CASE
130 and 180
Compact Tractors

Service Manual

9-76391

Reprinted

CASE

THIS SAFETY ALERT SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY OR DEATH.

M171B

If Safety Decals on this machine use the words **Danger, Warning or Caution,** which are defined as follows:

- **DANGER:** Indicates an immediate hazardous situation which if not avoided, will result in death or serious injury. The color associated with Danger is RED.
- **WARNING:** Indicates an potentially hazardous situation which if not avoided, will result in serious injury. The color associated with Warning is ORANGE.
- **CAUTION:** Indicates an potentially hazardous situation which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

If Safety Decals on this machine are ISO two panel Pictorial, decals are defined as follows:

- The first panel indicates the nature of the hazard.
- The second panel indicates the appropriate avoidance of the hazard.
- Background color is YELLOW.
- Prohibition symbols such as  and 

if used, are RED.

WARNING

IMPROPER OPERATION OF THIS MACHINE CAN CAUSE INJURY OR DEATH. BEFORE USING THIS MACHINE, MAKE CERTAIN THAT EVERY OPERATOR:

- Is instructed in safe and proper use of the machine.
- Reads and understands the Manual(s) pertaining to the machine.
- Reads and understands ALL Safety Decals on the machine.
- Clears the area of other persons.
- Learns and practices safe use of machine controls in a safe, clear area before operating this machine on a job site.

It is your responsibility to observe pertinent laws and regulations and follow Case Corporation instructions on machine operation and maintenance.

Bur 0-00000
issued November, 1994

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130 AND 180 COMPACT TRACTORS

J I Case
A Tenneco Company

TENNECO

Rac 9-76381

Printed in U.S.A.

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Series

General

SECTION

C

SPECIFICATIONS FOR K 241S AND K 301S ENGINES USED ON THE 130 AND 180 GARDEN TRACTORS

Rac. Form 9-76411

PRINTED IN U.S.A.

K241S engine

K241S ENGINE SPECIFICATIONS

Type ---------- Kohler, 1 Cylinder, 4 Stroke Cycle Air Cooled, "L" Head Engine
Bore ---------- 3.250 Inches
Stroke ---------- 2.880 Inches
Piston Displacement ---------- 23.9 Cubic Inches
Compression Ratio ---------- 6 to 1
Max. Comp. at Cranking Speed (Engine at Operating Temperature ---------- 110 to 120 PSI at Sea Level
Crankcase Vacuum(Engine Running)--- 5 to 10 Inches Vacuum at Sea Level
Ignition ---------- 12 Volt Coil, Breaker Point

CYLINDER BORE

Diameter of Cylinder Bore Std. A, B ---------- 3.2505-3.2545 Inches
.010 Oversize A, B + 10 ---------- 3.2605-3.2615 Inches
.020 Oversize A, B + 20 3.2705-3.2715 Inches
.030 Oversize A, B + 30 ---------- 3.2805-3.2815 Inches
Cylinder Bore Must Be Bored or Honed Oversize If Taper or Out of Round Exceeds ---------- .005 Inches

PISTON AND PISTON PIN

Diameter of Std. Piston at Bottom of Skirt -------- 3.2470-3.2480 Inches
Diameter of Std. Piston at Top of Skirt ---------- 3.2425-3.2535 Inches (Measured Just Below Oil Ring)
Diameter of Std. Piston at Top ---------- 3.218-3.220 Inches
Piston Pin ---------- Full Floating Type, Retained In Place With Two Retainer Rings.
Piston Pin Bore in Piston Std. ---------- .8595-.8596 Inches
Piston Pin Diameter Std. ---------- .8591-.8593 Inches
.005 Oversize ---------- .8641-.8643 Inches
Piston Pin Length ---------- 2.738-2.753 Inches
Piston Pin Fit in Piston (Select Fit) ---------- .0000-.0003 Inches
Piston Pin Fit in Connecting Rod ---------- .0003-.0008 Inches

PISTON RINGS

Rings Per Piston ---------- (2 Compression-1 Oil)
1st(Top)Compression-Chrome, Taper Face, Relief Indicates Top Side
Side Clearance ---------- .002-.004 Inches
Width ---------- .093-.094 Inches
2nd Compression-Chrome, Relief Indicates Bottom Side
Side Clearance ---------- .0015-.0035 Inches
Width ---------- .093-.094 Inches
3rd Oil Ring ---------- Cast W/Expander
Side Clearance ---------- .001-.003 Inches
Width ---------- .1860-.1870 Inches
Ring End Gap - When Installed in Bore ---------- .010-.020 Inches
Replacement Ring Width
1st. Comp. ---------- .0925-.0935 Inches
2nd. Comp. ---------- .0665-.0675 Inches
2nd. Comp. Rail ---------- .0235-.0245 Inches
3rd. Oil Rail ---------- .0235-.0245 Inches
3rd Oil Ring ---------- .134-.135 Inches

CONNECTING ROD

Connecting Rod Length from Center of Pin Hole To Center of Bearing Journal ---------- 5.560-5.562 Inches
Piston Pin Hole Diameter in Rod ---------- .8596-.8599 Inches
Inside Diameter of Rod Journal, Std. ---------- 1.5005-1.5010 Inches
Undersize ---------- 1.4905-1.4910 Inches
Connecting Rod to Crank Journal Clearance --------- .0005-.0015 Inches
Connecting Rod to Crank End Play Clearance --------- .007-.016 Inches

CRANKSHAFT AND BEARINGS

Type Main Bearings ---------- Ball Bearings
Crankshaft Rod Journal ---------- 1.4995-1.5000 Inches
Crankshaft Rod Journal Width ---------- 1.079-1.084 Inches
Crankshaft End Play ---------- .003-.020 Inches
Measured at Bearing Plate and Shim to Proper End Play

CAMSHAFT

Camshaft End Play ---------- .005-.010 Inches
Camshaft Pin Diameter ---------- .4980-.4985 Inches
Camshaft Inside Diameter ---------- .4995-.5015 Inches
Camshaft Pin to Camshaft Clearance ---------- .001-.0035 Inches
Camshaft Pin to Breaker Cam Clearance ---------- .001-.0025 Inches

VALVE LIFTERS

Valve Lifter Outside Diameter in Block ---------- .6232-.6237 Inches
Valve Lifter Bore in Block ---------- .6245-.6255 Inches
Valve Lifter to Block Clearance ---------- .0008-.0023 Inches

VALVES

Intake Valve Tappet Clearance (Cold) ---------- .008-.010 Inches
Exhaust Valve Tappet Clearance (Cold) ---------- .017-.020 Inches
Angle of Valve Face - Intake and Exhaust ---------- 44 Degrees
Valve Length - Intake and Exhaust ---------- 4.572-4.582 Inches
Max. Valve Face Runout - Intake ---------- .0015 Inches
Max. Valve Face Runout - Exhaust ---------- .003 Inches
Valve Head Diameter - Intake ---------- 1.370-1.380 Inches
Valve Head Diameter - Exhaust ---------- 1.120-1.130 Inches
Valve Stem Diameter - Intake ---------- .3105-.3110 Inches
Valve Stem Diameter - Exhaust ---------- .3090-.3095 Inches
Intake Valve Stem to Guide Clearance ---------- .001-.0025 Inches
Exhaust Valve Stem to Guide Clearance ---------- .0025-.004 Inches

VALVE SEATS

Seat Angle - Intake and Exhaust ---------- 45 Degrees
Max. Seat Runout - Intake and Exhaust ---------- .002 Inches
Seat Width - Intake ---------- .037-.045 Inches
Seat Width - Exhaust ---------- .031-.062 Inches
Exhaust Seat Insert ---------- Replaceable
Outside Diameter of Exhaust Insert ---------- 1.2535-1.2545 Inches
Exhaust Insert Height ---------- .219-.221 Inches

VALVE GUIDES

Valve Guide Length ---------- 2.125 Inches
Valve Guide Outside Diameter ---------- .6260-.6265 Inches
Valve Guide to Block (Press Fit) ---------- .0005-.002 Inches
Valve Guide Inside Diameter - Before Installing ----- .307-.308 Inches
Ream Valve Guides After Installing to ---------- .312-.313 Inches

VALVE SPRINGS

Spring Free Length ---------- 1.793 Inches
Spring Pressure When Comp. to 1.469 In. (Valve Closed)--27 to 31 Lbs.
Spring Pressure When Comp. to 1.165 In. (Valve Open) --- 54 to 62 lbs.

GOVERNOR

Governor Stub Shaft Outside Diameter ---------- .3735-.3740 Inches
Governor Gear Bore for Stub Shaft ---------- .3745-.3755 Inches
Stub Shaft to Governor Gear Clearance ---------- .0005-.002 Inches
Governor Spring Free Length With 2 Lbs. Pre-Load --------2.62 Inches
Governor Spring Extended to 2.88 Inches ---------- 5.5 to 6.5 Pounds

K301S ENGINE SPECIFICATIONS

Type ---------- Kohler, 1 Cylinder, 4 Stroke Cycle, Air Cooled, "L" Head Engine
Bore ---------- 3.380 Inches

Stroke ---------- 3.250 Inches

Piston Displacement ---------- 29.07 Cubic Inches

Compression Ratio ---------- 6 to 1

Max. Comp. at Cranking Speed
(Engine at Operating Temperature) --------110 to 120 PSI at Sea Level

Crankcase Vacuum(Engine Running)--- 5 to 10 Inches Vacuum at Sea Level

Ignition ---------- 12 Volt Coil, Breaker Points

CYLINDER BORE

Diameter of Cylinder Bore Std. A, B---------- 3.3745-3.3785 Inches
.010 Oversize A, B + 10 ---------- 3.3845-3.3855 Inches
.020 Oversize A, B + 20 ---------- 3.3945-3.3955 Inches
.030 Oversize A, B + 30 ---------- 3.4045-3.4055 Inches
Cylinder Bore Must Be Bored or Honed Oversize If Taper or Out of Round Exceeds ---------- .005 Inches

PISTON AND PISTON PIN

Diameter of Std. Piston at Top ---------- 3.356-3.360 Inches

Diameter of Std. Piston at Top of Skirt
(Measured Just Below Oil Ring) ---------- 3.369-3.370 Inches

Diameter of Std. Piston at Bottom of Skirt --------- 3.371-3.372 Inches

Piston Pin ---------- Full Floating Type Retained In Place With Two Retainer Rings.

Piston Pin Bore In Piston, Std. ---------- .8752-.8754 Inches

Piston Pin Diameter Std. ---------- .8752-.8754 Inches
.005 Oversize ---------- .8802-.8804 Inches

Piston Pin Length ---------- 2.735-2.750 Inches

Piston Pin Fit In Piston ---------- One Thumb Push Fit

Piston Pin Fit In Connecting Rod ---------- .0003-.0008 Inches

PISTON RINGS

Rings Per Piston ---------- (2 Compression-1 Oil)
1st(Top)Compression-Chrome, Tapered Face. Relief Indicates Top Side.
Side Clearance ---------- .002-.004 Inches
Width ---------- .078 Inches
2nd - Compression -------- Chrome, Relief Indicates Bottom Side
Side Clearance ---------- .002-.004 Inches
Width ---------- .078 Inches
3rd - Oil Ring ---------- Cast W/Expander
Side Clearance ---------- .001-.003 Inches
Width ---------- .1870 Inches
Ring End Gap When Installed In Bore ---------- .010-.020 Inches

Replacement Ring Width
1st Comp. ---------- .077-.078 Inches
2nd Comp. ---------- .077-.078 Inches
3rd Oil Rail ---------- .0235-.0245 Inches
3rd Oil Ring ---------- .134-.135 Inches

CONNECTING ROD

Connecting Rod Length From Center of Pin Hole
To Center of Bearing Journal ---------- 5.295-5.297 Inches

Piston Pin Hole Diameter In Rod ---------- .8757-.8760 Inches

Inside Diameter of Rod Journal, Std. ---------- 1.5005-1.5010 Inches
Undersize ---------- 1.4905-1.4910 Inches

Connecting Rod To Crank Journal Clearance ---------- .0005-.0015

Connecting Rod To Crank End Play Clearance -------- .007-.016 Inches

CRANKSHAFT AND BEARINGS

Type Main Bearings ---------- Ball Bearings

Crankshaft Rod Journal ---------- 1.4995-1.5000 Inches

Crankshaft Rod Journal Width ---------- 1.079-1.084 Inches

Crankshaft End Play ---------- .003-.020 Inches
Measured at Bearing Plate and Shim to Proper End Play.

CAMSHAFT

Camshaft End Play ---------- .005-.010 Inches

K301S engine

Camshaft Pin Diameter ---------- .4980-.4985 Inches

Camshaft Inside Diameter ---------- .4995-.5015 Inches

Camshaft Pin to Camshaft Clearance ---------- .001-.0035 Inches

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Valve Lifter Bore In Block ---------- .6245-.6255 Inches

Valve Lifter To Block Clearance ---------- .008-.0023 Inches

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Exhaust Valve Tappet Clearance (Cold) ---------- .017-.020 Inches

Angle of Valve Face - Intake and Exhaust ---------- 44 Degrees

Valve Length - Intake and Exhaust ---------- 4.572-4.582 Inches

Max. Valve Face Runout - Intake ---------- .0015 Inches

Max. Valve Face Runout - Exhaust ---------- .003 Inches

Valve Head Diameter - Intake ---------- 1.370-1.380 Inches

Valve Head Diameter - Exhaust ---------- 1.120-1.130 Inches

Valve Stem Diameter - Intake ---------- .3105-.3110 Inches

Valve Stem Diameter - Exhaust ---------- .3090-.3095 Inches

Intake Valve Stem to Guide Clearance ---------- .001-.0025 Inches

Exhaust Valve Stem to Guide Clearance ---------- .0025-.004 Inches

VALVE SEATS

Seat Angle - Intake and Exhaust ---------- 45 Degrees

Max. Seat Runout Intake and Exhaust ---------- .002 Inches

Seat Width - Intake ---------- .037-.045 Inches

Seat Width - Exhaust ---------- .031-.062 Inches

Exhaust Seat Insert ---------- Replaceable

Outside Diameter of Exhaust Insert ---------- 1.2535-1.2545 Inches

Exhaust Insert Height ---------- .219-.221 Inches

VALVE GUIDES

Valve Guide Length ---------- 2.125 Inches

Valve Guide Outside Diameter ---------- .6260-.6265 Inches

Valve Guide to Block (Press Fit) ---------- .0005-.002 Inches

Valve Guide Inside Diameter - Before Installing ------- .307-.308 Inches
Ream Valve Guides After Installing to ---------- .312-.313 Inches

VALVE SPRINGS

Spring Free Length ---------- 1.793 Inches

Spring Pressure When Comp. to 1.469 In. (Valve Closed) -27 to 31 Lbs.

Spring Pressure When Comp. to 1.165 In. (Valve Open) ---54 to 62 Lbs.

GOVERNOR

Governor Stub Shaft Outside Diameter ---------- .3735-.3740 Inches

Governor Gear Bore for Stub Shaft ---------- .3745-.3755 Inches

Stub Shaft to Governor Gear Clearance ---------- .0005-.002 Inches
Governor Spring Free Length with 2 Lb. Pre-Load -------- 2.62 Inches
Governor Spring Extended to 2.88 Inches ---------- 5.5 to 6.5 Inches

GENERAL TORQUE SPECIFICATION TABLE (Revised 5-64)

USE THE FOLLOWING TORQUES WHEN SPECIAL TORQUES ARE NOT GIVEN

NOTE: These values apply to fasteners as received from supplier, dry, or when lubricated with normal engine oil. They do not apply if special graphited or moly-disulphide greases or other extreme pressure lubricants are used. This applies to both UNF and UNC threads.

SAE Grade No.	5		8 *	
Bolt head identification marks as per grade Note: Manufacturing Marks Will Vary				
	Torque Foot Pounds		Torque Foot Pounds	
Bolt Size	Min.	Max.	Min.	Max.
1/4"	9	11	12	15
5/16	15	18	24	28
3/8	35	40	45	50
7/16	54	60	70	80
1/2	80	90	110	125
9/16	110	120	160	180
5/8	150	165	220	240
3/4	260	280	380	420
7/8	360	400	600	660
1"	540	600	900	1000
1-1/8	720	800	1280	1440
1-1/4	1000	1100	1800	2000
1-3/8	1460	1680	2380	2720
1-1/2	1940	2200	3160	3560

* Thick nuts must be used with Grade 8 bolts

GENERAL ENGINE TORQUE SPECIFICATION TABLE

	Torque Inch Pounds		Torque Foot Pounds	
Thread Size	UNC	UNF	UNC	UNF
Bolt Size				
1/4"	70	85		
5/16	150	165		
3/8			22	25
7/16			35	45
1/2			50	70

SPECIAL ENGINE TORQUE SPECIFICATIONS

Cylinder Head Bolts* ---------- Torque to 280 Inch Lbs., Loosen, Retorque to 300 Inch Lbs.

Connecting Rod Bolt* ---------- Torque to 300 Inch Lbs.

Flywheel Nut ---------- Torque to 100 Ft. Lbs.

Spark Plug ---------- Torque to 27 Ft. Lbs.

*Lubricate With Grease Upon Assembly

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Series

Engines

SECTION

M

SERVICING THE

KOHLER

K241S AND K301S

ENGINES

Rac. Form 9-76361

PRINTED IN U.S.A.

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Introduction

This manual covers servicing the Kohler 10HP 241 S and 12HP 301 S engines. There are some minor differences between these engines such as the bore and stroke. The difference will be indicated in the manual when they appear. These engines are of the 4 cycle type, splash oil lubrication, cast iron block and electric starting.

IMPORTANT

REFER TO THE SPECIFICATIONS SECTION OF THIS MANUAL FOR DIMENSIONS, TOLERANCES, ETC. WHEN SERVICING THIS ENGINE. THESE DATA ARE NOT INCLUDED IN THIS SECTION.

CHECKING COMPRESSION PRESSURE

Should you receive a service complaint dealing with excessive oil consumption, loss of power, hard starting, rough running or excessive smoke, check the compression pressure and the crankcase vacuum.

1. Steam clean engine thoroughly.

2. Warm up engine to operating temperature.

3. Remove the spark plug and shut off the fuel valve.

4. With the speed control lever in neutral or brake position, use a compression gauge similar to that shown in figure M-1.

5. Crank the engine with the starter and check the compression pressure, refer to Specification Section. If the pressure is 20 PSI or more below the specified pressure, leaking valves or excessive ring clearance is indicated.

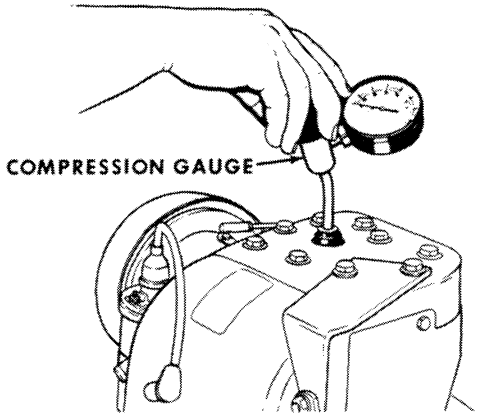


Figure M-1

CHECKING CRANKCASE VACUUM

The crankcase breather maintains a partial vacuum in the crankcase. To check vacuum proceed as follows:

1. Drill and tap a 1/8" NPT in a 3/4" pipe plug or use a 1/8" to 3/4" pipe reducing bushing. Install in place of the engine oil dipstick and plug.

2. Attach vacuum gauge to pipe plug, Figure M-2. Start engine and run at low idle speed. Refer to Specification Section for proper vacuum.

No or low vacuum indicates a faulty breather, excessive blowby, leaking valves or worn oil seals.

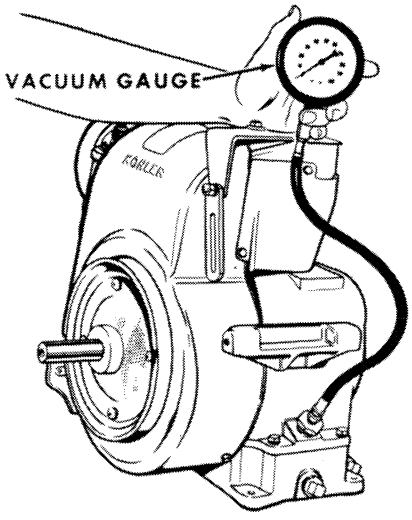


Figure M-2

CYLINDER HEAD VALVES,GUIDES AND SPRINGS

(Refer to Figure M-3)

Removal

Steam clean engine before doing any disassembly or service work.

Close the fuel tank shut off valve and disconnect the fuel line at the carburetor. Disconnect the choke and throttle connections at the carburetor. Disconnect governor linkage and remove carburetor (1) and baffle (2).

Remove and disassemble breather (25-31), cylinder head bolts (4). Remove the engine air deflector (5), cylinder baffle (6) and head baffles (7). Remove the generator adjusting bracket (8).

Remove the spark plug (9), wire (10), cylinder head (11) and gasket (12) from cylinder block (13). Using a valve spring compressor, inset A, compress the valve springs (17) and remove the valve retainer locks (15). Remove the valve retainers (16), springs, spring retainers (18), and valves (19).

To remove valve guides (20), drive them down into the tappet chamber and carefully break them off. Drive the balance of the guides down and remove. **CAUTION** Be very careful not to damage the cylinder block when breaking off the guides. The exhaust valve seat (21) can be removed by using a seat removing tool, refer to inset B. Remove tappet adjusting screws (22) if they are to be replaced.

Inspection

Remove all carbon from head, bore and valve guides. Blow out with compressed air. Refer to Pages M-6 and M-7 for inspection of valves, seats.

Inspect the tappet adjusting screws for wear and replace if worn.

Check the cylinder head for warpage by using a face plate. The head should make contact at all gasket surfaces. If it doesn't, replace cylinder head.

Installation

Drive new valve guides (20) in place until they are flush with the bottom of the valve chamber. The guides must be reamed to size after installing, refer to Specification Section for proper dimension. Install exhaust seat (21) by cooling it in dry ice and drive into the block.

Install valves (19), spring retainers (18) springs (17) and valve retainers (16). Compress valve springs and install locks (15).

Install new head gasket (12) after soaking it in oil. Install head (11) baffles (6) and (7), air deflector (5) generator bracket (8) and head bolts (4).

Tighten head bolts to proper torque. Back of the bolts and retorque to proper torque. Refer to Specifications Section.

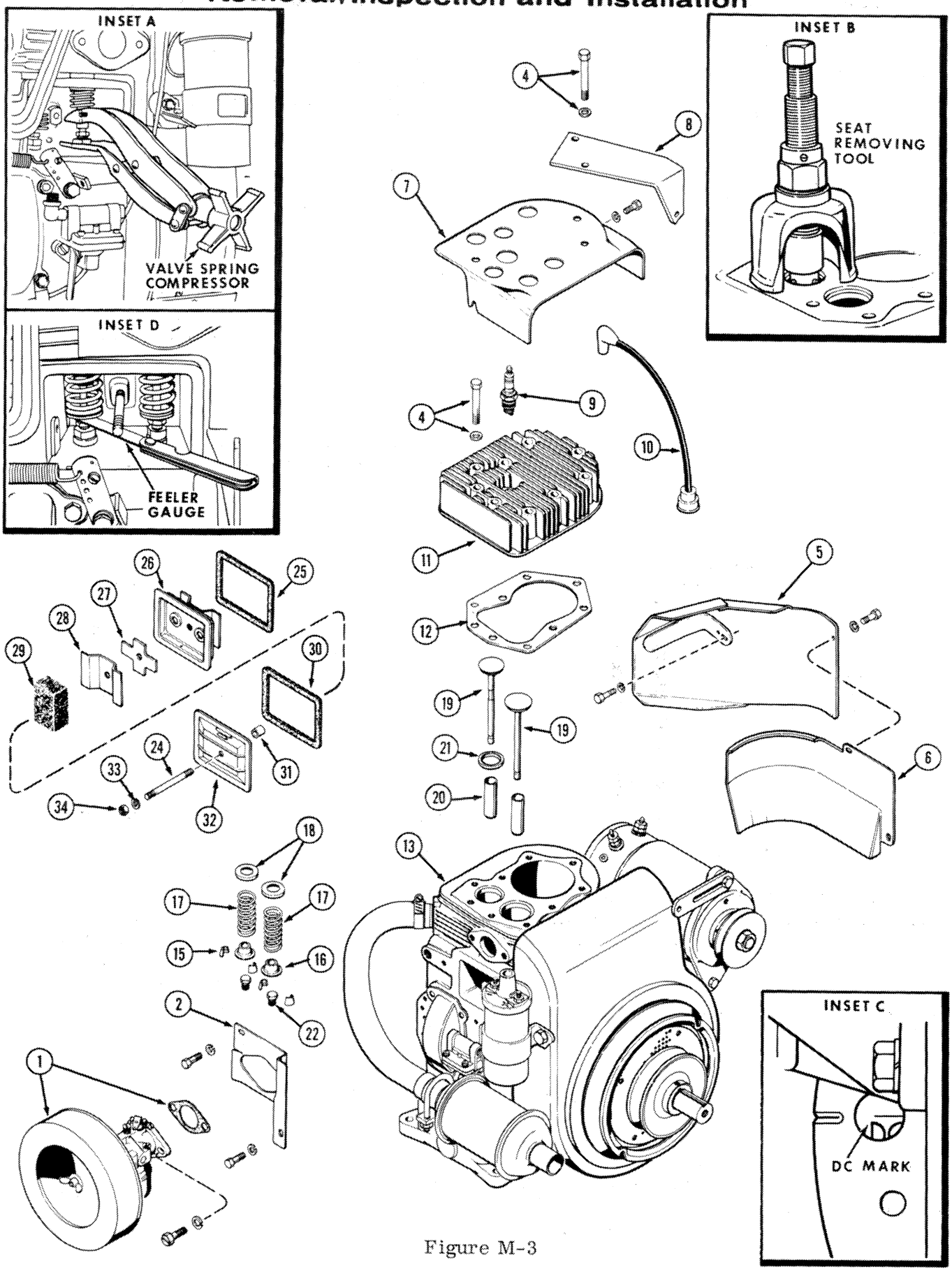
Clean, regap and install spark plug (9). Adjust tappets, refer to tappet adjustment. Install the breather assembly in the following order, stud (24) gasket (25), plate (26) with small drilled hole down, reed valve (27) and baffle (28).

Clean and lubricate filter (29) with engine oil and install. Install outer gasket (30), seal (31), cover (32) washer (33), and nut (34). Tighten the nut only enough to make a good seal.

Install baffle (2) carburetor (1) and gasket. Connect throttle and choke connections. Connect governor linkage and fuel line. Open fuel tank shutoff.

TAPPET ADJUSTMENTS

Hand crank the engine to set piston at the DC mark of the compression stroke, inset C. Outward pressure will be felt when the thumb is placed over the spark plug opening when the piston is coming up on the compression stroke. A lighter pressure is also felt on the exhaust stroke. DO NOT CONFUSE THE TWO. Refer to Specification Section for proper tappet clearance. Using a feeler gauge, set tappets, inset D.


INSET A
VALVE SPRING COMPRESSOR
INSET D
FEELER GAUGE
INSET B
SEAT REMOVING TOOL
INSET C
DC MARK
1
2
4
5
6
7
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10
11
12
13
15
16
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34

Figure M-3

INSPECTION OF THE VALVES,GUIDES AND SPRINGS

Valve springs should be checked for flat squared ends, broken or cracked coils and correct spring pressure. Use a Valve Spring Tension Tester. Refer to "Specification" Section.

Valve guides can be checked for wear by using a bore gauge and micrometer, Figure M-4.

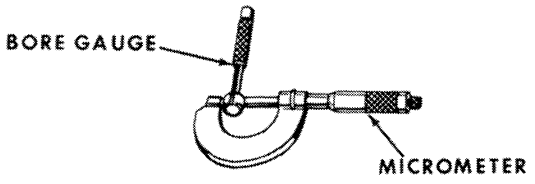

Figure M-4

The valve guide should be checked at the top, middle and bottom of the bore for wear, Figure M-5.

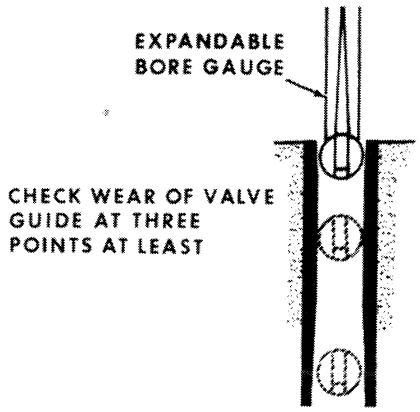

Figure M-5

The inside diameter wear limits of the valve guide should not exceed the specification given in the "Specification" Section, at any point along the bore of the guide. Replace guide if it does. Check the new valve guides after installation to make sure that the bore is not less than the inside diameter given in the "Specification" Section. Using an Arbor equal to the inside diameter of the valve guide will keep the guide from collapsing when pressed in place.

Clean the valves with a power driven fine wire brush being very careful not to scratch the valve stems. Reference is made to the different parts of the valve, Figure M-6.

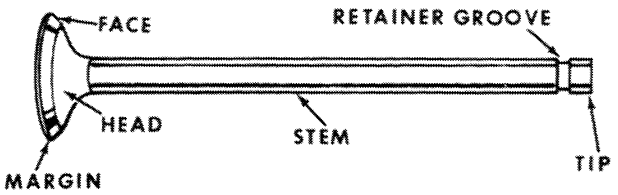

Figure M-6

Inspect the valves for excessive wear or necked stems, Figure M-7. This can be caused by lack of lubrication,plugged or dirty cooling fins or operating the engine under continous overload at excessive engine RPM. If these conditions exist the valves and guides should be replaced.

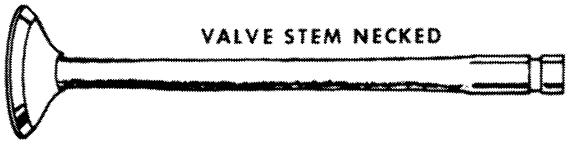

Figure M-7

Inspect the valves for deep grooves in the face, Figure M-8. This can be caused by abrasives entering the engine through the intake system or not servicing the air cleaner regularly. A leaking breather gasket can also cause this condition. If grinding the valve face will not correct this condition, replace the valves.

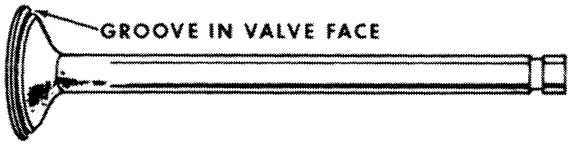

Figure M-8

Inspect the valve face and stem for rust or pitting, Figure M-9. Rust or pitting can usually be removed by grinding the valve face. If rust or pitting on the valve stem exist the valve should be replaced.These conditions can be caused by using poor quality engine oil or fuel that doesn't meet the specification given in the Operator's Manual. Rust could be caused by improper storing of the engine.

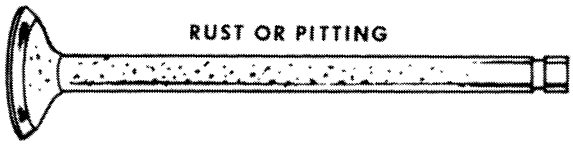

Figure M-9

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

Heavy carbon or varnish deposits on the valve, Figure M-10, should be removed before valves are ground. This condition is usually caused by worn piston rings and bore which allow too much oil to reach the combustion chamber. This condition could also be caused by worn valve guides. These conditions should be corrected or the same trouble with the valves will happen again.

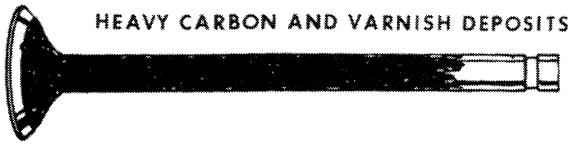

Figure M-10

Inspect the valve head for dishing and the valve face for deep burned spots, Figure M-11. These conditions can't be corrected by grinding the valves. The valves should be replaced. These conditions are usually caused by running the engine under excessive load, at high engine temperatures.

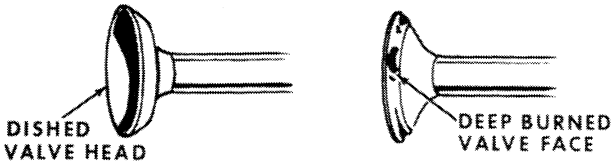

Figure M-11

Valves with worn lock grooves or the stem is worn or dished beyond the chamfer must be replaced, Figure M-12.

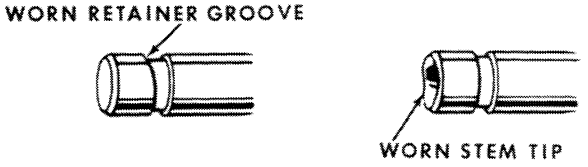

Figure M-12

The checking of the valve stem diameter can best be done with a good accurate micrometer Figure M-13.

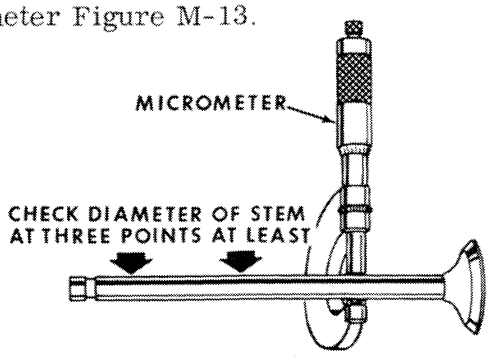

Figure M-13

The valve stem should not vary more than the wear limits given in the "Specification" Section at any point on the valve stem. If this condition exists, the valves must be replaced.

The checking of the valve face runout should be done after the valves have been ground. A Vee block type holder with a dial indicator, Figure M-14, should be used to check the valve face runout. The valve face should not vary more than the specification given in the "Specification" Section. The valve stem runout can also be checked with this Vee block and dial indicator.

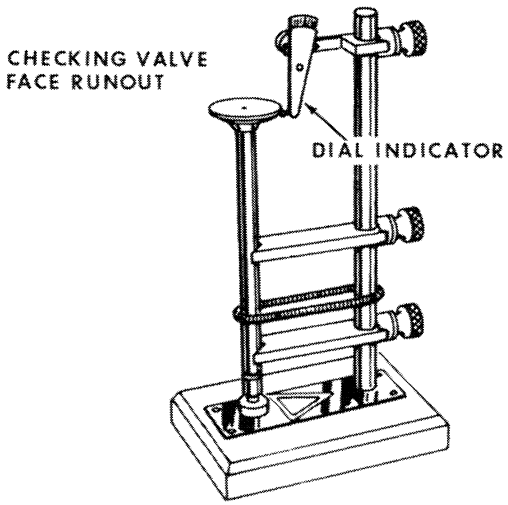

Figure M-14

IMPORTANT

Small amounts of very fine pitting, Figure M-15, may be found on the surfaces of the valve faces and seats after the valves are cleaned.

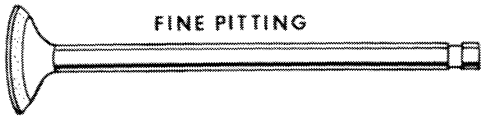

Figure M-15

These are normal and will not affect engine performance. This fine pitting is caused by a normal oxidation process and can happen on any engine during the run-in-period. It is not necessary to grind valves or seats if this fine pitting is found as the pitting will generally reoccur after the engine is run for a few hours.