HARLEY-DAVIDSON

Rider's Hand Book

MOTOR
HARLEY-DAVIDSON
CYCLES

Harley-Davidson Motor Co.

MILWAUKEE, WIS., U.S.A.

61 AND 74 TWIN MODELS

Price 20 Cents

1929

Price 50 Cents

INDEX

(Rerun 1938)

WE want you to be entirely satisfied with the performance of your Harley-Davidson. We want to see it give you many thousand miles of satisfactory service. With a reasonable amount of care and attention, your Harley-Davidson is going to serve you mighty well. To help you give it the proper care, this hand book is published.

This hand book is not intended to make a mechanic of every rider; therefore, it does not cover the overhauling of such units as the motor, generator and transmission. Work of this kind requires the attention of a skilled motorcycle mechanic and the use of special tools and equipment. Your nearest Harley-Davidson dealer has the proper facilities for handling this work. He also has a complete stock of genuine Harley-Davidson parts.

If any questions arise that this book does not cover, get in touch with your dealer or write our Service Department.

Return your registration card to the factory promptly.

OPERATING INSTRUCTIONS

The Importance of Correct Lubrication

To insure long and satisfactory service from your motorcycle, lubricate it properly—especially your motor. The motor requires a special oil, because it is air cooled and operates at high temperatures.

We recommend the use of genuine Harley-Davidson oil, which is refined to our specifications. We furnish this oil for the protection of Harley-Davidson riders. Your dealer can supply you.

Don't take a chance with an oil of unknown quality.

Become Familiar With the Operation of All Controls Before Starting Motor or Riding Machine

1. Right hand grip is the throttle (carburetor) control; turn outward to close throttle; turn inward to open throttle.

2. Left hand grip is the spark control; turn inward to advance spark; turn outward to retard spark. Fully advanced is the proper normal running position. Retard spark part way to prevent motor laboring and knocking when in high gear and pulling a heavy load at low speed, on bad hills, etc. Always start motor with spark fully advanced, or nearly so. If motor has a tendency to kick back, it is all right to retard spark slightly.

3. The foot pedal at left footboard is the clutch pedal; rocking it backward releases clutch; rocking it forward engages clutch.

4. Gear shifter lever is mounted on left side of tank. Shifter gate through which lever works is marked with four positions. Shifter lever must be operated in conjunction with the clutch. Before shifting from one position to another, the clutch must be fully released. When cranking motor, shifter lever must be in NEUTRAL position and clutch engaged.

5. The foot pedal at right footboard is the rear brake pedal. The lever on left handle bar operates the front brake.

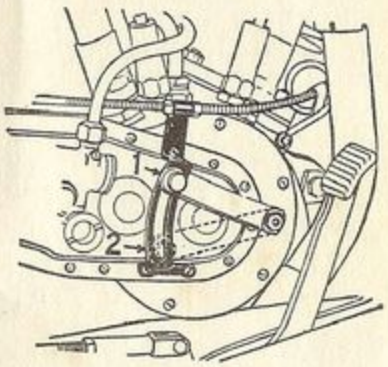
6. The kick starter is located on right side of transmission. To operate, give it vigorous downward strokes.

If starter crank sticks in up or down position, it is because the starter gears are not meshing properly. An adjusting plunger just back of starter crank, when pressed downward will throw starter gears in proper mesh.

7. On generator equipped models the switch box, mounted on fork triple clamp, houses both the ignition switch and main lighting switch. The left hand switch is for ignition. To operate either switch, insert key and turn switch lever as per markings on switch panel.

A magneto model has no switch.

8. Illus. 1 shows the compression release lever in running position. Moving lever to its downward position 2 raises the exhaust valves and completely releases compression, allowing the motor to be cranked easily when necessary to turn it over a few times to break the oil seal, preparatory to starting in cold weather. *Motor will not run or start with lever in downward position.*



Illus. 1

Compression Release Lever

1—Lever in running position; 2—Push lever downward to this position to release compression.

Filling Gas and Oil Tanks

The right side tank is your main gas tank—capacity 22½ pints. Left rear tank is your reserve gas tank—capacity 11½ pints. Left front tank is your oil tank—capacity 9 pints. Oil tank has no shut off. Both gas tanks are provided with shut off cocks. See that main tank cock is open before proceeding to start motor. Cock is open when handle is in vertical position. Reserve tank is usually kept shut off for emergency use.

Give New Motor Pumpful of Oil Before Starting

Inject a pumpful of oil into the motor with hand pump, before starting. This applies only to starting a new motor the first time, as the mechanical oil pump will amply care for motor thereafter. See page 7.

Use the Recommended Spark Plugs

Good motor performance depends on good spark plugs. The plugs furnished in new motors and for replacements by the factory are the best obtainable. It is strongly recommended that only this plug be used.

When a replacement plug is needed, obtain it from your Harley-Davidson dealer to be sure of getting the recommended plug—part No. 37-09.

Keep spark plugs clean and properly adjusted. For a magneto equipped motor, set the plug point gaps about .020 inch; for all generator equipped motors, about .030 inch. Plugs may be taken apart and cleaned with fine sandpaper. However, when this is done, plug must be re-assembled carefully and the nut drawn up very tightly to be certain of no leakage by the gaskets. A leaky plug will cause overheating and pre-ignition.

To Start Motor

(*For carburetor adjusting instructions, see page* 12.)

1. Except when priming, *with choke fully closed* as explained below, keep the throttle closed or almost closed while starting motor. Do not twist the throttle open when operating the starter. Spark should be fully advanced or nearly so.

2. TO START A COLD MOTOR—Set choke lever 1 (Illus. 7) at two-thirds closed or fully closed (PRIME) position, depending on weather conditions, and before turning ignition switch ON, kick the starter down once or twice to prime cylinders. *NOTE—A magneto model has no switch; retard the spark while priming.* Then with choke lever set ⅓ or ⅔ closed, depending on the weather, turn ignition switch ON and start motor with vigorous strokes of starter.

CAUTION—Motor will not run with choke lever set at PRIME position.

3. As soon as motor starts, open throttle just far enough to keep it running while warming up, or until ready to set machine in motion. As the motor warms up, gradually move choke lever downward. After running ¼ to 1 mile (.4 to 1.6 km.), depending on the weather, move choke lever to OPEN position (all the way down).

4. STARTING A HOT MOTOR—It usually is not necessary to raise choke lever. Ordinarily the motor will start by simply turning the ignition switch ON and operating the starter vigorously.

If Motor is Hard To Start

Hard starting and missing, especially with a new motor, is usually due to improperly adjusted or dirty spark plugs. See page 2.

Cold Weather Starting

To facilitate starting in very cold weather, prime the cylinders by injecting about one-half priming gunful of gasoline directly into each cylinder, through priming cocks.

To Stop Motor

Stop a generator equipped motor by turning the ignition switch OFF. If the motor should be stalled or stopped in any other way than with the switch, turn the switch OFF at once to prevent the battery from being discharged through the circuit breaker points.

Stop a magneto equipped motor by turning the spark control grip all the way outward, or by pushing compression release lever to downward position (Illus. 1). Remember that release lever must be in upward position when starting motor.

To Start and Stop Machine on the Road

(*See "Become Familiar with the Operation of All Controls," and "To start Motor"*)

Keep gear shifter lever in NEUTRAL and clutch engaged until you have straddled the machine.

1. Release clutch and set gear shifter lever in forward position marked LOW; then, with spark fully advanced, engage clutch very slowly and at the same time open throttle slightly.

2. After machine has run 40 to 50 feet in low gear and has gained a little momentum, shift into SECOND gear. To do this, release clutch fully and at same time close throttle; then quickly pull shifter lever

back to position marked SECOND. In shifting from low to second, you will find that if you hold shifter lever against outside of slot in shifter gate, a step machined in shifter gate will stop lever at proper position. It is not necessary to take your eyes off the road. After shifting, engage clutch slowly and at same time open throttle slightly.

3. After machine has attained a speed of not less than fifteen miles per hour (depending on road conditions), shift into HIGH gear. To do this, release clutch fully and at same time close throttle. Then, pull shifter lever all the way back to HIGH, and steady lever in this position with left hand until clutch starts to engage or you feel the high gear go in mesh. Engage clutch slowly and at same time open throttle slowly until desired speed is attained.

4. When you wish to stop machine, release the clutch and apply brakes. As soon as machine comes to a standstill, shift to NEUTRAL and engage clutch.

With a little practice, you will handle the clutch and shift gears with ease. You will find that you can shift from HIGH to lower gears without difficulty, when you have occasion to do so.

When running at speeds below fifteen miles per hour, retard the spark or shift into second gear to eliminate any tendency of the machine to jerk. Always shift to a lower gear rather than permit motor to labor and knock.

Don't let motor race when shifting gears. Learn to operate clutch and throttle together. As clutch is released, throttle must be closed.

Don't look down at your machine when shifting; it is a dangerous practice.

Don't keep motor running for more than one or two minutes at a time, while the machine is stopped.

IMPORTANT SUGGESTIONS FOR CARE OF MACHINE

Use only the recommended spark plugs and renew occasionally if motor performance should become unsatisfactory. See page 2.

If motorcycle is in service with sidecar or package truck, be sure you have a heavy duty motor and the correct gearing. See page 6.

When filling oil tank, be careful that no foreign matter that might plug up mechanical oil pump gets into tank.

Don't over-oil motor by excessive use of hand oil pump. Too much oil causes plug fouling, overheating and sticky valves, and forms carbon rapidly. See page 8, for proper use of hand oil pump.

Drain and flush crank case and give it a supply of fresh oil at least every 750 miles. If machine is in service on dirt roads where some road dust is likely to be drawn into motor through the carburetor, drain, flush, and give case a supply of fresh oil oftener, in order to keep it free from any road dust that may work by the piston rings. See page 8.

Use genuine Harley-Davidson oil in motor and transmission.

Don't adjust the carburetor extremely lean, because this will cause overheating.

Keep the outlets or slots in ends of muffler cleaned out and open. See page 21.

Don't run a new motor for long distances in low and second gear, or faster than 30 miles per hour, during first 500 miles.

Never shift gears until clutch has been fully released.

Keep drive chains properly adjusted. See page 16.

Follow carefully the instructions on care of battery. See page 28.

Because of the danger of fire, if gasoline is spilled over machine when filling tanks, wipe machine off thoroughly or allow it to stand until gasoline has evaporated, before starting motor.

To Clean Machine

Wash the enamel with clear water and a chamois skin, when it becomes covered with dust and mud. Grease spots may be removed by using a soap that contains no lye. Ivory soap is recommended. Remove all traces of soap, with clear water.

Wash an oily motor and transmission with kerosene or gasoline; but never use gasoline or kerosene on enameled parts.

What To Do Every Day

Make sure that you have plenty of oil in tank for the day's run. As long as you keep oil in the tank, the mechanical oil pump can be depended upon to supply motor with all the oil required for ordinary driving. See pages 7 and 8.

What To Do Twice a Week

Lubricate the inlet valve levers, fork rockers and seat post with Alemite gun.

What To Do Every Week

Check over machine for loose bolts and nuts.

Adjust drive chains, if necessary. See pages 16 and 17.

Adjust inlet valve push rods, if necessary. See page 10.

Add oil to transmission, if needed. See page 14.

Add distilled water to battery, if needed; don't overfill. See page 28.

Grease or oil all bearings requiring periodic lubrication, as per Lubrication Charts on pages 35-36.

What To Do Every Two Months

Inspect and if necessary, adjust exhaust valve tappets. See page 10.

Inspect, clean and if necessary, adjust circuit breaker points of the ignition unit. See page 27, if motor is generator equipped. See page 30, if magneto equipped.

Inspect and where necessary tighten wheel spokes.

Clean drive chains and treat them with Harley-Davidson Chain Lubricant. See page 16.

Flush cylinder heads with kerosene. See page 9.

Drain old oil out of crank case and replace with fresh oil. It is best to do this every 750 miles. See page 8.

What To Do Every Year

Remove and clean muffler thoroughly. See page 21.

Have battery inspected and tested by a competent battery man.

Have the motor, transmission, and other units thoroughly inspected and adjusted, carbon removed from motor, valves ground, and any worn parts replaced, at an authorized Harley-Davidson service station.

License Data

61 cubic inch (1000 c.c.) models

Number of cylinders	2
Cylinder bore (84.14 mm.)	3 5/16 inches
Piston displacement (986.18 c.c.)	60.18 cu. in.
Stroke (88.9 mm.)	3½ inches
Horsepower (N.A.C.C. rating)	8.76

74 cubic inch (1200 c.c.) models

Number of cylinders	2
Cylinder bore (87.31 mm.)	3 7/16 inches
Piston displacement (1208.19 c.c.)	73.73 cu. in.
Stroke (101.6 mm.)	4 inches
Horsepower (N.A.C.C. rating)	9.45

Engine Number: The motor or serial number is stamped on the crank case just below the front cylinder, on the left, or sprocket side.

NOTE—When writing to our Service Department for information, always mention this motor number.

Wheel base: 59½ inches, axle centers. Approximate weight: 425 pounds, standard equipment.

Solo and Sidecar or Package Truck Service

The solo machine differs from the machine furnished for heavy duty service with sidecar or package truck in that the heavy duty motor is fitted with 7/64 inch plates underneath the cylinders to lower compression and it is timed slightly later. The heavy duty machine is fitted with a different sprocket combination giving a lower gear ratio

Gear Ratios

STANDARD MODELS	Motor Sprocket	Clutch Sprocket	Countershaft Sprocket	Rear Wheel Sprocket	High Gear Ratio
61 cu. in. Solo, 27" wheels	17	44	27	45	4.31 to 1
61 cu. in. Solo, 25" wheels	16	44	27	40	4.07 to 1
61 cu. in. Sidecar, 27" wheels	17	44	27	51	4.88 to 1
61 cu. in. Sidecar, 25" wheels	16	44	27	45	4.58 to 1
74 cu. in. Solo, 27" wheels	17	44	27	44	4.21 to 1
74 cu. in. Solo, 25" wheels	17	44	27	40	3.83 to 1
74 cu. in. Sidecar, 27" wheels	17	44	27	51	4.88 to 1
74 cu. in. Sidecar, 25" wheels	16	44	27	45	4.58 to 1

NOTE—Recommended sidecar gearing applies also for package truck service.

In extremely hilly sections, possibly better results will be obtained by using a one tooth smaller engine sprocket.

To Find Gear Ratio

Divide product of number of teeth on rear and clutch sprockets by product of number of teeth on engine and countershaft sprockets. Result will be gear ratio, or number of motor revolutions to one revolution of rear wheel.

Speedometer Gearing

	Rear Wheel	Fibre Pinion
27" wheels	92	27
25" wheels	92	28

MOTOR LUBRICATION

Motorcycle motors, because they are air cooled and work at very high temperatures, must be lubricated with an oil prepared especially for them. The proper oil for you to use, to get the best performance from your motor for the greatest length of time, is GENUINE HARLEY-DAVIDSON OIL. This oil is refined to our specifications. We supply it for the protection of Harley-Davidson riders.

Few of the many brands of oil on the market will lubricate your motor as well as Harley-Davidson oil. Many oils that are very satisfactory for automobile motors would cause serious damage to a motorcycle motor in a short time; so don't take a chance.

Most Harley-Davidson dealers sell Harley-Davidson oil. You can purchase it by the quart as needed, or in one and five gallon sealed and trade-marked cans. If your dealer doesn't have Harley-Davidson oil in stock, he can order it for you. If you are so located that you can't get to a dealer, you can order oil directly from the factory.

Harley-Davidson oil is furnished in two grades—*Regular Heavy*, and *High Speed Special*. The *Regular Heavy* grade is recommended for all ordinary service involving the normal amount of high speed driving. The *High Speed Special* grade is intended for lubrication of motors subjected to considerable high speed driving or unusually hard service otherwise.

NOTE—To Overseas Riders: If your dealer cannot supply you with genuine Harley-Davidson oil, he can supply you with an oil that meets our oil specifications.

Important Things To Remember About Cold Weather Lubrication

In extremely cold winter weather, attention has to be given to the matter of possible congealing of lubricating oil. Harley-Davidson oil, either Regular Heavy or High Speed Special, can be depended upon to circulate until the temperature reaches about 10°F. (above zero). With a motorcycle in every-day winter service in a locality where the temperature goes down to 10°F. (above zero) and remains quite consistently at or below that point for a time, the matter of thinning lubricating oil as necessary to avoid congealing should be taken up with the local dealer.

In cold weather run motor slowly until it is thoroughly warmed up, to avoid possible damage to pistons, rings, and other parts before oil is warm enough to circulate freely.

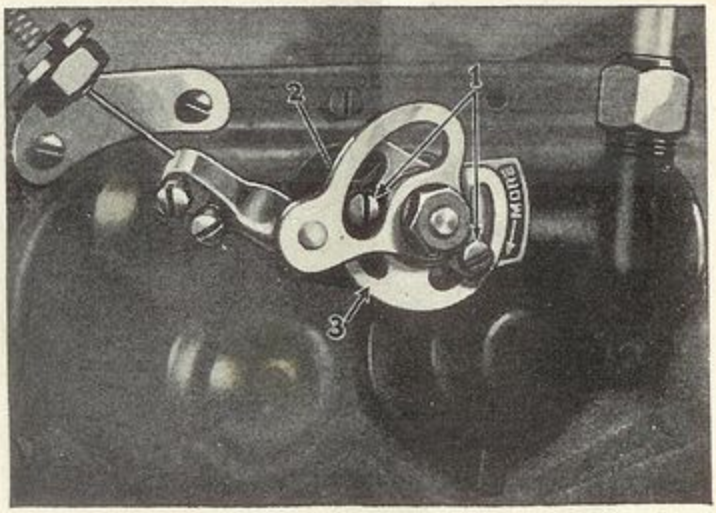
There is more crank case oil dilution in winter than in summer because the carburetor choke is used more for priming and starting, and also cylinders are often primed directly through priming cocks. Naturally more gasoline gets by the piston rings and into crank case. The crank case should, therefore, be drained and given a supply of fresh oil at frequent intervals.

Mechanical Oil Pump

The mechanical oil pump is in operation whenever the motor is running. It is throttle regulated and furnishes the right amount of oil to motor for any normal service condition. (See "Use of Hand Oil Pump"). The pump requires no attention from the rider other than an occasional inspection to be sure that its control wire is properly connected and adjusted. (See "To Connect and Adjust Throttle, Oil Pump, and Spark Controls").

There is no shut-off in oil line between tank and pump: therefore, if tank is kept supplied with oil and care is taken that no dirt or foreign matter that might plug oil line gets into tank, the motor will always be supplied with oil, whenever running.

The pump is adjustable to increase or decrease the amount of oil fed at speeds within the range of ⅔ open throttle. It is not likely, however, that any re-adjustment will be found necessary. Adjustment is changed by loosening screws 1 (Illus. 2), and then shifting adjusting eccentric 3 as per marking on indicator. The original factory setting is indicated by mark 2. No adjustment is provided that will affect the amount of oil fed at speeds within the range of ⅔ open and fully open throttle. Within this range, pump is feeding at full capacity.



Illus. 2—Mechanical Oil Pump With Cover Removed

1—Adjustment lock screws; 2—Mark indicating original setting; 3—Adjusting eccentric.

Mileage per gallon of oil depends entirely upon driving speed. A machine driven at low speeds the majority of the time may give 1000 miles or more; while a machine driven considerably at high speeds may give only 400 miles or possibly less. The average is 600 to 800 miles per gallon.

Use of Hand Oil Pump

When a machine is used in average service, it is only necessary to use the hand oil pump for flushing crank case and injecting supply of fresh oil after draining.

It should not be necessary to supply motor with extra oil with hand pump for a normal amount of high speed running; however, as a safety factor, when running at high speed for a long distance, it is advisable to supply a little extra oil with hand pump—about ½ pumpful every two miles.

Draining and Flushing Crank Case

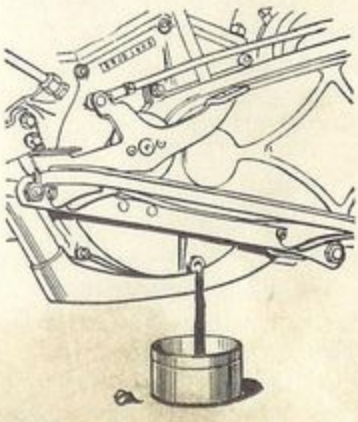
Do not use kerosene to flush crank case.

Drain and flush the crank case and give it a supply of fresh oil at least every 750 miles. Do this while motor is hot.

To drain crank case, remove drain plug as shown in Illus. 3.

After draining off the old oil, replace plug and inject 3 or 4 pumpfuls of fresh oil into crank case with hand oil pump. Start motor and run for one or two minutes; then drain case again. This will flush all the old oil out of case.

Replace plug, inject 1½ to 2 pumpfuls of oil into case and motor is again ready for service.



Illus. 3—Draining Crank Case

Flushing Cylinders With Kerosene
Every Two Months

Shooting a few priming gunfuls of kerosene into cylinders through priming cocks and also some around exhaust valves, through the spark plug openings, will loosen carbon deposits and free sluggish valves, although it does not remove all the carbon. This flushing should be done right after a run.

After flushing cylinders, the crank case should be drained, flushed, and given a supply of fresh oil, as explained under "Draining and Flushing Crank Case."

GENERAL MAINTENANCE

Removing Carbon and Grinding Valves

The carbon that accumulates in cylinder heads, on piston heads and on valve seats, eventually causes overheating, loss of power and pre-ignition or heat knocking. Have carbon removed and valves ground at least once a year if machine is in solo service, or twice a year if machine is in heavy duty service with sidecar or package truck. A motor will run like new again after it has been given this attention.

Let a Harley-Davidson dealer do this job, for it is necessary to remove motor from frame, take off and dismantle cylinders, remove valves, etc. The motor must be re-assembled with care to eliminate leaks around cylinder connections. To do the job properly, requires the use of a valve guide reamer, valve seat facer, manifold wrench and other special tools. A dealer is familiar with this work, has the proper tools, and will do a good job at a very reasonable charge.

We do not recommend removing carbon by burning with oxygen, because the motor parts may be overheated and damaged.

Valve Tappet Adjustment

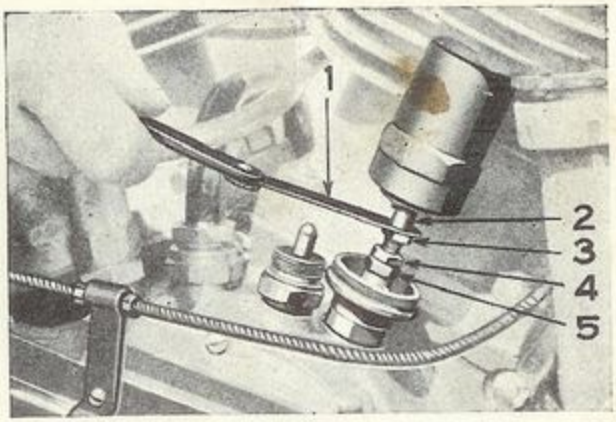
To get all the horsepower out of a motor, keep valve tappets and push rods properly adjusted. The inlet valve push rods should be inspected for clearance and if necessary, re-adjusted every 800 miles—the exhaust valve tappets every 1500 miles. A dealer can make the necessary adjustments in a few minutes, or you can make them by following carefully the instructions below.

Important Things To Be Remembered When Adjusting Tappets

Motor must be cold. Compression release lever must be in upward position (Illus. 1). To be sure that a valve is fully closed when adjusting its tappet clearance (push rod clearance if an inlet valve), turn motor to such a position that the like valve in the other cylinder is held wide open.

To Adjust Exhaust Valve Tappets

Adjust exhaust valve tappets so there is .008 to .010 inch clearance between tappet 3 (Illus. 4) and end of valve stem 2. An accurate thickness gauge should be used to measure this clearance. If no gauge is available, use two thicknesses of ordinary writing paper. To adjust, loosen lock nut 4 slightly; then hold tappet body hexagon head 5 with one wrench and with another wrench turn adjusting screw 3 in or out of tappet body, as may be necessary to obtain proper adjustment. After adjustment is completed, tighten lock nut 4.



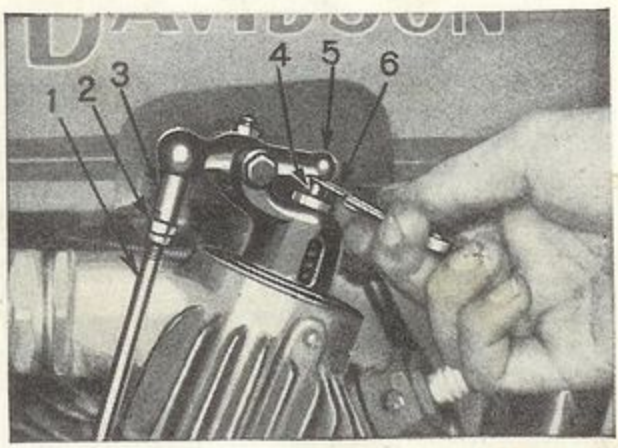
Illus. 4—Exhaust Valve Tappet

1—Thickness or feeler gauge; 2—Exhaust valve stem; 3—Exhaust valve tappet adjusting screw; 4—Adjusting screw lock nut; 5—Tappet body.

To Adjust Inlet Valve Tappets (Push Rods)

Adjust push rods so there is .002 to .004 inch clearance between inlet lever 5 (Illus. 5) and valve stem 4. If you have no thickness gauge, use a single sheet of writing paper. To adjust, loosen lock nut 2 slightly; then hold the push rod 1 and turn tip 3 as may be necessary to obtain proper adjustment. After adjustment is completed, tighten lock nut 2.

Push rod can be removed if desired, by unscrewing cover at lower end.



Illus. 5—Inlet Valve Push Rod

1—Inlet push rod; 2—Push rod end lock nut; 3—Push rod end; 4—Inlet valve stem; 5—Inlet lever; 6—Thickness or feeler gauge.

Valve and Ignition Timing

The valves are timed to open and close at the right time, and the ignition unit is timed to produce a spark at the right time, by means of a series of gears (Illus. 6) in timing gear case. Motor cannot get out of time unless some of the gears are removed or their setting disturbed. Of course, removing the circuit breaker and timer base assembly will also put ignition out of time.

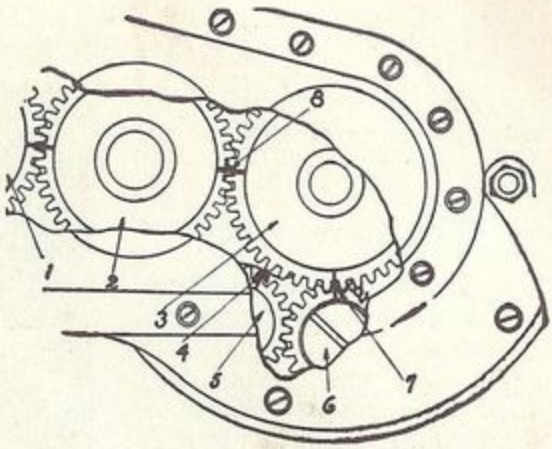
Should the motor for any reason become out of time, it can be retimed according to the instructions following. To get at the timing gears, remove the gear case cover.

To Time Valves

The valve and breather timing gears are marked so that if removed, they can be replaced in correct time as shown in Illus. 6.

Secondary gear 3 is marked in two places. Fit it to motor with one of the marks registering with marked tooth on pinion gear 6 and the other mark facing intermediate gear 2.

With the marks on pinion and secondary gears set in perfect alignment, fit breather gear 5 into case so that its marked tooth aligns with the "Λ" mark stamped in crank case, just above breather bushing.



Illus. 6—Timing Gear

1-2—Intermediate gears; 3—Secondary or cam gear; 4—Breather valve Λ timing mark on case; 5—Breather valve gear; 6—Pinion or main shaft gear; 7—Pinion and secondary gear marks correctly aligned; 8—Secondary and intermediate gear marks correctly aligned.

To Time Ignition On a Generator Equipped Model

The generator drive gear and the small compound or double gear that meshes with it are not marked (these gears not shown in Illus. 6), so use the following method to time ignition:

Assemble pinion, cam, and breather gears 6-3-5 into gear case with their marks in perfect alignment as shown in Illus. 6, and explained under "To Time Valves." Intermediate gears 1-2 may also be fitted into case, disregarding their marks (these marks are used when timing a magneto model). Fit generator gear to armature shaft and tighten shaft nut. Don't as yet fit the small compound, or double gear that meshes with generator gear. Next, after accurately adjusting the circuit breaker point gap (see page 27), set the circuit breaker (spark) lever in full advanced (forward) position, and then turn generator in direction in which it operates (to left) until *narrow end* of circuit breaker cam 3 (Illus. 18) has separated contact points about ½ of their full opening. Steady generator in this position and after observing that the marked gears are still in alignment as explained above, fit the compound gear into its place.

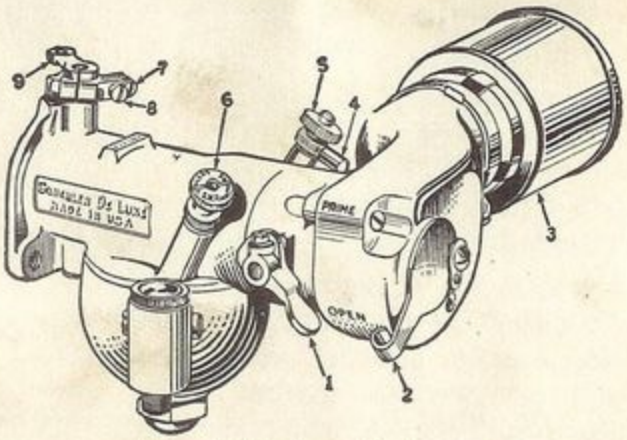
This gear may not slip into mesh freely on first attempt due to its teeth not registering properly with teeth on the generator and intermediate gears, but as the teeth on compound gear are staggered, a position can always be found, by turning the gear a tooth at a time, where it will slip into mesh freely without changing the position of either of the two gears with which it meshes.

To Time Ignition On a Magneto Equipped Model

As all timing gears in a magneto equipped motor are marked, simply set all gears with their marks in alignment as shown in Illus. 6, and carry the alignment of marks right through to magneto gear.

The Carburetor

Don't continually tamper with the carburetor adjustment. If motor doesn't start and run right, first look for trouble elsewhere than in carburetor. Particularly, see that spark plugs are clean, properly adjusted, and that the porcelain core is not cracked in either plug. Try new plugs. See "Use the Recommended Spark Plugs", page 2.



Illus. 7—DeLuxe Carburetor

1—Choke lever; OPEN position (all the way down) is normal running position of lever; 2—Air port shutter, open only for high speed; 3—Air cleaner; 4—Low speed needle lift lever; 5—Low speed adjusting needle; 6—High speed adjusting needle; 7—Lock screw; 8—Throttle stop screw, with which the closed throttle motor speed is regulated; 9—Throttle lever.

Check the adjustment of valve tappets and push rods. Make sure that there is good compression in both cylinders. See that the throttle and spark controls are properly adjusted. Also refer to "General Trouble Charts", page 31.

We suggest taking machine to a Harley-Davidson service station for carburetor adjustment.

Carburetor Flooding

Flooding may be caused by a leaky float needle valve (dirt or a poor seat), a faulty cork float, or a damaged bowl lock nut packing washer.

If a solo machine that is equipped with a "Jiffy Stand" is parked on an incline, or the stand is improperly adjusted or bent, allowing machine to lean farther than normal, the carburetor, regardless of its perfect condition might overflow.

To Adjust Carburetor

For Starting Instructions, See Page 3.

Needle 5 (Illus. 7) on back side of carburetor adjusts the mixture for low and idling speeds. It controls carburetion up to 15 miles per hour, and affects it up to 25 miles per hour. This needle is mounted in a lever which is actuated by a cam on end of choke shaft. By means of this arrangement, when choke lever is raised for starting and warming up motor, the needle is also lifted away from its seat—enriching the gas mixture. When choke lever is moved to OPEN position, needle is also

moved back to its original position. *When adjusting the low speed needle, choke lever must be at OPEN position (all the way down).*

Needle 6 on forward side of carburetor, adjusts the mixture for high speed. Its adjustment affects carburetion above 15 miles per hour, and controls it entirely above 25 miles per hour.

Both needles 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 plunger which drops into notches in the needle adjusting screw.

A carburetor once properly adjusted requires little, if any, re-adjusting. 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.

A carburetor that is badly out of adjustment may be re-adjusted as follows: Turn both the low and high speed needles all the way down (to right). Then, back up (to left) low speed needle about 2 turns, and high speed needle about 1½ turns. With needles in these positions, motor will start, but mixture will probably be too rich. Start motor and after choke has been moved to OPEN position and motor is normally hot, correct the adjustment of both needles.

Adjust for low speed first. Turn needle 5 down (to right) one notch at a time until mixture becomes so lean that motor misses and is inclined to stop; then, back needle up seven to ten notches or until motor hits regularly with throttle closed and spark advanced. Next, adjust throttle stop screw 8 as may be necessary to make motor idle at proper speed with throttle closed. Turning screw to right makes motor idle faster. Turning screw to left makes motor idle slower. Don't idle a motor at the slowest possible speed, because an extremely slow idling adjustment causes hard starting. Before making this idling adjustment, be sure control is adjusted to fully close throttle.

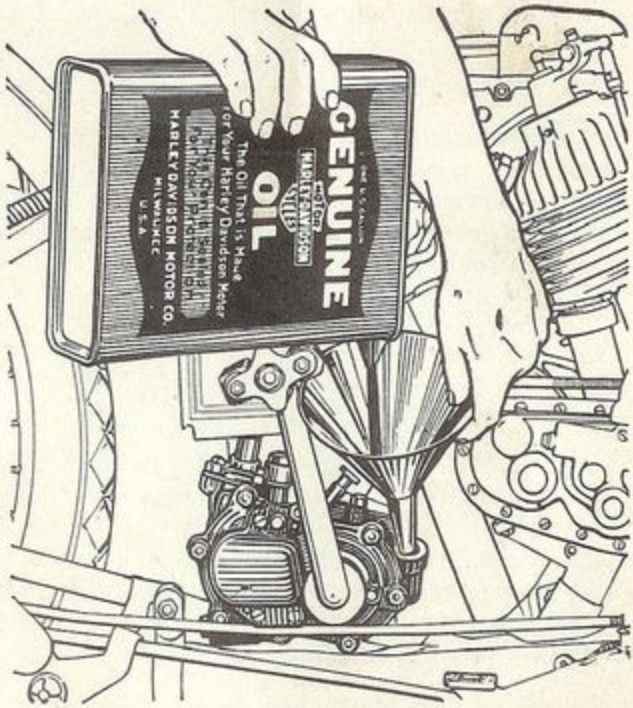
After low speed adjustments have been completed, run machine on the road to make high speed adjustment. Run at various speeds between 20 miles per hour and wide open. Have spark fully advanced. Turn high speed needle 6 down (to right) a little at a time until mixture becomes so lean that motor doesn't respond to throttle, and backfires (spits) through carburetor; then, back needle up a notch at a time until motor responds to throttle, accelerates without back-firing (spitting), and hits evenly at high speeds or with wide open throttle.

Auxiliary Air Port

When driving with wide open throttle, the speed of machine can usually be increased a little by opening auxiliary air port in air cleaner body. Moving shutter 2 (Illus. 7) upward opens port. Shutter should be kept in closed position for all ordinary service.

Care of Transmission

The transmission requires no periodic attention or adjustments other than to keep it filled to the proper level with oil. Inspect the oil level every week and add oil if necessary (Illus. 8). *A machine should be standing on a level surface when adding oil to transmission—If a solo machine, equipped with "Jiffy Stand", do not have it leaning against stand.* The correct oil level is ¾ inch below top of filler opening. Don't fill to top of opening. Use the same grade of oil used in motor—winter and summer. Don't use heavy auto transmission grease. A drain plug is located in the front side of case. Once or twice a season drain the case and put in fresh oil.



Illus. 8—Putting Oil in Transmission

There is an important Alemite connection on left side of case, which lubricates main bearing of transmission. Don't neglect it.

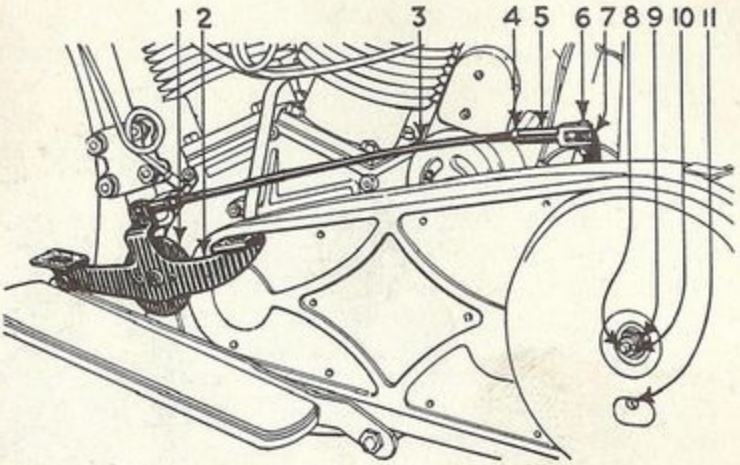
Keep the transmission clamped down tight to frame, to prevent the four bottom studs from working loose and damaging case.

A little oil may work out through the bearings of any transmission, so don't be alarmed if, after the macine is stopped, a few drops of oil drip from various parts around the case. However, should oil leakage become so bad that little oil can be kept in the case, it is probably because the brass oil retaining washers inside of case are damaged or worn out and should be renewed. This job should be done at a Harley-Davidson service station, for it is necessary to remove transmission from machine and disassemble it. This work requires a number of special tools.

NOTE—When the transmission and also the shifter control joints are properly lubricated, hard shifting and clashing of gears when shifting are almost invariably due to improper clutch adjustments rather than trouble in the transmission.

Adjusting the Clutch

When a clutch is in need of adjustment or repairs, it is because it either does not hold under a load, or it drags when in released position. In either case, the first thing to be checked up is the clutch pull rod adjustment. Nearly all clutch troubles are due to improper pull rod adjustment.



Illus. 9—Clutch Controls

1—Footpedal friction discs; 2—Clutch footpedal; 3—Clutch footpedal rod; 4—Lock nut; 5—Rod end (clevis); 6—Clevis pin; connects rod 3 to operating lever 7; 7—Clutch operating lever; 8—Clutch pull rod; 9—Pull rod adjusting nut; 10—Lock nut; 11—Clutch spring tension adjusting screw (6 of these screws).

To Adjust Clutch Pull Rod

This adjustment is made with adjusting nut 9 and lock nut 10 (Illus. 9) on end of pull rod 8.

First, disconnect and remove clutch footpedal rod 3 from end of clutch operating lever 7. Then, loosen lock nut 10, and adjust nut 9 so that operating lever 7 has $\frac{1}{16}$ to $\frac{1}{8}$ inch free movement between gear lock plate and the point where it starts to act on clutch. If lever has too much free movement, turn adjusting nut 9 in (to right). If lever has too little free movement, turn nut 9 out (to left). Don't fail to tighten lock nut 10 after adjustment is completed.

CAUTION—If operating lever 7 has no free movement as explained above, clutch will not hold properly. If too much free movement is allowed, clutch will drag when in released position, and consequently the gears will shift hard, clash, and eventually become damaged.

After pull rod adjustment is completed, adjust the length of footpedal rod 3, and connect it to operating lever 7. This adjustment is made by loosening lock nut 4, and turning rod end 5 further on or off rod. Adjust length of this rod so that with footpedal rocked all the way forward and operating lever in forward position (against gear lock plate), rod is about $\frac{3}{32}$ inch *too short* to correctly align the clevis pin holes in rod end and end of operating lever. Then, rock pedal back slightly to align holes, and insert clevis pin.

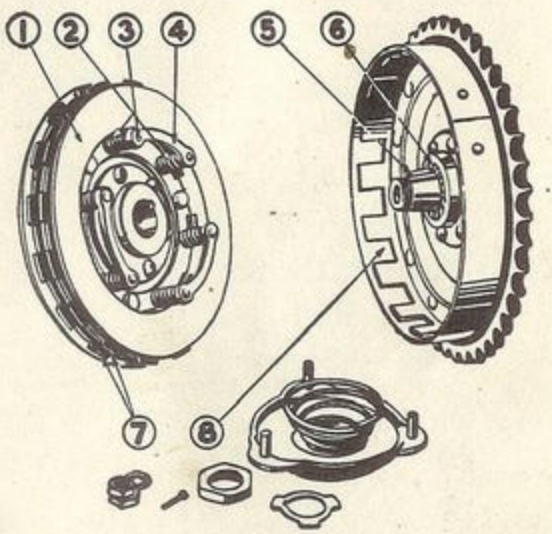
To Adjust Clutch Spring Tension

If clutch slips *after pull rod and footpedal rod adjustments are correct,* increase spring tension on clutch discs by turning *to the right* the six adjusting screws 11 (Illus. 9) in face of clutch. Illus. 9 shows one of these screws opposite hole in chain guard. Each of the screws can be moved to this position by carefully operating starter crank. Turn each of the six screws the same amount in order to keep all the springs adjusted to equal

tension. Turn them exactly one-half turn at a time, because at each half turn, projections on screw heads drop into slots, locking the adjustment. Usually one-half turn of each screw is sufficient to remedy a clutch that slips. Don't increase spring tension any more than necessary. Test clutch after each half turn of screws.

To Adjust Clutch Footpedal Friction

The clutch footpedal is fitted with friction discs 1 (Illus. 9) and a spring which will hold it in any position. Some pressure with the foot should be required to rock the pedal either forward or back. If the pedal does not hold properly, when rocked backward and foot removed from it, increase the spring tension on friction discs. If too much effort is required to rock pedal backward or forward, decrease spring tension.



Illus. 10—Clutch

1—Releasing disc; 2—Springs (6 used); 3—Adjusting screws (6 used); 4—Sector nuts (3 used); 5—Clutch hub key; 6—Roller bearings (24 used); 7—Lined friction discs; 8—Shell friction disc key ways.

To Adjust Gear Shifter Lever

Correctly adjusted, the shifter lever will stand 1/16 to 1/8 inch from the end of slot in shifter gate when gears are shifted into HIGH. This adjustment must be correct, otherwise gears will not mesh fully, gear locking device will not align properly, and difficulty will be experienced in engaging the clutch after shifting.

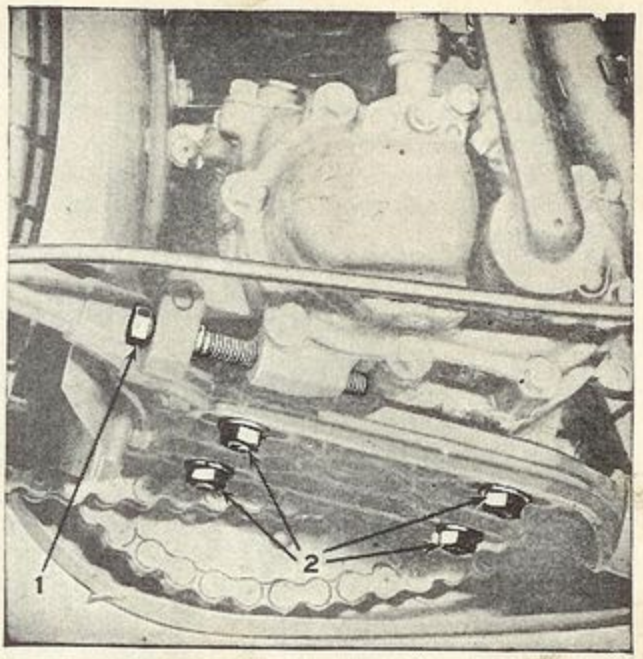
To adjust, disconnect shifter rod where it connects to shifter lever, and then shorten or lengthen the rod as may be necessary, by loosening lock nut and turning rod end further on or off rod.

Care of Drive Chains

Inspect the adjustment of chains every week and re-adjust them, if necessary. Chains should not be allowed to run loose enough to strike the chain guards, because when that loose, they cause machine to jerk when running at low speed, and there is excessive wear on chains and sprockets. *Adjust chains so that they have about ½ inch free movement up and down, midway between sprockets.* Do not adjust tighter, because running chains too tight is even more harmful than running them too loose. As chains stretch and wear in service, they will run tighter at one point on the sprockets than at another, always check the adjustment at the tightest point.

Inspect chains occasionally for broken rollers and worn or damaged links. If any are found, make repairs or renew the chain. To remove a chain, find connecting link and remove spring clip; chain will then come apart.

At least every 1000 miles, brush off dirt that has accumulated on chains, especially rear chain, and apply Harley - Davidson Chain Lubricant to the surface of chains. The composition of this lubricant is such that it will work into the chain bearing.



Illus. 11
Transmission Clamp Nuts & Adjusting Screw
1—Adjusting screw; 2—Clamp nuts.

To Adjust Front Chain

The front chain is adjusted by moving the transmission backward or forward, by means of adjusting screw 1 (Illus. 11). After loosening the four nuts 2 which clamp the transmission to the frame, turn adjusting screw 1—*to the right* to tighten chain—*to the left* to loosen chain. When the correct adjustment is obtained, securely tighten clamp nuts 2. Adjusting front chain, changes the adjustment of rear chain; so both must be adjusted.

After adjusting front chain a few times, check adjustment of gear shifter mechanism. See "To Adjust Gear Shifter Lever."

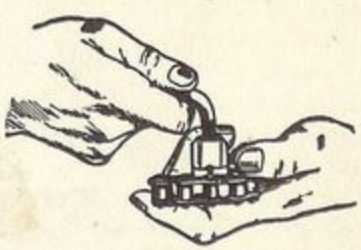
To Adjust Rear Chain

Loosen the rear wheel axle nuts, the two axle adjusting screw lock nuts, and brake arm clamp bolt nut. Then, by means of the axle adjusting screws in frame at each end of axle, move the axle as much as necessary to adjust the chain properly. Turn each of the adjusting screws an equal number of turns in order to keep rear wheel aligned. Check for correct alignment of wheel by noting that rear tire runs about midway between rear frame forks and also that rear sprocket aligns with chain and countershaft sprocket.

After adjusting the rear chain, the rear brake may be too tight and if a speedometer is used, the gear teeth may be out of proper mesh. Adjust brake rod and speedometer gear as may be necessary. See "To Adjust Rear Wheel Brake."

To Repair a Drive Chain

When necessary to repair a chain, remove damaged links by pushing out the riveted link pins, with chain repair tool (Illus. 12). Then fit the necessary repair links.



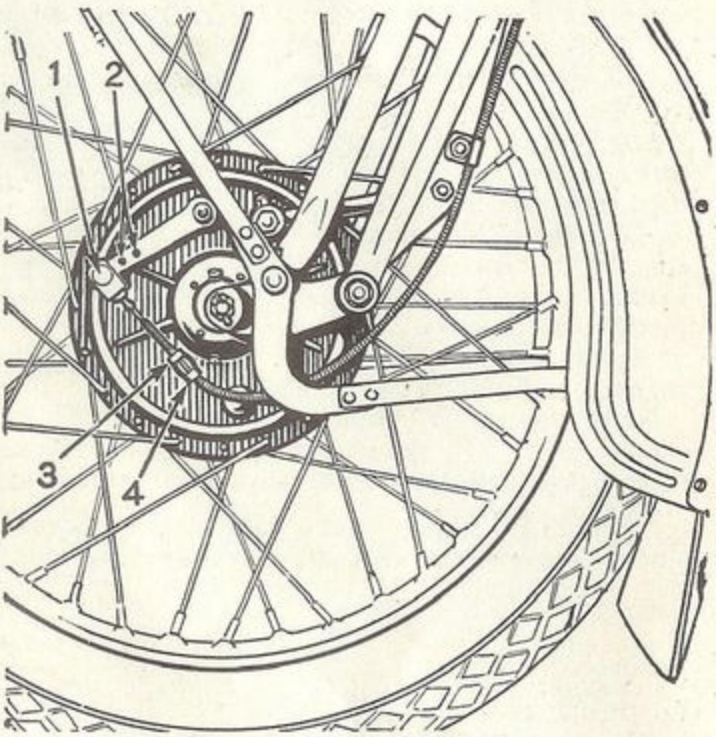
Illus. 12
Repairing a Chain

To Adjust Rear Wheel Brake

The rear brake is adjusted by lengthening or shortening the brake rod, as may be necessary. Simply disconnect the brake rod at front or rear end, and turn rod end further on or off the rod. Adjust brake rod so that brake does not take effect until footpedal is pushed downward about 1 inch. Turn rear wheel to make sure that brake is not too tight and dragging.

Adjusting Front Brake

Loosen lock nut 3 (Illus. 13) and turn adjusting sleeve 4—*to the left* to shorten cable and thus tighten brake—*to the right* to loosen brake. With cable properly adjusted, hand lever will move freely about one-quarter of its full movement before the brake starts to take effect. It is advisable after adjusting brake, to raise front end of machine and turn wheel to be sure that brake is not too tight and dragging. After adjustment is completed, be sure to securely tighten lock nut 3.



Illus. 13—Front Wheel Brake

1—Control connected for sidecar service; 2—Connect control at one of these holes for solo service; 3—Adjusting sleeve lock nut; 4—Cable adjusting sleeve.

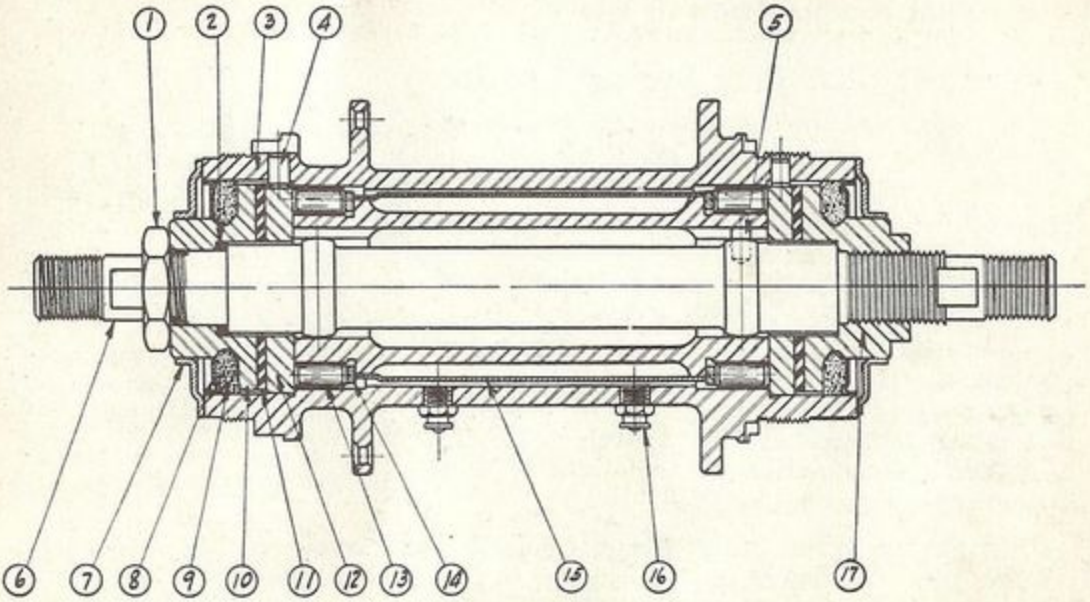
Oil cable often to keep control working freely. Simply apply oil to outside of cable. Alemite the brake cover bearing and shackle joints regularly as per Lubrication Chart, to assure smooth braking and also free fork action while brake is in operation.

To Adjust Front Wheel Hub Bearings

The front wheel hub is a ball bearing type hub. Inspect the adjustment of its bearings two or three times a year and re-adjust them, if necessary. To adjust, first remove wheel from the machine, and then remove the cone lock nut, dust protector, and cone lock washer, from right side of hub. The cone can then be turned to obtain the proper adjustment. Check the adjustment after cone lock nut has been replaced and securely tightened. When the bearings are properly adjusted, just a trifle of play or shake can be detected and the wheel must turn freely. Lubricate as per chart on page 35.

Roller Bearing Rear Hub

Rear hub will give many thousand miles of service without need of adjustments or repairs, if it is properly lubricated as per chart on page 35. If excess radial (up and down) shake develops due to bearing wear, adjustment is made by fitting oversize roller bearing rollers.



Illus. 14—Rear Hub

1—Lock nut; 2—Brass shim washers; 3—Hub shell; 4—Thrust washer retaining pin; 5—Axle and sleeve retaining pin; 6—Axle; 7—Dirt guard; 8—Felt washer retainer; 9—Felt washer; 10—Thrust collar (sprocket side); 11—Bakelite thrust washer; 12—Steel thrust washer; 13—Roller bearing; 14—Roller bearing retainer; 15—Roller bearing sleeve; 16—Alemite connection (two on hub); 17—Steel thrust collar (brake side).

End thrust adjustment is made with shim washers 2 (Illus. 14) between thrust collar 10 and a shoulder on axle. If hub develops too much end thrust, remove nut 1 and thrust collar 10 from sprocket side of hub; then remove one or more shim washers 2 as may be necessary. Proper adjustment is .005 to .010 inch end thrust.

To Disassemble Rear Hub

Remove lock nut 1 (Illus. 14) from sprocket side of hub and with a block of wood, strike end of axle. It will drift out easily through brake side of hub, carrying with it most of the inner hub parts. When hub is re-assembled, be sure that the right number of shim washers is fitted under thrust collar 10, to give proper end thrust adjustments.

Inflating Tires

Inflating tires to the recommended pressure means safest riding, best control of your machine and utmost efficiency from your tires. Inflate 3.85 inch balloon tires as follows: For solo service, front 16 lbs.; rear 20 lbs. For sidecar service, front 18 lbs.; rear 25 lbs.; sidecar 18 lbs. For package truck service, tire pressures should vary upward from pressures given for sidecar service, in due proportion to package truck load. NOTE—Heavy duty tires (special for package truck, not furnished as standard equipment) should be inflated approximately 5 lbs. higher than the pressures given for standard balloon tires.

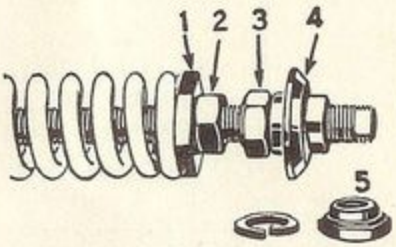
To Remove Seat Post

After raising saddle, remove seat post clamp nut 5 (Illus. 15) which is located underneath frame at bottom end of seat post tube. Seat post assembly can then be pulled out. When seat post assembly is inserted back into frame tube, see that flat side machined on seat post rod nut 4 registers in flat sided hole in bottom of tube.

To Adjust Seat Post Spring Tension

If seat post spring tension is not suited to weight of rider, it can be re-adjusted as follows: Remove seat post and after loosening lock nut 2 (Illus. 15), turn adjusting nut 1 to increase or decrease the tension of cushion springs (lower springs). When adjusted as desired, securely tighten lock nut 2.

The standard cushion spring combination consists of two springs of different strength. If in any case this standard spring combination cannot be adjusted satisfactorily to weight of rider, a combination of two light or two heavy springs can be installed.



Illus. 15—Seat Post

1—Spring tension adjusting nut; 2—Adjusting nut lock nut; 3—Rod nut lock nut; 4—Seat post rod nut; 5—Seat post clamp nut.

There are three other springs (check and recoil) in the upper end of seat post. However, no adjustment is provided in connection with these springs.

Rod nut 4 should be set and locked with the end of rod extending about ½ inch through it. With this setting, when seat post assembly is inserted in frame, the end of rod will extend just far enough through frame so that lock nut 5 can be turned completely on.

To Connect and Adjust Throttle, Oil Pump and Spark Controls

In connecting and adjusting control wires, the main point is, of course, to accomplish adjustments so that the carburetor throttle control and the oil pump control fully open and close and the circuit breaker fully advances and retards with inward and outward movement of the respective handlebar grips. Unless controls are adjusted for full range of operation, the motor cannot be expected to give best performance.

When it becomes necessary to remove and replace a damaged or broken control wire or possibly control coil, it is advisable before removing it to note carefully how it is passed between the forks and other fittings to its point of connection, and also note just where and how all connections are made. It will then be an easy matter to install and connect the wire or coil exactly as the original.

It is particularly important to assure correct lubrication of the motor that the carburetor-oil pump control wire be adjusted to maintain just the correct relation between the carburetor and oil pump control levers. As the carburetor lever strikes its full open stop, the oil pump control lever should simultaneously strike its full open stop. With this adjustment correctly made. It will be noted that the oil pump control lever lacks about ⅛ inch of striking its fully closed stop when carburetor lever is moved to

fully closed position; this, however, is normal, It is the relation between carburetor and oil pump control levers in fully open position, as just explained, that is to be considered in adjusting the control wire.

To Replace a Broken Control Wire or Coil

First, free the control at all its connections below the handlebars.

Remove grip sleeve by cutting about a ¾ inch hole in end of rubber grip and then backing out handlebar end screw. The slot in this screw is wide enough so that the edge of a tool kit wrench will serve as a screw driver. Remove the two small rollers and pull out the roller pin. The plunger to which wire is attached can then be pushed out through open end of bar. The control coil can be removed, if necessary, after turning off the two nuts which secure it in handlebar. It is not necessary, however, to remove coil in order to replace only the control wire.

A new control wire or control coil will be found overlength and must be cut to exact length at the time of installing. The correct length can be determined from the damaged wire or coil that is being replaced.

After installing the necessary new parts, re-assemble grip and adjust controls. See "To Connect and Adjust Throttle, Oil Pump and Spark Controls."

To Clean Muffler

A clogged muffler causes back pressure and consequently overheating and sluggish motor performance. To get the greatest efficiency from the motor it is important that muffler slots be kept clean and free from the soot and road dust that gradually accumulates. The four end slots can be cleaned easily with a piece of stiff wire. Do this often.

Once or twice a year remove and take muffler apart. Scrape the inside as clean as possible with a long piece of wire and flush with kerosene.

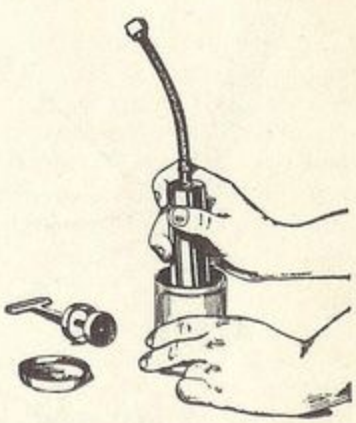
Do not pry the muffler slots further open because doing so only increases the exhaust noise and attracts undesirable attention, without bettering motor performance.

The Alemite (Grease) Lubricating System

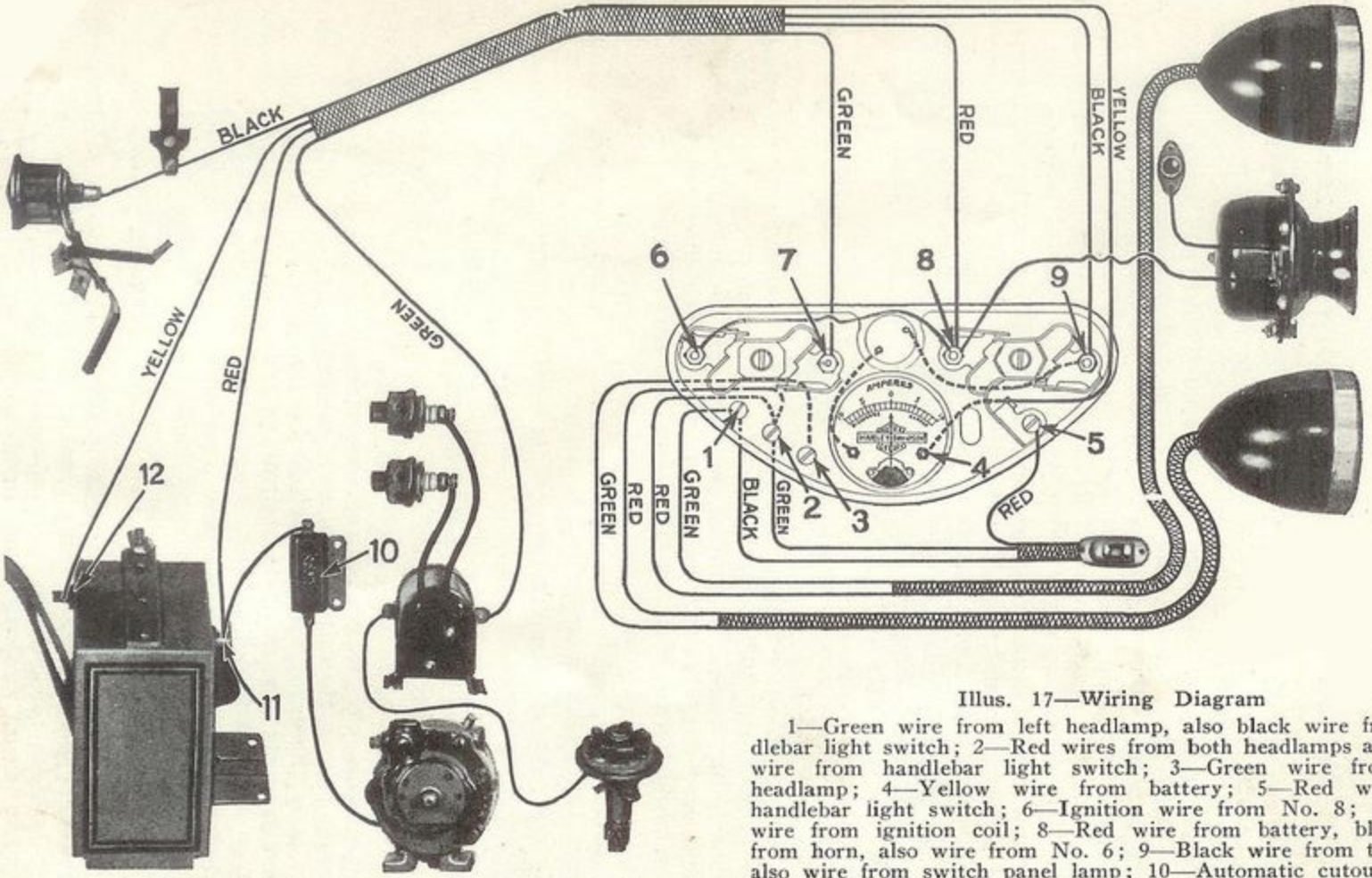
All bearings best lubricated with grease are fitted with Alemite grease gun connectors. A grease gun is furnished with each motorcycle. It is therefore a simple job to keep a machine properly lubricated. Lubricate as per charts on last pages of this book.

There are 21 Alemite connections on motorcycle and 8 on sidecar. Their exact locations are indicated by stars (★) on the lubrication charts.

Illus. 16 shows how Alemite gun is filled. If gun connection becomes leaky, renew the leather washer in hook-on connector. Alemite grease can be purchased from any Harley-Davidson dealer.



Illus. 16
Filling Alemite Gun



Illus. 17—Wiring Diagram

1—Green wire from left headlamp, also black wire from handlebar light switch; 2—Red wires from both headlamps also green wire from handlebar light switch; 3—Green wire from right headlamp; 4—Yellow wire from battery; 5—Red wire from handlebar light switch; 6—Ignition wire from No. 8; 7—Green wire from ignition coil; 8—Red wire from battery, black wire from horn, also wire from No. 6; 9—Black wire from tail lamp, also wire from switch panel lamp; 10—Automatic cutout switch, see page 24; 11—Positive battery terminal, connected with red wire of main cable from No. 8, also wire from cutout switch terminal marked BAT; 12—Negative battery terminal, connected with yellow wire of main cable from No. 4.

(Note—Dotted lines indicate wires connected underneath switch box; solid lines indicate internal connections.)

THE HARLEY-DAVIDSON LIGHTING AND IGNITION SYSTEM

A 6-8 volt, one wire or ground return system. The different units of the electric equipment are supplied with the required current from two sources—the generator and the battery. When the motor is not running, when starting, and when running in high gear at speeds below about 15 miles per hour, the battery is supplying all the current required. At about 15 miles per hour, the generator starts to charge, and above this speed the charging rate varies up to its maximum, with the speed of the machine. At average driving speeds the generator ordinarily produces more current than required to operate machine. The surplus current goes to the battery and keeps it charged. Of course, when driving at lower than average speed with *all* lamps lighted, the generator may not furnish all the current required and in this case some will be drawn from battery. When necessary to drive some distance at a speed where this condition exists, one head lamp should be switched off to avoid discharging battery.

To keep the electrical system in perfect working order, observe the following rules:

1. Give battery the required care. See page 28.

2. Look the system over occasionally, especially at battery terminals, for loose wiring connections, broken wires, and damaged insulation on wires.

Loose wiring connections may cut the battery out of circuit. This must not be allowed to occur while the motor is running, because the battery not only accumulates the surplus current generated, but also acts as a governor, and keeps the voltage of the entire system between 6 and 8 volts. If battery is allowed to become disconnected from the circuit, the generator voltage will go much higher than 6 to 8 volts, and may cause serious damage to generator, cutout switch, and other units.

3. Once a year or every 15000 miles, inspect brushes for wear, and renew them if necessary.

4. Lubricate the commutator end armature bearing occasionally as per instructions under "To Lubricate Commutator End Armature Bearing". Don't allow oil or grease to get on the commutator or brushes.

5. Lubricate timer shaft as per Lubrication chart on page 35.

To Inspect or Replace Brushes

After removing front chain guard, remove the two screws in generator end cover, and then pull off the cover, exposing the commutator and brushes. To remove brushes, unfasten brush spring retainer at outer end of brush holder, by pressing it lightly downward and outward. The retainer, spring, and brush will then pull out together. Brushes are worn out and should be renewed when longest side of brush measures 3/8 inch. After very little more wear, the brush stop will hold brush away from commutator. Insert brushes so that concave face of brush fits curve of commutator.

To Lubricate Commutator End Armature Bearing

Lubricate this bearing occasionally with a few drops of oil in oil cup on generator end cover.

Once or twice a year it is advisable to remove end cover, and lubricate bearing with a good grade of grease (Preferably Harley-Davidson

Grade A). Don't over-lubricate this bearing, for excess oil or grease will be thrown out and some may get on commutator.

Purpose of The Ammeter

The ammeter in switch panel indicates whether battery is being charged or discharged, and at what rate. When the indicator registers to the right of center (o) the battery is being charged—to the left of center (o) a discharge is being drawn from battery. The graduations on ammeter dial indicate the rate of charge or discharge, which of course varies with the speed of the machine and the lights in use. Should the ammeter fail to indicate charge when driving at speeds above 15 to 20 miles per hour, with no lights in use, see "If Generator Stops Charging."

Generator Charging Rate

The maximum charging rate of generator as indicated by the ammeter, can be adjusted by simply moving the lever which extends through commutator end cover—*upward* to increase rate—*downward* to decrease rate.

For daylight riding a maximum charging rate of 3 to 5 amperes should keep battery charged. At night the charging rate can be increased as necessary to take care of lights. Bear in mind however, that when driving at low speeds, the charging rate even when set at its maximum may not be sufficient to take care of all lights. If not, one headlamp should be switched off. The remaining lamp gives ample light for low speed driving. Don't set the charging rate higher than actually necessary to meet lighting requirements and keep battery charged. Overcharging, which is indicated by rapid evaporation of battery solution, is injurious to battery.

Should it be found that even with the adjusting lever fully advanced the charging rate is not sufficient to meet operating requirements and keep battery charged, take the matter up with an authorized Harley-Davidson service station, where it can be determined whether or not everything is in good condition and a further increase possible.

If Generator Stops Charging

1. Inspect brushes and commutator. See that brushes are not worn short and held away from commutator by brush stops. They must seat firmly on commutator. If oil or grease has worked out of bearing and onto commutator, wipe it off with a rag moistened with gasoline and clean it out from between segments with a knife point.

2. See that brush pig-tail connections and other generator wiring connections are tight.

3. Inspect cut-out switch (see "The Cutout or Relay Switch").

If these inspections show everything apparently all right, but the generator still refuses to charge, take the machine to a Harley-Davidson service station and have the generator tested.

The Cutout or Relay Switch

The cutout switch 10 (Illus. 17) mounted on front of battery case, automatically opens and closes the generator-battery circuit, at the proper time. When the generator is turning fast enough to produce current, the cutout contacts automatically close and connect the generator in circuit with the battery and other electric equipment. When the motor is stopped, or at

any time when the generator is not producing current, the cutout contacts open and disconnect generator from the circuit; this prevents the battery discharging through generator. The cutout operates at about 15 miles per hour. It is entirely automatic in operation and requires no particular attention from the rider.

The cutout is connected in the generator-battery circuit as follows: A wire leading from positive post of battery is connected to cutout terminal marked (BAT). The wire leading from generator is connected to unmarked cutout terminal.

The cutout has absolutely nothing to do with the ignition circuit, or starting and stopping of motor. The ignition circuit is controlled by ignition switch on fork triple clamp (see "The Ignition and Lighting Switches").

If cutout refuses to operate properly, look for one of the following troubles:

CAUTION—When necessary to inspect cutout, remove cover carefully to avoid disturbing the adjustments of fittings inside. Use a screw driver to pry cover loose, then pull it straight off.

1. Wires leading from battery and generator must be correctly connected to cutout, as explained above and shown in Illus. 17.
2. Inspect for loose wiring connections at cutout and battery terminals.
3. The cutout must be grounded to frame to operate; therefore, see that its base is securely clamped to mounting.
4. The proper gap between cutout contact points is .015 to .025 inch. This adjustment is made by bending the stop above contact blade.

If, after making these inspections, cutout still refuses to operate properly, have it inspected and tested at a Harley-Davidson service station. Also have the generator tested, see "If Generator Stops Charging."

The Ignition and Lighting Switches

The switch box, mounted on fork triple clamp, houses both the ignition switch and the main lighting switch. The left hand switch is for ignition, and right hand switch for lights. To operate either switch, turn switch lever until slot in lever is in alignment with slot in top of post insert key, and switch will then be operated when lever is turned. Turn the switch levers as per markings on switch panel. They may be turned either way and all the way around without damage to the switches.

CAUTION—Ignition switch must be turned to one of its OFF positions when motor is not running; otherwise battery will be discharged through the circuit breaker points.

The lighting system is provided with a dimming or tilting arrangement controlled by a thumb switch on right handlebar. After lights have been turned ON at switch box push thumb switch upward for bright and downward for dim. Dimming turns off the right lamp and tilts the beams of left lamp downward.

Turning the switch lever to PARK lights the tail lamp and also permits lighting the combination switch panel and front parking lamp; but neither headlamp is lighted. The switch panel lamp is directly controlled by a lever at its base; however it can be lighted only when the switch box lever is at PARK or ON position.

Switch box must be securely clamped to fork triple clamp for it is necessary that it be grounded. If switch box is not grounded, the entire electrical system is disabled.

To get at internal wiring connections or inspect switch contacts, remove switch levers and switch box cover. Switch levers can be lifted off after removing a small screw in each lever. A screw at each end and one at the rear secure the cover. To make wiring connections at switch, see wiring diagram on page 22.

To Adjust Headlamps

To get the greatest efficiency from your headlamps and to meet the requirements of the law, adjust them as follows: Adjustments must be made in a darkened building or at night. Have machine standing on a level surface about 25 feet away from, and headed directly toward a wall or screen upon which a horizontal line has been drawn at exactly the same height as lamp centers.

After removing lamp glasses (lenses), switch the lights ON (handlebar thumb switch must be in upward position) and adjust the focus of both lamps, *one at a time*, completely covering or blinding one while adjusting the other. Turn the focusing screw in back of lamp to right or left as may be necessary to make the light appear smallest and brightest on wall or screen. When focusing is completed, replace lamp glasses. The light from each lamp should now appear as a horizontal band of light, free from dark spots.

Next, check the adjustment of lamps as to direction of light beams. Machine must be resting on both wheels and front wheel must be in straight ahead alignment. The top of main beam of light from each lamp should register on wall or screen even with, but no higher, than the horizontal line mentioned above. After loosening the lamp clamp nuts underneath lamp bracket, the lamps can be tilted up or down to properly aim them in relation to horizontal line, and at the same time they can be turned right or left to give the desired spread of light.

Light Bulbs

The standard lighting equipment requires the following sizes and types of bulbs: Headlamp bulbs, 2 *filament*, 21-21 *candle power, double contact* —Tail lamp bulb, 3 *candle power, single contact*—Switch panel lamp bulb, 3 *candle power, double contact.*

To Adjust Horn

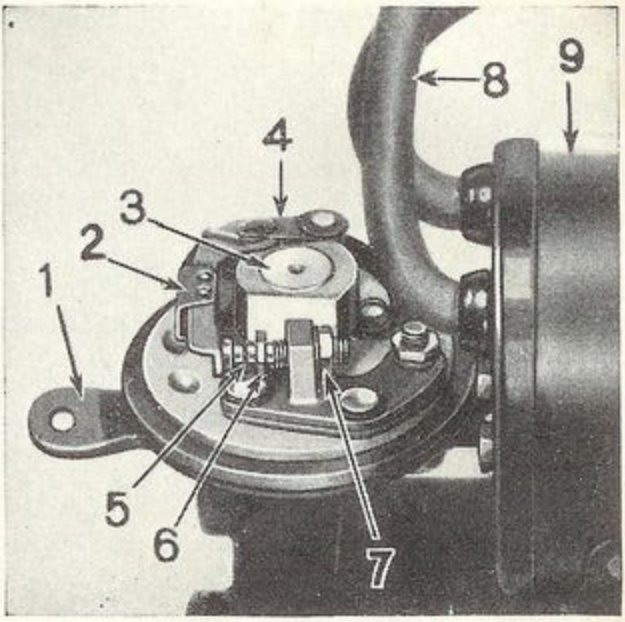
The horn is adjusted at the factory to give the clearest, most penetrating tone. Ordinarily it will give service for a long time before re-adjustment is required. To re-adjust, loosen lock nut on adjusting screw in center of diaphragm, and turn adjusting screw to right or left as necessary to give desired tone. Change the adjustment only a little at a time, tightening the lock nut and testing tone after each change.

If unable to obtain a satisfactory adjustment, consult the nearest Harley-Davidson or Remy service station.

Cleaning and Adjusting Circuit Breaker Points

To clean points, use a tungsten point file or a piece of fine sandpaper.

To adjust points, turn motor to a position where cam 3 (Illus. 18) is holding the points at their widest opening; then loosen lock nut 7 and turn adjusting screw 6 as may be necessary, to adjust the gap between points to .020 to .024 inch. A .022 inch gauge is attached to breaker point wrench in tool kit.



Illus. 18—Circuit Breaker

1—Spark advance and retard lever; 2—Circuit breaker lever; 3—Circuit breaker cam; 4—Circuit breaker lever retaining spring; 5—Circuit Breaker points, opened and closed at the proper time by the action of cam 3; when cam is holding them at their widest opening, the gap between the points should be about .020 inch; 6—Adjustable contact screw with which the gap between the points can be adjusted; 7—Adjusting screw lock nut; 8—Spark plug cables; 9—Ignition coil.

To Replace Spark Plug Cables

It is advisable to have this job done at a Harley-Davidson service station. However, if inconvenient to do so, it may be accomplished as follows:

After removing ignition coil from generator, remove coil end cover, and with a knife or screw driver, dig out the sealing compound from around ends of cables and their screw-in terminals. Cables can then be turned out. After attaching new cables, replace the sealing compound and pack it down tight around cables, to insure a seal against water and dampness.

Starting Motor With a Discharged Battery

If battery is completely discharged or disabled, but generator is in good condition, it is possible to start and operate machine as follows:

Disconnect the wire attached to negative terminal of battery, turn ignition switch on, set transmission in second gear, and release the clutch. Then get towed, coast down hill, or push machine and after it is in motion, engage the clutch. As soon as machine is moving fast enough (about 12 miles per hour) to start generator charging, the motor will start. *After motor starts, connect wire to negative terminal of battery; otherwise, generator may be seriously damaged.*

CARE OF STORAGE BATTERY

The care given a battery determines its life much more than the amount of time and miles in service. Don't neglect it.

1. Inspect battery every week. Add pure distilled water as often as necessary to keep the solution above the plates (see "To Add Water to Battery").

2. Don't overload with extra lighting equipment, nor operate at low speeds with both headlamps lighted to the extent of keeping battery constantly in a discharged condition.

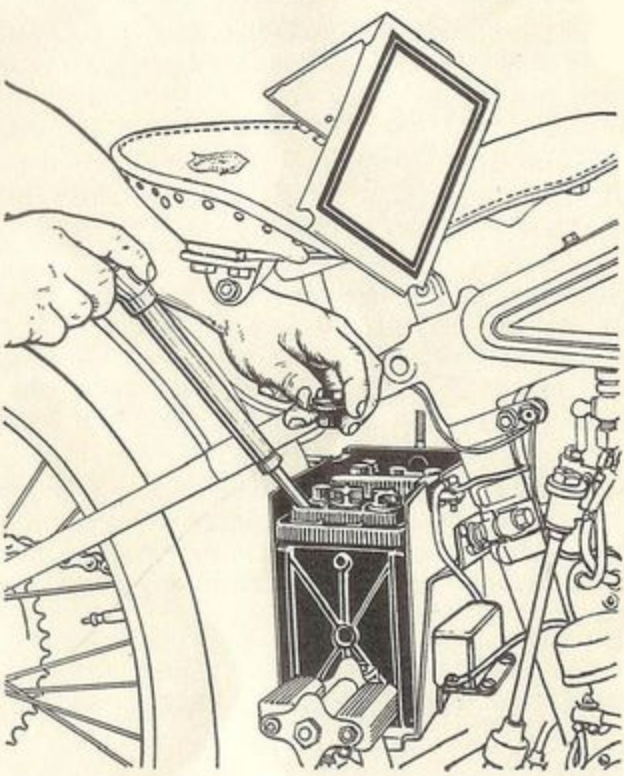
3. Remove battery and have it given a charge from an outside source, when the hydrometer shows that this attention is needed (see "Use of Hydrometer"). Allowing battery to remain in a discharged condition for any length of time, shortens its life.

4. Keep battery clean and terminal connections tight. Apply a little petroleum jelly (vaseline) to battery terminals, occasionally, to prevent corrosion from forming on terminals and their wiring connections. If terminals and their connections should become corroded, scrape them clean and bright before applying vaseline.

To Add Water to Battery

A machine should be standing on a level surface, when adding water to battery—If a solo machine, equipped with "Jiffy Stand", do not have it leaning against stand.

Loosen wing nut at top of case on left side, and remove case cover and rubber mat. Then take out the three screw-in filler plugs, and with hydrometer or syringe (Illus. 19), add enough water to each cell to raise the level of the solution just even with the plate tips which can be seen directly below filler openings. The level of the solution is then about 5/8 inch above the plates proper.



Illus. 19—Adding Water to Battery

CAUTION—If battery is filled to a higher level, some of the solution will be forced out through vent holes as soon as generator starts to charge. This will damage the case, and ruin the enamel on case and transmission.

To Remove Battery

The battery can be lifted out of case after removing case cover and disconnecting wires from terminals.

Do Not Add Acid

Only the water evaporates from battery solution. No acid should be added except in case some of the solution has been spilled out. In that case, the amount of acid necessary to balance the solution can be determined only by a competent battery repairman.

Use of Hydrometer

The hydrometer reading indicates the state of charge of a battery. Take a reading of each cell occasionally, *just before adding water*. After reading is obtained, return the solution to cell from which it was taken. 1.275 or above indicates full charge; 1.200 to 1.225 indicates half charge; 1.150 to 1.175 indicates discharged. If the hydrometer readings repeatedly indicate that the battery is in a low state of charge, adjust the generator to a higher charging rate, see "Generator Charging Rate." It is also advisable to have battery fully charged from an outside source. If the generator, even when adjusted for maximum output, doesn't keep battery in a fair state of charge, with only normal use of lighting equipment, have an inspection made at a Harley-Davidson service station to determine just what may be wrong.

Charging From An Outside Source

Charging from an outside source requires a special device to control the charging current. When your battery needs charging, take it to a Harley-Davidson service station or some other reliable battery service station.

Normal Charging Rate 2 Amperes

When charging a battery from an outside source, the charging rate is constant and should not be allowed to go over 2 amperes. A higher rate will heat and damage the battery. Don't allow your battery to be charged in the same line with automobile batteries, at a high charge rate.

Winter Care of Battery

A battery must be kept in a fair state of charge in cold weather, because of the danger of damage by freezing. A fully charged battery will not freeze, but a fully discharged battery is very likely to freeze. A frozen battery is worthless and beyond repair. Take hydrometer readings often, and check them against the table of freezing points below:

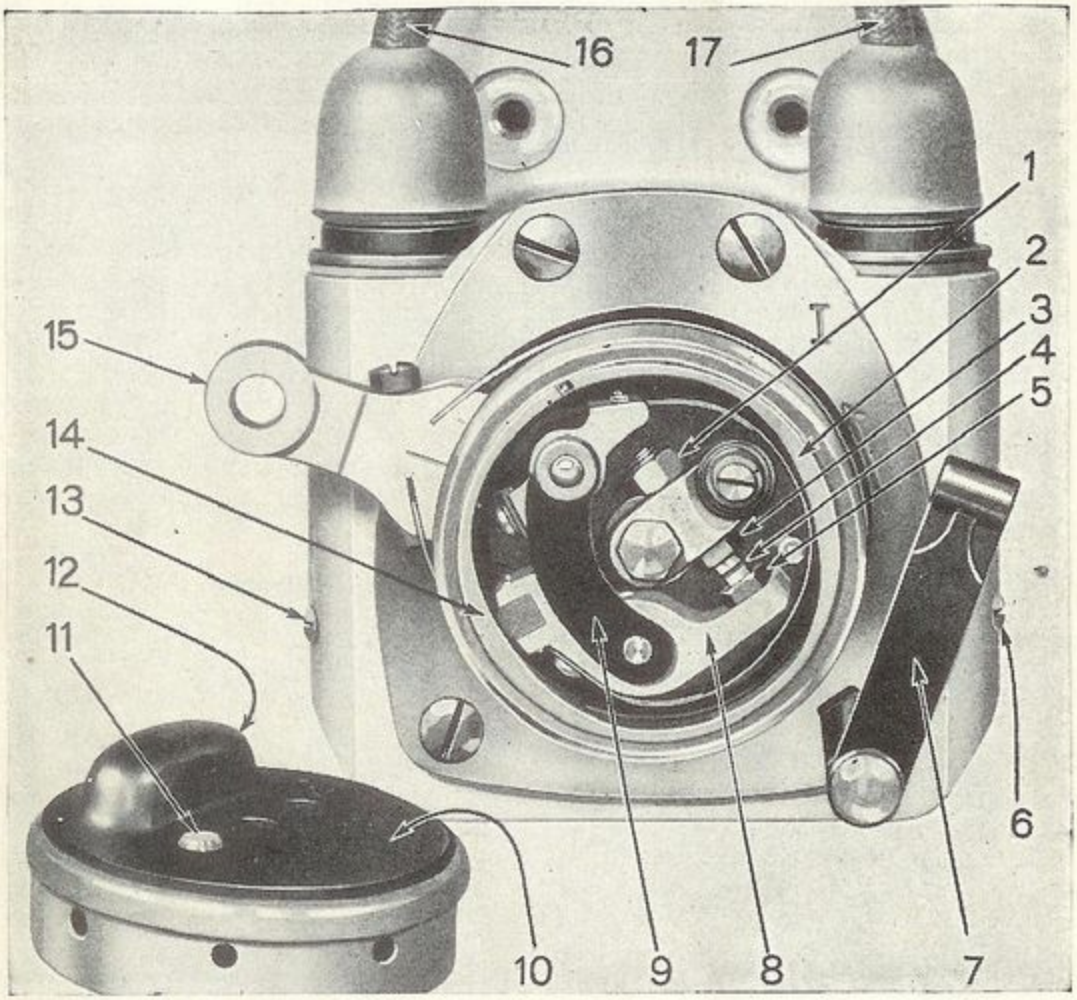
Specific Gravity	Freezing Point
1.150 discharged	16° F. (above zero)
1.215 half discharged	— 4° F. (below zero)
1.275 fully charged	—56° F. (below zero)

When Adding Water in Winter

Do not add water to battery while machine is idle, for water may freeze before it is mixed with solution. When necessary to add water, always do it just before starting for a ride, so water will be thoroughly mixed with solution.

Winter Storage

If a machine is taken from service for more than a month, remove battery, have it fully charged, and store it in a cool, dry place. While battery is out of service, have it given a freshening charge at least every two months. Inspect it occasionally to see that solution is above the plates.



Illus. 20—Magneto

1—Point adjusting screw lock nut; 2—Interrupter cam for rear cylinder; 3—Adjustable contact screw with which the gap between points can be adjusted; 4—Interrupter points; opened and closed at the proper time by cams 2 and 14; when held at their widest opening by either of the cams, the gap between points should be .014 inch; 5—Interrupter lever contact point; 6—Brush holder retaining screw; 7—Interrupter housing cap retaining spring; 8—Interrupter lever; 9—Interrupter lever retaining spring; 10—Interrupter housing cap; 11—Short circuiting stud; 12—Short circuiting terminal to which a connection can be made, if desired to attach a handlebar short circuiting (cutout) switch; 13—Brush holder retaining screw; 14—Interrupter cam for front cylinder; 15—Interrupter housing lever (spark advance and retard lever); 16—Spark plug cable for front cylinder; 17—Spark plug cable for rear cylinder.

To Clean and Adjust Interrupter Points

Interrupter points require little attention and should not be tampered with as long as motor starts and runs satisfactorily. Illus. 20 shows how to get at the points. Simply move retaining spring 7 to one side, and then remove interrupter housing cap 10. Hard starting will be the first indication

that points need attention. If found dirty and pitted, clean and smooth them with a platinum point file. Don't file away any more of the points than absolutely necessary.

To adjust points, turn motor to a position where the fibre block in interrupter lever 8 is in the center of either of the two cams 2-14, in interrupter housing. The points will then be held at their widest opening. Loosen lock nut 1, and turn adjusting screw 3 as may be necessary, to adjust the gap between points to .014 inch. A gauge of the proper thickness is attached to magneto wrench in tool kit. After adjustment is completed, tighten lock nut 1.

Interrupter point gap must be accurately adjusted; otherwise, motor may start hard and miss. Don't allow oil to get on points; it will damage them and cause missing.

When replacing interrupter housing cap 10, be very careful that it is fitted in its correct position, indicated by key and keyway in the cap and housing.

Magneto Short Circuiting Device

When spark is fully retarded, a metal stud 11 (Illus. 20) protruding from interrupter housing cap 10, makes contact with the cap retaining spring 7, short circuiting the magneto. The motor, therefore, will not run or start with spark fully retarded. Use this method to stop a magneto equipped motor.

Locating Ignition Trouble

Before inspecting the magneto, when trying to locate the trouble in a motor that doesn't start and run properly, refer to "General Trouble Charts" and make sure that the trouble is not elsewhere than in the ignition unit. When certain that the trouble is ignition trouble, try new spark plugs and inspect spark plug cables for faulty insulation. Inspect for dirty, badly worn, or improperly adjusted interrupter points. Interrupter lever 8 (Illus. 20) must work freely. If its action is sluggish, remove it and polish its bearing. Remove brush holders, and inspect for badly worn brushes or cracked brush holders. Brush holders with brushes can be lifted out, after removing the retaining screws 6-13. See that collector spool and brushes are free from oil. An oily collector spool can be cleaned with a cloth moistened with gasoline, through brush holder openings.

If the above inspection shows everything apparently all right, but the magneto still refuses to function properly, have it inspected and tested at a Harley-Davidson service station or an authorized magneto service station.

GENERAL TROUBLE CHARTS

The following charts will serve as a guide, when trying to locate the trouble in a motor that doesn't start or run right.

Missing at High Speed

Missing at high speed is usually due to poor carburetion—carburetor not properly adjusted or some of the vital parts loose or worn out; however, it may be due to any of the following causes:

Defective spark plugs—porcelain cracked, point gaps adjusted wrong, or fouled and in need of cleaning. Try new plugs.

Gasoline pipe clogged, or the cock partly closed.

Air vent (small hole) in gasoline filler cap plugged.
Sticking valves, due to carbon in valve guides.
Broken or weak valve springs.
Valve tappets improperly adjusted. See page 9.
Circuit breaker points out of adjustment. See page 27.
Circuit breaker points worn away.
Insufficient breaker lever spring tension.
Defective ignition coil.
Discharged or broken down battery.
Loose wiring connections around battery, generator, ignition coil or cicuit breaker.
Chafed or poor insulation on wiring, causing a short circuit.
Magneto trouble. See page 30.

Missing at Low Speed

May be due to any one of the causes described under "Missing at High Speed," but more likely due to one of the following:

Loose manifold connections.
Carburetor throttle shaft badly worn.
Carburetor loose on manifold.
} Causing air leaks.

Spark plugs fouled, or their gaps improperly adjusted. See page 2.
Carburetor adjusted too lean or too rich.
Too much oil in crank case.
Poor compression, due to condition of piston rings and valves.

If the Motor Refuses To Start

Failure to start is likely due to one of the following causes:
No gas in tank, or gas not getting to carburetor.
Carburetor loose on manifold.
Carburetor adjusted too lean.
Fouled spark plugs; clean and adjust.
Defective spark plugs; try new plugs.
No spark; see if a spark will jump from ends of plug cables.
Dirty, worn out, or improperly adjusted circuit breaker points on the generator or magneto.
Storage battery discharged; see if lamps will light.
Storage battery disconnected; look for loose wiring connections or broken wires; crank motor with ignition switch ON and see if ammeter indicates discharge, as it should, when circuit breaker makes contact.
Switch box not grounded. See page 25.
Damaged insulation on wiring causing a short circuit. (Ammeter would indicate heavy discharge.)
Magneto water soaked.
Defective ignition coil or magneto.
Compression release lever in wrong position. (Illus. 1.)
Valves or ignition timed wrong.
Clutch slips and prevents motor from being turned.
If it is impossible to turn the motor over with the starter, the trouble may be that the motor has been run without enough oil, until the pistons or piston rings have become seized in the cylinders.

See if you can locate any of the faults mentioned under "Missing at High (Low) Speed."

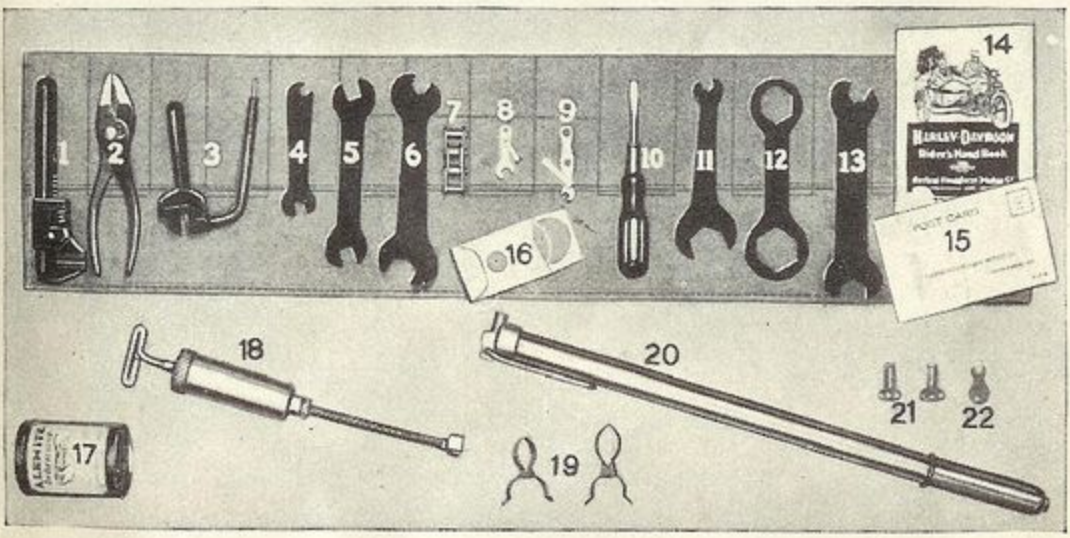
If the Motor Shows Loss of Power and Overheats

Overheating and loss of power are likely due to one of the following causes:
Spark lever does not advance all the way.
Improper carburetor adjustment; probably adjusted too lean.
Excessive carbon deposits in combustion chambers.
Poor compression due to bad valve seats, worn out piston rings, or scored cylinders.
Weak exhaust valve springs.
Valve tappets not adjusted properly; probably too close.
Defective spark plugs.
Clutch slips or brake drags.
Gear ratio too high for the locality or kind of service; see table of gear ratios on page 6. If you use a sidecar or package truck, be sure you have a heavy duty motor and the right gearing.

A poor grade of lubricating oil is being used.
Either too much or not enough oil in crank case; drain and give fresh supply. See page 8.
Bad air leak around carburetor, manifold or inlet valve housings.
Muffler clogged; keep the slots cleaned out. See page 21.
Valves or ignition improperly timed.

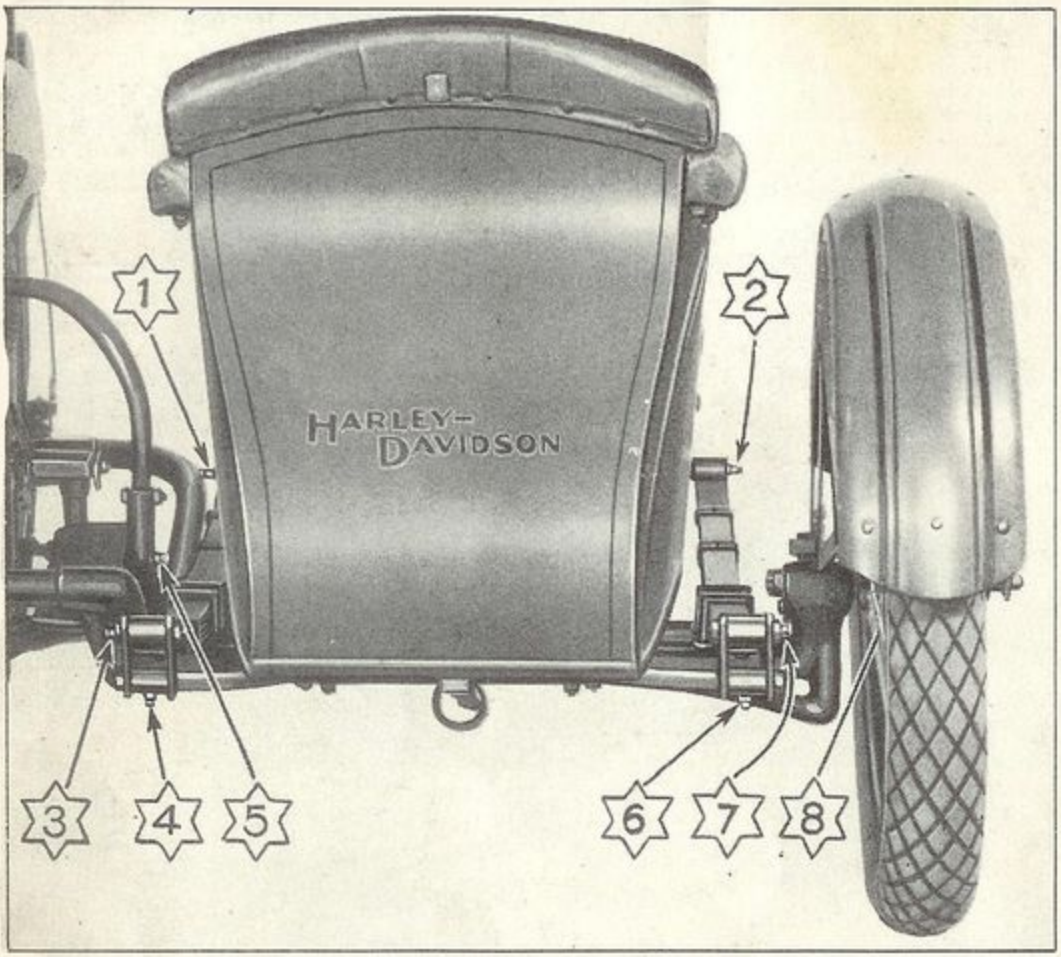
Back Firing or Popping in the Carburetor

Motor not sufficiently warm.
Carburetor chocking device set in running position too soon.
Carburetor adjustment wrong; mixture too lean.
Inlet valve tappets adjusted too tightly.
Exhaust valve tappets adjusted too loosely.
Weak inlet valve springs.
Faulty ignition or ignition timed wrong.
Muffler clogged.
Circuit breaker points too close.



Illus. 21—Tool Kit Furnished with New Motorcycles

1—Monkey wrench; 2—Pliers; 3—Chain repair tool; 4—Wrench for valve tappets, also fits various small nuts; 5—Wrench for rear axle adjusting screws and lock nuts, cylinder base nuts, gas pipe nuts, and clutch pull rod lock nut; 6—Wrench for transmission clamp nuts and transmission oil filler plug; 7—Chain repair links; 8—Circuit breaker point adjusting wrench (furnished with generator equipped models only); 9—Bosch magneto interrupter point adjusting wrench (furnished with magneto models only); 10—Screw driver; 11—Wrench for valve spring cover, valve tappet, and various small nuts; 12—Spark plug wrench; 13—Wrench for front and rear wheel axle nuts; 14—Rider's Hand Book; 15—Registration card; 16—Tire patches; 17—Alemite grease; 18—Alemite grease gun; 19—Pump fastening clips; 20—Tire pump; 21—Ignition and light switch keys; 22—Tool box key.



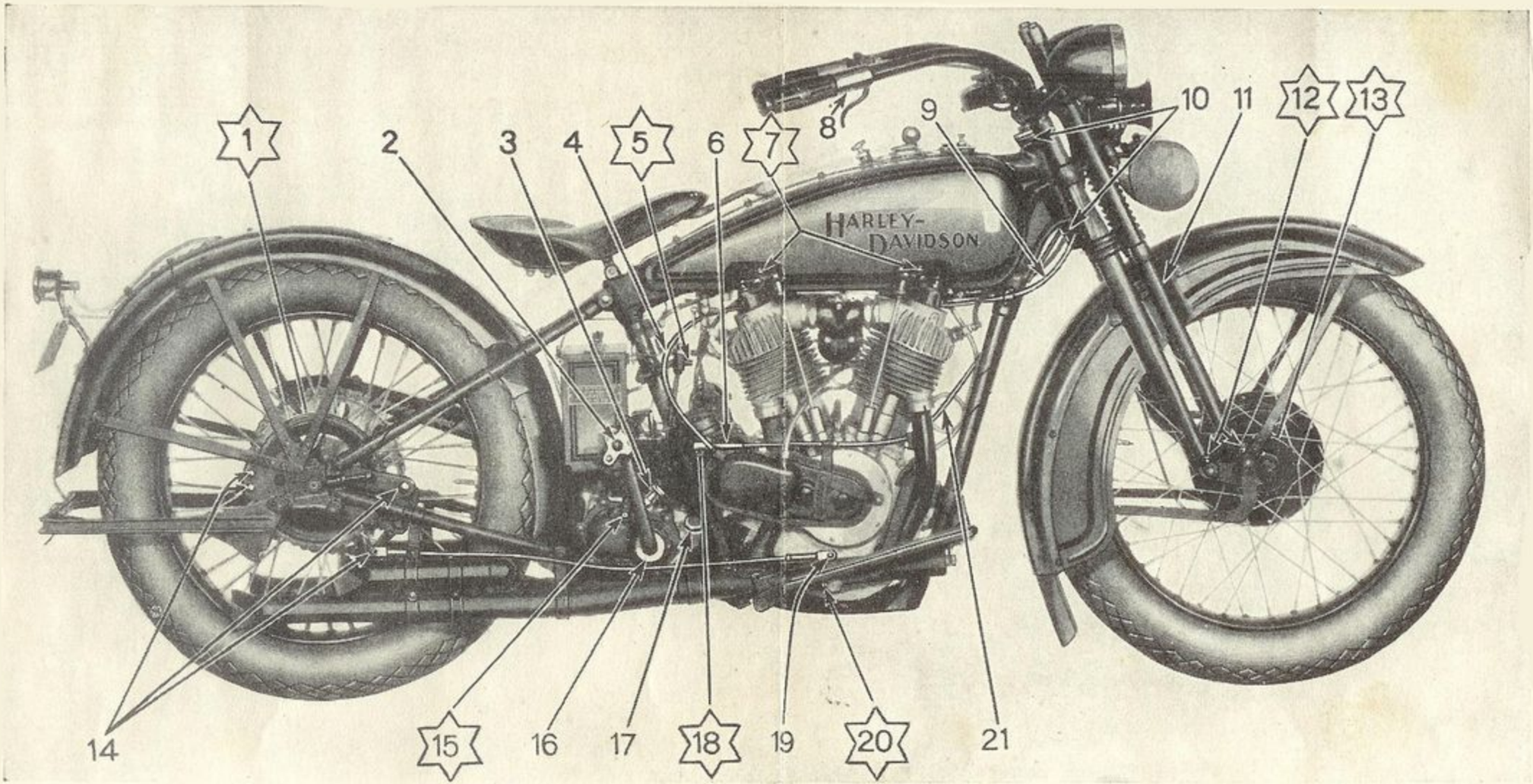
Illus. 22—Sidecar Lubrication Chart

Alemite Every 500 Miles

1-2-3-4-6-7—Spring bearings; 5—Frame brace lower bearing; 8—Wheel bearings.

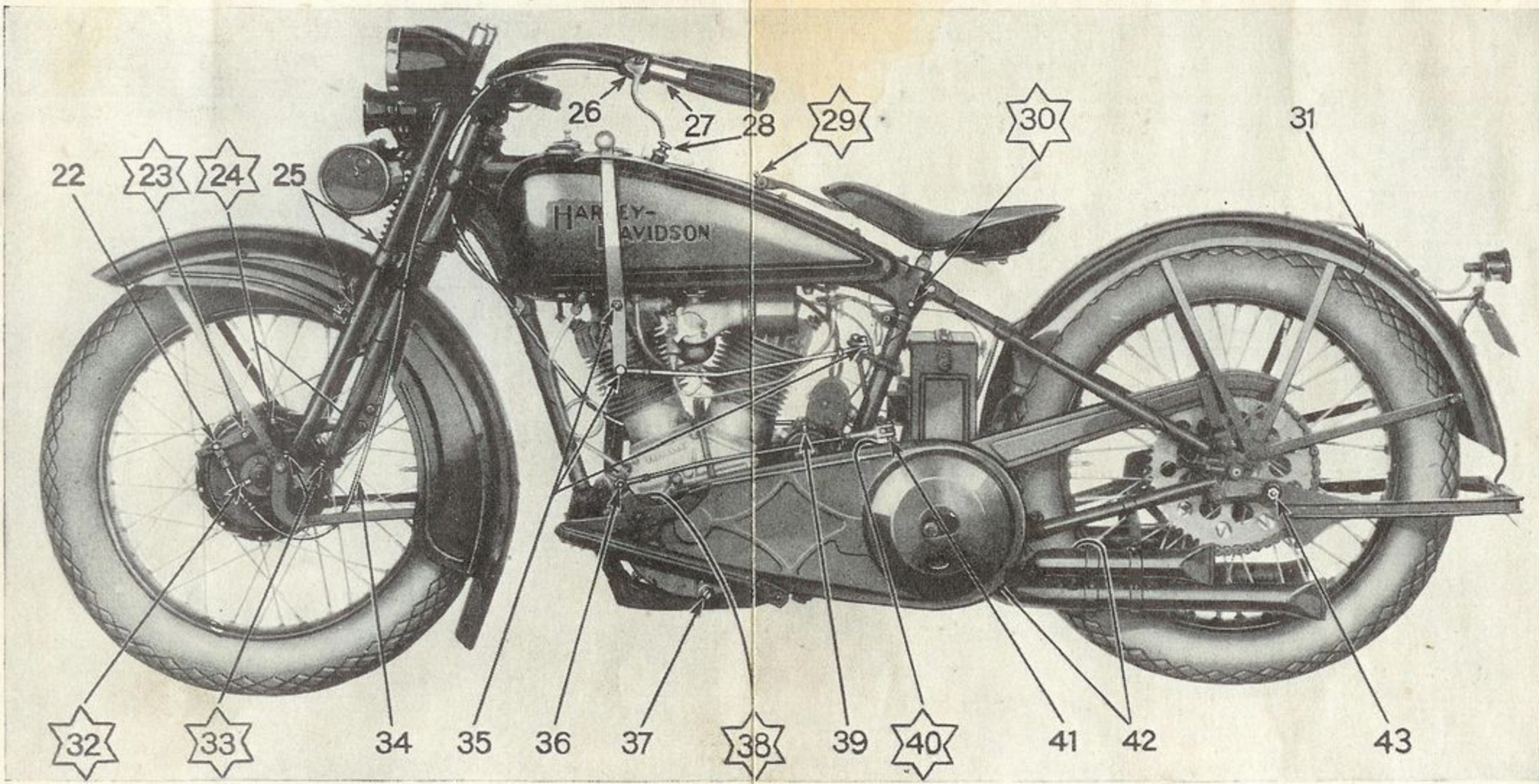
Care of Sidecar Wheel

Inspect wheel bearing adjustment every 1000 miles and re-adjust if necessary. Bearings will be damaged if allowed to run too loose. Adjust cone so there is about $\frac{1}{32}$ inch play at rim of wheel. Keep hub well greased with Alemite as per lubrication chart.



Illus. 23—Right Side Lubrication Chart. ★Stars Indicate Alemite Connections

Lubricate With	No.	Part of Motorcycle
Alemite ..... Twice a week	7	Inlet levers
Alemite ..... Once a week—or at 500 mile intervals when this distance is covered in less than a week.	12	Fork rocker bearings
	5	Gear shifter shaft bearing
	15	Clutch lever bearing
	20	Brake pedal bearing
Alemite Every 500 miles	1	Rear wheel bearings
	13	Front wheel bearings
	18	Timer shaft (requires little grease)
Pack with grease	8	Right handlebar grip (See page 21)
Once or twice a year	10	Frame head bearings
	11	Fork springs
Motor oil ..... Every 500 miles	2	Starter pedal bearing
	3	Starter gear adjuster
	4	Oiler control cable
	6	Spark control sleeve
	9	Throttle control cable
	14	Brake band studs and rod clevis joint
	16	Starter crank bearing (Put oil on spring)
	17	Transmission case (See page 14)
	19	Brake rod clevis joint
	21	Spark control cable



Illus. 24—Left Side Lubrication Chart. ★Stars Indicate Alemite Connections

Lubricate With	No.	Part of Motorcycle
Alemite ..... Once a week or at 500 mile intervals when this mileage is covered in less than a week.	23	Front brake operating lever stud
	32	Front brake cover bushing
	33	Fork rocker bearings
	38	Clutch pedal bearing
Alemite ..... Every 500 miles	24	Brake shackle bearings
	29	Seat bar hinge
	30	Seat post
	40	Transmission main bearing

Lubricate With	No.	Part of Motorcycle
Grease ..... Once or twice a year	25	Fork springs
	27	Left handlebar grip (See page 21)
Harley-Davidson Chain Lubricant Every 1000 miles	42	Front and rear chains (See page 16)

Lubricate With	No.	Part of Motorcycle
Motor oil ..... Every 500 miles	22	Front brake clevis joint
	26	Front brake hand lever bearing
	34	Front brake control cable
	35	Shifter control joints
	36	Clutch rod connection at pedal
	39	Generator end bearing (See page 23)
	41	Clutch rod clevis joint
Motor oil ..... Occasionally	31	Rear mudguard hinge
	43	Stand hinge bearing
See page 8	28	Hand oil pump
	37	Crank case drain plug

Your Harley-Davidson Dealer Is Always at Your Service

YOUR Harley-Davidson dealer wants you to get the thousands of carefree miles of riding joy that were built into your motorcycle at the factory. He is ready to help you at any time should an emergency arise.

He has special factory designed shop tools. These tools enable him to do a better job in less time and for less money. This is a service that only an authorized Harley-Davidson dealer can give you.

Most Harley-Davidson dealers or their mechanics are graduates of the factory service school. They are trained experts and know exactly how to take care of your Harley-Davidson.

Your dealer sells only Genuine Parts that are designed by Harley-Davidson engineers and are built to fit and to withstand the wear they get in service. For the protection of Harley-Davidson riders the following Genuine Parts are put up in trade-mark sealed, orange and black packages. Get your parts from your Harley-Davidson dealer.

These Genuine Harley-Davidson Parts are sold in sealed Orange and Black Packages

1. Fork Springs
2. Inlet Valves
3. Inlet Housings
4. Exhaust Valves
5. Inlet Valve Springs
6. Exhaust Valve Springs
7. Tank Caps
8. Bronze Crank Case Bushings
9. Flywheel Shafts
10. Roller Bearings
11. Pistons
12. Piston Rings
13. Piston Pins
14. Piston Pin Bushings

Our trademark is placed on the center of the jar on every Genuine Harley-Davidson Battery.

Harley-Davidson Motor Co.

Milwaukee, Wisconsin, U. S. A.