SERVICE MANUAL

APPLYING TO
THE FOLLOWING
HARLEY-DAVIDSON
MOTORCYCLES—
1940 to 1947 INCLUSIVE

O.H.V. Engine Models

61 Cu. In. (1000 c.c.)
74 Cu. In. (1200 c.c.)

Side Valve Engine Models

74 Cu. In. (1200 c.c.)
80 Cu. In. (1300 c.c.)

Printed in the United States of America

SECTIONAL INDEX

6. Check adjustment of chains and readjust if needed. Again, check lubrication of front chain and readjust chain oiler if found necessary. Clean and lubricate rear chain.
7. Check adjustment of brakes. Readjust controls if needed.
8. Check wheel mounting socket screws and tighten if needed. These screws must be kept very tight.
9. Check axle nuts and fork rocker plate stud nuts for looseness.
10. Check level of battery solution and add distilled water if needed. See that terminals are clean and connections tight.
11. Inspect all wiring connections and tighten any found loose. Check switches, lights, etc.
12. Check carburetor-manifold cap screws and manifold nuts.
13. Road test motorcycle to check carburetor adjustment and all-around performance.

At First 1500 Miles

1. Check condition of oil in tank to determine if oil change is needed.
2. Check level of oil in transmission and add oil if needed. Use same grade of oil used in engine. See "Transmission Lubrication," Page 144.
3. Lubricate all points indicated for 750 mile attention on Lubrication Chart.
4. Lubricate wheel hubs at 1500 mile intervals as indicated on Lubrication Chart.
5. Oil all control joints, namely clutch, gear shifter, brakes, front brake control wire, and spark and throttle control wires at ends of their respective housings.
6. Check adjustment of chains. Adjust if needed. Again, check lubrication of front chain. Clean and lubricate rear chain and check for broken rollers, loose pins or cracked side plates.
7. Check adjustment of gear shifting control. Adjust if needed.
8. Check adjustment of clutch and clutch control. Adjust if needed.
9. Check adjustments of brakes and brake controls. Adjust if needed.
10. Check all nuts, bolts and screws and tighten any found loose. Particular attention should be given to engine mounting bolts, cylinder head bracket bolts or nuts, transmission mounting stud nuts, and wheel mounting socket screws.
11. Check front and rear wheel for loose or broken spokes and rim damage.
12. Check level of battery solution and add distilled water if needed.
13. Engine should be given a complete tune-up including: Checking circuit braker points, ignition timing, valve tappets, spark plugs, draining and flushing carburetor bowl, cleaning and flushing gasoline strainer, carburetor adjustment, and cleaning muffler outlet. Service air cleaner if motorcycle is so equipped.
14. Road test motorcycle to check carburetor adjustment and all-around performance.

Preceding three service jobs conclude what is considered initial servicing. Further servicing should be given according to schedule of "Regular Interval Inspection and Maintenance," which follows below.

REGULAR INTERVAL INSPECTION AND MAINTENANCE

After schedule of initial servicing of new motorcycle has been completed, this maintenance schedule is then to be followed at regular intervals not exceeding 1500 miles.

1. Check condition of oil in tank to determine if oil change is needed.
2. Lubricate all points indicated for 750 mile attention on Lubrication Chart.
3. Lubricate wheel hubs at 1500 mile intervals as indicated on Lubrication Chart.
4. Oil all control joints, namely, clutch, gear shifter, brakes, front brake control wire, and spark and throttle control wires at ends of their respective housings.
5. If motorcycle is equipped with air cleaner, inspect and service if needed. See "Servicing Air Cleaner," Page 10.
6. Remove rear chain, check for broken rollers, loose pins or cracked side plates, and then clean and lubricate as per instructions under "Lubricating Drive Chains," Page 12. Check front chain for ample lubrication. Adjust chains.
7. Flush chain oiler passage as explained under "Lubricating Drive Chains," Page 12.
8. Check clutch and clutch control adjustments. Readjust if needed.
9. Check brakes. Readjust controls if needed.
10. Check all nuts, bolts, and screws and tighten any found loose.
11. Check wheel mounting socket screws and tighten if needed. These screws must be kept very tight.
12. Check axle nuts and fork rocker plate stud nuts for loosenes.
13. Check front and rear wheel for loose or broken spokes and rim damage.
14. Clean and flush gasoline strainer.
15. Remove carburetor bowl drain plug and flush bowl.
16. Check level of battery solution and add distilled water if needed.
17. Inspect all wiring connections. Check switches and lights.
18. Completely tune up engine, including: Checking circuit breaker points, ignition timing, valve tappets, spark plugs, carburetor adjustment, and cleaning muffler outlet.
19. Note that generator and oil pressure signal lights, in switch panel, go out when engine is running above idling speed.

Relining brake shoes: Clean and inspect all parts. If brake shoes are cracked or otherwise damaged they must be replaced. Brake shoe linings worn down to rivet heads, or impregnated with grease as a result of overgreasing wheel hubs, must be renewed. New linings can be riveted to shoes, or new shoes and linings can be installed.

Linings are the same for both shoes of front and sidecar wheel brakes.

Linings for rear wheel brake are the same for both shoes as received on parts order, however, after lining has been riveted to rear shoe, it must be beveled at lower end for a distance of ⅝" as shown in Illus. 12. Rear shoe and lining assembly as received on parts order, has lining beveled at lower end.

When relining a shoe, start at one end and work to other end in order to make lining bear tightly against shoe and not buckle in the middle. If a riveting machine is not available, set rivets with hand tools, making sure they draw lining tight against shoe.

After relining brake shoes, or fitting new brake shoes and linings, reassemble as shown in Illus. 12.

When installing brake operating shaft (13) or (18), be sure "arrow" points to outside as shown in Illus. 12.

Reinstall brake shoe springs (20) and (21) or (16) as shown in Illus. 12.

Install brake assembly and wheel in motorcycle, and loosen nut on pivot stud (5) or (8), Illus. 12. Apply brake hard and while holding it applied, tighten nut. This centers shoe assembly in brake drum. Adjust brake—see "Adjusting Brakes," Page 20.

ADJUSTING CARBURETOR

(To Identify Items, Refer to Illus. 108)

Before attempting to correct faulty engine performance, attention should be given other items which have a direct bearing on, and can affect carburetor adjustment as well as engine performance.

A. See that throttle and spark controls are correctly adjusted.

B. Remove drain screw from bowl of carburetor. Drain and flush bowl to eliminate dirt and water.

C. Drain and flush gasoline strainer.

D. Check air cleaner to be sure passage of air through cleaner is not restricted by an excessive accumulation of dirt in filter element.

E. Check manifold packing nuts and carburetor mounting screws for tightness.

F. See that spark plugs are clean and correctly adjusted. If condition of spark plugs is questionable, install new ones.

G. Check adjustment of valve tappets.

H. Check compression of both cylinders by operating starter pedal slowly.

I. Check condition and adjustment of circuit breaker contact points.

J. Check for poor or loose connections in wiring, particularly at battery terminals, switch terminals and circuit breaker condenser.

K. Check battery to be sure it is not nearly discharged.

L. Check for intermittent short circuit due to damaged wiring insulation.

M. Check gasoline tank cap to be sure air vent is not plugged.

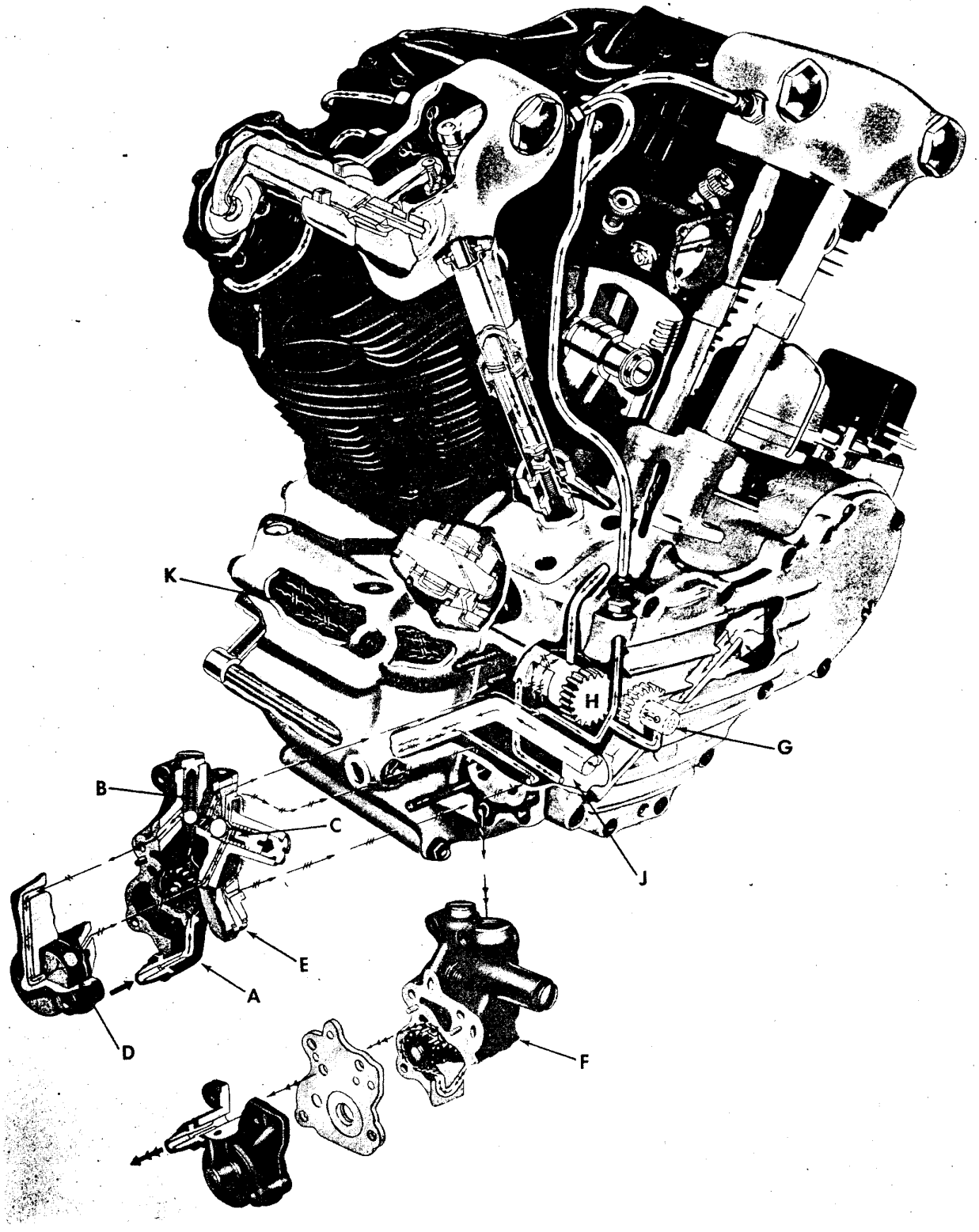
A carburetor once properly adjusted requires little, if any, readjusting. At the most, it should not be necessary to adjust the needles more than one or two notches richer or leaner to correct mixture for a change in weather conditions.

Both needles (2) and (3) turn down (to right) to make mixture "leaner" at the respective speeds for which they adjust. Backing them out (to left) makes mixture "richer." Both needles are held in whatever positions they may be turned to, by a spring and ball plunger which drops into notches in the needle adjusting screw.

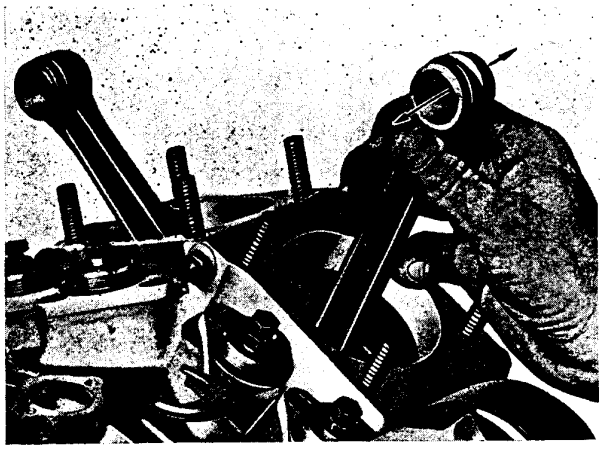
A carburetor that is badly out of adjustment may be readjusted as follows: First, make sure carburetor control wire is adjusted so throttle fully closes and opens with handlebar grip movement. Turn both the low and high speed needles all the way down (to right). Then, back up (to left) low speed needle (3) about 5 turns, and high speed needle (2) about 2 turns. With needles in these positions, engine will start, but mixture will probably be too rich. Start engine and after choke lever has been moved to "open" position and engine is normally hot, correct the adjustment of both needles.

Adjust for low speed first. Turn low speed needle down (to right) one notch at a time until mixture becomes so lean that engine misses and is inclined to stop; then back needle up 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. Next, adjust throttle lever stop screw (6) as may be necessary to make engine idle at proper speed with throttle fully closed. Turning screw to right makes engine idle faster. Turning screw to left makes engine idle slower. Don't idle an engine at the slowest possible speed, because an extremely slow idling adjustment causes hard starting. Since changing idling speed with throttle stop screw is likely to change low speed mixture to some extent, it will be necessary to again check and correct low speed needle adjustment by the same procedure followed in making the initial adjustment.

Starting and all-around carburetion will be better with low speed adjustment slightly rich rather than as lean as it can be made.



ILLUS. 22
OILING SYSTEM (O.H.V. ENGINE)



ILLUS. 30
CHECKING CONNECTING ROD FOR BEARING WEAR

REMOVING ASSEMBLED ENGINE FROM CHASSIS FOR COMPLETE OVERHAUL

When it is obvious that engine needs a complete overhaul, rather than possibly only an upper-end job, proceed as follows:

(If motorcycle is used with sidecar or package truck, remove it.)

1. Disconnect battery ground connection.
2. *Remove instrument panel cover:* 1946 and earlier Models require removal of speedometer lamp switch knob, front hexagon head screw, two side screws and cover side plate; 1947 Models require removing cap screw and cover side plate.
3. Disconnect shifter lever bottom bolt.
4. Drain gasoline from both tanks. Disconnect gasoline pipe from left tank and disconnect tank interconnecting pipe from right tank.
5. *Remove gasoline tanks:* This requires removal of the two front end bolts (upper and lower) and two stud nuts at rear between tanks directly behind saddle bar hinge bracket. (Saddle post clevis pin must be removed and saddle bar must be hinged forward.)
6. *Remove cylinder head bracket:* Pay particular attention to shim washers between cylinder head bracket and frame lug; these will have to be refitted when reinstalling engine. *O.H.V. Engine* —choke lever need not be removed from bracket—disengage choke rod from lever by turning bracket.
7. Remove spark plugs to avoid damaging. Use Harley-Davidson special wrench, Part No. 11929-40.
8. Disconnect throttle control wire at carburetor and remove carburetor control wire housing from front clamp.
9. *O.H.V. Engine:* Disconnect spark control wire at circuit breaker and free spark control wire housing from relay bracket.

   Side Valve Engine: Disconnect spark control wire at circuit breaker and free spark control wire housing from front cylinder base stud.
10. Remove brake lever from brake cross-over shaft, and remove right footboard and brake pedal assembly.
11. Remove muffler and rear exhaust pipe, front exhaust pipe, and rear exhaust pipe connection. If motorcycle is used with sidecar, or package truck, lower front connection tie rod must be removed to free front exhaust pipe.
12. Drain oil tank or install nipple cap, Part No. 3583-15. Remove oil pump feed pipe, oil tank vent pipe, and oil return pipe.
13. *Motorcycle equipped with relay only: 1946 and Earlier Models*—disconnect wire from each of the two terminals at one end of relay. *1947 Models*—disconnect wires from all relay terminals.
14. Disconnect oil pressure switch wire from pressure switch terminal.
15. Remove the two engine mounting bolts from right side. Front bolt nut stays in place beneath generator and does not require holding while removing or installing bolt.
16. Remove mesh type air cleaner, or air intake, and gasoline pipe. If equipped with oil bath air cleaner, refer to operation 10 under "Disassembling O.H.V. Engine," Page 37, or operation 12 under "Disassembling Side Valve Engine," Page 40.
17. Disconnect circuit breaker low tension wire from coil rear terminal—if wire is shielded, disconnect metallic shielding from coil rear lower terminal.

    Motorcycle equipped with relay only: 1946 and earlier Models—disconnect wire from generator terminal marked "switch." *1947 Models*—disconnect wires from generator terminals marked "switch" and "relay."

    Motorcycle equipped with current and voltage regulator: Disconnect wires from generator terminals marked "switch" and "relay," and remove generator end cover screw securing metallic shielding.
18. Remove left footboard and studs.
19. Remove outer front chainguard.
20. Remove engine sprocket nut (right thread) using Harley-Davidson special wrench, Part No. 12645-26. It will be necessary to strike wrench handle with a hammer to loosen nut. Free sprocket from shaft taper by striking flat surface, near outer edge, a light but sharp rap with a hammer being careful not to strike sprocket teeth or sprocket shaft threads. Sprocket and chain are then free to be removed. Bend ears of screw lock away from head of each of the three cap screws which secure front end of inner chain guard to crankcase, and remove cap screws and lock.
21. *O.H.V. Engine:* Free speedometer cable housing from crankcase top center stud. *Side Valve En-*

REAR CYLINDER HEAD ASSEMBLY (O.H.V. ENGINE)

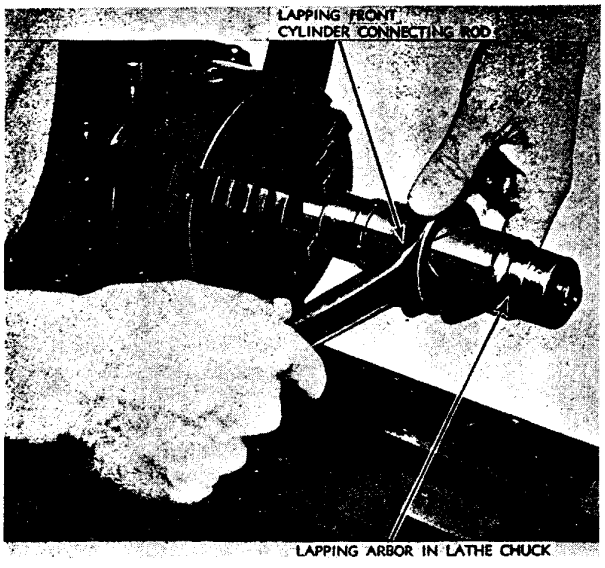
(To Identify Items, Refer to Illus. 39)

ITEM	NUMBER USED	PART NUMBER	NAME
1	16	179-39	Rocker Arm Cover Screw (same as Items 13, 16 and 27)
2	1	174-38A	Intake Cover Plate
3	1	175-38A	Intake Cover Gasket
4	2	172-36	Valve Key (Pair)—(same as Item 18)
5	2	170-36	Upper Valve Spring Collar (same as Item 20)
6	2	168-36	Outer Valve Spring (same as Item 21) Free length 1 13/16"—110 to 120 pounds @ 1 1/16"
7	2	169-36	Inner Valve Spring (same as Item 22) Free length 1 15/32"—70 to 80 pounds @ 29/32"
8	2	171-36A	Lower Valve Spring Collar (same as Item 23)
9	1	167-40	Intake Valve Guide (top end of guide is beveled—oversizes available .001" and .002")
10	1	173-38A	Intake Valve Spring Cover
11	1	176-38B	Intake Spring Cover Screw Plate (curved)
12	1	176-38C	Intake Spring Cover Screw Plate (straight)
13	See Item 1	.....	.....
14	3	176-37	Spring Cover Asbestos Gasket (same as Item 28—two under intake valve spring cover—one under exhaust valve spring cover)
15	1	163-36	Intake Valve (.004" to .006" clearance in valve guide—marked "IN" on head)
16	See Item 1	.....	.....
17	1	174-38	Exhaust Cover Plate
18	See Item 4	.....	.....
19	1	175-38	Exhaust Cover Gasket
20	See Item 5	.....	.....
21	See Item 6	.....	.....
22	See Item 7	.....	.....
23	See Item 8	.....	.....
24	1	167-36	Exhaust Valve Guide (top end of guide is flat—oversizes available .001" and .002")
25	1	173-38C	Exhaust Valve Spring Cover
26	1	176-38A	Exhaust Spring Cover Screw Plate (straight)
27	See Item 1	.....	.....
28	See Item 14	.....	.....
29	1	176-38	Exhaust Spring Cover Screw Plate (curved)
30	1	165-36	Exhaust Valve (.004" to .006" clearance in valve guide—marked "EX" on head)
31	2	0265	Lock Washer (same as Item 34)
32	2	0136	Rocker Arm Shaft Nut (same as Item 35)
33	1	0229	Plain Washer
34	See Item 31	.....	.....
35	See Item 32	.....	.....
36	1	071	Rocker Arm Housing Cap Screw (upper)
37	1	10-40	Cylinder Head
38	3	0261	Rocker Arm Housing Cap Screw Lock Washer
39	2	073	Rocker Arm Housing Cap Screw (lower)—(same as Item 53)
40	1	106-39	Intake Rocker Arm Shaft
41	1	99-39	Intake Rocker Arm (.007" to .016" sideplay)
42	2	120-38	Oil Seal (same as Item 50)
43	2	123-36	Oil Seal Retaining Washer (same as Item 49)
44	2	119-36	Rocker Arm Thrust Washer (same as Item 48)
45	1	91-41	Aluminum Rocker Arm Housing
46	2	469-15	Plain Washer
47	2	114-36	Rocker Arm Shaft Nut
48	See Item 44	.....	.....
49	See Item 43	.....	.....
50	See Item 42	.....	.....
51	1	101-39	Exhaust Rocker Arm (.007" to .016" sideplay)
52	1	108-39	Exhaust Rocker Arm Shaft
53	See Item 39	.....	.....
54	1	177-38	Exhaust Spring Cover Adaptor
55	1	178-38	Oil Seal Retaining Washer
56	1	120-38A	Oil Seal
57	1	123-36	Oil Seal Retaining Washer
58	1	120-38B	Oil Seal
			1940 and earlier models: Use Items 42 and 43 for intake rocker arm; Items 54, 55, 56, 57 and 58 for exhaust rocker arm.
			1941 and later models: Use Items 42, 43, 49 and 50.

New rods ordered from the factory or used rods returned to the factory for rebushing are usually ordered fitted with crank pin and rollers. If not, they are likely to need lapping to fit available rollers with specified clearance.

After it has been determined that lower end races are in good enough condition to be lapped and refitted, upper end bushings should be inspected for need of attention. Check bushings for looseness in rods as well as pin clearance (see "Installing and Fitting Connecting Rod Upper Bushing," Page 90).

Rods that have been returned to the factory for new lower end races will also be fitted with new upper end bushings, reamed to correct clearance for standard pin. This, of course, also applies to new rods.



ILLUS. 50
TRUING AND SIZING CONNECTING ROD LOWER RACE

Determining Correct Lower Bearing Fit

(See "Checking Connecting Rod Lower Bearing for Excessive Wear and Looseness," Page 40, for information on checking lower bearing in connection with top overhaul and how much looseness may be allowed before bearing must be refitted.)

After lapping lower races of used rods as necessary, to smooth and true them, or replacing rods with a set with new lower races, install set of rollers and retainers on crank pin; rollers must always be new. Check fit of rods on bearing assembly. In making this check, flywheel pinion gear shaft must be gripped tightly between copper-faced vise jaws to hold flywheel firmly in a horizontal position. If neither rod will start over bearing, select a smaller set of rollers. If they go over easily and there is considerable shake at top end of rods, install a larger set of rollers. If lower end race of one rod is found to be slightly larger than the other, select rollers of a size that come closest to correctly fitting larger rod race and then lap rod with smaller race to bring it up to same size, rather than fit with rollers of two sizes.

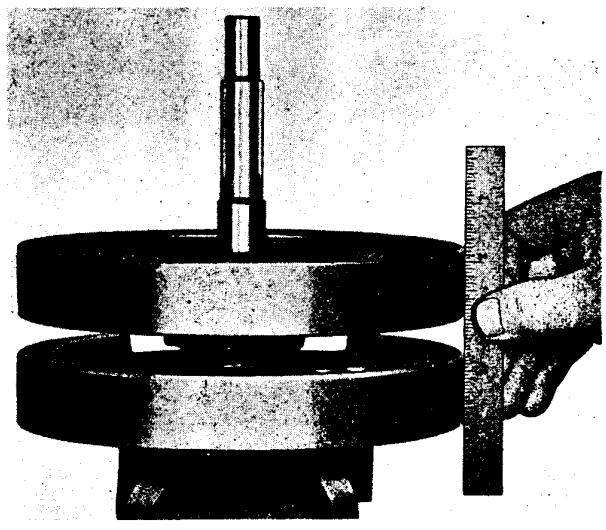
When rods are correctly fitted with required bearing clearance, extreme upper end of female (forked end) rod will have just noticeable side shake; extreme upper end of male (single end) rod will have .025" to 1/32" side shake. This check should be made with bearings clean and free of oil. Fitting tighter is likely to result in a seized and damaged bearing shortly after engine is put back in service.

Overall width of roller retainer assembly must be less than width of female rod end. Check to be sure of this.

Assembling Connecting Rods and Flywheels

After correct connecting rod bearing fit has been attained, thoroughly clean all parts and lubricate with engine oil preparatory to assembling flywheels. Install connecting rods on crank pin bearing so female (forked end) rod will be to rear and male (single end) rod will be to front.

With right side flywheel and rod assembly held in vise copper jaws, wipe crank pin taper and left flywheel taper perfectly clean and free of oil, then install left flywheel and align as nearly as possible concentric with right wheel by means of a straight edge held against outer face of wheel rims, 90° from crank pin—see Illus. 51. Install nut on crank pin and tighten lightly. Check rim faces again with straight edge and, if tightening nut has shifted wheel, correct its position by striking rim of wheel with a lead or copper hammer. Do not use steel hammer. Turn nut tighter and repeat straight edge check. To prevent flywheel assembly from turning in vise while tightening nut, insert a rod approximately ½" diameter and at least 5" long through holes in flywheels and shift flywheels in vise jaws so that rod bears against some part of vise.



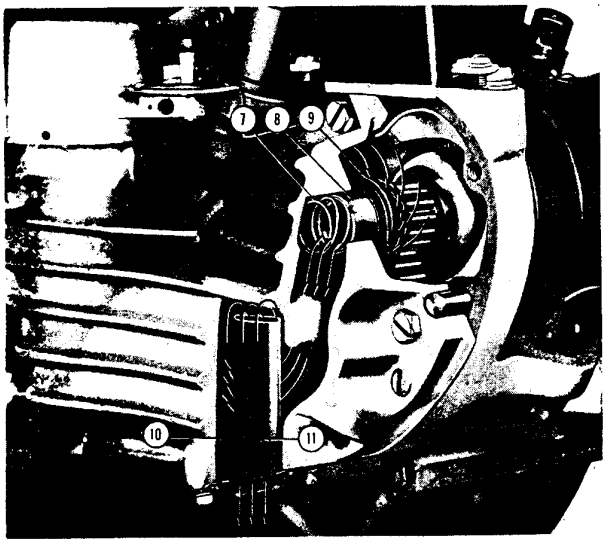
ILLUS. 51
CHECKING FLYWHEEL RIM FACES

attempts before spiral gear and sleeve gear can be meshed to give desired results.

Summarizing the above breather timing instructions: Spiral drive gear (2) must be so engaged with breather sleeve gear that when flywheel mark is in center of inspection hole and pinion gear (5) is held with its outer face (3) 7/16" from gear case joint face, timing hole (4) in breather sleeve registers in breather housing slot as shown.

After timing breather valve, exercise care that breather timing gears are not pulled out of mesh, permitting timing to change, while installing valve timing gears.

CAUTION: The breather is a part of and drives scavenger oil pump underneath gear case. If there is occasion to remove scavenger pump, breather will of course come out with it. Removing does not require taking off gear case cover. However, it must be remembered that in order to reassemble with breather timed, it is necessary to take off gear case cover and follow the foregoing timing instructions.



ILLUS. 59
CRANKCASE BREATHER (SIDE VALVE ENGINE)

7. Oil seal ring spring.
8. Oil seal ring—must bear against centrifuge.
9. Oil centrifuge—separates oil from air by centrifugal force, allowing only air and a slight oil mist to escape through holes in periphery of centrifuge.
10. Outside breather oil trap.
11. Outside breather tube—through which air, after having been separated from oil is exhausted to atmosphere.

Servicing Oil Pump (O.H.V. Engine)

(1941 to 1947 Models)

(To Identify Items, Refer to Illus. 56)

Oil feed pump and scavenger (oil return) pump are gear type pumps incorporated in one pump body. Feed pump incorporates an automatic (centrifugal) by-pass valve, reducing oil feed supply at low engine speeds and increasing supply at high engine speeds. Pump is provided with check valve (11) and adjustable pressure regulating valve (16). Maximum pressure is approximately 30 pounds per sq. in.

Thoroughly clean exterior of pump in gasoline or cleaning solvent before disassembling.

With cover (29), governor rotor (28) and cover plate (26) and gasket (27), already removed, scavenger pump gears (wide gears) (22) and (23) are exposed. Scavenger pump gear (23) is keyed on pump drive shaft (8) and idler gear (22) idles on stud in pump body.

Remove lock ring (24) from end of pump drive shaft and slide gears off shaft and stud respectively. Remove scavenger pump gear key (21) from pump drive shaft.

Drive shaft can now be pulled out of pump body. Oil feed pump gears (narrow gears) (5) and (6) are now free for removal, however, gear (6) may come out with drive shaft. Remove drive gear key (7) from drive shaft.

Remove chamber cap screws (9) and (13), adjusting screw (14), springs (10) and (15) and valves (11) and (16).

Remove front chain oiler adjusting screw (17) and adjusting screw washers (18) and (19). If pump is fitted with rear chain oiler, remove adjusting screw and adjusting screw washers.

Clean all parts in gasoline or cleaning solvent and blow out all pump body passages with air.

Using a light, inspect valve seats in pump body for pits and for dirty condition. Note: A small particle of foreign matter lodged on valve seat will prevent valve from seating, thus preventing correct operation of pump. Replace pump body if seats are damaged.

Inspect springs for breakage and rusted condition. Replace if not in good condition. Free length of new pressure regulating (by-pass) valve spring (15) is approximately 1-31/32".

Check valve spring (10) is the same for all pumps but is not interchangeable with any pressure regulating (by-pass) valve spring. It is much lighter (has less tension) than pressure regulating (by-pass) valve spring. Free length of check valve spring is approximately 1-9/32".

Valves (11) and (16) are interchangeable for check valve or pressure regulating (by-pass) valve and are the same for all pumps. Valves may have rings formed by action on valve seats. Valves not perfectly smooth and round should be replaced.

Governor rotor (28) and rotor chamber in pump cover (29) ordinarily show no appreciable wear, and very seldom need replacing.

Make sure that all parts and valve seats and all passages in pump body are thoroughly clean and free from dust, dirt, or grit before assembling. Also make sure valve in governor rotor (28) works freely, as a sticking valve will likely result in over-oiling at lower speeds.

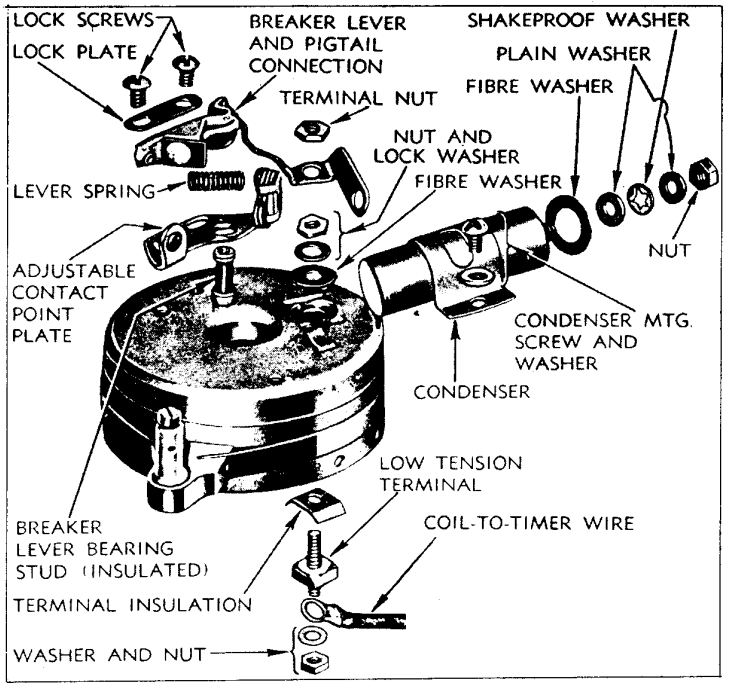
Install check valve (11) and spring (10) and secure with cap screw (9). Install pressure regulating (by-

"Installing Circuit Breaker and Timing Ignition (*Side Valve Engine*)," Page 82.

Circuit breaker spring tension should be 13 to 15 oz. at points. Hook a spring scale on circuit breaker lever at contact point and pull to separate points. Take reading of scale just as points separate.

If tension is too low, engine will miss at high speed—if tension is too high, breaker lever fibre will wear excessively.

Keep breaker cam very lightly greased.



ILLUS. 69
CIRCUIT BREAKER HEAD DISASSEMBLED

Installing Circuit Breaker and Timing Ignition (O.H.V. Engine)

(1946 and Earlier Models)

Refer to Illus. 66—also see "Timing Ignition By Piston Position," Page 86.

Turn engine in direction in which it runs until tappets indicate front cylinder is on compression stroke (directly after *front* intake valve closes). Continue turning engine slowly until flywheel timing mark is at *rear edge* of inspection hole in left crankcase.

If front cylinder head is off—circuit breaker completely assembled, can be installed. Be sure ground spring is in its proper place so when cover retainer ends are inserted through holes in circuit breaker head, they also register in spring locating notches. Otherwise, spring will have no tension and the head will be loose on its base. Contact points and condenser are grounded through circuit breaker base and this spring holds the head in close contact with base, thus insuring a good ground.

First make sure mark (4) on circuit breaker head and hole (4) in circuit breaker adjusting band line up before installing circuit breaker.

Turn circuit breaker shaft counter-clockwise (to left) approximately 60° from position where mark (4) on breaker cam lines up with fibre block on breaker lever.

Install base gasket and circuit breaker assembly, inserting shaft and shaft gear all the way down into place in gear case, with base turned so low tension wire is toward left side of engine and circuit breaker base mounting screw holes line up with holes in crankcase but do not as yet install base mounting screws.

Hold relay bracket on crankcase temporarily so mounting holes in bracket line up with holes in crankcase and stud in advance and retard lever registers in slot in bracket.

Fully advance lever (8) (turn counter-clockwise) and with relay bracket held in position, observe how closely mark (4) on breaker cam lines up with lever fibre.

If it does not line up, lift circuit breaker base and 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 (4) and breaker lever fibre. When this has been accomplished, secure base and relay bracket with screws and lock washers.

Provided circuit breaker cam shaft gear has not been replaced and mark (4) on side of circuit breaker head and hole (4) in adjusting band are still in align-

SUMMARY OF ENGINE SPECIFICATIONS
(Fitting and Adjusting)

CYLINDER: Standard bore—*O.H.V. Engine:* 61"—3.3125"; 74"—3.4375". *Side Valve Engine:* 74"—3.3125"; 80"—3.422".

PISTON CLEARANCE IN CYLINDER: .001" to .002", measuring piston at bottom of skirt, front to rear. Piston shapes to cylinder and acquires more clearance after short time in service. Measure cylinder about ½" from top of bore, front to rear. Warning: This fitting clearance applies only to genuine Harley-Davidson taper-cam ground piston, which is smaller at top of skirt, underneath lower ring, than at bottom of skirt. This clearance (.001" to .002") is not sufficient for straight-cam ground piston obtained from some other source.

PISTON-CYLINDER HEAD CLEARANCE: Side Valve Engine—1/16" to 3/32" with piston at top center.

PISTON PIN IN PISTON: Light hand press fit.

PISTON PIN IN CONNECTING ROD UPPER BUSHING: .0008" to .0012" loose.

PISTON RING GAP: .010" to .020".

PISTON RING SIDE CLEARANCE IN GROOVES: .004".

CONNECTING ROD LOWER END BEARING: .001" to .0012" loose.

CONNECTING ROD LOWER END SIDE PLAY: Forked rod must have .006" to .010" play between flywheels. Roller and retainer assembly must be narrower, but not more than .010" narrower, than forked rod.

PINION GEAR SHAFT: .0008" to .0012" loose in roller bearing and .0005" to .0012" loose in timing gear case cover bushing. Note: When new cover bushing is installed, oil transfer hole in bushing must be located as follows: *O.H.V. Engine*—oil transfer hole in bushing must line up with drilled oil passage in gear case cover; *Side Valve Engine*—oil transfer hole in bushing must be upward and 30° ahead (toward front of engine) of vertical center line.

SPROCKET SHAFT: .0005" to .001" loose in roller bearing; .007" to .009" loose in oil retaining bushing.

FLYWHEEL ASSEMBLY: .012" to .014" endplay in crankcase.

CAM GEARS: O.H.V. Engine—.001" to .0015" clearance in crankcase and gear case cover bushings; free to .005" endplay; *Side Valve Engine*—.0005" to .001" clearance in crankcase and gear case cover bushings; free to .007" endplay.

INTERMEDIATE GEARS: .001" to .0015" loose on studs.

VALVE STEM-VALVE GUIDE CLEARANCE: O.H.V. Engine—.004" to .006"; *Side Valve Engine*—.003" to .0055".

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

VALVE TAPPET—TAPPET GUIDE CLEARANCE: O.H.V. Engine—.0008" to .0017"; Side Valve Engine—.0005" to .001".

ROCKER ARM FIT ON SHAFT: O.H.V. Engine—.0005" to .0015" loose—.007" to .016" endplay.

OIL PUMP DRIVE SHAFT: O.H.V. Engine—.0008" to .0012" loose in crankcase bushing.

TAPPET CLEARANCE: Engine Cold: *O.H.V. Engine*—push rods just noticeable play or shake, and can be turned freely with finger tips, completely around, without any trace of bind. *Side Valve Engine*—intake .004" to .005"; exhaust .007" to .008".

CIRCUIT BREAKER POINTS: .022" gap with breaker lever fibre on highest point of cam.

IGNITION TIMING: O.H.V. Engine—7/16" before top dead center; *Side Valve Engine*—11/32" before top dead center; time according to flywheel mark, Page 81 or 82, or by piston position, Page 86.

CRANKCASE BREATHER TIMING: O.H.V. Engine—breather valve gear engaged with marks in alignment (see Illus. 64). Side Valve Engine—See Page 70.

VALVE TIMING: Time according to gear marks (see Page 78). Tappets to be adjusted first.

CHECKING VALVE TIMING: All O.H.V. Engines—adjust all valve tappets temporarily to .004" clearance. Turn engine in direction it runs until valve being checked is open .001" before measuring piston position. After timing has been checked, valve tappets must be readjusted to the correct clearance, see "Adjusting Valve Tappets," Page 22.

61" O.H.V. Engine—intake valve opens when piston is 19/64" to 25/64" before top dead center and closes when piston is 29/32" to 1-3/32" after bottom dead center. Exhaust valve opens when piston is 23/32" to 29/32" before bottom dead center and closes when piston is 19/64" to 25/64" after top dead center.

74" O.H.V. Engine—intake valve opens when piston is 23/64" to 29/64" before top dead center and closes when piston is 1-1/64" to 1-13/64" after bottom dead center. Exhaust valve opens when piston is 13/16" to 1" before bottom dead center and closes when piston is 23/64" to 29/64" after top dead center.

Side Valve Engine—intake and exhaust valve tappets adjusted to running clearance—intake valve tappets .004" to .005"; exhaust valve tappets .007" to .008". Turn engine in direction it runs until valve being checked is just starting to open before measuring piston position.

Intake valve opens when piston is 9/32" to 13/32" before top dead center and closes when piston is ⅞" to 1⅛" after bottom dead center. Exhaust valve opens when piston is ⅝" to ⅞" before bottom dead center and closes when piston is ¼" to ⅜" after top dead center.

OIL PUMP ADJUSTMENT: Normal setting—*O.H.V. Models*—end of presssure regulating valve adjusting screw ⅜" below end of valve chamber. *Side Valve Models*—1940 and earlier Models—pressure regulating valve adjusting screw nine complete turns open from closed position, 1941 and later Models—end of pressure regulating valve adjusting screw ⅜" below top of pump body. See "Adjusting Oil Feed Pump," Page 28.

FRONT CHAIN OILER ADJUSTMENT: Initial factory setting—*O.H.V. Models*—adjusted with the required washers under adjusting screw head to hold screw point 1 full turn off its seat. Make further adjustments as needed to meet actual service requirements. See "Lubricating Front Chain," Page 12. *Side Valve Models*—adjusted with the required washers under adjusting screw head to hold screw point 1⅛ turns off its seat. Make further adjustments as needed to meet actual service requirements. See "Lubricating Front Chain," Page 12.

REAR CHAIN OILER ADJUSTMENT: (Installed on a few motorcycles): Initial factory setting—adjusted with the required washers under adjusting screw head to hold screw point ½ turn off its seat. Make further adjustments as needed to meet actual service requirements. See "Lubricating Rear Chain," Page 14.

Testing Armature

To Test for "Ground":

If growler with test points is available, test as shown in Illus. 90. If this means of testing is not available, test with battery and ammeter hook-up, same as used for testing field coils. Contact commutator with one test point and armature core with the other. If circuit is completed, armature is grounded.

If armature is found to be grounded, make sure commutator is free from carbon and copper dust deposits. After cleaning thoroughly between segments and at ends of commutator and blowing off thoroughly with compressed air, repeat test. If ground still exists, armature must be replaced with a new one.

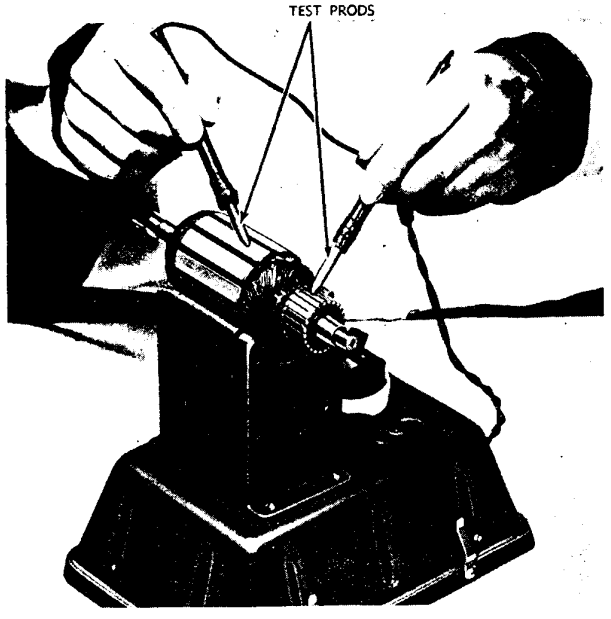
"Growler" Test for "Short":

Place armature in "growler" and hold piece of hacksaw blade in loose contact with armature core as shown in Illus. 91. Turn "growler" "ON". Rotate armature slowly one or more full turns. If armature is shorted, hacksaw blade will be attracted to armature core and will vibrate violently at one or more points around armature.

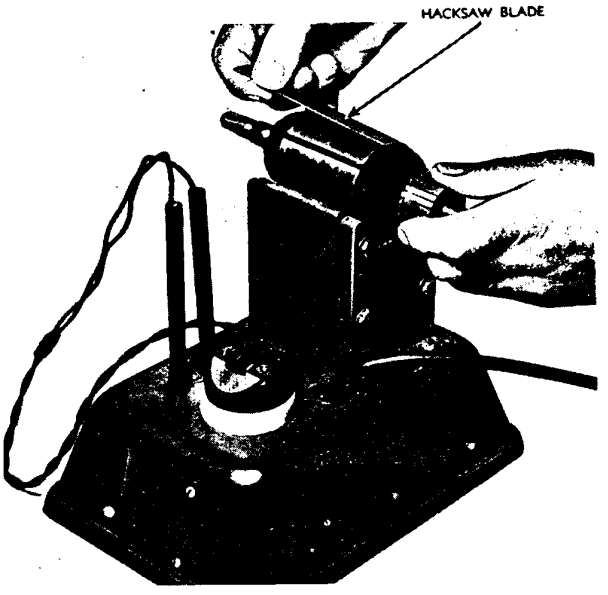
If short is found, clean thoroughly between commutator segments as described under "ground" test, and test again. If short still exists, armature must be replaced with a new one.

"Growler" Test for "Open":

Place armature in "growler" as shown in Illus. 92 and turn "growler" "ON." Insert tip of hacksaw blade between segments that are closest in alignment with the point of contact of armature core and "growler" V. Make and break contact between segments with hacksaw blade.



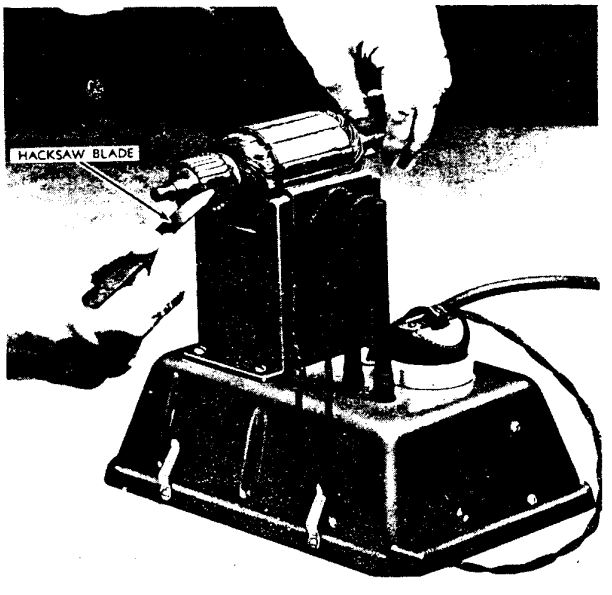
ILLUS. 90
TESTING ARMATURE FOR "GROUND"



ILLUS. 91
TESTING ARMATURE FOR "SHORT"

A strong flash should be seen as contact is broken. No flash or a very weak flash indicates an open circuit.

Repeat this test between all segments, turning armature so that each test is made on the line of contact between armature core and "growler" V. If an open circuit is found check for loose or broken wires at commutator connections. If none are found that can be repaired, armature must be replaced with a new one.



ILLUS. 92
TESTING ARMATURE FOR "OPEN"

Lamp Bulbs

1946 and Earlier Models

	Contact	Candlepower	Part No.
Headlamp (pre-focused)	D.C.	32-21	4925-35
Speedometer light	S.C.	3	4927-15
Generator signal light	S.C.	3	4927-15
Oil pressure signal light	S.C.	3	4927-15
Stop and tail lamp (motorcycle and sidecar)	D.C.	21-3	5058-34
Mudguard lamp (motorcycle and sidecar)	S.C.	3	4927-15
Spotlamp	S.C.	32	4925-20
Police pursuit lamp	S.C.	32	4925-20
Saddle and parking lamp	S.C.	3	4927-15

1947 Models

Headlamp (pre-focused)	D.C.	32-21	4925-35
Speedometer light	S.C.	1	4513-47
Generator signal light	S.C.	1	4513-47
Oil pressure signal light	S.C.	1	4513-47
Stop and tail lamp (motorcycle and sidecar)	D.C.	21-3	5058-47
Mudguard lamp (motorcycle and sidecar)	S.C.	3	4927-15
Spotlamp	S.C.	32	4925-20
Police pursuit lamp	S.C.	32	4925-20
Saddle and parking lamp	S.C.	3	4927-15

WARNING: The use of other than standard lighting equipment for any extended night driving may result in overloading electrical system to extent that battery will need frequent charging from outside source.

Memoranda

pletely bottom drill as doing so may damage low speed needle seat.

7. Clean out low speed (idle) needle valve seat hole with correct size drill. The M-25, M-51 and M-51L carburetors are cleaned with the #53L drill. The M-35 and M-75 are cleaned with the #53L #2 drill which has a smaller handle. (This tool has two rings around its handle).

8. Blow out all channels and holes with compressed air and wash all parts in gasoline or solvent.

Attention to Carburetor Bowl

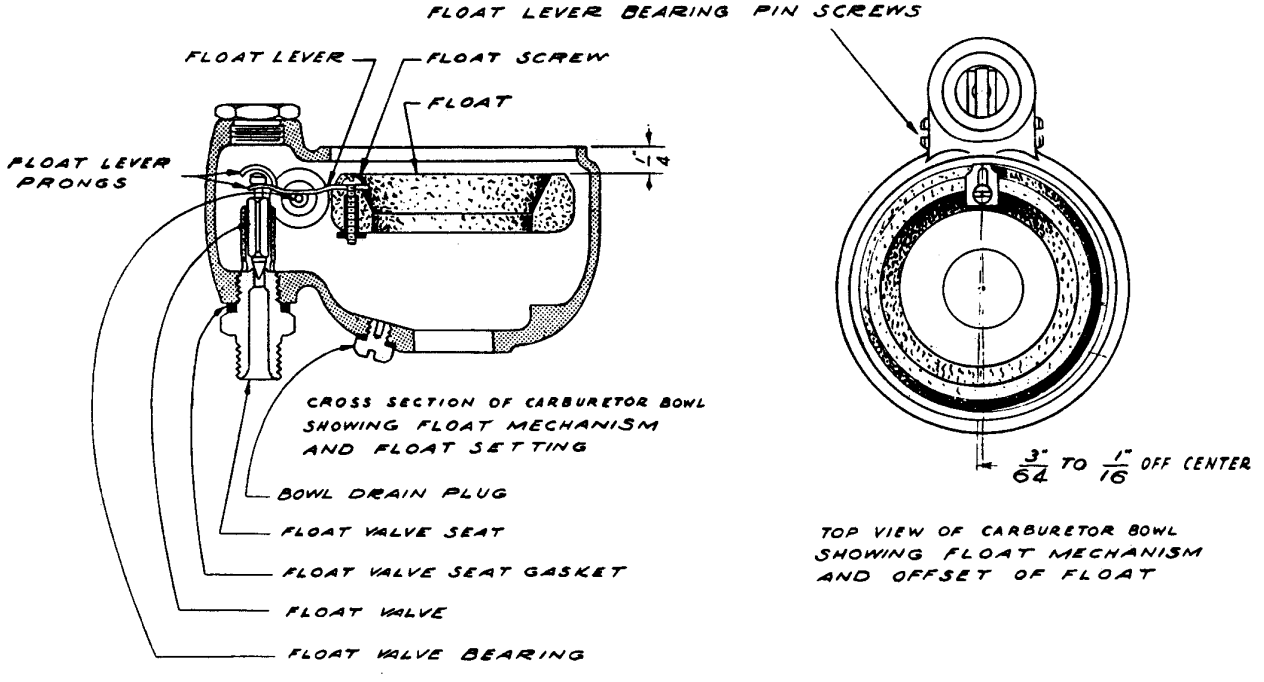
9. If carburetor bowl continually leaks, remove it from carburetor body, noting location of bowl fuel line nipple in relation to carburetor body. Remove all dirt with gasoline and compressed air. Hold bowl upsidedown so that float valve closes and suck on bottom of float valve seat. Valve and seat should hold this suction. If valve and seat leak after repeated testing, replace with new float valve and float valve seat.

10. If float is damaged or logged, replace with a new one. Remove old float after cutting cement seal around float screw which secures float to float lever. This seal can be cut with a pocket knife. Remove float screw and assemble new float to lever. This should be done with float valve, float valve lever, float hinge pin and screws, float valve seat and gasket assembled in bowl. Before tightening float screw securely, adjust as follows: Looking at bowl with gasoline inlet side away from you, pull float toward you to the limit of slot in float lever and about 1/16" to left of center line as shown in Illus. 110. This provides necessary body clearance. Tighten float screw and cement top of float screw to float with Dupont Household Cement, with mixture of celluloid dissolved in acetone, or with thick shellac. When cement has dried thoroughly, check float height and adjust as explained in paragraph 11.

11. Check float level and, if necessary, reset to 1/4" (see Illus. 110). Measure directly opposite float lever with bowl held upsidedown (top of float to top of bowl). When readjusting carburetor float, do not attempt to do so by simply bending float lever upward in some manner, without disassembling from bowl. Adjusting in this manner bends and spreads fingers between which head of float needle fits, and thus develops lost motion between float and needle. Float and lever assembly should be removed from bowl, and lever then bent as required.

Before reassembling, see that needle head is a good free fit between float lever fingers with not more than approximately .003" play. This clearance can also be checked after lever is assembled in bowl, by carefully placing a small screw driver or a small rod against the valve head in such a position that it will hold the valve firmly against the seat and yet not bind the lever. Moving the lever up and down will then show the amount of actual clearance between the valve head and fingers. If this clearance is excessive, the float mechanism will not feed properly. After assembling note that float is approximately square with top of bowl.

12. Bowl drain plug can be removed for quick flushing of bowl. Before removing this plug, turn off gasoline at tank. Be sure to pull this screw up tight when replacing.



ILLUS. 110

TRANSMISSION ASSEMBLY — MAIN DRIVE GEAR GROUP

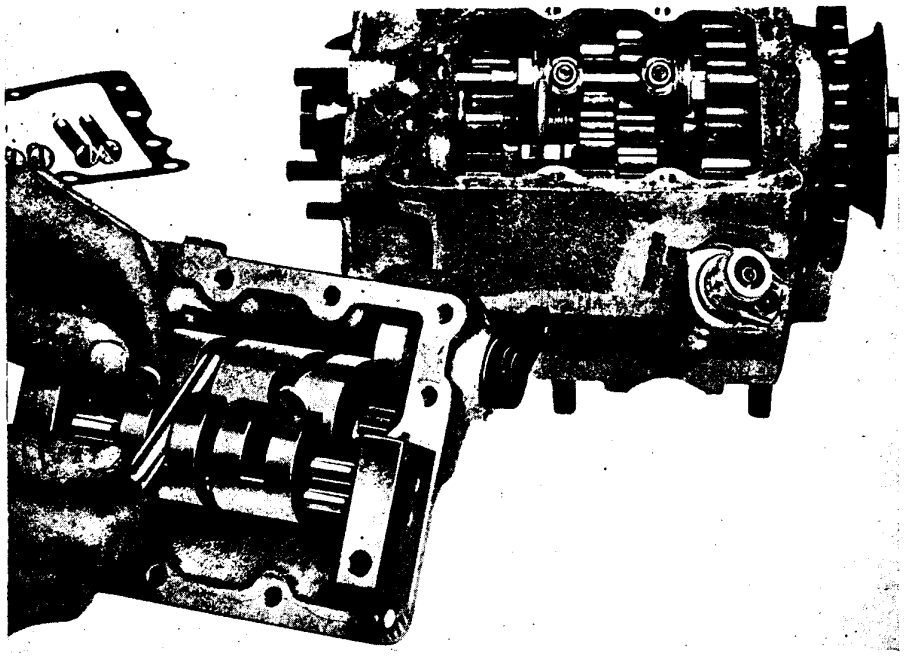
(Item Numbers Refer to Illus. 121)

ITEM	NUMBER USED–1940 TO 1947			PART NUMBER	NAME
	4 SPEED	3 SPEED REVERSE	3 SPEED		
1	1	1	1	2258-36	Transmission Case—Items 2 to 16 inclusive are furnished with each parts order case shipped from factory—Items 6, 11, 15 and 16 are press fit in case
2	1	1	1	2328-36	Adjusting Screw (front chain) in transmission
3	1	1	1	2265-36	Vent Nipple
4	1	1	1	2145-36	Starter Gear Bumper Plate
5	2	2	2	3813-30	Starter Gear Bumper Plate Screw
6	1	1	1	2314-36	Countershaft Mounting Collar (right side)
7	9	9	9	2134-36	Starter Cover Mounting Stud
8	1	1	1	453-11	Transmission Drain Plug
9	4	4	4	2318-36	Transmission Mounting Stud—(oversize stud furnished under Part No. 2318-36S)
10	1	1	1	2284-36A	Outer Bearing Race Lock Ring
11	1	1	1	2284-37	Outer Bearing Race
12	1	1	1	2290-36	Main Drive Gear Thrust Washer Inside Diameter—$1\frac{21}{32}$″ Outside Diameter—$2\frac{3}{64}$″ Thickness—washer used in production .060″; washer furnished on parts order .050″. See footnote
13	1	1	1	2339-37	Main Drive Gear Spacer
14	1	1	1	2163-36B	Oil Seal Cork Washer
15	1	1	1	2163-36	Oil Seal
16	1	1	1	2314-36A	Countershaft Mounting Collar (left side)
17	44	44	44	2289-36	Bearing Roller—Standard Size .125″ x .615; available in .0004″ to .0008″ oversizes
18	1	1	1	2296-38	Main Drive Gear
19	1	1	1	2339-38	Main Drive Gear Spacer Key
20	1	1	1	2035-36	Countershaft Sprocket
21	1	1	1	2290-39	Main Drive Gear Oil Deflector
22	1	1	1	2337-36	Sprocket Lock Nut Washer
23	1	1	1	2335-36	Sprocket Lock Nut
24	1	1	1	2307-36D	Countershaft End Cap Gasket
25	1	1	1	2307-36E	Countershaft End Cap
26	4	4	4	0352	Countershaft End Cap Screw Lock Washer
27	4	4	4	016	Countershaft End Cap Screw
28	1	1	1	11140-36	Speedometer Drive Unit Gasket
29	1	1	1	11138-36	Speedometer Drive Unit
30	1	1	1	0254	Drive Unit Screw Lock Washer
31	1	1	1	032	Drive Unit Screw

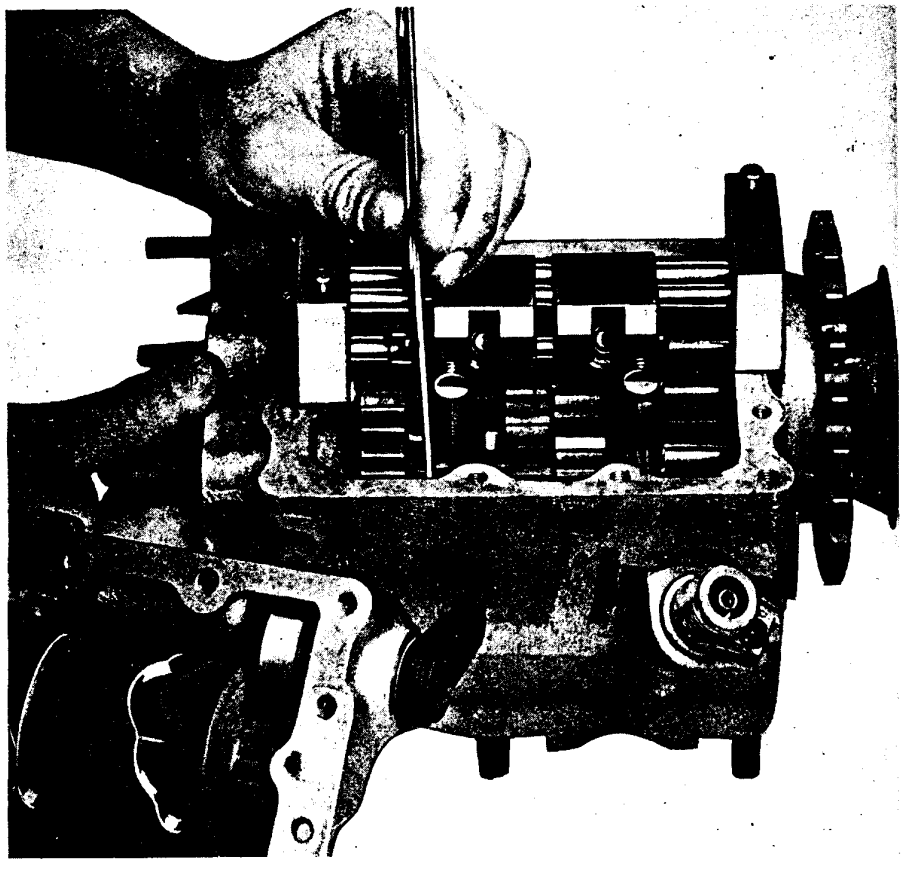
FOOTNOTE: Parts order thrust washer (12) is .010″ thinner than production thrust washer to make sure of providing sufficient endplay for any main drive gear assembly with which it may be used. Main drive gear assembly endplay should be .005″ to .014″.

1937 and early 1938 gear assemblies without copper gasket require the .050″ washer to obtain sufficient endplay. All other gear assemblies originally fitted with .060″ washer will have .010″ additional endplay when fitted with .050″ washer. However, this extra endplay is of no great importance as concerns operation. Washer very seldom needs renewing.

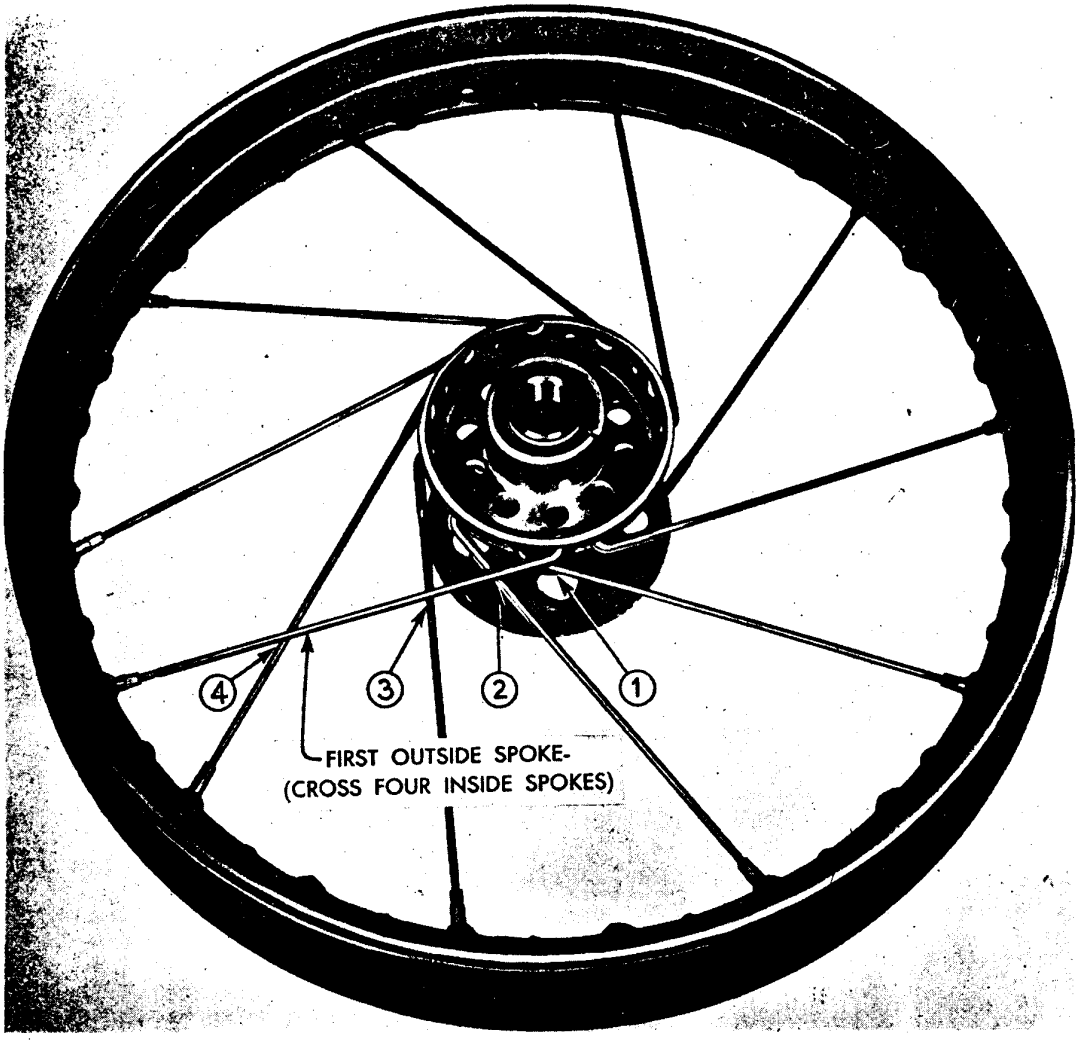
Caution Regarding Fitting of Oversize Rollers: Fitting oversize rollers to take up radial clearance also takes up circumferential clearance. Therefore, care must be taken to avoid crowding of rollers. Assemble specified number of rollers and observe whether last roller goes into place freely and without any effort to force it; if it doesn't go into place freely, leave it out.



ILLUS. 127
SETTING SHIFTER FORK GAUGE



ILLUS. 128
CHECKING ADJUSTMENT OF SHIFTING MEMBERS



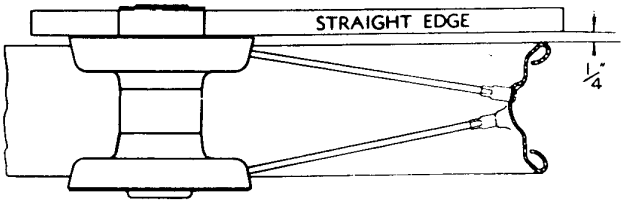
ILLUS. 142
SPOKING WHEEL

C. *18" Wheel (4.00" Tire)*—Lay straight edge *across brake side spoke flange of hub* and measure distance from straight edge *to rim*. When rim is correctly centered, this distance will be 1/4".

D. Adjust truing stand gauge to side of rim as shown in Illus. 144, so rim at highest point will strike gauge as wheel is rotated slowly. Loosen nipples at highest point of rim on gauge side, and tighten nipples on opposite side the same amount. Repeat this operation until rim runs true sideways. Reverse loosening and tightening of nipples, as explained above if rim moves too far away from gauge. After each loosening and tightening of spokes check rim in relation to hub as explained under paragraph B or C. Rim should be trued to within 1/32" sideways.

E. After rim has been centered sideways with wheel hub and runs true sideways, check it for concentricity. Adjust truing stand gauge to circumference of rim as shown in Illus. 145. If rim runs eccentric (out of round) nipples must be loosened at points rim does not contact gauge and nipples tightened at points rim contacts gauge. Amount nipples are to be loosened or tightened is determined by the amount rim runs eccentric. Rim should be trued to within 1/32" concentrically.

5. After above operations have been checked and corrected, start at valve hole and tighten nipples one turn at a time all the way around rim until spokes are normally tight. While tightening nipples, repeatedly check rim with gauge according to instructions under operation 4.



ILLUS. 143
WHEEL RIM CORRECTLY CENTERED (4.00" TIRE RIM)