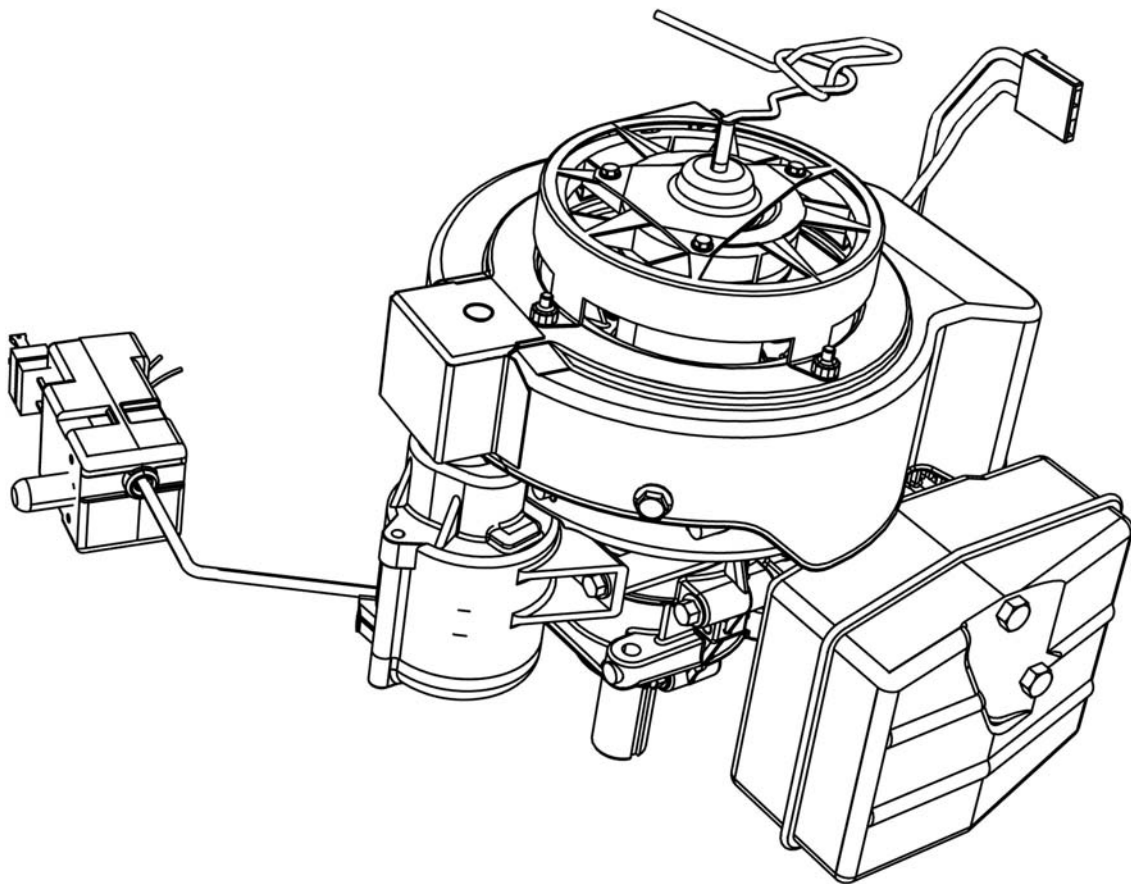


2-CYCLE SNOW ENGINE REPAIR MANUAL




SAFETY INFORMATION

The Briggs & Stratton engine is made of the finest material in a state-of-the-art manufacturing facility. Please understand that Briggs & Stratton sells engines to original equipment manufacturers. It also sells to others in the distribution chain who may sell to the ultimate consumer, an equipment manufacturer, another distributor or a dealer. As a result, Briggs & Stratton does not necessarily know the application on which the engine will be placed. For that reason, carefully read and understand the operating instructions of the equipment before you repair or operate.

You should also understand that there are equipment applications for which Briggs & Stratton does not approve the use of its engines. Briggs & Stratton engines are not to be used on vehicles with less than 4 wheels. This includes motor bikes, aircraft products and all terrain vehicles. Moreover, Briggs & Stratton does not approve of its engines being used in competitive events. **FOR THAT REASON, BRIGGS & STRATTON ENGINES ARE NOT AUTHORIZED FOR ANY OF THESE APPLICATIONS.** Failure to follow this warning could result in death, serious injury (including paralysis) or property damage.

IN THE INTEREST OF SAFETY

The safety alert symbol () is used to identify safety information about hazards that can result in personal injury.

A signal word (**DANGER**, **WARNING**, or **CAUTION**) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard.



DANGER indicates a hazard which, if not avoided, **will result in death or serious injury.**



WARNING indicates a hazard which, if not avoided, **could result in death or serious injury.**



CAUTION indicates a hazard which, if not avoided, might result in minor or moderate injury.

CAUTION: When this signal word is used without the alert symbol, it indicates a situation that could result in damage to the engine.

- Prior to work, read and understand the section(s) of this manual that pertain to the job. Follow all safety warnings.
- Wear suitable eye protection.
- Prevent accidental starting by removing spark plug wire from spark plug when servicing engine or equipment. Disconnect negative battery terminal if equipped with electric starting system.
- Periodically clean engine. Keep governor parts free of dirt, grass and other debris which can affect engine speed.
- Always use fresh gasoline. Stale fuel can gum carburetor and cause leakage.
- Check fuel lines and fittings frequently for cracks or leaks and replace if necessary.



WARNING

Briggs & Stratton does not approve or authorize the use of these engines on 3-wheel All Terrain Vehicles (ATVs), motor bikes, fun/recreational go-carts, aircraft products or vehicles intended for use in competitive events. Use of these engines in such applications could result in property damage, serious injury (including paralysis), or even death.

SFT-18



HAZARD SYMBOLS AND MEANINGS

Explosion	Fire	Shock
Goggles	Chemical Burns	Explosive Pressure
Kick Back	Hot Surface	Entanglement
Toxic Fumes	Read	Disconnect Spark Plug

SFT-01

WARNING

- The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

SFT-03

DANGER

Running engines produce heat. Temperatures of muffler and surrounding areas can reach 150°F (65°C). Severe burns can occur on contact.

- Allow muffler, engine cylinder fins and radiator to cool before touching.
- Remove accumulated combustibles from muffler area and cylinder area.
- Install and maintain in working order a spark arrestor before using equipment on forest-covered, brush-covered unimproved land. The state of California requires this (Section 4442 of the Public Resources Code). Other states may have similar laws. Federal laws apply on federal land.

SFT-08

WARNING

Gasoline and its vapors are extremely flammable and explosive. Fire or explosion can cause severe burns or death.

When adding fuel:

- Turn engine **OFF** and let engine cool at least 2 minutes before removing.
- Fill fuel tank outdoors or in a well ventilated area.
- Do not overfill fuel tank. Fill tank to approximately 1-1/2 inches below top of neck to allow for fuel expansion.
- Keep gasoline away from sparks, open flames, pilot lights, heat and other ignition sources.
- Check fuel lines, tank, cap and fittings frequently for cracks or leaks and replace if necessary.

When starting engine:

- Make sure spark plug, muffler, fuel cap and air cleaner are in place.
- Do not crank engine with spark plug removed.
- If fuel spills, wait until it evaporates before starting engine.
- If engine floods, set choke to **OPEN/RUN** position. Place throttle in **FAST** and crank until engine starts.

When operating equipment:

- Do not tip engine or equipment at an angle which would cause fuel to spill.
- Do not choke carburetor to stop engine.

When transporting equipment:

- Transport with fuel tank empty or with fuel shut-off valve set to **OFF**.

When storing gasoline or equipment with fuel in tank:

- Store away from furnaces, stoves, water heaters or other appliances that have a pilot light or other ignition source because they can ignite gasoline vapors.

SFT-05

WARNING

Unintentional sparking can result in fire or electric shock. Unintentional start-up can result in entanglement, traumatic amputation or severe lacerations.

Before performing adjustments or repairs:

- Disconnect spark plug wire and keep it away from spark plug.
- Disconnect negative (-) battery terminal.

When testing for spark:

- Use approved spark plug tester.
- Do not check for spark with the spark plug removed.

SFT-04

DANGER

Engines give off carbon monoxide, an odorless, colorless, poison gas. Breathing carbon monoxide can cause nausea, fainting or death.

- Start and run engine outdoors.
- Do not start or run engine in enclosed area, even if doors or windows are open.

SFT-07



DANGER

Starting engine creates sparking. Sparking can ignite nearby flammable gases. Explosion and fire could result.

- If there is natural or LP gas leakage in the area, do not start engine.
- Do not use pressurized starting fluids because vapors are flammable.

SFT-06

 DANGER	
	<p>Rotating parts can contact or entangle hands, feet, hair, clothing or accessories. Traumatic amputation or severe lacerations can result.</p>
<ul style="list-style-type: none"> ● Operate equipment with guards in place. ● Keep hands and feet away from rotating parts. ● Tie up long hair and remove jewelry. ● Do not wear loose-fitting clothing, dangling drawstrings or items that could become entangled in the equipment. 	
<small>SFT-09</small>	

 DANGER	
	<p>Broken bones, fractures, bruises or sprains could result.</p>
<ul style="list-style-type: none"> ● Remove all external equipment/engine loads before starting engine. ● Direct coupled equipment components such as, but not limited to blades, impellers, pulleys and sprockets must be securely attached. 	
<small>SFT-10</small>	



2-CYCLE SNOW ENGINE
REPAIR MANUAL 0

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SECTION 1 GENERAL INFORMATION

TWO-CYCLE ENGINE THEORY

In a piston-ported engine, the fuel mixture enters the crankcase through a port that comes directly from the carburetor (commonly referred to as a "third port"), See item **C** figure 1.

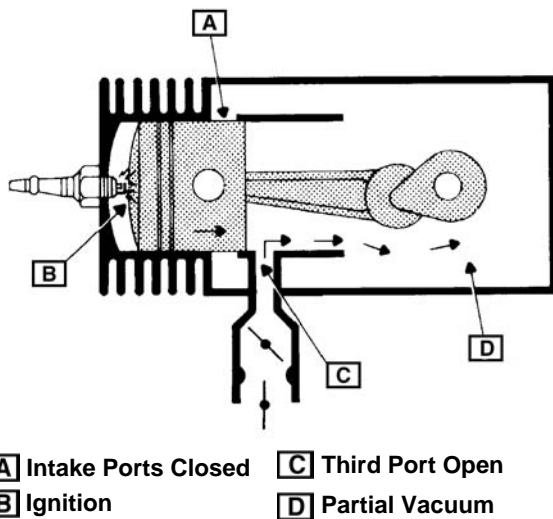


Fig. 1

At about 28° before top-dead-center (BTDC), the spark plug ignites and forces the piston away from the spark plug. As the piston moves away from the spark plug, it exposes the exhaust port (Item **B** Figure 2) and the expanding exhaust gases escape. As the piston continues to move away from the spark plug, it

compresses the fuel mixture (Item **D** Figure 2) that is on the bottom side of the piston in the crankcase.

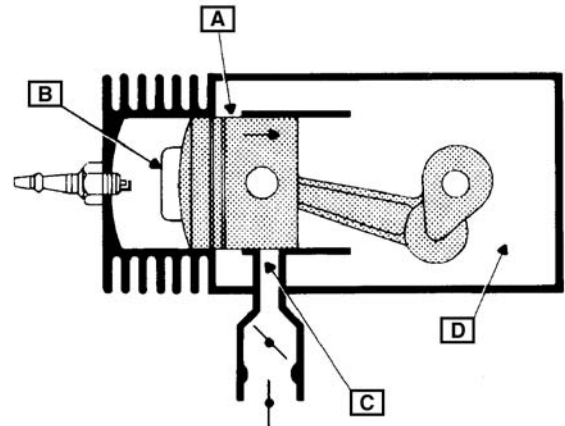


Fig. 2

Near the bottom of its travel, the piston uncovers the pressure transfer port and allows this compressed fuel/air mixture to expand into the combustion chamber (Item **A** Figure 3).

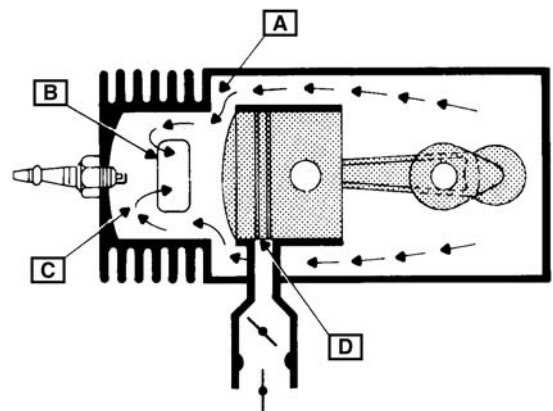
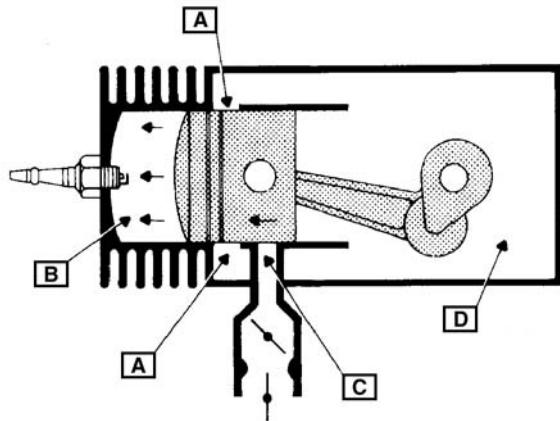


Fig. 3

Now the piston begins its travel in the opposite direction and first closes off the transfer port and then the exhaust

port. As it continues, it compresses the fuel mixture in the combustion chamber (Item **B** Figure 4).

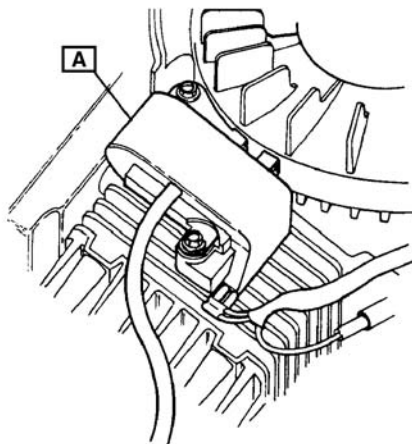


- A** Intake Ports Closed
- B** Compression
- C** Third Port Closed
- D** Partial Vacuum

Fig. 4

IGNITION COIL OPERATION

The ignition coil system (Item **A** Figure 5) is breakerless and contains electronic components that replace mechanical points and related accessories (such as a breaker cam, spark advance assembly, etc.).



- A** Ignition Coil Module

Fig. 5

As the flywheel magnet passes the ignition coil module, an AC voltage is induced into the charge coil. This AC

voltage is converted by a rectifier into a DC signal, which is then stored in a capacitor (Figure 6).

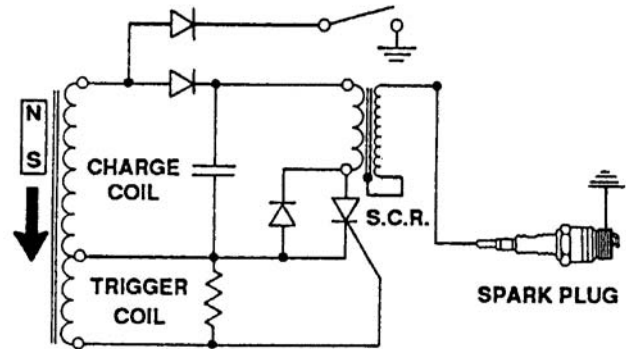


Fig. 6

When the silicone-controlled rectifier (SCR) is triggered, up to 200 volts DC, stored in the capacitor, travels to the spark coil. Here it is stepped up to as much as 25,000 volts and is discharged across the electrodes of the spark plug (Figure 7).

Ignition timing (when the SCR is triggered) is determined by the flywheel magnet and the keyways in the flywheel and crankshaft. Damage to any of these parts will affect the ignition timing.

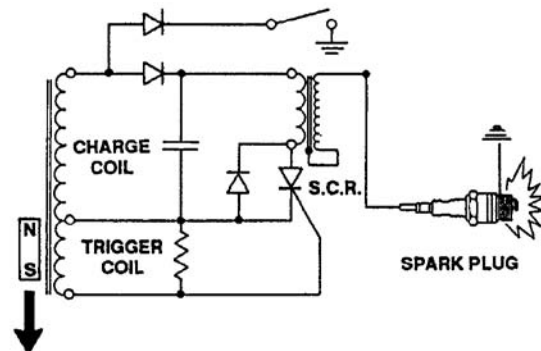
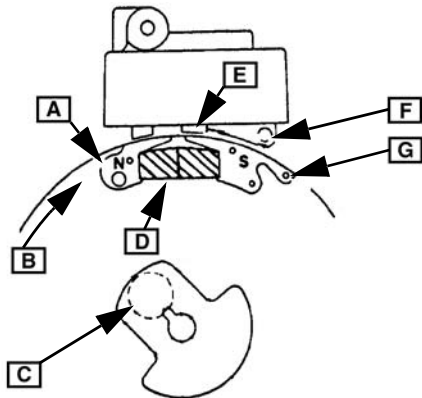


Fig. 7

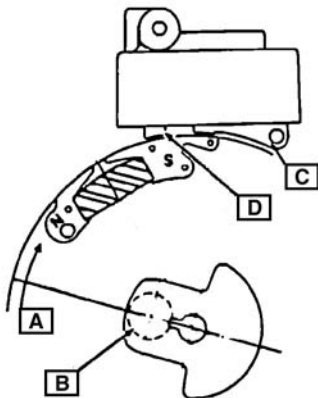
At slower speeds, the flywheel magnet induces a smaller charge in the trigger coil. This action triggers the (SCR), enabling easier starting in a “retarded firing position” -about 5° before top dead center (BTDC). See figure 8.



- A** Pole Shoe
- B** Flywheel Rotation
- C** Crankshaft at 5° BTDC
- D** Magnet
- E** Starting Leg
- F** Charging Leg
- G** Pole Shoe

Fig. 8

At faster speeds (about 800 RPM), the flywheel magnets induce a large enough charge in the trigger coil to trigger the SCR in the “advanced firing position,” -about 28° BTDC (Figure 9).



- A** Flywheel Rotation
- B** Crankshaft at 25° BTDC
- C** Charging Leg
- D** Running Leg 25° Advanced

Fig. 9

REWIND STARTER

The rewind starter operates through a retainer/friction disc and two engagement dogs that extend from the center of the rewind starter and engage the inside of the starter hub on the flywheel. The engagement dogs contact the starter hub when the rewind rope is pulled. When the engine starts, the starter cup exceeds the speed of the recoil starter causing the ramps on the inside of the cup to contact the back side of the starter dogs, pushing them inward. When the starter rope is relaxed, spring tension retracts the dogs.

ELECTRIC START (OPTIONAL)

The electric start models use a 120VDC starting system. When the starter is supplied with voltage, the helical shaft spins to force the pinion gear out on the shaft and engage the ring gear (Figure 10).

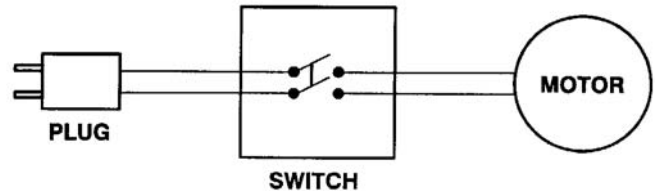


Fig.10

RECOMMENDED MAINTENANCE SCHEDULE

25 Hours

- Clean/replace or re-gap spark plug

50 Hours

- Clean exhaust ports
- Check for fuel leakage

SECTION 2 TROUBLESHOOTING

GENERAL TROUBLESHOOTING INFORMATION

Most complaints concerning engine operation can be classified as one or a combination of the following:

- Will not start
- Hard starting
- Lack of power
- Runs rough
- Vibration



NOTE: What appears to be an engine malfunction may be a fault of the powered equipment rather than the engine. If equipment is suspect, see Equipment Affecting Engine Operation.

Systematic Check

If the engine is hard starting or will not start and the cause of malfunction is not readily apparent, perform a systematic check in the following order:

- Ignition
- Carburetion
- Compression

This check-up, performed in a systematic manner, can usually be done in a matter of minutes. It is the quickest and surest method of determining the cause of failure.

Check Ignition

With stop switch in **ON/RUN** position and spark plug installed, attach a **#19368** ignition tester to the spark plug lead and ground the other end of the tester as shown in figure 14. Operate the starter. If a strong, steady spark is

observed at the tester gap, you may assume the ignition system is functioning satisfactorily.

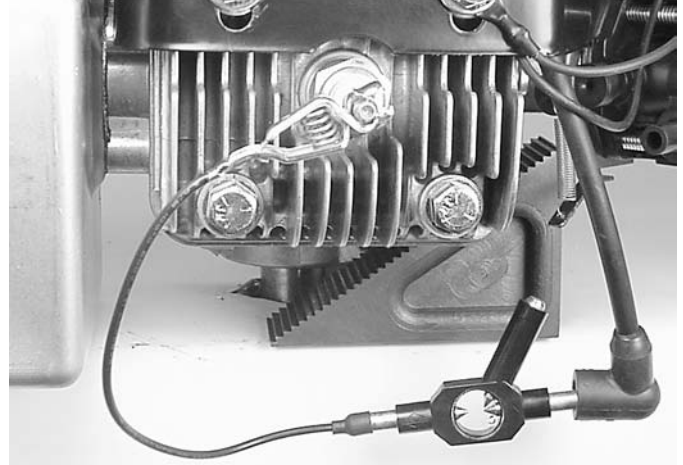


Fig. 14



NOTE: Engines equipped with capacitive discharge ignition system will still display spark at tester with a partially or fully sheared flywheel key. A partially sheared flywheel key will affect ignition timing and engine performance.



If spark does not occur look for:

- Shorted stop switch
- Shorted ground wire
- Incorrect armature air gap
- Armature failure

Engine Misfires

If engine runs but misses during operation, a quick check to determine if ignition is or is not at fault can be made by installing Tool **#19368** tester between the spark plug lead and spark plug (Figure 15). A spark miss will be obvious

when the engine is running. If the spark looks good in the tester but the engine misses, try a new spark plug.

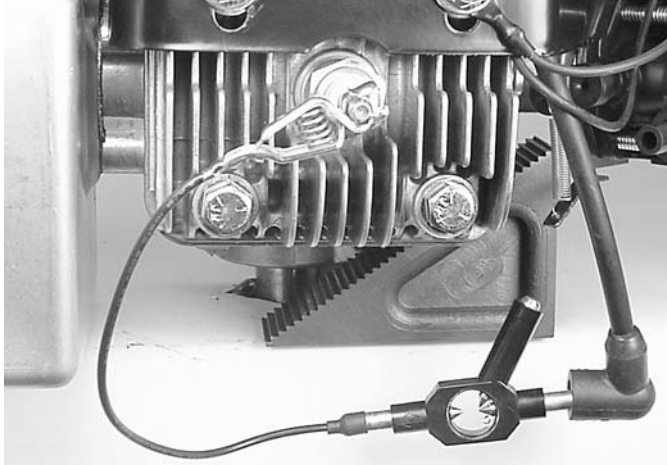


Fig. 15



NOTE: A leak at the cylinder crankcase mounting surfaces or oil seals can create a lean fuel mixture resulting in low power or a miss. Check for leakage at these areas.

Check Carburetion

Before checking carburetion, be sure the fuel tank has an ample supply of fresh, clean gasoline. Make sure throttle and choke controls are properly adjusted.

If engine cranks but will not start, remove and inspect the spark plug.

If plug is wet, look for:

- Over choking
- Water in fuel
- Float needle valve stuck open
- Fouled spark plug

If plug is dry, look for:

- Leaking carburetor mounting gaskets.
- Gummy or dirty carburetor, fuel filter, fuel lines or fuel tank
- Float needle valve stuck shut
- Plugged fuel cap vent

A simple check to determine if the fuel is getting to the combustion chamber through the carburetor is to remove the spark plug and pour a small quantity of fuel (1 teaspoon or 5 mil.) through the spark plug hole. Replace the plug. If the engine fires a few times and then stops, look for the same conditions as for a dry plug.

Check Compression

Connect spark plug wire to long terminal of tester, Tool #19368 and ground tester to engine with alligator clip.

To check compression, remove the spark plug and install compression tester **A** (Figure 16).

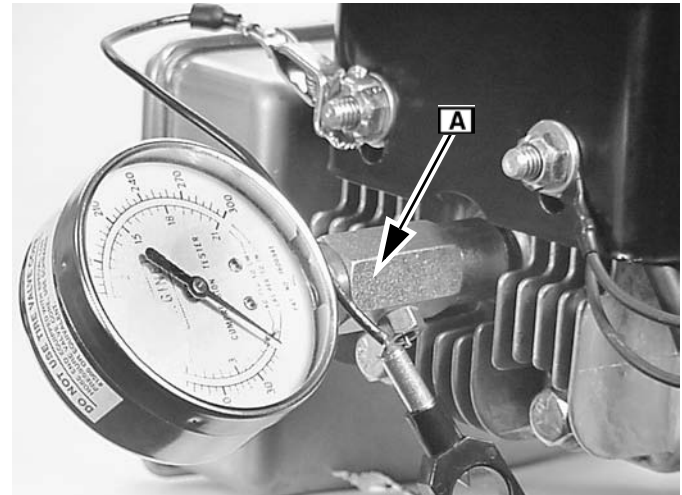


Fig. 16

Crank the engine using the rewind starter. Continue cranking until meter reading stabilizes. The meter reading should be approximately **115 PSI (7.9 bar)**. If compression is below **80 PSI (5.5 bar)**, look for:

- Loose cylinder head bolts
- Blown head gasket
- Worn bore and/or rings
- Broken connecting rod

EQUIPMENT AFFECTING ENGINE OPERATION

Frequently, what appears to be a problem with engine operation, such as hard starting, vibration, etc., can be caused by the equipment being powered rather than the engine itself. Since many varied types of equipment are powered by Briggs & Stratton engines, it is not possible to list all of the various conditions that may exist. Listed are the most common effects of equipment problems, and what to look for as the most common cause.



Hard Starting, Kickback, or Will Not Start

- Loose drive adapter(s) - Pulleys and adapters must be tight to shaft. Also, check for partially sheared flywheel key.
- Starting under load - ensure the unit is not engaged when engine is started; if the unit is engaged, that it does not pose an excessive load to the engine.
- Check choke for proper adjustment.
- Check interlock system (if equipped) for shorted wires, loose or corroded connections, or defective modules or switches.

Vibration

- Auger bent or out of balance.
- Worn drive pulley(s)
- Mounting bolts loose
- Check for partially sheared flywheel key.

Power Loss

- Bind or drag in unit - if possible, disengage engine and operate unit manually to check for any binding action.

STARTER MOTOR FAILS TO TURN

Power not reaching product.

- Plug another appliance into extension cord to ensure cord is OK.

Starter switch malfunction.

- Check switch using a volt/ohmmeter set for resistance. Ensure that there is continuity when the switch is depressed.

Engine has seized.

- Verify that the engine turns over freely.

Starter motor has failed.

- If all the above conditions are checked and the starter still fails to turn, it must be repaired or replaced.

NOTES



NOTES

A large rectangular area filled with a grid of small, light gray dots, intended for handwritten notes.

SECTION 3 ENGINE DISASSEMBLY

REMOVE SHROUD

1. Disconnect spark plug wire.
2. Remove the two screws **A** that attach the shroud to the base (Figure 17).
3. Remove the nuts and washers **B** from the studs (Figure 17).

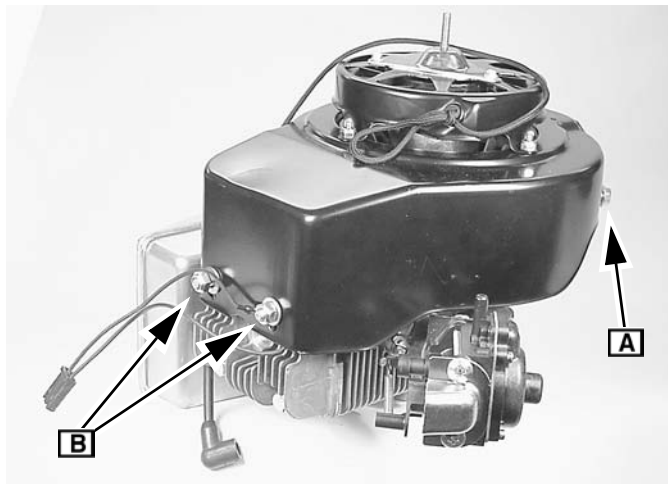


Fig. 17

REMOVE CARBURETOR



NOTE: We strongly recommend cleaning the exterior of the carburetor before removal from the engine.

1. Remove fuel line and drain; remove the fuel tank. (On some snow throwers, it will be necessary to remove the lower shroud to access the carburetor and fuel line.)
2. Disconnect the primer tube from the carburetor fitting and remove the choke cable.

3. Slide the air vane from its mounting bracket **A** as shown (Figure 18).



Fig. 18

4. Remove the two screws **A** that secure the carburetor to the intake pipe and discard the gasket (Figure 19).

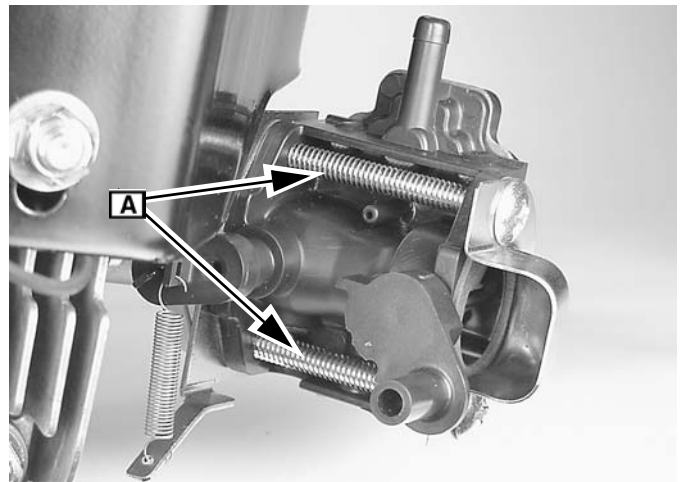


Fig. 19

5. Pull the carburetor assembly down and away from the engine and set aside.

REMOVE FLYWHEEL

1. Remove flywheel nut and starter cup (Figure 20).

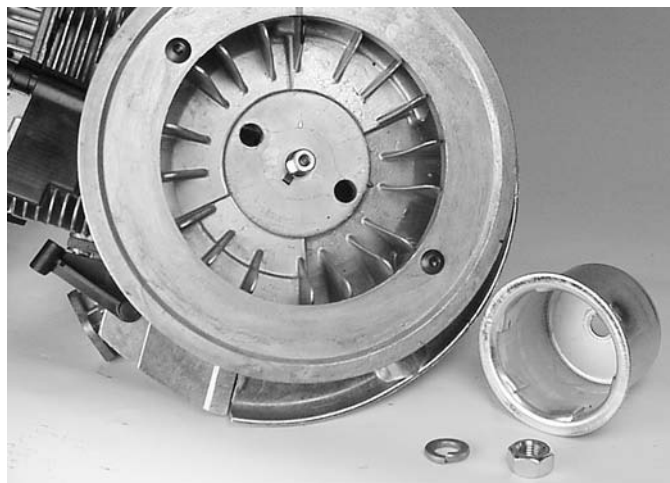


Fig. 20

2. Reinstall nut flush with the end of the crankshaft.
3. Remove the flywheel by pulling up on the edge of flywheel while striking the flywheel nut with a soft mallet (Figure 21).

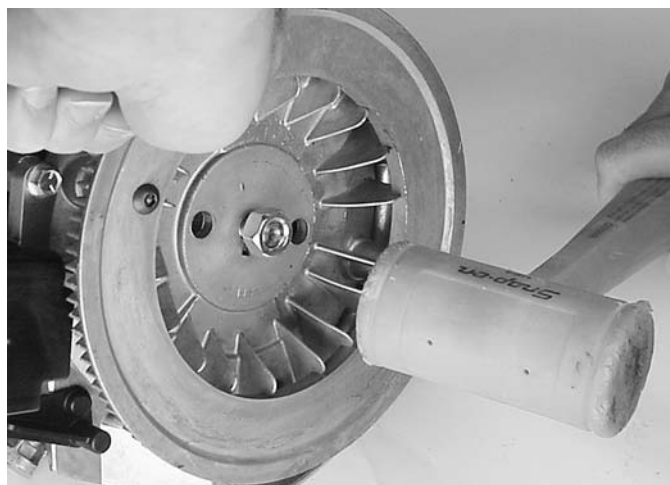


Fig. 21

4. Remove key.

REMOVE OPTIONAL 120V STARTER

1. Remove the starter switch, the bolt holding the wire clip, and the two bolts which mount the starter to the engine (Figure 22).

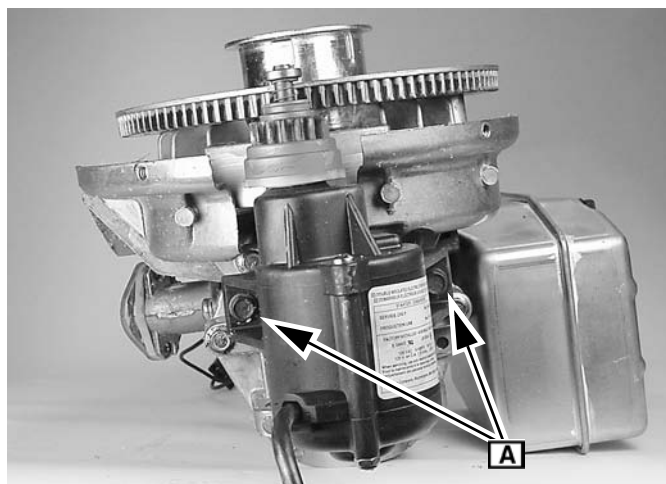


Fig. 22

REMOVE MUFFLER

1. Remove the two bolts **A** that secure the muffler to the cylinder (Figure 23).

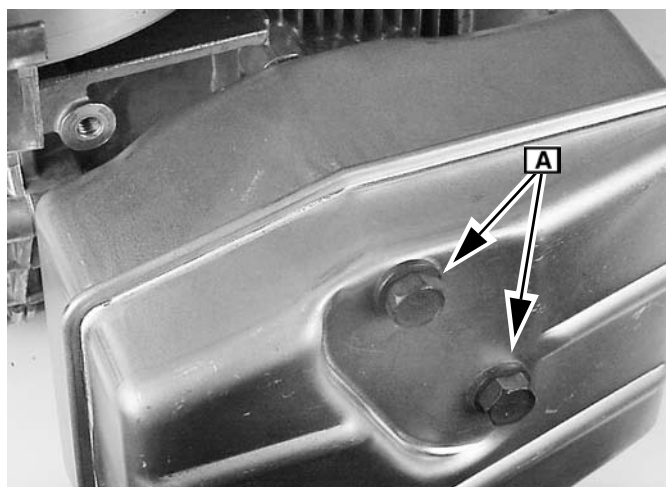


Fig. 23

2. Remove muffler and discard gasket.
3. Remove muffler re-enforcement plate (if installed).

REMOVE IGNITION MODULE

1. Remove the two bolts **A** that hold the ignition module to the head (Figure 24).

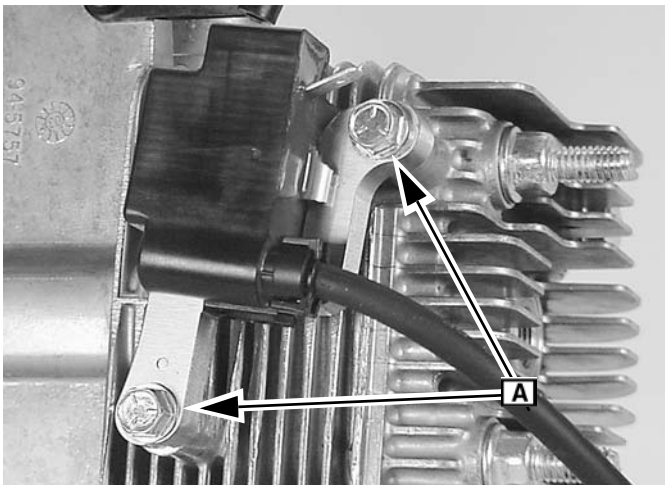


Fig. 24

5. Remove the connecting rod cap and the split bearing liner.

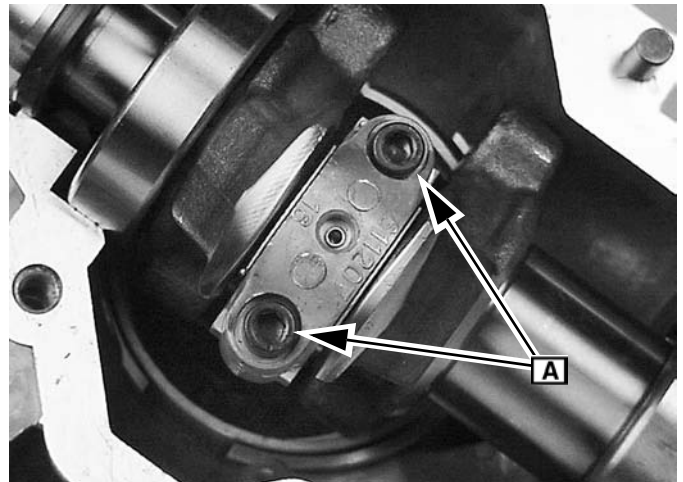


Fig. 26

The needle roller bearings are under the split bearing liner.

ENGINE DISASSEMBLY

1. Remove the six crankcase cap screws **A** (Figure 25).
2. Carefully separate the crankcase cover and cylinder using a screwdriver. Be careful not to damage the sealing surfaces.

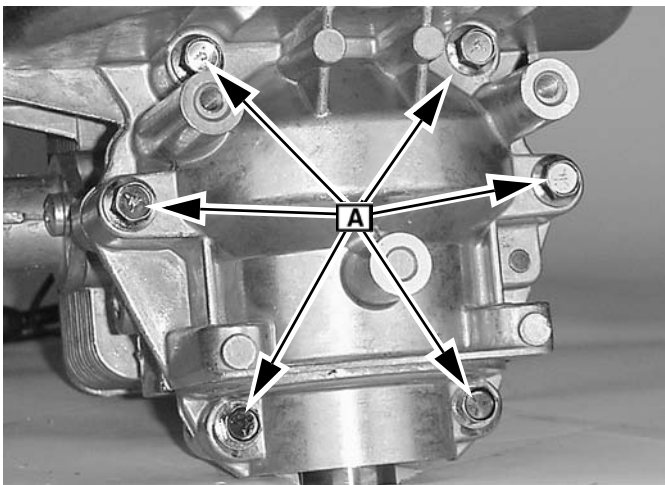


Fig. 25

3. Remove the entire crankshaft assembly and discard the oil seals.
4. Carefully remove the cap screws **A** (Figure 26).

N **NOTE:** Early engines do not have match marks on the connecting rod cap. If there are no marks, use a marker to index the cap to the connecting rod.

6. Remove the piston and rod assembly. Separate the assembly.
7. Use a snap ring pliers on the retaining rings and remove the wrist pin (Figure 27).

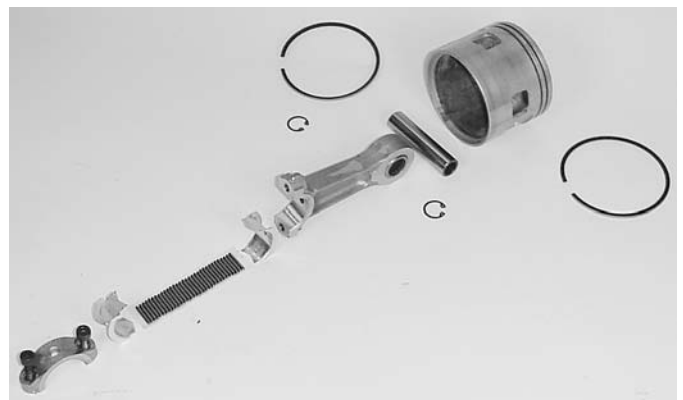


Fig. 27

8. Use ring expander (**#19340**) and remove rings from piston.

SECTION 4 ENGINE OVERHAUL

ENGINE INSPECTION & REPAIR

Flywheel and Key

1. Check the condition of the flywheel key and keyway **A** to ensure that is not partially sheared, galled or distorted (Figure 29).

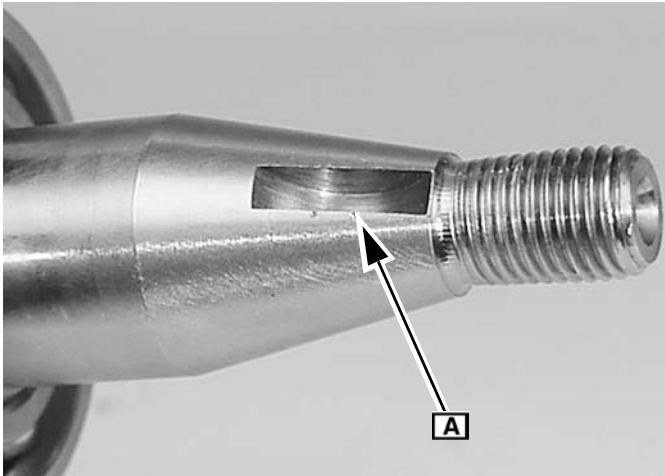


Fig. 29

2. Inspect the flywheel for cracks or damage. Replace as necessary (Figure 30).

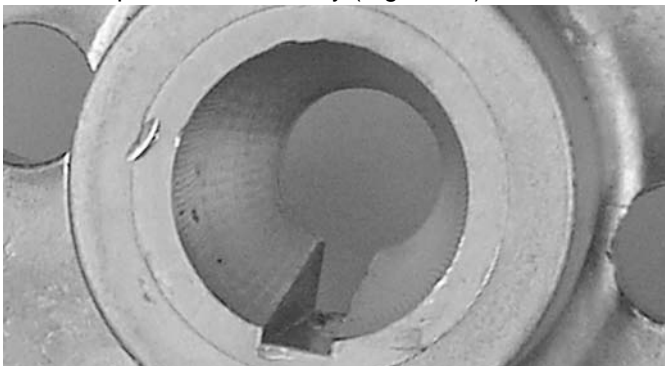


Fig. 30



NOTE: Replace crankshaft and/or flywheel if keyway is distorted or cracked in any way.

Bearings

1. Check ball bearings for wear and freedom of movement; replace if questionable.

Crankcase

1. Inspect the crankcase for cracks or any other indication of damage.
2. Clean crankcase surfaces with a commercial gasket remover (Figure 31).

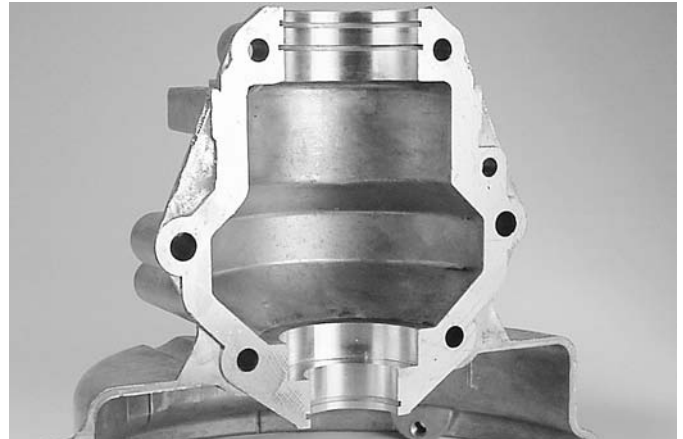


Fig. 31

Check Cylinder Bore

1. Check cylinder bore for wear using telescoping gauge (#19404) and dial caliper (#19199).
2. Measure cylinder bore at 6 right angle points as shown in figure 32. Replace cylinder if bore measures more than 2.5035 in. (63.58mm).

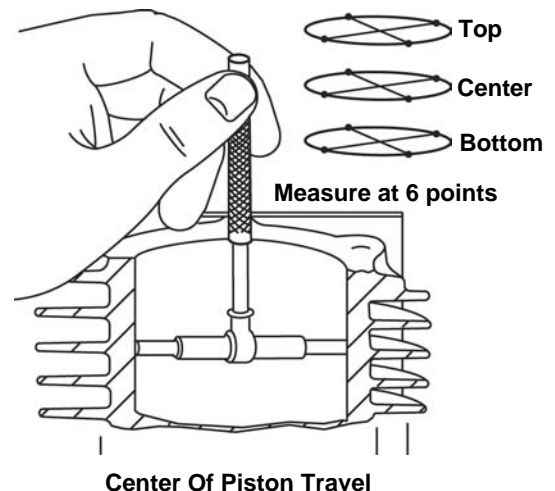


Fig. 32

Piston And Rings

1. Insert new rings into cylinder bore approximately 1" (25mm).
2. Use a feeler gauge to check ring end gap as shown in figure 33. Replace ring set if gap is more than .030 (0.76mm)

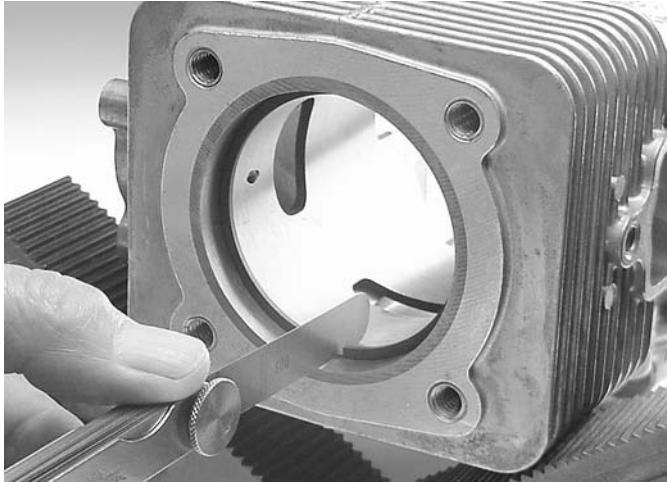


Fig. 33

3. Install new rings on piston using ring expander (#19340).
4. Check side clearance of ring grooves as shown in figure 34. Replace piston if clearance is more than .005 in. (0.12mm).



Fig. 34

5. Check piston for wear or damage. Replace if questionable.
6. Check piston pin bore (Figure 35) using dial caliper (#19199). Replace piston if bore is more than .501 in. (12.72mm).

7. Check piston diameter using a dial caliper (#19199). Replace piston if diameter is less than 2.4935 in. (63.33mm).

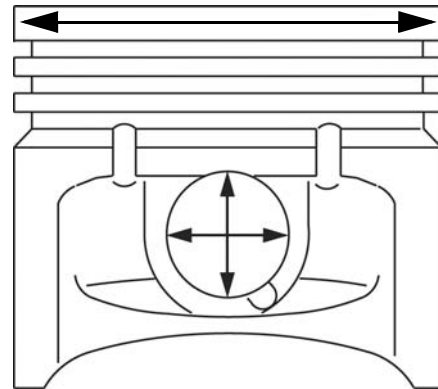


Fig. 35

Piston Pin (Wrist Pin) And Connecting Rod

1. Check piston pin in two directions as shown in figure 36. Replace pin if diameter is less than .4993 in. (12.68mm).

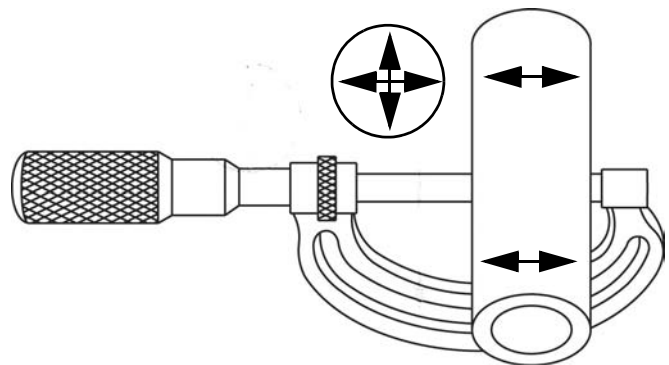


Fig. 36

2. Visually check crank pin bearing (Figure 37) for wear or damage. Replace connecting rod if piston pin bearings are loose or damaged.

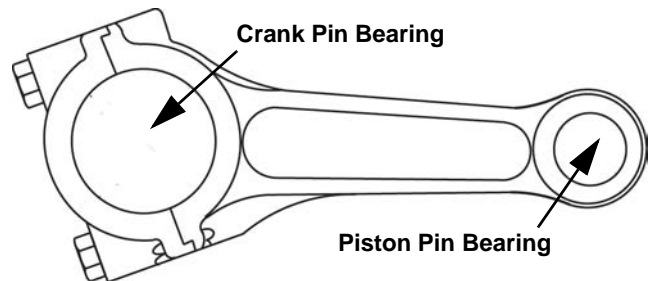


Fig. 37

CARBURETOR DISASSEMBLY



NOTE: The exterior of the carburetor should be cleaned before removal from the engine.

1. Using needle nose pliers, gently pull the throttle plate **A** out of the throttle shaft (Figure 38). Note the orientation of the small protrusions on the throttle plate as you pull it out.

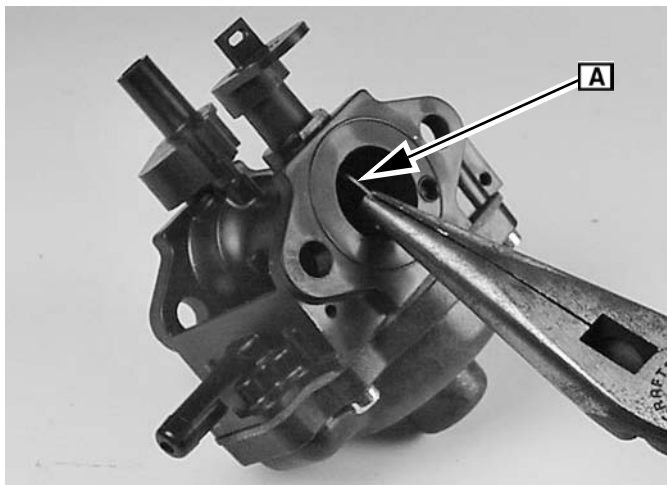


Fig. 38

2. Remove throttle shaft.
3. Set the choke lever to the full-open detent (Figure 39).

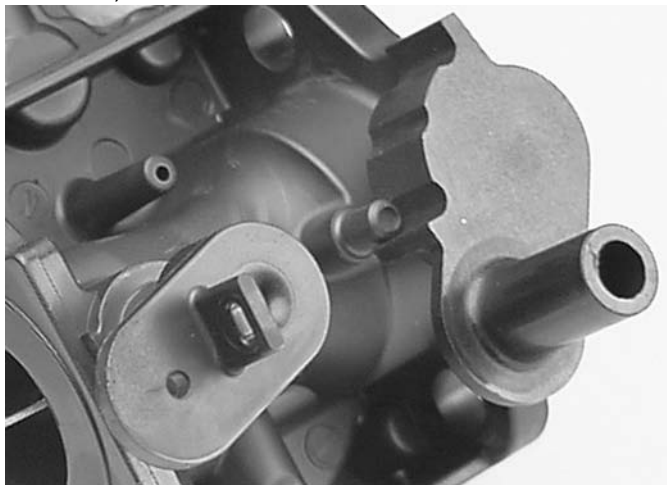


Fig. 39

4. Using needle nose pliers, gently pull the choke plate from the choke shaft (Figure 40). Note the orientation of the small protrusions on the choke plate as you pull it out.

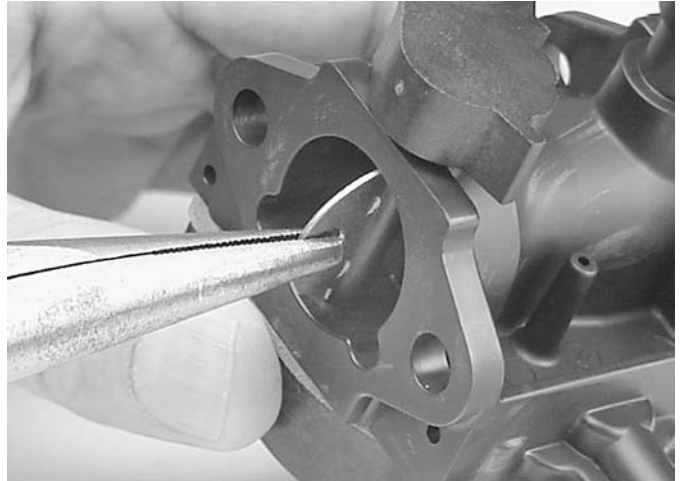


Fig. 40

5. Remove the four bowl retaining screws **A**, the bowl gasket **B**, and the bowl **C** (Figure 41). Discard the bowl gasket.

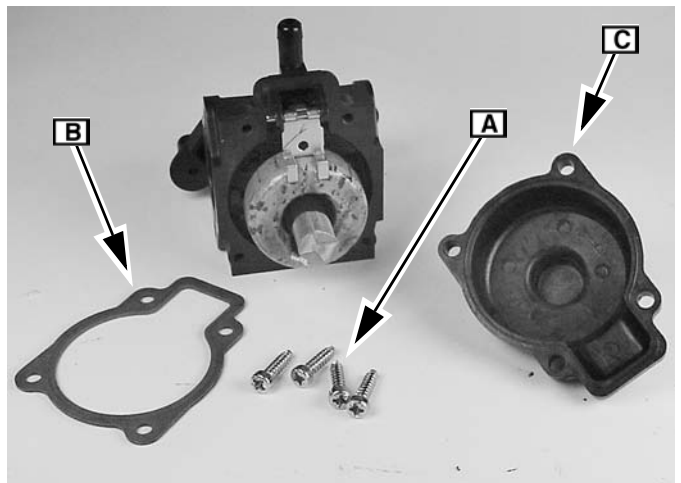


Fig. 41

6. Remove the decal on the side of the carburetor and unscrew the pilot jet **A** (Figure 42).

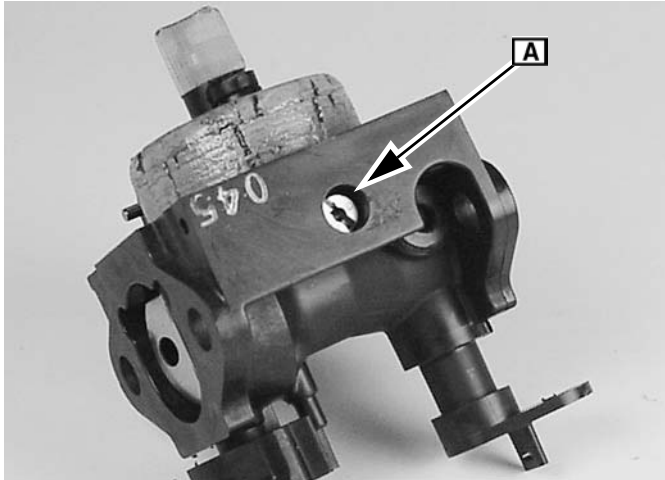


Fig. 42



NOTE: The threads have Loctite™ on them.

7. Remove the fuel filter screen from the fuel nozzle (Figure 43).

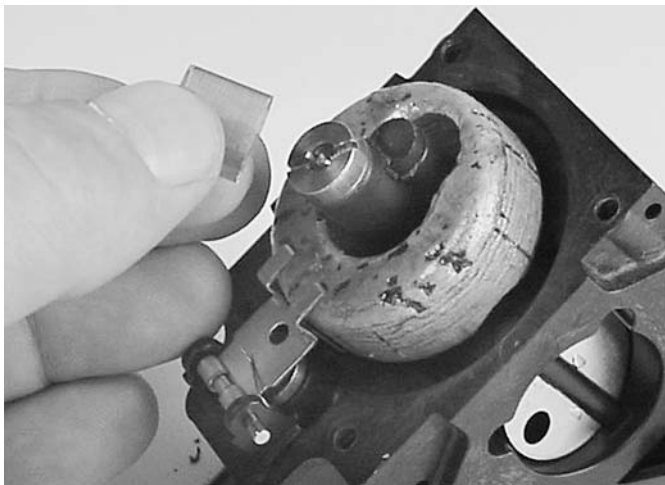


Fig. 43

8. Remove the float hinge pin **A**, the inlet valve needle assembly (with its clip) **B**, and the float **C** (Figure 44). Discard the needle and clip.

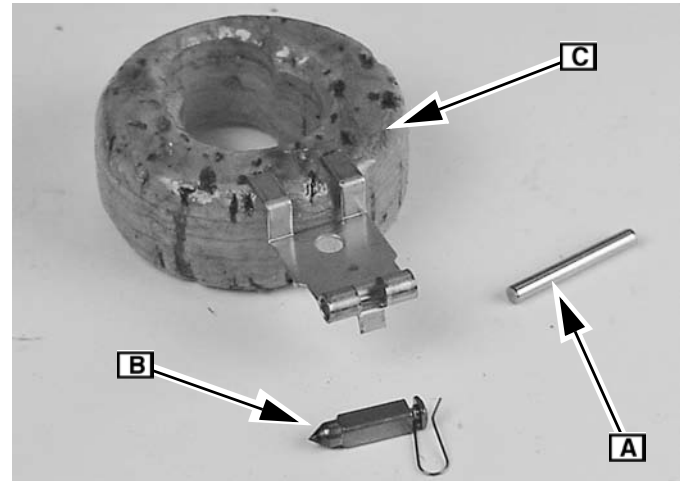


Fig. 44

9. Inspect the float for cracks or deterioration of the cork. Replace if necessary.
10. Remove the brass inlet seat **A** and discard (Figure 45).

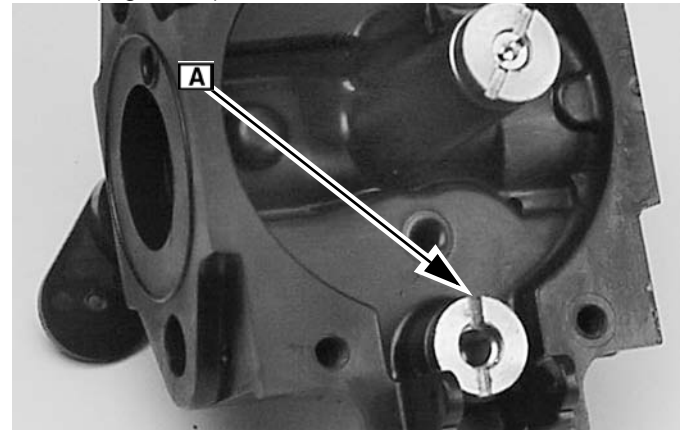


Fig. 45

Unscrew the high speed jet **A** from the nozzle **B** (Figure 46). Do not remove the nozzle **B** from the carburetor body.

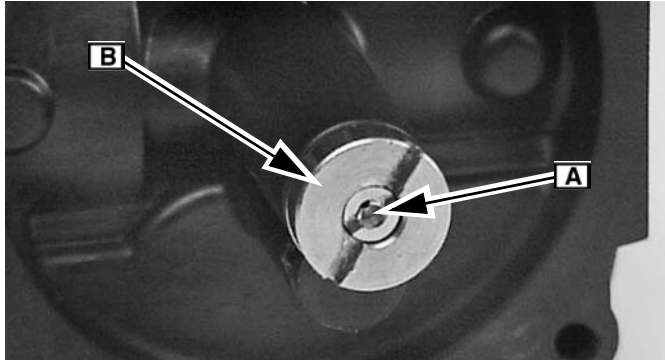


Fig. 46

CARBURETOR CLEANING & INSPECTION

1. With the carburetor completely disassembled, thoroughly clean all parts in a parts cleaning solution. Do not soak the carburetor. Leave it in the solvent only long enough to clean it.
2. Inspect all parts for wear or deterioration.
3. Using aerosol carburetor cleaner with the plastic hose, flush all passages.
4. Blow dry all carburetor passages with compressed air.
5. Ensure the carburetor mounting flange and the fuel bowl mounting flange are smooth and undamaged.

CARBURETOR ASSEMBLY

1. If the nozzle **B** has been removed, turn the carburetor over. Apply one drop of **Loctite 242™** blue or equivalent to the nozzle threads **C**, and

install the nozzle assembly into the carburetor body (Figure 47). Torque to **25 lb-in.**

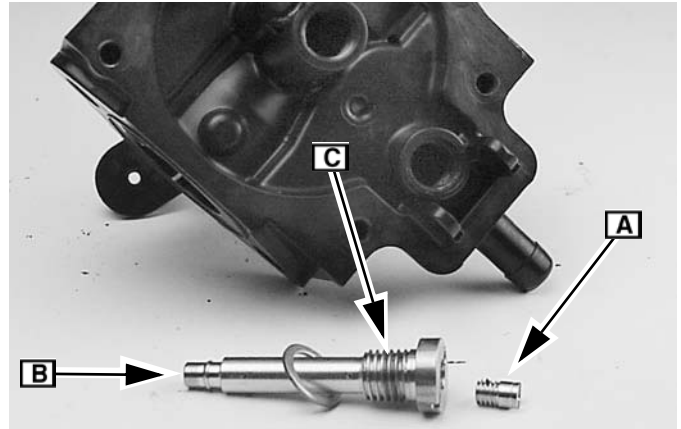


Fig. 47

2. Install the high speed jet **A** into the fuel nozzle. Torque to **5 lb-in.**
3. Apply one drop of **Loctite 242™** to the threads, and install the pilot jet **A** (Figure 48). Torque to **5 lb-in.**

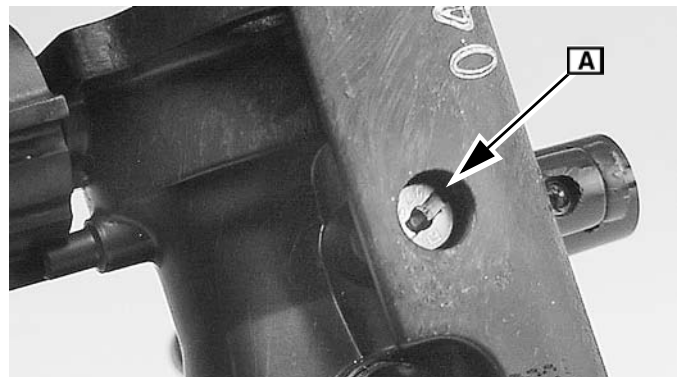


Fig. 48

4. Cut new decal (**#697778**) to size and cover pilot jet.

- Apply one drop of **Loctite 242™** or equivalent to the seat threads **A**, and install a new brass inlet seat (Figure 49). Torque to **25 lb-in.**

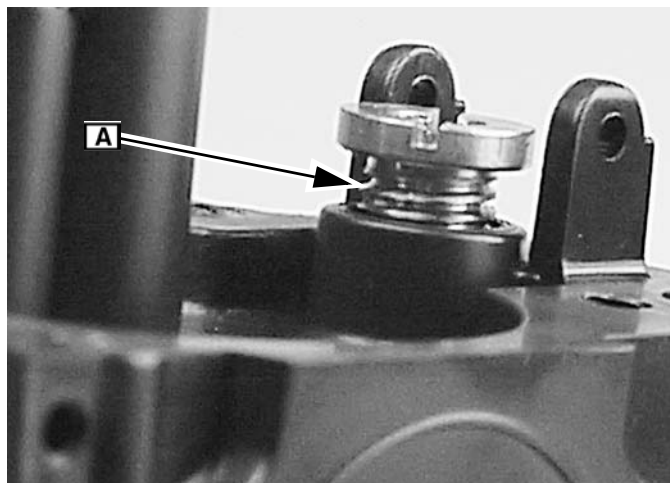


Fig. 49

- Install a new clip and needle valve on the float.
- Using a new float hinge pin, install the float assembly. Ensure the hinge pin is positioned properly to keep the float level. The float should be free to move up and down easily in the carburetor body.
- Adjust float by bending the hinge so height is **1/2 in. (12.7mm)** from bowl flange (without gasket) to top of float (Figure 50).

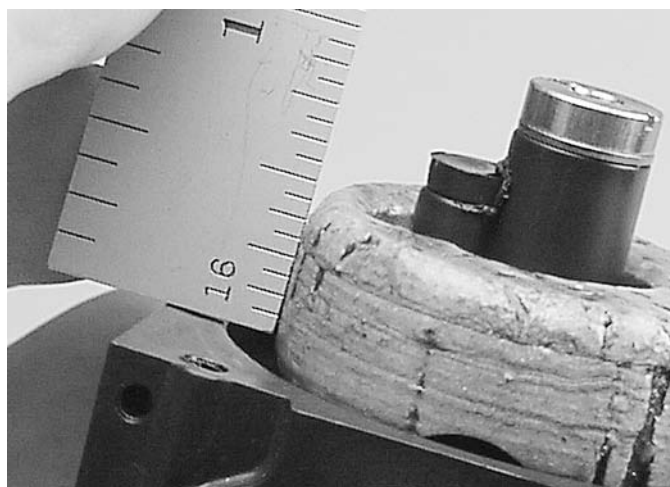


Fig. 50

- Pressure check inlet needle and seat. Attach pump (#19493) with pressure gauge to fuel inlet fitting on carburetor (Figure 51). With carburetor upside down, raise float and then lower to its

normal position. Apply pump pressure to **5 psi (34.5kp)**. Needle and seat should hold this pressure for 10 to 15 seconds (Figure 51). If it does not hold, wet the needle and seat with a drop of mineral spirits and repeat the test. If it still fails again, replace needle and seat.

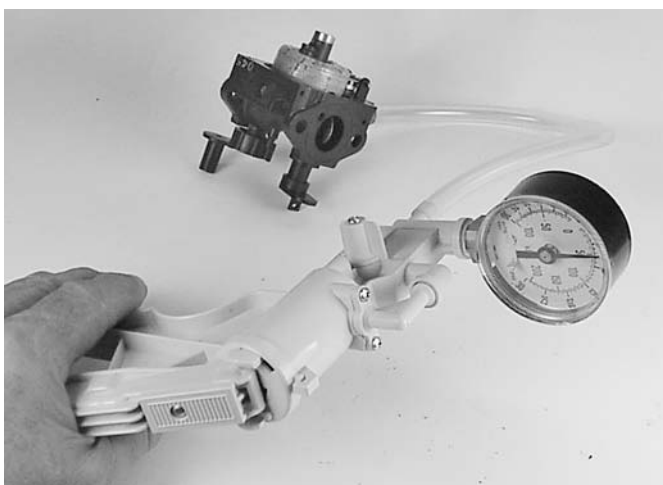


Fig. 51

- Install the fuel filter screen over the fuel nozzle (Figure 52).



Fig. 52

- Install a new fuel bowl gasket, the fuel bowl and the four bowl retaining screws. Tighten the screws evenly but do not strip the plastic.

12. Install the throttle shaft **A** into the carburetor body as shown (Figure 53).

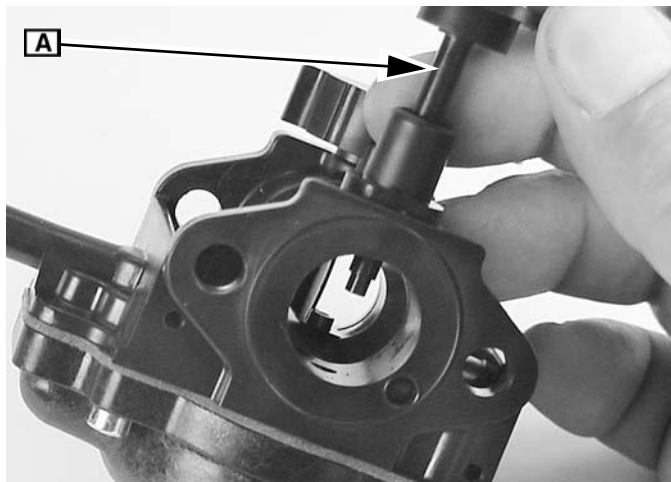


Fig. 53

13. Push the throttle plate **A** into the throttle shaft, following the orientation noted during disassembly. If the throttle plate does not fit snugly, replace the throttle shaft. Rotate throttle shaft to ensure plate **A** (Figure 54) does not stick or bind.

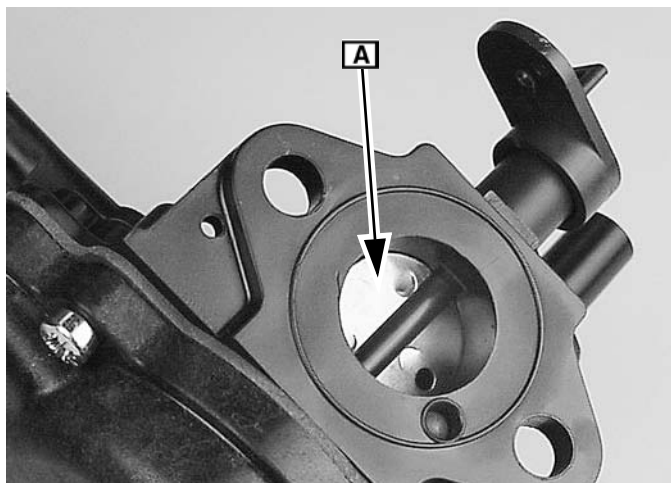


Fig. 54

14. Install the choke shaft into the carburetor body as shown in figure 55.

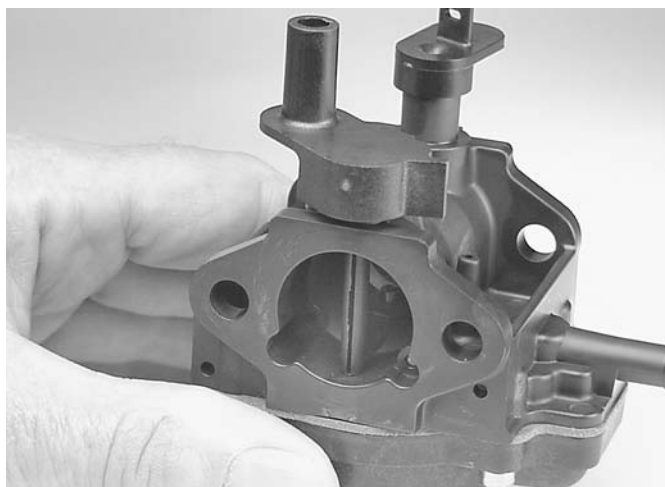


Fig. 55

15. Push the choke plate into the choke shaft following the orientation noted during disassembly. If the choke plate does not fit snugly, replace the choke shaft. Rotate the choke plate to ensure that it does not bind or stick (Figure 56).



Fig. 56

REWIND STARTER REPLACEMENT

Except for the rope, the rewind starter parts are not serviceable. If damage or wear occurs, the complete assembly must be replaced using the hardware included with the new rewind starter.

1. Mark the orientation of the pull-handle on the shroud.
2. Remove shroud (see page 9).
3. Drill out the rivets securing the rewind starter to the shroud.
4. Install the new rewind starter with the hardware provided and mount the nuts on top.

Rope Replacement

1. Remove shroud from engine (see page 9).
2. Ensure rope is 84 inches in length.
3. Rotate rewind pulley counterclockwise -6 revolutions and align hole in pulley with hole in housing.
4. Insert rope as shown in figure 57 and tie a knot.

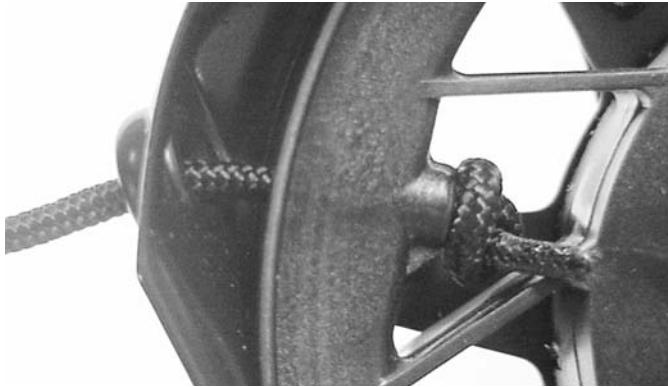


Fig. 57

5. Tie a temporary knot in the excess rope to prevent it from retracting.

6. Install starter handle **A** as shown in figure 58.

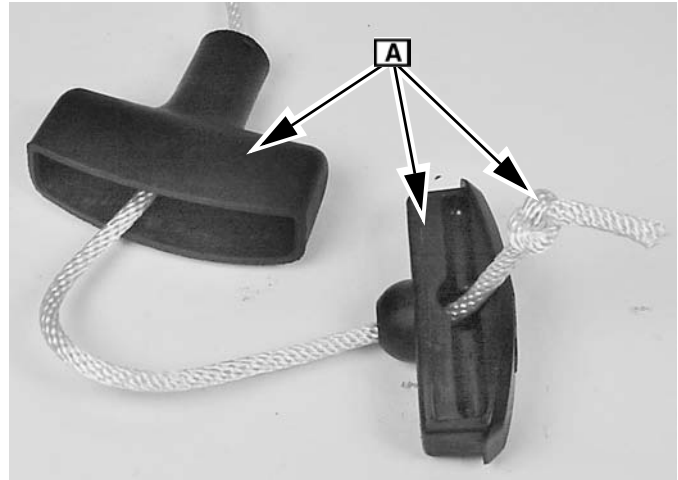


Fig. 58

7. Re-install shroud to engine.
8. Remove temporary knot and allow rope to retract.

(OPTIONAL) ELECTRIC STARTER REPLACEMENT

1. Remove the two bolts that secure the electric starter to the engine.
2. Remove switch from equipment.
3. Install new starter with the existing hardware and mount switch to equipment.

SECTION 5 ENGINE ASSEMBLY

ASSEMBLE PISTON AND CONNECTING ROD

Lubricate piston pin with 2 cycle engine oil.

1. Install one piston pin retainer.
2. Insert piston pin through opposite side of piston, through connecting rod until pin contacts pin retainer.
3. Install other piston pin retainer (**A** Figure 59).

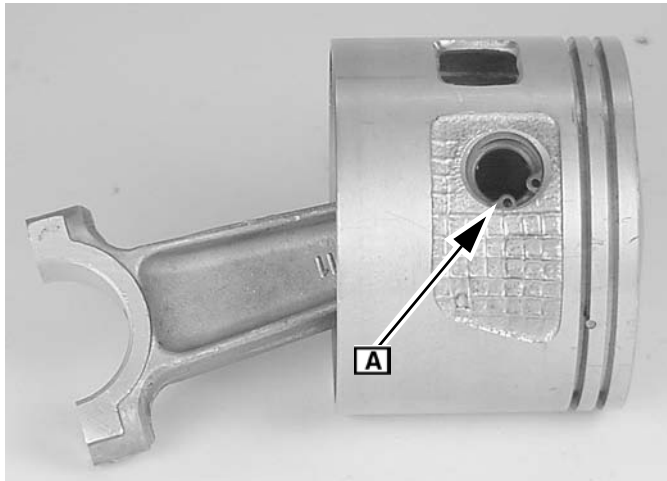


Fig. 59

INSTALL PISTON RINGS

Always use a ring expander when installing piston rings. Briggs & Stratton 2 cycle engines have two different style piston and piston ring configurations depending on the engine model (Figures 60 and 61). The piston and rings are NOT interchangeable.

Install piston rings to piston according to the engine model as shown.

Engine Model 84130 & 84230

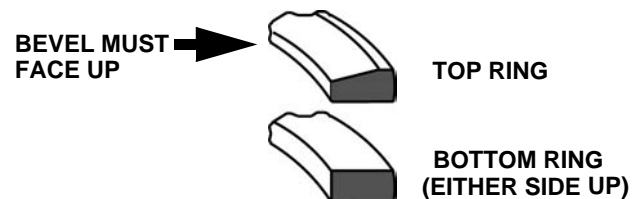


Fig. 60

Engine Model 84330

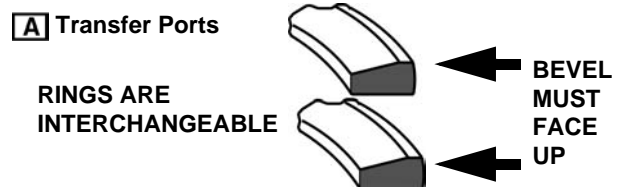


Fig. 61

1. Lubricate piston and rings with engine oil.
2. Align ring gaps with retainers **A** in ring grooves (Figure 62).

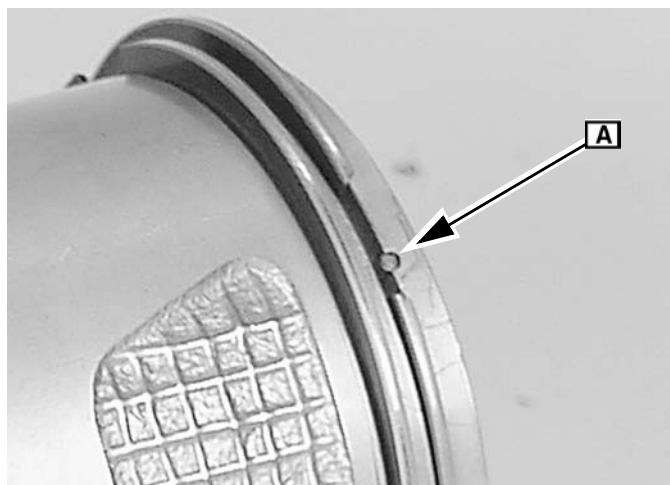


Fig. 62

INSTALL PISTON AND CONNECTING ROD

The piston is marked internally or externally with the letters PTO **A**, and is meant to be installed only one way.

When installing piston and connecting rod assembly, PTO must face the PTO side of the engine. If this is not done, the piston rings may catch in the transfer ports during operation, breaking the rings and damaging piston and cylinder wall (Figure 63).

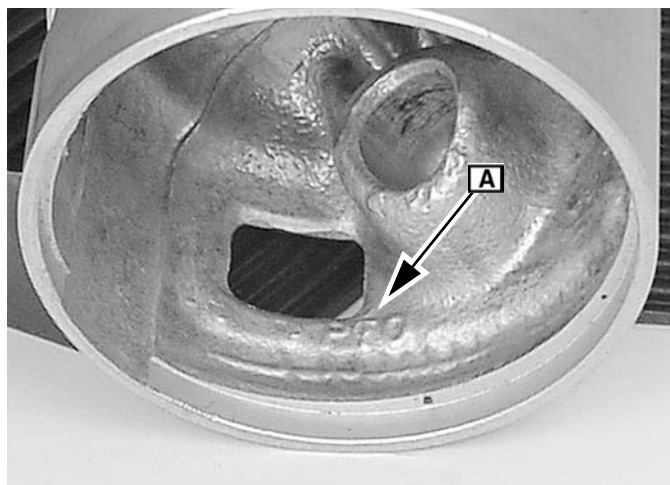


Fig. 63



NOTE: On engine models 84230 and 84330 the transfer ports in the piston skirt must align with the “finger ports” (these correspond with the transfer ports in the piston) in the cylinder bore.

1. Oil piston rings and piston skirt, and compress rings with ring compressor Tool #19070.
 - a. Place piston and ring compressor upside down on bench with projections on compressor facing up.
 - b. Tighten ring compressor evenly until rings are fully compressed.
 - c. Then loosen ring compressor very slightly so that compressor can be rotated on piston skirt while holding connecting rod.



NOTE: A pencil or ink mark **A** placed on the side of the piston skirt or top of the piston will help ensure correct piston orientation when installing piston and connecting rod assembly (Figure 64).

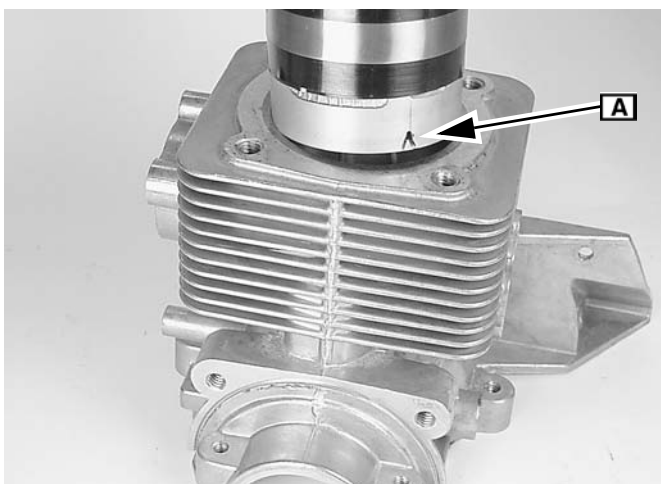


Fig. 64

2. Lubricate cylinder bore and install piston and connecting rod assembly making sure that mark on piston faces PTO side of engine (Figure 65).



Fig. 65

INSTALL CONNECTING ROD BEARINGS

The connecting rod and rod cap liners have a pierced locating tab **A** that must be inserted in locating hole in rod and rod cap. Make sure liners are fully seated in rod and rod cap.

Assemble connecting rod liner to rod making sure that "V" in liner will align with corresponding notch in rod cap liner (Figure 66).

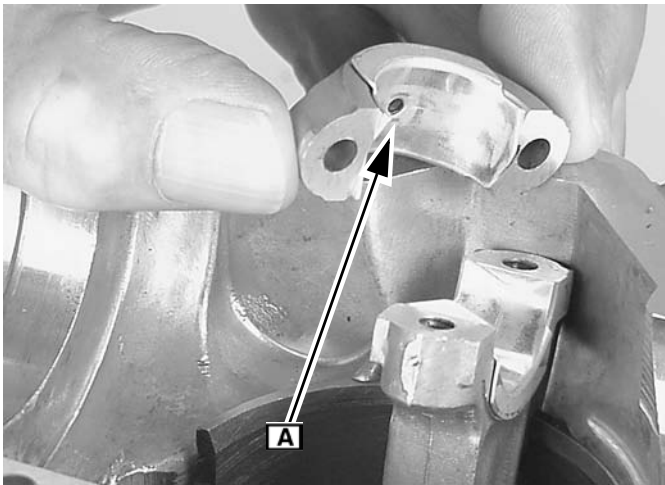


Fig. 66

If a new needle bearing set (32 needles) is being installed, the set will come on strip of paper and the needles will be coated with wax on one side. Remove

the paper and wrap needles around the crank pin with the wax towards the crankpin. Wax will hold needles in place until connecting rod is installed.

When reusing needles place a coating of grease on the rod and rod cap liners and install 16 needles to each side of the bearing liners (Figure 67).



Fig. 67

INSTALL CRANKSHAFT AND CONNECTING ROD

1. Place crankshaft into cylinder making sure that ball bearings are seated in their respective positions.
2. Hold crankshaft down and carefully pull connecting rod up until rod bearing is seated on crankpin. Make sure needles remain in position.
3. Assemble rod cap to connecting rod making sure that "V" in bearing cap liner is aligned with notch in connecting rod liner. Make sure needles remain in position.

- Torque rod screws to **70 lb-in. (8.0 Nm)** (Figure 68).

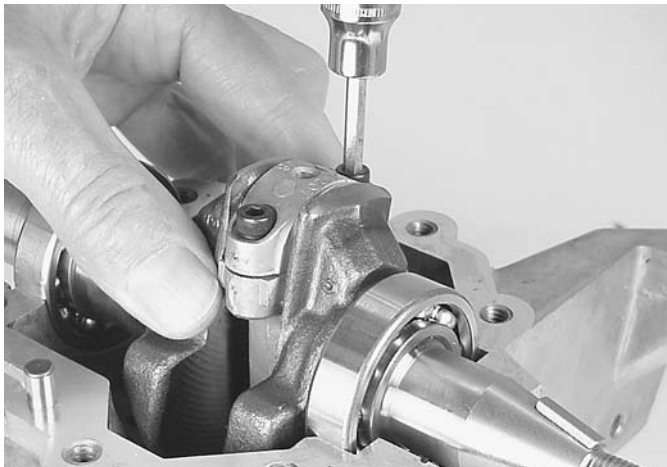


Fig. 68

- Make sure that MAG side ball bearing is seated against bearing surface **A** in cylinder (Figure 69).

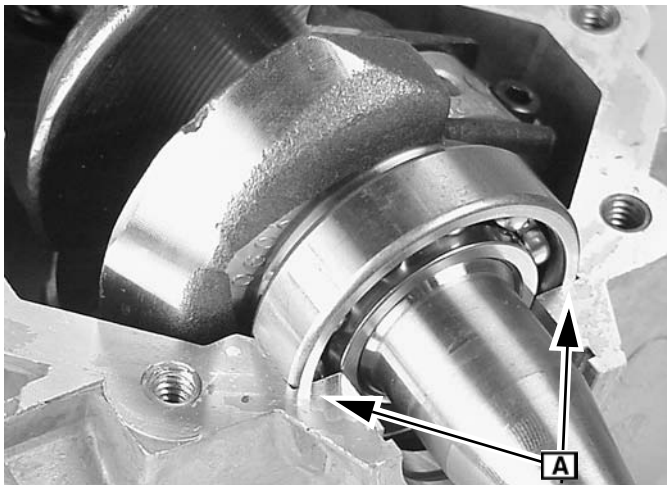


Fig. 69

- Install snap ring into groove behind PTO ball bearing. Push down on snap ring so that it is seated in its groove (Figure 70).



Fig. 70

INSTALL OIL SEALS



NOTE: Do not lubricate the seals. Install them dry.

- Slide seals over crankshaft and position them so that they are centered over the grooves in the cylinder crankcase **A** (Figure 71). Make sure seals are not crooked or tilted in any way.

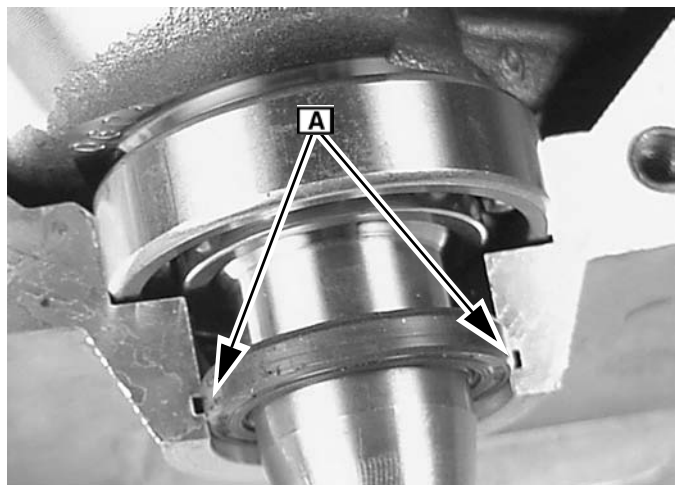


Fig. 71

INSTALL CRANKCASE COVER



NOTE: The crankcase halves are a matched assembly and cannot be interchanged between engines.

A crankcase sealant must be used when assembling the crankcase halves. See list of appropriate sealants. Mounting surfaces must be free of oil or grease before applying sealant.

Manufacturer	Sealant	Mfg. Part#
LOCTITE®	515 Gasket Eliminator	#51531
Permatex®	Silicone Form-A-Gasket	6 BR
GE	RTV Silmate	RTV-1473
Duro	Silicone Gasket	SGC-1

1. Apply a thin film of crankcase sealant to either half of crankcase.
2. Do not get sealant in screw holes or main bearing bore areas.
3. Assemble crankcase cover to crankcase.



NOTE: Install short screws **D** and **F** on PTO side.

4. Torque screws in **25 lb-in. (3 Nm) increments** in letter sequence shown to **75 lb-in. (8 Nm)**, figure 72.

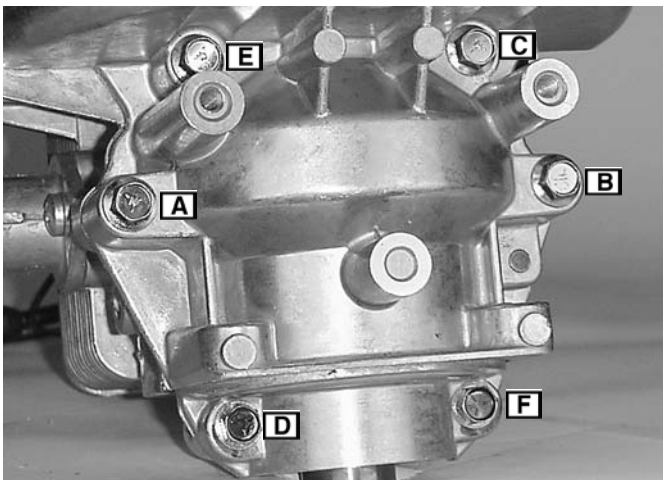


Fig. 72

INSTALL CYLINDER HEAD

1. Install cylinder head with new gasket (Figure 73). Ensure studed head bolts face MAG side of engine.
2. Torque head bolts to **180 lb-in. (20.0 Nm)**.

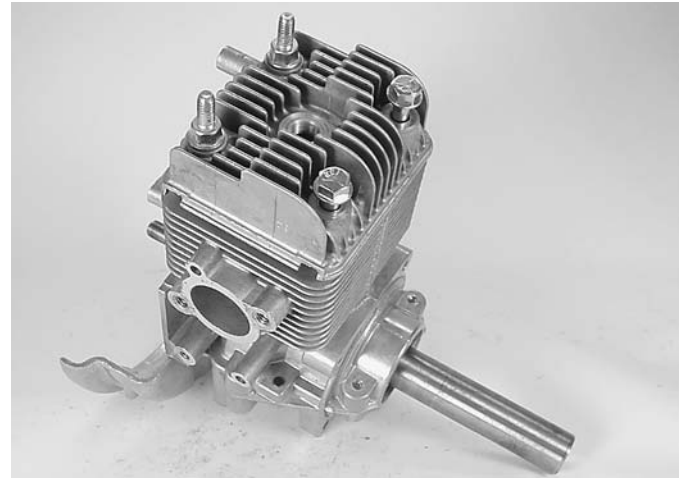


Fig. 73

INSTALL IGNITION COIL AND FLYWHEEL

Assemble flywheel key to crankshaft so that key is parallel to crankshaft threads (Figure 74).

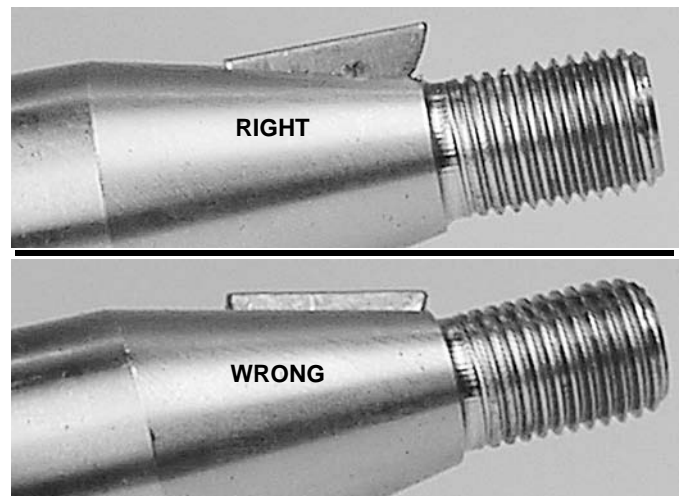


Fig. 74

1. Install flywheel, starter cup, washer and nut. Make sure the tab in starter cup engages the hole in the flywheel.
2. Hold flywheel with Tool #19433.

3. Torque flywheel nut to **33 lb-ft. (44.7 Nm)**.
4. Rotate flywheel so that magnet is away from coil mounting area.
5. Install ignition coil and push ignition coil towards cylinder head as far as it will go then temporarily tighten one screw.
6. Rotate flywheel until magnet is under coil laminations.
7. Place thickness gauge **A** .010" (0.25mm) between magnet and coil laminations (Figure 75).

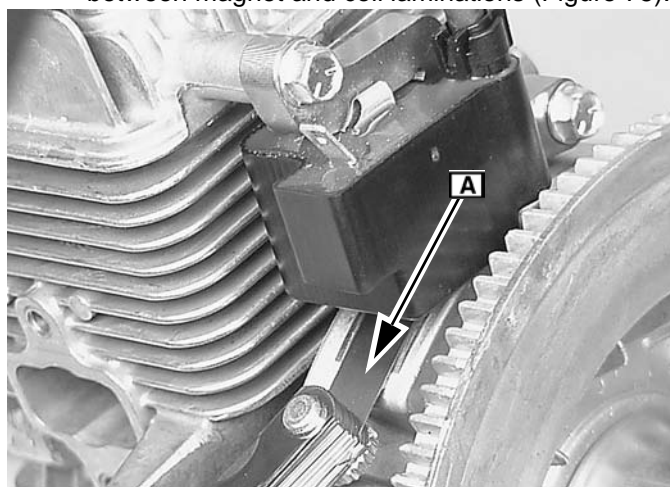


Fig. 75

8. Loosen mounting screw so magnet will pull ignition coil down against thickness gauge. Torque screws to **90 lb-in. (10.0 Nm)**.
9. Rotate flywheel to remove thickness gauge.
10. Install ground wire assembly to ignition coil. Route wire between cylinder head fins as shown (Figure 76).

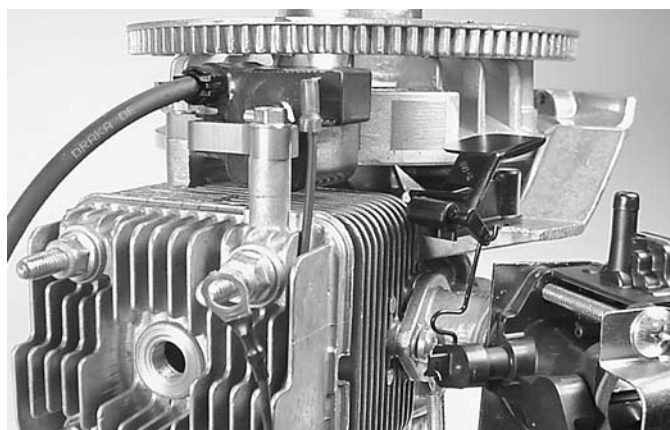


Fig. 76

INSTALL AIR VANE AND GOVERNOR

1. Install air vane governor bracket to cylinder (Figure 77).
 - a. Torque screw **A** to **30 lb-in. (3.0 Nm)**.

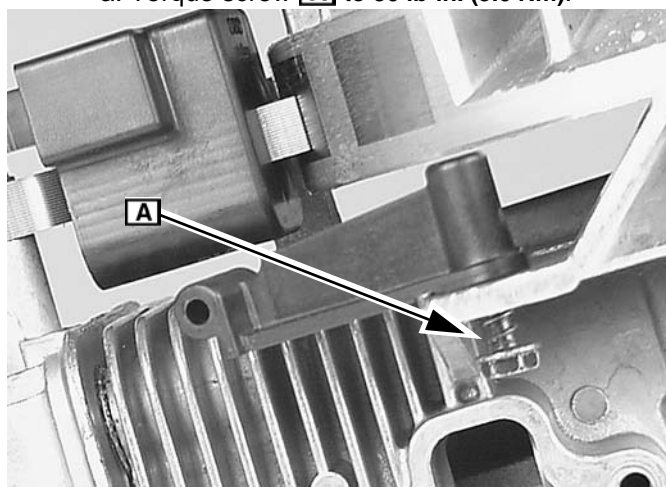


Fig. 77

2. Assemble governor link to lever on air vane from the back side as shown (**A** Figure 78).
3. Insert air vane into boss in governor bracket until retainer snaps over boss on governor bracket. Check that air vane pivots freely.

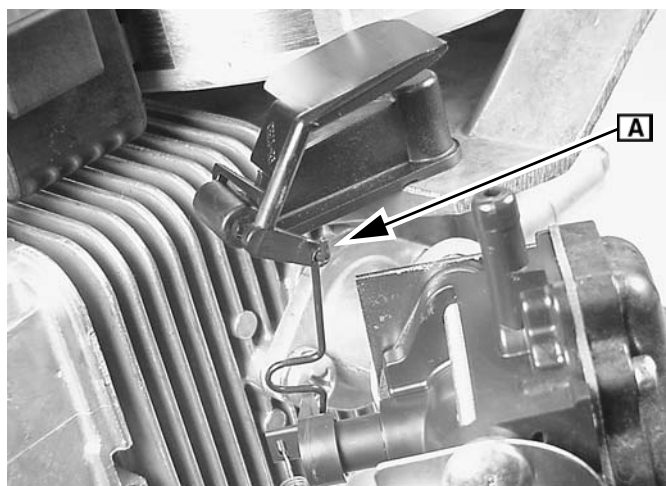


Fig. 78

INSTALL INTAKE MANIFOLD AND CARBURETOR

1. Install intake manifold with new gasket (Figure 79). Torque screws to **60 lb-in. (7.0 Nm)**.
2. Assemble carburetor mounting nuts to manifold and install rubber band retainer (later models have tapped holes instead of nuts).

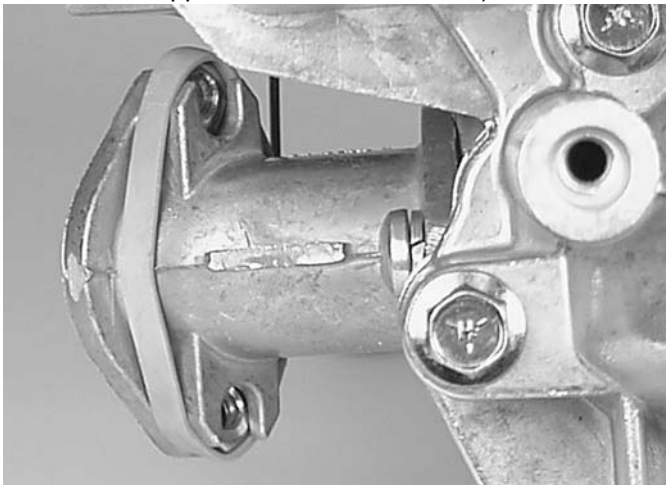


Fig. 79

3. Assemble deflector and governor spring bracket to carburetor with new gaskets.

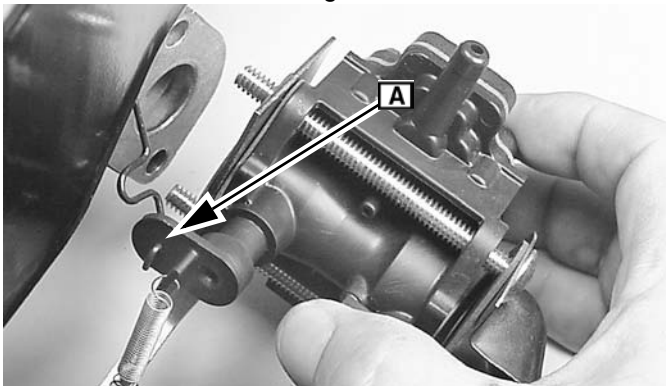


Fig. 80

4. Insert governor link through back side of throttle lever as shown (**A** Figure 80).
5. Install carburetor. Torque screws to **25 lb-in. (2.8 Nm)**.
6. Install governor spring (**A** Figure 81).



NOTE: Open ends of governor spring must face out.

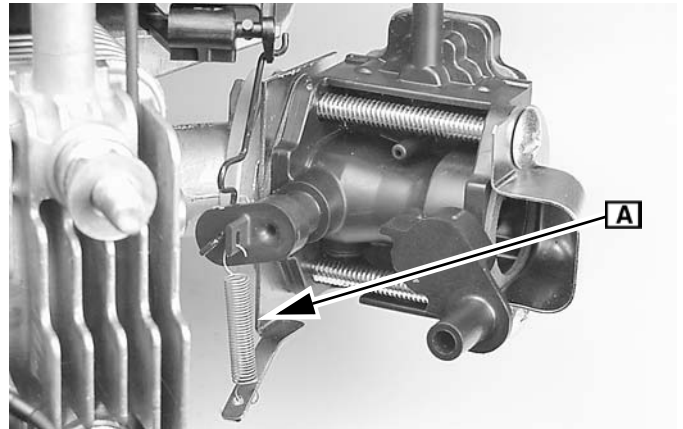


Fig. 81

CHECK GOVERNOR OPERATION

The governor link may require adjustment, particularly if a new governor link, governor spring bracket or air vane and bracket have been installed.

1. With linkage and governor spring installed, check the distance between the edge of the air vane and cylinder casting as shown (**A** Figure 82).
 - a. Distance should be approximately 1-1/4" (32 mm).
 - b. Adjust the length of the governor link at U-shaped bend (**B**) to achieve this dimension.



NOTE: Air vane and governor link must move freely. Air vane must NOT contact ignition coil.

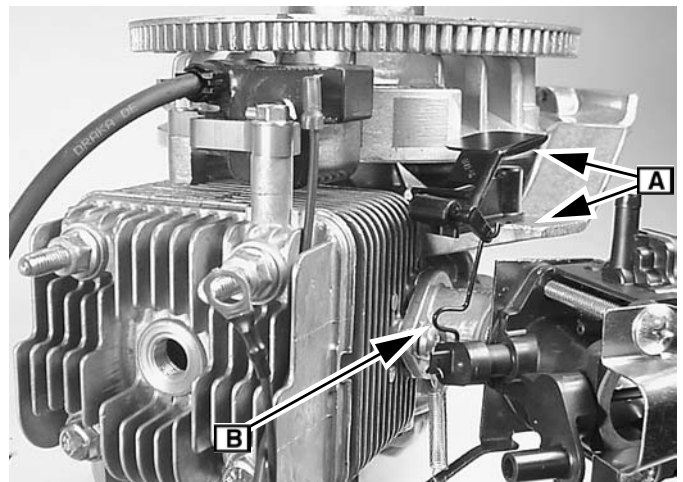


Fig. 82

INSTALL MUFFLER

1. Install muffler with new gasket (Figure 83).
 - a. Torque screws to **80 lb-in. (9.0 Nm)**.



Fig. 83

INSTALL BLOWER HOUSING

1. Assemble a flat washer to each cylinder head bolt stud (Figure 84).
2. Make sure ground wire is routed between outer cylinder head fins.

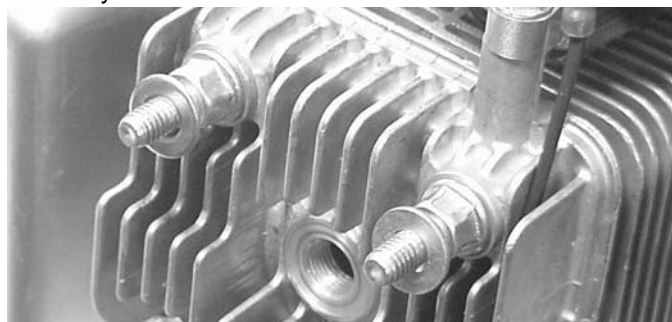


Fig. 84

3. Assemble blower housing to engine.

4. Assemble ground wire, flat washers and locknuts (Figure 85).



Fig. 85

5. Install front blower housing screws (Figure 86).

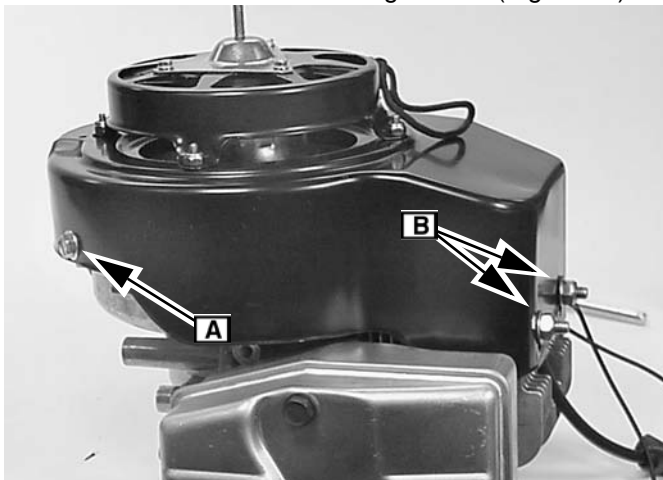


Fig. 86

6. Torque screws **A** to **80 lb-in. (9.0 Nm)**.
7. Torque locknuts **B** to **150 lb-in. (17.0 Nm)**.



SPECIFICATIONS

Fastener Specifications

DESCRIPTION	WRENCH/SOCKET SIZE	TORQUE
ARMATURE	3/8"	90 LB-IN. (10.0 NM)
AIR VANE BRACKET	5/16"	30 LB-IN. (2.8 NM)
BLOWER HOUSING (SCREWS)	3/8"	80 LB-IN. (9.0 NM)
BLOWER HOUSING (NUTS)	1/2"	150 LB-IN. (17.0 NM)
CARBURETOR (TO MANIFOLD)	PHILLIPS	25 LB-IN. (2.8 NM)
CARBURETOR:		
INLET SEAT		25 LB-IN. (2.8 NM)
MAIN JET		5 LB-IN. (0.5 NM)
NOZZLE		25 LB-IN. (2.5 NM)
PILOT JET		5 LB-IN. (0.5 NM)
CONNECTING ROD	5/16"	70 LB-IN. (8.0 NM)
CYLINDER TO CRANKCASE	3/8"	80 LB-IN. (9.0 NM)
FLYWHEEL	11/16"	33 LB-FT. (44.7 NM)
HEAD BOLTS	1/2"	180 LB-IN. (20.0 NM)
INTAKE MANIFOLD (TO CYL.)	PHILLIPS	60 LB-IN. (7.0 NM)
MUFFLER	1/2"	80 LB-IN. (9.0 NM)
REWIND STARTER	5/16"	20 LB-IN. (2.0 NM)
SPARK PLUGS	13/16" DEEP	180 LB-IN. (20.0 NM)
STARTER MOTOR	3/8"	100 LB-IN. (11.0 NM)
ENGINE MOUNTING		
CRANKCASE TO BRACKET	1/2"	180 LB-IN. (20.0 NM)
REWIND TO BRACKET	7/16"	100 LB-IN. (11.0 NM)

COMMON SPECIFICATIONS

Model Series: 84000

BORE	STROKE	DISPLACEMENT
2.500" (63.50 MM)	1.750" (44.45 MM)	8.6 CU. IN. (141CC)
ARMATURE AIR GAP	.010" (0.25 MM)	
CRANKSHAFT END PLAY	.001"-.017" (0.03 -0.43MM)	
SPARK PLUG GAP	.030" (0.76 MM)	
GOVERNED TOP SPEED:		
MODEL - TYPE		
84133 - 0196-E1	3800 RPM	
84132 - 0120-E1	3800 RPM	
84232 - 0121-E1	4000 RPM	
84233 - 0198-E1	4000 RPM	
84332 - 0130-E1	4000 RPM	
84333 -0197-E1	4000 RPM	
84333 - 0199-E1	4000 RPM	
OIL MIX RATIO	50: 1	



STANDARD AND REJECT DIMENSIONS

DESCRIPTION	STANDARD DIMENSION	REJECT DIMENSION
CYLINDER BORE	2.4995" - 2.5005" (63.48 - 63.51MM)	2.5035" (63.58MM)
OUT OF ROUND		.002" (0.05MM)
MAIN BEARING (MAGNETO & PTO)	BALL	
CYLINDER HEAD		
SURFACE FLATNESS	.0005 - .003" (0.01 - 0.07MM)	.007" (0.18MM)
CRANKSHAFT		
CRANKPIN	.7425" - .743" (18.86 - 18.87MM)	.7415" (18.83MM)
MAGNETO JOURNAL	BALL	
PTO JOURNAL	BALL	
CONNECTING ROD		
CRANKPIN BEARING	LOOSE ROLLER BEARINGS	
PISTON PIN BEARING	CAGED ROLLER BEARINGS	
PISTON		
PISTON (THRUST SIDE)	2.4955" - 2.4975" (63.38 - 63.43MM)	2.4935" (63.33MM)
PISTON PIN	.4998" - .500" (12.69 - 12.70MM)	.4993" (12.68MM)
PISTON PIN BEARING (PISTON)	.500" - .5005" (12.70 - 12.71MM)	.501" (12.72MM)
PISTON RING		
RING END GAP - (BOTH)	.008" - .016" (0.20 - 0.40MM)	.030" (0.76MM)
RING SIDE CLEARANCE (BOTH)	.0015" - .003" (0.04 - 0.08MM)	.005" (0.12MM)



NOTES

A large grid of dotted lines for taking notes, consisting of approximately 20 columns and 30 rows.