Model 420
Gasoline Crawler

Service Manual

9-70121

Reprinted

CASE

CASE TERRATRAC CRAWLER TRACTOR MODEL 420 GASOLINE

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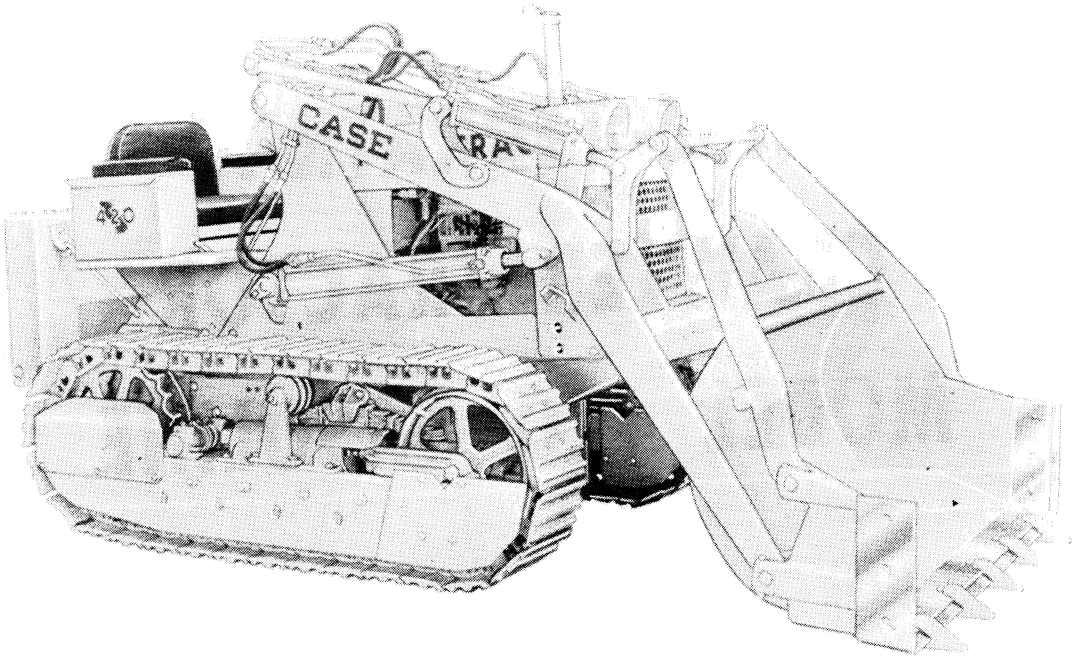
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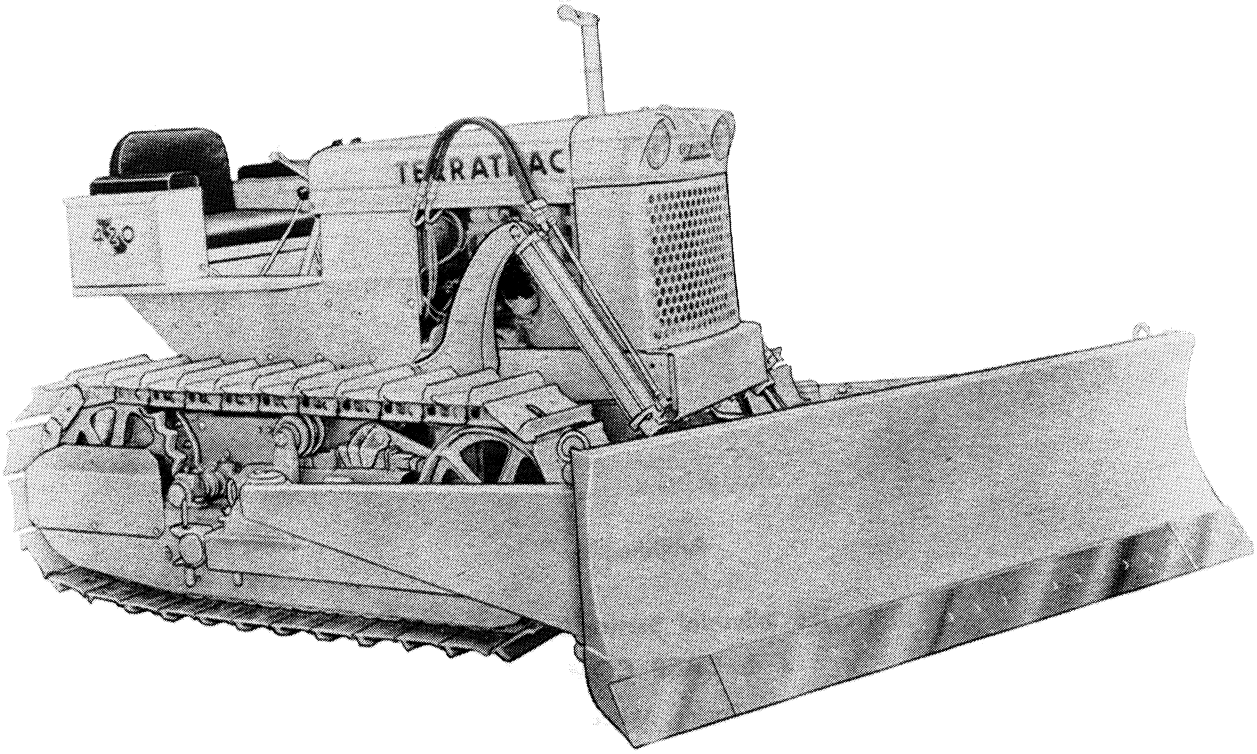

TERRATRAC

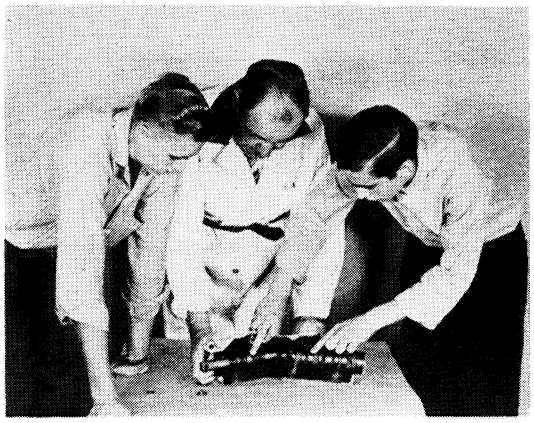
FOREWORD

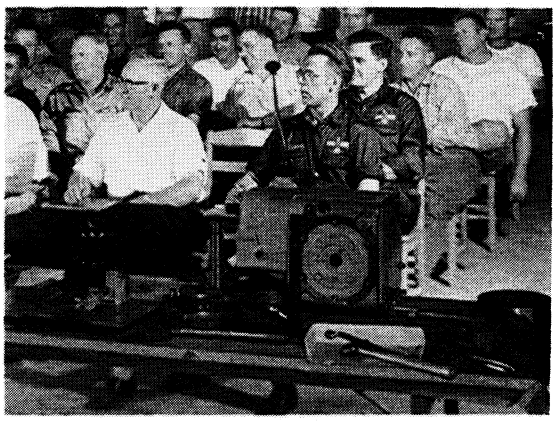
It is the policy of the J. I. Case Co. to build machines with long and useful life expectency. The reputation of this company and its products are dependent upon the diligent and conscientious maintenance given these products by the field service people.

Thousands of satisfied users have proven the design and quality of the J.I. Case products. In the final analysis it will be the field service personnel that will write the final chapter to the success story.

The J.I. Case Co. recognizes the importance of the thoroughly trained technician. No longer is the mechanic considered as a "grease monkey" or the "necessary evil". To help the service man gain his rightful place as a Professional, the company has inaugurated a "Mobile Training Program". This program has been highly successful and very fruitful. The J.I. Case Co. now is planning even greater and more far reaching programs to futher this endeavor.

Service Representatives for the J,I. Case Co. and its Dealers Servicemen are located all over the world, and they represent the finest in Service Personnel. This Service Manual has been written as a reference guide, and is dedicated to those that service, maintain and teach the J.I. Case Industrial Equipment.





The Mobile Training Unit is another service made available to the Case Dealers. Each dealer should be sure to take advantage of the training program offered by these Mobile units. Watch for it when it comes to your territory, and be sure to attend.

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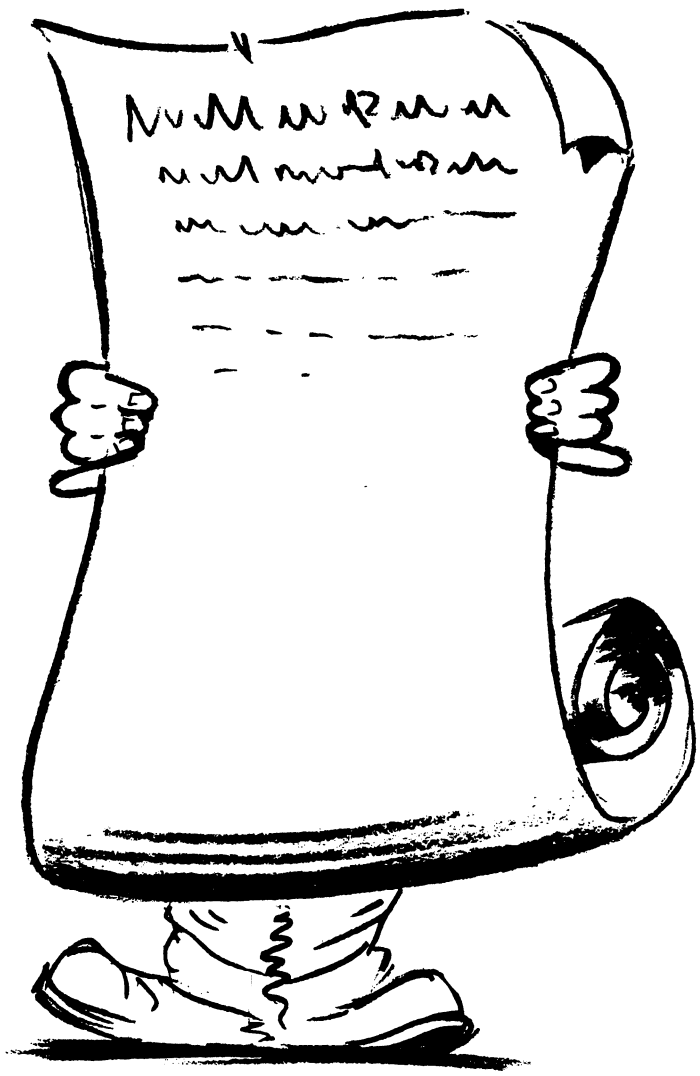
GENERAL SPECIFICATIONS

I



GENERAL SPECIFICATIONS

GROUP I

SECTION A - MODEL 420 SPECIFICATIONS

CAPACITIES (U. S.)

Fuel Tank	10 Gallons
Cooling	12 Quarts
Transmission-Differential	7 1/2 Quarts
Final Drive (each)	2-1/2 Pints
Crankcase	5-1/2 Quarts
with filter	6 Quarts
Air Cleaner	1 Pint
Hydraulic System	6 Gallons

TRACTOR

Engine, Case Gasoline	148 Cu. In.
Gross Engine Flywheel HP	42
Drawbar HP	30
Electrical System	12 Volts
Cooling Fan Diameter (Suction and Pusher)	16 Inches
Radiator	Tube and Fin Construction Pressurized with 4 lb. Cap
Clutch	Heavy-Duty, Dry-Type Single Disc Foot Operated
Transmission:	Spur Gear, Manual Shift
No. Speed Forward	3
No. Speed Reverse	1
Battery:	12 Volt Positive Grounding
Number	1
Capacity	50 Amp. Hr.
Generator: Make	Auto - Lite and Delco Remy
Capacity	20 Amperes

DIMENSIONS AND WEIGHTS

Length, Overall Without Drawbar	101 In.
Height	56 In.
Gauge	48 In.
Width, Overall	60 1/2 In.
Ground Clearance Without Drawbar	14-1/4 In.
Ground Clearance Under Drawbar	11-1/4 In.
Drawbar Height	12 In.
Drawbar Movement, Lateral	19-1/2 In.

Track Shoe Width, Standard	11 In.
Track Shoe Width, Maximum	20 In.
Number of Track Links Per Side	31
Length of Track on Ground	57 In.
Sprocket Teeth	23
Ground Area Contact	1,254 Sq. In.
Height of Grouser	1-1/2 In.
Track Pin Diameter	1-In.
Track Bushing Diameter	1-1/2 In.
Track Bolt Diameter	3/8 In.
Track Rollers, No. Per Side	4
Track Roller Diameter (Flange)	7-1/2 In.
Support Rollers, No. Per Side	1
Weight (Standard Basic) Shipping	4,850 Lbs.
Track Roller Diameter (Hub)	6-1/4 In.

ENGINE

Case Gasoline, 148 Cu. In.

Number of Cylinders	4
Bore	3-3/8 In.
Stroke	4-1/8 In.
Firing Order	1-3-4-2
Compression Ratio	7·1 to 1
Valve Tappet Clearance	014 In. (Cold)
Governed RPM (Full Load)	1850
(No Load)	2000
Idle Speed RPM	500

PERFORMANCE DATA

Forward:	Speeds	Gear Ratio
First	1.74	13.20 to 1
Second	2.75	8.34 to 1
Third	4.52	5.08 to 1
Reverse	2.01	11.42 to 1

Drawbar Pull (In pounds)

First	5815
Second	3863
Third	2203

SECTION B - 420 LOADER SPECIFICATIONS

Bucket Capacity	5/8 Cu. Yd.
Digging Depth Below Ground 3^{o} Angle	10-1/2 In.
Grading Angle	Up to 130^{o}
Bucket Rollback at Ground Level	26^{o}

Dump Clearance	102 In.
Dump Reach at Maximum Lift	27-7/8 In.
At 7 Foot Dump	34-7/8 In.
Lifting Time From Ground Level to Max. Lift	6-1/2 Sec.
Dumping Time	1-1/4 Sec.
Lowering Time	6 Sec.
Width of Bucket	62-5/8 In.
Tractor Width	60-1/2 In.
Overall Height	63-1/2 In.
Overall Length	146 In.
Weight With Counterweight	40 Lbs.
Lift Capacity Fully Raised	2600 Lbs.
Dump Cylinder Size	12-1/4"
Lift Cylinder Size	3-1/2" x 27-1/4"
Pump Capacity at Rated RPM	19 Gal./Min.
Width of Loader Bucket	62-5/8 In.

SECTION C - LOADER - BACKHOE SPECIFICATIONS

BACKHOE OPERATING DATE

Reach From Axle	218 In.
Reach From Pivot	194 In.
Max. Digging Depth	144 In.
Max. Dump Reach	118 In.
Clearance, Full Lift, Bucket Tucked	126 In.
Clearance, Full Lift, Bucket Extended	180 In.
Height Overall, Full Lift, Bucket Extended	186 In.
Swing Arc, Uninterupted	180°
Stabilizer Spread, Ground Level	72 In.
Vertical Cut on Max. Grade of	10°

BUCKET OPERATING DATA

Bucket Capacity	3/4 Cu. Yd.
Rated Capacity, Full Lift	2600 Lbs.
Rollback at Ground Level	26°
Dump Angle, Full Lift	47°
Grading Angle	103°
Lifting Time, Ground Level to Max. Height	6-1/2 Sec.
Dumping Time	1-1/4 Sec.
Lowering Time	6 Sec.

DIMENSIONS AND WEIGHT

Width of Loader Bucket	62-5/8 In.
Width of Tractor	60-1/2 In.
Width, Overall, Travel Position	73 In.

Height, Overall, Travel Position . . . . . 121 In.
Length, Overall, Travel Position. . . . . 204-1/2 In.
Ground Clearance . . . . . 10 In.
Weight (approx.) . . . . . 11,673 Lbs.

HYDRAULIC SYSTEM

Backhoe Cylinders, Double-acting; Chrome-Plated Rods:
Boom . (1) 3-1/2"x35",1-3/4" Rod ; After S/N 3009833, 4"x35",1-3/4" Rod.
Crowd . . . . . (1) 4" x 26-1/8",2" Rod.
Bucket . . . . . (1) 3-1/2" x 27-1/4",1-3/4" Rod.
Swing . . . . . (2) 2-1/2" x 16-1/2",1-1/4 Rod.
Stabilizers . . . . . (2) 3" x 9", 1-1/2 Rod.
Loader Cylinders, Double-Acting; Chrome-Plated Rods:
Lift . . . . . (2) 3-1/2" x 27-1/4",1-3/4"Rod.
Bucket . . . . . (2) 2-1/3" x 13", 1-1/4"Rod.
Pump Capacity at 2000 RPM . . . . . 19 Gal/Min.
Hydraulic Capacity, With Filter . . . . . 24 Quarts.

SECTION D - DOZER SPECIFICATIONS

TILT-CROWN DOZER

Moldboard Width . . . . . 76 In.
Moldboard Height . . . . . 25 In.
Lift Above Ground . . . . . 22 In.
Drop Below Ground . . . . . 10 In.
Hydraulic Lift Cylinders . . . . . 2-1/2" x 19-1/8"
Hydraulic Tilt Cylinders . . . . . 2-1/2" x 4-3/4"
Pump Capacity At 2000 RPM . . . . . 15 Gal/Min.
Moldboard Crown Adjustment . . . . . 11 In.
Moldboard Pitch Adjustment . . . . . 10°
Weight . . . . . 6025 Lbs.

ANGLE DOZER

Moldboard Width . . . . . 92 In.
Moldboard Length . . . . . 25 In.
Lift Above Ground . . . . . 23-1/4 In.
Drop Below Ground . . . . . 10-3/4 In.
Hydraulic Lift Cylinders . . . . . 2-1/2" x 19-1/8"
Hydraulic Angle Cylinders . . . . . 3-1/3" x 9-5/8"
Pump Capacity At 2000 RPM . . . . . 15 Gal/Min.
Moldboard Angle Adjustment . . . . . 25°
Moldboard Crown Adjustment . . . . . 11°
Overall Length (Blade Straight). . . . . 127 In.
Weight . . . . . 6350 Lbs.

When a nut is tightened on a bolt or a stud, a clamping action is set up between the nut and the component parts. Actually as a nut is tightened, the bolt or stud is stretched or elongated slightly. This stretching action of the bolt or stud maintains the clamping force on the component parts being held together.

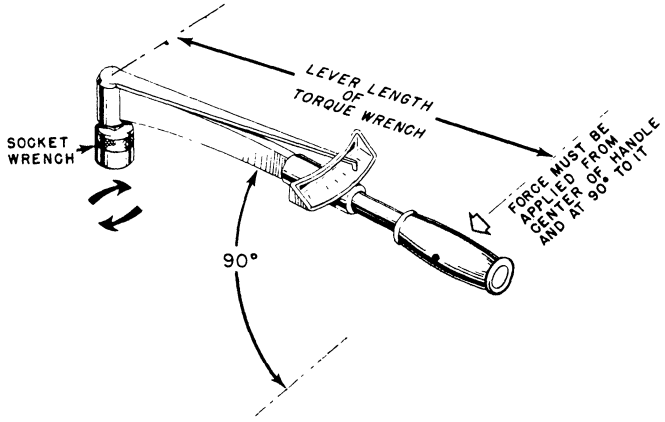


Figure 1 - Torque Wrench

Your torque wrench will register in "foot - pounds" of torque tightness. Be sure to use the recommended torque tightness shown in this Service Manual, for each specific assembly procedure. Unless otherwise stated in the applicable section in this manual, bolts are to be tightened as follows:

BOLT TORQUE CHART

NC (National Course) Thread Size	Torque (Ft. Lbs.)
1/4-20 NC	9-11
5/16-18 NC	17-21
3/8-16 NC	35-40
7/16-14 NC	60-65
1/2-13 NC	90-100
9/16-12 NC	120-130
5/8-11 NC	180-190
3/4-10 NC	310-320
7/8-9 NC	535-545
1-8 NC	755-765
1-1/8-7 NC	1070-1130
1-1/4-7 NC	1470-1530
1-3/8-6 NC	1920-1980
1-1/2-6 NC	2450-2550

NF (National Fine) Thread Size	Torque (Ft. Lbs.)
1/4-28 NF	10-12
5/16-24 NF	19-24
3/8-24 NF	45-50
7/16-20 NF	70-80
1/2-20 NF	100-110
9/16-18 NF	140-150
5/8-18 NF	220-230
3/4-16 NF	380-390
7/8-14 NF	620-630
1-14 NF	890-940
1-1/8-12 NF	1300-1350
1-1/4-12 NF	1750-1850
1-3/8-12 NF	2350-2450
1-1/2-12 NF	3000-3100

In order to properly control this stretch and not build up excessive pressure (which can snap a bolt in two) the torque wrench should be used. However, in order to obtain fairly accurate torque wrench tightness, several factors must be understood. Failure to consider the following conditions will prevent an accurate torque wrench reading

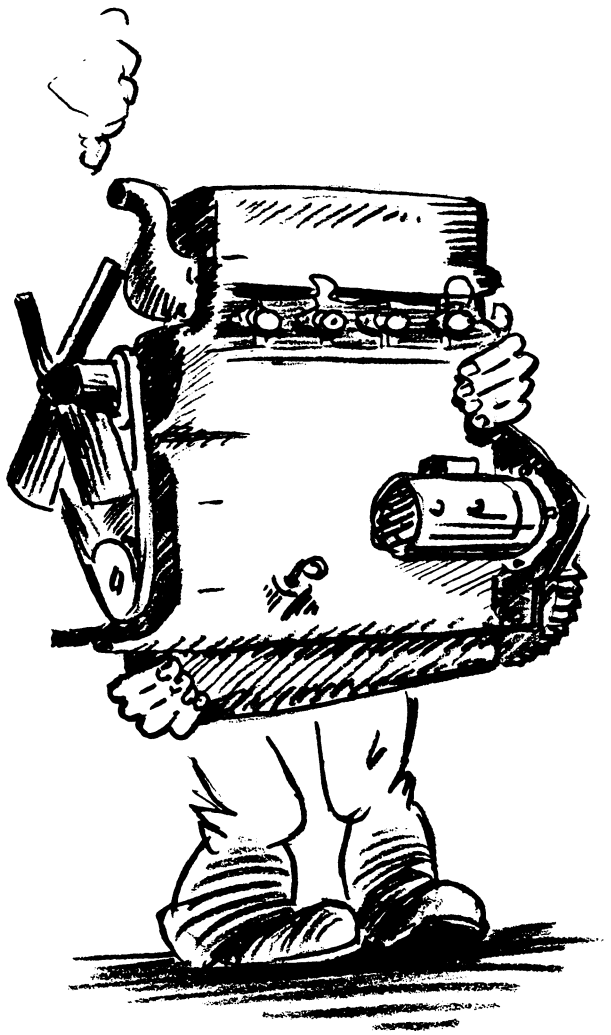
1. Be sure to lubricate the threads of the bolt before the nut is installed.

2. Use the exact type of washer, under the nut, as indicated.

3. Be sure to pull the torque wrench handle with a steady even pull, exerted at right angles to the wrench handle, when the dial is being read. (DO NOT USE AN EXTENSION ON THE HANDLE AS IT WILL CAUSE THE DIAL READING TO BE INACCURATE.)

ENGINE

II



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GROUP II

SECTION A - CYLINDER HEAD ASSEMBLY

GENERAL

Cylinder head is of the valve in head construction, containing the valve operating mechanism, intake and exhaust ports, and combustion chamber. Four passages extending through the head are provided for cooling purposes.

Individual rocker arms on the rocker shaft are secured by three mounting brackets. The rocker arms are operated by push rods and cam followers from the cam shaft. Figure 1.

Oil is supplied by a drilled oil passage leading from the center main bearing through the block and head to the rocker shaft and rocker arms.

The complete rocker arm shaft assembly can be removed from the cylinder head by removing the three capscrews, and removing the nuts from the studs releasing the rocker shaft brackets. Figure 2.

To prevent separation of parts when the complete rocker arm assembly is removed or installed, a simple holder can be used. This tool can easily be fashioned from a piece of flat steel. Figure 3.

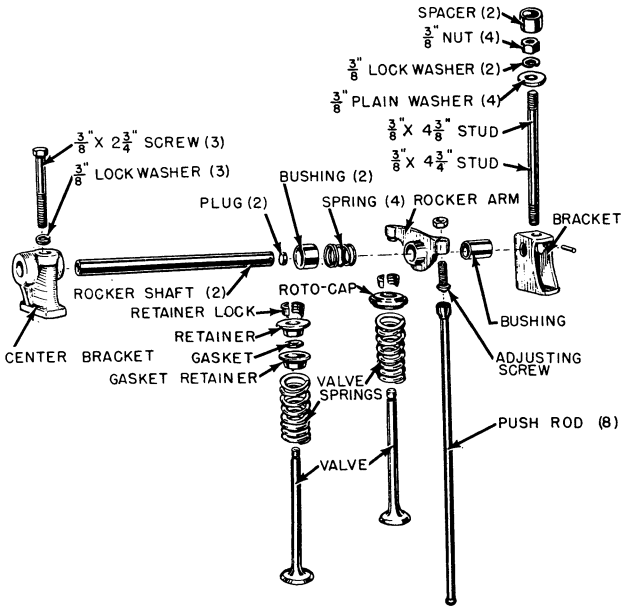

Figure 1 - Valve Action

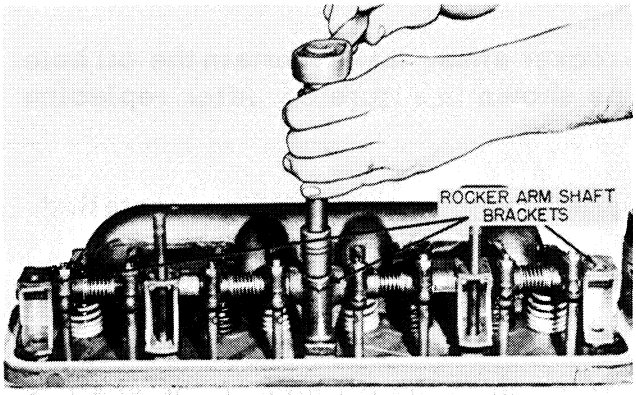

Figure 2 - Removing Rocker Arm

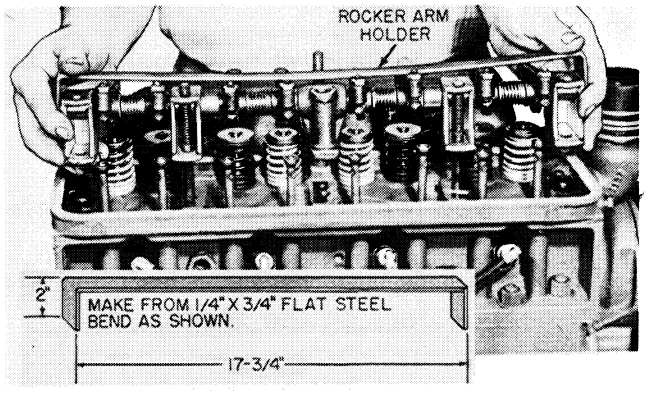

Figure 3 - Using Rocker Arm Holder

INSPECTION AND REPAIR OF ROCKER ARM ASSEMBLY

1. Inspect each of the rocker arm shaft bushings for scores, scratches, or excessive wear making sure the oil holes are properly aligned and not plugged. Cupping at the end of the levers that contact the valve stem should be observed and discarded or reground where it is excessive. Cupping makes it difficult to secure and maintain proper adjustment of the valve. Figure 4.

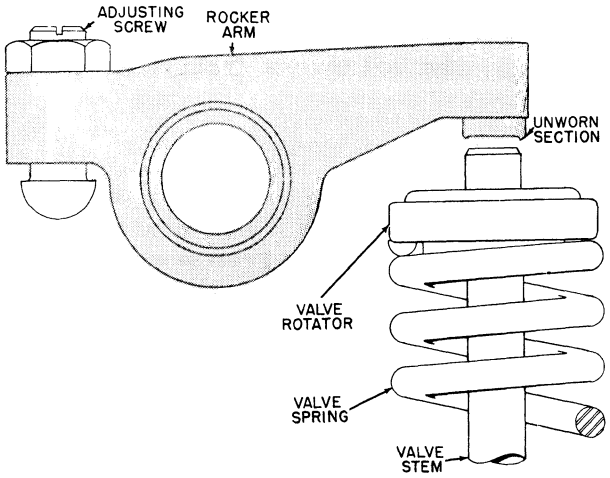

Figure 4 - Cupped Rocker Arm

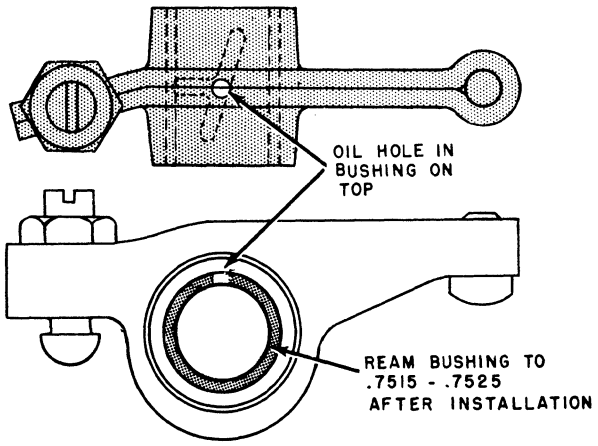

Figure 5 - Bushing Oil Hole

2. Check adjusting screw for cracks, chipping, or excessive wear. Replace where necessary.

3. Examine rocker arm bushings for evidence of cracking, pitting, or excessive wear. A further check for proper sizing of bushings to the shaft can be made by placing a rocker arm on the rocker shaft in the exact position it will ride when assembled on the cylinder head. The arm must be free on the shaft and free from any sidewise motion or wobble. If any is noted, replace bushing.

4. When installing new bushings in the rocker arms, make certain the oil hole in the bushing is in the top position as shown in Figure 5. After replacing bushing, ream to .7525 inches.

NOTE: New replacement rocker arms are supplied complete with bushings installed.

5. Examine the rocker shaft for wear and replace if there are indications of shoulders on the shaft.

6. Proper assembly of rocker arms with relation to the oil hole in the shaft is shown in Figure 6. Improper lubrication will result if the drilled hole is reversed.

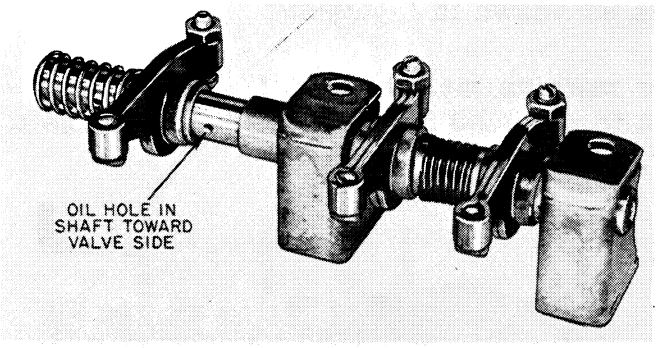

Figure 6 - Oil Hole In Shaft

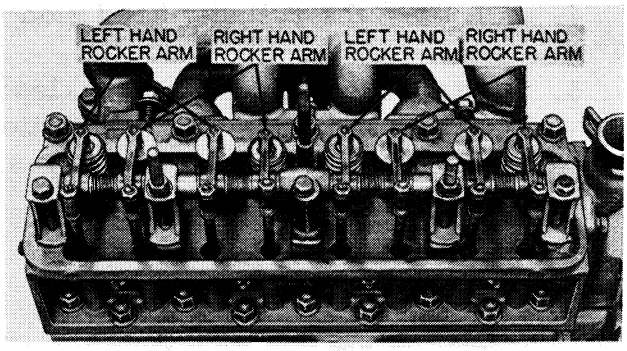

Figure 7 - Right And Left Rocker Arm

7. When reassembling rocker arms on shaft, make certain the right and left rocker arms are assembled in their respective positions. See Figure 7.

8. When replacing the rocker arm assembly, the capscrews and stud nuts are tightened to 20 ft. lbs. with a torque wrench.

STRIPPING AND REMOVING HEAD ASSEMBLY

In order to perform further servicing of cylinder head assembly it must be removed from the engine as follows:

1. Disconnect throttle rod at governor arm.

2. Remove carburetor and manifold as a unit. Unless servicing of one of these assemblies is required, no futher disassembly is necessary. Figure 8.

3. Remove water outlet elbow with hose and thermostat as a unit. Figure 9.

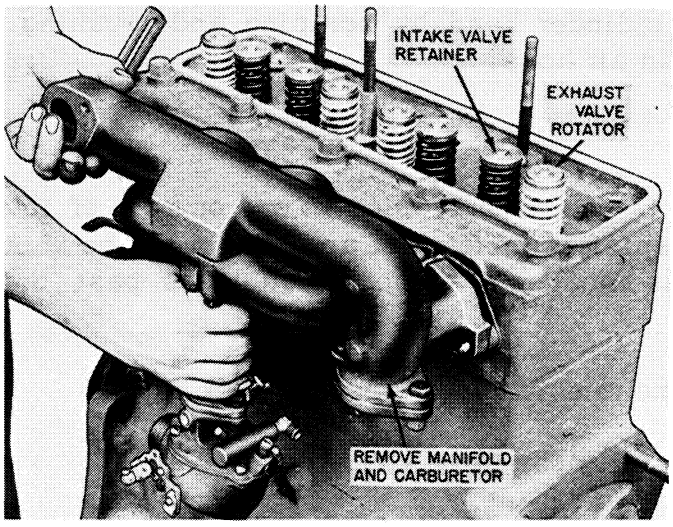

Figure 8 - Removing Manifold Assembly

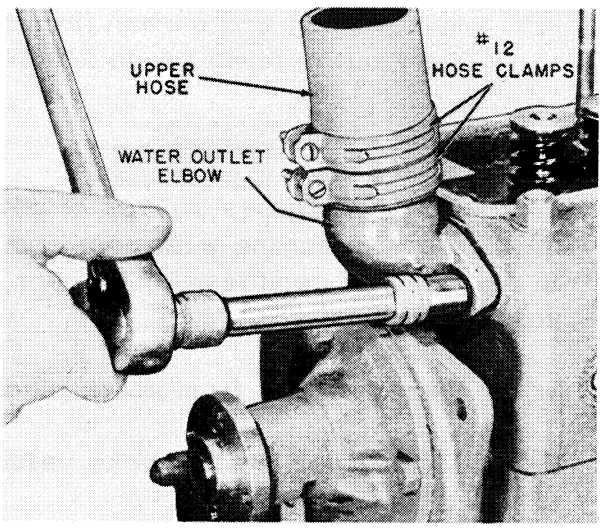

Figure 9 - Water Outlet Elbow

4. Loosen the cylinder head stud nuts as shown in Figure 10.

5. Tap edges of head with a lead or rawhide mallet and lift from engine as shown in Figure 11. Do not attempt to pry head from the block as damage to the machined surfaces will result.

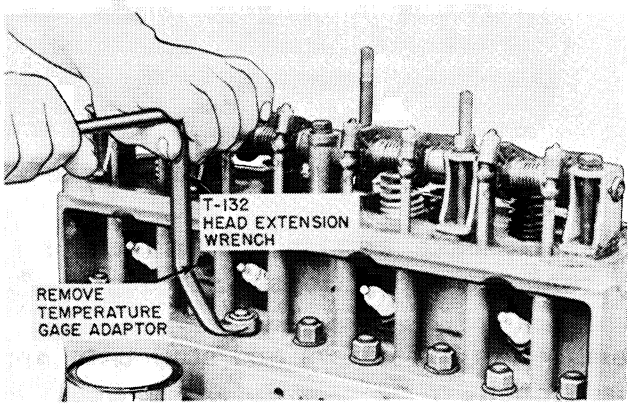

Figure 10 - Using Wrench Extension

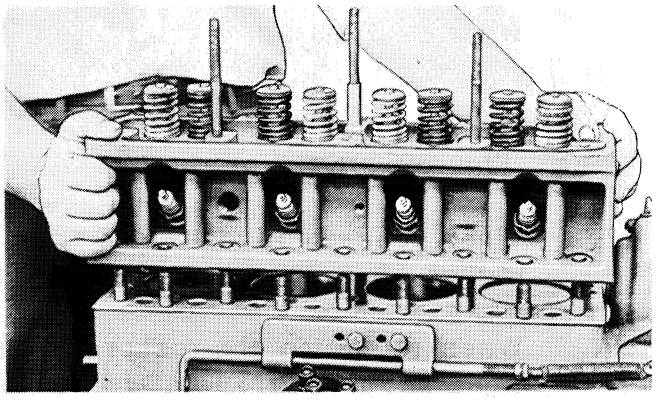

Figure 11 - Removing Cylinder Head

6. Remove cylinder head gasket and note impression made by cylinder sleeves. When sleeves are in proper position and cylinder head stud nuts are properly tightened, a sharp impression will be made on the gasket as shown in Figure 12.

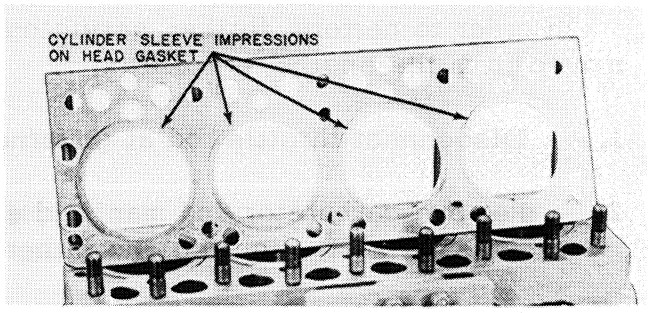

Figure 12 - Head Gasket Condition

CLEANING CYLINDER HEAD

1. Remove dirt and carbon from the cylinder head by scraping and brushing. Blow out cooling passages with an air hose.

CHECKING COMPRESSION

One of the sources of lack of power is poor compression in one or more of the cylinders. An engine with poor compression is inefficient and should not be kept in service. If compression is poor, it is because of compression leaks past the valves or rings.

1. Remove wires from spark plugs and remove plugs from cylinder head.

2. Move throttle and choke valve to full open position.

3. Install compression gauge into front spark plug port. Crank engine four revolutions and read gauge. Repeat this operation on the three remaining cylinders. Figure 13.

4. Compression pressure depends on starting speed, engine temperature, and compression ratio. If the readings indicated on the compression gauge fall within the pressure range listed on the compression pressure chart and do not vary more than 5 lbs. between cylinders, compression pressure can be considered normal.

COMPRESSION PRESSURE CHART	
148 Cu. In. Engine	
Gasoline	140-150 lbs.

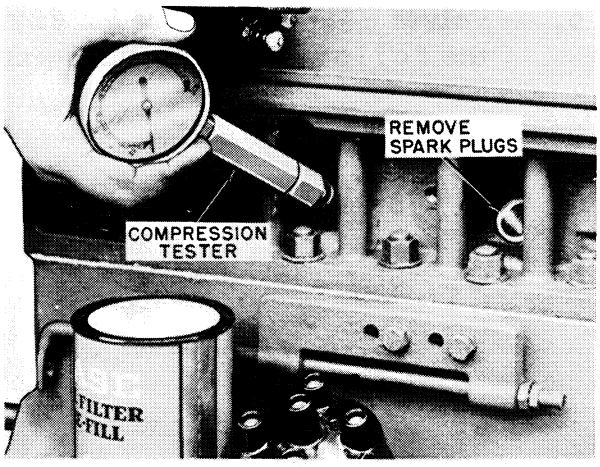

Figure 13 - Testing Compression

5. If pressure in any cylinder is weak, pour approximately one tablespoon of oil into spark plug hole while piston is down. Wait a few minutes for oil to run down over piston rings to prevent oil from getting on valve and repeat test. The oil seals the rings so a low reading on first test, which remains low on a second test, indicates leaky valves. A high reading on second test, indicates leaky rings. An extremly low compression reading on two adjacent cylinders indicates a leaking or blown cylinder head gasket. A gasket which has blown out between cylinders will cause erratic explosions. Replace with a new gasket.

6. A higher than normal reading may indicate excessive carbon deposits on walls of combustion chamber. Remove head and clean.

REMOVING AND INSPECTING VALVES

1. Place cylinder head on its side. Use a valve spring compressor tool to compress each spring until the valve stem retainer locks can be removed. Figure 14.

2. Remove valve stem retainers and springs.

3. Remove valve through reverse side of cylinder head.

4. Clean valves thoroughly. Do not use emery paper or a stiff wire brush which will damage valves. A brass wire brush is recommended.

5. Note that the intake valves have a rubber gasket retainer which prevents oil from being sucked into the combustion chamber on the intake stroke of the piston. Figure 16.

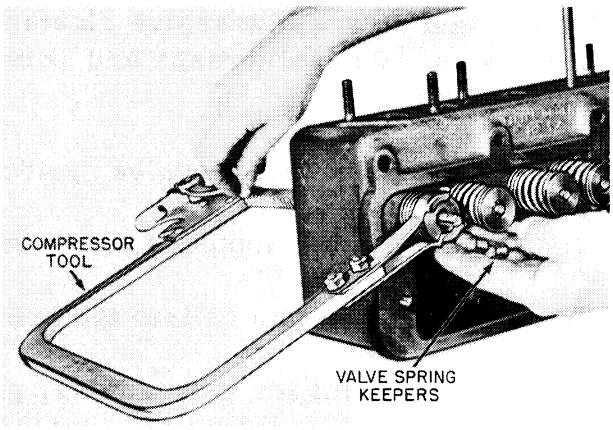

Figure 14 - Removing Valve

6. Valves must be replaced if any of the following conditions exist:

   A. Stem bent.

   B. Stem worn or scored.

   C. Stem nicked.

   D. Retainer groove worn.

   E. Tip damaged or worn.

   F. Face margin not maintained.

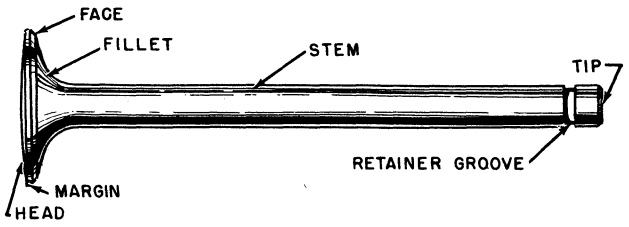

Figure 15 - Valve Nomenclature

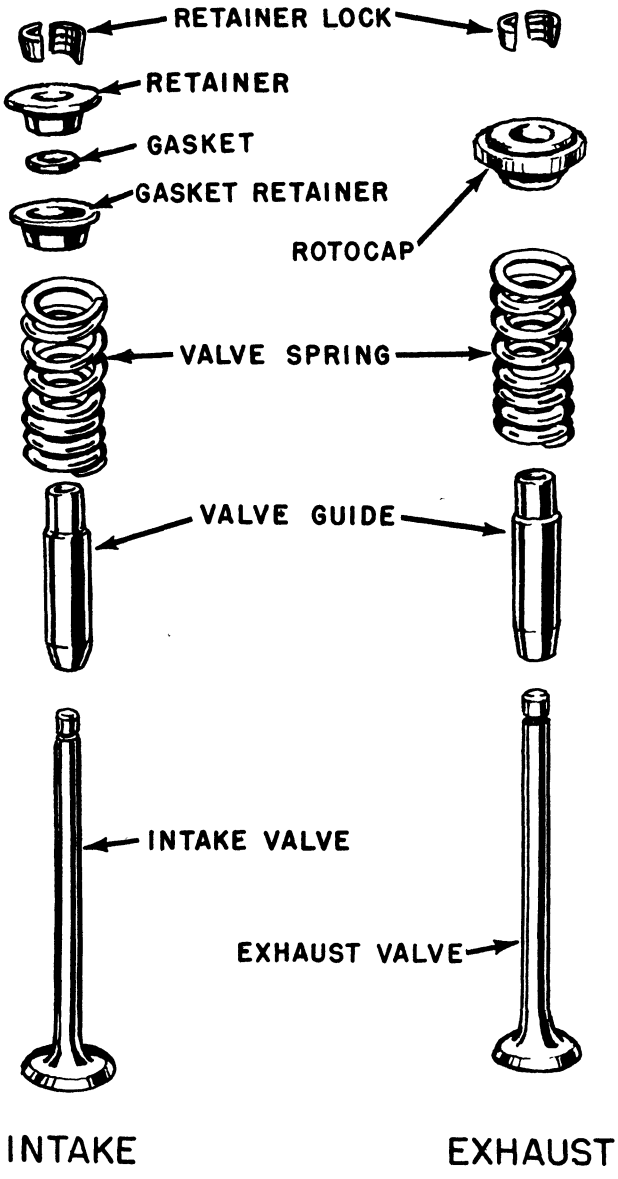

Figure 16 - Valve Assembly

Valve Guides

Before reconditioning valves seats, the valve guides should be inspected for excessive wear which will result in improperly seated valves.

Thoroughly clean the valve guides and check for wear by inserting the valve into the valve guide. Too much clearance not only prevents the valve from seating properly but also allows oil to enter the combustion chamber increasing oil consumption and causing heavy carbon deposits and warped valves. Excessive clearance in exhaust valve guides also causes poor heat transfer, misalignment, and poor seating resulting in early seat and valve warp. Figure 17.

1. If it is found that the valve guides need replacing, press out from the bottom.

2. Clean carbon deposit from valve guide recesses.

3. Press valve guides into the head from the top. Figure 18.

4. When installing new guides, press into place so that guide extends 31/32 inch above counterbored surface of cylinder head as shown in Figure 18.

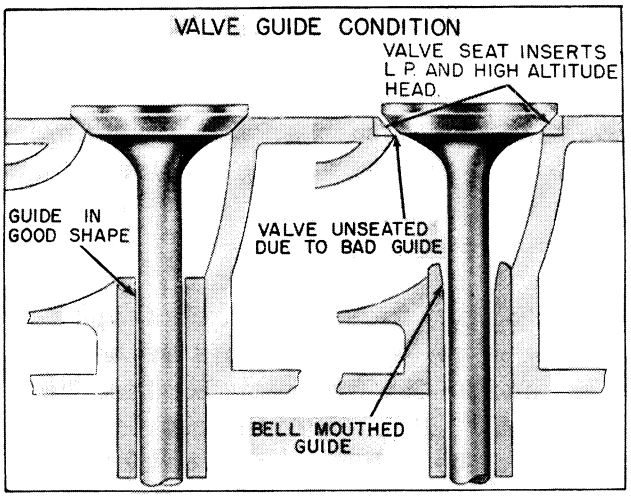

Figure 17 - Valve Guide Condition

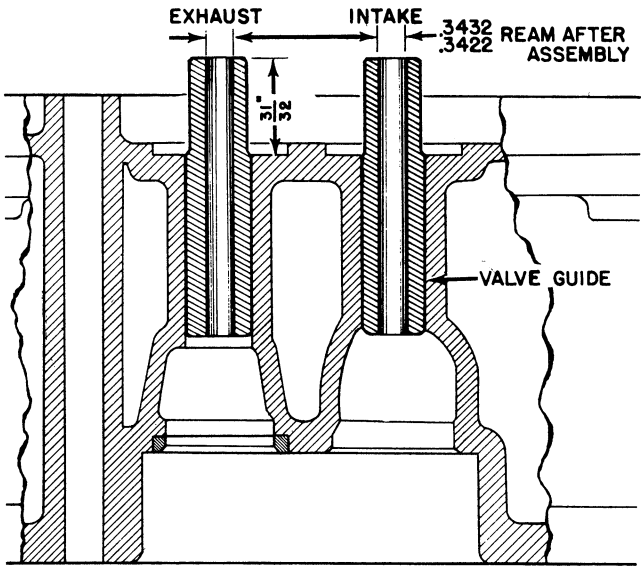

Figure 18 - Installing Valve Guide

5. After assembly, ream guides to .3422 - .3432 inches. Figure 19.

6. Clean out valve guides using a valve guide cleaning tool.

Both guides are reamed to the same dimensions as difference in clearance is obtained in valve stem diameters. Exhaust valves require greater clearance and therefore have a small stem.

When installing valves, coat valve stems and guides with a thin film of light oil.

NOTE: Every new valve guide must be reamed to proper dimensions before valves are installed.

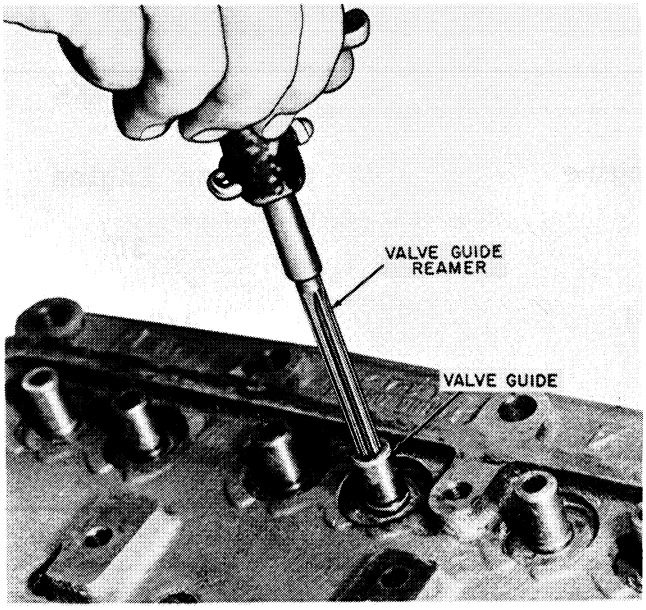

Figure 19 - Valve Guide Reamer

1. Check valve seat for evidence of pitting or burning.

2. Check width of contact area on exhaust valve.

3. Check width of contact area on intake valve. Too wide a seat will collect carbon, and a narrow seat will tend to reduce heat dissipation of the valve head.

4. Check concentricity of valve seat with dial indicator: .002 is maximum allowed runout. Figure 20.

When it becomes necessary to re-condition valve seats, modern power grinding tools should be used. Make certain the proper grade and size wheel is used.

NOTE: Gasoline engine head does not have exhaust seat inserts.

When valve rotators are used it is desirable to have face to face contact between the valve seat in the head and the face of the valve. The seats in the 148 cubic inch engine using valve rotators are ground to 46° while on engines not equipped with rotators, the valve seat is ground to 45°. It is advantageous to have one-degree interference angle between the seat and the valve face in order to remove face deposits from the valve where rotators are not installed.

NOTE: Where equipment is not available for grinding valve seats to 46°, it is permissible to grind both valve face and valve seat to 45° which will give a face to face contact.

A POOR VALVE GRINDING JOB CANNOT BE IMPROVED BY VALVE LAPPING

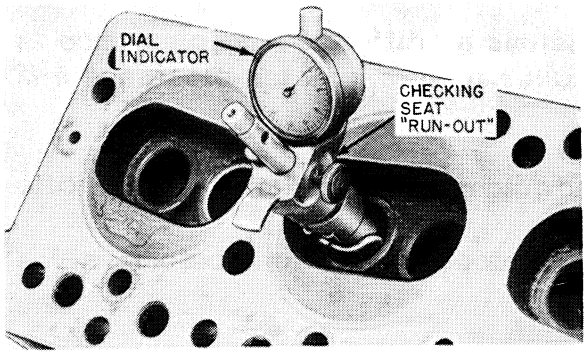

Figure 20 - Valve Seat Run Out

Valve Face Runout

1. Check refaced valve with a V-block type of gauge. Figure 21.

2. Runout must not exceed .002.

	EXHAUST	INTAKE
148 Cu. In. Engine	Gasoline Engine	Gasoline Engine
Angle of Seat	46°	30°
Width of Seat	.078 - .064	.078 - .066
Angle of Valve Face	44°	30°
Diameter	.3390 - .3382	.3414 - .3406

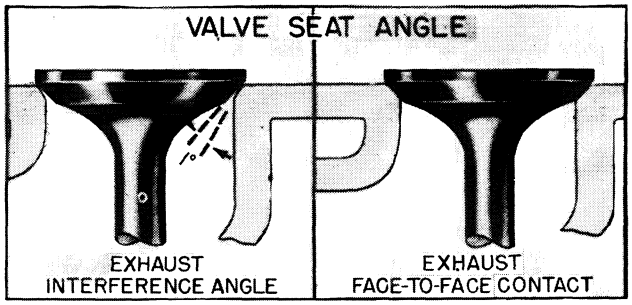

Figure 22 - Valve Seat Angle

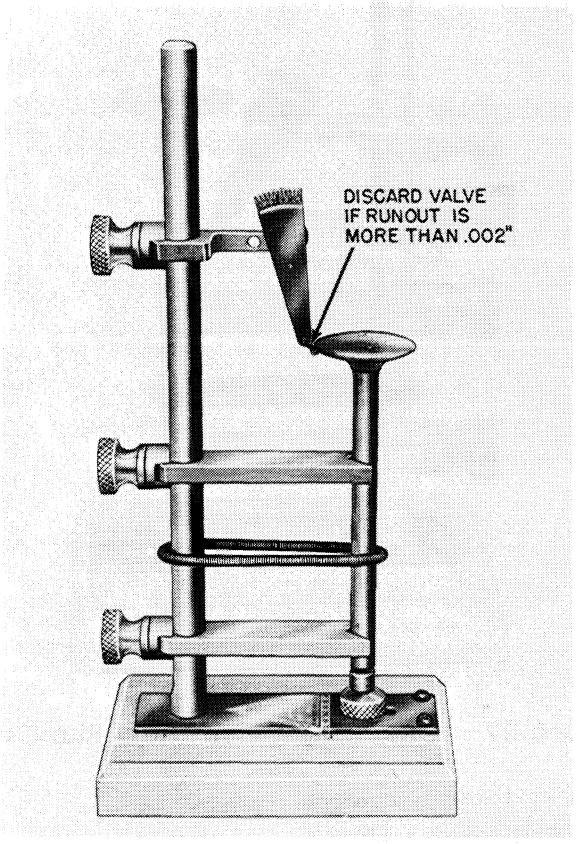

Figure 21 - Checking Valve Face Run Out

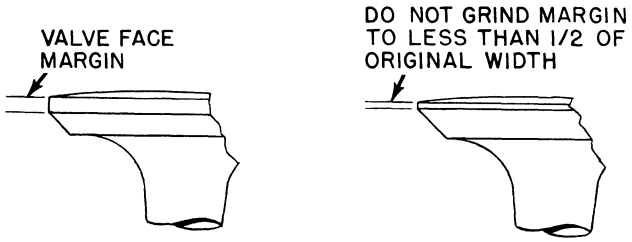

Figure 23 - Valve Face Margin

Valve Face Margin

Valve face margin of less than one-half the original margin of a new valve should be replaced. Knife edges are conducive to edge roll-over, valve burning, and pre-ignition due to heat localizing on valve edge.

1. Maintain reasonable margin. Figure 23.
2. Face intake valve to 30°.
3. Face all exhaust valves on 148 cu. in. engine to 44°.

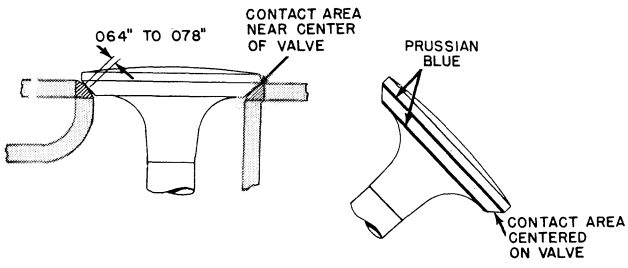

Figure 24 - Seat Contact Width

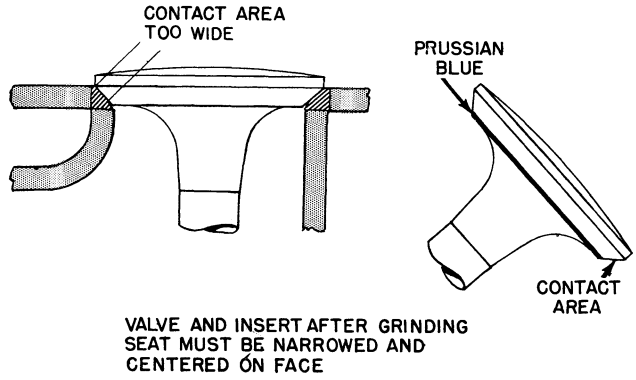

Figure 25 - Seat Contact Width

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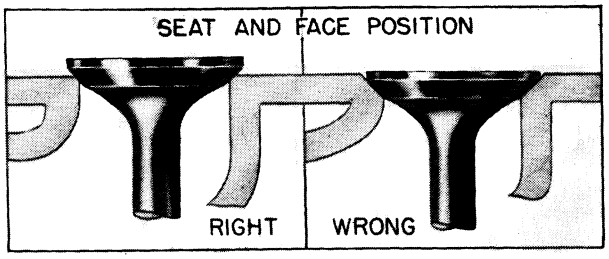

Figure 26 - Seat And Face Position

4. Remove only enough material to remove burned or pitted portion of face.

5. Check valve stem for straightness. If runout is more than .002, discard valve. Figure 27.

6. Using a micrometer, check the diameter of the valve stem near the valve head and compare the reading taken near tip end of valve. If difference is more than .002 discard valve. Figure 28.

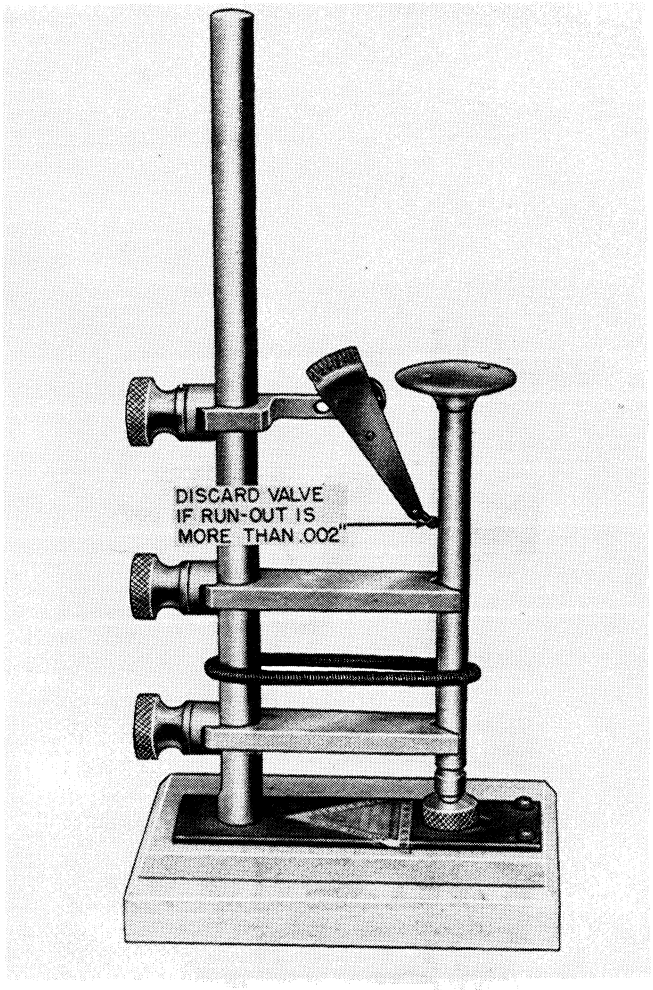

Figure 27 - Checking Valve Stem Run Out

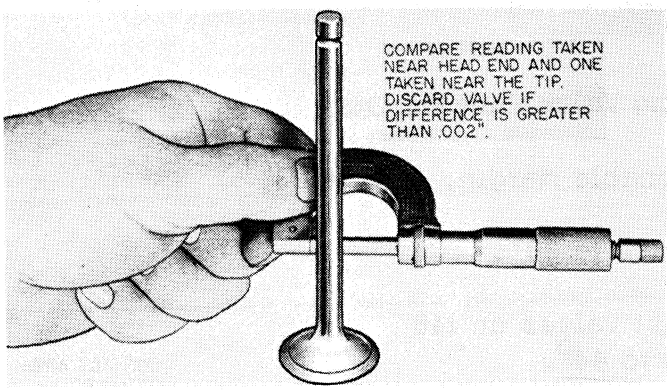

Figure 28 - Checking Valve Stem Diameter

VALVE SPRINGS

Inspect intake and exhaust valve springs for proper length and tension.