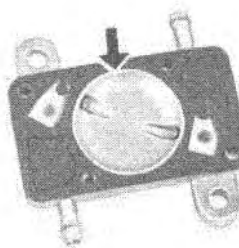
4. When adjustment is correct, marks will align. Tighten the jam nuts securing the oil injection pump control cable adjustment sleeve.
5. Install air duct, fan cover and muffler.



2A7/M29366 M22/3015C F 051081

FUEL PUMP, FUEL TANK, SCREEN AND IN-LINE FUEL FILTER**FUEL PUMP**

1. The fuel pump is non-serviceable.
2. To check fuel pump, remove fuel line from pump to carburetor at the carburetor.
3. With ignition off, pull recoil start handle and check for fuel flow from the line.
4. If fuel flows from line, pump is satisfactory; if not, disassemble pump and check diaphragm. Clean the pump and be sure diaphragm is not cracked or wrinkled. If pump does not function after cleaning, replace it.



2A7;M22695 M223020C A 051081

FUEL TANK

1. Disconnect fuel line. Drain tank.



CAUTION: Use care when draining fuel. Avoid fires due to smoking or careless maintenance practices.

2. Remove seat and tank hold-down clips. Slide tank rearward to remove.
3. Tank can be cleaned with solvent and compressed air.

2A8; M22-2070A C 011081

SCREEN

1. Disconnect fuel line from tank fitting. Remove fitting with pickup line from tank.
2. Remove screen from end of line.
3. Clean screen with solvent and compressed air. Replace screen if it is damaged.
4. Replace gasket on fuel tank fitting.



2A6/M22694 M22:3028A © 011081

IN-LINE FUEL FILTER

1. Change the filter annually.

2A7: M22:3028C © 051081

Section 40 ELECTRICAL SYSTEM

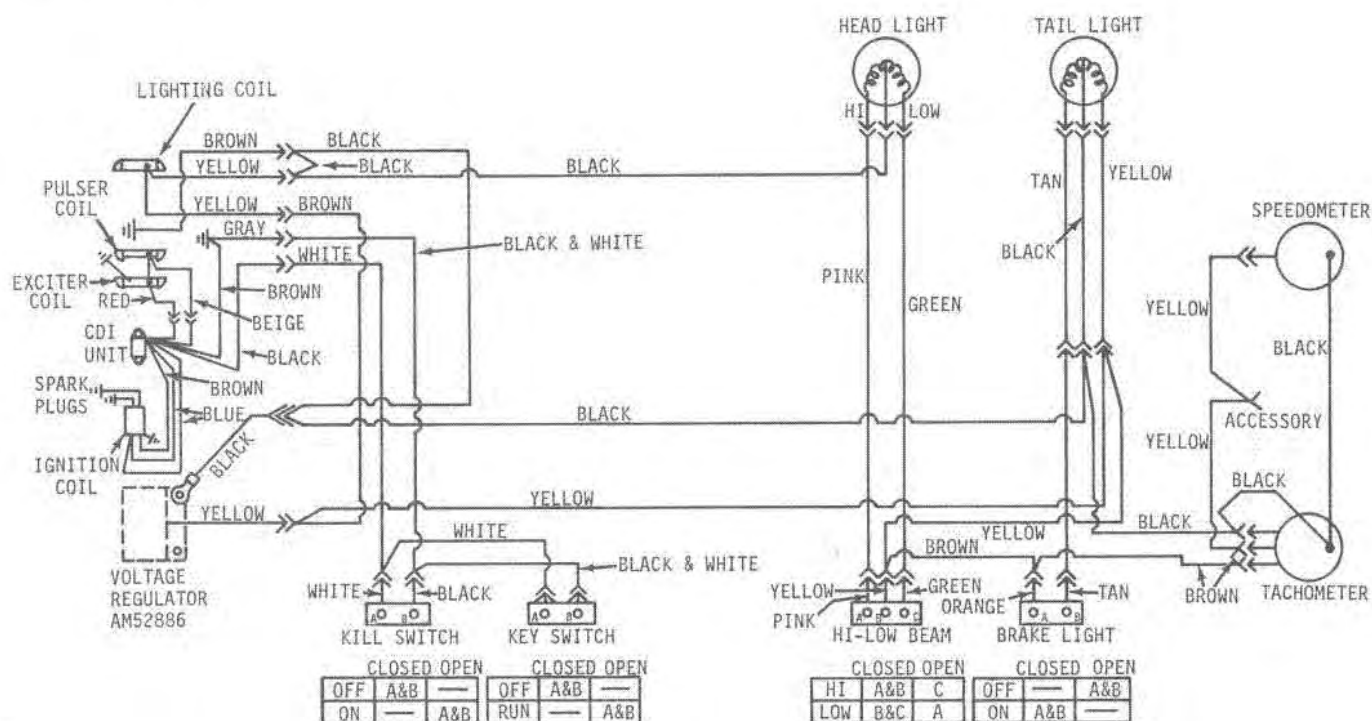
Group 5 GENERAL INFORMATION

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PRINCIPLE OF OPERATION

Electrical System



M25671

Fig. 1-Electrical System

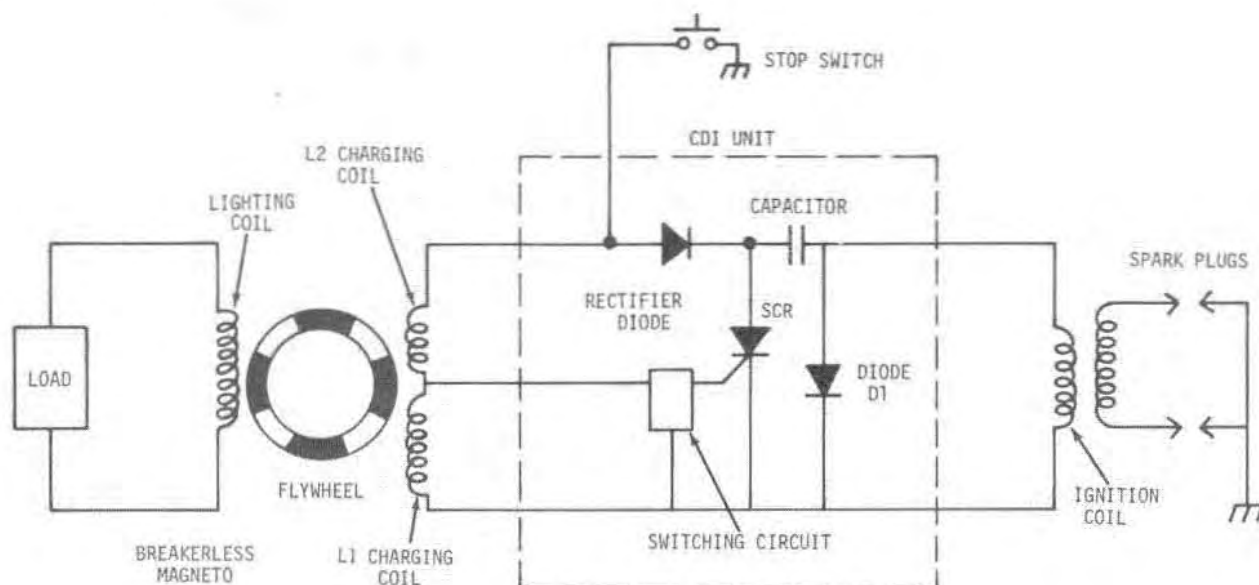
The electrical system, Fig. 1, contains a flywheel alternator to provide power for the lighting system and a voltage regulator which limits the average AC voltage, allowing only the voltage needed in the system at a given time.

The lights are automatically "ON" whenever the engine is running. A brake light switch turns the brake light "ON" when the brakes are applied.

Electric Start (Optional Equipment)

The optional electric start kit is discussed in Group 20.

Ignition System



M20697

Fig. 2-Capacitor Discharge Ignition

The Capacitor Discharge Ignition (CDI), Fig. 2, features a breakerless magneto, two capacitor charging coils, a CDI unit and one ignition coil.

As the four-pole-magnet-flywheel rotates, the magnets within the flywheel rotate past the capacitor charging coils, generating AC current within the coils. The charging coils also supply two ignition signals per revolution to the switching circuit in the CDI unit.

The alternating current from the charging coils passes through a diode in the CDI unit which acts as a 1/2 wave rectifier to change the AC current to DC current to charge the capacitor.

When the capacitor is fully charged, a signal from the charging coils to the switching circuit triggers the gate in the SCR (Silicon Controlled Rectifier) allowing the energy stored in the capacitor to be released to the ignition coil.

The ignition coil "steps-up" the electrical energy to a level high enough to fire the spark plugs.

The DI diode in the CDI unit is connected in parallel with the primary winding of the ignition coil to prolong arc duration time as the spark plugs fire.

Both spark plugs fire simultaneously.

TESTING

Instructions are provided in each group for testing the components. The tests isolate the problem in the lighting or ignition systems.

High quality test equipment is a must for accurate diagnosis. Always follow the procedures outlined by the equipment manufacturer to supplement instructions contained in this manual.

NOTE: Because there are many manufacturers of test equipment, it is important to follow the manufacturer's recommendations if the procedures in this manual should contradict those of the manufacturer.

DIAGNOSING MALFUNCTIONS

Lighting System

Lights Will Not Light

- Electric connections loose or wires damaged.
- Alternator faulty.
- Bulbs burned out.
- Voltage regulator faulty.

Brake Light Will Not Light

- Brake light switch faulty.
- Electrical connections loose or wires damaged.
- Bulb burned out.

Bulbs Burn Out Often

- Wrong type bulbs used.
- Voltage regulator faulty.

Lights Too Bright or Too Dim

- Voltage regulator faulty.
- Defective alternator.

Ignition System

Engine Hard To Start

- Spark plugs fouled or defective.
- Engine not timed properly.
- Electrical connections loose or corroded.

Engine Misfires

- Spark plugs fouled or defective.
- Electrical connections loose or corroded.
- Engine not timed properly.

Engine Overheating

- Engine not timed properly.

Engine Kicks Back and Backfires

- Engine not timed properly.

Group 10

CAPACITOR DISCHARGE IGNITION (CDI)

TESTING CAPACITOR DISCHARGE IGNITION

CAUTION: Capacitor discharge ignition systems can produce injurious electrical shock. Always stop engine before touching or working on any ignition components. DO NOT hold spark plugs, leads or connectors in your hand to check for spark.

IMPORTANT: Never use a 12-volt test light on CDI or the system will be destroyed.

Before Testing:

1. Make sure all connections are clean and tight.
2. Check all wiring for damage.
3. Install new spark plugs.
4. Read and understand all test procedures.
5. Perform all tests in sequence.
6. Test ignition and kill switches before performing tests on ignition. They must be functioning properly.

Test #1 (Coil Output)

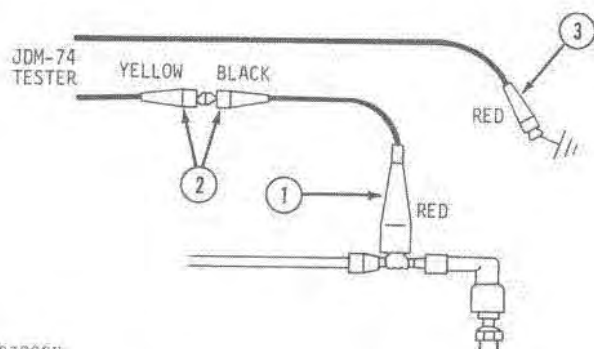


Fig. 1-Connections for Test #1

1. Connect test adaptor (red end) to either spark plug cable (as close to plug as shown, Fig. 1).
2. Connect JDM-74 Tester yellow lead to Test Adaptor (black end).
3. Connect JDM-74 Tester red lead to ground.

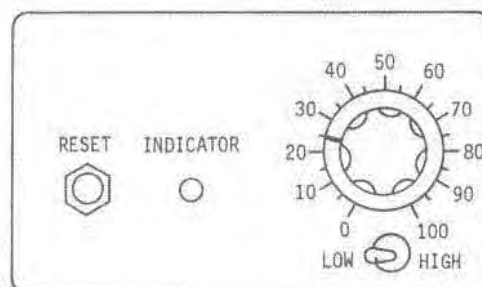


Fig. 2-Procedure for Test #1

4. Set tester for "LOW" range.
5. Turn tester dial to "25."
6. Turn key switch "ON" and place emergency stop switch in center position.
7. Crank engine with starter rope and observe tester indicator light.

NOTE: If engine starts, allow it to idle while observing indicator. Then, shut engine off.

8. Push reset button and repeat Step 6 twice.
9. Repeat procedure on remaining spark plug.

Test Results

- *Indicator lights on both spark plugs.
Ignition system is OK. Remove test leads and check for other causes.
- *Indicator does not light on one or both spark plugs.
Remove test leads and proceed to Test #2.

Test #2 (CDI Unit Output)

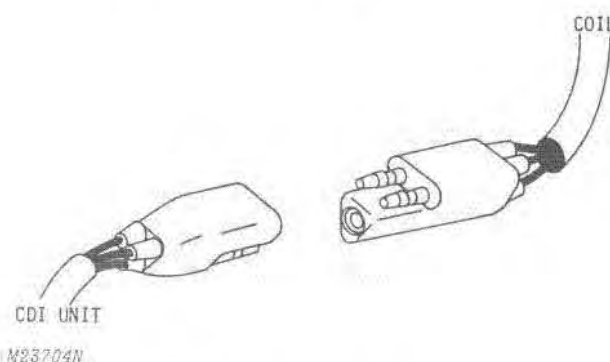


Fig. 3-Preparation for Test #2

1. Separate three-wire connector between coil and CDI unit, Fig. 3.

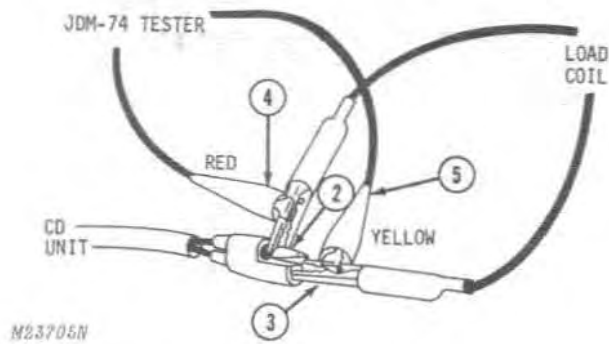


Fig. 4-Connections for Test #2

2. Connect either load coil lead to male terminal (brown lead) on CDI end of three-wire connector, Fig. 4.
3. Connect remaining load coil lead to both female terminals (blue leads). Make sure contact is good on both terminals.
4. Connect JDM-74 Tester red lead to load coil lead on male terminal (brown lead).
5. Connect JDM-74 Tester yellow lead to load coil lead on female terminal (blue lead).

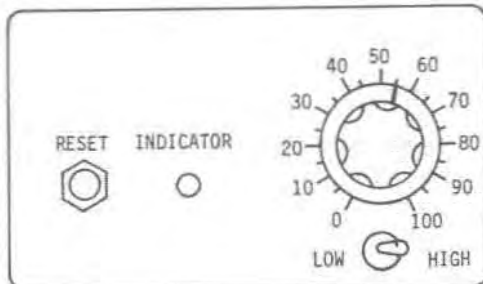


Fig. 5-Procedure for Test #2

6. Set tester for "HIGH" range.
7. Turn dial to "55."
8. Turn key switch "ON" and place emergency stop switch in center position.
9. Crank engine with starter rope and observe indicator.
10. Push reset button and repeat Step 8 twice.

Test Results

- * Indicator lights.
Remove test leads and replace coil.
- * Indicator does not light.
Remove test leads, reconnect three-wire connector and proceed to Test #3.

Test #3 (Exciter Coil)

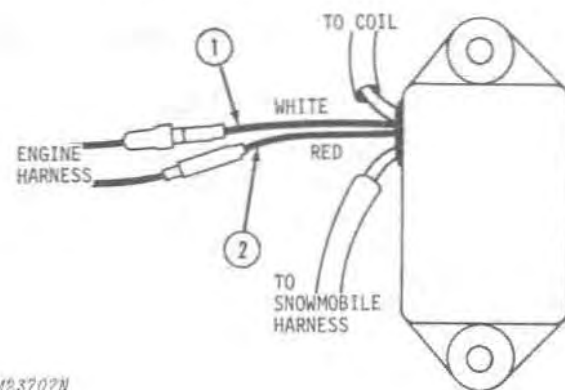


Fig. 6-Preparation for Test #3

1. Disconnect white CD lead from engine harness.
2. Disconnect red CD lead from engine harness.

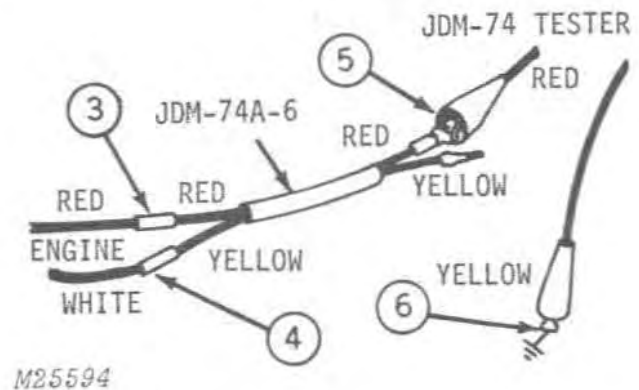


Fig. 7-Connections for Test #3

3. Connect JDM-74A-6 Test Harness red lead to engine harness red lead.
4. Connect JDM-74A-6 Test Harness yellow lead to engine harness white lead.
5. Connect JDM-74 Tester red lead to JDM-74A-6 test harness yellow lead.
6. Connect JDM-74 Tester yellow lead to engine ground.

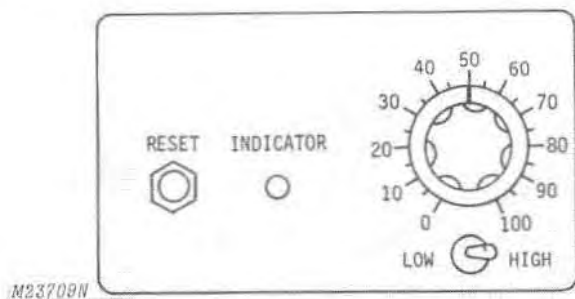


Fig. 8-Procedure for Test #3

7. Set tester for "HIGH" range.
8. Turn dial to "50."
9. Crank engine with starter rope and observe indicator.
10. Push reset button and repeat Step 9 twice.

Test Results

- * Indicator lights.
Proceed to Test #4.
- * Indicator does not light.
Remove test leads and replace exciter coil.

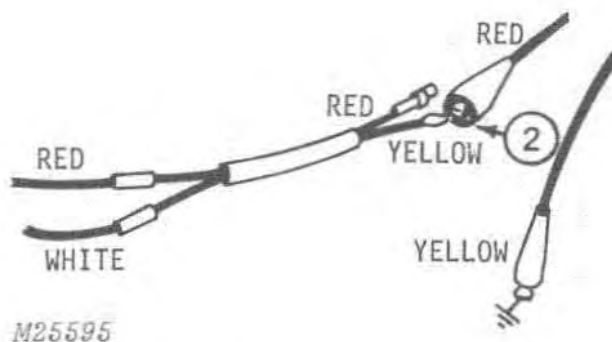
Test #4 (Pulser Coil)

Fig. 9-Connections for Test #4

1. Disconnect JDM-74 Tester red lead from JDM-74A-6 test harness red lead.
2. Connect JDM-74 Tester red lead to JDM-74A-6 test harness yellow lead.

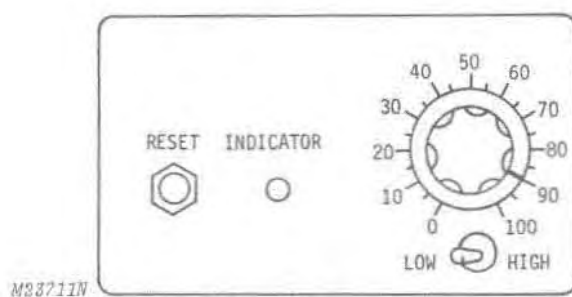


Fig. 10-Procedure for Test #4

3. Set tester for "HIGH" range.
4. Turn dial to "50."
5. Crank engine with starter rope and observe indicator.
6. Push reset button and repeat Step 5 twice.

Test Results

- * Indicator lights.
Remove test leads and replace CD unit.
- * Indicator does not light.
Remove test leads and replace pulser coil.

REMOVING FLYWHEEL AND STATOR

1. Remove muffler.
2. Remove air intake duct and fan cover.

NOTE: Beginning with Serial No. 190,001-up, remove oil injection pump. See Section 30, Group 15.

3. Disconnect spark plug leads.



Fig. 11-Removing Recoil Starter

4. Remove recoil starter, Fig. 11. Set starter in tunnel. DO NOT remove rope.

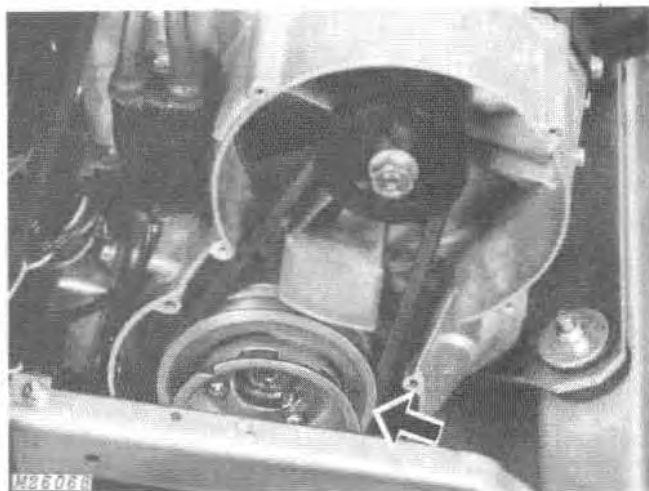


Fig. 12-Removing Starter Pulley and Fan Pulley

5. Remove starter pulley and fan belt pulley, Fig. 12.



Fig. 13-Removing Harness Clamp

6. Remove harness clamp, Fig. 13.

7. Remove screws securing engine shroud to fan housing.

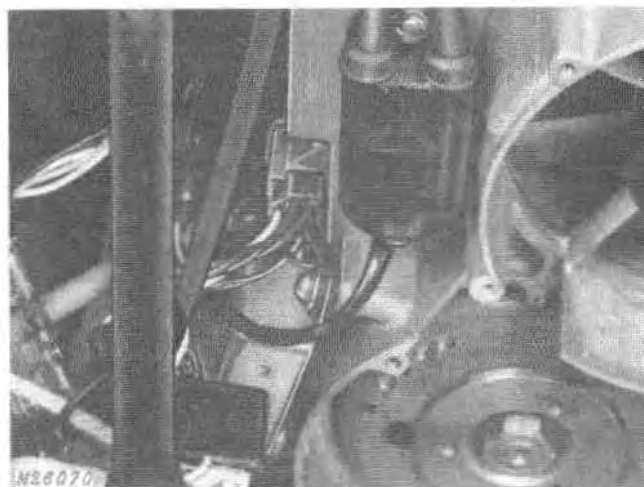
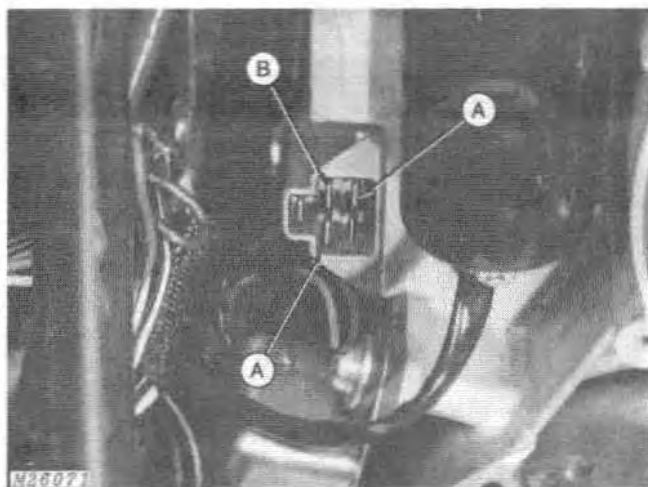


Fig. 14-Disconnecting Harness

8. Disconnect wiring harness connector, Fig. 14.



A—Yellow

B—Brown

Fig. 15-Removing Wiring

9. Remove two yellow leads and one brown lead from connector, Fig. 15. Mark their location for reassembly.

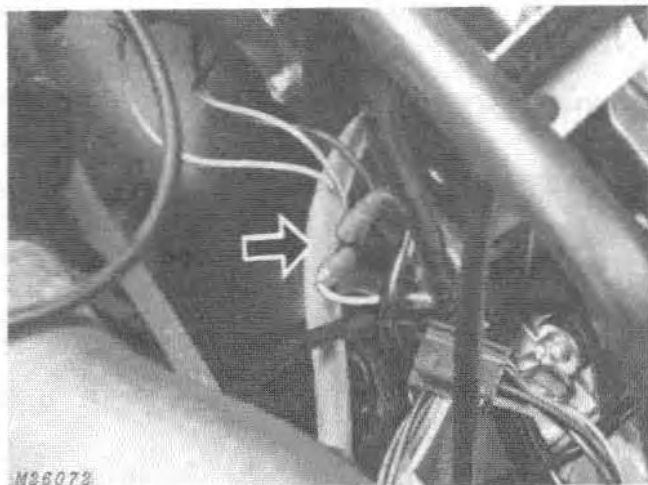


Fig. 16-Disconnecting Wiring

10. Disconnect red lead and white lead, Fig. 16.

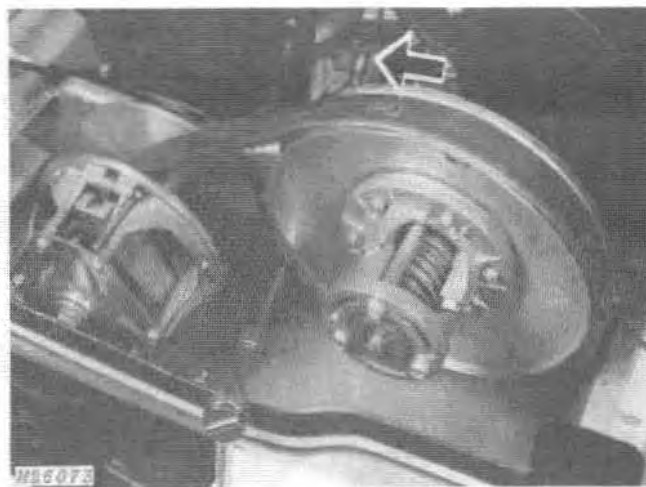
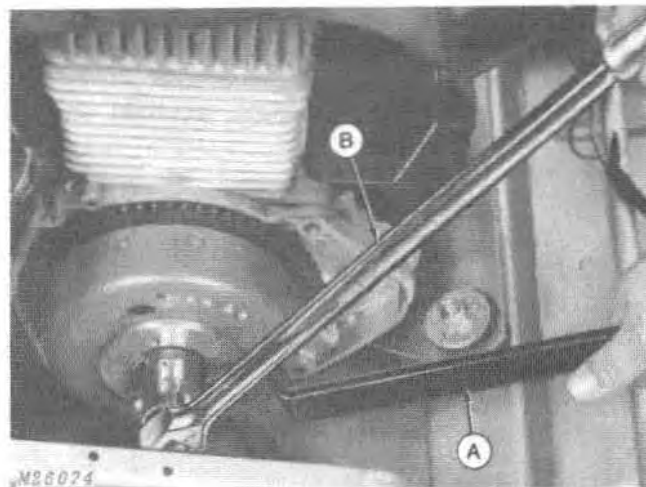


Fig. 17-Removing Fan Housing

11. Remove nuts from backside of fan housing. Use a long extension to remove the lower rear nut, Fig. 17. Remove upper rear nut with a wrench.

12. Remove flywheel housing.

13. Bend up tangs on flywheel lock washer.



A—JDM-64-1 Flywheel Holding Tool

B—Breaker Bar

Fig. 18-Flywheel Holding Tool

14. Use JDM-64-1 Flywheel Holding Tool (A), Fig. 18. Remove flywheel nut and lock washer.

NOTE: Use cap screws from starter pulley to install JDM-64-1 Flywheel Holding Tool. Modify JDM-64-1 Flywheel Holding Tool by drilling out holes to 3/8 inch (9.5 mm). Elongate holes to fit flywheel.

REMOVING FLYWHEEL AND STATOR—Continued



Fig. 19-Removing Flywheel

15. Remove flywheel with an air or electric impact wrench and JDM-9 Puller, Fig. 19.

NOTE: DO NOT strike puller bolt with hammer. Strike flywheel with plastic or wood mallet in line with flywheel key.

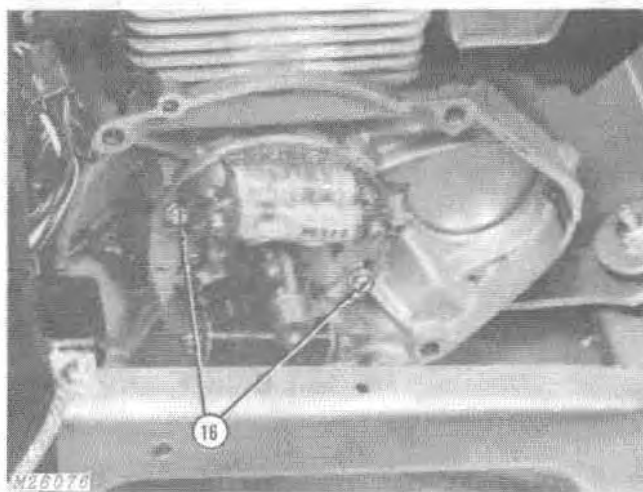


Fig. 20-Removing Stator

16. Remove stator screws, Fig. 20. Pull leads and grommet through crankcase.

INSTALLING STATOR AND FLYWHEEL (TIME IGNITION)

1. Guide stator leads through grommet and set against crankcase, Fig. 21.

2. Align mark on stator with top of ridge on crankcase. (Time Ignition).

3. Tighten stator screws.

4. Install flywheel key in keyway on crankshaft.

5. Install flywheel, lock washer and nut.

NOTE: Lock washer has a tang to engage keyway.

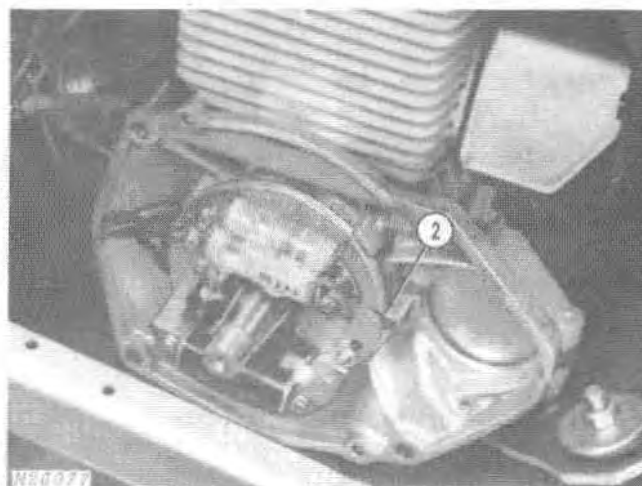
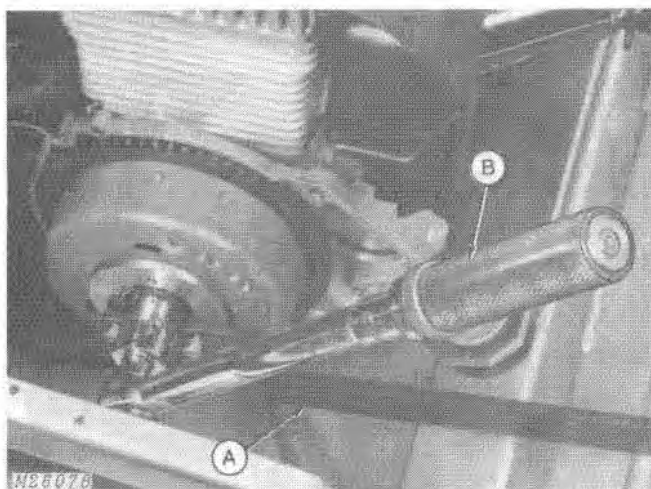


Fig. 21-Installing Stator and Time Ignition



A—JDM-64-1 Flywheel Holding Tool B—Torque Wrench

Fig. 22-Installing Flywheel

6. Hold flywheel with JDM-64-1 Flywheel Holding Tool (A), Fig. 22, and tighten flywheel nut to 60 ft-lbs (81 N·m) torque.

7. Bend tabs on lock washer to secure nut.

8. Install flywheel housing.

9. Install three engine shroud screws.



Fig. 23-Installing Harness Connector

10. Install engine wiring harness clamp, Fig. 23.

11. Connect red lead and white lead.

12. Install two yellow leads and one brown lead in connector as marked when removed.

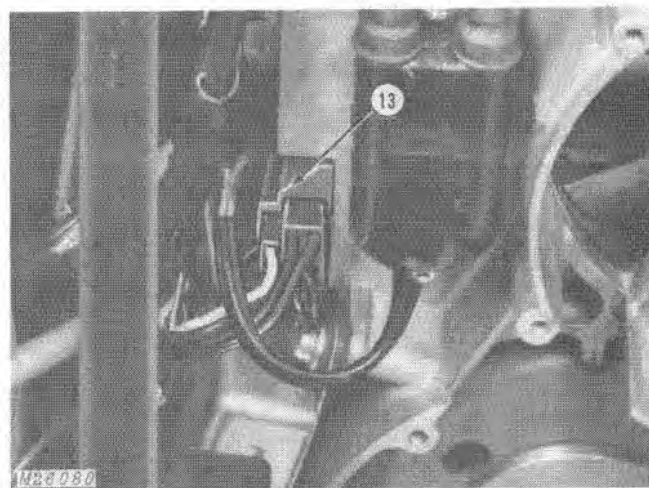


Fig. 24-Connecting Harness

13. Connect wiring harness connector, Fig. 24.

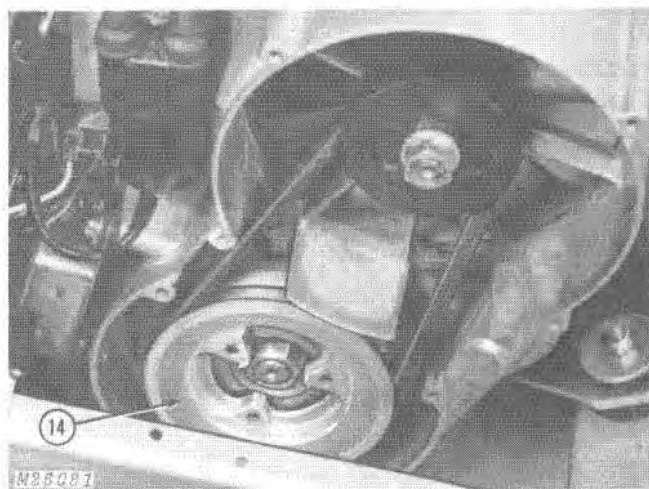


Fig. 25-Installing Fan Pulley

14. Place fan belt on fan pulley and install pulley. Line up mounting holes with flywheel, Fig. 25.

INSTALLING STATOR AND FLYWHEEL—Continued

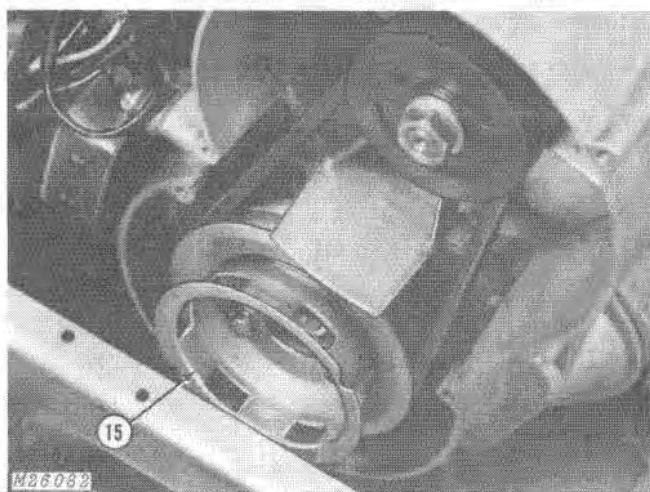


Fig. 26-Installing Starter Pulley

15. Install starter pulley, Fig. 26.
16. Install spark plug leads.

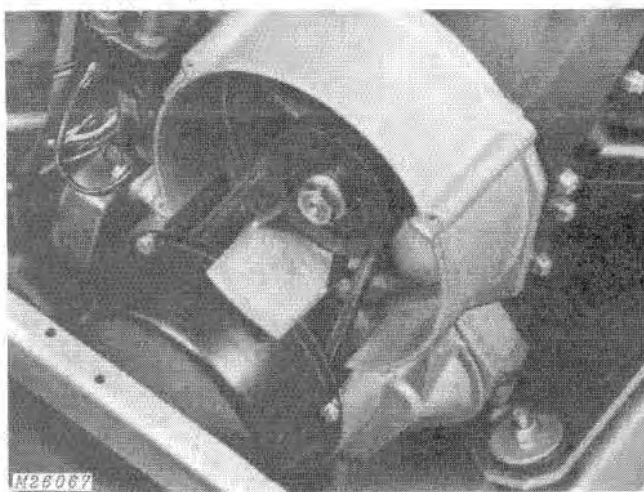


Fig. 27-Installing Recoil Starter

17. Install recoil starter, Fig. 27.

NOTE: Beginning with Serial No. 190,001-up, install oil injection pump. See Section 30, Group 15.

18. Install spark plug leads.
19. Install muffler.
20. Install air intake duct and fan cover.

REPLACING PULSER AND EXCITER COILS

1. Remove flywheel. See "Removing Flywheel and Stator."

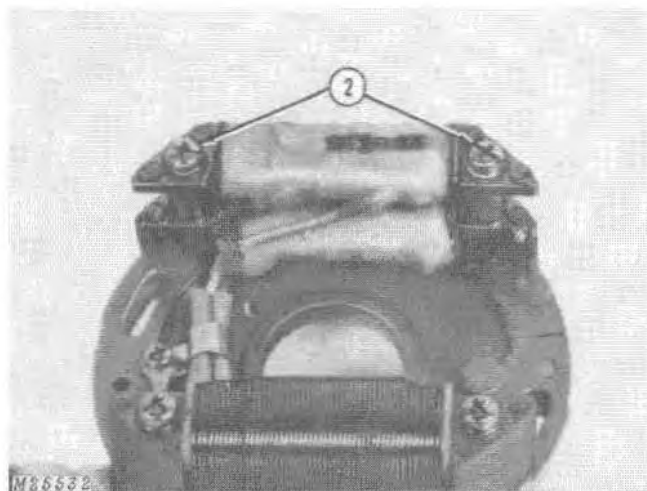


Fig. 28-Removing Coil Screws

2. Remove screws, Fig. 28.

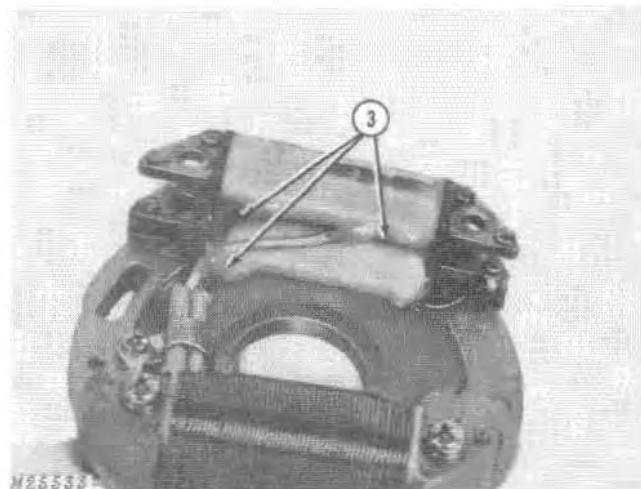


Fig. 29-Removing Coils

3. Chip epoxy seal from connections on coil being replaced, Fig. 29.

4. Unsolder connections and remove coil.

5. Solder leads to new coil with rosin core (high temperature) solder.

6. Seal connections with a two-part epoxy.

IMPORTANT: Make sure all exposed metal is covered thoroughly.

7. Mount exciter coil and pulser coil (in that order) on stator plate.

8. Make sure curvature of coils align with curve of stator plate, then tighten screws.

Group 15 LIGHTING SYSTEM

TESTING ALTERNATOR

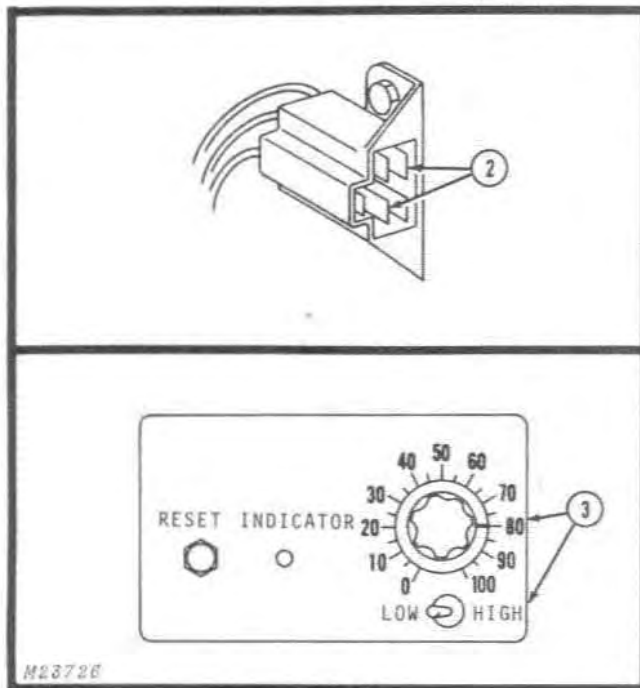


Fig. 1-Testing Alternator Output

1. Disconnect five-wire coupler, Fig. 1.
2. Connect JDM-74 Tester between the two yellow leads.
3. Set tester dial at "80" on the "LOW" circuit.
4. Crank engine with starter rope and observe tester indicator light.
5. Push reset button and repeat Step 4 twice.

Test Results

- * Indicator lights.
Alternator is OK.
- * Indicator does not light.
Alternator is defective.

TESTING VOLTAGE REGULATOR AND LIGHTING COIL

If all the lights burn out at engine speeds above idle, the voltage regulator is defective. Replace voltage regulator.

If lights will not light at any engine speed, check the voltage regulator and lighting coil as follows:

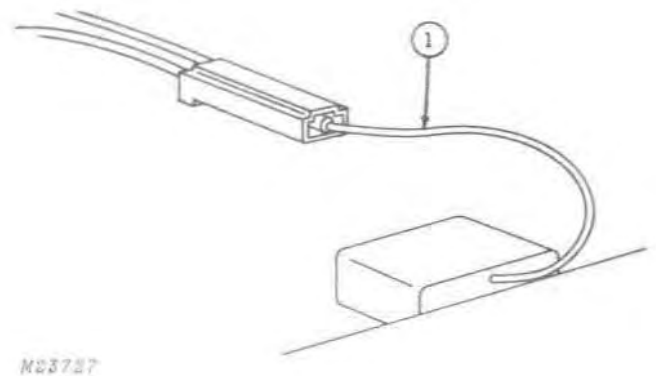


Fig. 2-Testing Voltage Regulator

1. Disconnect the yellow lead from the voltage regulator, Fig. 2.

2. Start the engine and allow it to idle.

IMPORTANT: Do not run engine above idle speed or all light bulbs will burn out.

Lights Light: Replace the voltage regulator.

Lights Do Not Light: Test the alternator as shown in Fig. 1. If alternator tests OK, replace voltage regulator.

TESTING HEADLIGHT DIMMER SWITCH

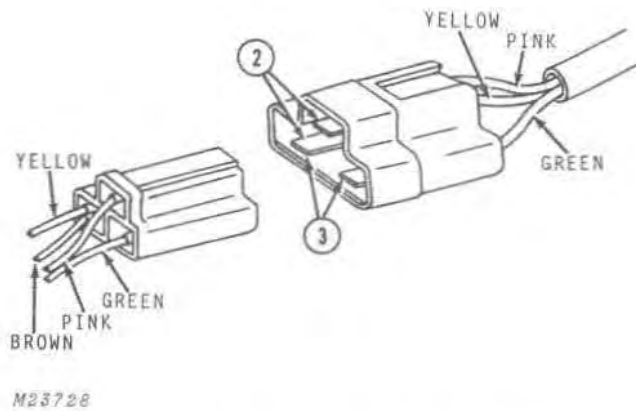


Fig. 3-Testing Headlight Dimmer Switch

1. Disconnect headlight coupler from wiring harness.
2. Connect flashlight tester between pink and yellow leads, Fig. 3. Actuate dimmer switch to high beam. Test light should light.
3. Connect flashlight tester between green and yellow leads. Actuate dimmer switch to low beam. Test light should light.

Test Results

If test light does not react as stated in Steps 2 and 3, the wiring or the dimmer switch is defective.

TESTING BRAKE LIGHT SWITCH

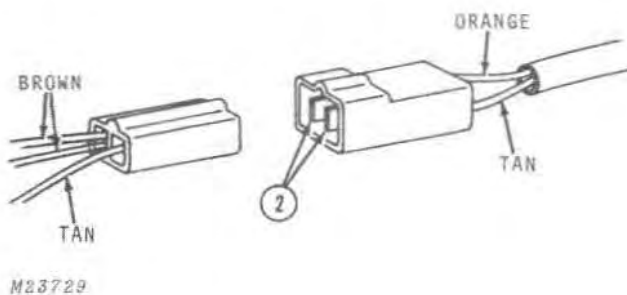


Fig. 4-Testing Brake Light Switch

1. Disconnect brake light coupler from wiring harness.

2. Connect a flashlight tester between the orange and tan leads, Fig. 4. Test light should light when brake is applied and go off when brake is released.

Test Results

If test light does not react as stated in Step 2, the wiring or the brake light switch is defective.

TESTING ENGINE KILL SWITCH

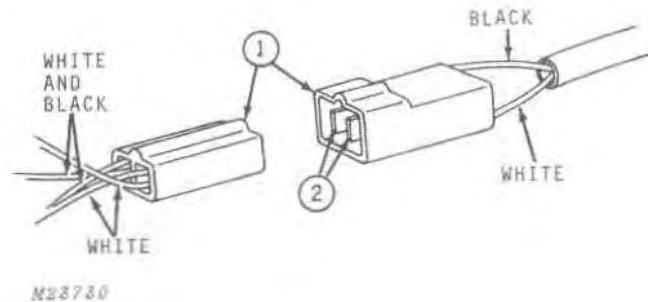


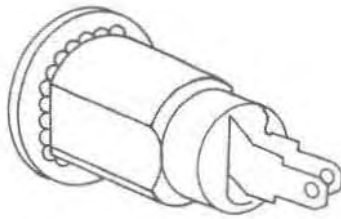
Fig. 5-Testing Engine Kill Switch

1. Disconnect engine kill switch coupler from wiring harness.
2. Connect a flashlight tester between black lead and white lead, Fig. 5. Tester should light when kill switch is actuated and go out when kill switch is released.

Test Results

If test light does not react as stated in Step 2, the wiring or the engine kill switch is defective.

TESTING TWO-TERMINAL IGNITION SWITCH



M23731

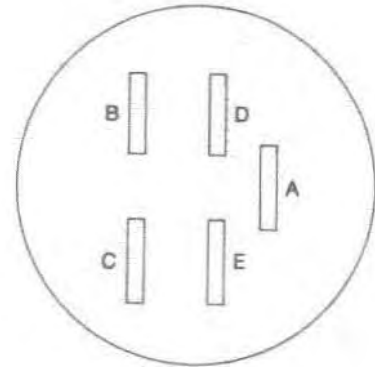
Fig. 6-Testing Two-Terminal Ignition Switch

1. Remove coupler from ignition switch.
2. Connect a flashlight tester between the switch terminals, Fig. 6. Test light should light with the key switch in the "ON" position and light should go out with key switch in the "OFF" position.

Test Results

If test light does not react as stated in Step 2, replace the ignition switch.

TESTING FIVE-TERMINAL IGNITION SWITCH



M23732

Fig. 7-Testing Five-Terminal Ignition Switch

1. Remove coupler from ignition switch.
2. Connect a flashlight tester between switch terminals E and B, Fig. 7. Test light should light when key is in the "RUN" position only.

Test Results

If test light does not react as stated in Step 2, replace the ignition switch.

ADJUSTING HEADLIGHT

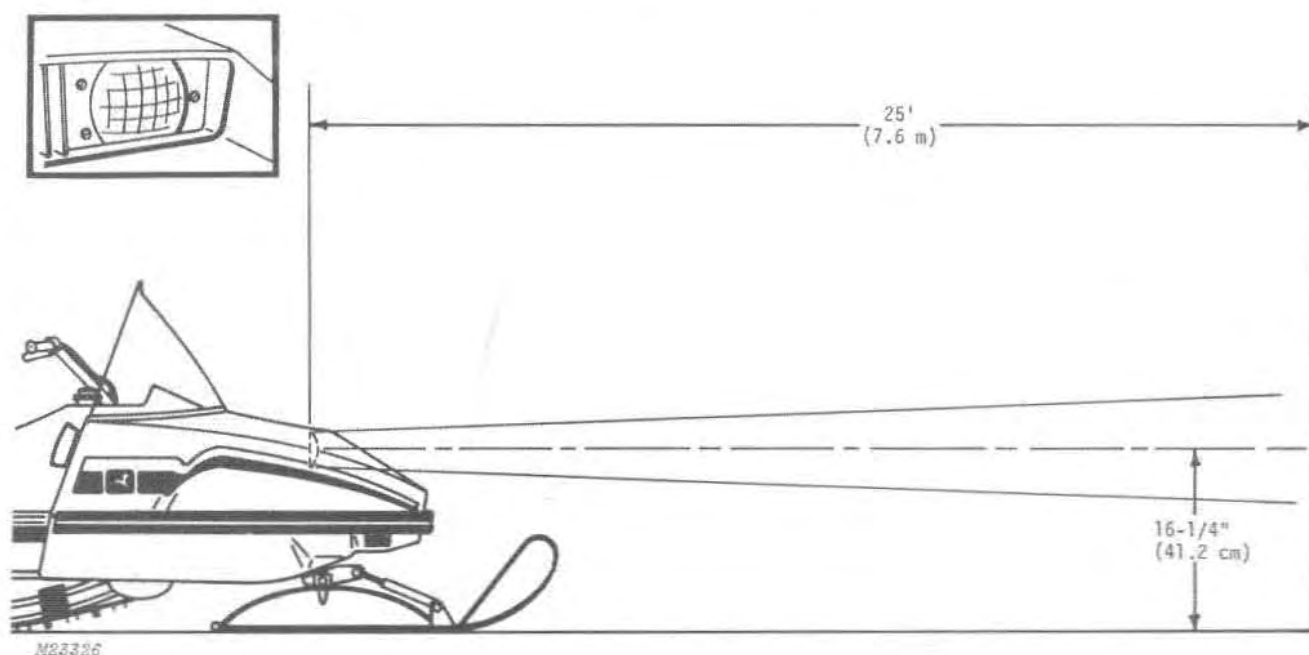


Fig. 8-Adjusting Headlight

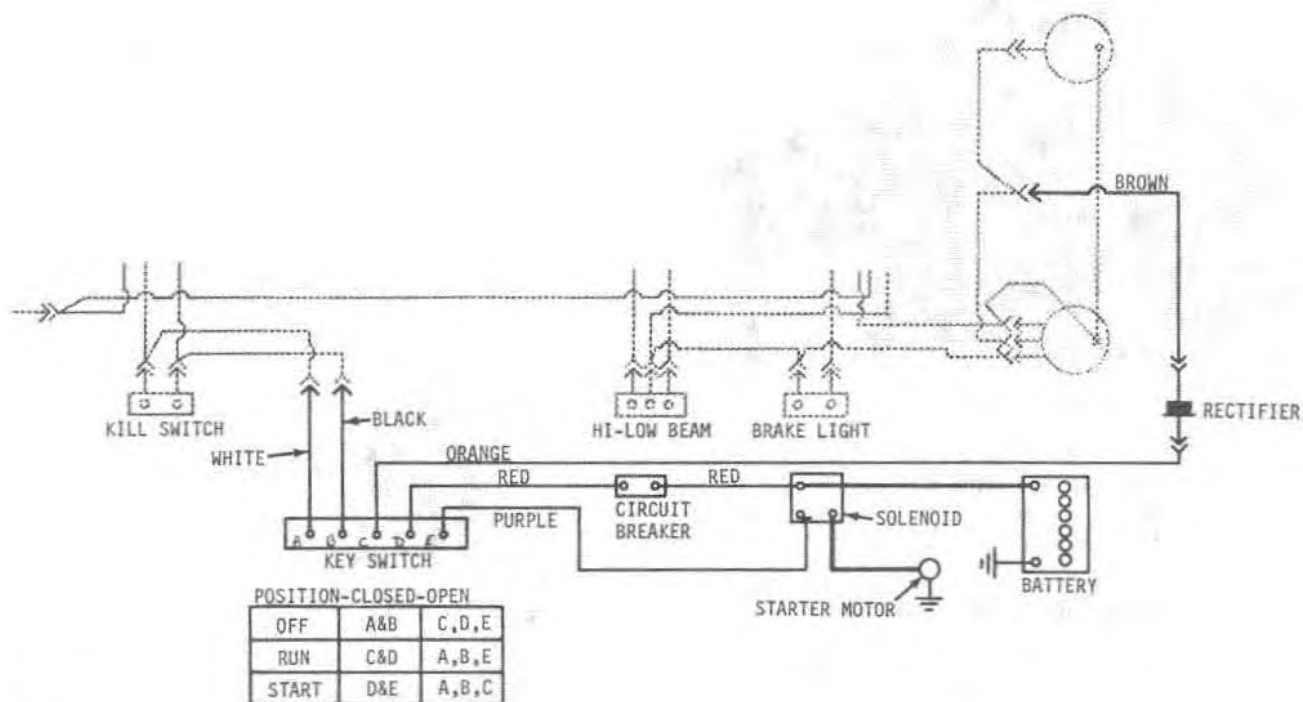


Fig. 9-Headlight Adjustment Screws

1. Position snowmobile on a flat surface with the headlight 25 feet (7.6 mm) from a vertical surface.
2. With operator on seat and headlight on "HIGH" beam, light beam center line should be straight ahead and 16-1/4 inches (41.2 cm) above ground level, Fig. 8.
3. Loosen or tighten the two adjusting screws to raise or lower the light beam, Fig. 9.
4. Loosen or tighten the adjusting screw to move the light beam right or left.

Group 20 ELECTRIC START KIT

PRINCIPLE OF OPERATION



M23568

Fig. 1-Electric Start Kit

The electric start kit, Fig. 1, consists of a starter motor, solenoid, circuit breaker, key switch and rectifier.

Note that the standard two-terminal key switch is replaced with a five-terminal key switch when the electric start kit is installed.

When the key switch is in the "START" position, battery current is directed to the solenoid which activates and connects the battery directly to the starter motor.

In the "RUN" position, a diode in the rectifier changes the alternating current from the engine alternator to direct current going into the battery. A circuit breaker protects the system from short circuits or electrical overloads.

In the "OFF" position the engine is grounded.

BATTERY

Removing Battery

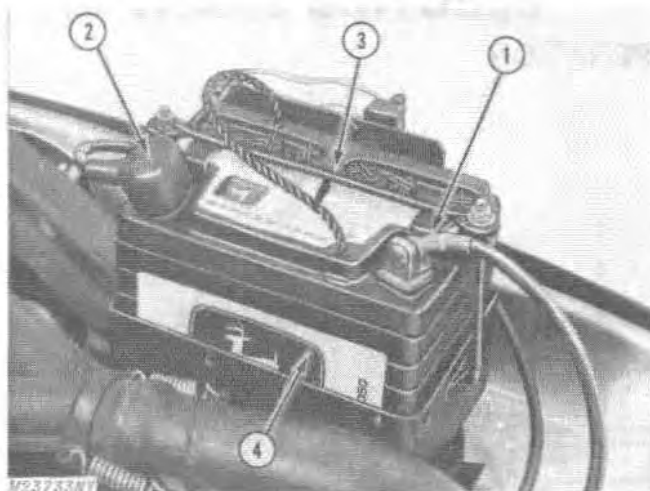
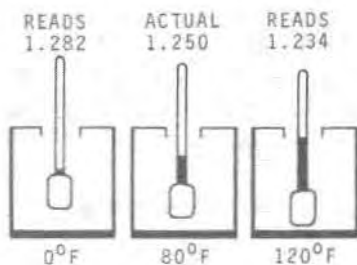


Fig. 2-Removing Battery

1. Disconnect negative (-) battery cable, Fig. 2.
2. Disconnect positive (+) battery cable.
3. Remove battery hold-down.
4. Lift battery out of box.

Testing Battery Specific Gravity

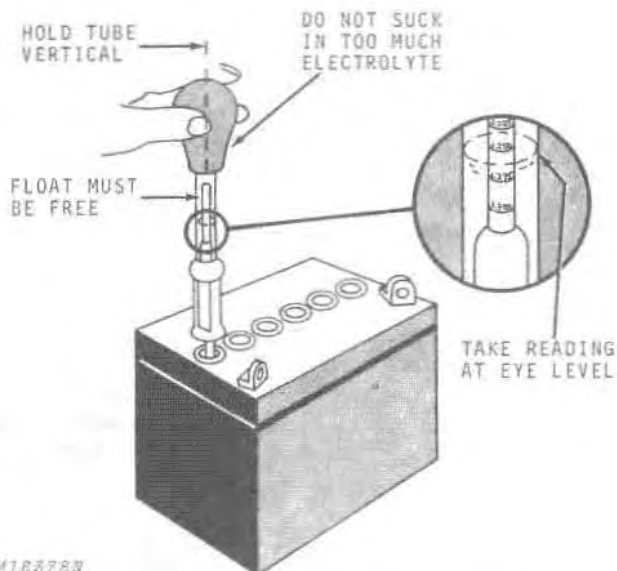
Use a hydrometer with thermometer to test specific gravity. Specific gravity varies with changing temperatures due to expansion and contraction of electrolyte. Hydrometers are calibrated to measure specific gravity correctly at 80°F.



M16377N

Fig. 3-Correcting Specific Gravity Readings to Allow for Temperatures

To determine a corrected specific gravity reading when the temperature of the electrolyte is other than 80°F: Add to the hydrometer reading four gravity points (0.004) for each 10° above 80°F. Subtract four gravity points (0.004) for each 10° below 80°F, Fig. 3.



M16378N

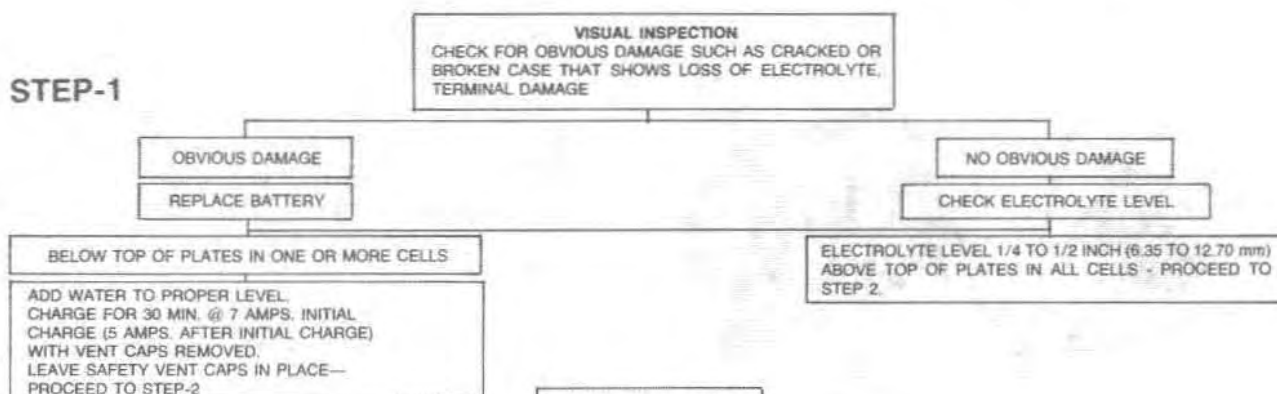
Fig. 4-Checking Specific Gravity of Battery With Hydrometer

Test specific gravity of each cell, Fig. 4. Make sure hydrometer float is suspended freely in the liquid and reading is taken at eye level.

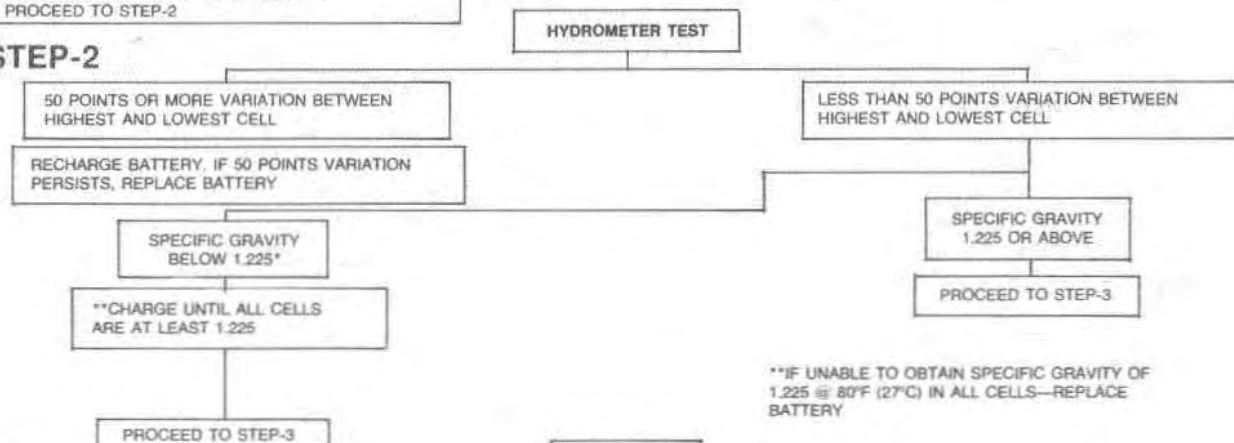
Use the chart on page 40-20-3 for testing the battery.

BATTERY TEST PROCEDURE

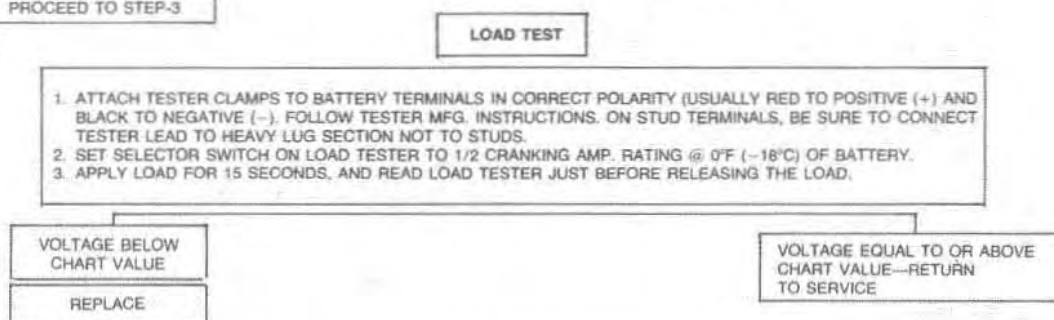
STEP-1



STEP-2



STEP-3



VOLTAGE CHART		
ESTIMATED ELECTROLYTE TEMPERATURE		MINIMUM REQUIRED VOLTAGE UNDER 15 SEC. LOAD
70°F	(21°C) & ABOVE	9.6
60°F	(16°C)	9.5
50°F	(10°C)	9.4
40°F	(4°C)	9.3
30°F	(-1°C)	9.1
20°F	(-7°C)	8.9
10°F	(-12°C)	8.7
0°F	(-18°C)	8.5

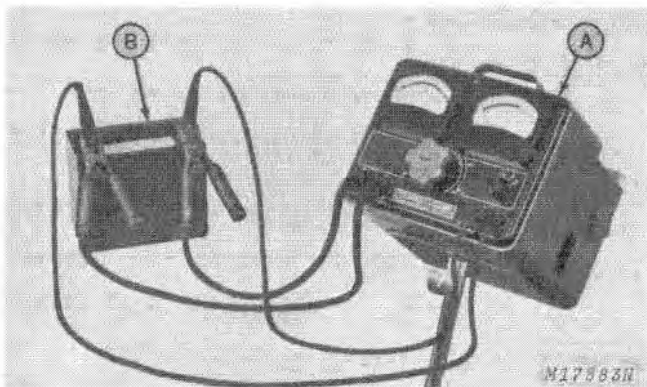
DANGER

Batteries produce EXPLOSIVE GASES. Keep sparks, flame, cigarettes away. Ventilate when charging or using in enclosed space. Batteries contain SULFURIC ACID which causes severe burns. If acid con-

tacts eyes, skin or clothing, flush well with water. For contact with eyes get immediate medical attention. KEEP AWAY FROM CHILDREN.

Testing Battery High-Rate Discharge

Test high-rate discharge to make sure the battery can deliver current under load.



A—High-Rate Discharge Tester

B—Battery

Fig. 5-High-Rate Discharge Test

Connect the high-rate discharge tester (A) to the battery (B), Fig. 5, and follow the manufacturer's instructions.

Discharge the battery under a fixed load, at three times the ampere-hour rating, for approximately 20 seconds, then read the terminal voltage.

If the battery is in satisfactory condition, the terminal voltage reading should remain above 9 volts.

If the terminal voltage falls below this value, the battery is defective or it is not fully charged.

To be sure of the battery condition, carefully charge it and repeat the test.

Replace the battery if it is defective.

Servicing Battery

Good battery servicing in the snowmobile should include the following 8 items.

1. Clean battery.
2. Inspect cables including ground connections.
3. Clean terminals.
4. Inspect hold-downs.
5. Inspect case for leaks.
6. Make hydrometer test.
7. Add water if necessary. Use caution to protect snowmobile from electrolyte damage.
8. Recharge battery if less than 75 per cent charged.

Cleaning Battery

Corrosion around the battery terminals is normal. However, an accumulation of corrosion over a long period can shorten the life of the battery. Keep battery terminals as clean as possible.

To clean terminals, remove battery from snowmobile. Remove all corrosion using a wire brush. Wash terminals using a solution of one part ordinary baking soda to four parts water. Do not permit cleaning solution to enter battery cells. Flush battery with clear water.

Wash entire battery case, battery base, and hold-down strap with clear water. Do not get water on switches and wiring connections.

Coat terminals with petroleum jelly or a light film of oil to protect against corrosion.

When installing battery, connect cable to positive terminal first. Be sure to slide rubber boot down on cable until terminal and clamp are completely covered.

Activating New Battery

Activate a new battery before installing it in snowmobile. This will prevent damage to machine in case electrolyte spills.

Add electrolyte until plates are just covered. Leave cell caps off while charging. Charge at 7 amps for 30 minutes. After initial charge, do not charge battery at more than 5 amps.

Charging the battery will increase battery temperature and raise the electrolyte level. If electrolyte is still below the ring in the battery neck, add enough electrolyte to fill to the bottom of the ring.

Add water as required. A healthy battery will consume about one teaspoon of water per cell each month.

CAUTION: While charging battery, hydrogen and oxygen gases are emitted which are very explosive. Therefore, keep open flames and sparks away from battery. Battery electrolyte is poisonous and can be injurious to eyes, skin and clothing. Handle it carefully.

Installing Battery

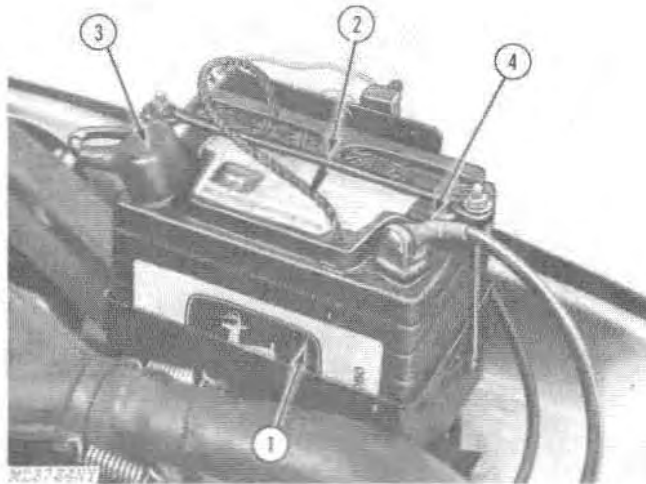


Fig. 6-Installing Battery

1. Set battery in box.
2. Install battery hold-down
3. Connect positive (+) battery cable and cover terminal with boot.
4. Connect negative (-) battery cable.

STARTER MOTOR

Removing Starter Motor

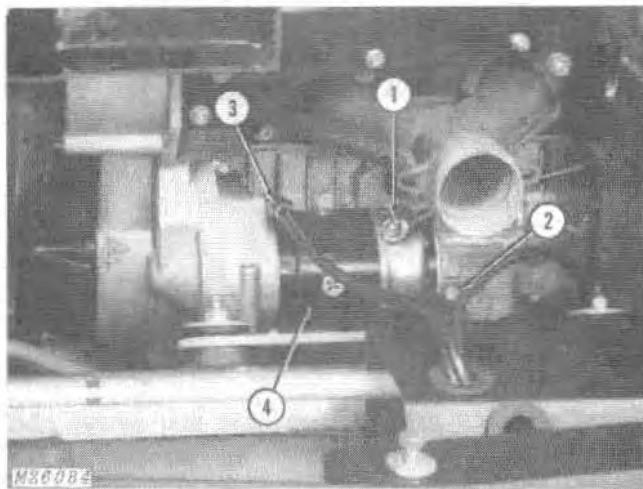


Fig. 7-Removing Starter Motor

1. Disconnect starter motor cable, Fig. 7.
2. Remove screws attaching bracket to engine.
3. Remove starter motor hardware.
4. Remove starter motor.

Testing Starter Motor Drive

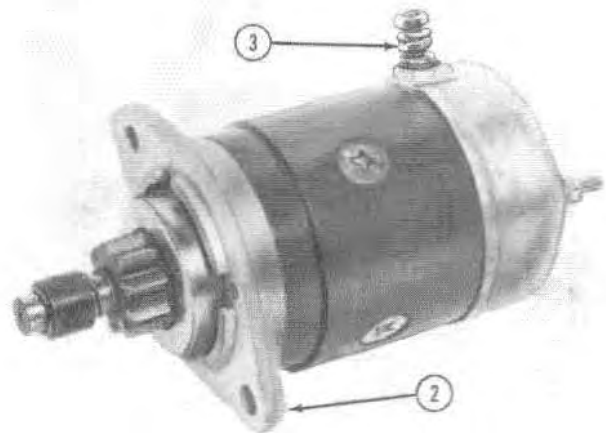


Fig. 8-Testing Starter Motor Drive

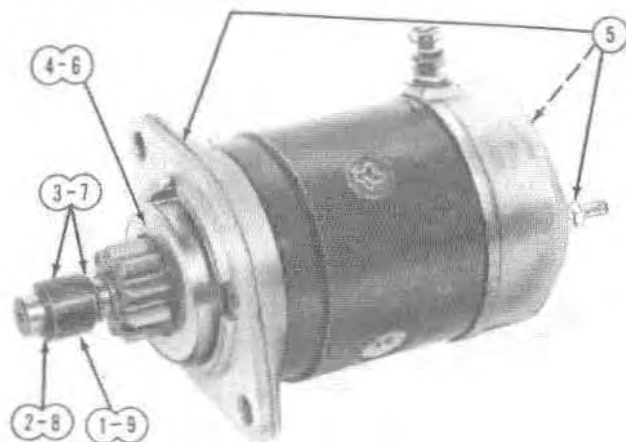
1. Connect jumper cables to a 12-volt battery.
2. Connect negative cable to starter motor housing, Fig. 8.
3. Touch positive cable to starter motor terminal.

Starter motor pinion should move freely up the clutch and come back when positive cable is removed. If not, disassemble starter motor drive and inspect it for dirt or damage.

Testing Armature Rotation

Rotate armature by hand. If it does not rotate freely, disassemble and inspect starter motor for a bent armature or badly worn bearings.

Repairing Starter Motor Drive

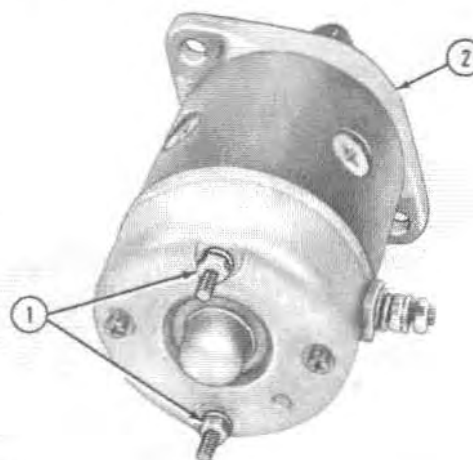


N25737Y

Fig. 9-Replacing Pinion Drive or Front Cover

1. Use a socket of the proper size and tap the collar down below retaining ring.
2. Remove retaining ring.
3. Remove collar and spring.
4. Thread pinion off the shaft.
5. Front cover can be replaced by removing the thru-bolts.
6. Thread pinion onto shaft.
7. Install spring and collar.
8. Install retaining ring.
9. Place an adjustable wrench under collar and tap armature shaft lightly with a plastic mallet to lock collar over ring.

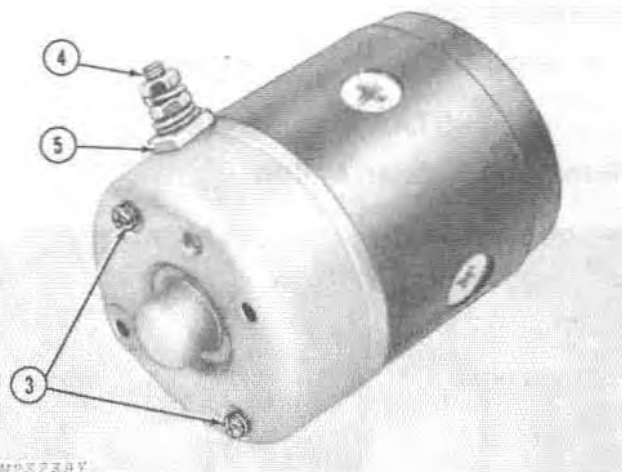
Repairing Starter Motor



N25732Y

Fig. 10-Removing Armature

1. Remove thru-bolts, Fig. 10.
2. Pull armature out of housing.



N25730Y

Fig. 11-Removing Rear Cover

3. Remove rear cover screws, Fig. 11.
4. Remove hardware from stud and sealer from plastic holder.
5. Hold the plastic holder while you remove gear cover.

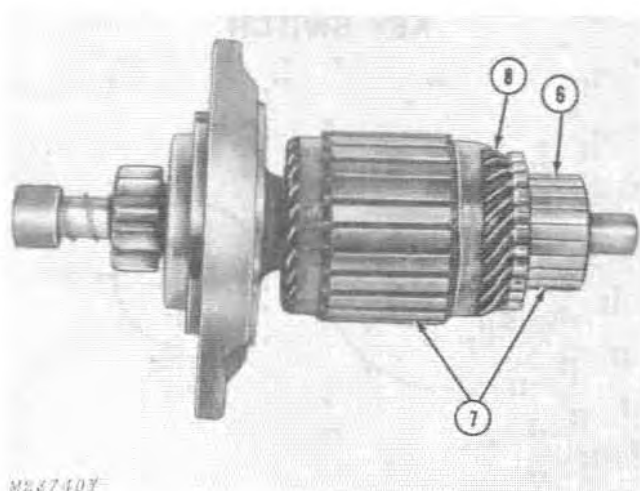


Fig. 12-Testing Armature

6. Inspect armature commutator bar for burned spots and brush dirt or copper between the bars which would indicate a short.

7. Connect a test light between commutator and conductor. If the test light lights, the armature is grounded.

8. Inspect all leads between the conductor and commutator for damage. Bad connections can cause the armature to arc and burn.

If armature is defective, replace starter motor.

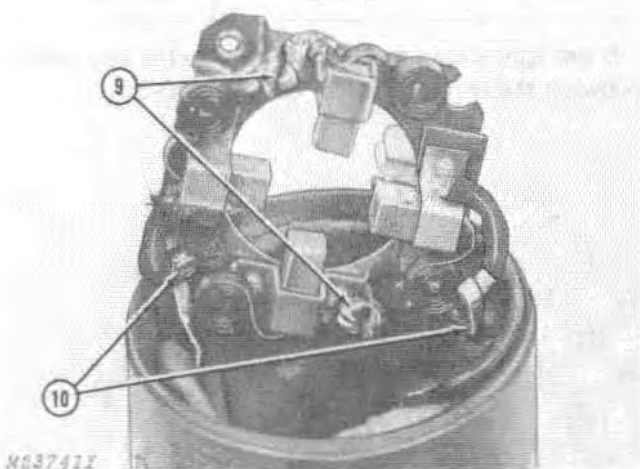


Fig. 13-Replacing Brushes

9. Replace negative brushes by heating the connection to disconnect the lead. Solder a new brush to the holder.

10. Replace positive brushes by heating the connection and uncrimping the field lead. Crimp and solder the new brush lead to the field lead.

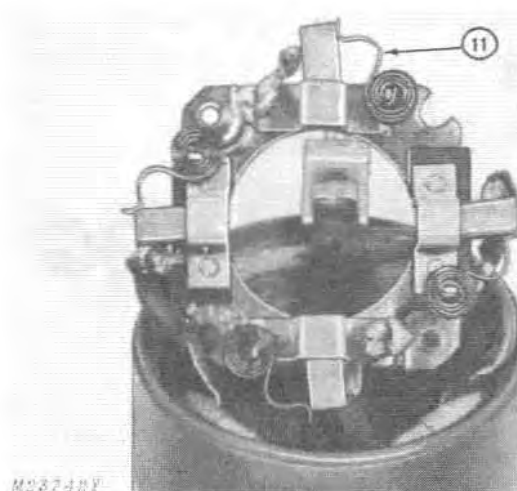


Fig. 14-Holding Brushes

11. Position brushes in holder so that the springs hold them out as shown, Fig. 14.

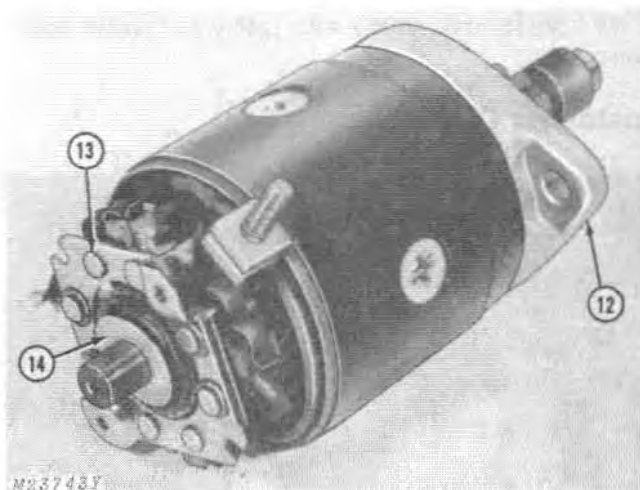
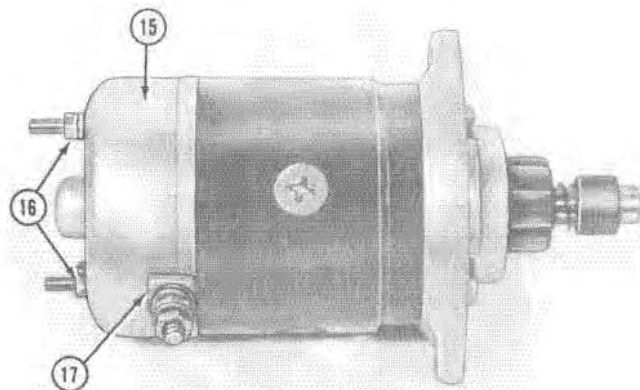


Fig. 15-Installing Armature

12. Install armature in housing and rotate front cover until it snaps into position.

13. Position brush holder over armature core and release brush springs.

14. Place washers over armature shaft.

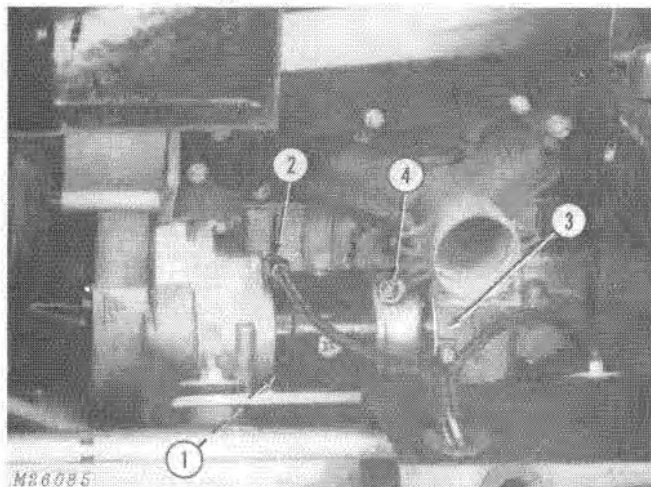


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Fig. 16-Installing Rear Cover

15. Install rear cover and screws.
16. Install thru-bolts.
17. Seal plastic holder with epoxy and install hardware.

Installing Starter Motor

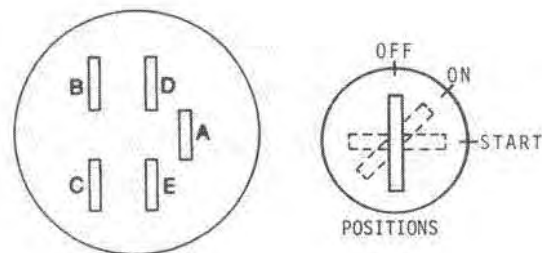


M26085

Fig. 17-Installing Starter Motor

1. Install lower socket-head bolt with flat washer.
2. Install upper socket-head bolt with flat washer. Install ground lead on upper bolt.
3. Secure starter motor bracket to engine with cap screws, flat washers and lock washers. Tighten all hardware in Steps 1 through 3.
4. Connect starter motor cable to starter motor.

KEY SWITCH



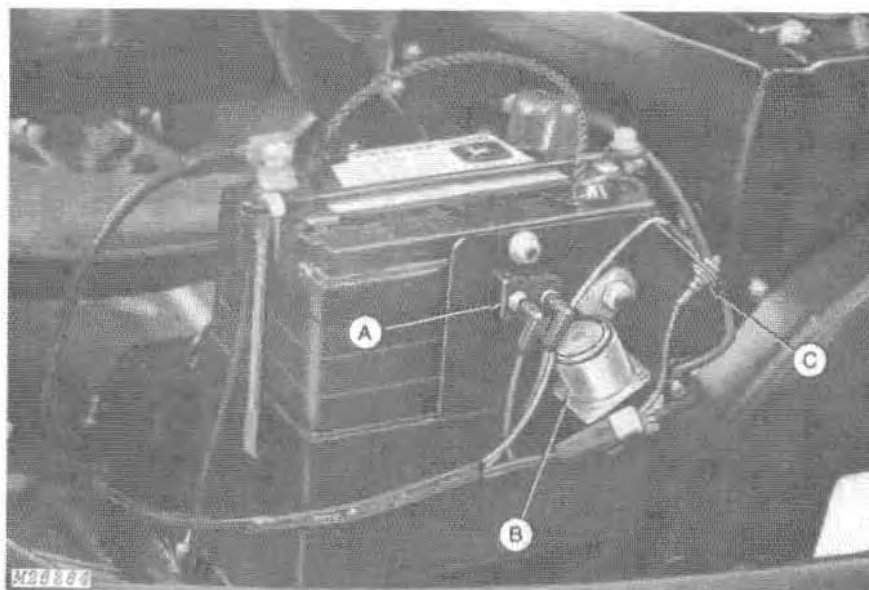
M23746

Fig. 18-Testing Key Switch

1. Remove connector from key switch.
2. Connect test light between terminals as shown in chart below. Test light should light on the closed terminals in the position called out.

POSITION	CLOSED	OPEN
OFF	A & B	D,C,E,
RUN	C & D	A,B,E,
START	D & E	A,C,B,

If test light shows incorrectly, replace the key switch following the wiring diagram on page 40-20-1.



A—Circuit Breaker

B—Solenoid

C—Rectifier

Fig. 19-Testing Solenoid, Circuit Breaker and Rectifier

CIRCUIT BREAKER

1. Connect a flashlight tester between terminals of circuit breaker (A, Fig. 19). Test light should light.

If not, replace the circuit breaker.

IMPORTANT: Circuit breakers must be installed so that the "BAT" terminal is connected to the lead coming from the solenoid.

SOLENOID

1. Remove starter motor cable from solenoid (B, Fig. 19).

2. Connect a flashlight tester between the two large solenoid terminals.

3. Connect a jumper cable between battery positive (+) terminal and solenoid small terminal.

Solenoid should snap and light the test light until jumper cable is removed. If not, replace the solenoid.

RECTIFIER

Connect the black flashlight tester lead to the brown lead side of rectifier and the red tester lead to the orange lead side of rectifier (C, Fig. 19).

Test light should light in this position and not light if leads are reversed. If not, replace the rectifier.

Group 25 SPECIFICATIONS

ELECTRICAL SYSTEM SPECIFICATIONS

Item	Specification
Spark Plug* Ignition Timing	QN-3 Kokusan CDI Align mark on stator with crankcase separation.

*Spark plugs are gapped at 0.025 inch (0.635 mm) at the factory. Do not regap plugs. When plug gap reaches 0.045 inch (1.143 mm), replace the plugs.

TORQUE SPECIFICATIONS

Item	Torque
Flywheel Nut	60 ft-lbs (81.3 N·m) (8.1 kgm)

12-VOLT LIGHT BULB CHART

Location	John Deere Part Number
Head Light	AM52959
Brake-Taillight	AM52619
Speedometer	AM52847
Tachometer	AM52847

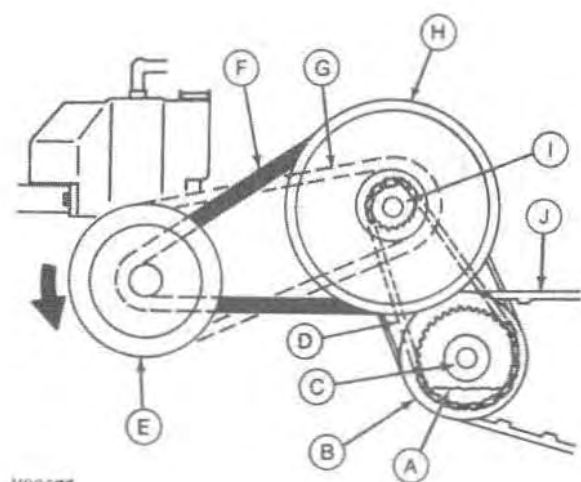
Section 50 POWER TRAIN

Group 5 GENERAL INFORMATION

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PRINCIPLE OF OPERATION



N2357L

- | | |
|---------------------|-----------------------|
| A—Oil Level | F—Drive Belt |
| B—Chain Case | (Low-Speed Position) |
| C—Track Drive Shaft | G—Drive Belt |
| D—Drive Chain | (High-Speed Position) |
| E—Drive Sheave | H—Driven Sheave |
| | I—Secondary Shaft |
| | J—Track |

Fig. 1-Power Train

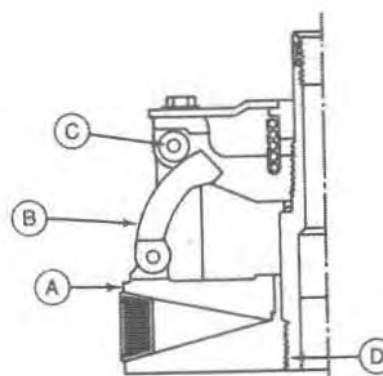
The power train for 440 SPORTFIRE Snowmobiles consists of a drive sheave (E, Fig. 1), drive belt (F), driven sheave (H), disk brake, secondary shaft (I), chain case (B), sprockets, drive chain (D), and drive shaft (C).

The drive sheave is mounted on the engine crankshaft and functions as a centrifugally-operated clutch and variator.

When stopped or at idle speed, the sides of the sheave do not contact the drive belt, thus providing a de-clutched position.

John Deere (Comet) 102C Drive Sheave

Increasing engine speed causes the centrifugally-actuated arms (B, Fig. 2) in the movable face (A) to swing out against the spider rollers (C) on the fixed face (D). This action forces the sheave halves together, engaging the drive belt with the sheave and starts the snowmobile moving.



N2357L

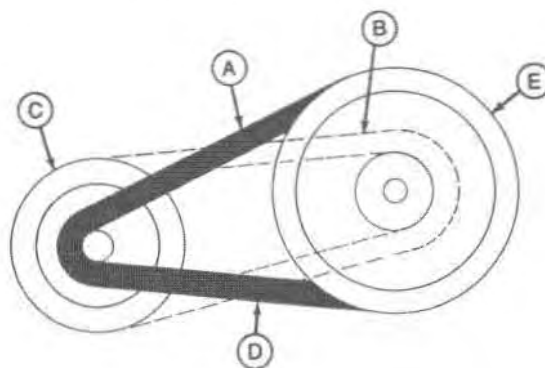
- A—Movable Face
B—Arms

- C—Spider Rollers
D—Fixed Face

Fig. 2-102C Drive Sheave

When the engine reaches top rpm, the sheave halves are as close together as possible. The drive belt continues to ride out as engine speed increases and the sheave halves come together. This action provides a smooth transition from slow to fast snowmobile travel speed.

John Deere Driven Sheave



M19245N

- A—Low-Speed Position
B—High-Speed Position
C—Drive Sheave

- D—Drive Belt
E—Driven Sheave

Fig. 3-Driven Sheave Operation

The drive sheave (C, Fig. 3) is spring-loaded in the low-speed position (A). Increased speed causes the drive belt (D) to ride out on the drive sheave (C). The driven sheave (E) opens against spring tension, allowing the drive belt to ride deeper in the driven sheave (E).

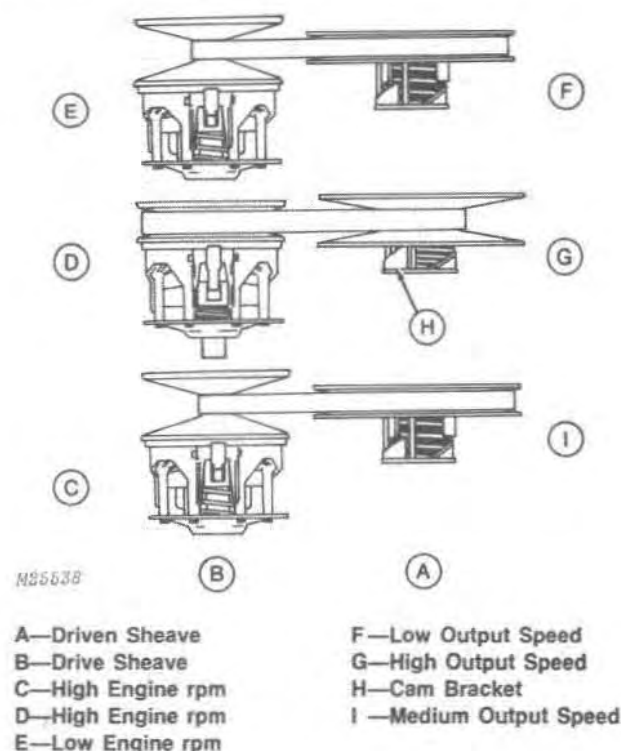


Fig. 4-Torque-Sensitive Driven Sheave

The driven sheave (A, Fig. 4) does more than act as a take-up for the action of the drive sheave. The driven sheave is also "torque-sensitive." The driven sheave rides on the cam bracket (H) as it opens to obtain high-speed position.

Normal rotational force on the cam bracket (H) works to keep the driven sheave in the low speed position (F).

If an increased load or high torque requirement occurs (such as climbing a steep hill) after the snowmobile is up to speed, the cam bracket (H, Fig. 4) in the driven sheave forces the sheave halves together, obtaining a slower travel speed (I) while maintaining high engine rpm (C) for increased torque.

In Fig. 4, the top and bottom drawings have the same drive belt position. Increased speed of the engine in the lower drawing, causes a difference in the output speed of the driven sheave.

Chain Case and Drive Chain

The fully-enclosed chain case consists of a silent chain, two sprockets and spring-loaded tensioner. The chain and sprockets are oil-bath lubricated.

The spring-loaded tensioner maintains proper chain tension when both accelerating and decelerating. No chain tension adjustment is necessary.

Brakes

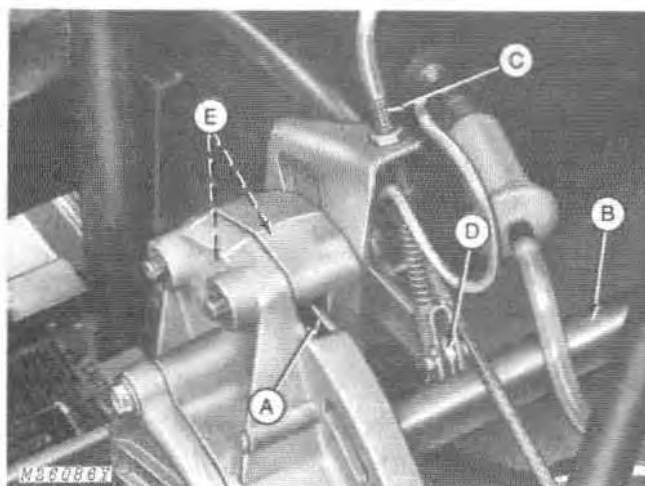


Fig. 5-Mechanical Disk Brake

The mechanical disk brake (A, Fig. 5) operates on the drive shaft (B) and is actuated by the brake cable (C). When the brake is applied, the cam on the brake arm (D) moves two pins in against the brake puck (E). The puck moves the brake disk (A) against a second puck for braking.

DIAGNOSING MALFUNCTIONS**John Deere 102C Drive Sheave****Sheave Clutching at Too Low rpm**

Spring weak or broken.
Inspect roller arm weights.

Sheave Clutching at Too High rpm

Wrong spring.
Drive sheave dirty internally.
Worn spider buttons.

Clutch Sticking

Belt mold builds up on center post and movable face cannot slide properly.

Erratic Shifting

Oil or grease on drive or driven sheaves.

Drive Belt Not Operating Smoothly in Drive Sheave

Sheave faces rough, grooved, pitted or scored.
Drive belt defective.

John Deere Driven Sheave**Driven Sheave Not Opening Properly**

Ramp buttons worn.
Ramp on movable face damaged.
Movable sheave half binding on fixed half.
Incorrect spring.
Spring tensioned improperly.

Driven Sheave Opening Too Easily

Spring weak or broken.
Spring pretensioned improperly.

Drive Belt**Uneven Belt Wear**

Sheaves misaligned.
Engine mounts loose.

Drive Belt Glazed

Excessive slippage.
Oil on sheave surfaces.

Belt Worn Narrow in One Section

Excessive slippage caused by stuck track.

Belt Too Tight at Idle Speed

Engine idle set too fast.
Incorrect distance between sheaves.
Incorrect belt length.

Belt Edge Cord Breakage

Sheaves misaligned.

Brake**Brake Not Holding Properly**

Brake cable out of adjustment.
Brake pucks worn.
Brake pucks oil-saturated.
Key sheared on brake disk.

Brake Not Releasing Properly

Return spring weak or broken.
Brake lever bent or damaged causing binding.

Chain Case Assembly**Chain Case Leaking**

Gaskets on drive shaft bearing flangettes or secondary shaft bearing flangettes damaged.

O-ring on drive shaft or secondary shaft bearings damaged.

Chain case cracked or broken.

Rapid Chain and Sprocket Wear

Insufficient oil in chain case.

Sprockets out of alignment due to improper assembly.

Chain tension spring broken.

LOW AND HIGH ELEVATION APPLICATIONS

To obtain and provide proper governed engine speed, proceed as follows:

1. Be sure correct clutching is used for altitude at which the snowmobile will operate.
2. Change carburetor as required. See Section 30.

Clutching Recommendations - 440 SPORTFIRE - 102C Clutch

Altitude	Clutch Engagement (rpm)	Governed Speed (rpm)	Primary Clutch			Secondary Clutch		Chain Case	
			Spacers in Clutch	Clutch Spring	Arm Kit	Spring Position	Cam	Gearing Sprockets	Chain (Pitch)
Sea Level to 4000 Ft. (0 to 1219 m)	3800 to 4000	6700 to 7200	2	Silver	AM55195	No. 2	Compound AM55127	21 Tooth* 39 Tooth*	66
4000 Ft. and up (1219 m)	4300 to 4500	6700 to 7200	2	Silver	AM54287	No. 1	Compound AM55127	21 Tooth 39 Tooth	66

*Factory Installed

Gears

17 Tooth Gear - M66302
 21 Tooth Gear - M66121
 22 Tooth Gear - M67665
 24 Tooth Gear - M66322
 25 Tooth Gear - M67970
 35 Tooth Gear - M65809
 38 Tooth Gear - M67898
 39 Tooth Gear - M65693
 40 Tooth Gear - M66323
 42 Tooth Gear - M65810

Chain

62 Pitch Chain - M66123
 66 Pitch Chain - M66122
 68 Pitch Chain - M66321

Gear Ratios

1.56:1 with 25 and 39 Tooth Gears and 68 Pitch Chain
 1.67:1 with 24 and 40 Tooth Gears and 68 Pitch Chain
 1.72:1 with 22 and 38 Tooth Gears and 66 Pitch Chain
 1.86:1 with 21 and 39 Tooth Gears and 66 Pitch Chain
 2.06:1 with 17 and 35 Tooth Gears and 62 Pitch Chain
 2.47:1 with 17 and 42 Tooth Gears and 66 Pitch Chain

Group 10 JOHN DEERE (COMET) 102C DRIVE SHEAVE

REMOVAL

1. Remove drive belt and knock-out plug from side of pan.

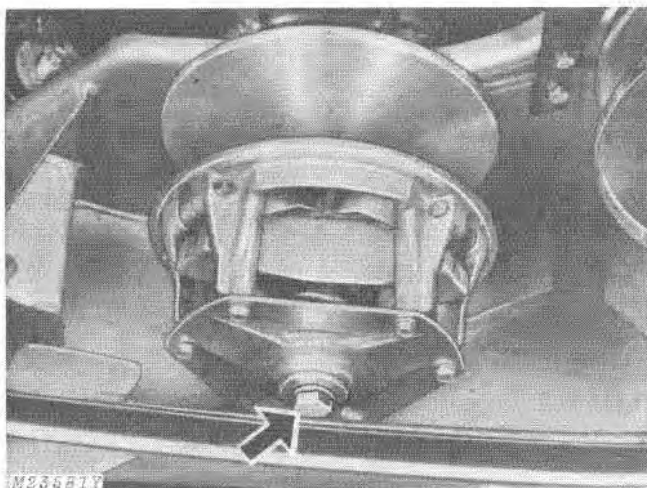


Fig. 1-Drive Sheave Retaining Screw

2. Remove retaining screw and washer, Fig. 1.

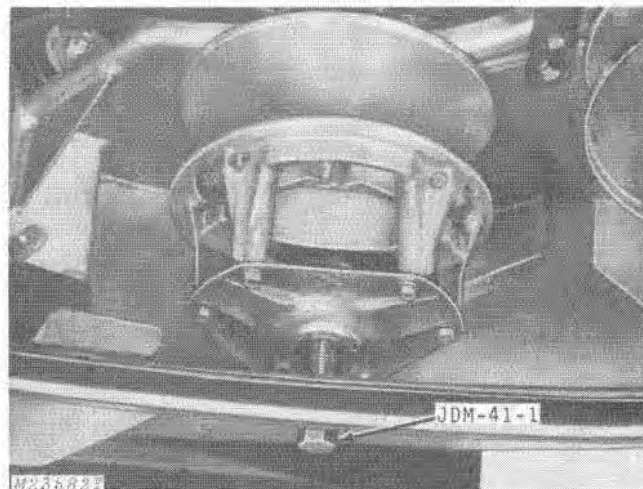


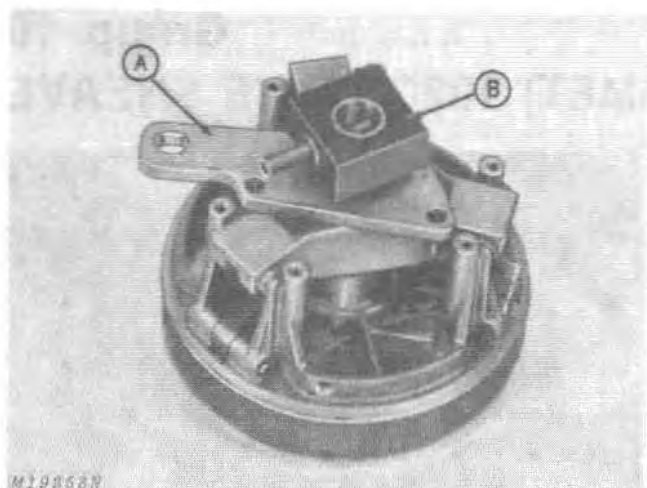
Fig. 2-JDM-41-1 Puller Installed

3. Screw JDM-41-1 Puller into sheave hub until sheave comes loose from the crankshaft, Fig. 2.

NOTE: Use an impact wrench or 1/2-inch socket wrench with long handle to remove retaining screw and to install JDM-41-1 Puller.

DISASSEMBLY

1. Remove every other screw from cover plate.
2. Remove three remaining cap screws equally.
3. Remove cover plate and spring.

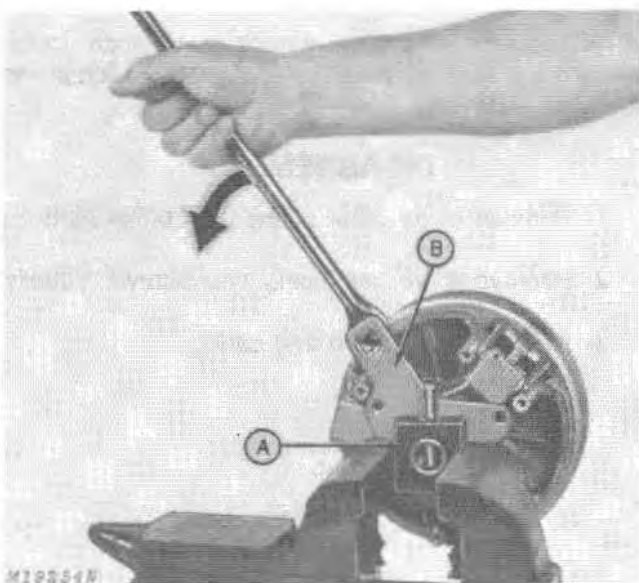


A—JDM-41-3 Spider Tool

B—JDM-41-5 Hub Lock

Fig. 3-Spider Tool and Hub Lock Installed

4. Install JDM-41-3 Spider Tool (A, Fig. 3) over hub.
5. Install JDM-41-5 Hub Lock Tool over hub with pin of tool through cross hole in hub.



A—JDM-41-5 Hub Lock

B—JDM-41-3 Spider Tool

Fig. 4-Removing Spider From Hub

6. Clamp assembly securely in vise. Install 1/2-inch socket wrench with long handle in Spider Tool (B, Fig. 4). Turn counterclockwise to loosen spider from hub.

IMPORTANT: DO NOT tighten vise too tight. Excess pressure on JDM-41-5 Hub Lock Tool can distort fixed face hub.

7. Remove Hub Lock and Spider tools. Turn spider off hub.

NOTE: Remove spacer rings and movable face. Note spacers for reassembly.

INSPECTION AND REPAIR

Inspecting Bushings

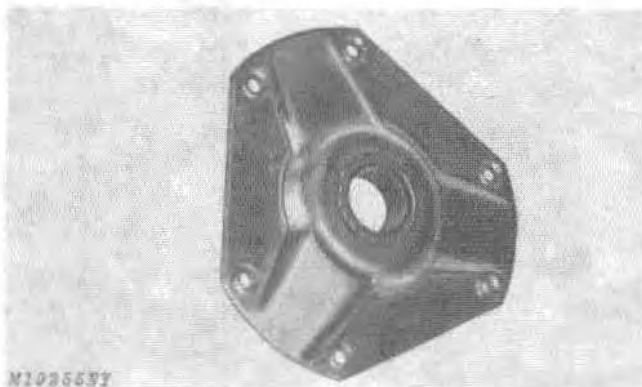


Fig. 5-Cover Plate and Bushing

1. If bushing in cover plate, Fig. 5, is worn or damaged, replace cover plate. Bushing is not serviceable.

Inspecting Guide Buttons and Rollers

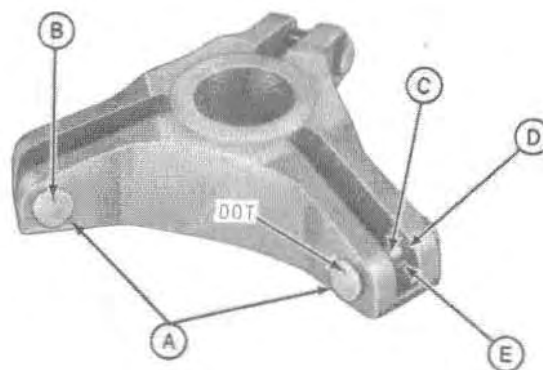
A—Guide Button
B—DotC—Steel Washers
D—Fiber Washer
E—Roller

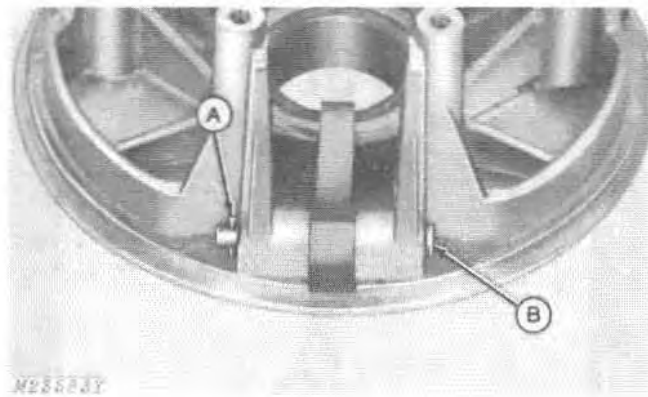
Fig. 6-Installing Guide Buttons

1. Inspect guide buttons (A, Fig. 6) and rollers (E) in spider. Replace if necessary.

2. Use pliers to remove guide buttons.
3. Remove pin, roller and three washers.
4. Install roller in spider with a steel washer (C) on each side of roller. Fiber washer (D) should be installed as shown in Fig. 6.
5. Install pin and guide buttons (A). Tap buttons gently until seated.

IMPORTANT: Position small dot (B) on guide buttons (A) straight up or straight down, Fig. 6. This matches bearing surface of guide button to bearing surface of movable face.

Inspecting Roller Arms



A—Spring Pin

B—Pivot Pin

Fig. 7-Removing Spring Pin and Pivot Pin

1. Inspect roller arms for wear and replace as necessary.
2. Use side cutters to remove spring pin (A, Fig. 7).
3. Remove pivot pin (B), roller and three steel washers.

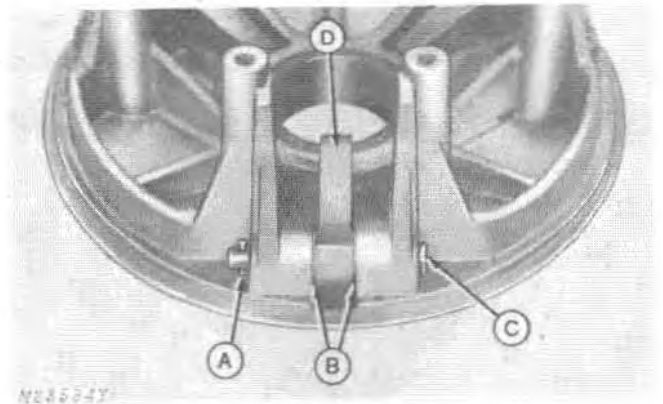
A—Spring Pin
B—Steel WashersC—Pivot Pin
D—Roller Arm

Fig. 8-Installing Pivot Pin

4. Install roller arm (D, Fig. 8) in movable face with a steel washer (B) on each side of arm.

5. Install pivot pin (C) from right to left. Install steel washer and NEW spring pin (A).

Inspecting Fixed and Movable Faces

1. Check sheave faces for pitting or wear. Replace as necessary.
2. Inspect bushing of movable face and hub of fixed face for damage or wear.
3. Measure outside diameter of fixed face hub and inside diameter of movable face bushing. Allowable clearance should not exceed 0.030 inch (0.762 mm). If clearance is greater, replace movable face bushing.

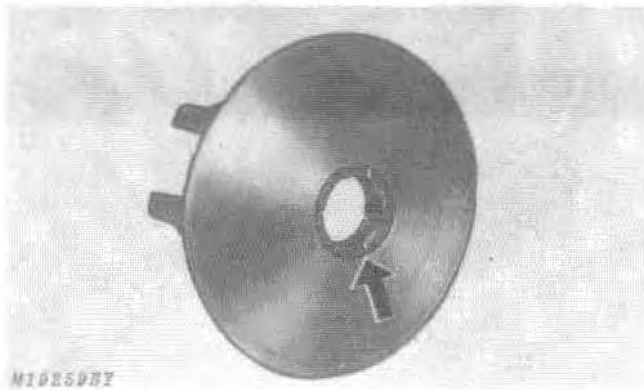


Fig. 9-Cuts in Movable Face Bushing

4. Use a hacksaw blade to carefully cut through the movable face bushing in several places, Fig. 9.

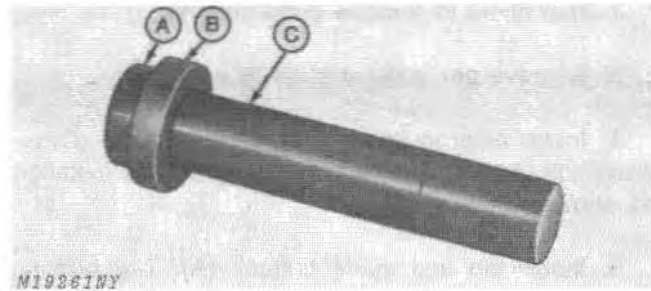
IMPORTANT: DO NOT saw into metal of movable face.

Remove bushing with a small cold chisel and hammer.



Fig. 10-Snap Ring Position in Movable Face Bushing

5. Install new bushing with snap ring up, Fig. 10.



A—27509 Disk B—27516 Disk C—27488 Handle

Fig. 11-Tool For Installing Movable Face Bushing

6. Use Owatonna Tool Company, Bushing, Bearing and Seal Driver Set. Install 27516 Disk and 27509 Disk to 27488 Handle, Fig. 11.

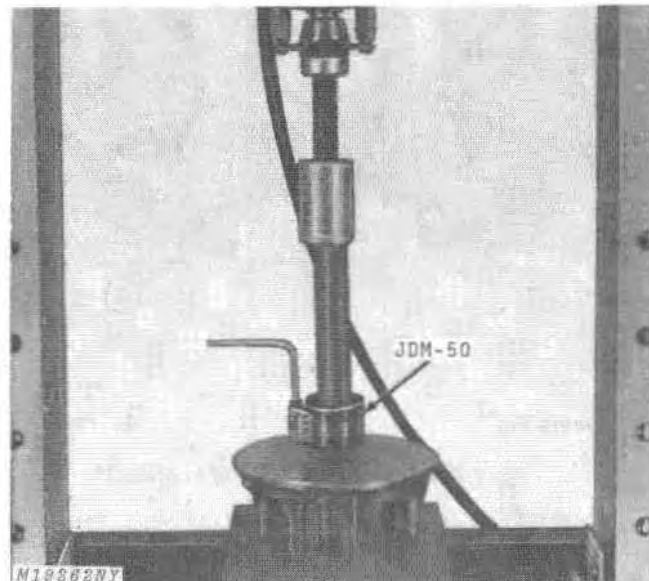


Fig. 12-Installing Movable Face Bushing

7. Use a press and JDM-50 Ring Compressor, Fig. 12, to install bushing flush with movable face.

ASSEMBLY

Lubricating Drive Sheave

Use Never-Seez Lubricant (PT569) or it's equivalent on the following:

1. Roller arms and pins in movable face.
2. Guide buttons in spider and mating surface of movable face.

NOTE: Use Loctite on spider-to-hub threads.

Assembling Drive Sheave

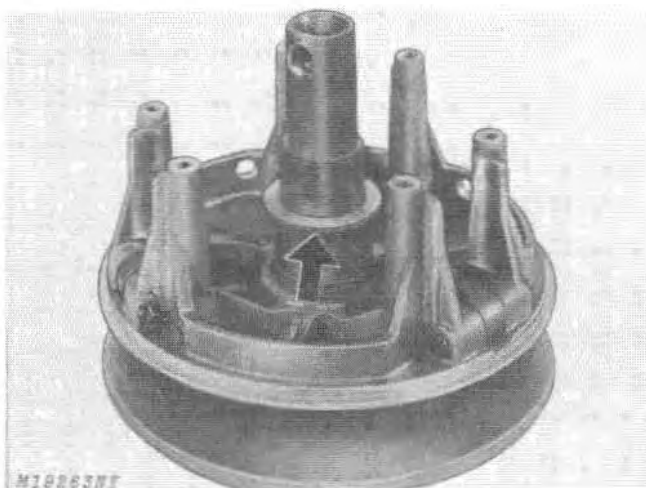


Fig. 13-Installing Spacer Rings

1. Install movable face over fixed face hub with required number of spacer rings, Fig. 13.

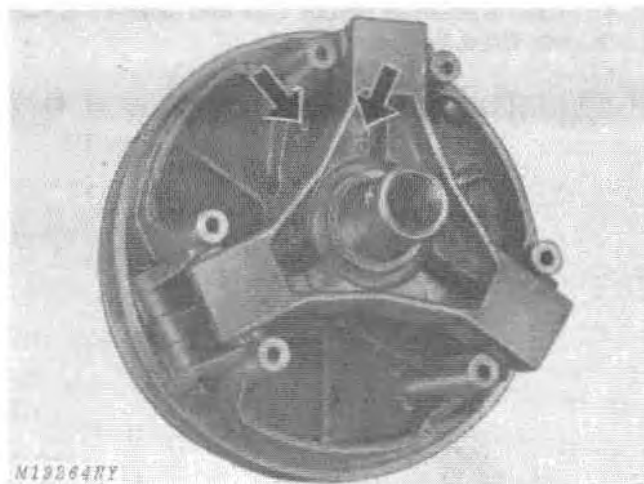
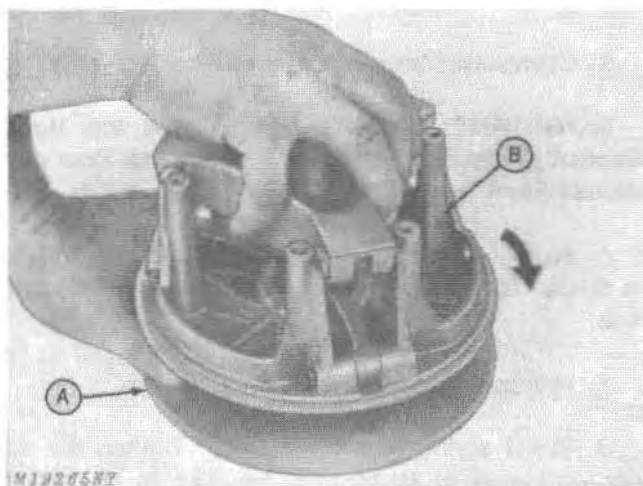


Fig. 14-Identification Marks on Spider and Movable Face

2. Install spider on movable face. Align identification marks on spider with identification marks on movable face, Fig. 14. This is necessary for proper balance of drive sheave.



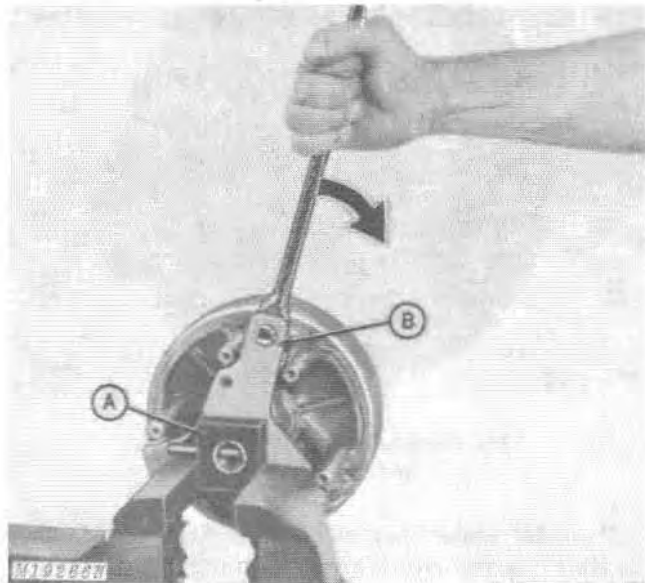
A—Fixed Sheave

B—Movable Face

Fig. 15-Installing Spider and Movable Face

3. Hold fixed sheave (A, Fig. 15) and turn the spider and movable sheave (B) clockwise. Tighten the assembly as far as possible by hand.

4. Install JDM-41-3 Spider Tool and JDM-41-5 Hub Lock over fixed face hub.



A—JDM-41-5 Hub Lock

B—JDM-41-3 Spider Tool

Fig. 16-Installing Spider to Hub

5. Clamp assembly securely in vise, Fig. 16.

IMPORTANT: DO NOT tighten vise too tight. Excess pressure on JDM-41-5 Hub Lock Tool can distort fixed face hub.

6. Install a 1/2-inch socket wrench with long handle in Spider Tool and turn clockwise to tighten spider to hub.

7. Remove Hub Lock and Spider Tools.

8. Install spring and cover plate. Tighten the six screws evenly to 10 to 12 ft-lbs (13.5 to 16.3 N-m) (1.35 to 1.63 kgm).

INSTALLATION

1. Install drive sheave on crankshaft.

2. Install retaining cap screw and washer. Torque retaining cap screw to 50 ft-lbs (68 N-m) (6.8 kgm).

NOTE: Pull on recoil start rope until dogs engage. Hold rope firmly while torquing retaining cap screw.

3. Install drive belt and knock-out plug.

NOTE: Always install drive belt so number on belt can be read when viewed from the left side.

Group 15 JOHN DEERE DRIVEN SHEAVE

REMOVAL

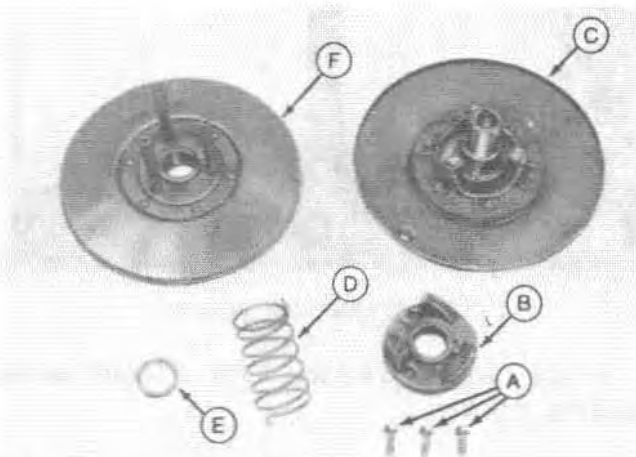
1. Remove belt guard and drive belt.



Fig. 1-Removing Driven Sheave

2. Remove cap screw, washer and spacers. Remove driven sheave and key, Fig. 1.

DISASSEMBLY



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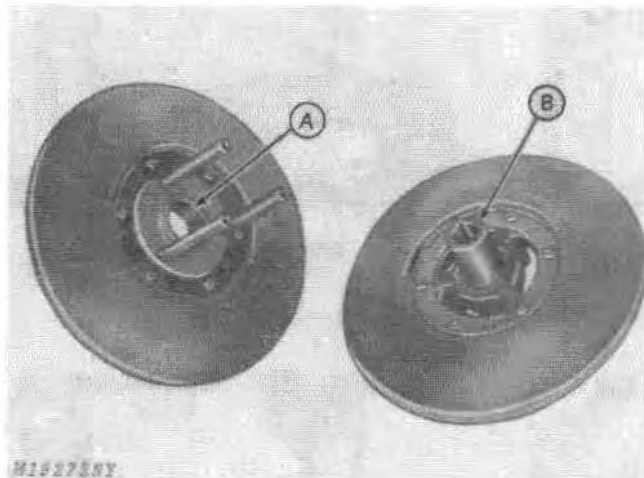
- | | |
|--------------|----------------|
| A—Cap Screws | D—Spring |
| B—Cam | E—Spacer |
| C—Fixed Face | F—Movable Face |

Fig. 2-Disassembling Driven Sheave

1. Remove cam (B) from movable face (F), Fig. 2.
2. Remove spring (D) and fixed face (C) with insert buttons.

INSPECTION AND REPAIR

1. Clean all components in solvent.



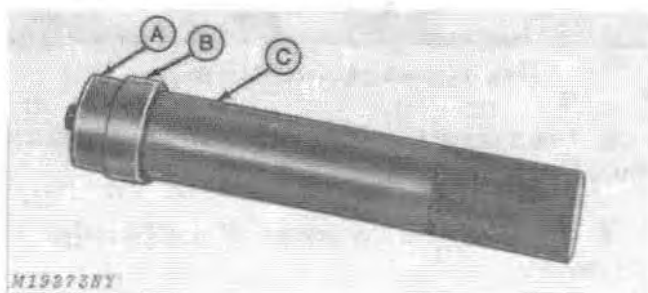
A—Movable Face Bushing

B—Fixed Face Hub

Fig. 3-Movable Face Bushing and Fixed Face Hub

2. Check movable face bushing (A, Fig. 3) and fixed face hub (B) for wear. Replace parts as necessary. Excessive looseness could cause binding.

Replace movable face bushing as follows:



A—27505 Disk

B—27507 Disk

C—27488 Handle

Fig. 4-Tool For Removing Movable Face Bushing

3. Use Owatonna Tool Company Bushing, Bearing and Seal Driver Sets. Install 27507 Disk (B, Fig. 4) and 27505 Disk (A) on 27488 Handle (C).

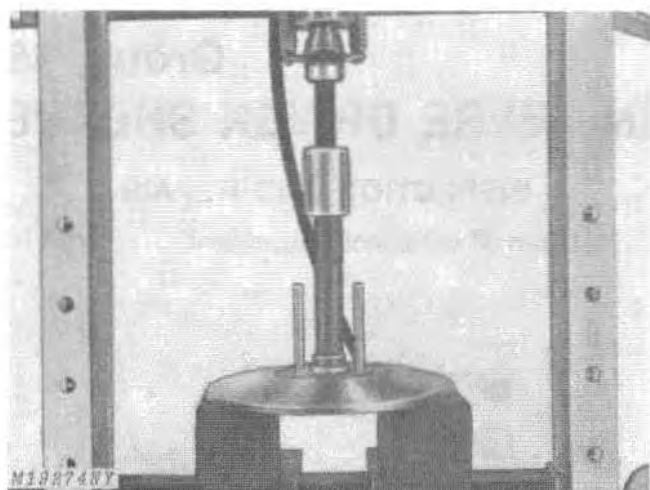


Fig. 5-Removing Movable Face Bushing

4. Use a press to remove old bushing, Fig. 5.

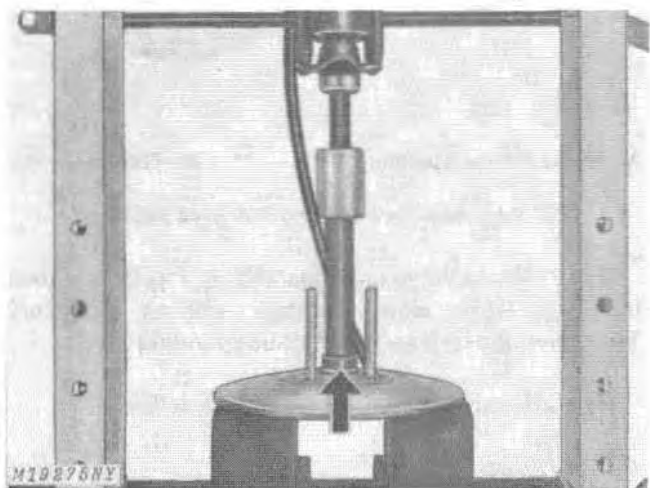
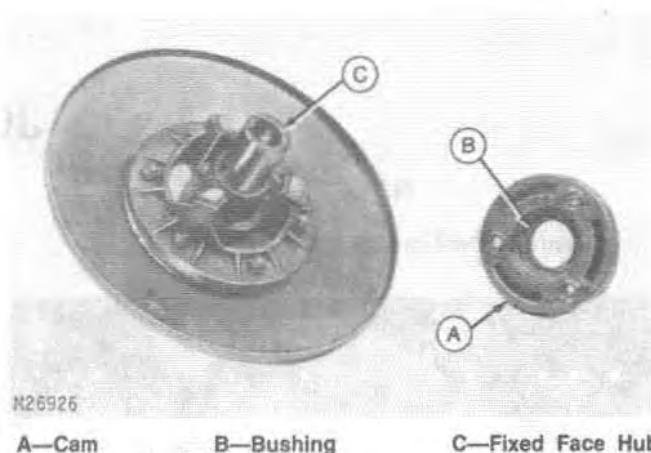


Fig. 6-Installing Movable Face Bushing

5. Use a press to install new bushing flush with the hub, Fig. 6.

6. Inspect spring for cracks or pits. Replace as necessary.

7. Check sheave faces with a straight-edge. Replace if worn, grooved, scored or pitted.



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A—Cam

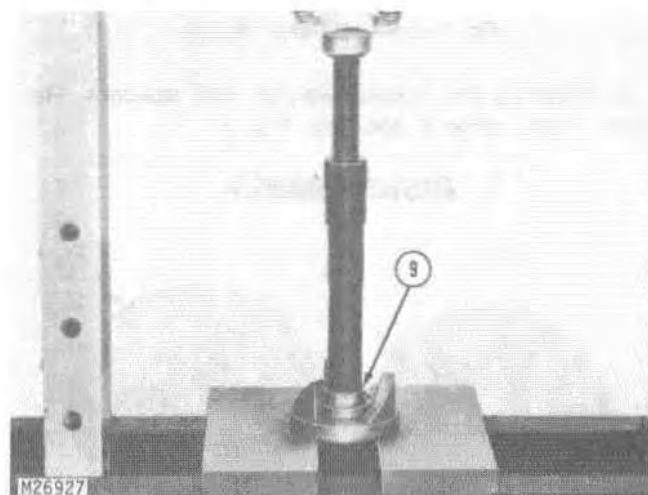
B—Bushing

C—Fixed Face Hub

Fig. 7-Cam Bushing and Fixed Face Hub

8. Check bushing (B, Fig. 7) in cam (A) and fixed face hub (C) for wear. Replace as necessary.

Replace bushing in cam as follows:



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Fig. 8-Removing Cam Bushing

9. Use a press and the tool in Fig. 4, to remove the bushing, Fig. 8.

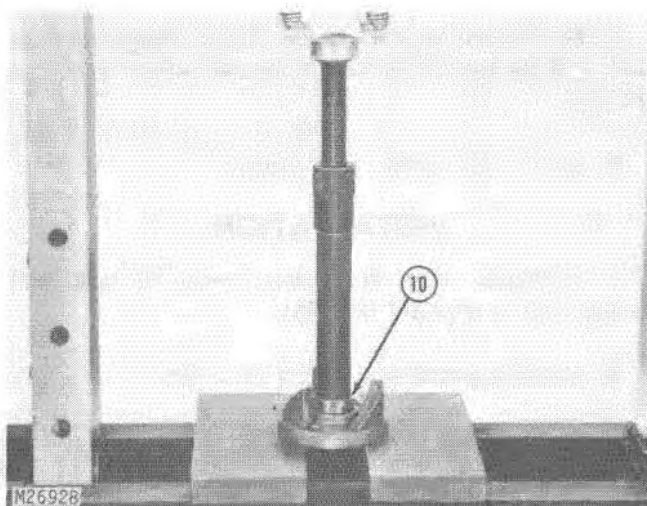


Fig. 9-Installing Cam Bushing

10. Use the same tool to install new bushing flush with top of cam, Fig. 9.

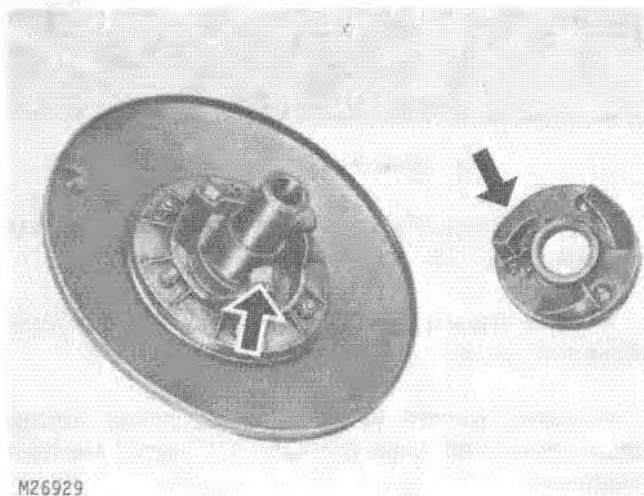


Fig. 10-Inspecting Insert Buttons

11. Inspect insert buttons for wear, Fig. 10. Buttons and mating surface on cam must be smooth. Replace insert buttons as a set.

NOTE: To remove worn buttons, heat tower slightly with a hand torch. Grasp button with a vice grip and pull button out.

12. Replace broken insert buttons as follows: Clamp a pop rivet steel shank (do not use aluminum shank) securely with vice grips and heat end red hot with a hand torch. Push steel shank into center of broken insert button shank, Fig. 11. Allow steel shank to cool slightly and remove insert button shank.

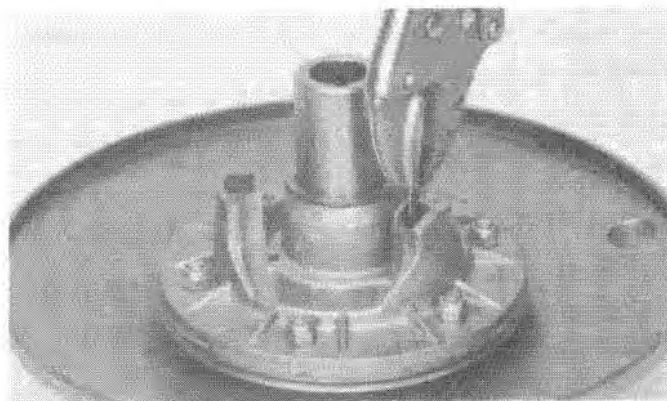


Fig. 11-Replace Insert Button Shank

NOTE: Repeat process until insert button shank is completely removed from bore.

13. Clean all glue out of bore.

14. Use a plastic or wood mallet to gently tap button into bore until it is seated flush. DO NOT tap too hard, buttons are easily broken if hit too hard.

ASSEMBLY

Pretensioning Driven Sheave

NOTE: The spring should be pretensioned in the No. 2 hole.

As temperature or altitude increases, the drive sheave, driven sheave and carburetor must be modified to obtain proper governed speed.

Governed engine speed is 6000 to 6500 rpm.

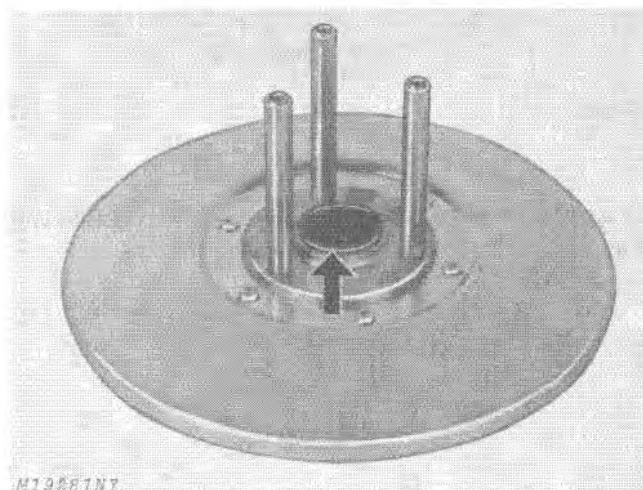
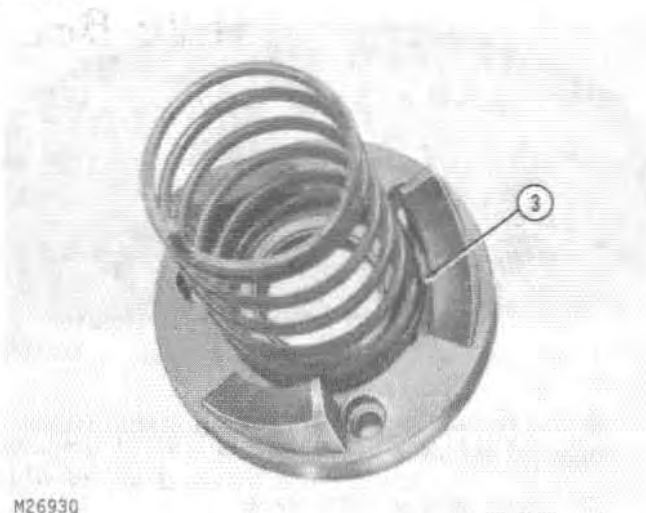


Fig. 12-Movable Sheave

1. Lay movable sheave flat, Fig. 12.

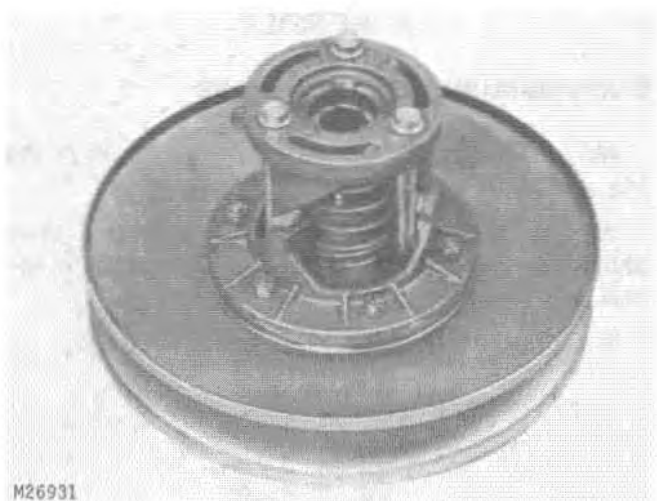
2. Install fixed sheave hub through movable sheave.



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Fig. 13-Spring Installed in Cam

3. Install spring in No. 2 hole in cam, Fig. 13.



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Fig. 14-Installing Cam With Spring

4. Install cam with spring over post of fixed face with tang of spring in hole in fixed face, Fig. 14.

5. Rotate cam past the proper ramp. Push down on cam making sure posts of movable face fit in recesses in cam.

6. Install and tighten cap screws.

INSTALLATION

1. Lubricate drive shaft and inside of hub with Never-Seez Lubricant (PT569).

2. Install spacers and shims on shaft.



Fig. 15-Installing Driven Sheave

3. Place sheave in line with shaft and back key out of sheave Fig. 15.

4. Slide sheave on shaft and push key in to secure sheave to shaft.

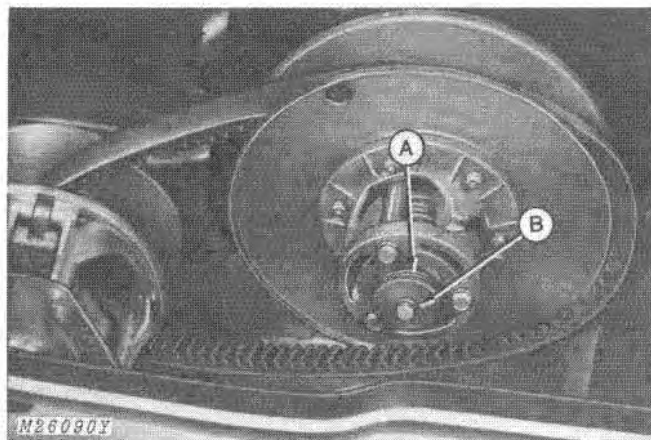
5. Install spacers, washer and cap screw. Torque cap screw to 20 ft-lbs (27 Nm) (2.7 kgm). Recheck alignment.

6. Install drive belt so that number on belt can be read when viewed from left side of snowmobile.

7. Install belt guard.

Group 20 DRIVE BELT

REMOVAL AND INSTALLATION



A—"Anti-Creep" Shims

B—Retaining Washer

Fig. 1-Removing Drive Belt

IMPORTANT: If there is a loss of snowmobile performance or if the belt appears too loose, remove "anti-creep" shims (A) from the outside of the driven sheave. Remove shims until the snowmobile just starts to "creep" at idle speed and then add back one shim. After this adjustment, if snowmobile performance is not satisfactory, realign drive and driven sheaves and install a new drive belt.

If snowmobile has a tendency to "creep", at idle speed, after installing a new belt, add "anti-creep" shims (A) to the outside of the driven sheave, as necessary, to stop "creep" at idle speed.

1. Push in on center of driven sheave and lift belt over sheave half, Fig. 1.

2. Remove belt from drive sheave.

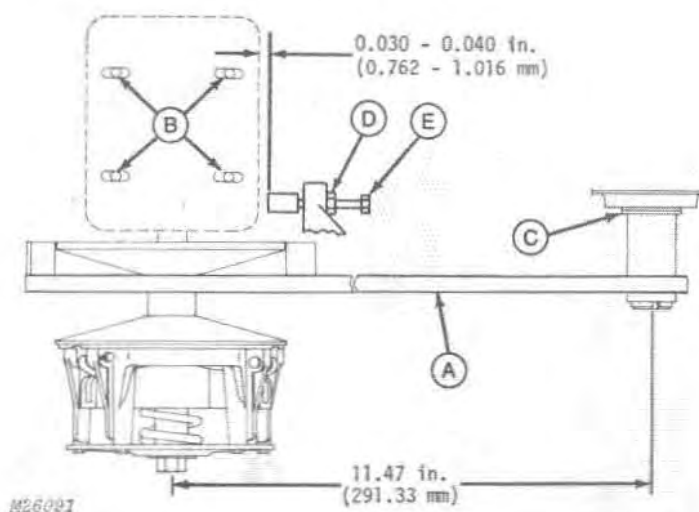
IMPORTANT: Never pry belt over sheaves. No prying is necessary if driven sheave is opened correctly.

CAUTION: Keep fingers out of area between center of driven sheave halves when sheave is opened.

3. Install belt in opposite sequence. Install belt so number on belt can be read when viewed from the left side.

NOTE: The drive belt should be replaced when its width is reduced by 1/8 inch (3.175 mm). Correct drive belt width is 1-1/4 inches (31.75 mm).

ALIGNING DRIVE BELT



A—JDM-81 Clutch Aligning Tool
B—Engine Mounting Bolts

C—Shims (0.018 or 0.060 inch)
D—Snubber Lock Nut

E—Snubber Cap Screw

Fig. 2-Aligning Drive Belt - 102C Clutch

Adjust as follows:

1. Remove drive belt.
2. Remove driven sheave and shims.
3. Loosen engine snubber lock nut (D, Fig. 2). Back off snubber cap screw (E, Fig. 2).
4. Install JDM-81 Clutch Aligning Tool (A, Fig. 2).

NOTE: JDM-81 Clutch Aligning Tool will fit snug on the primary sheave shaft. If necessary, tap the tool into place by hand over the primary sheave shaft.

5. For side-to-side adjustment, add shims (C) between the tool (A) and secondary shaft bearing, Fig. 2. Shims are available in 0.018 or 0.060-inch thicknesses.

6. For forward or rearward adjustment, loosen engine mounting bolts (B, Fig. 2) and move engine.

IMPORTANT: Always rotate the drive sheave 120 degrees and recheck alignment.

7. Thread snubber cap screw (E) against engine crankcase. Back off snubber to give 0.030 to 0.040 inch (0.762 to 1.016 mm) clearance between the engine crankcase and snubber. Tighten lock nut (D).

IMPORTANT: The 0.030 to 0.040 inch (0.762 to 1.016 mm) clearance must be maintained between the engine crankcase and snubber. DO NOT use the snubber as a jackscrew to align the engine.

8. Install drive belt so number on belt can be read when viewed from the left side.

DIAGNOSING MALFUNCTIONS

Problem	Cause	Solution
Uneven belt wear on one side only.	Sheave misalignment. Loose engine base.	Align sheaves. Replace or tighten base.
Belt glazed or has baked appearance.	Insufficient pressure on belt sides. Excessive horsepower for belt and clutch. Oil on sheave surfaces.	Check drive sheave for worn flyweights or clutch arms. Be sure correct clutch is being used. Clean sheave surfaces.
Belt worn excessively in top width.	Excessive slippage. Rough or scratched sheave surfaces. Improper belt angle.	Check drive sheave for smooth operation. Replace or repair sheaves. Check alignment.
Belt worn narrow in one section.	Excess slippage due to frozen track or clutch not functioning properly.	Rotate track by hand until free. Repair or replace clutch.
Belt too tight at engine idle.	Idle speed too high. Incorrect belt length. Incorrect shims in secondary.	Reduce speed. Check belt. Add a shim.
Belt disintegration.	Excessive belt speed.	Check engine speed at wide open throttle.
Belt worn concave on sides.	Excessive ride out on drive sheave.	Repair or replace sheave. Belt too long.
Belt "Flip-Over" at high speed.	Sheave misalignment. Excessive belt speed. Excessive ride out on drive sheave.	Align sheaves. Reduce engine rpm. Belt too long.
Belt edge cord breakage.	Sheave misalignment. Improper belt.	Align sheaves. Check drive belt.
Flex cracks between cogs.	Belt worn out.	Replace belt.
Sheared cogs, compression section fractured or torn.	Improper belt. Belt rubbing stationary object.	Check belt. Check drive sheave.

Group 25

CHAIN CASE, SECONDARY SHAFT AND DRIVE SHAFT

CHAIN CASE FINAL DRIVE RATIOS

Upper Sprocket (No. of Teeth)	Lower Sprocket (No. of Teeth)	Chain Length (No. of Pitches)	Ratio
21*	39*	66	1.86:1
25	39	68	1.56:1
17	35	62	2.06:1
17	42	66	2.47:1
24	40	68	1.67:1
22	38	66	1.72:1

*Factory Installed

DRIVE CHAIN AND SPROCKETS

REMOVAL

1. Loosen chain case cover to drain oil. Remove cover.



Fig. 1-Chain Tensioner, Sprockets and Chain

2. Remove chain tensioner, Fig. 1.
3. Remove sprockets and drive chain.

IMPORTANT: Record the number of shims between sprockets and bearings for reassembly.

INSPECTION

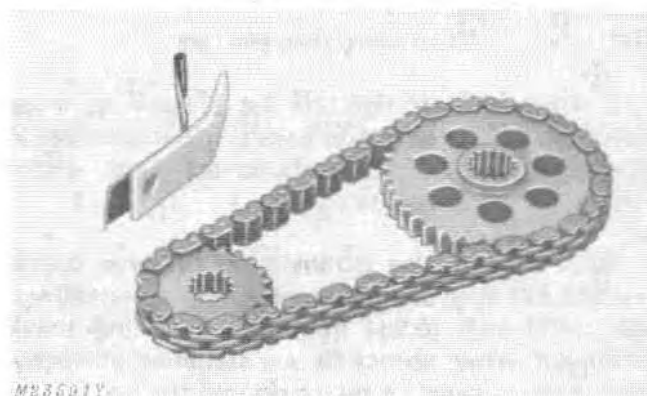


Fig. 2-Chain, Sprockets and Tensioner

1. Inspect drive chain for wear. Replace chain if worn or broken, Fig. 2.

NOTE: Drive chain is an endless chain and cannot be repaired.

2. If new chain is installed, replace sprockets. New chain will not properly match worn sprockets.

NOTE: Rapid chain and sprocket wear is caused by misalignment or lack of lubrication.

3. Replace chain tensioner if contact surface is worn until only 1/16 inch (1.588 mm) of material remains.

ALIGNING DRIVE SPROCKETS

1. Install spacer and four 0.010-inch (0.254 mm) shims and sprocket on lower shaft. Tighten cap screw.

2. Install two 0.018-inch (0.457 mm) shims and upper sprocket. Tighten cap screw.



Fig. 3-Aligning Drive Sprockets

3. Place straightedge on flat surface of lower sprocket, Fig. 3, and slide toward upper sprocket to check alignment. If sprockets do not align, add or deduct shims as necessary.

IMPORTANT: Use a maximum of three 0.018-inch (0.457 mm) shims behind upper sprocket and ten 0.010-inch (0.254 mm) shims behind lower sprocket. When sprockets are shimmed correctly, the shafts should be recessed into the sprockets. **DO NOT** allow shafts to protrude beyond the sprockets.

NOTE: Upper and lower sprockets must be aligned within 0.010 inch (0.254 mm) of each other.

4. Remove sprockets and leave spacer and shims in place.

INSTALLATION

1. Place drive chain around both sprockets.

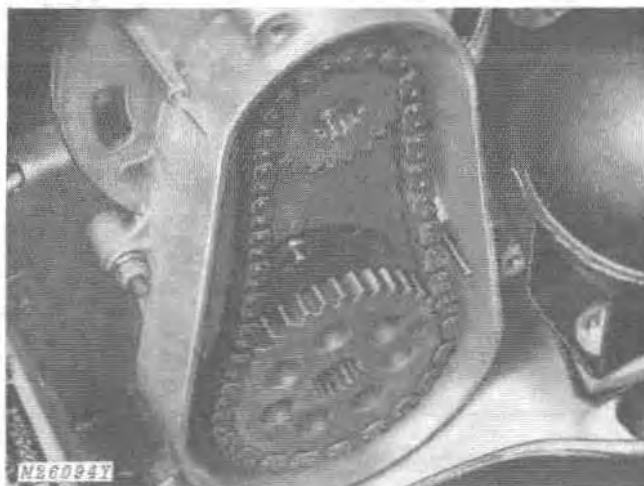


Fig. 4-Drive Chain and Sprockets

2. Install sprockets and chain as an assembly, Fig. 4.

3. Apply Loctite to cap screws and tighten securely.

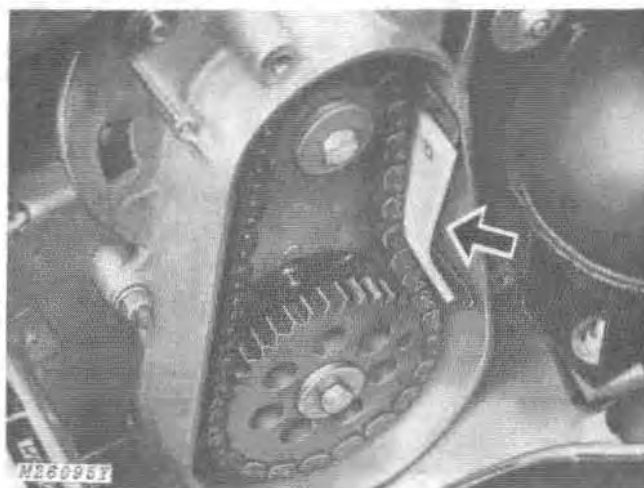


Fig. 5-Installing Chain Tensioner

4. Install chain tensioner, Fig. 5.

5. Install chain case cover.

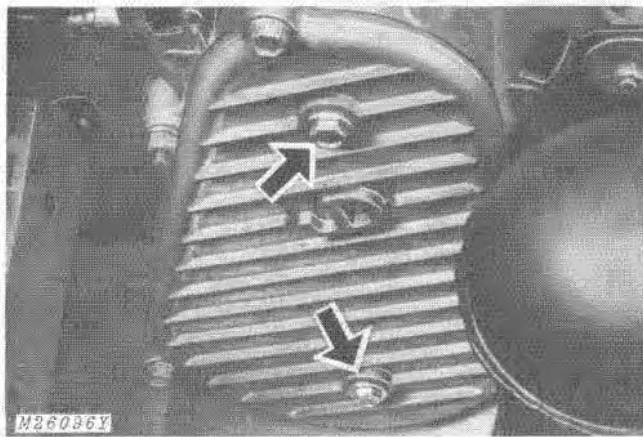


Fig. 6-Chain Case Fill and Drain Plugs

6. Remove upper and lower plugs, Fig. 6. Add API-GL5 gear oil (SAE 90) in the upper hole until it starts to run out lower hole. Replace plugs.

SECONDARY SHAFT REMOVAL

1. Remove drive belt and driven sheave.

IMPORTANT: Record shims between retaining washer and driven sheave and driven sheave and bearing. These shims tension and align the driven sheave.

2. Remove air intake silencer.

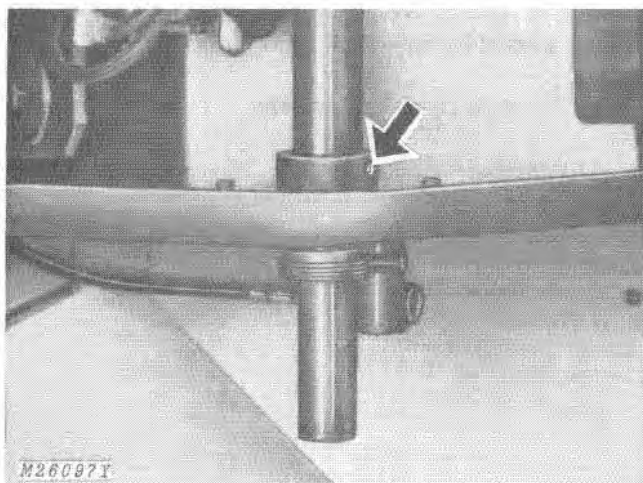


Fig. 7-Locking Collar

3. Remove locking collar set screw, Fig. 7.
4. Loosen collar by driving it clockwise.

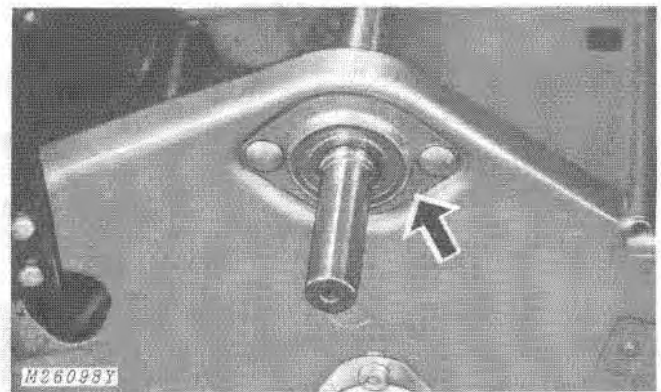


Fig. 8-Secondary Shaft Left-Hand Bearing

5. Remove left-hand bearing, Fig. 8.
6. Remove chain case cover, sprockets and chain.

IMPORTANT: Record shims between sprockets and bearings for reassembly.

7. Loosen right-hand bearing.
8. Slide secondary shaft to the left, to remove.

NOTE: DO NOT lose spring inside hub of brake disk.

INSPECTION

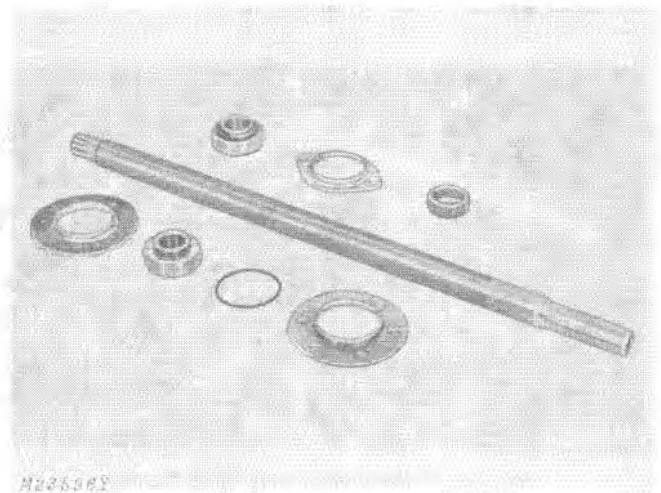


Fig. 9-Secondary Shaft

1. Check shaft bearing surfaces, Fig. 9, for evidence of bearings turning on shaft.
2. Inspect splined end.
3. Replace shaft if defective.
4. Check bearing and flanges.

INSTALLATION

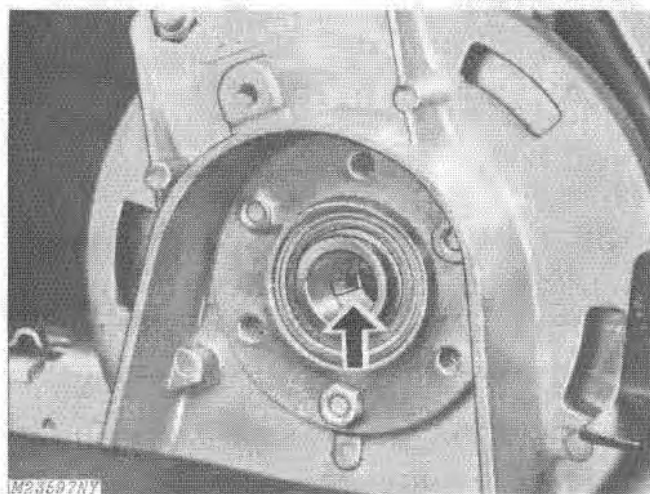


Fig. 10-Brake Disk Spring

1. Install flat spring in brake disk, Fig. 10.
2. Position brake disk and install secondary shaft through brake disk and chain case bearing.

IMPORTANT: Use Never-Seez on secondary shaft in area of brake disk. **DO NOT** allow Never-Seez to get on face of brake disk.

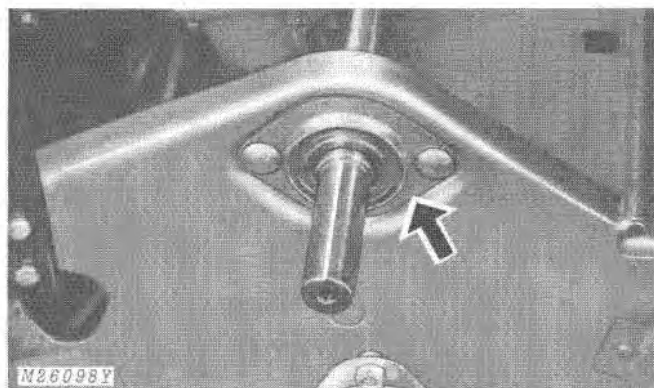


Fig. 11-Left-Hand Secondary Shaft Bearing

3. Install locking collar, bearing and flangettes on shaft and secure to left side of tunnel, Fig. 11.
4. Install spacer, shims, sprockets and drive chain. Add chain case oil.

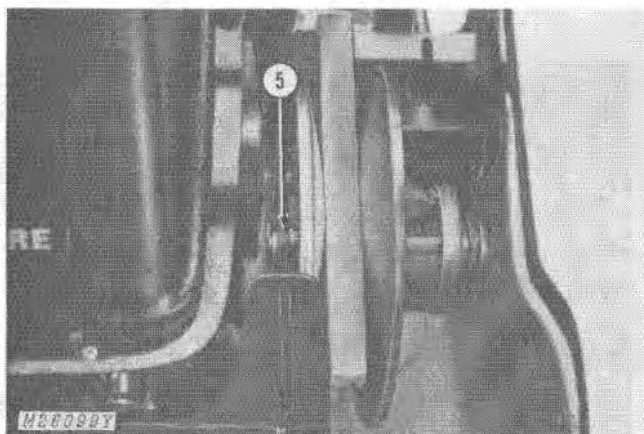


Fig. 12-Installing Driven Sheave, Spacer and Shims

5. Install spacer, shims and driven sheave, Fig. 12.
6. Install air intake silencer.
7. Recheck belt alignment.
8. Install drive belt.

DRIVE SHAFT

REMOVAL

1. Siphon fuel from tank and drain chain case oil.
2. Remove drive belt, driven sheave and shims.
3. Remove chain case cover, tensioner, sprockets and drive chain.

NOTE: Use JDST-24 Lift and Repair Stand. If stand is not available, turn snowmobile on its side.

4. Remove slide suspension.
5. Remove bolts securing drive wheels to drive shaft.

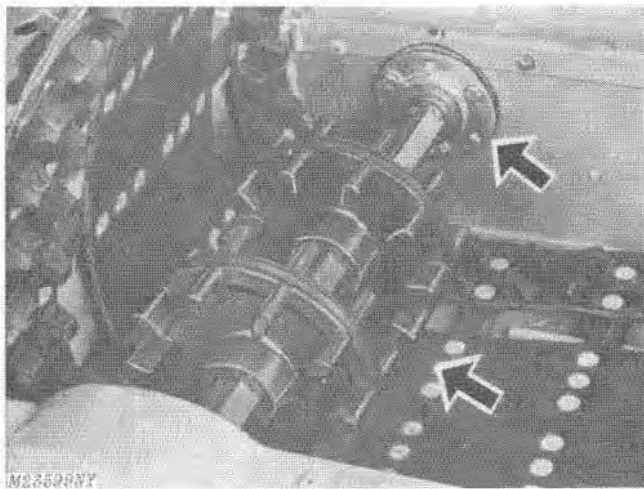


Fig. 13-Drive Wheels

6. Move drive wheels toward center of shaft, Fig. 13.

7. Remove cap screws securing bearing flangettes to tunnel.

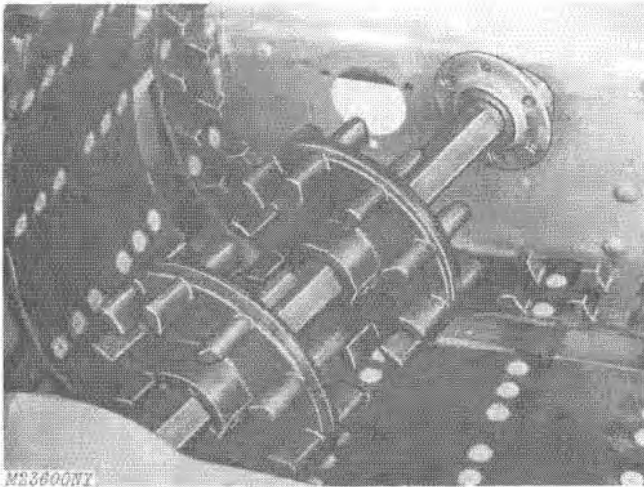


Fig. 14-Removing Drive Shaft

8. Move drive shaft toward chain case side. Lift end with spacer to remove shaft, Fig. 14.

INSPECTION

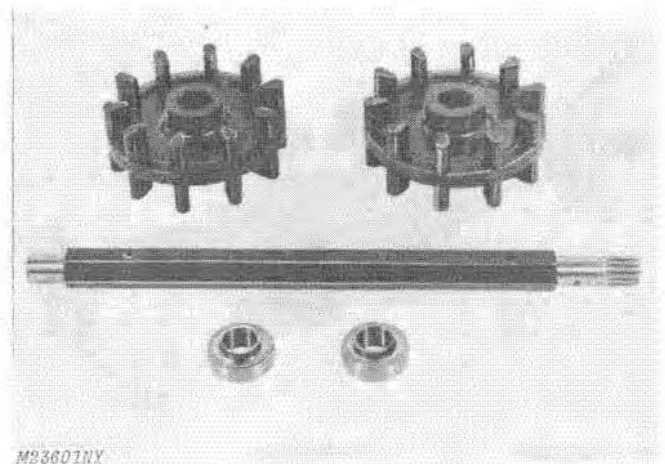


Fig. 15-Drive Shaft and Bearings

1. Check shaft bearing surfaces, Fig. 15, for evidence of bearings turning on shaft.

2. Inspect drive shaft bearings, Fig. 15. Replace them if they are binding, worn or noisy. Use a NEW O-ring on chain case bearing.

3. Inspect drive wheels and replace them if lugs are worn down to metal center.

NOTE: Rapid wear on leading edge of drive lugs indicates snowmobile was run without proper snow lubrication. Wear on trailing edge is normal after many hours of operation.

INSTALLATION

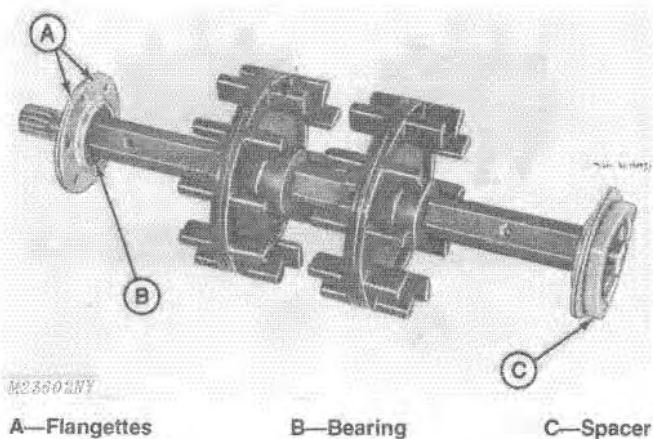


Fig. 16-Assembling Drive Shaft and Bearings

1. Assemble bearing flangettes (A), bearing (B) and spacer (C) on drive shaft, Fig. 16.

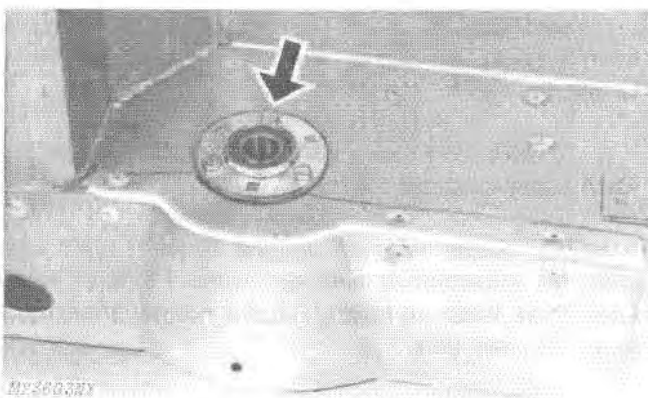


Fig. 17-Chain Case Bearing Installed

2. Lubricate and install O-ring on chain case bearing. Install bearing and flangettes in tunnel on chain case side, Fig. 17. DO NOT tighten nuts.

NOTE: Install new gasket on flangette side facing chain case. Gasket sticks to flangette and is between flangette and chain case.

IMPORTANT: Bearing locking flanges must face splined end of drive shaft.

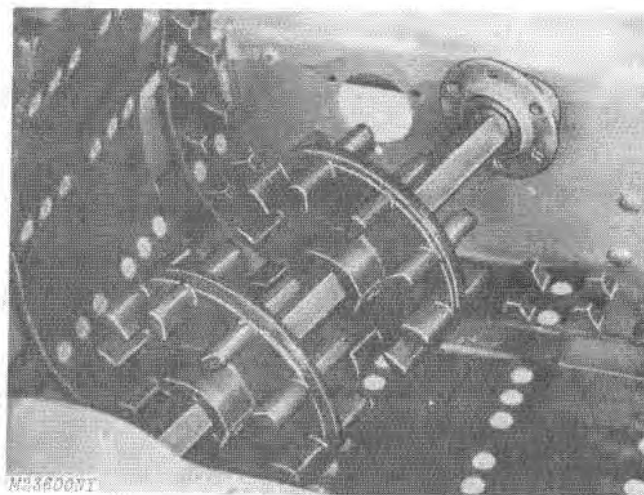


Fig. 18-Installing Drive Shaft

3. Position splined end of drive shaft through bearing in tunnel, Fig. 18.

IMPORTANT: Be sure chain case bearing O-ring is in correct position, or oil leakage will occur.

4. Position drive shaft and spacer. Install and tighten cap screws and nuts securing bearing flangettes.
5. Tighten bearing flangette nuts on chain case side.

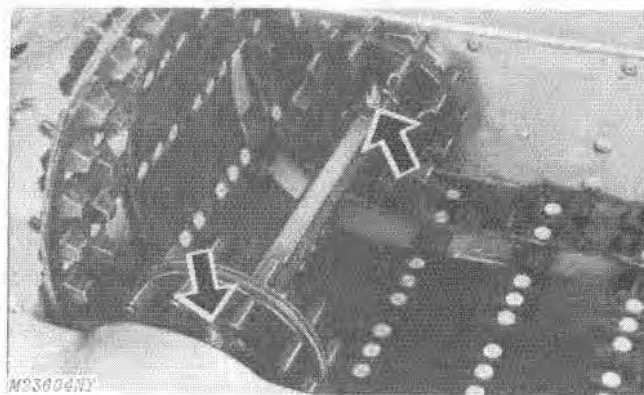


Fig. 19-Drive Wheels Secured to Shaft

6. Move drive wheels into position and secure with bolts, washers and lock nuts, Fig. 19.
7. Install slide suspension.
8. Install sprockets, chain and tensioner in chain case.
9. Install driven sheave and drive belt.
10. Add API-GL 5 gear oil (SAE 90) to chain case.
11. Adjust track tension.
12. Fill fuel tank.

CHAIN CASE

REMOVAL

1. Relieve track tension.
2. Remove engine muffler and bracket.
3. Loosen chain case cover screws to drain oil.
4. Remove chain case cover, tensioner, sprockets and drive chain.
5. Remove upper and lower flange nuts.
6. Remove air intake silencer.
7. Remove drive belt, drive sheave and secondary shaft.

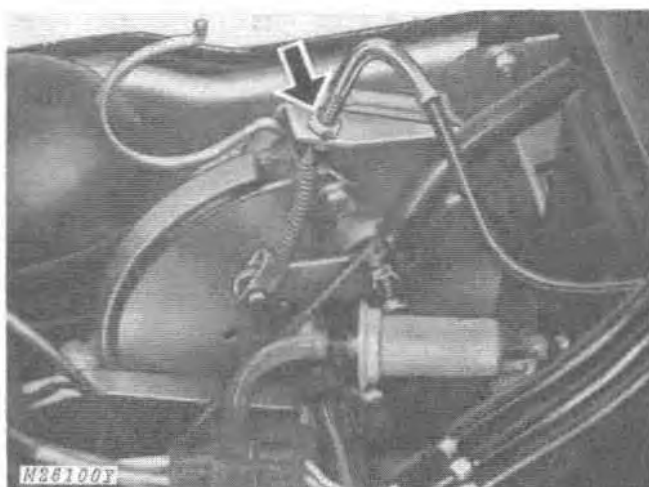


Fig. 20-Brake Cable, Brake Arm and Bracket

8. Remove brake cable from brake arm and bracket, Fig. 20.

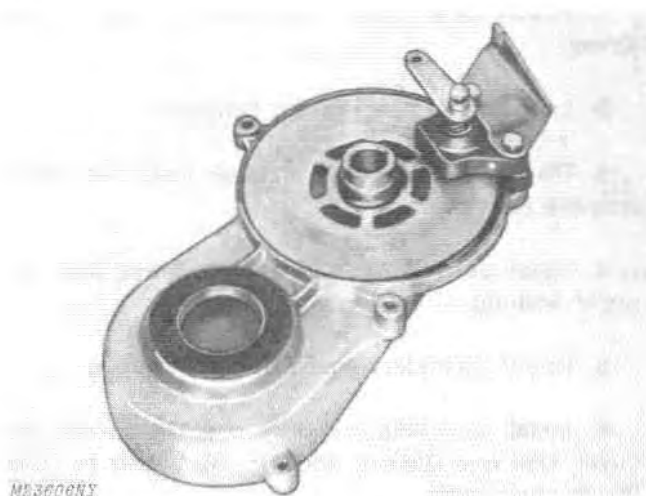


Fig. 21-Chain Case, Brake Disk and Pucks

9. Remove chain case with brake assembly, Fig. 21.
10. Remove brake disk, body, retainer, pucks and brake cable bracket from chain case.

INSPECTION

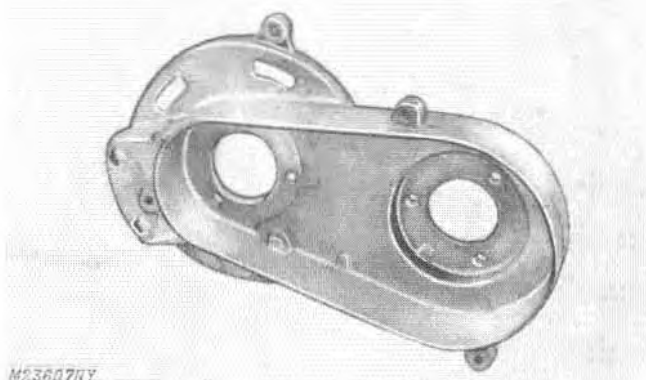


Fig. 22-Inspecting Chain Case

1. Inspect chain case, Fig. 22, for cracks or other damage that could cause chain and sprocket misalignment, or oil leakage.
2. Install new rubber gasket when installing chain case cover.

INSTALLATION

1. Attach chain case and muffler bracket to the tunnel.
2. Install upper bearing and flanges.
3. Place brake disk in chain case. Install flat spring in brake disk hub.
4. Install secondary shaft through brake disk and upper bearing.
5. Install secondary shaft left-hand bearing.
6. Install sprockets and drive chain, tensioner and cover. Use new gasket. Add API-GL 5 gear oil (SAE 90) to chain case.
7. Install brake puck body and puck, retainer and brake cable. Adjust brakes.
8. Install engine muffler and air intake silencer.
9. Install driven sheave and drive belt.
10. Adjust track tension.

Group 30 MECHANICAL DISK BRAKE DISK BRAKE

REMOVAL

1. Remove drive belt and driven sheave.
2. Remove air intake silencer.
3. Remove secondary shaft left-hand bearing.
4. Remove chain case cover, chain tensioner, drive chain and sprockets.

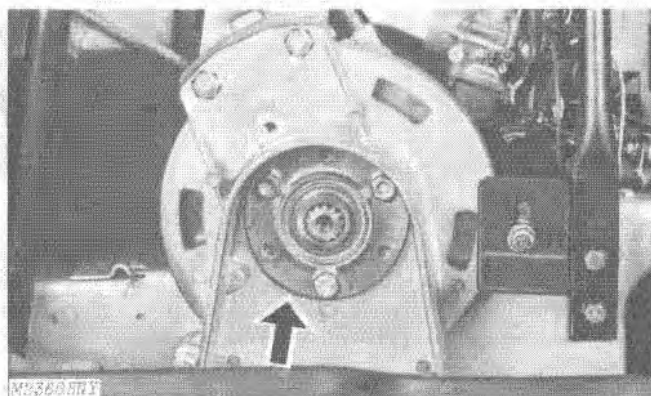
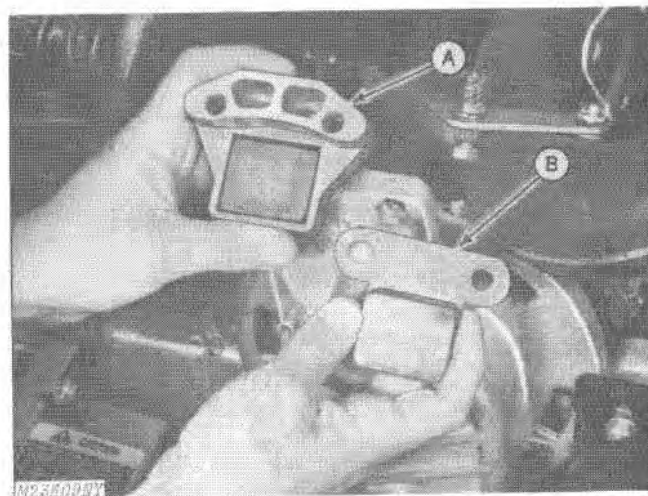


Fig. 1-Bearing Assembly in Chain Case

5. Loosen secondary shaft bearing assembly in the chain case, Fig. 1.
6. Slide secondary shaft to the left to free it from the brake disk.



A—Brake Puck Body

B—Brake Puck Retainer

Fig. 2-Removing Brake Puck Body and Retainer

7. Remove brake puck body brake cable, and brake puck retainer, Fig. 2.

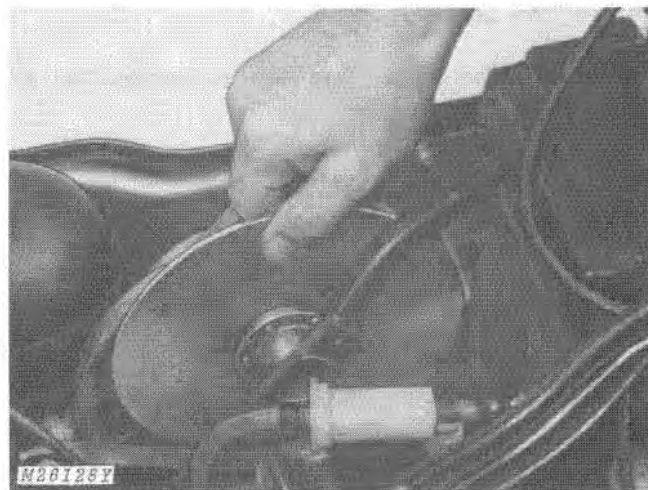


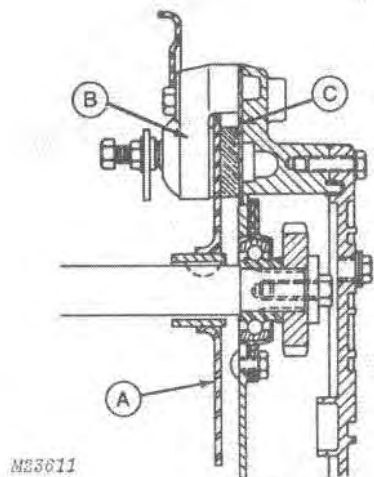
Fig. 3-Removing Brake Disk

8. Remove brake disk, Fig. 3.

INSPECTION

1. Replace brake pucks if contaminated or worn enough to prevent proper brake adjustment.
2. Replace brake disk or cable if worn or damaged.

INSTALLATION



A—Brake Disk B—Brake Puck Body C—Brake Puck Retainer

Fig. 4-Installing Brake Disk, Retainer and Body

1. Install brake disk (A), brake puck retainer (C) and brake puck body (B), Fig. 4.

NOTE: Whenever a new disk is installed, always install new brake pucks.

2. Position secondary shaft through brake disk and chain case bearing.

IMPORTANT: Use Never-Seez on secondary shaft in area of brake disk to prevent disk from seizing or sticking.

3. Tighten chain case bearing assembly.
4. Install and tighten secondary shaft left-hand bearing.
5. Install air intake silencer.
6. Install driven sheave and drive belt.
7. Install drive chain and sprockets, chain tensioner and chain case cover. Add API-GL 5 gear oil (SAE 90) to chain case.
8. Adjust brake.

BRAKE PUCKS

REMOVAL AND INSTALLATION

1. Remove brake puck body with cable and brake puck retainer.
2. Loosen jam nut and back out the adjusting screw.
3. Install brake puck retainer and brake puck body with cable.

ADJUSTMENT

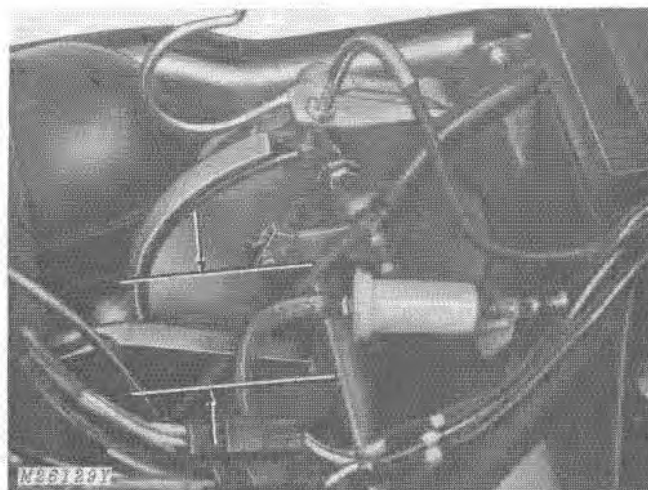


Fig. 5-Adjusting Brake Cable and Arm

1. Loosen or tighten jam nuts on brake cable until arm is parallel with tunnel, Fig. 5.

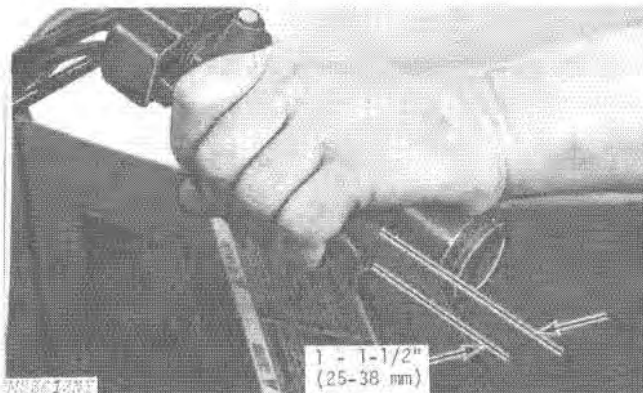


Fig. 6-Brake Lever

2. Turn adjusting screw in until 1 to 1-1/2 inches (25 to 38 mm) clearance exists between the brake lever and the handgrip, Fig. 6.
3. Tighten jam nut securely.
4. After brake adjustment, check stop light operation.

Group 35 SPECIFICATIONS

SPECIFICATIONS

Drive Belt Total Width	1-1/4 in. (31.75 mm)
Drive Belt Effective Length	46.30 \pm 0.25 in. (1175.62 \pm 6.35 mm)
Drive Sheave Alignment	See page 50-20-2

TORQUE FOR HARDWARE

Location	Torque
Drive Sheave Retaining Cap Screw	50 ft-lbs (68 Nm)
Driven Sheave Retaining Cap Screw	20 ft-lbs (27 Nm)

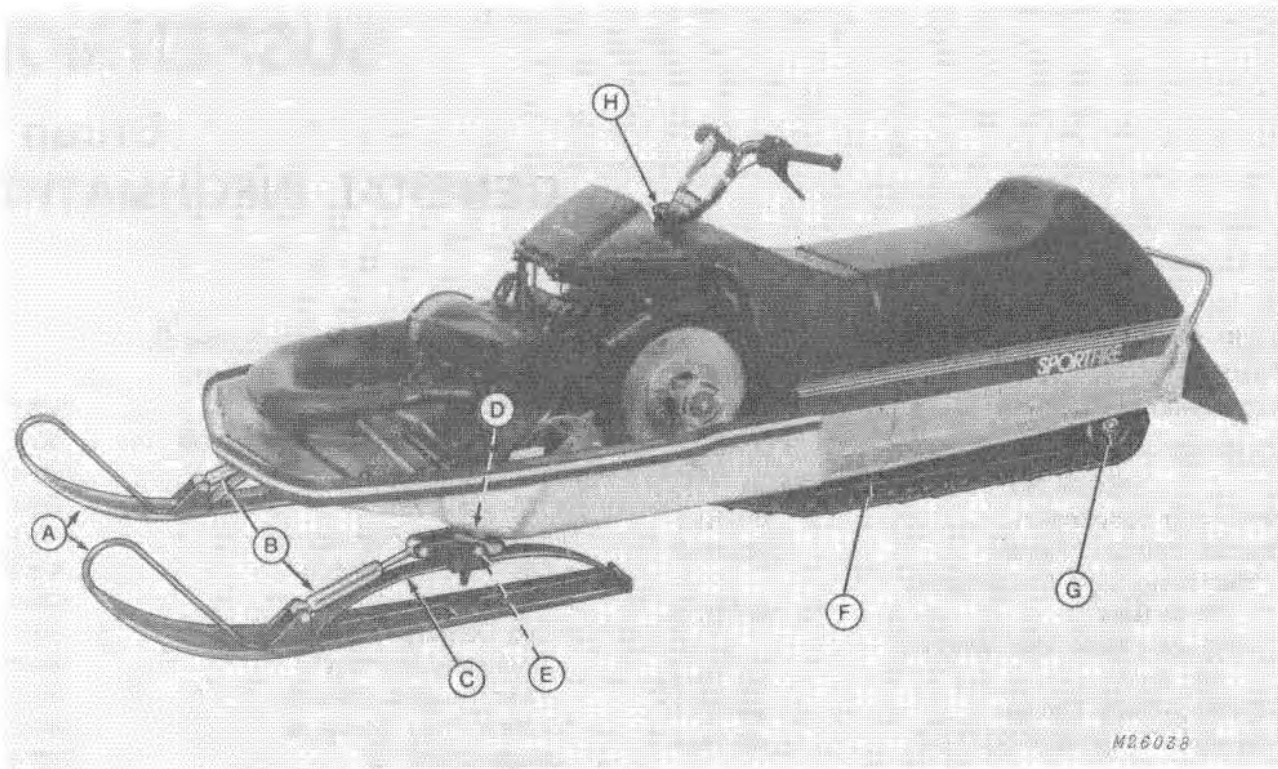
Section 60 SUSPENSION

Group 5 GENERAL INFORMATION

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DESCRIPTION



M26028

A—Skis
B—Shock Absorbers

C—Ski Spring
D—Steering Arm

E—Ski Spindle
F—Slide Suspension

G—Rear Idler Assembly
H—Steering Post

Fig. 1-Slide Suspension Components

The suspension system, Fig. 1, consists of the skis and steering mechanism, track and slide suspension. The system has replaceable wear bars, adjustable suspension springs and hydraulic shock absorbers.

The track has riveted steel grouser bars which are replaceable.

The skis have replaceable wear rods and wear plates. The ski spindles are mounted in replaceable bearings.

DIAGNOSING MALFUNCTIONS**Track Assembly****Track Edge Frayed**

Track out of alignment.

Track Grooved on Inner Surface

Track run too tight.

Rear idler shaft bearings frozen.

Track Drive Ratcheting

Track too loose.

Rear Idlers Turning on Shaft

Rear idler shaft bearings frozen.

Skis and Steering**Loose Steering**

Tie rod ends loose.

Spindle bushings worn.

Spindle splines stripped.

Skis Not Turning Equally in Both Directions

Tie rod adjusted improperly.

Steering arms installed improperly.

Rapid Ski Wear

Skis out of alignment.

Wear rods worn out.

Spring wear plate worn out.

Running in marginal snow cover.

Group 10

SLIDE SUSPENSION

(Serial No. 120,001-190,000)

REMOVING SUSPENSION

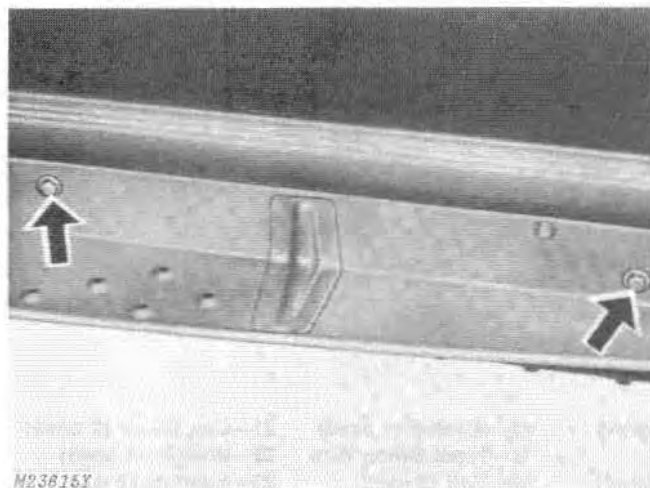


Fig. 1-Suspension Retaining Bolts

1. Remove suspension retaining bolts, Fig. 1, from each side of tunnel. Remove rear bolts first.

Remove upper tunnel idler wheels.

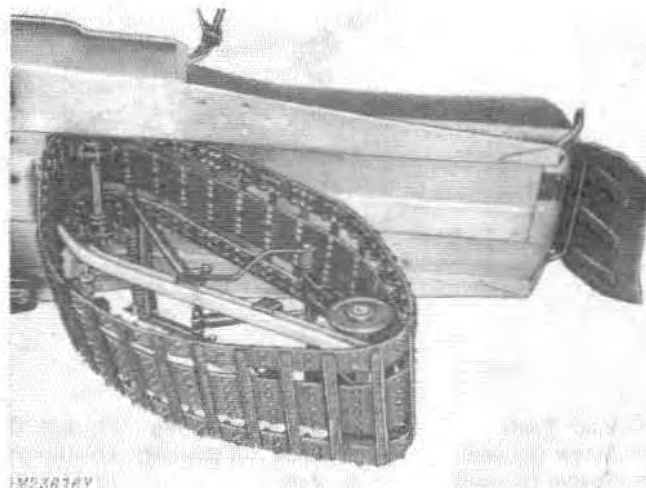


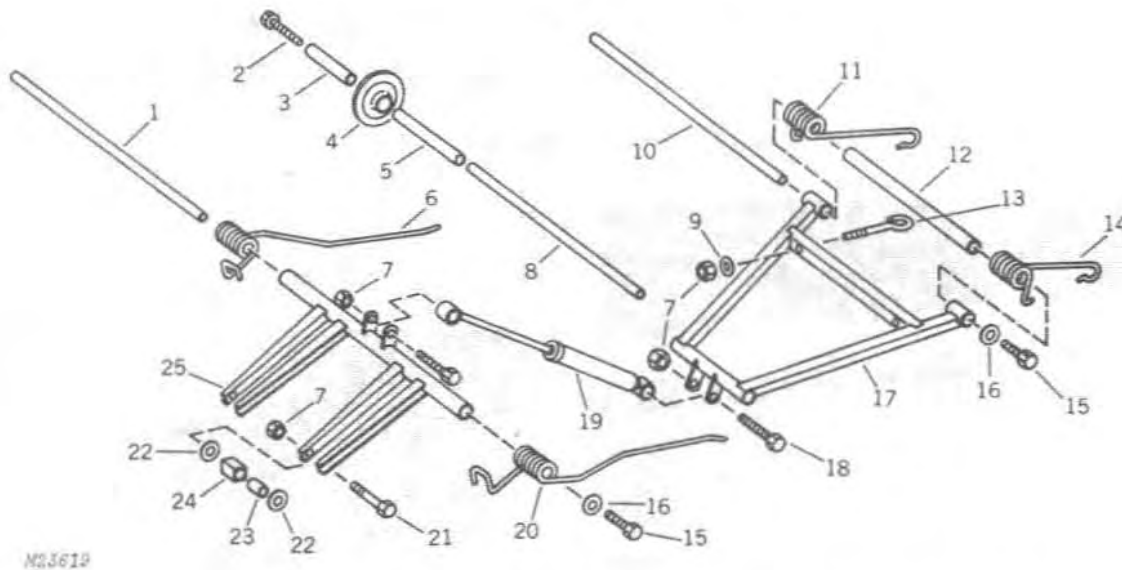
Fig. 2-Removing Slide Suspension

2. Turn the snowmobile on its right side and remove the suspension, Fig. 2.

IMPORTANT: Siphon all fuel from the tank to prevent spillage when snowmobile is on it's side.

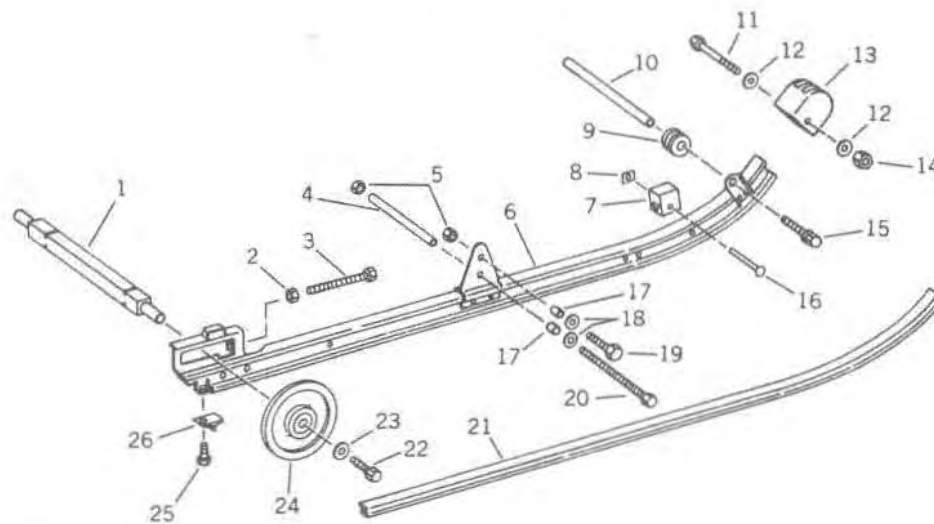
CAUTION: Gasoline is dangerous, even when mixed with oil. Avoid fire due to smoking or careless maintenance practices.

DISASSEMBLY AND REPAIR



- | | | | | |
|------------------------|---------------------|--------------------------|---------------------|--------------------------|
| 1—Pivot Shaft | 6—L.H. Rear Spring | 11—L.H. Front Spring | 16—Washer (4 used) | 21—Cap Screw (2 used) |
| 2—Screw (2 used) | 7—Lock Nut (6 used) | 12—Hinge Tube | 17—Front Swing Arm | 22—Washer (4 used) |
| 3—Spacer (2 used) | 8—Axle | 13—Eye Bolt (2 used) | 18—Bolt (2 used) | 23—Bushing (2 used) |
| 4—Bogie Wheel (2 used) | 9—Washer (2 used) | 14—R.H. Front Spring | 19—Shock Absorber | 24—Slip Bearing (2 used) |
| 5—Spacer | 10—Pivot Shaft | 15—Locking Bolt (4 used) | 20—R.H. Rear Spring | 25—Rear Pivot Arm |

Fig. 3—Exploded View of Slide Suspension



- | | | | | |
|----------------------|---------------------|-----------------------|-------------------------|---------------------------|
| 1—Axle | 6—Slide Rail | 11—Cap Screw (2 used) | 16—Truss Rivet (4 used) | 21—Wear Bar (2 used) |
| 2—Nut (2 used) | 7—Bumper (4 used) | 12—Washer (4 used) | 17—Spacer (4 used) | 22—Cap Screw (2 used) |
| 3—Cap Screw (2 used) | 8—Push Nut (4 used) | 13—Cap (2 used) | 18—Washer (4 used) | 23—Washer (2 used) |
| 4—Spacer | 9—Bearing (2 used) | 14—Lock Nut (2 used) | 19—Cap Screw (2 used) | 24—Idler Wheel (2 used) |
| 5—Lock Nut (3 used) | 10—Bearing Shaft | 15—Bolt (2 used) | 20—Cap Screw | 25—Cap Screw (2 used) |
| | | | | 26—Wear Bar Stop (2 used) |

Fig. 4—Exploded View of Slide Suspension

Replacing Slide Suspension Wear Bars

1. Remove suspension.
2. Remove cap (13, Fig. 4) from front of suspension.

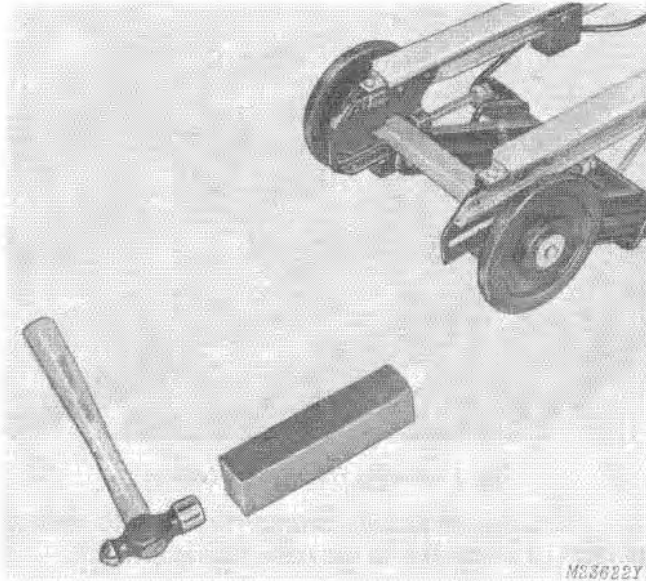


Fig. 5-Removing Slide Wear Bar

3. Use a wood block and hammer to remove the wear bar, Fig. 5.
4. Lubricate slide rail and wear bar with a liquid soap solution.
5. Install new wear bar (cut to length) from the front and drive it in place with a soft mallet.
6. Install cap.
7. Install suspension.

Replacing Rear Idler Wheels and Axle

1. Remove suspension.
2. Remove cap screws, idler wheels and washers from each end of rear axle shaft, Fig. 6.
3. Loosen both adjusting screws and slide rear axle forward. Remove axle through square hole in slide rail.

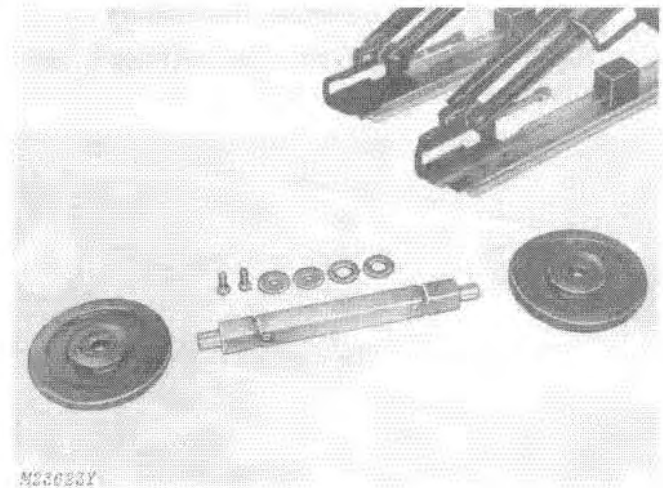


Fig. 6-Rear Axle Shaft and Wheels

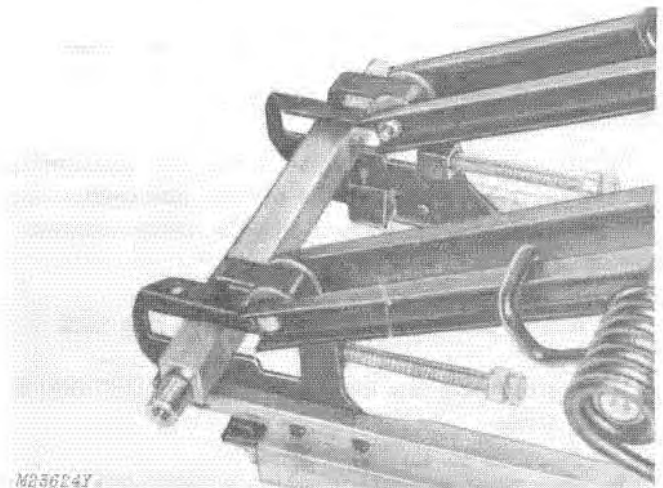


Fig. 7-Installing Rear Axle

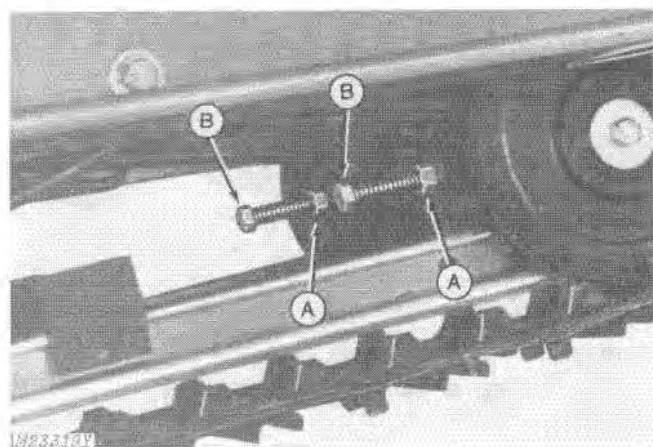
4. To reassemble: Place rear axle through slide rail with holes in axle facing forward. Be sure grooves in axle fit slide rail correctly, Fig. 7.
5. Partially tighten both adjusting screws.
6. Install washer, idler wheel, washer and cap screw on each end of axle.

NOTE: Use Loctite on each cap screw.

7. Install suspension.

ADJUSTING TRACK TENSION

1. Support rear of snowmobile so that track is clear of ground.



A—Jam Nuts

B—Adjusting Screws

Fig. 8-Adjusting Track Tension

2. Tension the track to give 0 to 1/4-inch (6.35 mm) clearance between the inside of track and bottom of the wear bar, Fig. 8. Measure below shock absorber mount.

3. Adjust both sides equally. Tighten jam nuts.
4. Start engine and idle track slowly until it rotates several times.
5. Shut off engine and allow track to coast to a stop. **DO NOT APPLY BRAKE.**

Check alignment as follows:

1. Rear idler wheels should run in center of drive lugs.
2. Slide wear bar should be in center of slide rail opening on each side of track.
3. If either Step 1 or 2 is off, retension track.

NOTE: Track will run to the loose side. For example, if the track is too far to the left side, tighten the left side to move the track to the right.

4. Run track again to recheck.

ADJUSTING SUSPENSION SPRINGS

- Ride the snowmobile to determine spring adjustments.

Front Spring Adjustment

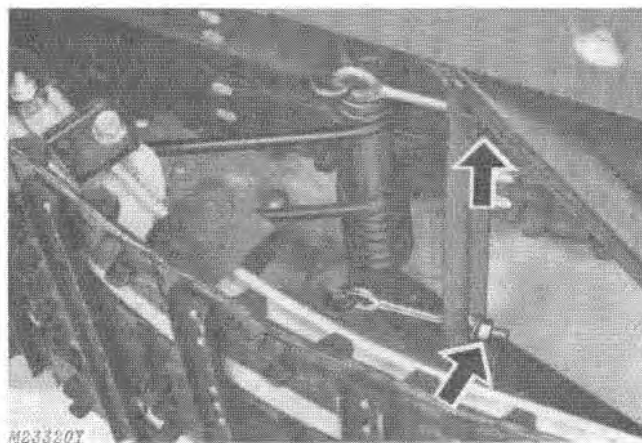


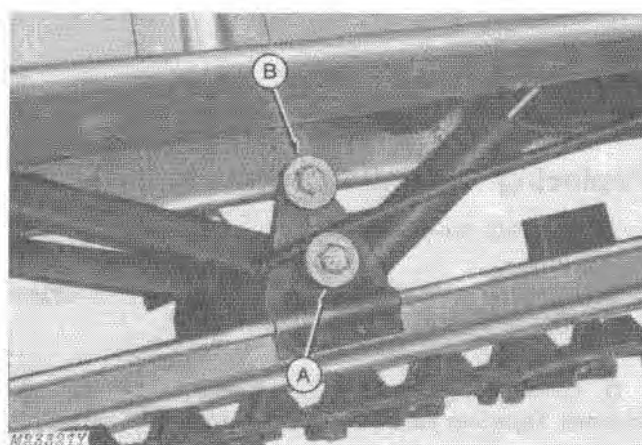
Fig. 9-Adjusting Front Spring Tension

1. Turn adjusting nuts counterclockwise to reduce tension or clockwise to increase tension, Fig. 9.
2. In deep snow (for more lift) increase tension. In light snow (for more steering control) reduce tension.

IMPORTANT: Never turn adjusting nuts all the way out. At least 1/2-inch of threads on each screw must protrude through its respective adjusting nut.

Rear Spring Adjustment

1. If suspension bottoms frequently, increase rear spring preload.



A—Bottom Position

B—Top Position

Fig. 10-Adjusting Rear Spring Preload

2. Move springs from bottom position (A) to top position (B) to increase spring preload, Fig. 10.

Group 12

SLIDE SUSPENSION

(Serial No. 190,001-)

REMOVING SUSPENSION

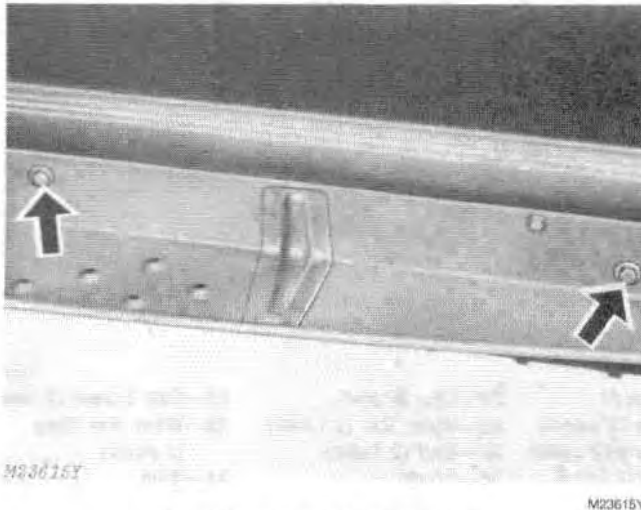


Fig. 1-Suspension Retaining Bolts

1. Remove suspension retaining bolts, Fig. 1, from each side of tunnel. Remove rear bolts first.

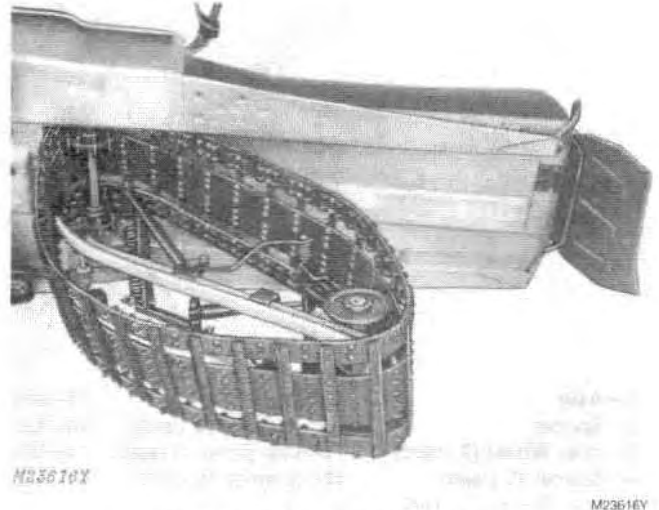


Fig. 2-Removing Slide Suspension

2. Turn the snowmobile on its right side and remove the suspension, Fig. 2.

IMPORTANT: Siphon all fuel from the tank to prevent spillage when snowmobile is on its side.

CAUTION: Gasoline is dangerous. Avoid fire due to smoking or careless maintenance practices.

DISASSEMBLY AND REPAIR

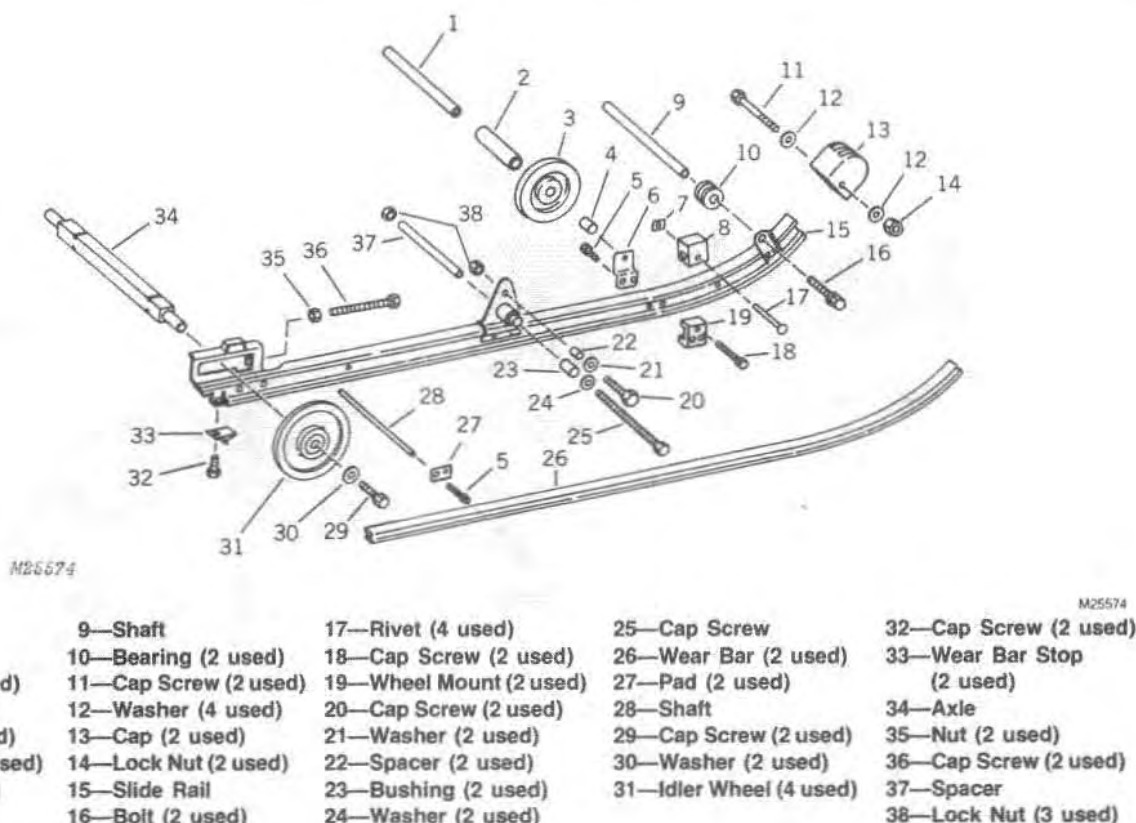


Fig. 3-Exploded View of Slide Suspension

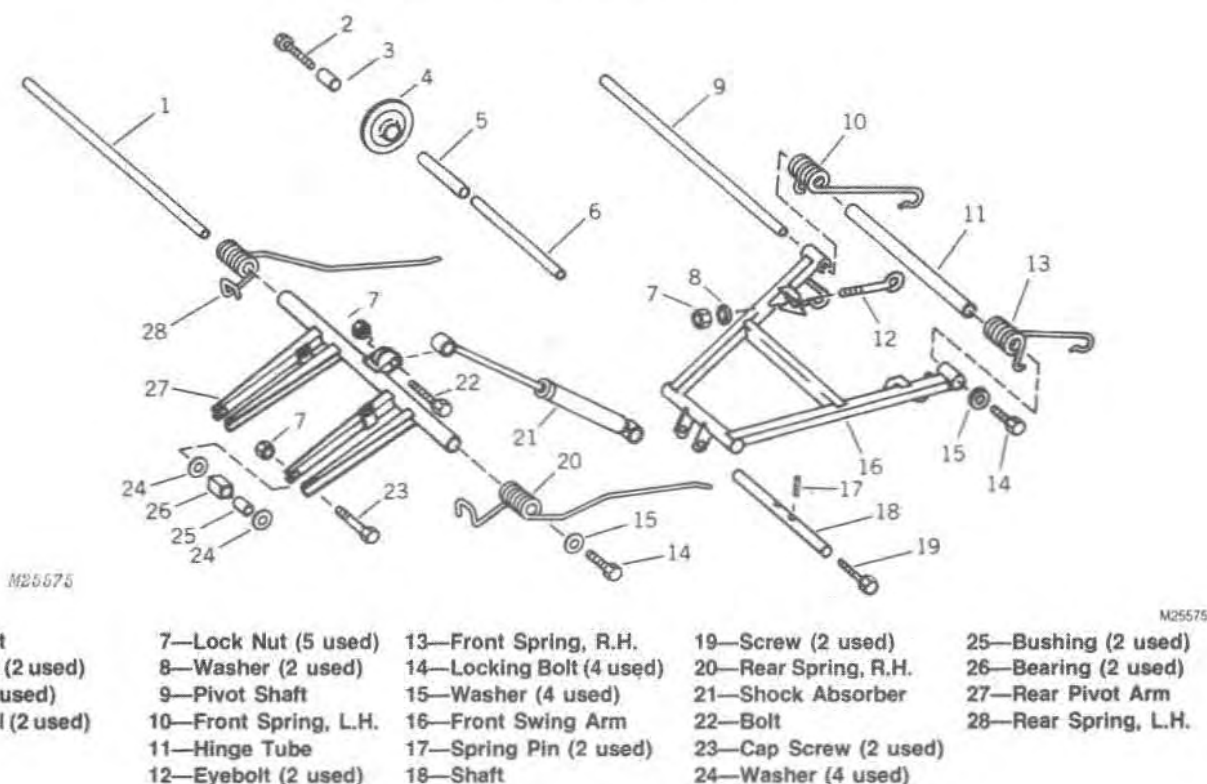


Fig. 4-Exploded View of Slide Suspension

Replacing Slide Suspension Wear Bars

1. Remove suspension.
2. Remove cap (13, Fig. 3) from front of suspension.

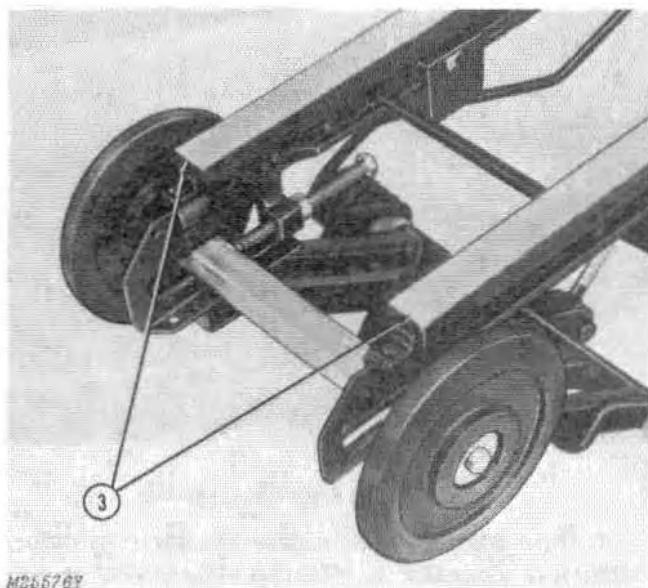


Fig. 5-Removing Slide Wear Bar

3. Use a wood block and hammer to remove the wear bar, Fig. 5.
4. Lubricate slide rail and wear bar with a liquid soap solution.
5. Install new wear bar from the front and drive it in place with a soft mallet.
6. Install cap.
7. Install suspension.

Replacing Rear Idler Wheels and Axle

1. Remove suspension.

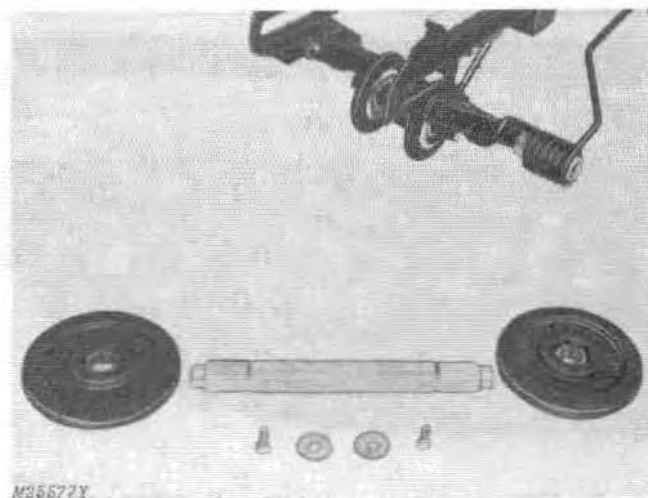


Fig. 6-Rear Axle Shaft and Wheels

2. Remove cap screws, idler wheels and washers from each end of rear axle shaft, Fig. 6.
3. Loosen both adjusting screws and slide rear axle forward. Remove axle through square hole in slide rail.

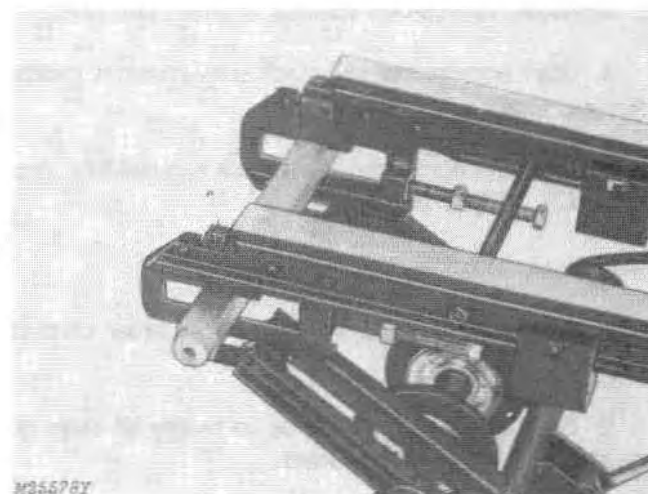


Fig. 7-Installing Rear Axle

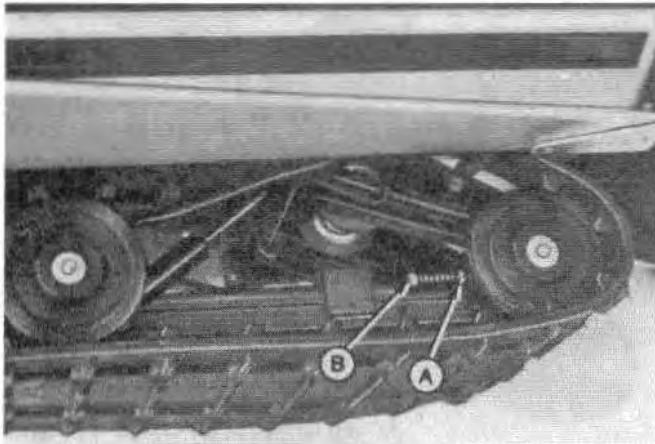
4. To reassemble: Place rear axle through slide rail. Be sure grooves in axle fit slide rail correctly, Fig. 7.
5. Partially tighten both adjusting screws.
6. Install idler wheel, washer and cap screw on each end of axle.

NOTE: Use Loctite on each cap screw.

7. Install suspension.

ADJUSTING TRACK TENSION

1. Support rear of snowmobile so that track is clear of ground.



A—Jam Nuts

B—Adjusting Screws

Fig. 8—Adjusting Track Tension

2. Tension the track to give 1/2-inch (12.7 mm) clearance between the inside of track and bottom of the wear bar, Fig. 8. Measure below shock absorber mount. Track should be suspended as shown.

3. Adjust both sides equally. Tighten jam nuts.
4. Start engine and idle track slowly until it rotates several times.
5. Shut off engine and allow track to coast to a stop. **DO NOT APPLY BRAKE.**

Check alignment as follows:

1. Rear idler wheels should run in center of drive lugs.
2. Slide wear bar should be in center of slide rail opening on each side of track.
3. If either Step 1 or Step 2 is off, readjust track tension.

NOTE: Track will run to the loose side. For example, if the track is too far to the left side, tighten the left side to move the track to the right.

4. Run track again to recheck.

ADJUSTING SUSPENSION SPRINGS

Ride the snowmobile to determine spring adjustments.

Front Spring Adjustment

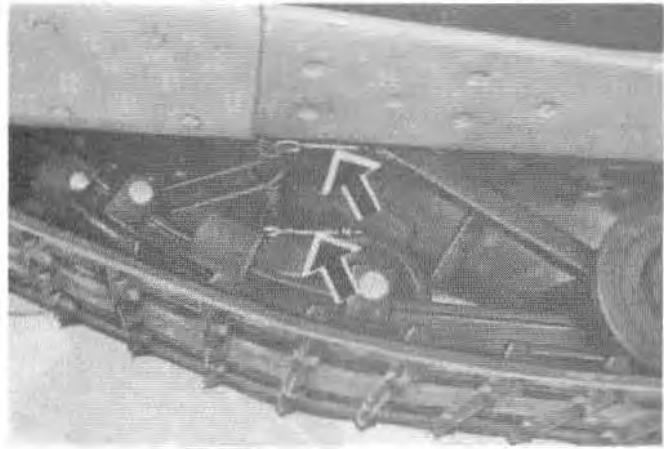


Fig. 9—Adjusting Front Spring Tension

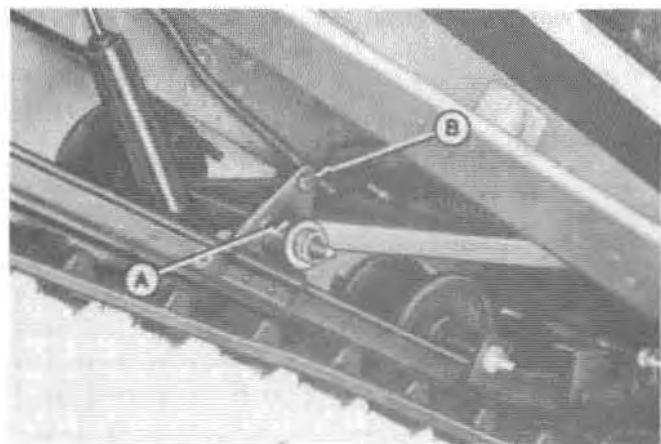
1. Turn adjusting nuts counterclockwise to reduce tension or clockwise to increase tension, Fig. 9.

2. In deep snow (for more lift) increase tension. In light snow (for more steering control) reduce tension.

IMPORTANT: Never turn adjusting nuts all the way out. At least two threads on each screw must protrude through its respective adjusting nut.

Rear Spring Adjustment

1. If suspension bottoms frequently, increase rear spring preload.



A—Bottom Position

B—Top Position

Fig. 10—Adjusting Rear Spring Preload

2. Move springs from bottom position (A) to top position (B) to increase spring preload, Fig. 10.

Group 15

JOHN DEERE TRACK

(Serial No. 120,001-190,000)

ANALYSIS

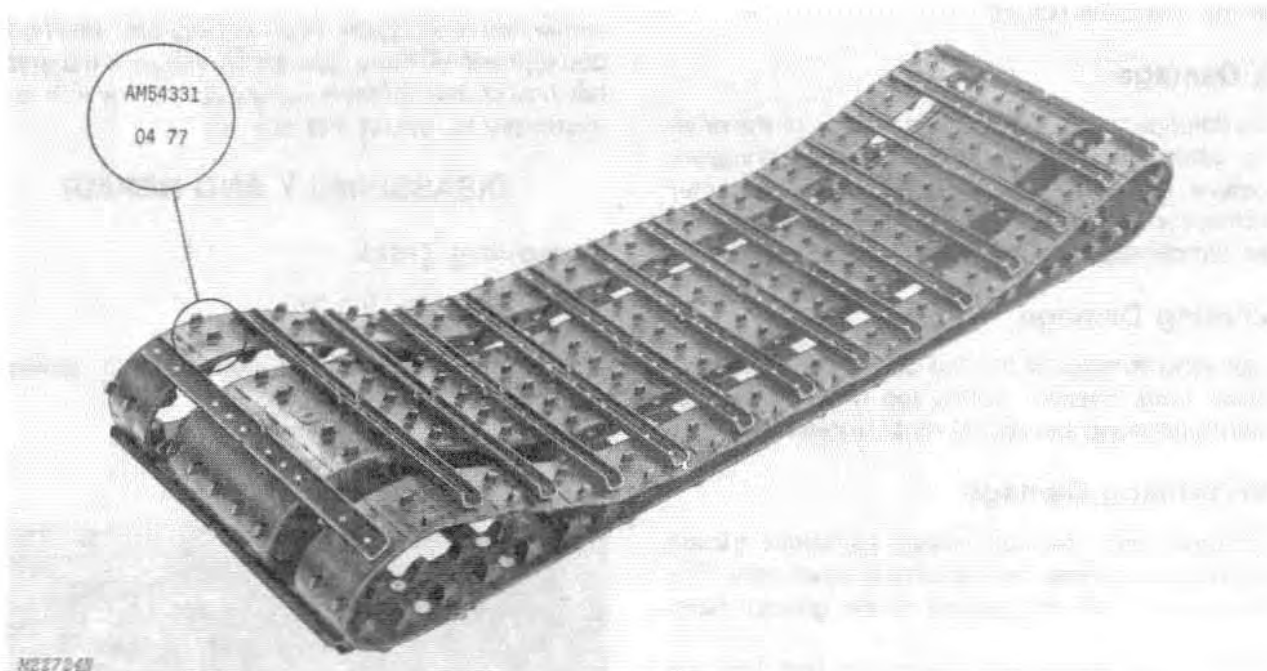


Fig. 1-John Deere Track

FAILURES COVERED UNDER WARRANTY

Ply Separation

Ply separation is a parting of the rubber from the tensile cords on any of the three belts.

Track Stretch

Track stretch occurs on a used track. Track stretch is first noticed by lack of adjustment on the track-adjusting screws. Remove the track and lay it flat. Measure ten pitches on the track. This distance should not exceed 22.15 inches (56.12 cm).

NOTE: A pitch is the distance (center-to-center) from one drive lug to the other.

NON-WARRANTY FAILURES

Obstruction Damage

Cuts, slashes or gouges in the track are caused by broken glass, sharp rocks or buried steel. Damage occurs during rapid acceleration or side-skidding over foreign objects.

If the grouser bar is bent, broken, cracked or torn from the track due to buried objects, obstructions or road hazards, neither repair nor replacement will be considered for warranty.

When the grouser bar is torn from the track, rubber will tear away and adhere to the bar.

Worn Grouser Bars

Grouser bars wear from operating on rough, dry terrain, railroads and highway roadsides, gravel roads and other non-approved snowmobile field conditions.

The slide wear bar becomes hot. Sand, dirt and grit become imbedded in the bar causing wear on the grouser bars. The slide wear bars must be replaced when this condition occurs.

Lug Damage

Lug damage to the sides or rear edges of the drive lug is usually caused by lack of snow lubrication. Excessive track tension and dirt or soil (summer operating conditions) in the drive mechanism can also cause lug damage.

Racheting Damage

Racheting damage to the top of the lugs is caused by loose track tension, pulling too great a load, or frequent prolonged periods of rapid acceleration.

Over-Tension Damage

Too much track tension causes excessive friction between the slide wear bars and the grouser bars. The wear bars will melt and adhere to the grouser bars.

The first indication of this condition is that the track may "stick" or "lock-up," causing loss of engine horsepower.

Loose Track Damage

Operating a track too loose causes the outer edge to flex too much resulting in cracks in the outer belts. Some wear on the driving lugs will also occur. Riding double (excessive weight) can also cause the track to flex and break the edge.

Impact Damage

Impact damage will cause the rubber on the tread side to open up exposing the cords. This may happen in more than one place.

Edge Damage

Edge damage is the operator's fault. The most frequent cause is tipping the snowmobile on its side to clear the track, allowing the track to come in contact with an abrasive surface.

Broken Grouser Bars

Grouser bar breakage is normal and expected in the center belt of the track. Grouser bars are "notched" to determine the fatigue area for breakage. If the grouser bar breaks but remains secure to the track, it is not necessary to replace the grouser bar.

DISASSEMBLY AND REPAIR

Removing Track

1. Siphon fuel from tank.
2. Remove chain case cover, chain tensioner, sprockets and drive chain.
3. Remove suspension.

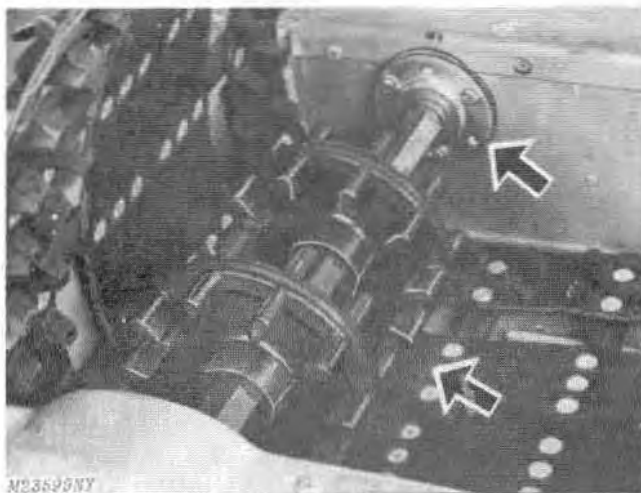


Fig. 2-Drive Wheels

4. Remove bolts securing drive wheels to drive shaft.
5. Move drive wheels toward center of shaft, Fig. 2.
6. Remove cap screws securing bearing flanges to tunnel.

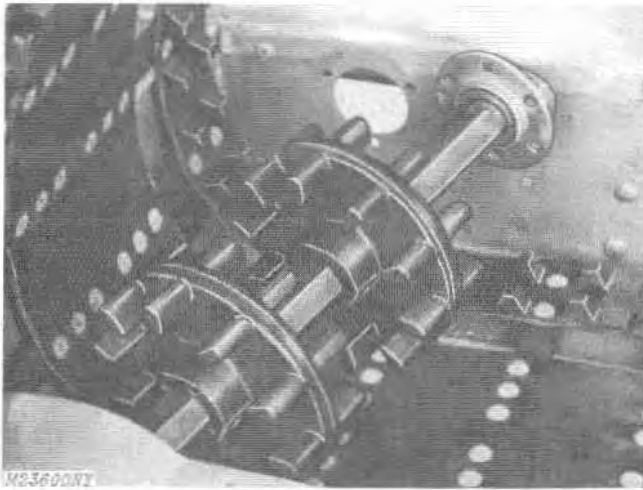


Fig. 3-Removing Drive Shaft

7. Move drive shaft toward chain case side. Lift end with spacer to remove shaft, Fig. 3.

8. Remove track.

Repairing Track

NOTE: Bent or broken grouser bars can be replaced individually. If a grouser bar is broken in the center, but still securely attached to the belts, it need not be replaced.

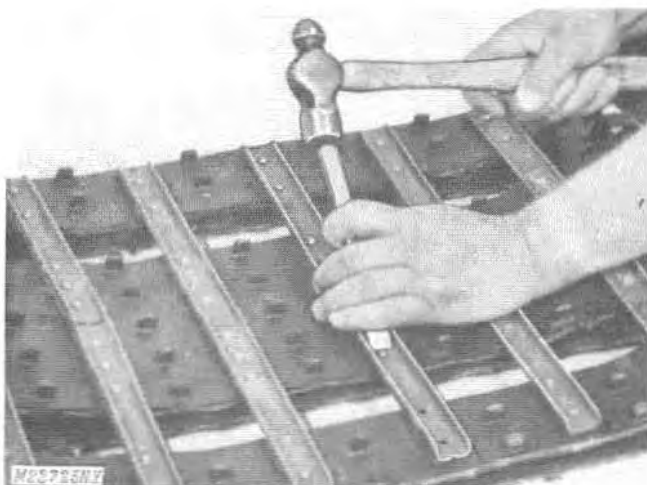


Fig. 4-Removing Grouser Bar Rivets
(Track Removed for Photo Purposes)

1. Use a hammer and cold chisel to remove grouser bar rivets, Fig. 4.

2. Position new grouser bar.

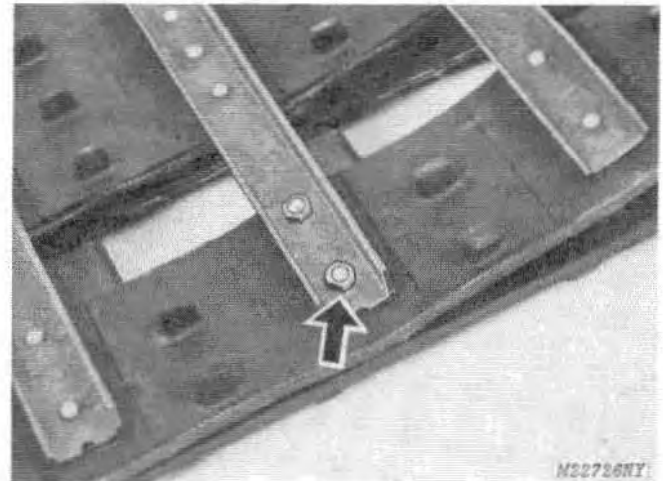


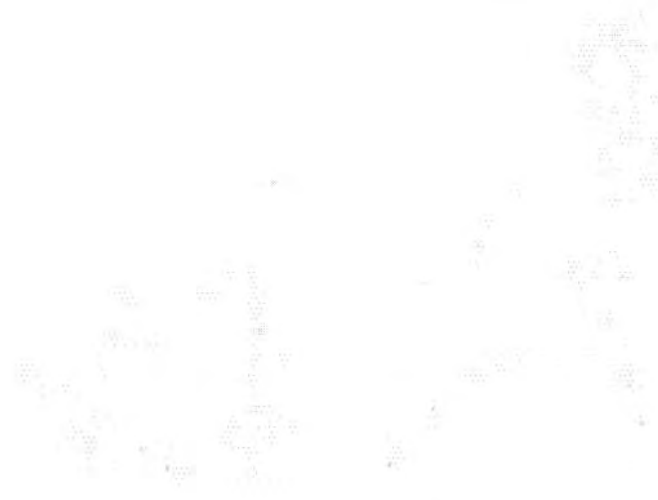
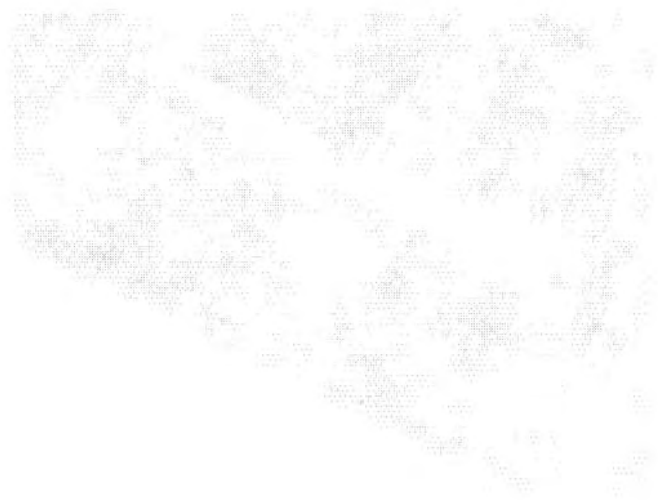
Fig. 5-Installing Grouser Bar
(Track Removed for Photo Purposes)

3. Install bolts from the inside (drive lug side of the track) with nut to the outside, Fig. 5.

4. Tighten nuts securely and then peen the bolt tight against the nut.

INSTALLING TRACK

1. Place track in tunnel.
2. See Section 50 for drive shaft, chain case sprockets, drive chain and chain tensioner installation.
3. Adjust track tension.
4. Fill chain case with API-GL5 gear oil (SAE 90).
5. Fill fuel tank.



Group 15 JOHN DEERE TRACK (Serial No. 190,001-)

ANALYSIS

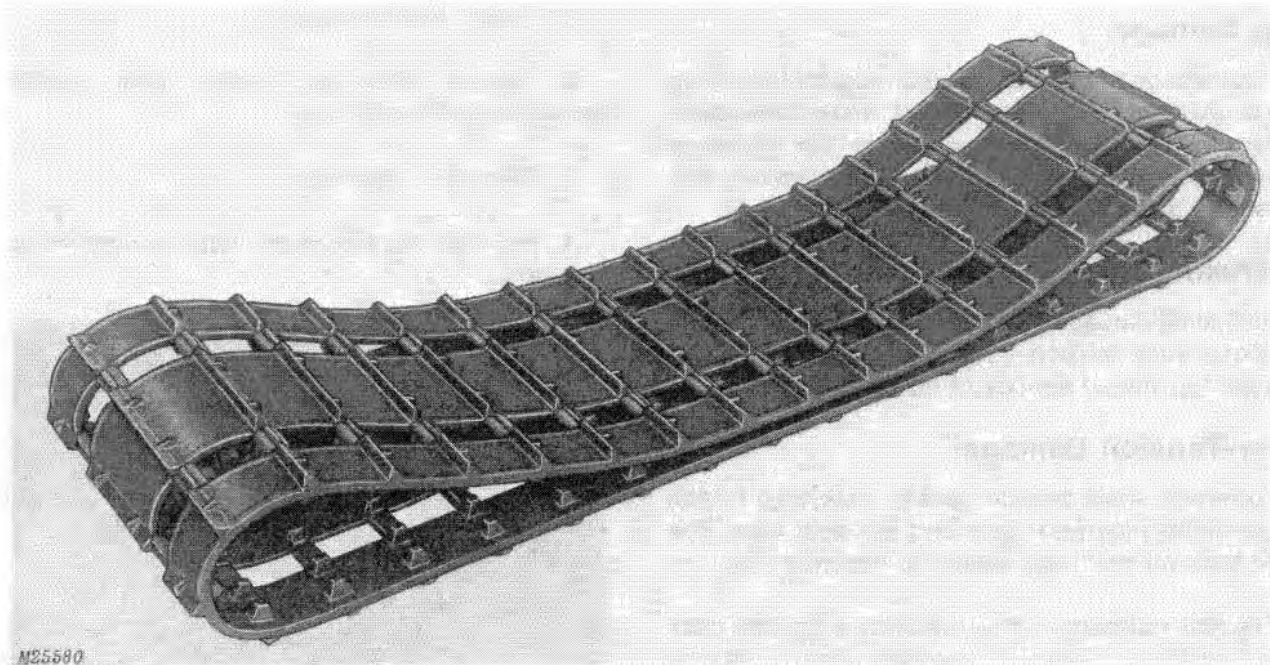


Fig. 1-John Deere Track

M25580

FAILURES COVERED UNDER WARRANTY

Ply Separation

Ply separation is a parting of the rubber from the tensile cords on any of the three belts.

Track Stretch

Track stretch occurs on a used track. Track stretch is first noticed by lack of adjustment on the track-adjusting screws. Remove the track and lay it flat. Measure ten pitches on the track. This distance should not exceed 32.9 inches (83.6 cm).

NOTE: A pitch is the distance (center-to-center) from one drive lug to the other.

NON-WARRANTY FAILURES

Obstruction Damage

Cuts, slashes or gouges in the track are caused by broken glass, sharp rocks or buried steel. Damage occurs during rapid acceleration or side-skidding over foreign objects.

If the fiber glass rod is torn from the track due to buried objects, obstructions or road hazards, neither repair nor replacement will be considered for warranty.

Wear Clips

Wear clips wear from operating on rough, dry terrain, railroads and highway roadsides, gravel roads and other non-approved snowmobile field conditions.

The slide wear bar becomes hot. Sand, dirt and grit become imbedded in the bar causing wear on the wear clips. The slide wear bars must be replaced when this condition occurs.

Lug Damage

Lug damage to the sides or rear edges of the drive lug is usually caused by lack of snow lubrication. Excessive track tension and dirt or soil (summer operating conditions) in the drive mechanism can also cause lug damage.

Racheting Damage

Racheting damage to the top of the lugs is caused by loose track tension, pulling too great a load, or frequent prolonged periods of rapid acceleration.

Over-Tension Damage

Too much track tension causes excessive friction between the slide wear bars and the wear clips. The wear bars will melt and adhere to the wear clips.

The first indication of this condition is that the track may "stick" or "lock-up", causing loss of engine horsepower.

Loose Track Damage

Operating a track too loose causes the outer edge to flex too much resulting in cracks in the outer belts. Some wear on the driving lugs will also occur. Riding double (excessive weight) can also cause the track to flex and break the edge.

Impact Damage

Impact damage will cause the rubber on the tread side to open up exposing the cords. This may happen in more than one place.

Edge Damage

Edge damage is the operator's fault. The most frequent cause is tipping the snowmobile on it's side to clear the track, allowing the track to come in contact with an abrasive surface.

DISASSEMBLY AND REPAIR

Removing Track

1. Siphon fuel from tank.
2. Remove chain case cover, chain tensioner, sprockets and drive chain.
3. Remove suspension.
4. Remove cap screws securing bearing flangettes to tunnel.

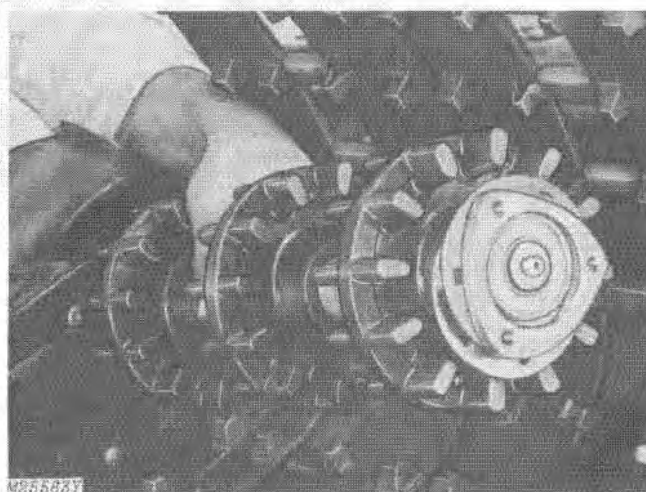


Fig. 2-Removing Track Drive Shaft

5. Move drive shaft toward chain case side. Lift end with spacer to remove shaft, Fig. 2.
6. Remove track.

Repairing Track

IMPORTANT: Any of the following conditions require wear clip or track replacement.

1. Wear clip missing (replace clip).
2. Excessively worn wear clips (replace clips).
3. Wear clip guides missing on more than three successive wear clips (replace clips).
4. Fiber glass rod broken (replace track).

Replacing Wear Clip

1. Break clip off with pliers or saw with hacksaw.

IMPORTANT: Use care when using hacksaw so as not to damage rubber or fiber glass rod.

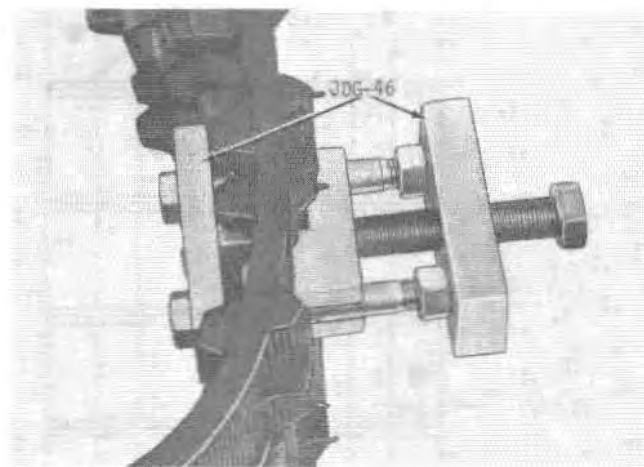


Fig. 3-Installing Wear Clip

2. Use Track Wear Clip Installing Tool JDG-46, Fig. 3, to install new wear clip.

INSTALLING TRACK

1. Place track in tunnel.
2. See Section 50 for drive shaft, chain case sprocket, drive chain and chain tensioner installation.
3. Adjust track tension.
4. Fill chain case with API-GL 5 gear oil (SAE 90).
5. Fill fuel tank.

TRACK STUD PATTERNS

Two stud kits and two track stud patterns are available.

The stud kits are:

AM 55177 — Steel Stud Kit

AM 55178 — Carbide Stud Kit

Each kit contains 18 studs.

One track stud pattern consists of 18 studs; the other 36 studs. Use two kits for the 36 stud pattern. DO NOT use steel and carbide together. Use two like kits.

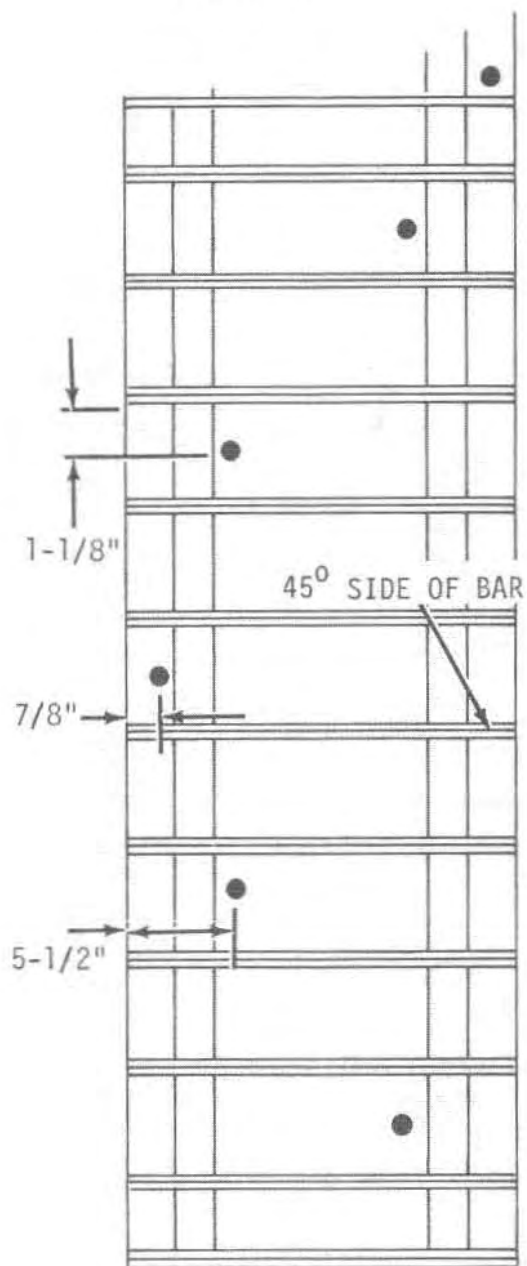
The 18 stud pattern is used for normal and trail riding. The 36 stud pattern is used for hardpack and lake running.

NOTE: Carbide wear rods must be used on the skis when using the 36 stud pattern.

IMPORTANT: Upper tunnel wear strips must be installed whenever the track is studded.

See page 60-17-4 for stud patterns.

18 Stud Pattern

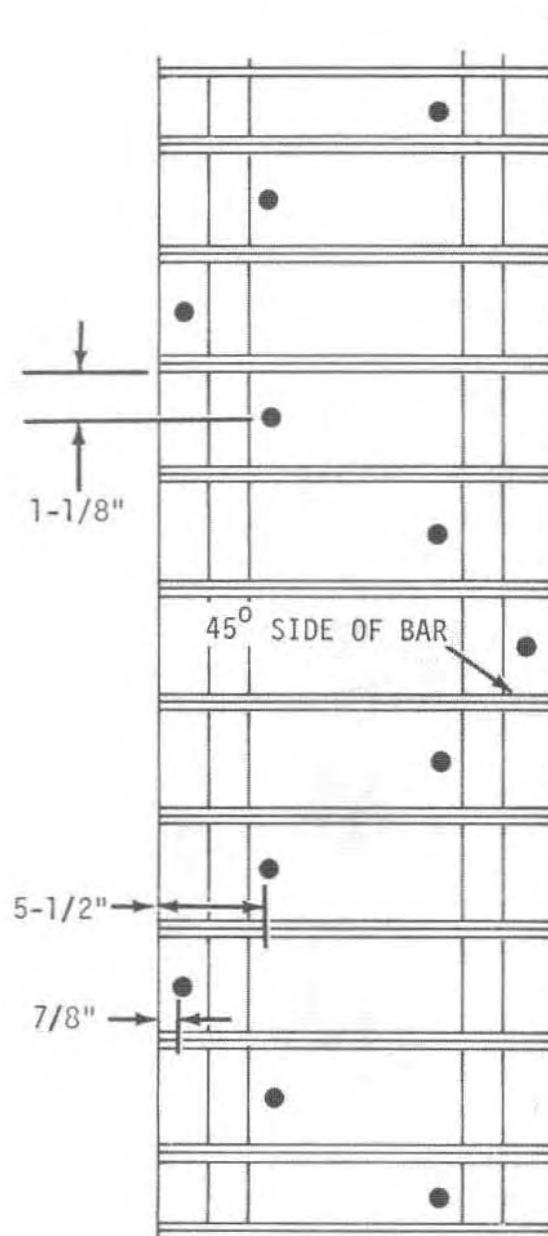


M25582

Fig. 4-18 Stud Pattern

M25582

36 Stud Pattern



M25583

Fig. 5 - 36 Stud Pattern

M25583

Group 20 SKIS AND STEERING

ANALYSIS



CAUTION: Worn, bent or damaged ski and steering components are unsafe.

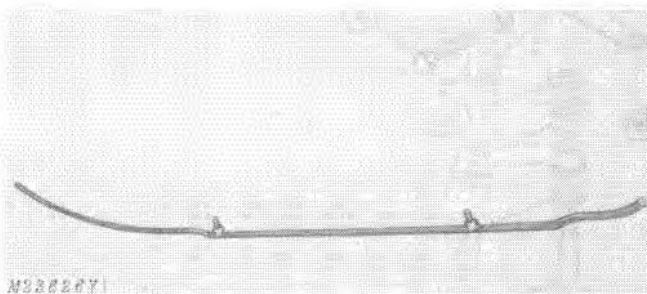


Fig. 1-Wear Rods

Replace wear rods, Fig. 1, if worn. Worn wear rods are unsafe because they cause a loss of snowmobile maneuverability.

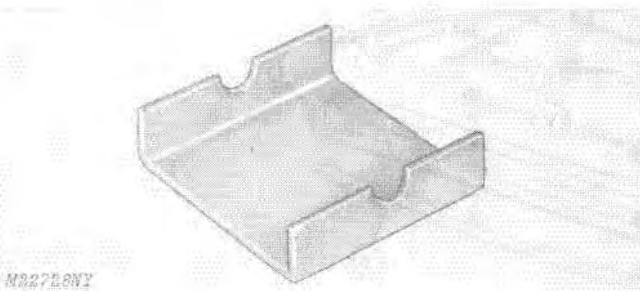


Fig. 2-Ski Wear Plates

Replace ski wear plates, Fig. 2, if worn or damaged. If a worn wear plate is not replaced, the ski spring will wear through the ski.

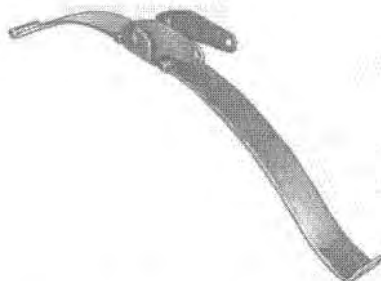


Fig. 3-Ski Springs

Replace ski springs, Fig. 3, if broken or damaged. A bent saddle indicates ski was subjected to severe forces and ski should be replaced. Replace ski attaching pins if worn.

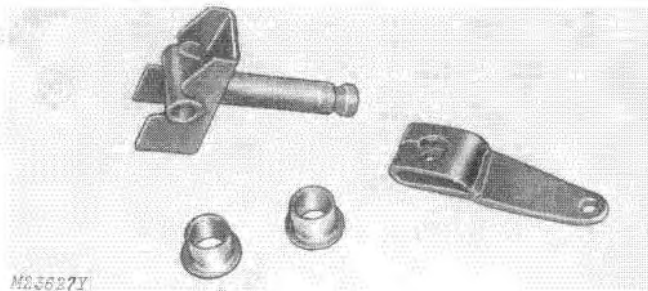


Fig. 4-Spindle, Bushings and Steering Arms

Stripped spindle and steering arm splines, Fig. 4, indicate operation without steering arm attaching cap screws tight or improper installation of steering arm.

Replace ski spindle bushings, Fig. 4, if worn, cracked or damaged.

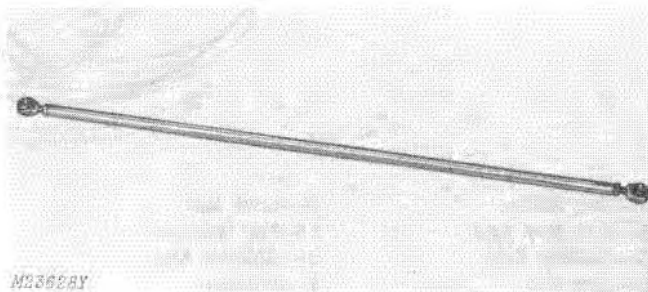
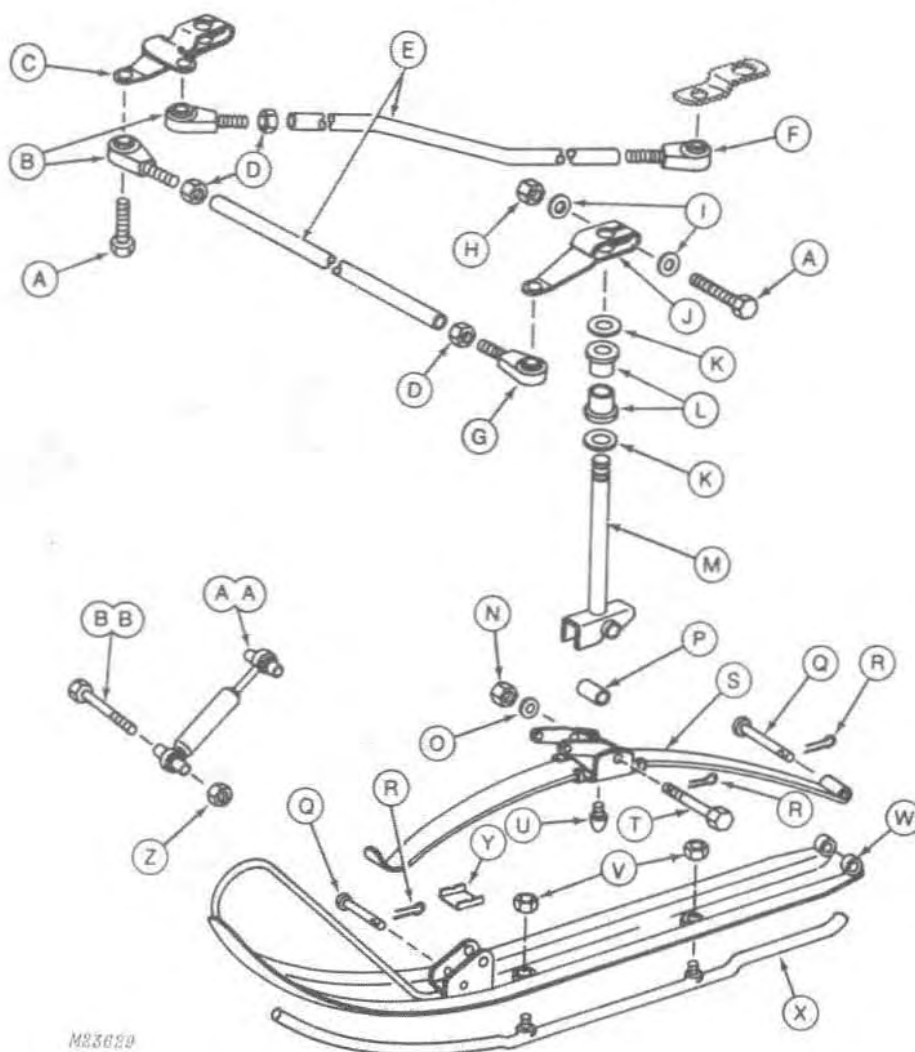


Fig. 5-Tie Rod

A bent tie rod indicates ski was subjected to severe forces. Replace tie rod and inspect all of the steering mechanism for damage.

Replace tie rod ends, Fig. 5, if loose. A loose tie rod end can cause erratic steering and could be a safety hazard.

REPAIR



MS3629

- | | | | |
|----------------|-------------------|-------------------|---------------------|
| A—Cap Screw | H—Lock Nut | O—Flat Washer | V —Flanged Lock Nut |
| B—R.H. Rod End | I —Flat Washer | P—Pivot Bushing | W —Ski |
| C—Spindle Arm | J —Spindle Arm | Q—Drilled Pin | X —Wear Rod |
| D—Jam Nut | K—Washer | R—Cotter Pin | Y —Wear Block |
| E—Tie Rod | L—Spindle Bushing | S—Spring Assembly | Z —Lock Nut |
| F—R.H. Rod End | M—Spindle | T—Ski Pivot Bolt | AA—Shock Absorber |
| G—L.H. Rod End | N—Lock Nut | U—Bumper | BB—Cap Screw |

Fig. 6-Exploded View of Skis and Steering

Replacing Ski Wear Rods

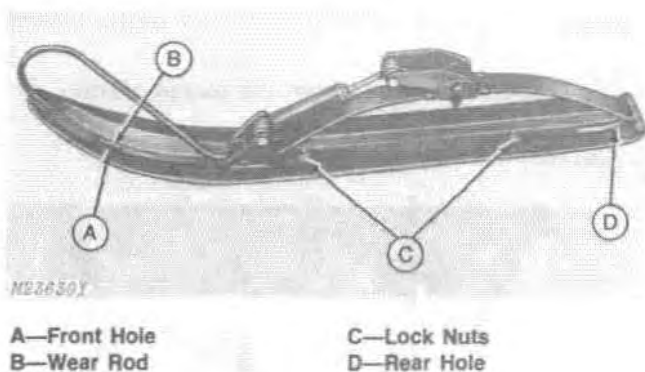


Fig. 7-Removing Wear Rod

1. Remove lock nuts (C, Fig. 7). Pry wear rod (B) down to free studs from holes.
2. Slide rod forward to free rod from rear hole (D).
3. Place front of new wear rod in position through front hole (A). Slide wear rod to rear to position studs and rear of rod.
4. Install and tighten lock nuts (C).

Replacing Wear Plates

NOTE: Ski spring does not have to be removed to replace wear plate.

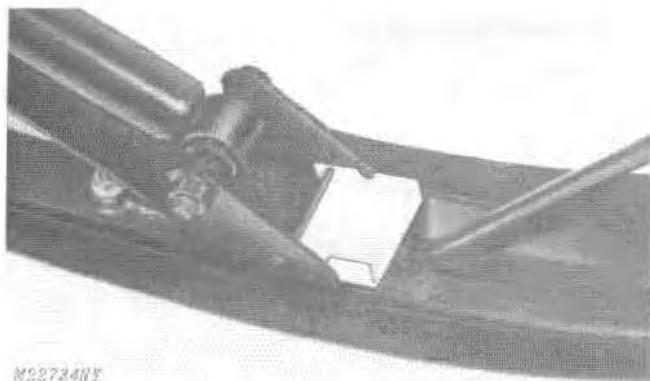


Fig. 8-Replacing Wear Plate

1. Remove cotter pin and drilled pin securing end of ski spring. Lift spring up and remove wear plate, Fig. 8.
2. Install new wear plate. Position spring and install drilled pin and cotter pin.

Replacing Ski Spring

NOTE: The mono-leaf spring, saddle and bumper are replaced as an assembly. The bumpers can be replaced individually.

1. Remove ski from ski spindle.



Fig. 9-Replacing Ski Spring

2. Remove cotter pins and drilled pins securing spring assembly to the ski, Fig. 9.
3. Install new wear plate if necessary. Install new spring assembly to ski.
4. Attach ski assembly to spindle with cap screw, washer and lock nut. Torque nut to 39 ft-lbs (53 Nm).

Replacing Ski Spindles and Bushings

1. Remove ski and spring assembly.
2. Remove hardware securing the steering arm to the spindle.
3. Remove the spindle.

Replace bushings as follows:

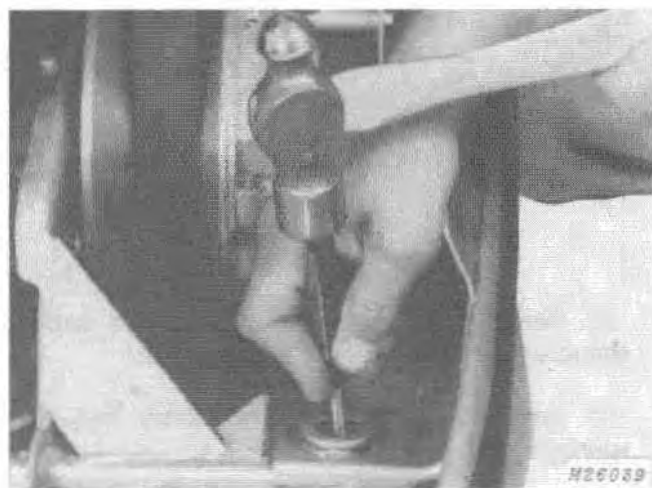


Fig. 10-Removing Ski Spindle Bushings

4. Use a drift punch to remove bushings, Fig. 10. Drive lower bushing out from the top. Reverse procedure to remove the upper bushing.
5. Install new bushing until it bottoms on frame. Do not crack or distort bushing during installation.
6. Install washer on spindle and install spindle from the bottom.
7. Install steering arm and upper washers if needed and secure with hardware.
8. Install ski and spring assembly. Torque nut to 39 ft-lbs (53 Nm).

Replacing Steering Arms

1. Position handlebars and skis to point straight ahead.
2. Disconnect tie rod from the steering arm.
3. Remove steering arm from spindle.

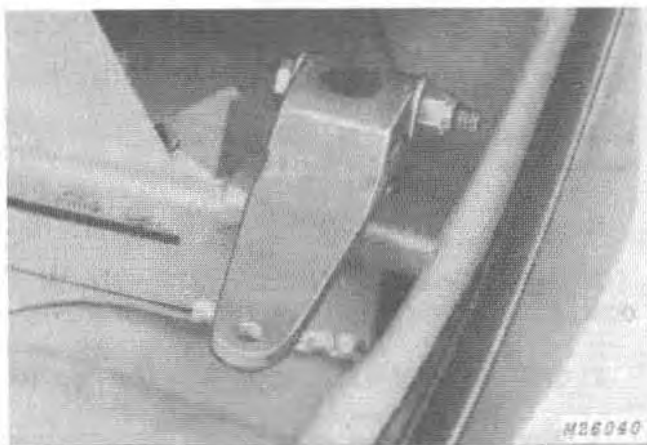


Fig. 11-Replacing Steering Arm

4. Install new steering arm parallel as shown in Fig. 11.
5. Secure steering arm to spindle. Torque nut to 22 to 28 ft-lbs (30 to 38 N-m).
6. Connect tie rod and align skis.
7. Install belt guard.

Replacing Tie Rod and Drag Link

1. Remove tie rod from steering arms. Remove drag link from right-hand steering arm and steering post.

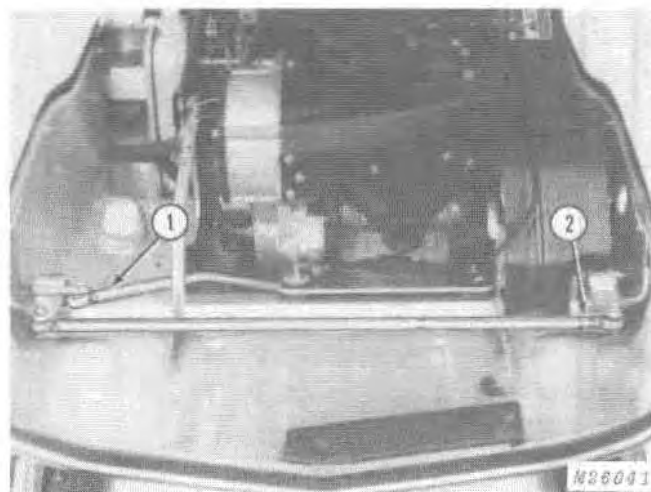


Fig. 12-Tie Rod and Drag Link

2. Install new tie rod and drag link. Stake end of drag link to the steering post and stake end of tie rod to the left-hand steering arm, Fig. 12.

3. Align skis.

4. Adjust drag link so handlebars are pointing straight ahead.

IMPORTANT: DO NOT exceed measurements shown in Fig. 15 for drag link and tie rod lengths.

Replacing Steering Post

1. Remove seat and fuel tank.

CAUTION: Gasoline is dangerous. Avoid fires due to smoking or careless maintenance practices.

2. Remove air intake silencer.

3. Remove engine with base. See Section 20.

4. Remove handlebar with cables from steering post.

5. Disconnect drag link from steering post, Fig. 13.

6. Disconnect steering post bracket from tunnel. Remove steering post.



Fig. 13-Disconnecting Drag Link

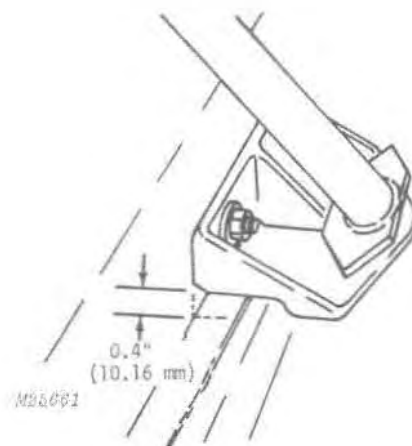


Fig. 14-Adjusting Steering Post

7. Install in opposite sequence.

NOTE: When installing steering post mounting bracket to the tunnel, bracket should be 0.4 inch (10.2 mm) above ledge in pan, Fig. 14. Tighten hardware.

IMPORTANT: After engine is installed, check steering post arm bolt-to-drag link for proper clearance.

8. Check clearance as follows:

- Clearance should exist between bolt head and pan with steering in a full left-hand turn. If bolt head hits pan, move mounting bracket up.
- Clearance should exist between slotted nut and engine with steering in a full right-hand turn. If slotted nut hits engine, move mounting bracket down.
- Both clearances should be approximately equal.

9. Align skis.

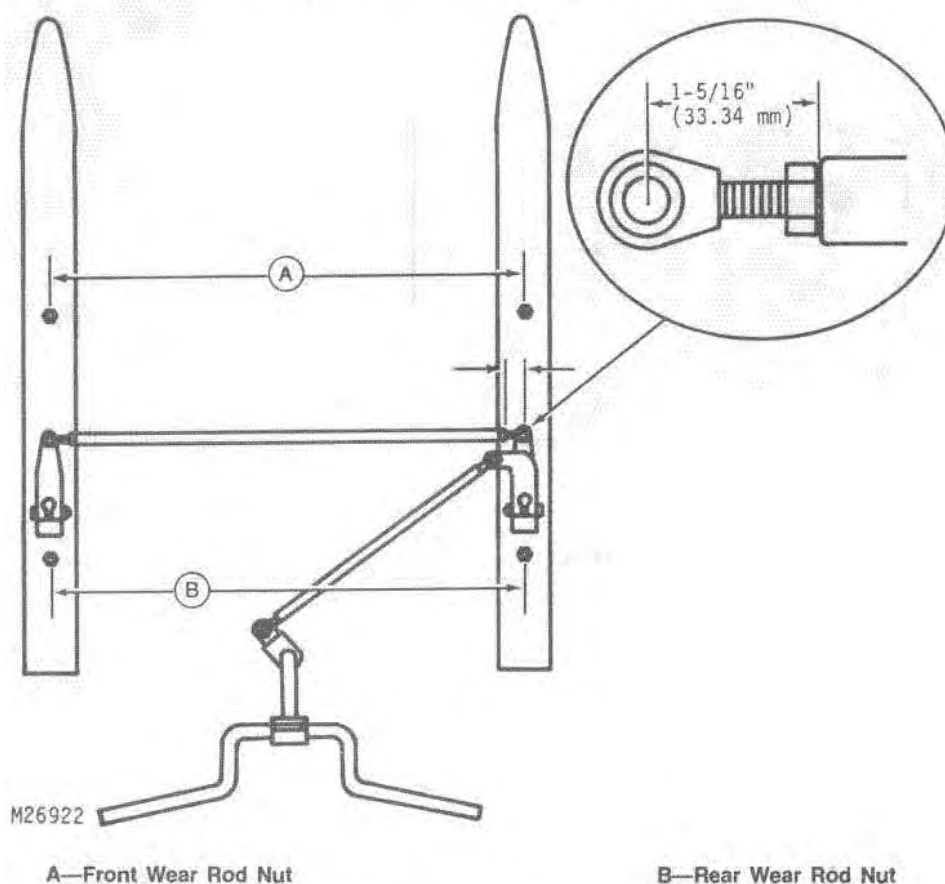
ALIGNING SKIS (Serial No. 120,001-155,000)

Fig. 15-Aligning Skis (Serial No. 120,001-155,000)

Fig. 15 shows the proper position of the skis in relation to the steering arms, tie rod and steering post.

To align skis:

1. Raise front of snowmobile to remove weight from skis.
2. Position handlebars straight ahead.
3. Measure dimension between skis over front and rear wear rod nuts (A and B). Dimension should be equal.
4. Loosen jam nut on right-hand end of tie rod. Rotate tie rod to align skis.

IMPORTANT: DO NOT exceed 1-5/16 inches (33.34 mm) between tie rod and center of tie rod end, Fig. 15.

5. Tighten jam nuts on tie rod. Torque to 8 to 12 ft-lbs (11 to 16 N·m).

IMPORTANT: Be sure tie rod ends are still free to swivel after adjustment.

6. Adjust drag link as necessary to align handlebars.

ALIGNING SKIS (Serial No. 155,001-)

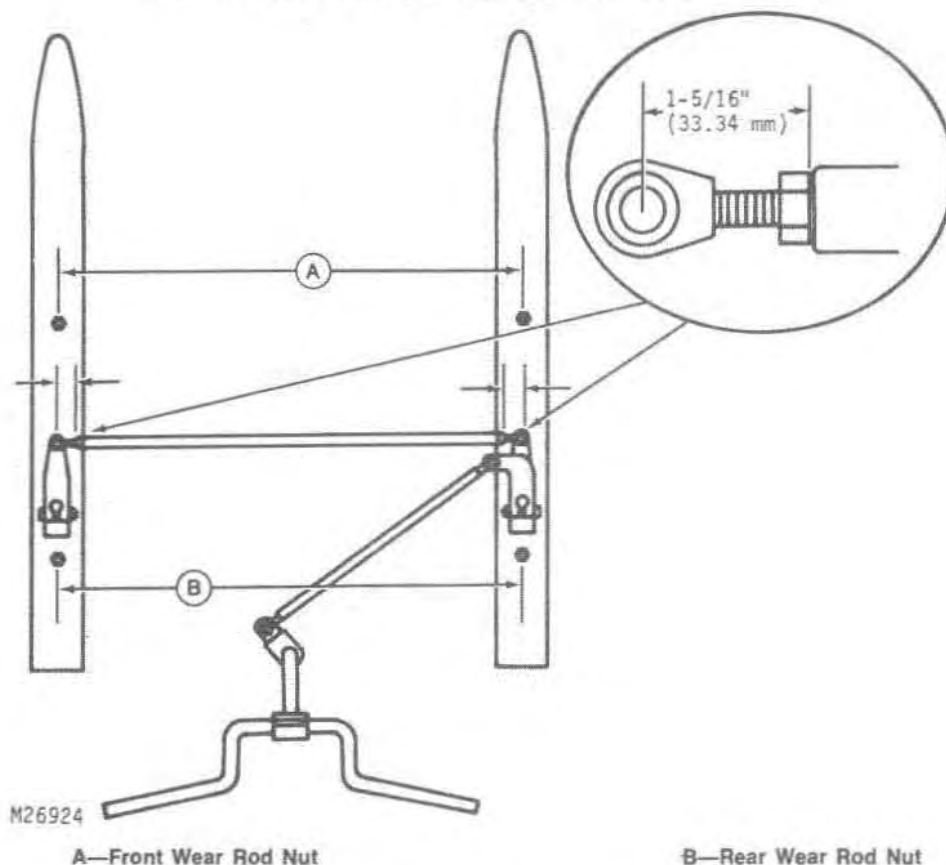


Fig. 16—Aligning Skis (Serial No. 155,001-)

Fig. 16 shows the proper position of the skis in relation to the steering arms, tie rod and steering post.

To align skis:

1. Raise front of snowmobile to remove weight from skis.
2. Position handlebars straight ahead.
3. Measure dimension between skis over front and rear wear rod nuts (A and B). Dimension should be equal.
4. Loosen jam nuts on each end of tie rod. Rotate tie rod to align skis.

IMPORTANT: DO NOT exceed 1-5/16 inches (33.34 mm) between the tie rod and center of tie rod end, Fig. 16.

5. Tighten jam nuts on tie rod.

IMPORTANT: Be sure tie rod ends are still free to swivel after jam nuts are tight.

6. Adjust drag link as necessary to align handlebars.

ELIMINATING LOOSE STEERING

Two major causes of loose steering are:

1. Worn tie rod ends.
2. Worn spindle bushings.

CAUTION: Check steering components and hardware frequently for condition and tightness.

Replace worn parts.

Group 25 SPECIFICATIONS

SPECIFICATIONS

Drag Link-to-Steering Post	32 to 38 ft-lbs (43 to 51 Nm)
Drag Link-to-Steering Arm	32 to 38 ft-lbs (43 to 51 Nm)
Steering Arm-to-Spindle Bolt	22 to 28 ft-lbs (30 to 38 Nm)
Ski Mounting Cap Screw	39 ft-lbs (52 Nm)
Tie Rod Jam Nuts	8 to 12 ft-lbs (11 to 16 Nm)
Tie Rod and Bearing Center Distance	30.26 inches (768.6 mm)
Drag Link End Bearing Center Distance	18.12 inches (460.24 mm)

Section 70 SERVICE TOOLS

Group 5 ESSENTIAL SERVICE TOOLS

CONTENTS

GROUP 5 - ESSENTIAL SERVICE TOOLS

Engine Tools	70-5-1
Clutch Tools	70-5-2
Electrical Tools	70-5-3
Track Tools	70-5-4

GROUP 10 - CONVENIENCE SERVICE TOOLS

Snowmobile Support Tools	70-10-1
Engine Tools	70-10-1
Carburetor Tools	70-10-2

The essential tools listed in this group will service the John Deere SPORTFIRE Snowmobile. These essential tools are required for all snowmobile dealers. They can be ordered from:

Service Tool Division
Owatonna Tool Co.
P.O. Box 314
Owatonna, Minn. 55060

ENGINE TOOLS

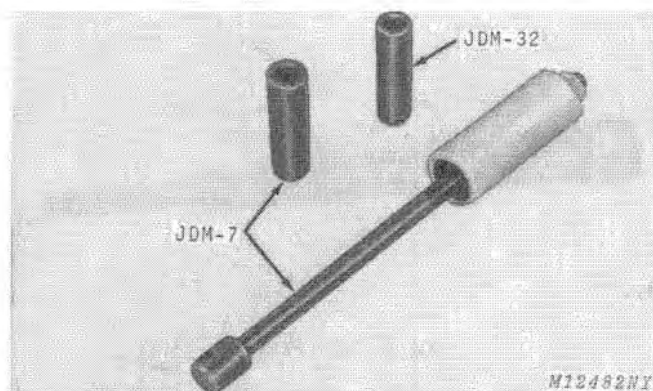


Fig. 1-Piston Pin Service Tools

JDM-7 Piston Pin Service Set, Fig. 1, is used to remove and install piston pins.

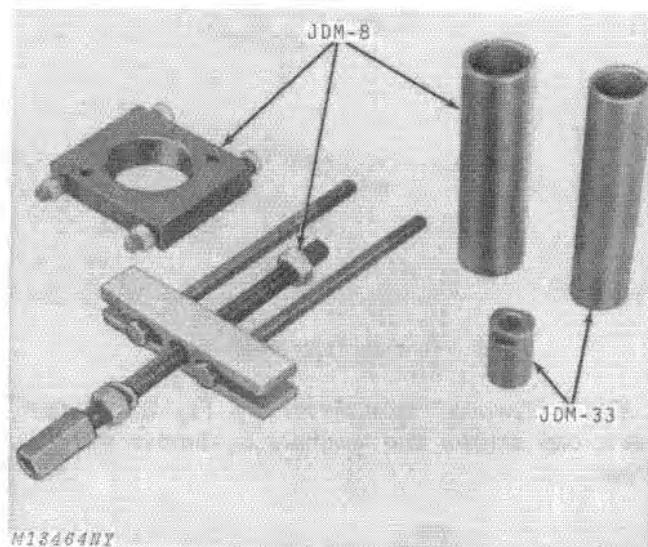


Fig. 2-Crankshaft Bearing Service Set and Bearing Tool Adapter Kit

JDM-8 Crankshaft Bearing Service Set and JDM-33 Bearing Tool Adapter Kit, Fig. 2, are used to remove and install the crankshaft bearings.

ENGINE TOOLS—Continued

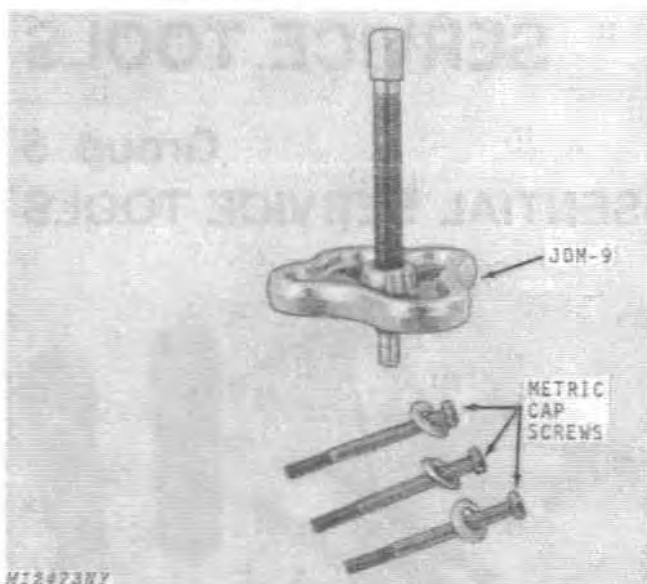


Fig. 3-Flywheel Puller Assembly

JDM-9 Flywheel Puller Assembly, Fig. 3, includes metric cap screws and washers to remove the flywheel.

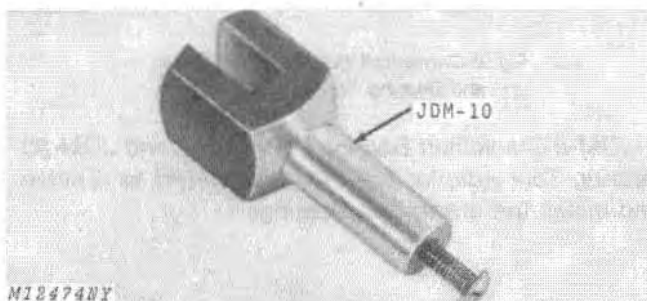


Fig. 4-Dial Indicator Mounting Bracket

JDM-10 Dial Indicator Mounting Bracket, Fig. 4, is used with JDM-15 Dial Indicator or equivalent to measure crankshaft runout.

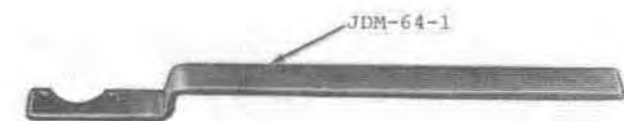


Fig. 5-Flywheel Holding Tool

JDM-64-1 Flywheel Holding Tool, Fig. 5, prevents the flywheel from rotating while removing and installing the retaining nut.

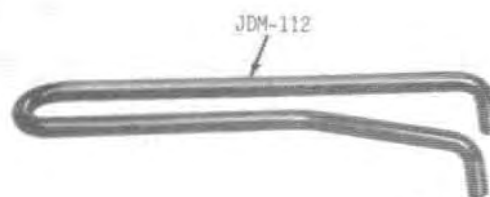


Fig. 6-JDM-112 Fan Holding Tool

JDM-112 Fan Holding Tool is used to hold the cooling fan for assembly and disassembly procedures.

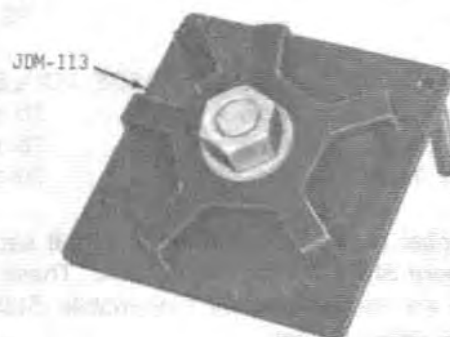


Fig. 7-JDM-113 Starter Spring Winding Tool

JDM-113 Starter Spring Winding Tool is used to rewind the starter spring.

CLUTCH TOOLS



Fig. 8-Clutch Puller

JDM-41-1 Clutch Puller, Fig. 8, is used to remove the 102C clutch.

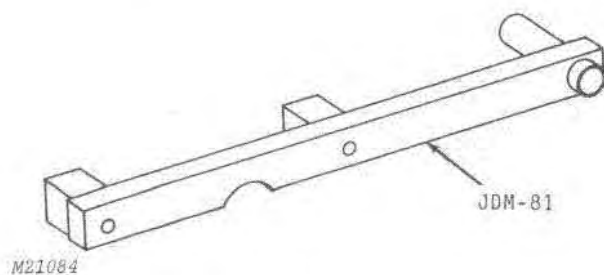


Fig. 9-Clutch Aligning Tool

JDM-81 Clutch Aligning Tool, Fig. 9 is used to accurately align the primary and secondary clutches. This tool checks both center distance and offset simultaneously.

ELECTRICAL TOOLS

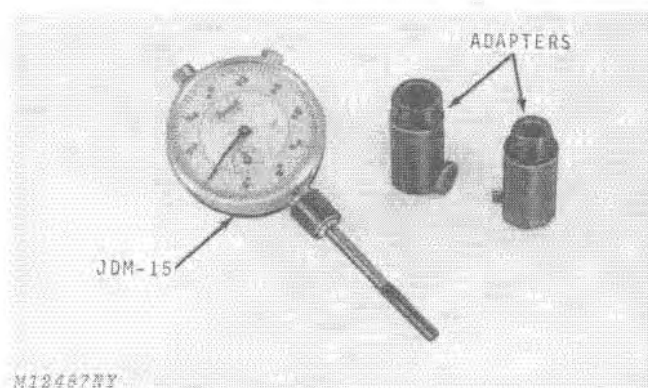
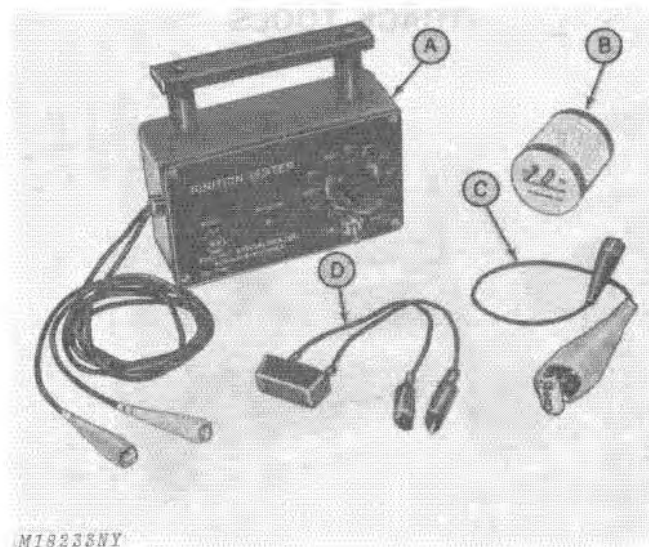


Fig. 10-Timing Indicator

JDM-15 Snowmobile Timing Indicator, Fig. 10, is a dial indicator graduated in 0.001-inch increments with a 1-inch range and collar for fastening into the 14 mm and 18 mm spark plug hole. The adapters are included. The indicator also can be used with the JDM-10 Mounting Bracket to measure crankshaft runout.



A—Tester
B—Test Simulator

C—Test Adapter
D—Load Coil

Fig. 11-Capacitor Discharge Ignition Tester

JDM-74 Capacitor Discharge Ignition (CDI) Tester, Fig. 11, consists of the tester (A), test simulator (B), test adapter (C) and load coil (D). The tester measures peak energy output of CDI units, magneto charge and trigger impulses.

The ignition energy output is referenced against a 0-100 scale on the tester. The tester has two input ranges selected by a toggle switch. The "LOW" range senses AC or DC voltage from 0.5 to 27 volts. The "HIGH" range senses AC or DC voltage from approximately 70 to 500 volts.

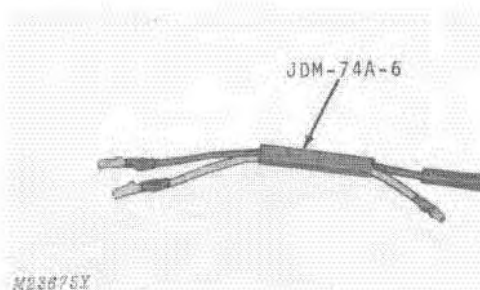
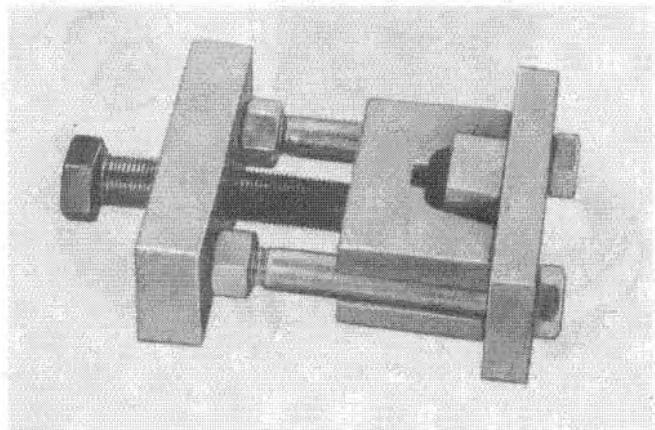


Fig. 12-Special Wiring Harness

JDM-74A-6 Special Wiring Harness, Fig. 12, is used with the JDM-74 CD Tester to check magneto output, trigger impulse and CD unit output.

TRACK TOOLS

M25501Y

Fig. 13-Track Wear Clip Installing Tool

JDG-46 Wear Clip Installing Tool, Fig. 13, is used to install the wear clip on John Deere tracks.

Group 10 CONVENIENCE SERVICE TOOLS

SNOWMOBILE SUPPORT TOOLS

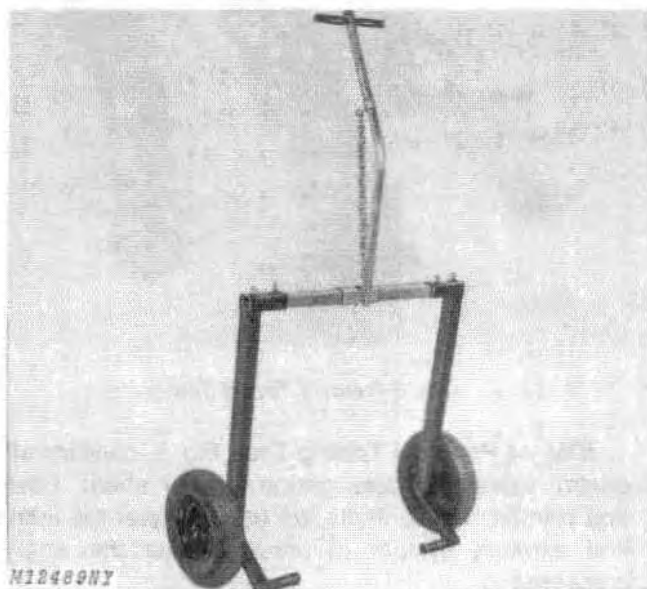


Fig. 1-Snowmobile Dolly

D-05024ST Snowmobile Dolly, Fig. 1, is used for moving snowmobiles in or out of the service shop or display area.

ENGINE TOOLS



Fig. 2-Bench Mounted Fixture

JDM-16 Bench Mounted Service Fixture, Fig. 2, is used to mount all consumer product engines as well as hydrostatic units and many other components. Any component weighing 350 pounds or less may safely be rotated 360 degrees with positive stops at 90 degree increments.

ENGINE TOOLS—Continued

Fig. 3-Ring Compressor

JDM-35 Ring Compressor, Fig. 3, is a band-type ring compressor with two adapters, usable with piston diameters of 2-1/8 inch to 2-5/8 inch.

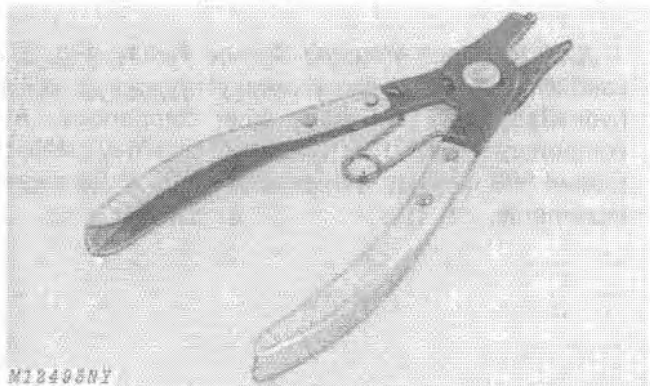


Fig. 4-Piston Lock Ring Plier

JDM-36 Piston Lock Ring Plier, Fig. 4, is used to install piston pin lock rings.

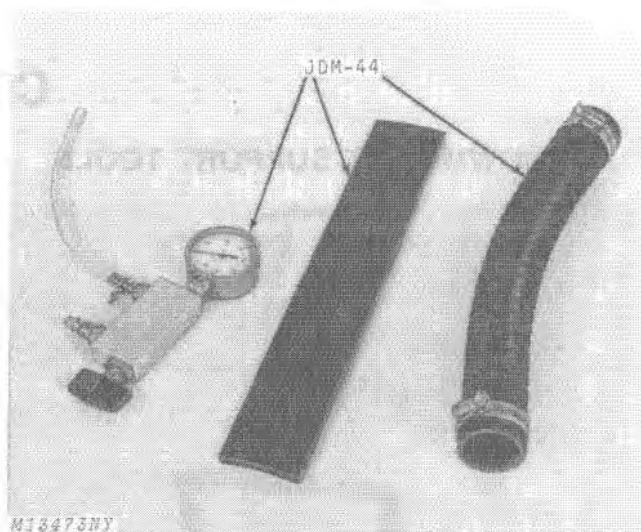


Fig. 5-Pressure Testing Tool

JDM-44 Pressure Testing Tool, Fig. 5, consists of a control valve, pressure gauge, rubber sheet, hoses and clamps. These items are used to seal the intake and exhaust system to pressure test the engine crankcase.

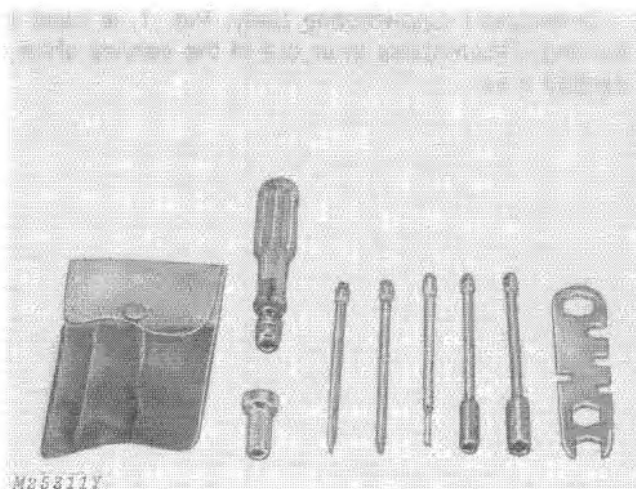
CARBURETOR TOOLS

Fig. 6-Mikuni Carburetor Tool Kit

JDM-109-A Mikuni Carburetor Tool Kit, Fig. 6, is used for making adjustments on the Mikuni Carburetor.