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 for Races	Check bearings assembly 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

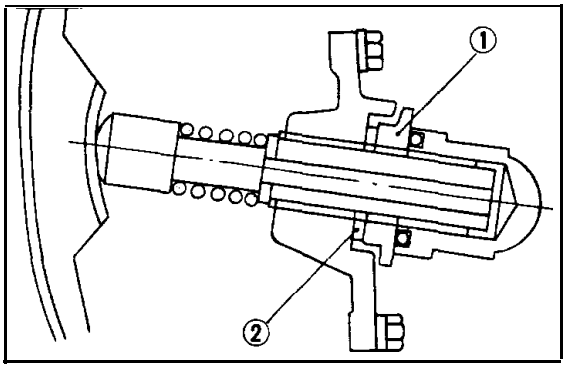
2. Cleaning method

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.



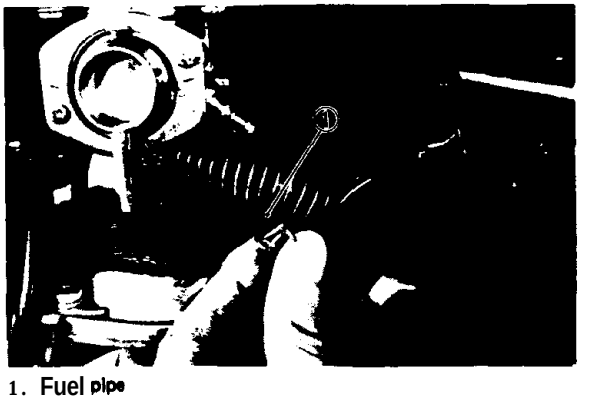
1. Locknut 2. Gasket

(PAGE 9 ~ 13)

2-4. CHASSIS

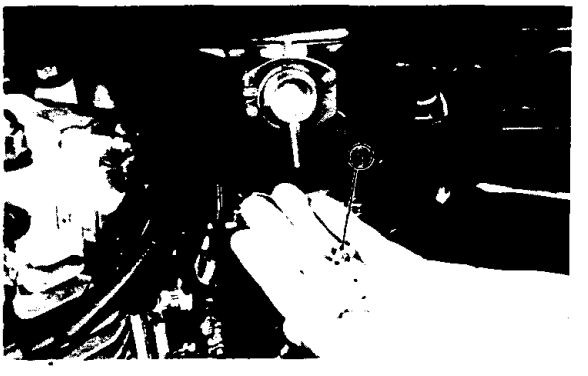
A. Fuel petcock cleaning

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

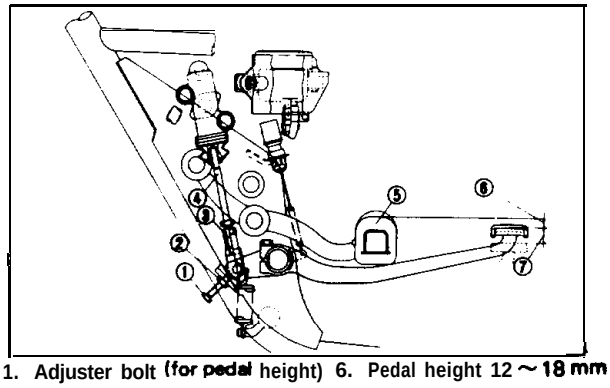
E. Rear brake (XS650SF only)

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

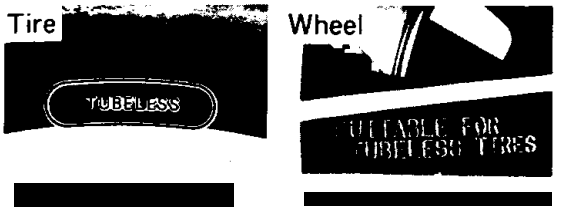
Tubeless tires and aluminium wheels (XS650SF only)

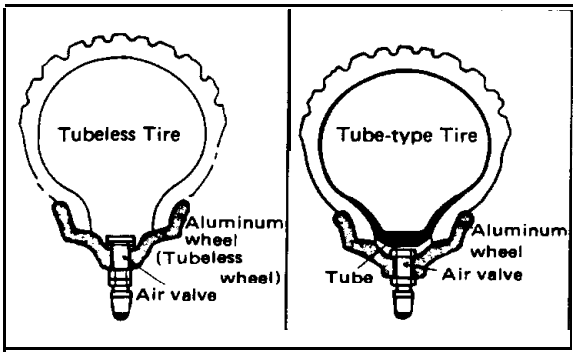
NOTE:

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 replaced. 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)

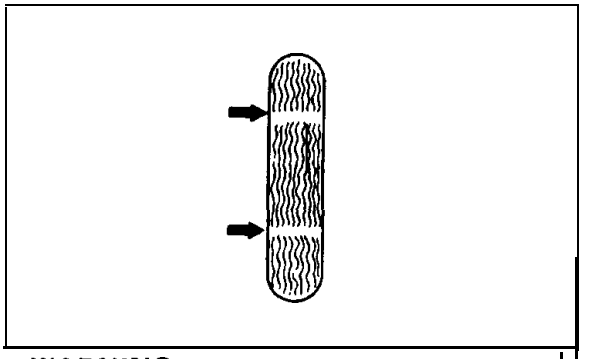
To insure maximum performance and long service, note the following:

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 (198lb) 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.

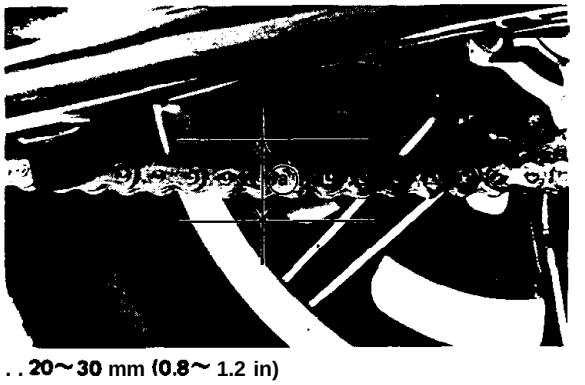
G. Drive chain

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.

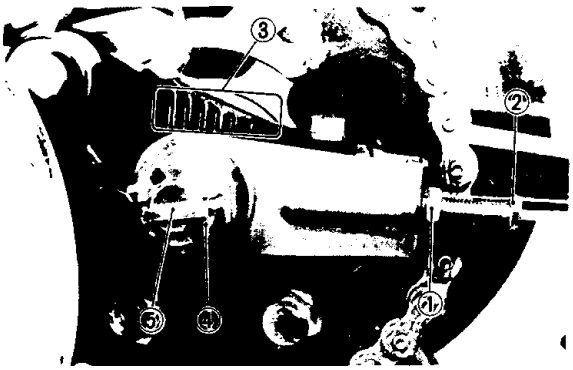
2. Tension adjustment

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.

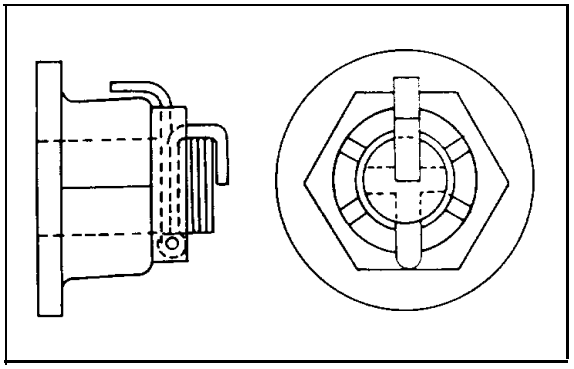
f. Inset-t the cotter pin into the rear wheel axle nut and bend the end of the cotter pin as shown in the illustration (if the nut notch and the cotter pin hole do not match, tighten the nut slightly to match).

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).

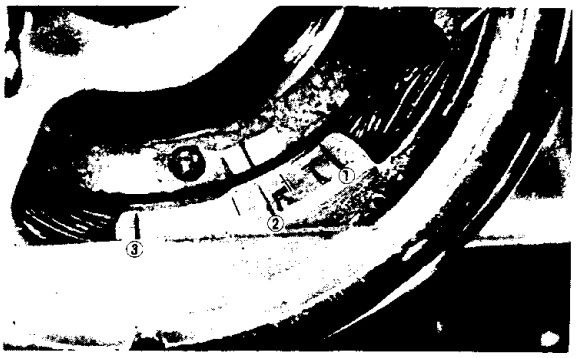
(PAGE 14 ~ 15)

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.



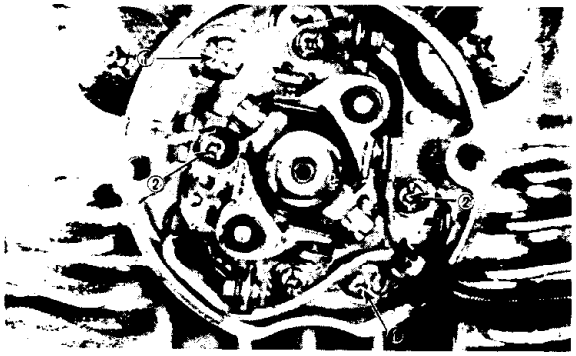
1. Top dead canter
2. 15° BTDC at 1,200 r/mn
3. Advanced mark

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)

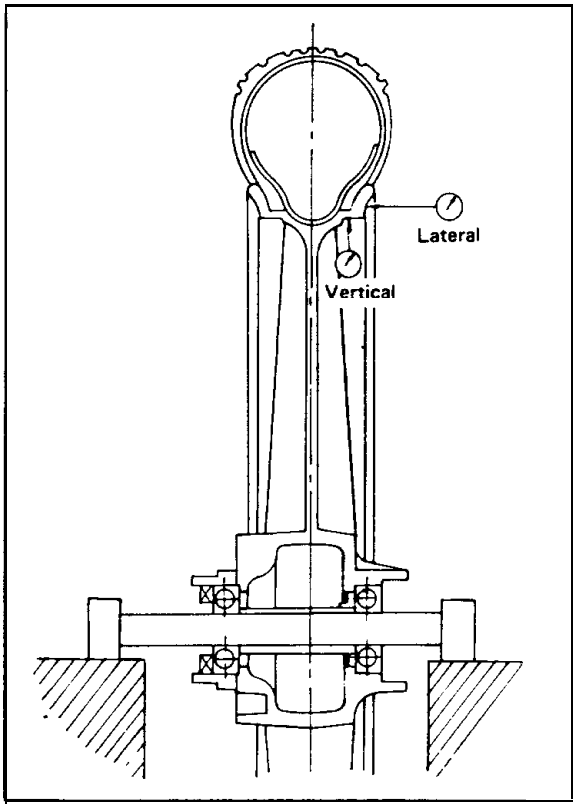
3. Check wheel balance

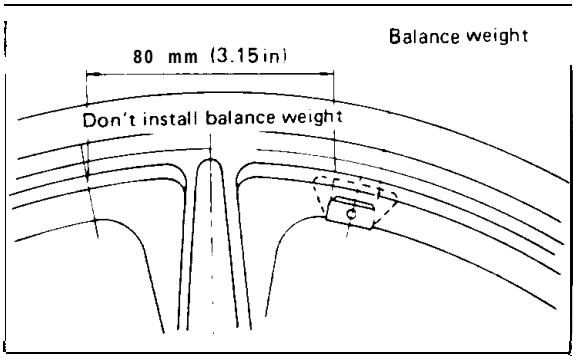
   Rotate wheel lightly several times and observe resting position.

   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)

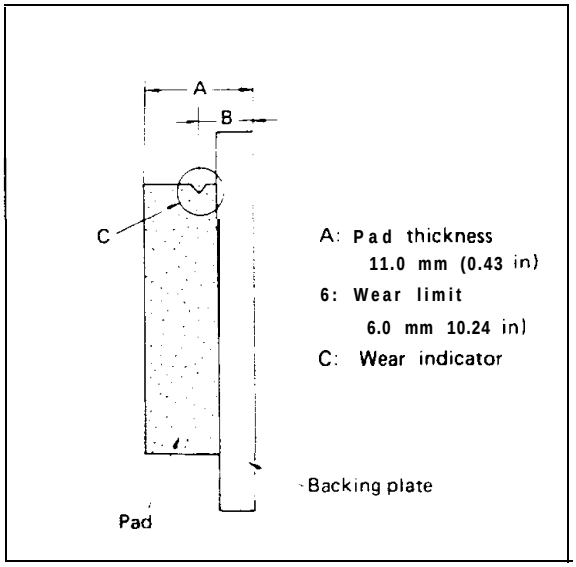
5-3. BRAKES

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)

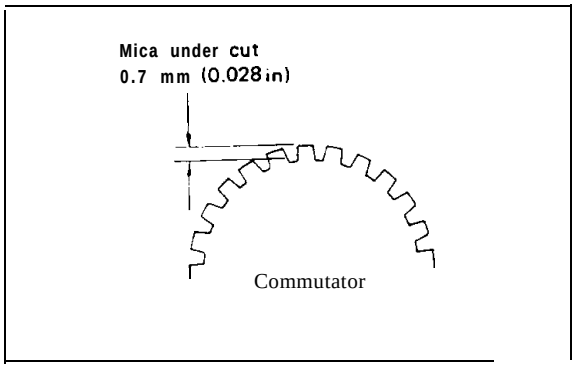
Refer to “Tubeless tire and Aluminium Wheel Manual” for tubeless tire and wheel service.

(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.

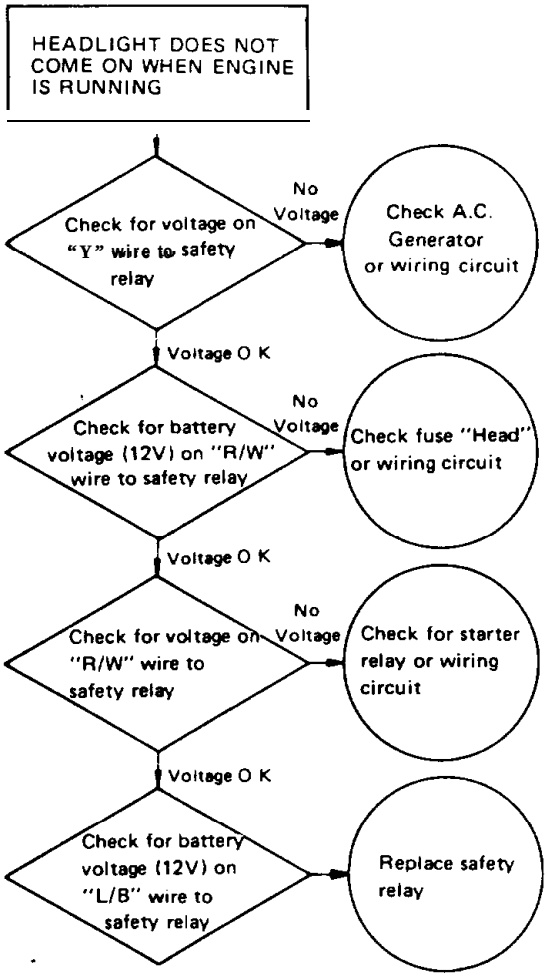
The system is connected to the headlight circuit only. The reserve lighting system unit is located under the seat.

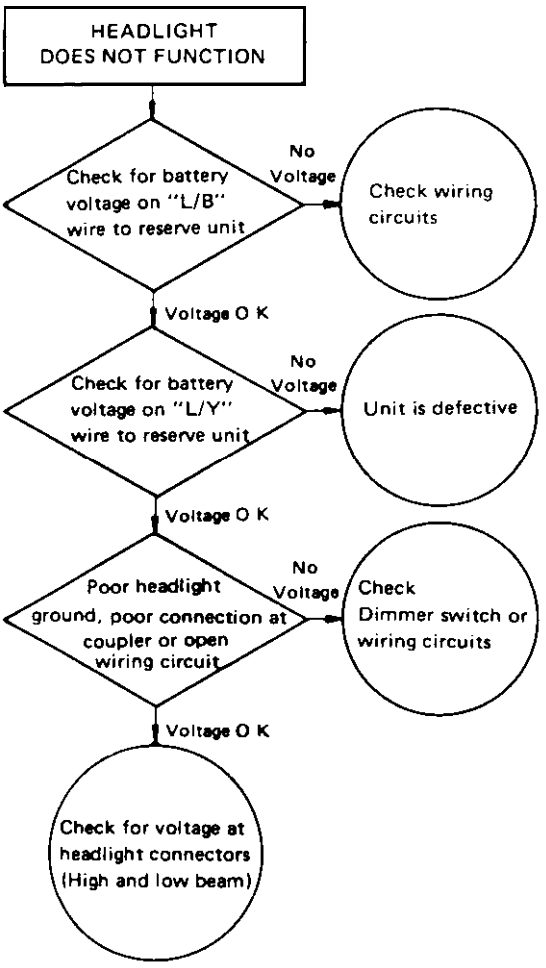
NOTE:

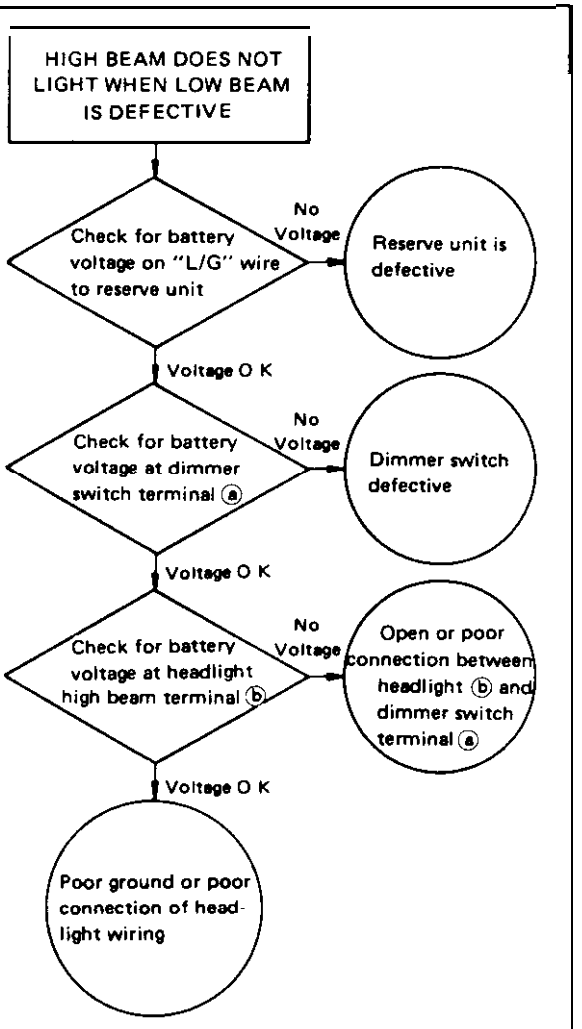
This model has been equipped with a safety relay so that the headlight comes on automatically when the engine is started and the light stays on until the main switch is turned to "OFF" even if the engine stalls.

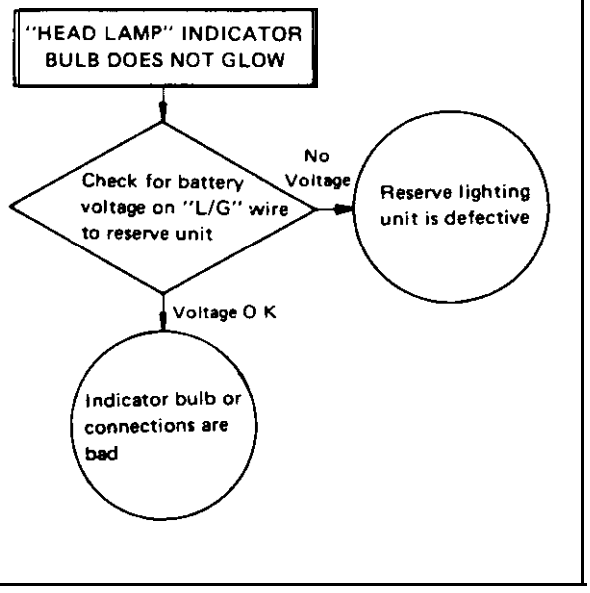
Headlight condition	Headlight failure indicator light	Reserve lighting function
Normal	Comes on (very dim)	—
High beam faulty	Comes on	Low beam comes on
Low beam faulty	Comes on	High beam comes on at low brilliance

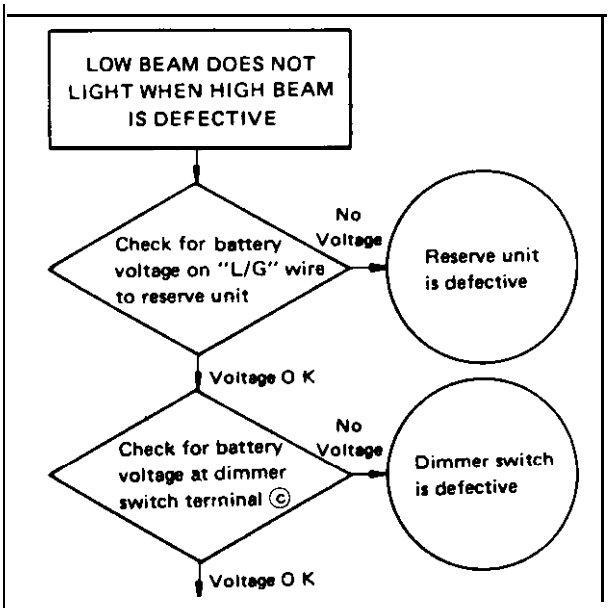
2. Troubleshooting/Inspection

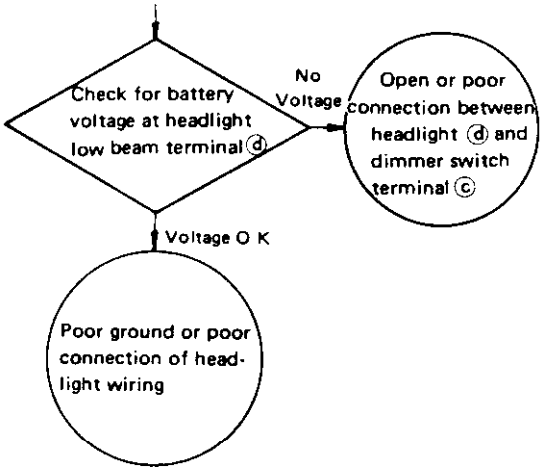


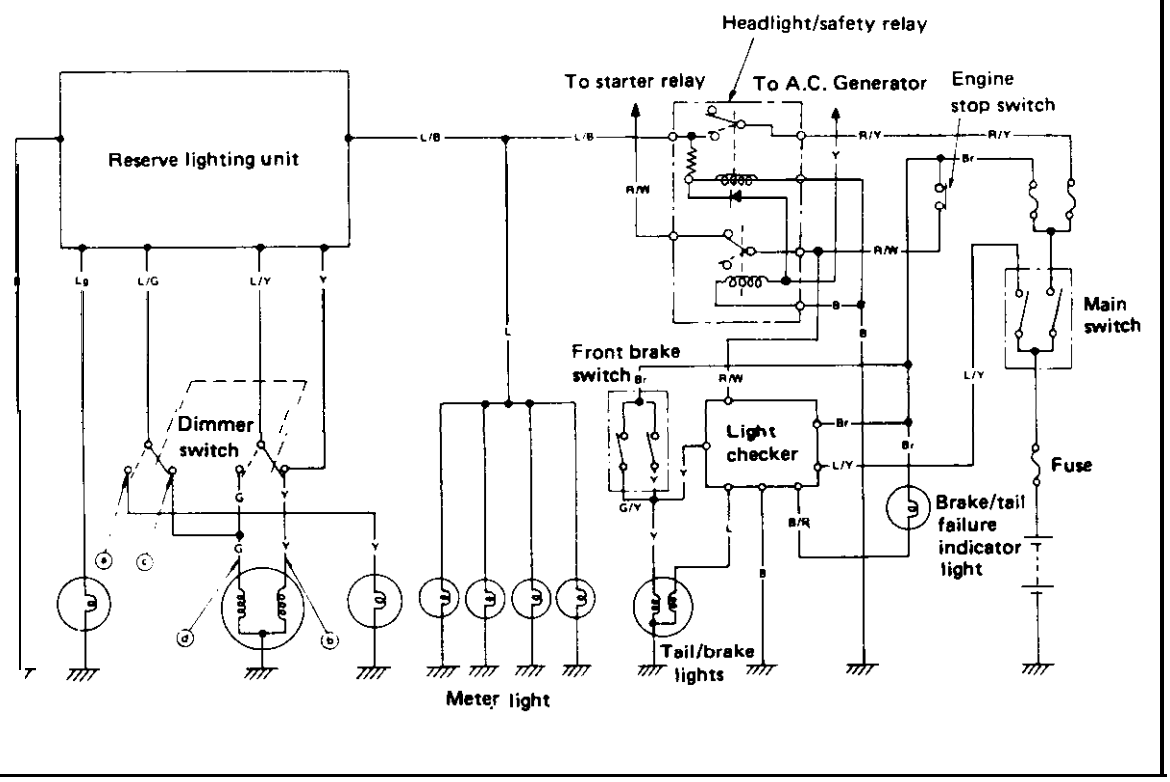

HEADLIGHT DOES NOT FUNCTION
Check for battery voltage on "L/B" wire to reserve unit
No Voltage
Check wiring circuits
Voltage O K
Check for battery voltage on "L/Y" wire to reserve unit
No Voltage
Unit is defective
Voltage O K
Poor headlight ground, poor connection at coupler or open wiring circuit
No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

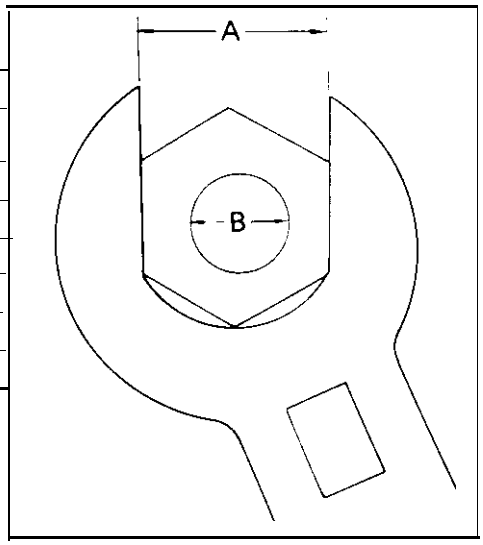
The following torque specifications must be adhered to on every machine. When applying torque to multi-secured fastener components, the several studs should be tightened in gradual stages and in a pattern that will avoid warpage to the item being secured. Torque settings are for dry, clean threads. Torquing 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	12 mm	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)

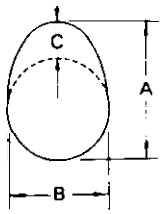
B. Engine

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	Top 1.2 mm (0.047 in), 2nd 1.5 mm (0.059 in), Oil ring 2.8 mm (0.110 in)
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	

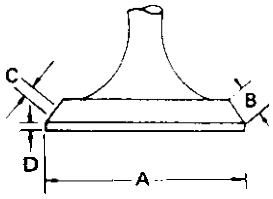
	Cam height "A"	Limit	Base circle "B"	Limit	Lift "C"
IN	39.99 ± 0.05 mm (1.574 ± 0.002 in)	39.84 mm (1.569 in)	32.24 ± 0.05 mm (1.269 ± 0.002 in)	32.09 mm (1.263 in)	7.991 mm (0.315 in)
EX	40.03 ± 0.05 mm (1.576 ± 0.002 in)	39.88 mm (1.570 in)	32.30 ± 0.05 mm (1.272 ± 0.002 in)	32.15 mm (1.266 in)	8.030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

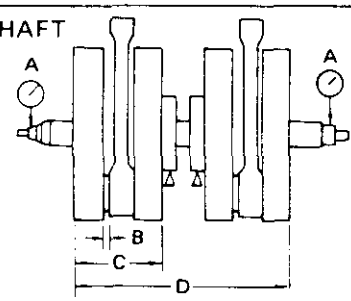
5) Valve timing

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



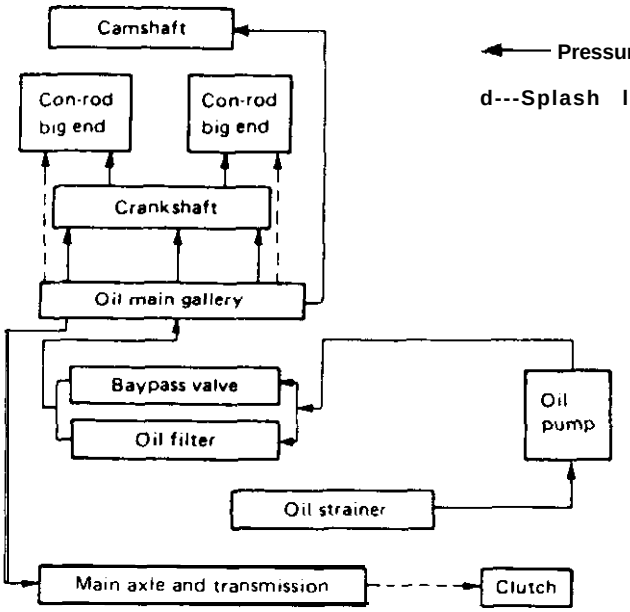
6) Camshaft deflection limit	0.03 mm (0.0012 in)
7) Cam chain	
Type	TSUBAKIMOTO BF05M
Number of links	106L
Sprocket ratio	36/18 (2.000)
I. ROCKER ARM AND ROCKER SHAFT	
1) Rocker arm inner diameter	$15.0\ ^{+0.018}_{0}$ mm (0.591 $^{+0.0007}_{0}$ in)
2) Rocker arm shaft diameter	$15.0\ ^{-0.009}_{-0.015}$ 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)

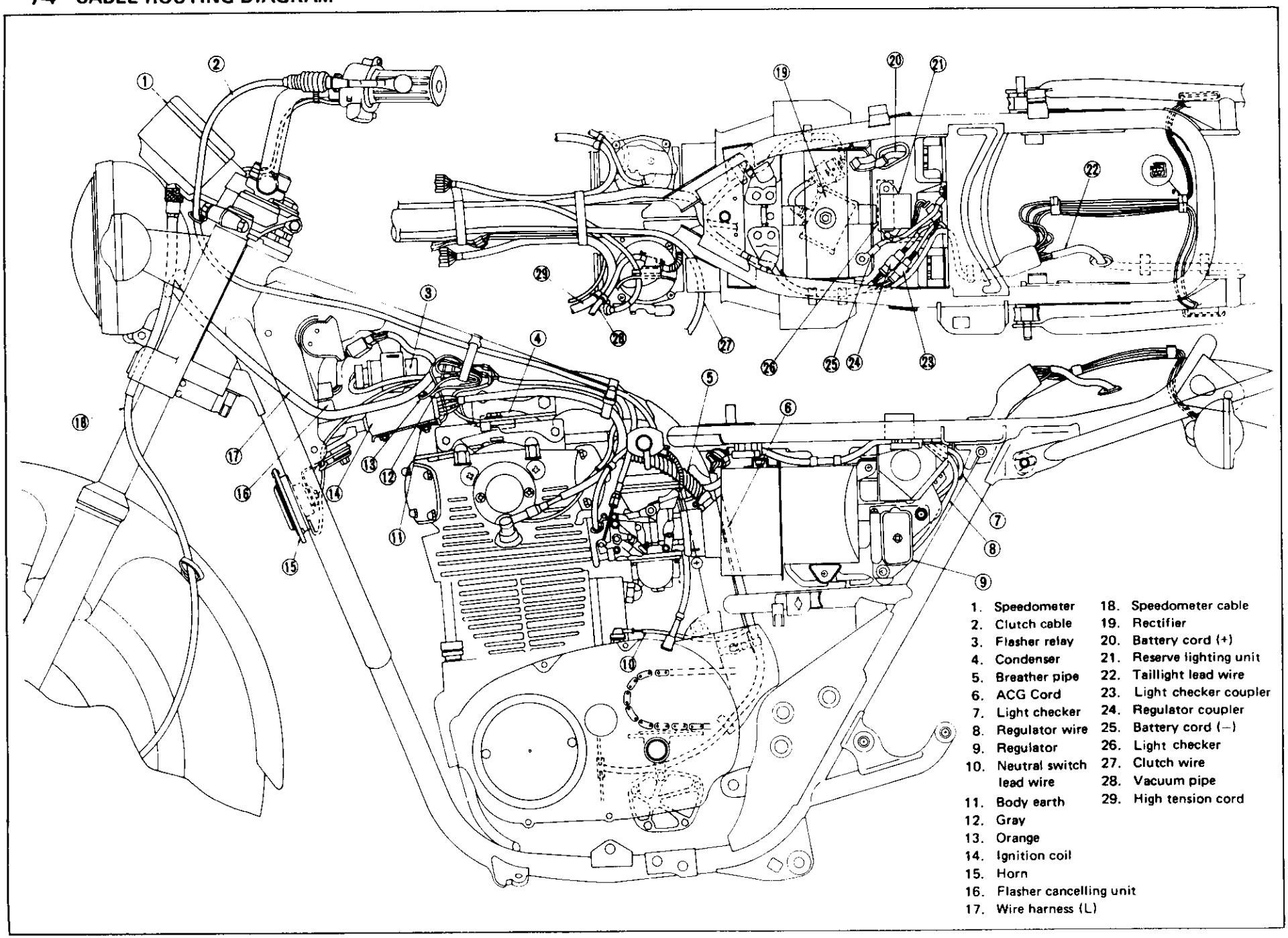
3) Rear brake (XS650-2F only)	
Type	Drum brake (Leading trailing)
Actuating method	Link rod
Brake drum I.D.	180 mm (7.09 in)
Brake shoe dia. x width	180 x 30 mm (7.09 x 1.18 in)
Lining thickness/wear limit	4 mm12 mm IO.16 in/0.08 in)
Shoe spring free length	68 mm (2.68 in)

D. Electrical

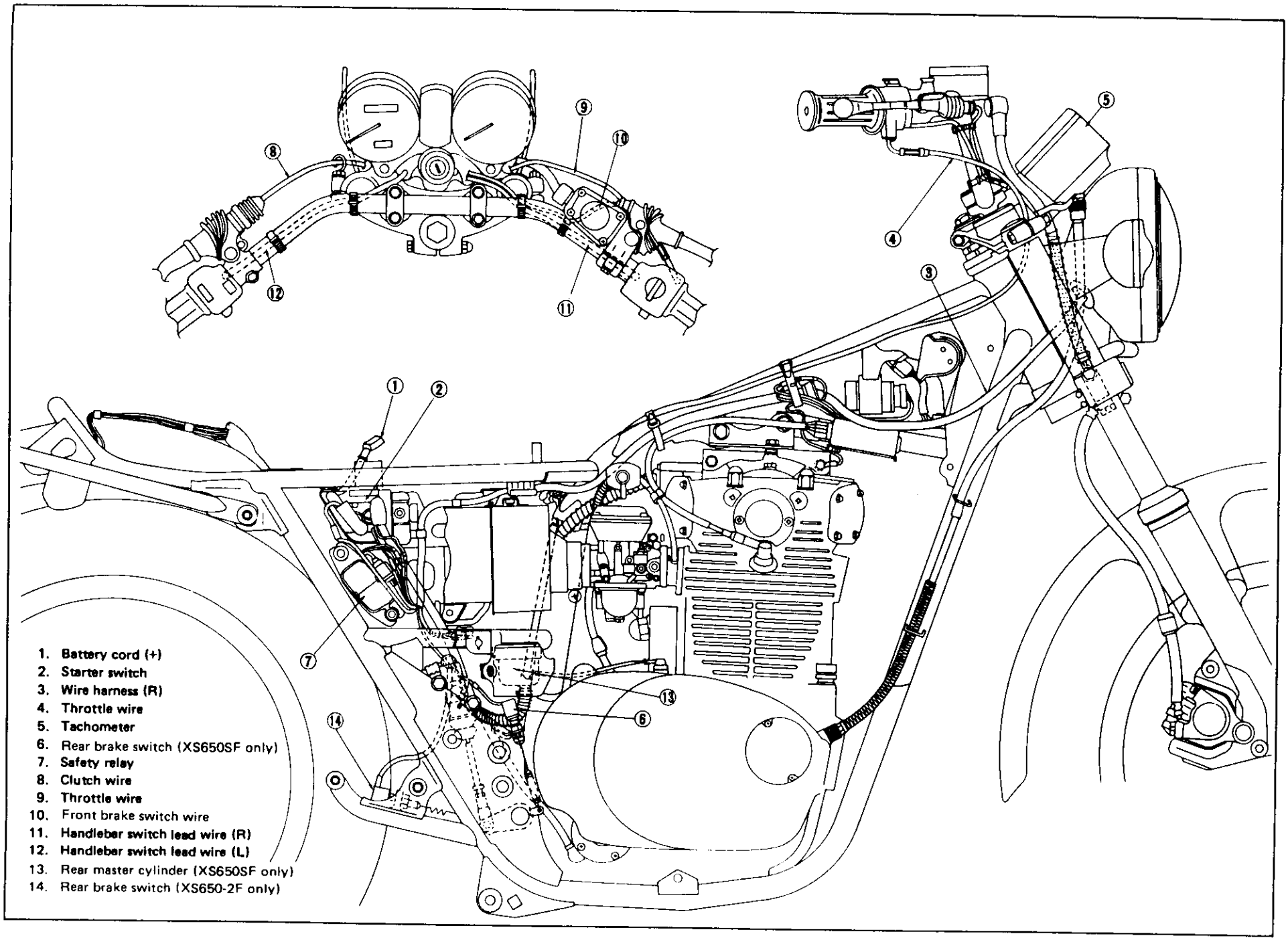
1. IGNITION SYSTEM	
1) Ignition timing (B.T.D.C.)	15°/1,200 r/min
2) Ignition coil	
Model/Manufacturer	CM11-50B/HITACHI
Spark gap	6 mm (0.24 in) or more at 500 r/min
Primary winding resistance	3.9Ω ± 10% at 20°C (68°F)
Secondary winding resistance	8.0kΩ ± 20% at 20°C (68°F)
3) Spark plug	
Type	N-7Y (CHAMPION) 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/2,000 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) 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)

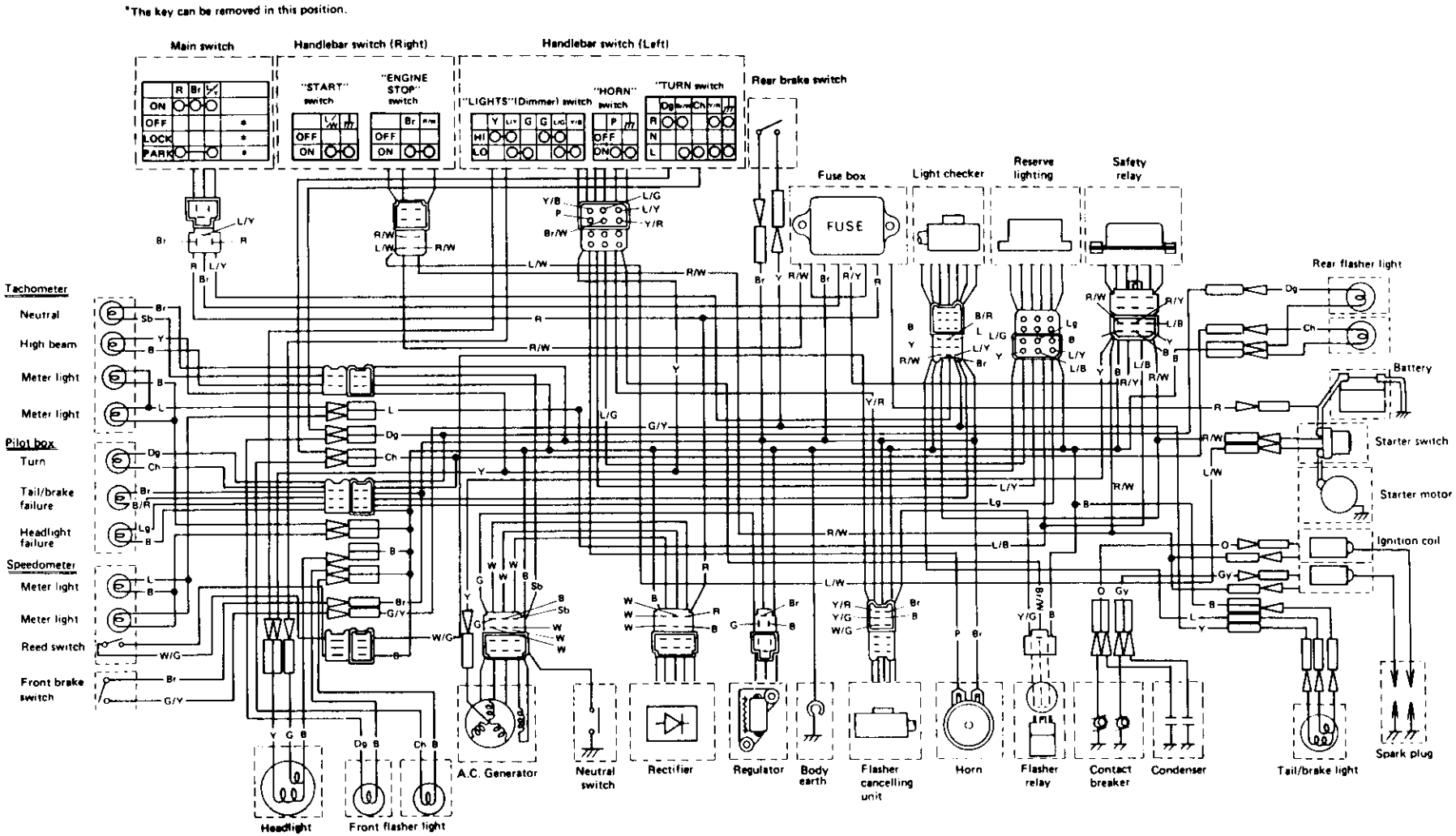
3. STARTER	
1) Starter motor	
Type	Bendix type
Manufacturer	HITACHI
Model	S108-35
output	0.5 kw
Armature coil resistance	0.0067Ω ± 10% at 20°C(68°F)
Field coil resistance	0.004Ω ± 10% at 20°C (68°F)
Brush size/Quantity	16 mm (0.63 in)/2 pcs.
Wear limit	4 mm (0.16 in)
Spring pressure	800 g (28.2 oz)
Commutator O.D./Wear limit	33 mm (1.30 in)/31 mm 11.22 in)
Mica undercut	0.7 mm 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