STB

Service Textbook

John Deere Snowmobiles

STB-172M
1973

JOHN DEERE

SERVICE SUPERIORITY

To those service technicians dedicated to superior service . . .

This book contains the latest in factory service information. The material has been written and illustrated through the efforts of the Factory Service Training Department and various Engineering personnel.

The total value of this book will be determined by the amount of knowledge you gain from it and how you use it as a reference in the future. No matter how great the book or who the author is, if the book is not read, the contents will be of absolutely no value. Because you are interested in learning, there is no doubt that this book will be of great value to you.

This book is designed as a study book, reference book, and notebook. Use it for all three purposes. Take it home and, in your leisure hours, read it again. Refer to it time and again.

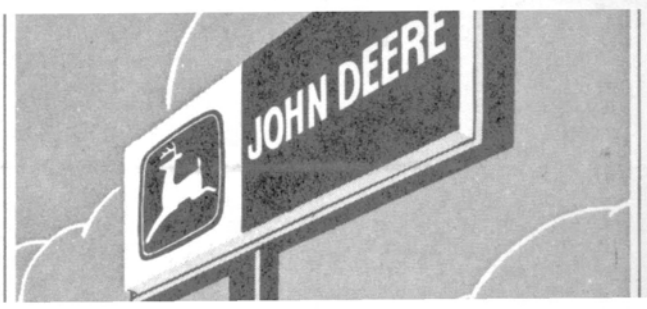
You are a vital part of a technical group representing John Deere service throughout the country. The modern, complex equipment of our time requires professional attention which only you can render. The role you play that provides **superior service** to the customer is serving many purposes.

Consider how you affect prospective customers who buy new machines — Consider how you affect repeat purchases by the old, reliable, satisfied customer — Consider how you can be the direct cause of a customer going elsewhere to purchase competitive machines — Consider the fact that few people have the keen technical ability to perform service tasks which you are qualified to do — Consider the role you play on-the-scene to develop your country and a major part of the rest of the world.

This is your book, intended to provide you with a little more knowledge to meet your job challenge with greater ease. *Remember — you are a professional person rendering not just service but* **superior service** *— John Deere Service!!!*

THIS BOOK BELONGS TO:

Name _____



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SPECIFICATIONS FOR 400, 500, 600 SNOWMOBILES

Component	Item	400	500	600
Engine	Manufacturer	CCW*	CCW*	CCW*
	Model	KEC 340/4	KEG 440/4	KEC 440/4
	No. of Cylinders	2	2	2
	Bore	60 mm	68 mm	68 mm
	Stroke	60 mm	60 mm	60 mm
	Displacement	339 cc	436 cc	436 cc
	Horsepower			
	SAE J245 hp. rating	27 @ 6500 rpm	35 @ 6750 rpm	35 @ 6750 rpm
	SAE J607 hp. rating	28 @ 6500 rpm	36 @ 6750 rpm	36 @ 6750 rpm
Fuel System	Carburetor Mfg.	Walbro	Walbro	Walbro
	Carburetor Model	WDA-32	WDA-32	WDA-32
	Tank Capacity	5.50 U.S. gal.	5.50 U.S. gal.	5.50 U.S. gal.
	Fuel Mixing Ratio	50:1**	50:1**	50:1**
Chassis and Body	Material:			
	Tunnel and Pan	Aluminum	Aluminum	Aluminum
	Hood and Console	Polyester	Polyester	Polyester
	Windshield	Polycarbonate	Polycarbonate	Polycarbonate
	Overall Length	103.4 in.	103.4 in.	103.4 in.
	Overall Width	35.5 in.	35.5 in.	35.5 in.
	Overall Height	44 in.	44 in.	44 in.
	Weight (lbs)	382	386	410
Track and Suspension	Suspension Type	Trailing arm bogie	Trailing arm bogie	Trailing arm bogie
	No. of Bogie Wheels	15	15	15
	Track Material	Polyurethane	Polyurethane	Polyurethane
	Track Width	15.5 in.	15.5 in.	18 in.
Power Train	Transmission:			
	Type	Two sheave variable	Two sheave variable	Two sheave variable
	Manufacturer	Salsbury	Salsbury	Salsbury
	Model	780	850	850
	Final Drive Ratio:			
	Standard	2.19:1	2.19:1	2.19:1
	Optional	2.44:1	2.44:1	2.44:1
	Brake	External band	External band	External band
	Drive Belt	M63911	M63912	M63912

**Manufactured for Canadian Curtiss-Wright by Kioritz Corp., Japan*
***With John Deere Snowmobile oil. See page 35.*

(Continued On Next Page)

SPECIFICATIONS FOR 400, 500, 600 SNOWMOBILES – Continued

Component	Item	400	500	600
Electrical System	Spark Plug Gap	0.020 in.	0.020 in.	0.020 in.
	Breaker Point Gap	0.014 ± .002 in.	0.014 ± .002 in.	0.014 ± .002 in.
	Timing (Static)	10° BTDC (.023 ± .005 in.)	10° BTDC (.023 ± .005 in.)	10° BTDC (.023 ± .005 in.)
	Lighting Coil Capacity	120 Watt	120 Watt	120 Watt
	Light Bulbs:			
	Headlight	4000*, 4002* 4040* (AM52309)	4000*, 4002*, 4040* (AM52309)	4000*, 4002*, 4040* (AM52309)
	Stop-taillight	1157 (AM52305)	1157 (AM52305)	1157 (AM52305)
	Speedometer	1816 (AT22970)	1816 (AT22970)	1816 (AT22970)
	Tachometer	1816 (AT22970)	1816 (AT22970)	1816 (AT22970)
	Battery (Electric Start)	AM52050	AM52050	AM52050

** Use in an emergency only. Inferior to AM52309.*

SPECIFICATIONS FOR JDX4 AND JDX8 SNOWMOBILES

Component	Item	JDX4	JDX8
Engine	Manufacturer	Kohler	CCW*
	Model	K295-2AX	KEC 440/21
	No. of Cylinders	2	2
	Bore	56 mm	66 mm
	Stroke	55 mm	64 mm
	Displacement	292 cc	438 cc
	Horsepower:		
	SAE J245 hp Rating	24 @ 6800 rpm	38 @ 6750 rpm
	SAE J607 hp Rating	25 @ 6800 rpm	40 @ 6750 rpm
Fuel System	Carburetor Mfg.	Walbro	Walbro
	Carburetor Model	WDA-37	WDA-34
	Tank Capacity	5.50 U.S. Gal.	5.50 U.S. Gal.
	Fuel Mixing Ratio	50:1**	50:1**

Component	Item	400	500	600
Electrical System	Spark Plug Gap	0.020 in.	0.020 in.	0.020 in.
	Breaker Point Gap	0.014 ± .002 in.	0.014 ± .002 in.	0.014 ± .002 in.
	Timing (Static)	10° BTDC (.023 ± .005 in.)	10° BTDC (.023 ± .005 in.)	10° BTDC (.023 ± .005 in.)
	Lighting Coil Capacity	120 Watt	120 Watt	120 Watt

SPECIFICATIONS FOR JDX4 AND JDX8 SNOWMOBILES – Continued

Component	Item	JDX4	JDX8
Chassis and Body	Material:		
	Tunnel and Pan	Steel	Aluminum
	Hood and Console	Polyester	Polyester
	Windshield	Polycarbonate	Polycarbonate
	Overall Length	103.4 in.	103.4 in.
	Overall Width	35.5 in.	35.5 in.
	Overall Height	40 in.	40 in.
	Weight (lbs)	396	386
Track and Suspension	Suspension Type	Trailing Arm Bogie	Trailing Arm Bogie
	No. of Bogie Wheels	15	15
	Track Material	Polyurethane	Polyurethane
	Track Width	15.5 in.	15.5 in.
Power Train	Transmission:		
	Type	2 Sheave Variable	2 Sheave Variable
	Manufacturer	Salsbury	Salsbury
	Model	780	850
	Final Drive Ratio:		
	Standard	2.19:1	2.05:1
	Optional	2.44:1	2.19:1, 2.44:1
	Brake	External Band	External Band
	Drive Belt	M63911	M63912
Electrical System	Spark Plug Gap	0.020 in.	0.020 in.
	Breaker Point Gap	0.016 ± .002 in.	0.014 ± .002 in.
	Timing (Static)	.090 in. BTDC (Advanced) (± .005)	10° BTDC (Retarded) (.023 ± .005 in.)
	Lighting Coil Capacity	100 Watt	120 Watt
	Light Bulbs:		
	Headlight	4000***, 4002***, 4040*** (AM52309)	4000***, 4002***, 4040*** (AM52309)
	Stop-taillight	1157 (AM52305)	1157 (AM52305)
	Speedometer	1816 (AT22970)	1816 (AT22970)
	Tachometer	1816 (AT22970)	1816 (AT22970)
	Battery (Electric Start)	AM52050	AM52050

**Manufactured for Canadian Curtiss-Wright by Kioritz Corp., Japan*
***With John Deere Snowmobile oil. See page 35.*
****Use in an emergency only. Inferior to AM52309.*

TROUBLE SHOOTING

Always take a systematic approach to trouble shooting. First of all, determine what is actually causing the problem. Is it due to poor quality or insufficient *fuel,* or is it caused by a weak or improperly timed ignition *spark,* or is it poor *compression*? If the complaint is poor performance, don't just assume that it is the engine without first checking out the vehicle drive—the drive belt could be loose or worn or the track could be binding. If these items check out OK, then go back to the engine. Do the easiest things first—make a visual check for loose connections, broken wires, etc. If you find that the problem is poor compression due to internal damage, don't just replace the damaged parts—*look for and correct* the causing factors which are usually related to fuel.

TROUBLE SHOOTING GUIDE

ENGINE PROBLEM	POSSIBLE CAUSES (SEE DETAILS BELOW AND ON NEXT PAGE)					
	NO FUEL	INCORRECT FUEL	TOO MUCH FUEL	NO IGN. SPARK	POOR IGNITION	POOR COMPRESSION
WILL NOT START	X		X	X		
HARD STARTING		X	X		X	X
LACKS POWER		X	X		X	X
POOR ACCELERATION		X	X		X	X
PINGS UNDER LOAD		X			X	
BACKFIRES, RUNS UNEVENLY		X			X	
STOPS OR STALLS SUDDENLY	X			X		X

FUEL RELATED CAUSES

No Fuel

1. Tank empty
2. Tank vent closed or plugged
3. Line disconnected
4. Line kinked, plugged
5. Filter, screens blocked
6. Impulse tube off or plugged

Incorrect Fuel

1. Stale fuel — won't vaporize
2. Air leaks — loose components
3. Improper fuel and/or mixture
4. Carburetor set wrong
5. Fuel lines restricted
6. Exhaust port blocked
7. Vapor lock
8. Faulty reed valve (JDX-8 only)

Too Much Fuel

1. Overchoking, flooded
2. Restricted air intake
3. Carburetor set wrong
4. Carburetor malfunctioning
5. Choke not opening

Fuel System Tests

Fuel in combustion chamber: If engine won't start, remove spark plug. If electrodes are wet this probably indicates fuel is getting to engine. If dry, check out system from carburetor back to tank. Track could be binding. If these items check out OK, then go back to the engine. Do the easiest things first—make a visual check for loose connections, broken wires, etc. If you find that the problem is poor compression due to internal damage, don't just replace the damaged parts—*look for and correct* the causing factors which are usually related to fuel.

TROUBLE SHOOTING GUIDE

	POSSIBLE CAUSES (SEE DETAILS BELOW AND ON NEXT PAGE)

IGNITION RELATED CAUSES

Poor Ignition

1. Plug wet
2. Plug gap incorrect
3. Plug carbon fouled
4. Wrong plug
5. Breaker points dirty
6. Point gap wrong
7. Timing wrong
8. Condenser weak

No Ignition Spark

1. Emergency stop switch "OFF"
2. Leads disconnected or broken
3. Faulty plugs
4. Ignition switch faulty
5. Breaker points oxidized
6. Breaker points stuck
7. Condenser faulty
8. Ignition coils faulty

Ignition Tests

SPARK PLUG: Remove plug, set gap at .020", and place plug with side electrode against cylinder head. Then crank engine at speed sufficient to produce a good spark—if a sharp snappy spark is noted between the electrodes, this eliminates the ignition components as the fault. However, wrong timing could be causing problems.

POINTS: If pitted or worn, replace—don't try to service. Clean dirty points, reset gap and re-time engine after servicing.

SWITCH: Unplug the switch (disconnect all terminals)—if the engine can be started with switch disconnected, check for wrong connections or, if none are found, replace the switch.

CONDENSER: Use commercial condenser tester per tester manufacturer's instructions—bad condenser will cause premature failure of points.

COIL: Check on coil tester—continuity must be indicated.

COMPRESSION RELATED CAUSES

Poor Compression

1. Spark plug loose
2. Head gasket leaking
3. Piston rings sticking
4. Cylinder badly worn
5. Burned piston

Abnormal Compression

1. Build-up of carbon
2. Wrong head

COMPRESSION TEST: Most causes of poor compression are readily evident. If none of the easier tests reveal the cause, it will be necessary to disassemble heads and cylinders to find reason. Lack of fuel is often the primary factor leading to damage to pistons and cylinders—check out this system too.

ENGINE PERFORMANCE CHART

Plug Description (Insulator Tip Color)	Plug Change		Adjust Carburetor (High-Speed Needle)
Black and wet	Change to hotter plug and stop long periods of idling.	and/or	Lean carburetor 1/8-turn or less clockwise
Black and dry	Consider hotter plug if present driving pattern is planned.	and/or	Lean carburetor 1/8-turn or less clockwise
Charcoal to brown	OK, but idle engine a litte less or drive a little faster.	and/or	Lean carburetor 1/16-turn clockwise
Brown to dark tan	Ideal		Ideal
Tan	OK, but avoid longer, faster runs.	and/or	Adjust carburetor 1/8-turn richer (counterclockwise).
Light tan to white	Consider colder plug, slow down.	and/or	Adjust carburetor 1/8-turn richer (Counterclockwise).
Grey to white	STOP - Change to colder plug. Severe engine damage eminent.	and	Adjust carburetor richer (counterclockwise).

NOTE: 1. The carburetor low-speed needle plays a part. Be sure it is adjusted according to instructions on page 39.

2. Oil selection and mixture are important. Recommend John Deere Snowmobile Oil mixed at 50 to 1 ratio. See page 35.

3. Speeding up pattern of operation can lighten plugs. Slowing down will darken them. A tan plug can become hazardous to the engine if prolonged higher speeds are expected. A charcoal plug can wet-foul if slower speeds are expected.

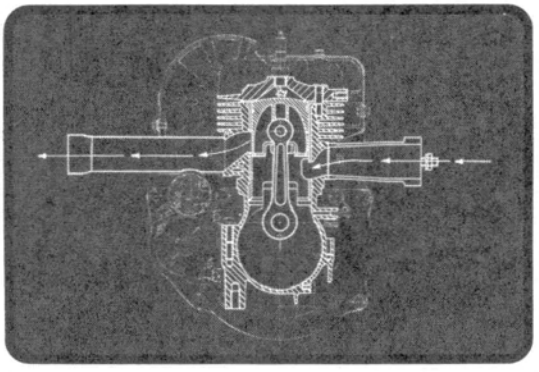
4. Excessive idling will cause a black and wet plug condition, even if heat range and carburetor adjustments are proper. Long periods of idling should be avoided.

ENGINE PERFORMANCE CHART

Plug Description (Insulator Tip Color)	Plug Change		Adjust Carburetor (High-Speed Needle)
Black and wet	Change to hotter plug and stop long	and/or	Lean carburetor 1/8-turn

TWO-CYCLE DESIGN

The majority of snowmobile engines are of the 2-cycle, piston-ported design.

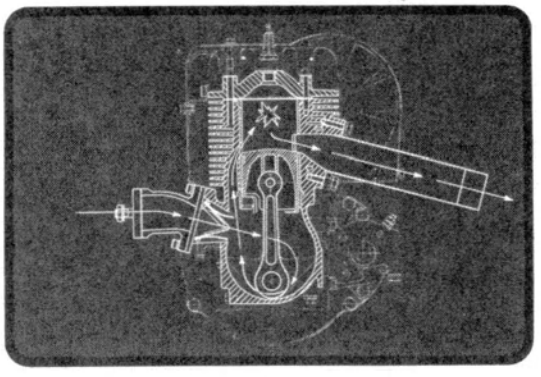


Slide No. 1 — Piston-Ported Design

This design has an intake port in the cylinder and uses the piston as a valve, to open and close the port.

This design is used in our K295-2AX Kohler (JDX-4), KEC340/4 CCW (400) and in our KEC440/4 CCW (500-600) engines.

Our new JDX-8 Snowmobile uses a KEC440/21 CCW engine which has a design unique to the snowmobile industry. It features a reed valve.



Slide No. 2 — Reed Valve Design

The reed valve engine has several performance advantages over the piston-ported design:

1. *Longer duration intake timing is obtained.*
2. *Precision operation of intake system, less fuel spit-back, and easier starting.*
3. *Intake ports can be larger as they are not in the cylinder. Transfer ports can also be larger due to absence of intake port in cylinder.*

CCW ENGINES

ENGINE REMOVAL

Remove console.

NOTE: To make console removal easier, remove left and right access panels from console. Also, remove two nuts inside storage compartment so storage compartment will not be removed with console.

Remove secondary belt shield and remove drive belt.

Disconnect fuel lines at carburetor.

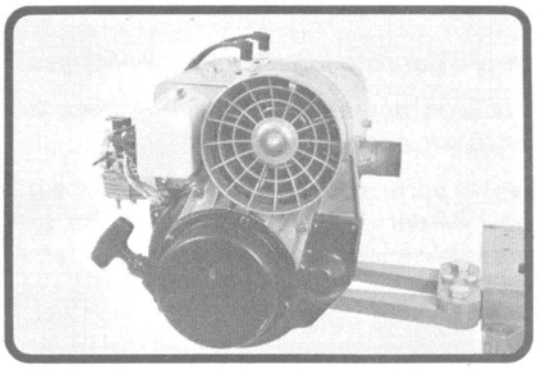
Disconnect choke and throttle cables.

Disconnect electrical system at plug.

Unhook four muffler ball joint springs.

Remove four engine mounting plate bolts.

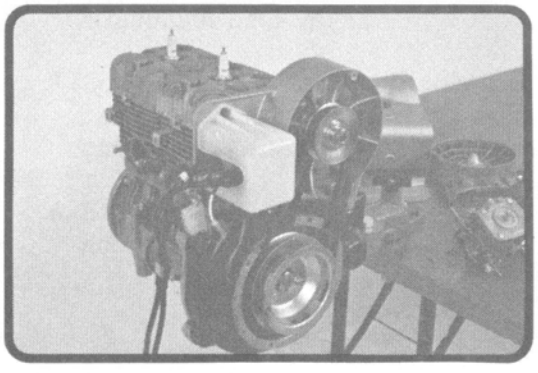
Lift engine up and rearward.



Slide No. 3 – Engine Assembly

Mount engine in an appropriate engine stand.

DISASSEMBLY



Slide No. 4 – Engine Disassembly

NOTE: To make console removal easier, remove left and right access panels from console. Also, remove two nuts inside storage compartment so storage compartment will not be removed with console.

Remove secondary belt shield and remove drive belt.

Disconnect fuel lines at carburetor.

Thoroughly clean exterior surfaces of engine using a suitable, safe cleaning solvent.

Remove drive sheave using proper tools. (See "Power Train" section).

Remove spark plugs.

Remove cylinder cover and axial fan guard.

Remove starter motor (if so equipped).

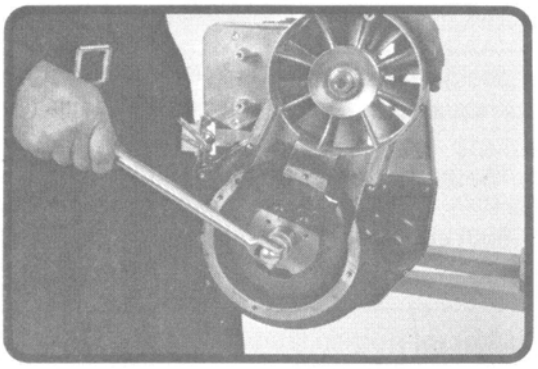
Remove intake and exhaust manifolds.

Disconnect the two ignition leads by the terminal coupler and remove the cap screw securing ignition terminal coupler to fan cover.

Remove recoil starter assembly.

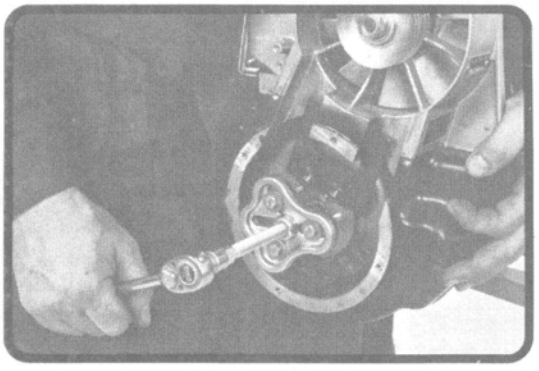
Remove starter cup, belt sheave and window plate from flywheel.

REMOVING FLYWHEEL



Slide No. 5 – Removing Flywheel

Position flywheel holding tool, JDM-2 and remove flywheel nut, lockwasher and flat washer.



Slide No. 6 – Using Flywheel Puller

Install flywheel puller, JDM-9, utilizing the three tapped holes in flywheel. Hold flywheel with JDM-2 tool. Tighten puller center bolt to 35-40 ft-lbs. If

Remove spark plugs.

Remove cylinder cover and axial fan guard.

Remove starter motor (if so equipped).

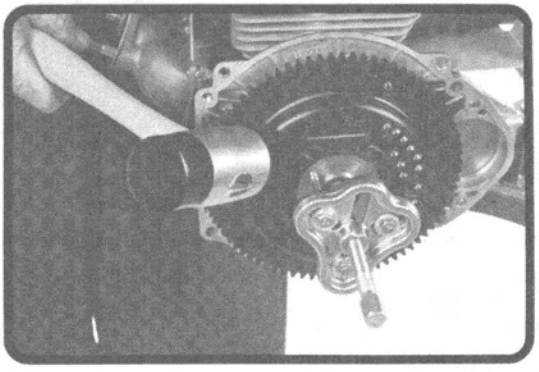
Remove intake and exhaust manifolds.

Disconnect the two ignition leads by the terminal coupler and remove the cap screw securing ignition terminal coupler to fan cover.

IMPORTANT

Do not overtorque center bolt of flywheel puller.

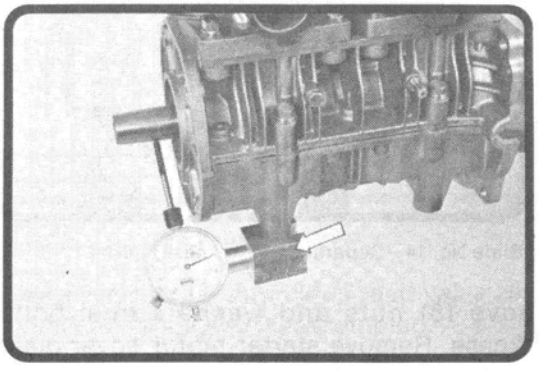
Do not hammer on end of puller bolt, as damage to crankshaft or bearings may result.



Slide No. 7 – Striking Flywheel

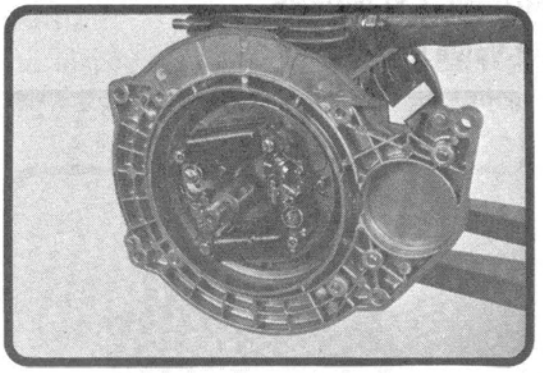
With puller in tension and fan cover removed, strike flywheel sharply in line with flywheel keyway, using a plastic or wood mallet.

CHECKING CRANKSHAFT FOR TWIST



Slide No. 8 – Checking Crankshaft

If crankshaft PTO end is to be checked for twist or bend, perform test at this stage of disassembly. Use JDM-10 adapter and dial indicator as shown. Maximum run-out is not to exceed .0035 inch.



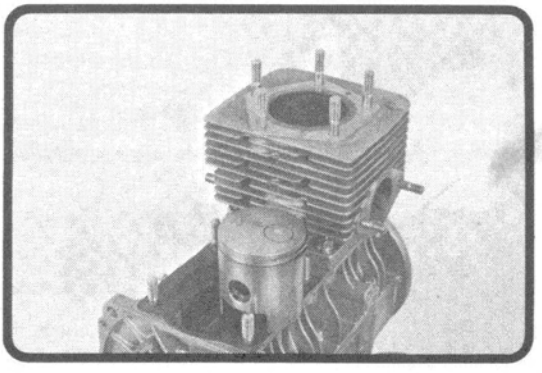
Slide No. 9 – Removing Stator

On piston-ported engines, remove the backing plate and stator assembly.

NOTE: Unless being serviced, stator assembly should be stored inside flywheel to keep flywheel magnetic properties.

REMOVING CYLINDERS

Piston-Ported Engines



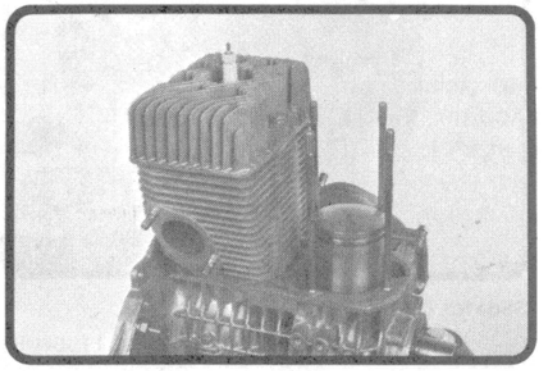
Slide No. 10 – Removing Cylinders (Piston Ported)

Remove the (5) nuts and washers securing each cylinder head. Remove cylinder heads. Discard cylinder head gaskets.

Remove the (4) nuts securing each cylinder to crankcase. Carefully lift each cylinder to remove. Discard cylinder base gaskets.

REMOVING CYLINDERS

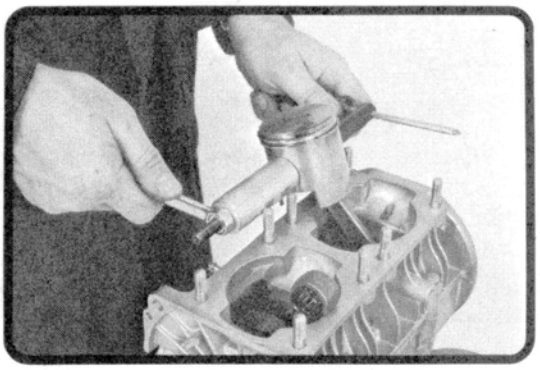
Reed-Valve Engine



Slide No. 11 – Removing Cylinders

Remove all (8) cylinder head retaining nuts. Remove cylinder heads and discard gaskets. Lift cylinders upward off cylinder studs. Discard cylinder base gaskets.

REMOVING PISTONS



Slide No. 12 – Removing Piston Pins

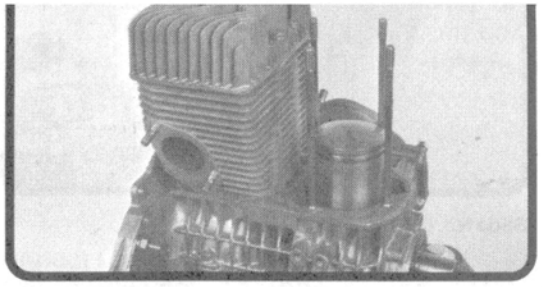
Before removing pistons, be sure piston crowns are marked on the exhaust port side. If no mark is legible, inscribe them.

Using a suitable Circlip removal tool, remove Circlips securing each piston pin.

Use the piston pin removal tool, JDM-7A, to remove the piston pins.

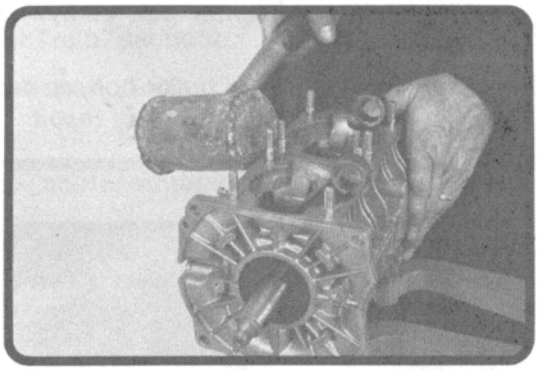
IMPORTANT

Be careful when removing piston pins to prevent damage to needle bearings. Use correct size piston pin guide for engine being disassembled.



SEPARATING CRANKCASE

Piston-Ported Engines

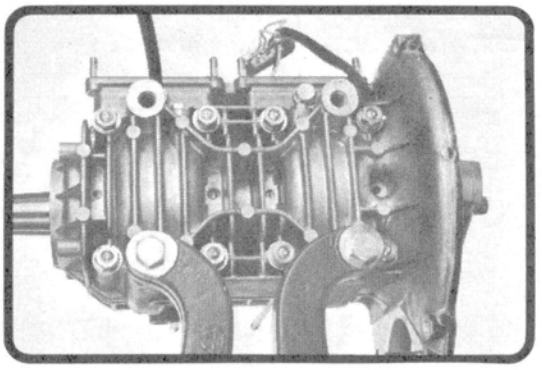


Slide No. 13 – Separating Crankcase Halves

Remove the (10) cap screws and washers joining the crankcase halves.

Separate crankcase by tapping case lightly on each side with a soft hammer. *DO NOT* use a screwdriver or chisel to force crankcase halves apart.

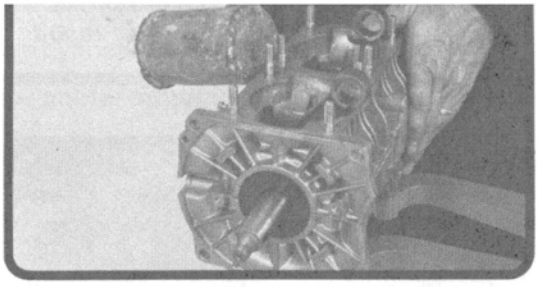
Reed-Valve Engine



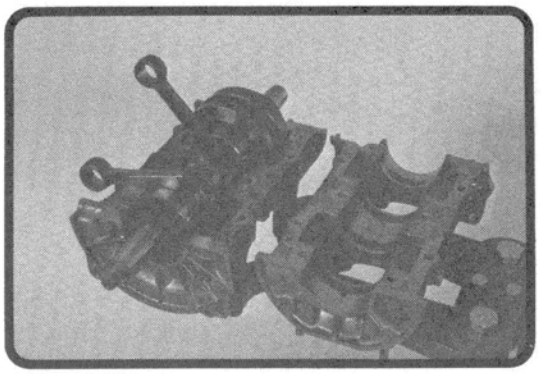
Slide No. 14 – Separation Crankcase Halves

Remove (8) nuts and washers from bottom of crankcase. Remove starter motor cover plate, cap screw by cover plate, and two screws securing stator plate before separating crankcase halves. Use soft hammer to separate halves as shown above. *DO NOT* pry apart.

Remove stator assembly and place into flywheel for storage until ready to reassemble.



REMOVING CRANKSHAFT

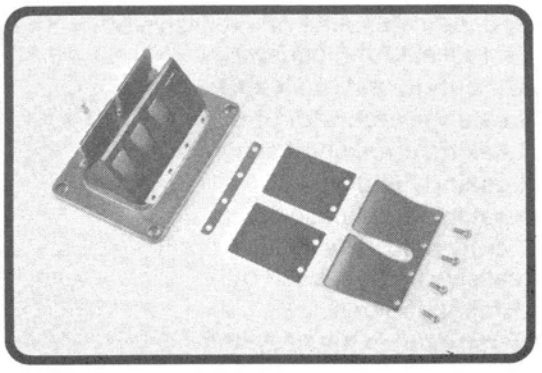


Slide No. 15 - Removing Crankshaft

Remove crankshaft by lifting gently upward.

Note the (4) seal retaining Circlips and their positions. The piston ported 340 and 440 CCW engines have Circlips positioned in the bottom half of crankcase, while the 440 reed valve engine Circlips are located in the top half of crankcase.

REED VALVE SERVICE (Reed Valve Engine Only)



Slide No. 16 - Reed Valve Assembly

Remove, disassemble and clean reed valve assemblies whenever engine is disassembled.

A faulty reed valve can be detected by excessive fuel spit-back through carburetor, causing a popping noise.

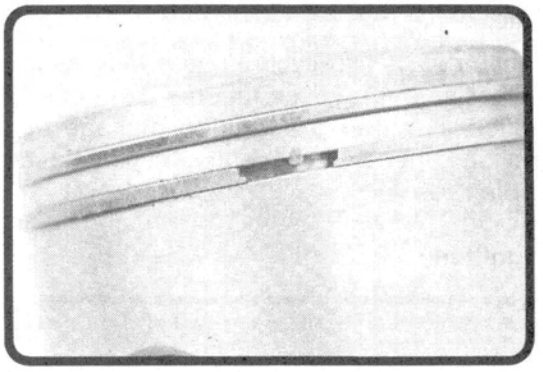
IMPORTANT

Prolonged running of an engine with a faulty reed valve could cause a seized piston. This is due to the lean mixture caused by improper fuel transfer on the piston's downstroke.

Inspect reeds for signs of cracking or warpage. Inspect reed seating surfaces for damage or wear.

CLEANING

Prior to inspection, clean all parts except crankshaft and ignition parts in a suitable cleaning solvent.



Slide No. 17 - Piston Locating Pins

Clean piston ring grooves with proper tool. Be careful not to damage ring locating pins when cleaning.

Clean carbon from piston crown and cylinder exhaust port with a soft, non-ferrous scraper.

Inspect spark plug threads for carbon build-up. Clean with a 14mm spark plug tap as necessary. A spark plug that does not seat properly will act like a "hot" plug due to poor heat conduction.

IMPORTANT

Be careful not to damage aluminum material when scraping.

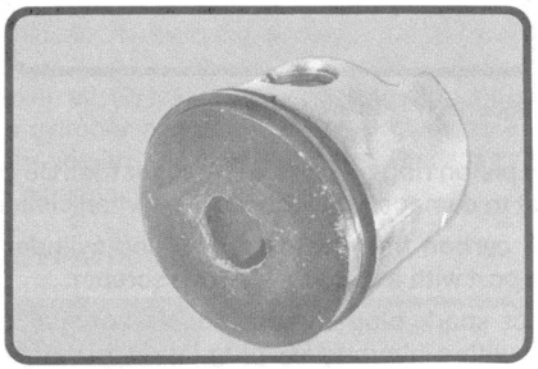
Avoid cleaning crankshaft assembly in solvent as contamination may occur. Clean with compressed air and a lint-free cloth.

INSPECTION AND ANALYSIS

Before starting engine assembly, measure pistons and cylinders for wear. Check cylinder heads for distortion. Check crankshaft and connecting rod bearings for wear. They should move freely but not wobble.

The majority of two-cycle engine failures are due to excessive heat. These failures can generally be classified as either pre-ignition damage or detonation damage. Below are examples of each and possible causes.

Pre-Ignition

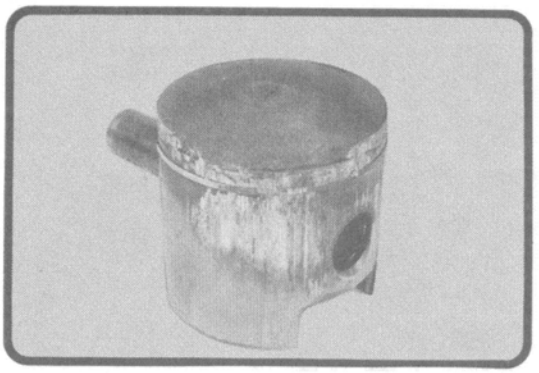


Slide No. 18 - Pre-Ignition Damage

Pre-ignition is caused by an excessively hot surface in the combustion chamber. This hot surface will ignite the charge prior to normal combustion and will generate enough heat to melt away the piston.

Causes of pre-ignition:
1. Spark plug with too "hot" a heat range.
2. Nicks or sharp edges in combustion chamber.
3. Excessive carbon in combustion chamber. caused by:
   a. Poor grade of oil.
   b. Excessive oil in fuel mixture.

Detonation



Slide No. 19 - Detonation Damage

Detonation is spontaneous explosion that occurs after the normal combustion takes place. This spontaneous explosion causes knocking and extremely high temperatures and pressures within the combustion chamber.

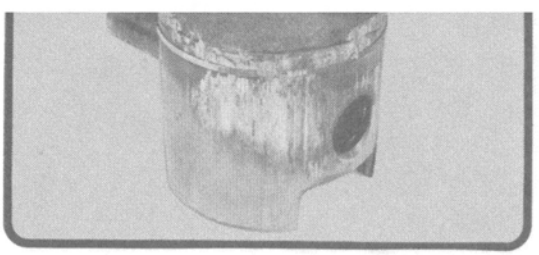
Top piston land damage, broken rings and scuffing are usually due to detonation damage.

Causes of detonation:
1. Low octane gasoline or excessive oil in mixture.
2. Lean fuel mixture, caused by:
   a. Carburetor set too lean.
   b. Leaking carburetor or manifold gaskets.
   c. Leaking crankshaft seals.
   d. Leaking head gaskets.
   e. Leaking crankcase seam.
   f. Faulty reed valve (JDX-8 only).
3. Excessive heat; caused by:
   a. Broken fan belt.
   b. Restricted exhaust system.
   c. Overly advanced ignition timing.
   d. Blocked air flow.

wobble.

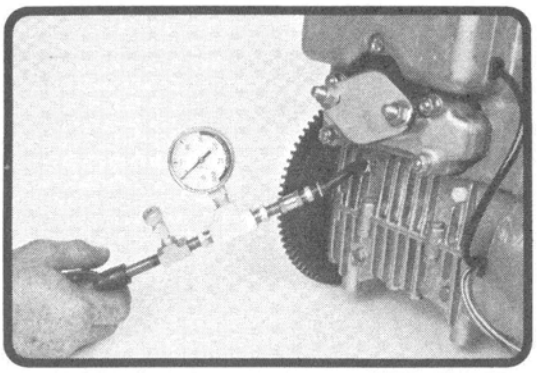
The majority of two-cycle engine failures are due to excessive heat. These failures can generally be classified as either pre-ignition damage or detonation damage. Below are examples of each and possible causes.

Pre-Ignition



Slide No. 19 - Detonation Damage

Pressure Testing the Engine



Slide No. 20 - Pressure Testing The Engine Crankcase

If detonation-type piston failures have been experienced and a fuel lean-out is suspected, the following procedure should be performed:

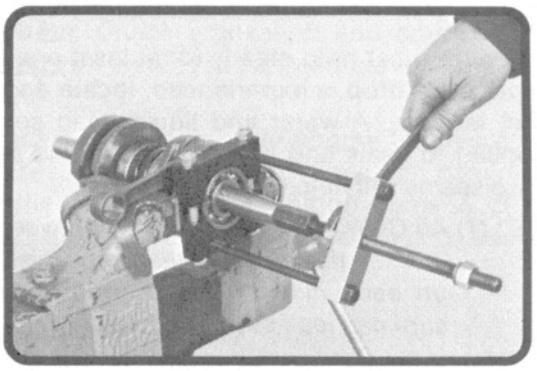
1. Seal intake manifold at carburetor mounting flange.
2. Seal exhaust at outlet with rubber plug(s).
3. Install spark plugs and torque to specifications.
4. Secure a low-pressure air gauge and a fuel line primer bulb with a check valve and fittings. A small shutoff valve is also required to insure against air leaking past primer bulb check valve.
5. Attach gauge with fittings and hoses to impulse tube fitting.
6. Pump air into crankcase until 10 to 15 psi is achieved.
7. Pressure must hold steady for at least one hour.
8. If pressure drop is experienced, locate and correct leakage. A water and liquid soap solution applied to seals and manifold areas and crankcase seams will help to locate leakage.

NOTE: (1) All CCW engines are sealed between cylinders; therefore, a test must be made on each cylinder to determine if pressure can leak between cylinders.

(2) Kohler K295-AX engine requires only one test hook-up to test both cylinders, due to the lack of crankshaft seals between cylinders.

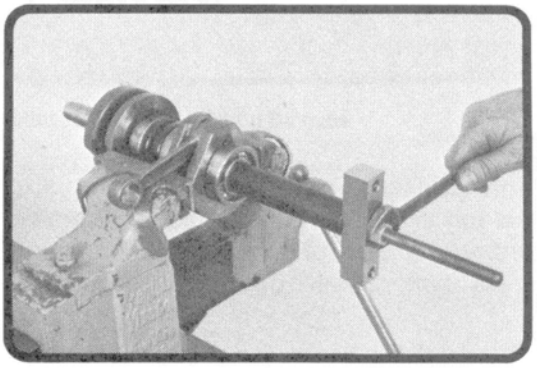
ASSEMBLY

REPLACING CRANKSHAFT BEARINGS



Slide No. 21 - Removing Crankshaft Bearings

If replacement is required, remove the outer bearings as shown using the JDM-8 puller. If the inner bearings or the lower connecting rod bearings are faulty, the entire crankshaft assembly must be replaced.

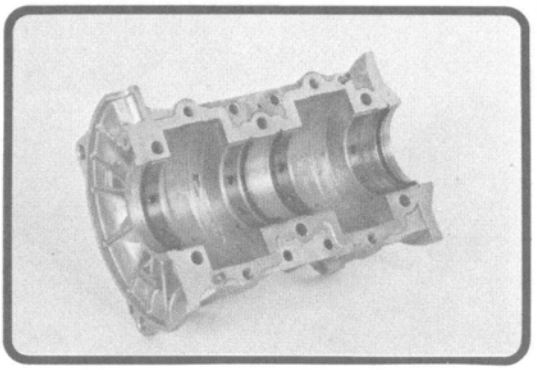


Slide No. 22 - Installing Crankshaft Bearings

Assemble JDM-8 puller as shown above to install outer bearings.

Always use new crankshaft seals when reassembling. Leakage at seals can cause a lean fuel mixture, resulting in possible engine damage.

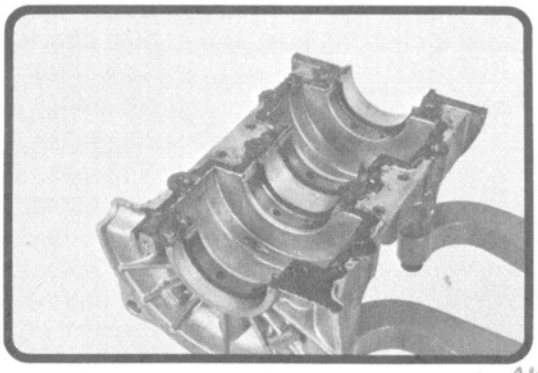
INSTALLING SEAL CIRCLIPS



Slide No. 23 - Circlip Placement

Prepare crankcase for re-assembly by inserting oil seal retaining Circlips in case half grooves. The piston-ported 340 and 440 engines have the Circlip positioned in the lower half of crankcase, whereas the 440 reed valve engines have the Circlips positioned in the top half of crankcase.

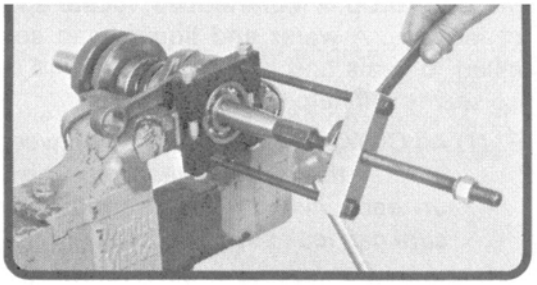
APPLYING CRANKCASE SEALER

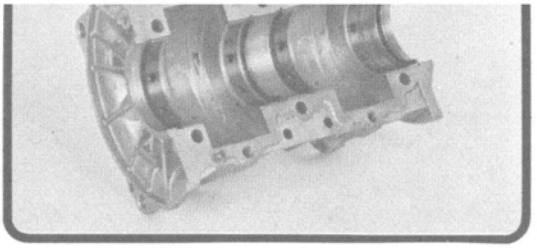


Slide No. 24 - Applying Crankcase Sealer 3M sealer

Apply a coat of good quality latex base non-hardening, gasoline resistant, sealing compound to sealing surfaces of both crankcase halves.

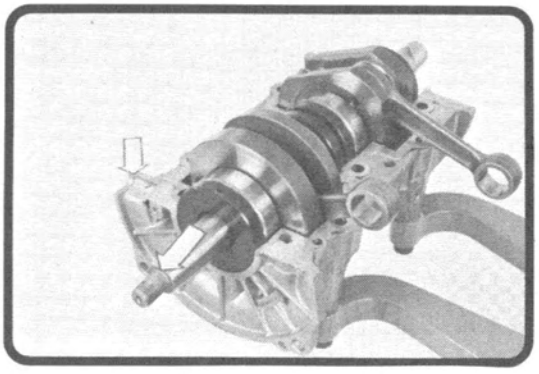
DO NOT permit sealer to run into interior of crankcase halves.





Slide No. 23 - Circlip Placement

INSTALLING CRANKSHAFT – Piston-Ported Engines

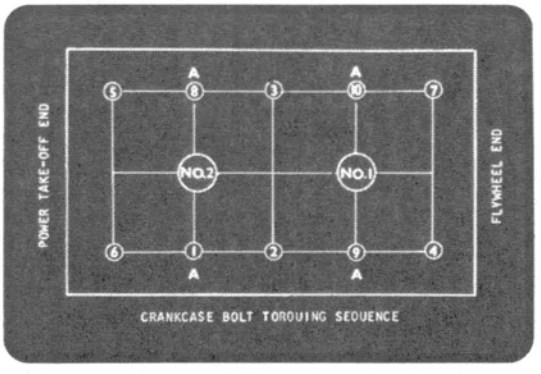


Slide No. 25 - Installing Crankshaft (Piston-Ported Engines)

Install crankshaft into lower half of crankcase with threaded flywheel end toward fan housing end of crankcase.

Check to insure seal-retaining Circlips and seals do not become dislodged.

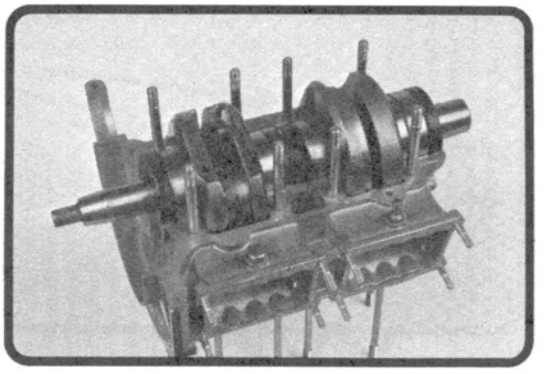
Apply a liberal amount of two-cycle engine oil to crankshaft bearings. Install upper crankcase half.



Slide No. 26 - Torque Sequence (Piston-Ported Engines)

Install the four longer bolts at locations 2, 3, 4 and 7. Then, install upper bolts "A" and tighten lightly. Install remaining bolts and torque crankcase bolts in the pattern shown to 15-18 ft-lbs.

INSTALLING CRANKSHAFT – Reed-Valve Engines



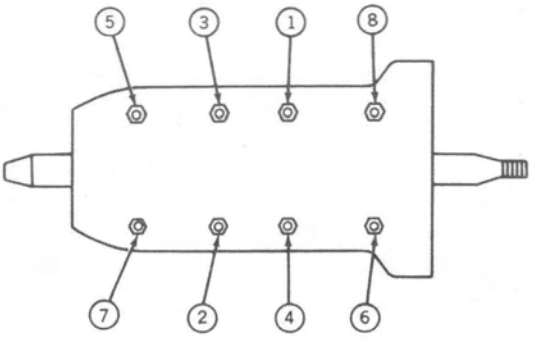
Slide No. 27 - Installing Crankshaft (Reed Valve Engines)

Stand upper crankcase half on studs and install crankshaft as shown.

Check to insure seal retaining Circlips and seals do not become dislodged.

Apply a liberal amount of two-cycle engine oil to crankshaft bearings.

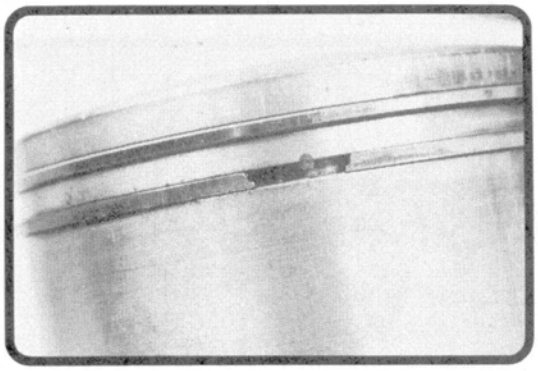
Install stator assembly on crankshaft, with rubber grommet on leads, in recess provided. Install the lower crankcase half. Be sure the two dowel pins are properly engaged with mating holes in opposite half of crankcase.



Slide No. 28 - Torque Sequence (Reed Valve Engines)

Install flat washers, lock washers, and nuts. Torque nuts in the sequence shown to 15-18 ft-lbs.

INSTALLING PISTON RINGS



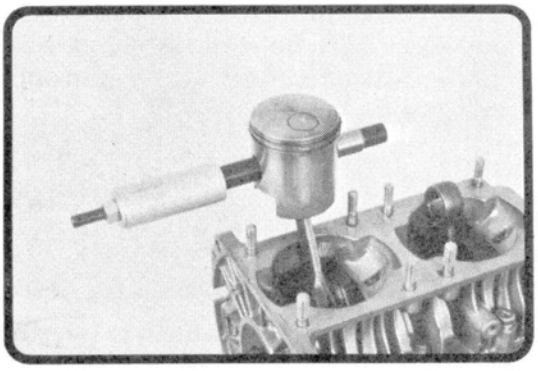
Slide No. 29 - Installing Piston Rings

Install piston rings carefully, locating ring gap at groove locating pin.

IMPORTANT

Install chrome ring in **top** *groove.*

INSTALLING PISTONS – Piston-Ported Engines

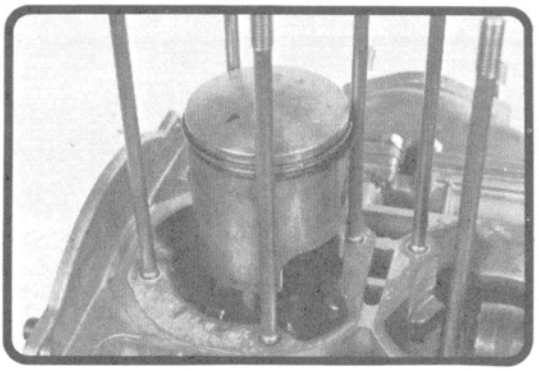


Slide No. 30 - Installing Pistons

Lubricate piston pin needle bearings with engine oil and install in connecting rod.

Place piston over connecting rod. Be sure marked side of piston is facing exhaust port. Position piston pin and assemble JDM-7A tool with large piston pin guide, as shown. Pull pin into position, remove tool and insert Circlips. Be certain Circlips seat properly.

INSTALLING PISTONS – Reed Valve Engines



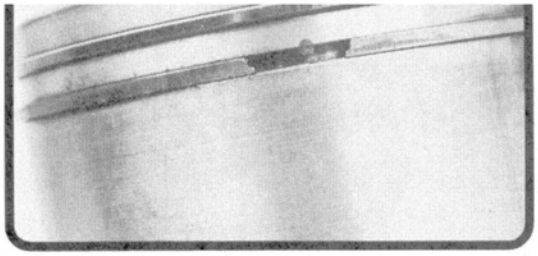
Slide No. 31 - Installing Pistons

Lubricate connecting rod needle bearing and install in rod.

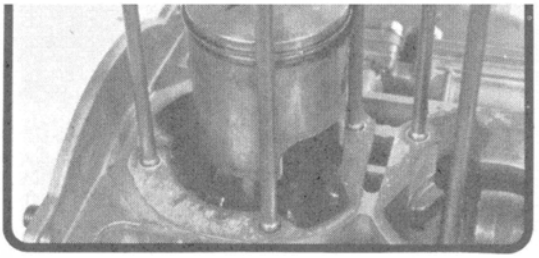
Place piston over connecting rod. Be sure port area of piston skirt aligns with port area of crankcase. Number "1" and number "2" pistons are *not* interchangeable.

Be sure triangular indentation on top of piston points toward exhaust port.

Assemble JDM-7A tool with JDM-32 piston pin guide (small one) and pull piston pin into position. Install Circlips and repeat for second piston.

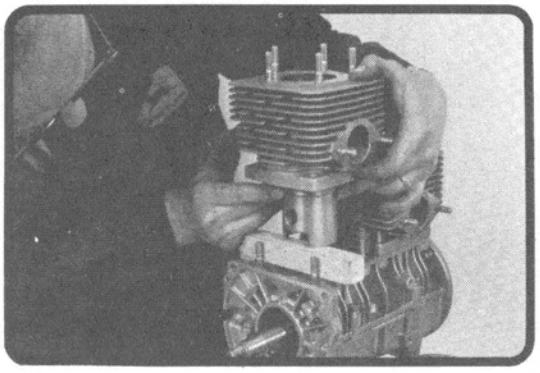


Slide No. 29 - Installing Piston Rings



Slide No. 31 - Installing Pistons

INSTALLING CYLINDERS – Piston-Ported Engines



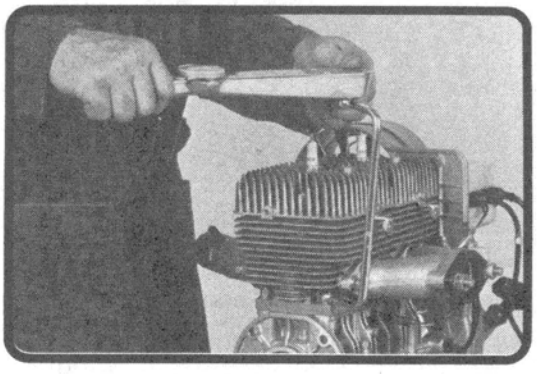
Slide No. 32 - Installing Cylinders

Install new base gaskets over cylinder studs.

Cylinders are identified with an "L" and "R". Locate "R" (right-hand, No. 1 cylinder) on flywheel end.

Lubricate pistons, rings and cylinders with two-cycle engine oil. Place a suitable wood block between piston and crankcase to steady piston.

Compress rings with fingers and gently slide cylinder over each ring. Be sure rings are centered on locating pins to prevent ring breakage.



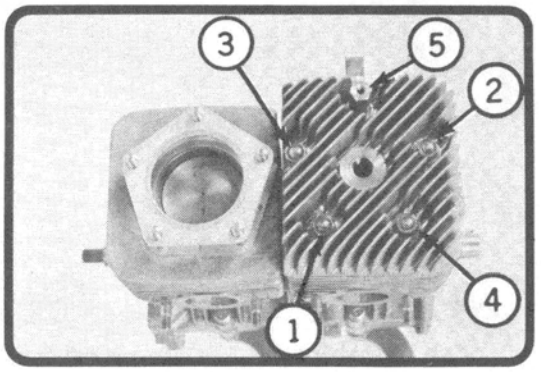
Slide No. 33 - Torquing Cylinder Nuts

Install (8) washers, lock washers and nuts. Finger tighten only.

Install and tighten intake manifold to cylinders. This properly aligns cylinders.

Torque (3) nuts on each cylinder to 15-18 ft. lbs., using JDM-5A cylinder nut wrench. Remove intake manifold, and torque remaining (2) nuts.

INSTALLING CYLINDER HEADS – Piston-Ported Engines



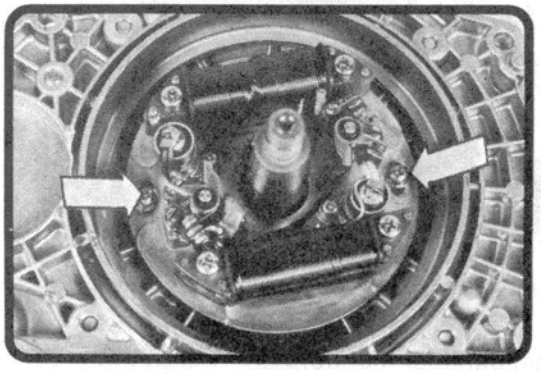
Slide No. 34 - Installing Cylinder Heads

Install new cylinder head gaskets with "Top" side up.

Position heads with flat sides facing inward. Use a flat washer under each nut. Use special nuts in position No. 5.

Torque nuts evenly to 15-18 ft-lbs. in the sequence shown. Install plugs.

INSTALLING STATOR ASSEMBLY Piston-Ported Engines



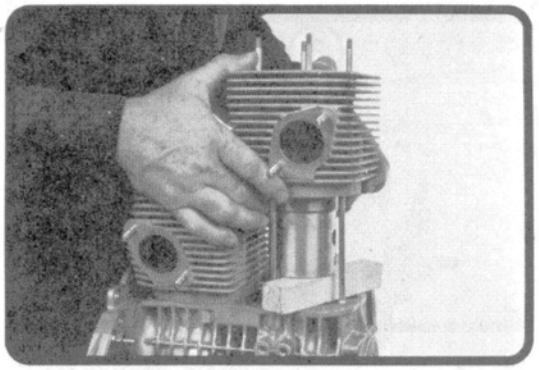
Slide No. 35 - Installing Stator Assembly

Install and secure stator to engine crankcase using (2) Phillips-head screws. Position rubber grommet on ignition wire bundle in the recess provided.

Install back plate and secure with (4) cap screws and lock washers.

John Deere Owatonna Minn.
JDM5A

INSTALLING CYLINDERS AND HEADS
Reed-Valve Engines

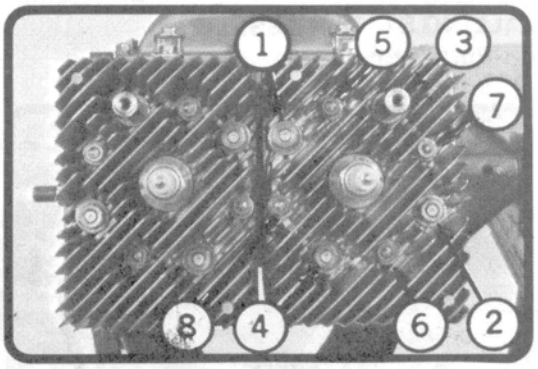


Slide No. 36 - Installing Cylinders (Reed Valve Engines)

Install new base gaskets over cylinder studs.

Lubricate pistons, rings and cylinders with two-cycle engine oil. Place a suitable wood block between piston and crankcase to steady piston.

Compress rings with fingers and gently slide cylinder over each ring. Be sure rings are centered on locating pins to prevent ring breakage.

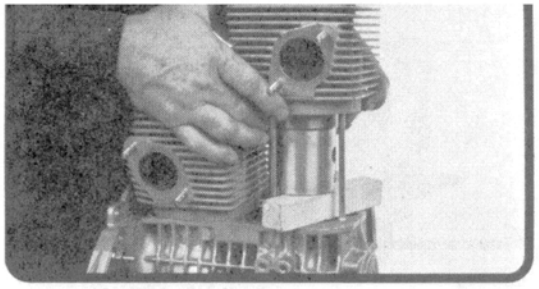


Slide No. 37 - Installing Cylinder Heads

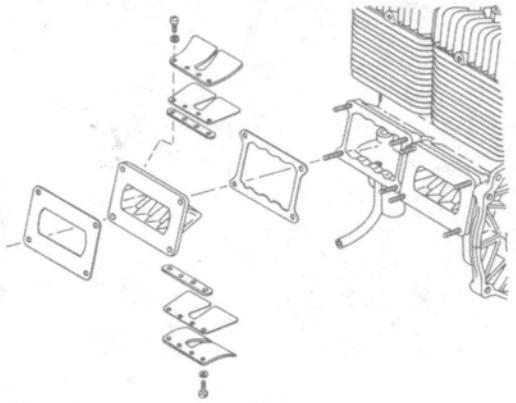
Install exhaust manifold and tighten to align cylinders. Install new cylinder head gaskets.

Place flat washers under nuts. Use special high nuts in location No. 3.

Torque cylinder stud nuts 1, 2, 3 and 4 in sequence to 11.5-14.5 ft-lbs. Complete torquing sequence by tightening cylinder head stud nuts 5, 6, 7 and 8 in sequence shown, to 5.0-6.5 ft-lbs.



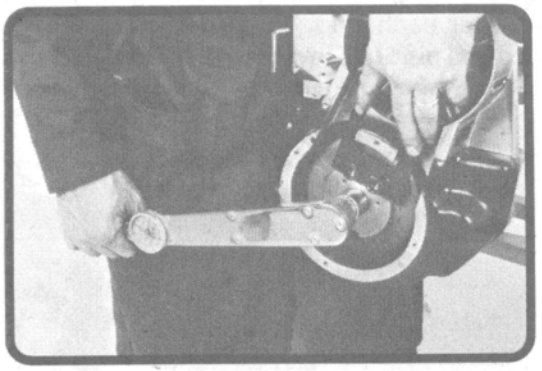
INSTALLING REED VALVE ASSEMBLIES
(Reed-Valve Engine Only)



Slide No. 38 - Installing Reed Valves

Assemble carefully, being sure reeds form a light, tight seal. If reeds are warped or cracked, they must be replaced. Always use new gaskets when re-assembling reed valve block to crankcase.

INSTALLING FLYWHEEL



Slide No. 39 - Installing Flywheel

Wipe crankshaft clean and install woodruff key. Position flywheel and install flat washer, lock washer and nut. Install fan cover and secure with (4) cap screws, lock washers and flat washers.

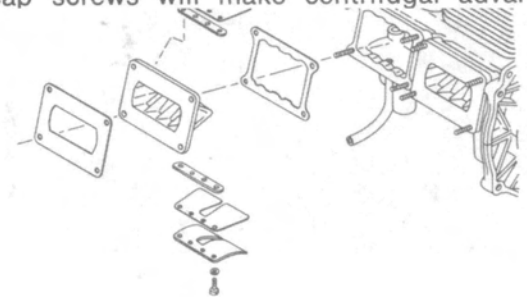
Using JDM-2 holding tool and a torque wrench, tighten flywheel nut to 45-50 ft-lbs.

Time ignition. See "Electrical" section for details.

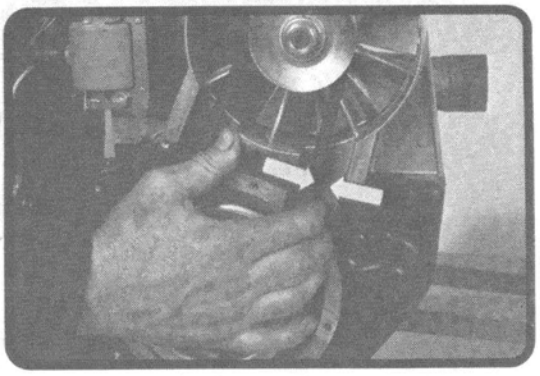
Install fan belt, window plate, belt sheave and starter cup. Secure to flywheel with (3) 6x15mm cap screws and lock washers.

IMPORTANT

Be certain not to use 6x22mm cap screws from recoil starter in this location. Longer cap screws will make centrifugal advance



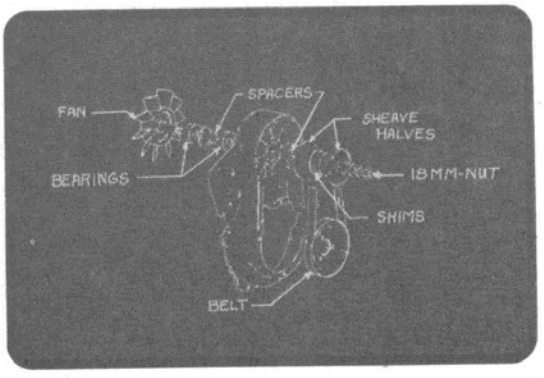
CHECKING BELT TENSION



Slide No. 40 - Checking Belt Tension

Inspect fan belt for proper tension. A properly adjusted fan belt should deflect approximately 3/8-inch when flexed by hand at a point near center of belt span.

ADJUSTING FAN BELT—340 ENGINE



Slide No. 41 - Adjusting Fan Belt (340 Engine)

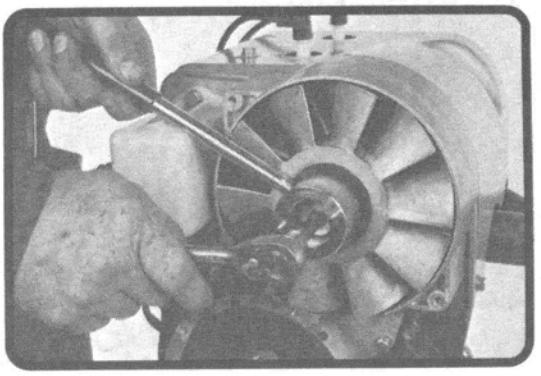
Remove 18mm nut, lock washer and plain washer from threaded end of fan shaft. Hold fan with screwdriver next to hub.

Remove outer sheave half. Remove one or more spacers to achieve proper tension.

Reinstall outer sheave half. Be sure belt is properly seated between sheave halves. Then tighten shaft nut securely. Replace belt if this adjustment does not provide proper 3/8-inch flex.

Fan bearings are serviceable and can be removed easily. Both bearings are a light slip fit to fan shaft and have a light interference fit within fan housing.

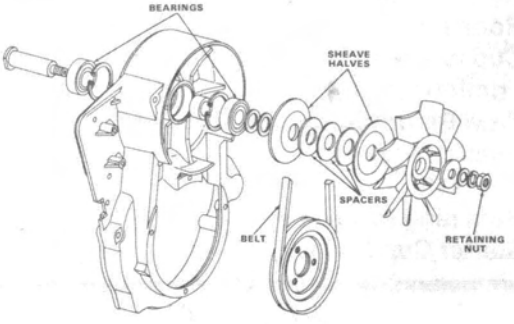
ADJUSTING FAN BELT—440 ENGINES



Slide No. 42 - Removing Fan Nut (440 Engine)

Remove fan retaining nut, using JDM-30 spanner wrench to keep fan from turning.

Remove fan, belt, and outer sheave half to expose spacing washer stack. Remove one or more spacing washers to increase tension to 3/8-inch deflection.



Slide No. 43 - Fan Assembly

Fan bearings are serviceable and can be removed easily. Both bearings are a light slip fit to fan shaft and have a light interference fit within fan housing.

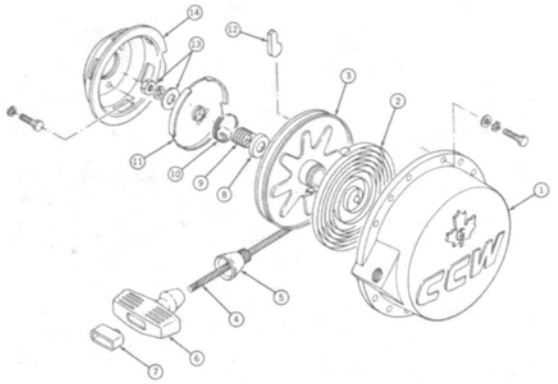
COMPLETING ASSEMBLY

Install manifolds, cylinder cover, ignition coupler, recoil starter and fan guard.

Install engine into snowmobile in opposite sequence from which it was removed. Line up drive and driven sheaves prior to securing. See "Power Train" section for details.

CCW RECOIL STARTER

Recoil Starter Components



Slide No. 44 - CCW Recoil Starter Assembly

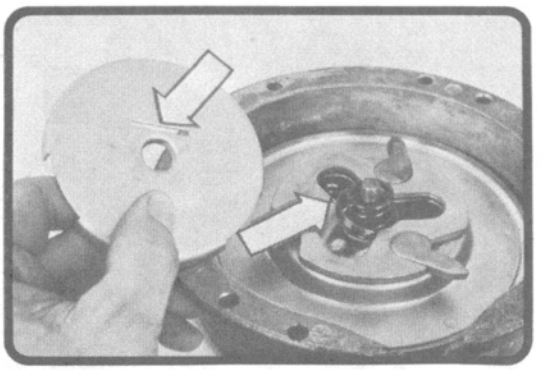
Listed below are the components of the CCW rewind assembly:

1. Case
2. Recoil Spring
3. Reel
4. Rope
5. Rope Guide
6. Handle
7. Rope Lock
8. Cup Washer
9. Friction Spring
10. Pawl Return Spring
11. Friction Plate
12. Pawls (3)
13. Retaining Hardware
14. Starter Cup

IMPORTANT

Be sure cap screws securing starter cup and recoil starter are not interchanged. If longer recoil start screws are used for starter cup they will make centrifugal advance mechanism inoperative.

Disassembly

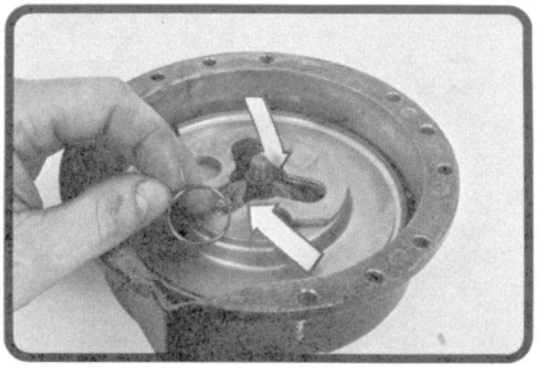


Slide No. 45 - Recoil Disassembly

Untie knot in starter rope at handle. Remove handle and allow recoil to unwind. Unscrew rope guide.

Remove retaining nut, lock washer and flat washer from end of reel hub.

Manipulate friction plate until spring eye aligns with slot and remove plate.

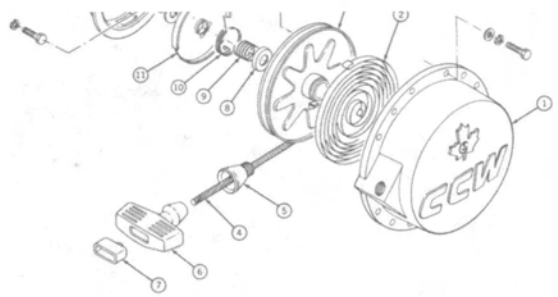


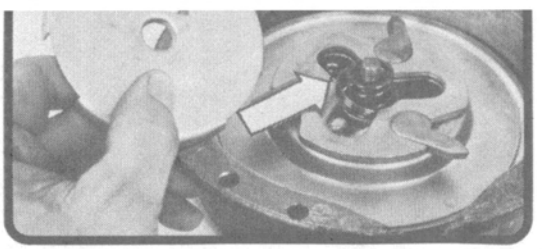
Slide No. 46 - Recoil Disassembly

Remove (3) pawls, cup washer and friction spring. Note position of plain end of panel return spring.

Lift out reel and rope. Unwind rope and inspect. Replace rope if worn or frayed.

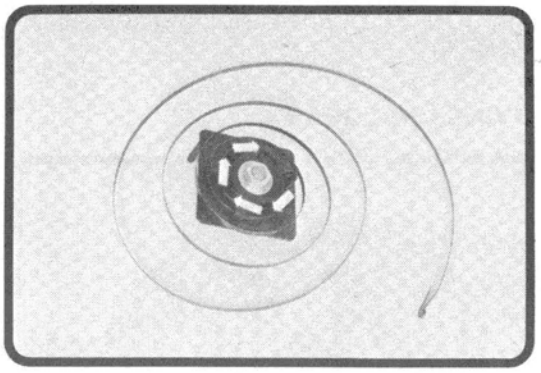
Lift recoil spring from cover. Clean all parts prior to assembly.





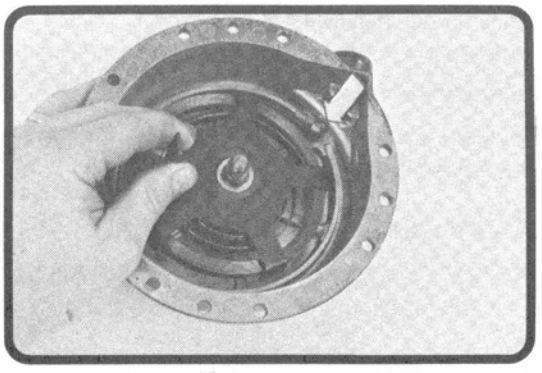
Slide No. 45 - Recoil Disassembly

Assembly of Recoil Starter



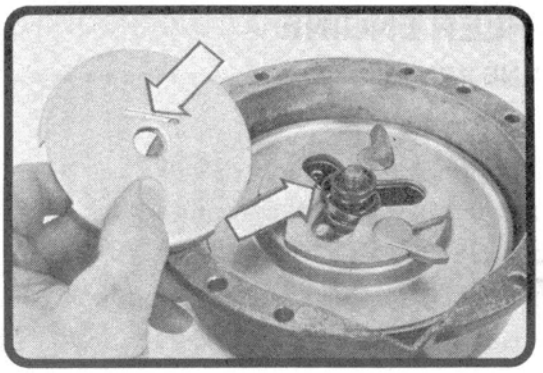
Slide No. 47 - Winding Recoil Spring

Wind recoil spring into JDM-6 tool in direction shown above.



Slide No. 48 - Installing Recoil Spring

Disassemble tool and place wound spring into recoil cover as shown. Carefully remove tool, leaving spring in cover.



Slide No. 49 - Recoil Assembly

Wind rope around reel in counterclockwise direction.

Apply a light film of grease to reel shaft and insert reel into cover.

Install cup washer, pawl return spring and friction spring. End of pawl return spring must be placed in hole of reel.

Install three pawls. Work eyelet end of pawl return spring through slot in friction plate and secure friction plate with washer, lockwasher and nut.

Pretension reel three turns by rotating in a counterclock direction. Insert rope through hole in cover.

Install rope guide and handle.

KOHLER ENGINE

ENGINE REMOVAL

Remove console.

Remove belt shield and drive belt.

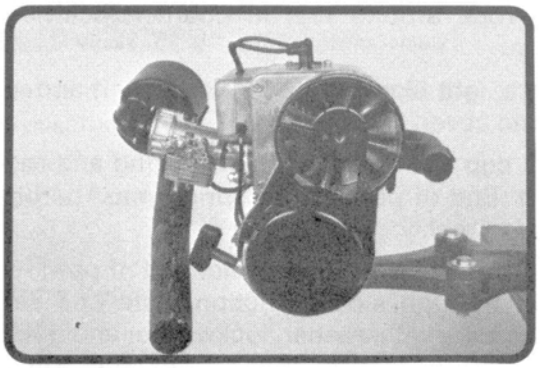
Disconnect fuel lines at carburetor.

Disconnect choke and throttle cables.

Disconnect electrical system at coupler.

Remove (4) engine mounting bolts.

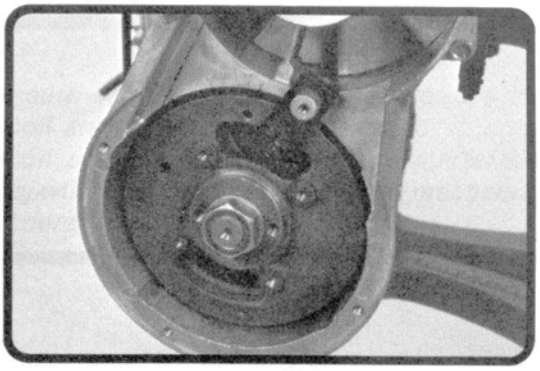
Disconnect exhaust system by unhooking (4) springs by ball joint.



Slide No. 50 - Kohler K295-AX Engine

Lift engine up and rearward. Mount engine in an appropriate engine stand.

DISASSEMBLY



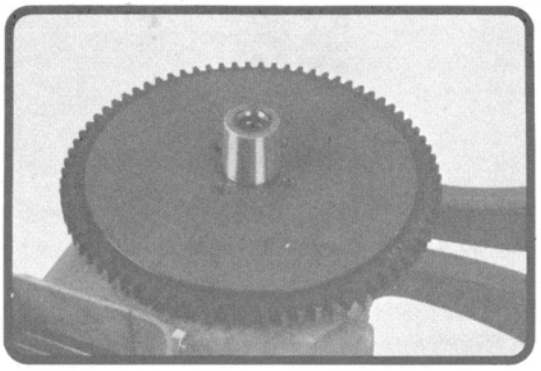
Slide No. 51 - Holding Flywheel

Thoroughly clean exterior surfaces of engine using a suitable, safe cleaning solvent.

Remove rewind assembly.

Position JDM-31 flywheel holding tool as shown in Slide No. 51.

REMOVING RING GEAR

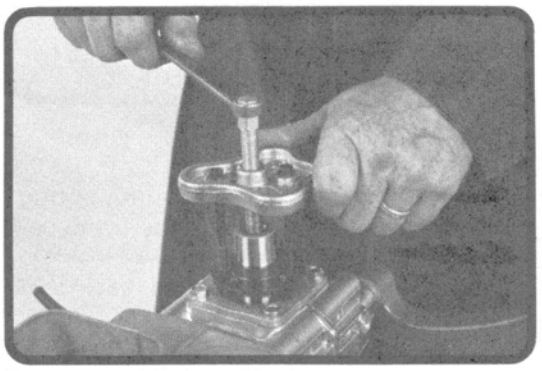


Slide No. 52 - Removing Flywheel

Remove drive sheave. See "Power Train" section.

Remove (4) socket head ring gear retaining screws and remove ring gear.

REMOVING RING GEAR HUB



Slide No. 53 - Removing Ring Gear Hub

Install JDM-9 puller as shown above. The JDM-31 flywheel holding tool, which was previously installed, will prevent crankshaft from turning.

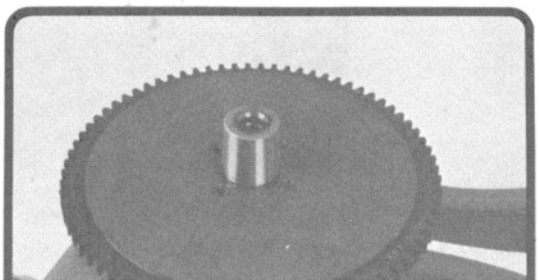
Disconnect fuel lines at carburetor.

Disconnect choke and throttle cables.

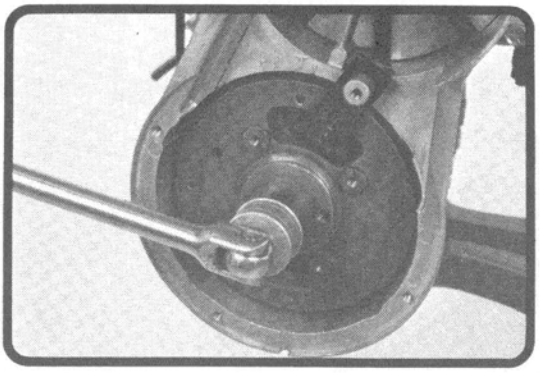
Disconnect electrical system at coupler.

Remove (4) engine mounting bolts.

Disconnect exhaust system by unhooking (4) springs by ball joint.

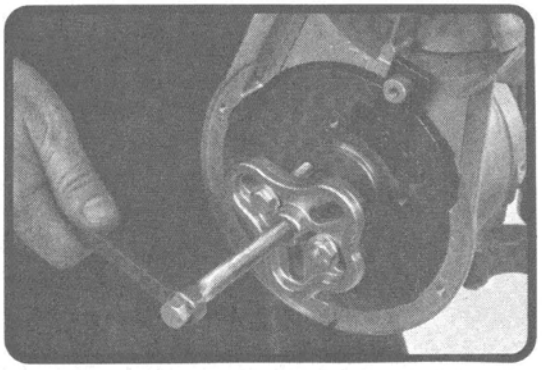


REMOVING FLYWHEEL



Slide No. 54 - Removing Flywheel Nut

Using the JDM-31 flywheel holding tool and appropriate wrench remove flywheel nut and washers.

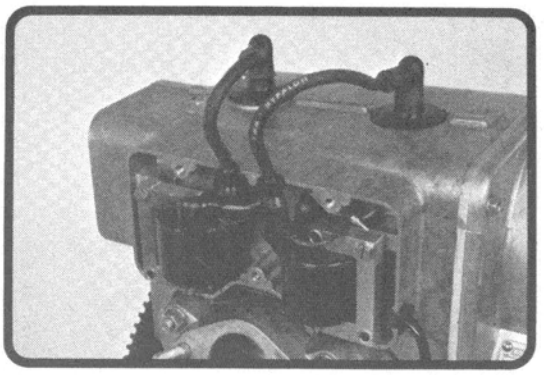


Slide No. 55 - Removing Flywheel

Install JDM-9 flywheel puller as shown above. Use puller *only* to remove the flywheel. Do not strike puller center bolt with hammer or crankshaft bearing damage may result.

blue & red No 1 cyl.
blue No 2 "

REMOVING SHROUDS AND BLOWER HOUSING

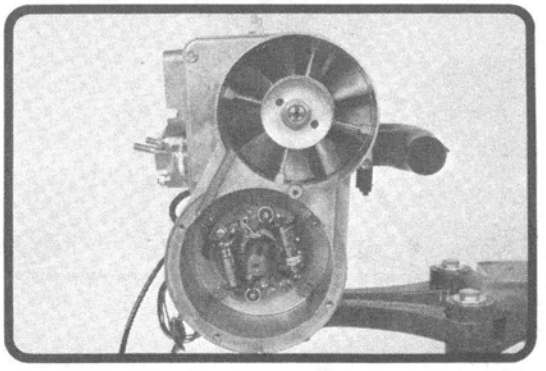


Slide No. 56 - Removing Coils and Shrouds

Remove coil cover.

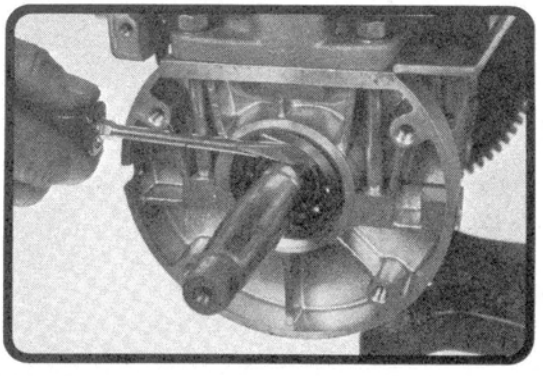
Disconnect secondary coil leads from stator leads and remove secondary coils.

Remove front and rear engine shrouds.



Slide No. 57 - Removing Blower Housing

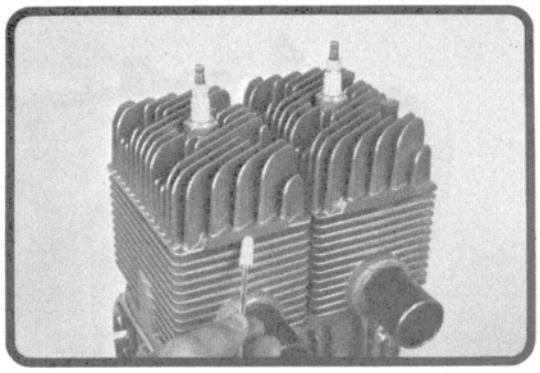
Remove blower housing and stator as an assembly. Remove intake and exhaust manifolds.



Slide No. 58 - Removing Crankshaft Shims

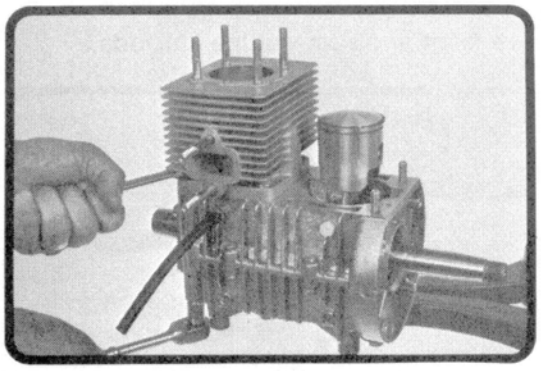
Remove shims from crankcase as shown above. Save shims for re-use during assembly.

REMOVING CYLINDER ASSEMBLIES



Slide No. 59 - Cylinder Heads Removal

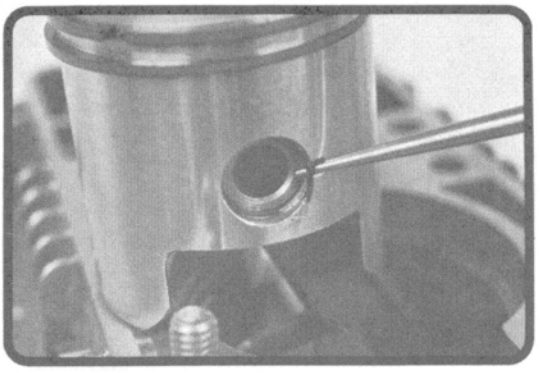
Remove cylinder heads. Note that head casting bosses face exhaust manifold side of engine.



Slide No. 60 - Cylinder Removal

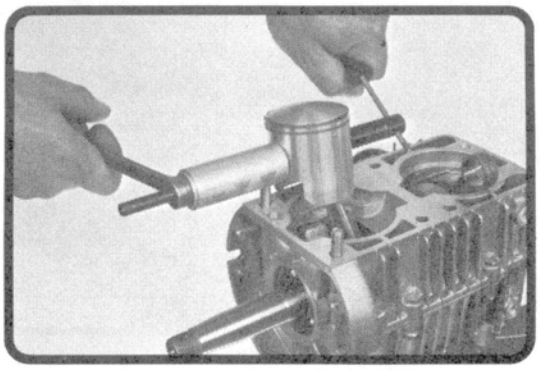
Remove cylinders. Remove and discard cylinder to crankcase gaskets.

REMOVING PISTONS



Slide No. 61 - Removing Piston Locks

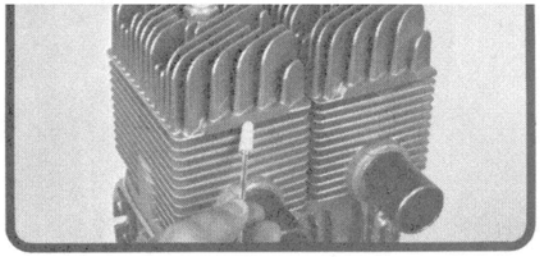
Remove piston pin locks with a sharp awl as shown above. Rotate end of spring lock slightly past indentation, insert awl under lock and pry out gently.



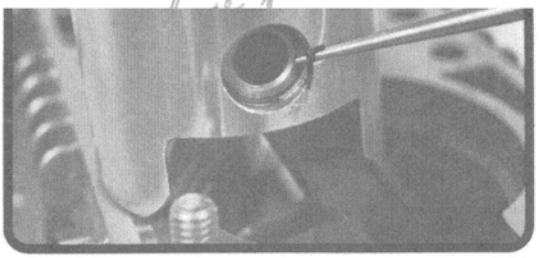
Slide No. 62 - Removing Pistons

After all piston pin locks have been removed, assemble piston pin remover JDM-7A as shown, and remove piston pins. Be sure to select the correct size piston pin guide to avoid piston damage. The Kohler engine requires the smaller of the two pin guides. In some cases, piston pin may be pushed out of piston with guide and hand pressure only.

use smaller tool for removing pins on Kohler engine for CCW

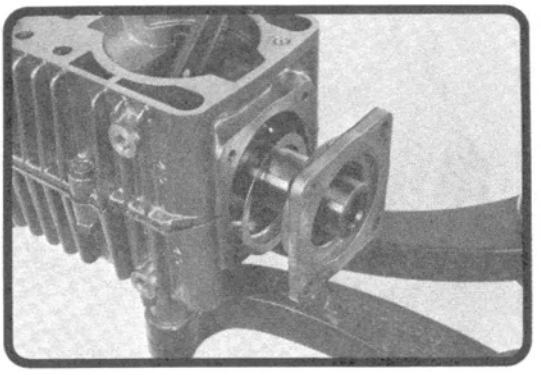


Slide No. 59 - Cylinder Heads Removal



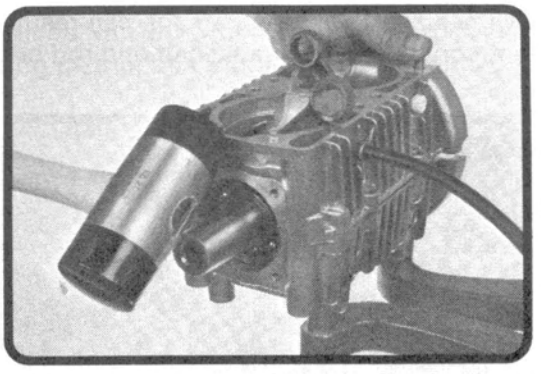
Slide No. 61 - Removing Piston Locks

CRANKCASE DISASSEMBLY



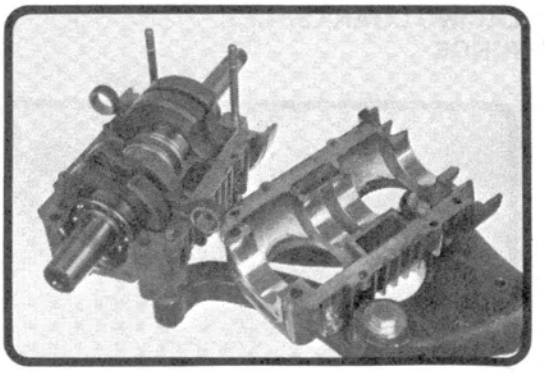
Slide No. 63 - Removing PTO End Plate

Remove PTO bearing end plate and shims. Save shims for re-use during assembly.



Slide No. 64 - Separating Crankcase Halves

Remove all crankcase retaining capscrews and tap upper crankcase half as shown above. DO NOT use screw driver to pry halves apart as damage to sealing surfaces may result.



Slide No. 65 - Removing Crankshaft

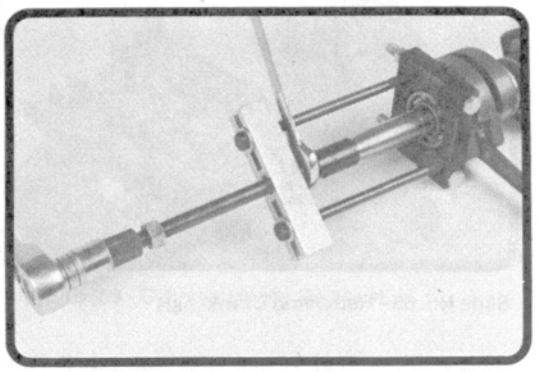
After separating crankcase, lift out crankshaft and clean sealing surfaces of crankcase halves. Be careful not to damage sealing surfaces. It may be necessary to soak halves in safety solvent to soften sealant prior to clean-up.

CLEANING, INSPECTION AND ANALYSIS

Refer to pages 13, 14, and 15 for details.

ASSEMBLY

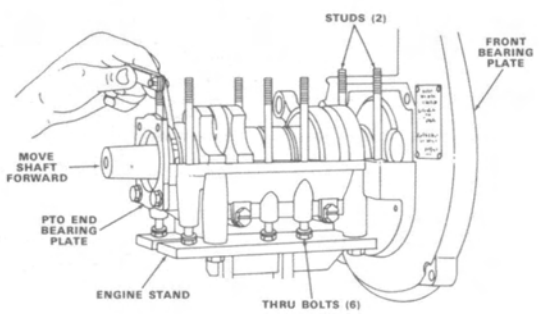
REPLACING CRANKSHAFT BEARINGS



Slide No. 66 - Replacing Crankshaft Bearings

The PTO end and flywheel end bearings can be replaced if necessary. Use JDM-8 puller as shown above. A JDM-33 adapter is required when removing or installing flywheel end bearing.

ADJUSTING CRANKSHAFT END PLAY



CRANKSHAFT END PLAY .006 - .012"

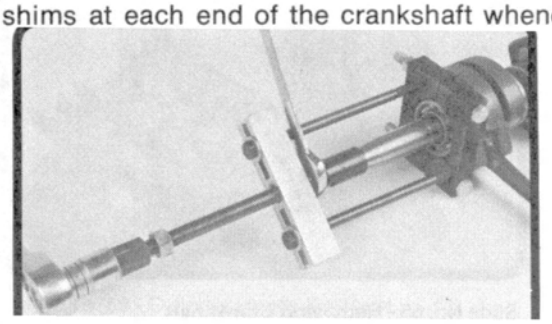
Slide No. 67 - Measuring Crankshaft End Play

Use the following procedure to determine crankshaft end play and shim requirements.

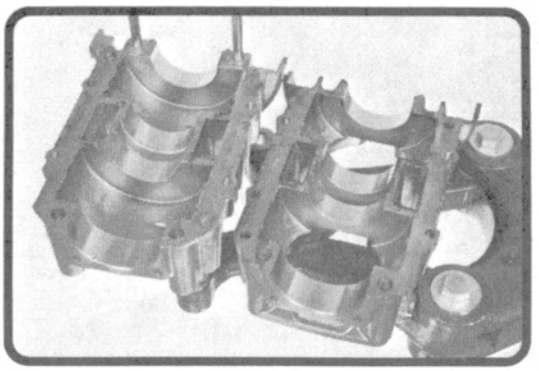
Place crankshaft in lower crankcase half and install blower housing and PTO end bearing plate with new gasket as shown above.

Push the crankshaft toward blower housing and measure clearance between PTO crankshaft bearing and PTO end bearing plate with a feeler gauge.

The correct crankshaft end play is .006 to .012-inch. Therefore, subtract a nominal .009 from feeler gauge measurement and determine the number of .006-inch shims required. Install an equal number of shims at each end of the crankshaft whenever

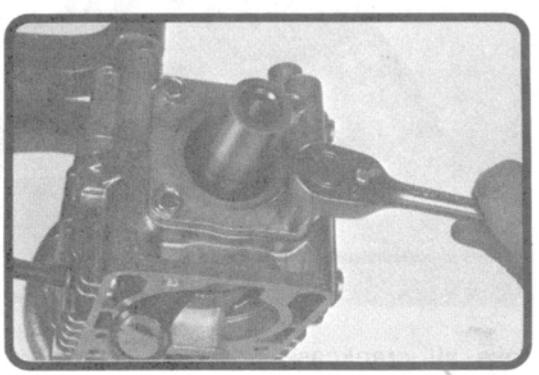


INSTALLING CRANKSHAFT



Slide No. 68 - Preparing Crankcase

Apply a gasoline-resistant latex sealant to the clean crankcase half mating surfaces. Use only enough sealant to form an air-tight joint. Avoid using excessive sealant as engine damage can result from sealant contaminating crankshaft and rod bearing.

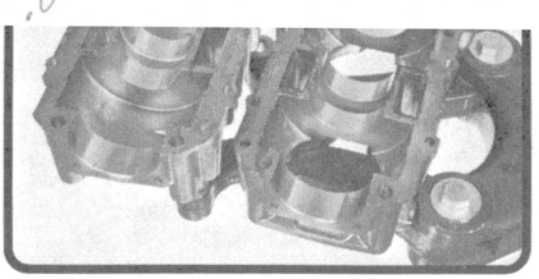


Slide No. 69 - Assembling Crankcase

Install crankshaft and upper crankcase half. Loosely install (4) 1/4-inch diameter crankcase side bolts.

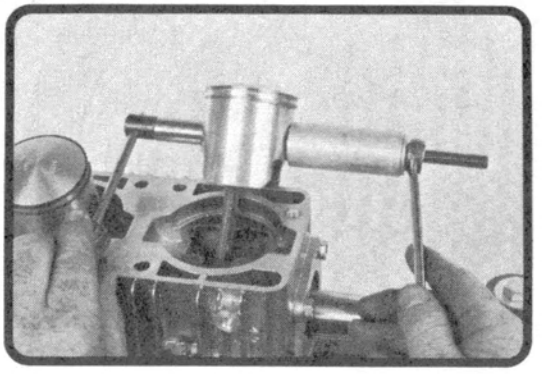
Install PTO end bearing plate and shims. DO NOT tighten until cylinders have been installed and torqued. Premature tightening of PTO bearing plate can cause an air leak between crankcase halves.

each shims
.006



Slide No. 68 - Preparing Crankcase

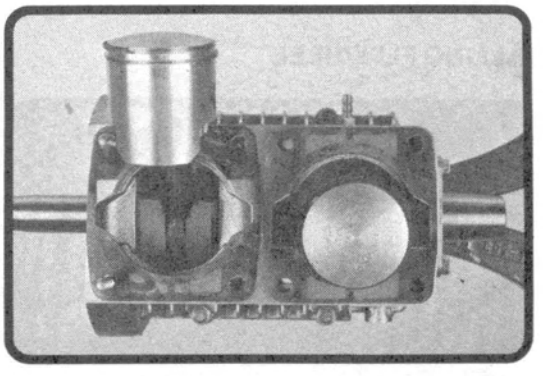
INSTALLING PISTONS



Slide No. 70 - Installing Pistons

Assemble pistons to connecting rods using the JDM-7A pin tool. Be sure to use correct pin guide (small) to lead piston through rod bearing. Using the guide will prevent damaging rod bearing by holding piston, bearing and rod in alignment.

INSTALLING CYLINDER GASKETS

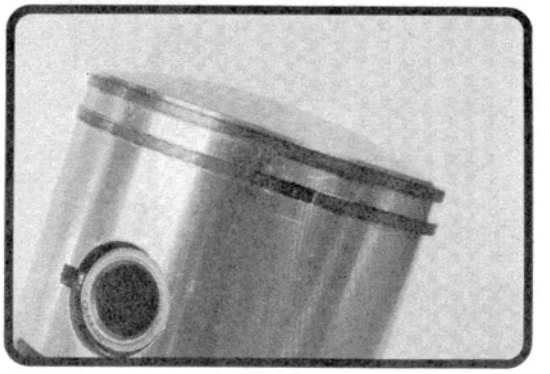


Slide No. 72 - Replacing Piston Rings

Next, install cylinder gaskets. Gaskets must be installed correctly to avoid partial coverage of transfer port.

Note above that the right-hand gasket is correctly installed and that the left-hand gasket is incorrectly installed. Notice how transfer part is partially blocked. This assembly error will cause poor performance.

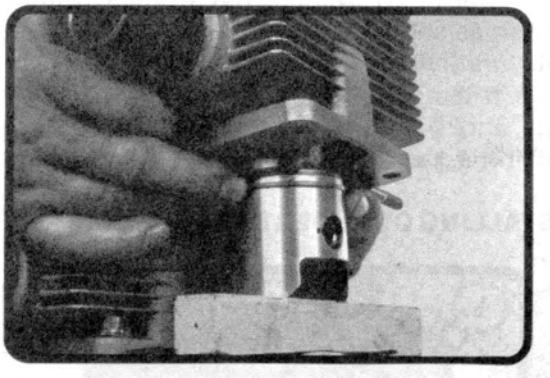
REPLACING PISTON RINGS



Slide No. 71 - Installing Cylinder Gaskets

If new rings are to be installed, change rings at this step of re-assembly. Leaving the old rings on pistons until this step, provides piston ring groove protection.

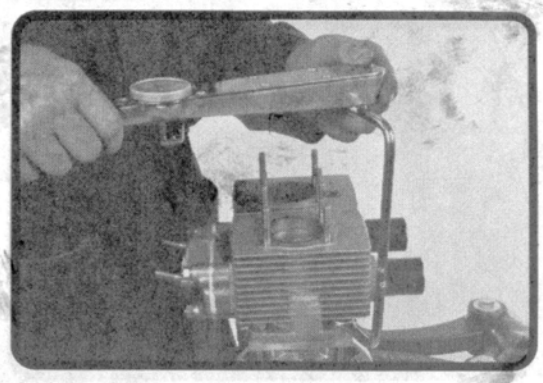
INSTALLING CYLINDERS



Slide No. 73 - Installing Cylinders

When installing pistons into cylinders, place a small block under skirt of piston as shown above. This will stabilize piston and permit both hands to be used to compress rings and slip cylinder over piston. Be certain ring ends are located around locating pins.

TORQUING CYLINDER BOLTS



Slide No. 74 - Torquing Cylinder Bolts

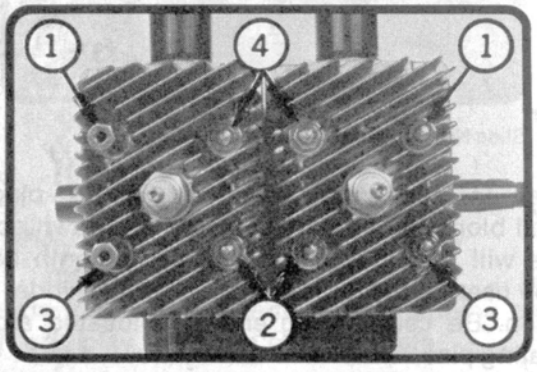
Tore intake manifolds First

Install cylinder bolts, nuts and washers. Use special serrated lock washers on two studs on blower housing end. Do not tighten nuts at this time.

Install intake manifold to cylinders and tighten to 15-18 ft-lbs. This procedure will align cylinders and manifold for a perfect seal.

Use the JDM-5A cylinder nut wrench with torque wrench as shown above. Torque center crankcase bolts *first*, then tighten remaining end bolts to 15-18 ft-lbs. Torque (4) 1/4-inch crankcase side bolts and PTO end bearing plate cap screws to 8-10 ft-lbs.

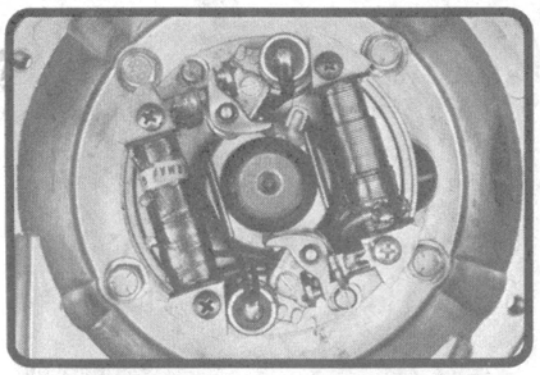
INSTALLING CYLINDER HEADS



Slide No. 75 - Installing Cylinder Heads

Install cylinder heads with raised bosses facing the exhaust side of engine. Using pattern shown above, torque to 15-18 ft-lbs. Always use new head gaskets when re-assembling. No gasket adhesive is required.

INSTALLING BLOWER HOUSING AND STATOR

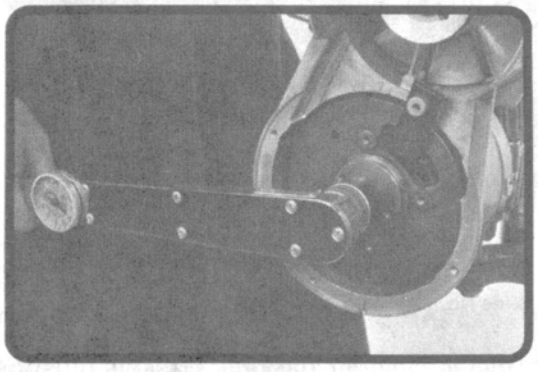


Slide No. 76 - Installing Stator

Next, install blower housing and stator assembly, using new O-ring between blower housing and crankcase. Be sure shims are properly inserted and seated in crankcase when blower housing is positioned. Tighten the (4) blower housing to crankcase cap screws to 15-18 ft-lbs.

Install cylinder shrouds, exhaust manifold and ignition coils.

INSTALLING FLYWHEEL

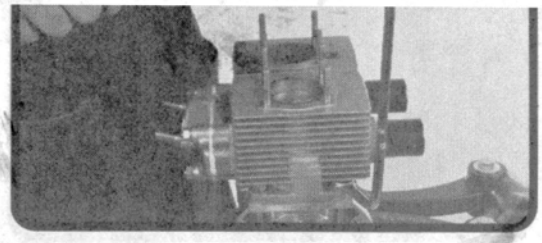


Slide No. 77 - Installing Flywheel

After all ignition service has been completed, install flywheel and torque flywheel nut to 90 ft-lbs. Use flywheel holding tool JDM-31 to restrain flywheel from turning.

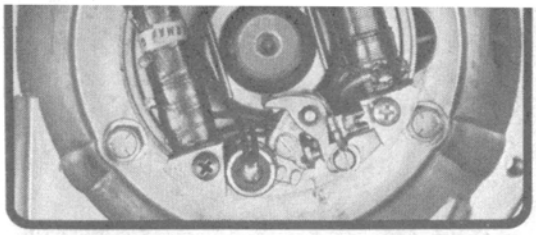
Do not use impact wrench as it could cause flywheel or engine damage.

Time ignition as explained in "Electrical System" section. Install lower sheave and starter cup.



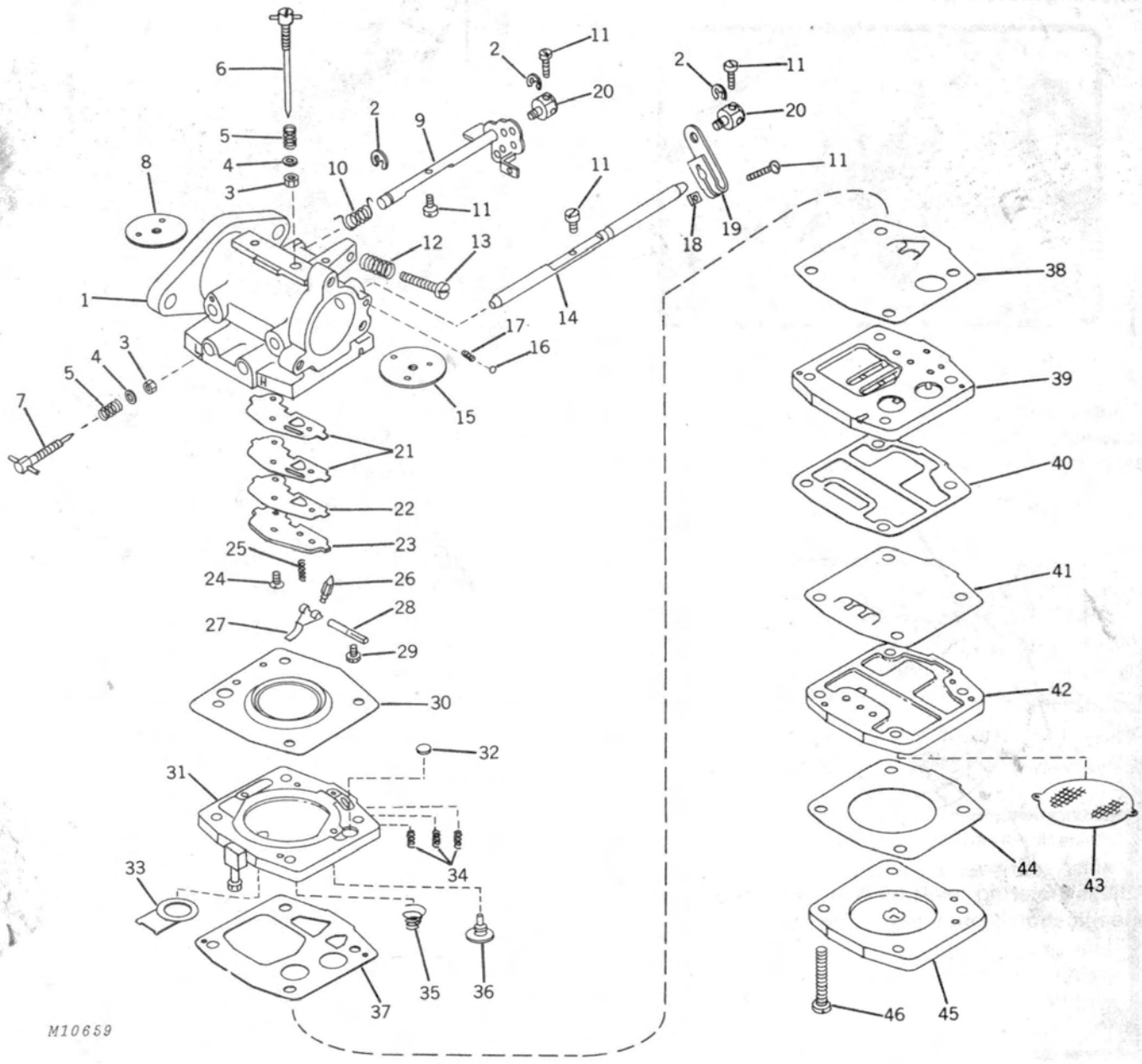
Slide No. 74 - Torquing Cylinder Bolts

Tore intake manifolds First



Slide No. 76 - Installing Stator

DISASSEMBLY AND ASSEMBLY

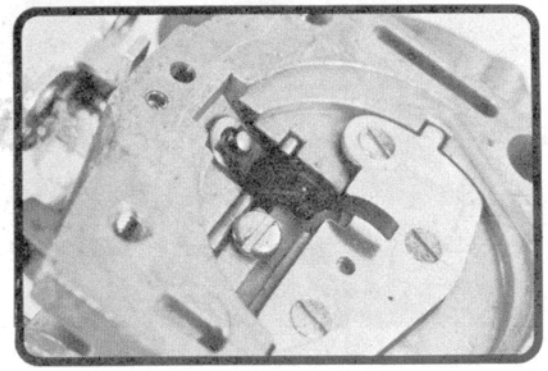


1—Carburetor Body
2—Retaining Ring
3—Packing Ring
4—Washer
5—Needle Spring
6—High-Speed Mixture Needle
7—Idle Mixture Needle
8—Throttle Plate
9—Throttle Shaft
10—Throttle Return Spring
11—Screw
12—Spring
13—Idle Stop Screw
14—Choke Shaft
15—Choke Valve
16—Detent Ball
17—Detent Spring
18—Nut
19—Choke Lever
20—Swivel
21—Circuit Plate Gasket
22—Circuit Diaphragm
23—Circuit Plate
24—Circuit Plate Screw (3 used)
25—Metering Lever Spring
26—Needle Valve
27—Metering Lever
28—Lever Pin
29—Lever Pin Screw
30—Metering Diaphragm
31—Metering Diaphragm Plate
32—Screen
33—Fuel Pump Spring
34—Valve Spring
35—Pressure Spring
36—Check Valve
37—Fuel Pump Gasket
38—Fuel Pump Diaphragm
39—Fuel Pump Plate
40—Check Valve Gasket
41—Check Valve Diaphragm
42—Filter Plate
43—Filter Screen
44—Fuel Inlet Gasket
45—Cover Plate
46—Cover Screw (4 used)

Slide No. 92 - Carburetor Exploded View

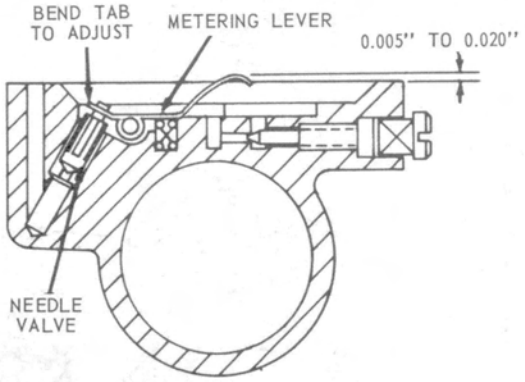
ADJUSTMENTS

Adjusting Metering Lever



Slide No. 93 - Metering Lever Assembly

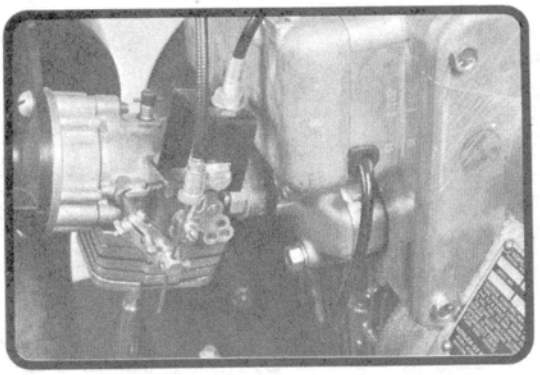
When assembling needle valve and metering lever assembly, be certain metering lever spring is seated properly around dimple in lever.



Slide No. 94 - Adjusting Metering Lever

Adjust metering lever by bending tab until above specification is obtained.

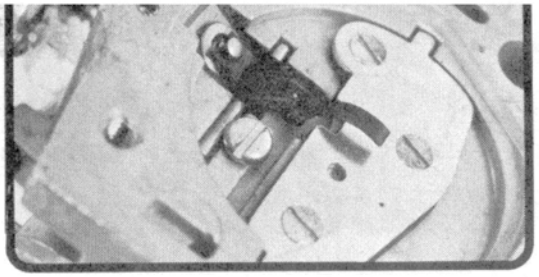
Adjusting Choke and Throttle Cables

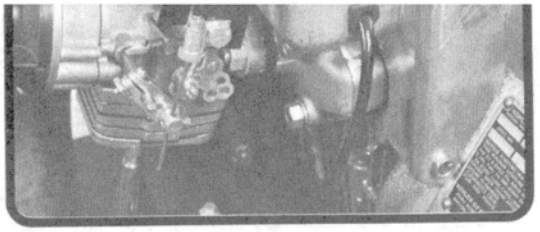


Slide No. 95 - Adjusting Choke and Throttle Cables

Adjust choke cable wire in swivel to obtain complete choke plate opening with choke knob (on instrument panel) out approximately 1/16-inch.

Adjust throttle cable with jam nuts or with swivel to obtain complete opening and closing of throttle plate when control is actuated. With throttle in idle position, a small amount of free play should be evident at control lever.





Slide No. 95 - Adjusting Choke and Throttle Cables

ADJUSTING CARBURETOR

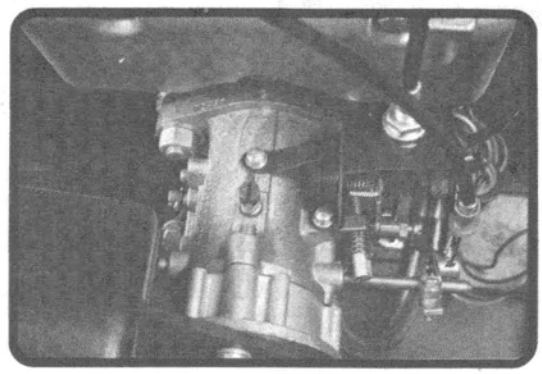
Preliminary Adjustments

Make the following preliminary adjustments:

Idle stop screw: turn screw until it contacts throttle lever, then give one additional turn.

Low speed needle: turn clockwise until *lightly* seated, then back out one complete turn.

High speed needle: turn clockwise until *lightly* seated, then back out one turn on JDX-8 and 3/4 turn on all other machines.



Slide No. 96 - Carburetor Adjusting Screws

Make final adjustments to carburetor, in the following sequence.

Adjusting Low-Speed Needle

Allow engine to warm up slightly. Turn low-speed needle clockwise or counterclockwise until smoothest running is obtained.

NOTE: Keep the low-speed needle adjusted as lean (clockwise) as possible, while still providing smooth idling and unfaltering acceleration. This will reduce spark plug fouling.

Adjusting Idle Stop Screw

The idle stop screw is adjusted only when a change in idle speed is required. Set the idle speed at 1800 to 2200 rpm.

Generally, if the idle stop screw is adjusted, the low-speed needle will have to be readjusted.

Adjusting High-Speed Needle

Start engine and take snowmobile for a high-speed trial run in a large, level area.

Stop, turn high-speed needle 1/8-turn or less clockwise, and make another trial run. Continue this procedure, 1/8-turn or less at a time, clockwise or counterclockwise, until optimum performance is obtained.

Then turn needle 1/8 turn counterclockwise for final adjustment.

IMPORTANT
A too lean (clockwise) high-speed needle setting causes detonation and aggravates a preignition tendency.

NOTE: High altitudes require leaner carburetor settings. Use the following rule for leanest possible high-speed needle setting:
Above 5000 feet altitude:
JDX-8 = 7/8 turn open
All others = 5/8 turn open

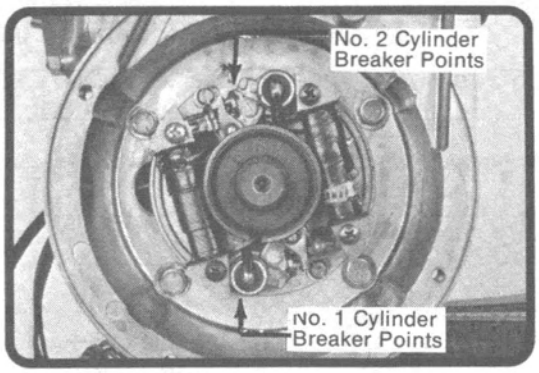
If, after setting high-speed needle correctly, engine falters or hesitates on acceleration, it may be necessary to lean or enrich the low-speed needle slightly to correct this condition.

Spark plug heat ranges and carburetor high-speed needle settings work together in affecting spark plug insulator tip color. See "Engine Performance Chart" on page 8.

IMPORTANT
Never set the high-speed needle with the track off the ground and the engine in a "no-load" situation. Engine must be under load to prevent engine damage from overspeeding and to obtain proper carburetor adjustment. Overspeeding the engine may damage or destroy the cooling fan belt.

SERVICING IGNITION SYSTEM

Replacing Breaker Points

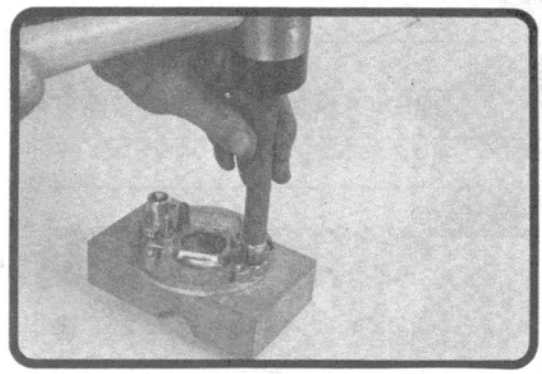


Slide No. 114 - Replacing Breaker Points

It is necessary to remove the flywheel before replacing points or condensers on both CCW and Kohler engines.

On CCW 440 engines, and on Kohler engines, the breaker point cam (from the flywheel) may be placed over the crankshaft to allow gapping of breaker points with the flywheel removed.

Replacing Condensers (Kohler)



Slide No. 115 - Replacing Condenser

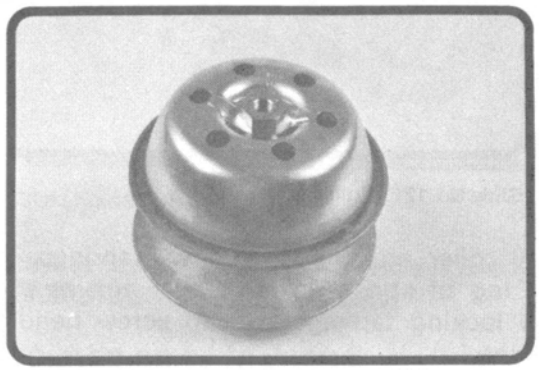
If condenser replacement is required, use the following procedure:

1. Make a condenser driver from a 1/2-inch hardwood dowel by drilling a 1/4-inch hole 1/4-inch deep in one end. This will prevent damage to solder terminal end of condenser).
2. Drill 3/4-inch hole in a 2 x 4 x 6-inch block of wood. Place stator as shown above. Unsolder leads and drive old condenser out of stator plate.
3. Insert new condenser and use wood dowel driver to install condenser flush with bottom of stator plate.
4. Re-solder condenser leads to condenser terminal.

WARNING: Use minimum of heat to solder or condenser will be ruined.

780 SERIES DRIVE SHEAVE

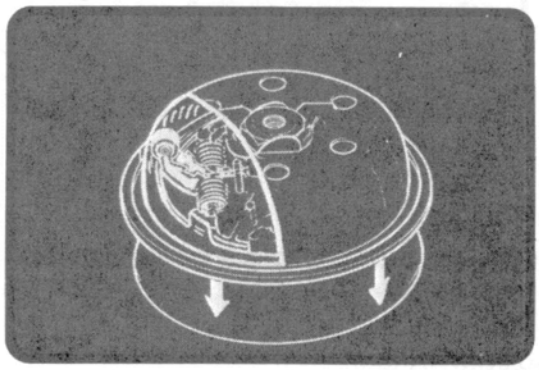
The 780 series Salsbury drive sheave is used on the JDX-4 and 400 snowmobiles.



Slide No. 116 - 780 Drive Sheave

The JDX-4 drive sheave is not interchangeable with the 400 drive sheave due to different roller arms, springs and hub bore size.

PRINCIPLES OF OPERATION



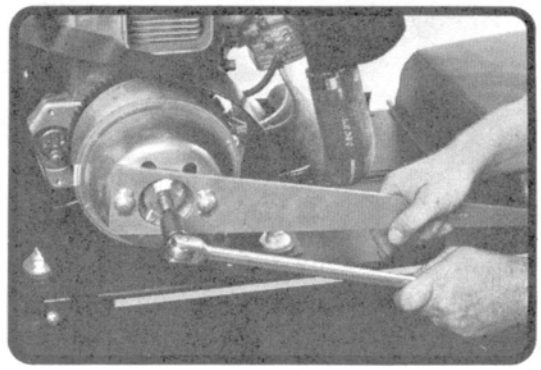
Slide No. 117 - Principles of Operation of Drive Sheave

As the speed increases, the centrifugally actuated roller weights follow the contour of the bowl-shaped cover, forcing the drive sheave halves together.

This engages the belt. Continued speed increase causes the belt to ride to the outer circumference of the sheave, providing maximum speed.

REMOVING SHEAVE FROM ENGINE

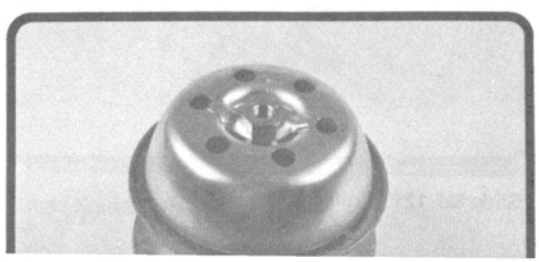
Remove left-hand access panel from console and drive belt.

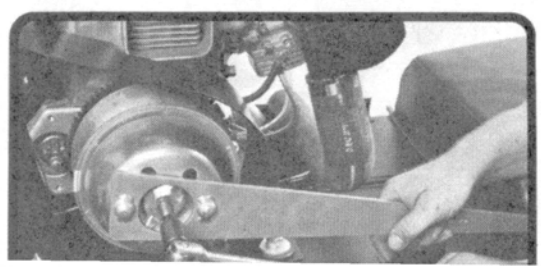


Slide No. 118 - Removing 780 Sheave

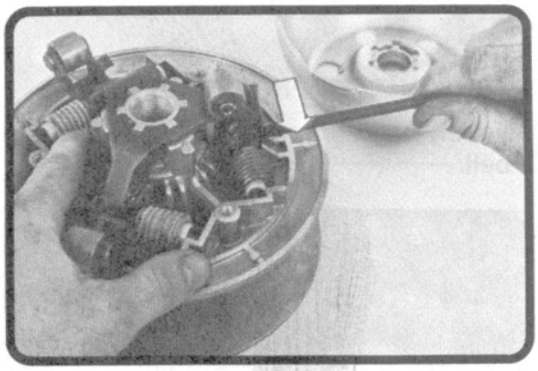
Using JDM-12-3 spanner wrench to prevent turning, remove cap screw securing drive sheave.

Thread JDM-28 clutch puller into sheave until sheave breaks loose.





DISASSEMBLY



Slide No. 119 - Sheave Disassembly

Remove ramp plate nut and ramp plate.

Unhook (6) roller arm springs using a screwdriver.

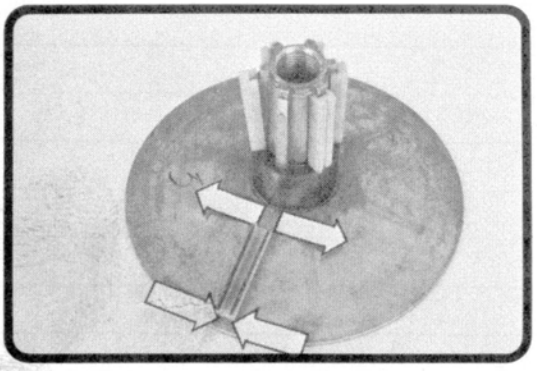
Slide moveable sheave half sharply against retractor to remove.

Disassemble roller arm assemblies and remove nylon spline liners.

Thoroughly clean clutch components.

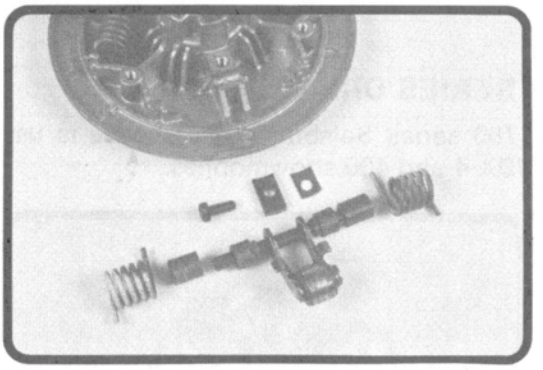
Replace all (6) springs as a unit even if only one is broken. Check rollers for free operation and flat spots. Replace sheave halves if grooved, scored or pitted.

ASSEMBLY



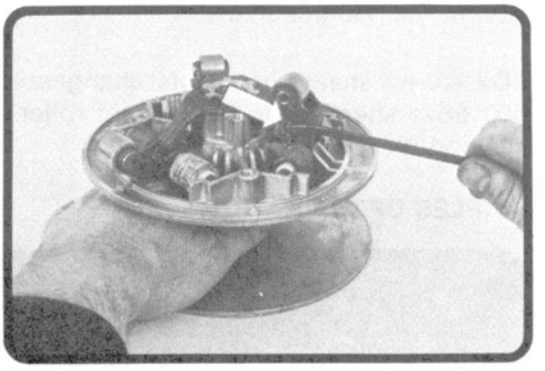
Slide No. 120 - Installing Spline Liners

Install washer and spline liners to fixed sheave half. Note tapered inner surfaces on liners.



Slide No. 121 - Roller Arm Assembly

Install roller arms, bushings and springs. Place long leg of spring toward roller arm as shown. Bend locking tap against cap screw head after securing.



Slide No. 122 - Latching Springs

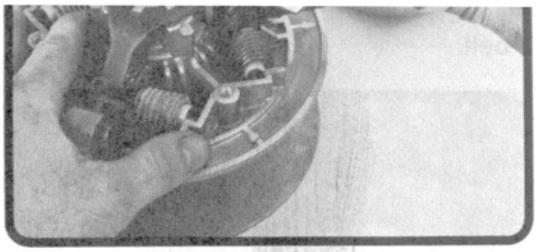
Spray silicone to spline liners if desired.

Slide assembled moveable sheave half onto fixed half and install retractor.

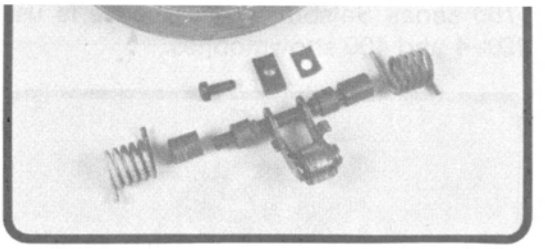
Lift moveable half upward and latch (6) springs using JDM-4A tool.

Install ramp plate, washer, lock plate and ramp plate nut. Torque ramp plate nut to 125 ft-lbs.

Install drive sheave onto engine. Torque retaining cap screw to 35 ft-lbs.

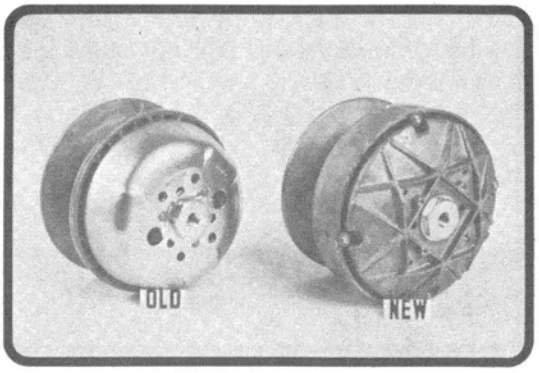


Slide No. 119 - Sheave Disassembly



Slide No. 121 - Roller Arm Assembly

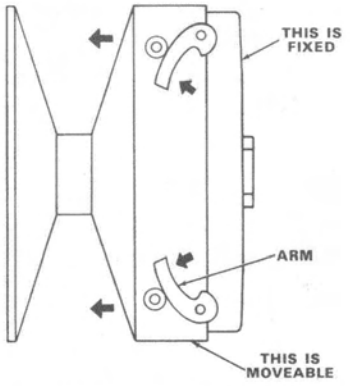
850 SERIES DRIVE SHEAVE



Slide No. 123 - 850 Drive Sheave

The 850 series Salsbury drive sheave is used on the 500, 600 and JDX-8 snowmobiles.

PRINCIPLES OF OPERATION



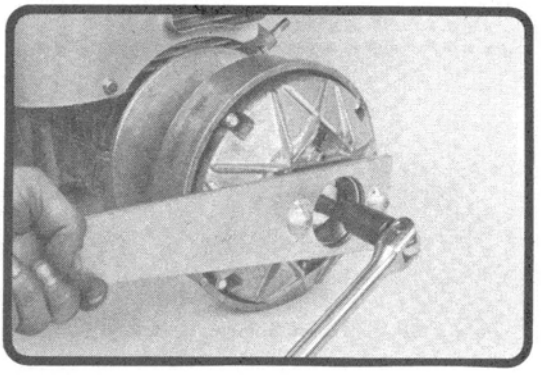
Slide No. 124 - 850 Sheave — Principles of Operation

As engine speed increases, centrifugal force causes the arms to swing out against the rollers on the movable half of the sheave. This forces the sheave halves together, engaging the belt.

A further increase in speed will bring the belt to the outer circumference, providing maximum speed.

REMOVING SHEAVE FROM ENGINE

Remove left-hand access panel from console and drive belt.

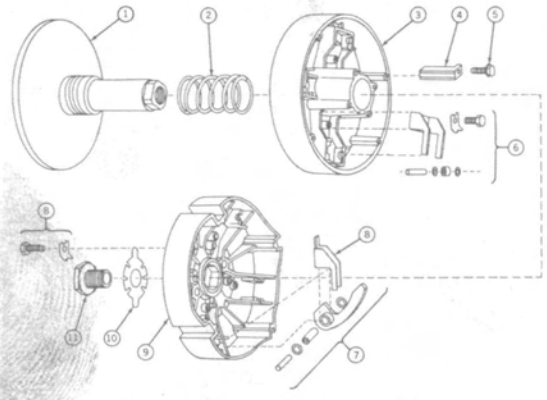


Slide No. 125 - Removing 850 Sheave

Using JDM-12-3 spanner wrench with JDM-29 adapter to prevent turning, remove cap screw securing drive sheave.

Thread JDM-28 clutch puller into sheave until sheave breaks loose.

DISASSEMBLY AND INSPECTION



Slide No. 126 - 850 Drive Sheave Assembly

1. Fixed Face
2. Spring
3. Movable Face
4. Slide
5. Cap Screw
6. Roller Kit
7. Arm Kit
8. Arm Clamp Kit
9. Housing
10. Lockplate
11. Special Screw

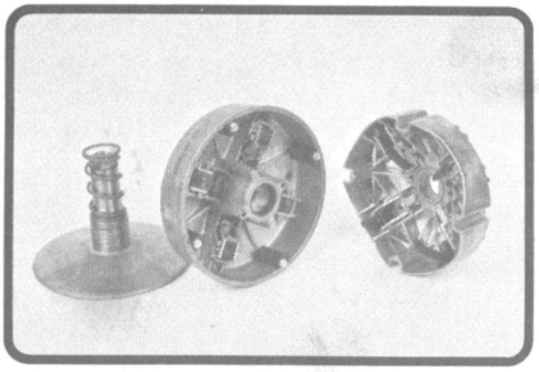
Remove special screw, key 11. Lift housing, key 9, and movable face assembly, key 3, off fixed face, key 1.

Inspect four bearing slides, key 4, for excessive wear. Check four roller assemblies, key 6, for free movement and possible flat spots. Check four arm assemblies, key 7, for freeness of operation. Replace spring, key 2, if broken or cracked.

Thoroughly clean all components.

ASSEMBLY

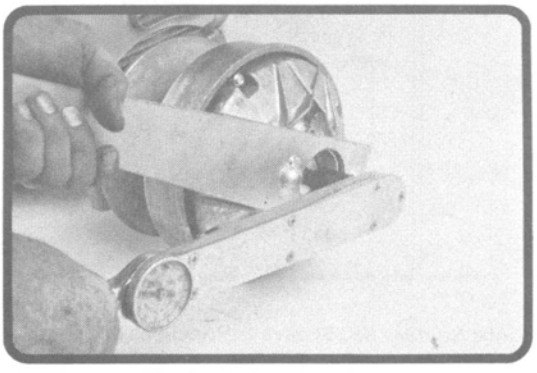
Be sure to place a nylon washer on each side of rollers and arms when assembling. Check new rollers and arms for freeness of movement after installing.



Slide No. 127 - Assembling 850 Drive Sheave

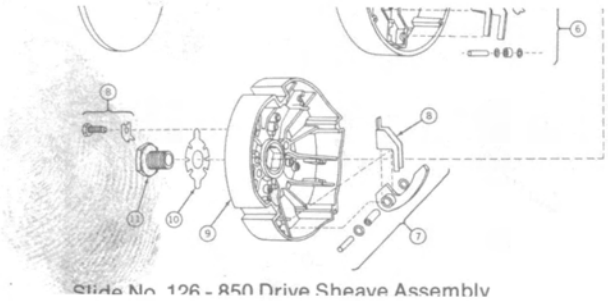
Install spring to fixed face. Spray silicone on bushing in movable face if desired.

Install movable face and housing to hub of fixed face. Secure with lockplate and special screw. Torque to 68-84 ft-lbs. and bend lockplate against head of screw.

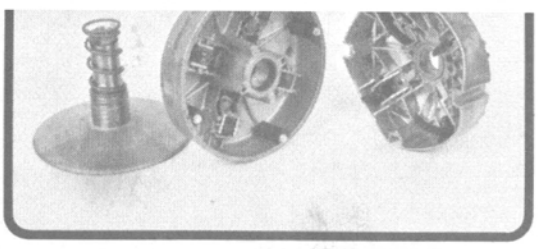


Slide No. 128 - Installing 850 Drive Sheave

Clean PTO end of crankshaft, install drive sheave, and torque retaining cap screw to 53-58 ft-lbs.



Slide No. 126 - 850 Drive Sheave Assembly

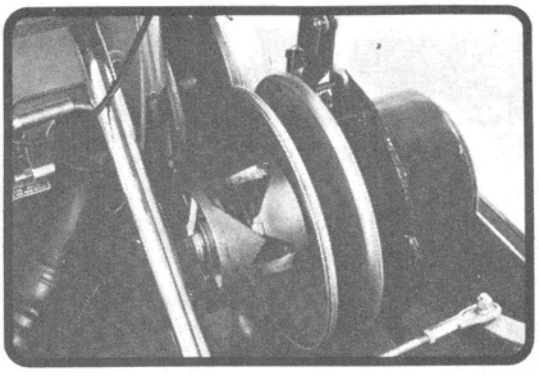


Slide No. 127 - Assembling 850 Drive Sheave

780 AND 850 DRIVEN SHEAVES

The 780 driven sheave is matched with 780 drive sheaves, while the 850 driven is matched with the 850 drive. While the two driven sheaves are of different size, the service procedures are essentially the same.

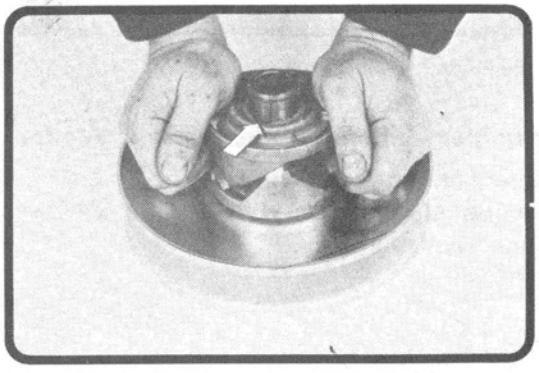
DRIVE SHEAVE REMOVAL



Slide No. 129 - Removing Drive Sheave

Remove belt shield and drive belt. Remove cap screw and washers securing driven sheave. Slide sheave off secondary shaft.

DISASSEMBLY



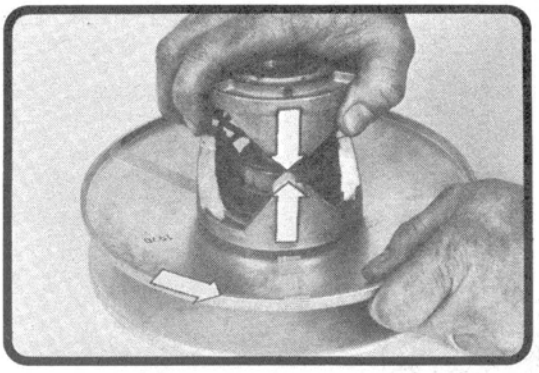
Slide No. 130 - Sheave Disassembly

Release spring tension by unhooking spring from anchor point with a screwdriver.

Press cam bracket down to expose key. Rotate slightly to misalign keyway. Remove snap ring, align keyway, and remove cam bracket, spring, key and movable sheave half.

Thoroughly clean all components. Replace (3) slippers if worn. Check wear of bushing in movable sheave half.

ASSEMBLY



Slide No. 131 - Assembling Sheave

Spray silicone on movable sheave bushing if desired.

Place movable sheave on hub and install key. Engage spring in anchor lug of cam bracket and anchor lug of movable sheave.

Compress spring until there is approximately 1/8-inch clearance between ramps. Turn movable face counterclockwise past second ramp; then, press cam bracket down and lock under key.

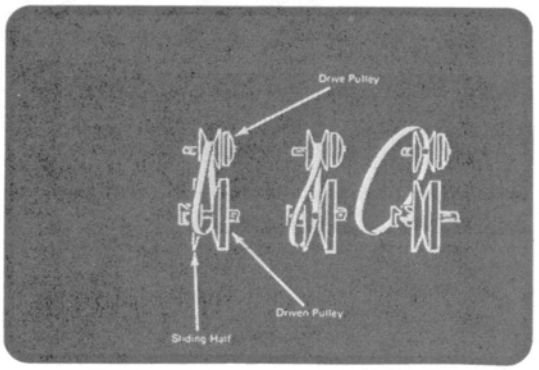
Install snap ring and release torque bracket to seat against snap ring.

DRIVE BELT

A new glass cord drive belt is used on the John Deere snowmobiles for 1973. The glass cord belt will not shrink when exposed to high temperatures. Two sizes of belts are used as follows:

M63911 – 400/JDX-4
M63912 – 500/600/JDX-8

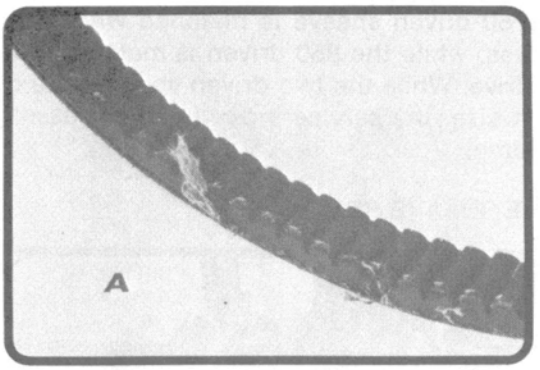
REMOVING DRIVE BELT



Slide No. 132 - Belt Removal

1. Remove left-hand console access panel. Remove belt shield.
2. Open driven sheave by pulling and turning movable half of sheave counterclockwise.
3. Lift belt and remove from driven sheave; then remove from drive sheave.
4. Install in opposite order.

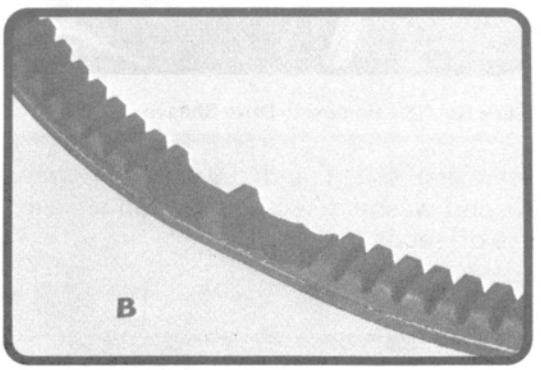
BELT FAILURE ANALYSIS



Slide No. 133 - Edge Cord Breakage

A. Condition – Edge Cord Breakage

1. Sheave misalignment.



Slide No. 134 - Sheared Cogs

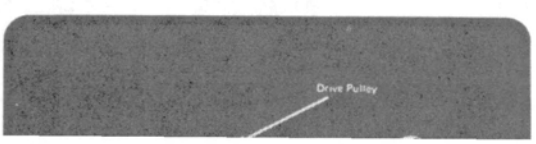
B. Condition – Sheared Cogs, Narrow Section

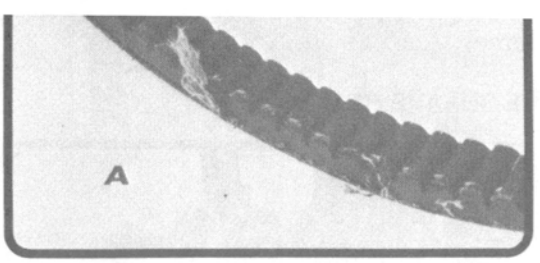
1. Violent engagement with cold belt.
2. Freeing stuck track with engine. Always free stuck track manually.

Fiber glass cord belts

M63911 – 400/JDX-4
M63912 – 500/600/JDX-8

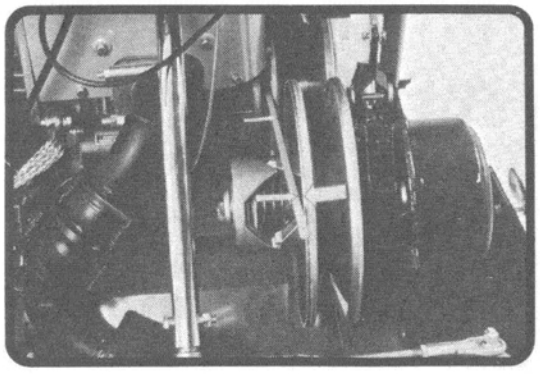
REMOVING DRIVE BELT





Slide No. 133 - Edge Cord Breakage

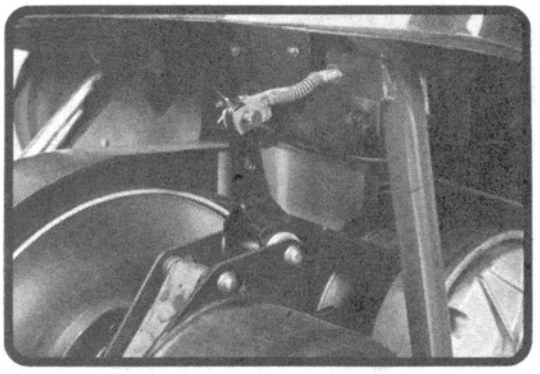
SHEAVE ALIGNMENT



Slide No. 135 - Aligning Sheaves

1. Remove drive belt.
2. Place straight edge along inside surfaces of sheaves as shown above.
3. A 1/4-inch parallel offset must exist between drive and driven sheaves.
4. Loosen (4) engine base carriage bolts and move engine as required to obtain proper alignment. Tighten securely.

BRAKE



Slide No. 136 - Replacing Brake Band

Replacing Brake Band

1. Remove anchor pin and pivot pin.
2. Remove brake arm from brake band.
3. Rotate band rearward and out.
4. Replace in opposite sequence.

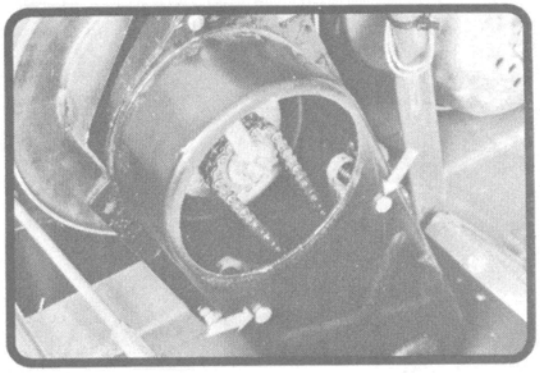
ADJUSTING BRAKE BAND

Apply the brake firmly and measure the distance from the brake control lever to the handgrip. If not 1 to 1-1/2-inches, adjust as follows:

1. Back off front jam nut on brake cable and tighten near nut.
2. Check brake tension.
3. Readjust, if necessary.

In time, adjustment will be used up on cable. When this occurs, loosen the cable adjustment and move the brake band pin to the rear hole. Adjust brake as explained above. When the adjustment is used up with the pin in the rear hole, replace brake band.

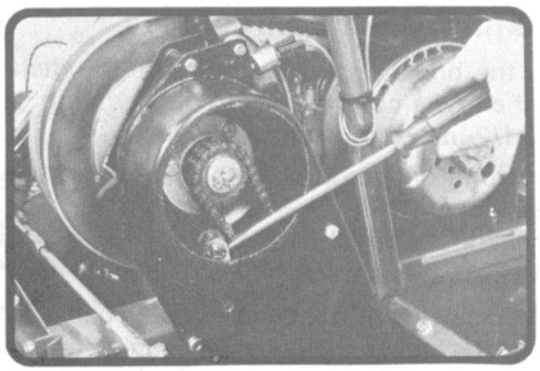
CHAIN CASE ASSEMBLY



Slide No. 137 - Drive Chain Removal

REMOVING DRIVE CHAIN

Remove rubber access plugs from chaincase. Remove tension block cap screws and nut securing upper sprocket.

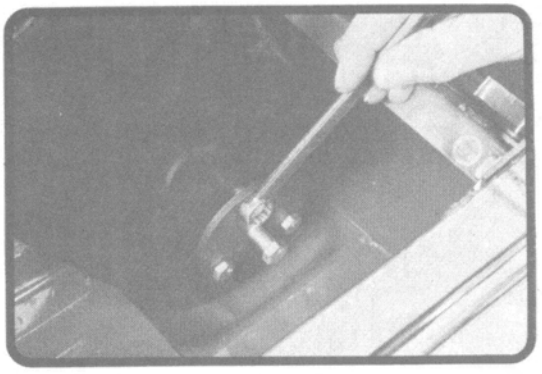


Slide No. 138 - Removing Tension Blocks

Pry tension blocks out of chaincase with a large screwdriver.

Remove upper sprocket, work chain off lower sprocket, and lift chain out upper hole in chain case.

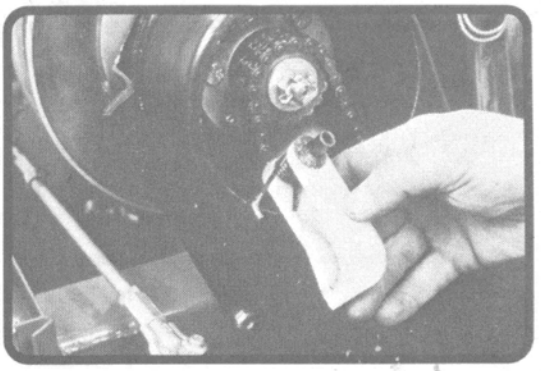
REMOVING LOWER SPROCKET



Slide No. 139 - Removing Lower Sprocket

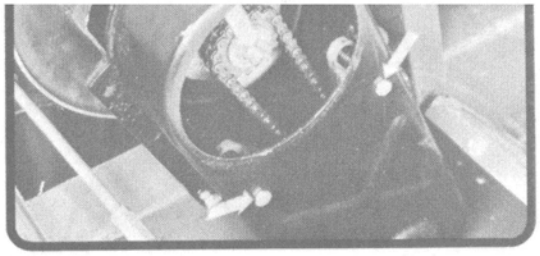
If lower drive sprocket is to be removed for either track or drive shaft servicing, use JDM-13 puller as shown.

REPLACING TENSION BLOCKS



Slide No. 140 - Replacing Tension Blocks

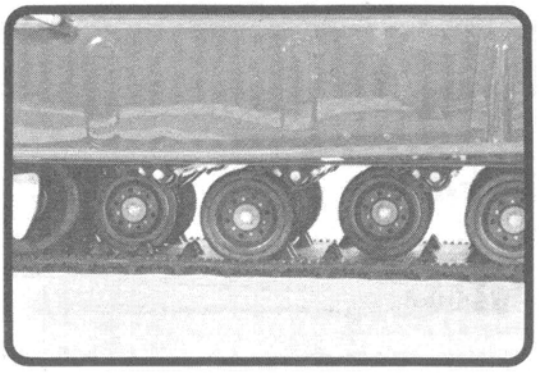
Replace tension blocks if excessively worn. Note spring and spacer arrangement.



Slide No. 137 - Drive Chain Removal

Slide No. 139 - Removing Lower Sprocket

BOGIE WHEEL SUSPENSION

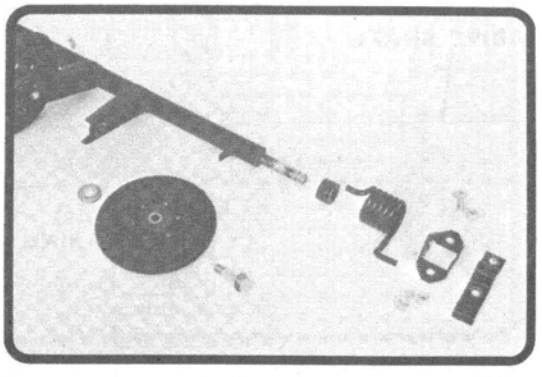


Slide No. 141 - Bogie Suspension

The John Deere Snowmobile's ability to negotiate any snow-covered terrain and to handle well at all speeds is directly related to the trailing bogie wheel suspension system.

Correct maintenance and overhaul procedures will ensure smooth and trouble-free operation.

DISASSEMBLY



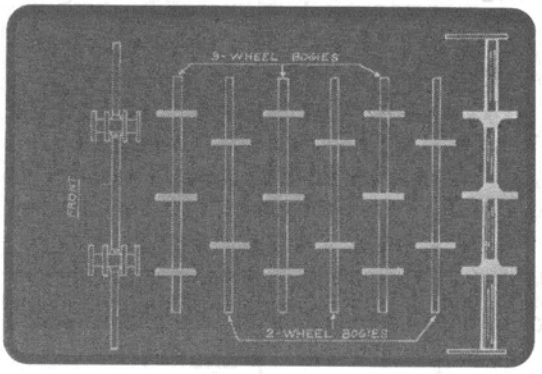
Slide No. 142 - Bogie Assembly

Repair or replace of any of the (6) bogie wheel assemblies is simply a matter of removing (4) carriage bolts. Tube arm assemblies are supported with resilient bushings to eliminate the need for grease fittings.

Service is reduced to inspection of parts for wear and replacement as needed.

Note that springs have a right and left placement. Be sure to assemble correctly. Long hooked leg of spring is clamped to rear of bogie axle.

Bogie wheels have sealed, anti-friction bearings. If worn or damaged, bogie wheels must be replaced as an assembly. Place a washer under cap screw head and between wheel and tube arm assembly. Tighten bogie wheel cap screw firmly.

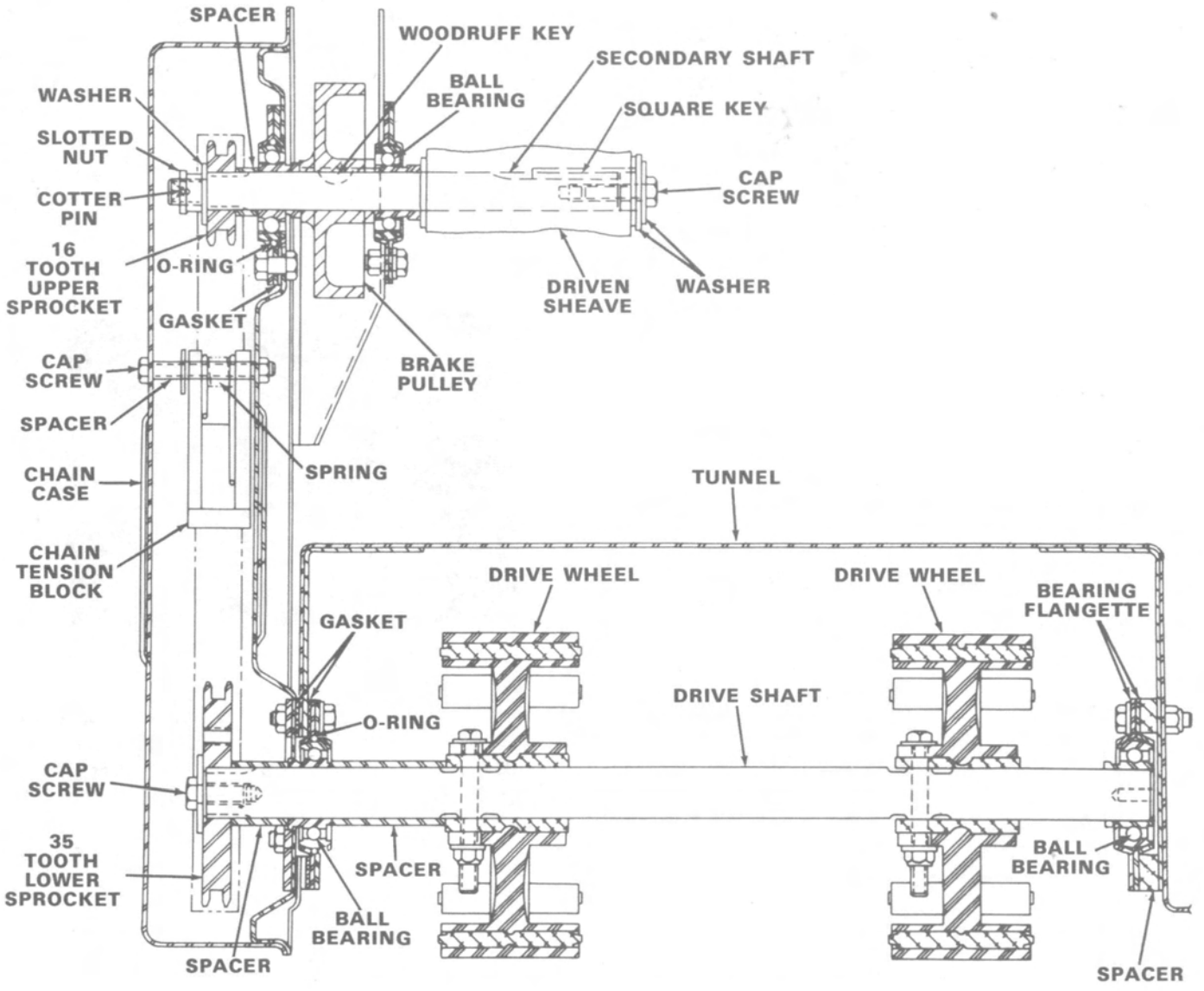


Slide No. 143 - Bogie Assembly Location

Two- and three-bogie wheel assemblies are arranged in an alternate pattern for equalized support of track. Be sure to replace assemblies in the pattern shown to prevent interference.

Heavy duty springs

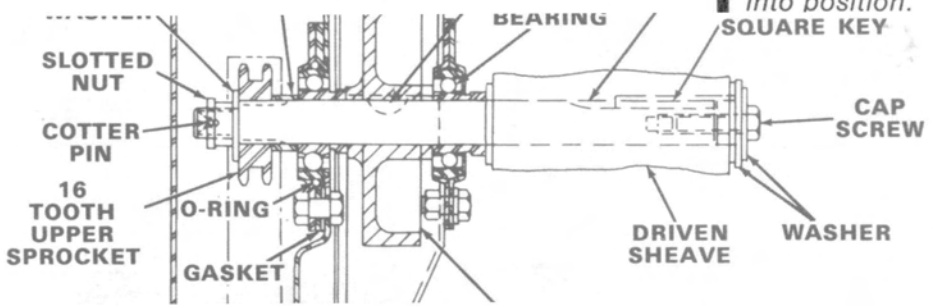
TRACK DRIVE SHAFT



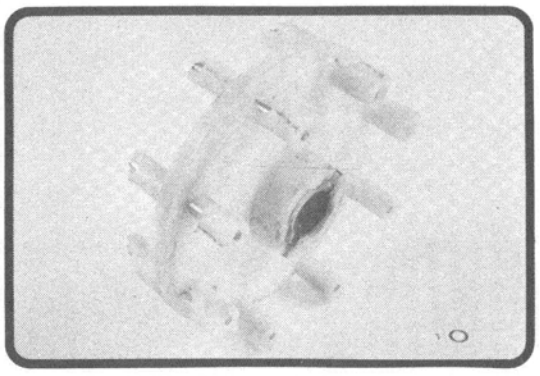
Slide No. 144 - Sectioned View of Chain Case and Drive Shaft

1. The drive shaft assembly can be removed for servicing by removing the following:
   a. Drive chain and lower sprocket.
   b. Speedometer drive (if so equipped) and right-hand bearing flangette bolts.
   c. Two front bogie axle assemblies.
   d. Rear idler assembly.
2. Loosen left-hand bearing flangette cap screws slightly.
3. Grasp drive shaft and pivot downward just far enough to allow shaft to clear tunnel; then pull out of chain case.
4. When installing drive shaft, reverse above procedure.

> *IMPORTANT*
>
> *Be certain O-ring around left-hand bearing is not damaged when bearing is pivoted back into position.*



DRIVE WHEELS

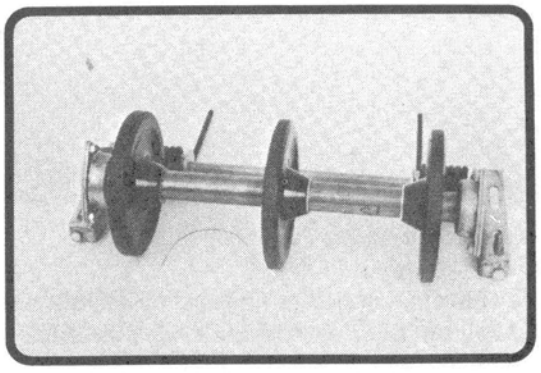


Slide No. 145 - Worn Drive Wheel

Inspect track drive wheels for wear or damage when servicing the axle assembly and/or bearings.

Worn lugs indicate that the snowmobile was run without snow lubrication or with the track over-tensioned. Replace sprockets if lugs are worn beyond 25 percent of lug diameter. Also replace if aluminum lug pins are exposed.

TRACK REAR IDLER ASSEMBLY



Slide No. 146 - Rear Idler Assembly

Track rear idler assembly consists of three idler wheels mounted on a pivoting axle. The pivoting axle is spring-loaded to provide constant and equalized track tension.

Use JDM-8 bearing puller tool to remove bearings from idler shaft.

Assemble outer idler wheels with hubs facing inward. Center idler may face either side, providing the short spacer is positioned on hub side of center idler wheel.

Press bearings onto idler shaft until flush with end of shaft.

TRACK REMOVAL

Remove track by removing the following components:

1. Six bogie assemblies.
2. Rear idler assembly.
3. Track drive shaft. See page 58.

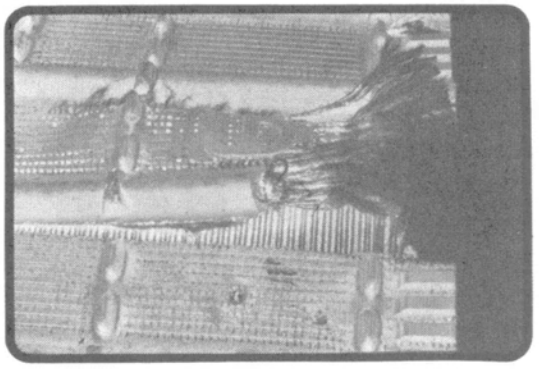
TRACK INSPECTION AND ANALYSIS

The following photos and illustrations are to be used as guidelines for determining if track failure is in warranty or is non-warranty.

The polyurethane track is a rugged, long-lived track—if proper care, track tension and alignment are maintained.

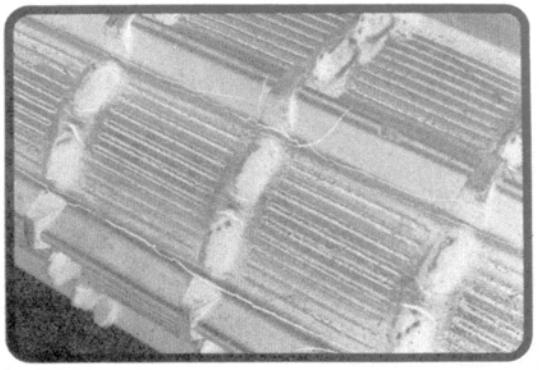
WARRANTABLE TRACKS

Warrantable tracks are shown in Slides No. 147 through 154 on the next two pages.



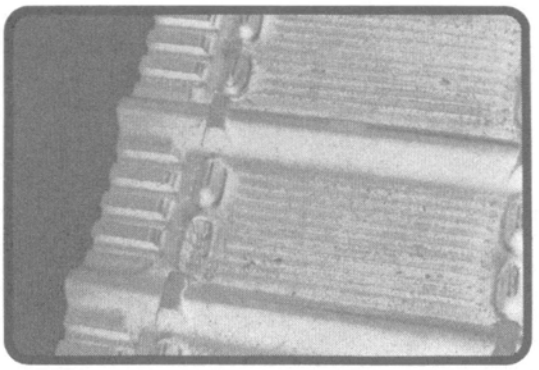
Slide No. 147 - Ply Separation

Ply Separation—obvious separation of the poly impregnated woven fabric from the tensile cords.



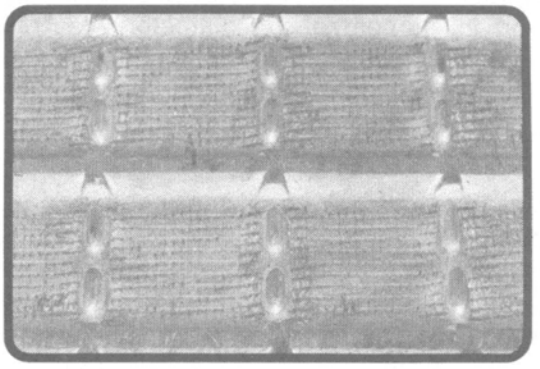
Slide No. 148 - Face Cracks

Face Cracks—the poly material appears to be hard, dry and brittle. Numerous hair line cracks in all directions, but always identified with heavier lateral cracks.



Slide No. 149 - Poor Cure

Poor Cure—the black poly material has a soft, gummy feel somewhat like latex gloves. The sipes (ice cleats) can usually be torn out with the bare fingers.



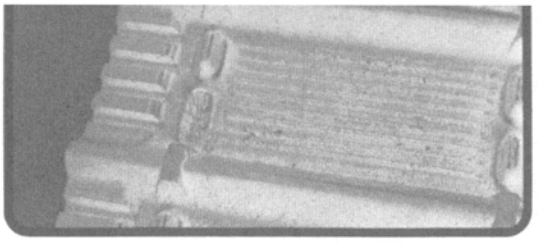
Slide No. 150 - Visible Fabric

Visible Fabric—major amounts of visible fabric, as above, on over 40 percent of the track area would be considered warrantable. Compare this with the non-warrantable track on Slide No. 159.

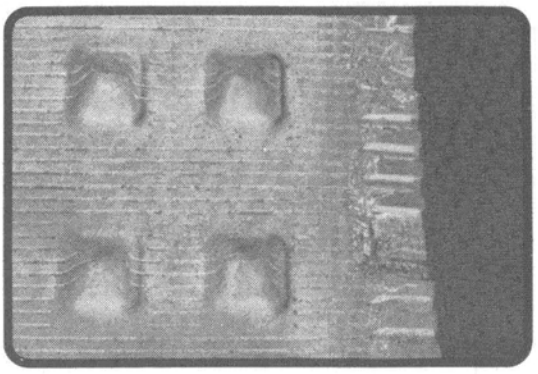
The polyurethane track is a rugged, long-lived track—if proper care, track tension and alignment are maintained.

WARRANTABLE TRACKS

Warrantable tracks are shown in Slides No. 147 through 154 on the next two pages.

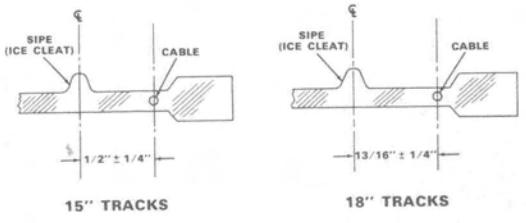


Slide No. 149 - Poor Cure



Slide No. 151 - Tensile Cords Mislocated

Tensile Cords Mislocated – the heavy tensile cords, which are wound radially (easily seen in slide No. 147) should extend to the edge of the track or not more than 3/8-inch inside the edge.



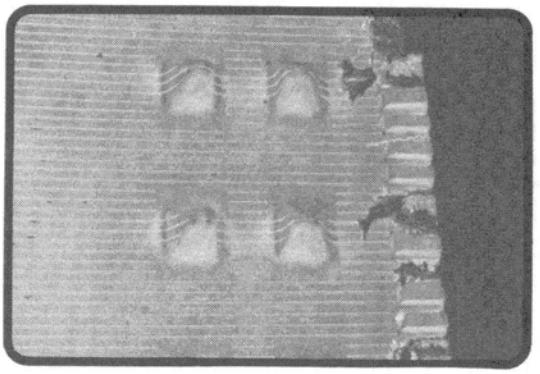
Slide No. 152 - Cable Mislocated

Cable Mislocated – each track is to have a woven steel cable, the full radial length of the track, near the edge. This cable is approximately 1/16-inch diameter.

For the M63000 track (15-inch) the cable should be within a range of 1/2 ± 1/4-inch towards the edge of the track when measured from the center line of the sipe (ice cleat).

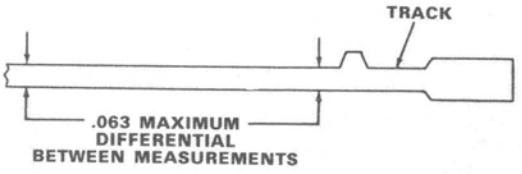
For the M63001 (18-inch) the cable should be in the range of 13/16 ± 1/4-inch toward the edge of the track when measured from the center line of the sipe (ice cleat).

A mislocated cable can be identified by examination of deep edge cracks to visually determine cable location.



Slide No. 153 - Cable Missing

Cable Missing – a missing cable can be identified by deep tears at the edge of the track and the inability to locate the cable as described under Cable Mislocated.



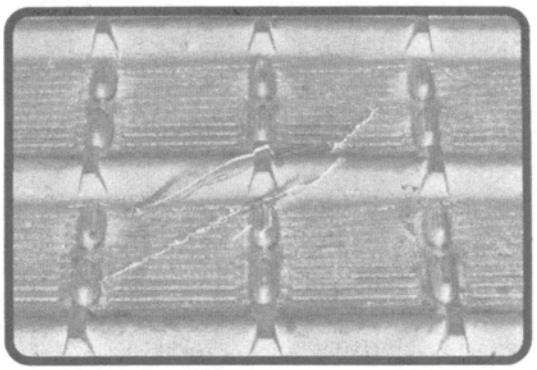
Slide No. 154 - Variation in Track Thickness

Great Variation in Track Thickness – could cause vibration and thumping of the track. If this is a problem, then the track must be replaced.

A maximum of .063-inch variance in track thickness is all that is tolerated. Therefore, any track exceeding this tolerance can be considered for warranty.

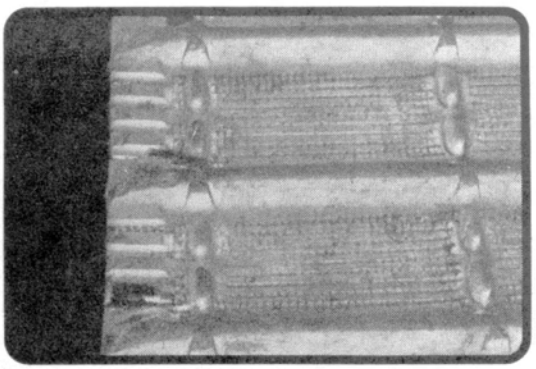
NON-WARRANTABLE TRACKS

Non-warrantable tracks are shown in Slides No. 155 through 162 on the next two pages.



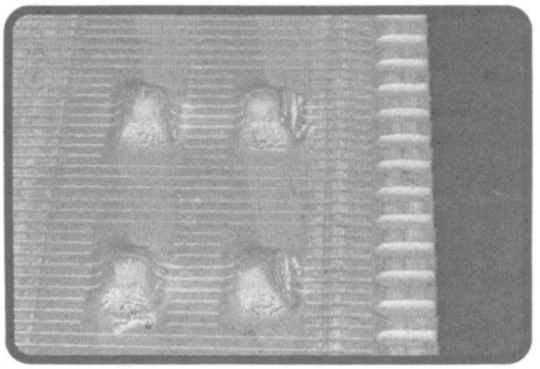
Slide No. 155 - Obstruction Damage

Obstruction Damage—apparent cuts, slashes or gouges in the surface of the track are caused by obstructions such as: broken glass, sharp rocks or buried steel. The track is highly resistant to obstructions, but invariably, damage will occur during rapid acceleration or side skidding over these foreign objects.



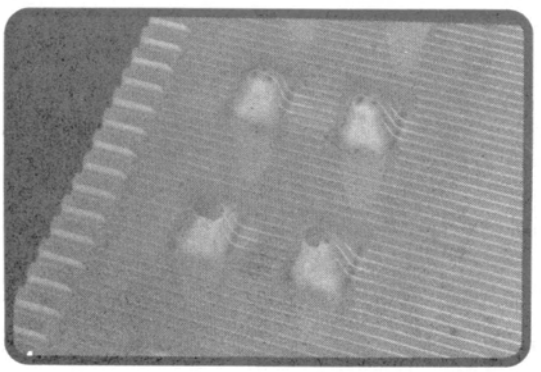
Slide No. 156 - Face Damage

Face Damage—excessively worn cross bars, sipes (ice cleats) or track face is related to operation on extremely rough and dry terrain such as: non-snow covered fields, railroad and highway roadsides, gravel roads, and other non-approved snowmobile field conditions.



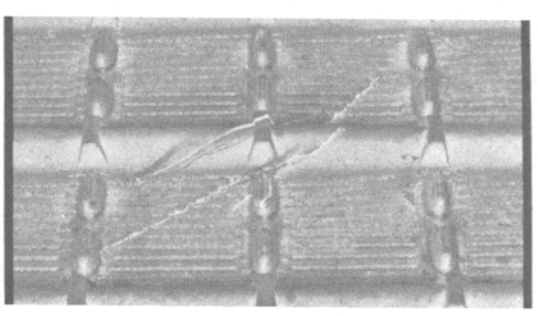
Slide No. 157 - Lug Damage

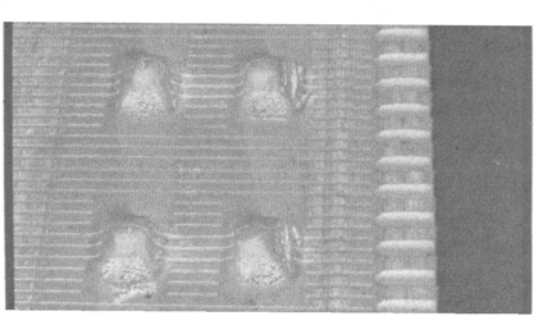
Lug Damage—lug damage to the sides or rear edges of the lug is usually caused by lack of snow lubrication. Introduction of dirt or soil into the driving mechanism is also a frequent cause. Excessive track tension under "summer" operating conditions coupled with lack of snow lubrication can cause lug damage failures.

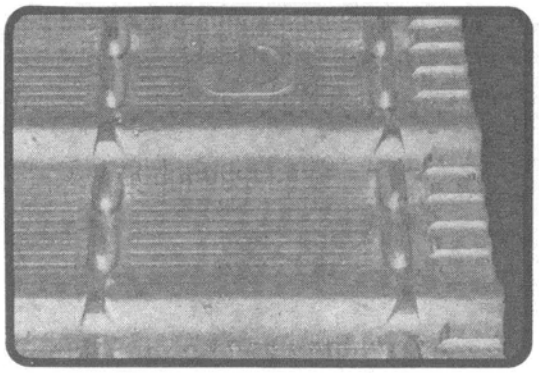


Slide No. 158 - Racheting Damage

Racheting Damage—racheting damage to the top of the lugs is caused by insufficient track tension and/or pulling too great a load and/or prolonged frequencies of rapid acceleration. Constant "jack rabbit" starts is not necessary with a snowmobile.

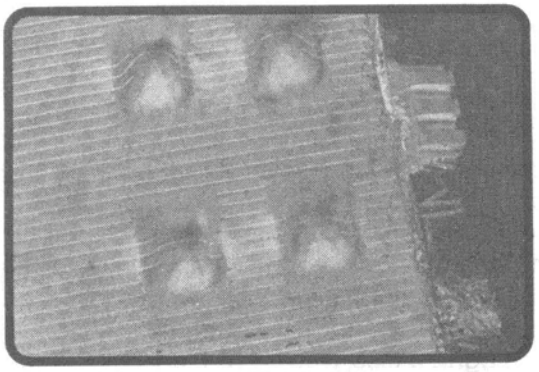






Slide No. 159 - Visible Fabric

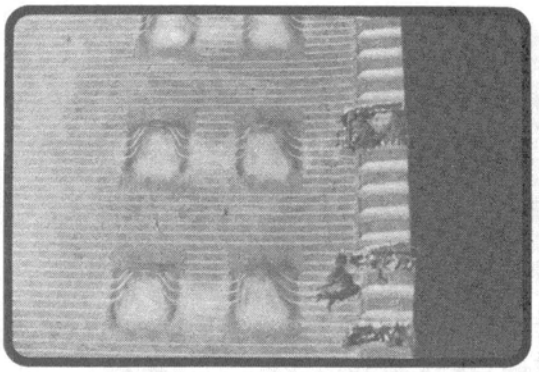
Visible Fabric – minor amounts of visible fabric on less than 40 percent of the track area, are considered normal and non-warrantable.



Slide No. 160 - Operated Loose

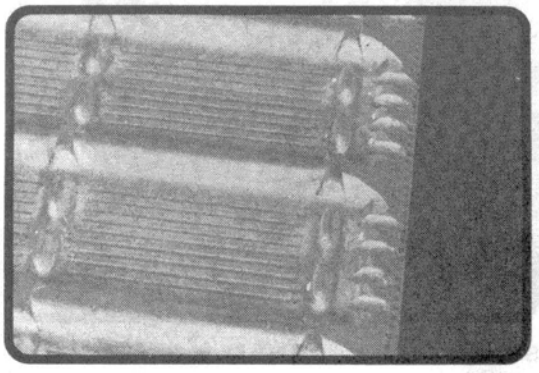
Operated Loose – a loose track causes too much flexing of the outer edge. Track operated loose can show a breakdown of the edge, even with proper tensile cords and steel cable positioning. Some wear on the driving lugs may also be visible.

A loose track will also allow the track to slip off the rear idlers on hard turns.



Slide No. 161 - Impact Damage

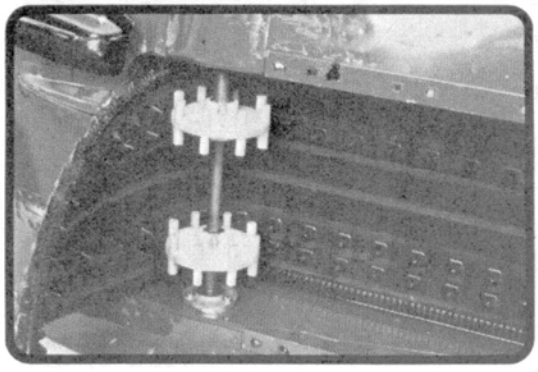
Impact Damage – this can be caused to the edge of the track by frequent riding on rough or frozen ground or ice conditions. Insufficient track tension and pounding of the track on the stabilizers inside the tunnel is also a cause. Excessive jumping, flexing of the track on corrugated trails or crossing buried ridges (logs), or hauling excessive weight without the heavy-duty rear suspension kit (optional equipment) can also cause impact damage.



Slide No. 162 - Edge Damage

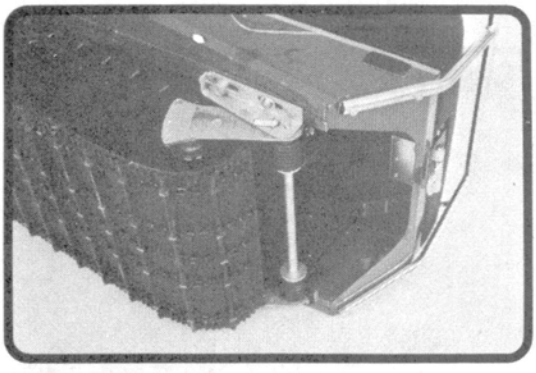
Edge Damage – edge damage of the type illustrated, or similar damage, is due to a careless operator. The most frequent cause is the tipping of the snowmobile on its side to clear the track of snow, thus allowing the track to come in contact with an abrasive surface.

TRACK INSTALLATION



Slide No. 163 - Installing Drive Shaft

1. Position track into front of chassis.
2. Position drive shaft assembly.
3. Install bearings and drive chain.
4. Rotate drive shaft after assembly to assure proper alignment with track.
5. Install rear idler assembly. Leave springs unlatched.



Slide No. 164 - Installing Rear Idler

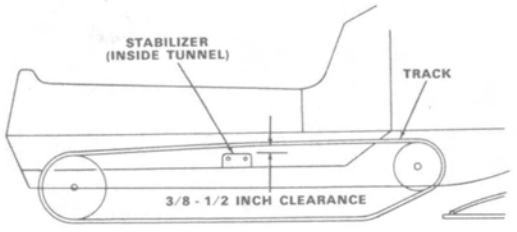
6. Install all six bogie assemblies, alternating front and rear during assembly, with the center two bogies last.
7. Latch rear idler springs and tension track.

TRACK TENSION ADJUSTMENTS

Proper track tension is very important and is the key to obtaining maximum track life.

If "ratcheting" of the track is noticed during operation, track is too loose. "Ratcheting" occurs when the drive lugs on the track slip over the cogs on the drive wheel.

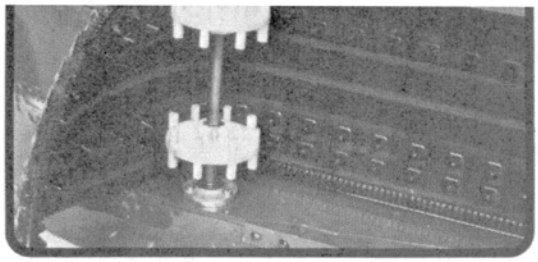
Check track tension as follows:



PROPER TRACK TENSION

Slide No. 165 - Proper Track Tension

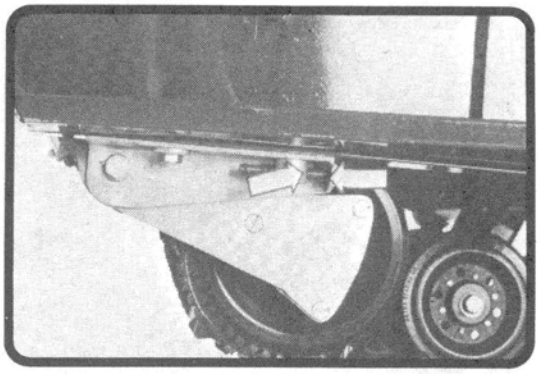
1. Place machine on a level surface with an operator on the seat.
2. Check clearance between the track stabilizers (one on each side) and the track. "Finger-thick" (3/8 to 1/2-inch) clearance should be evident.
3. If clearance is more than "finger thick", track is too tight; if less, track is too loose.



Slide No. 163 - Installing Drive Shaft

tion, track is too loose. "Ratcheting" occurs when the drive lugs on the track slip over the cogs on the drive wheel.

Check track tension as follows:



Slide No. 166 - Adjusting Track

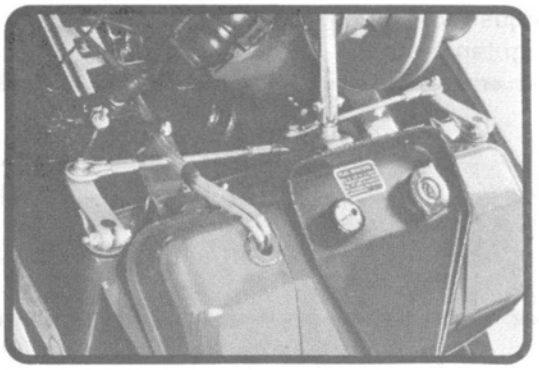
Adjust as follows:

1. Loosen trunnion bolt and rear bolt on both sides of snowmobile.
2. Turn adjusting screws into trunnions to increase track tension.
3. Adjust both sides equally.
4. Tighten bolts.

> *IMPORTANT*
>
> *Both sides must be adjusted equally with an equal length between screw head and trunnion bolt. Unequal adjustment will cause improper track alignment and possible track damage.*

In time, adjustment will be used up on adjusting screws. When this occurs, transfer rear bolts to rear holes; then, transfer trunnion bolts to rear holes. Adjust track tension as outlined previously.

STEERING SYSTEM

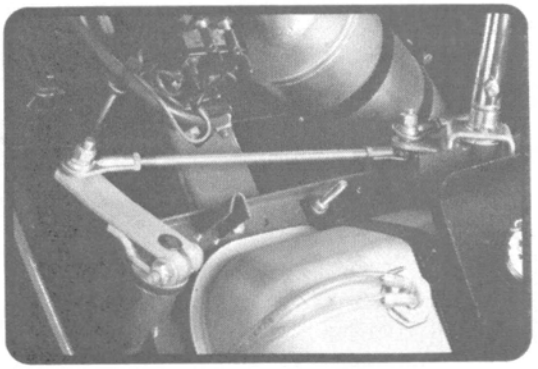


Slide No. 167 - Steering System

The steering system consists of a two-piece steering column, adjustable tie rods, steering arms and spindles.

John Deere snowmobiles feature rubber-mounted (isolated) spindles.

DISASSEMBLY AND INSPECTION



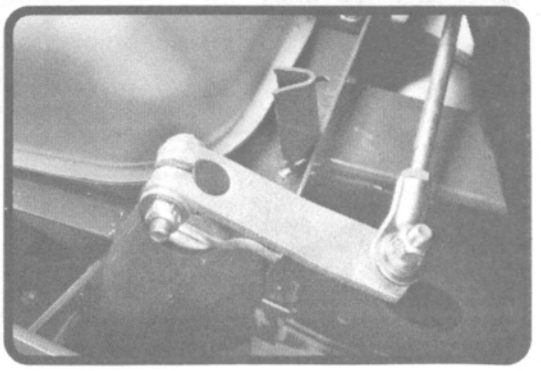
Slide No. 168 - Tie Rod Assemblies

When disassembling steering, note position of left and right steering arms. Scribe an index mark to assist in re-assembly.

If tie rods have been removed and disassembled, preset re-assembled tie rod to 12-inches (tie rod hole-to-hole centers). This will provide a basic parallel ski setting, with only minor adjustment required to complete assembly.

Install R.H. tie rod below center steering arm and L.H. tie rod above as shown.

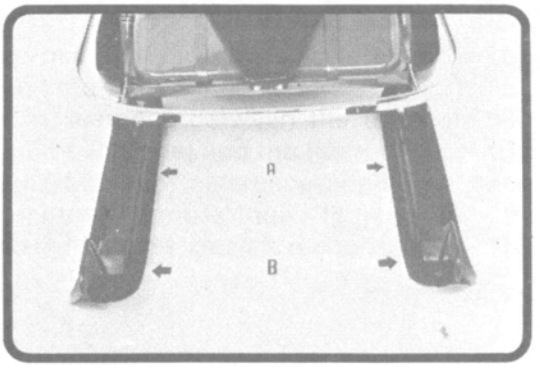
ASSEMBLY



Slide No. 169 - Installing Steering Arm

When assembling, be sure to position correct steering arm to its respective spindle. They are marked "L" and "R". Align to index marks previously scribed.

ALIGNING SKIS



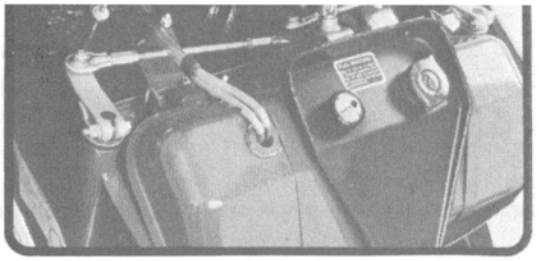
Slide No. 170 - Aligning Skis

When properly aligned, skis are parallel (equal distance at "A" AND "B") with skis pointing straight forward and handlebars positioned to steer straight ahead.

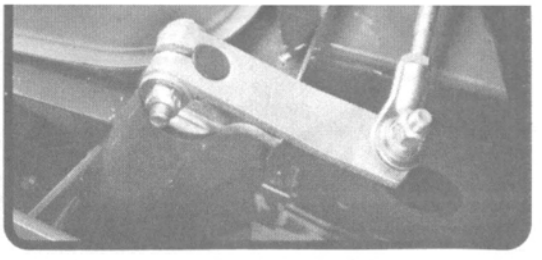
If not, adjust tie rods to obtain proper alignment.

IMPORTANT

Measure from straight sides of skis only; not from tapered ends.

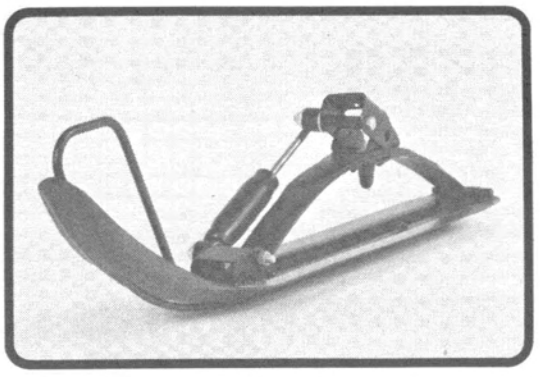


Slide No. 167 - Steering System



Slide No. 169 - Installing Steering Arm

SKIS

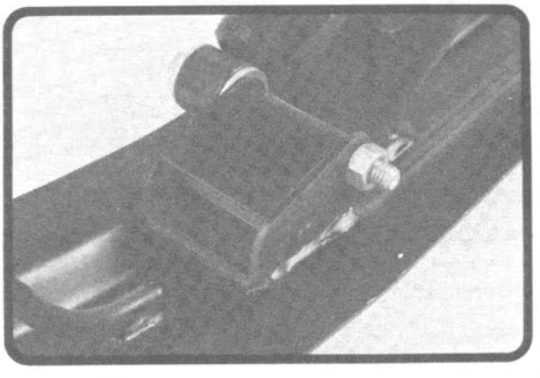


Slide No. 171 - Ski Assemblies

New, stronger skis are used on the 1973 John Deere snowmobiles. The redesigned forward spring bracket allows much quicker installation of shock absorbers. New ski wear rods, made of 1045 steel, provide much better life.

The leaf springs are designed for comfort and handling ease. All ski components are manufactured from high-quality, heat-treated steel to provide the ultimate in operator safety.

DISASSEMBLY AND INSPECTION



Slide No. 172 - Replacing Ski Wear Plate

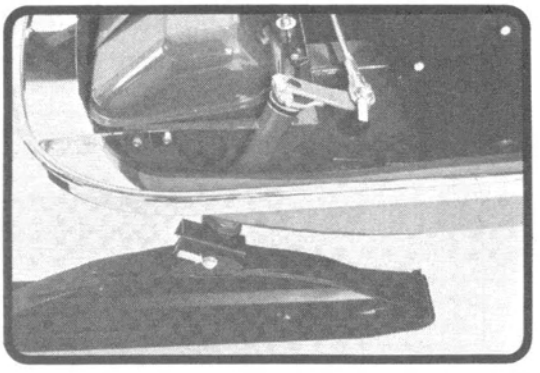
Visually check all components for wear, cracks, distortion and damage. Replace any questionable parts before assembling.

Replace ski wear rods if worn more than one-half of original thickness.

On JDX-8, replace wear rods if carbide inserts are cracked or missing. *Remember, worn wear rods reduce snowmobile maneuverability.*

Inspect and replace wear plate under front of spring, if worn.

To provide safe operation, the spring leaves are not serviced separately. Any damage or broken spring leaves require complete spring assembly replacement. Spring leaves fail progressively, top leaf to main leaf. Therefore, a single leaf replacement simply moves fail point to the next leaf. Complete spring assembly replacement helps elimiate the fail possiblity of the main leaf and its resulting danger of ski loss.



Slide No. 173 - Steering Hardware

ASSEMBLY

When assembling skis, be sure to use grade 5 cap screws or better to ensure against breakage.

Be sure cap screw heads are marked with either three ⟨Y⟩ or six ⟨⟩ marks as shown.

Lock nuts are utilized on all cap screws for safer operation.

Be sure cap screw heads are marked with either three or six raised marks.

SERVICE TOOLS®

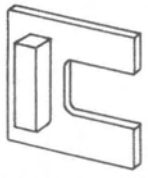
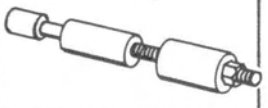
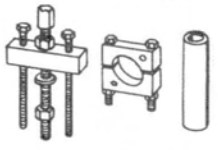
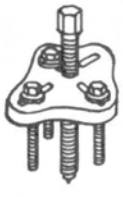
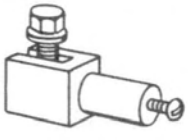
JOHN DEERE

ESSENTIAL SPECIAL SERVICE TOOLS for SNOWMOBILES

TOOLS REQUIRED FOR ALL NEW SNOWMOBILE DEALERS

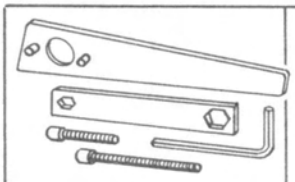
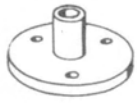
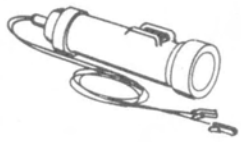
PLEASE INSERT THIS SHEET IN THE SPECIAL TOOLS SECTION OF YOUR SERVICE TOOLS, INC. CATALOG.

JDM-1 TOOL KIT FOR ALL 1972 JOHN DEERE SNOWMOBILES

	JDM-2	FLYWHEEL HOLDING TOOL...Used to prevent rotation of flywheel during removal and installation of the retaining nut. For application on KEC 340 & 440 engines	U.S. Users' Price $ 3.00
	JDM-4A	SALSBURY CLUTCH SPRING TOOL...A dual purpose tool to release and/or seat the tension springs used in Salsbury clutches	3.45
	JDM-5A	CYLINDER NUT WRENCH...Provides a means of removing and then retorquing the cylinder to crankcase nuts on KEC 340 & 440 engines..	8.50
	JDM-6	RECOIL STARTER SPRING WINDING TOOL...Makes the winding of KEC 340 & 440 recoil starter springs a fast, safe and easy operation.....	8.25
	JDM-7	PISTON PIN SERVICE SET...Removes and installs piston pins of KEC 340 & 440 engines without danger of damage to piston or rod bearings..	12.90
	JDM-8	CRANKSHAFT BEARING SERVICE SET...Removes and installs the crankshaft bearings on both ends of KEC 340 & 440 crankshafts	22.50
	JDM-9	FLYWHEEL PULLER ASSEMBLY...This versatile puller, provided with metric cap screws to remove the flywheels of KEC 340 & 440, can also be used with other sizes of cap screws to remove flywheels of most other consumer product engines	8.75
	JDM-10	DIAL INDICATOR MOUNTING BRACKET...Used with JDM-15 or equivalent dial indicator to measure the crankshaft runout on KEC 340 & 440 engines.....	5.60

ESSENTIAL
Special Service Tools

CONTINUED

	JDM-12	SALSBURY CLUTCH SERVICE SET...Tool contains a ramp plate holding tool, ramp plate nut wrench, and clutch assembly puller to service both models of Salsbury clutches	U.S. Users' Price $13.85
	JDM-13	SPROCKET PULLER...This tool is essential to the removal of the lower drive sprocket from the chain case of all John Deere snowmobiles.	5.50
	JDM-14	CONTINUITY TESTER...Used in conjunction with the JDM-15 to quickly and accurately establish engine timing. Ideal for locating open and closed circuits as well. For use on all snowmobiles and tractors	7.85
	JDM-15	SNOWMOBILE TIMING INDICATOR...Dial indicator reading in .001 increments with 1" range and collar for fastening into the 14mm and 18mm spark plug hole adapters also included. Used with JDM-14 continuity tester to establish engine timing. Also used with tool JDM-10 to measure crankshaft runout. In addition, this tool is required to check crankshaft twist. Tool is used on all KEC 340 & 440 engines	26.50

THE JDM-14 AND JDM-15 ESSENTIAL TOOLS ARE NOT INCLUDED IN THE JDM-1 TOOL KIT. THESE TOOLS MUST BE ORDERED SEPARATELY UNDER THE JDM-14 AND 15 TOOL NUMBERS.

Special Service Tools

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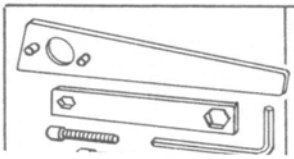	JDM-12	SALSBURY CLUTCH SERVICE SET...Tool contains a ramp plate holding tool, ramp plate nut wrench, and clutch assembly puller to ser-	U.S. Users' Price

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NEW ESSENTIAL SPECIAL SERVICE TOOLS for SNOWMOBILES

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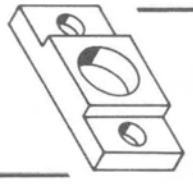
THE ITEMS DESCRIBED IN THIS BULLETIN ARE ESSENTIAL TOOLS REQUIRED TO UPDATE YOUR 1972 JDM-1 SNOWMOBILE TOOL SET TO COVER APPLICATIONS ON THE 1973 LINE OF JOHN DEERE SNOWMOBILES.

1973 TOOLS REQUIRED TO UPDATE 1972 JDM-1 ESSENTIAL TOOL SET

JDM-1B TOOL KIT FOR ALL 1972 AND 1973 JOHN DEERE SNOWMOBILES.

Not Illustrated			U.S. Users' Price
	JDM-1B	TOOL SET...Includes one each of JDM-28, JDM-29, JDM-30, JDM-31, JDM-32, JDM-33, and JDM-37A essential tools listed below.....	$ 41.00
	JDM-28	CLUTCH PULLER...This tool is used to remove all Primary Salsbury Clutches from either CCW or Kohler engines. It is used in conjunction with JDM-12-3 Spanner Wrench and JDM-29 Holding Tool Adapter.....	3.95
	JDM-29	SALSBURY 850 CLUTCH ADAPTER...This tool is used with JDM-12-3 Spanner Wrench to hold the clutch during removal and installation.....	9.90
	JDM-30	SPANNER WRENCH...Used to hold the axial cooling fan during assembly and disassembly operations. For use on Kohler 295 and CCW 440 Reed valve engines.....	7.80
	JDM-31	FLYWHEEL HOLDING TOOL...Used to prevent rotation of flywheel during removal and installation of retaining nut on Kohler engines.....	3.00

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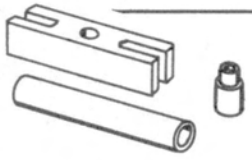
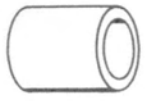
ESSENTIAL SERVICE TOOLS

			U.S. Users' Price
	JDM-32	PISTON PIN ADAPTER...Used with JDM-7 to remove and install piston pins on Kohler 295 and CCW 440 Reed Valve Engines, without danger of damage to piston or rod bearings.....	2.25
	JDM-33	BEARING TOOL ADAPTER KIT...Used in conjunction with JDM-8 to remove and install crankshaft bearings and the starter ring gear hub on Kohler engines.....	8.60
	JDM-37A	RING GEAR HUB INSTALLATION GAUGE...An essential tool needed to install and properly position the starter ring gear hub on the crankshaft of Kohler 295 engines. Used with JDM-8 crankshaft bearing set.....	2.95

CONTINUED

ESSENTIAL SERVICE TOOLS

			U.S. Users' Price
	JDM-32	PISTON PIN ADAPTER...Used with JDM-7 to remove and install piston pins on Kohler 295 and CCW 440 Reed Valve Engines, without danger of damage to	2.25

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CONVENIENCE Special Service Tools for SNOWMOBILES

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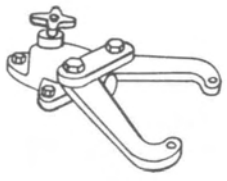
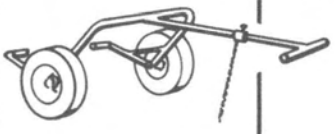
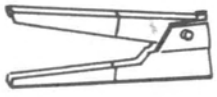
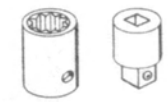
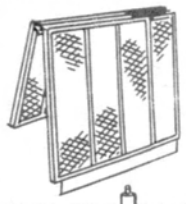
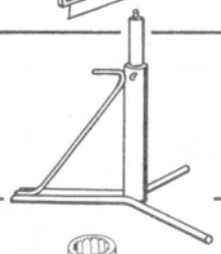
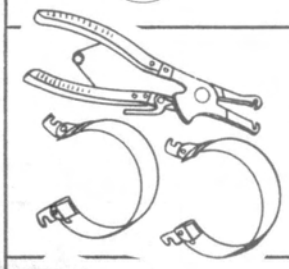
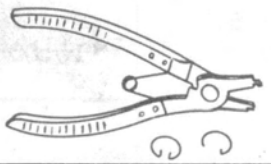
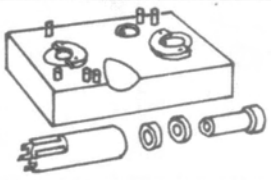
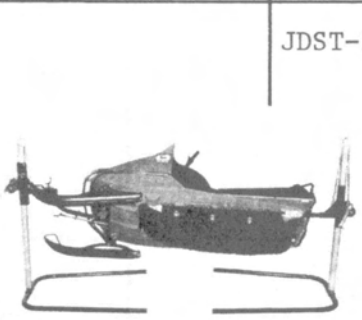
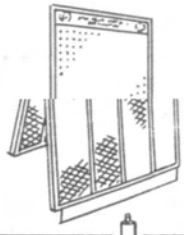
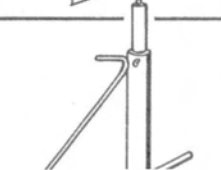
			U.S. Users' Price
	JDM-16	BENCH MOUNTED SERVICE FIXTURE...This tool will become an indispensable item in your shop-- its universal design allows for mounting of all consumer product engines, as well as such things as hydrostatic units, selective control valves, hydraulic pumps and many more. When mounted, any component weighing 350 lbs. or less may safely be rotated 360° with positive stops at 90° increments.....	$ 49.50
	JDM-17A	SNOWMOBILE DOLLY...Excellent for moving snowmobiles in and out of shop or display areas. Large 400 x 8 pneumatic tires make for easy operation. One model fits all units both wide and narrow track.....	68.00
	JDM-18	POP RIVET TOOL...Heavy-duty hand operated pop rivet tool can be used with rivets up to 5/16" dia. with steel cores.....	16.00
	JDM-19	10MM METRIC SOCKET...10mm 12 point metric socket, 3/8" square drive. High quality alloy steel construction.....	1.15
	JDM-20	13MM METRIC SOCKET...13mm 12 point metric socket, 3/8" square drive. High quality alloy steel construction.....	1.15
	JDM-21	22MM METRIC SOCKET...22mm 12 point metric socket, 3/8" square drive. High quality alloy steel construction.....	1.45
	JDM-22	10MM METRIC COMBINATION WRENCH...High quality alloy steel construction.....	2.06
	JDM-23	13MM METRIC COMBINATION WRENCH...High quality alloy steel construction.....	2.65
	JDM-24	1-1/8" SOCKET...1-1/8" 12 point socket with 1/2" square drive. For use with torque wrench on ramp nut of Salsbury model 780 Primary Clutch.....	2.55

	JDM-25	1-1/2" SOCKET & ADAPTER...1-1/2" 12 point socket 3/4" square drive with 3/4" to 1/2" square drive reducing adapter--for use with torque wrench on ramp nut of Salsbury 910 Primary Clutch.....	U.S. Users' Price $ 8.35
	JDM-26	FOLD-A-RAMP LOADING PLATFORM...41" wide, 1,000 lb. capacity ramp attaches to pickup tail gate. Folded ramp is 36" high. Lowered ramp extends 7' to ground where snowmobiles or lawn and garden tractors can quickly be loaded or unloaded.....	99.00
	JDM-27	REAR STAND...Unit designed to hold snowmobile track off floor when machine is being serviced or stored.....	24.95
	JDM-34	1-3/8" SOCKET...1 3/8" 12 point socket with 1/2" square drive. For use with torque wrench on ramp nut of Salsbury 850 Primary Clutch.....	4.31
	JDM-35	RING COMPRESSOR...A band type ring compressor with two adapters, covering piston diameters of 2-1/8" to 2-5/8". Holds rings in compressed position when installing the cylinders in all John Deere snowmobile engines.....	8.30
	JDM-36	PISTON LOCK RING PLIER...Provides an easy way to install all sizes of piston pin lock rings safely and easily without destroying the ring...	1.95
	JDM-38	CONDENSER INSTALLATION AND REMOVAL TOOL...A handy tool used to remove, install and stake Robert Bosch condensers. Used in Bosch ignition systems found on Kohler engines.....	21.05
	JDST-24	SNOWMOBILE LIFT AND REPAIR STAND...A unit designed for most makes and models of snowmobiles. Raises and rotates machines for ease in preventive maintenance work. Allows your serviceman to position the unit at a convenient working height to service or repair those difficult to reach components. Can also be used by your salesmen in the showroom to show customers all the snowmobile features, including the vehicle's undercarriage...	161.50
	41332	TOOL STORAGE PANEL...Standard 24" x 28-1/2" pegboard panel for storage of tools not assigned to a specific tool board. Uses standard pegboard [illegible] Folded ramp is 36" high. Lowered ramp extends 7' to ground where snowmobiles or lawn and garden tractors can quickly be loaded or unloaded.....	99.00
	JDM-27	REAR STAND...Unit designed to hold snowmobile track off floor when machine is being serviced or stored.....	24.95