General Information

Section 1-A

250/300 cc

Table of Contents

ENGINE/TRANSMISSION

This chapter has been organised into sections which show a progression for the complete servicing of the MASSEY FERGUSON AgTV 250/300 cc engine/ transmission.

To service the centre crankcase halves, the engine/ transmission must be removed from the frame.

To service top-side, left-side, and right-side components, the engine/transmission does not have to be removed from the frame.

NOTE: MASSEY FERGUSON recommends the use of new gaskets, lock nuts, and seals and lubricating all internal components when servicing the engine/ transmission.

NOTE: Some photographs and illustrations used in this section are used for clarity purposes only and are not designed to depict actual conditions.

SPECIFICATIONS*(250/300 CC)

Valves and Guides

Valve Face Diameter	
(Intake)	33 mm (1.3 in.)
(Exhaust)	28 mm (1.1 in.)
Valve/Tappet Clearance (cold engine)	
(Intake)	0.13 mm (0.005 in.)
(Exhaust)	0.25 mm (0.010 in.)
Valve Guide/Stem deflection (wobble method) Max	0.010 - 0.037 mm (0.0004 - 0.0015 in.) 0.030 - 0.057 mm (0.0012 - 0.0024 in.)
Valve guide inside diameter	5.500 - 5.512 mm (0.2165 - 0.2170 in.)
Valve stem outside diameter	
(Intake)	5.475 - 5.490 mm(0.2156 - 0.2161 in.)
(Exhaust)	5.455 - 5.470 mm (0.2148 - 0.2154 in.)
Valve stem run-out (max)	0.05 mm (0.002 in.)
Valve head thickness (max)	0.5 mm (0.002 in)
Valve stem end length (max)	2.7 mm (0.11 in.)
Valve face/seat width	0.9 - 1.1 mm (0.035 - 0.043 in.)
Valve seat angle	
(Intake)	45°
(Exhaust)	45°
Valve face radial run-out (max)	0.03 mm (0.001 in.)
Valve spring free length (max)	
(Inner)	35.1 mm (1.38 in.)
(Outer)	39.9 mm (1.57 in.)
Valve spring tension @ 32.5 mm (1.28 in.) (Inner)	7.1 - 9.2 Kg (15.7 - 20.3 lb.)
Valve spring tension@ 36.0 mm (1.42 in.) (Outer)	17.3 - 21.3 Kg (38.1 - 47.0 lb.)

Camshaft and Cylinder head

Cam lobe height (min.)	
(Intake)	33.820 mm (1.331 in.)
(Exhaust)	33.490 mm (1.318 in.)
Camshaft journal oil clearance (max)	0.15 mm (0.0059 in.)
Camshaft journal holder (inside diameter)	22.012 - 22.025 mm (0.8666 - 08671 in.)
Camshaft journal holder outside diameter	21.959 - 21.980 mm (0.8645 - 0.8654 in.)
Camshaft runout (max)	0.10 mm (0.004 in.)
Rocker arm inside diameter	12.000 - 12.018 mm (0.472 - 0.473 in.)
Rocker arm shaft outside diameter	11.977 - 11.995 mm (0.4715 - 0.4722 in.)
Cylinder head distortion (max)	0.05 mm (0.002 in.)
Cylinder head cover distortion (max)	0.05 mm (0.002 in.

Cylinder, Piston and rings

Piston skirt/cylinder clearance (max)	0.12 mm (0.047 in.)
Cylinder bore (max)	68.580 mm (2.700 in.) 66 mm** (2.598 in.)**
Piston diameter 18 mm (0.71 in.) from skirt end	68.380 mm (2.6921 in.)
Piston ring free end gap	
(1st ring)	6.2 - 7.8 mm (0.24 - 0.31in.)
(2nd ring)	7.3 - 9.1 mm (0.29 - 0.36 in.)
Bore x Stroke	68.5 x 76 mm(2.69 x 2.99 in.) 66 x 72 mm** (2.60 x 2.84 in.)
Cylinder trueness (max)	0.05 mm (0.002 in.)
Ring end gap	
(1st ring)	0.70 mm (0.028 in.)
(2nd ring)	1.0 mm (0.039 in.)
Piston ring to groove	
(1st)	0.180 mm (0.0071 in.)
(2nd)	0.150 mm (0.0059 in.)
Piston ring groove	
(1st)	1.01 - 1.04 mm
Width	(0.040 - 0.041in.)
(2nd)	1.22 - 1.24 mm (0.048 - 0.049 in.)
Oil	2.01 - 2.03 mm (0.079 - 0.080 in.)
Piston ring thickness	
(1st)	0.97 - 0.99 mm (0.038 - 0.039 in.)
(2nd)	1.71 - 1.19 mm (0.046 - 0.047 in.)
Piston pin bore (max)	17.030 mm (0.6075 in.)
Piston pin outside (min)	16.980 mm (0.6685 in.)

Crankshaft

Connecting rod (small end inside diameter) (max)	17.040 mm (0.6709 in.)
Connecting rod (big end side to side)	0.1 - 1.0 mm (0.004 - 0.039 in.)
Connecting rod (big end width)	17.95 - 18.00 mm (0.707 - 0.709 in.)
Connecting rod small end deflection (max)	3 mm (0.12 in.)
Crankshaft (web to web)	55 mm + - 0.1 mm (2.165 in.) (+ - 0.004 in.)
Crankshaft runout (max)	0.05 mm (0.002 in.) 0.08 mm (0.003 in.)
(left)	
(right)	
Oil pump reduction ratio	1.566 (47/30)
Oil pressure at 60° C (140°F) @ 3000 RPM	10 lbf/in² 40 lbf/in²
(above)	10 lbf/in²
(below)	40 lbf/in²

Clutch

Clutch release screw	1/8 turn back	
Drive plate (fibre) thickness (min)	2.42 mm (0.094 in.)	
Drive plate (fibre) tab (min)	11 mm (0.43 in.)	
Driven plate (warpage) (max)	0.1 mm (0.004 in.)	
Clutch spring length (min)	27.5 mm (1.08 in.)	
Clutch wheel inside diameter (max)	Scuffling of contact surface	
Starter clutch shoe	No groove at any part	
Clutch engagement - RPM	1900 + - 200	
Clutch lock-up - RPM	3400 + -	
Primary reduction ratio	3.150 (63/20)	
Secondary reduction ratio	1.125 (18/16)	
Final reduction ratio		
Front	3.090 (34/11)	
Rear	3.647 (62/17)	
Secondary transmission reduction ratio		
Super low	3.176 (17/18 x 25/11 x 37/25)	
Low	1.480 (37/25)	
High	1.112 (11/25 x 18/17 x 43/18)	
Gear ratios		
(1st)	3.083 (37/12)	
(2nd)	1.933 (29/15)	
(3rd)	1.388 (25/18)	
(4th)	1.095 (23/21)	
(5th)	0.913 (21/23)	
(Reverse)	2.833 (29/12 x 34/29)	
Shift fork to groove (side clearance)	0.10 - 0.50 mm (0.002 - 0.020 in.)	
Secondary transmission fork to groove (side clearance)	0.10 - 0.50 mm (0.002 - 0.020 in.)	
Reverse fork to groove (side clearance)	0.10 - 0.50 mm (0.004 - 0.020 in.)	
Shift fork groove 1, 2 & 3	4.5 - 4.6 mm (0.177 - 0.181 in.)	
Secondary transmission		
1 & 2	5.45 - 5.55 mm (0.215 - 0.219 in.)	
(reverse)	4.0 - 4.1 mm	
Shift fork thickness 1, 2 & 3	4.3 - 4.4 mm (0.169 - 0.173 in.)	
Secondary transmission		
1 & 2	5.3 - 5.4 mm (0.209 - 0.213 in.)	
(reverse)	3.8 - 3.9 mm	
Engine oil thermo switch operating temperature		
(off - on)	160° C (320°F)	N/A**
(on - off)	140° C (284°F)	

* Specification subject to change without notice.

**250 cc

REMOVING ENGINE/TRANSMISSION

250/300 cc

Many service procedures can be performed without removing the engine/transmission from the frame. Closely observe the note introducing each section for this important information.

NOTE: If the technician's objective is to service/replace left-side cover oil seals (3), front output joint oil seal (1), rear output joint oil seal (1), and/or the oil strainer (from beneath the engine/ transmission), the engine/ transmission does not have to be removed from the frame.

1. Lift the seat lock lever and remove the seat.
2. Disconnect the battery by removing the negative cable first and then the positive cable, (Fig.1).
3. Remove the battery hold-down bracket; then remove the battery.

CAUTION: Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.

4. Drain the oil from the engine/transmission.

NOTE: To drain the oil completely, both the engine and transmission plugs must be removed, (Fig. 3).

5. Turn the petrol tank valve to the OFF position.
6. Remove the springs securing the exhaust header pipe to the engine, (Fig. 4).

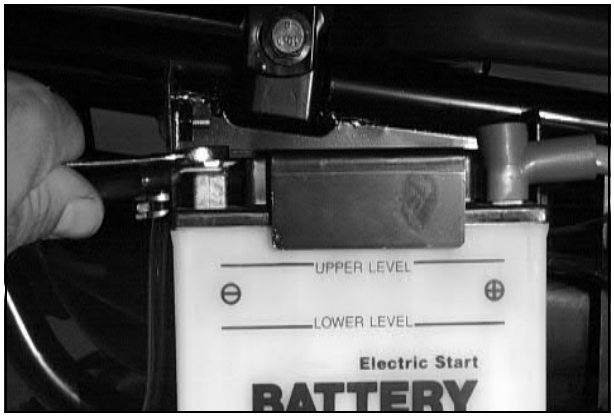


Fig.1

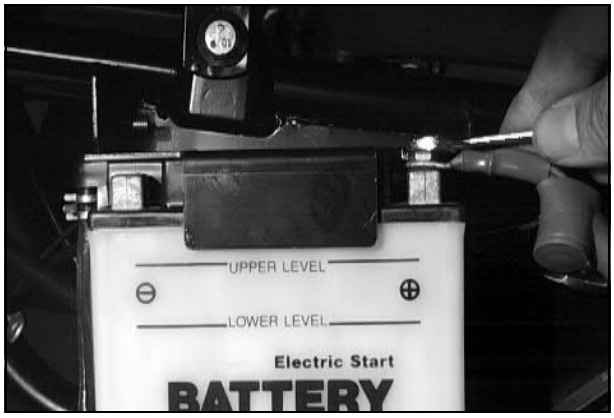


Fig. 2

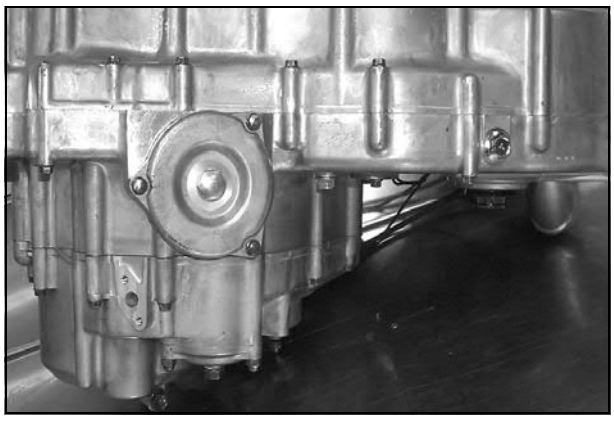


Fig. 3

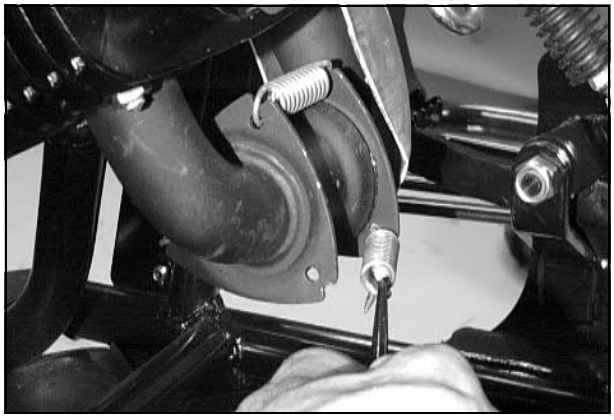
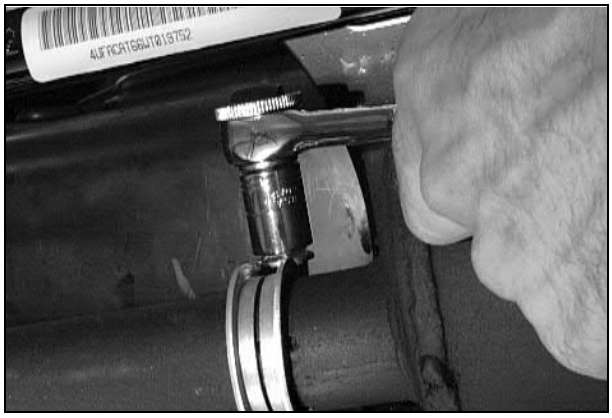


Fig. 4

7. Loosen the exhaust pipe from the muffler and the frame; then remove the exhaust pipe. Account for grafoil gaskets, (Fig. 5).
8. Mark the position of the hi/low range shifter arm; then remove the hi/low range shifter arm, (Fig. 6).



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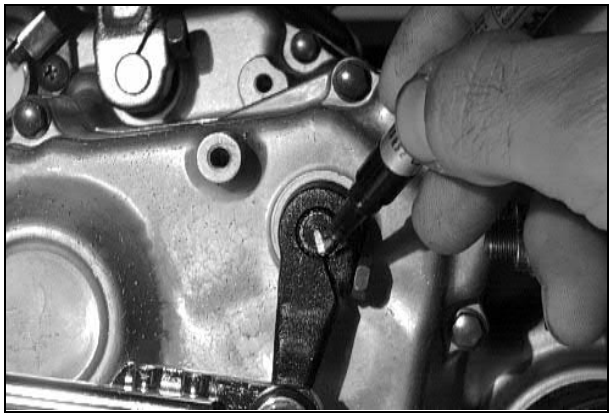

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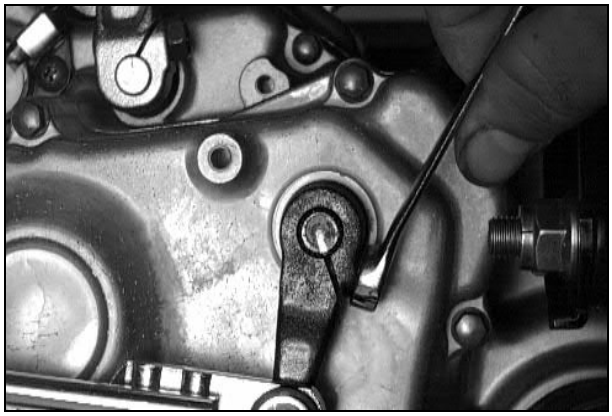
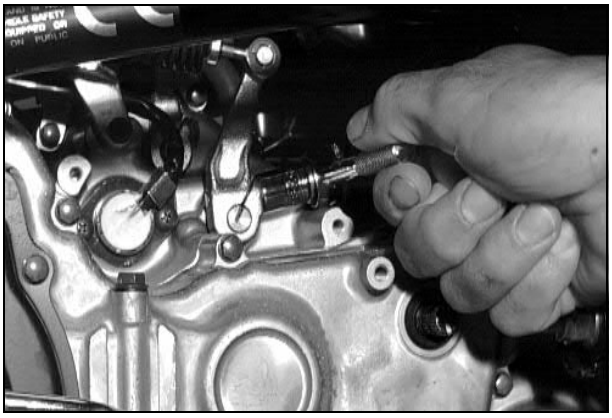


Fig. 7

Fig. 8

9. Mark the gear shifter arm; then remove the cap screw securing the gear shifter arm.
10. Mark the reverse gear shaft arm to the reverse shift shaft to aid in installing; then remove the cap screw securing the reverse gear shaft arm to the reverse shift shaft, (Fig. 10).
11. Remove the cap screws securing the air-intake snorkel to the frame; then loosen the hose clamp at the air-cleaner assembly, (Fig. 11).



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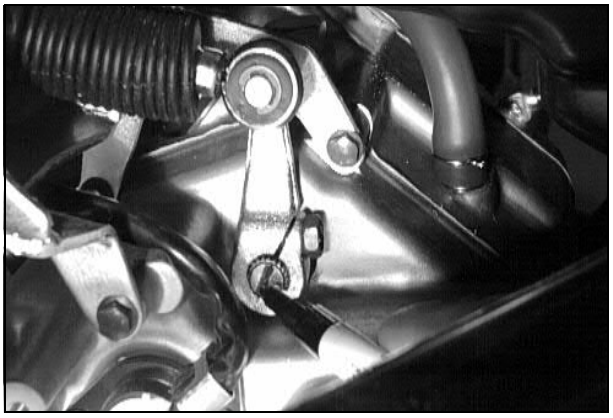


Fig. 10

Fig. 11

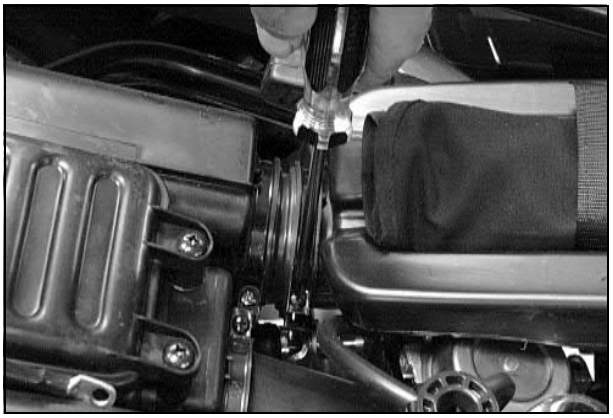
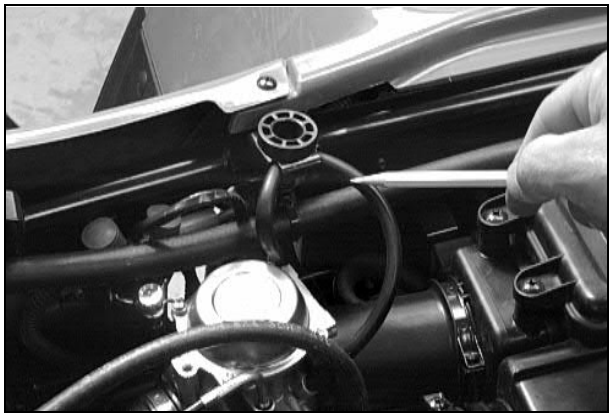


Fig. 12

12. Loosen the clamps securing the carburettor boots to the air intake and the engine (Fig. 13).
13. Remove the cap screws securing the air-cleaner assembly from the rear of the AgTV.
14. Remove the cap screws securing the CDI unit, (Fig. 15).
15. Remove the remaining cap screw securing the air-cleaner assembly to the frame; then remove the crankcase breather hoses from the air-cleaner assembly and remove the assembly.
16. Route the carburettor assembly up and away from the engine.

NOTE: It will not be necessary to disconnect the choke cable. Also, use cable ties or tape to secure the carburettor assembly to keep it from interfering with the removal procedure.

17. Remove the clips securing the shifter cables to the bracket, (Fig. 16).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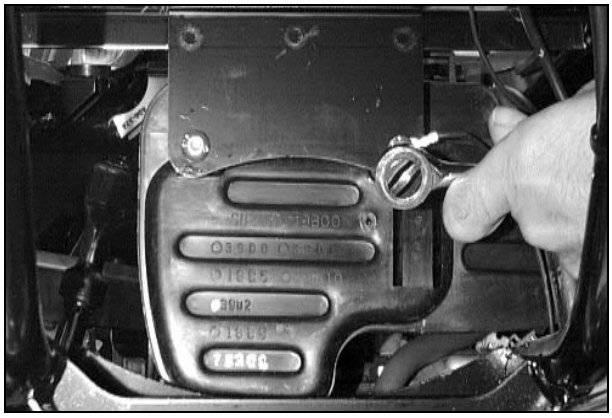
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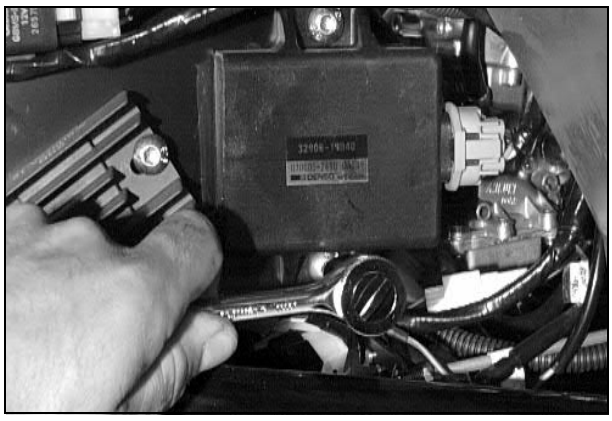


Fig. 15


Fig. 16

18. Disconnect the positive cable from the starter motor (Fig. 17).
19. Disconnect the battery ground (negative) cable from the crankcase cover, (Fig. 18).
20. Disconnect the high tension lead from the spark plug.
21. Disconnect the main wiring harness connectors, (Fig. 19).
22. Remove the right-hand side panel, (Fig. 20).

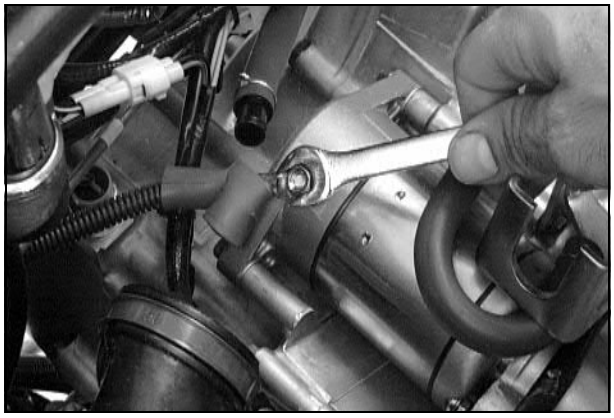


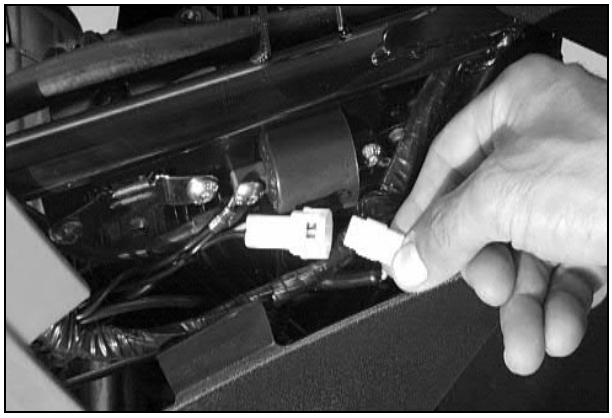
Fig. 17


Fig. 18


Fig. 19


Fig. 20

23. Disconnect the oil light switch, (Fig. 21).
24. Remove the rear hydraulic brake calliper, (Fig. 22).
25. Remove the mechanical foot brake, (Fig. 23).
26. Remove the torx-head screw securing the brake hose to the upper suspension arm.
27. Remove the two oil cooler hoses from the engine, (Fig. 24).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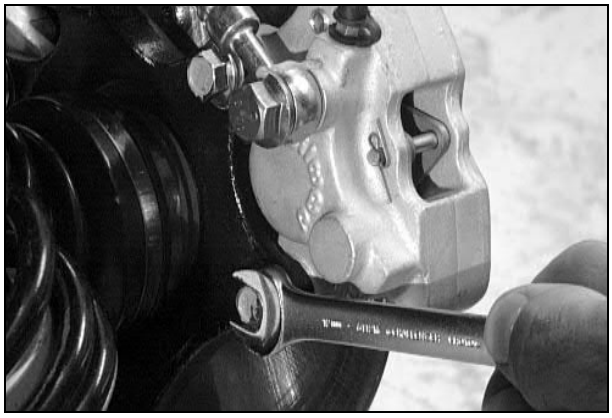


Fig. 22


Fig. 23

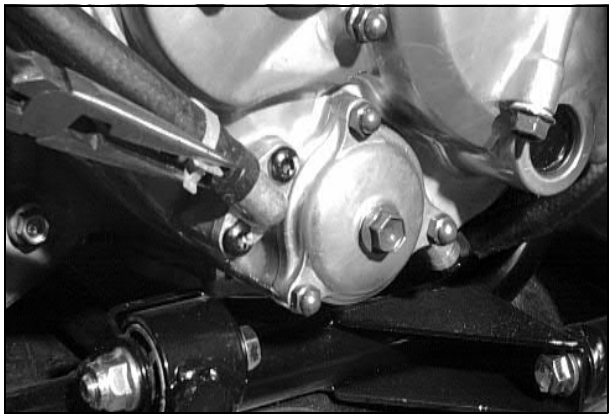
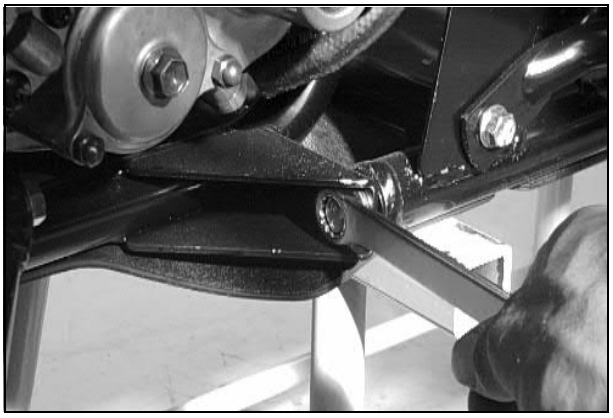


Fig. 24

28. Remove the skid plate from the rear end assembly.
29. Remove the two lower cap screws securing the sub-frame/engine assembly to the frame, (Fig. 25).
30. Secure the upper rear of the AgTV to the work stand using tie-down straps to help prevent the AgTV from falling forward when the engine/sub-frame assembly is removed.

WARNING: Support the AgTV so it does not fall off the work stand when the engine/sub-frame assembly is removed from the frame or severe damage, injury, or death may result.

31. Place a large floor/transmission jack under the engine assembly; then remove the upper four cap screws securing the sub-frame to the frame. Place the engine assembly on a suitable work stand and remove the wheels, (Fig. 26).
32. Remove the cap screw securing the front engine mount to the sub-frame. Account for spacers,(Fig. 28).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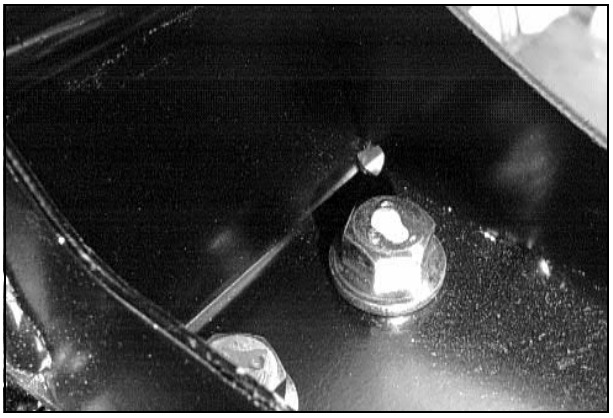
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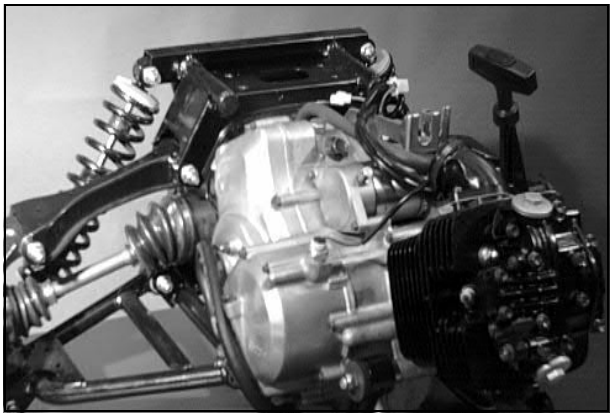
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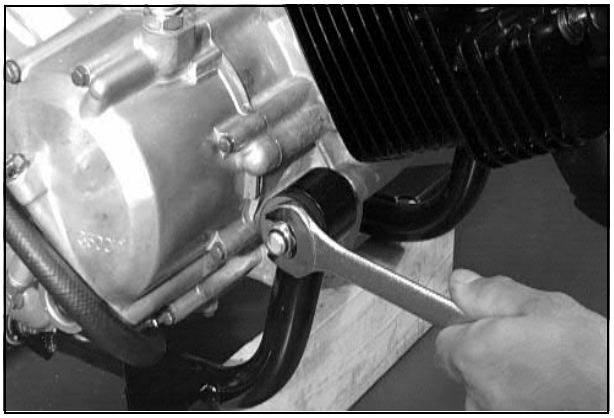
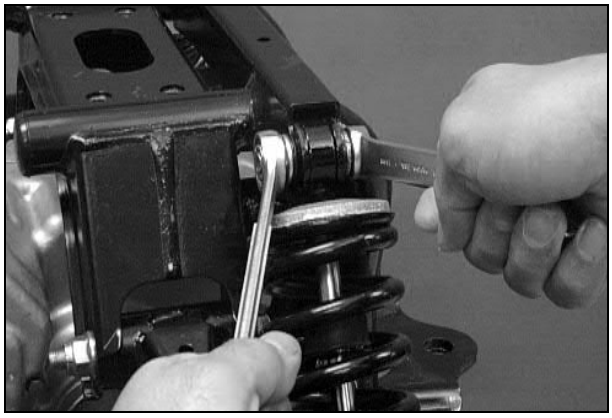


Fig. 28

33. Remove the upper shock mount cap screw to allow access for removal of the two rear engine mount cap screws, (Fig. 29).
34. Remove the two rear cap screws securing the engine to the sub-frame, (Fig. 30).
35. Remove the rear upper A-arm cap screws, (Fig. 31).
36. Using Side Case Puller (ATV0644-262) with an adapter, remove each drive axle assembly, (Fig. 32).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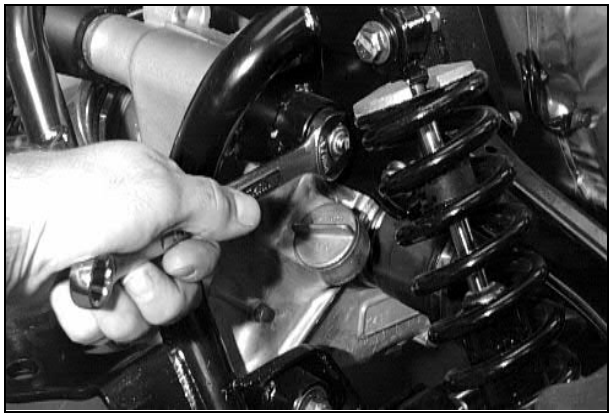
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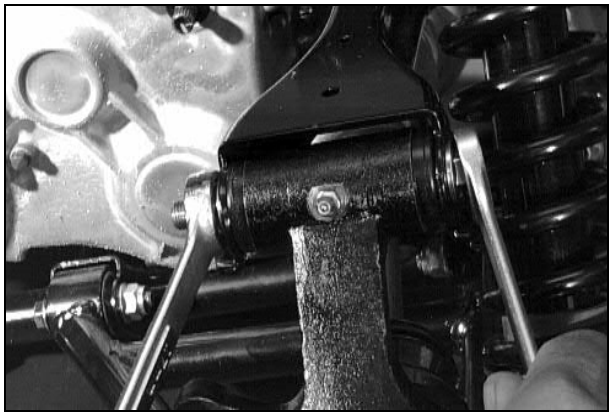
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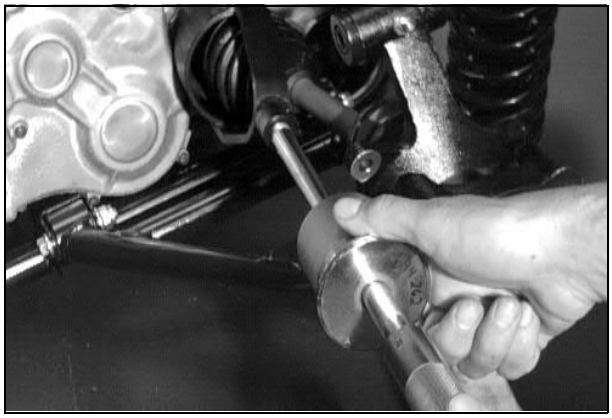


Fig. 32

TOP-SIDE COMPONENTS

NOTE: For efficiency, it is preferable to remove and disassemble only those components which need to be addressed and to service only those components. The technician should use discretion and sound judgment.

NOTE: To service any one specific component, only limited disassembly of components may be necessary. The engine/transmission does not have to removed from the frame for this procedure.

REMOVING TOP-SIDE COMPONENTS

A - Valve Cover

B - Cylinder Head

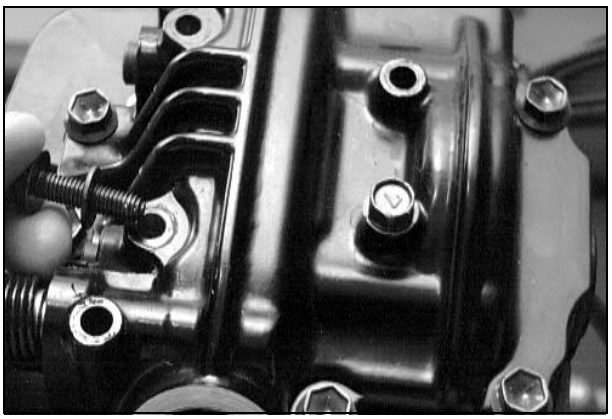
NOTE: Remove the spark plug and timing inspection plug; then using the recoil starter, rotate the crankshaft to top-dead-centre of the compression stroke, (Fig. 33).

1. Remove the cap screws securing the two tappet covers; then remove the covers. Account for the O-rings, (Fig. 34).
2. Remove the cap screws securing the valve cover to the head; account for the locations of any rubber washers on top side cap screws. Remove the valve cover. Account for the cylinder head plug. Note the location of two alignment pins.

NOTE: If removing the valve cover only, the two cap screws w/rubber washers next to the compression release lever do not have to be removed, (Fig. 35).

Fig. 33

Fig. 34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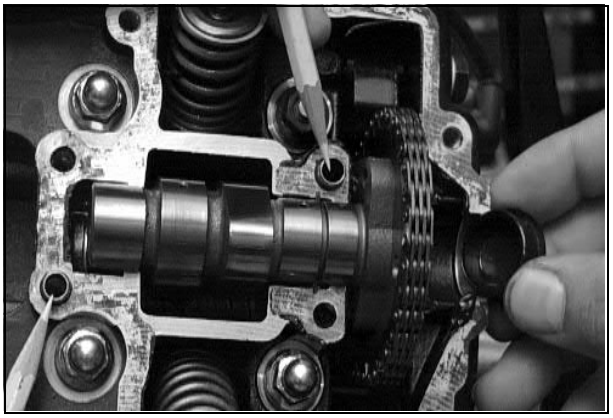
Fig. 36

3. Loosen the cap screw on the end of the chain tensioner; then remove the two Allen-head cap screws securing the tensioner adjuster assembly and remove the assembly. Account for a gasket, (Fig. 37).
4. Remove the cap screw securing the chain tensioner pad (account for a washer), (Fig. 38).
5. Bend the washer tabs and remove the two cap screws securing the sprocket to the camshaft; then drop the sprocket off the camshaft. While holding the chain, slide the sprocket and camshaft out of the cylinder head. Account for an alignment pin, (Fig. 39).

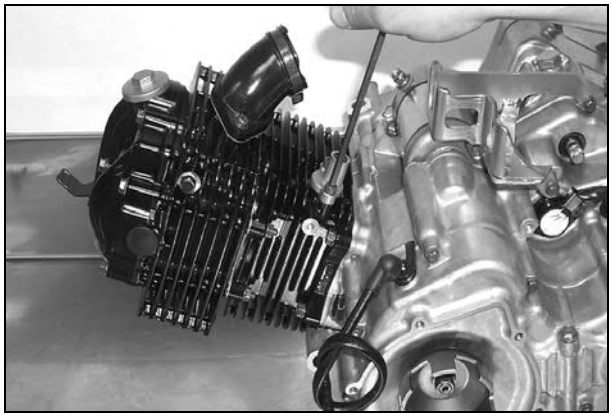
Fig. 37

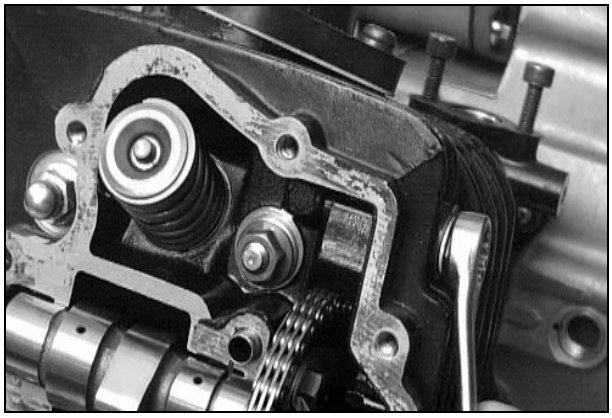
Fig. 38

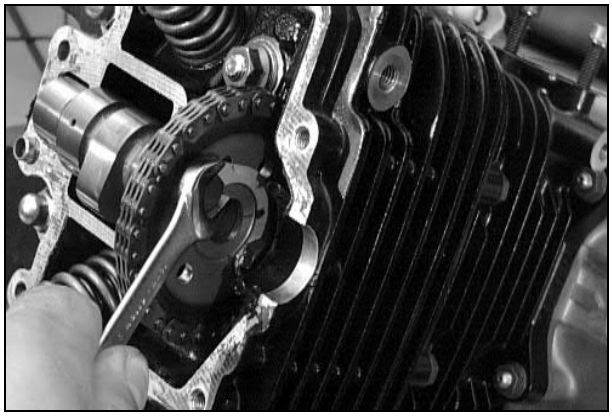
Fig. 39


Fig. 40

NOTE: Loop the chain over the cylinder and secure it with a wire to keep it from falling into the crankcase.

6. Using an awl, rotate the C-ring in its groove until it is out of the cylinder head; then remove the C-ring.

NOTE: Care should be taken not to drop the C-ring down into the crankcase, (Fig. 41).

7. Using a pair of needle-nose pliers, remove the chain tensioner pad, (Fig. 42).
8. Remove the nuts securing the cylinder head to the cylinder; then remove the three cylinder head cap nuts and one nut with copper washers (note location of the cap nuts and nuts), (Fig. 43).

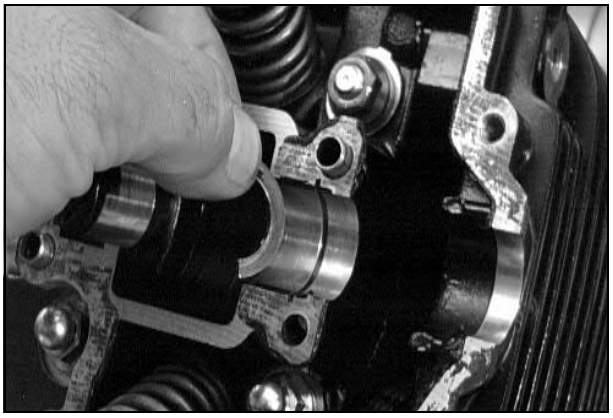

Fig. 41

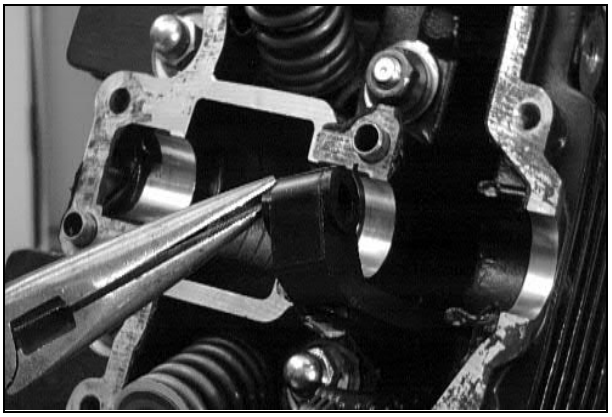

Fig. 42

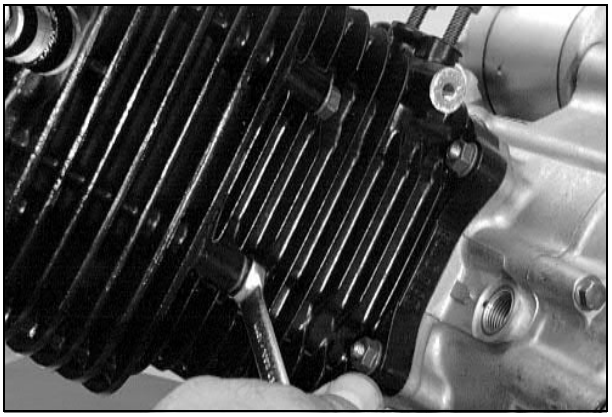

Fig. 43

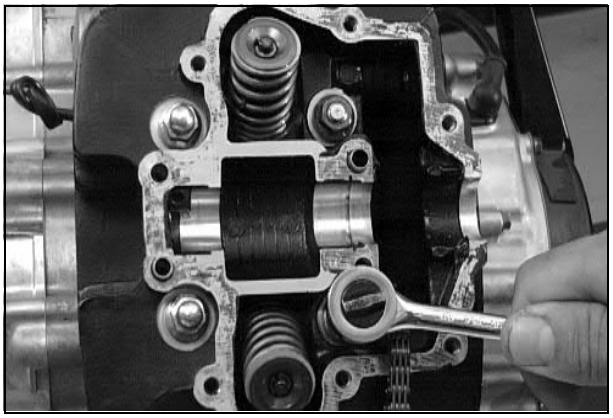

Fig. 44

9. Remove the cylinder head from the cylinder, remove the gasket, and account for two alignment pins, (Fig. 45).

NOTE: To service valves and cylinder head, see Servicing Top-Side Components in this chapter.

10. Remove the cam chain guide, (Fig. 46).

NOTE: To inspect cam chain guide, see Servicing Top-Side Components in this chapter.

C - Cylinder

D - Piston

11. Remove the two nuts securing the cylinder to the crankcase, (Fig. 47).
12. Lift the cylinder off the crankcase taking care not to allow the piston to drop against the crankcase. Account for the gasket and two alignment pins, (Fig. 48).

NOTE: It may be necessary to remove the stud w/O-ring to aid in removing the cylinder; however, there is no stud O-ring on the 250 cc.

NOTE: To service cylinder, see Servicing Top-Side Components in this chapter.

CAUTION: When removing the cylinder, be sure to support the piston to prevent damage to the crankcase and piston.

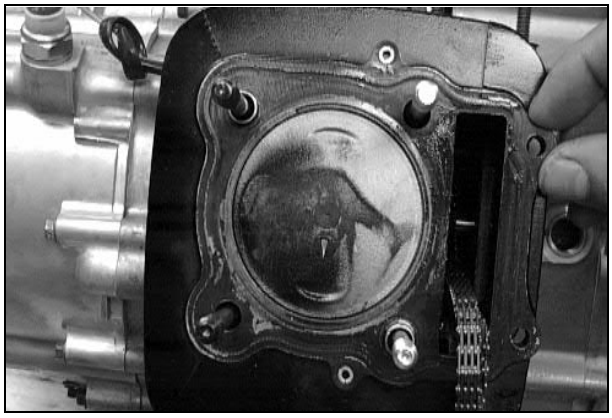

Fig. 45

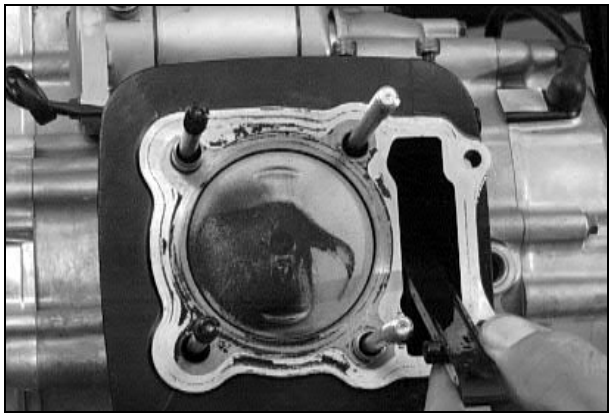

Fig. 46

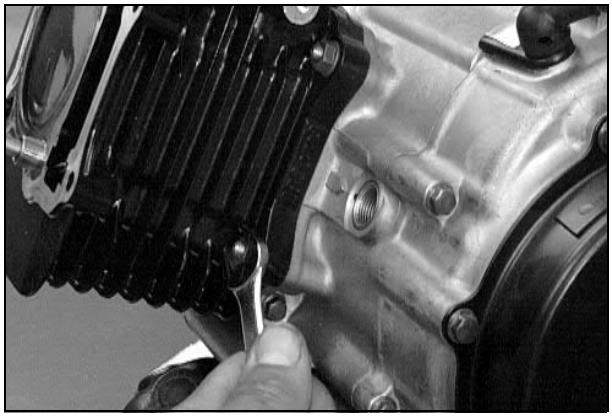

Fig. 47

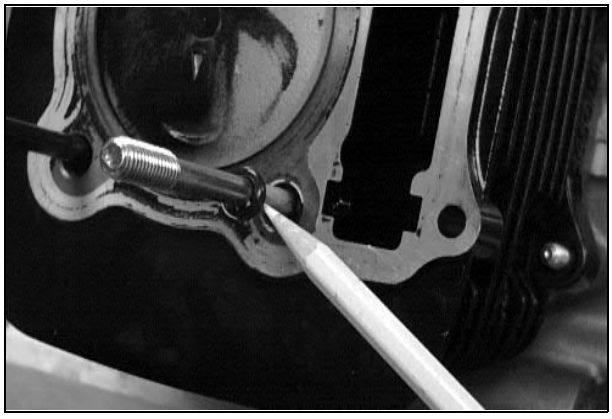

Fig. 48

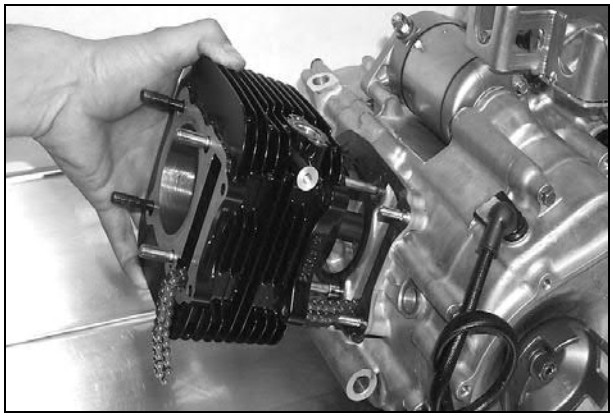

Fig. 49

13. Using an awl, remove one piston-pin circlip, (Fig. 52).
14. Using a piston-pin puller, remove the piston pin. Account for the opposite-side circlip. Remove the piston, (Fig. 53).

NOTE: It is advisable to remove the opposite-side circlip prior to using the puller, (Fig. 53).

NOTE: Support the connecting rod with rubber bands to avoid damaging the rod or install a connecting rod holder.

CAUTION: Do not allow the connecting rod to go down inside the crankcase. If the rod is down inside the crankcase and the crankshaft is rotated, severe damage will result.

NOTE: If the existing rings will not be replaced with new rings, note the location of each ring for proper installation, (Fig. 54). When replacing with new rings, replace as a complete set only. If the piston rings must be removed, remove them in this sequence.
A - Starting with the top ring, slide one end of the ring out of the ring-groove.
B - Remove each ring by working it toward the dome of the piston while rotating it out of the groove.

NOTE: To service piston, see Servicing Top-Side Components in this chapter.

NOTE: To service centre crankcase components only, proceed to Removing Left-Side Components.

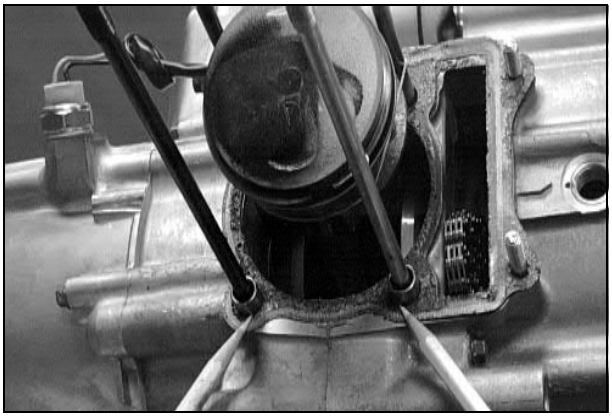

Fig. 50

Fig. 51

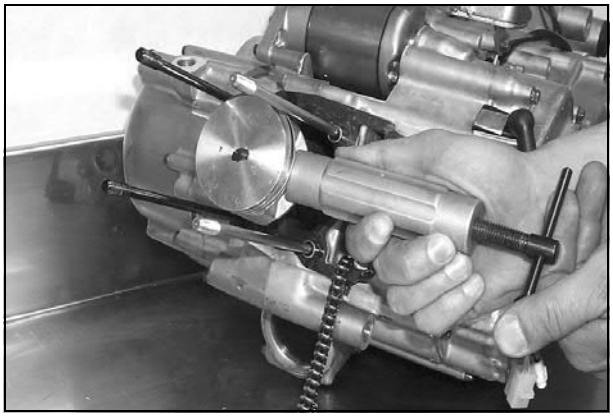

Fig. 52

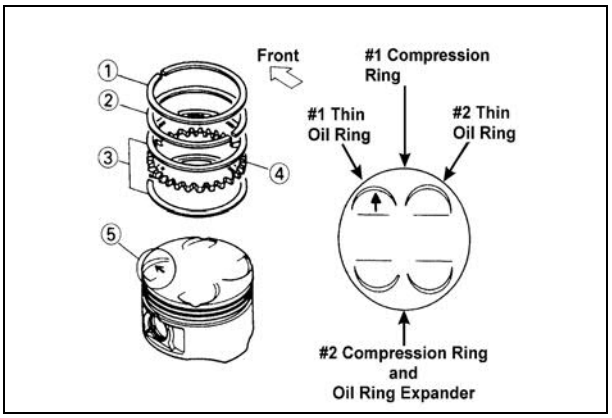

Fig. 53

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