INDEX

XS650E

GENERAL INFORMATION 1

PERIODIC INSPECTION AND ADJUSTMENT 2

ENGINE OVERHAUL 3

CARBURETION 4

CHASSIS 5

ELECTRICAL 6

APPENDICES 7

XS650SE SUPPLEMENT 8

(EPA)
XS650E SUPPLEMENT 9

*XS650SF USES THIS SUPPLEMENT (EPA)
XS650SE SUPPLEMENT 10

XS650SF/2F SUPPLEMENT 11

XS650G/SG SUPPLEMENT 12

CHAPTER 1. GENERAL INFORMATION

I-I. MACHINE IDENTIFICATION 1
I-2. SPECIAL TOOLS .....

1

CHAPTER 1. GENERAL INFORMATION

I-I. MACHINE IDENTIFICATION

Frame serial number

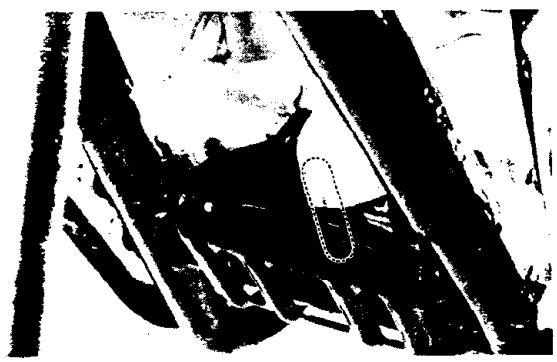
The frame serial number is stamped on the right side of the steering head stock.

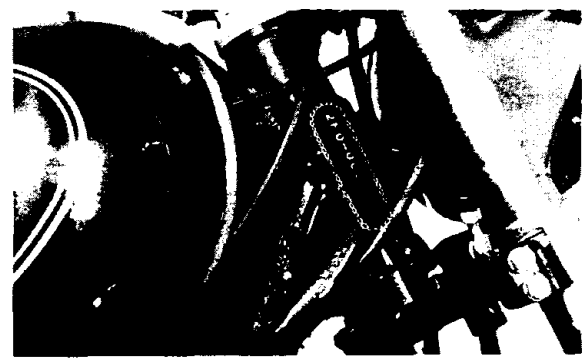
Engine serial number

The engine serial number is stamped on the front of the engine crank case.

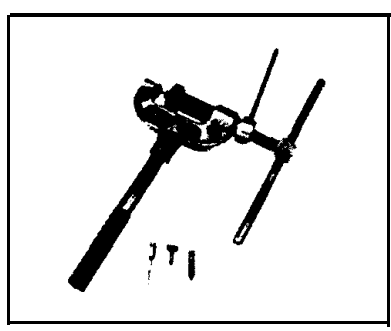
NOTE:

The first three digits of these numbers are for model identifications; the remaining digits are the unit production number.

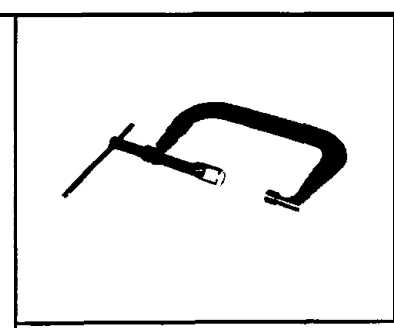




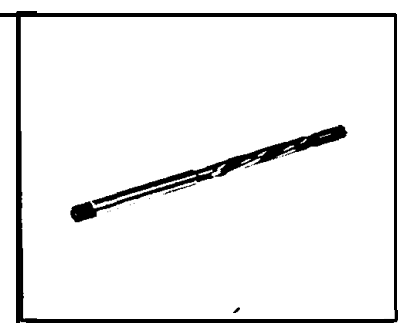
1-2. SPECIAL TOOLS



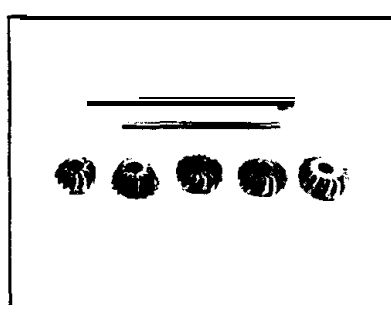
1. Cam chain cutter Parts No. (90890-01112)



2. Valve spring compressor (90890-01253)



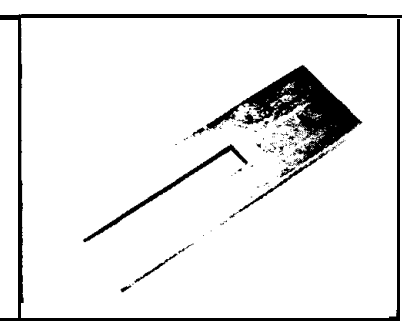
3. Valve guide reamer (90890-01211)



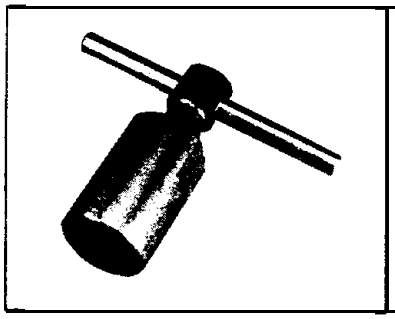
4. Valve seat cutter set (90890-01179)



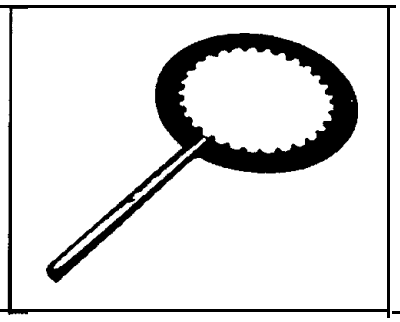
5. Piston ring compressors (90890-01066)



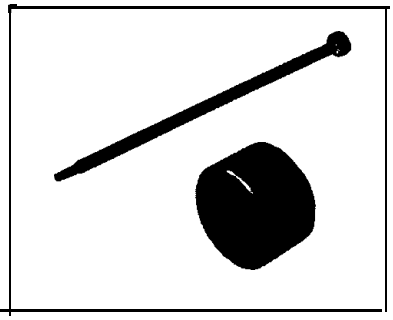
6. Piston support plate (90890-01067)



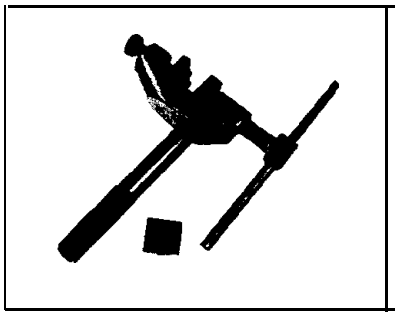
7. Rotor puller
(90890-01070)



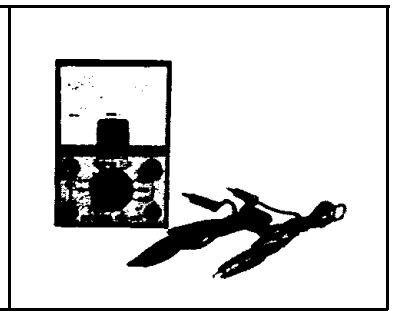
8. Clutch holding tool
(90890-01069)



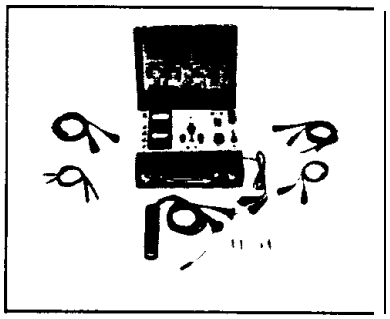
9. Slide hammer
(90890-1083, 1084)



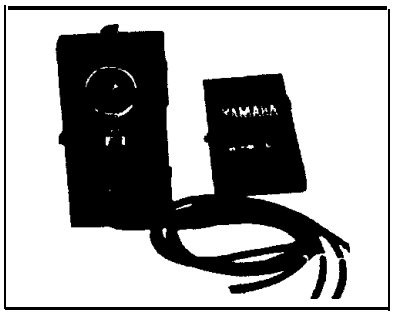
10. Drive chain cutter
(90890-01081)



11. Pocket tester
(90890-03096)



12. E lectro tester
(90890-0302 1)



13. Vacuum gauge
(90890-03094)

OTHER TOOL	PARTS No.
Valve guide remover	90890-01200
Valve guide installer	90890-01201
Spoke wrench	90890-05087
Steering nut wrench	90890-01051
Tappet adjuster wrench	256-28137-00

CHAPTER 2.
PERIODIC INSPECTION AND ADJUSTMENT

2-1. INTRODUCTION 4
2-2. MAINTENANCE INTERVAL CHARTS 4
A. PEPIODIC MAINTENANCE 4
B. LUBRICATION INTERVALS 5
2-3. ENGINE 6
A. Carburetor 6
B. Air filten 7
C. Engine/Transmission oil and filter 7
D. Clutch adjustment 6
E. Cam chain adjustment 8
F. Valve clearance adjustment 8
G. Crankcase ventilation system 9
H. Exhaust system 9
2-4. CHASSIS 9
A. Fuel petcock cleaning 9
B. Fuel petcock disassembly 9
C. Fuel hose 9
D. Front brake 10
E. Rear brake 10
F. Wheels and tires 10
G. Drivechain 11
H. Front fork oil change 12
I. Steering head 12
J. Lubrication of cables, pivots, etc 13
2-5. ELECTRICAL 13
A. Contact breaker point adjustment 13
B. Contact breaker point maintenance 13
C. Ignition timing 14
D. Carbon brushes 14
E. Battery 14
F. Sparkplug 15
G. Headlight 15

2

CHAPTER 2.
PERIODIC INSPECTION AND ADJUSTMENT

2-1. INTRODUCTION

This chapter includes all information necessary to perform recommended inspection and adjustments, These preventive maintenance procedures, if followed, will insure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies not only to vehicles already in service, but also to new vehicles that are being prepared for sale. Any service technician performing preparation work should be familiar with this entire chapter.

2-2. MAINTENANCE INTERVALS CHARTS

The following charts should be considered strictly as a guide to general maintenance and lubrication intervals. You must take into consideration that weather, terrain, geographical location, and a variety of individual uses all tend to alter this time schedule. For example, if the motorcycle is continually operated in an area of high humidity, then all parts must be lubricated much more frequently than shown on the chart to avoid damage caused by water to metal parts,

A.PERIODIC MAINTENANCE

Periodic inspection, adjustment and lubrication will keep your motorcycle in the safest and most efficient condition. Safety is an obligation of the motorcycle owner.

Unit: km (mi)

Item	Remarks	initial				Thereafter every		
		400 (250)	800 (500)	1,600 (1,000)	3,200 (2.000)	1,600 (1,000)	3,200 (2.000)	6,400 (4,000)
Cylinder	Check compression				○			○
Valves	Check/Adjust valve clearance			○	○			○
Cam chain	Check/Adjust chain tension		○					○
Spark pluqs	inspect/Clean or replace as required	○			○		○	
Air filter	Dry type — Clean/Replace as required			○		○		
Carburetor	Check operation/Adjust as required		○		○		○	
Brake system (complete)	Check/Adjust as required — Repair as required		0	0		○		
Clutch	/Adjust free play		io		○		○	
Wheel and tires	Check pressure/Wear/Balance	0	○	○		○		
Fuel petcocks	Clean/Flush tank as required	0		○			○	
Battery	Top-up/Check specific gravity and breather pipe	0	○	0	○	○		
Ignition timing	Adjust/Clean or replace parts as required		○	○	○		○	
Lights/Signals	Check operation/Replace as required	0	0	0	○	○		
Fittings/Fasteners	Tighten before each trip and/or	○	○	○	○	○		
Generator brushes	Check brush wear/Replace if necessary							○

B. LUBRICATION INTERVALS

Unit: Km (m)

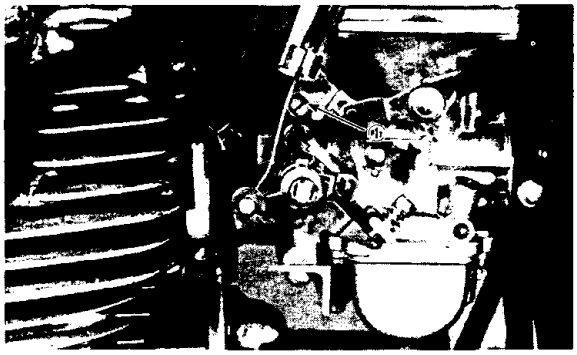
Item	Remarks	Type	Initial				Thereafter every		
			400 (250)	800 (500)	1,600 (1,000)	3,200 (2,000)	1,600 (1,000)	3,200 (2,000)	6,400 (4,000)
Engine/Transmission oil	Replace/Warm engine before draining	YAMALUBE 4-cycle oil or SAE 20W/40 "SE" motor oil	○			○		○	
Drive chain	Lube/Adjust as required	Yamaha chain and cable lube or SAE 10W/30 motor Oil	every 400 (250)						
	Remove/Clean/Lube				○		○		
Brake pedal shaft/Change pedal shaft	Light application	Yamaha chain and cable lube or SAE 10W/30 motor oil			○		○		
Control/Meter cables	Apply thoroughly	Yamaha chain and cable lube or SAE 10W/30 motor oil			○	○		○	
Throttle grip/Housing	Apply lightly	Lithium base grease				○		○	
Hydraulic brake fluid reserve	Use new fluid only	DOT No. 3 Brake fluid	check	check	check	check	check		
Oil filter element	Clean/Replace as required	–	○			○		○	
Front forks	Drain completely – Check specifications	Yamaha Fork Oil 10 wt.				○			○
Steering bearings	Inspect thoroughly Yearly or ...	Medium-weight wheel bearing grease							12,800 (8,000)
Speedometer gear housing	Inspect thoroughly/Pack moderately	Lithium base grease							12,800 (8,000)
Rear arm pivot shafts	Apply grease fully	Medium-weight wheel bearing grease				○			○
Wheel bearings	Do not over/Yearly or . . .	Medium-weight wheel bearing grease							12,800 (8,000)
Point cam lubrication wicks	Apply very lightly	Light-weight machine oil		0	0	0		0	

2-3. ENGINE

A. Carburetor

1. Idle mixture

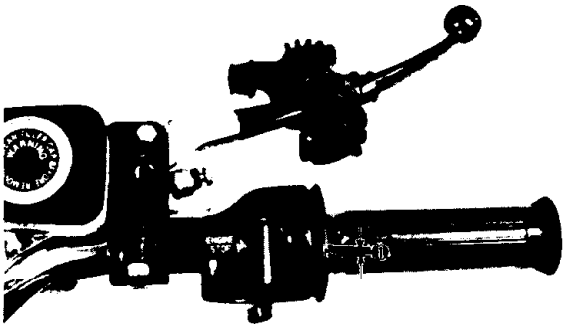
The idle mixture is set at the factory by the use of special equipment. No attempt should be made to change this adjustment by the dealer.



1. Do not adjust

2. Throttle

Turn the throttle grip to see if it operates properly and if the play is normal. Make certain the throttle snaps closed when released.



1.5 ~ 8 mm (0.2 ~ 0.3 in)

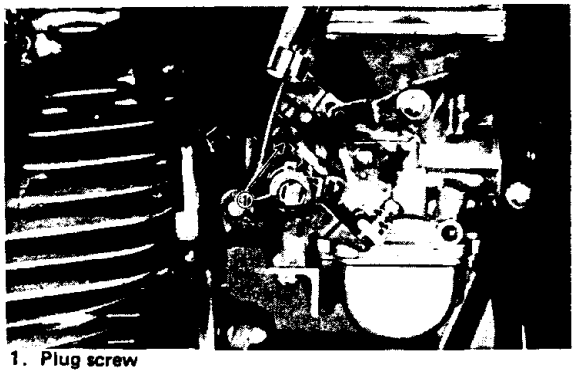
3. Synchronization

NOTE:

Ignition timing and valve clearances must be set properly before synchronizing carburetors.

Procedure:

a. Turn fuel petcocks to "PRIME", and remove the plug screws for the adapter attachment holes in the carburetor body.



1. Plug screw

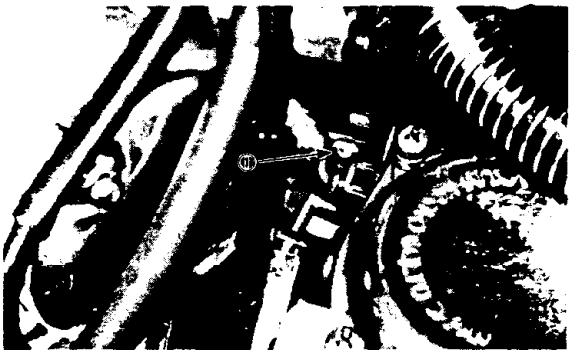
b. Install the attachment and set the vacuum gauge.

c. Start motorcycle and allow it to warm up for 2 ~ 3 minutes. The warm-up is complete when engine responds normally to throttle opening.

d. Adjust damping valve on each vacuum gauge until the needle flutters only slightly. The gauge needles must respond quickly to rapid opening of the throttle.

e. Both gauge will indicate the same reading if the carburetors are synchronized.

f. Turn the synchronizing screw until the gauge readings are the same.



1. Synchronizing screw

g. After adjustment, firmly tighten the plug screws.

NOTE:

Check gasket. Replace if damaged.

4. Idle speed adjustment.

NOTE:

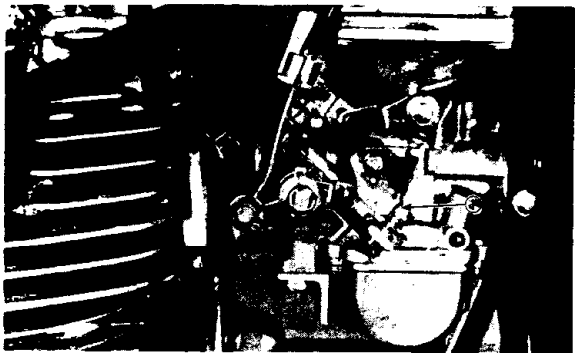
Carburetors must be synchronized before setting final idle speed.

a. Start the engine and warm it up for a few minutes.

b. Set the engine idle speed to specified rpm by turning the throttle stop screw in to increase the engine speed and back off the screw to decrease the engine speed.

Use a tachometer for checking and adjusting the engine speed.

Standard idle rpm:
1,200 rpm

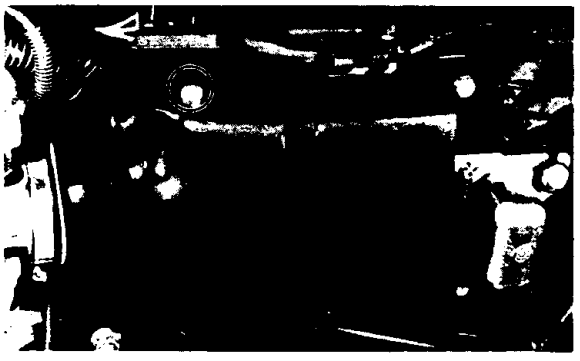


1 .Throttle stop screw

B. Air filters

This model uses a cartridge type air filter element which consists of foam rubber.

1. Removal
   a. Remove the air filter cover by removing the bolts.
   b. Pull out the springs and elements.



2. Cleaning method
   a. Tap the element lightly to remove most of the dust and dirt; then blow out the remaining dirt with compressed air through the inner surface of the element. If element is damaged, replace.



   b. Reassemble by reversing the removal procedure. Check whether the element is seated completely against the case.
   c. The air filter element should be cleaned once a month or every 1,600 km(l,000 mi.). It should be cleaned more often if the machine is operated in extremely dusty areas.

CAUTION:

The engine should never be run without the air cleaner element installed. Excessive oil contamination and engine wear may result.

C. Engine/transmission oil and filter

1. Oil level measurement
   a. To check the level, warm the engine up for several minutes. Stop the engine. With the engine stopped, screw the dip stick completely out and then rest the stick in the hole.



1. Oil level dip stick

NOTE:

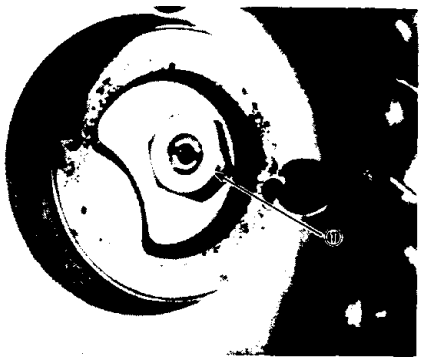
When checking engine oil level with the dip stick, position the machine straight up and on main stand.

   b. The dip stick has a minimum and a maximum mark. The oil level should be between the two. If the level is low, add sufficient oil to raise it to the proper level.
2. Oil replacement and filter cleaning
   a. Start the engine. Allow it to warm up for 2-3 minutes. Stop the engine.
   b. Place an oil pan under the engine.
   c. Remove the drain plugs and drain the oil.



1. drain plugs

d. Remove the filter cover and oil filter securing bolt.



1. Filter securing bolt.

e. Slip the filter element out and clean.

f. Install the filter and filter cover.

Filter torque: 1.0 m-ko (7 ft-lb)

g. Reinstall the drain plugs. (Make sure it is tight.)

Drain plug torque: 4.4 m-kg (32 ft-lb)

h. Add oil through the dip stick hole.

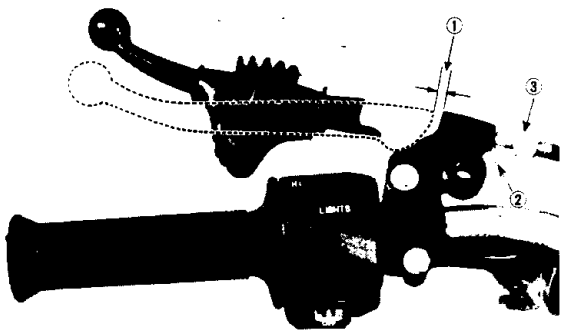
Oil quantity: 2.0 lit (2.1 qt): periodic oil change 2.5 lit (2.6 qt): engine overhauling Recommended oil: Yamalube 4-cycle oil or SAE 20W/40 type "SE" motor oil

D. Clutch adjustment

This model has a clutch cable length adjuster and a clutch mechanism adjuster. Normally, once the mechanism is properly adjusted, the only adjustment required is maintenance of free play at the clutch handle lever.

1. Free play adjustment

Loosen the handle lever adjuster lock nut. Next, turn the length adjuster either in or out until proper lever free play is achieved.



1. 2 ~ 3 mm (0.08 ~ 0.12 in)
2. Lock nut
3. Adjuster

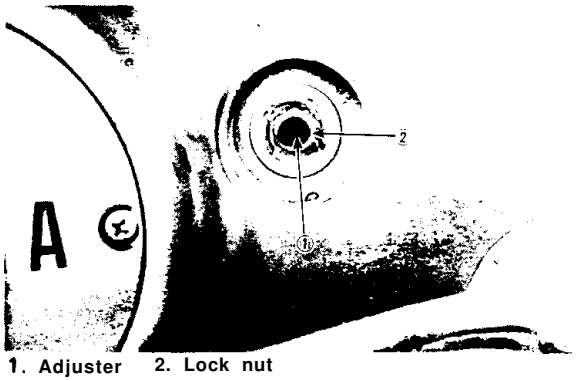
2. Mechanism adjustment

a. Screw in the cable adjuster (on the lever holder) until tight.

b. Screw in the adjuster (push screw) until it lightly seats against a clutch push rod.

c. Back the adjuster out I/4 turn and tihgten the lock nut.

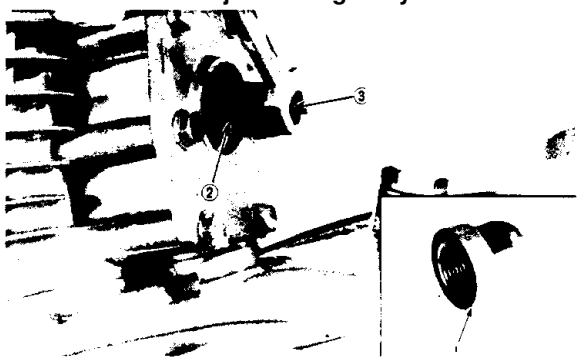
d. Adjust the free play of clutch lever by turning the cable adjuster.



1. Adjuster 2. Lock nut

E. Cam chain adjustment

The cam chain becomes stretched with use, resulting in improper valve timing and engine noise. To prevent this the cam chain tensioner must be adjusted regularly.



1. Cap nut 2. Adjuster bolt 3. Push rod

1. Remove the cap nut.
2. Turn the adjuster bolt in until the push rod (inside the adjuster bolt) is flush with the end of the adjuster bolt.

NOTE:

The push rod will not come out beyond a certain limit even if the adjuster bolt continues to be screwed in.

3. Reinstall the cap nut.

F. Valve clearance adjustment

NOTE:

Valve clearance must be measured with the engine at room temperature.

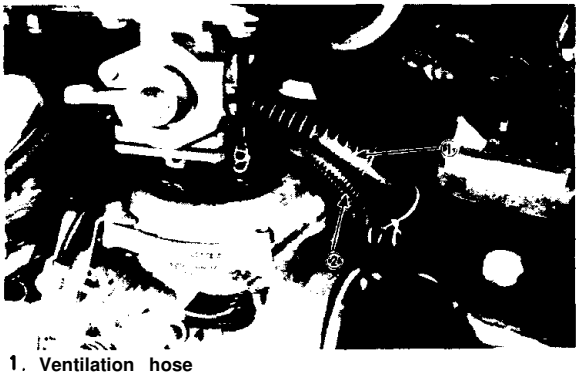
1. Remove all four tappet covers and the generator cover.
2. Turn the crankshaft to align the rotor mark with the "T" mark on the stator.
3. This places the pistons at the top dead center and the valve clearance should be checked and adjusted at the top dead center on the compression stroke by observing when the valve adjusters have clearance.
4. Use a feeler gauge to determine the clearance.

Exhaust valve clearance (cold):
0.15 mm (0.0059 in)
Intake valve clearance (cold):
0.10 mm (0.0039 in)



5. Loosen the valve adjuster lock nut. Turn the adjuster in or out to obtain the correct clearance. Hold the adjuster to prevent it from moving and throughly tighten the lock nut.
6. Recheck the clearance after tightening.

G. Crankcase ventilation system
1. Check ventilation hose for cracks or damage.
2. Replace it if necessary.

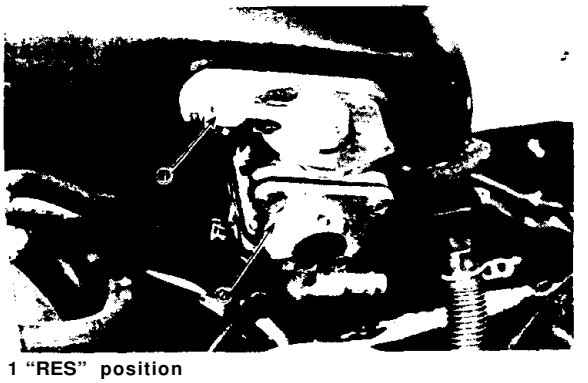


1. Ventilation hose
2. Fuel pipe

H. Exhaust system
1. Check for leakage from exhaust joints and retighten joint bolts and nuts.
2. Replace gaskets if necessary.

2-4. CHASSIS

A. Fuel petcock cleaning
1. Turn the petcock lever to the "ON" or "RES" position. Remove the fuel pipe.
2. Remove the drain cover and clean it with solvent.



1 "RES" position
2. Drain cover

B. Fuel petcock disassembly

If the fuel petcock is leaking or excessively contaminated, it should be removed from the fuel tank and inspected.

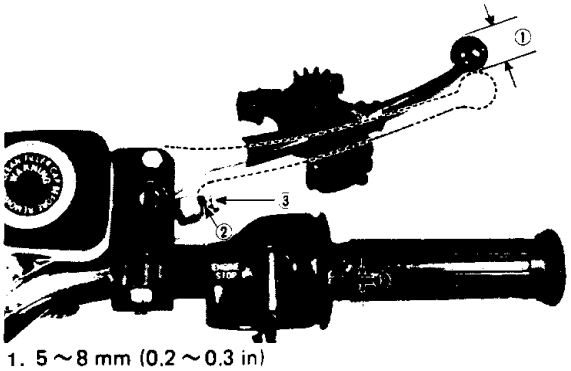
1. Remove fuel tank and position it so that fuel will not spill when the petcock is removed.
2. Remove petcock and inspect filter screen. Clean or replace filter if seriously contaminated.
3. Remove screws on front and rear of petcock and remove plate, gaskets, lever and diaphragm.
4. Inspect all components and replace any that are damaged. If the diaphragm is in any way damaged, or the petcock body gasket surfaces scratched or corroded, the petcock assembly must be replaced. If there is abrasive damage to any component, the fuel tank must be drained and flushed.
5. Reassemble petcock and install on fuel tank.

C. Fuel hose
1. Check fuel hose for cracks or damage.
2. Replace it if necessary.

D. Front brake

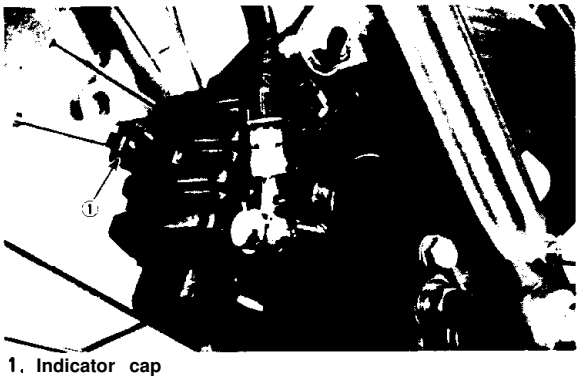
The brake can be adjusted by simplay adjusting the distance that the brake lever can travel. (The piston in the caliper moves forward as the brake pad wears out, automatically adjusting the clearance between the brake pad and the brake disc.)

1. Adjustment
   a. Turn adjuster so that a brake lever end is 5 — 8 mm (0.2 — 0.3 in) before adjuster contacts master cylinder piston.



1. 5 ~ 8 mm (0.2 ~ 0.3 in)
2. Lock nut
3. Adjuster

2. Brake pad check



1. Indicator cap

To check, open the wear indicator cap and if any pad is worn to the red line, replace pads.

3. Check the brake fluid level

Insufficient brake fluid may allow air to enter the brake system, possibly causing the brake to become ineffective. Check the brake fluid level and replenish when necessary and observe these precautions:

a. Use only the designated quality brake fluid; otherwise, the rubber seals may deteriorate, causing leakage and poor brake performance.

Recommended brake fluid:
DOT No. 3 Brake fluid

b. Refill with the same type and brand of brake fluid; mixing fluids may result in a harmful chemical reaction and lead to poor performance.

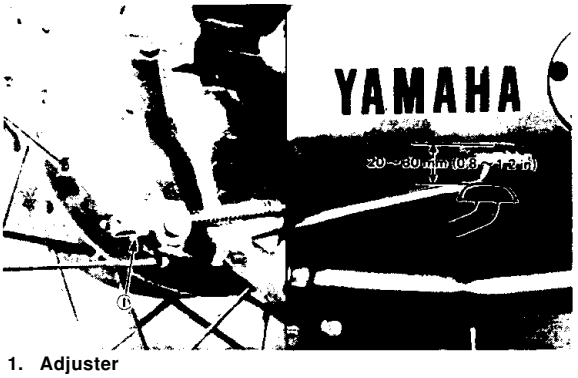
c. Be careful that water or other contamination does not enter the master cylinder when refilling. Water will significantly lower the boiling point and may result in vapor lock.

E. **Rear** brake

1. Adjust rear brake pedal play to suit, providing a minimum of 20 — 30 mm (0.8 — 1.2 in) freeplay. Turn the adjuster on the rear brake rod in or out until brake pedal free play is suitable.

NOTE:

Rear brake pedal adjustment must be checked anytime chain is adjusted or rear wheel is removed and then reinstalled.



1. Adjuster

F. Wheels and tires

1. Wheels

a. Check each spoke for tightness.

NOTE:

If loose spokes are found, tighten and repeat rim runout check.

2. Tires

a. Important notice

Proper loading of XS650E is important for the handling, braking, and other performance and safety characteristics. NEVER OVERLOAD THE **MOTORCYCLE.**

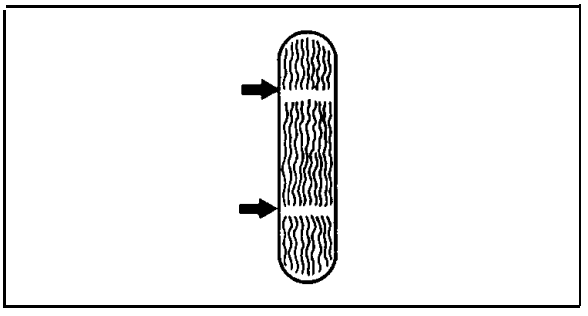
WARNING: Never overload the motorcycle beyond specified tire limits. Operation of an overloaded tire could cause tire damage, an accident and injury.

	FRONT	REAR
XS650E BASIC WEIGHT with oil and full fuel tank	104 kg(229 lb)	119 kg(262 lb)
Standard tire	Bridgestone or Yokohama 3.50H19–4PR	Bridgestone or Yokohama 4.00H18–4PR
Tire load limit	234 kg (515 lb)	280 kg (615 lb)
Cold tire pressure		
Normal riding	1.6 kg/cm^2 (22 psi)	2.0 kg/cm^2 (28 psi)
With passenger or high speed riding	2.0 kg/cm^2 (28 psi)	2.3 kg/cm^2 (32 psi)
With passenger and extra load riding	2.8 kg/cm^2 (40 psi)	2.8 kg/cm^2 (40 psi)
Minimum tire tread depth	0.8 mm (0.03 in)	0.8 mm (0.03 in)

Make sure the total weight of the motorcycle with accessories, rider(s) etc., does not exceed the tire limits.

b. Check the tire wear

If a tire tread shows cross wise lines, it means that the tire is worn to its limit. Replace the tire.

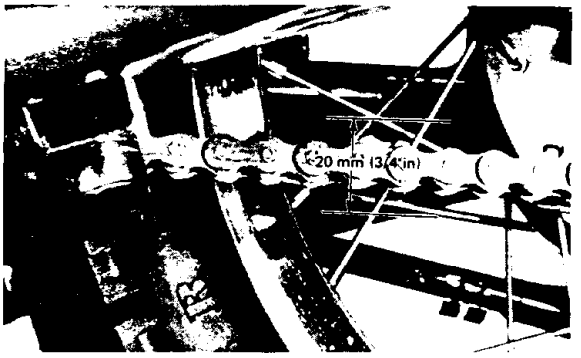


c. Check the wheel damage and check the tightness of spokes.

G. Drive chain

1. Tension check

a. Inspect the drive chain with mainstand erected. Check the tension at the position shown in the illustration. The normal vertical deflection is approximately 20 mm (3/4 in).



20 mm (3/4 in)

2. Tension adjustment

a. Loosen the rear brake adjuster.

b. Remove the cotter pin of the rear wheel axle nut.

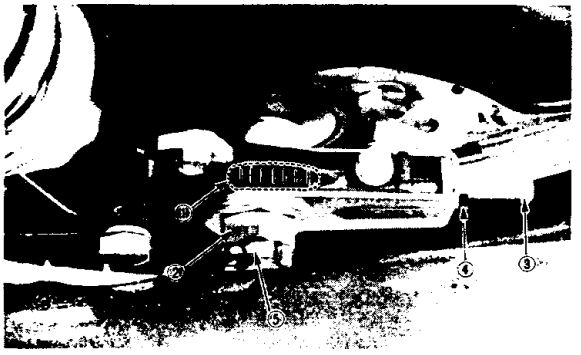
c. Loosen the rear wheel axle nut.

d. Loosen the adjuster lock nuts on each side.

e. To tighten chain turn chain puller adjuster clockwise.

Turn each bolt exactly the same amount to maintain correct axle alignment.

There are marks on each side of rear arm and on each chain puller; use them to check for proper alignment.



1. Alignment marks
2. Rear axle nut
3. Adjuster
4. Lock nut
5. Cotter pin

f. After adjusting be sure to tighten the lock nuts and the rear wheel axle nut.

g. Install a new cotter pin and bend the end over.

h. In the final step, adjust the play in the brake pedal and stoplight switch free play.

3. Lubrication

a. First, remove dirt and mud from the chain with a brush or cloth and then spray the lubricant between both rows of side plates and on all center rollers.

b. To clean the entire chain, first remove the chain from the motorcycle, dip it in solvent and clean with stiff brush. Then take the chain out of the solvent and dry it. Immediately, lubricate the chain to prevent the formation of rust.

Recommended lubricant:
YAMAHA CHAIN AND CABLE LUBE, or SAE 10W/30 type "SE" motor oil

H. Front fork oil change

1. Raise the front wheel off the floor with a suitable frame stand.
2. Loosen the fork pinch bolts.
3. Remove the rubber cap from the top of each fork.



1. Pinch bolt 2. Cap

4. Loosen the cap bolt (adjuster unit).
5. Remove drain screw from each outer tube with open container under each drain hole.



1. Drain screw

CAUTION:

Do not allow oil to contact disc brake components.

6. After most oil has drained, slowly raise and lower outer tubes to pump out re maining oil.
7. Install drain screw.

NOTE:

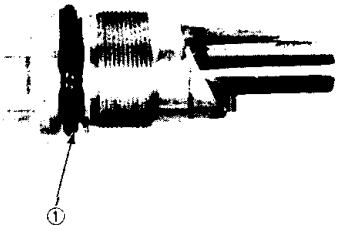
Check gasket. Replace if damaged.

8. Pour specified amount of oil into the inner tube through the upper end opening.

Front fork oil:
Yamaha fork oil 10 Wt

Front fork oil capacity:
164 ~ 172 cc (5.54 ~ 5.82 oz) each side

9. After filling, slowly pump the outer tubes up and down to distribute the oil.
10. Inspect O-ring on fork cap bolts and replace if damaged.



1. O-ring

11. Install fork cap bolts.
12. Tighten pinch bolts.

Tightening torque:	m-kg	ft-lb
Fork cap bolt	5.0	36
Pinch bolt	1.0	7

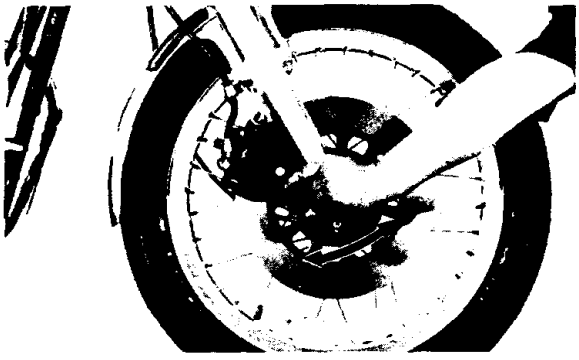
I. Steering head

1. adjustment

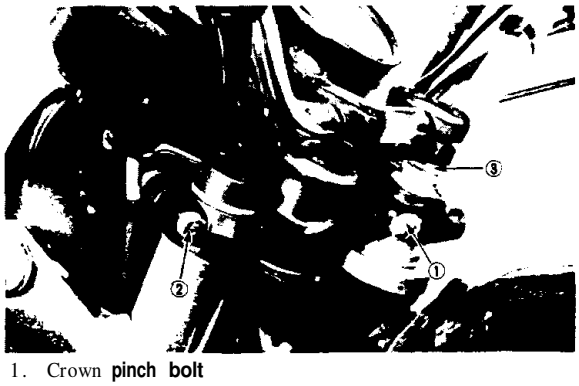
The steering assembly should be checked periodically for looseness.

Do this as follows:

a. Raise front end of machine so that there is no weight on the front wheel.
b. Grasp bottom of forks and gently rock fork assembly backward and forward, checking for looseness in the steering assembly bearings.



c. If there is looseness in the steering head, loosen the crown pinch bolt, fork pinch bolts, and steering fitting bolt.



1. Crown pinch bolt
2. Fork pinch bolt
3. Steering fitting bolt

d. Use steering nut wrench to loosen top steering fitting nut. The top nut serves as a lock nut.

e. Tighten the lower steering fitting nut until the steering head is tight, but does not bind when forks are turned.

f. Retighten the top steering fitting bolt, crown pinch bolts and fork pinch bolts, in that order.

g. Recheck steering adjustment to make sure there is no binding when the forks are moved from lock to lock. If necessary, repeat adjustment procedure.

2. Lubrication
Refer to PAGE 47.

J. Lubrication of cables, pivots, etc.

1. Throttle cable and grip
The throttle twist grip assembly should be greased at the time that the cable is lubricated since the grip must be removed to get at the end of the throttle cable. Two screws clamp the throttle housing to the handlebar. Once these two are removed, the end of the cable can be held high to pour in several drops of lubricant. With throttle grip disassembled, coat the inside surface of the throttle grip guide tube with a suitable all-purpose grease to cut down friction.

2. Meter cables
Pull the inner cable out and apply cable lube throughly.

Recommended lube:
Yamaha chain and cable lube or SAE 10W/30 motor oil.

3. Rear arm pivot shaft
Apply grease to grease nipple on top of pivot with low pressure hand operated gun. Apply until fresh grease appears at both ends of pivot shaft.

Recommended lube:
Medium-weight wheel bearing grease

4. Brake and change pedal shafts, and center and side stand pivots Lubricate the shafts and pivots with Yamaha chain and cable lube or SAE I0W/30 motor oil.

5. Wheel bearings
Refer to PAGE 39.

2-5. ELECTRICAL

A. Contact breaker point adjustment

1. Remove breaker point cover.
2. Check contact breaker point gap (at largest gap) with clean feeler gauge.

Contact breaker gap:
0.3 ~ 0.4 mm (0.012 ~ 0.016 in)

If necessary, adjust by loosening securing screws and moving the adjustable contact point.

3. Tighten adjusting screws and recheck breaker point gap.

B. Contact breaker point maintenance

1. The contact breaker should be checked for the following:
a. Wear of the bakelite cam heel
b. Damage of contact point surfaces

c. Rust or wear on the breaker arm or arm shaft.

d. Faulty insulation of the contact braker assembly.

e Oil or dirt on the assembly.

2. To clean the points, run a point file between the points until the grey deposits and pits have been removed. Spray the points with ignition point cleaner or lacquer thinner, then snap the points shut on a white business card (or paper of hard texture) and repeatedly pull the card through until no more carbon or metal particles come off on the card. (The card may be dipped in lacquer thinner or other cleaner to facilitate this procedure.)

3. Point replacement should be necessary when the points become severely pitted, if the heel is broken or worn unevenly, or if the points become shorted or show faulty operation.

NOTE:
New points must be cleaned and adjusted.

4. Add a few drops of light-weight machine oil onto the felt rubbing pad after each point adjustment to lubricate the point cam surface. Do not over oil.

C. Ignition timing

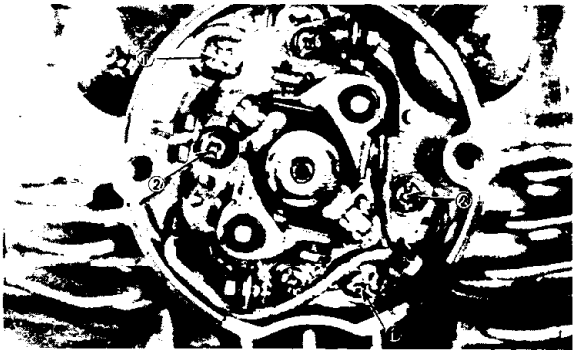
NOTE:
Point gap must be set before setting timing.

1. Ignition timing is checked with a timing light by observing the position of the stationary marks stamped on the stator and the pointer on the generator.



1. Top dead center
2. 15° BTDC/1,200 rpm
3. Advanced mark

2. Ignition timing of right-hand cylinder must be set first. Connect timing light to right-hand spark plug lead wire.
3. Start engine.
4. The mark stamped on the rotor_ should line up with the stationary "F" timing mark. If it does not align, loosen two breaker backing plate screws and move the complete backing plate until the mark on the rotor and the "F" mark align.
5. Retighten screws. Check timing again for the right-hand cylinder.
6. Rev the engine to above 3,500 rpm. Check whether the mark on the rotor is in the vicinity of the stationary "full advance" mark.
7. Repeat procedure (steps 2-6) for another cylinder.



1. Right cylinder timing adjustment
2. Left cylinder timing adjustment

D. Carbon brushes

Visually inspect the carbon brush holder brushes for obvious breakage or wear. Standard brush length is 14.5 mm(0.571 in). Wear limit is 7.0 mm (0.276 in) and marked there.

E. Battery

A poorly maintained battery will deteriorate quickly. The battery fluid should be checked at least once a month.

1. The level should be between the upper and lower level marks. Use only distilled water for refilling. Normal tap water contains minerals which are harmful to a battery; therefore, refill only with distilled water.
2. Always make sure the connections are correct when installing the battery. The magnet relay lead is for the (+) terminal

and thechassis lead is for the (-) terminal. Make sure the breather pipe is properly connected, properly routed, and is not damaged or obstructed.

NOTE:

The battery must be charged before using to insure maximum performance. Failure to properly charge the battery before first use, or a low electrolyte level, will cause premature failure of the battery.

Charging current:	1.4 Amp
Charging hours:	10 hrs

F. Spark plug

The spark plug indicates how the engine is operating. If the engine is operating correctly, and the machine is being ridden properly, the tip of the white insulator around the positive electrode of the spark plug will be a medium tan color. If the insulator is very dark brown

1. If the insulator is very dark brown or black color, then a plug with a hotter heat range might be required. This situation is quite common during the engine break-in period.
2. If the insulator tip shows a very light tan or white color or is actually pure white and glazed, or if electrodes show signs of melting, then a spark plug with a colder heat range is required. Remember, the insulator area surrounding the positive electrode of the spark plug must be a medium tan color. If it is not, check carburetion, timing and ignition adjustments.
3. The spark plug must be removed and checked. Check electrode wear, insulator color, and electrode gap.

Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)

Engine heat and combustion chamber deposits will cause any spark plug to slowly break down and erode. If the electrodes finally become too worn, or if for any reason you believe the spark plug is not functioning correctly, replace it. When installing the plug, always clean the gasket surface, use a new gasket, wipe off any grime that might be present on the surface of the spark plug, and torque the spark plug properly.

Standard spark plug:
Champion N-7Y or NGK BP 7ES
Tightening torque:
2.0 m-kg (14 ft-lb)

G. Headlight

1. Headlight beam adjustment.

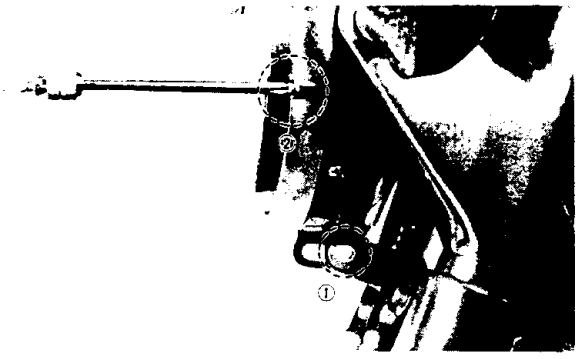
When necessary, adjust the headlight beam as follows:

a. Adjust horizontally by tightening or loosening the adjust screw.

To adjust to the right:
Tighten the screw
To adjust to the left:
Loosen the screw

b. Adjust vertically as follows:

1) Loosen adjusting screw and adjust vertically by moving the headlight body.
2) Retighten the screw.



1. Vertical adjustment
2. Horizontal adjustment

2. Replacing the headlight bulb.



a. Loosen bolts and replace bulb.
b. After installing, adjust headlight beam.

NOTE:

Take care not to damage the headlight. It is very fragile.

CHAPTER 3. ENGINE OVERHAUL

3-1. ENGINE REMOVAL 18
A. Preparation for removal 18
B. Fuel tank removal 18
C. Removal of other parts. 18
D. Engine mounting bolts and engine removal 18
3-2. ENGINE DISASSEMBLY 19
A. Governor and breaker assembly removal 19
B. Cylinder head and cylinder removal 19
C. Rocker arm removal 19
D. Valve removal 19
E. Piston removal 19
F. Generator removal 19
G. Primary drive gear and clutch assembly removal 19
H. Kick axle and change shaft removal 20
I. Electric starter unit removal 20
J. Oil pump removal. 20
K. Crankcase disassembly 20
L. Transmission illustration 21
M. Shift drum removal 21
N. Crank shaft removal 22
3-3. INSPECTION AND REPAIR 22
A. Cyinder head cover. 22
B. Cylinder head 22
C. Valve, valve guide and valve seat. 23
D. Valvespring.. 24
E. Rocker arm and rocker shaft 25
F. Cam shaft wear 25
G. Cam chain, sprocket and dampers 26
H. Cylinder 26
I. Piston and rings 26
J. Piston pin 27
K. Crankshaft 27
L. Oil pump 27
M. Clutch 28
N. Transmission 28
0. Electric starter gears and clip spring 29
P. Kickstarter 29
Q. Crankcase and oil passages 29
R. Bearings and oil seals 29

3-4. ENGINE ASSEMBLY AND ADJUSTMENT 29
A. Shift 29
B. Transmission and crankshaft 29
C. Shifter assembly 30
D. Kick starter assembly 30
E. Electric-starter gear assembly 30
F. Clutch 30
G. Generator 32
H. Oil pump 32
I. Right-hand crankcase cover 32
J. Piston 32
K. Cylinder and cylinder head. 32
L. Camshaft 32
M. Cylinder head cover 33
N. Governor and breaker assembly 33
0. Engine 33

CHAPTER 3.
ENGINE OVERHAUL

31. ENGINE REMOVAL

A. Preparation for removal

1. All dirt, mud, dust and foreign material should be thoroughly removed from the exterior of the engine before removal and disassembly.
2. Place machine on center stand. Star-f engine and allow it to warm up. Stop engine and drain engine/transmission oil.



1. Drain plugs

B. Fuel tank removal

1. Turn fuel petcocks to "on" (there is no "off" position – fuel will not flow from a petcock on the "on" position unless the engine is operating). Disconnect fuel pipes and vacuum pipes from petcock.
2. Lift seat and remove fuel tank holding bolt. Remove fuel tank.

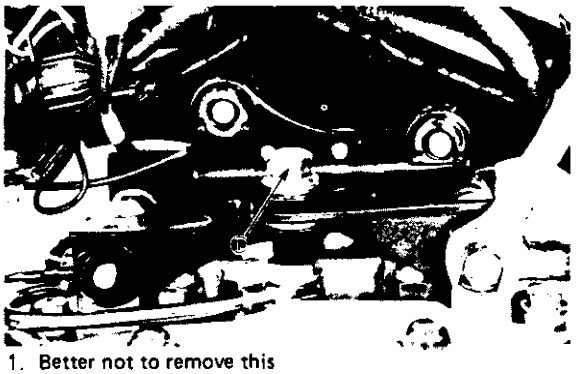
C. Removal of other parts

Remove the following parts in the order given.

1. Exhaust pipes
2. Horn (as a unit)
3. Both side footrests
4. Change pedal and drive chain guide
5. Left-hand crank case cover and clutch cable.
6. Side covers
7. Air cleaner assembly and ventilation hoses.



8. Carburetor (to the left), and throttle cable
9. Brake pedal
10. All wires and cables connecting engine and chassis
11. Top center engine mounting brackets (Remove only four bolts for easier re-assembly)

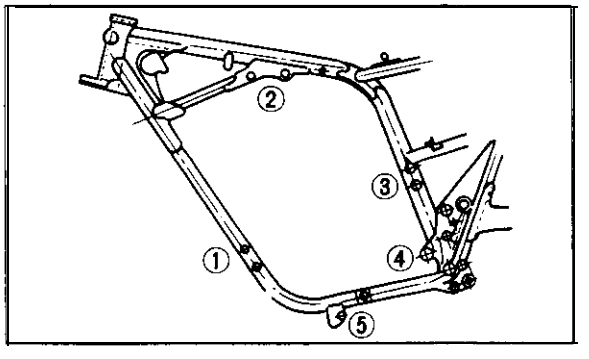


1. Better not to remove this

12. Drive chain (with special tool)

D. Engine mounting bolts and engine removal

1. Remove mounting bolts in the order as shown.



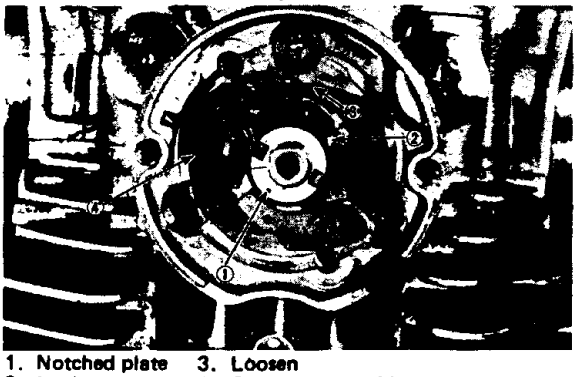
2. Remove the engine to the right.

3-2 ENGINE DISASSEMBLY

A. Governor and breaker assembly removal

Remove the following parts in the order given.

1. Breaker cover
2. Breaker backing plate
3. Breaker housing
4. Governor cover
5. Notched plate
6. Lock nut (using punch and hammer)
7. Governor assembly



1. Notched plate
2. Lock nut
3. Loosen
4. Governer assembly

8. Breaker shaft (to the point side)
9. Dowel pin
10. Advance unit housing

B. Cylinder head and cylinder removal

1. Remove the oil delivery and pipe fitting attached to the crankcase. Note place ment of copper gaskets.
2. Remove all tappet covers.
3. Remove spark plugs.
4. Remove four cylinder head cover holding bolts, three cylinder head holding bolts and eight cylinder head holding nuts.
5. Remove the head cover. It may be necessary to tap each lightly with a soft hammer.
6. Remove the camshaft as follows.
   a. Remove tensioner adjusting bolt to make the chain tension loose.
   b. Push out the master link pins with the cam chain cutter.
   c. Tie each end of the camchain with a wire to prevent it from falling into the crankcase.
7. Remove the cylinder head and cylinder.

NOTE:

It is advisable to remove the stator and rotor after finding the place of the master link pins. Refer to item "F. Generator removal."

C. Rocker arm removal

1. Remove rocker shaft covers.
2. Remove shouldered sleeves and O-rings.
3. Withdraw rocker shafts with the special tool or 6 mm bolt.

D. Valve removal

1. Compress the valve spring and then remove both retainer locks.
   Remove the compressor and lift off the retainer and springs.
2. Remove valve stem seals.
3. Remove valves.

NOTE:

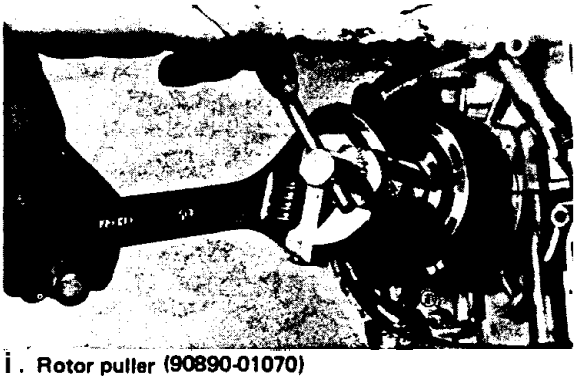
Deburr any deformed valve stem end. Use an oil stone to smooth the stem end. This will help prevent damage to the valve guide during valve removal.

E. Piston removal

Remove piston pin clips, piston pins and pistons.

F. Generator removal

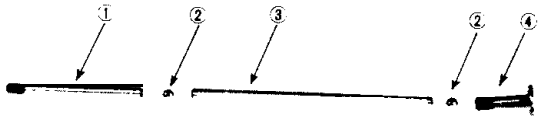
1. Remove the stator.
2. Remove the securing nut and lock washer.
3. Mount the rotor puller (special tool) onto the rotor and pull the rotor off.



i. Rotor puller (90890-01070)

G. Primary drive gear and clutch assembly moval

1. Remove the crankcase cover (right).
2. Loosen the drive gear securing nut by first placing a rag folded into many layers between the teeth of gears to lock them.
3. Remove six clutch spring screws and pressure plate.
4. Remove clutch plates, friction plates, push crown, two push rods and two balls.



1. Push rod
2. Ball
3. Push rod (Aluminum)
4. Push crown

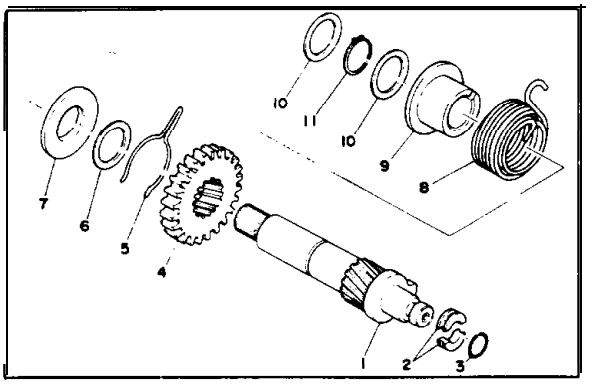
5. Hold the clutch unit with the holding tool (special tool), and unscrew the clutch boss lock nut.

H. Kick axle and change shaft removal

1. Slip the bent spring off and pull the kick axle assembly out.
2. Remove circlip from left side of change shaft and pull the shaft out.

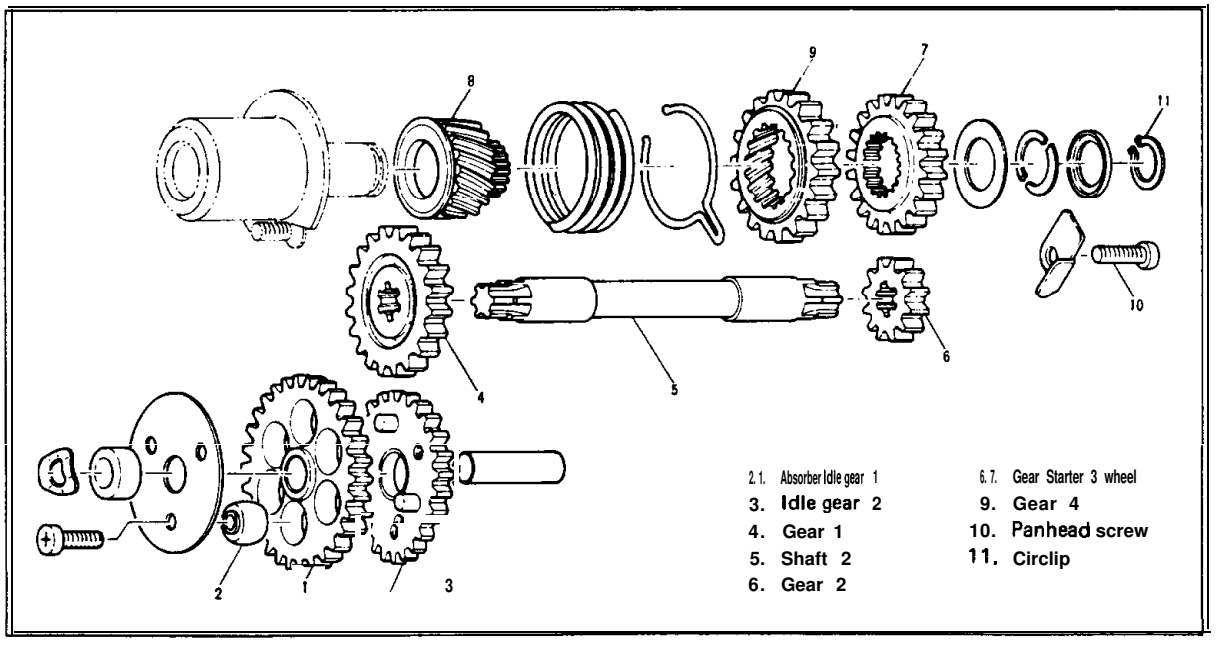
I. Electric starter unit removal

1. Remove the gear train cover, and idle gear 1 and 2.



1. Kick axle
2. Holder
3. Clip
4. Kick gear
5. Kick clip
6. Shim
7. Spacer
8. Kickspring
9. Spring guide
10. Washer
11. Circlip

2. Remove the four mounting bolts and motor.
3. Remove the panhead screw (10), gear 2 (6). shaft 2 (5), and gear 1 (4).
4. Remove the circlip (11), and gear assembly (7) (8) (9).
5. Starter gears illustration



2.1. Absorber Idle gear 1
3. Idle gear 2
4. Gear 1
5. Shaft 2
6. Gear 2
6.7. Gear Starter 3 wheel
9. Gear 4
10. Panhead screw
11. Circlip

J. Oil pump removal

1. Remove the tachometer drive gear, oil pump driven gear, and key.
2. Remove the three Phillips screws.
3. Remove the pump unit.

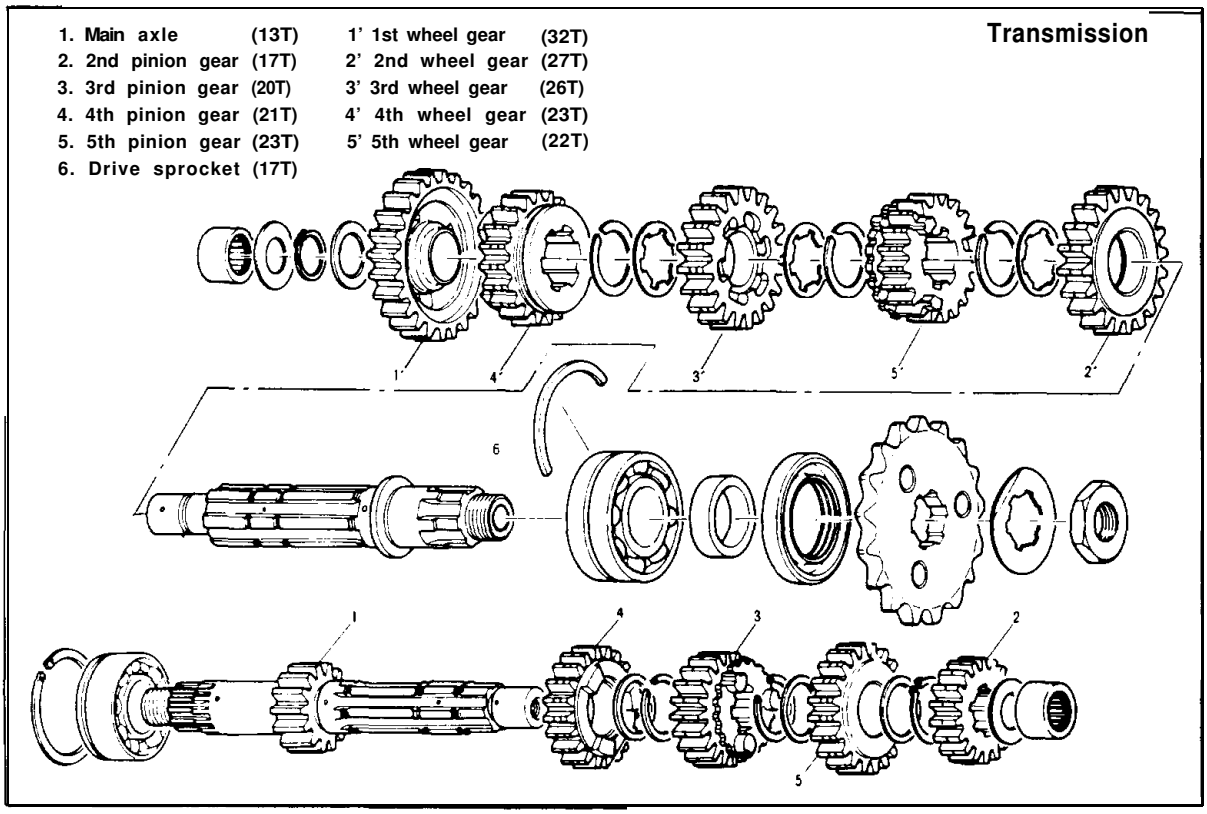
K.Crankcase disassembly

1. Loosen all case securing bolts and nuts l/4 turn at a time to avoid case warpage, and remove them.
2. Use a soft rubber hammer to carefully separate the crankcases.

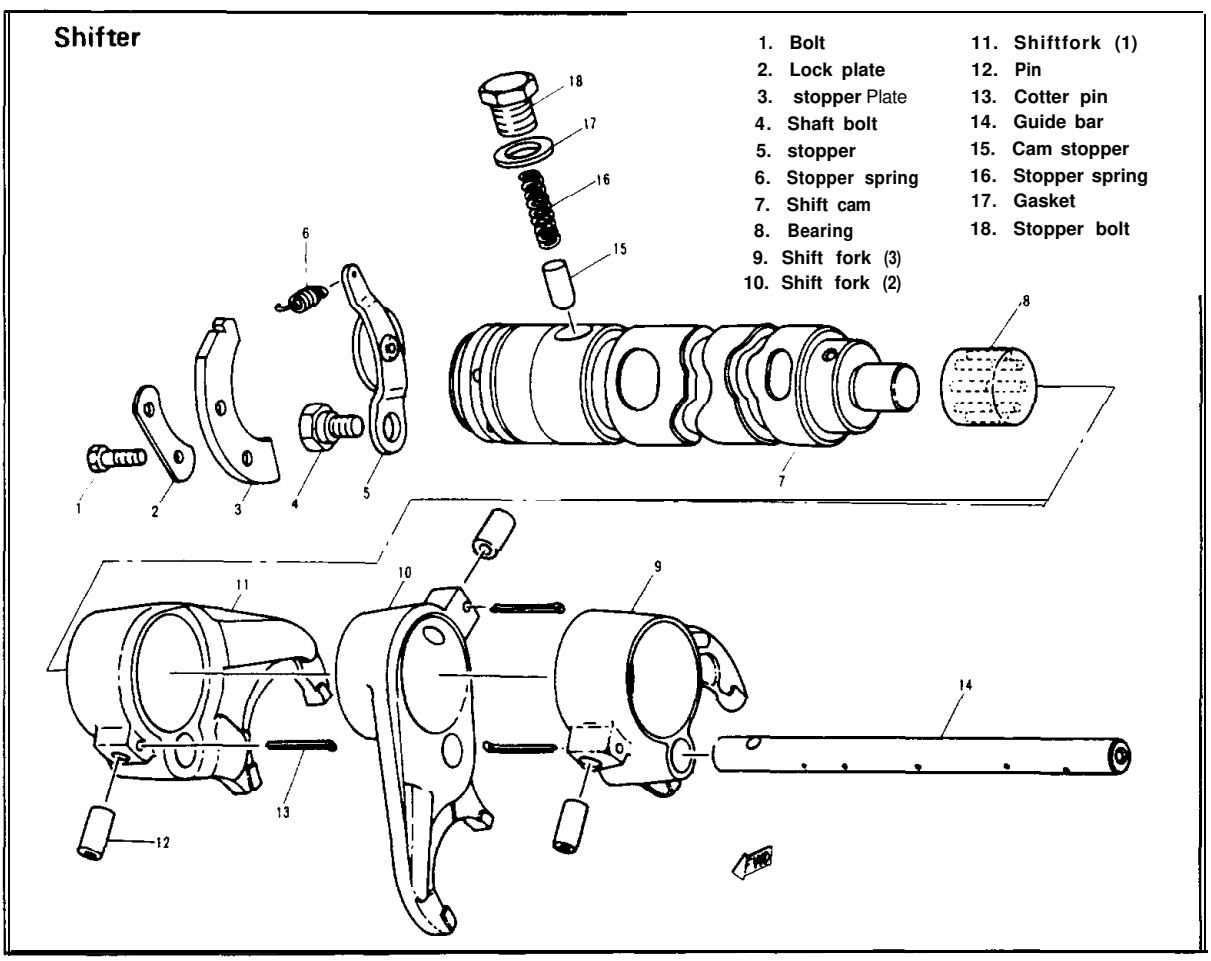
CAUTION:

There is one hidden crankcase holding nut. This nut is located near the primary drive gear.

L. Transmission illustration



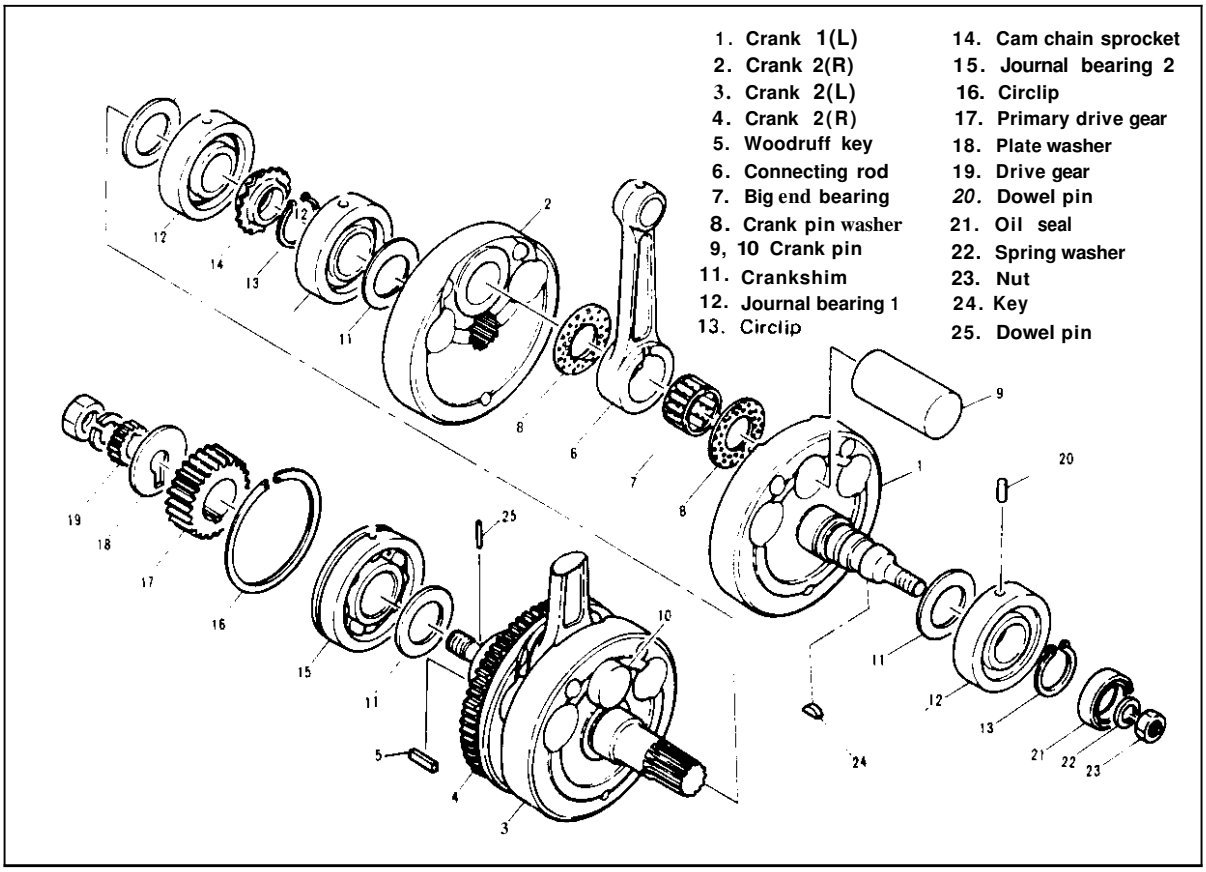
M. Shift drum removal



1. Release the stopper spring (6).
2. Remove the bolts (1) and stopper plate(3).
3. Pull the guide bar (14) out.
4. Remove the neutral detent unit (15-18).
5. Removecotter pins (13). and pin (12)
6. Pull out the shift cam (7).

N. Crankshaft removal

1. Tap the crankshaft with a rubber hammer to loosen it, then lift it out.
2. Crankshaft illustration



3-3. INSPECTION AND REPAIR

A. Cylinder head cover

Place head cover on a surface plate. There should be no warpage. Correct **by** re-surfacing as follows:

Place #400 or #600 grit wet sandpaper on surface plate and re-surface head cover using a figure-eight sanding pattern. Rotate head cover several times to avoid removing too much material from one side.

B. Cylinder head

1. Remove spark plugs.
2. Remove valves.
3. Using a rounded scraper, remove carbon deposits from combustion chamber. Take care to avoid damaging spark plug threads and valve seats. **Do** not **use** a sharp instrument. Avoid scratching the aluminum.
4. Place on a surface plate. There should be no warpage. Correct by re-surfacing as follows:

   Place #400 or #600 grit wet sandpaper on surface plate and re-surface head using a figure-eight sanding pattern. Rotate head several times to avoid removing too much material from one side.

C. Valve, valve guide and valve seat

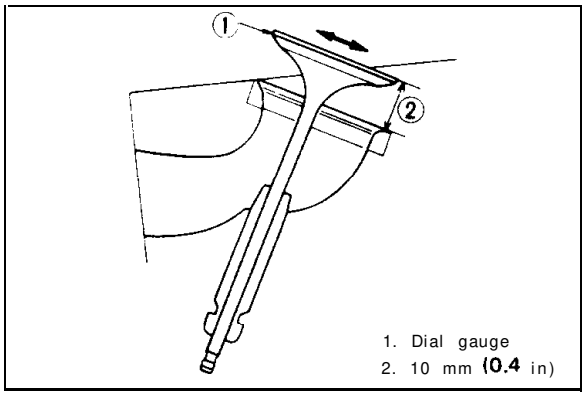
1. Valve guide

a. If the valve guide inside diameter is beyond serviceable limits, replace with an oversize valve guide.

	Standard
Guide diameter (I.D.) (IN.EX)	8.010 – 8.019 mm (0.315 – 0.316 in)

b. Measuring the clearance between valve and valve guide.

1) Insert the valve into the valve guide in the cylinder head and measure the clearance in both the X and Y axes, using a small dial gauge.



1. Dial gauge
2. 10 mm (0.4 in)

2) If the measured clearance is greater than 0.10 mm (0.0039 in) for the inlet valve or 0.12 mm (0.0047 in) for the exhaust valve, both the valve and valve guide should be replaced. The replacement valve guide should be one that is oversize.

Valve guide oversize:	
Part No.	Size (O.D.)
256-I 1133-I 1 (IN) 256-I 1133-21	15.1 mm (0.594 in) 15.2 mm (0.598 in)
256-I 1134-I 1 (EX) 256-I 1134-21	15.1 mm (0.594 in) 15.2 mm (0.598 in)

c. To ease guide removal and reinstallation, and to maintain the correct interference fit, heat the head to 100°C. Use an oven to avoid any possibility of head warpage due to uneven heating.

d. Use the appropriate shouldered punch (special tool) to drive the old guide out and drive the new guide in.

e, After installing the valve guide, use 8 mm reamer (special tool) to obtain the proper valve clearance.

f. After fitting the valve guide into the cylinder head, be sure to grind the valve seat, and perform valve lapping. The valve must be replaced with a new one.

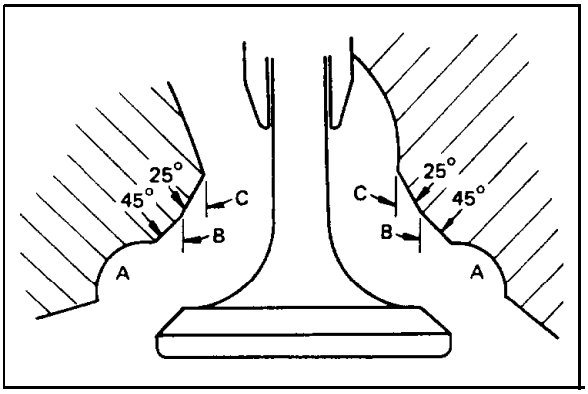
2. Grinding the valve seat.

a. The valve seat is subject to severe wear similar to valve face. Whenever the valve face is resurfaced, the valve seat should also be re-surfaced at a 45° angle. In addition, if a new valve guide has been installed (without any valve repair), the valve seat should be checked to guarantee complete sealing between the valve face and seat.

CAUTION :

If the valve seat is obviously pitted or worn, it should be cleaned with a valve seat cutter. Use the 45° cutter, and when twisting the cutter, keep an even downward pressure to prevent chatter marks.

If cutting section "A" of the valve seat, use the 8R cutter (radius cutter). If cutting section "B", use the 45° cutter.



b. Measure valve seat width. Apply mechanic's bluing dye (such as Dykem) to the valve face, apply a very small amount of fie grinding compound around the surface of the valve seat, insert the valve into position, and spin the valve quickly back and forth. Lift the valve, clean off all grinding compound, and check valve seat

width. The valve seat will have removed the bluing wherever it contacted the valve face. Measure the seat width with vernier calipers. It should measure approximately 1.3 mm. Also, the seat should be uniform in contact area. If valve seat width varies, or if pits still exist, then continue to cut with the 45° cutter. Remove just enough material to achieve a satisfactory seat.

	Standard width	Wear limit
Seat width	1.3 mm (0.051 in)	2.0 mm (0.079 in)

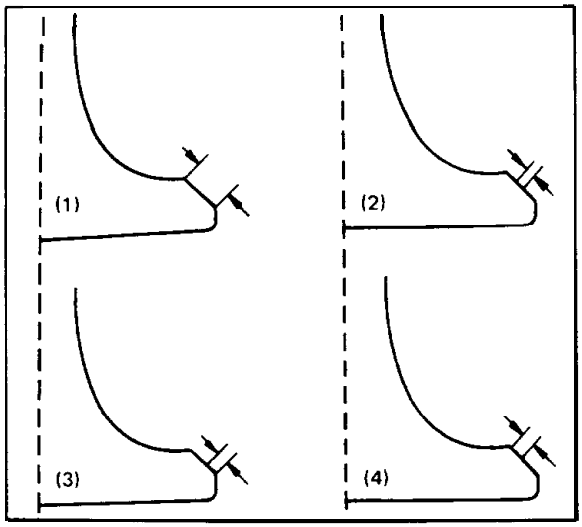
c. If the valve seat is uniform around the perimeter of the valve face, but is too wide or not centered on the valve face, it must be altered. Use either the 8R, 45° or 25° cutters to correct the improper seat location in the manner described below:

1) If the valve face shows that the valve seat is centered on the valve face, but too wide, then lightly use both the 8R and the 25° cutters to reduce the seat width to 1.3 mm.

2) If the seat shows to be in the middle of the valve face, but too narrow, use the 45° cutter until the width equals 1.3 mm.

3) If the seat is too narrow and right up near the valve margin, then first use the 8R cutter and then the 45° cutter to get the correct seat width.

4) If the seat is too narrow and down near the bottom edge of the valve face, then first use the 25° cutter and then the 45° cutter.



3. Lapping the valve/valve seat assembly.

a. The valve/valve seat assembly should be lapped if (1) neither the seat nor the valve face are severely worn, or (2) if the valve face and valve seat have been resurfaced and now require a final light grinding operation for perfect sealing.

b Apply a small amount of coarse lapping compound to valve face. Insert the valve into the head. Rotate the valve until the valve and valve seat are evenly polished. Clean off the coarse compound, then follow the same procedure with fine compound.

Continue lapping until the valve face shows a complete and smooth surface all the way around. Clean off the compound material. Apply bluing dye to the valve face and rotate the valve face for full seat contact which is indicated by a shiny surface all around the valve face where the bluing has been rubbed away.

c. Valve leakage check

After all work has been performed on the valve and valve seat, and all head parts have been assembled, check for proper valve/valve seat sealing by pouring solvent into each of the intake ports, then the exhaust ports. There should be no leakage past the seat. If fluid leaks, disassemble and continue to lap with fine lapping compound. Clean all parts thoroughly, reassemble and check again with solvent. Repeat this procedure as often as necessary to obtain a satisfactory seal.

D. Valve spring

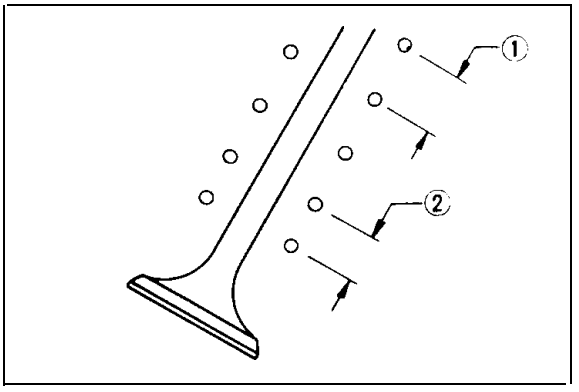
1. Checking the valve springs

a. This engine uses two springs of different sizes to prevent valve float or surging. The chart below shows the basic value characteristics.

b. Even though the spring is constructed of durable spring steel, it gradually loses some of it's tension. This is evidenced by a gradual shortening of free length. Use a vernier caliper to measure spring free length. If the free length of any spring has decreased more than 2 mm (0.08 in) from its specification, replace it.

c. Another symptom of a fatigued spring is insufficient spring pressure when compressed. This can be checked using a valve spring compression rate gauge. Test each spring individually. Place it in the gauge and compress the spring first to the specified compressed length with the valve closed (all spring specifications can be found in the previous section, valve spring), then to length with the valve open. Note the poundage indicated on the scale at each setting. Use this procedure with outer springs, then the inner spring.

NOTE:
All valve springs must be installed with greater pitch upward as shown.



1. Larger patch
2. Smaller pitch

d. Valve spring specifications

	Outer	Inner
Free length	42.55 mm (1.675 in)	42 mm (1.645 in)
Installed pressure	16.5 ~ 19.0 kg (36.4 ~ 41.9 lb)	9.3 ~ 10.7 kg (20.5 ~ 23.6 lb)
and length (valve closed)	37 mm (1.457 in)	35 mm (1.378 in)
Compressed pressure	53.5 ~ 61.5 kg (117.9 ~ 135.6 lb)	25.5 ~ 29.0 kg (56.2 ~ 63.9 lb)
and length (valve open)	27.5 mm (1.083 in)	25.5 mm (1.004 in)
Allowable tilt from vertical	1.6 mm or 2.5° (0.063 in)	←

E. **Rocker arm and rocker shaft.**

1. The rocker arm usually wears at two locations: (1) at the rocker shaft hole, (2) at the cam lobe contacting surface.
2. Measure the rocker shaft hole in the rocker arm.

Standard size:
15.000 ~15.018 mm
(0.5906 ~0.5913 in)

3. The shaft has been hardened and it should not wear excessively. If a groove has developed in this surface that can be felt, or if it shows a blue discoloration, then the shaft should be replaced and the lubrication system (pump and passages) checked.

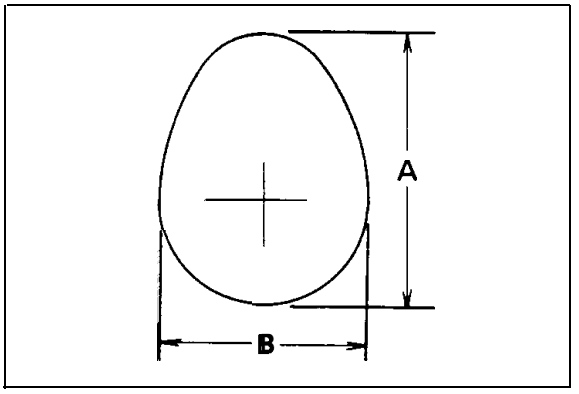
Standard shaft diameter:
14.985 ~14.991 mm
(0.5900 ~0.5902 in)

4. Standard clearance between the rocker shaft and hole should be 0.009 ~0.033 mm (0.00035 ~0.00130 in). If measurement shows more than 0.1 mm (0.0004 in) clearance, replace either or both parts as necessary.

F. **Camshaft wear**

1. The cam lobe metal surface may have a blue discoloration due to excessive friction. The metal surface could also start to flake off or become pitted. This is due to poor lubrication, incorrect clearances (from poor adjustment or valve bounce), or due to normal wear.
2. If any of the above wear conditions are readily visible, the camshaft should be replaced. Also, the corresponding rocker arm contacting surface should be checked for similar wear and replaced if obvious wear is noted.
3. Even though the cam lobe surface appears to be in satisfactory condition, the lobes should be measured with a micrometer. Cam lobe wear can occur without scarring the surface. If this wear exceeds a predetermined amount, valve timing and lift are affected. Replace the camshaft if wear exceeds the limits listed below.

	Cam Lift(A)		Width (B)	
	Standard Value	Wear Limit	Standard Value	Wear Limit
Intake	39.99±0.05 mm (1.574±0.002 in)	39 84 mm (1.569 in)	32.24±0.05 mm (1 269f0.002 in)	32.09 mm (1.263 in)
Exhaust	40 03±0.05 mm (1.576±0.002 in)	139.88 mm (1.570 in)	32.30±0.05 mm (1.272±0 002 in)	32.15 mm (1.266 in)



4. All camshaft bearings should be removed, cleaned, dried, and the races visually checked for pits, rust spots or chatter marks where the balls have dragged, If any of these conditions exists the bearing(s) should be replaced.

G.Cam chain, sprocket and dampers

1. Cam chain

Except in cases of oil starvation, the cam chain wears very little. If the cam chain has stretched excessively and it is difficult to keep the proper cam chain tension, the chain should be replaced.

2. Cam sprockets

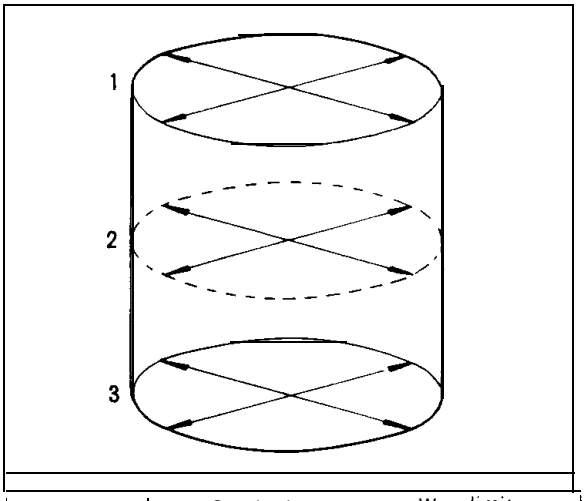
Check cam sprockets for obvious wear.

3. Cam chain dampers

Inspect the two vertical (slipper-type) dampers for excessive wear. Any that shows excessive wear should be replaced. Worn dampers may indicate an improperly adjusted or worn-out cam chain,

H. Cylinder

1. Inspect the cylinder walls for scratches. If vertical scratches are evident, the cylinder wall should be rebored or the cylinder should be replaced.
2. Measure cylinder wall wear as shown. If wear is excessive, compression pressure will decrease. Rebore the cylinder wall and replace the piston and piston rings. Cylinder wear should be measured at three depths with a cylinder bore gauge. (See illustration.)



	Standard	Wear limit
Cylinder bore	75.00 ~ 75.02 mm (2.9528 ~ 2.9536 in)	75.1 mm (2.9567 in)
Cylinder taper	–	0.05 mm (0.002 in)
Cylinder out-of-round		0.01 mm (0.0004 in)

If the cylinder wall is worn more than wear limit, it should be rebored.

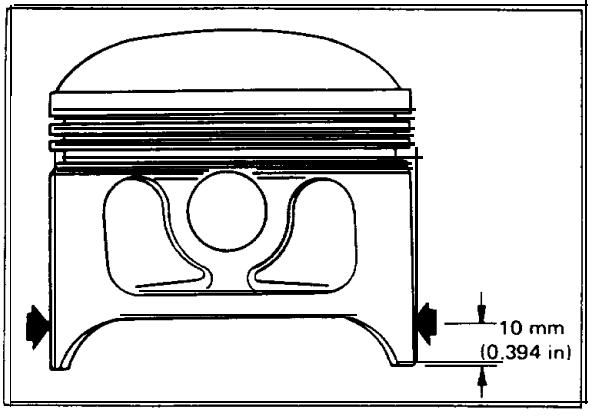
I. Piston and piston rings

1. Piston

a. Measure the outside diameter of the piston at the piston skirt.

Measurement should be made at a point 10 mm (0.394 in) above the bottom edge of the piston. Place the micrometer at right angles to the piston pin.

Standard:	74.96, 74.97 mm (2.951, 2.952 in)
Oversize 1:	75.25 mm (2.963 in)
Oversize 2:	75.50 mm (2.972 in)
Oversize 3:	75.75 mm (2.982 in)
Oversize 4:	76.00 mm (2.992 in)



b. Determine piston clearance as follows:

Minimum bore measurement – Maximum piston measurement = Piston clearance

Example:

75.02 mm
-74.97 mm
=0.05 mm piston clearance

c. Piston ring/ring groove fit must have correct clearance. If the piston and ring have already been used, the ring must be removed and the ring groove cleaned of carbon. The rings should then be rein stalled. Use a feeler gauge to measure the gap between the ring and the land.

	Top	2nd
Side clearance	0.04 ~ 0.08 mm (0.0016~0.0031 in)	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)

2. Piston ring

a. The oversize top and middle ring sizes are stamped on top of the ring.

Oversize 1:	0.25 (mm)
Oversize 2:	0.50 (mm)
Oversize 3:	0.75 (mm)
Oversize 4:	1.00 (mm)

b. Push the ring into the bore and check end gap clearance with a feeler gauge.

NOTE:
The end gap on the expander spacer of the oil control ring is unmeasureable. If oil control ring rails show excessive gap, all three components should be replaced.

	Standard	Limit
Top/2nd ring	0.2 ~ 0.4 mm (0.0079 ~ 0.016 in)	1.0 mm (0.039 in)
Oil control (Rails)	0.2 ~ 0.9 mm (0.0079 ~ 0.0354 in)	Visual inspection

J. Piston pin

1. Apply a light film of oil to pin. install in connecting rod small end. Check for play. There should be no noticeable vertical play. If play exists, check connecting rod small end for wear. Replace pin and connecting rod as required.
2. The piston pin should have no noticeable free play in piston. If the piston pin is loose, replace the pin and/or the piston.

K. Crankshaft

1. Main bearing and big end bearing visually inspect all friction surfaces for obvious pits, scratches, chatter marks, or rust. Replace it if necessary.
2. Small end play(A)

Maximum allowable tolerance: 2.0 mm (0.079 in)

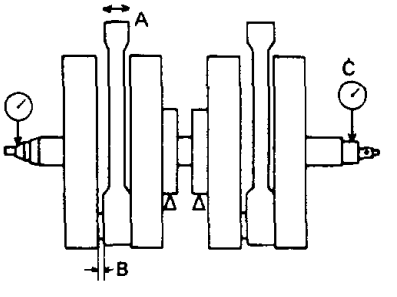
3. Big end side clearance(B)

Standard clearance: 0.15 – 0.4 mm (0.0059 ~ 0.016 in)

4. Crankshaft run out(C)

Mount the crankshaft in V-blocks and check for run out using a dial gauge.

Run out limit: 0.05 mm (0.002 in)



L. Oil pump

1. Check the clearance between housing and outer rotor.

Standard clearance: 0.10 ~ 0.18 mm (0.0039 ~ 0.0071 in)

2. Check the clearance between outer rotor and inner rotor.

Standard clearance:
0.03 ~ 0.09 mm (0.0012 ~ 0.0035 in)

M. Clutch

1. Clutch housing

Check dogs on clutch housing. Look for cracks and signs of galling on edges. If damage is moderate, deburr. If severe, replace clutch housing.

NOTE:

Galling on the friction plate dogs of the clutch housing will cause erratic clutch operation.

2. Clutch boss

Check splines on clutch boss for galling. If damage is slight to moderate, deburr. If it is severe, replace clutch boss.

NOTE:

Galling on clutch plate splines will cause erratic clutch operation.

3. Friction and clutch plates

Check clutch steel plates and friction plates for heat damage. Measure friction plate thickness at 3 or 4 points. Measure clutch plates for warpage. Replace clutch plate or friction plates as a set if any is faulty or beyond wear limits.

	Standard	Wear limit
Friction plate thickness	3.0 mm (0.118 in)	2.7 mm (0.106 in)
Clutch plate warp limit	–	0.05 mm (0.002 in)

4. Clutch push rod

Check ends of clutch push rod for indentation. If severe, clutch adjustment may be difficult. Check for looseness of the steel ends of the push rod. If ends are loose or indented, replace push rod.

5. Clutch springs

Measure clutch spring free length. Replace springs as a set if necessary.

Clutch spring length:
34.6 mm (1.362 in)

N. Transmission

1. Inspect each shift fork for signs of galling on gear contact surfaces. Check for bending. Make sure each fork slides freely on its guide bar.
2. Roll the guide bar across a surface plate. If bar is bent, replace.
3. Check the shift cam grooves for signs of wear or damage. If any profile has excessive wear and/or damage, replace cam.
4. Check the cam followers on each shift fork for wear. The follower should fit snugly into its seat in the shift fork, but should not be overly tight. Check the ends that ride in the grooves in the shift cam. If they are worn or damaged, replace followers.
5. Check shift cam dowel pins and side plate for looseness, damage or wear. Replace as required.
6. Check the shift cam stopper plate and circlip and stopper for wear. Replace as required.
7. Check the transmission shafts using a centering device and dial gauge. If any shaft is bent beyond specified limit, replace shaft.

Maximum run-out:
0.03 mm (0.001 in)

8. Carefully inspect each gear. Look for signs of obvious heat damage (blue discoloration). Check the gear teeth for signs of pitting, galling or other extreme wear. Replace as required.
9. Check to see that each gear moves freely on its shaft.
10. Check to see that all washers and clips are properly installed and undamaged. Replace bent or loose clips and bent washers.

11. Check to see that each gear properly engages its counterpart on the shaft. Check the mating dogs for rounded edges, cracks, or missing portions. Replace as required.

0. Electric starter gears and clip spring

1. Check the gears for wear or scratches on teeth, particularly in the chamfered area of each gear.
2. The clip spring is fitted to gear (4) (Refer to PAGE 20) and slides in the groove. A too-tight or loose-fitting clip may result in improper operation. If too loose, bend the clip so that the friction increases, or replace clip.

Friction tension:
2.2 ~ 2.5 kg (4.9 ~ 5.5 lb)

P. Kick starter

1. Kick gears

Check the kick gears for wear or scratches on teeth, particularly in the chamfered area of each gear.

2. Kick clip spring

The kick clip is fitted to kick gear and slides in the groove. A too-tight or loose-fitting clip may result in improper operation. If too loose, bend the kick clip so that the friction increases, or replace clip.

Friction tension:
1.2 ~ 1.7 kg (2.0 ~ 3.7 lb)

Q. Crankcases and oil passages

1. Check crankcases for cracks or other damage.
2. Clean all oil passages and blow out with compressed air.

R. Bearings and oil seals

1. After cleaning and lubricating bearings, rotate inner race with a finger. If rough spots are felt, replace the bearing.
2. Check oil seal lips for damage and wear. Replace as required.

3-4. ENGINE ASSEMBLY AND ADJUSTMENT

NOTE:

1) All gaskets and seals should be replaced when an engine is overhauled. All gasket surfaces must be cleaned.
2) Properly oil all mating engine and transmission parts during assembly.
3) All circlips should be inspected before assembly. Replace distorted circlips. Always replace cotter pins and piston pin clips after one use.

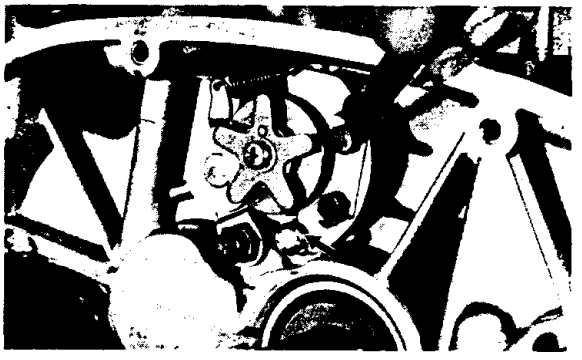
A. Shift

(Refer to PAGE 21)

Install shift forks, shift cam, guide pin, cotter pin, guide bar, stoper plate and detent. Apply LOCK-TITE to eccentric bolt.

NOTE:

Check for smooth and complete shifting after installing transmission.



B. Transmission and crankshaft

1. Rotate shift cam to neutral position.
2. Install the transmission, bearings and seals onto the upper case.
3. Install crankshaft, seal and bearings.

NOTE:

Fit each bearing over each locating pin and push the crankshaft into position by hand. Each bearing has line or punch mark which indicates the position of mating surface.

4. Make sure all bearings are positioned properly as shown.



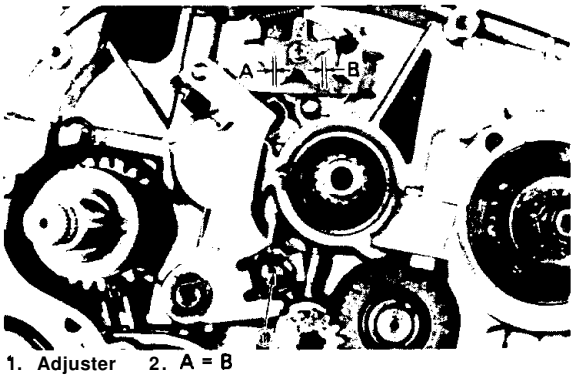
1. No clearance

5. Fit the chain over the cam sprocket,
6. Apply Yamaha Bond No. 4 sealant to crankcase mating surface.
7. Install bottom crankcase and nuts. Install nuts as follows:
   a. Use copper washers and blind nuts on bolts (1). (2), (3), (4), (12), (13).
   b. Tighten nuts in two stages in proper torque sequence. Start with bolt number one.

Crankcase torque: 2.2 m-kg (16 ft-lb)

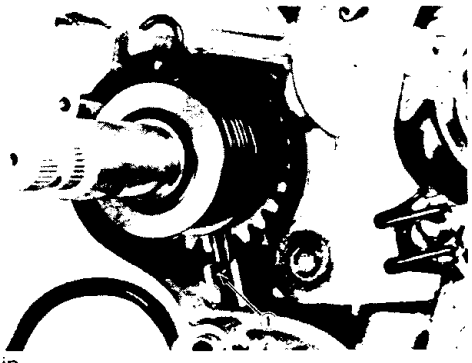
NOTE:
Before installing crankcase, make sure electric starter shaft 2 and gear 1 (PAGE 20) is installed.

C. Shifter assembly
1. Install shift shaft. Install circlip (E-clip) on left side of crankcases.
2. Make sure distances A and B are equal. Adjust them by adjuster if necessary.



1. Adjuster 2. A = B

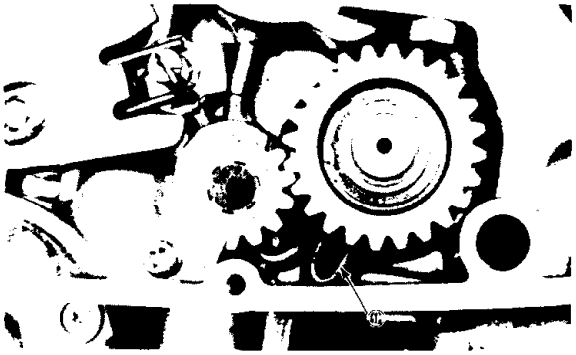
D. Kick starter assembly
1. Partially insert the assembly until the return spring can be slipped over its anchor point.



1. Kick clip

2. Positioning the kick clip in the groove, rotate the kick axle by kick lever I/2 turn counterclockwise.
3. Push the axle in.
4. Check for correct operation.

E. Electric-starter gear assembly
Install the unit as shown.
(Refer to PAGE 20, if necessary.)



1. Clip

F. Clutch
1. Install the following parts in the order given.
   a. Plate 1, t = 1 mm (0.039 in)
   b. Plate 2, t = 2 mm (0.079 in)
   c. Spacer shaft
   d. Housing
   e. Bearing plate, t = 1 mm (0.039 in)
   f. Bearing
   g. Plate 2, t = 2 mm (0.079 in)
   h. Clutch boss
   i. Plane washer, t = 2.6 mm (0.102 in)
   j. Conical spring
   k. Nut (using special tool)

Clutch lock nut torque: 6.5 m-kg (47 ft-lb)

   l. Friction plates and clutch plates
   m. Push rods, balls and push crown

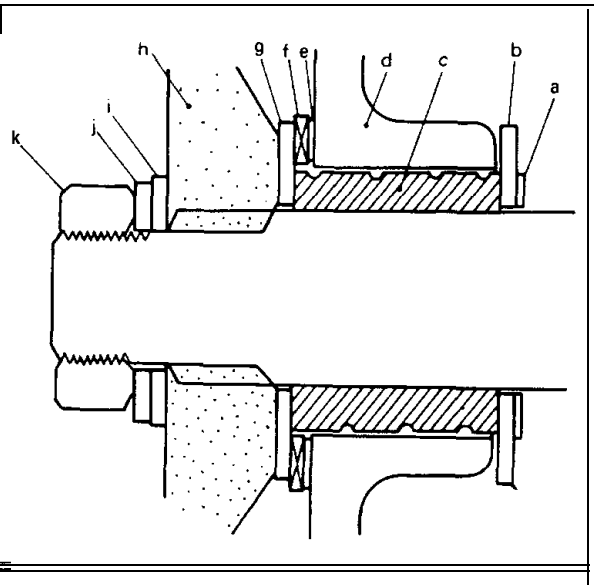
n. Pressure plate and clutch springs

Clutch screw torque:
1 .0 m-kg (7 ft-lb)

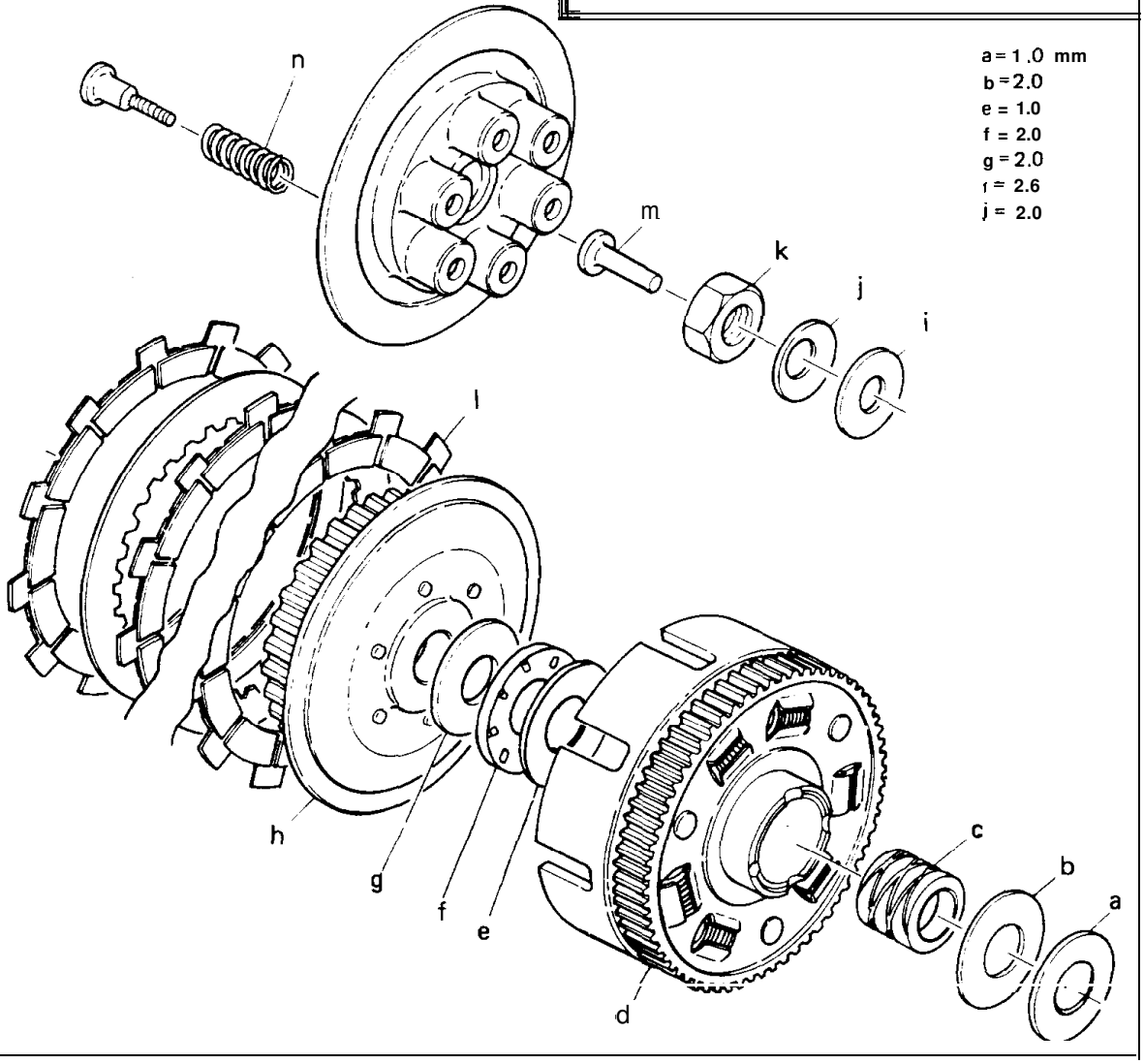
o. Primary drive gear

Drive gear torque:
9 m-kg (65 ft-lb)

a. Plate 1
b. Plate 2
c. Spacer shaft
d. Housing
e. Bearing plate
f. Bearing
g. Plate 2
h. Clutch boss
i. Plane washer
j. Conical spring
k. Nut (using special tool)
l. Friction plates and clutch plates
m. Push rods, balls and push crown
n. Pressure plate and clutch spring



a = 1 .0 mm
b = 2.0
e = 1.0
f = 2.0
g = 2.0
1 = 2.6
j = 2.0

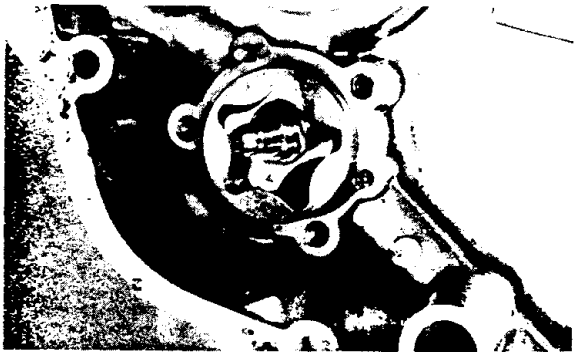


G. Generator

1. Lock the crank rotation at the primary drive gear.
2. Reverse the generator removal sequence.

H. Oil pump

Reverse the oil pump removal sequence.



I. Right-hand crankcase cover

While properly engaging oil pump gear, install new case cover gasket and right-hand crankcase cover. Tighten holding screws gradually until proper torque is reached.

Crankcase cover holding screw torque: 1.0 m-kg (7 ft-lb)

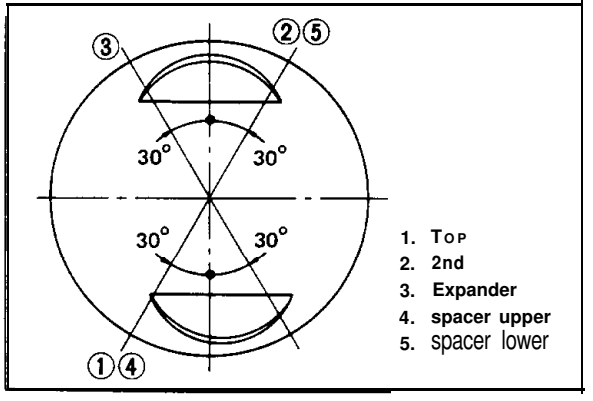
J. Piston

1. **Position piston rings as shown.**

NOTE:

1) **Make sure** ends of oil ring expanders are not overlapped.

2) Manufacturer's marks or numbers stamped on the rings are on the top side of the rings. Coat pistons and rings well with oil.



1. Top
2. 2nd
3. Expander
4. spacer upper
5. spacer lower

2. Install pistons on rods. The arrow on the pistons must point to the front of the engine.

NOTE:

Always install new piston pin clips.

K. Cylinder and cylinder head

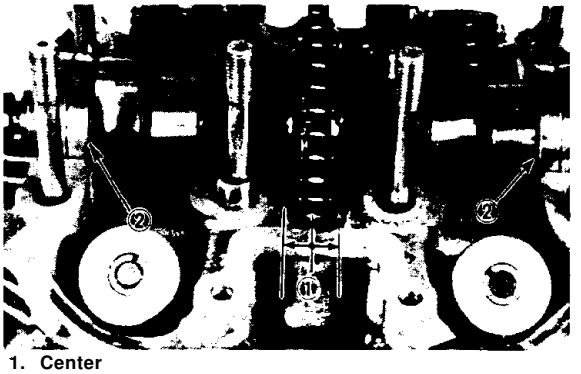
1. Install the tensioner cushion onto crankcase.
2. Install a new cylinder base gasket.
3. Install cylinder using special tool.
4. Install the cylinder head gasket and cylinder head.

NOTE:

The assembly of the cylinder head is the reverse of the disassembly procedure. Install valve springs with tighter windings (smaller pitch) down,

L. Camshaft

1. **Rotate the piston** to TDC.
2. Install the, chain onto the camshaft with no slack in the cam chain on the front portion (opposite side from the tensioner).



1. Center
2. No clearance

3. Position the groove in the left side of the cam sprocket so that it lines up with the sprocket centers.

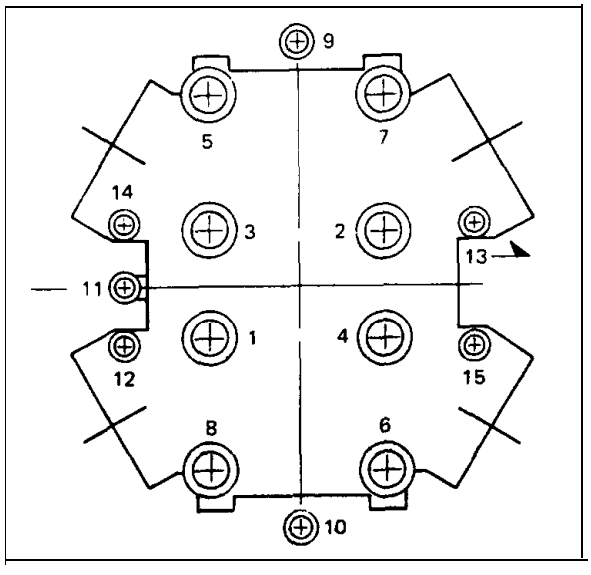


1. 90°

4. Joint the chain together and revet a new link.
5. Install the cam chain tensioner, and adjust chain tension. Refer to PAGE. (8).
6. Make sure the timing is correct.

M. Cylinder heed cover

1. Install all components in the head cover.
2. Apply Yamaha No. 4 sealant to cover mating surfaces.
3. Install all head cover retaining nuts and bolts and thread them down until lightly seated.
4. Tighten them with torque wrench in the order given



Tightening torque:
1 – 8 3.8 m-kg (27 ft-lb)
11 1.0 m-kg (7 ft-lb)
Others 2.2 m-kg (16 ft-lb)

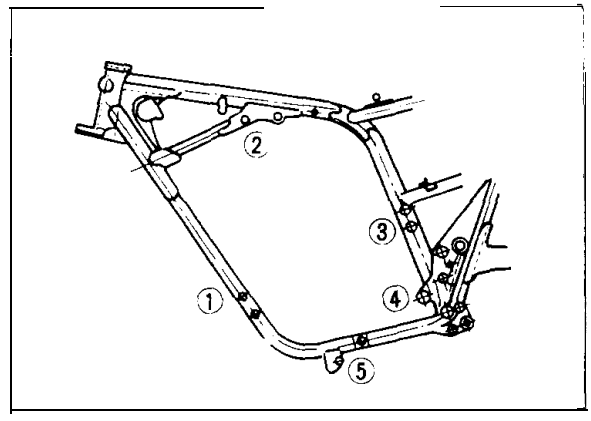
N. Governor and breaker assembly

Reverse the governor and breaker removal sequence.

NOTE:

Before inserting the governor rod, supportive bearings should be lubricated with molybdenum disulfide.

O. Engine



Tightening torque:
1. 4.5(M10) ; 5.0 m-kg (36 ft-lb)
2. (M8) ; 2.0 m-kg (14 ft-lb)
3. (M10) ; 4.5 m-kg (33 ft-lb)

4

CHAPTER 4. CARBURETION

4-1. CARBURETOR.. 36

A. Description ..... .36

B. Specifications ..... .36

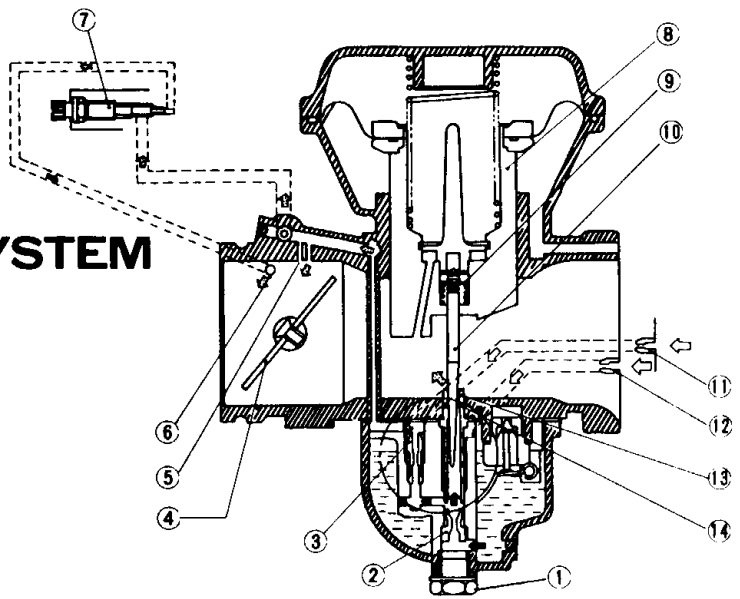
C. Disassembly. ..... .36

D. Inspecition.. 36

E. Adjustments ..... .37

MAIN METERING SYSTEM

IDLE SYSTEM



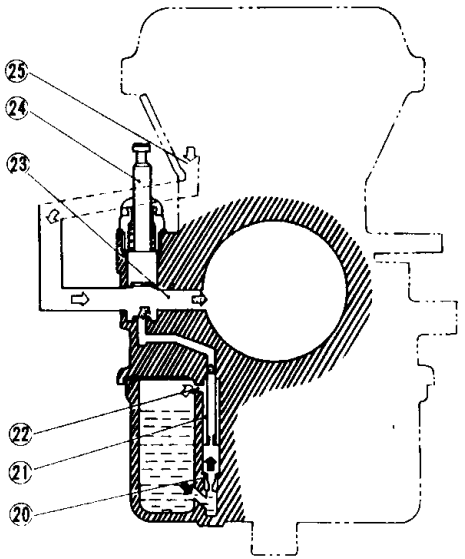
⇦ AIR

⇦ MIXTURE

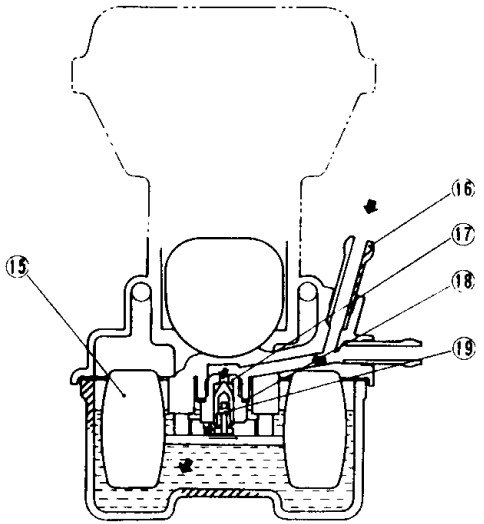
⬅ FUEL

1. DRAIN SCREW
2. MAIN JET
3. PILOT JET
4. THROTTLE VALVE
5. BY-PASS HOLE
6. PILOT OUTLET
7. PILOT SCREW
8. PISTON VALVE
9. SPRING CLIP
10. JET NEEDLE
11. PILOT AIR JET
12. MAIN AIR JET
13. NEEDLE JET
14. O-RING
15. FLOAT
16. FUEL INLET
17. FLOAT NEEDLE SEAT
18. GASKET
19. FLOAT NEEDLE
20. STARTER JET
21. STARTER BLEED PIPE
22. STARTER AIR BLEED
23. MIXTURE OUTLOT
24. STARTER PLUNGER
25. AIR INLET

STARTER SYSTEM



FLOAT SYSTEM



41. CARBURETOR

A. Description

Air flow through the venturi is controlled by a throttle slide (vacuum piston). The slide is raised and lowered by engine vacuum rather than a cable linked directly to the throttle grip.

B. Specifications

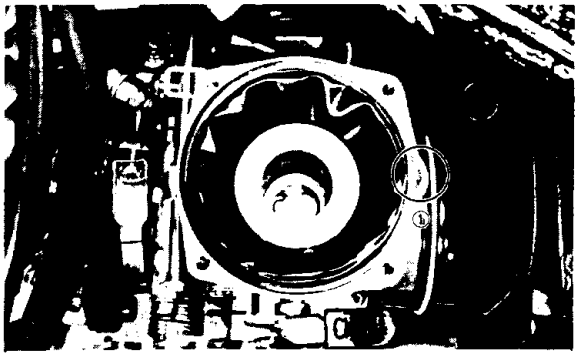
Main jet	#135
Jet needle	502-3
Needle jet	z-2
Starter jet	#80
Fuel valve seat	2 m m
Pilot jet	#27.5
Fuel level	24±1mm(0.94±0.04 in) (above gasket surface)

NOTE:

The low speed mixture screw settings are adjusted at the factory with the use of specialized equipment. Do not attempt to change these settings.

C. Disassembly

1. Prepare to separate carburetors (separation not necessary if only float level adjustment or throttle value inspection is to be done). Remove starter lever. Loosen starter lever securing screws and remove starter lever rod.
2. Remove upper and lower brackets. Note position of synchronizing screws for guidance in reassembly. Separate carburetors.
3. Remove vacuum chamber cover. Remove the spring, needle fitting clip, needle, and diaphragm (piston valve).
4. Note that there is tab on the rubber diaphragm. There are matching recesses in the carburetor body for the diaphragm tab.



1. Tab

5. To inspect starter jet, remove three (3) screws holding the starter body to the right side of the carburetor.
6. Remove the four screws holding the float bowl cover. Remove float bowl cover. The main jet is located under a cover in the float bowl.
7. Pull out float pivot pin. Remove the float assembly. Be careful not to lose the float valve needle located under the float level adjustment tongue. Remove the needle jet.
8. Reassemble in reverse order. Pay close attention to the installation of the vacuum piston diaphragm.

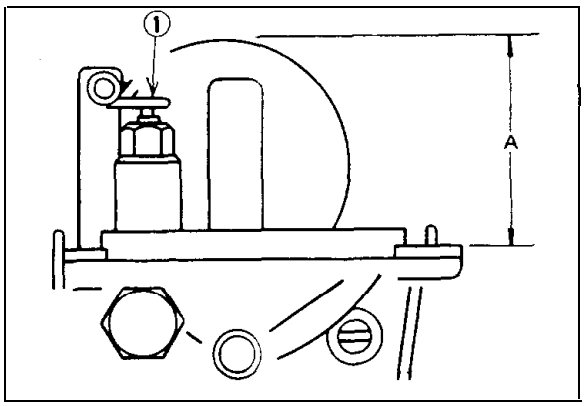
D. Inspection

1. Examine carburetor body and fuel passages. If contaminated, wash carburetor in petroleum-based solvent. Do not use caustic carburetor cleaning solutions. Blow out all passages and jets with compressed air.
2. Examine condition of floats. If floats are leaking or damaged, they should be replaced.
3. Inspect inlet needle valve and seat for wear or contamination. Replace these components as a set.
4. Inspect piston valve and rubber diaphragm. If the piston is scratched or the diaphragm is torn, the assembly must be replaced.

E. Adjustments

1. Float level adjustment

Measure the distance from the bottom of the float to the float bowl gasket surface. Bend the tongue on the float arm if any float level adjustment is necessary. Both floats must be at the same height. If the fuel level is too high, a rich air/fuel mixture will occur. If too low, a lean mixture will result.



1. Tongue A. 24±1 mm (0.94±0.04 in)

5

CHAPTER 5. CHASSIS

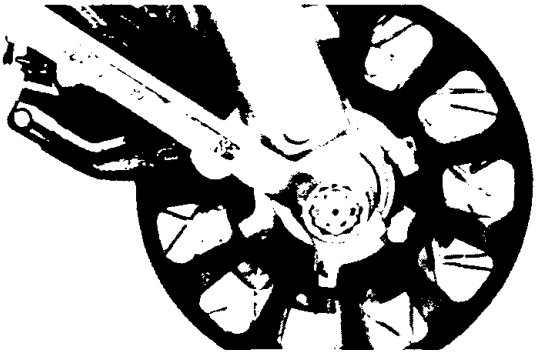
5-1. FRONT WHEEL 39
A. Removal 39
B. Front axle inspection 39
C. Front wheel inspection. 39
D. Replacing wheel bearings 39
E. Installing front wheel 39
5-2. REAR WHEEL 40
A. Removal 40
B. Rear axle inspection 40
C. Replacing wheel bearings 40
D. Rear wheel inspection 40
E. Installing rear wheel 40
F. Rear wheel illustration 40
5-3. BRAKES 40
A. Caliper pad replacement 40
B. Caliper disassembly. 42
C. Master cylinder disassembly 42
D. Brake inspection and repair 42
E. Brake reassembly 43
5-4. WHEELS, TIRES, TUBES 44
A. Wheel inspection 44
B. Tire, tube removal 44
C. Installation 44
5-5. REAR WHEEL SPROCKET 44
5-6. FRONT FORKS 45
A. Removal and disassembly 46
B. Inspection 46
C. Assembly 46
5-7. STEERING HEAD 47
A. Adjustment 47
B. Removal 47
C. Inspection 47
D. Reassembly 47
5-8. SWING ARM 47
A. Inspection 47
B. Swing arm removal 48
C. Swing arm lubrication 48
5-9. REAR SHOCK ABSORBER 48
A. Removal .....
B. Inspection .....
5-10. CABLES AND FITTINGS 48
A. Cablemaintenance 48
B. Throttle maintenance 48

CHAPTER 5.
CHASSIS

5-I. FRONT WHEEL

A. Removal

1. Remove cotter pin from front axle nut.
2. Remove the front axle nut.
3. Loosen the two **axle** holder nuts at the bottom of the fork leg.
4. Raise the front wheel of the machine by placing suitable stand under the engine.
5. Remove the front wheel axle by simultaneously twisting and pulling out on the axle. Then remove the wheel assembly. The speedometer gear unit housing must be removed.



B. Front axle inspection

Remove any corrosion from axle with emery cloth. Place the axle on a surface plate and check for bends. If bent, replace axle.

C. Front **wheel inspection**

1. A rim can develop warpage. It is due to (1) running the wheel into an object and bending the outer rim, or (2) one or more spokes loosening.
2. Check for warpage by mounting the wheel on a stand (or, if the wheel is attached to a motorcycle, it can be blocked up and held in place). Use some device to measure or detect movement then slowly spin the wheel and note the amount of rim "run-out". It should not exceed 2 mm(0.08 in).
3. If all the spokes are tight, and the rim shows no obvious signs of damage, and yet run out is still excessive, do the following:
   a) If the run out is up and down, loosen spokes opposite the high spot and tighten the spokes at the high spot.
   b) If the run out is sideways, loosen the spokes at the high spot, and tighten the spokes opposite the high spot.

D. **Replacing wheel bearings**

If the bearings allow play in the wheel hub or if wheel does not turn smoothly, replace the bearings as follows:

1. Clean the outside of the wheel hub.
2. Drive the bearing out by pushing the spacer aside and tapping around the perimeter of the bearing inner race with a soft metal drift pin and hammer. The spacer "floats" between the bearings. Both bearings can be removed in this manner.
3. To install the wheel bearing, reverse the above sequence. Be sure to grease the bearing before installation. Use a socket that matches the outside race of the bearing as a tool to drive in the bearing.

CAUTION:
Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.

E. Installing front wheel

When installing front wheel, reverse the removal procedure. Note the following points:

1. Lightly grease lips of front wheel oil seals and gear teeth of speedometer drive and driven gears. Use lightweight lithium soap base grease.
2. Make sure there is enough gap between disc pads.
3. Check for proper engagement of the boss on the outer fork tube with the locating slot on speedometer gear unit housing.
4. Always secure the front wheel axle as follows:

a Tighten the front axle nut.

Axle nut torque:
8.5 m-kg (61 ft-lb)

b. Tighten axle holder nuts. First tighten nut on front end of axle holder, then tighten nut on rear end.

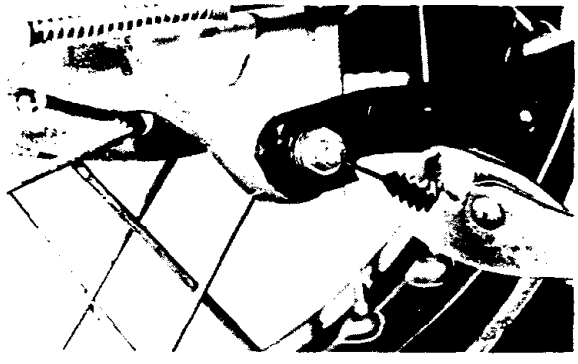
Holder nut torque: 1 .O m-kg (7 ft-lb)

c. install a new cotter pin.

5-2. REAR WHEEL

A. Removal

1. Place machine on center stand.
2. Disconnect the tension bar, and the brake rod from the rear shoe plate. Pay strict attention to the presence and location of the tension bar lock washer and cotter key. These are safety parts and must be included during assembly.



2. Loosen the chain tension adjusting nuts and bolts on both right and left sides.
3. Remove the rear axle cotter pin and nut.
4. Remove the right-hand chain adjuster and distance collar.
5. Remove the rear brake plate.
6. Lean the machine to the left and remove the rear wheel assembly.

B. Rear axle inspection

(See front Wheel, Axle Inspection Procedure.)

C. Replacing wheel bearings

Rear wheel bearing replacement is similar to the procedure for the front wheel.

D. Rear wheel inspection

(See Front Wheel, Inspection Procedures.)

E. Installing rear wheel

1. Lightly grease lips of rear wheel oil seals.
2. To install the rear wheel, reverse the removal procedure.

NOTE:

Always use a new cotter pin on the axle nut.

Torque: Axle nut: 15 m-kg(l08 ft-lb)

F. Rear Wheel lubrication (on page 41)

5-3. BRAKES

CAUTION:

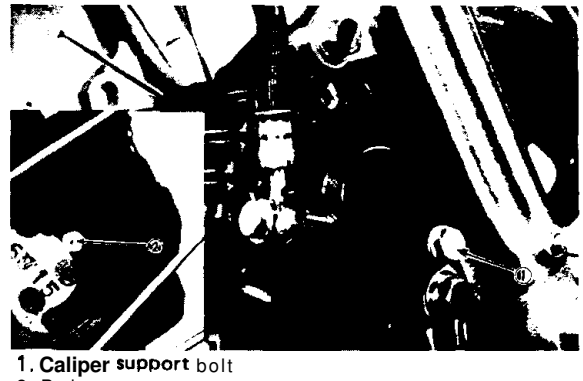
Disc brake components rarely require disassembly. Do not disassembly components unless absolutely necessary. If any hydraulic connection in the system is opened, the entire system should be disassembled, drained, cleaned and then properly filled and bled upon reassembly.

CAUTION:

Do not use solvents on brake internal components. Solvents will cause seals to swell and distort. Use only clean brake fluid for cleaning. Use care with brake fluid. Brake fluid is injurious to eyes and will damage painted surfaces.

A.Caliper pad replacement

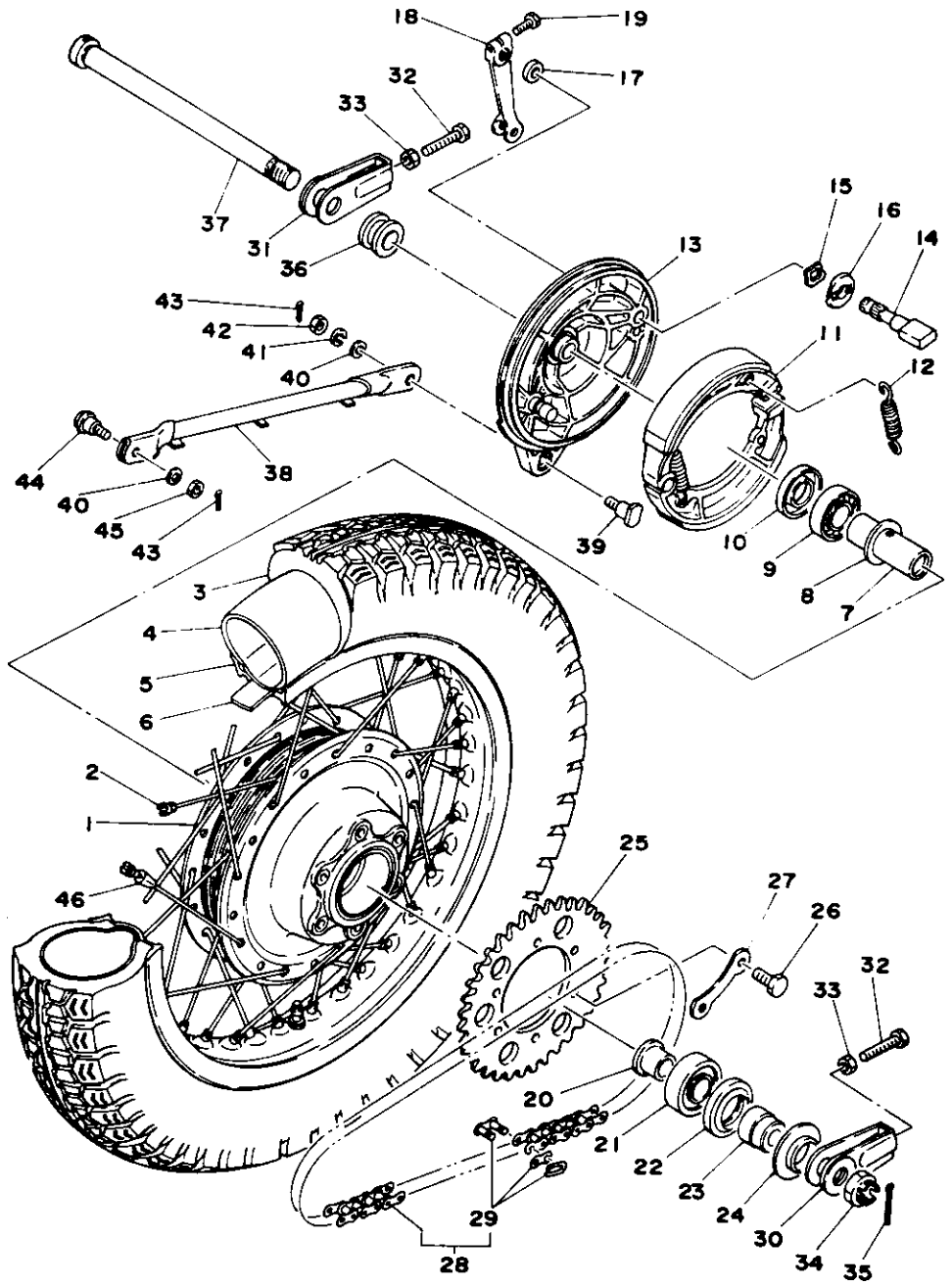
1. It is not necessary to disassemble the brake fluid hoses to replace the brake pads.
2. Remove the caliper suppdrt bolt.*
3. Remove the phillips screw that holds the brake pads.



1. Caliper support bolt
2. Pad screw

4. Pull caliper cylinder off caliper frame.
5. Install new brake pads. Replace pads as a set.

REAR WHEEL



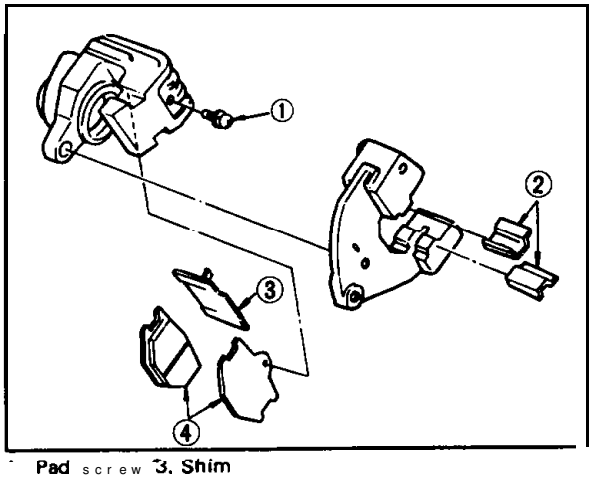
1. Rear, hub
2. Spoke set
3. Rear, tire
4. Tube
5. Rim
6. Rim, bend
7. Spacer
8. Flange
9. Bearing
10. Oil seal
11. Brake shoe comp.
12. Spring, tension
13. Brake shoe plate
14. Cam shaft
15. Wave, washer
16. Cam shaft shim
17. Cam shaft, seal
18. Cam shaft lever
19. Hexagon, bolt
20 Coloar
21. Bearing
22. Ool seal
23. Collar
24. Dust, cover
25. Sprocket wheel, gear
26. Bolt
27. Lock, washer
28. Chain
29. Chain, joint
30. Chain left, puller
31. Chain right puller
32. Hexagon bolt
33. Hexagon, nut
34. Castle, nut
35. Cotter, pin
36. Collar
37. Wheel, shaft
38. Tension, bar
39. Bolt
40. Plate, washer
41. Spring, washer
42. Nut, hexagon
43. Cotter, pin
44. Bolt
45. Hexagon, nut
46. Wheel, balancer

B. Caliper disassembly

1. Remove caliper brake hose. Allow caliper assembly to drain into a container.
2. Place the open hose end into the container and pump the old fluid out of the master cylinder.
3. Remove caliper support bolt and pad securing screw as in Caliper pad replacement procedure.
4. Remove caliper assembly from caliper frame.
5. Remove retaining ring and dust seal.
6. Carefully force the piston out of the caliper cylinder with compressed air. Never try to pry out the piston.

CAUTION:
Cover the piston with a rage. Use care so that piston does not cause injury as it is expelled from the cylinder.

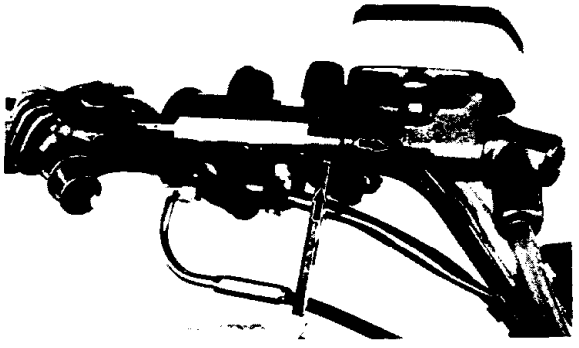
7. Remove piston seal.



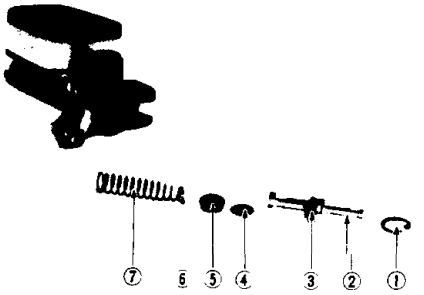
1. Pad screw 3. Shim
2. Shim 4. Pads.

C. Master cylinder disassembly

1. Remove brake hose.
2. Remove front brake switch.



3. Remove brake lever and spring.
4. Remove master cylinder from handlebars. Remove cap and drain remaining fluid.

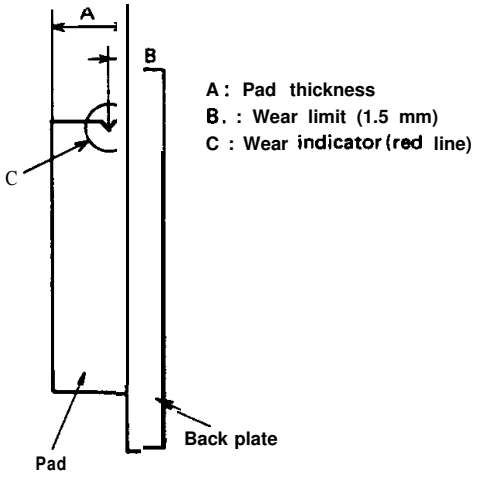


1. Snap ring
2. Cylinder cup (R)
3. Piston
4. Shim
5. Piston cup
6. Spacer
7. Return spring

D. Brake inspection and repair

Recommended Brake Component Replacement Schedule:	
Brake pads	As required
Piston seal, dust seal	Every two years
Brake hoses	Every four years
Brake fluid	Replace only when brakes are disassembled

1. Replace caliper piston if it is scratched.
2. Replace any brake pad worn beyond limits.
   Replace brake pads as a set.

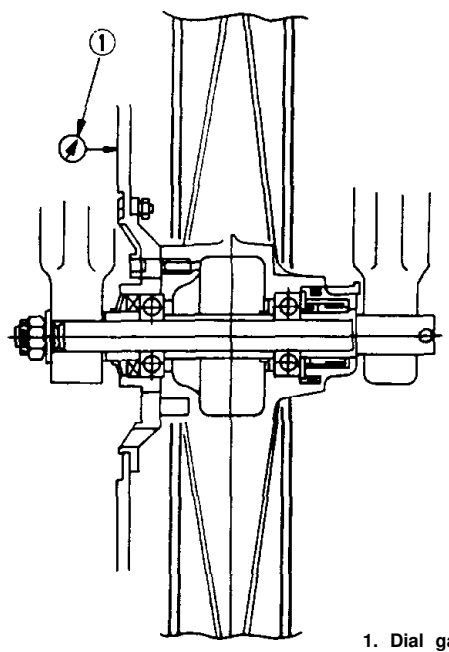


A: Pad thickness
B. : Wear limit (1.5 mm)
C : Wear indicator (red line)

See "Caliper Replacement Pad" procedure for parts to be replaced when pads are replaced.

3. Replace piston and dust seals if damaged.
4. Inspect master cylinder body. Replace if scratched. Clean all passages with new brake fluid.
5. Inspect brake hoses. Replace every four years or if cracked, frayed or damaged.
6. Check for wear and deflection of disc.

Wear limit:
1.5 mm (0.06 in)



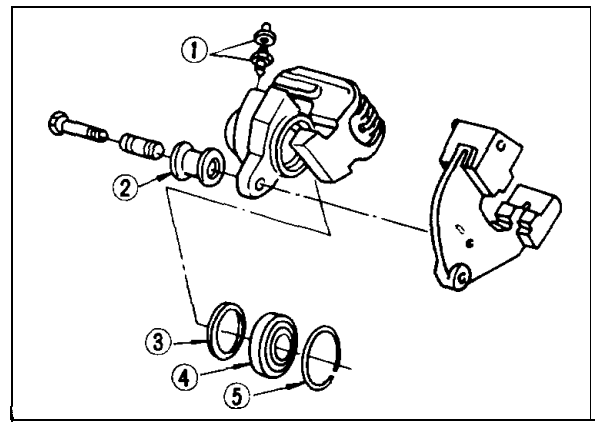
1. Dial gauge

Maximum deflection: 0.15 mm(0.006 in)
Minimum disc thickness: 6.5 mm(0.26 in)

If disc is worn beyond minimum thickness or deflection exceeds specified amount, replace disc.

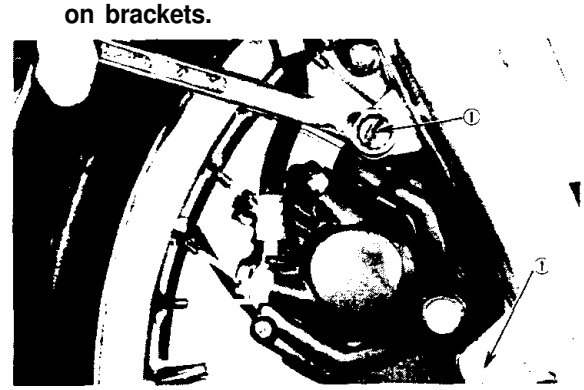
E. Brake reassembly

1. All internal parts should be cleaned in new brake fluid. Internal parts should be lubricated with brake fluid when installed.
2. Caliper reassembly
   Replace the following parts whenever a caliper is disassembled: bleed screw and cap, boot bushing, piston seal, dust seal, retaining ring.



1. Bleed screw (with cap)
2. Bush boot
3. Piston seal
4. Dust seal
5. Retaining ring

a. Install piston seal and piston. Place caliper cylinder into caliper frame.
b. Install pad spring and retainer. Install dust seal and clip.
c. Install pad spring and pads.
d. Install support bolt and remount caliper on brackets.



1. Mounting bolt

Mounting bolt torque:
3.5 m-kg (25 ft-lb)

3. Attach brake hoses.
4. Master cylinder reassembly
   Reassemble master cylinder.

Brake hose torque:
(all brake union bolts)
2.5 m-kg (18 ft-lb)

5. Brake disc assembly

If brake disc has been removed from hub or is loose, tighten bolts. Use new locking washers and bend over locking tabs after bolts are tightened.

Disc bolt torque: 2.0 m-kg (14 ft-lb)

6. Air bleeding

CAUTION:

If the brake **system is** disassembled **or if any brake hose has been loosened or removed, the brake system must be bled to remove air from the brake fluid. If the brake fluid level is very low or brake operation is incorrect, bleed the brake system.**

a. Add proper brake fluid to the reservoir. Install the diaphragm, being careful not to spill or overflow the reservoir.

b. Connect the clear plastic tube tightly to the caliper bleed screw. Put the end of the tube into a container.

c. Slowly apply the brake lever several times. Pull in lever. Hold lever in "on" position. Loosen bleed screw. Allow the lever to travel slowly toward its limit. When the limit is reached, tighten bleed screw.

d. Continue step C until all air bubbles are removed from system.

NOTE:

If bleeding is difficult, it may be necessary to let the brake system stabilize for a few hours. Repeat bleeding procedure.

5-4. WHEELS, TIRES, TUBES

A. Wheel inspection

Wheels should be inspected frequently. Wheel run-out is discussed in Chapter 5-1.

B. **Tire, tube removal**

1. Remove valve cap, valve core and valve stem lock nut.

2. When all air is out of tube, separate tire bead from rim (both sides) by stepping on tire with your foot.

3. Use two wide, flat tire irons with rounded edges to work the tire bead over the edge of the rim, starting 180" opposite the tube stem. Be careful not to pinch the tube as you do this.

4. After you have worked on side of the tire completely off the rim, slip the tube out. Be very careful not to damage the stem while pushing it back out of the rim hole.

NOTE:

If you are changing the tire itself, then finish the removal by working the second bead off the rim.

C. Installation

Reinstall the tire and tube by reversing the disassembly procedure. After the tube has been installed, but before the tire has been completely slipped onto the rim, put a small amount of air into the tube. This removes any creases that might exist. Release the air and continue with reassembly. After the tire has been completely slipped onto the rim, make sure the stem comes out of the hole in the rim at a right angle to the rim. Finally inflate the tire. Refer to PAGE (10).

	Front Tire	Rear Tire
Normal riding	1.6 kg/cm^2 (22 psi)	2.0 kg/cm^2 (29psi)

NOTE:

Make sure the wheel is balanced every time the tire is to "Front wheel inspection".)

5-5. REAR WHEEL SPROCKET

1. Bend the lock washer ears flat.

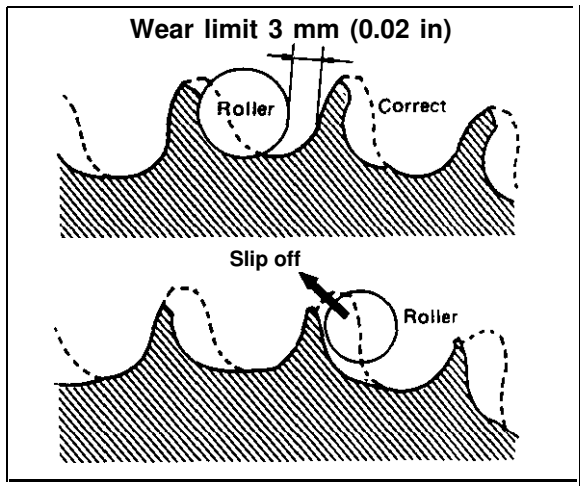
2. Remove the sprocket mounting bolts. Check the lock washer and bolt for damage. If the lock washer is not bent over the hexagon bolt head, or is broken, or the bolt is loose, the sprocket can come loose.

Tightening torque: 3.0 m-kg (22 ft-lb)

NOTE:

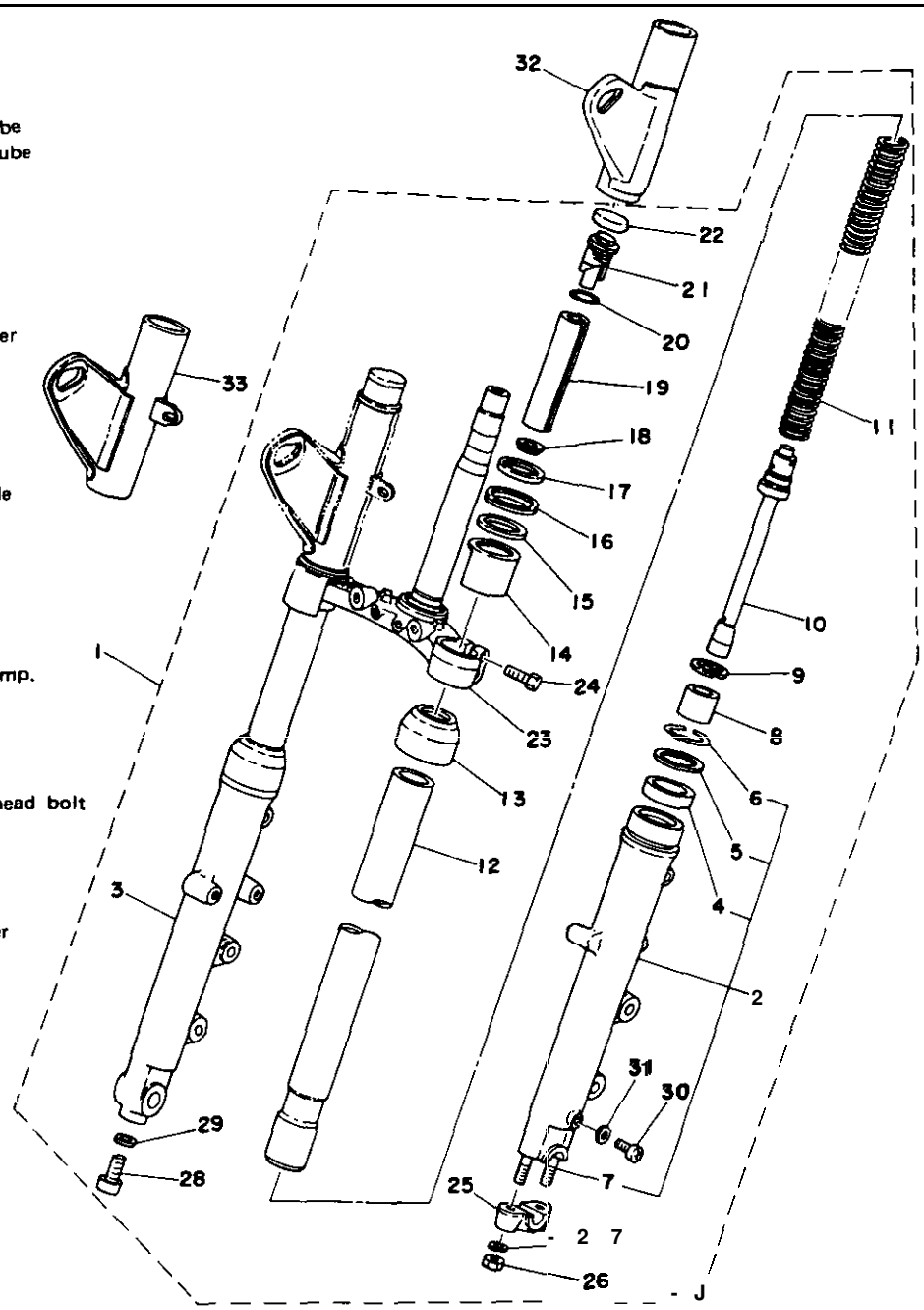
Be sure that all lock tabs are not cracked or broken and that they are all bent UP against the bolts.

3 **Constant friction and force from the chain creates wear on the sprocket teeth. If wear has progressed to the extent shown in this illustration, replace the sprocket.**



5-6. FRONT FORKS

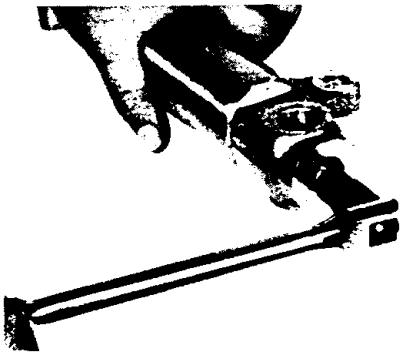
1. Front fork Ass'y
2. Outer lift fork tube
3. Outer right fork tube
4. Oil seal
5. Oil seal washer
6. Oil seal clip
7. Bllt
8. front fork piston
9. Circlip
10. Front fork cylinder
11. Spring
12. Inner fork tube
13. Dust seal
14. Outer cover
15. Gasket
16. Cover under guide
17. Washer
18. Spring upper seal
19. Spacer
20. O-ring
21. Cap bolt
22. Cap
23. Under bracket comp.
24. Bolt
25. Axle holder
26. Nut
27. Plate washer
28. Hexagon socket head bolt
29. Gasket
30. Drain plug
31. Drain plug gasket
32. Upper left cover
33. Upper right cover



A. Removal and disassembly

NOTE:
For fork oil replacement only, refer to PAGE (12)

1. Disconnect speedometer cable. Disconnect brake calipers and remove front wheel. Place wooden wedge or other object into caliper assemblies to keep brake pads apart. Remove front fender.
2. Loosen pinch bolts on steering stem and crown and remove fork.
3. Remove fork tube caps, spring stopper seats, and oil drain screws. Drain fork oil.
4. Remove Allen bolt from bottom of fork assembly. Pull inner tube out of outer tube.



5. To remove fork seal, pull off dust cover. Remove spring clip over oil seal. Pry out oil seal, being careful to not damage the fork tube.

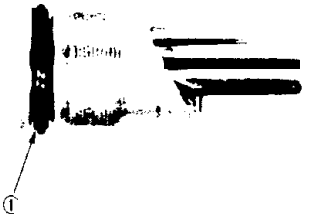


B. inspection

1. Examine fork inner tube for scratches and straightness. If the tube is scratched severely or bent, it should be replaced.
2. If the lips of the oil seal are worn, or the oil seal is leaking, replace it.
3. Check the outer tube for dents. If any dent causes the inner tube to “hang up” during operation, the outer tube should be replaced.
4. Check the free length of the springs.

Spring free length:
482 mm (18.98 in)

5. Check the O-ring on the top spring seat. If damaged, replace O-ring.



1. **O-ring**

C. Assembly

1. Make sure all components are clean before assembly.
2. Apply oil to the fork seal and install the seal spacer and seal by pressing in with a large socket. Install retaining clip.
3. Install inner tube into outer tube. Install dust cover. Install and tighten Allen bolt and washer. Assembly procedure is the reverse of the disassembly procedure.

NOTE:
When installing fork springs, the greater pitch should be at the bottom.



1. Bottom
2. To p

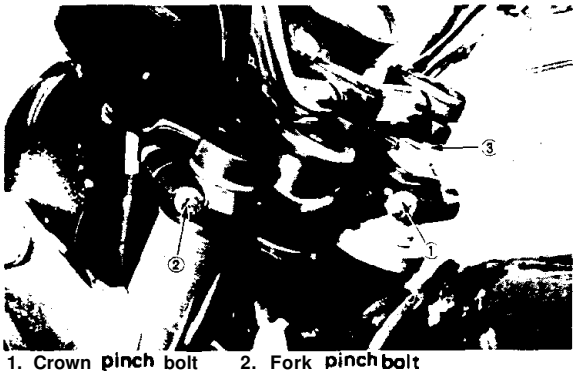
5-7. STEERING HEAD

A. Adjustment

(See Chapter 2-4 for Steering Head Adjustment.)

B. Removal

1. Remove front wheel, front forks and handle bars.
2. Remove front brake pipe junction.
3. Loosen steering stem (underbracket) pinch bolt. Remove stem bolt and washer.



1. Crown pinch bolt 2. Fork pinch bolt
3. Steering fitting bolt

4. Remove steering crown.
5. Remove top fitting nut. Use proper spanner.
6. Support steering stem (underbracket) and remove bottom fitting nut.
7. Remove bearings.

C. Inspection

1. Wash bearings in solvent.
2. inspect bearings for pitting or other damage. Replace bearings if pitted or damaged. Replace races when bearings are replaced.
3. Clean and inspect bearing races. If races are damaged, replace races and bearings.
4. Install bearings in races. Spin bearings. If the bearings hang up or are not smooth in their operation in the races, replace bearings and races.

D. Reassembly

1. Grease bearings and races with wheel bearing grease.



2. Install steering stem (underbracket) and bearings.
3. Install bottom fitting nut. Tighten to approximately 2.0 ~ 2.6 m-kg (14 ~ 19 ft-lb). Do not over-tighten. Tighten top fitting nut.
4. Continue reassembly in reverse assembly order.
5. When assembly is complete, check steering stem by turning it from lock to lock. If threr is any binding or looseness, readjust steering stem tightness.

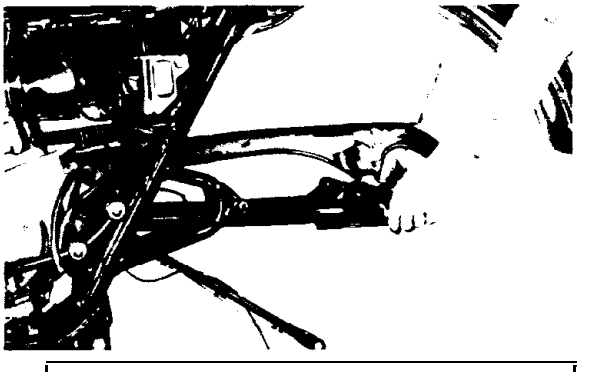
Pinch bolt torque:	
Handle crown	1.0 m-kg (7 ft-lb)
Under bracket.	1.5 m-kg (11 ft-lb)
Steering stem bolt torque:	
5.5 m-kg (40 ft-lb)	

5-8. SWING ARM

A. Inspection

1. Free play inspection

Remove rear wheel and shock absorbers. Grasp the swing arm and move it from side to side as shown. There should be no noticeable side play.



Swing arm freeplay: 1 mm (0.4 in)

2. If freeplay is excessive, remove swing arm and replace swing arm bushing.

B. Swing arm removal

1. Remove nut on swing arm pivot bolt and tap out bolt with a long aluminum or brass rod.

NOTE:
Carefully remove the arm while noting the location of spacing washers and shims.

Pivot bolt torque: 6.5 m-kg (47 ft-lb)

2. Tap out old bushing from each side of pivot using the long rod.
3. Install new bushings using a press.

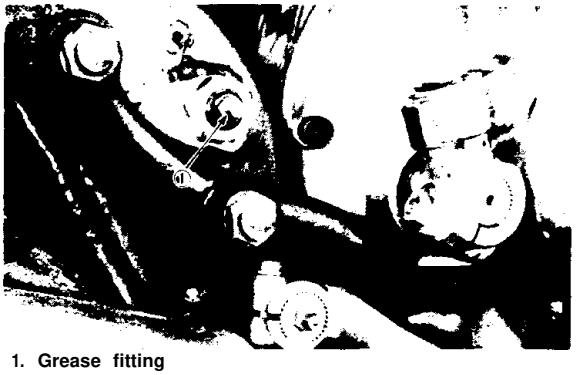
NOTE:
If tapping on bushing, bushing may be broken.

C. Swing arm lubrication

1. Apply grease to grease fitting on top of pivot with low pressure hand operated gun. Apply until fresh grease appears at both ends of pivot shaft.

Recommended lubricant:
Medium-weight grease

2. Wipe off excess grease.



1. Grease fitting

5-9. REAR SHOCK ABSORBER

A. Removal

Remove one (1) rear shock absorber at a time, inspect and reinstall before removing the other.

B. Inspection

1. Check the rod. If it is bent or damaged, replace the shock absorber.
2. Check for oil leakage. If oil leakage is evident, replace the shock absorber.
3. Operate shock absorber rod to check damping. There should be no noticeable damping as shock extends.
4. Install the shock absorber on the machine.

Rear shock absorber tightening torque:
3 m-kg (22 ft-lb)

5-10. CABLES AND FITTINGS

A.Cable maintenance

NOTE:
See maintenance and lubrication intervals charts. Cable maintenance is primarily concerned with preventing deterioration through rust and weathering and providing proper lubrication to allow the cable to move freely within its housing. Cable removal is straightforward and uncomplicated. Removal will not be discussed within this section.

WARNING:
Cable routing is very important. For details of cable routing, see the table routing diagrams! at the end of the manual. Improperly routed, assembled or adjusted cables may make the vehicle unsafe for operation.

1. Remove the cable.
2. Check for free movement of cable within its housing. If movement is obstructed, check for fraying or kinking of cable strands. If damage is evident, replace the cable assembly.
3. To lubricate cable, hold in vertical position. Apply lubricant to uppermost end of cable. Leave in vertical position until lubricant appears at bottom. Allow excess to drain and reinstall.

NOTE:
Choice of lubricant depends upon conditions and preferences. However, a semi-drying chain and cable lubricant will probably perform adequately under most conditions.

B. Throttle maintenance

1. Remove Phillips head screws from throttle housing assembly and separate two halves of housing.
2. Disconnect cable end from throttle grip assembly and remove grip assembly.

CHAPTER 6. ELECTRICAL

6-1. STARTER 50
A. Armature 50
B. Yoke 50
C. Starter relay switch 50
6-2. CHARGING SYSTEM 52
A. Charging circuit diagram. 52
B. A.C. Generator 52
C. Voltage regulator 52
D. Checking silicon rectifier 53
E. Battery 53
6-3. IGNITION SYSTEM 54
A. Ignition circuit diagram 54
B. Governor assembly 54
C. Spark gap test 54
D. Ignitioncoil 54
E. Condenser test 55
6-4. SPARK PLUG.. 56
A. How to "Read" a spark plug (condition) 56
B. Inspection 56
65. LIGHTING AND SIGNAL SYSTEMS 56
A. Lighting tests and checks 56
B. Reserve lighting system 57
C. Self-cancelling flasher system 58

6

CHAPTER 6. ELECTRICAL

6-1. STARTER

A.Armature

1. If the commutator surface is dirty, clean with #600 grit sandpaper as shown in the drawing below.
   After sanding, wash thoroughly with electrical contact cleaner and dry with high-pressure air steam.
2. The mica insulation between commutator segments should be 0.5 ~ 0.8 mm (0.02-0.03 in). below the segment level. If not, scrape to proper limits with appropriately shaped tool. (A hacksaw blade can be ground to fit).
3. Each commutator segment should show zero ohm resistance to the others and at least 3MΩ resistance to the core. If there is less than 3MΩ resistance to the core, or one of segments is open, replace the armature.
   In addition, the armature can be placed on a "growler" (testing device) and checked magnetically for internal shorts. Follow manufacturer's test recommendations.
4. If the commutator surface shows heavy scoring, it can be turned down on a lathe or commutator turning machine. Check the specification chart for minimum allowable commutator diameter. Recut the mica after.

NOTE:
Should turning be required, check the condition of the cover bearings, armature electrical properties starter amperage draw and rpm and, finally, carbon brushes.

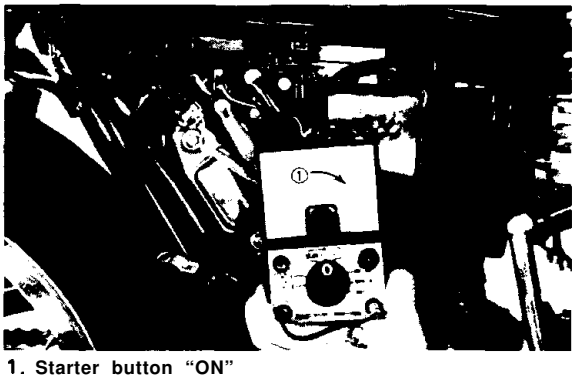
B. Yoke

1. If the yoke area is dirty, clean with clean solvent and dry with high-pressure air.
2. Yoke coil resistance is 0.05 ohm.
   The coil should be show zero ohm resistance, if it shows more than zero ohm, replace it.
   If the yoke shows leakage to ground (resistance is less then 100 kΩ) replace it.

NOTE:
Immediately after cleaning, the yoke may show some insulation leakage. Wait for it to thoroughly dry before checking or reinstalling.

C. Starter relay switch

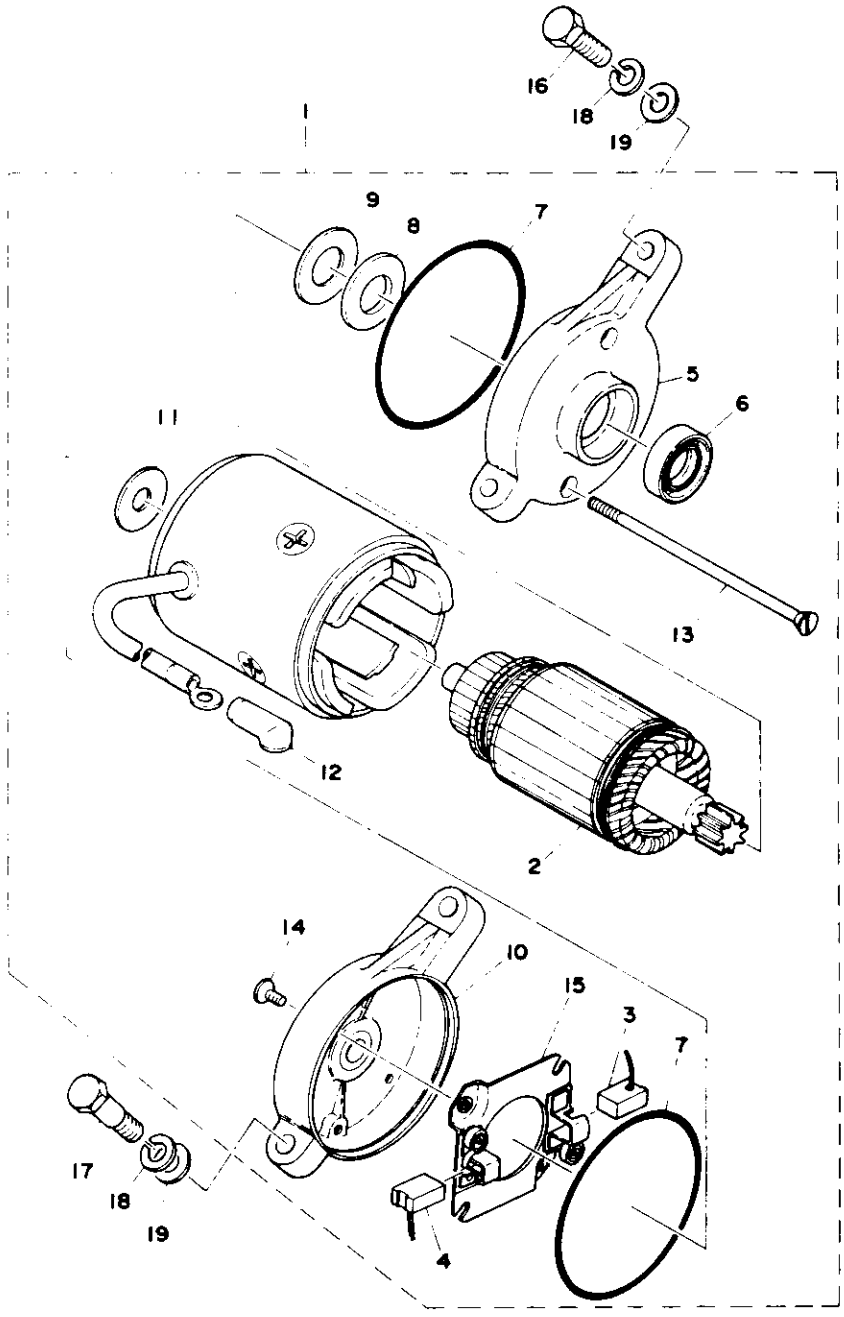
1. Inspection
   a. Disconnect starter relay leads at the relay.
   b. Connect pocket tester leads to the relay terminals (ohm x 1 scale).
   c. Turn ignition ON ("1" position) and engine stop switch to "RUN".
   d. Push starter button. The relay should click once and the scale should read zero ohm. If the relay clicks but the scale does not read zero, the relay must be replaced.



1. Starter button "ON"

   e. If the relay does not click, check the wires from the starter button and the battery (red/white, blue/white). Turn ignition off. Use (ohm x 1) scale on tester. The resistance between these wires should be no more than 3.5Ω. If there is more resistance, the relay should be replaced.

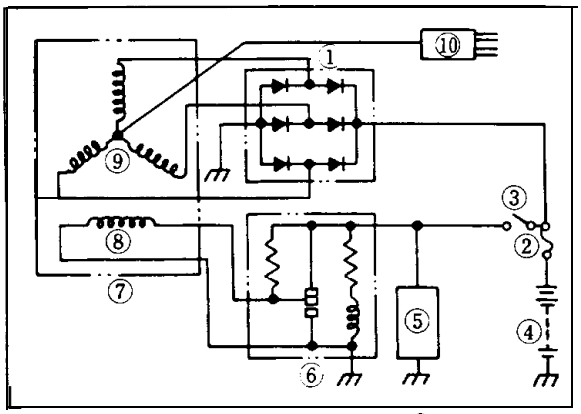
STARTING MOTOR



1. Starting motor Ass'y
2. Armature
3. Brush 1
4. Bursh 2
5. Starting motor 1 cover
5. Oil seal
7. O-ring
8. Special washer
9. Thrust 1 washer
10. Starting motor 2 cover
11. Thrust 2 washer
12. Cap
13. Special screw
14. Flathead screw
15. Brush holder
16. Bolt
17. Hexagon bolt
18. Spring washer
19. Plain washer

6-2. CHARGING SYSTEM

A.Charging circuit diagram



1. Rectifier
2. Fuse
3. Main switch
4. Battery
4. Load
6. Voltage regulator
7. A.C. Generator
8. Field coil
9. Stator coil
10. Relay unit

B. A.C.Generator

1. Checking method.

a. Connect D.C. voltmeter to the battery terminals. Battery should be fully charged.

b. Start engine.

c. Accelerate engine to approximately 2,000 rpm or more and check generated voltage.

Generated voltage:
14.5 ± 0.5 v

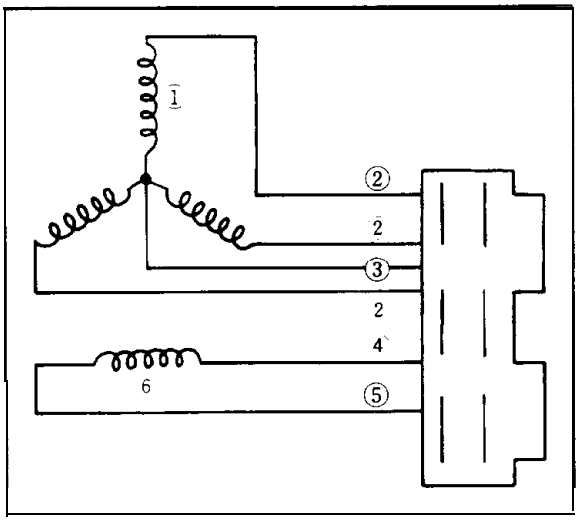
d. If the indicated voltage cannot be reached, then perform the tests in step 2.

NOTE:

Never disconnect wires from the battery while the generator is in operation. If the battery is disconnected, the voltage across the generator terminals will increase, damaging the diodes.

2. Resistance test of field coil and statorcoil. Check the resistance between terminals. If resistance is out of specification, coil is broken. Check the coil connections. If the coil connections are good, then the coil is broken inside and it should be replaced.

Field coil resistance:
(Green-Black)
5.25Ω ± 10% at 20°C
Stator coil resistance:
(W1-W2, W2-W3, W3-W1)
0.46Ω ± 10% at 20°C

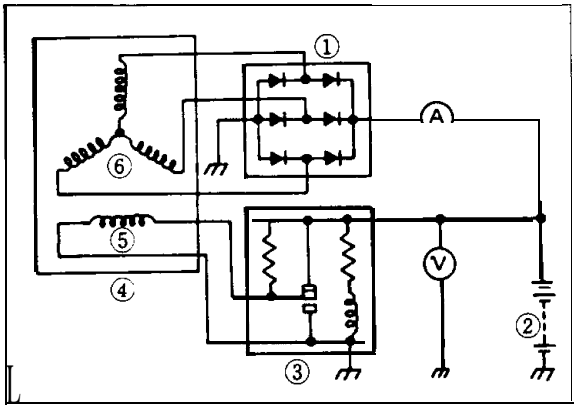


1. Stator coil
2. White
3. Yellow (Pick up cable)
4. Black
5. Sky blue
6. Field coil

C. Voltage regulator

The regulator's function is to pass a controlled amount of current through the field windings which creates a magnetic field that produces a charging voltage in the three stator windings.

1. When adjusting the regulator, a D.C. voltmeter, ammeter, and tachometer are necessary. They are connected as illustrated, and adjustment should be made in the following sequence:

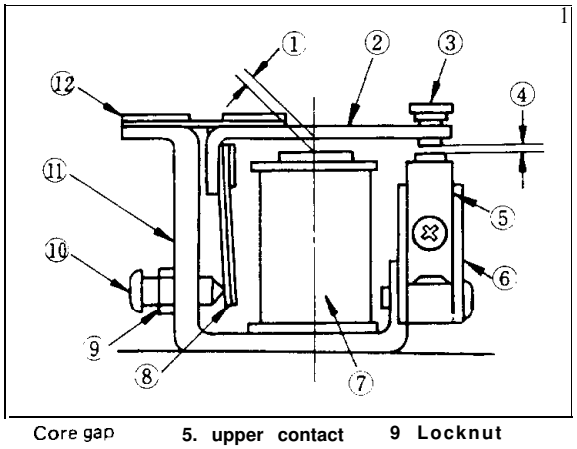


A. Ammeter
V. Voltmeter
1 Rectifier
2. Battery
3. Voltage regulator
4. AC. Generator
6. Field coil
6. Stator coil

a. Remove the regulator from the frame, and check the contact points. If the point surfaces are rough, they should be smoothed with sand paper (#500 or #600). After sandpapering, throughly clean contact points with contact point cleaner.

b. Check the core and points for gap adjustment. If any gap is incorrect, it should be adjusted.

> First adjust the core gap and then the point gap
> Core gap . . . . . 0.6 ~ 1.0 mm
> Point gap . . . . . 0.3 ~ 0.4 mm



1. Core gap
2. Armature
3. Lower contact
4. Point gap
5. upper contact
6. Contact set
7. Coil
8. Adjusting spring
9. Locknut
10. Adjusting screw
11. Yoke
12. Contact spring

c. Charging voltage output can be controlled at the regulator. Inside the housing is a screw that pushes against a flat spring steel plate. This is the adjusting screw.

d. Before starting engine, disconnect wire connector (coupler) containing 5 wires from rectifier (1 red, 1 black, 3 white). Remove the RED wire from the connector. Connect pocket tester (DC20V) red tester lead (+) to red wire from rectifier. Connect tester black (-) to good ground. Start engine. Tester should indicate 14.5 ~ 15 V (DC).

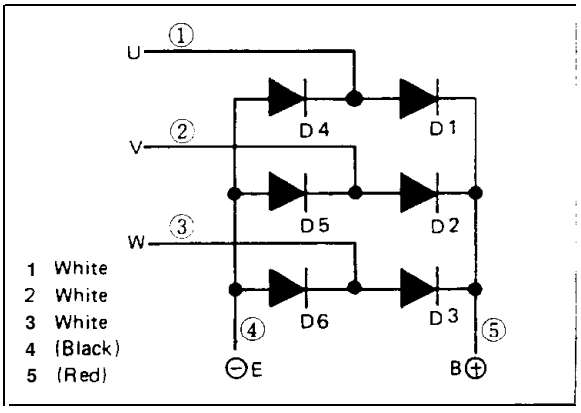
> CAUTION:
> Take care to not short the red wire. If this wire is shorted, the rectifier could be damaged.

D. Checking silicon rectifier

1. Check silicon rectifier as specified using the Yamaha Pocket Tester.

Continuity: Con

Checking element	Pocket tester connecting point (+) (red)	Pocket tester connecting point (−) (black)	Element O.K.	Replace (element shorted1	Replace (element opened)
D1	B	U	Con	Con	
	U	B	∞	Con	
D2	B	V	Con	Con	
	V	B	∞	Con	
D3	B	W	Con	Con	
	W	B	∞	Con	∞
D4	U	E	Con	Con	∞
	E	U	∞	Con	∞
D5	V	E	Con	Con	∞
	E	V	∞	Con	∞
D6	W	E	Con	Con	∞
	E	W	∞	Con	



Even if only one element is broken, replace assembly.

> CAUTION:
> /The silicon rectifier can be damaged if subjected to overcharging. Special care should be taken to avoid a short circuit, and/or incorrect connection of the positive and negative leads at the battery. Never connect the rectifier directly to the battery to make a check.

E. Battery

1. Checking

a. If battery sulfation (white accumulation) occurs on plates due to lack of battery electrolyte, the battery should be replaced.

b. If the bottoms of the cells are filled with corrosive material falling off the plates, the battery should be replaced.

2. The service life of a battery is usually 2 to 3 years, but lack of care as described below will shorten the life of the battery.

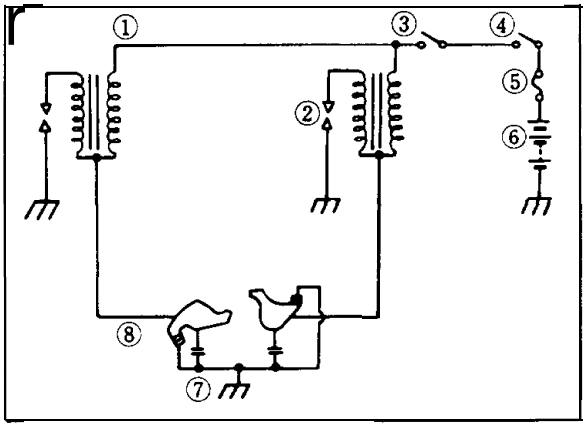
a. Negligence in keeping battery topped off with distilled water.
b. Battery being left discharged.
c. Over-charging with heavy charge.
d. Freezing.
e. Filling with water or sulfuric acid containing impurities.
f. Improper charging voltage or current on new battery.

Battery	12V, 14AH
Electrolyte	Specific gravity: 1 .28
Initial charging current	1.4 amp (new battery)
Recharging current	1.4 amp until specific gravity reaches 1.28
Refill fluid	Distilled water (to maximum level line)
Refill period	Check once per month (or more often. as required)

3. If the motorcycle is not to be used for a long time, remove the battery and have it stored. The following instructions should be observed :
a. Recharge the battery periodically.
b. Store the battery in a cool, dry place.
c. Recharge the battery before reinstallation.

6-3. IGNITION SYSTEM

A. Ignition circuit diagram



1. Ignition coil
2. Spark plug
3. Engine stop switch
4. Main switch
5. Fuse (20A)
6. Battery
7. Condenser
8. Contact breaker

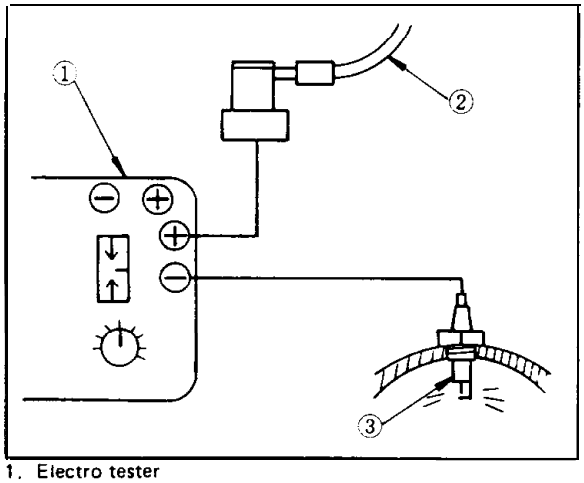
B. Governor assembly

1. Inspection
a. Both weights must pivot smoothly or ignition advance will not occur at the proper rpm, nor will it advance to its fullest extent. On occasion, lightweight grease must be applied to the weight pivot pins.
b. Check the operation of the point cam on the shaft. It must rotate smoothly.
c. Examine point cam surface. If surface is pitted or worn, the governor assembly must be replaced.

C. Spark gap test

The entire ignition system can be checked for misfire and weak spark using the Electro Tester. If the ignition system will fire across a sufficient gap, the engine ignition system can be considered good. If not, proceed with individual component tests until the problem is found.

1. Warm up engine throughly so that all electrical components are at operating temperature.
2. Stop engine and connect tester as shown.



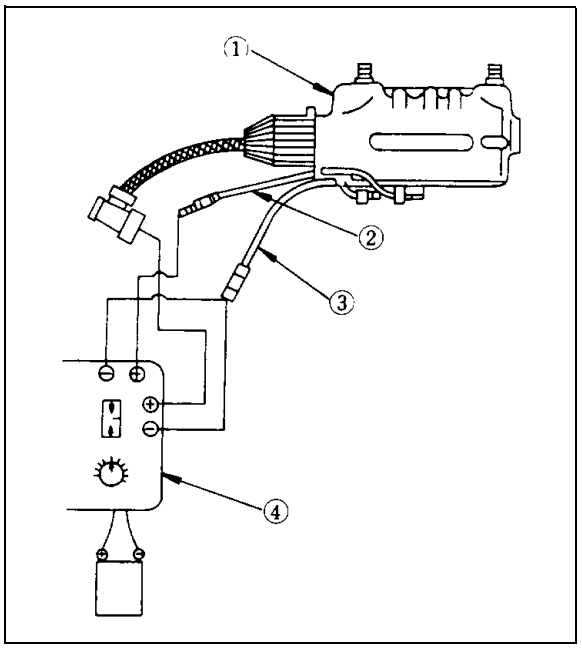
1. Electro tester
2. Plug wire from coil
3. Spark plug

3. Start engine and increase spark gap until misfire occurs. (Test at various rpm's between idle and red line.)

Minimum spark gap: 6 mm (0.24 in)

D. Ignition coil

1. Coil spark gap test.
a. Remove fuel tank and disconnect ignition coil from wire harness and spark plug.
b. Connect Electro Tester as shown.

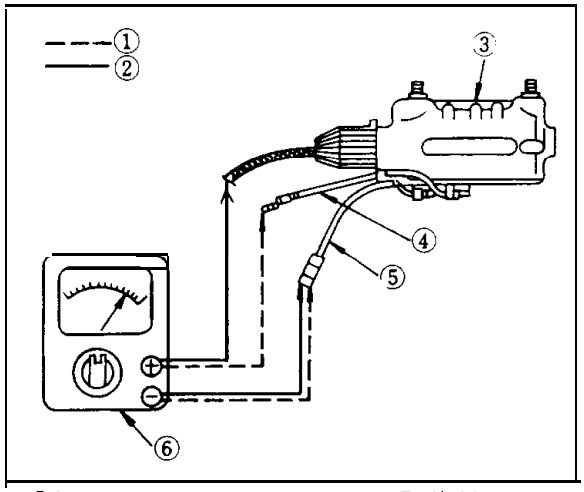


1. Ignition coil 3. Orange
2 Red/white 4. Electro tester

c. Connect fully charged battery to tester.
d Turn on spark gap switch and increase gap until misfire occurs.

Minimum spark gap:
6 mm (0.24 in)

2. Direct current resistance test.
Use a pocket tester or equivalent ohmmeter to determine resistance and continuity of primary and secondary coil windings.



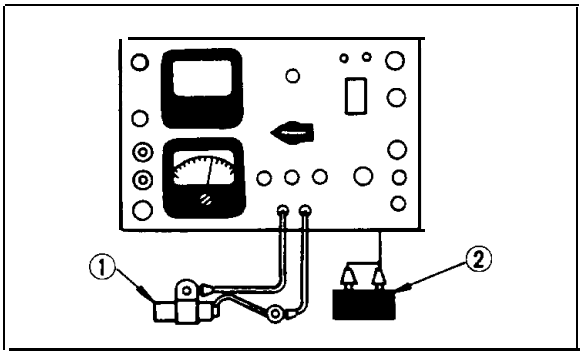
1. Primary coil resistance value
2. Secondary coil resistance value
3. Ignition coil
4. Red/white
5. Orange
6. Ohmmeter (Ωx1)

Standard values:
Primary coil resistance:
3.9Ω ± 10% at 20°C
Secondary coil resistance:
8KΩ ± 20% at 20°C

E. Condenser test
If the contact points show excessive wear, or the spark is weak (but the ignition coil is in good condition), check the condenser.
1. Capacity test (use Electro Tester).
a. Calibrate capacity scale.
b. Connect tester.
c. Meter needle will deflect and return to center as condenser is charged. After needle stops, note reading on "μF" scale.

Condenser capacity:
0.22μF ± 10%

2. Insulation test.
a. Connect ohmmeter as shown (Ω x 1,000 or more).
b. Resistance reading should be ∞ or at lease 3MR. If less, replace.



Condenser
2 Battery

CAUTION:
After this measurement, the condenser should be discharged by shorting the positive lead wire to the condenser case.

6-4. SPARK PLUG

The life of a spark plug and its discoloring vary according to the habits of the rider. At each periodic inspection, replace burned of fouled plugs with suitable ones determined by the color and condition of the bad plugs.

One machine may be ridden only in urban areas at low speeds; another may be ridden for hours at high speed. Confirm what the present plugs indicate by asking the rider how long and how fast he rides. Recommend a hot, standard, or cold plug type accordingly. It is actually economical to install new plugs often since it will tend to keep the engine in good condition and prevent excessive fuel consumption.

A. How to "Read" a spark plug (condition)

1. Best condition: When the porcelain around the center electrode is a light tan color.
2. If the electrodes and porcelain are black and somewhat oily, replace the plug with a hotter type for low speed riding.
3. If the porcelain is burned or glazed white and/or the electrodes are partially burned away, replace the plug with a colder type for high speed riding.

B. inspection

Instruct the rider to:

1. Inspect and clean the spark plug every 3,200 km. (2,000 mil)
2. Clean the electrodes of carbon and adjust the electrode gap.
3. Be sure to use the proper reach plug as a replacement to avoid overheating, fouling or piston damage.

Spark plug type:	N-7Y (Champion) or BP7ES (NGK)
Spark plug gap:	0.7 ~ 0.8 mm (0.027 ~ 0.031 in)

6-5. LIGHTING AND SIGNAL SYSTEMS

A. Lighting tests and checks

The battery provides power for operation of the horn, tail light, stop light, neutral light, and flasher light. If none of the above operates, always check battery voltage before proceeding further. Low battery voltage indicates either a faulty battery, low battery water, or a defective charging system. See section 6-2 Charging System, for checks of battery and charging system. Also check fuse condition. Replace any "open" fuses. There are individual fuses for various circuits.

1. Horn does not work:
   a. Check for 12V on brown wire to horn.
   b. Check for good grounding of horn (pink wire) when horn button is pressed.
2. Stop light does not work:
   a. Check bulb.
   b. Check for 12V on yellow wire to stop light.
   c. Check for 12V on brown wire to each stop light switch (front brake and rear brake switches).
3. Tail light does not work:
   a. Check bulb.
   b. Check for 12V on blue wire.
   c. Check for ground on black wire to tail/ stop light assembly.
4. Flasher light(s) do not work:
   a. Check bulb.
   b. Right circuit:
      1) Check for 12V on dark green wire to light.
      2) Check for ground on black wire to light assembly.
   c. Left circuit:
      1) Check for 12V on dark brown wire to light.
      2) Check for ground on black wire to light assembly.
   d. Right and left circuits do not work:
      1) Check for 12V on brown/white wire to flasher switch on left handlebar.
      2) Check for 12V on brown wire to flasher relay.
      3) Replace flasher relay.
      4) Replace flasher switch.
   e. Check flasher self-canceling system. (Refer to flasher self-canceling system.)
5. Neutral light does not work:
   a. Check bulb.
   b. Check for 12V on sky blue wire to neutral switch.
   c. Replace neutral switch.

B. Reserve lighting system

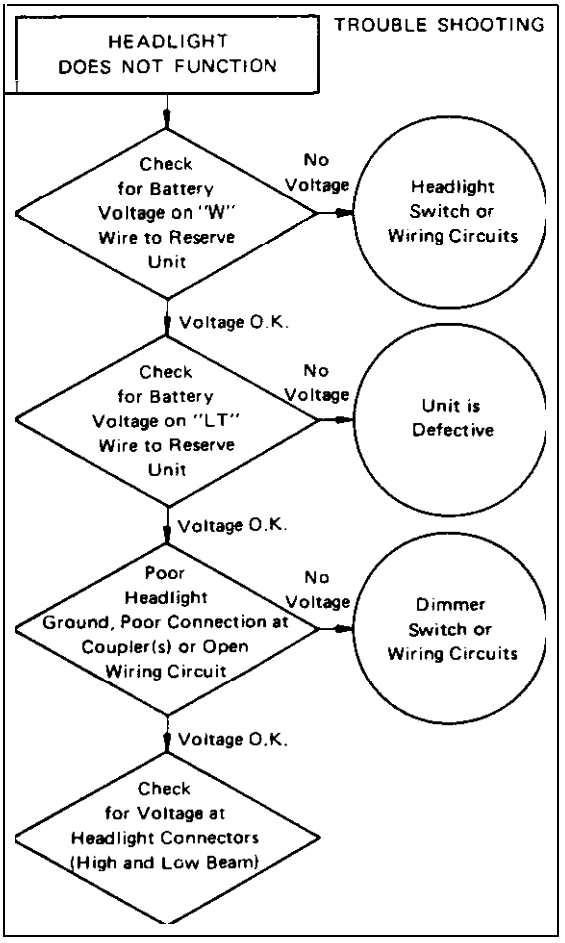
1. Description:

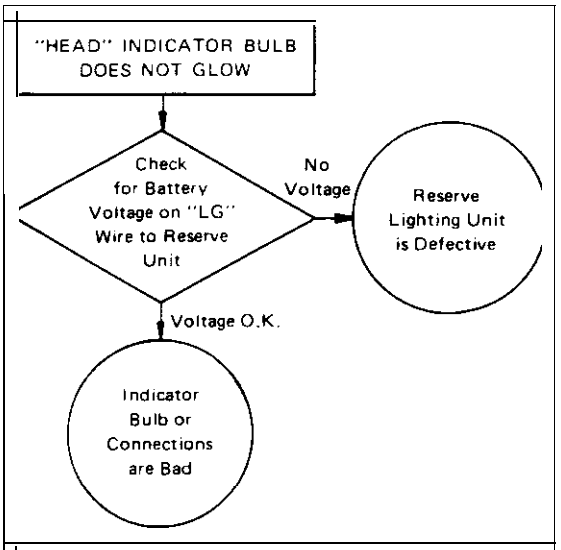
The reserve lighting system has two functions: (1) It notifies the rider that one of the head lamp filaments is inoperative, and (2) it switches current from the inoperative filament to the remaining functional filament.

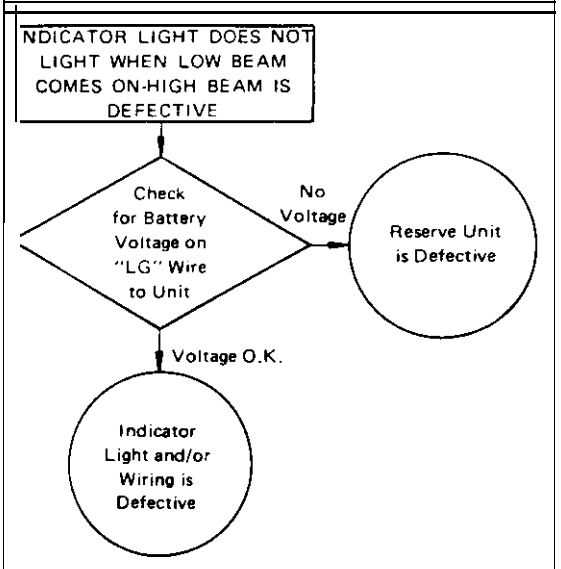
The system is connected to the headlight circuit only. The reserve lighting system unit is located under the fuel tank.

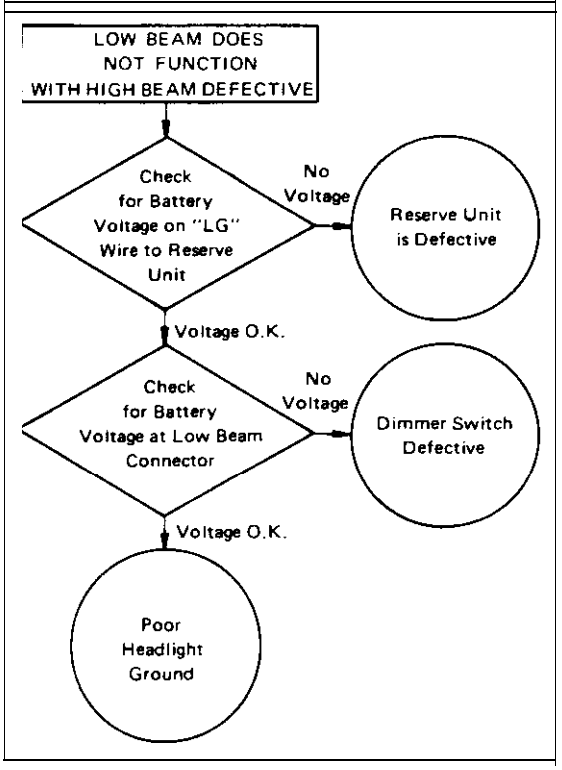
HEADLIGHT CONDITION	"HEAD" INDICATOR LIGHT	RESERVE LIGHTING FUNCTION
Normal	*Comes on (very dim)	.....
High beam faulty	Comes on	Low beam comes on
Low beam faulty	Comes on	High beam comes on at low brilliance

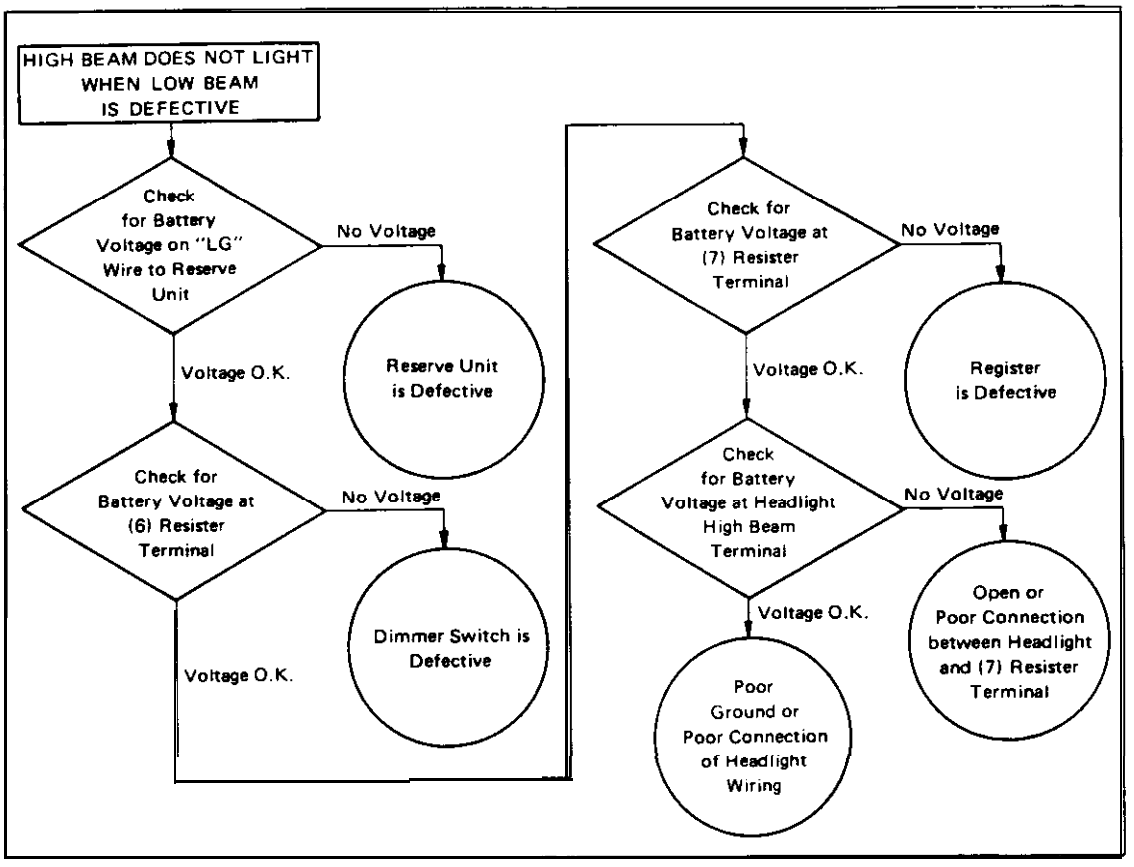
*Can only be seen by removing cover and inspecting bulb.











C. Self-canceling flasher system

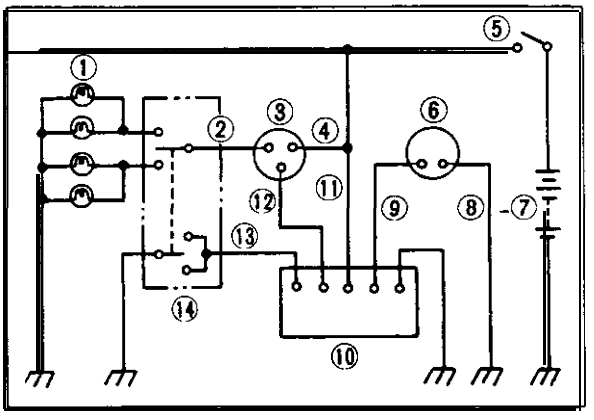
1. Description

The self-cancaling flasher system turns off the turn signal after a period of time or distance involved in turning or changing lanes. Generally, the signal will cancel after either 10 seconds, or 130 meters, whichever is greater. At very low speed, the function is determined by distance; at high speed, it is determined by time. At low speed, especially when changing speeds, the canceling determination is a combination of both time and distance.

2. Operation:

The handle switch has three positions: L (left), OFF, and R (right). The switch lever will return to the "OFF" position after being pushed to L or R, but the signal will function. By pushing the lever in, the signal may be cancelled manually,

3. Circuit diagram.



1. Flasher light
2. Brown/White
3. Flasher relay
4. Brown
5. Main switch
6. Speedometer sensor
7. Buffery
8. Black
9. White/Green
10. Flasher cancelling unit
11. Brown
12. Yellow/green
13. Yellow/red
14. Handle switch

4. Inspection:

If the flasher self-canceling system should become inoperative, proceed as follows:

a. Pull off the 6-pin connectar from the flasher canceling unit, and operate the handle switch. If the signal operates normally in L, R, and OFF, the following are in good condition:
   1) Flasher unit.
   2) Bulb.
   3) Lighting circuit.
   4) Handle switch light circuit.

   If (1) through (4) are in good condition. the following may be faulty:
   1) Flasher canceling unit.
   2) Handle switch reset circuit.
   3) Speedometer sensor circuit.

b. Pull off the 6-pin connector from the flasher canceling unit, and connect a tester (Ω x 100 range) across the white/ green and the black lead wires on the wire harness side. Turn the speedometer shaft. If the tester needle swings back and forth, four times between 0 and ∞, the speedometer sensor circuit is in good condition. If not, the sensor or wire harness may be inoperative.

c. Pull off the 6-pin connector from the flasher canceling unit. Check if there is continuity between the yellow/red lead wire on the wire harness side and the chassis.

Flasher switch OFF	∞
Flasher switch L or R	0Ω

   If the test needle does not swing as indicated above, check the handle switch circuit and wire harness.

d. If no defect is found with the above three check-ups and the flasher canceling system is still inoperative, replace the flasher canceling unit.

e. If the signal ftashes only when the handle switch lever is turned to L or R and it turns off immediately when the handle switch lever returns to center, replace the flasher canceling unit.

7

CHAPTER 7. APPENDICES

7-1. TORQUE SPECIFICATION 61

Torque Specifications 61

7-2. CONVERSION TABLE 63

Metric to Inch System 63

Inch to Metric System 63

Definition of Terms 63

7-3. SPECIFICATION 64

A. General 64

B. Engine 64

C. Chassis 66

D. Electrical 70

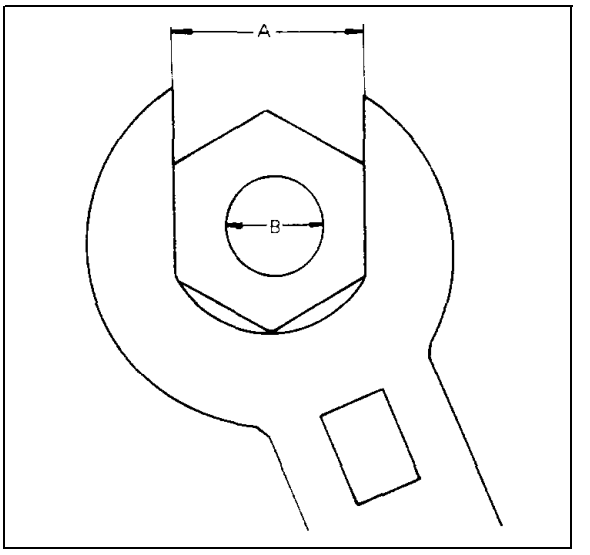
7-4. CABLE ROUTING DIAGRAM 72

7-5. CIRCUIT DIAGRAM 74

7-1. TORQUE SPECIFICATION

The following torque specifications must be adhered to on every machine. When applying torque to multi-secured fastener components, the several studs should be tightened in gradual stages and in a pattern that will avoid warpage to the item being secured. Torque settings are for dry, clean threads. Torquing should always be done to the nut, never the bolt head.

NOTE:
Certain items with other than standard thread pitches may require differing torque.



Torque **Specifications**

A (Nut)	B (Bolt)	Standard tightening torque		
		m-kg	ft-lb	in-lb
10mm	6 mm (M6)	1.0	7	85
12mm	8mm (M8)	2.0	14	175
14 mm	10 mm (M10)	3.5 ~ 4.0	25 ~ 29	300 ~ 350
17 mm	12 mm (M12)	4.0 ~ 4.5	29 ~ 33	350 ~ 400
19mm	14 mm (M14)	4.5 ~ 5.0	33 ~ 36	400 ~ 440
22 mm	16 mm (M16)	5.6 ~ 6.5	41 ~ 49	480 ~ 570
24 mm	18 mm (M18)	5.8 ~ 7.0	42 ~ 50	504 ~ 600
27 mm	20 mm (M20)	7.0 ~ 8.3	50 ~ 60	600 ~ 700

Part to be tightened	Thread dia. and part name	Tightening torque
Engine:		
Cylinder head and cylinder head cover	10mm nut 8 mm bolt	3.8 m-kg (27 ft-lb) 2.2 m-kg (16 ft-lb)
Cylinder head	6 mm bolt	1.0 m-kg (7 ft-lb)
Cylinder head cover side	6 mm crown nut 8 mm crown nut	1.0 m-kg (7 ft-lb) 1.5 m-kg (10 ft-lb)
Spark plug	I 14 mm	2.0 m-kg (14 ft-lb)
Generator	12 mm nut	4.0 m-kg (29 ft-lb)
Stator coil	6 mm pan headscrew	1.0 m-kg (7 ft-lb)
Governer	6 mm bolt	0.8 m-kg (6 ft-lb)
Valve clearance adjustment nut	8 mm nut	2.7 m-kg (20 ft-lb)
Cam chain tensioner cover	18 mm cap	2.2 m-kg (16 ft-lb)
Pump cover	6 mm pan head screw	1.O m-kg (7 ft-lb)
Strainer cover	6 mm bolt	1.0 m-kg (7 ft-lb)
Drain plug	30 mm bolt	4.4 m-kg (32 ft-lb)
Filter cover	6 mm bolt	1.0 m-kg (7 ft-lb)
Oil filter	16 mm bolt	1.0 m-kg (7 ft-lb)

Part to be tightened	Thread dia. and part name	Tightening torque
Delivery pipe	10 mm union bolt	2.2 m-kg (16 ft-lb)
Exhaust pipe	8mm nut	1.5 m-kg (11 ft-lb)
Crankcase 1 and 2	8 mm bolt/nut	2.2 m-kg (16 ft-lb)
Crankcase cover	6 mm bolt	1 .O m-kg (7 ft-lb)
Kick crank boss	8 mm bolt	2.0 m-kg (14 ft-lb)
Clutch spring	6 mm screw	1 .O m-kg (7 ft-lb)
Primary drive gear	14 mm nut	9.0 m-kg (65 ft-lb)
Clutch boss	18 mm nut	6.5 m-kg (47 ft-lb)
Drive sprocket	22 mm nut	5.0 m-kg (36 ft-lb)
Change pedal	6 mm bolt	1 .O m-kg (7 ft-lb)
Chassis: Front wheel shaft	14 mm nut	8.5 m-kg (61 ft-lb)
Outer tube and axle holder	8mm nut	1.5 m-kg (11 ft-lb)
Handle crown and inner tube	8mm nut	1.0 m-kg (7 ft-lb)
Handle crown and steering shaft	8 m m nut	1.0 m-kg (7 ft-lb)
Handle crown and steering shaft	14 mm bolt	5.5 m-kg (40 ft-lb)
Handle crown and handle holder	8 mm bolt	2.5 m-kg (18 ft-lb)
Under bracket and inner tube	8 mm nut	1.5 m-kg (11 ft-lb)
Engine mounting bolts		Refer to 33
Front flasher and head lamp	8 mm nut	1.0 m-kg (7 ft-lb)
Master cylinder and brake hose	10 mm union bolt	2.5 m-kg (18 ft-lb)
Brake disc and hub	8 mm bolt	2.0 m-kg (14 ft-lb)
Caliper and support bracket	8 mm bolt	2.0 m-kg (14 ft-lb)
Caliper and pad	5 mm bolt	0.3 m-kg (2 ft-lb)
Caliper and bleed screw	8 mm bolt	0.6 m-kg (4 ft-lb)
Support bracket and front fork	10 mm bolt	3.5 m-kg (25 ft-lb)
Master cylinder and cylinder bracket	6 mm bolt	0.6 m-kg (4 ft-lb)
Pivot shaft	14 mm nut	6.5 m-kg (47 ft-lb)
Rear wheel shaft	16 mm nut	15 m-kg (108 ft-lb)
Tension bar and brake plate	8 mm nut	2.0 m-kg (14 ft-lb)
Tension bar and rear arm	8 mm nut	2.0 m-kg (14 ft-lb)
Rear shock absorber	10 mm bolt	3.0 m-kg (22 ft-lb)
Rear arm and rear arm end	8 mm bolt	1.0 m-kg (7 ft-lb)
Sprocket wheel	10 mm nut	3.0 m-kg (22 ft-lb)
Handle crown and meter bracket	8 mm	2.5 m-kg (18 ft-lb)
Front fender	8 mm bolt	1.0 m-kg (7 ft-lb)
Neutral switch and engine	12 mm	1.5 m-kg (11 ft-lb)

7-2. CONVERSION TABLE

Metric to Inch System		
Known	Multiplier (Rounded off)	Result
Torque		
m-kg	7.233	ft-lbs
m-kg	86.80	in-lbs
cm-kg	0.0723	ft-lbs
cm-kg	0.8680	in-lbs
Wt.		
kg	2.205	lb
g	0.03527	oz
Flow/Distance		
km/l	2.352	mpg
km/hr	0.6214	mph
km	0.6214	mi
m	3.281	ft
m	1.094	yd
cm	0.3937	in
mm	0.03937	in
Vol./Capacity		
cc (cm^3)	0.03382	oz(US liq)
cc (cm^3)	0.06102	cu. in
l (liter)	2.1134	pt (US lia)
l (liter)	1.057	qt (US liq)
l (liter)	0.2642	gal (US liq)
Misc.		
kg/mm	56.007	lb/in
kg/cm^2	14.2234	psi (lb/in^2)
Centigrade (°C)	9/5 (°C) + 32	Fahrenheit (°F)

Inch Metric System		
Known	Multiplier (Rounded off)	Result
Torque		
ft-lbs	0.13826	m-kg
in-lbs	0.01152	m-kg
ft.lbr	13.831	cm-kg
in-lbs	1.1521	cm-kg
Wt.		
lb	0.4535	kg
oz	28.352	g
Flow/Distance		
mpg	0.4252	km/l
mph	1.609	km/hr
mi	1.609	km
ft	0.3048	m
yd	0.9141	m
in	25.4	cm
in	25.4	mm
Vol./Capacity		
oz (US liq)	29.57	cc (cm^3)
cu. in	16.387	cc (cm^3)
pt (US liq)	0.4732	l (liter)
qt (US liq)	0.9461	l (liter)
gal (US liq)	3.765	l (liter)
Misc.		
lb/in	0.017855	kg/mm
psi (lb/in^2)	0.07031	kg/cm^2
Fahrenheit (°F)	5/9 (°F) − 32	Centigrade (°C)

Definition of Terms:

m-kg = Meter-kilograms: Usually torque.
g = Gram(s).
kg = Kilogram(s): 1,000 grams.
km = Kilometer(s).
l = Liter(s).
km/l = Kilometer(s) per liter: Mileage.
cc = Cubic centimer(s) (cm^3): Volume or capacity.
kg/mm = Kilogram(s) per millimeter: Usually spring compression rate,
kg/cm^2 = Kilogram(s) per square centimeter: Pressure.

7.3. SPECIFICATION

A. General

1. MODEL	
1) Model (I.B.M. No.)	XS650E (2F0)
2) Frame I.D. and starting number	2F0-000101
3) Engine I.D. and starting number	2F0-000101
2. DIMENSION	
1) Overall length	2,180 mm (85.8 in)
21 Overall width	835 mm (32.9 in)
3) Overall height	1,160 mm (45.7 in)
4) Seat height	815 mm (32.1 in)
5) Wheelbase	1,435 mm (56.5 in)
6) Minimum ground clearance	150 mm (5.9 in)
3. WEIGHT	
1) Net weight (Dry)	212 kg (467 lb)
4. PERFORMANCE	
1) Climbing ability	26°
2) Minimum turning radius	2,500 mm (98.4 in)
3) Braking distance	14 m @ 50 km/h (45.9 ft @ 31 mi/h)

B. Engine

1. DESCRIPTION		
1) Engine type		Air cooled, 4-stroke. SOHC twin. parallel forward incline
2) Engine model		2F0
3) Displacement		653 cc (39.85 cu.in)
4) Bore x stroke		75 x 74 mm (2.953 x 2.913 in)
5) Compression ratio		8.5 : 1
6) Starting system		Kick and electric starter
7) Ignition system		Battery ignition
8) Lubrication system		Wet sump
2. CYLINDER HEAD		
1) Combustion chamber volume (with N-7Y)		44.18 cc (2.696 cu.in)
2) Combustion chamber type		Dome + Squish
3) Head gasket thickness		1.2 mm (0.047 in)
3. CYLINDER		
1) Material		Aluminum alloy with cast iron sleeve
2) Bore size		$75.00^{+0.02}_{0}$ mm ($2.9528^{+0.0008}_{0}$ in)
3) Taper limit		0.05 mm (0.002 in)
4) Out of round limit		0.01 mm (0.0004 in)
4. PISTON		
1) Piston skirt clearance		0.050 ~ 0.055 mm (0.0020 ~ 0.0022 in)
21 Piston oversize		75.25 mm (12.963 in) / 75.50 mm (12.972 in, / 75.75 mm (12.982 in) / 76.00 mm (2.992 in)
3) Piston pin outside diameter x length		$20.0^{0}_{-0.005}$ mm x $61.0^{0}_{-0.3}$ mm ($0.79^{0}_{-0.0002}$ in x $2.40^{0}_{-0.0116}$ in)
5. PISTON RING		
1) Piston ring design	(Top)	Barrel ring 1.2 mm (0.047 in)
	(2nd)	Taper ring 1.5 mm (0.059 in)
	(Oil ring)	With expander 2.8 mm (0.110 in)
2) Ring end gap	(Installed. top)	0.2 ~ 0.4 mm 10.008 ~ 0.016 in)
	(Installed. 2nd)	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)
	(Installed, oil)	0.3 ~ 0.9 mm (0.012 ~ 0.036 in)
3) Ring groove side clearance	(Top)	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)
	(2nd)	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)

6. BIG END BEARING

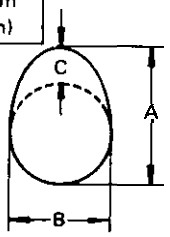
1) Type	Needle bearing
2) Bearing size I.D. x O.D. x Width	26 x 34 x 19.8 mm (1.024 x 1.339 x 0.780 in)
3) Needle size O.D. x Length x Number	4 x 15.8 mm x 13 (0.157 x 0.662 in x 13)

7. CAMSHAFT

1) Cam drive type	Chain (Center side)
2) Number and type of bearing	4 bearings, Ball bearings
3) Bearing dimensions I.D. x O.D. x Width	25 x 47 x 8 mm (0.984 x 1.850 x 0.315 in)

4) Cam dimensions

	Cam height "A"	Limit	Width "B"	Limit	Lift "C"
IN	39.99 ± 0.05 mm (1.574 ± 0.002 in)	39.84 mm (1.569 in)	32.24 ± 0.05 mm (1.269 ± 0.002 in)	32.09 mm (1.263 in)	7.991 mm (0.315 in)
EX	40.03 ± 0.05 mm (1.576 ± 0.002 in)	39.88 mm (1.570 in)	32.30 ± 0.05 mm (1.272 ± 0.002 in)	32.15 mm (1.266 in)	8.030 mm (3.161 in)



5) Valve timing

	OPEN	CLOSE	DURATION	OVERLAP
IN	BTDC36°	ABDC68°	284°	72°
EX	BBDC68°	ATDC36°	284°	

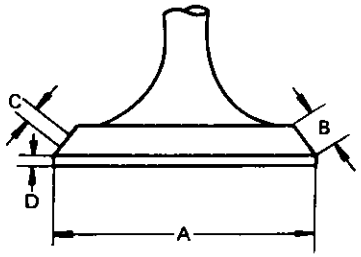
6) Camshaft deflection limit	0.03 mm (0.0012 in)
7) Cam chain	
Type	TSUBAKIMOTO BF05M
Pitch/Number of links	7.774 mm (0.3060 in)/106
Sprocket ratio (Teeth)	36/18 (2.000)

8. ROCKER ARM AND ROCKER SHAFT

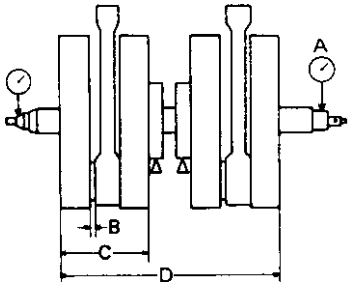
1) Rocker arm inner diameter	$15.0^{+0.018}_{0}$ mm ($0.591^{+0.0007}_{0}$ in)
2) Rocker arm shaft diameter	$15.0^{-0.009}_{-0.015}$ mm ($0.591^{-0.00035}_{-0.00059}$ in)
3) Clearance	0.009 ~ 0.033 mm (0.00035 ~ 0.00130 in)
4) Lift ratio	X : Y = 40 mm : 48.41 mm (1.575 in : 1.906 in)

9. VALVE, VALVE SEAT AND VALVE GUIDE

1) Valve per cylinder	2 pcs.
2) Valve clearance (In cold engine)	IN: 0.10 mm (0.0039 in) EX: 0.15 mm (0.0059 in)
3) Dimensions	
Valve head diameter "A"	IN: 41 mm (1.614 in) EX: 35 mm (1.378 in)
Valve face width "B"	IN: 2.1 mm (0.083 in) EX: 2.1 mm (0.083 in)
Valve seat width "C"	IN: 1.3 mm (0.051 in) EX: 1.3 mm (0.051 in)
Valve margin thickness "D"	IN: 1.3 mm (0.051 in) EX: 1.3 mm (0.051 in)

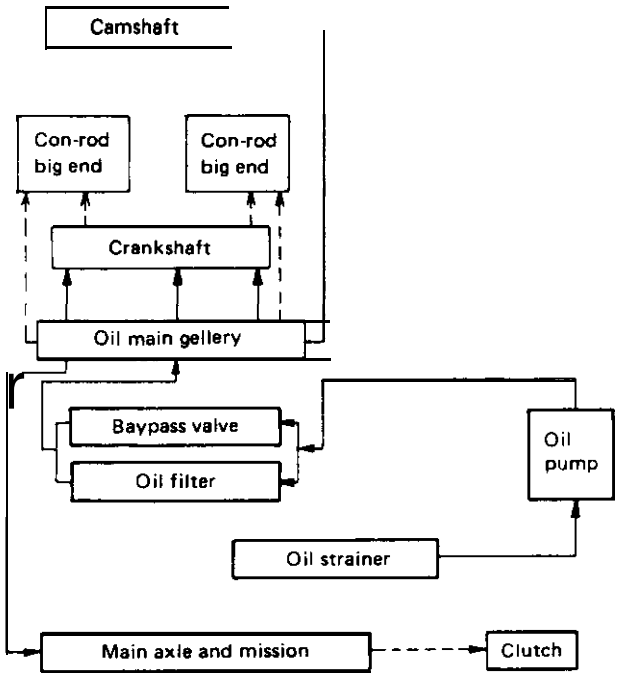


Valve stem diameter	IN: $8.0^{-0.010}_{-0.025}$ mm ($0.315^{-0.0004}_{-0.0009}$ in) EX: $8.0^{-0.025}_{-0.040}$ mm ($0.315^{-0.0010}_{-0.0016}$ in)
Valve guide diameter	IN: $8.0^{+0.019}_{+0.010}$ mm $10.315^{+0.0007}_{+0.0004}$ in) EX: $8.0^{+0.019}_{+0.010}$ mm ($0.315^{+0.0007}_{+0.0004}$ in)
Valve stem to guide clearance	IN: 0.020 ~ 0.044 mm (0.00079 ~ 0.00173 in) EX: 0.035 ~ 0.059 mm (0.00138 ~ 0.00232 in)
4) Valve face runout limit	IN & EX: 0.03 mm (0.0012 in) or less

10. VALVE SPRING	
1) Free length	INNER (IN/EX): 42 mm (1.654 in) OUTER (IN/EX): 42.55 mm (1.675 in)
2) Spring rate (kg/mm)	INNER (IN/EX): k_1 = 1.43 k_2 = 1.81 OUTER (IN/EX): k_1 = 3.2 k_2 = 4.18
3) Installed length (Valve closed)	INNER (IN/EX): 35 mm (1.378 in) OUTER (IN/EX): 37 mm (1.457 in)
4) Installed pressure (Valve closed)	INNER (IN/EX): 10 ± 0.7 kg (22.0 ± 1.5 lb) OUTER (IN/EX): 17.7 ± 1.25 kg (39.0 ± 2.6 lb)
5) Compressed length (Valve open)	INNER (IN/EX): 25.5 mm (1.004 in) OUTER (IN/EX): 27.5 mm (1.083 in)
6) Compressed pressure (Valve open)	INNER (IN/EX): 27.2 ± 1.9 kg (60.0 ± 4.2 lb) OUTER (IN/EX): 57.4 ± 4.0 kg (126.5 ± 8.8 lb)
7) Wire diameter	INNER (IN/EX): 2.9 mm (0.114 in) OUTER (IN/EX): 4.2 mm 10.165 in)
8) Winding O.D.	INNER (IN/EX): 19.4 mm (0.764 in) OUTER (IN/EX): 32.6 mm (1.283 in)
9) Number of windings	INNER (IN/EX): 6.0 turns OUTER (IN/EX): 4.25 turns
11. CRANKSHAFT	
	
1) Crankshaft deflection limit (A)	0.05 mm (0.002 in)
2) Con-rod large end clearance (B)	0.15 ~ 0.4 mm 10.0059 ~ 0.0157 in)
3) Width of crankshaft (C)	$66^{-0.05}_{-0.10}$ mm ($2.598^{-0.002}_{-0.004}$ in)
(D)	$186^{0}_{-0.3}$ mm ($7.323^{0}_{-0.012}$ in)
4) Crank pin I.D.	$26^{-0.077}_{-0.095}$ mm ($1.024^{-0.003}_{-0.004}$ in)
5) Crank pin O.D. x length	$26^{0}_{-0.006} \times 65^{+0.1}_{-0.2}$ mm ($1.024^{0}_{-0.0002} \times 2.559^{+0.004}_{-0.008}$ in)
12. CONNECTING ROD	
1) Big end I.D.	$34^{+0.016}_{0}$ mm ($1.339^{+0.0006}_{0}$ in)
2) Small end I.D.	$20^{+0.028}_{+0.015}$ mm ($0.787^{+0.0011}_{+0.0006}$ in)
13. CRANK BEARING	
1) Size Right end I.D. x O.D. x Width	30 x 70 x 19 mm (1.16 x 3.07 x 0.75 in)
Others I.D. x O.D. x Width	32 x 68 x 17 mm (1.26 x 2.69 x 0.67 in)
2) Oil seal type/size (I.D. x O.D. x Width)	SD25 x 40 x 9.0 mm (0.984 x 1.575 x 0.354 in)
14. CLUTCH	
1) Clutch type	Wet, multiple type
2) Clutch operating mechanism	Inner push type, screw push system
3) Primary reduction ratio and method	72/27 (2.666). spar gear
4) Primary reduction gear back lash	
Tolerance	0.05 ~ 0.08 mm (0.0020 ~ 0.0031 in)
5) Friction plate	
Thickness/Quantity	3 mm (0.118 in)/7 pcs.
Wear limit	2.7 mm (0.106 in)
6) Clutch plate	
Thickness/Quantity	1.4 mm 10.055 in)/6 pcs.
Warp limit	0.05 mm (0.002 in)

71 Clutch spring Free length/Quantity	 34.6 mm 11.362 in)/6 pcs.
8) Clutch housing radial play	0.027 ~ 0.081 mm (0.0011~ 0.0032 in)
9) Push rod bending limit	0.2 mm (0.008 in)
5. TRANSMISSION	
1)Type	Constant mesh, 5-speed forward
21 Gear ratio: 1st	32/13 (2.461)
2nd	27/17 (1.588)
3rd	26/20 (1.300)
4th	23/21 (1.095)
5th	22/23 (0.956)
3) Bearing type: Main axle (Left)(I.D.xO.D.xWidth)	Needle bearing (20x30x20 mm)(0.787x1.181x0.787 in)
Main axle (Right)(")	Ball bearing (25x52x20.6 mm)(0.984x2.047x0.811 in)
Drive axle (Left)(")	Ball bearing (30x62x23.8 mm)(1.181x2.441x0.937 in)
Drive axle (Right)(")	Needle bearing (20x30x16mm)(0.787x1.181x0.630 in)
4) Oil seal type Drive axle (Left)(")	SDD (40x62x9 mm)(1.575x2.441x0.354 in)
5) Secondary reduction ratio and method	34/17(2.0), chain
6. SHIFTING MECHANISM	
1) Type	Cam drum, return type
2) Oil seal type (Change lever) I.D.xO.D.x Width	SDO-14x24x6 mm 10.551x0.945x0.236 in)
7. KICK STARTER	
1)Type	Bendix type
2) Oil seal type (Kick axle) I.D.xO.D.x Width	SD-25x35x7 mm (0.984x1.378x0.276 in)
3) Kick clip friction tension	1.2 ~ 1.7 kg (2.6 ~ 3.7 lb)
8. INTAKE	
1) Air cleaner: Type/Quantity	Dry, foam rubber/2 pcs.
2) Cleaner cleaning interval	Every 1,600 km II.000 mile)
9. CARBURETOR	
1) Type and manufacturer/Quantity	BS38 MIKUNI/2 pcs.
2) I.D. mark	2F000
3) Main jet (MJ)	#135
4) Air jet (AJ)	#140
5) Jet needle (JN)	502.3
6) Needle jet (NJ)	z-2
7) Throttle valve (Th.V)	#120
8) Pilot jet (PJ)	#27.5
9) Pilot screw (Turns out)(PS)	2¼
10) starter jet (GS)	GS_1 : #80, GS_2 : 0.5
11) Fuel level (FL)	24 ± 1 mm (0.94 ± 0.04 in)
121 Vacuum synchronization	Same readings
13) Idling engine speed	1,200 rpm
0. LUBRICATION	
1) Engine sump oil Quantity	Oil exchange: 2.0 lit (2.1 qt) Overhaul : 2.5 lit (2.6 qt)
2) Oil type and grade	Yamalube 4-cycle oil or SAE 20W/40 "SE" motor oil

3) Oil pump type	Trochoid pump
4) Trochoid pump specifications	
Top clearance	0.10 ~ 0.18 mm IO.0039 ~ 0.0071 in)
Tip clearance	0.03 ~ 0.09 mm 10.0012 ~ 0.0035 in)
Side clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
Oil pump volume	1.3 lit/min at 1,000 rpm/lEngine
5) Bypass valve setting pressure	1.0 kg/cm^2 (14 psi)
6) Lubrication chart	



C. Chassis

1. FRAME	
1) Frame design	Double cradle, high tensile frame
2. STEERING SYSTEM	
1) caster	27"
2) Trail	115 mm (4.53in)
3) Number and size of balls in steering head	
upper race	19 pcs.1/4 in
Lower race	19 pcs. 114 in
4) Steering lock to lock	42° each (L and RI
3. FRONT SUSPENSION	
1) Type	Telescopic fork
2) Damper type	Oil damper, coil spring
3) Front fork spring	
Free length	482 ± 6 mm 118.98 ± 0.24 in)
Wire diameter x winding diameter	4 mm x 24.5 mm 10.157 X 0.965 in)
Spring constant	
4) Front fork travel	150 mm (5.906in)
5) Inner tube O.D.	35 mm (1.378 in)
6) Front fork oil quantity and type	169 cc 15.71 oz)
	Yamaha fork oil 10wt or equivalent

7) Distance from the top of inner tubeti oil level. without spring	Approx. 454 mm (17.9 in)
4. REAR SUSPENSION	
1) Type	Swing arm
2) Damper type	Oil damper, coil spring
3) Shock absorber travel	80 mm (3.15 in)
4) Shock absorber spring	
Set length	201 mm (7.91 in)
Free length	226 mm (8.90 in)
Wire diameter x winding diameter	7.5 mm x 60.5 mm 10.295 x 2.382 in)
5) Swing arm free play (Limit)	1 mm (0.04 in)
6) Pivot shaft -Outside diameter	16 mm (0.63 in)
5. FUEL TANK	
1) Capacity	15 lit (4.0 US.gal)
2) Fuel grade	Regular gasoline (90 octane)
6. WHEEL	
1) Type (Front and rear)	Aluminum run
2) Tire size (Front)	3.50H19-4PR
(Rear)	4.00H18-4PR
3) Tire pressure:	
Normal riding (Front)	1.6 kg/cm^2(22 psi)
(Rear)	2.0 kg/cm^2(28 psi) Refer to PAGE 10
4) Rim run out limit (Front and rear)	
Vertical	2 mm (0.08 in)
Lateral	2 mm (0.08 in)
5) Rim size (Front)	1.85-19 in
(Rear)	2.15-18 in
6) Bearing type	
Front wheel (Left)	6303RS
Front wheel (Right)	6303RS
Rear wheel (Left)	63052
Rear wheel (Right)	63042
7) Oil seal type	
Front wheel (Left) I.D.xO.D.x Width	SDO 45x56x6 mm (1.771x2.205x0.236 in)
Front wheel (Right) "	SD 28x47x7 mm (1.102x1.850x0.276 in)
Rear wheel (Left) "	SD 35x62x9 mm (1.378x2.441x0.354 in)
Rear wheel (Right) "	SO 27x52x5 mm (1.063x2.047x0.197 in)
8) Secondary drive chain type	
Type	50HDS
Number of links	103L + Joint
Chain pitch	15.875 mm (5/8 in)
Chain free play	20 mm (3/4 in)

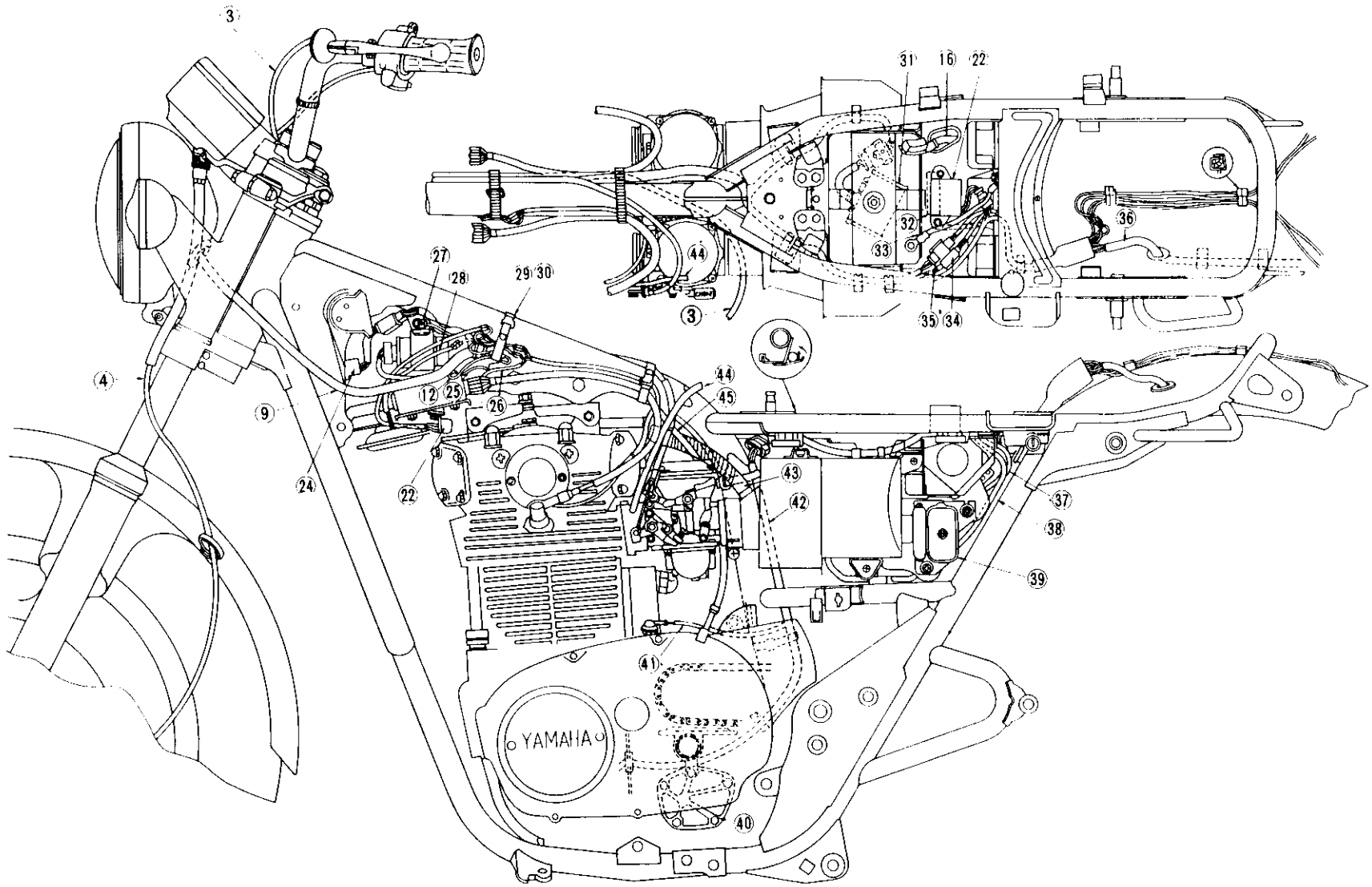
7. BRAKE	
1) Front brake	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	298 mm x 7.0 mm (11.73x0.28 in)
Disc wear limit	6.5 mm (0.26 in)
Disc pad thickness	6.5 mm (0.26 in)
Pad wear limit (Minimum thickness)	1.5 mm 10.06 in)
Master cylinder inside dia.	14.0 mm 10.55 in)
Caliper cylinder inside dia.	38.18 mm 11.5 in)
Brake fluid type	DOT #3 Brake fluid
2) Rear brake	
Type	Drum brake
Actuating method	Leading trailing
Brake drum I.D.	180 mm (7.09 in)
Brake shoe dia. x width	180 x 30 mm (7.09 x 1.18 in)
Lining thickness/wear limit	4/2 mm (0.16/0.08 in)
Shoe spring free length	68 mm (2.68 in)

D. Electrical

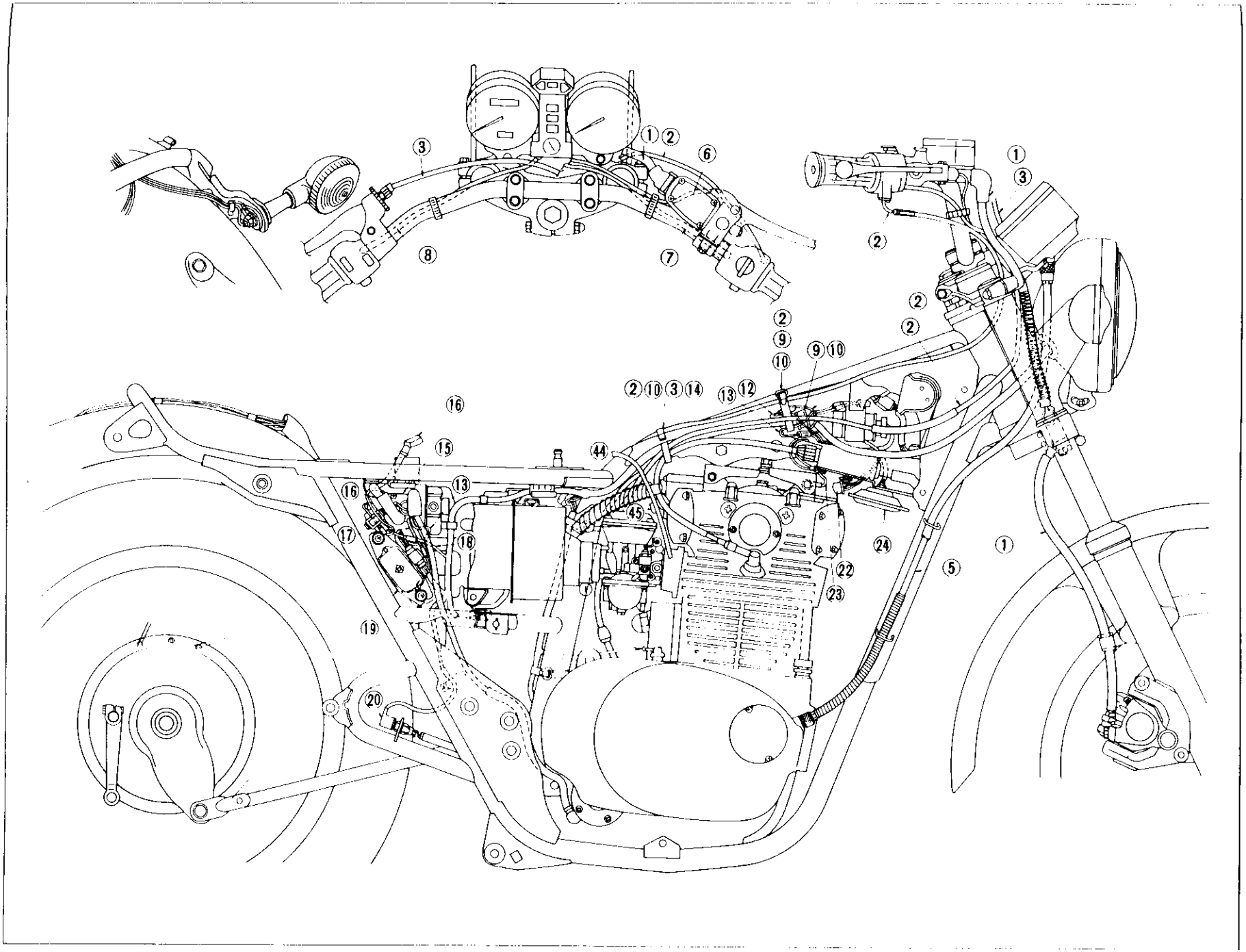
1. IGNITION SYSTEM	
1) Ignition timing (B.T.D.C.)	15°/1,200 rpm
2) Ignition coil	
Model/Manufacturer	CM1 1-50B/HITACHI
Spark gap	6 mm (0.24 in) or more1500 rpm
Primary winding resistance	3.9.Q ± 10% at 20°C (68°F)
Secondary winding resistance	8.0kΩ ± 20% at 20°C (68°F)
3) Spark plug	
Type	NGK BP 7ES, CHAMPION N-7Y
Spark plug gap	0.7 ~ 0.8 mm 10.027 ~ 0.031 in)
4) Contact breaker	
Manufacturer/Quantity	HITACHI/2 PCS.
Point gap	0.30 ~ 0.40 mm 10.012 ~ 0.016 in)
Point spring pressure	750 ± 100 g
Cam closing angle	93° ± 5°
5) Condenser	
Capacity	0.22 μF
Insulation resistance	10 MΩ or more
Quantity	2 pcs.
2. CHARGING SYSTEM	
1) AC generator	
Charging output	14 V 1 1A/2,000 rpm
Rotor coil resistance (Field coil)	5.2522 ± 10% at 20°C (68°F)
Stator coil resistance	0.4622 ± 10% at 20°C (68°F)
Brush length	14.5 mm IO.571 in)
Brush wear limit	7.0 mm 10.276 in)
2) Rectifier	
Type	B-Element type (Full wave)
Model/Manufacturer	SB6B-17/HITACHI
Capacity	12A
Withstand voltage	400v
3) Regulator	
Type	Tillil type
Model/Manufacturer	TL1Z-80/HITACHI
Regulating voltage	14.5 ± 0.5 v

4) Voltage regulator	
core gap	0.6 ~ 1 .O mm (0.024 ~ 0.039 in)
Point gap	0.3 ~ 0.4 mm (0.012 ~ 0.016 in)
Voltage coil	10Ω at 20°C (68°F)
Resistor	10/25Ω at 20°C (68°F)
5) Battery	
Model/Manufacturer/Quantity	YB14L-A2/YUASA/1
Capacitv	12V, 14AH
Charging rate	1.4A 10 hours
Specific gravity	1.28 at 20°C (68°F)
3. STARTER	
1) starter motor	
Type	Bendix type
Manufacturer	HITACHI
Model	S108-35
output	0.5 kw
Armature coil resistance	0.0067Ω ± 10% at 20°C (68°F)
Field coil resistance	0.004Ω ± 10% at 20°C (68°F)
Brush size/Quantity	16 mm (0.63 in)/2 pcs.
Wear limit	4 mm (0.16 in)
Spring pressure	800 g (28.2 oz)
Commutator O.D./Wear limit	33 mm (1.30 in)/31 mm 11.22 in)
Mica undercut	0.7 mm (0.028 in)
Reduction/Ratio	19.654 (36/7 x 24/26 x 23/14 x 63/25)
2) Starter switch	
Manufacturer	HITACHI
Model	A 104.70
Amparage rating	100A
Cut-in voltage	6.5V
Winding resistance	3.523
3) Starter clip friction tension	2.2 ~ 2.5 kg (4.9 ~ 5.5 lb)
4. LIGHTING SYSTEM	
1) Head light type	Sealed beam
2) Bulb brightness and wattage/Quantity	
Head light wattage	12V, 50/40W x 1 pc.
Tail/Stoplight wattage ss and wattage	3/32 cp, (12V, 8/27W) 1 pcs.
Flasher light wattage ss and wattage	32 cp. (12V, 27W) x 4 pcs.
Meter light wattage	12V, 3.4W x 4 pcs.
Neutral light wattage	12v. 3.4W x 1 pcs.
Flasher pilot light wattage	12V, 3.4W x 2 pcs.
	12v. 3.4W x 1 pc.
High beam indicator light wattage	12v. 3.4W x 1 pc.
3) Reserve lighting unit Model/Manufacturer	337-11720/KOITO
4) Horn	
Model/Manufacturer	CF-12/NIKKO
Maximum amparage	2.5A
5) Flasher relay	
Type	Condenser type
Model/Manufacturer	1AO-70/ND
Flasher frequency	85±10 cycle/min.
Capacitv	32 cp, (27W) x 2 + 3.4 W
6) Flasher cancelling Unit	
Model	EVH-AC518
Voltage	DC9V ~ 16V
7) Fuse	
Rating/Quantity	Main (Red): 20A

7-4. CABLE ROUTING DIAGRAM



1. Brake hose
2. Throttle wire
3. Clutch wire
4. Speedometer cable
5. Tachometer cable
6. Front stop switch wire
7. Switch handle (R) lead wire
8. Switch handle (L) lead wire
9. Wire harness (L)
10. Wire harness (R)
11. Gray
12. Orange
13. Red/White
14. High tension cord
15. Starter switch
16. Cord (+)
17. Blue/White
18. Red
19. Relay assembly
20. Rear stop light switch
21. Horn
22. Reserve lighting resistor
23. Black
24. Flasher cancelling unit
25. Brown
26. Condenser
27. Diode
28. Flasher relay
29. Breaker lead wire
30. Horn lead wire
31. Rectifier
32. Light checker
33. Cord (−)
34. Light checker coupler
35. Regulator coupler
36. Tail light lead wire
37. Light checker wire
38. Regulator wire
39. Regulator
40. Starter motor cover
41. Neutral switch lead wire
42. ACG Cord
43. Breather pipe
44. Vacuum pipe
45. Fuel hose

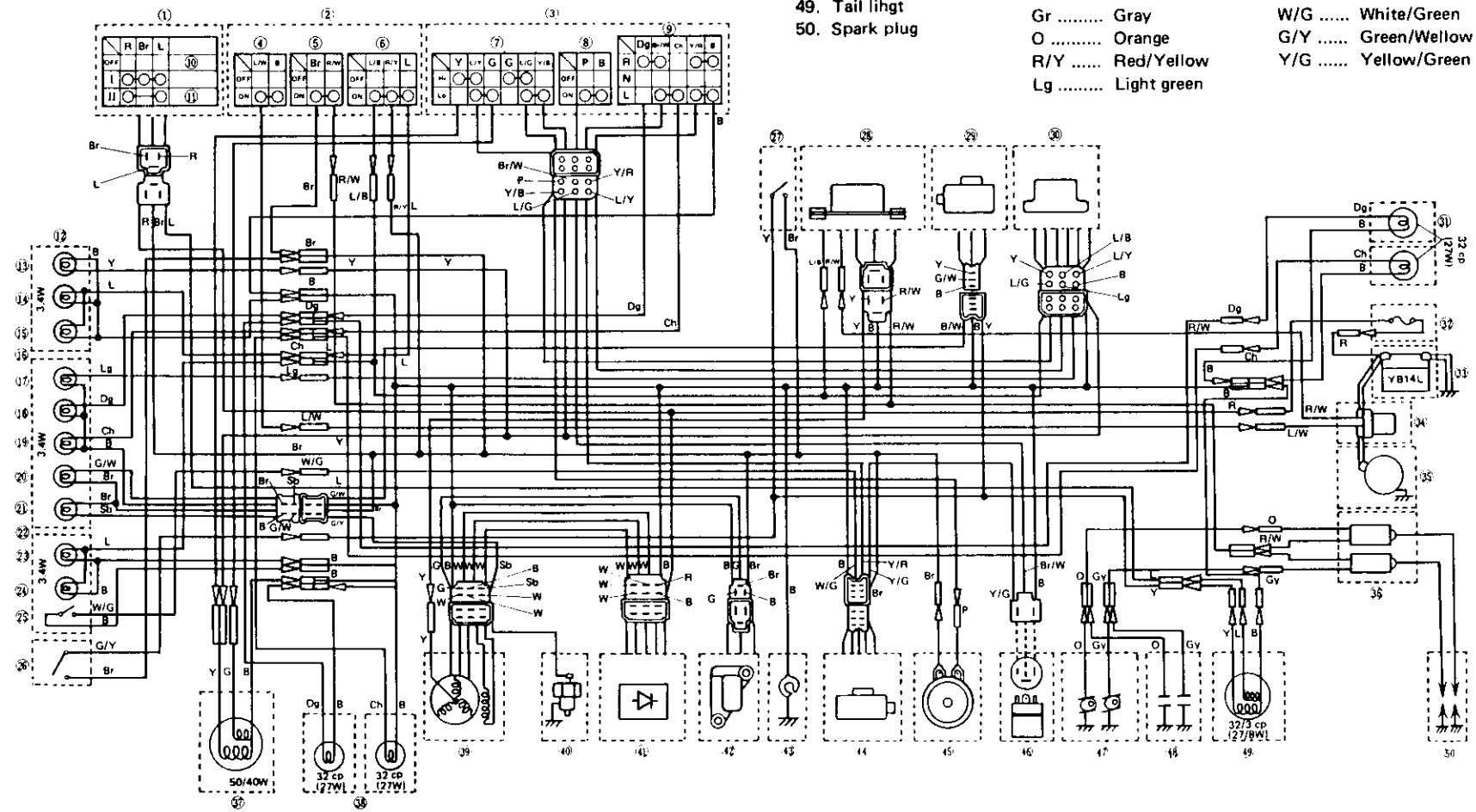

③
①②
⑥
⑧
⑦
①
③
②
②
②
②
⑨
⑩
⑨⑩
⑩
②⑩③⑭
⑬⑫
⑯
⑮
⑭
⑯
⑬
⑰
⑱
⑮
⑲
⑳
㉔
①
⑤
㉒
㉓

7-5. CIRCUIT DIAGRAM

1. Main switch
2. Handle switch right
3. Handle switch left
4. Starter switch
5. Kill switch
6. Headlight switch
7. Dimmer switch
8. Horn switch
9. Flasher switch
10. Key removal
11. Key removal
12. Tachometer
13. High beam
14. Meter light
15. Meter light
16. Pilot box
17. Headlight outage indicator
18. Turn right
19. Turn left
20. Stop light indicator
21. Neutral
22. Speedometer
23. Meter light
24. Meter light
25. Lead switch
26. Front stop switch
27. Rear stop switch
28. Safety relay
29. Light checker
30. Reserve lighting unit
31. Rear flasher light
32. Fuse
33. Battery
34. Starter switch
35. Starting motor
36. Ignition coil
37. Headlight
38. Front flasher light
39. A.C. Generator
40. Neutral switch
41. Rectifier
42. Regulator
43. Body earth
44. Cancelling unit
45. Horn
46. Flasher realy
47. Breaker
48. Condensor
49. Tail lihgt
50. Spark plug

COLOR CODE

R	Red	L/W	Blue/White
Br	Brown	R/W	Red/White
L	Blue	L/B	Blue/Yellow
Y	Yellow	L/Y	Blue/Yellow
G	Green	L/G	Blue/Green
P	Pink	Y/B	Yellow/Black
B	Black	Br/W	Brown/White
Dg	Dark green	Y/R	Yellow/Red
Ch	Chocolate	L/R	Blue/Red
Sb	Sky blue	W/B	White/Balck
W	White	G/W	Green/White
Gr	Gray	W/G	White/Green
O	Orange	G/Y	Green/Wellow
R/Y	Red/Yellow	Y/G	Yellow/Green
Lg	Light green		



8

XS650SE

Supplementary

FOREWORD

This Supplementary Service Manual for XS650SE has been published to supplement the Service Manual for the XS650E (2FO-28197-10) and includes changes in specifications and addition to the data.

For complete information on service procedures, it is necessary to use this Supplementary Service Manual together with the Service Manual for the XS650E (2FO-28197-10).

Page numbers shown in brackets correspond to page numbers of the XS650E Service Manual (2FO-28197-10).

(PAGE 4 ~ 5)

2-2. MAINTENANCE INTERVALS CHARTS

A. PERIODIC MAINTENANCE

Unit: km (mi)

Item	Remarks	Initial				Thereafter every		
		400 (250)	800 (500)	1,600 (1,000)	3,200 (2,000)	1,600 (1,000)	3,200 (2,000)	6,400 (4,000)
Cylinder	Check compression				○			○
Valves	Check/Adjust valve clearance			○	○			○
Cam chain	Check/Adjust chain tension	○			○			○
Spark plugs	Inspect/Clean or replace as required	○			○	○		
Air filter	Dry type – Clean/Replace as required			○	○	○		
Carburetor	Check operation/Adjust as required		○		○		○	
Brake system (complete)	Check/Adjust as required – Repair as required	○	○	○	○	○		
Clutch	Check/Adjust as required		○		○		○	
Wheel and tires	Check pressure/Wear/Damage	○	○	○	○	○		
Fuel petcocks	Clean/Flush tank as required	○		○			○	
Battery	Top-up/Check specific gravity and breather pipe	○	○	○	○	○		
Ignition timing	Adjust/Clean or replace parts as required		○	○	○		○	
Lights/Signals	Check operation/Replace as required	○	○	○	○	○		
Fittings/Fasteners	Tighten before each trip and/or ...	○	○	○	○	○		
Generator brushes	Check brush wear/Replace if necessary							○
Drive chain	Check tension, alignment/Adjust as required	Every 400 (250)						

B. LUBRICATION INTERVALS

Unit: km (mi)

Item	Remarks	Type	Initial				Thereafter every		
			400 (250)	800 (500)	1,600 (1,000)	3,200 (2,000)	1,600 (1,000)	3,200 (2,000)	6,400 (4,000)
Engine oil	Replace/Warm engine before draining	YAMALUBE 4-cycle oil or SAE 20W/40 type "SE" motor oil	○			○		○	
Drive chain	Clean/Lube	Yamaha chain and cable lube or SAE 10W/30 motor oil	Every 400 (250)						
Brake pedal shaft/ Change pedal shaft	Light application	Lithium base grease			○		○		
Control/Meter cables	Apply thoroughly	Yamaha chain and cable lube or SAE 10W/30 motor oil			○	○		○	

Unit: km (mi)

Item	Remarks	Type	initial				Thereafter every		
			400 (250)	800 (500)	1,600 (1,000)	3,200 (2.000)	1,600 (1,000)	3,200 (2.000)	6,400 (4.000)
Throttle grip/ Housing	Apply lightly	Lithium basegrease				0		0	
Hydraulic brake fluid reserve	Use new fluid only	DOT No. 3 Brake fluid	check	check	check	check	check		
Oil filter element	Clean/Replace as required	–	0			0		0	
Front forks	Drain completely – Check specifications	Yamaha Fork Oil 20 wt.				0			0
Steering bearings	Inspect thoroughly Pack moderately Yearly or . . .	Medium-weight wheel bearing grease							12,800 (8,000)
Speedometer gear housing	Inspect thoroughly Pack moderately	Lithium base grease							12,800 (8,000)
Rear arm pivot shafts	Apply grease fully	Medium-weight wheel bearing grease							12,800 (8,000)
Wheel bearings	Do not over-pack Yearly or . . .	Medium-weight wheel bearing grease							12,800 (8,000)
Point cam lubrication wicks	Apply very lightly	Light-weight machine oil		0	0	0		0	

NOTE :

Brake fluid replacement:

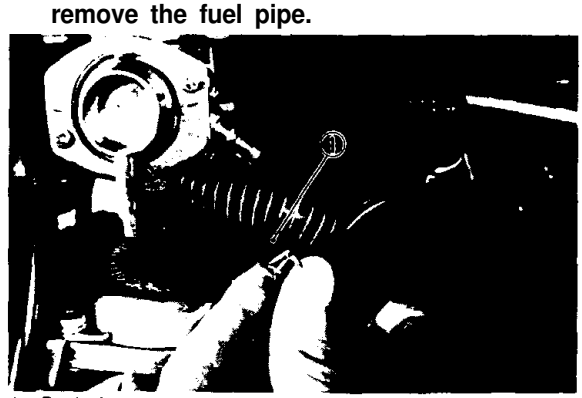
1. When disassembling the master cylinder or caliper cylinder, replace the brake fluid. Normally check the brake fluid level and add the fluid as required.
2. On the inner parts of the master cylinder and caliper cylinder, replace the oil seals every two years.
3. Replace the brake hoses every four years, or if cracked or damaged.

(PAGE 7,10 ~ 13)

24. CHASSIS

A. Fuel petcock cleaning

1. Open the seat and remove the fuel tank securing bolt.
2. Turn the petcock lever to the "ON" or "RES" position. Raise the fuel tank to remove the fuel pipe.



1. Fuel pipe

3. Remove the drain bolt and clean with solvent. If gasket is damaged, replace.



1. Drain bolt

E. Rear brake

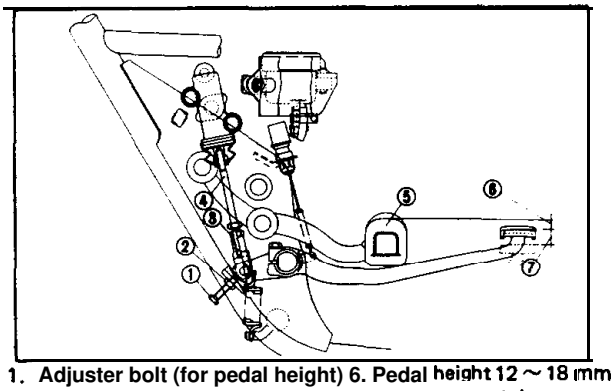
The rear brake pedal should be so adjusted that it has a free play of 13 ~ 15 mm (0.51 ~ 0.59 in) from when the brake pedal is trod to when the brake begins to be effected.

1. Loosen the adjuster lock nut (for pedal height).
2. By turning the adjuster bolt clockwise or counterclockwise, adjust the brake pedal

position so that its top end is approx. 12 ~ 18 mm (0.47 ~ 0.71 in) below the footrest top end.

3. Secure the adjuster lock nut.
4. Loosen the brake rod adjuster lock nut and screw brake rod downward until there is noticeable free play between rod and master cylinder.
5. Turn in the brake rod until it lightly touches the master cylinder, then turn it out by approx. 1-1/5 turns (for proper free play).
6. Tighten the brake rod adjuster lock nut.

CAUTION:
See that the punched mark on the brake rod is not above the top surface of the adjuster lock nut in securing the brake rod adjuster lock nut.



1. Adjuster bolt (for pedal height)
2. Lock nut
3. Lock nut
4. Brake rod
5. Footrest
6. Pedal height 12 ~ 18 mm (0.47 -0.71 in)
7. Free play 13 ~ 15 mm (0.51 -0.69 in)

F. Wheels and tires

2. Tires

Specifications should be changed as follows:

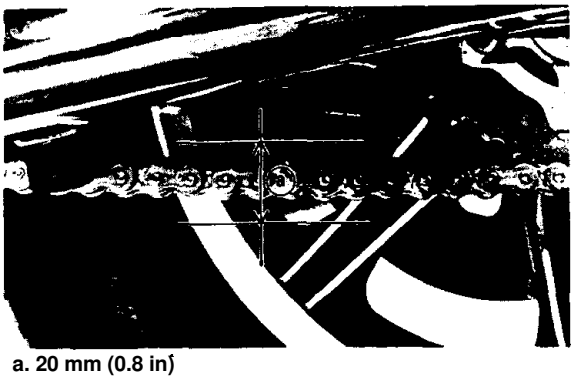
	FRONT	REAR
XS650SE BASIC WEIGHT with oil and full fuel tank	103 kg (227 lb)	119 kg (262 lb)
Standard tire	Bridgestone or Yokohama 3.50S19-4PR	Bridgestone or Yokohama 130/90S16-4PR
Maximum load limit	166 kg (365 lb)	279 kg (615 lb)
Cold tire pressure: Up to 90 kg (198 lb) load	1.6 kg/cm² (22 psi)	2.0 kg/cm² (28 psi)
90 kg (198 lb) load -204 kg (445 lb) load (Maximum load)	2.0 kg/cm² 128 psi)	2.3 kg/cm² (32 psi)
High speed riding	2.0 kg/cm² (28 psi)	2.3 kg/cm² (32 psi)
Minimum tire tread depth	0.8 mm (0.03 in)	l.8 mm (0.03 in)

G. Drive chain

1. Tension check

NOTE:
Before checking and/or adjusting, rotate rear wheel through several revolutions and check tension several times to find the tightest point. Check and/or adjust chain tension with rear wheel in this "tight chain" position.

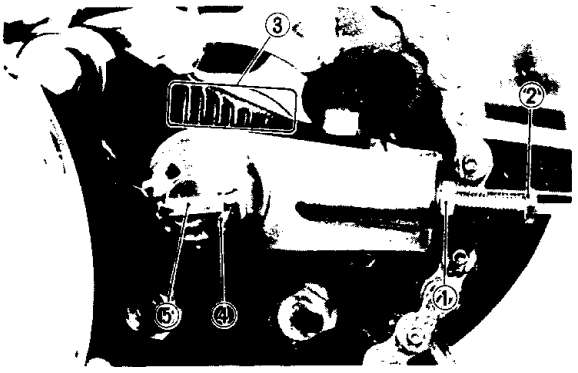
Inspect the drive chain with the center stand put up. Check the tension at the position shown in the illustration. The normal vertical deflection is approximately 10 ~ 20 mm (0.4 ~ 0.8 in). If the deflection exceeds 20 mm (0.8 in) adjust the chain tension.



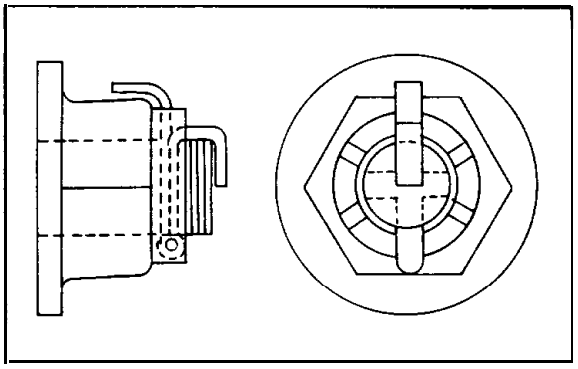
a. 20 mm (0.8 in)

2. Tension adjustment

a. Remove the cotter pin of the rear wheel axle nut with pliers.
b. Loosen the rear wheel axle nut.
c. Loosen the lock nuts on each side. To tighten chain turn chain puller adjusters clockwise. To loosen chain turn adjusters counterclockwise and push wheel forward. Turn each adjuster exactly the same amount to maintain correct axle alignment. (There are marks on each side of rear arm and on each chain puller; use them to check for proper alignment.)
d. After adjusting, be sure to tighten the lock nuts and the rear wheel axle nut.
e. Insert the cotter pin into the rear wheel axle nut and bend the end of the cotter pin as shown in the illustration (if the nut notch and the cotter pin hole do not match, tighten the nut slightly to match).



1. Lock nut
2. Adjuster
3. Marks for align
4. Rear wheel axle nut
5. Cotter pin



-CAUTION:

Excessive chain tension will overload the engine and other vital parts; keep the tension within the specified limits. Also, replace the rear axle cotter pin with a new one.

H. Front fork oil change

8. Pour specified amount of oil into the inner tube through the upper end opening.

Front for oil capacity: 169 cc (5.72 US oz) each leg

(PAGE 22 ~ 29)

3-3. INSPECTION AND REPAIR

D. Valve spring

1. Checking the valve springs

d. Valve spring specifications

Specifications should be changed as follows:

	Inner	Outer
Free length	42 mm (1.654 in)	42.55 mm (1.675 in)
Installed pressure (Valve closed)	9.3 ~ 10.7 kg (20.5 ~ 23.6 lb)	16.45 ~ 18.95 kg (36.3 ~ 41.8 lb)
Installed length (Valve closed)	35 mm (1.378 in)	37 mm (1.457 in)
Compressed pressure (Vlave open)	25.3 ~ 28.1 kg (55.8 ~ 62.0 lb)	53.5 ~ 61.5 kg (118.0 ~ 135.6 lb)
Compressed length (Valve open)	25.5 mm (1.004 in)	27.5 mm (1.083 in)
Allowable tilt from vertical	1.6 mm or 2.5° (0.063 in)	←

(PAGE 29 ~ 33)

3-4. ENGINE ASSEMBLY AND ADJUSTMENT

0. Engine

Specifications should be changed as follows:

Engine mounting bolt torque:			
Upper (U Nut)	M8	1.8 m-kg	(13.0 ft-lb)
Upper	M10	3.0 m-kg	(21.5 ft-lb)
Front (U Nut)	M10	4.6 m-kg	(33.5 ft-lb)
Rear (U Nut)	M10	4.1 m-kg	(29.5 ft-lb)
Rear — under (U Nut)	M10	4.6 m-kg	(33.5 ft-lb)
Under (U Nut)	M10	9.0 m-kg	(65.0 ft-lb)

(PAGE 39 ~ 40)

5-1. FRONT WHEEL

C. Front wheel inspection

1. Check for cracks, bends or warpage of wheels. If a wheel is deformed or cracked, it must be replaced.

NOTE:

These aluminum wheels are not designed for use with tubeless tires.

2. Check wheel run-out

If deflection exceeds tolerance, check wheel bearing or replace wheel as required.

Rim run-out limits: Vertical: 2 mm (0.08 in) Lateral: 2 mm (0.08 in)

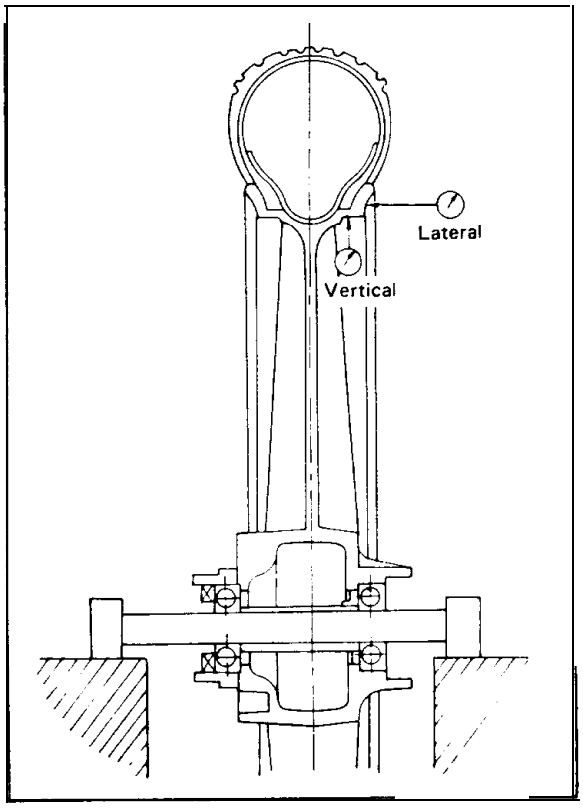
3. Check wheel balance

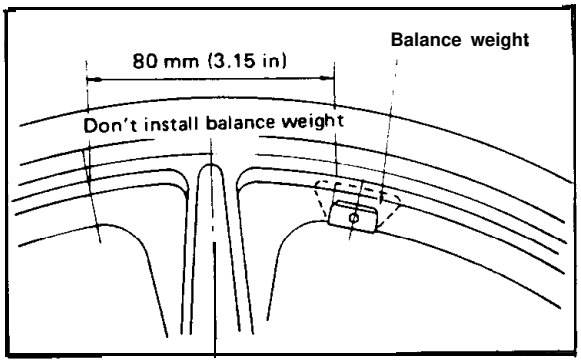
Rotate wheel lightly several times and observe resting position.

If wheels is not statically balanced, wheel will come to rest at the same position. Install balance weight at lighter position (at top) as illustrated.

NOTE:

The wheel should be balanced with brake disc installed.





E. Installing front wheel

4. Always secure the front wheel axle as follows:

Specifications should be changed as follows:

Axle nut torque:
10.7 m-kg (77.5 ft-lb)
Holder nut torque:
1.4 m-kg (10.0 ft-lb)

(PAGE 40)

5-2. REAR WHEEL

A. Removal

1. **Support machine on the center stand.**
2. **Disconnect the drive chain. Using drive chain cutter (special tool).**

NOTE:

The chain joint should be replaced each time the chain is cut.

3. **Remove the axle nut cotter pin and axle nut.**
4. **While supporting the brake caliper, pull out the rear axle.**
5. **Remove the rear wheel assembly.**

E. Rear wheel installation

When installing rear wheel, reverse removal procedure taking care of following points:

1, **Lightly grease lip of rear wheel oil seals.**
2. **Make sure the brake pads are installed properly and that there is an enough gap to install the rear disc.**
3. **Install wheel assembly and axle. Always use a new cotter pin on the axle nut.**

Axle nut torque:
15.0 m-kg (108.5 ft-lb)

4. **Connect drive chain.**
5. **Adjust drive chain.**

(PAGE 40 ~ 44)

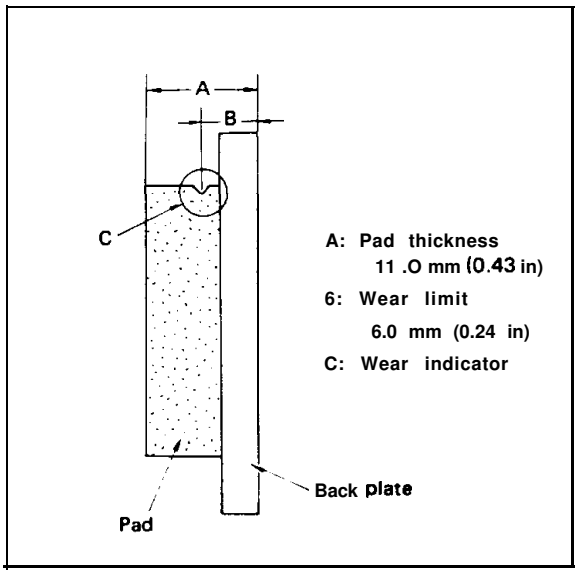
5-3. BRAKES

Except for the following, the same procedure can be performed for Disassembly, Inspection and Assembly of XS650SE front and rear brake and XS650E front brake.

D. Brake inspection and repair

Specifications should be changed as follows:

Wear limit:
6.0 mm (0.24 in)



(PAGE 48)

5-9. REAR SHOCK ABSORBER

B. Inspection

Specifications should be changed as follows:

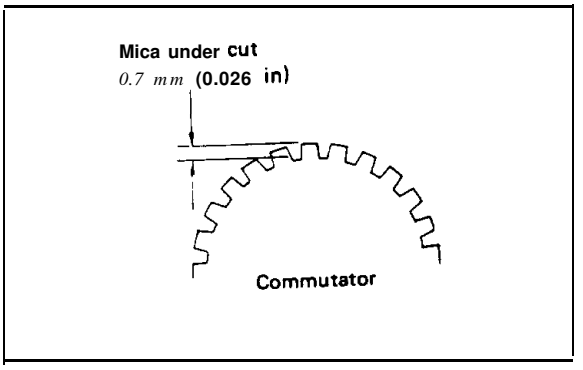
Rear shock absorber tightening torque:	
Upper	3.0 m-kg (21.5 ft-lb)
Lower	3.9 m-kg (28.0 ft-lb)

(PAGE 50 ~ 51)

6-1. STARTER

A. Armature

1. **Check the outer surface of the commutator. If it's surface is dirty, clean with No. 600 grit sand paper.**
2. **The mica insulation between commutator segments should be 0.7 mm (0.028 in) below the segment level. If not, scrape to proper limits with appropriately shaped tool. (A hack saw blade can be ground to fit.)**



3. **Check the armature and field coil for shorting and insulation. Replace armature as required.**

	Coil resistance
Armature coil	0.0067Ω at 20°C (68°F)
Field coil	0.004Ω at 20°C (68°F)

4. **Check the front and rear cover bearings for damage. If damaged, the starter assembly must be replaced.**

(PAGE 57 ~ 58)

6-5. LIGHTING AND SIGNAL SYSTEMS

B. Reserve lighting system

1. **Description:**

The reserve lighting system has two functions: (1) It notifies the rider that one of the headlight filaments is inoperative, and (2) it switches current from the inoperative filament to the remaining functional filament.

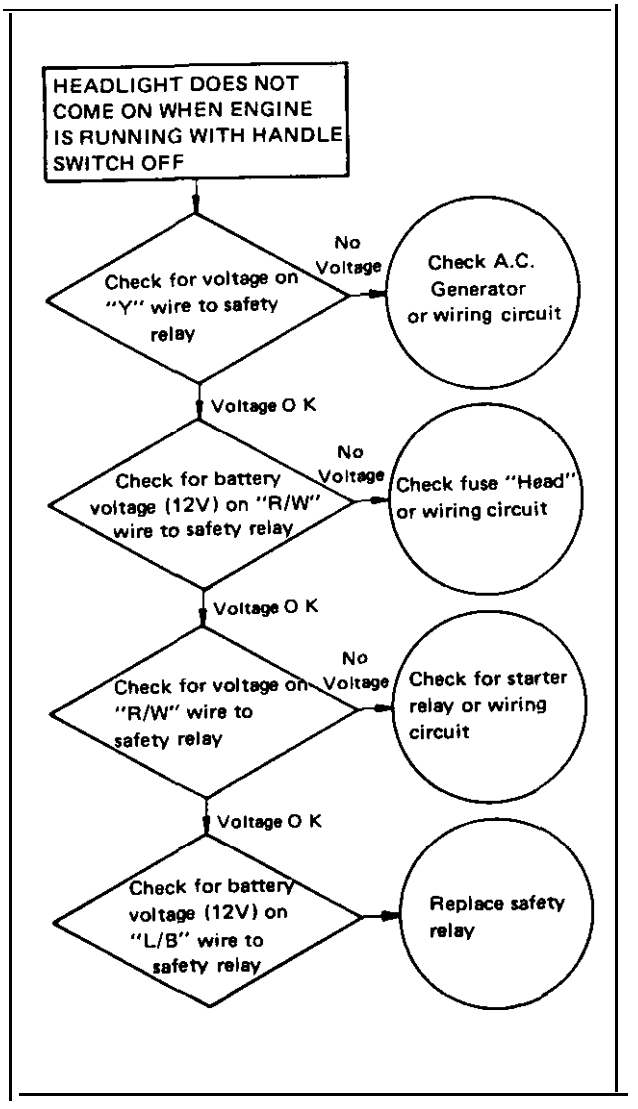
The system is connected to the headlight circuit only. The reserve lighting system unit is located under the fuel tank.

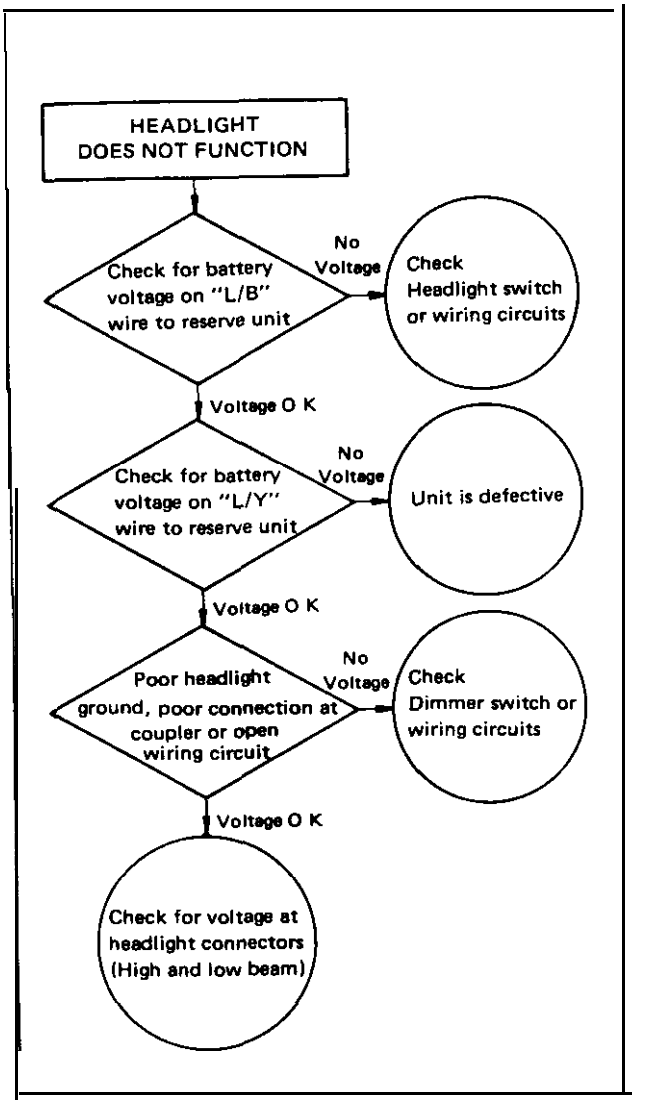
NOTE:

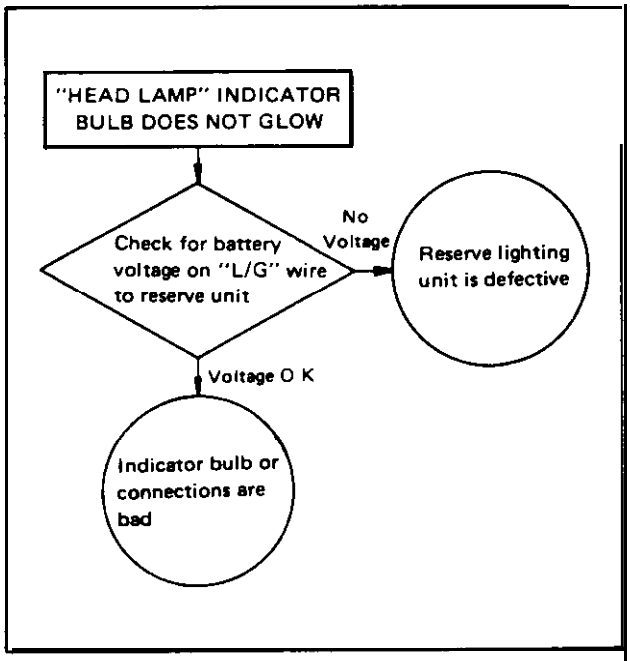
This model has been equipped with a safety relay so that the headlight comes on automatically when the engine is started even with the headlight switch "OFF".

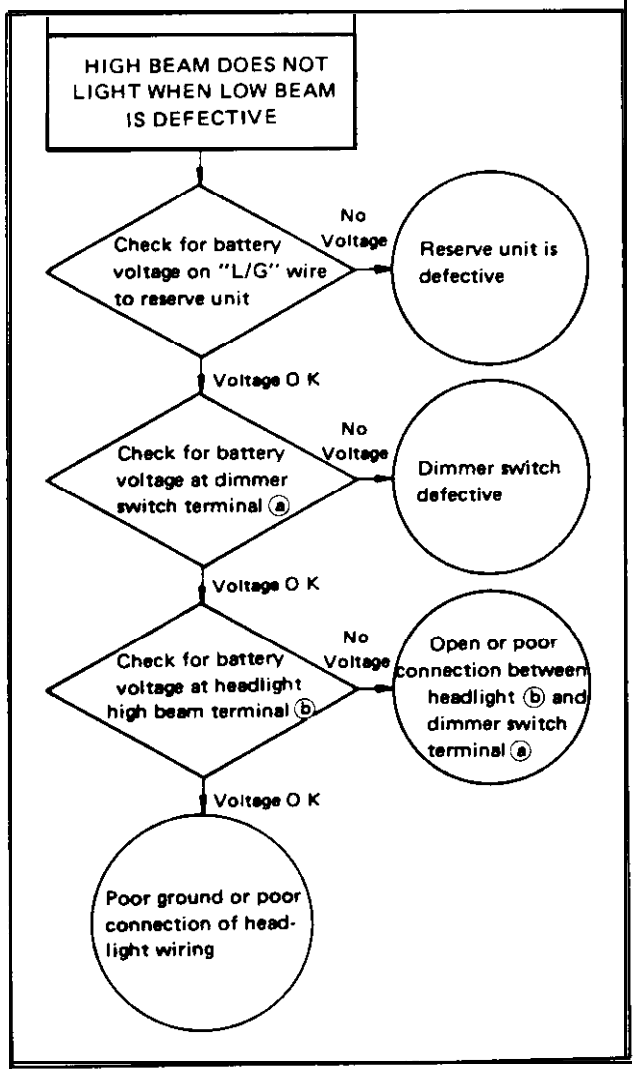
Headlight condition	Headlight failure indicator light	Reserve lighting function
Normal	Comes on (very dim)	—
High beam faulty	Comes on	Low beam comes on
Low beam faulty	Comes on	High beam comes on at low brilliance

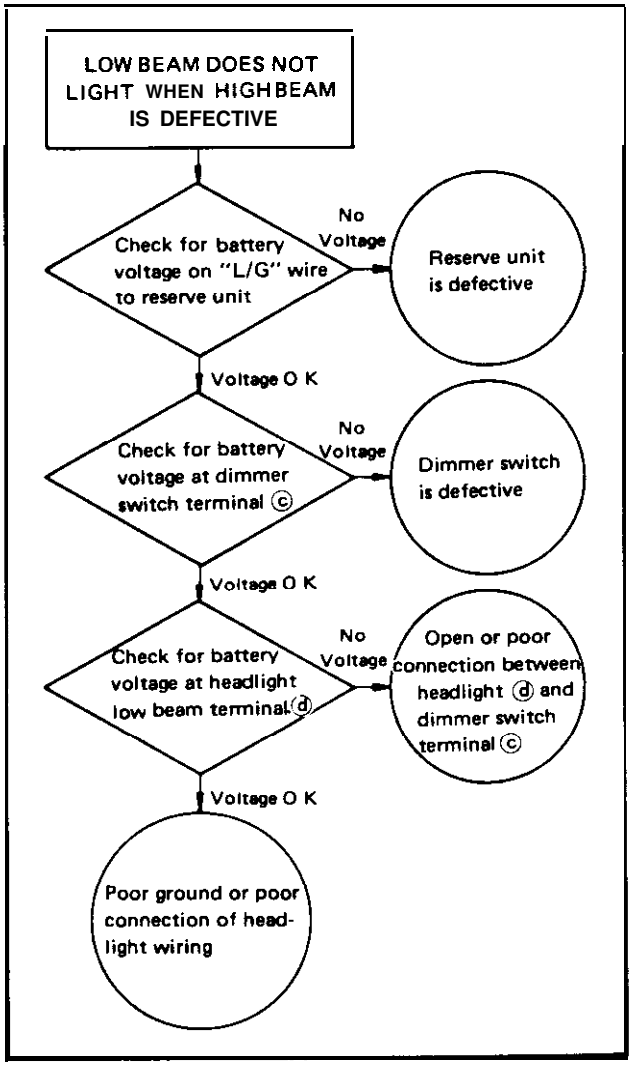
2. Troubleshooting/inspection

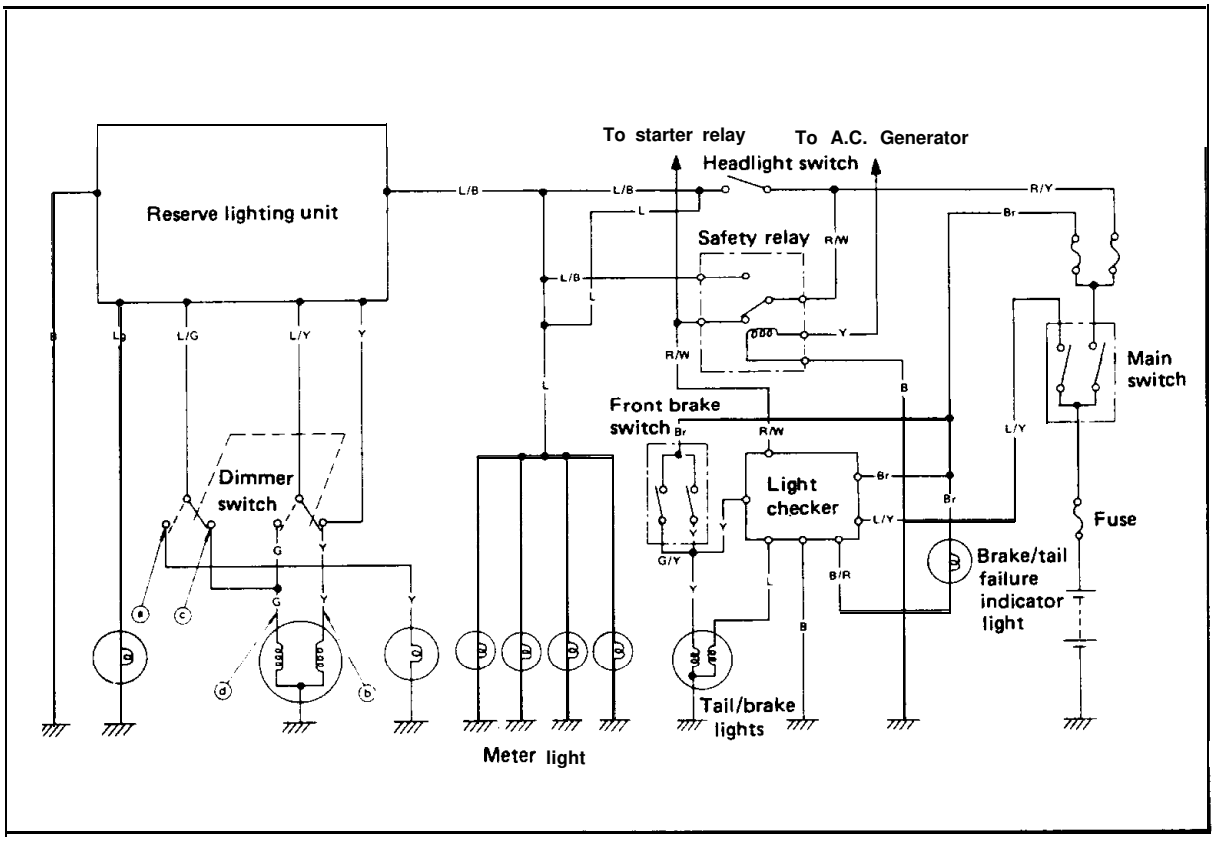





"HEAD LAMP" INDICATOR BULB DOES NOT GLOW
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve lighting unit is defective
Voltage O K
Indicator bulb or connections are bad


HIGH BEAM DOES NOT LIGHT WHEN LOW BEAM IS DEFECTIVE
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve unit is defective
Voltage O K
Check for battery voltage at dimmer switch terminal ⓐ
No Voltage
Dimmer switch defective
Voltage O K
Check for battery voltage at headlight high beam terminal ⓑ
No Voltage
Open or poor connection between headlight ⓑ and dimmer switch terminal ⓐ
Voltage O K
Poor ground or poor connection of head-light wiring


LOW BEAM DOES NOT LIGHT WHEN HIGH BEAM IS DEFECTIVE
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve unit is defective
Voltage O K
Check for battery voltage at dimmer switch terminal ⓒ
No Voltage
Dimmer switch is defective
Voltage O K
Check for battery voltage at headlight low beam terminal ⓓ
No Voltage
Open or poor connection between headlight ⓓ and dimmer switch terminal ⓒ
Voltage O K
Poor ground or poor connection of head-light wiring



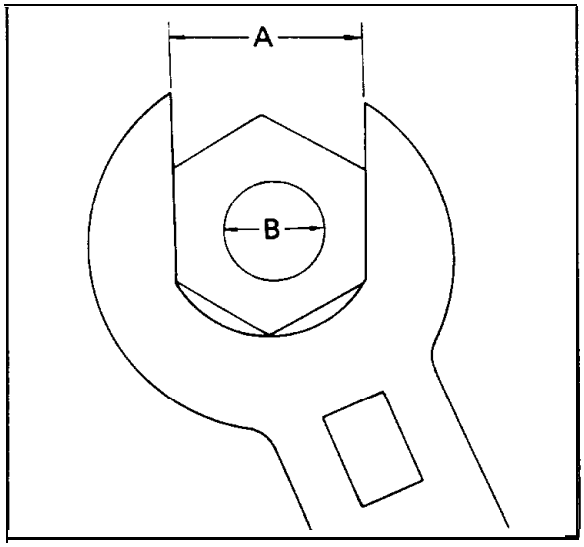
(PAGE 61 ~ 62)

7-1. TORQUE SPECIFICATION

The following torque specifications must be adhered to on every machine. When applying torque to multi-secured fastener components, the several studs should be tightened in gradual stages and in a pattern that will avoid warpage to the item being secured. Torque settings are for dry, clean threads. Torquing should always be done to the nut, never the bolt head.

NOTE:

Certain items with other than standard thread pitches may require differing torque.



Torque Specifications

A (Nut)	B (Bolt)	Standard tightening torque	
		m-kg	ft-l b
10 mm	6 m m (M6)	1.0	7.2
12mm	Bm m (M8)	2.0	15
14 mm	10mm (MI0)	4.0	29
17mm	12mm (M12)	4.5	33
19 mm	14mm (M14)	5.0	36
22 mm	16mm (MI6)	6.5	47
24 mm	18mm (MI8)	7.0	50
27 mm	20mm (M20)	8.0	58

Part to be tightened	Thread dia. and part name	Tightening torque
Engine:		
Cylinder head and cylinder head cover	10 mm nut 8 mm bolt	3.7 m-kg (27.0 ft-lb) 2.1 m-ka 115.0 ft-lb)
Cylinder head	6 mm bolt	0.9 m-kg (6.5 ft-lb)
Cylinder head cover side	6 mm crown nut 8 mm crown nut	0.9 m-kg (6.5 ft-lb) 1.3 m-ka (9.5 ft-lb)
Spark plug	14 mm	2.0 m-ka (14.5 ft-lb)
Generator	12 mm nut	3.8 m-ka (27.5 ft-lb)
Stator coil	6 mm pan head screw	0.9 m-kg (6.5 ft-lb)
Governer	6 mm bolt	0.8 m-kg (6.0 ft-lb)
Valve clearance adjustment nut	8 mm nut	2.7 m-kg (19.5 ft-lb)
Cam chain tensioner	18 mm cap	2.1 m-kg (15.0 ft-lb)
Pump cover	6 mm pan head screw	1 .0 m-kg (7.0 ft-lb)
Strainer cover	6 mm bolt	1.0 m-kg (7.0 ft-lb)
Drain plug	30 mm bolt	4.2 m-kg (30.5 ft-lb)
Oil filter	6 mm bolt	0.9 m-kg (6.5 ft-lb)
Delivery pipe	10 mm union bolt	2.1 m-kg (15.0 ft-lb)
Exhaust pipe	8 mm nut	1.3 m-kg (9.5 ft-lb)
Crankcase	8 mm bolt/nut	2.1 m-kg (15.0 ft-lb)
Kick crank boss	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Primary drive gear	14 mm nut	9.0 m-kg (65.0 ft-lb)
Clutch boss	18mm nut	8.0 m-kg (58.0 ft-lb)
Drive sprocket	22 mm nut	6.5 m-kg (47.0 ft-lb)
Change pedal	6 mm bolt	1 .O m-kg (7.0 ft-lb)
Chassis:		
Front wheel axle	14 mm nut	10.7 m-kg (77.5 ft-lb)
Front fork and axle holder	8 mm nut	1.4 m-kg (10.0 ft-lb)
Handle crown and inner tube	8 mm nut	1 .1 m-kg (8.0 ft-lb)
Handle crown and steering shaft	8 mm nut	1.1 m-kg (8.0 ft-lb)
Handle crown and steering shaft	14 mm bolt	5.4 m-kg (39.0 ft-lb)
Handle crown and handle holder	8 mm bolt	1.8 m-kg (13.0 ft-lb)
Under bracket and inner tube	8 mm nut	2.0 m-kg (14.6 ft-lb)
Engine mounting Upper	8 mm nut	1.8 m-kg (13.0 ft-lb)
Engine mounting Upper	10 mm nut	3.0 m-kg (21.5 ft-lb)
Engine mounting Front	10 mm nut	4.6 m-kg (33.5 ft-lb)
Engine mounting Rear	10 mm nut	4.1 m-kg (29.5 ft-lb)
Engine mounting Rear-Lower	10 mm nut	4.6 m-kg (33.5 ft-lb)
Engine mounting Lower	10 mm nut	9.0 m-kg (65.0 ft-lb)
Front flasher and headlight	8 mm nut	1 .O m-kg (7.0 ft-lb)
Master cylinder and brake hose	10 mm union bolt	2.6 m-kg (19.0 ft-lb)
Brake disc and hub	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Caliper and support bracket	8 mm bolt	1.8 m-kg (13.0 ft-lb)
Caliper and pad	5 mm bolt	0.3 m-kg (2.0 ft-lb)
Caliper and bleed screw	8 mm bolt	0.6 m-kg (4.5 ft-lb)
Front caliper and front fork	10 mm bolt	3.5 m-kg (25.5 ft-lb)
Master cylinder and cylinder bracket	6 mm bolt	0.6 m-kg (4.5 ft-lb)

Part to be tightened	Thread dia. and part name	Tightening torque
Pivot shaft	14 mm nut	6.5 m-kg (47.0 ft-lb)
Rear wheel axle	16 mm nut	15.0 m-kg (108.5 h-lb)
Tension bar and brake caliper	8 mm nut	1.8 m-kg (13.0 ft-lb)
Tension bar and rear arm	8 mm nut	3.2 m-kg (23.0 ft-lb)
Rear shock absorber Upper	10 mm bolt	3.0 m-kg (21.5 ft-lb)
Rear shock absorber Lower	10 mm bolt	3.9 m-kg (28.0 ft-lb)
Rear arm and rear arm end	8 mm bolt	1.0 m-kg (7.0 ft-lb)
Front fender	8 mm bolt	1.0 m-kg (7.0 ft-lb)
Neutral switch	12mm	1.3 m-kg (9.5 ft-lb)

(PAGE 64 ~ 71)

7-3. SPECIFICATION

A. General

1. MODEL	
1) Model (I.B.M. No.)	XS650SE (2MO)
2) Frame I.D. and starting number	2FO-100101
3) Engine I.D. and starting number	2FO-100101
2. DIMENSION	
1) Overall length	2,120 mm (83.5 in)
2) Overall width	925 mm (36.4 in)
3) Overall height	1,220 mm (48.0 in)
4) Seat height	790 mm (31.1 in)
5) Wheelbase	1,435 mm (56.5 in)
6) Minimum ground clearance	135 mm (5.3 in)
3. WEIGHT	
1) Net weight (Dry)	210 kg (463 lb)
4. PERFORMANCE	
1) Climbing ability	26°
2) Minimum turning radius	2,500 mm (98.4 in)
3) Braking distance	14 m @ 50 km/h (45.9 ft @ 31 mi/h)

B. Engine

1. DESCRIPTION	
1) Engine type	Air cooled, 4-stroke, SOHC twin, parallel forward incline
2) Engine model	2F0
3) Displacement	653 cc (39.85 cu.in)
4) Bore x stroke	75 x 74 mm (2.953 x 2.913 in)
5) Compression ratio	8.5 : 1
6) Starting system	Kick and electric starter
7) Ignition system	Battery ignition
8) Lubrication system	Wet sump
2. CYLINDER HEAD	
1) Combustion chamber volume (with N-7Y)	43.6 cc (2.660 cu.in)
2) Combustion chamber We	Dome + Squish
3) Head gasket thickness	1.2 mm (0.047 in)
3. CYLINDER	
1) Material	Aluminum alloy with cast iron sleeve
2) Bore size	75.00 $^{+0.02}_{0}$ mm (2.9528 $^{+0.0008}_{0}$ in)
3) Taper limit	0.05 mm (0.002 in)
4) Out of round limit	0.01 mm (0.0004 in)

4. PISTON

1) Pistonskirt clearance: 0.050 ~ 0.055 mm (0.0020 ~ 0.0022 in)

2) Piston oversize:

75.25 mm (2.963 in)	75.50 mm (2.972 in)	75.75 mm (2.982 in)	76.00 mm (2.992 in)

3) Piston pin outside diameter x length: $20.0\ ^{0}_{-0.005}$ mm x $61.0\ ^{0}_{-0.3}$ mm ($0.79\ ^{0}_{-0.0002}$ in x $2.40\ ^{0}_{-0.0116}$ in)

5. PISTON RING

1) Piston ring design	(Top)	Barrel ring 1.2 mm (0.047 in)
	(2nd)	Taper ring 1.5 mm (0.059 in)
	(Oil ring)	With expander 2.8 mm (0.110 in)
2) Ring end gap	(Installed, top)	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)
	(Installed, 2nd)	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)
	(Installed, oil)	0.3 ~ 0.9 mm (0.012 ~ 0.035 in)
3) Ring groove side clearance	(Top)	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)
	(2nd)	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)

6. BIG END BEARING

1) Type: Needle bearing

2) Bearing size: ϕ 26 x ϕ34 x 19.8

3) Needle size: ϕ 4 x ϕ15.8 x 13

7. CAMSHAFT

1) Cam drive type: Chain (Center side)

2) Number and type of bearing: 4 bearings, Ball bearings (6005)

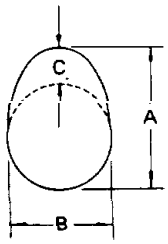
3) Bearing type: ϕ 25-ϕ 47-8

4) Cam dimensions

	Cam height "A"	Limit	Base circle "B"	Limit	Lift "C"
IN	39.99 ± 0.05 mm (1.574 ± 0.002 in)	39.84 mm (1.569 in)	32.24 ± 0.05 mm (1.269 ± 0.002 in)	32.09 mm (1.263 in)	7.991 mm (0.315 in)
EX	40.03 ± 0.05 mm (1.576 ± 0.002 in)	39.88 mm (1.570 in)	32.30 ± 0.05 mm (1.272 ± 0.002 in)	32.15 mm (1.266 in)	8.030 mm (0.316 in)

5) Valve timing

	OPEN	CLOSE	DURATION	OVERLAP
IN	BTDC36°	ABDC68°	284°	72°
EX	BBDC68°	ATDC36°	284°	



6) Camshaft deflection limit: 0.03 mm (0.0012 in)

7) Cam chain

Type	TSUBAKIMOTO BF05M
Number of links	106L
Sprocket ratio	36/18 (2.000)

8. ROCKER ARM AND ROCKER SHAFT

1) Rocker arm inner diameter: $15.0\ ^{+0.018}_{0}$ mm ($0.591\ ^{+0.0007}_{0}$ in)

2) Rocker arm shaft diameter: $15.0\ ^{-0.009}_{-0.015}$ mm ($0.591\ ^{-0.00035}_{-0.00059}$ in)

3) Clearance: 0.009 ~ 0.033 mm (0.00035 ~ 0.00130 in)

4) Lift ratio: X : Y = 40 : 48.41 mm (1.575 : 1.906 in)

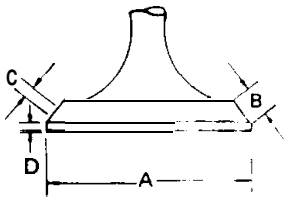
9. VALVE, VALVE SEAT AND VALVE GUIDE

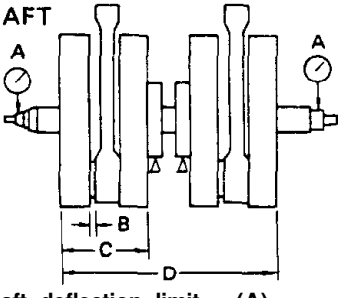
1) Valve per cylinder: 2 pcs.

2) Valve clearance (In cold engine): IN: 0.10 mm (0.0039 in); EX: 0.15 mm (0.0059 in)

3) Dimensions

Valve head diameter "A"	IN: 41 mm (1.614 in); EX: 35 mm (1.378 in)
Valve face width "B"	IN: 2.1 mm (0.083 in); EX: 2.1 mm (0.083 in)
Valve seat width "C"	IN: 1.3 mm (0.051 in); EX: 1.3 mm (0.051 in)

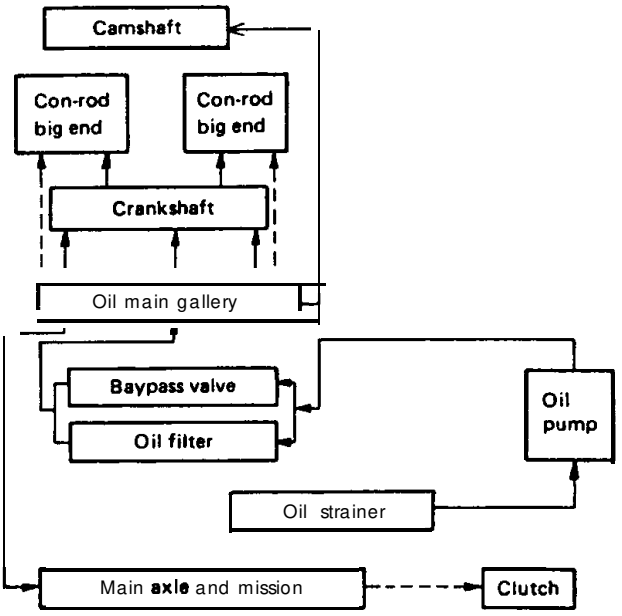


Valve margin thickness "D"	IN: 1.3 mm (0.051 in) EX: 1.3 mm (0.051 in)
Valve stem diameter	IN: 8.0 $^{-0.010}_{-0.025}$ mm (0.315 $^{-0.0004}_{-0.0010}$ in) EX: 8.0 $^{-0.025}_{-0.040}$ mm (0.315 $^{-0.0010}_{-0.0016}$ in)
Valve guide diameter	IN: 8.0 $^{+0.019}_{+0.010}$ mm (0.315 $^{+0.0007}_{+0.0004}$ in) EX: 8.0 $^{+0.019}_{+0.010}$ mm (0.315 $^{+0.0007}_{+0.0004}$ in)
Valve stem to guide clearance	IN: 0.020 ~ 0.044 mm (0.00079 ~ 0.00173 in) EX: 0.035 ~ 0.059 mm (0.00138 ~ 0.00232 in)
4) Valve face runout limit	IN & EX: 0.03 mm (0.0012 in) or less
10. VALVE SPRING	
1) Free length	INNER (IN/EX): 42 mm (1.654 in) OUTER (IN/EX): 42.55 mm (1.675 in)
2) Spring rate	INNER (IN/EX): k_1 = 1.43 kg/mm (80.1 lb/in) k_2 = 1.81 kg/mm (101.4 lb/in) OUTER (IN/EX): k_1 = 3.2 kg/mm (179.2 lb/in) k_2 = 4.18 kg/mm (234.1 lb/in)
3) Installed length (Valve closed)	INNER (IN/EX): 35 mm (1.378 in) OUTER (IN/EX): 37 mm (1.457 in)
4) Installed pressure (Valve closed)	INNER (IN/EX): 10 ± 0.7 kg (22.0 ± 1.5 lb) OUTER (IN/EX): 17.7 ± 1.25 kg (39.0 ± 2.8 lb)
5) Compressed length (Valve open)	INNER (IN/EX): 25.5 mm (1.004 in) OUTER (IN/EX): 27.5 mm (1.083 in)
6) Compressed pressure (Valve open)	INNER (IN/EX): 27.2 ± 1.9 kg (60.0 ± 4.2 lb) OUTER (IN/EX): 57.4 ± 4.0 kg (126.5 ± 8.8 lb)
7) Wire diameter	INNER (IN/EX): 2.9 mm (0.114 in) OUTER (IN/EX): 4.2 mm (0.165 in)
8) Winding D.D.	INNER (IN/EX): 19.4 mm (0.764 in) OUTER (IN/EX): 32.6 mm (1.283 in)
9) Number of windings	INNER (IN/EX): 6.0 turns OUTER (IN/EX): 4.25 turns
11. CRANKSHAFT 	
1) Crankshaft deflection limit (A)	0.05 mm (0.002 in)
2) Con-rod large end clearance (B)	0.15 ~ 0.4 mm (0.0059 ~ 0.0157 in)
3) Width of crankshaft (C)	66 $^{-0.05}_{-0.10}$ mm (2.598 $^{-0.002}_{-0.004}$ in)
(D)	186 $^{0}_{-0.3}$ mm (7.323 $^{0}_{-0.012}$ in)
4) Crank pin I.D.	26 $^{-0.077}_{-0.095}$ mm (1.024 $^{-0.003}_{-0.004}$ in)
5) Crank pin O.D. x length	28 $^{0}_{-0.006}$ x 65 $^{+0.1}_{-0.2}$ mm (1.024 $^{0}_{-0.0002}$ x 2.559 $^{+0.004}_{-0.008}$ in)
12. CONNECTING ROD	
1) Big end I.D.	34 $^{+0.016}_{0}$ mm (1.339 $^{+0.0006}_{0}$ in)
2) Small end I.D.	20 $^{+0.028}_{+0.015}$ mm (0.787 $^{+0.0011}_{+0.0006}$ in)
13. CRANK BEARING	
1) Type Right end	φ30-φ78-19
Others	φ32-φ68-17
2) Oil seal type	SD-2540-9

14. CLUTCH	
1) Clutch type	Wet, multiple type
2) Clutch operating mechanism	Inner push type, screw push system
3) Primary reduction ratio and method	72/27 (2.666). spar gear
4) Primary reduction gear back lash (4 teeth)	21.45 $^{0}_{-0.025}$ mm (0.8445 $^{0}_{-0.00010}$ in)
5) Friction plate	
Thickness/Quantity	3 mm (0.118 in)/7 pcs.
Wear limit	2.7 mm (0.106 in)
6) Clutch plate	
Thickness/Quantity	1.4 mm (0.055 in)/6 pcs.
Warp limit	0.05 mm (0.002 in)
7) Clutch spring	
Free length/Quantity	34.6 mm (1.362 in)/6 pcs.
8) Clutch housing radial play	0.027 ~ 0.061 mm (0.0011 ~ 0.0032 in)
9) Push rod bending limit	0.2 mm (0.006 in)
15. TRANSMISSION	
1) Type	Constant mesh, 5-speed forward
2) Gear ratio: 1st	32/13 (2.461)
2nd	27/17 (1.588)
3rd	26/20 (1.300)
4th	23/21 (1.095)
6th	22/23 (0.966)
3) Bearing type: Main axle (Left)	Needle bearing (ϕ20-ϕ30-20)
Main axle (Right)	Ball bearing (ϕ25-ϕ52-20.6)
Drive axle (Left)	Ball bearing (ϕ30-ϕ62-23.8)
Drive axle (Right)	Needle bearing (ϕ20-ϕ30-16)
4) Oil seal type Drive axle (Left)	SDD-40-62-9
5) Secondary reduction ratio and method	34/17 (2.000)/Chain
16. SHIFTING MECHANISM	
1) Tvpe	Cam drum, return type
2) Oil seal type (Change lever)	SDO-14-24-6
17. KICK STARTER	
1) Tvpe	Bendix type
2) Oil seal type (Kick axle)	SD-25-35-7
3) Kick clip friction tension	1.2 ~ 1.7 kg (2.6 ~ 3.7 lb)
18. INTAKE	
1) Air cleaner: Type/Quantity	Dry. foam rubber/2 pcs.
2) Cleaner cleaning interval	Every 1,600 km (1,000 mile)
19. CARBURETOR	
1) Type and manufacturer/Quantity	BS38 MIKUNI/2 pcs.
2) I.D. mark	2F0-00
3) Main jet (MJ)	#135
4) Air jet (AJ)	#140
5) Jet needle (JN)	502-3
6) Needle jet (NJ)	Z-2
7) Throttle valve (Th.V)	#120
8) Pilot jet (PJ)	#27.5
9) Pilot screw (Turns out) (PS)	Preset
10) Starter jet (GS)	GS_1 : #80, GS_2 : 0.5
11) Fuel level (FL)	24 ± 1 mm (0.94 ±0.04 in)
12) Idling engine speed	1,200 r/min
20. LUBRICATION	
1) Engine sump oil quantity	Oil exchange: 2.0 lit (2.1 qt) Overhaul: 2.5 lit (2.6 qt)
2) Oil type and grade	Yamaluba 4-cycle oil or SAE 20W/40 type "SE" motor oil
3) Oil pump type	Trochoid pump

4) Trochoid pump specifications	
Top clearance	0.10 ~ 0.18 mm (0.0039 ~ 0.0071 in)
Tip clearance	0.03 ~ 0.09 mm (0.0012 ~ 0.0035 in)
Side clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
Oil pump volume	1.3 lit/min (1.37 qt/min) at 1,000 r/min
5) Bypass valve setting pressure	1.0 kg/cm^2 (14 psi)

6) Lubrication chart



C. Chassis

1. FRAME	
1) Frame design	Double cradle, high tensile frame
2. STEERING SYSTEM	
1) Caster	27"
2) Trail	115 mm (4.53 in)
3) Number and size of balls in steering head	
Upper race	19 pcs. 1/4 in
Lower race	19 pcs. 1/4 in
4) Steering lock to lock	42" each (L and R)
3. FRONT SUSPENSION	
1) Type	Telescopic fork
2) Damper type	Oil damper, coil spring
3) Front fork spring	
Free length	482 mm (18.98 in)
Wire diameter x winding diameter	4 x 24.5 mm (0.157 x 0.965 in)
Spring constant	k_1 = 0.48 kg/mm (26.88 lb/in)/ 0 ~ 100 mm (0 ~ 3.94 in)
	k_2 = 0.65 kg/mm (36.40 lb/in)/ 100 ~ 150 mm (3.94 ~ 5.91 in)
4) Front fork travel	150 mm (5.906 in)
5) Inner tuba O.D.	35 mm (1.378 in)
6) Front fork oil quantity and type	169 cc (5.72 oz) each leg Yamaha fork oil 20 wt or equivalent
7) Distance from the top of inner tube oil level without spring	Approx. 454 mm (17.9 in)
4. REAR SUSPENSION	
1) Tvpe	Swing arm
2) Damper type	Oil damper, coil spring
3) Shock absorber travel	80 mm (3.15 in)
4) Shock absorber spring	
Free length	226 mm (8.90 in)

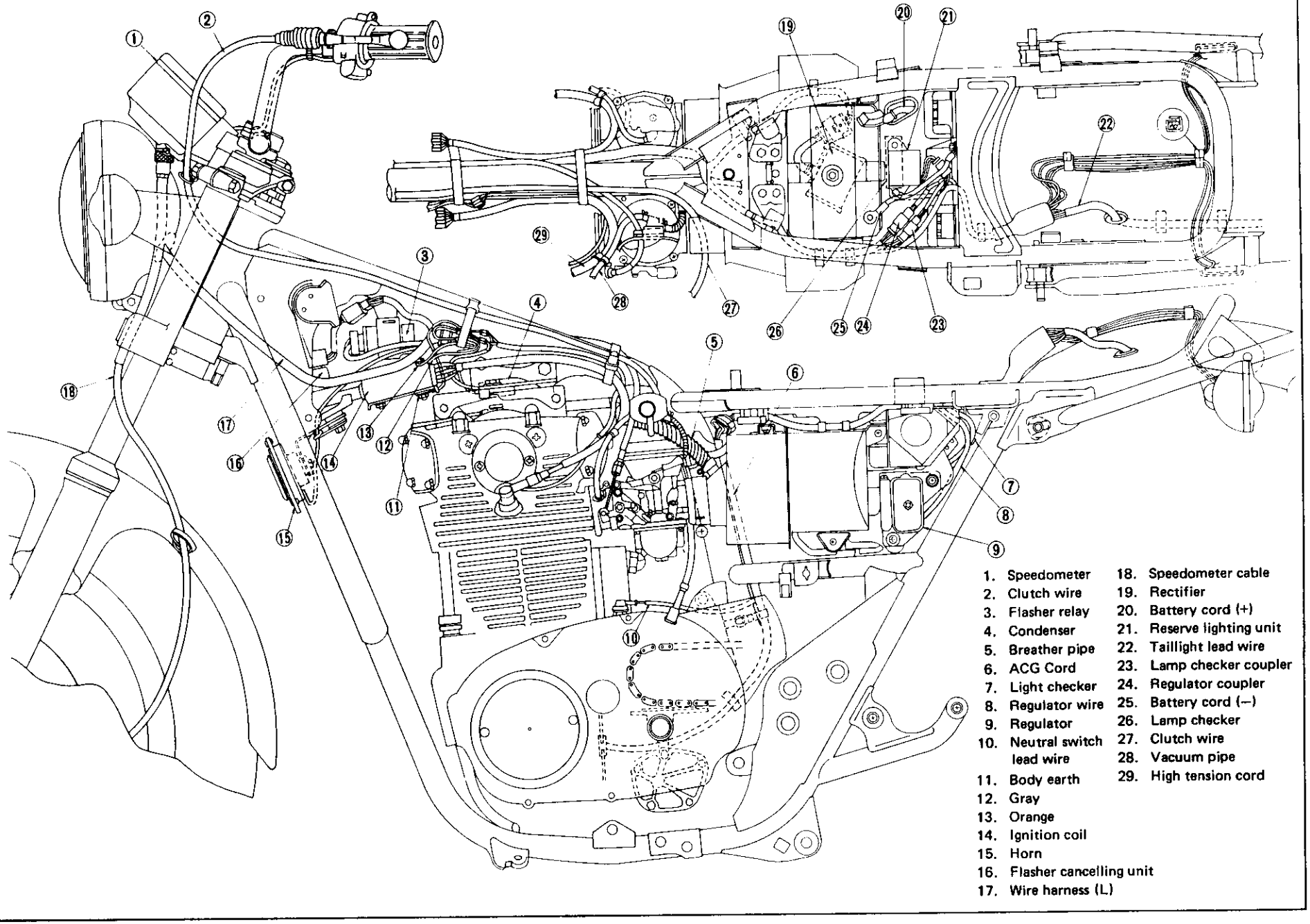
Wire diameter x winding diameter	7.5 x 60.5 mm (0.295 x 2.382 in)
Spring constant	k_1 = 1.714 kg/mm (96.0 lb/in)/ 0 ~ 45 mm (0 ~ 1.77 in) k_2 = 2.244 kg/mm (125.7 lb/in)/ 45 ~ 80 mm (1.77 ~ 3.15 in)
5) Swing arm free play (Limit)	1 mm (0.04 in)
6) Pivot shaft – Outside diameter	16 mm (0.63 in)
5. FUEL TANK	
1) Capacity	11.5 lit (2.53 US. gal)
2) Fuel grade	Regular gasoline
6. WHEEL	
1) Type (Front and rear)	Aluminum rim
2) Tire size (Front)	3.50S19-4PR
(Rear)	130/90S16-4PR
3) Tire pressure:	
up to 90 kg (198 lb) load	Front: 1.6 kg/cm^2 (22 psi) Rear: 2.0 kg/cm^2 (28 psi)
90 kg (198 lb)load ~ 204 kg (445 lb)load (Maximum load)	Front: 2.0 kg/cm^2 (28 psi) Rear: 2.3 kg/cm^2 (32 psi)
High speed riding	Front: 2.0 kg/cm^2 (28 psi) Rear: 2.3 kg/cm^2 (32 psi)
4) Rim run out limit (Front and rear)	
Vertical	2 mm (0.08 in)
Lateral	2 mm (0.08 in)
5) Rim size (Front)	1.85 x 19
(Rear)	MT3.00 x 16
6) Bearing type	
Front wheel (Left)	630322
Front wheel (Right)	63032132
Rear wheel (Left)	63052
Rear wheel (Right)	63042
7) Oil seal type	
Front wheel (Left)	SDD-45-56-6
Front wheel (Right)	SD-28-47-7
Rear wheel (Left)	SD-35-62-9
Rear wheel (Right)	SO-27-52-5
8) Secondary drive chain type	
Type	50HDS
Number of links	103L + Joint
Chain pitch	15.875 mm (5/8 in)
Chain free play	20 mm (314 in)
7. BRAKE	
1) Front brake	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	298 x 7.0 mm (11.73 x 0.28 in)
Disc wear limit	6.5 mm (0.26 in)
Disc pad thickness	11 .O mm (0.43 in)
Pad wear limit	6.0 mm (0.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm (1.50 in)
Brake fluid type / quantity	DOT #3 Brake fluid / 38.1 cc (1.29 oz)
2) Rear brake	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	267 x 7.0 mm (10.5 x 0.28 in)
Disc wear limit	6.5 mm (0.26 in)
Disc pad thickness	11 .O mm (0.43 in)
Pad wear limit	6.0 mm (0.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm (1.50 in)
Brake fluid type / quantity	DOT #3 Brake fluid / 38.1 cc (1.29 oz)

D. Electrical

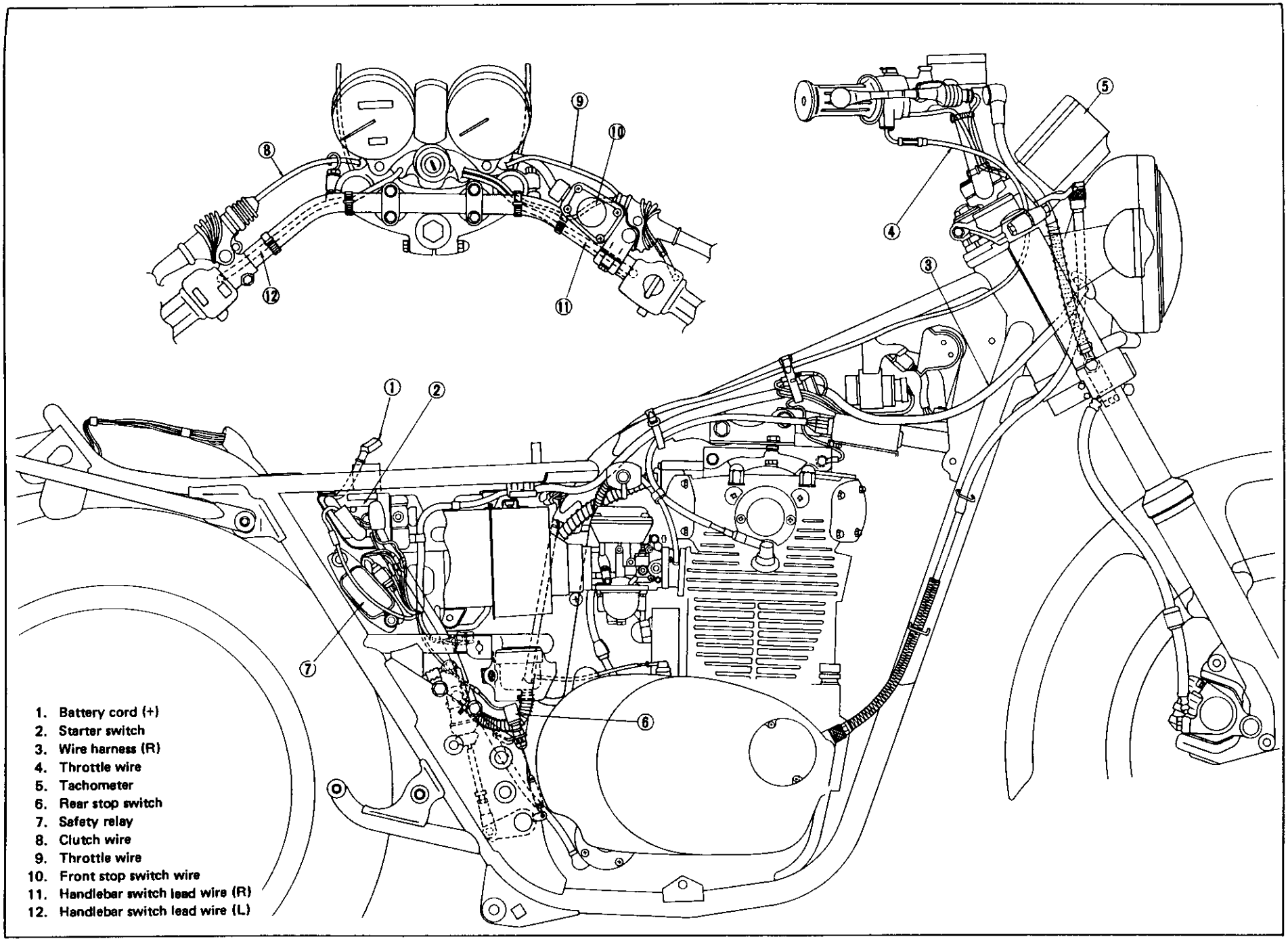
1. IGNITION SYSTEM	
1) Ignition timing (B.T.D.C.)	15°/1,200 r/min
2) ignition coil	
Model/Manufacturer	CM11-50B/HITACHI
Spark gap	B mm (0.31 in) or more/300 r/min at 8V
Primary winding resistance	3.9Ω ± 10% at 20°C (68°F)
Secondary winding resistance	8.0kΩ ± 20% at 20°C (68°F)
3) Spark plug	
Type	N-7Y (CHAMPION) or BP7ES (N.G.K.)
Spark plug gap	0.7 ~ 0.8 mm (0.027 ~ 0.031 in)
4) Contact breaker	
Manufacturer/Quantity	HITACHI/2 pcs.
Point gap	0.30 ~ 0.40 mm (0.012 ~ 0.016 in)
Point spring pressure	650 ~ 850 g (22.9 ~ 30.0 oz)
Cam closing angle	93" ± 5"
5) Condenser	
Capacity	0.22μF
Insulation resistance	10MΩ or more
Quantity	2 pcs.
2. CHARGING SYSTEM	
1) AC generator	
Charging output	14V 1 1A/2,000r/min
Rotor coil resistance (Field coil)	5.2552 ± 10% at 20°C (68°F)
Stator coil resistance	0.46Ω ± 10% at 20°C (68°F)
Brush length	14.5 mm (0.571 in)
Brush wear limit	7.0 mm (0.276 in)
2) Rectifier	
Type	6-Element type (Full wave)
Model/Manufacturer	SB6B-17/HITACHI
Capacity	12A
Withstand voltage	4oov
3) Regulator	
Type	Tillil type
Model/Manufacturer	TLIZ-80/HITACHI
Regulating voltage	14.5 ± 0.5V
Core gap	0.6 ~ 1.0 mm (0.024 ~ 0.039 in)
Point gap	0.3 ~ 0.4 mm (0.012 ~ 0.016 in)
Voltage coil resistance	10Ω at 20°C (68°F)
5) Battery	
Model/Manufacturer/Quantity	YB14L-A2/YUASA/1 pc.
Capacity	12V, 14AH
Charging rate	1.4A 10 hours
Specific gravity	1.28 at 20°C (68°F)
3. STARTER	
1) Starter motor	
Type	Bendix type
Manufacturer	HITACHI
Model	S108-35
output	0.5 kw
Armature coil resistance	0.006752 ± 10% at 20°C (68°F)
Field coil resistance	0.00451 ± 10% at 20°C (68°F)
Brush size/Quantity	16 mm (0.63 in)/2 pcs.
Wear limit	4 mm (0.16 in)
Spring pressure	800 g (28.2 oz)
Commutator O.D./Wear limit	33 mm (1.30 in)/31 mm (1.22 in)
Mica undercut	0.7 mm (0.028 in)

2) Starter switch	
Manufacturer	HITACHI
Model	A104-70
Amparage rating	100A
Cut-in voltage	6.5V
Winding resistance	3.5Ω
3) Starter clip friction tension	2.2 ~ 2.5 kg (4.9 ~ 5.5 lb)
4. LIGHTING SYSTEM	
1) Head light type	Sealed beam
2) Bulb brightness and wattage/Quantity	
Head light	12V, 50/40W x 1 PC.
Tail/brake light	12V, 3/32 CP (8W/27W) x 1 PC.
Flasher light	12V, 32 CP (27W) x 4 pcs.
Pilot lights: Turn	12V, 3.4W x 2 PCS.
High beam	12v. 3.4W x 1 PC.
Headlight failure	12V, 3.4W x 1 pc.
Neutral	12V, 3.4W x 1 pc.
Tail/brake failure	12V, 3.4W x 1 PC.
Meter lights	12V, 3.4W x 4 PCS.
3) Reserve lighting unit Model/Manufacturer	337-I 1720/KOITO
4) Horn	
Model/Manufacturer	CF-12/NIKKO
Maximum amparage	2.5A
5) Flasher relay	
Type	Condenser type
Model/Manufacturer	1A0-70/NIPPON DENS0
Flasher frequency	85 ± 10 cycle/min.
Capacity	32 CP (27W) x 2 + 3.4W
6) Flasher cancelling unit	
Model	EVH-AC518
Voltage	DC9V ~ 16V
7) Fuse	
Rating/Quantity	Main (Red): 20A
8) Light checker	
Model	35200-7 1859
Manufacturer	KOITO

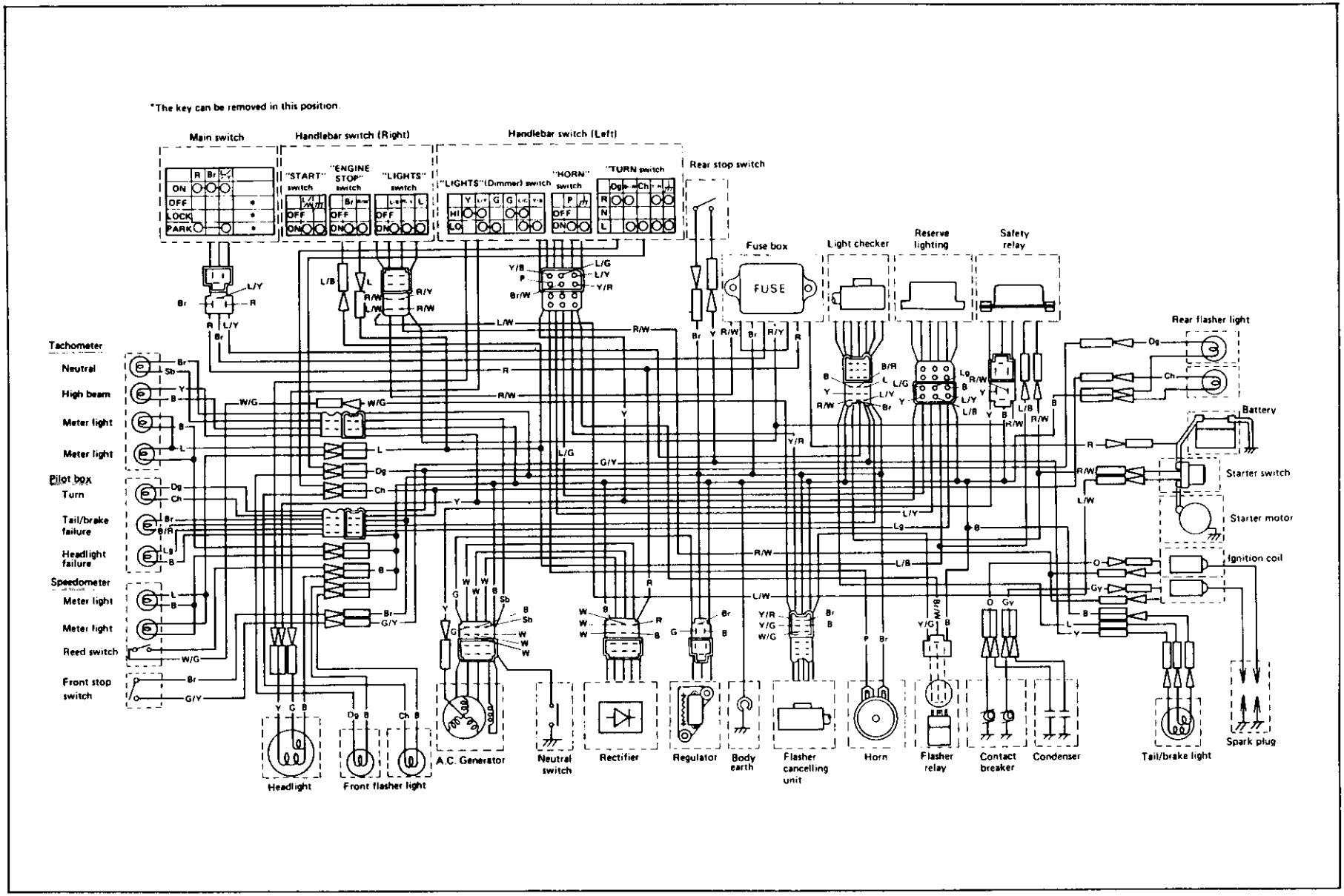
7-4 CABLE ROUTING DIAGRAM



1. Speedometer
2. Clutch wire
3. Flasher relay
4. Condenser
5. Breather pipe
6. ACG Cord
7. Light checker
8. Regulator wire
9. Regulator
10. Neutral switch lead wire
11. Body earth
12. Gray
13. Orange
14. Ignition coil
15. Horn
16. Flasher cancelling unit
17. Wire harness (L)
18. Speedometer cable
19. Rectifier
20. Battery cord (+)
21. Reserve lighting unit
22. Taillight lead wire
23. Lamp checker coupler
24. Regulator coupler
25. Battery cord (–)
26. Lamp checker
27. Clutch wire
28. Vacuum pipe
29. High tension cord

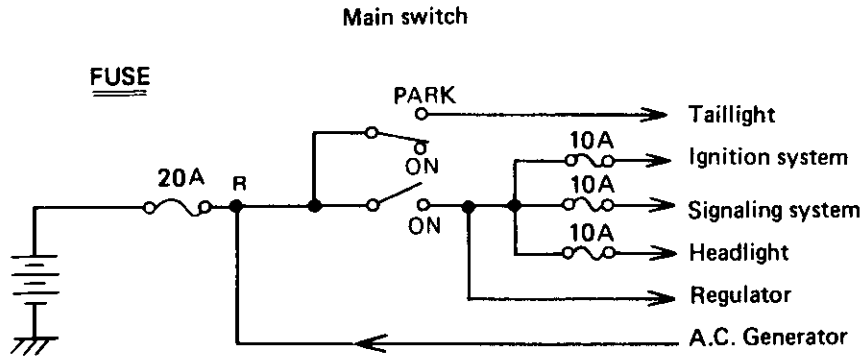

1. Battery cord (+)
2. Starter switch
3. Wire harness (R)
4. Throttle wire
5. Tachometer
6. Rear stop switch
7. Safety relay
8. Clutch wire
9. Throttle wire
10. Front stop switch wire
11. Handlebar switch lead wire (R)
12. Handlebar switch lead wire (L)

7-5 WIRING DIAGRAM



COLOR CODE

R	Red	L/W	Blue/White
Br	Brown	R/W	Red/White
L	Blue	L/B	Blue/Black
Y	Yellow	L/Y	Blue/Yellow
G	Green	L/G	Blue/Green
P	Pink	Y/B	Yellow/Black
B	Black	Br/W	Brown/White
Dg	Dark green	Y/R	Yellow/Red
Ch	Chocolate	L/R	Blue/Red
Sb	Sky blue	W/B	White/Black
W	White	G/W	Green/White
Gy	Gray	W/G	White/Green
O	Orange	G/Y	Green/Yellow
Lg	Light green	Y/G	Yellow/Green
R/Y	Red/Yellow		



XS650E

9

Supplementary

FOR XS650E MODELS AFTER ENGINE SERIAL NO. 2F0-006501

FOREWORD

This Supplementary Manual for XS650E has been published to supplement the Service Manual for the XS650E (LIT-1 1616-00-76), and provides updated information for the XS650E model as well as new data concerning the XS650E. For complete information on service procedures it is necessary to use this Supplementary Manual together with the Service Manual for the XS650E (LIT-1 1616-00-76).

NOTE:

This Supplementary Manual contains special information regarding periodic maintenance to the emissions control system for the XS650E. Please read this material carefully.

SERVICE DEPT.
INTERNATIONAL DIVISION
YAMAHA MOTOR CO., LTD.

Page numbers shown in brackets correspond to page numbers of the XS650E (LIT-1 1616-00-76) Service Manual.

(Page 4-5)

2-2. Maintenance Interval Charts

A. PERIODIC MAINTENANCE EMISSION CONTROL SYSTEM

NO.	ITEM	REMARKS	INITIAL BREAK-IN		THERE AFTER EVERY	
			1,000 km or 1 month (600 mi)	5,000 km or 7 months (3,000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)
1	Cam Chain	Check and adjust chain tension	○			○
2	Valve Clearance	Check and adjust valve clearance when engine is cold.	○	○		○
3	Contact Breaker Points	Check condition. Adjust point gap. Replace if necessary.	○	○	○	
4	Ignition Timing	Check and adjust ignition timing.	○	○	○	
5	Spark Plugs	Check condition. Adjust gap. Replace if necessary.		○		○
6	Crankcase Ventilation System	Check ventilation hose for cracks or damage. Replace if necessary.		○		○
7	Fuel Hose	Check fuel hose for cracks or damage. Replace if necessary.		○		○
8	Exhaust System	Check for leakage. Ratighten as necessary. Replace gasket(s) if necessary.	○	○	○	
9	Carburetor Synchronization	Adjust synchronization of carburetors.	○	○	○	
10	Idle Speed	Check and adjust engine idle speed. Adjust cable free play.	○	○	○	

B. GENERAL MAINTENANCE/LUBRICATION

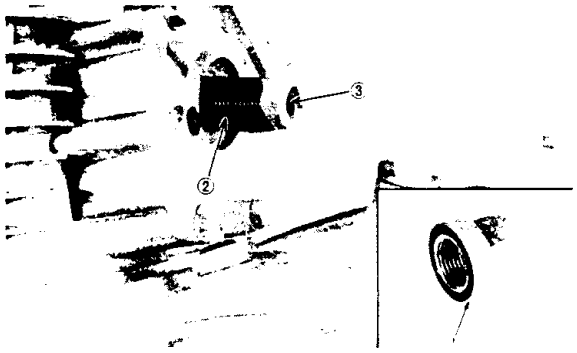
NO.	ITEM	REMARKS	TYPE	INITIAL BREAK-IN		THERE AFTER EVERY		
				1,000 km or 1 month (600 mi)	5,000 km or 7 months (3,000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)	16,000 km or 24 months (10,000 mi)
1.	Engine Oil	Warm-up engine before draining	Yamalube 4-cycle oil or SAE 20W/40 "SE" motor oil	○	○	○		
2	Oil Filter	Clean element in solvent	–		○		○	
3	Air Filter	Dry type filter. Clean with compressed air.	–		○		○	
4	Brake System	Adjust free play. Replace shoes and/or pads if necessary	–	○	○	0)		
5	Clutch	Adjust free play	–	○	○	0)		
6	Drive Chain	Apply chain lube thoroughly	Yamaha chain and cable lube or 10W/30 motor oil	CHECK CHAIN TENSION AND LUBE EVERY 500 km 300 mi.				
7	Control and Meter Cable	Apply cable lube thoroughly	Yamaha chain and cable lube or 10W/30 motor oil	○	○	○		
8	Rear Arm Pivot Shaft	Apply until new grease shows	Medium weight wheel bearing grease			○		
9	Brake pedal and change pedal shaft	Apply lightly	Yamaha chain and cable lube or 10W/30 motor oil		○	○		
10	Center and Side Stand Pivots	Apply lightly	Yamaha chain and cable lube or 10W/30 motor oil		○	○		
11	Front Fork Oil	Drain completely. Refill to specification	Yamaha fork oil 10Wt or equivalent					○
12	Steering Ball Bearing and Races	Check bearings assembly for looseness, Moderately repack every 16,000 km (10,000 mi)	Medium weight wheel bearing grease.		○	○		Repack
13	Wheel Bearings	Check bearings for smooth rotation. Moderately repack every 16,000 km (10,000 mi)	Medium weight wheel bearing grease		○	○		Repack
14	Battery	Check specific gravity. Check breather pipe for proper operation.	–		○	○		
15	A.C. Generator	Replace generator brushes Replace at initial 9,000 km (5,500 mi)	–				○	

(Page 8)

E. Cam chain adjustment

Check/Adjust the cam chain tension as follows:

1. Remove the cap nut.
2. Turn the left end of the crankshaft counterclockwise. As the crankshaft is turning, check to see that the cam chain adjuster push rod is flush with the end of the bolt. If not, turn the adjuster bolt until the push rod is flush.
3. Reinstall the cap nut. The cap nut acts as a lock nut for the adjuster.



1. Cap nut 2. Adjuster bolt 3. Push rod

(Page 9)

B. Air filters

2. Cleaning method

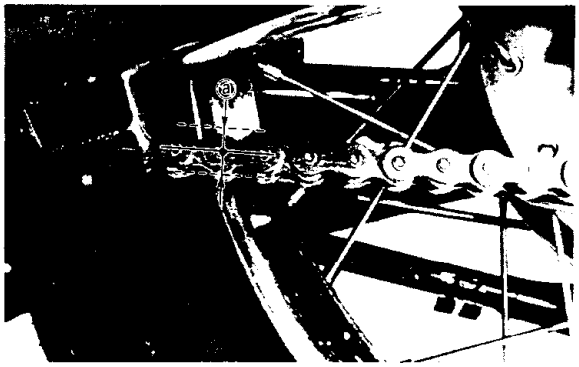
c. The air filter element should be cleaned every 8,000 km (5,000 mi). It should be cleaned more often if the machine is operated in extremely dusty areas.

(Page 11)

G. Drive chain

1. Tension check

Inspect the drive chain with both tires touching the ground. Check the tension halfway between drive and driven sprockets. The normal vertical deflection is approximately 20 ~ 30 mm (0.79 ~ 1.18 in)

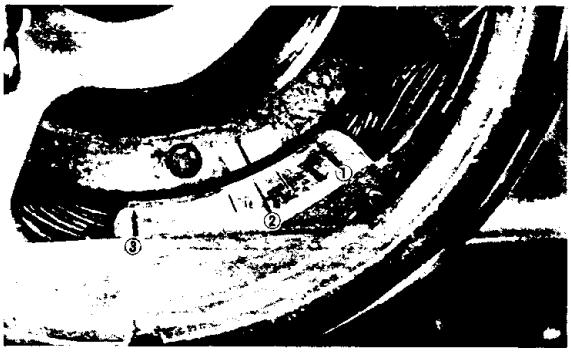


a. 20~30 mm (0.79~1.18 in)

(Page 14)

C. Ignition timing

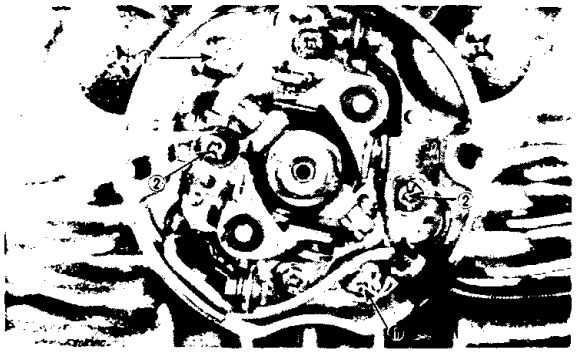
1. Point gap must be set before setting timing.
2. Ignition timing is checked with a timing light by observing the position of the stationary marks stamped on the stator and the pointer on the generator rotor.



1. Top dead center
2. 15° BTDC/1,200 r/min
3. Advanced mark

3. Connect timing light to right (left) cylinder spark plug lead wire. Ignition timing of right cylinder must be set first.
4. Start the engine and keep the engine speed as specified on the label. Use a tachometer for checking.
5. The rotor pointer should line up the "F" stamped timing mark on the stator at a specified engine speed. If it does not align, loosen the two breaker backing plate screws (breaker assembly holding screws for left cylinder) and move the complete backing plate (breaker assembly for left cylinder) until the point marks align.

6. Retighten screws. Check timing again for right cylinder.
7. Repeat procedure (steps 2-6) for left cylinder.



1. Right cylinder timing adjustment
2. Left cylinder timing adjustment

(Page 15)

F. Spark plug

Check electrode condition and wear, insulator color and electrode gap. Use a wire gauge for adjusting the plug gap. If the electrodes become too worn, replace it. When installing the plug, always clean the gasket surface, wipe off any grime that might be present on the surface of the spark plug, and torque the spark plug properly.

Standard spark plug:
N-7Y (CHAMPION) or BP7ES(NGK)
Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Spark plug tightening torque:
2.0 m-kg (14.5 ft-lb)

XS650SE

10

Supplementary

FOR XS650SE MODELS AFTER ENGINE SERIAL NUMBER 2FO-114241

FOREWORD

This Supplementary Service Manual for XS650SE has been published to supplement the Service Manual for the XS650E (LIT-11616-00-76), and provides updated information for the XS650E model as well as new data concerning the XS650SE. For complete information on service procedures, it is necessary to use this Supplementary Service Manual together with the Service Manual for the XS650E (LIT-1 1616-00-76).

NOTE:

This Supplementary Manual contains special information regarding periodic maintenance to the emissions control system for the XS650SE. Please read this material carefully.

SERVICE DEPT.
INTERNATIONAL DIVISION
YAMAHA MOTOR CO., LTD.

Page numbers shown in brackets correspond to page numbers of the XS650E Service Manual (LIT-1 1616-00-76).

(PAGE 4 ~ 5)

2-2. MAINTENANCE INTERVALS CHARTS

A. PERIODIC MAINTENANCE EMISSION CONTROL SYSTEM

NO.	ITEM	REMARKS	INITIAL BREAK-IN		THERE AFTER EVERY	
			1,000 km or 1 month (600 mi)	5,000 km or 7 months (3,000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)
1	Cam Chain	Check and adjust chain tension.	○			○
2	Valve Clearance	Check and adjust valve clearance when engine is cold.	○	○		○
3	Contact Breaker Points	Check condition. Adjust point gap. Replace if necessary.	○	○	○	
4	Ignition Timing	Check and adjust ignition timing.	○	○	○	
5	Spark Plugs	Check condition. Adjust gap. Replace if necessary.		○		○
6	Crankcase Ventilation System	Check ventilation hose for cracks or damage. Replace if necessary.		○		○
7	Fuel Hose	Check fuel hose for cracks or damage. Replace if necessary.		○		○
8	Exhaust System	Check for leakage. Retighten as necessary. Replace gasket(s) if necessary.	0	○	○	
9	Carburetor Synchronization	Adjust synchronization Of carburetors.1	○	0	0	
10	Idle Speed	Check and adjust engine idle speed. Adjust cable free play.	0	0	0	

B. GENERAL MAINTENANCE/LUBRICATION

NO.	ITEM	REMARKS	TYPE	INITIAL BREAK-IN		THEREAFTEREVERY		
				1,000 km or 1 month (600 mi)	5.000 km or 7 months 13,000 mi)	4.000 km or6 months (2,500 mi)	8,000 km or 12 months 15,000 mi)	16,000 km or 24 months (10,000 mi)
1	Engine Oil	Warm-up engine before draining.	Yamalube 4-cycle oil or SAE 20W/40 "SE" motor oil	○	○	○		
2	Oil Filter	Clean element in solvent.			○		○	
3	Air Filter	Dry type filter Clean with compressed air			○		○	
4	Brake System	Adjust free play. Replace pad if necessary.		○	○	0		
5	Clutch	Adjust free play.		○	○	0		
6	Drive Chain	Apply chain lube *thoroughly.*	Yamaha chain and cable lube or 10W/30 motor oil	CHECK CHAIN TENSION AND LUBE EVERY 500 km (300 mi)				
7	Control and Meter Cable	Apply cable lube thoroughly	Yamaha chain and cable lube or 10W/30 motor oil	○	○	○		
8	Rear Arm Pivot Shaft	Apply until new grease shows				○		
9	Brake pedal and change pedal shaft	Apply lightly.	Yamaha chain and cable lube or 10W/30 motor oil		○	○		
10	Center and Side Stand Pivots and Kick Crank Boss	Apply lightly.	Yamaha chain and cable lube or 10W/30 motor oil		○	○		

NO.	ITEM	REMARKS	TYPE	INITIAL BREAK-IN		THEREAFTEREVERY		
				1,000 km or 1 month (600 mi)	5,000 km or 7 months (3.000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)	16,000 km or 24 month (10,000 mi
, ,	Front Fork Oil	Dram completely. Refill to specification.	Yamaha fork oil 10Wt or equivalent					○
12	Steering Ball Bearing and Races	Check bearings assembly for looseness. Moderately repack every 16,000 km 110,000 mi).	Medium weight wheel bearing grease.		○	0		Repack
13	Wheel Bearings	Check bearings for smooth rotation. Moderaltely repack every 16,000 km (10,000 mi).	Medium weight wheel bearing grease.		0	0		Repack
14	Battery	Check specific gravity. Check breather pipe for proper operation.			0	0		
15	A.C. Generator	Replace generator brushes. Replace at initial 9.000 km (5,500 mi)	–				0	

In the XS650E Service Manual there are a few pages that are not arranged in order. These are pages 7, 8 and 9. They should be read in the reverse order, i.e. 9,8 and 7.

(PAGE 7 ~ 8)

2-3. ENGINE

B. Air filters

2. Cleaning method

c. The air filter element should be cleaned every 8,000 km (5,000 mi). It should be cleaned more often if the machine is operated in extremely dusty areas.

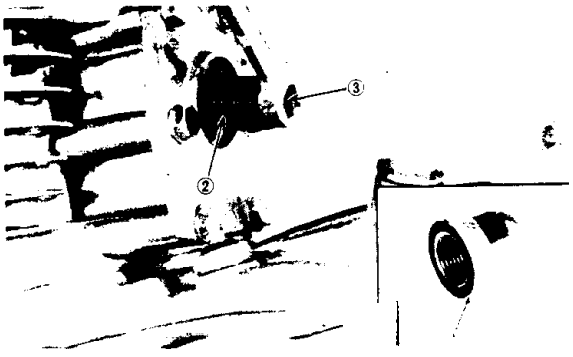
E. Cam chain adjustment

Check/adjust the cam chain tension as follows:

1. Remove the cap nut.

2. Turn the left end of the crankshaft counterclockwise. As the crankshaft is turning, check to see that the cam chain adjuster push rod is flush with the end of the bolt. If not, turn the adjuster bolt until the push rod is flush.

3. Reinstall the cap nut. The cap nut acts as a lock nut for the adjuster.



1. cap nut 2. Adjuster bolt 3. Push rod

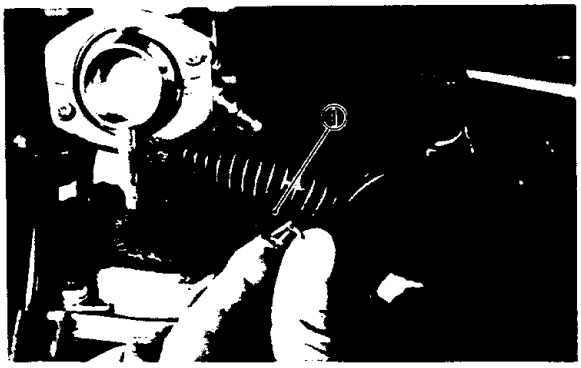
(PAGE 9 ~ 13)

2-4. CHASSIS

A. Fuel petcock cleaning

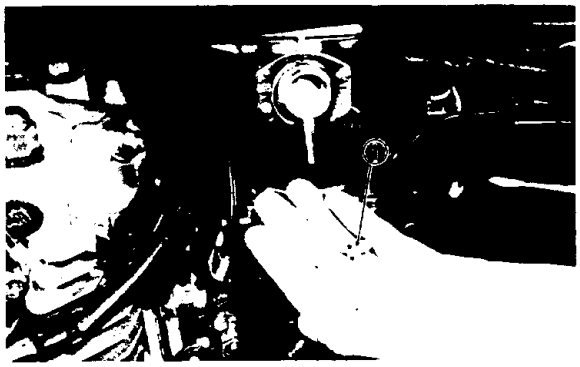
1. Open the seat and remove the fuel tank securing bolt.

2. Turn the petcock lever to the "ON" or "RES" position. Raise the fuel tank to remove the fuel pipe.



1. Fuel pipe

3. Remove the drain bolt and clean with solvent. If gasket is damaged, replace.



1. Drain bolt

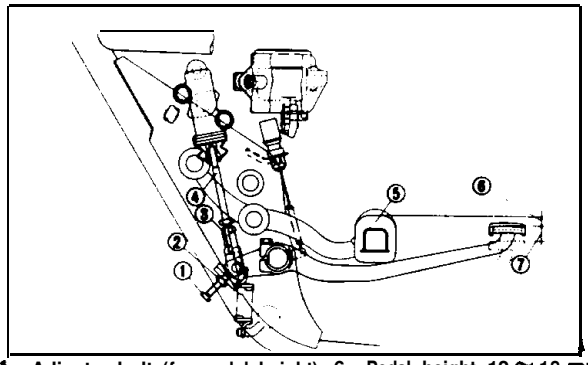
E. Rear brake

The rear brake pedal should be so adjusted that it has a free play of 13 ~ 15 mm (0.51 ~ 0.59 in) from when the brake pedal is first moved to when the brake begins to be effected.

1. **Loosen the adjuster lock nut (for pedal height).**
2. **By turning the adjuster bolt clockwise or counterclockwise, adjust the brake pedal position so that its top end is approx. 12 ~ 18 mm (0.47 ~ 0.71 in) below the footrest top end.**
3. **Secure the adjuster lock nut.**
4. **Loosen the brake rod adjuster lock nut and screw brake rod downward until there is noticeable free play between rod and master cylinder.**
5. **Turn in the brake rod until it lightly touches the master cylinder, then turn it out by approx. 1-1/5 turns (for proper free play).**
6. **Tighten the brake rod adjuster lock nut.**

CAUTION:

See that the punched mark on the brake rod is not above the top surface of the adjuster lock nut in securing the brake rod adjuster lock nut.



1. Adjuster bolt (for pedal height)
2. Lock nut
3. Lock nut
4. Brake rod
5. Footrest
6. Pedal height 12 ~ 18 mm (0.47 - 0.71 in)
7. Free play 13 ~ 15 mm (0.51 - 0.59 in)

F. Wheels and tires

2. Tires

Specifications should be changed as follows:

	FRONT	REAR
XS650SE BASIC WEIGHT with oil and full fuel tank	102 kg (225 lb)	118 kg (260 lb)
Standard tire	Bridgestone or Yokohama 3.50S19-4PR	Bridgestone or Yokohama 130/90S16-4PR
Maximum load limit	166 kg (365 lb)	279 kg (615 lb)
Cold tire pressure:		
Up to 90 kg (198 lb) load	1.6 kg/cm² (22 psi)	2.0 kg/cm² (28 psi)
90 kg (198 lb) load ~ 204 kg (445 lb) load (Maximum load)	2.0 kg/cm² (28 psi)	2.3 kg/cm² (32 psi)
High speed riding	2.0 kg/cm² (28 psi)	2.3 kg/cm² (32 psi)
Minimum tire tread depth	0.8 mm (0.03 in)	0.8 mm (0.03 in)

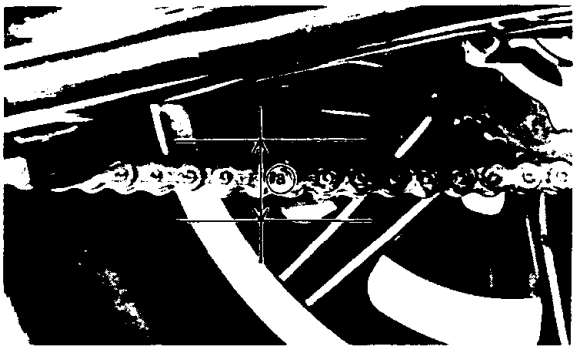
G. Drive chain

1. Tension check

NOTE:

Before checking and/or adjusting, rotate rear wheel through several revolutions and check tension several times to find the tightest point. Check and/or adjust chain tension with rear wheel in this "tight chain" position.

Inspect the drive chain with both tires touching the ground and without rider. Check the tension at the position shown in the illustration. The normal vertical deflection is approximately 20 ~ 30 mm (0.8 ~ 1.2 in). If the deflection exceeds 20 ~ 30 mm (0.8 ~ 1.2 in) adjust the chain tension.



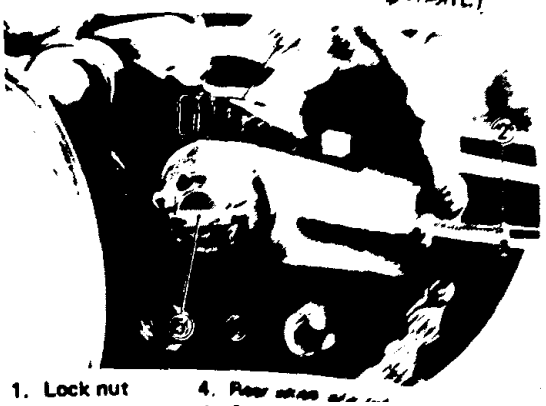
a. 20~30 mm (0.8~1.2 in)

2. Tension adjustment

a. **Remove the cotter pin of the rear wheel axle nut with pliers.**

b. **Loosen the rear wheel axle nut.**

c. Loosen the lock [illegible] side. To tighten chain turn [illegible] adjusters clockwise. To loosen turn adjusters counterclockwise and push wheel forward. Turn each adjuster exactly the same amount to maintain correct axle alignment. (There are marks on each side of rear arm and [illegible] roller; use them to check for proper alignment.)



1. Lock nut
2. Adjuster
3. Marks for alignment
4. [illegible]
6. [illegible]

d. After adjusting, securely tighten the lock nuts and the rear axle nut.

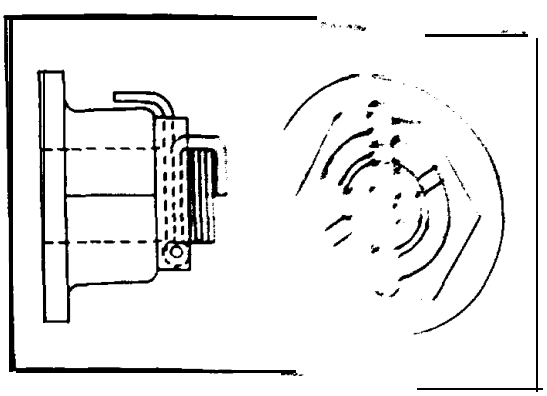
e. Insert the cotter pin into the rear wheel axle nut and bend the ends of the cotter pin as shown in the illustration (if the nut notch and the cotter pin hole do not match, tighten the nut slightly to match).

CAUTION:

Always use a new cotter pin on the rear axle nut.

NOTE:

Excessive chain tension will damage the engine and other vita, [illegible] keep the tension within the specified limits, replace the rear axle cotter pin with a new one.



H. Front fork oil change

8. Pour specified amount of oil into the inner tube through the upper end opening.

Front for oil capacity:
169 cc (5.72 US oz) each leg

(PAGE 14 ~ 15)

2-5. ELECTRICAL

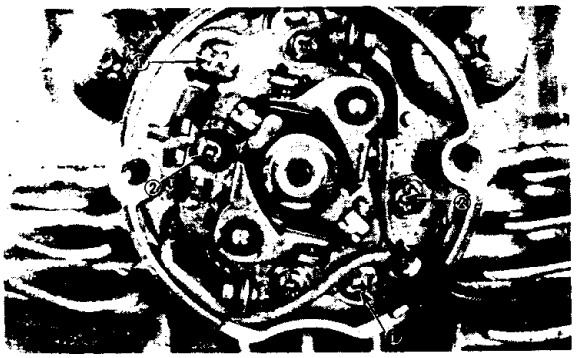
C. Ignition timing

1. Point gap must be set before setting timing.
2. Ignition timing is checked with a timing light by observing the position of the stationary marks stamped on the stator and the pointer on the generator rotor.



1. Top dead center
2. 15" BTDC at 1,200 r/mn
3. Advanced mark

3. Connect timing light to right (left) cylinder spark plug lead wire. Ignition timing of right cylinder must be set first.
4. Start the engine and keep the engine speed as specified on the label. Use a tachometer for checking.
5. The rotor pointer should line up the "F" stamped timing mark on the stator at a specified engine speed. If it does not align, loosen the two breaker backing plate screws (breaker assembly holding screws for left cylinder) and move the complete backing plate (breaker assembly for left cylinder) until the point marks align.
6. Retighten screws. Check timing again for right cylinder.
7. Repeat procedure (steps 2 ~ 6) for left cylinder.



1. Right cylinder timing adjustment
2. Left cylinder timing adjustment

F. Spark plug

Check electrode condition and wear, insulator color and electrode gap. Use a wire gauge for a adjusting the plug gap. If the electrodes become too worn, replace it.

When installing the plug, always clean the gasket surface, wipe off any grime that might be present on the surface of the spark plug, and torque the spark plug properly.

Standard spark plug:
N-7Y (CHAMPION) or BP7ES (NGK)
Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Spark plug tightening torque:
2.0 m-kg (14.5 ft-lb)

(PAGE 22 ~ 29)

33. INSPECTION AND REPAIR

D. Valve spring

1. Checking the valve springs

d. Valve spring specifications

Specifications should be changed as follows:

	Inner	Outer
Free length	42 mm (1.654 in)	42.55 mm (1.675 in)
Installed pressure (Valve closed)	9.3 ~ 10.7 kg (20.5 ~ 23.6 lb)	16.45 ~ 18.95 kg (36.3 ~ 41.8 lb)
Installed length (Valve closed)	35 mm (1.378 in)	37 mm (1.457 in)
Compressed pressure (Valve open)	25.3-28.1 kg (55.8 ~ 62.0 lb)	53.5-81.5 kg (118.0 -135.6 lb)
Compressed length (Valve open)	25.5 mm (1.004 in)	27.5 mm (1.083 in)
Allowable tilt from vertical	1.6 mm or 2.5° (0.063 in)	←

(PAGE 29 ~ 33)

3-4. ENGINE ASSEMBLY AND ADJUSTMENT

0. Engine

Specifications should be changed as follows:

Engine mounting bolt torque:		
Upper (U Nut)	M8	1.8 m-kg (13.0 ft-lb)
Upper	M10	3.0 m-kg (21.7 ft-lb)
Front (U Nut)	M10	4.6 m-kg (33.3 ft-lb)
Rear (U Nut)	M10	4.1 m-kg (29.7 ft-lb)
Rear – under (U Nut)	M10	4.6 m-kg (33.3 ft-lb)
Under (U Nut)	M10	9.0 m-kg (65.1 ft-lb)

(PAGE 39 ~ 40)

5-1. FRONT WHEEL

C. Front wheel inspection

1. Check for cracks, bends or warpage of wheels. If a wheel is deformed or cracked, it must be replaced.

NOTE:

These aluminum wheels are not designed for use with tubeless tires.

2. Check wheel run-out

If deflection exceeds tolerance, check wheel bearing or replace wheel as required.

Rim run-out limits:
Vertical: 2 mm (0.08 in)
Lateral: 2 mm (0.08 in)

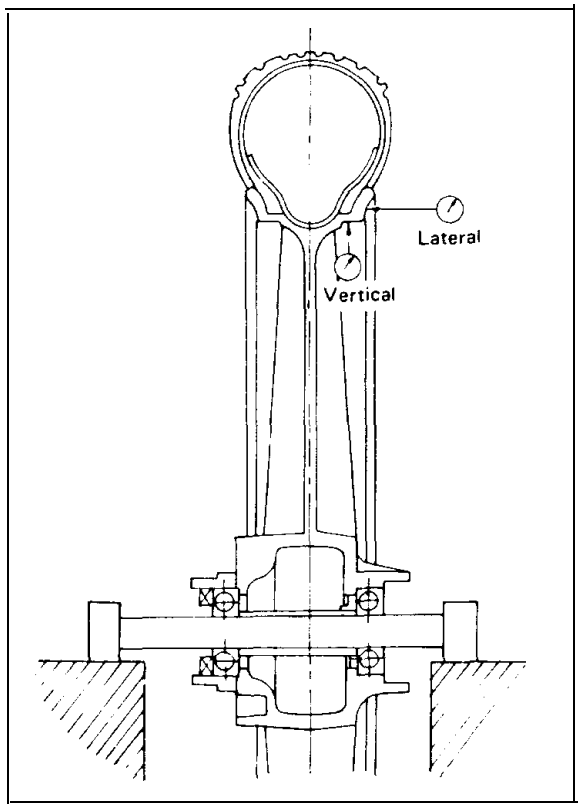
3. Check wheel balance

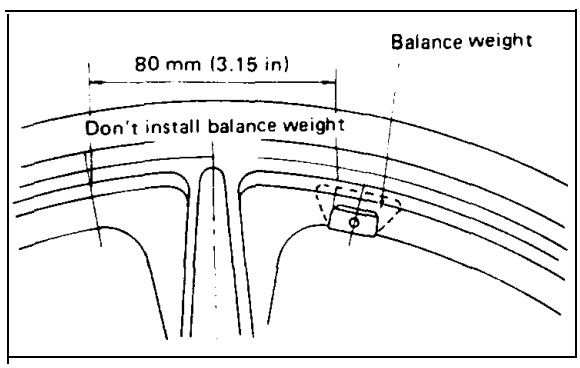
Rotate wheel lightly several times and observe resting position.

If wheels is not statically balanced, wheel will come to rest at the same position. Install balance weight at lighter position (at top) as illustrated.

NOTE:

The wheel should be balanced with brake disc installed.





E. **Installing front wheel**

4. Always secure the front wheel axle as follows:

Specifications should be changed as follows:

Axle nut torque: 10.7 m-kg (77.4 ft-lb) Holder nut torque: 1.4 m-kg (10.1 ft-lb)

(PAGE 40)

5-2. REAR WHEEL

A. Removal

1. Support machine on the center stand.
2. Disconnect the drive chain. Using drive chain cutter (special tool).

NOTE:

The chain joint should be replaced each time the chain is cut.

3. Remove the axle nut cotter pin and axle nut.
4. While supporting the brake caliper, pull out the rear axle.
5. Remove the rear wheel assembly.

E. Rear wheel installation

When installing rear wheel, reverse removal procedure taking care of following points:

1. Lightly grease lip of rear wheel oil seals.
2. Make sure the brake pads are installed properly and that there is an enough gap to install the rear disc.
3. Install wheel assembly and axle. Always use a new cotter pin on the axle nut.

Axle nut torque: 15.0 m-kg (108.5 ft-lb)

4. Connect drive chain.
5. Adjust drive chain.

(PAGE 40 ~ 44)

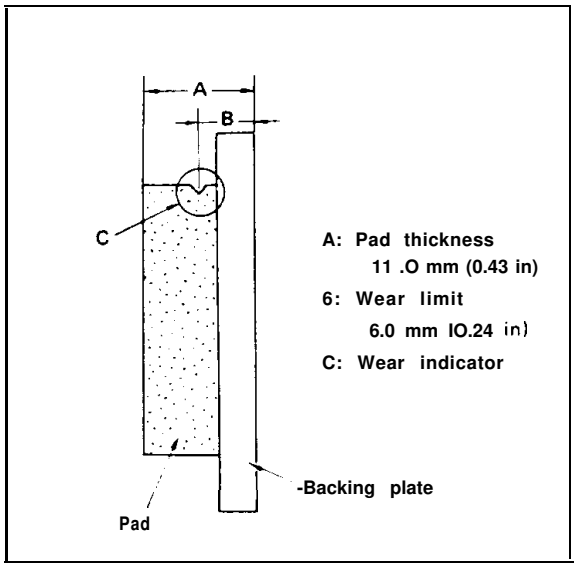
5-3. BRAKES

Except for the following, the same procedure can be performed for Disassembly, Inspection and Assembly of XS650SE front and rear brake and XS650E front brake.

D. Brake inspection and repair

Specifications should be changed as follows:

Wear limit: 6.0 mm (0.24 in)



(PAGE 48)

5-9. REAR SHOCK ABSORBER

B. **Inspection**

Specifications should be changed as follows:

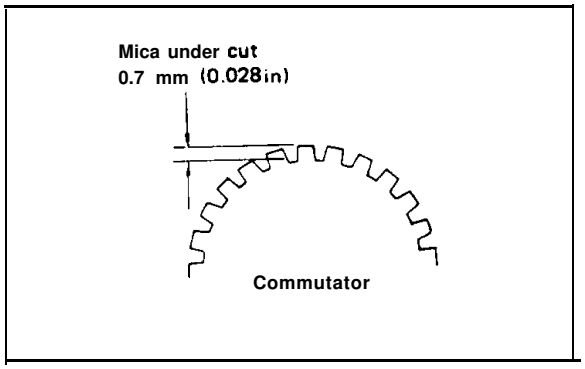
Rear shock absorber tightening torque:	
Upper	3.0 m-kg (21.7 ft-lb)
Lower	3.9 m-kg (28.2 ft-lb)

(PAGE 50 ~ 51)

8-1. STARTER

A. Armature

1. **Check the outer surface of the commutator. If it's surface is dirty, clean with No. 600 grit sand paper.**
2. **The mica insulation between commutator segments should be 0.7 mm (0.028 in) below the segment level. If not, scrape to proper limits with appropriately shaped tool. (A hack saw blade can be ground to fit.)**



3. **Check the armature and field coil for shorting and insulation. Replace armature as required.**

	Coil resistance
Armature coil	0.0067Ω at 20°C (68°F)
Field coil	0.004Ω at 20°C (68°F)

4. **Check the front and rear cover bearings for damage. If damaged, the starter assembly must be replaced.**

(PAGE 57 ~ 58)

6-5. LIGHTING AND SIGNAL SYSTEMS

B. Reserve lighting system

1. **Description:**

The reserve lighting system has two functions: (1) It notifies the rider that one of the headlight filaments is inoperative, and (2) it switches current from the inoperative filament to the remaining functional filament.

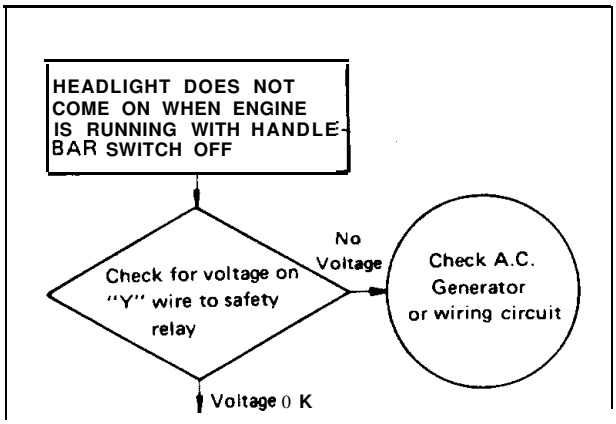
The system is connected to the headlight circuit only. The reserve lighting system unit is located under the fuel tank.

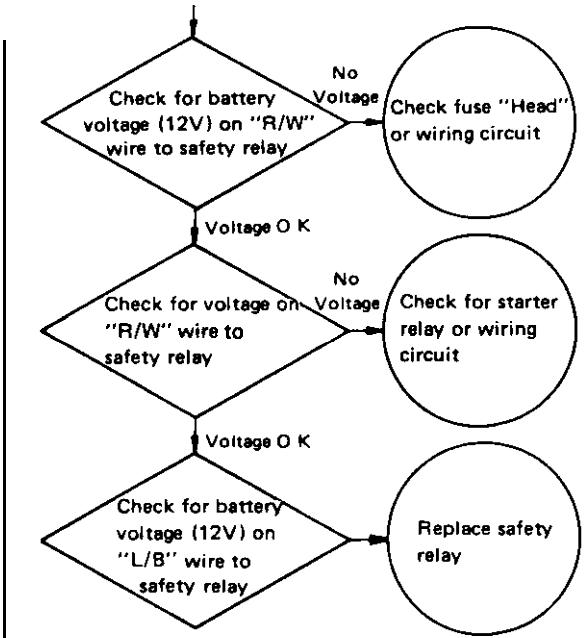
NOTE:

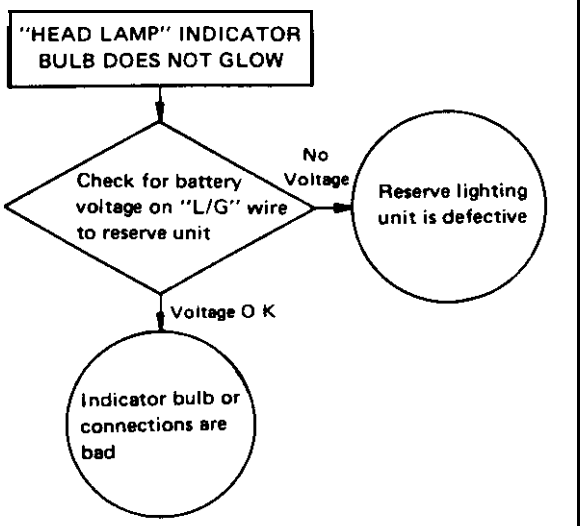
This model has been equipped with a safety relay so that the headlight comes on automatically when the engine is started even with the headlight switch "OFF".

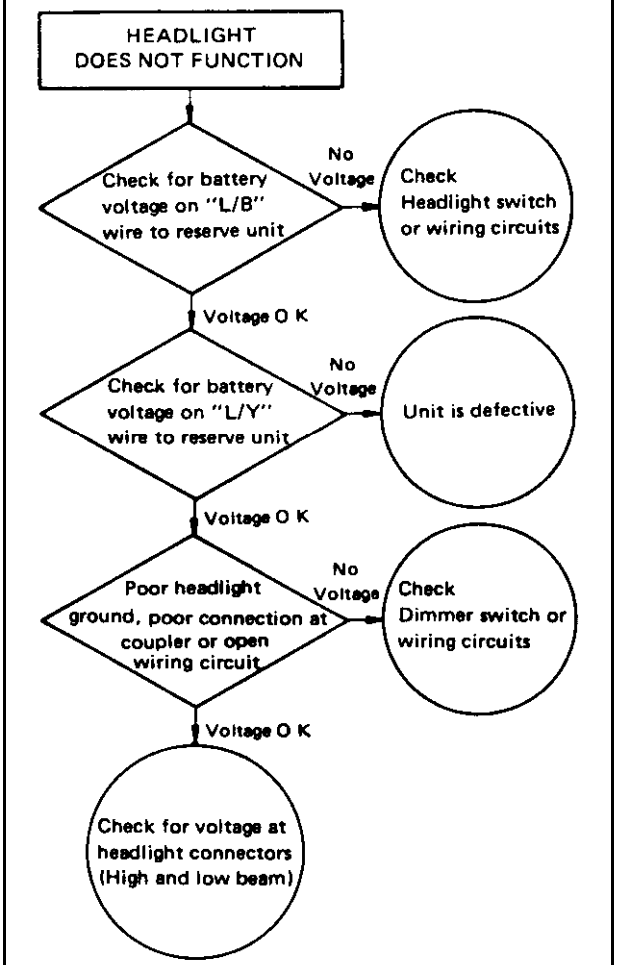
Headlight condition	Headlight failure indicator light	Reserve lighting function
Normal	Comes on (very dim)	—
High beam faulty	Comes on	Low beam comes on
Low beam faulty	Comes on	High beam comes on at low brilliance

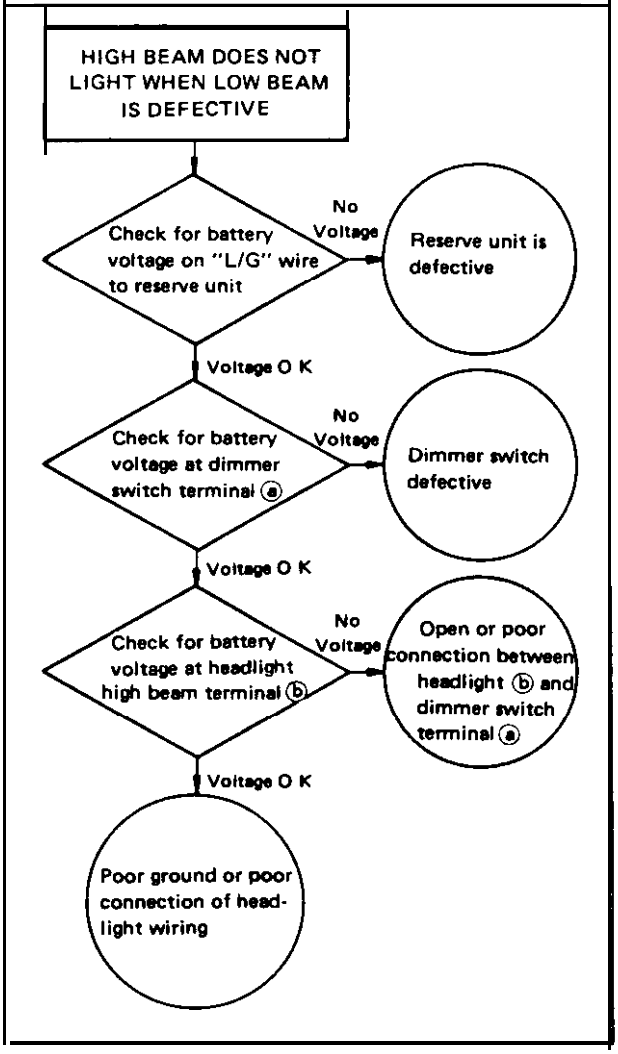
2. **Troubleshooting/Inspection**

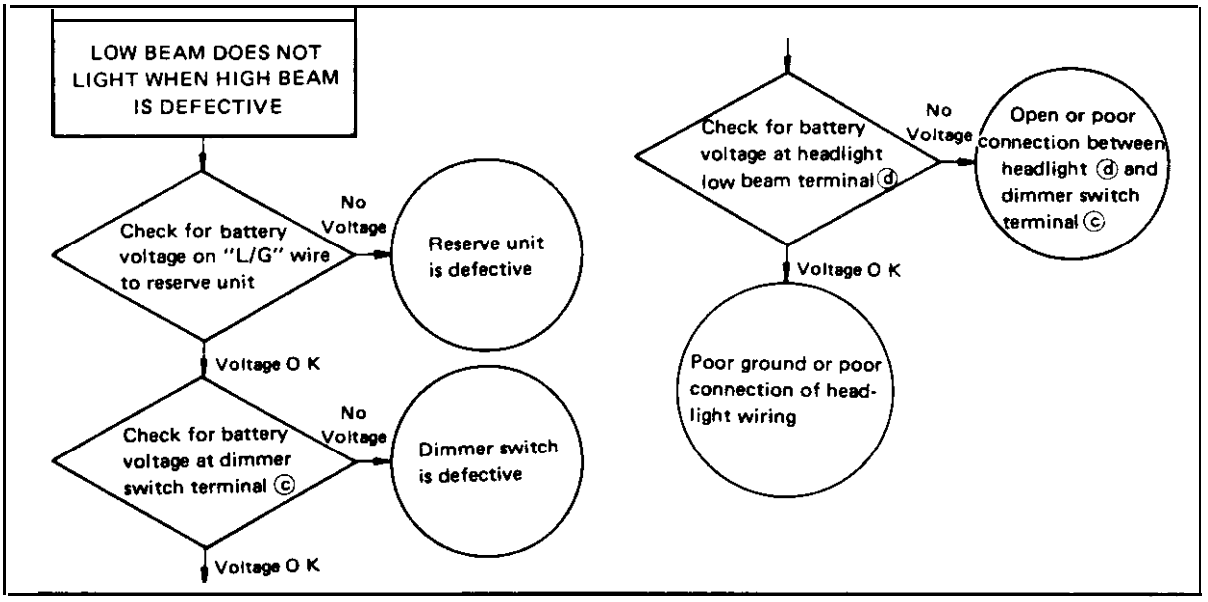


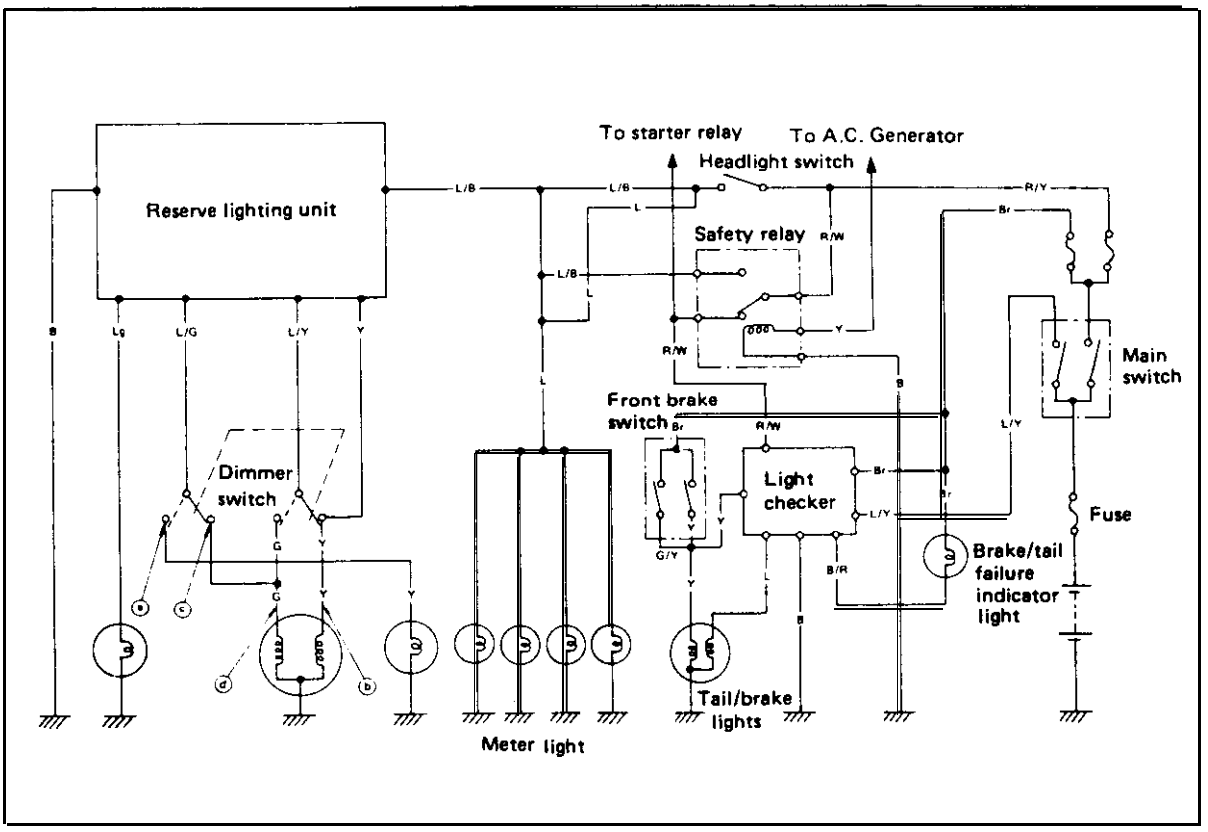

Check for battery voltage (12V) on "R/W" wire to safety relay
No Voltage
Check fuse "Head" or wiring circuit
Voltage O K
Check for voltage on "R/W" wire to safety relay
No Voltage
Check for starter relay or wiring circuit
Voltage O K
Check for battery voltage (12V) on "L/B" wire to safety relay
Replace safety relay


"HEAD LAMP" INDICATOR BULB DOES NOT GLOW
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve lighting unit is defective
Voltage O K
Indicator bulb or connections are bad


HEADLIGHT DOES NOT FUNCTION
Check for battery voltage on "L/B" wire to reserve unit
No Voltage
Check Headlight switch or wiring circuits
Voltage O K
Check for battery voltage on "L/Y" wire to reserve unit
No Voltage
Unit is defective
Voltage O K
Poor headlight ground, poor connection at coupler or open wiring circuit
No Voltage
Check Dimmer switch or wiring circuits
Voltage O K
Check for voltage at headlight connectors (High and low beam)


HIGH BEAM DOES NOT LIGHT WHEN LOW BEAM IS DEFECTIVE
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve unit is defective
Voltage O K
Check for battery voltage at dimmer switch terminal ⓐ
No Voltage
Dimmer switch defective
Voltage O K
Check for battery voltage at headlight high beam terminal ⓑ
No Voltage
Open or poor connection between headlight ⓑ and dimmer switch terminal ⓐ
Voltage O K
Poor ground or poor connection of headlight wiring


LOW BEAM DOES NOT LIGHT WHEN HIGH BEAM IS DEFECTIVE
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve unit is defective
Voltage O K
Check for battery voltage at dimmer switch terminal ⓒ
No Voltage
Dimmer switch is defective
Voltage O K
Check for battery voltage at headlight low beam terminal ⓓ
No Voltage
Open or poor connection between headlight ⓓ and dimmer switch terminal ⓒ
Voltage O K
Poor ground or poor connection of headlight wiring


To starter relay
To A.C. Generator
Headlight switch
Reserve lighting unit
Safety relay
Main switch
Front brake switch
Dimmer switch
Light checker
Fuse
Brake/tail failure indicator light
Tail/brake lights
Meter light

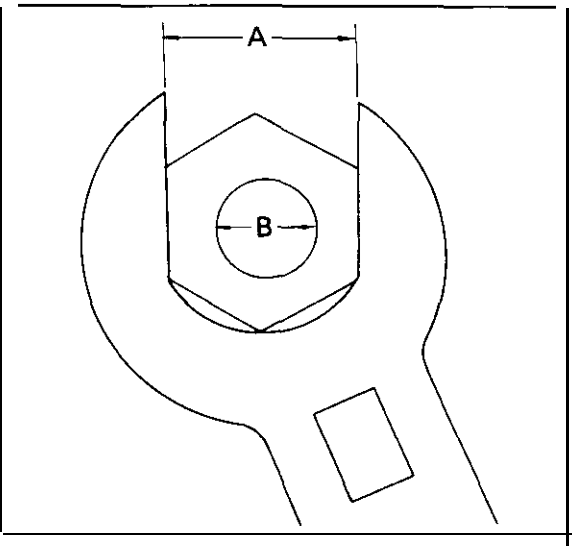
(PAGE 61 ~ 62)

7-1. TORQUE SPECIFICATION

The following torque specifications must be adhered to on every machine When applying torque to multi-secured fastener components, the several studs should be tightened in gradual stages and in a pattern that will avoid warpage to the item being secured. Torque settings are for dry, clean threads. Torquing should always be done to the nut, never the bolt head.

NOTE:

Certain items with other than standard thread pitches may require differing torque.



Torque Specifications

A (Nut)	B (Bolt)	Standard tightenins torque	
		m-kg	ft-lb
10mm	6mm (M6)	1.o	7.2
12mm	Bmm (M8)	2.0	15
14 mm	10mm (M10)	4.0	29
17mm	12mm (M12)	4.5	33
19mm	14 mm (M14)	5.0	36
22 mm	16mm (M16)	6.5	47
24 mm	18mm (M18)	7.0	50
27 mm	20 mm (M20)	8.0	58

Part to be tiqhtened	Thread dia. and part name	Tightening torque
Engine:		
Cylinder head and cylinder *head cover*	10 mm nut 8 *mm* bolt	3.7 m-kg (26.8 ft-lb) 2.1 m-kg (15.2 ft-lb)
Cylinder head	6 mm bolt	0.9 m-kg (6.5 ft-lb)
Cylinder head cover ride	6 mm crown nut B mm crown nut	0.9 m-kg (6.5 ft-lb) 1.3 m-kq (9.4 ft-lb)
Spark plug	14 mm	2.0 m-kg (14.5 ft-lb)
Generator	12mm nut	3.8 m-kq 127.5 ft-lb)
Stator coil	6 mm pan head screw	0.9 m-kg (6.5 ft-lb)
Governer	6 mm bolt	0.8 m-kg (5.8 ft-lb)
Valve clearance adjustment nut	8 mm nut	2.7 m-kg (19.5 ft-lb)
Cam chain tensioner	18 mm cap	2.1 m-kg (15.2 ft-lb)
Pump cover	6 mm pan head screw	1.0 m-kg (7.2 ft-lb)
Strainer cover	6 mm bolt	1.0 m-kg (7.2 ft-lb)
Drain plug	30 mm bolt	4.2 m-kg (30.4 ft.lb)
Oil filter	6 mm bolt	0.9 m-kg (6.5 ft-lb)

Part to be tightened	Thread dia. and part name	Tightening torque
Delivery pipe	10 mm union bolt	2.1 m-kg (15.2 ft-lb)
Exhaust pipe	8 mm nut	1.3 m-kg (9.4 ft-lb)
Crankcase	8 mm bolt/nut	2.1 m-kg (15.2 ft-lb)
Kick crank boss	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Primary drive gear	14 mm nut	9.0 m-kg (65.1 ft-lb)
Clutch boss	18 mm nut	8.0 m-kg (57.9 ft-lb)
Drive sprocket	22 mm nut	6.5 m-kg 147.0 ft-lb)
Change pedal	6 mm bolt	1.0 m-kg (7.2 ft-lb)
Chassis:		
Front wheel axle	14 mm nut	10.7 m-kg (77.4 ft-lb)
Front fork and axle holder	8 mm nut	1.4 m-kg 110.1 ft-lb)
Handle crown and inner tube	8 mm nut	1.1 m-kg (8.0 ft-lb)
Handle crown and steering shaft	8 mm nut	1.1 m-kg (8.0 ft-lb)
Handle crown and steering shaft	14 mm bolt	5.4 m-kg 139.1 ft-lb)
Handle crown and handlebar holder	8 mm bolt	1.8 m-kg (13.0 ft-lb)
Under bracket and inner tube	8 mm nut	2.0 m-kg (14.5 ft-lb)
Engine mounting Upper	8 mm nut	1.8 m-kg (5.8 ft-lb)
Engine mounting Upper	10 mm nut	3.0 m-kg (21.7 ft-lb)
Engine mounting Front	10 mm nut	4.6 m-kg (33.3 ft-lb)
Engine mounting Rear	10 mm nut	4.1 m-kg (29.7 ft-lb)
Engine mounting Rear-Lower	10 mm nut	4.6 m-kg (33.3 ft-lb)
Engine mounting Lower	10 mm nut	9.0 m-kg (65.1 ft-lb)
Front flasher and headlight	8 mm nut	1.0 m-kg (7.2 ft-lb)
Master cylinder and brake hose	10 mm union bolt	2.6 m-kg (18.8 ft-lb)
Brake disc and hub	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Caliper and support bracket	8 mm bolt	1.8 m-kg 113.0 ft-lb)
Caliper and pad	5 mm bolt	0.3 m-kg (2.2 ft-lb)
Caliper and bleed screw	8 mm bolt	0.6 m-kg (4.3 ft-lb)
Front caliper and front fork	10 mm bolt	3.5 m-kg (25.3 ft-lb)
Master cylinder and cylinder bracket	6 mm bolt	0.6 m-kg (4.3 ft-lb)
Pivot shaft	14 mm nut	6.5 m-kg (47.0 ft-lb)
Rear wheel axle	16 mm nut	15.0 m-kg (108.5 ft-lb)
Tension bar and brake caliper	8 mm nut	1.8 m-kg 113.0 ft-lb)
Tension bar and rear arm	8 mm nut	3.2 m-ka 123.1 ft-lb)
Rear shock absorber Upper	10 mm bolt	3.0 m-kg (21.7 ft-lb)
Rear shock absorber Lower	10 mm bolt	3.9 m-kg (28.2 ft-lb)
Rear arm and rear arm end	8 mm bolt	1.0 m-kg (7.2 ft-lb)
Front fender	8 mm bolt	1.0 m-kg (7.2 ft-lb)
Neutral switch	12mm	1.3 m-kg (9.4 ft-lb)

(PAGE 64 ~ 71)

7-3. SPECIFICATION

A. General

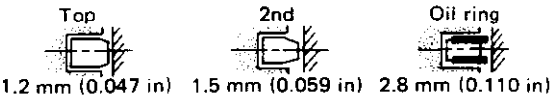
1. MODEL	
1) Model (I.B.M.No.)	XS650SE (2M0)
2) Frame I.D. and starting number	2F0-114241
3) Engine I.D. and starting number	2F0-114241
2. DIMENSION	
1) Overall length	2,120 mm (83.5 in)
2) Overall width	925 mm (36.4 in)
3) Overall height	1,225 mm (48.2 in)
41 Seat height	790 mm (31.1 in)
5) Wheelbase	1,435 mm (56.5 in)
6) Minimum ground clearance	135 mm (5.3 in)
3. WEIGHT	
1) Net weight (Dry)	210 kg (463 lb)
4. PERFORMANCE	
1) Climbing ability	26°
2) Minimum turning radius	2,500 mm (98.4 in)
3) Braking distance	14 m @ 50 km/h (45.9 ft @ 31 mi/h)

B. Engine

1. DESCRIPTION	
1) Engine type	Air cooled, 4-stroke, SOHC twin, parallel forward incline
2) Engine model	2F0
3) Displacement	653 cc 139.85 cu.in)
4) Bore x stroke	75 x 74 mm (2.953 x 2.913 in)
5) Compression ratio	0.5 : 1
6) Starting system	Kick and electric starter
7) Ignition system	Battery ignition
8) Lubrication system	wet sump
2. CYLINDER HEAD	
1) Combustion chamber volume (with N-7Y)	43.6 cc 12.660 cu.in)
2) Combustion chamber type	Dome + Swish
3) Head gasket thickness	1.2 mm (0.047 in)
3. CYLINDER	
1) Material	Aluminum alloy with cast iron sleeve
2) Bore size	75.00 $^{+0.02}_{0}$ mm (2.9528 $^{+0.0008}_{0}$ in)
3) Taper limit	0.05 mm 10.002 in)
4) Out of round limit	0.01 mm (0.0004 in)
4. PISTON	
1) Piston skirt clearance	0.050 ~ 0.055 mm (0.0020 ~ 0.0022 in)
2) Piston oversize	7525 mm 12.963 in) | 75.50 mm (2.972 l", | 75.75 mm (2.982 in) | 76.00 mm 12992 l",
3) Piston pin outside diameter x length	20.0 $^{0}_{-0.005}$ mm x 61 .O $^{0}_{-0.3}$ mm 10.79 $^{0}_{-0.0002}$ in x 2.40 $^{0}_{-0.0116}$ in)

. PISTON RING

1) Piston ring design



2) Ring end gap (Installed. top) 0.2 ~ 0.4 mm 10.006 ~ 0.016 in)
(Installed, 2nd) 0.2 ~ 0.4 mm (0.008 ~ 0.016 in)
(Installed. oil) 0.3 ~ 0.9 mm (0.012 ~ 0.035 in)

3) Ring groove side clearance (Top) 0.04 ~ 0.06 mm (0.0016 ~ 0.0031 in)
(2nd) 0.03 ~ 0.07 mm (0.0012 ~ 0.0026 in)

. BIG END BEARING

1) Type: Needle bearing
2) Bearing size: ϕ 26 x ϕ34 x 19.8
3) Needle size: ϕ 4 x ϕ15.8 x 13

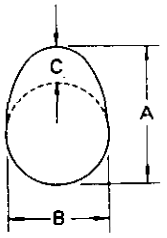
. CAMSHAFT

1) Cam drive type: Chain (Center side)
2) Number and type of bearing: 4 bearings, Ball bearings (6005)
3) Bearing type: ϕ 25-ϕ 47-8
4) Cam dimensions

	Cam height "A"	Limit	Base circle "B"	Limit	Lift "C"
IN	39.99 ± 0.05 mm (1.574 ± 0.002 in)	39.84 mm (1.569 in)	32.24 ± 0.05 mm (1.269 ± 0.002 in)	32.09 mm (1.263 in)	7.991 mm (0.315 in)
EX	40.03 ± 0.05 mm (1.576 ± 0.002 in)	39.88 mm (1.570 in)	32.30 ± 0.05 mm (1.272 ± 0.002 in)	32.15 mm (1.266 in)	8.030 mm (0.316 in)

5) Valve timing

	OPEN	CLOSE	DURATION	OVERLAP
IN	BTDC36°	ABDC68°	284°	72°
EX	BBDC68°	ATDC36°	284°	



6) Camshaft deflection limit: 0.03 mm 10.0012 in)

71 Cam chain
Type: TSUBAKIMOTO BF05M
Number of links: 106L
Sprocket ratio: 36/18 (2.000)

. ROCKER ARM AND ROCKER SHAFT

1) Rocker arm inner diameter: $15.0\ ^{+0.018}_{0}$ mm IO.591 $^{+0.0007}_{0}$ in)

2) Rocker arm shaft diameter: 15.0 $^{-0.009}_{-0.015}$ mm IO.591 $^{-0.00035}_{-0.00059}$ in)

3) Clearance: 0.009 ~ 0.033 mm (0.00035 ~ 0.00130 in)

4) Lift ratio: X : Y = 40 : 48.41 mm (1.575 : 1.906 in)

. VALVE, VALVE SEAT AND VALVE GUIDE

1) Valve per cylinder: 2 pcs.

2) Valve clearance (In cold engine)
IN: 0.10 mm (0.0039 in)
EX: 0.15 mm (0.0059 in)

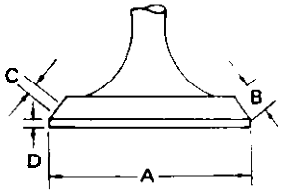
3) Dimensions

Valve head diameter "A"
IN: 41 mm (1.614 in)
EX: 35 mm (1.376 in)

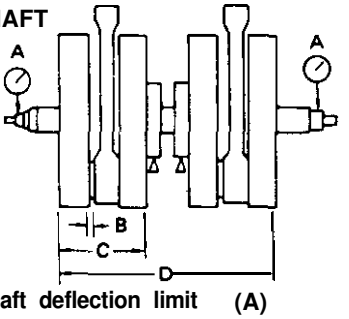
Valve face width "B"
IN: 2.1 mm (0.083 in)
EX: 2.1 mm (0.083 in)

Valve seat width "C"
IN: 1.3 mm (0.051 in)
EX: 1.3 mm (0.051 in)

Valve margin thickness "D"
IN: 1.3 mm IO.051 in)
EX: 1.3 mm IO.051 in)

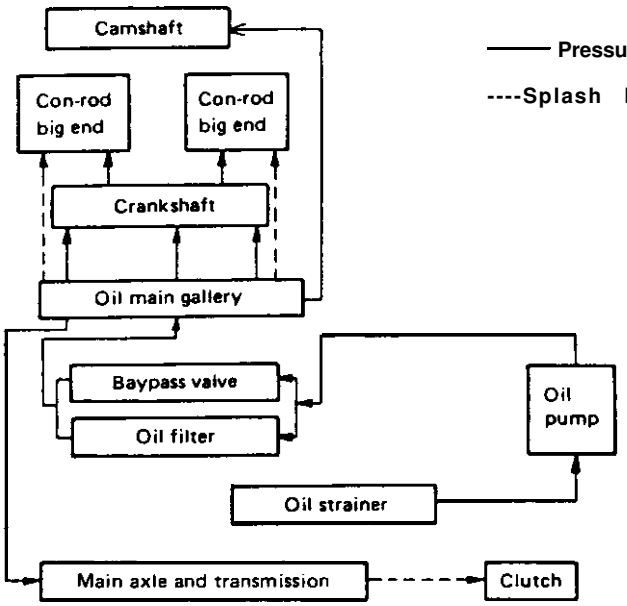


Valve stem diameter: IN: 8.0 $^{-0.010}_{-0.025}$ mm (0.315 $^{-0.0004}_{-0.0010}$ in)

Valve stem diameter	EX: 6.0 $^{-0.025}_{-0.040}$ mm (0.315 $^{-0.0010}_{-0.0016}$ in)
Valve guide diameter	IN: 8.0 $^{+0.019}_{+0.010}$ mm (0.315 $^{+0.0007}_{+0.0004}$ in)
	EX: 8.0 $^{+0.019}_{+0.010}$ mm (0.315 $^{+0.0007}_{+0.0004}$ in)
Valve stem to guide clearance	IN: 0.020 ~ 0.044 mm (0.00079 ~ 0.00173 in)
	EX: 0.035 ~ 0.059 mm IO.00138 ~ 0.00232 in)
4) Valve face runout limit	IN & EX: 0.03 mm (0.0012 in) or less
10. VALVE SPRING	
1) Free length	INNER (IN/EX): 42 mm (1.654 in)
	OUTER (IN/EX): 42.55 mm (1.675 in)
2) Spring rate	INNER (INIEX): k_1 = 1.43 kg/mm (80.1 lb/in)
	k_2 = 1.81 kg/mm (101.4 lb/in)
	OUTER (INIEX): k_1 = 3.2 kg/mm (179.2 lb/i")
	k_2 = 4.18 kg/mm(234.1lb/in)
3) Installed length (Valve closed)	INNER (INIEX): 35 mm (1.378 in)
	OUTER (IN/EX): 37 mm (1.457 in)
4) Installed pressure (Valve closed)	INNER (INIEX): 10 ±0.7 kg (22.0± 1.5 lb)
	OUTER (IN/EX): 17.7 ± 1.25 kg (39.0 ± 2.8 lb)
5) Compressed length (Valve open)	INNER (INIEX): 25.5 mm II.004 in)
	OUTER (IN/EX): 27.5 mm (1.083 in)
61 Compressed pressure (Valve open)	INNER (IN/EX): 27.2 ± 1.9 kg (60.0 ± 4.2 lb)
	OUTER (IN/EX): 57.4 ± 4.0 kg (126.5 ± 8.8 lb)
7) Wire diameter	INNER (IN/EX): 2.9 mm (0.114 in)
	OUTER (IN/EX): 4.2 mm (0.165 in)
8) Winding O.D.	INNER (IN/EX): 19.4 mm IO.764 in)
	OUTER (INIEX): 32.6 mm (1.283 in)
9) Number of windings	INNER (IN/EX): 6.0 turns
	OUTER (IN/EX): 4.25 turns
11. CRANKSHAFT 	
1) Crankshaft deflection limit (A)	0.05 mm (0.002 in)
2) Con-rod large end clearance (B)	0.15 ~ 0.4 mm 10.0059" 0.0157 in)
3) Width of crankshaft (C)	66 $^{-0.05}_{-0.10}$ mm (2.598 $^{-0.002}_{-0.004}$ in)
(D)	186 $^{0}_{-0.3}$ mm (7.323 $^{0}_{-0.012}$ in)
4) Crank pin I.D.	26 $^{-0.077}_{-0.095}$ mm (1.024 $^{-0.003}_{-0.004}$ in)
5) Crank pin O.D. x length	26 $^{0}_{-0.006}$ x 65 $^{+0.1}_{-0.2}$ mm
	(1.024 $^{0}_{-0.0002}$ x 2.559 $^{+0.004}_{-0.008}$ in)
12. CONNECTING ROD	
1) Big end I.D.	34 $^{+0.016}_{0}$ mm (1.339 $^{+0.0006}_{0}$ in)
2) Small end I.D.	20 $^{+0.028}_{+0.015}$ mm (0.787 $^{+0.0011}_{+0.0006}$ in)
13. CRANK BEARING	
1) Type Right end	ϕ30-ϕ78-19 (Ball bearing)
Others	ϕ32-ϕ68-17 (Rollar bearing)
2) Oil seal type	SD-25-40-9
14. CLUTCH	
1) Clutch type	Wet, multiple type
2) Clutch operating mechanism	Inner push type. screw push system
3) Primary reduction ratio and method	72/27 (2.666). spar gear
4) Primary reduction gear back lash (4 teeth)	21.45 $^{0}_{-0.025}$ mm (0.8445 $^{0}_{-0.00010}$ in)

5) Friction plate	
Thickness/Quantity	3 mm (0.118 in)/7 pcs.
Wear limit	2.7 mm (0.106 in)
6) Clutch plate	
Thickness/Quantity	1.4 mm (0.055 in)/6 pcs.
Warp limit	0.05 mm (0.002 in)
7) Clutch spring	
Free length/Quantity	34.6 mm (1.362 in)/6 pcs.
8) Clutch housing radial play	0.027 ~ 0.081 mm (0.0011 ~ 0.0032 in)
9) Push rod bending limit	0.2 mm (0.008 in)
15. TRANSMISSION	
1) Type	Constant mesh, 5-speed forward
2) Gear ratio: 1st	32/13 12.461)
2nd	27/17 (1.588)
3rd	26/20 (1.300)
4th	23/21 (1.095)
5th	22/23 (0.956)
3) Bearing type: Main axle (Left)	Needle bearing (φ20-φ30-20)
(Right)	Ball bearing (φ25-φ52-20.6)
Drive axle (Left)	Ball bearing (φ30-φ62-23.8)
(Right)	Needle bearing (φ20-φ30-16)
4) Oil seal type Drive axle (Left)	SDD-40-62-9
5) Secondary reduction ratio and method	34/17 (2.000)/Chain
16. SHIFTING MECHANISM	
1) Type	Cam drum, return type
21 Oil seal type (Change lever)	SDO-14-24-6
17. KICK STARTER	
1) Type	Bendix type
21 Oil seal type (Kick axle)	SD-25-35-7
31 Kick clip friction tension	1.2 ~ 1.7 kg (2.6 ~ 3.7 lb)
18. INTAKE	
1) Air cleaner: Type/Quantity	Dry, foam rubber/2 pcs.
2) Cleaner cleaning interval	Every 8.000 km (5.000 mile)
19. CARBURETOR	
1) Type and manufacturer/Quantity	BS38 MIKUNI/2 pcs.
2) I.D. mark	2F0-00
3) Main jet (MJ)	#135
4) Air jet (AJ)	#140
5) Jet needle (JN)	502.3
6) Needle jet (NJ)	z-2
71 Throttle valve (Th.V)	#120
8) Pilot jet (PJ)	#27.5
91 Pilot screw (Turns out) (PS)	Preset
10) starter jet (GS)	GS_1: #80, GS_2: 0.5
11) Fuel level (FL)	24 ± 1 mm (0.94 ±0.04 in)
12) Idling engine speed	1.200 rlmin
20. LUBRICATION	
1) Engine sump oil quantity	Oil exchange: 2.0 lit (2.1US qt) Overhaul: 2.5 lit 12.6 US qt)
2) Oil type and grade	Yamalube 4-cycle oil or SAE 20W/40 type "SE" motor oil
3) Oil pump type	Trochoid pump
4) Trochoid pump specifications	
Top clearance	0.10 ~ 0.18 mm (0.0039 -0.0071 in)
Tip clearance	0.03 ~ 0.09 mm (0.0012 ~ 0.0035 in)
Side clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
Oil pump volume	1.3 lit/min II.37 qt/min) at 1,000 r/min
5)Bypass valve setting pressure	1.0 kg/cm^2 114 psi)

6) Lubrication chart



C. Chassis

1. FRAME	
1) Frame design	Double cradle, high tensile frame
2. STEERING SYSTEM	
1) caster	27°
2) Trail	115 mm (4.53 in)
3) Number and size of balls in steering head	
upper race	19 pcs. 1/4 in
Lower race	19 pcs. 1/4 in
4) Steering lock to lock	42° each (L and RI
3. FRONT SUSPENSION	
1) Type	Telescopic fork
2) Damper type	Oil damper, coil spring
3) Front fork spring	
Free length	482 mm (18.08 in)
Wire diameter x winding diameter	4 x 24.5 mm IO.157 x 0.965 in)
Spring constant	k_1 = 0.48 kg/mm (26.88 lb/in)/ 0 ~ 100 mm (0 ~ 3.94 in)
	k_2 = 0.65 kg/mm (36.40 lb/in)/ 100 ~ 150 mm (3.94 ~ 5.91 in)
4) Front fork travel	150 mm (5.906 in)
5) Inner tube O.D.	35 mm (1.378 in)
6) Front fork oil quantity and type	169 cc (5.72 oz) each leg Yamaha fork oil 10Wt or equivalent
7) Distance from the top of inner tube oil level without spring	Approx. 454 mm (17.9 in)
4. REAR SUSPENSION	
1) Type	Swing arm
2) Damper type	Oil damper, coil spring
3) Shock absorber travel	80 mm (3.15 in)
4) Shock absorber spring	
Free length	226 mm (8.90 in)
Wire diameter x winding diameter	7.5 x 60.5 mm 10.295 x 2.382 in)
Spring constant	k_1 = 1.714 kg/mm (96.0 lb/in)/ 0 ~ 45 mm (0 ~ 1.77 in)
	k_2 = 2.244 kg/mm (125.7 lb/in)/ 45 ~ 80 mm (1.77 ~ 3.15 in)
5) Swing arm free play (Limit)	1 mm 10.04 in)
6) Pivot shaft — Outside diameter	16 mm IO.63 in)

5. FUEL TANK	
1) Capacity	11 .O lit (2.9 US gal)
2) Fuel grade	Regular gasoline
6. WHEEL	
1) Type (Front and rear)	Aluminum rim
2) Tire size (Front)	3.50S19-4PR
(Rear)	130/90S16-4PR
3) Tire pressure:	
Up to 90 kg (198lb) load	Front: 1.6 kg/cm^2 (22 psi)
	Rear: 2.0 kg/cm^2 128 psi)
90 kg 1198 lb)load ~ 204 kg (445 lb)load	Front: 2.0 kg/cm' (28 psi)
(Maximum load)	Rear: 2.3 kg/cm^2 (32 psi)
High speed riding	Front: 2.0 kg/cm^2 (28 psi)
	Rear: 2.3 kg/cm' (32 psi)
4) Rim run out limit (Front and rear)	
Vertical	2 mm (0.08 in)
Lateral	2 mm (0.08 in)
51 Rim size (Front)	1.85 x 19
(Rear)	MT3.00 x 16
6) Bearing type	
Front wheel (Left)	630322
(Right)	6303Z/3A
Rear wheel (Left)	63052
(Right)	63042
7) Oil seal type	
Front wheel (Left)	SDD-45-56-6
(Right)	SD-28-47-7
Rear wheel (Left)	SD-35-62-9
(Right)	SO-27-52-5
8) Secondary drive chain type	
Type	50HDS
Number of links	103L + Joint
Chain pitch	15.875 mm (5/8 in)
Chain free play	20 ~ 30 mm (0.8 ~ 1.2 in)
7. BRAKE	
1) Front brake	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	298 x 7.0 mm (11.73 x 0.28 in)
Disc wear limit	6.5 mm 10.26 in)
Disc pad thickness	11.0 mm (0.43 in)
Pad wear limit	6.0 mm (0.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm (1.50 in)
Brake fluid type / quantity	DOT #3 Brake fluid / 38.1 cc (1.29 oz)
2) Rear brake	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	267 x 7.0 mm (10.5 x 0.28 in)
Disc wear limit	6.5 mm (0.26 in)
Disc pad thickness	11 .0 mm (0.43 in)
Pad wear limit	6.0 mm (0.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm (1.50 in)
Brake fluid type/ quantity	DOT #3 Brake fluid / 38.1 cc (1.29 oz)

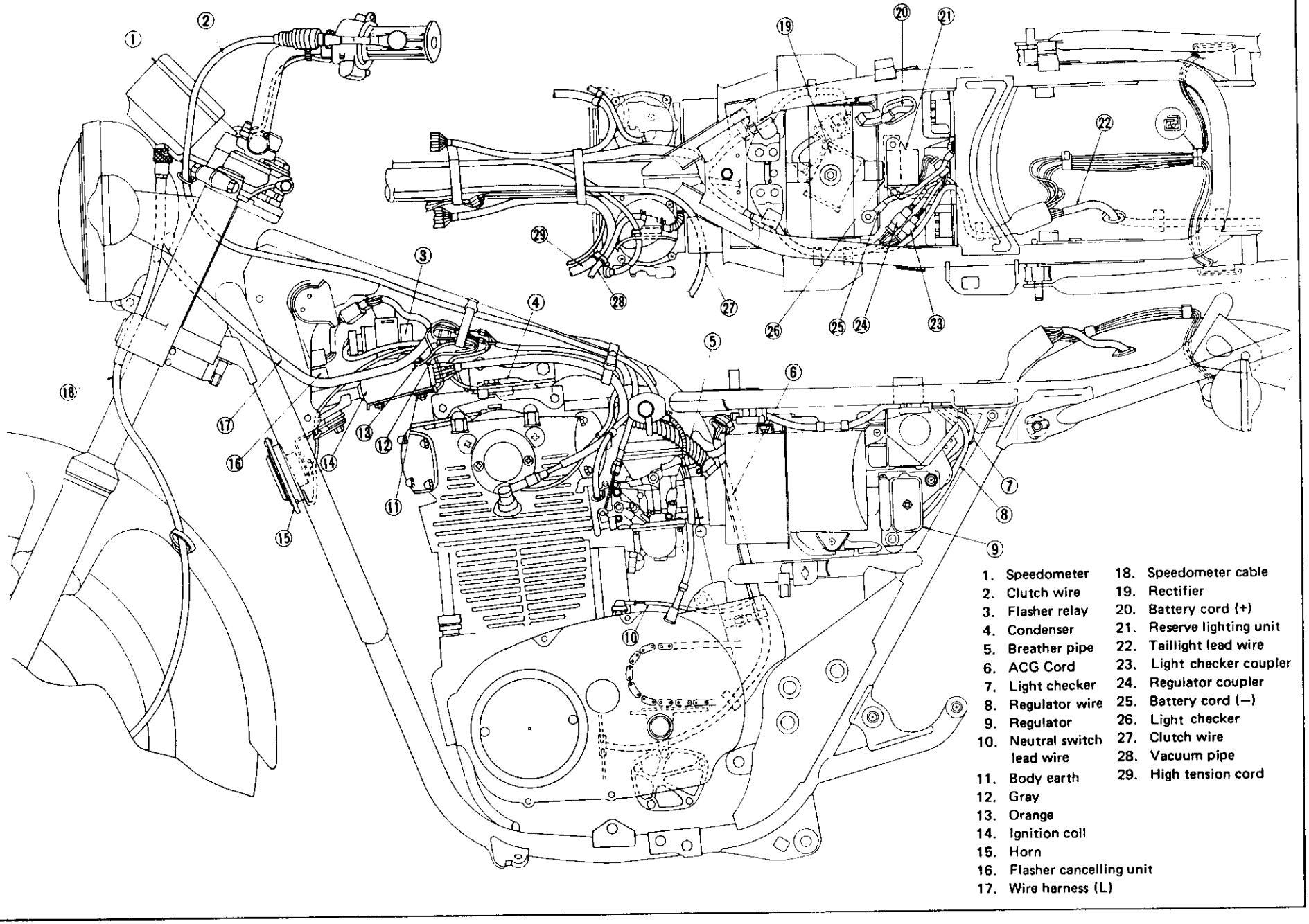
D. Electrical

1. IGNITION SYSTEM	
1) Ignition timing (B.T.D.C.)	15°/1,200 r/min
2) Ignition coil	
Model/Manufacturer	CM11-50B/HITACHI
Spark gap	8 mm (0.31 in) or more/300 r/min at 8V

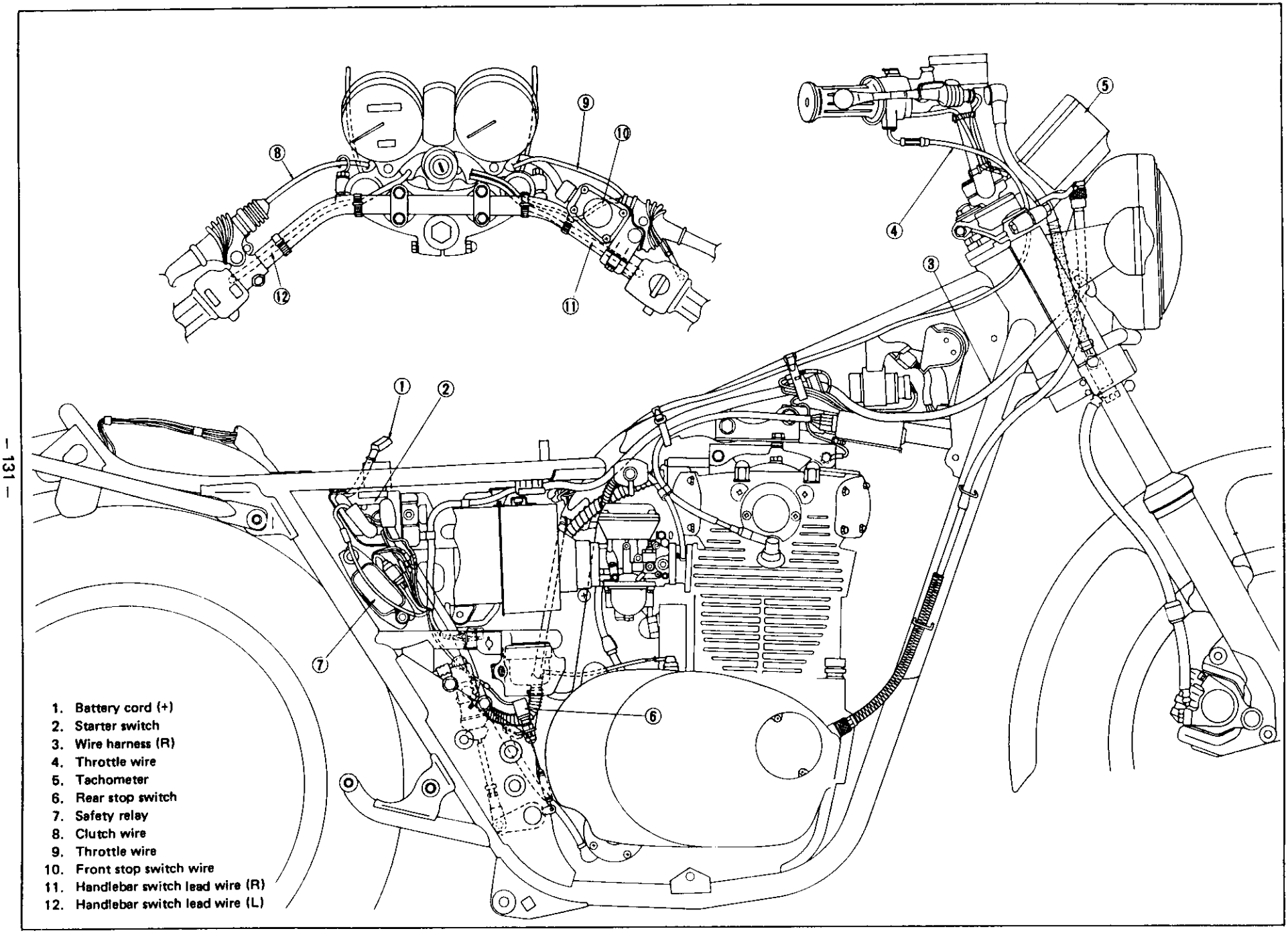
Primary winding resistance	3.9Ω ± 10% at 20°C (68°F)
Secondary winding resistance	8.0kΩ ± 20% at 20°C (68°F)
31 Spark plug	
Type	N-7Y (CHAMPION) or BP7ES (N.G.K.)
Spark plug gap	0.7 ~ 0.8 mm (0.027 ~ 0.031 in)
4) Contact breaker	
Manufacturer/Quantity	HITACHI/2 pcs.
Point gap	0.30 ~ 0.40 mm (0.012 ~ 0.016 in)
Point spring pressure	650 ~850 g (22.9 ~ 30.0 oz)
Cam closing angle	93" ±5°
5) Condenser	
Capacity	0.22μF
Insulation resistance	10MΩ or more
Quantity	2 pcs.
2. CHARGING SYSTEM	
1) AC generator	
Charging output	14V 1 1A/2,000r/min
Rotor coil resistance (Field coil)	5.2552 ± 10% at 20°C(68°F)
Stator coil resistance	0.46Ω ± 10% at 20°C(68°F)
Brush length	14.5 mm (0.571 in)
Brush wear limit	7.0 mm (0.276 in)
2) Rectifier	
Type	6-Element type (Full wave)
Model/Manufacturer	SB6B-17/HITACHI
Capacity	12A
Withstand voltage	4oov
3) Regulator	
Type	Tillil type
Model/Manufacturer	TLIZ-80/HITACHI
Regulating voltage	14.5 ±0.5V
Core gap	0.6 ~ 1 .O mm (0.024 ~ 0.039 in)
Point gap	0.3 ~ 0.4 mm (0.012 ~ 0.016 in)
Voltage coil resistance	10Ω at 20°C(68°F)
5) Battery	
Model/Manufacturer/Quantity	YB14L-A2/YUASA/ 1 pc.
Capacity	12V. 14AH
Charging rate	1.4A 10 hours
Specific gravity	1.28 at 20°C(68°F)
3. STARTER	
1) starter motor	
Type	Bendix type
Manufacturer	HITACHI
Model	S108-35
output	0.5 kw
Armature coil resistance	0.0067Ω ± 10% at 20°C(68°F)
Field coil resistance	0.004Ω ± 10% at 20°C(68°F)
Brush size/Quantity	16 mm (0.63 in)/2 pcs.
Wear limit	4 mm (0.16 in)
Spring pressure	BOO g (28.2oz)
commutator O.D./Wear limit	33 mm (1.30 in)/31 mm (1.22 in)
Mica undercut	0.7 mm (0.028 in)
2) Starter switch	
Manufacturer	HITACHI
Model	A104-70
Amparage rating	100A
Cut-in voltage	6.5V
Winding resistance	3.5Ω
3) Starter clip friction tension	2.2 ~ 2.5 kg (4.9 ~ 5.5 lb)

4. LIGHTING SYSTEM	
1) Headlight type	Sealed beam
2) Bulb brightness and wattage/Quantity	
Headlight	12V,50/40W x 1 PC.
Tail/brake light	12V, 3/32 CP (8W/27W) x 1 pc.
Flasher light	12V, 32 CP (27W) x 4 pcs.
Pilot lights: Turn	12V, 3.4W x 2 pcs.
High beam	12V, 3.4W x 1 pc.
Headlight failure	12V, 3.4W x 1 PC.
Neutral	12V, 3.4W x 1 pc.
Tail/brake failure	12V, 3.4W x 1 pc.
Meter lights	12V, 3.4W x 4 pcs.
3) Reserve lighting unit	
Model/Manufacturer	337-I 1720/KOITO
4) Horn	
Model/Manufacturer	CF-12/NIKKO
Maximum amparage	2.5A
5) Flasher relay	
Type	Condenser type
Model/Manufacturer	1A0-70/NIPPON DENS0
Flasher frequency	85 ± 10 cycle/min.
Capacity	32 CP (27W) x 2 + 3.4W
6) Flasher cancelling unit	
Model	EVH-AC518
Voltage	DC9V ~ 16V
7) Fuse	
Rating/Quantity	Main (Red): 20A
8) Light checker	
Model	35200.71859
Manufacturer	KOITO

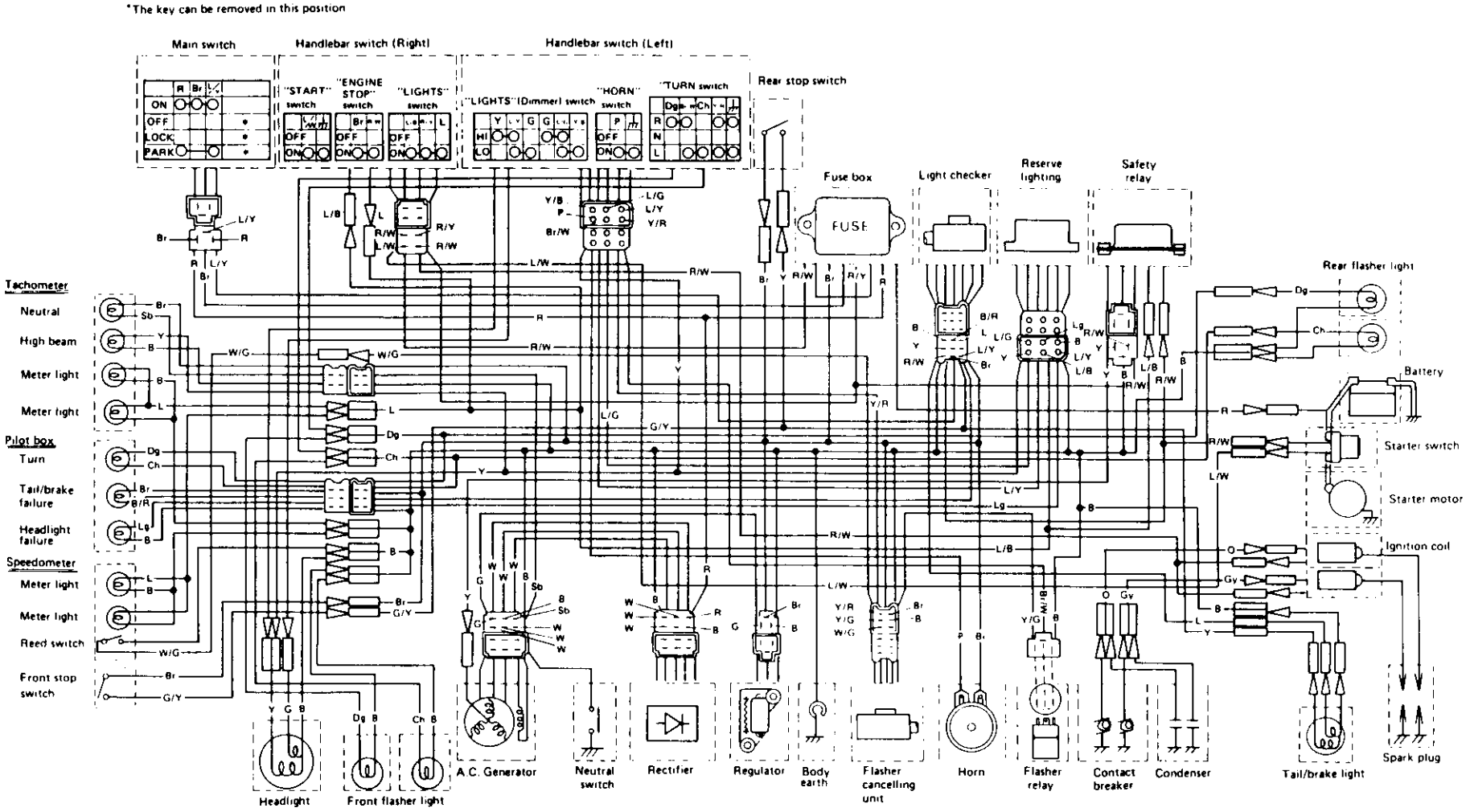
7-4 CABLE ROUTING DIAGRAM



1. Speedometer
2. Clutch wire
3. Flasher relay
4. Condenser
5. Breather pipe
6. ACG Cord
7. Light checker
8. Regulator wire
9. Regulator
10. Neutral switch lead wire
11. Body earth
12. Gray
13. Orange
14. Ignition coil
15. Horn
16. Flasher cancelling unit
17. Wire harness (L)
18. Speedometer cable
19. Rectifier
20. Battery cord (+)
21. Reserve lighting unit
22. Taillight lead wire
23. Light checker coupler
24. Regulator coupler
25. Battery cord (−)
26. Light checker
27. Clutch wire
28. Vacuum pipe
29. High tension cord

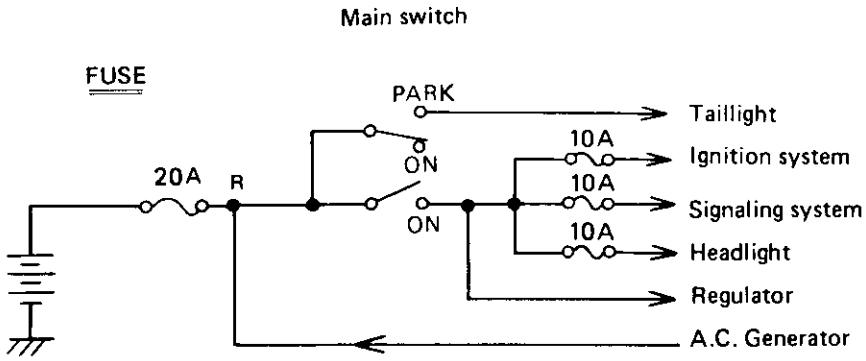

1. Battery cord (+)
2. Starter switch
3. Wire harness (R)
4. Throttle wire
5. Tachometer
6. Rear stop switch
7. Safety relay
8. Clutch wire
9. Throttle wire
10. Front stop switch wire
11. Handlebar switch lead wire (R)
12. Handlebar switch lead wire (L)

7-5 WIRING DIAGRAM



COLOR CODE

R	Red	L/W	Blue/White
Br	Brown	R/W	Red/White
L	Blue	L/B	Blue/Black
Y	Yellow	L/Y	Blue/Yellow
G	Green	L/G	Blue/Green
P	Pink	Y/B	Yellow/Black
B	Black	Br/W	Brown/White
Dg	Dark green	Y/R	Yellow/Red
Ch	Chocolate	L/R	Blue/Red
Sb	Sky blue	W/B	White/Black
W	White	G/W	Green/White
Gy	Gray	W/G	White/Green
O	Orange	G/Y	Green/Yellow
Lg	Light green	Y/G	Yellow/Green
R/Y	Red/Yellow		



XS650SF/XS650-2F

Supplementary

11

FOREWORD

This Supplementary Service Manual for XS650SF/XS650-2F has been published to supplement the Service Manual for the XS650E (LIT-1 1616-00-76), and provides updated information for the XS650E model as well as new data concerning the XS650SF/XS650-2F. For complete information on service procedures, it is necessary to use this Supplementary Service Manual together with the Service Manual for the XS650E (LIT-1 1616-00-76).

NOTE:

This Supplementary Manual contains special information regarding periodic maintenance to the emissions control system for the XS650SE. Please read this material carefully.

SERVICE DEPT.
INTERNATIONAL DIVISION
YAMAHA MOTOR CO., LTD.

Page numbers shown in brackets correspond to page numbers of the XS650E Service Manual (LIT-11616-00-76).

NOTE:

In the **XS650E** Service Manual there are a few pages that are not arranged in order. These are pages 7, 8 and 9. They should be read in the reverse order, i.e. 9, 8 and 7.

(PAGE 4 ~ 5)

2-2. MAINTENANCE INTERVALS CHARTS

A. PERIODIC MAINTENANCE EMISSION CONTROL SYSTEM

NO.	ITEM	REMARKS	INITIAL BREAK-IN		THERE AFTER EVERY	
			1,000 km or 1 month (600 mi)	5,000 km or 7 months (3,000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)
1	Cam Chain	Check and adjust chain tension.	○			○
2	Valve Clearance	Check and adjust valve clearance when engine is cold.	○	○		○
3	Contact Breaker Points	Check condition. Adjust point gap. Replace if necessary.	○	○	○	
4	Ignition Timing	Check and adjust ignition timing.	○	○	○	
5	Spark Plugs	Check condition. Adjust gap. Replace if necessary.		○		○
6	Crankcase Ventilation System	Check ventilation hose for cracks or damage. Replace if necessary.		○		○
7	Fuel Hose	Check fuel hose for cracks or damage. Replace if necessary		0		0
8	Exhaust System	Check for leakage. Retighten as necessary. Replace gasket(s) if necessary.	○	C	○	
9	Carburetor Synchronization	Adjust synchronization of carburetors.	○	0	0	
10	Idle Speed	Check and adjust engine idle speed. Adjust cable free play.	0	0	0	

B. GENERAL MAINTENANCE/LUBRICATION

*XS650SF only

NO.	ITEM	REMARKS	TYPE	INITIAL BREAK-IN		THERE AFTER EVERY		
				1,000 km or 1 month (600 mi)	5,000 km or 7 months (3,000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)	16,000 km or 24 months (10,000 mi)
1	Engine Oil	Warm-up engine before draining.	Yamalube 4-cycle oil or SAE 20W/40 "SE" motor oil	○	○	○		
2	Oil Filter	Clean element in solvent.	–		○		○	
3	Air Filter	Dry type filter. Clean with compressed air.	–		○		○	
4	Brake System	Adjust free play. Replace (* shoes and/or) pad if necessary.	–	○	○	○		
5	Clutch	Adjust free play.	–	○	○	○		
6	Drive Chain	Apply chain lube thoroughly.	Yamaha chain and cable lube or 10W/30 motor oil	CHECK CHAIN TENSION AND LUBE EVERY 500 km (300 mi).				
7	Control and Meter Cable	Apply cable lube thoroughly.	Yamaha chain and cable lube or 10W/30 motor oil	○	○	○		
8	Rear Arm Pivot Shaft	Apply until new grease shows.	–			○		
9	Brake pedal and change pedal shaft	Apply lightly.	Yamaha chain and cable lube or 10W/30 motor oil		○	○		
10	Center and Side Stand Pivots and Kick Crank Boss	Apply lightly.	Yamaha chain and cable lube or 10W/30 motor oil		○	○		

NO.	ITEM	REMARKS	TYPE	INITIAL BREAK-IN		THEREAFTEREVERY		
				1,000 km or 1 month 1600 mi)	5.000 km or 7 months (3,000 mi)	4,000 km or 6 months (2.500 mi)	8,000 km or 12 months (5,000 mi)	16,000 km or 24 months (10,000 mi)
11	Front Fork Oil	Drain completely. Refill to specification.	Yamaha fork oil 10Wt or equivalent					○
12	Steering Ball Bearing and Races	Check bearings assembly for looseness. Moderately repack every 16,000 km (10.000 mi).	Medium weight wheel bearing grease.		0	3		Repack
13	Wheel Bearings	Check bearings for smooth rotation. Moderaltely repack every 16,000 km (10,000 mi).	Medium weight wheel bearing grease.		0	○		Repack
14	Batterv	Check specific gravity. Check breather pipe for proper operation.	–		○	○		
15	A.C. Generator	Replace generator brushes. Replace at initial 9,000 km (5.500 mi)	–				0	

(PAGE 7 ~8)

2-3. ENGINE

B. Air filters

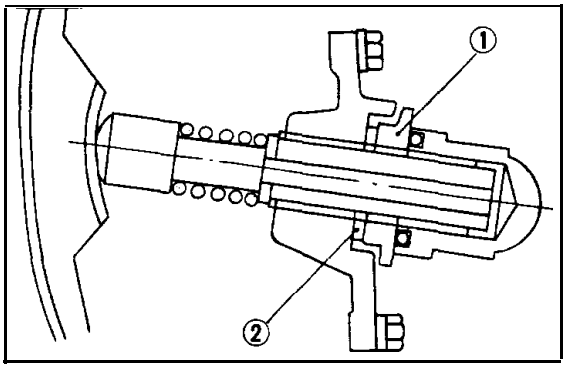
2. Cleaning method

c. The air filter element should be cleaned specified intervals. It should be cleaned more often if the machine is operated in extremely dusty areas.

E. Cam chain adjustment

Check/adjust the cam chain tension as follows:

1. Remove the cap nut and loosen the lock nut.
2. Turn the left end of the crankshaft counterclockwise. As the crankshaft is turning, check to see that the cam chain adjuster push rod is flush with the end of the bolt. If not, turn the adjuster bolt until the push rod is flush.
3. Secure the lock nut and tighten the cap bolt.



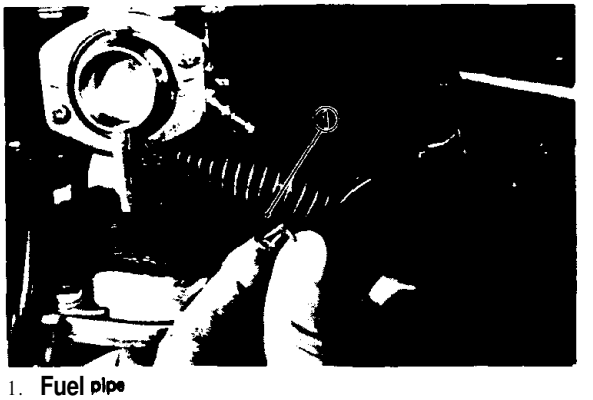
1. Locknut 2. Gasket

(PAGE 9 ~ 13)

2-4. CHASSIS

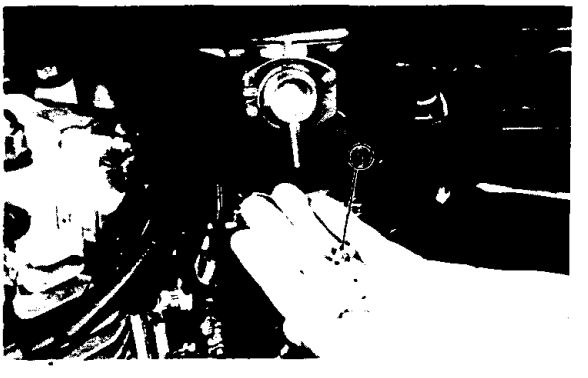
A. Fuel petcock cleaning

1. Open the seat and remove the fuel tank securing bolt.
2. Turn the petcock lever to the "ON" or "RES" position. Raise the fuel tank to remove the fuel pipe.



1. Fuel pipe

3. Remove the drain bolt and clean with solvent If gasket is damaged, replace.



1. Drain bolt

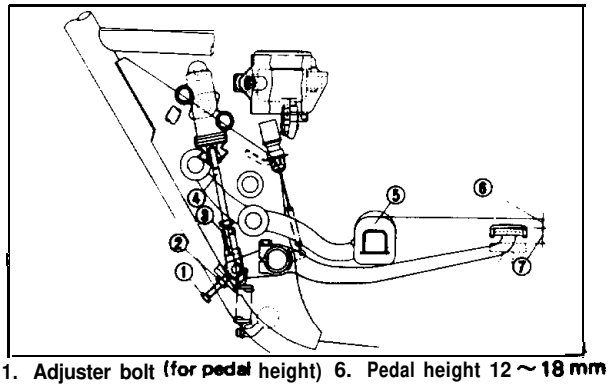
E. Rear brake (XS650SF only)

The rear brake pedal should be so adjusted that it has a free play of 13 ~ 15 mm (0.51 ~ 0.59 in) from when the brake pedal is first moved to when the brake begins to be effected .

1. Loosen the adjuster lock nut (for pedal height).
2. By turning the adjuster bolt clockwise or counterclockwise, adjust the brake pedal position so that its top end is approx. 12 ~ 18 mm (0.47 ~ 0.71 in) below the footrest top end.
3. Secure the adjuster lock nut.
4. Loosen the brake rod adjuster lock nut and screw brake rod downward until there is noticeable free play between rod and master cylinder.
5. Turn in the brake rod until it lightly touches the master cylinder, then turn it out by approx. I-1/5 turns (for proper free play).
6. Tighten the brake rod adjuster lock nut.

CAUTION:

See that the punched mark on the brake rod is not above the top surface of the adjuster lock nut in securing the brake rod adjuster lock nut.



1. Adjuster bolt (for pedal height)
2. Lock nut
3. Lock nut
4. Brake rod
5. Footrest
6. Pedal height 12 ~ 18 mm (0.47 - 0.71 in)
7. Free play 13 ~ 15 mm (0.51 - 0.59 in)

F. Wheels and tires

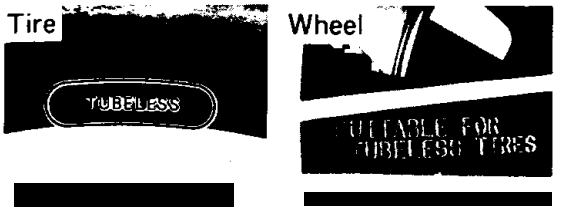
Tubeless tires and aluminium wheels (XS650SF only)

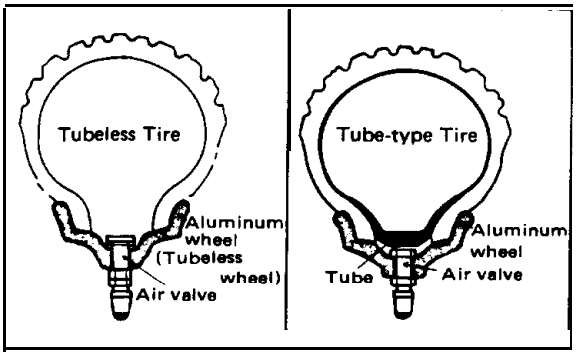
NOTE:

This model is available in two types, tubeless tire and tube-type tires. Before servicing tires, please note the following instructions.

1. Tubeless tire

a. The identification marks are fitted on the tire sidewall and wheel spoke for tubeless tires as shown.





WARNING:

Do not attempt to use tubeless tires on a wheel designed for use only with tube-type tires. Tire failure and personal injury may result from sudden deflation.

'Tube-type wheel : Tube-type Only

"Tubeless-type wheel : Tube-type or Tube less tires

When using tube-type tires, be sure to install the proper tube also.

After installing a tire, ride conservatively to allow the tire to seat itself on the properly. Failure to allow proper seating may cause tire failure resulting in serious injury to the machine and rider.

b. After repairing or replacing a tire, check to be sure the valve stem lock nut is securely fastened. If not, torque it as specified.

Tightening torque:
1.5 m-kg (1.1 ft-lb)

2. Aluminium wheels

a. Always inspect the aluminium wheels before riding. Place the machine on the center stand and check for cracks, bends or warapage of the wheels. Do not attempt even small repairs to the wheel. It must be replaced.

b. Tires and wheels should be balanced whenever either one is changed or re placed. Failure to have a wheel assembly balanced can result in poor perfo-rmance, adverse handling characteristics, and shortened tire life.

Tire pressure (XS650SF/XS650-2F)

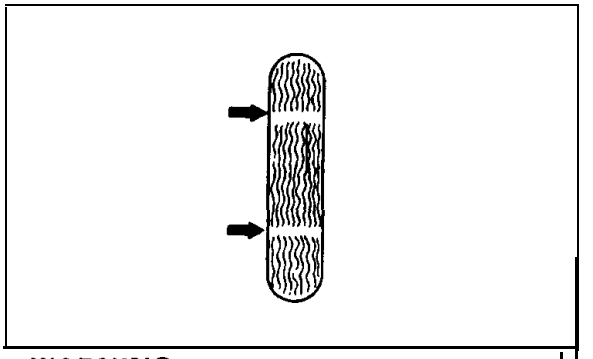
To insure maximum performance and long service, note the following:

1. Always maintain proper air pressure as described in the chart. Check tire pressure daily, before riding, and adjust as necessary.

*XS650SF only **XS650-2F only

	FRONT	REAR
BASIC WEIGHT with oil and full fuel tank	• 102 kg (225 lb) "100 kg (221lb) •	'118 kg (260 lb *116 kg (256 lb
Standard tire	Bridgestone or Yokohama 3.50S19-4PR	Bridgestone or Yokohama 130/90S16-4PR
Maximum load limit	166 kg (365 lb)	279 kg (615 lb)
Cold tire pressure:		
Up to 90 kg (198 lb) load	1.6 kg/cm² (22 psi)	2.0 kg/cm² (28 psi)
90 kg (198 lb) load ~ 206 kg (453 lb) load (Maximum load)	2.0 kg/cm² (28 psi)	2.3 kg/cm² (32 psi)
High speed riding	2.0 kg/cm² (28 psi)	2.3 kg/cm² 132 psi)
Minimum tire tread depth	0.8 mm (0.03 in)	0.8 mm (0.03 in)

2. Before operation, always check the tire surfaces for wear and/or damage; for example: cracks, glass, nails, metal fragments, stones, etc. Correct any such hazard before riding. If a tire tread shows crosswise lines, it means that the tire is worn to its limit. Reolace the tire.



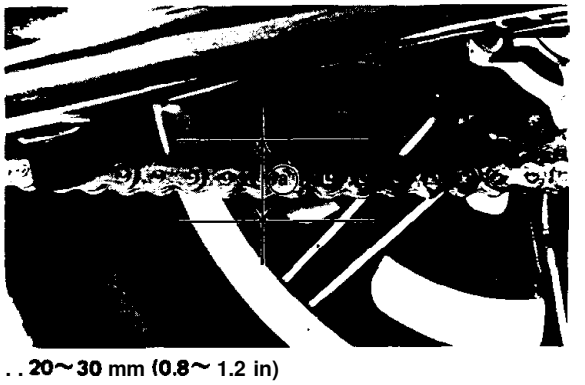
WARNING:
It is dangerous to ride with worn-out tire. When a tire tread begins to show lines. Replace the tire.

G. Drive chain

1. Tension check

NOTE:
Before checking and/or adjusting, rotate rear wheel through several revolutions and check tension several times to find the tightest point. Check and/or adjust chain tension with rear wheel in this "tight chain" position.

Inspect the drive chain with both tires touching the ground and without rider. Check the tension at the position shown in the illustration, The normal vertical



. . 20~30 mm (0.8~ 1.2 in)

deflection is approximately 20 ~ 30 mm (0.8 ~ 1.2 in). If the deflection exceeds 20 ~ 30 mm (0.8 ~ 1.2 in) adjust the chain tension.

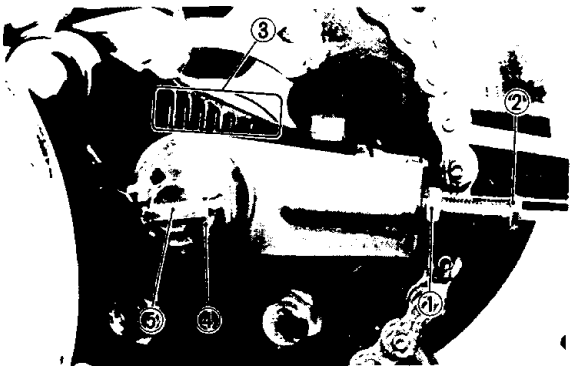
2. Tension adjustment

a. Loosen the rear brake adjusting nut (XS650-2F only).

b. Remove the cotter pin of the rear wheel axle nut with pliers.

c. Loosen the rear wheel axle nut.

d. Loosen the lock nuts on each side. To tighten chain,turn chain puller adjusters clockwise. To loosen chain, turn adjusters counterclockwise and push wheel forward. Turn each adjuster exactly the same amount to maintain correct axle alignment. (There are marks on each side of rear arm and on each chain puller; use them to check for proper alignment.)



1. Locknut
2. Adjuster
3. Marks for alignment
4. Rear wheel axle nut
5. Cotter pin

e. After adjusting, be sure to tighten the lock nuts and the rear wheel axle nut.

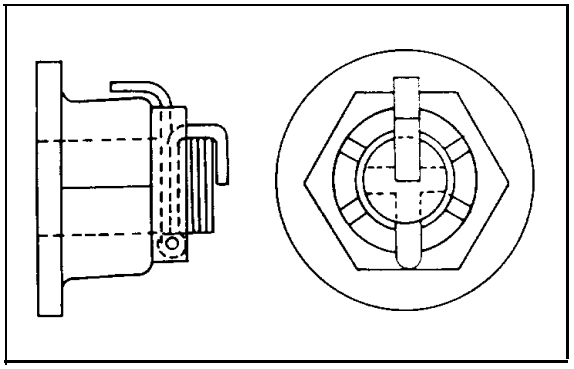
f. Inset-t the cotter pin into the rear wheel axle nut and bend the end of the cotter pin as shown in the illustration (if the nut notch and the cotter pin hole do not match, tighten the nut slightly to match).

CAUTION:

Always use a new cotter pin on the rear axle nut.

NOTE:

Excessive chain tension will overload the engine and other vital parts, keep the tension within the specified limits. Also, replace the rear axle cotter pin with a new one.



g. In the final step, adjust the play in the brake pedal (XS650-2F only).

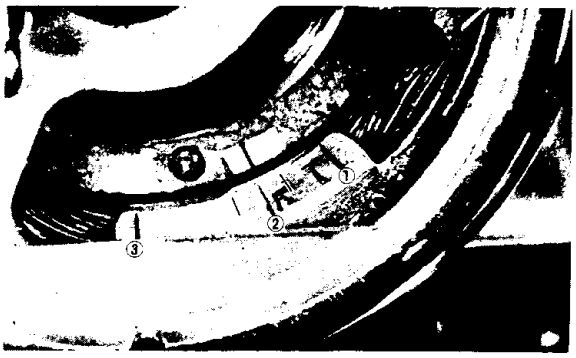
(PAGE 14 ~ 15)

2-5. ELECTRICAL

C. Ignition timing

1. Point gap must be set before setting timing.

2. Ignition timing is checked with a timing light by observing the position of the stationary marks stamped on the stator and the pointer on the generator rotor.



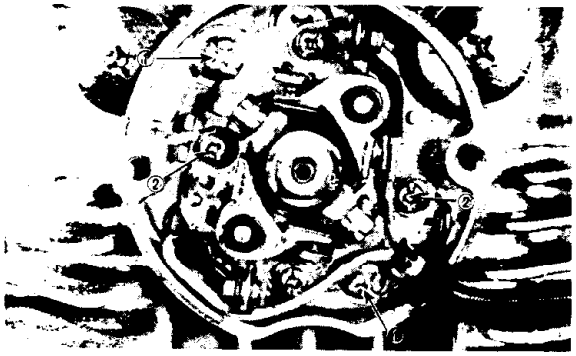
1. Top dead canter
2. 15° BTDC at 1,200 r/mn
3. Advanced mark

3. Connect timing light to right (left) cylinder spark plug lead wire. Ignition timing of right cylinder must be set first.

4. Start the engine and keep the engine speed as specified on the label. Use a tachometer for checking.

5. The rotor pointer should line up the "F" stamped timing mark on the stator at a specified engine speed. If it does not align, loosen the two breaker backing plate screws (breaker assembly holding screws for left cylinder) and move the complete backing plate (breaker assembly for left cylinder) until the point marks align.

6. Retighten screws. Check timing again for right cylinder.
7. Repeat procedure (steps 2 ~ 6) for left cylinder.



1. Right cylinder timing adjustment
2. Left cylinder timing adjustment

F. Spark plug

Check electrode condition and wear, insulator color, and electrode gap. Use a wire gauge for adjusting the plug gap. If the electrodes become too worn, replace it.

When installing the plug, always clean the gasket surface, wipe off any grime that might be present on the surface of the spark plug, and torque the spark plug properly.

Standard spark plug:
N-7Y (CHAMPION) or BP7ES (NGK)
Spark plug gap:
0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Spark plug tightening torque:
2.0 m-kg (14.5 ft-lb)

(PAGE 29 ~ 33)

3-4. ENGINE ASSEMBLY AND ADJUSTMENT

0. Engine

Specifications should be changed as follows:

Engine mounting bolt torque:		
Upper (U Nut)	M8	1.8 m-kg (13.0 ft-lb)
Upper	M10	3.0 m-kg (215 ft-lb)
Front (U Nut)	M10	4.6 m-kg (33.5 ft-lb)
Rear (U Nut)	M10	4.1 m-kg (29.5 ft-lb)
Rear — under (U Nut)		
	M10	4.6 m-kg (33.5 h-lb)
Under (U Nut)	M10	9.0 m-kg (65.0 ft-lb)

(PAGE 39 ~ 40)

5-1. FRONT WHEEL

C. Front wheel inspection (XS650SF only)

1. Check for cracks, bends, or warpage of wheels. If a wheel is deformed or cracked, it must be replaced.
2. Check wheel run-out

If deflection exceeds tolerance, check wheel bearing or replace wheel as required.

Rim run-out limits (XS650SF/XS650-2F):
Vertical: 2 mm (0.08 in)
Lateral: 2 mm (0.08 in)

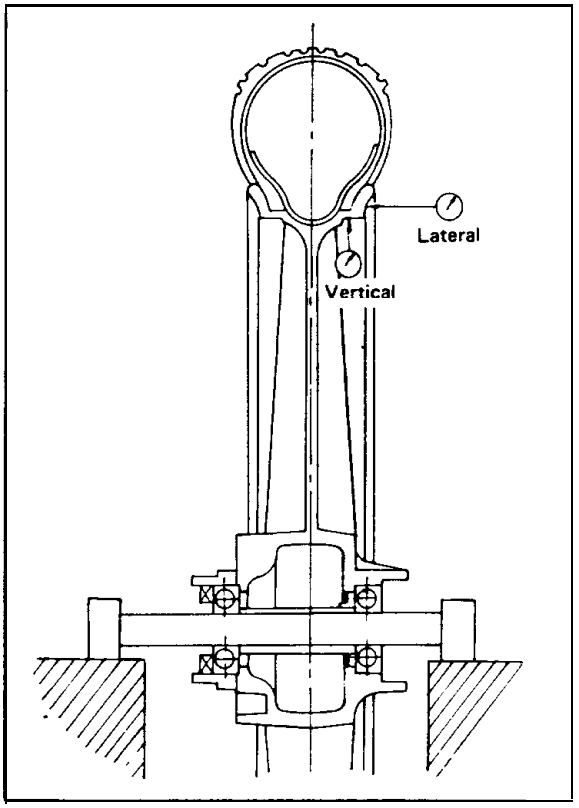
3. Check wheel balance

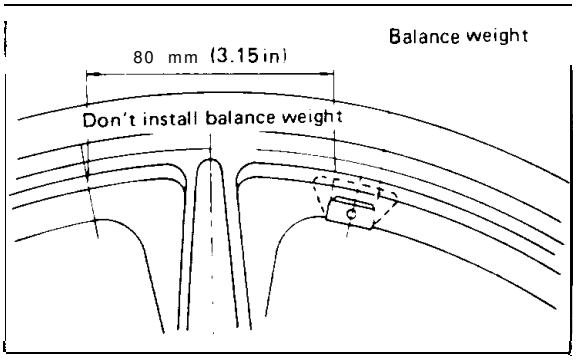
Rotate wheel lightly several times and observe resting position.

If wheels is not statically balanced, wheel will come to rest at the same position. install balance weight at lighter position (at top) as illustrated.

NOTE:

The wheel should be balanced with brake disc installed.





(PAGE 40)

5-2. REAR WHEEL

A. Removal (XS650SF only)

1. Support the machine on the center stand.
2. Disconnect the drive chain. Using the drive chain cutter (special tool).

NOTE:

The chain joint should be replaced each time the chain is cut.

3. Remove the axle nut cotter pin and the axle nut.
4. While supporting the brake caliper, pull out the rear axle.
5. Remove the rear wheel assembly.

E. Installing rear wheel (XS650SF only)

When installing rear wheel, reverse removal procedure taking care of following points:

1. Lightly grease lip of rear wheel oil seals.
2. Make sure the brake pads are installed properly and that there is a sufficient gap to install the rear disc.
3. Install the wheel assembly and the axle. Always use a new cotter pin on the axle nut.

Axle nut torque:
15.0 m-kg (108.5 ft-lb)

4. Connect the drive chain.
5. Adjust the drive chain.

(PAGE 40 ~ 44)

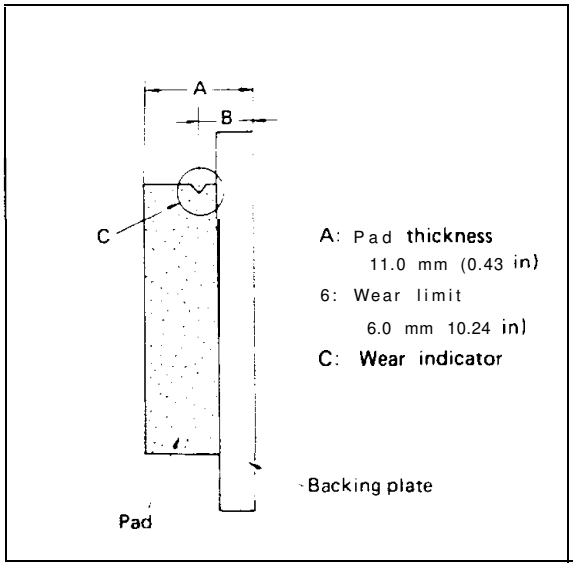
5-3. BRAKES

Except for the following, the same procedure as for the XS650E front brake can be performed for the disassembly, inspection,and assembly of the XS650SF (front and rear brake) and the XS650-2F (front brake).

D. Brake inspection and repair

Specifications should changed as follows:

Wear limit:
6.0 mm (0.24 in)



(PAGE 44)

5-4. WHEELS, TIRES, TUBE (XS650SF — Tubeless tire model)

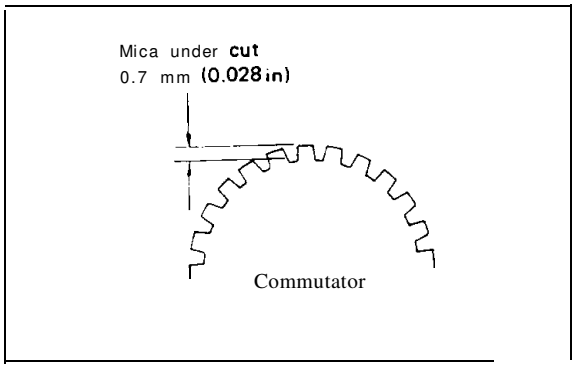
Refer to “Tubeless tire and Aluminium Wheel Manual” for tubeless tire and wheel service.

(PAGE 50 ~51)

6-1. STARTER

A. Armature

1. Check the outer surface of the commutator. If its surface is dirty, clean with No. 600 grit sand paper.
2. The mica insulation between commutator segments should be 0.7 mm (0.028 in) below the segment level. If not, scrape to proper limits with appropriately shaped tool. (A hack saw blade can be ground to fit.)



3. Check the armature and field coil for shorting and insulation. Replace armature as required.

	Coil resistance
Armature coil	0.0067Ω at 20°C 168°F)
Field coil	0.004Ω at 20°C (68°F)

4. Check the front and rear cover bearings for damage. If damaged, the starter assembly must be replaced.

(PAGE 57 ~ 58)

6-5. LIGHTING AND SIGNAL SYSTEMS

B. Reserve lighting system

1. Description:

The reserve lighting system has two functions: (1) It notifies the rider that one of the headlight filaments is inoperative, and (2) it switches current from the inoperative filament to the remaining functional filament.

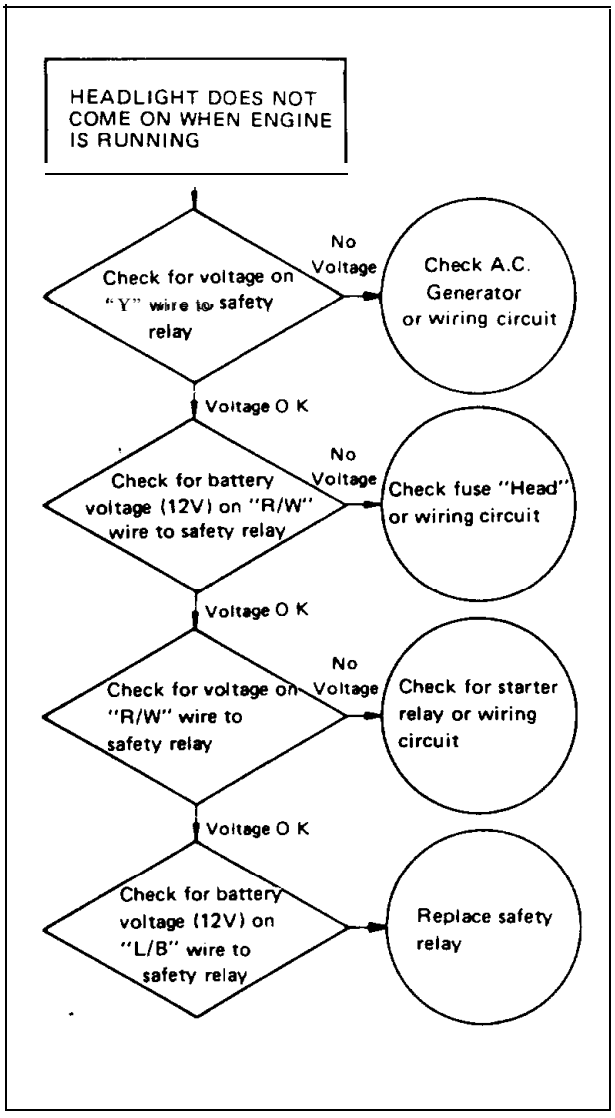
The system is connected to the headlight circuit only. The reserve lighting system unit is located under the seat.

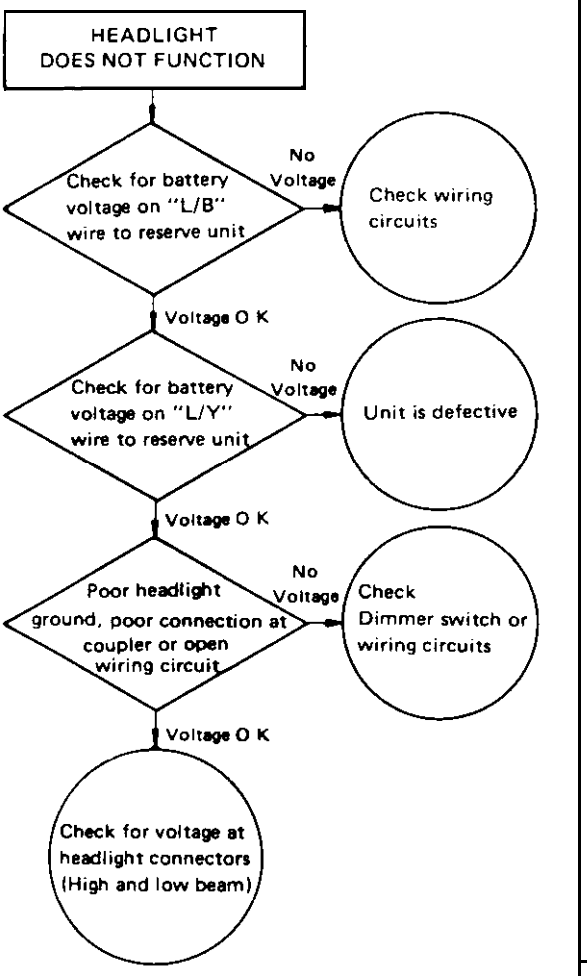
NOTE:

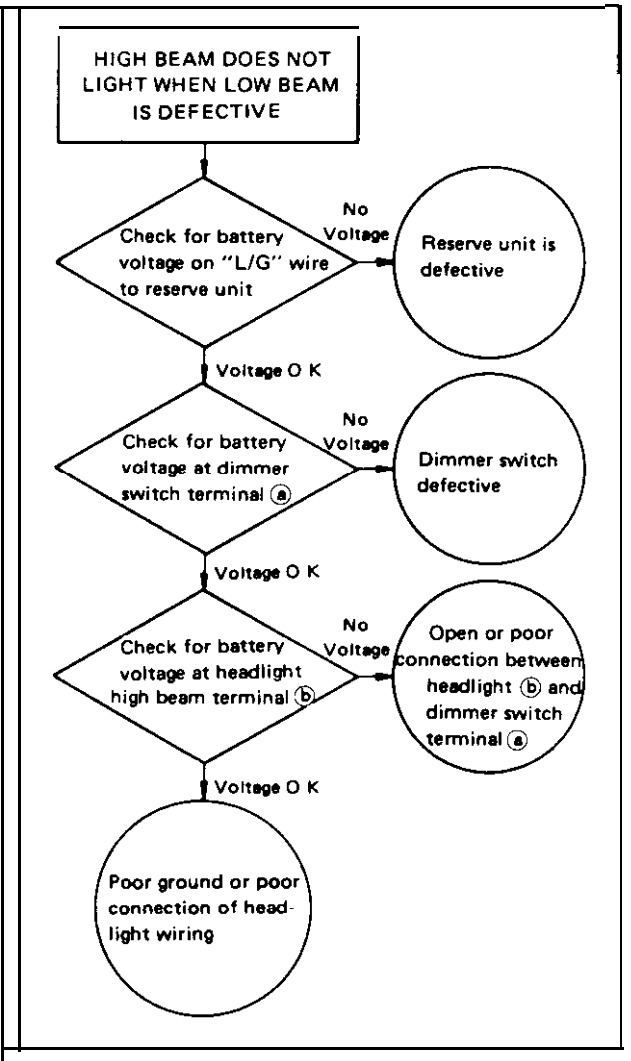
This model has been equipped with a safety relay so that the headlight comes on automatically when the engine is started and the light stays on until the main switch is turned to "OFF" even if the engine stalls.

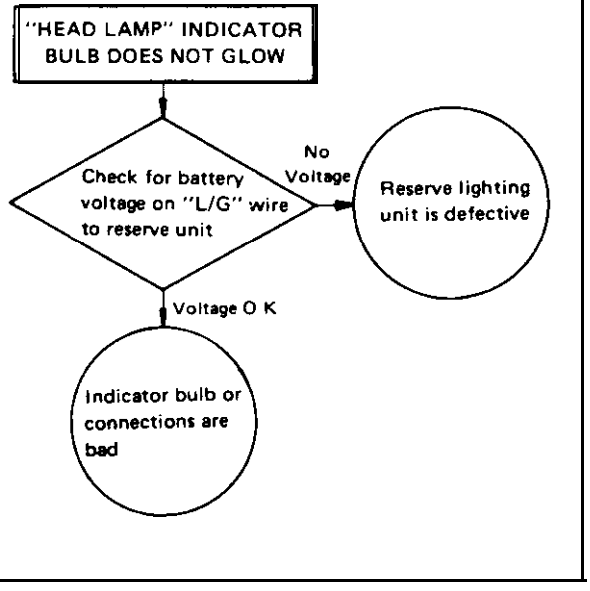
Headlight condition	Headlight failure indicator light	Reserve lighting function
Normal	Comes on (very dim)	—
High beam faulty	Comes on	Low beam comes on
Low beam faulty	Comes on	High beam comes on at low brilliance

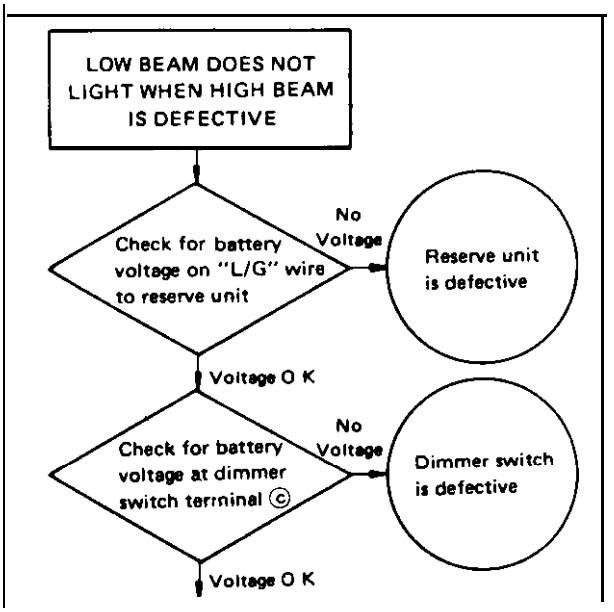
2. Troubleshooting/Inspection

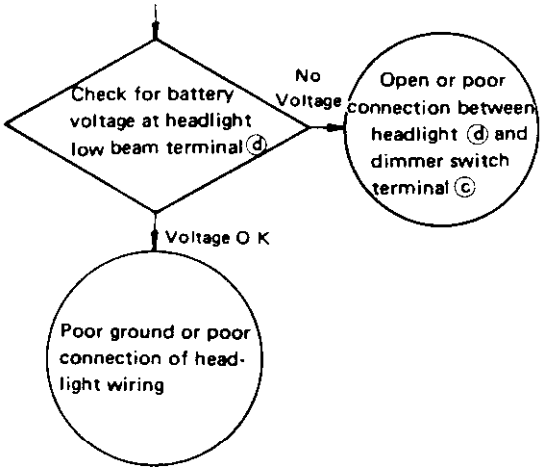


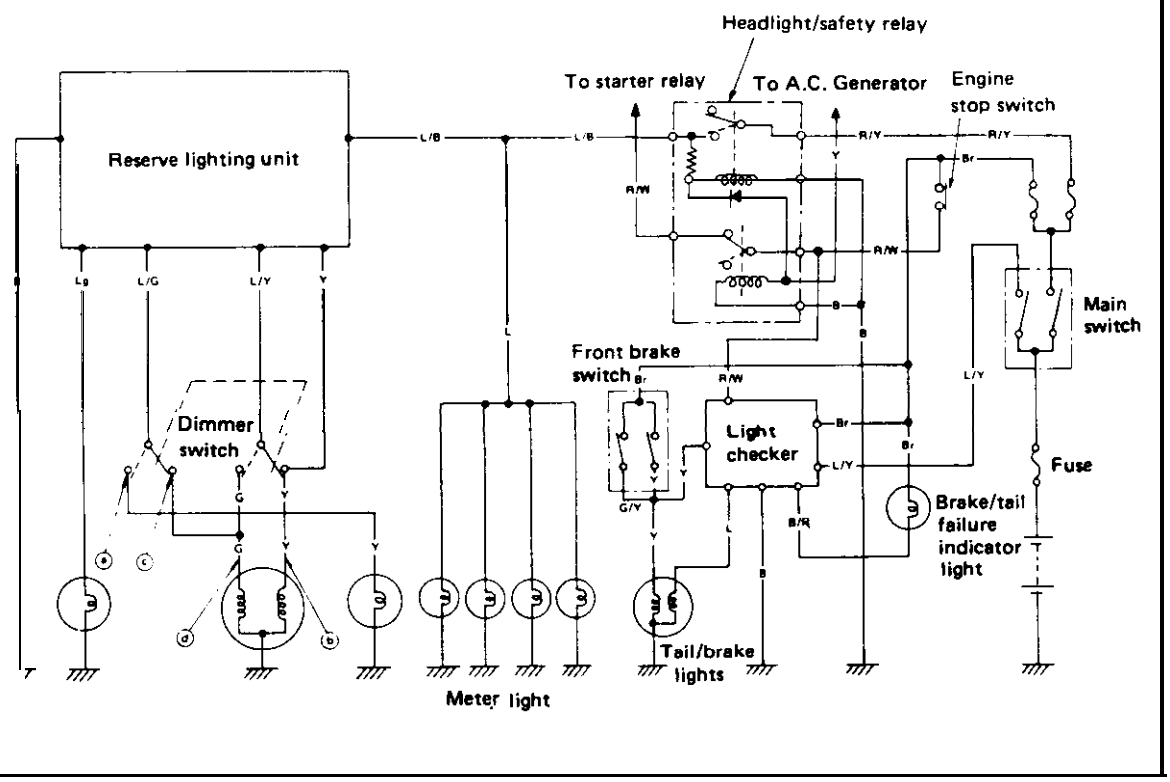

HEADLIGHT DOES NOT FUNCTION
Check for battery voltage on "L/B" wire to reserve unit
No Voltage
Check wiring circuits
Voltage O K
Check for battery voltage on "L/Y" wire to reserve unit
No Voltage
Unit is defective
Voltage O K
Poor headlight ground, poor connection at coupler or open wiring circuit
No Voltage
Check Dimmer switch or wiring circuits
Voltage O K
Check for voltage at headlight connectors (High and low beam)


HIGH BEAM DOES NOT LIGHT WHEN LOW BEAM IS DEFECTIVE
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve unit is defective
Voltage O K
Check for battery voltage at dimmer switch terminal ⓐ
No Voltage
Dimmer switch defective
Voltage O K
Check for battery voltage at headlight high beam terminal ⓑ
No Voltage
Open or poor connection between headlight ⓑ and dimmer switch terminal ⓐ
Voltage O K
Poor ground or poor connection of headlight wiring


"HEAD LAMP" INDICATOR BULB DOES NOT GLOW
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve lighting unit is defective
Voltage O K
Indicator bulb or connections are bad


LOW BEAM DOES NOT LIGHT WHEN HIGH BEAM IS DEFECTIVE
Check for battery voltage on "L/G" wire to reserve unit
No Voltage
Reserve unit is defective
Voltage O K
Check for battery voltage at dimmer switch terminal ⓒ
No Voltage
Dimmer switch is defective
Voltage O K





(PAGE 61 ~62)

7-1. TORQUE SPECIFICATION

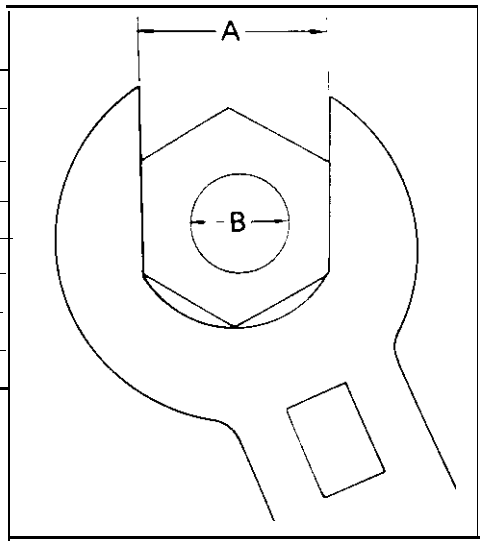
The following torque specifications must be adhered to on every machine. When applying torque to multi-secured fastener components, the several studs should be tightened in gradual stages and in a pattern that will avoid warpage to the item being secured. Torque settings are for dry, clean threads. Torquing should always be done to the nut, never the bolt head.

NOTE:

Certain items with other than standard thread pitches may require differing torque.

Torque Specifications

A (Nut)	B (Bolt)	Standard tightening torque	
		m-kg	ft-lb
10 mm	6 mm	0.6	4.5
12 mm	8 mm	1.5	11
14 mm	10 mm	3.0	22
17 mm	12 mm	5.5	40
19 mm	14 mm	8.5	61
22 mm	16 mm	13.0	94



Part to be tightened	Thread dia. and part name	Tightening torque
Engine:		
Cylinder head and cylinder head cover	10 mm nut 8 mm bolt	3.7 m-kg (27.0 ft-lb) 2.1 m-kg (15.0 ft-lb)
Cylinder head	6 mm bolt	0.9 m-kg (6.5 ft-lb)
Cylinder head cover side	6 mm crown nut 8 mm crown nut	0.9 m-kg (6.5 ft-lb) 1.3 m-kg (9.5 ft-lb)
Spark plug	14 mm	2.0 m-kg (14.5 ft-lb)
Generator	12 mm nut	3.8 m-kg (27.5 ft-lb)
Stator coil	6 mm pan head screw	0.9 m-kg (6.5 ft-lb)
Governer	6 mm bolt	0.8 m-kg (6.0 ft-lb)
Valve clearance adjustment nut	8 mm nut	2.7 m-kg (19.5 ft-lb)
Cam chain tensioner	18 mm cap	2.1 m-kg (15.0 ft-lb)
Pump cover	6 mm pan head screw	1.0 m-kg (7.2 ft-lb)
Strainer cover	6 mm bolt	1.0 m-kg (7.2 ft-lb)
Drain plug	30 mm bolt	4.2 m-kg (30.5 ft-lb)
Oil filter	6 mm bolt	0.9 m-kg (6.5 ft-lb)
Delivery pipe	10 mm union bolt	2.1 m-kg (15.0 ft-lb)
Exhaust pipe	8 mm nut	1.3 m-kg (9.5 ft-lb)
Crankcase	8 mm bolt/nut	2.1 m-kg (15.0 ft-lb)
Kick crank boss	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Primary drive gear	14 mm nut	9.0 m-kg (65.0 ft-lb)
Clutch boss	18 mm nut	8.0 m-kg (58.0 ft-lb)
Drive sprocket	22 mm nut	6.5 m-kg (47.0 ft-lb)
Change pedal	6 mm bolt	1.0 m-kg (7.2 ft-lb)
Chassis:		
Front wheel axle	14 mm nut	10.7 m-kg (77.5 ft-lb)
Front fork and axle holder	8 mm nut	1.4 m-kg (10.0 ft-lb)
Handle crown and inner tube	8 mm nut	1.1 m-kg (8.0 ft-lb)
Handle crown and steering shaft	8 mm nut	1.1 m-kg (8.0 ft-lb)
Handle crown and steering shaft	14 mm bolt	5.4 m-kg (39.0 ft-lb)

Part to be tightened	Thread dia. and part name	Tightening torque
Handle crown and handlebar holder	8 mm bolt	1.8 m-kg (13.0 ft-lb)
Under bracket and inner tube	8 mm nut	2.0 m-kg (14.5 ft-lb)
Engine mounting UPPer	8 mm nut	1.6 m-kg (13.0 ft-lb)
Engine mounting upper	10 mm nut	3.0 m-kg (21.5 ft-lb)
Engine mounting Front	10 mm nut	4.6 m-kg (33.5 ft-lb)
Engine mounting Rear	10 mm nut	4.1 m-kg (29.5 ft-lb)
Engine mounting Rear-Lower	10 mm nut	4.6 m-kg (33.5 ft-lb)
Engine mounting Lower	10 mm nut	9.0 m-kg (65.0 ft-lb)
Front flasher and headlight	8 mm nut	1.0 m-kg (7.2 ft-lb)
Master cylinder and brake hose	10 mm union bolt	2.6 m-ka (19.0 ft-lb)
Brake disc and hub	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Caliper and support bracket	8 mm bolt	1.8 m-kg (13.0 ft-lb)
Caliper and pad	5 mm bolt	0.3 m-kg (2.2 ft-lb)
Caliper and bleed screw	8 mm bolt	0.6 m-kg (4.5 ft-lb)
Front caliper and front fork	10 mm bolt	3.5 m-kg (25.5 ft-lb)
Master cylinder and cylinder bracket	6 mm bolt	0.6 m-kg (4.5 ft-lb)
Pivot shaft	14 mm nut	6.5 m-kg (47.0 ft-lb)
Rear wheel axle	16 mm nut	15.0 m-kg (106.5 ft-lb)
Tension bar and brake caliper (plate)	8 mm nut	1.6 m-kg (13.0 ft-lb)
Tension bar and rear arm	8 mm nut	3.2 m-kg (23.0 ft-lb)
Rear shock absorber Upper	10mm bolt	3.0 m-kg (21.5 ft-lb)
Rear shock absorber Lower	10 mm bolt	3.9 m-kg (28.0 ft-lb)
Rear arm and rear arm end	8 mm bolt	1.0 m-kg (7.2 ft-lb)
Front fender	8 mm bolt	1.0 m-kg (7.2 ft-lb)
Neutral switch	12mm	1.3 m-kg (9.5 ft-lb)

(PAGE 64 ~71)

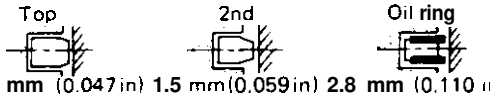
7-3. SPECIFICATION

A. General

*XS650SF only **XS650-2F only

1. MODEL	
1) Model (I.B.M. No.)	XS650SF (2MO)/XS650-2F (3NO)
2) Frame I.D. and starting number	2F0-150101/2F0-250101
31 Engine I.D. and startinq number	2F0-150101/2F0-250101
2. DIMENSION	
1) Overall length	2,120 mm (83.5 in)
2) Overall width	925 mm 136.4 in)
31 Overall height	* 1,225 mm (48.2 in) "1,220 mm (48.0 in)
4) Seat height	790 mm (31.1 in)
5) Wheelbase	1,435 mm (56.5 in)
6) Minimum ground clearance	135 mm (5.3 in)
3. WEIGHT	
1) Net weight (Dry)	'210 kg (463 lb) "205 kg (452 lb)
4. PERFORMANCE	
1) Climbing ability	26°
2) Minimum turning radius	2,500 mm 196.4 in)

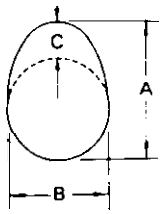
B. Engine

1. DESCRIPTION	
1) Engine type	Air cooled, 4-stroke, SOHC twin, parallel forward incline
2) Engine model	2F0
3) Displacement	653 cc (39.85 cu.in)
4) Bore x stroke	75 x 74 mm (2.953 x 2.913 in)
51 Compression ratio	8.5 : 1
61 Starting system.	Kick and electric starter
7) Ignition system	Battery ignition
8) Lubrication system	wet sump
2. CYLINDER HEAD	
1) Combustion chamber volume (with N-7Y)	43.6 cc (2.660 cu.in)
2) Combustion chamber type	Dome + Squish
3) Head gasket thickness	1.2 mm (0.047 in)
3. CYLINDER	
1) Material	Aluminum alloy with cast iron sleeve
2) Bore size	$75.00\ ^{+0.02}_{0}$ mm ($2.9528\ ^{+0.0008}_{0}$ in)
3) Taper limit	0.05 mm (0.002 in)
4) Out of round limit	0.01 mm (0.0004 in)
4. PISTON	
1) Piston skirt clearance	0.050 ~ 0.055 mm ~0.0020 ~ 0.0022 in)
21 Piston oversize	75.25 mm (2.963 in) / 75.50 mm (2.972 in) / 75.75 mm (2.982 in) / 76.00 mm (2.992 in)
3) Piston pin outside diameter x length	$20.0\ ^{0}_{-0.005}$ mm x 61 .o $^{0}_{-0.3}$ mm $10.79\ ^{0}_{-0.0002}$ in x 2.40 $^{0}_{-0.01\,16}$ in)
5. PISTON RING	
1) Piston ring design	 1.2 mm (0.047 in) 1.5 mm (0.059 in) 2.8 mm (0.110 i
21 Ring end gap (Installed, top)	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)
(Installed, 2nd)	0.2 ~ 0.4 mm (0.008 ~ 0.016 in)
(Installed. oil)	0.3 ~ 0.9 mm (0.012 ~ 0.035 in)
3) Ring groove side clearance (Top)	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in)
(2nd)	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)
6. BIG END BEARING	
1) Type	Needle bearing
2) Bearing size	ϕ 26 x ϕ34 x 19.8
31 Needle size	ϕ 4 x ϕ15.8 x 13
7. CAMSHAFT	
1) Cam drive type	Chain (Center side)
21 Number and type of bearing	4 bearings, Ball bearings (6005)
3) Bearing type	ϕ 25-ϕ 47-8
41 Cam dimensions	

	Cam height "A"	Limit	Base circle "B"	Limit	Lift "C"
IN	39.99 ± 0.05 mm (1.574 ± 0.002 in)	39.84 mm (1.569 in)	32.24 ± 0.05 mm (1.269 ± 0.002 in)	32.09 mm (1.263 in)	7.991 mm (0.315 in)
EX	40.03 ± 0.05 mm (1.576 ± 0.002 in)	39.88 mm (1.570 in)	32.30 ± 0.05 mm (1.272 ± 0.002 in)	32.15 mm (1.266 in)	8.030 mm (0.316 in)

5) Valve timing

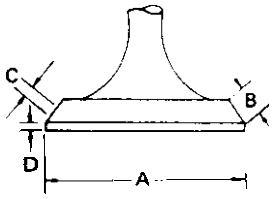
	OPEN	CLOSE	DURATION	OVERLAP
IN	BTDC36°	ABDC68°	284°	72°
EX	BBDC68°	ATDC36°	284°	



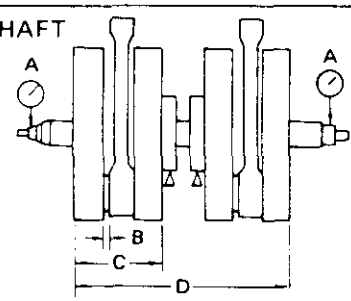
6) Camshaft deflection limit	0.03 mm (0.0012 in)
7) Cam chain	
Type	TSUBAKIMOTO BF05M
Number of links	106L
Sprocket ratio	36/18 (2.000)

I. ROCKER ARM AND ROCKER SHAFT	
1) Rocker arm inner diameter	$15.0\ ^{+0.018}_{0}$ mm (0.591 $^{+0.0007}_{0}$ in)
2) Rocker arm shaft diameter	$15.0\ ^{-0.009}_{-0.015}$ mm (0.591 $^{-0.00035}_{-0.00059}$ in)
3) Clearance	0.009 ~ 0.033 mm (0.00035 ~ 0.00130 in)
41 Lift ratio	X : Y = 40 : 46.41 mm (1.575 : 1.906 in)

). VALVE, VALVE SEAT AND VALVE GUIDE	
1) Valve per cylinder	2 pcs.
2) Valve clearance (In cold engine)	IN: 0.06 mm (0.0024 in) EX: 0.15 mm (0.0059 in)
3) Dimensions	
Valve head diameter "A"	IN: 41 mm (1.614 in) EX: 35 mm (1.378 in)
Valve face width "6"	IN: 2.1 mm (0.083 in) EX: 2.1 mm (0.063 in)
Valve seat width "C"	IN: 1.3 mm (0.051 in) EX: 1.3 mm (0.051 in)
Valve margin thickness "D"	IN: 1.3 mm (0.051 in) EX: 1.3 mm (0.051 in)
Valve stem diameter	IN: $8.0\ ^{-0.010}_{-0.025}$ mm (0.315 $^{-0.0004}_{-0.0010}$ in)
Valve stem diameter	EX: $6.0\ ^{-0.025}_{-0.040}$ mm (0.315 $^{-0.0010}_{-0.0016}$ in)
Valve guide diameter	IN: $6.0\ ^{+0.019}_{+0.010}$ mm (0.315 $^{+0.0007}_{+0.0004}$ in)
	Ex: $6.0\ ^{+0.019}_{+0.010}$ mm (0.315 $^{+0.0007}_{+0.0004}$ in)
Valve stem to guide clearance	IN: 0.020 ~ 0.044 mm (0.00079 ~ 0.00173 in) EX: 0.035 ~ 0.059 mm (0.00136 ~ 0.00232 in)
4) Valve face runout limit	IN & EX: 0.03 mm (0.0012 in) or less

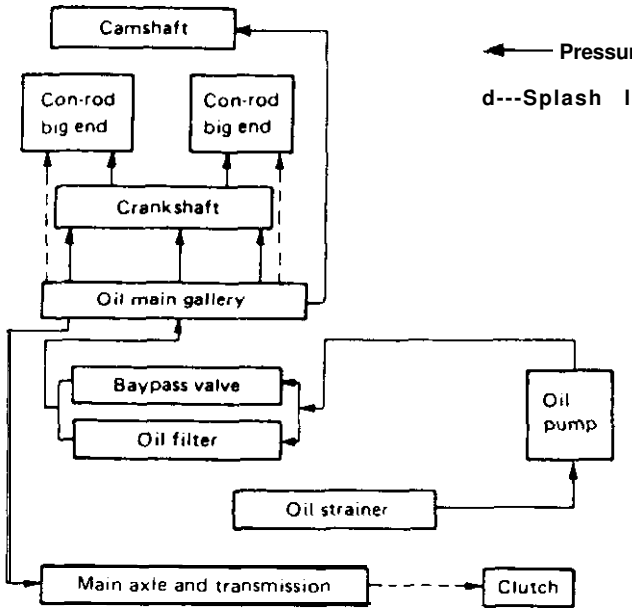


I. VALVE SPRING	
1) Free length	INNER (IN/EX): 42 mm (1.654 in) OUTER (IN/EX): 42.55 mm (1.675 in)
2) Spring rate	INNER (IN/EX): k_1 = 1.43 kg/mm (80.1 lb/in) k_2 = 1.61 kg/mm (101.4 lb/in) OUTER (IN/EX): k_1 = 3.2 kg/mm (179.2 lb/in) k_2 = 4.16 kg/mm (234.1 lb/in)
3) Installed length (Valve closed)	INNER (INIEX): 35 mm (1.378 in) OUTER (IN/EX): 37 mm (1.457 in)
4) Installed pressure (Valve closed)	INNER (IN/EX): 10 ± 0.7 kg (22.0 ± 1.5 lb) OUTER (IN/EX): 17.7 ± 1.25 kg (39.0 ± 2.6 lb)
5) Compressed length (Valve open)	INNER (INIEX): 25.5 mm (1.004 in) OUTER (IN/EX): 27.5 mm (1.063 in)
6) Compressed pressure (Valve open)	INNER (IN/EX): 27.2 ± 1.9 kg (60.0 ± 4.2 lb) OUTER (IN/EX): 57.4 ± 4.0 kg (126.5 ± 8.6 lb)

7) Wire diameter	INNER (IN/EX): 2.9 mm (0.114 in) OUTER (IN/EX): 4.2 mm (0.165 in)
8) Winding O.D.	INNER(IN/EX): 19.4 mm (0.764 in) OUTER (IN/EX): 32.6 mm il.283 in)
9) Number of windings	INNER (IN/EX): 6.0 turns OUTER (IN/EX): 4.25 turns
11. CRANKSHAFT 	
1) Crankshaft deflection limit (A)	0.05 mm (0.002 in)
2) Con-rod large end clearance (B)	0.15 ~ 0.4 mm (0.0059 ~ 0.0157 in)
3) Width of crankshaft (C)	$66\ ^{-0.05}_{-0.10}$ mm ($2.598\ ^{-0.002}_{-0.004}$ in)
(D)	$186\ ^{0}_{-0.3}$ mm ($7.323\ ^{0}_{-0.012}$ in)
4) Crank pin I.D.	$26\ ^{-0.077}_{-0.095}$ mm ($1.024\ ^{-0.003}_{-0.004}$ in)
5) Crank pin O.D. x length	$26\ ^{0}_{-0.006} \times 65\ ^{+0.1}_{-0.2}$ mm ($1.024\ ^{0}_{-0.0002} \times 2.559\ ^{+0.004}_{-0.008}$ in)
12. CONNECTING ROD	
1) Big end I.D.	$34\ ^{+0.016}_{0}$ mm ($1.339\ ^{+0.0006}_{0}$ in)
2) Small end I.D.	$20\ ^{+0.028}_{+0.015}$ mm ($0.787\ ^{+0.0011}_{+0.0006}$ in)
13. CRANK BEARING	
1) Type Right end	$\phi 30$-$\phi 78$-19 (Ball bearing)
Others	$\phi 32$-$\phi 68$-17 (Rollar bearing)
2) Oil seal type	SD-25-40-9
14. CLUTCH	
1) Clutch type	Wet, multiple type
2) Clutch operating mechanism	Inner push type, screw push system
3) Primary reduction ratio and method	72/27 (2.6661. spar gear
4) Primary reduction gear back lash (4 teeth)	$21.45\ ^{0}_{-0.025}$ mm ($0.8445\ ^{0}_{-0.00010}$ in)
5) Friction plate	
Thickness/Quantity	3 mm (0.118 in)/7 pcs.
Wear limit	2.7 mm (0.106 in)
6) Clutch plate	
Thickness/Quantity	1.4 mm (0.055 in)/6 pcs.
Warp limit	0.05 mm (0.002 in)
7) Clutch spring	
Free length/Quantity	34.6 mm (1.362 in)/6 pcs.
8) Clutch housing radial play	0.027 ~ 0.081 mm (0.0011 ~ 0.0032 in)
9) Push rod bending limit	0.2 mm (0.008 in)
15. TRANSMISSION	
1) Type	Constant mesh. 5-speed forward
2) Gear ratio: 1st	32/13 (2.4611
2nd	27/17 (1.588)
3rd	26/20 (1.3001
4th	23/21 11.095)
5th	22/23 (0.956)

3) Bearing type: Main axle (Left)	Needle bearing (φ20-φ30-20)
(Right)	Ball bearing (φ25-φ52-20.6)
Drive axle (Left)	Ball bearing (φ30-φ62-23.8)
(Right)	Needle bearing (φ20-φ30-16)
4) Oil seal type Drive axle (Left)	SDD-40-62-9
5) Secondary reduction ratio and method	34117 (2.000)/Chain
16. SHIFTING MECHANISM	
1) Type	Cam drum, return type
2) Oil seal type (Change lever)	SDO-14-24-6
17. KICK STARTER	
1) Type	Bendix type
2) Oil seal type (Kick axle)	SD-25-35-7
3) Kick clip friction tension	1.2 ~ 1.7 kg (2.6 ~ 3.7 lb)
18. INTAKE	
1) Air cleaner: Type/Quantity	Dry. foam rubber/2 pcs.
2) Cleaner cleaning interval	Every 6,000 km (5,000 mile)
19. CARBURETOR	
1) Type and manufacturer/Quantity	BS38 MIKUNI/2 pcs.
2) I.D. mark	2F0-00
3) Main jet (MJ)	#135
4) Air jet (AJ)	#140
5) Jet needle (JN)	502.3
6) Needle jet (NJ)	z-2
7) Throttle valve (Th.V)	#120
8) Pilot jet (PJ)	#27.5
9) Pilot screw (Turns out) (PSI	Preset
101 Starter jet (GS)	GS_1 : #80, GS_2 : 0.5
11) Fuel level (FL)	24 ± 1 mm (0.94 ±0.04 in)
12) Idling engine speed	1,200 r/min
20. LUBRICATION	
1) Engine sump oil quantity	Oil exchange: 2.0 lit 12.1 US qt)
	Overhaul: 2.5 lit (2.6 US qt)
2) Oil type and grade	Yamalube 4-cycle oil or SAE 20W/40 type
	"SE" motor oil
3) Oil pump type	Trochoid pump
4) Trochoid pump specifications	
Top clearance	0.10 ~ 0.16 mm IO.0039 -0.0071 in)
Tip clearance	0.03 ~ 0.09 mm 10.0012 ~ 0.0035 in)
Side clearance	0.03 ~ 0.08 mm (0.0012 ~ 0.0031 in)
Oil pump volume	1.3 lit/min (1.37 qt/min) at 1,000 r/min
5) Bypass valve setting pressure	1.0 kg/cm² (14 psi)

6) Lubrication chart



C. Chassis

1. FRAME	
1) Frame design	Double cradle, high tensile frame
2. STEERING SYSTEM	
1) Caster	27"
2) Trail	115 mm (4.53 in)
3) Number and size of balls in steering head	
upper race	19 pcs. 1/4 in
Lower race	19 pcs. 1/4 in
4) Steering lock to lock	42" each IL and R)
3. FRONT SUSPENSION	
1) Type	Telescopic fork
2) Damper type	Oil damper. coil spring
3) Front fork spring	
Free length	402 mm 118.98 in)
Wire diameter x winding diameter	4 x 24.5 mm 10.157 x 0.965 in)
Spring constant	k_1= 0.46 kg/mm i26.66 lb/in)/ 0~ 100 mm (0~ 3.94 in)
	k_2= 0.65 kg/mm (36.40 lb/in)/ 100 ~ 150 mm (3.94 ~ 5.91 in)
41 Front fork travel	150 mm (5.906 in)
5) Inner tube O.D.	35 mm (1.376 in)
6) Front fork oil quantity and type	169 cc 15.72 oz) each leg Yamaha fork oil 10Wtor equivalent
7) Distance from the top of inner tube oil level without spring	Approx. 454 mm 117.9 in)
4. REAR SUSPENSION	
1) Type	Swing arm
2) Damper type	Oil damper. coil spring
3) Shock absorber travel	80 mm 13.15 in)
4) Shock absorber spring	
Free length	226 mm 18.90 in)
Wire diameter x winding diameter	7.5 x 60.5 mm (0.295 x 2.362 in)
Spring constant	k_1= 1.714 kg/mm (96.0 lb/in)/ 0 ~ 45 mm (0~ 1.77 in)
	k_2= 2.244 kg/mm (125.7 lb/in)/ 45 ~ 80 mm (1.77 ~ 3.15 in)
5) Swing arm free play (Limit)	1 mm IO.04 in)
6) Pivot shaft -Outside diameter	16 mm (0.63 in)

5. FUEL TANK	
1) Capacity	11.0 lit 12.9 US gall
2) Fuel grade	Regular gasoline
6. WHEEL	
1) Type (Front and rear)	*Cast wheel **Spoke wheel
2) Tire size (Front)	3.50S19-4PR
(Rear)	130/90S16-4PR
31 Tire pressure:	
Up to 90 kg (198 lb) load	Front: 1.6 kg/cm' (22 psi)
	Rear: 2.0 kg/cm^2 (28 psi)
90 kg (198 lblload ~ 204 kg (445 lb)load (Maximum load)	Front: 2.0 kg/cm^2 (28 psi)
	Rear: 2.3 kg/cm^2 (32 psi)
High speed riding	Front: 2.0 kg/cm^2 128 psi)
	Rear: 2.3 kg/cm^2 (32 psi)
4) Rim run out limit (Front and rear)	
Vertical	2 mm (0.08 in)
Lateral	2 mm (0.08 in)
5) Rim size (Front)	1.85 x 19
(Rear)	*MT3.00 x 16 "2.75 x 16
6) Bearing type	
Front wheel (Left)	'630222 **B6303
(Right)	'63022 **B6303RS
Rear wheel (Left)	63042
(Right)	63052
7) Oil seal type	
Front wheel (Left)	SDD-45-56-6
(Right)	SD-22-42-7
Rear wheel (Left)	SD-35-62-9
(Right)	SO-27-52-5
8) Secondary drive chain type	
Type	50HDS
Number of links	103L + Joint
Chain pitch	15.875 mm (5/8in)
Chain free play	20 ~ 30 mm (0.8 ~ 1.2 in)
7. BRAKE	
1) Front brake	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	298 x 7.0 mm 111.73 x 0.28 in)
Disc wear limit	6.5 mm 10.26 in)
Disc pad thickness	11.0 mm (0.43 in)
Pad wear limit	6.0 mm (0.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm 11.50 in)
Brake fluid type/ quantity	DOT #3 Brake fluid / 38.1 cc (1.29 oz)
2) Rear brake (XS650SF only)	
Type	Hydraulic disc type
Disc sire (Outride dia. x thickness)	267 x 7.0 mm (10.5 x 0.28 in)
Disc wear limit	6.5 mm IO.26 in)
Disc pad thickness	11.0 mm 10.43 in)
Pad wear limit	6.0 mm (0.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm (1.50 in)
Brake fluid type / quantity	DOT #3 Brake fluid / 38.1 cc (1.29 oz)

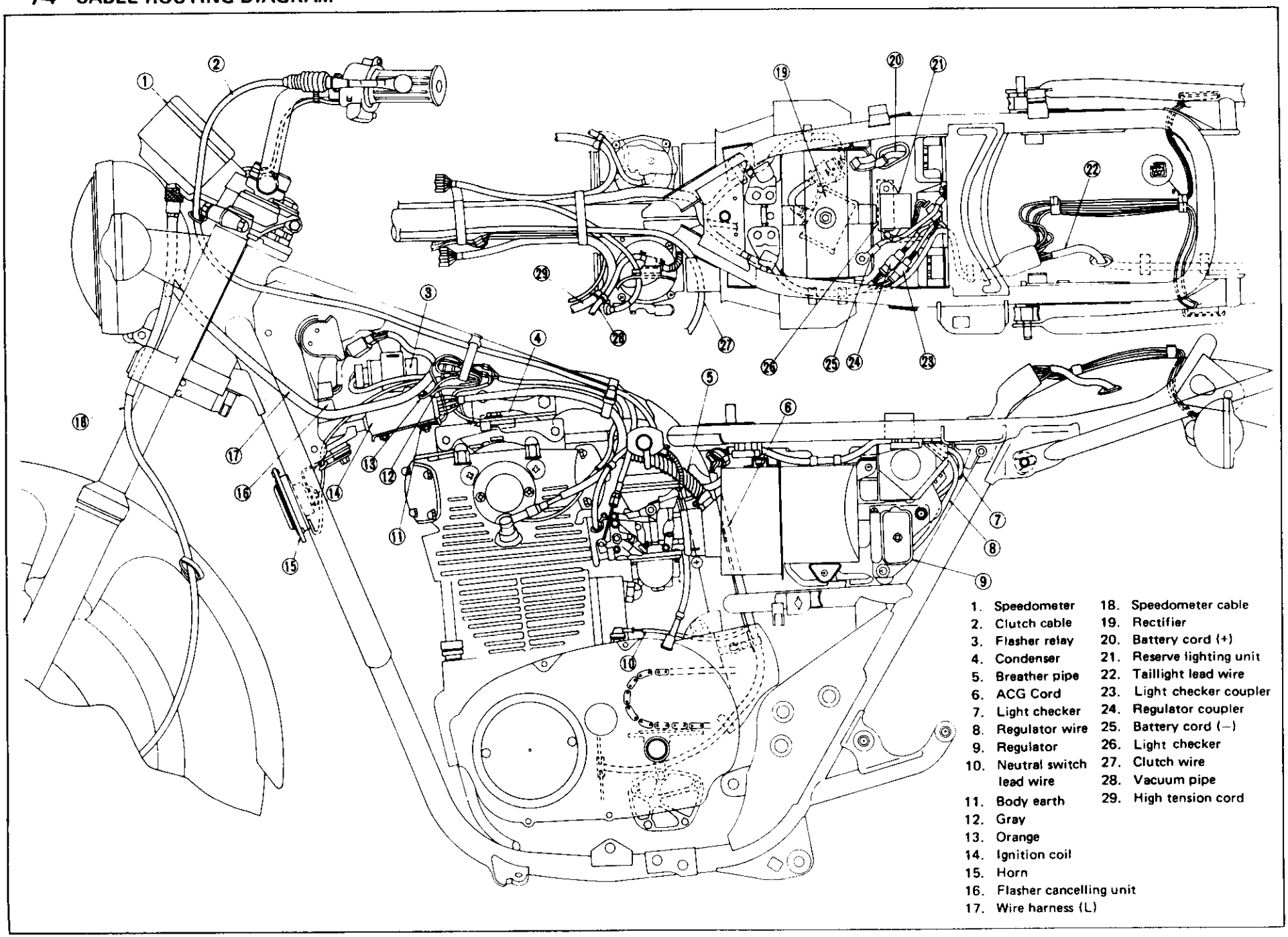
3) Rear brake (XS650-2F only)	
Type	Drum brake (Leading trailing)
Actuating method	Link rod
Brake drum I.D.	180 mm (7.09 in)
Brake shoe dia. x width	180 x 30 mm (7.09 x 1.18 in)
Lining thickness/wear limit	4 mm12 mm IO.16 in/0.08 in)
Shoe spring free length	68 mm (2.68in)

D. Electrical

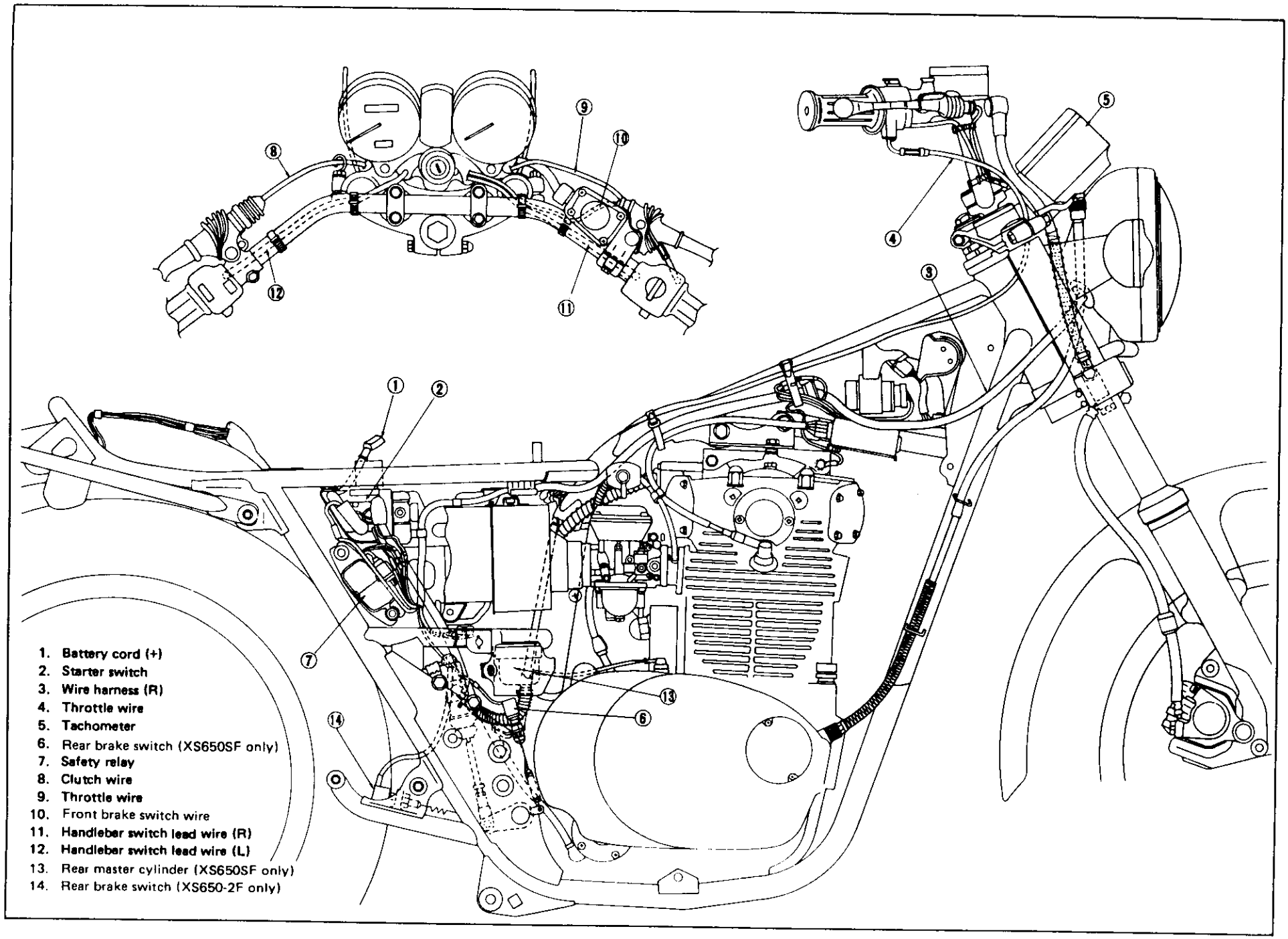
1. IGNITION SYSTEM	
1) Ignition timing (B.T.D.C.)	15°/1,200 r/min
2) Ignition coil	
Model/Manufacturer	CM11-50B/HITACHI
Spark gap	6 mm (0.24 in) or more at 500 r/min
Primary winding resistance	3.9Ω ± 10% at 20°C (68°F)
Secondary winding resistance	8.0kΩ ± 20% at 20°C (68°F)
3) Spark plug	
Type	N-7Y (CHAMPION) or BP7ES(N.G.K.)
Spark Plug gap	0.7 ~ 0.8 mm 10.027 ~ 0.031 in)
4) Contact breaker	
Manufacturer/Quantity	HITACHI/2 pcs.
Point gap	0.30 ~ 0.40 mm (0.012 ~ 0.016 in)
Point spring pressure	650 ~ 850 g 122.9 ~ 30.0 oz)
Cam closing angle	93° ± 5°
51 Condenser	
Capacity	0.22μF
Insulation resistance	10MΩ or more
Quantity	2 pcs.
2. CHARGING SYSTEM	
1) AC generator	
Charging output	14V 1 1A/2,000r/min
Rotor coil resistance (Field coil)	5.25Ω ± 10% at 20°C(68°F)
Stator coil resistance	0.46Ω ± 10% at 20°C(68°F)
Brush length	14.5 mm (0.571 in)
Brush wear limit	7.0 mm (0.276 in)
2) Rectifier	
Type	B-Element type (Full wave)
Model/Manufacturer	SB6B-17/HITACHI
Capacity	12A
Withstand voltage	4oov
31 Regulator	
Type	Tiltil type
Model/Manufacturer	TLIZ-80/HITACHI
Regulating voltage	14.5 ±0.5V
Core gap	0.6 ~ 1.0 mm (0.024 ~ 0.039 in)
Point gap	0.3 ~ 0.4 mm (0.012 ~ 0.016 in)
Voltage coil resistance	10Ω at 20°C (68°F)
5) Battery	
Model/Manufacturer/Quantity	YB14L-A2/YUASA/1 pc.
Capacity	12V. 14AH
Charging rate	1.4A 10 hours
Specific gravity	1.28 at 20°C(68°F)

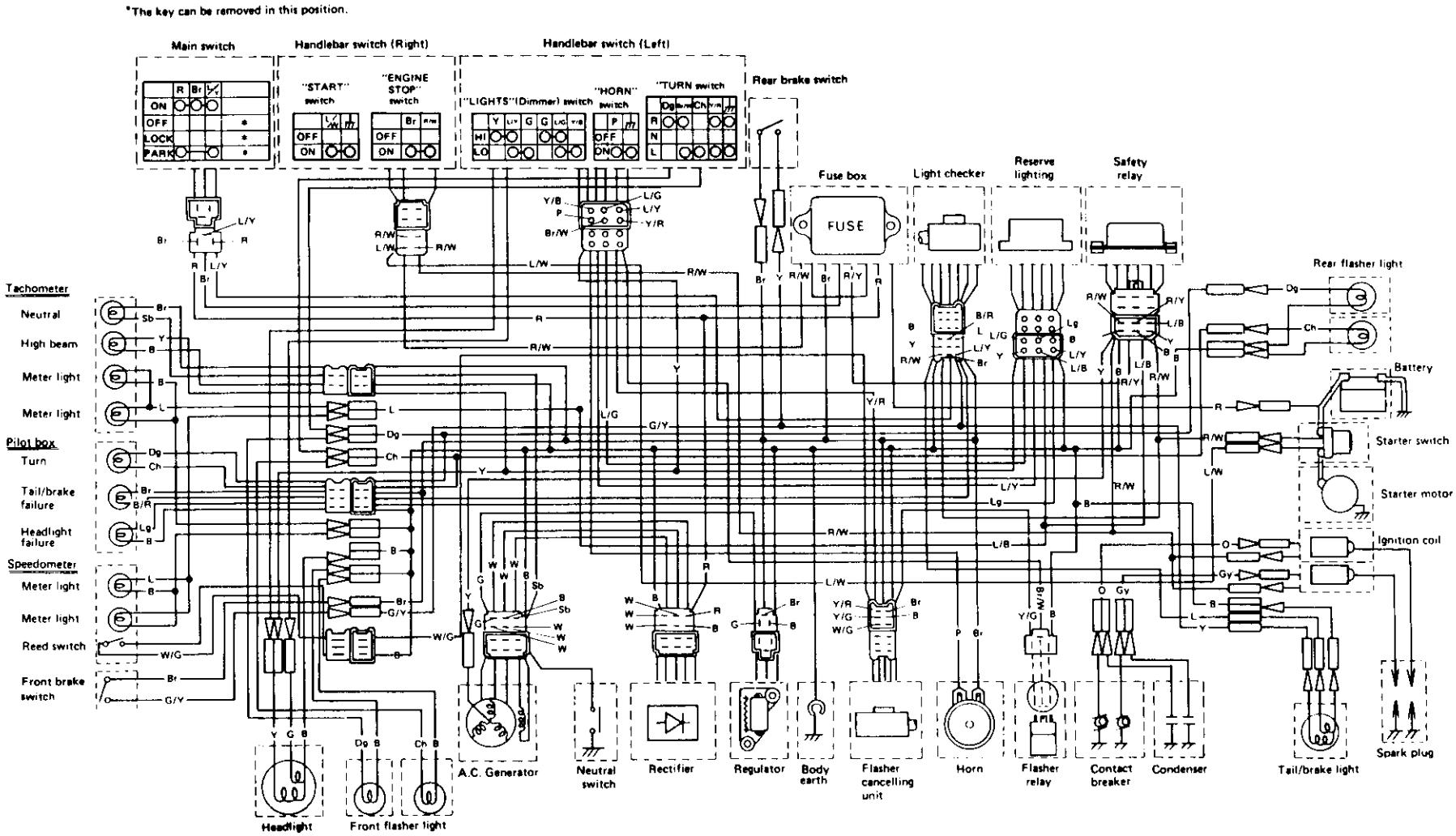
3. STARTER	
1) Starter motor	
Type	Bendix type
Manufacturer	HITACHI
Model	S108-35
output	0.5 kw
Armature coil resistance	0.0067Ω ± 10% at 20°C(68°F)
Field coil resistance	0.004Ω ± 10% at 20°C (68°F)
Brush size/Quantity	16 mm (0.63 in)/2pcs.
Wear limit	4 mm (0.16 in)
Spring pressure	800 g (28.2 oz)
Commutator O.D./Wear limit	33 mm (1.30 in)/31mm 11.22 in)
Mica undercut	0.7 mm 10.028 in)
2) Starter switch	
Manufacturer	HITACHI
Model	A104-70
Amparage rating	100A
Cut-in voltage	6.5V
Winding resistance	3.5Ω
3) Starter clip friction tension	2.2 ~ 2.5 kg (4.9 ~ 5.5 lb)
4. LIGHTING SYSTEM	
1) Headlight type	Sealed beam
2) Bulb brightness and wattage/Quantity	
Headlight	12V, 50/40W x 1 PC.
Tail/brake light	12V, 3/32 CP (8W/27W) x 1 PC
Flasher light	12V, 32 CP (27W) x 4 PCS.
Pilot lights: Turn	12V 3.4W x 1 pc.
High beam	12V, 3.4W x 1 PC.
Headlight failure	12V, 3.4W x 1 pc.
Neutral	12V, 3.4W x 1 pc.
Tail/brake failure	12V, 3.4W x 1 pc.
Meter lights	12V, 3.4W x 4 pcs.
3) Reserve lighting "nit	
Model/Manufacturer	337-11720/KOITO
4) Horn	
Model/Manufacturer	CF-12/NIKKO
Maximum amparage	2.5A
5) Flasher relay	
Type	Condenser type
Model/Manufacturer	1A0-70/NIPPON DENS0
Flasher frequency	85 ± 10 cycle/min.
Capacity	32 CP (27W) x 2 + 3.4W
6) Flasher cancelling unit	
Model	EVH-AC518
Voltage	DC9V ~ 16V
7) Fuse	
Rating/Quantity	Main (Red): 20A
8) Light checker	
Model	35200.71859
Manufacturer	KOITO

7-4 CABLE ROUTING DIAGRAM



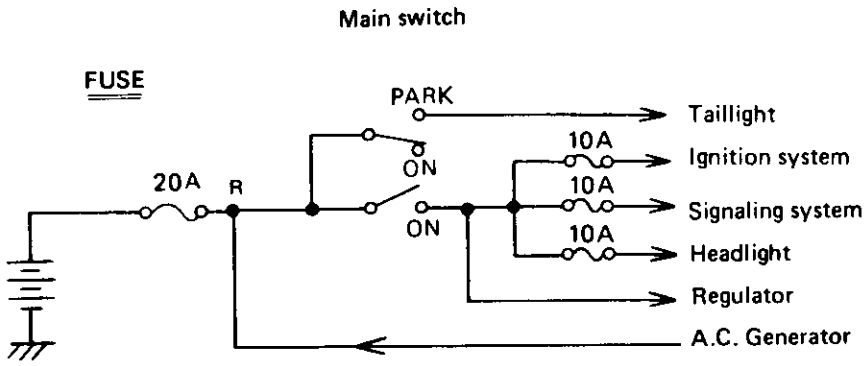
1. Speedometer
2. Clutch cable
3. Flasher relay
4. Condenser
5. Breather pipe
6. ACG Cord
7. Light checker
8. Regulator wire
9. Regulator
10. Neutral switch lead wire
11. Body earth
12. Gray
13. Orange
14. Ignition coil
15. Horn
16. Flasher cancelling unit
17. Wire harness (L)
18. Speedometer cable
19. Rectifier
20. Battery cord (+)
21. Reserve lighting unit
22. Taillight lead wire
23. Light checker coupler
24. Regulator coupler
25. Battery cord (−)
26. Light checker
27. Clutch wire
28. Vacuum pipe
29. High tension cord


1. Battery cord (+)
2. Starter switch
3. Wire harness (R)
4. Throttle wire
5. Tachometer
6. Rear brake switch (XS650SF only)
7. Safety relay
8. Clutch wire
9. Throttle wire
10. Front brake switch wire
11. Handlebar switch lead wire (R)
12. Handlebar switch lead wire (L)
13. Rear master cylinder (XS650SF only)
14. Rear brake switch (XS650-2F only)


*The key can be removed in this position.
Main switch
Handlebar switch (Right)
Handlebar switch (Left)
"START" switch
"ENGINE STOP" switch
"LIGHTS" (Dimmer) switch
"HORN" switch
"TURN" switch
Rear brake switch
Fuse box
FUSE
Light checker
Reserve lighting
Safety relay
Rear flasher light
Battery
Starter switch
Starter motor
Ignition coil
Spark plug
Tachometer
Neutral
High beam
Meter light
Meter light
Pilot box
Turn
Tail/brake failure
Headlight failure
Speedometer
Meter light
Meter light
Reed switch
Front brake switch
Headlight
Front flasher light
A.C. Generator
Neutral switch
Rectifier
Regulator
Body earth
Flasher cancelling unit
Horn
Flasher relay
Contact breaker
Condenser
Tail/brake light

COLOR CODE

R	Red	L/W	Blue/White
Br	Brown	R/W	Red/White
L	Blue	L/B	Blue/Black
Y	Yellow	L/Y	Blue/Yellow
G	Green	L/G	Blue/Green
P	Pink	Y/B	Yellow/Black
B	Black	Br/W	Brown/White
Dg	Dark green	Y/R	Yellow/Red
Ch	Chocolate	L/R	Blue/Red
Sb	Sky blue	W/B	White/Black
W	White	G/W	Green/White
Gy	Gray	W/G	White/Green
O	Orange	G/Y	Green/Yellow
Lg	Light green	Y/G	Yellow/Green
R/Y	Red/Yellow		



XS650G
XS650SG

Supplementary

12

FOREWORD

This Supplementary Service Manual has been prepared to introduce new service and new data for the XS650G/XS650SG. For complete information on service procedure, it is necessary to use this Supplementary Service Manual together with following manuals:

XS650E Service Manual (LIT-1 1616-00-76)
XS650SE Supplementary Service Manual (LIT-1 1616-01-08)
XS650SF/2F Supplementary Service Manual (LIT-1 1616-01-65)

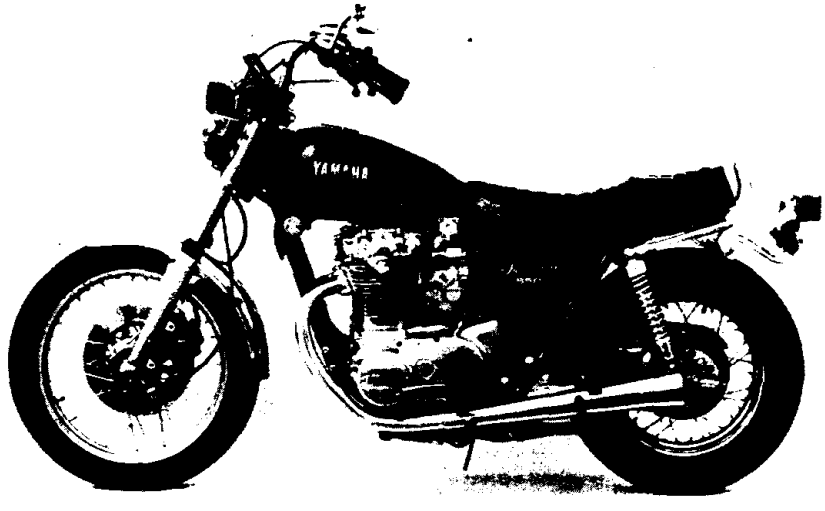
SERVICE DEPT.
INTERNATIONAL DIVISION
YAMAHA MOTOR CO., LTD.

NOTE:

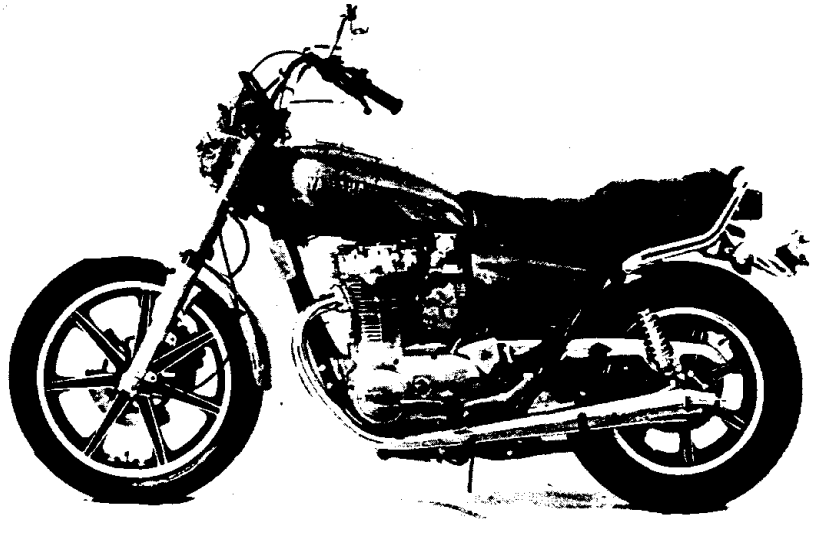
This Supplementary Service Manual contains information regarding periodic maintenance to the emission control system for the XS650G/XS650SG. Please read this material carefully.

Starting Serial Number

XS650G 3G1-000101



XS650SG 2F0-200101



MAINTENANCE AND LUBRICATION CHART

PERIODIC MAINTENANCE EMISSION CONTROL SYSTEM

NO.	ITEM	REMARKS	INITIAL BREAK-IN		THEREAFTEREVERY	
			1,000 km or 1 month (600 mi)	5,000 km or 7 months (3,000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)
1'	Cam Chain	Check and adjust chain tension.	○	0		0
2'	Valve Clearance	Check and adjust valve clearance when engine is cold.	0	0		0
3	Spark Plugs	Check condition. Adjust gap. Replace after initial 13,000 km.		○	○	Replace every 12,000 km or 18 months (7,500 mi)
4'	Crankcase Ventilation System	Check ventilation hose for cracks or damage. Replace if necessary.		0		0
5'	Fuel Hose	Check fuel hose for cracks or damage. Replace if necessary.		0		○
6'	Exhaust System	Check for leakage. Retighten as necessary. Replace gasket(s) if necessary.		0	0	
7'	Carburetor Synchronization	Adjust synchronization of carburetors.		0	0	
8'	Idle Speed	Check and adjust engine idle speed, Adjust cable free play if necessary.		0	0	

'It is recommended that these items be inspected and service by a Yamaha Dealer or other qualified mechanic.

GENERAL MAINTENANCE/LUBRICATION

NO.	ITEM	REMARKS	TYPE	INITIAL BREAK-IN		THEREAFTER EVERY		
				1,000 km or 1 month (600 mi)	5,000 km or 7 months (3,000 mi)	4,000 km or 6 months (2,500 mi)	8,000 km or 12 months (5,000 mi)	16,000 km or 24 months (10,000 mi)
1	Engine Oil	Warm-up engine before draining	Yamalube 4-cycle oil or SAE 20W/40 "SE" motor oil	Replace	Replace	Replace		
2	Oil Filter	Clean element in solvent	–		○		○	
3*	Air Filter	Dry type filter. Clean with compressed air.	–		○		○	
4*	Brake System	Adjust free play. Replace (**shoes and/or) pads if necessary.	–	○	○	○		
5'	Clutch	Adjust free play.	–	0	0	0		
6	Drive Chain	Check chain condition. Adjust and lubricate chain thoroughly.	Yamaha chain and cable lube or 10W/30 motor oil	CHECK CHAIN TENSION AND LUBE EVERY 500 km (300 mi).				
,	Control and Meter Cable	Apply cable lube thoroughly.	Yamaha chain and cable lube or 10W/30 motor oil	○	○	0		
6	Rear Arm Pivot Shaft	Apply until new grease shows.	–			0		
9	Brake Pedal and Change Pedal Shaft	Apply lightly	Yamaha chain and cable lube or 10W/30 motor oil		0	0		
10	Brake/Clutch Lever Pivot Shafts	Apply lightly	Yamaha chain and cable lube or 10W/30 motor oil		0	0		

NO.	ITEM	REMARKS	TYPE	INITIAL BREAK-IN		THEREAFTEREVERY		
				1,000 km or 1 monthior (600 mi)	5,000 km 7 months 13,000 mi)	4,000 km or 6 month!s (2,500 mi)	8,000 km or 12 months (5,000 mi)	16,000 km or 24 months (10,000 mi)
11	Center and Side Stand Pivots and Kick Crank Boss	Lubricate Apply lightly	Yamaha chain and cable lube or 10W/30 motor oil		○	0		
12*	Front Fork Oil	Drain completely. Refill to specification	Yamaha fork oil 10wt or equivalent					Replace
13*	Steering Bearings	Check bearings assembly for looseness. Moderately repack every 16,000 km (10,000 mi).	Medium weight wheel bearing grease.		○	○		Repack
14*	Wheel Bearings	Check bearings for smooth rotation.	–		○	○		
15	Battery	Check specific gravity. Check breather pipe for proper operation.	–		◐	○		
16*	A.C. Generator	Replace generator brushes. Replace at initial 9,000 km (5,500 mi)	–				Replace	

'It is recommended that these items be inspected and serviced by a Yamaha dealer or other qualified mechanic.

**XS650G only

©Yamaha Motor Corporation, U.S.A.. 1979 All rights reserved. Any reprinting or unauthorized use without the written permission of Yamaha Motor Corporation, U.S.A., is expressly prohibited.

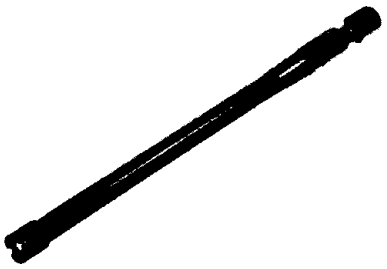
NEW SERVICE

***SPECIAL TOOL**

New special tool for XS650G/XS650SG.

"TORX" socket

P/NO. 90890-01308-00



This socket is used to tighten the pick-up coil securing bolts (special bolts) and to shear off the bolt head.

***ENGINE**

A. IGNITION TIMING CHECK

Ignition timing adjustment is required only when the pick-up coil is replaced.

1. **Connect the timing light to the left cylinder spark plug lead wire.**
2. **Start the engine and keep the engine speed as specified. Use a tachometer to check the engine speed.**

Specified engine speed: 1,200 r/min

3. **The rotor pointer should line up with the "F" stamped timing mark on the timing plate. If it does not align or steady, check the crankshaft bearing and/or woodruff key for damage.**

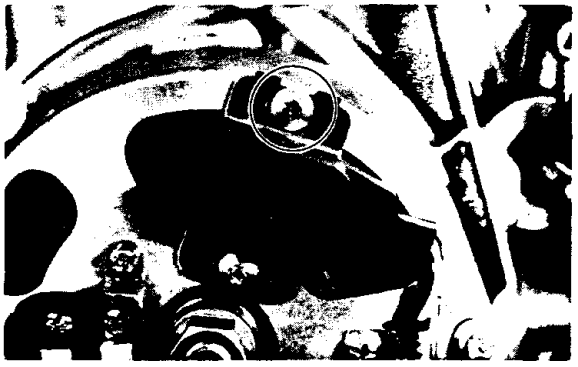
B. PICK-UP COIL ASSEMBLY

The pick-up plate assembly is permanently mounted to the stator housing with special bolts and adhesive. It is necessary to replace the A.C.G. stator assembly with a new one if the pick-up coil is damaged.

C. IGNITION TIMING ADJUSTMENT

If the A.C.G. stator assembly is replaced with a new one, the following adjustment and treatment are necessary. It is mandatory that these procedures be followed carefully and exactly as described. Failure to do so may be a violation of law.

1. **Install the A.C.G. stator assembly to the crankcase.**
2. **Set the pick-up coil assembly so that the upper bolt (special bolt) comes in the center of the oblong hole in the upper pick-up plate and lightly tighten the special bolts (upper and lower).**

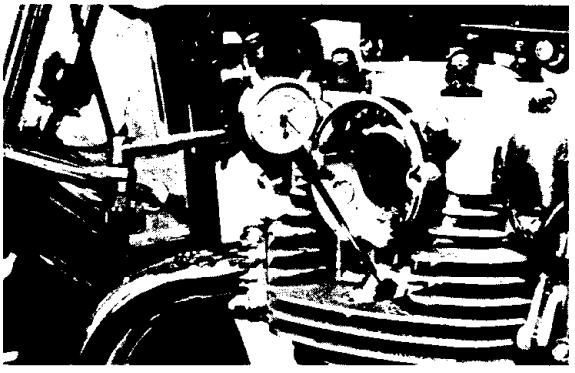


3. **Remove the breaker cover.**
4. **Install the dial gauge in the left cylinder to set the timing plate.**

NOTE:

Put the gauge needle through the plug hole as normal to the piston head as possible.

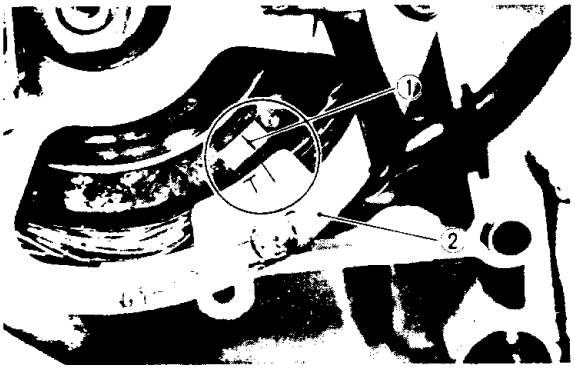
Do not let the needle contact the plug hole.



5. **Rotate the engine in a counterclockwise direction until top dead center is found.**
6. **With the engine at top dead center, loosen the screw on the timing plate and align the "T" mark on the timing plate with the rotor pointer.**

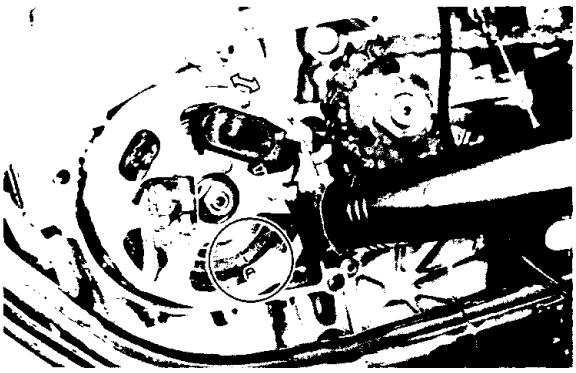
   Recheck the top dead center and alignment of the "T" mark and pointer. When all are aligned, tighten the screw.

© Yamaha Motor Corporation, U.S.A., 1979 All rights reserved. Any reprinting or unauthorized use without the written permission of Yamaha Motor Corporation, U.S.A., is expressly prohibited.

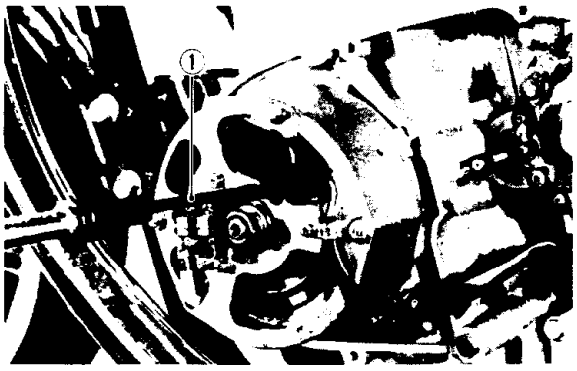


1. Rotor pointer 2. Timing plate

7. Check the ignition timing (refer to page 3).
8. If the ignition timing is incorrect, loosen the special bolts and move the pick-up plate until the "F" and pointer marks align.



9. After the ignition timing is properly adjusted, tighten the lower special bolt until the head shears off.

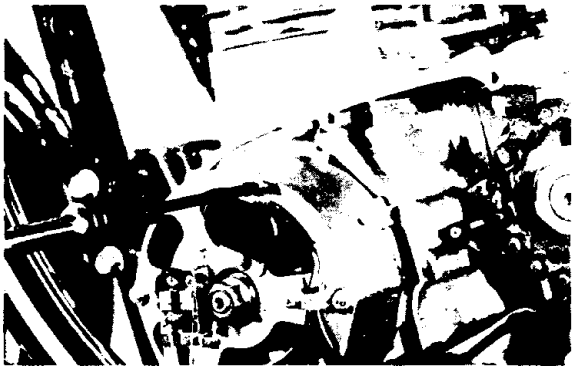


1. "TORX" socket

10. Back off the upper special bolt 3 or 4 turns and apply a liberal amount of an epoxy adhesive around the bolt thread. Retighten the bolt until the head shears off.

NOTE:

A special socket (90890-01308-00) is necessary for tightening these special bolts. The heads will shear off when the bolts have been properly torqued.



D. CARBURETOR

1. Specifications

Main jet	# 132.5
Jet needle	5HX12
Needle jet	Y-O
Starter jet	# 30
Float level	27.3 ± 0.5 mm (1.075 ± 0.020 in)
Pilot jet	# 42.5
Pilot screw	Preset
Fuel valve seat	2.0 mm (0.079 in)
Engine idle speed	1,200 r/min

2. Inspection And Correction

a. Examine the carburetor body and fuel passages. If contaminated, remove all component pieces, wash the carburetor in a petroleum-based solvent. Blow out all passages and jets with compressed air.

CAUTION:

Do not use caustic carburetor cleaning solutions.

b. Examine the condition of the floats. If the floats are damaged, they should be replaced.
c. Inspect the inlet needle valve and seat for wear or contamination. Replace these components as a set if required.
d. Inspect the vacuum piston and rubber diaphragm. If the piston is scratched or the diaphragm is torn, the assembly must be replaced.

e. Inspect the starter plunger assembly for damage. If damaged, replace.

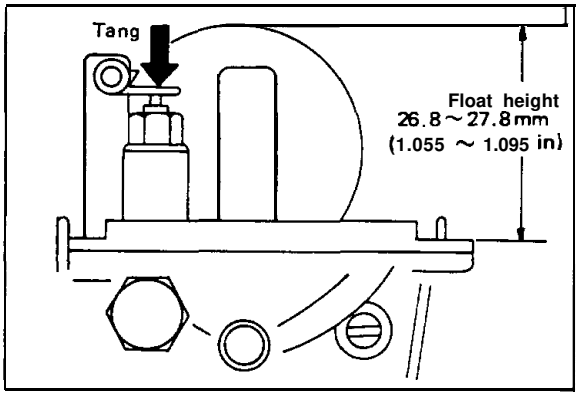


f. Float level

Hold the carburetor in an upside down position. Hold the floats so the tang is just touching the float needle. Measure the distance from the top of the float to the float bowl gasket base surface without the gasket. If the distance is out of the specification, correct the specification.

Float level: 27.3 ± 0.5 mm (1.075 ± 0.02 in)

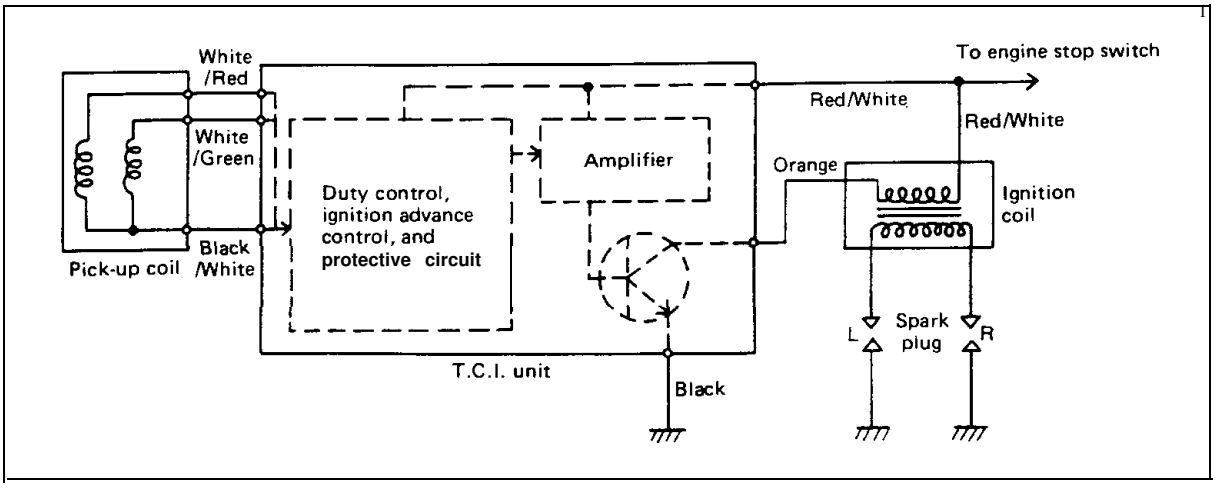
To correct, carefully bend the tang on the float arm. Both floats must be at the same height.



*ELECTRICAL

A. IGNITION SYSTEM

1. Block diagram



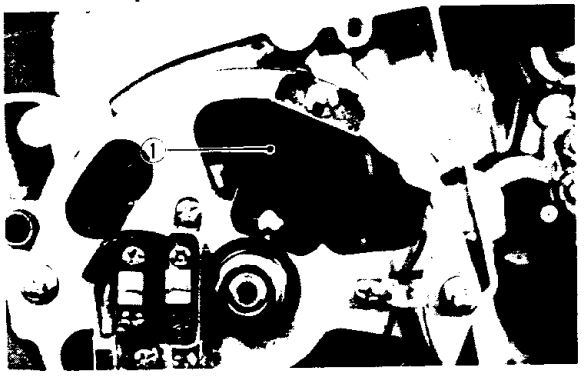
2. Description

This model is equipped with a battery operated, fully transistorized breakerless ignition system. By using magnetic pick-up coils the need for contact breaker points is eliminated. This adds to the dependability of the system by eliminating frequent cleaning and adjustment of points and ignition timing. This TCI unit incorporates an automatic advance circuit controlled by signals generated by the pick-up coils. This adds to the dependability of the system by eliminating the mechanic advancer. This TCI system consists of two main units; a pick-up unit and an ignitor unit.

3. Operation

The TCI functions on the same principle as a conventional DC ignition system with the exception of using magnetic pick-up coils and a transistor control box (TCI) in place of contact breaker points.

a. Pick-up unit

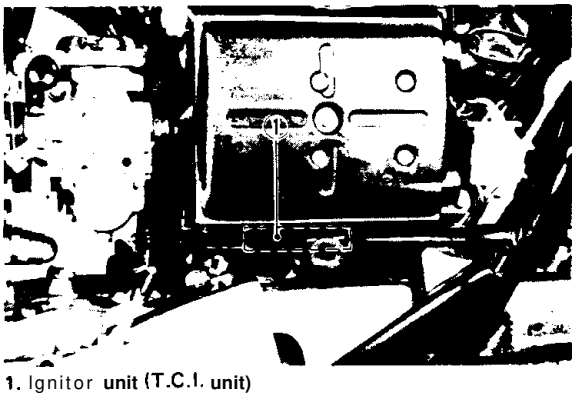


1. Pick-up unit

This unit consists of two pick-up coils mounted on the generator case and a permanent magneto on the rotor which is mounted to the crankshaft. When the magneto passes through these pickup coils, the signals are generated at the pick-up coils and forwarded to the ignitor unit as a signal.

The full ignition advance is determined by the distance (or angle) between two pick-up coils.

b. Ignitor unit



1. Ignitor unit (T.C.I. unit)

This unit has such functions of wave form, duty control, switching, and electrical ignition advance. The ignition timing is advanced electrically using two signals from the pick-up coils.

The duty control circuit is provided to control the on time period of the primary ignition current to reduce the electrical consumption. This unit also incorporates a protective circuit for the ignition coil. If the ignition switch is

turned on and the crankshaft is not turned, the protective circuit stops current flow to the primary coil within a few seconds. When the crankshaft is turned over, the current is turned on again by the signals generated by the pick-up coils.

NOTE:

Even though two spark plugs fire at the same time only one cylinder is on the compression stroke at a time. The other cylinder is on the exhaust stroke and the spark in that cylinder has no effect.

-CAUTION:

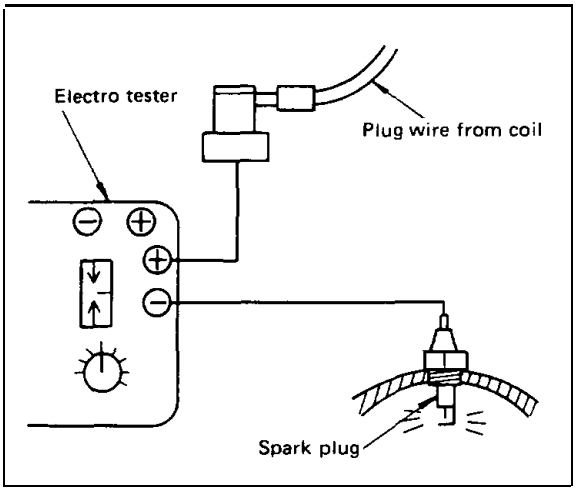
Do not run the engine without any spark plug cap(s) in place. Due to the high secondary voltage, it is possible to damage the internal insulation of the secondary coil.

4. Troubleshooting/Inspection

a. The entire ignition system can be checked for misfire and weak spark using the Electro Tester. If the ignition system will fire across a sufficient gap, the engine ignition system can be considered good. If not, proceed with individual component tests until the problem is found.

1) Warm up engine thoroughly so that all electrical components are at operating temperature.

2) Stop the engine and connect the tester as shown.

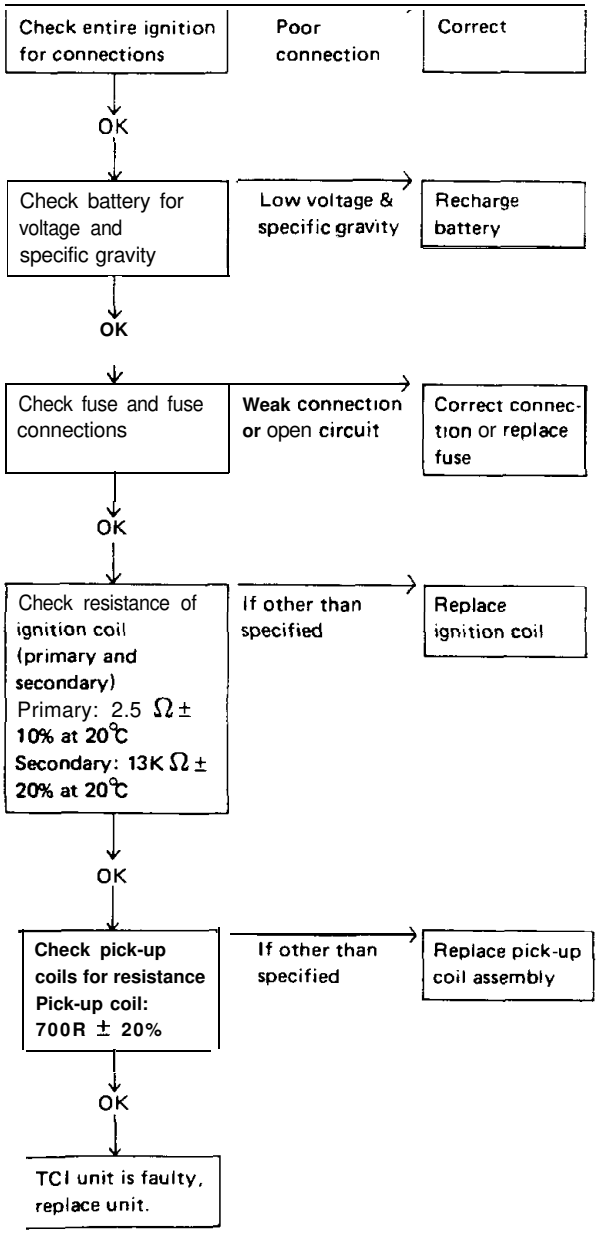


3) Start the engine and increase the spark gap until misfire occurs. (Test at various rpm between idle and red line.)

Minimum spark gap: 6 mm (0.24 in)

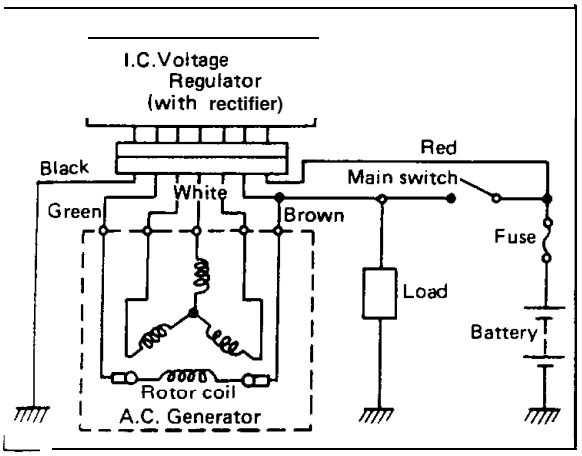
Do not run engine in neutral above 6,000 r/min for more than 1 or 2 seconds.

b. If the ignition system should become inoperative, the following troubleshooting aids will be useful.



B. CHARGING SYSTEM

1. Block Diagram

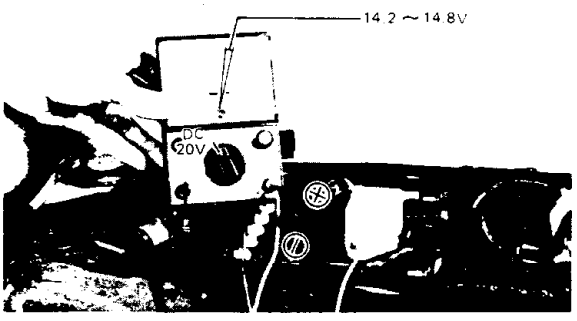


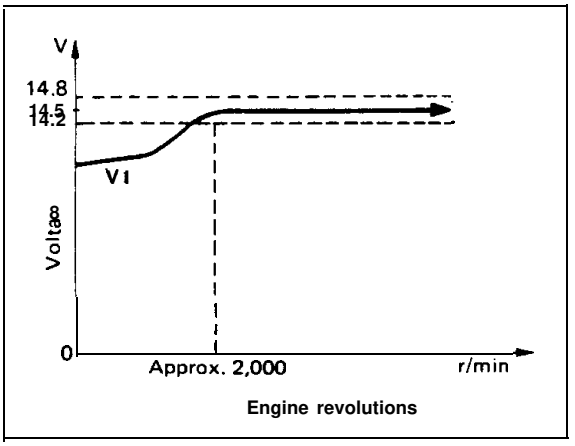
2. A.C. Generator/Voltage Regulator

a. Output voltage check

1) Remove the seat and left side cover.
2) Connect a D.C. voltmeter to the battery terminals and start the engine.
3) Accelerate the engine to approximately 2,000 r/min or more and check the generated voltage.

Generated voltage: 14.2 ~14.8V





NOTE:

Remove the headlight fuse (I0A) in the fuse box so that the headlight does not turn on when the engine is started. Do not turn on the signals.

4) If the indicated voltage cannot reach the specification, then perform the following tests.

- CAUTION:

Never disconnect the wires from the battery while the generator is in operation. If the battery is disconnected, the voltage across the generator terminals will increase, damaging the semiconductors.

b. Brush

Check the brush length. Replace brush if at, or near, limits. Check the brush spring pressure by comparing it with a new spring. Replace the old spring if it is weak.

Minimum brush length: 7 mm (0.28 in)

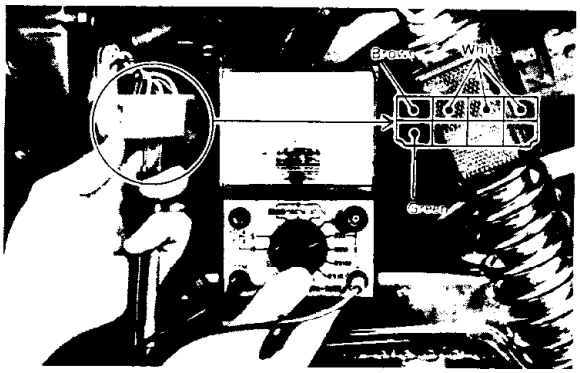


c. Rotor coil/Stator coil

Check the resistance between terminals using the Yamaha Pocket Tester or other circuit tester as shown. If resistance is out of specification, check the coil connections. If the coil connections are good, then the coil is broken inside and it should be replaced.

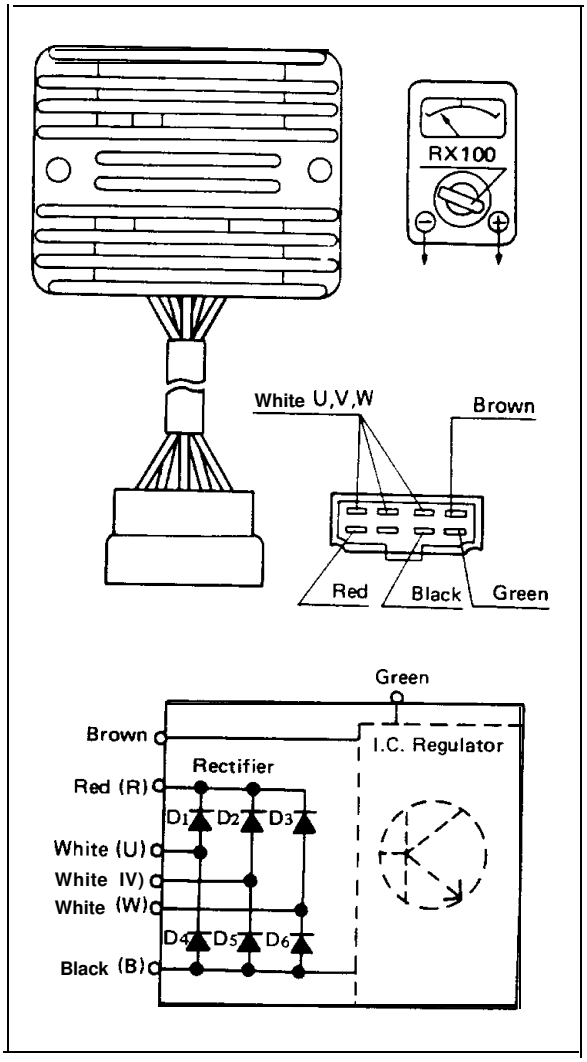
Rotor coil resistance (Green-Brown):
5.3Ω ± 10% at 20°C (68°F)
Stator coil resistance (White-White):
0.46Ω ± 10% at 20°C (68°F)

All three stator windings must be checked. Also test between each terminal and ground. A reading other than infinity indicates an improper ground which must be corrected.



d. Silicon rectifier

Check the silicon rectifiers as specified using the Yamaha Pocket Tester or other circuit tester. Even if only one of the elements is broken, replace the voltage regulator assembly.



Checking element	Tester lead connecting point (+) (red)	Tester lead connecting point (−) (black)	Good	Replace (element shorted)	Replace (element opened)
D1	R	U	○	○	x
	U	R	x	○	x
D2	R	V	○	○	x
	V	R	x	○	x
D3	R	W	○	○	x
	W	R	x	○	x
D4	U	B	○	○	x
	B	U	x	○	x
D5	V	B	○	○	x
	B	V	x	○	x
D6	W	B	○	○	x
	B	W	x	○	x

○ : Continuity
x : Discontinuity (∞)

-CAUTION:

The silicon rectifier can be damaged if subjected to overcharging. Special care should be taken to avoid a short circuit and/or incorrect connection of the positive and negative leads at the battery. Never connect the rectifier directly to the battery to make a continuity check.

e. If the above inspection reveals that the regulator is faulty, it cannot be adjusted and must be replaced.

● SPECI FICATION

A. General

*XS650SG only **XS650G only

1. MODEL	
1) Model (I.B.M. No.)	XS650SG (3G1)/ XS650G (3GO)
2) Basic color	'CARDINAL RED or NEW YAMAHA BLACK "BLACK GOLD
2. DIMENSION	
1) Overall length	2,120 mm (83.5 in)
2) Overall width	925 mm 136.4 in)
3) Overall height	'1,225 mm (48.2 in) **1,220 mm (48.0 in)
4) Seat height	790 mm (31.1 in)
5) Wheelbase	1,435 mm (56.5 in)
6) Minimum ground clearance	135 mm (5.3 in)
3. WEIGHT	
1) Net weight (Dry)	'210 kg (463 lb) "205 kg (452 lb)
4. PERFORMANCE	
1) Climbing ability	26°
2) Minimum turning radius	2,500 mm (98.4 in)

B. Engine

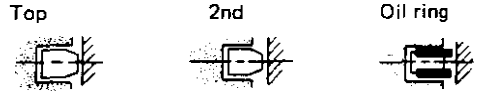
1. DESCRIPTION	
1) Engine type	Air cooled. 4-stroke, SOHC twin, parallel forward incline
2) Engine model	2FO
3) Displacement	653 cc (39.85 cu.in)
4) Bore x stroke	75 x 74 mm (2.953 x 2.913 in)
5) Compression ratio	8.7 : 1
6) Starting system	Kick and electric starter
7) Ignition system	Battery ignition (Full transistor ignition)
8) Lubrication system	Wet rump
2. CYLINDER HEAD	
1) Combustion chamber volume (with N-7Y)	42.5 cc (2.59 cu.in)
2) Combustion chamber type	Dome + Squish
3) Head gasket thickness	1.2 mm (0.047 in)
3. CYLINDER	
1) Material	Aluminum alloy with cast iron sleeve
2) Bore size	$75.00^{+0.02}_{0}$ mm (2.9528 $^{+0.008}_{0}$ in)
3) Taper limit	0.05 mm (0.002 in)
4) Out of round limit	0.01 mm (0.0004 in)

4. PISTON

1) Piston skin clearance		0.050 ~ 0.055 mm (0.0020 ~ 0.0022 in)
2) Piston oversize		75.25 mm (2.963 in) / 75.50 mm (2.972 in) / 75.75 mm (2.982 in) / 76.00 mm (2.992 in)
3) Piston Pin outside diameter x length		$20.0^{0}_{-0.005}$ mm x $61.0^{0}_{-0.3}$ mm ($0.79^{0}_{-0.0002}$ in x $2.40^{0}_{-0.0116}$ in)

5. PISTON RING

1) Piston ring design



1.2 mm(0.047 in) 1.5 mm (0.059 in) 2.8 mm (0.110 ir

2) Ring end gap	(Installed, top)	0.2~0.4 mm (0.008-0.016 in)
	/Installed. 2nd)	0.2-0.4 mm (0.008~0.016 in)
	(Installed, oil)	0.3-0.9 mm (0.012~0.035 in)
3) Ring groove side clearance	(Top)	0.04 ~0.08 mm (0.0016 ~0.0031 in)
	(2nd)	0.03 ~0.07 mm (0.0012~0.0028 in)

6. BIG END BEARING

1) Type	Needle bearing
2) Bearing size	ϕ 26 x ϕ 34 x 19.8
3) Needle size	ϕ 4 x ϕ 15.8 x 13

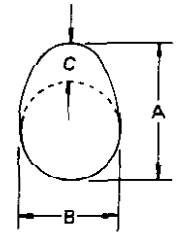
7. CAMSHAFT

1) Cam drive type	Chain (Center side)
2) Number and type of bearing	4 bearings, Ball bearings (6005)
3) Bearing type	ϕ 25- ϕ 47-8
4) Cam dimensions	

	Cam height "A"	Limit	Base circle "B"	Limit	Lift "C"
IN	39.99 ± 0.05 mm (1.574 ± 0.002 in)	39.84 mm (1.569 in)	32.24 ± 0.05 mm (1.269 ± 0.002 in)	32.09 mm (1.263 in)	7.99 mm (0.315 in)
EX	40.03 ± 0.05 mm (1.576 ± 0.002 in)	39.88 mm (1.570 in)	32.30 ± 0.05 mm (1.272 ± 0.002 in)	32.15 mm (1.266 in)	8.03 mm (0.316 in)

5) Valve timing

	OPEN	CLOSE	DURATION	OVERLAP
IN	BTDC 35°	ABDC 69°	284°	72°
EX	BBDC 67°	ATDC 37°	284°	

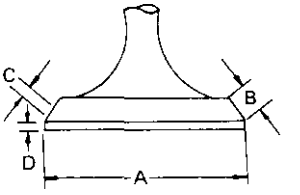


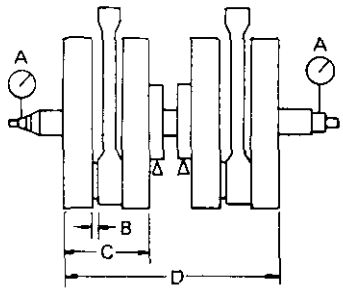
6) Camshaft deflection limit	0.03 mm (0.0012 in)
7) Cam chain	
Type	TSUBAKIMOTO BF05M
Number of links	106L
Sprocket ratio	36/18 (2.000)

8. ROCKERARMANO ROCKETSHAFT

1) Rocker arm inner diameter	$15.0^{+0.018}_{0}$ mm ($0.591^{+0.0007}_{0}$ in)
2) Rocker arm shaft diameter	$15.0^{-0.009}_{-0.015}$ mm $10.591^{-0.00035}_{-0.00059}$ in)
31 Clearance	0.009 -0.033 mm (0.00035~0.00130 in)
41 Lift ratio	X : Y = 40 : 48.41 mm (1.575 : 1.906 in)

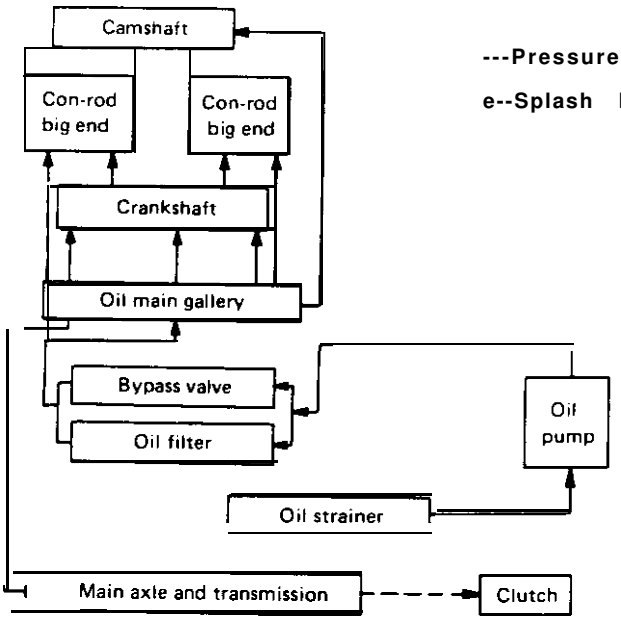
9. VALVE, VALVE SEAT AND VALVE GUIDE	
1) Valve per cylinder	2 PCS.
2) Valve clearance (In cold engine)	IN: 0.06 mm (0.0024 in) EX: 0.15 mm IO.0059 in)
3) Dimensions	
Valve head diameter "A"	IN: 41 mm (1.614 in) EX: 35 mm (1.378 in)
Valve face width "B"	IN: 2.1 mm (0.083 in) EX: 2.1 mm (0.083 in)
Valve seat width "C"	IN: 1.3 mm (0.051 in) EX: 1.3 mm 10.051 in)
Valve margin thickness "D"	IN: 1.3 mm (0.051 in) EX: 1.3 mm (0.051 in)
Valve stem diameter	IN: $8.0^{0}_{-0.015}$ mm $10.315^{0}_{-0.0010}$ in) EX: $8.0^{-0.025}_{-0.040}$ mm $(0.315^{-0.0010}_{-0.0016}$ in)
Valve guide diameter	IN: $8.0^{+0.019}_{+0.010}$ mm $(0.315^{+0.0007}_{+0.0004}$ in) EX: $8.0^{+0.019}_{+0.010}$ mm $(0.315^{+0.0007}_{+0.0004}$ in)
Valve stem to guide clearance	IN: 0.010-0.034 mm (0.00079~ 0.00173 in) EX: 0.035~ 0.059 mm (0.00138 ~ 0.00232 in)
4) Valve face runout limit	IN & EX: 0.03 mm 10.0012 in)or less
10. VALVE SPRING	
1) Free length	INNER (IN/EX): 42 mm (1.654 in) OUTER(IN/EX): 42.55 mm (1.675 in)
2) Spring rate	INNER (IN/EX): k_1 = 1.43 kg/mm (80.1lb/in) k_2 = 1.81 kg/mm (101.4 lb/in) OUTER(IN/EX): k_1 = 3.2 kg/mm (179.2 lb/in) k_2 = 4.18 kg/mm (234.1 lb/in)
3) Installed length (Valve closed)	INNER (IN/EX): 35 mm 11.378 in) OUTER(IN/EX): 37 mm 11.457 in)
4) Installed pressure (Valve closed)	INNER (IN/EX): 10 ± 0.7 kg (22.0 ± 1.5 lb) OUTER(IN/EX): 17.7 ± 1.25 kg (39.0 ± 2.8 lb)
5) Compressed length (Valve open)	INNER (IN/EX): '25.5 mm 11.004 in) OUTER(IN/EX): 27.5 mm (1.083 in)
6) Compressed pressure (Valve open)	INNER (IN/EX): 27.2 il.9 kg (60.0 ± 4.2 lb) OUTER(IN/EX): 57.4 ± 4.0 kg (126.5 ± 8.8 lb)
7) Wire diameter	INNER (IN/EX): 2.9 mm (0.114 in) OUTER(IN/EX): 4.2 mm (0.165 in)
8) Winding O.D.	INNER (IN/EX): 19.4 mm (0.764 in) OUTER(IN/EX): 32.6 mm (1.283 in)
9) Number of windings	INNER (IN/EX): 6.0 turns OUTER(IN/EX): 4.25 turns



11. CRANKSHAFT 	
1) Crankshaft deflection limit (A)	0.05 mm 10.002 in)
2) Con-rod large end clearance (B)	0.15~ 0.4 mm (0.0059~ 0.0157 in)
3) Width of crankshaft (C)	$66^{-0.05}_{-0.10}$ mm ($2.598^{-0.002}_{-0.004}$ in)
(D)	$186^{0}_{-0.3}$ mm ($7.323^{0}_{-0.012}$ in)
4) Crank pin I.D.	$26^{-0.077}_{-0.095}$ mm ($1.024^{-0.003}_{-0.004}$ in)
5) Crank pin O.D. x length	$26^{0}_{-0.006}$ x 65 $^{+0.1}_{-0.2}$ mm ($1.024^{0}_{-0.0002}$ x $2.559^{+0.004}_{-0.008}$ in)
12. CONNECTING ROD	
1) Big end I.D.	$34^{+0.016}_{0}$mm ($1.339^{+0.0006}_{0}$ in)
2) Small end I.D.	$20^{+0.028}_{+0.015}$ mm (0.787 $^{+0.0011}_{+0.0006}$in)
13. CRANK BEARING	
1) Type Right end	ϕ 30-ϕ78-19 (Ball bearing)
Others	ϕ 32-ϕ68-17(Rollar bearing)
2) Oil seal type	SD-25-40-9
14. CLUTCH	
1) Clutch type	Wet, multiple type
2) Clutch operating mechanism	Inner push type, screw push system
31 Primary reduction ratio and method	72/27(2.666), spar gear
4) Primary reduction gear back lash (4 teeth)	$21.45^{0}_{-0.025}$ mm ($0.8445^{0}_{-0.00010}$ in)
5) Friction plate	
Thickness/Quantity	3 mm (0.118 in)/7pcs.
Wear limit	2.7 mm (0.106 in)
6) Clutch plate	
Thickness/Quantity	1.4 mm (0.055 in)/6 pa.
Warp limit	0.05 mm (0.002 in)
7) Clutch spring	
Free length/Quantity	34.6 mm II.362 in)/6 pcs.
8) Clutch housing radial play	0.027-0.081 mm (0.0011~ 0.0032 in)
9) Push rod bending limit	0.2 mm 10.008 in)
15. TRANSMISSION	
1) Type	Constant mesh, 5-speed forward
2) Gear ratio: 1st	32/13 12.461)
2nd	27/17 (1.588)
3rd	26/20(1.300)
4th	23/21 (1.095)
5th	22/23 (0.956)

3) Bearing: Main axle (Left)	Needle bearing (φ20-φ30-20)
(Right)	Ball bearing (φ25-φ52-20.6)
Drive axle (Left)	Ball bearing (φ30-φ62-23.8)
(Right)	Needle bearing (φ20-φ30-16)
41 Oil seal type Drive axle (Left)	SDD-40-62-9
5) Secondary reduction ratio and method	34/17 (2.000)/Chain
16. SHIFTING MECHANISM	
1) Type	Cam drum, return type
2) Oil seal type (Change lever)	SDO-14-24-6
17. KICK STARTER	
1) Type	Bendix type
2) Oil seal type (Kick axle)	SD-25-35-7
3) Kick clip friction tension	1.2 ~ 1.7 kg (2.6 ~ 3.7 lb)
18. INTAKE	
1) Air cleaner: Type/Quantity	Dry. foam rubber/2pcs.
2) Cleaner cleaning interval	Every 8,000 km 15.000 mile)
19. CARBURETOR	
1) Type and manufacturer/Quantity	BS34 MIKUNI/2 pcs.
2) I.D. mark	3G1-00
3) Main jet (M.J.)	#132.5
4) Air jet (A.J.)	#85
5) Jet needle (J.N.)	5HX12
6) Needle jet (N.J.)	Y-0
7) Throttle valve (Th.V)	#135
8) Pilot jet (P.J.)	#42.5
9) Pilot screw (Turns out) (P.S.)	Preset
10) starter jet (G.S.)	#30
11) Fuel level (F.L.)	27.3 ± 0.5 mm 11.075 ± 0.020 in)
12) Idling engine speed	1,200 r/min
20. LUBRICATION	
1) Engine rump oil quantity	Oil exchange: 2.0 lit 12.1 US qt)
	Overhaul: 2.5 lit (2.6 US qt)
2) Oil type and grade	Yamalube 4-cycle oil or SAE 20W/40 type
	"SE" motor oil
3) Oil pump type	Trochoid pump
4) Trochoid pump specifications	
Top clearance	0.10~ 0.18 mm (0.0039~ 0.0071 in)
Tip clearance	0.03~ 0.09 mm (0.0012~ 0.0035 in)
Side clearance	0.03~ 0.08 mm (0.0012 ~ 0.0031 in)
Oil pump volume	1.3 lit/min (1.37 qt/min) at 1,000 r/min
5) Bypass valve setting pressure	1.0 kg/cm^2 (14 psi)

6) Lubrication chart



C. Chassis

1 FRAME	
1) Frame design	Double cradle, high tensile frame
2. STEERING SYSTEM	
1) caster	27°
2) Trail	115 mm 14.53 in)
31 Number and size of balls in steering head	
Upper race	19 pcs. 114 in
Lower race	19 pcs.1/4 in
4) Steering lock to lock	42° each (L and R)
3. FRONT SUSPENSION	
1) Type	Telescopic fork
21 Damper type	Oil damper, coil spring
3) Front fork spring	
Free length	482 mm (16.96 in)
Wire diameter x winding diameter	4 x 24.5 mm (0.157 x 0.965 in)
Spring constant	k1 = 0.46 kg/mm (26.88 lb/in)/ 0 ~ 100 mm (0 ~ 3.94 in)
	k2 = 0.65 kg/mm 136.40 lb/in)/ 100 ~ 150 mm (3.94-5.91 in)
4) Front fork travel	150 mm (5.906 in)
5) Inner tube O.D.	35 mm (1.378 in)
6) Front fork oil quantity and type	169 cc 15.72 oz) each leg Yamaha fork oil 10wt or equivalent
7) Distance from the top of inner tube oil level without spring	Approx. 454 mm (17.9 in)
4. REAR SUSPENSION	
1) Type	Swing arm
2) Damper type	Oil damper, coil spring
3) Shock absorber travel	80 mm (3.15 in)

4) Shock absorber spring	
Free length	226 mm (8.90 in)
Wire diameter x winding diameter	7.5 x 60.5 mm 10.295 x 2.382 in)
Spring constant	k_1 = 1.714 kg/mm 196.0 lb/in)/ O-45 mm (0~ 1.77 in)
	k_2 = 2.244 kg/mm (125.7 lb/in)/ 45~ 80 mm (1.77 ~ 3.15 in)
5) Swing arm free play (Limit)	1 mm (0.04 in)
6) Pivot shaft -Outside diameter	16 mm (0.63 in)
5. FUEL TANK	
1) Capacity	11.5 lit (3.04 US gall
2) Reserve capacity	2.3 lit (0.61 US gall
3) Fuel grade	Regular gasoline
6. WHEEL	
1) Type (Front and rear)	*Cast wheel **Spoke wheel
2) Tire size (Front)	3.50S19-4PR "Tubeless tire **Tube-type tire
(Rear)	130/90S16-4PR *Tubeless tire "Tube-type tire
3) Tire pressure:	
Up to 90 kg (198 lb) load"*'	Front: 1.6 kg/cm² 122 psi)
	Rear: 2.0 kg/cm² (28 psi)
90 kg (198 lb) load-206 kg (453 lb) load"' (Maximum load)	Front: 2.0 kg/cm² (28 psi)
	Rear: 2.3 kg/cm² (32 psi)
High speed riding	Front: 2.0 kg/cm² (28 psi)
	Rear: 2.3 kg/cm² (32 psi)
4) Rim run out limit (Front and rear)	
Vertical	2 mm (0.08 in)
Lateral	2 mm (0.08 in)
51 Rim size (Front)	*MT1.85 x 19 **1.85 x 19
(Rear)	'MT3.00 x 16 '"2.75 x 16
6) Bearing type	
Front wheel (Left)	*6302ZZ ""86303
(Right)	'63022 **B6303RS
Rear wheel (Left)	63042
(Right)	63052
7) Oil seal type	
Front wheel (Left)	SDD-45-56-6
(Right)	SD-22-42-7
Rear wheel (Left)	SD-35-62-9
(Right)	SO-27.52-5
8) Secondary drive chain type	
Type	50HDS
Number of links	103L + Joint
Chain pitch	15.875 mm (5/8in)
Chain free play	20 ~ 30 mm (0.8 ~ 1.2 in)

*: XS650SG
**: XS650G
***: Total weight of accessories, etc., excepting motorcycle.

7. BRAKE	
1) Front brake	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	298 x 7.0 mm (11.73 x 0.28 in)
Disc wear limit	6.5 mm (0.26 in)
Disc pad thickness	11 .O mm (0.43 in)
Pad wear limit	6.0 mm IO.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm (1.50 in)
Brake flaid type / quantity	DOT =3 Brake fluid / 38.1 cc (1.29 oz)
2) Rear brake (XS650SG only)	
Type	Hydraulic disc type
Disc size (Outside dia. x thickness)	267 x 7.0 mm (10.5 x 0.28 in)
Disc wear limit	6.5 mm (0.26 in)
Disc pad thickness	11 .0 mm (0.43 in)
Pad wear limit	6.0 mm 10.24 in)
Master cylinder inside dia.	14.0 mm (0.55 in)
Caliper cylinder inside dia.	38.1 mm 11.50 in)
Brake fluid type/quantity	DOT =3 Brake fluid / 38.1 cc (1.29 oz)
3) Rear brake (XS650G only)	
Type	Drum brake (Leading trailing)
Actuating method	Link rod
Brake drum I.D.	180 mm (7.09 in)
Brake shoe dia. x width	180 x 30 mm (7.09 x 1.18 in)
Lining thickness I wear limit	4 mm/2 mm (0.16 in/0.08 in)
Shoe spring free length	68 mm (2.68 in)

D. Electrical

1. IGNITION SYSTEM	
1) Ignition timing (B.T.D.C.)	15°/1,200 r/min
2) Ignition coil	
Model/Manufacturer	CM12-08A/HITACHI
Spark gap	6 mm 10.24 in) or more at 500 r/min
Primary winding resistance	2.5Ω ± 10% at 20°C (68°F)
Secondary winding resistance	13kΩ ± 20% at 20°C(68°F)
3) Spark plug	
Type	N-7Y (CHAMPION) or BP7ES(N.G.K.)
Spark plug gap	0.7 ~ 0.8 mm (0.027-0.031 in)
2. CHARGING SYSTEM	
1) A.C. generator	
Charging output	14V 16A/5,000 r/min
Rotor coil resistance (Field coil)	5.25Ω ± 10% at 20°C(68°F)
Stator coil resistance	0.46Ω ± 10% at 20°C (68°F)
Brush length	14.5 mm (0.571 in)
Brush wear limit	7.0 mm (0.276 in)
2) Regulator	
Type	I.C. type
Model/Manufacturer	S8515/TOSHIBA
Regulating voltage	14.5 ±0.3V
3) Battery	
Model/Manufacturer/Quantity	YB14L-A2/YUASA/1 pc.
Capacity	12V. 14AH
Charging rate	1.4A 10 hours
Specific gravity	1.28 at 20°C(68°F)

3. STARTER	
1) Starter motor	
Type	Bendix type
Manufacturer/Model	HITACHI/S108-35
Output	0.5 kw
Armature coil resistance	0.0067Ω ± 10% at 20°C (68°F)
Field coil resistance	0.0040 ±10% at 20°C (68°F)
Brush size/Quantity	16 mm (0.63 in)/2 pcs.
Wear limit	4 mm (0.16 in)
Spring pressure	800 g (28.2 oz)
Commutator O.D./Wear limit	33mm (1.30 in)/30 mm (1.18 in)
Mica undercut	0.7 mm IO.028 in)
2) Starter switch	
Manufacturer	HITACHI
Model	A10470
Amperage rating	100A
Cut-in voltage	6.5V
Winding resistance	3.552
3) Starter clip friction tension	2.2 ~ 2.5 kg (4.9 ~ 5.5 lb)
4. LIGHTING SYSTEM	
1) Headlight type	Sealed beam
2) Bulb brightness and wattage/Quantity	
Headlight	12V, 50/40W x 1 pc.
Tail/Brake light	12V, 3/32 CP (8W/27W) x 1pc.
Flasher light	12V, 32 CP (27W) x 4 pcs.
* License light	12V, 3.8W x 2 pcs.
Pilot lights: Turn	12v. 3.4W x 1 pc.
High beam	12V, 3.4W x 1 pc.
Headlight failure	12V, 3.4W x 1 pc.
Neutral	12V, 3.4W x 1 pc.
**Tail/brake failure	12V, 3.4W x 1 pc.
Meter lights	12V, 3.4W x 4 pcs.
3) Reserve lighting unit	
Model/Manufacturer	337-11720/KOITO
4) Horn	
Model/Manufacturer	CF-12/NIKKO
Maximum amperage	2.5 ±0.5A
5) Flasher relay	
Type	Condenser type
Model/Manufacturer	061300-04810/NIPPON DENS0
Flasher frequency	85 ± 10 cycle/min.
Capacity	32 CP (27W) x 2 + 3.4W
6) Flasher cancelling unit	
Model	EVH-AC518
Voltage	DC9V ~ 16V
7) Fuse	
Rating/Quantity:	
Main	20A x 1 PC.
Head light	10A x 1 pc.
Signal	10A x 1 pc.
Ignition	10A x 1 pc.

* XS650SG only.

** : XS650G only.

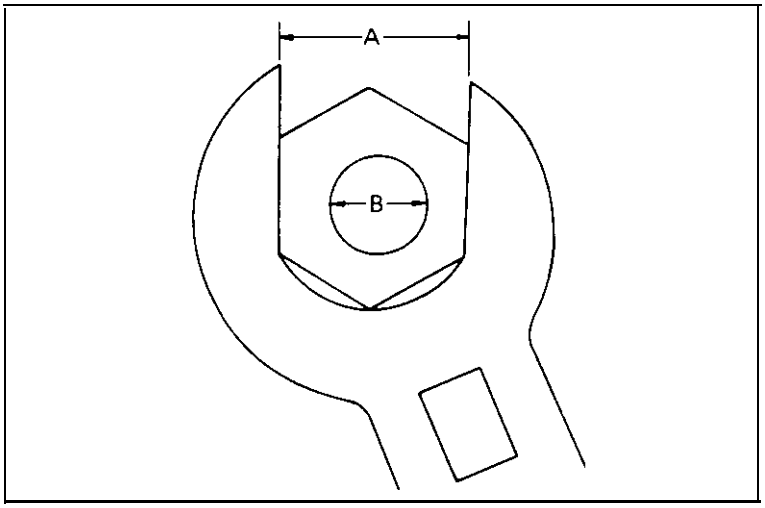
Torque Specifications

Part to be tightened	Thread dia. and part name	Tightening torque
Engine:		
Cylinder head and cylinder head cover	10 mm nut 8 mm bolt	3.7 m-kg (27.0 ft-lb) 2.1 m-kg (15.0 ft-lb)
Cylinder head	6 mm bolt	0.9 m-kg (6.5 ft-lb)
Cylinder head cover side	6 mm crown nut 8 mm crown nut	0.9 m-kg (6.5 ft-lb) 1.3 m-kg (9.5 ft-lb)
Spark plug	14 mm	2.0 m-kg (14.5 ft-lb)
Generator	12 mm nut	3.8 m-kg (27.5 ft-lb)
Stator coil	6 mm pan head screw	0.9 m-kg (6.5 ft-lb)
Governer	6 mm bolt	0.8 m-kg (6.0 ft-lb)
Valve clearance adjustment nut	8 mm nut	2.7 m-kg (19.5 ft-lb)
Cam chain tensioner	18 mm cap	2.1 m-kg (15.0 ft-lb)
Pump cover	6 mm pan head screw	1.0 m-kg (7.2 ft-lb)
Strainer cover	6 mm bolt	1.0 m-kg (7.2 ft-lb)
Drain plug	30 mm bolt	4.2 m-kg (30.5 ft-lb)
Oil filter	6 mm bolt	0.9 m-kg (6.5 ft-lb)
Delivery pipe	10 mm union bolt	2.1 m-kg (15.0 ft-lb)
Exhaust pipe	8 mm nut	1.3 m-kg (9.5 ft-lb)
Crankcase	8 mm bolt/nut	2.1 m-kg (15.0 ft-lb)
Kick crank boss	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Primary drive gear	14 mm nut	9.0 m-kg (65.0 ft-lb)
Clutch boss	18 mm nut	8.0 m-kg (58.0 ft-lb)
Drive sprocket	22 mm nut	6.5 m-kg (47.0 ft-lb)
Change pedal	6 mm bolt	1.0 m-kg (7.2 ft-lb)
Chassis:		
Front wheel axle	**14 mm nut**	**10.7 m-kg (77.5 ft-lb)**
Front fork and axle holder	**8 mm nut**	**1.4 m-kg (10.0 ft-lb)**
Handle crown and inner tube	**8 mm nut**	**1.1 m-kg ((8.0 ft-lb)**
Handle crown and steering shaft	**8 mm nut**	**1.1 m-kg ((8.0 ft-lb)**
Handle crown and steering shaft	**14 mm bolt**	**5.4 m-kg (39.0 ft-lb)**
Handle crown and handlebar holder	**8 mm bolt**	**1.8 m-kg (13.0 ft-lb)**
Under bracket and inner tube	**8 mm nut**	**2.0 m-kg (14.5 ft-lb)**
Engine mounting Upper	**8 mm nut**	**1.8 m-kg (13.0 ft-lb)**
Engine mounting Upper	**10 mm nut**	**3.0 m-kg (21.5 ft-lb)**
Engine mounting Front	**10 mm nut**	**4.6 m-kg (33.5 ft-lb)**
Engine mounting Rear	**10 mm nut**	**4.1 m-kg (29.5 ft-lb)**
Engine mounting Rear-Lower	**10 mm nut**	**4.6 m-kg (33.5 ft-lb)**
Engine mounting Lower	**10 mm nut**	**9.0 m-kg (65.0 ft-lb)**
Front flasher and headlight	**8 mm nut**	**1.0 m-kg ((7.2 ft-lb)**
Master cylinder and brake hose	**10 mm union bolt**	**2.6 m-kg (19.0 ft-lb)**

Part to be tightened	Thread dia. and pan name	Tightening torque
Brake disc and hub	8 mm bolt	2.0 m-kg (14.5 ft-lb)
Caliper and support bracket	8 mm bolt	1.8 m-kg (13.0 ft-lb)
Caliper and pad	5 mm bolt	0.3 m-kg (2.2 ft-lb)
Caliper and bleed screw	8 mm bolt	0.6 m-kg (4.5 ft-lb)
Front caliper and front fork	10 mm bolt	3.5 m-kg (25.5 ft-lb)
Master cylinder and cylinder bracket	6 mm bolt	0.6 m-kg (4.5 ft-lb)
Pivot shaft	14 mm nut	6.5 m-kg (47.0 ft-lb)
Rear wheel axle	16 mm nut	15.0 m-kg (108.5 ft-lb)
Tension bar and brake caliper (plate)	8 mm nut	1.8 m-kg (13.0 ft-lb)
Tension bar and rear arm	8 mm nut	3.2 m-kg (23.0 ft-lb)
Rear shock absorber Upper	10 mm bolt	3.0 m-kg (21.5 ft-lb)
Rear shock absorber Lower	10 mm bolt	3.3 m-kg (28.0 ft-lb)
Rear arm and rear arm end	8 mm bolt	1.0 m-kg (7.2 ft-lb)
Front fender	8 mm bolt	1.0 m-kg (7.2 ft-lb)
Neutral switch	12 mm	1.3 m-kg (9.5 ft-lb)

General Torque Specifications

This chart specifies torque for standard fasteners with standard I.S.O. pitch threads. Torque specifications for special components or assemblies are included in the applicable sections of this book. To avoid warpage, tighten multi-fastener assemblies in a criss-cross fashion, in progressive stages, until full torque is reached. Unless otherwise specified, torque specifications call for clean, dry threads. Components should be at room temperature.



A (Nut)	B (Bolt)	Standard tightening torque	
		m-kg	ft-lb
10 mm	6 mm	0.6	4.5
12 mm	8 mm	1.5	11
14 mm	10 mm	3.0	22
17 mm	12 mm	5.5	40
19 mm	14 mm	8.5	61
22 mm	16 mm	13.0	94

CONVERSION TABLES

METRIC TO INCH SYSTEM			
	KNOWN	MULTIPLIER	RESULT
TORQUE	m-kg	7.233	ft-lb
	m-kg	86.80	in-lb
	cm-kg	0.0723	ft-lb
	cm-kg	0.8680	in-lb
WT.	kg	2.205	lb
	g	0.03527	oz
FLOW/DISTANCE	km/lit	2.352	mpg
	km/hr	0.6214	mph
	km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in
	mm	0.03937	in
VOL./ CAPACITY	cc (cm^3)	0.03382	oz (US liq)
	cc (cm^3)	0.06102	cu.in
	lit (liter)	2.1134	pt (US liq)
	lit (liter)	1.057	qt (US liq)
	lit (liter)	0.2642	gal (US liq)
MISC.	kg/mm	56.007	lb/in
	kg/cm^2	14.2234	psi (lb/in^2)
	Centigrade (°C)	9/5(°C) + 32	Fahrenheit (°F)

INCH TO METRIC SYSTEM			
	KNOWN	MULTIPLIER	RESULT
TORQUE	ft-lb	0.13826	m-kg
	in-lb	0.01152	m-kg
	ft-lb	13.831	cm-kg
	in-lb	1.1521	cm-kg
WT.	lb	0.4535	kg
	oz	28.352	g
FLOW/DISTANCE	mpg	0.4252	km/lit
	mph	1.609	km/hr
	mi	1.609	km
	ft	0.3048	m
	yd	0.9141	m
	in	2.54	cm
	in	25.4	mm
VOL./ CAPACITY	oz (US liq)	29.57	cc (cm^3)
	cu.in	16.387	cc (cm^3)
	pt (US liq)	0.4732	lit (liter)
	qt (US liq)	0.9461	lit (liter)
	gal (US liq)	3.785	lit (liter)
MISC.	lb/in	0.017855	kg/mm
	psi (lb/in^2)	0.07031	kg/cm^2
	Fahrenheit (°C)	5/9(°F – 32)	Centigrade(°F)

DEFINITION OF TERMS:

m-kg	=	Meter-kilogram(s) (usually torque)
g	=	Gram(s)
kg	=	Kilogram(s)(1,000 grams)
lit	=	liter(s)
km/lit	=	Kilometer(s) per liter (fuel consumption)
cc	=	Cubic centimeter(s)(cm^3)(volume or capacity)
kg/mm	=	Kilogram(s) per millimeter (usually spring compression rate)
kg/cm^2	=	Kilogram(s) per square centimeter (pressure)

CONSUMER INFORMATION

Notice

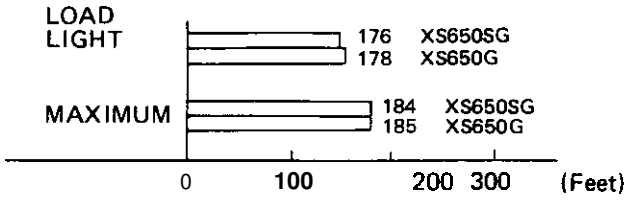
The information presented represents results obtainable by skilled drivers under controlled road and vehicle conditions, and the information may not be correct under other conditions.

STOPPING DISTANCE

This figure indicates braking performance that can be met or exceeded by the vehicles to which it applies, without locking the wheels, under different conditions of loading and with partial failures of the braking system.

FULL OPERATIONAL SERVICE BRAKE

("Partial failure" information is not applicable and is not included)

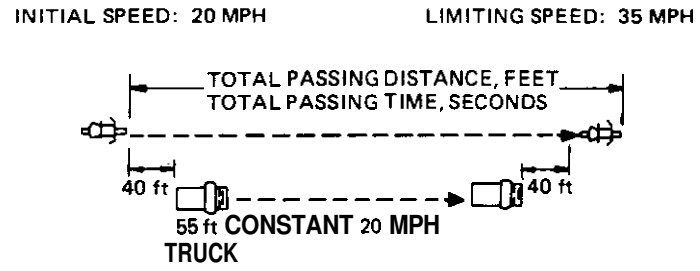


STOPPING DISTANCE IN FEET FROM 60 MPH

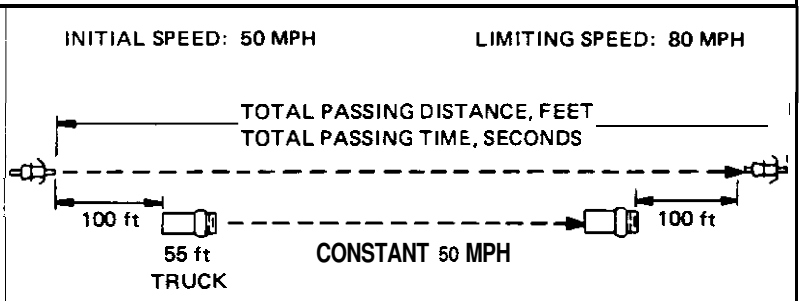
ACCELERATION AND PASSING ABILITY

This figure indicates passing times and distances that can be met or exceeded by the vehicles to which it applies, in the situations diagrammed below. The low-speed pass assumes an initial speed of 20 mph. and a limiting speed of 35 mph. This high-speed pass assumes an initial speed of 50 mph. and a limiting speed of 60 mph.

LOW-SPEED PASS



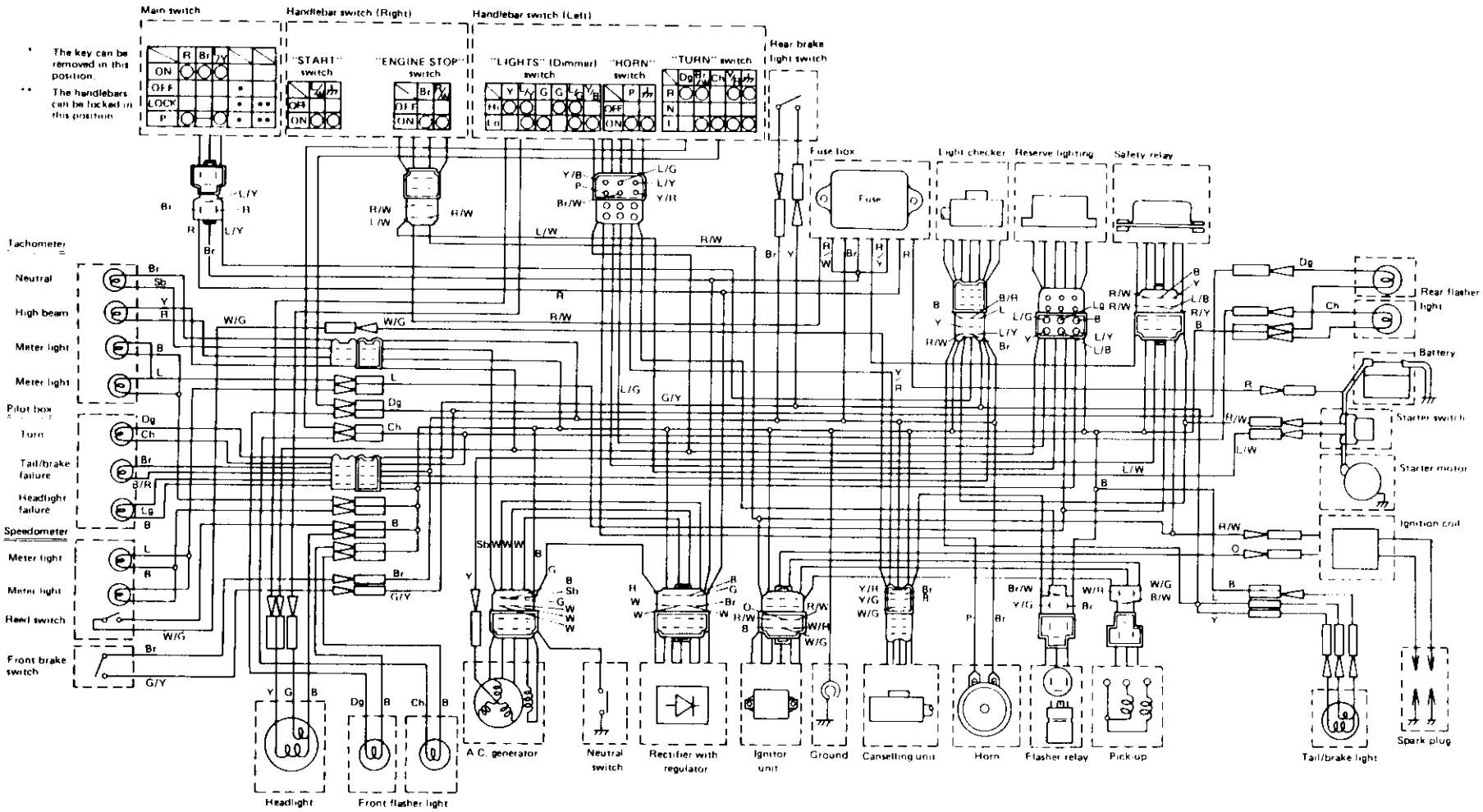
HIGHSPEED PASS



SUMMARY

Low-speed pass	357 feet:	7.3 seconds	XS650SG
	352.3 feet:	7.14 seconds	XS650G
High-speed pass	945.5 feet:	9.3 seconds	XS650SG
	931.8 feet:	9.0 seconds	XS650G

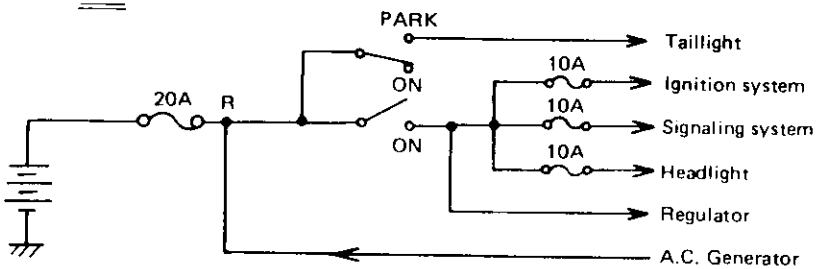
* WIRING DIAGRAM XS650G



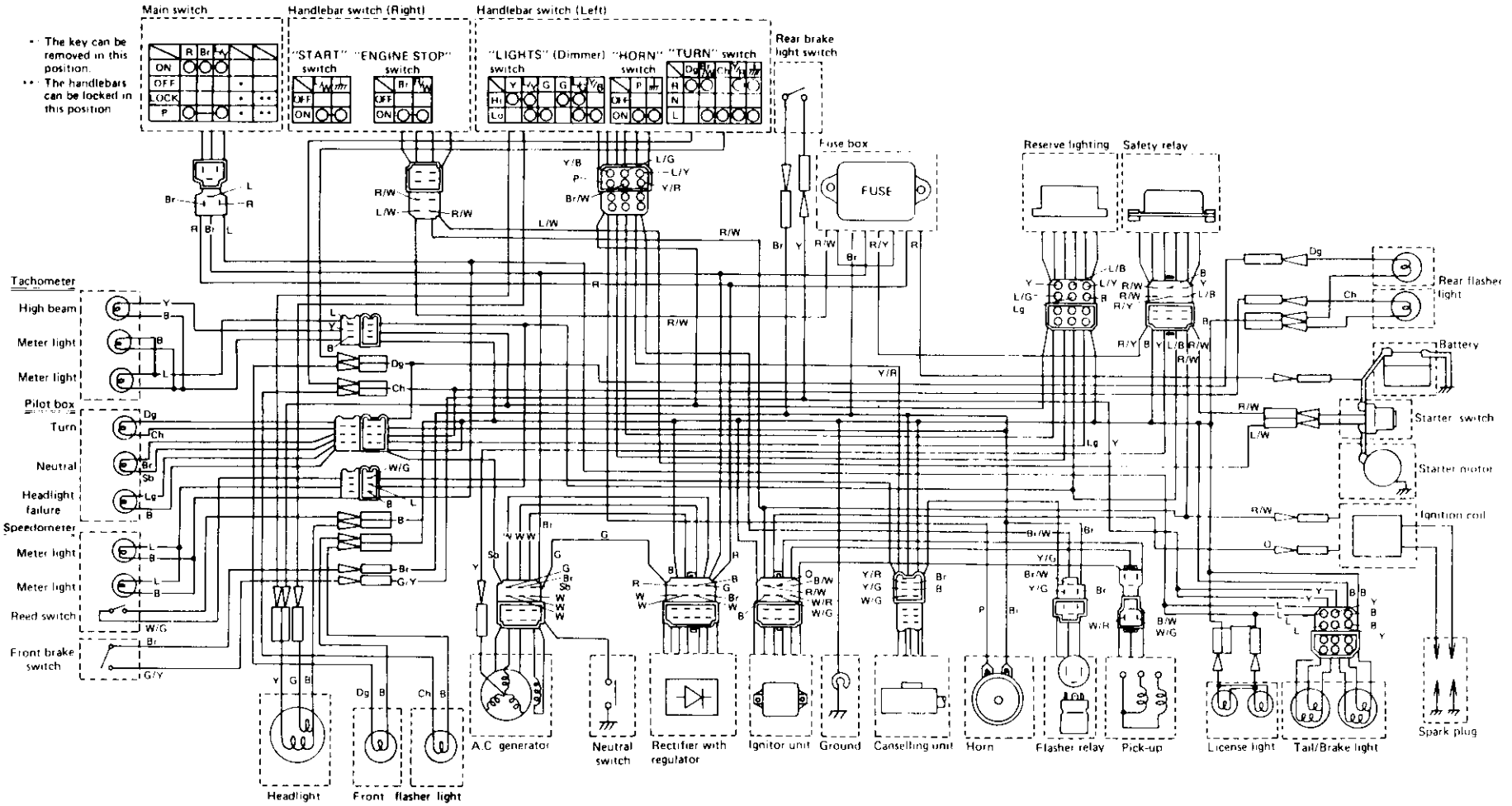
COLOR CODE

Dg :	Dark green	Br :	Brown	L/W :	Blue/White
Ch :	Chocolate	O :	Orange	Br/W :	Brown/White
B :	Black	L :	Blue	Y/G :	Yellow/Green
Y :	Yellow	P :	Pink	B/W :	Black/White
Lg :	Light green	L/B :	Blue/Black	W/G :	White/Green
G :	Green	R/W :	Red/White	W/R :	White/Red
W :	White	R/Y :	Red/Yellow	G/Y :	Green/Yellow
Sb :	Sky blue	L/Y :	Blue/Yellow	Y/R :	Yellow/Red
R :	Red	L/G :	Blue/Green	Y/B :	Yellow/Black

Fuse



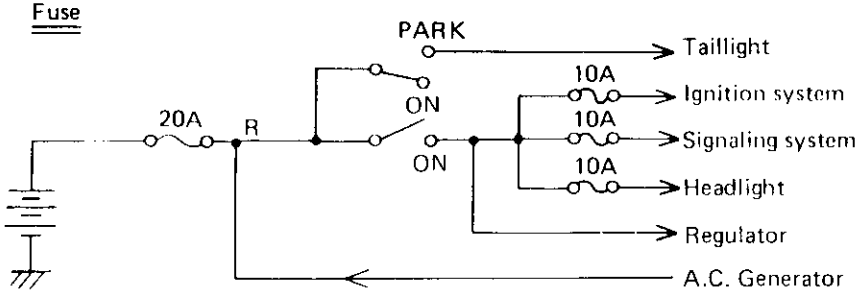
XS650SG



COLOR CODE

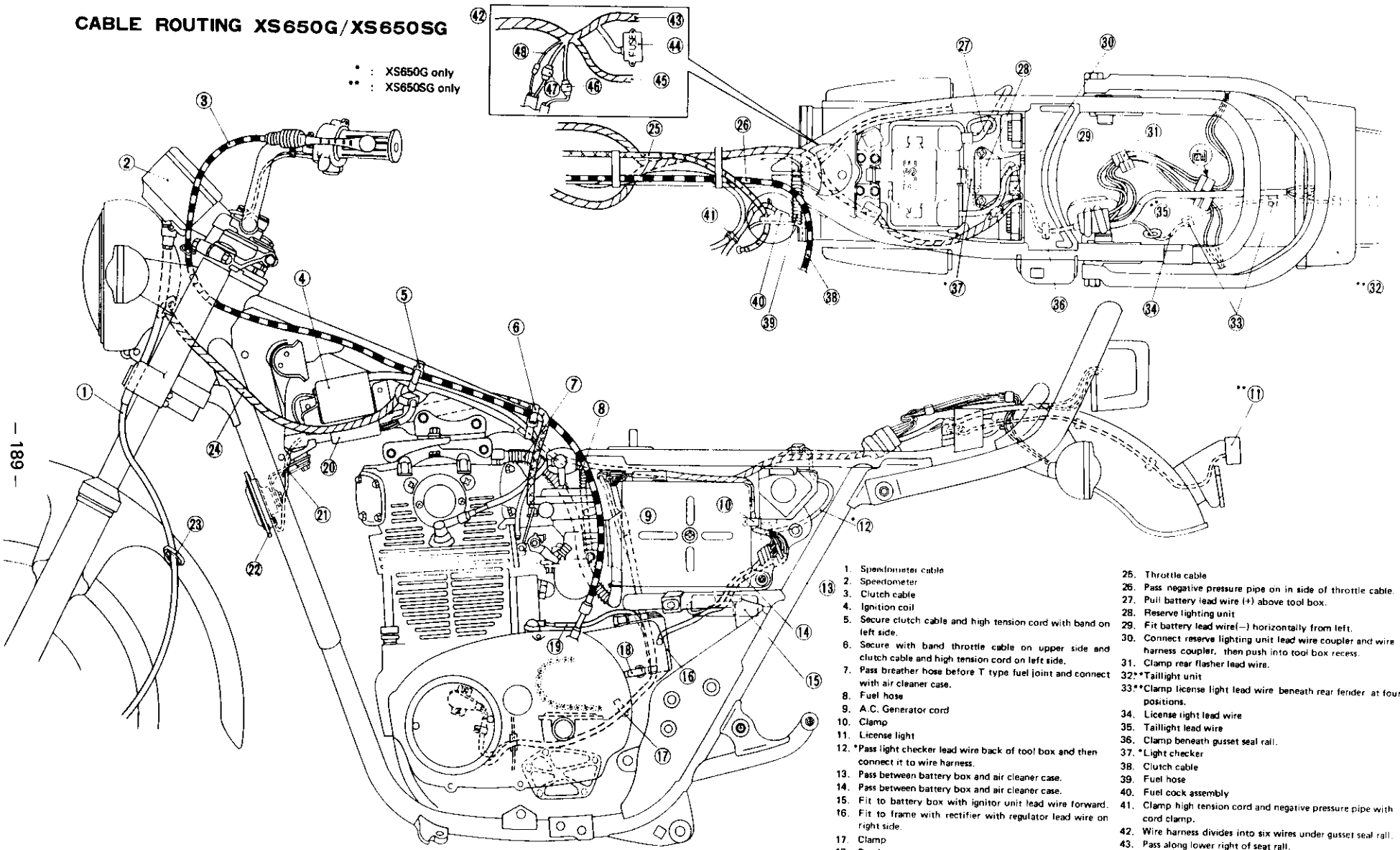
Dg :	Dark green	Br :	Brown	L/W :	Blue/White
Ch :	Chocolate	O :	Orange	Br/W :	Brown/White
B :	Black	L :	Blue	Y/G :	Yellow/Green
Y :	Yellow	P :	Pink	B/W :	Black/White
Lg :	Light green	L/B :	Blue/Black	W/G :	White/Green
G :	Green	R/W :	Red/White	W/R :	White/Red
W :	White	R/Y :	Red/Yellow	G/Y :	Green/Yellow
Sb :	Sky blue	L/Y :	Blue/Yellow	Y/R :	Yellow/Red
R :	Red	L/G :	Blue/Green	Y/B :	Yellow/Black

Fuse



CABLE ROUTING XS650G/XS650SG

* : XS650G only
** : XS650SG only



1. Speedometer cable
2. Speedometer
3. Clutch cable
4. Ignition coil
5. Secure clutch cable and high tension cord with band on left side.
6. Secure with band throttle cable on upper side and clutch cable and high tension cord on left side.
7. Pass breather hose before T type fuel joint and connect with air cleaner case.
8. Fuel hose
9. A.C. Generator cord
10. Clamp
11. License light
12. *Pass light checker lead wire back of tool box and then connect it to wire harness.
13. Pass between battery box and air cleaner case.
14. Pass between battery box and air cleaner case.
15. Fit to battery box with ignitor unit lead wire forward.
16. Fit to frame with rectifier with regulator lead wire on right side.
17. Clamp
18. Band
19. Neutral switch lead wire
20. Flasher cancelling unit
21. Clamp horn lead wire
22. Horn
23. Through cable holder.
24. Pass wire harness (left) under fuel tank fitting bracket (left).
25. Throttle cable
26. Pass negative pressure pipe on in side of throttle cable.
27. Pull battery lead wire (+) above tool box.
28. Reserve lighting unit
29. Fit battery lead wire(−) horizontally from left.
30. Connect reserve lighting unit lead wire coupler and wire harness coupler, then push into tool box recess.
31. Clamp rear flasher lead wire.
32. **Taillight unit
33. **Clamp license light lead wire beneath rear fender at four positions.
34. License light lead wire
35. Taillight lead wire
36. Clamp beneath gusset seal rail.
37. *Light checker
38. Clutch cable
39. Fuel hose
40. Fuel cock assembly
41. Clamp high tension cord and negative pressure pipe with cord clamp.
42. Wire harness divides into six wires under gusset seal rail.
43. Pass along lower right of seat rail.
44. Fit fuse box to battery cover.
45. Pass along lower left of seat rail.
46. Pick-up coil lead wire
47. A.C. Generator lead wire
48. Yellow

49. Starter switch
50. Secure wire harness with band.
51. Secure with band throttle cable on upper side and wire harness and high tension cord on right side.
52. Secure flasher relay lead wire, ground lead wire, throttle cable, high tension cord, wire harness and ignition coil lead wire with band on right side.
53. Pass wire harness (right) under fuel tank fitting bracket (right).
54. Pass throttle cable upper fuel tank fitting bracket (right).
55. Throttle cable
56. Brake hose
57. Tachometer
58. Pass brake hose between light stay and tachometer cable.
59. Joint
60. Brake hose
61. Clamp
62. Pass tachometer cable through three cable holders.
63. Tachometer cable
64. Horn lead wire
65. Flasher relay
66. Breather pipe
67. **Rear brake switch
68. *Rear brake switch
69. *Rear brake switch lead wire clamp
70. **Pass brake switch lead wire back of master cylinder.
71. Safety relay assembly
72. Pass first through cable holder and then between light stay and meter bracket.
73. Pass between light stay and meter bracket.
74. Handlebar switch (right) lead wire
75. Band
76. Pass between main switch and meter bracket.
77. Band
78. Handlebar switch (left) lead wire

