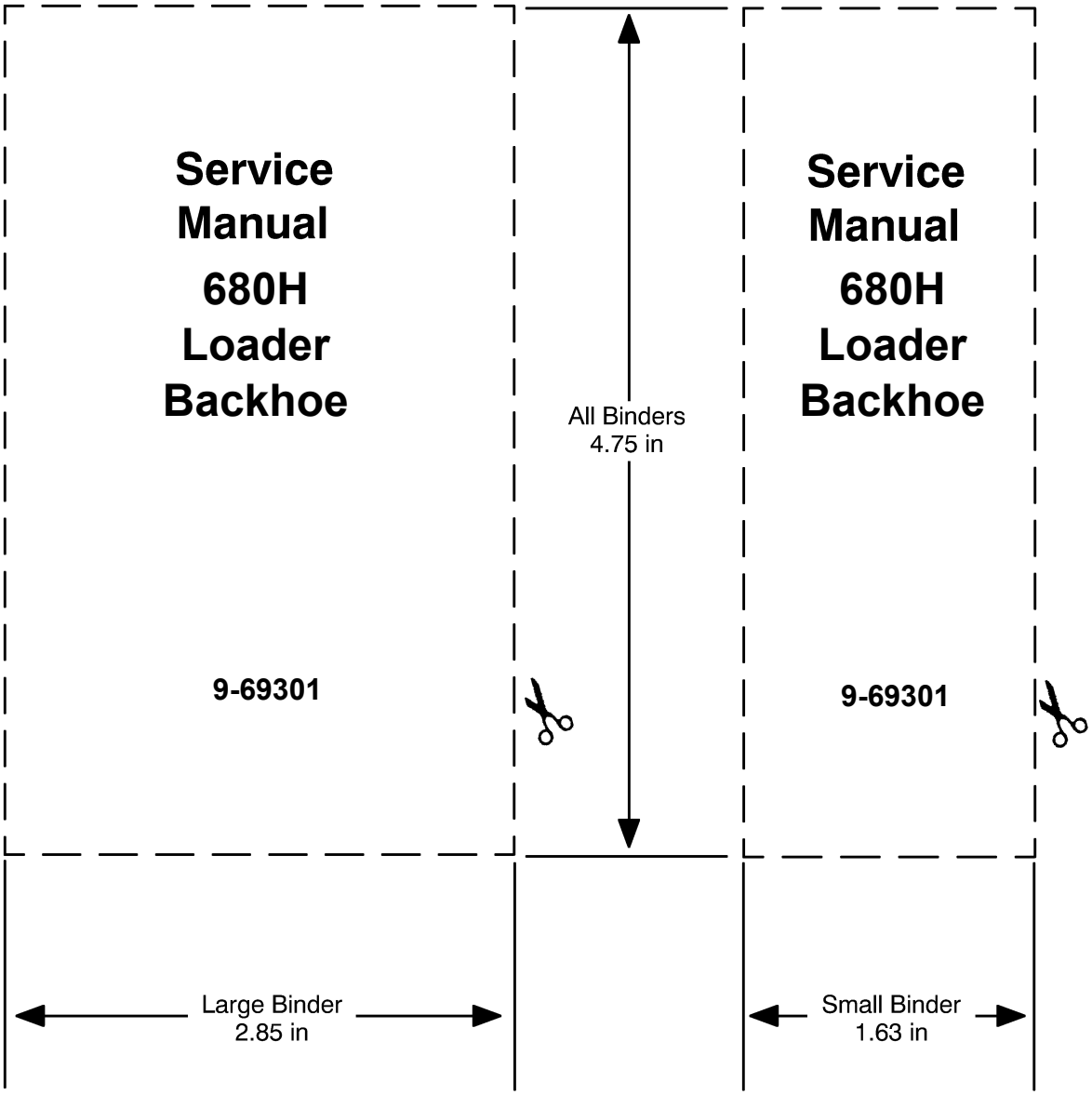

Service
Manual
680H
Loader
Backhoe
9-69301
All Binders
4.75 in
Service
Manual
680H
Loader
Backhoe
9-69301
Large Binder
2.85 in
Small Binder
1.63 in

680H LOADER BACKHOE

TABLE OF CONTENTS

Printed in U.S.A.
Issued September 1981
Revised April 1982

Section
1001

SAFETY RULES
SERVICE MANUAL INTRODUCTION
AND
TORQUE SPECIFICATIONS

Written In ***C**lear*
***A**nd*
***S**imple*
***E**nglish*

CASE CORPORATION

9-69300
September 1981

PRINTED IN U.S.A.

SERVICE MANUAL INTRODUCTION

This service manual has been prepared with the latest service information available. Troubleshooting, removal, disassembly, inspection and installation procedures, and complete specifications and tightening references can be found in most sections. Some sections have drawings with a written procedure because the job is so easily done. This service manual is one of the most important tools available to the service technician.

Right-Hand and Left-Hand

The terms right-hand and left-hand and front and rear as used in this manual indicate the right and left sides, and front and rear of the machine as seen from the operator's seat for correct operation of the machine or attachment.

Text

If the service manual is for more than one machine or different models of components (planetary axles, gear boxes, control valves, etc.) the procedures have the steps necessary to service each model.

Table of Contents

A Table of Contents is in the front of this manual. The Table of Contents shows the main divisions and the sections that are in each division. The individual sections, where necessary, have a Table of Contents on the second page of that section.

Page Numbers

All page numbers are made of two numbers separated by a dash, such as 4002-9. The number before the dash is the section number. The number following the dash is the page number in that section. Page numbers will be found at the upper right or left of each page.

Illustrations

Illustrations are put as near as possible to the text and are to be used as part of the text.

Torque Specifications

The most common grades of fasteners (bolts, nuts, and screws) used on Case machines are grade 5 and grade 8. See page 1001-6 for torque specifications and identification marks.

The specifications in this section are standard torque values and are to be used on all fasteners during assembly and installation unless special torque values are shown in a section.

P.I.N., Serial and Model Numbers

When replacement parts are needed, it can be necessary to give the parts department one or all of the numbers. The model number is normally found on the Product Identification Number plate or Serial Number plate.

The Product Identification Number (P.I.N.) and serial numbers will be found in the following locations.

Machine - The Product Identification Number plate is above the foot brake pedals.

Engine - A serial number plate is on the right-hand side of the engine above the starter.

Components - A serial number plate is on many components such as starters, alternators, pumps, etc.

Classification of Lubricants

The SAE number is the viscosity of engine oils; for example, SAE 30, a single viscosity oil. SAE 10W30 is a variable viscosity oil.

The API classification (SD, CD, etc.) is the oil performance in terms of engine usage. Only oil specified in Section 1002 can be used. These oils have the needed chemical additives to give maximum engine protection. Both the SAE grade and API classification must be found on the container.

Gear Lubricant and Grease

Gear lubricant and grease for each application is specified in Section 1002.

Special Tools

Special tools are needed to remove and install, disassemble and assemble, check and adjust some component parts of this machine. Some special tools can be easily made locally and the necessary information to make the tool is in this service manual. Other special tools are more difficult to make locally and are available from Service Tools in the U.S. and from Jobborn Manufacturing in Canada. Use these tools according to the instructions in this service manual for your personal safety and to do the job correctly.

Order special tools from either of the following companies:

Service Tools
P.O. Box 314
Owatonna, Minnesota 55060

Jobborn Manufacturing Co.
97 Frid Street
Hamilton, Ontario L8P 4M3
Canada

TORQUE SPECIFICATIONS - U.S. HARDWARE

Use the following torques when special torques are not given.

These torques apply to fasteners as received from suppliers, dry, or when lubricated with engine oil. These torques do not apply if special graphites, moly-disulfide greases or other extreme pressure lubricants are used. These torques apply to both UNC and UNF threads.

Grade 2 Bolts, Nuts, and Studs

Size	Pound-Feet	Newton metres	Kilogram metres
1/4 in 6.4 mm	5-6	7-8	0.7-0.8
5/16 in 7.9 mm	10-12	14-16	1.4-1.7
3/8 in 9.5 mm	20-23	27-31	2.8-3.2
7/16 in 11.1 mm	30-35	41-47	4.1-4.8
1/2 in 12.7 mm	45-52	61-71	6.2-7.2
9/16 in 14.3 mm	65-75	88-102	9.0-10.4
5/8 in 15.9 mm	95-105	129-142	13.1-14.5
3/4 in 19.0 mm	150-185	203-251	20.7-25.6
7/8 in 22.2 mm	160-200	217-271	22.1-27.7
1.0 in 25.4 mm	250-300	339-407	34.6-41.5

Grade 5 Bolts, Nuts, and Studs

Size	Pound-Feet	Newton metres	Kilogram metres
1/4 in 6.4 mm	9-11	12-15	1.2-1.5
5/16 in 7.9 mm	17-21	23-28	2.4-2.9
3/8 in 9.5 mm	35-42	48-57	4.8-5.8
7/16 in 11.1 mm	54-64	73-87	7.5-8.8
1/2 in 12.7 mm	80-96	109-130	11.1-13.3
9/16 in 14.3 mm	110-132	149-179	15.2-18.2
5/8 in 15.9 mm	150-180	203-244	20.8-24.9
3/4 in 19.0 mm	270-324	366-439	37.3-44.8
7/8 in 22.2 mm	400-480	542-651	55.3-66.4
1.0 in 25.4 mm	580-696	787-944	80.2-96.2
1-1/8 in 28.6 mm	800-880	1085-1193	111-122
1-1/4 in 31.8 mm	1120-1240	1519-1681	155-171
1-3/8 in 34.9 mm	1460-1680	1980-2278	202-232
1-1/2 in 38.1 mm	1940-2200	2631-2983	268-304

811360

Grade 8 Bolts, Nuts, and Studs

Size	Pound-Feet	Newton metres	Kilogram metres
1/4 in 6.4 mm	12-15	16-20	1.7-2.1
5/16 in 7.9 mm	24-29	33-39	3.3-4.0
3/8 in 9.5 mm	45-54	61-73	6.2-7.5
7/16 in 11.1 mm	70-84	95-114	9.7-11.6
1/2 in 12.7 mm	110-132	149-179	15.2-18.2
9/16 in 14.3 mm	160-192	217-260	22.1-26.5
5/8 in 15.9 mm	220-264	298-358	30.4-36.5
3/4 in 19.0 mm	380-456	515-618	52.5-63.0
7/8 in 22.2 mm	600-720	814-976	83.0-99.5
1.0 in 25.4 mm	900-1080	1220-1465	124-149
1-1/8 in 28.6 mm	1280-1440	1736-1953	177-199
1-1/4 in 31.8 mm	1820-2000	2468-2712	252-277
1-3/8 in 34.9 mm	2380-2720	3227-3688	329-376
1-1/2 in 38.1 mm	3160-3560	4285-4827	437-492

NOTE: Use thick nuts with Grade 8 bolts.

Split Flange Mounting Bolts

Size	Pound-Feet	Newton metres	Kilogram metres
5/16-18	15-20	20-27	2.1-2.8
3/8-16	20-25	26-33	2.8-3.5
7/16-14	34-45	47-61	4.7-6.2
1/2-13	55-65	74-88	7.6-9.0
5/8-11	140-150	190-203	19.4-20.7

Steel Hydraulic Fittings

Tube OD Hose ID	Thread Size	Pound-Feet	Newton metres	Kilogram metres
37 Degree Flare Fittings				
1/4 in 6.4 mm	7/16-20	6-12	8-16	0.8-1.7
5/16 in 7.9 mm	1/2-20	8-16	11-21	1.1-2.2
3/8 in 9.5 mm	9/16-18	10-25	14-33	1.4-3.5
1/2 in 12.7 mm	3/4-16	15-42	20-56	2.1-5.8
5/8 in 15.9 mm	7/8-14	25-58	34-78	3.5-8.0
3/4 in 19.0 mm	1-1/16-12	40-80	54-108	5.5-11.1
7/8 in 22.2 mm	1-3/16-12	60-100	81-135	8.3-13.9
1.0 in 25.4 mm	1-5/16-12	75-117	102-158	10.4-16.2
1-1/4 in 31.8 mm	1-5/8-12	125-165	169-223	17.3-22.8
1-1/2 in 38.1 mm	1-7/8-12	210-250	285-338	29.0-34.6
Straight Threads with O-ring				
1/4 in 6.4 mm	7/16-20	12-19	16-25	1.7-2.6
5/16 in 7.9 mm	1/2-20	16-25	22-33	2.2-3.5
3/8 in 9.5 mm	9/16-18	25-40	34-54	3.5-5.5
1/2 in 12.7 mm	3/4-16	42-67	57-90	5.8-9.3
5/8 in 15.9 mm	7/8-14	58-92	79-124	8.0-12.7
3/4 in 19.0 mm	1-1/16-12	80-128	108-174	11.1-17.8
7/8 in 22.2 mm	1-3/16-12	100-160	136-216	13.8-22.1
1.0 in 25.4 mm	1-5/16-12	117-187	159-253	16.2-25.9
1-1/4 in 31.8 mm	1-5/8-12	165-264	224-357	22.8-36.5
1-1/2 in 38.1 mm	1-7/8-12	250-400	339-542	34.6-55.3

Section

2002

ENGINE TUNE-UP

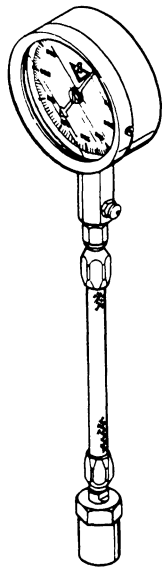
Written In *Clear And Simple English*

CASE CORPORATION

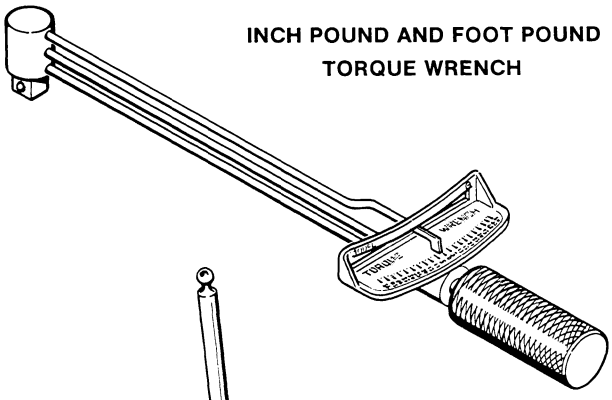
Rac 8-23140

Printed in U.S.A.
March, 1981

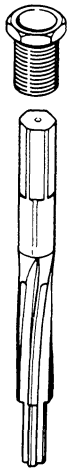
SPECIAL TOOLS



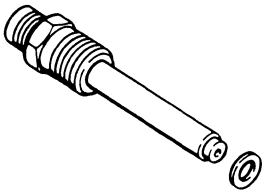
COMPRESSION GAUGE



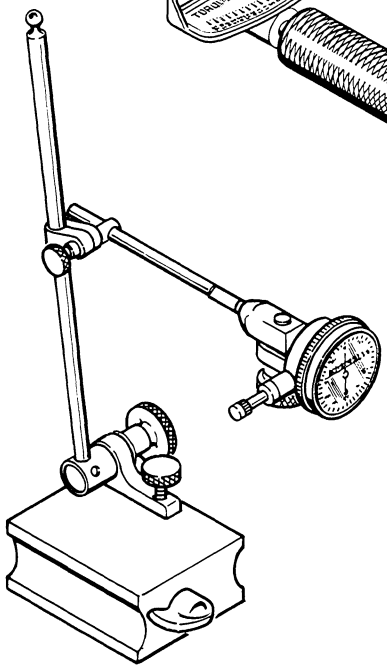
INCH POUND AND FOOT POUND TORQUE WRENCH



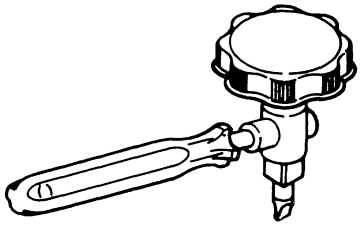
INJECTOR BORE CLEANER CAS-1411



COMPRESSION GAUGE ADAPTER CAS-1410



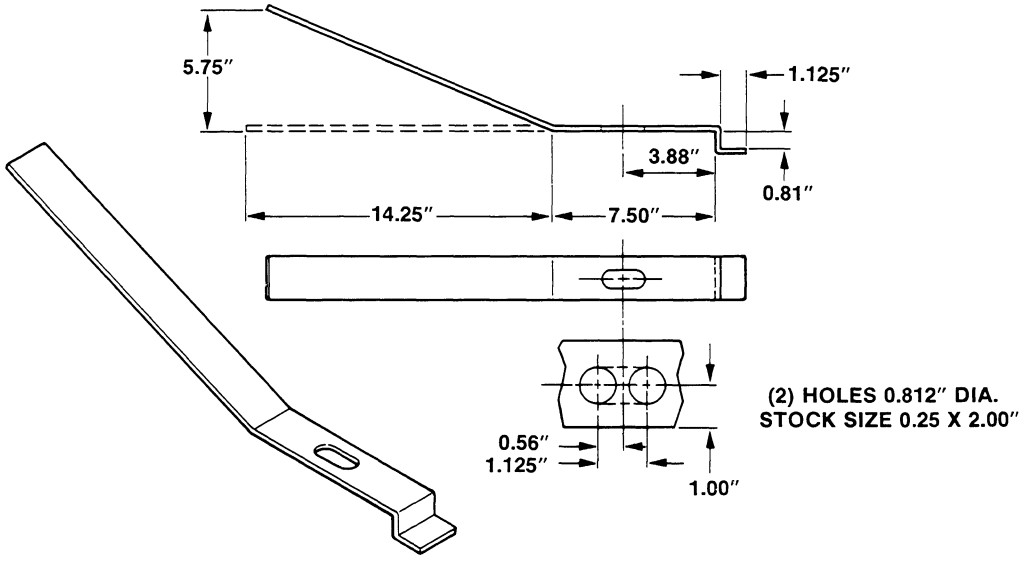
DIAL INDICATOR



TAPPET ADJUSTMENT TOOL

SPECIFICATIONS FOR TOOLS WHICH MUST BE MADE

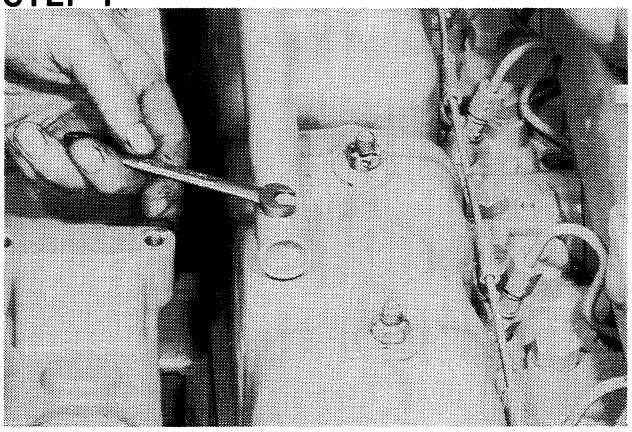
Valve Spring Compressor Tool



ENGINE TUNE-UP PROCEDURE

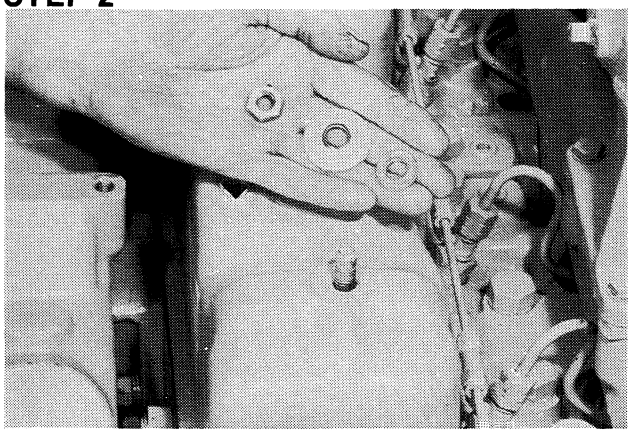
Checking Top Center

STEP 1



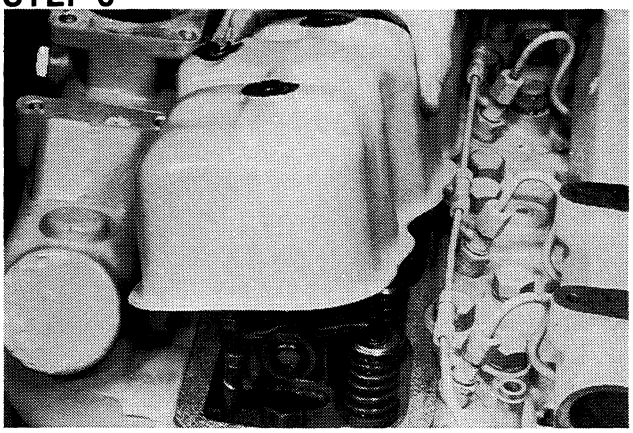
Remove the breather tube and gasket.

STEP 2



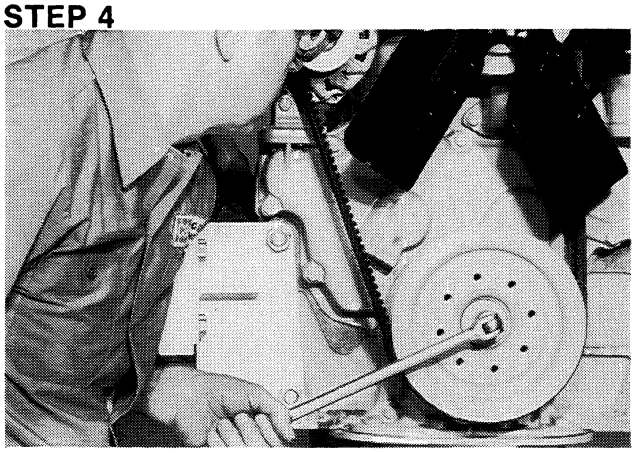
Remove the nuts, washers and rubber gaskets from the front valve cover.

STEP 3



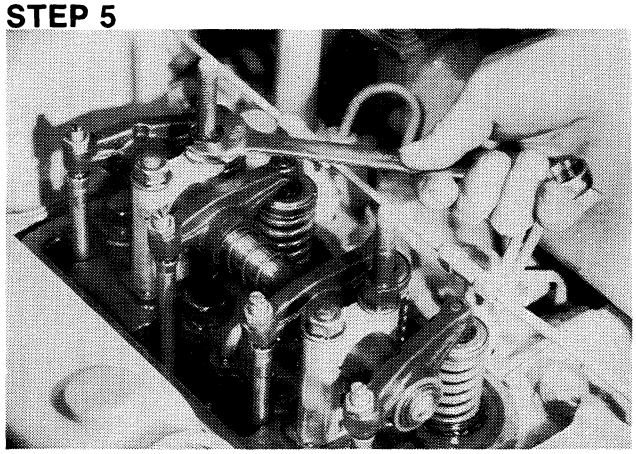
Remove the front valve cover.

STEP 4



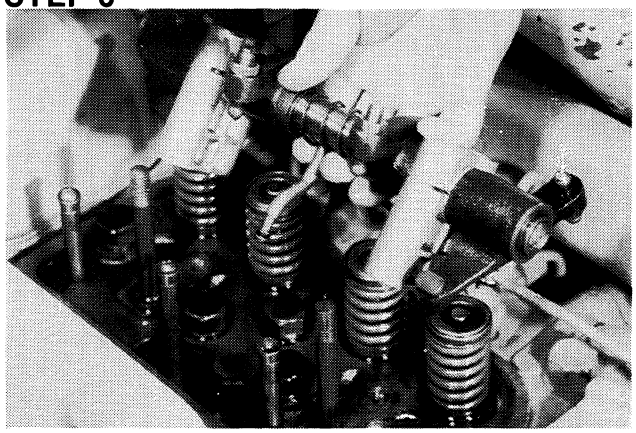
Turn the engine over until the Top Center mark on the crankshaft pulley is aligned with the timing pointer.

STEP 5



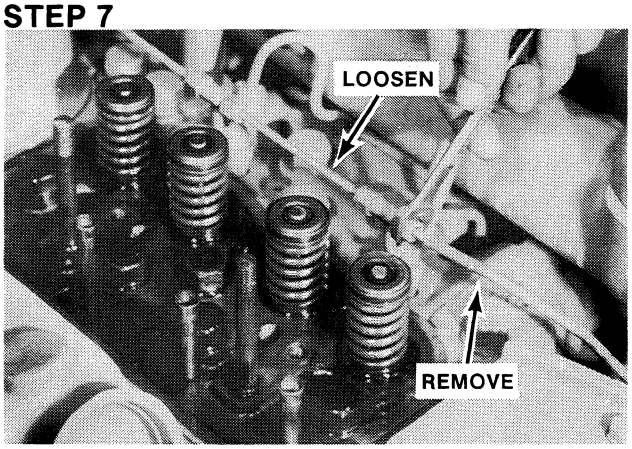
Remove the rocker arm retaining studs, nuts and washers.

STEP 6



Remove the rocker arm assembly.

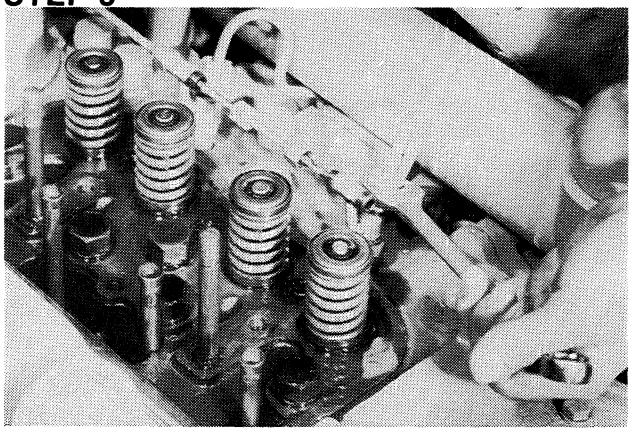
STEP 7



Remove the leak off line from the Number One fuel injection nozzle to the fuel pump. Loosen the leak off line between the Number One and the Number Two fuel injection nozzles.

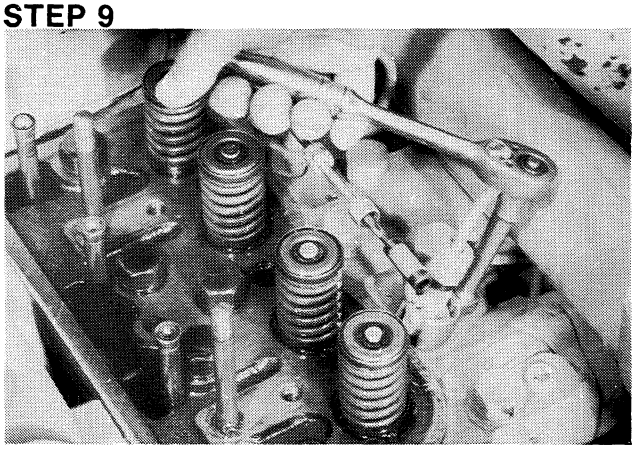
NOTE: *Removal of fuel lines will prevent damage to the lines when removing the exhaust valve spring.*

STEP 8



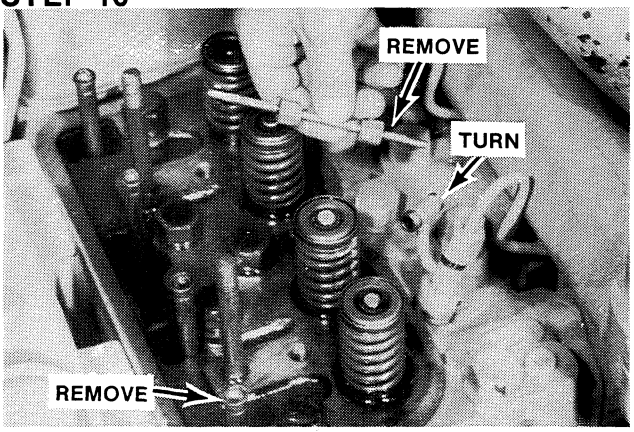
Loosen the Number One nozzle fuel line.

STEP 9



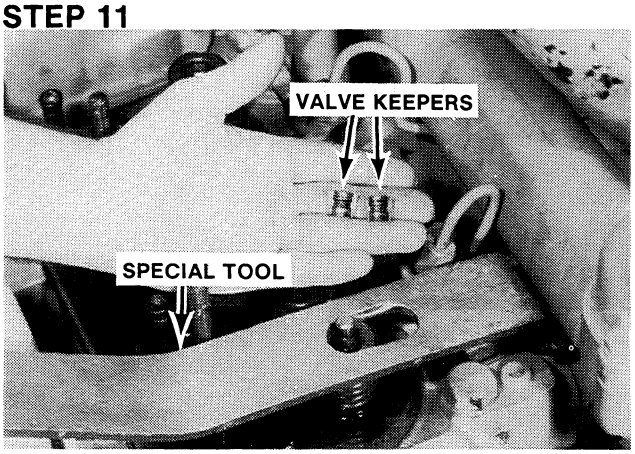
Loosen the retaining nut of the Number One nozzle using a 7/8" crowsfoot wrench (Snap-On Tool Part Number AN-8508-14, flared nut type or AN-8506-8, open end type) with an extension and ratchet wrench.

STEP 10



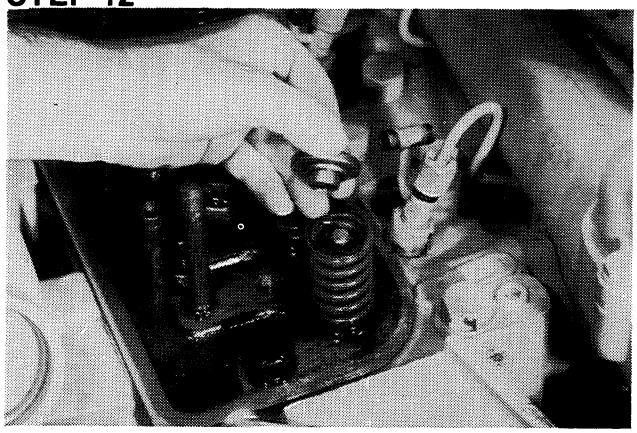
Remove the leak off line and turn the fuel injector nozzle toward the rear of the engine. Remove the Number One cylinder exhaust push rod.

STEP 11



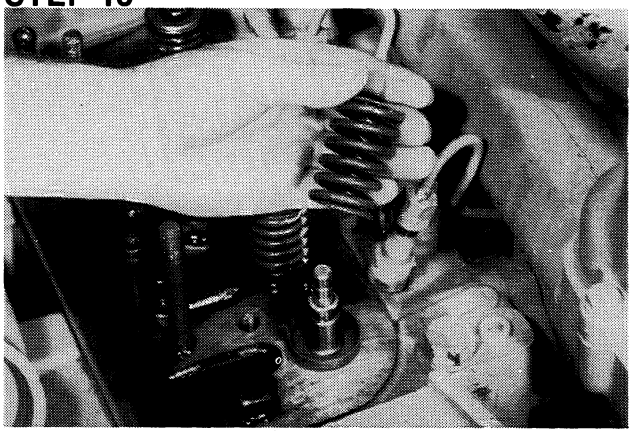
Push down the exhaust valve spring on the Number One cylinder, using a special tool and remove the valve keepers. See Special Tools Page for making this tool.

STEP 12



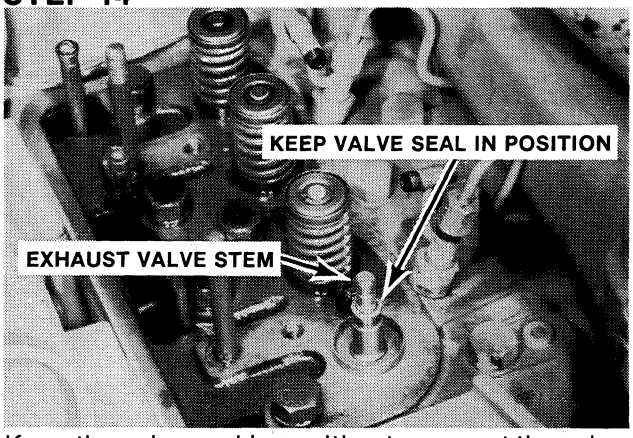
Remove the exhaust valve rotator.

STEP 13



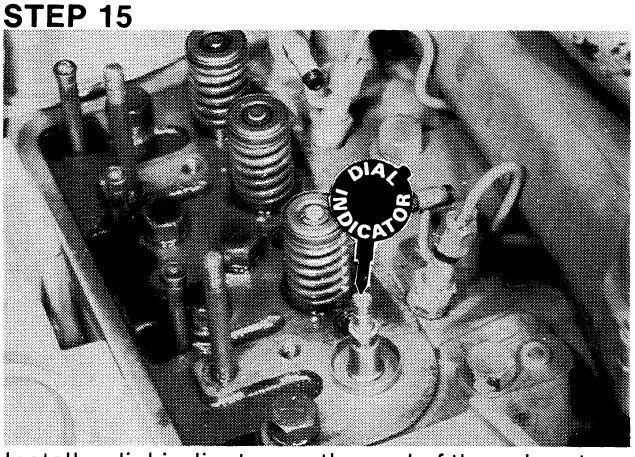
Remove the exhaust valve spring.

STEP 14



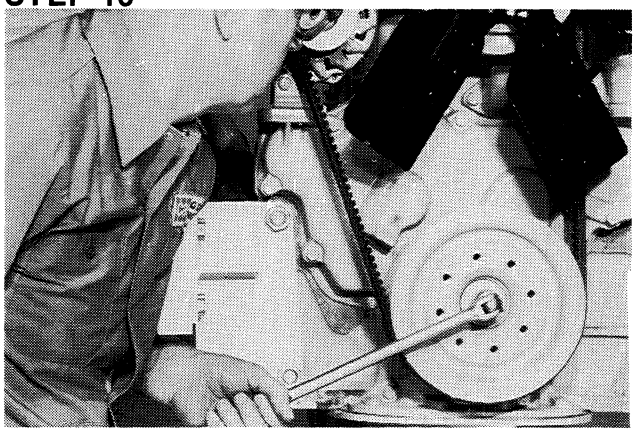
Keep the valve seal in position to prevent the valve from falling through the valve guide if the piston is moved too far.

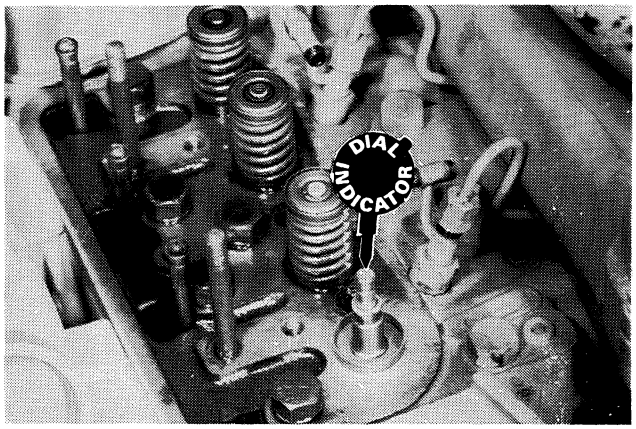
STEP 15



Install a dial indicator on the end of the valve stem with the valve face in contact with the top of the piston.

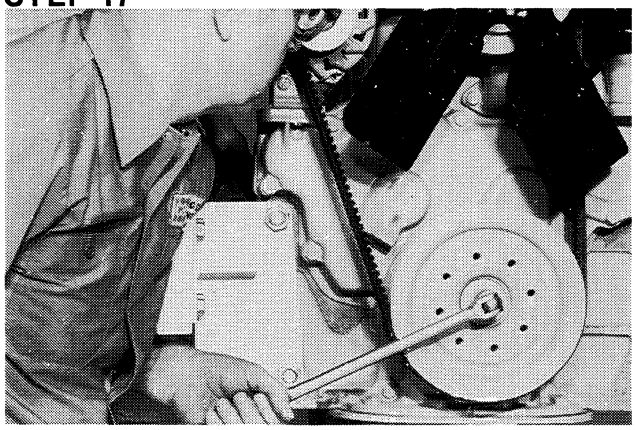
STEP 16



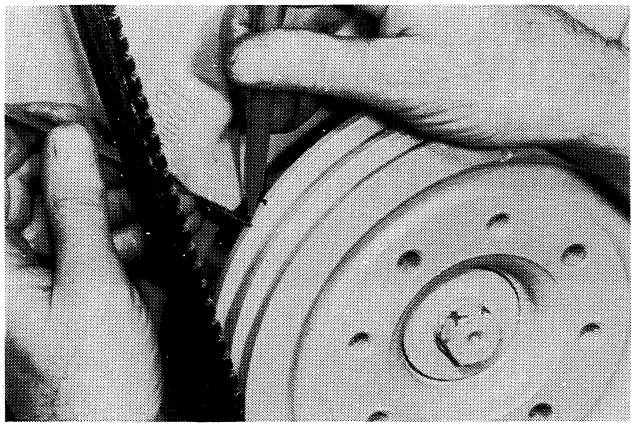


Turn the engine over clockwise until the dial indicator hand stops moving. Reset the indicator to zero.

STEP 17

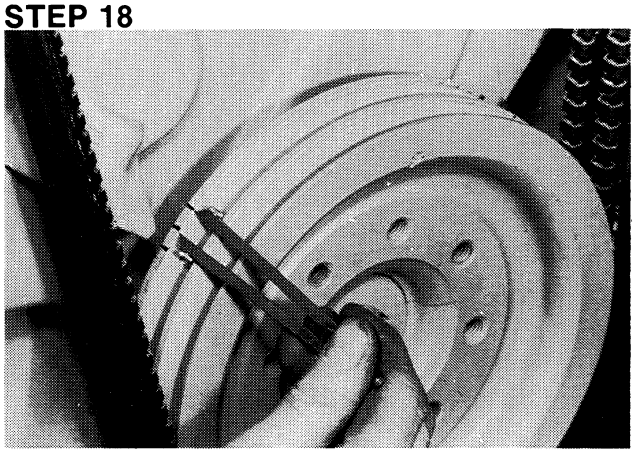


Turn the engine over clockwise, approximately 5 degrees until 0.010" (0.254 mm) shows on the dial. Put a mark on the crankshaft pulley in line with the timing pointer.



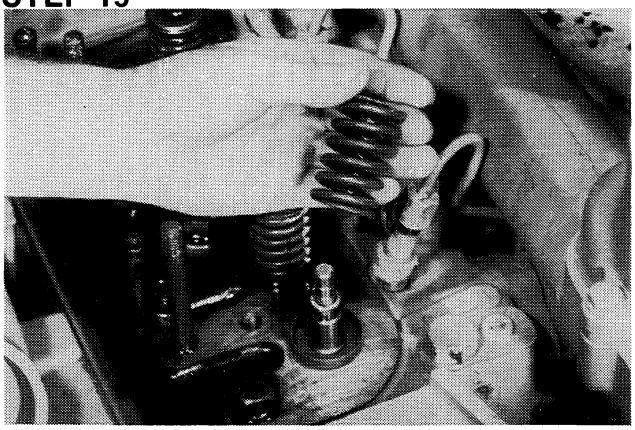
Turn the engine over counterclockwise past the zero mark on the indicator until 0.010" (0.254 mm) shows on the dial. Again, put a mark on the crankshaft pulley.

STEP 18



Half the distance between the two marks on the crankshaft pulley will be Top Center.

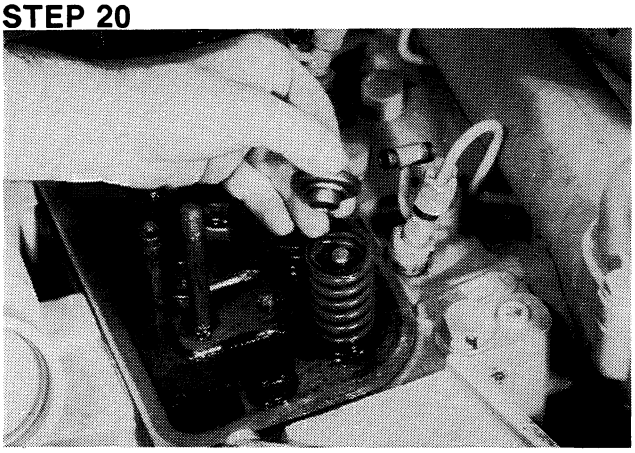
STEP 19



Turn the engine over to Top Center and install the valve spring in the spring seat.

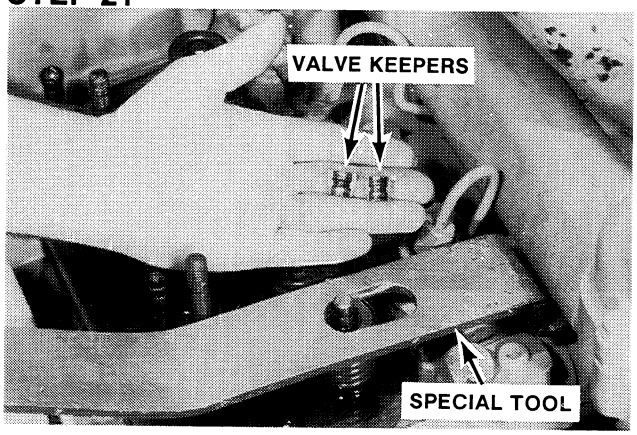
NOTE: *Install either end of the spring against the spring seat because both ends of the spring are closed.*

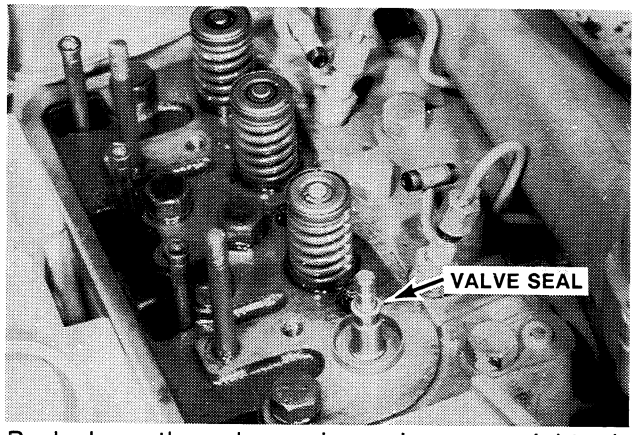
STEP 20



Install the valve rotator (flat side up).

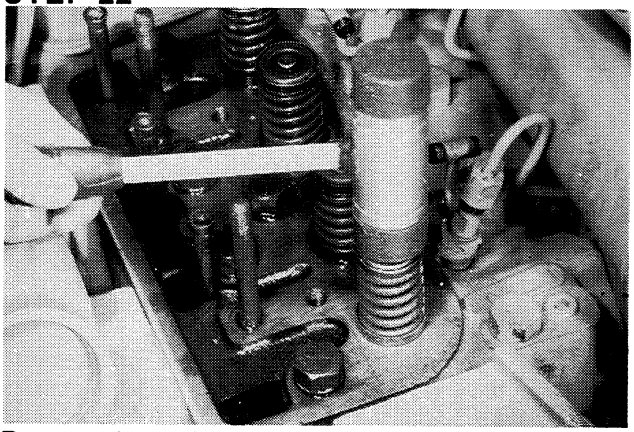
STEP 21





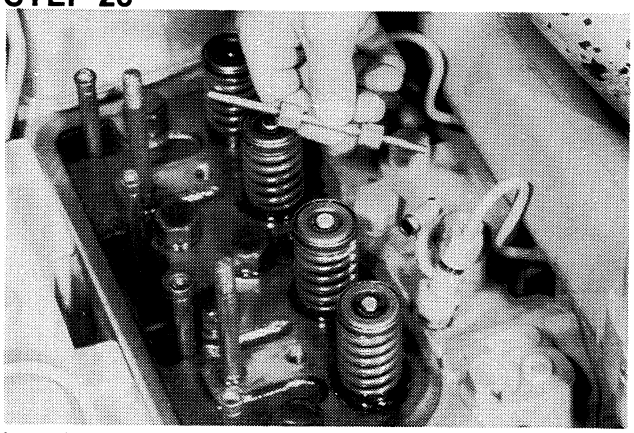
Push down the valve spring using a special tool. Install a new valve seal in the lower valve stem groove. Install the valve keepers (narrow end down) in the upper valve stem groove.

STEP 22



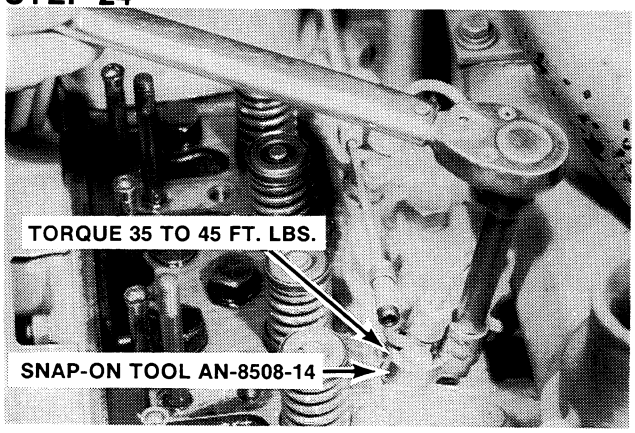
Remove the spring compressor tool. Lightly hit the end of the valve stem to seat the keepers.

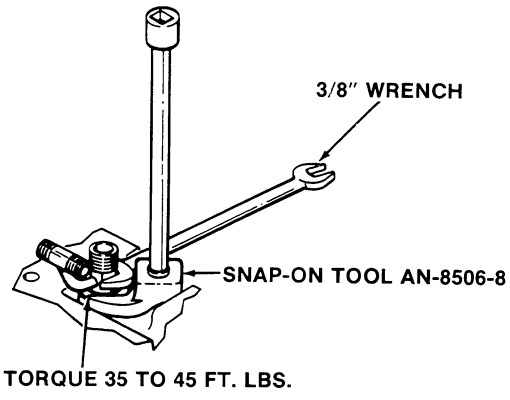
STEP 23



Install the Number One Cylinder exhaust push rod. Install the leak off line, loosely, between the Number One and the Number Two fuel injection nozzles, to put the injector in alignment with the other injectors.

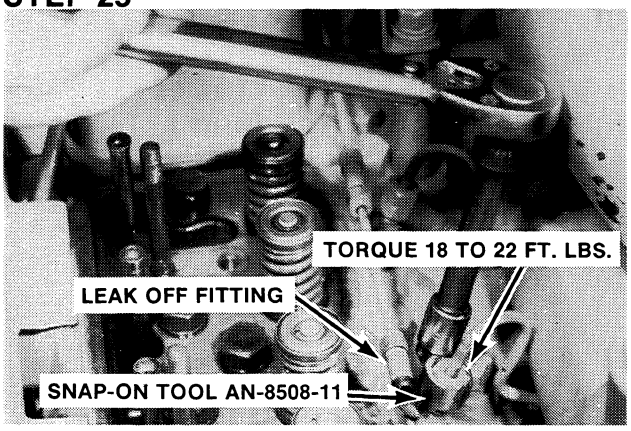
STEP 24





Use a 3/8" open end wrench on the flats of the injector body to hold the injector in alignment with the other injectors. Tighten the injector retaining nut to a torque of 35 to 45 ft. lbs. (48 to 61 Nm)(4.8 to 6.1 kgm), using a 7/8" crowsfoot wrench (Snap-On Tool Part Number AN-8508-14, Flared Nut Type) or (Snap-On Tool Part Number AN-8506-8, Open End Type).

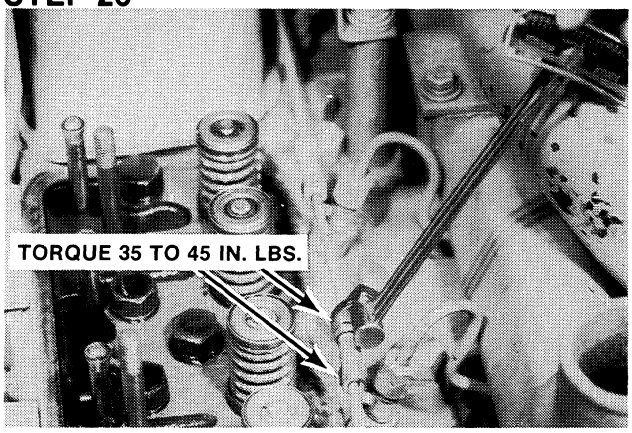
STEP 25



Connect the inlet fitting to the fuel injector. Tighten to a torque of 18 to 22 ft. lbs. (24 to 30 Nm) (2.4 to 3.0 kgm), using a 11/16" crowsfoot wrench (Snap-On Tool Part Number AN-8508-11).

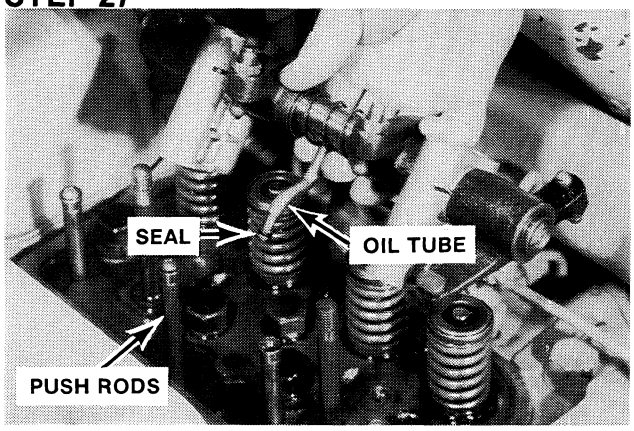
IMPORTANT: *Be careful not to hit the injector leak off fitting with the wrench. Leakage in the fittings can result.*

STEP 26



Install the leak off line from the Number One fuel injection nozzle to the fuel pump. Tighten the leak off line nuts to a torque of 35 to 45 in. lbs. (4 to 5 Nm)(0.4 to 0.5 kgm).

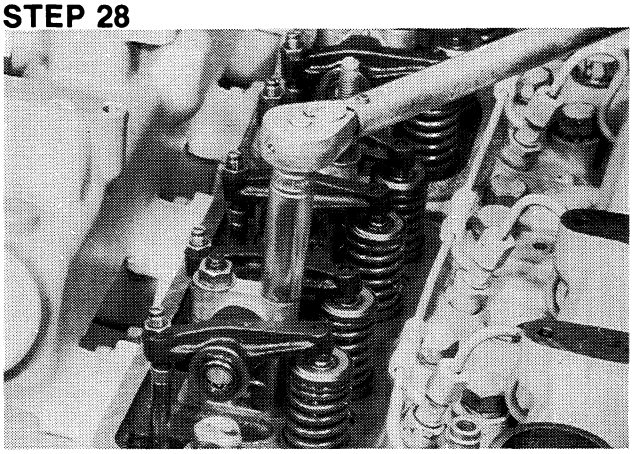
STEP 27



Install the rocker arm assembly. Check the seal to make sure seal is not damaged.

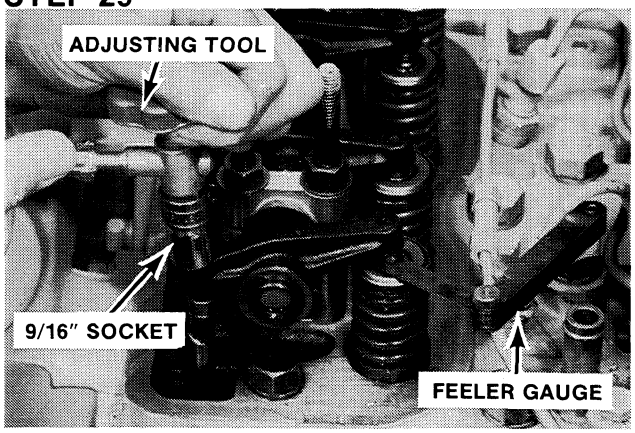
IMPORTANT: *Make sure that the seal is on the oil tube and that the oil tube end is toward the push rods.*

STEP 28



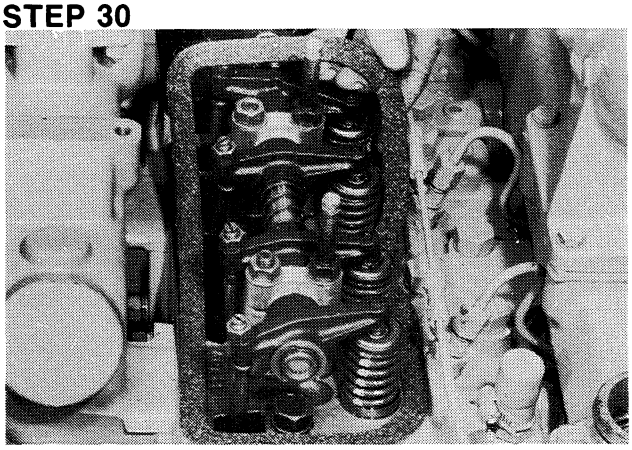
Install the rocker arm retaining studs, nuts and washers. Tighten the studs and nuts to a torque of 40 to 45 ft. lbs. (54 to 61 Nm)(5.4 to 6.1 kgm).

STEP 29



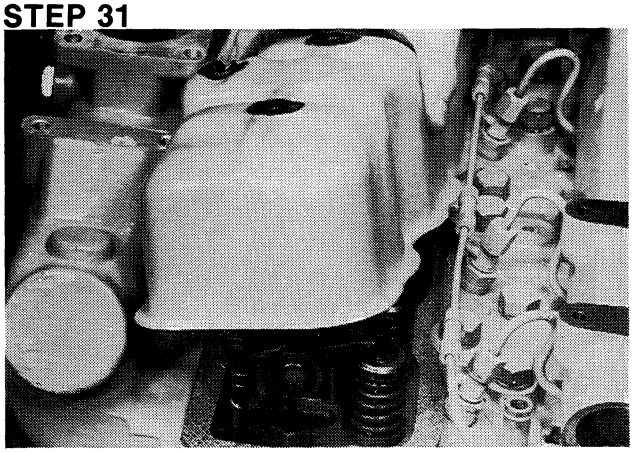
Turn the engine over two revolutions to seat the push rod. Then, adjust the valve clearance on No. 1 and No. 2 cylinders, see Steps 37 through 40.

STEP 30



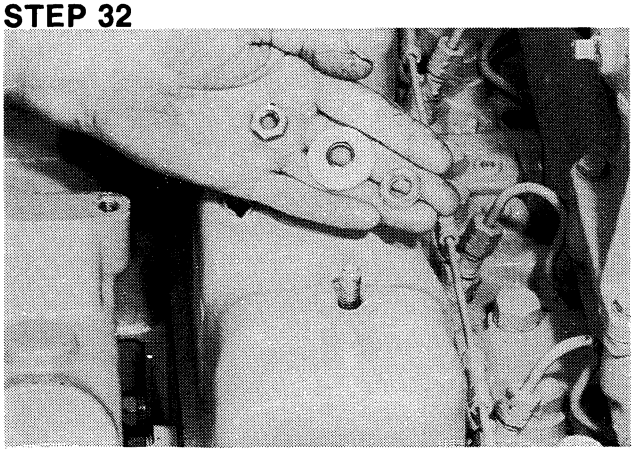
Install a new valve cover gasket.

STEP 31



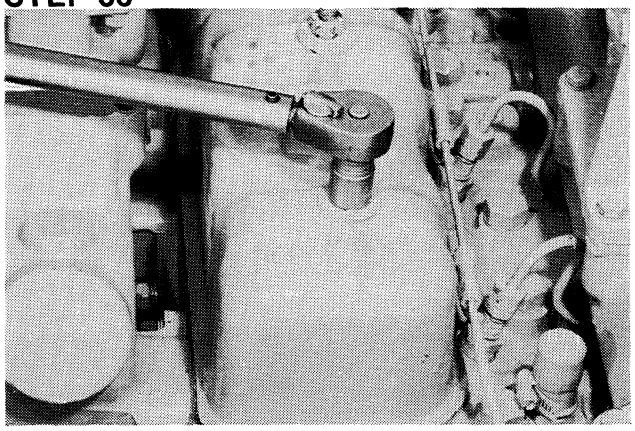
Install the valve cover.

STEP 32



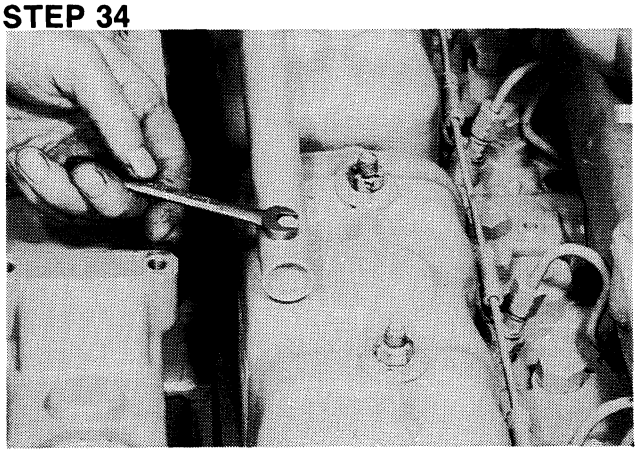
Install the valve cover seals, washers and nuts.

STEP 33



Tighten the nuts to a torque of 8 to 10 ft. lbs. (11 to 14 Nm)(1.1 to 1.4 kgm).

STEP 34

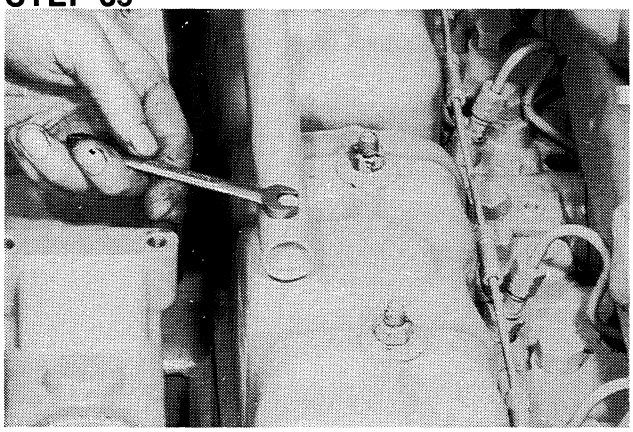


Install the breather tube and gaskets.

Adjusting The Rocker Arm To Valve Clearance

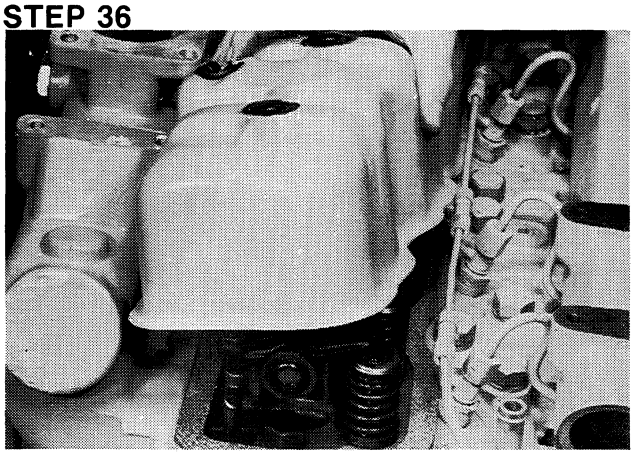
IMPORTANT: *Valve clearance adjustments must be made when the engine is not running.*

STEP 35



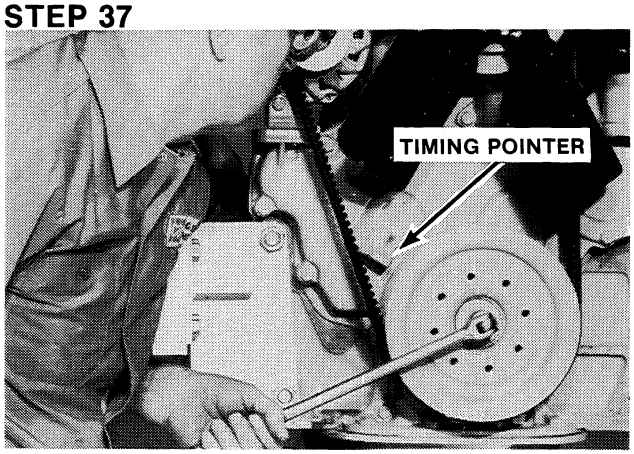
Remove the breather tube.

STEP 36



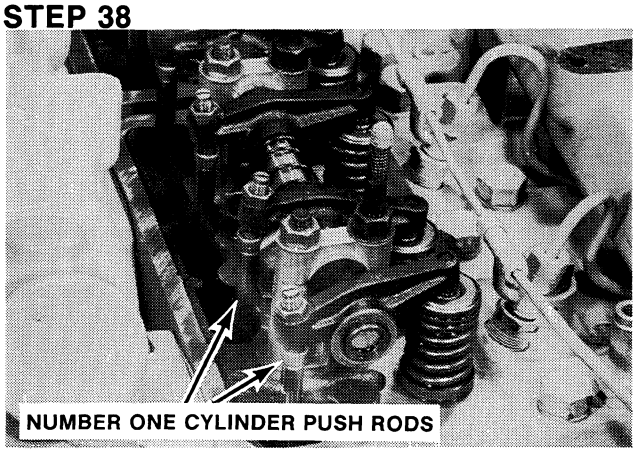
Remove the valve covers.

STEP 37



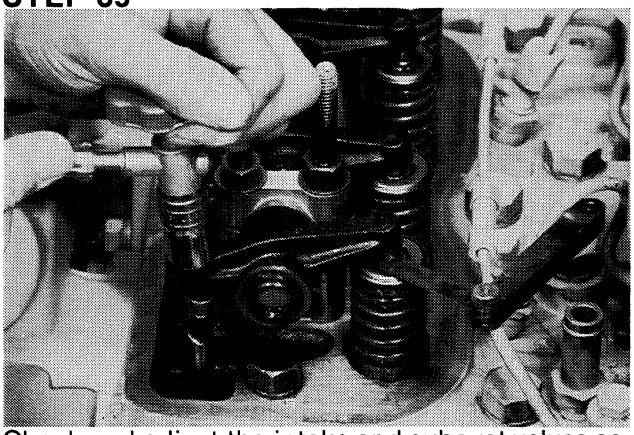
Turn the engine over until the timing pointer is aligned with the Top Center timing mark on the crankshaft pulley.

STEP 38



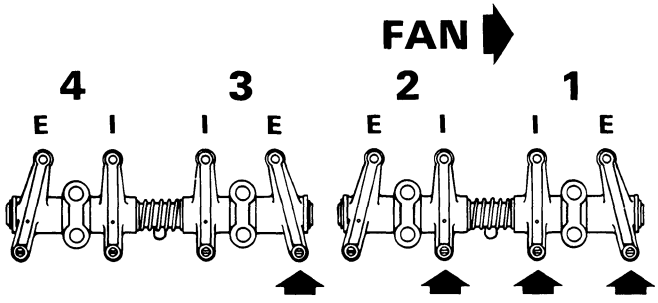
Check the push rods on the Number One cylinder for looseness. If the push rods are loose, the Number One cylinder will be at Top Center on the compression stroke. If the push rods are tight, turn the engine over one complete revolution and align the timing pointer with the Top Center mark on the crankshaft pulley.

STEP 39



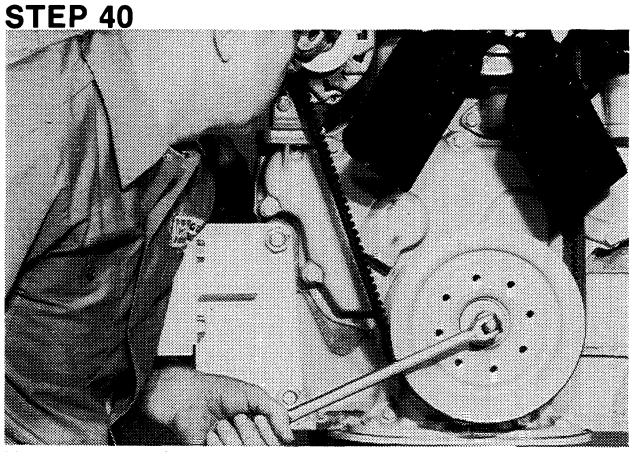
Check and adjust the intake and exhaust valves as the arrows show below. Then, tighten the locking nut to a torque of 20 to 25 ft. lbs. (27 to 34 Nm)(2.7 to 3.4 kgm).

Valve Clearance:
INTAKE VALVES - 0.015" (0.381 mm)
EXHAUST VALVES - 0.025" (0.635 mm)



NUMBER ONE CYLINDER TOP CENTER COMPRESSION STROKE

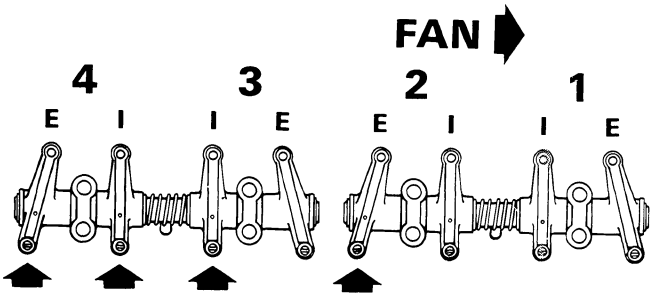
STEP 40



Turn the engine over one complete revolution and align the timing pointer with the Top Center mark on the crankshaft pulley.

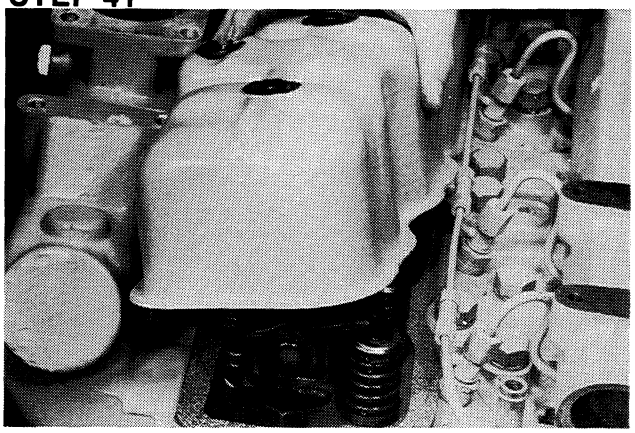
Check and adjust the intake and exhaust valves as the arrows show below. Then, tighten the locking nuts to a torque of 20 to 25 ft. lbs. (27 to 34 Nm)(2.7 to 3.4 kgm).

Valve Clearance:
INTAKE VALVES - 0.015" (0.381 mm)
EXHAUST VALVES - 0.025" (0.635 mm)



NUMBER FOUR CYLINDER TOP CENTER COMPRESSION STROKE

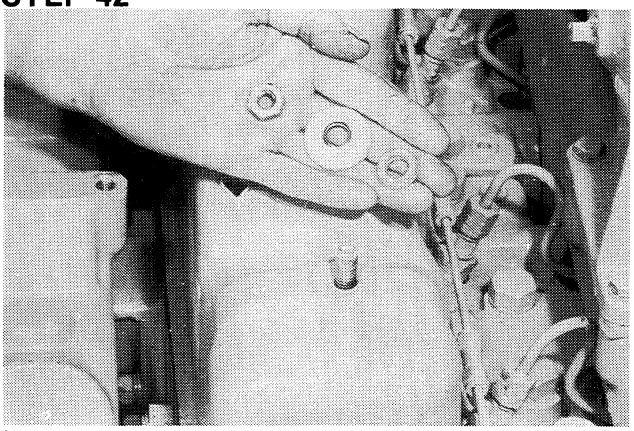
STEP 41



Install the cylinder head covers.

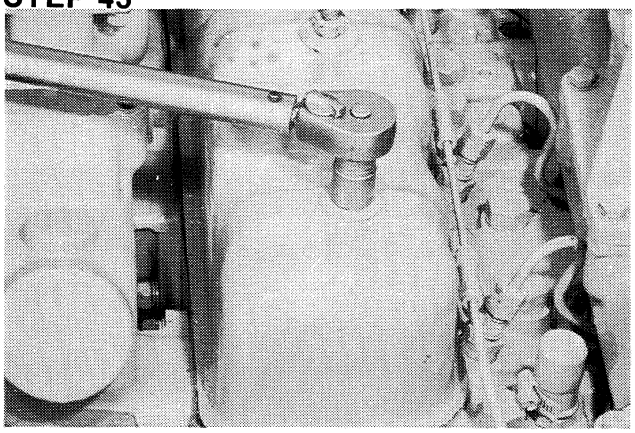
NOTE: *Check the cover gasket and replace if necessary.*

STEP 42



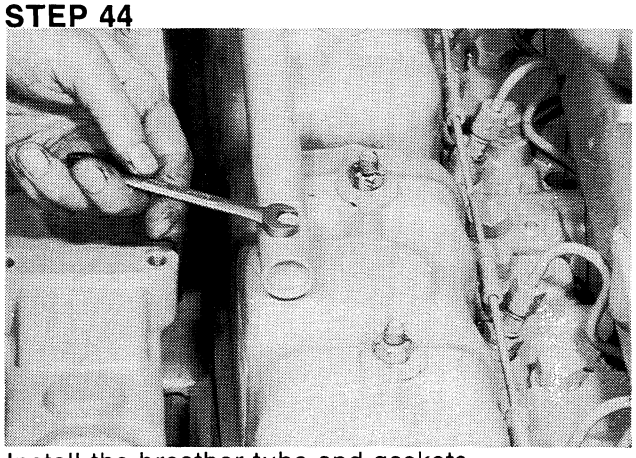
Install the seals, washers and nuts.

STEP 43



Tighten the valve cover nuts to a torque of 8 to 10 ft. lbs. (11 to 14 Nm)(1.1 to 1.4 kgm).

STEP 44



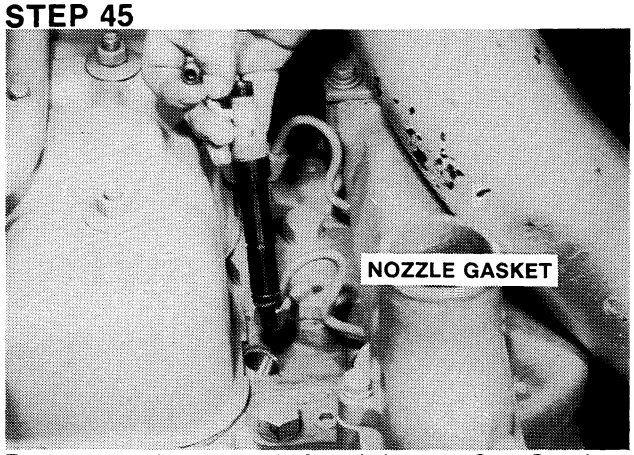
Install the breather tube and gaskets.

Checking The Nozzle Spray Pattern And The Engine Compression

17MM NOZZLES

Nozzle Removal

STEP 45



Remove and test each fuel injector. See Section 3213 of the Service Manual for removal and testing. Do a compression test on each cylinder before installing the fuel injector.

IMPORTANT: *Make sure that the nozzle gaskets are not left in the bore.*

Compression Check

STEP 46

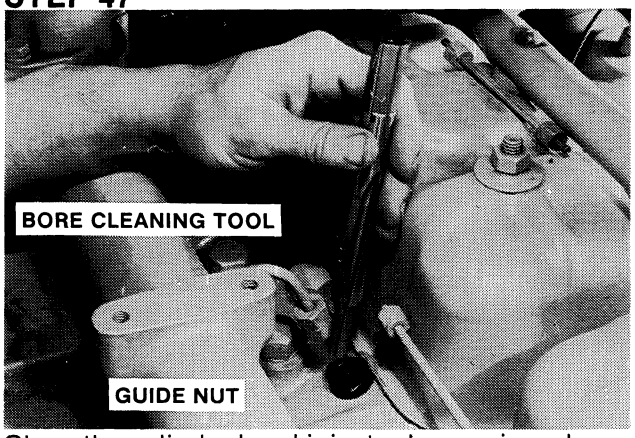
There are two methods of checking the compression pressure. The two methods are the crank method and the engine running method. The engine must be at operating temperature for either method used.

1. CRANK METHOD: Remove all the injectors.

2. RUNNING METHOD: Disconnect the high pressure fuel line and the leak off line from the Number One injector. Send the fuel from the lines back to the fuel tank or a clean container. Repeat for each cylinder.

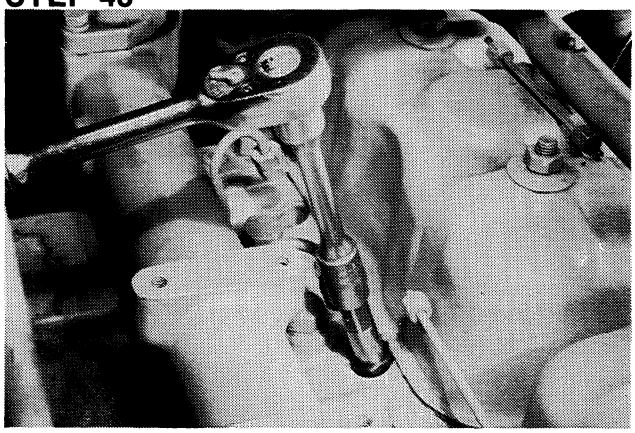
CAUTION *Before cranking engine, make sure all operating controls are in neutral, brakes are set and wheels are securely blocked.*

STEP 47



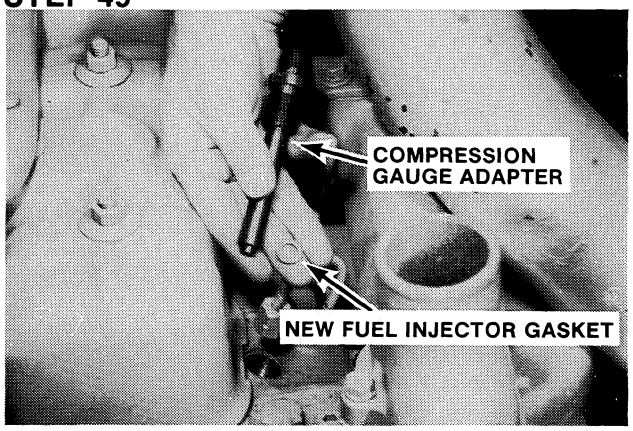
Clean the cylinder head injector bore using a bore cleaning tool with a guide nut (CAS-1411).

STEP 48



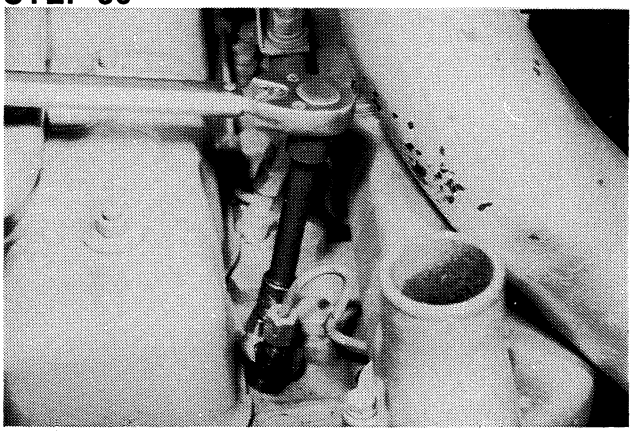
Turn the tool clockwise. The tool will not be kept sharp if counterclockwise rotation is used. Clean the bore with air under pressure, or with the fuel injector removed, turn the engine over to remove the particles.

STEP 49



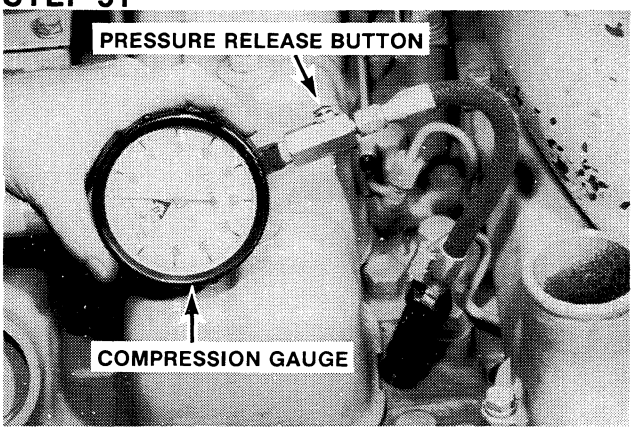
Install the compression gauge adapter (CAS-1410) and a new fuel injector gasket in the cylinder head.

STEP 50



Tighten the adapter to a torque of 35 to 42 ft. lbs. (48 to 57 Nm)(4.8 to 5.7 kgm).

STEP 51

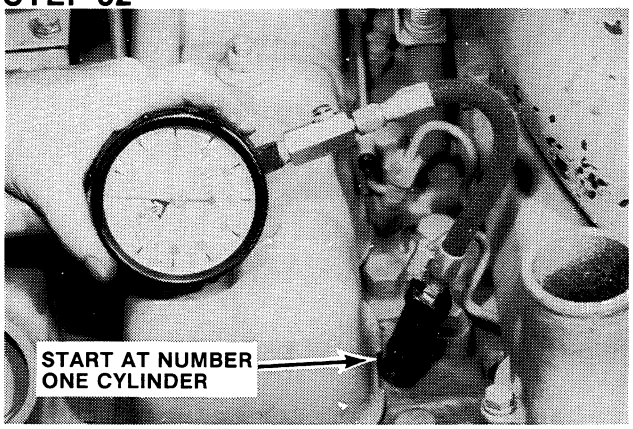


Connect the compression gauge (70-7003) to the adapter.

NOTE: *Take several compression readings on each cylinder using the pressure release button to decrease the gauge pressure. See the chart on this page.*

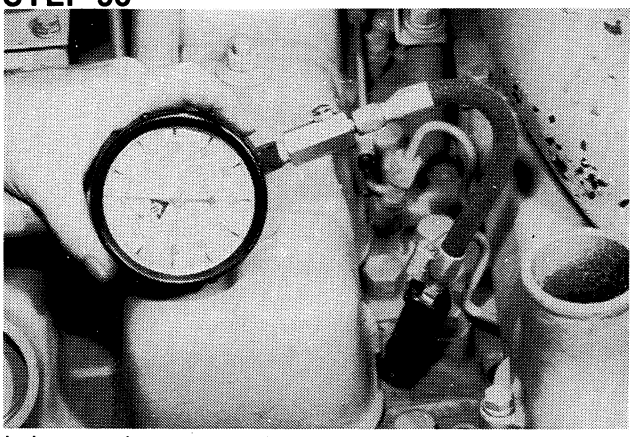
	ENGINE SPEED	NORMAL COMPRESSION PRESSURE	PERMITTED CHANGES BETWEEN CYLINDERS
CRANK	**APPROXIMATELY 200 RPM UNTIL COMPRESSION GAUGE BECOMES CONSTANT**	**400 PSI* (2 758 kPa) (27.58 bar)**	**25 PSI (172 kPa) (1.72 bar)**
RUNNING	**800 RPM**	**480 PSI* (3 310 kPa) (33.10 bar)**	**20 PSI (138 kPa) (1.38 bar)**
***NOTE:** A 4% REDUCTION IN PSI MUST BE PERMITTED FOR EVERY 1000 FT. (304.8m) ABOVE SEA LEVEL.			

STEP 52



When checking the compression, using the crank method, start at the Number One cylinder and continue down the line (Number 2, 3, 4). Then, check again the Number One cylinder after finishing the last cylinder, because compression can change because of a weak battery.

STEP 53

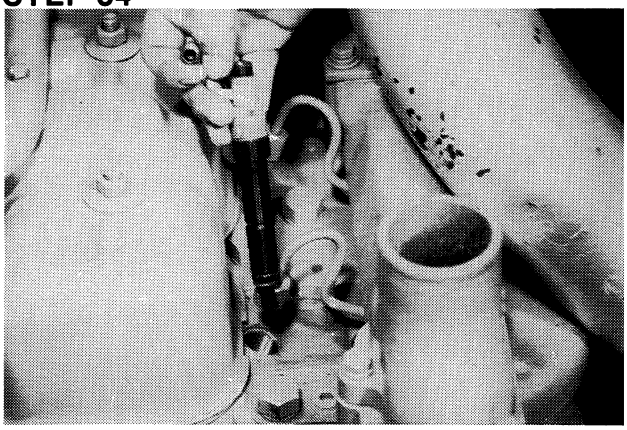


It is very important that all cylinder pressures be approximately the same. See the chart under Step 51 for permitted compression pressure changes.

More than normal compression is an indication of carbon deposits. Below normal compression is an indication of a valve that leaks or too much ring clearance.

NOTE: *To make an easy test when a compression leak is shown, put oil in the cylinder and check the compression again. If the pressure goes up to near normal, then the compression loss is past the rings. Very little change in compression is an indication of leakage past the valves.*

STEP 54

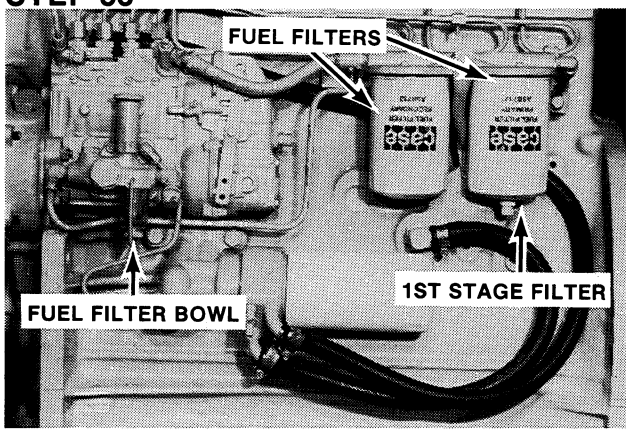


Install the fuel injectors and new gaskets. See Fuel Injection Section of the Service Manual for installation.

IMPORTANT: *Make sure that the nozzle gasket that was used with the compression gauge adapter is not left in the nozzle bore.*

Cleaning The Fuel Filters

STEP 55



Clean and service the fuel system and filters. See Fuel System and Filters Section of the Service Manual for correct procedure.

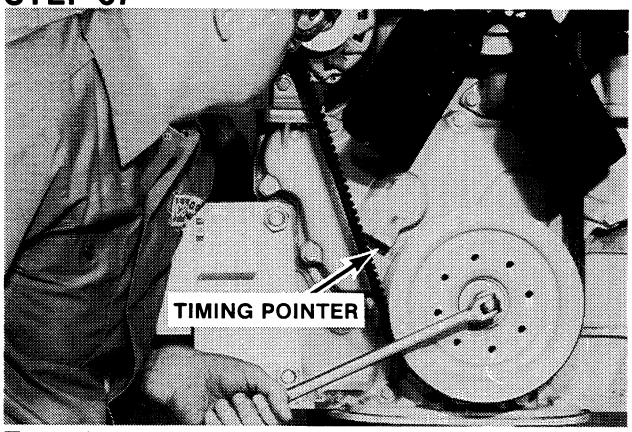
Cleaning The Air Cleaner

STEP 56

See Air Cleaner Section in this Service Manual for cleaning the air cleaner system.

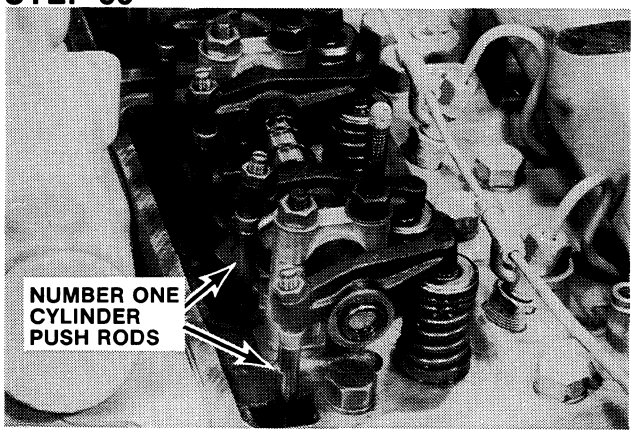
Timing The Injection Pump

STEP 57



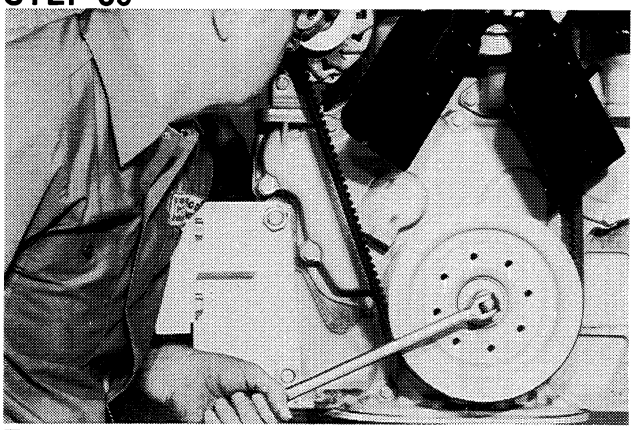
Turn the engine over until the timing pointer is aligned with the Top Center timing mark on the crankshaft pulley.

STEP 58



Check the push rods on the Number One Cylinder for looseness. If the push rods are loose, the Number One cylinder is at Top Center on the compression stroke. If the push rods are tight, turn the engine over one complete revolution and align the timing pointer with the Top Center mark on the crankshaft pulley.

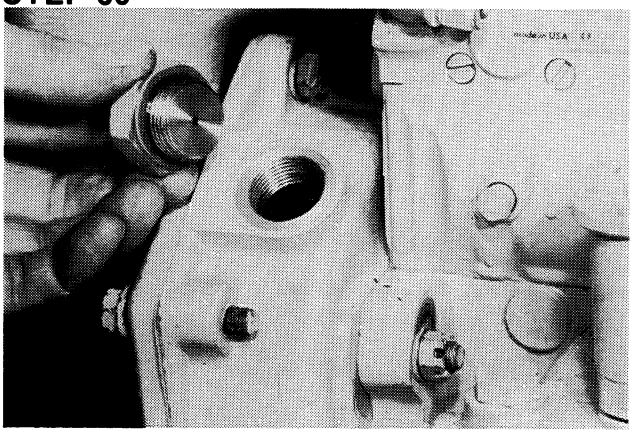
STEP 59



Turn the engine over counterclockwise to the 35 degree mark. Then turn the engine over clockwise to the given fuel pump timing.

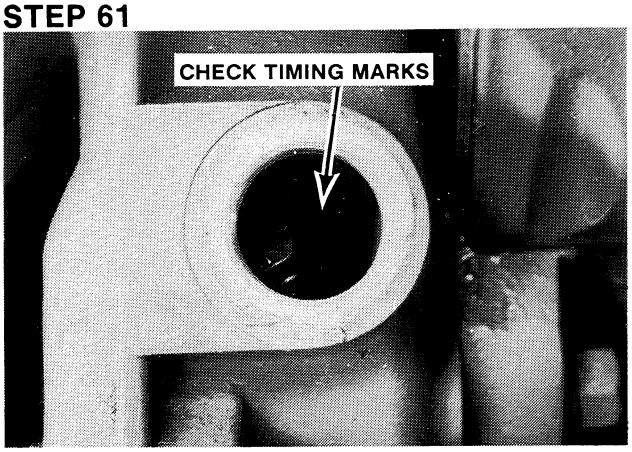
NOTE: *See the engine decal on the cylinder head cover or General Engine Specifications Section of the Service Manual for the fuel pump timing.*

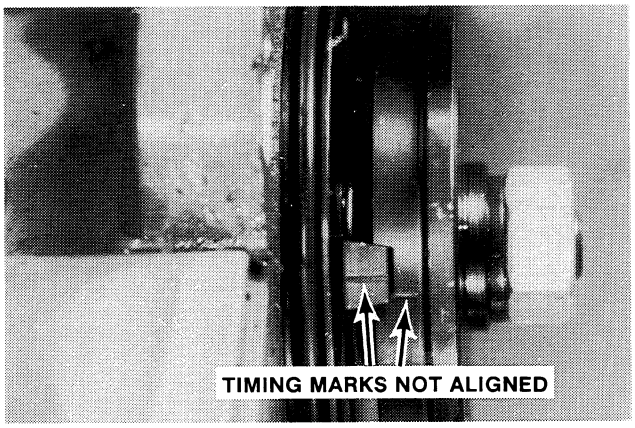
STEP 60

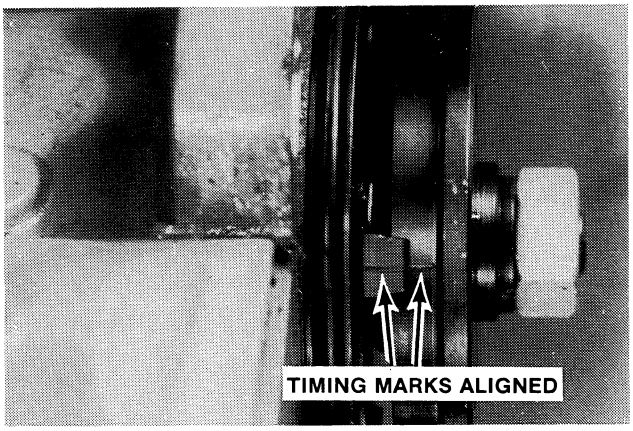


Remove the plug from the timing gear cover.

STEP 61

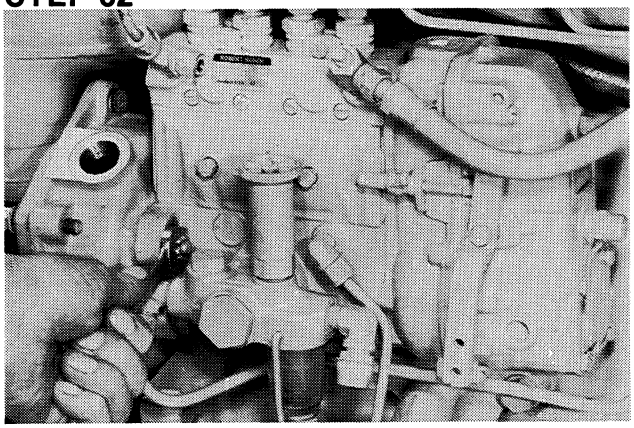






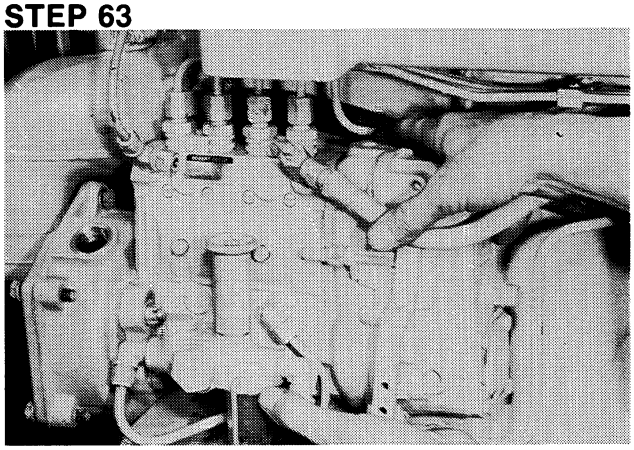
Check the timing marks. If the marks are not aligned, go to the next Step. If the marks are aligned, then the pump is in time.

STEP 62



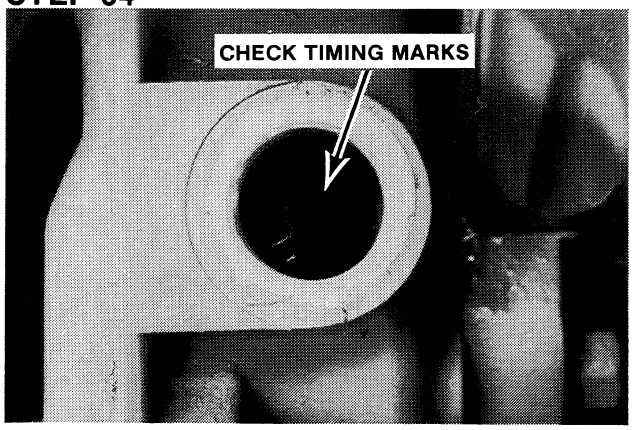
Loosen the four pump mounting nuts.

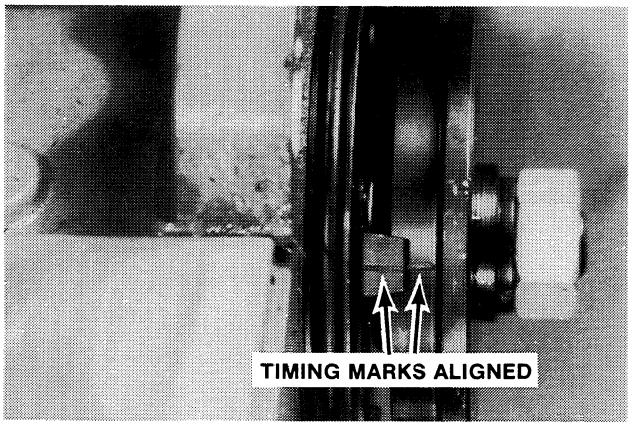
STEP 63



Move the pump toward or away from the engine until the timing marks are aligned.

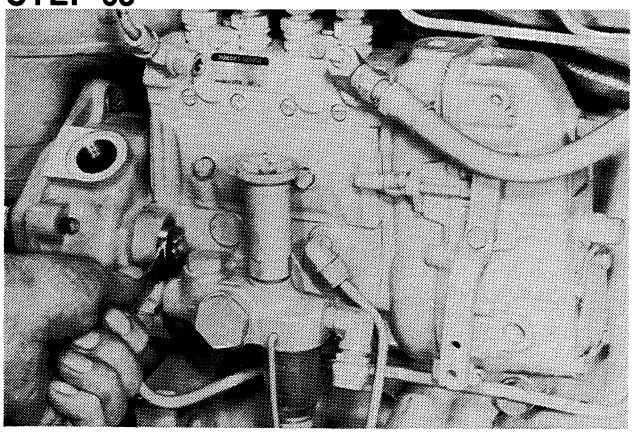
STEP 64





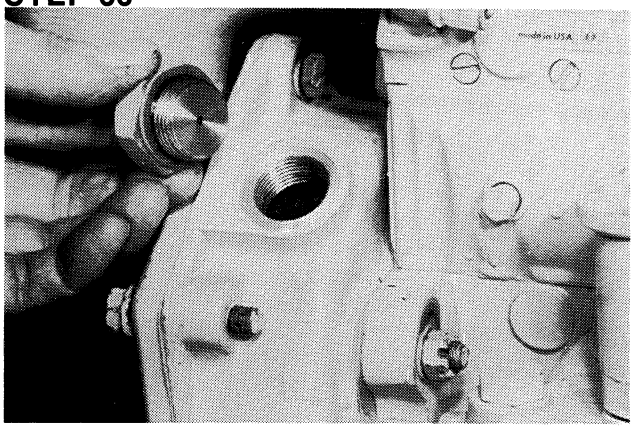
Timing marks aligned for correct timing.

STEP 65



Tighten the pump mounting nuts to a torque of 35 to 42 ft. lbs. (48 to 57 Nm)(4.8 to 5.7 kgm).

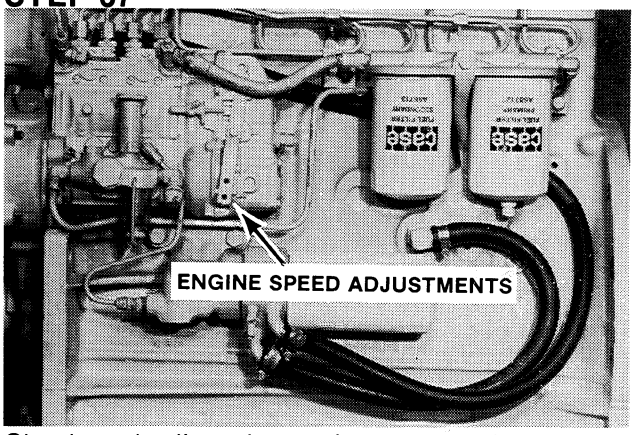
STEP 66



Install the plug and washer in the timing gear cover.

Adjusting The Governed Speed

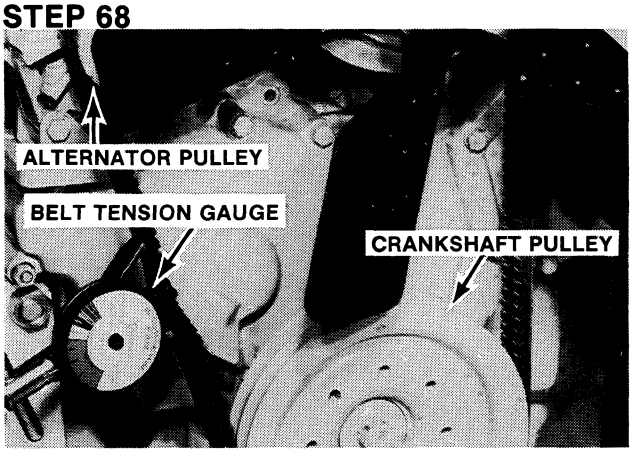
STEP 67



Check and adjust the engine governed speed as shown in Section 3012 of the Service Manual.

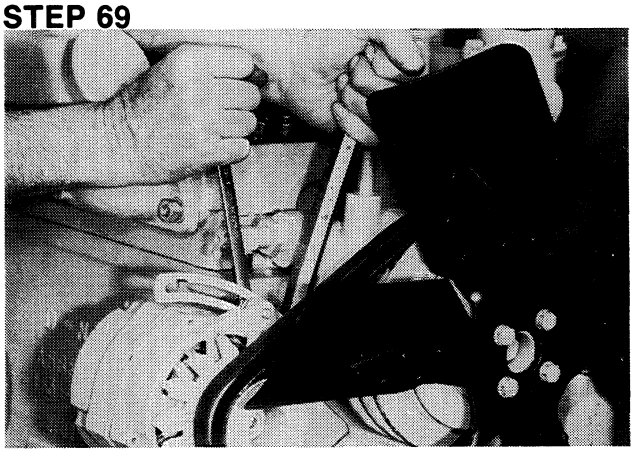
Adjusting The Fan Belts

STEP 68



Measure the fan belts for correct tension. Use a belt tension gauge. Measurements must be made between the alternator pulley and the crankshaft pulley. Belt tension must be 45 to 56 lbs. (200 to 249 N).

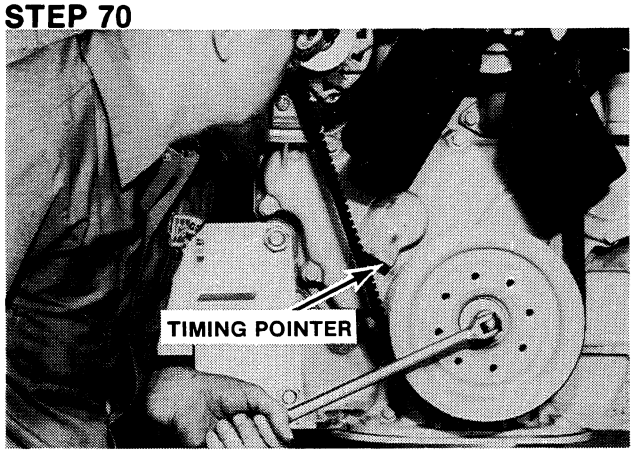
STEP 69



Loosen the alternator adjusting and mounting bolts. Use a prybar to put tension on the fan belts. Use the prybar only on the alternator front housing area and on the pipe spacer found on the front timing gear cover. See the Cooling System, Section 2055, in the Service Manual for replacing the fan belts.

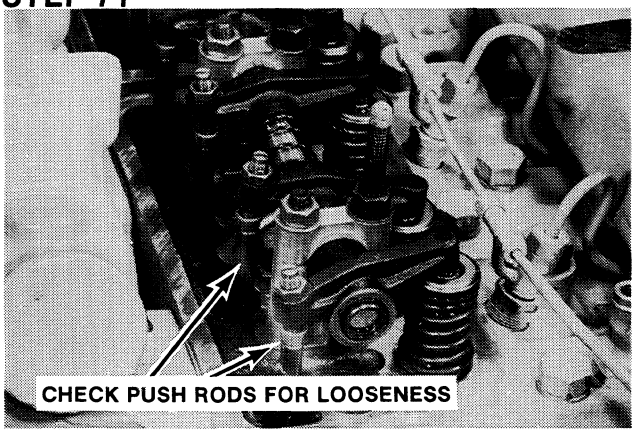
Checking The Valve Timing

STEP 70



Turn the engine over until the 0 degree mark or the Top Center mark on the crankshaft pulley is aligned with the timing pointer.

STEP 71



The Number One cylinder must be on Top Center. An indication of getting Top Center is the looseness of the Number One intake and exhaust push rods. If the push rods are tight, turn the engine over one complete revolution and align the timing pointer with the Top Center mark on the pulley.

Suggest:

If the above button click is invalid.

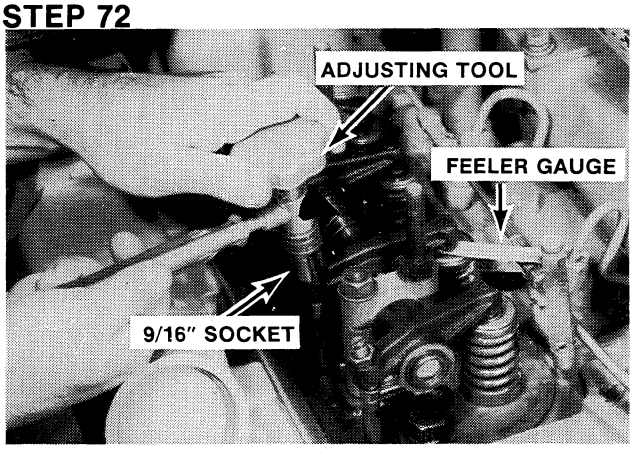
Please download this document

first, and then click the above link

to download the complete manual.

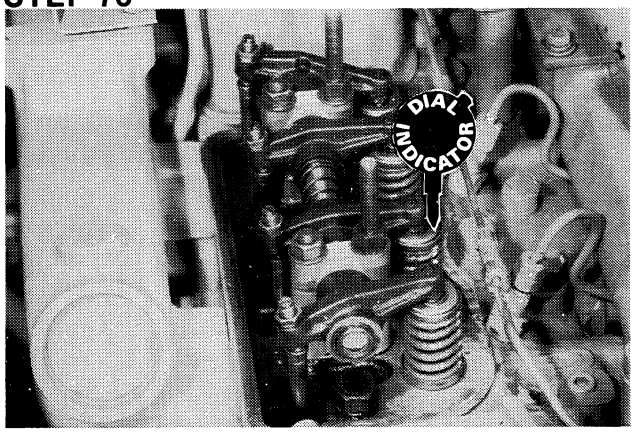
Thank you so much for reading

STEP 72



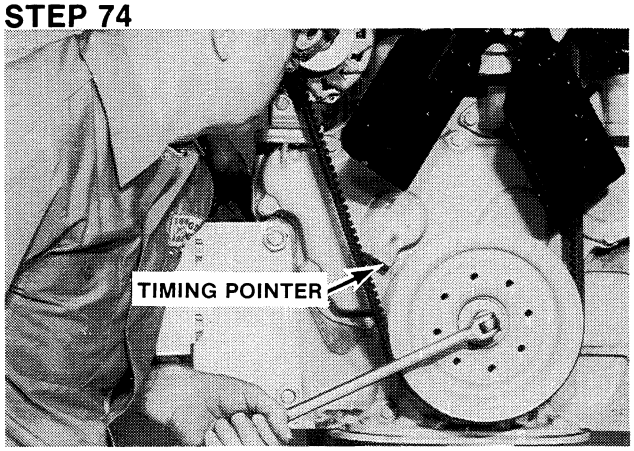
Adjust the Number One intake valve clearance to 0.015" (0.381 mm) by using a valve clearance adjusting tool, 9/16" socket and a feeler gauge.

STEP 73



Put a dial indicator on the Number One intake valve retainer and set the dial indicator at zero.

STEP 74



Turn the engine over one revolution, clockwise, plus 7 degrees After Top Center. The dial indicator (Step 73) will show 0.053" (1.35 mm). If 0.053" (1.35 mm) is not reached, then the complete valve train assembly must be checked.

NOTE: *This procedure, Steps 70 through 74, can be used to check the correct assembly of the camshaft to the crankshaft gear teeth without removing the front timing gear cover.*