Practical Exercise for Instruction Pack 7

Contents

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INTRODUCTION

The purpose of this practical exercise is to help you apply your knowledge of the operation, maintenance, and troubleshooting procedures of motorcycles and ATVs. Using some real-life examples, you'll also learn some things that weren't covered in the study units.

This practical exercise includes eight activities. As in the practical exercises you've already completed, you'll get a chance to get out and have some fun applying the knowledge you've gained thus far. These activities aren't required to complete the program, and they're not graded. However, completing these activities will help you gain a better understanding of the study unit material. We strongly recommend that you attempt to complete as many of these activities as possible.

If you wish to review the material that's contained in this practical exercise, refer to the following study units:

- Motorcycle Maintenance (03301800)
- Motorcycle Troubleshooting (03301900)

When you've finished with the Suggested Activities, complete the examination at the end of this booklet. This examination is required and must be submitted for grading.

Remember, even though this exercise contains examination questions, we've designed it to be fun! Applying your knowledge will help you realize just how much you've really learned about motorcycle operation, maintenance, and troubleshooting, as well as snowmobile and personal watercraft design and maintenance.

SUGGESTED ACTIVITIES

It's time again to have some fun! The following pages contain some maintenance and troubleshooting activities. Try these activities to expand your knowledge and improve your understanding of the written information covered in the study units. Remember, none of these suggested activities is required to complete the program, and none of them will be graded. These activities are designed to help you apply your knowledge. At any time, you can proceed to the examination.

Activity 1

Visit the service departments of several motorcycle dealerships to find out what each actually does when performing a tune-up. Ask the service managers the following questions:

- Do they check and adjust the valves?
- Do they synchronize the carburetors?
- Do they offer more than one type of tune-up?
- Do they offer a chassis-only tune-up?
- Do they offer maintenance?

You're likely to find that each service department offers a different list of items that they check when they perform a tune-up. Some dealerships follow the service and owner's manual recommendations for typical routine maintenance. Others sell a custom-service package, which can be better for the customer because it doesn't offer unnecessary services! For instance, the valves on most motorcycles require adjusting only every 4,000 miles. There's no need to pay for a valve adjustment with every tune-up if it's not time! It's wise to investigate what exactly is done when a motorcycle or ATV is brought in for routine maintenance.

Activity 2

Talk to the experienced technicians at your local motorcycle and ATV service department. Ask them about their troubleshooting experiences in the following areas:

- Internal engine problems
- Oil leaks (engine and other parts of the machine as well)
- Fuel-related problems
- Engine noises
- Chassis problems
- Tire-wear problems
- Ignition problems
- Charging-system problems
- Electrical DC-circuit problems

You'll probably find that technicians often work for hours searching for the cause of a problem, which turns out to be something they overlooked from the beginning. Ask technicians to tell you about their troubleshooting weaknesses. Most likely, they'll tell you that their

most feared troubleshooting situations lie in the area of electrical problems! Ask technicians what advice they can offer about troubleshooting and how to start diagnosing a problem.

Activity 3

If you haven't already, purchase service manuals for your own motorcycle, ATV, snowmobile and / or personal watercraft. Perform the recommended maintenance on your own motorcycle, ATV, snowmobile and / or personal watercraft. Find out how much work should be done to your machine, and compare it to the service your local dealer would suggest if you brought it to them for service.

Activity 4

In an earlier practical exercise, we suggested that you begin a collection of manufacturer's service manuals. A good source of these manuals is the service department of your local motorcycle or ATV dealership. Most manufacturers update their service manuals to add new specifications and procedures every new model year. Instead of writing a completely new service manual, they add an addendum to the current edition and send it to dealerships. Once a new manual is received, the old one is no longer needed. Many dealers will offer to sell the old manuals at a fraction of their original cost. Look through some service manuals and compare the sections that cover general maintenance. Look up the lists of specifications, torque requirements, and other recommendations. Note how each manufacturer lists this information in a slightly different manner. Also, note the variety of terminology manufacturers use for the same item. For example, one manufacturer may refer to a "rear swing arm" while another may call it the "rear fork"!

Activity 5

Compare the troubleshooting charts and tables from one manufacturer's manual to those from other manuals. Except for the actual layout of the text, you're likely find similar procedures. This is because each machine we've discussed is made of the same basic components. Repairing the charging system on a Honda, for example, won't be much different from repairing the charging system on a Suzuki or any other motorcycle. The only true differences are the colors of the wires, the location of the components, and the size of the fasteners!

Activity 6

Buy some motorcycle, ATV, snowmobile, and watercraft magazines from your local newsstand. These magazines discuss everything from model riding tests to highly technical analyses of new engine design. There are also many great articles on simple day-to-day maintenance procedures that will make working on your favorite motorcycle, ATV, snowmobile, or watercraft easier and even more fun than before!

Conclusion

We hope these practical exercises have been helpful and enjoyable. When you're ready, proceed to the examination. Complete this part of the exercise the same way you did your other examinations for your program. Follow the instructions provided to send your answers to the school for grading.

Appendix

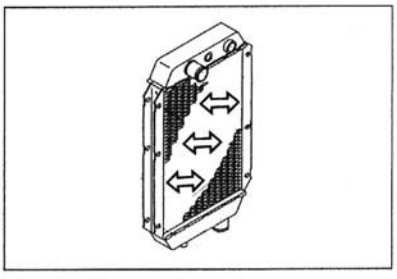
(Provided compliments of Kawasaki Motors Corp., U.S.A.)

Radiator Inspection

- ●Check the radiator core.
- ★If there are obstructions to air flow, remove them.
- ★If the corrugated fins are deformed, carefully straighten them.
- ★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

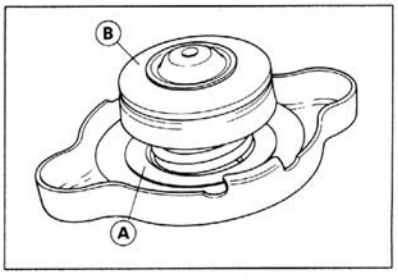
CAUTION

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage.
1) Keep the steam gun away more than 0.5 m from the radiator core.
2) Hold the steam gun perpendicular to the core surface.
3) Run the steam gun horizontally following the core fin direction. Running it vertically may damage the fin.



Radiator Cap Inspection

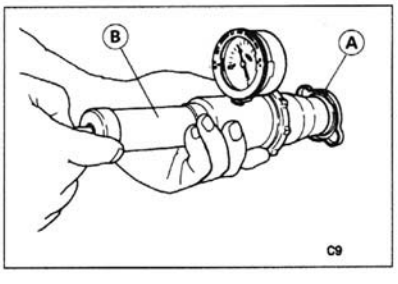
- ●Check the condition of the top [A] and bottom [B] valve seals.
- ★If any one of them shows visible damage, replace the cap with a new one.



- ●Install the cap [A] on a cooling system pressure tester [B].

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*



- ●Watching the pressure gauge, slowly pump the pressure tester to build up the pressure. The gauge pointer must remain within the relief pressure range in the table below at least 6 seconds. Continue to pump the tester until the relief valve opens, indicated by the gauge pointer flicks downward. The relief valve must open within the specified range.

Radiator Cap Relief Pressure
Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kg/cm^2,14 ~ 18 psi)

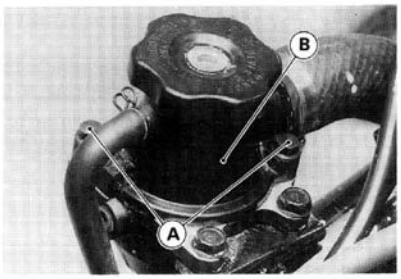
- ★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

3-12 COOLING SYSTEM

Thermostat

Thermostat Removal

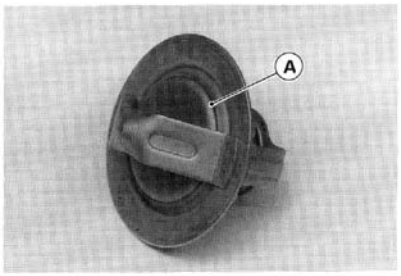
● Remove:
Coolant (see Coolant Draining)
Seat (see Frame chapter)
Fuel Tank (see Fuel System chapter)
Thermostat Housing Cover Bolts [A]
Thermostat Housing Cover [B]
Thermostat



Thermostat Inspection

● Remove the thermostat, and inspect the thermostat valve [A] at room temperature.

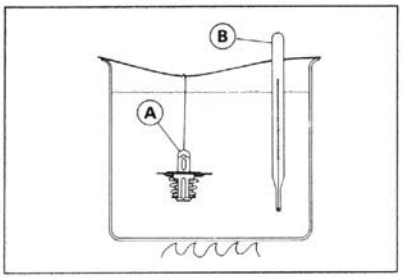
★ If the valve is open, replace the thermostat with a new one.



● To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.
[B] Thermometer

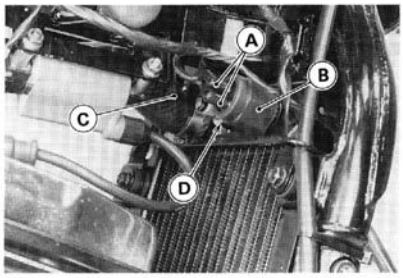
★ If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature
Standard: 80 ~ 84°C (176 ~ 183°F)



Radiator Fan Switch, Water Temperature Sensor

Radiator Fan Switch, Water Temperature Sensor Removal



CAUTION

The fan switch or the water temperature sensor should never be allowed to fall on a hard surface. Such a shock to their parts can damage them.

- Drain the coolant (see Coolant Draining).
- Remove:
  Fuel Tank (see Fuel System chapter)
  Radiator Fan Switch Lead Connectors [A]
  Cover [B] and Radiator Fan Switch
  Water Temperature Sensor Lead Connector [C]
  Water Temperature Sensor [D]

Radiator Fan Switch, Water Temperature Sensor Installation

- Apply silicone sealant to the threads of the fan switch and water temperature sensor.

Sealant – Kawasaki Bond (Silicone Sealant): 56019-120

- Tighten the fan switch and water temperature sensor.

Torque – Radiator Fan Switch : 18 N-m (1.8 kg-m, 13.0 ft-lb)
Water Temperature Sensor : 7.8 N-m (0.80 kg-m, 69 in-lb)

Radiator Fan Switch, Water Temperature Sensor Inspection

- Refer to Electrical System chapter for these inspections.

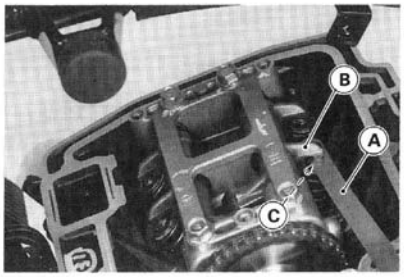
Valves

Valve Clearance Adjustment

NOTE

○ *Valve clearance must be checked and adjusted when the engine is cold (at room temperature).*

● Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal)
Timing Inspection Cover (Engine Left Side)
● Set the front piston at TDC (see Camshaft Installation).
● Using a thickness gauge [A], measure the valve clearance between the rocker arm [B] and the shim [C].

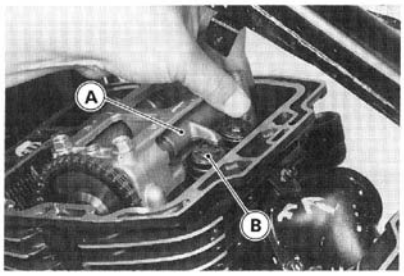


● Set the rear piston at TDC by turning the crankshaft counterclockwise 305° (see Camshaft Installation).
● Using a thickness gauge, measure the valve clearance between the rocker arm and the shim.

Valve Clearance
Standard: **IN: 0.10 ~ 0.15 mm**
EX: 0.25 ~ 0.30 mm

★ If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

● To change the valve clearance, slide the rocker arm [A] sideways and change the shim [B]. Replace the shim with one of a different thickness.



NOTE

○ *Mark and record the shim locations so that the shims can be reinstalled in their original positions.*

● To select a new shim which brings the valve clearance within the specified range, refer to the Valve Clearance Adjustment Charts.
○ Remeasure any valve clearance that was adjusted. Readjust if necessary.

CAUTION

Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

4-18 ENGINE TOP END

VALVE CLEARANCE ADJUSTMENT CHART
INLET VALVE

	PRESENT SHIM												← Example								
PART No. (92025 -)	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890
MARK	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	00
THICKNESS (mm)	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00

VALVE CLEARANCE MEASUREMENT (Example →)	PRESENT SHIM																				
0.00 ~ 0.04	–	–	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90
0.05 ~ 0.09	–	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95
0.10 ~ 0.15	SPECIFIED CLEARANCE/NO CHANGE REQUIRED																				
0.16 ~ 0.20	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	
0.21 ~ 0.25	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00		
0.26 ~ 0.30	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00			
0.31 ~ 0.35	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00				
0.36 ~ 0.40	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00					
0.41 ~ 0.45	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00						
0.46 ~ 0.50	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00							
0.51 ~ 0.55	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00								
0.56 ~ 0.60	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00									
0.61 ~ 0.65	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00										
0.66 ~ 0.70	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00											
0.71 ~ 0.75	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00												
0.76 ~ 0.80	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00													
0.81 ~ 0.85	2.70	2.75	2.80	2.85	2.90	2.95	3.00														
0.86 ~ 0.90	2.75	2.80	2.85	2.90	2.95	3.00															
0.91 ~ 0.95	2.80	2.85	2.90	2.95	3.00																
0.96 ~ 1.00	2.85	2.90	2.95	3.00																	
1.01 ~ 1.05	2.90	2.95	3.00																		
1.06 ~ 1.10	2.95	3.00																			
1.11 ~ 1.15	3.00																				

INSTALL THE SHIM OF THIS THICKNESS (mm)

1. Measure the clearance (when engine is cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. Install the shim specified where the lines intersect. This shim will give the proper clearance.

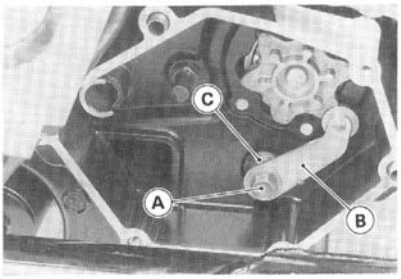
   Example: Present shim is **2.60 mm**
   Measured clearance is **0.25 mm**
   Replace **2.60 mm** shim with **2.70 mm** shim.

5. Remeasure the valve clearance and readjust if necessary.

NOTE

○ *If there is no clearance, select a shim which is several sizes smaller and then measure the clearance.*

● Remove:
Bolt [A]
Shift Drum Position Lever [B]
Spring [C]



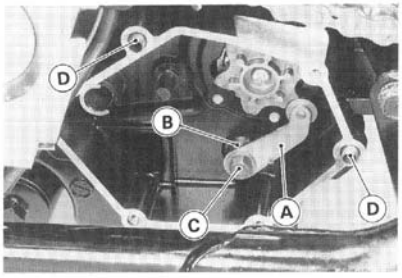
External Shift Mechanism Installation

● Install the shift drum position lever [A] and spring [B], and tighten the bolt [C].

Torque – Shift Drum Position Lever Bolt: 11 N-m (1.1 kg-m, 95 in-lb)

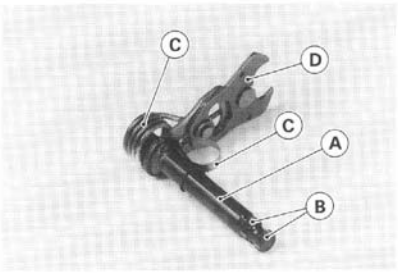
● Install the knock pins [D] and new cover gasket.
● Apply high temperature grease to the oil seal lips.
● Install the washer to the shift shaft, then insert the shaft into the cover.
● Install the cover with the shaft to the crankcase.
● Tighten the cover bolts.

Torque – External Shift Mechanism Cover Bolts: 11 N-m (1,1 kg-m 95 in-lb)



External Shift Mechanism Inspection

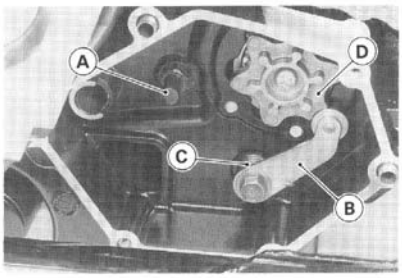
● Examine the shift shaft [A] for any damage.
★ If the shaft is bent, straighten or replace it.
★ If the splines [B] are damaged, replace the shaft.
★ If the springs [C] are damaged in any way, replace them.
★ If the shift mechanism arm [D] is damaged in any way, replace it.



● Check the return spring pin [A] is not loose.
★ If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

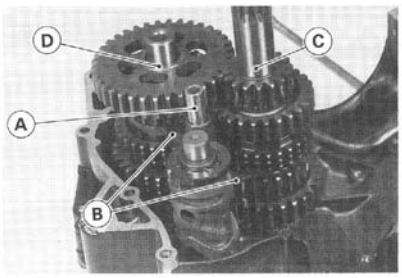
Torque – Shift Shaft Return spring Pin: 29 N-m (3.0 kg-m, 22 ft-lb)

● Check the shift drum position lever [B] and spring [C] for breaks or distortion.
★ If the lever or spring is damaged in any way, replace it.
● Visually inspect the shift drum cam [D].
★ If it is badly worn or shows any damage, replace it.



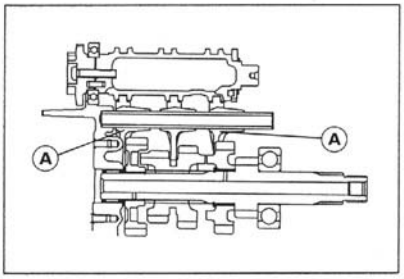
Transmission Shaft, Shift Fork Removal

● Split the crankcase (see Crankcase Splitting).
● Remove:
Shift Rod [A]
Shift Forks (2) [B]
● Take out the drive shaft [C] and output shaft [D] as a set, and remove the remainder shift fork.

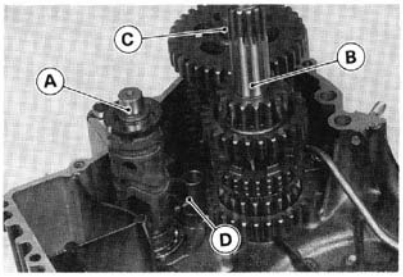


Transmission Shaft, Shift Fork Installation

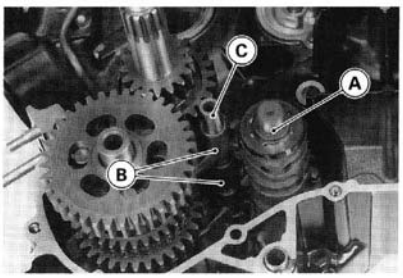
● Make the direction of the shift forks as shown.
○ The two forks [A] on the output shaft are identical.



● Position the shift drum [A] as shown.
● Apply engine oil to the transmission shafts and shift fork.
● Install the drive shaft [B], output shaft [C], and shift fork [D] on the output shaft as a set.



● Set the shift drum [A] in the neutral position as shown.
● Apply engine oil to the shift forks [B] and shift rod [C], and install them.

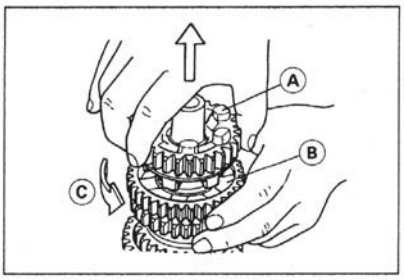


Transmission Disassembly

● Remove the transmission shafts (see Transmission Shaft Removal).
● Remove the circlips, disassemble the transmission shafts.

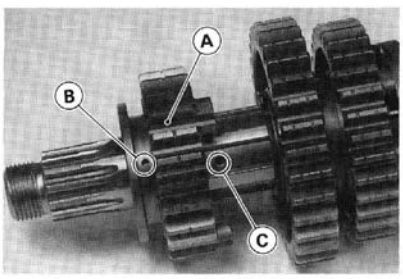
Special Tool – Outside Circlip Pliers: 57001-144

● The 4th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 4th gear.
○ Set the output shaft in a vertical position holding the 3rd gear [B].
○ Spin the 4th gear quickly [C] and pull it off upward.

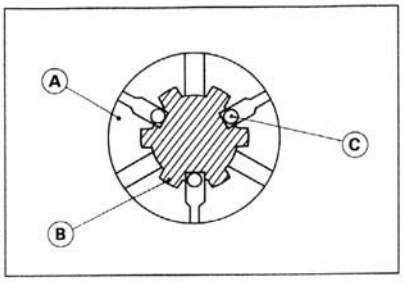


Transmission Assembly

● Install the 5th gear [A] on the output shaft with its oil hole [B] aligned with the shaft oil hole.

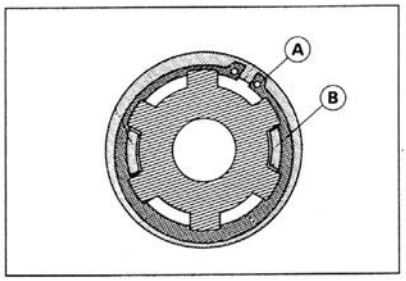


● Fit the steel balls into the 4th gear holes as shown.
View A – A' (see the output shaft illustration)
[A] Gear (4th)
[B] Shaft
[C] Steel Balls



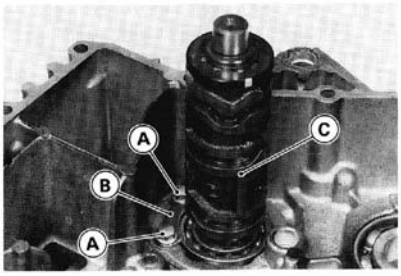
CAUTION
Do not apply grease to the steel balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

● Replace any circlip that were removed with new ones.
● Install the circlips [A] so that the opening is aligned with a spline groove.
[B] Toothed Washer



Shift Drum Removal

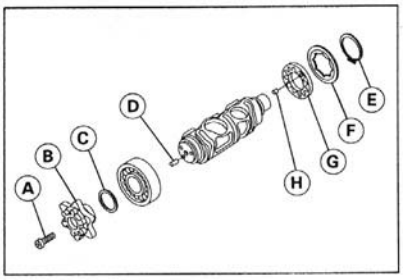
● Remove:
Transmission Shafts (see Transmission Shaft Removal)
Bolts [A]
Bearing Stopper [B]
● While aligning the shift drum cam with the left crankcase hole, pull out the shift drum [C].



Shift Drum Disassembly/Assembly

● Remove the shift drum (see Shift Drum Removal).
● While holding the shift drum with a vise, remove the shift drum cam holder bolt [A].
[B] Shift Drum Cam
[C] Washer
[D] Knock Pin (longer)
● Remove the circlip [E].

Special Tool – Outside Circlip Pliers: 57001-144



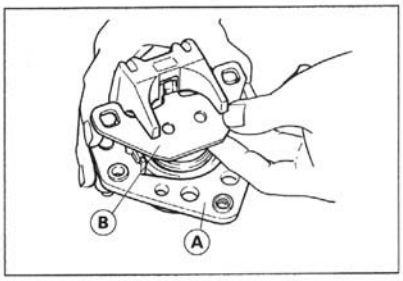
● Remove:
[F] Spring
[G] Shift Drum Holder
[H] Knock Pin (shorter)
● When assembling the shift drum, note the following.
○ Be sure to install the knock pins.
○ Apply a non-permanent locking agent to the threads of the shift drum cam mounting bolt.

11-8 BRAKES

Brake Pads

Brake Pad Removal

- Unscrew the caliper mounting bolts.
- Detach the caliper from the disc.
- Take off the piston side pad from the caliper holder [A].
- Push the caliper holder to the piston side, and then remove the pad [B] from the caliper holder shaft.



Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Install the anti-rattle spring in place.
- Install the brake pads.
- Install the caliper (see Caliper Installation).

⚠WARNING

Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

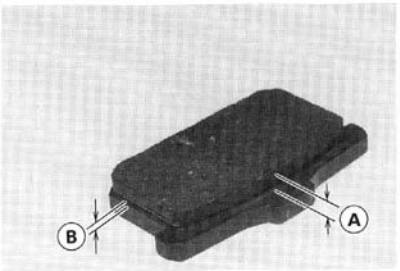
Lining Wear

- Check the lining thickness [A] of the pads in the caliper.

★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

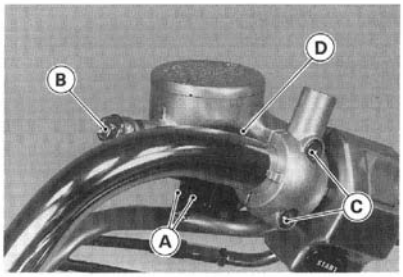
Pad Lining Thickness

Standard:	**4.85 mm**
Service Limit:	**1 mm**



Master Cylinder

Master Cylinder Removal



- Disconnect the front brake light switch connectors [A].
- Remove the banjo bolt [B] to disconnect the brake hose from the master cylinder (see Brake Hose Removal/Installation).
- Unscrew the clamp bolts [C], and take off the master cylinder [D] as an assembly with the reservoir, brake lever, and brake switch installed.

Master Cylinder Installation

- Apply grease to the extreme end of the clamp bolts.
- Tighten the upper clamp bolt first, and then the lower clamp bolt. There will be a gap at the lower part of the clamp after tightening.

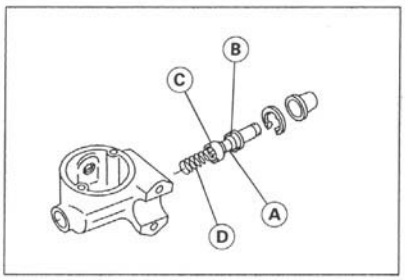
Torque – Master Cylinder Clamp Bolts: 11 N-m (1.1 kg-m, 95 in-lb)

- Replace the washers that are on each side of the hose fitting with new ones.
- Tighten the brake hose banjo bolt.

Torque – Brake Hose Banjo Bolt: 25 N-m (2.5 kg-m, 18.0 ft-lb)

- Bleed the brake line (see Bleeding the Brake Line).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Master Cylinder Disassembly



- Remove the master cylinder (see Master Cylinder Removal).
- Remove the reservoir cap and diaphragm, and pour the brake fluid into a container.
- Unscrew the pivot nut and pivot bolt, and remove the brake lever.
- Push the dust cover out of place, and remove the circlip.

Special Tool – Inside Circlip Pliers: 57001-143

- Pull out the piston [A], secondary cup [B], primary cup [C], and return spring [D].

CAUTION
Do not remove the secondary cup from the piston since removal will damage it.

11-16 BRAKES

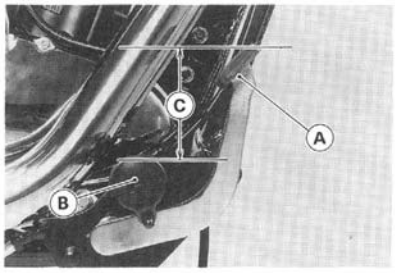
Brake Pedal and Cable

Brake Pedal Position Inspection

● Check that the brake pedal [A] is in the correct position.
[B] Footpeg

Pedal Position [C]
Standard: About 65 mm above footpeg top

★ If it is incorrect, adjust the brake pedal position.

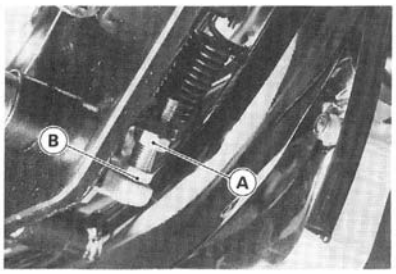


Brake Pedal Position Adjustment

● Loosen the locknut [A], and turn the adjusting bolt [B] until the brake pedal is correctly positioned.
● Tighten the locknut.
● Check:
Rear Brake Light Switch (see Electrical System chapter)
Brake Pedal Free Play (see Brake Pedal Free Play Inspection)

NOTE

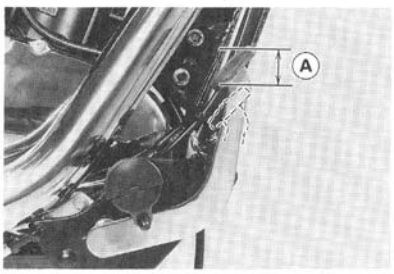
○ *If the pedal position cannot be adjusted by turning the adjusting bolt, the brake pedal may be deformed or incorrectly installed.*



Brake Pedal Free Play Inspection

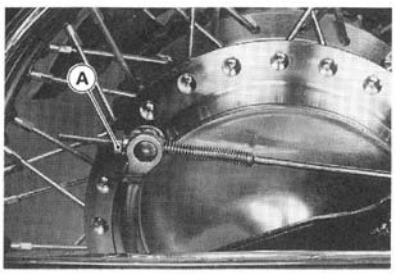
● Check the brake pedal free play [A].
○ Depress the rear brake pedal lightly by hand until the brake is applied.
★ If the free play is incorrect, adjsut it.

Pedal Free Play
Standard: 20 ~ 30 mm



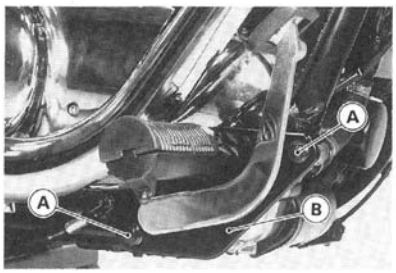
Brake Pedal Free Play Adjustment

● Turn the adjusting nut [A] at the rear brake until the brake pedal has the correct amount of play.
● Operate the pedal a few times to see that it returns to its rest position immediately upon release.
● Rotate the rear wheels to check for brake drag.
● Check braking effectiveness.
★ If there is any doubt as to the conditions of the brake, check the brake parts for wear or damage.

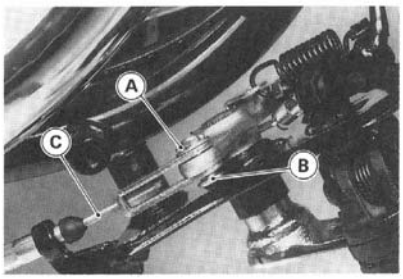


Brake Pedal Removal

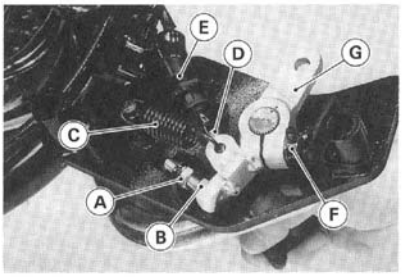
● Remove:
Bolts [A] and Footpeg Bracket [B]



Cotter Pin [A], Joint Pin [B], and Brake Cable [C]

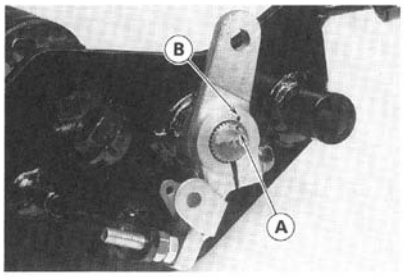


- Loosen the locknut [A] and adjusting bolt [B].
- Remove:
  Brake Pedal Spring [C]
  Brake Switch Spring [D]
  Brake Switch [E]
  Bolt [F] and Brake Pedal Lever [G]
  Brake Pedal



Brake Pedal Installation

- Align the punch mark [A] on the brake pedal shaft witht he punch mark [B] on the pedal lever.

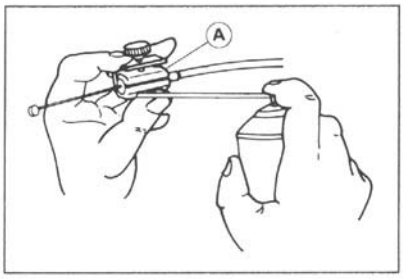


Brake Cable Lubrication

Whenever the brake cable is removed, lubricate the cable as follows:

- Lubricate the cable with a penetrating rust inhibitor.

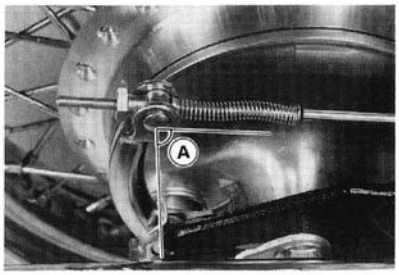
Special Tool – Pressure Cable Luber: K56019-021 [A]



11-18 BRAKES

Brake Panel

Camlever Angle Inspection



- Check that the rear brake cam lever comes to an **80° ~ 90°** angle [A] with the rear brake rod when the rear brake is fully applied.
- ★If it does not, adjust the rear brake cam lever angle.

Cam Lever Angle
Standard: 80° ~ 90°

⚠WARNING

Since a cam lever angle greater than 90° reduces braking effectiveness, cam lever angle adjustment should not be neglected.

Camlever Angle Adjustment

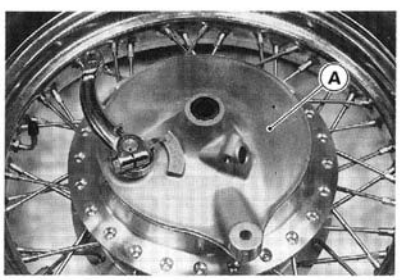
- Remove:
  Rear Wheel (see Wheels/Tires chapter)
  Cam Lever Bolt and Cam Lever
- ○Before removing the brake cam lever, mark the position of the cam lever.
- Mount the cam lever at a new position so that the cam lever moves one screw thread from the original position to the rear.

⚠WARNING

A change in cam lever angle is caused by wear of internal brake parts. Whenever the cam lever angle is adjusted, also check for drag and proper operation, taking particular note of the brake lining wear indicator position.
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.

- Install the rear wheel (see Wheels/Tires chapter).
- Adjust the rear brake play (see Brake Pedal Free Play Inspection).

Brake Panel Removal



- Remove the rear wheel (see Wheels/Tires chapter).
- Separate the brake panel [A] from the wheel.

Brake Panel Installation

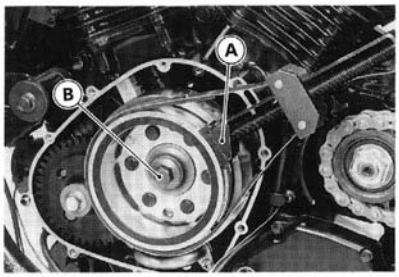
- Fit the brake panel to the rear wheel, and then install the rear wheel (see Wheels/Tires chapter).

15-12 ELECTRICAL SYSTEM

Alternator Rotor Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
- Wipe oil off the outer circumference of the rotor.
- Hold the alternator rotor steady with the flywheel holder [A], and remove the rotor bolt [B].

Special Tool – Flywheel Holder: 57001-1313



- Using the rotor puller [A], remove the alternator rotor from the crankshaft.

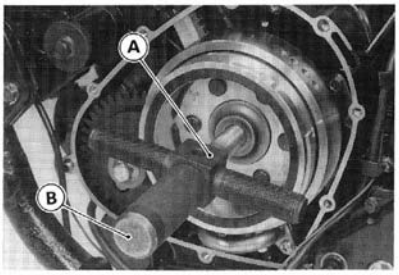
Special Tool – Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216

NOTE

○ *Screw in the puller while tapping the head [B] of the puller with a hammer.*

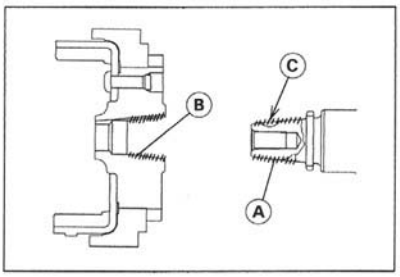
CAUTION

Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.



Alternator Rotor Installation

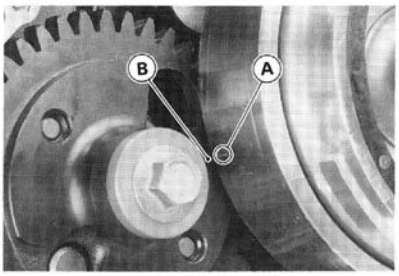
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  [A] Crankshaft Tapered Portion
  [B] Alternator Rotor Tapered Portion
- Fit the woodruff key securely in the slot [C] in the crankshaft before installing the alternator rotor.



- When installing the alternator rotor, align the rotor mark [A] with the left balancer mark [B].
- Apply oil to the threads and seating surface of the alternator rotor bolt.
- Tighten the alternator rotor bolt while holding the alternator rotor steady with the flywheel holder.

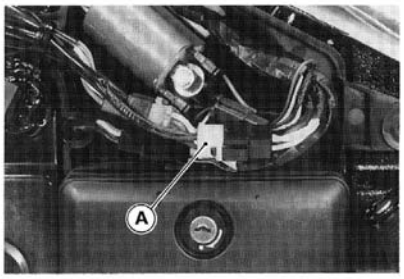
Special Tool – Flywheel Holder: 57001-1313
Torque – Alternator Rotor Bolt: 155 N-m (16.0 kg-m, 115 ft-lb)

- Install the alternator cover (see Alternator Cover Installation).



Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.



- ●To check the alternator output voltage, do the following procedures.
- ○Turn off the ignition switch.
- ○Remove the left side cover (see Frame chapter).
- ○Disconnect the alternator lead connector [A].
- ○Connect the hand tester as shown in the table 1.
- ○Start the engine.
- ○Run it at the rpm given in the table 1.
- ○Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage

Tester	Connections		Reading
Range	Tester (+) to	Tester (−) to	@ 4,000 rpm
250 V AC	One black lead	Another black lead	50 ~ 80 V

★If the output voltage shows the value in the table, the alternator operates properly and the regulator/rectifier is damaged. A much lower reading than that given in the table indicates that the alternator is defective.

- ●Check the stator coil resistance as follows:
- ○Stop the engine.
- ○Connect the hand tester as shown in the table 2.
- ○Note the readings (total 3 measurement).

Table 2 Stator Coil Resistance

Tester	Connections		Reading
Range	Tester (+) to	Tester (−) to	
× 1 Ω	One black lead	Another black lead	0.3 ~ 0.5 Ω

★If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

- ●Using the highest resistance range of the hand tester, measure the resistance between each of the black leads and chassis ground.

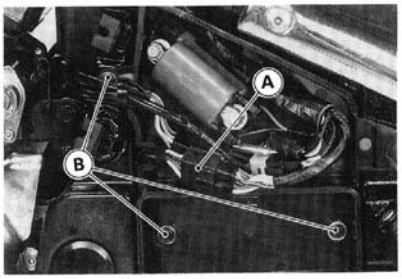
★Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.

★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

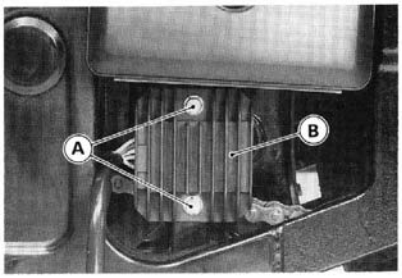
Special Tool − Hand Tester: 57001-1394

Regulator/Rectifier Inspection

● Remove:
Left Side Cover (see Frame chapter)
Connector [A] (disconnect)
Tool Kit Container Bolts [B]



Bolts [A] and Regulator/Rectifier [B]

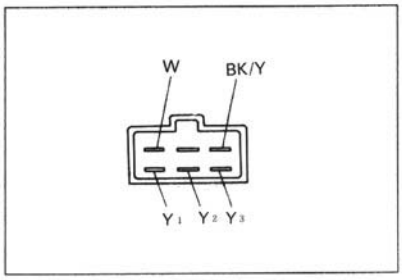


Rectifier Circuit Check:

● Check conductivity of the following pair of terminals.

Rectifier Circuit Inspection

Tester connection	W-Y1,	W-Y2,	W-Y3
	BK/Y-Y1,	BK/Y-Y2,	BK/Y-Y3



★ The resistance should be low in one direction and more than ten times as much in the other direction. If any two leads are low or high in both directions, the rectifier is defective and must be replaced.

NOTE

○ *The actual meter reading varies with the meter used and the individual rectifier, but, generally speaking the lower reading should be from zero to one half the scale.*

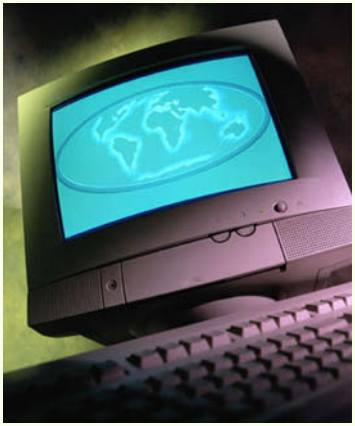
Regulator Circuit Check:

To test the regulator out of circuit, use three 12 V batteries and a test light (12 V 3 ~ 6 W bulb in a socket with leads).

CAUTION

The test light works as an indicator and also a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

● Check to be sure the rectifier circuit is normal before continuing.



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