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 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.

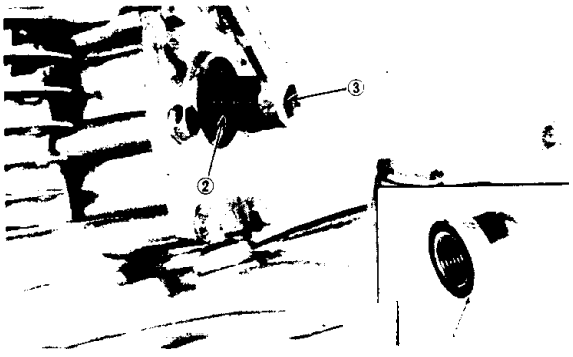
E. Cam chain adjustment

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

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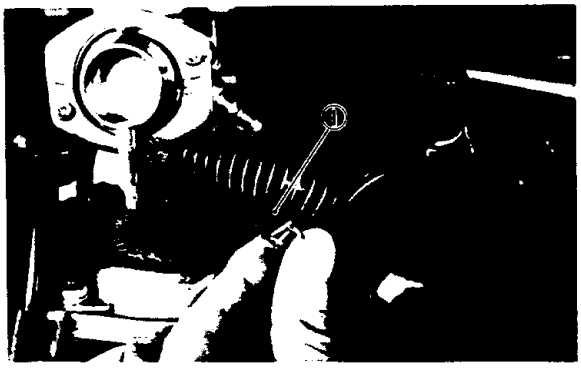
2-4. CHASSIS

A. Fuel petcock cleaning

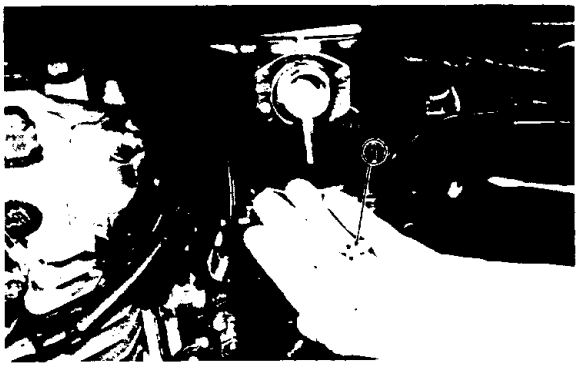
1. Open the seat and remove the fuel tank securing bolt.

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

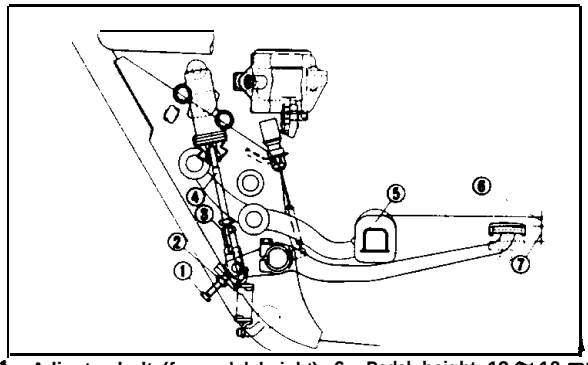
E. Rear brake

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)

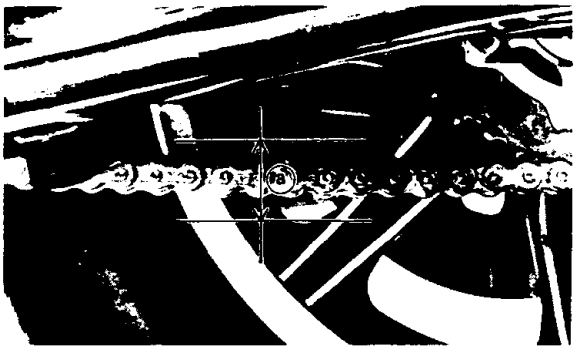
G. Drive chain

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.



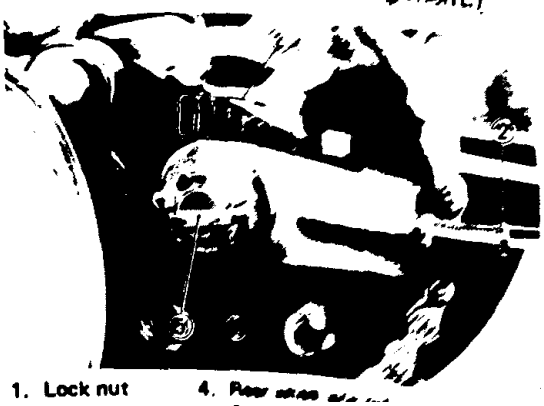
a. 20~30 mm (0.8~1.2 in)

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 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 [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.

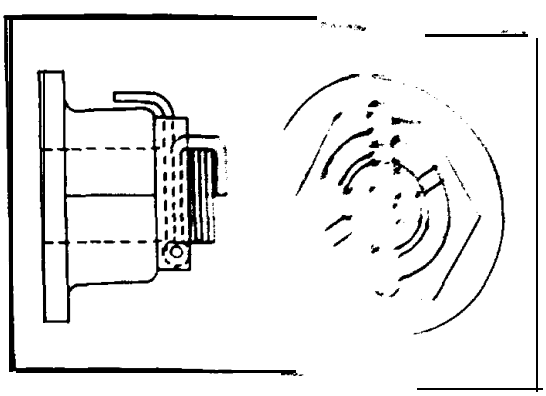
e. Insert the cotter pin into the rear wheel axle nut and bend the ends of the cotter pin as shown in the illustration (if the nut notch and the cotter pin hole do not match, tighten the nut slightly to match).

CAUTION:

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

NOTE:

Excessive chain tension will cause damage to the engine and other vital parts. To keep the tension within the specified limits, replace the rear axle cotter pin with a [illegible] 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

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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

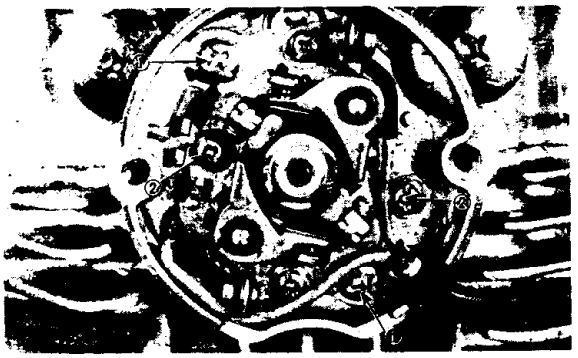
3. Connect timing light to right (left) cylinder spark plug lead wire. Ignition timing of right cylinder must be set first.

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)

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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)	←

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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)

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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)

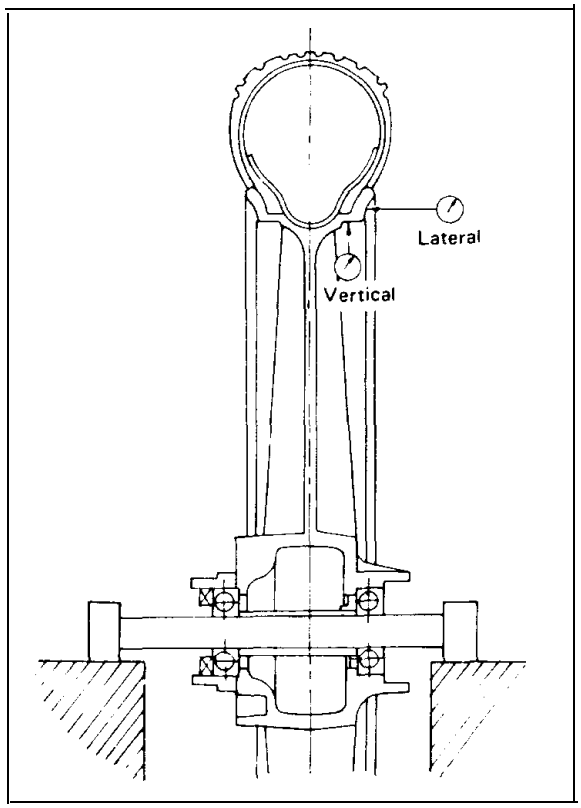
3. Check wheel balance

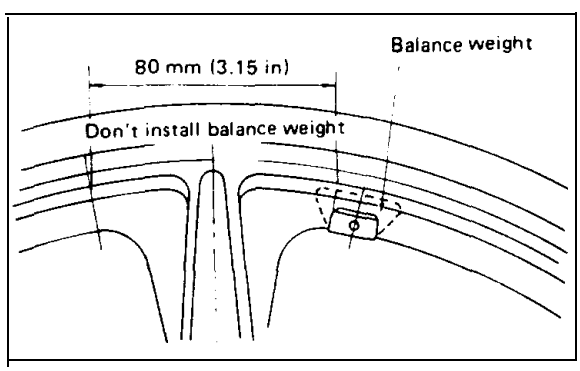
Rotate wheel lightly several times and observe resting position.

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)

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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.

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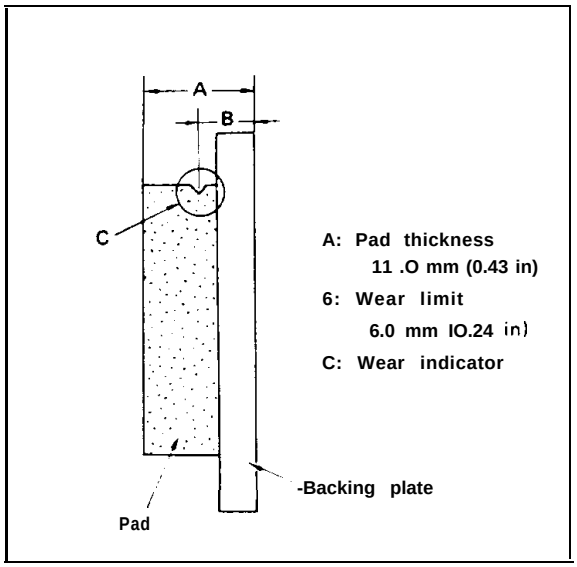
5-3. BRAKES

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)



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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)

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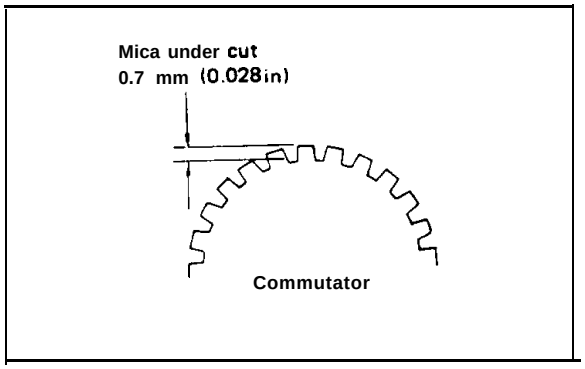
8-1. STARTER

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.**

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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.

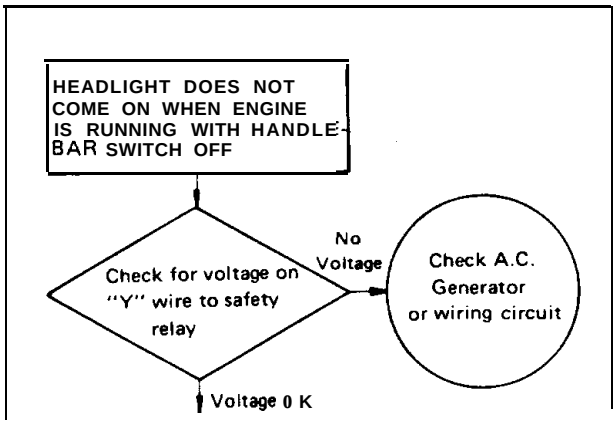
The system is connected to the headlight circuit only. The reserve lighting system unit is located under the fuel tank.

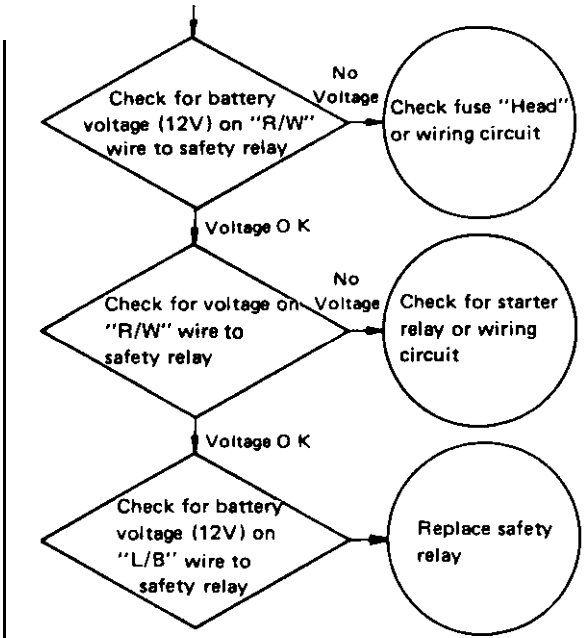
NOTE:

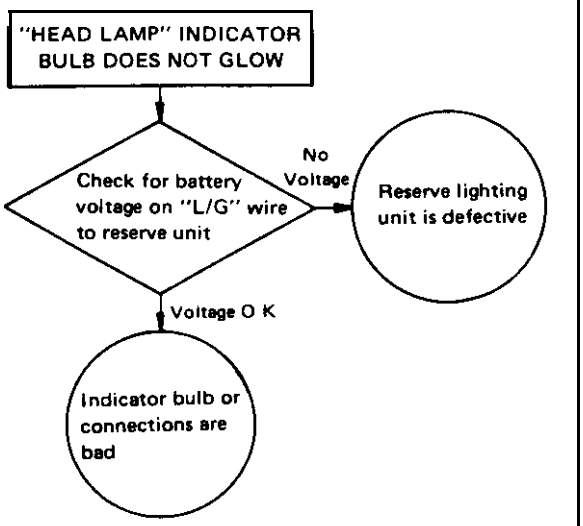
This model has been equipped with a safety relay so that the headlight comes on automatically when the engine is started even with the headlight switch "OFF".

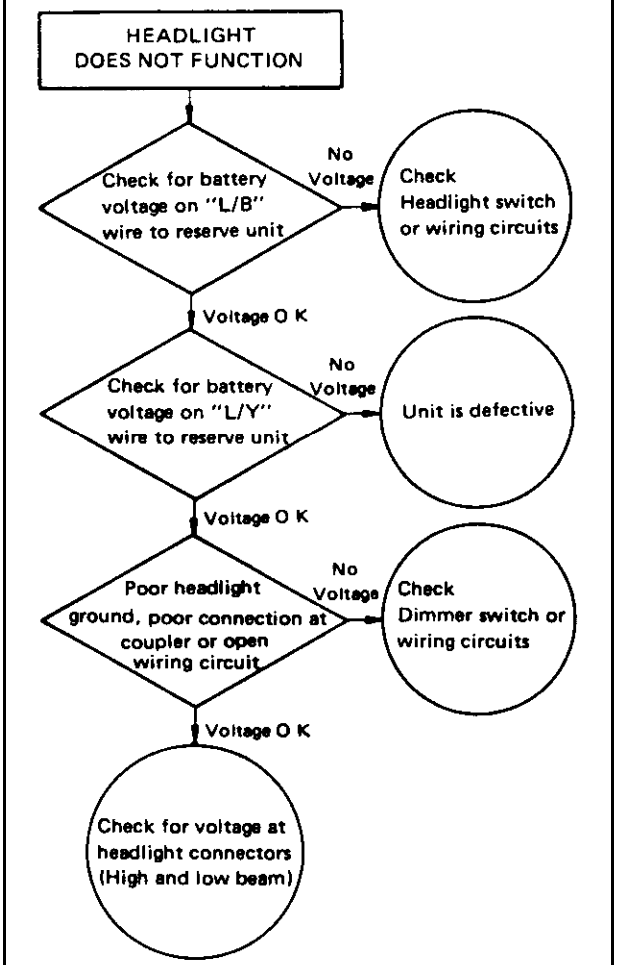
Headlight condition	Headlight failure indicator light	Reserve lighting function
Normal	Comes on (very dim)	—
High beam faulty	Comes on	Low beam comes on
Low beam faulty	Comes on	High beam comes on at low brilliance

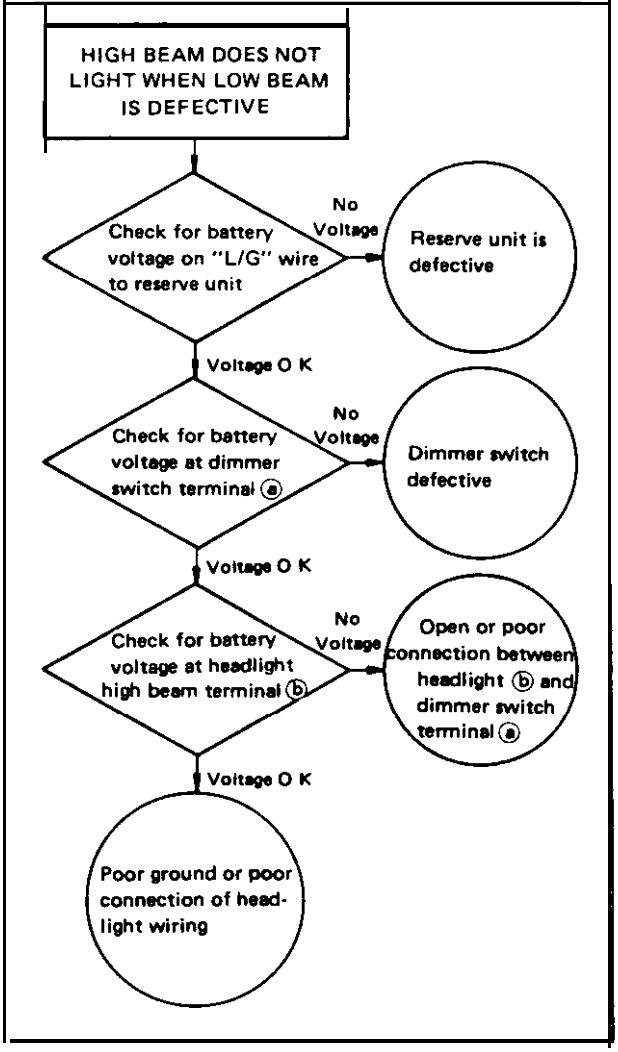
2. **Troubleshooting/Inspection**

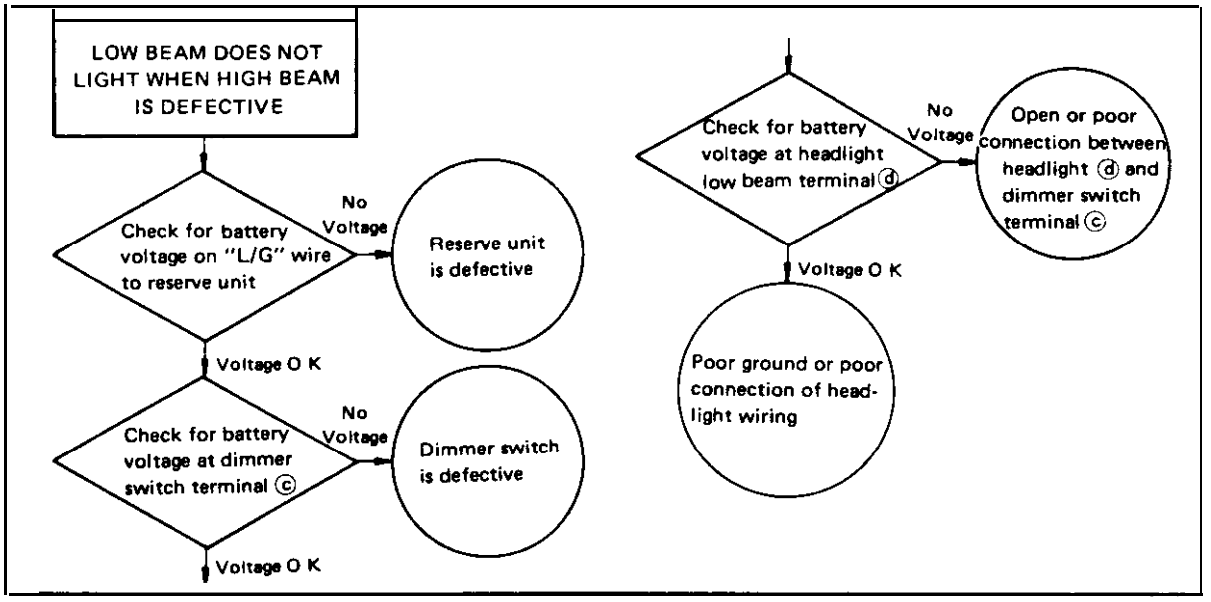


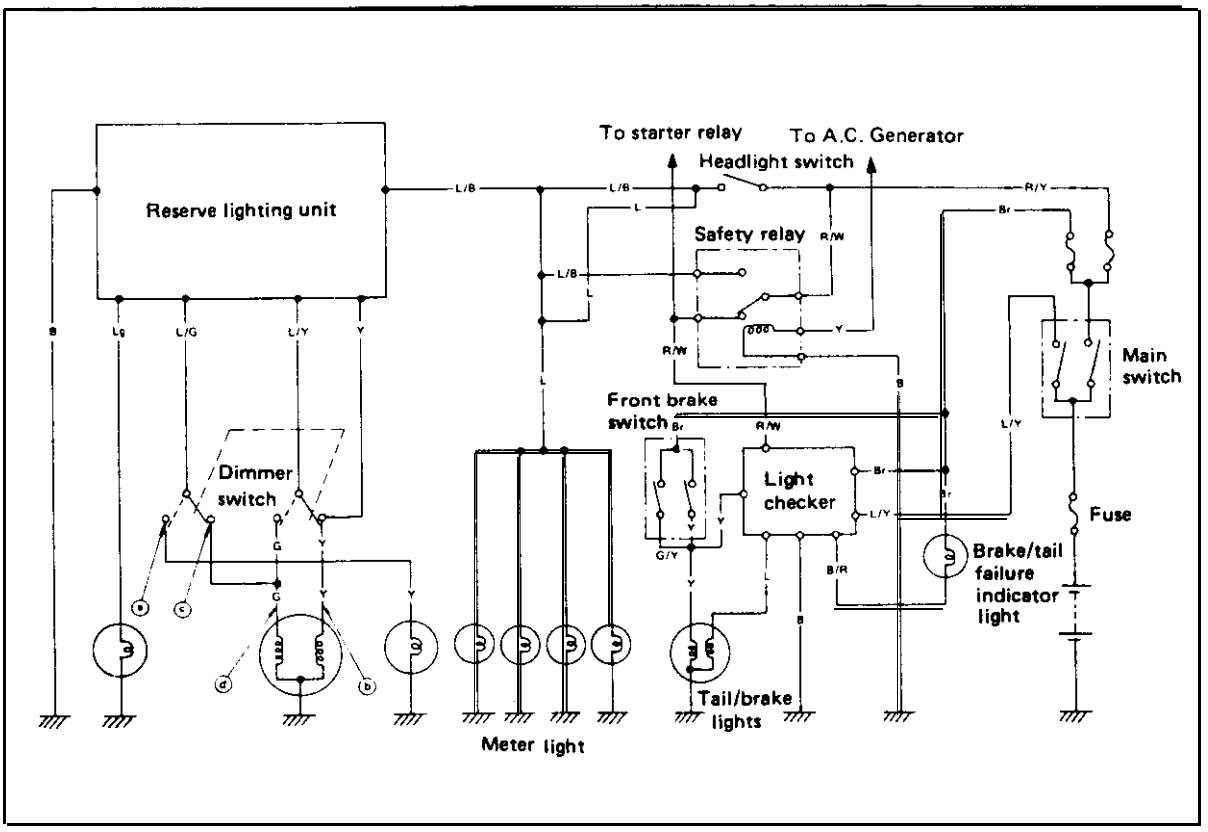

Check for battery voltage (12V) on "R/W" wire to safety relay
No Voltage
Check fuse "Head" or wiring circuit
Voltage O K
Check for voltage on "R/W" wire to safety relay
No Voltage
Check for starter relay or wiring circuit
Voltage O K
Check for battery voltage (12V) on "L/B" wire to safety relay
Replace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


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

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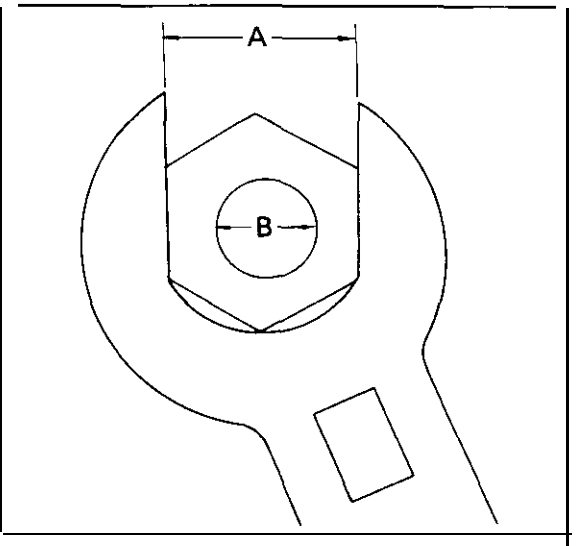
7-1. TORQUE SPECIFICATION

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)	1.0	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 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 (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-kg (9.4 ft-lb)
Spark plug	14 mm	2.0 m-kg (14.5 ft-lb)
Generator	12mm nut	3.8 m-kg 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)

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7-3. SPECIFICATION

A. General

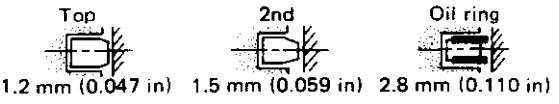
1. MODEL	
1) Model (I.B.M.No.)	XS650SE (2M0)
2) Frame I.D. and starting number	2F0-114241
3) Engine I.D. and starting number	2F0-114241
2. DIMENSION	
1) Overall length	2,120 mm (83.5 in)
2) Overall width	925 mm (36.4 in)
3) Overall height	1,225 mm (48.2 in)
41 Seat height	790 mm (31.1 in)
5) Wheelbase	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 I", | 75.75 mm (2.982 in) | 76.00 mm 12992 I",
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

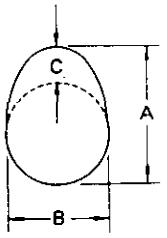
. CAMSHAFT

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)

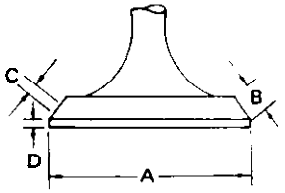
. VALVE, VALVE SEAT AND VALVE GUIDE

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)

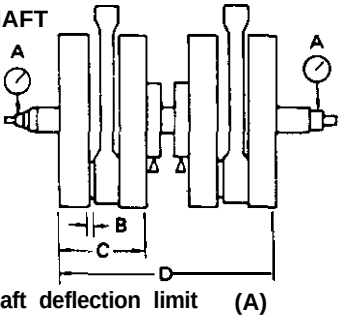


Valve face width "B"
IN: 2.1 mm (0.083 in)
EX: 2.1 mm (0.083 in)

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

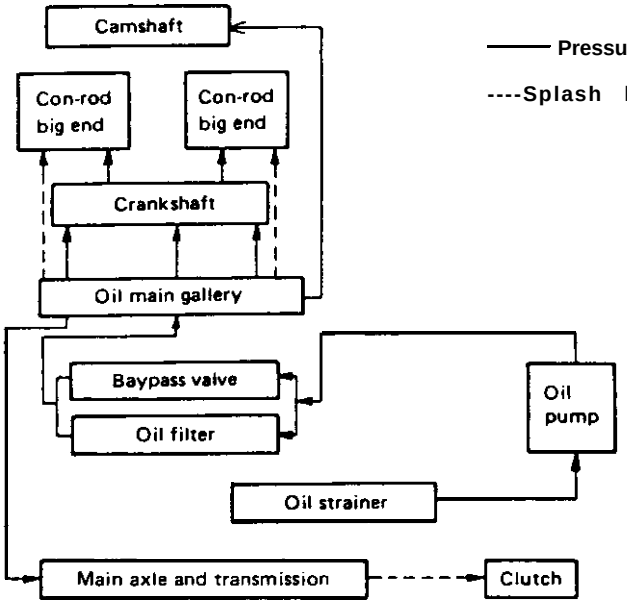
Valve margin thickness "D"
IN: 1.3 mm IO.051 in)
EX: 1.3 mm IO.051 in)

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 (234.1 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 (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)

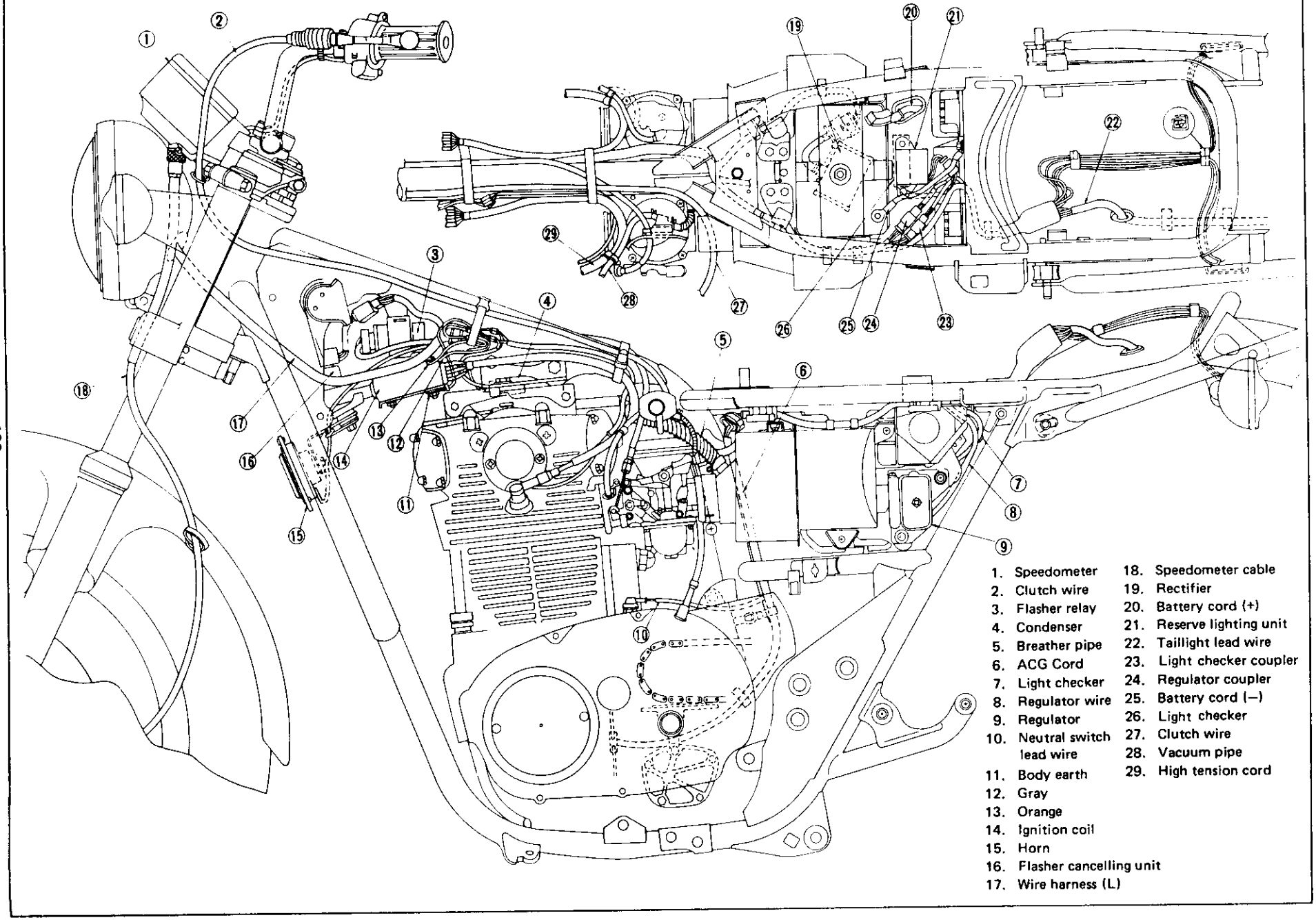
D. Electrical

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

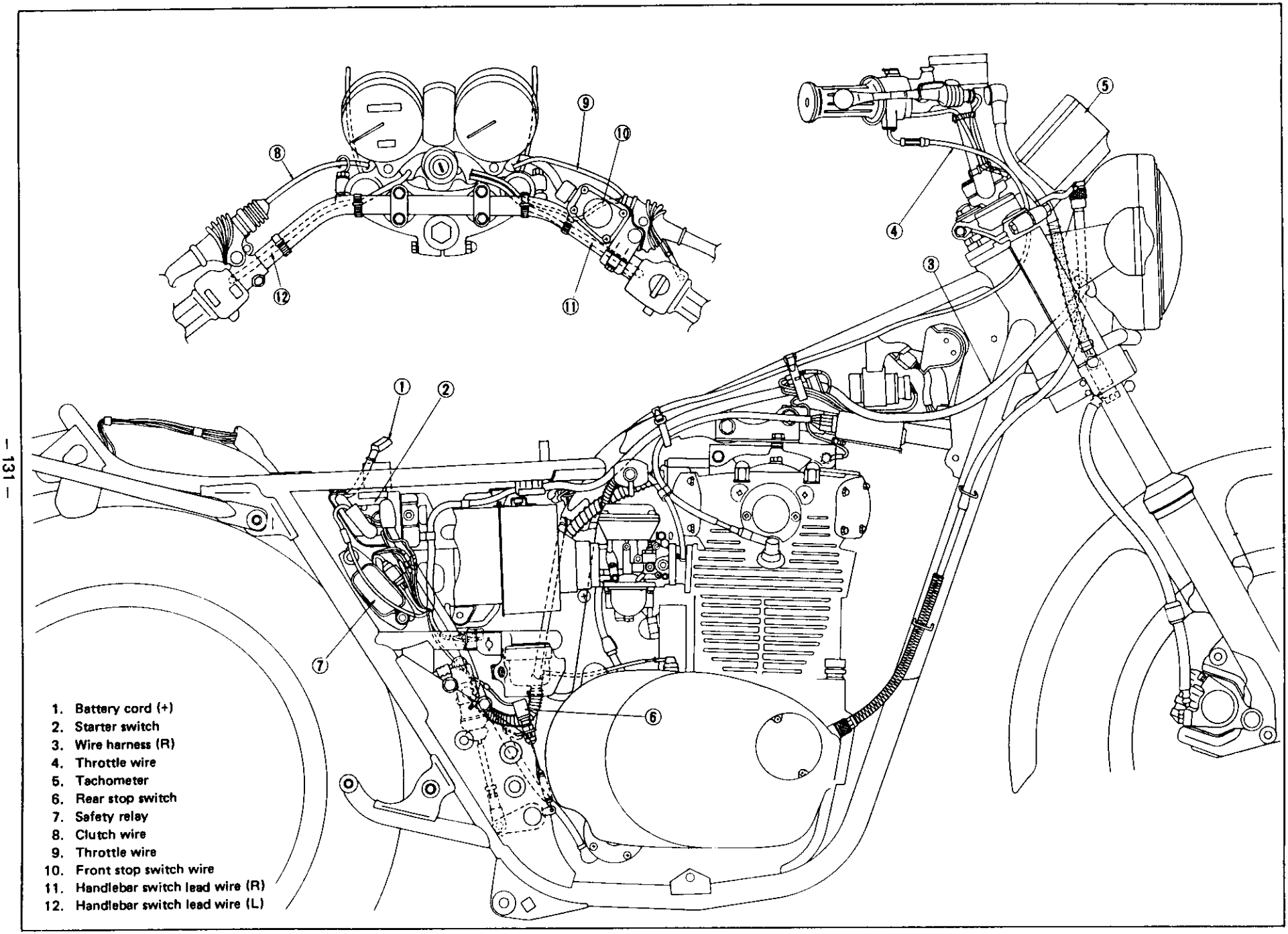
Primary winding resistance	3.9Ω ± 10% at 20°C (68°F)
Secondary winding resistance	8.0kΩ ± 20% at 20°C (68°F)
31 Spark plug	
Type	N-7Y (CHAMPION) or BP7ES (N.G.K.)
Spark plug gap	0.7 ~ 0.8 mm (0.027 ~ 0.031 in)
4) Contact breaker	
Manufacturer/Quantity	HITACHI/2 pcs.
Point gap	0.30 ~ 0.40 mm (0.012 ~ 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	Tilil 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

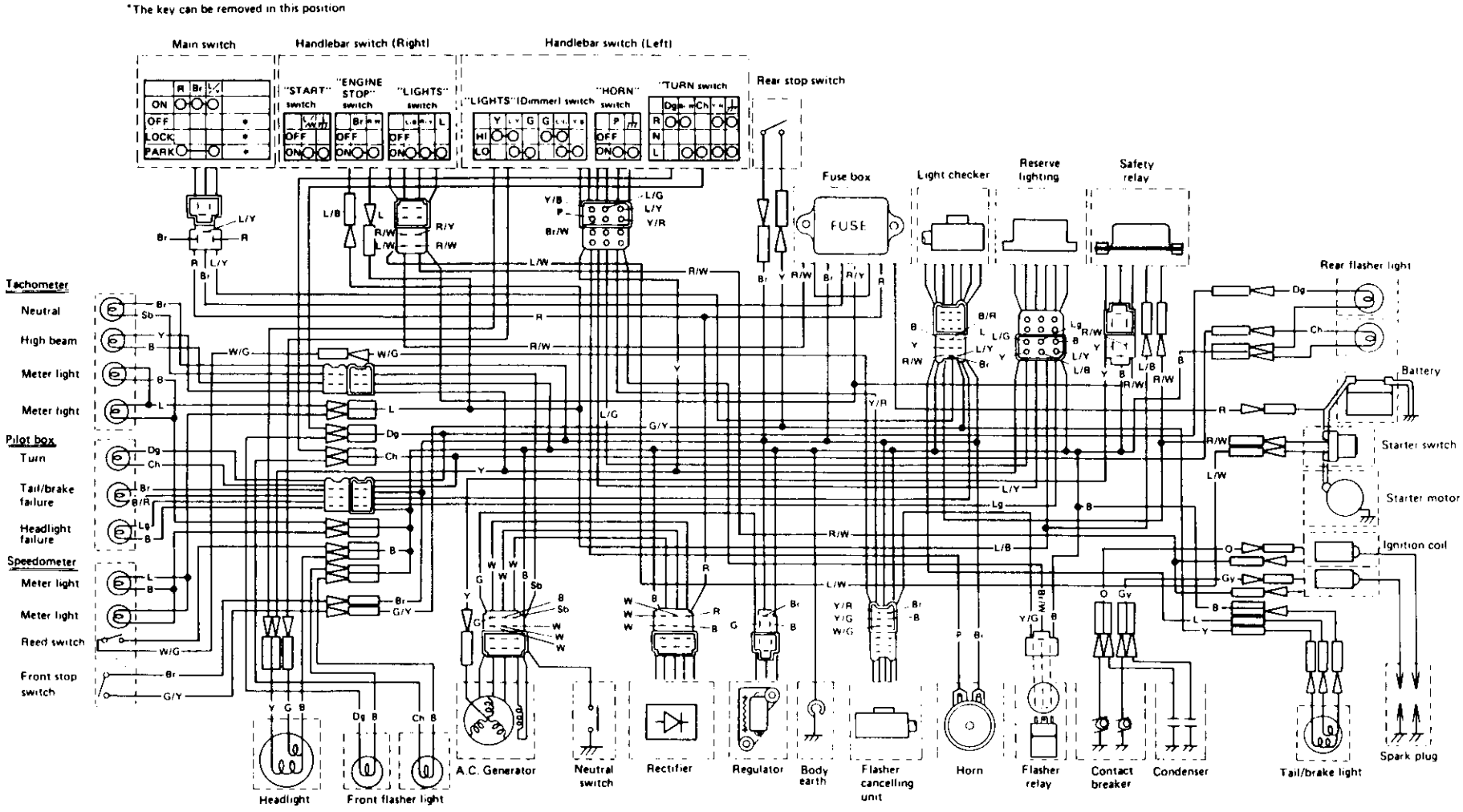
7-4 CABLE ROUTING DIAGRAM



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