

# Service

SHOP DOPE BULLETIN NO. 381

1-31-57

FILE: D2-1A-15

## XL (SPORTSTER) MODEL FITTING SPECIFICATIONS

### ENGINE

BORE AND STROKE---Standard bore 3.000"---Stroke 3.8125".

PISTON DISPLACEMENT---53.9 cubic inches.

PISTON CLEARANCE---New piston fitted in cylinder with .001" to .0015" clearance.  
Measure piston at bottom of skirt front to rear, 90° from piston pin hole.  
Measure cylinder 1/2" from top of bore, front to rear.

PISTON PIN IN PISTON---Light hand press fit at 70° F. When assembling on rod, heat piston just enough so pin can be pushed into piston bosses easily.

PISTON PIN IN UPPER END OF CONNECTING ROD---.0008" to .001" loose.

COMPRESSION RING GAP AND GROOVE CLEARANCE---(Two chrome rings used) .010" to .020" gap  
---.0025" to .004" side clearance in grooves. Compression rings have a step or chamfer cut at inner edge on one side, install on piston with step or chamfer upward.

U-FLEX OIL CONTROL RING---(one used) Ring end should overlap about 1/4" when new ring is inserted free in cylinder bore. When ring is worn so overlap is 5/32" or less, replace ring. Ring should have .003" to .005" side clearance in groove. When installing cylinder over piston using U-FLEX ring, a ring compressor must be used, otherwise U-FLEX ring will be damaged. Bottom of cylinder bore must be well chamfered (especially if cylinder has been rebored) so there will be no sharp edges to catch ring. Although the ends of a standard U-FLEX ring will overlap when ring is inserted free in an oversize cylinder, this is no indication that a standard ring will function satisfactorily in any oversize bore.

It is just as important to use correct oversize U-FLEX ring for an oversize cylinder as it is to use correct oversize compression rings. Like a compression ring, the U-FLEX ring is made for a given size bore, and will fit only that bore perfectly.

LOWER CONNECTING ROD BEARING---.0008" to .001" loose.

CONNECTING RODS---.006" to .010" loose between flywheels. Roller and retainer assembly should be narrower, but not more than .010" narrower than forked rod.

FLYWHEEL ASSEMBLY---Tapered flywheel shafts are used in the "XL" model: Sprocket and gear shafts must run true within .001" and flywheels within .002" when assembly is rotated on main bearings.

SPROCKET SHAFT BEARING---Timken sprocket shaft bearings are made up in matched sets. All bearing parts are marked with matching numbers. Do not use bearing parts with different numbers. If any part of bearing requires replacing, the entire bearing assembly must be replaced. A complete set of Timken sprocket shaft bearings consists of two inner races with bearings and retainers, one outer race and one spacer. Spacer determines running clearance between bearings and races, and flywheel assembly end play when assembled in engine.

PINION GEAR SHAFT---.0008" to .001" loose in roller bearing---.0005" to .0012" loose in gear case cover bushing.

CAM GEARS---.0005" to .001" loose in crankcase and gear case cover bushing---.001" to .006" end play. Use cam gear shims when necessary to obtain recommended running clearance.

INTERMEDIATE GEAR---.0005" to .001" loose in crankcase and gearcase cover bushing.

TAPPET GUIDES---.0005" to .001" press fit in crankcase.

VALVE TAPPETS---.0005" to .001" loose in tappet guides.

TAPPET ROLLERS---.0005" to .001" loose on needle bearings.

ROCKER ARM ON SHAFT---.001" to .002" loose---.0015" preferred.

EXHAUST VALVE---.0025" to .0045" loose in guide.

INTAKE VALVE---.0015" to .0035" loose in guide.

VALVE SPRINGS---Following table lists specifications for new valve springs. Used valve spring testing 5 pounds or more below low limit poundage shown in table should be replaced with a new spring.

	FREE LENGTH	POUNDAGE (open)	POUNDAGE (closed)
INNER SPRING	1-23/64	75-85 (3/4")	30-35 (1-3/32")
OUTER SPRING	1-1/2	155-165 (15/16")	52-62 (1-9/32")

TAPPET CLEARANCE---Just free (no lash)---engine cold.

ENGINE TIMING

INTAKE AND EXHAUST VALVES---Valve timing is checked at tappets with push rods out. Dial indicator must be used to measure tappet lift of .005" from cam base circle (valve closed position). Piston position in inches (or crankshaft rotation in degrees) from top or bottom dead center is measured at this point. Rotate engine forward to obtain valve opening point---backward to obtain valve closing point.

Valve timing should be as close as possible to the following values:

INTAKE VALVE---

OPENS 82 deg. (1-7/8") before piston top dead center.  
 CLOSES 121 deg. (2-23/32") after piston bottom dead center.

EXHAUST VALVE---

OPENS 104 deg. (2-1/8") before piston bottom dead center.  
 CLOSES 104 deg. (2-19/32") after piston top dead center.

BREATHER VALVE---Breather valve timing is checked in relation to front piston position.

OPENS 77 deg. (1-11/16") after piston top dead center.  
 CLOSES 67 deg. (31/32") after piston bottom dead center.

CIRCUIT BREAKER POINTS---.022" gap.

IGNITION TIMING---With front piston on compression stroke, spark fully advanced, spark should occur with flywheel mark in exact center of timing hole. With flywheel mark in this position, the piston is 45 degrees (11/16") before top dead center.

### TRANSMISSION

TRANSMISSION MAIN SHAFT RIGHT SIDE BEARING---.0006" to .0014" loose---.001" preferred.

TRANSMISSION MAINSHAFT IN CLUTCH GEAR---.001" to .002" loose---.0015" preferred.

MAINSHAFT THIRD GEAR---.002" to .003" loose on mainshaft, .015" to .025" endplay.

TRANSMISSION MAIN SHAFT---.004" to .009" end play.

To obtain correct main shaft end play use variable thickness washers available under part numbers 35349-52 - .050", 35350-52 - .055", 35351-52 - .060", 35352-52 - .065", 35353-52 - .070" and 35354-52 - .075". This washer is used at end of main shaft gear assembly on right side of transmission.

CLUTCH GEAR BALL BEARING---To be .0001" tight to .0012" loose in case. Clutch gear to be .0001" loose to .0009" tight in ball bearing.

CLEARANCE BETWEEN CLUTCH TEETH ON STARTER CLUTCH GEAR AND CLUTCH---.040" minimum. With starter crank in up position, if measured clearance is less than .040" with short clutch sprocket spacer, part No. 37756-57 (1.025") installed, substitute part No. 37755-57 (1.047") long spacer to obtain .040" minimum clearance.

CLUTCH---Normal clutch spring tension adjustment is 11/64" to 13/64" - measured from top of spring cup to inner side of clutch spring tension adjusting plate.

COUNTERSHAFT END BEARINGS---.0005" to .002" loose on each end of countershaft. Bearings are needle roller bearings in retainers-pressed into each side of transmission case.

COUNTERSHAFT SECOND GEAR---.0005" to .002" loose on bushing, .005" to .010" end play.

COUNTERSHAFT LOW GEAR---.0005" to .0016" loose on bushing.

CLEARANCE BETWEEN COUNTERSHAFT SECOND AND THIRD GEAR CLUTCH FACES---.038" to .058".

CLEARANCE BETWEEN COUNTERSHAFT LOW AND THIRD GEAR CLUTCH FACES---.038" to .058". Use variable thickness washers available under part numbers 35840-52 - .065", 35836-55 - .075", 35838-55 - .085", 35839-55 - .100", against shoulder on countershaft to left side of low gear, to obtain correct clearance.

TRANSMISSION COUNTERSHAFT---.004" to .009" end play. To obtain correct counter shaft end play use variable thickness washers available under part numbers 35820-52 - .050", 35821-52 - .055", 35824-52 - .060", 35825-52 - .065", 35828-52 - .070" and 35829-52 - .075". This washer is used at end of countershaft gear assembly on right side of transmission.

FRONT CHAIN---Chain adjusting shoe is to be adjusted so that chain has 1" free movement up and down midway between sprockets - engine cold.

### REAR FORK

FRAME REAR FORK TIMKEN BEARING---This is a preloaded bearing. The adjustment is made on the right side of frame as follows: With bearing adjusted perfectly free, weigh

fork by attaching spring scale at extreme rear end of axle clip and raise fork to horizontal position, taking scale reading while doing so. Tighten bearing adjusting nut a sufficient amount to provide from one to two pounds drag while raising fork and taking scale reading as before. For example, if rear end of fork weighs three and one half pounds with bearings free, bearings should be adjusted tight enough to make fork weigh four and one half to five and one half pounds.

#### FRONT FORK

HYDRAULIC FORKS---When forks are disassembled and reassembled (DRY) four and one half ounces of oil should be put into each fork side. When forks are drained, three and one half ounces of oil should be put into each fork side. The difference is due to oil cling and the fact that it is not possible to drain all oil from the forks.

#### ELECTRICAL

GENERATOR---Two brush, shunt type with voltage regulator.

VOLTAGE REGULATOR---Delco-Remy No. 794,.This regulator will hold generator to a low charge rate when battery becomes fully charged. Setting 7.4 volts.

BATTERY---10 AMP.-Hr.