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Maintaining Motorcycles. A Fieldworker's Manual

by: Russell Henning

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A WORLD NEIGHBORS PUBLICATION

# MAINTAINING MOTORCYCLES

A Fieldworker's Manual



By Russell Henning

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## **AUTHOR'S NOTE**

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This manual was written for the following reasons:

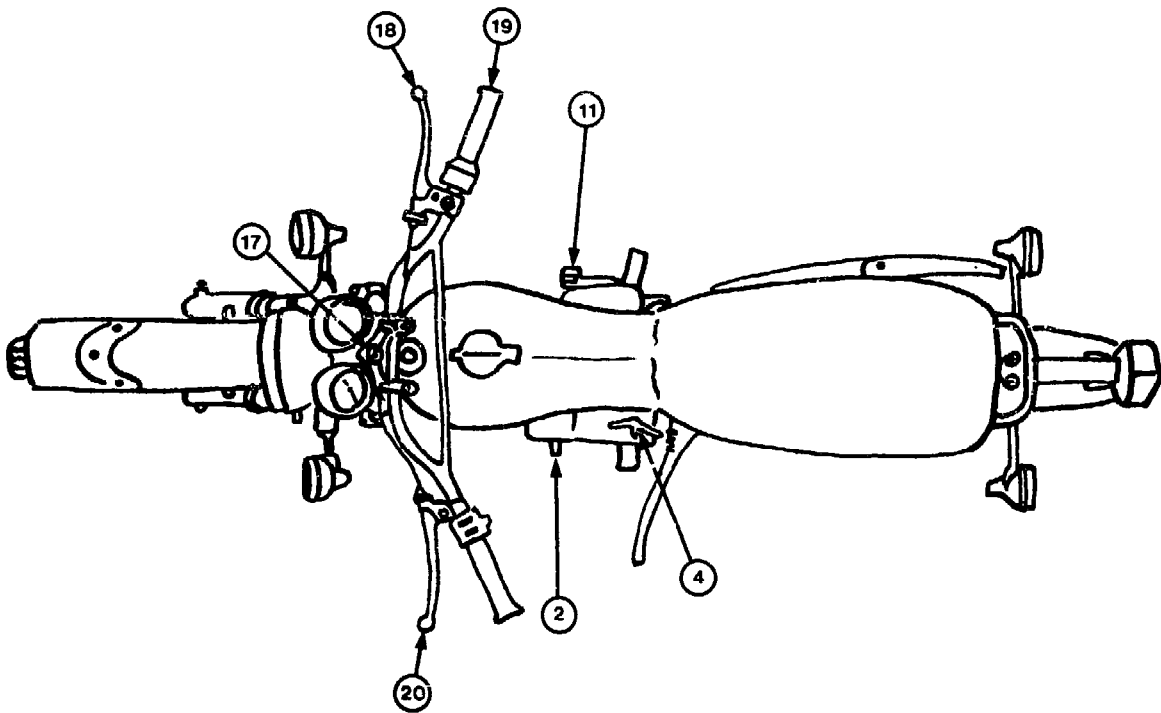
1. to help those who are unfamiliar with the parts of a motorcycle,
2. to help them give their motorcycles good care and maintenance, and
3. to help them recognize the more common problems of the motorcycle.

This is only a guide. The explanations apply to motorcycles in general.

There are two philosophies concerning the maintenance and repair of motorcycles. The first is that the performance and reliability of the motorcycle will depend on the type of maintenance given by the owner. The second and more popular philosophy states: "If it works, leave it alone." Aside from the normal maintenance explained in this manual, it is probably better to follow the latter philosophy, unless you are skilled in mechanics and have all the proper tools.

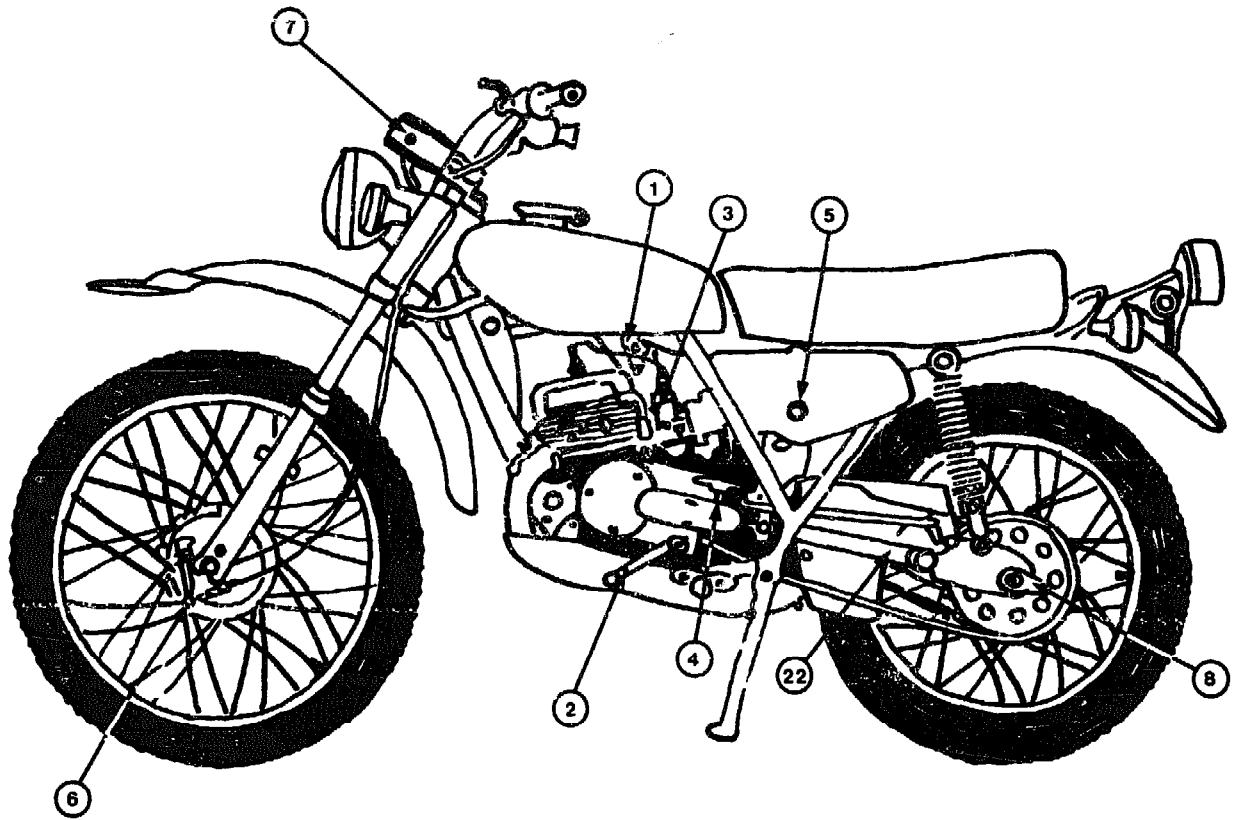
For those who are not familiar with motorcycles, a series of diagrams showing the basic parts of the motorcycle follow.

Figure No. 1



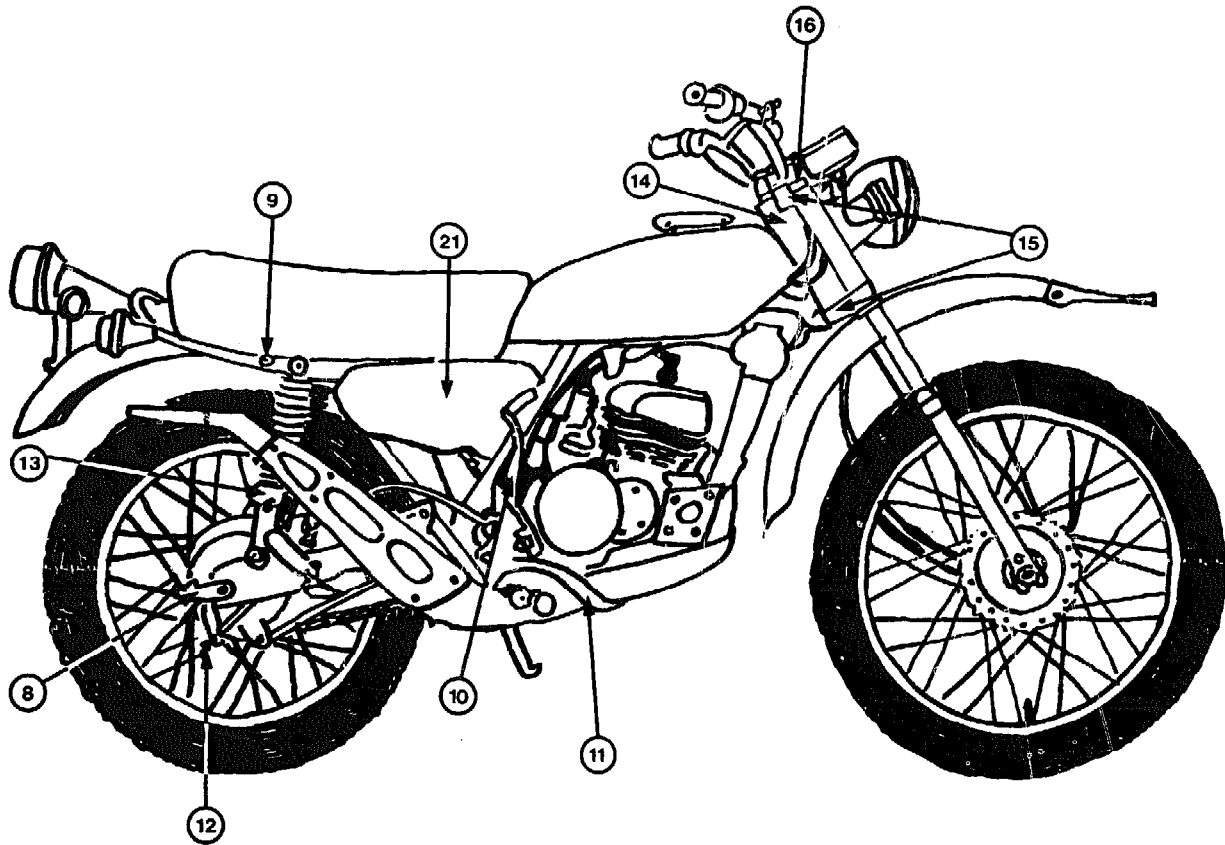
- 2 GEAR SHIFT LEVER
- 4 POSI-SELECT LEVER (only found in the Suzuki TC series)
- 11 REAR BRAKE PEDAL
- 17 IGNITION SWITCH
- 18 FRONT BRAKE LEVER
- 19 THROTTLE GRIP
- 20 CLUTCH LEVER

Figure No. 2



- 1 SHUT-OFF SWITCH
- 2 GEARSHIFT LEVER
- 3 CARBURETOR CHOKE LEVER
- 4 POSI-SELECT LEVER (only found in the Suzuki TC series)
- 5 OIL LEVEL INSPECTION EYE
- 6 FRONT BRAKE ADJUSTER
- 7 TRIP METER
- 8 CHAIN ADJUSTER
- 22 SWING ARM

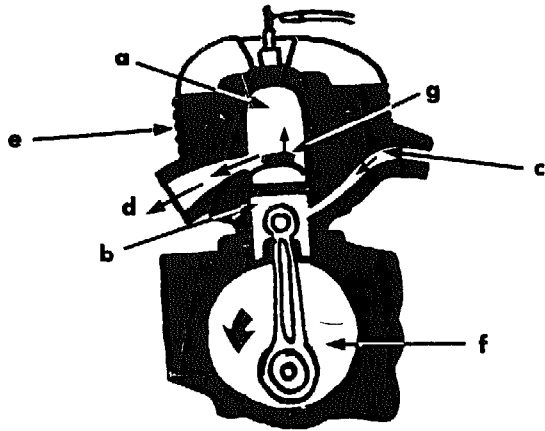
Figure No. 3



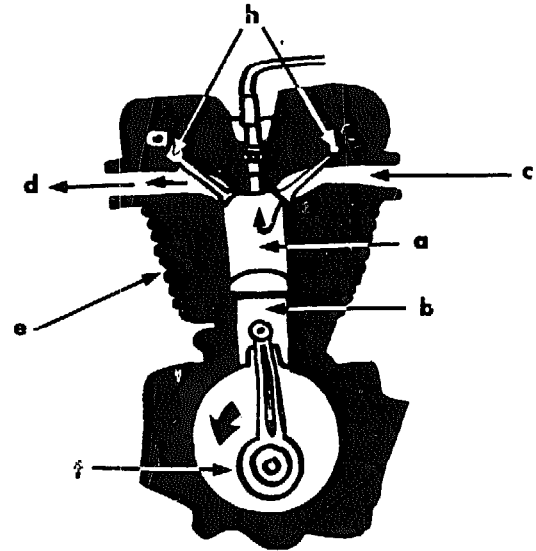
- 8 CHAIN ADJUSTER
- 9 SEAT LOCK LEVER
- 10 KICK START LEVER
- 11 REAR BRAKE PEDAL
- 12 REAR BRAKE ADJUSTER
- 13 REAR SPRING ADJUSTER
- 14 STEERING HEAD
- 15 TRIPLE CLAMP (HANDLE CROWN)
- 16 FRONT SPRING TENSION ADJUSTER (OR AIR VALVE)
- 21 AIR FILTER (under side cover)

Figure No. 4

*TWO-STROKE MOTOR*



*FOUR-STROKE MOTOR*



- a* COMBUSTION CHAMBER
- b* PISTON
- c* AIR/GAS MIXTURE  
(entering from carburetor)
- d* EXHAUST GASES

- e* CYLINDER
- f* CRANKCASE
- g* TRANSFER PORT  
(air/gas mixture entering from crankcase)
- h* VALVES

We will not explain in detail how the two- and four-stroke motors work, but we will show you the basic differences so that you can distinguish one from the other.

Please note that in the two-stroke motor the carburetor and exhaust pipe are connected low on the cylinder. The entrance and exit of the gases to and from the cylinder are governed by the piston's going low in the cylinder to uncover the respective holes or ports.

In the four-stroke motor, the carburetor and exhaust pipe are connected high on the cylinder, to the **cylinder head**. The entrance and exit of the gases to and from the cylinder are governed by **valves** and other mechanical parts in the cylinder head.

Now look at your bike and see what kind of motor it has. Most bikes sold since 1979 are four-strokes.

If your bike has a four-stroke motor, it is important that you change your oil and adjust your valves frequently (every 3,000 km). Valve adjustment is beyond the scope of this book, but it can be done with basic tools.



## CLUTCH

---

The motorcycle is equipped with a multi-disk, oil bath clutch. When the disks are together, the clutch causes power to be transmitted to the transmission and then to the rear wheel.

Pulling the clutch lever (located on the left handgrip) forces the disks to separate and allows oil to enter the spaces between the disks. This forms a frictionless barrier. Thus, the power from the engine does not pass to the transmission.

To extend the life of the clutch, shift into neutral when stopping for more than a few seconds. Do not use the clutch when stopping the motorcycle for a short time with the motor running. The disks can become too hot. In time they will not function properly and will be ruined. Also, when the motorcycle is stopped at a stop sign and is not in neutral, the clutch cable could break. This may cause the motorcycle to jump forward, resulting in an accident.

Clutch adjustment varies with different kinds of motorcycles. Before adjusting the clutch, consult the owner's manual or ask a person with experience to show you how to do it.

The clutch cable should be adjusted so that there is a 3mm space between the lever and the housing on the handlebar, before you feel resistance.

## GEAR SHIFT LEVER

---

The shift pedal is located in front of the left foot peg. The shift pedal works on a ratcheting principle, which means that following shifting, the shifter must be allowed to return to its original position before being shifted again.

*Figure No. 5*

*The gears are arranged in the following order:*

*\*6a*

*\*5a*

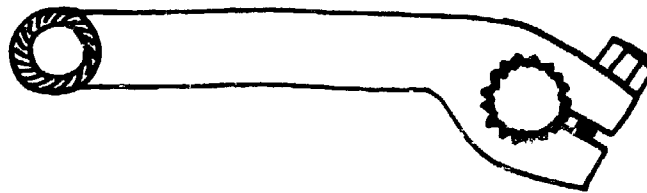
*4a*

*3a*

*2a*

*Neutral*

*1a*



---

*\*5a Old Suzuki TC models have only four gears, but they have a high-low range lever on the left side of the motor. Shift the high-low range lever only when the bike is stationary, and then only with your hand; don't kick it.*

*\*6a Some dirt bikes have six gears.*

## **THROTTLE**

---

Your right handgrip is the throttle. Twisting it toward you will cause it to pull on the throttle cable, which raises a piston-like slide in the carburetor. This slide regulates the air flowing horizontally through the carburetor, and hence, the engine speed.

The slack in the throttle cable should be adjusted to the absolute minimum, but should still permit the slide to close hard in the carburetor body. You should be able to hear it click when it closes. If the cable is allowed to become too slack, the cable housing may jump from its place. This could cause excessive acceleration and, possibly, a bad accident.

In two-stroke motors, the throttle cable is forked in the middle, under the gas tank, so that it can control the carburetor and the oil pump. You should adjust this cable only on the end which enters the throttle grip.

## **OIL PUMP (two-stroke motors only)**

---

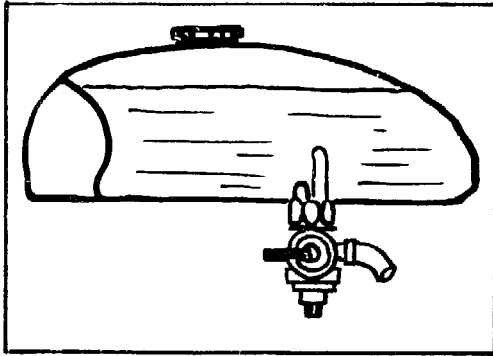
The two-stroke motorcycle is equipped with an oil injection system. It has a two-stroke oil reservoir and an oil pump that supplies oil to the motor. The quantity of oil supplied is regulated by the throttle cable and engine speed. When descending long hills with the throttle closed, the two-stroke oil pump is supplying very little oil to the motor. Disengage the clutch and accelerate once in a while.

**DO NOT LET THE OIL RESERVOIR RUN OUT OF TWO-STROKE OIL.**

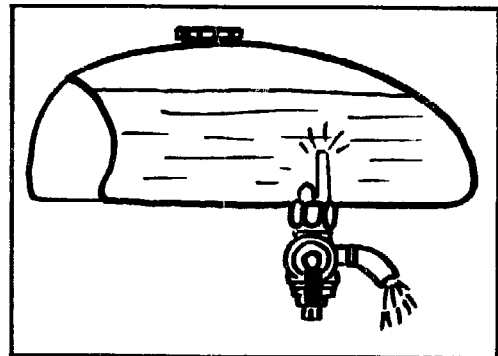
## FUEL SWITCH

---

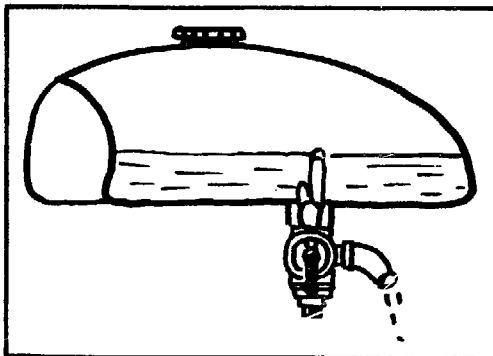
*Figure No. 6*



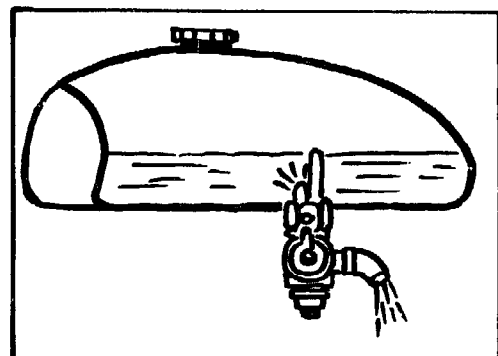
*OFF*



*ON*



*ON*



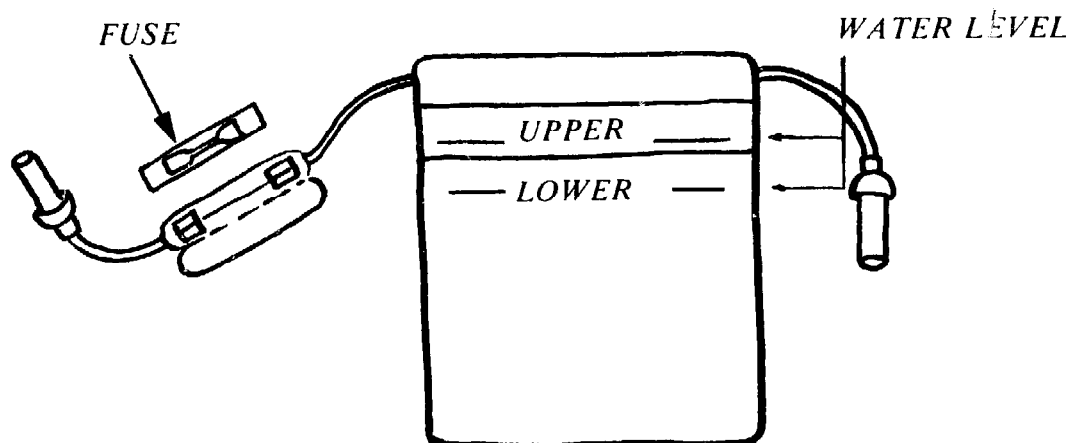
*RES (RESERVE)*

This switch is found under the fuel tank. It has three positions: ON, OFF and RESERVE. Turn the switch to "ON" when filling the tank. When the motorcycle seems to be out of fuel, turn the switch to "RESERVE" and you should have fuel for about twenty more kilometers. Should the bike drip fuel while parked, turn the switch to the "OFF" position.

## BATTERY

---

Figure No. 7



The battery, located under the seat, supplies power to the tail light, turn-signal lights and the horn. It may also supply power for the headlight and the ignition. If it goes dry or the water level is very low, the battery can be ruined. Therefore, it is important to check the water level in the battery at least once a month.

The battery is transparent. It has water level marks, high and low, painted on the side. Distilled or rain water should be used for refilling the battery.

If you have electrical problems: (1) first check your water level, and (2) then check the fuse. The fuse is a tubular glass held in a white plastic container connected to the red wire coming from your battery. If the fuse is burned out, or the filament inside the fuse is broken, the fuse must be changed. Never make direct connections bypassing the fuse because you may start a fire. (3) A third possibility is that plug-in connections may be broken, oxidized or wet with oil. Look closely inside the motor and around the battery for problems with electrical connections.

## AIR CLEANER

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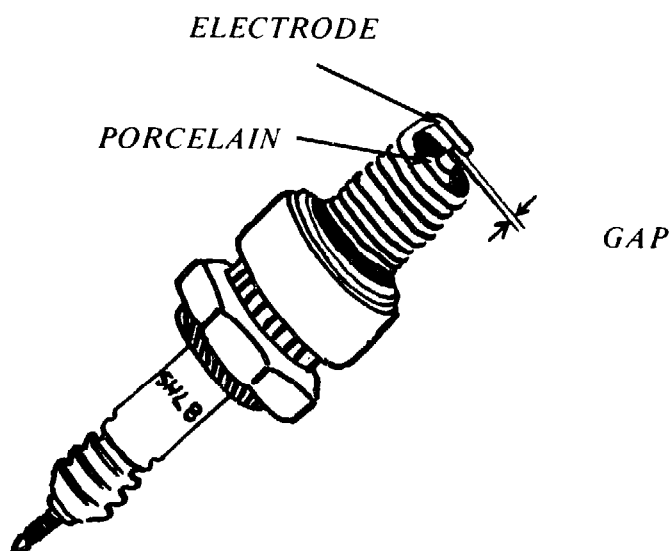
The air cleaner is usually found behind the carburetor and underneath the seat. (See Figure No. 3.) A dirty air cleaner will cause power loss, poor gas mileage and fouled spark plugs. If the filter is made of foam, wash it with diesel fuel, or with detergent and water. Wring out the foam and allow it to dry. Then re-soak the foam with motor oil and replace it. However, if the filter is made of paper, blow it out carefully with compressed air or replace the air cleaner. Some paper air filters have a foam filter over them. This type of filter needs only to be washed in water, not oiled.

Clean the air filter often. Under dusty conditions, it must be cleaned every two weeks. This is especially important when using the motorcycle on dirt roads during the dry season.

## SPARK PLUG

---

Figure No. 8



First, be sure to have the suggested spark plug with the correct gap. (The reason for this is that previously someone may have put in a different plug.) The number of the spark plug which must be used will be listed in the motorcycle owner's manual or in the "Spark Plug Criteria" section of this manual.

The spark plug should be set to the specified size gap listed in the manual, using a wire thickness gauge. The opening should be about 0.026 inches (0.6mm), which is about the thickness of a doubled-over matchbook cover. Adjust the spark plug gap by carefully bending the **outer** electrode.

To have top performance in two-stroke motors, clean the spark plug every 1,000 km and replace the plug every 3,000 to 4,000 kilometers.

When replacing the spark plug, always screw in the plug with your fingers, and then tighten it with a wrench. Starting the plug with a wrench could ruin the threads in the hole.

### NOTE:

Never use a spark plug with different letters than those indicated for the motor. The letters identify the length and diameter of the plug threads. Using a different spark plug could ruin the motor.

## SPARK PLUG CRITERIA (including 1982 models)

<u>Make/cc's</u>	<u>Year</u>	<u>ND</u>	<u>NGK</u>	<u>Bosch</u>	<u>Champion</u>	<u>in</u>	<u>Gap mm</u>
<b>Honda</b>							
XL500	79-82						
XL250-350	72-82	X24ES-U	D-8ES-L	X2C	A8Y, R6	.028	.7
XL185S	82	X24ESR-U	DR8ES-L			.028	.7
XL185S	79-81	X24ES-U	D-8ES-L	X2C	A8Y, R6	.028	.7
XL175	73-78	W22ES-U	B8ES	W4C2	N4	.028	.7
XL125S	82	X24ESR-U	DR8ES-L			.028	.7
XL125	74-81	X24ES-U	D-8ES-L	X2C	A8Y, R6	.028	.7
XL100S	82	U22FSR-U	CR7HS			.028	.7
XL100S	79-81	U22FS-U	C-7HS	U4A	Z8	.028	.7
XL100	74-78	X24ES-U	D-8ES-L	X2C	A8Y, R6	.028	.7
<b>Kawasaki</b>							
F5/F9350	70-75	W31FS	B-10H			.040	1
KL250	78-82	W22ES-U	B-8ES	W4C2	N4	.028	.7
KE250	77-79	W24ES-U	B-8ES	W4C1	N3	.028	.7
FII250	73-75	W27FS-U	B-9HS		L77J,L4J	.024	.6
FIIIM250	73	W27ES-GU	B-9EV	W3CS	N2G	.024	.6
F8 250	71-72	W24FS-U	B-8HS	W4A1	L78	.024	.6
KE175	80-81	W22ES-U	B-8ES	W4C2	N4	.032	.8
KE175	76-78	W27FS-U	B-9HS		L77J,L4J	.028	.7
F7 175	71-75	W27FS-U	B-9HS		L77J,L4J	.024	.6
KE125	80-82	W24ES-U	B-8ES	W4C1	N3	.032	.8
KE125	76-79	W24FS-U	B-8HS	W4A1	L78	.028	.7
KS125	74-75	W24FS-U	B-8HS	W4A1	L78	.024	.6
F6 125	71-73	W24FS-U	B-8HS	W4A1	L78	.024	.6
KE/GT3R100	71-77	W24FS-U	B-8HS	W4A1	L78	.028	.7
KM/KV/G4TR	70-81	W22FS-U	B-7HS	W5A	L82,L7J,L5	.028	.7
G5/G3SS100	68-75	W24FS-U	B-8HS	W4A1	L78	.024	.6
<b>Suzuki</b>							
SP-500	81-82						
SP400	80		D-8ES-L				
TM400	71-75	X24ES-U	D-8EA	X2C	A8Y, R6	.028	.7
SP370	78-79						
TS250	78-81	W22EP-U	BP7ES	W5D	N7Y	.028	.7
	76-77	W24ES-U	B-8ES	W4C1	N3	.028	.7
	69-75	W22ES-U	B-8ES	W4C2	N4	.028	.7
TC185	74-77	W22FS-U	B-7HS	W5A	L7J	.028	.7
TS185	78-81	W22EP-U	B-7ES	W5D	N7Y	.028	.7
	71-77	W22FS-U	B-7HS	W5A	L7J	.028	.7
TC125	72-77	W24FS-U	B-8HS	W4A1	L78	.028	.7
TS125	78-81	W24ES-U	B-8ES	W4C1	N3	.028	.7
	76-77	W24FS-U	B-8HS	W4A1	L78	.028	.7
	71-75	W22FS-U	B-7HS	W5A	L7J	.028	.7

TC100	73-77	W24FS-U	B-8HS	W4A1	L78	.028	.7
TS100	78-81	W24ES-U	B-8ES	W4C1	N3	.028	.7
	73-77	W24FS-U	B-8HS	W4A1	L78	.028	.7
TC/TS90	70-72	W24FS-U	B-8HS	W4A1	L78	.028	.7
<b>Yamaha</b>							
XT500	82	X22ES-U	D-7ES	X4C	R8	.028	.7
XT500	76-79	W22EP-U	BP7ES	W5D	N7Y	.032	.8
DT400	75-78	W24ES-U	B-8ES	W4C1	N3	.024	.6
DT360	74	W24ES-U	B-8ES	W4C1	N3	.028	.7
RT1-1,2,3,		W24ES-U	B-8ES	W4C1	N3	.028	.7
XT250	80-82	W22EP-U	BP7ES	W5D	N7Y	.032	.8
DT250	74-79	W24ES-U	B-8ES	W4C1	N3	.024	.6
DT1,2,3,B,C,E,		W24ES-U	B-8ES	W4C1	N3	.024	.6
DT175	80-81	W27ES-U	B-9ES	W2C0	N2	.028	.7
	74-79	W24ES-U	B-8ES	W4C1	N3	.028	.7
DT125	74-81	W24ES-U	B-8ES	W4C1	N3	.028	.7
DT100	76-82	W22ES-U	B-8ES	W4C2	N4	.028	.7
	74-75	W24FS-U	B-8HS	W4A1	L78	.024	.6

#### Mopeds

<b>Benelli</b>							
All models		W16ES-U	B-5ES	W8C	N7		
G2		W16EP-U	BP5ES(?)	W8D	N12Y		
<b>Cosmo</b>							
All models		W16EP-U	BP5ES(?)	W8D	N12Y		
<b>Negrini</b>							
All models		W16EP-U	BP5ES(?)	W8D	N12Y		
<b>Nearly all other brands</b>							
		W16FS-U	B-5HS	W8A	L86, L88A, L89CM		
<b>Vespa</b>							
Ciao, Bravo							
Grande, SI		W16FS-U	B-5HS	W8A	L86, L88A, L89CM		
<b>Vespa Scooters</b>							
100,50 Spec. 90,							
125 Prim., P125X,		W22FS-U	B-7HS	W5A	L82, L7J, L5		
150S, Sprint							
200 Rally, P200E		W20ES-U	B-6ES	W7C W5C	N5		

Two-stroke motors, especially old ones, lose power when they become hot. If the motorcycle will be used on highways most of the time, you may want to use a plug which is one step colder (with a shorter heat path) than the type recommended for your bike. If you are using NGK plugs, use a number one step higher. This practice seems to help keep the motor temperature down. If the motorcycle will be used for short trips most of the time, you may want to use a hotter plug (with a longer heat path) than recommended in order to avoid fouling problems.

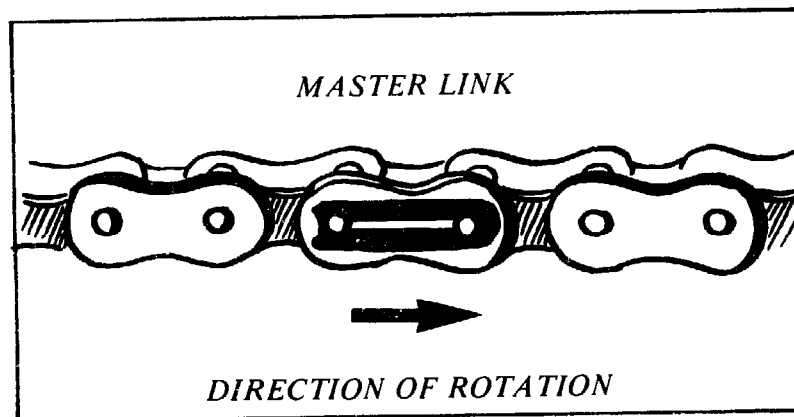
## CHAIN

A new, perfectly adjusted, well-oiled chain only transmits 98% of the horsepower to the rear wheel. If it is dirty, worn, out of adjustment, dry or rusty, that figure drops drastically: to around 50%.

If the chain is really dirty, or if there are kinked links, which can cause the chain to feel tighter at some spots in its rotation, take it apart at the master link\* and soak it in diesel fuel overnight.

### \*Master Link

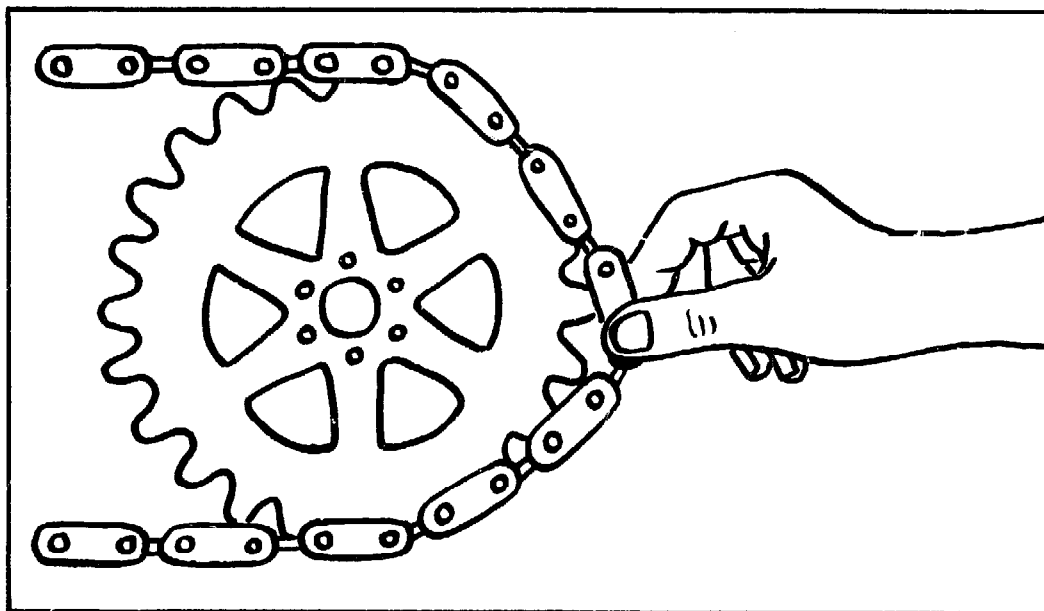
Figure No. 9



The master link is the one that has a spring clip holding it together. Always install this clip so that the opening trails as the chain goes around. If you install it backwards, the mud will knock off the clip, and the chain will fall off. If the clip is stretched while being installed, it will fall off by itself. It's always good to carry an extra master link in your tool kit.



Figure No. 10



With use, the chain will stretch, and it will have to be replaced. To determine whether it is time to buy another chain, take hold of the chain at the back of the rear sprocket. If the chain can be pulled away from the sprocket more than 1/2 inch (1-1/2 cm), the chain or the sprocket or both are worn, and they need to be replaced. When changing your chain, examine the sprockets; worn sprockets will wear out the new chain faster. Aluminum rear sprockets wear out quickly and must be replaced when you replace your chain.

When changing the chain, connect the end of the new chain to the end of the old one, so that the old one will help put the new one in place.

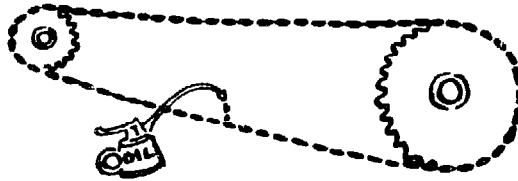
It is important to maintain your chain and sprockets in good condition. If you don't, the chain will break, and this usually happens far away from home!

While examining your chain, be sure that the bolts that hold the rear sprocket to its aluminum plate are tight. Also, see that the sprocket/plate doesn't revolve independently of the rear wheel more than 3/8 inch. If it does, the rubber cushions inside that rear hub have dried up and shrunk. If, while rotating the sprocket, you hear a metallic noise, you need to change the rubber cushions immediately.

## Chain Lubrication

The best way to lubricate the chain is to use 40W oil or chain-lube in an aerosol can.

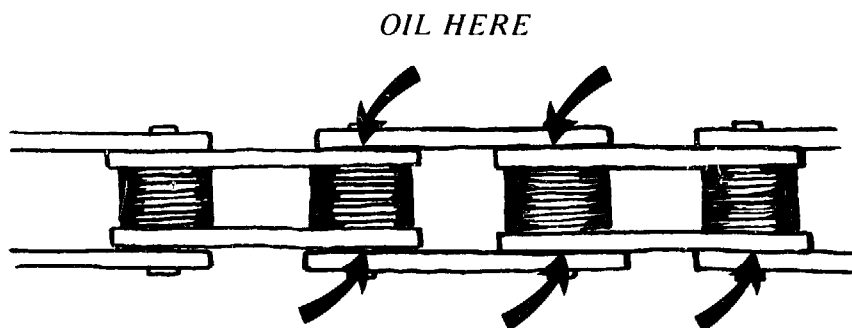
Figure No. 11



Always oil inside the loop of the chain, as shown in Figure No. 11, because when the motor is running, centrifugal force will throw the oil outward through the chain as you ride.

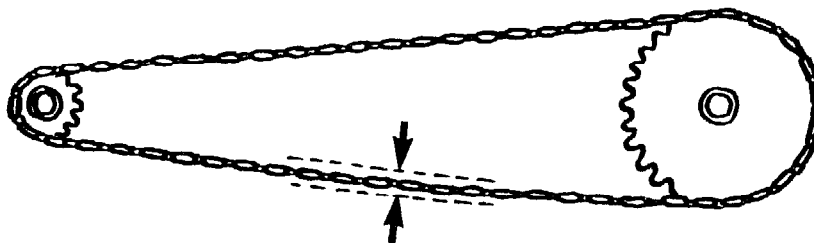
Do not put oil on the rollers; the oil needs to be between the end plates on the links. See Figure No. 12.

Figure No. 12



The best and most practical way to lubricate the chain is to elevate the rear wheel and to turn it with your hand while putting oil on the inside of the chain.

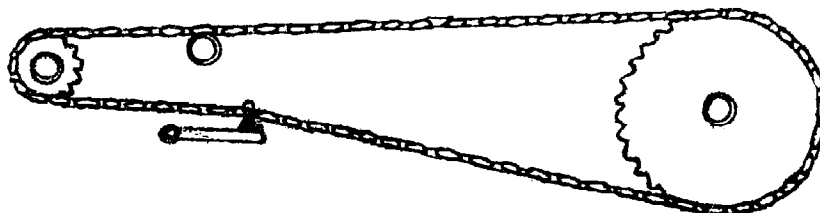
Figure No. 13



After oiling, the chain should be adjusted so that it has 1 to 1-1/2 inches of play at midpoint between the sprockets. (See Figure No. 13.) Remember to loosen the rear axle before adjusting the chain.

If the motorcycle has a spring-loaded chain tensioner, it should look something like this (no tighter!) when the chain is adjusted. If your tensioner uses a plastic rubbing block, be sure to replace it before it wears through to the screw. If your tensioner uses a little wheel, take it apart, clean it, and grease it each time you change your oil.

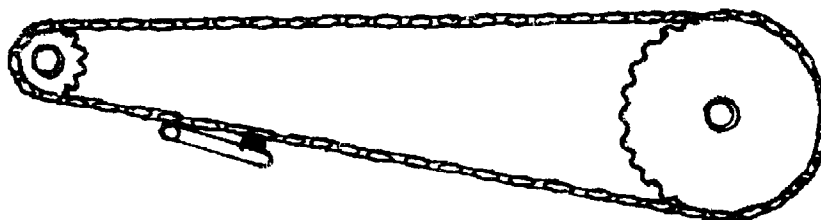
Figure No. 14



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If the chain is too tight, it will ruin the motor.

Figure No. 15



---

If the chain is too loose, it will fall off the sprockets.

Figure No. 16

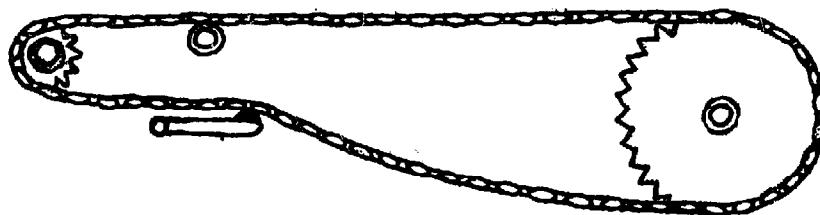
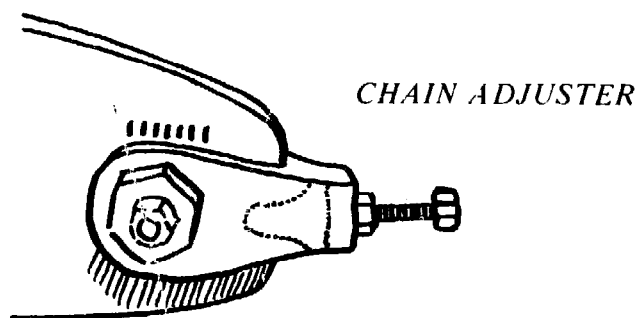


Figure No. 17



Look at the marks on the swing arm and tensioners on Figure No. 17. These marks are to help you align the rear wheel. The line on the tensioner should be in the same position at both sides of the swing arm, so that the rear wheel is aligned. Then, you have to adjust your rear brake.

Some people believe that if you ride on dirt or sand roads, the chain should not have oil. This is not true. The chain should **always** have enough oil so that the links will not "freeze" and break the chain.

## SUSPENSION

---

The suspension consists of the shocks and springs. The main purpose of the suspension is to keep your tires in contact with the ground as much as possible. It also helps to prevent your feeling all the bumps on the road!

You can aid your suspension on rough roads if you ride in a crouched position with your weight on the foot pegs and your knees tight to the bike.

The best way to check the suspension is to enlist the aid of two other people. Push each end (separately) of your bike all the way down, and then quickly release it. If the tire of either end leaves the ground, you need to let a mechanic work on the suspension.

### Rear Spring Adjustment

You can increase the spring tension on the rear of the motorcycle to handle heavy loads by pulling up on and twisting the rear spring adjusters. (See Figure No. 3, #13.) If the rear spring adjusters are not rusty, you can do this with your hand.

**NOTE:** For old (pre-1974) Suzukis only:

If you have black rubber caps on top of your front fork tubes, you can adjust the tension on your front springs, also. Just remove the rubber caps and find the screw head. To increase spring tension, push the screw down with a large screwdriver and turn it to the right. This screw has three adjustment positions.

## TIRES

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Your motorcycle is more than likely to have "trials" tires. These tires are designed to work as street tires on the pavement and as "knobbies" in the sand and mud.

You should be extremely careful, because they slide on wet pavement. They can even slip on the dew from a tree at the side of the road.

Knobbies last only 2/3 as long as trials tires do, and they make noise and vibrate on the pavement.

Always try to have two tires of the same kind. Never put a knobby on the back and a trials tire on the front. The traction of the tires will be different, and the rear tire (the knobby) will affect the steering more than it should. This may result in a fall when you are rounding a loose dirt curve.

## SPOKES

The spokes on a new motorcycle should be checked after the first 1,000 kilometers, and then after each 10,000 kilometers.

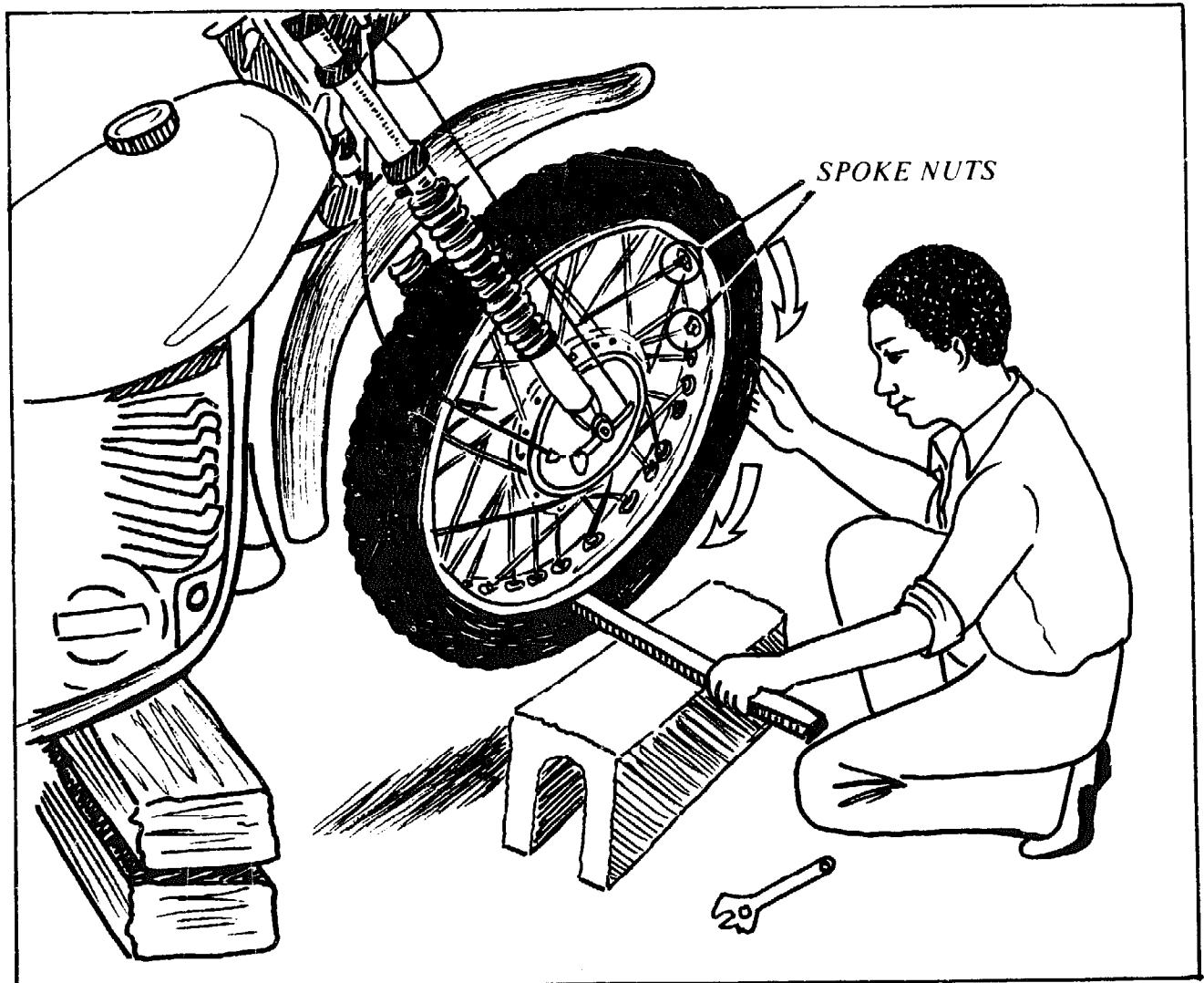
If the tension is right, the spokes ring like a bell when tapped with a small screwdriver. Check to see if the spokes touch where they cross. If they touch, they will ring with a flat sound, or not ring at all.

If you find several of your spokes loose, check your wheels for "trueness," as shown in Figure No. 18. To check this, you must put the motorcycle up on a block, place another block close to the tire, and on this last block put a ruler or stick that is level with the rim. (See Figure No. 18.)

Then turn the tire. With the ruler you can tell if the rim of the tire is true. If it is more than 1/2 cm off, you should take your motorcycle to somebody who can fix it.

If the rims are nearly true, you can tighten the spokes that are loose. To tighten them, you must turn the tire a couple of times, at each turn giving each loose spoke nut no more than 1/2 of a turn before going on to the next one. Continue in this manner until all the spokes are tight.

*Figure No. 18*



## IMPORTANT: BRAKE MAINTENANCE

The day you are riding down the road at full speed is **not** the day you want to discover that your brakes do not work properly. Why not check them now and keep them in good shape?

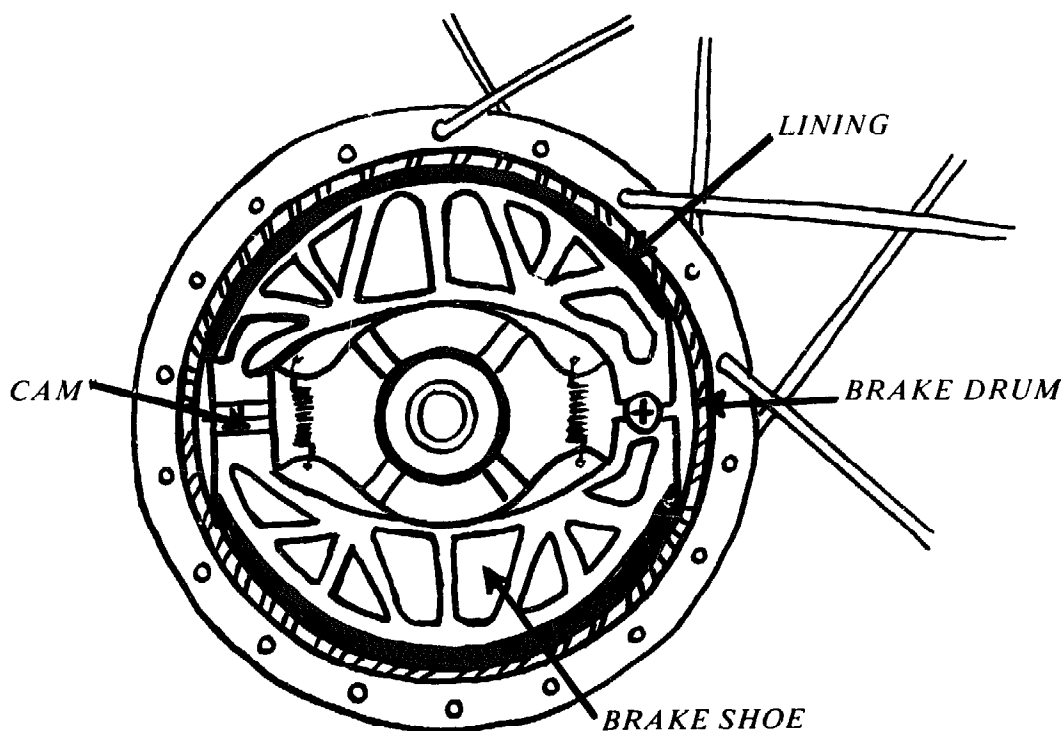
On many older bikes, the rear brake doesn't grab properly, and the front brake doesn't work at all. This results from poor adjustment, dirt and rust.

Your front brake is the most important because that is where 70% of your stopping power is. **But it should only be applied hard on straight and good roads.**

The brake cable should be adjusted so that the front wheel turns freely; however, when the brake lever is pulled, it should not touch the handle.

*Figure No. 19*

### *BRAKE*



If the brake still doesn't grab, you have to dismantle it. (See Figure No. 19 and "Emergency Proceedings: Flat Tire.") If the brake shoes are less than 1/16 inch thick, replace them. If they are okay, clean the glaze off them and off the inside of the brake drum with sandpaper. If you remove the brake shoes, do not replace them upside down, and do not touch the drum or the linings with your greasy fingers, or you will ruin your linings.

## Rear Brake

First, set the brake pedal height where you want it by adjusting the pedal-stop bolt.

On the rear wheel, adjust the nut behind the brake actuating arm so that the brake pedal has approximately 1/4 to 1/2 inch of play before it starts working.

If the lining is still good (but the nut won't tighten enough to adjust it), you may move the brake actuating arm one notch on its shaft to adjust it some more. Be careful that the arm doesn't turn more than 1/4 turn from its rest position. If the cam pulls past center, it will lock the brake.

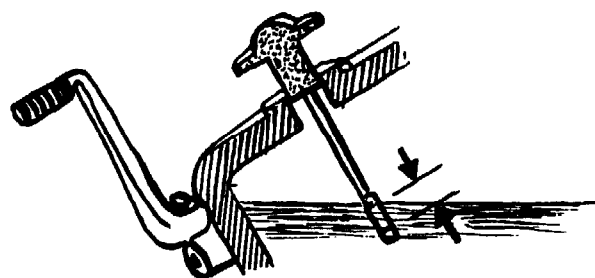
Along the frame there is a tube-shaped switch placed about 6 inches above the brake pedal. There are two wires coming off the top of the tube and a spring below it which connects to your brake pedal. That is your stop light switch. Adjust the nuts on the outside of it to move it up and down until the stop light comes on just as the brake pedal goes down.

**NOTE:** When you are riding double, especially at high speed, **DO NOT OVERWORK YOUR BRAKES.** They might heat up and fail, costing you your life.

## CHANGING YOUR OIL

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*Figure No. 20*



The oil in a four-stroke bike should be changed every 2,000 km, and that in two-strokes, every 3,000 km. The procedure is the same. Warm up the bike to stir up the dirt into the oil; then locate the oil drain plug under the engine. Remove it and let the oil drain out.

Your four-stroke bike will have an oil filter (or screen), which should be cleaned or replaced at least at every second oil change. This oil filter can be found under a small cover on the bottom or lower front of the motor.

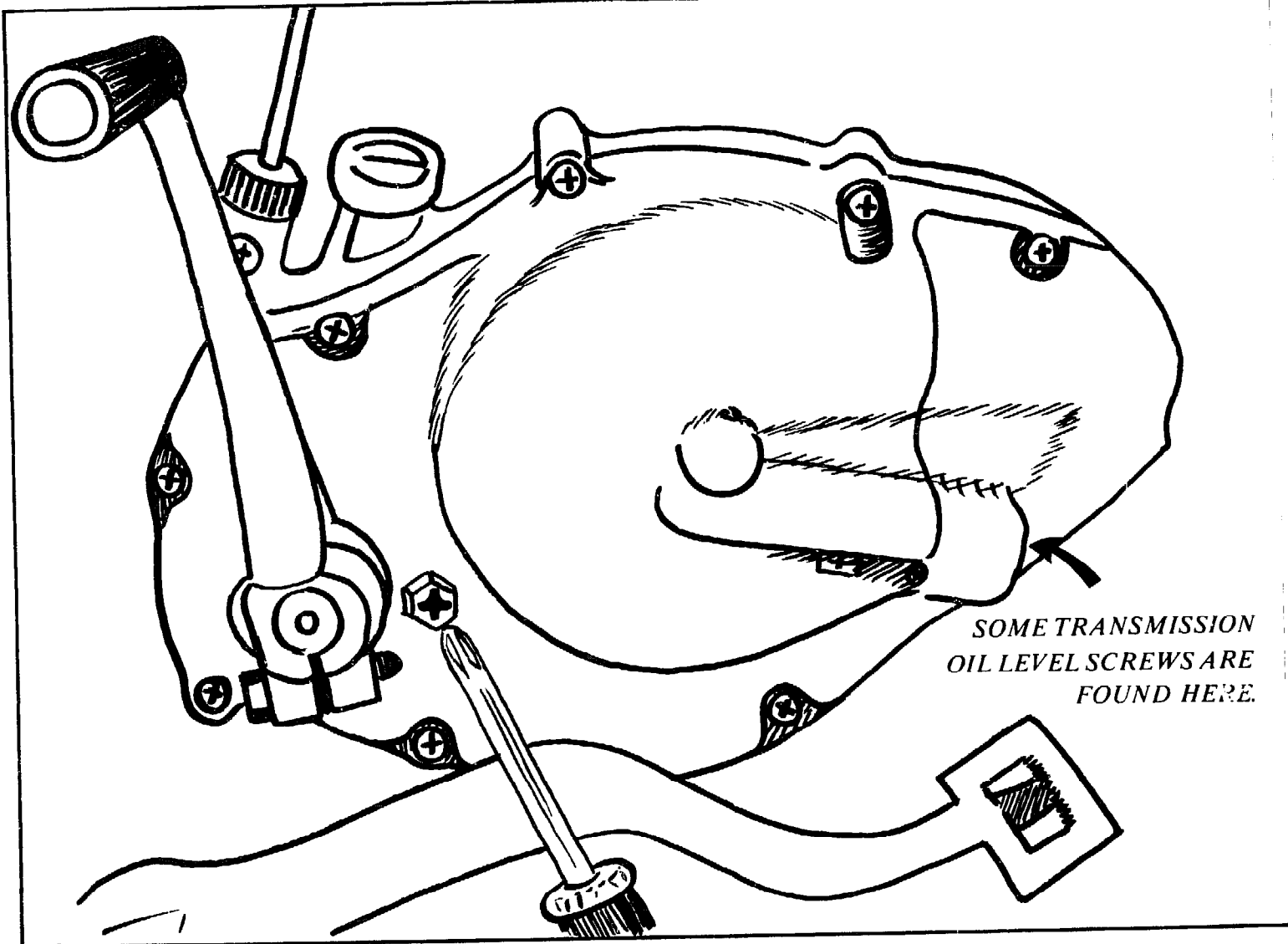
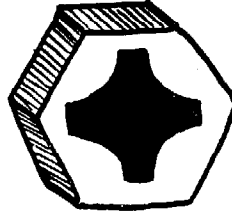
Many Hondas use a centrifugal oil filter, which is under the clutch cover. Pull the cover and clean out the filter every 10,000 km. Replace the gasket on the clutch cover (usually the right side cover).

Replace the drain plug and pour in the exact amount of oil that you need. The amount of oil you need to use will be marked (in cc's) on the side cover near the fill hole.

If your bike has a dip stick on the fill cap (Figure No. 20), check your transmission oil without screwing in the cap (as shown). The dip stick has two lines on the end; the oil level should be between the two.

If your bike has an oil level screw (Figure No. 21), oil should dribble out of the hole when the bike is balanced straight up and the oil level is okay.

*Figure No. 21*





## HANDLING PROBLEMS, BAD STABILITY AND STEERING

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If your steering seems crooked, check for bent handlebars; however, your fork tubes are probably just twisted in the "triple clamps." (See Figure No. 3, #15.)

Loosen the four or six bolts that clamp your fork tubes into the triple clamps (but not so loose that the tubes slip up or down). Then loosen the big chrome bolt head just above the gas tank. Now, straddle the front wheel and twist the handlebars so they line up with the front wheel. Retighten the bolts.

### Causes of Bad Stability:

1. Check tire pressure. (Proper pressure varies; check owner's manual or with dealer.)
2. Check for loose spokes.
3. Check wheel alignment. If it is bad, correct it by using the chain adjusters.
4. Take hold of the front forks and check for play in the steering head. If it rattles, loosen the big chrome bolt in the top of the steering head. Now take a hammer and punch and tighten the chrome collar with the notches in the side of it which you will find under the top triple clamp. Tighten it just enough to remove the play. Retighten the big bolt.
5. Elevate the rear wheel and check for side-to-side play in the swing arm. If it is loose, tighten the bolt that holds it in the frame. If that doesn't work, your swing arm bushings are worn out. Take them out and replace them. Remember to grease your swing arm occasionally.
6. Move the wheels laterally to see if the bearings are worn.
7. Elevate the wheels and spin them to check for trueness.
8. If the motor has a lot of vibration, check to see that the bolts that hold the motor to the frame are complete and tight. Also check the motor mounts to see that they are not broken and the frame is not cracked.

## TOOL KIT

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There are some people who do not carry tool kits; they belong to the "God Provides" school of motorcycling. However, whenever you are riding your motorcycle for some distance (farther than you would like to push it back home), it is important that you have a tool kit with you. If you lose yours, here is what you need to carry:

1. a spark plug wrench
2. extra spark plug
3. metric wrenches that fit your axles
4. screwdrivers, preferably one-handed with detachable bits
  - #3 Phillips
  - #1 Phillips
  - #2 Straight Blade
5. Pliers

In addition, it might be a good idea to carry the following:

1. patch kit
2. tire irons
3. bicycle tire pump, modified to fit standard tire valves, or mini tire pump
4. extra master link
5. needle-nosed pliers
6. small vice grip
7. front light bulb
8. extra fuse
9. 3 to 6 feet of electrical wire or other similar wire

The wrenches you need for a Japanese bike (in order of importance) are: 10mm, 17mm, 14mm, 22mm and 6mm. Whether you will need 21mm, 8mm or 19mm depends on your bike.

It is a good idea to have a padlock on your seat so that you won't lose your tool kit.

## EMERGENCY PROCEDURES

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### Flat tire

First, you have to determine if the center of the valve is good. Many times air comes out from here. Moisten the air valve and watch for air bubbles to see if it is leaking. If the tire is flat, the tools you will need are:

1. wrenches to remove the wheel
2. small tire irons or large screwdrivers
3. pliers, and
4. a bowl or can of detergent and water.

Some people patch tubes without removing the wheel from the bike. It is usually better to remove it, because then you can check to see if there is anything else wrong with the tire.

If you are putting on a new tire, set it in the sun for a while first in order to soften the rubber.

### Rear Wheel

The rear wheel is almost always the one to go flat. When it does, follow these steps:

Either put the bike up on a block or shut off the gas and lay it on its side. As you remove the wheel, lay nuts, bolts, pins and spacer on the side of the bike they came from so it will be easier to put back together.

Remove the bolt holding the brake rod on the hub (if one is there) and the adjusting nut from the end of the brake actuating rod. Now, move to the left side and remove the cotter pin and axle nut. Going back on the right, pull the axle in the hole with a small phillips screwdriver or a vice grip. Encourage it with a hammer and a block of wood if it doesn't come easily. Lift the chain off the sprocket, remove the brake assembly, and drop the wheel.

Remove the nuts from the air valve stem and rim lock(s) (if any). Break the tire loose from the rim all the way around by walking on it. Now, carefully pry one side of the tire over the edge of the rim. Don't damage your inner tube! Use the detergent and water to lubricate the rubber so that it slides off and on the rim easily. As much as possible, use your fingers rather than the screwdrivers. When you have one side off, pull out the tube, inflate it, and hold it under water to find the hole(s). While it's drying, feel around inside the tire to find what caused the flat. Whatever made the hole must be removed.

If you need to completely remove the tire from the rim, put a direction-of-rotation arrow on it so that it will be put back going the same direction, or it will make noise when you drive.

To apply the patch: rough up the rubber around the hole in the tube, apply patch cement, let it dry, and then apply the patch.

Now put the tube back in between the tire and the rim. Do not tighten the rim lock or valve stem nut until the tire is inflated. And do not pinch the tube. Be sure to get the valve stem back in the hole. Be sure the adjusting notches on your chain adjusters (Figure No. 3) are on top, and apply the brake as you tighten the axle to center everything.

### Front Wheel

If you have bolt-on caps or pinch bolts at the bottom of your forks, they must be loosened in order to pull your axles. In the inside of the hub, where the brake shoes are mounted, there is a big washer with two "ears" on it. This is your speedometer drive (spun by the spinning wheel). It fits up against the wheel. Be sure it goes in properly when you put it back together, or the speedometer won't work. If you had to remove the speedometer cable, spin the wheel as you reinsert it so it doesn't jam.

### Won't Start?

Check to see:

1. if there is gas in the tank.
2. if the fuel switch is on.
3. if the key switch is on.
4. if the kill switch is "on." (If your bike has a kill switch, it will be on the right handgrip.)

## Ignition

Remove the spark plug. If it is wet, you are getting gas. If the electrodes are bridged with carbon or it is really wet, clean or replace it. You may need to kick the starter a few times with the plug out to dry out the cylinder. Check for cracks in the porcelain; if it looks okay, connect the ignition wire to the plug and lay it on the cylinder head. Turn on the key and see that a strong blue spark jumps across the electrodes when you spin the engine with the kick-starter. (A weak orange spark means a bad connection, bad plug or bad coil.) If it sparks, go to the "Fuel" section. (Note that a damp spark plug may work in open air, but may fail when subjected to compression in the cylinder.)

If your spark plug cap screws off the end of the ignition wire, check this connection. With the key "on," check your tail light and/or horn. If they are dead, you might have water or moist corrosion in the ignition switch, a blown fuse (generator-equipped bikes) or a dead battery. Check all electrical plugs (under seat and tank) for corrosion. Make sure there is no moisture in the spark plug cap or in the ignition (under left side cover).

If these are all okay and you still have no spark, your problem is probably either contact points or a coil. Electronic ignitions on motorcycles rarely fail if they get power, are properly grounded, and are not physically damaged.

## Fuel

Unplug the gas line from the carburetor. If no gas comes out, remove the bowl from the bottom of the fuel switch (Figure No. 6) under your gas tank and check for dirt in screen, bowl and valve. If there was gas in the line, you should take your bike to a mechanic.

### **POWER LOSS CAUSED BY PLUGGED EXHAUST (Procedure for Two-strokes)**

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If your bike seems to be losing its power, hold your hand about six inches from the end of your exhaust pipe and see if you can feel the individual bursts of exhaust easily. If not, remove the baffle from the rear end of your exhaust pipe and take it apart. Now scrape all the dirt from the holes and passages. If it is too tough, soak it in solvent overnight, and then clean it.

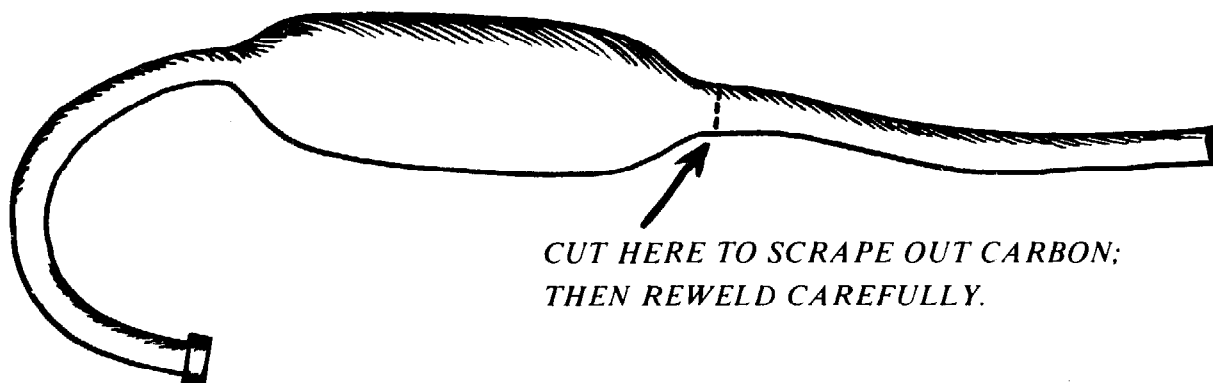
### **Carbon-plugged Exhaust on Yamaha**

Yamaha pipes have a spark arrester welded to the inside of the pipe.

Heat the pipe from the inside or outside with an acetylene torch to ignite the carbon. (Carbon burns like coal.) Then blow oxygen through the pipe to keep it burning. Be careful not to melt the pipe.

If you do not have a torch and are not worried about sparks, you can knock the spark arrester loose and pull it out with a long sharp punch. (This can be done with the pipe in place on the bike.) And you can cut the front section of the pipe in two to clean it out if necessary. (See Figure No. 22.) Mark the side of the pipe before cutting so that you don't weld it back twisted.

*Figure No. 22*



## Carburetor

If your carburetor is set up to operate well at high altitudes, it may not supply enough gasoline to mix with the denser air at low altitudes. A lean mixture will cause excessive heat and possible engine damage. Depending on what size of main jet you have in your carburetor, you may need to install a larger jet, or at the very least, a cooler spark plug when you visit low altitudes.

## Suggestions

If you are one of those bikers who is in the habit of falling down regularly, it might be wise for you to:

1. loosen the screws in the clutch and brake lever brackets a little, so that the levers spin around the handlebars on impact, instead of braking.
2. plug the holes in the ends of your handgrips so that dirt can't get into your throttle mechanism.

REMEMBER: "Be kind to your beast, for it bears you."

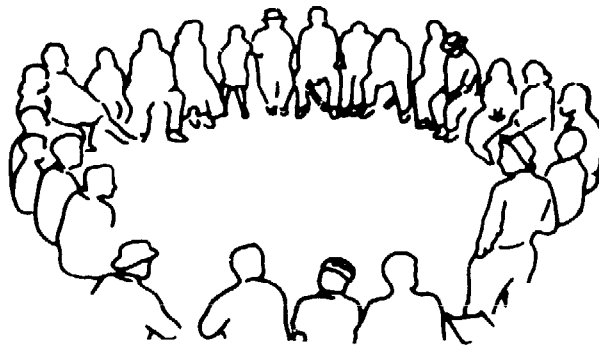
## SERVICE CHECK SCHEDULE

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Every 500 km	Put oil on the chain. (Do this more often if there is dust or rain.)
Every 1,000 km	Clean and adjust the spark plugs (in two-strokes). Adjust the brakes and clutch. Check the water in the battery. Clean the air filter. (If necessary, do this more often.)
Every 3,000 km	Change the motor oil. <b>Adjust valves</b> (four-strokes).
Every 5,000 km	Clean the strainer on the fuel switch. Lube the cables and the swing arm. <b>Check the points and the timing</b> (conventional ignition). <b>Check the two-stroke oil pump</b> . Change spark plug(s).
Every 10,000 km	<b>Change points and spark plug(s). Decarbonize the motor and exhaust (two-strokes). Clean and adjust the carburetor. Grease and adjust the triple clamp (handle crown). Change the oil in the front forks.</b> Check to see that all the bolts, screws and spokes are tight. Check to see that the frame is not cracked.

## NOTE:

The jobs above which are in bold face type are those you may not be able to do by yourself.



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