

TM 10-515

WAR DEPARTMENT

TECHNICAL MANUAL



THE MOTORCYCLE

September 25, 1942

THE MOTORCYCLE

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SECTION I
GENERAL

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1. General.—a. The motorcycle is generally thought of as just a small two-wheeled edition of the automobile, or as a heavy bicycle

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which has an engine instead of foot pedals. Perhaps that is why the motorcycle is said to be the least understood and the most abused vehicle in the Army. The fact is, a motorcycle, having smaller parts and fewer devices to maintain its efficiency, requires more frequent and careful servicing than larger motor vehicles; as for its similarity to a bicycle, there is more to riding a motorcycle than learning how to start it and stop it.

b. A military motorcyclist must ride over good roads and difficult terrain with equal skill. He will be expected to service his motorcycle, make minor adjustments and repairs, and discover and report signs of failure before they actually occur, so that it will always be ready for use. In short, he must be an expert rider and a practical mechanic as well. He will need a thorough knowledge of motorcycle operation, performance, construction, and maintenance. He will need practice and experience and, most of all, the *will* to excel in his assigned duty.

c. This manual is intended to provide the motorcyclist with basic information on the operation, maintenance, and construction of military motorcycles. The first four sections are concerned with the primary responsibilities of a motorcycle operator, whereas the rest of the manual explains how the vehicle is constructed and how the various mechanisms operate. It outlines tolerances, clearances, and servicing of various parts which are beyond the facilities of the driver or even the motorcycle mechanic. Such additional information will help the motorcyclist to understand the practices of higher echelons when accompanying the motorcycle for monthly and semiannual maintenance inspections.

d. Some sections of the manual have been divided into parts in order to cover both chain-driven and shaft-driven motorcycles now in service. The first part of the section deals with chain-driven models and the second deals exclusively with shaft-driven models. However, many points common to both models have not been repeated in the second part.

e. For definitions of terms used throughout the manual, see appendix I.

2. Qualifications of a military motorcyclist.—*a.* To become an efficient motorcyclist a man must first be an excellent soldier. He must be interested in his vehicle; be a quick, logical thinker; have initiative and mechanical ability; be strong, and have an excellent sense of balance. He must know the rules of the road, the principles of safety, and how to control the vehicle under all conditions.

b. As a driver, he should know what a motorcycle can and cannot do;

the names of its parts, how to operate it (use of controls), and when and how to perform first and second echelon motorcycle inspection and maintenance under all conditions. (See TM 10-545.)

c. As a messenger (or courier), he must be able to receive and transmit verbal or written messages correctly, read maps accurately, avoid delays, and complete the assigned task.

d. As a traffic policeman, he must be proficient in map reading; he must be able to recognize serious traffic jams, analyze their causes and correct them; he must anticipate, recognize, and take protective measures against hazards to march columns such as railroad crossings,

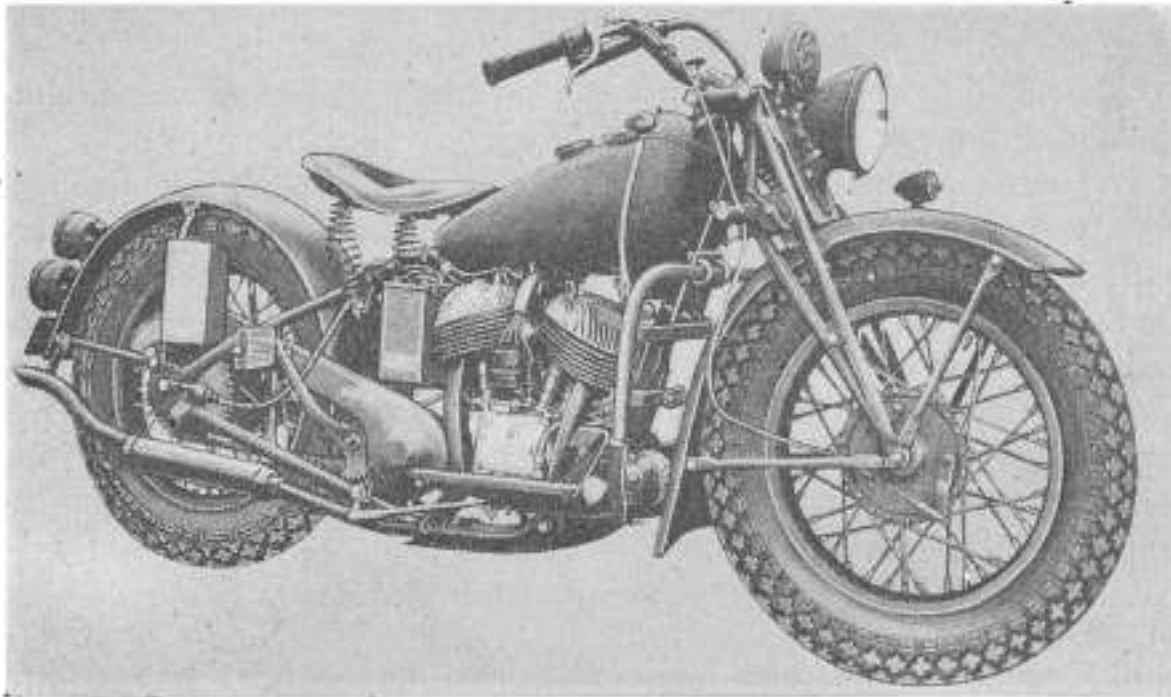


FIGURE 1.—Solo motorcycle (chassis type—2 x 1).

bad turns, sharp curves, dangerous intersections, bad detours, icy or slippery roads, steep grades, reckless driving, and heavy opposing traffic streams; he should be qualified to render first aid; he must be cooperative and must keep traffic moving.

3. Construction.—*a.* In many respects, a solo motorcycle (fig. 1) is similar in appearance to a bicycle. Two wheels support and are connected by a frame. The vehicle is steered by handle bars which turn the front wheel. The rider sits on a saddle which is mounted on the frame, above and in front of the rear wheel. A chain or shaft transmits the power to the rear wheel. All shaft-driven motorcycles being supplied to the Army are solo models.

b. Driving power is developed by an air-cooled internal combustion engine, mounted on the frame. A transmission permits selection of gear ratios between the engine and the drive wheel; a clutch provides

for engaging or disengaging the engine power without undue strain or jerking; a fuel system delivers fuel to the engine; a generator and battery supply electricity for the ignition, lights, and other electrical units.

c. The entire structure of a motorcycle must be heavy and strong enough to accommodate the engine and its accessories and withstand the usage for which it was designed. The "body" or frame is of tubular steel. The steering forks and handle bars are similar to those of a bicycle.

d. The motorcycle may be divided into unit assemblies, such as chassis, engine, power train, electrical system, instruments, accessory equipment, and side car. Details of the construction and characteristics of these units are considered in subsequent sections.

e. There are two variations of the motorcycle still in service: motorcycle with side car (fig. 2); and motor tricycle (fig. 3).

4. Uses and limitations.—*a.* The solo motorcycle is intended primarily for transporting one person. As such it provides the Army with fast, flexible, motorized transportation which is well adapted for scouting and patrolling. It is also widely used for liaison purposes and traffic control.

b. The motorcycle with side car and the motor tricycle are being replaced by the $\frac{1}{4}$ -ton, 4 x 4, reconnaissance car as tactical units. Side car motorcycles and motor tricycles still in service are used as administrative vehicles at posts, camps, and stations.

c. The fact that a solo or side car motorcycle has only one driving wheel is perhaps its most important limiting factor. Relatively light and with limited tractive ability, the motorcycle is normally restricted to good, hard-surfaced highways, roads, and trails. For cross-country travel it is hampered by mud, sand, soft or rocky stream bottoms, deep ditches, heavy roots, bad bumps, holes, and underbrush. In order to meet such conditions, it is advisable to have an extra rider along for assistance. Operation on icy, wet, or other slippery surfaces is difficult and extremely hazardous because, under these conditions, the motorcycle tends to go out of control or skid at the slightest change of speed or direction.

5. Visual aids.—The following War Department training film and film strips will be helpful in becoming acquainted with the motorcycle:

TF 10-654. Description and function of motorcycles.

FS 10-62. Command, maintenance, and technical inspections of motorcycles.

FS 10-84. Lubrication of Indian chain-driven models.

FS 10-90. Lubrication of Harley-Davidson chain-driven models.

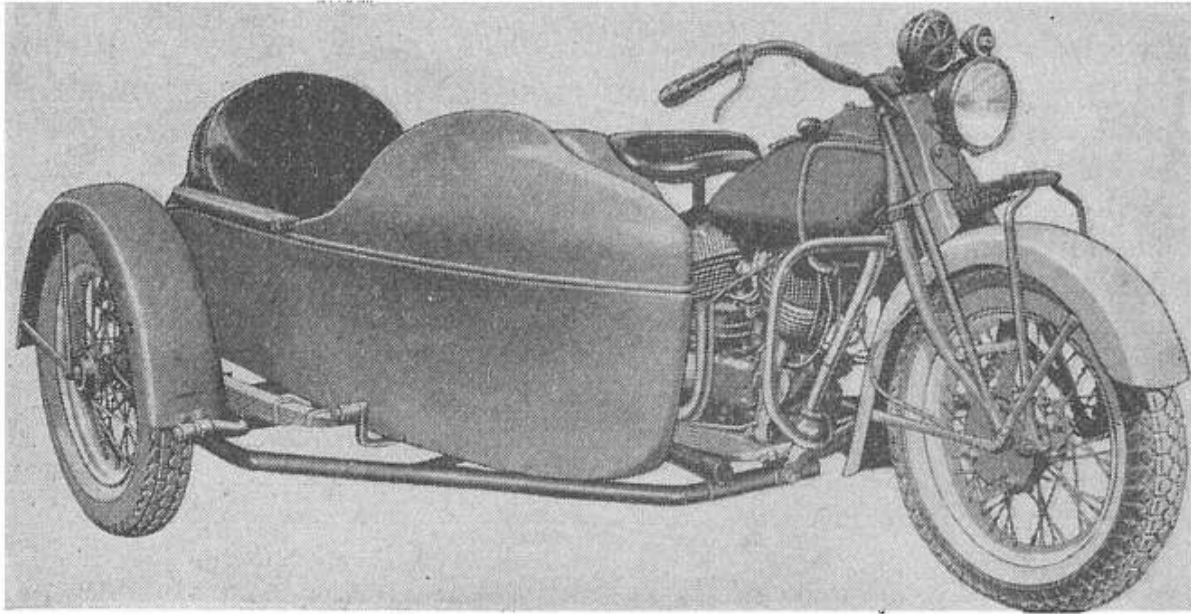


FIGURE 2.—Motorcycle with side car (chassis type—3 x 1).

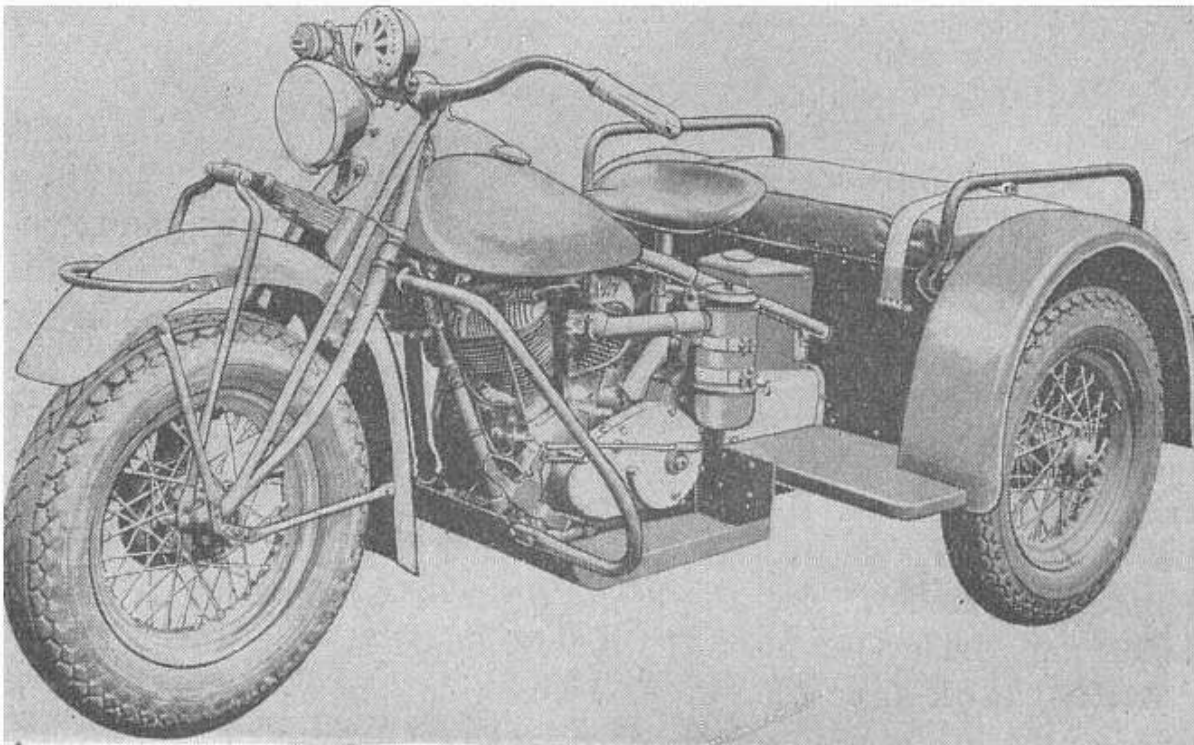


FIGURE 3.—Motor tricycle (chassis type—3 x 2).

SECTION II

LOCATION AND USE OF CONTROLS

CHAIN-DRIVEN MODELS

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SHAFT-DRIVEN MODELS

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CHAIN-DRIVEN MODELS

6. General.—*a.* Superior performance of one motorcycle over another, when both are in the same type of service, is usually the direct result of the motorcyclist's diligence in practicing approved operating and maintenance methods. Seldom is the original quality and construction of one motorcycle much better than another. Practice in the approved operating methods outlined in this section will obtain the most satisfactory performance from the assigned motorcycle.

b. The motorcyclist must first become familiar with the location of the various controls on the two makes of motorcycles used by the Army—the Indian and the Harley-Davidson—and also with the differences between the shaft-driven (second part of this section) and the chain-driven models. Figures 4 and 5 illustrate the controls on the Indian and Harley-Davidson chain-driven models respectively.

7. Fuel tank shut-off valves.—Gasoline shut-off valves are provided on both the main and reserve tanks. Operate the motorcycle on one tank at a time, keeping a supply of reserve fuel in the other. Use only the grade of fuel recommended by the manufacturer's maintenance manual.

8. Throttle.—*a.* The throttle on chain-driven models is operated by twisting the left (Indian) or right (Harley-Davidson) handle-bar grip. Turning the grip inward opens the throttle and increases the engine speed; turning it outward closes the throttle and decreases the speed. When the carburetor needle valves are adjusted correctly, the engine will continue to run at idling speed with the throttle grip in a fully closed position.

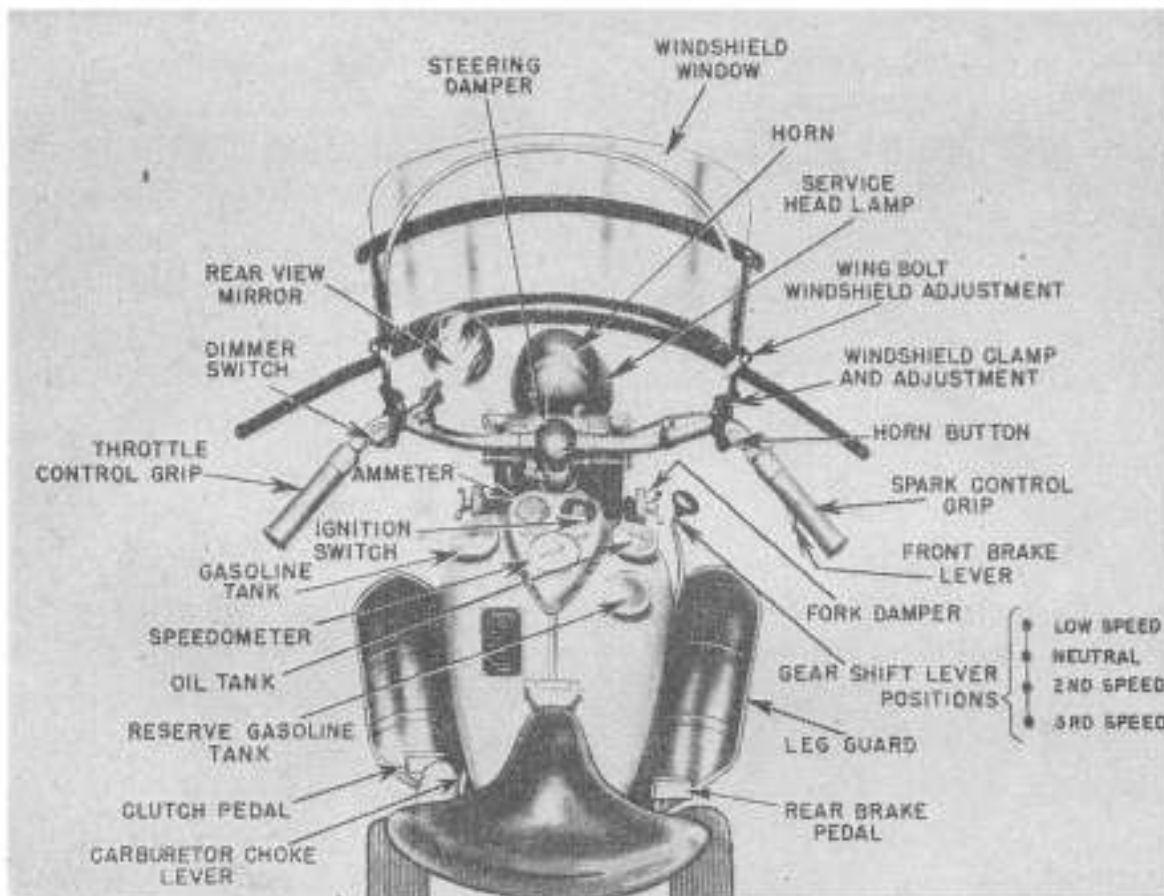


FIGURE 4.—Controls—Indian motorcycle.

b. When slowing down or coming to a standstill, close the throttle. When shifting gears, use the throttle to synchronize the engine speed with the transmission speed.

c. At sustained high road speeds, snap the throttle closed at frequent intervals to facilitate lubrication and cooling within the cylinders. This is necessary because, at high speeds, with the throttle wide open, a great pressure is built up in the combustion chamber which tends to prevent oil from reaching the upper piston surfaces and rings.

d. When the throttle is closed, the pressure above the piston is lowered on the intake stroke. The lower pressure above the piston, combined with the increased pressure below the piston, tends to draw up the oil, past the top rings, providing lubrication and cooling.

9. Choke lever.—*a.* The choke lever, located on the carburetor at the left side of the motorcycle, operates a valve which controls the flow of air from the air cleaner to the carburetor. When the choke is

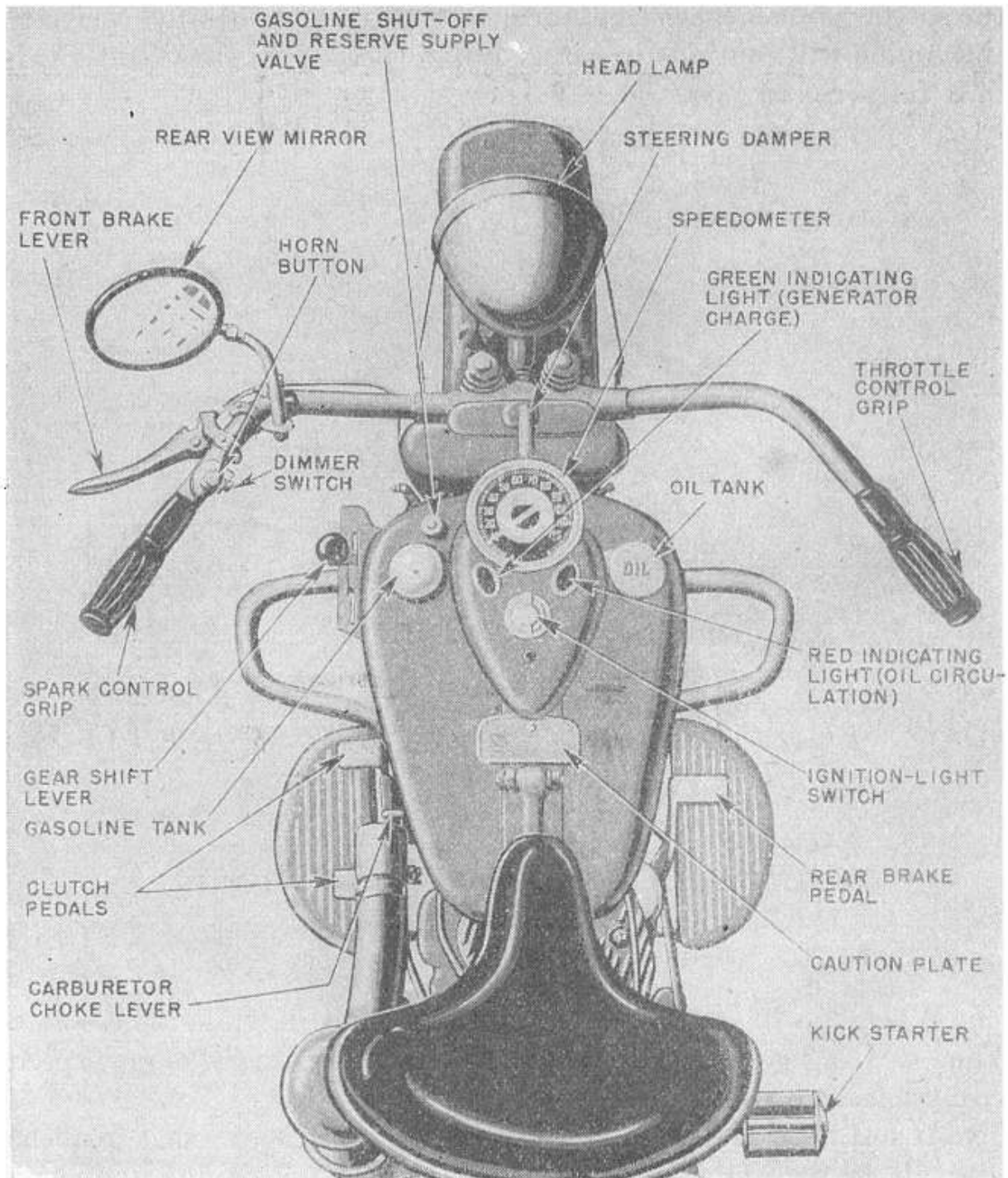


FIGURE 5.—Controls—Harley-Davidson motorcycle.

closed (lever turned down, Indian; up, Harley-Davidson) a large portion of gasoline and a small amount of air are drawn into the cylinders. Therefore, the lever should be in this position *only* when starting the engine. As soon as the engine starts, turn the choke lever to a point about midway between closed and normal running positions.