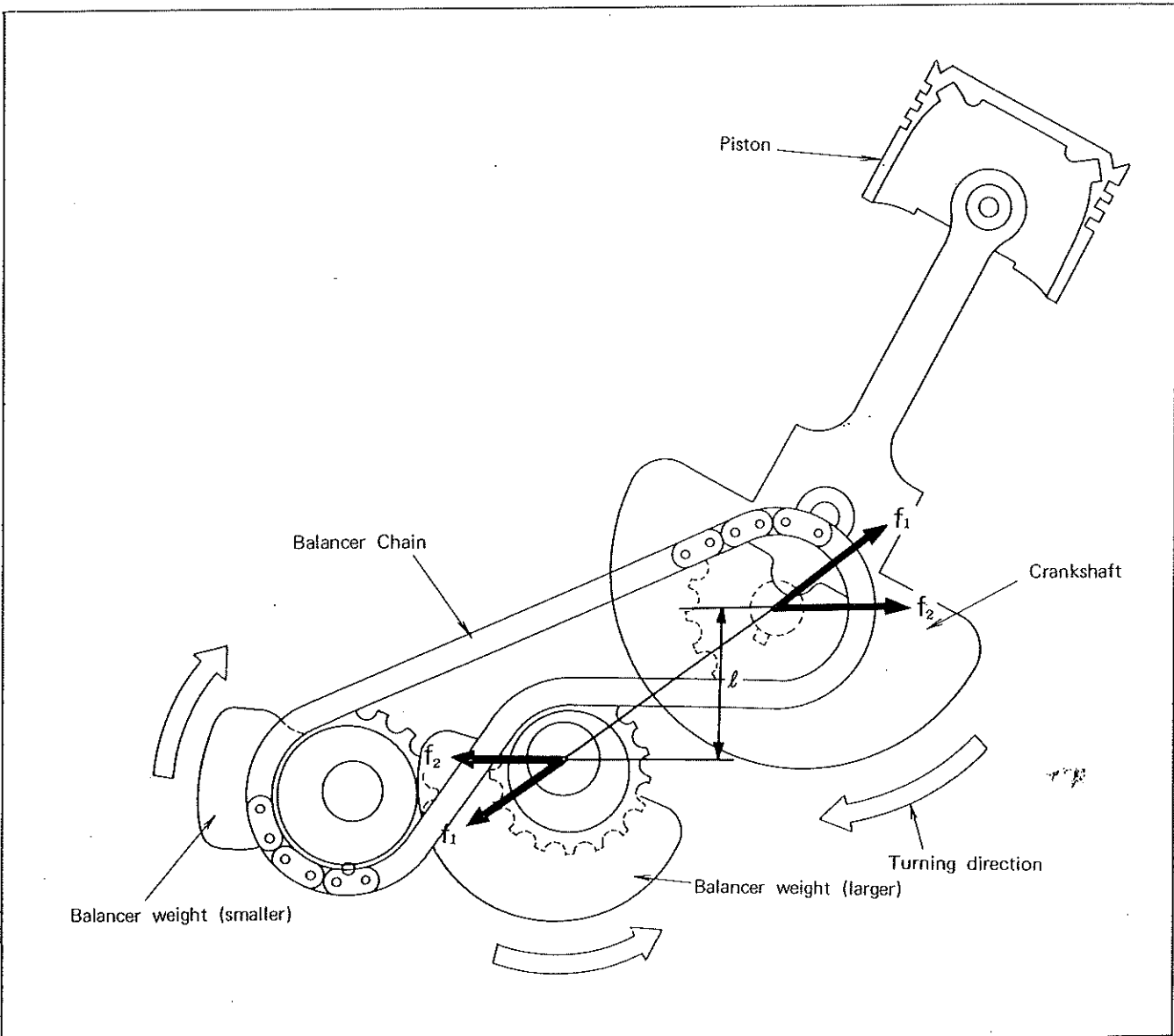


4. At the 270° crank angle

As in the case of the 90° crank angle, the vertical inertia force of the piston is zero, but the rightward inertia force of the crank is 75%. At the 270° crank angle, the larger balancer weight generates a leftward inertia force of 50% while the smaller balancer weight 25% in the same direction. The net result is zero.

As discussed previously, the primary inertia forces of the engine are counterbalanced by means of both larger and smaller balancer weights, but in the actual engine, the crankshaft and balancer shafts are not coaxially arranged on the axis A-A'. For this reason, a rocking couple $f_2 \times \ell$ is generated in reference to the engine's center of gravity, as illustrated in the construction diagram.

To eliminate this rocking couple, the mass ratio of the two balancer weights, as well as the relative positions of the primary inertia forces generated, are varied accordingly.



OMNI-PHASE BALANCER

Description

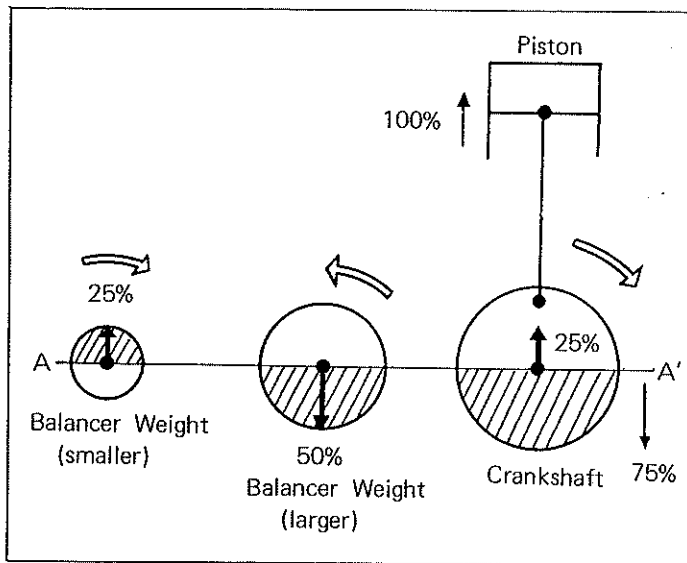
In a parallel twin-cylinder reciprocating engine, two types of vibrations are generated. One is the primary inertia force of reciprocating parts and the other is the rocking couple of revolving engine components. The primary inertia force generated by a reciprocating piston causes a vertical vibration with a frequency equal to the rotation speed of the crankshaft, whereas the rocking couple of the revolving internal mechanism of the engine gives rise to vibration in reference to the center of gravity of the whole engine unit. These two types of vibrations are the main factors in overall engine vibration and can be counterbalanced to a great extent by means of special balancing devices. The Omni-phase balancer is such a device and is employed in the Yamaha TX750 in order to reduce engine vibration.

Method of Operation

1. Zero degree crank angle

At this crank angle, the upward inertia force generated by the piston is taken as 100%, but it is reduced to 25% by the 75% inertia force of the crank web moving downward. On the other hand, the larger balancer weight generates an inertia force of 50% in a downward direction, and the smaller balancer weight an inertia force of 25%. The net result is $(+25) + (-50) + (+25) = 0^*$. That is, the inertia forces completely counter-balance each other.

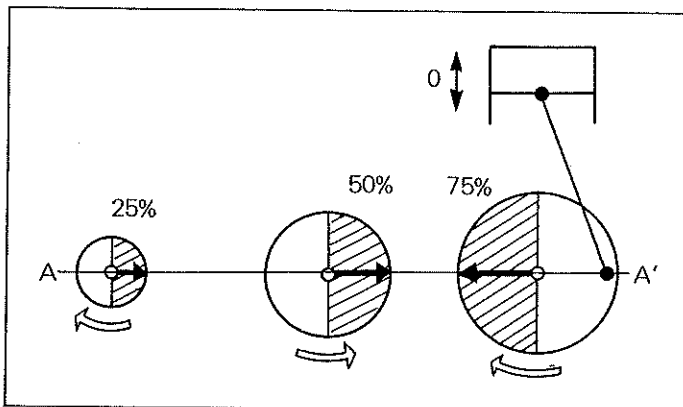
(*It is assumed that the crankshaft, larger and smaller balancer weights are arranged coaxially on the A-A' axis.)



2. At the 90° crank angle

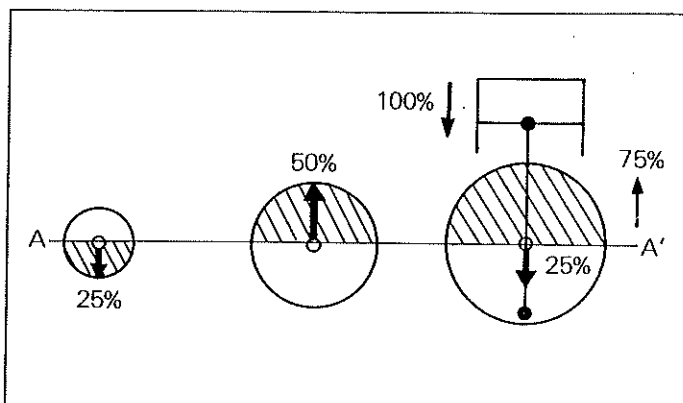
At this crank angle, the vertical inertia force of the piston is zero, but the leftward inertia force of the crank web is 75%.

Accordingly, if both larger and smaller balancer weights generate a total inertia force of 75% in the direction opposing the inertia force of the crank web, the net result is zero.



3. At the 180° crank angle

At this crank angle, the downward inertia force of the piston is taken as 100%, but it is reduced to 25% by the 75% upward inertia force of the crank web. At the same time, the larger balancer generates an inertia force of 50% in an upward direction and the smaller balancer weight 25% in a downward direction. The net result is zero.



DRY SUMP SYSTEM

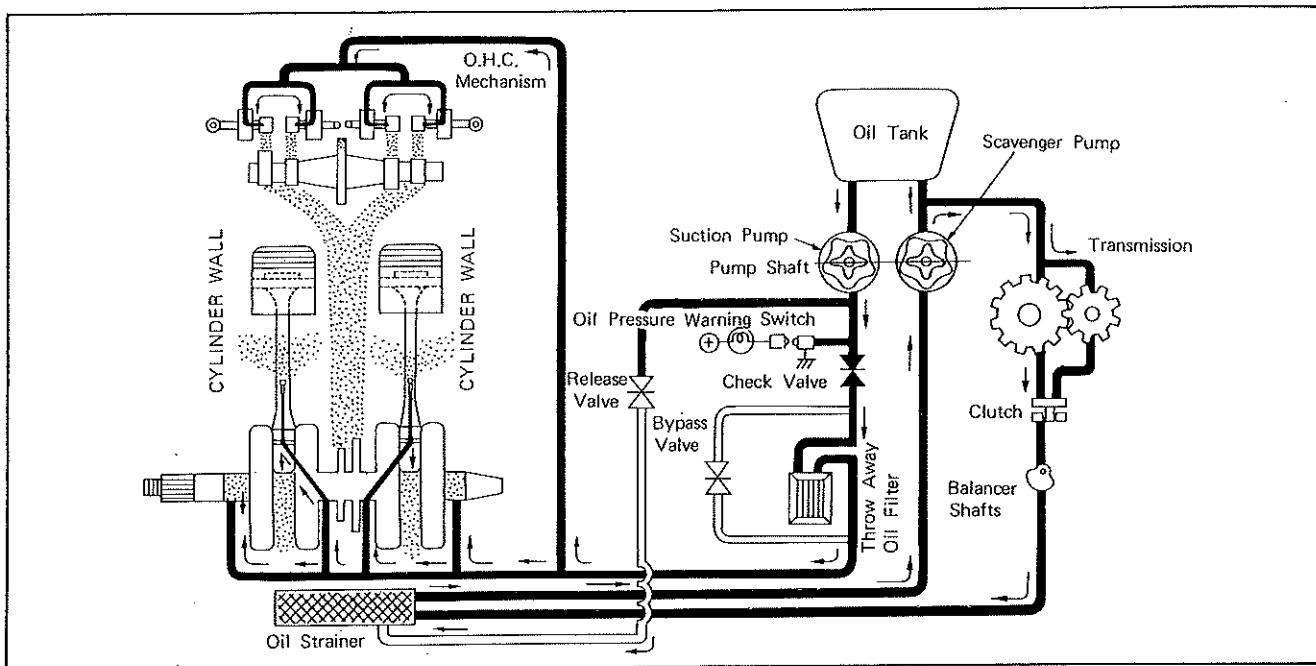
Description

The TX750 dry sump system utilizes a suction pump to draw oil from the oil tank to the pump. The oil is then pressurized through the oil filter to the crankshaft and overhead camshaft mechanism.

From the camshaft, oil drops to the oil strainer area in the bottom of the engine. Additionally, crankshaft lubricating oil is forced out spigots in the rod lower ends where it is then flung onto the cylinder walls. After lubricating the cylinder walls, excess oil drops to the oil strainer area.

A scavenging pump is connected to the strainer. This pump has 25% more pumping capacity than the suction (delivery) pump. All excess oil is picked up and forced back to the oil tank. Prior to delivery to the tank, a portion of the return oil is routed to the transmission, clutch, and balancer shafts.

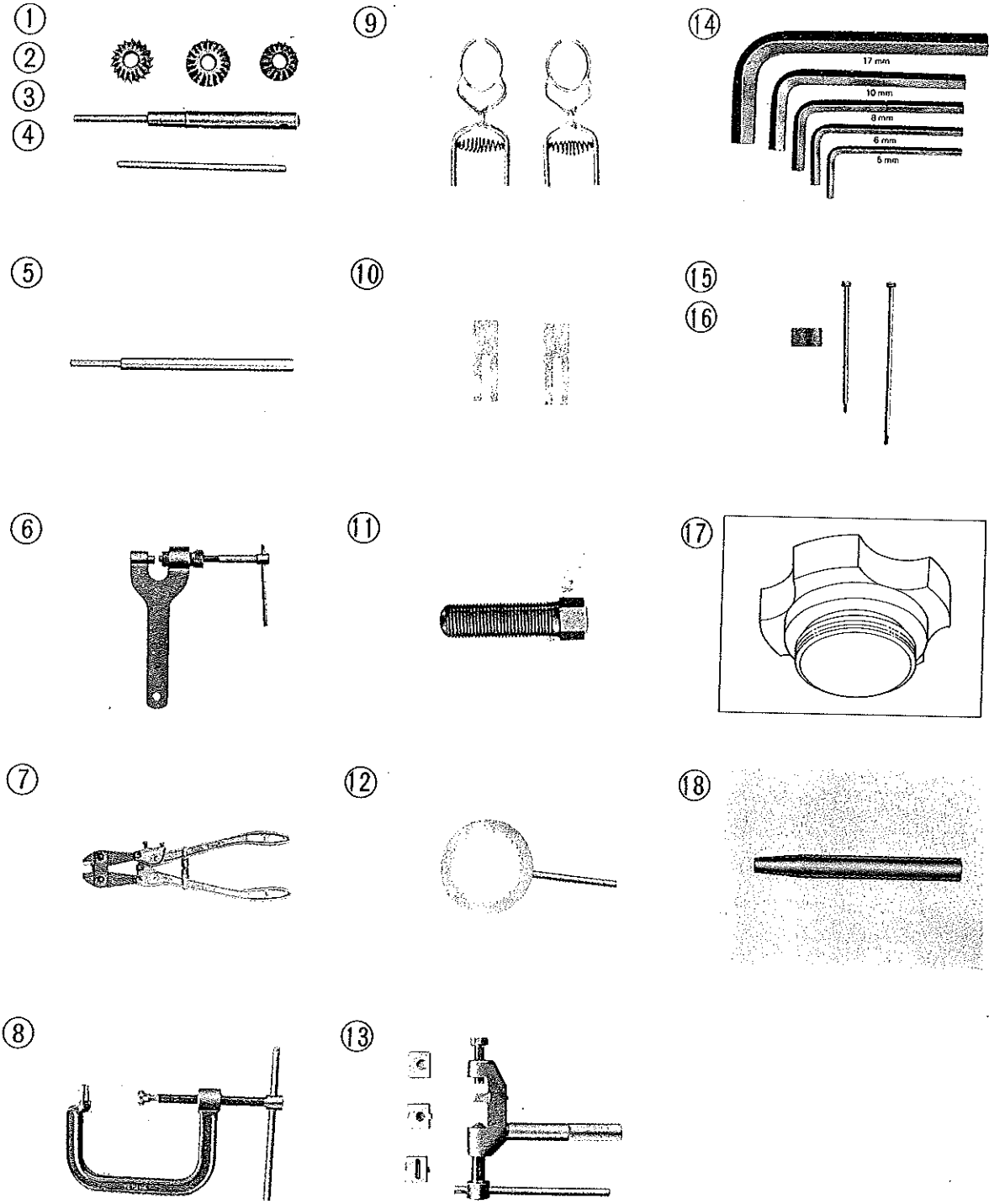
OIL DELIVERY SCHEMATIC



Features and Advantages

1. With no storage space needed within the engine, a lower overall height is allowed; improving looks, balance, and overall design.
2. With the dry sump system, as utilized in the TX750, lubricating oil is kept separate from the engine. This allows for more heat dissipation.
3. Filtered oil is fed to the engine by the trochoidal suction pump at a rate of over one gallon per minute with a minimum pressure of 15-20 psi at normal cruising speeds (approximately 4,000 rpm). This is considerably more than previous designs.
4. The oil pressure warning switch, which is located directly after the suction (delivery) pump, will operate immediately if oil pressure drops below approximately 5.5-6.0 psi. This provides an immediate warning should loss of pumping action occur for any reason.
5. Transmission, clutch, and balancer mechanism lubricating oil must pass through the filtering system prior to being sent to the camshaft and crankshaft. This improves lubricating oil quality and assures longer component life for these vital parts.
6. The check valve is located within the delivery circuit to prevent oil tank drainage through the suction pump when the machine is idle, thereby preventing "wet-sumping" of the engine. Additionally, the bypass valve mechanism in the filter circuit will function automatically should any blockage occur in this vital area, thereby assuring constant oil supply to all engine components.
7. The cartridge-type oil filter, as installed on the TX750, assures ease of maintenance and an over-size filtering capacity. This extra capacity provides cleaner lubricating oil for longer engine life.
8. The connecting rod spigots (oil outlet holes) provide for a high pressure oil supply to the cylinder walls, supplementing and improving upon previous "splash" type systems.

3. Special Tools

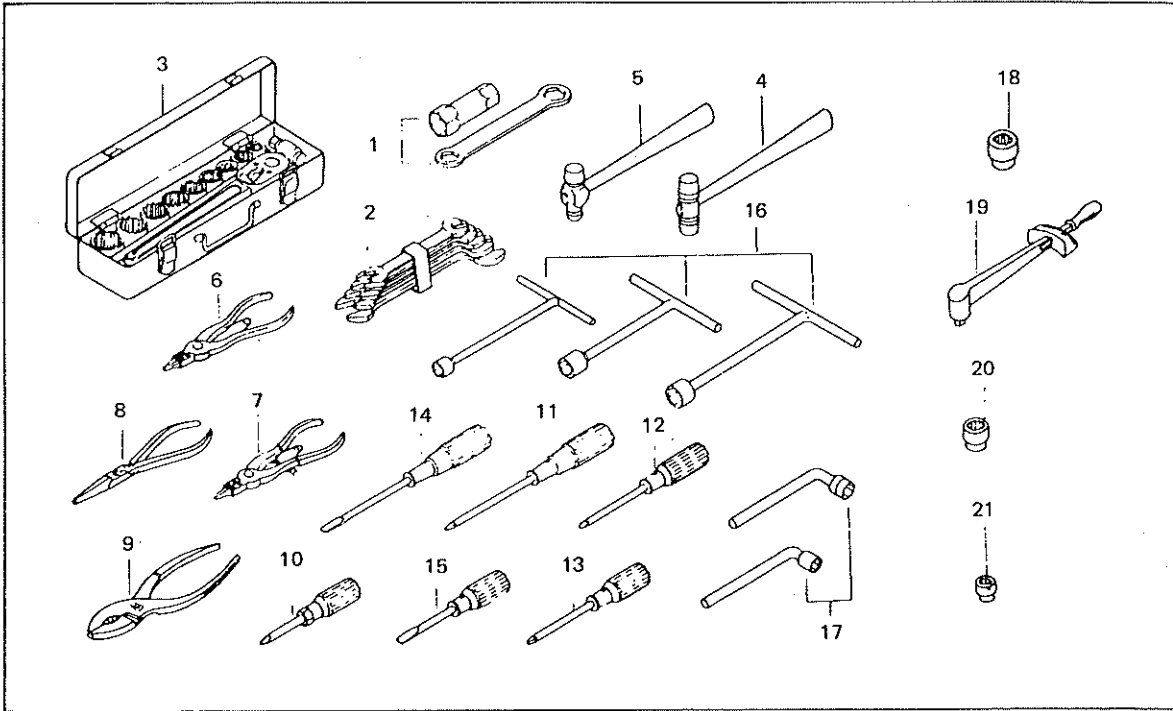


- Valve seat cutters: (1 ~ 4)
- 1. 45° - 40mm dia. (intake)
- 2. 45° - 34mm dia. (exhaust)
- 3. 65° - 42mm dia. (exhaust/intake)
- 4. Seat cutter pilot 8.0mm
- 5. Valve guide installation and removal tool
- 6. Cam chain link cutter
- 7. Cam chain link riveter
- 8. Valve spring compressor
- 9. Piston ring compressors
- 10. Piston support plates
- 11. Rotor puller
- 12. Clutch holding tool
- 13. Drive chain link cutter
- 14. Hexagon wrenches (5, 6, 8, 10, 17mm)
- 15. Rocket arm shaft puller
- 16. Balancer shaft puller
- 17. Governor checking attachment
- 18. Pump shaft oil seal installing tool

SERVICE TOOLS

The following additional tools are required to service the YAMAHA TX750.

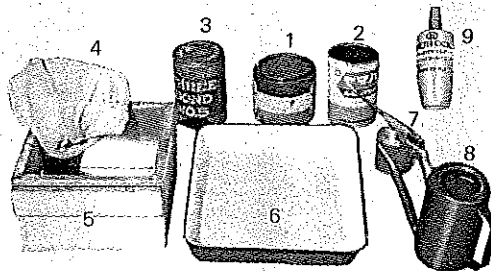
1. Standard Tools



- | | | |
|---------------------------|--|-------------------------------------|
| 1. Plug wrench | 8. Needle nose pliers | 15. Slot-head screwdriver (Small) |
| 2. Open-end wrenches | 9. Pliers | 16. T-type socket wrench |
| 3. Socket wrenches | 10. Phillips-head screwdriver (Small) | 17. L-type socket wrench |
| 4. Soft-faced hammer | 11. Phillips-head screwdriver (Large) | 18. 29mm socket (for Torque wrench) |
| 5. Steel hammer | 12. Phillips-head screwdriver (Medium) | 19. Torque wrench |
| 6. Circlip pliers ST type | 13. Phillips-head screwdriver (Small) | 20. 13mm Socket (for Torque wrench) |
| 7. Circlip pliers RT type | 14. Slot-head screwdriver (Medium) | 21. 10mm Socket (for Torque wrench) |

In addition to the above tools, the YAMAHA electrotester, tachometer (engine speedometer) and battery specific gravity hydrometer are required.

2. Miscellaneous



- | | | |
|--|----------------------|--------------|
| 1. Grease | 4. Wiping materials | 7. Oil jug |
| 2. YAMAHA 4 stroke oil
or Motor oil 20W-40 ("SE") | 5. Overhauling stand | 8. Oil cup |
| 3. YAMAHA Bond (No.4 and No.5) | 6. Parts tray | 9. Lock tite |

CLEANING AND STORAGE

A. Cleaning

Frequent thorough cleaning of your motorcycle will not only enhance its appearance but will improve general performance and extend useful life of many components.

1. Before cleaning the machine:
 - a. Block off end of exhaust pipe to prevent water entry; a plastic bag and strong rubber band may be used.
 - b. Remove air cleaner or protect it from water with plastic covering.
 - c. Make sure spark plug(s), gas cap, oil tank cap, transmission oil filler cap and battery caps are properly installed.
2. If engine case is excessively greasy, apply degreaser with a paint brush. Do not apply degreaser to chain, sprockets, or wheel axles.
3. Rinse dirt and degreaser off with garden hose, using only enough hose pressure to do the job. Excessive hose pressure may cause water seepage and contamination of wheel bearings, front forks, brake drums, and transmission seals. Many expensive repair bills have resulted from improper high-pressure detergent applications such as those available in coil-operated car washes.
4. Once the majority of dirt has been hosed off, wash all surfaces with warm water and mild, detergent-type soap. An old tooth brush or bottle brush is handy to reach those hard-to-get-to places.
5. Rinse machine off immediately with clean water and dry all surfaces with a chamois skin, clean towel, or soft absorbent cloth.
6. Immediately after washing, remove excess moisture from chain and lubricate to prevent rust.
7. Chrome-plated parts such as handlebars, rims, spokes, forks, etc., may be further cleaned with automotive chrome cleaner.
8. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.
9. Automotive-type wax may be applied to all painted and chrome-plated surfaces. Avoid combination cleaner-waxes. Many contain abrasives which may mar paint or protective finish on fuel and oil tanks.
10. After finishing, start the engine immediately and allow to idle for several minutes.

B. Storage

Long term storage (30 days or more) of your motorcycle will require some preventive procedures to insure against deterioration. After cleaning machine thoroughly, prepare for storage as follows:

1. Drain fuel tank, fuel lines, and carburetor float bowl(s).
2. Remove empty fuel tank, pour a cup of 10W to 30W oil in tank, shake tank to coat inner surfaces thoroughly and drain off excess oil. Reinstall tank.
3. Remove spark plug(s), pour about one tablespoon of 10W to 30W oil in spark plug hole(s) and reinstall spark plugs. Kick engine over several times (with ignition off) to coat cylinder walls with oil.
4. Remove drive chain. Clean thoroughly with solvent and lubricate with graphite-base chain lubricant. Reinstall chain or store in a plastic bag (tie to frame for safe-keeping).
5. Lubricate all control cables.
6. Remove battery and charge. Store in a dry place and re-charge once a month. Do not store battery in an excessively warm or cold place (less than 32°F or more than 90°F).
7. Block up frame to raise both wheels off ground. (Main stands can be used on machine so equipped.)
8. Deflate tires to 15psi.
9. Tie a plastic bag over exhaust pipe outlet(s) to prevent moisture entering.
10. If storing in humid or salt-air atmosphere, coat all exposed metal surfaces with a light film of oil. Do not apply oil to rubber parts or seat cover.

Service Notes:

- # 1. For average operation at ambient temperatures of 30-90°F, use SAE 20W-40 type "SE" motor oil.
- # 2. Use SAE 10W-30 type "SE" motor oil. (If desired, specialty type lubricants of quality manufacture may be used.)
Note: Drive chain must be lubricated every 200-250 miles. If unit is subjected to extremely hard usage, chain must be inspected constantly and serviced as required.
- # 3. Use SAE 10W-30 type "SE" motor oil. (If desired, or at ambient temperatures below 30°F., a graphite base "dry" lubricant of quality manufacture may be used.)
- # 4. Light duty: Lithium soap base (white) grease, Heavy duty: Standard 90 wt. lube grease (Do not use 90 wt. lube grease on throttle/throttle housing.)
- # 3. Use standard 90 wt. lube grease - - smooth, not coarse.
- # 6. Medium-weight wheel bearing grease of quality manufacture - - preferably waterproof.
- # 7. Light-weight machine oil.
- # 8. Change yearly or 8,000 miles. Use quality manufacture corresponding to DOT#3 or #4 specifications. Keep clean. Do not allow water, etc., to contaminate. Do not mix types when adding.
- # 9. AIR FILTER - Foam element air filter must be damp with oil at all times to function properly. Clean and lube monthly or per mileage. If hard usage, clean and lube daily. Do not over-oil. Use SAE 10W/30 "SE".

PRE-OPERATION CHECK CHART

BRAKES	Check Operation/Adjustment/Hydraulic Reservoir
CLUTCH	Check Operation/Lever Adjustment
ENGINE OIL	Check Tank Level/Top-up as required
DRIVE CHAIN	Check Alignment/Adjustment/Lubrication
BATTERY	Check Electrolyte Level Weekly/Top-up Monthly
SPARK PLUGS	After Break-In-Check Color and Cond'n Weekly
AIR FILTER	Foam Type-Must be Clean and Damp W/Oil Always
WHEELS & TIRES	Check Pressure/Runout/Spoke Tightness/Axle Nuts
FITTINGS/FASTNERS	Check All-Tighten as Nec'y
LIGHTS/SIGNALS	Check headlight/tail-stop lights/turn sigs., etc.

Pre-operation checks should be made each time the machine is used. Such an inspection can be thoroughly accomplished in a very short time; and the added safety is assured is more than worth the time involved.

MAINTENANCE & LUBRICATION CHARTS

Interval recommendations and lubricant types listed in the Maintenance and Lubrication Charts are based upon general averages. Extreme in environment or usage may dictate shorter maintenance intervals, different lubricants or shorter lubrication intervals.

Therefore, all recommendations regarding types and intervals are to be considered a guide only. Intervals should not be exceeded but may be shortened as required. Lubricant types may be up-graded, but never down-graded.

PERIODIC MAINTENANCE INTERVALS

Page	Item	Remarks	Preoperational Check	Initial				Thereafter every	
				250	500	1,000	2,000	1,000	2,000
91 105	Brake System (Complete)	Chk/Adj as req'd repair as req'd	0		0	0	0		0
66	Clutch	Check/Adjust as required	0		0	0	0		0
117	Battery	Top-Off/Ck spec. gr. as req'd - monthly - or	0	0	0	0		0	0
131	Spark Plug(s)	Inspect/Clean or replace as req'd	0	0	0	0		0	
106	Wheels & Tires	Pressure/Spoke Tension/Runout	0	0	0	0		0	
—	Fittings & Fasteners	Tighten before each trip and/or	0	0	0	0		0	
112	Drive Chain	Tension/Alingment #1	0	0	0	0		0	
65	Engine Oil Level	Unit level/Engine warm	0			0		0	
79	Air Filter	Foam Type #2				0	0	0	
67	Fuel Petcock(s)	Clean/Flush tank as req'd	0	0		0	0		0
132	Ignition Timing	Adjust/Clean or repl. pts. as req'd			0	0	0		0
77	Carburetor Adjustment	Check Operation/Synch./Fittings.			0	0	0		0
76	Carburetor Overhaul	Clean/Repair as Req'd/Refit/ Adjust						4,000	
65	Cylinder Compression	Preventive Maintenance Check			0	0	0		0
—	Decarbonize Engine	Includes Exhaust System					4,000		8,000
31	Camshaft Drive Chain	Adjust Tension		0		0	0		0
65	Oil Filter Element	Replace		0	0	0	0		4,000
—	Oil Filter System	Clean All- Includes Traps, etc.							8,000
26	Valves	Adjust/Regrind per tests as req'd				0	0		0

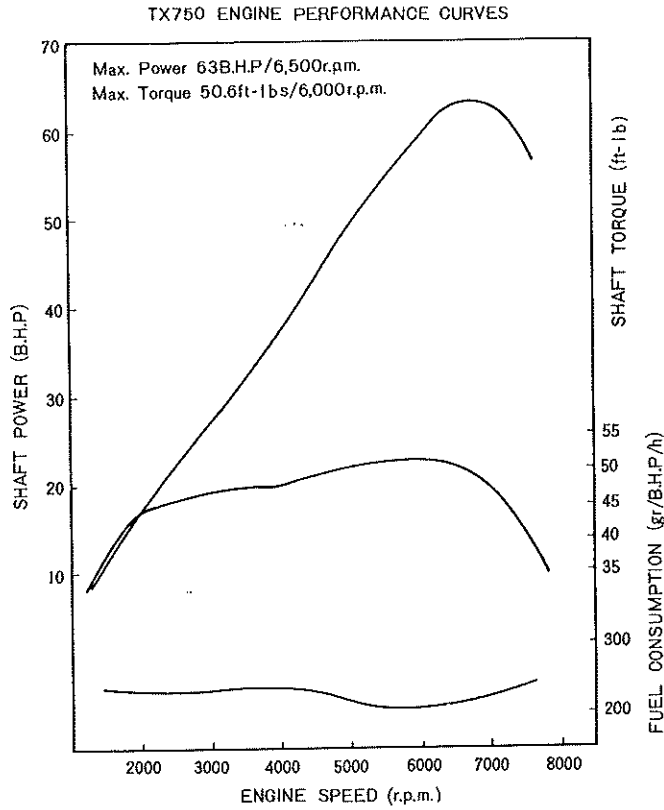
Service Notes:

- #1 DRIVE CHAIN: In addition to tension and alignment, chain must be lubricated every 200-250 miles. If unit is subjected to extremely hard usage, such as racing or dirt riding, chain must be checked constantly. See "Lubrication Intervals" for additional details.
- #2 AIR FILTER: Foam element air filters must be damp with oil at all times to function properly. Remove, clean, and oil filter at least once per month or every 500-1,000 miles; more often if possible. (If extremely hand usage, such as dirt riding, clean and lube daily). See lubrication chart for add'l details.

LUBRICATION INTERVALS

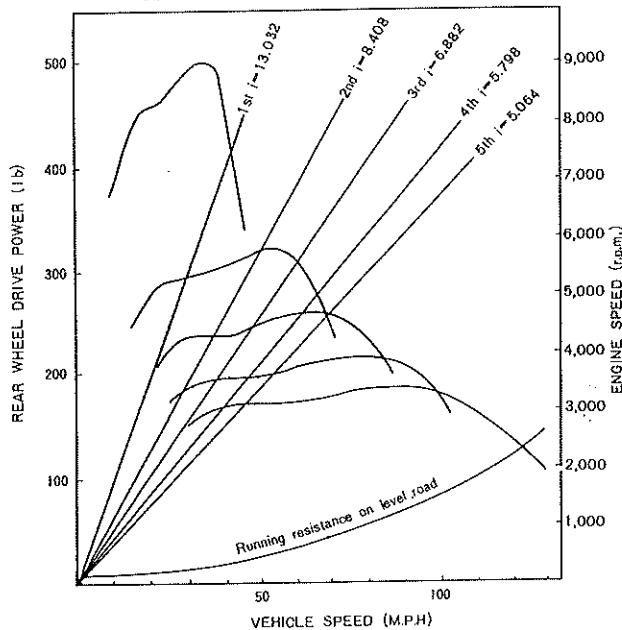
Page	Item	Remarks	Preop ck	Type	Period						
					Initial				Thereafter every		
					250	500	1,000	2,000	1,000	2,000	4,000
65	Engine Oil Change	Warm engine before draining	0	#1	0	CHK	CHK	0	CHK	0	
112	Drive Chain	Lube/Adjust as req'd	0	#2	See Service Notes						
112	Drive Chain	Remove/Clean/Lube/Adjust		#2				0		0	
79	Air Filter	Foam type	0	#9	See Service Notes						
—	Control & Meter Cables	All - Apply thoroughly		#3			0	0		0	
—	Throttle Grip & Housing	Light Application		#4				0		0	
—	Tach & Speedo Gear Hsgs.	Light Application		#4				0			0
88	Rear Arm Pivot Shaft	Zirc - Apply until shows		#5				0		0	
—	Brake Pedal Shaft	Light Application		#4				0		0	
—	Change Pedal Shaft	Light Application		#4				0		0	
—	Stand Shaft Pivot(s)	Light Application		#4				0		0	
82	Front Forks	Drain Completely - CK Specs.		#2	CHK			0		CHK	0
85	Steering Ball Races	Inspect Thoroughly/Med. pack		#6				0			0
127	Point Cam Lubr. Wick	Very Light Application		#7				0			0
96	Hyd. Brake Fluid Res.	Use New Fluid Only-Yearly or:		#8	CHK		CHK		CHK		8,000
109	Wheel Bearings.	Do Not Over-Pack		#6				0			0

PERFORMANCE CURVES

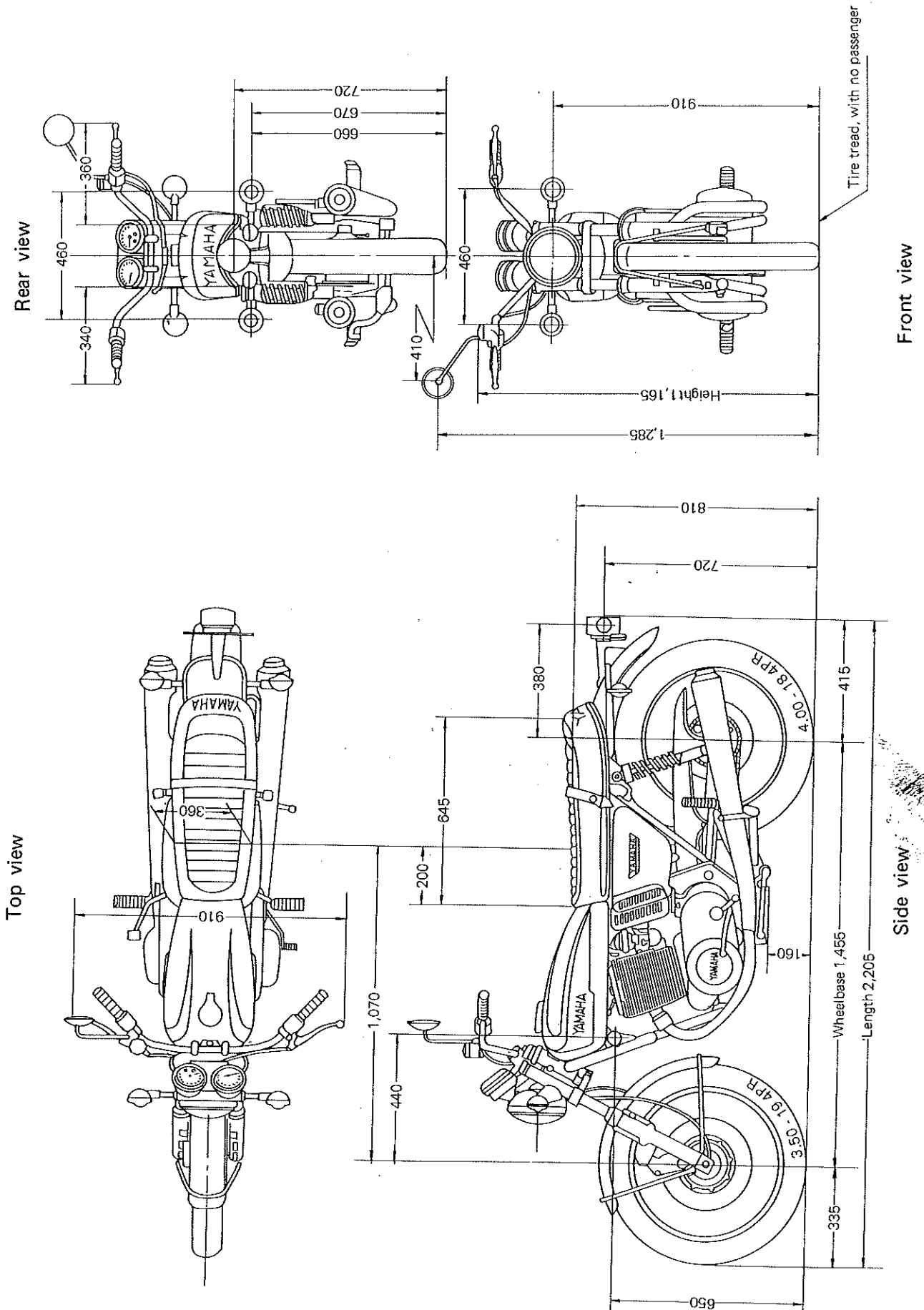


TX750 DRIVING PERFORMANCE CURVES

Max. Power 63B.H.P./6,500r.p.m.	Gear ratio 1st 32/13 2.461
Max. Torque 50.6ft-lbs/6,000r.p.m.	2nd 27/17 1.588
Primary reduction ratio 72/32 (2.250)	3rd 26/20 1.300
Secondary reduction ratio 40/17 (2.352)	4th 23/21 1.095
Tire Size (F) 3.50-19-4PR	5th 22/23 0.956
(R) 4.00-18-4PR	



FEATURES FOUR-SIDE VIEWS



Chassis:	
Frame type	Tubular steel, double cradle type
Suspension system, front	Telescopic fork
Suspension system, rear	Swing arm
Cushion system, front	Coil spring, oil damped
Cushion system, rear	Coil spring, oil damped
Steering system:	
Caster	63 degrees
Trail	3.9 in. (99mm)
Braking system:	
Operation method, front	Hydraulic disc brake (fixed type)
Operation method, rear	Internal expansion, single leading shoe
Tire size:	
Front tire	3.50 - 19 - 4PR
Rear tire	4.00 - 18 - 4PR
Tank capacity:	
Fuel tank capacity	3.7 US gal. (14 liters)
Oil tank capacity	3.2 US qts. (3.0 liters)
Generator:	
Type	Alternator
Model	LD115-03
Manufacturer	HITACHI
Spark plug:	
Manufacturer	N.G.K.
Heat Range	(B-8ES) x 2
Battery:	
Model	(12N16-3B) x 1
Capacity	12V 16 A.H.
Lights:	
Headlight	12V, 50W/40W
Taillight	12V/8W
Stoplight	12V/27W
Flasher light	12V/27W
Parking light Front	12V/5W
Rear	12V/8W
Neutrallight	12V/3W
High beam indicator light	12V/3W
Charging light	12V/3W
Flasher pilot light	12V/3W
Meterlight	12V/4W x 4
Oil warning light	12V/3W
Taillight warning light (for outage)	12V/3W
Rear brake lining warning light (for wear)	12V/3W
Outage indicator	12V/3W

GENERAL SPECIFICATION

Model	TX750	
Dimensions:		
Overall length	86.8 in. (2,205mm)	
Overall width	35.8 in. (910mm)	
Overall height	45.9 in. (1,165mm)	
Wheelbase	57.3 in. (1,455mm)	
Min. ground clearance	6.3 in. (160mm)	
Weight:		
Net	463 lbs (210kg)	
Performance:		
Max. speed	120 mph plus (195 km/h plus)	
Fuel consumption (on paved level road)	61.2 mile/US gal. at 37 mph (26 km/ℓ at 60 km/h)	
Climbing ability	26° (tan θ = 0.48)	
Min. turning radius	94.5 in. (2,400mm)	
Braking distance	46 ft. at 31 mph (14 m at 50 km/h)	
Acceleration performance (SS ¼ mile)	12.3 seconds	
Engine:		
Type	Twin cylinder Air-cooled 4 stroke S.O.H.C.	
Bore and stroke	3.150 in. x 2.913 in. (80mm x 74mm)	
Displacement	45.3 cu.in. (743 cc)	
Compression ratio	8.8 : 1	
Max. power	63 B.H.P/6,500 r.p.m. (63 P.S/6,500 r.p.m.)	
Max. torque	50.6 ft-lbs/6,000 r.p.m. (7.0 kg-m/6,000 r.p.m.)	
Starting system	Electric and kick starter	
Ignition system	Battery ignition	
Carburetor:	Twin 38mm constant velocity	
Air cleaner:	Dry paper x 1	
Transmission:		
Clutch	Wet, multi-disc	
Primary reduction system	Spur gear	
Primary reduction ratio	2.250 (72/32)	
Secondary reduction system	Single row chain	
Secondary reduction ratio	2.352 (40/17)	
Gear box:		
Type	Constant mesh, 5 speed forward	Overall
Reduction ratio 1st	2.461 (32/13)	13.032
Reduction ratio 2nd	1.588 (27/17)	8.408
Reduction ratio 3rd	1.300 (26/20)	6.882
Reduction ratio 4th	1.095 (23/21)	5.798
Reduction ratio 5th	0.956 (22/23)	5.064

I. GENERAL

FEATURES

A) Valve and Camshaft Mechanism

The use of a single overhead camshaft is beneficial in two ways: First, it contacts the rocker arm in a more positive manner than standard push rod valve arrangements, which allows the engine to rev higher. Secondly, there are less moving parts to wear. Also, the overhead camshaft is driven by a long-lasting single row endless chain that is directly connected to the crankshaft. An adjustable chain tensioner and several additional cushions keep chain noise at a minimum.

B) Twin, Constant Vacuum Carburetors

The throttle slide in this type carburetor is raised by engine vacuum, not a cable. The amount of vacuum to the carburetor is controlled by a butterfly valve in the carburetor venturi. The carburetor meters precisely the correct amount of fuel at all times because it is controlled by engine demand.

C) Five Speed Transmission

The wide ratio five speed synchromesh transmission permits full usage of engine power under all conditions.

D) Dry Sump System Lubrication

In the dry sump system, the oil is pressure-fed to the engine from the separate oil tank. For this pressure feed, two pumps feed and scavenging are used. This system features a high oil cooling efficiency and is suitable for a high-temperature operating engine. Both oil pumps are of trochoidal design.

E) Omni-phase Balancer

To reduce the vibration of the crankshaft, a pair of balancer weights are provided. The balancer weights are turned by an endless chain coming from the center of the crankshaft.

In addition, the crankshaft is a one-piece forged assembly and ensures high rigidity and better durability.

F) Safety Measures

1) Disc brake

For the front wheel, a hydraulic disc type brake is provided, which is fade-free even after a prolonged period of use.

2) Tire wear indicator

The tire is fitted with a wear indicator, which enables the rider to check the amount of wear on the tire.

3) Brake lining switch

If the rear brake lining wears to less than 2 mm thick, the pilot lamp lights up.

4) Oil pressure warning lamp

When oil pressure rises above 0.1 - 0.2 kg/cm² (1.4 - 2.8 psi) the oil pressure warning lamp goes off, indicating proper operation of the lubrication system.

5) Reserve lighting system

a. If either headlight filament burns out, the remaining headlight filament will come on and the "LAMP" light (on instrument cluster) will come on.

b. If the tail lamp filament burns out the stop lamp filament will automatically come on (at reduced brilliance) and the "TAIL LAMP" indicator (on instrument cluster) will come on (very dim).

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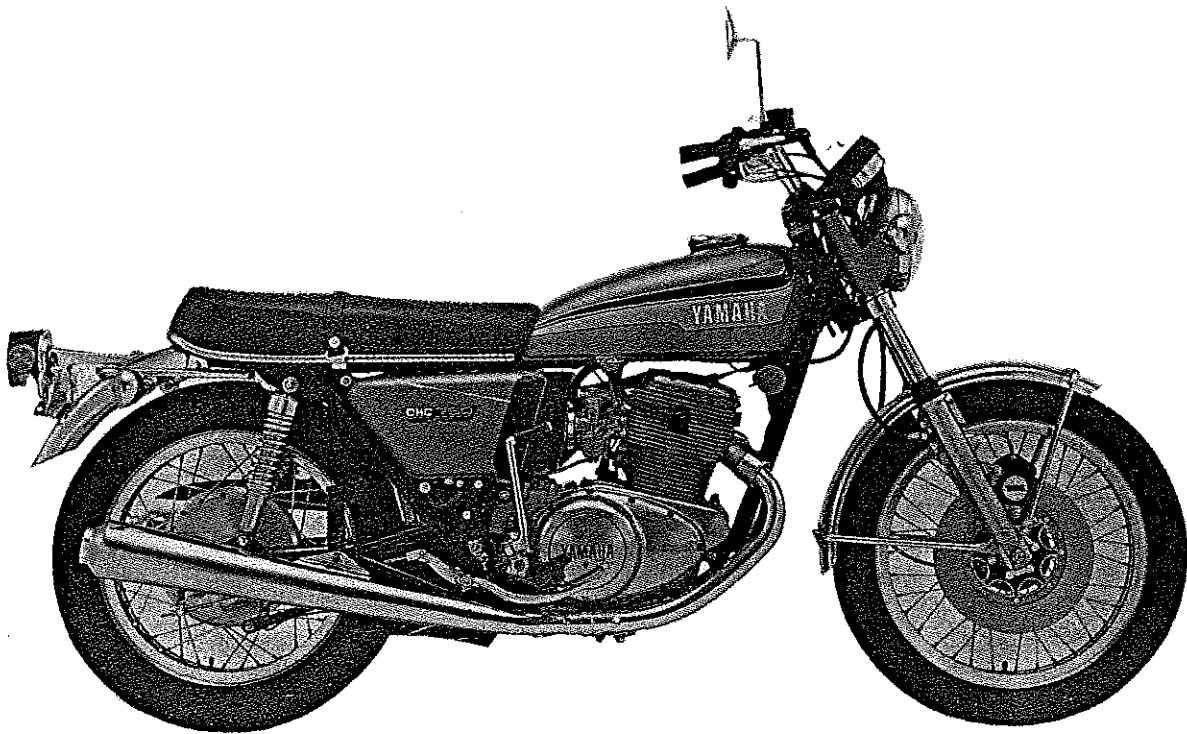
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FOREWORD

This service manual has been designed to furnish all dealers and service personnel with specific information concerning the TX750, including disassembly and assembly procedures, inspection and analyzation of worn parts, and subsequent repair or adjustment procedures.

The manual should be thoroughly read. This will provide full familiarity with the design of this machine and all correct repair procedures.

Because Yamaha engineers are constantly searching for new and more efficient engine advancements, it is possible that some of this information may be modified in the future. Any changes in design, adjustments, or repair procedures will be immediately forwarded to all Authorized Yamaha dealers through Service and/or Parts News Bulletins.



YAMAHA MOTOR CO.,LTD.
SERVICE DEPARTMENT

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.

The Research, 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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