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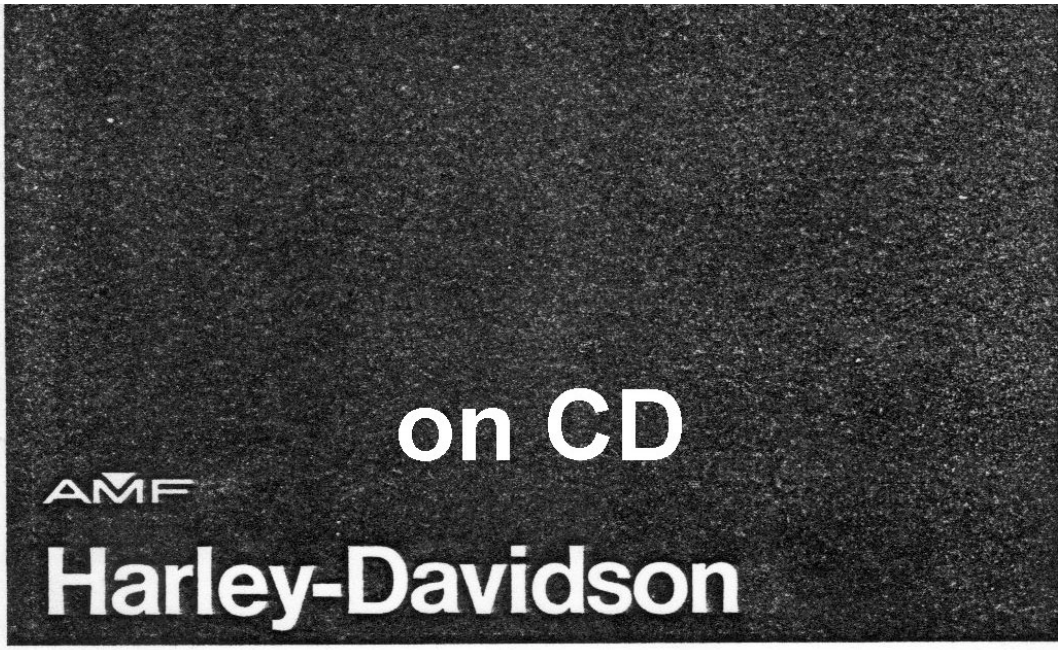


SERVICE MANUAL

XR-750

1978 to 1980

PART NO. 99491-72RA

GENERAL INFORMATION

The engine has been assembled with Bel-Ray MC-5 Engine Oil (SAE 40 weight). THIS IS DIFFERENT THAN IN THE PAST. We do not advise mixing any Castor base oil with Bel-Ray lubricant unless the engine oil tank and crankcase has been drained and washed of old oil.

The engine has been fitted with warm-up plugs, Champion No. N6OR. These plugs are not to be used for racing or full throttle operation. The recommended spark plug numbers are specified in the SPECIFICATIONS section of this manual.

The XR-750 engine as shipped from the factory has an approximate maximum operating RPM of 8000.

— CAUTION —

Constant operation of the engine above this 8000 RPM will severely shorten the life of critical engine components and will require extra maintenance to keep the engine in peak condition. Also, full throttle operation before the engine has reached operating temperature will further shorten the life of the engine.

The XR-750 has been fitted at the factory with an air cleaner for each carburetor. These filters must be oiled with a straight viscosity non-detergent engine oil before using the motorcycle. Allow excess oil to drain off over night if possible. When the filters become dirty, wash them in solvent and re-oil. For best performance, you are advised to clean the filters after each event.

The XR-750 engine has two Mikuni carburetors, one for each of the cylinders. To start the motorcycle, lift the choke buttons. After the engine has started, return the choke buttons to the down position. The carburetors have been fitted with the correct low and mid-range jetting, but you will have to determine the correct high-speed jetting, and this will depend upon the atmospheric conditions prevailing at the time of calibration. Always check main jetting for the race track and atmospheric conditions prevailing at each race meet as follows:

Engine must be at operating temperature and fitted with Champion N57G or equivalent heat range spark plugs. Starting with a #240 Main jet, conduct a full throttle run terminated with a simultaneous clutch disengagement and kill button application. Remove the plugs and inspect for proper mixture. Change main jets and repeat process until proper readings are obtained. It will not be uncommon that the main jet for the front cylinder will be different than the main jet for the rear cylinder. Needle position may also have to be varied front to rear to obtain a clean running engine.

The XR-750 engine has a high compression ratio requiring the use of a high grade premium fuel. Spark timing has been set at the factory at 33° BTDC. The flywheels have been marked in the proper location for the above timing for ease of adjustment. Refer to the magneto section for further information on these timing marks.

The XR-750 motorcycle requires a break-in period before any racing event. A new or rebuilt engine should be run-in for approximately 20 miles to allow the components to seat themselves. We recommend that the vehicle be run at nearly constant speed with intermittent full throttle application for short periods of time. Do not exceed 6000 RPM during this break-in period. After completion of break-in, change the engine oil. Check valve lash and ignition timing and adjust as necessary. At this time also check all chassis fasteners for tightness, paying particular attention to the suspension attachment points such as steering head bearing races and rear fork attachment.

SPECIFICATIONS

All dimensions are in inches unless otherwise specified.

Dimensions of Motorcycle

Overall length	83 in.
Overall width	33 in.
Saddle height	31 in.
Wheelbase	56.75 in.
Minimum ground clearance	7.0 in.
Total dry weight	295 lbs.

Chassis

Head angle	26° ± 30′
Trail	3.437 in.
Tire size front & rear	4.00 x 19 in.

Capacities

Fuel tank	2.5 gallons
Oil tank	2.75 quarts
Transmission	1 pint

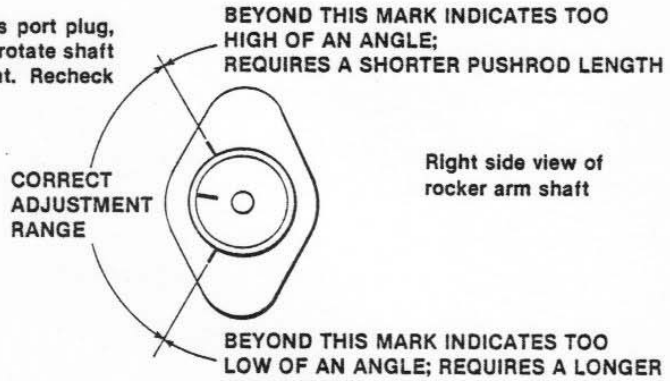
Engine

Type	4 cycle, V Twin, OHV
Bore	(79.4mm) 3.125 in.
Stroke	(75.7mm) 2.98 in.
Total displacement	(750cc) 45.77 cu. in.
Compression ratio	9.8 to 1
Compression pressure	165 psi minimum
Maximum RPM	8000

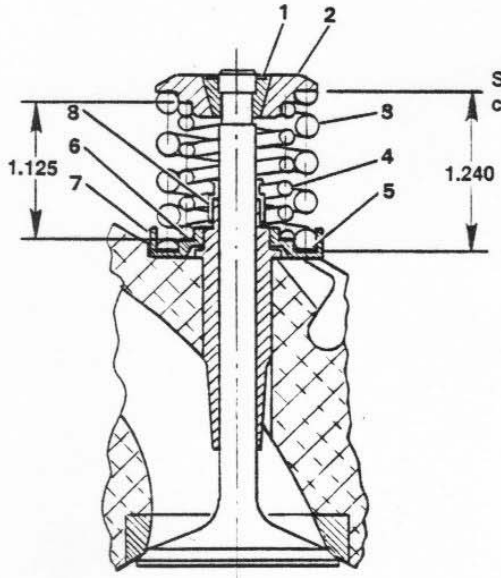
Maximum HP developed @	7600 RPM
Piston Clearance	.0045 in./.0055 in.
Carburetor	36mm Mikuni
Magneto	Fairbanks-Morse Single Fire
Magneto point gap	.015 to .016 in.
Ignition timing	33° to 35° BTDC
Tappet clearance	
Intake	.010 in. COLD
Exhaust	.012 in. COLD
Spark plugs (Champion)	N57G FOR AVERAGE USE
Size	14 mm x 3/4 in.
Gap setting	.020 to .022 in.
Torque	15 ft-lbs

Cam Timing @ .060 Tappet Lift	1978 & Earlier	1980
Cam profile	E	J
Valve lift	.420"	.500"
Intake opens	33°	43°
Intake closes	54°	57-1/2°
Exhaust opens	64°	67-1/2°
Exhaust closes	24°	29°
Part Numbers		
Cam Gear:		
#1 (R. In.)	25474-74R	25474-79R
#2 (R. Ex.)	25522-74R	25522-79R
#3 (F. In.)	25472-74R	25472-79R
#4 (F. Ex.)	25524-74R	25524-79R

To adjust tappet clearance, remove access port plug, loosen nut on left side of rocker shaft and rotate shaft to obtain proper clearance and alignment. Recheck after tightening locknut.



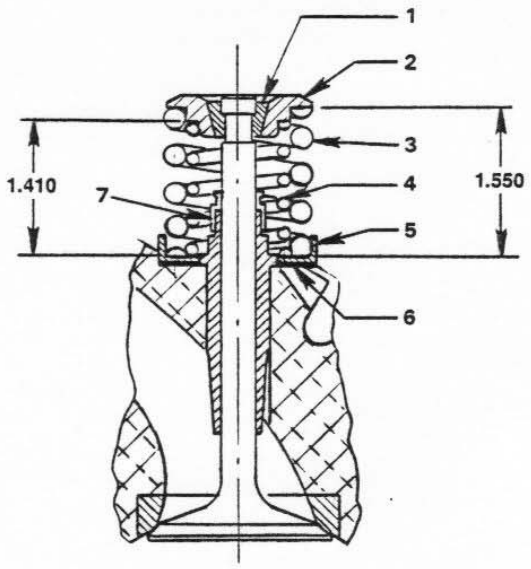
TAPPET ADJUSTMENT



Shim inner and outer springs to within .040 in. of being coil bound.

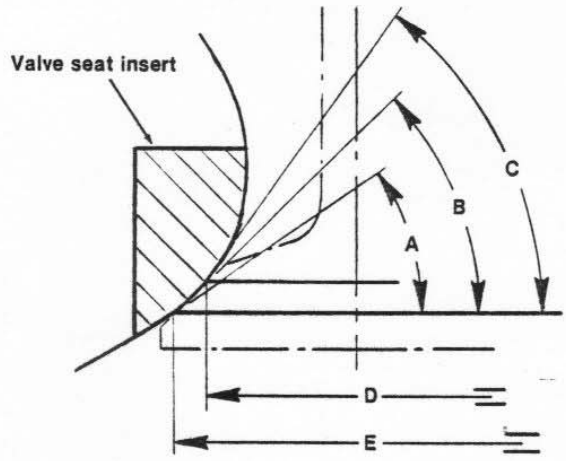
1. Key
2. Upper collar
3. Outer spring
4. Inner spring
5. Outer spring shim - as required (.007, .0149, .0359)
6. Inner spring shim - as required (.007, .0149, .0350)
7. Lower collar
8. Valve seal

VALVE SPRING SET-UP, INTAKE & EXHAUST 1978 & EARLIER



1. Key
2. Upper collar
3. Outer spring
4. Inner spring
5. Lower collar
6. Shim (.007, .015, .035)
7. Valve seal

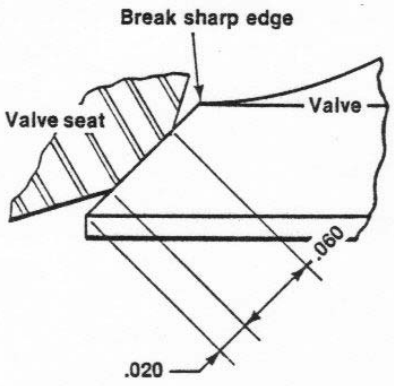
VALVE SPRING SET-UP, INTAKE & EXHAUST 1980 & LATER

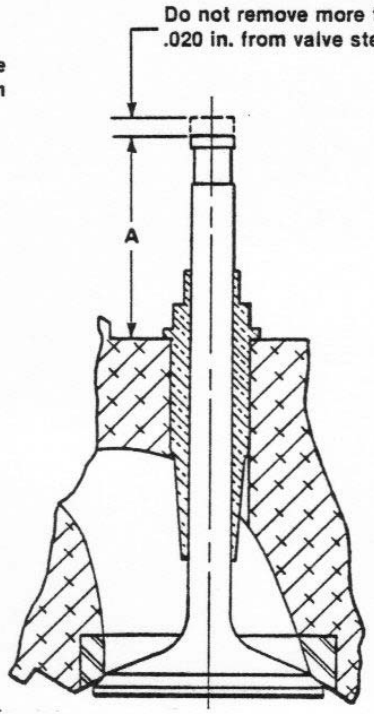


		1978 & Earlier		1980	
		35 mm Exhaust Valve	42 mm Intake Valve	35 mm Exhaust Valve	44 mm Intake Valve
Top relief angle	A	40	40	40-43	40-43
Valve seat angle	B	45	45	45	45
Bottom relief angle	C	52	52	52	52
	D	1.265	1.535	1.265	1.617
	E	1.350	1.630	1.350	1.702

DIMENSIONS FOR RENEWING VALVE SEATS

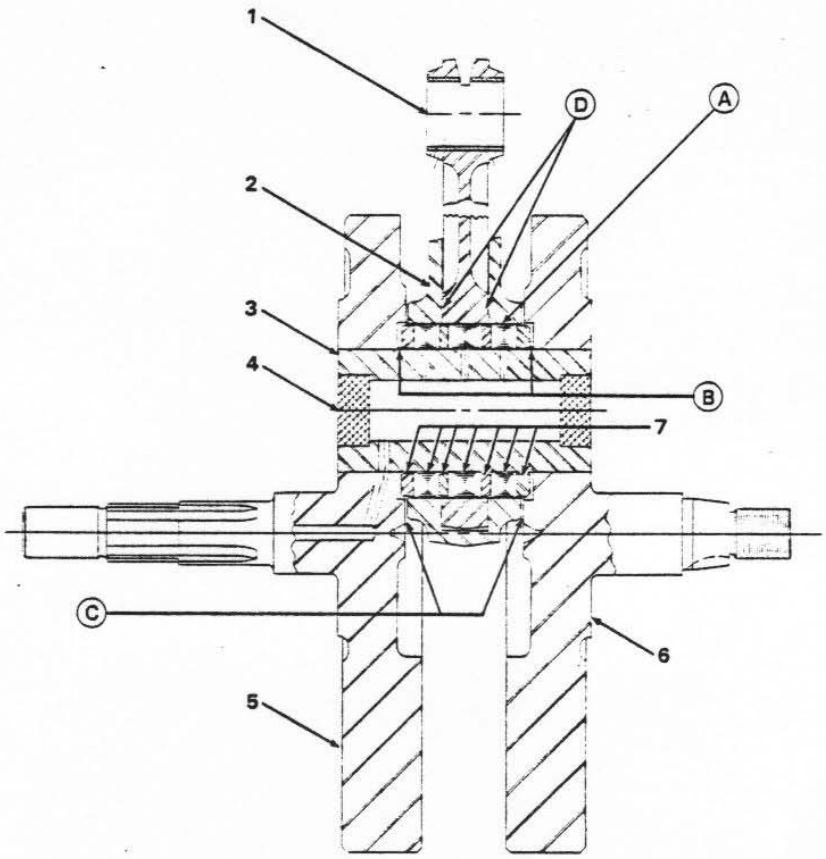
When renewing valve seats, valve height ("A") must be maintained. If more than .020 in. must be removed from valve stem, replace valve or valve seat.





	1978& Earlier	1980
Dim. "A"	1.570	1.680

VALVE STEM HEIGHT



1. Front connecting rod
2. Rear connecting rod
3. Crankpin
4. Crankpin plug (2)
5. Flywheel, gear side
6. Flywheel, sprocket side
7. Roller bearings and retainers

(A) Select rollers to obtain .0008 in. to .0012 in. looseness across crankpin diameter. Variation between rollers in any set not to exceed .0001.

(B) Total bearing and retainer end play .020 to .025 in.

(C) Total connecting rod end play .020 to .025 in.

(D) Total female-to-male rod side clearnace .004 to .010 in.

FLYWHEELS & CONNECTING ROD ASSEMBLY

CRANKSHAFT SERVICE PROCEDURE

1. Measure width of assembled roller bearing set.

2. Measure pocket depth in each flywheel where retainer indexes into flywheel.

3. Measure total width of female rod. This should be within a few thousandths of the width of the bearing set minus the depth of the pockets. Material may be removed from either the connecting rod or the bearing retainers if necessary to adjust the width to obtain the proper tolerance.

4. Align oil hole in the crank pin with oil feed hole in the right flywheel. Press crank pin into the right side flywheel until it is flush with the outside of the flywheel.

5. Liberally coat the crank pin and the rod bearing set with oil. Assemble the rod set onto the crank pin.

6. Press left side flywheel onto crank pin until proper female rod side clearance is obtained of .020 in. to .025 in. It is OK for the crank pin to protrude through the sprocket side of the flywheel.

7. The sketches on the following two pages describe the above procedure. Drawings of the press plates and press pins shown may be obtained from the Racing Dept. by special request. Be advised that we do not manufacture these parts and that you will have to obtain the services of a qualified machine shop to make the parts for you.

8. To disassemble the flywheel assembly, it is mandatory that the plugs be removed from the ends of the crank pin. This is done by drilling one side of the plugs out with a 13/32 drill and then pressing the opposite plug out with a long 3/8 bolt. The drilled plug may then be pressed out from the opposite side with the head of the 3/8 bolt.

NOTE: A change in design of the crankpin and plug will be apparent. The latest configuration will be a smaller hole through the crankpin and smaller steel plugs will be supplied as spares.

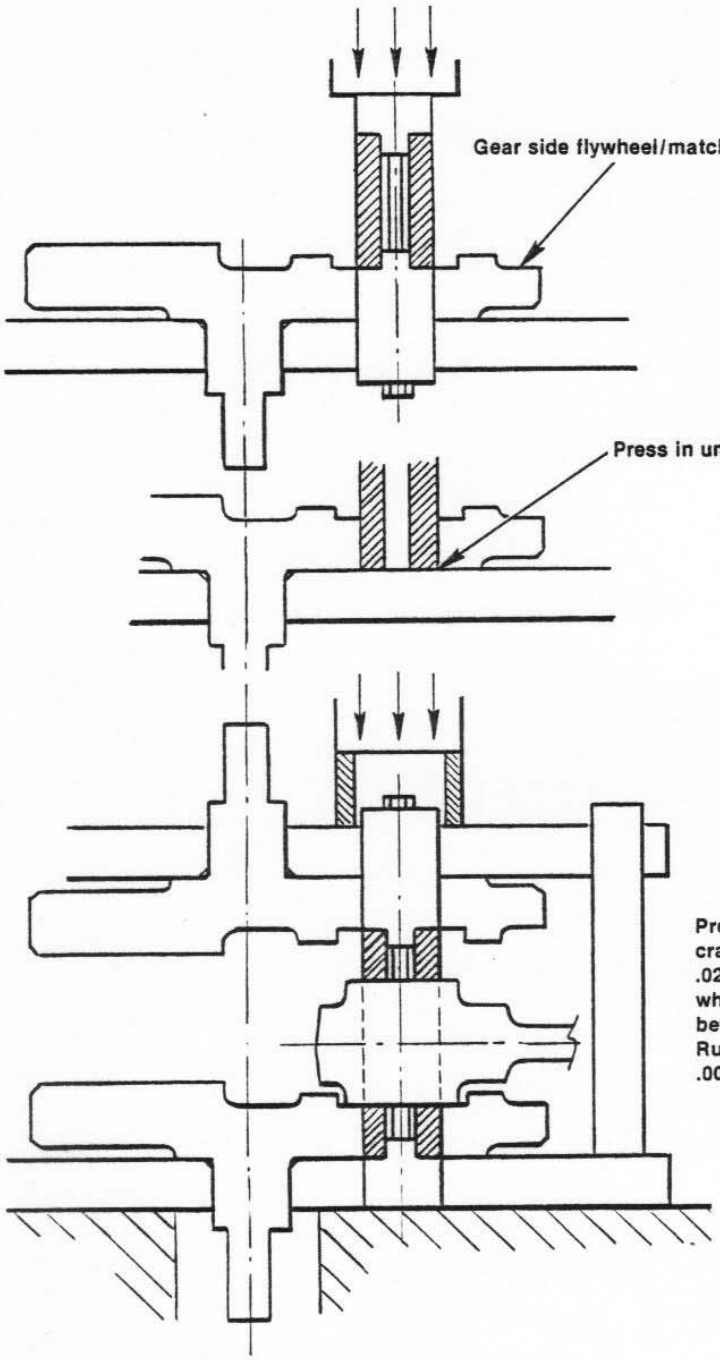
CRANKSHAFT END-PLAY SHIMMING PROCEDURE

To facilitate shimming the crankshaft having barrel roller bearings, special spacer collars P/N 96680-72R have been made available to ease this procedure. Two spacer collars are required.

Assemble one of the spacer collars into the right side crankcase. Place the crankshaft assembly into the right side case. Be sure the collar fits flush onto the crank face. Assemble a .105 in. thick thrust washer onto the sprocket side of the crankshaft, and place the other spacer collar onto the crank. Assemble the left side crankcase onto the above assembly, and draw down tight.

Using a dial indicator, determine the exact amount of end-play the crankshaft now has in the crankcase. This measurement will determine which thrust washer size to use on the right side or gear side of the flywheel. If the measurement is more than .060 in., then a thicker sprocket side thrust washer will have to be selected, the correct selection of thrust washer thickness on the left and right sides of the flywheel will give you a correct end-play of .001 to .005 in. with the spacer collars.

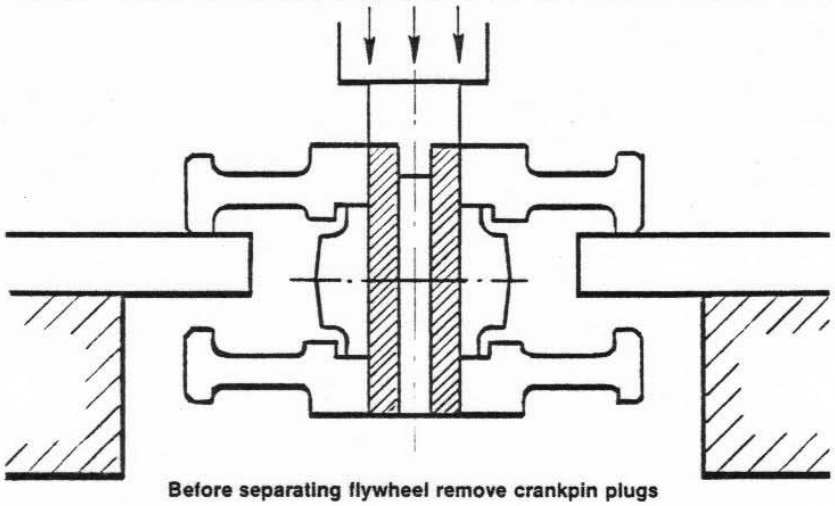
You may now proceed to assemble the crankcases with the roller bearings. After assembly, the crankshaft end play may be checked again, at which time the end play may be as high as .035 in. due to the clearances within the bearing itself.



Press sprocket side flywheel on crankpin until a total clearance of .020-.025 between rod and flywheel is obtained. Align wheels before pressing in crankpin plugs. Runout on bearing area of shafts .001 max.

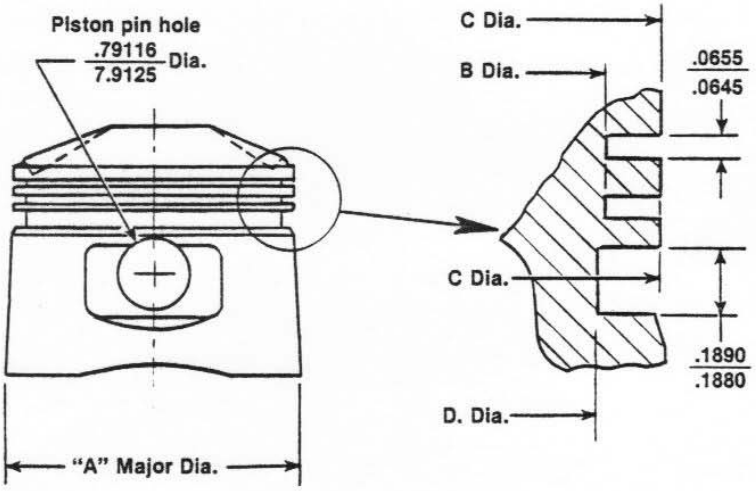
Check runouts after plugs are pressed in

FLYWHEEL ASSEMBLY



Before separating flywheel remove crankpin plugs

FLYWHEEL DISASSEMBLY



PART NUMBER	OVERSIZE	A	B	C	D
22244-72RA	Std.	3.1190	2.793 / 2.783	3.094 / 3.092	2.760 / 2.750
22245-72RA	.010 O.S.	3.1290	2.803 / 2.793	3.104 / 3.102	2.770 / 2.760
22246-72RA	.020 O.S.	3.1390	2.813 / 2.803	3.114 / 3.112	2.780 / 2.770
22247-72RA	.030 O.S.	3.1490	2.823 / 2.813	3.124 / 3.122	2.790 / 2.780
22248-72RA	.040 O.S.	3.1590	2.833 / 2.823	3.134 / 3.132	2.800 / 2.790

PISTON DIMENSIONS

MAGNETO

The XR-750 is fitted with a new type of Magneto. The unit is manufactured, as in the past, by Fairbanks-Morse and differs from previous units in construction details and operation. This new magneto fires each cylinder independent of the other cylinder. The condensor is now mounted on the outside of the body casting and is held in place with two straps. The magneto cap is of a different design to accommodate the new distributor rotor and two spark plug leads. The cap is also located on the body casting with dowel pins, and care must be taken to remove the cap off of the dowel pins. Do not strike the cap with hammer from the side since this will break the cap. When servicing the magneto, care must be taken to prevent breakage of the rotor. If during service the rotor becomes loose, we advise that the rotor be bonded to the shaft with a drop of H-D SuperBonder P/N 99629-77.

We would also suggest that since there is no rubber boot over the spark plug leads exiting from the cap, that you use silicone sealant to prevent corrosion in this area. Furthermore, on some race tracks that have an abrasive surface, fabricate a plastic shield to help prevent any damage to the magneto external wiring and condensor. These shields are normally tie-wrapped to the front down tubes just in front of the magneto.

CARBURETOR

The Mikuni carburetors supplied with your motorcycle are jetted for average conditions. Your engine will require at the least main jet changes for optimum performance under various racing conditions. The following is a listing of the standard jetting and a description of their functions.

Air Correction Jet
(1.0 Standard)

The air correction jet is used for fine tuning the mixture changes of the main jet and is changed when air temperature changes. The larger the jet number the leaner the mixture.

Main Jet

(240 Standard)

The main jet controls open throttle operation. The main jet is changed to allow for changes in the barometric pressure. The larger the jet number the richer the mixture.

Air Screw

The air screw is used for setting idle mixture. The farther the screw is backed out, the leaner the mixture.

Pilot Jet

(25 Standard)

The pilot jet is used for setting idle mixture. The larger the jet number, the richer the mixture.

Throttle Valve or Slide

(2.0 Cutaway Standard)

The throttle valve cutaway controls the mixture up to 1/4 throttle opening. The larger the throttle valve cutaway the leaner the mixture.

Needle Jet

(159-P4 Standard)

The needle jet controls the mixture from 1/4 to 3/4 throttle opening. The larger the needle jet number the richer the mixture.

Jet Needle

(6F5 Standard)

The jet needle fine tunes the mixture of the needle jet The sharper the taper angle, the richer the mixture.

The following are the methods for tuning the Mikuni carburetors. Other more technical data is available from Mikuni carburetor distributors.

TUNING MIKUNI CARBURETORS

Carburetors should be fine tuned with the engine under load and at operating temperatures. Following is the procedure for fine tuning the Mikuni carburetors.

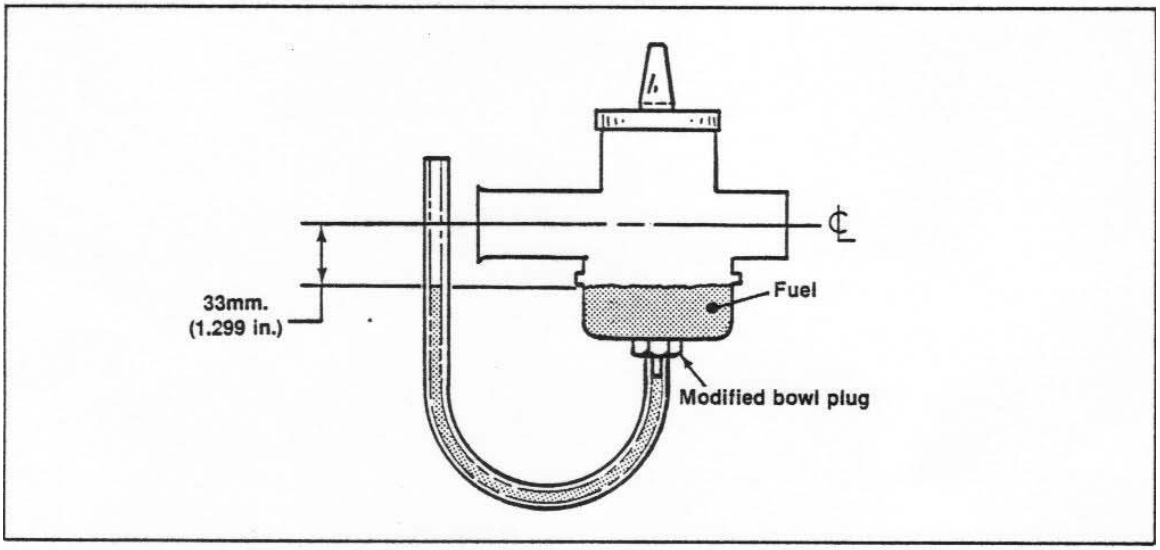
1. **Adjusting fuel level**

   The fuel level of the float chamber is 33 mm. (1.299 in.) below the center line of the carburetor bore. See illustration.

   Adjust fuel level using the arrangement shown above. First drill a hole through the center of a bowl plug, Harley-Davidson Part No. 27180-72R, so that a short length of 1/8 in. copper tubing may be soldered in place. Attach a piece of flexible, clear plastic tubing, approximately 8 in. long, to the copper tubing. Install modified plug in float bowl.

   Fuel level is changed by bending float lever arm.

   Use modified bowl plug only for checking fuel level. Replace with standard plug after fuel level adjustment is completed.



2. **Adjusting air screw and pilot jet**

   After engine is warmed to operating temperature, determine the best idling mixture by turning air screw in and out. If the air screw is more than 2-1/2 turns out, use a smaller number pilot jet. If the air screw is less than 1/2 turn out, use a larger number pilot jet. The carburetor comes equipped with a #25 pilot jet installed. Pilot jets are available in increments of 5.

3. **Throttle valve**

   Open throttle slowly (not more than 1/4 open) until engines fires irregularly. Hold this throttle position and pull starter plunger up. This makes fuel-air mixture richer. If engine fires more irregularly, use a larger throttle valve cutaway. If engines fires regularly, use a smaller throttle valve cutaway.

   With starter plunger down and correct size throttle valve cutaway, engine should fire regularly in the throttle range from closed to 1/4 open. Carburetor comes equipped with 1.5 mm. cutaway installed. Cutaway throttle valve is available in 0.5 mm. increments from 1.0 mm. to 3.5 mm.

4. **Adjusting needle jet and needle**

   From 1/4 to 3/4 throttle opening, needle jet and needle control the fuel mixture. Open throttle slowly, not more than 3/4 open, until engine fires irregularly. Pull starter plunger up. If engine fires more regularly, enrich mixture by moving clip on jet needle to a lower groove. If engines fire more irregularly, lean the mixture by moving clip on jet needle to a higher groove. If necessary, use a needle with a sharper taper to enrich the mixture.

In extreme cases, needle jet must be changed. A larger number jet will enrich the mixture. Conversely, a smaller number jet will result in a leaner mixture. The carburetor comes equipped with 6F5 needle and a #159-P4 needle jet installed.

5. **Main jet**

The carburetors come equipped with a #240 main jet installed. Main jets are available in increments of 5 for sizes below #200 and increments of 10 for sizes above #200. Select the largest main jet that gives the highest speed.

— CAUTION —

Take care not to overheat engine. Always start overrich, not too lean.

TRANSMISSION SPECIFICATIONS

Mainshaft:
.003 in. to .009 in. end play - adjusted by item 4, shown in "XR-750 Transmission" illustration.

Countershaft:
.004 in. to .009 in. end play - adjusted by item 18, shown in "XR-750 Transmission" illustration.

Clearance between countershaft clutch faces:
.038 in. to .058 in. - adjusted by item 16, shown in "XR-750 Transmission" illustration. Clearance between countershaft second and third gears should be equal when transmission is in neutral. If proper spacing cannot be maintained, oversize or undersize shifter forks must be used.

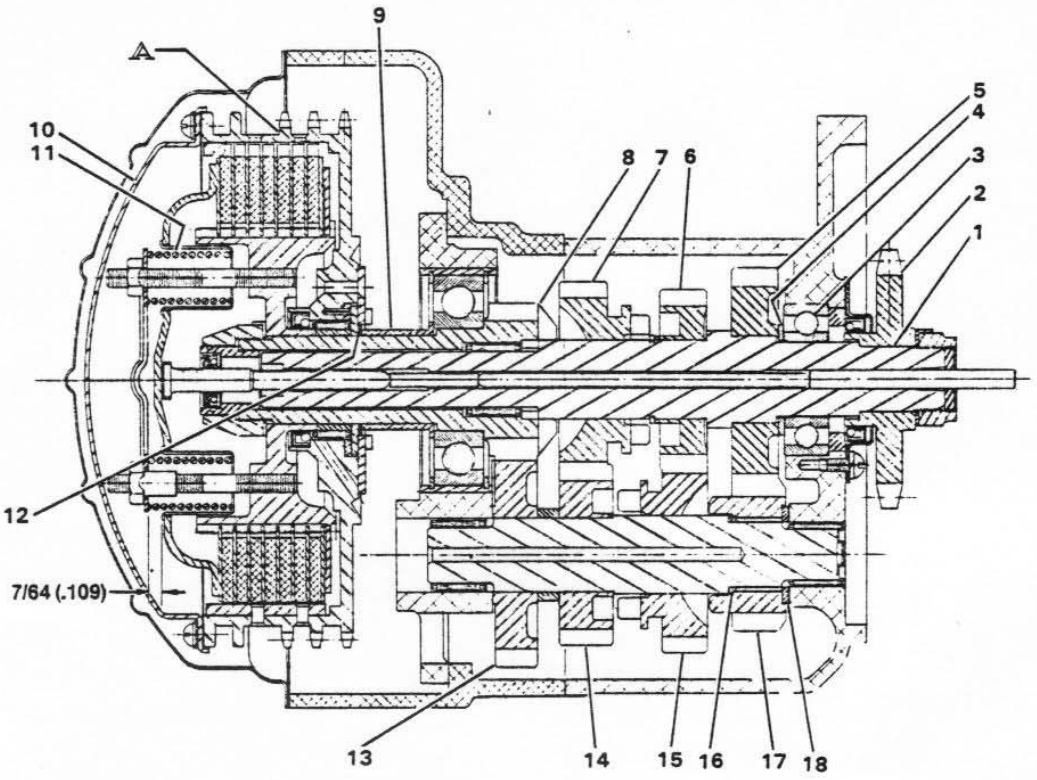
A detailed procedure for disassembling, assembling, and adjusting the transmission shifter mechanism is located in SECTION 4 of the Sportster Service Manual.

PRIMARY CHAIN

Primary Chain Adjustment:
Primary chain should be adjusted for 3/4 in. slack (total play) with engine cold. Slack is measured on the upper strand midway between engine and clutch sprockets.

Primary Chain Alignment:
To check primary chain alignment, place a straightedge across the outside surface of crankshaft sprocket and surface "A" of clutch sprocket shown in "XR-750 Transmission" illustration. Straightedge should lie flat across the two surfaces. If not, vary shims #12 and clutch sprocket spacer #9 as necessary.

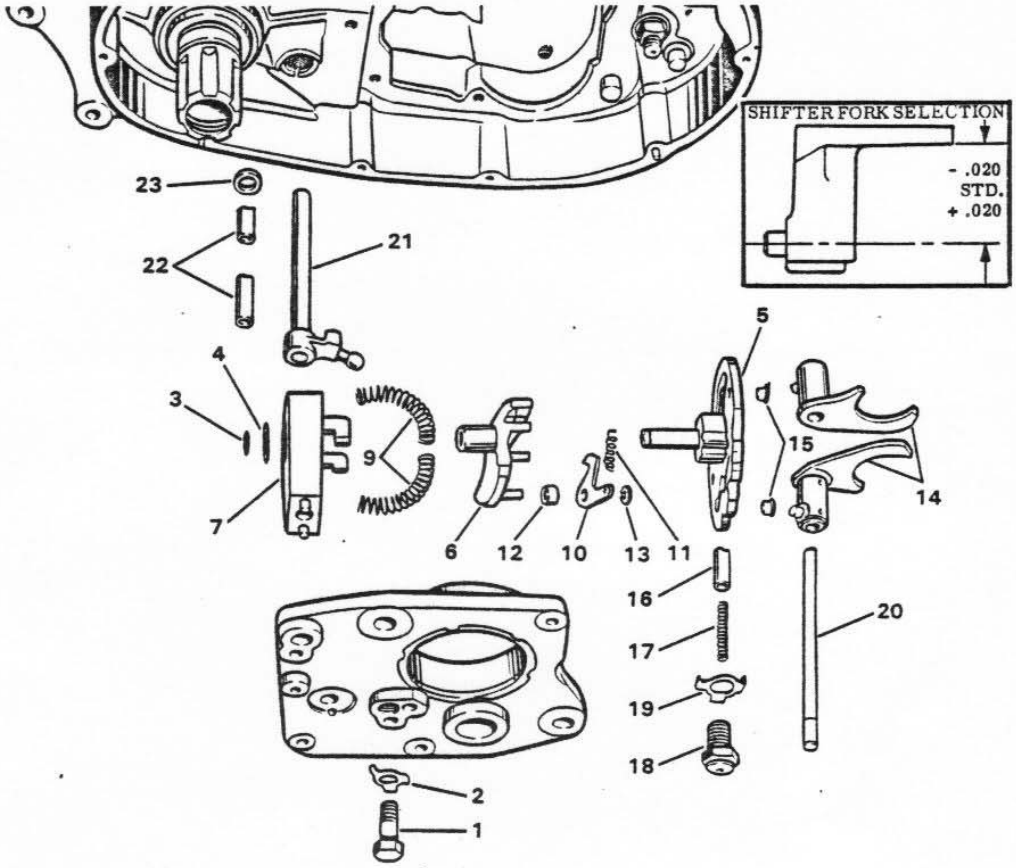
NOTE: Primary chain should be replaced after a maximum of 3 hours of operation.



1. Mainshaft
2. Mainshaft sprocket
3. Mainshaft bearing
* 4. Mainshaft thrust washer - right, as required (.050, .055, .060, .065, .070, .075)
5. Mainshaft low gear
6. Mainshaft third gear
7. Mainshaft second gear
8. Mainshaft drive gear
9. Clutch sprocket spacer, as required (1.025, 1.047)
10. Clutch cover
11. Clutch spring
12. Clutch sprocket shim, as required (.020)
13. Countershaft drive gear
14. Countershaft second gear
15. Countershaft third gear
16. Countershaft low gear washer - left, as required (.065, .075, .085, .100)
17. Countershaft low gear
* 18. Countershaft low gear washer - right, as required (.050, .055, .060, .065, .070, .075)

* More sizes available than listed above

XR-750 TRANSMISSION



1. Cam cap screw
2. Cam screw lock
3. Cam retaining ring
4. Cam shaft thrust washer
5. Gear shifter cam
6. Pawl carrier
7. Pawl carrier support
9. Pawl carrier springs (2)
10. Pawl (2)
11. Pawl spring
12. Pawl spacer (2)
13. Pawl retaining ring (2)
14. Gear shifter forks (2) (variable)
15. Finger rollers (2)
16. Cam follower
17. Cam follower spring
18. Cam follower retainer
19. Cam follower retainer lock
20. Fork shaft
21. Lever arm shaft
22. Shifter shaft bushings (2)
23. Shifter shaft oil seal

SHIFTER MECHANISM — FOUR SPEED TRANSMISSION

DRIVE RATIOS

*20T MOTOR SPROCKET
*59T CLUTCH SPROCKET

(* Denotes Standard Equipment)

REAR SPKT.	TRANSMISSION MAINSHAFT SPROCKET									
	15	16	17	18	*19	20	21	22	23	24
36	7.08	6.64	6.25	5.90	5.59	5.31	5.06	4.83	4.62	4.42
37	7.28	6.82	6.42	6.06	5.74	5.46	5.20	4.96	4.75	4.55
38	7.47	7.01	6.59	6.23	5.90	5.60	5.34	5.09	4.87	4.67
39	7.67	7.19	6.77	6.39	6.06	5.75	5.48	5.23	5.00	4.79
*40	7.87	7.38	6.94	6.56	6.21	5.90	5.62	5.36	5.13	4.92
41	8.06	7.56	7.11	6.72	6.37	6.05	5.76	5.50	5.26	5.04
42	8.26	7.74	7.29	6.88	6.52	6.20	5.90	5.63	5.39	5.16
43	8.46	7.93	7.46	7.05	6.68	6.34	6.04	5.77	5.52	5.29
44	8.65	8.11	7.64	7.21	6.83	6.49	6.18	5.90	5.64	5.41
45	8.85	8.30	7.81	7.38	6.99	6.64	6.32	6.03	5.77	5.53
46	9.05	8.48	7.98	7.54	7.14	6.79	6.46	6.17	5.90	5.65

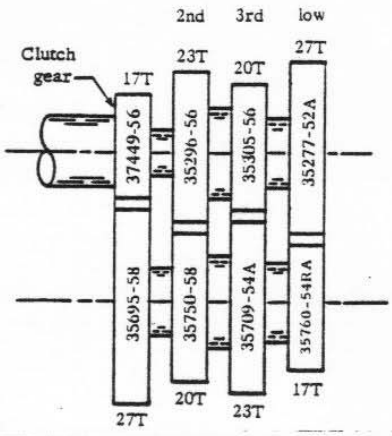
25T MOTOR SPROCKET
59T CLUTCH SPROCKET

REAR SPKT.	TRANSMISSION MAINSHAFT SPROCKET									
	15	16	17	18	19	20	21	22	23	24
36	5.66	5.31	5.00	4.72	4.47	4.25	4.04	3.86	3.69	3.54
37	5.82	5.46	5.14	4.85	4.60	4.37	4.16	3.96	3.79	3.63
38	5.98	5.60	5.28	4.98	4.72	4.48	4.27	4.07	3.89	3.73
39	6.14	5.75	5.41	5.11	4.84	4.60	4.38	4.18	4.00	3.83
40	6.29	5.90	5.55	5.24	4.97	4.72	4.50	4.29	4.10	3.93
41	6.45	6.05	5.69	5.38	5.09	4.84	4.61	4.40	4.21	4.03
42	6.61	6.20	5.83	5.51	5.22	4.96	4.72	4.51	4.31	4.13
43	6.77	6.34	5.97	5.64	5.34	5.07	4.83	4.61	4.41	4.23
44	6.92	6.49	6.11	5.77	5.47	5.19	4.94	4.72	4.51	4.33
45	7.08	6.64	6.25	5.90	5.59	5.31	5.06	4.83	4.62	4.43
46	7.24	6.79	6.39	6.03	5.71	5.43	5.17	4.93	4.72	4.52

30T MOTOR SPROCKET
59T CLUTCH SPROCKET

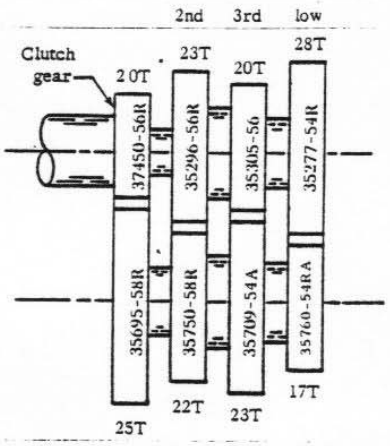
REAR SPKT.	TRANSMISSION MAINSHAFT SPROCKET									
	15	16	17	18	19	20	21	22	23	24
36	4.72	4.42	4.16	3.93	3.73	3.54	3.37	3.22	3.08	2.95
37	4.85	4.54	4.28	4.04	3.83	3.64	3.46	3.30	3.16	3.03
38	4.98	4.67	4.39	4.15	3.93	3.74	3.56	3.40	3.25	3.11
39	5.11	4.79	4.51	4.26	4.04	3.84	3.65	3.48	3.33	3.19
40	5.24	4.92	4.63	4.37	4.14	3.93	3.75	3.58	3.42	3.28
41	5.38	5.04	4.74	4.48	4.24	4.03	3.84	3.67	3.51	3.36
42	5.51	5.16	4.86	4.59	4.35	4.13	3.93	3.75	3.59	3.44
43	5.64	5.29	4.97	4.70	4.45	4.23	4.03	3.84	3.68	3.52
44	5.77	5.41	5.09	4.81	4.55	4.33	4.12	3.93	3.76	3.60
45	5.90	5.53	5.21	4.92	4.66	4.42	4.21	4.02	3.85	3.69
46	6.03	5.65	5.32	5.03	4.76	4.52	4.31	4.11	3.93	3.77

XR TRANSMISSION GEAR RATIOS



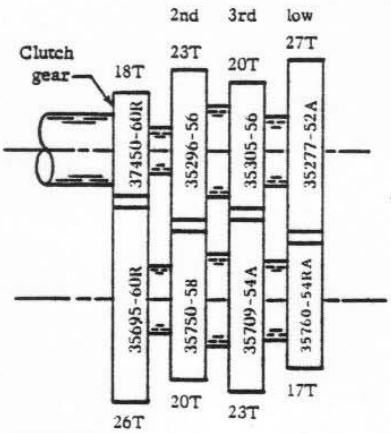
SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.38 to 1	27/17 x 20/23
SECOND	1.83 to 1	27/17 x 23/20
LOW	2.52 to 1	27/17 x 22/17

STANDARD RATIO



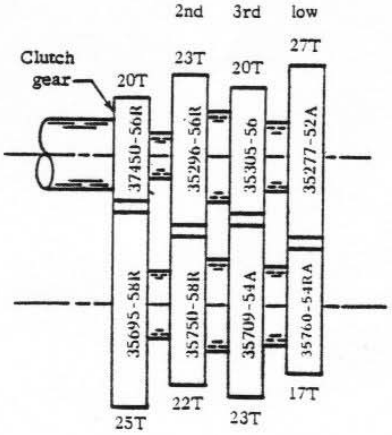
SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.09 to 1	25/20 x 20/23
SECOND	1.31 to 1	25/20 x 23/22
LOW	2.06 to 1	25/20 x 28/17

STANDARD "CLOSE" RATIO



SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.26 to 1	26/18x20/23
SECOND	1.66 to 1	26/18x23/20
LOW	2.29 to 1	26/18x27/17

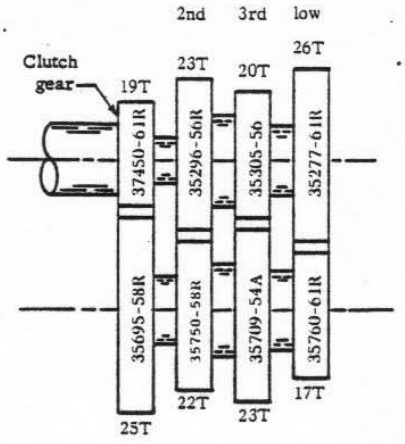
SPECIAL RATIO "C"



SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.09 to 1	25/20 x 20/23
SECOND	1.31 to 1	25/20 x 23/20
LOW	1.98 to 1	25/20 x 27/17

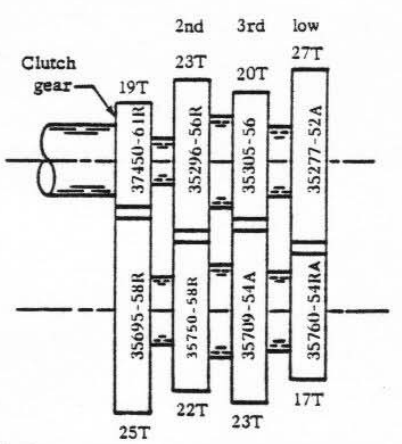
SPECIAL RATIO "D"

XR TRANSMISSION GEAR RATIOS



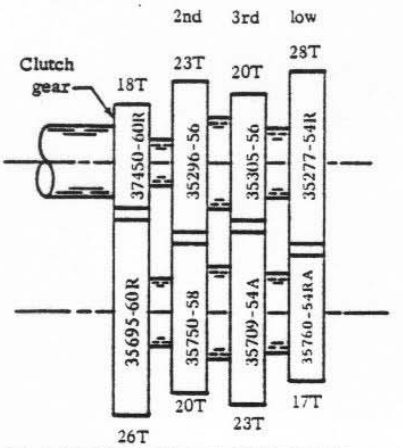
SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.14 to 1	25/19 x 20/23
SECOND	1.38 to 1	25/19 x 23/22
LOW	2.01 to 1	25/19 x 26/17

SPECIAL "CLOSE" RATIO "E"



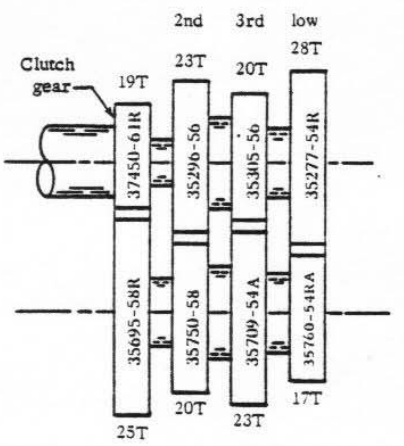
SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.14 to 1	25/19 x 20/23
SECOND	1.38 to 1	25/19 x 23/22
LOW	2.09 to 1	25/19 x 27/17

SPECIAL "CLOSE" RATIO "F"



SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.26 to 1	26/18 x 20/23
SECOND	1.66 to 1	26/18 x 23/20
LOW	2.38 to 1	26/18 x 28/17

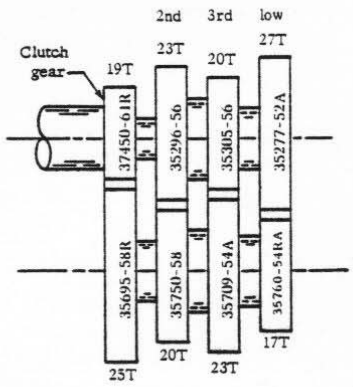
SPECIAL "CLOSE" RATIO "G"



SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.14 to 1	25/19 x 20/23
SECOND	1.51 to 1	25/19 x 23/20
LOW	2.17 to 1	25/19 x 28/17

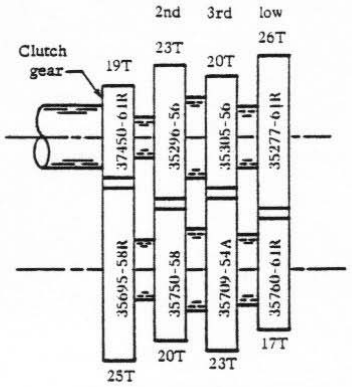
SPECIAL "CLOSE" RATIO "H"

XR TRANSMISSION GEAR RATIOS



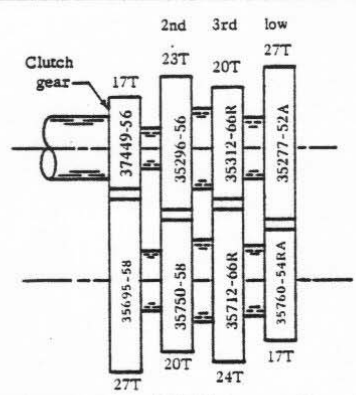
SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.14 to 1	25/19 x 20/23
SECOND	1.51 to 1	25/19 x 23/20
LOW	2.09 to 1	25/19 x 27/17

SPECIAL "CLOSE" RATIO "J"



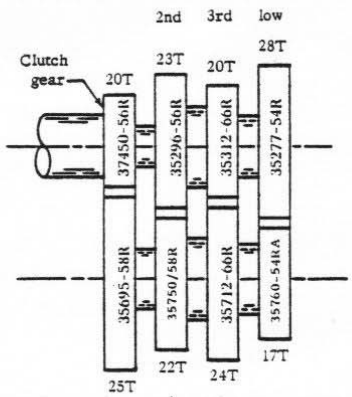
SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.14 to 1	25/19 x 20/23
SECOND	1.51 to 1	25/19 x 23/20
LOW	2.01 to 1	25/19 x 26/17

SPECIAL "CLOSE" RATIO "K"



SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.32 to 1	27/17 x 20/24
SECOND	1.83 to 1	27/17 x 23/20
LOW	2.52 to 1	27/17 x 27/17

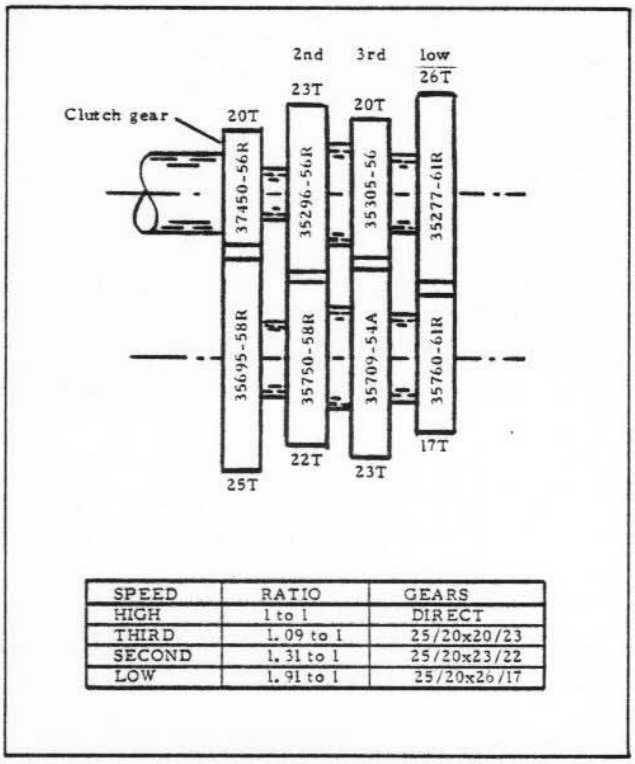
SPECIAL "CLOSE" RATIO "M"



SPEED	RATIO	GEARS
HIGH	1 to 1	direct
THIRD	1.04 to 1	25/20 x 20/24
SECOND	1.31 to 1	25/20 x 23/22
LOW	2.06 to 1	25/20 x 28/17

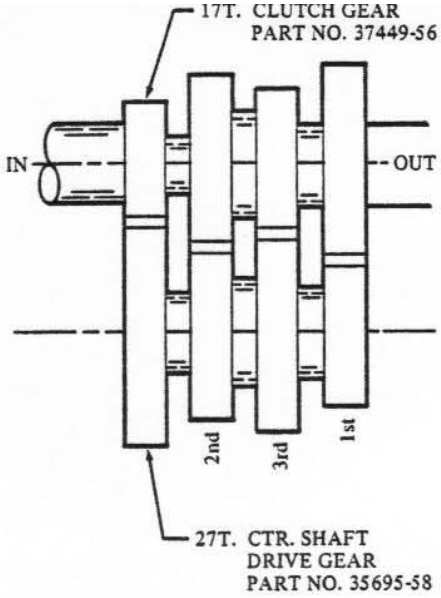
SPECIAL "CLOSE" RATIO "N"

XR TRANSMISSION GEAR RATIOS



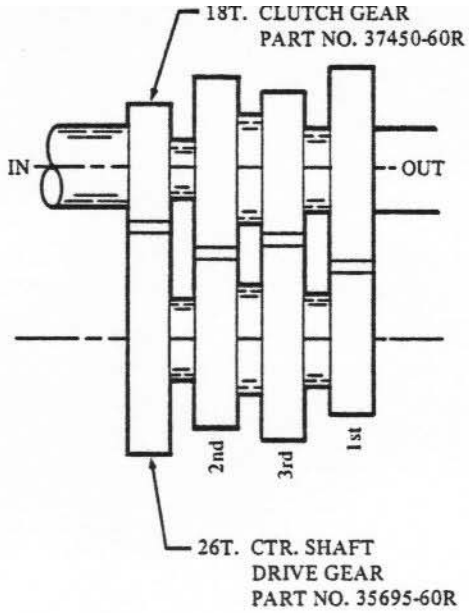
SPEED	RATIO	GEARS
HIGH	1 to 1	DIRECT
THIRD	1.09 to 1	25/20x20/23
SECOND	1.31 to 1	25/20x23/22
LOW	1.91 to 1	25/20x26/17

SPECIAL "CLOSE" RATIO "P"



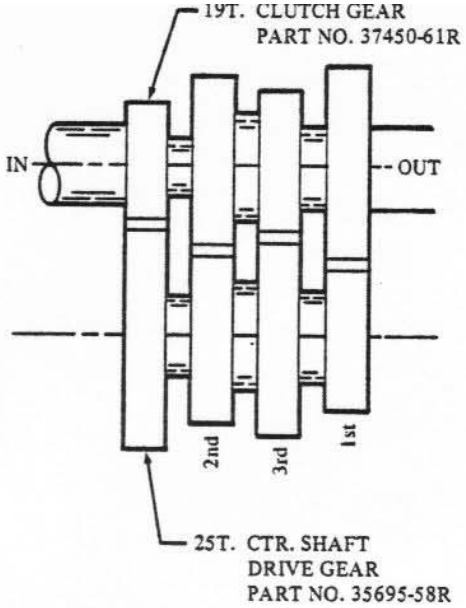
GEAR		NO. T.	RATIO	NO. T.	RATIO	NO. T.	RATIO
4th			1.000		1.000		1.000
3rd	MAINSHAFT CTR. SHAFT	$\frac{20}{23}$	1.381	$\frac{20}{24}$	1.324		
2nd	MAIN SHAFT CTR. SHAFT	$\frac{23}{20}$	1.826	$\frac{23}{22}$	1.660		
1st	MAIN SHAFT CTR. SHAFT	$\frac{26}{17}$	2.429	$\frac{27}{17}$	2.522	$\frac{28}{17}$	2.616

MAINSHAFT			USE WITH	COUNTERSHAFT		
GEAR	NO T.	PART NO.		PART NO.	NO T.	GEAR
3rd	20	35305-56	⟷	35709-54A	23	3rd
	20	35312-66R	⟷	35712-66R	24	
2nd	23	35296-56	⟷	35750-58	20	2nd
	23	35296-56R	⟷	35750-58R	22	
1st	26	35277-61R	⟷	35760-61R	17	1st
	27	35277-52A	⟷	35760-54RA	17	
	28	35277-54R	⟷	35760-54RA	17	



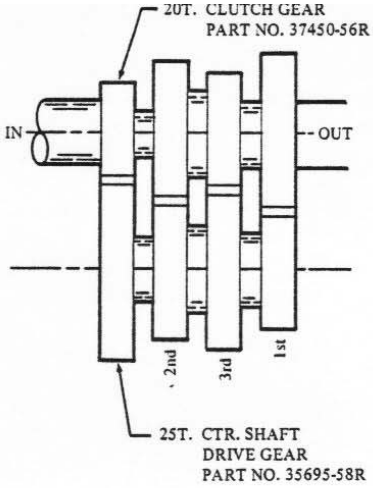
GEAR		NO. T.	RATIO	NO. T.	RATIO	NO. T.	RATIO
4th			1.000		1.000		1.000
3rd	MAINSHAFT CTR. SHAFT	$\frac{20}{23}$	1.256	$\frac{20}{24}$	1.204		
2nd	MAIN SHAFT CTR. SHAFT	$\frac{23}{20}$	1.661	$\frac{23}{22}$	1.510		
1st	MAIN SHAFT CTR. SHAFT	$\frac{26}{17}$	2.209	$\frac{27}{17}$	2.294	$\frac{28}{17}$	2.379

MAINSHAFT			USE WITH	COUNTERSHAFT		
GEAR	NO T.	PART NO.		PART NO.	NO T.	GEAR
3rd	20	35305-56	⟷	35709-54A	23	3rd
	20	35312-66R	⟷	35712-66R	24	
2nd	23	35296-56	⟷	35750-58	20	2nd
	23	35296-56R	⟷	35750-58R	22	
1st	26	35277-61R	⟷	35760-61R	17	1st
	27	35277-52A	⟷	35760-54RA	17	
	28	35277-54R	⟷	35760-54RA	17	



GEAR		NO. T.	RATIO	NO. T.	RATIO	NO. T.	RATIO
4th			1.000		1.000		1.000
3rd	MAINSHAFT CTR. SHAFT	$\frac{20}{23}$	1.144	$\frac{20}{24}$	1.096		
2nd	MAIN SHAFT CTR. SHAFT	$\frac{23}{20}$	1.513	$\frac{23}{22}$	1.376		
1st	MAIN SHAFT CTR. SHAFT	$\frac{26}{17}$	2.012	$\frac{27}{17}$	2.090	$\frac{28}{17}$	2.167

MAINSHAFT			USE WITH	COUNTERSHAFT		
GEAR	NO T.	PART NO.		PART NO.	NO T.	GEAR
3rd	20	35305-56	⟷	35709-54A	23	3rd
	20	35312-66R	⟷	35712-66R	24	
2nd	23	35296-56	⟷	35750-58	20	2nd
	23	35296-56R	⟷	35750-58R	22	
1st	26	35277-61R	⟷	35760-61R	17	1st
	27	35277-52A	⟷	35760-54RA	17	
	28	35277-54R	⟷	35760-54RA	17	



GEAR		NO. T. RATIO	NO. T. RATIO	NO. T. RATIO
4th		1.000	1.000	1.000
3rd	MAINSHAFT CTR. SHAFT	$\frac{20}{23}$ 1.087	$\frac{20}{24}$ 1.042	
2nd	MAIN SHAFT CTR. SHAFT	$\frac{23}{20}$ 1.438	$\frac{23}{22}$ 1.307	
1st	MAIN SHAFT CTR. SHAFT	$\frac{26}{17}$ 1.912	$\frac{27}{17}$ 1.985	$\frac{28}{17}$ 2.059

MAINSHAFT			USE WITH	COUNTERSHAFT		
GEAR	NO T.	PART NO.		PART NO.	NO T.	GEAR
3rd	20	35305-56	⟷	35709-54A	23	3rd
	20	35312-66R	⟷	35712-66R	24	
2nd	23	35296-56	⟷	35750-58	20	2nd
	23	35296-56R	⟷	35750-58R	22	
1st	26	35277-61R	⟷	35760-61R	17	1st
	27	35277-52A	⟷	35760-54RA	17	
	28	35277-54R	⟷	35760-54RA	17	

TORQUE SPECIFICATIONS

Torque figures are in foot pounds

Torque specifications for specific components are listed below. For all other fasteners, use the values listed in the table below. Torque figures are in ft-lbs except those marked with an asterisk (*) which are in in-lbs.

FASTENER	TYPE	MINIMUM TENSILE STRENGTH	MATERIAL	Body Size or Outside Diameter															
				2	3	4	5	6	8	10	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
	SAE 2 STEEL	74,000 PSI	LOW CARBON								6	12	20	32	47	69	96	155	206	310
	SAE 5 STEEL	120,000 PSI	MEDIUM CARBON HEAT TREAT						14*	22*	10	19	33	54	78	114	154	257	382	587
	SAE 7 STEEL	133,000 PSI	MEDIUM CARBON ALLOY								13	25	44	71	110	154	215	360	570	840
	SAE 8 STEEL	150,000 PSI	MEDIUM CARBON ALLOY								14	29	47	78	119	169	230	380	600	700
	SOCKET HEAD CAP SCREW	160,000 PSI	HIGH CARBON QUENCHED TEMPERED								16	33	54	84	125	180	250	400	640	970
	SOCKET SET SCREW	212,000 PSI	HIGH CARBON QUENCHED TEMPERED					9*	16*	30*	70*	140*	18	29	43	63	100	146		
	STUDS	Use SAE 2, 5 and 8 values when grade is known, with nut of sufficient strength.																		

The following exceptions to the Torque Specification Chart should be used:

Rocker cover bolts ..... 18 ft-lbs

Head nuts ..... tighten nuts in a cross pattern in increments of 10, 20, and 25 ft-lbs

Engine sprocket nut ..... 100 ft-lbs

Clutch nut ..... 150 ft. lbs minimum

COMPRESSION RATIO

The formula for compression ratio (C.R.) is:

$$C.R. = \frac{\text{Swept Volume + Head Volume}}{\text{Head Volume}}$$

Nominal swept volume of the XR-750 engine is 375cc.

To determine head volume, set pistons at TDC, seal piston rings and valves with grease. Index crankshaft until both valves are closed. Tilt engine so that spark plug hole is vertical. Then, using a graduated cylinder or other container graduated in cc, fill the cylinder head with kerosene or light oil. Fill to bottom of spark plug hole. Rock crankshaft back and forth slightly until liquid reaches its maximum height. Add additional fluid if necessary until it reaches half-way up the plug hole. Use the amount of fluid used in the above formula to obtain the compression ratio.

This procedure is useful when any cylinder head work has been done.

METRIC CONVERSION TABLE

MILLIMETERS to INCHES (MM x 25.40 = inches)								INCHES to MILLIMETERS (inches x 0.03937 = MM)							
MM	IN	MM	IN	MM	IN	MM	IN	IN	MM	IN	MM	IN	MM	IN	MM
.1	.0039	25	.9842	58	2.283	91	3.582	.001	.025	.6	15.240	1 19/32	49.21	3 5/16	84.14
.2	.0078	26	1.024	59	2.323	92	3.622	.002	.051	5/8	15.875	2	50.80	3 3/8	85.72
.3	.0118	27	1.063	60	2.362	93	3.661	.003	.076	11/16	17.462	2 1/16	52.39	3.4	86.36
.4	.0157	28	1.102	61	2.401	94	3.701	.004	.102	.7	17.780	2.1	53.34	3 7/16	87.31
.5	.0197	29	1.142	62	2.441	95	3.740	.005	.127	3/4	19.050	2 1/8	53.97	3 1/2	88.90
.6	.0236	30	1.181	63	2.480	96	3.779	.006	.152	.8	20.320	2 3/16	55.56	3 9/16	90.49
.7	.0275	31	1.220	64	2.519	97	3.819	.007	.178	13/16	20.638	2.2	55.88	3.6	91.44
.8	.0315	32	1.260	65	2.559	98	3.858	.008	.203	7/8	22.225	2 1/4	57.15	3 5/8	92.07
.9	.0354	33	1.299	66	2.598	99	3.897	.009	.229	.9	22.860	2.3	58.42	3 11/16	93.66
1	.0394	34	1.338	67	2.638	100	3.937	.010	.254	15/16	23.812	2 5/16	58.74	3.7	93.98
2	.0787	35	1.378	68	2.677	101	3.976	1/64	.397	1	25.40	2 3/8	60.32	3 3/4	95.25
3	.1181	36	1.417	69	2.716	102	4.016	.020	.508	1 1/16	26.99	2.4	60.96	3.8	96.52
4	.1575	37	1.456	70	2.756	103	4.055	.030	.762	1.1	27.94	2 7/16	61.91	3 13/16	96.84
5	.1968	38	1.496	71	2.795	104	4.094	1/32	.794	1 1/8	28.57	2 1/2	63.50	3 7/8	98.42
6	.2362	39	1.535	72	2.834	105	4.134	.040	1.016	1 3/16	30.16	2 9/16	65.09	3.9	99.06
7	.2756	40	1.575	73	2.874	106	4.173	.050	1.270	1.2	30.48	2.6	66.04	3 15/16	100.01
8	.3149	41	1.614	74	2.913	107	4.212	.060	1.524	1 1/4	31.75	2 5/8	66.67	4	101.6
9	.3543	42	1.653	75	2.953	108	4.252	1/16	1.588	1.3	33.02	2 11/16	68.26	4 1/16	102.19
10	.3937	43	1.693	76	2.992	109	4.291	.070	1.778	1 3/16	33.34	2.7	68.58	4.1	104.14
11	.4331	44	1.732	77	3.031	110	4.331	.080	2.032	1 3/8	34.92	2 3/4	69.85	4 1/8	104.77
12	.4724	45	1.772	78	3.071	111	4.370	.090	2.286	1.4	35.56	2.8	71.12	4 3/16	106.36
13	.5118	46	1.811	79	3.110	112	4.409	.1	2.540	1 7/16	36.51	2 13/16	71.44	4.2	106.68
14	.5512	47	1.850	80	3.149	113	4.449	1/8	3.175	1 1/2	38.10	2 7/8	73.02	4 1/4	107.95
15	.5905	48	1.890	81	3.189	114	4.488	3/16	4.762	1 9/16	39.69	2.9	73.66	4.3	109.22
16	.6299	49	1.929	82	3.228	115	4.527	.2	5.080	1.6	40.64	2 15/16	74.61	4 5/16	109.54
17	.6693	50	1.968	83	3.268	116	4.567	1/4	6.350	1 5/8	41.27	3	76.20	4 3/8	111.12
18	.7086	51	2.008	84	3.307	117	4.606	.3	7.620	1 11/16	42.86	3 1/16	77.79	4.4	111.76
19	.7480	52	2.047	85	3.346	118	4.645	5/16	7.938	1.7	43.18	3.1	78.74	4 7/16	112.71
20	.7874	53	2.086	86	3.386	119	4.685	3/8	9.525	1 3/4	44.45	3 1/8	79.37	4 1/2	114.30
21	.8268	54	2.126	87	3.425	120	4.724	.4	10.160	1.8	45.72	3 3/16	80.96	4 9/16	115.89
22	.8661	55	2.165	88	3.464	121	4.764	7/16	11.112	1 13/16	46.04	3.2	81.28	4.6	116.84
23	.9055	56	2.205	89	3.504	122	4.803	1/2	12.700	1 7/8	47.62	3 1/4	82.55	4 5/8	117.47
24	.9449	57	2.244	90	3.543	123	4.842	9/16	14.288	1.9	48.26	3.3	83.82	4 11/16	119.06

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