

OWNER'S and DRIVER'S MANUAL



Models

LC-180, LC-181, and LC-182

This manual contains a lubrication chart and operating information which will be valuable to you during the entire life of your truck. Rely on your manual for operating and maintenance information . . . and rely on your International service station when in need of skilled mechanical service or International service parts. A complete list of parts will be supplied on request.



INTERNATIONAL TRUCKS

WARRANTY

THE INTERNATIONAL HARVESTER COMPANY warrants each new INTERNATIONAL MOTOR TRUCK to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any part or parts thereof which shall be returned to it with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective, provided that such part or parts shall be so returned to it not later than ninety (90) days after delivery of such vehicle to the original purchaser, and that at the time of such return, the said vehicle shall not have been operated in excess of five thousand (5,000) miles. This warranty is expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on its part, and it neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale of its vehicles.

This warranty shall not apply to any vehicle which shall have been repaired or altered outside of its factory in any way so as, in its judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor to any commercial vehicle made by it which shall have been operated at a speed exceeding the factory rated speed, or loaded beyond the factory rated load capacity.

It makes no warranty whatever in respect to tires, rims, ignition apparatus, horns or other signaling devices, starting devices, generators, batteries, speedometers or other trade accessories inasmuch as they are usually warranted separately by their respective manufacturers.

It is the policy of the International Harvester Company to improve its products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to make such changes on trucks sold previously.

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Drive Safely
And Save A Life
It May Be Your Own

NATIONAL SAFETY COUNCIL

TO THE TRUCK OWNER

We feel sure you will obtain from this truck the economical and superior performance it is designed and built to give.

Years of truck manufacturing experience and actual contact with transportation problems have been combined with advancements in engineering and metallurgical science to produce all the features and refinements built into your truck. Properly lubricated, adjusted, operated, and maintained, this truck will respond to every reasonable demand you make upon it and will give you reliable service for years to come.

The purpose of this manual is to explain maintenance requirements and routine adjustments which are necessary for the most efficient operation. To protect your investment, study your manual before starting or operating your truck.

If you should need information not given in this manual, or require the services of a trained mechanic, we urge you to use the extensive facilities offered by the company-owned Service Station or authorized dealer in your locality. They are kept informed on the best methods of servicing and are equipped to provide prompt, first-class service in an up-to-date Service Station. International district Service Stations and dealers carry ample stocks of essential International service parts.

A new procedure for handling service parts has been placed in operation at International Harvester Company service parts departments. With this new system in operation, it is expected that the vehicle owner will realize many benefits from a service standpoint; particularly when ordering replacement parts for his truck.

The system consists of assigning code numbers to each of the units included in the vehicle, engine, transmission, cab, rear axle, wheels, frame, etc. This same code number is used during the manufacturing of the vehicle and will be further carried over into the parts catalogs which apply to the particular model trucks. By this means, a common language has been set up for all parties involved in the design, the use, and the servicing of this particular vehicle.

The code numbers assigned to the units on this particular truck have been printed on a vehicle specification card which is included with this truck. The parts catalogs are subdivided into sections identical with code numbers shown on the specification card.

When ordering parts for this vehicle, it is important to include with the order the information contained on the vehicle specification card. This card is located inside the cab behind the seat on the right quarter panel, below the belt rail.

The vehicle specification card will prove of great value to the customer when entering the service station for service work, since reference to the card will indicate to the service station just what units are included with the vehicle and will put them in a position to render the best possible service.

When in need of parts, always mention the model and chassis number as well as the serial number of the unit for which the parts are required. We suggest that you write these serial numbers in the spaces provided below for ready reference when parts are required. Request the salesman to assist you in securing and recording these serial numbers when the truck is delivered to you.

TRUCK
MODEL _____

(Stamped on capacity plate inside of cab panel,
at side of clutch pedal.)

CHASSIS
SERIAL
NUMBER _____

(Stamped on frame left side rail, front.)

ENGINE
SERIAL
NUMBER _____

(Stamped on crankcase left side upper, front.)

SPECIFICATIONS

ENGINE

IH Model Super Blue Diamond.	BD-269
Number of Cylinders.	6
Bore	3-9/16 Inches
Stroke	4-1/2 Inches
Piston Displacement.	269 Cubic Inches
Maximum Idle Range (No Load).	350 to 400 r.p.m.
Maximum Recommended Speed.	3000 r.p.m.
Engine Weight (Dry)	781 Pounds
Horsepower (A.M.A.)	30.4
(A.M.A. Horsepower rating is based on the bore of the engine and is no index to actual engine power. It is required in some states for licensing purposes.)	

Crankshaft

Main Bearings	4
Connecting Rod Bearings	6
Lubrication (Drilled Shaft)	Pressure System

Valves

Valve Tappet Clearance (Hot)	.018 to .020 Inch
Valve Seat Inserts (Exhaust Valves)	Hardened Alloy

FUEL SYSTEM

Carburetor	Updraft
Fuel Filter	At Fuel Pump

COOLING SYSTEM	Sealed Type
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ELECTRICAL

Electrical System.	Positive Ground
Spark Plug Gap	.028 to .032 Inch
Distributor Contact Point Setting.	.018 to .024 Inch
Battery.	Frame Mounted (Front Right)
Headlights.	Sealed-Beam
Windshield Wiper.	Electric Dual Drive (Central Motor, Both Blades)

BRAKES

Service Brakes

Hydraulic	Two-Shoe, Self-Centering (Front and Rear)
Hydrovac Power-Brake Unit	Third or "C" Series, Single Guided Piston
Air Brakes	Available as Optional Equipment
Parking Brake	Propeller Shaft Mounted Rear of Transmission

TRANSMISSION

Five-Speeds Forward; One Reverse (F-51) (Code No.1307)	Overdrive in Fifth Gear
Five-Speeds Forward; One Reverse (F-51C) (Code No.1308)	Direct in Fifth Gear

REAR AXLE

Single-Reduction (Code No.1406)	Hypoid
Two-Speed (Code No.1412)	Hypoid, Planetary Gears
Double-Reduction; Two-Speed (H-300) (Code No.1427)	Hypoid, Helical Gears

WHEELBASE	112, 130, 142, 154, and 172 Inches
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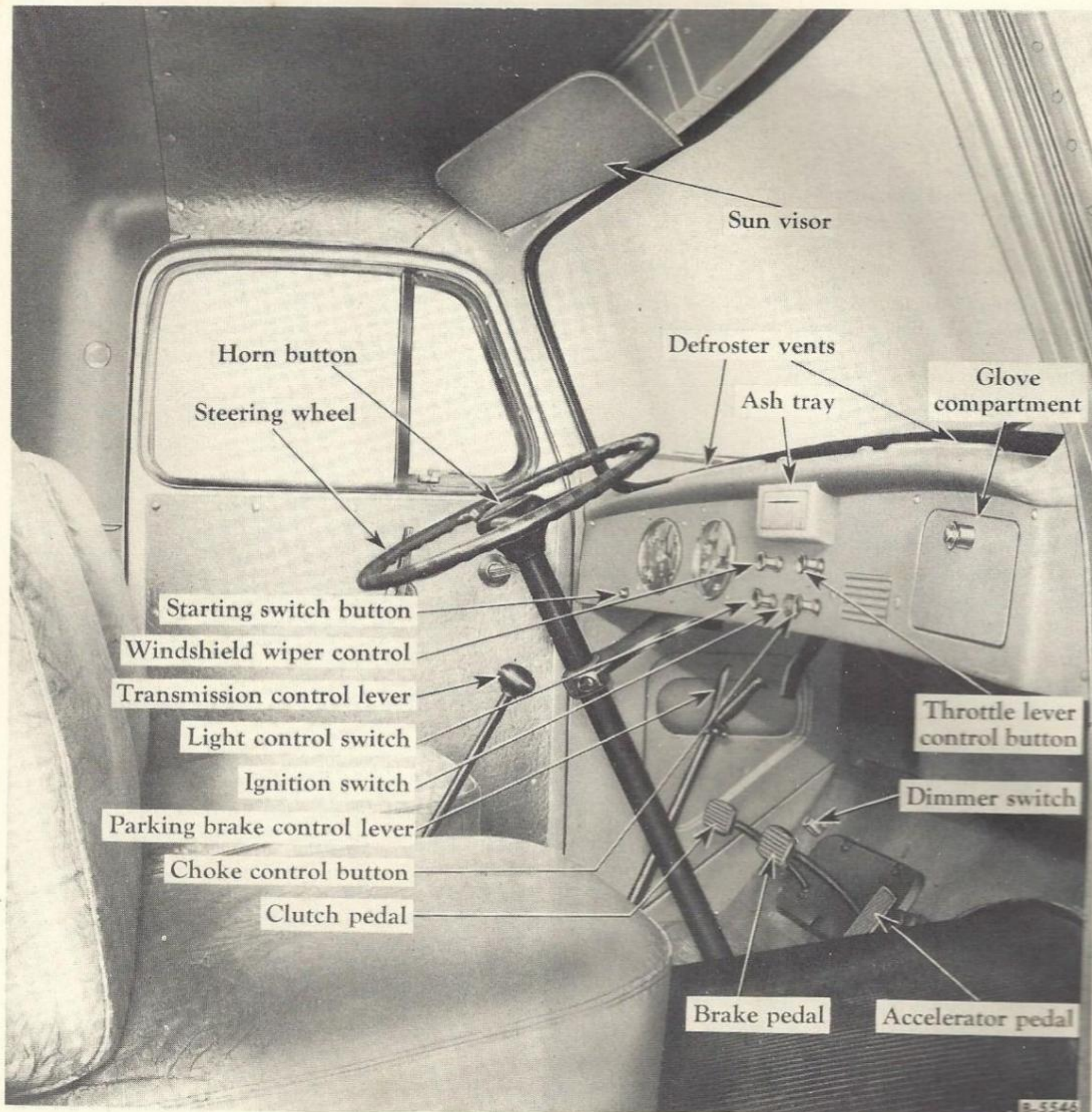
TIRE SIZE.	7.50x20-8 or 10 Ply, 8.25x20-10 or 12 Ply, and 9.00x20-10 or 12 Ply
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Note: The code numbers listed above refer to the various units available. To identify the specific rear axle or transmission in the vehicle, refer to the Vehicle Specification Card located inside the cab, behind the seat on the right quarter panel, below the belt rail.

Specifications subject to change without notice.

OPERATING INSTRUCTIONS

CONTROLS



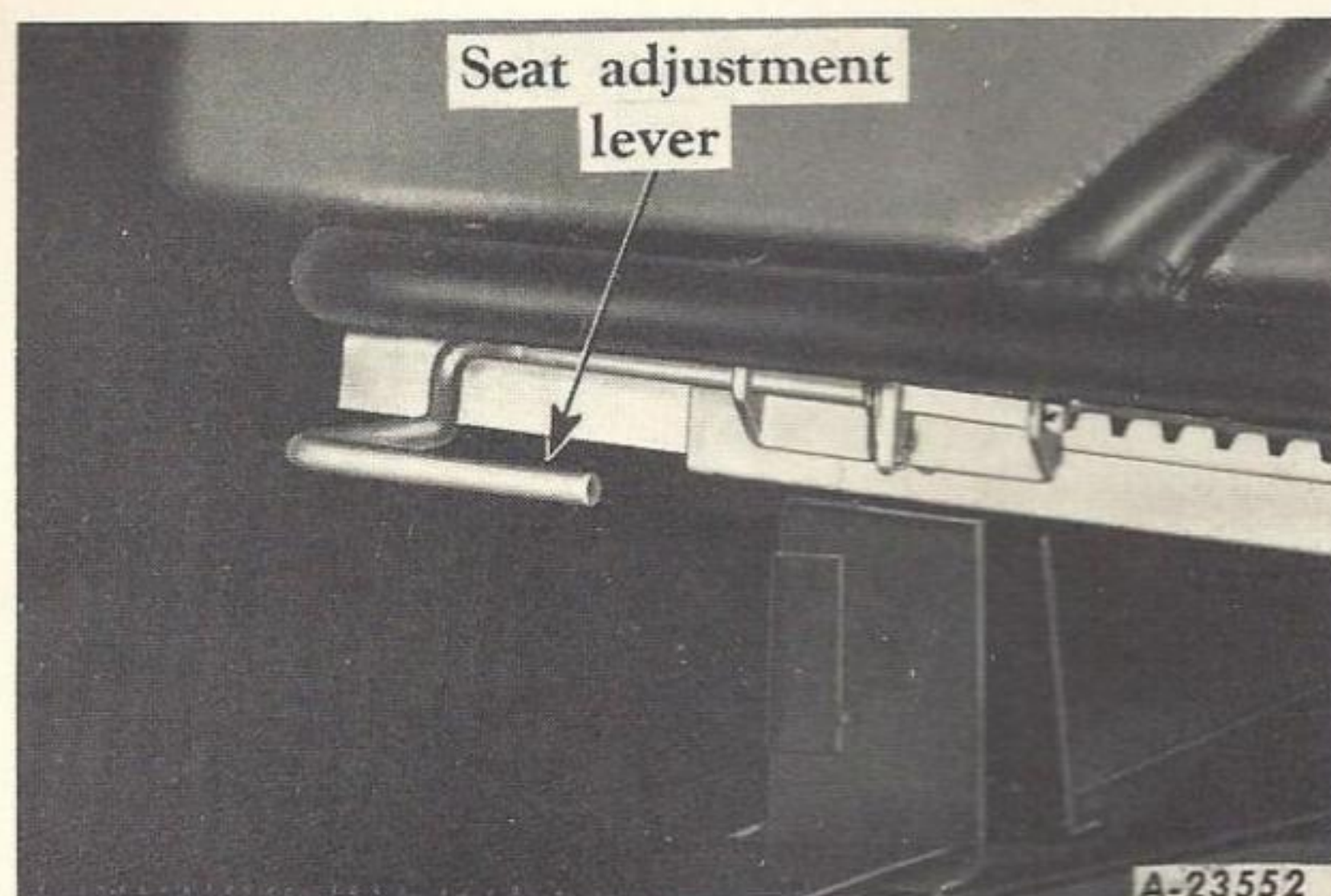
Cab interior.

Note: Arm rest, fresh-air heating, ventilating, defrosting system, and dome light are available at owner's selection.

OPERATING INSTRUCTIONS

CONTROLS

Seat Adjustment



The driver's seat is adjustable to accommodate the driver.

To change positions, disengage the seat lock, pull the seat forward or push back to the desired position.

Ignition Switch

When the switch key is turned to the left, all accessories and gauges are "On" but the ignition is "Off". When the switch key is turned all the way to the right, the ignition also is "On".

Choke Control Button

The choke control button is used to operate the carburetor choke valve when starting a cold engine. Pulling the choke button out away from the panel closes the choke valve. The choke valve will be open when the choke button is again pushed all the way in against the panel.

Throttle Control Button

The throttle control button may be used to open the throttle slightly when starting the engine, or to set the throttle at any position to maintain a constant engine speed. Operation of the throttle button actuates the accelerator pedal, but the operation of the accelerator pedal has no effect on the throttle button.

Starting Switch Button

Pressing the starting switch button completes the electrical circuit between the battery and the starting motor so that the pinion engages the flywheel ring gear and cranks the engine.

Light Control Switch

The light control switch on the instrument panel controls the headlights, parking lights, instrument panel lights, and taillights. When the light control switch is pulled out halfway, both parking and taillights are lit. When the light control switch is pulled out all the way, both headlights and taillights are lit. To light the instrument panel, turn the light control switch to the right; a built-in rheostat controls the intensity of the panel light, from off to full power as shown on page 6.

Dimmer Switch

The foot-operated dimmer switch, convenient to the driver's left foot, is used to control the upper and lower headlight beams. The switch is not operative unless the light control switch is pulled out. Use of this dimmer switch permits the driver to lower the headlight beam when approaching or passing oncoming vehicles, and to raise the headlight beam when again needed.

Clutch Pedal

The clutch pedal, operated by the driver's left foot, engages and disengages the clutch. Depressing the clutch pedal disengages the engine from the transmission so that the transmission gears may be shifted.

Rear View Mirror

The rear view mirror is adjustable for the position desired.

Service Brake Pedal

The service brake pedal, operated by the driver's right foot, controls the application and release of the hydraulic brakes at the wheels. The braking action at the wheels is in direct proportion to the pressure applied to the brake pedal. Release of the brake pedal pressure releases the brakes at the wheels.

Accelerator Pedal

The accelerator pedal, operated by the driver's right foot, controls the carburetor throttle valve. When the pedal is completely released, the engine will operate at idling speed.

Parking Brake Control Lever

The parking brake should not be used to brake the vehicle during normal road operation. The primary purpose of this brake is to hold the vehicle in a parked position, or to assist in bringing it to an emergency stop.

OPERATING INSTRUCTIONS

CONTROLS

Transmission Control Lever

The transmission control lever, convenient to the driver's right hand, is used to select the various gear ratios or speeds provided in the transmission. The shifting patterns or diagrams are shown on page 11.

A safety rule followed by all good drivers when going downhill is to use the same, or next lower, transmission gear as would be used in climbing the same grade.

However, caution demands that the road speed be controlled not to exceed the road speed possible for that particular gear range on a level road. Otherwise, with the vehicle driving the engine, it is possible for the engine speed to reach far in excess of the maximum recommended speed which will cause serious damage to the engine.

Two-Speed Electric Shift

Trucks having a two-speed rear axle incorporate a dependable electrically powered shift control, thus making driving easier and full two-speed axle performance readily available. When properly serviced, the unit will function efficiently for an indefinite period.

The switch control has two positions which are up and down. Three wires are connected to the switch. When the selector button of the switch is up, the battery wire is connected to the wire leading to one field of the motor in the axle shift units. When the button is down, the battery wire is connected to the wire leading to the other field of the axle shift unit motor.

When the shifting button is up, the axle is in high range; and when the shifting button is down, the axle is in low range.

Steering Wheel

The front wheels are turned by the steering wheel at the top of the steering gear assembly which is connected to the front axle steering knuckles and tie rod by two drag links.

Horn Button

The horn control button is located in the center of the steering wheel. Depressing the button operates the horn.

Electric Windshield Wiper

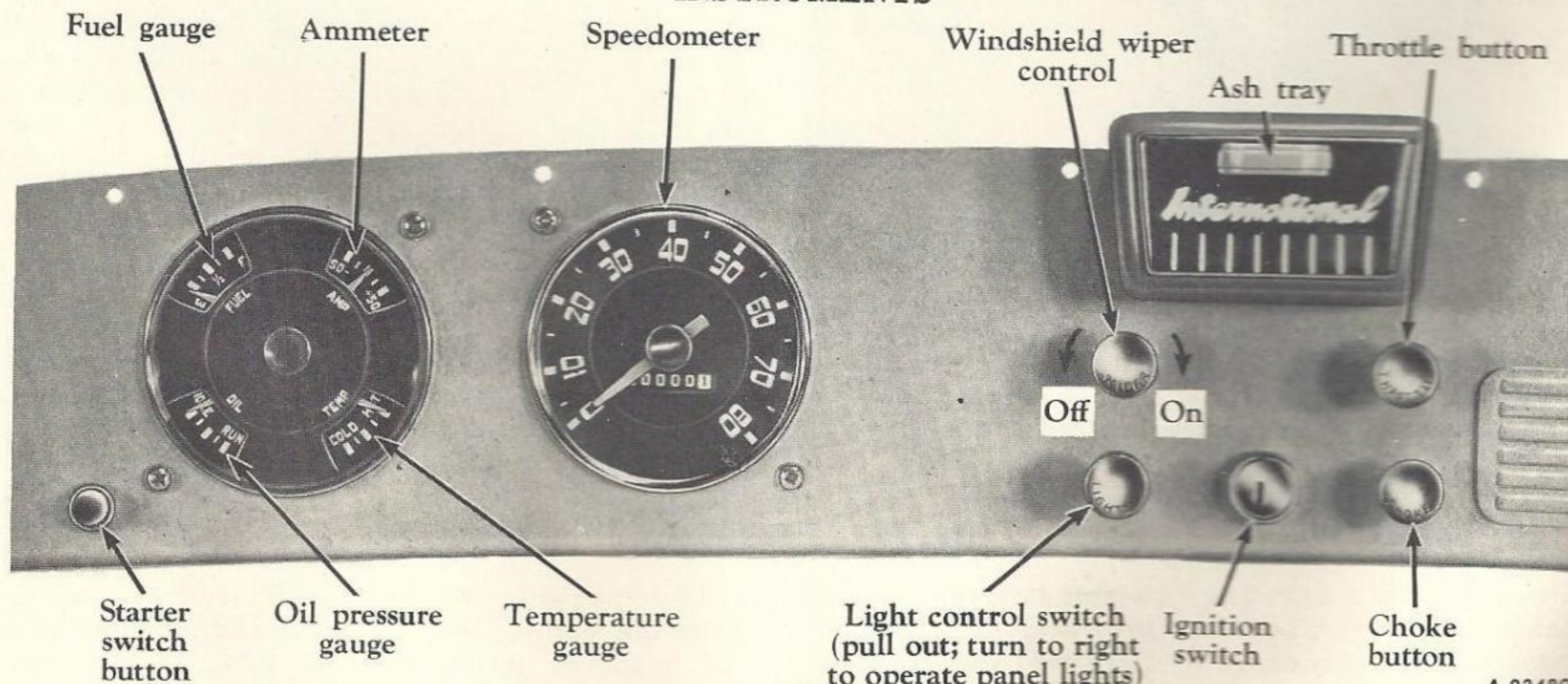
The windshield wiper operating control switch controls the operation of the windshield wiper. The wiper arms are driven by a central motor with a dual drive arrangement, thus making the wiper assembly a single unit and providing synchronized wiper arm movement at all times. There are three positions for the wiper control switch, namely "Off", "High", and "Low".

Speedometer Adapter (Two-Speed Axle)

The speedometer adapter compensates for variations in the speed of the drive shaft between the high and low speed range of the axle.

This adapter is held in the high range by a spring and in the low range by an electro magnet. The inner mechanism is lubricated and sealed for life, but the two shaft ends should occasionally receive a small amount of light oil at the oil-wick cups provided.

INSTRUMENTS



Instrument panel.

A-23480A

OPERATING INSTRUCTIONS

INSTRUMENTS

Oil Pressure Gauge

The oil pressure gauge indicates the pressure of the engine oil, not the amount of oil in the crankcase. The gauge is marked to indicate idling range (marked "Idle") and operating range (marked "Run"). The gauge is electrically operated and is connected to the crankcase sending unit. Pressure is controlled by a nonadjustable relief valve located on the distributor side of the crankcase. If the gauge fluctuates or fails to register at any time while the engine is running, stop the engine immediately and determine the cause.

Ammeter

The ammeter indicates the rate of charge or flow of electric current being supplied to the battery by the generator, or the rate of discharge from the battery. At low engine speeds the needle may show a negative or discharge reading. When the battery is fully charged, a very slight charge is indicated by the needle during normal vehicle operation.

Vacuum Gauge (Trucks Equipped with Hydraulic Brakes and Vacuum Reserve Tank)

The vacuum gauge on the instrument panel registers the amount of vacuum maintained in the brake vacuum system.

Air Gauge (Trucks Equipped with Air Brakes)

The air gauge on the instrument panel regis-

ters the pressure in the air brake system. Make sure the air pressure is up before driving the truck.

Temperature Gauge

The electrically operated temperature gauge indicates the temperature of the coolant in the cooling system, not the quantity of coolant in the system. The gauge operates only when the ignition switch is turned to the "On" position, or is turned to the left to operate the accessories. If the indicator suddenly rises to the "Hot" position during the warm-up or operation periods, the engine should be stopped and the cause of overheating determined.

Fuel Gauge

The fuel gauge is electrically operated and is connected to the fuel tank sending unit. The gauge indicates the level of gasoline in the tank and will register only after the ignition switch is turned on.

Speedometer

The speedometer indicates the road speed in miles per hour. The unit, operated through a flexible cable from the transmission, also records the total number of miles traveled.

Dome Light Switch

The dome light switch is located on the lower left side of the dash panel.

BEFORE STARTING A NEW TRUCK

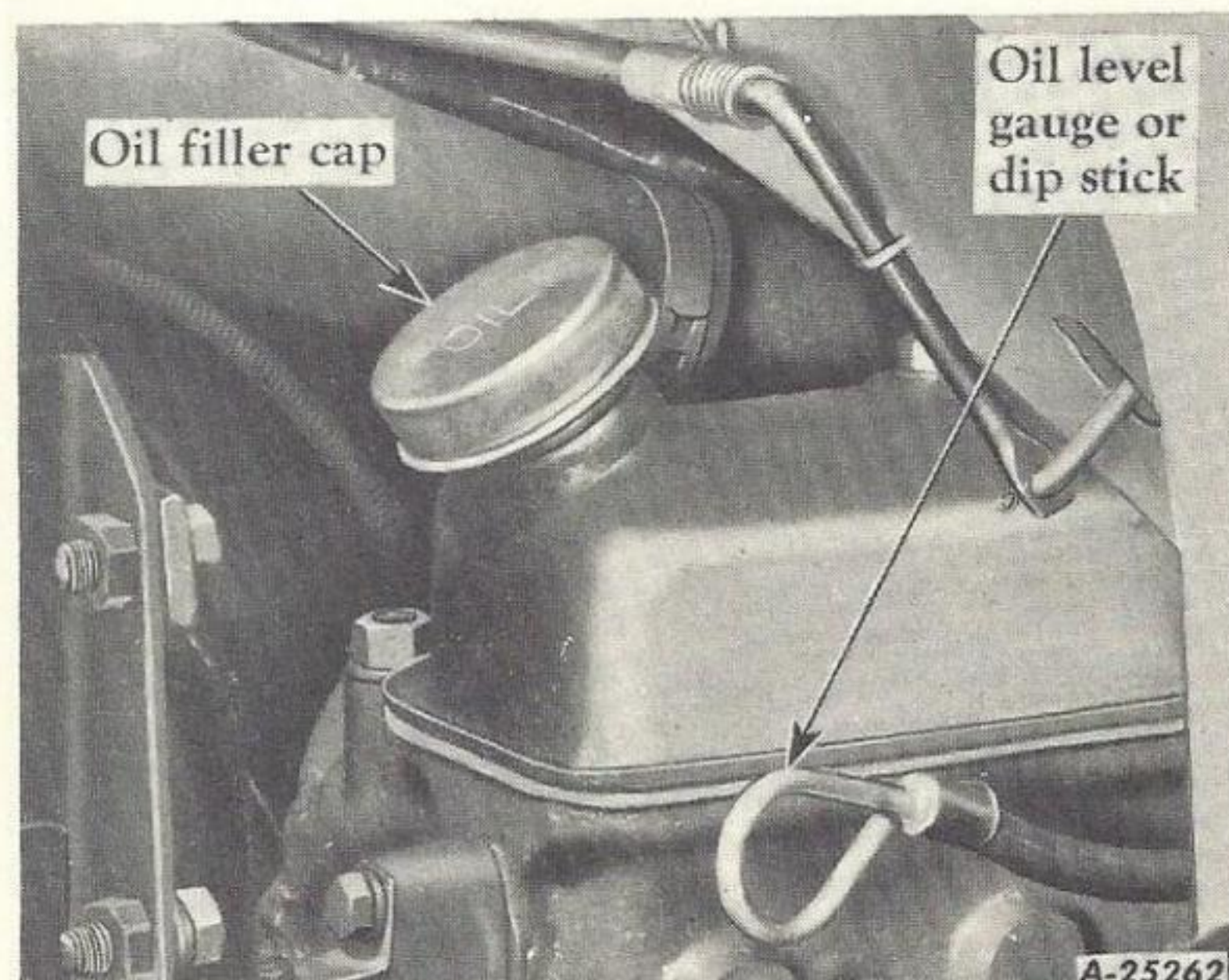
Caution: Do not start or run an engine in a closed garage. Exhaust gas from all internal combustion engines contains poisonous carbon monoxide gas, which is odorless, tasteless, and colorless. Keep the garage doors wide open when starting and keep your cab completely ventilated at all times to avoid drowsiness.

Lubrication

Important: Be sure the truck has been properly lubricated according to the lubrication chart. See pages 42 and 43.

Engine Oils

Be sure that the lubricating oil in the crankcase is up to the full mark on the oil level gauge located on the left side toward the front of the engine.



Oil level gauge.

OPERATING INSTRUCTIONS

BEFORE STARTING A NEW TRUCK

Engine Oils - Continued

When testing the oil level, the gauge must be withdrawn and wiped clean, then inserted all the way and withdrawn for a true reading.

Never test the oil level while the engine is running.

Use only a good grade of engine oil.

Fuel System

Be sure the tank has sufficient fuel.

Caution: When filling, keep the filler spout or nozzle in contact with the metal of the tank to avoid the possibility of an electric spark igniting the gas.

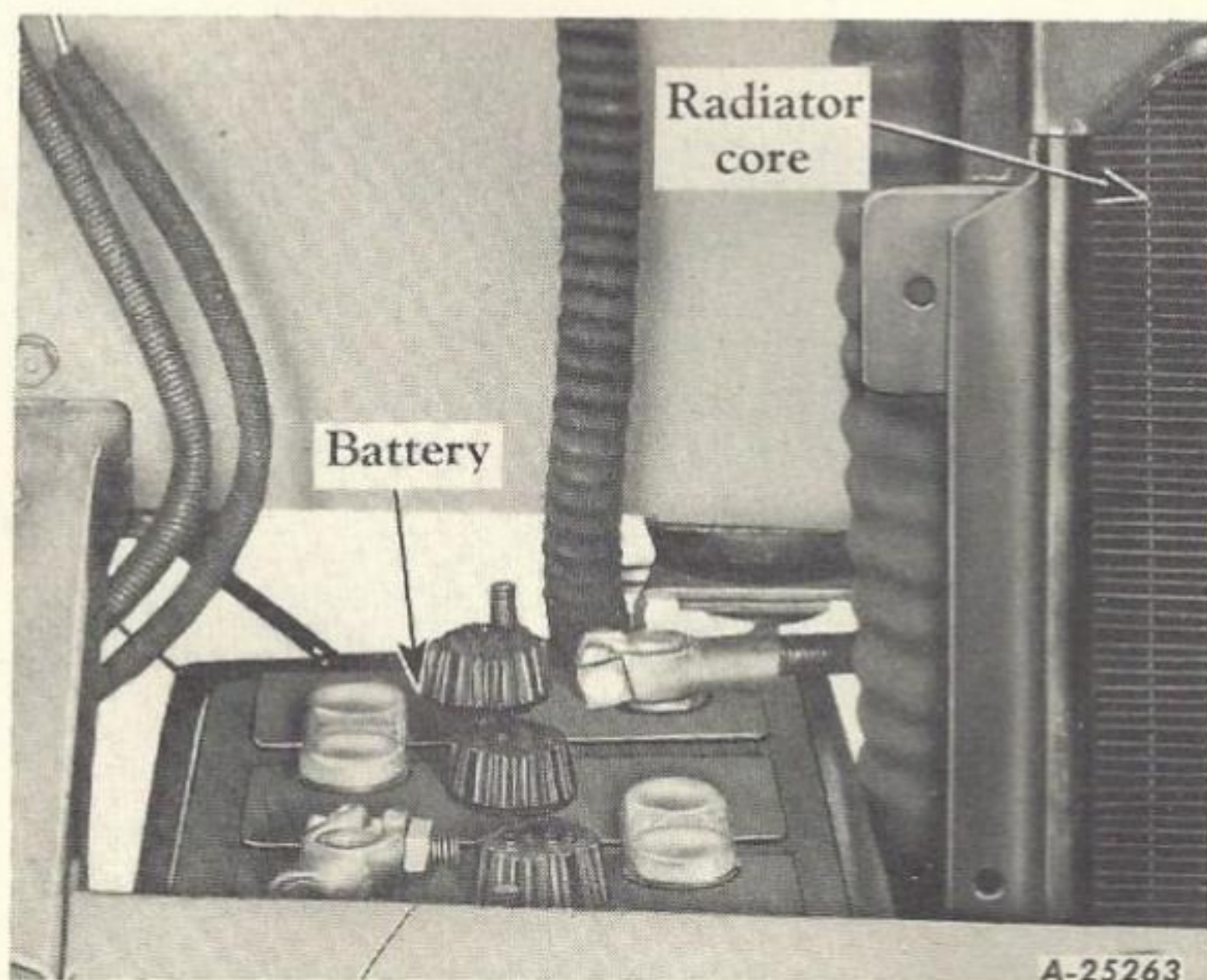
Cooling System

Be sure the radiator is filled with clean water. Use soft or rain water if available.

During cold weather, cover the lower portion of the radiator so as to maintain an operating temperature between 160° to 180° F.

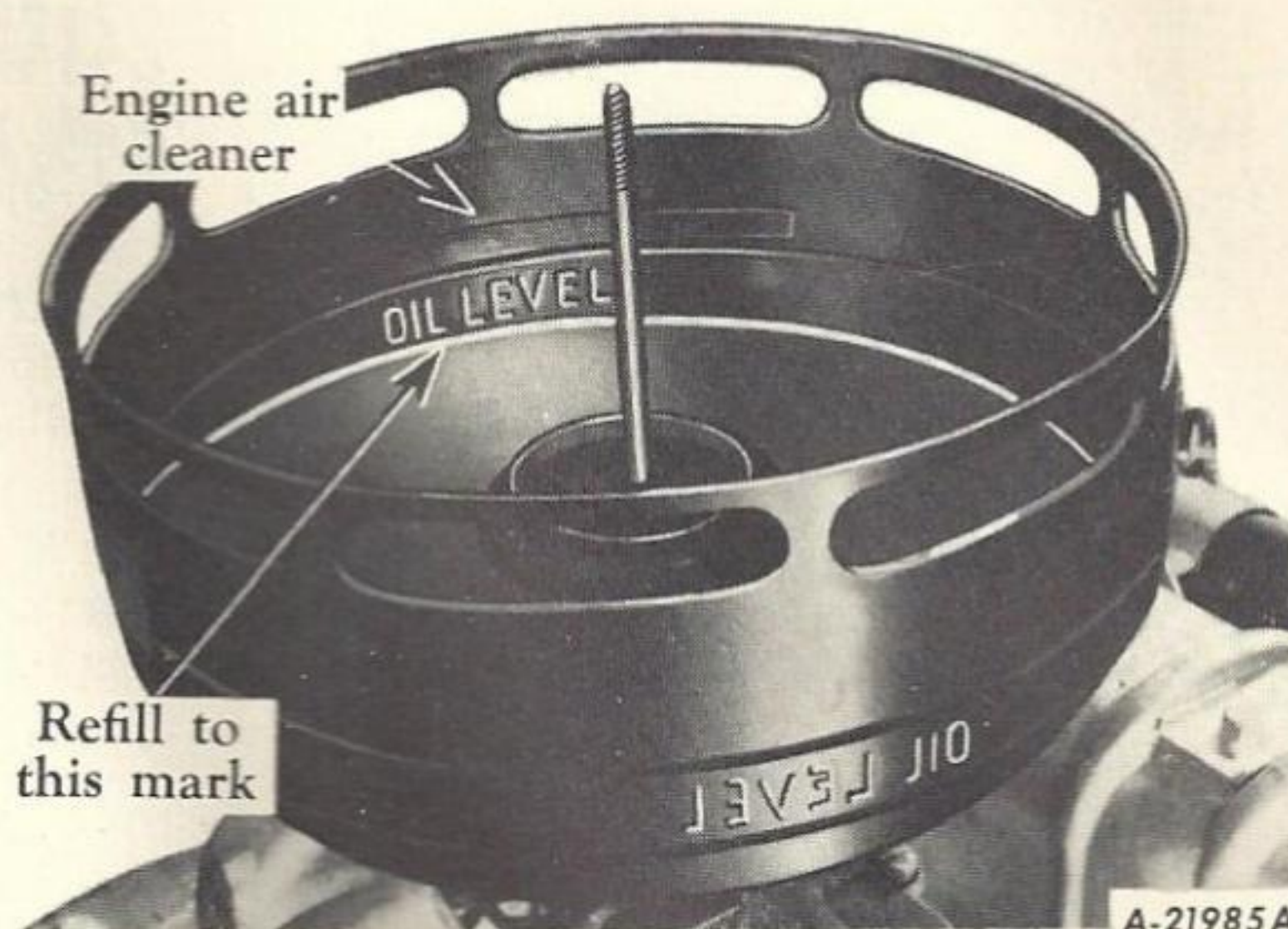
For continuous cold weather, put antifreeze having a low freezing point into the radiator. Refer to "Cold Weather Operation" on pages 12 and 13.

Storage Battery



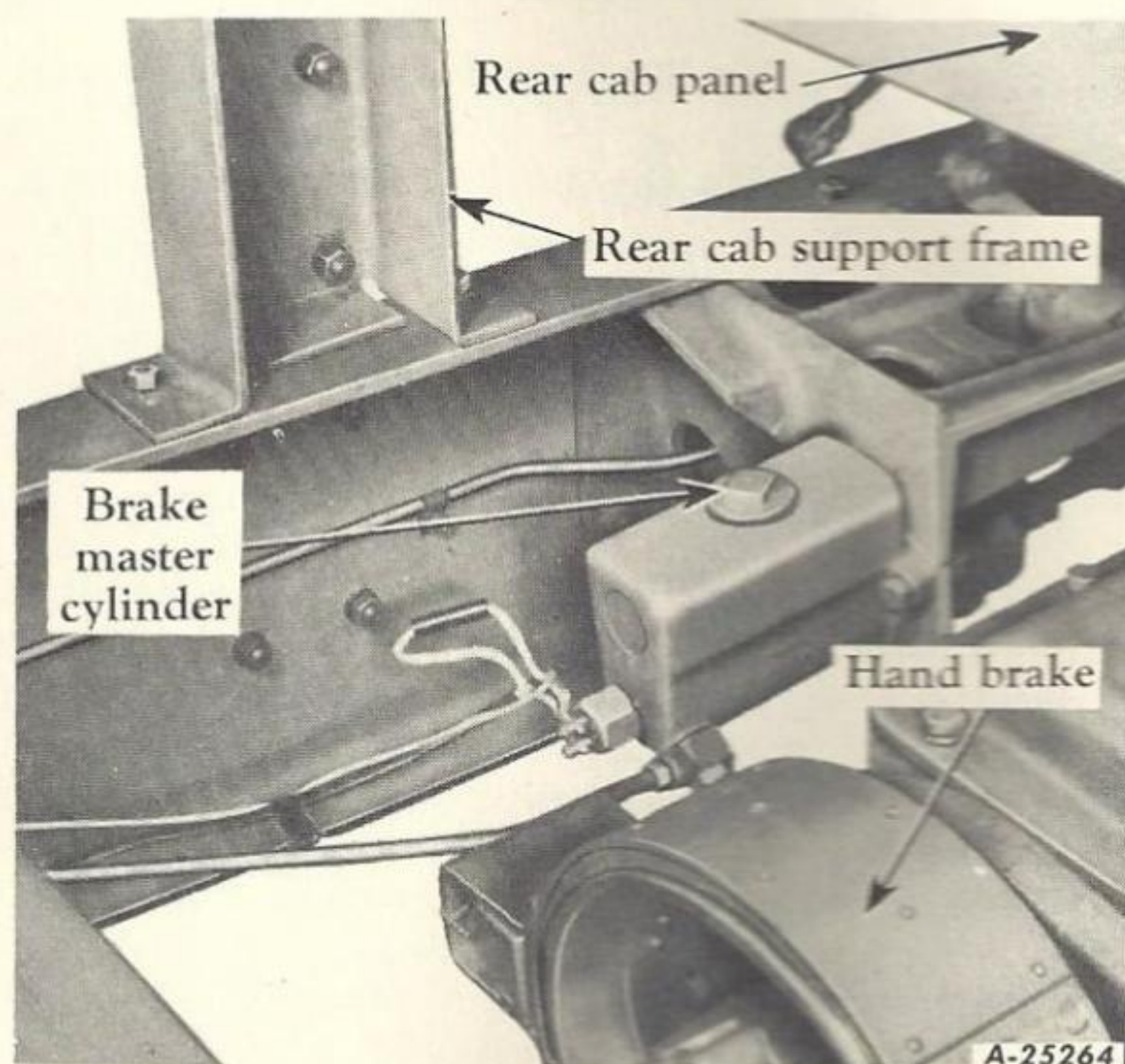
The water level must be 3/8-inch above the separator plates. Use clean distilled water.

Air Cleaner



See that the oil in the air cleaner is up to the indicated level and use the same grade of oil as used in the engine crankcase.

Brake Master Cylinder



The brake master cylinder is located on the left frame rail just in back of the service brake pedal, and is accessible at the rear of the cab. The hydraulic brake fluid must be maintained at a level 3/4-inch below the top of the filler neck. Use only a good grade of "automotive-type" brake fluid. Do not fill the master cylinder to the top of the filler neck.

OPERATING INSTRUCTIONS

BEFORE STARTING A NEW TRUCK

Tires

Inspect the tires periodically. Excessive speed is definitely one of the most important factors in loss of tire mileage. An increase of speed from 40 m.p.h. to 60 m.p.h. results in 33% tire mileage loss. Overloading tires beyond their rated capacity results in tire waste. A 20% overload will give only 70% normal tire mileage.

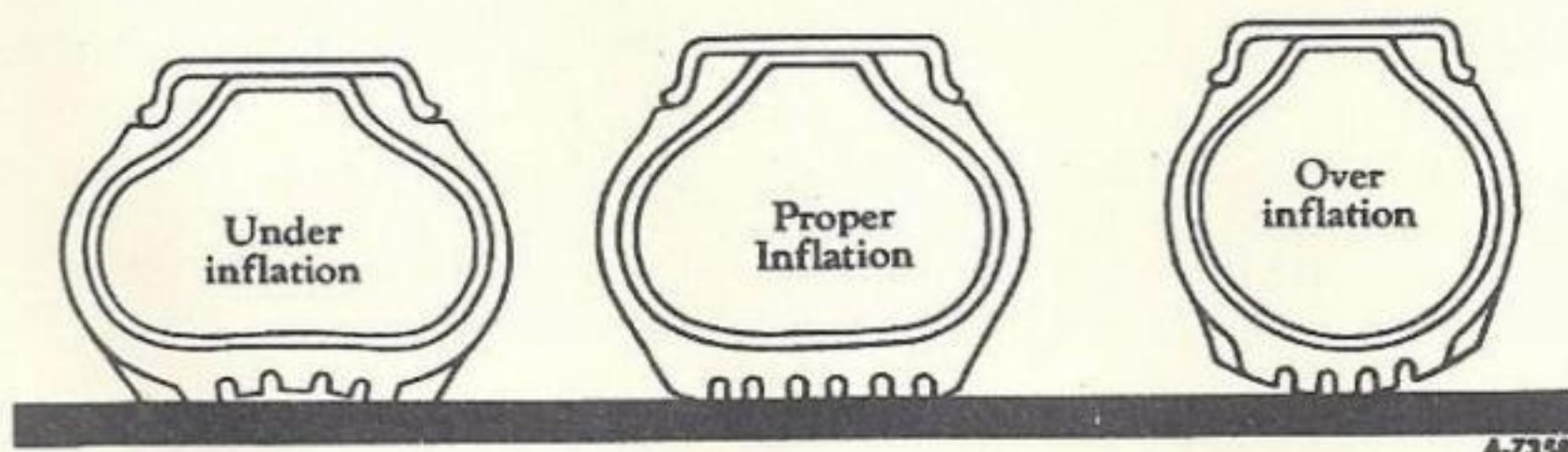
Inflation pressures should be checked when tires are cool, and be sure to use an accurate air pressure gauge. Do this at regular and frequent intervals.

Bleeding the air from hot tires is dangerous and should not be done. While the pressure will be reduced, an increase in temperature of the tire will take place as soon as driving is resumed and tire failure will result.

Valve Caps

Always see that the tire valve caps are in place and screwed tight. The caps assure positive sealing of air in the tires. Besides preventing loss of air through the valve core, they prevent loose soil, mud, gravel, snow, and ice from entering and damaging the valve core and air chamber in the tires.

Underinflation



Too little air pressure increases deflection, causes the tread to wipe and scuff over the road, results in extra strain on the tire, and chances for bruising are increased.

Proper Inflation

Maintaining the proper air pressure provides maximum road contact and results in increased tire life.

Overinflation

Overinflation reduces the tire deflection and tire contact area, causing the tire to ride on the crown, and results in rapid wear in the center of the tread.

TIRE SIZE	PLY	POUNDS PRESSURE
7.50 x 20	8	60 Maximum
7.50 x 20	10	75 Maximum
8.25 x 20	10	65 Maximum
8.25 x 20	12	75 Maximum
9.00 x 20	10	65 Maximum
9.00 x 20	12	80 Maximum

Misalignment of Wheels

If the front wheels are not in proper alignment, excessive tire wear will result. The cause of this condition is too much toe-in or toe-out. A tire on a wheel only 1/2-inch out of alignment is dragged sideways approximately 87 feet in one mile of travel. This type of wear is easily detected because it causes a feather-edge on the shoulder of the tire.

Wheel and Tire Balance

Front wheel shimmy, wandering and cupped tires are caused by an out-of-balance condition of one or both front tires. If tires are changed because of a flat tire or to equalize wear, we recommend they be checked for balance before operating the truck.

OPERATING INSTRUCTIONS

DRIVING THE TRUCK

Breaking-In Period

Note: A new truck should not be driven over 30 miles per hour for the first 500 miles. The engine should not be raced or worked too hard until it has warmed up and is running smoothly, with the carburetor choke button pushed all the way in. Remember, the life of an engine depends on the care it is given, especially during the breaking-in period.

How to Start the Engine

1. Set the parking brake control lever (pull back).
2. Place the transmission control lever in the neutral position.
3. Pull the throttle control button open sufficiently to "crack" the throttle; the engine will then run at "fast idle" speed; the throttle control button should be gradually pushed in until the proper idling speed is obtained.
4. Turn the ignition switch to the "On" position.
5. Pull the choke control button out one-half the distance. Do not use the choke when the engine is warm. In extremely cold weather, the choke button may be pulled out the full distance but must be immediately pushed part way in when the engine starts.
6. Push the clutch pedal forward and keep it there until the engine is running.
7. Press on the starting switch button and release the instant the engine starts.

Caution: Do not run the starting motor for more than approximately 30 seconds at any time. If the engine fails to start or makes a false start, do not press the starting switch button again until the engine has come to a complete stop.

8. When the engine starts, the choke control button must be pushed in to its best running position, and all the way in as soon as the engine is warm enough to permit it.

Caution: The frequent use of the choke control button dilutes the crankcase oil by allow-

ing the unburned gasoline to leak down past the pistons, thus washing away the lubricant from the pistons and cylinder walls and thinning the oil to such an extent that its value as a protecting film between moving parts is destroyed. For this reason we recommend a more frequent complete oil change in winter, using new oil of good quality. See "Engine Oils", pages 44 and 45.

Brakes

Always test the hydraulic brake system by depressing the brake pedal before attempting to move the truck.

Engine Oil Pressure

Maximum oil pressure is set at the factory by means of a nonadjustable relief valve. The oil gauge should always register in the "Idle" range when the engine is idling, and in the "Run" range when the engine is operating at speeds above idle.

How to Start the Truck

1. Push the clutch pedal down to disengage the clutch.
2. Move the transmission gearshift lever into the first gear position.
3. Release the hand brake lever.
4. Depress the accelerator pedal to speed up the engine sufficiently to pick up the load. Release the clutch pedal slowly and further depress the accelerator pedal to prevent the engine from stalling while the truck starts forward.
5. As the truck speed increases, release the accelerator and at the same time depress the clutch pedal. Then move the gearshift lever through the neutral position to the next higher transmission gear. Release the clutch slowly and step on the accelerator as described above. Repeat this procedure as you shift progressively into the higher speed ranges.

OPERATING INSTRUCTIONS

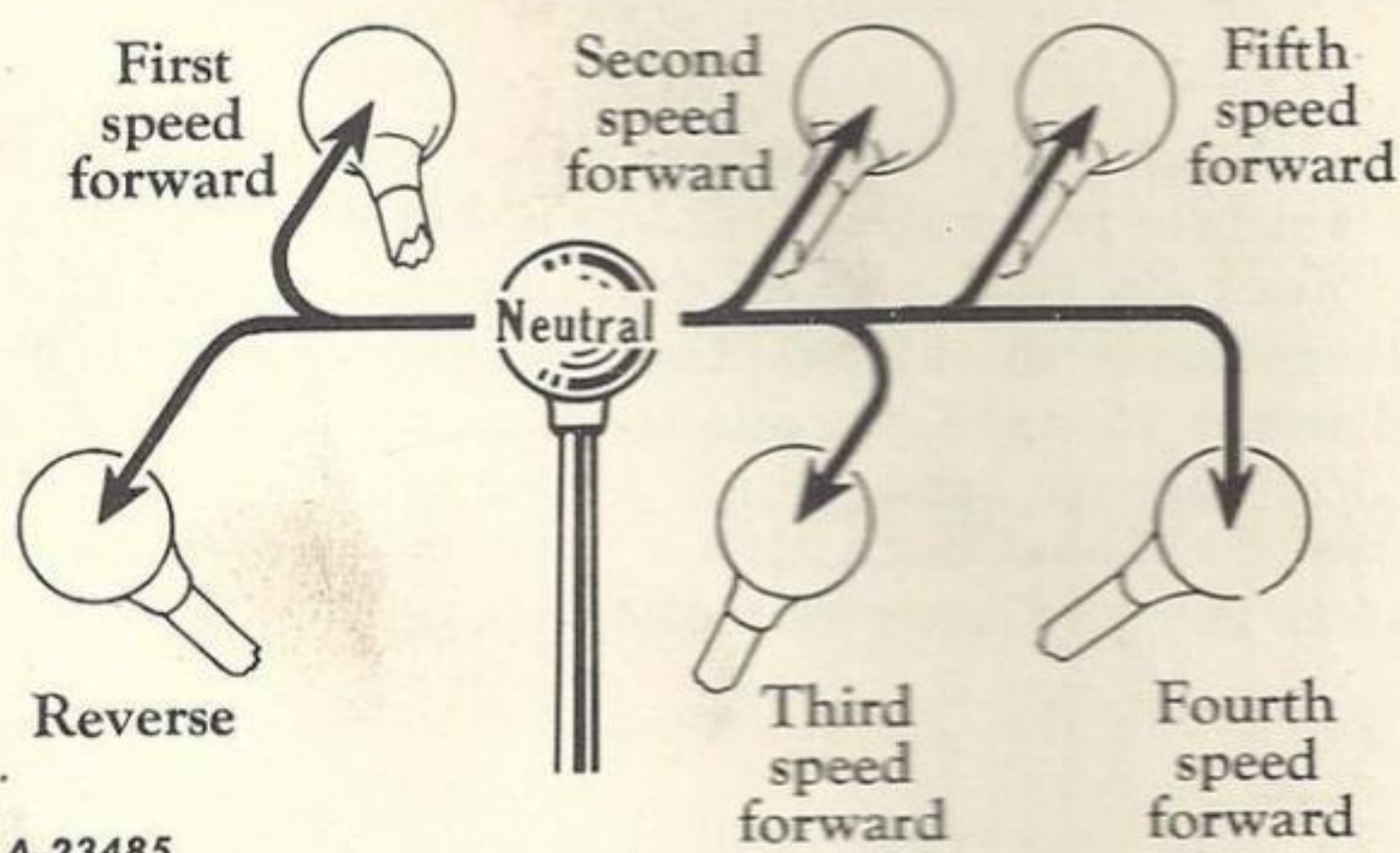
DRIVING THE TRUCK

Clutch

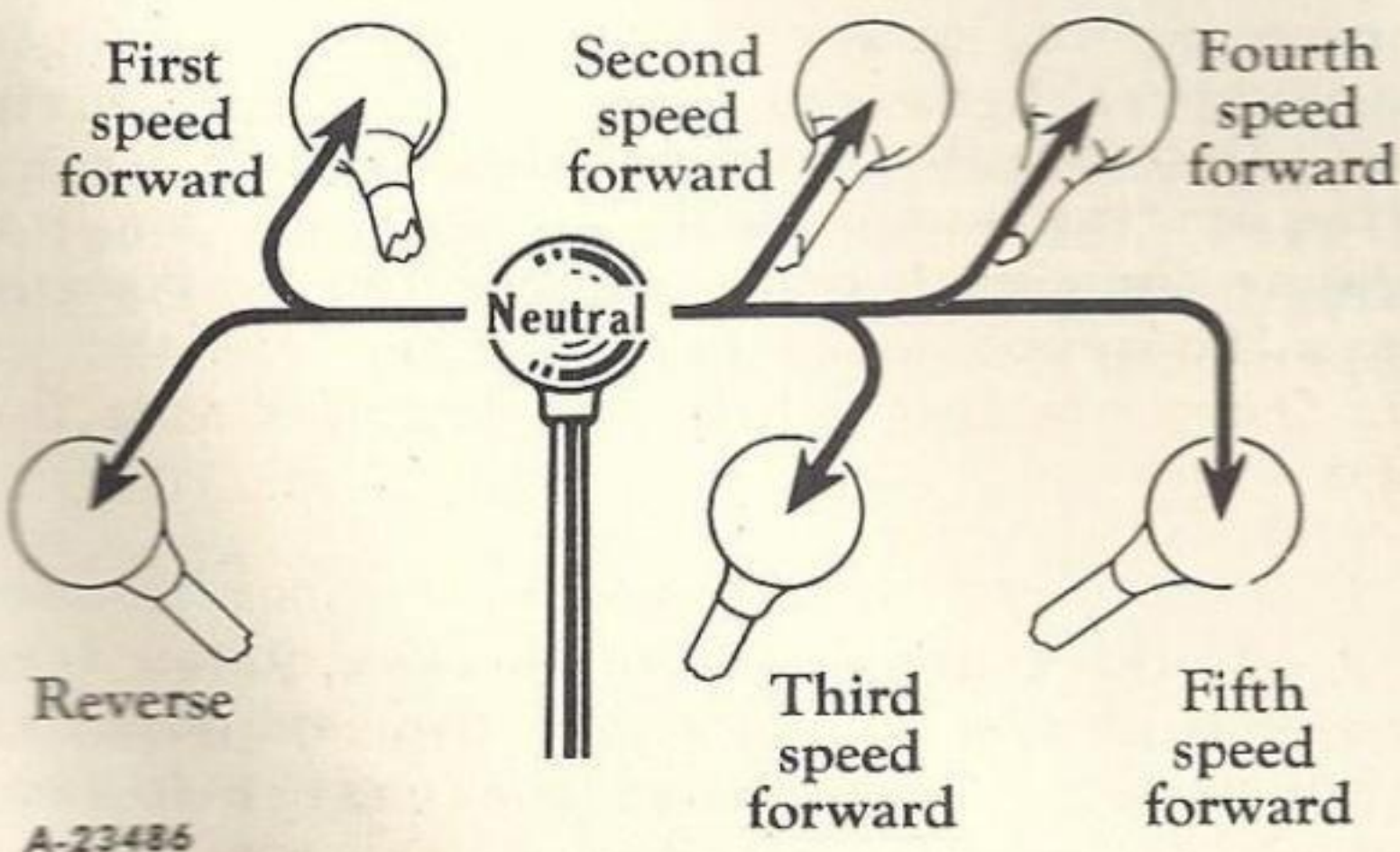
The clutch is the single dry-disc type and has been designed to give long service. Nevertheless, steady abuse by "riding" the clutch pedal will cause slippage and burned linings, so keep your foot off the clutch pedal except to shift gears or when the truck is brought to a stop. Never "ride" the clutch pedal.

Do not coast down grade, even for a very short distance, with the transmission in gear (particularly in reverse or in the lower ranges) and with the clutch disengaged. To do so permits the clutch to be driven by the vehicle at an excessive rate of speed, and the resultant centrifugal force may damage or even completely disintegrate the clutch.

Transmission



F-51 Transmission shifting diagram; five-speeds forward, one reverse (overdrive in fifth speed) (Code No. 1307).



F-51C Transmission shifting diagram; five-speeds forward, one reverse (direct in fifth-speed) (Code No. 1308).

When shifting from high gear to a lower gear, it is advisable to disengage the clutch and move the shifting lever into the neutral position, then re-engage the clutch and speed up the engine sufficiently to complete the shift without clashing. A little practice will bring perfection. Stop the truck completely before shifting into reverse.

Auxiliary Transmission

The auxiliary transmission is used in conjunction with the main transmission and makes available additional gear reduction. The auxiliary transmission is controlled from the driver's compartment.

Driving Downhill

A safety rule followed by all good drivers when going downhill is to use the same, or next lower, transmission gear as would be used in climbing the same grade.

However, caution demands that the road speed be controlled not to exceed the road speed possible for that particular gear range on a level road. Otherwise, with the vehicle driving the engine, it is possible for the engine speed to reach far in excess of the maximum recommended speed, which will cause serious damage to the engine.

For example, a vehicle equipped with a rear axle gear ratio and tire size to permit a road speed of eight miles per hour on level terrain could, with the vehicle going downhill in low gear at a speed of only twenty miles per hour, cause the engine to revolve at more than eight thousand revolutions per minute. The vehicle on which this example is based should not be allowed to descend the grade in low gear faster than eight miles per hour. Even then, the engine speed is at its recommended maximum.

OPERATING INSTRUCTIONS

DRIVING THE TRUCK

Cold Weather Operation

If the truck is to be operated in temperature of 32 F. or lower, observe the following precautions:

HYDROVAC POWER-BRAKE UNIT

Perform the hydrovac lubrication service operation just prior to the cold weather periods. This will provide the working parts of the unit with needed lubrication during the winter months. Tighten all the vacuum hose connections to prevent entry of moisture or dirt. See *lubrication section for instructions.*

LUBRICATION

Engine oil must be changed to a winter grade, depending upon locality and type of service in which the truck is used. General recommendations will be found on pages 42 and 43.

Severe cold weather may make it advisable to change to a lighter grade lubricant in the transmission and in the rear axle differential. A lubricant of lighter viscosity will provide better lubrication to the moving parts. See page 42.

Important: The frequent use of the choke button dilutes the crankcase oil by allowing unburned gasoline to leak down past the pistons, thus washing away lubricant from the pistons and cylinder walls and thinning the oil to such an extent that its value as a protecting film between moving parts is destroyed. For this reason, we recommend a more frequent complete oil change in cold weather, refilling the crankcase with new oil of good quality. See page 43.

COOLING SYSTEM

Before cold weather arrives, put a good antifreeze solution containing an effective rust corrosion preventive into the system.

Before adding solution, do the following:

1. Inspect all hoses. They should be in good condition inside and out. Install the hoses and tighten all hose clamps. Check for leaks.

2. Inspect the water pump for leaks.

3. Inspect the fan belt and adjust to the proper tension. If the belt is worn or oil-soaked, it is safer to install a new one.

4. The engine should be level so that all the water will drain out.

5. Remove the radiator filler cap and open the radiator drain cock; also open the engine drain cock (located on the right side of the crankcase, at the rear of the generator) and thoroughly drain the cooling system. Then close both drain cocks and use a recognized cleaning solution, following the manufacturer's instructions. If a commercial cleaning solution is not available, dissolve about four pounds of ordinary washing soda in sufficient water (21 quarts) to fill the system.

6. Leave the radiator filler cap off and run the engine for about one-half hour or until the engine gets hot. Then disconnect the radiator outlet hose to allow the larger particles of sediment to pass through; also open both drain cocks. Drain and flush thoroughly with clean water. Close both drain cocks and securely fasten the radiator outlet hose.

7. Put the required amount of antifreeze into the cooling system. Add clean water and inspect the hose connections for leaks.

The use of a good winterfront, which will cover the lower portion of the radiator, is recommended in order to maintain an engine temperature between 160° to 180° F. During freezing weather, if antifreeze solutions are not used, the entire cooling system must be drained when the truck is not in use. Be sure to open both drain cocks.

If a solution of alcohol and water is used, keep adding a small amount of alcohol from time to time to compensate for evaporation. Do not use calcium chloride or salt solutions.

Note: Do not use chemical mixtures to stop radiator leaks except in an emergency. Never use solutions instead of needed radiator repair.

OPERATING INSTRUCTIONS

DRIVING THE TRUCK

Cold Weather Operation - Continued

PROPERTIES OF ANTIFREEZE SOLUTIONS

Denatured Alcohol

% By Volume	Freezing Point		Specific Gravity
	°C.	°F.	
0%	0	32	1.000
10%	-3	27	.988
20%	-7	19	.978
30%	-12	10	.968
40%	-19	-2	.957
50%	-28	-18	.943

Distilled Glycerine

% By Volume	Freezing Point		Specific Gravity
	°C.	°F.	
0%	0	32	1.000
10%	-2	29	1.029
20%	-6	21	1.057
30%	-11	12	1.085
40%	-18	0	1.112
50%	-26	-15	1.140

Methanol (Wood Alcohol)

% By Volume	Freezing Point		Specific Gravity
	°C.	°F.	
0%	0	32	1.000
10%	-5	23	.987
20%	-12	10	.975
30%	-19	-2	.963
40%	-29	-20	.952
50%	-40	-40	.937

Ethylene Glycol

% By Volume	Freezing Point		Specific Gravity
	°C.	°F.	
0%	0	32	1.000
10%	-3	26	1.016
20%	-9	16	1.031
30%	-16	3	1.045
40%	-24	-11	1.058
50%	-35	-31	1.070

RUST PREVENTION

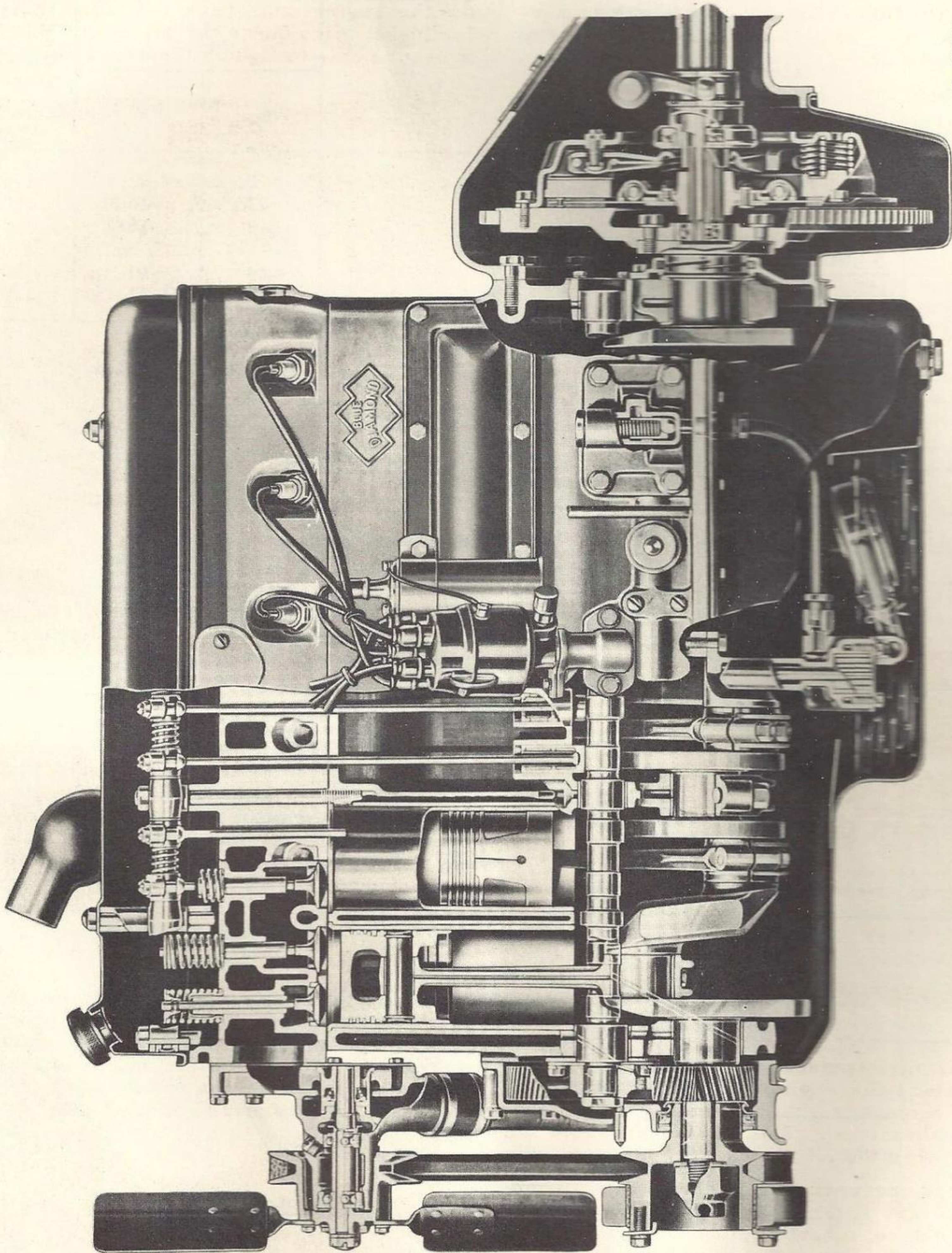
Rust and corrosion formation can be prevented by maintaining full strength corrosion protection at all times.

For rust protection during the winter months, a fresh filling of an antifreeze containing an effective corrosion preventive should be installed in the fall. In the spring, drain and discard the old antifreeze solution because the cooling liquid may have become contaminated by corrosive impurities during use and the rust preventives or "inhibitors" in the antifreeze solution may have become weakened and exhausted by continual driving.

During the summer, a rust preventive should be added to the cooling system to protect the system against corrosion during warm weather operation. This inhibitor solution should be drained in the fall and a fresh filling of chemically treated antifreeze solution again installed. See page 17.

MAINTENANCE

BD-269 SUPER BLUE DIAMOND ENGINE



B-4950A

Sectional view.

MAINTENANCE

BD-269 SUPER BLUE DIAMOND ENGINE

Caution: Based on the fire hazard and insurance regulations, we do not recommend the use of gasoline when cleaning parts. A less inflammable fluid should be used such as kerosene or any noninflammable commercial cleaning solvent.

Overhauling

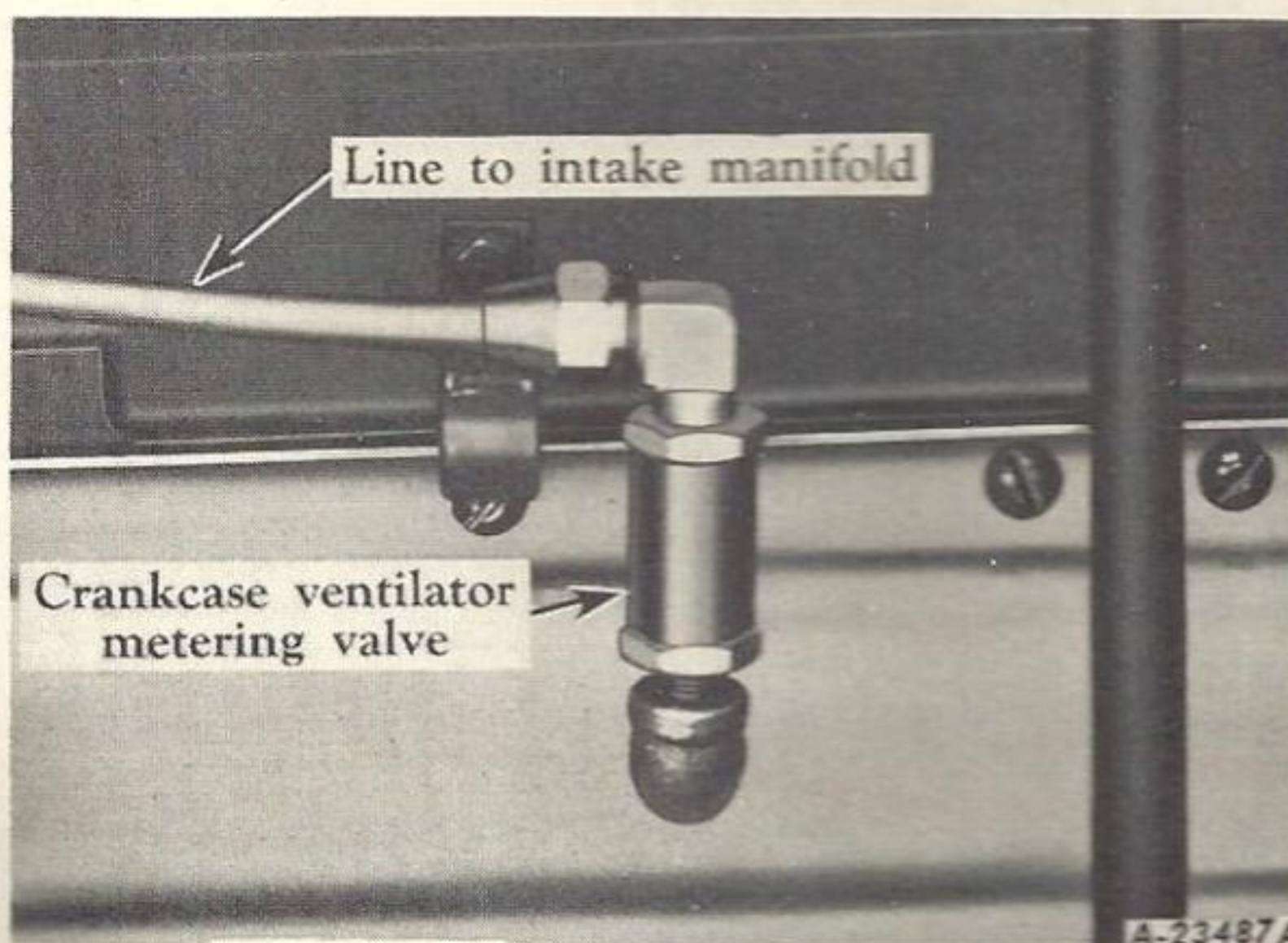
Consult an International Service Station or an authorized dealer before attempting a general overhauling.

Cleaning the Engine

The importance of having an engine, or any other unit in the truck, clean and free from dirt, sludge, abrasives, etc., cannot be too strongly emphasized.

Crankcase Ventilation

To retard the accumulation of these harmful substances in the engine crankcase, positive ventilation of the crankcase has been provided. The ventilator metering valve, shown below maintains positive air flow through the engine crankcase at all engine speeds. A rubber hose connecting the engine valve cover to the engine air cleaner supplies dust-free air for crankcase ventilation. To maintain crankcase ventilation at maximum efficiency, the engine air cleaner should be serviced according to the lubrication instructions on *page 43*.

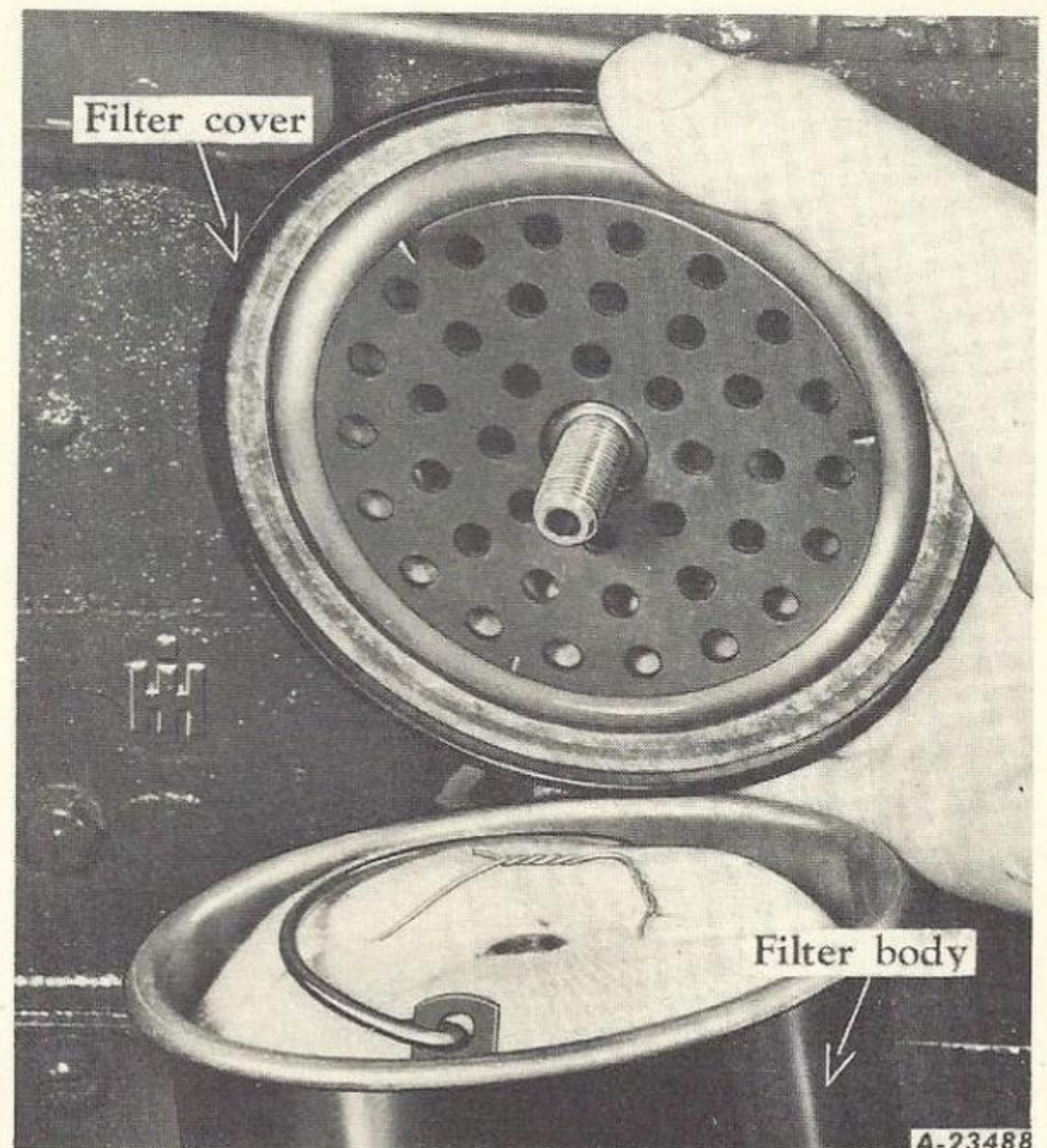


Oil Filter

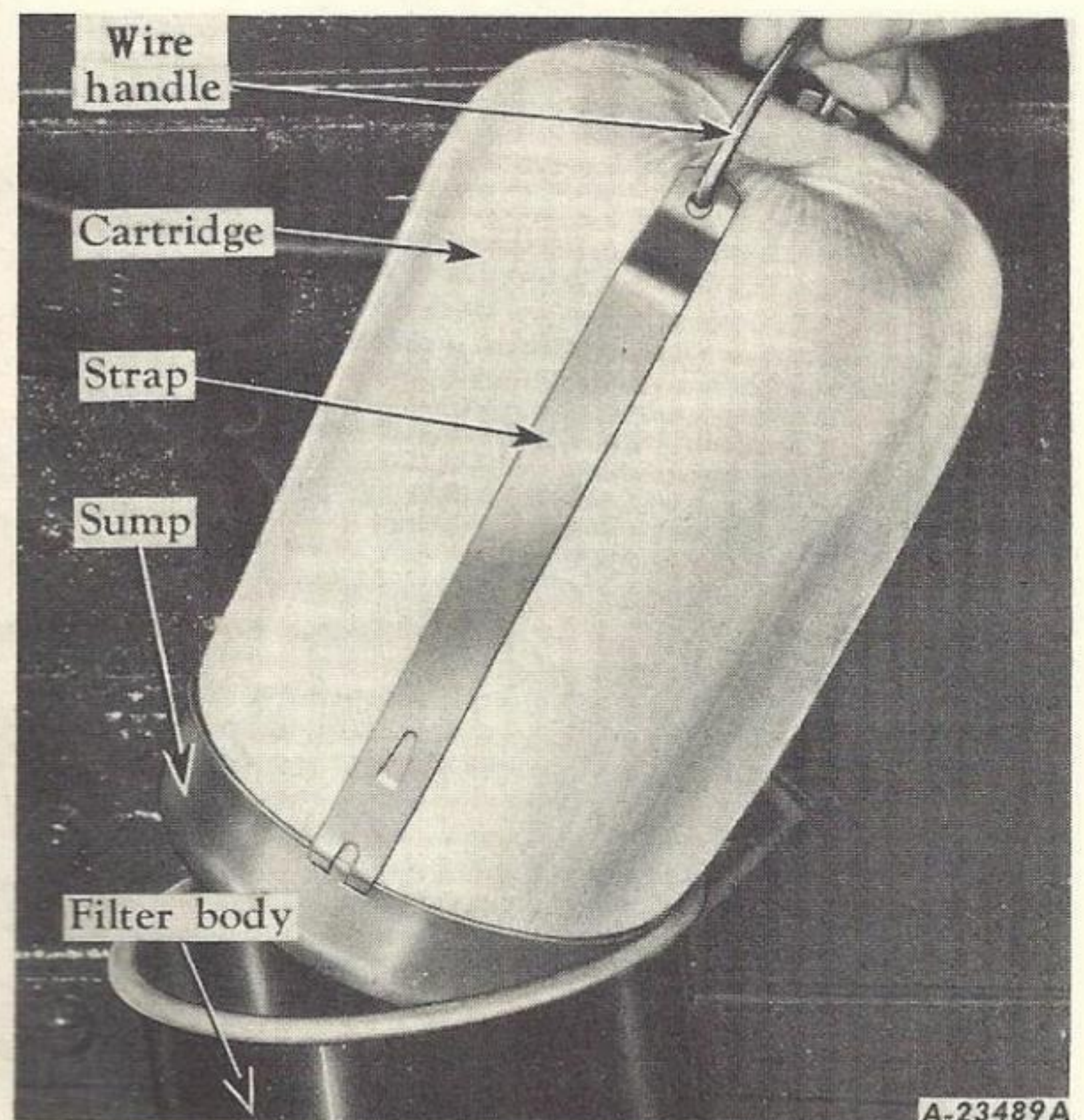
Proper maintenance will enable the oil filter to retard the engine oil contamination and prevent damage to the engine by removing harmful abrasives. The cartridge should be replaced when the oil has darkened.

Be sure the sediment in the sump at the bottom of the filter cartridge is thoroughly cleaned before inserting the new cartridge. Do not fail to read the printed instructions on the box containing the new filter cartridge. Place the new cartridge in the sump using the handle of the assembled unit; slide the cartridge and sump into the filter body, replace the

cover and tighten the screw top. Start the engine and allow it to run for at least ten minutes to fully saturate the new filter cartridge. Shut off the engine and check the filter thoroughly for leaks. Also check the oil level. Use finger pressure only to tighten the screw top.



Loosen the screw top and remove the filter cover.

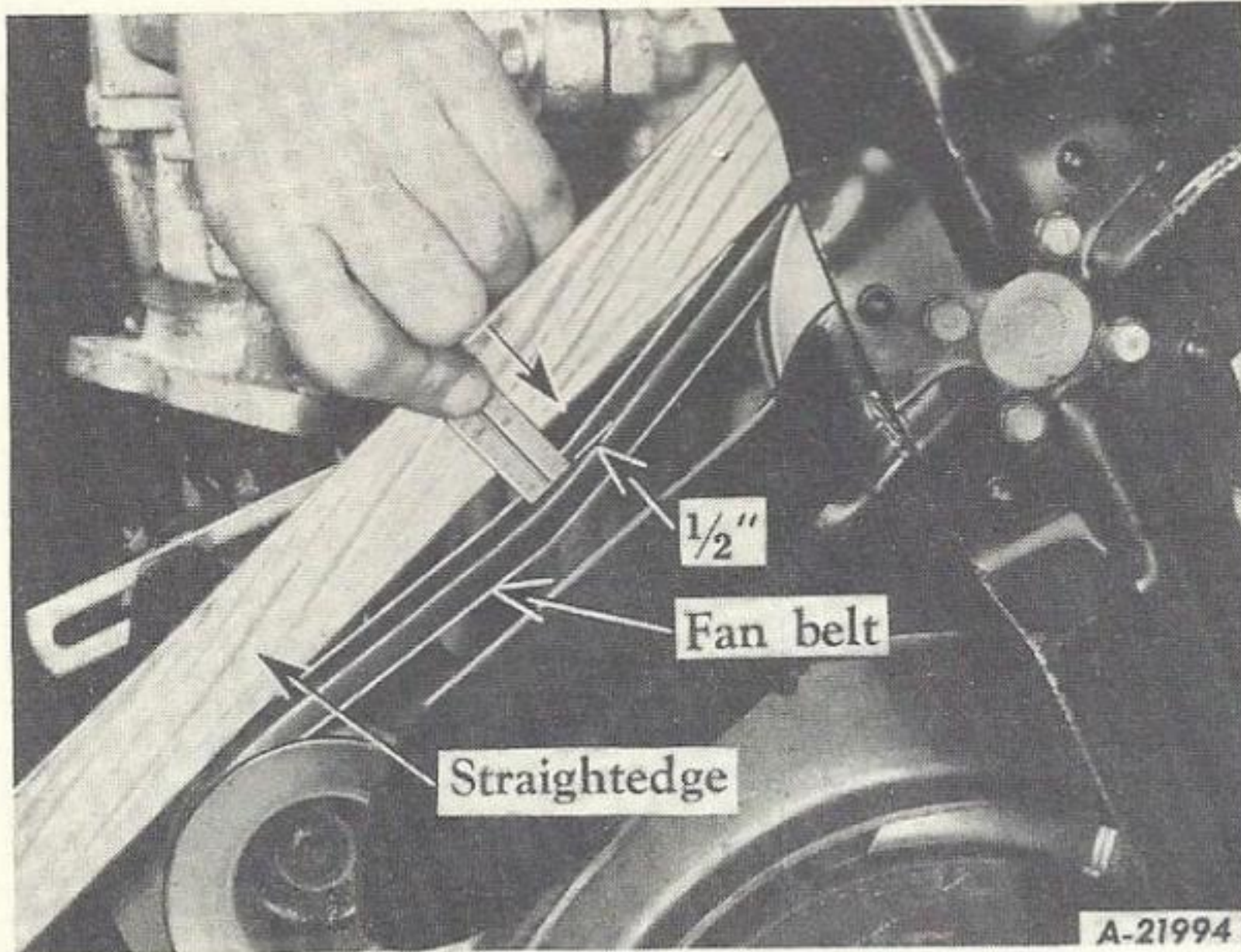


Use the handle of the sump and cartridge to lift out the used cartridge from the filter body.

MAINTENANCE

COOLING SYSTEM

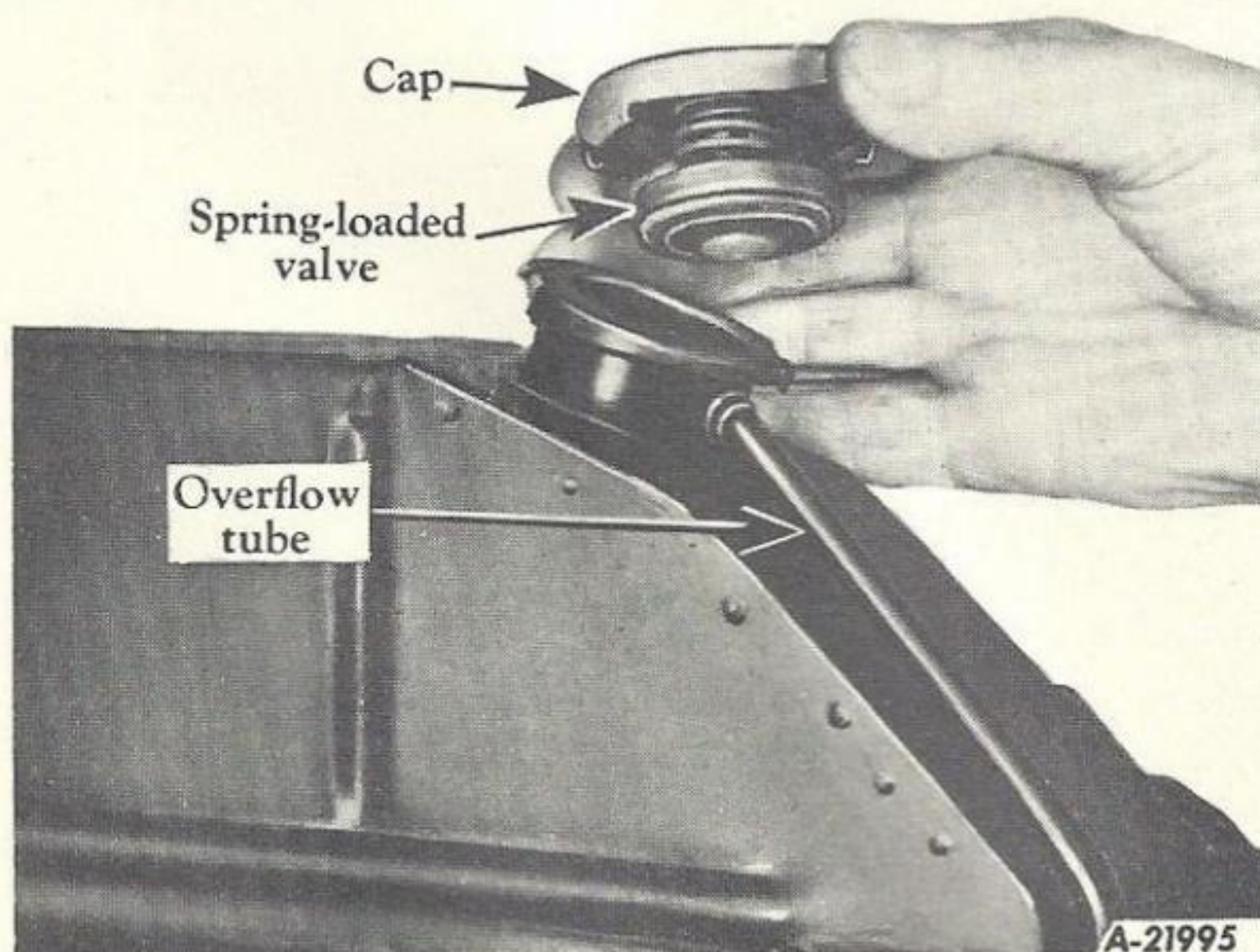
Fan Belt



The tension of the fan belt should be examined periodically. The proper tension is obtained when the belt can be depressed approximately 1/2-inch halfway between the fan pulley and the generator.

To adjust the belt, loosen the generator mounting cap screws and the generator brace cap screw, then move the generator in or out as required. After adjustment has been made, be sure to tighten the cap screws.

Radiator Cap



The radiator cap is the pressure-sealing type. Its purpose is to hold the cooling system under slight pressure, increasing the boiling point of the cooling solution and preventing loss of the solution due to evaporation and overflow.

The cap has a spring-loaded valve, the seat of which is below the overflow pipe in the filler neck. This prevents the escape of air or liquid while the cap is in position. When the cooling system pressure reaches a predetermined point, the cap valve opens and will again close when the pressure drops below the predetermined point.

When removing the pressure-type cap from the radiator, perform the operation in two steps. Loosening the cap to its first notch raises the valve from the gasket and releases the pressure through the overflow pipe. In the first stage position of the cap it should be possible to depress the cap approximately 1/8-inch. The prongs on the cap can be bent to adjust this condition. Care must be taken that the cap is not too loose as this would prevent proper sealing.

Caution: In removing the cap, loosen it slowly and then pause a moment. This will avoid possible burning by hot water or steam. Then continue to turn the cap to the left until you can remove it.

Cleaning the Cooling System

Twice a year or more often, depending upon the kind of cooling water used, the cooling system should be drained and thoroughly flushed. This is particularly important before using an antifreeze solution.

Unless the cooling water is treated with a corrosion preventive, rust and scale will eventually clog up passages in the radiator and water jackets. This condition is aggravated in some localities by the formation of insoluble salts from the water used.

Cleaning solutions are available which have proven very successful in removing the accumulation of rust, scale, sludge and grease. This solution should be used according to the manufacturer's recommendation.

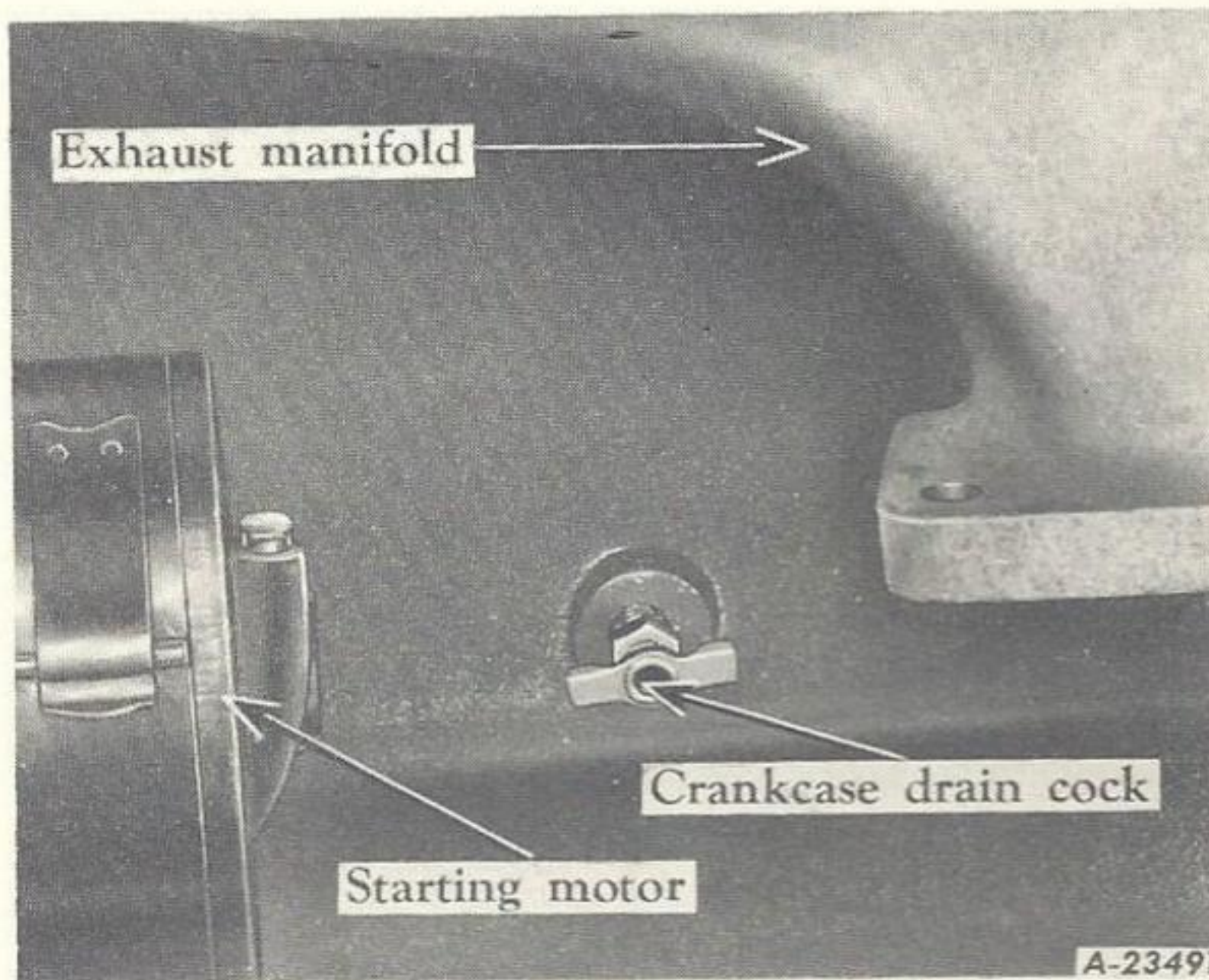
Note: Do not use chemical mixtures to stop radiator leaks except in an emergency. Never use such solutions instead of needed radiator repair.

If no commercial cleaning solution is available, dissolve about four pounds of ordinary washing soda in sufficient water (21 quarts) to fill the cooling system. Leave the radiator filler cap off and run the engine for about one-half hour or until the engine gets hot. Then drain and flush thoroughly with clean water.

MAINTENANCE

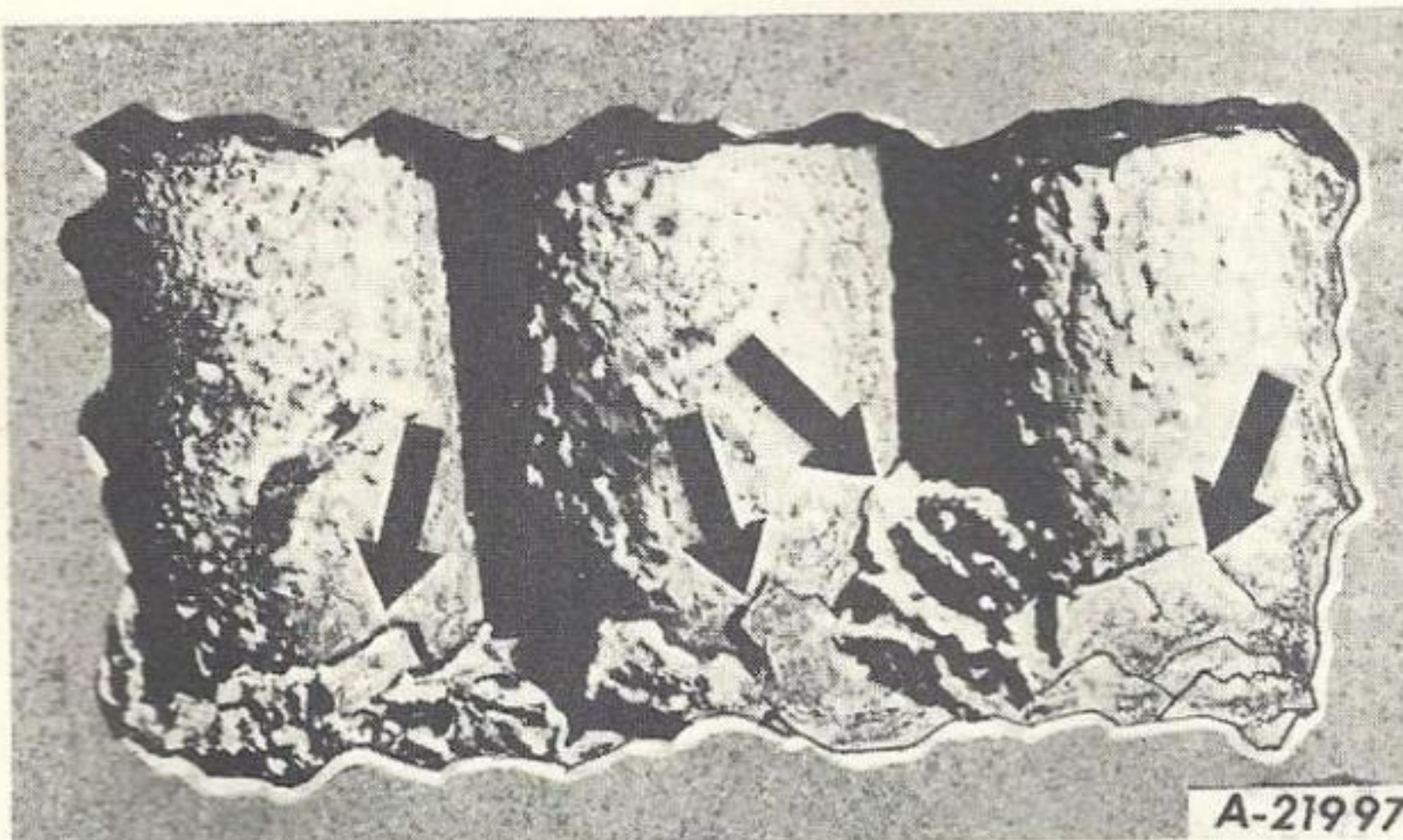
COOLING SYSTEM

Cleaning the Cooling System - Continued



When draining the cleaning solution, disconnect the radiator outlet hose, as large particles of sediment will not pass through the drain cock. Also open the drain cock on the right side of the crankcase just ahead of the starting motor.

If the radiator is clogged with insoluble salt formations, it should be taken to a reputable concern specializing in the removal of such formations. Reliable radiator service stations are familiar with local conditions and are equipped to apply the proper treatment.



Rust and corrosion accumulation.

The condition of extreme rust clogging illustrated, is convincing proof that the practice of flushing the system by forcing water from a hose in the radiator filler neck, without the use of cleaning solutions, may be only a waste of time. Iron corrosion is greater than that of any other cooling system metal, which accounts for the large quantities of rust found in neglected water jackets. Heavy rust deposits in water jacket hold in heat and create local hot spots, especially around the exhaust valve seats. Under these conditions, the metal may get so hot that the valves will stick or burn, or the cylinder block or head may be damaged by heat cracking.

Rust Prevention

One of the common causes of engine overheating is a rust-clogged cooling system. Rust interferes with circulation and cooling, causing overheating.

Rust and corrosion formation can be prevented by maintaining full-strength corrosion protection at all times.

A rust preventive or inhibitor should be added to the cooling system for protection against corrosion during warm weather operation. For cold weather operation, replace the inhibitor solution with a chemically treated antifreeze solution.

Thermostat

The thermostat is the nonadjustable type and is incorporated in the cooling system for the purpose of retarding or restricting circulation of water or coolant to achieve rapid engine warm-up. The thermostat is mounted in the cylinder head water outlet, just above the water pump.

Engine overheating and loss of coolant is sometimes due to a defective thermostat. When thorough inspection seems to indicate this condition exists, check the thermostat with an accurate high temperature thermometer by submerging in hot water.

MAINTENANCE

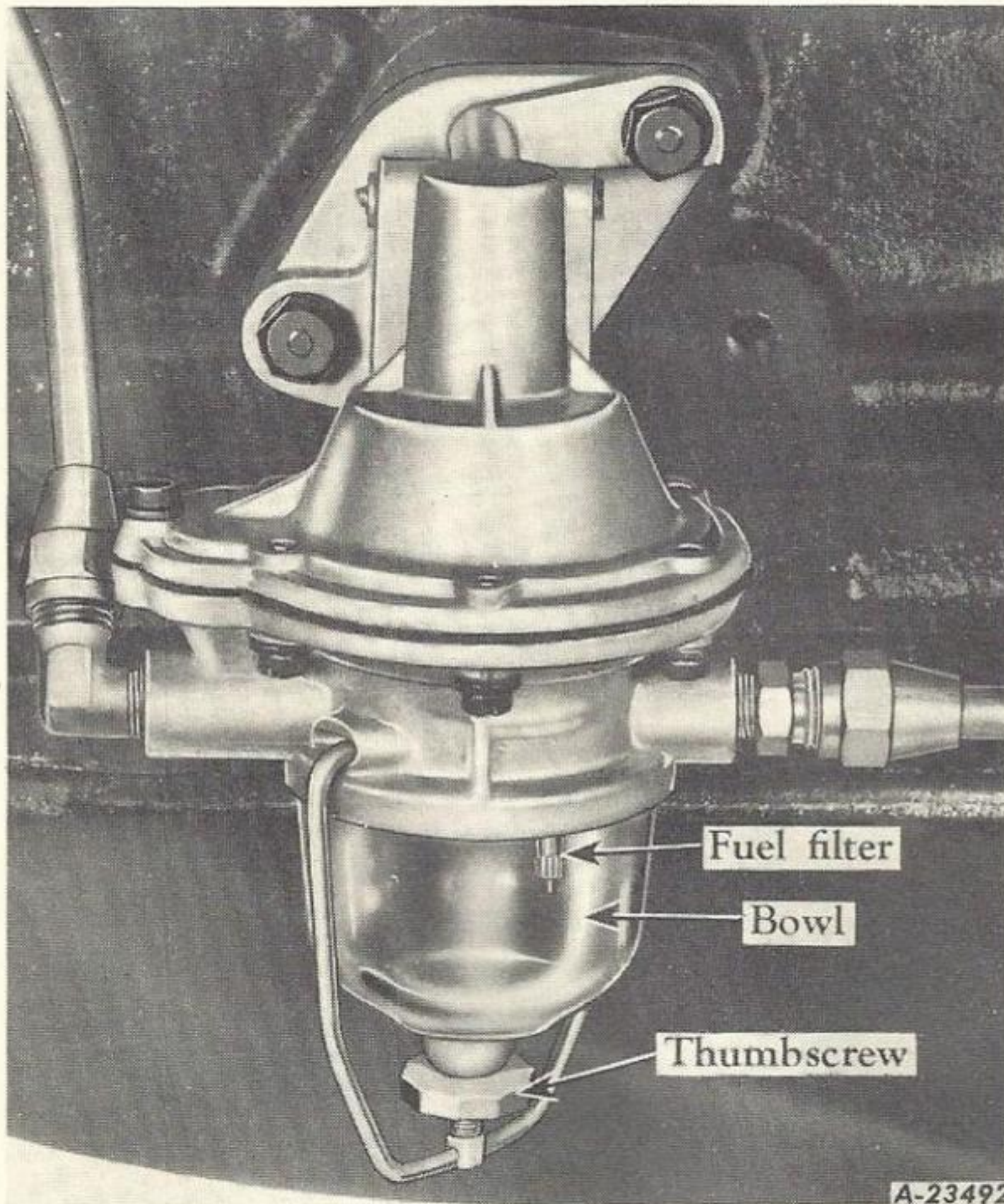
FUEL SYSTEM

Fuel Pump

The fuel pump should be thoroughly cleaned. Periodically check the fuel pump bowl for dirt, moisture and rust accumulation. The sediment bowl and filter element or screen are provided to prevent the entry of these troublesome elements into the carburetor and thus cause engine failure.

AC Type Fuel Pump

To clean, loosen the thumbscrew at the bottom of the fuel pump bowl. Remove the bowl and filter element or screen, and wash the bowl in kerosene. Loosen the two knurled nuts on the fuel filter element; this allows the individual discs to be slightly separated from each other so that all the dirt can be blown from the element with a blast of air. After cleaning the filter element, tighten the knurled nuts finger tight. Do not use a wrench or pliers.



When assembling, be sure the cork gasket is in place and that the thumbscrew is tight. Before a new gasket is used, soak it in light engine oil. A leak at the gasket will cause erratic action of the pump and thus retard delivery of fuel to the carburetor.

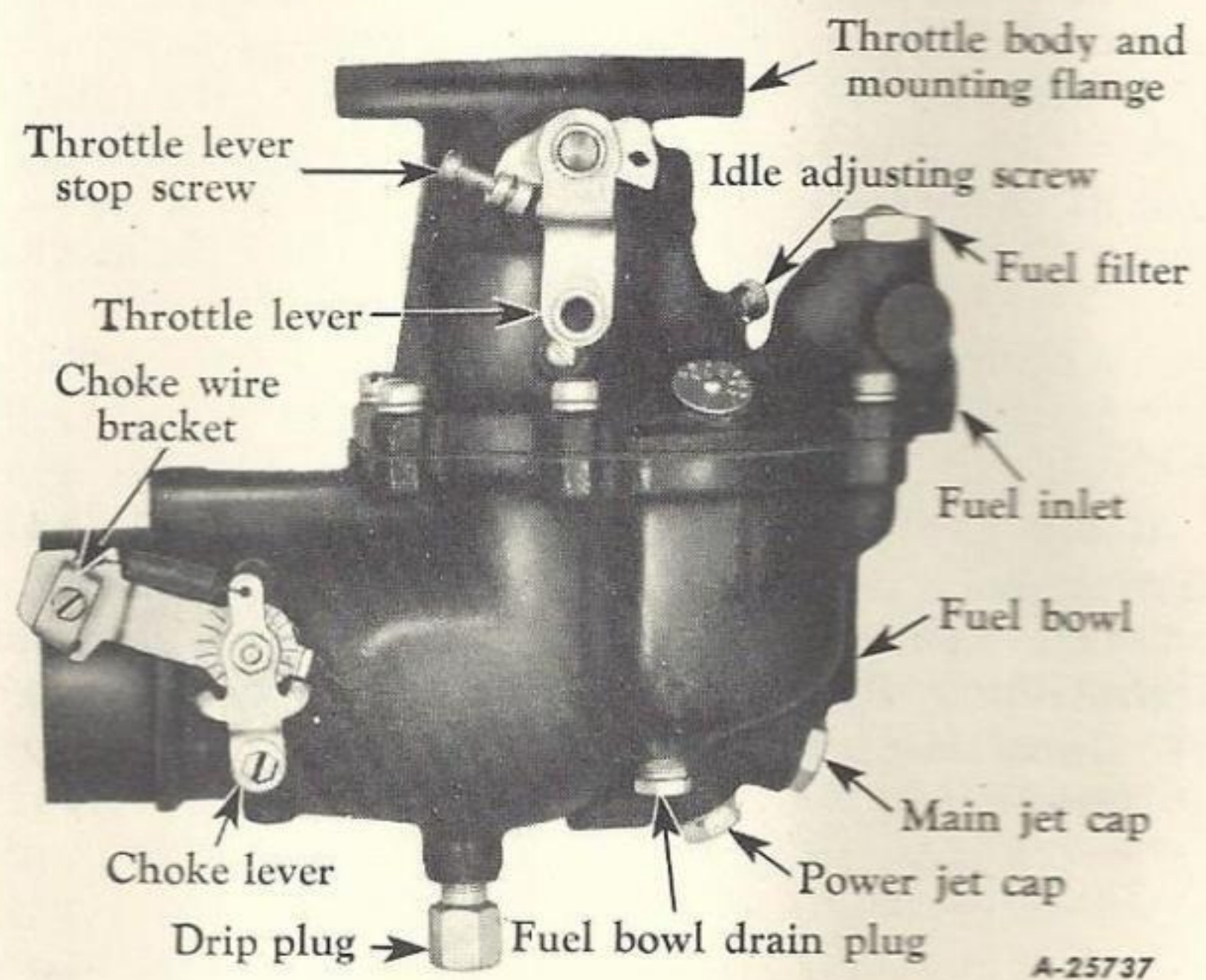
Note: Always remove the dirt around the parts to be worked on so as to be sure none enters the fuel system. Use cleaning solvent or kerosene. Do not use gasoline.

Carburetor

When excessive gas consumption or inefficient engine performance is encountered, care should be exercised in determining the exact cause before assuming the carburetor to be at fault. Engine compression, valve clearance, ignition timing, defective wiring, improperly spaced or fouled plugs, distributor contact points, condenser, coil and fuel pump are all factors to be considered and must be within the limits specified by the manufacturer to secure maximum gas mileage.

Due to the technical knowledge and skill required and special equipment needed to make the necessary tests and corrections, we recommend the work be done by an International Service Station or authorized dealer.

Zenith Carburetor



Idling Speed Adjustment (Zenith)

Start the engine and run it until thoroughly warm.

Close the throttle and set the throttle lever stop screw so that the engine will run sufficiently fast to keep it from stalling.

Turn in or out on the idle adjusting screw until the engine fires evenly and without galloping or skipping. Then back off on the stop screw until the desired idling speed is obtained.

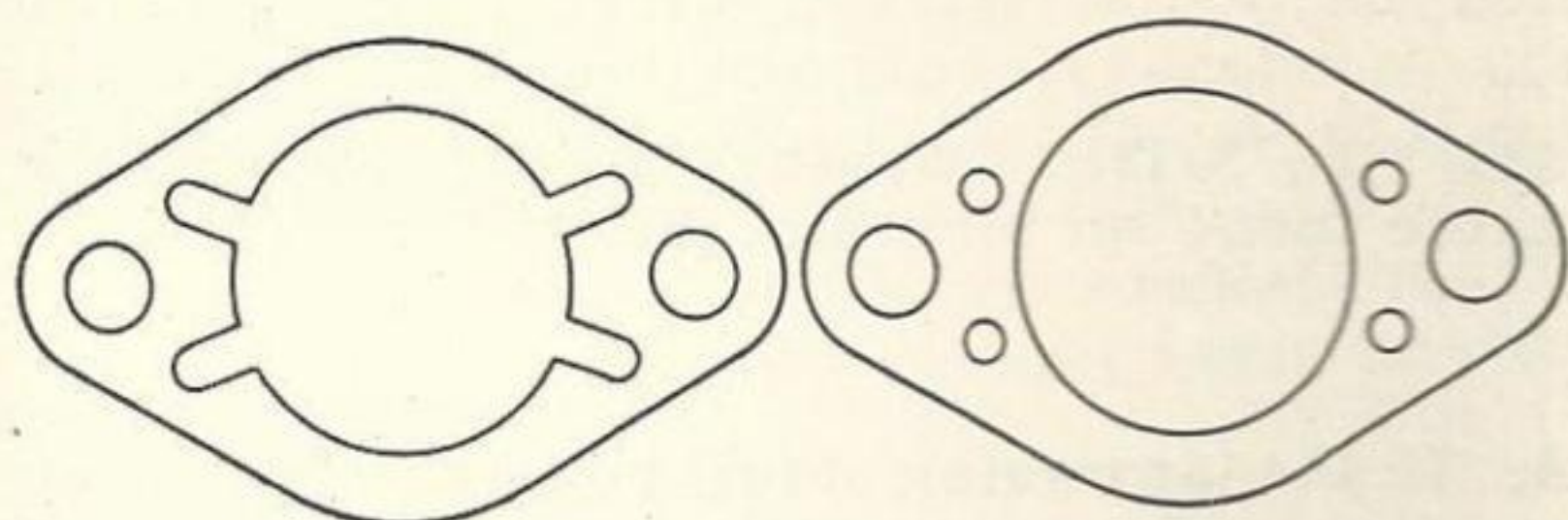
MAINTENANCE

FUEL SYSTEM

Idling Speed Adjustment (Zenith) - Continued

Note: If a vacuum gauge is used for adjustment, adjust the idle adjusting screw to obtain the highest steady vacuum reading.

Flange Gasket



Use without governor

Use with governor

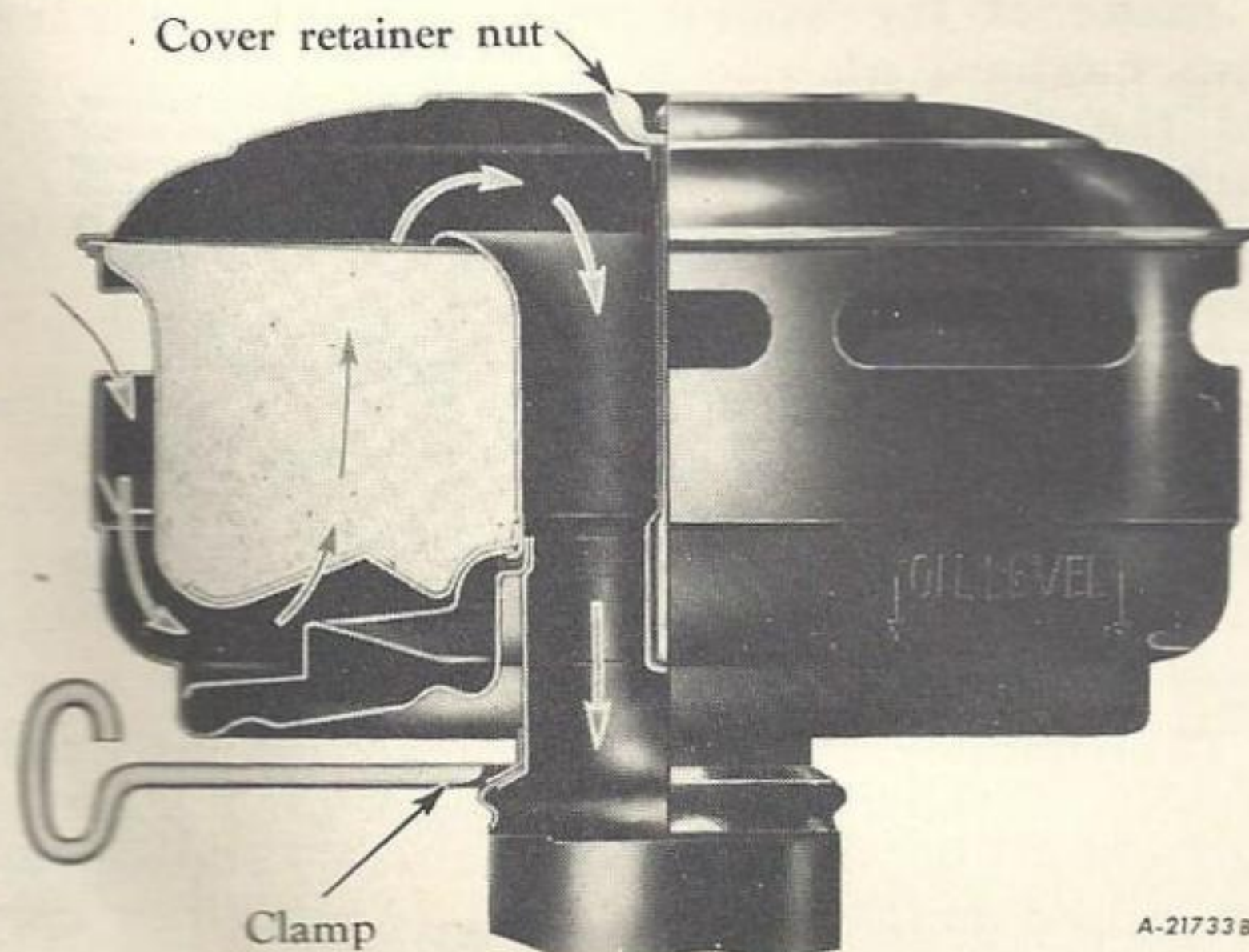
A-23494

Proper selection of the carburetor flange gasket is necessary when installing the carburetor on the manifold. If the carburetor is used in conjunction with a sandwich type governor (governor mounted between carburetor flange and manifold), the gasket with the four holes as indicated above is used. Where no governor is used, the slotted gasket is used. The slots in the gasket provide leads to the vacuum passage leading to the step-up piston cylinder in the high speed fuel circuit of the carburetor. The use of the wrong flange gasket prevents proper functioning of the step-up piston, thereby adversely affecting the power output of the engine and fuel economy.

Air Cleaner

The oil in the air cleaner should be changed to maintain cleaner efficiency whenever the chassis is lubricated. Clean out the air cleaner cup and refill with new oil. Make sure all connections are tight so that dust and dirt cannot enter.

Cleaning and Refilling Air Cleaner (Oil-Bath Type)



A-21733B

Remove the filter element and wash in kerosene every 5,000 miles or oftener under severe dust conditions. Never allow the dirt level in the oil sump to reach the underside of the baffle. Clean the oil sump and refill to the indicated level with clean engine oil.

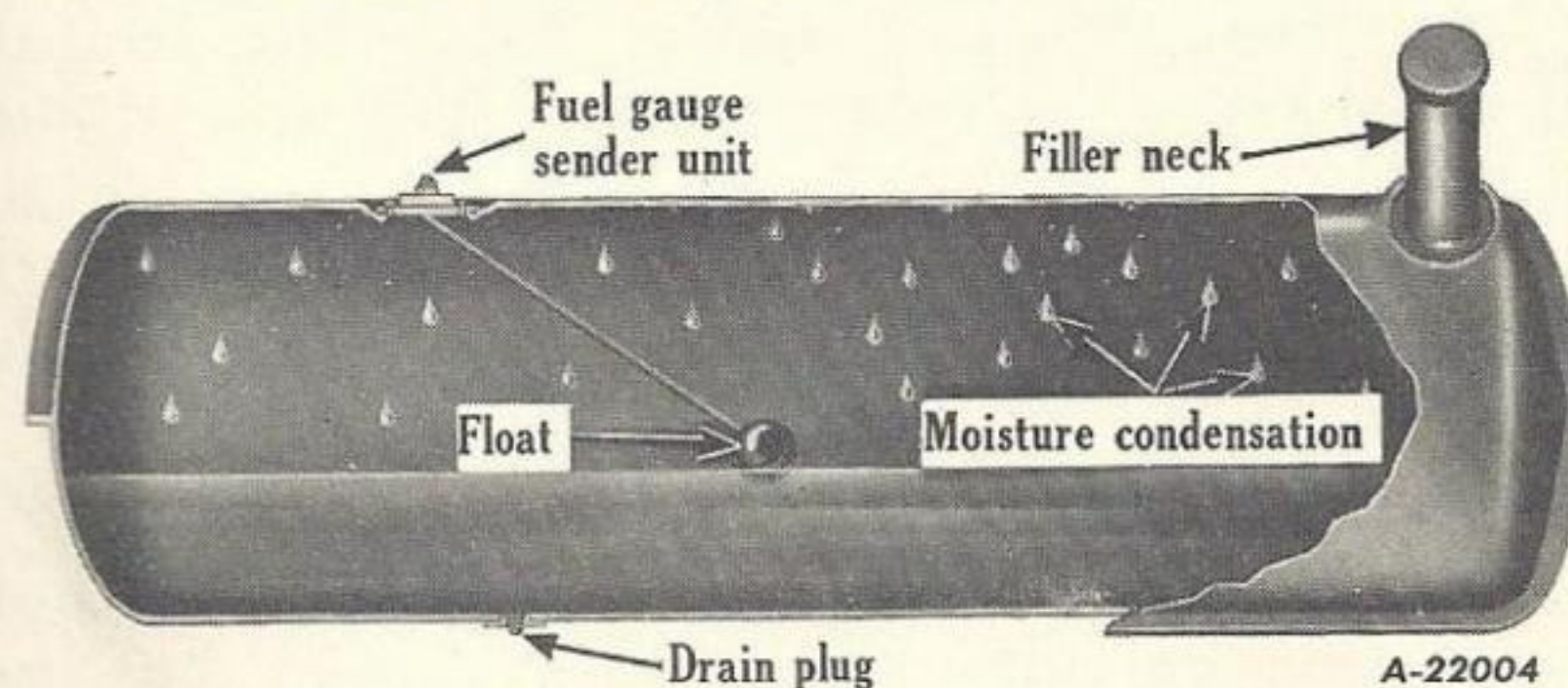
Use the same grade oil in the cleaner as used in the crankcase. Be sure all kerosene has been thoroughly drained from the filter element before reassembling.

Fuel Tank

The fuel tank gives little or no trouble and usually requires no servicing other than an occasional cleaning. However, if the tank is punctured or develops a leak, it should not be welded or repaired with or near an open flame until all traces of fuel and fuel vapors have been completely removed. It is advisable to have such work done by a repair shop equipped to render this type of service.

Keep Fuel Tank Full

As the fuel is consumed, air is drawn into the tank through the vent. Under certain climatic conditions, moisture may be condensed from this air when the temperature drops, as when the vehicle is parked at night. Thus, the fuel tank may become the unsuspected source of moisture contamination in the fuel supply, causing faulty engine performance or complete failure. Therefore, always fill the fuel tank at the end of the day's run.



A-22004

When placing the truck in storage, it is important to remove all fuel from the system. If not entirely removed, a gum-like substance will be deposited on all parts contacted by the fuel and will seriously affect the operation of the fuel pump and carburetor. Gum deposits can be dissolved with a mixture of one part alcohol and one part benzol, or with acetone. See instructions on inside back cover.

Caution: Never light matches near gasoline, because the air within a radius of several feet is permeated with a highly explosive vapor. Keep the filling spout or nozzle in contact with the metal of the tank to avoid the possibility of an electric spark igniting the gas.

MAINTENANCE

ELECTRICAL SYSTEM

Important

Any major overhauling or adjustment of the electrical system should be done by an International Service Station or authorized dealer.

How to Correct Minor Troubles

There are times when minor troubles are encountered on the road, and these are due generally to loose connections or defective terminals in the wiring system. These can be easily detected by observing the following:

1. If the engine runs but misses at times, look for:

Wiring - Battery terminals loose or corroded. High and low tension cables grounded or loosely connected.

Distributor - Contact points not set right.

Spark Plug - Gap should be between .028 to .032 inch. If misfiring is not confined to one cylinder, have the coil tested, wiring checked, and distributor inspected. If the engine misses regularly on one cylinder, the trouble is usually due to the spark plug in that cylinder being dirty, broken, or improperly adjusted.

2. If the starting motor turns the engine but no spark or a weak spark is obtained at the spark plug, look for:

Wiring - High and low tension cables may be grounded or loosely connected.

Distributor - Contact points either do not open or do not close. Gap should be between .018 to .024 inch.

Ignition Switch - Does not make contact.

Weak Battery - Low voltage will give a weak spark.

Starting Motor - Examine all cable connections between the battery and the starting motor. Connections must be clean and tight.

3. If the starting motor will not turn over or turns slowly when the starting switch is closed, look for:

Battery - Weak or completely discharged.

Wiring - Loose or dirty battery connections. See that all cable connections between the battery and starting motor are clean and tight.

Starting Switch - Contact points burned, or cable loose on terminal posts.

4. If the ammeter does not show that the generator is charging, look for:

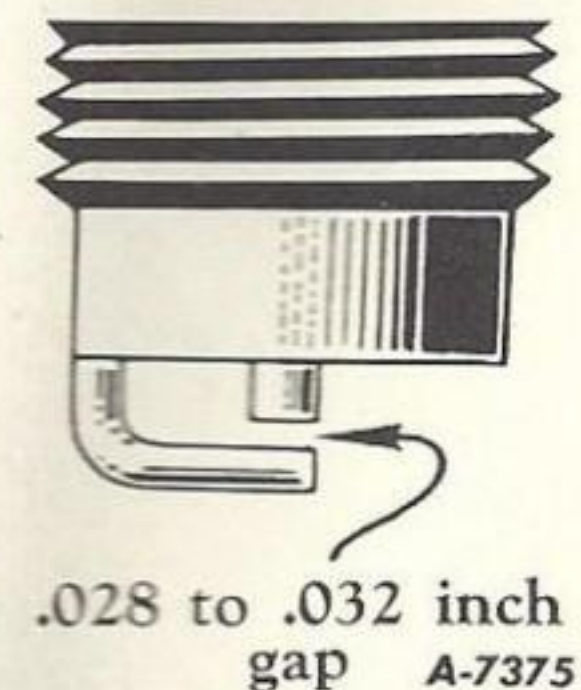
Generator - Commutator and brushes dirty or greasy. To clean, use No. 00 sandpaper. Never use emery cloth.

Wiring - Cable connections at the ammeter may be grounded or loosely connected. Also check the cable connections at the starting switch and battery.

Regulator - If the trouble is within the regulator unit, it will not usually hinder an operator from reaching a service station for a check of the unit. Check the regulator to determine whether it is properly connected to a good ground.

Spark Plugs

We recommend that a periodic examination be made of the spark plugs to keep them free from carbon, also to see that the gap between the points is set .028 to .032 inch. When changing the gap, always bend the outer electrode; never bend the center electrode. Be accurate -- use a round-wire feeler gauge.



The proper method to clean fouled spark plugs is to use a reliable spark plug cleaner. See your International Service Station or authorized dealer for the best results.

MAINTENANCE

ELECTRICAL SYSTEM

Generator and Regulators

A shunt-wound belt-driven generator is provided; it is current-and-voltage controlled by regulators mounted on one base but operating independently to maintain the output and voltage within specified limits. Shunt-wound generator output can be changed only by adjustment of the regulators. If the regulator or generator wires are disconnected, or when changing the battery, observe the following instructions in order to avoid the possibility of reversing polarity of the generator, thus vibrating and burning the cut-out relay contacts.

See that the positive side of the battery is grounded. The cable from the "F" terminal on the generator must be connected to the "F" terminal on the regulator. The cable from the "A" terminal on the generator must be connected to the "GEN" terminal on the regulator. The cable from the "BAT" terminal on the regulator must be connected to the ammeter. Then, before starting the engine, momentarily touch a lead (or screwdriver) from the "GEN" to the "BAT" terminals on the regulator. The surge of the battery current to the generator will correctly polarize the generator.

When replacing a battery in the vehicle, a quick check can be made to determine that the proper terminal (positive) is grounded before starting the engine, as follows:

After connecting the battery cables, turn on the headlights. If the ammeter shows "discharge," the battery is properly connected. If the ammeter indicates "charge", then the battery cables should be disconnected and reconnected so that the ammeter will show "discharge" when the lights are on.

Starting Motor

The starting motor is located on the right rear side of the engine.

Caution: Do not run the starting motor more than approximately 30 seconds at any time, because it can be seriously damaged if held too long in contact. It is a good policy to remove the cover band on the starting motor and inspect the brushes and commutator at least once a year.

Storage Battery

Examine the battery at least twice a month during warm weather and once a month in cold weather to see that the solution is kept to the proper level. It is advisable to keep the battery fully charged at all times.

Caution: Hydrogen gas is produced in the normal operation of the battery in the vehicle. Therefore, it is imperative that flames or sparks be kept away from the vent openings of the battery. Failure to do so may result in destruction of the battery.

The electrolyte in each cell should be 3/8-inch above the separator plates, or to the indicated level. When the electrolyte is below this level, clean distilled water should be added, using a clean syringe. Acid or electrolyte should never be added except by a skilled battery man.

Under no circumstances add any special battery "dopes," solutions or powders.

Test the specific gravity of the electrolyte in each cell with a hydrometer at least once a month. A hydrometer reading of 1.270 to 1.285 indicates a full charge. Never allow the battery to fall below 1.225, which indicates half discharged. A discharged battery will freeze at 20° F. above zero. A fully charged battery will withstand temperatures as low as 45° F. to 90° F. below zero. See charts on following page.

Battery cable terminals must be clean and tight. Use hot water and common soda for removing terminal corrosion and for cleaning the top of the battery. Brighten the contact surface with steel wool, apply a light coat of vaseline, and reassemble. Be sure the terminals are clamped tightly and that the battery is clamped securely in the battery box.

Battery Registration Card

A battery registration card is furnished with each new truck. Promptly after delivery of the new truck, this card should be filled in and sent to the nearest representative of the battery manufacturer in order to assure protection under the battery warranty.

MAINTENANCE

ELECTRICAL SYSTEM

Storage Battery Chart

The following chart gives the freezing point of battery electrolyte at given specific gravities:

Electrolyte Specific Gravity	1.280	1.220	1.210	1.180	1.160	1.140	1.100	1.000
Freezing Point F.	90° below zero	30° below zero	20° below zero	10° below zero	zero	10° above zero	20° above zero	30° above zero

The following chart shows the effect of atmospheric temperature on the capacity of a battery to discharge and proves the necessity of keeping a battery fully charged, particularly during low temperature operation. Note, for example, that even a fully charged battery at zero temperature is only 43% efficient:

State of Charge	Temperature F.	Percentage Capacity	State of Charge	Temperature F.	Percentage Capacity
Full	80° above zero	100	Full	20° above zero	61
Full	60° above zero	88	Full	zero	43
Full	40° above zero	76	Full	20° below zero	25

Engine Tune-Up

In general, the operating efficiency of an engine decreases so gradually that it escapes detection until good engine performance has been restored by correct tune-up. Engine tune-up consists of making necessary adjustments and possible replacement of minor parts and units to regain a balanced condition of engine performance. It is advisable to check all related units. Adjustments made and parts replaced should be checked with testing equipment designed for the specific purpose. Avoid guesswork.

A good engine tune-up should reveal and correct such faults as:

- Battery low on charge.
- Spark plug insulator cracked.
- Primary ignition cables loose.
- Fan belt loose.
- Coil or condenser defective.
- Air filter dirty, choke partly closed.
- Fuel pump erratic in operation.
- Distributor timing incorrect, cap cracked, rotor burned or cracked.
- Carburetor float level too high.
- Breaker points incorrectly gapped.

MAINTENANCE

ELECTRICAL SYSTEM

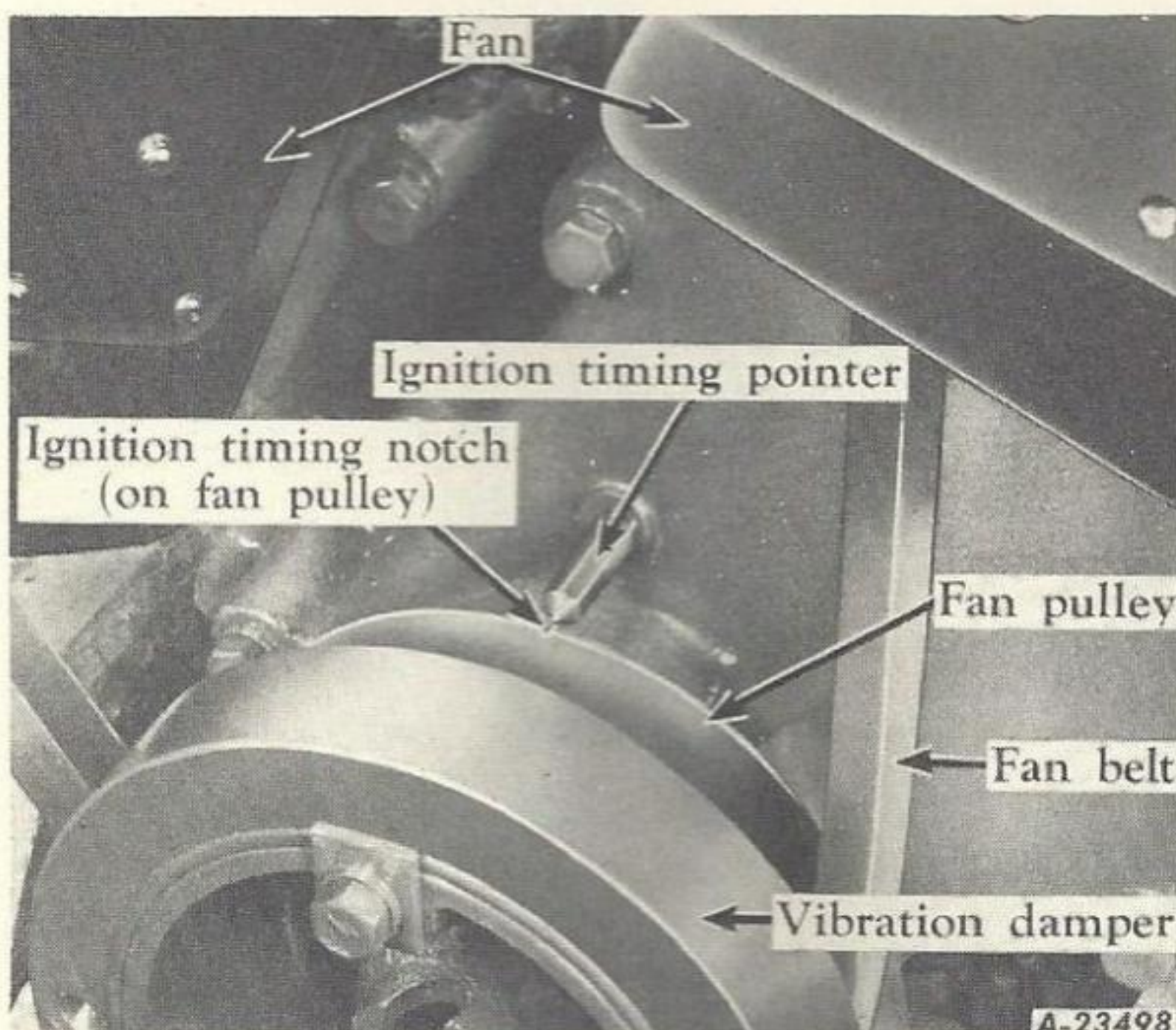
Condenser

A condenser should be proven defective before being replaced. It is seldom that burned or oxidized contact points are due to a defective condenser. High voltage, overcharged battery, an excessive oil vapor or oil on the contact surface has the effect of increasing the normal rate of wear on the contacts. A short-circuited condenser will cause complete failure of the ignition system.

Ignition Coil Testing

If the coil does not fire the engine satisfactorily, the unit should be removed from the truck and checked.

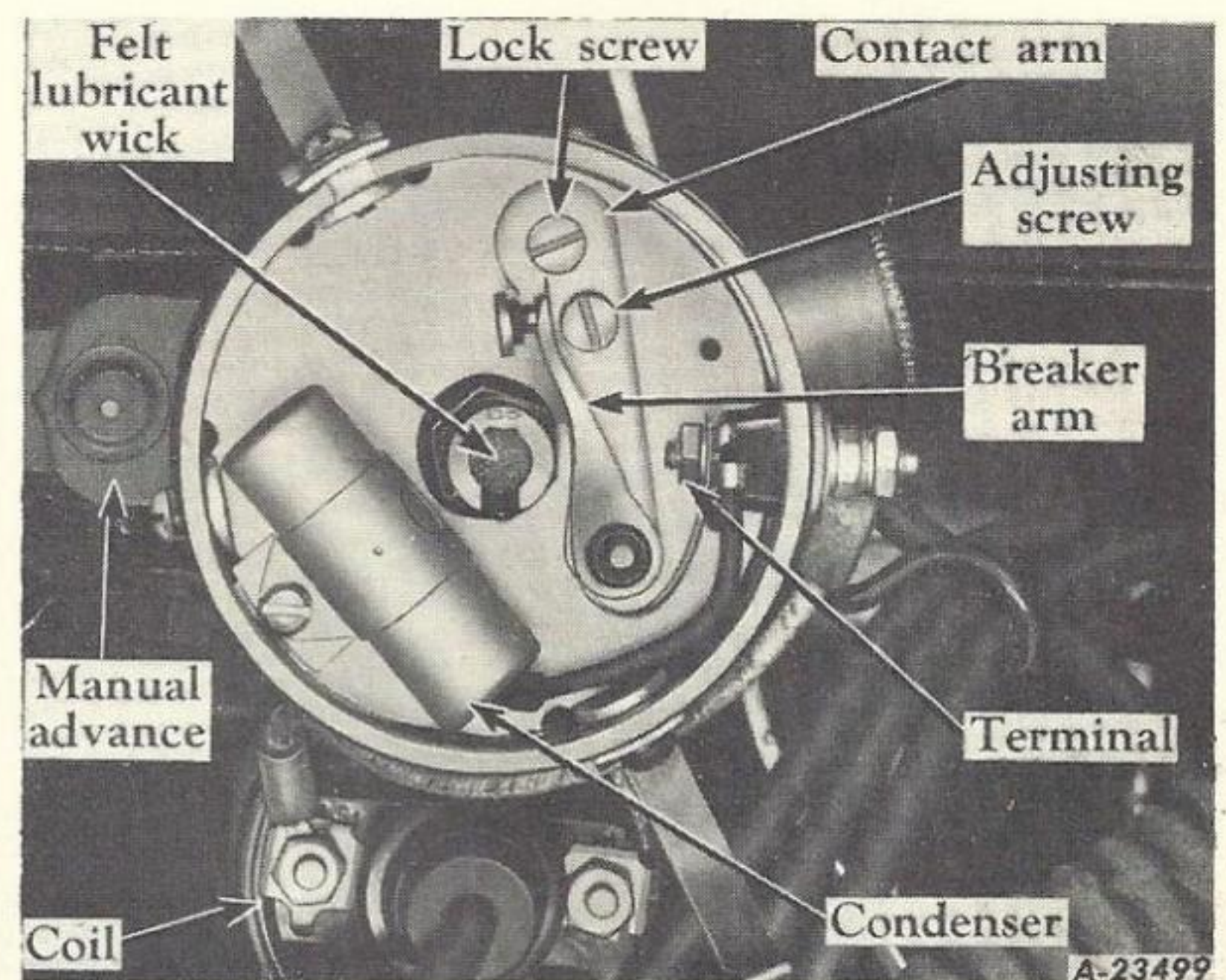
Ignition Timing



The ignition timing notch on the fan pulley and the timing pointer on the gear case cover are shown above. To assure efficient operation of the engine, the timing should be checked with a timing light, and the timing notch and pointer should be in register as indicated for the best engine performance.

Note: When the oil pump has been removed from the engine, it will be necessary to remove the ignition distributor before reinstalling the pump assembly. This is required to assure proper alignment of the distributor shaft with the oil pump shaft. It will also be necessary to retune the ignition.

Distributor Contact Points



The proper gap between the distributor breaker points is .018 to .024 inch.

Electric Windshield Wiper

The windshield wiper arm and blade must be raised from the glass and not moved from side to side when cleaning the windshield. The wiper arm is hinged near the wiper shaft to permit this operation. Observance of this practice is necessary because the wiper motor does not have a clutch built into the motor mechanism. Moving the wiper blade and arm manually from side to side will result in stripping the wiper motor gears.

MAINTENANCE

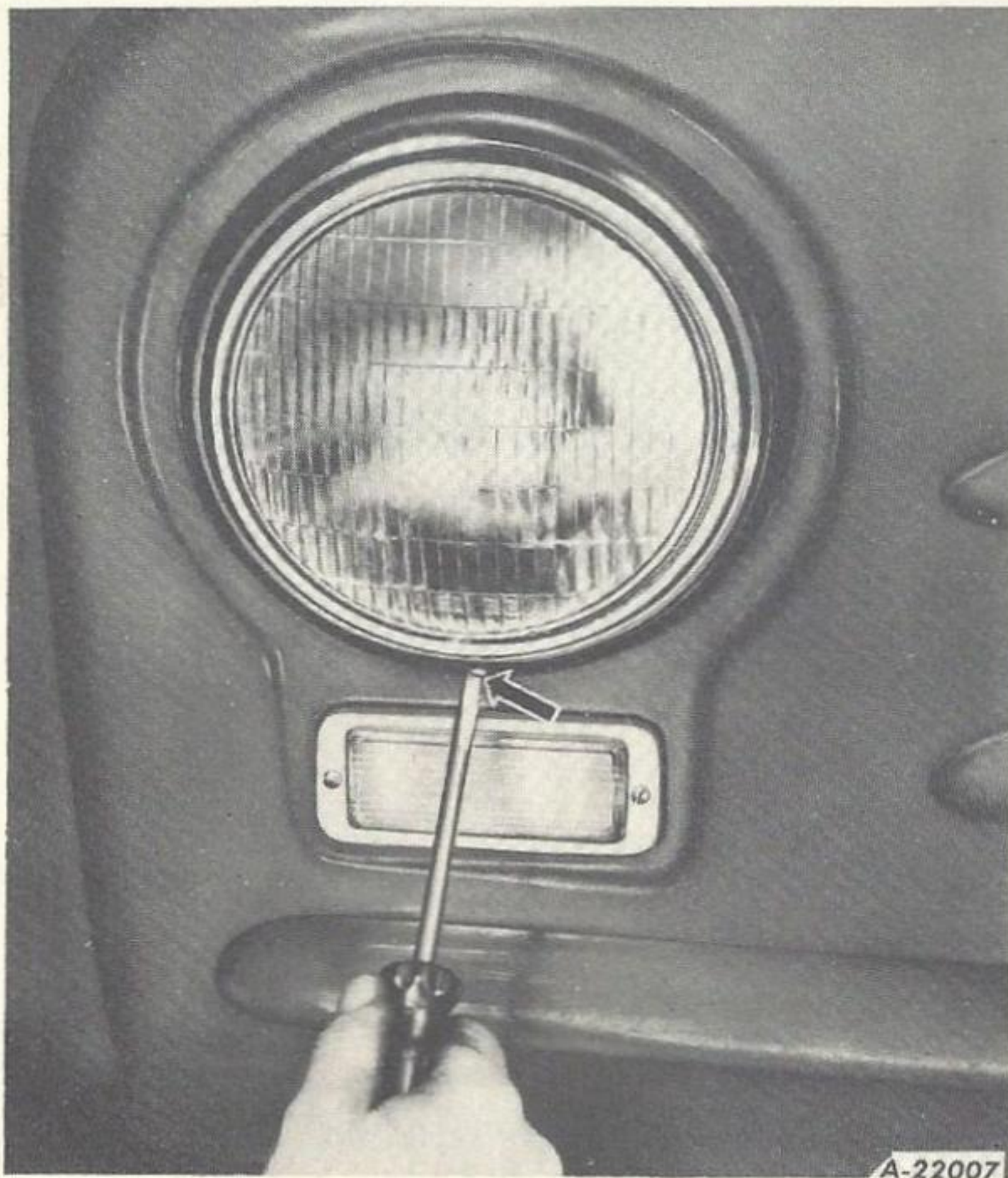
ELECTRICAL SYSTEM

Headlights

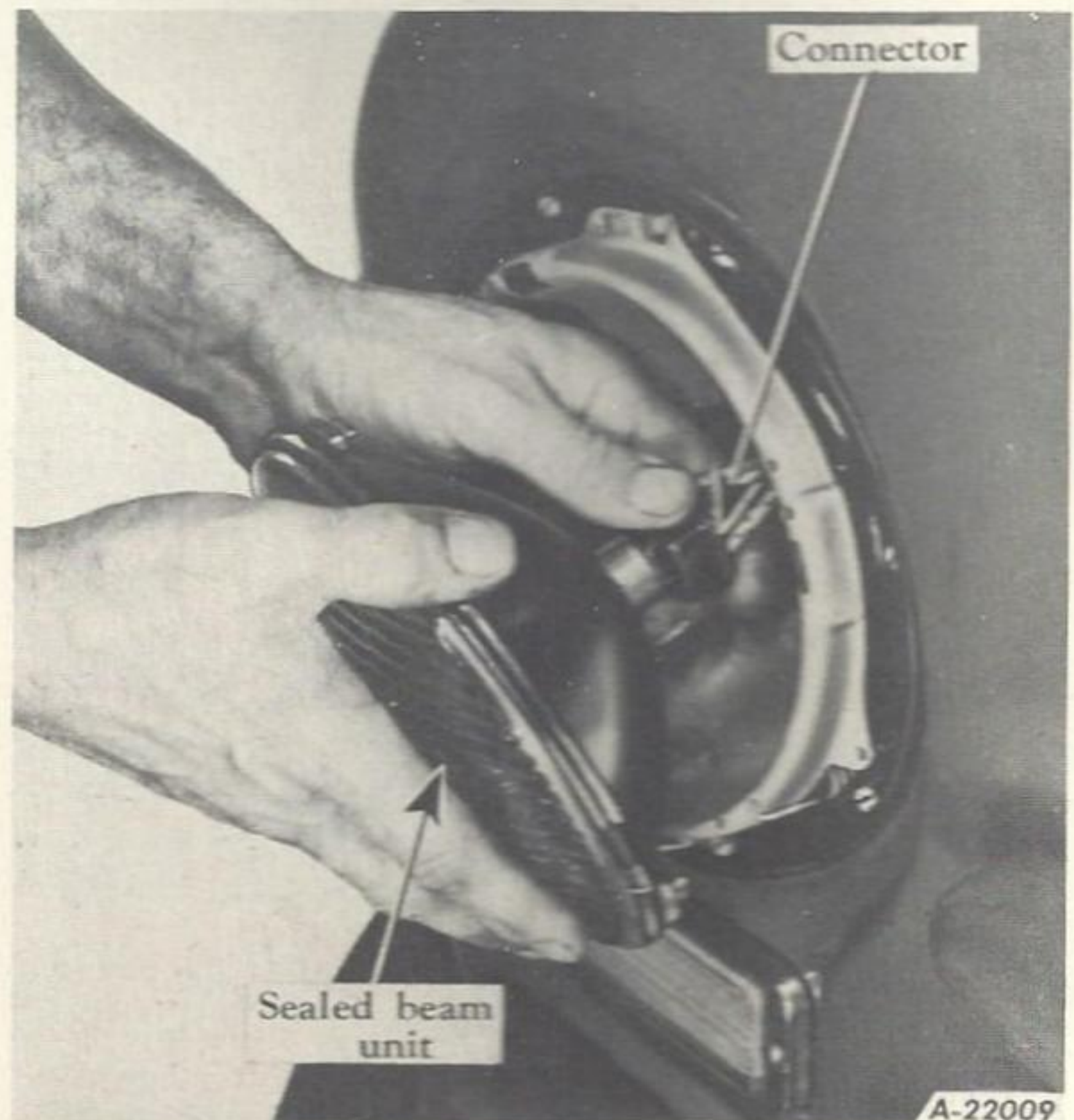
The headlights are the sealed-beam type. The parts are so constructed that the filament, reflector, lens and gasket are assembled in a unit permanently sealed against dirt, moisture, and corrosion. Sealed-beam headlights provide two separate and distinct beams, namely, an upper beam which is intended for use on the open highway when other vehicles are not approaching, and a lower beam which is intended to be used in traffic. Should a filament burn out or a lens break, the complete unit must be replaced. Replacement can easily be made by referring to the following illustrations.



2. Remove the retaining ring by removing three screws.



1. Remove the headlight rim retaining screw at the bottom of the headlight body, and remove the rim.



3. Remove the sealed-beam unit from the headlight and disconnect the three-way connector at the rear. Hold the three-way connector firmly when withdrawing the unit, to avoid damage to the wiring.

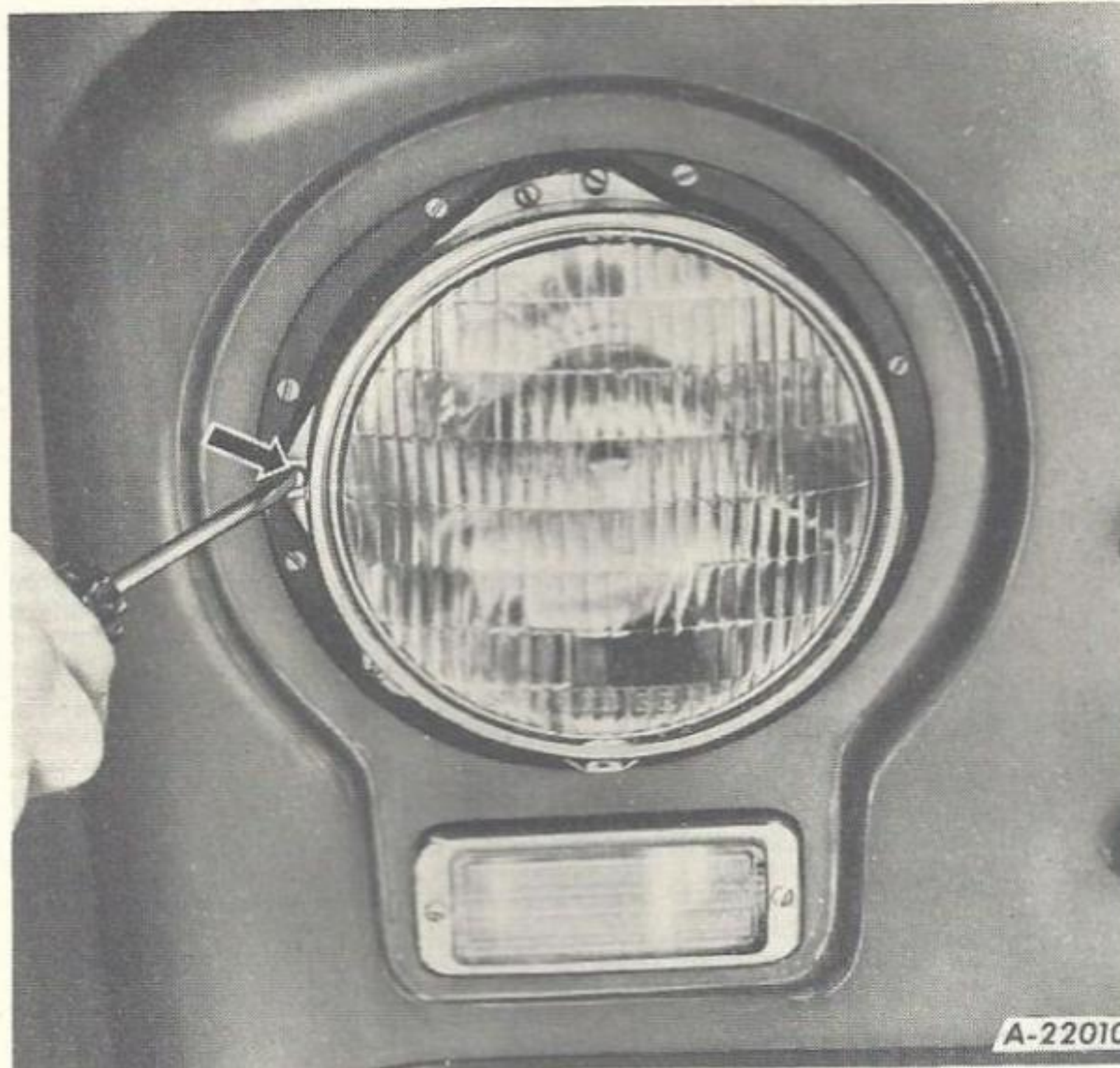
The assembly of a new unit is accomplished by reversing the above procedure.

MAINTENANCE

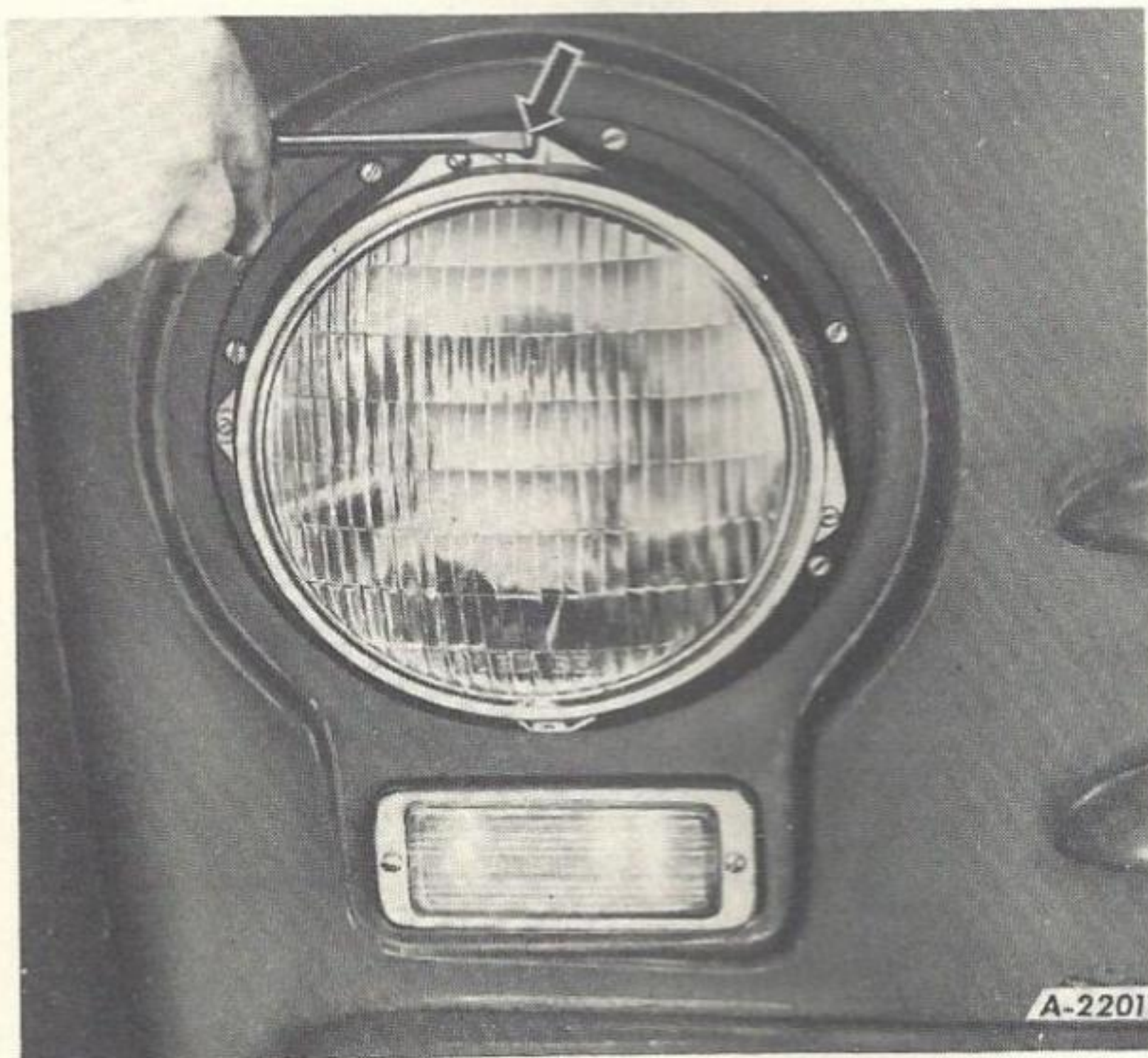
ELECTRICAL SYSTEM

Headlight Adjustment

Note: Headlight adjustment should always be made on a level floor and with the truck empty.



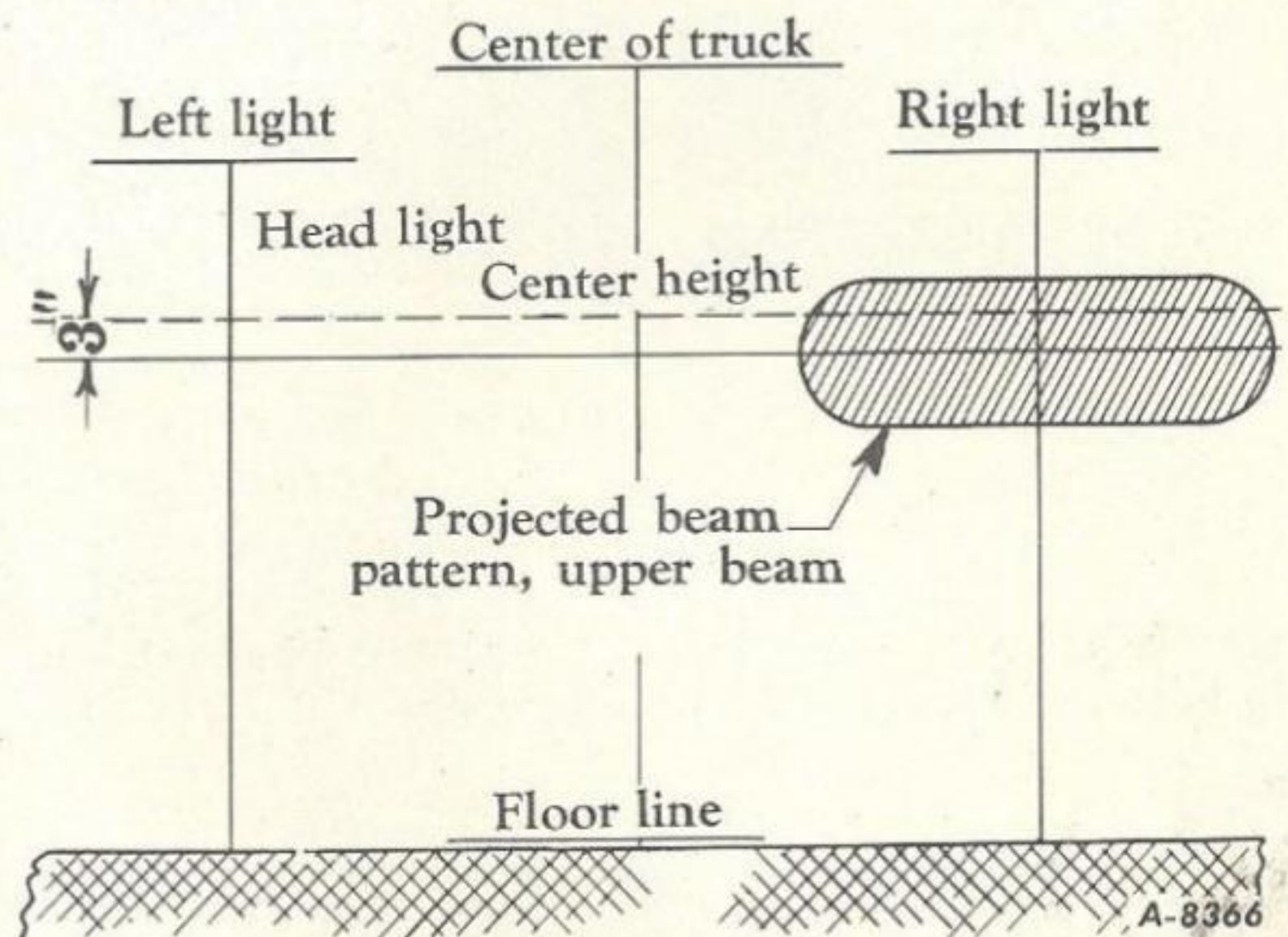
The lateral or side adjustment is accomplished by turning the adjusting screw as shown in the above illustration.



The vertical or up-and-down adjustment is accomplished by turning the adjusting screw as shown in the above illustration.

Headlight Aiming

The aiming of the headlights is effected by projecting the upper beam of each light upon a screen or a chart at a distance of about 25 feet from the headlights as illustrated. The truck should be squarely lined up with the screen. The vertical lines on the chart mark the distance between the center lines of the headlights and are equally spaced from the center line of the chart.



A horizontal line should be placed on the chart at a level of three inches below the height of the headlight centers above the floor. Each headlight must be adjusted so the hot spot of the beam will be centered over the point of intersection of the vertical and horizontal lines as shown in the above illustration.

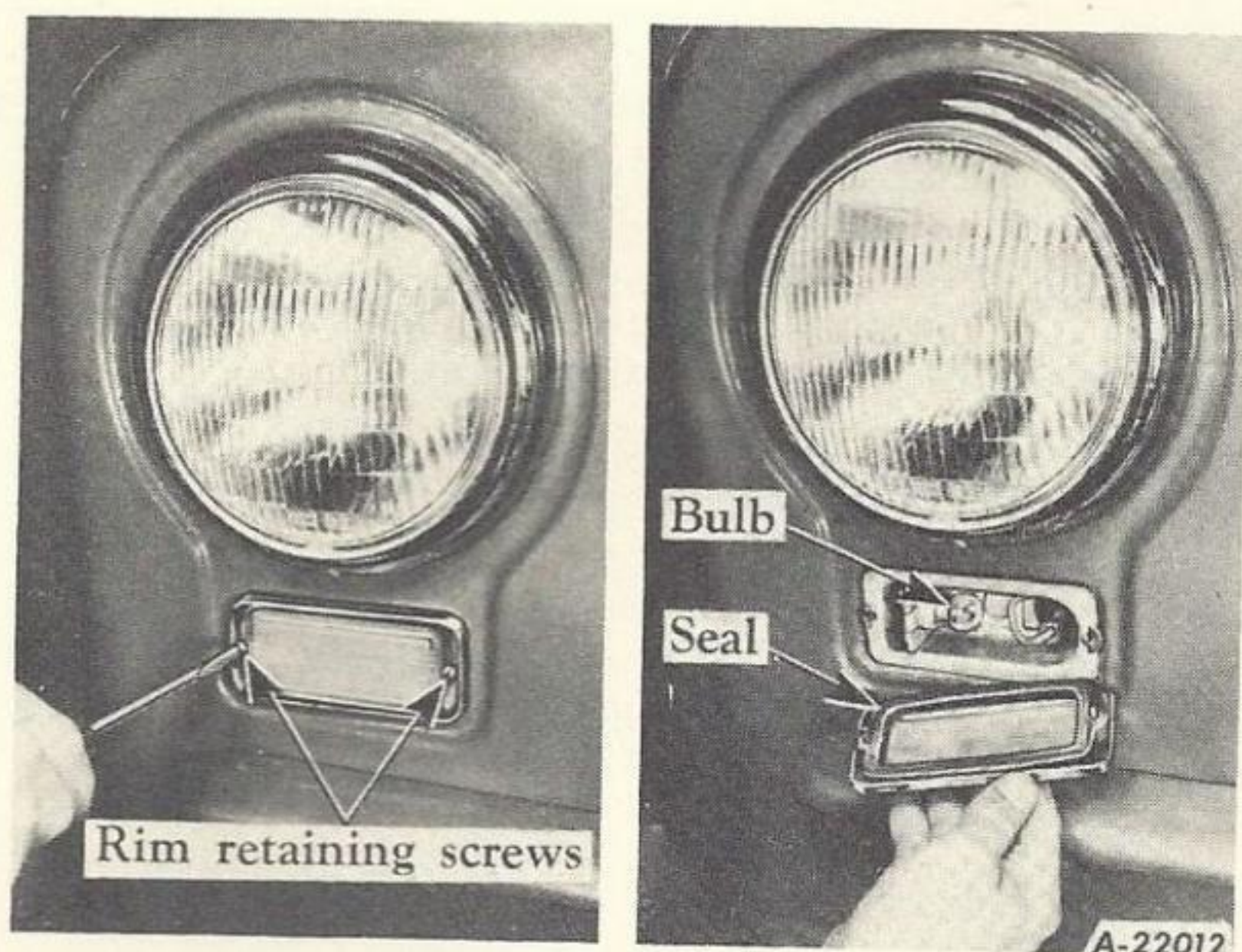
All International dealers and Service Stations include in their service tools equipment scientifically developed for aiming headlight beams. The use of this equipment will result in maximum illumination for night driving and assure that the headlight aiming does not conflict with existing laws and regulations. It is a good practice to avail yourself of this service when a sealed-beam unit has been replaced or the headlight beam pattern does not give adequate illumination.

Important: In some states the above instructions conflict with the existing laws and regulations. Whenever such is the case, the legal requirements must control and the instructions should be modified accordingly.

MAINTENANCE

ELECTRICAL SYSTEM

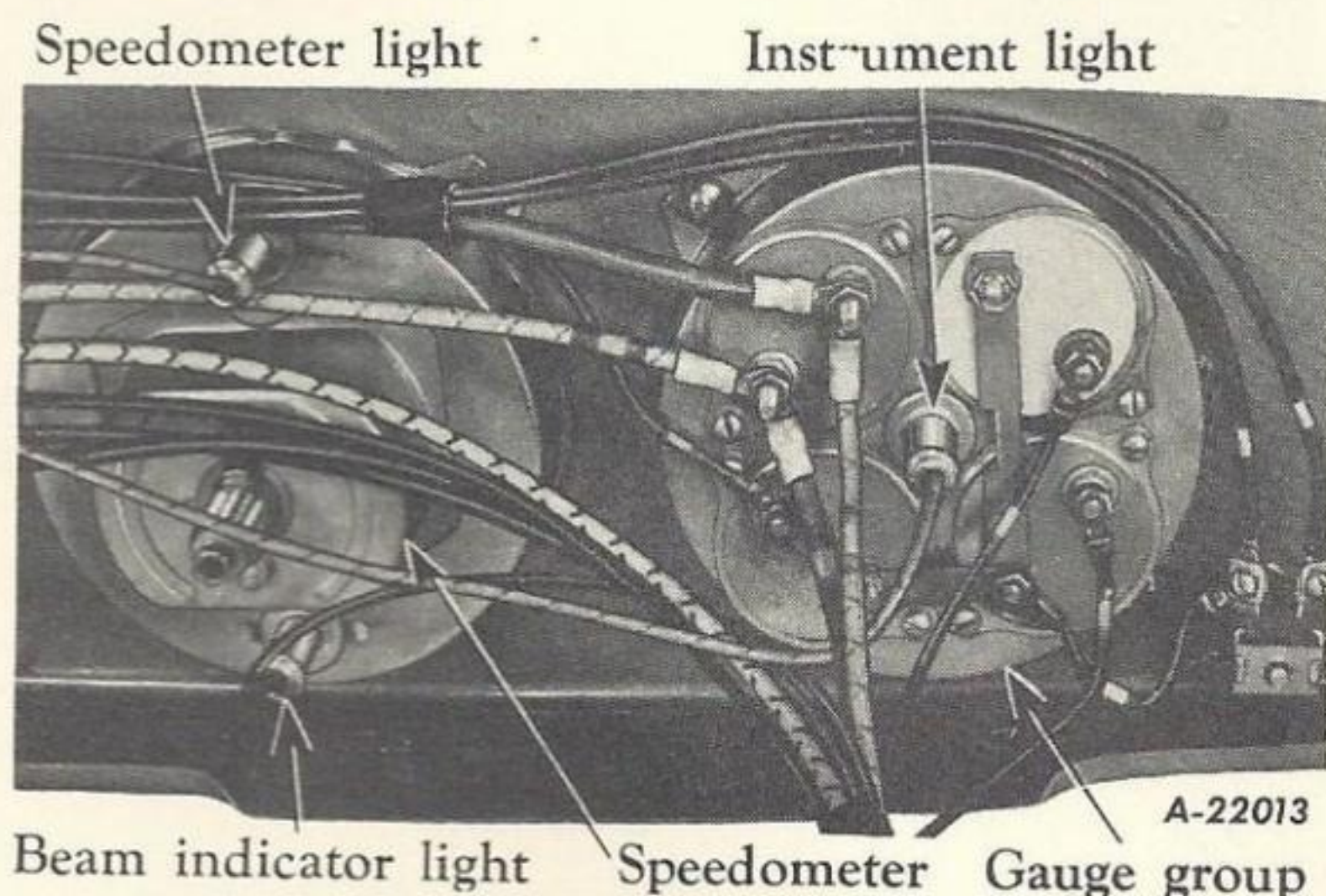
Parking Lights



The parking lights, located just below the headlights, are equipped with ordinary filament bulbs. Should it become necessary to replace either a parking light lens or bulb, remove the rim-retaining screws as shown, replace the necessary parts and reassemble.

Carefully observe the condition of all wires and terminals to enjoy trouble-free operation. Corroded, water-soaked, oil-soaked and cracked wire insulation cause most electrical troubles. Loose and dirty terminals set up high voltages and shorten the life of lights, distributor points and other electrical units.

Panel Lights



The two instrument lights, located at the top of the speedometer and in the center of the gauge group, are retained in a socket at the end of their respective wire leads. This sock-

et is held in place by a spring clip. A slight pressure on the side of the socket will release it and give easy access to the light bulb. To complete the installation after the light bulb has been replaced, merely push the socket into the receptacle until the spring clip snaps into position.

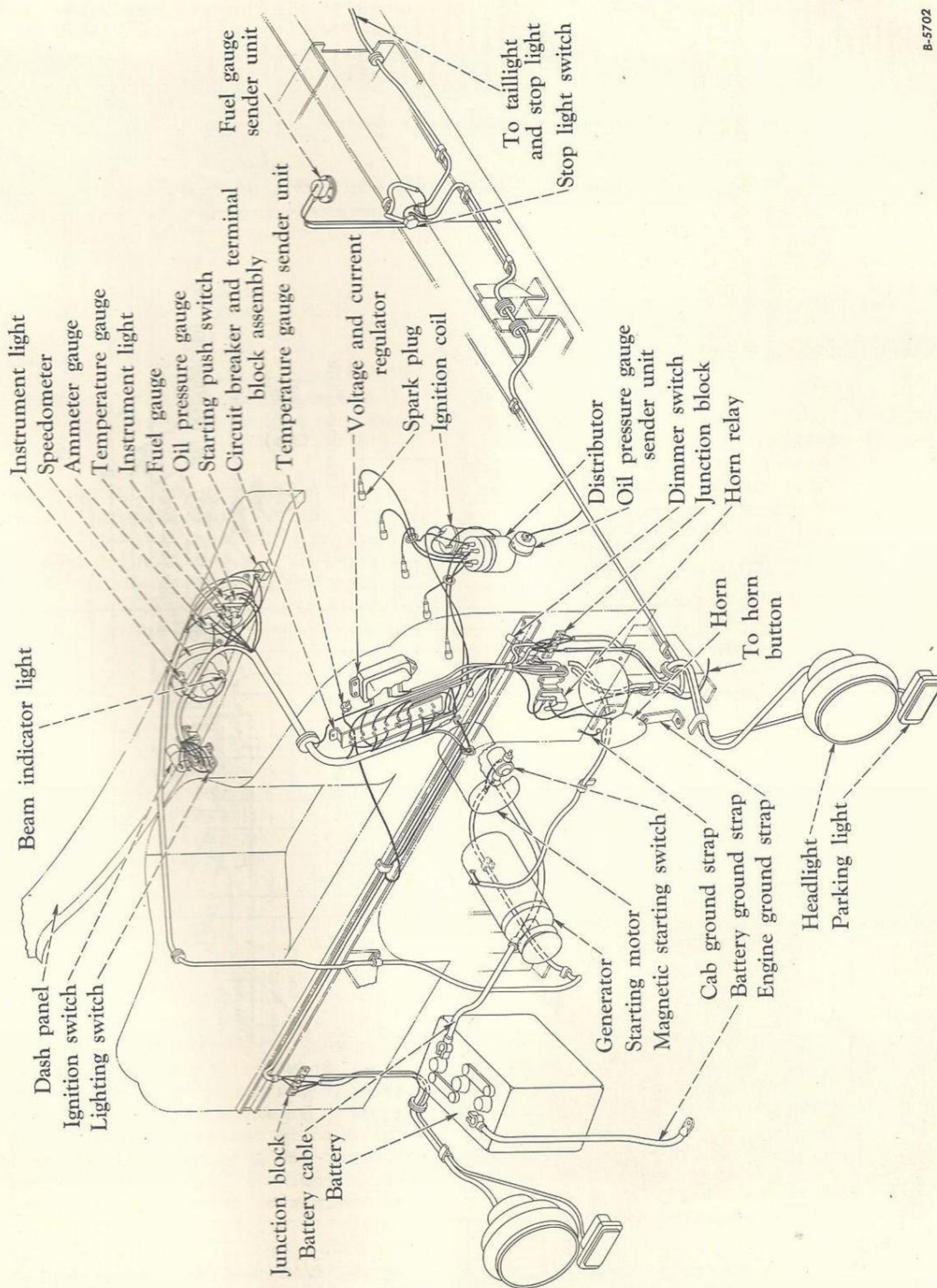
The headlight beam indicator, located at the bottom of the speedometer, is constructed in the same manner as the instrument lights and is serviced in a like manner.

Circuit Breakers

The headlight (high and low beam), parking light, taillight, stop light, and horn circuit are all protected by separate circuit breakers incorporated in each circuit. Should a short circuit occur in any of the above-mentioned circuits, it will cause severe fluctuations of the ammeter. If a short circuit occurs in any of the light circuits, the lights will go on and off at short intervals. If the headlights suddenly go out because of a short, step on the dimmer switch to put the headlights on the other circuit (either high or low beam), and continue until the vehicle can be brought to a stop or until repairs can be made. Circuit breakers are located on the engine side of the cowl dash (left side).

Good engine performance involves five major engine processes, namely: carburetion, compression, ignition, cooling and lubrication. Of these, it may safely be said, the ignition is potentially the most frequent source of trouble because of the multiplicity of the connections, terminals, switches, wires and various units comprising the electrical system. A short circuit, or high resistance caused by a loose connection or a defective switch, although not directly in the ignition circuit, can have a marked effect upon the ignition performance. The importance of using the proper testing equipment is readily apparent, and the necessity of avoiding all guesswork is self-evident.

MAINTENANCE ELECTRICAL SYSTEM

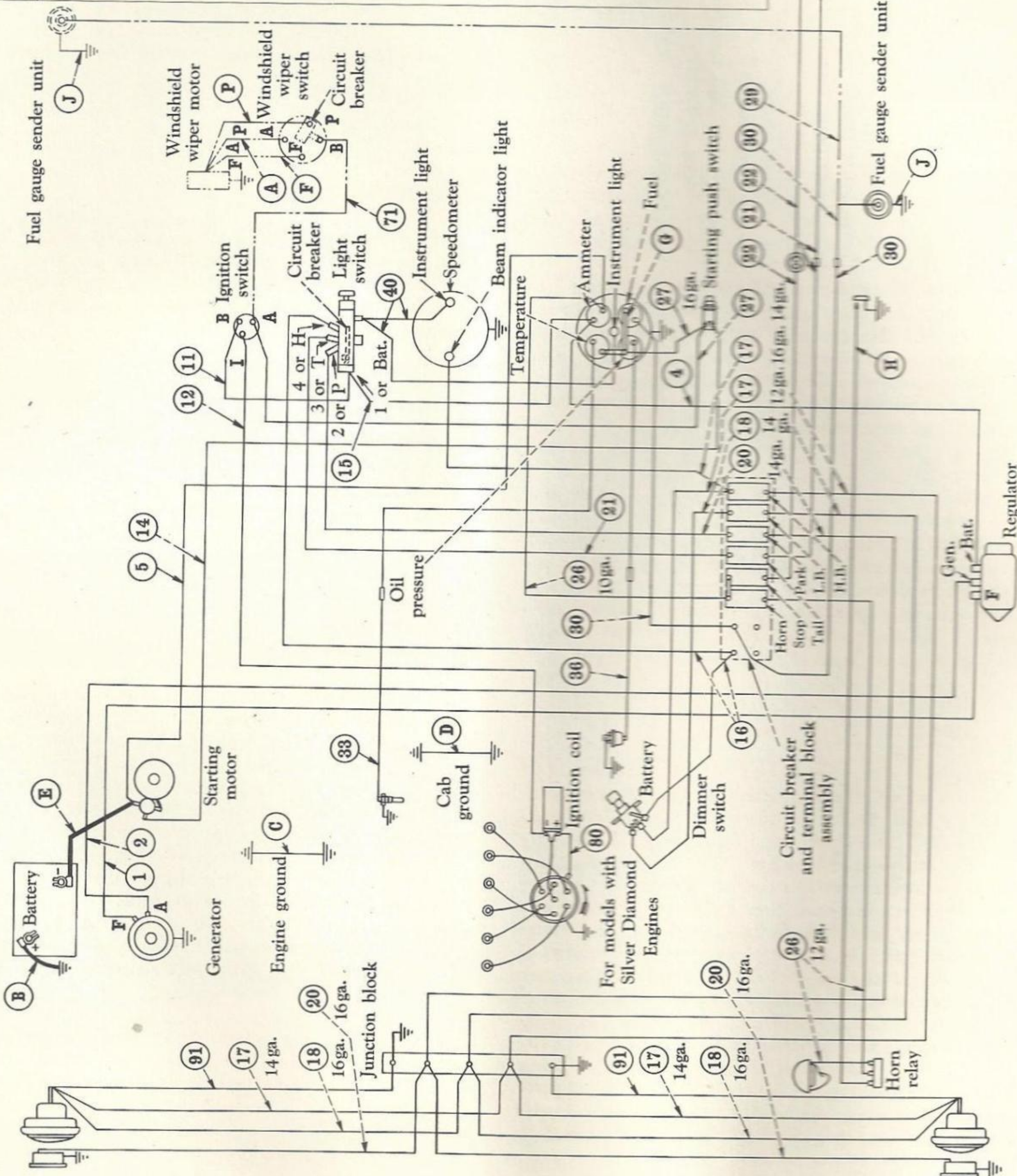


B-5702

Location of electrical units.

MAINTENANCE ELECTRICAL SYSTEM

Circuit No. or Index Letter	Cable Gauge	Cable Color or Description
1	14	Generator field
2	8	Generator arm
4	8	Regulator to ammeter
5	8	Ammeter feed
11	10	Ignition switch feed
12	14	Ignition switch to ignition coil
14	14	Starting
15	10	Light switch feed
16	12	Dimmer switch feed
17	12	High beam feed
17	14	High beam headlight leads
17	16	High beam indicator
18	14	Low beam feed
18	16	Low beam headlight leads
20	14	Parking light leads
20	16	Parking light leads
21	14	Tail light
22	14	Stop light
26	10	Horn and stop light feed
26	12	Horn and horn relay feeds
27	14	Instrument feed
27	16	Instrument feed
29	16	Fuel gauge
30	16	Fuel gauge
33	16	Temperature gauge
36	16	Oil pressure gauge
40	16	Instrument lights
71	14	Wiper switch feed
80	14	Ignition coil to distributor
91	14	Headlight ground
A	16	Natural with circuit letter "A" or black
B	0	Battery ground
C	3	Engine ground
D	12	Cab ground
E	0	Battery cable
F	16	Natural with circuit letter "F" or red
G	14	Instrument bus bar
H	14	Horn push button
J	16	Fuel gauge ground
P	16	Natural with circuit letter "P" or green

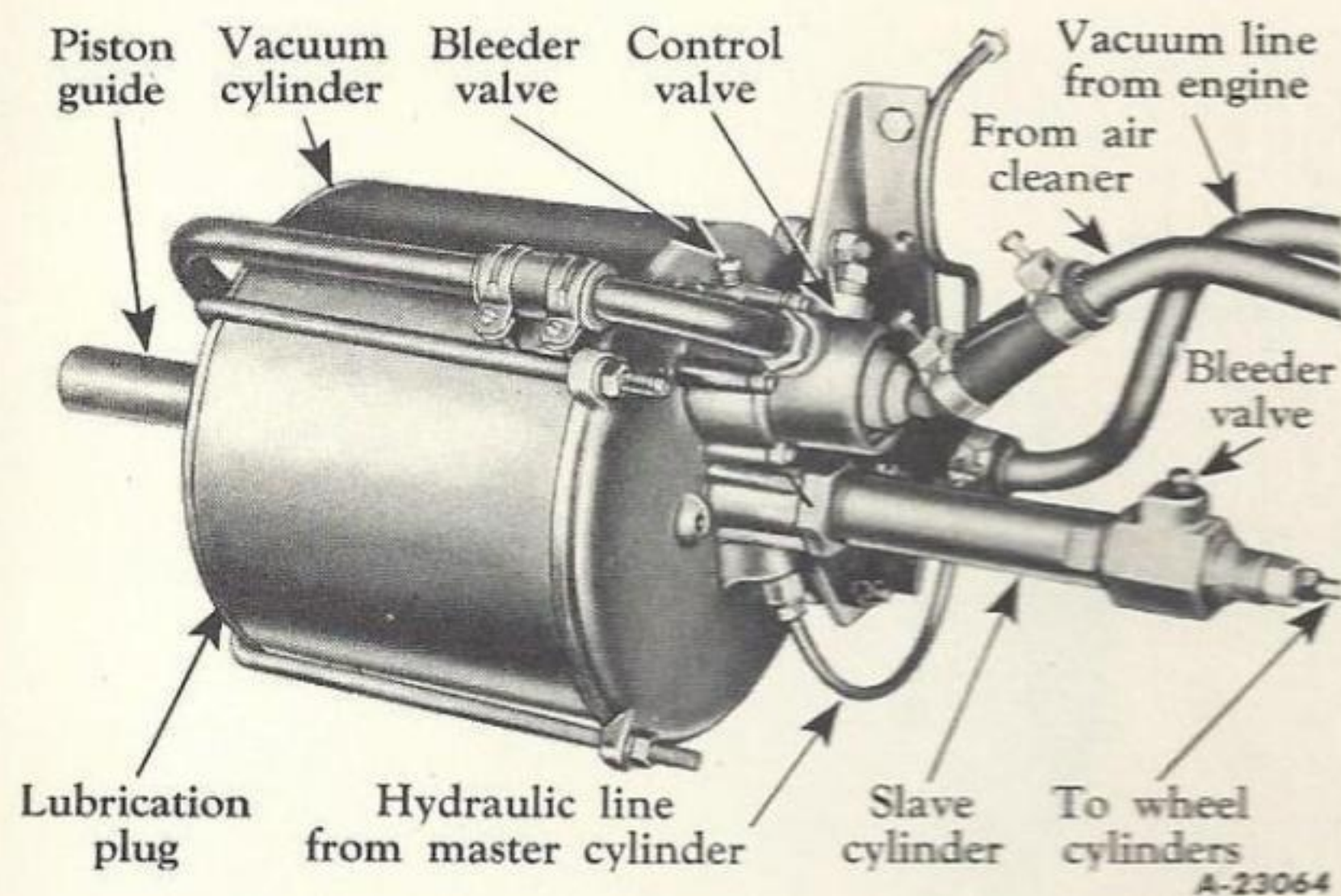


Wiring circuit diagram.

MAINTENANCE

HYDRAULIC BRAKES

Hydrovac Power-Brake Unit



The hydrovac power unit makes available to the driver a greater pressure on the hydraulic brakes than could be exerted by foot pressure alone.

Note: Should the vacuum system become inoperative due to damaged lines or other accidental causes, the power cylinder piston will return to the released position and the hydraulic system automatically returns to the physical operation. Thus the foot pedal pressure would still act to operate the brakes.

Operation

The third series ("C" series) single piston hydrovac is a combined hydraulic-vacuum power unit, using the engine vacuum and atmospheric pressure for its operation. It is self-contained, having no external rods or levers exposed to dirt or moisture.

Manual Bleeding

Manual bleeding requires filling the master cylinder reservoir and pumping the brake pedal to force the fluid through the lines to expel the air from the system. **Caution:** This operation must be done when the engine is shut off and the vacuum released in the power brake system. When the master cylinder reservoir is filled, open the No. 1 bleeder valve on the hydrovac and depress the brake pedal to expel the air. When the pedal has reached the toe board, close the bleeder valve before returning the pedal to the release position. Repeat this procedure until solid fluid comes from the bleeder valve, checking the master cylinder reservoir frequently to insure an ample supply of fluid. Using this method, bleed the No. 1 and No. 2 bleeder valves on the hydrovac and then proceed to the vehicle wheel cylinders.

Lubrication

For service periods and lubrication instructions refer to pages 42 and 43.

Vacuum Reserve Tank

The vacuum reserve tank serves a two-fold purpose. It maintains full vacuum power when the engine is under a prolonged heavy pull and the vacuum would normally drop. It also retains the full vacuum power for an emergency stop.

Vacuum Gauge

The vacuum gauge serves to warn the operator when a rupture occurs in the vacuum lines and indicates at all times that vacuum power is available to operate the hydrovac cylinder.

Hydrovac Air Inlet Filter

On all hydrovac installations the air inlet line is connected to the engine air cleaner. When servicing the air cleaner refer to page 43.

Vacuum Line Oil Bath Air Cleaner

On trucks having a separate air cleaner for the vacuum line, this unit is located on the engine side of the cowl at the upper right hand corner. The vacuum line air cleaner prevents any dirt or foreign matter from entering the engine intake manifold when the brakes are applied. In normal operation, service the air cleaner every 5000 miles by removing the oil reservoir and cleaning thoroughly in a suitable cleaning solution or kerosene, then refill with a clean engine oil to the indicated level on the side of the reservoir. Use the same grade of oil as used in the engine crankcase.

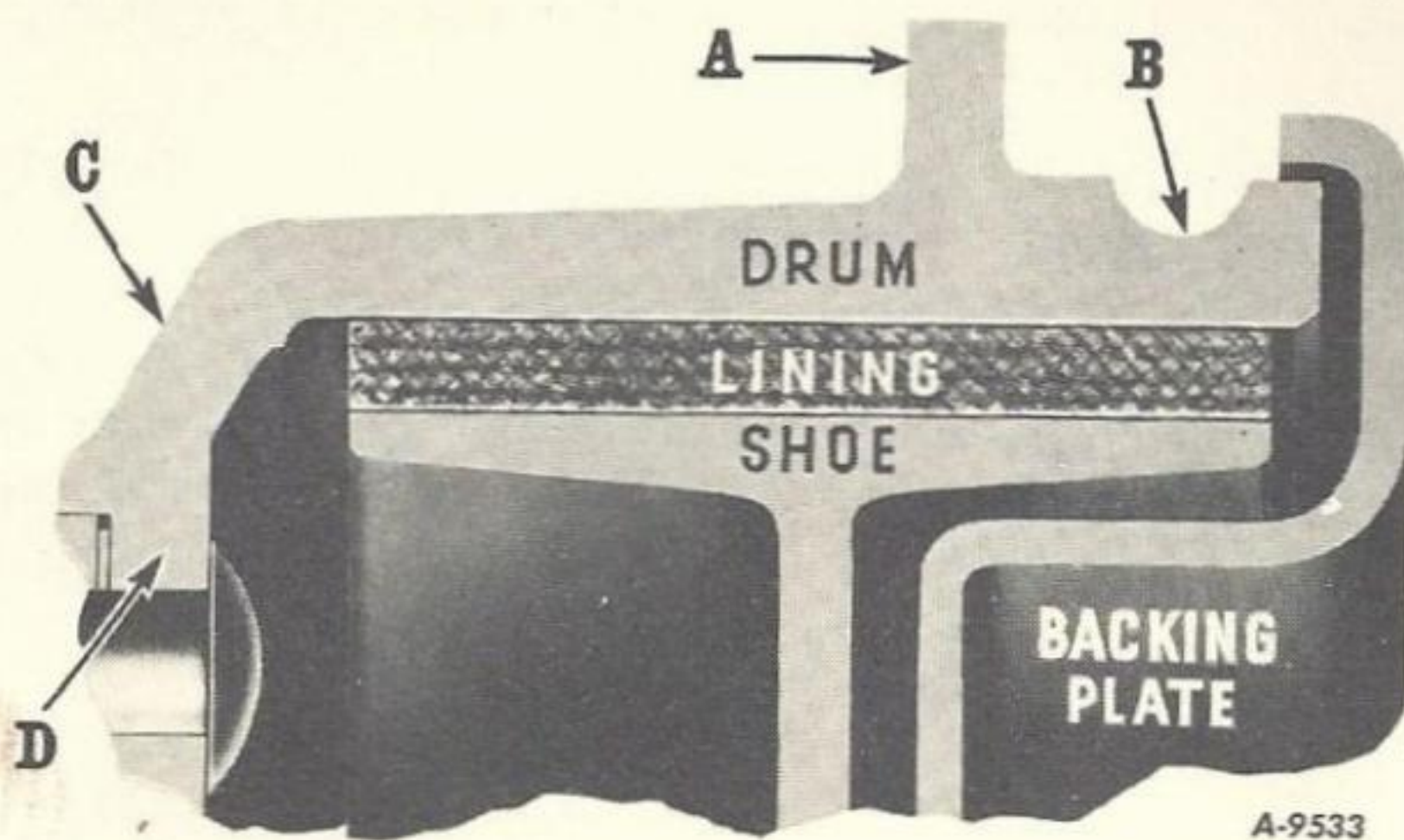
Caution: Be sure that the reservoir sets perfectly against the gasket and that the clamp is correctly installed after completing the service operation. Should a leak occur, the performance of the engine and the hydrovac operation will be seriously affected.

MAINTENANCE HYDRAULIC BRAKES

International hydraulic brakes are safe, dependable, easily operated and long lived.

The brakes are the two-shoe, double-acting, self-centering type. The brake shoes are held against the anchors by the retracting springs. This design makes full use of each brake shoe, resulting in maximum braking power and greater brake lining life.

The self-centering feature also simplifies adjustment and assures smooth, straight-line stops when applying pressure to the brake pedal.



The sectional view above is part of a brake and brake drum and shows:

A. The reinforcing rib which reduces the possibility of drum distortion and provides for heat dissipation.

B. The self-cleaning dirt slinger which prevents dirt and dust from entering the brake.

C. Heavy section at back of the drum.

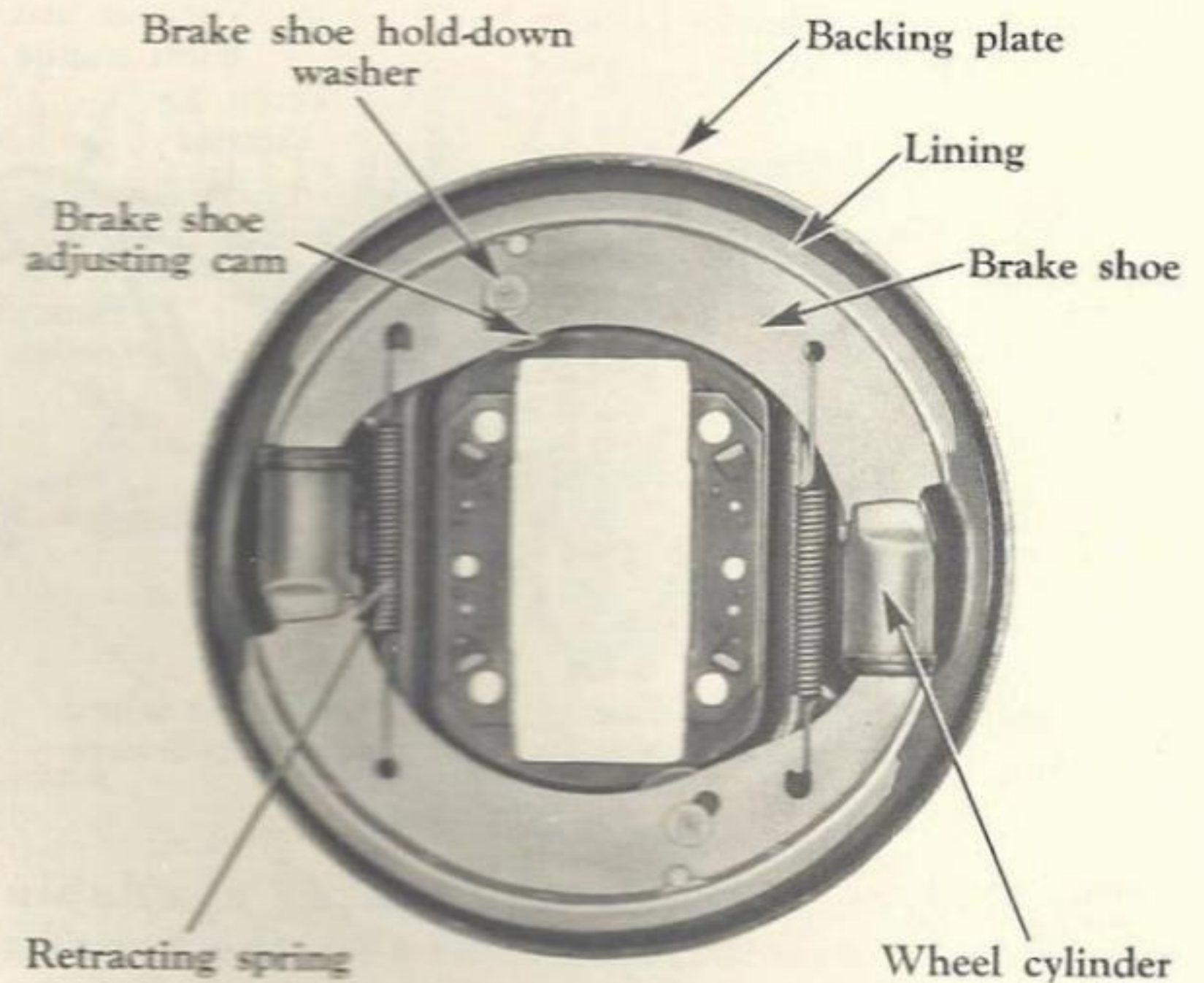
D. Drum mounting flange.

When new brake shoe linings are required, we recommend the use of "Exchange" replacement shoes in sets assembled with the proper lining.

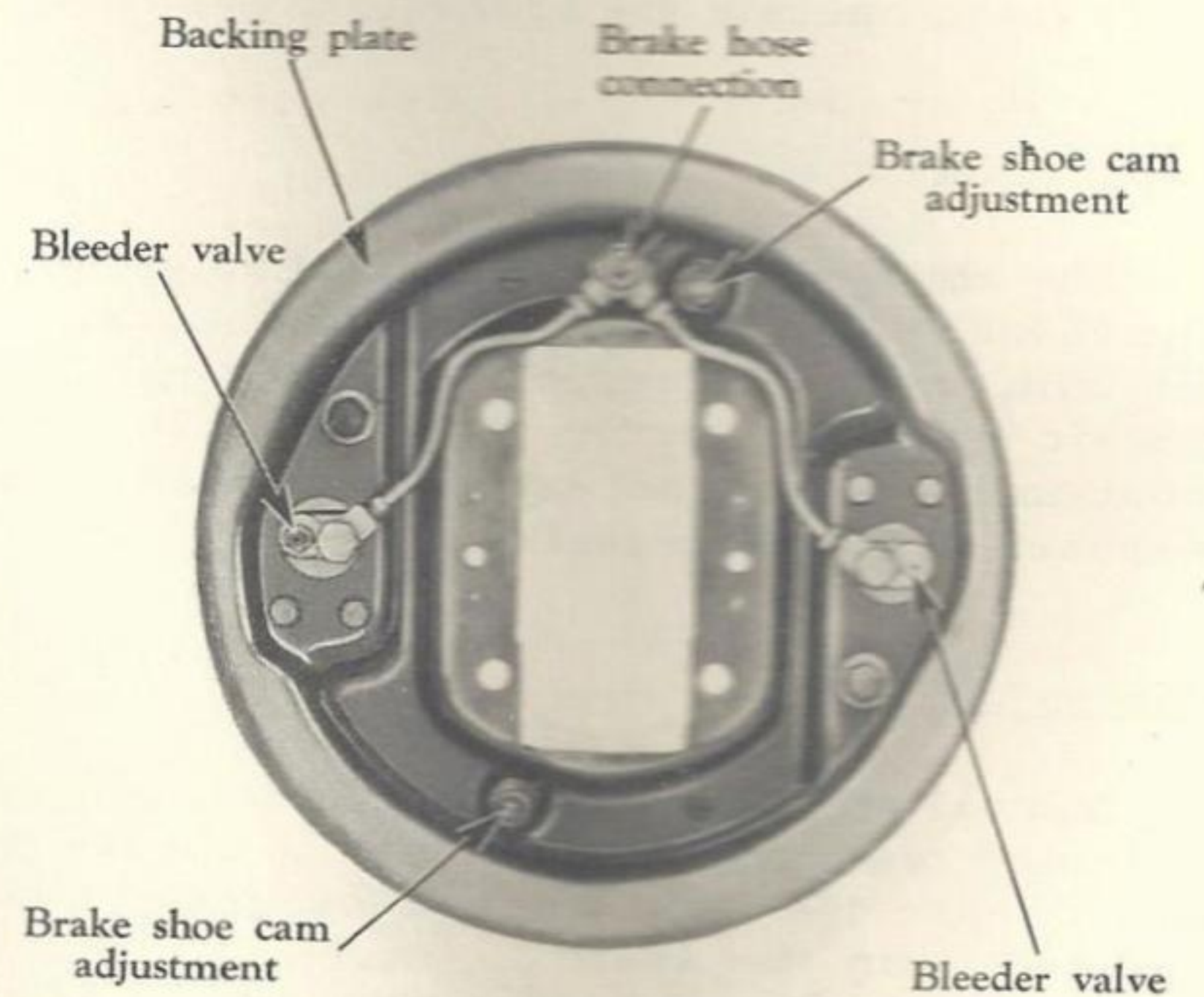
This will assure a satisfactory job at a cost comparable with that of relining the shoes.

Important: Keep all lubricant and brake fluid away from the brake lining when working on the brake shoes.

Front Brakes



Internal view.



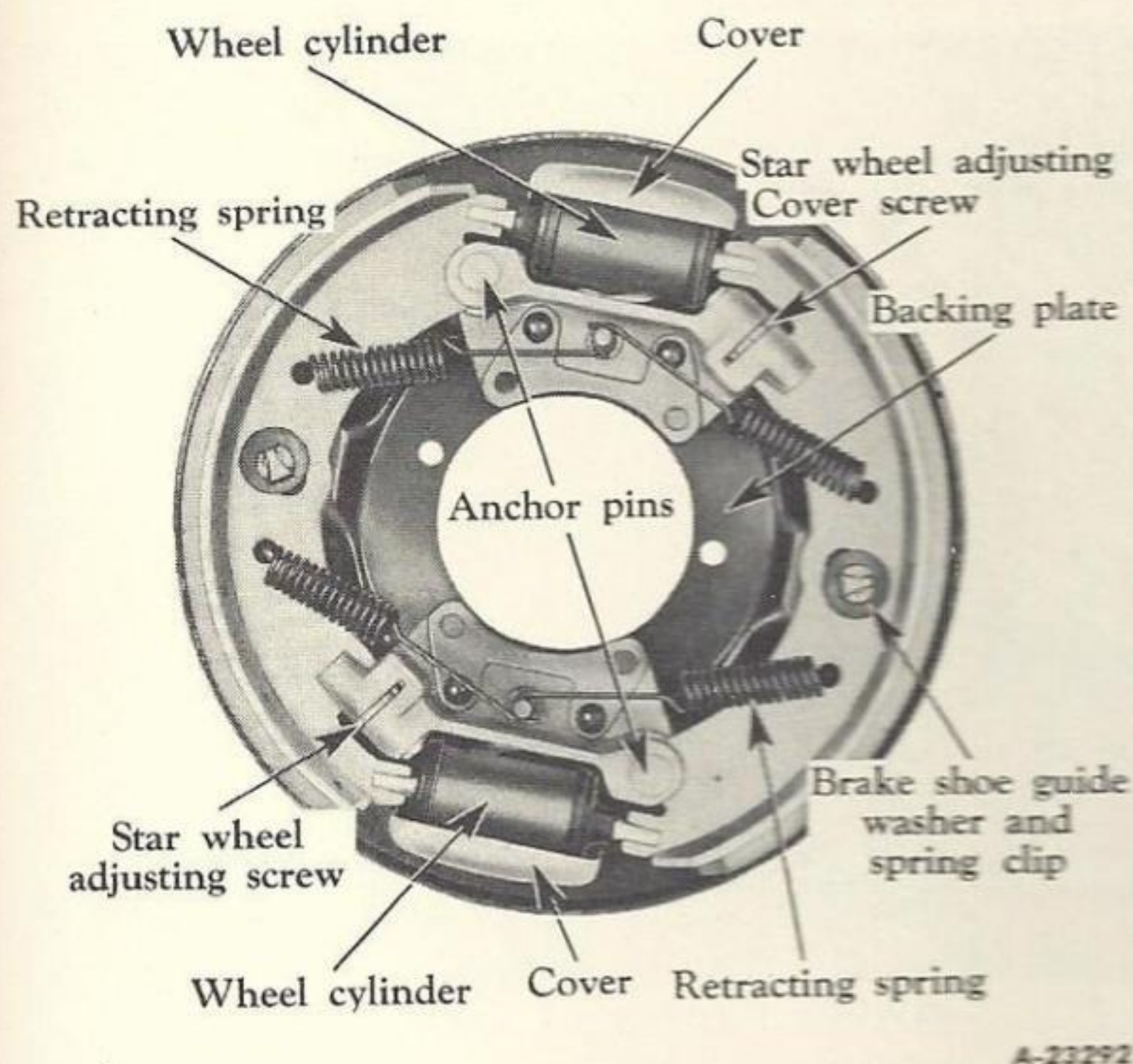
External view.

The above illustrations show the two single-piston wheel cylinder, two-shoe, self-centering internal expanding brakes used on the front wheels.

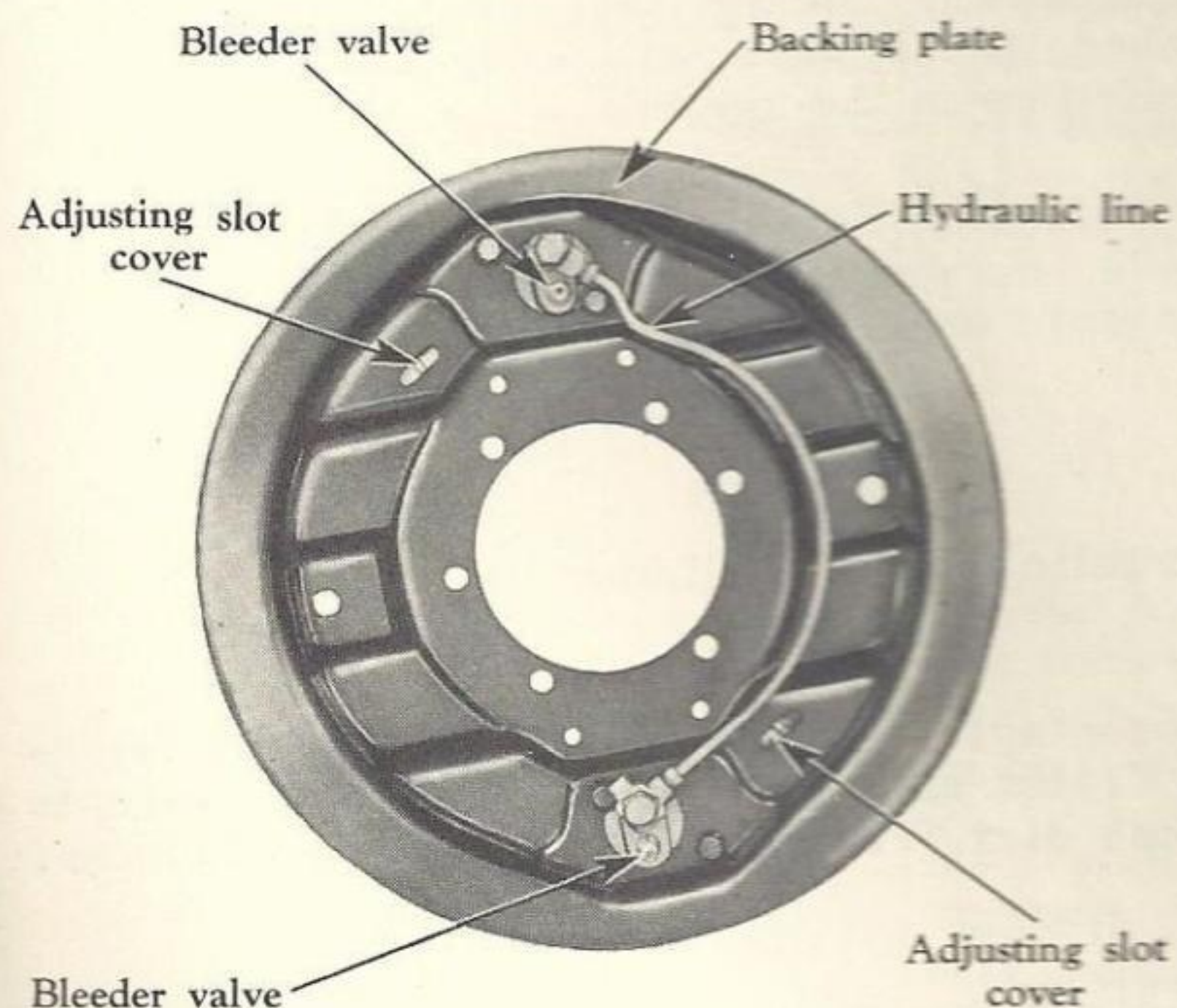
MAINTENANCE

HYDRAULIC BRAKES

Rear Brakes



Internal view.



External view.

The above illustrations show the two double-piston wheel cylinder, two-shoe, self-centering internal expanding brakes used on the rear wheels.

Brake Adjustment

(To Compensate for Normal Lining Wear)

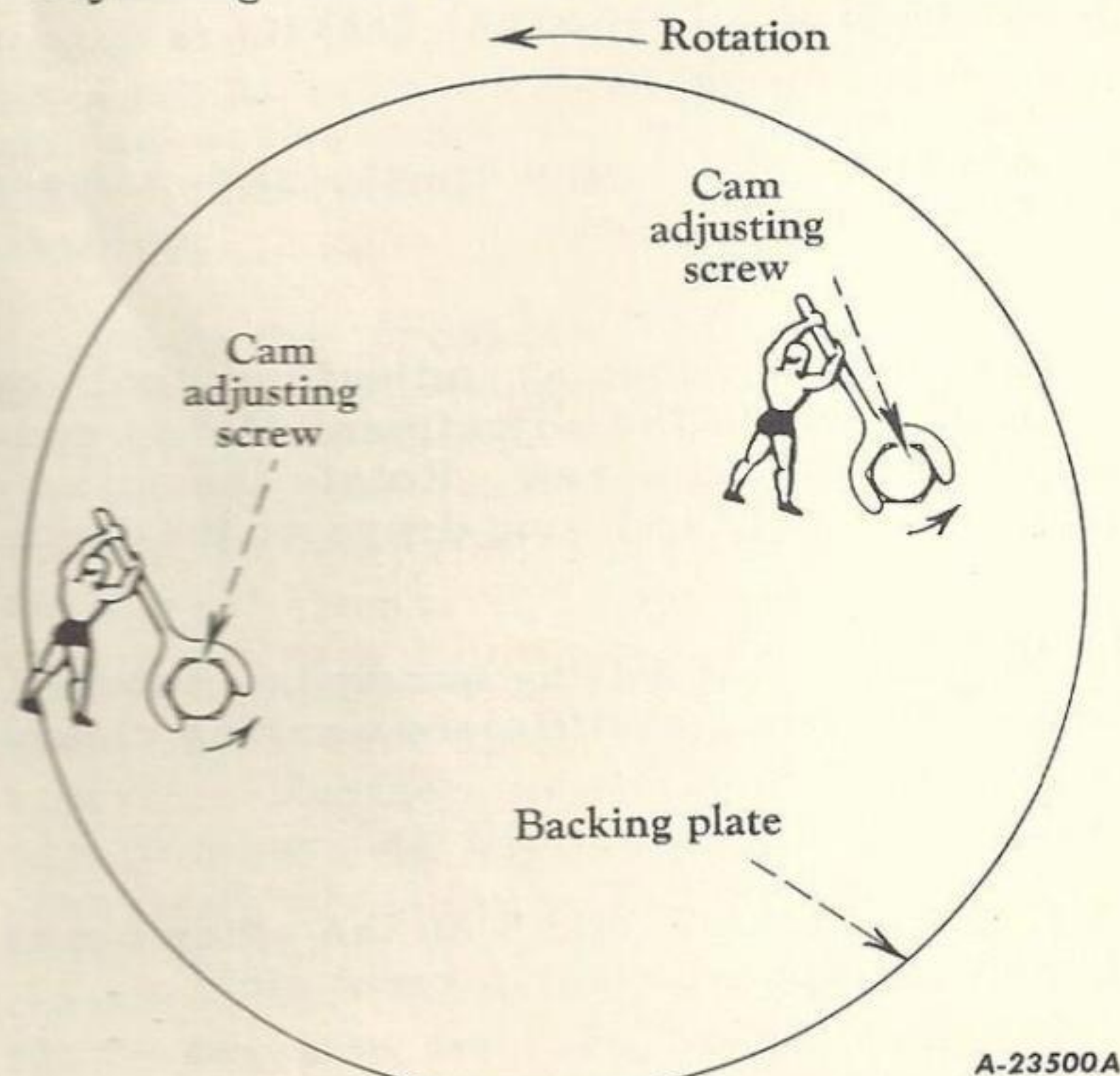
Note: It is impossible to adjust the brakes properly when the backing plates are loose. Inspect these parts before attempting to adjust the brakes. It is extremely important that the adjustment instructions be followed in the given sequence.

Brakes should be adjusted when the linings have been worn to the extent that the pedal pad travels to within two inches of the toe board on a hard brake application. For high speed driving, brakes should be adjusted when the pedal pad travel is within three inches of the toe board on a hard brake application. Check the master cylinder fluid level before performing the brake adjustment.

Brake drums should be at approximately room temperature when making the adjustment. If the brakes are adjusted when the drums are hot and expanded, the shoes may drag when the drums cool and contract.

Perform the following operations at each wheel before proceeding to the succeeding wheel:

1. Jack up the wheel in a safe manner.
2. End play in the wheel bearings should be according to specifications before attempting the brake adjustment.
3. Check the pedal adjustment to make sure that the pedal pad travels approximately 1/4-inch before the master cylinder link end play has been taken up and the master cylinder piston starts to move.
4. To adjust the front wheel brakes: place a 5/8-inch wrench on the brake shoe cam adjusting screw and rotate the wrench the



Front brake adjustment.

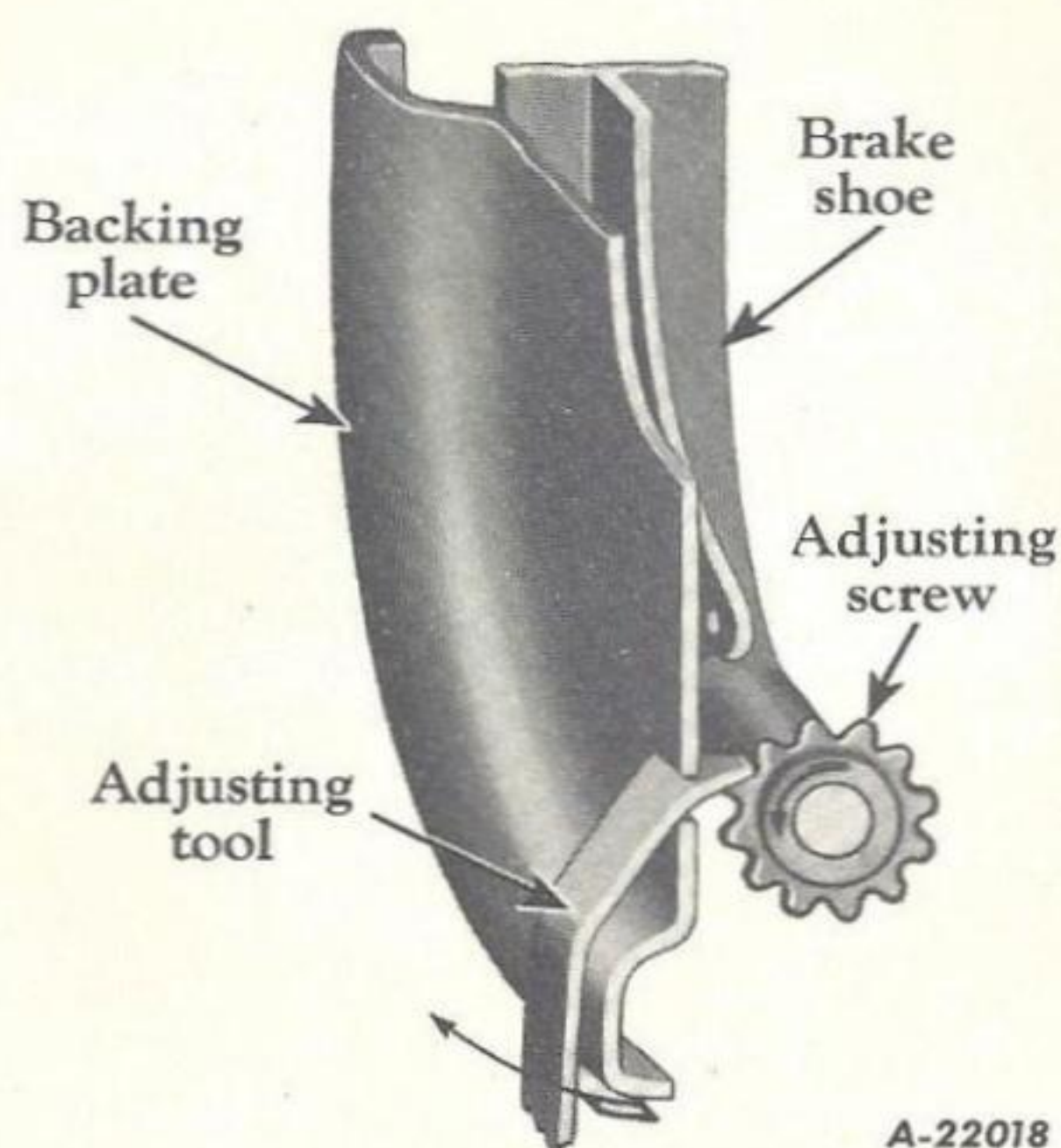
MAINTENANCE

HYDRAULIC BRAKES

Brake Adjustment - Continued

direction of the forward wheel rotation to decrease the lining to the drum clearance. Reduce the clearance until the lining drags on the drum. Move the wrench in the opposite direction, to increase the clearance until drag is relieved. Then move the wrench slightly further to give the proper working clearance. This additional movement is approximately 1 to 1-1/2 inch movement through the arc swung by an 8-inch wrench. Repeat this operation at the other shoe cam adjusting screw to adjust the second shoe.

Perform the following operations at each rear wheel only:



5. Be sure the parking brake is in the full release position before attempting the adjustment of the rear wheel brakes.

6. Remove the adjustment slot covers from the backing plate.

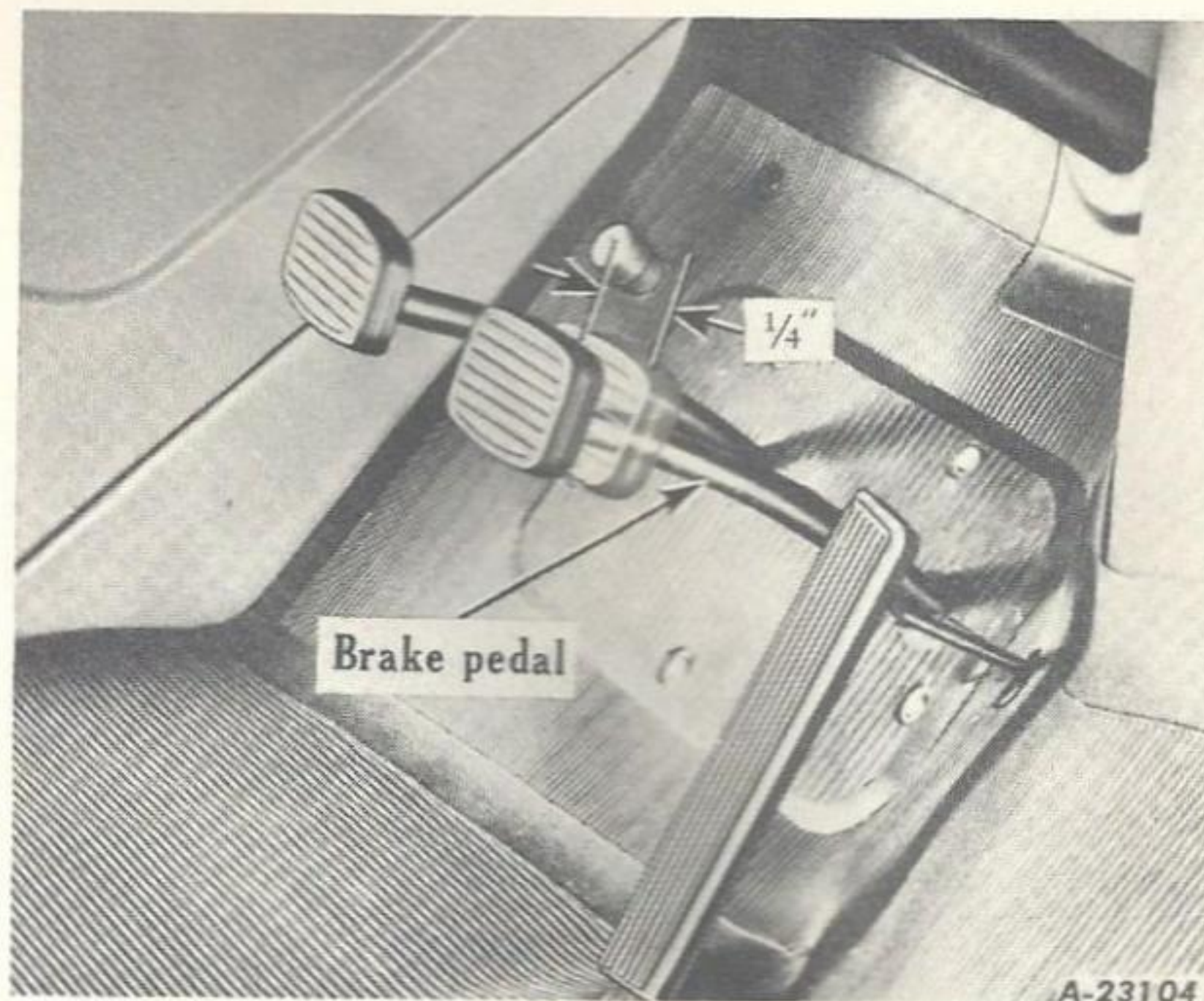
7. Insert the special adjusting tool or screwdriver into the adjustment slot to contact the adjusting screw. Rotate the adjusting screw until the lining drags on the drum.

8. Back off the adjusting screw two notches. This will provide sufficient working clearance.

9. Repeat steps 7 and 8 on the other brake shoe at the opposite adjustment slot.

10. Replace the adjustment slot covers.

Brake Pedal



When the brake control system is in the release position, the foot brake pedal should have 1/4-inch free travel before the pressure stroke starts. This free travel is required to prevent blocking of the bypass port in the master cylinder. Should the bypass port become blocked, the brakes will drag due to pressure building up in the system.

Hydraulic Master Cylinder

Important: When removing the master cylinder filler cap, extreme care must be used to prevent dirt from entering the master cylinder.

Inspect the master cylinder every 1000 miles for the correct fluid level. Fluid should be maintained at a level 3/4-inch below the top of the filler neck. Do not fill the master cylinder to the top of the filler neck.

Always use a high grade "automotive-type" brake fluid. The use of other than genuine "automotive-type" fluid or the introduction of mineral base oil into the system will cause the rubber parts to swell and become inoperative.

MAINTENANCE

HYDRAULIC BRAKES

Bleeding the Brake Lines

Any air inside the hydraulic system must be removed. Whenever a line has been disconnected at the master cylinder, the entire system must be bled at all four wheels until all the air is completely expelled. When a line has been connected at any wheel cylinder, either front or rear axle, the opposite wheel cylinder must be bled in conjunction with the cylinder from which the line was removed.

Fill the master cylinder with high grade, "automotive-type" brake fluid, and see that it is kept at least half-full during the entire bleeding operation.

Attach the bleeder hose to the end of the bleeder connection. Allow the tube to hang in a clean container such as a pint glass jar. Unscrew the bleeder connection three-quarters of a turn and depress the brake pedal by hand, allowing the pedal to return slowly.

Pumping the brake pedal forces fluid out into the glass jar and carries with it any air which might be present in the system. Watch the flow of fluid from the tube, the end of which should be kept below the surface of the fluid in the glass jar, and when all the air bubbles cease to appear or when the stream is a solid fluid mass, close the bleeder connection.

Fluid withdrawn in the "bleeding" operation should not be used again. New fluid should be put in the master cylinder after each cylinder is bled, to avoid air entering the system. If air is allowed to get into the system, rebleeding will be necessary.

Parking Brake

The parking brake, mounted on the drive shaft at the rear of the transmission is very simple in design and built to give long service. Use the brake only to hold the vehicle in a parked position.

AIR BRAKE SYSTEM (Optional equipment)

Successful maintenance of the air brake equipment depends upon systematic inspection and service of each device at regular intervals. How long these intervals should be depends largely upon the service and the mileage.

Important: Have the brakes inspected periodically by an International Service Station or authorized dealer, for safety on the highway.

Charging

The reservoirs are charged with air by the compressor. The reservoir air has access to the inlet valve chamber of the brake valve and the inlet valve is then held closed by the tension of its spring and air pressure.

Caution: Before starting the vehicle, observe the gauge on the dash. This shows the pressure stored in the reservoir, which must be 40 pounds or over, before the air brake can develop its full effectiveness.

Service Application

When it is desired to apply the brakes, foot pressure is applied to the brake pedal, which action is carried through the brake rod pulling up on the lever of the brake valve. This compresses the spring, deflects the diaphragm downward, and through the medium of the rock-

er arm, closes the exhaust valve and opens the inlet valve. Air is thereby admitted from the reservoir to the brake valve, thence out the two side outlets to the front and rear brake chambers. The power thus exerted against the brake chamber diaphragms or pistons forces the push rods out, rotating the camshafts to apply the brakes.

In flowing to the front brake chambers the air passes through the quick release valve, entering at the top, deflecting the diaphragm and its seat to seal the exhaust opening while the air passes around the diaphragm to the two side connections, each leading to a brake chamber.

When the pressure built up in the brake chambers and acting against the brake valve diaphragm is enough to compress the regulating spring, the diaphragm moves upward, allowing the inlet valve to close by action of its spring.

The exhaust valve remains closed by action of the inlet valve spring and tilting of the rocker arm. Further increase of the brake chamber pressure is thus prevented. If, however, there should be leakage from the brake chambers or piping while the brake valve lever remains in this position, the resulting drop in pressure under the brake valve diaphragm will cause the regulating spring to again unseat the inlet valve and restore the lost pressure.

MAINTENANCE

AIR BRAKE SYSTEM

Release

When the foot is removed from the brake pedal, the brake valve lever is moved back toward normal position again, which relieves the tension on the regulating spring so that the diaphragm will be moved upward to its normal position by the brake chamber pressure underneath it. This permits the exhaust valve to be unseated by its spring which opens the brake chamber line to atmosphere and allows the air to exhaust from the brake chambers.

If the brake valve lever is moved all the way back to the normal position and left there (foot entirely removed from brake pedal), the brakes will entirely release, but if moved only part way back (foot pressure eased), the brakes will only partially release, i.e., the exhaust valve will remain open until the brake chamber pressure has reduced to such an amount that it will no longer hold the diaphragm up, whereupon the regulating spring will move the diaphragm, with the rocker arm, downward again and close the exhaust valve.

The brake chamber line to the rear wheels is released only up to the quick release valve or relay valve. This allows the diaphragm to unseat, uncovering the exhaust port through which the rear brake chambers are then exhausted.

Operating Instructions

The foot pedal is normally held in release position by the action of a spring. To make a light application of the brakes, depress the pedal slightly. To make a heavier application, depress the pedal further. Removing the foot from the pedal automatically releases the brakes.

The air brake is designed so that when the lever of the brake valve is moved to the limit of its stroke an emergency application results, which will stop the vehicle in the shortest possible time.

The retarding effect depends upon the adhesion between the tires and the roadway, and is at the maximum when the wheels are just at the point of sliding. If the wheels slide, the retarding effect is to a large extent lost.

The retarding effect of any given braking pressure is greater at low than at high speeds, and a heavy application at low speeds may result in sliding the wheels. When running at high speeds, however, a heavy initial application may be made, as it is desirable to obtain the most effective deceleration when the speed of the vehicle is greatest.

The best possible stop will be made when the brakes are applied as hard at the very start as the speed and condition of the road will permit and then graduated off as the speed is reduced so that at the end of the stop little pressure remains in the brake chambers.

Never apply the brakes lightly at first and increase the pressure as the speed diminishes; it not only makes a longer stop, but the final high pressure will be likely to produce a rough stop.

In making a stop or a slow-down from any speed above the idling speed of the engine, allow the engine to remain in gear with the throttle closed to get the full benefit of its retarding effect, disengaging the clutch when the idling speed is reached. With the knowledge of ample braking power in reserve, many slow-downs can be accomplished by drifting and utilizing the retarding effect of the engine, whereas without utilizing the engine it would be necessary to apply brakes much earlier in order to be sure to be able to stop if necessary.

In graduating the brakes off, do not "fan" the brake valve, repeatedly releasing and applying the brakes, as this wastes air pressure.

Air Compressor (Bendix-Westinghouse)

At the end of every 10,000 miles of operation, or oftener depending upon operating conditions, the cylinder head should be removed and carbon cleaned from the discharge and unloading valves. Adjust the unloading valve clearance .010 to .015 inch between the top of the valve and the adjusting screw. Check the unloading device by applying 60 pounds of air pressure to the unloading connections, at which the unloading valves should unseat. Test the unloading diaphragm cover for leakage with soapsuds. If the unloading device does not function, remove and thoroughly clean the diaphragm and follower.

Remove all the curled hair in the air cleaner and wash thoroughly in kerosene, then saturate with a light lubricating oil and replace. If operating under extremely dusty conditions the air cleaner should be cleaned more often.

The compressor is cooled by water from the engine cylinder head and is discharged into the engine water inlet.

Oil is supplied under pressure to the compressor through a line connected to the main oil line in the engine crankcase and to the compressor and bearing.

MAINTENANCE

AIR BRAKE SYSTEM

Air Compressor (Wagner)

Run the engine until normal driving temperature is reached. After the compressor has "warmed up" and with the engine running at a speed equivalent to 30 m.p.h. road speed, the compressor should pump a maximum pressure of 95 to 105 pounds of air into the air reservoir. When the maximum air pressure is reached, the compressor control valve should "cut-off" and "unload," that is, permit a small volume of air to escape to the atmosphere through the compressor air intake. Fan the brake pedal until the air gauge shows a pressure drop of 15 to 20 pounds below the maximum pressure. At this point, the compressor control valve should "cut-in."

If the compressor will not pump to the maximum air pressure, check the oil supply making sure that sufficient oil is in the oil dome. If the oil level is correct, loosen the two mounting cap screws which attach the compressor control valve to the end-plate and lift the control valve away from the compressor intake. **Caution:** Do not allow dirt to fall into the intake. If the compressor now pumps satisfactorily, the control valve is at fault and it must be repaired or replaced. If the compressor will not "cut-in" or "cut-off" at the proper pressures the control valve is at fault and must be repaired or replaced with a new unit.

If the compressor does not pump up and "cut-off" normally, *refer to the above paragraph*, and the fault is not in the compressor control valve, the compressor should be removed from road service for further inspection.

While the compressor is pumping, check for air, water, or oil leaks at the various connections and gaskets. Leaks should be located and repaired.

The compressor has its own independent oil reservoir and lubricating system. The oil level should be checked each time the engine oil is checked and oil should be changed at least every 5000 miles (at shorter intervals under severe operating conditions).

An oil filler plug with the dip stick attached and the oil drain plug are located in the oil dome opposite the pulley or drive end of the compressor. **Caution:** Do not remove the oil filler plug or oil drain plug while the engine is running. With the engine turned off, unscrew the oil filler plug approximately two complete turns and allow the compressed air in the oil dome to bleed off. A bleeder hole is located in the filler plug for this purpose. Remove the filler plug for this purpose. Remove the filler plug and inspect the oil on the dip stick for condition and oil level. Drain and refill or add oil as required.

Any good grade of engine lubricating oil may be used in the compressor, but the viscosity should not be heavier than SAE-40 or lighter

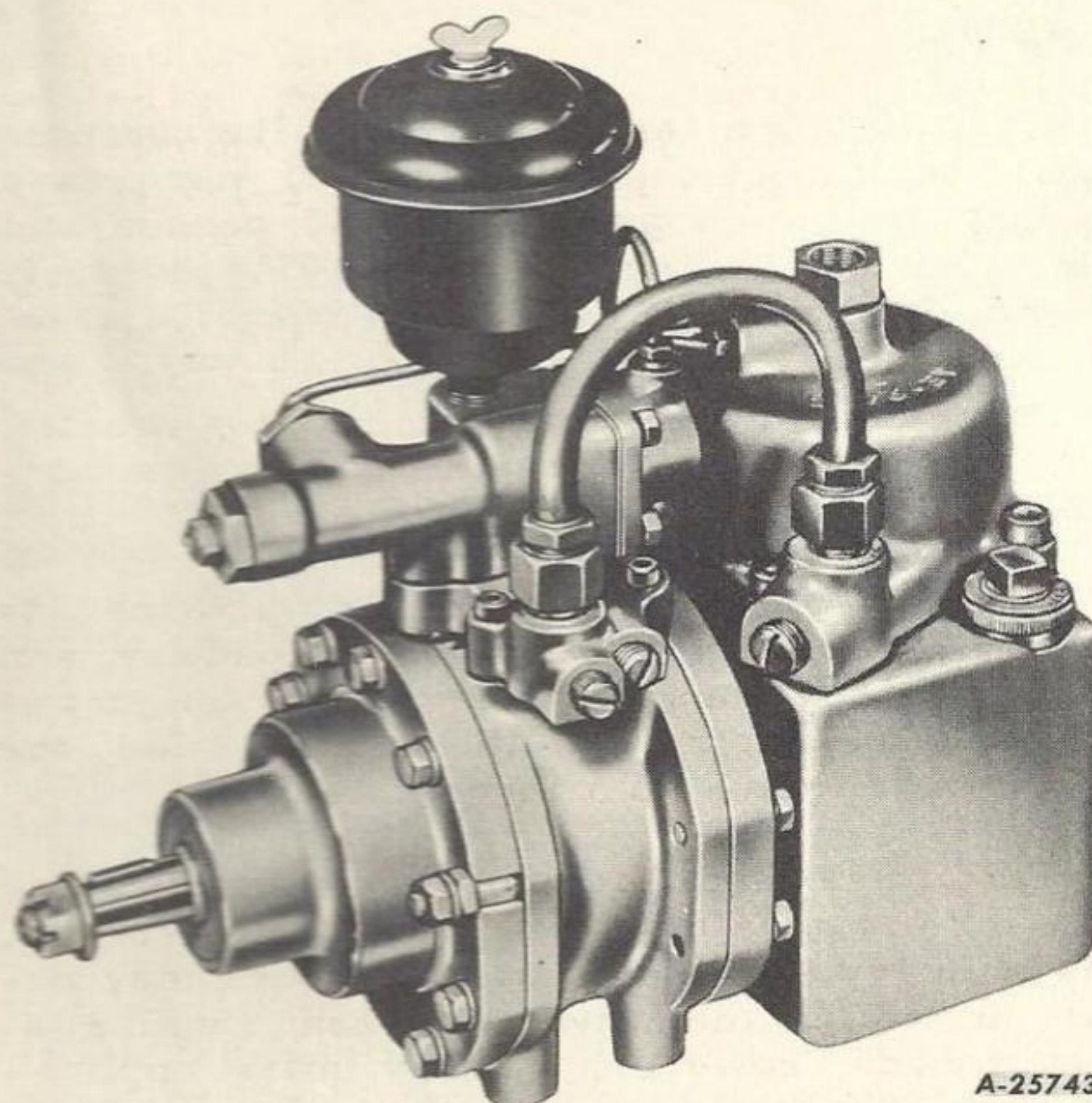
than SAE-20. The compressor requires approximately 1-1/4 pints. For winter operation in cold climates, it will generally be found desirable to use a lighter viscosity oil than during summer operation.

Be sure to tighten the drain plug securely and make sure that the filler plug is firmly seated on the oil dome after checking or changing the oil. The filler plug is under air pressure during pumping periods and will leak air unless properly tightened. Do not use a wrench to tighten the filler plug as tightening it more than necessary will damage the rubber insert which seals it against air leaks.

Never allow the air compressor to operate on the road without its air cleaner, which in most cases, is mounted on top of the compressor. Check and see that the air cleaner is screwed tightly into the air intake and that the top of the cleaner has not worked loose. At least every 5,000 miles (at shorter intervals under severe operating conditions) remove the air cleaner from the compressor, disassemble and wash it in clean kerosene, or cleaning solution. After washing the copper mesh or hair filter, dip it in light lubricating oil. Reassemble the air cleaner and fill the bottom part up to the ring, with light oil. Replace the air cleaner on the compressor.

A properly maintained air cleaner is the best insurance for long life of the compressor.

Note: On some installations, the air compressor intake is connected to the carburetor air cleaner. For recommended service procedure for the carburetor air cleaner refer to page 19.



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Rotary type air compressor.

MAINTENANCE

AIR BRAKE SYSTEM

Reservoirs

Moisture taken in with the air through the compressor inlet valves collects in the reservoirs and necessitates draining the reservoirs daily in cold weather and every week in warm weather. This is done by opening the drain cock located on the bottom. Be sure to close the drain cocks after all moisture has been removed.

Safety Valve

The safety valve should be regularly checked for leakage and thoroughly cleaned once a year and reset to blow off at 150 pounds.

Brake Valve

The brake valve is operated by foot pressure and controls brake operation by controlling the flow of air from reservoir to brake chambers in brake application, and from brake chambers to atmosphere in release.

Quick Release Valve and Relay Valve

The valve should be tested at regular intervals for leakage by applying soapsuds on the exhaust port with the brakes applied. On releasing the brakes, see that the valve releases immediately with the corresponding return movement of the foot pedal. Leakage may be caused by dirt in the valve or a defective diaphragm. As a rule the diaphragm should be replaced at least once every year.

Governor

After 10,000 miles of service, the governor should be inspected and adjusted, if necessary so that the cut-in pressure is 85 pounds and the cut-out pressure is 100 to 105 pounds. It should also be tested for leakage and, if found to be leaking, a new or a factory-reconditioned governor should be installed.

To raise the cut-in pressure, increase the tension of the tube on the valve by screwing down the adjusting screw. To raise the cut-in and cut-out range, remove one or more shims from underneath the upper valve nut.

This should be done by any Authorized Bendix-Westinghouse service station, as special tools are required.

Brake Chambers (Piston Type, Midland)

The cylinders should be lubricated at intervals of four months or every 15,000 miles in order to function properly. Remove the air connection at the rear of the cylinder and inject

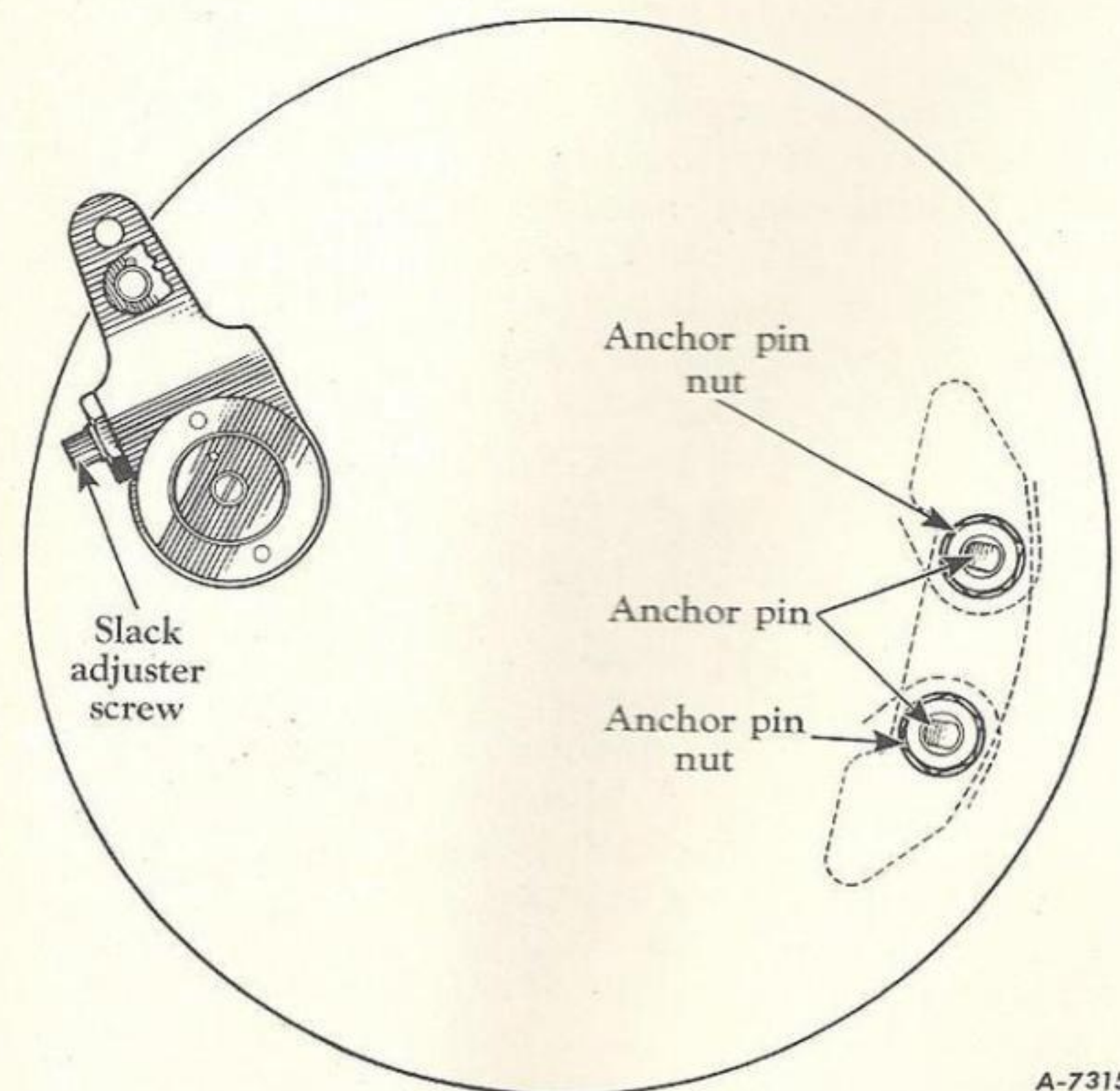
1/4 pint of heavy motor lubricating oil. Then clean the breather hair in the piston stem assembly with Stoddard's Solvent, and dip in a light lubricating oil. Be sure the rubber boot is in good condition and properly installed to protect the piston shaft from harmful elements.

Brake Chambers (Diaphragm Type) (Bendix-Westinghouse)

With the brakes applied, test the brake chambers for leakage with soapsuds around the outer edge and also around the clamping bolts. The diaphragm should be replaced at least once every year.

Adjustment of Front Wheel Brakes

- A. Jack up the wheel and remove the brake drum feeler gauge hole cover.
- B. Loosen the anchor pin nuts.
- C. Turn the slack adjuster screw until there is .010 inch lining to drum clearance at the cam end of the brake shoes.
- D. Turn the anchor pins until there is .010 inch lining to drum clearance at the anchor pin end of the brake shoes.
- E. Tighten the anchor pin nuts.
- F. Make this adjustment at both front wheels.



Front wheel brakes.

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MAINTENANCE

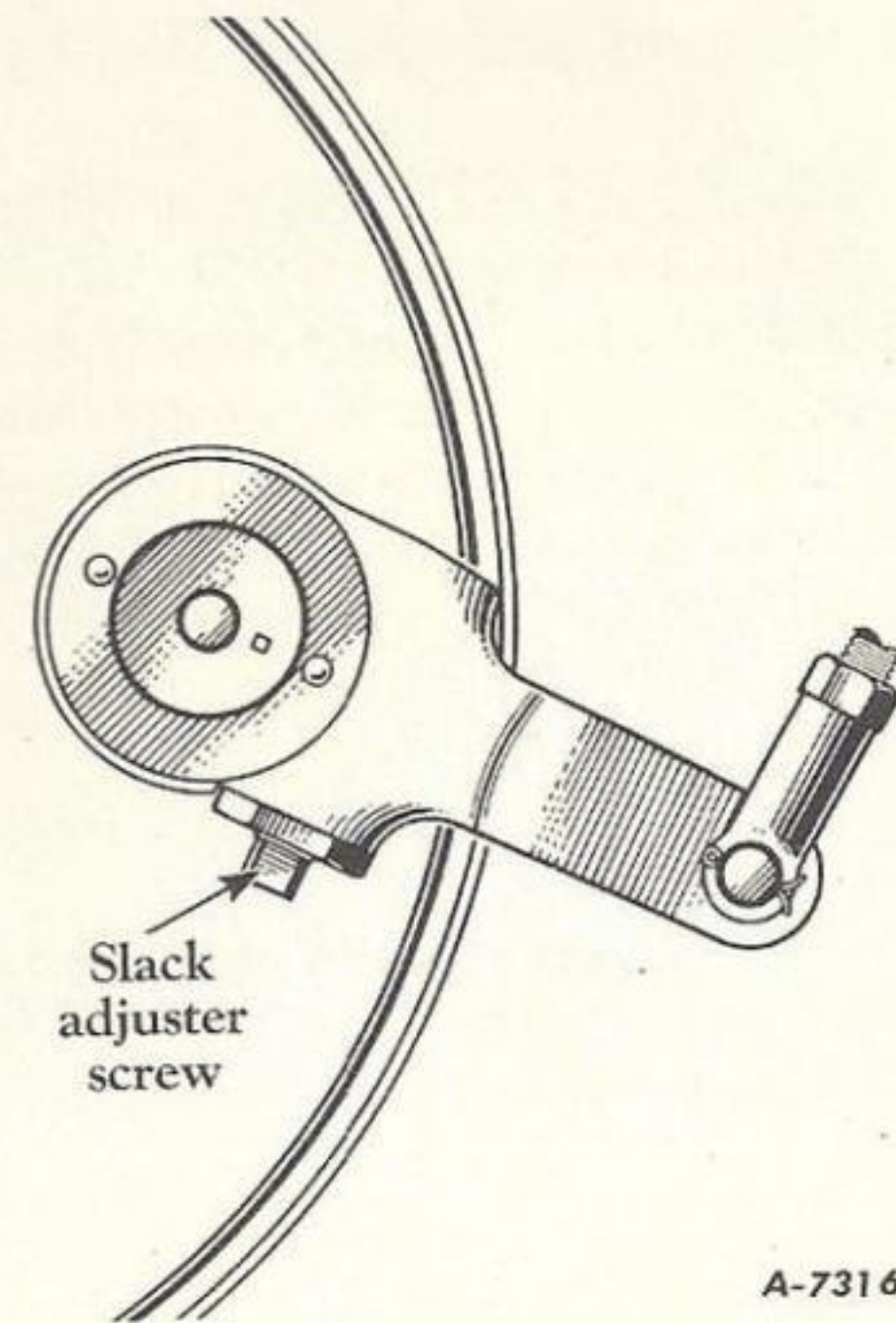
AIR BRAKE SYSTEM

Adjustment of Rear Wheel Brakes

A. Jack up the wheel and remove the brake drum feeler gauge hole cover.

B. Turn the slack adjuster screw until there is .010 inch lining to the drum clearance at the cam end of the brake shoes.

C. Make this adjustment at both rear wheels.

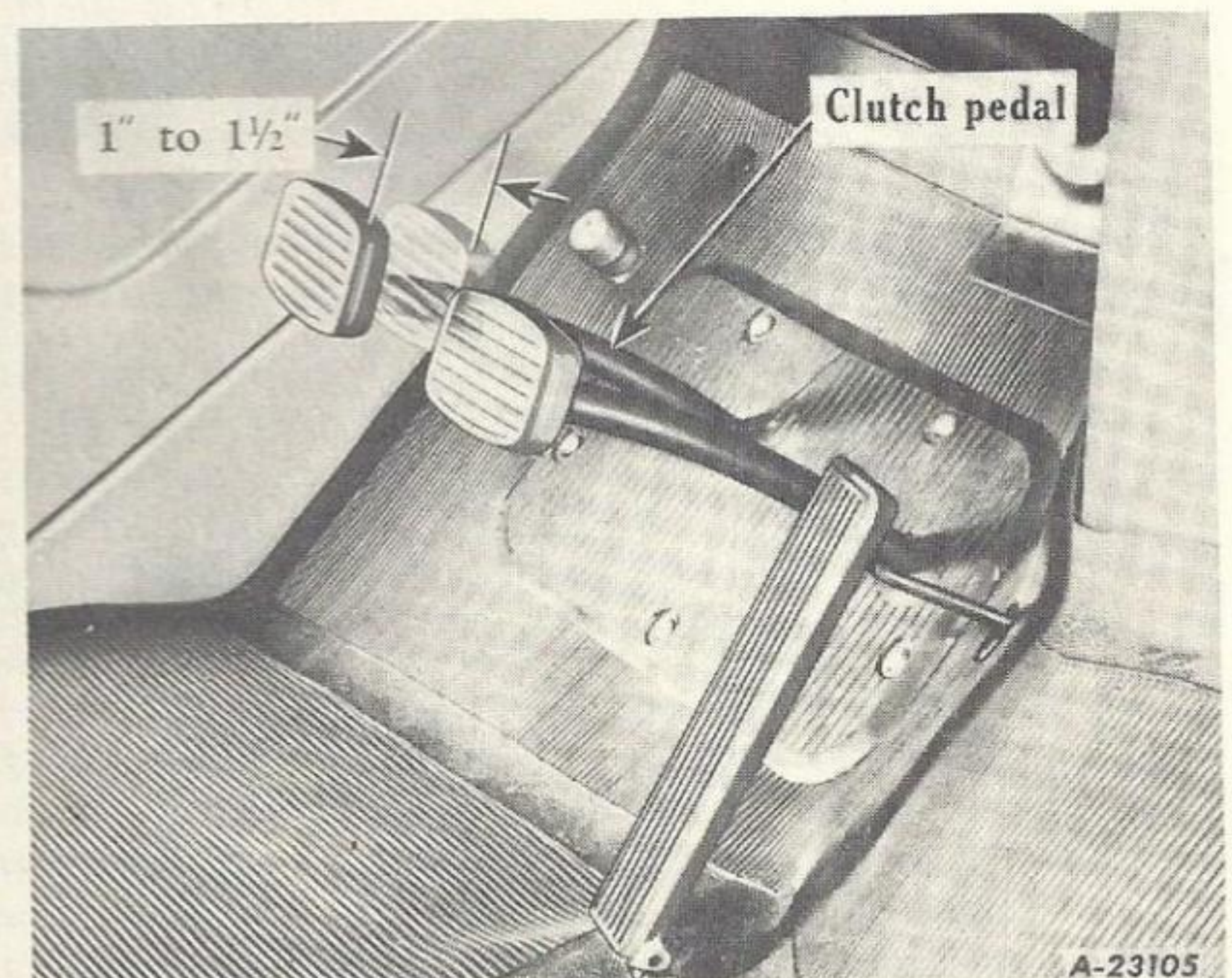


Rear wheel brakes.

CLUTCH PEDAL ADJUSTMENT

Clutch Pedal Adjustment

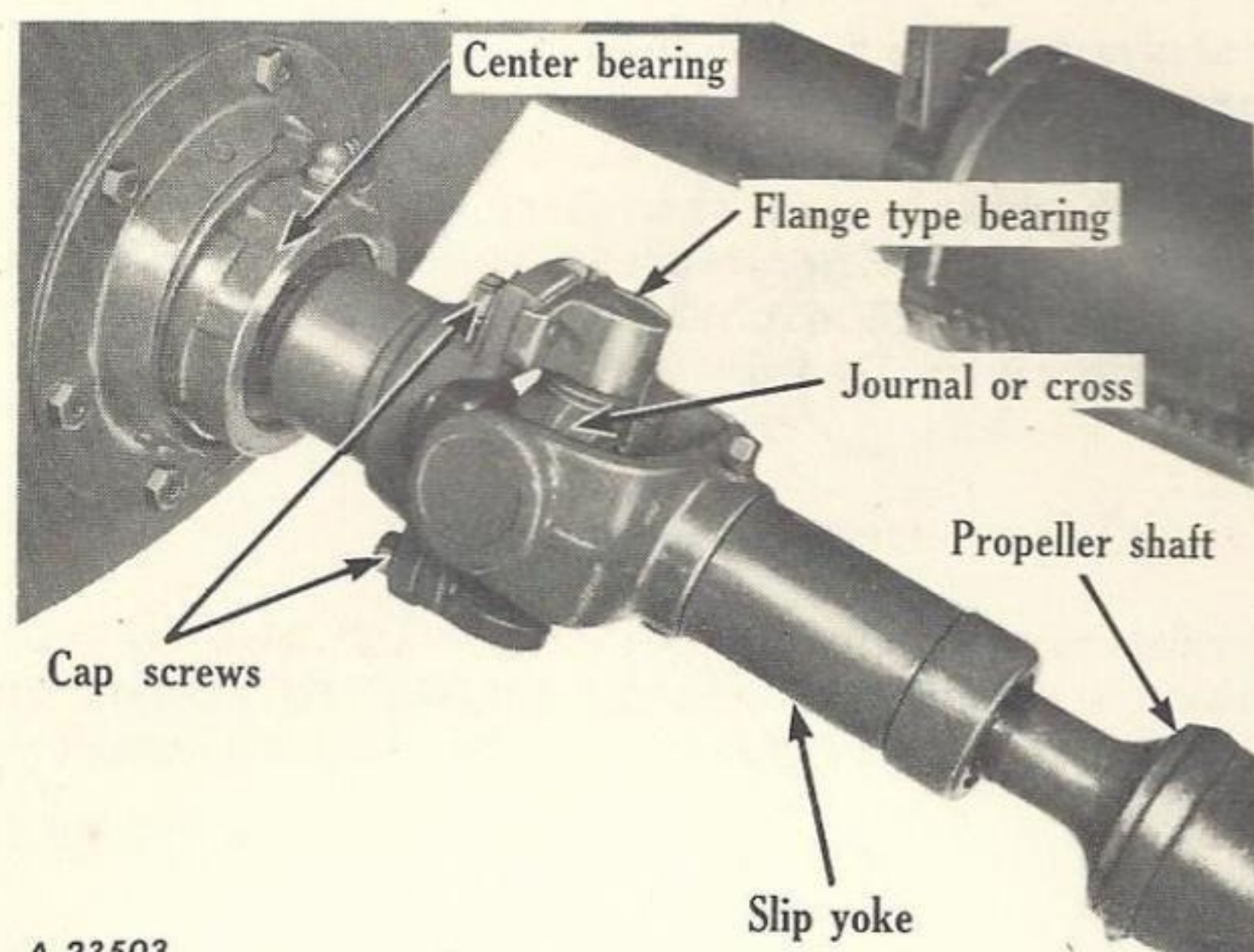
The clutch pedal should be inspected periodically and adjusted whenever free travel has been reduced beyond the specified limit. The correct free travel of the clutch pedal should be 1 to 1-1/2 inches when depressed and before the clutch starts to disengage. When adjustment is necessary, it is extremely important that the work be properly done; otherwise, early failure of the clutch will result and a costly clutch overhaul becomes necessary. To avoid needless delay and expense, allow only competent and experienced servicemen to perform these operations. Keep your foot off the clutch pedal except to shift gears or when the truck is brought to a stop.



MAINTENANCE

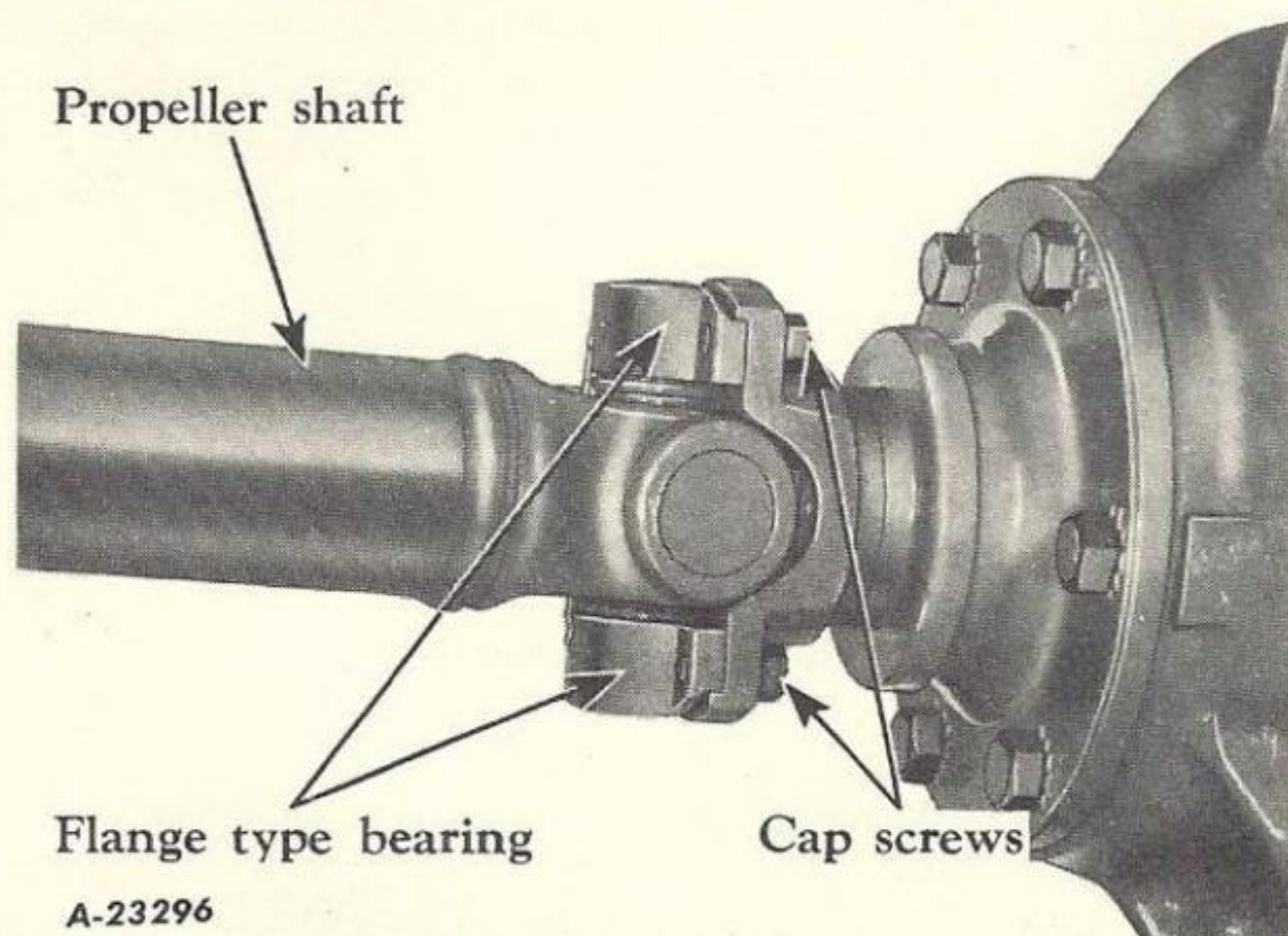
PROPELLER SHAFTS, UNIVERSAL JOINTS AND CENTER BEARINGS

Propeller Shafts and Universal Joints



A-23503

The propeller shaft universal joint and slip yoke at the center bearing are shown above. The propeller shaft can be disconnected by removing the four cap screws at each end of the shaft. The cap screws hold the flange type bearings to the yokes. Do not allow the bearings to fall off the journal.

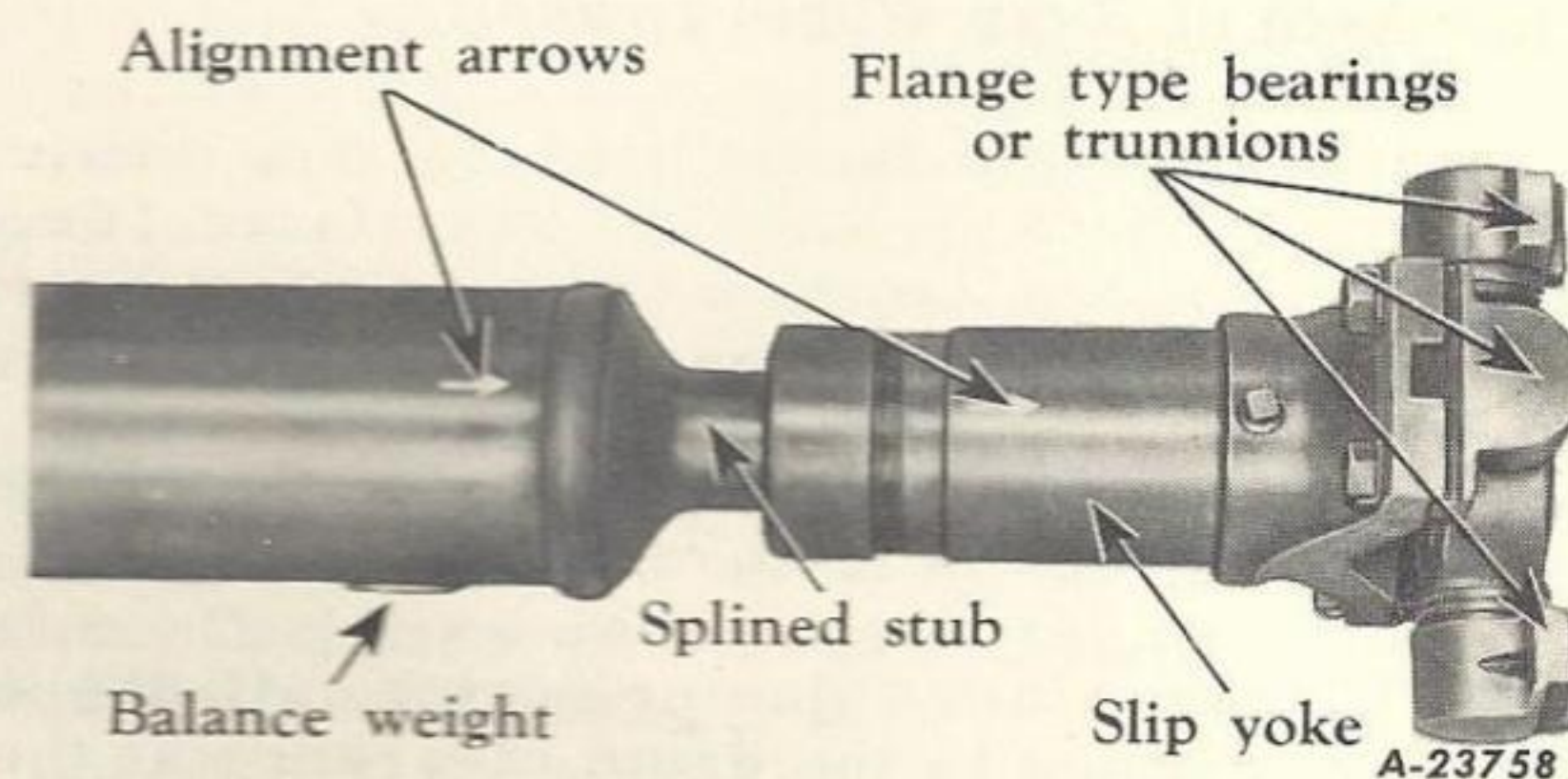


A-23296

The propeller shaft mounting at the differential is illustrated above.

Important: It is extremely important that the individual trunnion bearings be reassembled on the same journals from which they were originally removed, and it is advisable to wire them in place while other service operations are being performed.

When reassembling the complete propeller shaft, be sure that the splined stub enters the slip yoke so as to bring the trunnions of the yoke on the rear end of the shaft parallel with the trunnions on the slip yoke on the front joint. Aligning the arrows found on the stub shaft and slip yoke will assure correct assembly.

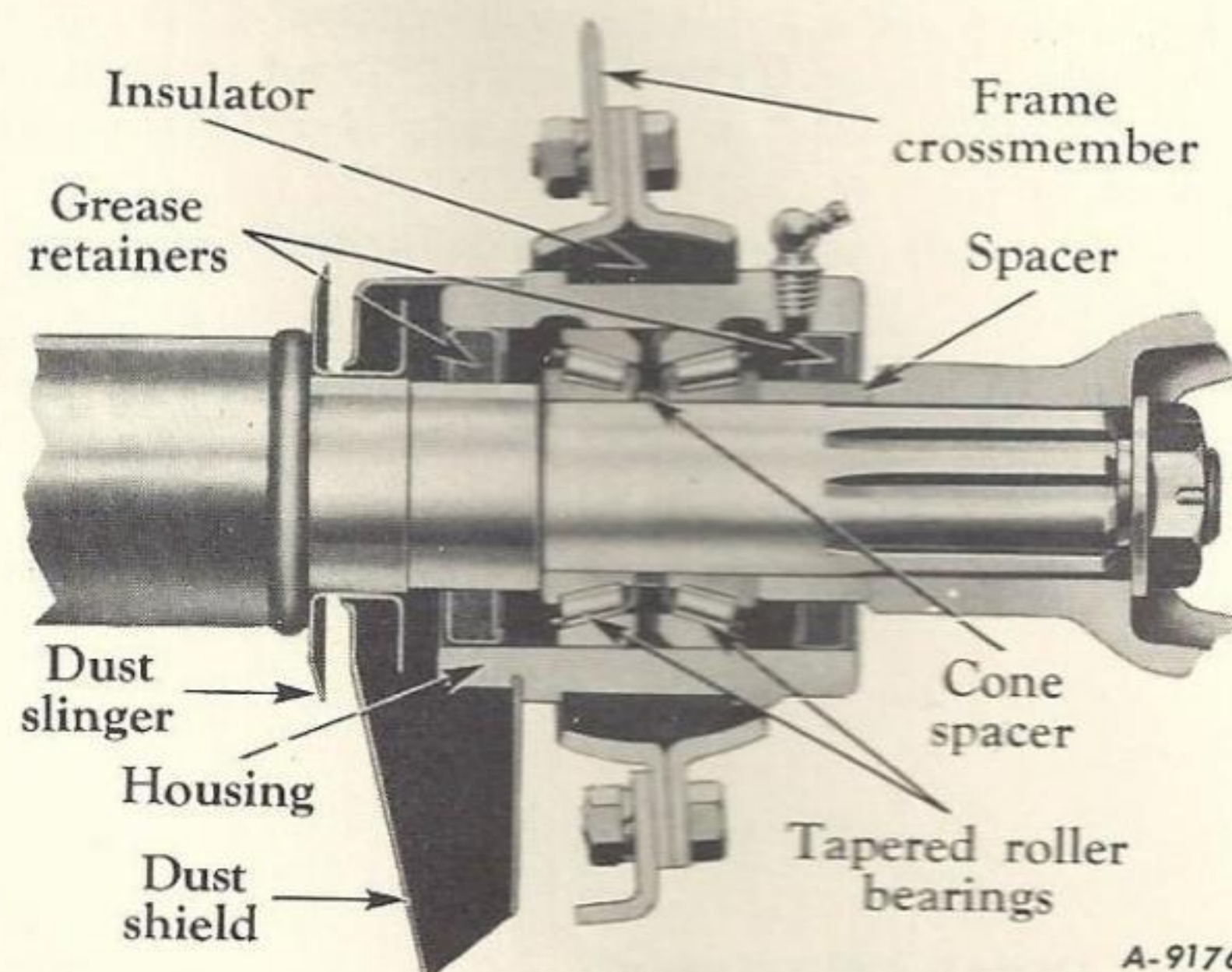


A-23758

Propeller Shaft Center Bearing

The self-aligning propeller shaft center bearing permits the use of short propeller shaft sections. This avoids "whip" and assures accurate shaft alignment under all conditions.

There are two rows of tapered roller bearings. They are effectively protected from dirt by felt seals and by a slinger arrangement. See illustration below.



A-9176

The flexibility of the mounting protects the bearing from all misaligning forces caused by unevenness of the road and results in the lowest possible bearing resistance, a minimum loss of power, and a distinct reduction in the transmission of drive-line noises. The fixed relation of the bearing and the bearing housing keeps the seals functioning properly at all times.

The bearing housing also has specially designed grooves to distribute the lubricant effectively over the entire area of the bearing. These grooves are shaped so that they overcome the natural tendency of the lubricant to circulate in one direction--away from the lubricant supply. This helps prevent the lubricant from being forced out of the bearing housing and keeps it in the bearing.

MAINTENANCE

AXLES, WHEELS AND BEARINGS

Front Axle

Steering knuckle thrust bearings are located between the knuckles and the lower faces of the front axle I-beam support the entire front-end load. Draw keys hold the king pins rigidly in the ends of the I-beams.

Inspect the draw keys occasionally to see that they are tight. Loose draw keys will cause needless wear at the king pin and axle I-beam. King pins and bushings in sets are available at all International Service Stations or authorized dealers. Adjustable stop screws in the steering knuckles limit the movement of the front wheels when turning, thus preventing the tires from rubbing against the nearest point on the chassis. These screws should be adjusted when the tires rub or when the tire size is changed.

Front Wheel Alignment

To guard against excessive tire wear, have the front wheel alignment inspected occasionally by a qualified service station for toe-in, camber and axle caster.

Toe-In

Front wheel toe-in is necessary to assure that the front wheels will run parallel to each other when the vehicle is in motion and under a load.

Camber

The purpose of front wheel camber is to distribute the load more evenly between the inner and outer wheel bearings and to offset the wear and deflection of the front axle parts.

Caster

The axle caster (or backward tilt at the top of the king pin) provides steering stability to aid in holding the front wheels in a straight position, and to assist in bringing the wheels out of a turn or curve. The caster further helps to control front wheel shimmy by counteracting vibration and the gyroscopic motion of the front wheels.

From the foregoing, the inter-relation of the steering adjustment becomes self-evident. When irregular tire wear, hard steering, or damage from impact with some obstruction indicates corrective measures are needed, insist on a thorough and complete alignment check-up. It is recommended to check the front wheel alignment periodically, based on the type of service and mileage.

Front Wheel Bearings

Bearings should never be allowed to have either a loose or a tight adjustment. The rollers and races must be in proper contact to avoid bearing trouble.

To adjust the front wheel bearings, proceed as follows: See that the truck is on level ground and the hand brake lever is pulled all the way back. Jack up the front end and be positive it is securely supported or blocked. Then remove the hub cap and grease cap and pull out the cotter pin. Now tighten the bearing adjustment nut, using an 8-inch wrench with steady pressure until the wheel binds slightly, rotating the wheel at the same time. Then back off the nut to the first castellation from the cotter pin hole and install a new cotter pin hole. Be sure to fasten the cotter pin securely.

Rear Axle

Whenever it becomes necessary to replace the bevel drive gears and pinions, we suggest obtaining a matched or mated set.

Rear Wheel Bearings

Tapered roller bearings are used in the rear wheels. These bearings should never be allowed to have either a loose or a tight adjustment. The rollers and races must be in proper contact to avoid bearing trouble.

Rear wheel bearings should be adjusted by International Service Stations or authorized dealers.

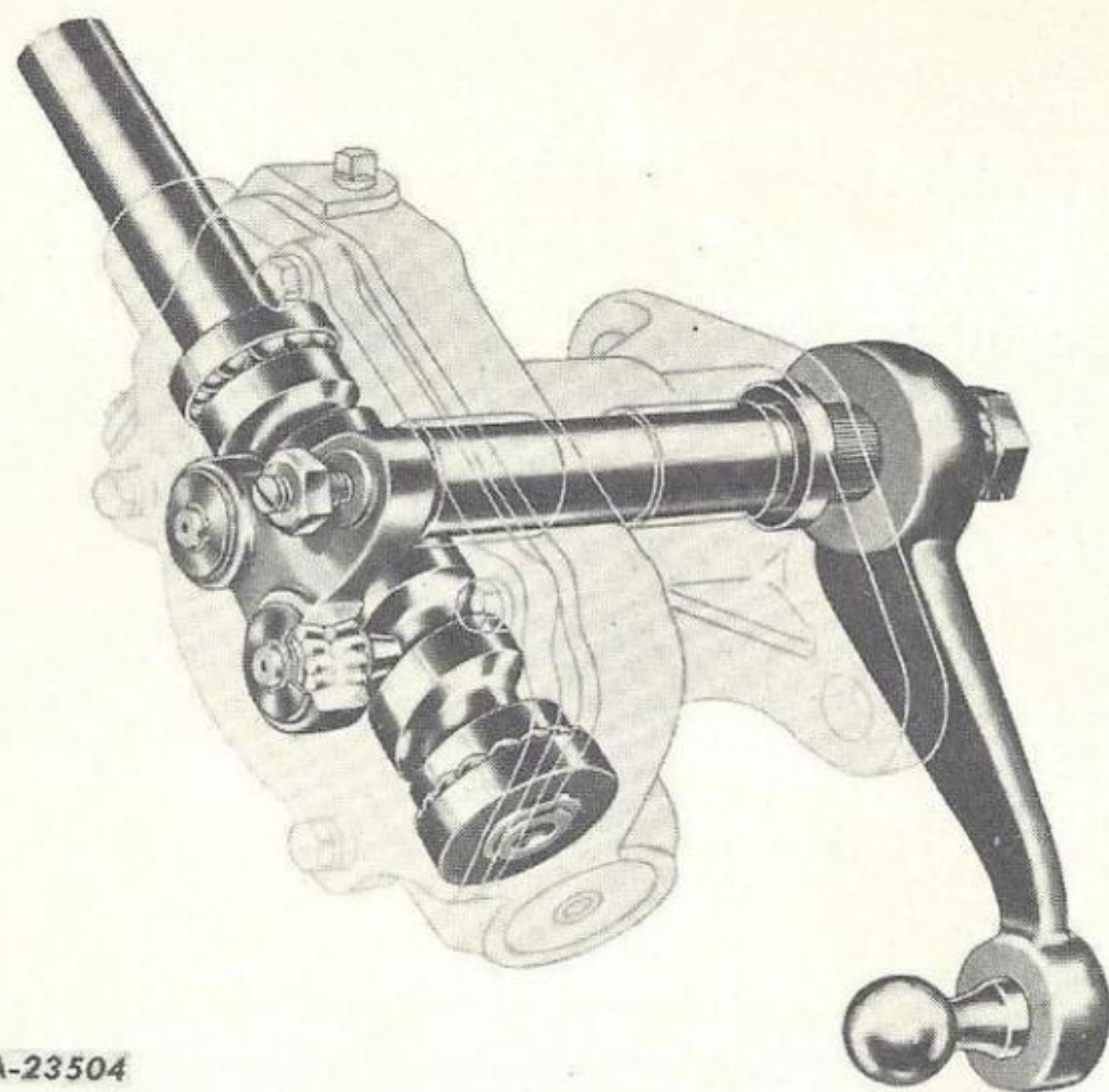
Wheel Rims and Nuts

Wheel stud nuts and rim clamp nuts should be inspected at regular intervals to see that they are tight. The rim and tire alignment, in relation to the wheel, should be inspected to be sure that the tire is running true.

MAINTENANCE

STEERING GEAR, SPRINGS, AND SHOCK ABSORBERS

Steering Gear



A-23504

This truck has a semi-reversible cam and twin-lever steering gear. The twin-lever construction is shown above.

Both studs of the twin-lever gear engage the cam for normal straight-ahead driving. As the steering action moves away from the normal driving position into the parking range, one of the studs disengages the cam. The effective leverage of this single stud increases so rapidly, however, that in full parking position the leverage is 45 percent greater than with a single-lever type of steering gear. This is due largely to the fact that because of the twin levers the steering arm is shorter and therefore has a full 100 degrees of travel compared to 76 degrees in a single-lever unit.

Actually, the driver has at his disposal a dual-ratio gear which automatically changes from one ratio to another to suit the requirements of steering stability at high speeds and easy wheel turn for sharp turns in parking.

A valuable safety factor is a lessening of the tendency to over-steer on curves and when passing other vehicles at high speed.

The steering gear and steering mechanism should always be kept in good condition and properly adjusted. Adjustments are provided to compensate for wear at the worm bearings and at the lever arm and all related parts. Neglect of the steering gear has contributed to many accidents. Steering gear adjustments must be made in correct sequence. It is therefore advisable to have adjustments made only

by a skilled mechanic with the proper equipment and knowledge of correct procedure. Hard steering or excessive wheel play usually indicates the need for attention. Do not fail to keep the steering gear housing filled with gear oil.

Chassis Springs

The springs are semi-elliptic type mounted on the front axle I-beam and rear axle housing with U-bolts. On both front and rear springs the front end of the spring is pivoted while the rear is shackled. Spring breakage can be materially reduced by proper loading and keeping the spring U-bolts and clips tight. Examine the spring U-bolts and rebound clips and periodically tighten the nuts.

Shock Absorbers

The front and rear shock absorbers are the opposed cylinder double-acting type. The shock absorber arms are connected to the axles by rubber-mounted links for quiet operation. The use of shock absorbers controls the body sway, excessive tire wear, front wheel shimmy, and spring breakage, and assures comfortable riding qualities when the vehicle is empty or only partially loaded. The shock absorbers also minimize the road shocks transmitted to the springs and other chassis parts when the vehicle is under a full load.

Inspect the fluid level every 10,000 miles. The fluid must be maintained at a level up to the bottom of the filler plug hole. A leak will cause a loss of the fluid, which can easily be determined by disconnecting the arm linkage and pulling the arm down.

If the arm moves easily part of the stroke then comes to a stop and moves slowly for the remainder of the stroke, there is not enough fluid in the absorber.

When replenishing the fluid, wipe around the filler plug opening before removing the plug in order to remove all the dirt. Disconnect the link between the axle and the absorber arm. Fill the absorber to the proper level, moving the arm up and down several times, forcing out any air in the cylinder. Add fluid and repeat this operation until no more can be added.

Important: Should dirt enter the mechanism, a complete disassembly will be necessary to remove all trace of dirt.

Always use a high grade of shock absorber fluid.

UNIT REFILL CAPACITIES

United States
Measures

CRANKCASE

Engine Oil.	7 Quarts
With Oil Filter Change	8 Quarts

TRANSMISSION

F-51 (Code No.1307) Five-Speeds Forward; Overdrive in Fifth Gear	12 Pints
F-51C (Code No.1308) Five-Speeds Forward; Direct in Fifth Gear	12 Pints

REAR AXLE

Single-Reduction (Code No.1406) Hypoid	11 Pints
Two-Speed (Code No.1412) Hypoid, Planetary Gears	20 Pints
Double-Reduction; Two-Speed (H-300) (Code No.1427).	26 Pints

COOLING SYSTEM 21 Quarts

FUEL TANK

Side Mounted Tank (Left Hand)	20 or 31 Gallons
Auxiliary Tank (Right Hand).	20 or 31 Gallons
Safety Tank (Right or Left Hand).	34 or 47 Gallons

CARBURETOR AIR CLEANER 1 Pint

WEIGHTS AND MEASURES (METRIC)

Linear Measure

1/64 inch (.015625).	0.397 mm
1/32 inch (.03125).	0.794 mm
3/64 inch (.046875).	1.191 mm
1/8 inch	3.175 mm
1/4 inch	6.350 mm
5/16 inch	7.938 mm
3/8 inch	9.525 mm
1/2 inch	12.700 mm
5/8 inch	15.875 mm
3/4 inch	19.050 mm
1 inch.	25.400 mm
12 inches (1 foot)	304.8 mm
36 inches (1 yard).	0.9144 meter
39.37 inches	1 meter
1 mile	1.6093 kilometers

1 cubic inch. 16.38716 cubic centimeters.

Weights in Kilograms

United States	
1 ounce (oz.)	28.3495 grams
1 pound (lb.)	0.45359 kilogram
1 short ton (2000 lbs.)	907.185 kilograms
1 long ton (2240 lbs.)	1,016.047 kilograms

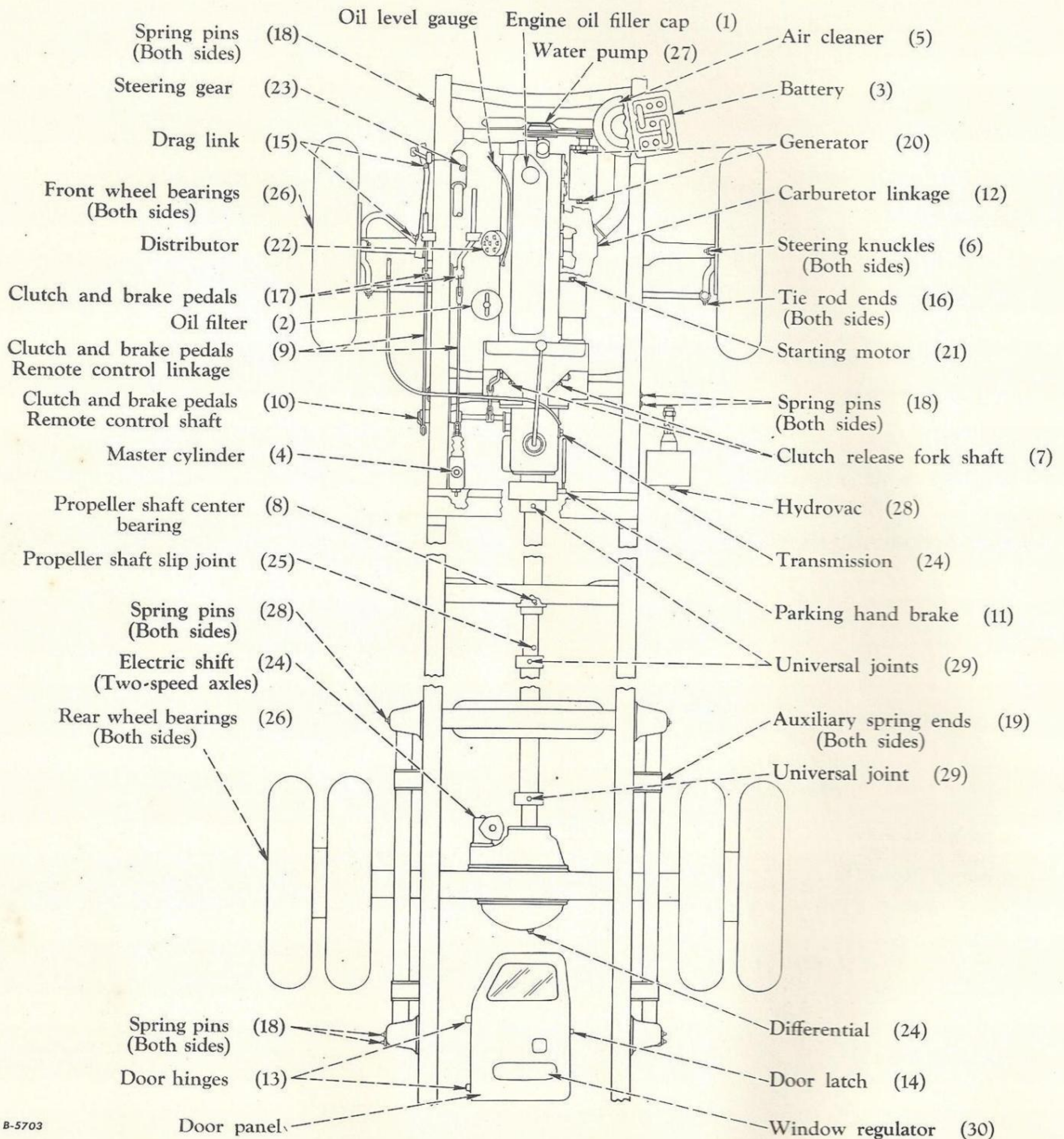
Liquid Measures in Liters

	(2 pints equal 1 quart)
United States	(4 quarts equal 1 gallon)
1 pint (pt.)	0.4732 liter
1 quart (qt.)	0.9463 liter
1 gallon (gal.)	3.7853 liters
*British Imperial	
1 pint (pt.)	0.5682 liter
1 quart (qt.)	1.1364 liters
1 gallon (gal.)	4.5456 liters

*Approximately 20% larger than United States measure.

LUBRICATION

LUBRICATION CHART



B-5703

Lubrication periods provide an excellent opportunity to inspect and check for maintenance service that may be needed. Early attention to minor service needs at this inspection will usually prevent serious breakdown later.

LUBRICATION SPECIAL INSTRUCTIONS

Daily

1. **Engine:** Keep the crankcase filled to the correct level with a high grade engine oil. Changing the oil regularly will remove the dirt which has accumulated. Cold weather operation requires frequent oil changes due to the dilution which is caused by the increased usage of the choke and condensation of moisture. For trucks operating in multi-stop or other services where sustained higher engine speeds will not be encountered, select oil grades as follows:

TEMPERATURES	OIL GRADE	TEMPERATURES	OIL GRADE
*90° F. and up	SAE-40	10° F. to 32° F.	SAE-20W
32° F. to 90° F.	SAE-40	Minus 10° F. to 10° F.	SAE-10W
*See Hot Climate—High Speed Instructions.			

For temperatures lower than minus 10° F. use SAE-10W plus kerosene. SAE-10W may be safely diluted with colorless kerosene up to 30%. Mix the kerosene thoroughly with the oil before adding to the engine.

Note: Kerosene will evaporate at crankcase operating temperature. Because of this fact, more frequent checking of the oil level is advisable to avoid operating the engine with a low oil level.

Hot Climate, High Speed:

For trucks operating on the highway or other services demanding sustained higher engine speeds, use engine lubricating oil having a viscosity as near SAE-50 as the starting ability will permit. **Note:** High viscosity oils are available which also have very good cold pour characteristics.

Periodical

2. **Oil Filter:** Change the cartridge when the oil becomes discolored. Remove the oil filter cover and cartridge, then clean the inside of the oil filter, and install the new cartridge. After operating the engine a few minutes, check the oil filter for leaks.
3. **Battery:** Check the battery solution level. Add pure distilled water to indicator level. **Do not overfill.**
4. **Master Cylinder:** Check the hydraulic master cylinder fluid level. Fill $\frac{3}{4}$ -inch from the top of the filler neck.
5. **Air Cleaner:** Remove the oil reservoir, and dispose of the dirty oil. Clean the filter. Refill to the oil level mark with clean engine oil of the same grade used in the crankcase.

500 to 1,000 Miles

6. **Steering Knuckles:**
 7. **Clutch Release Fork Shaft:**
 8. **Propeller Shaft Center Bearing:**
 9. **Clutch and Brake Pedals**
 10. **Remote Control Linkage:**
 11. **Clutch and Brake Pedals**
 12. **Remote Control Shaft:**
 13. **Parking Hand Brake:**
 14. **Carburetor Linkage:**
 15. **Door Hinge:**
 16. **Door Latch:**
 17. **Drag Link:**
 18. **Tie Rod Ends:**
 19. **Clutch and Brake Pedals:**
 20. **Spring Pins:**
 21. **Auxiliary Spring Ends:**
 22. **Generator:**
 23. **Starting Motor:**
 24. **Distributor:**
 25. **Steering Gear:**
 26. **Transmission Refill:**
 27. **Capacity 5 Pts.**
 28. **Differential Refill:**
 29. **Capacity 5.5 Pts.**
- Do not overlubricate. It may cause failure of other functioning parts such as the brake lining or clutch facings. Use a viscous chassis lubricant or SAE-140 gear oil.
- Lubricate linkage clevis pins, pivot pins and sliding surfaces with engine oil.
- When lubricating, force the lubricant into the fitting until the old lubricant, dirt and water are expelled. Use a viscous chassis lubricant or SAE-140 gear oil. Apply coating of lubricant to auxiliary spring ends.
- Place ten to twenty drops of light engine oil in each oil cup. Do not overlubricate.
- Apply one drop of light oil to the movable contact arm pivot pin. Remove the rotor and apply two or three drops of light engine oil on the felt wick. Apply a light coat of vaseline to the distributor cam and contact arm fiber rubbing block. **Note:** Lubricate distributor shaft at overhaul or at 25,000-mile intervals. Use SAE-20 engine oil. Use sealing compound when replacing lubricant plug.
- Keep filled to filler plug level. SAE-90 cold climate; SAE-140 warm climate. Refill capacity 1 pint. Remove the oil filler plugs and inspect the lubricant level every 1,000 miles; keep filled to the filler plug level. Drain down to the filler plug level if the lubricant is above the filler plug opening. Drain and flush twice each year or 10,000 miles, preferably in the spring and fall. Use either an SCL extreme pressure lubricant or a multi-purpose gear lubricant suitable for hypoid axles and supplied by a reputable refinery. Viscosity of lubricant should be SAE-90 for atmospheric temperatures below 40° F. For temperatures above 40° F. use SAE-140.
- †Electric Shift: Check the oil level every 10,000 miles. Keep filled to the plug level. Use SAE-10 oil.

3,000 to 5,000 Miles

25. **Propeller Shaft Slip Joint:** Remove the plug and install a pressure-gun fitting. Force a small amount of lubricant into the joint. **Important:** Too much pressure will damage the oil seal and retainer. Remove the fitting and replace the plug.
26. **Wheel Bearings:** Remove the wheels, clean and inspect the bearings, races and wheel hubs. Then repack the bearings, replace the wheels, and adjust the bearings. Use a short-fiber wheel bearing grease.

10,000 Miles

27. **Water Pump:** Remove the plug. Inject the wheel bearing grease. Fill the housing. Use a short-fiber wheel bearing grease in a low-pressure gun.
28. **Hydrovac:** Inject two ounces of vacuum cylinder oil every 10,000 miles or twice a year; one lubrication period before cold weather.

15,000 to 20,000 Miles

29. **Propeller Shaft Universal Joints:** Remove the plugs, insert pressure-gun fittings and fill (under low pressure). Use SAE-140 gear oil. Remove the fittings and replace the plugs.
30. **Window Regulator:** Remove the door panel and lubricate the regulator slide. Use a viscous chassis lubricant.

LUBRICATION

ENGINE OILS

Selection of the proper engine lubricating oil demands consideration of two important factors--namely, easy starting during low atmospheric temperatures and adequate engine lubrication after the engine is placed in service.

Lighter viscosity oils facilitate cold-weather starting and also provide better immediate lubrication as the engine starts. They do not, however, provide adequate lubrication under sustained higher engine speeds or severe service. Increased oil consumption can also be expected when using lighter viscosity oils.

Consideration must therefore be given to the cold-weather housing facilities for the idle truck, the service in which the truck is engaged, and the selection of higher viscosity oils which have better free-pouring characteristics at low temperatures.

In consideration of the foregoing, the following general recommendations are made:

Moderate Service

For trucks operating in multi-stop or other services where sustained higher engine speeds will not be encountered, select the oil grades as follows:

TEMPERATURES	OIL GRADE
*90° F. and up	SAE-30
32° F. to 90° F.	SAE-30
10° F. to 32° F.	SAE-20W
Minus 10° F. to 10° F.	SAE-10W

*See Hot Climate, High Speed Instructions.

For temperatures lower than minus 10° F., use SAE-10W plus kerosene; SAE-10W oil may be safely diluted with colorless kerosene up to 30%. Mix the kerosene thoroughly with the oil before adding to the engine.

Note: Kerosene will evaporate at crank-case operating temperatures. Because of this fact, frequent checking of the oil level is advisable to avoid operating the engine with a low oil level.

Hot Climate, High Speed

For trucks operating on the highway or other service demanding sustained high engine speeds: Use engine lubricating oil having a viscosity as near SAE-50 as the starting ability will permit. **Note:** High viscosity oils are available which also have very good cold-pour characteristics.

Engine Oil Types

Engine oils are available either as "straight" mineral oil (having nothing added during its manufacture other than possibly a pour-point depressant), or as "additive" oils which have had certain chemicals added during manufacture for the purpose of providing qualities or properties not available in the original oil, either before or after refining.

Under operating conditions, oils tend to undergo chemical changes due to oxidation and form such nonlubricating products as varnish, lacquer and carbon. Where formation of these undesirable products is excessive when using untreated oils, use of an additive oil may prove beneficial since, through the additive chemicals, formation of these deposits may be minimized or retarded.

"Additive" engine oils are those to which chemicals have been added to alter or modify the characteristics of the oil and are generally referred to as "inhibited" oils or as "detergent" oils. An "inhibited" oil is not necessarily a "detergent" oil. "Additive" oils having both inhibiting and detergent qualities are classed as "heavy-duty oils." The matching of chemical "additives" to a base oil is carried out in extensive laboratory engine tests. **Note:** The refiners' choice of the base stock to be treated with modern "additive" is very important. An inferior base oil cannot be transformed into an acceptable oil merely by the use of "additives." (Not all base oils are equally susceptible to improvement with a given "additive," and not all "additives" are equally effective in the same oil base.)

"Additives" to engine oils generally serve as (1) corrosion inhibitors or antioxidants, (2) as detergents, (3) pour-point depressants. More fully, these agents are described as follows:

1. Corrosion Inhibitors or Antioxidants

Some of the products of oil or fuel oxidation are corrosive in nature and attach certain of the engine metals such as hard alloy bearings, causing pitting or etching. Engine deposits such as sludge and lacquer result in part from oil oxidation products. Antioxidants impart in a great degree a resistance to corrosion and sludge formation by controlling oil oxidation.

2. Detergents (Dispersants)

Chemicals are added which serve as mild cleaning agents and, as such, tend to clean or wash away lacquer and sludge deposits from pistons, side walls, bearing surfaces and other

LUBRICATION

ENGINE OILS

interior working surfaces of an engine. The detergent action is the result of the ability of the oil to keep insoluble particles (the products of fuel combustion and oil decomposition) in a finely divided state so that they can be kept in suspension in the oil. Unless these particles are carried in the suspension or filtered out, they tend to deposit in piston ring grooves and on other engine interior parts. The detergent dispersive action is not effective with particles of metal, other abrasives or coarse carbonaceous material.

3. Pour-Point Depressants

Because mineral oils thicken or congeal at low temperature, certain chemicals are added to "additive" oils to serve as pour-point depressants or, in other words, to lower or depress the pour-point a few degrees. The result is an oil having better flow characteristics at low temperatures which will provide better immediate lubrication upon starting during cold weather because of the fluid state of the oil.

The use of the proper engine oil is of the utmost importance in obtaining maximum performance and satisfaction. The selection of the proper brand of oil should be based on the reputation of the refiner or seller.

The American Petroleum Institute and the automotive manufacturers have agreed that engine oils shall now be marketed under three classifications or categories, namely, "regular oil," "premium oil," and "heavy-duty oil." These are more fully defined as follows:

Regular Motor Oil

This term shall be used to designate a straight mineral oil. Oils of this type are generally suitable for use in internal-combustion engines under moderate operating conditions. (These oils may and often do contain pour-point depressants.)

Premium Motor Oils

This term shall be used to designate an oil having proved oxidation stability and bearing corrosion preventive properties. Oils of this type are generally suitable for use in internal-combustion engines where operating conditions are such that regular oils do not give satisfactory service.

Heavy-Duty Motor Oil

This term shall designate an oil having proved oxidation stability, bearing corrosion preventive properties and detergent-dispersant characteristics. Oils of this type are generally

suitable for use in both high speed diesel and gasoline engines under heavy-duty service conditions.

Heavy-duty oil, if installed in an engine where other-type oils have been used, requires that precautionary measures be taken to prevent loosened particles from clogging oil passages. The following measures represent good, practical advice when changing from one brand of oil to another:

1. Drain and flush the engine crankcase.

2. Install a new oil filter cartridge and thoroughly clean the oil filter sump. **Note:** Only absorbent type or edge type (filter disc) filter packs should be used with detergent type oils. Clay or chemically treated filters should not be used, as they will remove some of the beneficial "additives" used in the manufacture of the oil.

3. It is very important that engine operating temperatures be maintained at an efficient level between 160° to 180° F. to reduce the possibility of excessive sludge formation.

Certain precautionary measures must also be observed after the additive type oil is placed in service:

1. The original fill should be drained after 300 to 500 miles operation and the oil filter should be serviced. In new or reconditioned engines this is necessary in order to remove possible abrasives. In other engines, where other type oils have previously been used, the washing or detergent action of the heavy-duty type oil tends to loosen deposits which, if not removed by draining, may clog the oil pump screen and oil channels.

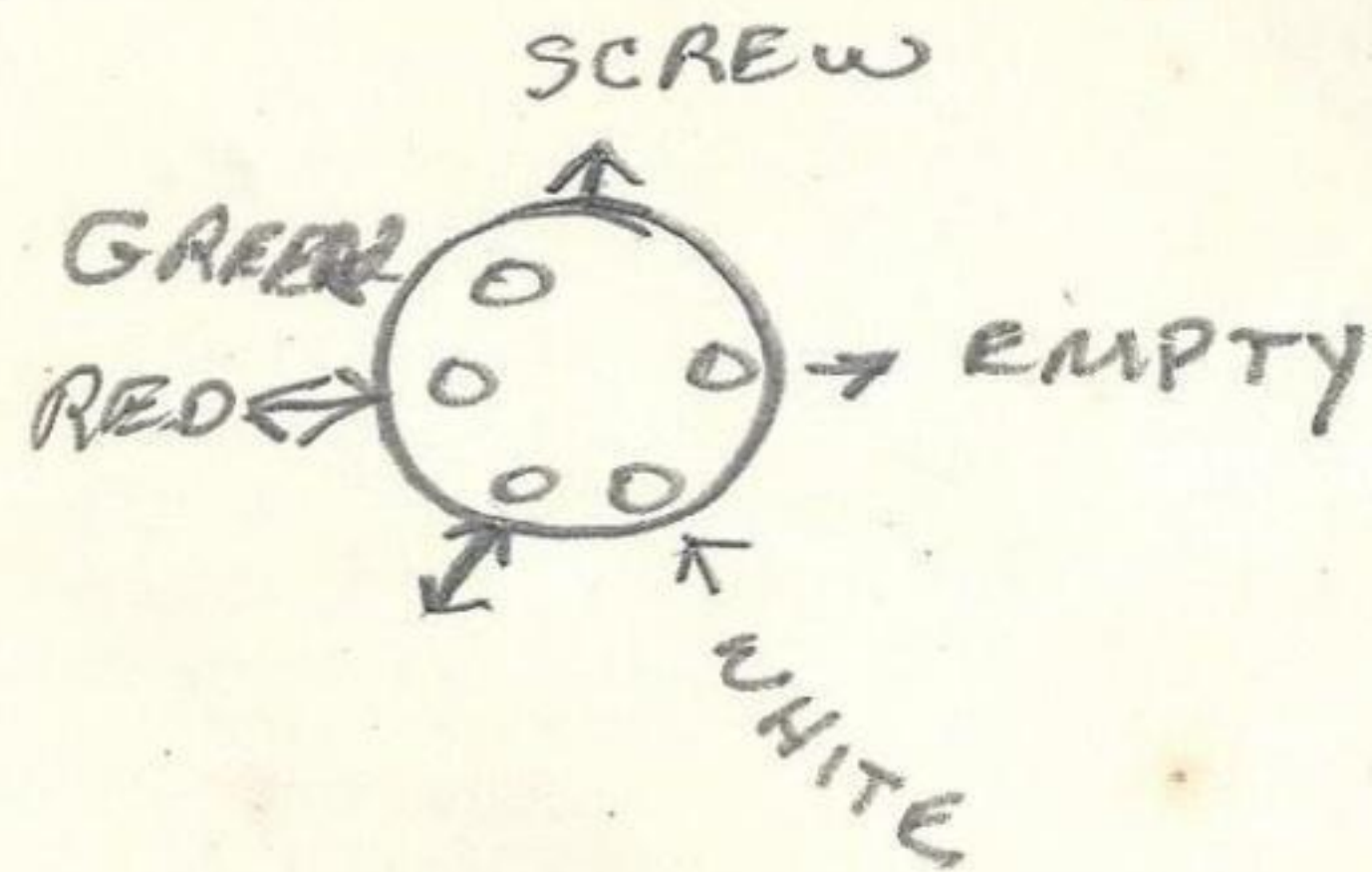
2. The second fill should not be used in excess of 1,000 miles operation, and the oil filter again should be serviced. **Note:** If necessary, as judged by the condition of the oil, change at an earlier period.

3. The third fill will generally serve for the regularly established drain period. **Important:** Color cannot be the basis on which oil changes are made; rather, the oil should be changed at periods previously established or as recommended by the oil manufacturer.

4. If an engine previously operated on either regular or premium-type oils (not heavy-duty) had a bad varnish condition, the use of heavy-duty oil, because of its detergent quality, may dissolve some of the varnish and increase running clearances, resulting in an increase in engine noise and a lowering or loss of oil pressure. Should this occur, the cause should be determined and the necessary corrections made to restore the oil pressures.

MEMORANDUM

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MEMORANDUM



THE NATION'S LARGEST exclusive truck service organization is ready to give your International Truck complete, quick, expert service—when and where you need it. It includes International factory-trained mechanics, with special equipment and tools. It includes precision-built replacement parts, factory-built exchange units, company-approved accessories. It stands behind every International Truck.

PRECAUTIONARY INSTRUCTIONS

STORING A TRUCK

When a truck is not to be used for a period of time, it should be placed in a dry and protected place and the following procedure should be observed:

1. Wash the truck and completely lubricate the chassis (refer to lubrication chart).

2. Drain the engine oil and flush with flushing oil. Refill with new oil. Run the engine until the oil is thoroughly circulated.

3. **CAUTION:** *Drain the fuel tank, fuel lines, fuel pump and carburetor fuel bowl. Run the engine until carburetor is dry. Remove carburetor fuel bowl and drain. If gasoline is allowed to remain in the fuel system a gummy substance will form in the carburetor jets and passages, causing serious trouble. Be sure to drain system thoroughly. The gum deposits can be dissolved with a mixture of 1 part alcohol and 1 part benzol, or with acetone.*

4. Remove the storage battery and put in a dry place.

5. Drain and flush the radiator and cooling system. **BE SURE** all drain cocks are open.

6. After the engine has become cold, remove the spark plugs and pour a small quantity of SAE-50 engine oil in each cylinder through the plug holes. Then turn the engine over by hand a few times to thoroughly distribute the heavy oil over the pistons and cylinder walls. **BE SURE** to replace spark plugs. Remove valve cover and flush the valves, rocker arms and push rods with SAE-50 engine oil. Replace valve cover.

7. Clean the air cleaner and refill to indicated level with new oil.

8. Block up the truck so that the weight is off the tires.

SERVICING A TRUCK AFTER STORING

When a truck is returned to service the following procedure should be followed:

1. Close drain cocks and fill cooling system with clean water (use antifreeze if required). Inspect all hose and water pump connections for water leaks.

2. Fill the fuel tank and examine the condition of fuel filter glass bowl gasket. The gasket must form a good seal, otherwise the pump will not supply fuel to the carburetor.

3. Test and install the storage battery. **IMPORTANT:** Before starting the engine, see "Generator Polarity" instructions shown under Electrical System Maintenance in this book.

4. Examine the level of oil in the air cleaner and refill if necessary.

5. Examine the oil level in engine. Remove the spark plugs and pour a small quantity of light engine oil in each cylinder through spark plug holes. Turn engine over by hand a few times and then replace spark plugs. Remove valve cover and flush the valves, rocker arms and push rods with SAE-50 engine oil. Replace valve cover.

6. Inspect the oil level in the transmission, in the rear axle and in any auxiliary unit.

7. Inspect the air pressure in all tires and be sure to replace the valve caps.

SHORT-PERIOD STORAGE

Because of the tendency toward accelerated gum formation in gasoline obtainable under present conditions, if this vehicle is to be stored or remain inactive for a period exceeding three days, the fuel system of this vehicle should be prepared as follows as a preventive against gum formation:

1. Completely drain the fuel tanks.

2. Run the engine until all fuel is consumed in the carburetor.

3. Remove the plug from the carburetor, under the main jet assembly, to complete the draining.

4. Empty the sediment bowl at the fuel pump.



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Davenport, Iowa
Dayton, Ohio
Decatur, Ill.
Denver, Colo.
Des Moines, Iowa
Detroit, Mich. (2)
Dubuque, Iowa
Duluth, Minn.
East Hartford, Conn.
East St. Louis, Ill.
Eau Claire, Wis.
Elizabeth, N. J.
Elmira, N. Y.
El Paso, Tex.
Ephrata, Pa.
Erie, Pa.
Evansville, Ind.

Fargo, N. Dak.
Fort Dodge, Iowa
Fort Wayne, Ind.
Fort Worth, Tex.
Fresno, Calif.
Gary, Ind.
Glendale, Calif.
Grand Forks, N. Dak.
Grand Island, Nebr.
Grand Rapids, Mich.
Great Falls, Mont.
Green Bay, Wis.
Greensboro, N. C.
Harrisburg, Pa.
Houston, Tex.
Hutchinson, Kans.
Indianapolis, Ind.
Jackson, Mich.
Jersey City, N. J.
Kankakee, Ill.
Kansas City, Mo.
Kansas City, Kans.
Knoxville, Tenn.
La Fayette, Ind.
Lexington, Ky.
Lincoln, Nebr.
Little Rock, Ark.
Long Beach, Calif.
Long Island City, N. Y.
Los Angeles, Calif. (2)
Louisville, Ky.
Madison, Wis.
Mankato, Minn.
Mason City, Iowa
Memphis, Tenn.
Milwaukee, Wis. (2)
Minneapolis, Minn.
Nashville, Tenn.
Newark, N. J.
New Orleans, La.
New York, N. Y.
Norfolk, Va.
Oakland, Calif.
Oklahoma City, Okla.
Omaha, Nebr. (2)
Paterson, N. J.
Peoria, Ill.
Philadelphia, Pa. (2)
Pittsburgh, Pa.
Portland, Maine
Portland, Oreg.
Pottsville, Pa.
Poughkeepsie, N. Y.
Presque Isle, Maine

Providence, R. I.
Quincy, Ill.
Reading, Pa.
Richmond, Va.
Rochester, N. Y.
Sacramento, Calif.
Saginaw, Mich.
St. Cloud, Minn.
St. Joseph, Mo.
St. Louis, Mo. (2)
St. Paul, Minn.
Salina, Kans.
Salt Lake City, Utah
San Antonio, Tex.
San Diego, Calif.
San Francisco, Calif.
Savannah, Ga.
Schenectady, N. Y.
Scranton, Pa.
Seattle, Wash. (2)
Shreveport, La.
Sioux City, Iowa
Sioux Falls, S. Dak.
Somerville, Mass.
South Bend, Ind.
Spokane, Wash.

Springfield, Ill.
Springfield (W.), Mass.
Springfield, Mo.
Springfield, Ohio
Syracuse, N. Y.
Tacoma, Wash.
Terre Haute, Ind.
Toledo, Ohio
Topeka, Kans.
Trenton, N. J.
Tulsa, Okla.
Utica, N. Y.
Washington, D. C.
Waterbury, Conn.
Waterloo, Iowa
Watertown, N. Y.
Watertown, S. Dak.
West Haven, Conn.
Wichita, Kans.
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