KX125-A6

KAWASAKI
HEAVY INDUSTRIES, LTD.
MOTORCYCLE DIVISION

Part No. 99920-1089-02

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80

Kawasaki

KX125

Motorcycle

Owner's Manual & Service Manual

Whenever you see the symbols shown below, heed their instructions! Always follow safe operating and maintenance practices.

WARNING This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in **personal injury, or loss of life.**

CAUTION This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in **damage to or destruction of equipment.**

"NOTE" indicates points of particular interest for more efficient and convenient operation.

WARNING

- THIS VEHICLE IS AN OFF-ROAD VEHICLE ONLY AND WAS NOT MANUFACTURED FOR USE ON PUBLIC STREETS, ROADS, OR HIGHWAYS.
- FOR OFF-ROAD USE IN CERTAIN AREAS, THE OPTIONAL SILENCING KIT MUST BE INSTALLED.
- USE YOUR BIKE LEGALLY.
- RESPECT THE ENVIRONMENT AND THE RIGHTS OF OTHER PEOPLE.

DISCLAIMER OF WARRANTY

THIS MOTORCYCLE IS SOLD AS IS, WITH ALL FAULTS, OBVIOUS OR CONCEALED AND THERE ARE NO WARRANTIES EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS.

The purchaser accepts all responsibilities concerning quality, performance, cost of service and/or necessary repairs.

IMPORTANT

Off-road motorcycle riding is a wonderful sport, and we hope you will enjoy it to the fullest.

However, if improperly conducted, the sport has the potential to cause environmental problems as well as conflicts with other people. Responsible use of your off-road motorcycle will ensure that these problems and conflicts do not occur.

TO PROTECT THE FUTURE OF YOUR SPORT, MAKE SURE YOU USE YOUR BIKE LEGALLY, SHOW CONCERN FOR THE ENVIRONMENT, AND RESPECT THE RIGHTS OF OTHER PEOPLE.

MEMO

Foreword

Congratulations for choosing the KAWASAKI Motorcycle, which has been developed through Kawasaki engineering to produce a light weight, high performance machine with superb handling and stability for racing and sporting use.

Your new KX125 is a highly tuned production racer, and thus does not require tuning modification for participation in racing events. However, as with any mechanical device, proper care and maintenance are important for trouble-free operation and top performance. This guide is written to enable you to keep your KX125 properly tuned and adjusted.

Due to improvements in design and performance during production, in some cases there may be minor discrepancies between the actual vehicle and the illustrations and text in this manual.

Dec. 1979. ②. 2 (Ki)

Table of Contents

MEMO

MEMO

Specifications

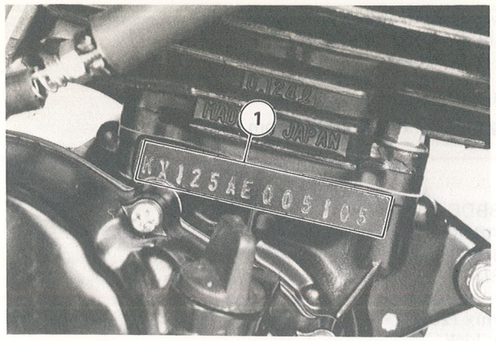
Dimensions		
Overall length		2,160 mm (85.0 in)
Overall width		880 mm (34.6 in)
Overall height		1,230 mm (48.4 in)
Wheelbase		1,470 mm (57.9 in)
Road clearance		330 mm (13.0 in)
Dry weight		91 kg (201 lbs)
Fuel tank capacity		8.0 ℓ (2.1 US gal)
Engine		
Type		2-stroke, single cylinder, piston reed valve
Bore and stroke		56.0 x 50.6 mm (2.20 x 1.99 in)
Displacement		124 cc (7.56 cu in)
Compression ratio		7.6
Maximum horsepower		26 HP/10,750 rpm (r/min)
Maximum torque		1.75 kg-m (12.7 ft-lbs)/10,500 rpm (r/min)
Port timing		
Intake	Open	62.5° BBDC
	Close	62.5° ABDC
Scavenging	Open	99° BBDC
	Close	99° ABDC
Exhaust	Open	Mikuni VM32SS
	Close	Petrol mix (20:1)
Carburetor		Primary kick
Lubrication system		Electronic CDI
Starting system		23° (2.38 mm) BTDC/6,000 rpm (r/min)
Ignition system		NGK B9EV
Ignition timing		Eyvind Boyesen's valve
Spark Plug		(Patent No. 3905340, 3905341, 4000723)
Reed Valve		
Transmission		
Type		6-speed, constant mesh, return shift
Clutch		Wet multi disc
Gear ratio:	1st	2.14 (30/14)
	2nd	1.67 (30/18)
	3rd	1.33 (24/18)
	4th	1.15 (23/20)
	5th	1.00 (21/21)
	6th	0.91 (20/22)
Primary reduction ratio		3.55 (71/20)
Final reduction ratio		4.33 (52/12)
Overall drive ratio		13.98 (Top)
Transmission oil:	Capacity	0.55 ℓ (0.58 US qt)
	type	SE class SAE 10W30 or 10W40
Frame		
Type		Tubular, single down tube
Steering angle		42° to either side
Castor		28°
Trail		120 mm (4.72 in)
Tire size:	Front	3.00-21 4PR
	Rear	4.00-18 4PR
Suspension:	Front	Telescopic fork
	Rear	Swing arm
Front suspension stroke		280 mm (11.0 in)
Rear wheel travel		280 mm (11.0 in)
Front fork oil (per shock absorber)		KYB G-15 or SAE 10W20 362 cc (12.24 US fl oz)
Brakes		
Inside diameter:	Front	120 x 28 mm (4.7 x 1.1 in)
	Rear	130 x 28 mm (5.1 x 1.1 in)

Specifications subject to change without notice and may not apply to every country.

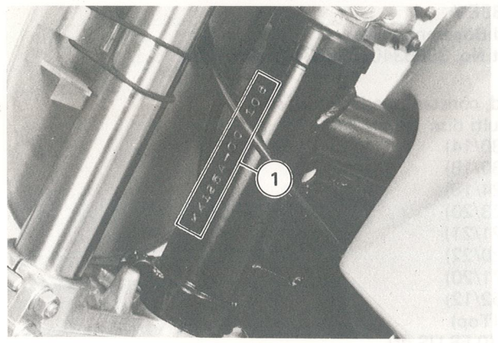
General Information

SERIAL NUMBER LOCATIONS

The frame and engine serial numbers are the only means of identifying your particular machine from others of the same model type. These serial numbers may be needed by your dealer when ordering parts. In the event of theft, the investigating authorities will require both numbers as well as the model type and any peculiar features of your machine that can help them identify it.



1. Engine Number



1. Frame Number

FUEL

The fuel is a mixture of gasoline and oil.

Gasoline	Octane Rating 95 or Higher
Recommended Oil	Two Stroke Racing Oil
Recommended Mixture Ratio	20:1

Thoroughly mix the gasoline and oil.

NOTES: ○The lubricative quality of this mixture deteriorates rapidly; use a fresh mixture for each day of operation.

○Do not mix a vegetable oil with a mineral oil.

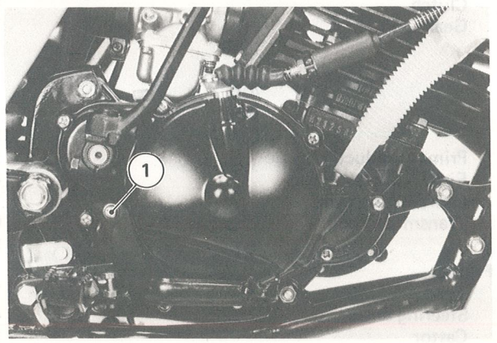
TRANSMISSION OIL

In order for the transmission and clutch to function properly, maintain the transmission oil at the proper level, and change the oil periodically. Motorcycle operation with insufficient, deteriorated, or contaminated transmission oil will cause accelerated wear and may result in transmission seizure.

Oil Level

Check the oil level with the oil inspection screw on the right engine cover. When checking the oil, position the vehicle so that it is fully perpendicular to the ground.

●Remove the oil inspection screw. The oil should just run out of the hole when the motorcycle is held vertical.



1. Oil Inspection Screw

●If there is too much oil, remove the excess oil with a syringe or some other suitable device.

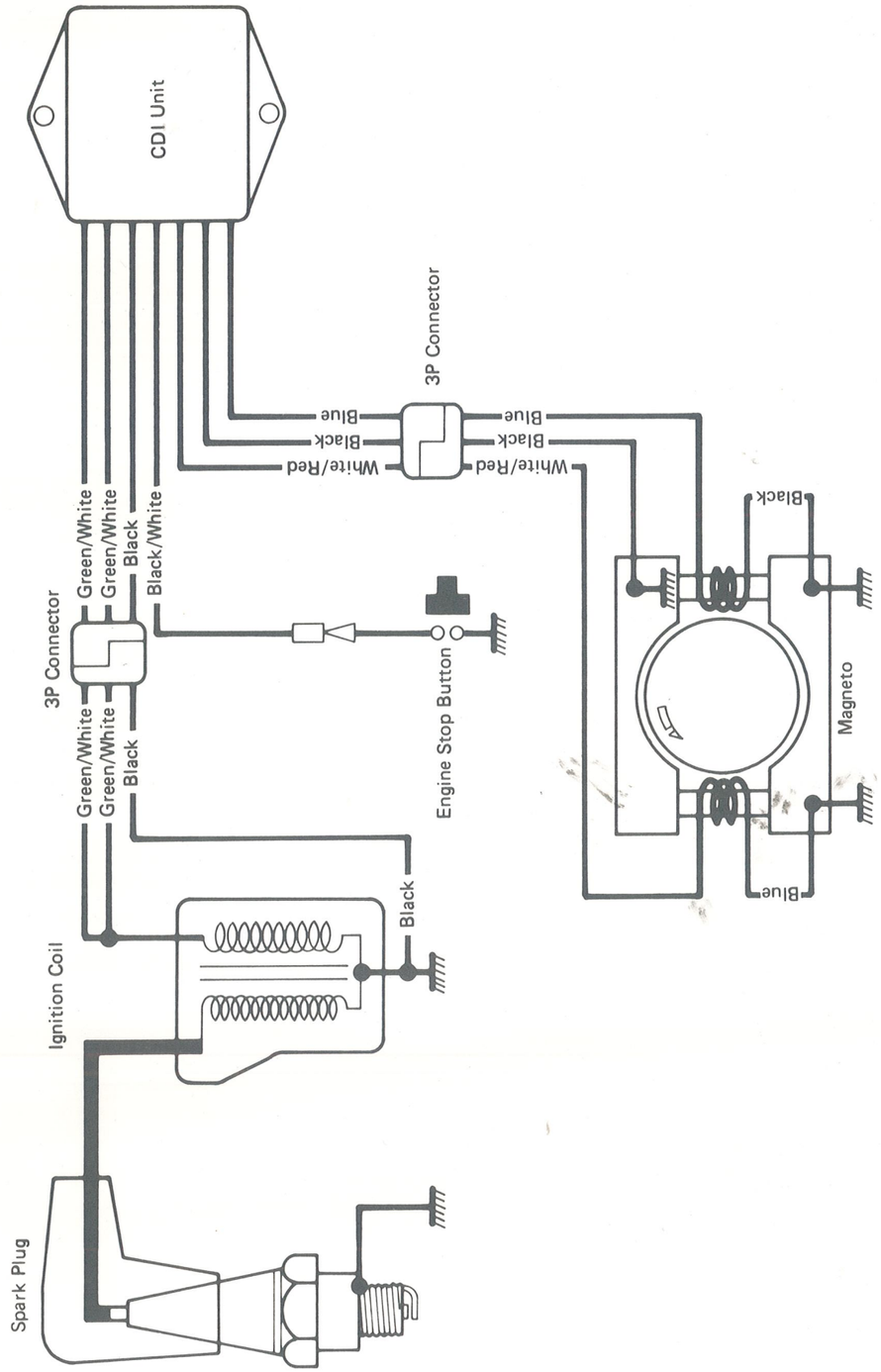
●If there is too little oil, add the correct amount of oil through the oil filler opening. Fill with the same type and make of oil that is already in the transmission.

Oil Change

The transmission oil should be changed periodically to ensure long engine life.

●Warm up the engine thoroughly so that the oil will pick up any sediment and drain easily.

WIRING DIAGRAM



The table below, relating tightening torque to thread diameter and pitch, lists the basic torque for the bolts and nuts used on Kawasaki Motorcycles. However, the actual torque that is necessary may vary among bolts and nuts with the same thread diameter and pitch. The bolts and nuts listed on Pg. 55 vary to a greater or lesser extent from what is given in this table. Refer to this table for only the bolts and nuts not included in the table on Pg. 55. All of these values are for use with dry solvent cleaned threads.

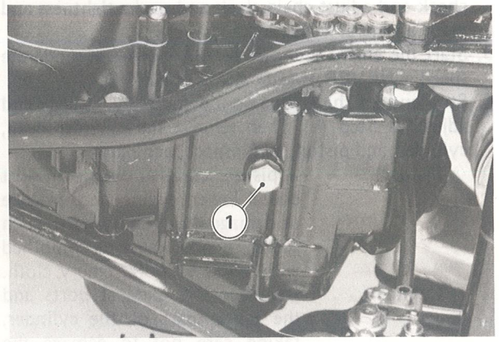
Coarse threads

dia (mm)	pitch (mm)	kg-m	ft-lbs
5	0.80	0.35~0.50	2.5~3.5
6	1.00	0.6~0.9	4.5~6.5
8	1.25	1.6~2.2	11.5~16.0
10	1.50	3.1~4.2	22~30
12	1.75	5.4~7.5	39~54
14	2.00	8.3~11.5	60~83
16	2.00	13~18	94~130
18	2.50	18~25	130~181
20	2.50	26~35	188~253

Fine threads

dia (mm)	pitch (mm)	kg-m	ft-lbs
5	0.50	0.35~0.50	2.5~3.5
6	0.75	0.6~0.8	4.5~5.5
8	1.00	1.4~1.9	10.0~13.5
10	1.25	2.6~3.5	19.0~25
12	1.50	4.5~6.2	33~45
14	1.50	7.4~10.2	54~74
16	1.50	11.5~16	83~116
18	1.50	17~23	123~166
20	1.50	23~33	166~239

- Stop the engine, and place an oil pan beneath the engine.
- Remove the drain plug and position the vehicle so that it is fully perpendicular to the ground to allow all the oil to drain out.

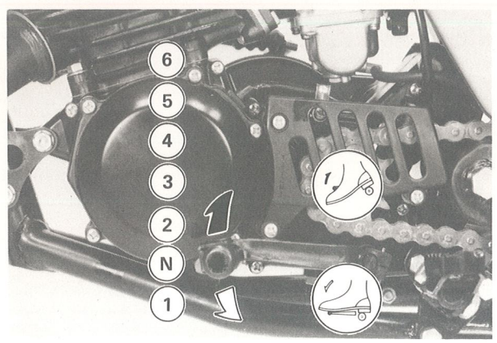


1. Drain Plug

- Install the drain plug with its gasket, tightening it to 1.3 kg-m (9.5 ft-lbs) of torque.
- Remove the oil filler plug, and pour in 0.55 ℓ (0.58 US qt) of fresh transmission oil.
- Check the oil level, after kicking the kick pedal 3 or 4 times.
- Install the oil filler plug.

TRANSMISSION

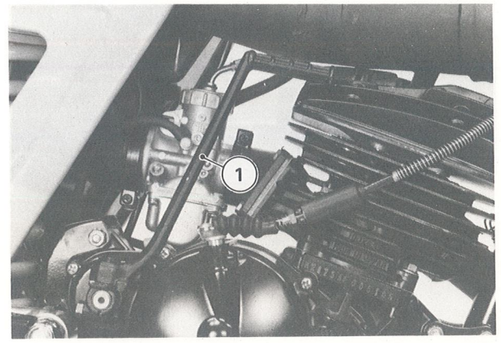
The transmission is a 6-speed, return shift type. Neutral is located between 1st and 2nd gears; 1st gear is reached by shifting down from neutral, and 2nd through 6th gears are reached by shifting up from neutral. The shift pattern is shown on the engine sprocket cover.



1. Shift Pedal

KICKSTARTER

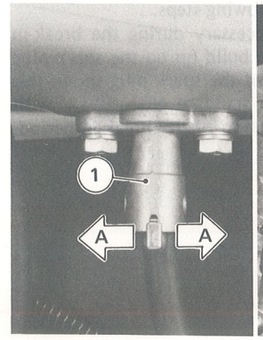
Since the starter is a primary kick type, the engine can be started even if the transmission is in gear, by pulling in the clutch lever and kicking the engine over.



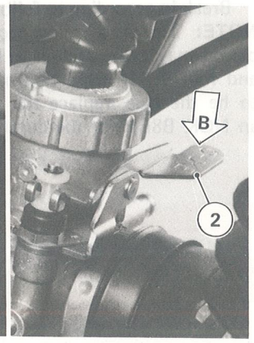
1. Kick Pedal

STARTING THE ENGINE

- Turn the fuel tap to **ON.**
- If the engine is cold, push down the choke lever, leaving the throttle closed.



1. Fuel Tap
A. ON position



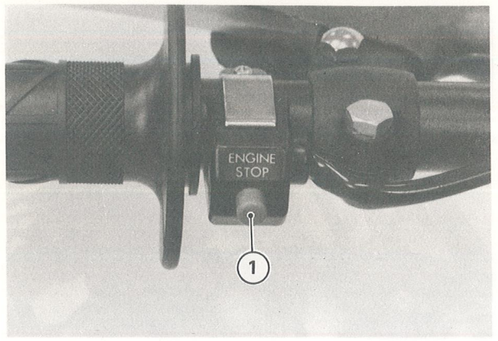
2. Choke Lever
B. Push down.

- Kick the engine over.
- Even after the engine starts, keep the choke lever pushed down. When the engine is thoroughly warmed up, pull up the choke lever.

NOTES: ○When the engine is already warm or on hot days, open the throttle part way instead of using the choke lever.
○If the engine is flooded, kick with the throttle fully open until the engine starts.
○If the clutch lever is pulled, the motorcycle can be started while in any gear.

STOPPING THE ENGINE

- Shift the transmission into neutral.
- After racing the engine slightly, close the throttle completely and push the engine stop button.



1. Engine Stop Button

- Turn the fuel tap to the **OFF** (Stop) position.

BREAK-IN

To obtain the proper operating clearances in the engine and transmission that are necessary for smooth engine performance and reliability, a brief break-in procedure must be carried out. For the first hour or 20 km (12 mi) of operation, run the engine at low and moderate rpm (r/min).

Break in according to following steps.

NOTE: The slow riding necessary during the break-in period may cause carbon to build up on the spark plug and foul it. If inspection of the spark plug shows this to be the case, replace the standard NGK B9EV with an NGK B8EV for the duration of the break-in period.

1. Start the engine and let it run at idle until the engine is thoroughly warmed up.
2. Stop and let the engine cool completely.
3. Start the engine and ride for 10 minutes at moderate speed – **NEVER HARD ACCELERATION.**
4. Stop and let the engine cool completely. Be sure to check and adjust chain slack and spoke tightness and make a general inspection.
5. Start the engine and ride for 20 minutes at moderate speed – **NEVER HARD ACCELERATION.**
6. Stop and let the engine cool completely. Check and adjust as Step 4. Then remove the cylinder head, cylinder, and piston, and inspect each parts.
   - Piston: A piston scored at the piston skirt could lower engine performance or damage the cylinder wall. Such scores, if any, must be smoothed with #400 to #600 emery cloth.
   - Cylinder: Decarbon the exhaust ports and the upper part of the cylinder, taking care not to damage the cylinder wall. Scores on the cylinder wall should be smoothed with #400 to #600 emery cloth.
   - Cylinder Head: Remove the carbon inside the combustion chamber.
7. Start the engine and ride for 30 minutes at moderate speed – **NEVER HARD ACCELERATION.**
8. Stop and let the engine cool completely. Check and adjust as Step 4.
9. After the break-in procedure has been properly carried out, the motorcycle is ready for regular operation. However, since recklessly high rpm (r/min) will lead to engine trouble, take care to use the necessary skill and technique in operating the motorcycle.

NOTE: After break-in, install a new NGK B9EV spark plug, and change the transmission oil.

TORQUE TABLE

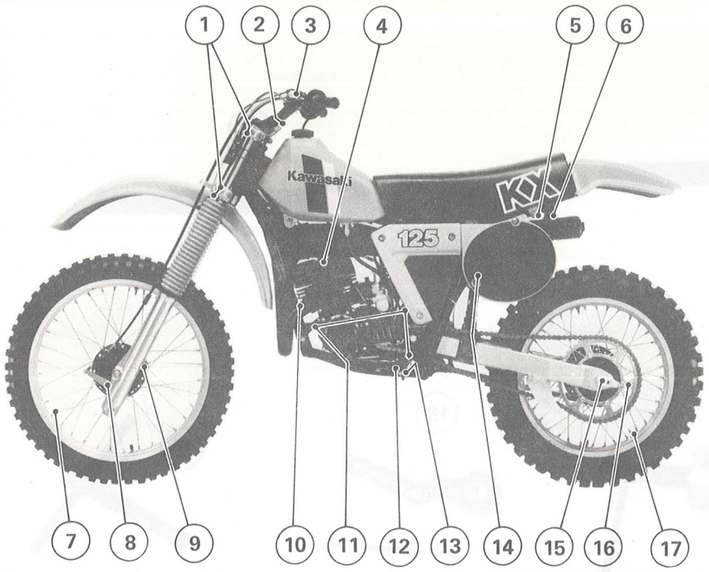
Tighten all bolts and nuts to the proper torque using an accurate torque wrench. A bolt or nut if insufficiently tightened may become damaged or fall out, possibly resulting in damage to the motorcycle and injury to the rider. A bolt or nut which is over-tightened may become damaged, strip internal screw, or break and then fall out.

The following table lists the tightening torque for the major bolts and nuts:

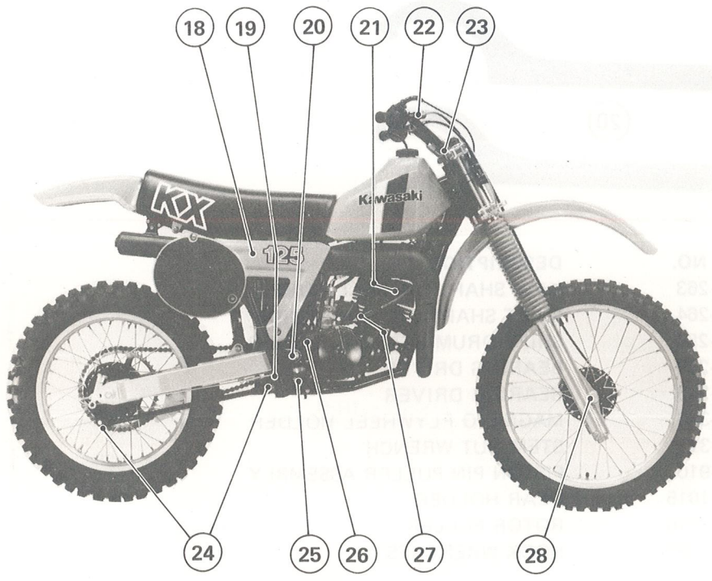
Part Name		Metric (kg-m)	English (ft-lbs)	See Pg.
Brake Pedal Bolt		2.0	14.5	–
Clutch Hub Nut		5.0	36	31
Clutch Spring Bolts (6)		0.45	39 (in-lbs)	31
Cylinder Nuts (4)		2.2	16.0	34, 37
Cylinder Head Nuts (5)		2.5	18	11, 34, 37
Engine Drain Plug		1.3	9.5	5
Engine Mounting Bolts (4)		2.4	17.5	–
Front Axle Nut		5.0	36	–
Front Fork Clamp Bolts (6)		1.6	11.5	13
Front Fork Top Bolts (2)		2.0	14.5	–
Front Panel Stop Bolt		4.0	29	–
Footpeg Mounting Bolts (2)		2.5	18.0	–
Handlebar Clamp Bolts (4)		1.6	11.5	–
Magneto Rotor Bolt		2.2	16.0	32
Pivot Shaft Nut		9.0	65	–
Primary Gear Nut		4.8	35	32
Rear Axle Nut		9.0	65	14
Rear Sprocket Bolts (6)		1.9	13.5	–
Shock Absorber Bolt	Upper	10.0	72	–
	Lower	6.0	43	–
Spark Plug		2.8	20	9
Spokes		0.3	26 (in-lbs)	–
Steering Stem Clamp Bolt		1.6	11.5	13
Steering Stem Head Bolt		6.0	43	13
Torque Link Bolts (2)	Front	6.0	43	–
	Rear	2.2	16.0	14
Uni-trak Arm Center Bolt		10.0	72	–
Uni-trak Link Bolts	Upper	10.0	72	–
	Lower	6.0	43	–

BOLT AND NUT TIGHTENING

Every day before riding, check without fail the tightness of the bolts and nuts described here. Also, check to see whether or not each cotter pin is in place and in good condition.



1. Front Fork Clamp Bolts
2. Handlebar Mounting Bolts
3. Clutch Lever Mounting Bolt
4. Spark Plug
5. Seat Mounting Bolt
6. Silencer Mounting Bolt
7. Spokes
8. Brake Cam Lever Bolt
9. Brake Panel Stop Bolt
10. Muffler Mounting Springs
11. Engine Mounting Bolts and Nuts
12. Shift Pedal Bolt
13. Footpeg Mounting Bolt
14. Uni-trak Link Bolts
15. Rear Axle Nut
16. Chain Adjuster Locknut
17. Bead Protector Nut



18. Uni-trak Center Bolt
19. Rear Shock Absorber Bolts
20. Pivot Shaft Nut
21. Cylinder Head Nuts
22. Brake Lever Mounting Bolt
23. Steering Stem Head Bolt
24. Torque Link Bolts
25. Rear Brake Pedal Bolt
26. Kick Pedal Bolt
27. Cylinder Base Nuts
28. Axle

PERIODIC MAINTENANCE CHART

OPERATION \ FREQUENCY	Each race	Every 2 races	Every 3 races	Every 5 races	Every 10 races	See Page
Brake adjustment — check †	•					14
Brake wear — check †					•	43
Piston ring — replace			•			—
Clutch — adjust	•					8
Engine sprocket — check †					•	45
Rear sprocket — check †				•		45
Throttle cable — adjust	•					9
Air cleaner element — clean	•					11
Air cleaner element — replace	Every 5 cleanings		•			11
Transmission oil — change		•				4
Main bearings — check †					•	44
Big end bearing — check †					•	44
Spoke tightness and rim runout — check †	•					15
Drive chain — adjust	•					13
Drive chain — lubricate	•					19
Drive chain — replace				•		45
Front fork — inspect/clean	•					—
Front fork oil — change				•		46
Nuts, bolts, fasteners — check and torque	•					54
Fuel system — clean	•					—
Steering play — check †	•					12
General lubrication — perform	•					19
Wheel bearings — grease					•	44
Brake camshaft — grease				•		19
Steering stem bearings — grease				•		47
Spark plug — clean and gap †	•					9
UNI-TRAK links bearing wear — check †		•				47
UNI-TRAK arm bearing wear — check †		•				47
UNI-TRAK bearings — grease		•				19

† Replace, add or adjust if necessary.

Inspection and Adjustment

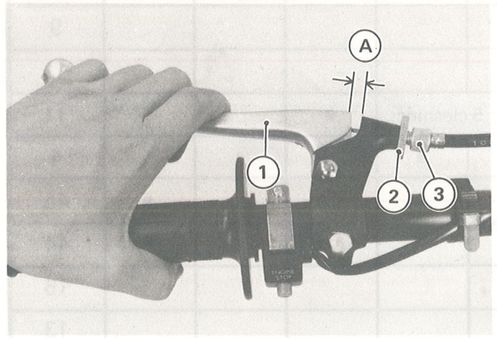
CLUTCH

Clutch Lever

Proper clutch lever play between the clutch lever and the clutch lever holder is 2～3 mm (0.08～0.12 in). The play increases with the cable stretch and the friction plate wear, necessitating adjustment.

When there is too much lever play, first try adjusting the cable at the clutch lever.

- Slide the clutch lever dust cover out of place.
- Loosen the knurled locknut, turn the adjuster to obtain the proper amount of lever play, and tighten the locknut.

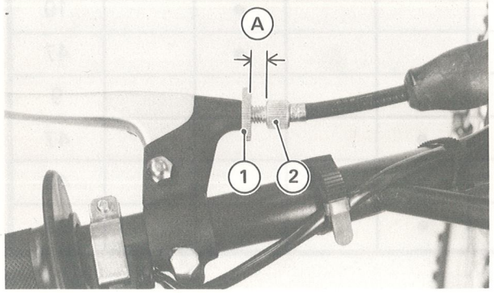


1. Clutch Lever
2. Knurled Locknut
3. Adjuster
A. 2～3 mm (0.08～0.12 in)

- Slide back the clutch lever dust cover.

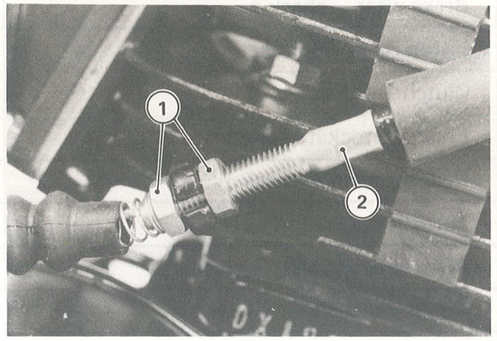
If the adjuster at the clutch lever has reached its limit, adjust the cable with the adjuster on the right engine cover.

- Loosen the knurled locknut at the clutch lever just enough so that the adjuster will turn freely, and then turn the adjuster so that there is a 5～6 mm (0.20～0.24 in) gap between the adjuster and locknut.



1. Knurled Locknut
2. Adjuster
A. 5～6 mm (0.20～0.24 in)

- Slide the dust cover out of its position at the bottom of the clutch cable.
- Loosen the nuts and take up all the cable play by sliding the adjuster. Tighten the nuts.



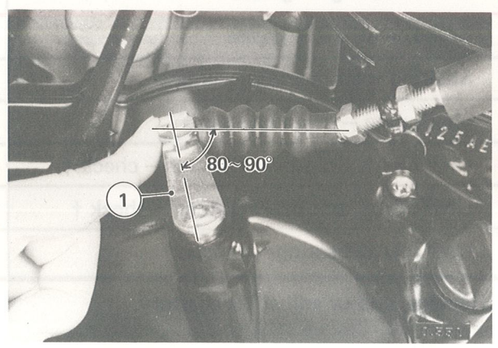
1. Nuts
2. Adjuster

- Slide the dust cover back into place.
- Turn the adjuster at the clutch lever so that the clutch lever will have 2～3 mm (0.08～0.12 in) of play, and tighten the locknut.
- Slide back the clutch lever dust cover.

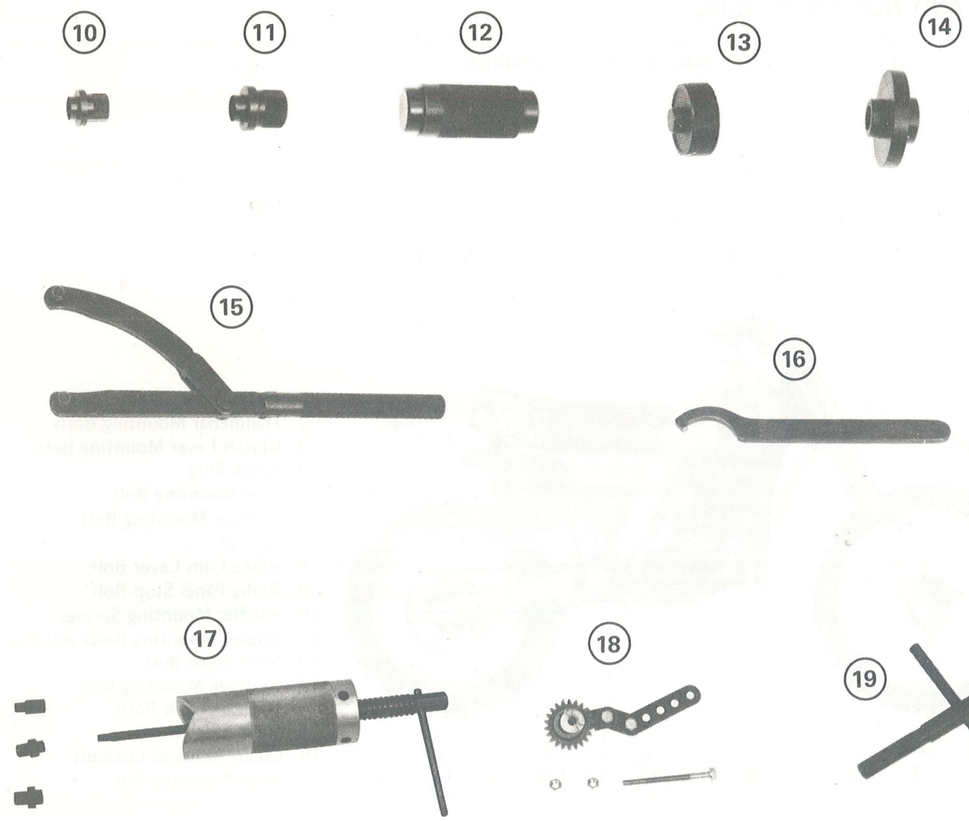
Clutch Release Lever

If the clutch slips or the action at the lever feels heavy despite proper clutch cable adjustment, inspect and adjust the clutch release mechanism in the following manner.

- Slide the dust cover on the lower end of the clutch cable. Loosen the nuts, and slide the adjuster to give the cable plenty of play.
- Turn the clutch release lever until it becomes hard to turn. This is the point where the clutch is just starting to release. At this time, check that the clutch release lever to clutch cable angle is 80～90°.

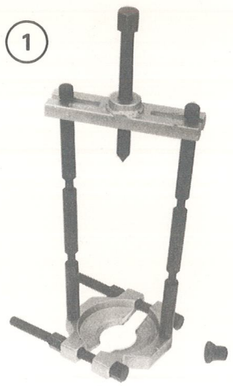


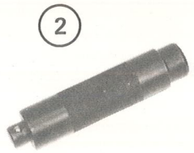
1. Clutch Release Lever

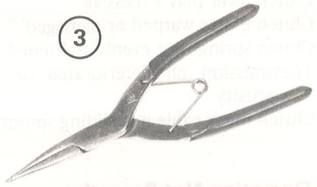


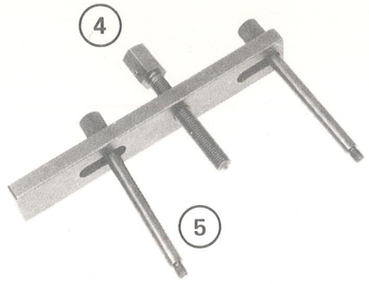
REF. NO.	TOOL NO.	DESCRIPTION
10	57001-263	KICK SHAFT OIL SEAL GUIDE
11	57001-264	SHIFT SHAFT OIL SEAL GUIDE
12	57001-286	SHIFT DRUM BEARING DRIVER
13	57001-290	BEARING DRIVER
14	57001-296	BEARING DRIVER
15	57001-306	MAGNETO FLYWHEEL HOLDER
16	57001-321	STEM NUT WRENCH
17	57001-910	PISTON PIN PULLER ASSEMBLY
18	57001-1015	GEAR HOLDER
19	57001-1016	ROTOR PULLER
20	57001-1083	HOOK WRENCHES

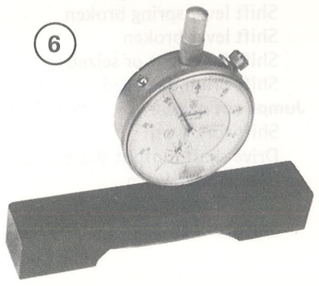
SPECIAL TOOLS

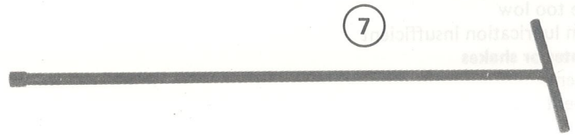






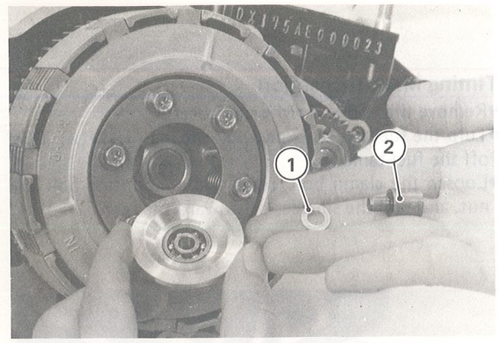






REF. NO.	TOOL NO.	DESCRIPTION
1	57001-135	BEARING PULLER
2	57001-139	BEARING DRIVER HOLDER
3	57001-144	CIRCLIP PLIERS
4	57001-153	CRANKCASE SPLITTING TOOL
5	57001-157	CRANKCASE SPLITTING TOOL ADAPTER
6	57001-160	TDC FINDER "B"
7	57001-183	FRONT FORK CYLINDER HOLDER HANDLE
8	57001-1011	CYLINDER HOLDER ADAPTER
9	57001-202	FUEL LEVEL GAUGE

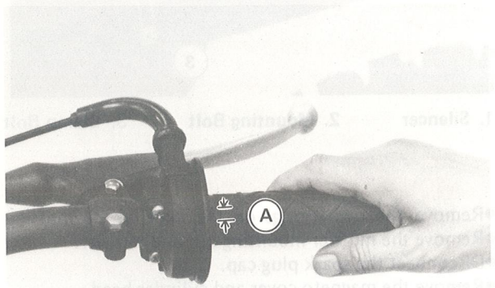
●If it is not, make sure that at least one flat washer is placed on the clutch pusher, and add another if necessary.



1. Flat Washer **2. Clutch Pusher**

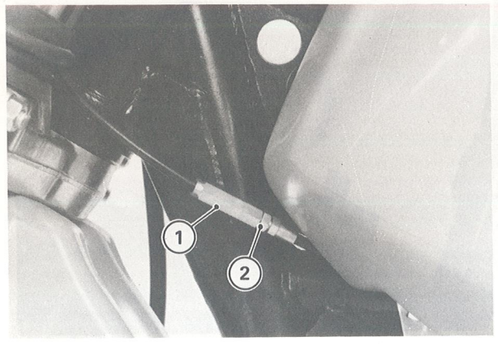
THROTTLE CABLE

●Check that the throttle grip has 2 ~ 3 mm (0.08 ~ 0.12 in) of play and turns smoothly.



A. 2 ~ 3 mm (0.08 ~ 0.12 in)

●If the play is incorrect, loosen the locknut in the middle of the throttle cable, and turn the adjusting nut to obtain the correct amount of play. Tighten the locknut.



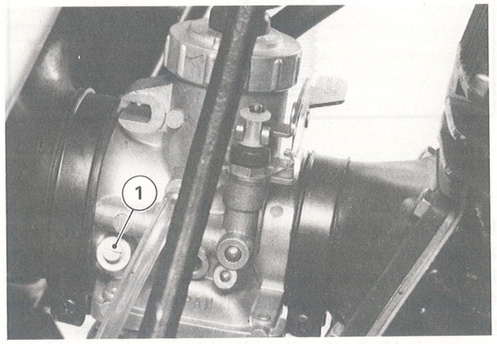
1. Adjusting Nut **2. Locknut**

CARBURETOR

Idling Adjustment

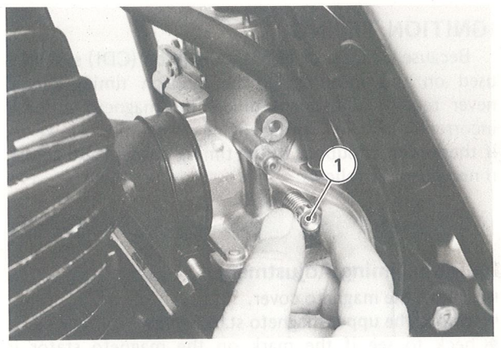
Idling adjustment is carried out using the air screw and idle adjusting screw.

●First turn in the air screw until it seats lightly, and then back it out 1½ turns.



1. Air Screw

●After thoroughly warming up the engine, turn the idle adjusting screw to obtain the desired idle speed. If no idle is preferred, turn out the screw until the engine stops.

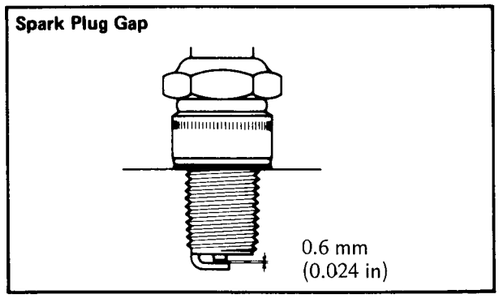


1. Idle Adjusting Screw

SPARK PLUG

The standard spark plug is an NGK B9EV. It should have a 0.6 mm (0.024 in) gap, and be tightened to 2.8 kg-m (20 ft-lbs) of torque.

The spark plug should be taken out periodically to check its gap and ceramic. If the plug is oily or has carbon built up on it, clean it (preferably with a sand-blaster) and then clean off any abrasive particles. The plug may also be cleaned using a high flash-point solvent and a wire brush or other suitable tool. Measure the gap with a wire-type thickness gauge, and adjust the gap, if incorrect, by bending the outer electrode. If the spark plug electrodes are corroded or damaged, or if insulator is cracked, replace the plug.



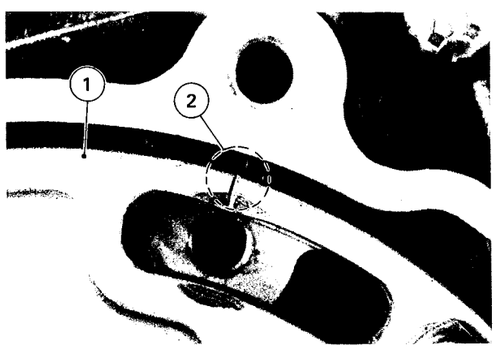
To find out whether the right temperature plug is being used, pull it out and examine the ceramic insulator around the center electrode. If the ceramic is light brown, the spark plug is correctly matched to engine temperature. If the ceramic is burned white, the plug should be replaced with the next colder type. If the ceramic is black, the plug should be replaced with the next hotter type, NGK B8EV.

IGNITION TIMING

Because a capacitor discharge ignition (CDI) system is used on this motorcycle, the ignition timing should never require adjustment unless the magneto stator is incorrectly installed during engine reassembly. However, if there is any doubt as to the timing, inspect and adjust, if necessary, as follows:

Ignition Timing Adjustment

- Remove the magneto cover.
- Remove the upper magneto stator screw.
- Check to see if the mark on the magneto stator is aligned with the mark on the crankcase.

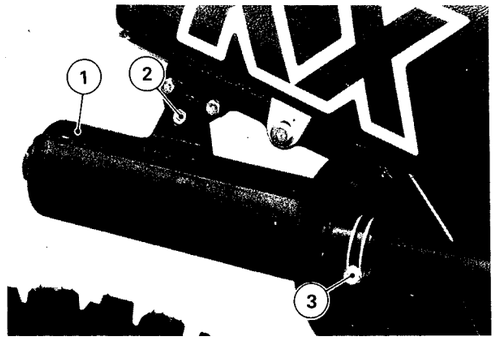


1. Magneto Stator 2. Marks

- If the marks are not aligned, loosen the lower magneto stator screw and move the magneto stator.
- Install the screws.
- Install the magneto cover.

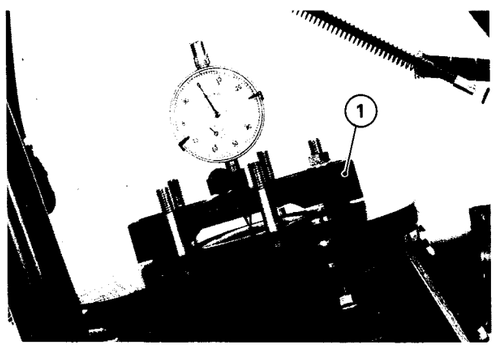
Timing Mark Inspection

- Remove the seat and right side cover.
- Turn the fuel tap "off" and pull off the fuel hose. Take off the fuel tank.
- Loosen the clamp bolt, remove the mounting bolt and nut, and pull the silencer off toward the rear.



1. Silencer 2. Mounting Bolt 3. Clamp Bolt

- Remove the two springs on the inlet of the muffler.
- Remove the muffler mounting nut and muffler.
- Disconnect the spark plug cap.
- Remove the magneto cover and cylinder head.
- Turn the crankshaft until the position of the piston is close to the top.
- Using TDC finder "B" (special tool), mount a dial gauge on the finder, turn the crankshaft to set the piston at exact TDC (top dead center), and set the dial to zero.



1. TDC Finder "B" (57001-160)

Clutch springs weak
Clutch inner cable not sliding smoothly

Clutch doesn't disengage properly
Clutch lever play excessive
Clutch plates warped or damaged
Clutch springs not evenly tightened
Transmission oil deteriorated or of too high a viscosity
Clutch inner cable not sliding smoothly

Shift Operation Not Smooth

Doesn't go into gear or shift pedal doesn't return
Clutch not disengaging
Shift return spring weak or broken
Shift return spring pin loose
Shift lever spring broken
Shift lever broken
Shift fork bent or seized
Shift drum damaged

Jumps out of gear
Shift fork worn
Drive shaft, output shaft, or gear splines worn
Gear groove worn
Shift drum groove worn
Shift fork guide pin worn

Poor Handling or Stability

Handlebar hard to turn
Steering stem nut too tight
Tire pressure too low
Steering stem lubrication insufficient

Handlebar vibrates or shakes
Swing arm bent
Front fork bent
Frame bent
Wheel alignment incorrect
Pivot shaft warped
Right/left front fork oil level uneven

Shock absorption too stiff
Front fork oil quantity excessive
Front fork oil viscosity too high
Front fork air pressure too high
Tire air pressure too high

Shock absorption too soft
Oil quantity insufficient
Oil viscosity too low
Fork spring weak
Suspension oil leak

Brakes Don't Hold

Brake maladjustment (cable play excessive)
Linings or drum worn
Brakes overheated
Water in brakes
Brake cam worn
Oil in drum

3) After washing
- Remove the plastic bags, and clean the air cleaner intake.
- Lubricate the points listed in the General Lubrication Section (Pgs. 19 ~ 21).
- Start the engine and run it for 5 minutes.
- Test the brakes before motorcycle operation.

TROUBLESHOOTING

Engine Doesn't Start or Starting Difficulty

Engine won't turn over
- Cylinder, piston seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Kick return spring broken
- Kick gear not engaging

Compression low
- Cylinder worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder warped
- Cylinder head gasket damaged
- Crankshaft oil seal defective

No spark or spark weak
- Spark plug defective
- Spark plug cap poorly connected or shorted
- Ignition coil defective
- Wiring open or shorted
- Magneto defective (layer short)

No fuel flow
- No gasoline in fuel tank
- Fuel hose clogged
- Fuel tap clogged
- Float valve clogged
- Pilot jet clogged

Flooded
- Fuel level too high
- Float valve worn or stuck open

Poor Running at Low Speed

Spark weak
- Spark plug defective
- Ignition coil defective
- Spark plug cap, high tension cord short
- Spark plug gap excessive

Mixture too rich or too lean
- Air screw maladjusted
- Pilot jet or air passage clogged
- Idle adjusting screw maladjusted
- Starter plunger stuck open
- Fuel level too high or too low
- Air cleaner clogged
- Intake manifold loose
- Tank cap air vent obstructed

Compression low
- Cylinder worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal defective

Other
- Ignition timing incorrect
- Transmission oil viscosity too high

Poor Running or No Power at High Speed

Mixture too rich or too lean
- Air cleaner clogged
- Intake manifold loose
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Starter plunger stuck open
- Tank cap air vent obstructed
- Fuel level too high or too low

Compression low
- Cylinder worn
- Piston ring worn, weak, broken, or sticking
- Piston ring groove and ring clearance excessive
- Cylinder head not sufficiently tightened down
- Cylinder head warped
- Cylinder head gasket damaged
- Crankshaft oil seal defective

Misfiring
- Spark plug defective
- Spark plug cap poorly connected or shorted
- Ignition coil defective
- High tension cord defective

Knocking
- Ignition timing advanced
- Fuel poor quality
- Carbon built up in combustion chamber

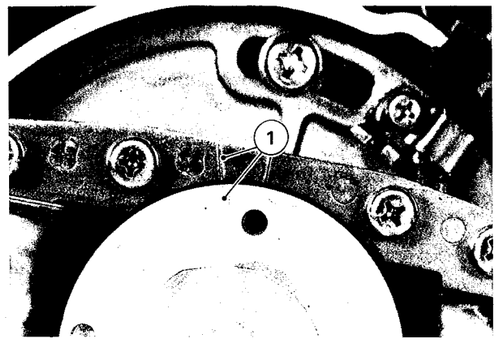
Other
- Ignition timing incorrect
- Brakes dragging
- Overheating
- Clutch slipping
- Throttle valve does not fully open
- Transmission oil quantity excessive
- Transmission oil viscosity too high

Overheating
- Ignition timing retarded
- Carbon built up in combustion chamber
- Brakes dragging
- Clutch slipping
- Intake manifold loose or damaged
- Main jet clogged
- Fuel level too low

Clutch Not Operating Smoothly

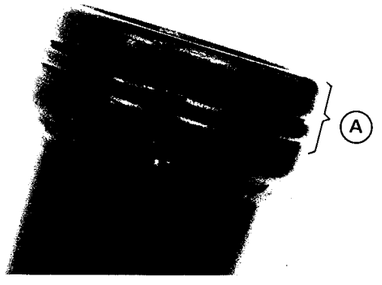
Clutch slipping
- No clutch lever play
- Friction plates worn

- Turn the crankshaft clockwise until the dial gauge reads about 2.7 mm (1.1 in) and then counterclockwise until the dial gauge reads 2.38 mm (0.09 in).
- The timing mark on the rotor should align with the mark on the coil at this position. If it does not, once the piston has been set at 2.38 mm (0.09 in) BTDC (before top dead center), make a new timing mark on the coil.



1. Marks

- Remove the dial gauge and TDC finder "B".
- Install the cylinder head. Cross-tighten the nuts to 2.5 kg-m (18 ft-lbs) of torque.
- Apply the molybdenum disulfide grease around the inlet of the muffler, from the edge to the **O** ring.



A. Grease here.

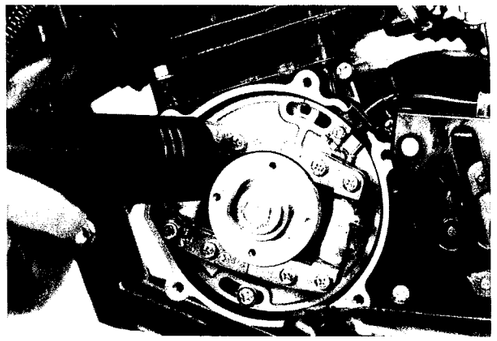
- Install the muffler and silencer.
- Connect the spark plug cap.
- Install the fuel tank, connect the fuel hose, and slide up the hose clamp.
- Install the seat and right side cover.
- Install the magneto cover.

Ignition Timing Inspection (Dynamic)

If a strobe light and an electric or hand tachometer are available, a dynamic inspection of ignition timing can be made.

WARNING **To avoid an injury, make sure that no tools, clothes, or leads ever touch the spinning flywheel.**

- Remove the magneto cover, and connect a strobe light and electric or hand tachometer in the manner prescribed by the manufacturer.
- Start the engine and set the engine speed at 6,000 rpm (r/min).
- Direct the light at the timing mark on the rotor and coil. The marks should align at 6,000 rpm (r/min).

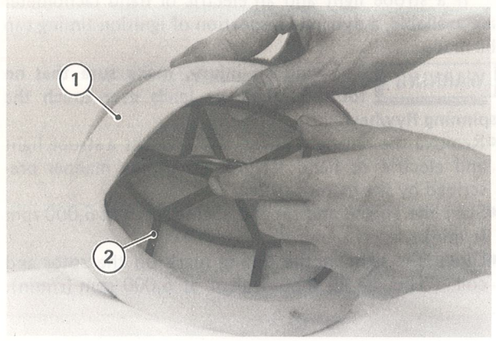


- If they do not, loosen the magneto stator screws, and move the magneto stator to adjust the timing. Clockwise rotation advances timing and counterclockwise retards it.
- Tighten the screws securely.
- Stop the engine and disconnect the strobe light and tachometer leads.
- Install the magneto cover.

AIR CLEANER

A clogged air cleaner restricts the engine's air intake, increasing fuel consumption, reducing engine power, and causing spark plug fouling.

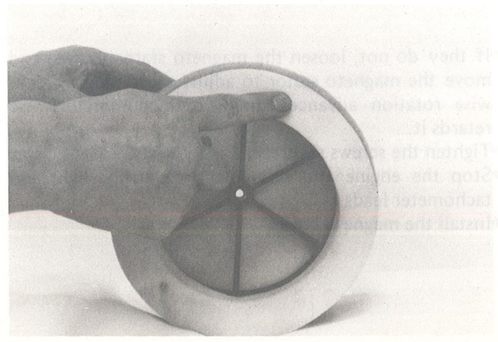
Inspect the element without fail before and after each racing or practice session, and clean it if necessary.
- Remove the left side cover and take off the element.
- Stuff rags into the air cleaner outlet so no dirt is allowed to enter the carburetor.
- Separate the sponge filter from the frame.



1. Sponge Filter 2. Air Cleaner Frame

- Clean the element in a bath of a high flash-point solvent, and squeeze it dry.
- After cleaning, saturate the element with SE class SAE 30 oil, squeeze out the excess oil, then wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the element.
- Inspect the element for damage.

NOTES: ○Replace the element after cleaning it 5 times or if it is damaged.
○When installing the element, coat the lip of the element with a thick layer of all purpose grease to assure a complete seal against the air cleaner element base. Also, coat the base where the lip of the element fits.



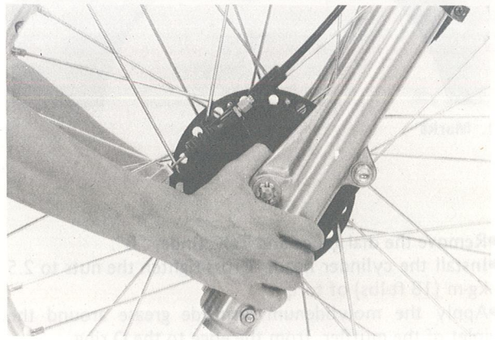
CAUTION **○Clean the element in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area.**
○Because of the danger of highly flammable liquids, do not use gasoline or a low flash-point solvent to clean the element.
○A break in the element material or damage to the air cleaner tube will allow dirt and dust to pass through into the carburetor and eventually damage the engine.

If any part of the element is damaged, the element must be replaced.

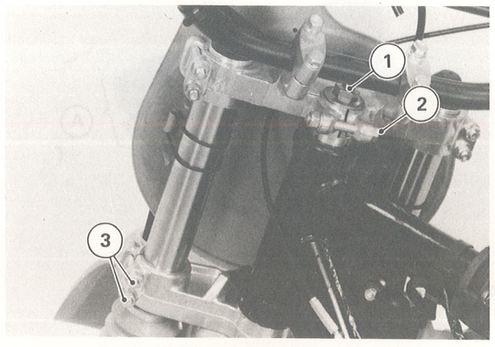
STEERING

For safety, the steering should always be kept adjusted so that the handlebar will turn freely but not have excessive play.

To check the steering adjustment, first place a stand or block under the engine so that the front wheel is raised off the ground. Push the handlebar lightly to either side; if it continues moving under its own momentum, the steering is not too tight. Squatting in front of the motorcycle, grasp the lower ends of the front fork at the axle, and push and pull the bottom end of the front fork back and forth; if play is felt, the steering is too loose.



If the steering needs adjusting:
- Place a stand under the frame to raise the front wheel off the ground.
- Loosen the steering stem head bolt and clamp bolt.
- Loosen the four front fork lower clamp bolts.



1. Stem Head Bolt
2. Clamp Bolt
3. Front Fork Lower Clamp Bolts

- Turn the steering stem locknut with the stem nut wrench (special tool) to obtain the proper adjustment.

Appendix

PRE-RACE CHECK POINTS

Engine

Transmission oil	Transmission oil level correct
Spark plug	Tighten to correct torque
Cylinder, cylinder head	Tighten to correct torque
Clutch	Clutch functioning properly
Carburetor	Adjusted properly
Air cleaner	Clean, properly installed
Ignition timing	Ignition timing correct
Muffler	Muffler not damaged
Engine sprocket	Not worn or damaged

Frame

Tires	Check for wear, cracks, and other damage
Spokes	Tighten any loose spokes
Drive chain	Check overall condition and chain slack, oil as necessary
Brakes; front and rear	Function properly, brake lever and pedal have correct play or travel
Throttle	Functions properly, returns smoothly
Steering	Action is smooth but not loose from lock to lock. No binding of control cables
Front fork	Function properly, no oil leakage
Rear shock absorber	Function properly, no oil leakage
Nuts, bolts, fasteners	Tighten any loose bolts and nuts
Fuel tank	Mounted securely
Rear sprocket	Not worn or damaged
Engine stop switch	Functions

AFTER-RACE CHECK POINTS

After racing, first clean the motorcycle (Pg. 49), and then inspect the engire motorcycle, with special care to parts such as the air cleaner, carburetor, brakes, etc.

Carry out general lubrication (Pgs. 19~21), and make adjustments as necessary (Pgs. 8~18).

STORAGE

When the motorcycle is to be stored for any length of time, it should be prepared for storage as follows:
- Clean the entire vehicle thoroughly.
- Empty the gasoline from the fuel tank, and empty the carburetor float bowl. (If left in for a long time, the gasoline will sour.)
- Remove the empty fuel tank, pour about ½ pint of motor oil into the tank, roll the tank around to coat inner surfaces thorouhly, and pour out the excess oil. Install the tank.
- Remove the spark plug and put several drops of SAE 30 oil into the cylinder. Kick the engine over slowly a few times to coat the cylinder wall with oil, and install the plug.
- Lubricate the drive chain and all the cables.
- Spray oil on all unpainted metal surfaces to prevent rusting. Avoid getting oil on rubber parts or in the brakes.
- Set the motorcycle on a box or stand so that both wheels are raised off the ground. (If this cannot be done, put boards under the front and rear wheels to keep dampness away from the tire rubber.)
- Tie a plastic bag over the exhaust pipe to prevent moisture from entering.
- Put a cover over the motorcycle to keep dust and dirt from collecting on it.

To put the motorcycle back into use after storage.
- Make sure the spark plug is tight.
- Fill the fuel tank.
- Run the engine for about five minutes to warm the oil, and drain the transmission oil.
- Put in fresh transmission oil (Pg. 4).
- Check all the points listed under the Inspection and Adjustment Section (Pgs. 8~18).
- Lubricate the points listed in the General Lubrication Section (Pgs. 19~21).

CLEANING

1) Preparation for washing

Before washing, precautions must be taken to keep water off the following parts:

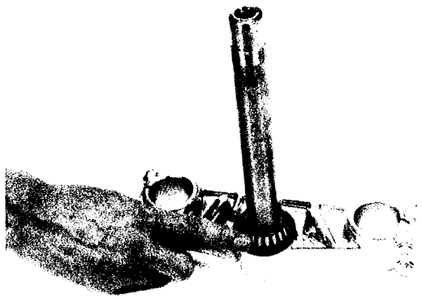
Rear opening of the muffler	Cover with a plastic bag secured with rubber bands.
Clutch and brake levers, hand grips, engine stop switch	Cover with plastic bags.
Air cleaner intake	Close up the opening with tape, or stuff in rags.

2) Where to be careful

Avoid spraying water with any great force near the following places:

Front and rear hubs	If water gets inside the hubs, the brakes will not function until they dry out.
Under the fuel tank	If water gets into the ignition coil or into the spark plug cap, the spark will jump through the water and be grounded out. When this happens, the motorcycle will not start and the affected parts must be wiped dry.

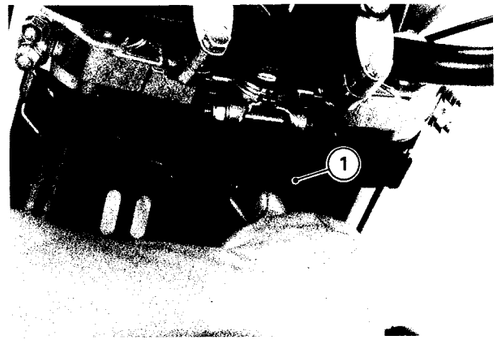
Wipe all the old grease off the races and rollers, if necessary washing them in a high flash-point solvent. Replace the bearing parts if they show wear or damage. Apply grease liberally to the upper and lower races, and pack the cone bearings with grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.



Grease seal deterioration, damage

Inspect the grease seal for any signs of deterioration or damage, and replace if necessary.

Replace the grease seal with a new one whenever it has been removed. The grease seal comes off whenever the lower bearing inner race is removed.



1. Stem Nut Wrench (57001-321)

- Tighten the steering stem head bolt to 6.0 kg-m (43 ft-lbs) of torque and the stem clamp bolt to 1.6 kg-m (11.5 ft-lbs) of torque.
- Tighten the front fork lower clamp bolts to 1.6 kg-m (11.5 ft-lbs) of torque.
- Check the steering again, and readjust it if necessary.

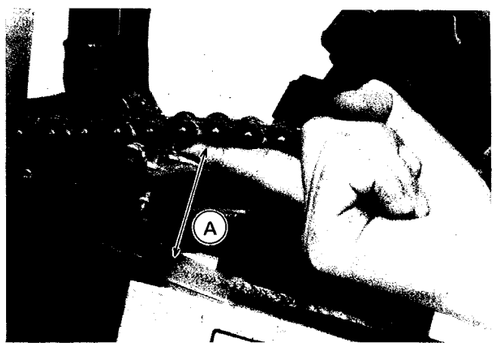
DRIVE CHAIN

The drive chain must be kept properly adjusted for safety and to prevent excessive wear. If the chain becomes badly worn or maladjusted – either too loose or too tight – the chain could jump off the sprockets or break.

WARNING **A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.**

Inspection

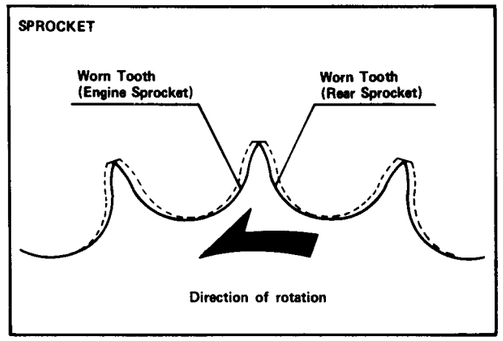
With the motorcycle held vertical, push up the drive chain in the middle of the upper run to measure the chain play. The space between the chain and the swing arm at the rear of the rubber protector should be 50~60 mm (1.96~2.36 in). Rotate the rear wheel to find the place where the chain is tightest (because it wears unevenly). If it does not, adjust the drive chain.



A. 50~60 mm (1.96~2.36 in)

In addition to checking the slack, rotate the rear wheel to inspect the drive chain and sprockets for damaged rollers, loose pins and links, unevenly or excessively worn teeth, and damaged teeth.

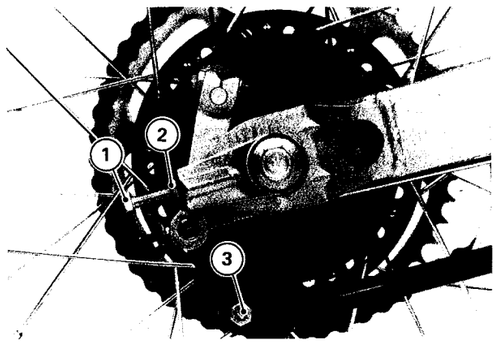
NOTE: Sprocket wear is exaggerated for illustration. See maintenance section for wear limits.



If there is any irregularity, replace the drive chain and/or sprockets.

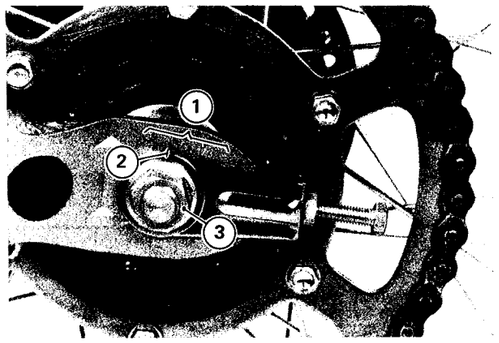
Adjustment

- Loosen the rear torque link bolt.
- Loosen both chain adjuster locknuts.



1. Adjusting Bolt
2. Locknut
3. Torque Link Bolt

- Loosen the rear axle nut.
- Turn both chain adjusting bolts evenly until the drive chain has the correct amount of slack. To keep the chain and wheel aligned, the notch on the left chain adjuster should align with the same swing arm mark that the right chain adjuster notch aligns with.



1. Marks 2. Notch 3. Axle Nut

NOTE: Wheel alignment can also be checked using the straightedge or string method.

WARNING **Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition.**

- Tighten both chain adjuster locknuts.
- Center the brake panel assembly in the brake drum. This is done by tightening the axle lightly, spinning the wheel, and depressing the brake pedal forcefully. The partially tightened axle allows the brake panel assembly to center itself in the brake drum.

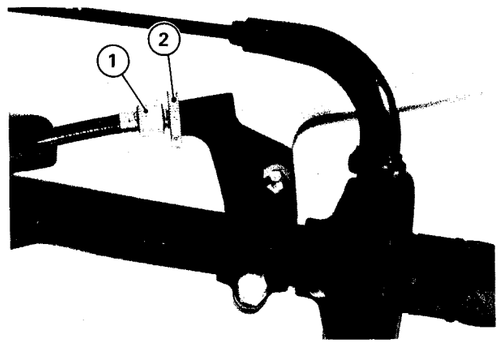
NOTE: This procedure can prevent a soft, or "spongy feeling" brake.

- Tighten the axle nut to 9.0 kg-m (65 ft-lbs) of torque.
- Rotate the wheel, measure the chain slack again at the tightest position, and readjust if necessary.
- Tighten the rear torque link bolt to 2.2 kg-m (16 ft-lbs) of torque.

WARNING **If the axle nut and torque link bolt are not correctly tightened, an unsafe riding condition may result.**

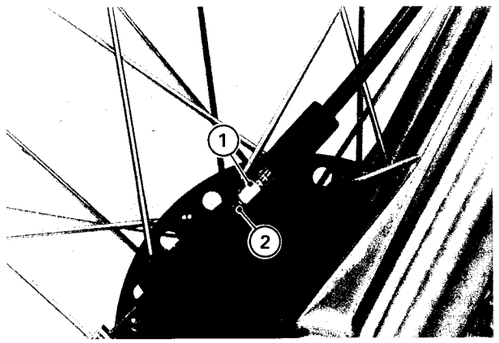
- Adjust the rear brake.

NOTE: In wet and muddy conditions, mud sticks to the chain and sprockets resulting in an overly tight chain, and the chain may break. To prevent this, adjust the chain to 55 ~ 65 mm (2.17 ~ 2.56 in) of space between the chain and swing arm whenever necessary.



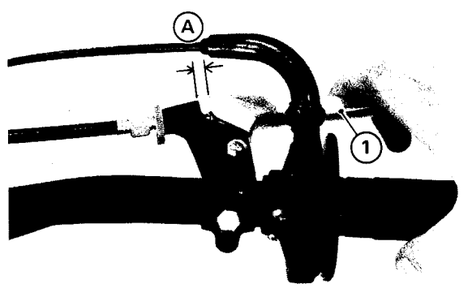
1. Adjuster 2. Knurled Locknut

- Slide up the dust cover, and loosen the locknut at the lower end of the brake cable.



1. Adjuster 2. Locknut

- Turn the adjuster on the lower end of the front brake cable so that the brake lever has 4~5 mm (0.16~0.20 in) of play, and tighten the locknut.



1. Front Brake Lever A. 4~5 mm (0.16~0.20 in)

- If sufficient adjustment cannot be made with the adjuster, complete the adjustment with the adjuster at the brake lever, and then tighten the locknut.
- Check for brake drag.

BRAKES

Front Brake Lever

- Slide the front brake lever dust cover out of place.
- Loosen the knurled locknut at the front brake lever, screw the adjuster fully in, and tighten the locknut.

NOTE: Since oil quantity greatly influences damping performance, use only the specified quantity.

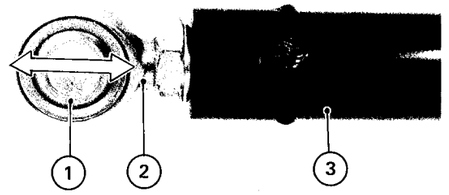
UNI-TRAK

Check the Uni-trak component parts for wear periodically, or whenever excessive play is suspected.

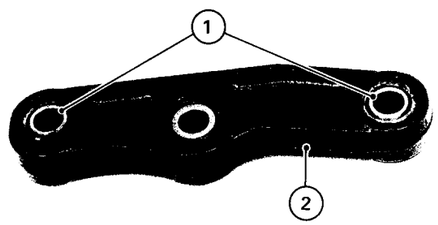
- Put a sturdy block under the engine so that the rear wheel is raised off the ground.
- Push and pull on the swing arm, up and down, to check for wear externally.
- A small amount of play on the swing arm is normal and no corrective action is needed. However, if excessive play is felt, remove the Uni-trak parts from the frame and check for wear respectively.

Spherical Bearings

- Move the spherical bearings in the Uni-trak arm and ball-joint to feel for wear. The wear must be under 0.7 mm (0.028 in).



1. Spherical Bearing 3. Uni-Trak Link
2. Ball-joint



1. Spherical Bearings 2. Uni-Trak Arm

- If the spherical bearing in the ball-joint is overworn, replace the ball-joint.

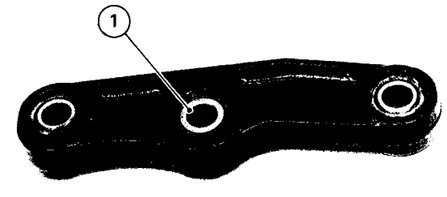
NOTE: The ball-joint should be installed so that the center of the spherical bearing and the edge of the Uni-trak link or torque link is 27 mm, and that the mounting holes are parallel.

- If any spherical bearing in the Uni-trak arm is overworn, replace it using a press and a suitable driver.

WARNING **Installation of new spherical bearing(s) in the Uni-trak arm may cause too stiff rear suspension. Testride the motorcycle slowly and prudently until the suspension becomes normal.**

Sleeve Bearing

Pull out the sleeve bearing, and measure the outside diameter of the sleeve bearing and the inside diameter of the Uni-trak arm. The difference of two readings is the clearance of two parts. If it exceeds 0.7 mm (0.028 in), replace the sleeve bearing.



1. Sleeve Bearing

Table 34 Spherical Bearing, Sleeve Bearing

Service Limit
0.7 mm (0.0276 in)

STEERING STEM BEARINGS

The bearing race surfaces may become dented, from overtightening or from a heavy shock to the steering stem. Damaged bearing races will cause the handlebar to jerk or catch when turned.

Bearing lubrication

Whenever the steering stem is disassembled, the steering stem bearings should be relubricated.

Measure the diameter of the sprocket at the base of the teeth. If the sprocket is worn down to less than the service limit, replace the sprocket.

Table 31 Sprocket Diameter

	Service Limit
Engine	50.3 mm (1.98 in)
Rear	252.4 mm (9.937 in)

FRONT FORK

WARNING **When disassembling, checking the oil level, and changing the oil of the front fork, first release the air from the fork.**

Since the spring becomes shorter as it weaken, check its free length to determine its condition. Replace the spring if it is shorter than the service limit. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the shock absorbers balanced for motorcycle stability.

A. Free Length

Table 32 Front Fork Spring Free Length

Service Limit
579 mm (22.8 in)

NOTE: When installing the front fork, check that the upper surface of the inner tube is even with the top surface of the stem head.

Fork oil level

To check the fork oil level:

- Place a jack or stand under the engine so that the front wheel is raised off the ground.
- Remove the top bolts from the top of the fork tubes, and pull out the spring seats and springs.
- Take out the jack or stand under the engine, and slowly compress the front fork.
- At this position, insert a rod down into the tube, and measure the distance from the top of the inner tube to the oil level.

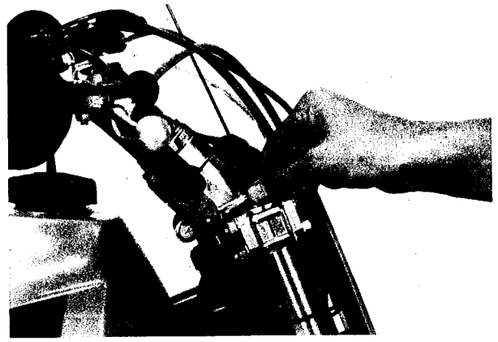


Table 33 Front Fork Oil

Type	Amount per side	Oil level from top of inner tube
KYB G-15 or SAE 10W20	362 cc (12.24 US fl oz)	197 mm (7.76 in)

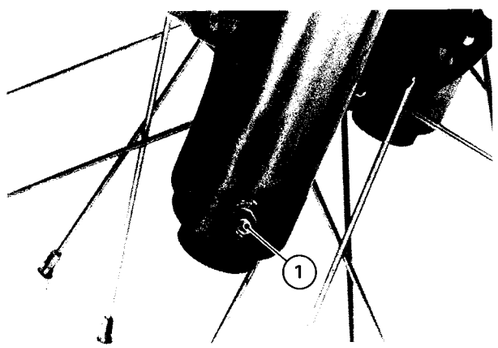
- If the oil is below the correct level, add oil taking care not to overfill the fork.
- Put in springs, fit the spring seats and top bolts, and then tighten the top bolts securely.

NOTE: Before inserting the springs, wash them with a high flash-point solvent.

- If the front fork is disassembled, pour correct amount of oil into the front fork. Ride the motorcycle for five to ten minutes so that oil will penetrate into the tube, then recheck the oil level.

Oil change

To drain out the old oil, remove the drain screw from the lower end of the outer tube on each side. With the front wheel on the ground, push down on the handlebar a few times to pump out the oil. Place a jack or stand under the engine so that the front wheel is raised off the ground. Apply a non-permanent locking agent to the drain bolts and install them. Remove the top bolt from each side, and pour in the specified type and amount of oil. Then install the top bolts, tightening them securely.



1. Drain Screw

- Check braking effectiveness.
- Slide the dust covers back into place.

NOTES: ○For minor corrections, use the adjuster at the front brake lever.

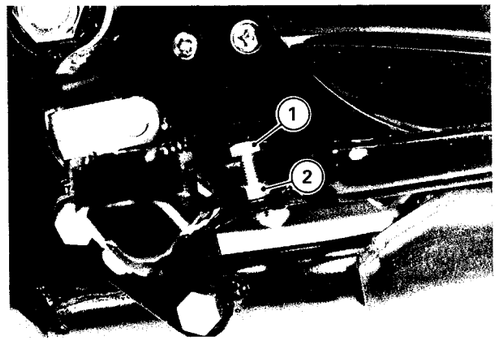
○If the brake lever adjustment cannot be made with the adjuster at the brake lever or at the brake panel, move the front brake cam lever to a new position on the brake camshaft.

WARNING **Check brake linings for excessive wear before moving front brake cam lever (Pg. 44).**

Rear Brake Pedal

BRAKE PEDAL POSITION

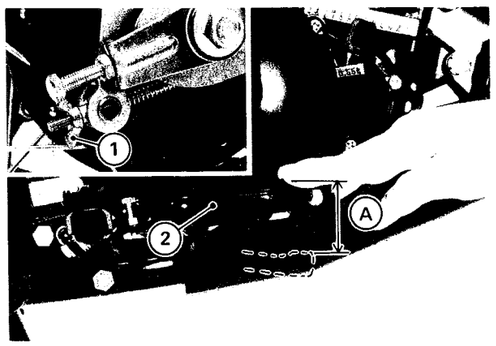
Adjust the rear brake pedal position to suit you. To adjust the pedal position, loosen the locknut, turn the adjusting bolt, and then tighten the locknut.



1. Adjusting Bolt **2. Locknut**

BRAKE PEDAL TRAVEL

- The brake pedal should have 20~30 mm (0.8~1.2 in) of travel from the rest position to the fully applied position when the pedal is pushed down lightly by hand. Adjustment is made by turning the adjusting nut at the end of the brake rod.

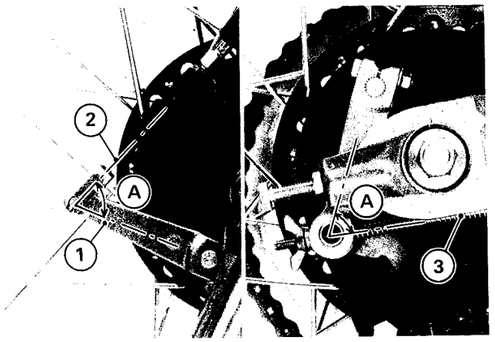


1. Adjusting Nut **2. Rear Brake Pedal**
A. 20~30 mm (0.8~1.2 in)

- Check for brake drag.
- Check braking effectiveness.

Cam Lever Angle

- When the brake is fully applied, the brake cam lever should come to an 80~90° angle with the brake cable or rod. If it does not, remove the cam lever, and then remount it at a new position on the shaft to obtain the proper angle. Adjust the brakes.



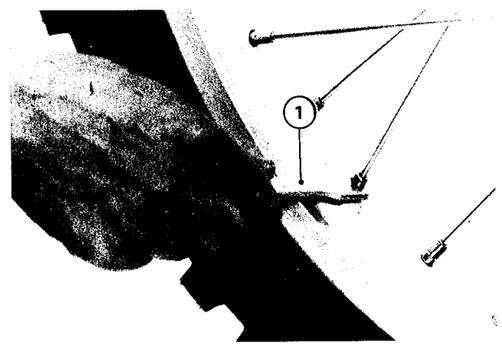
1. Cam Lever **2. Brake Cable** **3. Brake Rod**
A. 80~90°

WARNING **Since a cam lever angle greater than 90° reduces braking effectiveness, this adjustment should not be neglected. Whenever the cam lever angle is adjusted, also check for drag and proper pedal operation. In case of doubt as to braking effectiveness, disassemble and inspect all internal brake parts. Worn parts could cause the brake to lock or fail, possibly causing a crash.**

WHEELS

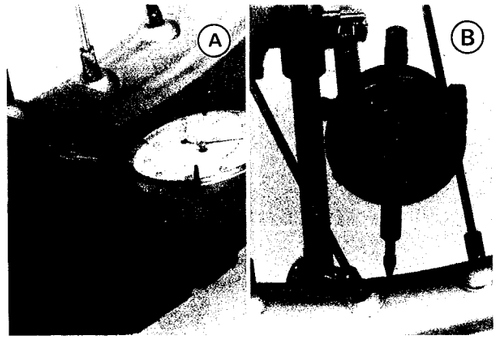
Spokes and Rim

The spokes on both wheels must all be tightened securely and evenly and not allowed to become loose. Unevenly tightened or loose spokes will cause the rim to warp, hasten nipple and overall spoke fatigue, and may result in spoke breakage.



1. Spoke Wrench

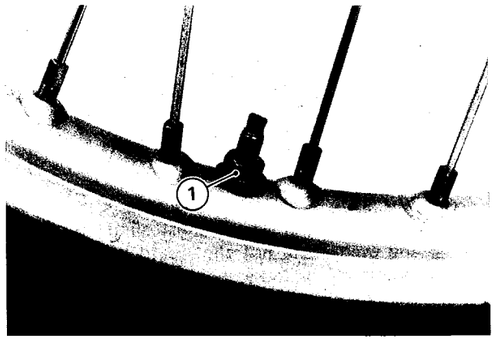
The axial rim runout should be under 3 mm (0.12 in), and the radial rim runout should be under 2 mm (0.08 in).



A. Axial Rim Runout B. Radial Rim Runout

Bead Protectors

There is a bead protector on the front wheel and two on the rear. The use of the bead protectors is to prevent the tire and tube from slipping on the rim and damaging the valve stem. Valve stem damage may cause the tube to leak, necessitating tube replacement. In order that the tire and tube will remain fixed in their position on the rim, inspect the bead protectors before riding and tighten them if necessary. However, do not tighten the valve stem nut securely.



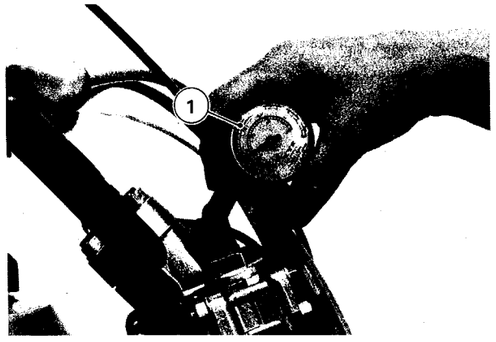
1. Bead Protector Nut

FRONT FORK

The condition of the front fork is very important for steering stability, and front fork performance is dependent on front fork oil viscosity, quantity, quality, and front fork air pressure.

Alteration of the stiffness or softness of the shock absorption can be achieved by using fork oil of a different viscosity or changing the fork air pressure. When altering the shock absorption by changing the fork air pressure, carry out the following steps:

- Use a jack under the engine or other suitable means to lift the front of the motorcycle.
- The standard air pressure is 0.3 kg/cm^2 (4.3 psi, 29 kPa). Adjust the shock absorption to suit your preference under special conditions.



1. Air Pressure Gauge

CAUTION **○The maximum air pressure is 2.5 kg/cm^2 (36 psi, 245 kPa). Higher pressure will damage the seals.**

○The left and right fork legs must have the same air pressure.

WARNING **○Use only air or nitrogen gas.**

○Do not incinerate the front fork.

UNI-TRAK

The rear suspension system of this motorcycle is UNI-TRAK. It consists of a rear shock absorber, uni-trak arm, and two links.

To suit to various riding conditions, the spring preload of the shock absorber can be adjusted, the spring can be replaced with an optional part, or the shock damping force especially in the extension stroke can be adjusted. In either case, the rear shock absorber must be removed from the frame.

Removal

- Remove the seat.
- Remove the left side cover and air cleaner case.
- Remove the right side cover.
- Remove the bolt and rubber damper above the uni-trak arm.
- Loosen the upper and lower mounting nuts. Do not remove them yet.
- Place a sturdy block or support under the frame so that the rear wheel is raised off the ground.
- Remove the mounting bolts and nuts, and take the rear shock absorber out to the left.

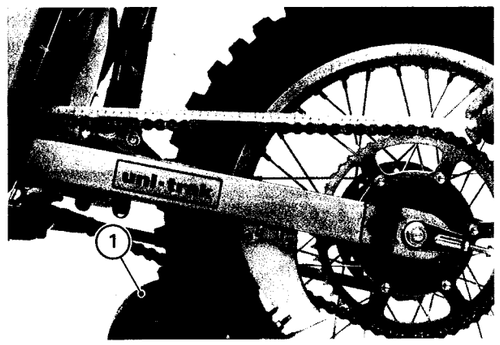
1. Wheel Bearing

DRIVE CHAIN

Drive chain wear

When the chain has worn so much that it is more than 2% longer than when new, it is no longer safe for use and should be replaced. Whenever the chain is replaced, inspect both the engine and rear sprockets, and replace them if necessary. Overworn sprockets will cause a new chain to wear quickly.

Since it is impractical to measure the entire length of the chain, determine the degree of wear by measuring a 20 link length of the chain. Stretch the chain taut either by using the chain adjuster, or by hanging a 10 kg (20 lb) weight on the chain. Measure the length of 20 links on a straight part of the chain from the center of the 1st pin to the center of the 21st pin. If the length is greater than the service limit, the chain should be replaced.



1. Weight

Table 30 Drive Chain Length

	Service Limit
20-link Length	259 mm (10.2 in)

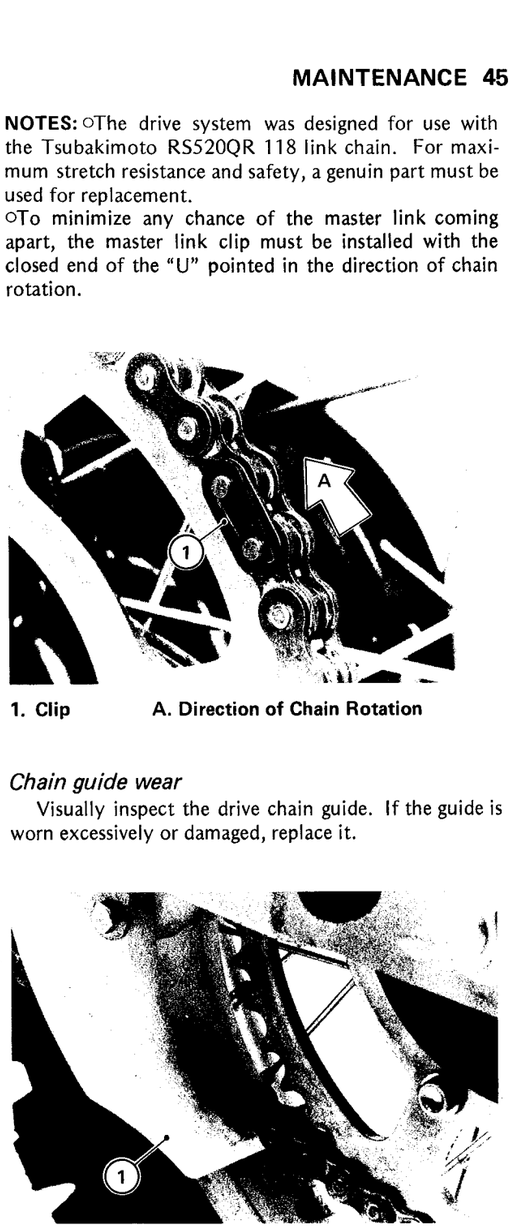
NOTES: ○The drive system was designed for use with the Tsubakimoto RS520QR 118 link chain. For maximum stretch resistance and safety, a genuin part must be used for replacement.

○To minimize any chance of the master link coming apart, the master link clip must be installed with the closed end of the "U" pointed in the direction of chain rotation.

1. Clip A. Direction of Chain Rotation

Chain guide wear

Visually inspect the drive chain guide. If the guide is worn excessively or damaged, replace it.



1. Drive Chain Guide

SPROCKETS

Sprocket wear

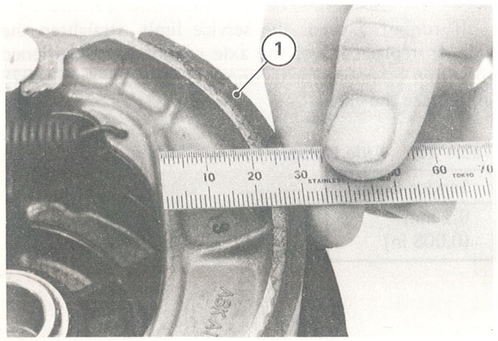
Visually inspect the sprocket teeth. If they are worn, replace the sprocket.

Table 27 Brake Drum Inside Diameter

	Service Limit
Front	120.75 mm (4.754 in)
Rear	130.75 mm (5.147 in)

Braking shoe lining wear

Check the thickness of the brake linings, and replace both shoes as a set if the thickness at any point is less than the service limit. If the thickness of the brake linings is sufficient, check the linings for uneven wear, and file or sand down any high spots. With a wire brush, remove any foreign particles imbedded in the lining surface. Wash off any oil or grease with a high flash-point solvent. In case the linings are damaged or the surface cannot be restored by sanding and cleaning, the shoes must be replaced.



1. Brake Lining

Table 28 Brake Shoe Lining Thickness

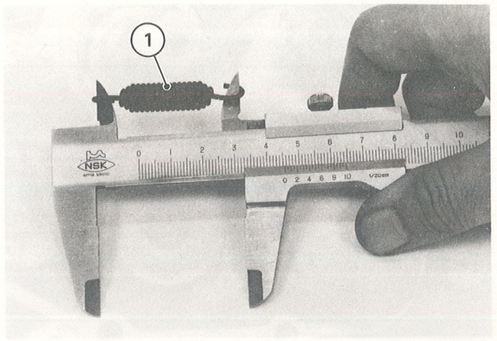
	Service Limit
Front and Rear	2 mm (0.08 in)

Brake shoe spring tension

If the brake springs become stretched, they will not pull the shoes back away from the drum after the brake lever or pedal is released, causing the shoes to drag on the drum. Remove the springs, and check their free length with vernier calipers. If either is stretched beyond the service limit, replace both springs.

Table 29 Brake Shoe Spring Free Length

	Service Limit
Long	47.0 mm (1.85 in)
Short	32.5 mm (1.28 in)



1. Brake Shoe Spring

GREASE SEALS, OIL SEALS AND BEARINGS

Ball bearing wear, damage

Since the ball bearings are made to extremely close tolerances, the clearance cannot normally be measured. Therefore, the condition of the bearings must be judged by feel. Wash each bearing with a high flash-point solvent, dry it (do not spin it while it is dry), and oil it. Spin it by hand to check its condition. If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced. Before reinstalling the bearing, replace its oil seal with a new one.

Needle bearing wear, damage

The rollers in the needle bearings wear so little that the wear is difficult to measure. Instead, inspect the bearings for abrasions, color change, or other damage. If there is any doubt as to the condition of a bearing, replace it.

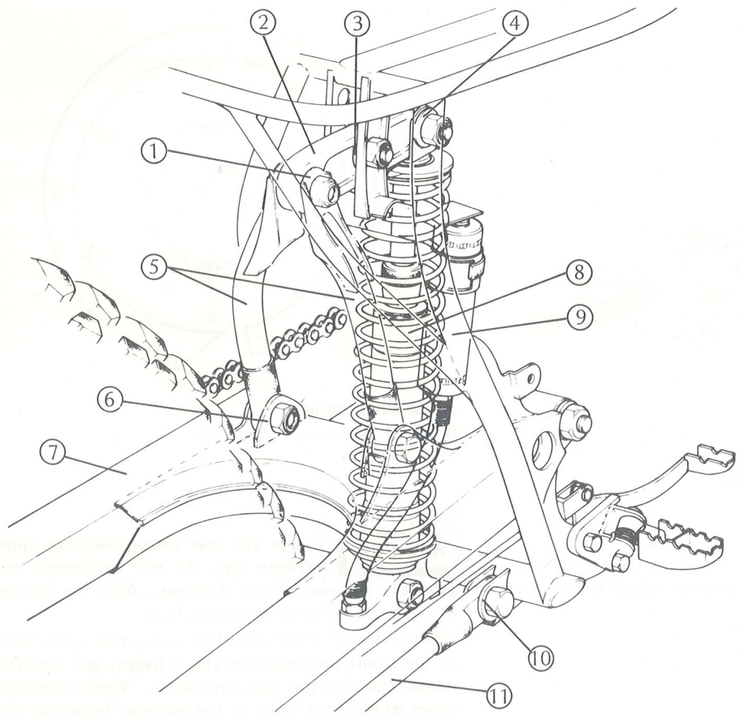
Grease, oil seal damage

Inspect the oil seals or grease seals, and replace any with the lips misshapen, discolored (indicating the rubber has deteriorated), hardened, or otherwise damaged. Since oil seals or grease seals are nearly always damaged during removal, replace all oil seals or grease seals which have been removed.

Lubricating the wheel bearings

If the same bearing is to be used again, wash it with a high flash-point solvent, dry it, and pack it with good quality bearing grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing, and wipe the old grease out of the hub before bearing installation. Clean and grease the wheel bearings periodically.

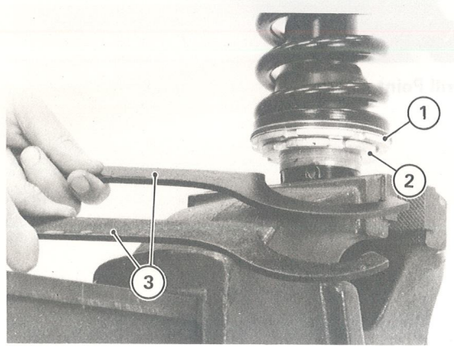
Uni-Trak



1. Spherical Bearing
2. Uni-trak Arm
3. Sleeve Bearing
4. Spherical Bearing
5. Uni-trak Links
6. Ball-joint
7. Swing Arm
8. Rear Shock Absorber
9. Nitrogen Gas Reservoir
10. Ball-joint
11. Torque Link

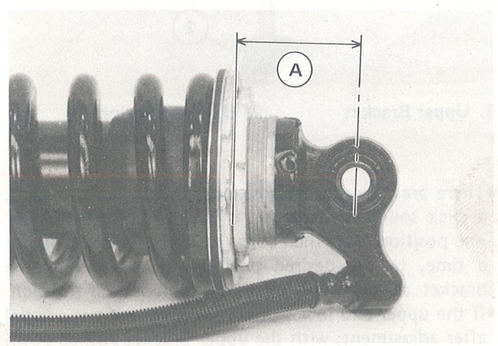
Spring Preload Adjustment

- Clean the threaded portion on the bottom of the rear shock absorber.
- Hold the bottom of the rear shock absorber with a vice. Be careful not to damage the gas hose.
- Using the hook wrenches (special tools), loosen the locknut and turn the adjusting nut as required. Hold the upper mounting bracket so that it does not turn during adjustment. Turning the adjusting nut up makes the spring preload stronger.



1. Adjusting Nut
2. Locknut
3. Hook Wrench (57001-1083)

- Initial spring preload is 65 kg (143 lbs) and the adjusting nut changes the preload 13 kg (29 lbs) a turn.
- The standard adjusting nut position from the center of the lower mounting hole is 63 mm (2.48 in) and the adjustable range is 53~73 mm (2.08~2.87 in). Check the adjusting nut position after adjustment.



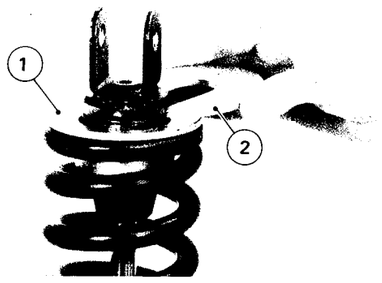
A. Adjusting Nut Position

- Tighten the locknut securely.

Shock Damping Adjustment

- Measure the adjusting nut position so that the adjusting nut can be reinstalled later in the same position.

- Using a vice and hook wrenches, turn the locknut and adjusting nut all the way down.
- Remove the circlip and spring seat, and pull off the spring.



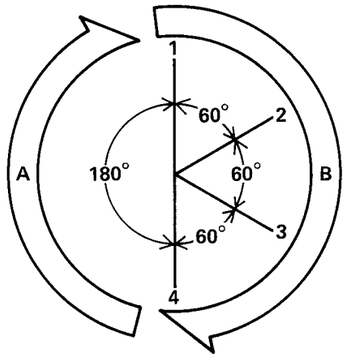
1. Spring Seat 2. Circlip

- Holding the damper portion of the rear shock absorber, turn the upper bracket clockwise to adjust the shock damping force.

1. Upper Bracket 2. Damper Portion

- There are four setting positions, and at each position, a click sound is made. It is wise to find the number one position first, then turn the upper bracket, 60° at a time, to the desired position. Stop turning the bracket as soon as it clicks at your desired position.
- If the upper and lower mounting holes are not parallel after adjustment, with the upper bracket pushed down more than 10 mm (0.4 in), turn the upper bracket clockwise as required.
- Without pushing down the bracket, turn the bracket to make sure the setting.
- Align the upper and lower mounting holes.
- Fit the spring, spring seat, and circlip.
- Reposition the adjusting nut without turning the upper bracket. Tighten the locknut.

Setting Positions



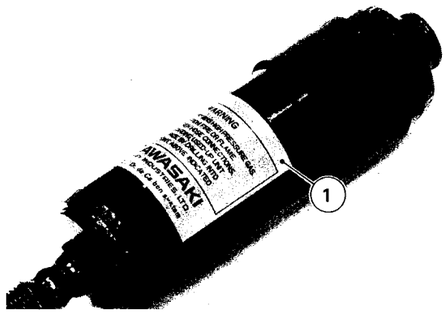
A. No click sounds.
B. Shock damping force becomes stronger.

Scrapping

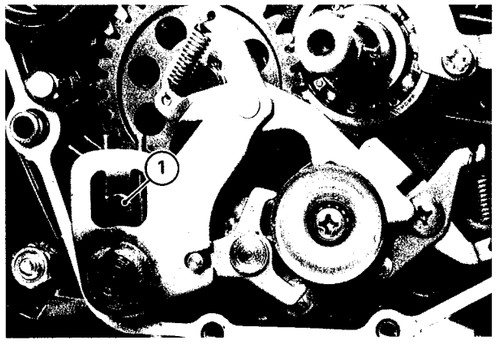
WARNING

○Since the rear shock absorber contains nitrogen gas, do not incinerate or disassemble the rear shock absorber. Also, do not loosen the nut on both ends of the gas hose.

○Before a rear shock absorber is scrapped, open the hole at the point indicated on the nitrogen gas reservoir to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



1. Drill Point



1. Return Spring Pin

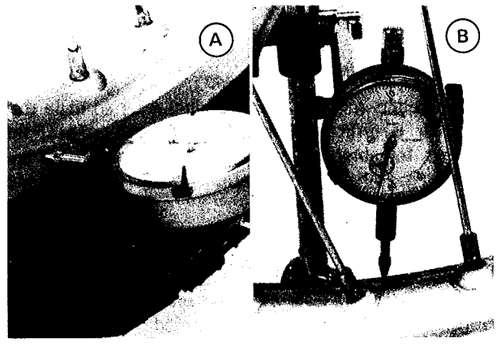
WHEELS

Rim runout

Set a dial gauge to the side of the rim, and rotate the wheel to measure axial runout. The difference between the highest and lowest dial readings is the amount of runout.

Set the dial gauge to the inner circumference of the rim and rotate the wheel to measure radial runout. The difference between the highest and lowest dial readings is the amount of runout.

A certain amount of rim warp (runout) can be corrected by recentering the rim, that is, loosening some spokes and tightening others to change the position of different parts of the rim. If the rim is badly bent, however, it should be replaced.



A. Axial Runout B. Radial Runout

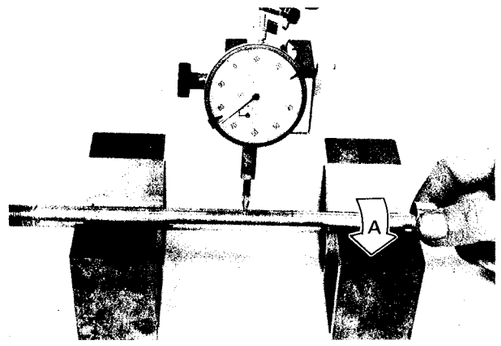
Table 25 Rim Runout

	Service Limit
Axial	3.0 mm (0.12 in)
Radial	2.0 mm (0.08 in)

Axle bend

A bent axle causes vibration, poor handling, and instability.

To measure axle runout, remove the axle, place it in V blocks that are 100 mm (4 in) apart, and set a dial gauge to the axle at a point halfway between the blocks. Turn the axle to measure the runout. The amount of runout is the amount of dial variation.



A. Turn

If runout exceeds the service limit, straighten the axle or replace it. If the axle cannot be straightened to within tolerance, or if runout exceeds 0.7 mm (0.028 in) replace the axle.

Table 26 Axle Runout/100 mm (4 in)

Service Limit
0.2 mm (0.008 in)

BRAKES

Brake drum wear

Measure the inside diameter of the brake drum with calipers to determine wear. Since uneven drum wear will decrease braking effectiveness, take measurements at a minimum of two places. If any diameter measurement exceeds the service limit, the hub must be replaced.

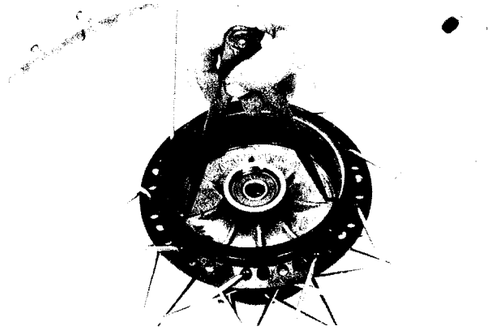


Table 20 Clutch Plate Warp

	Service Limit
Friction Plate	0.35 mm (0.014 in)
Steel Plate	0.3 mm (0.012 in)

TRANSMISSION

Shift fork bending

Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting or allow the transmission to jump out of gear when under power.

Shift fork, gear groove wear

Measure the thickness of the fingers of each shift fork, and measure the width of the gear shift fork groove. If the thickness of a shift fork finger is under the service limit, the shift fork must be replaced. If a gear shift fork groove is worn over the service limit, the gear must be replaced.

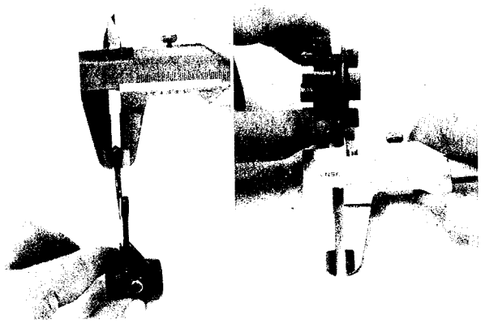


Table 21 Shift Fork Thickness

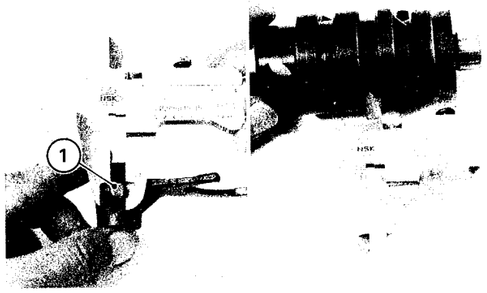
Service Limit
3.7 mm (0.146 in)

Table 22 Gear Shift Fork Groove Width

Service Limit
4.25 mm (0.167 in)

Shift fork guide pin/shift drum groove wear

Measure the diameter of each shift fork guide pin, and measure the width of each shift drum groove. Replace any shift fork on which the guide pin has worn past the service limit. If a shift drum groove is worn past the service limit, replace the shift drum.



1. Guide Pin **2. Shift Drum**

Table 23 Shift Fork Guide Pin Diameter

Service Limit
5.85 mm (0.23 in)

Table 24 Shift Drum Groove Width

Service Limit
6.25 mm (0.246 in)

Transmission gear damage

Inspect the teeth on the transmission gear. Any light damage can be corrected with an oilstone, but the gear must be replaced if the teeth are badly damaged. Damaged teeth on a gear indicate that the teeth on the gear that drives it may also be damaged. At the same time that a gear is repaired or replaced, the driving gear should also be inspected and repaired or replaced if necessary.

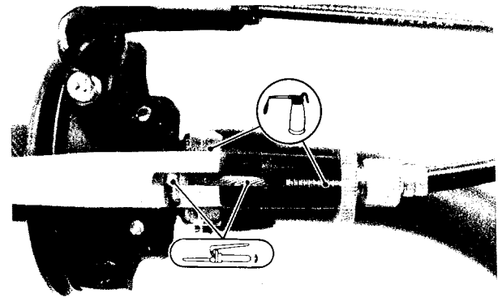
External shift mechanism inspection

Inspect the shift pawl spring, gear set lever spring, neutral set lever spring, and shift pawl. Replace any broken or otherwise damaged parts.

Check to see if the return spring pin is loose or not. If it is loose, remove it and apply a locking agent to the threads. Then screw and tighten it securely.

General Lubrication

Lubricate exposed parts which are subject to rust, with either motor oil or regular grease whenever the vehicle has been operated under wet or rainy conditions, and especially after using a high-pressure spray washer. Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.

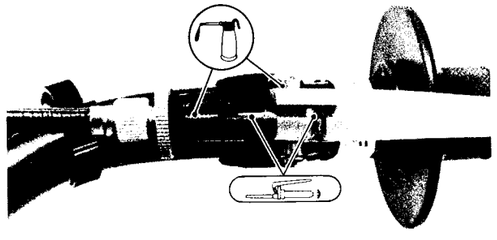


Drive Chain

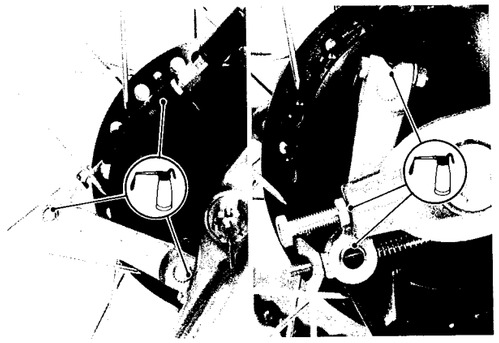
The drive chain should be oiled after riding through rain or on wet roads, after washing the motorcycle, or any other time the chain appears dry.

Use a heavy oil such as SAE 90 weight gear oil to lubricate the chain. A lighter oil is better than no oil at all, but a heavier oil will stay on the chain longer and provide better lubrication. Apply oil to the sides of the rollers and between the side plates of the links so that the oil will penetrate to the pins and bushings. Wipe off any excess oil.

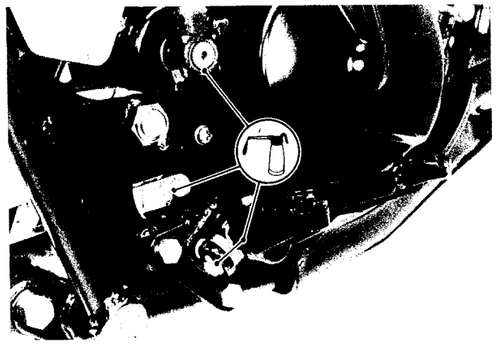
Clutch Lever and Brake Lever



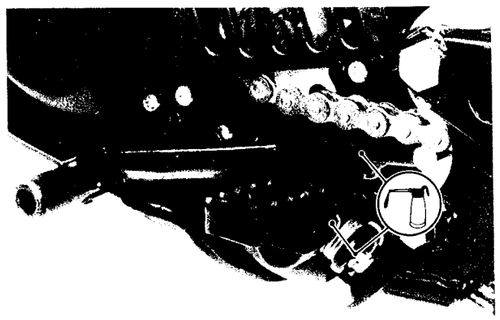
Brake Cam Levers



Kick Pedal, Brake Pedal, and Right Footpeg



Shift Pedal and Left Footpeg

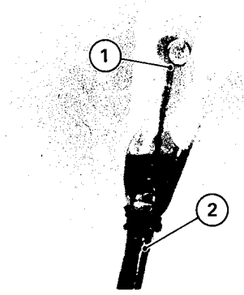


Throttle Grip

Remove the throttle grip housing screws. Apply a light coat of grease to the exposed portion of the throttle inner cable.

Clutch, Brake, Throttle Cables

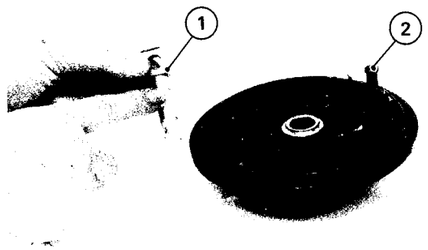
Lubricate the clutch cable, throttle cable, and the front brake cable as shown.



1. Inner Cable 2. Outer Cable

Brake Camshafts

Wipe off the old grease, and re-grease the brake pivot points. Apply grease to the brake shoe anchor pins, spring ends, and cam surface of the camshaft, and fill the camshaft groove with grease.



1. Brake Camshaft 2. Anchor Pin

NOTES: ○Do not get any grease on the brake shoe linings, and wipe off any excess grease so that it will not get on the linings or drum after brake assembly. ○When hooking the brake shoe springs onto the brake shoes, the longer spring should be on the camshaft side.

1. Brake Shoe Lining 2. Longer Spring

Swing Arm

Table 16 Crankshaft Runout

Service Limit
0.10 mm (0.004 in)

CLUTCH

Clutch spring tension

Measure the free length of the clutch springs with vernier calipers. If any spring is shorter than the service limit, replace all the springs as a set to ensure even pressure on the clutch plates.

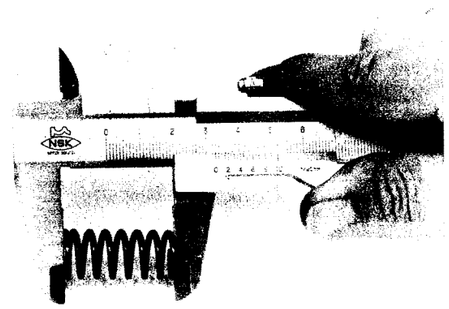


Table 17 Clutch Spring Free Length

Service Limit
29.8 mm (1.17 in)

Friction plate wear, damage

Visually inspect the friction plates to see if they show any signs of heat seizure or have become rough or unevenly worn. Measure the thickness of the plates with vernier calipers. If any plates show signs of damage or if they have worn past the service limit, replace them with new ones.

Friction Plate Measurement

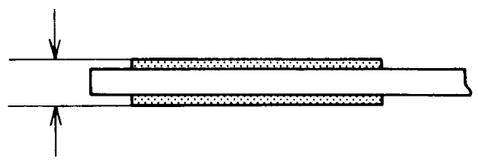


Table 18 Friction Plate Thickness

Service Limit
2.8 mm (0.11 in)

Friction plate/clutch housing clearance

Measure the clearance between the tangs on the friction plates and the fingers of the clutch housing. If this clearance is excessive, the clutch will be noisy. If the clearance exceeds the service limit, replace the friction plates.

Friction Plate/Clutch Housing Clearance

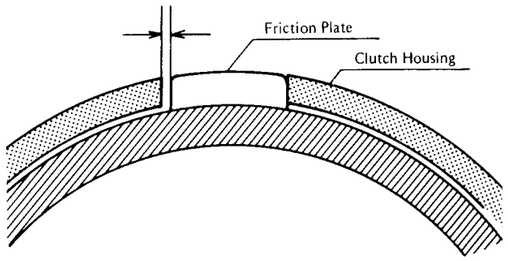


Table 19 Friction Plate/Clutch Housing Clearance

Service Limit
0.6 mm (0.024 in)

Clutch plate warp

Place each friction plate and each steel plate on a surface plate, and measure the gap between each clutch plate and the surface plate. This gap is the amount of clutch plate warp. Replace any plates warped beyond the service limit.

1. Friction Plate 2. Thickness Gauge

Using the arrangement shown in the figure, measure the amount that the arbor varies from being parallel with the crankshaft over a 100 mm (4 in) length of the arbor to determine the amount the connecting rod is twisted.

If either of the above measurements exceeds the service limit, the crankshaft assembly must be replaced.

Connecting Rod Twist

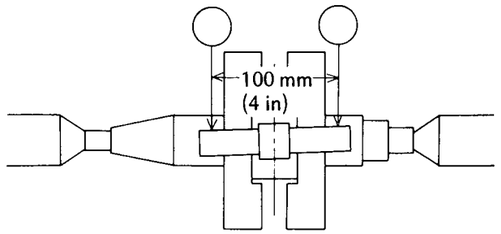


Table 13 Connecting Rod Bend, Twist

Service Limit
0.20 mm/100 mm (0.008 in/4 in)

Connecting rod big end radial clearance

Set the crankshaft in a flywheel alignment jig. Placing a dial gauge against the connecting rod big end, push the connecting rod first towards the gauge and then in the opposite direction. The difference between the high and low reading is the radial clearance.

If the radial clearance exceeds the service limit, replace the crankshaft assembly.

Connecting Rod Big End Radial Clearance

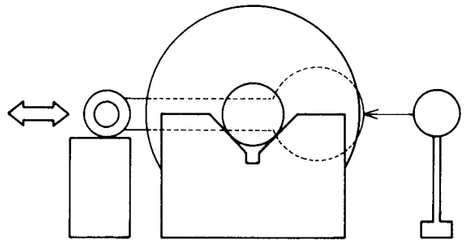


Table 14 Connecting Rod Big End Radial Clearance

Service Limit
0.09 mm (0.003 in)

Connecting rod big end side clearance

Measure the side clearance of the connecting rod with a thickness gauge. If the clearance exceeds the service limit, replace the crankshaft assembly.

Connecting Rod Big End Side Clearance

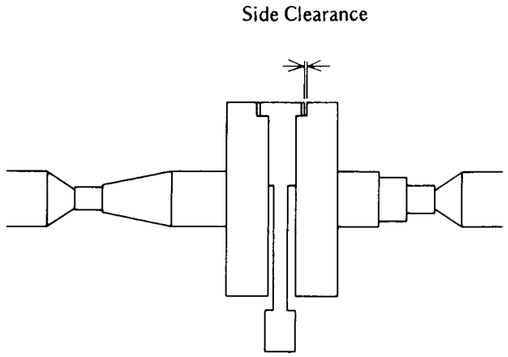


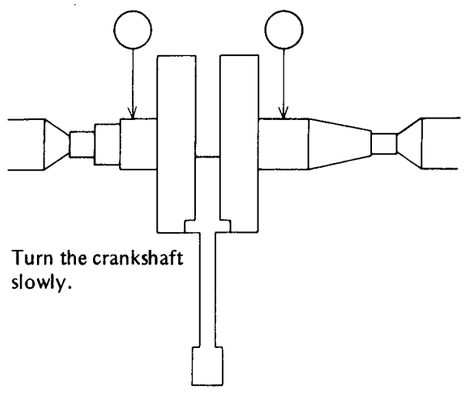
Table 15 Connecting Rod Big End Side Clearance

Service Limit
0.6 mm (0.024 in)

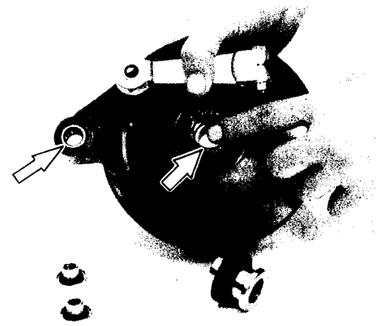
Crankshaft runout

Set the crankshaft in a flywheel alignment jig, and place a dial gauge on each side of the crankshaft where the crankshaft ball bearings fit. Turn the crankshaft slowly. The maximum difference in gauge readings is the crankshaft runout. If the runout exceeds the service limit, replace the crankshaft assembly.

Crankshaft Runout

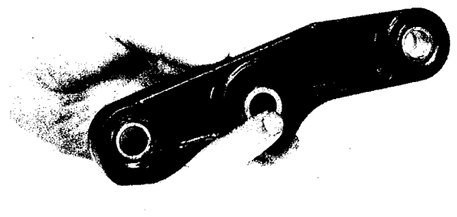


Rear Brake Panel



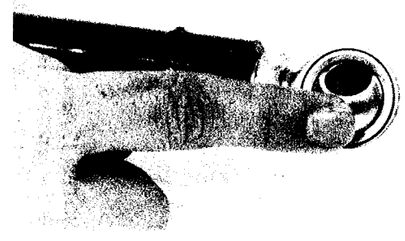
Torque Link

Uni-Trak Arm



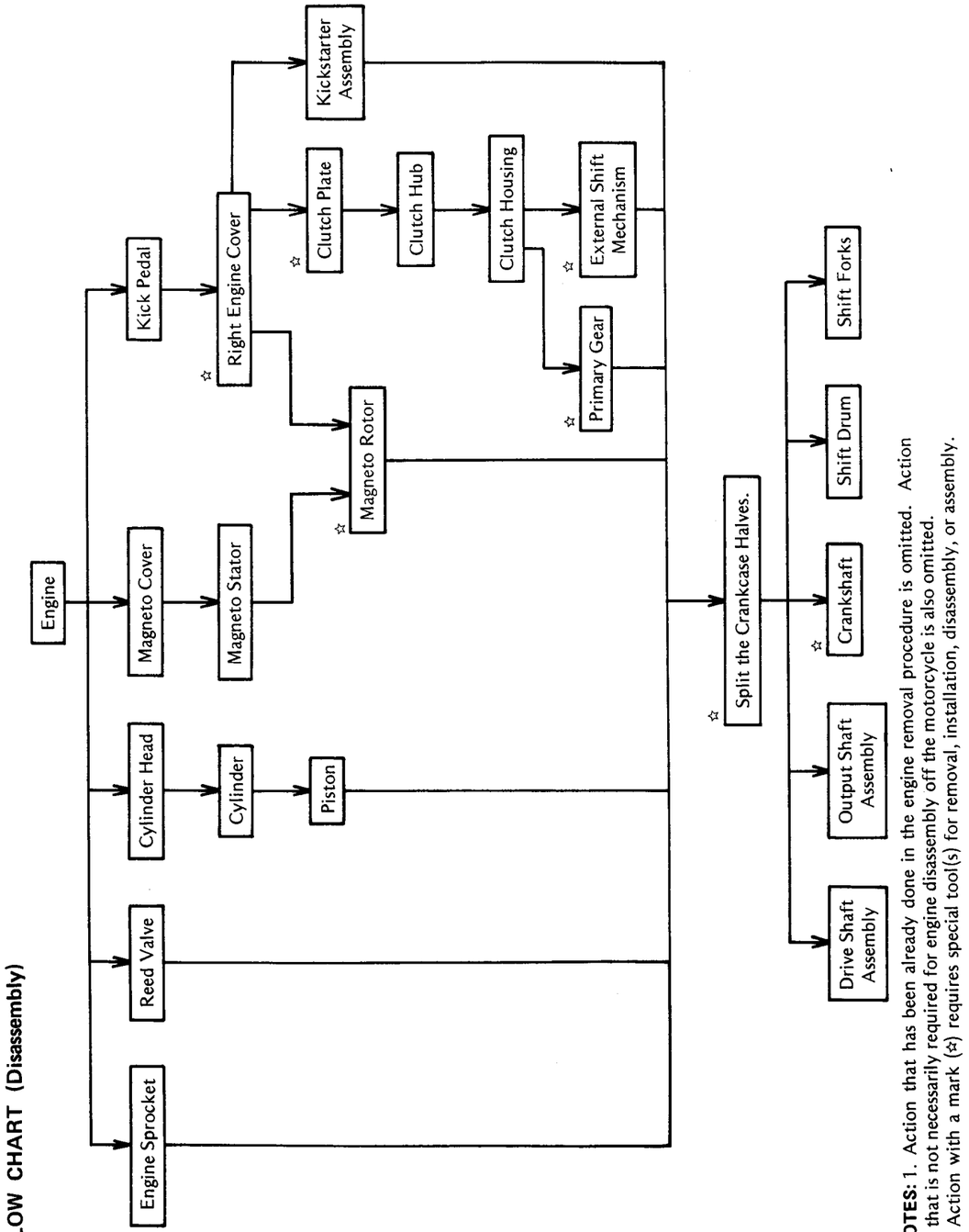
Apply molybdenum disulfide grease (same quality as MIL-G 21164, applicable temperature of $-54 \sim 128°$) to the sleeve bearing and spherical bearings.

Uni-Trak Links



Disassembly

FLOW CHART (Disassembly)



NOTES: 1. Action that has been already done in the engine removal procedure is omitted. Action that is not necessarily required for engine disassembly off the motorcycle is also omitted.
2. Action with a mark (☆) requires special tool(s) for removal, installation, disassembly, or assembly.

Table 11 Piston Ring Groove Thickness

Service Limit
1.3 mm (0.051 in)

When a new ring is being fitted into a used piston, check for uneven groove wear by inspecting the ring seating. The ring should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.

Piston, piston pin, connecting rod small end wear

Measure the diameter of the piston pin with a micrometer. If the piston pin diameter is less than the service limit at any point, replace the piston pin.

Using a cylinder gauge, measure the diameter of both piston pin holes in the piston and the inside diameter of the connecting rod small end. If either piston pin hole diameter exceeds the service limit, replace the piston. If the connecting rod small end diameter exceeds the service limit, replace the crankshaft assembly.

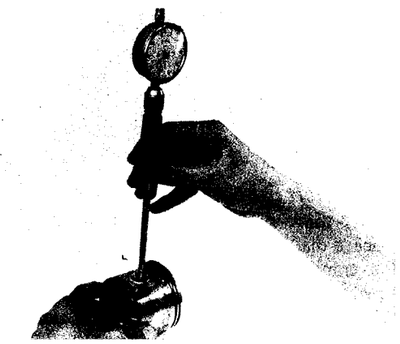


Table 12 Piston Pin, Piston Pin Hole Small End Dia.

	Service Limit
Piston Pin	15.96 mm (0.628 in)
Piston Pin Hole	16.07 mm (0.633 in)
Small End I.D.	20.05 mm (0.789 in)

NOTE: When a new piston or pin is used, check that piston-to-pin clearance is under 0.011 mm (0.00043 in).

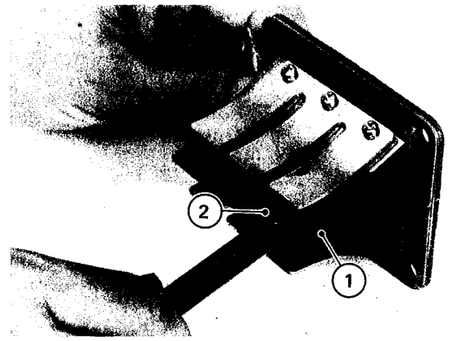
Needle bearing

The connecting rod small end needle bearing must be replaced if it has cracked.

REED VALVE

An Eyvind Boyesen's reed valve is used on this model.

When the clearance between the reed valve and valve holder is over 0.5 mm (0.02 in), or if the reed valve has cracked, warped, or damaged, replace the reed valve assembly with a new one.



1. Valve Holder **2. Reed Valve**

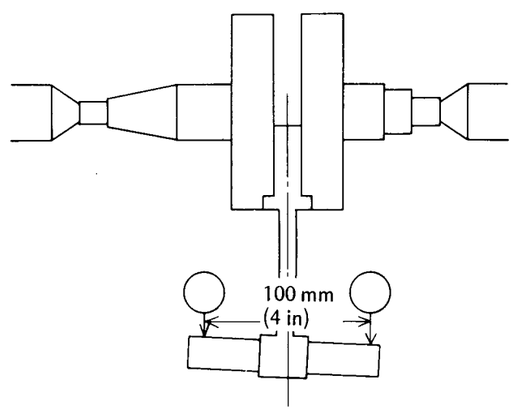
CRANKSHAFT

Connecting rod bending, twisting

Set the crankshaft in a flywheel alignment jig or on V blocks on a surface plate. Select an arbor of the same diameter as the piston pin and of optional length, and insert it through the small end of the connecting rod.

Using a height gauge or dial gauge, measure the difference in the height of the rod above the surface plate over a 100 mm (4 in) length to determine the amount the connecting rod is bent.

Connecting Rod Bend



Piston wear

Measure the outside diameter of the piston 10 mm up from the bottom of the piston at a right angle to the direction of the piston pin using a micrometer. If the measurement is under the service limit, replace the piston.

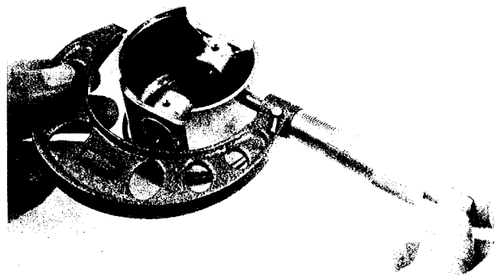


Table 6 Piston Diameter

Service Limit
55.8 mm (2.19 in)

Piston/cylinder clearance

In order to maintain proper piston/cylinder clearance, the piston/cylinder clearance should be measured whenever a new piston or cylinder is installed. The most accurate way to find the clearance is to make separate piston and cylinder measurements and then compute the difference between the two values. Measure the piston diameter as just described, and substract this piston diameter value from the smallest value of the previously measured front-to-back cylinder diameters. The difference is the piston/cylinder clearance.

Table 7 Piston/Cylinder Clearance

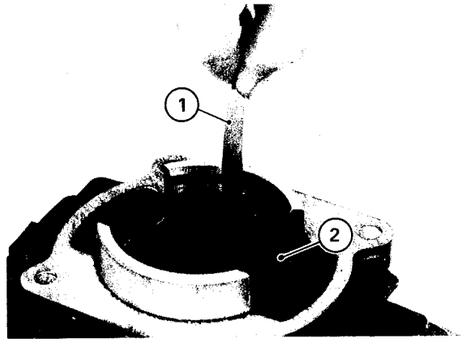
Standard
0.047 ~ 0.052 mm (0.0018 ~ 0.0020 in)

Piston ring end gap

Place the piston ring being checked inside the cylinder close to the bottom where the wear is low. Measure the gap between the ends of the ring with a thickness gauge. If the gap is wider than the service limit, the ring is overworn and must be replaced.

Table 8 Piston Ring End Gap

Service Limit
0.7 mm (0.028 in)



1. Thickness Gauge **2. Piston Ring**

Piston ring, piston ring groove wear

Visually inspect the piston ring and the piston ring groove. If the ring is worn unevenly or damaged, they must be replaced. If the piston ring groove is worn unevenly or damaged, the piston must be replaced and fitted with new rings.

With the piston ring in its groove, make several measurements with a thickness gauge to determine piston ring/groove clearance. If the clearance exceeds the service limit, measure the thickness of the piston ring and the width of the ring groove. If the ring has worn down to less than the service limit, replace the ring; if the groove width exceeds the service limit, replace the piston.

Table 9 Piston Ring/Groove Clearance

Service Limit
0.16 mm (0.0063 in)

Table 10 Piston Ring Thickness

Service Limit
1.1 mm (0.043 in)

ENGINE REMOVAL

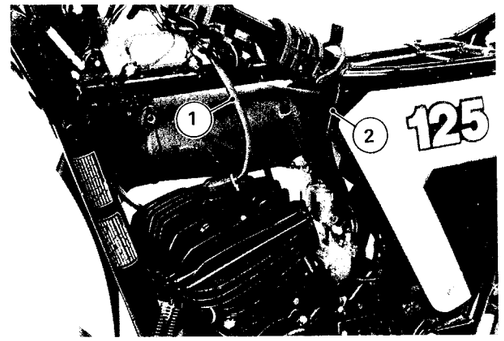
- Drain the transmission oil.
- Remove the seat and right side cover.
- Turn the fuel tap "off" and pull off the fuel hose. Take off the fuel tank.
- Loosen the clamp bolt, remove the mounting bolt, and pull the silencer off toward the rear.
- Remove the two springs on the inlet of the muffler.
- Remove the muffler mounting nut and muffler.
- Remove the engine sprocket cover.
- Remove the circlip, and pull off the engine sprocket and drive chain.
- Disconnect the magneto output leads, and free the leads from the frame.
- Disconnect the spark plug cap.
- Loosen the carburetor clamp screws, and take off the carburetor.
- Slide the dust cover on the lower end of the clutch cable out of place. Loosen the nuts and slide the adjuster to give the clutch cable plenty of play.
- Line up the slots in the clutch lever, locknut, and adjuster. Disconnect the cable tip from the clutch lever.
- Move the adjuster on the lower end of the clutch cable, and slide the inner cable out of the tab on the cylinder. Disconnect the cable tip from the clutch release lever.
- Remove the mounting bolts, nuts, left footpeg, and drive chain guide roller.
- Remove the bolts and engine brackets.
- Remove the engine mounting bolts and remove the engine.

INSTALLATION NOTE

- Apply the molybdenum disulfide grease around the inlet of the muffler, from the edge to the **O** ring.

A. Grease here.

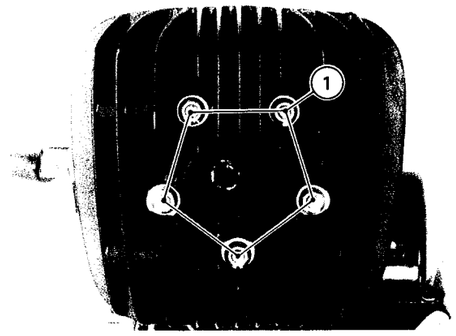
- Feed the spark plug lead and magneto output lead so that they do not directly touch the muffler.



1. Spark Plug Lead **2. Magneto Output Lead**

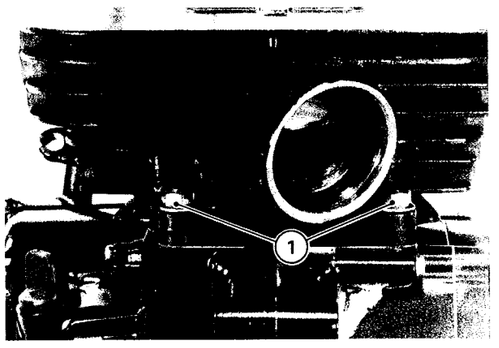
ENGINE DISASSEMBLY

- Remove the spark plug.
- Remove the cylinder head nuts.



1. Cylinder Head Nuts

- Lift off the cylinder head and the gasket.
- Remove the cylinder nuts (4).

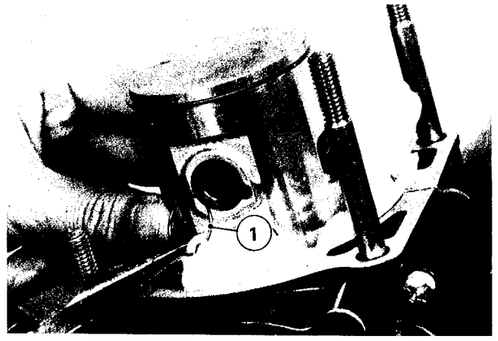


1. Cylinder Nuts

●Lift off the cylinder and cylinder base gasket. If necessary, lightly tap around the cylinder with a mallet, taking care not to damage the cooling fins.

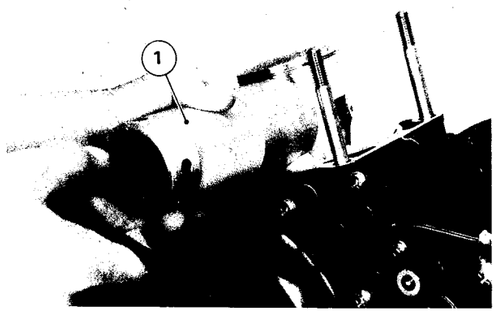
CAUTION **Do not twist the cylinder as you slide it off the piston. Twisting may cause the piston ring to pop into the intake port. This will cause the cylinder to jam, making removal impossible. If the cylinder does jam, remove the reed valve and press the piston ring back into position.**

●Remove one of the piston pin snap rings with needle nose pliers.



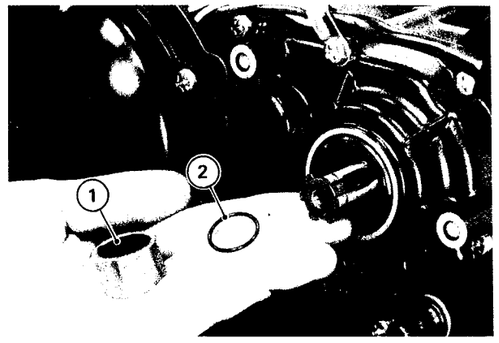
1. Snap Ring

●Remove the piston by pushing its piston pin out the side from which the snap ring was removed. Use a piston pin puller and adapter "B" (special tool) if necessary.



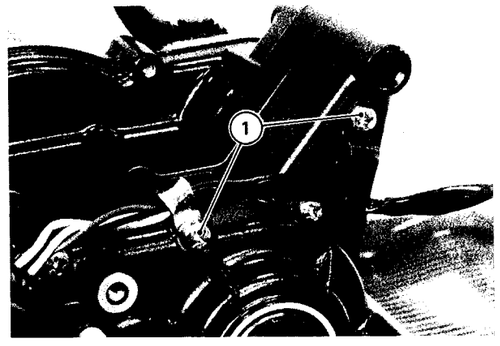
1. Piston Pin Puller (57001-910)
Adapter "B" (57001-913)

●Remove the piston and pull out the connecting rod small end needle bearing.
●Remove the clamp bolt and pull off the shift pedal.
●Pull off the sleeve and O ring from the output shaft.



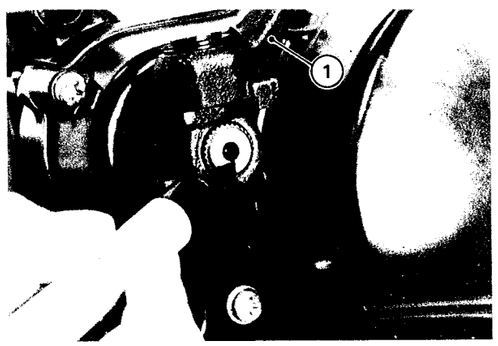
1. Sleeve **2. O Ring**

●Remove the magneto output wiring clamp screws.

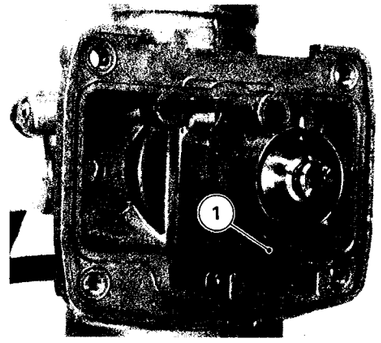


1. Clamp Screws

●Remove the screws, and pull off the magneto cover and gasket.
●Remove the magneto stator screws and flat washers, and pull off the magneto stator.
●Remove the kick pedal bolt.
●Mark the position of the kick pedal on the shaft so that it can be reinstalled later in the same position, and remove the kick pedal.



1. Kick Pedal



1. Tab

DECARBONIZATION

The exhaust system, piston head, exhaust port, cylinder head, and muffler can fill up with carbon and other exhaust by-products over an extended period of operation, resulting in a drop in performance.

●Remove the muffler, and scrape off the carbon.
●Remove the cylinder head, scrape out any carbon, and clean the head with a high flash-point solvent.
●Remove the cylinder, carefully scrape the carbon out of the exhaust port.
●Remove the piston, scrape off the carbon, and then lightly polish the piston with fine emery cloth.
●Clean carbon and dirt out of the piston ring grooves using a suitable tool.

CYLINDER AND PISTON

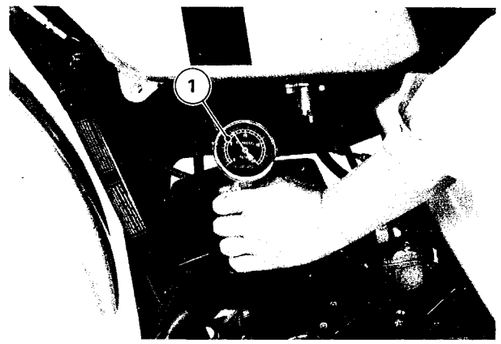
Compression measurement

A compression test is very useful as an aid in determining the condition of the engine. Low compression may be due to cylinder wear; worn piston ring groove; worn, broken, or sticking piston ring; cylinder head leaks; or damage to the engine such as piston seizure. Too high a compression may be due to carbon build-up on the piston head and cylinder head.

Before measuring compression, check that the cylinder head is tightened down to 2.5 kg-m (18 ft-lbs) of torque and cylinder base nuts to 2.2 kg-m (16 ft-lbs) of torque, and then thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running. While the engine is running, check that there is no gas leakage from around the spark plug or the cylinder head gasket.

Stop the engine, remove the spark plug, and install the compression gauge hose securely against the spark plug hole so that there will no be leakage. With the throttle fully open so that air can flow freely to the engine, turn the engine over sharply with the kick pedal several times until the compression gauge stops rising.

The compression is the highest reading obtainable.



1. Compression Gauge

Table 4 Cylinder Compression

Standard
12 kg/cm² (171 psi, 1,177 kPa)

Cylinder wear

Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement using an inside micrometer or a cylinder gauge. If any measurement exceeds the service limit, or if there is a difference of more than 0.05 mm (0.002 in) between two measurements, the cylinder must be replaced with a new one.

NOTE: The ELECTRO FUSE cylinder cannot be bored or horned. If altering the cylinder ports, take care that the cylinder wall does not get scratched or otherwise damaged.

Cylinder Inside Diameter Measurement

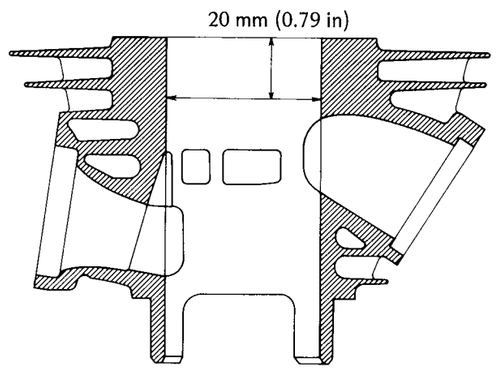
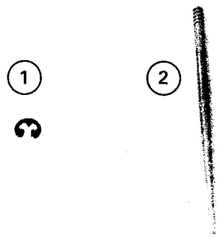


Table 5 Cylinder Inside Diameter

Service Limit
56.1 mm (2.209 in)

is opened, the cross sectional area of the jet needle/needle jet clearance becomes greater, increasing the fuel flow.

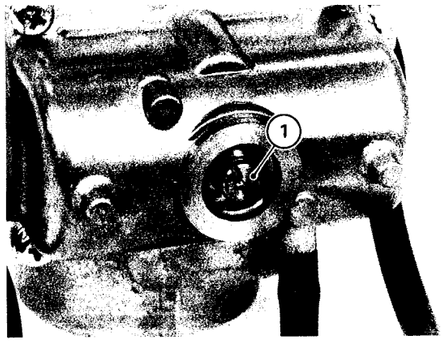
To change the position of the jet needle in the needle jet at a given throttle opening, move the clip, which is in one of 5 grooves at the upper part of the needle, to a higher or lower groove. Moving the clip to a higher groove makes the fuel/air mixture leaner; conversely, moving it lower makes the mixture richer.



1. Clip **2. Jet Needle**

(4) 3/4 ~ 1 throttle

Alteration of the mixture in this range is effected by the main jet size. The larger the main jet, the greather the flow of fuel at a given throttle position.



1. Main Jet

(5) Influence of atomospheric pressure and temperature on carburetor settings

- In high altitude areas, where the air density is low due to the lower atomospheric pressure, less air enters the carburetor resulting in too rich a mixture for a carburetor that was adjusted properly at low altitude. To obtain the proper carburetor fuel/air mixture, it may be necessary to raise the clip on the jet needle and to change the main jet to one size smaller.
- In particularly cold weather, the increased density of the air may necessitate a lower clip position on the jet needle and a size larger main jet to avoid an overly lean fuel/air mixture.
- Rainy weather also may influence the fuel/air mixture. As the moisture content of the air rises, the air density decreases, which may result in too rich a fuel/air mixture.

(6) Selecting the correct main jet

Choose a main jet that fulfills the following conditions:

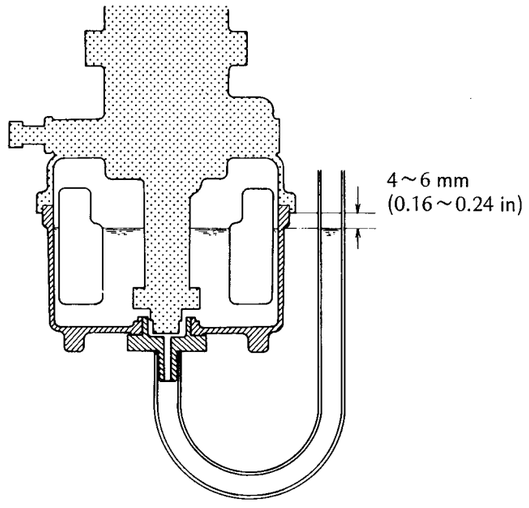
- Highest rpm (r/min).
- Smooth transition when accelerating from low rpm (r/min).
- Spark plug buring properly.
- Engine lugs without knocking (detonating).

(7) Service fuel level/measurement and adjustment

- Close the fuel tap, and remove the carburetor. The fuel hose and carburetor cable do not have to be removed to inspect the fuel level.
- Remove the drain plug from the bottom of the float bowl, and screw a fuel level gauge (special tool) into the plug hole.
- Open the fuel tap so that fuel will flow into the carburetor.
- Line up the uppermost part of the ruled portion of the gauge hose with the bottom edge of the carburetor. The proper fuel level is 4 ~ 6 mm (0.16 ~ 0.24 in) from the top of the ruled portion.

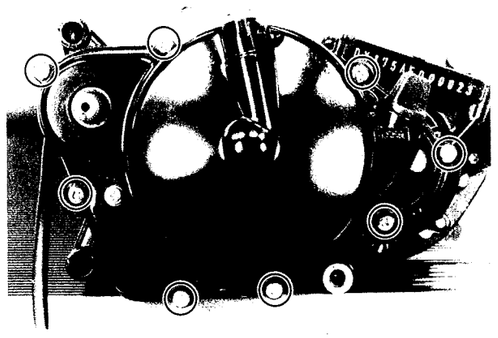
NOTE: Measure the fuel level keeping the carburetor fully perpendicular to the ground.

Service Fuel Level Measurement

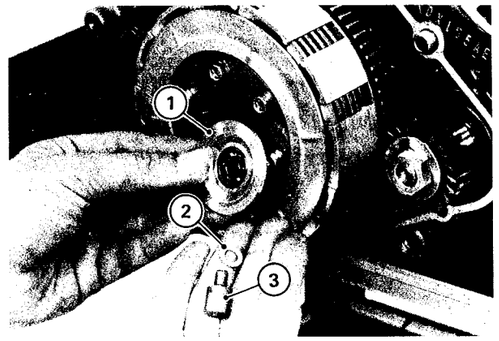


- If the fuel level is incorrect, open the float chamber, bend the tab on the float arm a slight amount and then recheck the level; readjusting it if necessary.

- Remove the screws, and pull off the right engine cover and gasket.

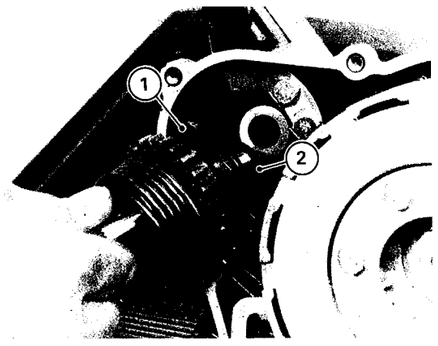


- Remove the spring plate pusher, flat washer, and clutch pusher in the clutch hub.



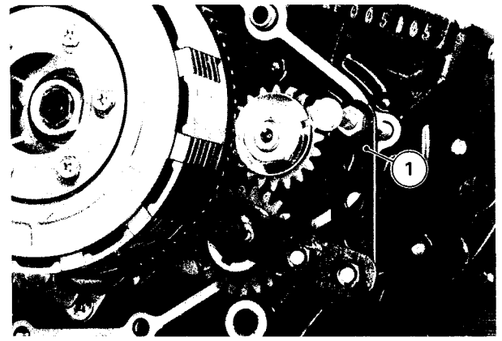
1. Spring Plate Pusher **3. Clutch Pusher**
2. Flat Washer

- Unhook the end of the kick spring from the kick spring stop.
- Pull out the kickstarter assembly. There is a thrust washer where the kick shaft goes through the crankcase.



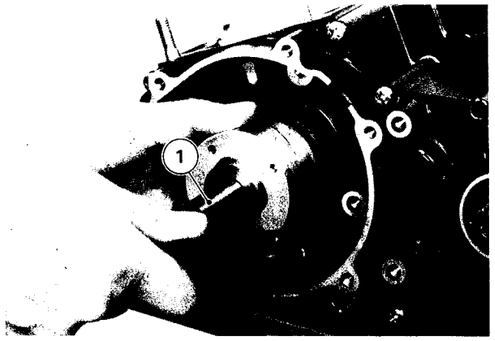
1. Kickstarter Assembly **2. Thrust Washer**

- Install the gear holder (special tool) to keep the crankshaft steady, and loosen the rotor bolt. Remove the rotor bolt and flat washer.



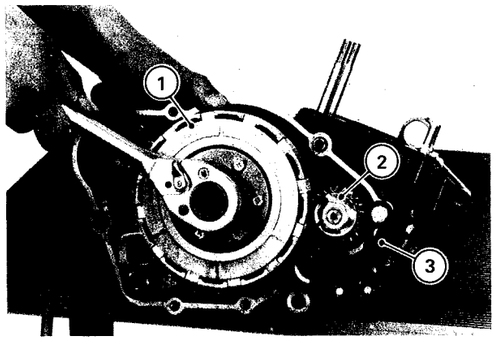
1. Gear Holder (57001-1015)

- Remove the magneto rotor using the rotor puller (special tool).



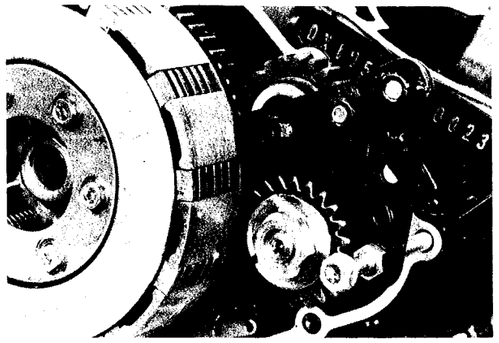
1. Rotor Puller (57001-1016)

- Remove the woodruff key on the crankshaft.
- Flatten the portion of the toothed washer which is bent over the primary gear nut.
- Using the gear holder (special tool) to prevent the clutch and primary gear from rotating, loosen the clutch hub nut.

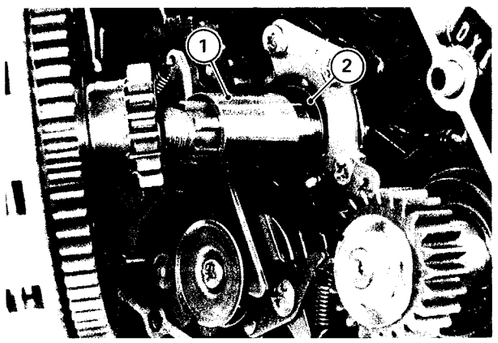


1. Clutch Assembly **3. Gear Holder (57001-1015)**
2. Primary Gear

●Change the gear holder position, and loosen the primary gear nut.

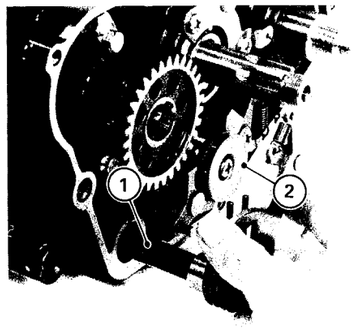


●Remove the gear holder.
●Remove the clutch hub nut, lockwasher, and splined washer.
●Pull off the clutch assembly sleeve, and thrust washer.



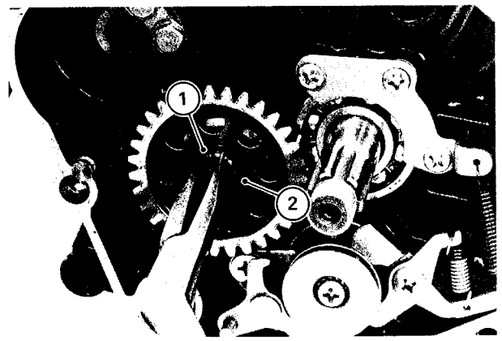
1. Sleeve **2. Thrust Washer**

●Remove the primary gear nut, toothed washer, primary gear, and woodruff key.
●Move the external shift mechanism pawl out of position on the end of the shift drum, and pull the external shift mechanism shaft out of the crankcase.



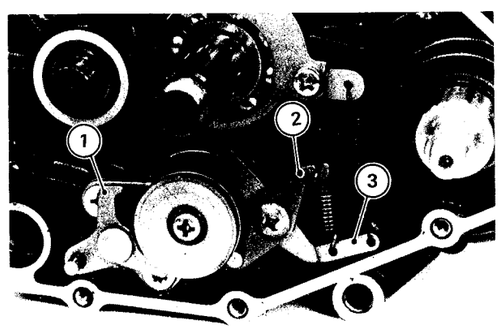
1. External Shift Mechanism Shaft **2. Shift Drum**

●Remove the circlip and thrust washer on the output shaft idle gear.



1. Circlip **2. Thrust Washer**

●Pull off the output shaft idle gear and another thrust washer.
●Remove the two springs and a mounting screw, and remove the neutral set lever and gear set lever. There is a flat washer at the rear of the gear set lever.



1. Shift Drum Guide/Over Shaft Limiter
2. Neutral Set Lever **3. Gear Set Lever**

Maintenance

CARBURETOR

Since the carburetor regulates and mixes the fuel and air going to the engine, there are two general types of carburetor trouble: too rich a mixture (too much fuel), and too lean a mixture (too little fuel). Such trouble can be caused by dirt, wear, maladjustment, or improper fuel level in the float chamber. A dirty or damaged air cleaner can also alter the fuel to air ratio.

Table 2 Mixture Trouble Symptoms

Mixture too rich	Mixture too lean
Engine is sluggish	Engine overheats
Smoky exhaust	Spark plug burned white
Runs worse when warm	Running is unstable
Spark plug fouled black	No power

Table 3 Carburetor Specification

Main Jet	147.5R
Air Jet	(2.5)
Jet Needle	6F21-2
Needle Jet	Q-4
Cutaway	2.0
Pilot Jet	50
Air Screw (turns out)	1½
Service Fuel Level	4~6 mm

NOTE: The last number of the jet needle number ("2" of 6F21-2) is not stamped on the needle, but is the number of the standard groove in which the clip is set. The groove numbers are counted from the top of the needle, 1 being the topmost groove, and 5 being the lowest groove.

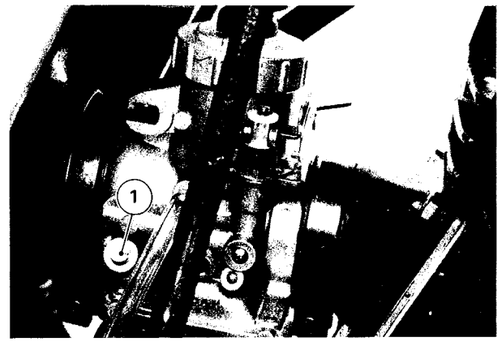
Jet Needle

(1) 0~1/8 throttle

The fuel is metered by the pilot jet in this throttle range, which provides the rich mixture necessary at low rpm (r/min). Alteration of this mixture is effected by the position of the air screw. As the air screw is turned in, the mixture becomes richer.

To achieve the standard air screw setting, turn in the air screw lightly until it stops, and then back it out 1½ turns.

NOTE: Do not screw in the air screw forcefully, turn it just until it stops.

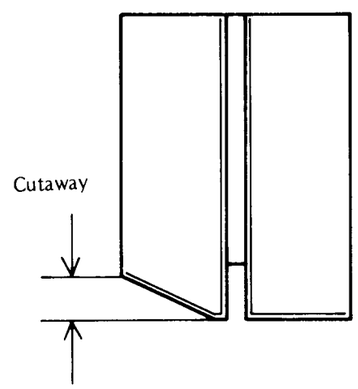


1. Air Screw

(2) 1/8~1/4 throttle

Alteration of the fuel mixture within this range is effected largely by the amount of throttle valve cutaway. The greater the amount of the cutaway, the leaner the mixture in this throttle range.

Throttle Valve



(3) 1/4~3/4 throttle

Alteration of the mixture in this range is effected by repositioning the jet needle in the needle jet. The bottom part of the jet needle is tapered; as the throttle

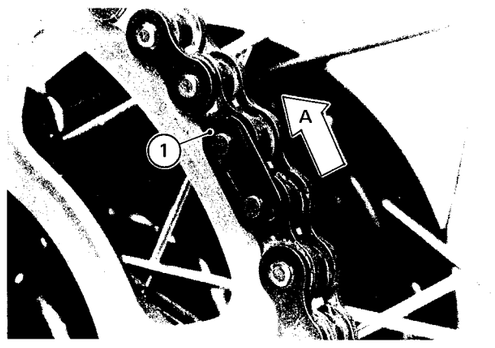
- Cross-tighten the cylinder nuts to 2.2 kg-m (16 ft-lbs) of torque.
- Place the cylinder head gasket and the cylinder head on the cylinder.
- Cross-tighten the cylinder head nuts evenly to 2.5 kg-m (18 ft-lbs) of torque.
- Install the magneto cover and new gasket.

NOTE: After assembling and installing the engine, fill the engine with oil and check the oil level.

- If the footpeg mounting bolt is overtightened, the footpeg will not fold up. Tighten the footpeg mounting bolt to correct torque (Pg. 55).
- Uni-trak:
  - Before removing the unit-trak parts, put a sturdy block or support under the frame so that the rear wheel is raised off the ground.
  - See "Torque Table", Page 55, for proper tightening torques.

DISASSEMBLY AND ASSEMBLY NOTES OF THE FRAME PARTS

- Before removing the brake cam lever, mark the position of the cam lever so that it can be installed later in the same position.
- When the wheel is disassembled, apply grease liberally to the wheel bearing.
- Front Wheel:
  - Center the brake panel assembly in the brake drum. This is done by tightening the axle lightly, spinning the wheel, and pulling the brake lever forcefully. The partially tightened axle allows the brake panel assembly to center itself within the brake drum. This procedure can prevent a soft, or "spongy feeling" brake.
  - After tightening the front axle, tighten the panel stop bolt securely.
  - After installing the front wheel, adjust the front brake.
- Rear Wheel:
  - The direction of the chain master link clip should be as shown.



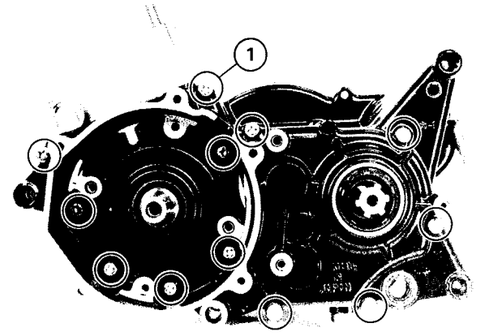
1. Clip **A. Direction of Chain Rotation**

  - After installing the rear wheel, adjust the drive chain and rear brake.

- Remove the shift drum guide/over shift limiter.

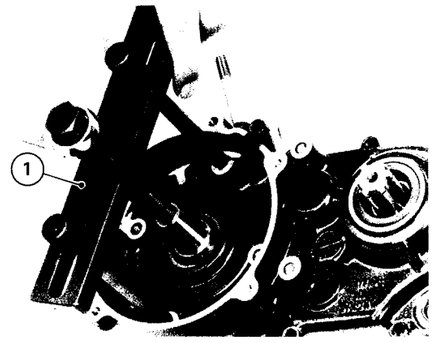
NOTE: Due to close tolerance between the crankshaft and crankshaft bearings, a press will be necessary for the following procedure. Do not attempt to service the transmission and shift drum if a press is not available.

- Remove the crankcase screws.



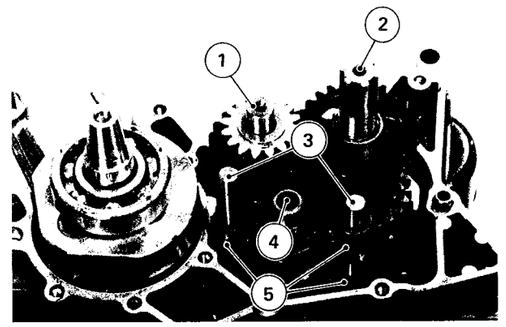
1. Crankcase Screws

- Screw the crankcase splitting tool and adapter (special tools) into the left side of the crankcase. Be certain to screw the tool in all the way.
- Tighten the bolt on the crankcase splitting tool to split the crankcase.



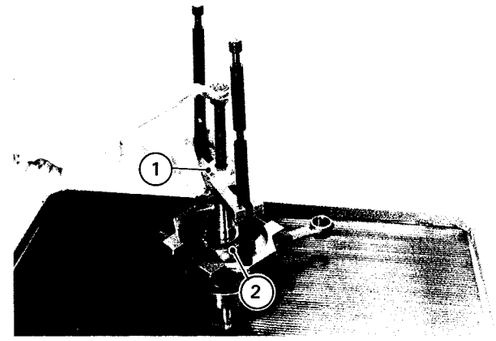
1. Crankcase Splitting Tool (57001-153)
Adapter (57001-157)

- Once the crankcase is split, remove the crankcase splitting tool, and lift off the left crankcase half. Remove the shift rods, shift forks, shift drum, and output and drive shaft assemblies.



1. Drive Shaft **3. Shift Rods** **5. Shift Forks**
2. Output Shaft **4. Shift Drum**

- Remove the breather tube from the right crankcase half.
- Remove the crankshaft from the right crankcase half using a press.
- Remove the bearing on the crankshaft with the bearing puller (special tool).



1. Bearing Puller (57001-135) **2. Bearing**

- Remove the bearings from the crankcase.

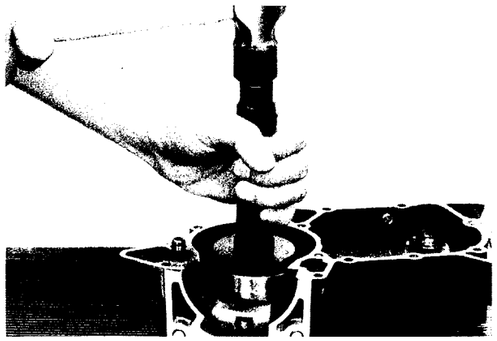
ENGINE ASSEMBLY

- Clean out the crankcase, and clean off any grime on the transmission and crankshaft parts with a high flash-point solvent.

●Any oil seal that is removed is damaged and must be replaced with a new one. Press in the new oil seal using a press and suitable adapters so that the face of the seal is level with the surface of the crankcase.

Apply a little amount of heat durable grease to the inner lip of the oil seal.

●Install the ball bearings using a press and the bearing driver and bearing driver holder (special tools). Install the shift drum needle bearing using a press and the shift drum bearing driver (special tool).



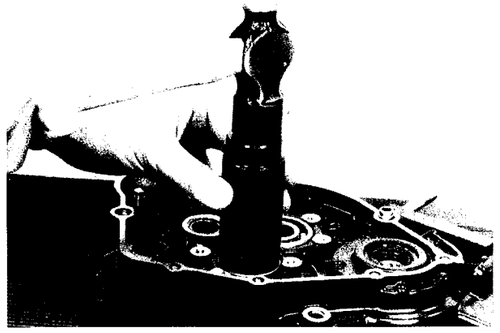
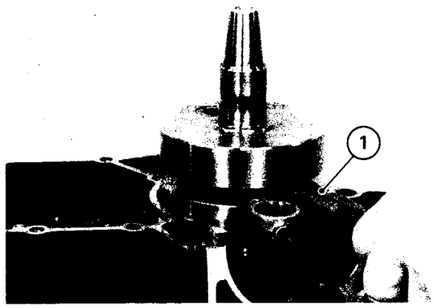


Table 1 Bearing Drivers Necessary for Crankcase Assembly

			Part Number
Left Crankcase Half	Ball Bearing	Crankshaft	57001-296
		Output Shaft	57001-290
Right Crankcase Half	Ball Bearing	Crankshaft	57001-296
		Drive Shaft	57001-290
	Shift Drum Needle Bearing		57001-286

●Insert a chisel or wedge between the crankshaft flywheels opposite the connecting rod big end to protect flywheel alignment as shown, and fit the crankshaft into the right crankcase half using a press.



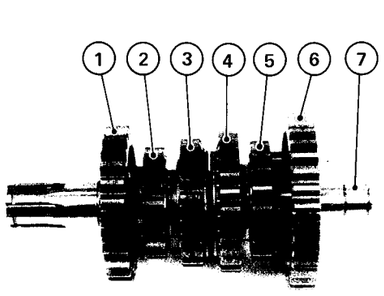
1. Chisel

●Replace the crankcase knock pins if they were removed.

●Mesh the output shaft gears with those on the drive shaft, and simultaneously fit the shift drum, shift forks, and both assemblies into the right crankcase half.

NOTES: ○The output shaft gears can be recognized by size, the gear with the largest diameter being 1st gear, and the smallest one being 6th gear.

2nd gear – plain side faces left
6th gear – fork groove goes to right side of the gear teeth
4th gear – dog recesses face left
3rd gear – dog recesses face right
5th gear – fork groove goes to the left side of the gear teeth
1st gear – plain side faces right



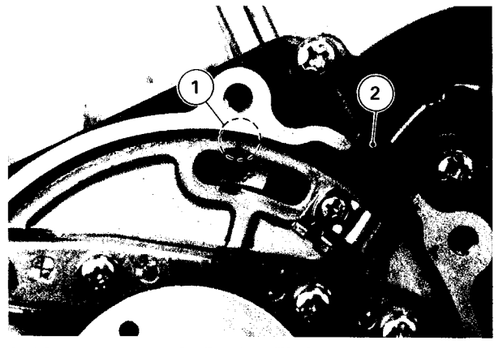
1. 2nd Gear
2. 6th Gear
3. 4th Gear
4. 3rd Gear
5. 5th Gear
6. 1st Gear
7. Output Shaft

○Drive shaft gears are opposite from those of the output shaft, the smallest being for 1st gear and the largest for 6th.

1st gear – part of drive shaft
5th gear – plain side faces right
3rd and 4th gears – larger gear faces left
6th gear – plain side faces left
2nd gear – plain side faces left

1. Kick Shaft Oil Seal Guide (57001-263)

●Install the magneto stator so that the mark on the magneto stator aligns with the mark on the crankcase. Fit the rubber fitting into the crankcase.



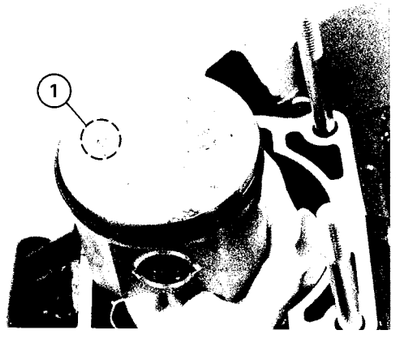
1. Marks **2. Rubber Fitting**

●Fit the magneto output wiring into the guides, and screw the guides back onto the crankcase, tightening them with an impact driver.

●Fit a new **O** ring and the sleeve on the output shaft.

●Apply 2-stroke oil to the connecting rod needle bearing, and fit it into the connecting rod.

●Install the piston and piston pin. The arrow on the top of the piston must point towards the front.



1. Arrow

●Install a new piston pin snap ring in place since removal weakens and deforms the ring. After installation, turn the snap ring so that its opening does not coincide with the groove in the side of the piston.

NOTES: ○If the piston is replaced with a new one, the piston to cylinder clearance must be the specified amount (Pg. 39). Also, when a new piston or piston pin is used, check the piston to pin clearance (Pg. 39).

○If a piston ring is replaced with a new one, install the ring so that the "R" marked side faces up.

1. "R" Mark

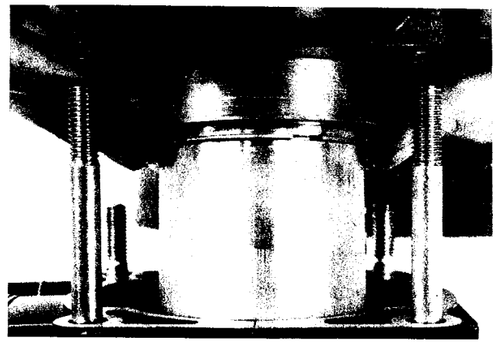
●Remove the cloth that covers the cylinder base hole, and set the piston at BDC (bottom dead center) to facilitate cylinder installation.

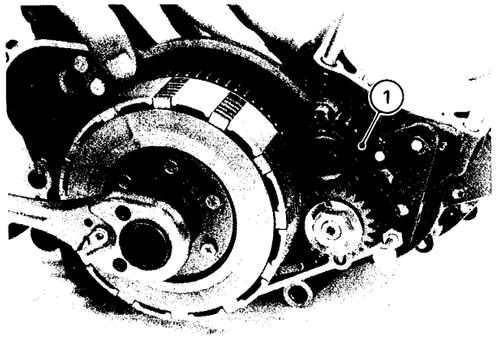
●Install the cylinder base gasket. If it is damaged, replace it.

●Apply a little 2-stroke oil to the piston ring and the inside wall of the cylinder.

●Fit the base of the cylinder over the ring, pressing in on opposite sides of the ring as necessary. Be certain that the ring does not slip out of position. The pin in the piston groove must be between the ends of the piston ring.

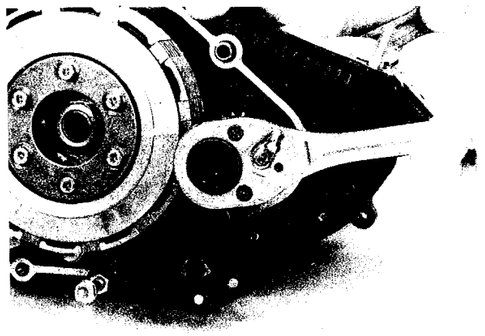
CAUTION **Do not twist the cylinder during installation. See disassembly procedure.**





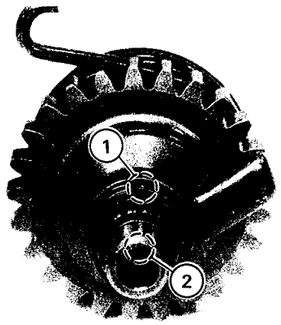
1. Gear Holder (57001-1015)

- Using a high flash-point solvent, clean off the oil and dirt on the tapered portion of the crankshaft.
- Fit the woodruff key on the left side of the crankshaft.
- Fit the magneto rotor and insert the flat washer and bolt. Using the gear holder (special tool) to keep the crankshaft steady, tighten the rotor bolt to 2.2 kg-m (16 ft-lbs) of torque.
- Change the gear holder position, and tighten the primary gear nut to 4.8 kg-m (35 ft-lbs) of torque.



- Remove the gear holder.
- Bend back part of the toothed washer against the side of the primary gear nut.
- Install the kickstarter assembly with the thrust washer, and turn the kick shaft all the way clockwise.

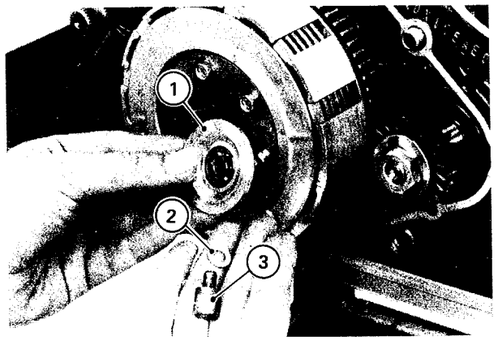
NOTE: When installing the ratchet on the kick shaft, align the ratchet gear punch mark with the notch on the kick shaft.



1. Punch Mark 2. Notch

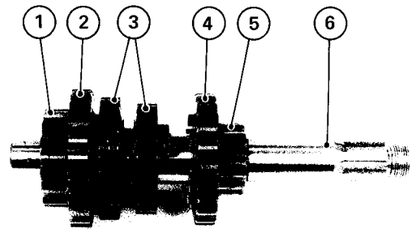
CAUTION **Misalignment of the ratchet gear changes the kick spring preload. If the kick spring preload is too light, partial mesh of the kick gear and the ratchet gear could cause kick mechanism noise. If the kick spring preload is too heavy, the kick spring could weaken or break.**

- Fit the kick spring back onto the kick spring stop.
- Stick the spring plate pusher to the clutch with a thin layer of grease. Insert the flat washer and clutch pusher into the spring plate pusher.



1. Spring Plate Pusher
2. Flat Washer
3. Clutch Pusher

- Pull the clutch release shaft out of the right engine cover. Apply molybdenum disulfide grease to the lower portion of the shaft and **O** ring. Fit the clutch release shaft into place.
- Stick the gasket in position with a thin layer of grease, and mount the right engine cover using the kick shaft oil seal guide (special tool) to protect the cover oil seal. Install the mounting screws.



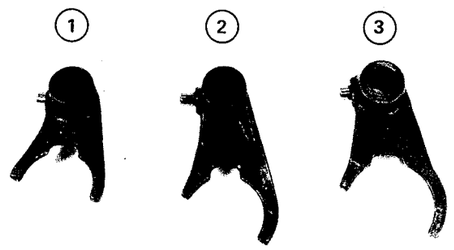
1. 2nd Gear
2. 6th Gear
3. 4th and 3rd Gears
4. 5th Gear
5. 1st Gear
6. Drive Shaft

○Identification of the shift forks

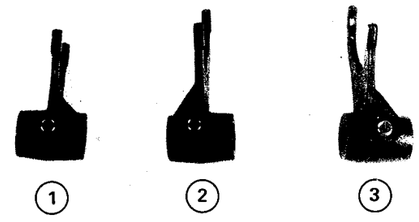
Drive shaft 3rd and 4th gears shift fork: fingers are shorter than those of other two shift forks

Output shaft 6th gear shift fork: fingers and guide pin are aligned

Output shaft 5th gear shift fork: fingers and guide pin are not in line

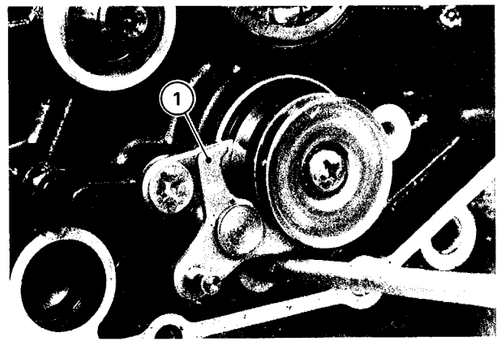


1. Drive Shaft 3rd and 4th Gears Shift Fork
2. Output Shaft 6th Gear Shift Fork
3. Output Shaft 5th Gear Shift Fork



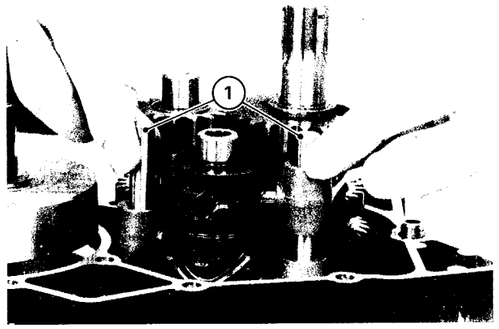
1. Drive Shaft 3rd and 4th Gears Shift Fork
2. Output Shaft 6th Gear Shift Fork
3. Output Shaft 5th Gear Shift Fork

- Fit the shift drum guide/over shift limiter.



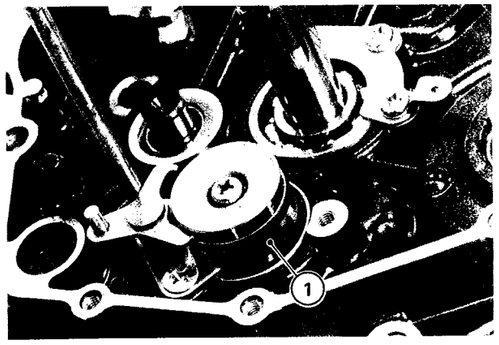
1. Shift Drum Guide/Over Shift Limiter

- Fit each shift fork guide pin into a shift drum groove.
- Insert the shift rods into the shift forks.



1. Shift Rods

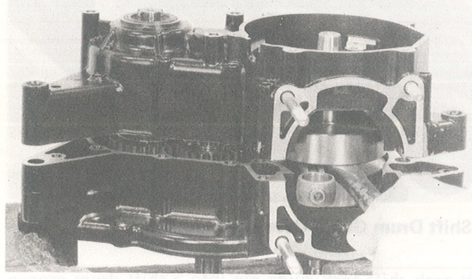
- Shift the transmission to neutral before reassembling the cases. Note the position of the neutral recess on the shift drum.



1. Neutral Recess

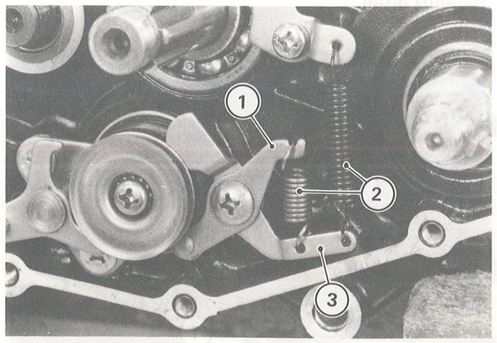
- Clean off and wipe dry the mating surfaces of the crankcase halves, and apply liquid gasket to the mating surface of the left crankcase half.

- Fit the breather tube to the right crankcase half.
- Using a suitable tool on the left side of the crankshaft, fit the crankcase halves together using a press on the left side end of the crankshaft.



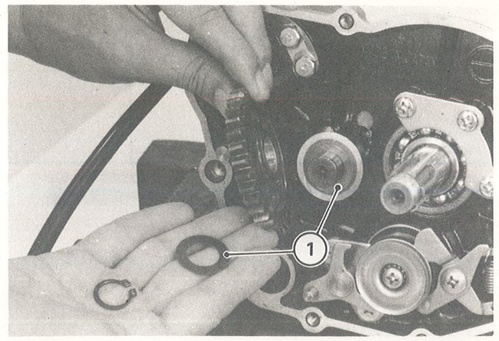
NOTE: Constantly check the alignment of the two halves, and the position of the transmission shafts.

- After the crankcase halves are fitted together, screw in the crankcase screws and tighten them with an impact driver.
- Check to see that the crankshaft, drive shaft, and output shaft all turn freely (in the neutral position). If the crankshaft will not turn, it probably is not centered. Tap the appropriate end of the crankshaft with a mallet to reposition it. If it does not free up, split the crankcase again and find the cause.
- While spinning the output shaft, shift the transmission through all gears to make certain there is no binding and that all gears shift properly.
- Stuff a clean cloth into the crankcase opening around the connecting rod so that no parts will fall into the crankcase.
- Install the flat washer, neutral set lever, and gear set lever, and put the two springs back into position.



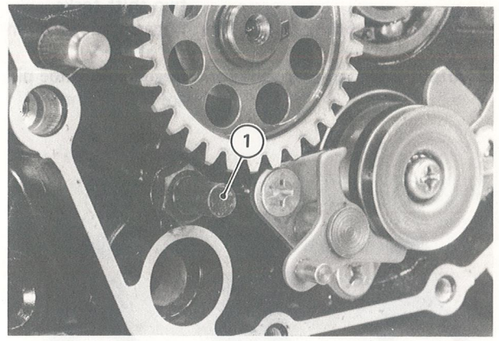
1. Neutral Set Lever
2. Springs
3. Gear Set Lever

- Install the thrust washer, output shaft idle gear, thrust washer, and circlip. The side of the hub that protrudes the most, faces in.



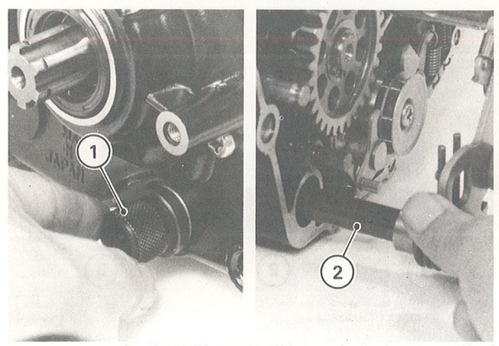
1. Washers

- Check to see if the return spring pin is loose. If it is loose, remove it and apply a locking agent to the threads. Then screw it back in, tightening its locknut.



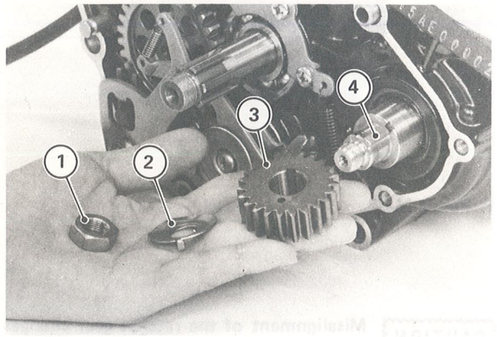
1. Return Spring Pin

- Using the shift shaft oil seal guide (special tool) on the crankcase shift shaft oil seal, insert the external shift mechanism shaft through the crankcase, and fit the pawls back onto the end of the shift drum.



1. Shift Shaft Oil Seal Guide (57001-264)
2. External Shift Mechanism

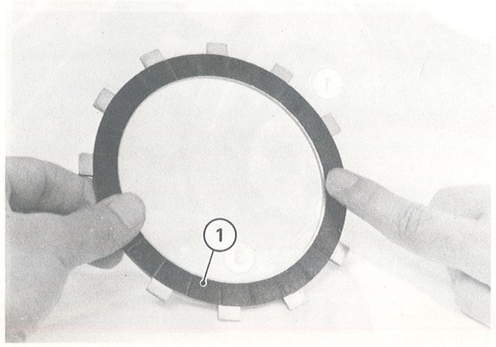
- Fit the woodruff key on the right side of the crankshaft.
- Install the primary gear by hand with the hole facing outward to accommodate the toothed washer.



1. Primary Gear Nut
2. Toothed Washer
3. Primary Gear
4. Woodruff Key

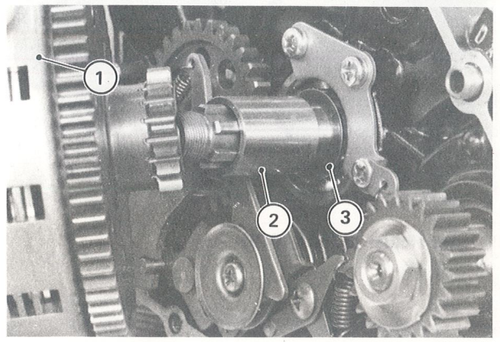
- Once the primary gear is fully in place, place a new toothed washer with the tooth fitting into the hole in the primary gear, and put on the primary gear nut.

NOTE: When replacing any clutch plate, apply transmission oil to the new clutch plate surfaces.



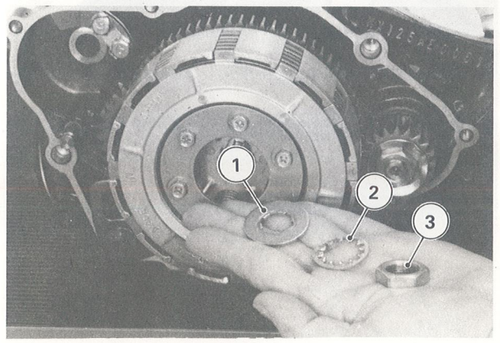
1. Friction Plate

- If the clutch assembly was disassembled, pre-assemble the clutch hub, friction plates (6), and steel plates (5) to facilitate clutch installation. The sequence is friction plate, steel plate, friction plate, etc. finishing with a friction plate. Screw in the clutch spring bolts slightly.
- To simplify installing the clutch on the drive shaft, separate the clutch housing from the clutch hub assembly. There is a thrust washer between the clutch housing and the clutch hub assembly.
- Install the thrust washer, sleeve, clutch housing, and thrust washer in that order.



1. Clutch Housing
2. Sleeve
3. Thrust Washer

- Fit the clutch hub assembly while meshing the friction plate tabs with the clutch housing fingers, and clutch hub hole with the splined portions of the drive shaft. If necessary, loosen the clutch spring bolts so that the friction plates can be moved by hand to align the tabs.
- If the clutch spring bolts are loose, cross-tighten them evenly by hand rather than using a compressed air tool, which might cause uneven spring pressure. The torque for the bolts is 0.45 kg-m (39 in-lbs).
- Install the splined washer, lockwasher, and clutch hub nut.



1. Splined Washer
2. Lockwasher
3. Hub Nut

- Hold the primary gear and clutch with the gear holder (special tool), and tighten the clutch hub nut to 5.0 kg-m (36 ft-lbs) of torque.