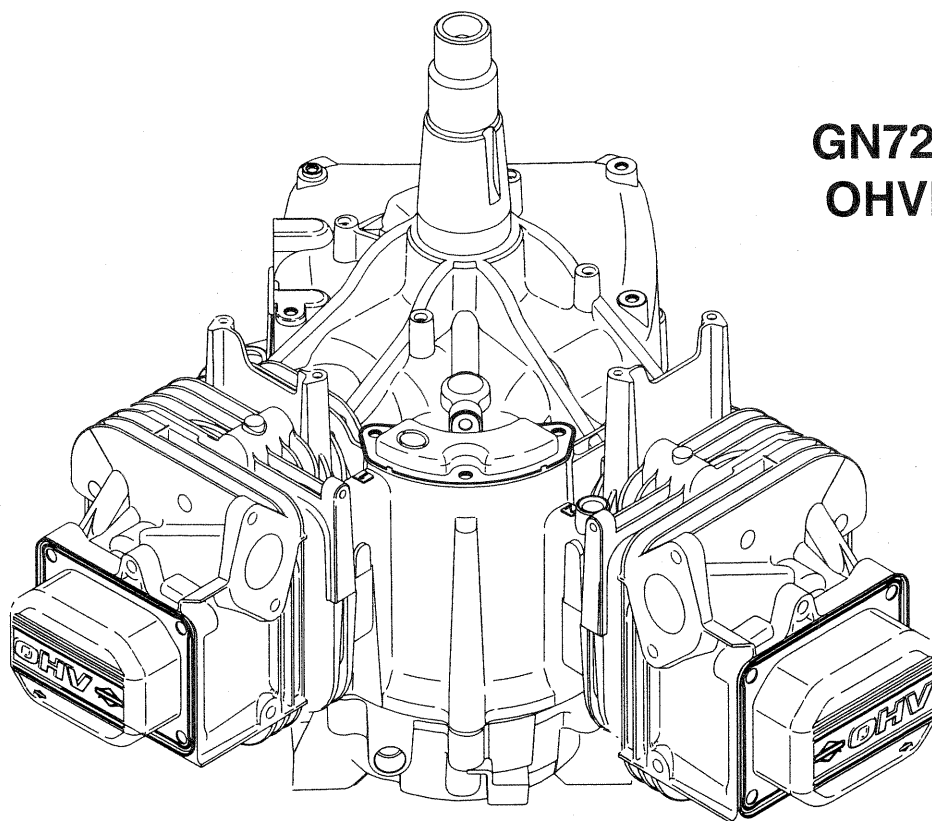


SERVICE MANUAL



**GN724 V-TWIN
OHV ENGINE**

GENERAC®
POWER SYSTEMS, INC.

P.O. Box 297 • Whitewater, WI • 53190

Phone: (262) 473-5514

Fax: (262) 472-6505

FOREWORD

This manual has been written and published by GENERAC® POWER SYSTEMS, INC. to aid our dealers' mechanics, company service personnel and general consumers when servicing the products described herein.

It is assumed that these personnel are familiar with the servicing procedures for these products, or like or similar products, manufactured and marketed by GENERAC® POWER SYSTEMS, INC. It is also assumed that they have been trained in the recommended servicing procedures for these products, which includes the use of mechanics hand tools and any special tools that might be required.

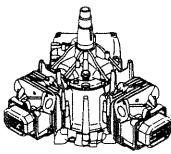
Proper service and repair is important to the safe, economical and reliable operation of the products described herein. The troubleshooting, testing, service and repair procedures recommended by GENERAC® POWER SYSTEMS, INC. and described in this manual are effective methods of performing such operations. Some of these operations or procedures may require the use of specialized equipment. Such equipment should be used when and as recommended.

We could not possibly know of and advise the service trade of all conceivable procedures or methods by which a service might be performed, nor of any possible hazards and/or results of each procedure or method. We have not undertaken any such wide evaluation. Therefore, anyone who uses a procedure or method not recommended by the manufacturer must first satisfy himself that neither his safety, nor the product's safety, will be endangered by the service or operating procedure selected.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication. However, GENERAC® POWER SYSTEMS, INC. reserves the right to change, alter or otherwise improve the product at any time without prior notice.

Some components or assemblies of the product described in this manual may not be considered repairable. Disassembly, repair and reassembly of such components may not be included in this manual.

The engines described herein may be used to power a wide variety of products. Service and repair instructions relating to any such products are not covered in this manual. For information pertaining to use of these engines with other products, refer to any owner's or service manuals pertaining to said products.



4-CYCLE ENGINE THEORY	4
SECTION 1: GENERAL INFORMATION	5
SECTION 2: IGNITION	10
SECTION 3: GOVERNOR	14
SECTION 4: CYLINDER HEAD AND VALVES	18
SECTION 5: ELECTRIC STARTERS	24
SECTION 6: LUBRICATION SYSTEM	30
SECTION 7: ENGINE DISASSEMBLY	35
SECTION 8: CYLINDER AND CRANKCASE INSPECTION AND REPAIR	37
SECTION 9: CRANKSHAFT AND CAMSHAFT	41
SECTION 10: PISTON, RINGS AND CONNECTING ROD INSPECTION AND ASSEMBLY	42
SECTION 11: ENGINE ASSEMBLY	45

A WORD ABOUT SPECIAL TOOLS

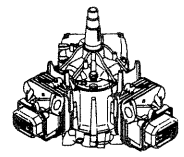
Many of the procedures depicted in this manual require the use of special tools. Some of the tools required are available as Generac parts and are listed as such in this manual. Other tools are listed only as Briggs & Stratton parts and must be acquired through a Briggs & Stratton source of supply.

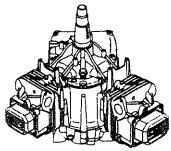
Portions of this manual have been reprinted from Briggs & Stratton P/N 273521-4/98 "Repair Manual For Intek™ V-twin Cylinder OHV Engines" with permission from Briggs & Stratton.

All rights are reserved

ATTENTION!

Generac Power Systems does not approve or authorize the use of these engines on All Terrain Vehicles (ATV's), go-carts, motorbikes, aircraft products, personal watercraft, 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.





If you don't understand any portion of this manual, contact an authorized Generac service dealer.

Throughout this publication, DANGER, WARNING and CAUTION blocks are used to alert you to special instruction about a particular operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully.

These safety warnings cannot eliminate the hazards that they indicate. Strict compliance with the special instructions while performing the service plus "common sense" are major measures to prevent accidents.

The following definitions apply to DANGER, WARNING, CAUTION and NOTE blocks found throughout the manual.



DANGER: After this heading you can read handling, installing, operating or servicing instructions that, if not strictly complied with, will result in personal injury.

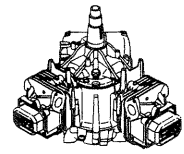


WARNING: After this heading you can read handling, installing, operating or servicing instructions that, if not strictly complied with, may result in personal injury.



CAUTION: After this heading you can read instructions for handling, installing, operating or servicing the engine that, if not strictly complied with, may result in damage to equipment and/or property.

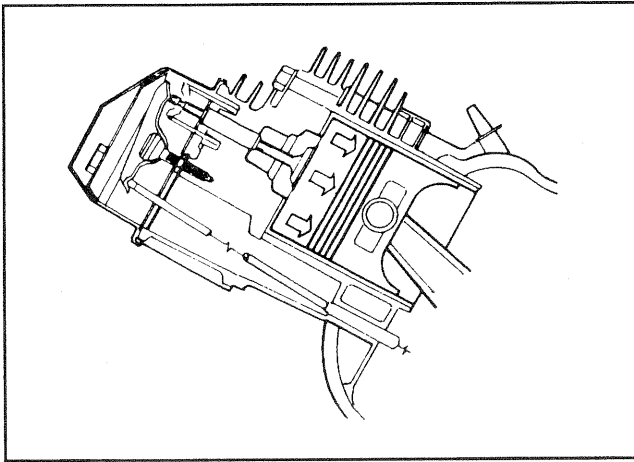
NOTE: After this heading you can read explanatory statements that require special emphasis.



If the engine is to run properly, four (4) events must occur in the proper sequence and at the correct time. These events are (a) intake, (b) compression, (c) ignition and power, and (d) exhaust.

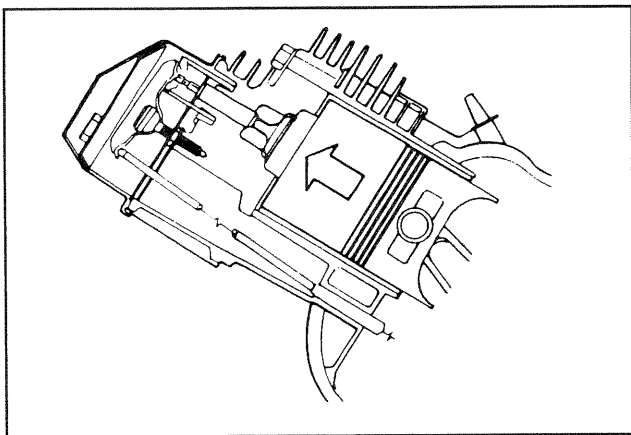
A INTAKE

The piston is travelling from top dead center (TDC) to bottom dead center (BDC). The cam has opened the intake valve. The piston's downward movement in the cylinder creates a partial vacuum in the cylinder. Air at atmospheric pressure is drawn into the cylinder through the carburetor and is mixed with fuel in the carburetor. The fuel-air mixture flows through the open intake valve into the cylinder. When the piston reaches BDC, the intake stroke is over.



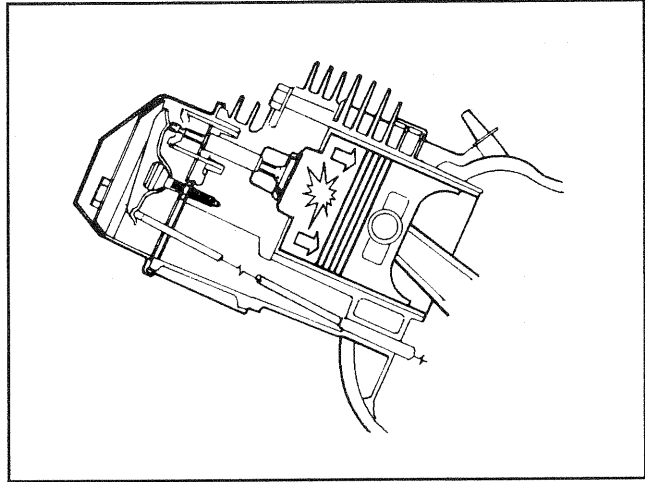
B COMPRESSION

As the piston reaches bottom dead center (BDC), both the intake and exhaust valves are closed. The piston moves upward toward TDC and the fuel-air mixture is compressed. Just before the piston reaches TDC, ignition occurs.



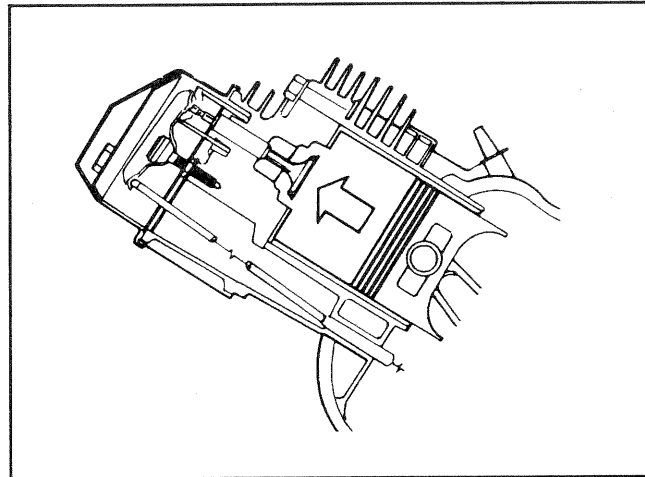
C IGNITION AND POWER

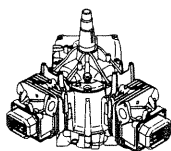
By the time the piston reaches TDC, combustion is already in progress. The intake and exhaust valves remain closed as the expanding gases of combustion force the piston downward.



D EXHAUST

The exhaust stroke begins when the piston has reached BDC and has started its upward movement. The intake valve is closed. The exhaust valve is open to let gases escape.





Purpose and Scope of Manual

This manual contains all information normally required to service or repair the Model GN-724 V-twin engine. Applicable procedures are carefully explained and illustrated.

For exploded views and listings of engine parts, refer to the Owner's Manual for the specific device on which the engine is used.

When ordering parts, always include the model and serial number of the engine. **Be sure to insist on genuine Generac repair parts.**

Systematic Check

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

1. Ignition
2. Fuel
3. 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. The basic check-up procedure is the same for all engine models, while any variation, by model, will be shown under the subject heading.

Check Ignition

If spark does not occur look for -

- Two closed diodes in ground wire harness
- Incorrect armature air gap
- Armature failure
- Shorted wire #18

Check Ignition (Engine Running)

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 a spark tester (Generac P/N 0C5969) between the spark plug lead and each spark plug, Fig. 6. A spark miss will be readily apparent when the engine is running. If spark is good but engine misses, check for a fouled spark plug.

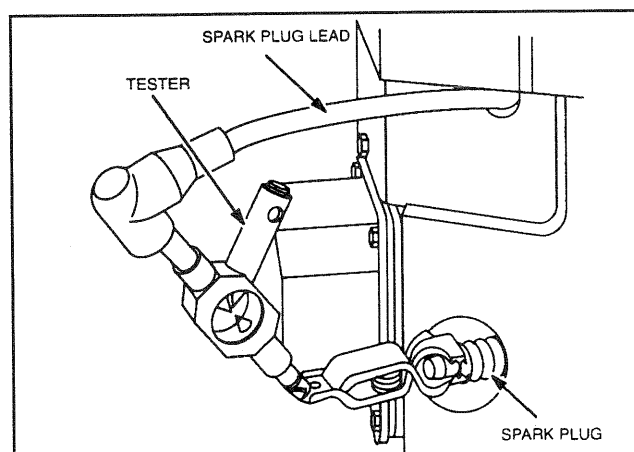


Fig. 6 - Running Check

Check Ignition (Fouled Plug or Other Causes)

To check for a fouled spark plug or a non-functioning cylinder, attach the spark tester (Generac P/N 0C5969) between the spark plug lead and each spark plug. Start and run engine at top no load speed. Now ground one spark plug, Fig. 7. The engine should continue to run on the other cylinder. Repeat this test with the other cylinder. If the engine will not continue to run when making this test, the cylinder that is NOT grounded is not functioning and/or the spark plug is fouled. Install a new spark plug before proceeding. If miss continues, problem may be carburetion or compression. See Check Carburetion, Check Compression. Also see Cylinder Balance Test.

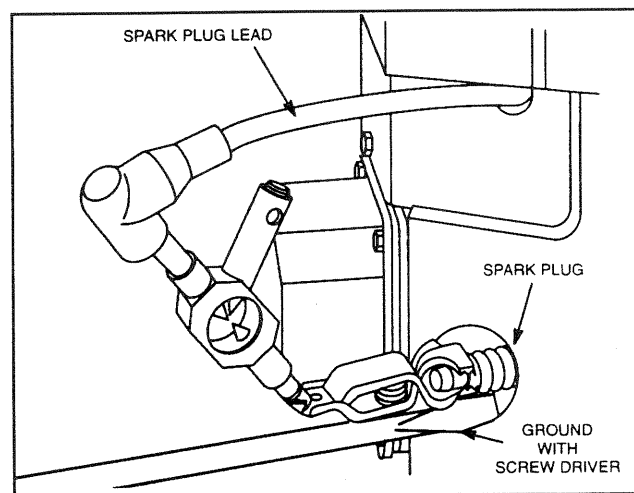
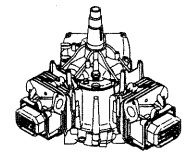


Fig. 7 - Checking For Fouled Plugs



Tools Required:

1. Two Ignition Testers (Generac P/N 0C5969)
2. Screwdriver with insulated handle

Attach an ignition tester between the spark plug lead and each spark plug, Fig. 8.

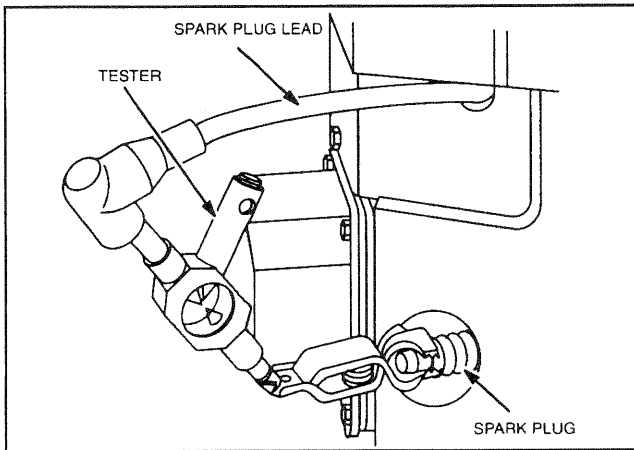


Fig. 8

Start and run engine running at top no load speed and note spark at ignition testers. If the spark is equal at both ignition testers, the problem is not ignition related. A spark miss will be readily apparent. Now note RPM of engine. Ground out one cylinder with screwdriver by contacting alligator clip on ignition tester and a good ground on engine, Fig. 9. Note RPM loss. Then ground out the other spark plug and note the RPM loss. If the difference between the two cylinders does not exceed 75 RPM, the amount of work the two cylinders are doing should be considered equal.

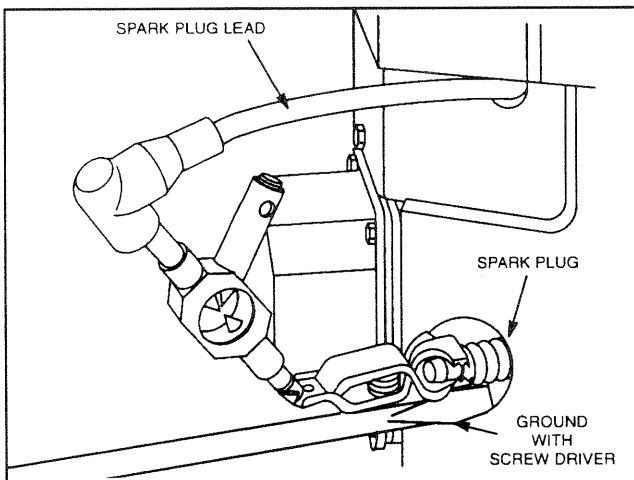


Fig. 9 — Cylinder Balance Test

Check Fuel

The fuel pressure can be checked using a pressure tester kit (Generac P/N 0C7977). This kit comes with an informative "How To" video.

Check Compression

It has been determined through testing, a simple and accurate indication of compression can be made as follows:

Remove both spark plugs and insert a compression gauge into either cylinder (one cylinder at a time). Turn engine over with engine starter until there is no further increase in pressure. Record this reading. Repeat procedure on other cylinder and record that reading. The difference between both cylinders should not exceed 25%. More than 25% indicates loss of compression in the cylinder with lower pressure. See example.

EXAMPLE:

	Cyl. #1	Cyl. #2	Diff.	% Diff.
Eng. #1	65 PSI	60 PSI	5 PSI	7.6%
Eng. #2	75 PSI	55 PSI	20 PSI	26.7%

If compression is poor, look for:

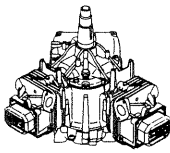
- Loose cylinder head bolts
- Blown head gasket
- Burned valves, valve seats and/or loose valve seats
- Insufficient valve clearance
- Warped cylinder head
- Warped valve stems
- Worn bore and/or rings
- Broken connecting rods

Cylinder Leakdown Test

A cylinder leakdown tester may be used to test the sealing capability of the compression components of each cylinder and quickly identify the problem component.

Cylinder Balance Test

If the engine is hard starting, runs rough, misses or lacks power, perform a cylinder balance test to determine whether both cylinders are operating to their full potential.



Things Which Affect Both Cylinders

1. Carburetion
2. Crankcase vacuum
3. Ignition timing
 - a. A partially sheared flywheel key will effect ignition timing and engine performance.

If the RPM loss is greater than 75 RPM this indicates that the cylinder with the least RPM loss is the weakest of the two cylinders. Look to that cylinder for a problem.

Example.

Engine RPM - Both Cylinders = 3400 RPM

Engine RPM - #1 Cylinder Grounded = 3300 RPM

Engine RPM - #2 Cylinder Grounded = 3100 RPM

Conclusion: #1 cylinder is weakest of the two cylinders.

Things Which Affect One Cylinder

1. Spark plug
 - a. A fouled spark plug may indicate that carburetor is out of adjustment.
2. Leak in spark plug wire
3. Head gasket
4. Intake manifold
 - a. A leak at either end of the intake manifold will only affect one cylinder, not both.
5. Valves
6. Rings
7. Piston
8. Cylinder

The cylinder balance test will also detect a cylinder that is not functioning. When grounding out one cylinder there will be no RPM loss. When the other cylinder is grounded out the engine will stop.

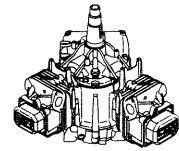
NOTE: A twin cylinder engine will run well on one cylinder as long as the power required for the application does not exceed the power produced by the one cylinder.

Equipment Affecting Engine Operation

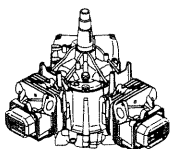
Frequently, what appears to be a problem with engine operation, such as hard starting, vibration, etc., may be the fault of the equipment powered rather than the engine itself. Listed are the most common effects of equipment problems, and what to look for as the most common cause.

Hard Starting, or Will Not Start

1. Loose belt - a loose belt like a loose blade can cause a backlash effect, which will counteract engine cranking effort.
2. Starting under load - see if the unit is disengaged when engine is started; or if engaged, should not have a heavy starting load.



FASTENER SPECIFICATIONS		
Description	Wrench/Socket Size	Torque
Back Plate (to cylinder)	3/8"	100 in. lbs. (11.2 Nm)
Blower Housing	3/8"	80 in. lbs. (9.0 Nm)
Carburetor (to manifold)	E-5	65 in. lbs. (7.4 Nm)
Connecting Rod	5/16"	100 in. lbs. (11.2 Nm)
Cylinder Shield	3/8"	80 in. lbs. (9.0 Nm)
	5/16"	45 in. lbs. (5.0 Nm)
Exhaust Manifold	1/2"	140 in. lbs. (16.0 Nm)
Fan Retainer	1/2"	140 in. lbs. (16.0 Nm)
Flywheel	1-1/4"	150 ft. lbs. (203.0 Nm)
Governor Control Bracket	3/8"	80 in. lbs. (9.0 Nm)
Governor Nut	7/16"	130 in. lbs. (14.6 Nm)
Head Bolts	1/2"	220 in. lbs. (25.0 Nm)
Intake Air Horn	7/16"	45 in. lbs. (5.0 Nm)
Intake Manifold (to cyl. head)	3/8" (T-30)	80 in. lbs. (9.0 Nm)
Oil Drain Plug	3/8" Square Drive (internal)	125 in. lbs. (14.0 Nm)
Oil Pump Cover	T-30	50 in. lbs. (5.6 Nm)
Rocker Arm	8 mm	100 in. lbs. (11.2 Nm)
Rocker Arm Lock Nut	13 mm	60 in. lbs. (6.6 Nm)
Rocker Arm Adjustment Screw	T-40	
Rotating Screen	5/16"	20 in. lbs. (2.2 Nm)
Spark Plugs	5/8" mm Deep	180 in. lbs. (20.0 Nm)
Starter Motor	1/2" (T-40)	140 in. lbs. (15.8 Nm)
Starter Thru Bolts	5/16"	50 in. lbs. (5.6 Nm)
Sump	1/2"	200 in. lbs. (22.6 Nm)
Valley Cover	5/16"	45 in. lbs. (5.0 Nm)
Valve Cover	3/8"	100 in. lbs. (11.2 Nm)



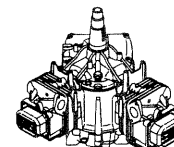
SPECIFICATIONS MODEL GN724

Bore: 2.970" (75.44 mm)
 Stroke: 2.890" (73.40 mm)
 Displacement: 40.0 cu. in. (656 cc)

Armature Air Gap008" - .012" (0.20 - 0.30 mm)
 Crankshaft End Play002" - .030" (0.05 - 0.76 mm)
 Spark Plug Gap030" (0.76 mm)
 Valve Clearance (Cold) - Int. - Exh.004" - .006" (0.10 - 0.15 mm)

Standard and Reject Dimensions

Description	Standard Dimension	Reject Dimension
Cylinder		
Bore	2.969" - 2.970" (75.41 - 75.44 mm)	2.973" (75.51 mm)
Out of round:	.0015" (0.04 mm)	
Main Bearing (Magnet)	1.379" - 1.3805" (35.02 - 35.06 mm)	1.383" (35.12 mm)
Cam Bearing (Magnet)	.6255" - .626" (15.88 - 15.90 mm)	.6275" (15.93 mm)
Cylinder Head		
Valve Guide	.2374" - .2383" (6.03 - 6.05 mm)	.240" (6.09 mm)
Valve Stem	.2345" - .235" (5.97 - 5.98 mm)	.233" (5.92 mm)
Sump		
Main Bearing (PTO)	1.6268" - 1.6275" (41.32 - 41.34 mm)	1.629" (41.37 mm)
Cam Bearing (PTO)	.6255" - .626" (15.88 - 15.90 mm)	.6275" (15.93 mm)
Crankshaft		
Crankpin	1.4982" - 1.499" (38.05 - 38.07 mm)	1.4965" (38.01 mm)
Magnet Journal	1.3776" - 1.3784" (34.99 - 35.01 mm)	1.376" (34.95 mm)
PTO Journal	1.6241" - 1.6249" (41.25 - 41.27 mm)	1.623" (41.22 mm)
Cam Shaft		
Journals	.624" - .625" (15.85 - 15.87 mm)	.623" (15.82 mm)
Lobes		
Intake	1.228" - 1.231" (31.19 - 31.26 mm)	1.225" (31.15 mm)
Exhaust	1.226" - 1.229" (31.14 - 31.21 mm)	1.223" (31.06 mm)
Connecting Rod		
Crankpin Bearing	1.500" - 1.5006" (38.10 - 38.11 mm)	1.5015" (38.13 mm)
Piston Pin Bearing	.6727" - .673" (17.08 - 17.09 mm)	.6745" (17.13 mm)
Piston Pin	.6721" - .6726" (17.07 - 17.08 mm)	.6718" (17.06 mm)
Piston Pin Bearing (Piston)	.673" - .6735" (17.09 - 17.10 mm)	.6745" (17.13 mm)
Piston Ring		
Ring End Gap -Top	.005" - .013" (0.13 - 0.33 mm)	.030" (0.76 mm)
Center	.014" - .022" (0.35 - 0.56 mm)	.030" (0.76 mm)
Oil	.005" - .017" (0.13 - 0.43 mm)	.030" (0.76 mm)
Ring Side Clearance (All)	.002" - .003" (0.05 - 0.07 mm)	.005" (0.12 mm)



SECTION CONTENTS

	PAGE
SPECIFICATIONS	10
GENERAL INFORMATION	10
ARMATURES	
Testing	10
Remove Armatures	10
Install Armatures	10
Adjust Armature Air Gap	11
FLYWHEEL	
Remove Flywheel	11
Inspect Flywheel Key and Keyways	11
Install Flywheel	11
ENGINE WIRING HARNESS	12
Testing Ground Wires	12
Engine Wiring Harness Diagram	13
Diode Failure Diagnosis	13

SPECIFICATIONS FOR GN724 OHVI V-TWIN ENGINE

MODEL SERIES	GN724
ARMATURE AIR GAP	.008" TO .012" (.20 TO .30 MM)

FLYWHEEL HOLDER	
BRIGGS & STRATTON PART NO.	19321
FLYWHEEL PULLER	
BRIGGS & STRATTON PART NO.	19203
FLYWHEEL NUT TORQUE	
FT. LBS.	150
FLYWHEEL NUT TORQUE	
NM	203.0

See Section 1 For Spark Plug Maintenance And Specifications

GENERAL INFORMATION

Generac GN724 OHVI V-Twin engines use a magneto ignition: an ignition armature with a self-contained transistor module (no moving parts). Two magneto ignition armatures are used, with a flywheel containing a permanent magnet.

NOTE: The magneto ignition system requires a minimum of 350 RPM to produce spark.

ARMATURES

ARMATURE TESTING:

The condition of the ignition armatures can accurately diagnosed using an ignition tester, (Generac P/N 0C5969) as described in "Troubleshooting" in Section 1.

REMOVING ARMATURES:

1. Remove spark plug leads and spark plugs.
2. Remove rotating screen and blower housing.
3. Remove armature screws and lift off armature(s), Fig. 1.
 - a. Disconnect stop switch wires at armatures.

Note: The flywheel does not need to be removed to service ignition except to check the flywheel key.

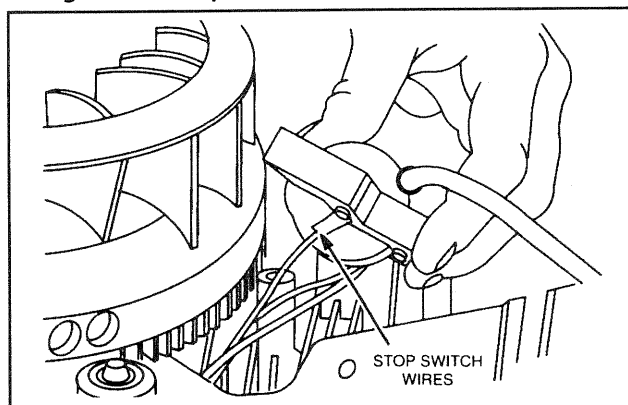


Fig. 1 - Removing Armature

INSTALL ARMATURES:

1. Turn flywheel so magnet is away from armature.
2. Install ground wire onto tab terminal on armature.

Note: Make sure wires are routed over armature mounting posts and away from flywheel.

3. Assemble armature to engine, Fig. 2.

- a. Mounting holes in armature are slotted. Push armature away from flywheel as far as possible and tighten one screw to hold armature in place.
4. Repeat for second armature.

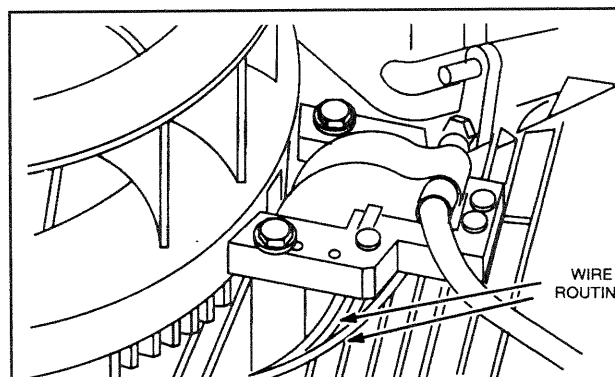
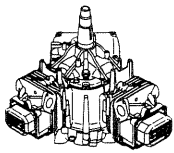


Fig. 2 - Installing Armature



ADJUST ARMATURE AIR GAP:

1. Rotate flywheel until magnet is under armature laminations.
2. Place thickness gauge, .008"-.012" (0.20-.30 mm) between magnet and armature laminations, Fig. 3.
3. Loosen mounting screw so magnet will pull armature down against thickness gauge.
 - a. Torque screws to 25 in. lbs. (2.8 Nm).
4. Rotate flywheel to remove thickness gauge.
5. Repeat for second armature.

Note: Route armature ground wire between breather tube and air horn.

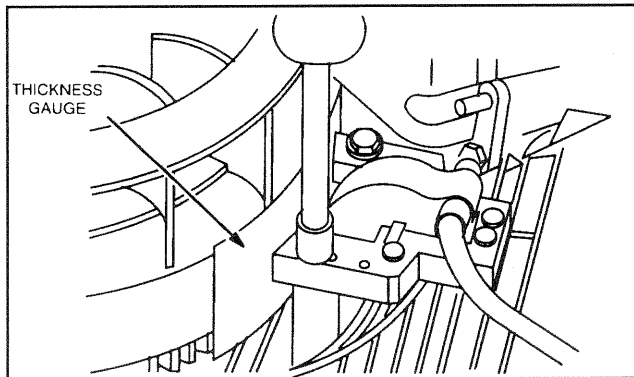


Fig. 3 - Adjusting Air Gap

FLYWHEEL

REMOVE FLYWHEEL:

1. Remove flywheel nut and washer.
2. Remove fan retainer and fan.

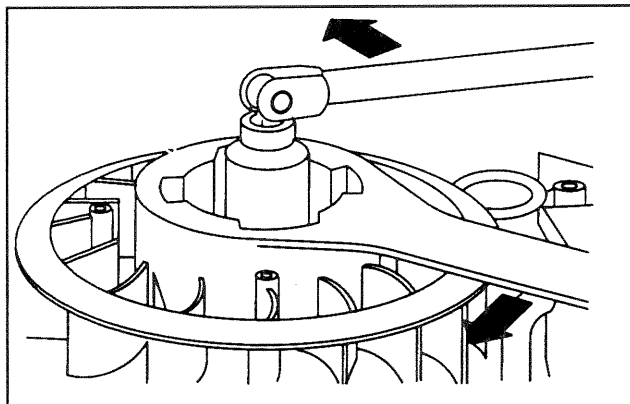


Fig. 4 - Removing Flywheel Nut

4. Reinstall flywheel nut. Turn nut down flush with top of threads.
5. Install flywheel puller.
6. Tighten puller screws equally until flywheel loosens, Fig. 5.

DO NOT strike flywheel with a hard object or a metal tool as this may cause flywheel to shatter in operation. Always use approved flywheel removal tools.

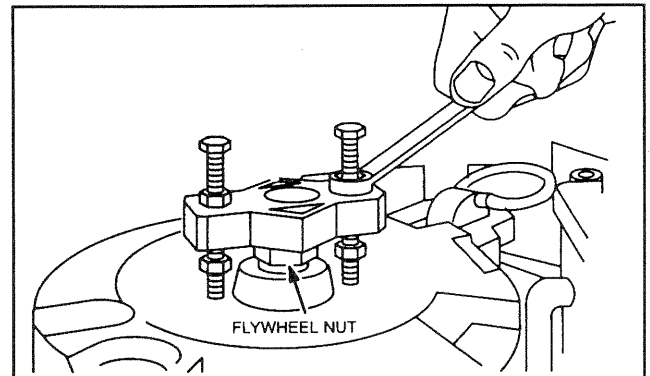


Fig. 5 - Removing Flywheel

Inspect Flywheel Key, Keyways, Flywheel and Crankshaft

Check flywheel key for damage. Check flywheel for cracks, broken fins or keyway damage. Also check crankshaft keyways and taper for damage, Fig. 6. Replace crankshaft, if damaged.

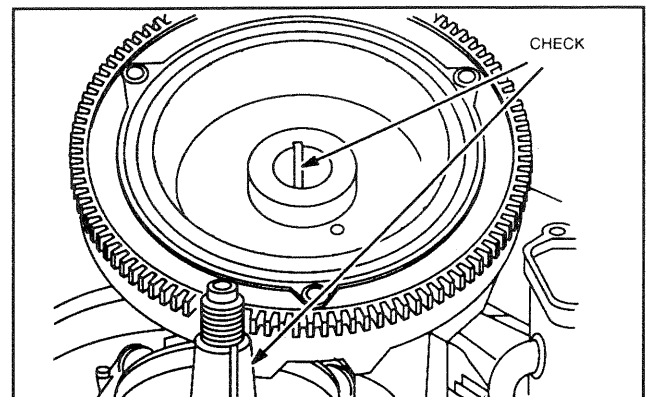
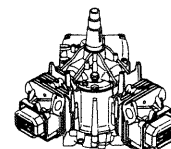


Fig. 6 - Check Flywheel And Crankshaft

Install Flywheel

Note: CLEAN flywheel and crankshaft taper removing all oil, dirt or grease.

1. Assemble flywheel to crankshaft and align keyways.
2. Insert flywheel key into crankshaft.



3. Assemble fan and retainer to flywheel, Fig. 7.

- a. Torque screws to 140 in. lbs. (16.0 Nm).

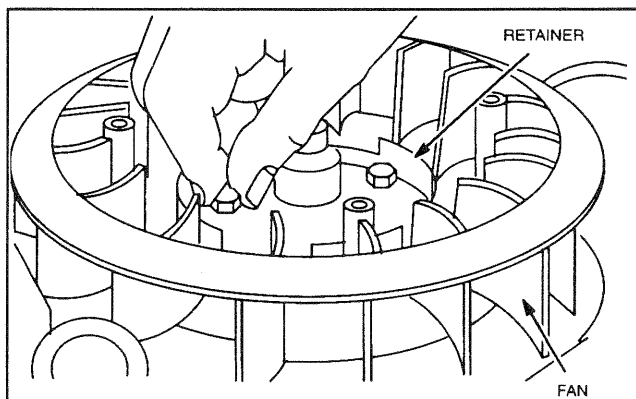


Fig. 7 - Installing Flywheel And Fan

4. Install washer and flywheel nut.

5. Assemble flywheel to retainer, Fig. 8.

- a. Torque flywheel nut to 150 ft. lbs. (203.0 Nm).

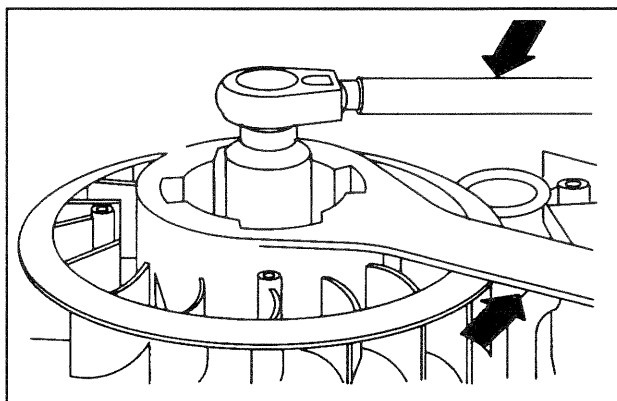


Fig. 8-Torquing Flywheel Nut

ENGINE WIRING HARNESS

The engine wiring harness consists of a ground wire with a diode for each armature and a separate wire for the carburetor solenoid, Fig. 9. The engine wiring harness is connected to the wiring harness provided by the equipment manufacturer. A raised rib on the polarized connector indicates the ground side.

See engine wiring harness diagram, page 12.

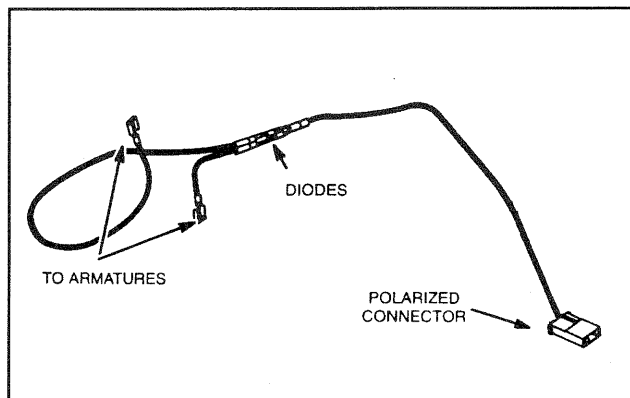


Fig. 9 - Engine Wiring Harness

Testing Ground Wires

Use Digital Multimeter to test the ground wires, Fig. 10.

The following test will be made with the meter in the Diode Test position.

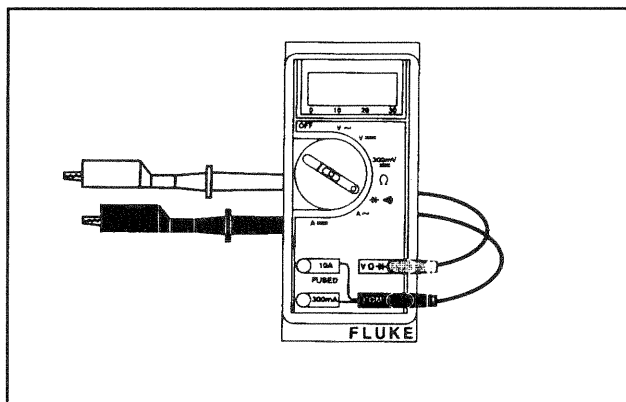
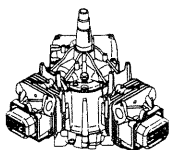


Fig. 10 - Digital Multimeter

In the Diode Test position, the meter will display the forward voltage drop across the diode(s). If the voltage drop is less than 0.7 volts, the meter will "Beep" once as well as display the voltage drop. A continuous tone indicates continuity (shorted diode) An incomplete circuit (open diode) will be displayed as "OL."

1. Insert RED test lead into $\nabla \Omega \rightarrow$ receptacle in meter.
2. Insert BLACK test lead into the "COM" receptacle in meter.
3. Rotate selector to $\rightarrow \nabla \Omega$ (Diode Test) position.
4. Insert RED test lead clip into connector "A" (black wire), Fig. 11. Leave attached for remainder of test.



5. Touch BLACK test lead probe to terminal "B."

 - a. If meter "Beeps" once, diode is OK.
 - b. If meter makes a continuous tone, diode is defective (shorted). Replace ground harness.
 - c. If meter displays "OL," diode is defective (open). Replace ground harness.

6. Now repeat test for terminal "C." Results must be the same.

See Diode Failure Diagnosis on page 5.

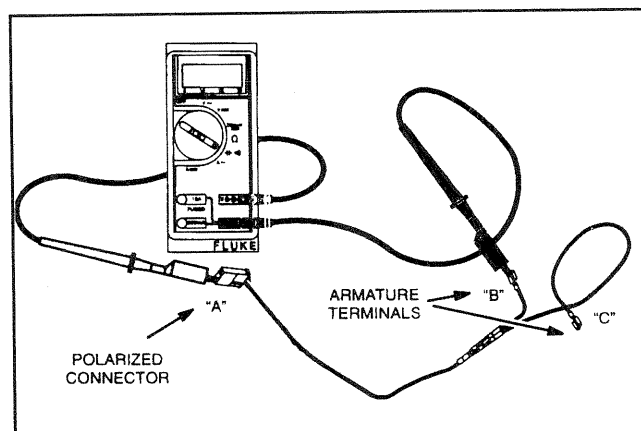
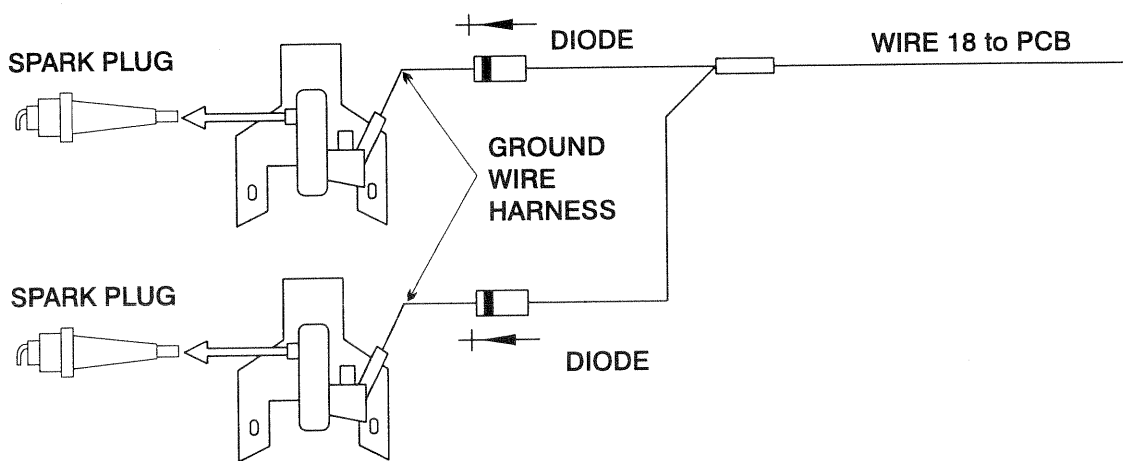


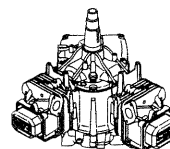
Fig. 11 - Testing Ground Wire



Engine Wiring Harness

DIODE FAILURE DIAGNOSIS

SWITCH ON	TURNED OFF	CAUSE
Engine Runs On 1 Cylinder	Shuts Off OK	1 Closed Diode
Engine Runs (Both Cylinders)	Only One Cylinder Shuts Off	1 Open Diode
Won't Run (No Spark)		2 Closed Diodes
Engine Runs (Both Cylinders)	Engine Won't Shut Off	2 Open Diodes



SECTION CONTENTS

GOVERNOR

Disassemble	14
Check Governor Gear And Shaft	15
Install Governor Shaft Bushing	15
Reassemble	16
ADJUST GOVERNOR	17

GOVERNOR

DISASSEMBLE:

Drain oil and remove engine from equipment. Remove spark plugs. Remove valve covers, depress springs and remove push rods. Mark push rods so that they may be reassembled in their original position. If push rods are mixed, it may be necessary to readjust valve clearances.

Note: Intake push rods are aluminum.

1. Loosen governor lever nut.

a. Remove governor lever from shaft, Fig. 6.

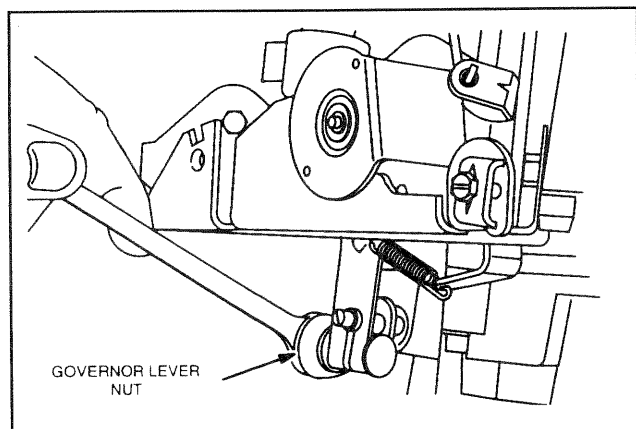


Fig. 6 - Remove Governor Lever

2. Remove oil pump. Fig. 7.

- Remove oil pump cover.
- Remove inner rotor.
- Remove outer rotor.
- Remove drive shaft.

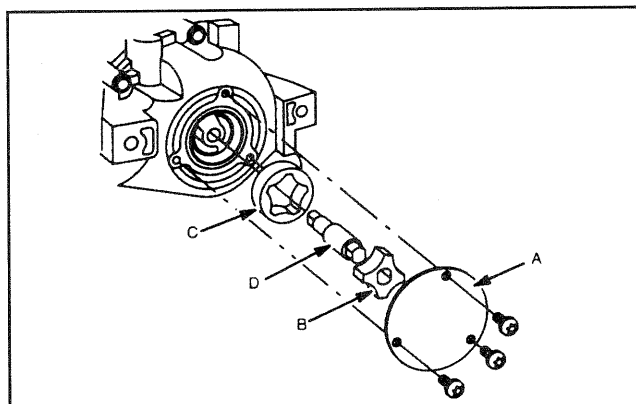


Fig. 7 - Remove Oil Pump

3. Remove sump and discard gasket, Fig. 8.

a. Remove governor gear and thrust washer

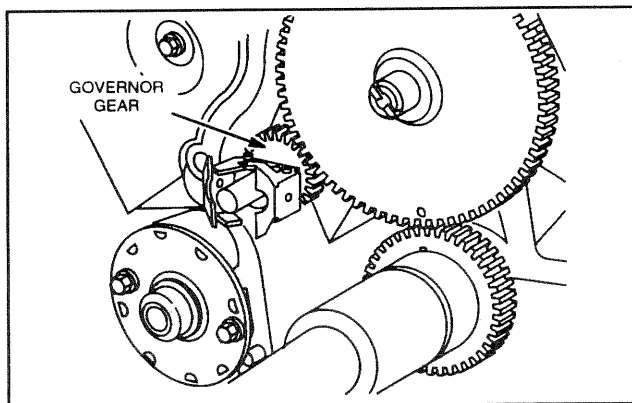


Fig. 8 - Remove Sump

4. Remove governor shaft from sump, Fig. 9.

- Remove lower E-ring.
- Rotate governor paddle clockwise and slide governor shaft out of bushing.
- Remove and discard oil seal.

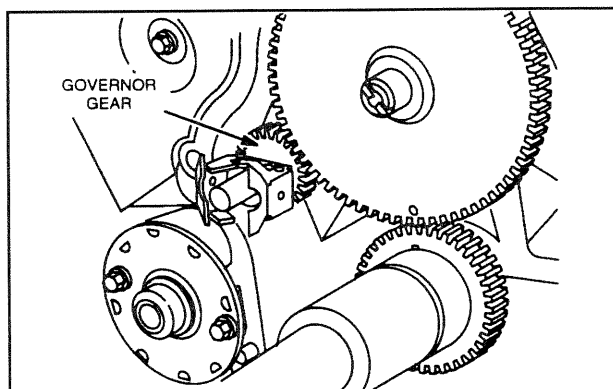
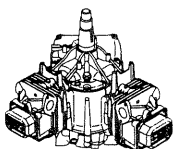


Fig. 9 - Remove Governor Shaft



5. The following tools are required to remove the governor shaft bushing, Fig. 10.

- a. 3/8" drive 5/8" socket.
- b. 1/4" flat washer.
- c. 1/4 - 20 screw and nut.
- d. Flat washer.

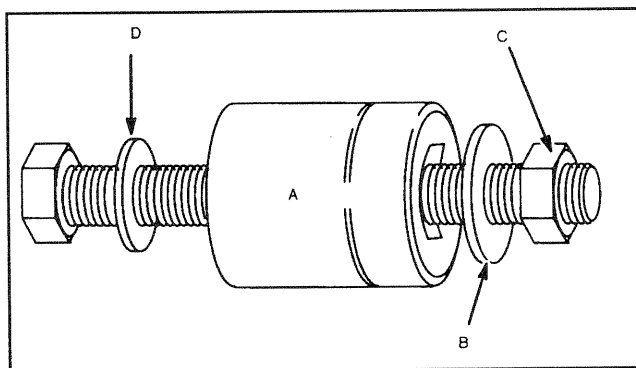


Fig. 10 - Bushing Removal Tools

6. Assemble tools as shown.

- a. Tighten nut until bushing is removed, Fig. 11.

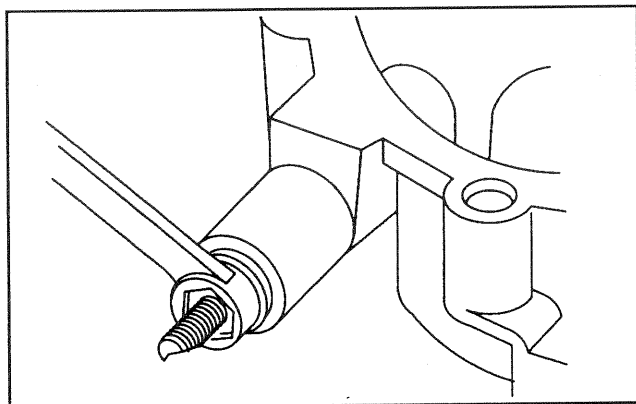


Fig. 11 - Remove Governor Shaft Bushing

Check Governor Gear And Shaft

SHAFT:

1. Check governor gear for burrs or nicks, Fig. 12.
2. Check flyweights for damage or wear.
3. Check governor cup and thrust washer for damage or wear.
4. Check governor gear shaft and bearings for damage or wear.

Replace as required.

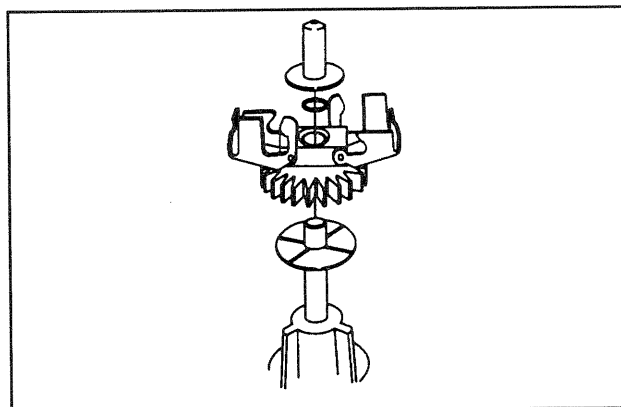


Fig. 12 - Check Governor Gear And Shaft

Install Governor Shaft Bushing

Lubricate new bushing and governor shaft with engine oil.

1. Assemble governor shaft to sump to act as a pilot for bushing.

Do not install lower E-ring.

2. Using Briggs & Stratton Tool P/N 19129, press in bushing until it bottoms, Fig. 13.
3. Install lower E-ring.

- a. Install new oil seal.

Governor shaft must rotate freely.

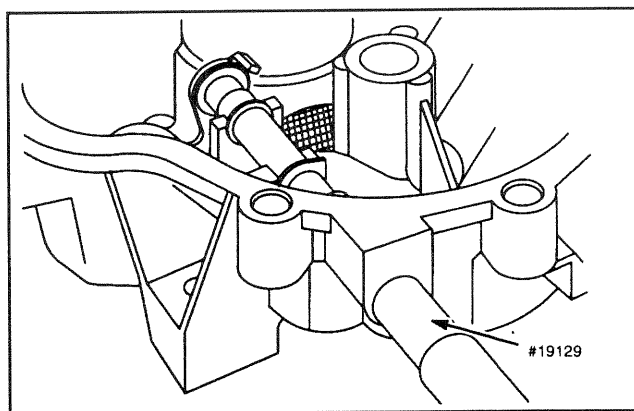
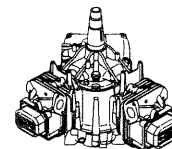


Fig. 13 - Install Governor Shaft Bushing



Reassemble

1. Lubricate thrust washer, governor gear and governor cup with engine oil and assemble to shaft, Fig. 14.

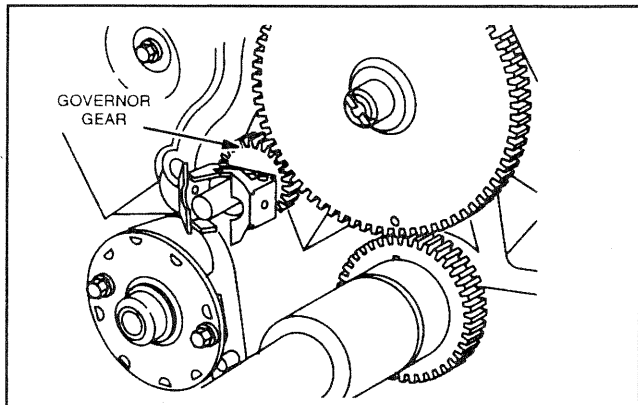


Fig. 14 - Install Governor Gear

2. Install sump with new gasket, Fig. 15. a. Torque screws in sequence shown to 200 in. lbs. (22.6 Nm).

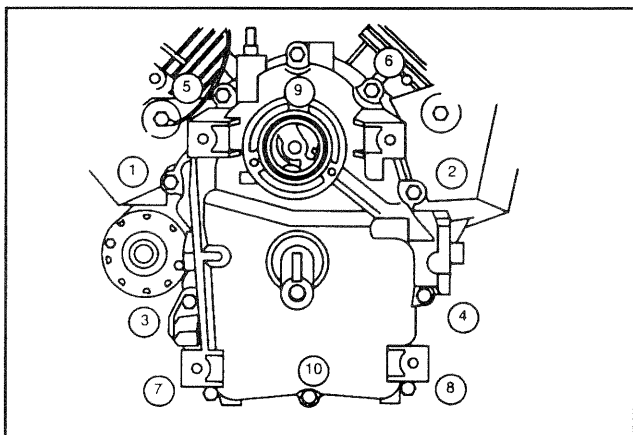


Fig. 15 - Install Sump

3. Lubricate oil pump components with engine oil and assemble to sump, Fig. 16. Make sure drive shaft is engaged in camshaft.

- a. Install drive shaft.
- b. Install inner rotor.
- c. Install outer rotor.
- d. Install oil pump cover with new O-ring.
- e. Torque screws to 50 in. lbs. (5.6 Nm).

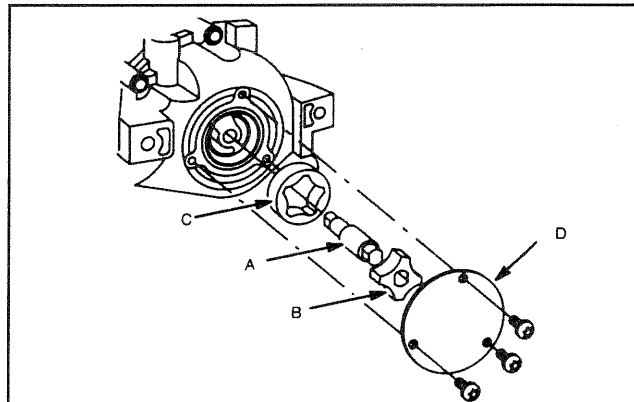


Fig. 16 - Install Oil Pump

4. Reassemble governor lever to governor shaft, Fig. 17. DO NOT tighten nut at this time.

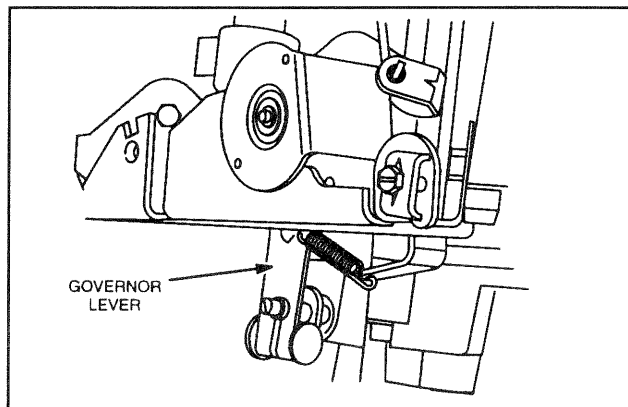


Fig. 17 - Install Governor Lever

5. Install push rods in their original positions.

- a. Compress valve springs and insert push rods into recess in rocker arm adjustment screws, Fig. 18.

Note: Intake push rods are aluminum.

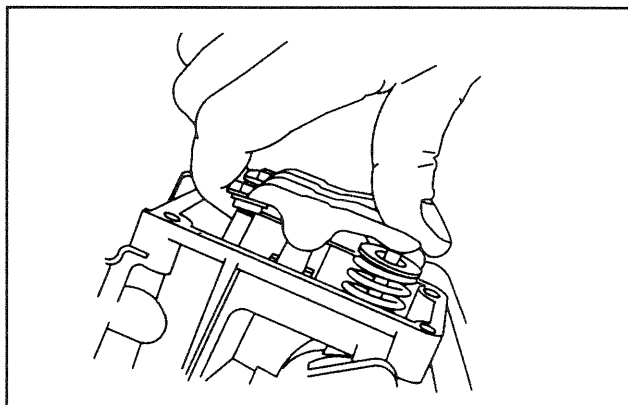
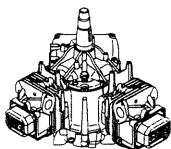


Fig. 18 - Install Push Rods



6. Install valve covers with new gaskets, Fig. 19.
 - a. Torque screws to 100 in. lbs. (11.2 Nm).

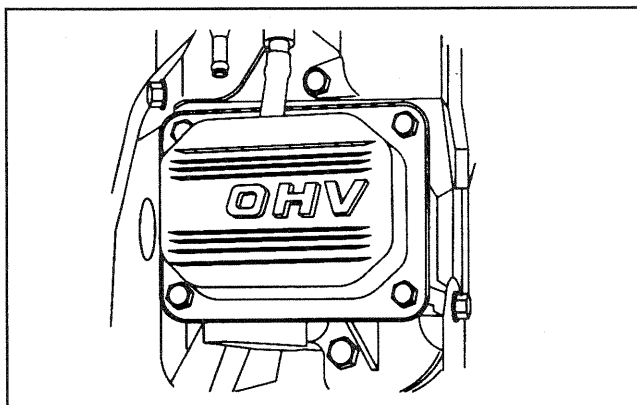


Fig. 19 - Install Valve Covers

ADJUST GOVERNOR

1. Loosen the governor clamp bolt (Figure 3.2).
2. Push the spring end of the governor lever clockwise to the wide open throttle position of the lever.
 - Hold the governor lever at wide open throttle and, with a screwdriver, rotate the governor shaft fully clockwise.
 - Before tightening, verify that the governor lever is pushed all the way onto the governor shaft.
 - While holding the governor shaft fully clockwise and the governor lever at wide open throttle, tighten the governor clamp bolt to 70 inch-pounds (8 N-m).

3. Start the engine; let it stabilize and warm up at no-load.
4. Turn the speed adjust nut to obtain a frequency reading of 62 Hertz.
5. When frequency is correct at no-load, check the AC voltage reading. If voltage is incorrect, the voltage regulator may require adjustment.

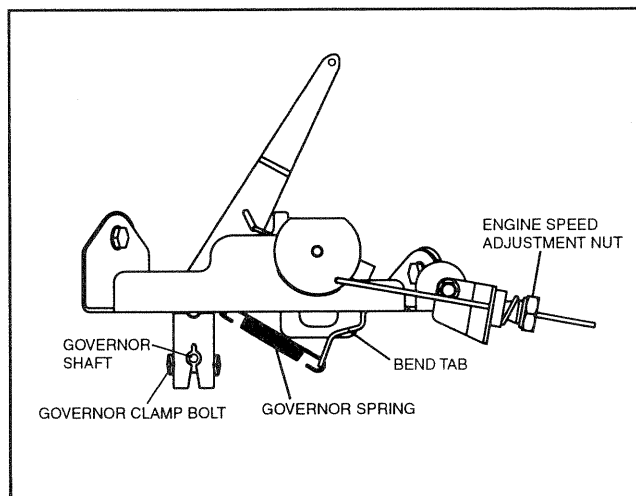
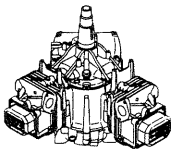


Fig. 20 - Engine Governor Adjustment

NOTE: If the engine continues to run fast, use a pair of pliers, or tang bender (Briggs P/N 19229 or 19352) to bend the bend tang clockwise to release tension on the lower governor spring.



SECTION CONTENTS

	PAGE
REMOVE CYLINDER HEAD	18
DISASSEMBLE CYLINDER HEAD	19
INSPECT AND REPAIR	20
Cylinder Head	20
Valve Guides	20
Valves	20
ASSEMBLE CYLINDER HEAD	21
INSTALL CYLINDER HEAD	22
ADJUST VALVES	23
ADJUST GOVERNOR.....	23

REMOVE CYLINDER HEADS

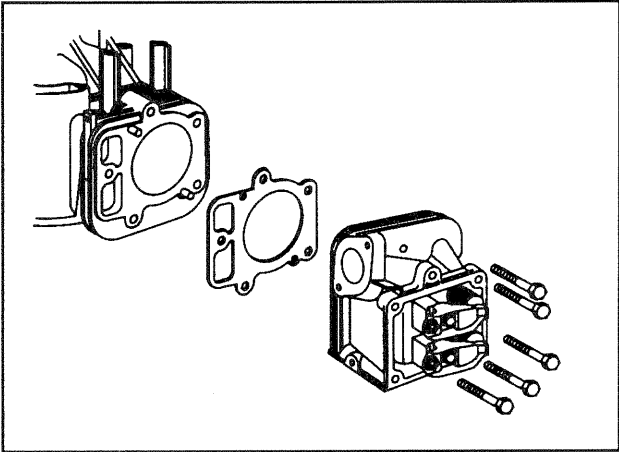
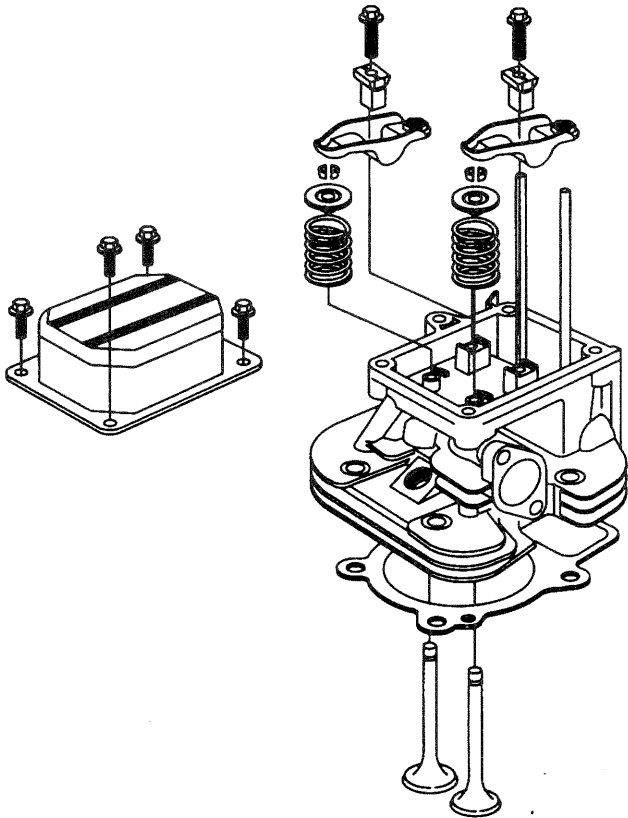


Fig. 1 - Remove Cylinder Head



Over Head Valve Train

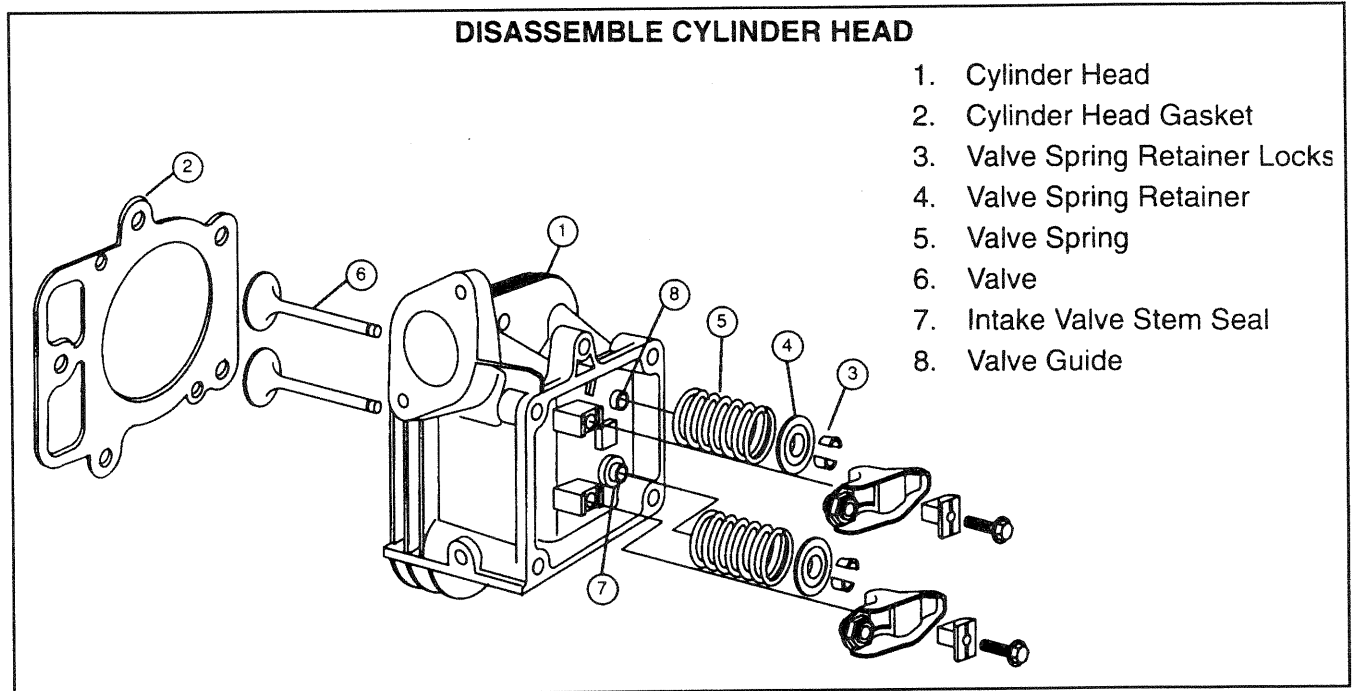
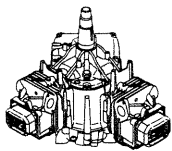


Fig. 9 - Cylinder Head Components

1. Remove valves, Fig. 10.

2. Remove and discard intake valve stem seals, Fig. 11.

Note: Place a shop rag or short section of rubber fuel line under valves inside combustion chamber to hold valve in place while compressing spring.

Thread rocker arm support screw into cylinder head a few turns and compress spring with valve spring compressor, (Briggs & Stratton P/N 19347). Remove the following:

- a. Valve spring retainer locks
- b. Valve spring retainer
- c. Valve spring
- d. IN and EX valve

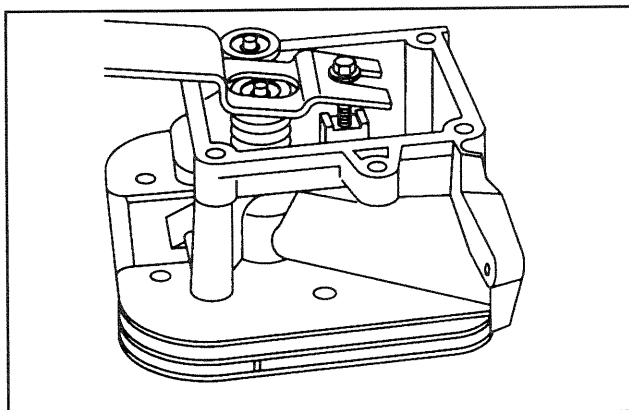


Fig. 10 - Remove Valves

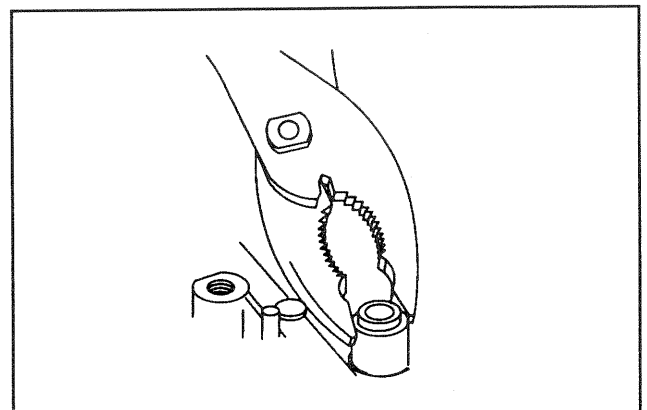
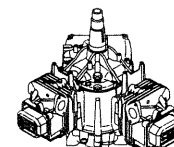


Fig. 11 - Remove Valve Stem Seal



INSPECT AND REPAIR

1. Check cylinder head, Fig. 12. Be sure all gasket material is removed from surfaces before checking. Use a gasket scraper if necessary.

- Inspect cylinder head for cracks or damage.
- Use a surface plate or straightedge and check cylinder head mounting surface for distortion.

If mounting surfaces are distorted more than .004" (0.1 mm), the cylinder head must be replaced.

It is not recommended that cylinder head mounting surfaces be resurfaced.

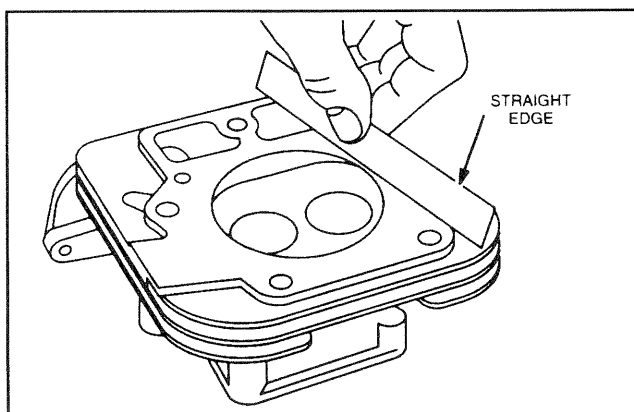


Fig. 12 - Check Cylinder Head For Distortion

2. Check valve guide bushings for wear using reject gauge, (Briggs & Stratton P/N 19381), Fig. 13.

If valve guides are worn, the cylinder head must be replaced.

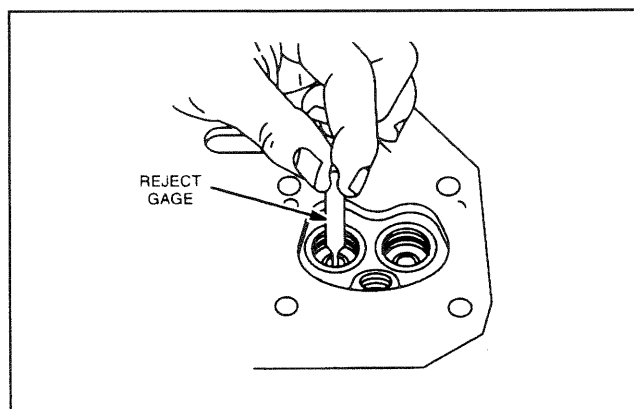


Fig. 13 - Check Valve Guide Bushing

3. Valve seats may be reconditioned using valve seat cutter tool (Briggs & Stratton P/N 19237 and P/N19343).

If valve seat is wider than dimension shown in Fig. 14, a narrowing cutter should be used to ensure that contact area of valve seat is centered on face of valve. a. Use a 60° cutter to narrow seat from bottom and a 15° cutter to narrow seat from top, Fig. 18.

Note: If valve seat is loose or cracked, replace cylinder head.

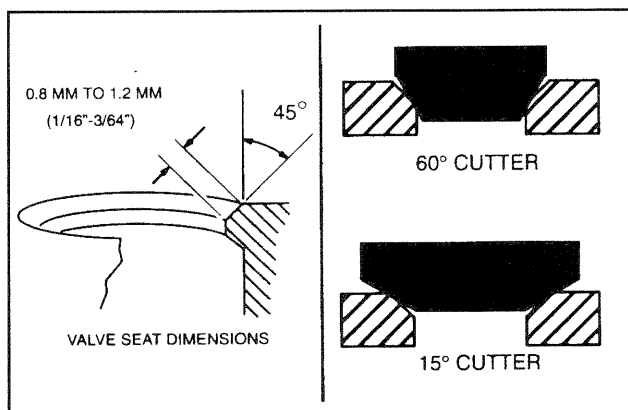


Fig. 14 - Valve Seat Dimensions

4. Valve faces may be resurfaced to 45°. See Fig. 15 for dimensions for valves. Lap valves and seats with valve lapping tool, (Briggs & Stratton P/N 19258) and valve lapping compound, (Briggs & Stratton P/N 94150).

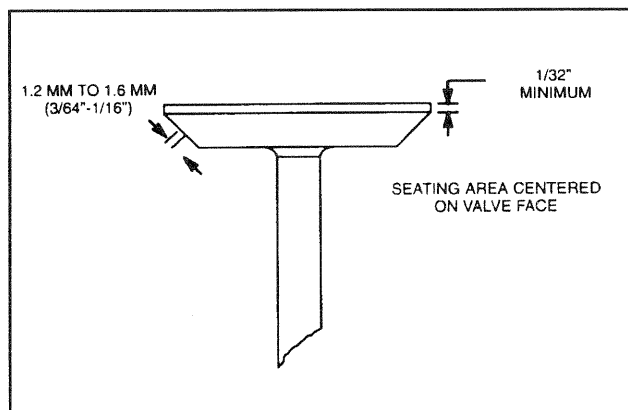
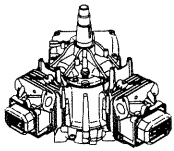


Fig. 15 - Valve Dimensions



5. Measure valve stem diameter at specified distance from end of valve, as shown in Fig. 16.

Replace if less than .233" (5.92 mm).

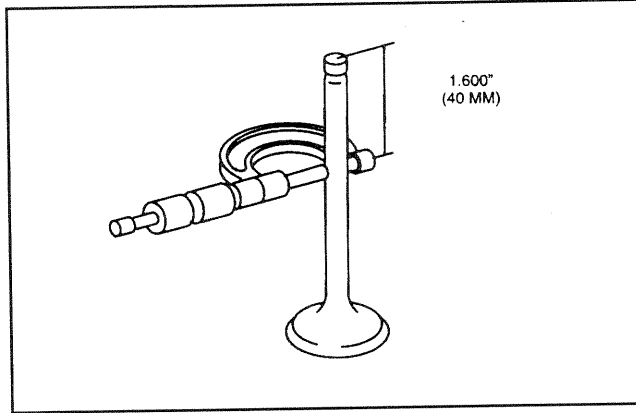


Fig. 16 - Measure Valve Stem Diameter

6. Check valve springs for free length, Fig. 17. Replace if free length is less than 1.320" (33.5 mm).

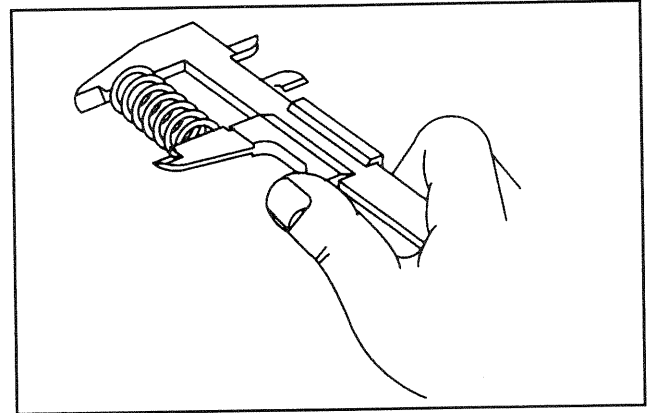
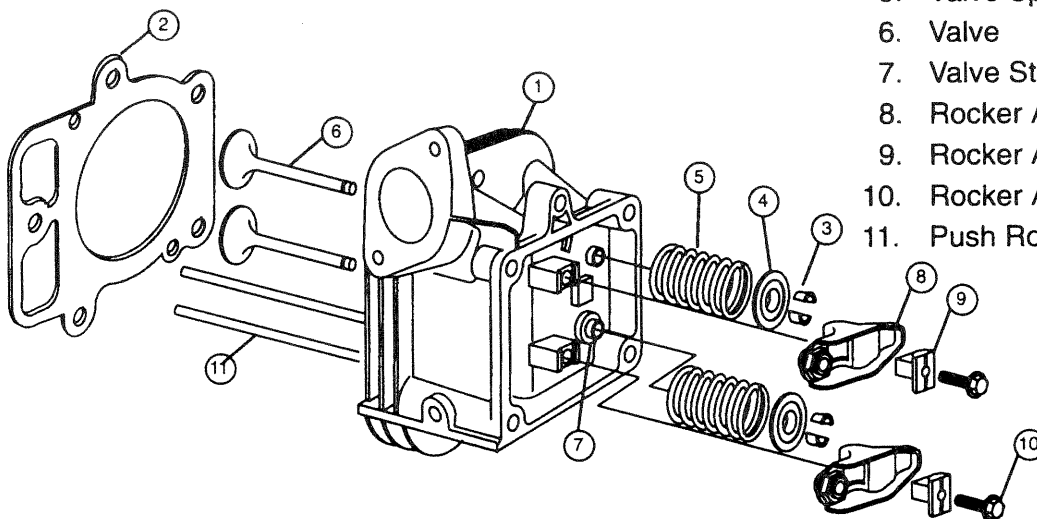


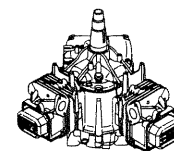
Fig. 17 - Check Valve Springs

ASSEMBLE CYLINDER HEAD



1. Cylinder Head
2. Cylinder Head Gasket
3. Valve Spring Retainer Locks
4. Valve Spring Retainer
5. Valve Spring
6. Valve
7. Valve Stem Seal
8. Rocker Arm
9. Rocker Arm Support
10. Rocker Arm Support Screw
11. Push Rod

Fig. 18 - Cylinder Head Components



1. Use valve guide driver, (Briggs & Stratton P/N 19416) and install new intake valve stem seal.

- a. Oil inner surface and lip of valve stem seal.
- b. Press seal on to valve guide bushing until it bottoms, Fig. 19.

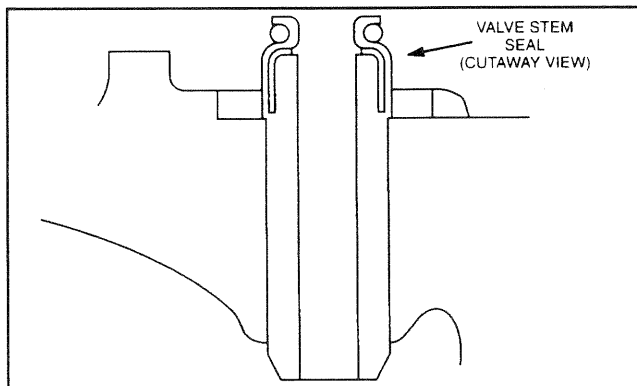


Fig. 19 - Install Valve Stem Seals

2. Install valves. Note: Lightly coat valve stems with Valve Guide Lubricant (Briggs & Stratton P/N 93963) before installing valves.

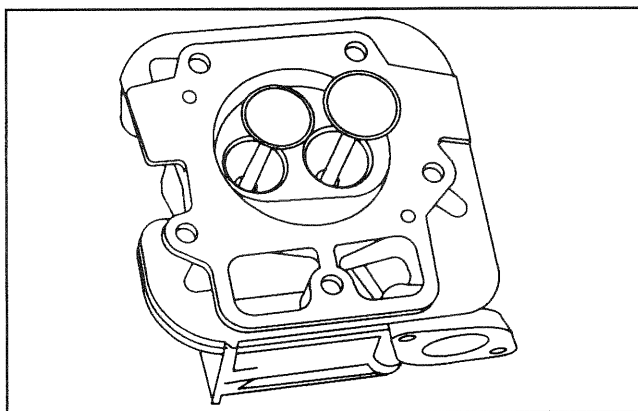


Fig. 20 - Install Valves

3. Install valve springs with valve spring compressor, Tool (Briggs & Stratton P/N 19347), Fig. 21.

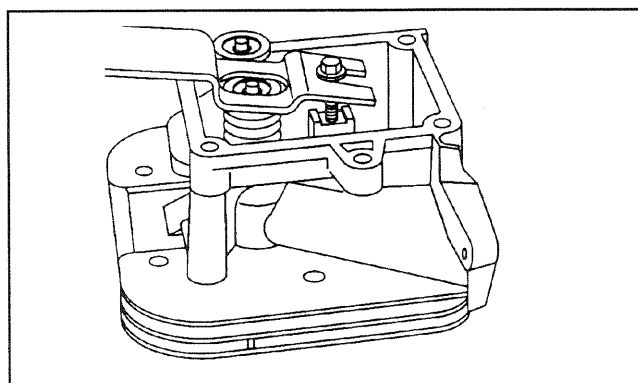


Fig. 21 - Install Valve Springs

4. Assemble rocker arms and supports to cylinder head, Fig. 22. Apply Loctite® 242 or similar sealant to threads.

- a. Torque screws to 100 in. lbs. (11.2 Nm).

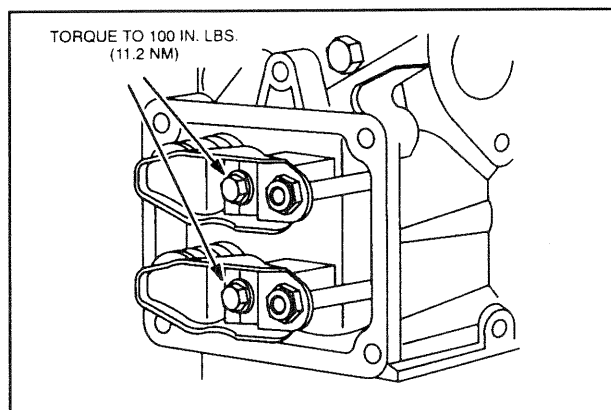


Fig. 22 - Install Rocker Arms

INSTALL CYLINDER HEAD

1. Place cylinder head gasket over alignment dowels on cylinder block, Fig. 23.

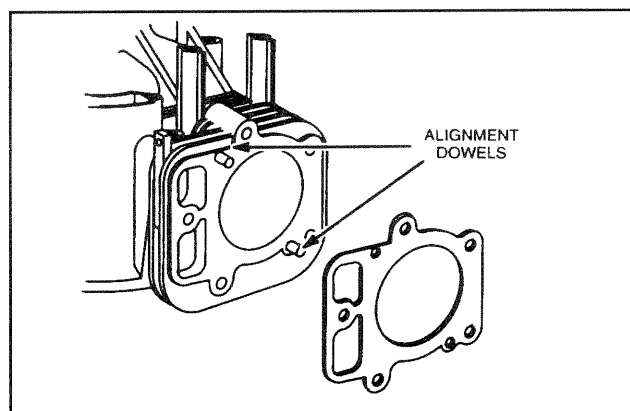


Fig. 23 - Install Cylinder Head Gasket

2. Install cylinder head assembly, Fig. 24.

- a. Torque head bolts in sequence shown to 220 in. lbs. (25.0 Nm).

3. Install push rods. Make sure push rods are inserted in recess in tappets.

Note: Intake push rods are aluminum.

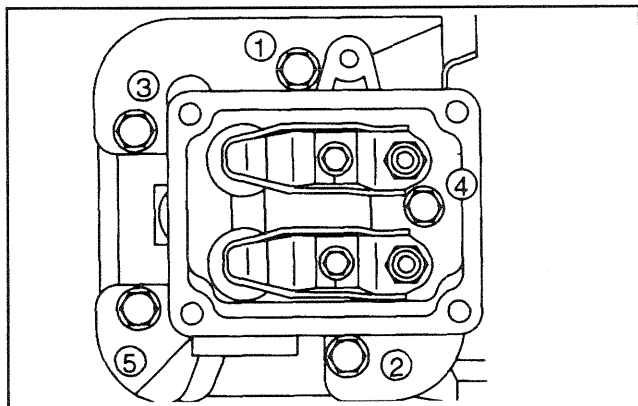
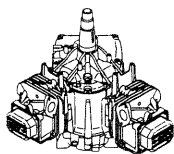


Fig. 24 - Install Cylinder Head Assembly

4. Compress valve springs and insert push rods into recess in rocker arm adjustment screws, Fig. 25.

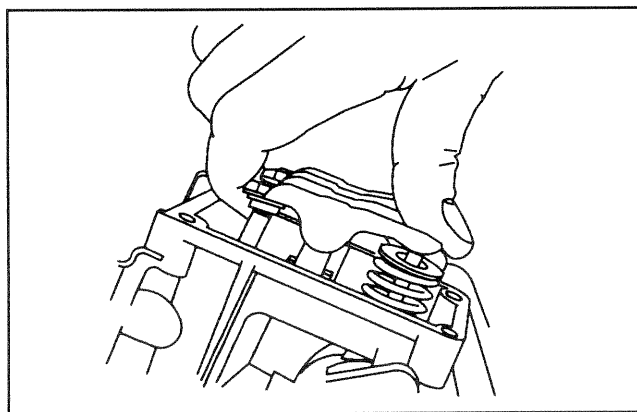


Fig. 25 - Install Push Rods

ADJUST VALVES

1. Set No. 1 cylinder at TDC, compression stroke.
 - a. Adjust valves and check, Fig. 26.
- Valve Clearance (cold) IN and EX .005" (0.13 mm)**
- b. Torque jam nut and adjusting screw to 60 in. lbs. (6.6 Nm).
2. Set No. 2 cylinder at TDC, compression stroke.
 - a. Repeat for No. 2 cylinder.

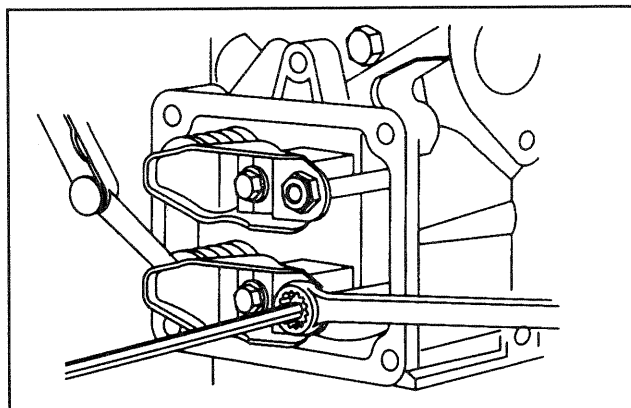


Fig. 26 - Adjust Valve Clearances

3. Install valve covers with new gaskets, Fig. 27.
 - a. Torque screws to 100 in. lbs. (11.2 Nm)

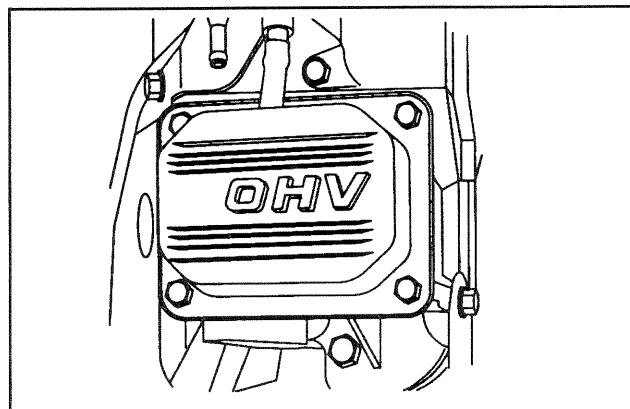


Fig. 27 - Install Valve Covers

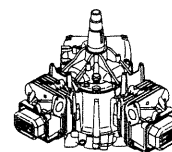
ADJUST GOVERNOR



WARNING: BEFORE STARTING or running engine, static adjustment of the governor must be completed! Failure to make the static adjustments first could result in engine overspeeding which may result in engine damage, property damage or personal injury.

STATIC GOVERNOR ADJUSTMENT

1. Rotate governor control swivel counter-clockwise as far as it will go (wide open throttle) and hold in this position.
2. Rotate governor shaft clockwise as far it will go.
 - a. Torque governor nut to 130 in. lbs. (14.6 Nm).



SECTION CONTENTS

	PAGE
GENERAL INFORMATION	24
TROUBLESHOOTING	24
TEST EQUIPMENT	25
TEST STARTER MOTOR	26
Remove Starter Motor	26
Testing Starter Motor	26
Starter Motor Specifications	26
Conditions Affecting Starter Motor Performance	26
STARTER DRIVE	
Checking Starter Motor Drive	26
Disassemble Starter Motor Drive	27
Assemble Starter Motor Drive	27
DISASSEMBLE STARTER MOTOR	27
Inspect Armature Commutator	28
Inspect Brushes	28
ASSEMBLE STARTER	28
Install Starter Motor	29

GENERAL INFORMATION

The starter motor uses a gear type engagement method, similar to an automobile starter. When the starter motor is activated, the pinion gear engages a ring gear attached to the engine flywheel and cranks the engine.

The pinion gear and flywheel ring gear are replaceable.

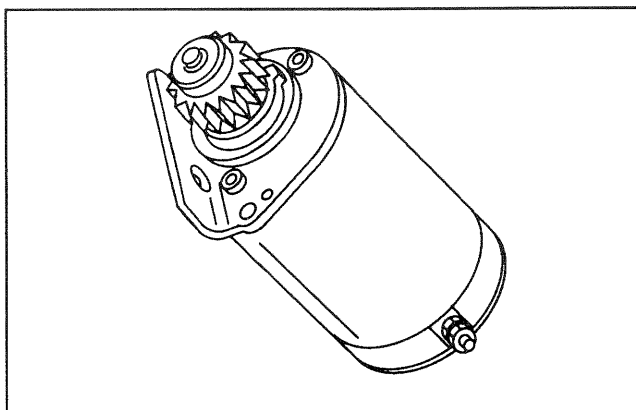


Fig. 1 - Starter Motor

TROUBLESHOOTING

NOTE: If a starting problem is encountered, the engine itself should be thoroughly checked to eliminate it as the cause of starting difficulty. It is a good practice to check the engine for freedom of rotation by removing the spark plugs and turning the crankshaft over slowly by hand, to be sure it rotates freely.



WARNING: DO NOT ROTATE ENGINE WITH ELECTRIC STARTER WITH SPARK PLUGS REMOVED. ARCING AT THE SPARK PLUG ENDS MAY IGNITE THE GASOLINE VAPOR EXITING THE SPARK PLUG HOLE.

ENGINE CRANKS SLOWLY:

- Additional load affecting performance (see note above).
- Discharged battery.
- Faulty electrical connection (battery circuit).
- Discharged battery (see alternators).
- Dirty or worn starter motor commutator, bearing, weak magnets, etc.
- Worn brushes or weak brush spring.
- Wrong oil viscosity for temperature expected.
- Battery leads too long or wire too small.
- Battery too small.

ENGINE WILL NOT CRANK:

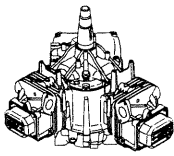
- Faulty safety interlocks.
- Discharged or defective battery.
- Faulty electrical connections.
- Faulty starter motor switch (open circuit).
- Open circuit in starter motor.
- Brushes sticking, etc.
- Faulty solenoid.

STARTER MOTOR SPINS BUT DOES NOT CRANK ENGINE:

- Sticking pinion gear due to dirt.
- Damaged pinion or ring gear.
- Starter clutch slipping.
- Battery faulty or damaged.
- Incorrect rotation due to reversed motor polarity-all motors rotate counterclockwise viewed from pinion gear.

STARTER MOTOR SPINS BUT WILL NOT STOP:

- Defective starter switch.



TEST EQUIPMENT

The following is a list of equipment recommended to test and repair starter motors.

DIGITAL MULTIMETER:

The Digital Multimeter is available from your Briggs & Stratton source of supply. Order as Briggs & Stratton P/N 19357 or 19390. The meter may be used to read volts, ohms, amperes and test diodes (rectifiers), Fig. 2.

The Digital Multimeter will withstand DC input of 10-20 Amps for up to 30 seconds. When checking current draw of 12 volt starter motors, the DC Shunt, Briggs & Stratton P/N 19359, is required.

NOTE: The Digital Multimeter is equipped with two fuses to prevent damage to the meter in the event that the input limits are exceeded. If the meter displays a reading of 0.00 when testing DC output, check fuses in meter. Refer to FLUKE Operators Manual for procedure for checking fuses. Replacement fuse is available from your Briggs & Stratton source of supply. Order (Briggs & Stratton P/N 19449.

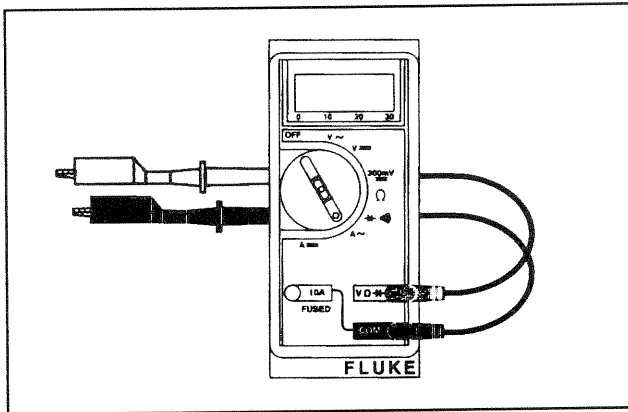


Fig. 2 - Digital Multimeter

DC SHUNT:

Use with Digital Multimeter. The DC Shunt is required when checking starter motor current draw on 12 volt starter motors. Order as Briggs & Stratton P/N 19359, Fig. 3.

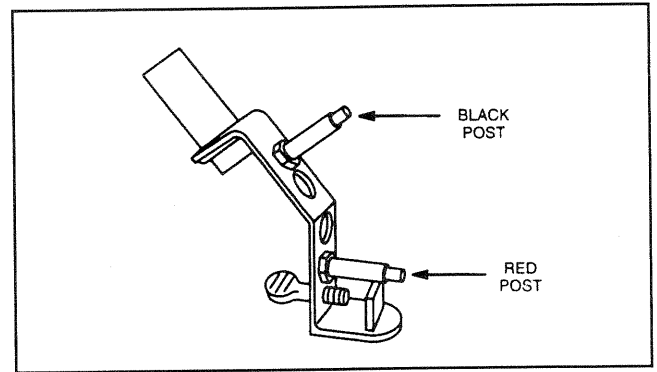


Fig. 3 - DC Shunt - Briggs & Stratton P/N 19359

A tachometer is available from your Generac Power Systems source of supply. Order as P/N 042223. The tachometer measures from 800 to 50,000 RPM, Fig. 4.

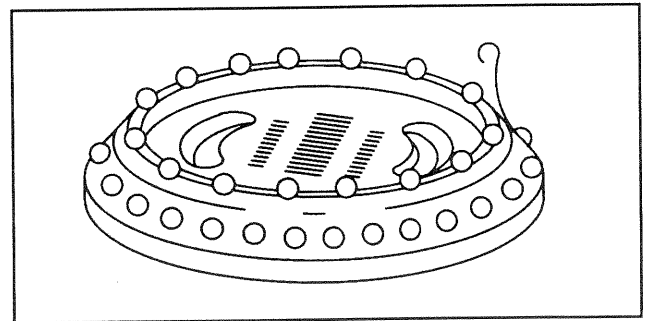


Fig. 4 - Tachometer

TEST BRACKET

A starter motor test bracket may be made as shown in Fig. 5. A growler or armature tester is available from an Automobile Diagnostic service supplier.

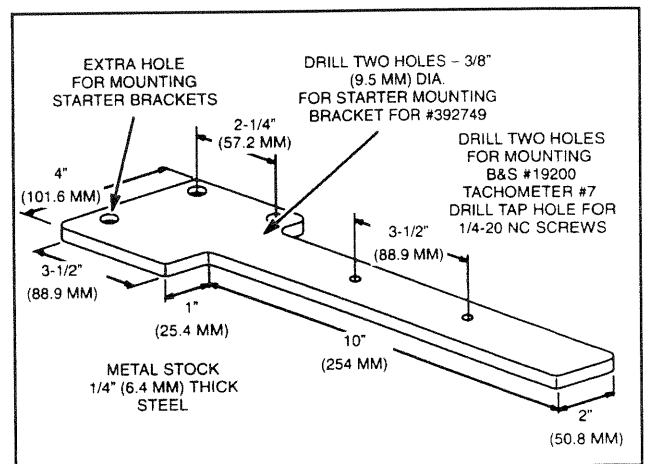
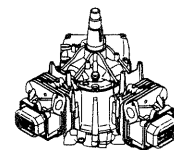


Fig. 5 - Test Bracket



TEST STARTER MOTOR

REMOVE STARTER MOTOR:

It is recommended that the starter motor be removed from the engine when testing starter motor performance. Remove rotating screen and blower housing. Remove two starter motor mounting screws. Assemble starter to test bracket and clamp test bracket in vise, Fig. 6.

IMPORTANT: DO NOT clamp motor housing in a vise or strike with a steel hammer. Starter motors contain two ceramic magnets which can be broken or cracked if the motor housing is hit, deformed or dented.

TESTING STARTER MOTOR:

A fully charged 12 volt battery is required.

1. The DC Shunt MUST be installed on the negative (-) battery terminal as shown in Fig. 6.
2. Insert RED test lead into $\nabla \Omega \rightarrow$ receptacle in meter and connect to RED post terminal on shunt.
3. Insert BLACK test lead into "COM" receptacle in meter and connect to BLACK post terminal on shunt.
4. Rotate selector to $300\text{mA} \rightarrow$ position.
5. Activate the starter motor and note reading on meter and tachometer (RPM).

Note: Take reading after meter stabilizes (approximately 2 - 3 seconds).

6. A starter motor in good condition will be within specifications listed.

STARTER MOTOR SPECIFICATIONS:

MINIMUM RPM:6500
MAXIMUM AMPERES:35

If 12 volt starter motor does not perform satisfactorily, see Conditions Affecting Starter Motor Performance.

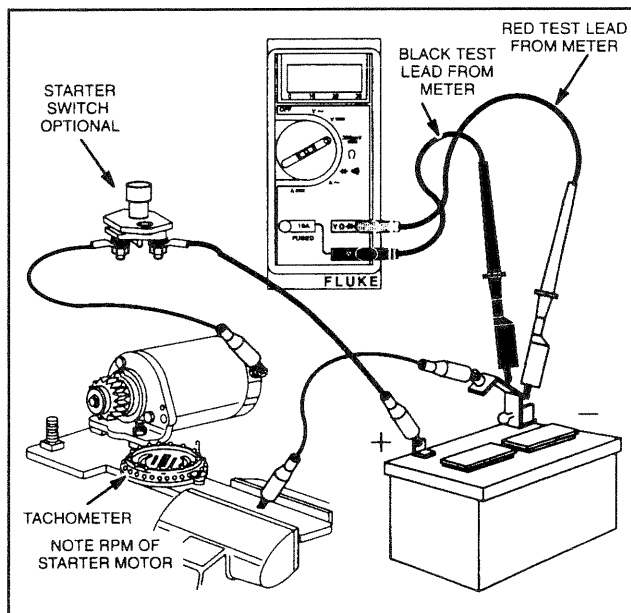


Fig. 6 - Testing Starter Motor

CONDITIONS AFFECTING STARTER MOTOR PERFORMANCE

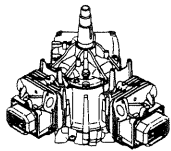
1. A binding or seizing condition in the starter motor bearings.
2. A shorted, open or grounded armature.
 - a. Shorted, armature (wire insulation worn and wires touching one another). Will be indicated by low or no RPM.
 - b. Open armature (wire broken) will be indicated by low or no RPM and excessive current draw.
 - c. Grounded armature (wire insulation worn and wire touching armature lamination or shaft). Will be indicated by excessive current draw or no RPM.
3. A defective starter motor switch.
4. Broken, damaged or weak magnets.
5. Starter drive dirty or binding.

STARTER DRIVE

CHECKING STARTER MOTOR DRIVE:

When the starter motor is activated, the pinion gear should engage the flywheel ring gear and crank the engine. If the starter motor drive does not react properly, inspect the helix and pinion gear for freedom of operation, Fig. 7.

The pinion gear should be inspected for damaged teeth. Pinion gear must move freely on helix. The parts may be washed in a solvent such as Stanisol® or Varsol®.



DISASSEMBLE STARTER MOTOR DRIVE:

WARNING: TO PREVENT EYE INJURY always wear eye protection when removing C-ring.

1. Place counterbore side of Briggs & Stratton P/N 19436 (Fig. 8) over retainer and align drive pins with open end of C-Ring.

Important: If retainer has a notch as shown, DO NOT align drive pins with notch. If necessary, rotate notch away from open end of C-Ring.

2. Place palm of hand over tool and push down evenly on tool to compress spring washer.
3. While applying pressure, turn knurled knob clockwise until C-Ring pops off. Discard C-Ring.
4. Remove retainer, return spring, spring washer, pinion gear, and starter clutch.

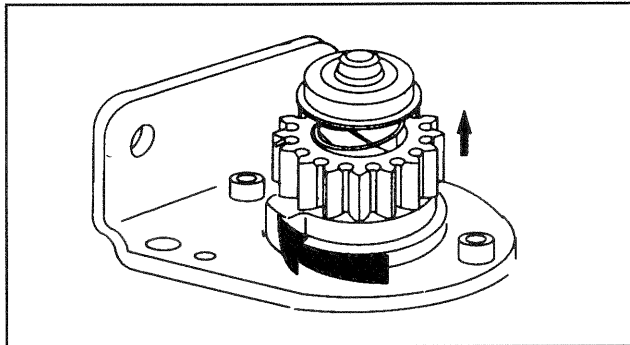


Fig. 7 - Starter Drive

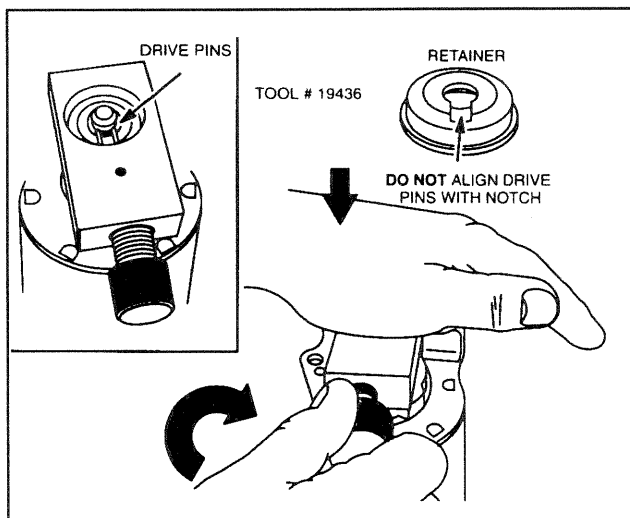


Fig. 8 - Removing C-Ring

ASSEMBLE STARTER DRIVE:

1. Assemble clutch drive to starter shaft and rotate clutch until it drops into place, Fig. 9.
2. Install pinion gear with beveled side of teeth up. Then install return spring making sure spring is in recess of starter gear.
3. Install spring washer with concave side up. Install retainer.

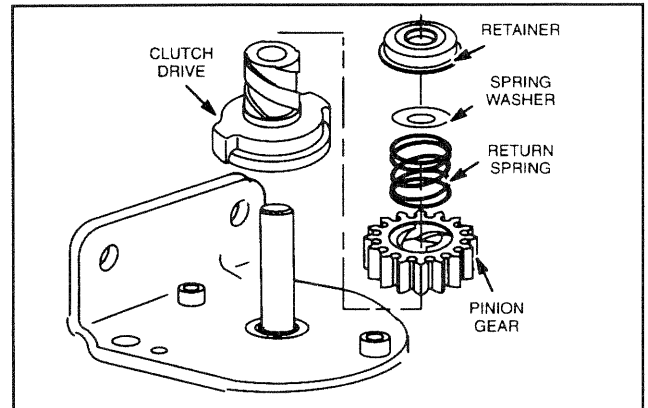


Fig. 9 - Assemble Starter Drive

4. Place C-Ring over chamfered end of shaft. Align one of the slots of Briggs Tool P/N19435 with open end of C-Ring.
5. Press or drive C-Ring on until it snaps into groove in shaft, Fig. 10.

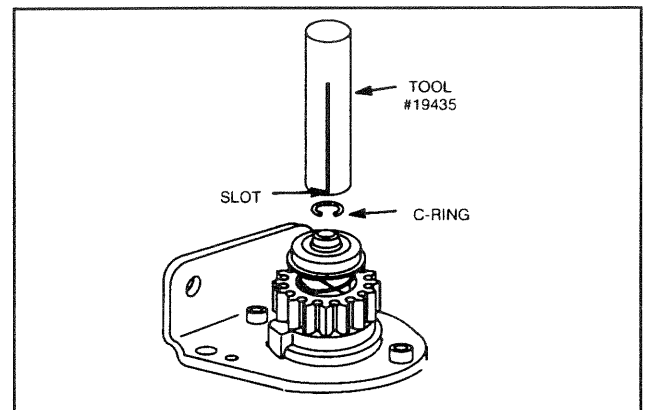


Fig. 10 - Install C-Ring

DISASSEMBLE STARTER MOTOR:

See Fig. 11 for exploded view of starter motor.

To aid in reassembly, scribe a mark on drive end cap and starter housing for alignment purposes.

1. Remove thru bolts.
2. Remove drive end cap assembly

Replace drive end cap if bushing is worn or damaged.

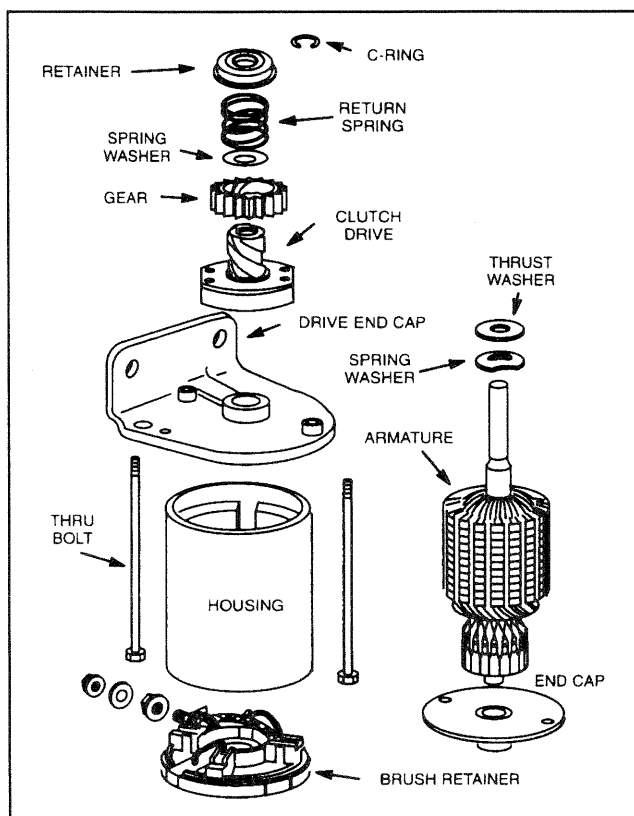
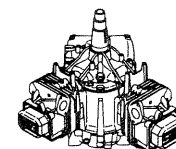


Fig. 11 - Exploded View

3. Hold the armature and commutator end cap against a work surface while sliding housing off the armature, Fig. 12.

NOTE: This allows the brush retainer to remain assembled to commutator for inspection of brush to commutator contact.

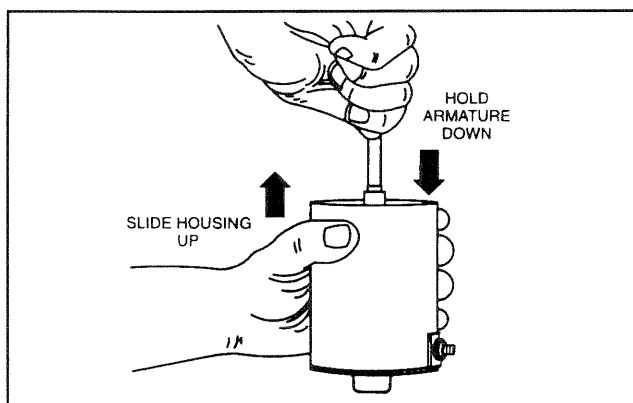


Fig. 12 - Removing Armature

4. Remove end cap and brush retainer with brushes. Replace end cap if bushing is worn or damaged.

INSPECT ARMATURE COMMUTATOR:

The armature commutator may be cleaned with fine sandpaper. DO NOT use emery cloth. Commutator may be machined to no less than 1.230" (31.24 mm), Fig. 13.

Slots between commutator bars should be cleaned with a hack saw blade after cleaning or machining, Fig. 13. The slots can also be cleaned using an aerosol carburetor cleaner or compressed air.

The armature should be checked for shorts with a growler.

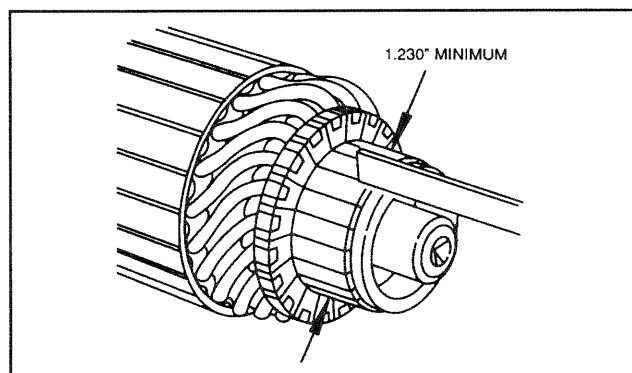


Fig. 13 - Inspect Commutator

INSPECT BRUSHES:

The brushes should be checked for proper seating, weak brush springs, dirt, oil or corrosion. Brush spring pressure should be strong enough to ensure good brush contact with armature. Check to be sure brushes are not sticking in their holders.

Minimum brush dimension is 1/4" (6 mm), Fig. 14.

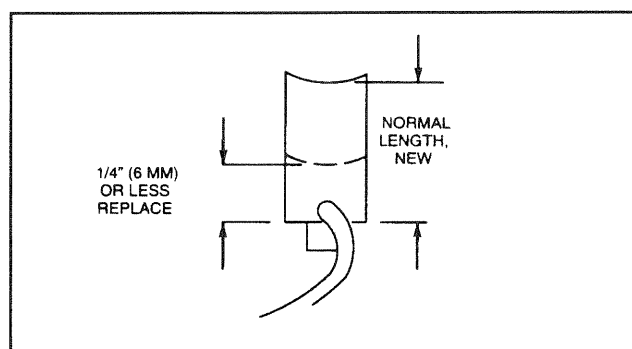
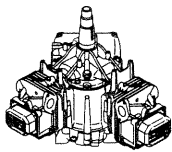


Fig. 14 - Inspect Brushes

ASSEMBLE STARTER MOTOR:

1. Assemble brushes in their proper holders.

Note: Brush retainers may be made using control wire (Briggs & Stratton P/N 26634) as shown in Fig. 15.



2. Assemble brush retainer to commutator and remove brush retainers.

- a. Assemble end cap to armature shaft.

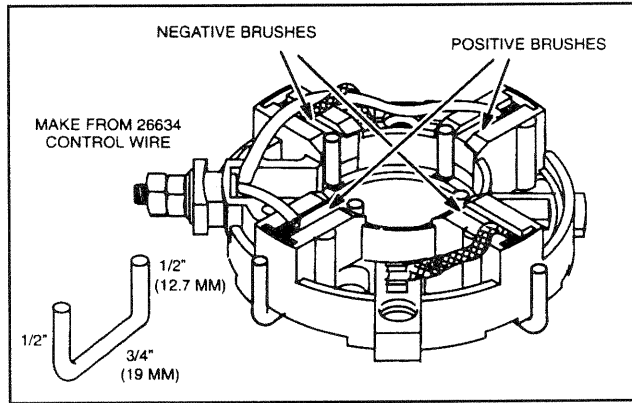


Fig. 15 - Assemble Brushes

3. Hold armature and end cap against work surface.
4. Slide housing over armature, aligning notch in housing with terminal on brush retainer, Fig. 16.

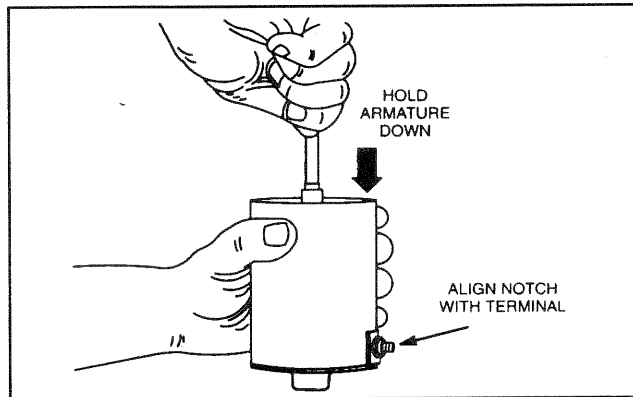


Fig. 16 - Install Starter Housing

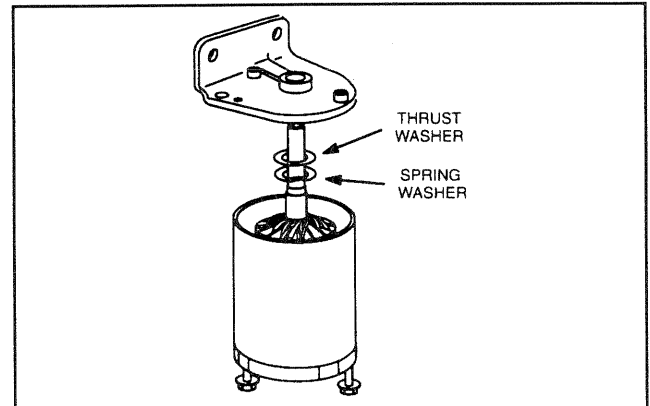


Fig. 17 - Install Drive End Cap

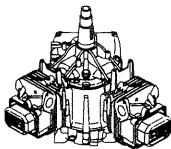
5. Assemble spring washer and thrust washer to armature shaft and install drive end cap, Fig. 17.

- a. Torque thru bolts to 50 in. lbs. (5.6 Nm).

6. Install starter drive.

INSTALL STARTER MOTOR:

Install starter motor and torque screws to 140 in. lbs. (15.8 N m).



DESCRIPTION 30

PROTECTION SYSTEMS

 Low Oil Pressure Switch30

 High Temperature Switch30

CHECKING THE ENGINE OIL 31

CHANGING THE ENGINE OIL 31

CHANGING THE OIL FILTER 31

CHECK PRESSURE SWITCH..... 32

CHECK OIL PRESSURE 32

CRANKCASE BREATHER 32

 Check Breather 33

 Install Breather 34

DISASSEMBLE OIL PUMP 34

ASSEMBLE OIL PUMP 34

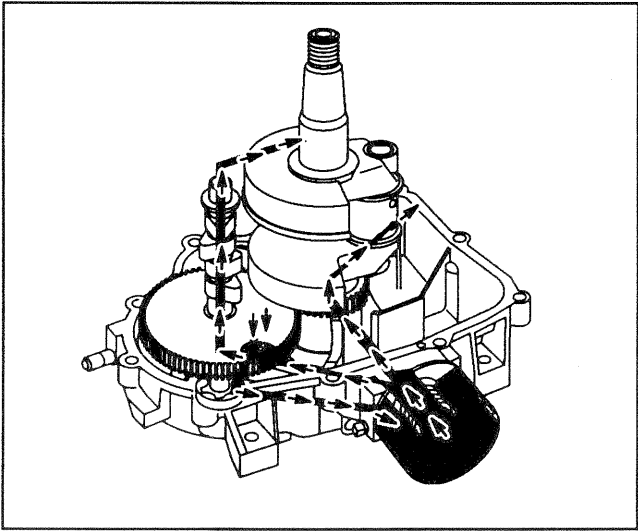
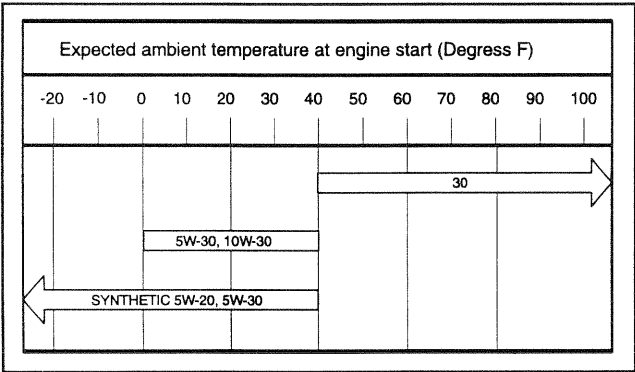


Fig 1



Use a high quality detergent oil classified "For Service SE" or higher. Use no special additives with recommended oils.

DESCRIPTION

Generac GN724 OHVI V-Twins use a full pressure lubrication system with an oil filter. The gear driven oil pump draws oil from a screened oil pickup in the sump and pumps the oil through the oil filter.

The filtered oil flows through oil galleries in the sump and is distributed to the main bearings, connecting rod bearings and camshaft bearings. Engine oil pressure will vary with oil viscosity, ambient air temperature differences, operating temperatures and engine load. Follow the oil recommendation on page 1 of this section. Oil Pressure - @ 70° F (21 ° C): 15 - 50 psi (1.0 - 3.5 Bar)

A pressure relief valve limits the maximum oil pressure in the system.

PROTECTION SYSTEMS

LOW OIL PRESSURE SWITCH:

This switch (Figure 2.3) has normally closed contacts that are held open by engine oil pressure during cranking and operating. Should oil pressure drop below the 8 psi range, switch contacts close, and the engine shuts down. The unit should not be restarted until oil is added, and the Auto/Off/Manual switch must be turned to OFF and then back to AUTO.

HIGH TEMPERATURE SWITCH:

This switch's (Figure 2) contacts close if the temperature should exceed approximately 140° C (284° F), initiating an engine shutdown. Your generator will automatically restart and the LED will reset once the temperature has returned to a safe operating level.

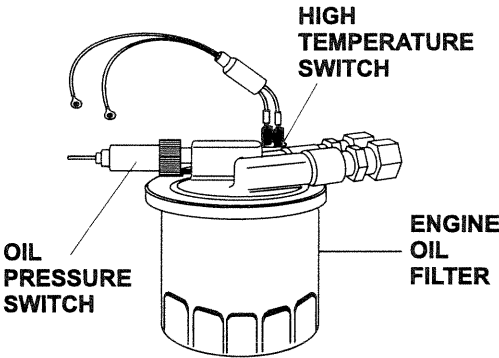
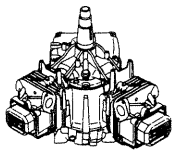


Fig. 2



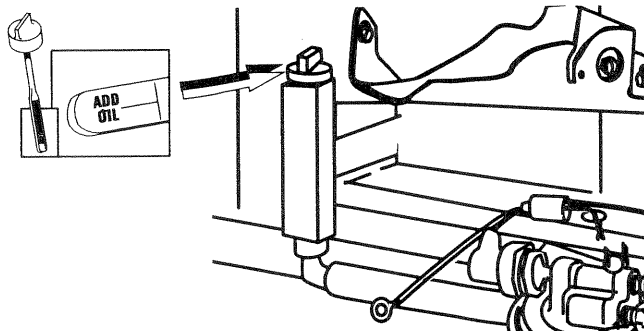
CHECKING THE ENGINE OIL LEVEL

The oil capacity of the GN724 OHVI engine is approximately 2 quarts. To check the engine oil level, proceed as follows:

1. Start the generator by moving the Auto/ Off/Manual switch to the MANUAL position. Allow it to run for a short while and then shut it down by moving the switch to the OFF position.
2. Remove the dipstick and wipe it dry with a clean cloth.
3. Install and tighten the dipstick cap; then, remove it again. The oil level should be at the dipstick "Full" mark. If necessary, add oil to the "Full" mark only. **DO NOT FILL ABOVE THE "FULL" MARK.**

⚠ Never operate the engine with the oil level below the "Add" mark on the dipstick. Doing this could damage the engine.

4. Install and tighten the dipstick.
5. Reset the Auto/Off/Manual switch to its original position.



CHANGING THE ENGINE OIL

ENGINE OIL RECOMMENDATIONS:

Use oil of American Petroleum Institute (API) Service Class SG, SH or SJ. Select the viscosity based on the air temperature at the time of operation. See the following chart:

Temperature	Oil Grade (Recommended)
Above -7° C (20° F)	SAE 10W-30 or SAE 30
Below -7° C (20° F)	SAE 5W-20 or 5W-30
All Seasons	SAE 5W-30 Synthetic*

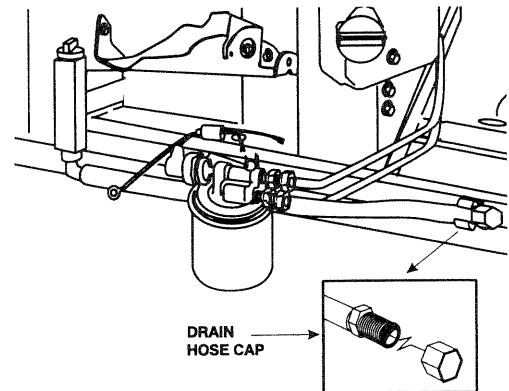
*Organic break-in oil is required before using synthetic oil.

⚠ Any attempt to crank or start the engine before it has been properly serviced with the recommended oil may result in an engine failure.

OIL CHANGE PROCEDURE:

To change the oil, proceed as follows:

1. Run the engine until it is thoroughly warmed up then shut OFF the engine.
2. Immediately after the engine shuts OFF, pull the oil drain hose (Figure 3) free of its retaining clip. Remove the cap from the hose and drain the oil into a suitable container.

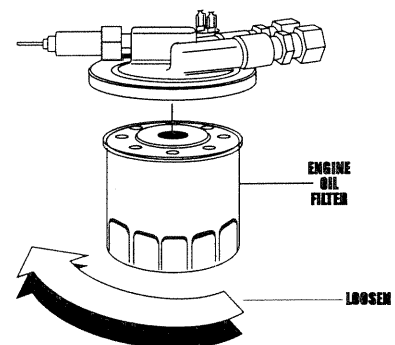


3. After the oil has drained, replace the cap onto the end of the oil drain hose. Retain the hose in the clip.
4. Refill with the proper recommended oil.

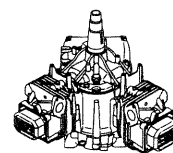
CHANGING THE OIL FILTER

Change the engine oil filter as follows:

1. With the oil drained, remove the old oil filter by turning it counterclockwise.



2. Apply a light coating of clean engine oil to the gasket of the new filter.



3. Screw the new filter on by hand until its gasket lightly contacts the oil filter adapter. Then, tighten the filter an additional 3/4 to one turn (Figure 3.4).
4. Refill with the proper recommended oil (see owner's manual for oil capacities).
5. Start the engine and check for leaks.

CHECK PRESSURE SWITCH

Use a Digital multimeter. Set meter to test for continuity.

Remove pressure switch for testing. Connect one continuity tester lead to the switch terminal and the other tester lead to the metal body of the switch, Fig. 5. The tester should indicate continuity when no pressure is applied to the switch. The switch should open (no continuity) when approximately 4.5 PSI (0.3 Bar) is applied. Replace the switch if test results are not to specification.

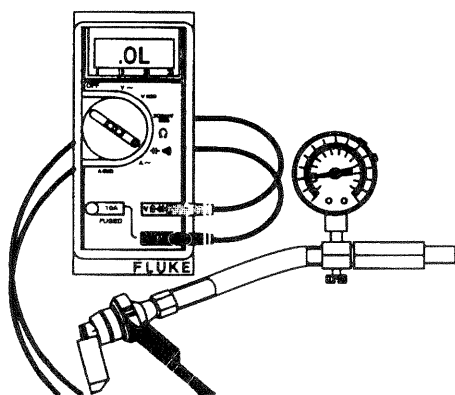


Fig. 5 - Checking Pressure Switch

CHECK OIL PRESSURE

1. Oil level must be between the LOW and FULL mark on dipstick. If oil level is low, check for leaks and add to FULL mark.
2. Remove pressure switch.
3. Install oil pressure gauge, Fig. 6.
4. Start and run engine for approximately 5 minutes. 5. Check oil pressure at 3000 RPM.
5. Check oil pressure.

Oil Pressure @ 70° F (21 ° C): 15 ~ 50 psi (1.0 ~ 3.5 Bar)

Low oil pressure may be caused by the following reasons:

- Engine RPM Too Low
- Wrong Viscosity or Diluted Oil
- Low Oil Level
- Broken Pressure Relief Spring
- Missing Pressure Relief Plunger
- Worn Bearings
- Damaged Or Defective Oil Pump

High oil pressure may be caused by the following reasons:

- Wrong Viscosity Oil
- Plugged Oil Galleries
- Stuck Pressure Relief Plunger

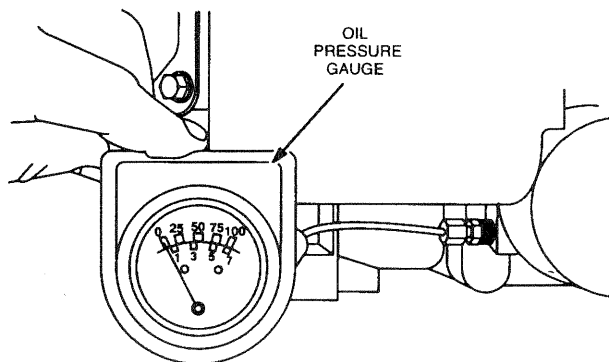


Fig. 6 - Checking Oil Pressure

CRANKCASE BREATHER

The crankcase breather is equipped with a reed valve to control and maintain a partial vacuum in the crankcase. The breather is vented to the intake elbow. The breather chamber contains a removable oil vapor collector. Oil vapor is condensed on the collector material and drains back into the crankcase, which minimizes the amount of oil vapor entering the breather.

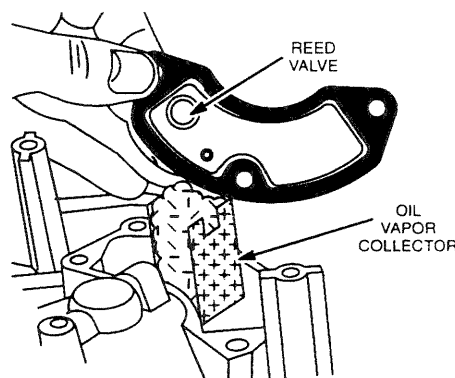
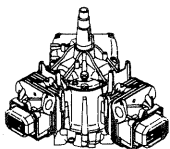


Fig. 7 - Crankcase Breather



CHECK BREATHER:

Remove rotating screen, blower housing and flywheel. See Section 2.

1. Disconnect breather tube from intake elbow, remove three screws and breather. Discard gasket.
2. Check to see that reed valve is not deformed, Fig. 8.

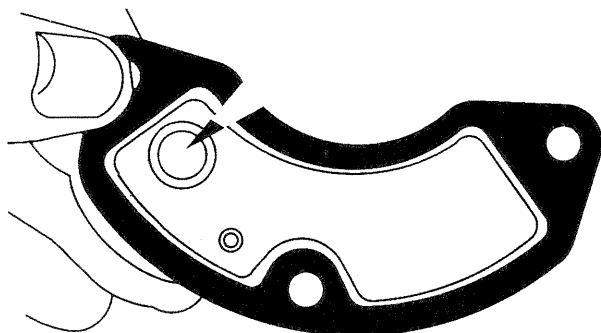


Fig. 8 - Checking Breather

Note: Reed valve must make a complete seal around vent hole.

3. Remove oil vapor collector and retainer.
4. Check collector for deterioration and replace if necessary.

INSTALL BREATHER:

1. Install oil vapor collector and retainer.

Note: Push oil vapor collector and retainer in until it bottoms.

2. Install breather with new gasket, Fig. 9.
 - a. Torque screws to 55 in. lbs. (6.2 Nm).
 - b. Assemble breather tube to intake elbow.

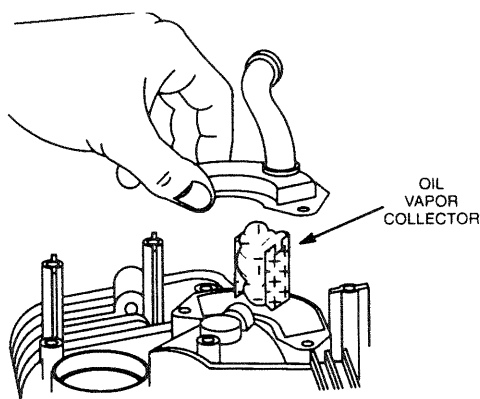


Fig. 9 - Install Breather

DISASSEMBLE OIL PUMP:

Drain oil and remove oil filter. Remove engine from equipment. Remove spark plugs. The oil pump can be inspected or replaced without removing the sump.

1. Remove the following parts, Fig. 10.
 - a. Remove oil pump cover
 - b. Remove inner rotor.
 - c. Remove outer rotor.
 - d. Remove shaft.
 - e. Remove and discard O-ring

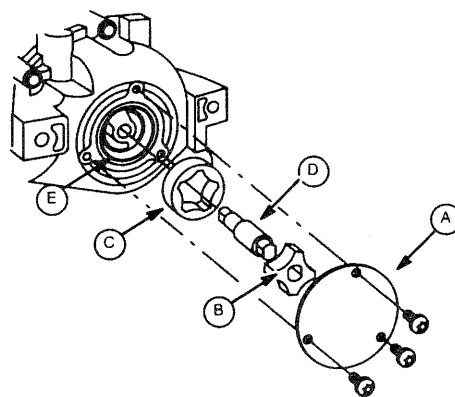


Fig. 10 - Remove Oil Pump

2. Check rotors and shaft for any obvious wear and/or damage, Fig. 11. Replace as necessary.

If pump housing is worn or damaged the sump must be replaced.

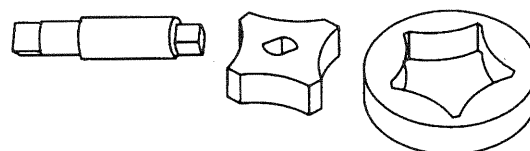
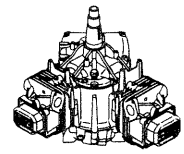


Fig. 11 - Checking Oil Pump

ASSEMBLE OIL PUMP

1. Lubricate oil pump components with engine oil and assemble to sump, Fig. 12. Make sure drive shaft is engaged in camshaft.



- a. Install drive shaft.
 - b. Install inner rotor.
 - c. Install outer rotor.
 - d. Install new O-ring.
 - e. Install oil pump cover.
2. Torque screws to 50 in. lbs. (5.6 Nm). The oil pump is virtually trouble free and requires very little maintenance.

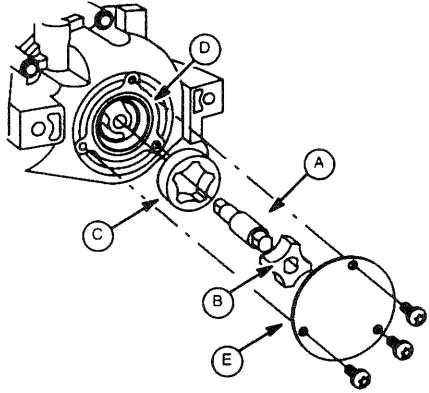
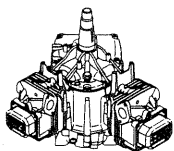


Fig. 12 - Assembling Oil Pump



ENGINE DISASSEMBLY

Drain oil, remove oil filter and remove engine from equipment. Remove spark plugs. Remove cylinder heads. See Section 5. Remove flywheel, disconnect stop switch wires at armatures and remove armatures. See Section 2.

1. Remove the following parts, Fig. 1.

- a. Back plate
- b. Air guide
- c. Starter motor
- d. Oil fill tube and dipstick
- e. Stop switch wiring harness
- f. Breather and oil vapor collector
- g. Alternator

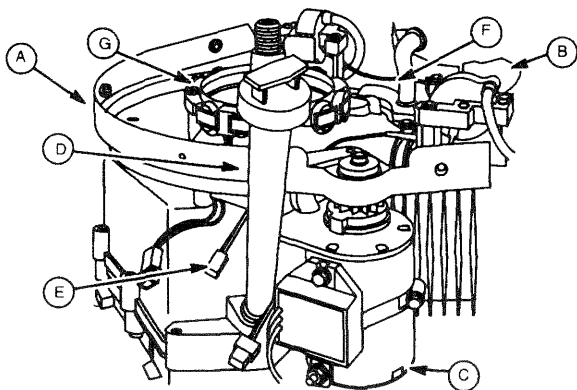


Fig. 1 - Remove Back Plate And Starter Motor

2. Remove oil pump. Fig. 2.

- a. Oil pump cover
- b. Inner rotor
- c. Outer rotor
- d. Drive shaft

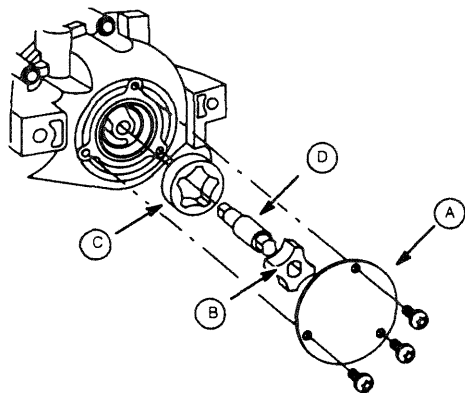


Fig. 2 - Remove Oil Pump

3. Remove sump and discard gasket, Fig. 3.

- a. Remove governor gear and thrust washer.

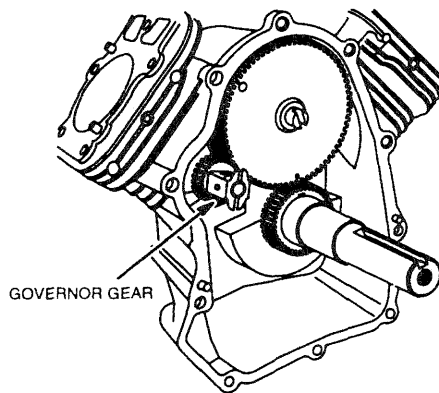


Fig. 3 - Remove Sump

4. Rotate crankshaft and camshaft until timing marks align and remove camshaft, Fig. 4.

- a. Remove tappets.

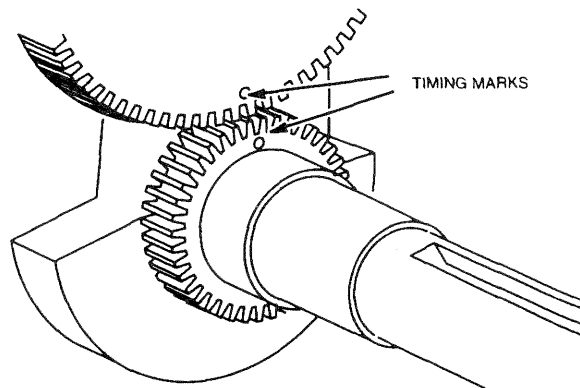


Fig. 4 - Align Timing Marks

Note: Remove any carbon or ridge at the top of cylinder bores to prevent breaking rings when removing piston and connecting rod assemblies.

5. Remove No. 2 connecting rod cap and push connecting rod and piston assembly out of cylinder.

- a. Reassemble cap to rod to prevent interchanging.

6. Repeat for other cylinder.

7. Remove crankshaft.

CLEAN ALL SURFACES OF GASKET MATERIAL. REMOVE OIL SEALS AND THOROUGHLY CLEAN COMPONENTS IN SOLVENT. ORGANIZE COMPONENTS, KEEPING PARTS WHICH ARE AN ASSEMBLY TOGETHER.

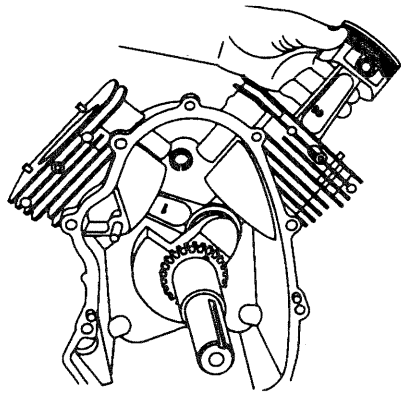
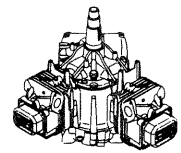


Fig. 5 - Remove Piston And Connecting Rod

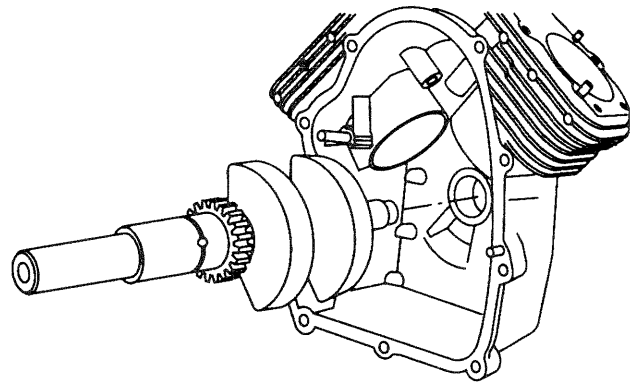
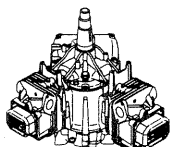


Fig. 6 - Remove Crankshaft



SECTION CONTENTS

	PAGE
CYLINDER	37
Check Cylinder.....	37
Resizing	37
Cylinder Finish	38
Cleaning	38
BEARINGS	39
Check Mag Bearing	39
Remove Mag Bearing.....	39
Install Mag Bearing	39
Check Camshaft Bearings	39
Check PTO Bearings.....	40
Install PTO Oil Seal	40

CHECK CYLINDER

Check cylinder for cracks, stripped threads or broken fins.
Check cylinder bores for damage or scoring.

1. Check cylinder head mounting surface for distortion with a straight edge, Fig. 1.

If mounting surfaces are distorted more than .004" (0.1 mm), the cylinder must be replaced.

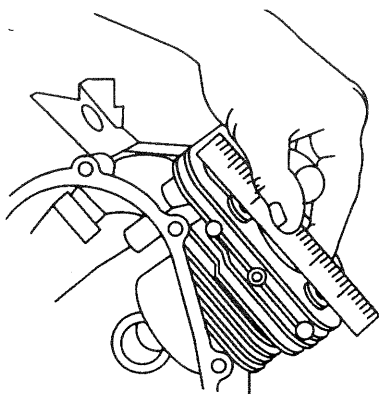


Fig. 1 - Checking Cylinder

2. Check cylinder bores for wear using telescoping gauge, Briggs Tool P/N19404 and dial caliper, Briggs Tool P/N19199.

Standard Bore Size: 2.969"-2.970" (75.41-75.43 mm)

- a. Measure cylinder bore in 6 points at right angles as shown, Fig. 3.
- b. If cylinder bore is worn more than .003" (0.075 mm) or more than .0015" (0.035 mm) out of round, it must be resized.

NOTE: If cylinder bores are within specification and show no signs of scoring or other damage, new piston rings may be installed providing the cylinder bores are reconditioned using a rigid hone with finishing stones, to restore the proper cross hatch angle in the cylinder bores. The proper cylinder cross hatch ensures proper lubrication and piston ring break in.

Refer to Page 2, "Cylinder Finish" (Cross Hatch) for correct procedure for installing cross hatch.

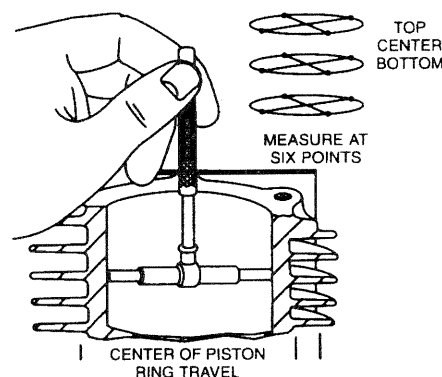


Fig. 2 - Check Cylinder Bore

RESIZING:

Always resize to exactly .010" (25 mm) or .020" (.51 mm) or .030" (.76 mm) over standard bore size. If this is done accurately, the service oversize rings and pistons will fit perfectly and proper clearances will be maintained.

Cylinders can be quickly resized with a good hone such as Briggs Tool P/N19205. Contact your Briggs & Stratton source of supply. Use the stones and lubrication recommended by the hone manufacturers to produce the correct cylinder cross hatch.

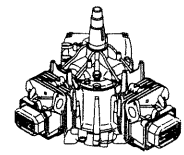
NOTE: Automatic transmission fluid is an acceptable honing oil. Another acceptable honing oil can be made by mixing 4 parts No. 30 weight oil with 1 part kerosene.

If a boring bar is used, a hone must be used after the boring operation to produce the proper cylinder cross hatch.

Honing is done with a variable speed 1/2", portable drill and a honing fixture. See page 5 for dimensions to make your own honing fixture.

Use three crankcase cover mounting screws and fasten cylinder to a honing fixture, Fig. 3.

Clamp honing fixture and cylinder securely in a vise at a convenient work height. Place hone drive shaft in chuck of portable drill and tighten.



Cut a wood block and place inside cylinder to prevent hone from extending further than 3/4" to 1" (19 mm to 25 mm) below cylinder bore.

Place hone in middle of cylinder bore. Tighten adjusting knob with finger until stones fit snugly against cylinder wall. **DO NOT FORCE.** Connect drive shaft to hone. Be sure that cylinder and hone are centered and aligned with drive shaft and drill spindle.

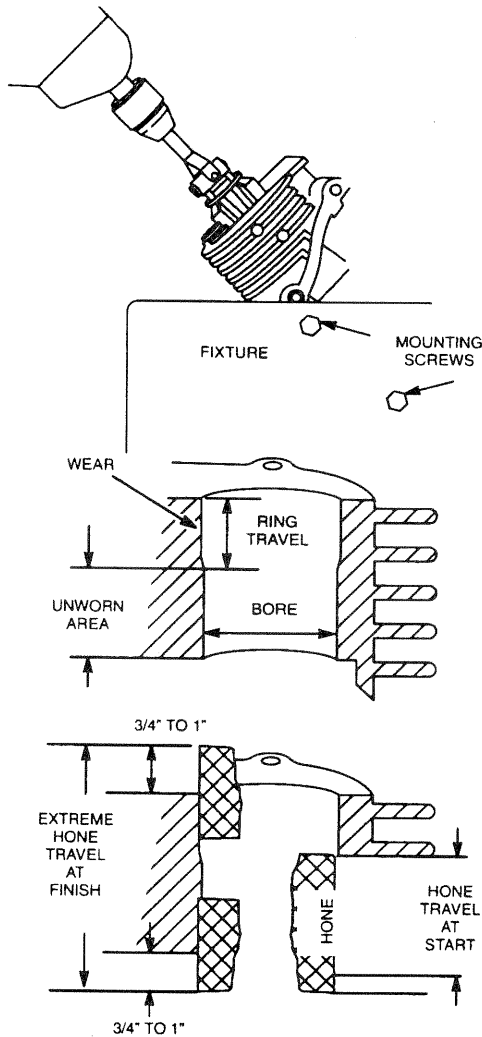


Fig. 3

Lubricate hone as recommended by hone manufacturer. The recommended drill speed is 300 to 700 RPM MAXIMUM and 40-60 strokes per minute. Because cylinder bores normally wear only in the area of ring travel, the cylinder bore will be round above and below ring travel, Fig. 3. Start drill and, as hone spins, move it up and down at the bottom of the cylinder bore. Gradually increase the length of the strokes until hone

travels full length of cylinder bore, and no more than 3/4" to 1" above cylinder bore, Fig. 3. Lubricate hone frequently to prevent build up on stones.

As cutting tension decreases, stop hone and tighten adjusting knob following hone manufacturer's recommendations.

Check cylinder bore frequently.

CYLINDER FINISH (CROSS HATCH):

The finishing stones are used after the cylinder bore has been resized to within .0015" (.04 mm) of the desired size or when reconditioning a cylinder bore. The as finishing stones will produce the correct cross hatch necessary for proper lubrication. The correct cross hatch angle is approximately 45 degrees, Fig. 4.

It is recommended that the cylinder bores be reconditioned to restore the cross hatch when new piston rings are to be installed in a cylinder that is within specification. Be careful not to hone oversize or it will be necessary to resize the cylinder.

NOTE: To produce the proper cross hatch finish use a drill speed of approximately 200 RPM and 40-60 Hatch strokes per minute. Lubricate hone liberally to prevent build up on finishing stones.

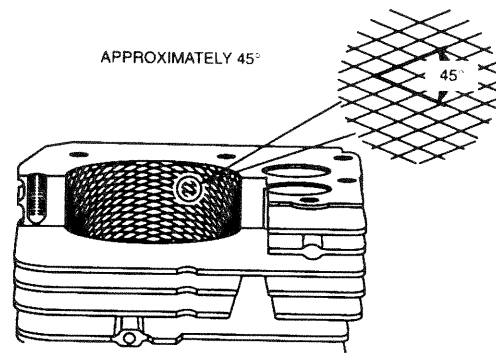
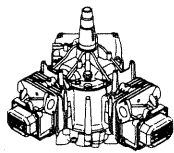


Fig. 4 - Cylinder Cross

CLEANING:

IT IS MOST IMPORTANT THAT THE ENTIRE CYLINDER AND CRANKCASE BE THOROUGHLY CLEANED AFTER HONING.

First wash the cylinder and crankcase carefully in a solvent such as kerosene or commercial solvent. Then thoroughly wash cylinder and crankcase using a stiff brush with soap and hot water. Rinse thoroughly with hot running water. Repeat washing and rinsing until all traces of honing grit are gone.



Honing grit is highly abrasive and will cause rapid wear to all of the internal components of the engine unless it is completely removed.

NOTE: When cylinder and crankcase have been thoroughly cleaned, use a clean white rag or napkin and wipe the cylinder bore. If honing grit is present it will appear as a gray residue on rag. If any honing grit is evident, re-wash and rinse entire cylinder and crankcase and check again. When there is no trace of honing grit on rag, the cylinder is properly cleaned. Then oil cylinder bore to prevent rusting.

BEARINGS

CHECK MAG BEARING:

Check DU magneto bearing for damage. Check for wear using plug gauge Briggs Tool P/N19219, Fig. 5. Try gauge at several locations. If plug gauge is not available see reject dimension below.

Reject Dimension: 1.383" (35.12 mm)

Replace bearing if damaged or worn.

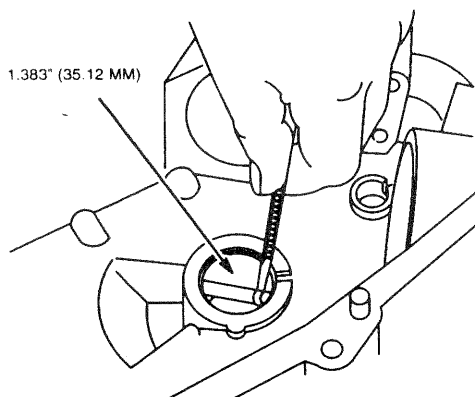


Fig. 5 - Check Mag Bearing

REMOVE MAG BEARING:

Insert bushing driver, Briggs Tool P/N19226 into bearing from oil seal side. Place a reference mark on driver to indicate proper depth of bushing when installing new bushing.

1. Place cylinder on cylinder support, Briggs Tool P/N19227 with large opening facing DU bearing, Fig. 6.
2. Press out bearing with bushing driver, Briggs Tool P/N 19226.

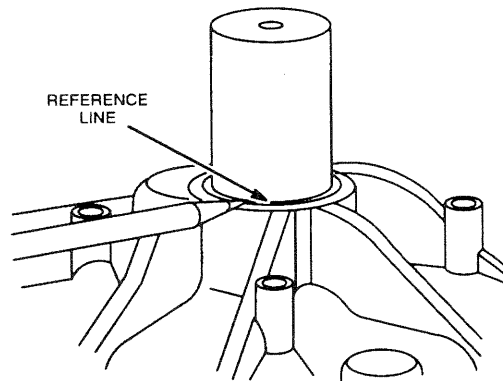


Fig. 6 - Remove Mag Bearing

INSTALL MAG BEARING:

1. Place cylinder on cylinder support, Briggs Tool P/N19227 with large opening facing bearing, Fig. 7.
2. Align oil hole in DU bearing with oil hole in cylinder.
3. Press in new bearing to correct depth with bushing driver, Briggs Tool P/N19226.

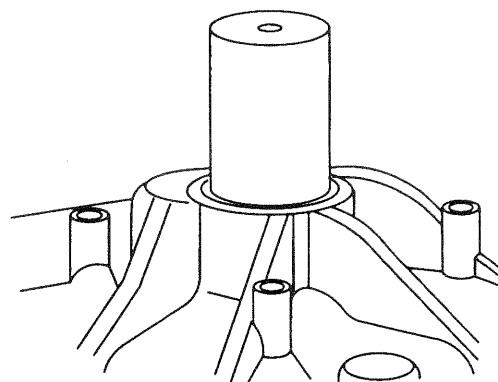


Fig. 7 - Install Mag Bearing

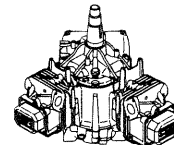
4. Stake bearing from both sides with 1/4" round punch to prevent bearing from turning, Fig. 8.
 - a. Install new oil seal with sealing lips facing in.
 - b. Use cylinder support, Briggs Tool P/N19227 and press oil seal until flush with cylinder.

CHECK CAMSHAFT BEARINGS

Check camshaft bearings in cylinder and sump for damage or wear.

Reject Dimension: .6275" (15.93 mm)

If bearings are damaged or worn the cylinder or crankcase cover must be replaced.



CHECK PTO BEARING

Check PTO bearing for damage or wear.

Reject Dimension: 1.629" (41.37 mm)

If PTO bearing is damaged or worn the sump must be replaced.

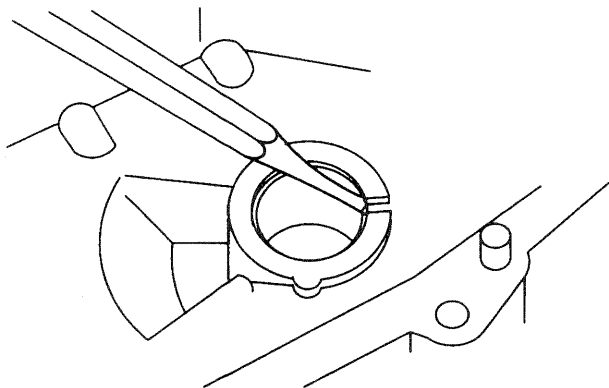


Fig. 8 - Stake Bearing

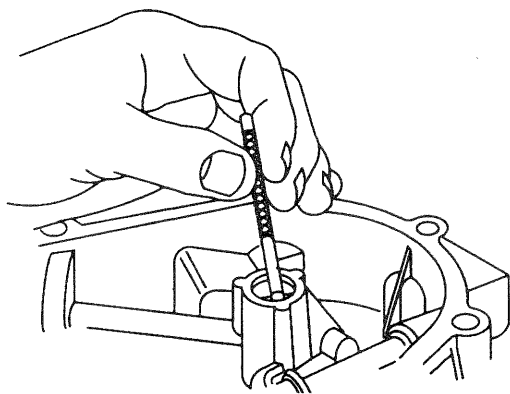


Fig. 9 - Check Cam Bearings

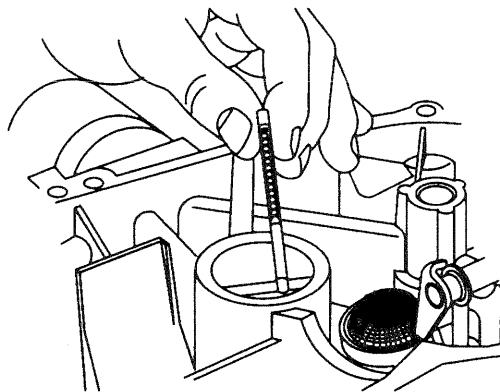


Fig. 10 - Check PTO Bearing

INSTALL PTO OIL SEAL:

Always install new oil seals whenever engine is disassembled for major servicing. When installing new PTO oil seal, use cylinder support, Briggs Tool P/N19227 and press oil seal slightly below mounting surface. Always lubricate sealing lips with engine oil to prevent damaging seal when installing crankshaft.

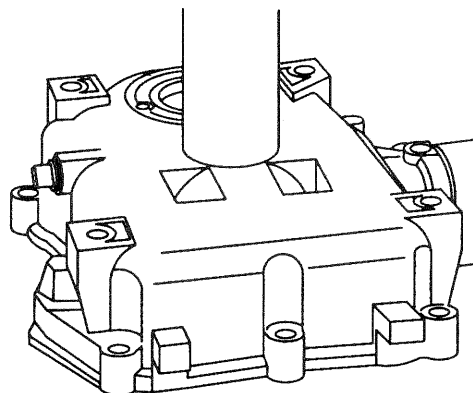
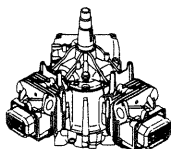


Fig. 11 - Install Oil Seal



SECTION CONTENTS

	PAGE
CHECKING CRANKSHAFT	41
CHECKING CAMSHAFT	41

CHECKING CRANKSHAFT:

Inspect crankshaft threads and keyways for damage or wear. If threads or keyways are damaged or worn, replace crankshaft. Check journals for scoring. If journals are scored, replace crankshaft. Check journals for wear. See crankshaft reject sizes.

Crankshaft Reject Sizes

Model Series	PTO Journal	Mag. Journal	Crankpin Journal
405770	1.623" (41.22 mm)	1.376" (34.95 mm)	1.4965" (38.01 mm)

Check oil galleries for blockage or obstructions. Check timing gear for damaged teeth. Timing gear is replaceable. See illustrated parts list.

Crankshaft crankpin may re-ground for .020" undersize connecting rods, Fig. 2. See illustrated parts list for part number. See crankshaft grinding dimensions.

Crankshaft Grinding Dimensions

Dim. A	Dim. R	Dim. T
1.4782/1.479" (37.54/37.56 mm)	.170/.180" (4.32/4.57 mm)	1.4435/1.4465 (36.66/36.74 mm)

Complete instructions are included with undersize connecting rods.

CHECKING CAM SHAFT:

Inspect gear teeth, lobes and journals for wear and nicks, Fig. 3. Check oil galleries for blockage or obstructions. Camshaft journal and lobe reject sizes are shown below. Replace cam gear if not to specification.

Camshaft Reject Size

Journals (Mag & PTO)	Intake Lobes	Exhaust lobes
.623" (15.82 mm)	1.225" (31.15 mm)	1.223" (31.06 mm)

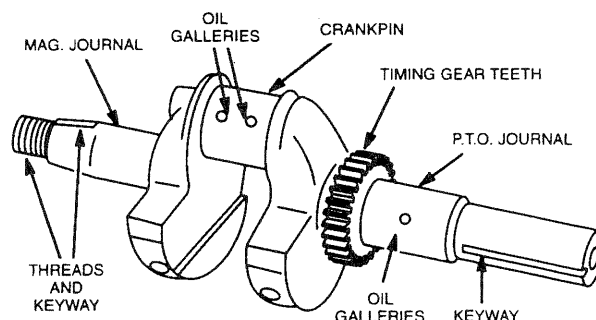


Fig. 1 - Checking Crankshaft

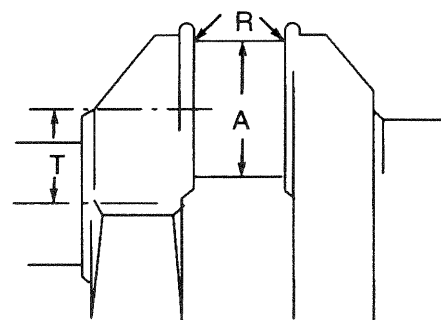


Fig. 2 - Crankshaft Dimensions

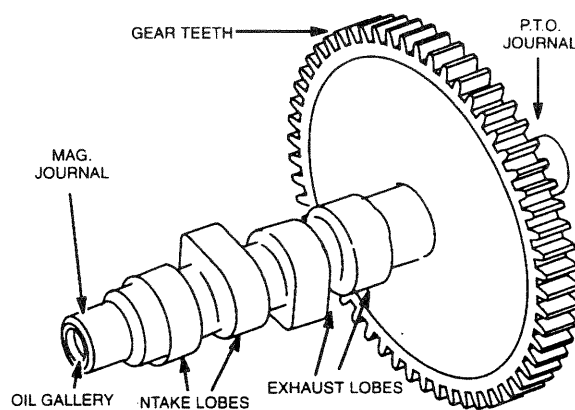
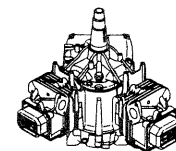


Fig. 3 - Checking Camshaft



SECTION CONTENTS

	PAGE
GENERAL INFORMATION	42
DISASSEMBLE PISTON AND CONNECTING ROD	42
CHECKING PISTON AND RINGS	42
CHECKING PISTON PIN AND CONNECTING ROD	43
ASSEMBLE PISTON AND CONNECTING ROD	43
ASSEMBLE PISTON RINGS TO PISTON	44

GENERAL INFORMATION

It is recommended that new piston rings be installed whenever the engine is disassembled for major servicing or overhaul, providing that cylinder bores are within specification.

Remove any carbon or ridge at the top of the cylinder bore. This will prevent breaking the rings when removing the piston and connecting rod from the engine. Remove the connecting rod cap. Push the piston and connecting rod out through the top of the cylinder.

Measure cylinder bores before checking pistons and rings. See Section 10. If cylinder bores require re-sizing it will not be necessary to check pistons and rings since a new oversized piston assembly will be used.

If the cylinder bore is more than .08 mm (.003") oversize, or .04 mm (.0015") out of round, it must be resized.

DISASSEMBLE PISTON AND CONNECTING ROD

1. Remove piston rings using ring expander, Briggs & Stratton P/N 19340, Fig. 1.
 - a. Then remove coil expander.

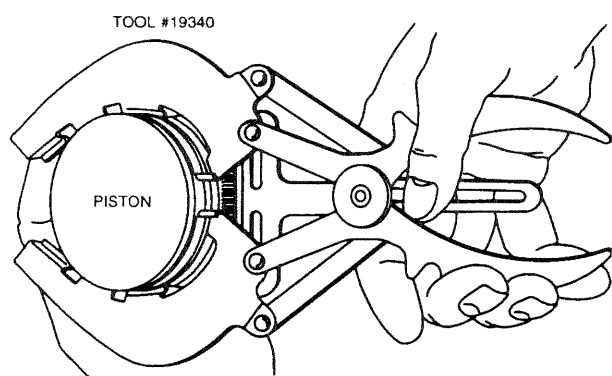


Fig. 1 - Remove Rings

2. Disassemble piston from connecting rod, Fig. 2.
 - a. Remove piston pin locks.
 - b. Piston pin is a slip fit in piston and connecting rod.

Keep pistons and connecting rods together as an assembly. Do not mix.

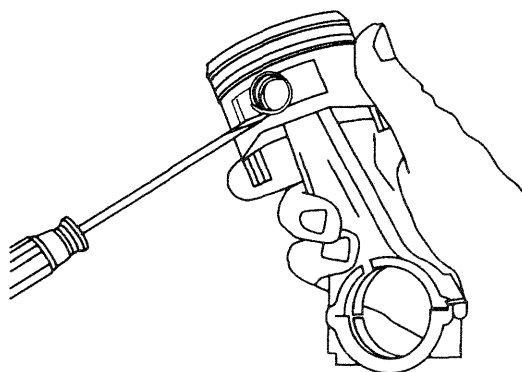


Fig. 2 - Remove Piston Pin Locks

CHECKING PISTON AND RINGS

If the cylinder is not going to be resized and the piston shows no signs of scoring, the piston should be checked.

1. Check side clearance of ring grooves using NEW rings, Fig. 3.
 3. If a .005" (0.12 mm) feeler gauge can be inserted, the ring groove is worn. The piston must be replaced.

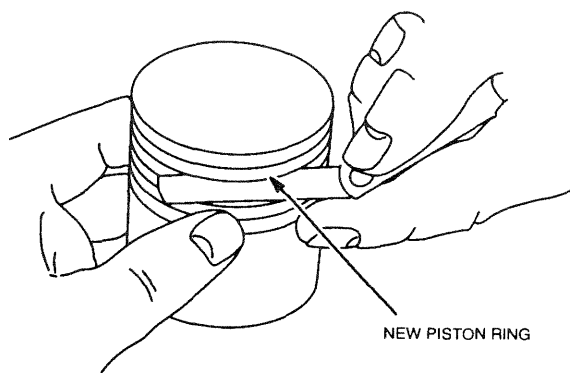
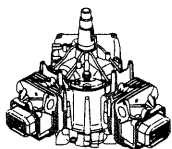


Fig. 3 - Check Ring Grooves



2. Check ring end gap, Fig. 4.

- a. Clean carbon from end of rings and insert approximately 1" (25 mm) into cylinder.

Reject Dimension (all): .030" (0.76 mm)

3. Check piston pin bore, Fig. 5.

- a. Replace if greater than .6745" (17.13 mm) or .0005" (.01 mm) out of round.

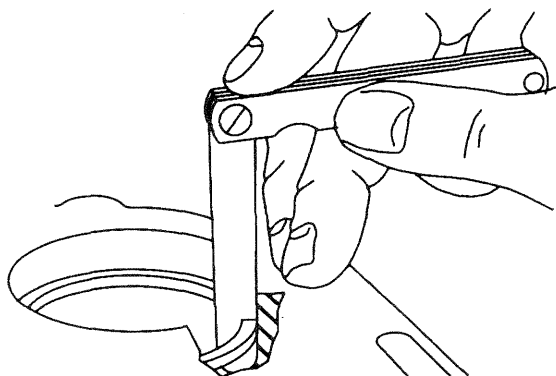


Fig. 4 - Checking Ring End Gap

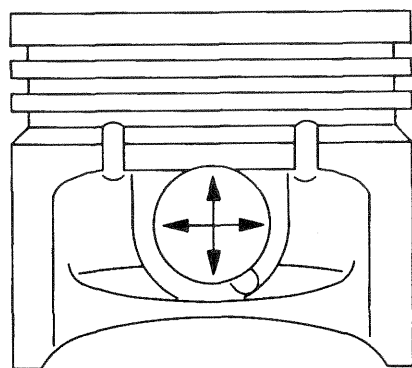


Fig. 5 - Check Piston Pin Bore

CHECKING PISTON PIN AND CONNECTING ROD

1. Check piston pin, Fig. 6.

- a. Replace if less than .6718" (17.06 mm) or .0005" (.01 mm) out of round.

2. Check connecting rod bearings.

Note: If crankpin bearing is scored or worn the connecting rod must be replaced.

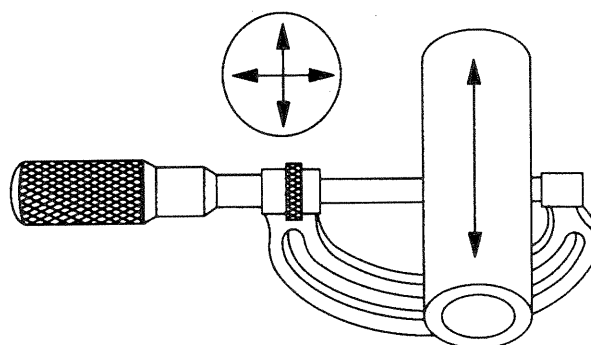


Fig. 6 - Check Piston Pin

Connecting Rod Reject Size

Crankpin Bearing	Piston Pin Bearing
1.5015" (38.13 mm)	.6745" (17.13 mm)

Note: .020" undersize connecting rods are available for use on a reground crankpin journal. See illustrated parts list.

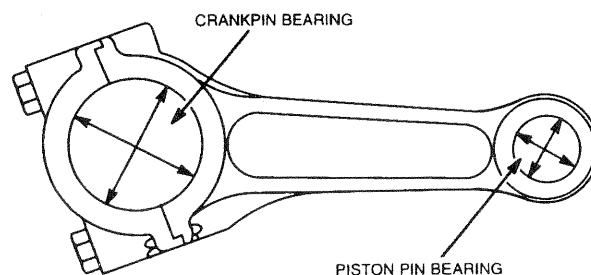


Fig. 7 - Check Rod Bearings

ASSEMBLE PISTON AND CONNECTING ROD

Lubricate parts with engine oil and assemble #1 piston and connecting rod, Fig. 8.

1. Arrow on piston must face flywheel side.
 2. Number "1" on connecting rod must face PTO side (opposite arrow on piston).
 - a. Install piston pin locks with needle nose pliers.
- Lubricate parts with engine oil and assemble #2 piston and connecting rod, Fig. 9.
1. Arrow on piston must face flywheel side.
 2. Number "2" on connecting rod must face PTO side (opposite arrow on piston).
 - a. Install piston pin locks with needle nose pliers.

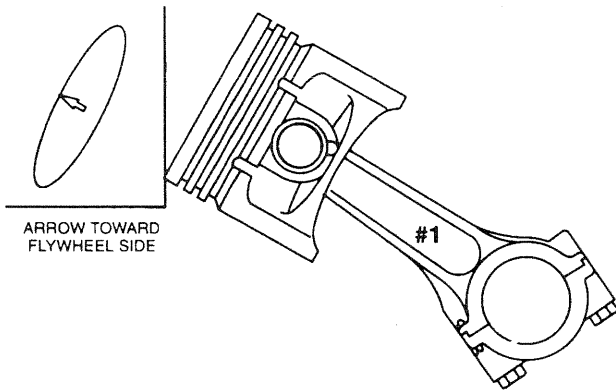
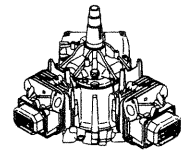


Fig. 8 - Assemble #1 Rod And Piston

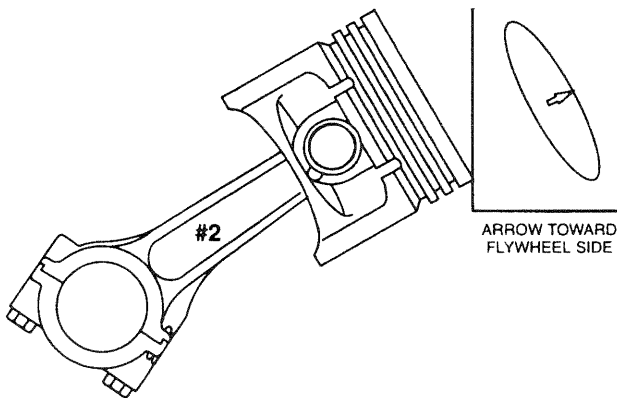


Fig. 9 - Assemble #2 Rod And Piston

ASSEMBLE PISTON RINGS TO PISTON

1. Install piston rings using ring expander, Briggs Tool P/N19340, Fig. 10.
 - a. Install oil ring coil expander making sure wire is inserted fully into coil.
 - b. Install oil ring.
 - c. Install center compression ring then, top compression ring.

Note: Top compression ring maybe installed with either side up.

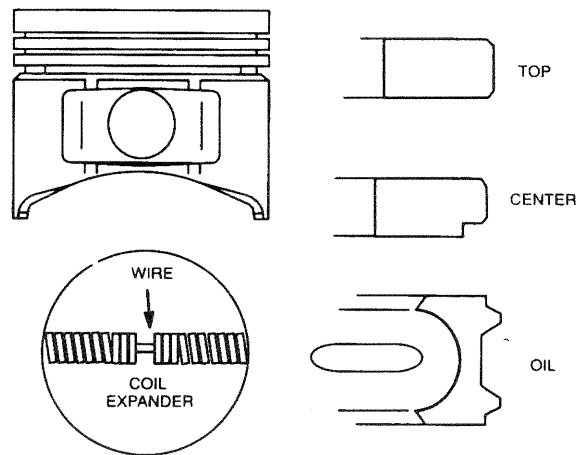
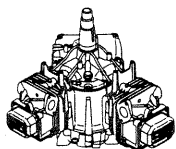


Fig. 10 - Piston Ring Installation



SECTION CONTENTS

INSTALL CRANKSHAFT	45
INSTALL PISTON AND CONNECTING ROD.....	45
INSTALL CAM SHAFT	46
INSTALL SUMP	46
GENERAL ASSEMBLY	46
INSTALL FLYWHEEL.....	47
ADJUST ARMATURE AIR GAP	48
INSTALL CYLINDER HEADS	48
ADJUST VALVES	48

INSTALL CRANKSHAFT

Lubricate mag bearing and lips of oil seal with engine oil and install crankshaft.

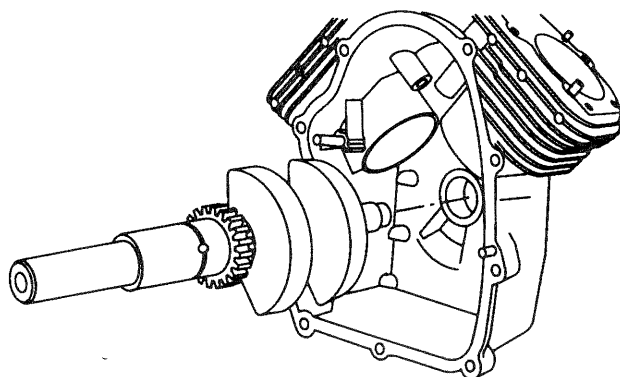


Fig. 1 - Installing Crankshaft

INSTALL PISTON AND CONNECTING ROD

Note: Install #1 piston and connecting rod first.

1. Oil piston rings, piston skirt, and compress rings with Ring Compressor, Briggs & Stratton P/N 19070, Fig. 2.
 - 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, Fig. 2.

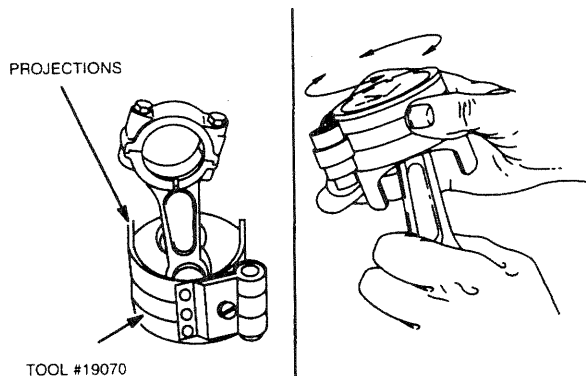


Fig. 2 - Compressing Rings

2. Lubricate cylinder bores and crankpin and rotate crankshaft until it is at bottom of stroke.
3. Install #1 piston with arrow towards flywheel side, Fig. 3.
 - a. Push piston down by hand until connecting rod is seated on crankpin.

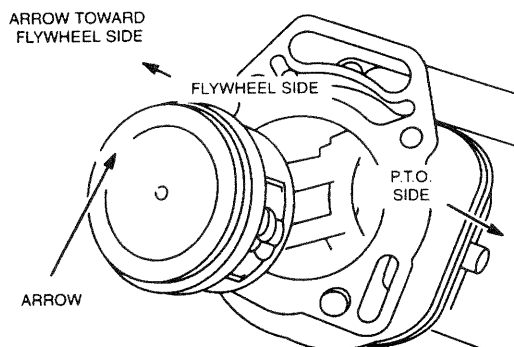


Fig. 3 - Installing Piston And Connecting Rod

4. Assemble connecting rod cap to rod with match marks aligned, Fig. 4.
 - a. Torque screws to 100 in. lbs. (11.2 Nm).

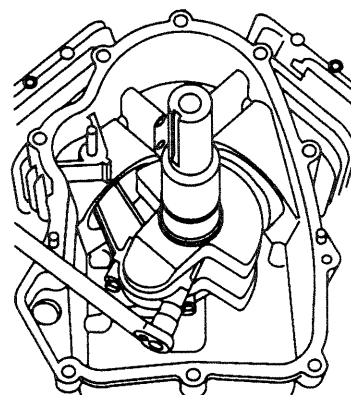
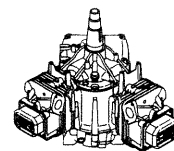


Fig. 4 - Torque Connecting Rods



5. Rotate crankshaft two revolutions to check for binding. Rod should also be free to move sideways on crankpin.

Repeat for #2 cylinder.

Note: The number 1 on #1 connecting rod and the number 2 on #2 connecting rod must be facing PTO side.

Important: Failure to use a torque wrench can result in loose connecting rod screws causing breakage or tight connecting rod screws causing scoring.

INSTALL CAMSHAFT

Lubricate tappets, cam shaft journals and lobes with engine oil. Assemble timing gear to crankshaft.

1. Install tappets.
2. Align timing marks on cam shaft and crankshaft gear and install cam shaft, Fig. 5.
3. Lubricate thrust washer, governor gear and governor cup and assemble to shaft.

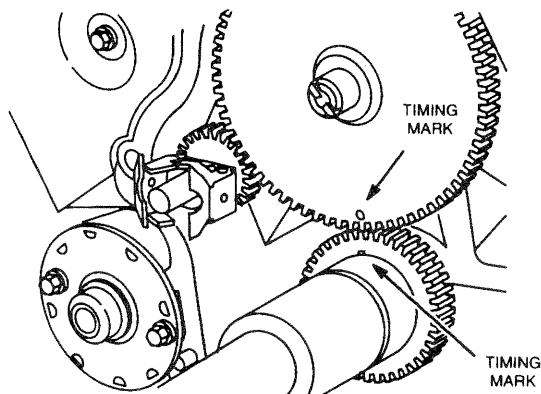


Fig. 5 - Installing Camshaft

INSTALL SUMP

Lubricate PTO and cam gear bearing.

1. Install sump with new gasket.
 - a. Torque screws in sequence shown to 200 in. lbs. (22.6 Nm), Fig. 6.
2. Check crankshaft end play.

Specification: .002"-.030" (0.020-0.30 mm)

3. Lubricate oil pump components with engine oil and assemble to sump, Fig. 7. Make sure drive shaft is engaged in camshaft.
 - a. Install drive shaft.
 - b. Install inner rotor.
 - c. Install outer rotor.

- d. Install oil pump cover with new O-ring.
- e. Torque screws to 50 in. lbs. (5.6 Nm).

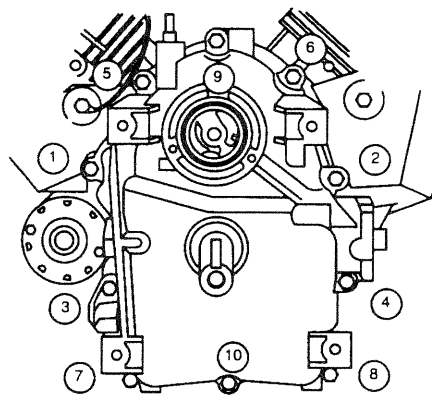


Fig. 6 - Installing Crankcase Cover

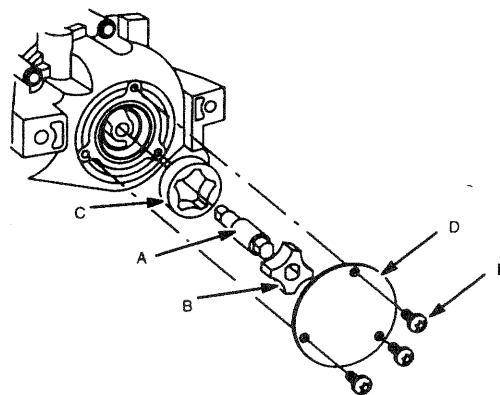


Fig. 7 - Assemble Oil Pump

GENERAL ASSEMBLY

1. Install armatures and ground wire assembly.

Note: Push armatures away from crankshaft as far as they will go and temporarily tighten screws.

2. Install air guide.
 - a. Torque screws to 45 in. lbs. (5.0 Nm).
3. Install alternator.
 - a. Torque screws to 20 in. lbs. (2.2 Nm).
4. Assemble oil fill tube to cylinder and crankcase cover, Fig. 9.
 - a. Route alternator wires between oil fill tube mounting boss on cylinder and oil fill tube bracket.
 - b. Route wiring harness between oil fill tube and cylinder.

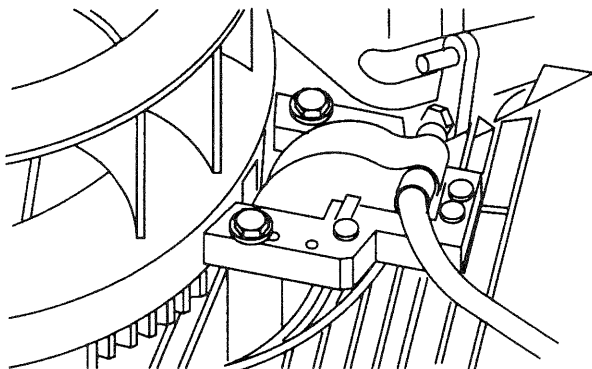
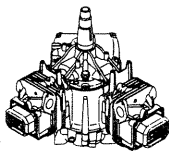


Fig. 8 - Install Armatures

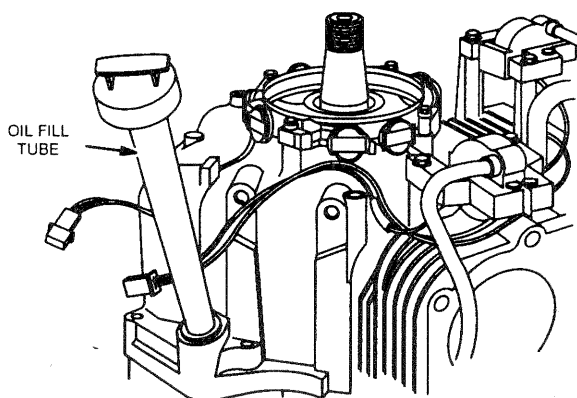


Fig. 9 - Route Wires

5. Install back plate.

- a. Torque screws to 100 in. lbs. (11.2 Nm).

Note: Route armature ground wire under back plate and between starter motor mounting bosses on cylinder as shown, Fig. 10.

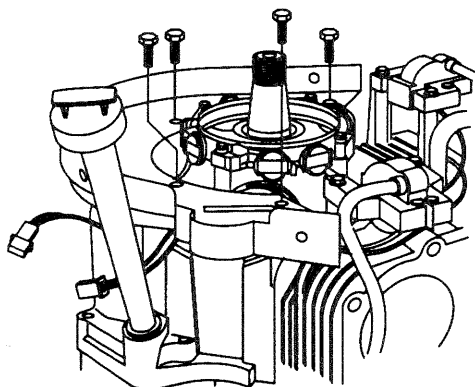


Fig. 10 - Route Armature Ground Wire

6. Install starter motor.

- a. Torque screws to 140 in. lbs. (15.8 Nm).

7. Install oil vapor collector and retainer.

8. Install breather.

- a. Torque screws to 55 in. lbs. (6.2 Nm).

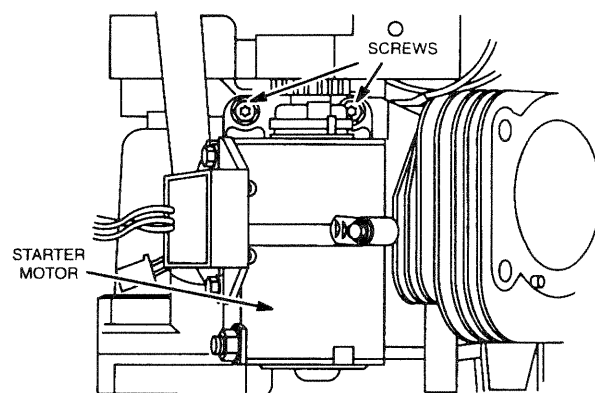


Fig. 11 - Install Starter Motor

INSTALL FLYWHEEL

Note: Clean flywheel and crankshaft taper removing all oil, dirt or grease.

1. Assemble flywheel to crankshaft and align keyways.

2. Insert flywheel key into crankshaft.

3. Assemble fan and retainer to flywheel, Fig. 12.

- a. Torque screws to 140 in. lbs. (16.0 Nm).

4. Install washer and flywheel nut.

5. Assemble flywheel holder, Briggs & Stratton P/N 19321, to retainer, Fig. 13.

- a. Torque flywheel nut to 150 ft. lbs. (203.0 Nm).

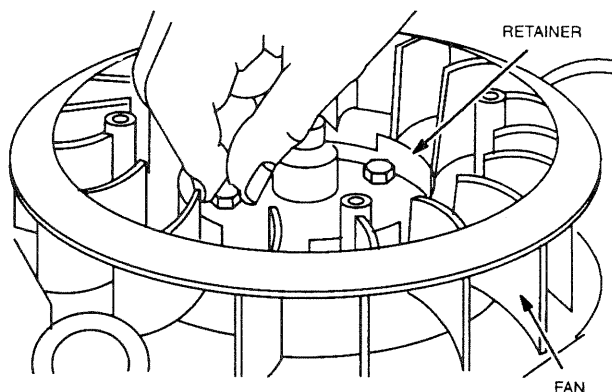


Fig. 12 - Install Fan And Retainer

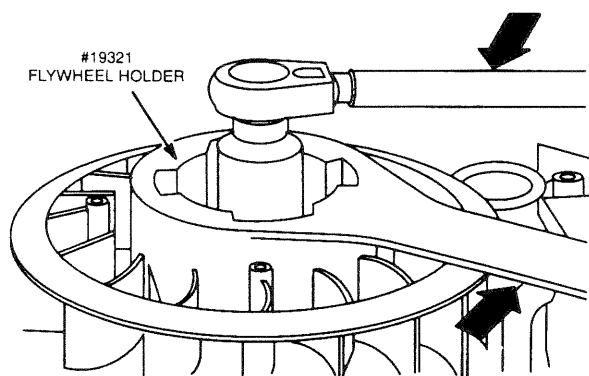
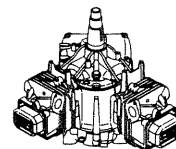


Fig. 13 - Install Flywheel

ADJUST ARMATURE AIR GAP

1. Rotate flywheel until magnet is under armature laminations.
2. Place thickness gauge, .008"-.012" (0.20-.30 mm) between magnet and armature laminations, Fig. 14.

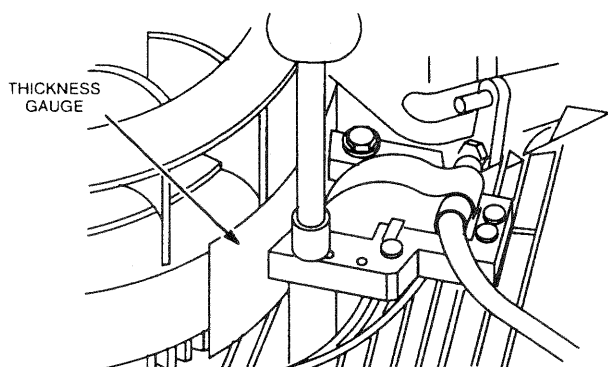


Fig. 14 - Adjust Armature Air Gap

3. Loosen mounting screw so magnet will pull armature down against thickness gauge.
 - a. Torque screws to 25 in. lbs. (2.8 Nm).
4. Rotate flywheel to remove thickness gauge.
5. Repeat for second armature.

INSTALL CYLINDER HEADS

1. Place cylinder head gasket over alignment dowels on cylinder block.
2. Install cylinder head assembly, Fig. 15.
 - a. Torque head bolts in sequence shown to 220 in. lbs. (25.0 Nm).
3. Install push rods. Make sure push rods are inserted in recess in tappets.

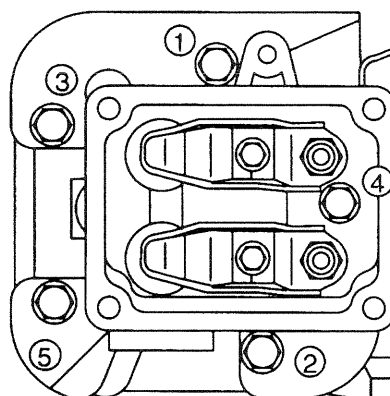


Fig. 15 - Install Cylinder Head

Note: Intake push rods are aluminum.

4. Compress valve springs and insert push rods into recess in rocker arm adjustment screws, Fig. 16.

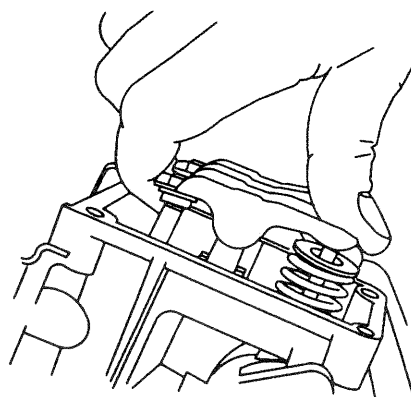


Fig. 16 - Insert Push Rods

ADJUST VALVES

1. Set No. 1 cylinder at TDC, compression stroke.
 - a. Adjust valves and check, Fig. 17.

Valve Clearance (cold) IN and EX .005" (0.13 mm)

- b. Torque adjusting screws and jam nuts to 60 in. lbs. (6.6 Nm).
2. Set No. 2 cylinder at TDC, compression stroke.
 - a. Repeat for No. 2 cylinder.

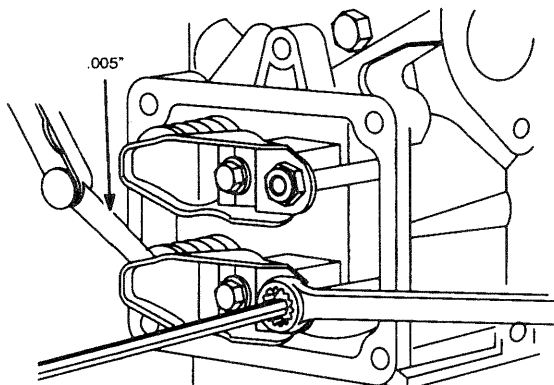
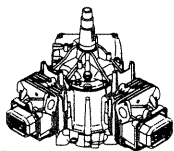


Fig. 17 - Adjust Valves

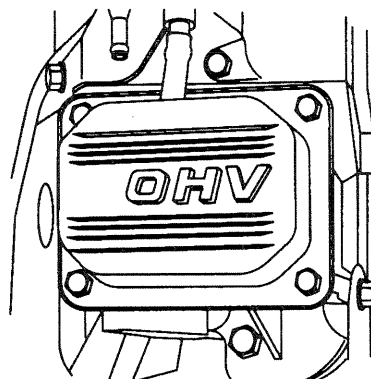


Fig. 18 - Install Valve Covers

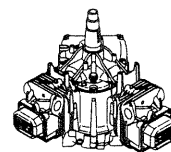
3. Install valve covers with new gaskets, Fig. 18.
 - a. Torque screws to 100 in. lbs. (11.2 Nm).

ADJUST GOVERNOR

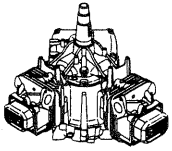


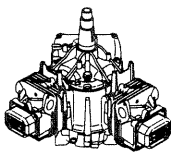
WARNING: BEFORE STARTING OR RUNNING ENGINE, static adjustment of the governor must be completed! Failure to make the static adjustments first could result in engine overspeeding which may result in engine damage, property damage or personal injury.

SPECIAL TOOLS



Description	Generac P/N	Briggs & Stratton P/N
Spark Tester	0C5969	—
Pressure Tester Kit	0C7977	—
	—	19129
Tang Bender	—	19229 or 19352
Valve Spring Compressor,	—	19347
Reject Gauge	—	19381
Valve Seat Cutter	—	19237 and 19343
Valve Lapping Tool	—	19258
Valve Lapping Compound,	—	94150
Valve Guide Driver	—	19416
Valve Guide Lubricant	—	93963
Digital Multimeter	—	19357 or 19390
Digital Multimeter Replacement Fuse	—	19449
DC Shunt	—	19359
Tachometer	042223	—
	—	19436
	—	19435
Telescoping Gauge	—	19404
Dial Caliper	—	19199
Cylinder Hone	—	19205
Plug Gauge	—	19219
Bushing Driver	—	19226
Cylinder Support	—	19227
Ring Expander	—	19340
Ring Compressor	—	19070
Flywheel Holder	—	19321





A series of horizontal lines for writing notes, spanning the width of the page below the header.

