Greetings and thanks for helping us with our own vintage American motorcycle restoration projects. We hope this manual will assist you with yours.

Our personal recommendation is to take this CD to your local office supply store and have a paper copy printed out for use on your work bench. Then save a format copy on your computer & store the original CD in a safe place. I have found that this is also a nice way to carry your manuals on road trips….just so they wont be needed (kind of like taking an umbrella so it wont rain). You can even put them on a USB jump-drive.

Keep the shiny side up and the rubber side down !

RW&B
Sunnymead Cycles
So. Calif., USA

REGULAR SERVICE INTERVALS CHART (CONT)

REGULAR SERVICE INTERVAL	FIG. 1B-1 & 1B-1A INDEX NO.	GREASE	FIG. 1B-1 & 1B-1A INDEX NO.	OIL	FIG. 1B-1 & 1B-1A INDEX NO.	SERVICE
EVERY 10,000 MILES	22 4	Repack Rear Fork Pivot Bearings (1959 to 1961 Models) Generator Bearing (1961 and later)				
EVERY 50,000 MILES	3	Repack Steering Head Bearings				
WEEKLY						Check Tires Check Battery

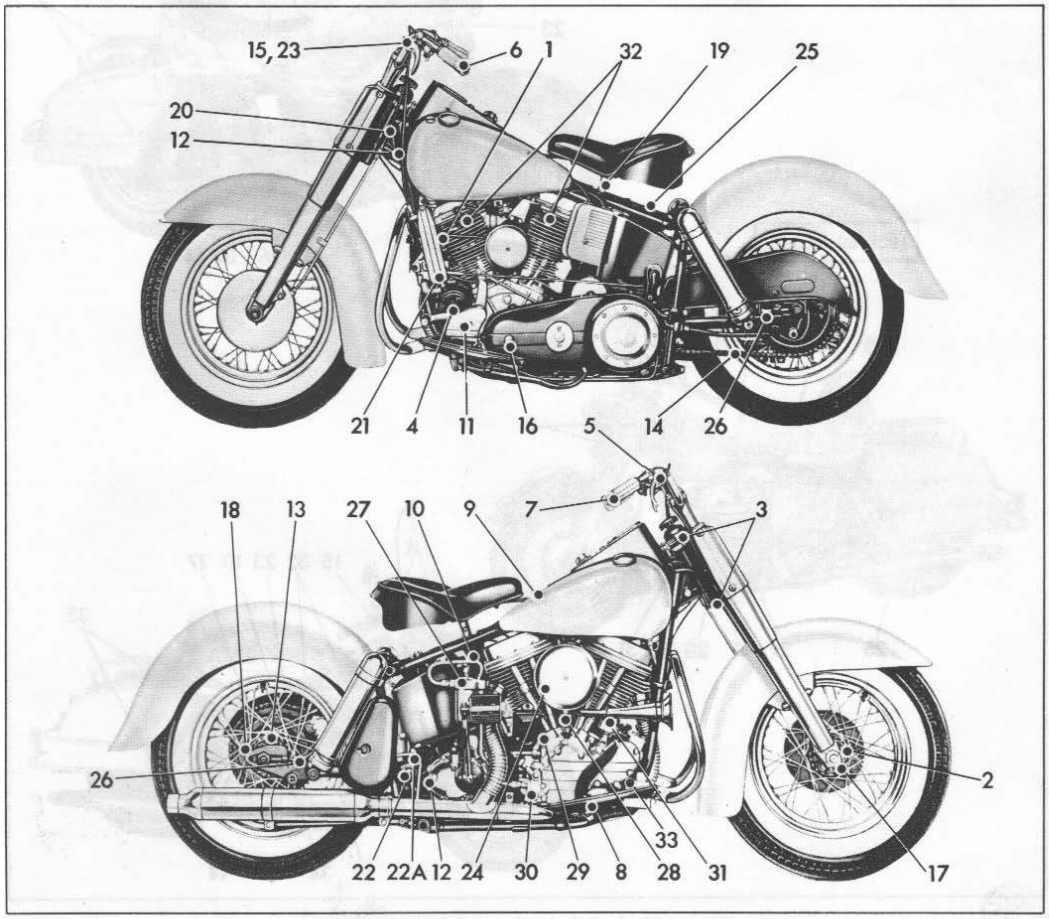


Figure 1B-1A. Lubrication and Service Chart (1964 & earlier Models)

WHEELS

GENERAL

Good handling of a motorcycle at any speed will result in maximum tire mileage. Tires must be transposed at regular intervals for best performance and long life.

The larger the tire size and higher the average road speed, the more essential it is that wheels and tires be given proper attention. A tire kept in continuous solo motorcycle front end service long enough to allow tread to wear irregular and peaked, may cause high speed weave, especially if over-inflated.

At regular intervals of approximately 5000 miles or when a solo motorcycle develops handling irregularities at high speed, check the following list for possible causes:

1. Loose wheel axle nuts.

2. Excessive wheel hub bearing play.

3. Loosened spokes.

4. Rear wheel out of alignment with frame and front wheel.

5. Rims and tires out-of-true sideways (tire run-out should not be more than 3/64 in.).

6. Rims and tires out-of-round or eccentric with hub (tire run-out should not be more than 3/32 in.).

7. Irregular or peaked front tire tread wear. Determine mileage since tires were last transposed. If mileage is found to be 2500 or more, transpose front and rear wheels and tires even though irregular wear or peaking of front tread is not noticeable.

8. Tires over-inflated. Check "Tire Data," Section 1A. Do not over-inflate.

9. Tire and wheel unbalanced. Static balancing alone may be satisfactory if dynamic balancing facilities are not at hand, however both are recommended.

10. Steering head bearings loose. Correct adjustment and replace pitted or worn bearings and races. See Section 2F.

11. Shock absorber not functioning normally. Check possible causes. See "Forks," Section 2F.

12. Rear fork bearings loose. Check possible causes. See "Forks," Section 2F.

13. Heavy front end loading. Non-standard equipment on the front end such as heavy radio receivers, extra lighting equipment or luggage, tends to cause unstable handling. Extra equipment on the front end should be held down to a minimum.

In most every case, high speed handling faults are caused by one or more of the above conditions being present on the motorcycle. The possible exception will be the case where there is serious frame or fork misalignment.

Switching wheels and tires approximately every 5000 miles and inflating to recommended pressure are of major importance. In many cases, this attention alone applied to a solo motorcycle will remedy faulty handling at higher speeds.

It is advisable to rebalance wheels and tires, at least statically, whenever casing and/or tube is replaced.

SERVICING WHEELS

Front and rear wheels may be removed as necessary for wheel or tire service. When removing a wheel, apply brake to hold drum securely while pulling wheel from drum. When detached from drums, Duo-Glide and Electra-Glide wheels are interchangeable.

REMOVING FRONT WHEEL (Fig. 2C-1)

Block motorcycle under frame until front wheel is clear of ground. Disassemble in following order:

Remove the cotter pin (1), axle nut (2) and flat washer (3). Servi-Car wheel disassembly includes removing bushings (4); also remove the five wheel mounting socket screws (5), loosen the two slider cap nuts (7) and remove axle (6). Remove front wheel, leaving the brake drum in its place over the brake shoes.

When replacing the wheel, assemble in reverse order. Important: Clamping faces on wheel hub and brake drum must be clean so that wheel will be true and tight against brake drum when socket screws are tightened. Securely tighten wheel mounting socket screws (5) and axle nut (2), and then tighten the two slider cap nuts (7). This will insure correct alignment of fork sides.

REMOVING REAR WHEEL (DUO-GLIDE AND ELECTRA-GLIDE)

Elevate motorcycle rear end with service stand, or suitable blocking under frame so rear wheel is off the ground. Remove two rear screws from fender support, and raise end of fender as shown in Fig. 2C-2. Remove the five socket screws (4) that secure wheel to brake drum. The socket screw wrench can be inserted only at the rear of axle; turn wheel to bring each screw to this position.

Remove axle nut (3) and axle nut lock washer (2). Remove axle (1) from brake drum side of motorcycle and then remove spacer (5) from between wheel hub and right axle clip. Apply rear brake and remove wheel.

NOTE

Foot Brake Lever Locking Tool, Part No. 95875-58, can be used to lock brake. To

FRAME

FRAME

To rough check a frame for correct alignment, see Fig. 2E-1. The dimensions shown will provide basic information to determine whether a frame is enough out of alignment to require a major realigning job or replacement.

Straightening a badly bent frame requires special tools and fixtures for holding, bending and gauging. If frame straightening facilities are not available locally, damaged frames may be returned to the factory for repair (through authorized Harley-Davidson dealers only).

NOTE

Replace all badly bent or broken frames. The cost of repair would be prohibitive.

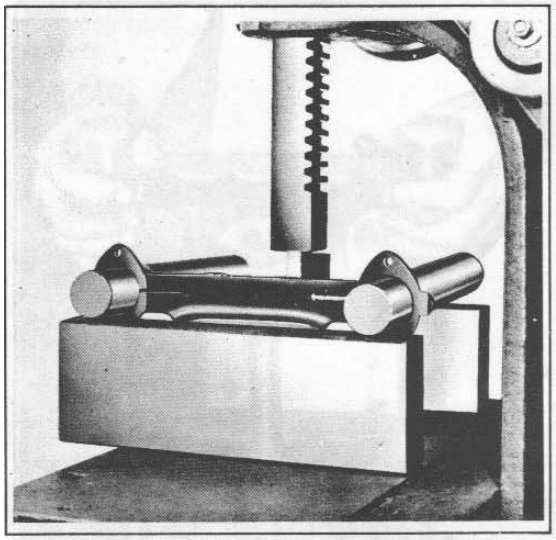


Figure 2F-12. Correcting Bracket Bow

Find the highest point out of round with a dial indicator (Fig. 2F-9) and mark with chalk. Press high point as shown in Fig. 2F-10. Repeat indicating and pressing operations until tube is within .003 in. to .004 in. of being straight.

Sometimes fork tubes are out of round, especially at the point it is clamped in the fork bracket. Place tube in straightening blocks and press until perfectly round as shown in Fig. 2F-11, checking with dial indicator and micrometer. Finally, check tube by inserting in new fork slider. Work tube up and down. If it does not bind, it is straight.

STRAIGHTENING FORK STEM AND BRACKET ASSEMBLY

Straightening a fork stem and bracket assembly requires a great deal of skill, experience and several tools and fixtures. Special tools necessary include Fork Tube Straightening blocks, Part. No. 96246-50, four blocks are needed; Bending Bar, Part No. 96806-40; Fork Stem and Bracket Aligning Gauge, Part No. 96245-51. In addition, the following pieces of bar stock are needed: Two bars, 1-5/8 in. diameter, about 12 in. long; two bars 1 in. x 4 in. x 12 in. (approximately); assorted pieces of rectangular bar stock to use in transmitting arbor press pressure to unit to be straightened.

If facilities are not available locally, fork stem and bracket assembly may be sent to factory for straightening providing it is not badly bent or broken.

NOTE

Repair fork stem and bracket assemblies must be sent to factory through authorized Harley-Davidson dealers.

To straighten stem and bracket, proceed as follows: Insert the two 1-5/8 in. x 12 in. bars in fork bracket

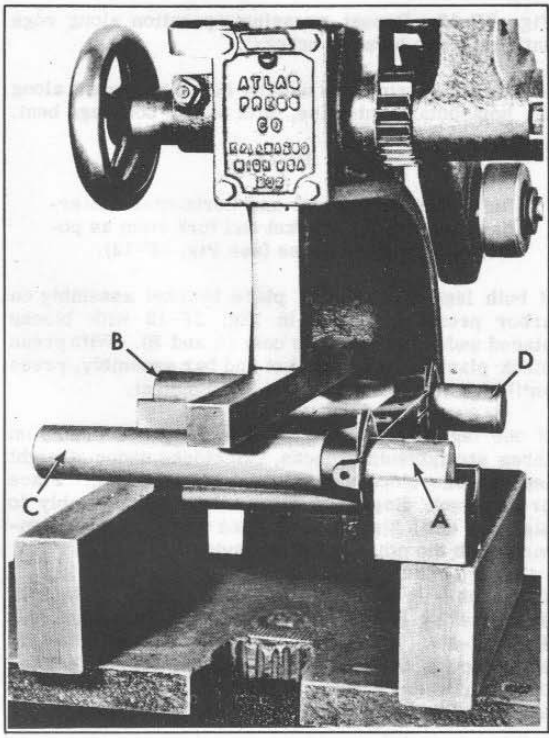


Figure 2F-13. Straightening Two Twisted Legs

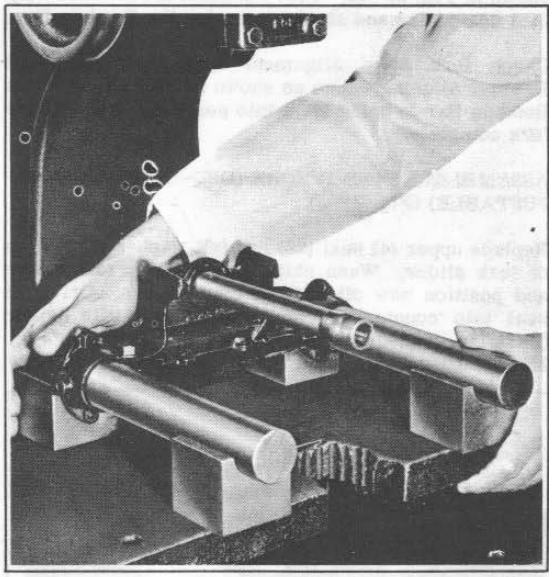


Figure 2F-14. Checking Bracket Alignment

and secure with two clamping studs. Sometimes the bracket is so badly bent that the bars cannot be inserted. In this case, press the bars into place with an arbor press, then press on the front edge of bracket to correct the "bow" distortion as shown in

SEAT

SEAT POST SPRINGING

Two seat post spring arrangements are available for each model. A standard spring set is suitable for rider weighing up to 220 pounds. A heavy spring set for weights over that amount include heavier springs and longer guide collars. The heavy set is indicated by a letter "D" (Duo-Glide) or an "E" (Servi-Car) stamped on the upper end of the seat post plunger. See Fig. 2H-1 for cutaway view of seat post springing arrangement. Duo-Glide and Servi-Car assemblies have same number of components with following exceptions: (See Fig. 2H-2.)

Duo-Glide assembly omits seat post recoil spring (14A) and incorporates two auxiliary springs (14 and 17).

DISASSEMBLING SEAT POST (Fig. 2H-2)

Remove rod lock nut (1) and washer (2) from bottom of frame seat post tube. Pull back of seat upward sharply to break loose seat post rod nut (5) at the base of seat post tube. Unsnap clevis pin spring (3) and pull out clevis pin (4). Tip seat forward and lift out seat post assembly. Disassemble remaining parts in order indicated.

INSPECTION AND SERVICE

Wash and air dry all parts. Inspect for broken or "set" springs. New spring length appears in Fig. 2H-2 listing. Replace seat bar bushings (19) if worn appreciably.

ASSEMBLING SEAT POST (Fig. 2H-2)

Seat post assembly is reverse of disassembly. Apply liberal coating of "Grease-All" grease to parts, working it into the springs.

For correct spring preloading, draw up spring adjusting nut to compress total visible spring length to 11 in. for standard springs and 10-1/2 in. for "D" heavy springs, on Duo-Glide assemblies; 11-1/2 in. on standard and "E" heavy Servi-Car sets. Lock with one lock nut (6). Turn on other lock nut. Position rod nut (5) on rod so bottom end of rod extends through rod nut exactly 3/4 in. Lock adjustment with second lock nut.

Figure 2H-1. Cutaway of Seat Post Springing

GENERAL

ENGINE SPECIFICATIONS

VALVES (3B)

Fit in guide (EX)	.004 - .006 in.
Fit in guide (IN)	.002 - .004 in.
Spring (FL)	
(Outer)	55 - 65 lbs. at 1-13/32 in. (closed)
	110 - 120 lbs. at 1-1/16 in. (open)
Free length	1-13/16 in.
(Inner)	25 - 35 lbs. at 1-1/4 in. (closed)
	70 - 80 lbs. at 29/32 in. (open)
Free length	1-15/32 in.
Spring (FLH)	
(Outer)	105 - 115 lbs. at 1-3/8 in. (closed)
	180 - 190 lbs. at 1 in. (open)
Free length	1-31/32 in.
(Inner)	20 - 30 lbs. at 1-3/16 in. (closed)
	70 - 80 lbs. at 51/64 in. (open)
Free length	1-25/64 in.
Tappet adjustment	Hydraulic tappet unit compressed 1/8 in. from fully extended position.

ROCKER ARM (3B)

Fit in bushing	.0005 - .002 in. loose
End clearance	.004 - .025 in.

PISTON (3C)

Fit in cylinder	.001 - .002 in. loose
Ring gap	.010 - .020 in.
Compression ring side clearance	.004 - .005 in.
Oil ring side clearance	.003 - .005 in.
Piston pin fit	Light hand press at 70° F.

CONNECTING ROD (3C)

Piston pin fit	.0008 - .0012 in. loose
End play between flywheels	.006 - .010 in.
Fit on crankpin	
(1959 & earlier)	.001 - .0015 in. loose
(1960 & later)	.0006 - .001 in. loose

OIL PUMP PRESSURE

(3D)	(20 MPH) 25 lbs./sq. in.
	(30 MPH) 35 lbs./sq. in.
	(60 MPH) 35 lbs./sq. in.
	(90 MPH) 35 lbs./sq. in.

IGNITION TIMING (3D)

Breaker point setting	.020 in. gap
(Dwell	90°@ 2000 RPM)
Ignition Timing (Retarded)	5° BTC (1/64 in. before Piston T.C.)
(Automatic Advance)	35° BTC (7/16 in. before Piston T.C.)
Spark plug gap setting	.025 to .030 in.

TAPPETS (3D)

Guide fit	.002 tight - .002 loose
Fit in guide	.001 - .002 in. loose
Roller fit	.0005 - .001 in.
Roller end clearance	.008 - .010 in.

GEARCASE (3D)

Timer gear end play	.003 - .007 in.
Idler gear end play	.003 - .020 in.
Breather gear end play	.001 - .005 in.
Cam gear shaft in bushing	.001 - .0015 in.
Cam gear shaft in bearing	.0005 - .003 in.
Cam gear end play	.001 - .005 in.
Intermediate and idler gear (on shafts)	.001 - .0015 in.
Oil pump drive shaft (crankcase bushing)	.0008 - .0012 in.

FLYWHEEL ASSEMBLY (3E)

Gear shaft nut torque	100 ft.-lbs.
Sprocket shaft nut torque	100 ft.-lbs.
Crank pin nuts torque	175 ft.-lbs.
Runout (flywheels)	.003 in. maximum at rim
Runout (mainshafts)	.001 in. maximum

SPROCKET SHAFT BEARING (3E)

Cup fit in crankcase	.0015 - .0035 in. press
Cone fit on shaft	.0002 - .0015 in. press
End play	.0005 - .006 in.

PINION SHAFT BEARINGS (3E)

Roller bearing fit	.0004 - .0008 in. loose
Cover bushing fit	.0005 - .0012 in. loose

ENGINE DESCRIPTION

The Duo-Glide engine is a two-cylinder, four-cycle, air cooled, overhead-valve, V-type engine with 74 cu. in. displacement. It has three major component assemblies: cylinder, crankcase and gearcase.

Cylinder assemblies include cylinder head, valves, rocker arms and piston. Cylinders mount on the engine crankcase in a 45 degree "V," with both connecting rods connected to a single crank pin.

The reciprocating, linear motion of the piston in the cylinder is converted to circular motion in the crankcase. The built-up crankshaft consists of an off-center crank pin interposed between two counterweighted flywheels which rotate on two end shafts (pinion and sprocket shafts) supported by anti-friction roller bearings. The lower end of the rear

CYLINDER HEAD

REMOVING CYLINDER HEAD ASSEMBLY

1966 and Later (Fig. 3B-1)

Before removing cylinder head assembly, strip motorcycle as described in "Stripping Motorcycle For Engine Repair," Section 3A. Free carburetor and manifold assembly from motorcycle by removing two manifold clamps and carburetor support bracket nut at crankcase.

Disconnect overhead oil feed line (1) and cylinder interconnecting oil line (1C) at fittings.

Remove spring cap retainers 4A on push rod covers by prying down on cover spring cap with screwdriver wedged between cylinder cooling fins and pulling spring cap retainers out.

Remove five head bolts and washers (2) from each head. Lift cylinder head enough to slip out push rods (3) and push rod covers (4). Remove cylinder head (5). Remove cylinder head gasket (6). Mark push rods so that they will be reassembled in same position.

1965 and Earlier (Fig. 3B-1A)

Disconnect overhead oil feed line (1) at fittings (1963 and later). Remove spring cap retainers 4A on push rod covers by prying down on cover spring cap with screwdriver wedged between cylinder cooling fins and pulling spring cap retainers out.

Remove five head bolts and washers (2) from each head. Lift cylinder head enough to slip out push rods (3) and push rod covers (4). Remove cylinder head (5). Remove cylinder head gasket (6). Mark push rods so that they will be reassembled in same position.

DISASSEMBLING CYLINDER HEAD

1966 and Later (Fig. 3B-1)

Free the rocker arm cover (9) from cylinder head by removing stud nuts (7). Before further disassembly, carefully check the rocker arm pads and ball sockets for pitting and excessive wear. Also, check the rocker arm shaft (12) for appreciable end play.

Remove rocker arm shaft screw and "O" ring (13), acorn nut and washer (10). Discard shaft screw "O" ring. Tap rocker arm shaft (12) from cover and remove rocker arm (15) and spacer (11). Mark rocker arm shaft and arm in some manner so all parts may be returned to respective locations during assembly. Rocker arms are not interchangeable.

Compress valve springs using Valve Spring Compressor, Part No. 96600-36, and remove valve keys (18) from ends of valve stems as shown in Fig. 3B-2. Mark keys to identify them with their respective valves. Remove valve spring collars (19 and 22), springs (20 and 21) and valves (23). It is customary to reassemble valves in same cylinder head from which they were removed; therefore, before removing, mark them in some manner to identify them with front and rear cylinder head.

1965 and Earlier (Fig. 3B-1A)

Remove the 12 cover reinforcing screws (7) and lift off reinforcing ring (8), rocker arm cover (9) and cover gasket (11). Cover pad (10) is cemented inside cover and needs no attention if in serviceable condition.

Turn off the eight rocker arm bearing stud nuts (12), and lift intake valve oiler (13) off studs. Remove rocker arm bearing halves (14 and 16) with rocker arms (15).

Remove exhaust valve stem pads (17) (if used). Compress valve springs with Valve Spring Compressor, Part No. 96600-36, as shown in Fig. 3B-2. Remove valve key halves (18).

Remove upper valve spring collar (19), outer valve spring (20) and inner valve spring (21) and lower spring collar (22). Slip valves (23) out of valve guides in head.

Do not interchange valves, rocker arms or rocker arm bearing halves. Either process parts separately or mark them in some manner so they may be returned to their respective positions.

CLEANING AND INSPECTION

Clean outside of cylinder head with a wire brush. Scrape carbon from head, top of cylinder, top of bore above ring path, and inlet and exhaust valve ports. When scraping carbon, be careful to avoid scratching or nicking cylinder head and cylinder joint faces or bore. Blow off loosened carbon or dirt with compressed air.

Wash all parts in Harley-Davidson "Gunk Hydro-Seal". Blow out oil passages in head. Be sure they are free of sludge and carbon particles. Remove loosened carbon from valve head and stem with a wire wheel. Never use a file or other hardened tool that will scratch or nick valve. Polish valve stem with very fine emery cloth or steel wool. Check valve stem for excessive wear.

Valve head should have a seating surface about 1/16 in. wide, it should be free of pit marks and burn spots. Exhaust valves should contain carbon that is black or dark brown. White or light buff carbon indicates excessive heat and burning.

NOTE

Piston skirt is cut away at bottom (below piston pin) for flywheel clearance, therefore, it cannot be used with squaring plate for checking rod alignment. Temporarily install a 61 O.H.V. piston to check rod alignment.

If a rod is in perfect alignment piston bottom will rest squarely on plate when flywheels are turned so that crank pin is in forward and rear position. This check, to be accurate, depends upon checking with crank pin alternately in both forward and rear positions. It is the change of rod angle, resulting from changing crank pin from one position to the other that influences the seat of piston on squaring plate and thus indicates whether or not rod is in alignment.

Insert narrow strips of paper of equal thickness underneath piston, one on each side, below piston pin, as shown in Fig. 3C-11. Press piston down lightly with finger tips resting on center of piston head and pull first one paper, then the other, partially from underneath piston. If piston is perfectly square (rod in alignment), both will have the same amount of drag.

If rod proves to be out of alignment, it can be straightened by means of a bar inserted through piston pin, as shown in Fig. 3C-12. Use a bar with a diameter as close to the hole diameter in the piston pin as possible. The manner in which piston seats on squaring plate indicates as follows:

1. Piston high on same side, both crank pin positions; rod is bent.

2. Piston high on opposite sides as crank pin position is changed; rod is twisted.

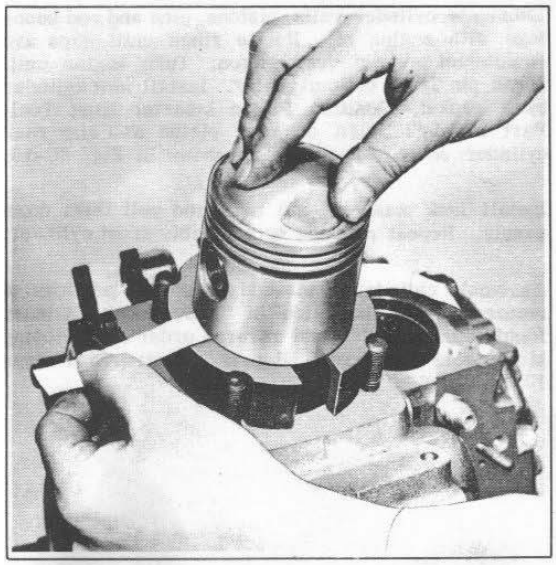


Figure 3C-11. Checking Rod Alignment

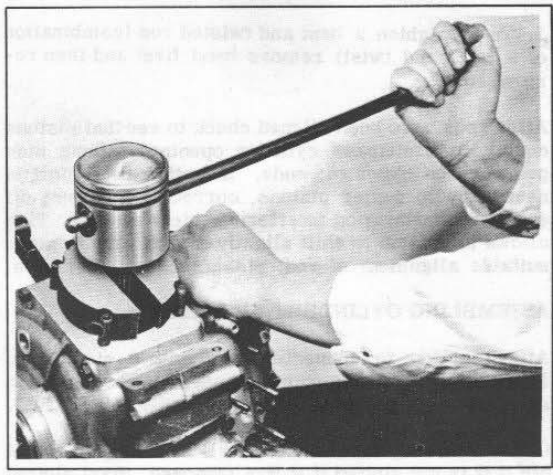


Figure 3C-12. Straightening Connecting Rod

3. Piston square or nearly square with crank pin in one position and high on one side with crank pin in other position; rod is bent and twisted.

Correct as follows:

1. To straighten a bent rod, insert straightening bar through piston pin hole on low side of piston and apply upward force.

2. To straighten a twisted rod, insert straightening bar through piston pin hole on high side of piston, and if crank pin position is to front apply force to rear - if crank pin position is to rear apply force to front.

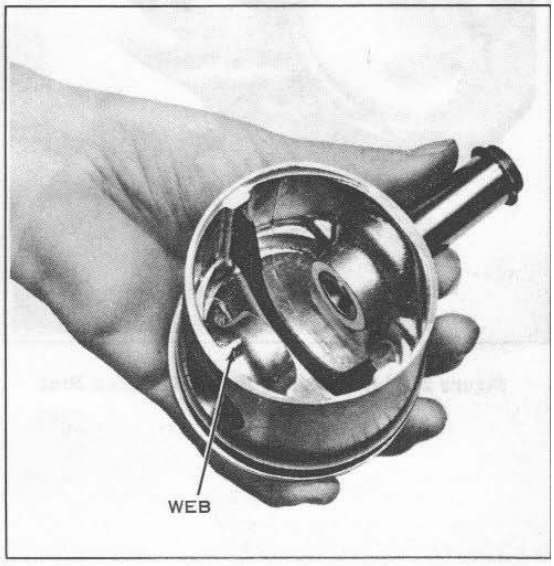


Figure 3C-13. Piston with Web on Right Side

CRANKCASE

GENERAL

When rod bearings, pinion shaft bearings or sprocket shaft bearings are in need of repair, the engine must be removed from the motorcycle as described in "Stripping Motorcycle for Engine Repair," Section 3A. It is recommended procedure to check and make repairs to cylinder heads, cylinders and gearcase at the same time, or in other words, perform an entire engine overhaul.

Flywheel End Play Check:

Before starting crankcase disassembly, check flywheel assembly end play to determine sprocket shaft bearing wear using a dial indicator. Assemble engine sprocket and nut or compensating sprocket to sprocket shaft before taking reading to assure accurate measurement. Attach indicator securely to crankcase with indicator stem resting on end of sprocket shaft. Measure total endplay by lifting flywheel assembly vertically using a screwdriver as a pry as shown in Figure 3E-17A. If play exceeds .006 maximum allowable endplay bearings must be replaced if found worn or damaged. If not worn, shimming can be used to take up endplay as described on page 3E-10.

Starting with the 1969 model season, the sprocket shaft bearing was changed as shown in Fig. 3E-3. The new bearing is locked in place with a combination lock ring-spacer which is located in a groove between the two bearing outer races. As with 1968 and earlier bearings, if any part of the bearing set requires replacement the entire bearing assembly, including bearings, races, lock ring and inner race spacer, must be replaced as a set.

DISASSEMBLING CRANKCASE

Remove cylinder heads as described in "Disassembling Cylinder Head," Section 3B.

Remove cylinders as described in "Disassembling Cylinder," Section 3C.

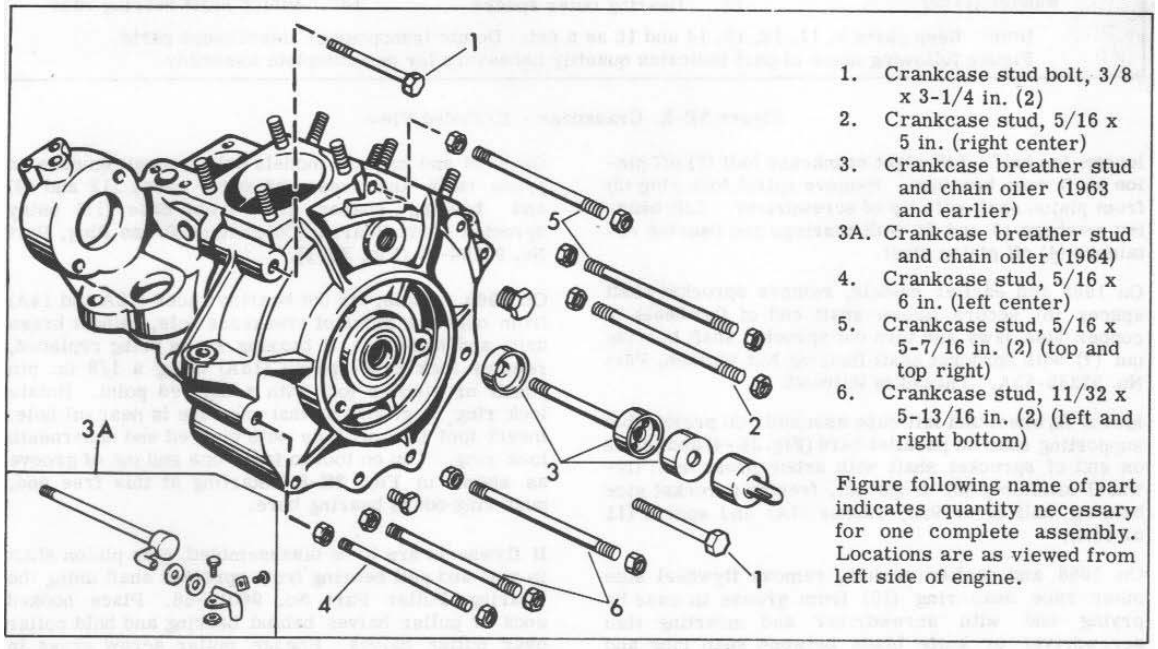
Remove gearcase parts as described in "Disassembling Gearcase," Section 3D. See "Crankcase," above for checking procedure before starting crankcase disassembly.

Refer to Fig. 3E-1 and proceed as follows:

Remove crankcase bolt (1), stud (2), crankcase breather stud assembly (3) or (3A), stud (4), top and right crankcase studs (5) and two lower crankcase studs (6). It is necessary to remove only one stud nut and slip stud and other nut out opposite side of crankcase.

Refer to Fig. 3E-2 and continue disassembly:

Position crankcase with gearcase (right side) up. Tap crankcase with rawhide or soft metal mallet to



1. Crankcase stud bolt, 3/8 x 3-1/4 in. (2)
2. Crankcase stud, 5/16 x 5 in. (right center)
3. Crankcase breather stud and chain oiler (1963 and earlier)

3A. Crankcase breather stud and chain oiler (1964)

4. Crankcase stud, 5/16 x 6 in. (left center)
5. Crankcase stud, 5/16 x 5-7/16 in. (2) (top and top right)
6. Crankcase stud, 11/32 x 5-13/16 in. (2) (left and right bottom)

Figure following name of part indicates quantity necessary for one complete assembly. Locations are as viewed from left side of engine.

Figure 3E-1. Crankcase Studs - Exploded View

FUEL SYSTEM

MODEL HD CARBURETOR

DESCRIPTION (See Fig. 3F-1)

The Model HD carburetor is a dual-venturi, diaphragm-type carburetor with an automatic economizer and accelerating pump.

The fuel inlet needle is operated through a compression-spring balanced lever that is controlled by the diaphragm to regulate the flow of fuel into the metering chamber. The amount of fuel going into the carburetor metering chamber is exactly equal to the amount of fuel being used by the engine.

This type of fuel supply control operates at any tilt angle and is resistant to any vibration which could cause a poor fuel-air mixture or flooding.

The small primary venturi is offset to the bottom of the large secondary venturi where the main nozzle outlet protrudes from the metering chamber. The accelerating pump discharges into the small venturi to take advantage of the venturi pressure drop that breaks up the solid stream of accelerating-pump fuel.

The accelerating unit is a positive-acting plunger type pump that is connected to the throttle shaft through a cam lever. The pump plunger is a spring-loaded leather cup that operates in a smooth plastic cylinder, and draws its fuel directly from the metering chamber to provide extra fuel for accelerating.

The automatic economizer is a hydraulically-operated enrichment valve that controls the main-nozzle fuel mixture at very low engine speeds. The valve opens an auxiliary fixed main jet as the venturi air flow decreases, allowing the fuel mixture to be maintained at a full-power richness. As the air flow through the carburetor increases, or as the engine speed increases, the valve closes to prevent an over-rich mixture at intermediate speeds.

OPERATION

STARTING OPERATION (Fig. 3F-2)

Choke is in the closed position and the throttle in a slightly open position. As the engine is cranked, the entire metering system--idle, intermediate, and nozzle--is subjected to engine suction which is transmitted to the fuel chamber via the metering

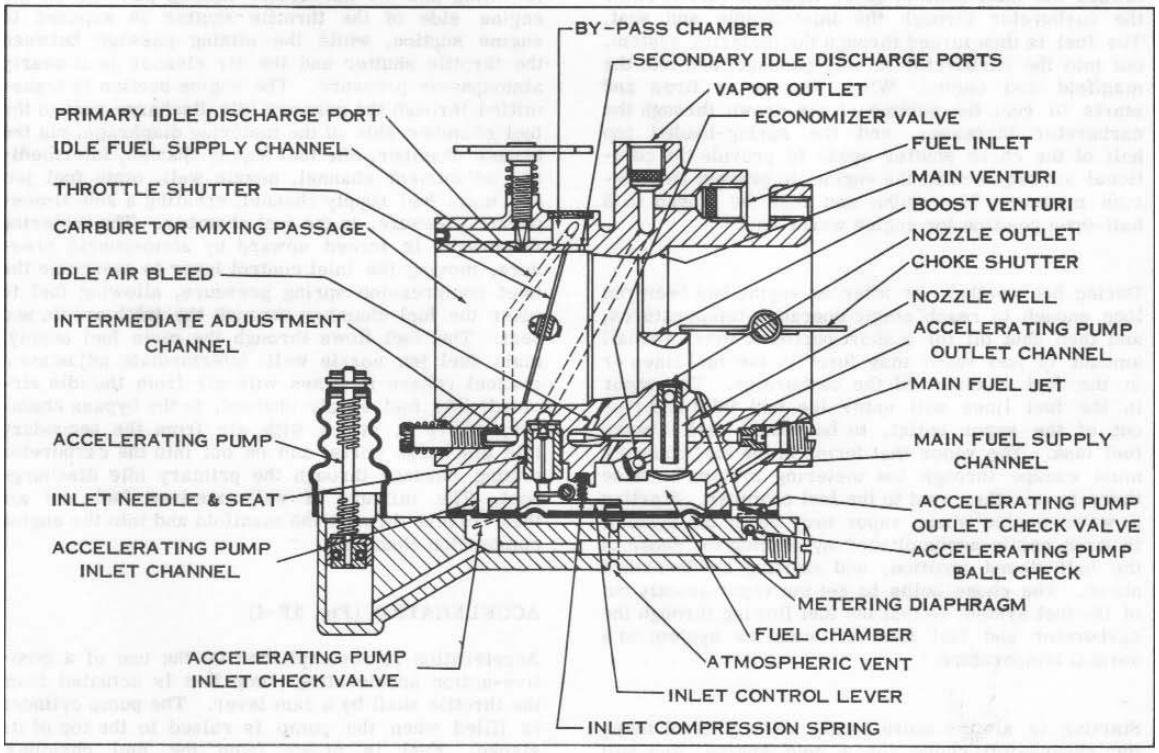


Figure 3F-1. Carburetor Cross Section - Model HD

MODEL M CARBURETOR

DESCRIPTION

The model M carburetor is a plain tube carburetor containing a venturi, and a discharge nozzle through which fuel is drawn into the air stream passing through the venturi. The quantity of fuel is metered by two jets or openings, one for low and one for high speed, before entering the nozzle.

Needle valves in the low and high speed passages allow the carburetor to be adjusted for the slightly varying and individual needs of the engine. Once a carburetor is adjusted, it requires little if any attention. At most, two "clicks" or notches richer or leaner on the needles are all that should be necessary to correct air-fuel mixture for changes in weather conditions. All carburetor final adjustments should be made with the engine at full operating temperature.

ADJUSTING CARBURETOR

Before attempting to correct faulty engine performance through carburetor adjustment, check over "Locating Operating Troubles", Section 1C. In addition, be sure air cleaner element is clean and check carburetor and manifold connections to be sure they are tight and not leaking air.

Both high and low speed needles (1 and 2, Fig. 3F-9), are turned clockwise, or in, to make leaner mixture, and counterclockwise, or out, to make mixture richer. Both needles are held to whatever position they are set by a spring and ball plunger which drops into notches in the needle adjusting screw.

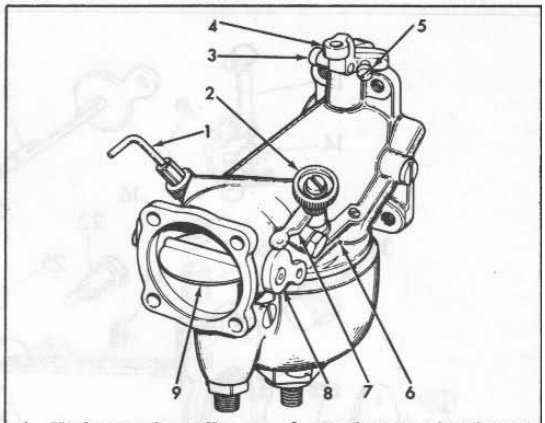
A carburetor may be adjusted as follows:

Turn both low and high-speed needles all the way in (clockwise). Back out the low speed needle five turns. Back out the high-speed needle two turns. With needles in these positions, the engine will start but the mixture will be too rich. Advance spark all the way or nearly all the way, whichever is best. Warm engine to full operating temperature and correct adjustment of both needles.

Adjust low speed first, with engine at operating temperature and idling. Turn needle in, one notch at a time, until mixture becomes so lean that the engine misses and acts starved. Back out the needle five to ten notches, or until engine hits regularly with spark advanced and throttle closed, or as nearly closed as it can be set and still have engine run at idling speed.

Adjust throttle lever stop screw (5, Fig. 3F-9) to make engine idle at desired speed with throttle fully closed. Turning screw clockwise makes engine idle faster. Never set idle adjustment to slowest possible speed. An extremely slow idle causes bearing wear, oil consumption and slow speed accelerating difficulties.

Make final readjustment on low speed needle. Try one notch at a time, first in and then out, to see if engine picks up speed or runs more smoothly. Starting and all around carburetion will be better with low speed adjustment set slightly rich rather than lean. If necessary, make further adjustment on idle stop screw to obtain desired idling engine speed. Retard spark completely. If carburetor is properly adjusted, engine will continue to run evenly and smoothly, though more slowly.



1. High speed needle
2. Low speed needle
3. Throttle lever lock screw
4. Throttle lever
5. Throttle stop screw
6. Carburetor bowl vent
7. Low speed needle lift lever
8. Choke lever
9. Choke disc

Figure 3F-9. Model M Carburetor Controls and Adjustments

During high speed operation, fuel is metered by a fixed jet which has no adjustment. However, the high speed needle may be used as "trimmer valve" to supplement the fuel flowing through the jet during extremely high speed operation (opened amount which achieves best results). It may be closed during operation at high altitudes to keep mixture from becoming too rich in the rarified air.

DISASSEMBLING CARBURETOR (Fig. 3F-9A)

Disconnect carburetor from motorcycle as follows:

Remove air cleaner cover, element and back plate.

Disconnect fuel line with strainer at carburetor.

Disconnect throttle control wire.

Remove carburetor support from top center crankcase bolt.

Remove intake (choke) lever stud nut and washer. Twist intake lever off intake lever rod, and remove intake lever rod from carburetor.

Remove four carburetor fastening bolts and pull carburetor out to right.

Disassemble carburetor as follows:

Remove bowl lock nut (1), gasket (2), main nozzle retainer spring (3) and main nozzle (4). Remove bowl (5) and bowl cover gasket (6).

MODEL MD CARBURETOR (1966 AND LATER SERVI-CAR)

GENERAL

See Figure 3F-12. On the Model MD carburetor, fuel enters carburetor at inlet connection (A) flowing past inlet needle and seat (C) into the fuel bowl. Fuel flows from bowl past main nozzle adjusting screw (T) into main nozzle orifice (W) and into nozzle sump (Z).

Idle and slow speeds: Fuel reaching its level in the carburetor passes main adjusting screw (T) through main nozzle orifice (W) and into idle tube (L). High manifold vacuum at throttle disc (G) draws this fuel upward past idle tube outlet orifice (M) where it mixes with air from channel (P) adjusted to requirements by idle mixture adjustment screw (O) through channel (J) and into air stream at idle discharge ports (H) where it mixes with additional air passing the slightly opened throttle disc (G).

High speeds and full power: When engine is pulling a load throttle disc (G) has opened further reducing suction and minimizing fuel discharge at (H) and increasing air flow to a high velocity through venturi (R). This air draws fuel from main nozzle (Y) supplied from bowl, past main nozzle adjusting screw (T) through orifice (W). As engine speed or load increases air is automatically bled into the main nozzle through tube (U) which causes a proper proportion of fuel drawn from sump (Z) in relation to adjustment to be metered at that speed range.

ADJUSTING CARBURETOR (Fig. 3F-13)

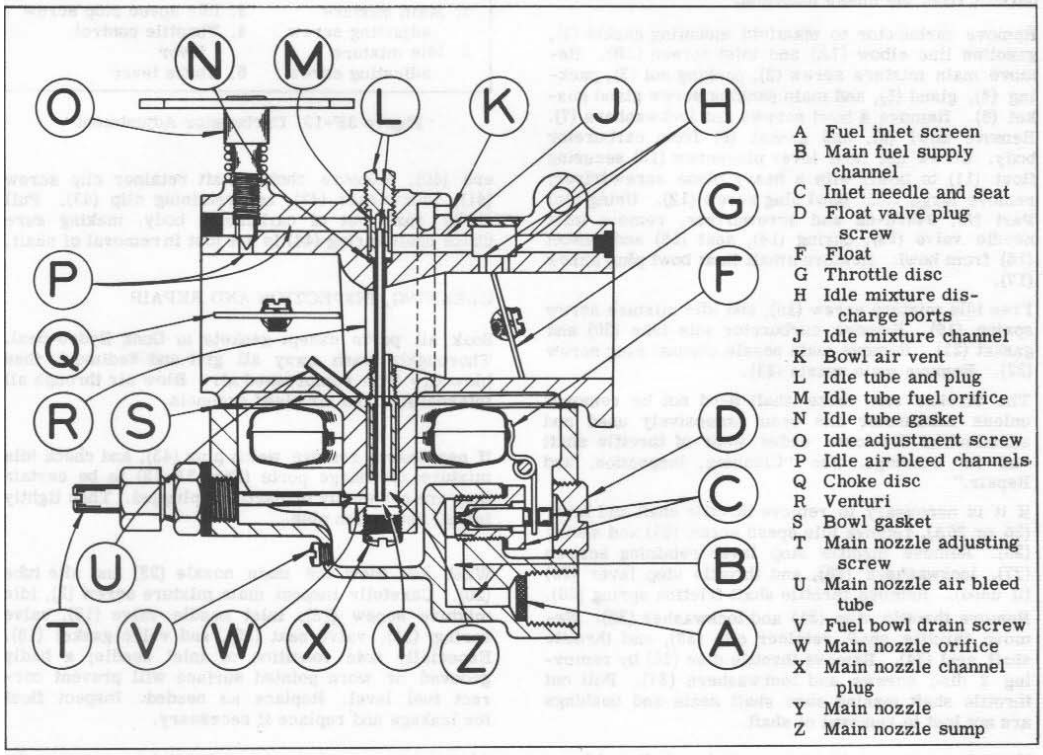
A carburetor once properly adjusted requires little if any readjustment. Before attempting to correct faulty engine performance through carburetor adjustment, eliminate all other possible causes for engine trouble. Such as bad spark plugs, incorrect spark timing, misadjusted tappets, dirty air cleaner, or leaky carburetor and manifold connections.

Idle mixture adjustment screw (1), turns to the right to enrich mixture for the idle speed range. Backing it out (turning left) makes mixture leaner.

Main nozzle adjusting screw turns to the right to lean mixture for the high speed range. Backing it out (turning left) makes mixture richer.

INITIAL ADJUSTMENT

Completely close (turn clockwise) both adjusting



A Fuel inlet screen
B Main fuel supply channel
C Inlet needle and seat
D Float valve plug screw
F Float
G Throttle disc
H Idle mixture discharge ports
J Idle mixture channel
K Bowl air vent
L Idle tube and plug
M Idle tube fuel orifice
N Idle tube gasket
O Idle adjustment screw
P Idle air bleed channels
Q Choke disc
R Venturi
S Bowl gasket
T Main nozzle adjusting screw
U Main nozzle air bleed tube
V Fuel bowl drain screw
W Main nozzle orifice
X Main nozzle channel plug
Y Main nozzle
Z Main nozzle sump

Figure 3F-12. MD Carburetor Cross Section

TRANSMISSION 4

TABLE OF CONTENTS

ELECTRIC STARTER

STARTER DRIVE (Fig. 4C-1C)

The Bendix type drive shaft and gear assembly, located in starter housing between starting motor and clutch ring gear, provides automatic means of engaging the starter shaft drive pinion with the ring gear on the clutch sprocket for cranking the engine, and for disengaging the drive pinion from the ring gear after the engine starts.

When the starter motor is not operating, the drive shaft worm pinion is disengaged from the ring gear.

When the starter switch button closes starting circuit, the solenoid armature shaft (1) pulls shifter lever (2). Fingers on lever engage groove in shifting collar (3) which forces pinion gear (4) into engagement with clutch ring gear (5). At the same time, solenoid also closes starter motor circuit thus turning the ring gear and cranking the engine. After the engine starts and switch button is released spring return on solenoid shaft returns lever so that pinion gear disengages from ring gear and starter motor shuts off. There are matching spiral threads on starter shaft (6) and pinion gear (4) so pinion will shift if mating teeth do not line up for going into mesh. If starter button is not released after engine starts, pinion gear will turn freely by means of overrunning clutch (7) to prevent damage to starter.

DISASSEMBLING STARTER AND SOLENOID (Fig. 4C-1D)

DISASSEMBLING SOLENOID:

Remove solenoid as follows:

Disconnect battery ground wire from battery terminal post. Remove cover (1) and disconnect wires from starter solenoid terminals held by nuts and lockwashers (2) and (3).

Remove chain housing cover.

Depress retainer cup (4), remove pin (5) from hole in plunger (11) shaft. Remove spring (6).

Remove solenoid attaching bolts and lockwashers (7) and spacer bar (8). Remove solenoid (13) with boot (9), gasket (10), plunger (11), plunger spring (12).

DISASSEMBLING STARTER DRIVE SHAFT AND HOUSING

Remove starter drive shaft and parts as follows:

Remove solenoid as described in previous paragraph.

Rotate starter pinion lever (25) end forward and disengage lever fingers from pinion gear shifting collar (20). Pull pinion gear and shaft assembly (14) from housing. Note drive gear (27) will remain in drive shaft housing (28).

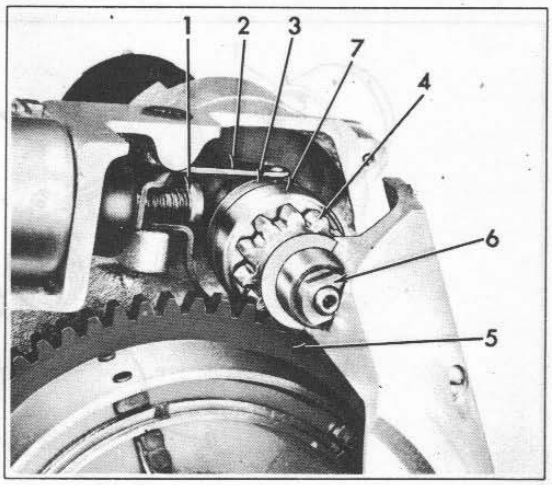


Figure 4C-1C. Starter Drive

To disassemble pinion gear and shaft assembly (14) remove thrust washer (15). Place nut (16) between copper jaws in a vise and unscrew from shaft which has a left hand thread. Remove pinion gear assembly (17). Remove lock ring (18) to separate gear (19) and shifter collar (20). Remove snap ring (21) or spacer (21A) from shaft (22).

To remove starter shifter lever (25), it is necessary to either remove inner chain housing (See Stripping Motorcycle for Transmission Repair, Section 4A) or remove oil tank.

Remove screw (24) and lever (25) from chain housing.

Remove starter shaft housing from chain housing studs as follows:

Remove starter motor and housing as an assembly by removing nuts and lockwashers (23) from chain housing studs. (See Starter Motor, Section 5L-5.)

Remove oil deflector (26) and gear (27) from starter shaft housing (28). Washer (29) is staked in place in housing recess. Needle bearings (30) and (31) are pressed into housings at shaft ends. Washer (29) presses out with needle bearing (30).

Replace deflector O-ring (26A) if worn or damaged. To service starter motor see Section 5L.

ASSEMBLING STARTER AND SOLENOID (Fig. 4C-1D)

Assembly is essentially the reverse of disassembly except as follows:

Clean needle bearings (30 and 31) and repack with grease. If replaced, needle bearing (30) should be pressed in flush with outside of housing. Stake washer (29). Pinion (19) and shaft (22) should be assembled with no lubrication on worm threads.

side of gearcase. Bend ear of lock washer (6) away from flat of nut and remove countershaft nut (5), lock washer (6) and countershaft lock plate (7). Countershaft (8 or 8A) may then be driven out of case toward left side with appropriate-size drift pin, freeing countershaft gear assembly consisting of parts 9 through 25. When countershaft gear assembly needs no repair, it should not be disassembled. With shaft out, countershaft gear end washer (9) will drop into case unless some provision for catching it is made before extracting countershaft.

Disassemble countershaft gear assembly as follows:

Lift low gear (10), low gear bushing (11), low gear bearing washer (12) and shifter clutch (13) off splined countershaft.

Remove spring lock ring (14), gear retaining washer (15), countershaft second gear (16) and second gear bushing (17).

Remove the 22 bearing rollers (18) and roller retainer washer (19) from shaft hole in countershaft gear. Use knife blade or thin screwdriver to remove lock ring (20).

Remove roller thrust washer (21), 22 rollers (22), retaining washer (23) and lock ring (24) from opposite end of countershaft gear (25).

When disassembling countershaft gear assembly, be sure all rollers are accounted for and roller set from each end of gear is wrapped separately in paper or cloth, marked for end of gear from which it was removed.

CAUTION

If any of the rollers are lost or if sets become mixed, both sets will have to be replaced with new parts even though in serviceable condition.

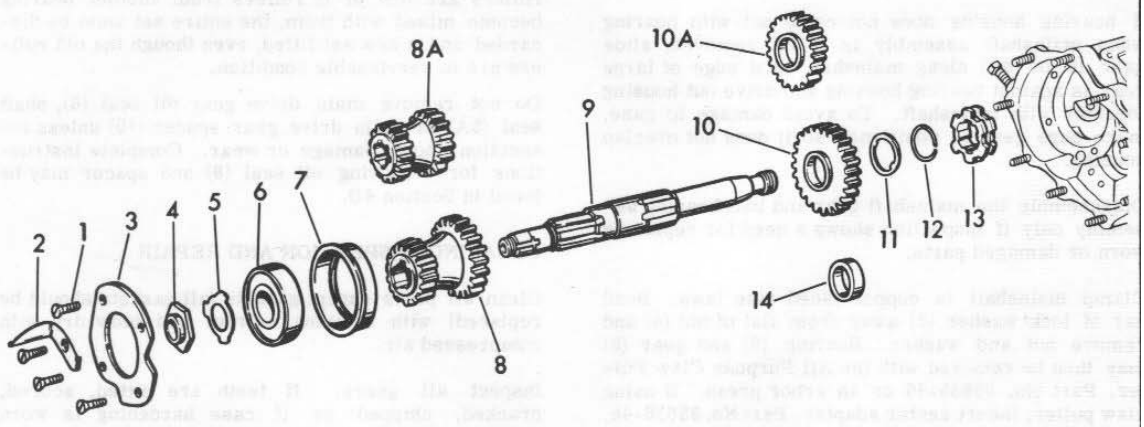
Remove speedometer drive housing screw (26) and washer (27) and lift out speedometer drive unit (28) and gasket (29) from gear case.

If a three-speed and reverse transmission, remove idler gear shaft (30), spacer washer (30A) and idler gear (31). Thread a 1/4-20 tap screw into end of shaft, grasp screw head in pliers and pull shaft out of case. It may be necessary to heat the case to facilitate pulling the shaft.

DISASSEMBLING MAINSHAFT (Fig. 4D-13)

Remove the four bearing housing retaining plate screws (1), oil deflector (2) and retaining plate (3).

Drive mainshaft assembly toward right side of case with rawhide mallet or block of wood and hammer until mainshaft bearing (6) or bearing housing (7) with bearing are just free of opening in case. With screwdriver or other suitable tool, pry lock ring (12) out of groove in mainshaft and slide it onto mainshaft splines. Pull ball bearing nut (4), ball bearing washer (5), ball bearing (6), bearing housing (7), low and second gear assembly (8) and mainshaft (9) out



1. Bearing housing retaining plate screw (4)
2. Oil deflector
3. Retaining plate
4. Ball bearing nut
5. Ball bearing washer
6. Mainshaft bearing
7. Mainshaft bearing housing
8. Low and second gear
8A. Low and reverse gear (handshift)
9. Mainshaft
10. Third gear
10A. Mainshaft second gear (handshift)
11. Retaining washer
12. Lock ring
13. Shifter clutch
14. Third gear bushing

Figure following name of part indicates quantity necessary for one complete assembly.

Figure 4D-13. Mainshaft Assembly - Exploded View

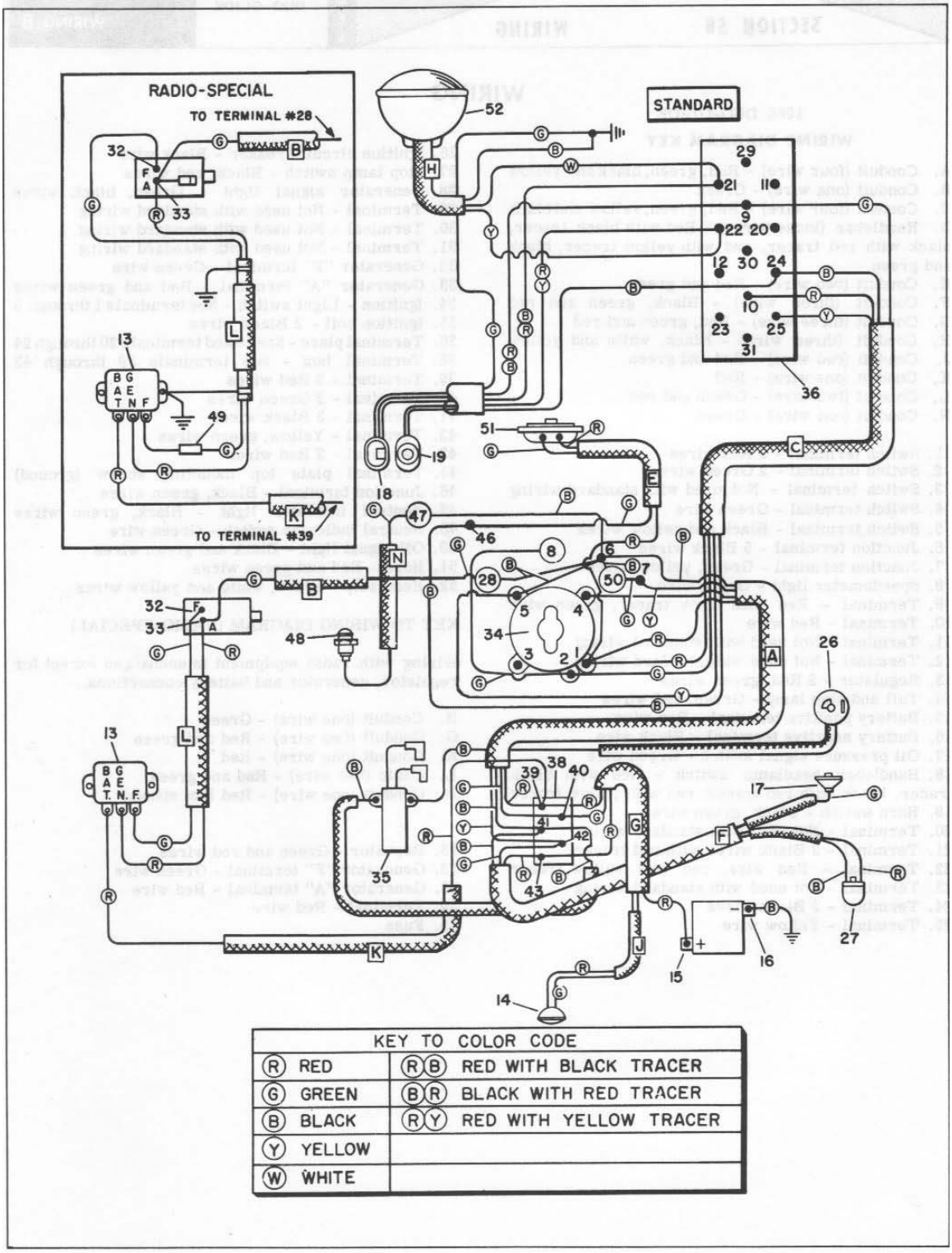


Figure 5B-1A. 1960 Duo-Glide Wiring Diagram

LAMPS

HEADLAMP

DUO-GLIDE, SPORTSTER AND SERVI-CAR

The headlamp is a sealed-beam type, specially designed and made for Harley-Davidson motorcycles. When replacement is required, use only the prescribed sealed-beam unit. Do not attempt to use an automobile sealed-beam unit because the current requirements for a motorcycle are much less than for an automobile and damage to battery or generator will result. If either filament burns out, or the lens breaks, the entire unit must be replaced. Do not attempt to repair a defective sealed-beam unit because when the seal is broken the reflector tarnishes and poor light and road visibility result.

DUO-GLIDE AND SERVI-CAR

Loosen door screw enough to remove headlamp door. Remove three retaining ring screws and retaining ring.

NOTE: Late models may have spring hooked into retaining ring hole - unhook spring to free retaining ring.

The sealed-beam unit is now free from the headlamp body, and connector block can be removed from the unit by pulling connector block from the unit prongs.

Assembly is the reverse order of disassembly. Make sure connector block contacts are clean to ensure good electrical contact.

To replace the entire headlamp on 1959 models remove a back panel and disconnect two lamp wires leading to terminal plate. Remove headlamp fastening nut and free lamp from motorcycle. On 1960 models remove 6 slotted screws holding headlamp body to housing.

SPORTSTER

1966 and Earlier XLH

Loosen headlamp mounting nut located beneath headlamp housing with socket wrench and move headlamp back so screw located on lower periphery of headlamp door is accessible with a screwdriver. Remove screw, simultaneously lift and swing unit up and free from headlamp body. Pull connector block from sealed-beam unit prongs. Pry retaining springs from headlamp door grooves to free sealed-beam unit from rim.

Assembly is the reverse order of disassembly. Be sure connector block contacts are clean to ensure a good electrical contact. After final assembly, readjust headlamp as described under "Beam Adjustment."

To replace entire headlamp assembly it is first necessary to remove handlebar clamp front cover and then the headlamp housing assembly. To free headlamp, disconnect lamp wires and remove nut securing lamp to the fork. Assembly is the reverse order of disassembly.

1967 and Later XLH and XLCH

To remove sealed beam unit, remove screw from door or clamping ring. Pry unit from rubber mounting and pull connector block from unit prongs. Headlamp mounting nut is located under snap plug on mounting bracket.

BEAM ADJUSTMENT

To get the greatest efficiency from the headlamp and to meet the requirements of the law, correctly adjust headlamp beam according to the following instructions.

Draw a horizontal line on a wall or screen exactly the same height as the center of the headlamp to be checked and adjusted. Then, position the motorcycle on a level surface with headlamp approximately 25 feet away from the test pattern. Have a rider sit on the motorcycle to simulate actual running conditions. Be sure tires are correctly inflated. Aim the headlamp directly at the screen and turn on the light switch. Set beam selector switch on the high beam position, and check beam for height and direction. The top of the main beam of light should register even with, but no higher than the horizontal line of the test pattern.

SPORTSTER

To aim beam, loosen the headlamp mounting nut and position the lamp to correctly adjust the beam of light in relation to the horizontal line. At the same time, turn the headlamp right or left to direct the beam of light straight ahead. Tighten the clamp nut after the lamp is correctly adjusted and install remaining fork parts.

ELECTRA GLIDE, DUO-GLIDE AND SERVI-CAR

The lamp can be tilted up or down to aim it in relation to the horizontal line by turning vertical adjusting screw in or out. The lamp can be aimed to the right or left in relation to the front wheel by turning the horizontal adjustment screw in or out.

LEGEND FOR FIGURE 5E-7

1. Fan housing screw (3)
2. Internal lock washer (3)
3. Fan housing
4. Armature shaft nut
5. Armature shaft lock washer
6. Armature shaft plain washer
7. Fan
8. Armature shaft key (used 1961 and earlier)
9. Fan baffle plate screw (3)
10. Fan baffle plate
11. Fan spacer
12. Fan housing spider
13. End plate
14. Brush end bearing housing
15. Drive end cover gasket
16. Inner oil retainer
17. Commutator end bearing shim (0 to 3)
18. Terminal screw (3)
19. Brush and spring (2)
20. Clutch spring collar pin
21. Clutch spring collar
22. Oil slinger
23. Clutch spring
24. Drive gear
25. Clutch
26. Drive end oil deflector
27. Frame screw (2)
28. Frame end
29. Armature bearing
30. Armature spacing shim (.020 in.)
31. Bearing plate spring ring
32. Armature
33. Armature bearing
34. Drive end spring ring
35. Felt retainer
36. Negative brush holder screw (2)
37. Lock washer (2)
38. Brush holder screw nut (2)
39. Brush holder (negative)
40. Terminal screw nut (2)
41. Terminal screw lock washer (2)
42. Terminal screw insulating washer (2)
43. Field coil terminal insulator (2)
44. Field coil terminal
45. Terminal screw (2)
46. Terminal screw bushing (2)
47. Brush holder (positive)
48. Brush holder insulation
49. Pole shoe screw (4)
50. Pole shoe (2)
51. Field coil (2)
52. Air intake shield screw (2)
53. Air intake shield (2)
54. Spacing bushing (2)
55. Generator frame

Figure following name of part indicates quantity necessary for one complete assembly.

In step three, touch one test lead to generator frame, the other to either of two field coil leads, making sure other lead from same coil does not touch generator frame. Repeat process on other coil.

Omit step four.

In place of step five, touch ammeter leads to two field coil leads. Repeat process with opposite coil. Ammeter should read 1 ampere in both cases. No reading indicates an open coil, a higher reading indicates a shorted coil.

In step six, touch one test lead to generator frame, the other to positive (insulated) brush holder.

TESTING ARMATURE

Test armature as described in "Testing Armature," standard generator.

REPAIRING COMMUTATOR

Repair commutator as described in "Repairing Commutator," standard generator.

POLARIZING GENERATOR

Polarize generator as described in "Polarizing Generator," standard generator.

GENERATOR CHARGING RATE

Refer to directions in "Generator Charging Rate," standard generator, except minimum charging rate should be 20 amperes.

DISASSEMBLING GENERATOR Fig. 5E-7)

Remove three fan housing screws (1), washers (2) and fan housing (3). Turn off armature shaft nut (4) and remove lock washer (5) and plain washer (6).

Use All Purpose Claw Puller, Part No. 95635-46, to pull the fan (7). Remove key (8) (if used) from armature shaft.

Remove three fan baffle plate screws (9) and lift off baffle plate (10), fan spacer (11), fan housing spider (12) and end plate (13). Use Claw Puller to pull brush end bearing housing (14). Ball bearing (29) should come off with bearing housing and parts 30 and 31. However, the bearing sometimes stays on the shaft holding parts 15, 16, and 17, in place. In that event, do not remove bearing and go on to following procedure.

Remove terminal screws (18) and lift brush and spring assemblies (19) out of brush holders. At this point electrical checks to determine condition of field coils may be made (see "Testing Field Coils").

Drive clutch spring collar pin (20) out of clutch spring collar (21) on Duo-Glide, out of oil slinger (22) on Servi-Car. Slip clutch spring (23) and drive gear off armature shaft. Pull clutch (25) from shaft using All Purpose Claw Puller. Lift oil deflector (26) off shaft.

Loosen frame screws (27) about 1/4 in. and tap on ends to unseat frame end (28). Remove frame screws and pull frame end with bearing (29), gasket (15), oil retainer (16) and bearing shims (17) if there are any. In factory assembly, these shims are supplied as needed to center brushes on commutator. The usual assembly includes up to three spacing shims.

The armature (32) may be pressed out of the frame to release drive end ball bearing (33). If necessary spring ring (34) and felt grease retainer (35) can be removed.

left side of crankcase. Telescope front push rod cover so that opening and closing of valve can be observed. Turn engine in direction in which it runs until front piston is on compression stroke (just after front intake valve closes) and continue turning engine very slowly (less than 1/2 revolution) until timing mark (Fig. 5F-3A) on flywheel is aligned in the inspection hole.

Assemble circuit breaker as follows (see Fig. 5F-2): On automatic advance circuit breakers, lubricate camshaft end of shaft and stem assembly (22B) and install breaker cam (24) on camshaft so that notches in cam engage with flyweights (26). Place breaker base (10B) on shaft and stem assembly. Put on nuts and washers (20A) but do not tighten. Stem mounting stud slots in breaker base are offset and base can be installed only in one position to allow full range of circuit breaker adjustment. Be sure to align timing marks (8, Fig. 5F-1A) on stem and breaker base.

Install a new circuit breaker gasket (23) using gasket sealer. Insert circuit breaker shaft and stem assembly into gear case cover with wire (12, Fig. 5F-2) inserted in hole of stem flange. On automatic advance circuit breakers, stem (22B) should be positioned so that timing marks on base (8, Fig. 5F-1A) face toward outside of engine. Before engaging circuit breaker driving gear, turn shaft counterclockwise, approximately 60 degrees from position where mark on cam lobe lines up with breaker lever fiber block. Insert screws (21, Fig. 5F-2) snug, but not tight. Temporarily position base on shaft and stem assembly with timing marks aligned.

With flywheel ignition timing mark in center of hole in crankcase, observe how closely mark on cam lobe lines up with lever fiber. If it does not line up, remove screws (21, Fig. 5F-2), lift circuit breaker shaft and stem assembly from gear case. Turn shaft gear so its engagement with its driving gear is changed one tooth. Check again according to breaker cam mark. Repeat this procedure until gear engagement is attained which closely aligns mark on cam with breaker lever fiber. Then tighten screws.

Position base assembly on shaft (29B) with timing marks on base (8, Fig. 5F-1A) in alignment and tighten hold down nuts and washers (20A, Fig. 5F-2) snugly, but do not overtighten.

Adjust ignition timing. See previous paragraph "Checking and Adjusting Ignition Timing" in this section.

1966 AND LATER ELECTRA-GLIDE, SPORTSTER AND SERVI-CAR AUTOMATIC ADVANCE CIRCUIT BREAKER

Remove spark plugs to permit engine to turn easily; remove screw plug from timing inspection hole in left side of crankcase. Telescope front push rod cover so that opening and closing of valve can be observed. Turn engine in direction in which it runs until front piston is on compression stroke (just after front intake valve closes) and continue turning engine very slowly (less than 1/2 revolution) until timing mark (Fig. 5F-3A) on flywheel is aligned in the inspection hole.

Assemble circuit breaker as follows: (See Fig. 5F-2). Lubricate camshaft end of shaft and stem assembly (22D) and install breaker cam (24) on camshaft so that notches in cam engage with flyweights (26). Place breaker base (10B) on stem and shaft assembly. Install nuts and washers (20A). Do not over-tighten. Install new seal (23B). Before installing circuit breaker, turn shaft gear to approximately align cam mark (3) with cam follower (2) as shown in Fig. 5F-1A. Insert circuit breaker into gearcase with wire toward rear of engine. This will position circuit breaker points to outside of engine permitting access to adjusting screws when cover is removed.

With flywheel ignition timing mark in center of timing hole in crankcase, observe how close timing marks on cam lobe lines up with breaker lever fiber.

If fiber is not close to cam lobe timing mark, lift circuit breaker assembly and turn shaft gear in correct direction so engagement with driving gear is changed one tooth and reinstall circuit breaker in gearcase to get approximately close alignment of fiber and cam mark. Reinstall stem clamp (34 or 34A, Fig. 5F-2) and tighten clamp nut (or bolts) (35) being sure cam mark and fiber are still in alignment.

Adjust ignition timing. See previous paragraph "Checking and Adjusting Ignition Timing" in this section.

2. Testing regulator voltage setting under no load.

Testing Voltage Setting Under Load

1. Make same connections as used to make previous Test B, except move positive voltmeter lead to regulator "B+" terminal. See Fig. 5I-8.

2. Turn field control resistor to "Direct" position (no resistance in field circuit).

3. Operate engine at 2700 RPM (approximately 45 MPH) and note reading on voltmeter. This reading will be the voltage under load.

Testing Voltage Setting Under No Load

1. Remove 1-1/2 ohm resistor used in previous load test from circuit by disconnecting grounded ammeter lead. Place field control resistor in Direct position (no resistance).

2. With engine running at 2700 RPM, note voltmeter reading. This reading will be the voltage at no load.

Readings taken in Load and No Load tests must be within specifications or regulator should be replaced. See Fig. 5I-1 for specifications.

METHOD II
TESTING DELCO - REMY REGULATORS
(VAT 26 TESTER)

GENERATOR-BATTERY SYSTEM (6 OR 12 VOLT)
Covers all models except Sporster XLCH

A. TESTER CONTROLS

Turn ground polarity selector to negative; Load Control knob to Direct; Ammeter selector to 100A position; and voltage selector to 16V position for 12 volt system, or 8V position for 6 volt system.

B. TESTER CONNECTIONS (See Fig. 5I-9)

1. Remove "BAT" lead from voltage regulator.

2. Connect Regulator lead "R" of tester to "BAT" terminal of regulator.

3. Connect Battery lead "B" of tester to battery wire removed from regulator.

4. Connect Ground lead "G" of tester to ground of motorcycle.

5. Connect Positive voltmeter lead to "GEN" terminal of regulator.

6. Connect Negative voltmeter lead to ground of motorcycle.

7. Remove wire connected to regulator field "F" terminal and connect this wire to a lead of the field control variable resistor, the other lead of the field control resistor is connected to ground on motorcycle. Turn field control to "Open" position.

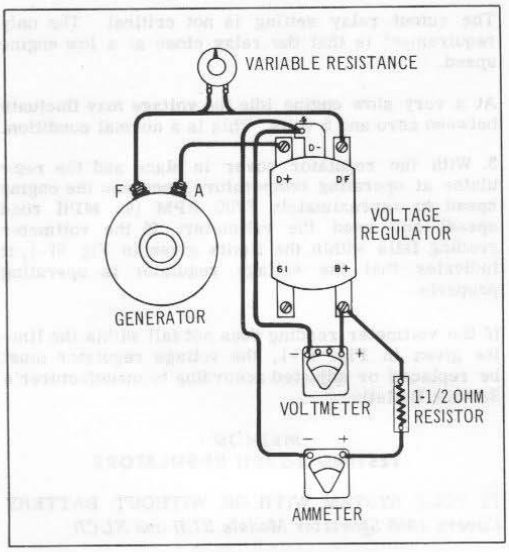


Figure 5I-8.

C. TESTING GENERATING SYSTEM.

1. Operate engine at 2000 RPM (approximately 35 MPH).

2. Slowly turn field control resistor knob to "Direct" position until ammeter reads:

15 amperes for 6 volt systems using standard equipment generators.

20 amperes for heavy duty fan-cooled generators (6 volt)

10 amperes for 12 volt generators.

If ammeter reading is as specified, generator is not at fault and difficulty is in voltage regulator or wiring. Make regulator Tests D, E, and F.

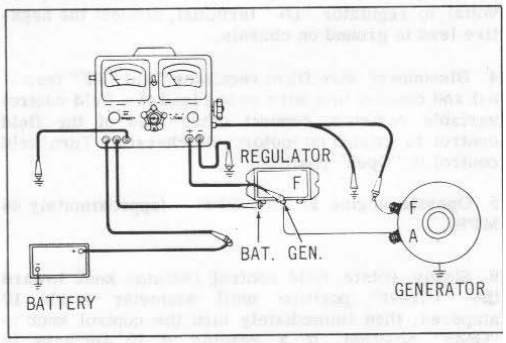


Figure 5I-9.

STARTER MOTOR

STARTER MOTOR

The starter motor is a 12-volt, series field 2-pole or 4-pole drive motor which engages the clutch ring gear through a Bendix type drive and a reduction gear unit. The two pole 2-brush type was used on early Servi-cars. The four pole 4-brush type is used on the Electra-Glide, Servi-car and Sportster models. A solenoid relay provides battery current directly to the motor. The solenoid is controlled by a button switch on the handle bar. On some models control circuit has a cut-out switch in the transmission cover. Switch plunger contacts a nub on the shifter can only when transmission is in neutral to complete the starting circuit. This prevents starter operation when transmission is in gear.

NOTE

Starter motor should never be operated continuously for more than 30 seconds without pausing to let it cool for at least two minutes. The motor is not designed for continuous operation and serious damage may result.

LOCATING TROUBLES

The starter motor is designed to be corrosion resistant and requires very little maintenance. However, to insure satisfactory operation, periodic inspection of brushes and commutator should be made. In the event starter motor fails to operate satisfactorily, the following checks should be made before removing motor for inspection:

1. Wiring

Make sure the mounting and wiring connections are tight and in good condition. The solenoid switch should be firmly mounted and all wiring connections should be clean and tight. Also inspect the connections to the battery and return circuit, as loose or dirty connections anywhere in the circuit will cause high resistance and reduced motor efficiency.

2. Battery

If the connections and wiring are found to be satisfactory, the battery should be checked to determine its state of charge (See Section 5J, "Charging Battery"). If the battery is charged and battery voltage is reaching the motor without any excessive losses in wiring or connections, the trouble may be attributed to either the engine or the starter motor itself.

3. Switches

If the battery is charged but there is no current flow to motor at all, trouble is probably in handlebar button switch, transmission cutout switch or the solenoid switch. This can be determined by by-passing each switch with a heavy jumper (Refer to wiring diagram, Section 5B).

4. Engine

Excessive friction in the engine from tight bearings or pistons or from heavy oil obviously makes engine harder to crank. However, if engine is known to be in normal condition and the rest of the starting system is satisfactory, the starter motor should be removed for further checking.

NOTE: Electrical tests to locate cause of starting system failures can be made using the Sun VAT-26 Tester and applicable Service Bulletins.

REMOVING STARTER MOTOR AND DRIVE

SERVI-CAR (Fig. 5L-5)

Disconnect solenoid and battery cables from starter motor. On 1964-65 model, remove motor thru bolt nuts and lockwashers (1), securing motor (2), until it can be removed as an assembly from starter shaft housing and transmission top cover flange (3). Remove starter motor end support bracket (not shown). On 1966 and later models, unscrew motor thru bolts (4) from transmission cover (3A).

NOTE: Late 1966 mounting flange has 2 sets of holes for Delco Remy or Prestolite motor.

ELECTRA-GLIDE (Fig. 5L-6)

Disconnect solenoid cable from starter motor terminal. Remove attaching nuts and lockwashers (1) which fasten starter motor housing (3) to studs on chain housing. Remove starter motor end support plate (not shown) from transmission. It may be necessary to loosen and raise battery carrier to provide clearance. Remove starter motor (2) and starter shaft housing (3) from motorcycle as an assembly.

SPORTSTER (Fig. 5L-7)

Disconnect solenoid cable from starter motor terminal. Remove starter motor clamp bolt and lockwasher (1) from crankcase. Unscrew motor thru bolts (4) from starter shaft housing (3). Remove starter motor and clamp (2) as an assembly.

DELCO-REMY STARTER MOTOR SERVICE

DISASSEMBLING STARTER MOTOR

Delco-Remy 2-pole and 4-pole (Fig. 5L-8 and 5L-9)

Remove thru-bolts (1). Note that the bolt which passes near field coil connection has insulating sleeve (2). Remove commutator end frame (3) and drive end frame (4). Remove armature (5) from drive end of frame and field assembly (6).