

PERIODIC MOTOR VEHICLE INSPECTION  
MANUAL FOR INSPECTORS  
OF  
MOTORCYCLES



DEPARTMENT OF TRANSPORTATION  
STATE OF HAWAII  
AUGUST 2005

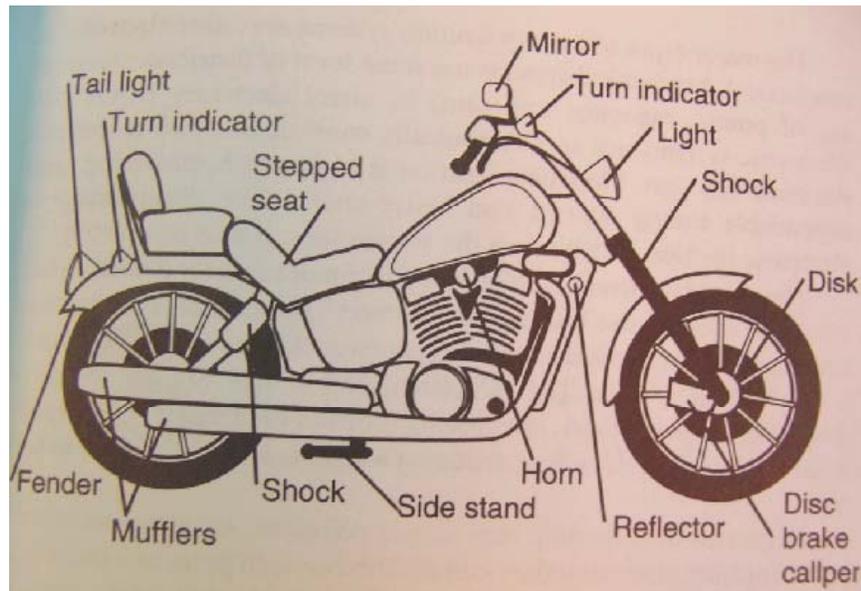
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# MOTORCYCLE INSPECTIONS



A motorcycle has 8 basic systems: (1) Engine, (2) Fuel, (3) Exhaust, (4) Frame and suspension, (5) Wheels, tires and brakes, (6) Drive train, (7) Controls and gauges, (8) Electrical.

The following items need to be inspected, provided they can be easily accessed.

Battery	Final Drive	Steering
Brakes	Footrests	Suspension
Cables	Frame	Tires
Controls	Fuel	Wheels
Engine	Kick & center stands	Wheel bearings
Exhaust	Registration	Windscreen
Fenders	Seats	Wiring

## **ALIGNMENT** (line 2 of Form)

Wheel alignment can be checked several ways. One quick method is to use a straight piece of wood. Place it against the sidewalls of the tires as close up to the axles as possible. If the wheels are aligned perfectly, the straight edge will contact the two tires at four points. One point on the sidewall in front of the front axle; one point on the sidewall to the rear of the front axle; one point on the sidewall to the front of the rear axle, and one point on the sidewall to the rear of the rear axle.

Another method is to make 3 parallel lines one inch apart on the floor. The lines should be twice the length of a motorcycle. Center the wheels on the centerline and observe tracking of the rear wheel as the motorcycle is moved forward on the centerline.

### **Fail alignment if:**

► The rear wheel alignment of a two-wheel motorcycle, in relation to tracking the front wheel, is misaligned by one inch or more, or not within the manufacturer's specifications.

## **BATTERY & WIRES** (Line 29 of Form)

Battery & wires must have secure, tight connections; battery vent tube should not be able to drip on the chain.

### **Fail battery if:**

- ▶ It is not securely mounted or leaks.
- ▶ Vent tube drips on the chain.
- ▶ Wires are loose or insulation is worn off so as to have potential for a short circuit.

## **BRAKES** (Line 8 of Form)

There are two basic types: drum and disc. On all but the slowest, smallest bikes, the rear brake is applied by a foot pedal on the right side of the bike. The front brake is applied by a hand lever near the right handle grip. A linked braking system activates both brakes with one lever or pedal. An antilock braking system (ABS) is an added feature on some bikes. If the ABS is inoperative, the brakes can still pass the inspection.

### **Fail brakes (Line 8) if:**

- ▶ The brake system warning light does not function.
- ▶ Brakes do not lock the wheels when applied fully while bike is moving about 4 mph.
- ▶ Hydraulic brake pressure cannot be maintained for ten seconds.
- ▶ Hydraulic fluid level is below the minimum mark; the master cylinder is not securely mounted; brake fluid is leaking somewhere.

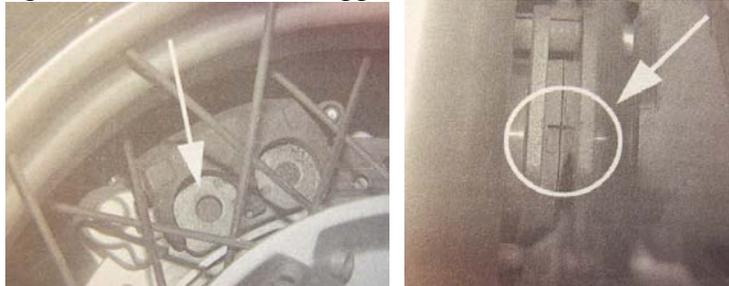


(Some rear brake reservoirs are a bit difficult to find).

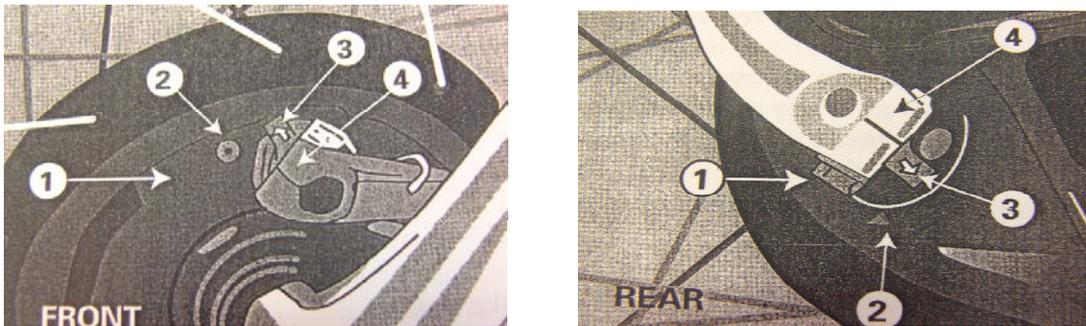


- ▶ A 3-wheeled motorcycle does not have a functioning **parking brake** (Line 9).
- ▶ **Cables** are frayed, broken or routed so as to be pinched.
- ▶ A **lever** is out of adjustment (lever contacts handle grip when fully depressed) or does not snap back to the rest position when released.

► **Disc** is deeply grooved or scored; disc pad thickness is less than 1/16 inch or 2 millimeters (Check the lever adjustment reserves. If they are minimal, it is probable that pads are very worn). Many pads can be checked with very little effort. In the example on the left, the pads are at the minimum level when the rotor can be seen through the hole. On the right, the indentations disappear at minimum level.

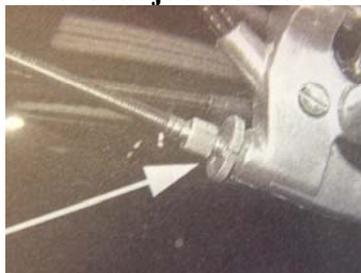


► Drum brake **wear indicator** arrow is below the minimum mark.



1. Brake panel; 2. Reference mark on brake panel; 3. Arrow on brake arm; 4. Brake arm

► Lever **adjustment screws** are broken or stripped.



### Test Ride

Check front and rear brakes for stopping power and noise at about 4 mph. If brakes are noisy, they may be worn too thin.

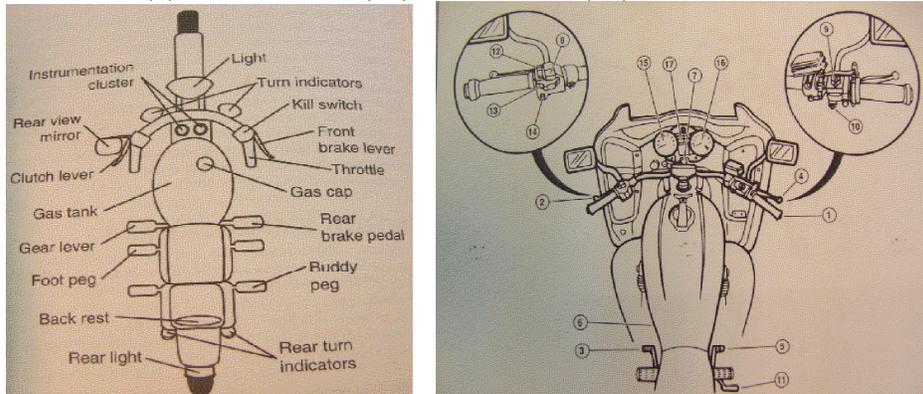
**Fail brakes if:**

► They will not lock up the wheels at a speed of about 4 mph.

### CONTROLS AND INDICATORS (Line 29 of Form)

The basic components are shown on the graphics below. Items that must pass inspection are underlined. The numbers relate to the graphics: speedometer/odometer (15), tachometer (16), indicator lights (neutral, high beam, turn signals, engine oil low pressure warning, kick stand down, temperature gauge, voltage) (17), turn signal switch

(13), horn button (14), rear view mirror, handlebars, headlight, turn signal lights, tail light, throttle (1), clutch (2), headlight beam selector (12), gear shift lever (3), front brake lever (4), rear brake pedal (5), fuel supply valve (6), ignition (7), choke (8), engine cut-off switch (9), electric start (10), kick starter (11), starter button.



Check to see that cables allow for free, smooth movements. Cables usually fray before they break completely. When a cable begins to fray, its action will feel rough and gritty. Levers and controls should be tight in the mounts but pivot freely. The **throttle**, **clutch** and **brake levers** should snap back to the resting position when released.

**Fail cables** (Line 29 of Form) if:

► They are frayed, have loose connections or do not allow free movement of control lever.

**Fail clutch** (Line 29 of Form) if:

► The lever has no free play or it bottoms out prior to full clutch disengagement.

► It does not spring back to the rest position when released.

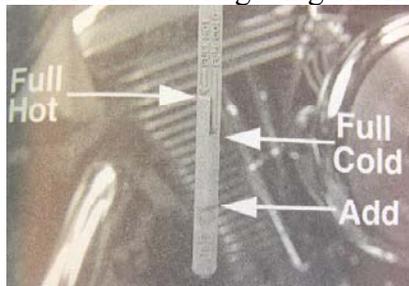
**Fail kill switch** (Line 29 of Form) if:

► It fails to kill the engine, or it is missing on a motorcycle manufactured after 9/1/74.

► The **high beam indicator** lamp (Line 29 of Form), or any other safety oriented indicator lamp is inoperative.

## ENGINE (Line 28 of Form)

The engine must be securely mounted to the frame and be free of serious fluid leaks. The oil level need not be checked unless the engine has a serious oil leak. If dipstick has threads, don't thread it in just to take an oil level measurement. Instead put the dipstick in until it stops against the threads and then pull it out for the reading. The dipstick markings are calibrated for this procedure. When reading the level, hold the dipstick vertical to avoid getting an erroneous reading.

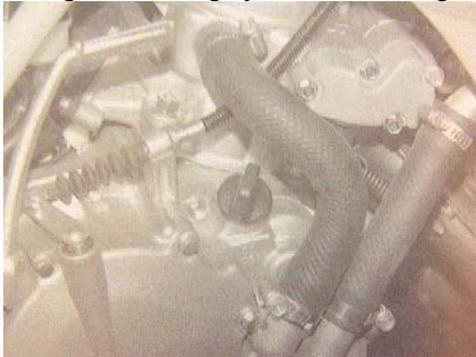


Two-stroke engines usually have an oil reservoir located under the seat. Some motorcycles have a sight glass for oil but no center stand to keep the bike in a vertical position. In these cases, find a way to prop it up securely or ask someone to help you, because it is easy to lose the balance and drop the bike when you are bent over looking at a sight glass. The sight glass is usually located on the lower side of the engine case.

Some bikes use oil or water to cool the engine. Check this system for leaks.

**Fail engine if:**

- ▶ It is not securely mounted.
- ▶ Any engine mount bolt is missing or loose.
- ▶ Oil level is below the low mark on the dipstick or oil cannot be seen through the sight glass.
- ▶ Engine-cooling system is leaking.



**EXHAUST SYSTEM (Line 6 of Form)**

Components must be securely mounted, have no leaks or an unacceptably loud sound level. Welding cracks is an acceptable method of repairing an exhaust pipe.

**Fail exhaust system if:**

- ▶ It is leaking.
- ▶ Any component part is not securely fastened.
- ▶ Any component part is missing, equipped with exhaust cut-outs, by-pass or similar devices or lacks a muffler. Installing a baffle in an open pipe is acceptable provided it reduces the noise level to about that of a stock exhaust system.
- ▶ Emits a much louder noise than that emitted by the vehicle as equipped from the factory, or
- ▶ Exhaust gas is not exiting beyond the passenger.

**FENDERS (Line 26)**

There is no federal standard for fenders and no state law. However, §19-133.2-35 (b) (5), HAR, which has the force of law, requires fenders on all motor vehicles. §15-19.31, Revised Ordinances of Honolulu, §10.20.390, Maui County Code and §16-17.30, Kauai County Ordinances require every motor vehicle upon a highway, except motorcycles and motor scooters, to be equipped with fenders for all wheels. §24-104, Hawaii County Code requires fenders on all motor vehicles. Fenders must be present, they must be firmly attached and designed to deflect spray.

### **FINAL DRIVES:** (Line 29)

There are three types: belt, chain and shaft. Belts are the oldest type. They are lighter and simpler than shaft drives and waste less energy. They are smoother than a chain and have no lash when the rider backs off the accelerator. Belts don't stretch, need no lubrication and last three times longer than a chain. Chains are inexpensive, extremely durable in all kinds of conditions and are energy efficient. However, they are less smooth, require maintenance and are noisy. A shaft is smooth, durable, low maintenance and quiet, but it is heavy and produces considerable gyroscopic torque, which pushes the bike up or down on a turn.

Check belts for movement at 10 pounds of pressure at middle of the top strand; there should be between 3/8 and 1/2 inch movement.

Check drive shaft for serious leakage at seals.

Check final drive chain for play: It should have 1/2 to 1 inch. Check sprockets for damaged or missing teeth.

#### **Fail chain if**

▶ You can pull it away from the rear sprocket and expose more than half of a tooth and the rear axle adjusters have reached their farthest limits.

▶ Rear sprocket has hooked or broken teeth.

**Warn** the owner if you notice a kinked chain link. These can be seen by spinning the rear wheel and watching to see if the chain follows the rear sprocket smoothly.

### **FOOTRESTS** (Line 29)

There is a wide variety of footrests. For the purpose of this inspection, we are only concerned that they exist and function properly.

#### **Fail footrests if:**

▶ They are not available for each occupant position.

▶ They do not fold upward or rearward and upward when not in use.

▶ They are not securely mounted.

### **FRAME** (Line 29)

To a large extent, frame geometry determines the motorcycle's handling characteristics. Frames on modern standard production motorcycles can be grouped into three basic types: tube, pressed steel and monocoque (a type of vehicle construction in which the body is integral with the chassis). Tube frames are the most common. They are inexpensive, lightweight, strong and offer high stability at highway cruising speed. They usually have a diamond shape and are made of steel, which is strong and resistant to fatigue. However, the tube design cannot withstand racing stresses. Motorcycles with high-speed capabilities generally have aluminum boxed tube sections that have greater stiffness than steel. "Backbone" or "spine" frames are made of pressed steel that is



welded together. The engine literally hangs down from these frames. This frame is economical, but heavier and less rigid than tube frames. It is mostly

used for small, inexpensive motorcycles. Monocoque frames incorporate many components, such as the tank, rear fender seat mount and engine mount into cast sections that comprise the frame. Motor scooters typically have monocoque frames.

**Fail the frame if:**

▶ It has damage that looks like it compromises structural integrity. A crack is an example.

**FUEL** (Line 7)

Motorcycle should be on a level surface in an upright position: Check fuel tank and lines for leaks, loose connections and damage.

**Fail fuel if:**

- ▶ The fuel petcock, if present, does not move to all three positions.
- ▶ Fuel cap cannot cover fill opening tightly and remain secure.

**HORN** (Line 16 of Form)

County Ordinance requires a vehicle's horn to be audible at a distance of 200 feet

**Fail horn if:**

▶ It is inoperative, inappropriately loud, or the location of the horn switch is not readily accessible to the operator.

**KICK STAND AND CENTER STANDS** (Line 28)

Check to be sure the stand holds up the motorcycle and continues to hold it when turning the handlebars from stop to stop.

**Fail stand if:**

- ▶ It does not hold the bike up.
- ▶ When not in use, the stand does not fold up toward the rear of the bike and stay close to the frame. A dangling stand can catch the pavement when leaning into a turn and cause a crash.

**LIGHTS AND REFLECTORS** (Lines 10-15 of Form)

Tables III & IV below list the required lights and reflectors for motorcycles.

**Fail light and reflector items if:**

- ▶ **Missing**
- ▶ **Damaged** so that light shows through the damaged portion of the lens (placing tape over the damaged portion of the lens is not adequate to pass the inspection but gluing that restores proper function is adequate) or moisture is present inside the lens, or reflector does not redirect light properly
  - ▶ **Not properly or securely installed**, or directs light improperly (this could be caused by vehicle damage that causes a properly installed lamp or reflector to improperly direct light).
  - ▶ **Not of an approved type or color** (See Tables III & IV and Hawaii Administrative Rules 19-132),
  - ▶ **Obscured** or blocked in any manner or is **covered** with material that is non-transparent and which diminishes the function of the lamp, lens or reflectors so as to put it out of conformance with FMVSS and local laws, ordinances or rules (the burden of

proof of conformance is on the vehicle owner). If a lamp or reflector that is not required is installed, it cannot diminish the effectiveness of any required lamp or reflector.

▶ **Inoperable**, or operates improperly.

▶ **Headlamp** cannot produce a light sufficient to reveal any person or object straight ahead for a distance of two hundred feet.

▶ **Headlamp** not properly aimed.

▶ **Turn signal** flashing rate is less than 60 per minute or more than 120.

**Table III**

FMVSS Required Motor Vehicle Lighting Equipment

[All Passenger Cars and Motorcycles, and Multipurpose Passenger Vehicles, Trucks, Buses and Trailers of Less Than 80 Inches (2032 mm) Overall Width]

Item	Passenger cars, multipurpose passenger vehicles, trucks, and buses	Trailers	Motorcycles	Applicable SAE standards or recommended practice (See S5 for subreferenced SAE materials)
Headlamps	See S7	None	See S7.9	J566, 1/60.
Taillamps	2 red	2 red	1 red	J585e, 9/77
Stoplamps	2 red	2 red	1 red	J586, 2/84.
High-mounted stoplamp	1 red	Not required	Not required	J186a, 9/77.
License plate lamp	1 white	1 white	1 white	J587, 10/81.
Parking lamps	2 amber or white	None	None	J222, 12/70
Reflex reflectors	4 red; 2 amber	4 red; 2 amber	3 red; 2 amber	J594f, 1/77
Intermediate side reflex reflectors.	2 amber	2 amber	None	J594f, 1/77
Intermediate side marker lamps	2 amber	2 amber	None	J592e, 7/72
Side marker lamps	2 red; 2 amber	2 red; 2 amber	None	J592e, 7/72
Backup lamp	1 white	None	None	J593c, 2/68
Turn signal lamps	2 red or amber; 2 amber.	2 red or amber	2 amber; 2 red or amber.	J588, 11/84

**Table IV**

FMVSS Location of Required Equipment

[All Passenger Cars and Motorcycles, and Multipurpose Passenger Vehicles, Trucks, Buses and Trailers of Less Than 80 Inches (2032 mm) Overall Width]

Item	Location on		Height above road surface measured from center of item on vehicle at curb weight
	Passenger cars, multipurpose passenger vehicles, trucks, trailers and buses	Motorcycles	
Headlamps	On the front, each headlamp providing the lower beam, at the same height, 1 on each side of the vertical centerline, each headlamp providing the upper beam, at the same height, 1 on each side of the vertical center-line, as far apart as practicable. See also S7.	See S7.9 of FMVSS 108	Not less than 22 inches (55.9 cm) nor more than 54 inches (137.2 cm).
Taillamps	On the rear--1 on each side of the vertical centerline, at the same height, far apart as practicable.	On the rear--on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline.	Not less than 15 inches, nor more than 72 inches.
Stoplamps	On the rear--1 on each side of the vertical centerline, at the same height, and as far apart as practicable.	On the rear--on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline.	Not less than 15 inches, nor more than 72 inches.
High-mounted stoplamp	On the rear, on the vertical centerline [See S5.1.1.27 S5.3.1.8, and Table III], effective 9/1/85, for passenger cars only.	Not required	See S5.3.1.8 for passenger cars. Not less than 34 inches for multipurpose, passenger vehicles, trucks, and buses.
License plate lamp	At rear license plate, to illuminate the plate from the top or sides	At rear license plate	No requirement

**Table IV (Continued)**

Item	Location on		Height above road surface measured from center of item on vehicle at curb weight
	Passenger cars, multipurpose passenger vehicles, trucks, trailers and buses	Motorcycles	
Parking lamps	On the front – 1 on each side of the vertical centerline, at the same height, and as far apart as practicable.	Not required	Not less than 15 inches, nor more than 60 inches.
Reflex reflectors	On the rear--1 red on each side of the vertical centerline, at the same height, and as far apart as practicable. On each side – 1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	On the rear--1 red on the vertical centerline except that, if two are used on the rear, they shall be symmetrically disposed about the vertical centerline. On each side – 1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	Not less than 15 inches, nor more than 60 inches.
Backup lamp	On the rear	Not required	Not required
Turn signal lamps	At or near the front – 1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable. On the rear – 1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable.	At or near the front – 1 amber on each side of the vertical centerline, at the same height, and having a minimum horizontal separation distance (centerline of lamps) separation distance between lamp and headlamps is 4 inches. At or near the rear – 1 red or amber on each side of the vertical centerline, at the same height and having a minimum horizontal separation distance (centerline to centerline of lamps) of 9 inches. Minimum edge-to-edge separation distance between lamp and tail or stop lamp is 4 inches, when a single stop and taillamp is installed on the vertical centerline and the turn signal lamps are red.	Not less than 15 inches, nor more than 83 inches.
Side marker lamps	On each side--1 red as far to the rear as practicable, and 1 amber as far to the front as practicable.	Not required	Not less than 15 inches.
Intermediate side marker lamps	On each side--1 amber located at or near the midpoint between the front and rear side marker lamps.	Not required	Not less than 15 inches.
Intermediate side marker reflectors	On each side--1 amber located at or near the midpoint between the front and rear side marker reflectors.	Not required	Not less than 15 inches, nor more than 60 inches.

**MIRRORS** (Line 21 of Form)

County Ordinance requires only one mirror so located as to reflect to the driver a view of the highway for a distance of at least 200 feet to the rear. If there are two, check them both.

**Fail mirror if:**

▶ Field of view is inadequate, mirror is insecurely mounted, ease and stability of adjustment are inadequate, there are exposed sharp edges.

**REGISTRATION** (Line 22) & **INSURANCE** (Line 32)

**Fail registration if:**

▶ Vehicle description & VIN do not match the vehicle

▶ License plate numbers & decal on vehicle do not match the registration

certificate.

▶ VIN on the vehicle is not in agreement with the registration document or the

insurance Card VIN.

- ▶ Hawaii Insurance Identification Card is not an original.
- ▶ Insurance is not in effect at the time of inspection

**Plate:**

- ▶ The plate numbers do not match the registration.
- ▶ Plate is not secure and legible.
- ▶ Plate is less than 12 inches above the ground.

**SEATS** (Line 25 of Form)

§291C-152, Hawaii Revised Statutes requires a permanently mounted seat for each occupant.

Fail seats if:

- ▶ They are absent or not securely fastened.

**SPEEDOMETER-ODOMETER** (Line 30 of Form)

Record the odometer reading.

**Fail** speedometer-odometer if:

- ▶ If a comparison with the old reading shows no increase in mileage, or testing the odometer shows that it does not operate.
- ▶ The speedometer does not operate.
- ▶ The speed does not read in miles per hour, provided the vehicle is less than 25 years old.

**STEERING** (Line 1)

Wobbly movement of the handlebars or rough movement suggests worn steering head bearings or maladjustment. With bike on center stand, check for bearing wear and tightness by grasping each side of the front fork at the axle and push and pull gently. There should be no play. Check steering for full range of movement from stop to stop. There should be no binding. Test for proper steering looseness by pushing the front wheel to one side lightly. If the wheel continues moving, the steering is not too tight. The handle bar should line up with the front wheel in the straight position and the front wheel should line up with the frame and rear wheel.

**Fail** steering if:

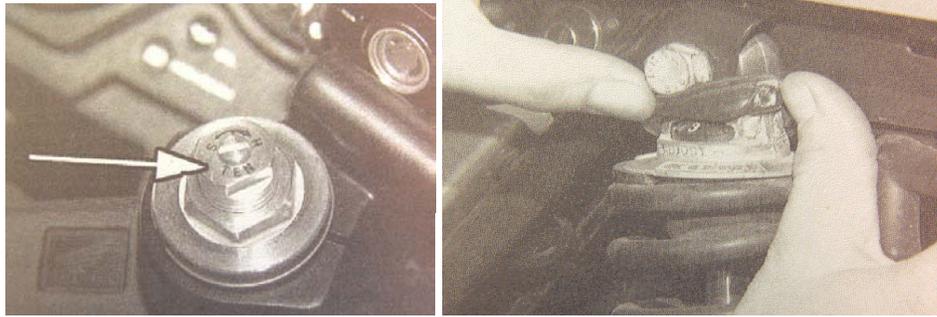
- ▶ Steering is too tight or does not move freely from stop to stop.
- ▶ Play is felt at the steering head.
- ▶ The handlebars do not line up with the front wheel.
- ▶ A handlebar grip is missing or worn so as to be slippery.



- ▶ Handlebars are more than fifteen inches above that portion of the seat occupied by the operator.

### **SUSPENSION (Line 3)**

Parts include swing arm, shocks, and springs. If a bike has adjustable suspension, the front and back adjustments should be about the same.



Suspension travel can be checked by pressing the front fork downward by placing most of your weight on it. The suspension should not bottom-out. The resistance to the downward pressure should be smooth, as should the rebound upward. The bike movement should settle down when it comes down from the first upward rebound. Inspect the rear suspension the same way. Check for leaks around hydraulic shocks and breaks in coil spring shocks. Inspect the swing arm for play with bike on center stand: gently push the rear wheel from side to side and see if it has play.

#### **Fail suspension if:**

- ▶ It bottoms out or does not settle down after the first upward rebound.
- ▶ A coil spring has a break or a shock absorber has a serious leak.
- ▶ The swing arm has play, or is damaged so as to adversely affect tracking.

### **TIRES (Line 4)**

Check: Sidewall printed information, pressure, tread depth and tire condition.

#### **Fail tires if:**

- ▶ Treads are worn to less than 1/32 inch deep or to where the wear indicators contact the road.
- ▶ There are bumps, bulges, cuts, snags, knots indicating partial failure or structure separation, cracks in excess of one inch in any direction and deep enough to expose the cords.
- ▶ A tire has a load capacity rating less than that recommended by the vehicle manufacturer, is on a rim of improper width, or can rub or touch other parts of the motorcycle when operated.
- ▶ A tire does not display the "DOT" symbol on the sidewall, is marked "Off-Highway Use only", "For Racing Use only", or other inappropriate restrictive use.
- ▶ A tire is not marked with the standard automotive size designation, does not have highway-type design treads, or the tire tread is equipped with metal studs.

### **WHEELS (Line 5)**

Three basic types: pressed steel, spoke and “mag” casting. Wheels require little maintenance other than checking to see that they are “true” and undamaged. Mag wheels are generally lighter, stronger and more likely to stay “true”. Larger diameter wheels are more stable but they require more energy to move. Smaller diameter wheels are more responsive but less stable. Thus, more powerful bikes tend to have larger wheels.

**Fail wheels for:**

▶ Cracks, missing spokes, serious impact points such as bent spokes or a dent in the rim. A loose, bent or missing spoke, a bent spider or disc can affect the trueness of the wheel. (A loose spoke can be identified by comparing the sounds of spokes when tapped with a metal object).

**Wheel bearings:** Inspect the bushing or bearing for looseness by raising the wheel off the ground, grasping the wheel with one hand on either end of the diameter and gently push with one hand while pulling with the other. There should be no play.

**Fail bearings if:**

▶ They have side-to-side play. **Warn** owner if bearing seals have cracks or discoloration.

**WINDSCREENS (Line 18)**

These are not required, but if they are present, they must not interfere with the rider's forward vision.

**Fail windscreen if:**

▶ It has imperfections that interfere with the rider's forward vision to such extent that it is dangerous.

▶ It is not securely mounted.

▶ It does not have a DOT symbol on it plus any of the following AS indicators in areas requisite for driving visibility: AS-1, AS-6, AS-10, AS-11C. Any part of the windscreen that is below a horizontal plane 15 inches vertically above the lowest seating position is not requisite for driving.

**WIRING (Line 29)**

**Fail wiring if:**

▶ Insulation is worn so bare wire is exposed

▶ A functional wire connection is loose.