

**KAWASAKI**

**SHOP MANUAL**

**292 cc. ENGINE  
KT-150 SERIES**

**KAWASAKI MOTORS CORP.  
ENGINE DIVISION**

PRINTED JANUARY 1, 1970



# KT- 150 SERIES SHOP MANUAL

## SPECIFICATIONS

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## SPECIFICATIONS

### **Kawasaki KT 150-292**

|                   |  |
|-------------------|--|
| Type              | Single cylinder, two-cycle, piston valve                                   |
| Bore x Stroke     | 2.92 inches x 2.68 inches (74 mm x 68 mm)                                  |
| Displacement      | 17.8 cu. in. (292 cc)  |
| Compression Ratio | 7.4:1  |
| Weight            | 48.5 lbs. without carburetor or muffler                                    |
| Cylinder          | Aluminum Alloy with cast iron sleeve                                       |
| Lubrication       | Oil mixed with gasoline, 20 to 1 ratio                                     |
| Spark Plug        | NGK A6 or A7 or equivalent   |
| Starting System   | Recoil with emergency rope pulley  |
| Ignition System   | Flywheel magneto   |
| Ignition Timing   | 10° BTDC for starting automatically advancing to 25° BTDC during operation |

#### TIGHTENING TORQUES

|                               |             |
|-------------------------------|-------------|
| Cylinder Head Bolts           | 16 ft. lbs. |
| Crankcase Bolts               | 13 ft. lbs. |
| Flywheel Nuts                 | 56 ft. lbs. |
| Recoil Starter Mounting Bolts | 13 ft. lbs. |

## LUBRICATION

### MIXING RATIO

The engine is lubricated by mixing oil with the fuel in a ratio of 20 parts fuel to 1 part oil (20 to 1). Mix the fuel and the oil thoroughly in a separate container before pouring the mixture into the fuel tank.

To insure proper blending in cold weather, pre-mix the oil with a small quantity of gasoline and shake thoroughly until the mixture is well blended, then add the remainder of gasoline. Use a 5-gallon container for convenience. One quart of oil in 5 gallons of gas provides the proper 20 to 1 mixing ratio. Do not use Kerosene or fuel oil for pre-mixing.

### TYPE OF OIL

Use any good quality 2-cycle oil that is labeled for use in air-cooled engines or use the brand recommended by the vehicle manufacturer.

Avoid using racing oils in unmodified engines. Racing oils are specifically formulated for high RPM, high heat conditions and may produce excessive carbon or gum deposits when used in an unmodified engine at normal operating temperatures.



## section 2

# COMPLETE ENGINE DISASSEMBLY

1. Remove the engine from the vehicle chassis.
2. Remove carburetor, muffler, recoil starter assembly, and drive pulley. (See Photo A)
3. Remove spiral case and cylinder head cover.



PHOTO A



PHOTO B

4. Remove magneto assembly (use the flywheel). Mark the position of the magneto base before removing so it can be reinstalled in the same position. This will maintain the timing adjustment. (See Photo B)
5. Remove the automatic timing advance mechanism.

6. Remove cylinder head and slide cylinder upward off the piston. The piston may be removed at this time (see Section 4)(see Photo C).

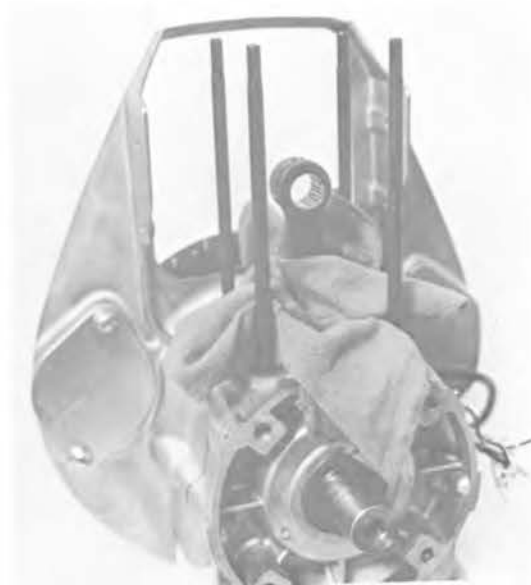


PHOTO C

7. Remove the six crankcase bolts and separate the cases. Hold one-half of the case while tapping the end of the crankshaft with a plastic hammer. Never use a steel hammer on the crankshaft. (See Photo D-E)

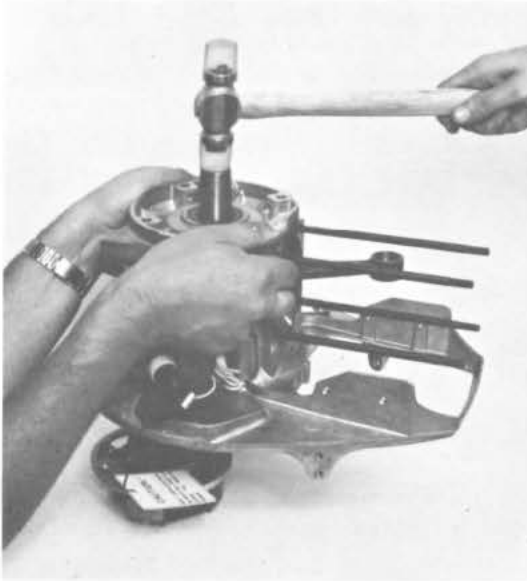


PHOTO D

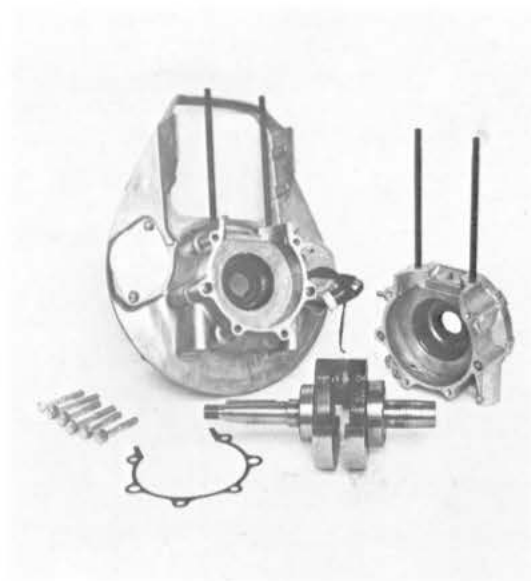


PHOTO E

## ENGINE REASSEMBLY

The engine can be reassembled by reversing the above procedure. Note the following items:

1. Pack the oil seal lips with bearing grease before reassembly.
2. Check the end play in the crankshaft and use shims to establish proper clearance. Refer to Section 3 of this manual (crankshaft repair).
3. Check the ignition timing and readjust if necessary.
4. Two of the crankcase bolts are 9 mm longer than the other four. Be sure the two are in their proper locations before tightening. Torque all 6 bolts to 13 ft. lbs. using a criss-cross tightening pattern. (See Photo F)

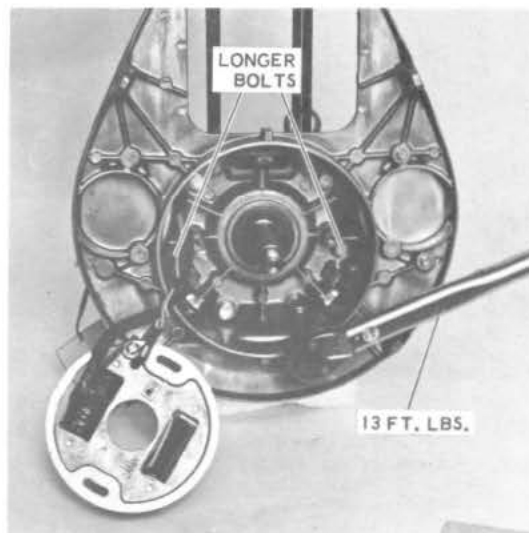


PHOTO F

## section 3

# CRANKSHAFT REPAIR

Main bearings may be removed and replaced but care should be taken so that the crankshaft is not misaligned during this procedure. Remove the crankshaft bearings with the special Kawasaki bearing replacement tool. When reinstalling new bearings, support the crankshaft between the flyweights to prevent accidental misalignment while the bearing is being pressed on.

## BIG END CONNECTING ROD BEARING

The crankshaft should be replaced if the shake in the connecting rod (radial play) exceeds 0.0009 in. (0.023 mm).

## CRANKSHAFT MISALIGNMENT

Check the runout of the crankshaft by mounting it between lathe centers. Use a dial indicator and measure runout in the middle of the bearing mounting surface. Runout should not exceed 0.0012 in. (0.03 mm). (See Photo G)



PHOTO G

**NOTE:** The crankshaft, crank pin, connecting rod, and large end bearing are a factory assembled unit and disassembly is not recommended. No warranty will be allowed for any component on an engine when the crankshaft has been disassembled. If a crankshaft fails during the warranty period, replace it with a new factory supplied assembly.

## END PLAY

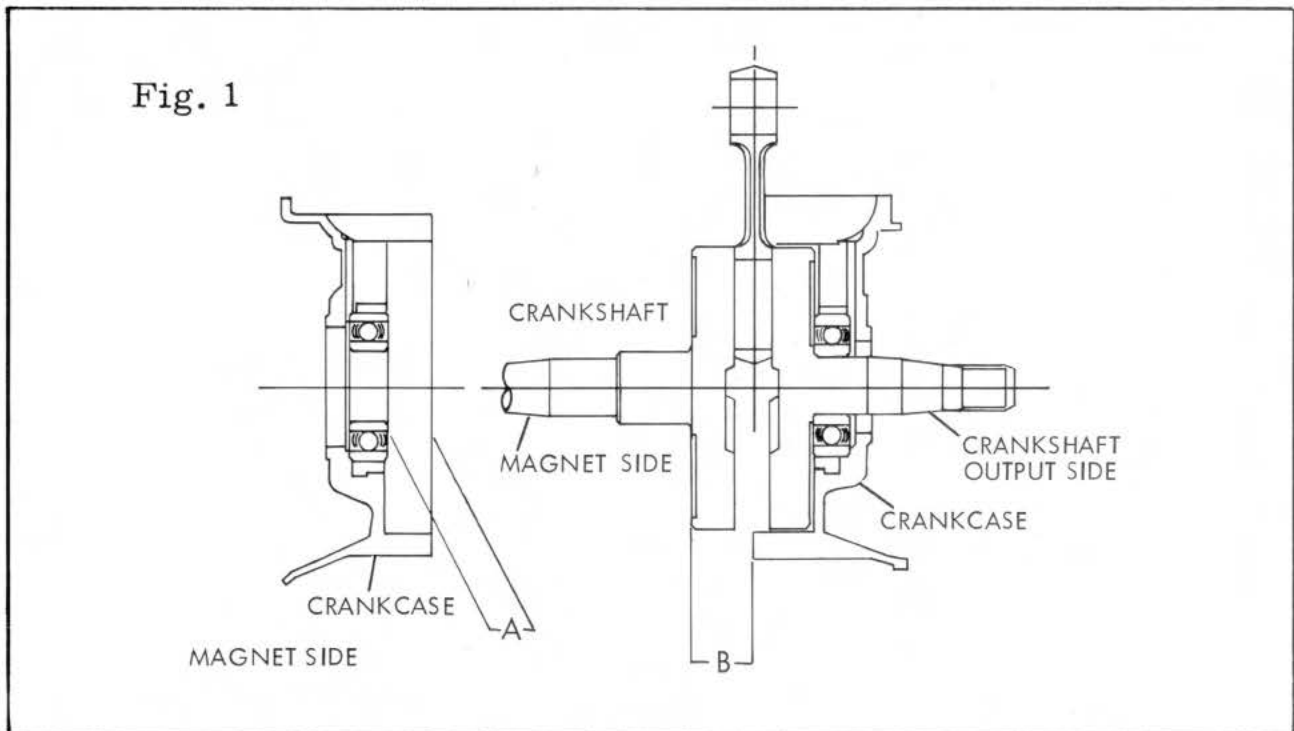
The proper crankshaft end play can be established by following these steps:

1. Install the output end of the crankshaft into the output side of the crankcase. See figure 1.
2. Measure distance B (the distance from the crankcase gasket surface with the gasket removed to the inside bearing mounting surface of the crankshaft flyweight).
3. Measure distance A (the distance from the inside mounting surface of the bearing to the crankcase gasket surface, gasket removed).
4. Subtract distance B from A and refer to the chart for the proper shim.

### SHIM CHART

| Difference B Subtracted from A           | Shim No. |
|--|----------|
| -0.0070 - -0.0009 inch (-0.2 - -0.01 mm) | None     |
| 0 - 0.0038 ( 0 - 0.09 )                  | 4        |
| 0.0039 - 0.0078 ( 0.10 - 0.19 )          | 1        |
| 0.0079 - 0.0118 ( 0.20 - 0.29 )          | 1 + 4    |
| 0.0119 - 0.0158 ( 0.30 - 0.39 )          | 2        |
| 0.0159 - 0.0198 ( 0.40 - 0.49 )          | 2 + 4    |
| 0.0199 - 0.0238 ( 0.50 - 0.59 )          | 3        |
| 0.0239 - 0.0278 ( 0.60 - 0.69 )          | 3 + 4    |
| 0.0279 - 0.0318 ( 0.70 - 0.79 )          | 1 + 3    |

| Shim No. | Parts No.      |
|----------|----------------|
| 1        | 318401-3231-00 |
| 2        | 318401-3232-00 |
| 3        | 318401-3233-00 |
| 4        | 318401-3234-00 |



## section 4

# TOP END REPAIR

The cylinder and piston can normally be serviced without removing the engine from the vehicle chassis.

1. Remove the exhaust pipe.
2. Remove the cylinder head and cylinder. Stuff a shop cloth into the crankcase opening around the connecting rod to prevent foreign objects from falling in the crankcase. (See Photo H)



PHOTO H

3. Remove the piston pin circlip and use the Kawasaki Universal Piston Pin Puller to remove the piston pin. Remove the piston and small end needle bearing. (See Photo I)

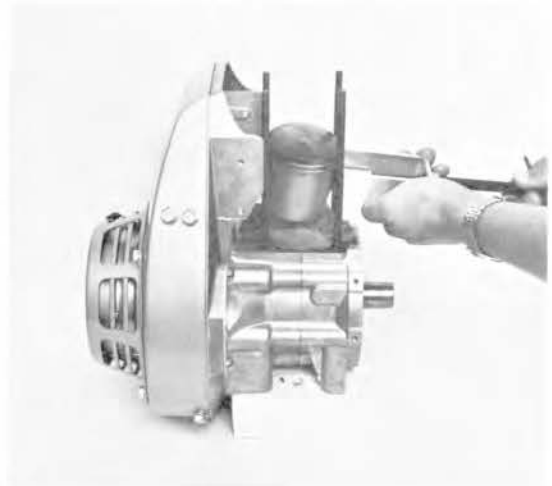


PHOTO I

4. The tension in the rings is high but they can easily be removed with a light cord as illustrated or with a ring removing tool. (See Photo J)



PHOTO J

Once the cylinder head, cylinder and piston have been removed, the cylinder head and the top of the piston should be completely decarbonized. In addition to top of the piston, it is necessary to make certain that the ring grooves are absolutely clean. Before replacing the upper end components, you should check the condition of the piston, the rings, and the upper end needle bearing and piston pin. The piston rings are the items most likely to wear, therefore, they should be checked very carefully. Worn rings can usually be detected by an increase in end gap or by discoloration of the piston skirt caused by bow-by, or they can be checked before disassembly by the use of a cylinder compression gauge. The piston ring end gap should be 0.006 to 0.014 inch (0.15 to 0.35 mm). It can be checked by placing the ring in the lower portion of the cylinder and measuring with a thickness gauge. (See Photo K)

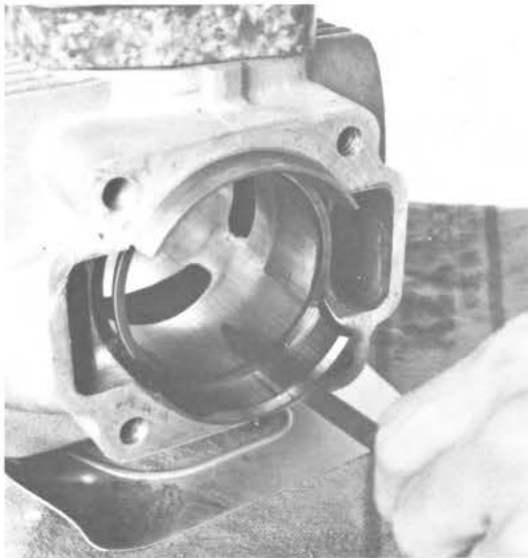


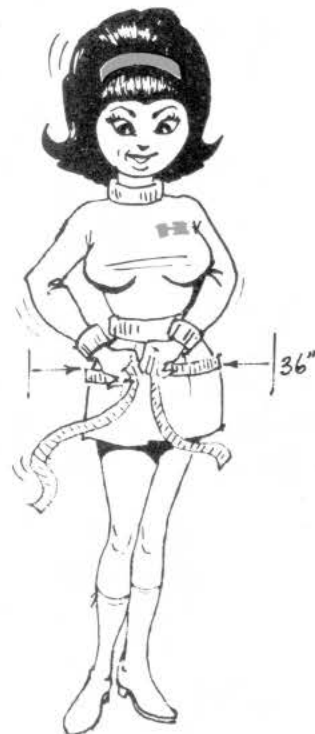
PHOTO K

If it is found that the cylinder walls have been damaged, it will probably be necessary to replace the cylinder. However, in case there are only small amounts of aluminum stuck to the cylinder bore but no grooves, it is possible to salvage the barrel by a very light honing.

## PISTON CLEARANCE

The standard piston to cylinder clearance at the piston skirt is 0.0035 inch but should not exceed 0.005 inch.

NOTE: The Kawasaki piston is made of special alloy with an anti-friction surface material. Always use genuine Kawasaki pistons for replacement in standard engines. The piston clearance should be increased on engines that are used for racing or if special pistons are installed.



## REASSEMBLING THE TOP END

Reassemble the top end by reversing the disassembly procedure. Observe the following notes when reassembling. Make sure the gasket surfaces are clean and lubricate all parts with 2-cycle oil as they are assembled to protect them when the engine is first started.

Reinstall the rings with the self-lubricating ring on top (green tinted) and with the notch in the end of the ring toward the top of the piston. Make certain this notch is aligned with the pin in the piston before attempting to install the cylinder. (See Photo L)



PHOTO L

Do not replace the small end bearing or the piston pin only. They are supplied as matched pairs from the factory and must be replaced as a set.

Reinstall the piston with the arrow pointing toward the output side of the crankshaft (towards the drive pulley). Tap the piston pin in place and make certain to install a new circlip. If the piston pin is too tight to be tapped in place, heat the piston first in boiling water to cause it to expand. (See Photo M)



PHOTO M

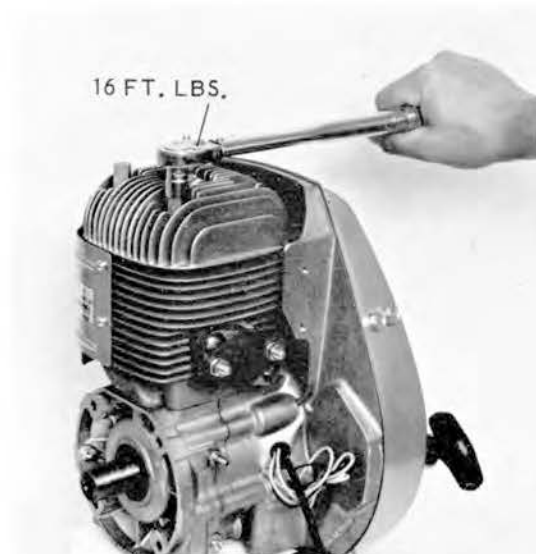


PHOTO N

Reinstall the cylinder carefully to prevent ring breakage, install a new head gasket and replace the head. Torque the head bolt to 16 ft. lbs. (See Photo N)

# IGNITION AND ELECTRICAL

## IGNITION TIMING ADJUSTMENT

To check or adjust the ignition timing, remove the recoil starter assembly and connect a timing buzzer or continuity tester to the black wire coming out of the engine. If the black wire is connected to the ignition switch, turn the switch to the ON position. Connect the other test lead to any grounded metal part of the engine. (See Photo O)

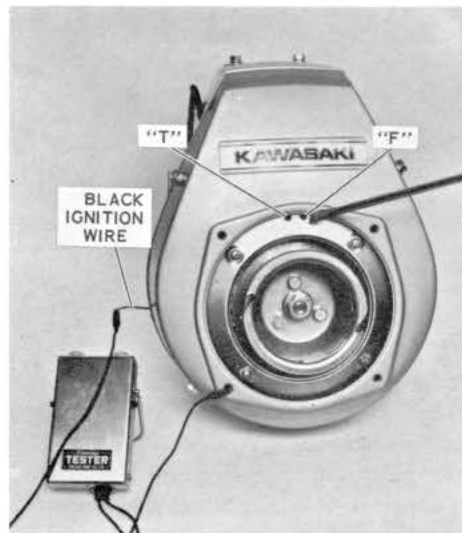


PHOTO O

The timing should be set so that the breaker points separate when inspection hole "F" lines up with the timing mark on the crankcase. The timing buzzer will change tone when the points separate. It may be necessary to illuminate the timing mark on the crankcase by shining a flash light on it from carburetor side of the engine, directing the light towards the back side of the cooling fan. Inspection hole "F" is the stationary timing mark (10° BTDC) and hole "T" indicates top dead center. The timing is automatically advanced to 25° BTDC at about 1800 RPM. (See Photo P)



PHOTO P

The ignition timing can usually be adjusted by a slight change in the point gap which can be adjusted by removing the recoil starter pulley and the inspection cover. (See Photo Q)

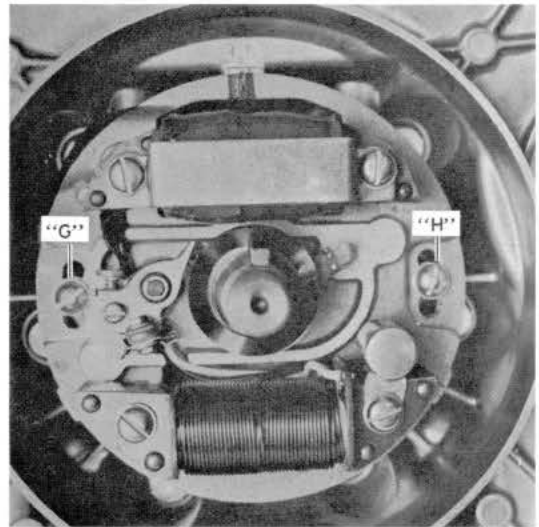
The breaker point gap should be between 0.012 and 0.016 inch (0.3 and 0.4 mm). If the timing adjustment cannot be made within these point adjustment limits, it will be necessary to remove the flywheel and either replace the breaker point assembly or change the position of the magneto base by loosening screws G and H. (See Photo R)

PHOTO Q



Inspect the breaker points for corrosion or pitting and replace the points if necessary. Replace the condenser if pitting is evident. Aerosol spray breaker point cleaner is very effective to remove grease and dust particles from the breaker points. Don't overuse the spray however, because it can remove the lubricant from the contact breaker cam.

PHOTO R



## IGNITION TROUBLESHOOTING

If the engine fails to produce spark or if the engine misfires, check according to the following sequence:

1. Make sure the ignition switch is on and that the black wire leading from the engine is not grounded to the frame.
2. Check with a timing buzzer to determine that the timing is correct and that the points are actually making contact when closed and are not grounded when open. Clean the breaker point surfaces or replace the breaker points if necessary.
3. Inspect for broken or grounded wires.
4. Replace the ignition coil and other components until the faulty component is found. Technicians experienced with electrical test equipment may prefer electronic testing, however, due to the simplicity of this system, the elimination process is often most efficient.

## RECOIL STARTER REPAIR



PHOTO S

This engine is equipped with a manual rewind rope spool to be used in emergency in case of recoil starter failure. Remove the recoil starter assembly from the engine and take out the waterproofing plate. (See Photo S)

### DISASSEMBLY

1. Release the preload on the recoil starter spring. This is done by positioning the rope in the notch located in the recoil reel and rotating the reel assembly counterclockwise. Rotate the recoil reel a sufficient number of turns so that slack remains in the rope when it is released.

2. Remove the center mounting nut and lift out the internal components. Carefully observe the location and relative position of each part, especially the positioning of the small return spring. (See Photo T)

Lift out the coupling reel carefully so that the main recoil spring is not pulled out with it. The main spring should not be removed from the outer coupling case unless it is necessary to clean or replace it.

3. If the main recoil spring must be removed, lift it out carefully so that injury does not occur from sudden uncoiling.
4. Thoroughly wash all components and lubricate them with petroleum jelly or light grease. Free movement of the recoil mechanism depends upon generous lubrication between the coils of the main recoil spring.

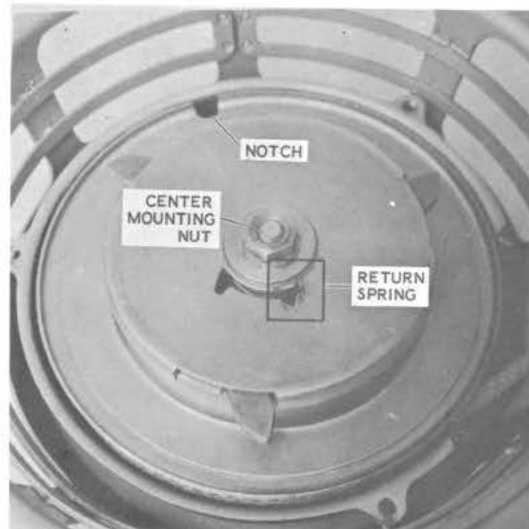


PHOTO T

## REASSEMBLY

1. With some trial and error experience, it is possible to wind the main recoil spring directly into the outer case, however, we recommend using an adjustable hose clamp adjusted to a diameter of 4-1/4 inches. The spring can be wound into the hose clamp starting with the outer coil first, pressing the inner coils into position one by one. The coil spring can then be transferred to the hose clamp from the outer case as illustrated. Note the winding direction of the spring in the photographs so that it is not accidentally installed upside down. (See Photo U) 1 2 3 4

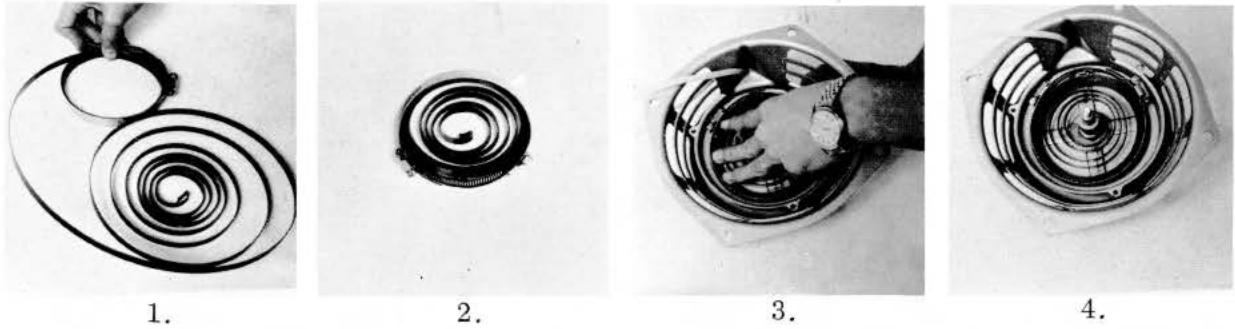


PHOTO U

2. Slip the recoil reel over the recoil spring so that the center hub of the recoil reel engages with the center of the spring. (See Photo V)

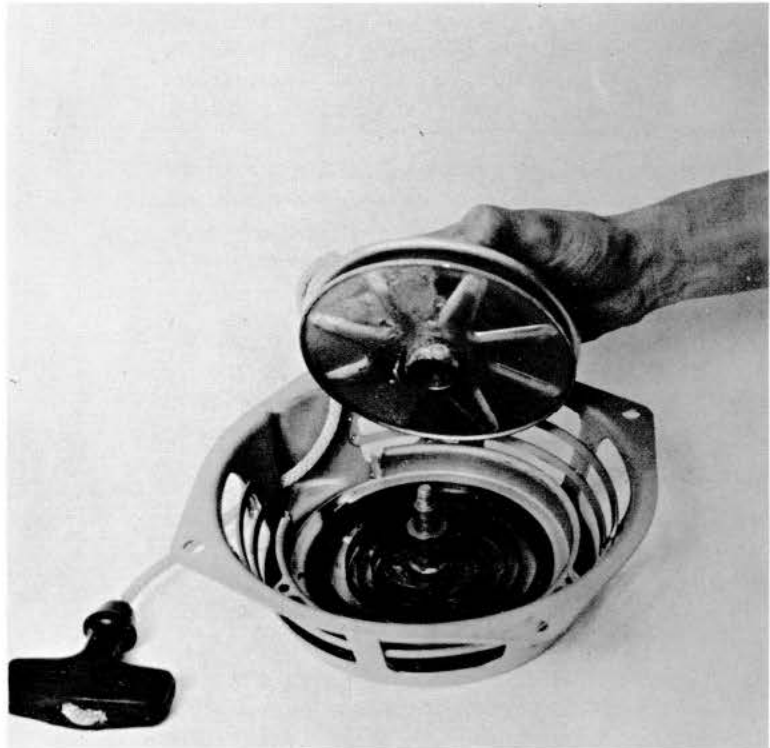


PHOTO V

PHOTO W



3. Install the washers, engagement pawls, and springs. Carefully position the small return spring with its end protruding through the retainer cover. Rotate the retainer cover one-third turn clockwise to slightly preload the return spring, insuring that the pawls do not extend when the engine is running. (See Photo W)

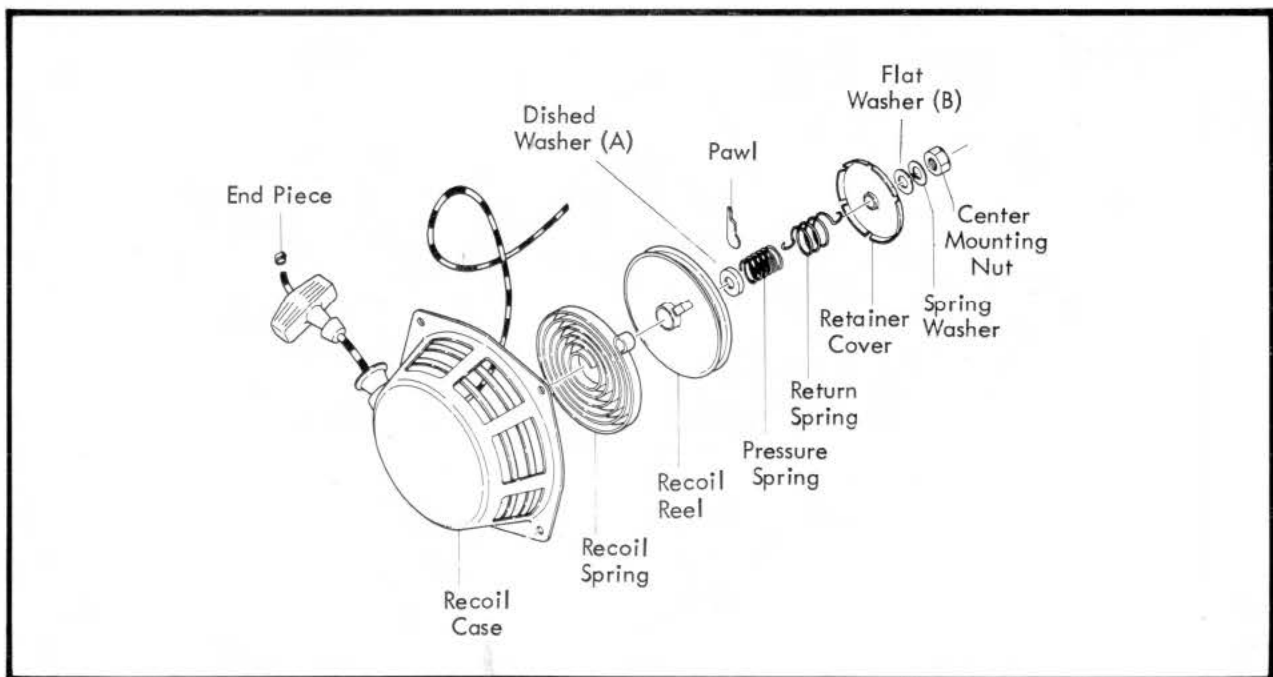
4. Install the center mounting washer and nut.

5. Position the rope in the notch in the recoil reel and rotate the recoil reel counterclockwise to tension the main recoil spring. The proper tension is obtained by rotating the recoil reel two additional turns counterclockwise after the slack is taken out of the rope.

6. Pull on the rope to check the operation of the assembly, especially that the pawls extend and retract properly. (See Photo X)



PHOTO X



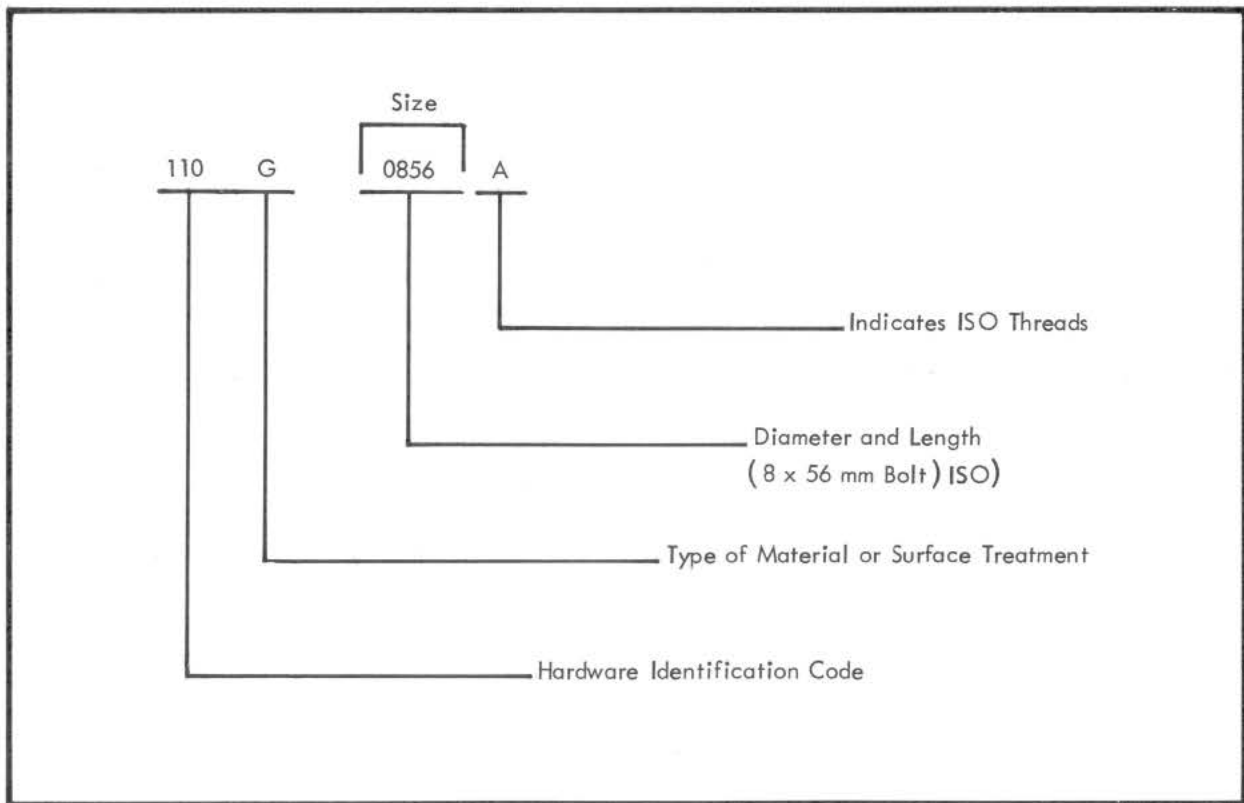
# section 7

## I.S.O. METRIC INFORMATION

### INFORMATION ON STANDARD HARDWARE ITEMS

KAWASAKI has accepted the ISO (International Standardization Organization) RECOMMENDATIONS on screw threads of bolts and nuts. Pay special attention when replacing threaded nuts, bolts and screws since some ISO parts are not interchangeable with old-type threaded parts you may have in stock.

Standard nuts, bolts, screws and washers are called Standard Hardware Items. Standard Hardware Items are interchangeable on all models of Kawasaki engines. Parts numbers of Standard Hardware Items are descriptive of the item.



#### EXAMPLES

|            |                 |
|------------|-----------------|
| 310B 0800A | 8 mm Nut ISO    |
| 171H 0820  | 8 x 20 mm Stud  |
| 410B 1000  | 10 mm Washer    |
| 211B 0616  | 6 x 16 mm Screw |

## HARDWARE ITEM IDENTIFICATION CODE

|     |   |
|-----|---|
| 110 | Standard pitch bolt   |
| 113 | Fine pitch small head bolt                                  |
| 114 | Fine pitch bolt   |
| 170 | Standard pitch stud (For steel and steel casting)           |
| 171 | Standard pitch stud (For cast iron and copper alloy)        |
| 172 | Standard pitch stud (For light alloy)                       |
| 173 | Fine pitch stud (For steel and steel casting)               |
| 174 | Fine pitch stud (For cast iron and copper alloy)            |
| 175 | Fine pitch stud (For light alloy)                           |
| 210 | Standard pitch flat head screw                              |
| 211 | Standard pitch round head screw                             |
| 212 | Standard pitch countersunk flat head screw — Straight Slot  |
| 213 | Standard pitch countersunk round head screw — Straight Slot |
| 220 | Standard pitch pan head screw                               |
| 221 | Standard pitch countersunk flat head screw — Cross Slot     |
| 222 | Standard pitch countersunk round head screw — Cross Slot    |
| 310 | Standard pitch nut — Countersink One Side                   |
| 311 | Standard pitch nut — Countersink Both Sides                 |
| 312 | Standard pitch thin nut                                     |
| 313 | Fine pitch nut — Countersink One Side                       |
| 314 | Fine pitch nut — Countersink Both Sides                     |
| 315 | Fine pitch thin nut   |
| 410 | Standard washer   |
| 411 | Large outside diameter washer                               |
| 460 | Standard spring washer                                      |
| 461 | Large outside diameter, thick spring washer                 |

## THREAD PITCHES

DIMENSIONS GIVEN IN MILLIMETERS

| Bolt Diameter | 03  | 04  | 05  | 06  | 08   | 10   | 12   | 14  | 16  | 18  | 20  |
|---------------|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|
| Standard      | 0.5 | 0.7 | 0.8 | 1.0 | 1.25 | 1.5  | 1.75 | 2.0 | 2.0 | 2.5 | 2.5 |
| Fine          |     |     |     |     | 1.0  | 1.25 | 1.25 | 1.5 | 1.5 | 1.5 | 1.5 |

## METRIC EQUIVALENTS

One inch is approximately equal to 25 mm, 25.4 mm to be more exact.

One millimeter is approximately equal to 0.040 inch, 0.0394 inch to be more exact.

To Change:

Inches to millimeters (mm), multiply inches by 25.4.

Millimeters to inches, multiply millimeters by 0.0394.



Kawasaki Motors Corp. 5100 EDINA INDUSTRIAL BLVD., MINNEAPOLIS, MINNESOTA 55435

LITHO IN U.S.A.