

Lilac LS-18 Motorcycle Maintenance Standards Chart English Translation

The original of this manual was produced only in Japanese. The Marusho/Lilac Register has enlisted the assistance of **Mr. Michimasa Sugimoto** to undertake the tedious translation into English, for which we are **very grateful**. Editing and formatting was done by David Bernardi and Ralph Walker.

While we assume that this manual was produced for the LS-18/1, or early model, there are enigmatic references within it to specifications for the 'previous model', which would seem to imply that this was written for the /2 variant. In any case you will find that virtually all of the specifications apply to both models. Further, in the absence of much technical documentation for the other V-twin models, you should use this manual (applying common sense) when servicing the models LS-38 (250cc sport V-twin), MF-19 (300cc V-twin) and MF-39 (300cc sport V-twin). You may even find it has some value when servicing the CF-40 (125cc V-twin) and the 500cc opposed twins.

READ THIS: There is abundant room for error in this translation. There may have been typos in the original Japanese version and the three of us who participated in the production of this document each had a chance to introduce errors. While we feel confident that it is quite good, you should not assume it is perfect. If a specification looks suspicious, consult the original Japanese version. If you find errors PLEASE forward them to Ralph Walker.

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The pages are 8.25 x 11 inches and are meant to be readily printable on either US Letter or A4 paper.

The type font is CG Omega, which is embedded in the PDF (Portable Document Format) file.

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Lilac No. LS-18 Type Maintenance Standards Chart English Translation

What a comfortable ride this fast motorcycle has! This is the result of careful and thorough maintenance. It is essential to be familiar with motor cycle construction for proper and complete maintenance. The motor cycle will then perform as an extension of the rider's arms and legs. A motor cycle which has been maintained by a conscientious user will always perform safely and achieve its full capability.

With this in mind, this maintenance standards chart has been compiled to assist in maintenance. It gives dimensions, details of usage and brief notes about the type LS-18, which are needed to retain or restore like-new performance and safety.

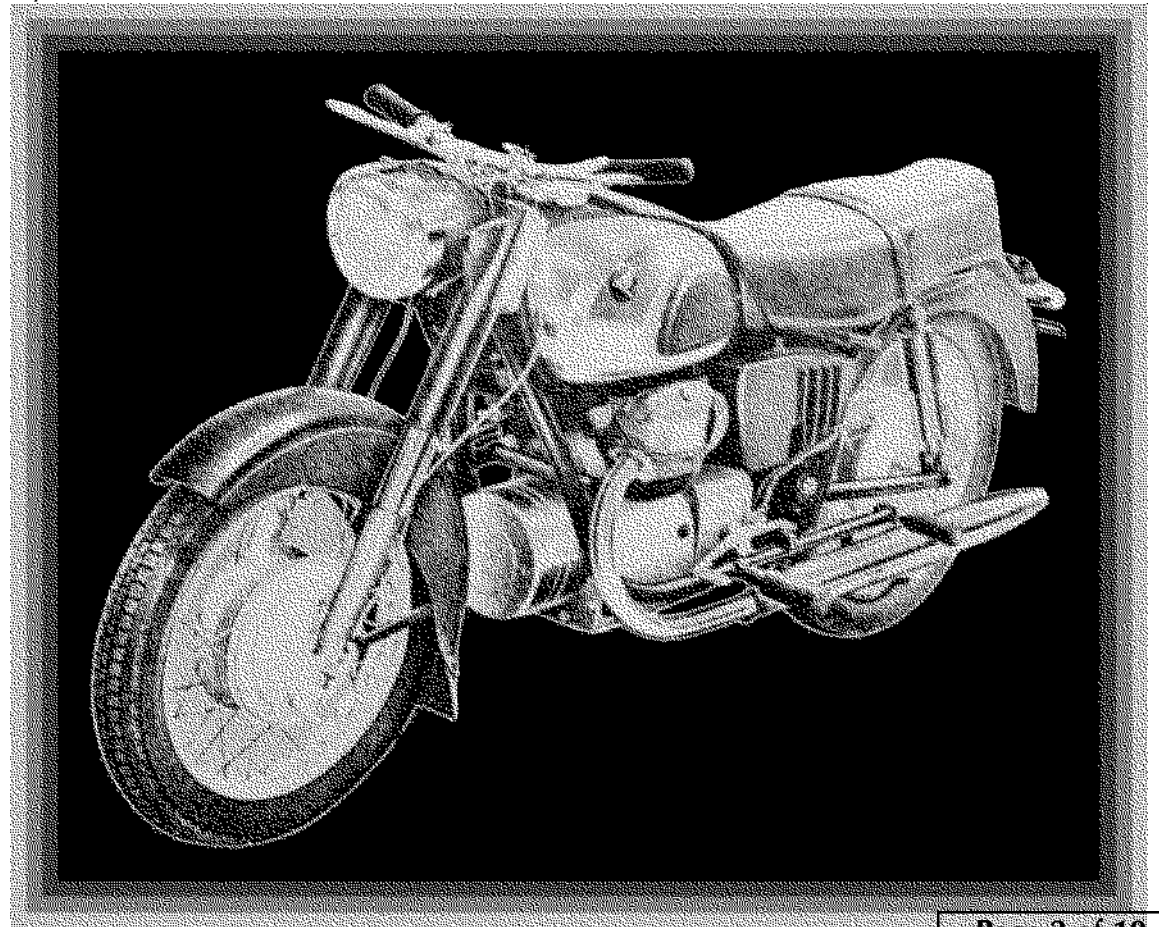
Explanation of Column Headings

Maintenance Item: Item or checkpoint necessary for maintenance

Standard: Dimensions and tolerances of new or repaired parts

Repair Limit: Limit of wear beyond which system becomes unusable without repair

Method: Counter measure or method necessary for maintenance



1: OVERHAUL CRITERIA

<i>MAINTENANCE ITEM</i>	<i>STANDARD</i>	<i>REPAIR LIMIT</i>	<i>METHOD</i>	<i>REMARKS</i>
Compression Pressure	8.45 kg/cm ² (120 lb/in ²)	5.9 kg/cm ² (84 lb/in ²)		Using Dyna Starter 500-600 RPM
Fuel Consumption	50 km/l (at 40 km/hr)	60% of normal consumption		
Oil Consumption	2550 km/l	1275 km/l		

2: ENGINE

(1) CYLINDER AND CYLINDER HEAD

<i>MAINTENANCE ITEM</i>	<i>STANDARD</i>	<i>REPAIR LIMIT</i>	<i>METHOD</i>	<i>REMARKS</i>	
Cylinder	Bore	54 ϕ \pm 0.01	54.1 ϕ	Boring	After boring honing should be performed
	Ovality	0.01	0.05	Boring	After boring honing should be performed
	Taper	0.01	0.05	Boring	After boring honing should be performed
	Oversize	0.25 steps	55 ϕ max.	Do R and L cylinders at same time / 4 steps	
Valve Seat	Width	0.8 - 1.0	1.3	Adjust	Use a cutter
	Angle	45°			
Combustion Chamber	Volume	18.2cc \pm 0.5cc			Remove carbon if heavy accumulation
Compression Ratio		7.8:1			
Head Gasket	Thickness	1.0			
Cylinder Head	Nut Torque	3.0 kg/m (22 ft.-lb.)	Out standard	Adjust	8mm nut
Intake and Exhaust Ports	Port Wall Surface	Must be smooth			Remove carbon
Intake and Exh. Valve Guides	OD	12 ϕ +0.09 +0.1			
	ID	7 ϕ +0.01 -0.0	7.06 ϕ	Exchange	
Intake Valve	Stem Diameter	7 ϕ -0.02 -0.03	6.9	Exchange	
	Head Thickness	1	0.7	Exchange	
Exhaust Valve	Stem Diameter	7 ϕ -0.02 -0.03	6.9	Exchange	
	Head Thickness	1	0.7	Exchange	
Intake and Exhaust Valve	Seat Face Width	Range 0.8~1.0	1.3	Use valve seat cutter	
	Intake Valve Guide	Clearance 0.02~0.04	0.08	Replace valve or guide	
Exhaust Valve Guide	Clearance 0.06~0.08	0.12	Replace valve or guide		
Valve Spring (Large)	Installed Load	10.2 kg	8.7 kg	Replace	Fitted length 31.5
	Free Length	36.5	34.7	Replace	
	Tilt	1.5/100	3/100	Replace	
Valve Spring (Small)	Installed Load	5.48 kg	4.65 kg	Replace	Fitted length 29.5

	Free Length	33.5	31.8	Replace	
	Tilt	1.5/100	3/100	Replace	
Rocker Arm	ID	12 \emptyset +0.00 +0.021	12.07 \emptyset	Replace	
Rocker Shaft	OD	12 \emptyset -0.06 -0.024	11.92 \emptyset	Replace	
Arm and Shaft	Clearance	0.045~0.006	0.10	Replace arm or shaft	
Tappet	Clearance	0.05	Out standard	Adjust	Measure cold at TDC
Rocker Arm Ball Surface		1.8"R -0.006 -0.024		Replace if severe wear	
Pushrod	Bend	0.1	0.5	Straighten	Over 100mm

(2) CRANKSHAFT, PISTON AND CONROD

<u>MAINTENANCE ITEM</u>	<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>	
Piston	OD @ Top	53.65 \emptyset \pm 0.02			
	Max Diameter	53.95 \emptyset \pm 0.015	53.85	Replace	
	Ovality	0.1			
Piston and Cylinder	Clearance	0.04~0.05	0.15	Replace	
Piston Ring Groove	Clearance	0.03~0.07	0.10	Replace	
Piston Oversize	Step	0.25		4 steps	
Top Ring and 2nd Ring	Thickness	2 -0.01 -0.03	1.92	Replace	
	Width	2.5 \pm 0.01	0.55kg		
	Tension	0.85 - 1.15kg	1	Replace	
	End Gap	0.15 - 0.35		Replace	
Oil Ring	Thickness	3.2 -0.01 -0.03	3.12	Replace	
	Width	2.5 \pm 0.1			
	Tension	1.0~1.3kg	0.65kg	Replace	
	End Gap	0.15~0.35	1	Replace	
Ring Gap Position		120° 3 equal spaces	Out standard	Adjust	Avoid Piston Pin Axis
Ring Oversizes		0.25 steps			4 steps
Piston Pin	OD	15 \emptyset -0.0 +0.006	14.95 \emptyset	Replace	
Pin Hole in Piston	ID	15 \emptyset +0.012 -0.0	15.05 \emptyset	Replace	
Pin and Piston	Clearance	-0.006 ~ +0.012	0.06	Replace	Hand push fit piston at 100°C
Conrod Small End Bush	ID	15 \emptyset +0.027 +0.016	15.07 \emptyset	Replace bush	
Conrod and Piston Pin	Clearance	0.01~0.027	0.07	Replace	
Crankpin	OD	24.94 \emptyset +0.0 +0.01	24.90 \emptyset	Replace	
Crankpin Roller	OD	5 \emptyset (+0.001 +0.003)	Refer to conrod ID for selective fit	Replace	3Sizes; 52 per assembly
		5 \emptyset (+0.0 -0.002)			
		5 \emptyset (-0.003 -0.005)			
Conrod	ID	34.95 \emptyset +0.03 +0.024	35.02 \emptyset		
	Axial Play	0.2~0.4	0.5	Adjust	
	Radial Play	0.026~0.036	0.06	Replace	
	Weight	190g			

Crankpin Bolt	Torque	8.3 kg/m (60 ft.lb.)	Out standard	Adjust	
Conrod Big and Little End	Skew	0.2	1.0	Adjust or replace	@ 100mm
	Runout	0.02	0.04	Adjust or replace	@ 100mm
	Parallel	0.05	0.1	Adjust or replace	@ 100mm
	Centers	118 ±0.05			
Crankshaft	Axial Play	0.2~0.05	0.5	Shim	Shim thickness 0.2
	Runout	0.02	0.1	Adjust	Support at bearing diameters, measure at Dynamo taper

(3) CRANKCASE AND CAMSHAFT

<u>MAINTENANCE ITEM</u>		<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>
Assembly Face	Parallel	< 0.02	> 0.05	Adjust	
Left and Right Cyl. Mounts	Offset	14 ±0.1			
	Angle	66° ± 30"			
Cam Gear	Backlash	0.01 ~ 0.04	0.3		
Camshaft	Cam Lift	4	3.5	Replace	
	Axial Play	0.05 ~ 0.1	0.5	Shim	
Intake Valve Timing	Open	B.T.D.C. 35°	± 5°	Adjust	Measure with 0.3 clearance
	Close	A.B.D.C. 60°	± 5°	Adjust	Measure with 0.3 clearance
Exhaust Valve Timing	Open	B.B.D.C. 60°	± 5°	Adjust	Measure with 0.3 clearance
	Close	A.T.D.C. 35°	± 5°	Adjust	Measure with 0.3 clearance
Tappet Surface	Wear	Surf. finish 0.4--S	0.4	Replace	If little wear, resurface
Tappet Bush Hole in C/case	ID	12ø +0.021 -0.0			Insert Bush
Tappet Bush	ID	10ø +0.021 -0.0	10.07ø	Replace	Ream after insertion
Tappet	OD	10ø -0.011 -0.028	9.92ø	Replace	
Tappet and Bush	Clearance	0.011 ~ 0.049	0.10	Replace	

(4) OIL PUMP

<u>MAINTENANCE ITEM</u>		<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>
Pump and Crank Gear	Backlash	0.03 ~ 0.08		Replace gears	Can be used if no noise
Internal Pump Gears	Backlash	0.07 ~ 0.1	0.2	Replace	
Internal Gears Side Face	Clearance	0.03 ~ 0.08	0.15	Replace	
Tooth Tip and Side Wall	Clearance	0.05 ~ 0.1	0.15	Replace	
Gear Shafts and Gears	Play	0.005 ~ 0.03	0.05	Replace	
Oil Filter				Remove foreign objects /	Must be clean
Oil Passages	Clogging			Check for clogging	Must be clean

(5) CLUTCH

<u>MAINTENANCE ITEM</u>		<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>
Friction Facing	Thickness	3.5 +0.0 +0.02	2.5	Replace	
	Bend	0.2	0.5	Adjust or Replace	
Springs	Free Length	31.2 +0.2 -0.0	29.6	Replace	
	Tension	15 kg	12.7 kg	Replace	Measure at fitted length 18
Flywheel and Pressure Plate	Backlash	0.1~0.2	1.0	Replace	
Flywheel and Outer Plate	Backlash	0.1~0.2	1.0	Replace	
Release Rod	Bend	<0.2	>0.5	Adjust	

(6) TRANSMISSION

<u>MAINTENANCE ITEM</u>		<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>
Main Shaft	Axial Clearance	0.05~0.15	0.3	Adjust with shim	
Spline Shaft	Axial Play	0.05~0.15	0.3	Adjust with shim	
Counter Shaft	Axial Play	0.05~0.15	0.3	Adjust with shim	
Ratchet Gear	Height of Teeth	3.0	2.5		
Other Gears	End Float	0.04~0.06			Use unless noisy
Shift Fork Shaft	OD	10 ϕ -0.013 -0.028	9.9 ϕ	Replace	
Shift Fork	ID	10 ϕ +0.0 +0.017	10.1 ϕ	Replace	
	Tip Thickness	5 -0.3 -0.25	4.2	Replace	
Shift Fork and Shaft	Clearance	0.013~0.045	0.1	Replace	
Change Arm and Shaft	Clearance	0.01~0.035	0.1	Replace	
Change Shaft and Metal	Clearance	0.028~0.077	0.2	Replace change shaft metal	
Each Bearing in Gearbox	Axial Play	0.01~0.02	0.1	Replace	
	Radial Play	0.007~0.022	0.05	Replace	

(7) CARBURETTOR

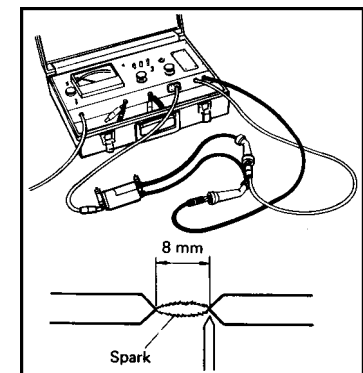
Carburettor	Type	VM22H			Setting No. VM22-5
Main Jet	Number	180 (170)			() = previous model
Needle Jet	Number	0-0			
Needle	Number	22M ₂ -4			
Cutaway	Height	2.5			
Air Jet	ID	1.3			
Pilot Jet	Number	25 (15)			
Bypass	ID	1.4			
Pilot Outlet	ID	0.5			
Air Screw	Turns Out	1 3/4 (1 1/2)	Out standard	Adjust	
Throttle Valve and Body	Clearance	0.5~0.8	0.2	Replace	

(8) DYNASTARTER, RELAY, CONTACT POINTS, IGNITION, SPARK PLUGS

<u>MAINTENANCE ITEM</u>		<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>
Dynastarter	Model	Mitsubishi CB-EL			
Brushes	Thickness x Width x Length	4x12.5x17	< 11	Replace	
Commutator	OD	40ø	38ø	Repair or Replace	Repair if grooved
Commutator	Undercut	0.5	0	Adjust	
Field Coil	Part-wound Coils Resistance __ ohms *		Out standard	Repair	
	Direct-wound Coils Resistance __ ohms *		Out standard	Repair	
* These two values are missing from the original document. If you have a revision which shows these values, please forward them to the editor					
Starter Output	Power	0.25 kW			
	Torque	1.6 kg/m			
Dynamo Output		100 W			Start charge 1500 rpm; Full output 1900 rpm
Contact Points	Gap	0.35 ± .05	Out standard	Adjust	
	Spring Force	0.55 ~ 0.65 kg	Out standard	Replace	
	Condenser	0.25µF ± 10%	Out standard	Replace	
Ignition Timing	Full Advance	37°			3000rpm
	Idle	5° BTDC			700rpm
Fixed Voltage Relay	Air Gap	1.00 ± .1	Out standard	Correct	When contact point is 1N
	Voltage	14.5V ± 0.5V	Out standard	Adjust	Adjust @ 3000 rpm no load
Automatic Charging Switch	Point Gap	0.5 ± 0.1	Out standard	Adjust	
	Air Gap	0.8 ± 0.1	Out standard	Adjust	When contact point OFF
	Voltage Adj. Value	Contact Point 1N: 13.5V ± .5V /	Out standard	Correct	
		Contact Point OFF: > 8V			
Starter Solenoid	Point Gap	1.00 ± .2	Out standard	Repair or replace	
	Pull In	> 8V	Out standard	Adjust or replace	
	Drop Out	< 3V			
Stator and Rotor	Clearance	0.6	Out standard	Adjust or replace	
Coil Spark Function	3 Point Spark Gap*	> 9mm	< 6mm	Replace coil	12V 500rpm
	* Also known as '3 needle test: See diagram below'				
Spark Plugs	Type	BC 6E			NGK

* NOTES ON '3 NEEDLE TEST': The editors are not familiar with this procedure, but a reference was found in a Suzuki shop manual, and is reprinted here. Perhaps the physics involved in the use of the third needle will be apparent to you: 'Inspection / Ignition Coils (Checking with Electro Tester) / Using the electro tester, test each ignition coil for sparking performance. The test connection is as indicated. Make sure that the three-needle sparking distance is at least 8 mm. If no sparking, or orange sparking color occurs with this much gap, then the coil is defective and must be replaced'.

IMPORTANT CAUTION WHEN REMOVING SPARK ADVANCE MECHANISM: The long bolt (part L8-504) which secures the advance mechanism to the rotor has a **left-hand thread**. The rotor extraction thread used with the special puller bolt has a right-hand thread.



3: CHASSIS

(1) HANDLEBAR AND FRONT FORK

<i>MAINTENANCE ITEM</i>		<i>STANDARD</i>	<i>REPAIR LIMIT</i>	<i>METHOD</i>	<i>REMARKS</i>
Throttle Grip	Free Play	3~5	Out standard	Adjust	Measure at grip OD
Brake Lever	Free Play	20~30	Out standard	Adjust	Measure at lever end
Clutch Lever	Free Play	10~20	Out standard	Adjust	Measure at lever end
Fork Legs	Runout	0.05	Out standard	Adjust or replace	Per 100mm
	Parallel	0.05	Out standard	Adjust or replace	Per 100mm
	Square	90°	Out standard	Adjust or replace	
Caster	Angle	63°	Out standard	Adjust or replace	
Trail	Length	80			
Front Damper	Travel	130	Out standard	Adjust or replace	
	Oil Quantity	210cc	Repair if leak	Adjust or replace	#2 grade damper oil
Steering Head Clamping Nut	Torque	8.3 kg/m (60 ft.lb)	Out standard	Adjust	

(2) FRAME

<i>MAINTENANCE ITEM</i>		<i>STANDARD</i>	<i>REPAIR LIMIT</i>	<i>METHOD</i>	<i>REMARKS</i>
Frame	Bend			Repair	
	Crack			Repair	
Steering Head Bearings	Clearance	0.047~0.11	0.03	Adjust or Replace	
Pivot Hole of Brake Pedal	ID	15 \emptyset +0.027 -0.0	15.1 \emptyset	Replace	
Brake Pedal Pivot	OD	15 \emptyset -0.016 -0.043	14.85 \emptyset	Repair	
Brake Pedal and Pivot	Clearance	0.07~0.016	0.15	Adjust or Replace	
Seat Fastening Metal	ID	24 \emptyset -0.01 -0.05	24.0 \emptyset	Repair	
Saddle Pivot Rubber	OD	24 \emptyset +0.021 +0.004	24.03 \emptyset	Replace	Should not rotate
	ID	10 \emptyset +0.1 +0.3			
Saddle Pin	OD	10 \emptyset			
Saddle Metal and Pivot Rubber /	Clearance	0.071~0.014	0.02	Replace	
Pivot Rubber and Saddle Pin	Clearance	-0.15~0.55			Should not rotate
Brake Pedal	Travel	20~30	Out standard	Adjust	

(3) REAR FORK, BEVEL CASE, FRONT BRAKE

<i>MAINTENANCE ITEM</i>		<i>STANDARD</i>	<i>REPAIR LIMIT</i>	<i>METHOD</i>	<i>REMARKS</i>
Rear Fork Pivot Tube	Hole ID	28 \emptyset -0.018 -0.042	28.02 \emptyset	Repair	
Rubber Bush	OD	28 \emptyset +0.030 -0.0	27.98 \emptyset	Replace	
	ID	12.3 \emptyset +0.02 -0.0	12.7 \emptyset	Replace	

Rear Fork Pivot Shaft	OD	12 \emptyset +0.1+0.15	12.0 \emptyset		
Pivot Tube Rubber	Press Fit	0.018~0.072	0.015		
Rubber and Pivot Shaft	Clearance	0.15~0.4			
Joint Rubber	ID	10.2 \emptyset +0.15 -0.0	11 \emptyset	Replace	
Drive Shaft	Joint Pin Hole	10 \emptyset +0.01 -0.02	10.1 \emptyset	Replace	
	Bend	0.1	0.5	Repair or replace	Per 100mm
Joint Pin	OD	10 \emptyset -0.02 -0.03	9.9 \emptyset	Replace	
Joint Slider Block	ID	10 \emptyset +0.02 -0.01	10.15 \emptyset	Replace	
Joint Pin and Drive Shaft	Clearance	0~0.04	0.1	Replace	
Joint Pin and Slider Block	Clearance	0.01~0.05	0.15	Replace	
Bevel Gear and Ring Gear	Backlash	0.05~0.1		Adjust with shim	Use if no noise
Bevel Case Brake Cam Hole	ID	15 \emptyset +0.035 -0.0	15.1 \emptyset	Replace	
Bevel Case Brake Cam	Thickness	8 \pm 0.25			
	OD	15 \emptyset -0.014 -0.052	14.9	Replace	
Case and Brake Cam Hole	Clearance	0.014~0.087	0.1	Replace	
Front Brake Cam Hole	ID	15 \emptyset +0.035-0.0	15.1 \emptyset	Replace	
Front Brake Cam	Thickness	8 \pm 0.25			
	OD	15 \emptyset -0.014 -0.052	14.9	Replace	
Front Brake Cam Hole and Cam /	Clearance	0.014~0.087	0.1	Replace	
Rear Brake Lining	Thickness	4.5	3.5	Replace	
Front Brake Lining	Thickness	4.5	3.5	Replace	

(4) WHEELS AND REAR SUSPENSION

<u>MAINTENANCE ITEM</u>	<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>	
Front Wheel Ball Bearings	Axial Play	0.01~0.02	0.1	Replace	
	Radial Play	0.007~0.022	0.05	Replace	
Rear Wheel Ball Bearings	Axial Play	0.01~0.02	0.1	Replace	
	Radial Play	0.007~0.022	0.05	Replace	
Front Rim	Side Runout	1.0	> 3	Adjust	
Rear Rim	Side Runout	1.0	> 3	Adjust	
Front Tyre	Air Pressure	1.7 kg/cm ²	1.4~2.1 kg/cm ²	Adjust	
Rear Tyre	Air Pressure	2.2 kg/cm ²	1.7~2.5 kg/cm ²	Adjust	
Front Brake Drum	ID	178 \emptyset -0.0+0.1	180 \emptyset	Replace	
Rear Brake Drum	ID	178 \emptyset -0.0+0.1	180 \emptyset	Replace	
Front Axle	Bend	0.05	Out standard	Adjust	Support ends in V, measure in center
Rear Axle	Bend	0.05	Out standard	Adjust	Support ends in V, measure in center
Rear Cushion	Stroke	80			
	Oil Quantity	45cc			
	Max Damping Force	220kg		Repair if leakage is evident / Repair	

(5) ELECTRICAL ACCESSORIES

<u>MAINTENANCE ITEM</u>		<u>STANDARD</u>	<u>REPAIR LIMIT</u>	<u>METHOD</u>	<u>REMARKS</u>
Headlight Bulb	Capacity	12V 35,25W			
Charge Bulb	Capacity	12V 3W			
Neutral Bulb	Capacity	12V 3W			
3rd gear Bulb	Capacity	12V 3W			
Meter Bulb	Capacity	12V 3W			
Stop Light Bulb	Capacity	12V 10W			
Tail Light Bulb	Capacity	12V 5W			
Flasher Relay	Capacity	12V 20W /			
	Speed	70 - 80	50 - 120	Flashes / minute	
Flasher Bulb	Capacity	12V 10W			
Battery	Type	YSB MBM 5-6			Use 2 in series
	Voltage	6V	Out standard	Repair or Replace	
	Current	10AH		Recharge	10 hour rate
	Acid Quantity	0.33 litres	Within marks		
	Specific Gravity	1.260	< 1.22	Recharge	Measured at 20° C
Fuse	Rating	10A			
Speedometer	Tolerance	- 0 + 10%		Replace	