

# **HARLEY- DAVIDSON**

## **Rider's Hand Book**



**HARLEY-DAVIDSON MOTOR Co.**  
**MILWAUKEE, WIS., U.S.A.**

**45 TWIN MODEL**

Price 50 Cents Price 35 Cents

Barnstormers Co. N.Z.



# INDEX

Alemite Lubrication System .....	38
Ammeter .....	32
Battery .....	34 to 36
Brakes .....	23
Carburetor .....	16 to 18
Care of Motorcycle .....	7 to 9
Carbon Removing and Valve Grinding .....	11 to 14
Chains .....	21 and 22
Circuit Breaker Points .....	34
Clutch and Its Control .....	19 to 21
Controls (General) How To Operate .....	4 to 7
Controls (Throttle, Oil Pump, and Spark), To Connect and Adjust .....	27 and 28
Electrical System; Generator—Ignition Unit—Battery .....	29 to 36
Flushing Crank Case .....	11
Gasoline, Recommended .....	3
Gear Shifter Controls, Adjustment .....	21
Gear Ratios .....	1 and 2
Generator, Charging Rate Adjustment .....	31
Headlamp .....	33
Horn .....	33
License Data .....	1
Lock .....	2
Lubrication of Motor .....	2 and 3; 9 to 11
Lubrication of Transmission .....	18
Lubrication Charts .....	39 and 40
Muffler .....	29
Oil .....	2; 9
Oil Pump, Hand .....	10 and 11
Oil Pump, Mechanical .....	9 and 10
Operating Motorcycle on the Road .....	6 and 7
Seat Post, Adjustment .....	28 and 29
Spark Plugs .....	3
Starting the Motor .....	5 and 6
Starting with a Discharged Battery .....	34
Switch, Ignition and Lighting .....	32 and 33
Switch, Cutout (Relay) .....	31 and 32
Tanks, Capacity .....	3
Timing Motor .....	15 and 16
Tires .....	2; 26 and 27
Tools .....	38
Transmission .....	18 to 21
Trouble Charts .....	36 and 37
Valve Tappet Adjusting .....	14 and 15
Wheels .....	24 to 26
Wiring Diagram .....	30

# Foreword



HIS Hand Book contains the necessary information to enable you to give your Harley-Davidson the proper care. Follow instructions closely, and you will be sure of best performance from your motorcycle.

It is not intended that this Hand Book 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 are not covered by this Hand Book, get in touch with your dealer.

Return your registration card to the factory promptly, and thus assure yourself of full benefit of the Harley-Davidson guarantee. Furthermore, when we receive this card, your name will be placed on our mailing list to receive the "Harley-Davidson Enthusiast," the magazine for Harley-Davidson riders.



## License Data

Number of cylinders .....	2
Cylinder bore (69.85 mm.) .....	2 3/4 inches
Piston displacement (739.46 c. c.) .....	45.12 cu. in.
Stroke (96.85 mm.) .....	3 1/8 inches
Horsepower (N. A. C. C. Rating) .....	6.05
Wheel Base .....	57 1/2 inches
Weight (Solo Motorcycle) .....	430 lbs.

## Motor Number

The motor or serial number is stamped on left crank case. When ordering parts or making any inquiry regarding your motorcycle always mention complete motor number.

## Gear Ratios

Model	Motor Sprocket	Clutch Sprocket	Counter-shaft Sprocket	Rear Wheel Sprocket	High Gear Ratio
Solo .....	33	59	16	41	4.58 to 1
Sidecar .....	29	59	16	41	5.21 to 1
Servi-Car .....	26	63	16	37	5.6 to 1



## To Determine Gear Ratio

Gear ratio is the number of motor revolutions to one revolution of the rear wheel. It can be determined by dividing the product of the number of teeth on rear and clutch sprockets, by the product of the number of teeth on engine and countershaft sprockets.

$$\text{Example } \frac{59 \times 41}{33 \times 16} = 4.58 \text{ to 1 Gear Ratio}$$

## Tire Inflation Pressures

Solo service—Front, 16 lbs.—Rear, 18 lbs.

Sidecar service—Front, 16 lbs.—Rear, 20 lbs.—Sidecar, 16 lbs.

Servi-Car—Front, 18 lbs.—Rear, 20 lbs.

Tire inflation pressures given for solo service apply to motorcycle used under normal conditions with a rider of average weight (150 lbs.).

Pressures given for sidecar and Servi-Car apply to motorcycle used under normal conditions with a rider of average weight (150 lbs.), and an average load (150 lbs.).

Tire pressures should be increased in proportion to any increase in normal load.

For maintained high speed driving, it is advisable to increase pressures, as given above, about 2 lbs. per tire.

## Steering Head Lock

The steering head lock, located on right side of frame head, provides a means of protection against theft of motorcycle while parked. To lock, insert key and turn it to the left; at same time, turn, handlebars to left until lock plunger drops into place. Handlebars, then cannot be turned. Form the habit of removing key immediately after locking or unlocking. In case both keys furnished with motorcycle become lost, others can be obtained from a Harley-Davidson dealer.

## 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 normally 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.

## Give New Motor Pumpful of Oil Before Starting

Inject a pumpful of oil into motor with hand pump, before starting. This applies only to starting a new motor the first time, as thereafter the mechanical oil pump will supply motor with all the oil required for ordinary service. See page 10.

## Recommended Gasoline

Benzol blended gasoline (about 50% benzol), Ethyl gasoline, or other equally good "anti-knock" gasolines are recommended as better motor fuels than straight gasoline. Straight gasoline can be used satisfactorily for ordinary service; however, a motor will run much cooler with little if any detonating (heat knocking), and will perform better under all service conditions, using anti-knock fuel exclusively. This applies particularly to high compression motors.

## Filling Gas and Oil Tanks

The right side tank is the main gas tank; left side rear tank is the reserve gas tank; left side front tank is the oil tank. Respective capacities are as follows:—21, 8½ and 9 pints. The oil tank has no shut off. Each gas tank is provided with a shut-off cock. See that main tank cock is open before proceeding to start motor. Cock is open when handle is in alignment with gas pipe. The reserve tank is usually kept shut off for emergency use.

## Use the Recommended Spark Plug

Good motor performance depends on good spark plugs. The plugs furnished by the factory in new motors and for replacements 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.

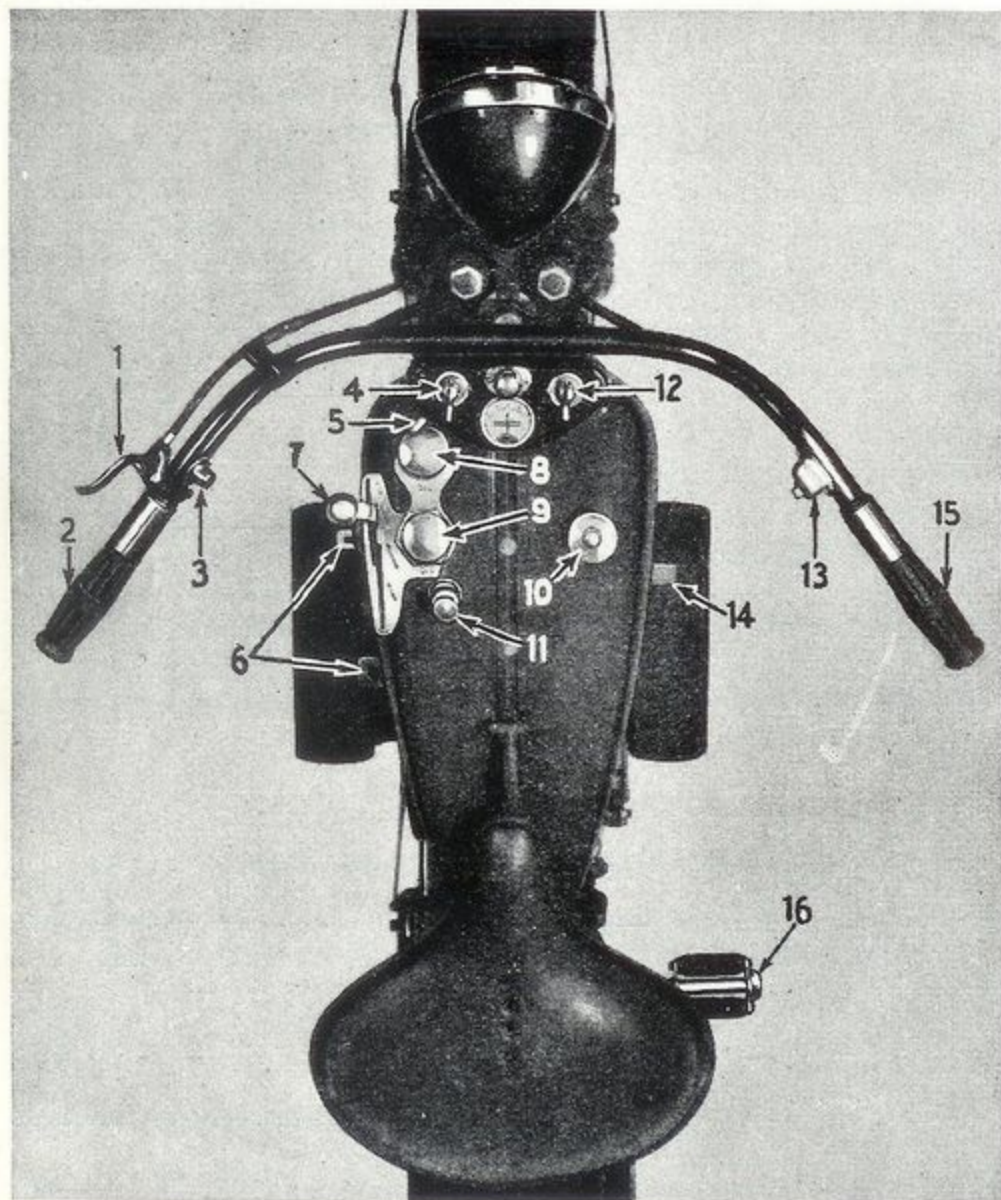
Keep spark plugs clean and the gap between the points adjusted to about .030 inch.

It is not advisable to take a plug apart for cleaning, because of the possibility of imperfect re-assembly resulting in leakage around the core gasket, especially when the original gasket is re-used. A leaky plug will cause overheating and pre-ignition. Usually a fouled plug can be cleaned effectively by simply brushing the soot from the core end with a fine wire brush and then washing it out with gasoline. Take apart only when absolutely necessary.



## OPERATING INSTRUCTIONS

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



Illus. 1—Controls

1—Front brake hand lever; 2—Spark control grip; turn inward to advance spark; turn outward to retard spark. Fully advanced is the proper normal running position. When motor is laboring under a hard pull, retard part way for better performance and to avoid knocking. Some motors start best with slight retard; 3—Horn button; 4—Ignition switch; insert key and turn as per markings on panel; 5—Steering damper

(special equipment); move to right to increase steering friction; move to left to relieve steering friction; 6—Clutch pedal; rock backward to release clutch; rock forward to engage clutch; 7—Gear shifter lever must be in neutral position with clutch engaged when starting motor. Clutch must be fully released before shifting from one position to another; 8—Oil tank cap; 9—Reserve gas tank cap; 10—Main gas tank cap; 11—Hand oil pump; see "Use of Hand Oil Pump"; 12—Main lighting switch; insert key and turn as per markings on panel; 13—Handlebar thumb switch; see "The Ignition and Lighting Switches"; 14—Rear brake pedal; 15—Throttle (carburetor) control grip; turn outward to close throttle; turn inward to open throttle; 16—Starter crank pedal; kick downward with vigorous strokes when starting motor.

## Starting Motor

In every case, when starting motor, the gear shifter lever must be in NEUTRAL and the clutch fully engaged. Spark should be fully advanced, or nearly so. When priming, the ignition switch should be OFF.

1. STARTING A COLD MOTOR: Keep the throttle closed, or only slightly open, except when priming *with choke fully closed*, at which time throttle may be opened. Set choke lever 1 (Illus. 7) at  $\frac{2}{3}$  closed or fully closed (PRIME) position, depending on weather conditions. Kick down the starter once or twice to prime cylinders. Then, move choke lever downward to  $\frac{2}{3}$  or  $\frac{1}{2}$  closed position, depending on 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.

As soon as motor starts, open the throttle just far enough to keep it running while warming up or until ready to set motorcycle in motion.

As the motor warms up and misfires, due to an over-rich mixture, gradually move choke lever downward. After motor has thoroughly warmed up, move choke lever to OPEN position (all the way down).

2. STARTING A WARM MOTOR: (This applies to a motor halfway between hot and cold). Lift choke lever to  $\frac{1}{3}$  closed position (1st upward position) and with throttle closed, kick the starter down once or twice. Then, set throttle about  $\frac{1}{4}$  to  $\frac{1}{3}$  open, turn ignition switch ON, and kick the starter down quickly. Soon after motor starts, the choke lever should be moved back to full open position. Remember, this starting procedure calls for having the throttle part way open during the starting strokes after switch has been turned ON.

3. STARTING A HOT MOTOR: If motor has been shut off for only a brief period and is at about normal running temperature, it is not necessary to use choke lever. Simply close the throttle, turn ignition switch ON, and kick the starter down quickly. With some motors, depending on carburetor adjustment, hot starting is more dependable if the starter is given one stroke before turning ignition switch ON.

When a hot motor does not start readily, that is, with two or three starting kicks, it is usually due to an over-rich (flooded) condition, and the proper procedure is to open the throttle wide so that more air can enter; closing it quickly as motor starts.



## Cold Weather Starting

To facilitate starting *in very cold weather*, when it becomes difficult to crank motor, prime the cylinders by injecting a small amount of gasoline directly into each cylinder, through priming cocks. A priming gun can be obtained from your dealer.

## To Stop Motor

Stop motor by turning the ignition switch OFF. If 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.

## To Start and Stop Motorcycle on the Road

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

After motor is started, keep gear shifter lever in NEUTRAL and clutch engaged until you have straddled motorcycle.

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. *Note—In shifting into LOW, it will occasionally be found that the gears will not go into mesh readily, due to their alignment. In this case, either operate the starter crank, or move motorcycle until the gears line up properly.*

2. After motorcycle 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. After shifting, engage clutch slowly and at same time open throttle slightly.

3. After motorcycle 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 the same time close throttle. Then, pull shifter lever all the way back to HIGH, and steady it in this position for a moment with left hand while engaging clutch, or until you feel high gear go into mesh. Engage clutch slowly, and at same time open throttle slowly until desired speed is attained.

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

With a little practice, you will operate 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 motorcycle 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 at the same time. As clutch is released, throttle must be closed.

Don't look down at controls when shifting; it is a dangerous practice. Learn to shift without taking your eyes from the road.



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

## IMPORTANT SUGGESTIONS FOR CARE OF MOTORCYCLE

Don't run a new motor for long distances in low or second gear, nor faster than 35 miles per hour the first 250 miles; 40 miles per hour the second 250 miles; 45 miles per hour the next 500 miles. Driving at moderate speeds during first 1,000 miles, particularly if motorcycle is attached to sidecar, avoids damage to motor and adds to its performance and life. However, it is not necessary to drive altogether at extremely low speeds and neither is it advisable, because doing so permits rapid and excessive accumulation of carbon and gummy deposits in cylinder heads and around valves.

Use only the recommended spark plug and renew occasionally if motor performance should become unsatisfactory. See page 3.

When filling oil tank, be careful that no foreign matter which 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, sticky valves, and forms carbon rapidly. See page 10 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 motorcycle 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 11.

Use genuine Harley-Davidson oil in motor and transmission.

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

Keep the muffler outlet cleaned out and open. See page 29.

Never shift gears until clutch has been fully released.

Keep drive chains properly adjusted. See pages 21 and 22.

Follow carefully the instructions on care of battery. See page 34.

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

*After a new motorcycle has been run about 500 miles, go over all bolts that fasten motor in frame, also cylinder base stud nuts, and re-tighten them as securely as possible.*

## Cleaning and Polishing Motorcycle

Wash enameled parts with a sponge and cold or luke warm water, or if very dirty, use soap and water. Do not use hot water or steam as either is injurious to enamel—varnish finish. To avoid scratching of enamel when motorcycle is in muddy condition, apply water liberally before starting to wash with sponge and also while washing. When soap is needed, use a soap especially prepared for enamel

washing, or at least one that contains no lye—Ivory Soap is suitable. Carefully rinse off all traces of soapy water with clear water.

After washing is completed, dry thoroughly with a chamois, and polish with a good quality polish.

Gasoline or kerosene may be used for cleaning motor, transmission, wheel hubs, and other miscellaneous fittings that accumulate considerable oil or grease. Do not, however, use either gasoline or kerosene on principal 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 page 2.

### **What To Do Every Week**

Check over motorcycle for loose bolts and nuts.

Adjust drive chains, if necessary. See pages 21 and 22.

Add oil to transmission, if needed. See page 18.

Add distilled water to battery, if needed; don't overfill. See page 35.

Grease or oil all bearings requiring periodic lubrication, as per Lubrication Charts on pages 39 and 40. Do this oftener than once a week, if weekly driving totals over 500 miles.

### **What To Do Every Two Months**

Inspect and if necessary, adjust valve tappets. See page 15.

Inspect, clean, and if necessary, adjust ignition circuit breaker points. See page 34.

Inspect and where necessary, tighten wheel spokes.

Clean rear drive chain, and treat with Harley-Davidson Chain Grease. See page 21.

Drain old oil out of crank case and replace with fresh oil. This should be done at least every 750 miles. See page 11.

Empty and clean gasoline strainer. See page 18.

To keep a motor performing at its best, it is necessary to remove carbon and grind valves at intervals, depending upon kind of service motorcycle is used for and mileage covered. The need for this attention will be indicated by motor knocking and loss of power and speed.

Cleaning carbon and grinding valves are minor service operations that can be done in a short time at an authorized Harley-Davidson service station or, if desired, the rider can give this attention. See "Removing Carbon" and "Grinding Valves".

### **What To Do Every Year**

Remove and clean muffler inside thoroughly. See page 29.

Have battery inspected, tested, and given necessary attention, at an authorized Harley-Davidson service station. If impossible to get to a Harley-Davidson service station, go to some thoroughly reliable battery shop.

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



## MOTOR LUBRICATION

Motorcycle motors, because they are air cooled and work normally 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 any quantity desired in sealed and trade-marked one quart 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 directly from the factory.

Harley-Davidson oil is furnished in three grades—*Medium Heavy*, *Regular Heavy*, and *High Speed Special*.

*Regular Heavy* oil is recommended for all year around use, if winter weather is not very severe. In localities where winter temperature goes down to 15 to 20 degrees F. (above zero) and remains quite consistently at or below this point for a time, it is advisable to change to *Medium Heavy* oil during the extremely cold period. This not only safeguards against possible congealing of oil, but also starting will be easier, and lubrication will be better during the starting and warming up period. *Medium Heavy* oil is a safe lubricant for any ordinary service not involving much high speed driving.

*High Speed Special* oil is intended for summer lubrication of motors subjected to more than normal 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 localities where winter weather becomes extremely cold, attention has to be given to possible congealing of oil, even though *Medium Heavy* oil is used. If it is found that oil becomes congealed in tank, the matter of thinning 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 "Adjusting Throttle, Oil Pump, and Spark Controls").

There is no shut-off in oil line between tank and pump, and therefore, if tank is kept supplied with oil, motor will always be

getting oil when running. Be careful that no dirt or foreign matter that might clog oil line gets into tank.

In addition to supplying motor with oil, the mechanical pump also supplies, through a secondary outlet that discharges into crank case breather pipe, the oil required for lubrication of front drive chain. Oil is blown onto chain by breather exhaust.

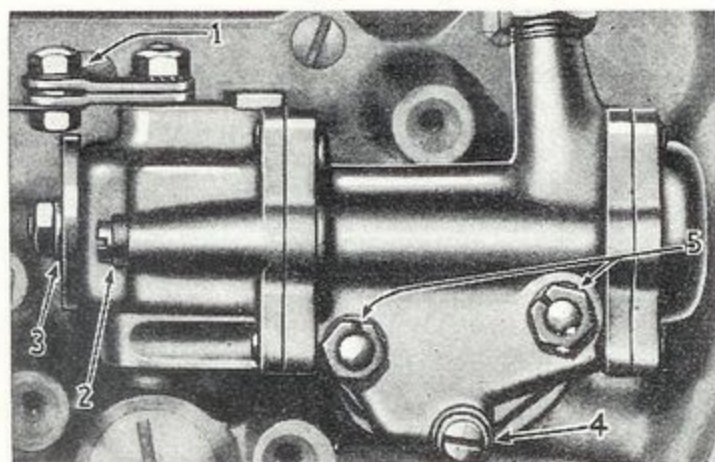
Pump is carefully adjusted at the factory for normal lubrication requirements and it is not likely that re-adjustment will be found necessary. Readjustment can be made as follows:

*Low and moderate speeds*—Screw 2 (Illus. 2) with several washers under its head. Add thin (.002 inch thick) washers for more oil—take off washers for less oil. Add or take off only one or two thin washers at a time. Do not take off heavy washers as doing so will shut off this adjustment too far for safety.

*High speed*—Adjusting plate 3. Loosen lock nut and shift according to marking on plate. Do not change this adjustment more than  $\frac{1}{8}$  inch at a time. A mark cut in pump body indicates original factory setting.

*Front chain oiling*—Screw 4 with several washers under its head. Add thin washers for more oil—take off thin washers for less oil. Add or take off only one or two washers at a time.

Normal oil consumption depends entirely on driving speed. A motorcycle driven at low speeds the majority of the time may run 1,000 miles per gallon; while one driven considerably at high speeds may run only 400 miles or less. The average is about 700 miles per gallon.



Illus. 2—Mechanical Oil Pump

1—Control lever; 2—Adjusting screw for low and moderate speeds; 3—Adjusting plate for high speed; 4—Adjusting screw for front chain oiling; 5—Pump fastening nuts (secure pump to gear case cover).

## Use of Hand Oil Pump

When a motorcycle is used in average service, it is only necessary to use the hand oil pump for flushing crank case and injecting a 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  $\frac{1}{2}$  pumpful every two miles.

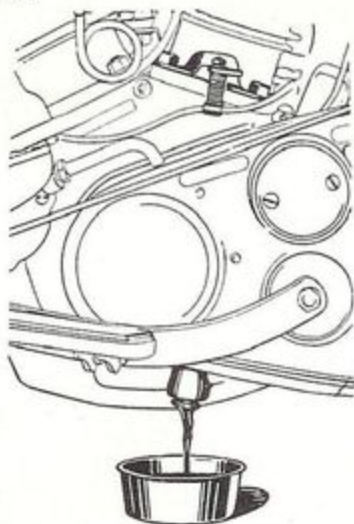
## Draining and Flushing Crank Case

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

To drain oil from crank case, press downward on drain valve rod at base of rear cylinder on left side of motor, and turn lever on top end until it catches under bracket attached to cylinder base as shown in Illus. 3.

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

Close drain, inject  $2\frac{1}{2}$  pumpfuls of oil into case, and motor is again ready for service.



Illus. 3  
Draining Crank Case

## Summary of Lubrication Rules

1. Use the hand oil pump at regular intervals when motor is running at, or near, its top limit.
2. Develop the habit of occasionally snapping throttle shut for an instant when running at high speeds. This will draw additional lubrication to pistons and cylinder walls.
3. Do not run a motorcycle in sidecar service wide open for long distances, without giving close attention to lubrication, and also over-heating conditions that may develop due to bad spark plugs or the need of a general tuning-up. This applies particularly to a motorcycle equipped with handlebar windshield.
4. 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.
5. Use Harley-Davidson oil exclusively, winter and summer.

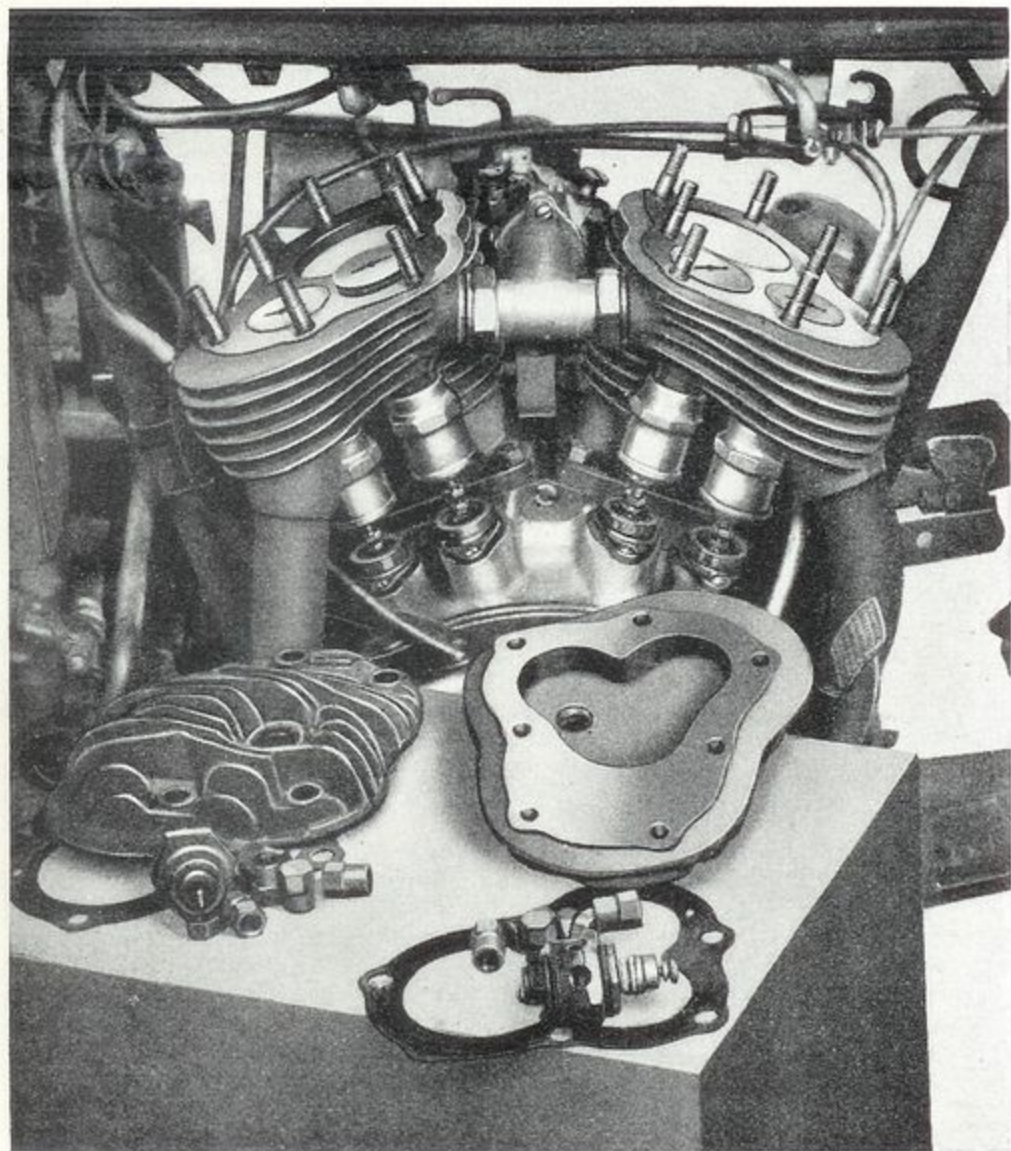
## GENERAL MAINTENANCE

### When and How To Remove Carbon and Grind Valves

Remove carbon from cylinder and piston heads, and if necessary grind valves, when motor indicates by knocking and loss of power that this attention is needed. Without removing motor from the frame or disturbing gas and oil tanks, the cylinder heads can be taken off in a short time, exposing piston heads and valves. With cylinder heads removed, valves can be taken out if desired, or cylinders can be lifted off to permit inspecting pistons and rings. The operations in connection with removing carbon and grinding valves are explained below.

### Removing Cylinder Heads

Illustration 4 shows better than words can explain how cylinder heads are removed. After taking out the spark plugs, remove the seven head clamp nuts from



Illus. 4—Cylinder Heads Off To Allow Removing Carbon

each cylinder; also remove cylinder head brace. If odd fittings, such as the carburetor air intake, gear shifter rod, etc., are first removed, some of the head clamp nuts will be more accessible. *CAUTION: Remove cylinder heads very carefully to avoid damaging copper gaskets and the smoothly ground surfaces of the cylinder and head joints. Any scratches or other damage to gaskets or joint surfaces may make it difficult to obtain compression and oil-tight joints when heads are re-assembled on cylinders.* Mark one gasket with chalk or pencil to indicate which cylinder it belongs with, so that gaskets can be replaced as they were originally fitted.



## Removing Carbon

A screw driver, a knife, or some other sharp edged instrument will serve as a carbon scraper. Scrape carbon from cylinder heads, and then from the piston heads and from around the valves. When removing carbon from either cylinder and piston, the piston should be at the top of stroke. Be careful not to deeply scratch or nick the ground surfaces of cylinder and head joints, and the heads of pistons. While scraping carbon, some carbon dust will work down between cylinder and piston above the top piston ring. To remove this, lower piston about an inch, and with a clean cloth, wipe cylinder wall clean. Repeat this operation until certain that all carbon dust has been wiped out.

Next, inspect the valves as explained below.

## Removing and Examining Valves and Valve Springs

Ordinarily, valves will not need attention oftener than when cylinder heads are removed for carbon cleaning, and probably not as often; however, if at any time the motor loses its compression, first make sure that it is not due to tappets being adjusted too tight, and then remove cylinder heads and inspect valves, seats, and springs.

While it is possible to inspect and grind-in valves without removing gas and oil tanks, it is much more convenient to give this attention with tanks off. The valves can be more easily lifted out for inspection, cleaning, and refacing if necessary, and grinding-in is made easier.

To take out a valve, loosen and lift valve spring cover, pry spring collar upward with special Harley-Davidson spring compressor or a screw driver, and remove split retaining ring that keeps the spring collar in place. The valve can then be lifted out of cylinder. With valve out, the spring and collar can be removed. Be careful that paper gasket between valve spring cover and tappet bushing does not become lost or damaged.

The inlet valves are those next to the carburetor, and they are marked "IN"; exhaust valves are marked "EX". The valves are of different materials and therefore are not interchangeable.

Examine valves and seats closely. Valves must seat perfectly for good motor performance. Any leakage by them means overheating and loss of power. If there are any carbon deposits on valves or seats, or if valves appear burned and pitted, they should be ground in. If, however, valves and seats appear clean and free from carbon, and valves seem to seat perfectly, it is not necessary to grind them.

If any of the valve springs appear weak or measure less than  $2\frac{3}{4}$  inches long, replace with new springs.

## Grinding Valves

First, thoroughly clean and polish each valve, particularly the stem. Put a small amount of grinding compound on valve face (a carborundum and oil compound—preferably Harley-Davidson—is recommended). Make sure that valve tappet is in its lowest position and then drop valve back into its place in cylinder. Note that there is ample clearance between valve stem and tappet to allow for valve lowering a trifle as a result of grinding-in. Using a screw driver in slot in valve head, and pressing down lightly, turn the valve back and forth, lifting it and dropping it back

onto its seat occasionally. It is important that valve grinding be done in this manner to avoid cutting rings or grooves in valve face and seat. (The grinding operation is somewhat easier if a very light coil spring, just strong enough to lift the valve away from its seat, is fitted over the valve stem between the valve head and the guide in cylinder). It may be necessary to add fresh grinding compound several times, depending on the condition of the valve.

If valve faces and seats are in very bad condition—burned and pitted or warped out of true, it is advisable to have them refaced at a Harley-Davidson service station where necessary refacing tools are at hand. Cylinders must be removed for refacing of seats.

Grind each valve until, when washed off with gasoline, both the valve face and the valve seat are smooth and bright all the way around. Wash every particle of grinding compound from the valves and valve seats, and flush out valve guides with gasoline or kerosene. After wiping all parts clean and dry, put a little oil on valve stems and re-assemble valves in cylinders.

After the valves are re-assembled in cylinders, replace cylinder heads and adjust valve tappets.

## Replacing Cylinder Heads

With a piece of very fine emery paper or sandpaper, rubbing with a rotary motion, thoroughly clean and polish the ground surfaces of each cylinder head joint. Use the same method to clean the copper gaskets. Before doing this polishing, insert a cloth into cylinder above piston to keep dust out. After polishing is completed, carefully blow and wipe all traces of sand or emery dust from the cylinders and the joint surfaces. Give the gaskets a light coat of motor oil on both sides and place them on cylinders. If the old gaskets are being used again, fitting them on the same cylinders from which they were removed will assure best results in getting head joints compression tight. If new gaskets are being fitted, they may be fitted on either cylinder the first time. It is not necessary to renew gaskets every time heads are removed. Ordinarily with careful treatment, they may be used several times.

Next, place heads on cylinders and after putting a little oil on the studs, turn the nuts on. The heads must be tightened down evenly and carefully in order to get tight joints. First, turn all of the nuts up just snug; then tighten each of them  $\frac{1}{8}$  to  $\frac{1}{4}$  turn at a time until they are pulled up tight.

After motor has been run a few miles, go over the head clamp nuts again and see that they are all tight. Do this while motor is normally hot.

## Valve Tappet Adjustment

To get the maximum power and best all-around performance from a motor, keep valve tappets properly adjusted. They must be adjusted after grinding valves, and should be inspected and, if necessary, re-adjusted about every 1,000 miles thereafter.

The important things to be remembered when adjusting tappets are: Motor must be cold. To be sure that a valve is fully closed and its tappet at the lowest position when adjusting clearance, turn motor until the like valve in the other cylinder is held wide open. Before replacing valve spring covers, inspect the paper gasket between each cover and tappet bushing. If broken or damaged, fit a new gasket to prevent an oil leak.

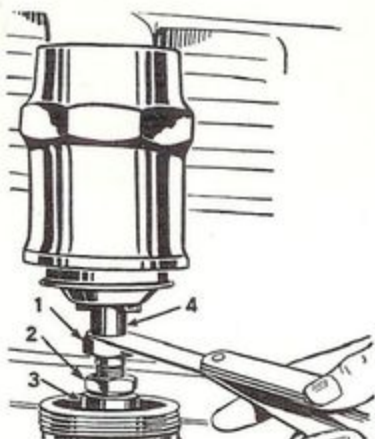


## Adjusting Valve Tappets

The inlet valves are those nearest the carburetor.

Adjust tappets so that there is .004 to .005 inch clearance between inlet valve stems and tappets, and .006 to .007 inch clearance between exhaust valve stems and tappets. An accurate thickness gauge should be used to measure these clearances. If no gauge is available, use one thickness of ordinary writing paper to gauge inlet tappet clearance, and two thicknesses of the same paper to gauge exhaust tappet clearance.

To adjust a tappet, loosen lock nut 2 (Illus. 5) slightly; then turn adjusting screw 1 in or out of tappet body as may be necessary to obtain proper adjustment. When adjustment is completed, securely tighten lock nut 2.



Illus. 5 Valve Tappet

- 1—Tappet adjusting screw;  
2—Adjusting screw locknut;  
3—Tappet; 4—Valve stem.

## Valve and Ignition Timing

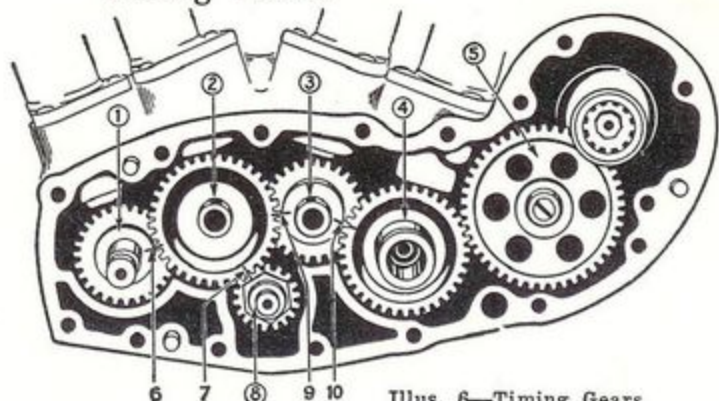
The valves are opened and closed at the proper time, and the ignition unit is timed to deliver a spark at the right moment, by means of a series of gears (Illus. 6) in timing gear case. All gears affecting timing are marked, so that in case it is found necessary for any reason to take them out, they can be replaced with timing correct. Motor cannot become out of time *as concerns the valves* unless the gears are tampered with. This applies also to ignition as long as the circuit breaker assembly is simply removed and replaced as a unit, when there is occasion to do so, without taking it apart. See "Timing Ignition".

To inspect the timing gears, it is first necessary to remove right footboard, oiler cover and front exhaust pipe, disconnect spark and oil pump controls, and remove oil pump supply pipe, circuit breaker assembly and gear case cover. Instructions for timing valves and ignition follow:

## Timing Valves

Rear inlet cam gear 2 (Illus. 6) is marked in 3 places, 6-7-9. Front inlet cam gear 3 is marked in 2 places, 9-10. The other two marked gears have only one mark each. Generator drive gear is not marked at all because it does not affect timing in any way. Note that some marks are on or between gear teeth, while others are on gear hubs.

Assemble gears in case with all marks in alignment, as shown in Illus. 6.



Illus. 6—Timing Gears

- 1—Rear exhaust cam gear; 2—Rear inlet cam gear;  
3—Front inlet cam gear; 4—Front exhaust cam gear; 5—  
Generator drive gear (not marked); 6—Marks on rear  
inlet cam gear and rear exhaust cam gear correctly  
aligned; 7—Marks on rear inlet cam gear and pinion gear  
correctly aligned; 8—Pinion gear; 9—Marks on rear inlet  
cam gear and front inlet cam gear correctly aligned; 10—  
Marks on front inlet cam gear and front exhaust cam gear  
correctly aligned.

The valves are then timed correctly. After noting that fiber washers are in place on the shafts of gears 1-2-3, the gear case cover and other fittings can be replaced.

## Timing Ignition

Timing the valves according to gear marks also automatically times ignition, provided the two clamp screws 12 (Illus. 19) in face of circuit breaker have not been loosened, allowing the circuit breaker to shift its position in relation to the advance and retard plate. As long as these screws are not loosened, the circuit breaker and timer assembly as a unit can be removed and replaced without affecting original timing.

If at any time it becomes necessary to take the circuit breaker and timer assembly apart, before doing so, inspect for a file mark 1, (Illus. 19) across the edge of assembly, indicating the original factory setting. If none is found, make one to enable re-assembling as originally set. This is the simple way of maintaining original timing. Another way of accurately checking and re-setting ignition timing is explained below:

### *Checking and Re-timing Ignition Without Following Circuit Breaker Mark as Explained Above.*

Take out spark plugs to permit turning motor freely. After removing oil pump dust cover and circuit breaker cover, adjust point gap to .022 inch. It is of first importance in timing ignition that point gap be accurately adjusted.

Remove timing inspection hole plug from face of left crank case, just below motor number. Turn motor counter-clockwise (the direction in which motor runs) to get front cylinder on *compression stroke*. Keep on turning slowly until mark cut in flywheel shows through timing hole. With motor turned to this position, narrow end of circuit breaker cam should be about to open points. *Bear in mind that flywheel mark is in relation to front cylinder only, and front cylinder must time with narrow end of circuit breaker cam.*

If it is found that with spark control in fully advanced position, circuit breaker points just start to open as flywheel mark is turned to about the *center* of inspection hole or a little to the rear of center, *timing is correct*. If, however, the points are not just starting to open, timing is not correct or at least it is not exact. The position of flywheel mark at which points are just starting to open can be found exactly by turning switch ON. When points open, ammeter indicator will go from discharge to zero.

To re-set timing, loosen screws 12 (Illus. 19) that hold the circuit breaker and timer assembly together, and re-set the circuit breaker as necessary. It is advisable to have any timing re-adjustments made, or at least checked, at a Harley-Davidson service station.

## The Carburetor

Don't continually tamper with 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 porcelain cores are not damaged. Try new plugs. See "Use the Recommended Spark Plug," page 3.

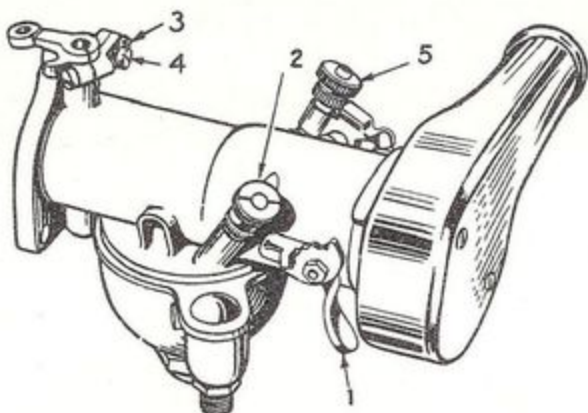
Check the adjustment of valve tappets. Make sure that there is good compression in both cylinders. See that throttle and spark controls are properly adjusted. Also refer to "Summary of Motor Troubles and Their Causes", page 36.

We suggest having carburetor adjustments made at a Harley-Davidson service station.



## Adjustments Provided on Carburetor

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, the 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).*



Illus. 7—Carburetor

1—Choke lever; OPEN position (all the way down) is normal running position of lever; 2—High speed adjusting needle; 3—Lock Screw; 4—Throttle stop screw with which closed throttle motor speed is regulated; 5—Low speed adjusting needle.

Needle 2 on front 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.

## How To Adjust Carburetor

*For Starting Instructions, See Page 5.*

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 lever 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 4 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 motorcycle 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 2 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.

## Gasoline Strainer

The carburetor bowl is kept clean by a gasoline strainer attached to bowl, which accumulates any water and sediment in gasoline supply. Empty strainer and clean screen at least once a month, or oftener if need of cleaning is indicated by irregular carburetion.

To take strainer apart for cleaning, shut off gas tank cocks, turn off lower cover of strainer, and take out screen. When re-assembling, note that gaskets are in good order.

## Care of Transmission

The only periodic attention the transmission requires is to keep it filled to the correct level with oil. Check the oil level every week and add oil if necessary (See "Lubrication Chart," Page 39). Add as much oil as the height of filler opening on the front of case will allow. *Note—Motorcycle should be standing on a level surface when adding oil to transmission. If a solo motorcycle equipped with "Jiffy Stand", do not have it leaning on stand.*

Use the same grade of oil used in motor—winter and summer. Do not use heavy transmission grease. In extremely cold weather, if shifting becomes difficult due to transmission oil becoming congealed to some extent, thin the oil by adding a small amount of kerosene (not more than  $\frac{1}{4}$  pint).

A little oil may work out through the bearings of transmission, so don't be alarmed if, when motorcycle is left standing after a run, 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 case, the oil retaining washer on each side of case should be renewed. One of these washers is back of the clutch; the other, back of the countershaft sprocket. These washers can be changed in a short time at a Harley-Davidson service station, where the necessary special wrenches are at hand.

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

*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.*

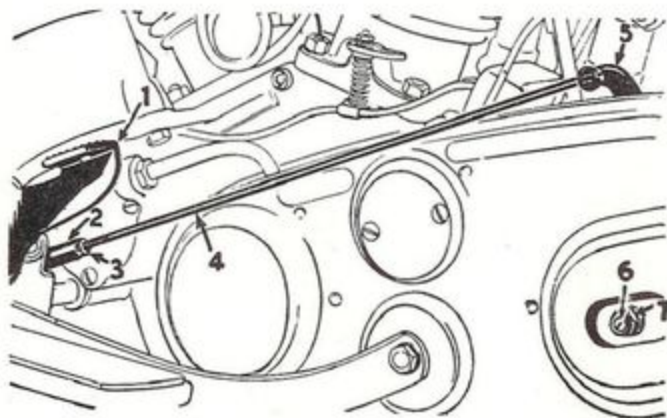


## Adjusting the Clutch

The need for attention to clutch and controls will be indicated by clutch failing to hold under a load, or dragging when in released position. In either case, the first things to be checked up are the adjustments of clutch footpedal rod 4 (Illus. 8) and push rod thrust screw 6. Clutch trouble is usually due to improper adjustment of one or possibly both of these controls.

### Adjusting Clutch Footpedal Rod and Push Rod Thrust Screw

If, with clutch footpedal rocked forward as far as it can go, clutch lever 5 (Illus. 8) stands about squarely across top of transmission, and end of lever has just a small amount of free movement (about  $\frac{1}{8}$  inch) back and forward, the adjustments of rod 4 and thrust screw 6 are all right and require no attention. If, however, a check up as just explained proves that adjustments are not right, correct them as follows:



Illus. 8—Clutch Controls

1—Footpedal; 2—Clutch rod end; 3—Lock nut; 4—Clutch footpedal rod; 5—Clutch lever; 6—Push rod thrust screw; 7—Thrust screw lock nut.

Bear in mind that clutch footpedal must be rocked *all the way forward while making adjustments.*

Loosen lock nut 3, and by turning rod 4 further into or out of rod end 2, adjust the length of rod so that clutch lever 5, when tight against end of rod, stands squarely across or a little to the rear or squarely across top of transmission. Tighten lock nut 3.

Next, loosen lock nut 7 and re-adjust thrust screw 6 so that end of lever 5 has  $\frac{1}{8}$  to  $\frac{1}{4}$  inch free movement back and forward. Turn screw 6 inward (to right) for less free movement of lever—outward (to left) for more free movement. When correct adjustment is obtained, hold thrust screw 6 with screw driver while securely tightening lock nut 7.

**CAUTION**—If clutch lever 5 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.

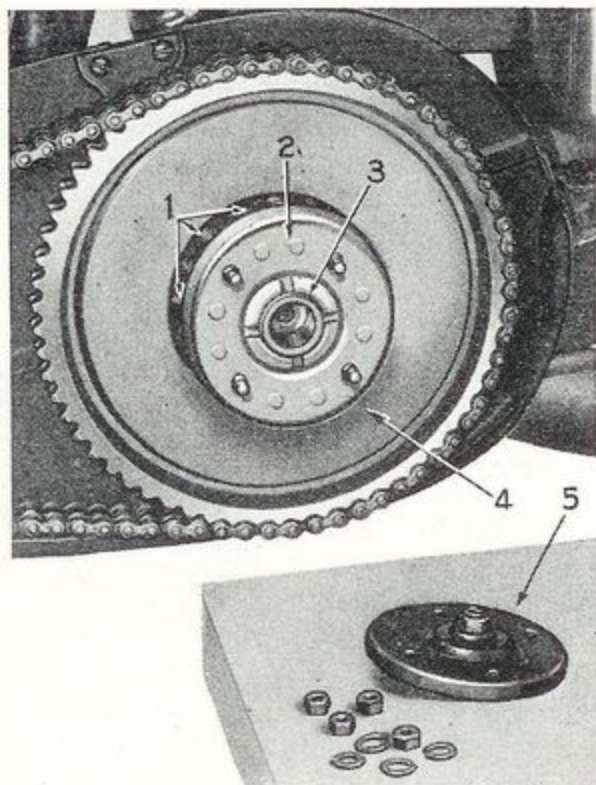
## Adjusting Clutch Spring Tension

If clutch slips, after foot-pedal rod and push rod thrust screw adjustments are correct, increase the spring tension as follows: After removing the front chain guard, remove thrust cap 5 (Illus. 9), exposing adjusting nut 3. Tighten nut 3 (turn right) one-half turn at a time until clutch holds, testing clutch after each half turn of nut.

A good way to test a clutch is to crank the motor. Usually a clutch that will hold to crank the motor will hold on the road.

Do not increase spring tension any more than necessary to make clutch hold. In any case, do not tighten nut 3 to the extent of compressing spring collar 2 more than  $\frac{1}{4}$  inch away from shoulder on four thrust cap mounting studs. If compressed more, clutch probably cannot be fully released.

If increasing the spring tension will not make the clutch hold, disassemble it and inspect the friction discs.



Illus. 9

### Clutch With Thrust Cap Removed

1—Clutch springs; 2—Spring collar; 3—Spring tension adjusting nut; 4—Outer clutch disc; 5—Thrust cap.

## To Disassemble Clutch

After removing chain guard and thrust cap 5 (Illus. 9), turn nut 3 all the way off. The clutch is then free to come apart.

Inspect the fibre composition friction discs. If they are oil soaked but otherwise in good condition, drop them in a pan of clean gasoline for a few minutes; then, burn off the gas and oil and dry them with a blow torch or over an open flame. Clean the glazed surfaces of the discs with sandpaper and wipe them clean and dry.

After washing all oil and dirt from the metal parts with gasoline, and drying them thoroughly, re-assemble the clutch. Apply a few drops of oil or a small amount of grease to sprocket ball bearing. Turn nut 3 on clutch shaft and adjust it so that spring collar is about  $\frac{1}{8}$  inch away from shoulder on four thrust cap mounting studs.

Before replacing thrust cap 5, put a little grease on the ball inside the cap. After clutch is assembled, check the adjustments of foot pedal rod and push rod thrust screw.



## Adjusting Clutch Footpedal Friction

The clutch footpedal is fitted with friction discs 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 works too freely, or requires too much effort to operate it, change the spring tension as may be necessary, by means of the large hexagon headed adjusting screw in face of pedal.

Before the adjusting screw can be turned, lip of lock washer that will be found turned up against side of screw head, must be bent away. After adjustment is completed, bend one of the lips of lock washer up tight against the side of screw head, to lock the adjustment.

To take pedal assembly apart, first remove nut and offset stud by means of which footpedal rod is attached to pedal. Then, turn the adjusting screw all the way out. When re-assembling, install offset stud with offset downward.

## Adjusting Gear Shifter Controls

Shifter controls must be kept in correct adjustment, otherwise, driving dogs on shifting clutches inside transmission will not fully engage, and are likely to become damaged from jumping out of engagement under driving load.

To re-adjust, disconnect shifter rod from tank shifter lever. Set *transmission lever* in neutral position between "low" and "second." Lock plunger, inside transmission, will drop fully into retaining notch when lever is in just the right position. Finally, re-adjust shifter rod as necessary so that when connected with tank shifter lever, tank lever stands exactly in "neutral" position.

With adjustment correctly made, tank lever will have a little clearance from end of slot in shifter gate, after shifting into "high" and letting go of lever.

## Care of Drive Chains

Inspect the adjustment of chains every week and re-adjust them, if necessary. Adjustment of front chain can be checked through inspection hole provided in chain guard. Chains should not be allowed to run loose enough to strike the chain guards, because when that loose, they cause motorcycle to jerk when running at low speed, and there is excessive wear of chains and sprockets. The rear chain requires more frequent re-adjustment than front chain.

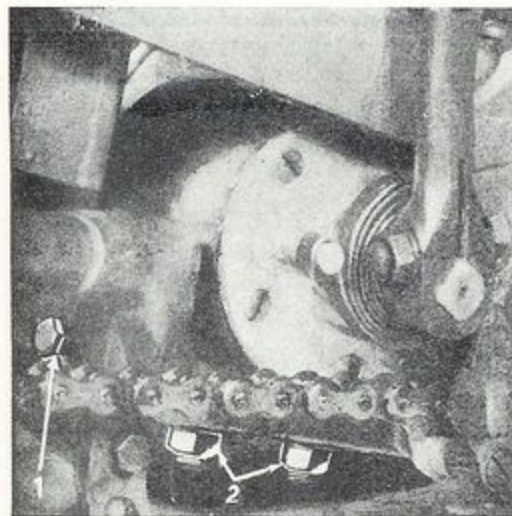
*Adjust chains so that they have about 1/2 inch free movement up and down, midway between sprockets.* Do not adjust tighter, because running chains too tight is even more harmful than running them too loose. As chains stretch and wear in service, they will run tighter at one point on the sprockets than at another; always check adjustment at the tightest point.

Inspect chains occasionally for links in bad condition. If any are found, make repairs or renew the chain. The rear chain can be taken apart and removed after locating and taking out the spring locked connecting link. The front chain is not, however, originally provided with such a connecting link and unless one has at some time been fitted in making repairs, it will be necessary to remove the engine sprocket before chain can be taken off.

At least every 1,000 miles, brush off dirt that has accumulated on rear chain, and apply Harley-Davidson Chain Grease to its surface. The composition of this lubricant is such that it will work into the chain bearings. The front chain is supplied with necessary lubrication by the mechanical oil pump (see "Mechanical Oil Pump", page 9).

## Adjusting Front Chain

The front chain is adjusted by moving transmission backward or forward, by means of adjusting screw 1 (Illus. 10). After loosening the two nuts 2 which clamp transmission to the frame, turn adjusting screw 1—to the right to tighten chain—to the left to loosen chain. When correct adjustment is obtained, securely tighten clamp nuts 2. Re-adjusting front chain changes the adjustment of rear chain; so both must be re-adjusted.



Illus. 10—Transmission Clamp Nuts and Adjusting Screw  
1—Adjusting screw; 2—Clamp nuts.

After re-adjusting front chain a few times, check adjustments of gear shifter mechanism and clutch controls. See "Adjusting Gear Shifter Controls," and "Adjusting Clutch Footpedal Rod and Push Rod Thrust Screw."

## Adjusting Rear Chain

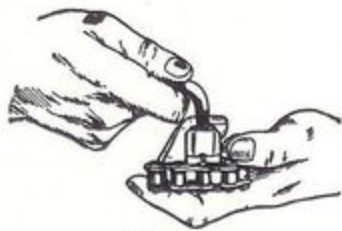
Remove rear axle nut and lock washer, loosen brake sleeve nut, and loosen brake arm torque bolt nut. Also loosen lock nuts on axle adjusting screws in frame—one at each end of axle.

Turn adjusting screws as necessary to correctly re-adjust chain. Turn each screw an equal number of turns in order to keep wheel aligned. Check correct alignment of wheel by noting that tire runs about midway between lower, rear frame tubes and also that rear sprocket runs centrally in chain. When re-adjustment is completed, be sure to securely tighten everything that was loosened.

After re-adjusting rear chain, rear brake may be too tight. Re-adjust brake rod as necessary. See "Adjusting Rear Wheel Brake."

## Repairing a Drive Chain

When necessary to repair a chain, remove damaged links by pushing out the riveted link pins, with chain repair tool (Illus. 11). Then fit the necessary repair links. A duplex chain is used for the front drive and a single width chain for the rear, however, the chain tool furnished in tool kit is designed to take care of both.



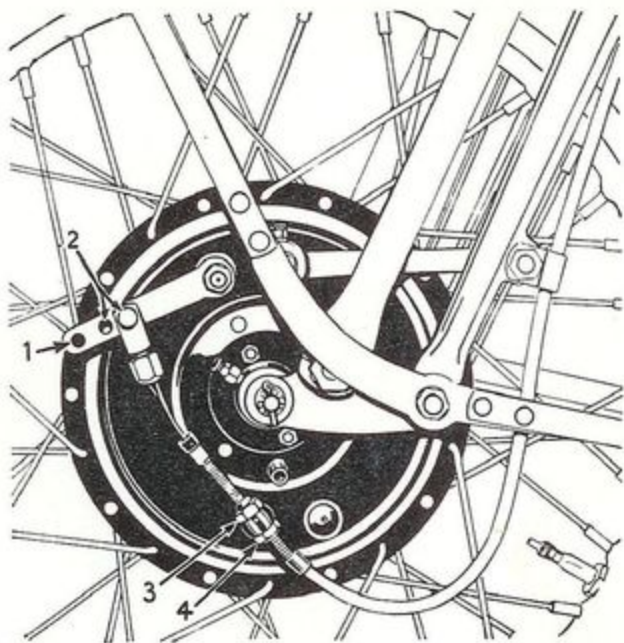
Illus. 11  
Repairing Chain



## Adjusting Front Wheel Brake

Loosen lock nut 3 (Illus. 12) and turn adjusting sleeve 4—to the left to shorten control coil and thus tighten brake—to the right to loosen brake. With control coil properly adjusted, hand lever will move freely about one-quarter of its full movement before brake starts to take effect. It is advisable after re-adjusting brake, to raise front end of motorcycle and turn wheel to be sure that brake is not too tight and dragging. After re-adjustment is completed, be sure to securely tighten lock nut 3.

Oil control often to keep it working freely. Alemite brake bearings regularly as per Lubrication Chart, to assure smooth braking and also free fork action while brake is applied.



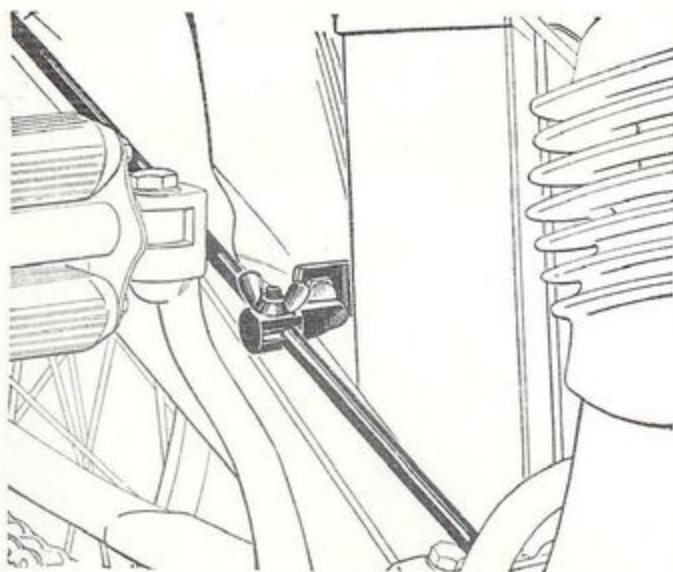
Illus. 12—Front Wheel Brake

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

## Adjusting Rear Wheel Brake

Rear wheel brake is re-adjusted by lengthening or shortening rear brake rod. Disconnect brake rod at rear end, loosen clevis lock nut, and turn clevis to the right to shorten rod and thus tighten brake—to the left to loosen brake.

Adjust brake rod so that brake does not start to take effect until foot pedal is pushed downward about one inch. Turn wheel to make sure brake is not too tight and dragging.



Illus. 13—Brake Lock

## Rear Wheel Brake Lock

Use to hold brake assembly while removing demountable wheel. It can also be used if needed, when motorcycle is parked.

To use, apply brake with foot pedal, shift lock back against battery box bracket as shown in Illus. 13, and tighten wing nut. When not in use, tighten securely on brake rod, a little forward of battery box bracket.

## Care of Wheel Hubs

Wheel hubs normally require little attention other than ample lubrication. Refer to Lubrication Charts on pages 39 and 40. Occasionally, set motorcycle on rear stand, block up front end of motorcycle to raise front wheel, and check adjustment of hubs. Adjustment is all right when only a small amount of side shake can be found at rim of wheel.

## Removing Front Wheel

Raise front end of motorcycle by means of front stand, or blocking up under frame loop. Disconnect brake control, take out rigid fork brake shackle bolt, remove axle, and wheel is then free to come out. In re-assembling wheel, make sure that slot in brake stabilizer plate is fitted over extended end of front rocker plate stud. Tighten axle securely.

## Adjusting Front Wheel Bearings

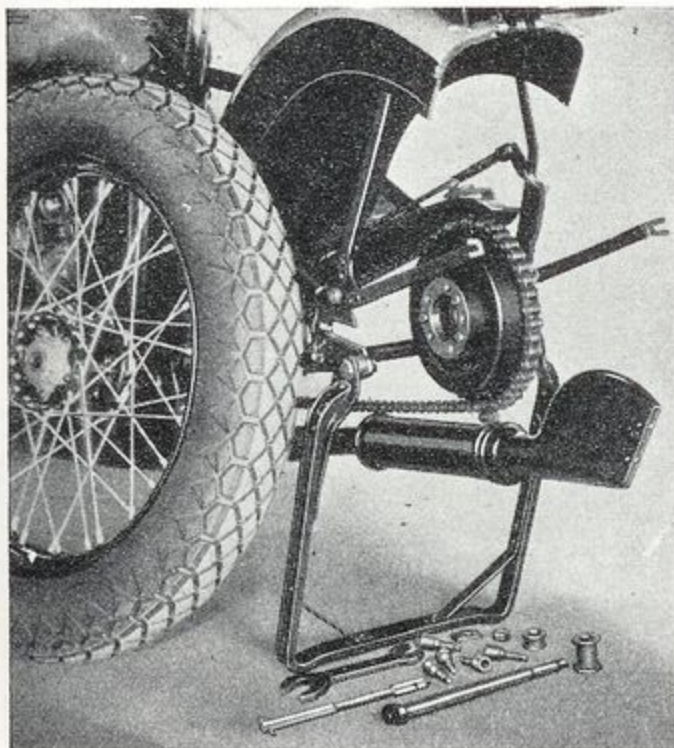
Remove wheel from motorcycle, and then remove cone lock nut and washer from right side of hub. Cone can then be turned to obtain proper adjustment. Adjust so that just a trifle of play or shake can be detected, and wheel turns freely. Check adjustment after cone lock nut has been replaced and securely tightened. To remove and inspect cones and balls, turn right side cone all the way off axle bushing. There are 26,  $\frac{5}{16}$  inch balls in hub—13 on each side.



## Removing Rear Wheel

Refer to Illus. 14. Set motorcycle on rear stand, and loosen and raise end of mud-guard. Remove the five clamp screws that secure wheel to brake assembly. Clamp screw wrench can be inserted only directly to the rear of axle, so wheel will have to be turned to bring each screw to this position. Apply and lock brake as described under "Rear Wheel Brake Lock". Take out axle, and remove the two spacers or one spacer and speedometer drive unit from between wheel hub and left side of frame. Wheel is then free to come out.

When re-assembling wheel, reverse the removing



Illus. 14—Rear Wheel Removed

operations, but securely tighten the five wheel clamp screws before tightening axle nut. To avoid any possibility of wheel working loose in service and consequently damaging clamping flange, it is important that clamp screws be pulled very tight. Use wrench 9 (Illus. 21) as a handle for wrench 8 to be sure of getting them tight.

A motorcycle without speedometer has two spacers between wheel hub and left side of frame. If motorcycle is equipped with speedometer, the driving unit takes the place of the longer spacer. In re-assembling speedometer drive unit, be sure its driving dogs are engaged in notches in hub end fitting.

## Adjusting Rear Wheel Hub

Illus. 15 shows a cross-section of rear hub. Before attempting to make re-adjustments or take hub apart, carefully study this illustration and its description.

To take up only excessive side play that may develop, it is not necessary to take hub completely apart. Simply take out screws 1, and complete thrust bearing assembly comes off end of hub and can be taken apart. One or more shims 6, as required can then be added, and the assembly re-assembled on hub. Be careful about adding too many shims and thus binding thrust sleeve 5. It must still be free with cover screws 1 securely tightened. It is best to leave cork retainer 4 out of thrust assembly while determining correct adjustment of thrust sleeve, and put it back in when re-adjustment is completed. Cork retainer interferes to some extent with free movement of thrust sleeve and, therefore, makes it difficult to determine whether or not sleeve is altogether free between thrust washers 7.

Excessive radial (up and down) play in wheel hub bearings, due to wear, can be taken up by fitting oversize rollers 10. To take hub completely apart for attention to roller bearings, first remove thrust assembly as explained above. Next, remove spring ring 15, washer 14, cork 13, and pull out inner sleeve 8. Brake side roller bearing can then be taken out, after removing spring ring 12 and washer 11.

The diagram shows a cross-section of a wheel hub assembly. On the left is a vertical component with four circular holes. In the center is a horizontal shaft with a nut and washer. To the right is the hub housing. Numbered callouts point to the following parts: 1. A bolt on the top of the hub housing. 2. The hub housing itself. 3. A component inside the hub housing. 4. A small circular part, likely a roller. 5. Another small circular part. 6. A component at the bottom of the hub housing. 7. A component on the left side of the hub housing. 8. The inner sleeve, which is being pulled out. 9. A component on the right side of the hub housing. 10. A roller bearing, shown as a small circle between the inner sleeve and the hub housing.

It is advisable to have any needed wheel hub readjustments made at a Harley-Davidson service station where rollers in assorted sizes and any other parts that may be required are at hand. Furthermore, re-fitting should be done by a mechanic thoroughly familiar with this service operation, because care must be exercised to avoid refitting too tight. With hub re-assembled, roller bearings must turn freely and have slight play or shake.

1—Thrust bearing cover screws (five); 2—Thrust bearing outer cover; 3—Thrust bearing housing; 4—Cork grease retainer; 5—Thrust bearing sleeve; 6—Thrust bearing adjusting shims (each shim .002" thick, use as many as necessary to adjust so that sleeve 5 has .001" to .002" end play); 7—Thrust washers; 8—Hub inner sleeve; 9—Roller retainers; 10—Bearing rollers; 11—Roller bearing washer; 12—Roller bearing spring lock ring; 13—Cork grease retainer; 14—Cork retainer washer; 15—Cork retainer spring lock ring.

## Care of Tires

Check tires for proper inflation, and if necessary, re-inflate them about once a week, and before going on a long trip. See "Tire Inflation Pressures," page 2. If tires are run in an under-inflated condition continually, rapid tread wear and damage to the fabric will be the result.

Every few days inspect tire treads and side walls. Very often a tack or a piece of glass will be found imbedded in the tread, and if not removed, it may eventually work its way through the casing, and puncture the inner tube. Both the casing and tube may be seriously damaged.

If a puncture is experienced on the road, repair it immediately, rather than run the tire flat for some distance, thus probably damaging tire beyond repair, and also damaging rim. Always carry a tire patching kit and pump.

## Removing and Applying Straight Side Tire on Drop Center Rim

To remove tire; first remove valve cap, valve inside, and valve stem nut. Press the head of upper side of casing into the well, or drop center of rim, to within a



short distance of each side of valve. Using a tire iron, start bead of casing over edge of rim, at valve. *Don't use force when starting bead over edge of rim with a tire iron, because the bead wire may be broken and the tire ruined. See that the bead is in rim-well on one side of wheel, as explained above, and the bead at opposite side of wheel can easily be started over edge of rim.* After the bead is started over the edge of rim, the casing can be taken the rest of the way off without further aid of a tire iron. If necessary to completely remove casing, the lower bead can be taken off the rim in the same manner as just described for upper bead. It isn't always necessary to completely remove casing. Removing one side only, allows the inner tube to be removed and replaced, and also allows the inside of casing to be inspected.



Illus. 16—Applying Tire

Before applying casing, see that the rubber rim strip is in place around the rim, and that the valve hole in rim strip aligns with valve hole in rim. Start either bead of casing over rim, pressing it into rim-well and working around wheel until the complete bead is on rim. Then, place the inner tube in casing. (NOTE: *It makes no difference whether inner tube is placed in casing before or after the first bead of casing is placed on rim*). Insert valve through hole in rim, and start valve stem nut. Starting directly opposite valve, push remaining bead over rim and press it into rim-well. Work both ways around the wheel toward the valve. Possibly there will be a short section of the bead that will not push over the rim readily by hand, and in that case finish with a tire iron.

Bear in mind that the main point in removing or applying a tire is to press the tire bead into the rim-well on one side of wheel, while working it over the edge of rim at the opposite side of wheel, as shown in Illus. 16.

### Adjusting Throttle, Oil Pump, and Spark Controls

The main point in adjusting control wires is to adjust them so that carburetor lever and oil pump control lever open and close fully, and circuit breaker advances and retards fully. If controls are not adjusted for full range of operation, motor cannot be expected to perform at its best.

To be sure that motor gets correct lubrication, it is very important that the carburetor-oil pump control wire be adjusted so that oil pump control lever operates in proper relation to carburetor control lever. When throttle is opened until carburetor lever strikes its full open stop, oil pump lever should lack just a trifle, not more than 1/64 inch, of striking its full open stop. Disregard closed position of pump lever because this is determined by movement of carburetor lever. As a safety, pump control lever is provided with a spring that throws it wide open in case of control wire breakage.

## Replacing a Broken Control Wire or Control Coil

When a control wire and control coil become damaged or broken and replacement is required, it is advisable before removing the damaged control, to carefully note how it is passed between the forks and other fittings. Also note just how control coil is secured and wire connected. It will then be an easy matter to install and connect the new wire and coil exactly as the originals. Replacing only a broken or damaged control wire does not require removing control coil from handlebar or even freeing it below handlebars; however, with end of control coil free, it is an easier matter to insert new wire.

To remove control, first free it below handlebars. Back out handlebar end screw and remove grip sleeve. The slot in handlebar end screw is wide enough so that the edge of a tool kit wrench will serve as a screw driver. Remove roller and block, and then pull out 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 taking out lock screw concealed underneath handlebar light or horn switch on right or left handlebar respectively.

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 damaged wire or coil that is being replaced.

After installing the necessary new parts, re-assemble grip and adjust control. See "Adjusting Throttle, Oil Pump and Spark Controls".

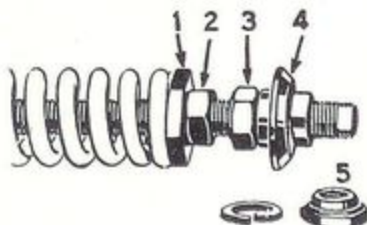
## Removing Seat Post

After raising saddle, remove seat post clamp nut 5 (Illus. 17) 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.

## Adjusting 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. 17), turn adjusting nut 1 to increase or decrease the tension of cushion spring combination (three lower springs).

With standard seat post adjustment, the three lower cushion springs are twelve inches long. This adjustment will be found suitable for a saddle load of approximately 150 pounds. For heavier saddle load requiring increased tension, adjust spring combination shorter, a little at a time, until desired tension is obtained. Securely tighten lock nut 2, after adjustment is completed.



Illus. 17—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.



NOTE: If desired, a stronger seat post spring combination can be obtained from your Harley-Davidson dealer.

Rod nut 4 should be set and locked with the end of rod extending about  $\frac{1}{2}$  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.

### Cleaning Muffler

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

Once or twice a year remove muffler and scrape the inside as clean as possible with a long piece of wire.

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

## THE HARLEY-DAVIDSON LIGHTING AND IGNITION SYSTEM

A 6-8 volt, one wire or ground return system. The different units of the electrical system are supplied with the required current from two sources—the generator and the battery. When motor is not running, when starting, and when running in high gear at very low speeds, the battery is supplying the current required. At average driving speeds, the generator supplies the current needed for operation, with a surplus charging the battery. Charging rate varies up to its maximum with motor speed.

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

1. Give battery the required care. See page 34.

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

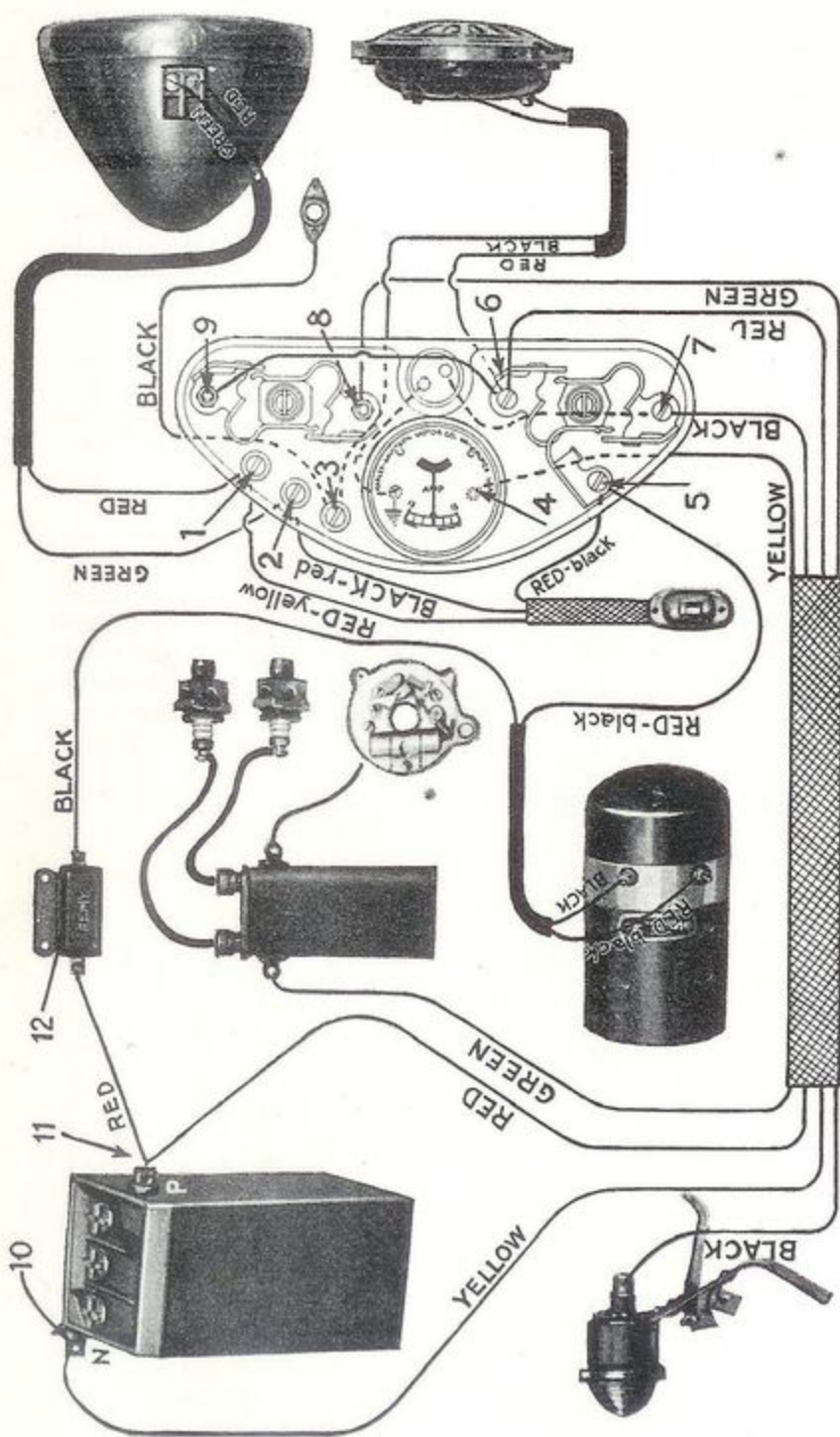
Loose wiring connections may cut the battery out of circuit. This must not be allowed to occur while motor is running, because the battery not only accumulates surplus current generated, but also acts as a governor, and keeps the voltage of the entire system between 6 and 8 volts. If battery should become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

3. Lubricate commutator end armature bearing occasionally as per instructions under "Lubricating Commutator End Armature Bearing". Care should be taken to avoid getting oil or grease on commutator or brushes.

### Inspecting or Replacing Brushes

After removing the left footboard, remove the two screws in generator end cover, and then pull off cover, exposing the commutator and brushes. Brushes can be taken out after unfastening spring retainers. To unfasten small brush spring retainer, simply press it downward and outward. Remove fastening screw from each of large brush spring retainers.

Brushes are worn out and should be renewed when longest side of brush measures  $\frac{3}{8}$  inch or less. Be sure to insert brushes into holders so that concave face of brush fits curve of commutator.



Illus. 18—Wiring Diagram

1—Red wire with yellow tracer from handlebar light switch, and red wire of headlamp cable (connect to lamp small terminal screw); 2—Black wire with red tracer from handlebar light switch, and green wire of headlamp cable (connect to lamp large terminal screw); 3—Black wires—one from handlebar horn switch and one from horn; 4—Yellow wire from battery; 5—Red wire with black tracer—one from handlebar light switch, and one from generator terminal marked "Switch"; 6—Red wire from battery, red wire from horn, also wire from No. 9; 7—Black wire from tail lamp, also wire from switch panel lamp; 8—Green wire from ignition coil; 9—Ignition wire from No. 6, also terminal for extra lighting equipment; 10—Positive battery terminal, connect with red wire of main cable from No. 4; 11—Positive battery terminal, connected with red wire of main cable from No. 6, and also red wire from relay switch; 12—Relay switch, see page 31. NOTE: Dotted lines indicate wires connected underneath switch box, solid lines indicate internal connections. Heavy black lines indicate wires in conduit.



## Lubricating Commutator End Armature Bearing

Two or three times a year, remove generator end cover and lubricate this bearing with a few drops of motor oil through hole in bearing cover. Once a year remove bearing cover and lubricate bearing with a good grade of grease (preferably Harley-Davidson Grade A Grease).

Do not over-lubricate this bearing because excess oil or grease will very likely work out of bearing and some may get onto commutator and brushes.

## Generator Charging Rate

A maximum charging rate of about 4 amperes, as indicated by ammeter (with regular equipment lamps lighted) is the standard factory setting. This should be sufficient to keep battery in a good state of charge under normal service conditions. At average driving speeds, the charging rate is about the same with lights either ON or OFF, because, when lighting switch is turned ON, generator output is automatically boosted enough to take care of the standard lighting equipment. The charging rate can be re-adjusted higher or lower as desired to meet unusual service conditions, but bear in mind, that a higher than normal charging rate is likely to overcharge, overheat, and damage battery.

When it is found necessary to re-adjust charging rate, proceed as follows: Remove generator end cover, and loosen screws that hold the regulating brush (small brush) plate assembly to generator frame. Then, shift regulating brush *to the right*, to increase charging rate—*to the left*, to decrease charging rate. Shift brush only a little at a time, until desired maximum charging rate is obtained.

It is advisable to have generator re-adjusting done at a Harley-Davidson service station.

## 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 the short wires that connect brushes with spring retainers are not broken, and that other generator wiring connections are tight.

3. Inspect relay switch (see "The Relay Switch").

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

## The Relay Switch

The relay switch 12 (Illus. 18) mounted on crank case at base of rear cylinder, automatically opens and closes generator-battery circuit, at the proper time. When generator is turning fast enough to produce current, the relay contacts automatically close and connect the generator in circuit with the battery and other electrical

equipment. When the motor is stopped, or at any time when the generator is not producing current, the relay contacts open and disconnect generator from the circuit; this prevents the battery discharging through generator. The relay operates at about 18 miles per hour. It is entirely automatic in operation and requires no periodic attention.

The relay is connected in the generator-battery circuit as follows: A red wire from positive post of battery is connected to relay terminal marked "BAT" Black wire from generator terminal marked "Relay" is connected to unmarked relay terminal.

*The relay has absolutely nothing to do with 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 relay fails to operate properly, look for one of the following troubles:

**CAUTION**—When necessary to inspect relay, 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 relay, as explained above and shown in Illus. 18.
2. Inspect for loose wiring connections at relay and battery terminals.
3. The relay must be grounded to frame to operate; therefore, see that its base is securely clamped to mounting.
4. The proper gap between relay contact points is .015 to .025 inch. This adjustment is made by bending the stop above contact blade.

If, after making these inspections, relay still does not function properly, have it inspected and tested at a Harley-Davidson service station. Also have the generator tested, (see "If Generator Stops Charging").

## The Ammeter

The ammeter in switch panel indicates whether battery is being charged or discharged. The graduations on ammeter dial indicate the rate of charge or discharge which varies with driving speed. Should the ammeter fail to indicate charge at average driving speeds, see "If Generator Stops Charging".

The ammeter is a sensitive instrument and at certain motor speeds, particularly high speed, it may be affected by vibration to the extent that indicator becomes very unsteady. This condition is nothing to be alarmed at because it affects only the ammeter indicator.

## 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 the right hand switch is for lights. To operate either switch, insert key and turn lever as per the markings on panel. Switch levers may be turned either way and all the way around without damage to switch.

**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.



After main lighting switch has been turned ON, headlamp can be "dimmed" (beam tilted downward) whenever desired, by means of thumb switch on right handlebar. Push thumb switch upward for "bright" and downward for "dim".

Turning lighting switch lever to PARK, lights the tail lamp and also permits lighting the switch panel lamp; but headlamp is not lighted. The switch panel lamp is directly controlled by a lever at its base; however, it can be lighted only when main lighting switch is at either PARK or ON position.

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

To get at internal wiring connections or inspect switch contacts, remove switch levers, ammeter, and switch box cover. Switch levers can be lifted off after removing a small screw in each lever. Remove nuts from ammeter terminal posts underneath switch box to free ammeter. A screw at each end and one at the rear secure cover. To make wiring connections at switch, see wiring diagram on page 30.

## Adjusting Headlamp

To get the greatest efficiency from headlamp and to meet the requirements of law, adjust as follows: Adjustment should be made in a darkened room or at night. Have motorcycle standing on a level surface about 25 feet away from, and headed toward a wall or screen upon which a horizontal line has been drawn at exactly the same height as lamp center. Motorcycle must be resting on both wheels and front wheel must be in straightahead alignment.

Turn light switch ON, set handlebar thumb switch in upward (bright) position, and check light beam for height and direction. The top of main beam of light should register on wall or screen even with, but no higher than the horizontal line mentioned above. After loosening the clamp nut underneath lamp bracket, lamp can be tilted up or down to properly aim it in relation to horizontal line, and at the same time can be turned right or left to direct beam of light straight ahead.

Headlamp is pre-focused type and does not require re-focusing.

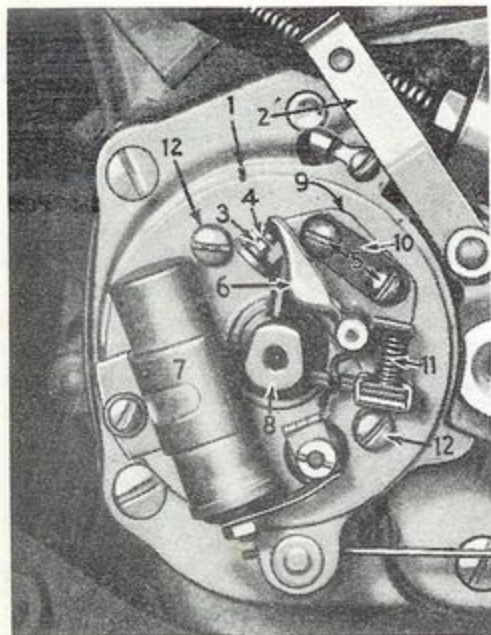
## Light Bulbs

Standard lighting equipment requires bulbs of the following sizes and types: Headlamp—*pre-focused type, two-filament, 32-21 candlepower, double contact*; Tail lamp—*3 candlepower, single contact*; Switch panel lamp—*3 candlepower, double contact*.

Accessory lighting equipment bulbs: Combination stop-tail lamp—*two-filament, 21-3 candlepower, double contact*; Speedometer internal light—*6-8 volt radio panel type*; Other accessory lamps—*3 candlepower, single contact*.

## Adjusting Horn

Ordinarily, the horn as originally adjusted will give satisfactory service for a long time before re-adjustment is required. To re-adjust, loosen lock nut on adjusting screw on back of horn, and turn adjusting screw to right or left as necessary to give desired tone. Change the adjustment only a little at a time, tightening lock nut and testing tone after each change. If unable to obtain satisfactory re-adjustment, consult the nearest Harley-Davidson or Remy service station.



Illus. 19

#### Circuit Breaker and Timer Assembly

1—Mark indicating original timing; 2—Breaker cover retainer; 3—Adjustable contact point; 4—Breaker lever contact point; 5—Contact point adjustment lock screws; 6—Breaker lever; 7—Condenser; 8—Circuit breaker cam; 9—Adjustable contact point plate; 10—Contact point plate spring washer; 11—Breaker lever spring; 12—Circuit breaker and timer assembly clamp screws.

## Circuit Breaker Points

Clean points with a tungsten point file or a piece of fine sandpaper, when hard starting or misfiring indicates the need of cleaning.

Correct point gap—.022 inch; readjust as follows:

Turn motor until circuit breaker cam is holding points at their widest opening. Loosen screws 5 (Illus. 19) and shift point 3 as necessary.

Securely tighten lock screws after adjustment is completed.

## Starting Motor With a Discharged Battery

If battery is completely discharged or disabled, but generator is in good condition, it is possible to start motor 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 motorcycle and after it is in motion, engage clutch. With motorcycle moving fast enough 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 "Adding Water To Battery").

2. 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.

3. 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.

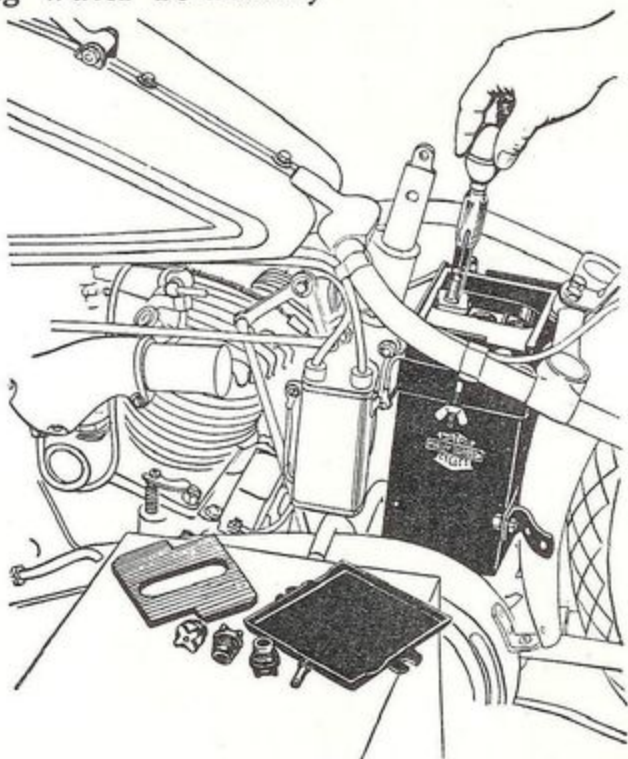


## Adding Water To Battery

*Motorcycle should be standing on a level surface when adding water to battery — if solo motorcycle equipped with "Jiffy Stand", do not have it leaning on stand.*

Remove saddle clevis pin and raise saddle; then loosen wing nuts, at top of case, and remove case cover and rubber mat. Take out the three screw-in filler plugs, and with a hydrometer or syringe (Illus. 20) add enough water to each cell to raise the level of the solution about  $\frac{3}{8}$  inch above the plates and separators.

**CAUTION:** If battery is filled to a higher level, some of the solution will be forced out through vent holes when battery is charging. This will damage battery case and ruin its enamel.



Illus. 20  
Adding Water to Battery

## Removing Battery

The battery can be lifted from case, after raising saddle, removing case cover, and disconnecting the terminal wires.

## 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 hydrometer readings repeatedly indicate that 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 higher than normal output, doesn't keep battery in a fair state of charge, 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. If impossible to get to a Harley-Davidson service station, go to some thoroughly reliable battery shop.

## 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. *CAUTION—Therefore, 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 charged .....	— 4° F. (below zero)
1.275 fully charged .....	— 56° F. (below zero)

## Adding Water in Winter

Do not add water to battery while motorcycle 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 motorcycle 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.

## SUMMARY OF MOTOR TROUBLES AND THEIR CAUSES

The following information 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

Carburetor not properly adjusted.  
Defective spark plugs—porcelain cracked, point gaps adjusted wrong, or fouled and in need of cleaning. Try new plugs.  
Gasoline not getting to carburetor due to pipe being clogged with dirt, or overheated and vapor locked from being bent against or too close to cylinder.  
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 15.  
Circuit breaker points out of adjustment. See page 34.  
Circuit breaker points worn badly.  
Insufficient breaker lever spring tension.  
Defective ignition coil.  
Faulty condenser.  
Discharged or broken down battery.  
Loose wiring connections around battery, generator, ignition coil or circuit breaker.  
Chafed or poor insulation on wiring, causing a short circuit.



## 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.
- Leaky cylinder head joints.
- Spark plugs fouled, or their gaps improperly adjusted. See page 3.
- Carburetor adjusted too lean or too rich.
- Too much oil in crank case.
- Poor compression, due to condition of piston rings and valves.

## If 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 spark will jump from ends of plug cables.
- Dirty, worn out, or improperly adjusted circuit breaker points.
- 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 33.
- Damaged insulation on wiring causing a short circuit. (Ammeter would indicate heavy discharge).
- Defective ignition coil.
- Faulty condenser.
- Valves or ignition timed wrong.
- Clutch slips and prevents motor from being turned.
- If impossible to turn motor over with starter, the trouble may be that motor has been run without enough oil, until the pistons or piston rings have become seized in cylinders.
- See if you can locate any of the faults mentioned under "Missing at High (Low) Speed."

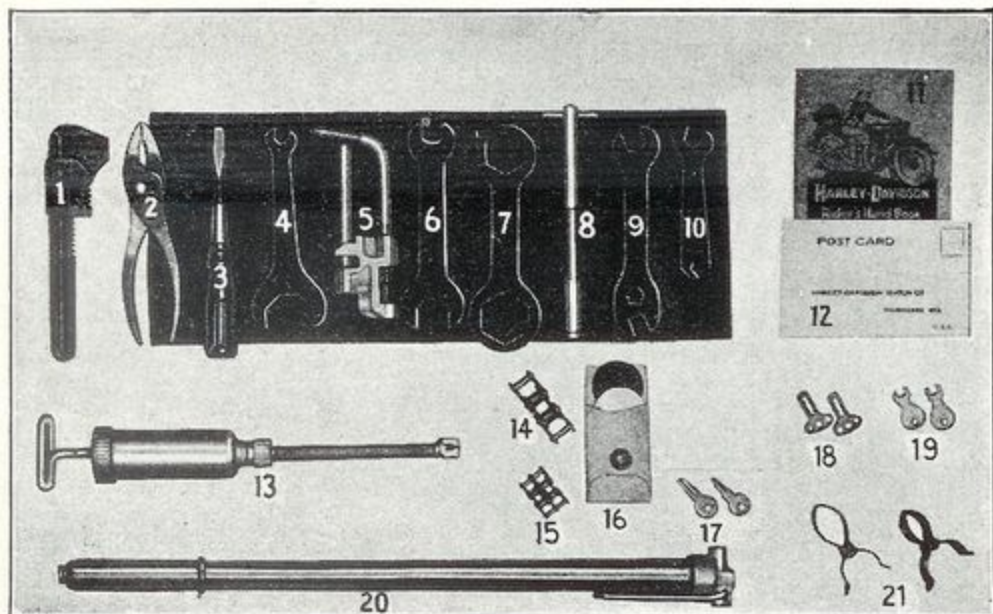
## If Motor Shows Loss of Power and Overheats

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 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. If you use a sidecar be sure motorcycle is geared properly. See "Gear Ratios", page 1.
- A poor grade of lubricating oil being used.
- Either too much or not enough oil in crank case; drain and give fresh supply.
- Bad air leak around carburetor or manifold.
- Leaky cylinder head joints.
- Muffler clogged; clean the outlet. See page 29.
- Valves or ignition improperly timed.

## Back Firing or Popping in the Carburetor

- Motor not sufficiently warmed up.
- Carburetor choking device set in running position too soon after starting.
- 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

1—Monkey-wrench; 2—Pliers; 3—Screw driver; 4—Wrench for valve spring covers, valve tappets, and various small nuts; 5—Chain repair tool; 6—Wrench for rear axle nut, rear brake sleeve nut, and transmission mounting stud nuts; 7—Spark plug wrench; 8—Wrench for demountable rear wheel screws; 9—Wrench for front axle nuts, rear axle adjusting screw lock nuts, gas pipe nuts, cylinder head and base nuts, and other nuts and bolts, also a handle for wrench No. 8; 10—Wrench for valve tappets, rear axle adjusting screws, and other small nuts; 11—Rider's Handbook; 12—Registration card; 13—Alemite gun; 14—Double repair link for rear chain; 15—Double repair link for front chain; 16—Tire patches; 17—Steering head lock keys; 18—Ignition and light switch keys; 19—Tool box keys; 20—Tire pump; 21—Tire pump clips.

## Greasing Motorcycle

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 motorcycle well lubricated. Lubricate as per charts on following pages.

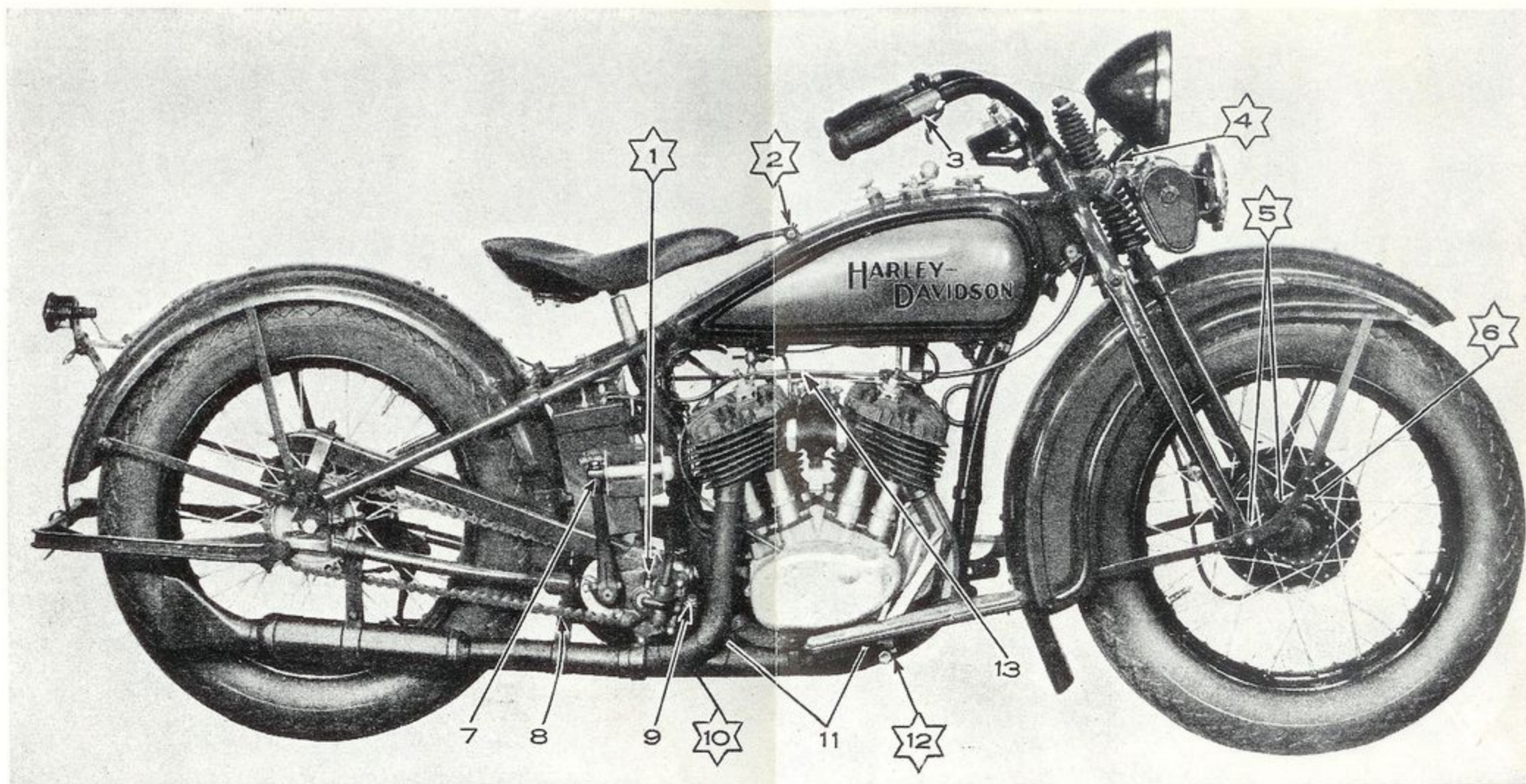
There are 19 Alemite connections on motorcycle. Their exact locations are indicated by ( \* ) on the lubrication charts.

Illus. 22 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. 22—Filling Alemite Gun



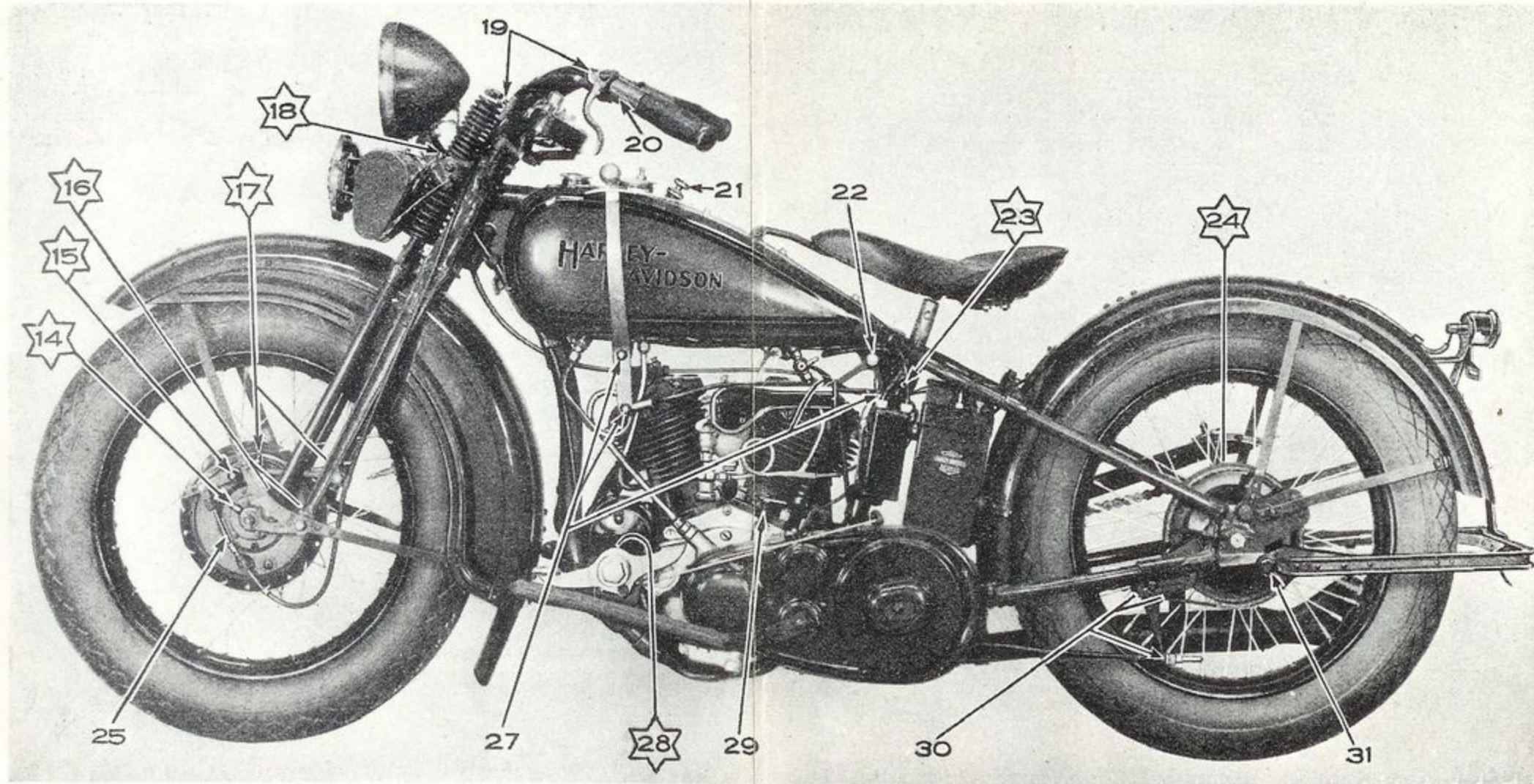


Illus. 23—Right Side Lubrication Chart      \*Stars Indicate Alemite Connectors

Lubricate With	No.	Part of Motorcycle	Lubricate With	No.	Part of Motorcycle	Lubricate With	No.	Part of Motorcycle
<b>Alemite</b> Once a week—or at 500 mile intervals when this mileage is covered in less than a week.	1	Clutch thrust bearing	<b>Alemite</b> Every 1,000 miles	6	Front wheel hub	Motor Oil ..... Every 500 miles	7	Starter Pedal Bearing
	2	Seat bar hinge		3	Right handlebar grip (See page 28)		11	Brake rod joints
	4	Spring fork plunger bearing		8	Rear chain (See page 21)		13	Oil pump control cable
	5	Fork rocker bearings	Grease ..... Once or twice yearly	9	Transmission case (See page 18)			
			Harley-Davidson Chain Lubricant Every 1,000 miles					
<b>Alemite</b> Every two weeks—or at 750 mile intervals when this distance is covered in less than two weeks.	12	Brake pedal bearing	Motor oil ..... Every week					
	10	Brake shaft bearing (on foot-board rod)						
	X	Rear brake lever bearing						

(X—Not shown in Illus. 23)





Illus. 24—Left Side Lubrication Chart \*Stars Indicate Alemite Connectors

Lubricate With	No.	Part of Motorcycle	Lubricate With	No.	Part of Motorcycle	Lubricate With	No.	Part of Motorcycle
<b>Alemite</b> Once a week—or at 500 mile intervals when this mileage is covered in less than a week.	14	Front brake cover bearing	<b>Alemite</b> Every 1,000 miles	24	Rear wheel hub	Motor oil .....	19	Front brake hand lever bearing and control cable oiler
	15	Front brake operating lever stud				<b>Every 500 miles</b>	22	Shifter bell crank bearing
	16	Fork rocker bearings	<b>Grease</b> .....	20	Left handlebar grip (See page 28)		25	Front brake control cable
	17	Brake shackle bearings	Once or twice yearly				27	Shifter control joints and shifter lever bearing
<b>Alemite</b> Every two weeks—or at 750 mile intervals when this mileage is covered in less than two weeks.	18	Spring fork plunger bearing	(See page 10)	21	Hand oil pump	<b>Motor oil</b> .....	30	Brake lever bearings and band connections
	23	Seat post				<b>Occasionally</b>	31	Stand hinge bearing
	28	Clutch pedal bearing				(See page 11)	29	Crank case drain valve



# Your Harley-Davidson Dealer Is Always at Your Service

**Y**OUR Harley-Davidson dealer wants you to get the thousands of carefree miles of riding joy that were built into your motorcycle. 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              | 7. Flywheel Shafts      |
| 2. Inlet Valves              | 8. Roller Bearings      |
| 3. Exhaust Valves            | 9. Pistons              |
| 4. Valve Springs             | 10. Piston Rings        |
| 5. Tank Caps                 | 11. Piston Pins         |
| 6. Bronze Crank Case Bushing | 12. 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.

