YAMAHA

Supplementary

DT2·RT2

YAMAHA

LIT 11613-08-00

******* NOTICE *******

This manual has been written by Yamaha Motor Company for use by Authorized Yamaha Dealers and their qualified mechanics. In light of this purpose it has been assumed that certain basic mechanical precepts and procedures inherent to our product are already known and understood by the reader.

Without such basic knowledge, repairs or service to this model may render the machine unsafe, and for this reason we must advise that all repairs and/or service be performed by an Authorized Yamaha dealer who is in possession of the requisite basic product knowledge.

Other information is produced by the U.S. distributor, Yamaha International Corporation, and is necessary to provide total technical coverage regarding the product.

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The Research, Engineering, and Service Departments of Yamaha are continually striving to further improve all models manufactured by the company. Modifications are therefore inevitable and changes in specifications or procedures will be forwarded to all Authorized Yamaha Dealers and will, where applicable, appear in future editions of this manual.

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YAMAHA DT2-RT2, SUPPLEMENTARY SERVICE MANUAL

1st Edition

July 1971

ENGINEERING & SERVICE DEPARTMENT
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FOREWORD

New Yamaha DT2 and RT2—improved versions of the DT1 and RT1—have been put on the market. These two models feature the unique design of the engine which is quite new to the field of motorcycle engineering.

This Supplementary Service Manual furnishes the technical information required to service these new machines. In providing your service jobs, the use of the DT1E and RT1B Service Manual is also advisable.

YAMAHA MOTOR CO., LTD.

ENGINEERING & SERVICE DEPARTMENT

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Specifications

Model:	YAMAHA 250 DT2
Dimensions:	
Overall length	82.7 in. 2,100 mm.
Overall width	35.0 in. 890 mm.
Overall height	45.7 in. 1,160 mm.
Wheelbase	54.7 in. 1,390 mm.
Min. ground clearance	10.0 in. 255 mm.
Weight:	
Gross	
Net	258 lbs. 117 kg
Performance:	
Max. speed	75 mph (120 km/h) or more
Fuel consumption	94.1 mile/US gal (31) mph
(on paved level roads)	
Climbing ability	35°
Min. turning radius	78.7 in. 2,000 mm.
Braking distance	49 ft. at 31 mph (15 m at 50 km/h)
Engine:	
Model	DT1
Type	2 stroke, gasoline, 7 port & Piston-Reed valve
Lubricating system	Separate lubrication (Yamaha Autolube)
Cylinder	Single, forward inclined, 7 port
Displacement	15.01 cu. in. (246 c.c.)
Bore ×Stroke	2.756 x 2.520 (70 x 64 mm.)
Compression ratio	6.8 : 1
Max power	24 BHP/7,000 r.p.m.
Max torque	18.3 ft-lbs./6,000 r.p.m. 2.53 kg-m/6,000 r.p.m.
Starting system	Primary-coupled kick starter system
Ignition system	Flywheel magneto ignition
Carburetor:	
Type	(VM26SH) X 1
Air cleaner:	Wet, foam rubber
Transmission:	
Clutch	Wet, multiple-disk
Primary reduction system	Helical gear
Primary reduction ratio	3.095 (65/21)

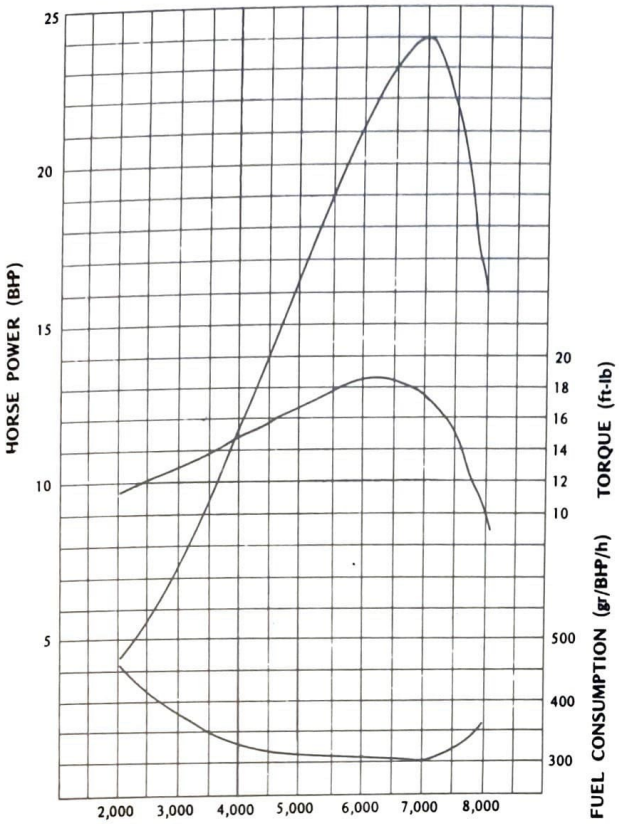
Gear Box:	
Type	Constant mesh, 5-speed forward
Reduction ratio lst	38/15 2.533
2nd	34/19 1.789
3rd	30/23 1.304
4th	26/26 1.000
5th	23/30 0.766
Secondary reduction system	Chain
Sécondary reduction ratio	3.142 (44/14)
Chassis:	
Frame	Tubular-Double loop
Suspension Type , front	Telescopic fork
Suspension Type , rear	Swinging arm
Suspension system, front	Coil spring, oil damper
Suspension system, rear	Coil spring, oil damper
Steering system:	
Steering angle	49° both right and left
Caster	60°30′
Trail	5.1 in. 130 mm.
Braking system:	
Type of brake	Internal expansion
Operation system, front	Right hand,
Operation system, rear	Right foot,
Tire size:	
Front	3.25-19-4PR
Rear	4.00-18-4PR
Dynamo:	
Model	FZA-1B.L
Manufacturer	Mitsubishi Elec.
Battery:	
Model	(6N4−2A−2)X1
Manufacturer	Nippon Battery
Capacity	6V 4AH
Lighting:	
Headlight	6V 35W/35W
Flasher light	6V 17W
Stoplight, Taillight	6V 17W , 5.3W
Meter light	6V 3W×2
Tanks:	
Gasoline tank capacity	2.5gals. (9.5liters)
Oil tank capacity	1.7qts. (1.6liters)

Model:	YAMAHA 360 RT2
Dimensions:	
Overall length	82.7 in. 2,100 mm.
Overall width	35.0 in. 890 mm
Overall height	45.7 in. 1,160 mm.
Wheelbase	54.7 in. 1,390 mm.
Min. ground clearance	10.0 in. 255 mm.
Weight:	
Gross	
Net	258 lbs. 117 kg
Performance:	
Max. speed	83 mph (133 km/h) or more (std.)
Fuel consumption	82.5 mile/US gal (37) mph
(on paved level roads)	
Climbing ability	35
Min. turning radius	78.7 in. 2,000 mm.
Braking distance	49 ft. at 31 mph (15 m at 50 km/h)
Engine:	
Model	RT1
Type	2 stroke, gasoline, 7 port & Piston Reed Valve
Lubricating system	Separate lubrication (Yamaha Autolube)
Cylinder	Single, forward inclined, 7 port
Displacement	21.42 cu. in. (351 c.c.)
Bore X Stroke	3.150X2.756 in. (80X70 mm.)
Compression ratio	6.3 : 1
Max power	32 BHP/6,000 r.p.m.
Max torque	27.7 ft-lbs./5,500 r.p.m. 3,83 kg-m/5,500 r.p.m.
Starting system	Primary-coupled kick starter system
Ignition system	Flywheel magneto ignition system
Carburetor:	
Type	(VM32SH) X 1
Air cleaner:	Wet, foam rubber
Transmission:	
Clutch	Wet, foam rubber
Primary reduction system	Helical gear
Primary resuction ratio	65/21 3.095

Gear Box:	
Type	Constant mesh, 5-speed forward
Reduction ratio 1st	38/15 2.533
2nd	34/19 1.789
3rd	30/23 1.304
4th	26/26 1.000
5th	23/30 0.766
Secondary reduction system	Chain
Secondary reduction ratio	39/15 2.600
Chassis:	
Frame	Tubular-Double loop
Suspension Type, front	Telescopic fork
Suspension Type, rear	Swinging arm
Suspension system, front	Coil spring, oil damper
Suspension system, rear	Coil spring, oil damper
Steering system:	
Steering angle	49° both right and left
Caster	60 30'
Trail	5.1 in. 130 mm.
Braking system:	
Type of brake In	Internal expansion
Operation system, front	Right hand,
Operation system, rear	Right foot,
Tire size:	
Front	3.25-19-4PR
Rear	4.00-18-4PR
Magneto	
Model	FZA-1B.L
Manufacturer	Mitsubishi Elec.
Battery:	
Model	(6N4−2A−2) x 1
Manufacturer	Nippon Battery.
Capacity	6V 4AH
Lighting:	
Headlight	6V 35W/35W
Flasher light	6V 17W
Stoplight, Taillight	6V 17W, 5.3W
Meter light	6V 3WX2
Miscellaneous:	
Tank capacity	2.5 gals. (9.5 liters)
Oil tank capacity	1.7 qts. (1.6 liters)
Gear box capacity	1.0 qus. (1.0 liters)

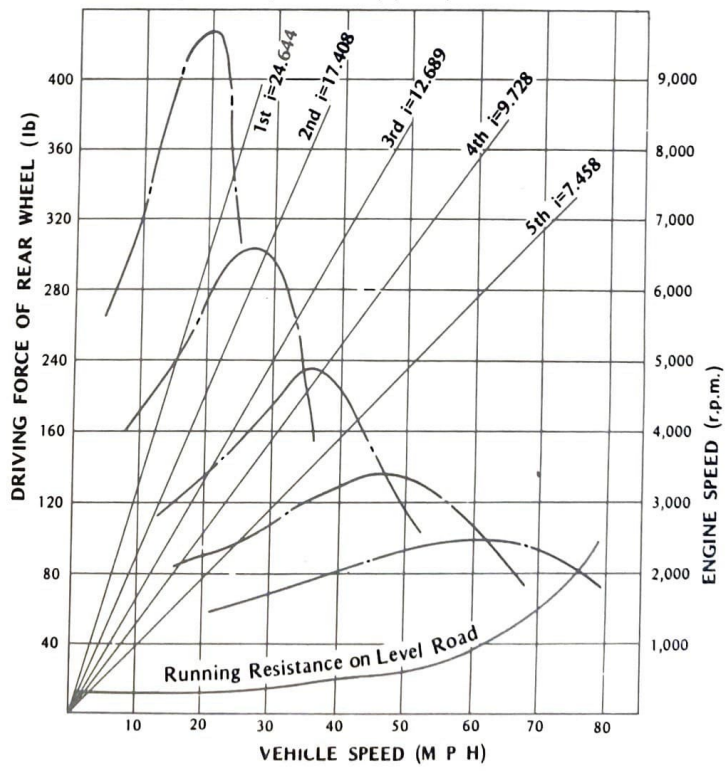
250 DT2 ENGINE PERFORMANCE CURVES

Maximum Power 24ps/7,000 rpm
Maximum Torque 18.3 ft-lb/6,000 rpm



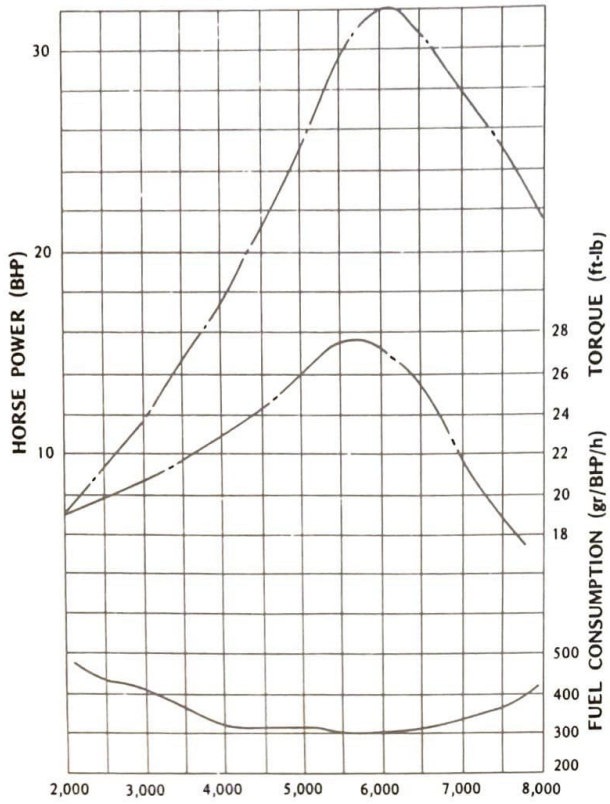
250 DT2 DRIVING PERFORMANCE CURVES

Maximum Power 24 BHP/7,000 rpm
Maximum Torque 18.3 ft-lb/6,000 rpm



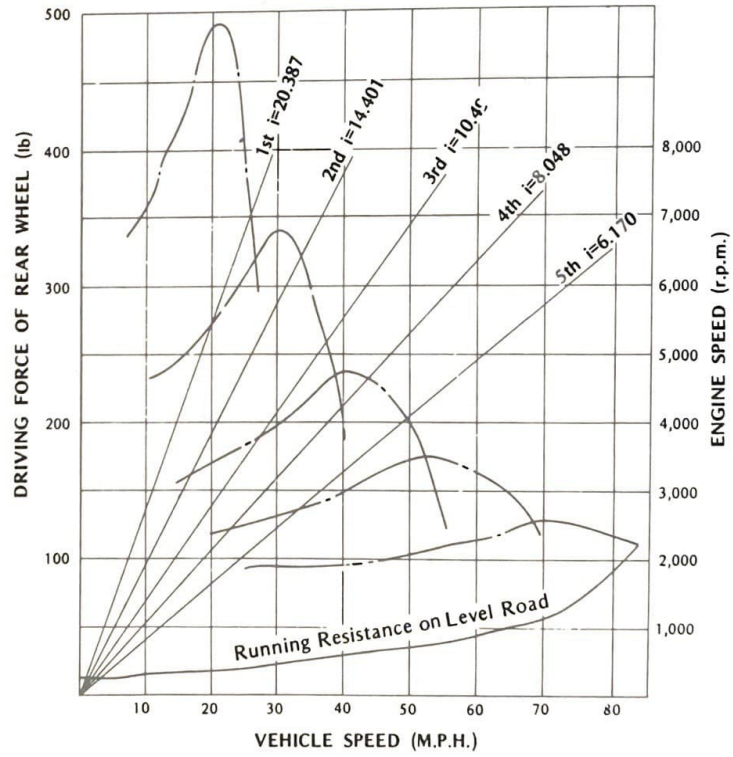
360 RT2 ENGINE PERFORMANCE CURVES

Maximum Power 32BHP/6,000 rpm
Maximum Torque 27.7 ft-lb/5,500 rpm



360 RT2 DRIVING PERFORMANCE CURVES

Maximum Power 32 BHP/6,000 rpm
Maximum Torque 27.7 ft-lb/5,500 rpm



3. Reed Valve-construction and Handling

Construction of the Reed Valve

a. Valve

The valve is made of special flexible stainless steel and designed to open and close the inlet port.

b. Case

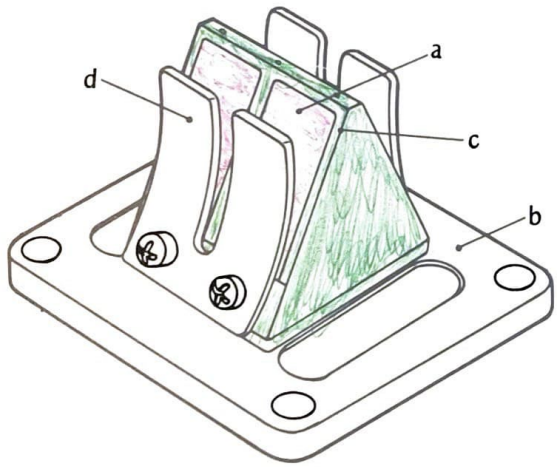
The case is made of a die-cast aluminum alloy.

c. Gasket

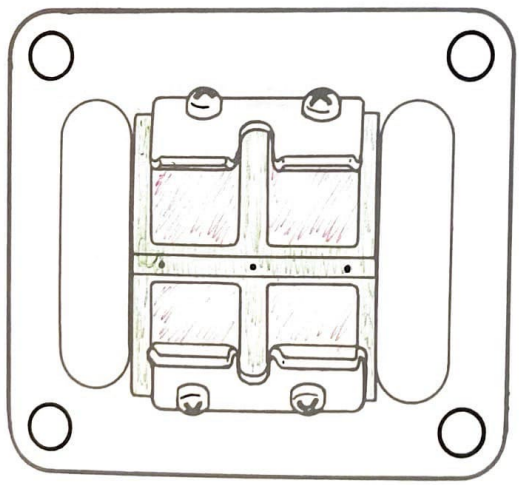
Made of heat-and oil-resisting rubber, the gasket is "welded" to the case by heat.

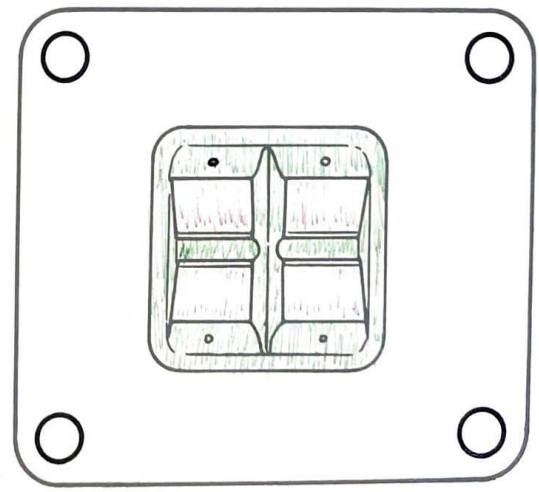
d. Valve Stopper

The valve stopper is made of highly-durable cold-rolled stainless steel plate, and controls the movement of the valve.



a. Valve
b. Case
c. Gasket
d. Valve stopper





Handling of the Reed Valve

As explained earlier, the reed valve is operated by changes in the crankcase pressure and by the inertia effect of the fuel-air mixture stream. It is a high-precision work, and therefore, it must be handled with special care.

a. Storage

The reed valve must be stored in a clean and dry place and must not be exposed to the sun. Particularly, it must be kept free from salt. Avoid allowing your hand to touch the valve.

b. Inspection

(a) Valve

Check the valve for cracks and breakage.

(b) Valve stopper

The valve stopper limits the movement of the reed valve. The movement of the valve end measured from the gasket is controlled to a certain limit.

Normal movement: DT2 . . . . . 9.3 + 0.3 mm

RT2 . . . . . 9.3 + 0.3 mm

* If the valve stopper is positioned more than the specified distance from the gasket, it will shorten the life of the valve and poor performance will result.

(c) Set-screw

The valve and valve stopper should be fastened with the set-screw. Tightening torque should be correct; otherwise, the valve and valve stopper will be deformed.

Correct tightening torque: 8.0 kg-cm

(d) Gasket

The gasket is "welded" to the case by heat. It should be checked for separation from the case. If the gasket becomes loose, it may fail to achieve a good seal with the valve.

c. Valve Service

The reed valve can not be perfect, if any of its componets—valve, valve stopper, gasket case and set-screw—is faulty. If so, it is advisable to replace the whole assembly, instead of replacing a faulty aprt.

4. What is the 7-port, Piston Reed Valve System

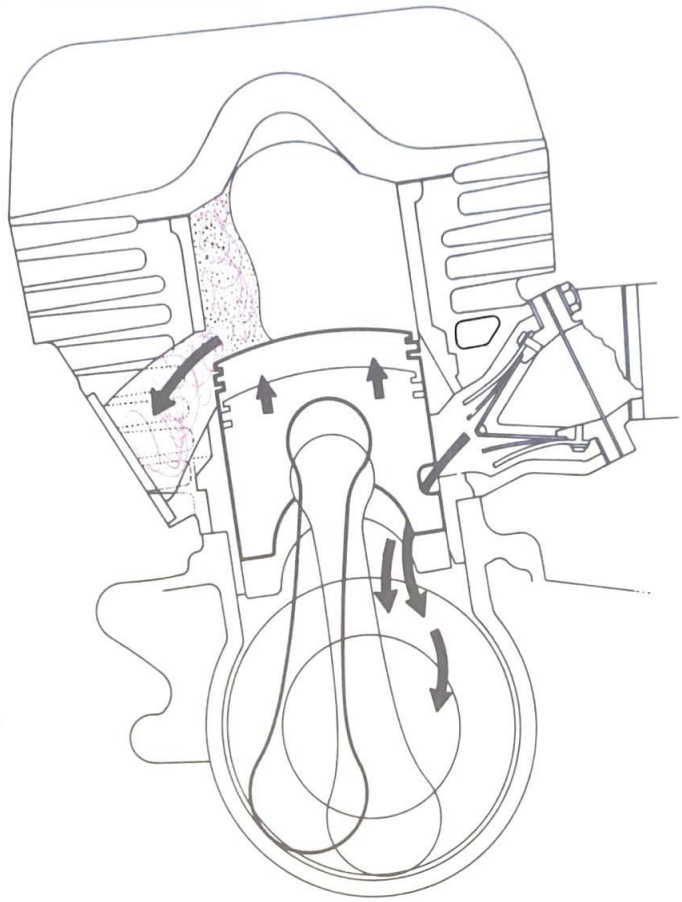
For better performance of a two-stroke engine, a sufficient amount of fuel-air mixture must be fed to the engine, while the burned gases must be completely forced out of the cylinder.

On the two-stroke engine, if the inlet port timing is increased, the complete closure of the port will be slowed, and as a result, the fuel-air mixture may tend to flow back toward the carburetor. To improve the scavenging efficiency of the cylinder, the opening of the transfer port must be widened. On the two-stroke engine, it is the most important to meet these requirement satisfactorily. As a measure to transfer a sufficient amount of fuel-air mixture to the cylinder and to force the burned gases completely out of the cylinder, the 5-port system has been in use. However, Yamaha has invented a new 7-port reed valve engine to achieve the following improvements; advanced inlet port timing, elimination of any possible reverse flow of fuel-air mixture, and transfer of the mixture with full efficiency. As a result, the engine has greatly improved its performance at low speeds with the adoption of the reed valve, and in addition, steady performance at any gear from low to high has been assured by improved scavenging efficiency.

5. Action of the Piston in 7-port Reed Valve Cylinder

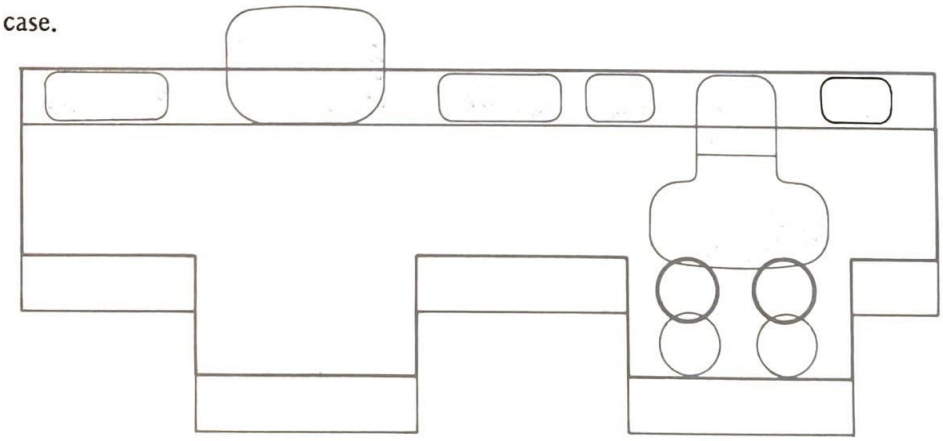
1. Piston Moves Up → from B.D.C. and Closes Exhaust Port.

Fuel-air mixture entering cylinder through main, auxiliary transfer and 7th ports forces burned gases toward exhaust port.



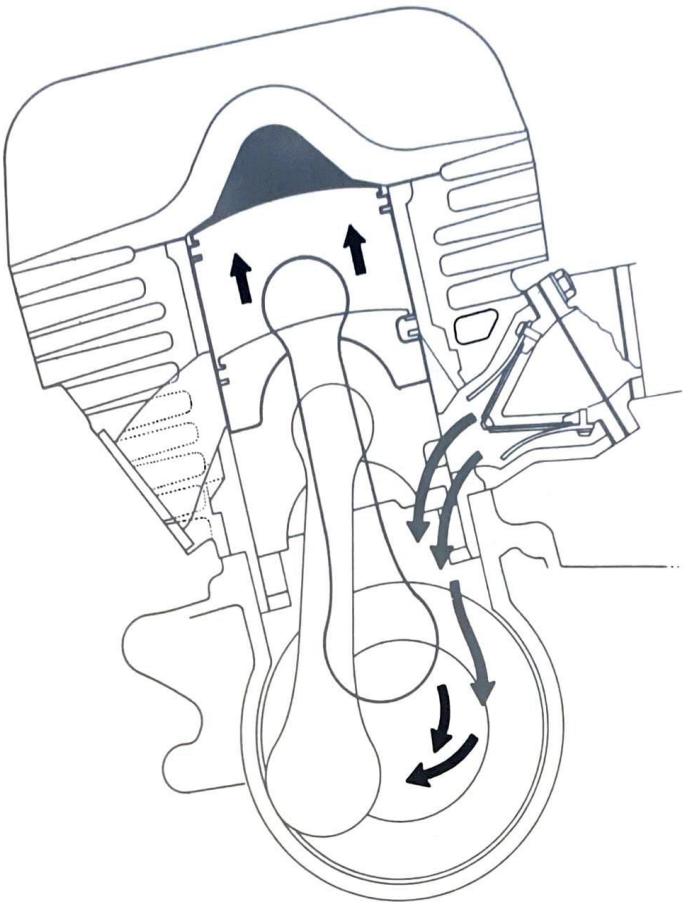
As piston moves up, crankcase pressure decreases, leading to negative.

As inlet port ararnged in piston skirt begins to overlap with cylinder inlet port, negative pressure in crankcase causes reed valve to open, and fuel-air mixture streams into crank-case.

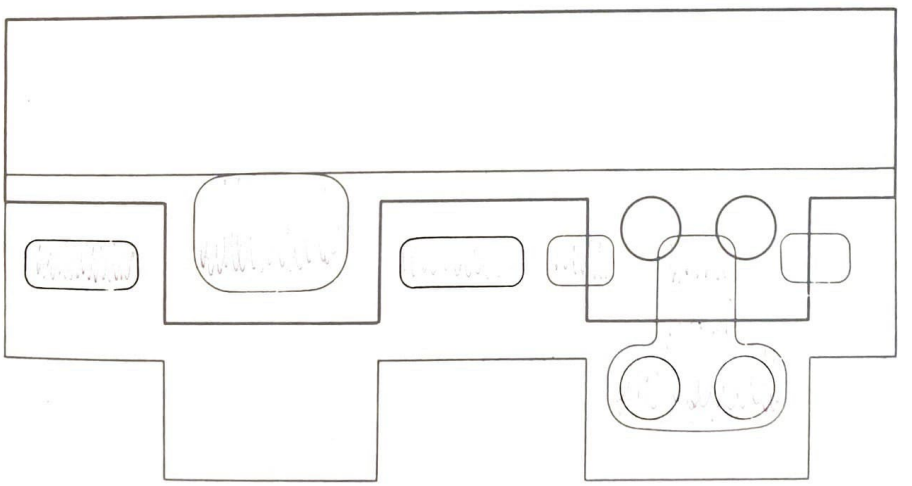


2. Piston Closes Exhaust Port and Moves Up → to T.D.C.

Fuel-air mixture transferred into cylinder through main, auxiliary transfer and 7th ports is compressed by piston, ignited just BTDC, and burned.

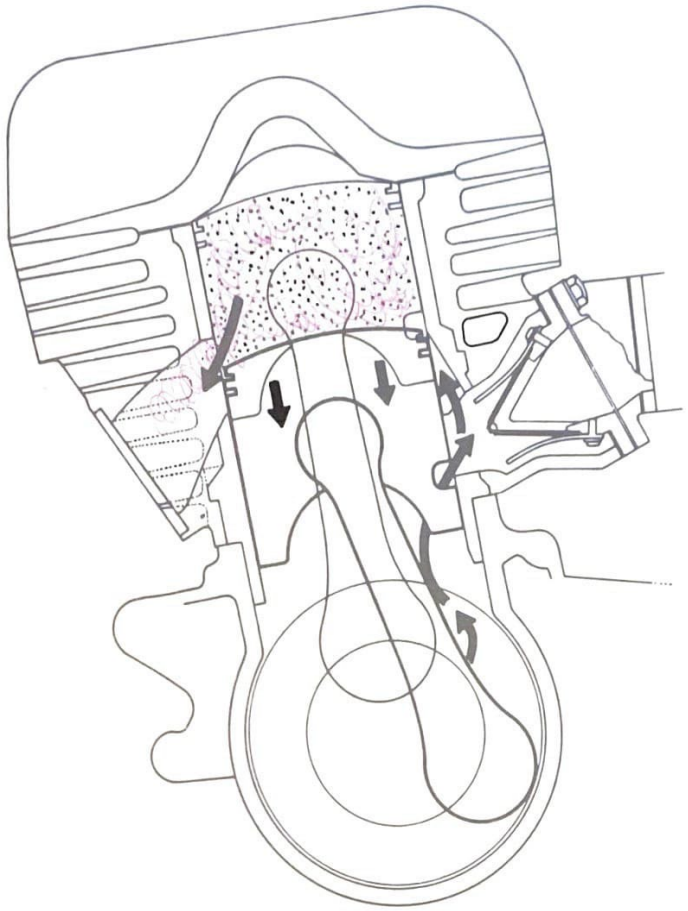


Piston skirt clears inlet port, fule-air mixture streams into crankcase through piston inlet port and cylinder inlet port.

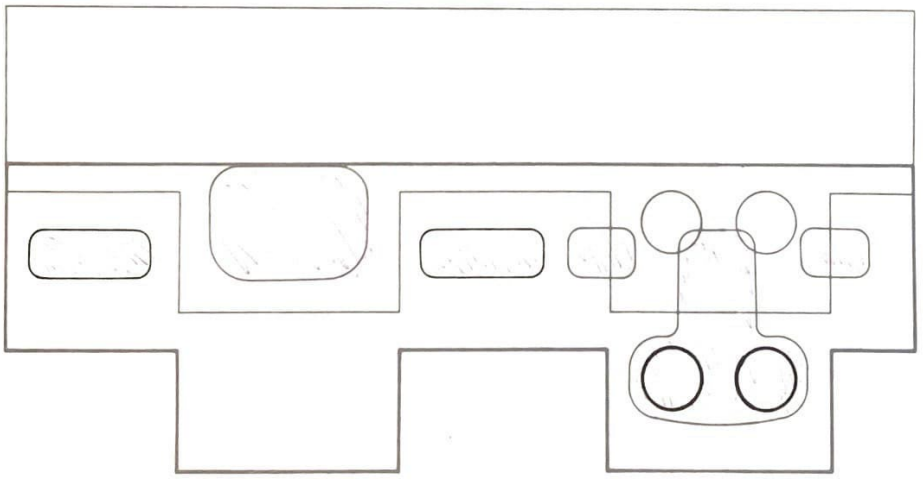


3. Piston Moves Down → from T.D.C. and Opens Exhaust Port.

Heated, high pressure burned gases produced by "explosion" pushes piston downward.

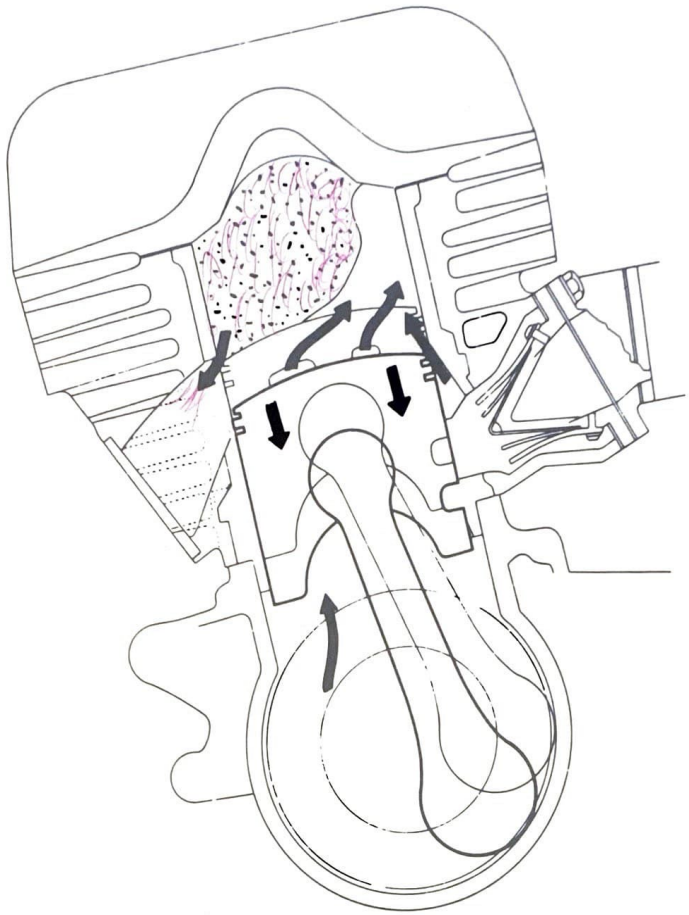


High pressure of burned gases begins to push piston head. As piston lowers, fule-air mixture entering crankcase in intake stroke is compressed.

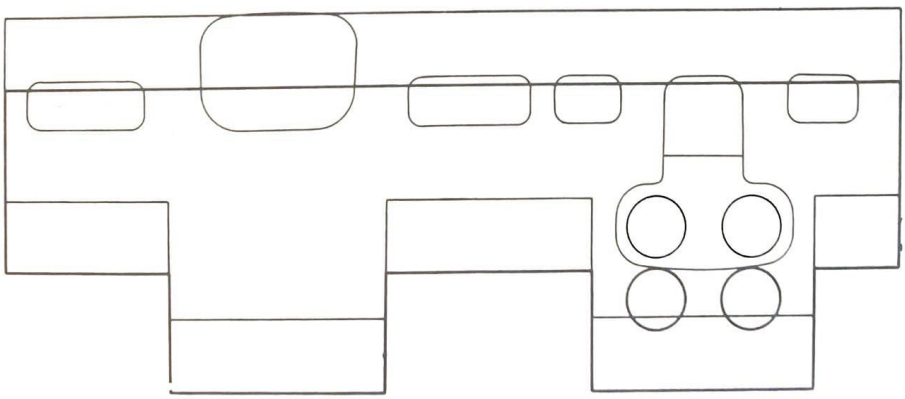


4. Piston Opens Exhaust Port and then Opens Transfer Port

Exhaust port is cleared and burned gases is pushed out in a stream.

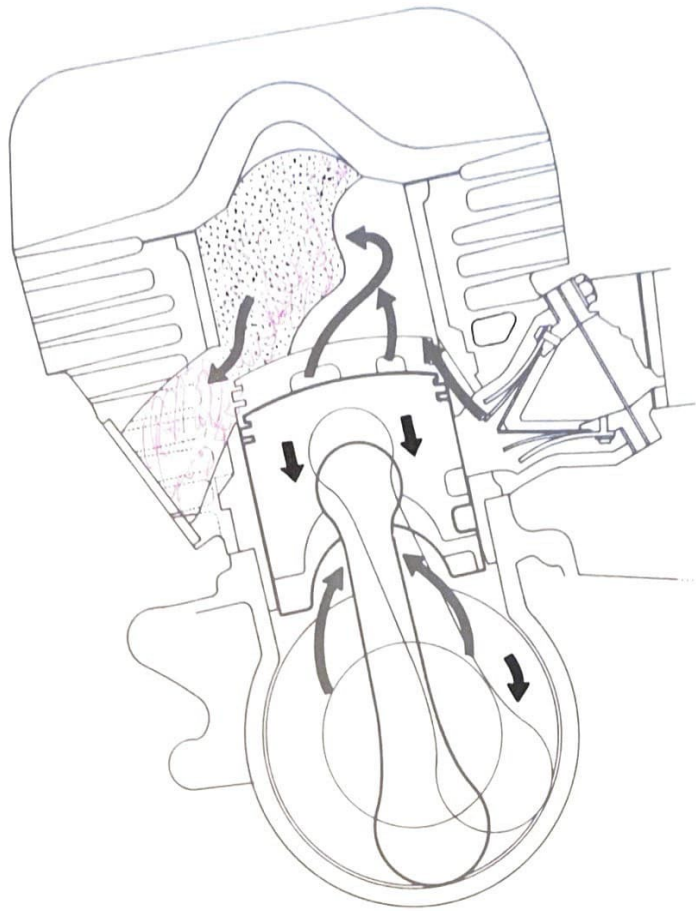


a. As piston lowers, fuel-air mixture in crankcase begins to be compressed.

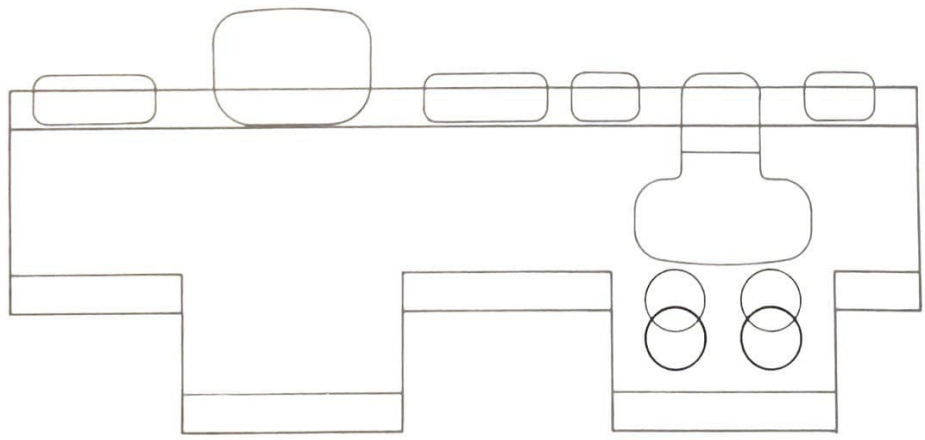


5. Piston Opens Transfer Port and Moves Down → to B.D.C.

Main and auxiliary transfer ports open, and fuel-air mixture is induced into cylinder from crankcase and forces burned gases out of cylinder, thereby filling the cylinder.



As piston moves down further, main, auxiliary transfer and 7th ports are cleared, and compressed mixture in crankcase streams into cylinder. As a result, crankcase pressure decreases.

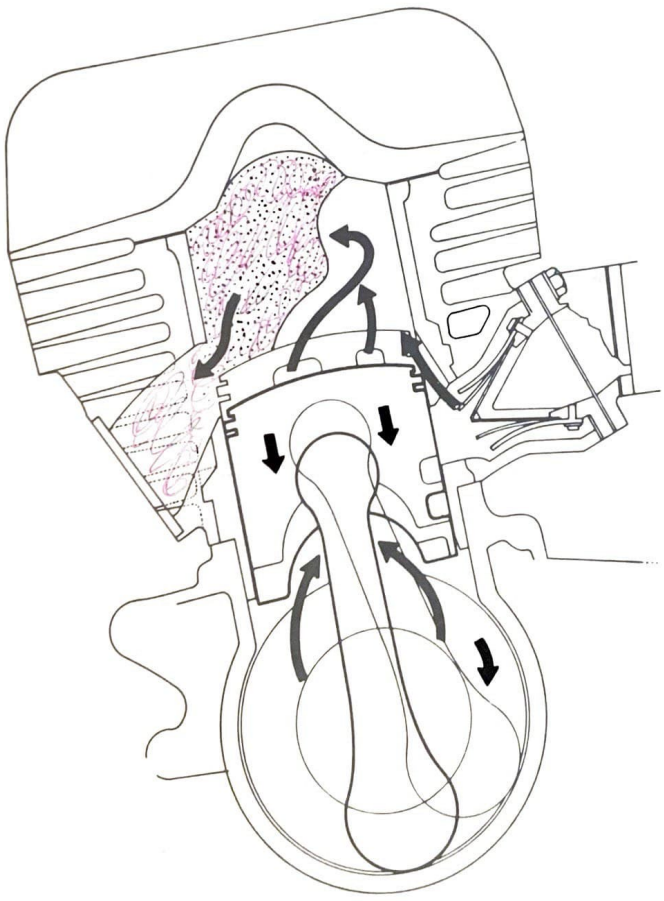


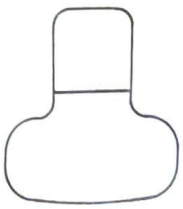
6. Scavenging by the 7th Port

On the 5-port cylinder, the auxiliary transfer ports are positioned on the same level as the main transfer ports. As the piston lowers to the position as illustrated, the fuel-air mixture in the cylinder is compressed and is going to stream into the cylinder through the main and auxiliary transfer ports. On the 7-port cylinder, too, the compressed mixture is about to stream into the cylinder through the inlet port of the piston.

As the piston moves down further, the main, auxiliary and 7th ports are cleared and the fuel-air mixture enters the cylinder in streams.

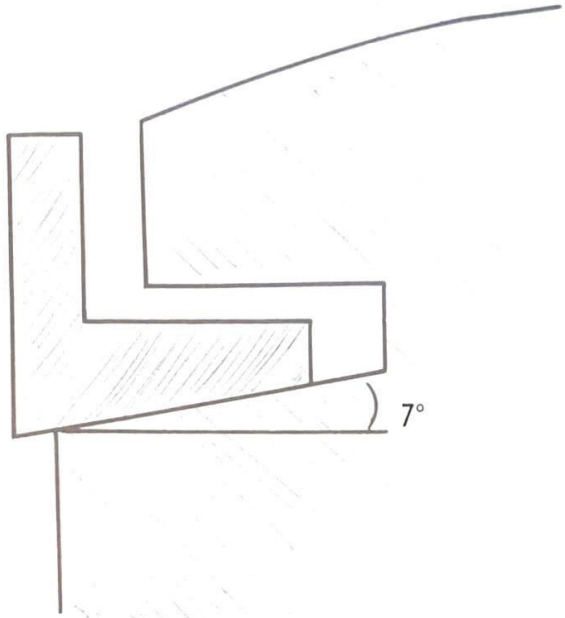
In this case, the inertia effect of the streams causes the reed valve to open, and the fuel-air mixture passing through the reed valve flows directly into the cylinder through the 7th port (the mixture does not enter the crankcase), thereby forcing the burned gases out of the cylinder. This is the scavenging action of the 7th port.





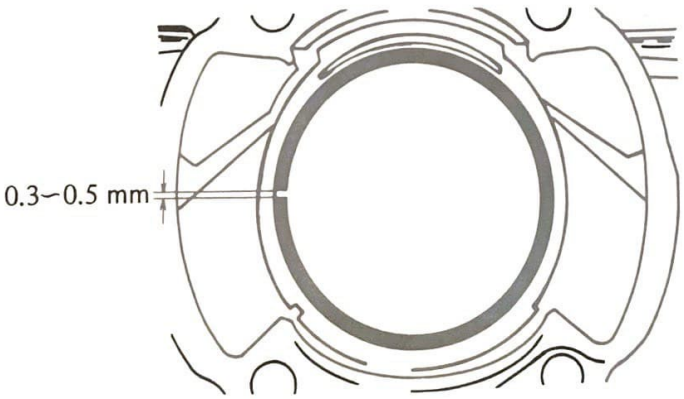
L Type Keystone Ring

The top ring is of the L-type Keystone Ring design, as illustrated below. This ring design will increase engine output through more complete sealing of combustion pressure. The 7° taper of the lower part of the ring is designed to prevent the ring from sticking (scrubbing action), and to provide increased sealing through Standard Keystone "action".



2. Remove the piston ring from the piston, and place it in the cylinder so that it is in tight contact with the cylinder wall. By using the piston head, position the ring in parallel to the cylinder top edge. Measure the ring end gap with a feeler gage. If the gap measured is in the range of 0.3 to 0.5mm, the ring is in satisfactory condition. If more than 0.5mm, the ring face is excessively worn.

   Remove the ring from the cylinder, and keep it is a free position. Then, measure the ring end gap. If the gap measured is less than 0.3mm, the ring is considered to be fatigued with heat. Replace it with a new one; otherwise, power loss or ring breakage may result. When installing a ring on the piston, avoid opening the end gap apart more than 16mm, because the ring may break.



Handling of Ring

A. Clearance between free meeting ends of ring

In the fitting of the L Type Keystone Ring, the clearance between the ring ends should be at a required minimum for fitting, because the piston top land is smaller than that of an STD one in diameter.

B. Inspection in fitting

Make sure that the ring moves lightly in the circumferential direction in the piston groove.

C. Care in handling

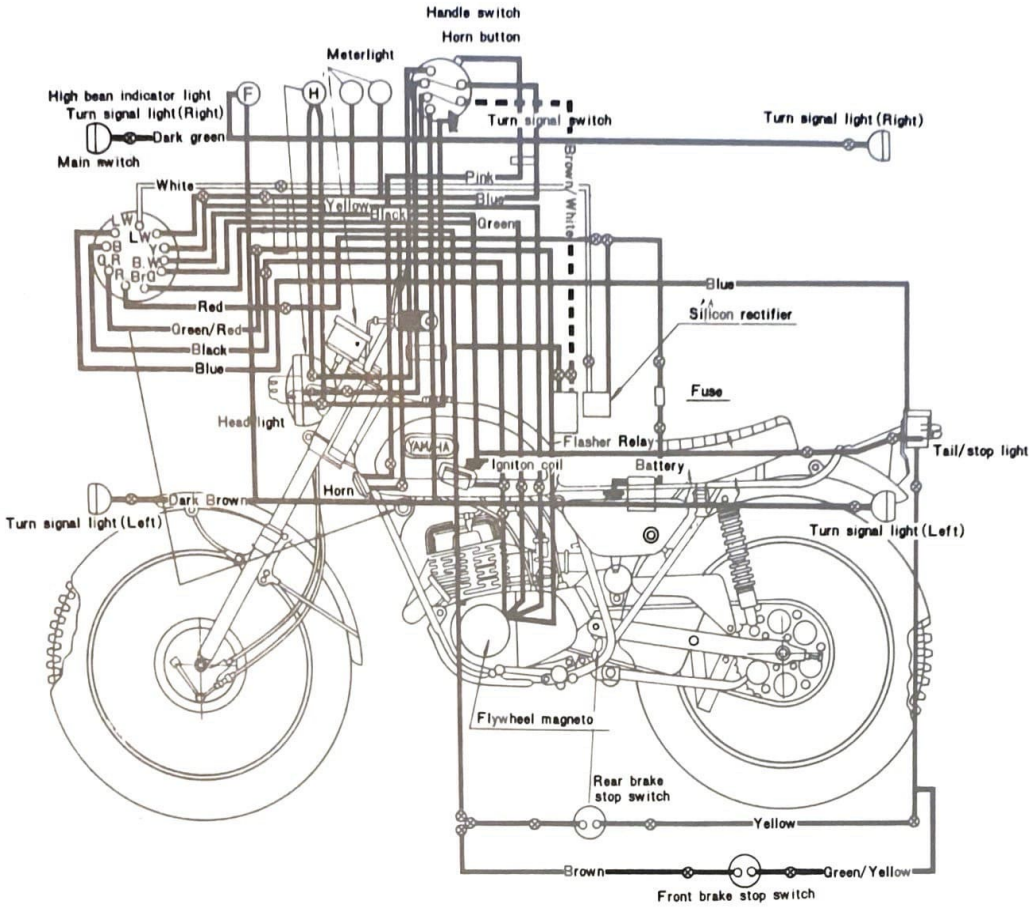
Distortion and breakage of the ring are mainly caused by forcing it to close toward the circumference with a ahnd, the clawing between the piston and cylinder in its fitting, and so forth.

Extra care should be taken not to create such trouble.

SERVICE DATA

		DT2	RT2
Spark plug		B-8ES	B-9ES
Ignition timing		3.2 ± 0.15	2.9 ± 0.15
Idling speed		1300 ~ 1400 r.p.m.	1400 ~ 1500 r.p.m.
Transmission oil		1000 ± 50 cc	1000 ± 50 cc
Carburetor type		VM 26SH	VM 32SH
Main Jet	M.J	#160	#230
Jet Needle	J.N Notch position	5DP7-3	6DH3-3
Needle Jet	N.J	N-8	D-0
Cut Away Slide	C.A	1-5	3-0
Pilot	P.J	#30	#45
Air Screw Turns	A.S	1-1/4	1-1/2
	V.S	2.0	3.3
Starter Jet	G.S	#60	#60

WIRING DIAGRAM



Color / Postion	E	B	R	Br	L	G	W	GR	LW	Y
OFF	○	○								
I			○	○		○	○			
II			○	○	○		○	○	○	○

Chart of wire colors

Daytime charging circuit	Green
Night time charging circuit	Green/Red
Battery (s+) circuit	Red
Ground circuit	Black
Front brake stop light circuit	Green/Yellow
Rear brake stop light circuit	Yellow
Tail light circuit	Blue
Head/Meter light circuit	Blue(L.W)
Common circuit	Brown
Head light maim circuit	Yellow
Head light sub circuit	Green
Horn circuit	Pink
Rectifier circuit	White
Turn signal light (Right) circuit	Dark green
Turn signal light (Left) circuit	Dark Brown
Turn signal relay circuit	Brown/White

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