SERVICE MANUAL

CRAWLER

350B

9-67880

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

CRAWLER

350B

9-67880

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

CRAWLER

350B

9-67880

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

CRAWLER

350B

9-67880

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

350B CRAWLER

TABLE OF CONTENTS

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Printed in U.S.A.
Issued May 1980
Revised July 1983

Classification of Lubricants

The Society of Automotive Engineers (SAE), the American Petroleum Institute (API), and the National Lubricating Grease Institute (NLGI) put oil and grease in classifications and grades according to temperature and use.

Engine Oil

The SAE number is the viscosity of engine oils; for example, SAE 30, a single viscosity oil. Engine oils are also indentified by dual numbers, SAE 10W30, a variable viscosity oil.

The API classification (SD, CD, etc.) is the oil performance in terms of engine usage. Only oil specified in Section 1050 is to 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 must be that specified in section 1050.

Special Tools

There are some special tools that are needed to remove and install, disassemble and assemble, check and adjust the component parts of this machine. Some special tools are easily made locally and the necessary information to make the tool is in this service manual. Others are more difficult to make locally and must be purchased. Use these tools as recommended in this service manual for your personal safety and to do the job correctly.

Special tools that were ordered from Case Service Parts Supply are now available from Service Tools in the U.S. and from Jobborn Manufacturing Co. in Canada.

Address your orders for special tools to:

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

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

Section

1010

GENERAL ENGINE SPECIFICATIONS

350B CRAWLER

Written In *Clear And Simple English*

CASE CORPORATION

Rac 9-46321

Printed in U.S.A
February, 1980

188 DIESEL ENGINES

General

Type	Case Open Chamber, 4 Cylinder, 4 Stroke Cycle, Valve-in-Head
Firing Order	1-3-4-2
Bore	3-13/16 Inches (101.6 mm)
Stroke	4-1/8 Inches (104.8 mm)
Piston Displacement	188 Cubic Inches (3 081 cm^3)
Compression Ratio	17.5 to 1
No Load Governed Speed	2150 RPM
Rated Engine Speed	2000 RPM
Engine Idling Speed	725 to 775 RPM
Valve Tappet Clearance (Exhaust)	(Cold) 0.014 Inch (0.356 mm)
(Intake)	(Cold) 0.012 Inch (0.305 mm)

Piston and Connecting Rods

Rings per Piston	3
Number of Compression Rings	2
Number of Oil Rings	1
Type Pins	Full Floating Type
Type Bearing	Replaceable, Precision Steel Back, Copper-Lead Alloy Liners

Main Bearings

Number of Bearings	5
Type Bearings	Replaceable, Precision Steel Back, Copper-Lead Alloy Liners

Engine Lubricating System

Crankcase (Without Filter Change)	6 Quarts (5.7 liters)
(With Filter Change)	7 Quarts (6.7 liters)
Oil Pressure	50 to 70 PSI (345 to 483 kPa)(3.45 to 4.83 bar) with Engine Warm and Operating at Rated Engine Speed
Type System	Pressure and Spray Circulation
Oil Pump	Gear Type
Oil Filter	Full Flow Spin on Type

Fuel System

Fuel Injection Pump	Roosa-Master
Pump Timing	7 Degrees Before Top Center
Fuel Injectors	Pencil Type
Fuel Transfer Pump	Vane Type, Integral Part of Injection Pump
Governor	Variable Speed, Fly-Weight Centrifugal Type, Integral Part of Injection Pump
Fuel Filters	Full Flow Spin on Type

Section 1012

DECALS AND PAINTING

Written In *Clear And Simple English*

CASE CORPORATION

CE Div. 9-67880
May 1980

PRINTED IN U.S.A.

GENERAL INFORMATION

The following pages show decals that are installed on the machine and machine attachments. Part numbers for the decals are also shown. When decals are needed, check the parts catalog to be sure the part number is correct. Decals are available separately or in a kit for this machine.

1. The condition of all decals about the operation of the machine and/or attachments must be easy to read.

2. The condition of all decals that start with the words WARNING, CAUTION, or DANGER must be easy to read.

3. Replace any decal that is damaged or is not easy to read.

4. Remove the old decal before installing a new decal. Use enamel thinner to help remove the old decal.

5. Remove all dirt, grease, and oil before installing a new decal.

6. Use standard procedure to prepare the machine or attachment for painting.

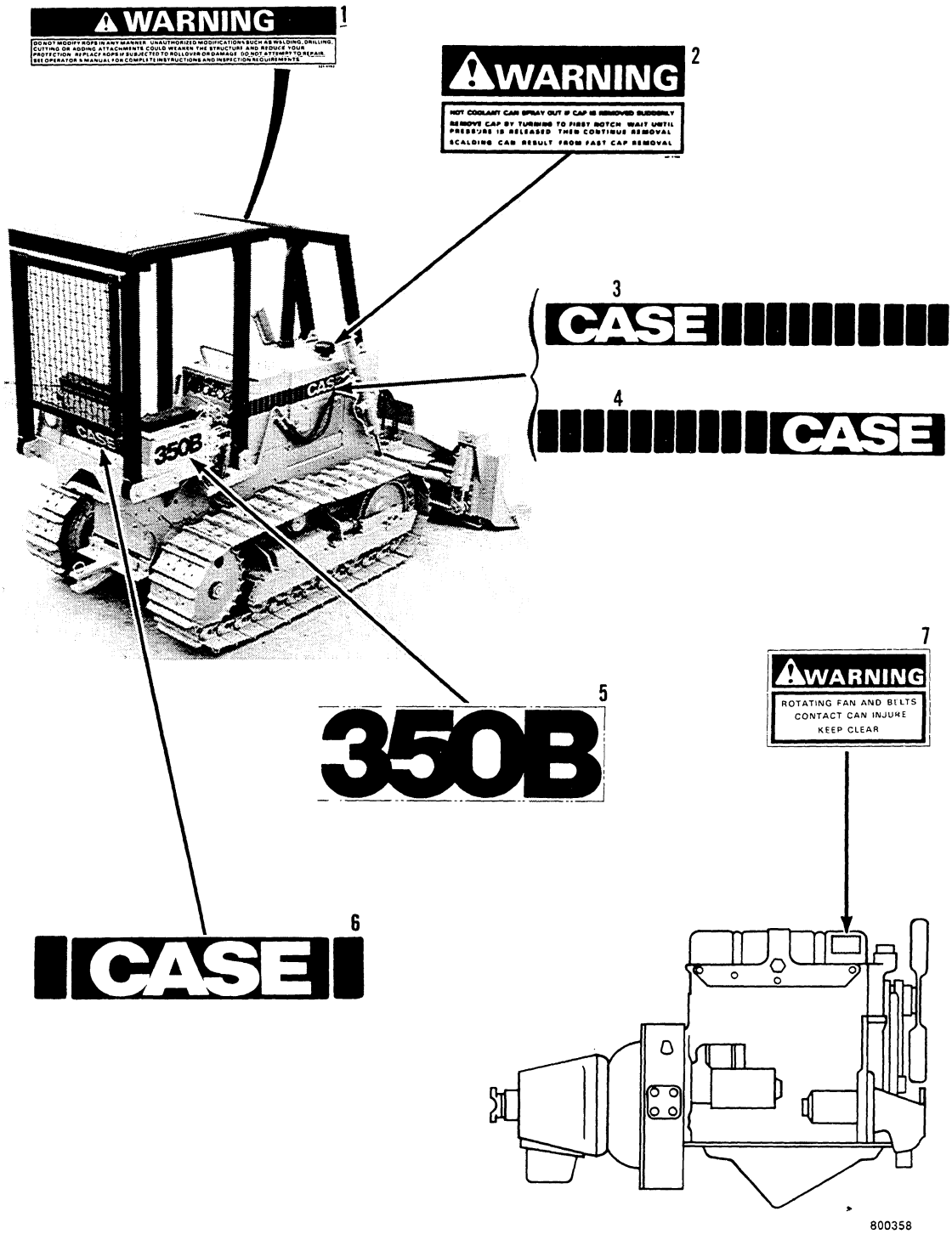
   a. Remove all dirt, grease, and oil from the surface to be painted.

   b. Wash the area to be painted.

   c. Use sandpaper to prepare the surface that is to be painted.

   d. Cover all surfaces that are not to be painted.

   e. Paint the machine or attachment.



1. 321-4192
2. 321-3708 (UNDER COVER FOR RADIATOR CAP)
3. 321-5066 (LEFT-HAND SIDE)
4. 321-5300 (RIGHT-HAND SIDE)
5. 321-5278
6. 321-5301 (BACK OF SEAT)
7. 321-3596 (ON BOTH SIDES OF ENGINE)

Figure 1 - Common Decals

Section 2001

ENGINE DIAGNOSIS

188 and 207 Diesel Engines

CASE CORPORATION Rac. 9-78875 PRINTED IN U.S.A.

GENERAL INFORMATION

Before making any repairs or adjustments on an engine, a mechanic or technician must properly diagnose the trouble.

Locating the trouble and repairing it is only part of the job, a technician must find and eliminate the cause of the trouble as well. Too many repairs are made with no thought to removing the causes that made the repair necessary.

For any engine to start or perform properly, three main requirements must be present:

1. FUEL
2. COMPRESSION
3. COMBUSTION

When any of these requirements are not present or limited by some mechanical reason, the engine will not start and will fail to operate properly throughout the power range.

FUEL. Fuel system problems can be present anywhere from the fuel tank, through the filters and injection pump as well as the injectors. Correct injection pump timing is important in the overall fuel system performance.

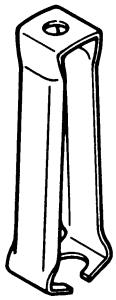
COMPRESSION. Compression on an engine is related to the "breathing function". Proper compression is affected by the air cleaner condition, muffler restriction, valve condition and operation including proper valve adjustment, cylinder head gaskets, condition of sleeves, rings, pistons, camshaft, and camshaft timing.

COMBUSTION. Combustion is the result of adequate compression to develop enough heat in the air charge on the compression stroke to fire the fuel being injected into the engine cylinders. Proper spray pattern and atomization of the fuel by the injector is very important. Timing the fuel injection pump to the engine to a precise degree BTDC is a vital requirement for proper combustion.

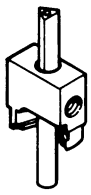
The engine diagnosis contained in the following pages covers many trouble symptoms, the causes, and what will be necessary to repair or eliminate the problem. Under each symptom are listed the most common and reoccuring problems progessing to the not so common problems. Locate your problem symptom in the diagnosis chart and refer to the pages listed for the probable causes and remedies.

INSTALLATION INSTRUCTIONS FOR M20611 TEFLON VALVE SEAL KIT

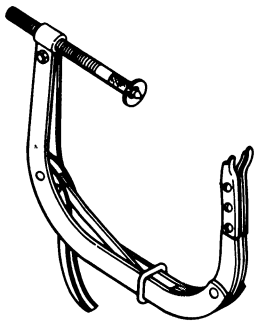
Special Tools Required



M20624 SEAL INSTALLATION TOOL

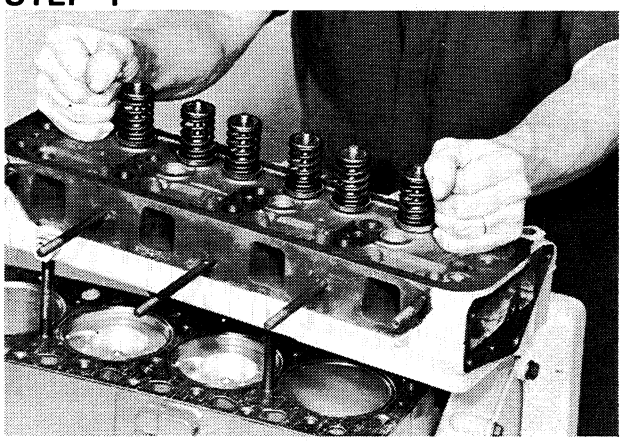


M20615 VALVE GUIDE CUTTING TOOL



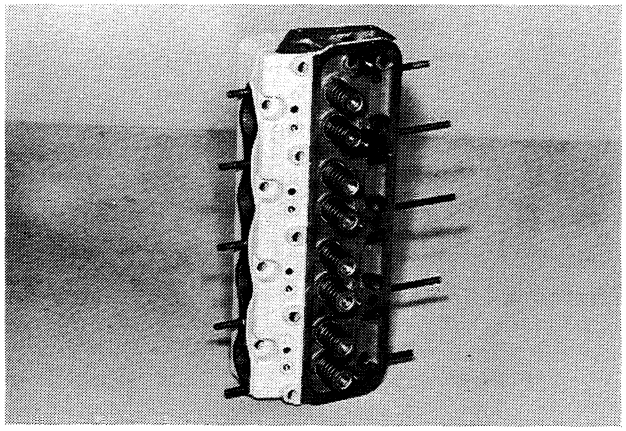
VALVE SPRING COMPRESSOR

STEP 1



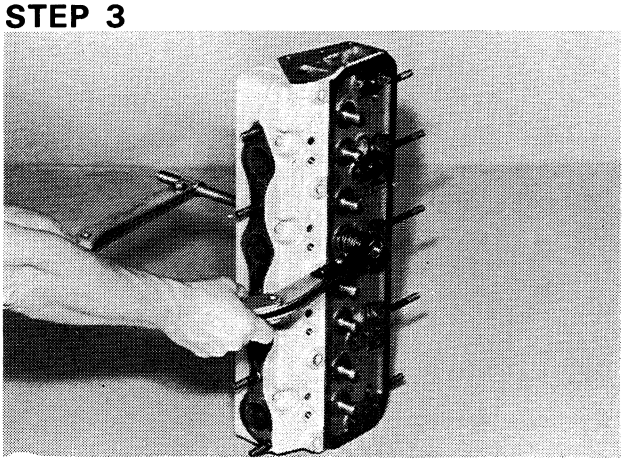
Remove the cylinder head from the engine block. Refer to section 2015 for head removal. *NOTE:* This cylinder head requires two M20611 Kits.

STEP 2



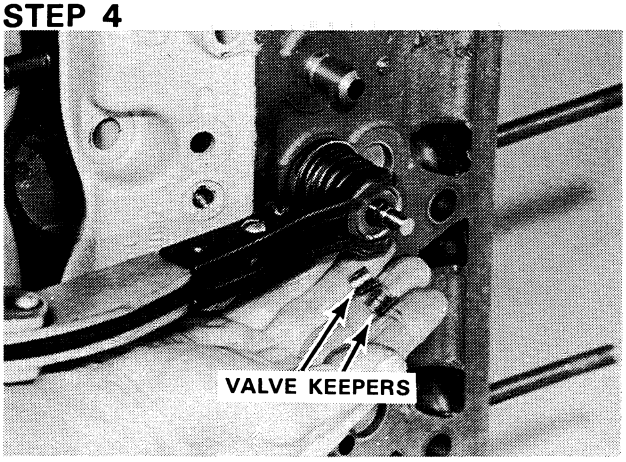
Place cylinder head on work bench.

STEP 3



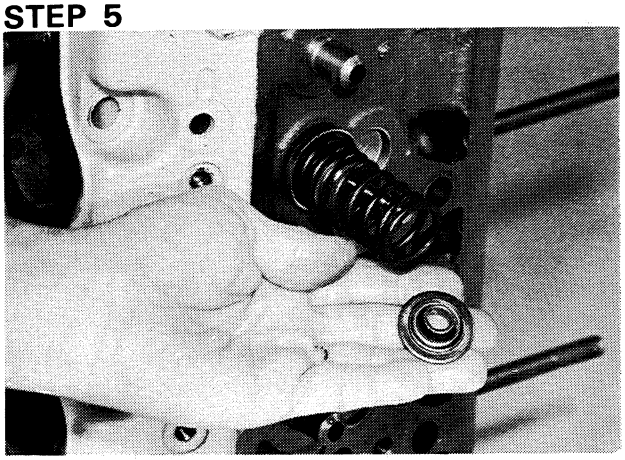
Install a valve spring compressor.

STEP 4



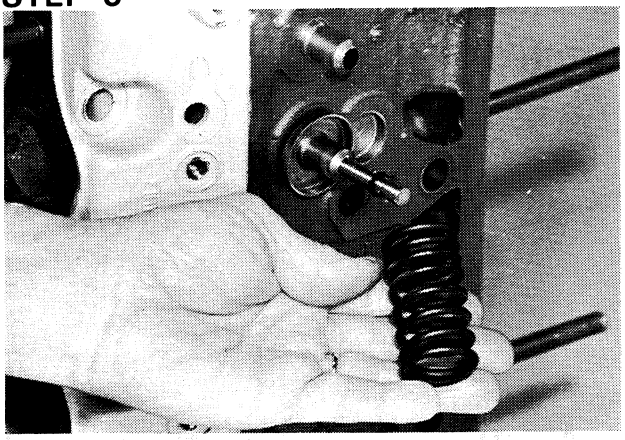
Compress valve spring and remove valve keepers. *IMPORTANT:* Valves and valve keepers should be marked when removed to insure that they will be reinstated in their original location.

STEP 5



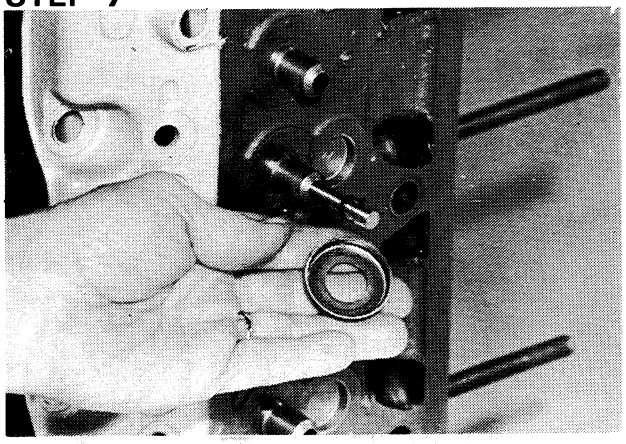
Remove spring retainer.

STEP 6



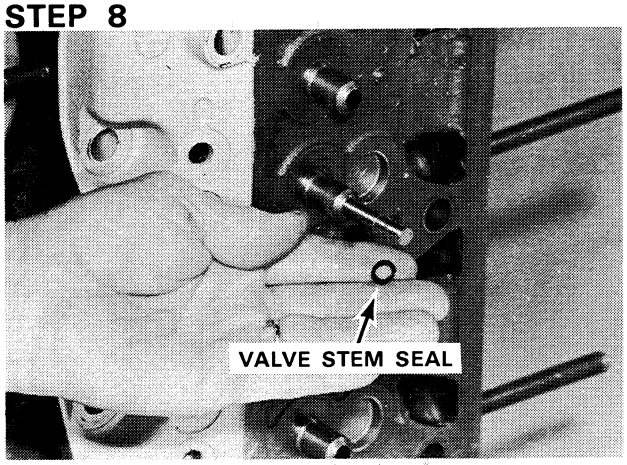
Remove spring.

STEP 7



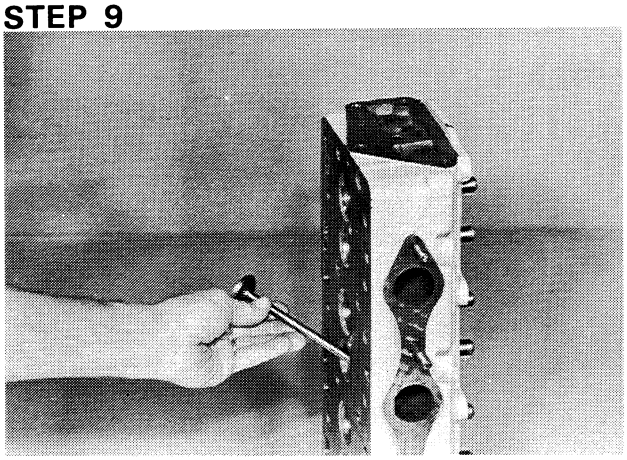
Remove spring seat.

STEP 8



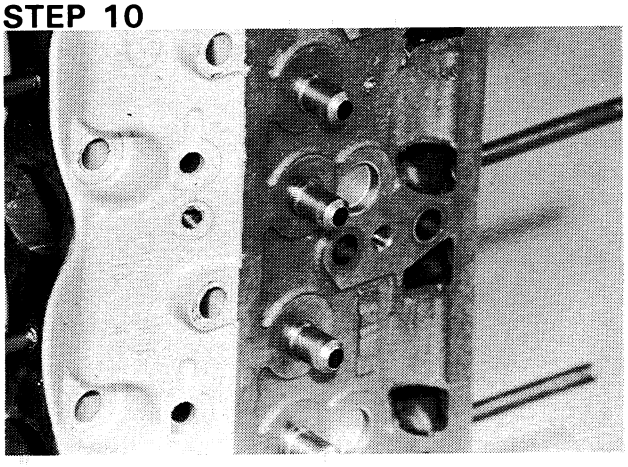
Remove valve stem seal.

STEP 9



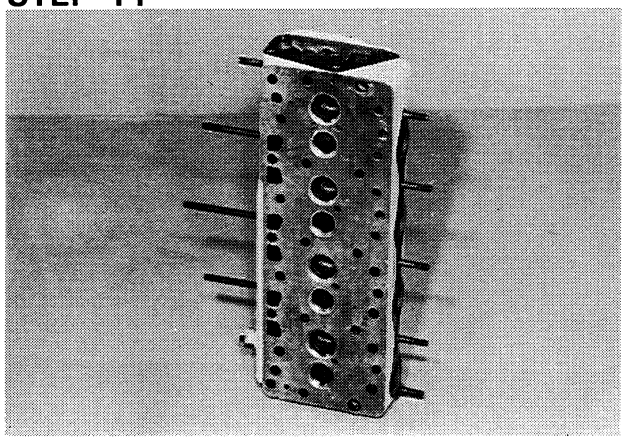
Remove valve.

STEP 10



Remove all the valve assemblies.

STEP 11

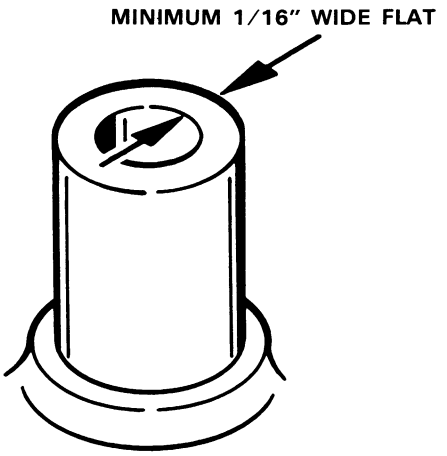


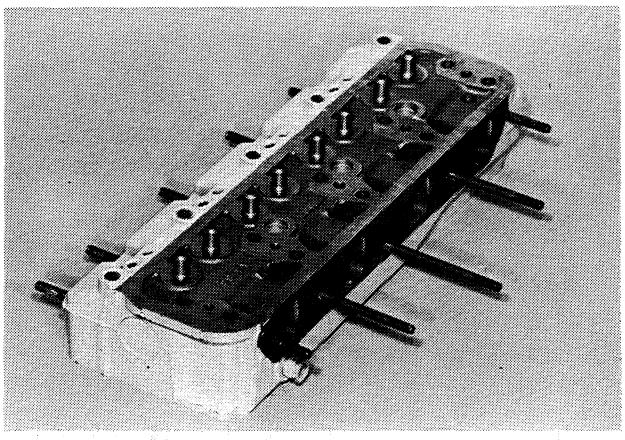
Wash, clean and inspect head. Use a rotary brush to clean around and down into valve ports. Refer to Section 2015 for complete head reconditioning.

STEP 12

Clean valves with a fine power drive wire brush, removing all carbon and varnish deposits. Be careful not to scratch valve stems. Refer to Section 2015 for valve inspection.

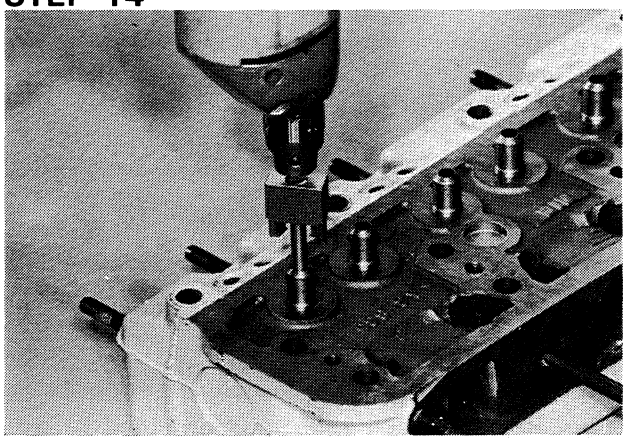
STEP 13





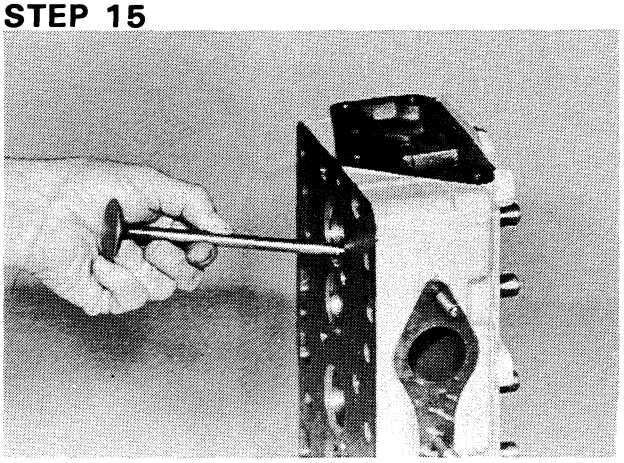
Check valve guide top surface. There must be a minimum of a 1/16" wide flat around entire top surface.

STEP 14



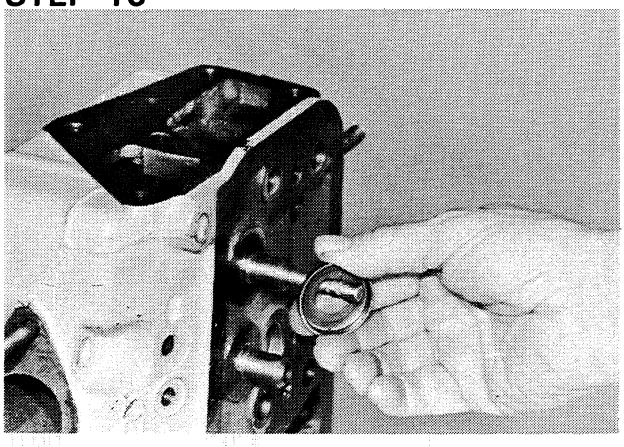
Use M20615 tool in a electric drill (if required) to provide necessary flat area on valve guide. *IMPORTANT:* Do not exceed 450 RPM drill speed when using valve guide cutting tool.

STEP 15



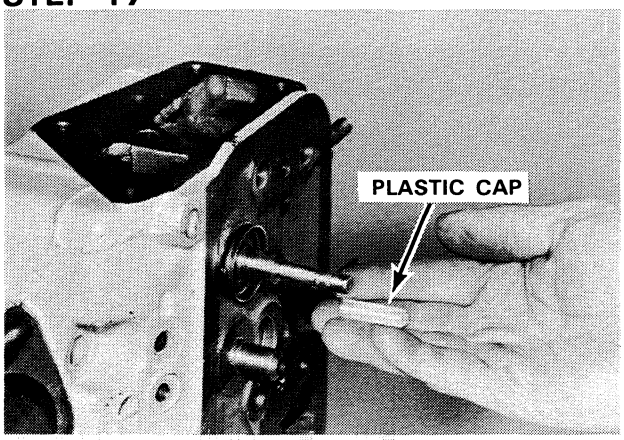
Dip valve stems into HDM #30 oil before assembly in cylinder head.

STEP 16



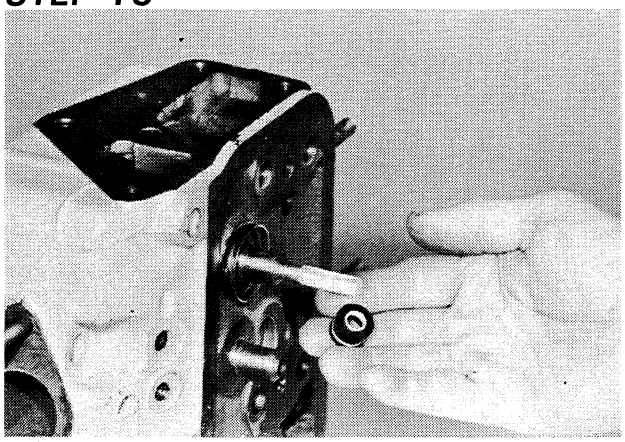
Install spring seat.

STEP 17



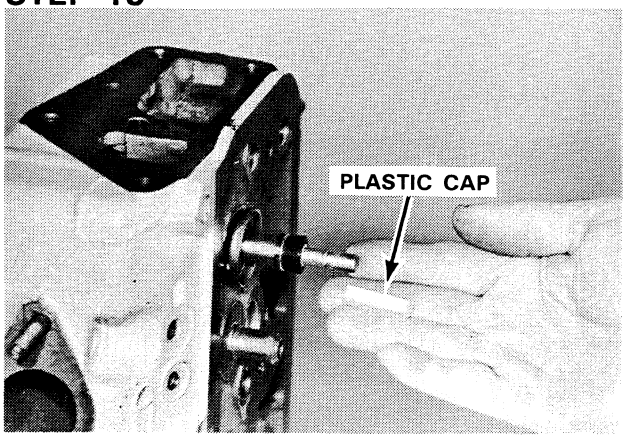
Place plastic installation cap, provided in kit, on the end of the valve stem. *NOTE:* Cap prevents sharp edges on valve stem grooves from cutting valve seal.

STEP 18



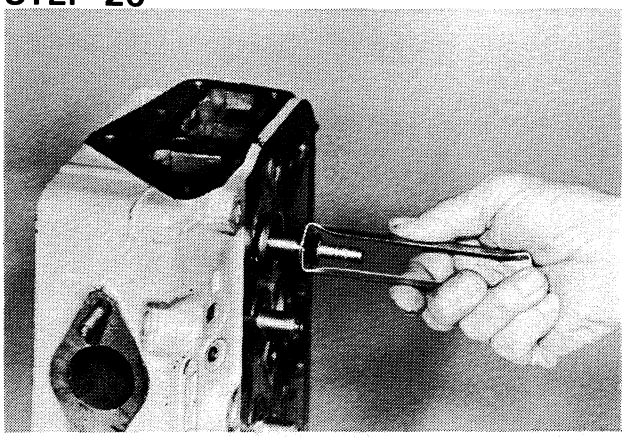
Carefully start valve seal on cap and hold thumb against white seal insert to avoid dislodging it. Push seal down until seal jacket touches top of valve guide.

STEP 19



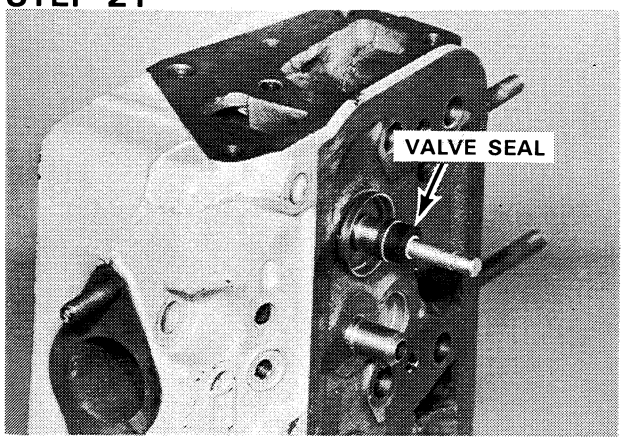
Remove installation cap and save, since it must be reused.

STEP 20



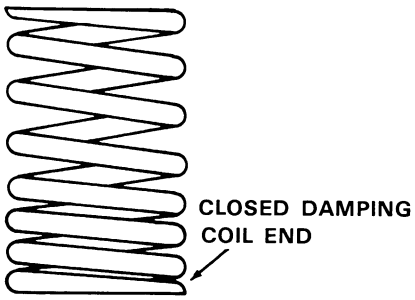
Use M20624 tool and press seal down over valve guide until seal is flush with top of guide.

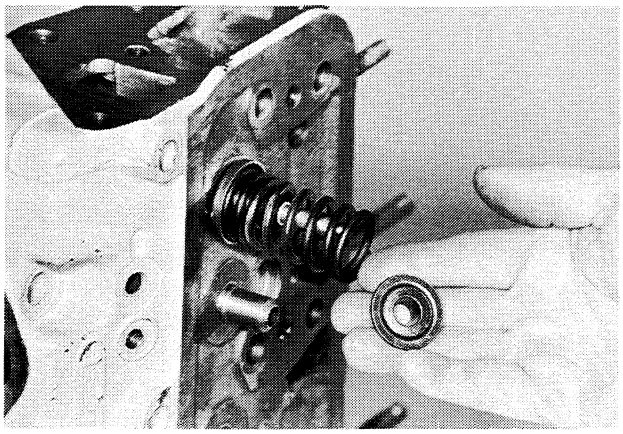
STEP 21



Valve seal installed.

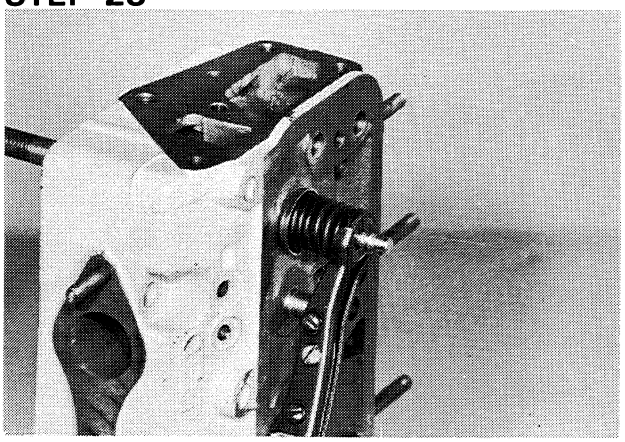
STEP 22





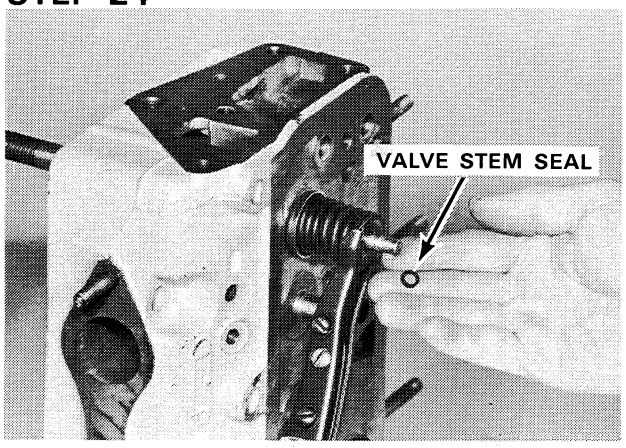
Install spring (damping coil end down) and spring retainer.

STEP 23



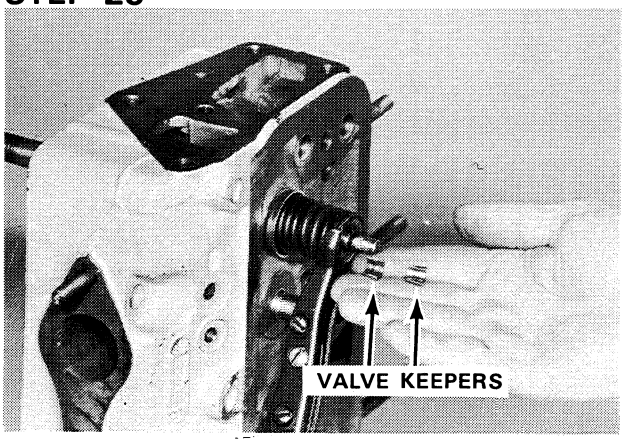
Install valve spring compressor.

STEP 24



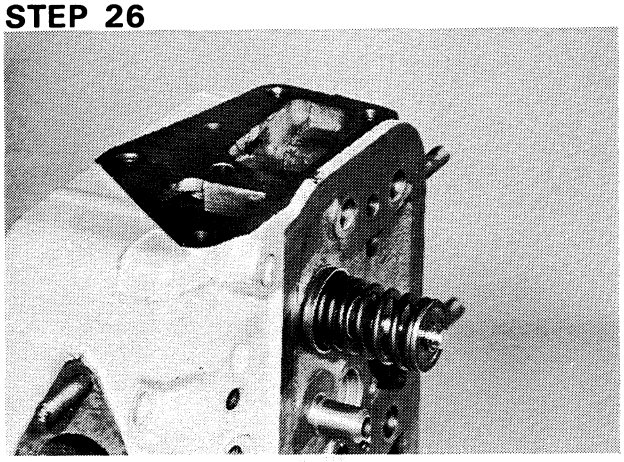
Install stem seal in lower valve stem groove.

STEP 25



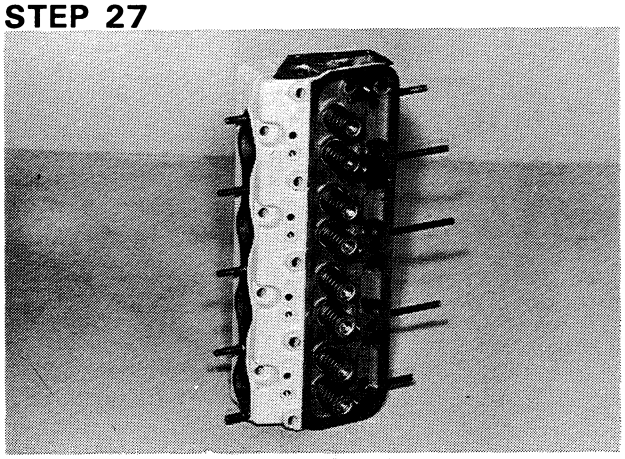
Install valve keepers in outer valve stem groove.

STEP 26



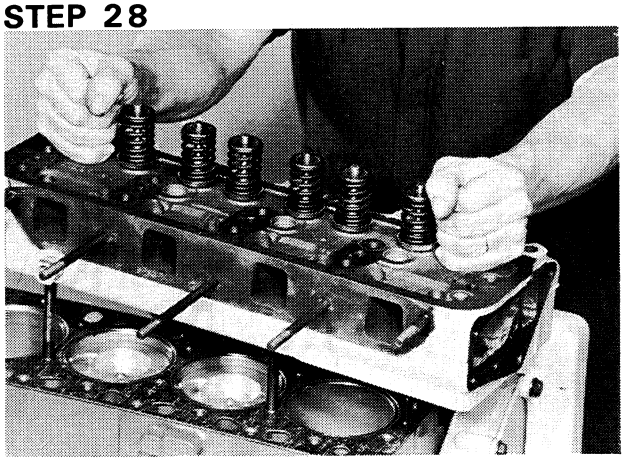
Remove spring compressor and tap valve stem end to seat keepers.

STEP 27



Install teflon seals on the other intake and exhaust valves, following the preceeding procedure.

STEP 28



Install cylinder head on engine block following procedure outlined in Section 2015.

NOTE: The Case Corporation reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

ENGINE TUNE-UP PROCEDURE

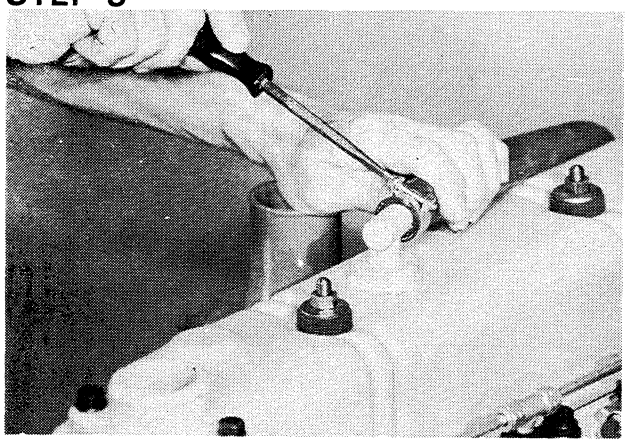
STEP 1

Service the air cleaner. Refer to your Operator's Manual.

STEP 2

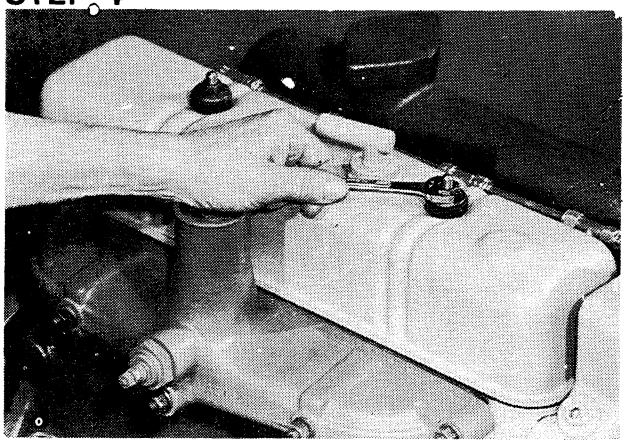
Adjust the belts. Refer to your Operator's Manual.

STEP 3



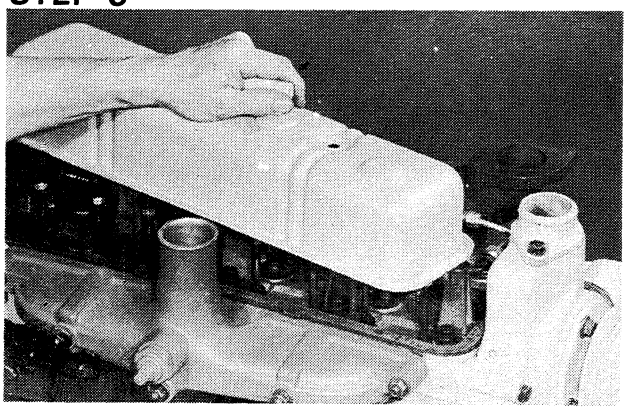
Remove breather tube.

STEP 4



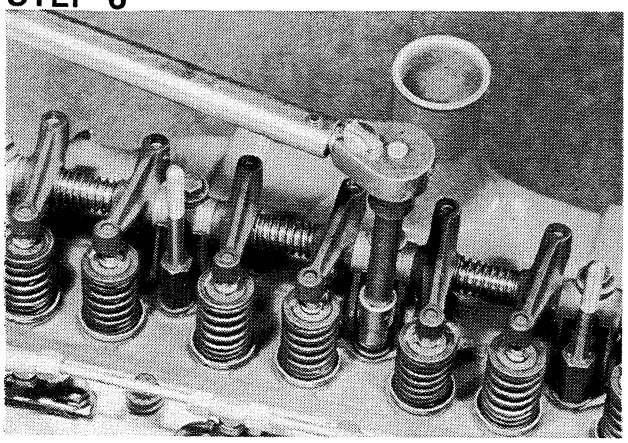
Remove valve cover mounting nuts and grommets.

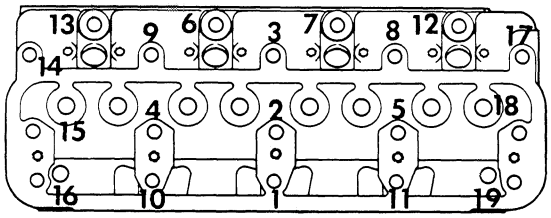
STEP 5



Remove valve cover and gasket.

STEP 6

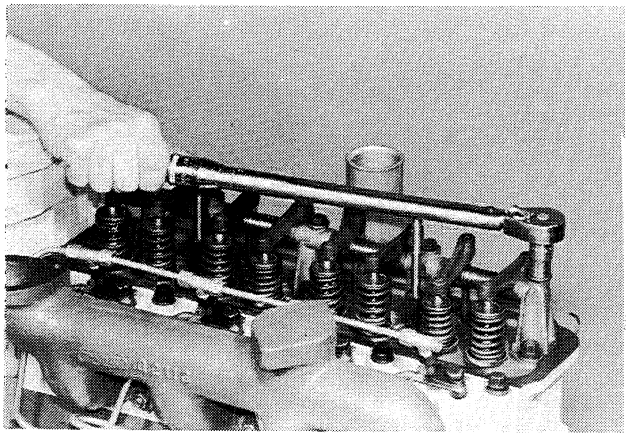




FAN

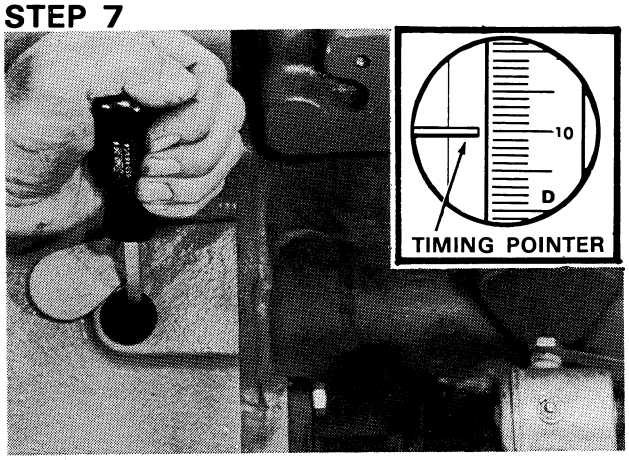
Loosen each cylinder head bolt or nut approximately 1/4 turn and then tighten bolt or nut to the specified torquing procedure as listed below and in sequence as shown above. *NOTE:* Do not loosen all nuts or bolts simultaneously but loosen and tighten each individual bolt and nut in the prescribed sequence. The bolt or nut is backed off 1/4 turn to break the set of the threads caused by heat, high stress and oxidation. If this is not done, a false reading is obtained.

1. Nuts w/hardened washers - torque 95-105 ft.lbs.
2. Grade 8, 12 pt. hd. bolts - torque 110-115 ft. lbs.
3. Flanged nuts - torque 90-100 ft. lbs.



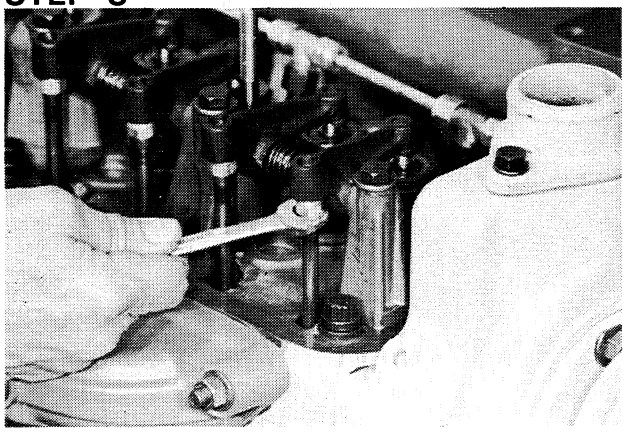
Torque rocker arm mounting bracket bolts to insure that the bolts have retained 25 to 30 ft. lbs. torque.

STEP 7



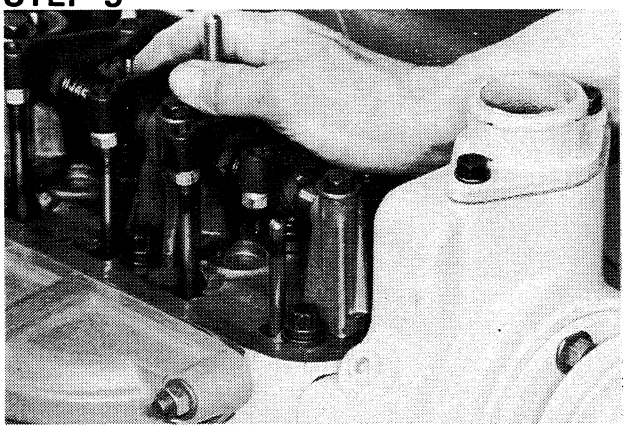
Crank engine by inserting a screwdriver into the timing hole in the flywheel housing or torque tube, and by engaging the ring gear teeth with the screwdriver, align the timing pointer with the 10° BTDC mark on the flywheel.

STEP 8



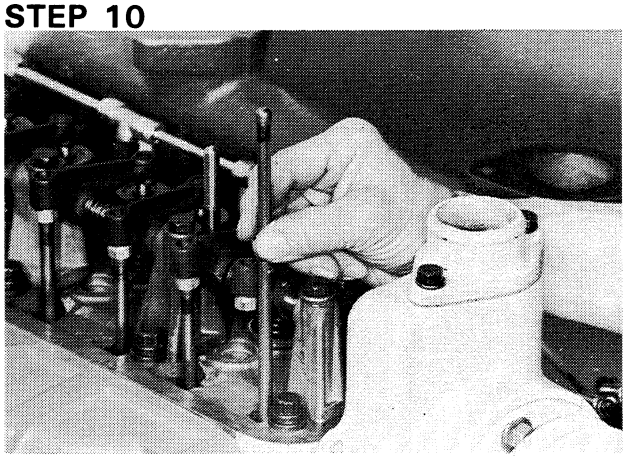
Turn the rocker arm adjusting screw on number one cylinder intake valve inwards to take pressure off the push rod.

STEP 9



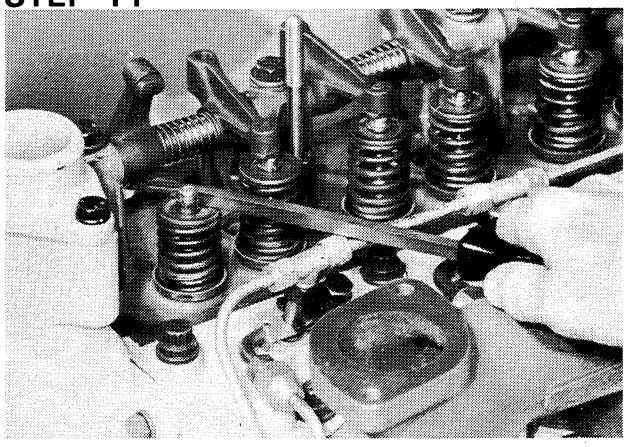
Push down on the number one cylinder intake valve spring and at the same time push the rocker arm assembly rearwards.

STEP 10



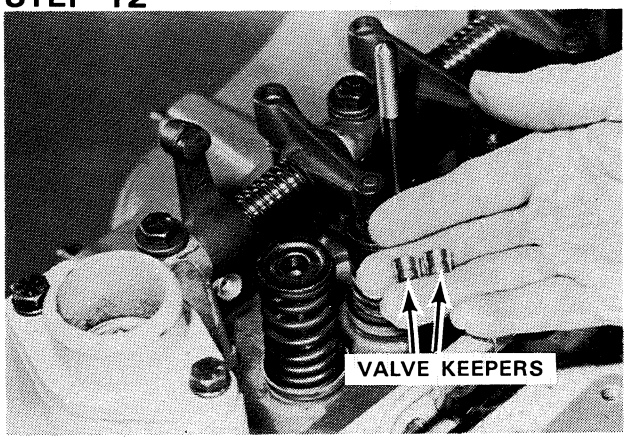
Remove the push rod.

STEP 11



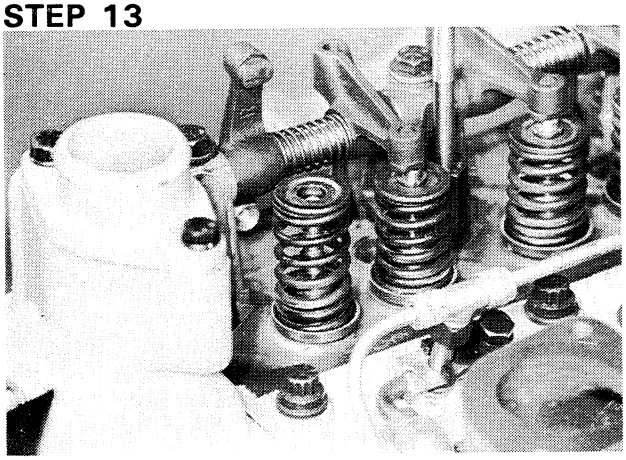
Compress exhaust valve spring on number one cylinder by using a screwdriver.

STEP 12



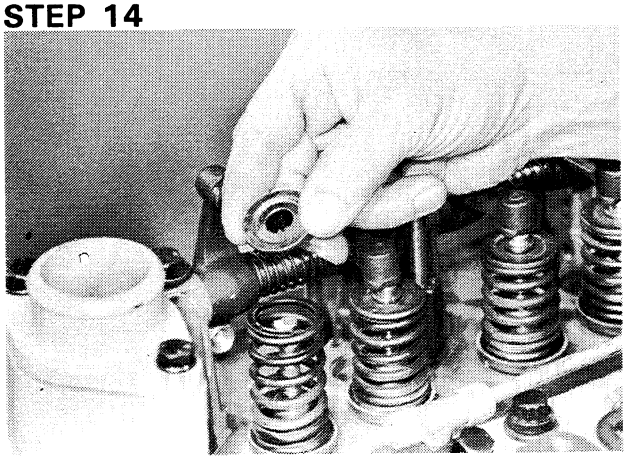
Remove the valve keepers.

STEP 13



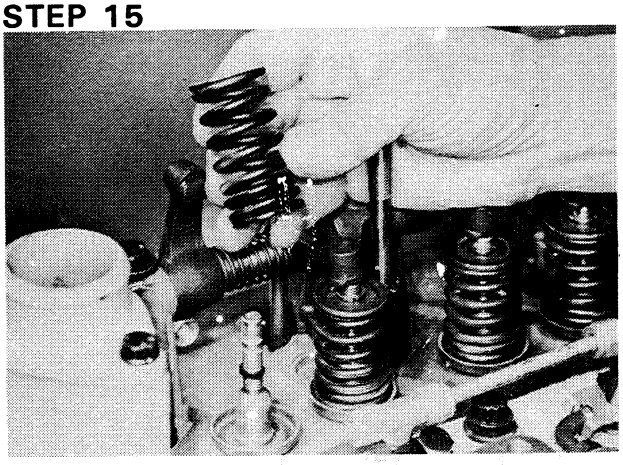
Valve keepers removed.

STEP 14



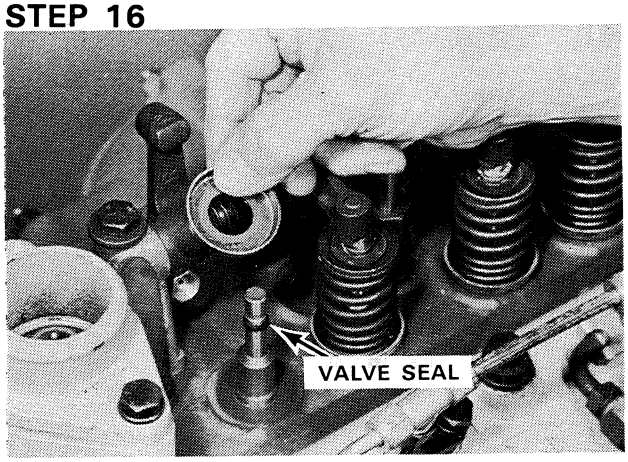
Remove valve spring retainer.

STEP 15



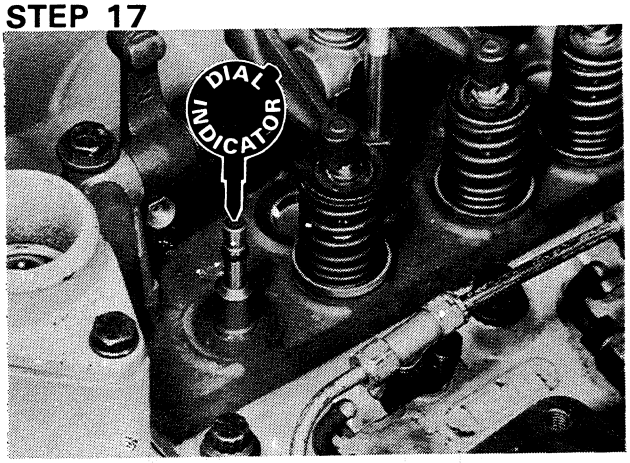
Remove valve spring.

STEP 16



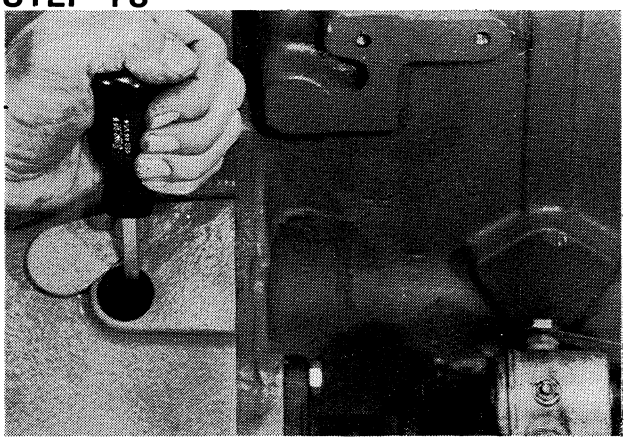
Remove valve spring seat. *NOTE:* Keep valve seal in place to prevent valve from falling through valve guide if the piston is moved too far.

STEP 17

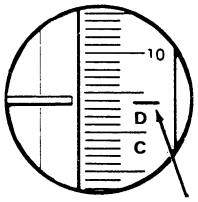


Install dial indicator on end of valve stem with valve resting on top of piston.

STEP 18

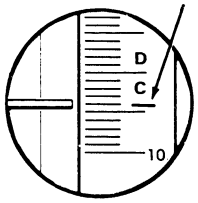


Crank engine clockwise until dial indicator hand stops moving. Reset indicator to zero.



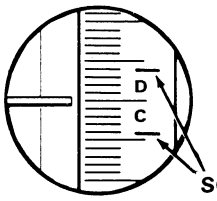
Crank engine clockwise until .010" shows on the dial indicator. Scribe a mark on the flywheel in line with timing pointer.

SCRIBE MARK



Crank engine counter-clockwise past zero mark on indicator until .010" shows on the dial indicator. Again, scribe a mark on the flywheel in line with timing pointer.

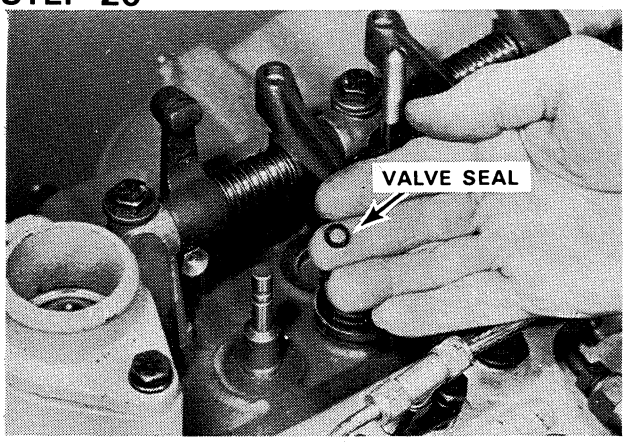
STEP 19



Half the distance between these two scribe marks on the flywheel will be the top dead center (TDC).

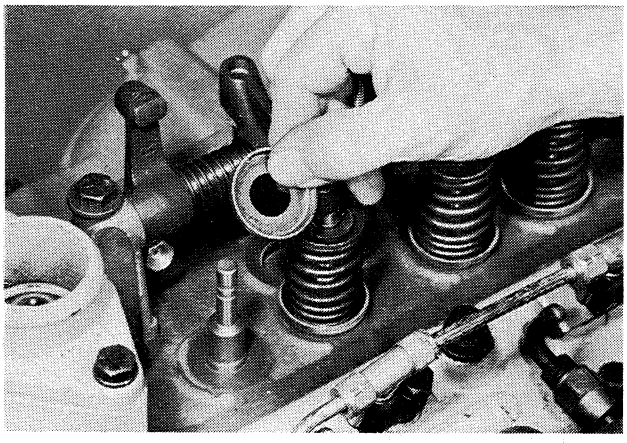
SCRIBE MARKS

STEP 20



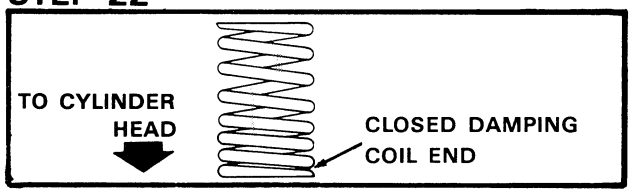
Remove valve stem seal from lower valve stem groove.

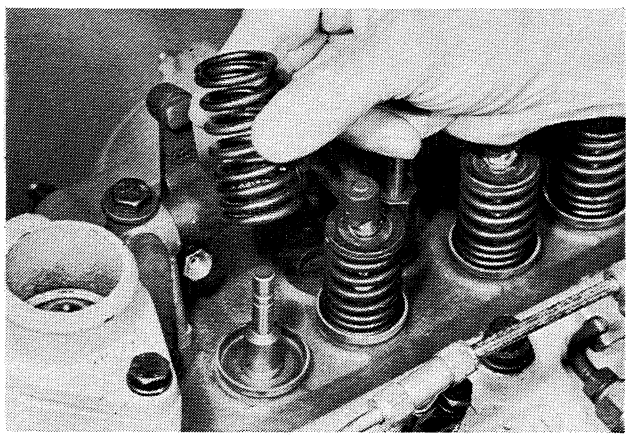
STEP 21



Install the spring seat.

STEP 22



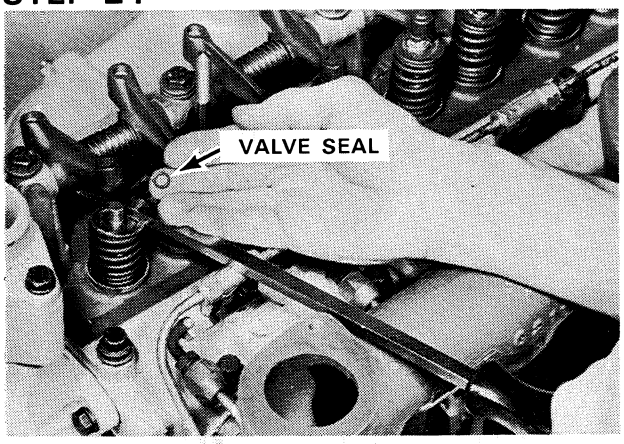


Install the spring with the damping coil end on top of the cylinder head. See inset above.

STEP 23

Install the spring retainer.

STEP 24

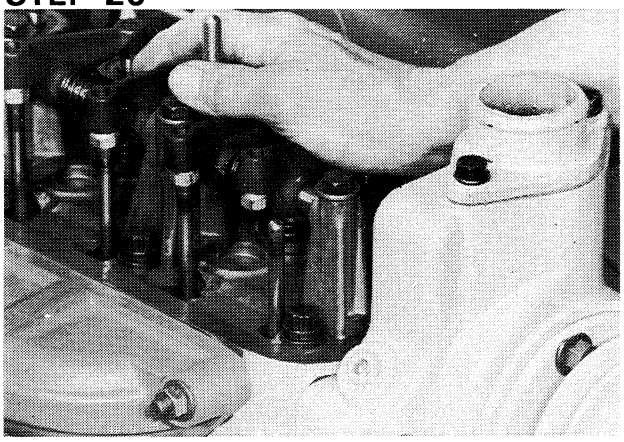


Compress valve spring using a screwdriver and install a new valve stem seal in the lower groove.

STEP 25

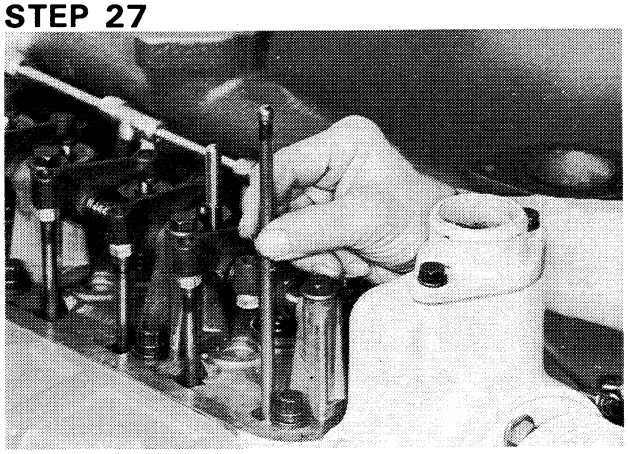
Keeping the valve spring compressed, install the valve keepers in the upper valve stem groove. Remove screwdriver and tap end of valve stem to seat keepers.

STEP 26



Push back the rocker arm assembly.

STEP 27

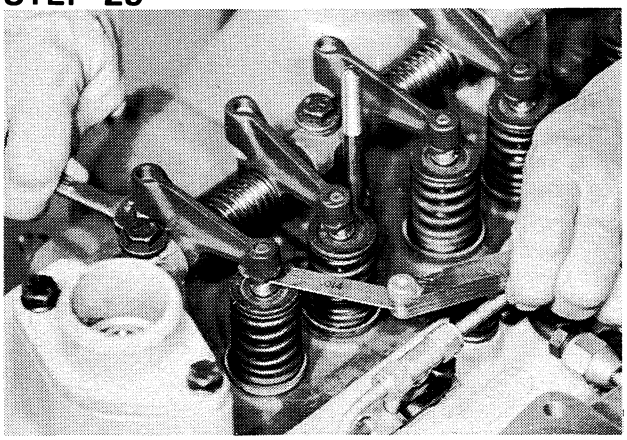


Install the push rod.

STEP 28

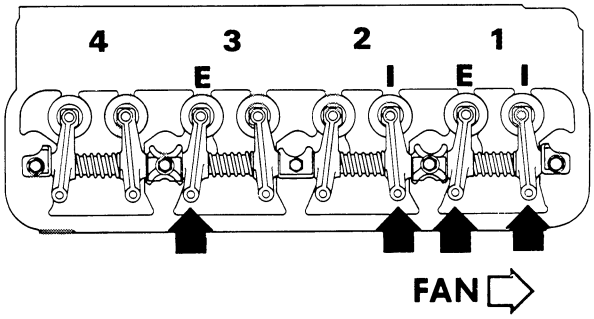
Release rocker arm assembly and position push rod beneath rocker arm adjusting screw.

STEP 29



Check and adjust the intake and exhaust valves as pointed out by the arrows below.

Tappet Clearance - Intake Valves .012"
Exhaust Valves .014"

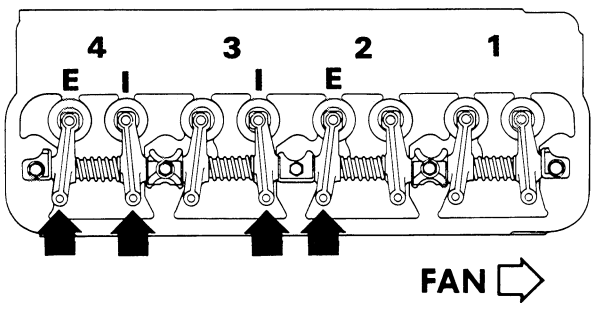


NO. 1 TDC COMPRESSION STROKE

Crank the engine one complete revolution and align the timing pointer with the TDC mark on the flywheel.

Check and adjust the intake and exhaust valves as pointed out by the arrows below.

Tappet Clearance - Intake Valves .012"
Exhaust Valves .014"



NO. 4 TDC COMPRESSION STROKE

STEP 30

Remove and check each fuel injector. Refer to Section 3013.

STEP 31

Perform a compression test on each cylinder befor installing fuel injector.

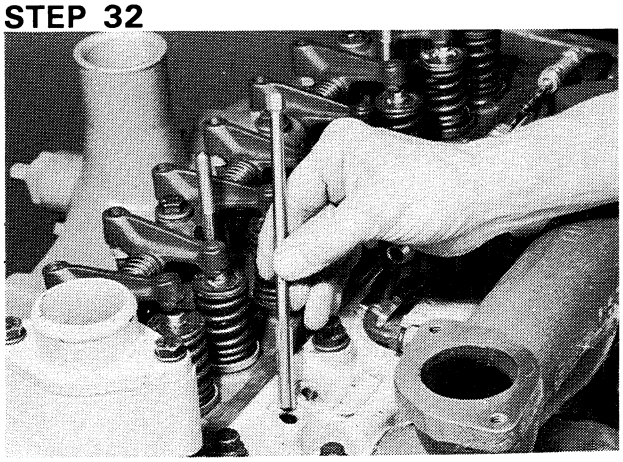
There are two methods of checking compression pressure - the cranking method and the engine running method. The engine must be at operating temperature for either method used.

A. CRANKING METHOD - Remove all fuel injectors.

B. RUNNING METHOD - Disconnect high pressure fuel line and leak-off line from No. 1 injector. Route fuel from these lines back to fuel tank or clean container. Repeat for each cylinder.

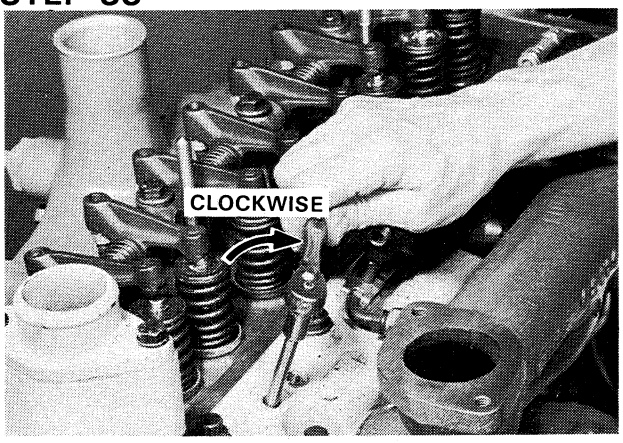
CAUTION *Before cranking engine, make sure all operating controls are in neutral, brakes are set and wheels are securely blocked.*

STEP 32



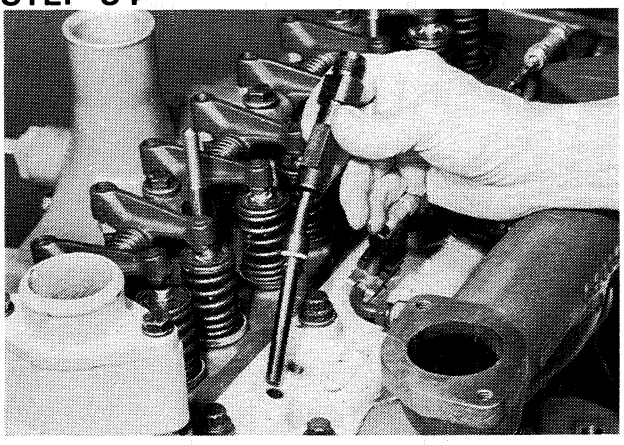
Clean cylinder head injector bore using bore cleaning tool A43277.

STEP 33



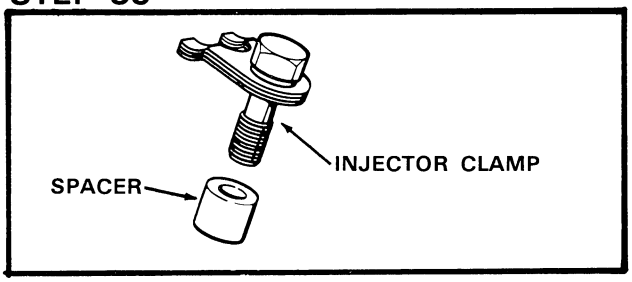
Always turn tool clockwise. Counter-clockwise rotation dulls tool. Blow out with compressed air.

STEP 34



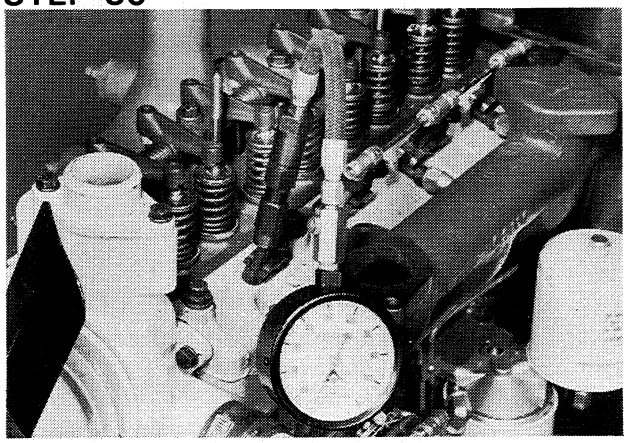
Install Bacharach 70-314 (D-558) compression gauge adapter.

STEP 35



Secure gauge adapter with an original injector clamp assembly and spacer.

STEP 36



Connect Case No. CD-504 compression gauge to adapter. *NOTE:* Take several compression readings on each cylinder using vent valve button to relieve gauge pressure.

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

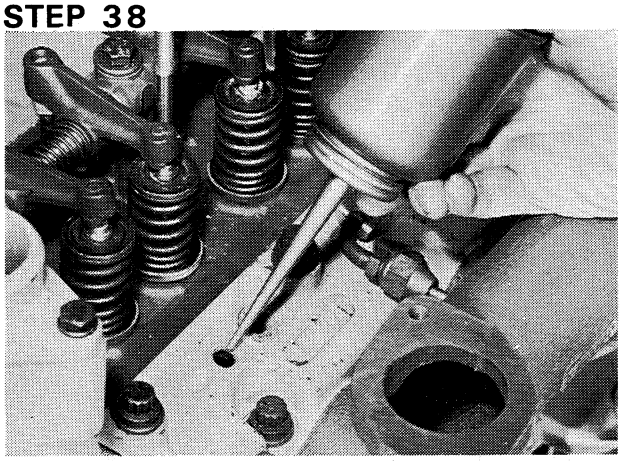
STEP 37

It is very important that all cylinder pressures be apprxomately the same. See chart for allowable compression pressure variation.

If compression is greater than normal, carbon deposits are indicated. If reading is below normal, leaking valves or excessive ring clearance is indicated.

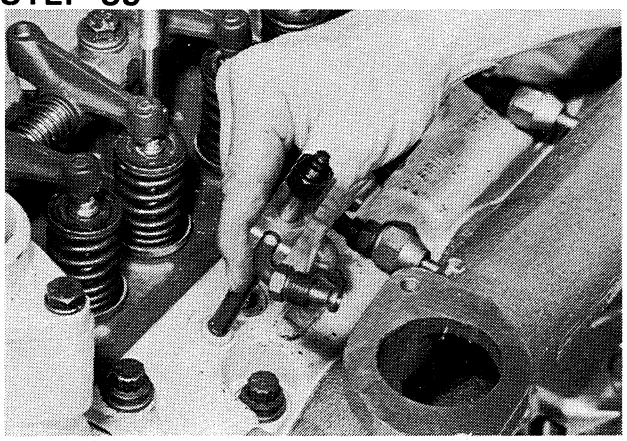
NOTE: To make a simple test when a compression leak is indicated, squirt a teaspoon of oil into cylinder and recheck compression. If pressure rises to near normal, compression loss is past the rings. Very little change in compression indicates leakage past the valves.

STEP 38



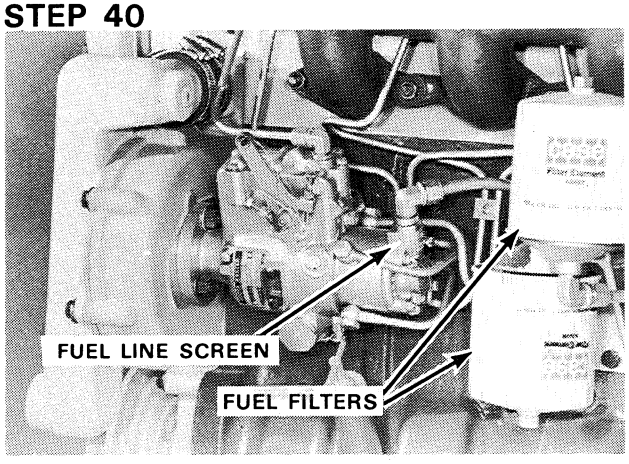
Squirt a few drops of clean engine oil in each cylinder head injector hole to provide lubricant for carbon dam at lower end of injector when being installed.

STEP 39



Install fuel injectors. Refer to Section 3013.

STEP 40



Refer to Section 3010 & 3012 for cleaning and servicing the fuel filters and system.

	ENGINE SPEED	NORMAL COMPRESSION PRESSURE	ALLOWABLE VARIATION BETWEEN CYLINDERS
CRANKING	APPROXIMATELY 200 RPM	400 PSI*	25 PSI
RUNNING	800 RPM	480 PSI*	20 PSI

*NOTE: A 4% REDUCTION IN PSI MUST BE ALLOWED FOR EVERY 1000 FT. ABOVE SEA LEVEL.