

Bombardier **JUNIOR**
Trailbike **CROSS**
Service **bantam**
Manual **trail**
bantam
cross



Suspension, Engine and Transmission, Electrical.

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INTRODUCTION

FOREWORD

This Manual has been prepared by the Technical Information Centre of Bombardier Limited, and contains the complete servicing of all BOMBARDIER TRAILBIKES for 1971. The manual is intended for use by Authorized BOMBARDIER TRAILBIKE dealers.

As many of the procedures in the Manual are inter-related, we suggest that before undertaking any task, you read and thoroughly understand the entire section or sub-section in which the procedure is contained. A number of procedures throughout the book require the use of special tools. Where a special tool is indicated, a cross-reference to its full description is provided (i.e. Use mounting bar and retaining sleeve, refer Section 2-4 Item 1). Before commencing any procedure, be sure that you have on hand all of the tools required or approved equivalents.

ARRANGEMENT OF THE MANUAL

The Manual is divided into three (3) major Sections: (1) Suspension, (2) Engine and Transmission, (3) Electrical. Each Section includes — replacement procedures, and adjustment/alignment instructions, all adequately supported by numerous photographs.

IMPORTANT: It is not necessary to carry out an entire procedure if your task can be completed by any of the intermediate steps. At any point, once you have accomplished your intentions, merely do the steps you have followed in reverse order to complete the assignment.

The Table of Contents on the first page of the Manual lists the Sections, Sub-sections, Divisions and general order of content.

DEFINITION OF NUMBERING SYSTEM

The Manual makes use of a 3-part digital numbering system for pages (i.e. 1-1-01) in which the first digit represents the Section (1), the second digit the Sub-section (1-1) the third digit, the page number (1-1-01). Figure numbers accompanying the illustration utilize a 4-part numbering system (i.e. Fig. 1-1-1-01). The first digit represents the Section, the second digit, the Sub-section (1-1) the third digit, the division (1-1-1-) and the fourth digit, the figure number (1-1-1-01).

ILLUSTRATIONS

The illustrations are conveniently located as close as possible to the written procedures, and are meant to assist the user in identifying parts and components and in cross-relating to the actual vehicle. In some cases, however, depending on Model, they may not show the exact relation or arrangement of parts, as space within the Manual does not permit.

GENERAL

All of the information, illustrations and component/system descriptions contained in this Manual are correct at time of publication. Bombardier Limited however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

IDENTIFICATION

Engine serial numbers are used for tracing and identification. The numbers on the frame are serial numbers for production and identification purposes.

All serial numbers become valuable in the event of warranty claims, loss, theft or dispute. They are prominently displayed and easy to locate.

Location of Serial Numbers

Engine: The engine serial number is stamped on the front section of the crankcase.

Vehicle: The Identification Number (V.I.N.) is located on the frame yoke. In addition, the frame serial number is also stamped on the support adjacent to the Vehicle Identification Plate.

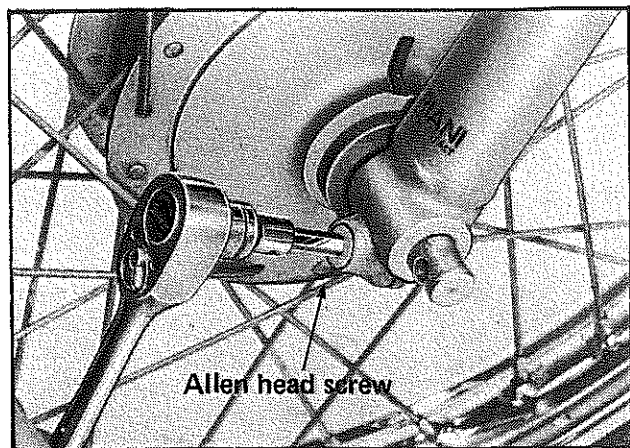
1-1 WHEELS

1-1-1 REMOVAL AND DISASSEMBLY

Front wheel

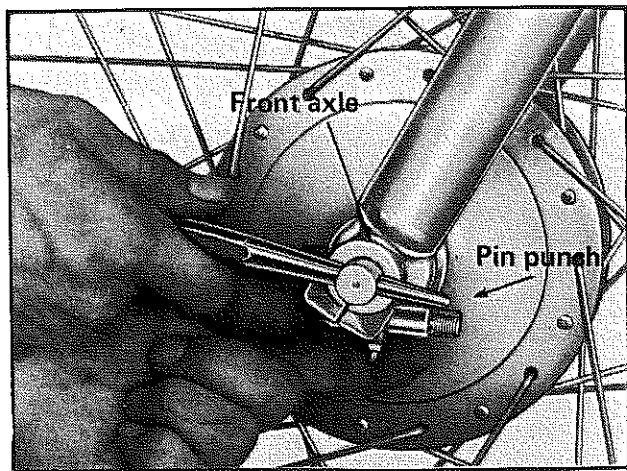
Junior Cross model

1. Raise front wheel off the ground by placing a support block under engine.
2. Disconnect the speedometer cable from the drive unit.
3. Disconnect front brake cable from brake lever and pull out cable.
4. Loosen the Allen head screw retaining the front axle. (Fig. 1-1-1-01).



1-1-1-01

5. Using a pin punch, unscrew and remove the front axle. (Fig. 1-1-1-02). Remove wheel.

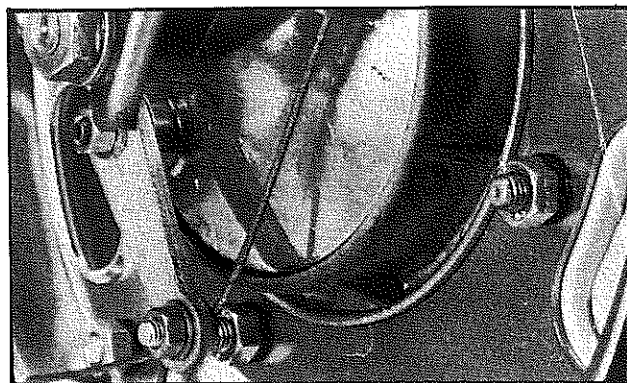


1-1-1-02

6. Remove drive unit and brake flange from wheel hub.

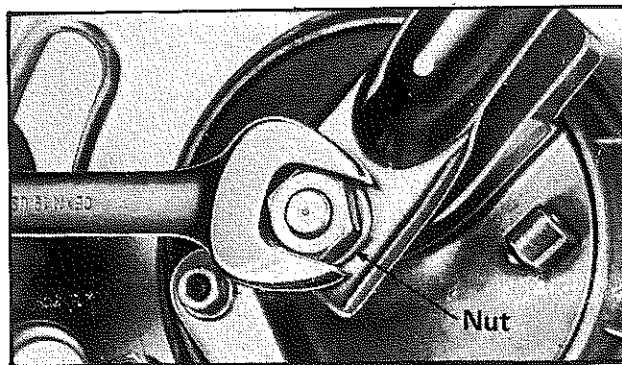
Bantam models

1. Raise front wheel off the ground by placing a support block under engine.
2. Disconnect the speedometer cable from the drive unit.
3. Disconnect front brake cable from brake lever and pull out cable. (Fig. 1-1-1-03).



1-1-1-03

4. Loosen the two (2) front axle nuts and remove wheel. (Fig. 1-1-1-04).



1-1-1-04

5. While holding drive unit and brake flange, remove one (1) nut and slide out front axle. Remove drive unit and brake flange.

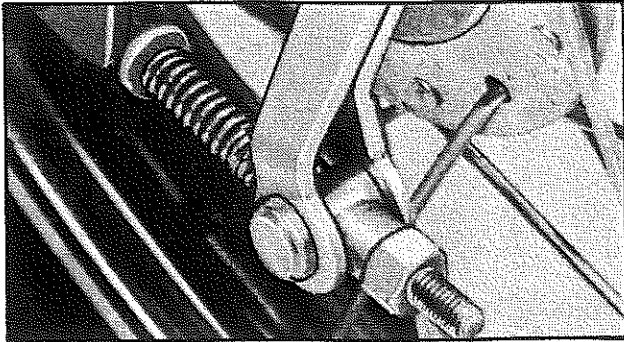
Rear wheel

Junior Cross model

1. Raise rear wheel off the ground by placing a support block under engine.
2. Disconnect drive chain at the connecting link

1-1-02

3. Disconnect rear brake rod by unscrewing adjuster nut. (Fig. 1-1-1-05).

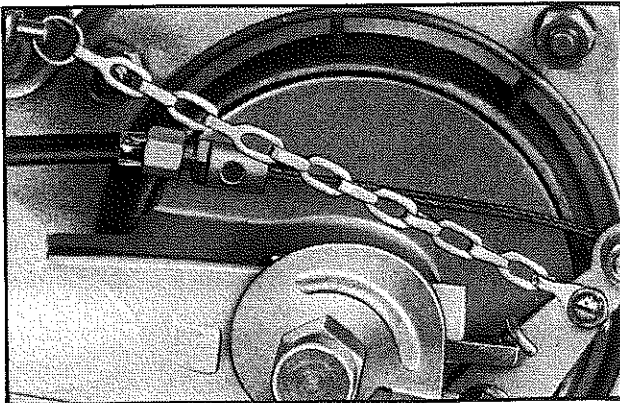


1-1-1-05

4. Remove axle retaining nut from right side of axle.
5. Remove the two (2) nuts, washers and chain tensioners from rear axle.
6. Push and withdraw rear axle from wheel. Remove brake flange and both rear sprockets from hub.

Bantam models

1. Raise rear wheel off the ground by placing a support block under engine.
2. Disconnect rear brake cable and brake chain. (Fig. 1-1-1-06).



1-1-1-06

3. Disconnect the drive chain at connecting link.
4. Loosen the rear axle nuts and remove wheel.
5. Remove one (1) nut and slide out rear axle. Remove rear sprocket and brake flange.

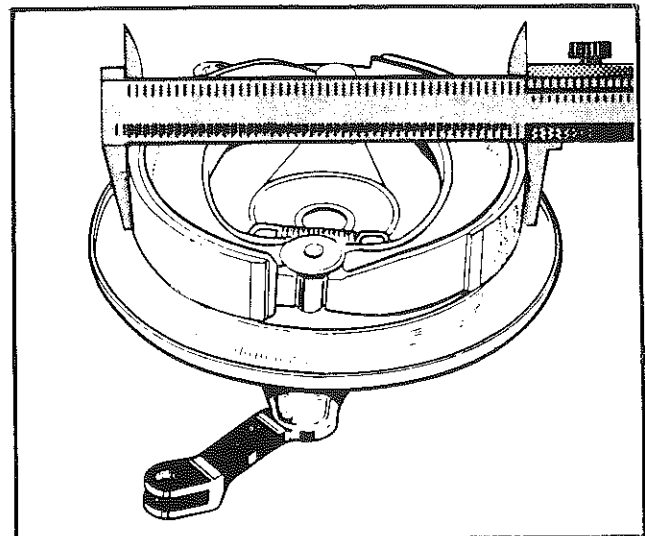
1-1-2 CLEANING

1. Clean each metal component using cleaning solvent. Dry using clean cloth.

2. Clean and smooth out the inside drum surface with a rag or emery cloth.
3. Clean brake shoes using emery cloth.

1-1-3 INSPECTION

1. Visually inspect all threaded parts for stripped, crossed or otherwise damaged threads. Use tap or die to repair damaged components.
2. Check brake linings as follows:
 - a) With brake shoes inside drum in operating position, actuate brake lever until resistance is felt.
 - b) The lever should return normally when released.
 - c) Measure inside diameter of brake drum.
 - d) Measure outside diameter of brake linings with cam turned 180° to free position (Fig. 1-1-3-01).



1-1-3-01

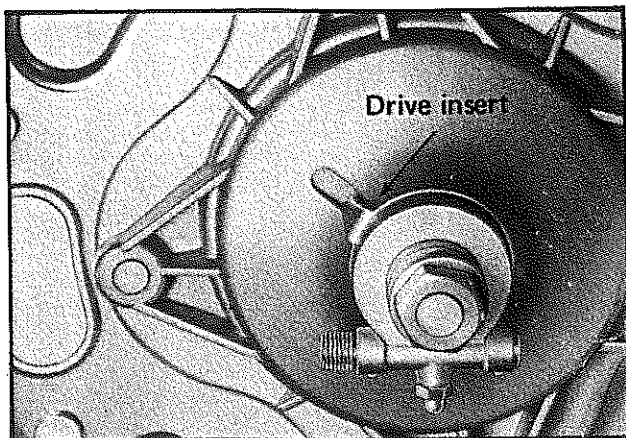
- e) Measurement should be .100 inch larger than drum diameter.
 - f) If not, check thickness of linings, they should be .100 inch minimum.
3. On Junior Cross models; using a screwdriver hit the wheel spokes. A low pitch indicates a loose spoke. Spokes must all be approximately the same tension. Do not over tighten.
 4. Check tire pressure 25 lbs. at rear and 20 lbs. at front.

1-1-4 ASSEMBLY, INSTALLATION

Front wheel

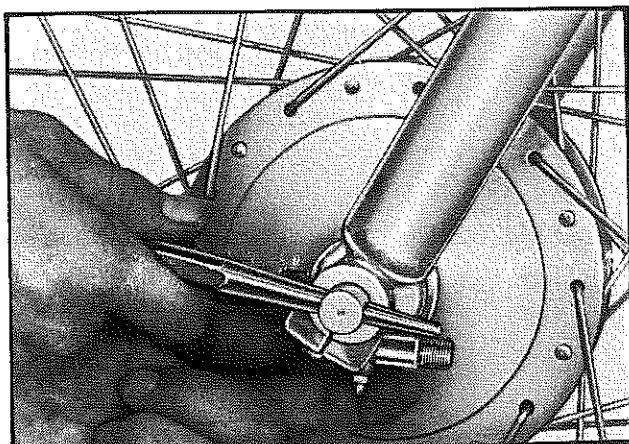
Junior Cross model

1. Position drive unit and brake flange on drive hub ensuring that drive unit insert sits correctly in the recess. (Fig. 1-1-4-01).



1-1-4-01

2. Position wheel between fork legs and screw in the front axle. (Fig. 1-1-4-02). Ensure that the drive unit is parallel with ground and that the brake anchor distance piece is parallel with fork. Torque axle to 45 ft/lbs.



1-1-4-02

3. Tighten front axle Allen head screw.
4. Connect front brake cable at lever, front brake adjustment 1/8 inch at upper lever.
5. Connect speedometer cable.
6. Remove support block and lower vehicle.

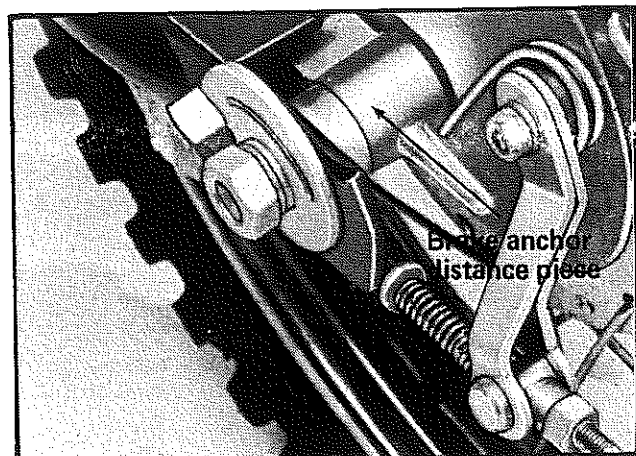
Bantam models

1. Slide front axle through the drive unit, wheel hub and the brake flange. Ensure that drive unit insert sits correctly in the recess. (Refer to Fig. 1-1-4-01)
2. Position the two (2) nuts on front axle and position wheel between fork legs. Tighten front axle nut to 45 ft/lbs, ensuring that drive unit is parallel with ground and that brake anchor distance piece is parallel with fork.
3. Connect front brake cable at lower lever. Brake adjustment 1/8 inch free-play.
4. Connect speedometer cable.
5. Remove support block and lower vehicle.

Rear wheel

Junior Cross model

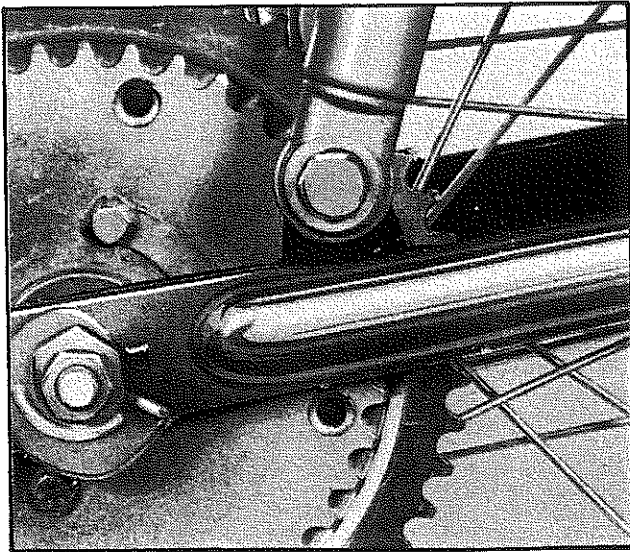
1. Position brake flange and both rear sprockets on hub.
2. Position wheel between rear swinging arms, ensuring that the brake anchor distance piece is parallel with arm. (Fig. 1-1-4-03). Slide the rear axle through arm, hub and second arm.



1-1-4-03

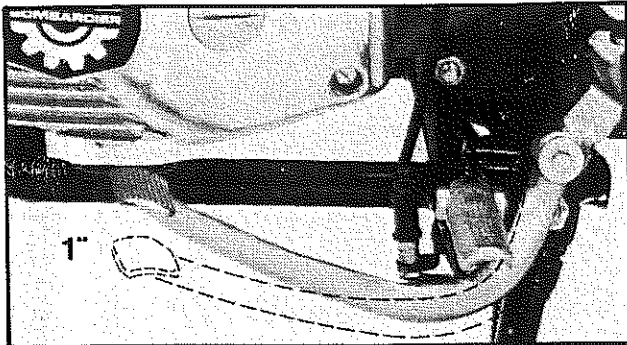
3. Position two (2) chain tensioners, right side retaining nut and the two (2) axle nuts. (Fig. 1-1-4-04).

1-1-04



1-1-4-04

4. Connect drive chain and adjust (1/2 inch free-play). Torque rear axle to 45 ft/lbs.
5. Connect rear brake rod and adjust (1 inch of free-play on pedal). (Fig. 1-1-4-05).



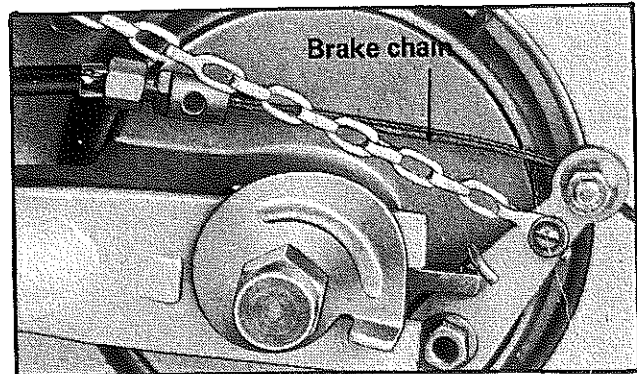
1-1-4-05

6. Remove support block and lower vehicle.

Bantam models

1. Position rear sprocket and brake flange on rear hub.
2. Slide wheel between swinging arms ensuring that the brake anchor distance piece is parallel with arm.
3. Install chain tensioner and finger tighten the nuts. Ensure that the distance between wheel rim and arm is equal both sides.
4. Connect chain and check tension (1/2 inch free-play). Tighten axle to 45 ft/lbs.
5. Connect rear brake cable at lever (1 inch free-play on pedal). (Refer to Fig. 1-1-4-05).

6. Connect brake chain. Remove support block and lower vehicle. (Fig. 1-1-4-06).



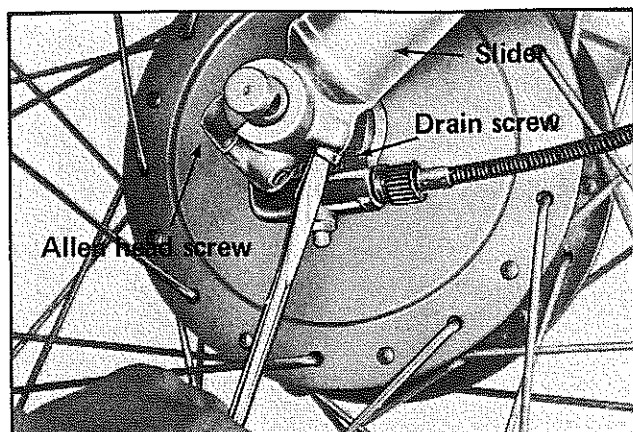
1-1-4-06

1-2 FRONT FORK

1-2-1 REMOVAL AND DISASSEMBLY

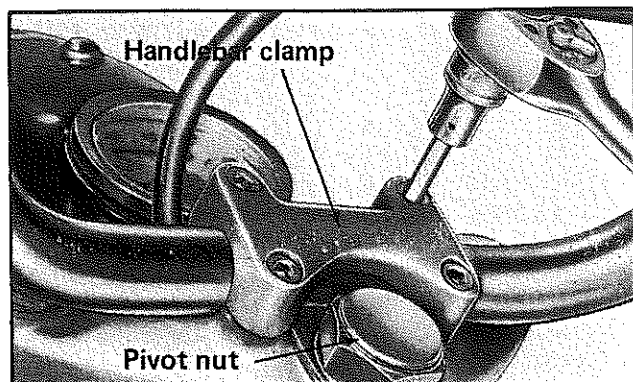
Junior Cross Model

1. Remove the slider drain screw located at bottom of each slider. (Fig. 1-2-1-01).



1-2-1-01

2. Apply downward pressure on handlebar to drain the slider of oil.
3. Remove entire front wheel assembly as detailed in Section 1-1.
4. Remove the four (4) Allen head screws retaining the handlebar clamp. (Fig. 1-2-1-02).



1-2-1-02

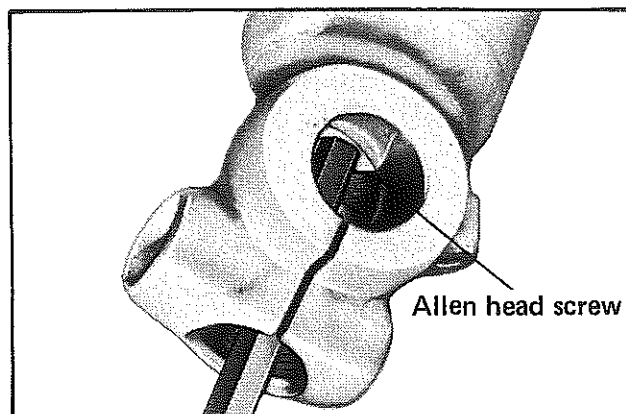
5. Remove the pivot nut and washer from upper plate. Remove handlebar and set it on right hand side of vehicle.
6. Remove the two (2) screw stoppers and washers from inner tubes. Remove springs (Fig. 1-2-1-03).

CAUTION: The springs are under tension and may fly up when released.



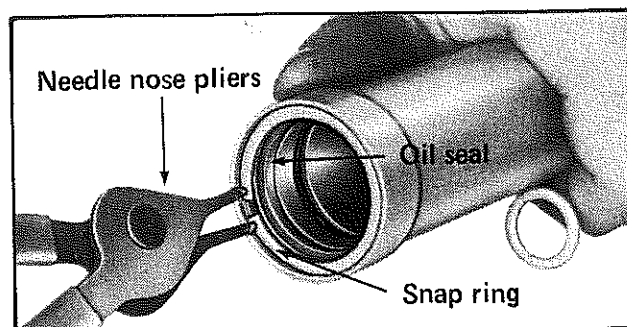
1-2-1-03

7. Remove retaining lower fork slider screws located inside of lower forks. (Fig. 1-2-1-04).



1-2-1-04

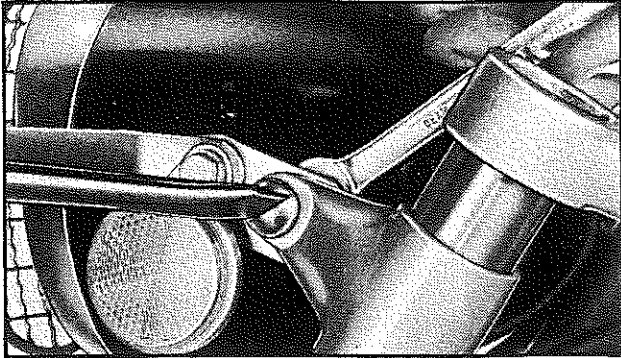
8. Push slider assembly up and remove slider with a sharp downward "jerk". Repeat for other slider.
9. Lift off outer rubber dust cover and using needle nose pliers remove snap ring. (Fig. 1-2-1-05).



1-2-1-05

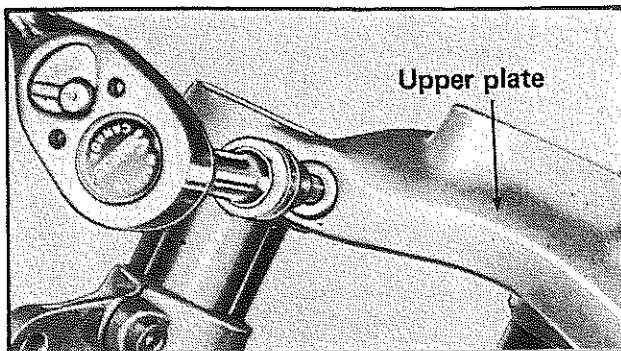
1-2-02

10. Insert a 5/16 inch width screwdriver into lips of ring seal and pry out the seal.
11. Remove headlamp assembly and allow the components to hang on vehicle. (Fig. 1-2-1-06).



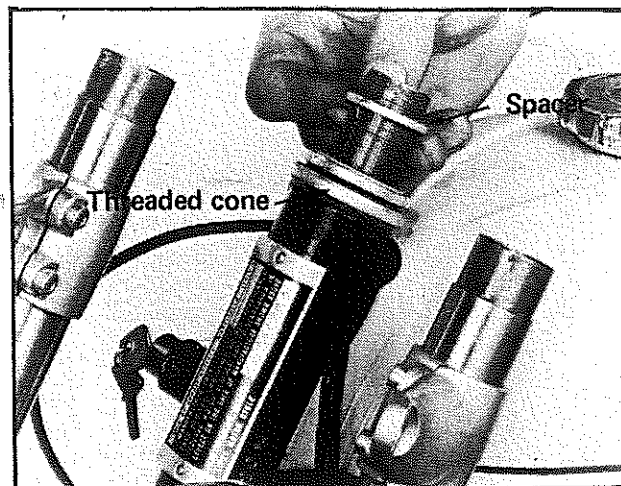
1-2-1-06

12. Remove horn. Slacken off the Allen head screws (2) retaining upper plate to inner tubes. (Fig. 1-2-1-07).



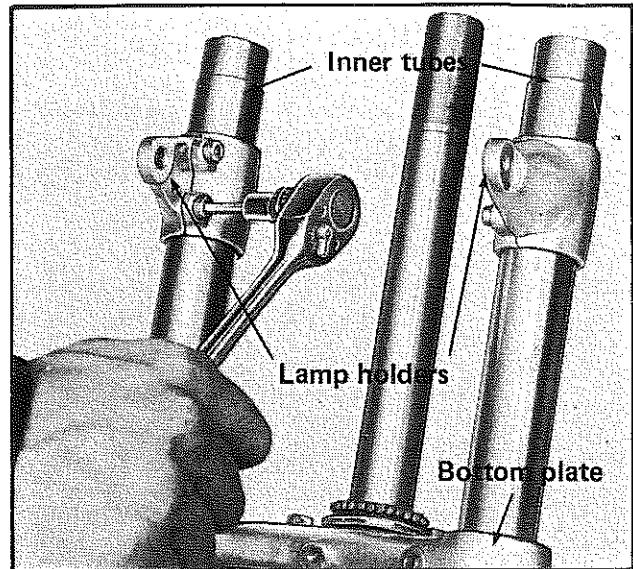
1-2-1-07

13. Using a soft faced hammer, gently tap the upper plate from inner tubes.
14. Remove spacer, threaded cone and front fork assembly from vehicle. (Fig. 1-2-1-08).



1-2-1-08

15. Slide off upper ball cage then using a soft faced hammer, gently tap off the upper and lower cups.
16. Loosen the two (2) Allen head screws of each lamp holder and remove the lamp holders from inner tubes. (Fig. 1-2-1-09).

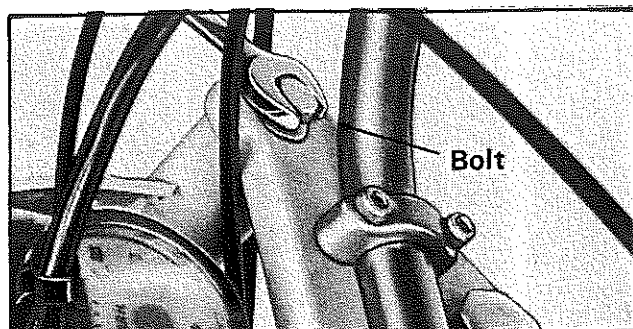


1-2-1-09

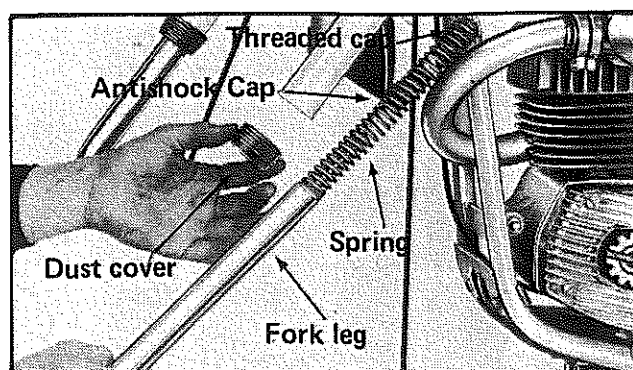
17. Slacken off the Allen head screws retaining the inner tubes to bottom plate and slide out each tube.
18. Invert the tubes to remove fork pistons.
19. Remove the snap rings from piston tubes and remove the piston bushings.
20. Remove front fender.
21. Note the position of the four (4) rubber spacers on "U" bracket and remove bracket.
22. Slacken off the center Allen screw retaining the bottom plate.
23. Observe the location of lock hole of center tube for reassembly procedure then using a press, push out the center tube from bottom plate. Remove lower cone and ball cage.

Bantam Models

1. Remove entire front wheel assembly as detailed in Section 1-1.
2. Remove the two (2) bolts and washers attaching fork legs to upper fork yoke. (Fig. 1-2-1-10). Remove fork legs, springs, threaded caps, antishock caps, and dust covers. (Fig. 1-2-1-11).

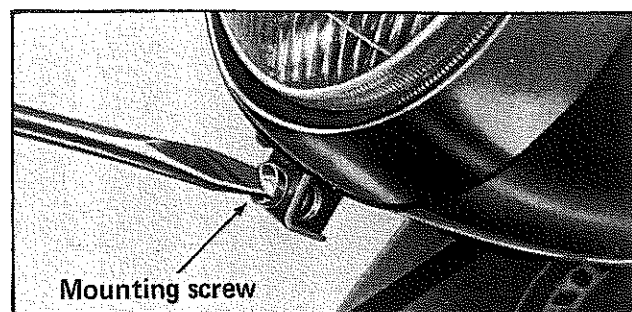


1-2-1-10



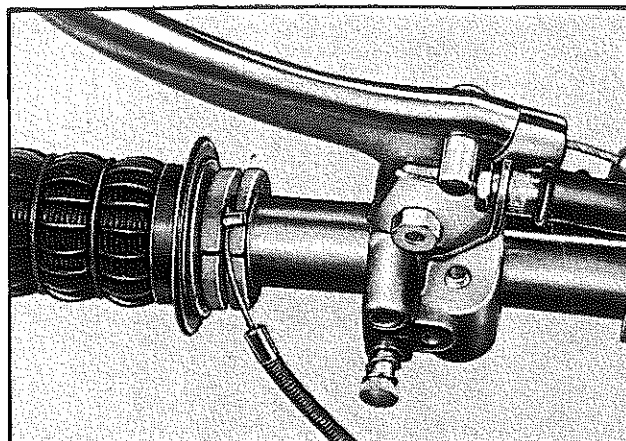
1-2-1-11

3. Completely unscrew headlamp mounting screw and pull out retaining ring and sealed beam. (Fig. 1-2-1-12). Disconnect receptacle housing and remove retaining ring assembly.



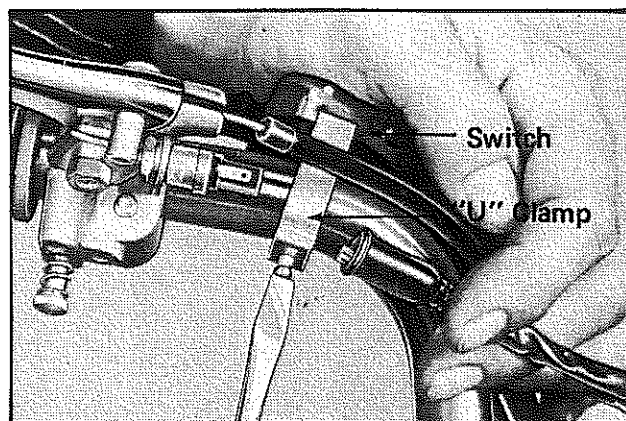
1-2-1-12

4. Remove receptacle from housing using a screwdriver blade. Disconnect indicator lamp wire.
5. Push out rubber grommet and pull out wiring harness from headlamp shell.
6. Remove two (2) bolts, washers and spacers retaining side reflector brackets. Remove headlamp.
7. Disconnect throttle cable (Fig. 1-2-1-13). Disconnect clutch cable at handlebar.
8. Disconnect stoplight switch wires at handlebar. Disconnect horn wires.



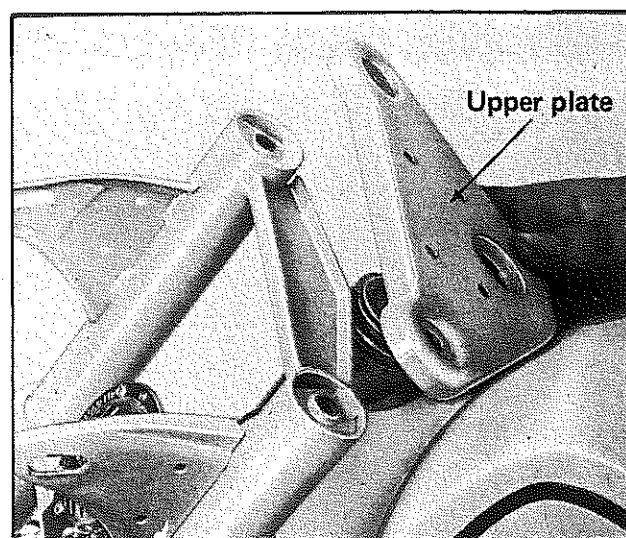
1-2-1-13

9. Remove switch assembly from handlebar by unscrewing lock screw located on "U" clamps. (Fig. 1-2-1-14).



1-2-1-14

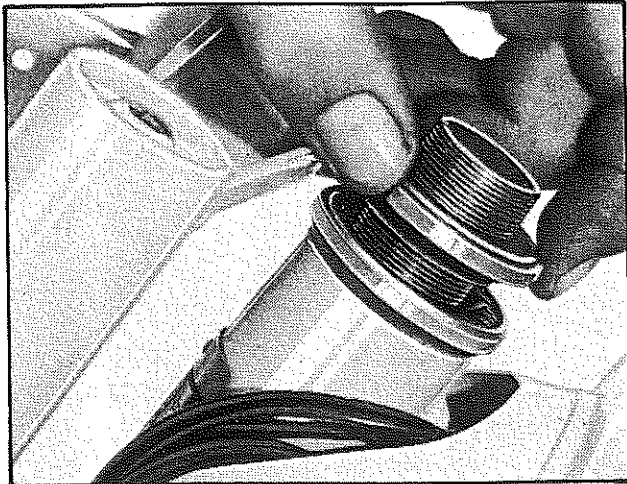
10. Remove the two (2) clamps securing handlebar to fork plate by unscrewing the (4) Allen head screws. Remove handlebar.
11. Remove pivot nut, washer and upper fork plate. (Fig. 1-2-1-15).



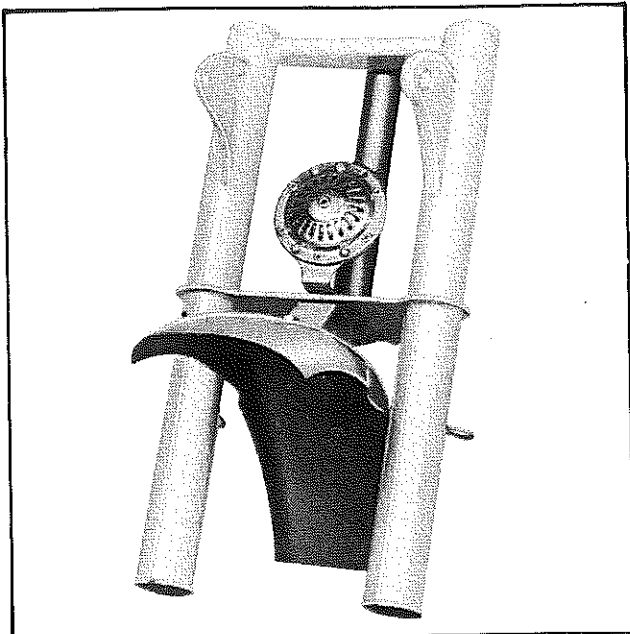
1-2-1-15

1-2-04

12. Remove threaded cone and upper ball cage. (Fig. 1-2-1-16). Remove fork assembly from vehicle (Fig. 1-2-1-17).



1-2-1-16



1-2-1-17

13. Remove lower ball cage from fork tube and using a suitable puller, pull off the lower cone.
14. Remove front fender and horn from fork assembly.
15. Using a soft faced hammer, push out upper and lower cups from frame yoke.

1-2-2 CLEANING

1. Discard all oil seals and "O" rings. These items must be replaced during assembly procedures.
2. Individually, clean each metal component using cleaning solvent. Dry using a clean cloth.

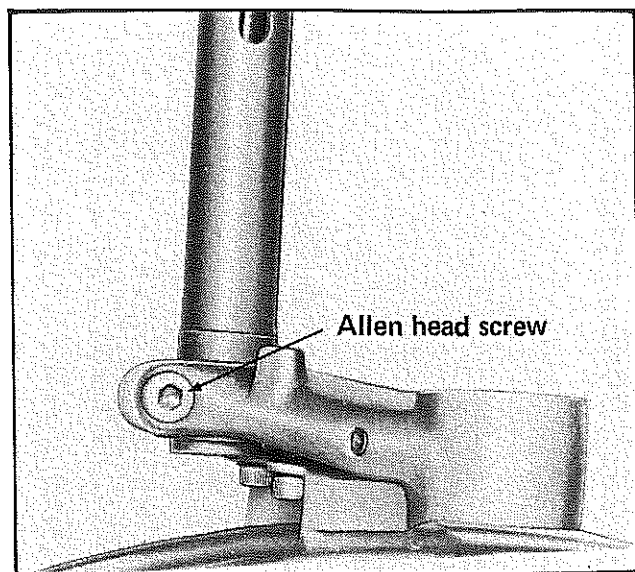
1-2-3 INSPECTION

1. Visually check all threaded parts for stripped, crossed or otherwise damaged threads. Use tap or die to repair damaged components.
2. Check fork legs for possible bends. With the leg positioned in a vee block, set up a dial indicator over the center of the leg. Rotate leg and check dial needle. If the needle indicates a deflection of more than .015 inch, use a press to return leg within specifications.

1-2-4 ASSEMBLY Junior Cross model

Prior to assembly, ensure that all parts have been cleaned or replaced. Lubricate ball cage with neutral grease.

1. Press center tube into bottom plate noting the location of the lock hole.
2. Tighten center Allen head screw of bottom plate. (Fig. 1-2-4-01).



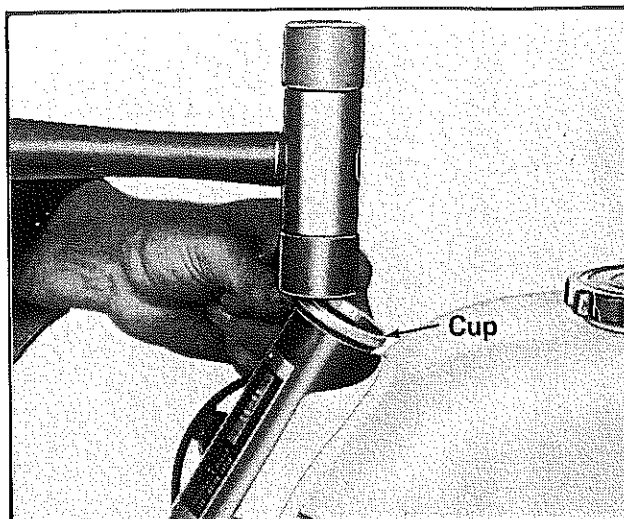
1-2-4-01

3. Heat lower cone in oil to 350° F then slide it down the center tube.

NOTE: Ensure the cone lip faces upward.

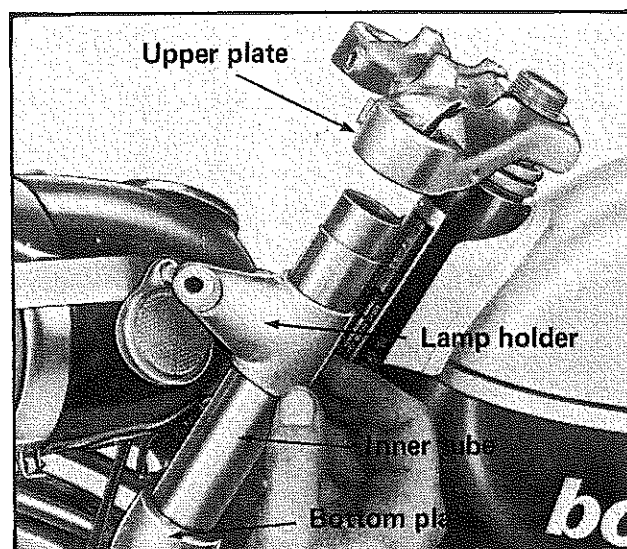
4. Install "U" bracket and front fender, ensuring that the four (4) rubber spacers are in position between the bracket and bottom plate.
5. Using a soft faced hammer, gently tap the upper and lower cups into the frame yoke. (Fig. 1-2-4-02).
6. Slide the lower ball cage onto center tube ensuring that the flat side of the cage is against the cup.
7. Slide the center tube into frame yoke. Position upper ball cage with the flat side of cage against upper cup and secure with threaded cone.

CAUTION: Tighten threaded cone only to eliminate free-play, otherwise overtightening will cause bearing damage.



1-2-4-02

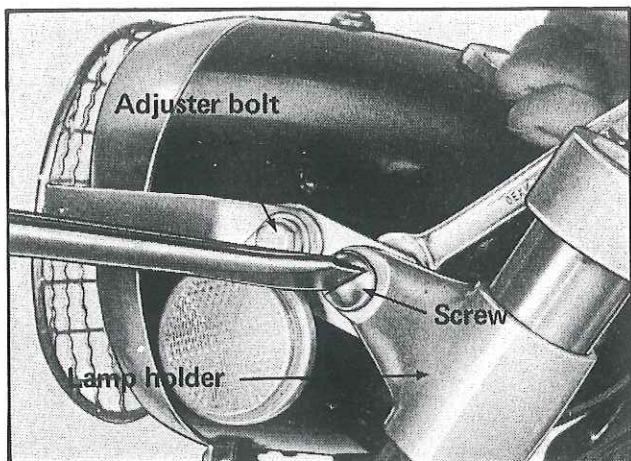
8. Position spacer and upper plate in location.
9. Slide the inner tubes through bottom plate, position lamp holders, and continue pushing inner tubes through upper plate. (Fig. 1-2-4-03).



1-2-4-03

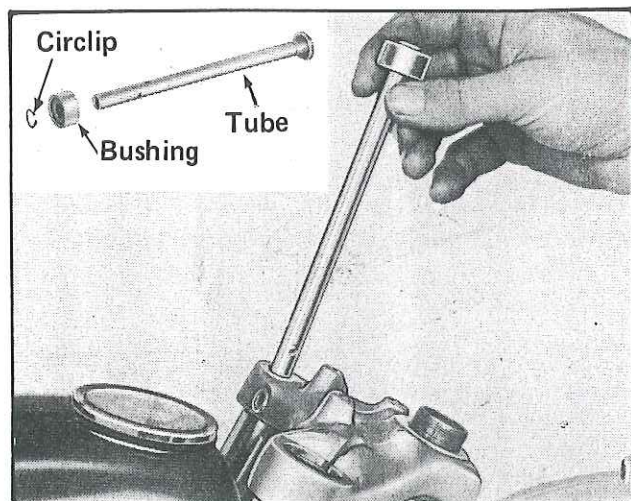
NOTE: Control cables and electrical wiring must pass between inner tubes and frame yoke.

10. Tighten the two (2) Allen head screws of the upper plate.
11. Install horn.
12. Secure headlamp to lamp holders. (Fig. 1-2-4-04). Loosen the two (2) adjusting bolts and tilt the headlamp down.
13. Tighten the four (4) Allen head screws of holders. Reset headlamp and retighten adjuster bolts.



1-2-4-04

14. Position piston bushing on piston tube and lock with the circlip. Slide the piston assembly, tube down, into inner tubes. (Fig. 1-2-4-05).



1-2-4-05

15. Insert the piston springs into the inner tubes. Ensure the close coil end of the spring is nearest upper plate. (Fig. 1-2-4-06).

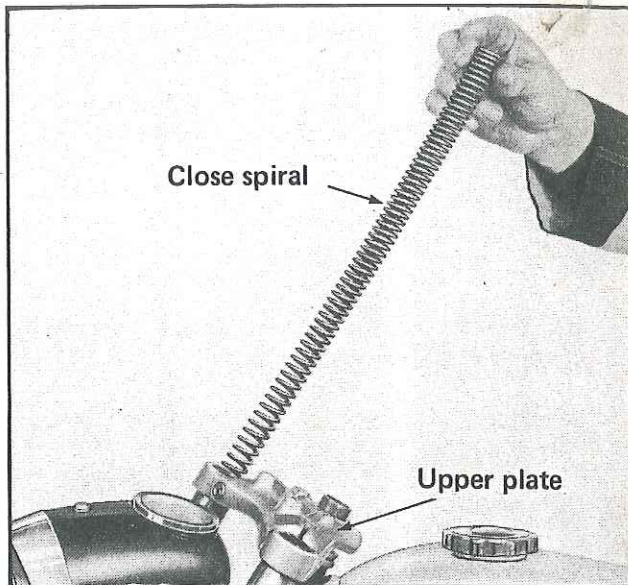
16. Press in new oil seals into sliders and secure using snap rings.

NOTE: Oil seals must be installed to position JUST below circlip groove. If they are bottomed fork re-assembly will be difficult.

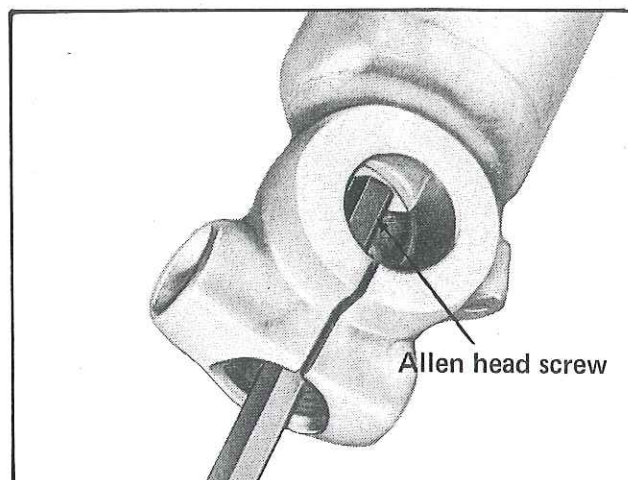
17. Press the dust covers on inner tubes. Position spacers.

18. While holding the inner tube spring in location, slip the slider onto bottom of inner tube. Secure slider with appropriate Allen head screw. (Fig. 1-2-4-07). Pull slider downward. Repeat procedure for other slider.

19. Install front wheel as detailed in Section 1-1.



1-2-4-06



1-2-4-07

20. Install oil drain screws into bottom of each slider.

21. Pour 135 cubic centimeters or 4.5 ounces of SAE 30 non foamant oil into each inner tube. Position washers and fully tighten the screw stoppers on the tubes. (Fig. 1-2-4-08).



1-2-4-08

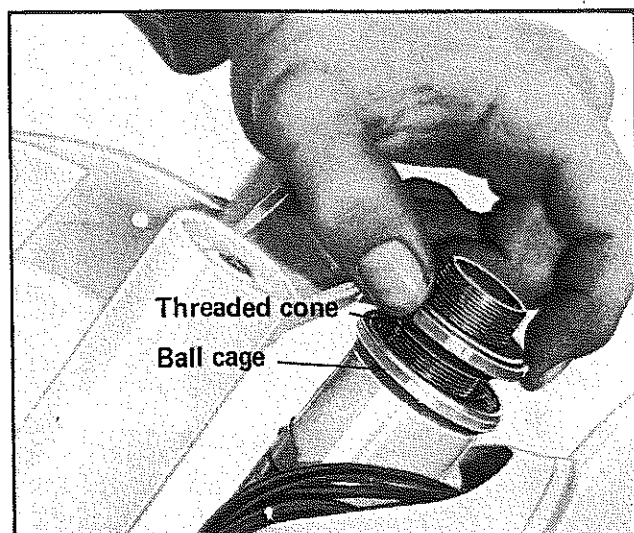
22. Position handlebar in location, ensuring the bracket faces the fuel tank. Temporarily, tighten the pivot nut and using the clamp and four (4) Allen head screws, firmly affix handlebar in location.

NOTE: Concave side of clamp must face fuel tank.

23. Torque the pivot nut to 26 ft/lbs.

Bantam Models

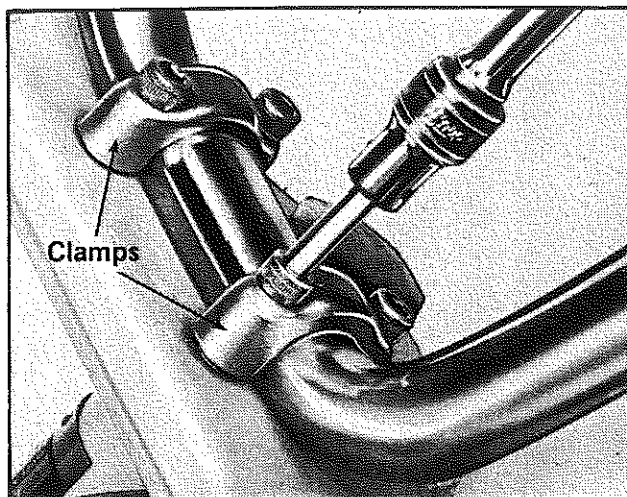
1. Prior to assembly, ensure that all parts have been cleaned and that all damaged parts have been repaired or replaced. The ball cage, the fork legs and the springs should be lubricated with neutral grease.
2. Using a soft face hammer, install the two (2) cups into frame yoke.
3. Press lower cone onto front fork tube and install the ball cage on the cone with the flat face against cup.
4. Insert fork tube into frame yoke and install ball cage with the flat face against cup. Screw threaded cone on fork tube (Fig. 1-2-4-09).



1-2-4-09

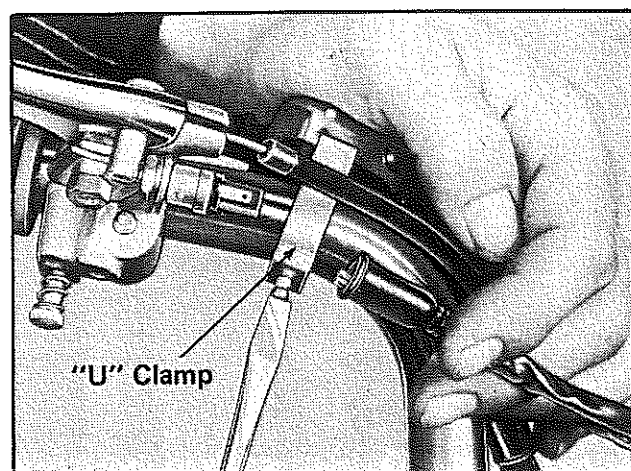
CAUTION: Tighten threaded cone only to eliminate free-play otherwise overtightening will cause bearing damage.

5. Install upper plate, washer and pivot nut. Torque pivot nut to 26 ft/lbs.
6. Position handlebar on upper plate and secure using two (2) clamps and four (4) Allen head screws. (Fig. 1-2-4-10).



1-2-4-10

7. Install horn with two (2) bolts, washers and nuts.
8. Place headlamp shell in position and secure using two (2) spacers, washers, side reflectors complete with bracket plates and bolts.
9. Install switch assembly on handlebar and secure by tightening lock screw on "U" clamp. (Fig. 1-2-4-11).



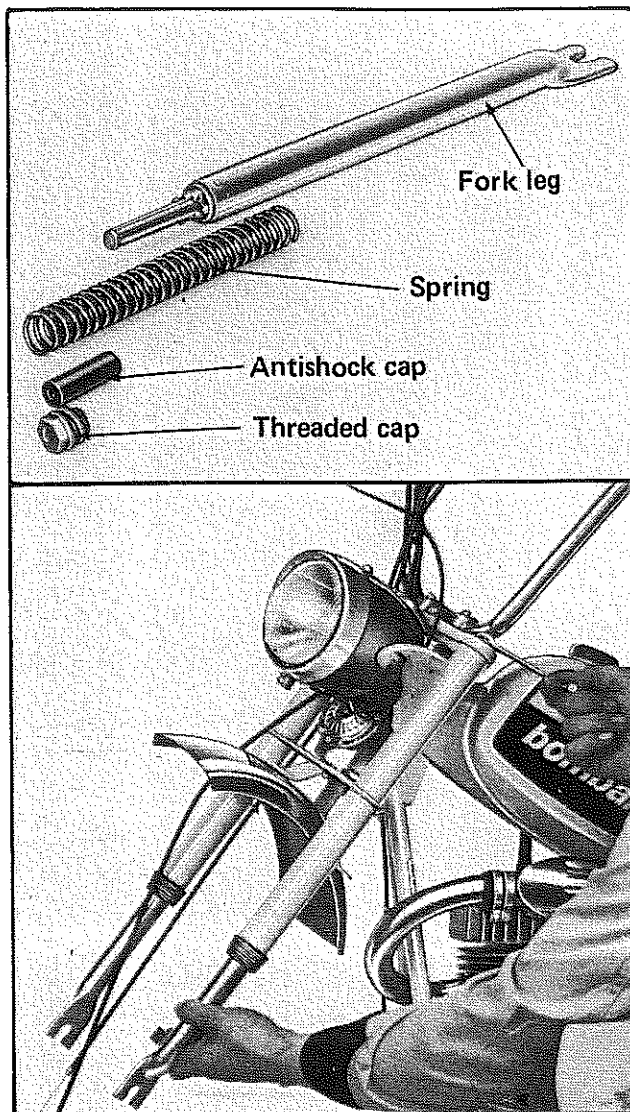
1-2-4-11

CAUTION: Be careful not to squeeze wires between switch body and handlebar.

10. Connect the blue wires to stoplight switch and the red and green wires to horn.
11. Insert wiring harness into hole of headlamp shell and insert rubber grommet.
12. Connect single white wire to indicator lamp terminal.
13. Spread open the locking tabs on receptacles then insert them into the slots marked "M" and "A" on the receptacle housing.

1-2-08

14. Connect receptacle housing to sealed beam terminals and install retaining ring with sealed beam on headlamp shell. Secure with mounting screw.
15. Pass throttle and clutch cables between headlamp shell and fork assembly and connect them to respective handlebar levers.
16. Screw spring on fork leg, slide on the antishock caps and screw on the threaded caps. (Fig. 1-2-4-12).



1-2-4-12

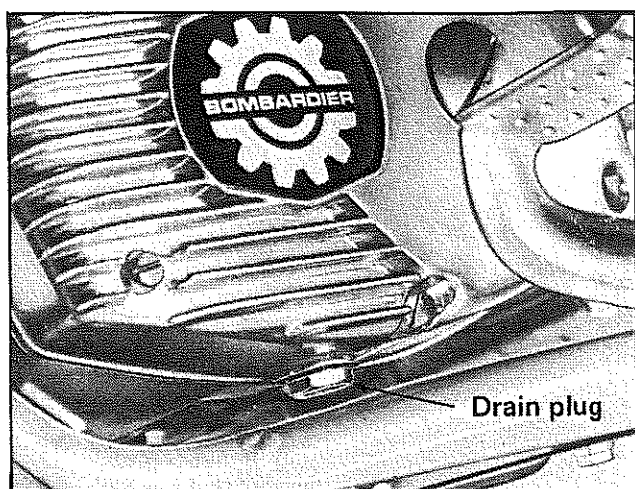
17. Install dust covers on fork and insert fork legs complete with springs, antishock caps and threaded caps into fork. Secure with two (2) bolts and washers inserted from upper plate.
18. Install front wheel as detailed in Section 1-1.

2-1 ENGINE AND TRANSMISSION

2-1-1 REMOVAL

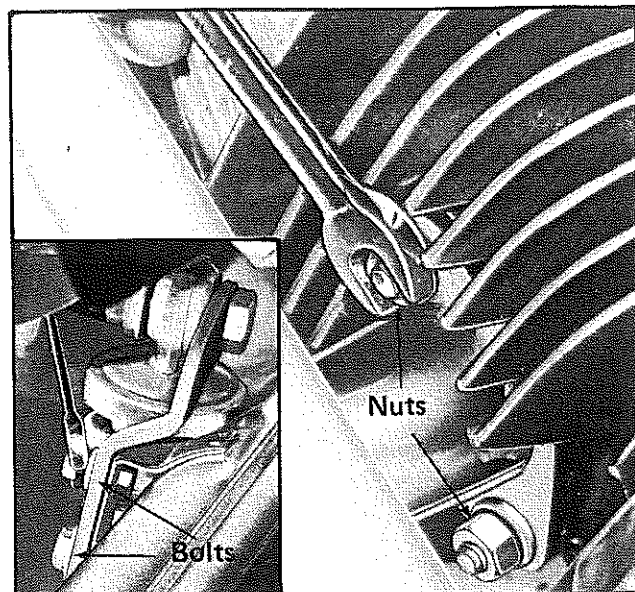
IMPORTANT: During engine and transmission removal and disassembly procedures, retain all attaching parts, screws, bolts, washers, nuts, etc. with the removed or disassembled components.

1. If possible, run the engine for 2-3 minutes until warm. Remove drain plug located at the crankcase base and drain the transmission oil. (Fig. 2-1-1-01).



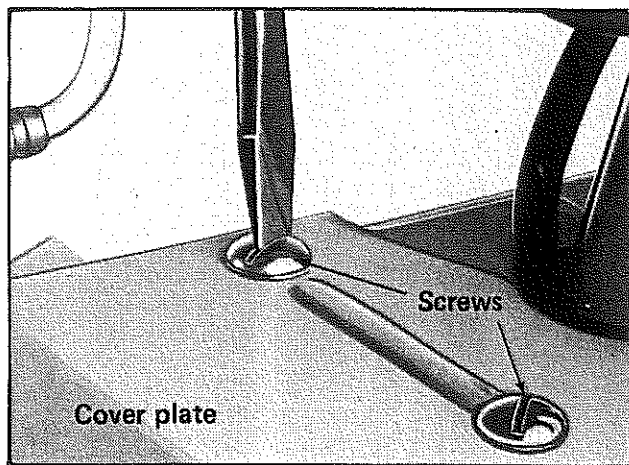
2-1-1-01

2. Remove the nuts and bolts attaching the muffler assembly to cylinder and frame. Remove muffler assembly and gasket. (Fig. 2-1-1-02).



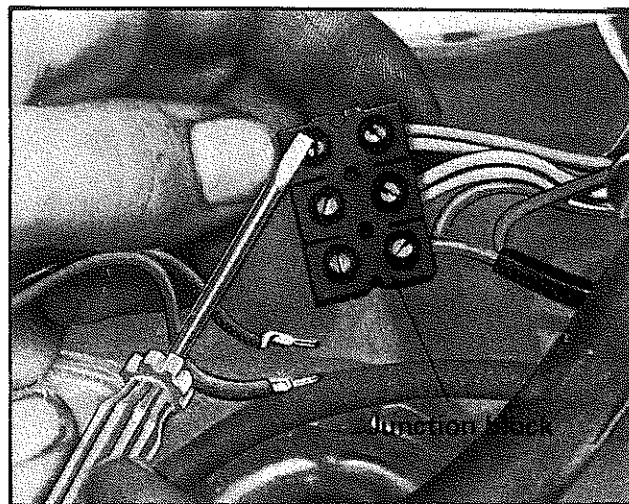
2-1-1-02

3. Disconnect spark plug wire from plug terminal. Unscrew air filter.
4. Remove the two (2) screws holding the cover plate and remove the cover. (Fig. 2-1-1-03).



2-1-1-03

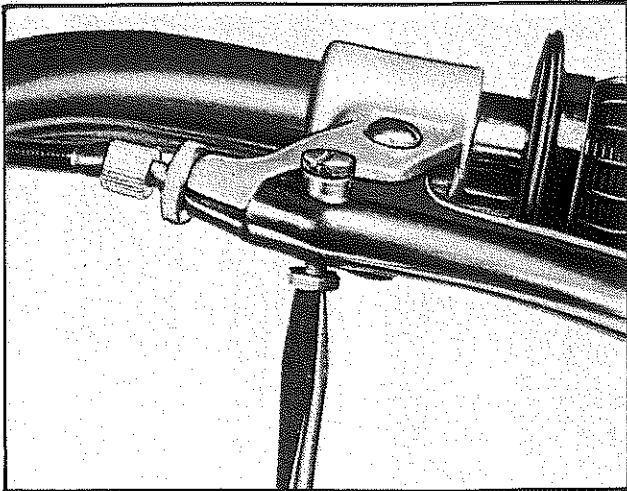
5. Disconnect electrical wires at junction block (Fig. 2-1-1-04).



2-1-1-04

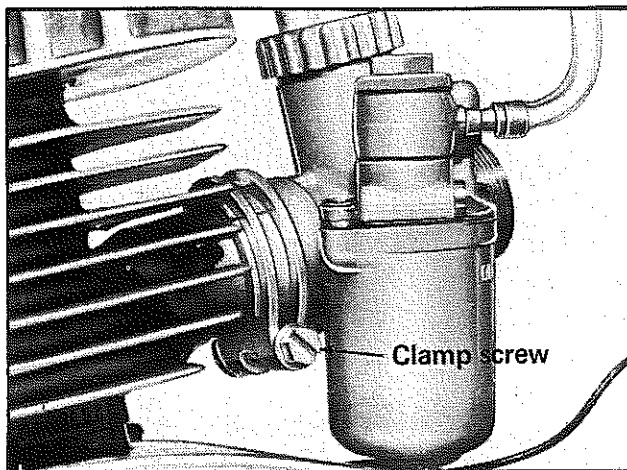
6. Remove kickstarter pedal.
7. On Junior Cross models; Disconnect clutch cable from **lower** clutch lever.

On Bantam models; Disconnect clutch cable from **upper** clutch lever. (Fig. 2-1-1-05).
8. Pull cable and housing from beneath the engine.



2-1-1-05

9. Slacken off the Allen head screw retaining the gear shift pedal to shaft and remove the pedal.
10. Remove three (3) screws attaching right-hand cover and remove cover.
11. Using long nose pliers, remove locking clip from drive chain. Remove outer link and link pin. Lift drive chain from drive sprocket.
12. Slacken off the carburetor manifold clamp screw and carefully pull the carburetor body from the intake manifold (Fig. 2-1-1-06).



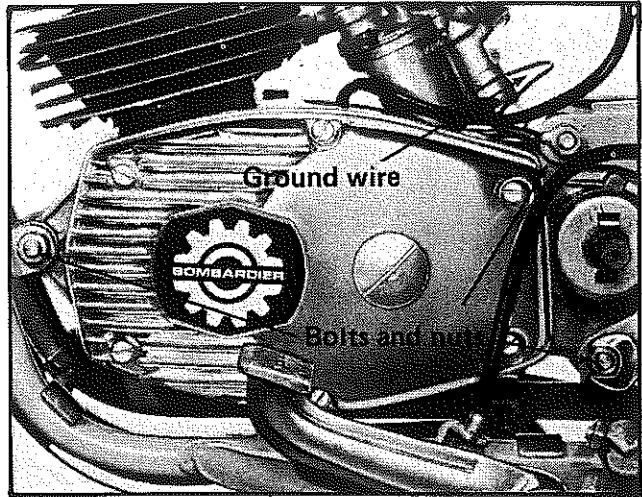
2-1-1-06

13. Remove the three (3) bolts and nuts securing engine assembly to vehicle frame. (Fig. 2-1-1-07).

NOTE: The ground wire is attached to one of these bolts.

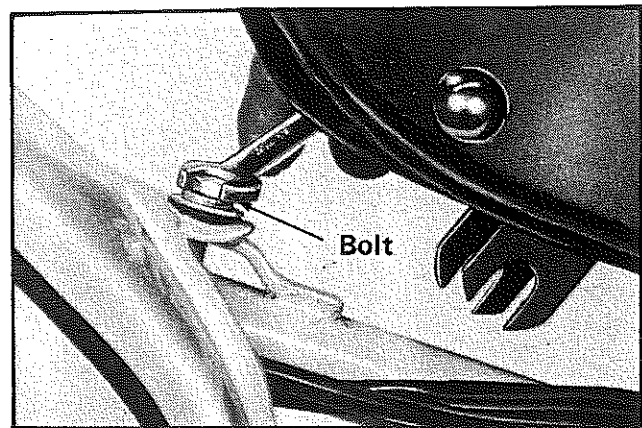
14. Bantam Cross model only,

- a) Slacken off the bolt securing seat to frame.



2-1-1-07

- b) Remove bolt securing rear of gas tank to frame. (Fig. 2-1-1-08).



2-1-1-08

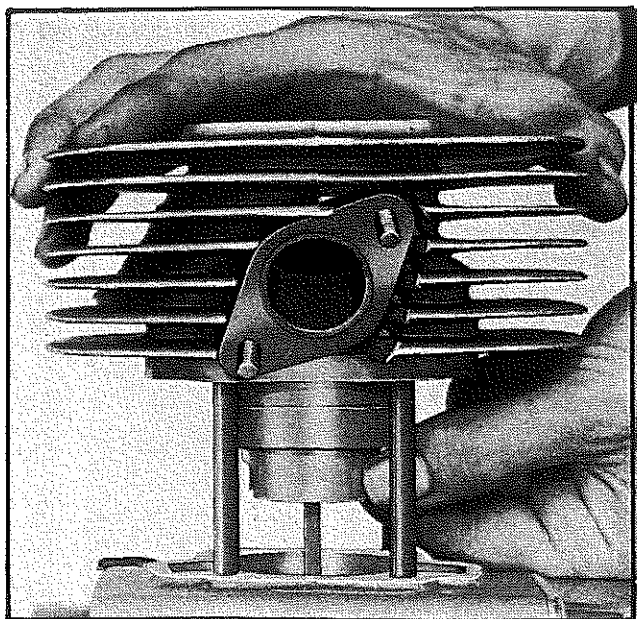
- c) Slacken off two (2) front bolts securing gas tank to frame.

NOTE: The seat and gas tank should be tilted up for engine removal.

15. Lift engine assembly from frame cradle and place it on a clean worktable.

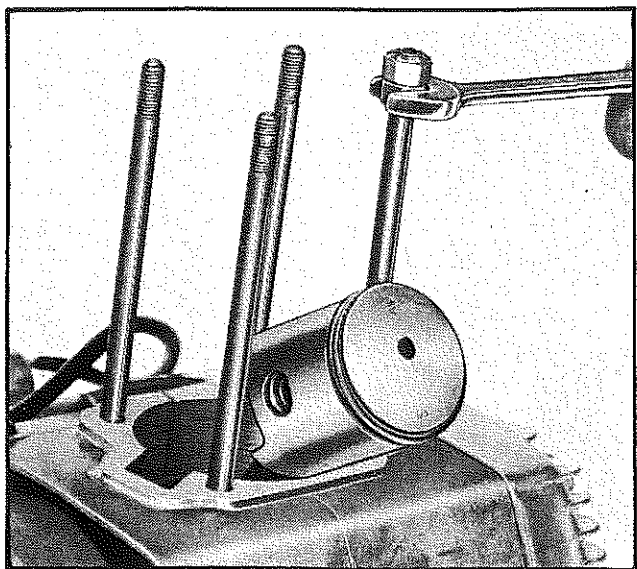
2-1-2 DISASSEMBLY

1. Using a cross-sequence pattern, remove the four (4) cylinder head nuts and washers. Remove cylinder head.
2. Unscrew intake manifold nuts and remove the manifold and gasket.
3. Carefully lift the cylinder from the crankcase. While lifting cylinder, hold piston to avoid damage to piston on studs. (Fig. 2-1-2-01).
4. Remove and discard the cylinder flange gasket.



2-1-2-01

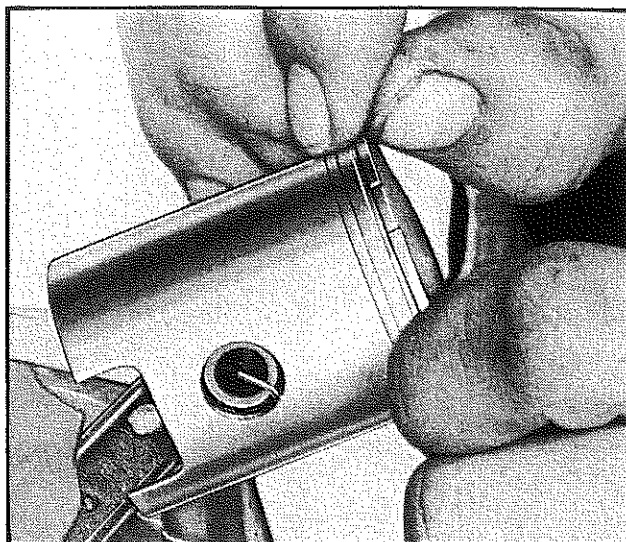
5. Using two (2) of the previously removed head nuts, unscrew the four (4) crankcase studs. (Fig. 2-1-2-02).



2-1-2-02

6. Place a clean, dry cloth over the crankcase allowing only the connecting rod and piston to be exposed. The cloth will prevent foreign matter and/or small components falling into crankcase.
7. Gently spread open the piston rings until they can be slid from the piston grooves. (Fig. 2-1-2-03).

CAUTION: Do not spread open the rings too far apart as breakage can occur. Do not twist rings.



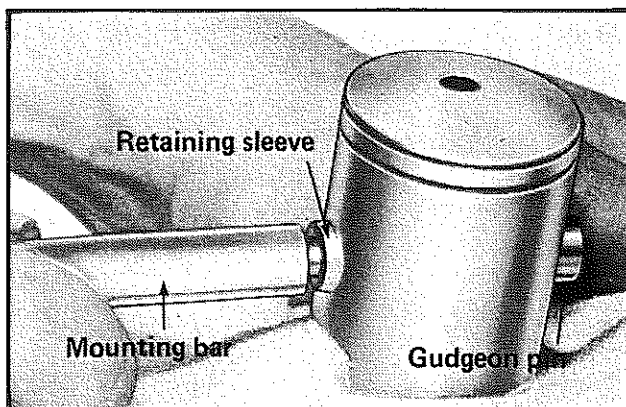
2-1-2-03

8. Using long nose pliers remove the circlips from the piston (Fig. 2-1-2-04).



2-1-2-04

9. Using the mounting bar and retaining sleeve (Section 2-4 Item 1), carefully drive the gudgeon pin through the piston. Once the gudgeon pin is sufficiently disengaged from the connecting rod, remove mounting bar and lift off the piston (Fig. 2-1-2-05).

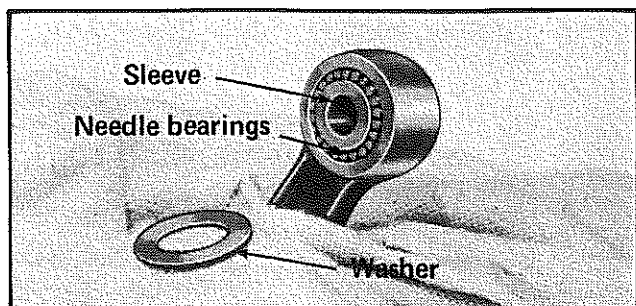


2-1-2-05

2-1-04

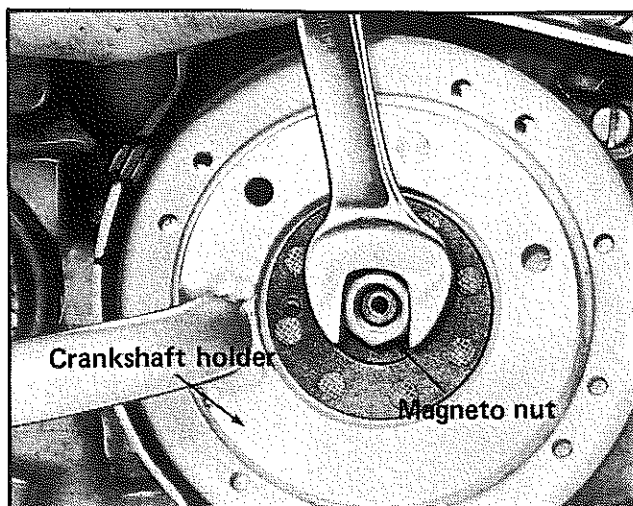
CAUTION: Take extreme care that the mounting bar does not dislodge the needle bearings in the connecting rod.

10. Remove sleeve, needle bearings and washers from connecting rod (Fig. 2-1-2-06).



2-1-2-06

11. Position the crankshaft holder (Item 2) on magneto and unscrew magneto nut. Remove spring washer (Fig. 2-1-2-07).



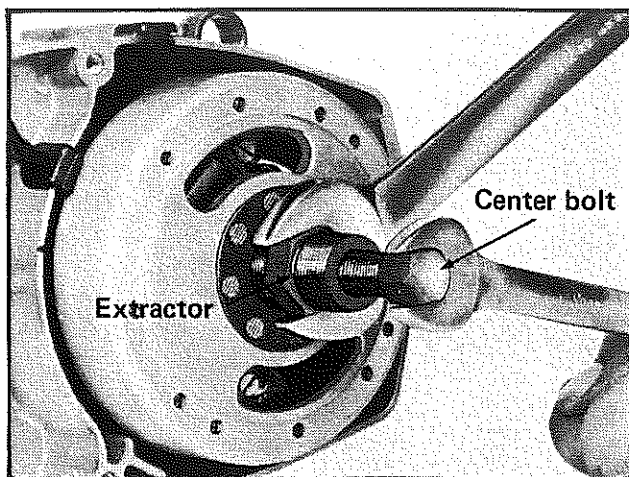
2-1-2-07

12. Lightly grease the external threads of the extractor bolt and the threads of the center bolt.

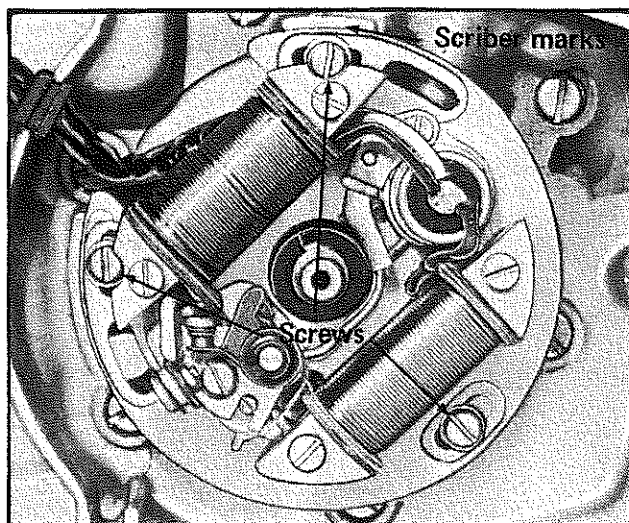
13. Firmly screw the extractor (Item 3) onto the magneto threads then turn the centre bolt of the extractor in a clockwise direction to pull the magneto off the taper (Fig. 2-1-2-08).

CAUTION: Do not place the magneto on a bare or metal surface as dirt and/or metal particles can affect the magneto efficiency.

14. Scribe across the top of the armature plate and the crankcase boss, in order to facilitate re-timing on assembly. Remove the three (3) screws holding armature plate to crankcase. Remove armature plate (Fig. 2-1-2-09).

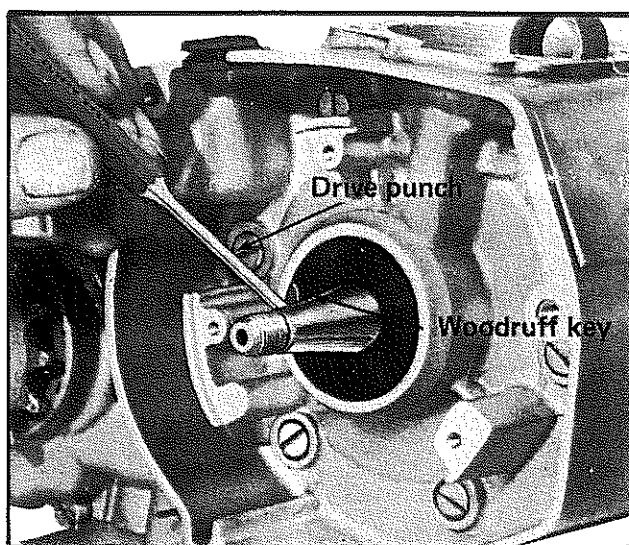


2-1-2-08



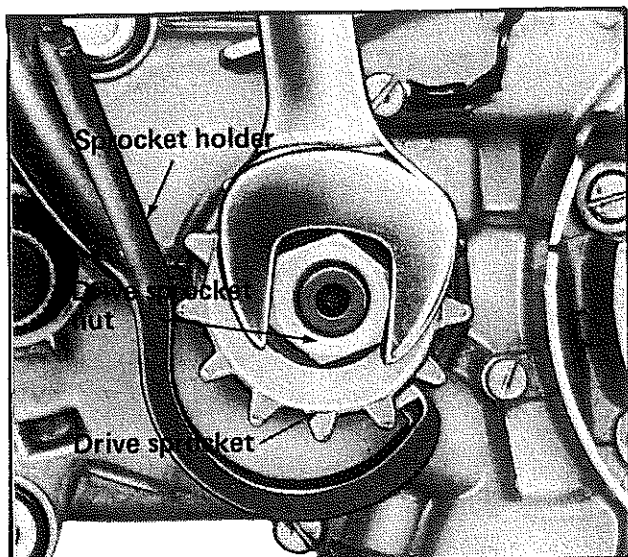
2-1-2-09

15. Using a drive punch and a soft faced hammer, gently tap out woodruff key from crankshaft (Fig. 2-1-2-10).



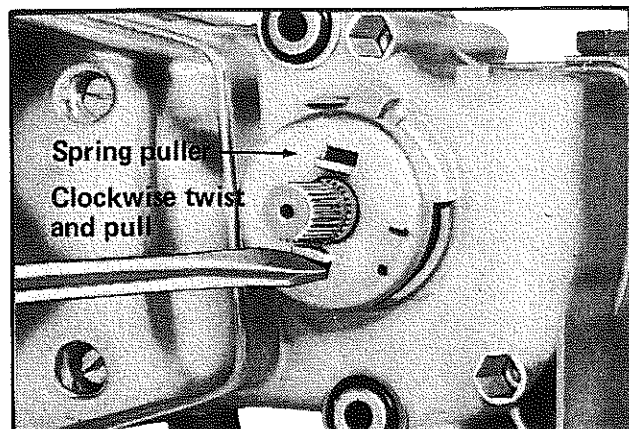
2-1-2-10

16. Using a sprocket holder (Item 4) and wrench, remove the drive sprocket nut (Fig. 2-1-2-11).



2-1-2-11

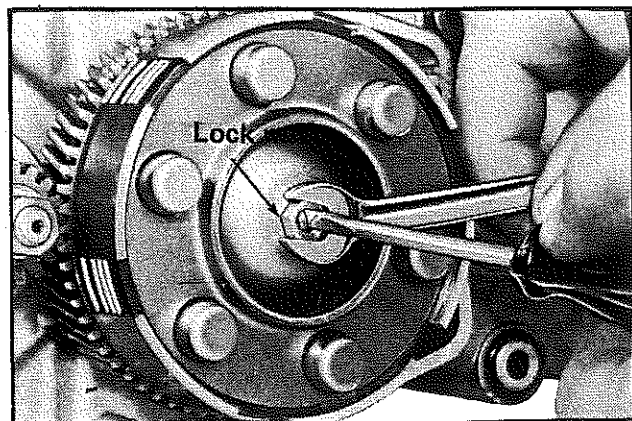
17. Using a screwdriver, remove spring puller, bushing and spring. Remove washer. (Fig. 2-1-2-12).



2-1-2-12

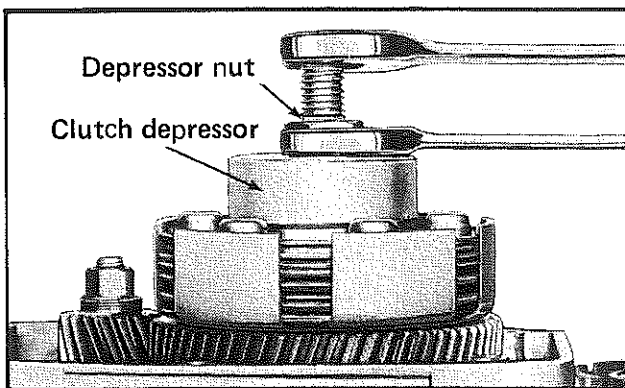
18. Remove the six (6) screws attaching left side cover and remove the cover from crankcase. Discard cover gasket.

19. Remove the clutch adjusting screw lock nut (Fig. 2-1-2-13).



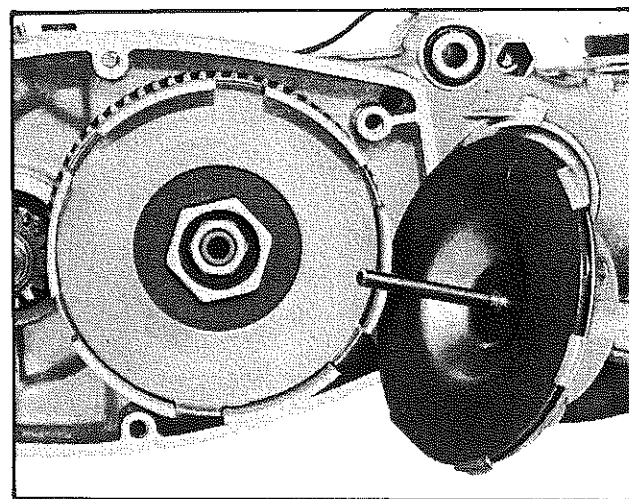
2-1-2-13

20. Screw the clutch depressor (Item 5) onto the clutch adjusting screw and tighten the depressor nut until spring plate is disengaged (Fig. 2-1-2-14). Once the spring plate is sufficiently disengaged from retaining ring, use a pair of pliers and remove the ring.



2-1-2-14

21. Remove clutch disc, spring plate, spring cap, spring clutch disc and adjusting screw. (Fig. 2-1-2-15).



2-1-2-15

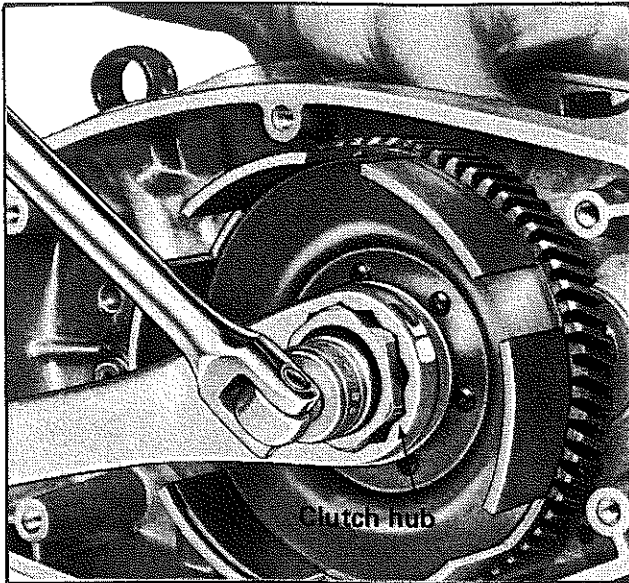
22. Remove depressor.

23. Remove the drive and driven discs from driven gear.

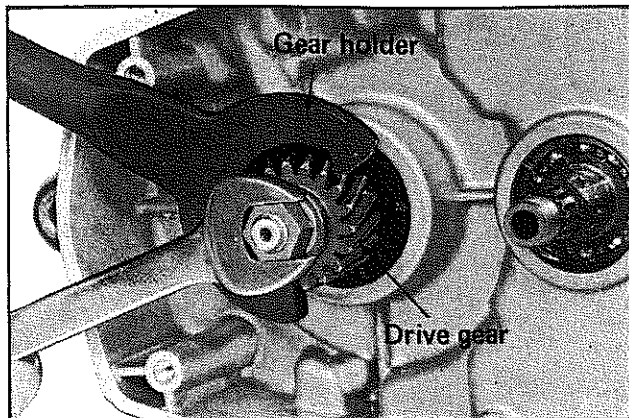
24. Using a 30mm. wrench to hold the clutch hub, unscrew the 17mm. clutch hub lock nut. Remove washer, shim, clutch hub and shim(s) (Fig. 2-1-2-16).

25. Pull the driven gear from the shaft. If applicable, remove shim(s).

26. Using a gear holder (Item 6) hold drive gear and remove nut and spring washer. (Fig. 2-1-2-17).

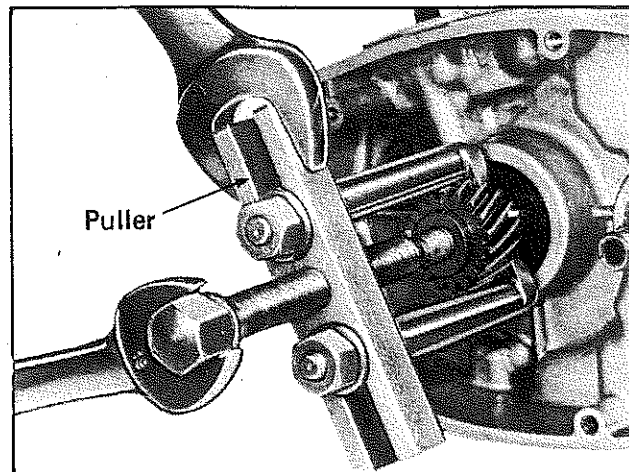


2-1-2-16



2-1-2-17

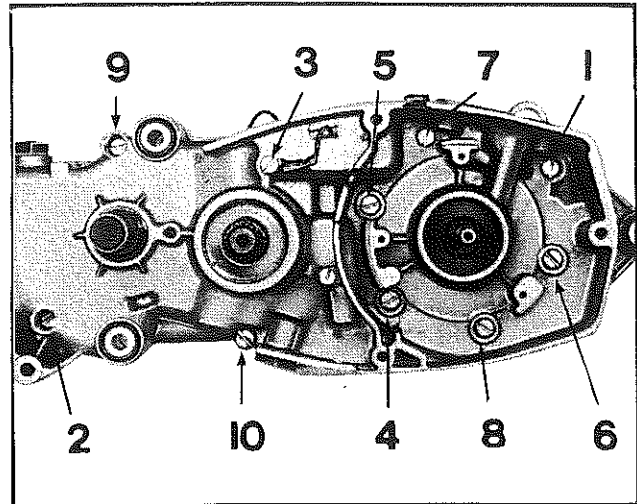
27. Using puller (Item 7) remove drive gear. (Fig. 2-1-2-18).



2-1-2-18

28. Tilt crankcase on left side. Remove ball and clutch pin from primary shaft.

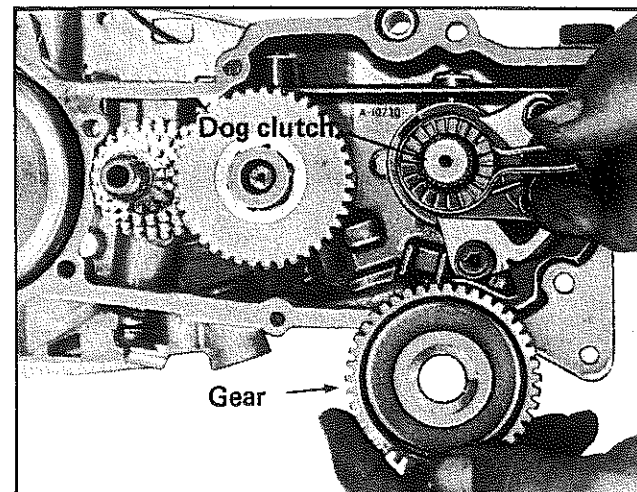
29. From right side, remove screws securing crankcase halves (Fig. 2-1-2-19).



2-1-2-19

30. With a soft faced hammer, tap gently on the crankshaft and primary shaft until crankcase separates.

31. Remove gear, dog clutch and washer from shifter shaft (Fig. 2-1-2-20).



2-1-2-20

32. Pull out kickstarter shaft and remove washer.

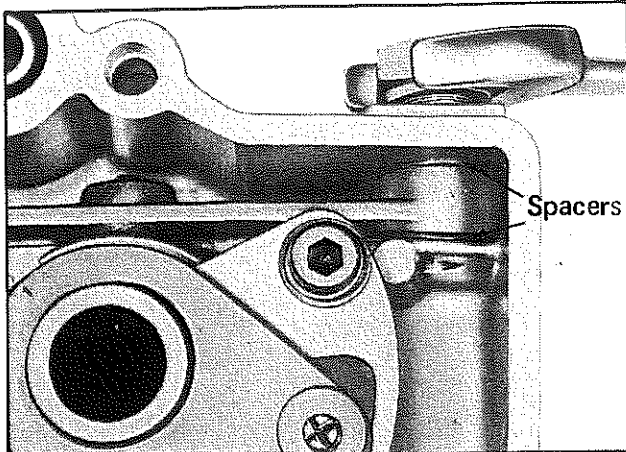
33. Remove pedal spring.

34. Unscrew the selector fork pivot screw, observing the position of the two (2) spacers. (Fig. 2-1-2-21).

35. Disengage and remove selector fork from guide ring by turning it clockwise one half turn.

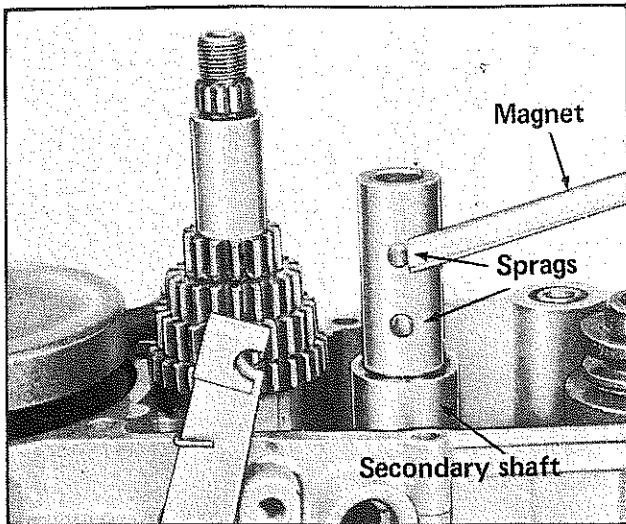
36. Remove the selector fork circlip and remove the gear control fork.

37. While observing shim(s) positioning, individually remove the secondary gears.



2-1-2-21

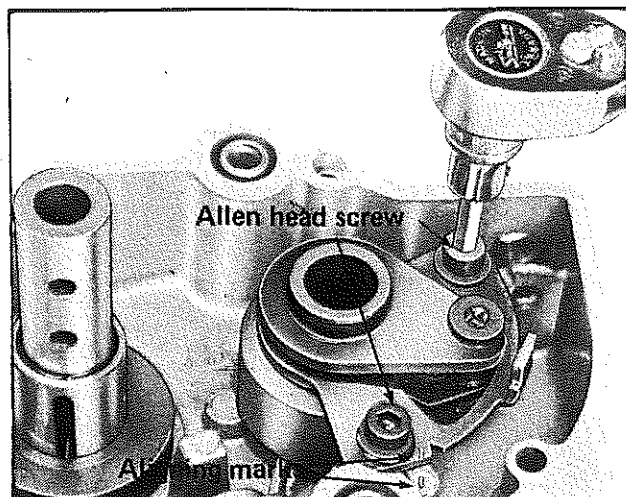
38. Using a magnet, remove the nine (9) sprags from secondary shaft (Fig. 2-1-2-22).



2-1-2-22

39. Pull out primary shaft and remove spacer.

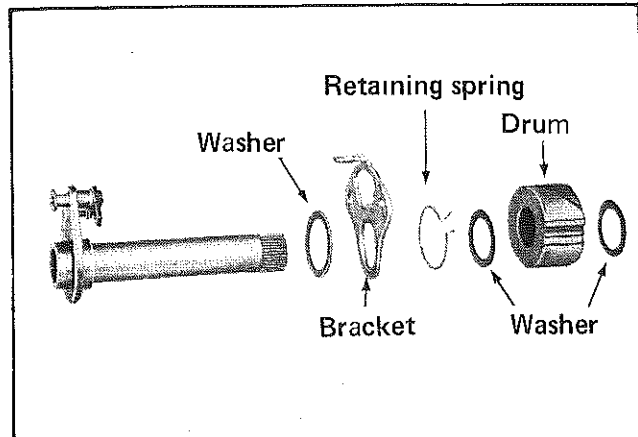
40. Remove two (2) Allen head screws holding bracket (Fig. 2-1-2-23). Observe installation mark and remove anchor bracket.



2-1-2-23

Disassemble as follows:

a) Remove drum and washers. (Fig. 2-1-2-24).



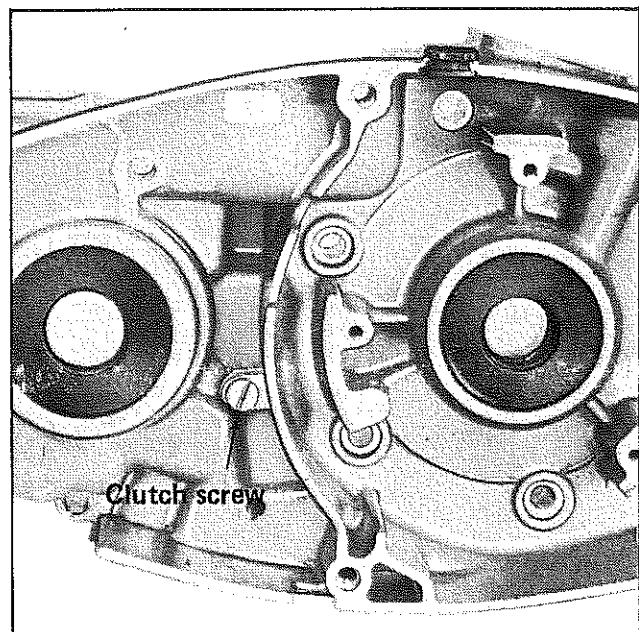
2-1-2-24

b) Note position of retaining spring then remove it.

c) Remove bracket and washer.

41. Using a soft faced hammer, remove secondary shaft by tapping gently on threaded end of shaft.

42. Remove the screw securing clutch lever, unhook the spring and pull out the lever. (Fig. 2-1-2-25).



2-1-2-25

43. Press out the anti-vibration bushing and spacer.

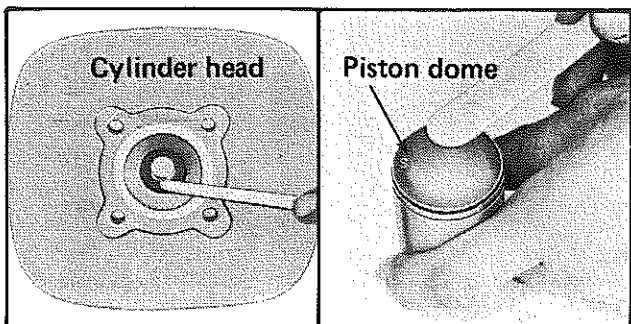
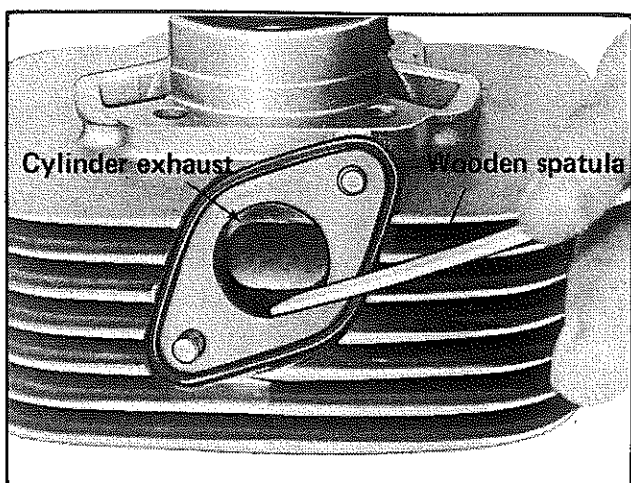
44. To remove bearings or bushings from crankcase, carefully pry out from crankcase halves.

2-1-3 CLEANING

1. Discard all oil seals, gaskets and "O" ring. These items must be replaced during Assembly procedures.
2. Individually, clean each metal component using cleaning solvent. Dry using a clean cloth.

CAUTION: Do not use cleaning solvent on armature plate. If necessary clean plate using a clean, dry cloth.

3. Using a wooden spatula, scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome. (Fig. 2-1-3-01).



2-1-3-01

NOTE: The letter "S" on exhaust side of the piston dome must be visible after cleaning.

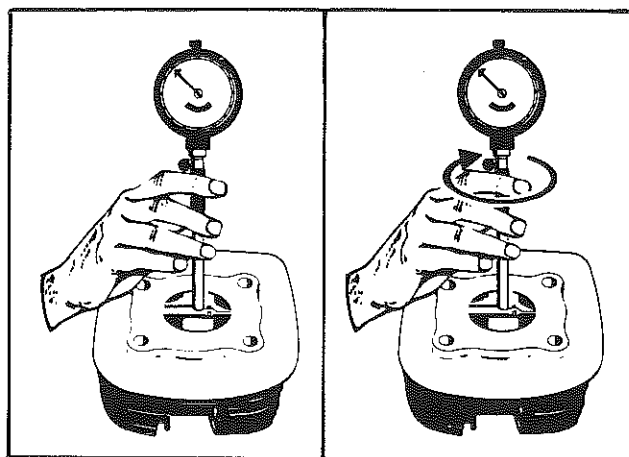
4. Clean the ring grooves of the piston using a "piston groove cleaner tool", or a broken ring.
5. Remove any other deposits on all other components using a soft bristle brush.

CAUTION: Never use a sharp object for cleaning purposes. Incurred score marks are detri-

mental towards re-assembly and engine operation.

2-1-4 INSPECTION

1. Visually inspect all threaded parts for stripped, crossed or otherwise damaged threads. Use tap or die to repair damaged components.
2. Check the cylinder for the following:
 - a) **WEAR:** Measuring 1/2 inch below the top of cylinder, check if cylinder bore is worn more than .002 inch above nominal dimension. Should bore exceed specifications, the cylinder should be replaced (Fig. 2-1-4-01).
 - b) **OUT OF ROUND:** Measuring 1/2 inch below the top of cylinder, check if the cylinder bore is out of round more than .001 inch. If the out of round exceeds this tolerance, the piston, cylinder and rings must be replaced (Fig. 2-1-4-02).



2-1-4-01

2-1-4-02

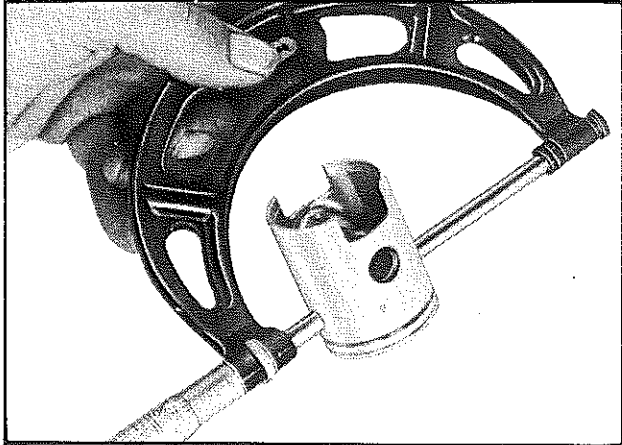
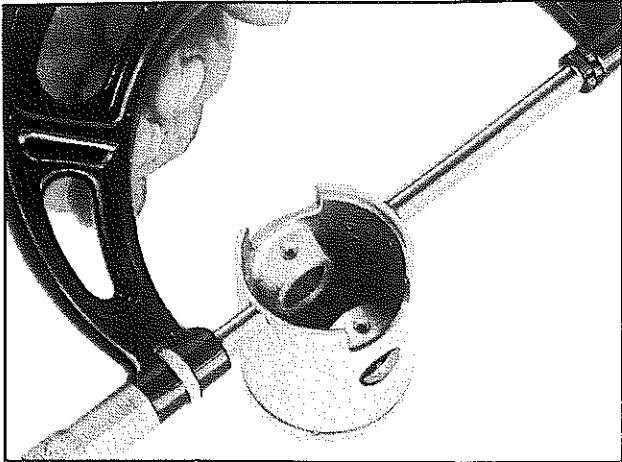
- c) **CYLINDER TAPER:** When measuring vertically 1/2 inch from top of cylinder to 1/2 inch from bottom of the cylinder, the difference should not exceed .001 inch. If so, replace cylinder.

NOMINAL VALUES

White 1.5748 to 1.5750
 Yellow 1.5750 to 1.5752
 Red 1.5752 to 1.5754
 Green 1.5754 to 1.5756

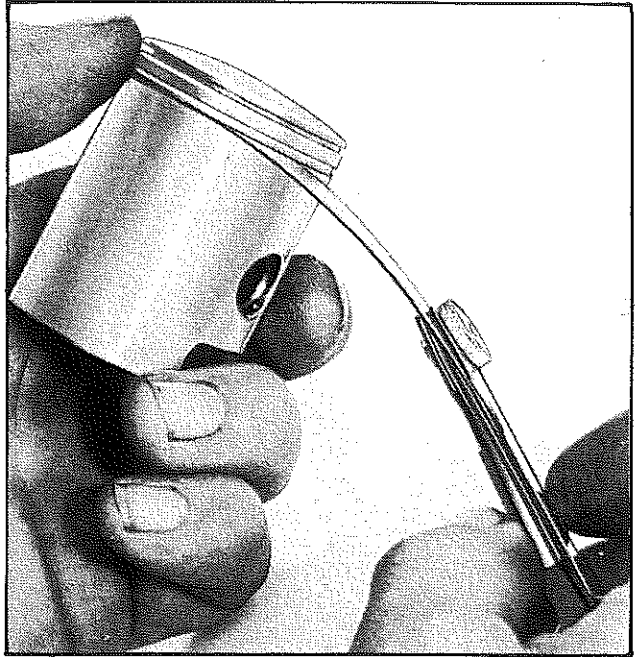
3. Check piston to cylinder wall clearance by first checking the cylinder bore as mentioned above then checking the piston diameter at two (2) points, 3/32 inch and 1-5/8 inch from

bottom of piston skirt. Subtract piston diameters from cylinder bore (Fig. 2-1-4-03). Cylinder wall clearance must not exceed the following: Wear limit at 3/32 inch from bottom — .0056 inch. At 1-5/8 inches from bottom — .0070 inch.

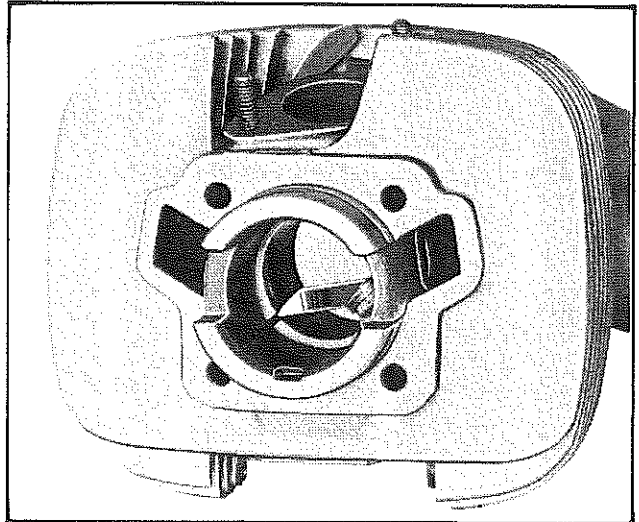


2-1-4-03

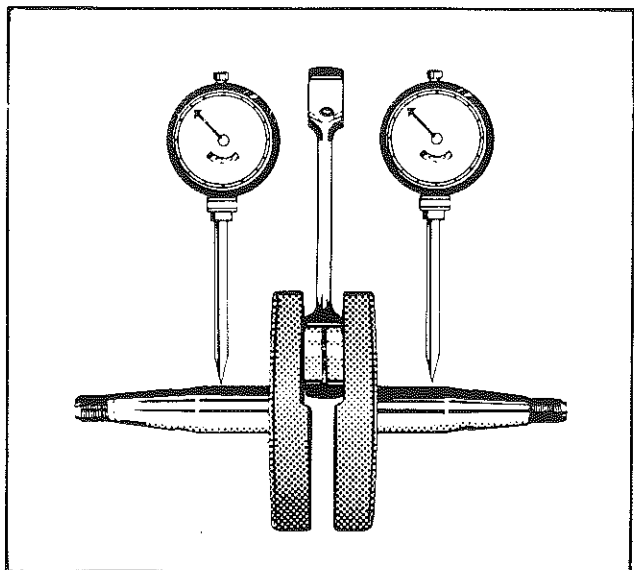
4. Check vertical clearance of piston ring in piston ring groove. The minimum clearance must not be under .001 inch and not over .0015 inch. To do this insert a feeler gauge blade between piston ring and piston groove. (Fig. 2-1-4-04).
5. Check ring end gap. Place ring in cylinder half way between transfer port and intake port. Using a feeler gauge, measure clearance between ring ends. The ring end gap tolerance is .003 inch to .019 inch. If over, replace ring (Fig. 2-1-4-05).
6. Check crankshaft deflection as follows: With the crankshaft positioned on a centre lathe, place a dial indicator on crankshaft at a point closest to the crankshaft blades. (Fig. 2-1-4-06). Rotate crankshaft. Crankshaft deflection should not exceed .001 inch.



2-1-4-04



2-1-4-05

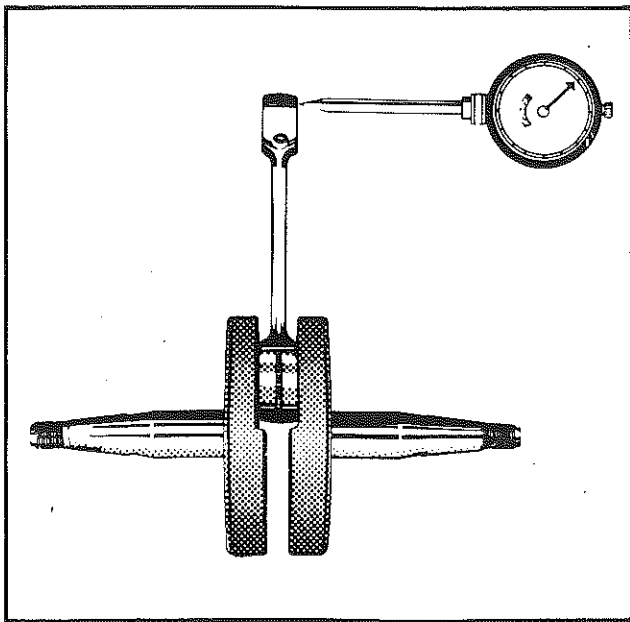


2-1-4-06

2-1-10

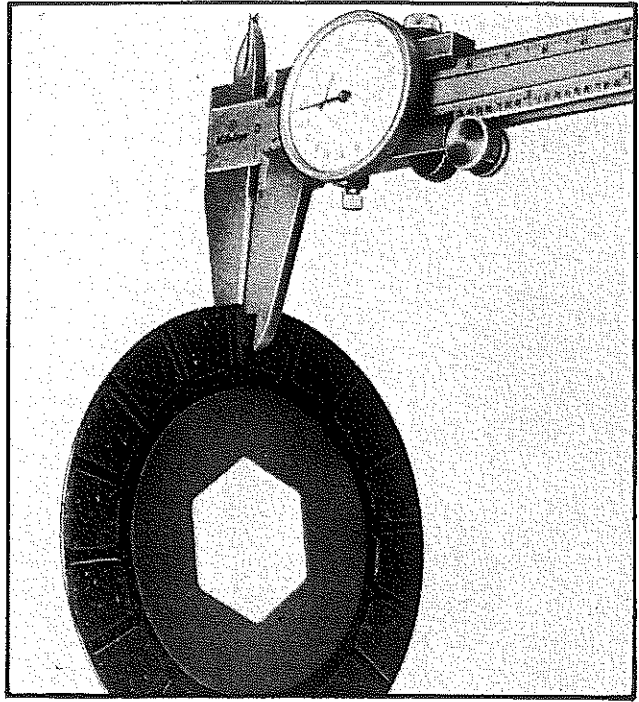
Should crankshaft need correction, adjust deflection using a wedge and a hammer. Replace crankshaft if deflection cannot be corrected.

7. To inspect gudgeon pin use the following procedure:
 - a) If color of gudgeon pin is brown or blue (burned), replace pin and needle bearings.
 - b) Slide your fingers along gudgeon pin to locate possible wear. Replace gudgeon pin and needle bearings as required.
 - c) Insert the gudgeon pin into COLD piston and inspect for noticeable radial clearance of the gudgeon pin in the piston eyes. If clearance is noticed, replace gudgeon pin and needle bearings.
8. Inspect piston eyes for burnt or scored sides. Replace piston as required.
9. Check connecting rod axial play at connecting rod small end. Axial play should not be over .030 inch. If more, replace crankshaft. (Fig. 2-1-4-07).

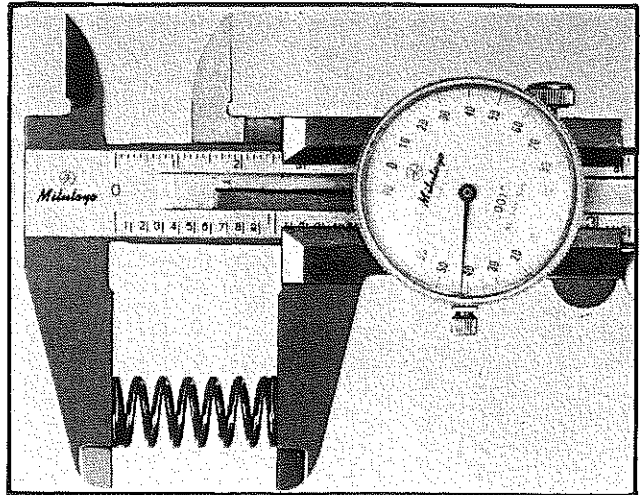


2-1-4-07

10. Check clutch driven discs for wear. Thickness should not be under .072 inch (Fig. 2-1-4-08).
11. Check length of clutch spring. It should be 1.060 inch. If the length is between 1.020 inch and 1.050 inch, one .040 inch spacer should be added into cup. If spring length is less than 1.020 inch, replace. (Fig. 2-1-4-09).



2-1-4-08

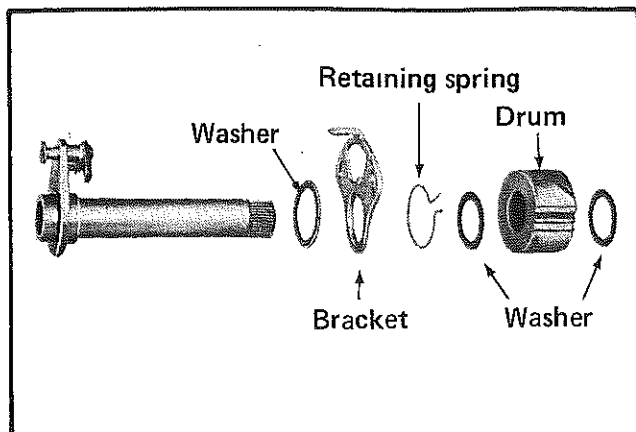


2-1-4-09

2-1-5 ASSEMBLY

1. Prior to assembly ensure all components have been cleaned and inspected as detailed in sub-section 2-1-3 and 2-1-4.
2. If bearings or bushings were removed, press in the new bearings and/or bushings.
3. Slide the new antivibration bushings onto the new spacer sleeve. Grease the antivibration bushings and press them into crankcase.
4. Gear selector mechanism assembly
 - a) Place a .040 inch washer and the bracket over selector shaft ensuring that hole in bracket aligns with anchor pivot.

- b) Position the retaining spring over mechanism and secure by crossing the spring ends over spring support. Ensure that the crossed end lies flush with bracket.
- c) Slide a .020 inch washer, drum and .020 inch washer over shaft and hold complete assembly (Fig. 2-1-5-01).



2-1-5-01

- d) Place gear selector mechanism into bearing of right crankcase. Secure using two (2) spring washers and Allen head screws.
- e) Install dust protector on external side of shaft.

NOTE: Ensure the installing marks on bracket and crankcase align.

5. Place the pedal spring onto bracket and lock in place by crossing spring ends.

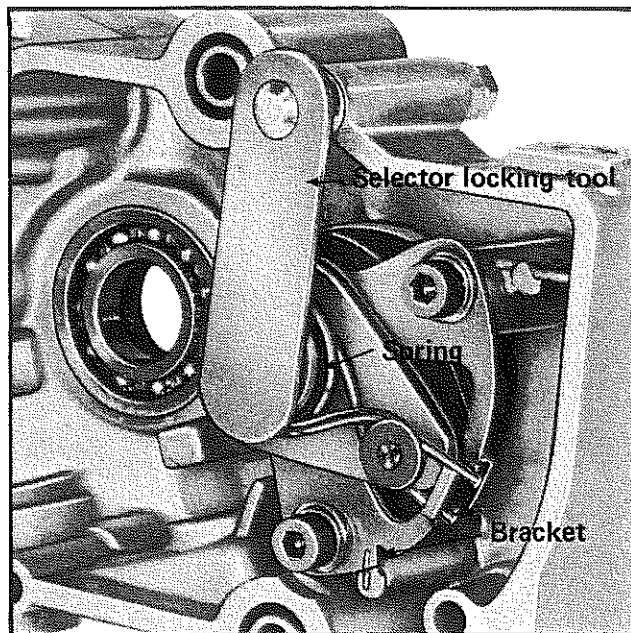
NOTE: If the pedal spring is installed incorrectly it will not lock in position.

6. Finger tighten selector locking tool (Item 8) on crankcase. Ensure tool lever retains the pedal spring in location (Fig. 2-1-5-02).

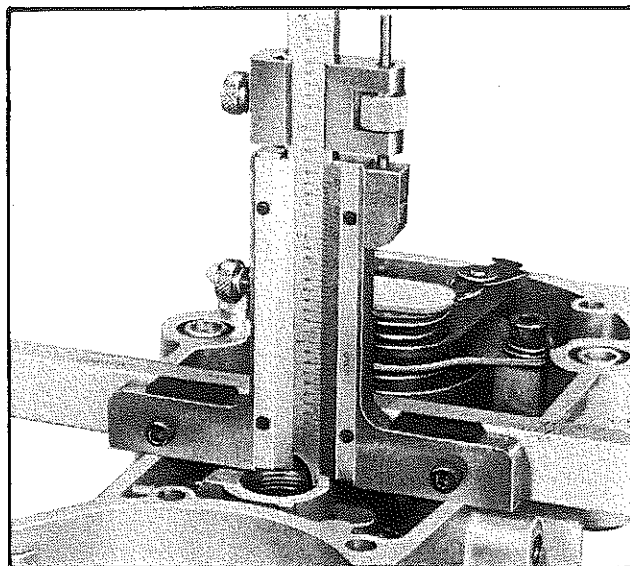
7. Check free-play on primary and secondary shafts as follows:

A) PRIMARY SHAFT

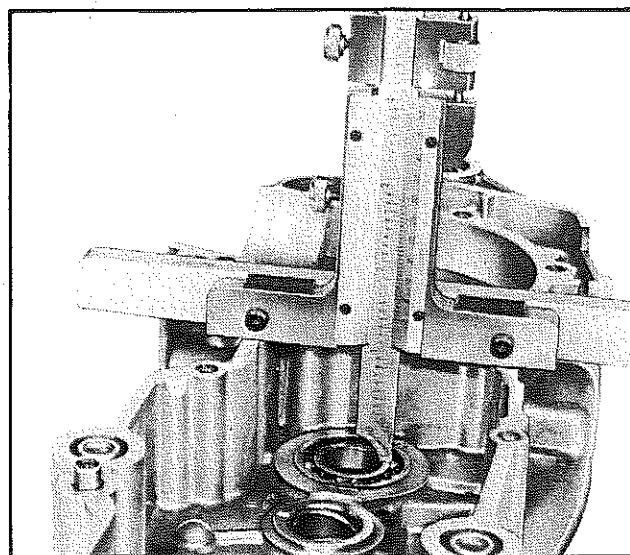
- Measure inside cavity of right hand side crankcase = A (Fig. 2-1-5-03).
- Measure inside cavity of left hand side crankcase = B (Fig. 2-1-5-04).
- Measure crankcase gasket thickness = C.



2-1-5-02



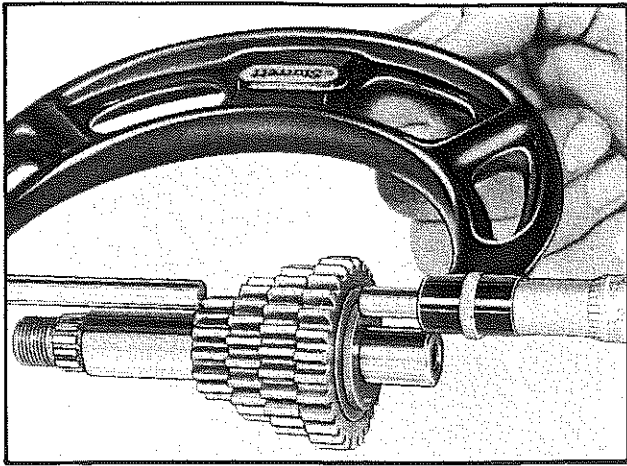
2-1-5-03



2-1-5-04

2-1-12

- Add A plus B plus C, = D (Total measurement).
- Measure thickness of gears on primary shaft which includes the .100 inch spacer = E (Fig. 2-1-5-05).

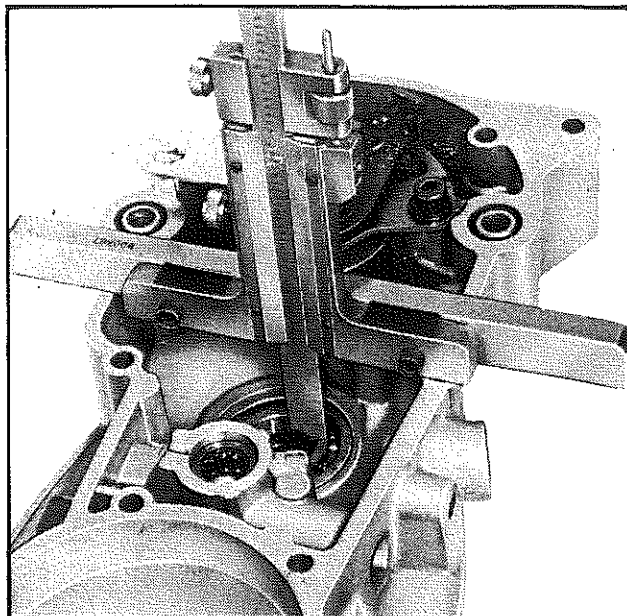


2-1-5-05

- Subtract D from E = F (Total free-play on primary shaft).
- The final free-play (G) must be between .005 inch and .015 inch.
- To obtain this, subtract F from G equals H (Thickness of shims to be added to primary shaft).

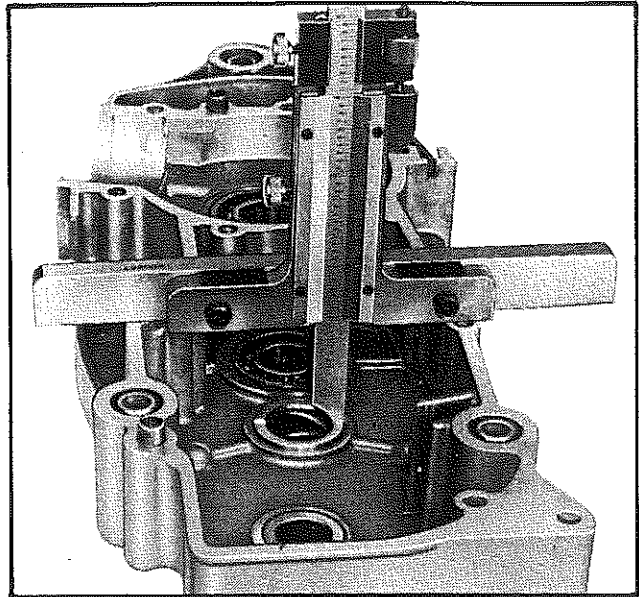
B) SECONDARY SHAFT

- Measure inside cavity of right hand side crankcase = A (Fig. 2-1-5-06).



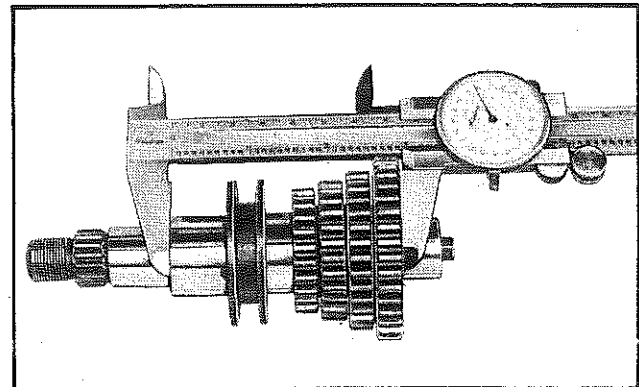
2-1-5-06

- Measure inside cavity of left hand side crankcase = B (Fig. 2-1-5-07).



2-1-5-07

- Measure crankcase gasket thickness = C.
- Add A plus B plus C = D (total measurement).
- With only the gears installed on secondary shaft, measure gear width. = E (Fig. 2-1-5-08).



2-1-5-08

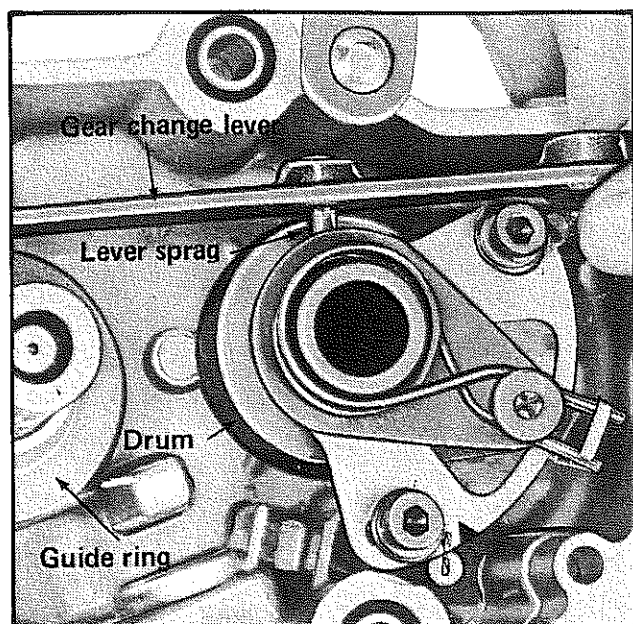
- Subtract D from E equals F (Total free-play on secondary shaft)
- The final free-play (G) must be between .005 inch and .015 inch. To obtain this, subtract F from G = H (Thickness of shims that will have to be added between gears).
- Remove gears from secondary shaft.

Note this measure for further assembly

8. From the external side of right hand crankcase, insert an oil seal. Press the secondary shaft in position.

NOTE: Tape splined end of secondary shaft to protect oil seal during shaft insertion.

9. Turn the selector locking tool one half turn.
10. Place the operating slider into the secondary shaft guide ring. Turn the gear change lever a half turn clockwise to align with gearchange lever screw, ensuring that the lever sprag slides into drum (Fig. 2-1-5-09).



2-1-5-09

11. Insert a pin punch into gearchange lever screw orifice and align with gearchange lever then insert the two (2) gearchange lever spacers. Reposition selector locking tool.

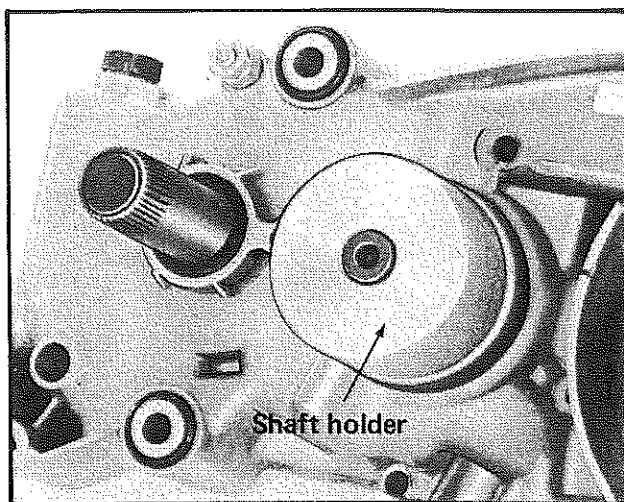
12. Lock assembly by carefully removing pin punch and installing the pivot bolt. Tighten the pivot bolt.

13. On the external side of secondary shaft firmly screw on the secondary shaft holder (Item 9) (Fig. 2-1-5-10).

14. Temporarily, install gear shift lever.

15. Proceed with gearchange adjustment as follows:

- a) Engage into first gear by fully depressing gear shift lever. **Hold the guide ring in place.**



2-1-5-10

- b) Look through the top (1st) sprag orifice of the secondary shaft and observe the engagement rod position.

- c) Engage into second gear and look through the second sprag orifice of the shaft and observe engagement rod.

- d) Gear change adjustment is correct when the groove center of the engagement rod is at exact center of sprag orifice. To correct, slacken Allen head screws holding bracket in a clockwise direction when the engagement rod groove is **below** center in first gear and **above** center in second gear. Rotate counter-clockwise when engagement rod groove is **above** center in first gear and **below** in second gear. (Fig. 2-1-5-11).

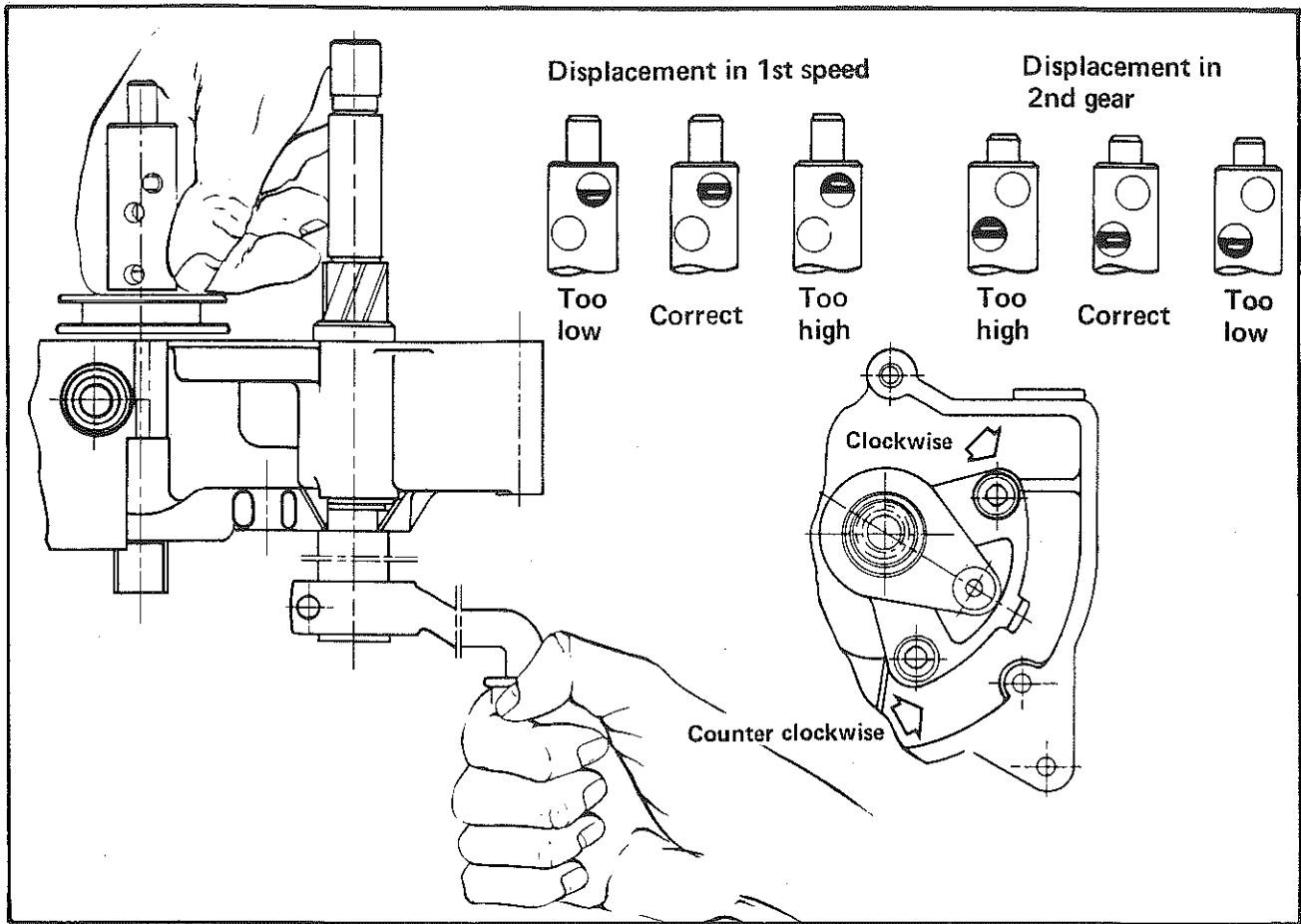
- e) Retighten Allen head screws and recheck gearchange adjustment.

16. Place gear shift lever in neutral and remove shift lever.

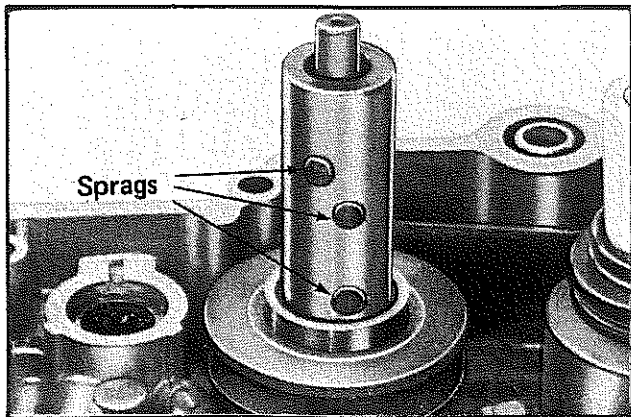
17. Insert secondary shaft sprags into orifices. Ensure that the concave side of the sprags face inward and that the convex sides face outward and are parallel with shaft. (Fig. 2-1-5-12).

18. Place the .100 inch spacer on base of primary shaft and position shaft into appropriate crankcase bearing. (Fig. 2-1-5-13).

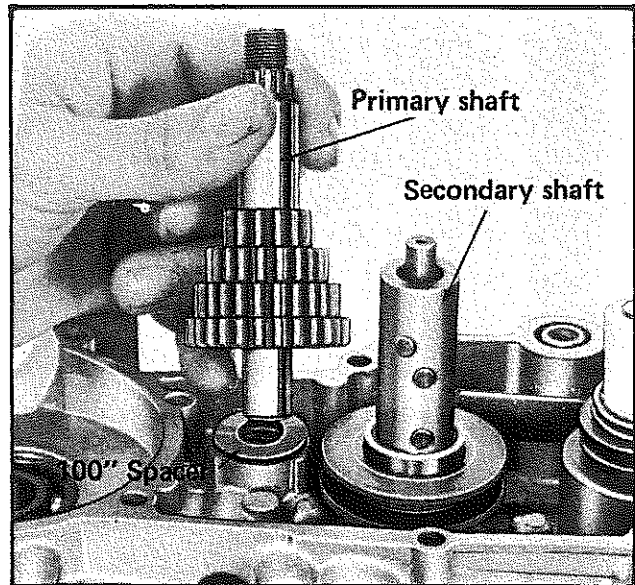
19. Slide the first gear (smallest) onto secondary shaft. Ensure that the flange of the gear faces up. (Fig. 2-1-5-14).



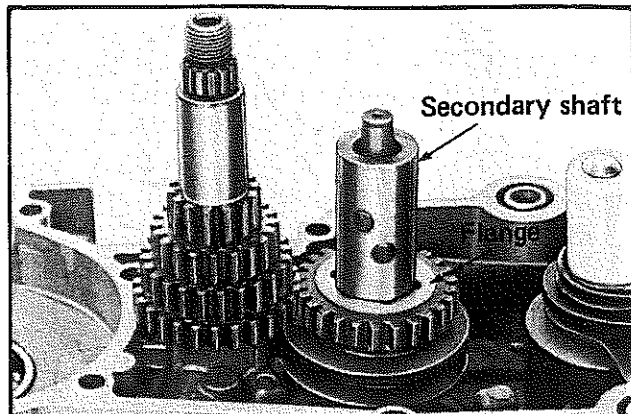
2-1-5-11



2-1-5-12

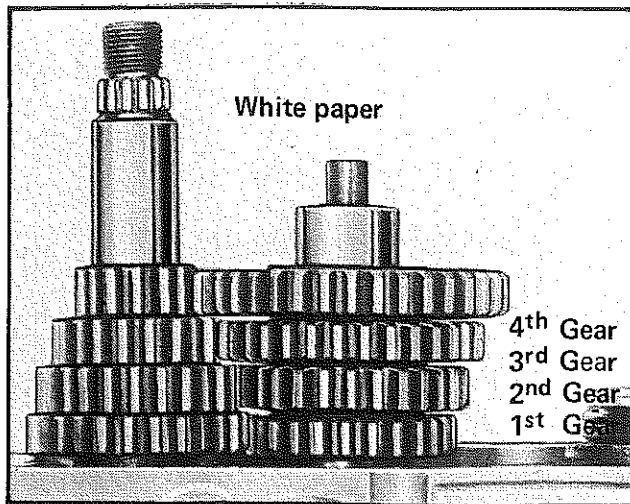


2-1-5-13



2-1-5-14

20. Place second, third and fourth gears on shaft and test for correct seating by placing white paper behind gear assembly. The white paper should be visible through seating of each gear (Fig. 2-1-5-15). If the fourth gear partially engages with third gear or third with second etc. remove gears and equally distribute the correct amount of shims (total of H in step

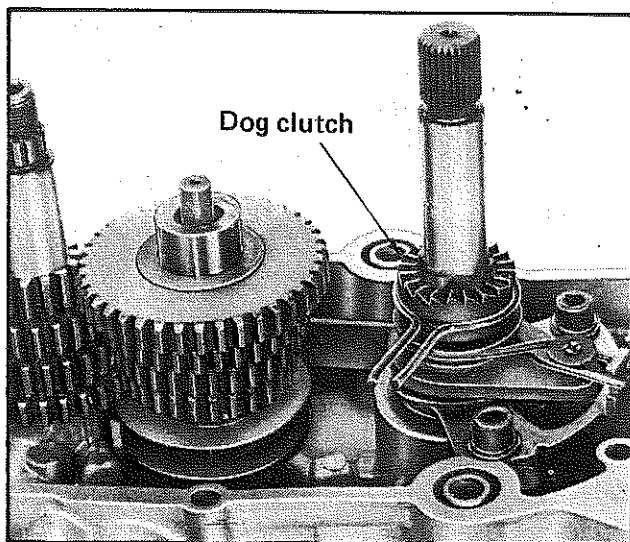


2-1-5-15

7.B of assembly) between gears. Any remaining shim amount should be placed on top of fourth gear. It should be noted that the smallest space between secondary gears should exceed .005 inch more than primary shaft free-play. If the primary shaft free-play is .010 inch then the smallest space between gears should be .015 inch.

Paper test once more.

21. Remove spring holder tool from pedal spring.
22. Install washer on anchor bracket.
23. Push shifter shaft into anchor bracket.
24. Position dog clutch with teeth facing upward (Fig. 2-1-5-16).

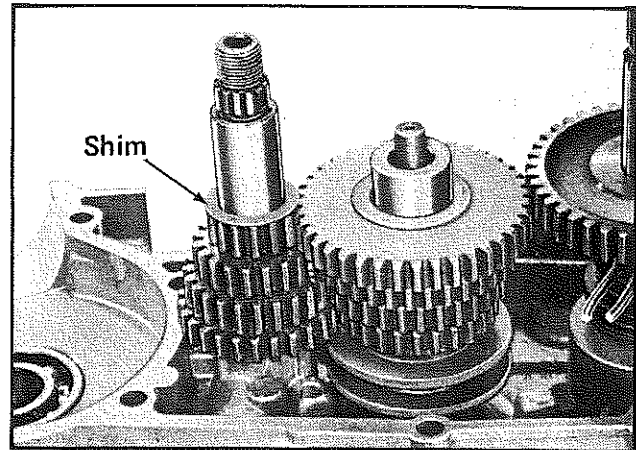


2-1-5-16

25. Install gear with tooth mesh into dog clutch.
26. Install the two (2) crankshaft oil seals.

27. Install crankshaft into right crankcase half.

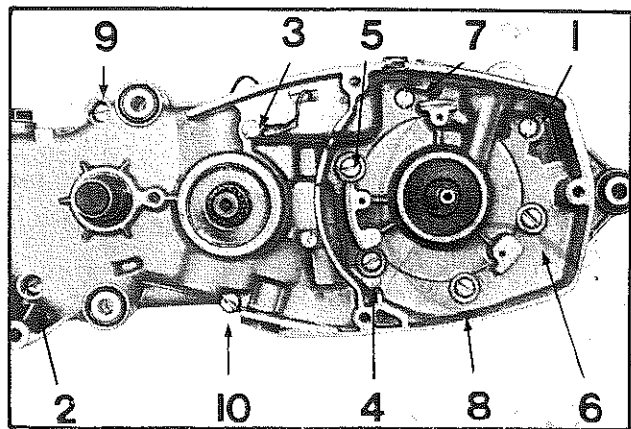
28. Install correct amount of shims, total of H step 7.A of assembly, on top of primary shaft (Fig. 2-1-5-17).



2-1-5-17

29. Install clutch lever with spring and screw.

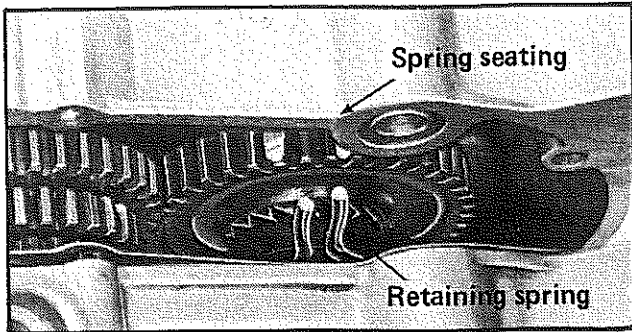
30. Correctly position a new crankcase gasket and join the two (2) crankcase halves. Secure firmly using the crankcase screws. Ground wire must be attached to one (1) of these screws. (Fig. 2-1-5-18).



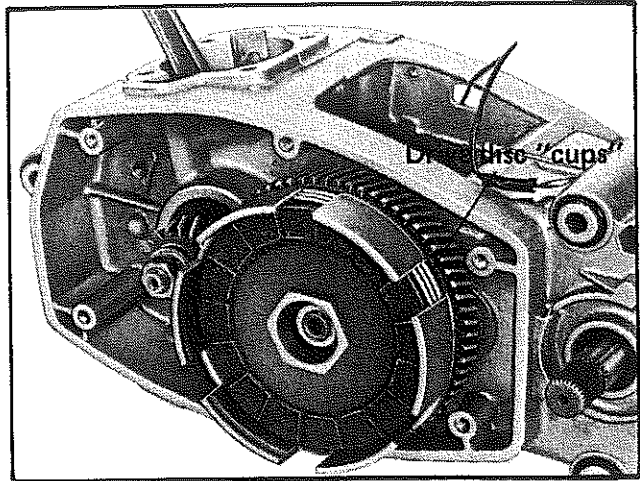
2-1-5-18

CAUTION: While joining crankcase halves ensure that the retaining spring of the dog clutch sits correctly into spring seating of left hand side crankcase. (Fig. 2-1-5-19). Remove secondary shaft holder.

31. Position the drive gear on crankshaft, place washer and nut. Hold the drive gear in position using the appropriate holder and firmly secure drive gear nut (Fig. 2-1-5-20).
32. In the following sequence place the shim, driven gear, shim, clutch hub, washer and 17mm nut on primary shaft. (Fig. 2-1-5-21).

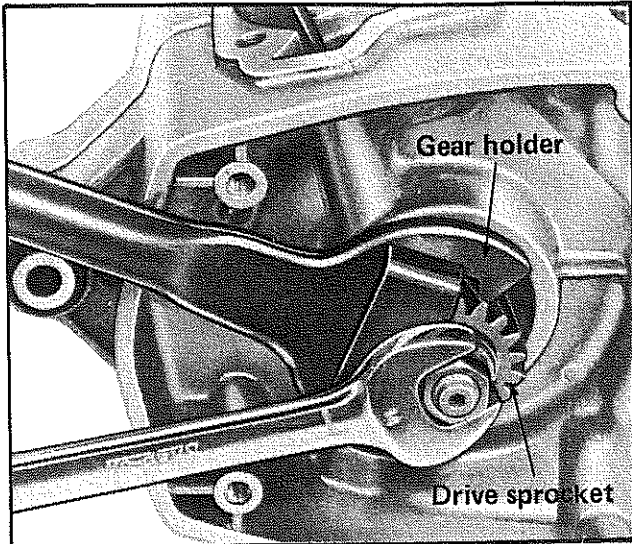


2-1-5-19

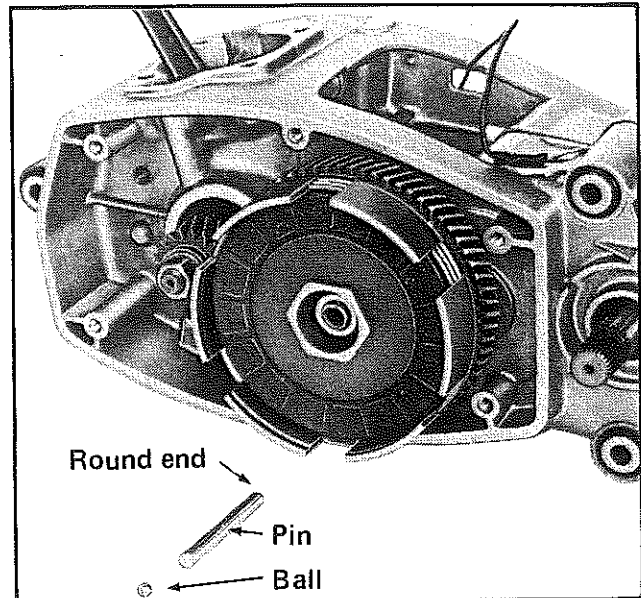


2-1-5-22

35. Slide the pin and ball into primary shaft. (Fig. 2-1-5-23).

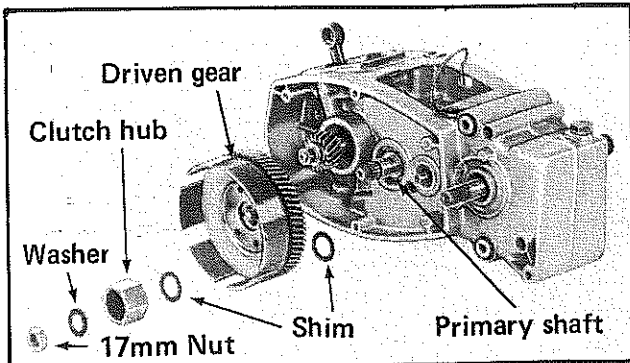


2-1-5-20



2-1-5-23

NOTE: The round end of the pin should be inserted first.



2-1-5-21

33. Using a 30mm and a 17mm wrench firmly secure the assembly.

NOTE: For clutch free-play there are two different shim sizes .020 inch and .008 inch. The simplest way to adjust free-play is to start with one (1) .020 inch and one .008 inch. If clutch is too tight, remove the .008 inch shim and recheck. A combination of two or three .008 inch shims can be used to obtain .016 inch or .024 inch.

34. Fit the drive and driven discs in location.

NOTE: Ensure that the drive disc "cups" face outward (Fig. 2-1-5-22).

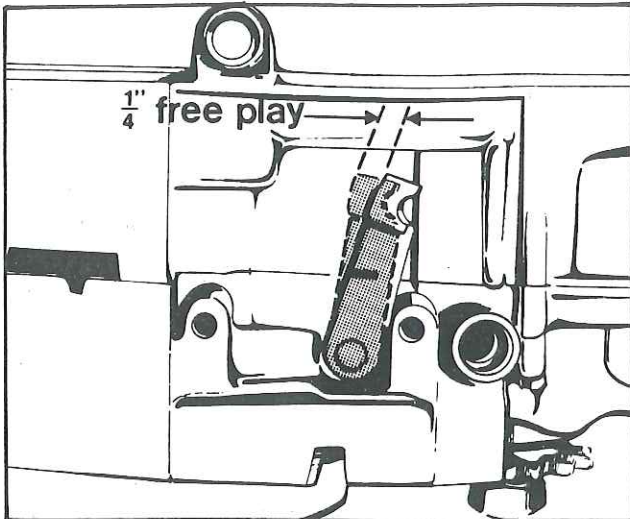
36. Install the pressure plate assembly and lock in position with retaining ring. Remove clutch depressor tool.

37. Place clutch adjusting screw lock nut on screw and proceed with clutch lever adjustment (1/4 inch free-play) (Fig. 2-1-5-24).

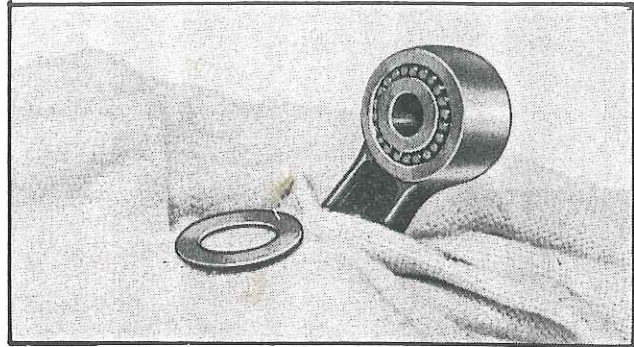
38. Position a new cover gasket and install left hand cover.

39. Install washer, retaining spring, bushing and spring puller over shifter shaft (Fig. 2-1-5-25).

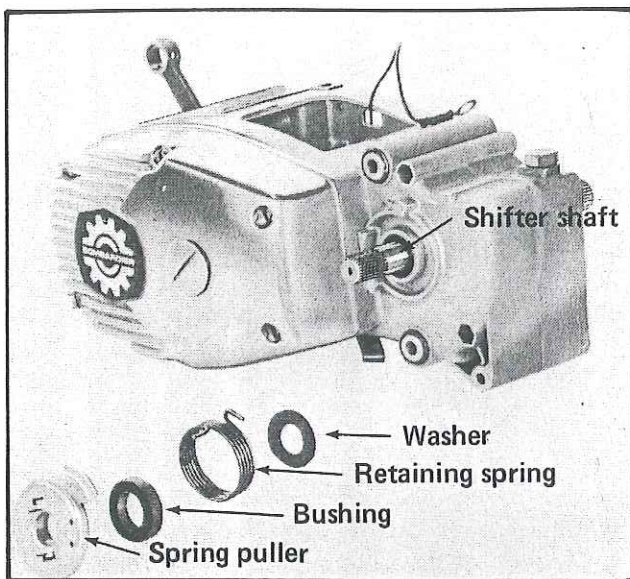
40. Place a dry, clean cloth over crankcase exposing only the connecting rod.



2-1-5-24



2-1-5-26



2-1-5-25

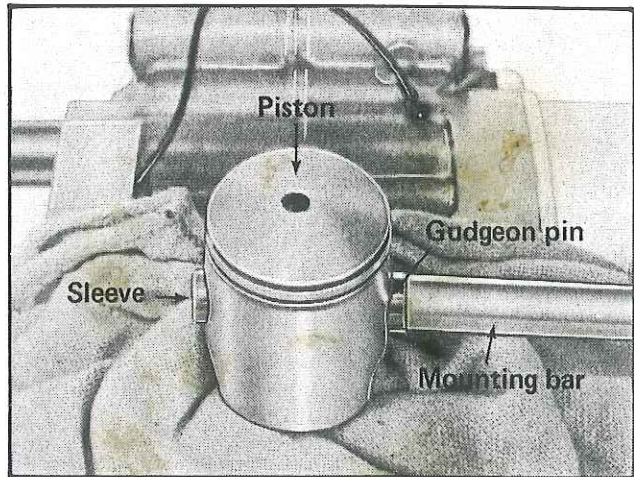
41. Apply grease inside small end of connecting rod. Install sleeve and the 21 needle bearings. Install washer on each side of connecting rod (Fig. 2-1-5-26).

42. Place the piston over the connecting rod with the "S" mark on the exhaust side of crankcase. Using a mounting bar align the piston with the retaining sleeve. Once aligned, complete the insertion of the gudgeon pin until the retaining sleeve can be removed from piston. Ensure the circlip notch at each end of piston orifice is visible (Fig. 2-1-5-27).

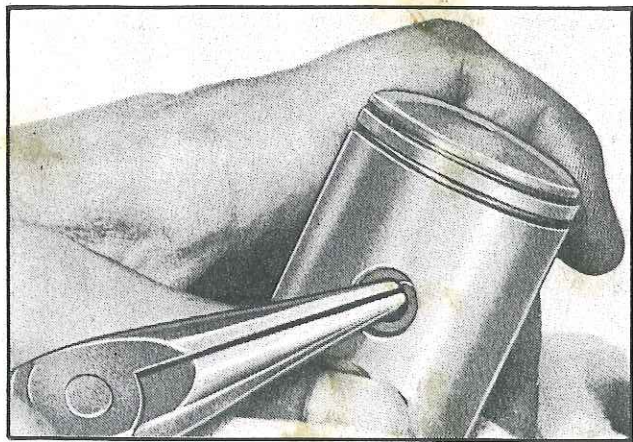
43. Press the circlips into location (Fig. 2-1-5-28).

44. Using very fine emery cloth, remove any possible burrs on piston caused through circlip installation.

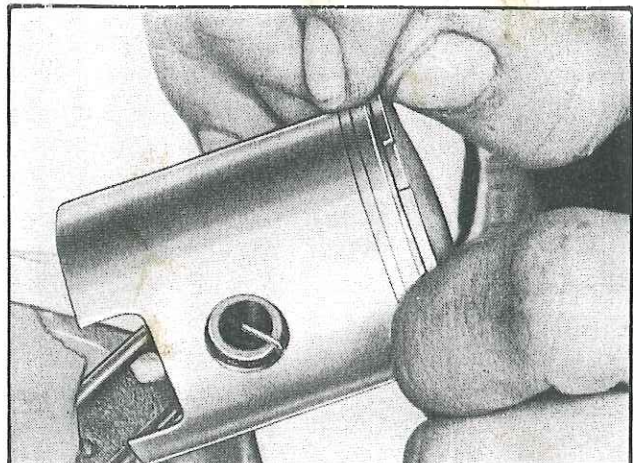
45. Place the rings on the piston and position them in proper grooves. (Fig. 2-1-5-29).



2-1-5-27



2-1-5-28



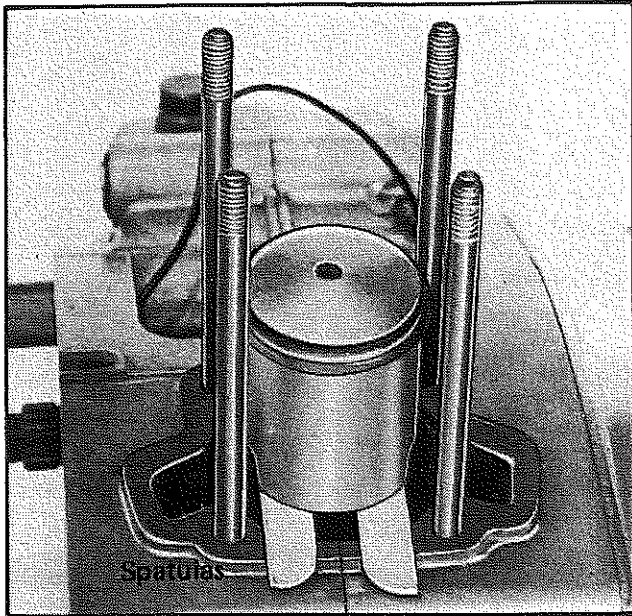
2-1-5-29

2-1-18

NOTE: Ensure the V ends of the rings sit correctly in the ring landings.

46. Place a new crankcase/cylinder gasket in location. Screw the four (4) cylinder studs into crankcase until threads are well into crankcase.

47. Position two (2) spatulas over crankcase top and rotate crankshaft until the piston sits evenly on the spatulas. (Fig. 2-1-5-30).



2-1-5-30

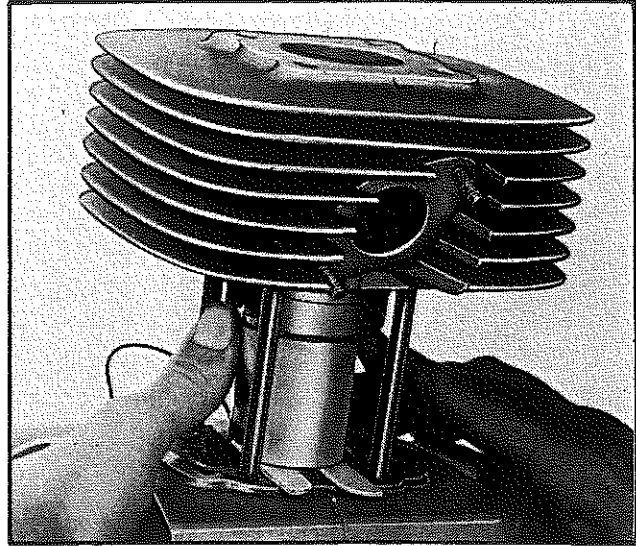
NOTE: Ensure the piston is well centered with crankcase, and apply a film of oil to piston skirt, cylinder walls and rings.

48. Slide the cylinder on the four (4) cylinder studs. Ensure the exhaust port is facing forward.

49. While carefully pushing the cylinder down, close the piston rings over the piston until each ring is compressed sufficiently to allow the cylinder to pass over it. After passing the piston into cylinder continue pushing the cylinder down until it is seated on spatulas (Fig. 2-1-5-31).

50. Remove spatulas carefully to avoid crankcase/cylinder gasket damage. Lower cylinder onto crankcase.

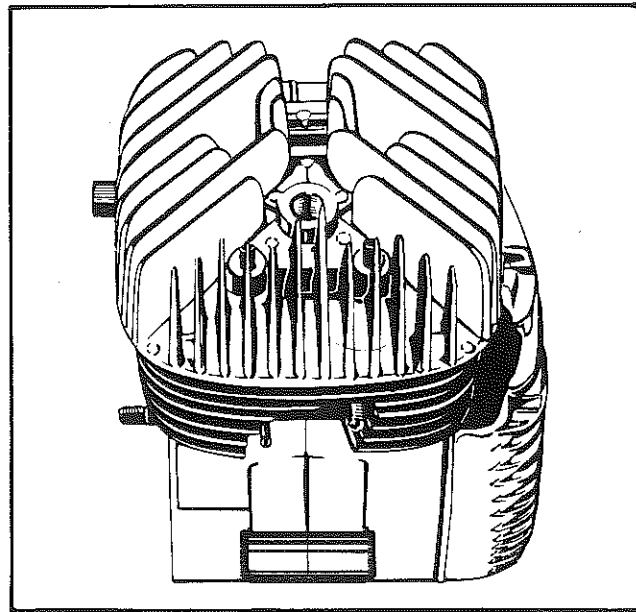
51. Rotate crankshaft to allow even oil distribution over cylinder wall and piston. Wipe any oil spillage from cylinder top using a clean, dry cloth.



2-1-5-31

52. Position manifold gasket on manifold studs. Place manifold and secure with two (2) nuts.

53. Correctly position cylinder head on cylinder ensuring the straight cooling fins are forward (Fig. 2-1-5-32).



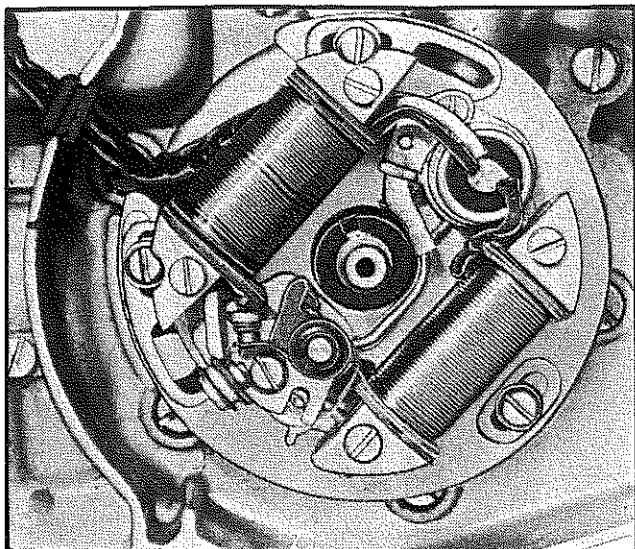
2-1-5-32

54. Place washers and cylinder head on cylinder studs. Cross torque each nut to 5 ft/lbs. and then to 10 ft/lbs.

55. Position armature plate on crankshaft observing the previously made scribe marks and secure plate to crankcase using three (3) screws (Fig. 2-1-5-33).

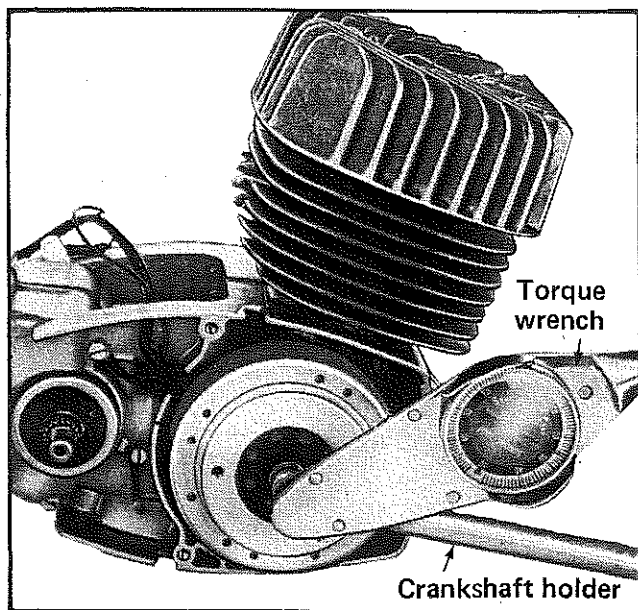
56. Pass the armature plate wires through the crankcase slot.

57. Install crankshaft woodruff key.



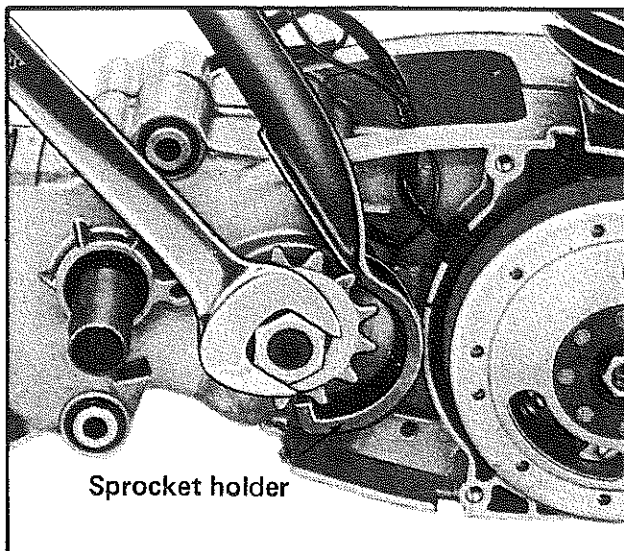
2-1-5-33

58. Turn crankshaft until woodruff key faces up. Position magneto on crankshaft with the keyway aligned with the woodruff key.
59. Position lockwasher and magneto nut on crankshaft. Proceed with "engine timing" (Section 2-1-7).
60. Place the appropriate crankshaft holder over magneto and using a torque wrench, tighten magneto nut to 26 ft/lbs (Fig. 2-1-5-34).



2-1-5-34

61. Position spacer, sprocket and a second spacer on secondary shaft. Place washers and nut then holding the sprocket with the appropriate holder, firmly tighten sprocket nut to 43 ft/lbs (Fig. 2-1-5-35).
62. Pour 1.1. pints (17 ounces) of SAE 30 oil

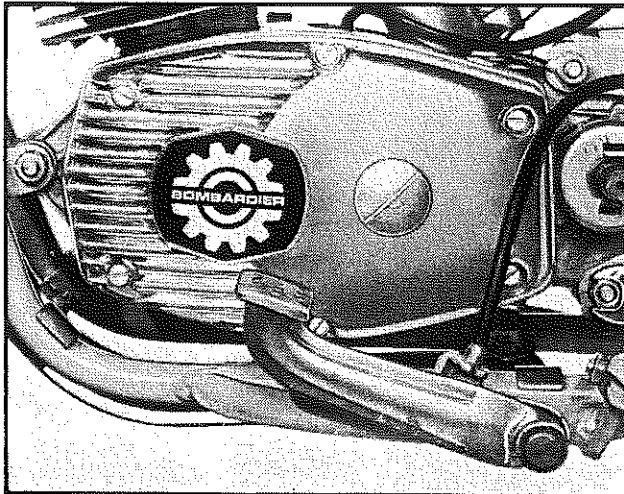


2-1-5-35

- (non detergent) into transmission. Install cover plug.

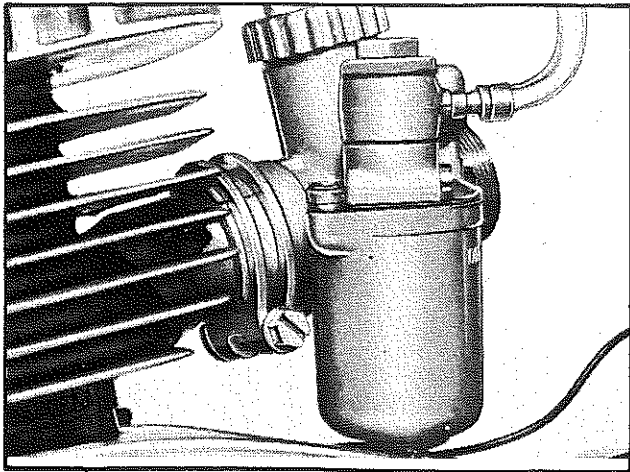
2-1-6 INSTALLATION

1. Place engine in frame cradle and secure using three (3) bolts and nuts. Ensure the ground wire is attached to one of these bolts. (Fig. 2-1-6-01).

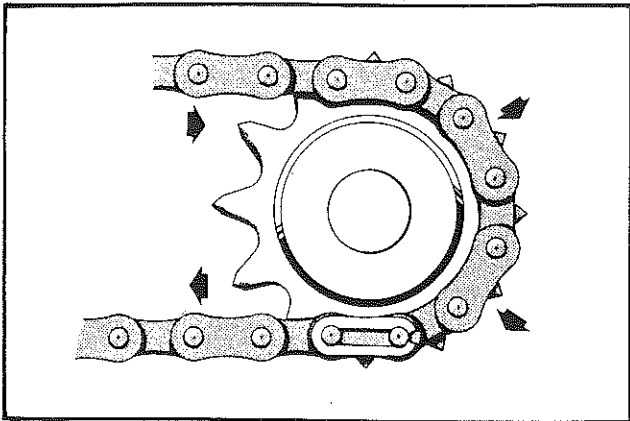


2-1-6-01

2. Carefully push the carburetor body onto manifold and position it vertical. Secure by tightening manifold clamp screw. (Fig. 2-1-6-02).
3. Connect the drive chain. Make sure the closed end faces direction of chain rotation. (Fig. 2-1-6-03).
4. Connect clutch cable to appropriate clutch lever.

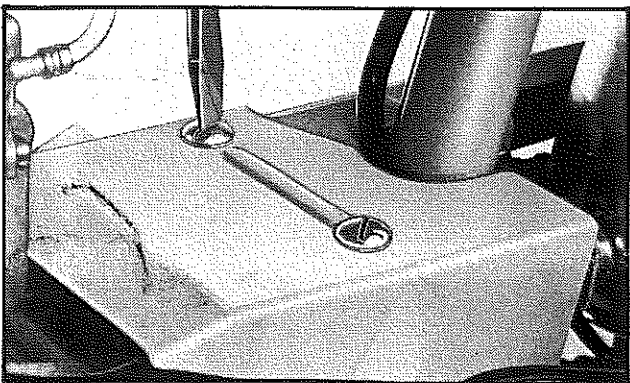


2-1-6-02



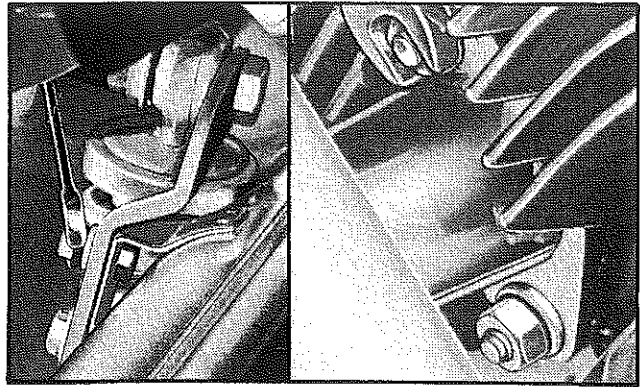
2-1-6-03

5. Connect armature wires to junction block.
6. Position cover plate and affix using two (2) screws. (Fig. 2-1-6-04).



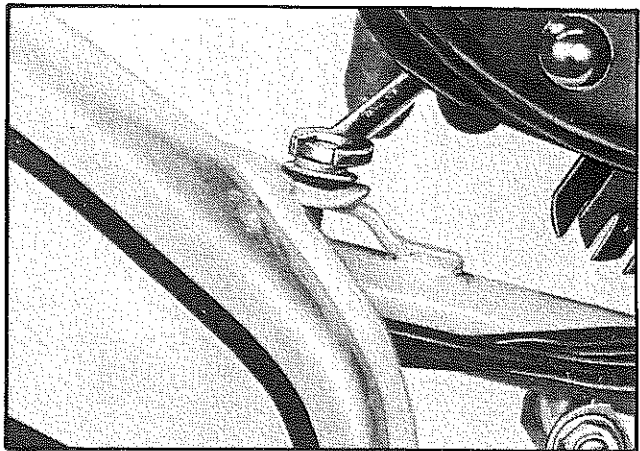
2-1-6-04

7. Install carburetor filter.
8. Install spark plug and connect spark plug wire.
9. Position muffler gasket on exhaust flange studs.
10. Attach muffler and exhaust pipe to exhaust flange and frame (Fig. 2-1-6-05).



2-1-6-05

11. On Bantam Cross model only, secure gas tank to frame using previously removed bolts. Secure seat. (Fig. 2-1-6-06).



2-1-6-06

12. Test vehicle operation.

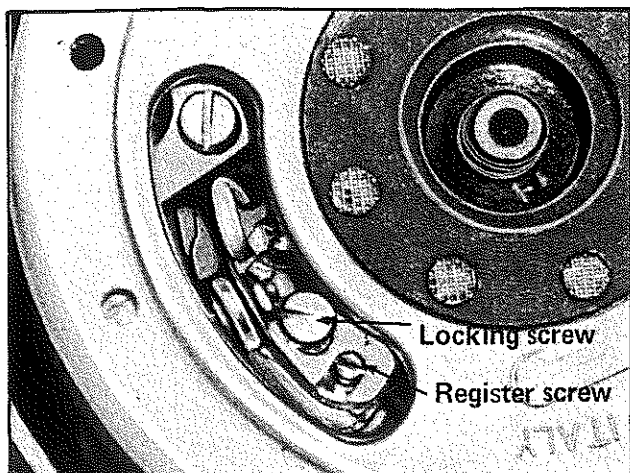
2-1-7 ENGINE TIMING

1. Remove two (2) screws and washers securing cover plate and remove cover.
2. Slacken off Allen head screw of gear shift pedal and remove pedal.
3. Remove the three (3) screws securing right hand side cover. Remove cover.
4. Disconnect spark plug wire and remove spark plug.
5. Inspect breaker points condition, if pitted, burned or worn, replace.

NOTE: Breaker points can be cleaned by inserting a piece of paper between the points and moving it over the contact surfaces.

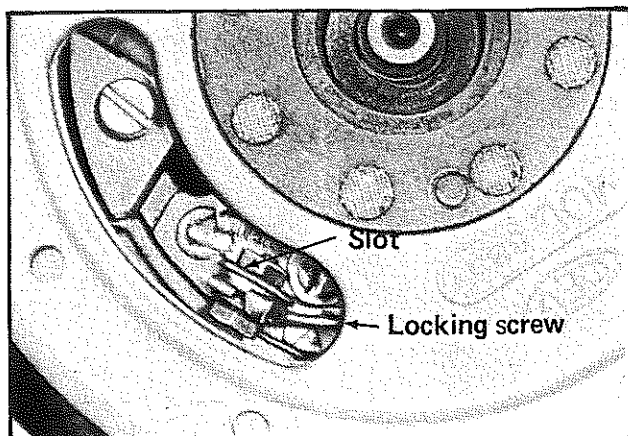
6. Rotate magneto ring until breaker points visible through magneto ring are in fully open position and adjust breaker points gap to .016 inch.

- On engine serial numbers up to E016079, adjust points by loosening locking screw and by turning register screw from one side to the other (Fig. 2-1-7-01).



2-1-7-01

- On engine serial numbers from E016080, loosen locking screw and adjust points with a screwdriver blade (Fig. 2-1-7-02).



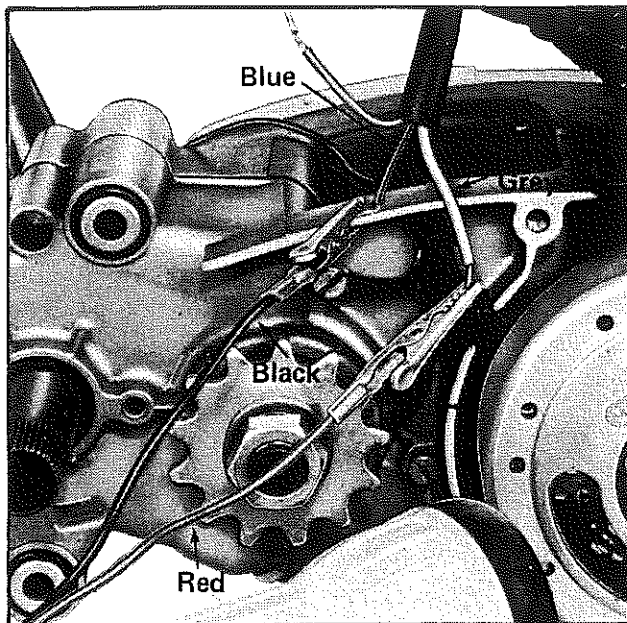
2-1-7-02

7. Disconnect blue and grey wires leading from armature, at junction block.

Connect red wire of test lamp to grey wire leading from armature plate and connect the black wire of test lamp to BOTH blue wires and engine crankcase (Fig. 2-1-7-03).

8. If T.D.C. (Top Dead Center) dial gauge is being used, continue as follows:

- a) Rotate crankshaft until piston is just before T.D.C.
- b) With gauge in adaptor, adjust roller so that it is parallel with dial face. Tighten roller lock nut.



2-1-7-03

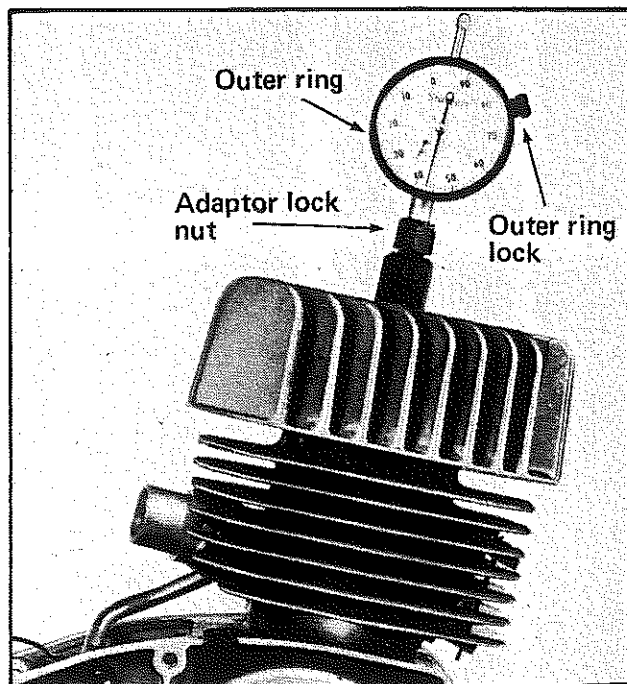
- c) Loosen adaptor lock nut then holding gauge, screw adaptor into spark plug hole.

- d) Position the face of dial towards magneto side and adjust gauge stem for precise reading.

Finger tighten adaptor lock nut.

- e) Rotate crankshaft until piston is at T.D.C.

- f) Unlock outer ring of dial and turn it until "0" on dial aligns with pointer. Lock outer ring in position (Fig. 2-1-7-04).



2-1-7-04

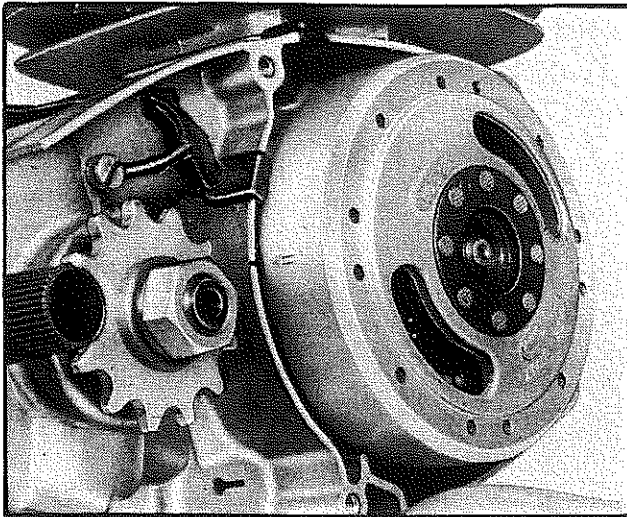
2-1-22

9. Turn timing light ON. Slightly slacken breaker points locking screw.
10. Rotate magneto ring counter-clockwise until desired piston position is obtained (.133 inch) or until timing marks on engine crankcase and on magneto ring align.

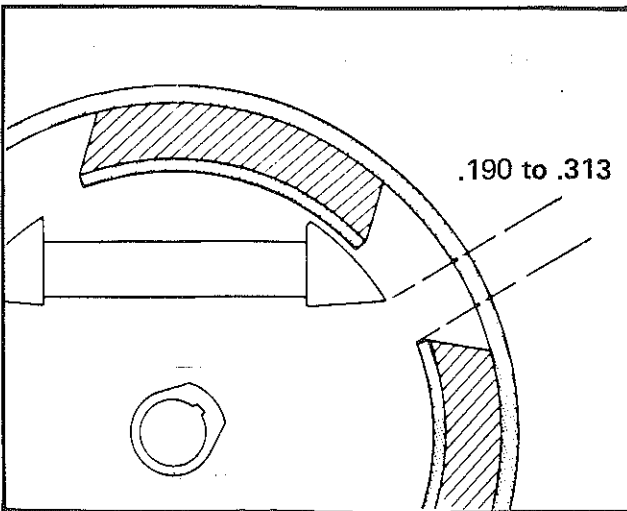
At this point, increasing or decreasing breaker points gap will cause the timing light to fluctuate. Retighten locking screw.

11. Rotate magneto counter-clockwise 1/8 of a turn and slowly turn magneto back in a clockwise direction.

As soon as pointer matches specified reading on dial or when timing marks align (Fig. 2-1-7-05) the timing light should fluctuate. At this point, check the edge gap (distance between trailing edge of pole shoe and magnet). (Fig. 2-1-7-06). The distance should be 0.190 inch to .313 inch.



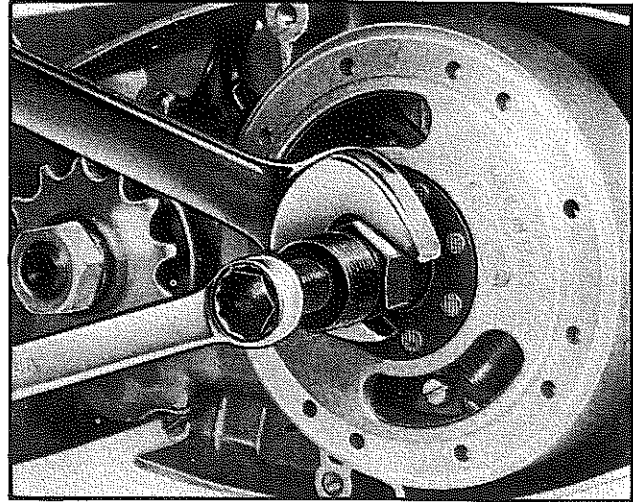
2-1-7-05



2-1-7-06

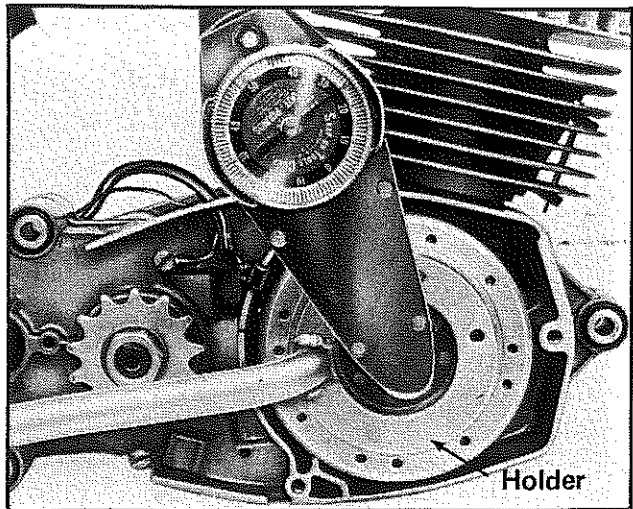
12. If edge gap has to be corrected proceed as follows:

- a) Using appropriate holder, lock magneto ring in position and remove magneto ring nut.
- b) Using appropriate extractor, remove magneto ring (Fig. 2-1-7-07).



2-1-7-07

- c) Slacken the three (3) screws securing armature plate and rotate armature plate clockwise if edge gap is more than .313 inch and counter-clockwise if edge gap is less than .190 inch. Retighten screws.
- d) Temporarily install magneto ring on crankshaft and recheck edge gap.
- e) If edge gap is correct, install washer and magneto ring nut on crankshaft, lock magneto ring in position and torque nut to 26 ft/lbs. (Fig. 2-1-7-08).

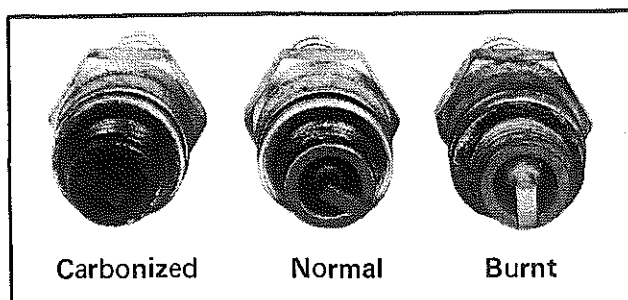


2-1-7-08

13. If the edge gap was corrected, reset breaker points to match the correct dial reading or timing marks and recheck breaker points gap.

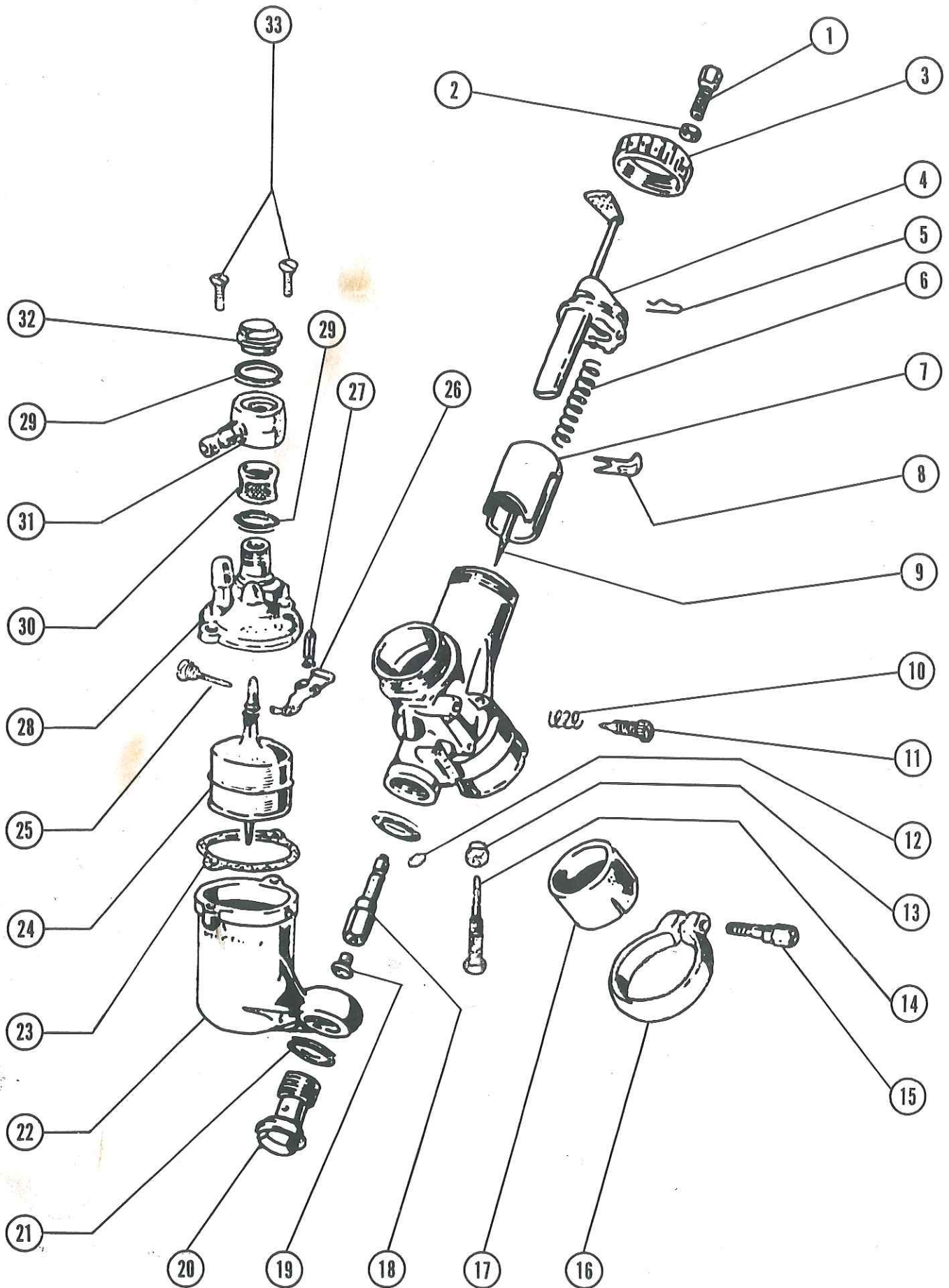
NOTE: The breaker points gap should be between .014 to .018 inch.

14. Disconnect timing light. If dial gauge was used, remove gauge.
15. Inspect spark plug, replace if necessary (Fig. 2-1-7-09). Adjust spark plug gap to .020 inch using a wire gauge. Install spark plug and connect spark plug wire.



2-1-7-09

16. Install right hand side cover and secure with three (3) screws.
17. Install gear change pedal. Secure by tightening Allen head screw.
18. Connect the blue and grey wires to junction block.
19. Install cover plate and secure with two (2) washers and screws.



2-2 CARBURETOR

2-2-1 GENERAL

The Dellorto carburetor installed on the Bombardier Trailbike is a variable venturi, needle jet type in which the throttle piston assembly simultaneously controls the amount of fuel and air entering the engine.

Carburetor fuel supply is accomplished via a constant level float chamber therefore, since the fuel tank is seated directly above the carburetor, a fuel pump is not required.

The float, operating a taper valve, rises with the incoming fuel from the tank and drops as the fuel is used by the engine. The action of the taper valve and the float maintains the proper level in the carburetor passages.

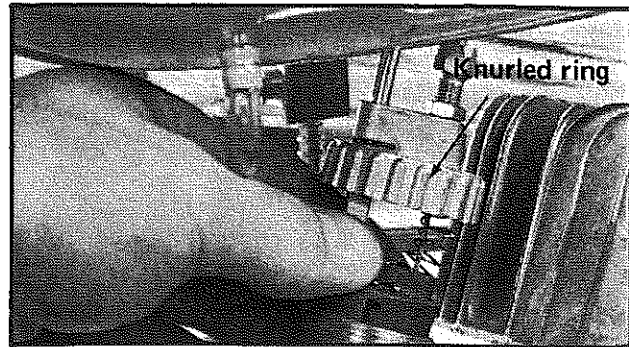
DISASSEMBLED VIEW OF CARBURETOR

1. Cable adjuster
2. Lock nut
3. Knurled ring
4. Carburetor cover
5. Locking clip
6. Spring
7. Throttle valve
8. Needle clip
9. Tapered needle
10. Spring
11. Idle air adjusting screw
12. Idle jet
13. Lock nut
14. Idle speed adjusting screw
15. Screw
16. Clamp
17. Reducing sleeve
18. Needle jet
19. Main jet
20. Bottom plug
21. Fiber washer
22. Float chamber
23. Gasket
24. Float
25. Pivot screw
26. Fulcrum lever
27. Inlet needle
28. Float chamber cover
29. Fiber washer
30. Fuel filter
31. Fuel pipe union
32. Pipe union nut
33. Screw

2-2-2 REMOVAL

1. Close fuel valve(s), disconnect fuel line at carburetor and remove air filter.

2. Unscrew knurled ring and remove throttle valve assembly (Fig. 2-2-2-01).



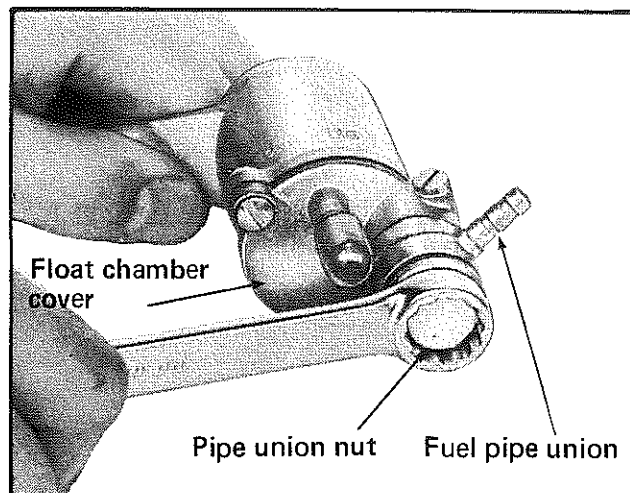
2-2-2-01

3. Loosen clamp screw and remove carburetor.

2-2-3 DISASSEMBLY

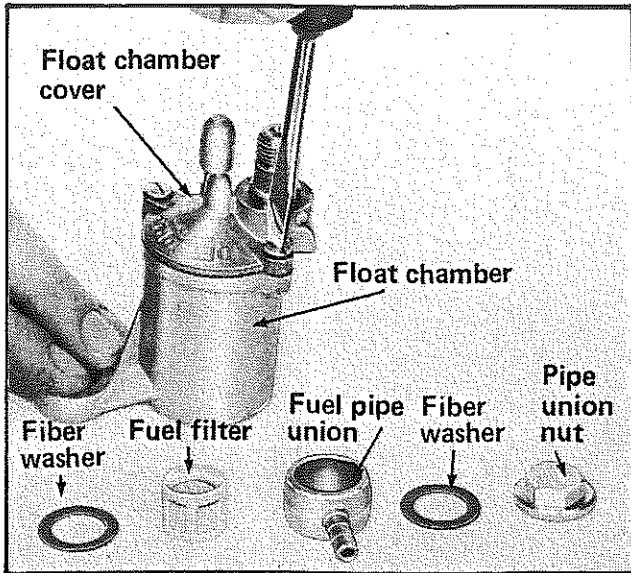
The carburetor should be cleaned by flushing with fuel then dried with compressed air before disassembly.

1. Remove bottom plug, two (2) fiber washers and float chamber assembly.
2. Remove pipe union nut, two fiber washers, fuel filter and fuel pipe union on float chamber cover. (Fig. 2-2-3-01).

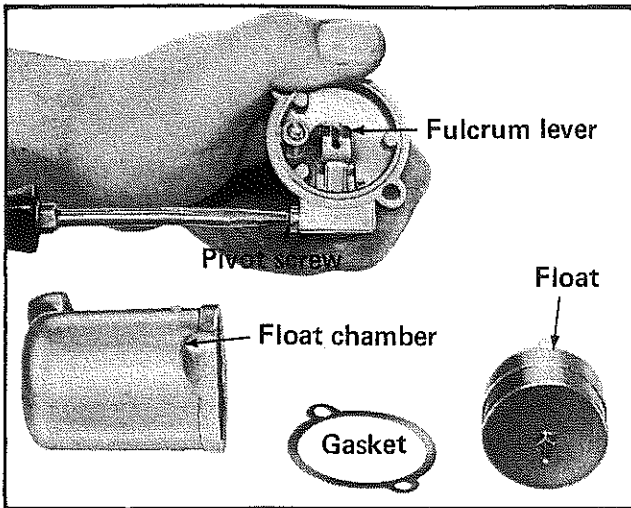


2-2-3-01

3. Remove the two (2) screws securing float chamber cover and remove cover, gasket and float (Fig. 2-2-3-02).
4. Remove pivot screw, fulcrum lever and inlet needle (Fig. 2-2-3-03).

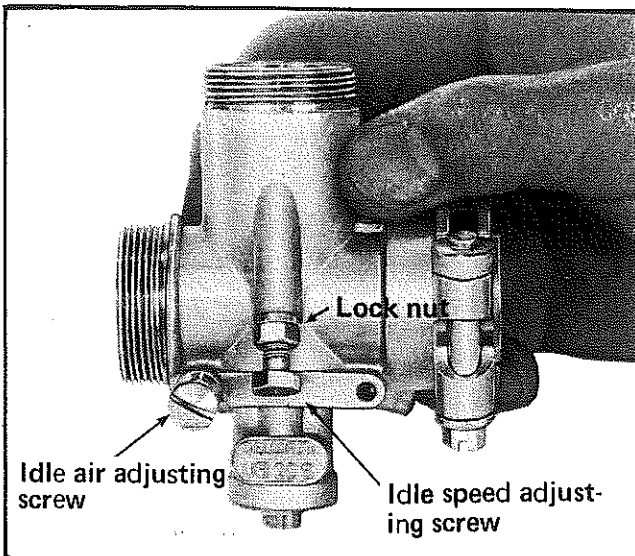


2-2-3-02



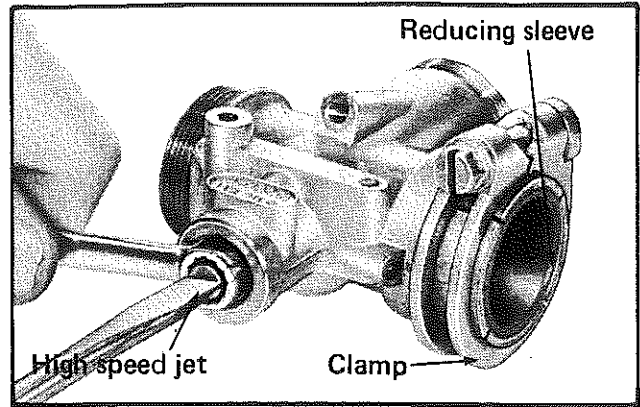
2-2-3-03

5. Unscrew locknut and remove idle speed adjusting screw. Remove idle air adjusting screw and spring (Fig. 2-2-3-04).



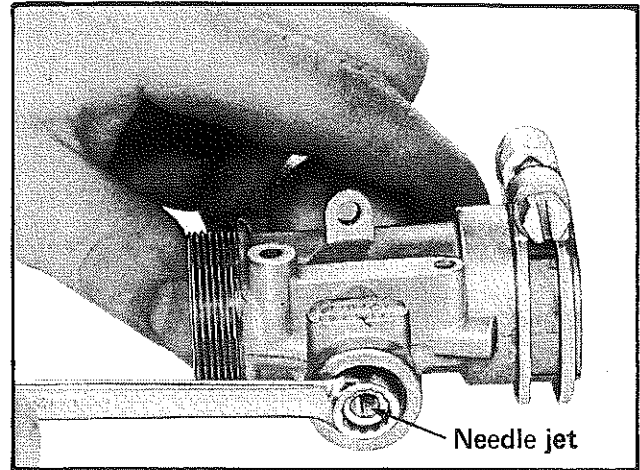
2-2-3-04

6. Hold needle jet with a closed end key and remove high speed jet (Fig. 2-2-3-05).



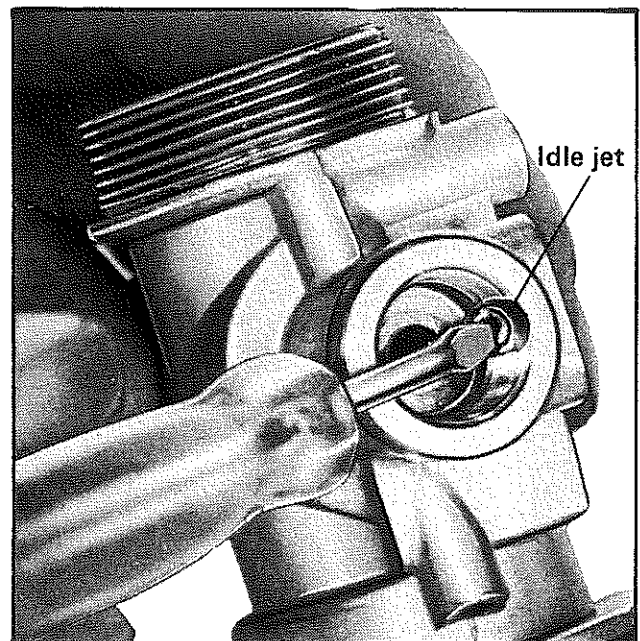
2-2-3-05

7. Remove needle jet (Fig. 2-2-3-06).



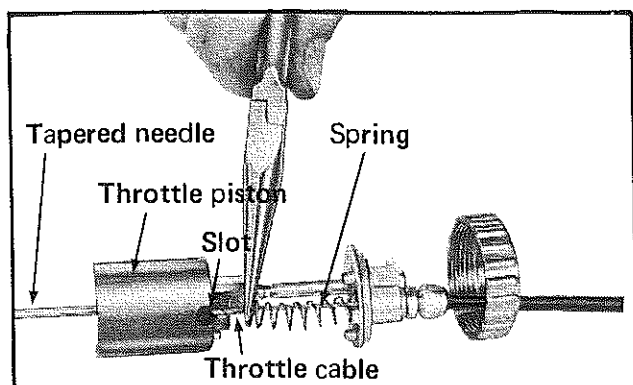
2-2-3-06

8. Remove idle jet using a thin blade screwdriver (Fig. 2-2-3-07).



2-2-3-07

9. Remove clamp and reducing sleeve (See Fig. 2-2-3-05).
10. To disassemble throttle valve assembly use a pair of long nose pliers to compress spring then slide out throttle cable. Remove needle clip and tapered needle (Fig. 2-2-3-08).



2-2-3-08

2-2-4 CLEANING

Some solvents and cleaners have a damaging effect on the fiber and nylon parts of the carburetor. It is best to use a petroleum product for cleaning. Do not use alcohol, lacquer, acetone, thinner, benzol, or any solvent with a blend of these ingredients unless the fiber and nylon parts and gaskets are removed. If you are in doubt about your solvent, test a used part in it and observe the reaction.

Note: If the carburetor is not very dirty, the parts can be cleaned with compressed air. Ensure that each channel and orifice of the castings are carefully blown clean of dirt particles.

2-2-5 INSPECTION

1. The castings of the carburetor should be inspected for cracks. Examine threaded parts for stripped, crossed or otherwise damaged threads.
2. Inspect inlet valve seat and inlet needle for damage. Replace defective parts.

NOTE: Inlet valve seat is an integral part of the float chamber cover therefore, if seat is damaged, the cover must be replaced.

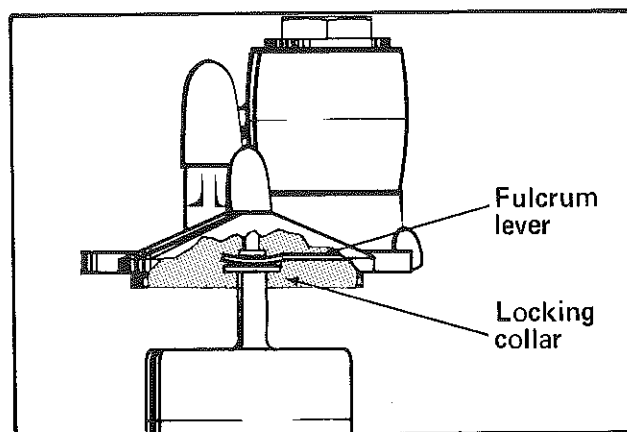
3. Inspect float for leak by shaking to see if it contains fuel. If float is damaged, replace.
4. Inspect the throttle valve for excessive surface scoring. If excessively worn, the throttle valve should be replaced.

5. Carefully check the needle jet and the tapered needle for wear or scoring. Replace defective parts.

6. Inspect fiber washers, if cracked or scored, replace.

2-2-6 ASSEMBLY

1. Install idle jet into jet chamber. (see Fig. 2-2-3-07).
2. Install needle jet and high speed jet. (see Fig. 2-2-3-05 and Fig. 2-2-3-06).
3. Install idle air adjusting screw with spring and idle speed adjusting screw with lock nut (see Fig. 2-2-3-04).
4. Install reducing sleeve and clamp on carburetor.
5. Insert inlet needle into inlet valve and slide fulcrum lever over inlet needle notch. Make sure that fulcrum lever is hooked to inlet needle. Secure assembly to float chamber cover using the pivot screw.
6. Insert float into float chamber and place float chamber cover and new gasket. chamber. Make sure that fulcrum lever fork engages in locking collar of float stem (Fig. 2-2-6-01). Secure with two (2) star washers and screws.



2-2-6-01

7. Install a fiber washer, fuel filter, fuel pipe union and fiber washer on float chamber cover. Secure with pipe union nut.
8. Install float chamber to carburetor using two (2) fiber washers and bottom plug.
9. Insert tapered needle into throttle valve and place needle clip in middle groove.

2-2-04

10. Place knurled ring on top of carburetor cover. Insert throttle cable in cover and slide the spring over cable. Compress spring and slide cable into side slot of the throttle valve (see Fig. 2-2-3-08).

2-2-7 INSTALLATION

1. Install carburetor on intake manifold and secure by tightening clamp screw.

NOTE: Make sure that carburetor is vertical with engine.

2. Insert throttle valve assembly into carburetor body and secure by tightening knurled ring.
3. Connect fuel line at carburetor and install air filter.

2-2-8 CARBURETOR ADJUSTMENT

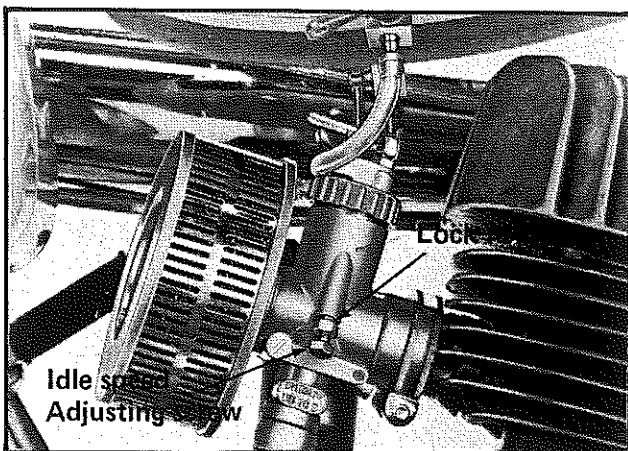
Carburetor Idle adjustment

Idle adjustment of the carburetor should be performed when the vehicle is upright, not on the kickstand.

1. Completely close idle air adjusting screw then back off one (1) turn as a primary adjustment.

CAUTION: Do not close screw too tightly as the needle and/or seat may be damaged.

2. Start engine and allow it to warm up for 3 minutes.
3. Set idle speed to a fairly fast idle (1800 R.P.M.) by loosening lock nut and turning idle speed adjusting screw (Fig. 2-2-8-01).



2-2-8-01

4. Adjust idle air screw for a steady idle and a fast response of the engine to the throttle.

5. Next, work alternatively on idle speed adjusting screw and idle air screw until the correct mixture combination and idle speed is achieved.

NOTE: Idle air adjusting screw is backed off between a half (1/2) to two (2) turns.

Carburetor Tapered Needle Adjustment

This adjustment is best performed on the road. Needle clip must be in center groove for a primary adjustment.

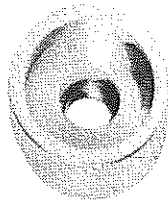
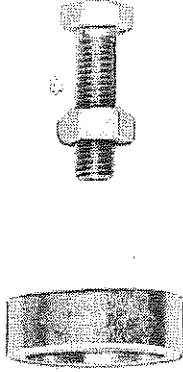
1. If when gradually opening the throttle about half way, the engine runs regularly, the mixture is correct.
2. If on the contrary the engine **falters** or backfires due to a lean mixture, the needle must be moved upward one groove. If the engine gives off black smoke or 'four strokes' due to a rich mixture, the needle must be moved down one groove.
3. To change tapered needle position, unscrew knurled ring on top of carburetor, lift out throttle valve assembly and remove needle clip. Change needle position and reinstall throttle valve assembly.

2-3-1 TROUBLE SHOOTING GUIDE

SYMPTOMS	POSSIBLE CAUSES	WHAT TO DO
Engine fails to start or starts with difficulty	1) no fuel to the carburetor	Check the tank level and refill with correct gas-oil mixture. Check for possible clogging of fuel line, fuel valve or vent hole in filler cap, see item 5.
	2) Spark plug	Check for fouled or defective spark plug. Disconnect spark plug wire, unscrew plug and remove from cylinder head. Reconnect wire and ground exposed plug to engine head, being careful to hold away from spark plug hole. Crank engine and check for spark. If no sparks appear, replace spark plug. Recheck plug. If sparks still do not appear, check item 3.
	3) Faulty ignition	Disconnect spark plug wire from plug, unscrew the spark plug cap, then hold wire about 1/8 inch from the cylinder head. Follow engine starting procedure and if no sparks appear, it means a faulty ignition system (see Sect. 3).
	4) Flooded engine	Pull up choke, wait 60 sec. or more then fully open throttle and try to start engine.
	5) Clogged fuel line, fuel valve filter or vent hole.	Check flow by disconnecting fuel line at carburetor. If there is no flow proceed as follows: a) Remove filler cap and see if fuel flows. If fuel flows the vent hole is plugged. Clean with small gauge wire. b) Place a catch pan under fuel valve then remove and clean filter.
	6) Idle speed mixture adjustment	Screw in the idle air adjusting screw and turn it back one turn. Make final adjustment with engine running and warmed up (see Sect. 2-2).
	7) Too much oil in fuel	Drain the fuel tank and refill with the correct gas-oil mixture.
	8) Faulty carburetor	Make adjustment as detailed in item 6 above. If carburetor is still faulty, refer to Sect. 2-2.
	9) Poor engine compression	Running with a lean fuel mixture may produce excessive engine wear resulting in poor engine compression. If this occurs, see Sect. 2-1.

<p>Engine lacks acceleration or power</p>	<ul style="list-style-type: none"> 1) defective ignition 2) Restriction in fuel system 3) Carburetor 4) Clogged air filter 5) Fouled or defective spark plug 6) Engine 7) Clogged muffler 	<p>First check items 2 and 3 of "Engine fails to start or starts with difficulty". If the ignition system still seems defective, see Section 3.</p> <p>Check item 5 of "Engine fails to start or starts with difficulty".</p> <p>Adjust idle. Check tightness of intake manifold nuts and carburetor clamp. If the trouble persists, see Section 2-2.</p> <p>Remove and clean.</p> <p>Fouled spark plug may be cleaned and regapped (.020"). Check for defective spark plug and change if necessary. (Bosch W260T2).</p> <p>If unable to locate specific symptoms, see Section 2-1.</p> <p>Remove baffle and clean.</p>
<p>Engine stops when brake is applied</p>	<ul style="list-style-type: none"> 1) Burnt brake light 	<p>Change light bulb and return (PUSH IN) bypass switch to off position.</p>
<p>Trailbike cannot reach full speed</p>	<ul style="list-style-type: none"> 1) Clutch slipping 2) Poor engine compression 3) Friction at rear wheel 	<p>Adjust clutch free play.</p> <p>Check item 9 of "Engine fails to start or starts with difficulty".</p> <p>Check for tight chain, brake drag or worn wheel bearing. Adjust or replace.</p>
<p>Engine will not crank</p>	<ul style="list-style-type: none"> 1) Engine full of gas 2) Seized piston 	<p>Close fuel valve(s). Remove spark plug and muffler. Clean thoroughly. Keep spark plug wire away from engine and crank engine until all gas has escaped. Wait for a while. Install plug and muffler then start engine.</p> <p>See Section 2-1</p>

2-4 SPECIAL TOOLS

			
<p>ITEM 2 Crank shaft holder</p>	<p>ITEM 3 Extractor</p>		
			
<p>ITEM 4 Sprocket Holder</p>	<p>ITEM 8 Selector locking</p>		
			
<p>ITEM 6 Gear holder</p>	<p>ITEM 9 Shaft holder</p>		
			
<p>ITEM 7 Puller</p>	<p>ITEM 1 Mounting bar with sleeve</p>	<p>ITEM 5 Clutch depressor</p>	<p>ITEM 10 Secondary shaft aligning tool</p>

3-1 ELECTRICAL

3-1-1 GENERAL

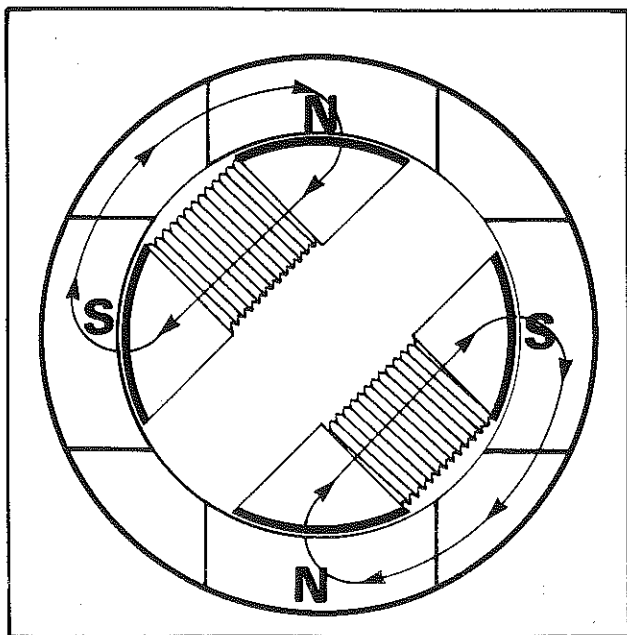
Electricity covers a wide and complicated range therefore a thorough coverage of electrical fundamental is not possible in this manual.

However, a basic understanding of the electrical functions of the Bombardier Trailbike is a must for any person maintaining a vehicle.

OPERATING PRINCIPLES

The Trailbike utilized the theory of converting magnetic energy into electrical energy.

The primary source of magnetic energy is a magneto ring, incorporating four (4) magnetized bars. As shown in Figure 3-1-1-01, this energy flow is concentrated in a set field, i.e. from north pole to south pole.

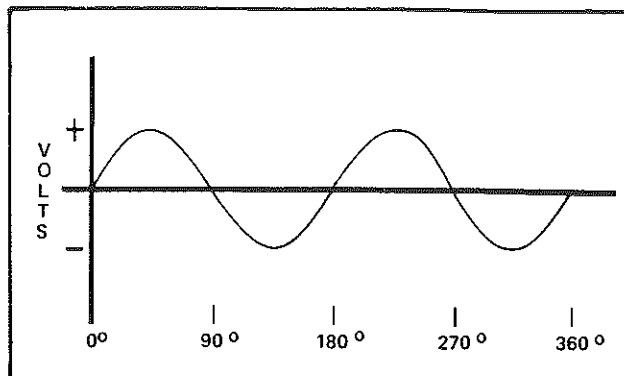


3-1-1-01

In operation, the south and north poles of the magnets, rotating around the armature, induce an AC current in the generating coils. Figure 3-1-1-02 shows the current formation for one (1) revolution (360°).

IGNITION SYSTEM

The ignition system of the Bombardier Trailbike comprises an external high tension coil, a primary generating coil, a breaker points set, a condenser and a spark plug.



3-1-1-02

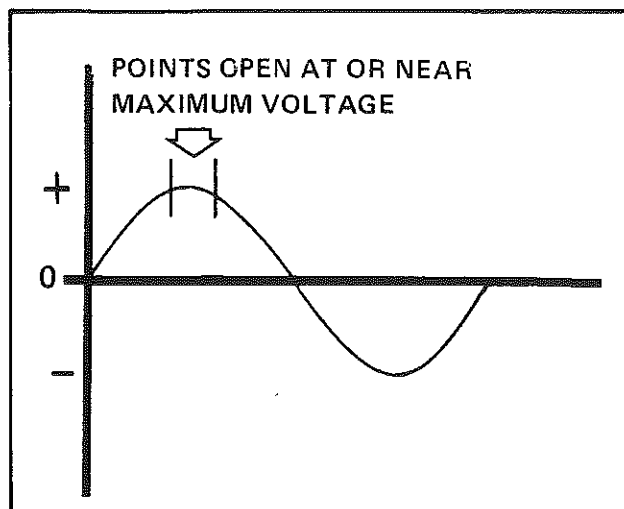
To explain the ignition system we will follow the electrical path from breaker points to spark plug.

When the breaker points are closed, the current generated in the primary generating coil flows through the breaker points to ground. At a pre-determined position, a cam begins to open the points and current flows into the condenser and the external high tension coil.

By absorbing current when the breaker points begin to open the condenser reduces voltage rise at the points thereby almost eliminating arcing.

The voltage applied to the primary winding of the external coil is multiplied in the secondary winding by a large factor and causes a spark to jump between the spark plug electrodes.

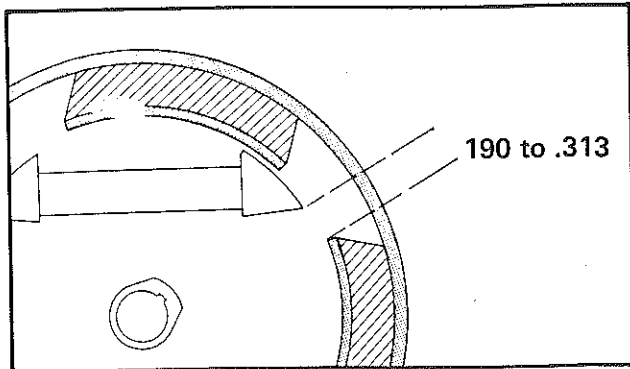
As can be seen in Fig. 3-1-1-02 there are variations in voltage and direction of current flow. Therefore, to obtain maximum power at the plug, it is important that points opening begin at, or near, the current peak. (Fig. 3-1-1-03).



3-1-1-03

3-1-02

To achieve this, the correct positioning of the generating coil in relation to the magneto magnets is pre-determined by the manufacturer and is referred to as EDGE GAP (Distance between trailing edge of armature and magnet). (Fig. 3-1-1-04).



3-1-1-04

3-1-2 WIRING DIAGRAMS

GENERAL

The following pages include the wiring diagrams of the Bombardier Trailbike Series.

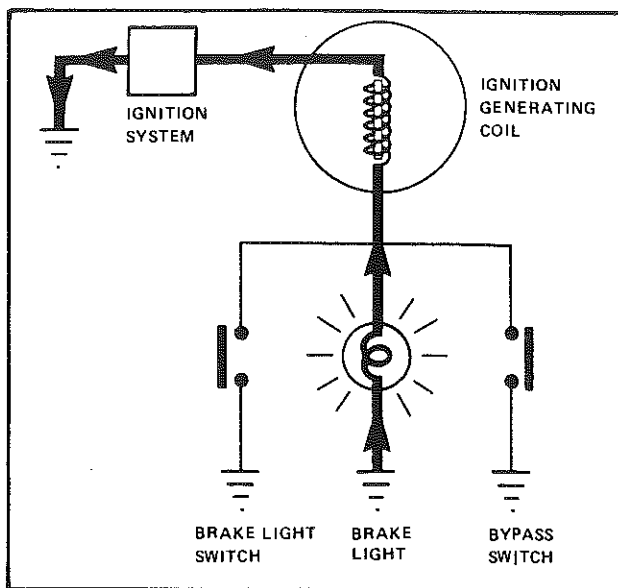
When inspecting the electric circuit, it should be remembered:—

1. That a circuit must be **complete** in order to have a current flow through it. Therefore, inspect all ground connections as well as live connections.
2. Given alternative paths, the current will always flow through the path of **least resistance**.

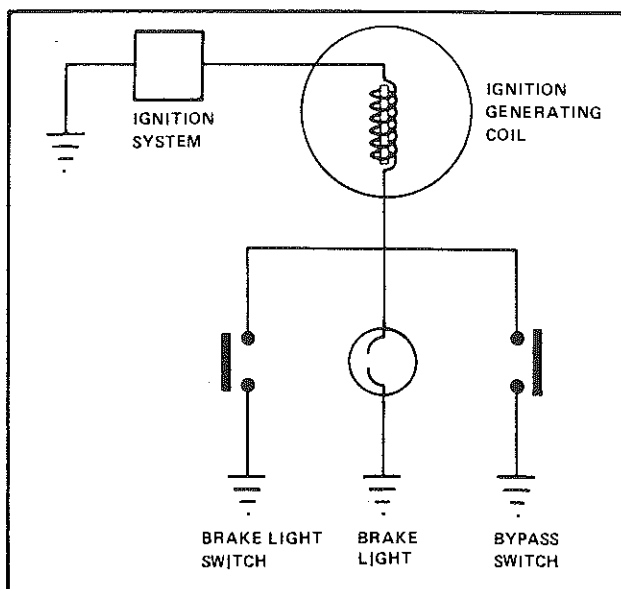
A good example of this is the Bombardier Trailbike brake light system.

In the following simplified diagrams, we show three (3) alternative paths for completion of the ignition generating coil circuit.

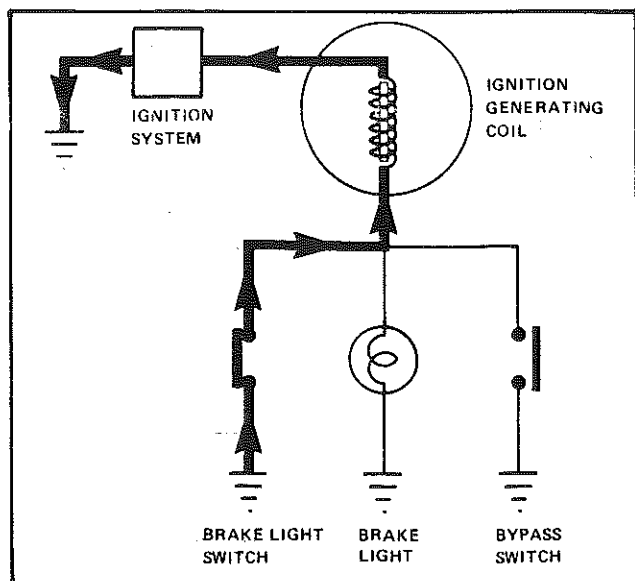
- (i) When the brake light switch is OFF, the path with least resistance is through the switch to ground.
- (ii) When brake is applied, brake light switch opens. Current flows through brake light filament.
- (iii) If brake light filament is burned, and the brake is applied, the ignition system circuit opens and the engine stop.
- (iv) When brake light filament is burned, and the bypass switch is pulled, the ignition system circuit is complete and allows engine operation.



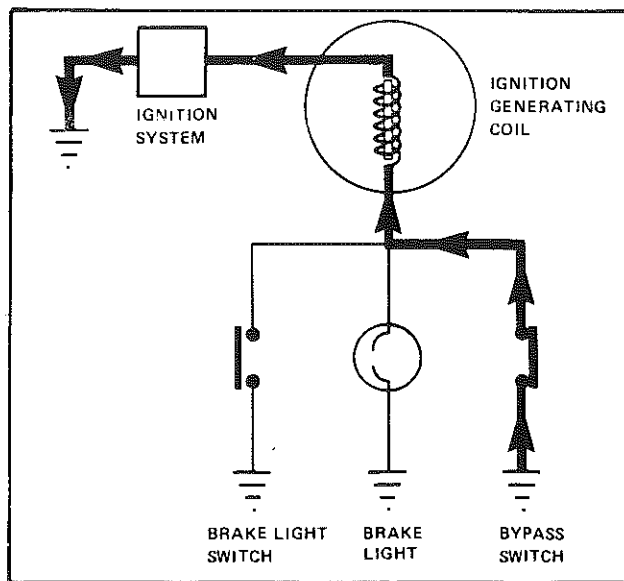
(ii)



(iii)



(i)



(iv)

