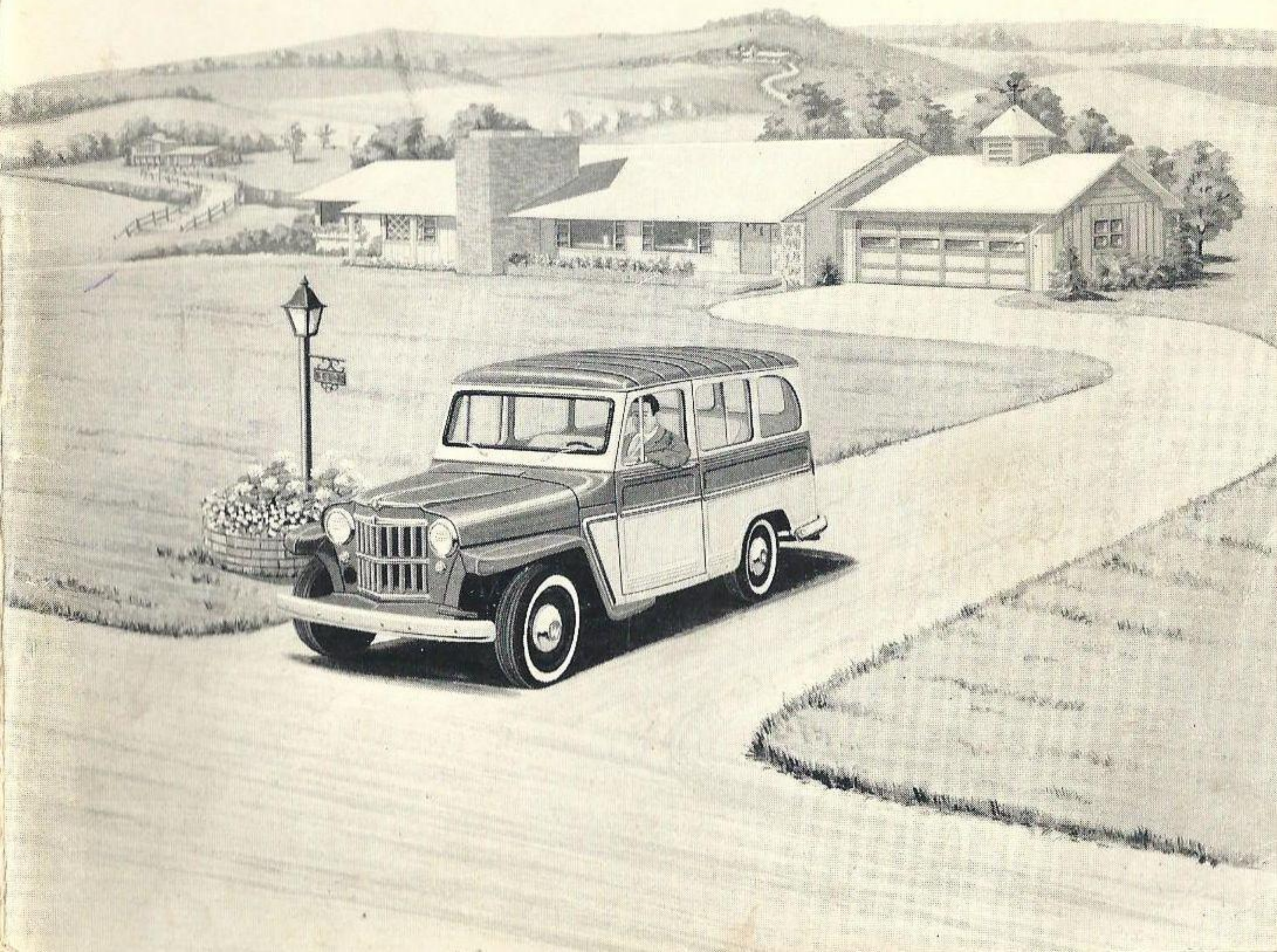


Jeep[®] *Station Wagon*

and 4 x 2 UTILITY DELIVERY

OWNER'S MANUAL



Jeep[®]

STATION WAGON

UTILITY WAGON

UTILITY DELIVERY

2-WHEEL DRIVE

Owner's Manual

Willys Sales Corporation

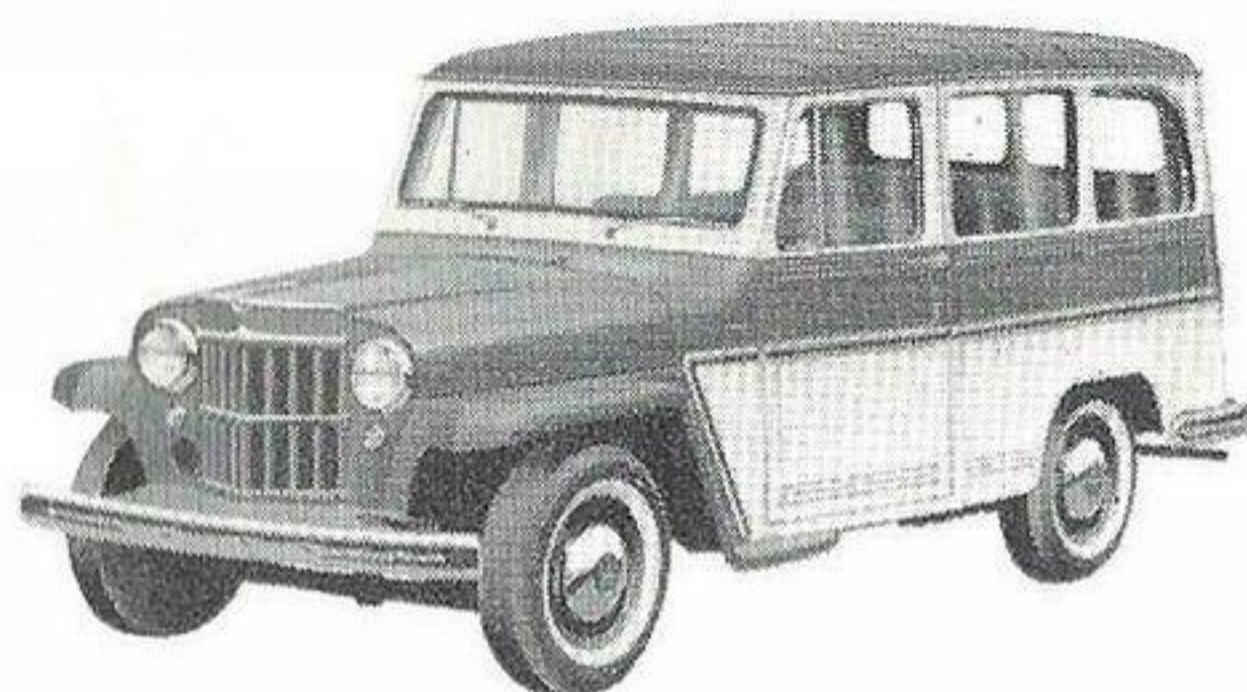
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TOLEDO 1, OHIO, U. S. A.

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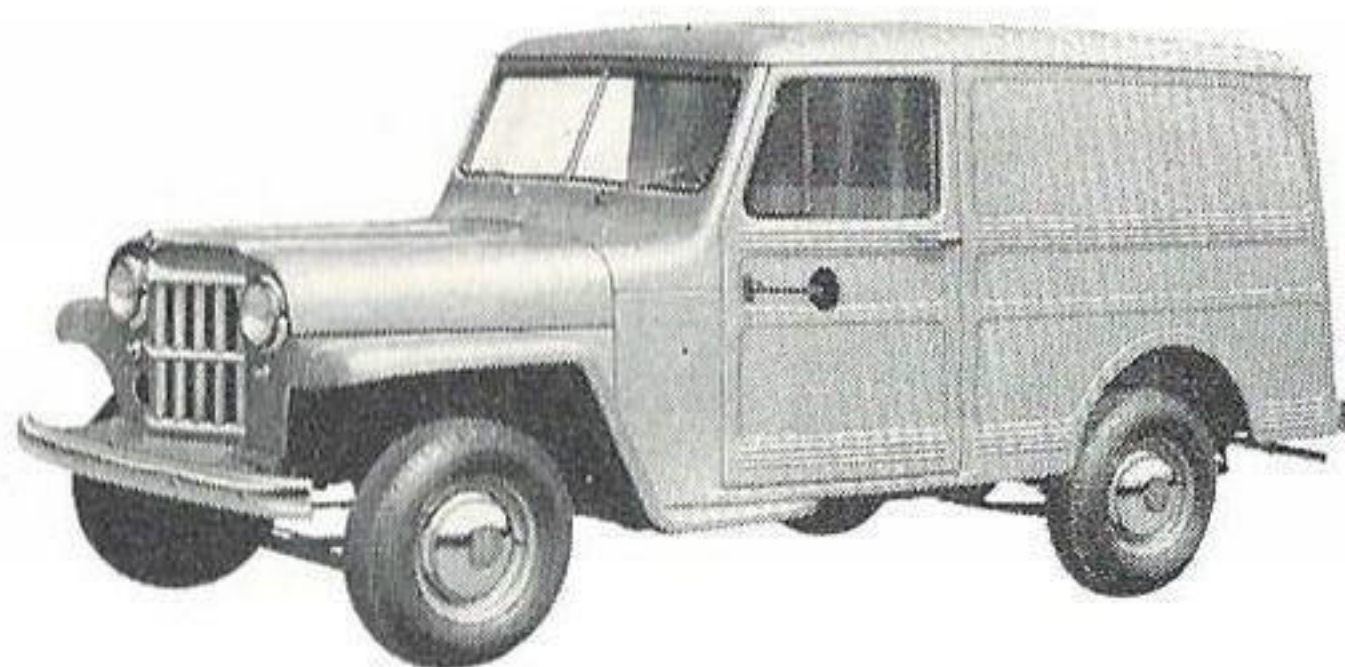
10218

'JEEP' STATION WAGON



10226

'JEEP' UTILITY WAGON



10225

'JEEP' UTILITY DELIVERY

Dear Owner:

Welcome to the family of satisfied 'Jeep' vehicle owners. We pledge ourselves to serve you with satisfaction as we have the many thousands of other Willys owners throughout our fifty-year history.

Your 'Jeep' vehicle has been thoroughly tested and inspected to ensure that properly maintained it will give you many miles of satisfactory service. Your Willys 'Jeep' dealer is interested in your continued satisfaction and will be glad to cooperate with you in providing the proper maintenance for your 'Jeep' vehicle.

You will receive from your dealer an Owner's Service Policy which has a 1000-mile Inspection Coupon attached, and an Owner's Identification Card.

Read your Owner's Service Policy carefully and completely. It describes the services which your Willys 'Jeep' dealer will furnish as part of his sales contract with you. Ask your dealer to explain any points that are not clear to you.

Have your dealer fill out both your Owner's Identification Card and also the 1000-mile Inspection Coupon.

Our first gesture of service is this owner's manual. Read it carefully so that you will be familiar with the instruments, controls, and correct operation of your 'Jeep' vehicle.

MANUFACTURER'S WARRANTY

The only Warranty under which new Willys Motor Vehicles are sold is that of the Manufacturer, being the Standard Warranty recommended by the Automobile Manufacturers' Association, and is as follows:

"This is to certify that we, WILLYS MOTORS, INC., TOLEDO, OHIO, U.S.A. warrant each new motor vehicle manufactured by us, to be free from defects in material and workmanship under normal use and service, our obligation under this Warranty being limited to making good at our factory any part or parts thereof, including all equipment or trade accessories (except tires) supplied by the vehicle manufacturer, which shall, within ninety (90) days after making delivery of such vehicle to the original purchaser or before such vehicle has been driven 4000 miles (6400 Km.), whichever event shall first occur, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on our part, and we neither assume nor authorize any other person to assume for us any other liability in connection with the sale of our vehicles. This warranty shall not apply to any vehicle which shall have been repaired or altered outside of an Authorized Willys Service Station in any way so as, in the judgment of the Manufacturer, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident."

The Manufacturer makes no warranty against, nor assumes any liability for any defect in metal or other material in any part, device or trade accessory which cannot be discovered by ordinary factory inspection.

WILLYS MOTORS, INC.

NOTE—Willys Motors, Inc., reserves the right at any time or times to revise, modify, discontinue or change any models of its vehicles, or any part or parts thereof, without notice; and, without it or the seller, incurring any liability or obligation to the purchaser.

TABLE OF CONTENTS

	Page
MANUFACTURER'S WARRANTY	4
SPECIFICATIONS	6
GETTING ACQUAINTED WITH YOUR 'JEEP' VEHICLE	
GENERAL INFORMATION	7
INSTRUMENTS	8
SWITCHES AND CONTROLS	11
KNOW YOUR 'JEEP' VEHICLE	14
OPERATING YOUR 'JEEP' VEHICLE	
BREAK-IN	17
DRIVING THE 'JEEP'	18
LUBRICATING YOUR 'JEEP' VEHICLE	
ENGINE LUBRICATION	19
LUBRICATION CHART	21, 23
SERVICE MILEAGE CHART	28
MAINTAINING YOUR 'JEEP' VEHICLE	
POWER PLANT	29
FUEL SYSTEM	32
COOLING SYSTEM	33
ELECTRICAL SYSTEM	36
WIRING DIAGRAM	43, 44
DRIVING COMPONENTS	45
BODY	54
EMERGENCY CHART	56

SPECIFICATIONS

VEHICLE CODE	MODEL	TYPE	ENGINE
58147.....	F4-134 4x2 SW	Station Wagon	F4-134
54147.....	F4-134 4x2 UW	Utility Wagon	F4-134
54247.....	F4-134 4x2 UD	Utility Delivery	F4-134
59167.....	L6-226 4x2 SW	Station Wagon	L6-226
54167.....	L6-226 4x2 UW	Utility Wagon	L6-226
54267.....	L6-226 4x2 UD	Utility Delivery	L6-226

ENGINE	F4-134		L6-226	
	<u>Metric</u>		<u>Metric</u>	
Type.....	F-head		L-head	
Number of cylinders.....	4		6	
Bore.....	3 1/8"	79,37 mm.	3 5/16"	84,14 mm.
Stroke.....	4 3/8"	111,12 mm.	4 3/8"	111,12 mm.
Displacement.....	134.2 cu. in.	2199,53 cm ³	226.2 cu. in.	3706,73 cm ³
Ignition Timing.....	5° BTC		5° BTC	
Compression Ratio.....	7.4 to 1		6.86 to 1	
Compression Pressure.....	120 to 130 psi	8,4 a 9,1 kg-cm ²	125 to 140 psi	8,8 a 9,8 kg-cm ²
Horsepower (max. brake)...	75 at 4000 rpm		105 at 3600 rpm	
Horsepower (SAE).....	15.63		26.33	
Torque (max.).....	114 lb-ft at 2000 rpm	15,7 kg-m.	190 lb-ft at 1400 rpm	26,3 kg-m.

	<u>Metric</u>
Wheelbase.....	104 1/2" 265,4 cm.
Tread (Front and Rear).....	57" 144,8 cm.
Road Clearance.....	7 3/8" 18,74 cm.
Height (over all).....	71 5/8" 181,8 cm.
Station Wagon Models.....	70 1/2" 179 cm.
Length (over all).....	176 1/4" 447,6 cm.
Width (over all):	
Station Wagon & Utility Wagon.....	71 3/4" 182,2 cm.
Utility Delivery.....	68 1/8" 173,0 cm.

Capacities:	U. S.	Imperial	Metric
Fuel Tank.....	15 gal.	12.5 gal.	56,8 ltr.
Cooling System (without heater):			
4-cylinder models.....	11 qt.	9 qt.	10,4 ltr.
6-cylinder models.....	12 qt.	10 qt.	11,4 ltr.
Cooling System (with heater):			
4-cylinder models.....	12 qt.	10 qt.	11,4 ltr.
6-cylinder models.....	13 qt.	10.8 qt.	12,3 ltr.

	4-cylinder Models		6-cylinder Models	
Gross Vehicle Weight (GVW).....	4500 lb.	2.041 kg.	4500 lb.	2.041 kg.
Station Wagon Models.....	3900 lb.	1.769 kg.	3900 lb.	1.769 kg.
Weights—approximate:				
Shipping (less fuel, oil, water):				
Station Wagon.....	2858 lb.	1.296 kg.	2971 lb.	1.348 kg.
Utility Wagon.....	2944 lb.	1.347 kg.	3057 lb.	1.386 kg.
Utility Delivery.....	2746 lb.	1.246 kg.	2859 lb.	1.297 kg.
Curb (including fuel, oil, water):				
Station Wagon.....	2993 lb.	1.358 kg.	3106 lb.	1.409 kg.
Utility Wagon.....	3079 lb.	1.397 kg.	3196 lb.	1.450 kg.
Utility Delivery.....	2881 lb.	1.307 kg.	2998 lb.	1.360 kg.

GETTING ACQUAINTED WITH YOUR 'JEEP' VEHICLE

GENERAL INFORMATION

The following pages, divided into four sections, contain information about your 'Jeep' vehicle.

The first section will acquaint you with specifications, model designations and serial numbers, instruments, and controls.

The second section describes proper operation including the all-important break-in period.

The third section covers lubricating procedures and recommendations as well as periodic servicing requirements.

The fourth section explains the function of your 'Jeep' vehicle's systems and components and also describes minor adjustments and minor maintenance procedures.

Proper lubrication is most important. Your 'Jeep' vehicle should be lubricated at the recommended frequencies with the correct grades of lubricants, as given in the third section, to maintain it in first-class condition. You should periodically have it lubricated and inspected at an Authorized Willys Dealer's Service Department.

When extensive adjustments and repairs seem necessary, have the work performed by a competent automotive repair technician. At your Authorized Willys Dealer's Service Department the service technicians are familiar with your 'Jeep' vehicle and with all factory repair recommendations.

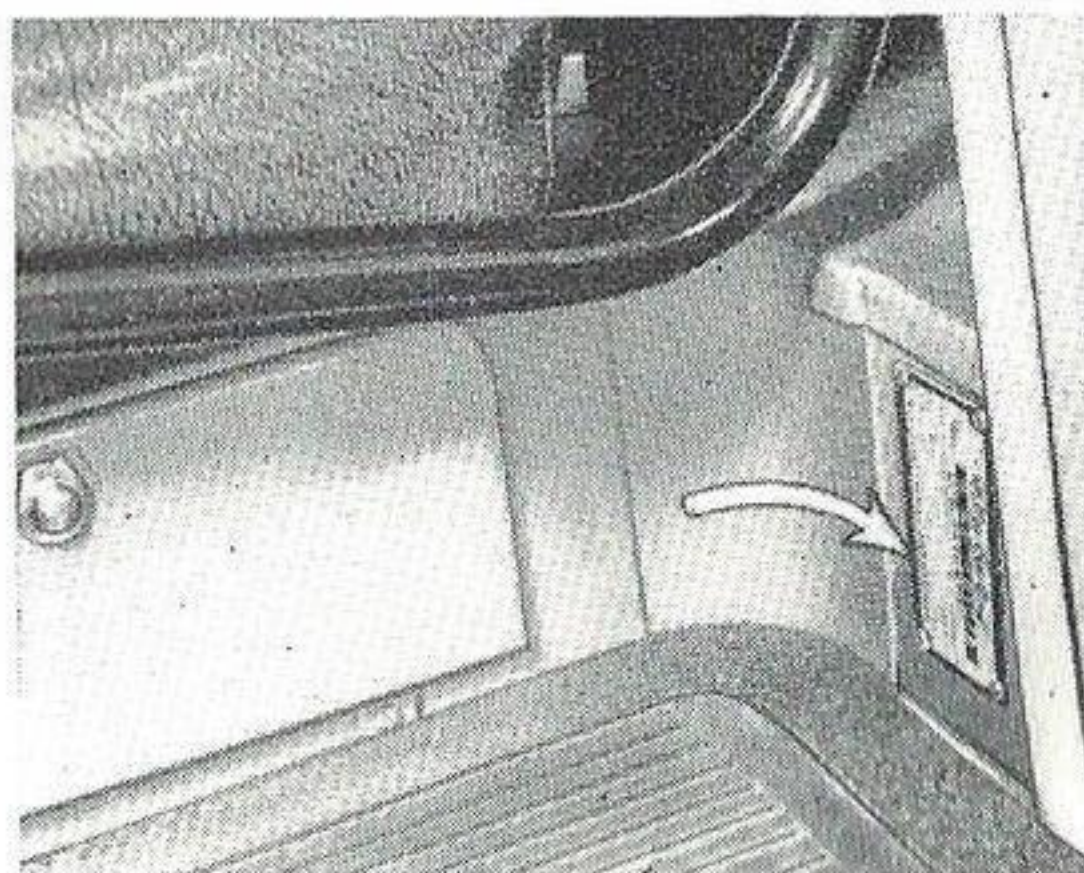
All the information given in this owner's manual consists of factory recommendations that should be used as a guide for properly operating and servicing your 'Jeep' vehicle.

VEHICLE SERIAL NUMBER

The vehicle serial number is stamped on a metal plate. This plate is located to the left of the driver's seat on the floor riser.

The vehicle serial number will consist of a vehicle code prefix followed by a five-digit serial number. Vehicle code prefixes are given in the Specifications on page 6. For example: 58147-00000.

For ready reference, record your vehicle serial number here:

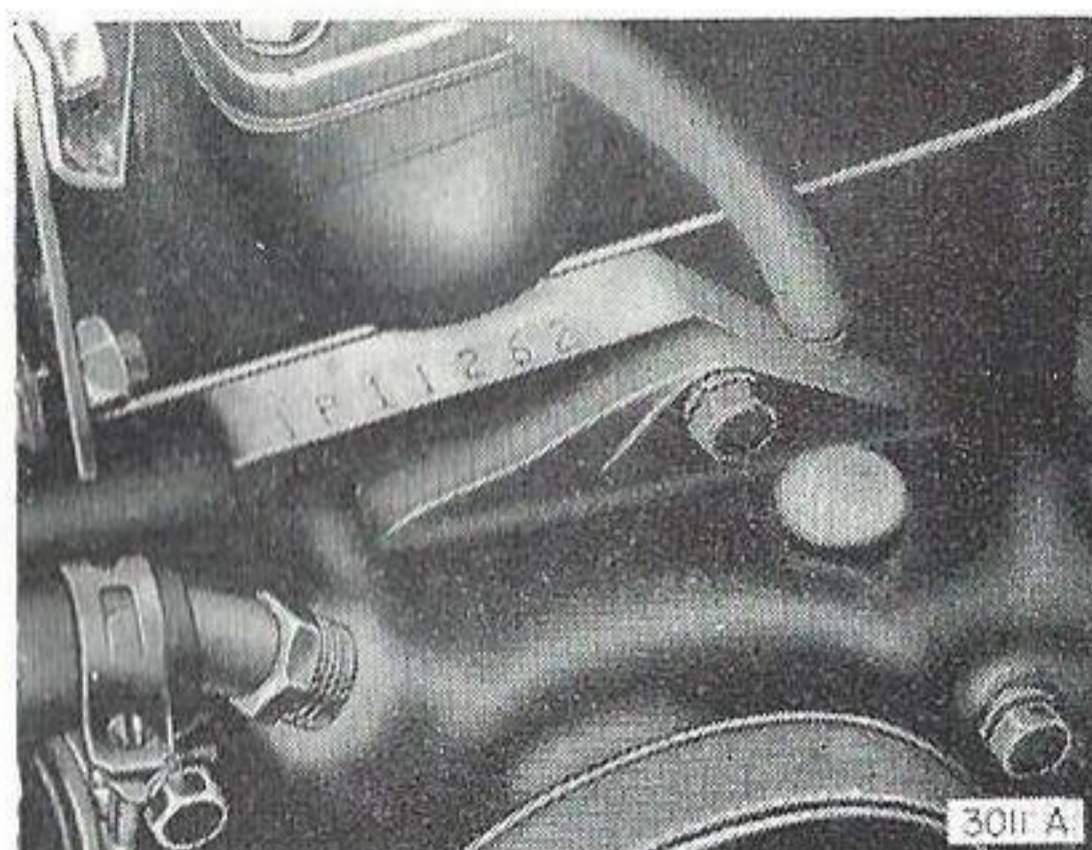


ENGINE SERIAL NUMBER

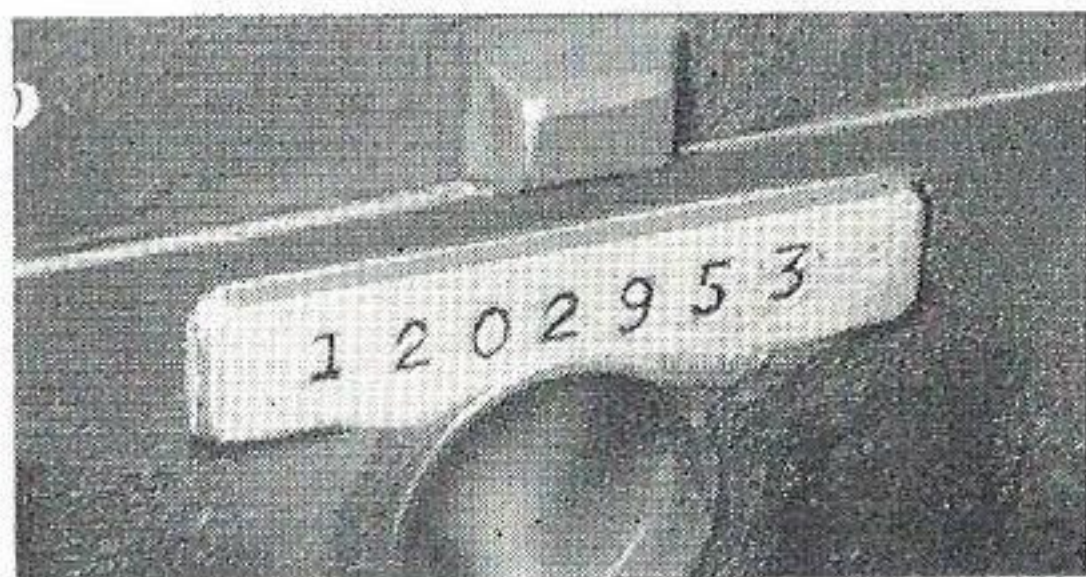
The 4-cylinder engine serial number is stamped on the water pump boss at the front of the engine. The F4-134 engine will have a prefix IT followed by a six-digit serial number, thus: IT-000000.

The 6-cylinder engine serial number is stamped near the left front corner of the cylinder block above the generator. The L6-226 engine will have a prefix SW6L-226 followed by a five-digit serial number, thus: SW6L-226-00000.

For ready reference, record your engine serial number here.



F4-134 ENGINE SERIAL NUMBER



L6-226 ENGINE SERIAL NUMBER

KEYS AND LOCKS

When you receive the keys to your new 'Jeep' vehicle, record the key number, and put it in a safe, convenient place. If your keys should become lost, your Willys 'Jeep' dealer or any competent locksmith can replace the keys from this number.



INSTRUMENTS

The operational instruments are conveniently grouped where they can be easily seen on the instrument panel. Each of the gauges and warning lights indicates a critical function of the vehicle and warns, in advance, when something serious

is going wrong. Knowing the function of these gauges and warning lights and observing them occasionally while driving or while the engine is running can prevent breakdowns and expensive repairs.

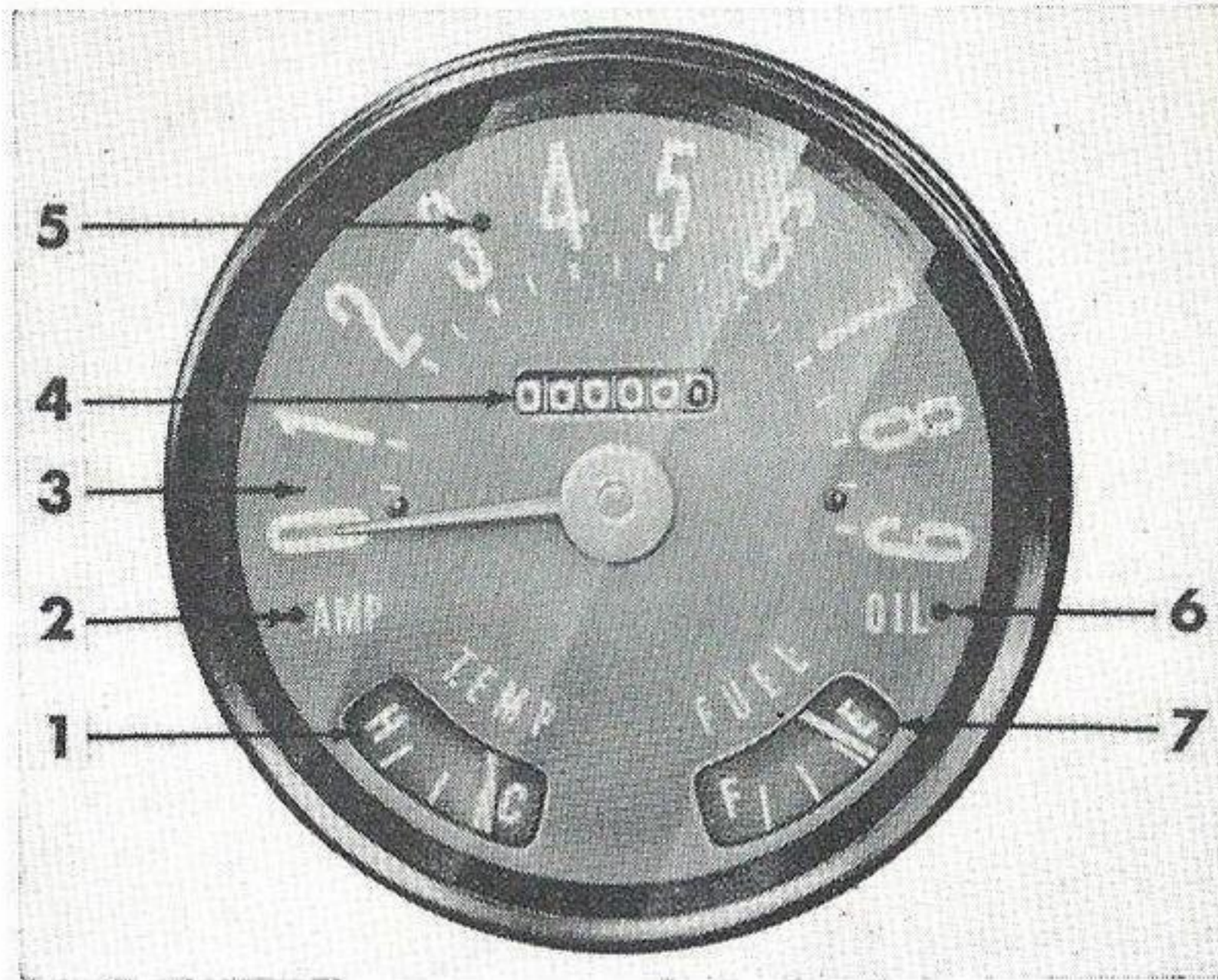


FIG. 1—INSTRUMENTS

- 1—Temperature Gauge
- 2—Battery Charge Indicator
- 3—Speedometer
- 4—Odometer

- 5—Headlight Beam Indicator
- 6—Oil Pressure Indicator
- 7—Fuel Gauge

SPEEDOMETER

The speedometer sweep hand indicates vehicle speed in miles per hour. The odometer registers ac-

cumulated mileage travelled. The right-hand numeral of the odometer indicates tenths of a mile.

“OIL” WARNING LIGHT

A ruby-red lamp will light to indicate when the engine oil is not being pumped at sufficient pressure to reach the places that need lubrication. When the ignition key is turned on but the engine is not running, or when the engine is running at idle speed, this light

will show red without meaning anything is wrong. If it lights when the engine is running above idle speed, shut the engine off immediately, for it is not being lubricated and will burn itself out in a very few minutes.

“AMP” WARNING LIGHT

A ruby-red lamp will light to indicate that for some reason the generator is not properly recharging the battery. When the ignition key is turned on but the engine is not running, or when the engine is running at idle speed, this light will show red without meaning any-

thing is wrong. If it lights when the engine is running above idle speed, have the charging circuit checked as soon as possible or the battery will soon go dead. If this light comes on and stays on while driving, promptly determine and correct the failure.

“FUEL” GAUGE

This gauge indicates how much fuel is in the fuel tank. The pointer will drop back to the E (empty) mark when the ignition switch is turned off. It may take a moment

for the gauge to record when the ignition switch is again turned on. The pointer may fluctuate without meaning anything is wrong as the vehicle is driven over rough terrain.

“TEMP” GAUGE

The temperature gauge registers the temperature of the solution in the cooling system. If the needle of the gauge swings far into the H (hot) zone, it means the engine is running dangerously hot and may soon quit. Stop and investigate. The usual cause of overheating is that some of the water or antifreeze in the radiator has evaporated or leaked out through a broken radiator or heater hose. If the “amp” warning light comes

on at the same time, it may mean the fan belt has broken. Whatever the trouble is, don’t drive on until it has been corrected or the engine may be ruined.

CAUTION. Always remove the radiator cap slowly to avoid possible injury from escaping steam or hot water. Never add water when the engine has overheated; allow the engine to cool first.

HEADLIGHT BEAM INDICATOR

A ruby-red light glows when the headlights are on high beam and warns that your lights may be shining into the eyes of oncoming

drivers. When the dimmer switch is pushed once, the headlights will switch back to low beam and the indicator light will go off.

TURN SIGNAL INDICATOR

The turn signal indicator switch is located on the steering column. The up position of the switch lever signals a right turn; the down position signals a left turn. When a turn is signalled, the green light

will flash. When the turn is completed and the vehicle is again going straight ahead, the self-cancelling switch will turn off the lights as the lever automatically snaps back to centered position.

SWITCHES AND CONTROLS

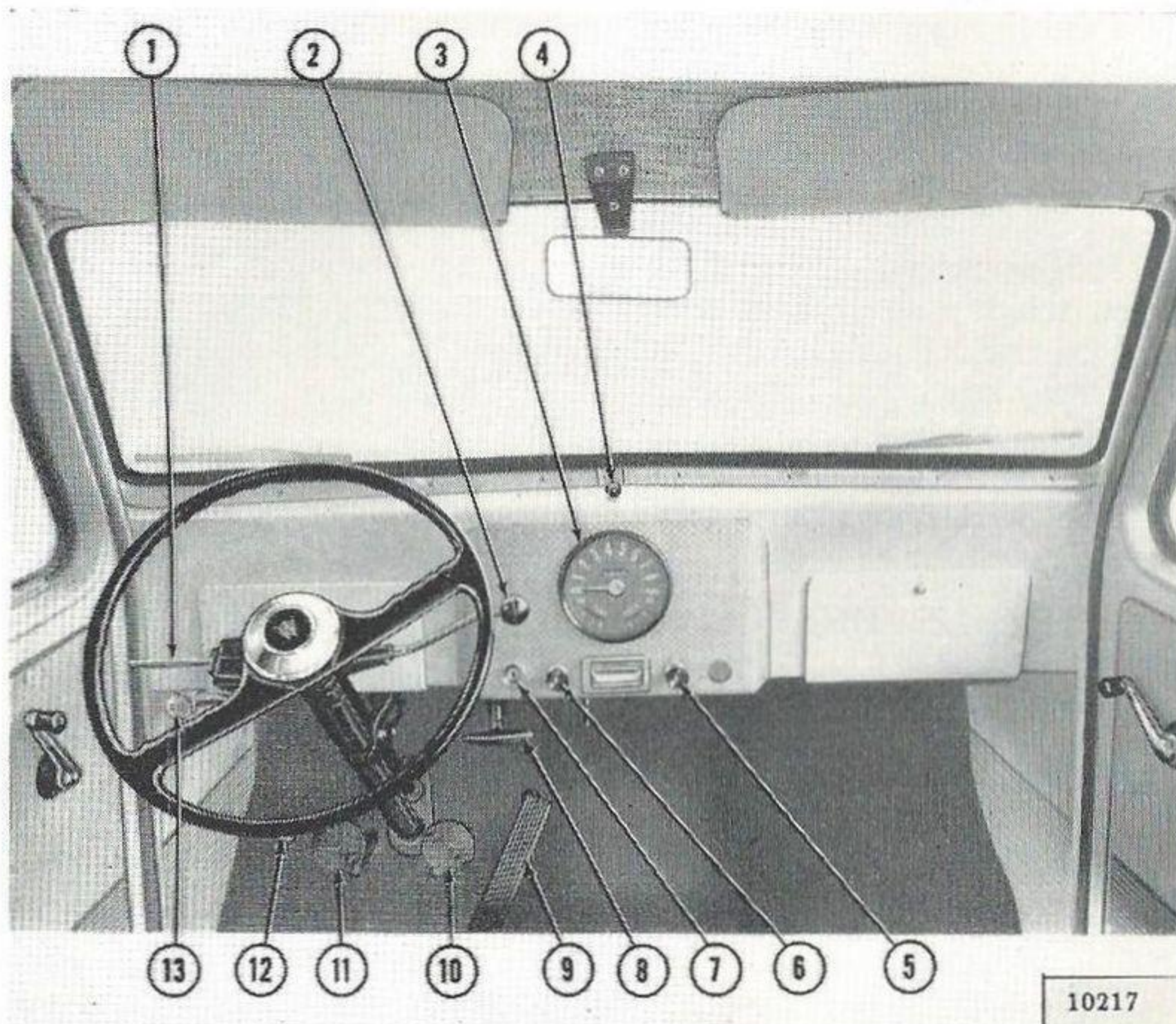


FIG. 2—SWITCHES AND CONTROLS

- 1—Turn Signal Control
- 2—Gear Shift Control
- 3—Instrument Cluster
- 4—Windshield Wiper Control
- 5—Light Switch
- 6—Choke Button
- 7—Ignition-Starter Switch
- 8—Hand Brake Handle
- 9—Accelerator Treadle
- 10—Brake Pedal
- 11—Clutch Pedal
- 12—Headlight Dimmer Switch
- 13—Overdrive Control

IGNITION AND STARTER SWITCH

The ignition and starting motor switch are integral. This switch is located on the dash.

The key must be turned to the extreme right, or clockwise, to operate the starting motor.

When the engine starts, the key returns to the normal "ON" posi-

tion of the ignition switch.

Turning the key to the left, or counterclockwise, energizes only the electrically operated accessory equipment, permitting the radio, heater and similar accessories to function when the engine is not running.

LIGHT SWITCH

The light switch is the plunger type. When the control knob is pushed in, no lights are lit. Pulling it out half way operates the parking lights and all the way out the head-

lights. The instrument cluster light is on when either the parking lights or the headlights are operating.

HEADLIGHT DIMMER SWITCH

The foot-operated headlight dimmer switch is mounted on the toe board to the left of the clutch pedal. Either high beam lights for country driving or low beam lights for passing and city driving may be used at will by alternately pressing this switch.

SHIFT LEVERS

The "shifting pattern" of the transmission shift lever is shown in Figure 3 for the 3-speed transmission. See the section on "Operating Your 'Jeep' Vehicle" for operation of the transfer case shifting levers.

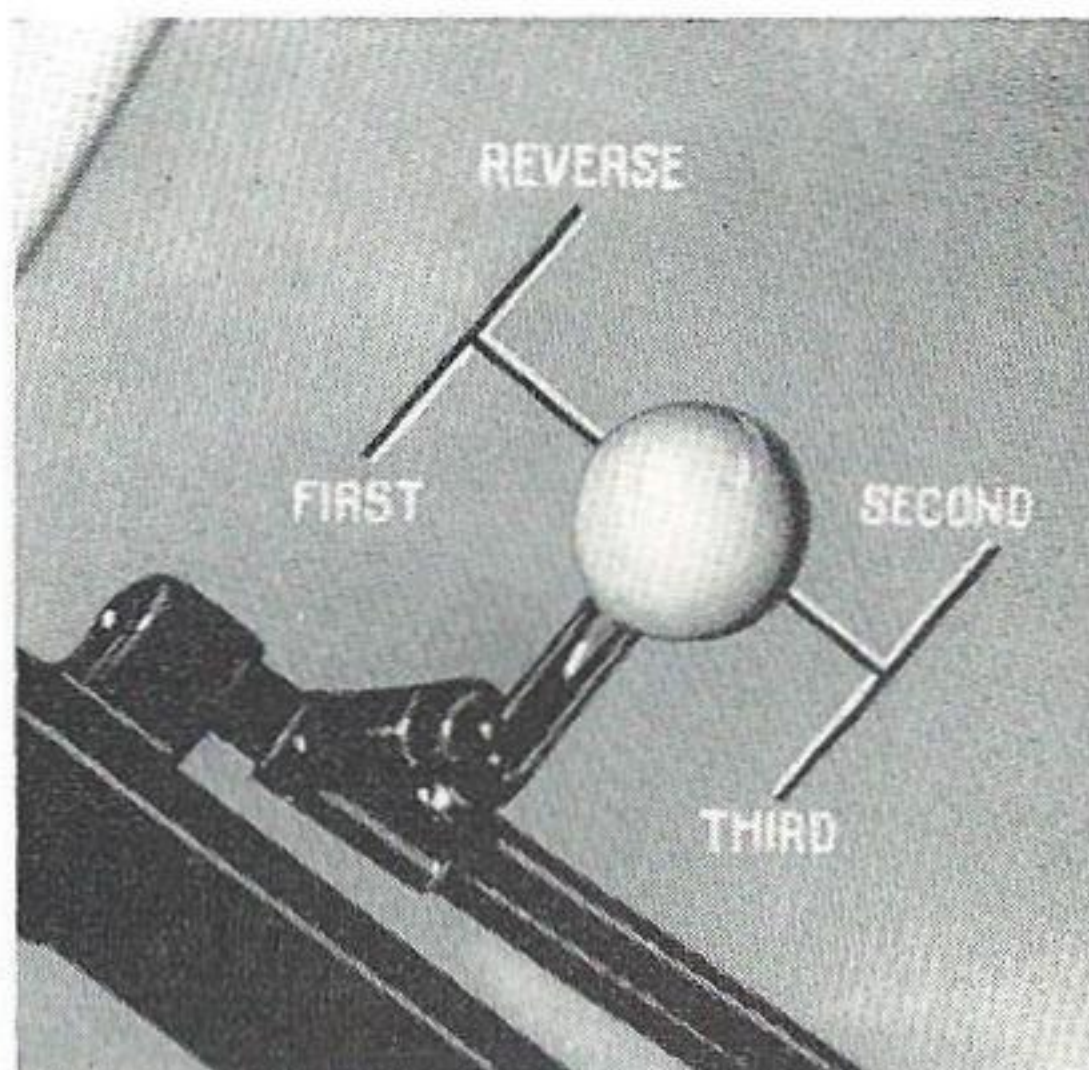


FIG. 3—SHIFT PATTERN

HAND BRAKE

The Utility Wagon and Utility Delivery are equipped with the hand brake shown in Fig. 4. To set this hand brake, first set the foot brakes and then pull out on the hand brake lever. By first setting the foot brakes, the hand

brake will apply easier and set more fully for better holding power.

To release the hand brake, turn the handle to one side and allow it to return to the off position (all the way in).

STATION WAGON HAND BRAKE

The hand brake illustrated in Fig. 4 is the standard hand brake for Station Wagon models. This type of hand brake is either fully on or fully off, never part way on. It affords increased mechanical leverage and is adjustable for the amount of tension applied to the hand brake cable.

To set the hand brake, first set the foot brakes and then pull the hand brake handle up to a horizontal position. To release the hand brake, push the handle down to the vertical position.

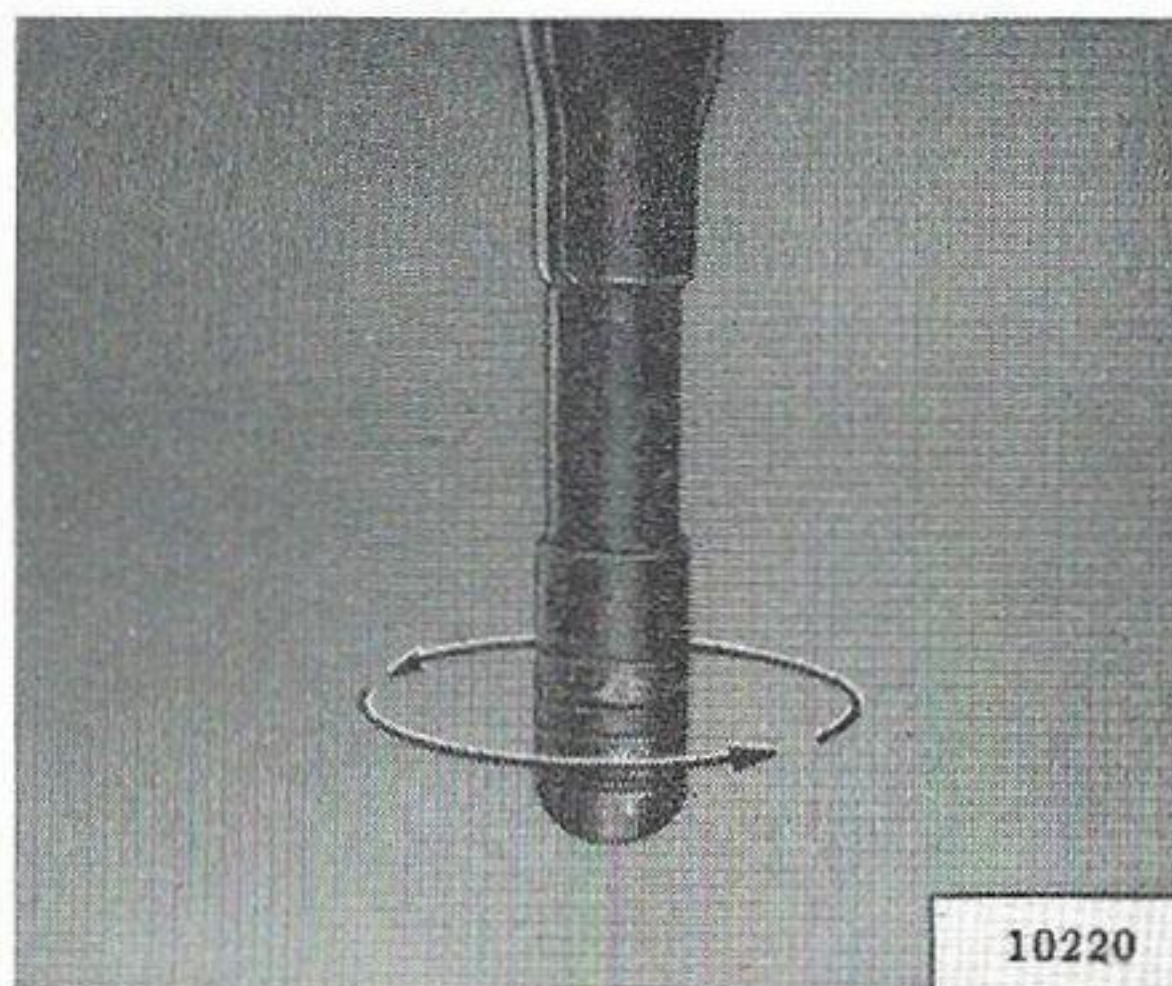


FIG. 4—STATION WAGON HAND BRAKE

The tension which is applied can be changed by rotating the knurled knob at the end of the handle. A counterclockwise rotation (as viewed from above) as indicated in Fig. 4 increases the tension applied. Rotating the knob in the opposite direction will decrease the applied

tension.

This adjustment does not eliminate or change the requirement for periodic wheel brake adjustment. Brakes should still be adjusted according to the recommendations given in the maintenance section.

WINDSHIELD WIPER CONTROL

The windshield wiper control, is mounted at the top center of the instrument panel. The wipers are operated by turning the control

knob. As the control knob is turned clockwise, the speed of wiper operation increases.

HEATER CONTROLS

The heater controls are centrally located on the lower edge of the instrument panel.

Check all controls for free operation and turn air control knob for checking blower control speeds. The air control knob when pulled all the way out, gives the maximum air travel through the heater coils and the amount of heat depends on how far the (left knob) temperature control is pulled out. To increase the air flow heat output,

turn the air control (center knob) which controls the blower speeds. One notch to the left (counterclockwise) for low speed and second notch for high speed. Pulling out defroster control (right knob) directs warm air through the two defrosters to the windshield. *For Summer Driving*—Pull out air control (center knob) only half way for maximum fresh air to driver's compartment.

KNOW YOUR 'JEEP' VEHICLE

FRONT DOORS

The front doors are opened from the outside by squeezing the trigger type door handles as you pull on them. They are opened from the inside by pulling back on the con-

ventional type handles. To lock the doors on the inside, slide down the small button mounted at the upper rear corner of the door, below the window.

HOOD LATCH

The hood lock release latch is located back of the radiator grill, a little to the right of center. To release the latch, reach in through the grill and press in on the latch which will allow you to raise the hood against the safety catch.

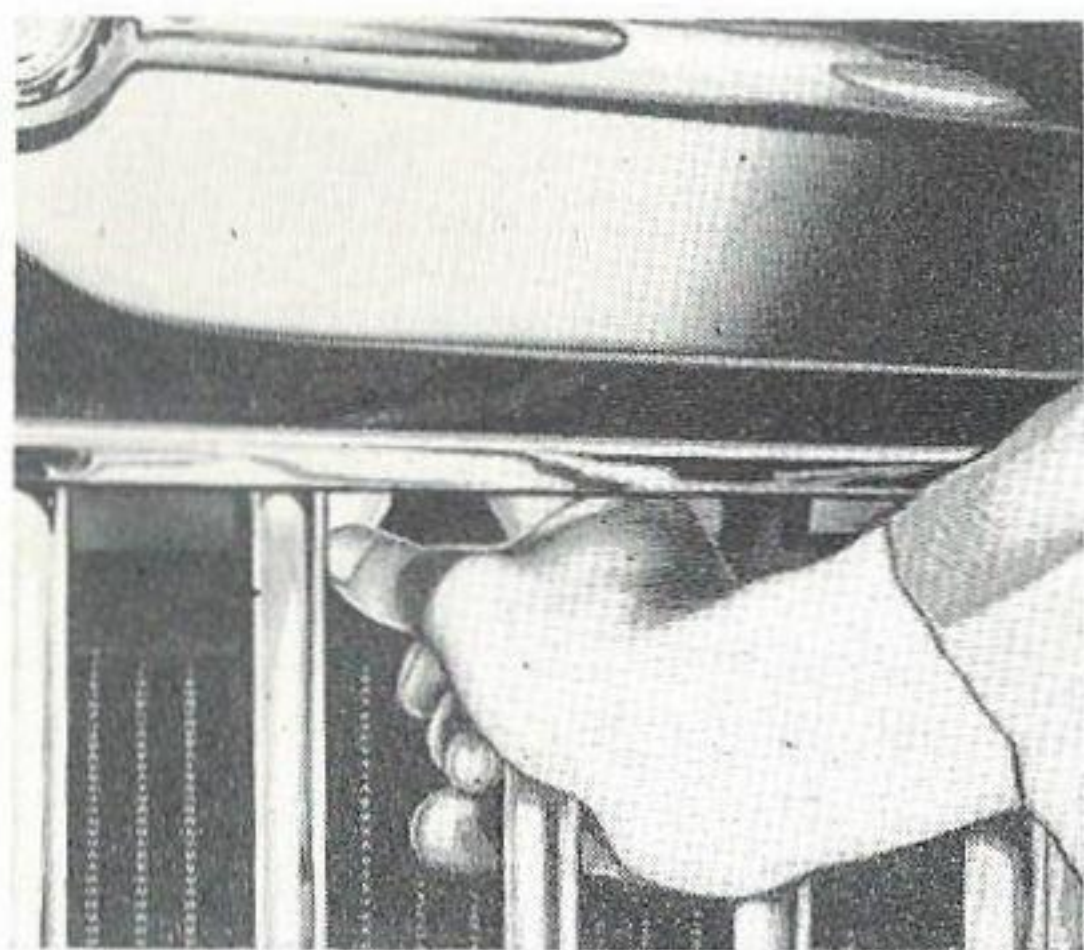


FIG. 5—HOOD LATCH

SAFETY CATCH

Release the safety catch located to the left of center, by pressing up against the curved upper edge of the catch, or pull the lower end of the catch forward.

The hood is held safely in the open position by a prop rod, the lower end of which slides on a radiator brace rod.

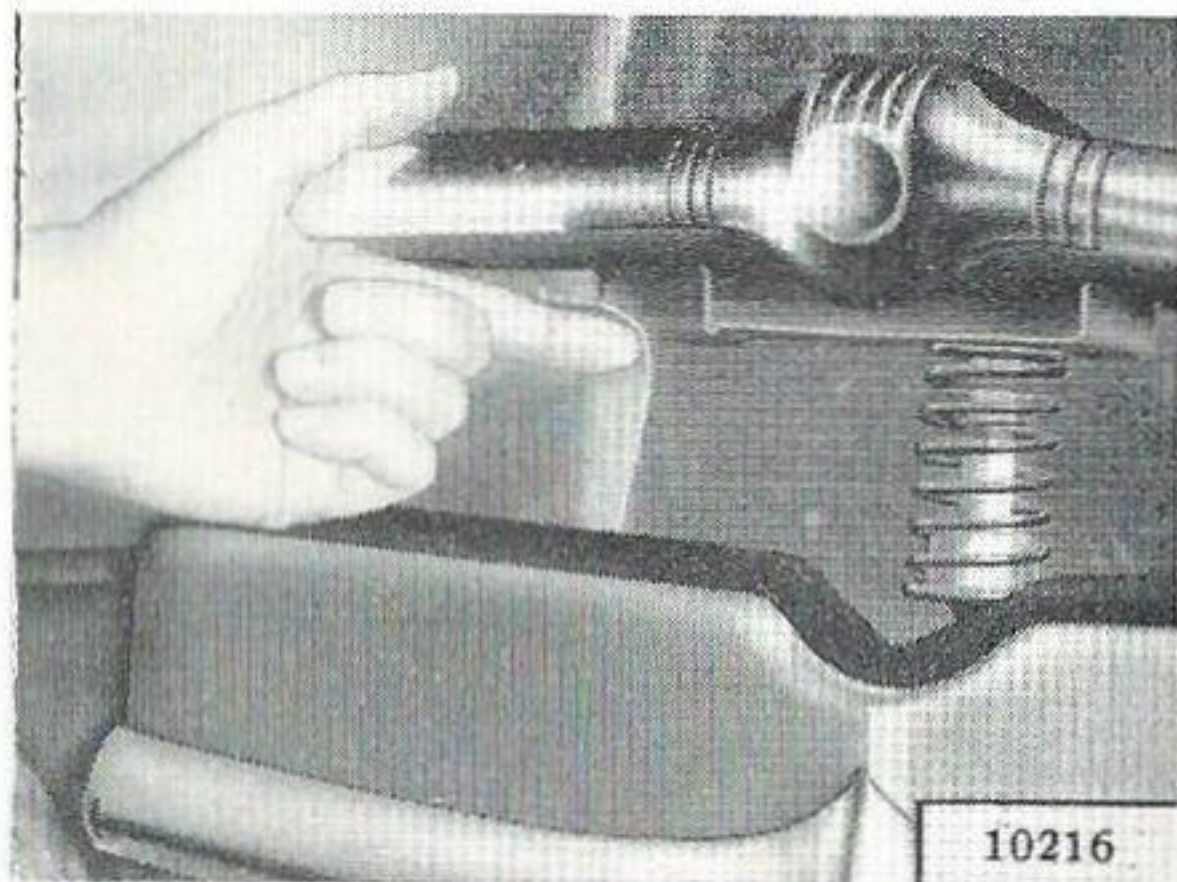


FIG. 6—SAFETY CATCH

DRIVING COMPONENTS

CLUTCH

The clutch is the single plate, dry disc type. It provides smooth engagement of the engine power to the wheels. The clutch consists of a pressure plate assembly with pressure springs and release levers, and a driven plate assembly with spring center vibration neutralizers and two flexible facings.

As the clutch facings wear, the free travel of the clutch pedal (the distance the pedal moves down before any resistance is felt) decreases. The standard free travel is 1" [2,54 cm.]. It is important to maintain this clearance to prevent clutch release bearing wear and clutch slippage. No adjustment of the clutch proper is required to compensate for wear of the facings.

The free pedal travel is adjusted at the threaded connection between the clutch control lever and clutch control tube lever. To increase the free travel, loosen the lock nut and screw the adjusting nut forward.

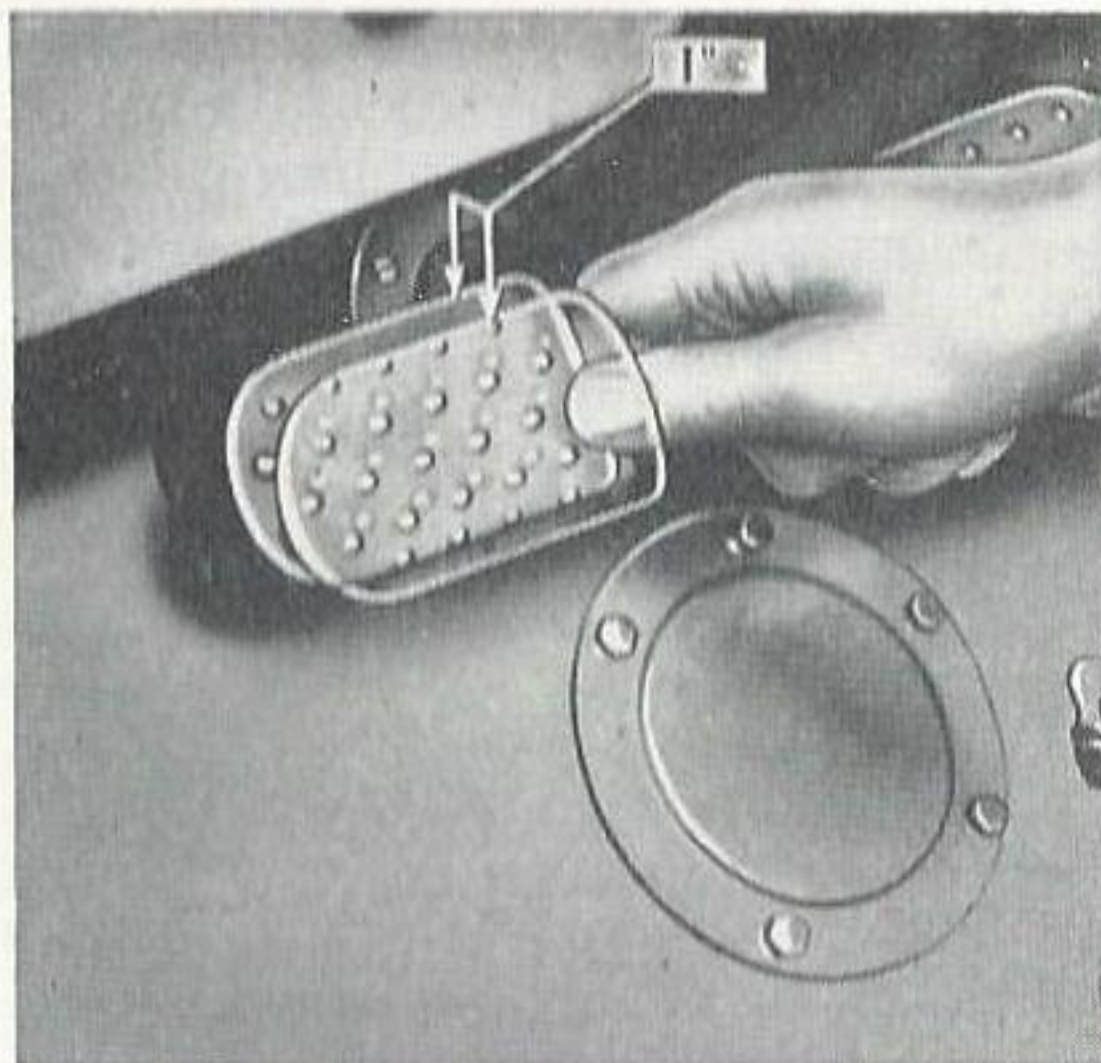


FIG. 28—CLUTCH PEDAL ADJUSTMENT

CAUTION: Avoid the practice of resting the foot continuously on the clutch pedal while driving and do not slip the clutch excessively instead of shifting gears. Slipping the clutch causes excessive heat, with the result that the clutch is finally made inoperative.

TRANSMISSION

The transmission is a three-speed synchromesh unit with remote control steering-post shift. It is bolted to the rear of the flywheel bell housing and is supported on a rubber insulator at the center frame cross member which forms the engine support.

If the shift is not smooth and positive, correction can usually be made in the following manner. First, place the gear shift lever in the neutral position, then remove the shift rod clevis pins at the transmission. Next, make sure the transmission gears are in the neutral position. The gears are in neutral when the two control levers on the side of the transmission are

in such a position that either of the levers can be freely moved while the other remains stationary.

Slip a piece of $\frac{1}{4}$ " [6,35 mm.] snug fitting rod (or a $\frac{1}{4}$ " drill) through the gearshift levers and the housing to assure the correct neutral position of the shift mechanism.

So adjust the shift rod yokes that the clevis pins can be slipped freely into place without moving the control levers on the transmission. Then pull out the alignment rod.

Should unsatisfactory shifting remain after making these adjustments, it is advisable to consult your Willys 'Jeep' Dealer.

UTILITY WAGON INTERIOR

The interior of your Utility Wagon was tailored to meet the requirements of rugged use, easy maintenance, and pleasant appearance. The complete interior is washable. If necessary, you can flush it out with a hose. When cleaning, use care so that the headlining does not become soaked. Clean it with a damp cloth or chamois.

The cargo area floor is protected with hardwood rub strips which aid in loading and unloading heavy or bulky objects.



FIG. 9—WASHABLE INTERIOR

TAIL GATE

The tailgate is strongly braced, and can support 1000 lbs. With the tailgate down, you have 8½ feet of level floor area. The license plate bracket and light on the tailgate will rotate so that the license plate is visible when running with the tailgate down. The upper section of the tailgate can be held open by the sturdy braces. In warm weather this feature provides straight through ventilation without annoying back drafts.

To open the lower tail gate, release the lever at each end by pulling up. When closing it be sure the latches are pushed down firmly as they are designed to pull the gate firmly against the body to prevent noise.

When the lower gate is open, it

is supported by two folding rods. These rods are designed to carry the rear edge of the tail gate slightly higher than the inner edge so that luggage or other articles will move forward due to road bounce or vibration to minimize possibility of loss.

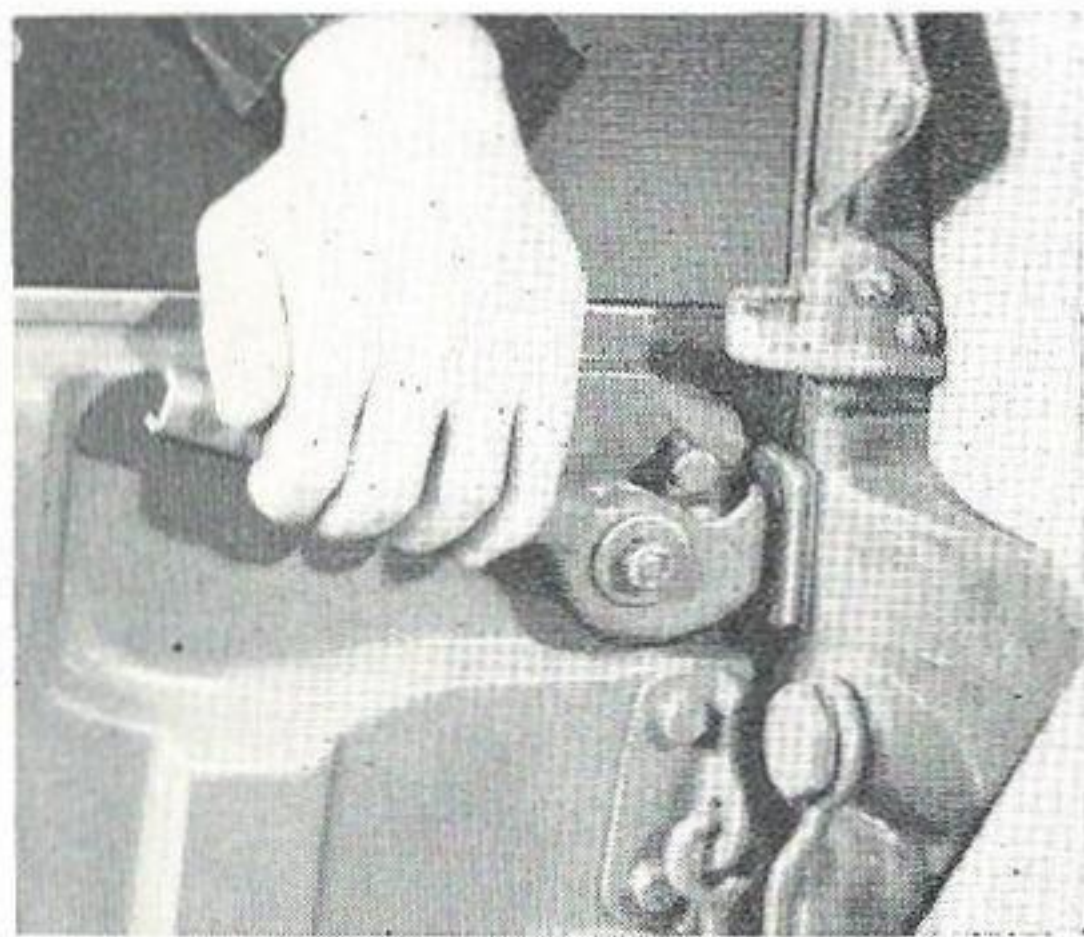


FIG. 10—TAIL GATE LATCH

STORAGE SPACE

The tool and storage compartments beneath the front seats are accessible from the right and left sides. The compartment doors are located in the floor riser, and have push button latches. Jack and tire wrench are located here. The glove compartment in the dash is operated by a push-button latch.

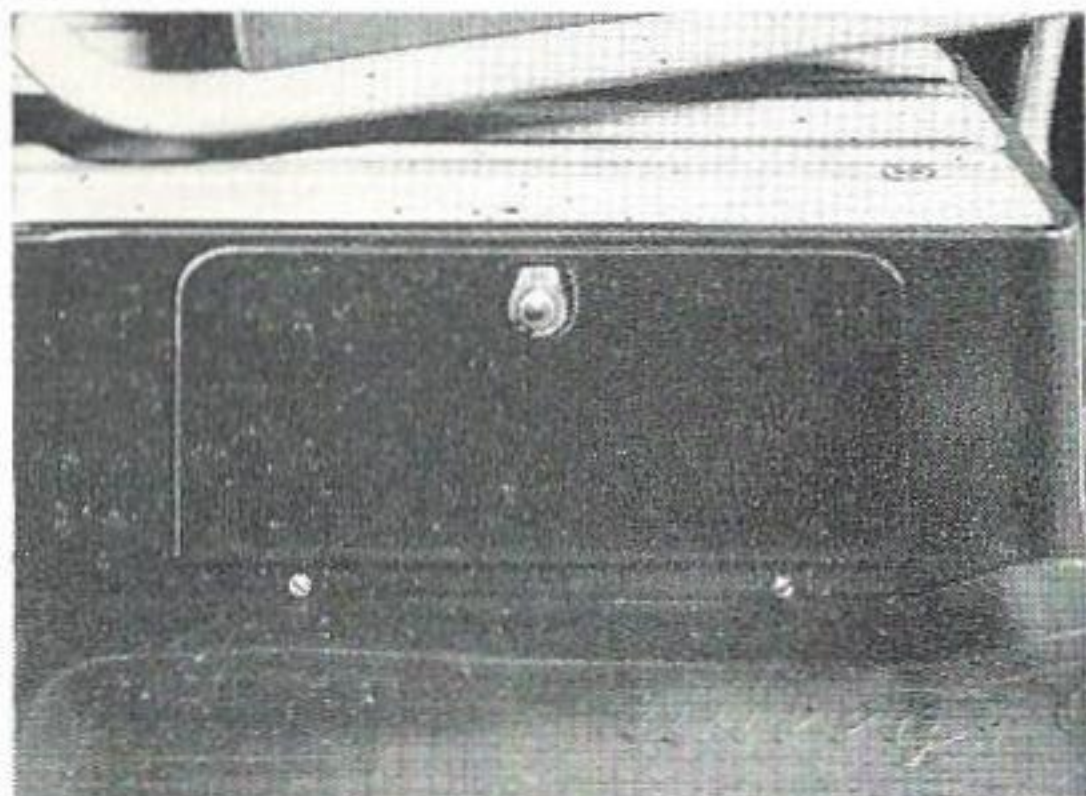


FIG. 11—TOOL COMPARTMENT

OPERATING YOUR 'JEEP' VEHICLE

PROPER BREAK - IN

By taking a few reasonable precautions during the first few miles of driving and by giving your vehicle an opportunity to properly "break-in", operation and life of the working parts of your 'Jeep' vehicle will be greatly improved.

The parts of your new 'Jeep' vehicle are precision fitted. Close limits are maintained throughout. Therefore certain speed limits should be observed to "break-in" the engine.

After engine warm-up, do not exceed:

40 mph. [65 kph.] . . . 0 to 300 miles
[500 km.]

50 mph. [80 kph.] . 300 to 800 miles
[1,300 km.]

60 mph. [95 kph.] . 800 to 1200 miles
[2,000 km.]

The crankcase is filled at the factory with oil of the proper viscosity for the "break-in" period. This special oil should be drained at 500 miles [800 km.] and replaced with engine oil of the viscosity recommended in the Lubrication Section.

During the first 1000 miles [1,600 km.] of operation be alert for any indication of overheating in any component of the vehicle.

Be sure to have your Willys Dealer inspect your 'Jeep' vehicle at the end of 1000 miles [1,600 km.].

CARBON MONOXIDE

Carbon monoxide is a deadly gas. It has no odor, no taste, no color. It is in the exhaust fumes of all gasoline engines. Never start an

engine in a closed garage. Always open the doors wide before starting the engine. Keep them open wide as long as the engine is running.

OPERATION

MAKING THE VEHICLE READY

- Fill the radiator.
- Put gasoline in the tank.
- Fill the oil reservoir through the filler pipe until the oil indicator stick registers FULL. See Lubrication Section.

- Supply all parts requiring lubrication with oil or lubricant. See Lubrication Section.

- See that all tires have the proper pressure.

STARTING THE ENGINE

- Check the transmission gear shift lever and see that it is in "neutral" position.

- Pull the choke button out about half way, which will also open the gas throttle slightly.

- Place the ignition key in the switch on instrument panel and turn it extreme right. This turns

on the ignition circuit and also the starting circuit as long as the key is held in the extreme right position.

- If engine still does not start, pull the choke button out to stop and try the starter again.

CAUTION: Be sure to push choke button in halfway, as soon

as engine starts. Leaving the choke button out will flood the carburetor and make engine hard to start.

- Set the choke button at the best operating position to keep engine running and when engine warms up push the choke all the way in. Do not run the vehicle with choke out as this will waste

fuel and cause undue wear on engine parts.

- As soon as engine is running smoothly depress clutch pedal and shift gears in transmission as outlined under "Starting the Vehicle".

- Should the engine fail to start, consult the Emergency Chart.

DRIVING THE VEHICLE

Start the vehicle in motion in the conventional manner by depressing the clutch pedal, shifting into low gear, releasing the clutch pedal and depressing the accelerator pedal. Shift into second and high gears in

the same manner.

Never attempt to shift to a lower gear with the vehicle traveling at a high rate of speed. Always have the vehicle at a standstill when shifting into reverse.

OVERDRIVE

Some vehicles will be equipped with overdrive as optional equipment. The overdrive affords low fuel consumption and minimum engine wear. It permits low engine speed at high vehicle speed.

To engage the overdrive, push in the overdrive handle located at the lower left edge of the instrument panel. To disengage it pull the handle out. Either operation can be performed with the vehicle in motion without damage. However, to disengage the overdrive with the vehicle in motion, it is necessary to first press the accelerator treadle to the floor board momentarily and immediately pull out the control handle.

The overdrive becomes operative at approximately 30 miles per hour [50 kph.] whenever the driver momentarily releases the accelerator. Disengagement occurs at approximately 20 mph. [30 kph.]

regardless of any action on the part of the driver. To obtain increased pick-up for passing or for hill climbing, press the accelerator treadle firmly to the floor board to make the overdrive inoperative. After passing, again release the accelerator treadle momentarily.

A free-wheeling unit is built into the overdrive which automatically disengages the engine from the transmission when the accelerator treadle is not depressed and the engine speed is below that at which the overdrive operates. This permits the engine to "idle" while the vehicle continues to move under its own momentum. Because of the free-wheeling feature, the overdrive should be disengaged when driving in mountainous country or on ice, or when descending steep hills. This permits more stable control of the vehicle under these conditions.

LUBRICATING YOUR 'JEEP' VEHICLE

Regular application of high-grade lubricants when operating your 'Jeep' vehicle is especially important because of the diversified type of service it performs. The amount of trouble-free service you receive will be in proportion to the care given.

The type of service performed determines the frequency of lubri-

cation. Vehicles operating principally on gravel or dusty roads and through extended rainy seasons may need lubrication attention more frequently and should be serviced as required. In dusty territories, the air cleaner should be cleaned often. Under extreme conditions, once a day cleaning may be necessary.

ENGINE LUBRICATION

The engine is lubricated with a force-feed continuous circulating system. A gear type pump circulates the oil.

The oil is drawn into the circulating system through a floating oil intake. The floating intake prevents water and dirt, which may have accumulated in the bottom of the oil pan, from circulating because the oil is drawn from near the top surface.

The quantity of oil in the crankcase is measured by a bayonet type oil level indicator located on the right side of the F4-134 engine and the left side of the L6-226 engine. Whenever the oil level is below the "F" (full) mark for the F4-134 engine, add sufficient oil to bring the level near or to the F-mark but do not fill above this mark. Maintain the oil level for the L6-226 engine in the "safe" range.

The crankcase is filled at the

factory with oil of the proper viscosity for the "break-in" period of 500 miles [800 km.]. Change the engine oil at 500 miles, at 2000 miles [3.200 km.] and every 2000 miles thereafter. Use the grade of oil shown in the Lubrication Chart.

The crankcase is drained by removing the drain plug from the oil pan. Always drain the oil when the engine is warm. If it is drained when the engine is cold, some of the foreign matter will remain in the bottom of the oil pan, losing to a large extent the benefit of the oil change.

After draining, replace the plug and refill with fresh oil. Add an additional quart if the oil filter has also been drained.

At least once a year, preferably in the spring, remove the oil pan and floating oil intake and wash them thoroughly with cleaning solution.

LUBRICATION CHARTS

The lubrication illustrations on the following pages are prepared as a guide to the location of some of the major lubrication points as indicated on the charts accompanying them. The chassis shown is a

composite and may not necessarily reflect any particular vehicle in all details. Text should be carefully read for other points not indicated on the charts.

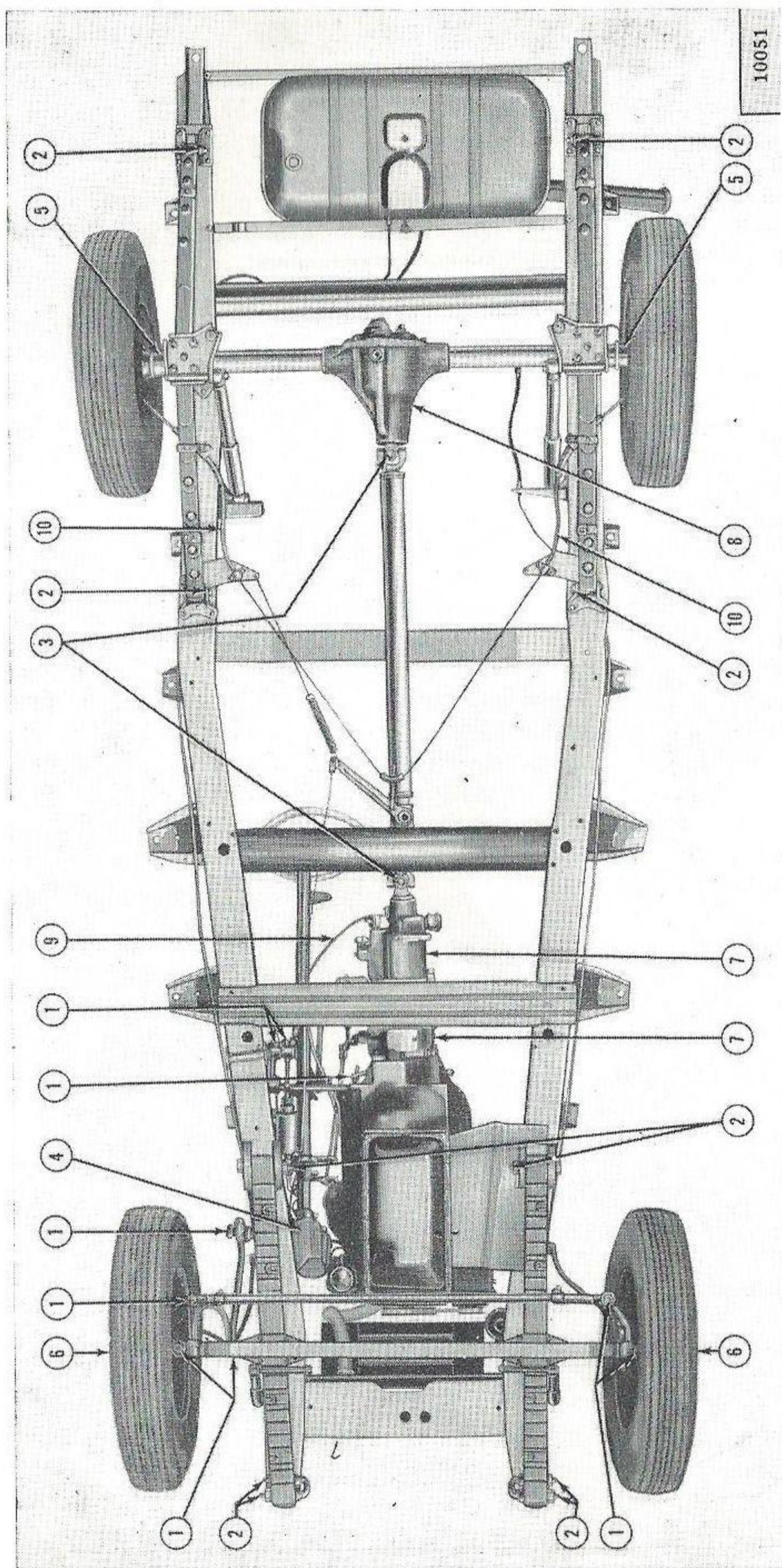


FIG. 12—LUBRICATION CHART — MODEL F4-134 4x2

Chart No.	ITEM TO BE LUBRICATED	FREQUENCY 1000 miles = 1.600 km.	QUANTITY		LUBRICANT	
			U.S. Imperial	Metric	TYPE	GRADE Summer Winter
1.	Chassis Bearings.....	Each 1000 miles	As required		Chassis Lubricant	No. 1 No. 0
2.	Spring Shackle Bushings... Spring Pivot Bolt Bushings..	{ With lube fittings: Each 1000 miles Without lube fittings: No lubrication	As required		Chassis Lubricant	No. 1 No. 0
3.	Universal Joints.....	Each 1000 miles	As required		Chassis Lubricant	No. 1 No. 0
4.	Steering Gear.....	Check each 1000 miles	As required		GL-4	SAE 90 SAE 90
5.	Rear Wheels.....	Sparringly each 1000 miles	As required		Wheel Bearing Lubricant	No. 2 No. 2
6.	Front Wheels.....	Disassemble to lubricate each 10,000 miles	As required		Wheel Bearing Lubricant	No. 2 No. 2
7.	Transmission..... Overdrive.....	{ Check each 1000 miles Change each 10,000 miles	1 1/2 pts. 1 1/4 pts. 3/4 pt. 3/8 pt.	0,8 ltrs. 0,4 ltrs.	GL-4 GL-4	SAE 90 SAE 80 SAE 90 SAE 80
8.	Differential.....	{ Check each 1000 miles Change each 10,000 miles	2 pts. 1 3/4 pts.	1,0 ltrs.	GL-4*	SAE 90 SAE 90
9.	Speedometer Cable.....	Disassemble to lubricate each 12,000 miles [19.200 km.]	As required		Graphite Grease	Light
9.	Hand Brake Cable.....	Disassemble to lubricate each 10,000 miles	As required		Graphite Grease	Light
	Generator.....	Each 1000 miles	2-4 drops		Engine Oil	Same as engine
	Distributor Oiler..... Wick..... Pivot..... Cam.....	Each 1000 miles Each 1000 miles Each 1000 miles Each 1000 miles	Several drops One drop One drop Sparringly		Engine Oil Engine Oil Engine Oil Grease	Same as engine Same as engine Same as engine Soft
	Air Cleaner.....	Change each 2000 miles	1 1/4 pts. 1 pt.	0,6 ltrs.	Engine Oil	Same as engine
	Engine.....	Change each 2000 miles	4** qts. 3 1/3 qts.	3,8 ltrs.		

Above 90°F. [32°C.] Not lower than 32°F. [0°C.] As low as 10°F. [-12°C.] As low as -10°F. [-23°C.] Lower than -10°F. [-23°C.]
 use SAE 30 or use SAE 20, 20W, use SAE 10W, use SAE 5W or
 10W-30, or 10W-20 10W-30, or 10W-20 10W-30, or 10W-20 5W-20

*For Powr-Lok differential use only Willys Powr-Lok Differential Oil, Part No. 94557.

**When oil filter is changed at the same time, add one quart [1 ltr.].

ENGINE OIL CLASSIFICATIONS

The American Petroleum Institute has adopted a new system of classifying engine oils according to type of service. These new designations are:

ML — light and favorable service.

MM — moderate to severe service.

MS — most severe service.

These new designations replace the older designations of "regular", "premium", and "heavy duty". Depending upon the conditions of operation, either MM or MS grade is recommended for Jeep vehicles.

The API-SAE viscosity numbering system is not affected by this change. It is still necessary to specify the SAE number in addition to the above classification.

MULTIPURPOSE GEAR LUBRICANT GL4

A new multipurpose gear lubricant designated as "A.P.I. Service GL4" has improved load carrying capacity for most hypoid, spiral bevel, and worm gear applications. GL4 is recommended in the Lubrication Specification table for the

transmission, transfer case, differentials (except Powr-Lok differentials), and steering gear. The proper SAE grade of GL4 should be selected to correspond with climatic conditions.

LUBRICATION FITTINGS

Each 1000 miles [1.600 km.] clean each lubrication fitting indicated by No. 1 on the Lubrication Chart and use a pressure gun

to lubricate. Be sure that the grease channels are open to provide complete lubrication of bearing surfaces.

SPRING SHACKLES AND PIVOT BOLTS

All spring shackles and spring pivot bolts are shown as No. 2 on the Lubrication Chart, but some of these points will not have lubrication fittings. Where there is no lubrication fitting at one of these points, indicating a silent block

bushing has been installed, that point is not to be lubricated. Where there are lubrication fittings at the spring shackles or pivot bolts lubricate at each fitting with a pressure gun every 1000 miles [1.600 km.].

OIL FILTER

The oil filter should be dismantled, cleaned and the filter element replaced at the end of the

first 2000 miles [3.200 km.]. Replace the element at each 6000 miles [9.600 km.].

AIR CLEANER

The oil bath air cleaner thoroughly removes all dust from the air before it enters the carburetor. For efficient operation, the

cleaner must be serviced at regular intervals. Service the unit at each engine oil change. To service the air cleaner, unscrew the eye

bolt on the oil cup clamp and remove the oil cup. Scrape all dirt from inside the oil cup and clean the inside surface with cleaning solution. Refill with new oil of the

same viscosity as is recommended for the engine crankcase to the oil level bead and install the cup securely to the cleaner body with the attaching clamp.

MANIFOLD HEAT CONTROL VALVE

Lubricate the manifold heat control valve on the L6-226 engine at each 1000 mile interval. Lubricate the valve shaft and bushings by placing a few drops of penetrating

oil at each end of the shaft where it passes through the manifold. Then move the valve up and down a few times to work the lubricant into the bushing.

WATER PUMP AND CLUTCH

The water pump bearing and clutch release bearing are prelubri-

cated at assembly and the lubricant lasts the life of the bearings.

GENERATOR

Two oilers are provided on the generator, one at each end. Two to four drops of engine oil in each

oiler is recommended every 1000 miles [1.600 km.].

STARTING MOTOR

The starting motor is lubricated at assembly and requires no further

lubrication between starting motor overhauls.

DISTRIBUTOR

The distributor should be lubricated every 1000 miles [1.600 km.]. Place several drops of engine oil in the oiler. Also place one drop of light engine oil on the wick located on the top of the shaft, which is

accessible by removing the rotor arm. Sparingly apply soft grease on the breaker arm cam. Apply a drop of oil on the breaker arm pivot.

SPEEDOMETER

Remove the speedometer drive shaft from the tube once each year, clean it thoroughly and lubricate

with a good quality light graphite grease.

STEERING GEAR

Check the lubricant level in the steering gear housing at each 1000 miles [1.600 km.] to be sure that the lubricant is at filler plug open-

ing level. Should lubricant be required, fill the housing slowly with a hand compressor. Do not overlook replacing the filler plug.

UNIVERSAL JOINTS

The propeller shaft universal joints are equipped with hydraulic fittings. Use a hand compressor to

lubricate the trunnion bearings each 1000 miles [1.600 km.].

WHEEL BEARINGS

The front wheel bearings should be removed, thoroughly cleaned, checked and repacked every 10,000 miles [16.000 km.] with wheel bearing lubricant.

The rear wheel bearings are equipped with lubrication fittings. Clean the oil relief hole at the top of the housing and lubricate every

1000 miles [1.600 km.] with wheel bearing lubricant. The bearing is filled with lubricant when the lubricant comes out of the relief hole. Do not use an excessive amount of lubricant for the surplus may work through the seals to saturate the brake linings.

HAND BRAKE CONTROL

Lubricate all bearings and clevis pins of the hand brake control each 1000 miles [1.600 km.]. Lubri-

cate the brake cables inside the conduits each 10,000 miles [16.000 km.].

BRAKE MASTER CYLINDER

Check the fluid level in the brake master cylinder every 1000 miles [1.600 km.]. Wipe clean the top of the filler cap and also the housing area around it. Replenish the brake fluid to a level $\frac{1}{2}$ " [1,3 cm.] below the top of the fill hole. Use only

heavy-duty brake fluid conforming to specification SAE-70-R1. Be sure to handle the brake fluid in clean dispensers and containers that will not introduce even the slightest amount of other liquids. Replace and tighten the filler cap.

CHOKE CONTROL

Lubricate the exterior surfaces of the flexible conduit with pene-

trating oil every 1000 miles [1.600 km.].

CLUTCH LINKAGE

Lubricate all friction points of the clutch linkage every 1000 miles [1.600 km.]. Use the same grade of engine oil as used for the engine. Failure to lubricate these points

will result in premature wear; the links will wear and the holes in the mating parts will become elongated.

TRANSMISSION

Check the oil level in the transmission assembly every 1000 miles [1.600 km.]. If the level is low, fill to filler plug opening. Each 10,000

miles [16.000 km.] drain the oil and refill with a high grade gear lubricant.

OVERDRIVE

If your vehicle is equipped with overdrive, lubricate it in the same

manner and at the same time as the transmission.

DIFFERENTIALS

Check the level in the differential housings every 1000 miles [1.600 km.] to be sure that the lubricant is at the level of the filler plug openings. Drain and refill each housing every 10,000 miles [16.000 km.]. Do not mix different types

of lubricants. Use light engine oil or light flushing oil to clean out the housing (except on Powr-Lok differentials). Do not use water, steam, kerosene, or gasoline for flushing.

POWR-LOK DIFFERENTIAL

Some vehicles are equipped with locking differential (optional equipment). Locking differential has a brass plate stamped with the letter *T* under one of the gear cover screw heads to distinguish it from standard differential.

Ordinary lubricants *must not*

be used in the locking differential. Use only Willys Powr-Lok Differential Oil, Part No. 94557, furnished in pint cans.

Do not flush the Powr-Lok differential. The use of cleaning solvents of any kind is not recommended.

SPRINGS

The vehicle springs do not require lubrication. The spring leaves are coated at assembly with a long-lasting special lubricant which is designed to last the life of the

springs. Spraying with lubricant has a tendency to wash this special lubricant from between the spring leaves.

MAINTAINING YOUR 'JEEP' VEHICLE

PERIODIC INSPECTION

Proper maintenance of your 'Jeep' vehicle demands that it be given a thorough service inspection and lubrication at each 1000 miles [1.600 km.] of operation. Such an inspection consists of a careful road test and examination by a competent service technician to locate and analyze any small faults that may have developed. The prompt correction of minor faults thus discovered will go far toward holding down maintenance expense and costly delays in operation.

Your Willys 'Jeep' Dealer is

vitaly interested in your 'Jeep' vehicle and it will pay you to have him regularly inspect it. 'Jeep' dealers' service technicians have the advantage of complete factory specifications covering the vehicle as well as bulletins which are sent out by the factory.

The following paragraphs outline methods of making minor adjustments and also suggestions covering preventive maintenance. Should major repair work be necessary, consult your Willys 'Jeep' Dealer.

POWER PLANT

ENGINE TUNE-UP

For best performance and dependability, the engine should have a tune-up twice yearly, preferably in the spring and fall. Tune-up should include the following items:

- Clean and tighten the battery cable terminals, the battery ground connection and ground strap.
- Remove the spark plugs, clean them thoroughly and space the electrodes to .030" [0,76 mm.] gap.
- Remove the distributor cap and adjust the contact points. Adjust the points to .020" [0,51 mm.] gap.
- Check the ignition timing.
- Check the valve lash.
- Clean the fuel pump filter screen and check the fuel line connections.
- Start the engine and allow it to run until thoroughly warm, then set the carburetor throttle adjusting screw so the engine will idle at 600 rpm for the F4-134 engine and 550 rpm. for the L6-226 engine.
- Adjust the carburetor low speed idle screw so that the engine will idle smoothly.

Should the engine fail to perform satisfactorily and the trouble is definitely traced to the carburetor, consult your Willys Dealer. Carburetor service is specialized and should not be undertaken unless the unit is thoroughly understood.

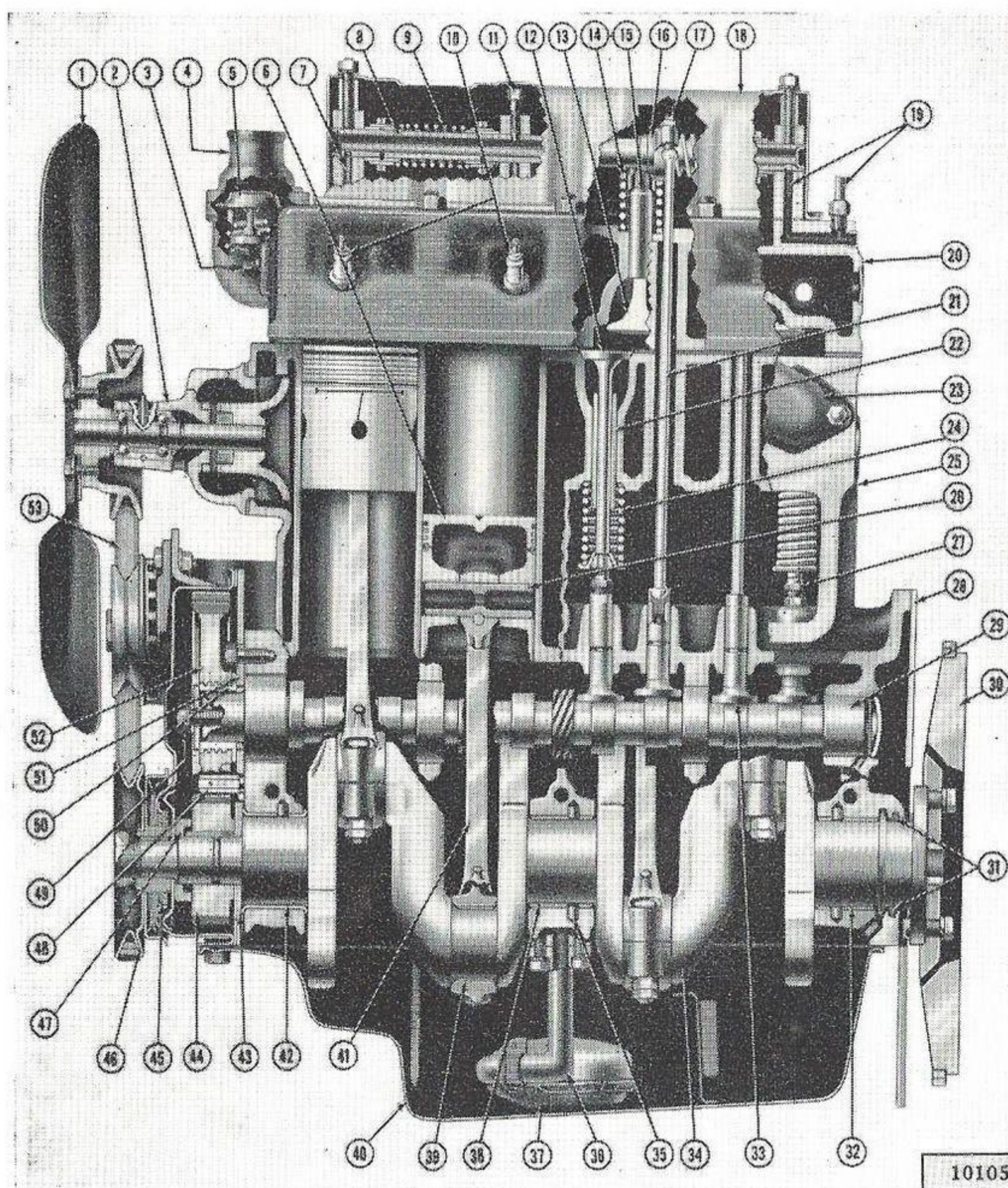


FIG. 14—MODEL F4-134 ENGINE

10105

- | | |
|---------------------------------|---------------------------------|
| 1—Fan | 28—Engine Rear Support Plate |
| 2—Water Pump | 29—Camshaft |
| 3—Plug | 30—Flywheel |
| 4—Water Outlet Fitting | 31—Rear Bearing Oil Seal |
| 5—Thermostat | 32—Rear Main Bearing Shell |
| 6—Piston | 33—Tappet |
| 7—Oil Return Tube | 34—Crankshaft |
| 8—Rocker Arm Shaft | 35—Main Bearing Dowel |
| 9—Rocker Arm Shaft Spring | 36—Oil Float Support |
| 10—Spark Plug | 37—Oil Float |
| 11—Rocker Arm Shaft Lock Screw | 38—Center Main Bearing Shell |
| 12—Exhaust Valve | 39—Connecting Rod Bearing |
| 13—Inlet Valve | 40—Oil Pan |
| 14—Inlet Valve Spring | 41—Connecting Rod |
| 15—Inlet Valve Guide | 42—Front Main Bearing Shell |
| 16—Rocker Arm | 43—Front Engine Plate |
| 17—Adjusting Screw | 44—Crankshaft Gear |
| 18—Rocker Arm Cover | 45—Crankshaft Front End Seal |
| 19—Oil Inlet Tube | 46—Fan and Generator Pulley |
| 20—Cylinder Head | 47—Crankshaft Gear Spacer |
| 21—Push Rod | 48—Timing Gear Oil Jet |
| 22—Exhaust Valve Guide | 49—Camshaft Gear Screw |
| 23—Exhaust Manifold | 50—Camshaft Thrust Plate Spacer |
| 24—Exhaust Valve Spring | 51—Camshaft Thrust Plate |
| 25—Cylinder Block | 52—Camshaft Gear |
| 26—Piston Pin | 53—Fan Belt |
| 27—Valve Tappet Adjusting Screw | |

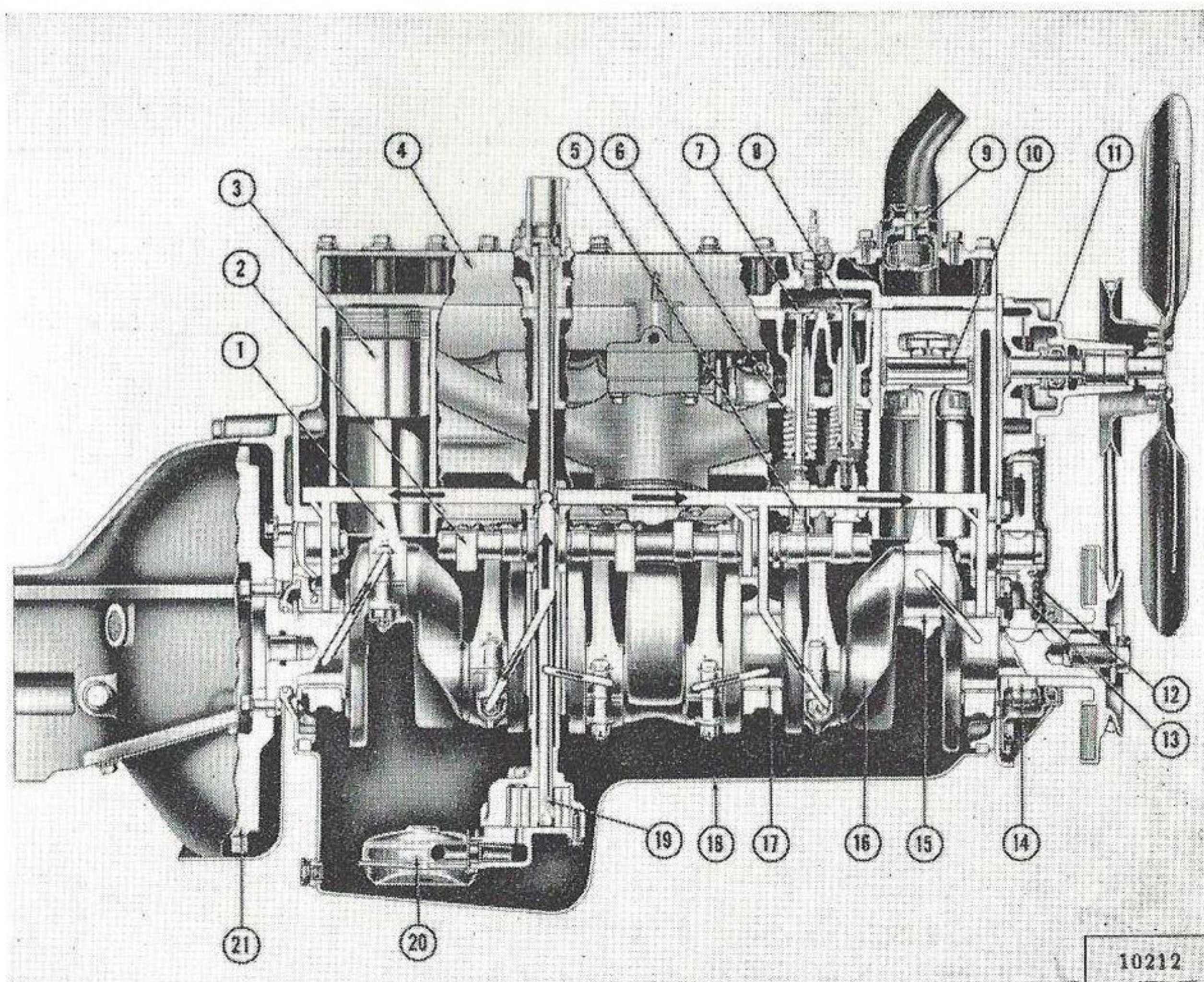


FIG. 15—MODEL L6-226 ENGINE

- | | |
|------------------|---------------------------|
| 1—Connecting Rod | 12—Timing Chain |
| 2—Camshaft | 13—Camshaft Gear |
| 3—Piston | 14—Crankshaft Gear |
| 4—Cylinder Head | 15—Connecting Rod Bearing |
| 5—Push Rod | 16—Crankshaft |
| 6—Valve Spring | 17—Crankshaft Bearing |
| 7—Exhaust Valve | 18—Oil Pan |
| 8—Intake Valve | 19—Oil Pump |
| 9—Thermostat | 20—Oil Intake Float |
| 10—Piston Pin | 21—Flywheel |
| 11—Water Pump | |

ENGINE MOUNTINGS

The rubber engine mountings, which are attached to the frame side rail brackets and to the support plate, prevent fore-and-aft motion of the engine, yet allow free sidewise and vertical oscilla-

tion which neutralizes vibration at the source. Keep the mountings tight. A loose engine may cause vibration, clutch chatter or high fuel level in the carburetor.

FLOATING OIL INTAKE

The floating oil intake is attached to the crankcase with two screws. The construction of the float and screen cause it to remain on top of the oil, preventing the circulation of water and dirt.

Once each year remove the float, screen and tube and clean

thoroughly with a suitable cleaning fluid. When replacing, be sure to install a new gasket between the float support and the engine crankcase. A leak at this point will allow air to enter the oil suction line, seriously affecting the oil pressure.

FUEL SYSTEM

The fuel system consists of the fuel tank, fuel lines, fuel pump, carburetor and air cleaner.

The most important maintenance attention is to keep the system clean and free of water, also periodically to inspect for leaks.

Should the vehicle be stored for an extended period, the fuel system should be completely drained and the engine started and allowed to run until the carburetor is emptied. This will avoid oxidation of the fuel, resulting in the formation of gum in the units of the system.

Gum formation is similar to hard varnish and may cause trouble in the fuel pump valves or the carburetor float valve may become stuck or the filter screen blocked. Gum formation can be dissolved by acetone, obtainable in most drug stores. In extreme cases, it will be necessary to disassemble and clean the fuel system, however, often one pint of acetone placed in the fuel tank with about one gallon of gasoline will dissolve any deposits as it passes through the system with the gasoline.

CARBURETOR

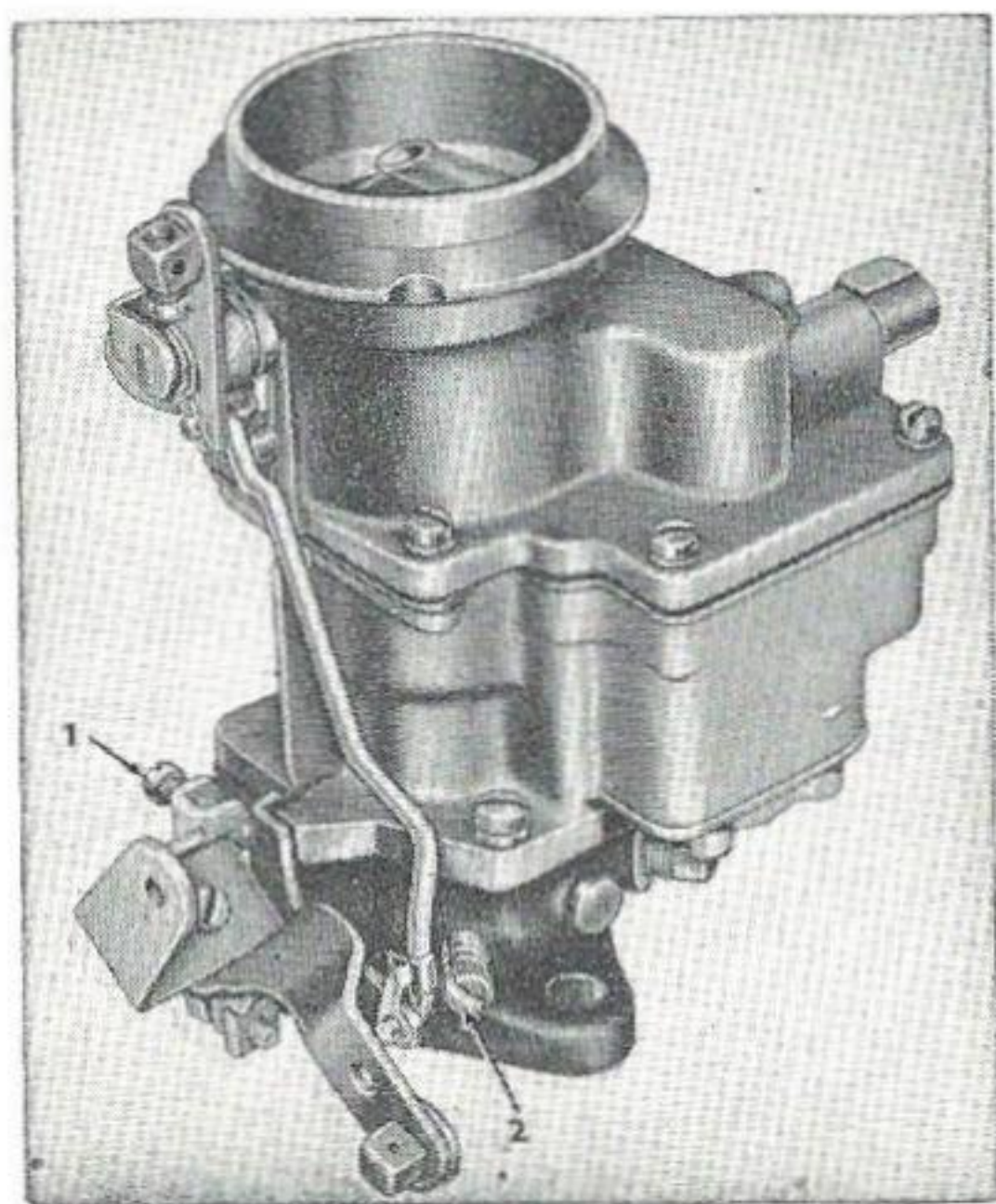


FIG. 16—CARBURETOR

The carburetor is the single downdraft type. It is a precision instrument designed to deliver the proper fuel and air mixtures at all engine speeds.

Carburetor parts wear little. The chief cause of faulty carburetor operation is the accumulation of dirt and water. Usually poor engine performance is not caused by the carburetor. Do not disturb the carburetor until it is proven that the trouble is not elsewhere. Should the carburetor be at fault, consult your Willys Dealer.

The carburetor is provided with an idle adjusting screw, No. 2, to secure smooth engine idle. The screw should be turned out from

the seat one to two turns for normal opening. For richer mixture turn the screw out; for leaner mixture, turn the screw in.

The carburetor is also provided with throttle lever adjusting screw, No. 1, to control the idle speed of the engine. Do not idle engine be-

low 600 rpm. for the F4-134 engine or 550 rpm. for the L6-226 engine.

Should the carburetor flood (too much gasoline), check the unit to make certain that the needle valve is seating properly and that the float is not stuck.

FUEL PUMP

The combination fuel and vacuum pump is of the diaphragm type operated from an eccentric on the camshaft.

The pump draws gasoline from the fuel tank, through a filtering screen mounted in the pump sediment chamber and forces it to the carburetor.

The principle trouble experienced with the fuel pump is caused by the accumulation of dirt and water in the sediment chamber and filtering screen. Regular cleaning of the screen and sediment chamber twice yearly will prevent annoying delays due to a blocked screen or water freezing.

The sediment chamber may be opened for cleaning by loosening

the cover retaining screw. The chamber and cover should be washed and wiped dry and the screen dried and then cleaned with a stiff brush. When reinstalling the cover, make certain that the cork gasket is not broken; reverse it and position it flat on the seat, then install the cover and tighten the retaining screw securely. After cleaning, start the engine and make a careful inspection to guard against leakage.

CAUTION: Do not attempt repairs which require disassembling of the fuel and vacuum pump other than cleaning, as special care is required. It is recommended that all fuel pump trouble be taken up with your Willys 'Jeep' Dealer.

FUEL SUPPLY TANK

When filling the tank, use care that no foreign matter or water enters. The fuel intake line in the tank is equipped with the latest type of fuel filter. This filter element resists the passage of both water and dirt. Once each spring and fall, when the fuel level in the tank is low, disconnect the fuel line

at the fuel pump inlet and blow the line out with compressed air. This will clean the sediment from the filter. After blowing out the line and filter, drain the tank by removing the drain plug in the bottom. This will remove any sediment which may have accumulated.

COOLING SYSTEM

The practice of checking the condition of the cooling system while lubricating your vehicle will guard against unnecessary and possibly costly delays in service. Inspecting the condition of the radiator and heater hoses, also the fan belt and water pump will eliminate the possibility of an over-

heated engine due to an unexpected water leak or loose or broken fan belt.

Flush the cooling system before adding antifreeze in the fall and after draining antifreeze in the spring. In climates where antifreeze solutions are not required, flush the cooling system twice a year.

RADIATOR

The radiator is designed to cool the water under all operating conditions; however, the core must be kept free from corrosion and scale and the air passages clear.

At least twice a year flush out the cooling system. A good way to do this is to open the drain cocks at the bottom of the radiator and in the cylinder block, back of the starter. Place a hose in the radiator filler opening and adjust the water flow to equal that draining from

the two openings. Start the engine and allow it to run until the cooling system is thoroughly flushed. After flushing, add corrosion inhibitor in the system to prevent the formation of rust and scale.

Should the air passages become clogged, do not use a metal tool of any kind to clean them. Use compressed air or water pressure and clean from the rear, forcing the dirt out through the front of the radiator.

RADIATOR PRESSURE CAP

The pressure cap helps to prevent loss of coolant by evaporation. It should never be replaced by a nonpressure type. The pressure cap, which maintains pressure in the cooling system up to 7 psi. [0,492 kg-cm²] makes the engine more efficient by permitting a slightly higher operating temperature. Vacuum in the radiator is relieved by a valve in the cap which opens at $\frac{1}{2}$ to 1 psi. [0,035 to 0,070 kg-cm²] vacuum.

To remove the radiator pressure cap when the engine coolant temperature is high or boiling, place a cloth over the pressure cap and turn counterclockwise about $\frac{1}{4}$ turn until the first (pressure release) stop is reached. Keep the cap in this position until all pressure is released. Then, push cap

down and turn still further until cap can be removed.

To install the pressure cap, place it in position and turn it clockwise as far as it will go.

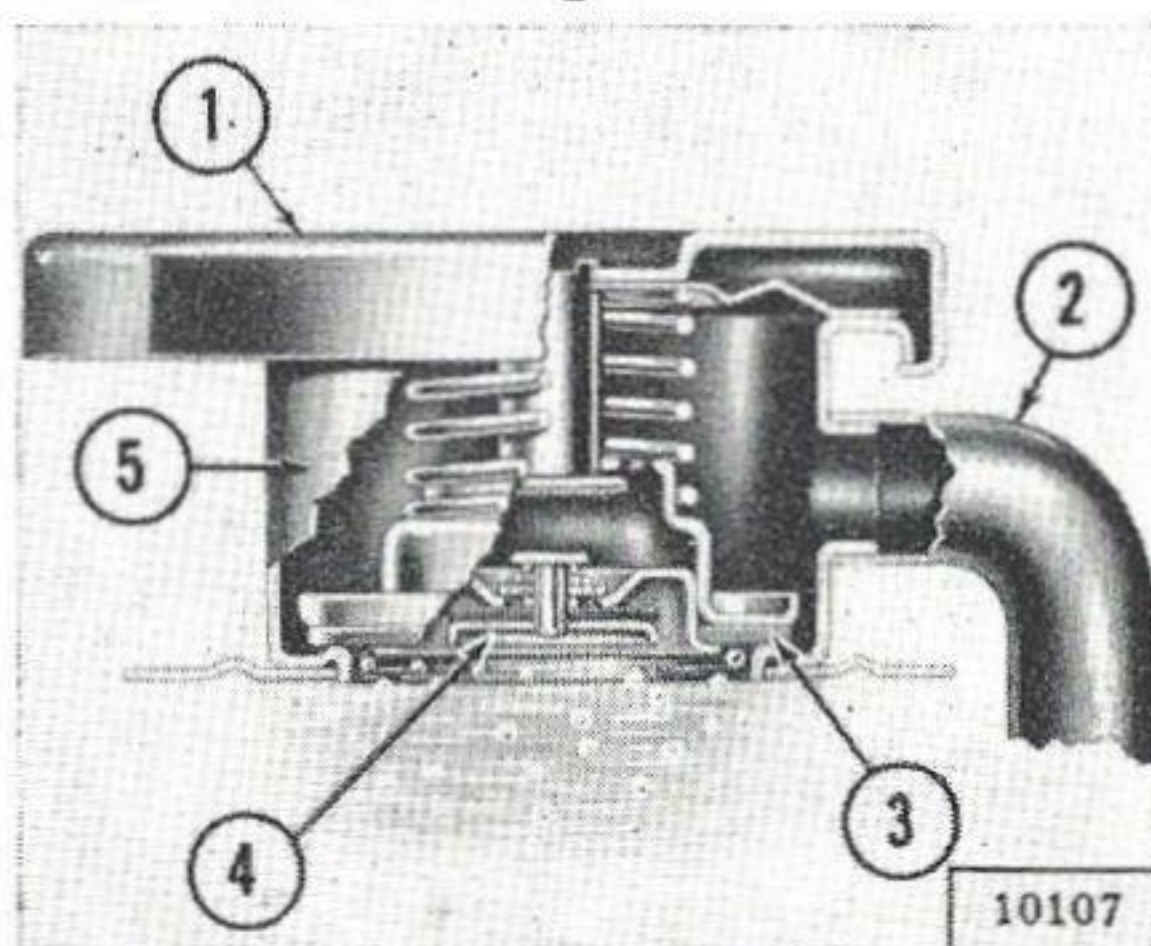


FIG. 17—RADIATOR CAP

- 1—Pressurized Radiator Cap
- 2—Overflow Tube
- 3—Pressure Seal
- 4—Vacuum Release Valve
- 5—Radiator Neck

DRAINING COOLING SYSTEM

Two drain cocks are provided to completely drain the cooling system. When draining the system, to guard against freezing damage, use care that both cocks are opened. One drain is in the bottom of the radiator and the other in the cylinder block directly behind the starter. Remove the radiator cap to break any vacuum which might prevent thorough draining.

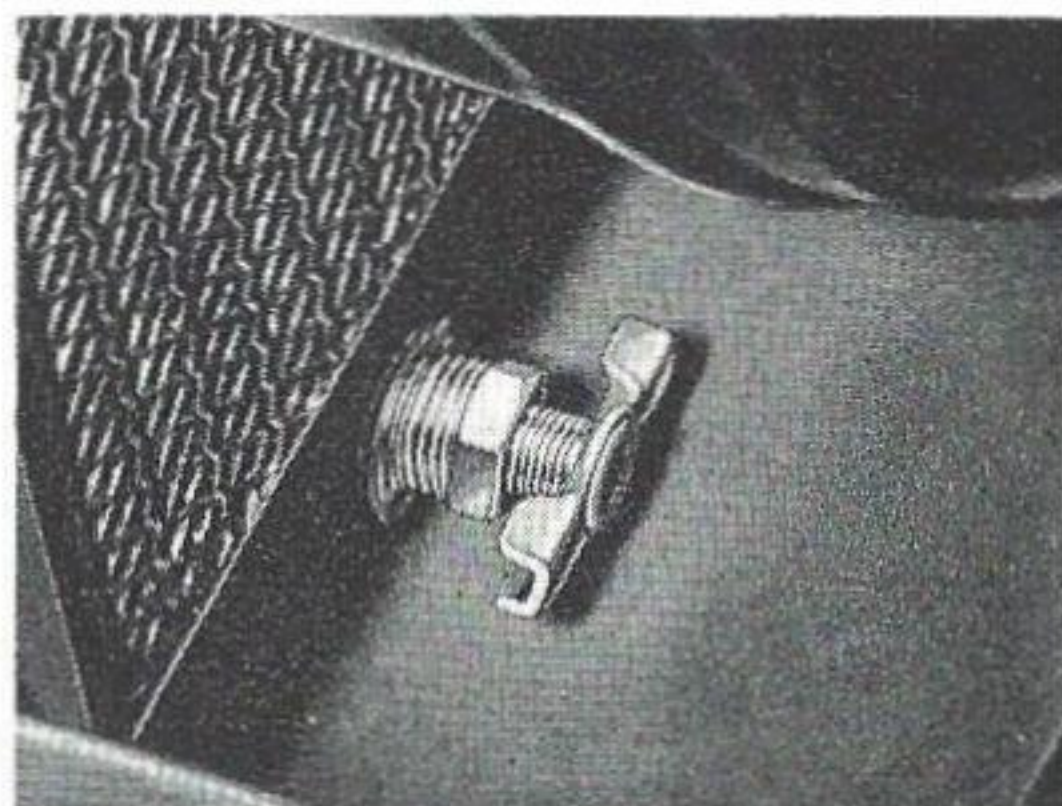


FIG. 18—RADIATOR DRAIN

THERMOSTAT

A thermostat is used to provide quick warming and to prevent overcooling during normal vehicle operation. The temperature at which the unit operates is set by the manufacturer and cannot be altered. The valve starts to open at 165°F. [74°C.]. Should sudden

overheating occur, check the thermostat first as failure of this unit to operate will nearly block the water circulation. As a test remove the thermostat and if overheating is eliminated, install a new one.

WATER PUMP

The water pump is a centrifugal impeller type of large capacity to circulate the water in the entire cooling system.

The sealed type double-row ball bearing is integral with the shaft and is prelubricated at the time of assembly with a special high melt-

ing point grease, so requires no lubrication for the life of the bearing.

The pump is designed to give maximum service without adjustments. Should trouble develop, consult your Willys Dealer.

FAN BELT

The fan and generator are driven by a V-type belt. The drive is on the sides of the belt so it is not necessary to adjust it tight which might cause rapid wear of the water pump and generator bearings. Ad-

just the belt by swinging the generator away from the engine until the belt can be depressed $\frac{1}{2}$ " [1,27 cm.] by thumb pressure midway between the pulleys.

COLD WEATHER PRECAUTIONS

In regions where winter temperatures can be expected to drop below 32°F. [0°C.] precautions must be taken to prevent freezing of the water in the cooling system. Without the protection of sufficient antifreeze solution added to it, water in the cooling system will freeze and expand, possibly bursting the radiator and the cylinder block.

It is important that the cooling system be made leak-proof before installing any antifreeze solution. Be sure that hose connections are tight and that the hoses are in good condition. Should there be doubt regarding the condition of either radiator hoses or heater

hoses, replace them.

The base for the two most common antifreeze solutions is either methyl alcohol or ethylene glycol. Do not mix these two types in the cooling system as a hydrometer will not give an accurate reading of the mixture.

Methyl alcohol has a lower evaporation point than ethylene glycol. For this reason, when alcohol base solution is used it should be checked at least once a week. Use of ethylene glycol (permanent) is mandatory when a high-temperature thermostat has been installed.

Immediately after adding anti-

freeze, run the engine a few moments to thoroughly mix the solution.

The following tables show the

degree of protection obtained from adding different amounts of anti-freeze.

ANTIFREEZE CHART

ANTIFREEZE			PROTECTION TO TEMPERATURE SHOWN			
Quarts U.S.	Quarts Imperial	Liters	Methyl Alcohol		Ethylene Glycol	
			Fahr.	Cent.	Fahr.	Cent.
11-Quart System						
2	1 $\frac{2}{3}$	2	13°	-10,5°	18°	- 7,6°
3	2 $\frac{1}{2}$	2 $\frac{3}{4}$	0°	-17,7°	8°	-13,3°
4	3 $\frac{1}{3}$	3 $\frac{3}{4}$	-18°	-27,7°	- 6°	-21,1°
5	4 $\frac{1}{4}$	4 $\frac{3}{4}$	-38°	-38,8°	-23°	-30,5°
6	5	5 $\frac{2}{3}$			-47°	-43,8°
12-Quart System						
2	1 $\frac{2}{3}$	2	15°	- 9,5°	19°	- 7,2°
3	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3°	-16,1°	10°	-12,2°
4	3 $\frac{1}{3}$	3 $\frac{3}{4}$	-12°	-24,4°	0°	-17,7°
5	4 $\frac{1}{4}$	4 $\frac{3}{4}$	-31°	-35,0°	-15°	-26,1°
6	5	5 $\frac{2}{3}$	-50°	-35,5°	-34°	-36,6°
13-Quart System						
2	1 $\frac{2}{3}$	2	16°	- 8,9°	21°	- 6,1°
3	2 $\frac{1}{2}$	2 $\frac{3}{4}$	6°	-14,4°	13°	-10,5°
4	3 $\frac{1}{3}$	3 $\frac{3}{4}$	- 8°	-22,2°	3°	-16,1°
5	4 $\frac{1}{4}$	4 $\frac{3}{4}$	-23°	-30,5°	-10°	-23,3°
6	5	5 $\frac{2}{3}$	-40°	-40,0°	-25°	-31,6°
7	5 $\frac{3}{4}$	6 $\frac{1}{2}$			-44°	-42,2°

ELECTRICAL SYSTEM

Your 'Jeep' vehicle has either a 6-volt or 12-volt electrical system. As the electrical circuits remain the same for both systems, the wiring diagrams represent both 6-volt and 12-volt wiring. However, bulbs and electrical components are not always interchangeable and a replacement item of the correct voltage rating must be secured.

Use caution around the higher

voltage of the 12-volt system as accidental short circuits are more capable of damaging electrical units. Also, arcs around the 12-volt battery are more apt to ignite any gas that may be escaping from it.

All electrical contact points should be checked regularly for secure and corrosion-free connections.

BATTERY

The battery is either a 12-volt, 50 hour capacity or a 6-volt, 105-ampere hour capacity. It is located under the hood on a bracket to the left hand side of the dash and is held firmly in the bracket with a hold-down frame, and two studs and wing nuts.

Check the battery once a week

with a hydrometer and at the same time check the electrolyte level in each cell; add distilled water to maintain the solution level $\frac{3}{8}$ " [9,52 mm.] above the plates. Avoid overfilling and do not fail to replace the filler caps and tighten securely. If the plates are exposed for any length of time, they can

be seriously damaged, therefore, it is important to add enough water to keep the plates covered.

A hydrometer reading of 1.260 indicates that the battery is fully charged. Should the reading fall below 1.225 it will be necessary to recharge it or else use the lights and starting motor sparingly until the battery has had an opportunity to build itself up again.

Coating the battery terminals with light grease will protect them from corrosion. The battery must be held securely in place, otherwise it may shift, resulting in loose connections, broken cells or other trouble.

Should a sufficiently charged battery fail to crank the engine, it is probably due to loose or corroded terminals or ground connection. The terminal connections should be removed and all corrosion cleaned from them as well as the posts, to

insure proper contact. A strong solution of baking soda and water will be found effective to neutralize and remove the corrosion.

WARNING: Do not allow flames or sparks to be brought near the vent openings of the battery since hydrogen gas, produced in the course of the battery's normal operation in the vehicle, may be present in the battery and might explode. The liquid in the battery is a solution of sulphuric acid which, if accidentally spilled on the skin or splattered in the eyes should, as a first-aid measure, be flushed away promptly with quantities of clear water only. Seek medical aid if discomfort continues. If acid is spilled on the clothes, wet it thoroughly with a weak solution of ammonia or with sodium bicarbonate or baking soda dissolved in water.

ENGINE GROUND STRAP

The rubber engine mountings insulate the engine from the frame. To assure a positive electrical connection between the engine and the frame, a ground strap is provided at the front engine support.

The attaching screws must be kept tight and the connections clean. A loose or poor connection may result in hard engine starting, low charging rate of the generator or sluggish operation of the starting motor.

GENERATOR

The generator is either a 12-volt-30-ampere or a 6-volt, 45-ampere, two-brush unit. The output is automatically controlled by the regulator which limits the current generated to that which is required by the battery.

As a general rule, it will not pay an owner, not having specialized test equipment, to undertake generator repairs. There are some adjustments which may be made however, and these are outlined below.

Should the generator stop charging or fail to charge sufficiently to cause the indicator light to "cut

off", examine all the external wiring connections to be sure they are clean and tight. On 12-volt units, no further inspection can be made. On 6-volt units, note the condition of the commutator and brushes. If the commutator is dirty, or discolored, clean it by holding a piece of No. 00 sandpaper against it with the engine running at idle speed. Do not use emery or carborundum cloth.

Check the brushes — they must slide freely in their holders and if they are badly worn or oil soaked, they must be replaced.

Excessive arcing between the

commutator and brushes usually indicates incorrect seating of the brushes against the commutator or high mica insulation between the commutator segments. Incorrect seating may be corrected by drawing a piece of No. 00 sandpaper around the commutator with

the sanded side against the brushes. After sanding, blow the carbon dust and sand from the generator.

Should the above attention fail to make the unit operate satisfactorily, consult your Willys Dealer.

VOLTAGE REGULATOR

Do not attempt to adjust the regulator, for without highly specialized test equipment, correction of faults cannot be accomplished. This unit must be adjusted with extreme accuracy; heat as well as

voltage and amperage must be considered in making adjustments. Should trouble develop in this unit either install a new unit or consult your Willys 'Jeep' Dealer.

DISTRIBUTOR

The distributor delivers the spark for ignition to each cylinder at the correct time. A mechanical breaker, built into the distributor, opens and closes the primary circuit at the exact time for ignition.

The distributor cap should be kept clean for efficient operation. It should be inspected periodically for cracks, carbon runners, evidence of arcing and badly corroded high tension terminals. If any of these conditions exist, the cap should be replaced.

Inspect the distributor rotor for cracks or evidence of excessive burning at the end of the metal strip. After a rotor has had normal use, the end of the metal strip will become burned. If burning is found on top of the rotor, it indicates the rotor is too short and should be replaced. Usually when this condition is found, the distributor cap segment will be burned on the horizontal face and the cap should also be replaced.

The distributor contact points should be kept clean as dirty, burned or pitted points may cause misfiring. The contact gap should be set at .020" [0,51 mm.]. When making adjustments, be sure that the fiber block in the breaker arm

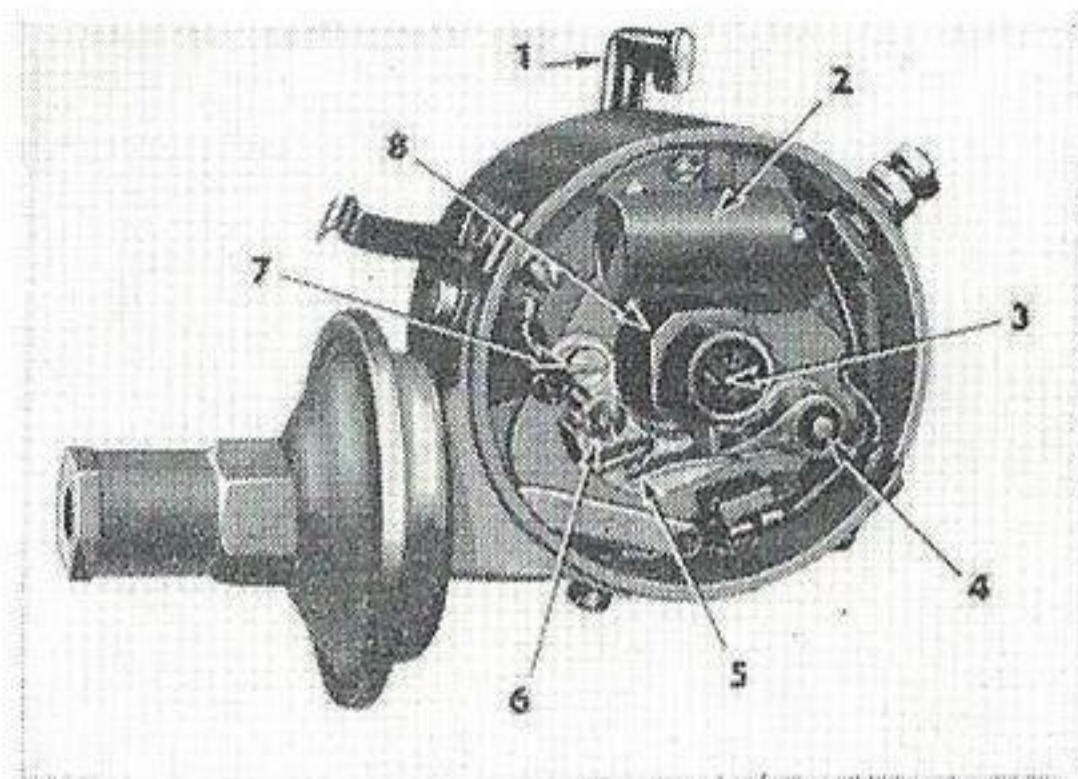


FIG. 19—DISTRIBUTOR
F4-134 ENGINE

- | | |
|---------------------|----------------------|
| 1—Oiler | 5—Distributor Points |
| 2—Condenser | 6—Lock Screw |
| 3—Lubricating Wick | 7—Adjusting Screw |
| 4—Breaker Arm Pivot | 8—Breaker Cam |

rests on the highest point of one of the cams. Adjust the points by loosening the lock screw and turn-

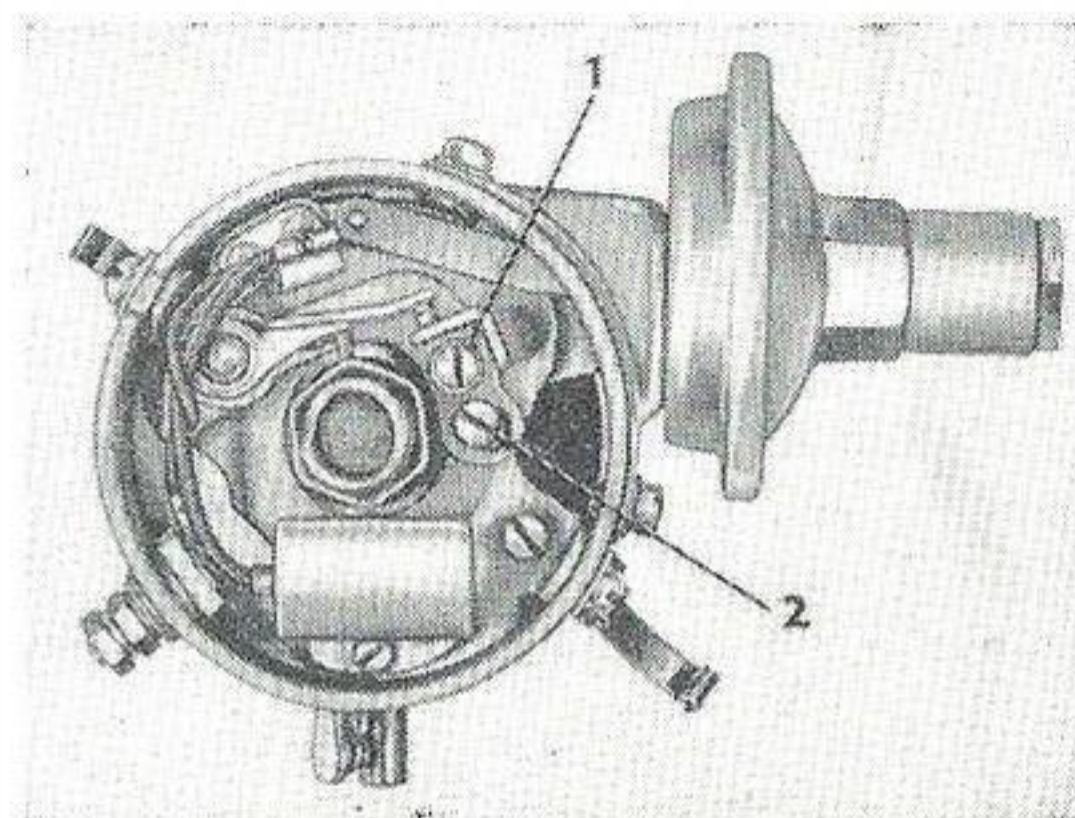


FIG. 20—DISTRIBUTOR
L6-226 ENGINE

- | |
|-------------------|
| 1—Lock Screw |
| 2—Adjusting Screw |

ing eccentric adjusting screw. Recheck the gap and timing after tightening the lock nut.

Should new contact points be installed they should be aligned so

as to make contact at the center of the contact surface. Bend the stationary contact bracket to secure correct alignment and then recheck the gap and timing.

IGNITION TIMING

To set the timing, remove all the spark plugs except No. 1. Rotate the crankshaft until No. 1 piston is coming up on the compression stroke. This can be determined by resistance in the cylinder.

Remove the spark plug and continue to turn the crankshaft slowly until the 5° before top center mark is reached. This places the piston in the correct position to set the ignition timing.

Loosen the distributor clamp and rotate the distributor assembly until the distributor rotor arm points to No. 1 terminal in the distributor cap and the distributor points just start to break. To advance the timing turn the distributor in a clockwise direction; to retard it, turn in a counterclockwise direction. Tighten the clamp screw firmly

ly but do not over-tighten it.

After setting the timing, revolve the crankshaft two complete turns to make sure all backlash is eliminated. Again check the timing to the "5° BTC" mark.

Ignition must be accurately set to obtain maximum engine efficiency. The above information is given only to enable the operator to place the vehicle back in service should trouble develop. At the first opportunity, have your Willys 'Jeep' Dealer check the setting with a neon timing lamp. This lamp can also be used to check the automatic spark advance operation by accelerating the engine.

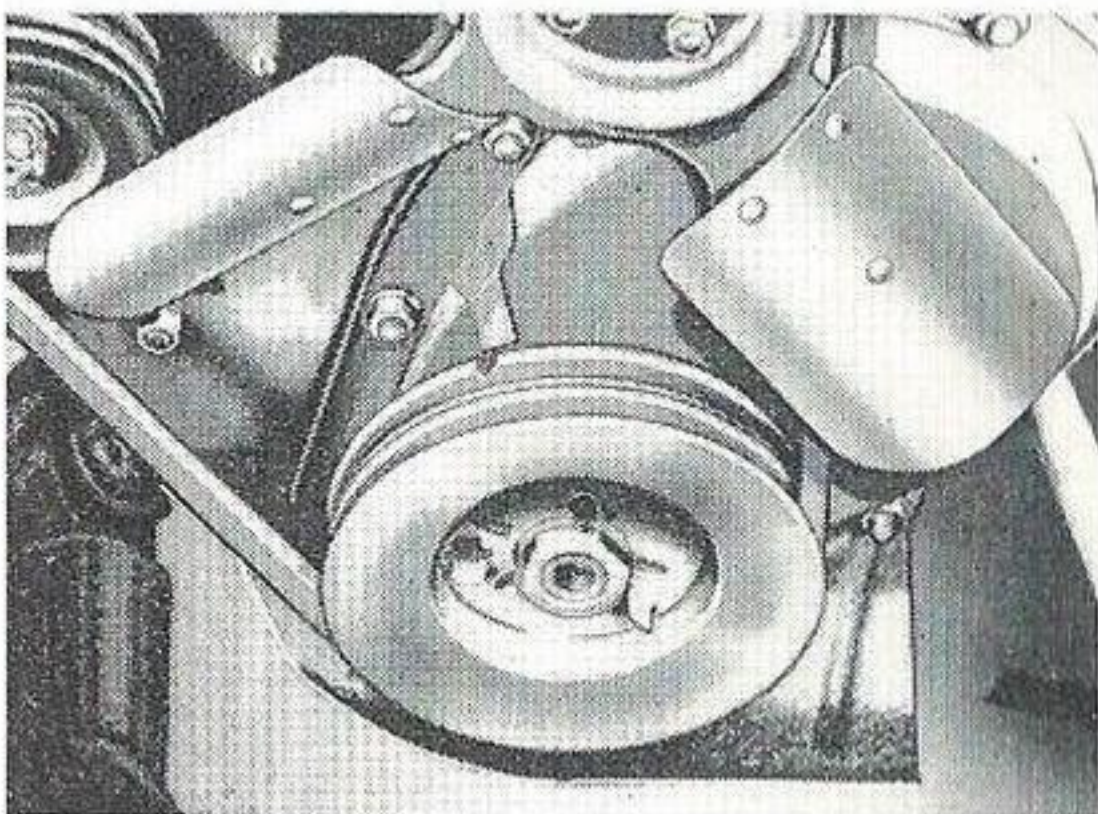


FIG. 21—TIMING MARKS
F4-134 ENGINE

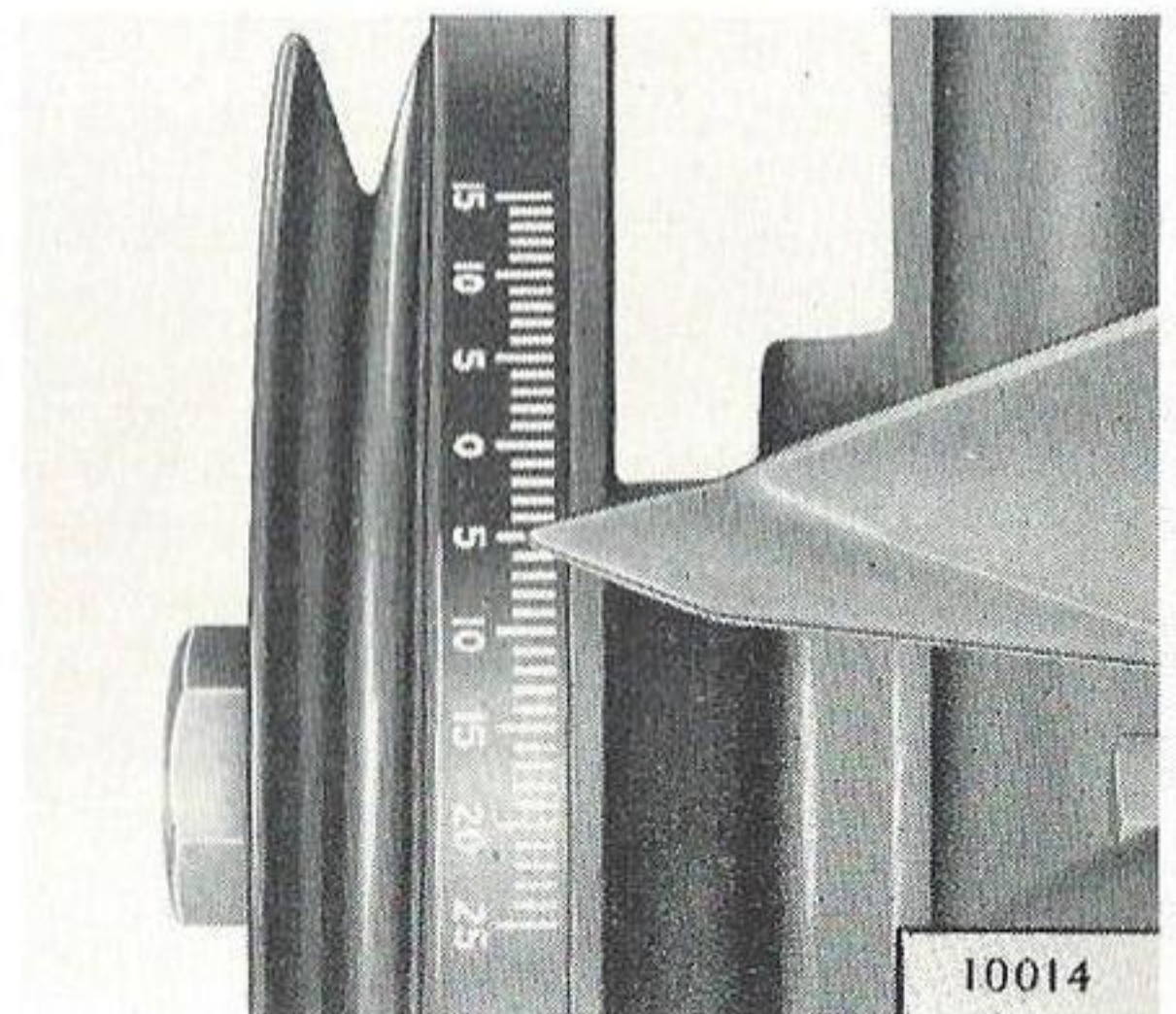


FIG. 22—TIMING MARKS
L6-226 ENGINE

SPARK PLUGS

Keep spark plug porcelains clean. Dirty oil covered porcelains will cause hard engine starting and poor operation, especially in damp weather.

The spark plug electrode gap should be set at .030" [0,76 mm.]. Too wide gap will cause misfiring at high speeds and when operating with wide open throttle, while a small gap causes poor idling. Uniform gap setting assures smooth engine operation.

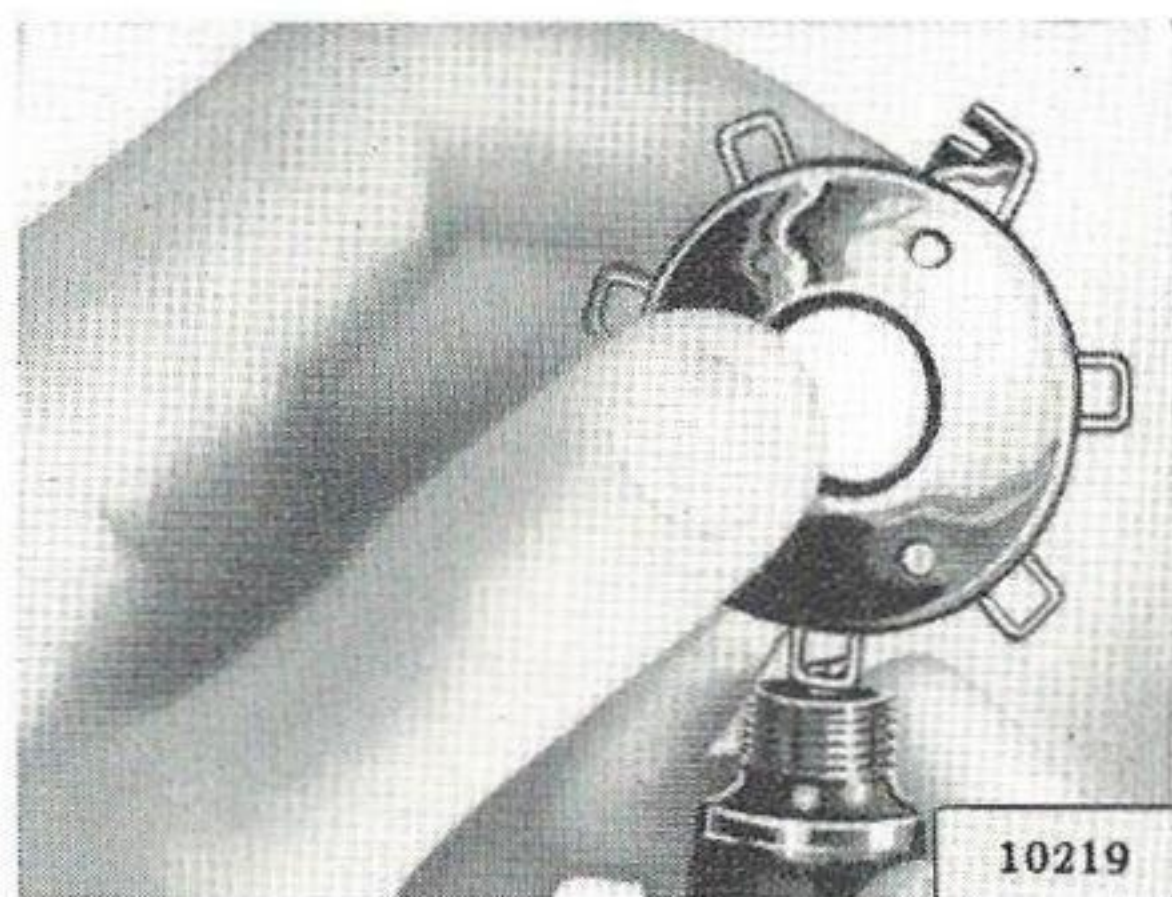


FIG. 23—SETTING GAP

STARTING MOTOR

The starting motor is equipped with sealed type bearings and requires no lubrication. The starting circuit should be checked periodically. All connections should be clean and tight. Insulation on the

wires should not be worn or damaged.

The brushes must slide freely in their holders and make full contact on the commutator. Worn brushes should be replaced.

BENDIX DRIVE

The starter is equipped with the Bendix Folo-Thru type drive which is designed to overcome premature demeshing of the drive pinion from the flywheel ring gear until a pre-

determined engine speed is reached.

No adjustment or repairs are possible on this drive and a complete new unit must be installed if trouble develops.

LIGHTING SYSTEM

The wiring of the lighting system is shown in the wiring diagram. The lighting circuit is protected by an overload circuit breaker mounted on the back of the main

light switch and no replaceable fuse is required. It clicks on and off in the event of a short circuit in the wiring.

MAIN LIGHT SWITCH

The main light switch controls all vehicle lights with the exception of the stop light. It is a combination plunger and rotary type.

The headlights are operated by pulling the control knob all the way out, the parking lights half-way out and all the way in is the "off" position.

The rotary feature of the switch controls the instrument panel and dome lights. A rheostat is built in the switch so that the instrument

panel light may be dimmed. Turning the control knob to the left provides a dimmed instrument light which becomes progressively brighter as the control is turned. At the extreme left movement of the knob, when the instrument light is brightest, the dome light is turned on to provide maximum interior lighting.

Should it be necessary to install a new switch, refer to the wiring diagram, which indicates the cor-

rect wires to install on the terminals which are identified.

To remove the switch, loosen the set screw on the side of the control knob and remove the knob. The retaining nut may then be removed and the switch removed through the rear of the instrument panel.

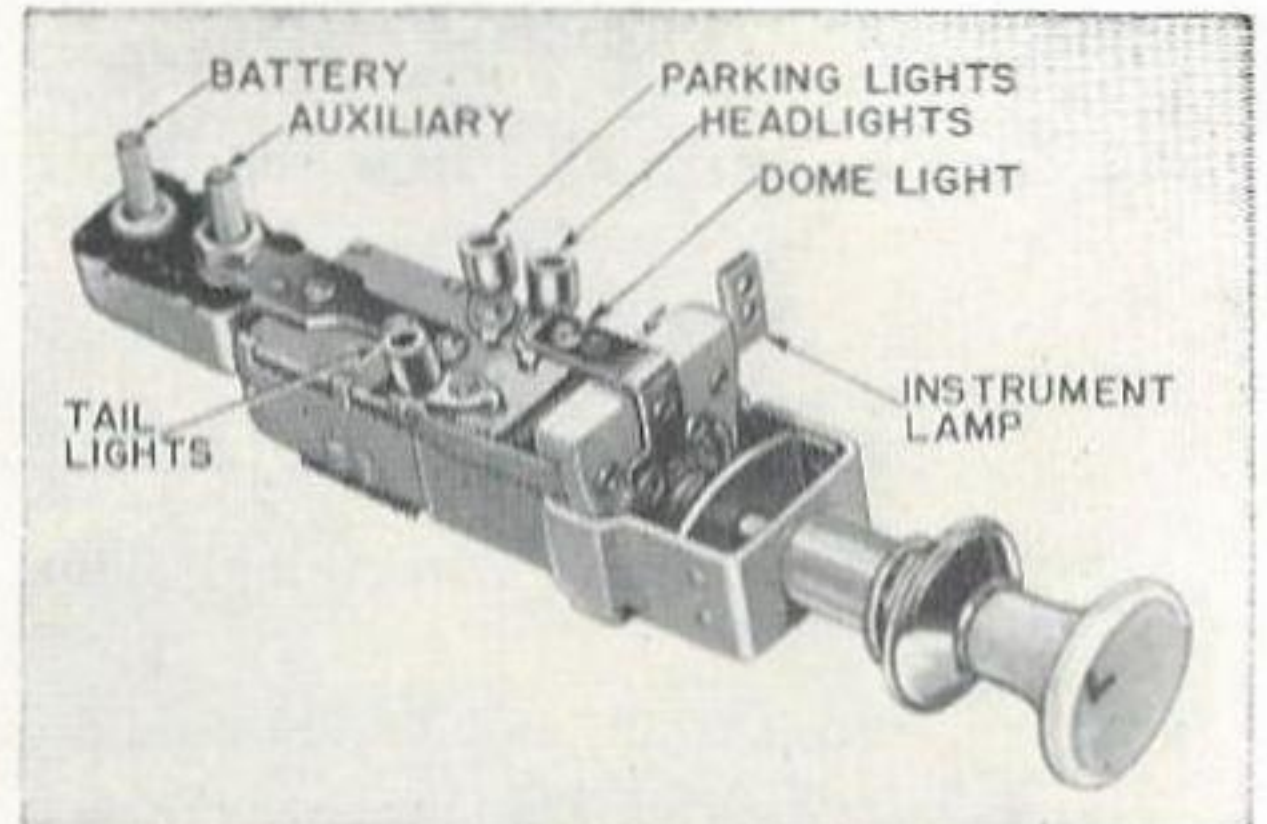


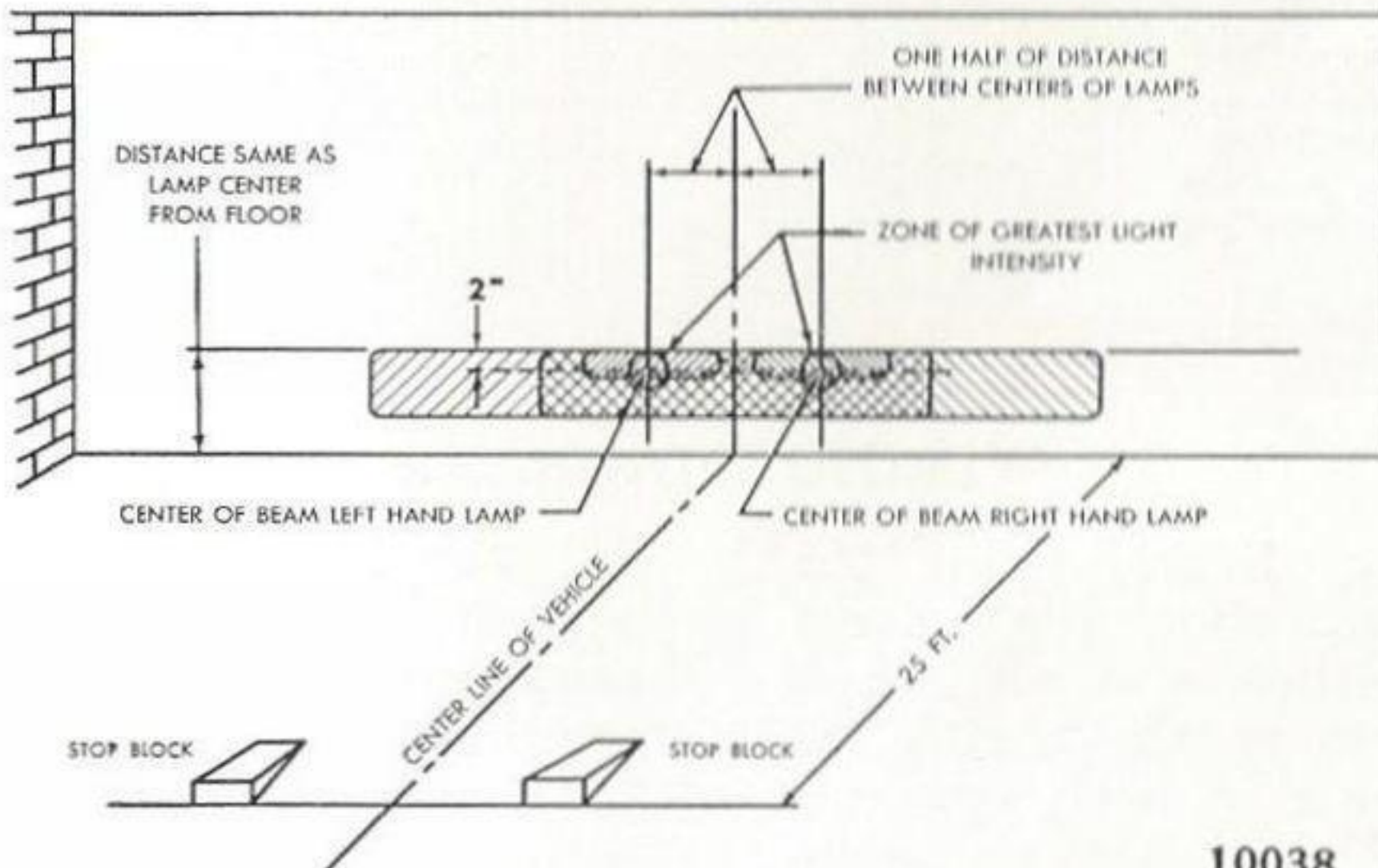
FIG. 24—MAIN LIGHT SWITCH

HEADLIGHT AIMING

Head lamps may be aimed correctly by using an aiming screen or wall providing a clear, level space of 25 feet [7,62 m.] from the front of the headlights to the screen or wall is available.

The screen should be made of

light colored material and should have a black center line for use in centering the screen with the vehicle. The screen should also have two vertical black lines, one on each side of the center line at a distance equal to the lamp centers.



10038

FIG. 25—HEADLIGHT AIMING CHART

Place the vehicle on the floor with the tires inflated to the recommended pressure for highway use. Set the vehicle 25 feet [7,62 m.] from the front of the screen or wall, so that the center line of the vehicle is in line with the center line on the screen.

Measure from the floor to the center of the head lamp and mark a horizontal line on the screen 2 inches [50,8 mm.] less.

Turn on the head lamp upper beam, cover one lamp and check the location of the beam on the

screen. The center of the "hot spot" should be centered on the intersection of the vertical and horizontal lines.

If the aim is incorrect, remove the head lamp door screw and remove the door, then adjust the two screws in the mounting ring to move the head lamp unit until the beam is correctly aimed, then tighten.

Cover the head lamp aimed and adjust the other in the same manner.

LAMP BULB TRADE NUMBERS

The following bulb and fuse trade numbers should be used for replacements:

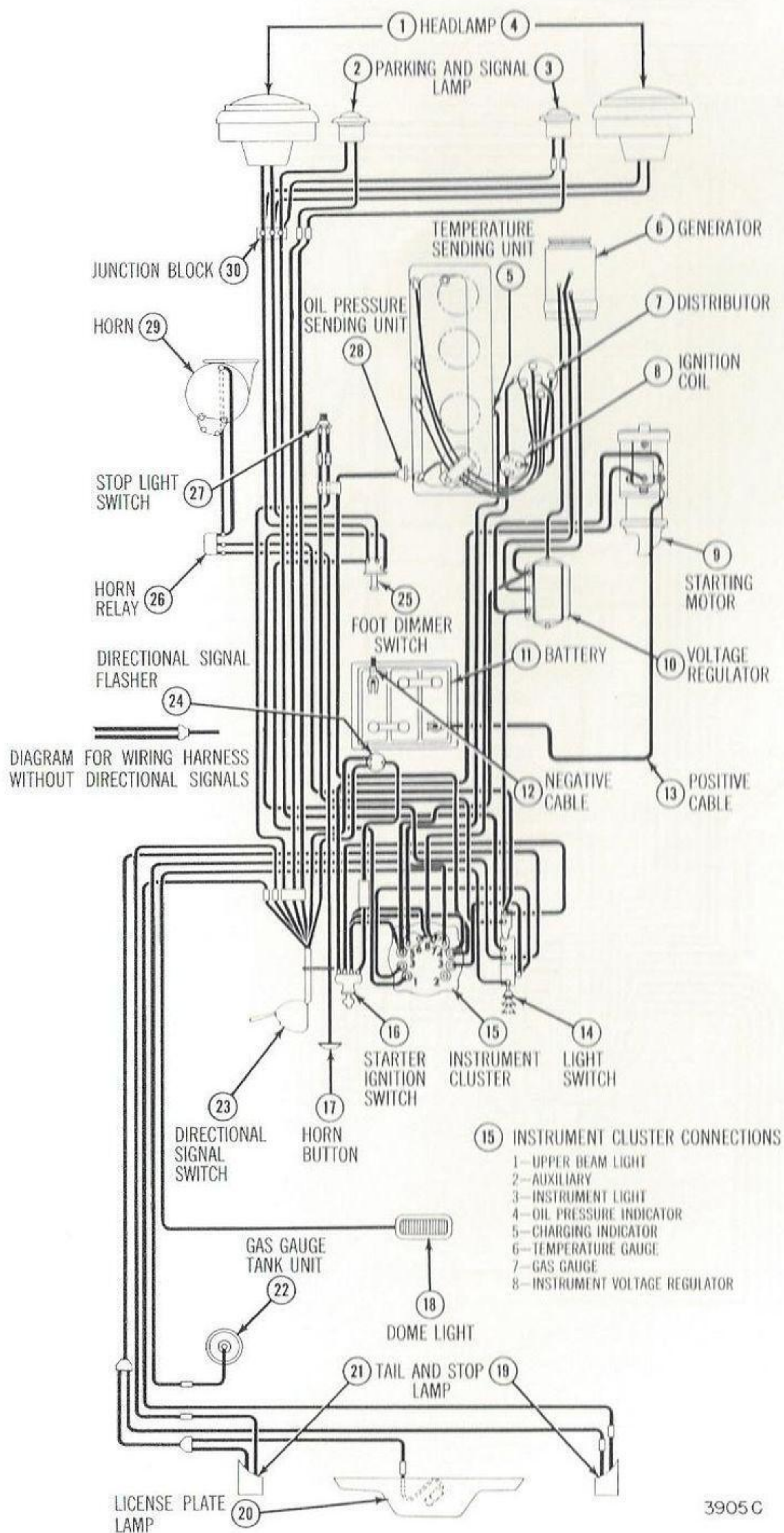
	VEHICLE EQUIPPED FOR:	
	6 Volt	12 Volt
Front Lamps:		
Headlamp.....	5040-S	5400-S
Parking.....	63	67
*Parking and Directional Signal.....	1158	1176
Rear Lamps:		
Stop, Tail, and Directional Signal.....	1158	1034
License Plate.....	63	67
Indicator Lamps:		
Headlamp Beam.....	51	53
*Directional Signal.....	51	53
Charge.....	51	53
Oil Pressure.....	51	53
Cab Interior Lamps:		
*Dome Lamp.....	87	93
Instrument Lamp.....	55	57
*Directional Signal Flasher Type.....	P229D	524
Fuse Data:		
*Directional Signal.....	SFE 14	SFE 9
*Heater.....	SFE 14	SFE 9
*Overdrive.....	SFE 20	SFE 14

*Optional Equipment

WIRING DIAGRAMS

The wiring diagrams on the following pages show the correct wiring for either a 6-volt or a 12-volt vehicle as the wiring remains the same in both systems.

A 6-volt battery is shown and the 12-volt battery is located in the same position and has the same ground.



3905 C

FIG. 26—WIRING DIAGRAM—F4-134 4x2

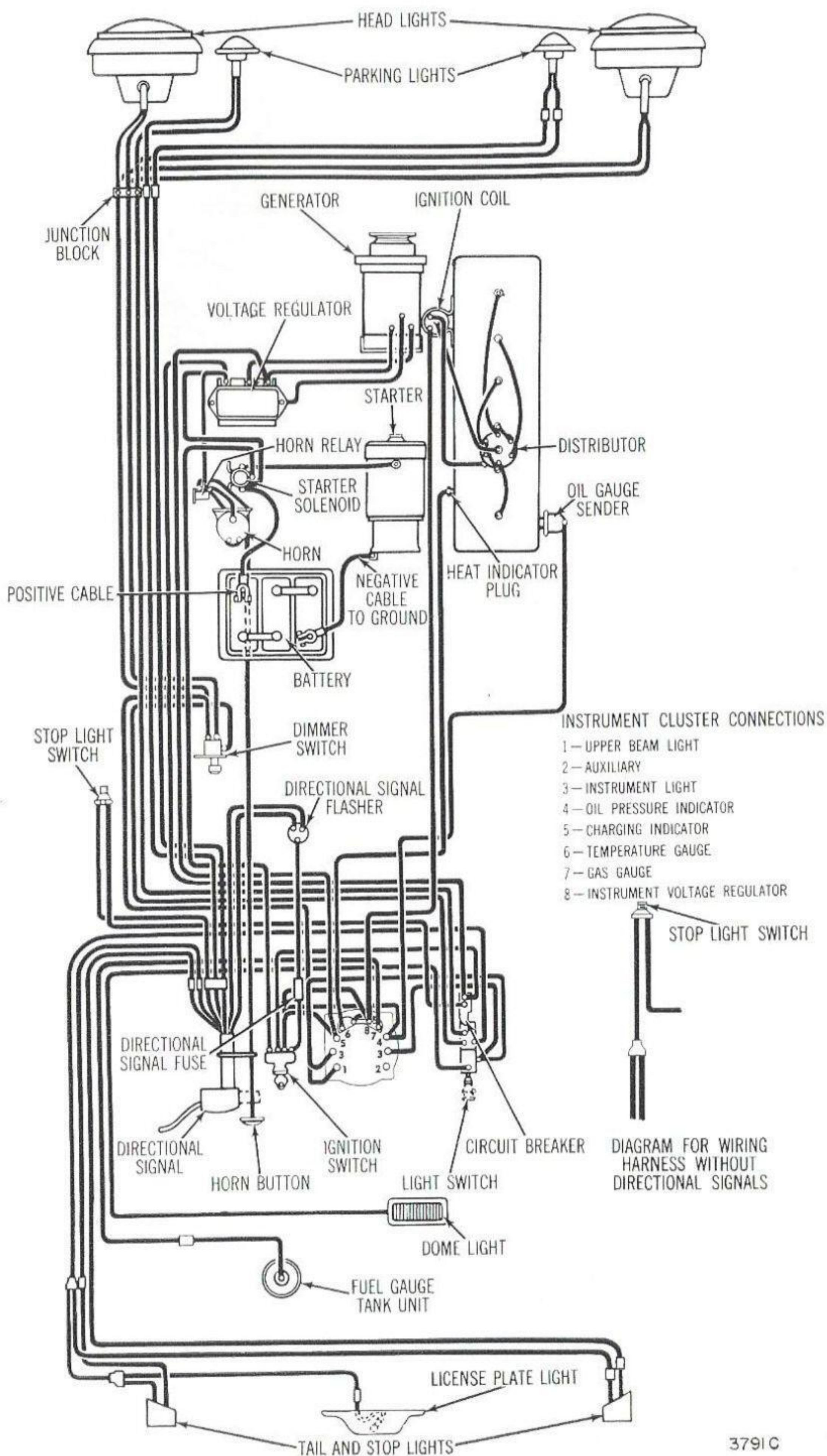


FIG. 27—WIRING DIAGRAM—L6-226 4x2

DRIVING COMPONENTS

CLUTCH

The clutch is the single plate, dry disc type. It provides smooth engagement of the engine power to the wheels. The clutch consists of a pressure plate assembly with pressure springs and release levers, and a driven plate assembly with spring center vibration neutralizers and two flexible facings.

As the clutch facings wear, the free travel of the clutch pedal (the distance the pedal moves down before any resistance is felt) decreases. The standard free travel is 1" [2,54 cm.]. It is important to maintain this clearance to prevent clutch release bearing wear and clutch slippage. No adjustment of the clutch proper is required to compensate for wear of the facings.

The free pedal travel is adjusted at the threaded connection between the clutch control lever and clutch control tube lever. To increase the free travel, loosen the lock nut and screw the adjusting nut forward.

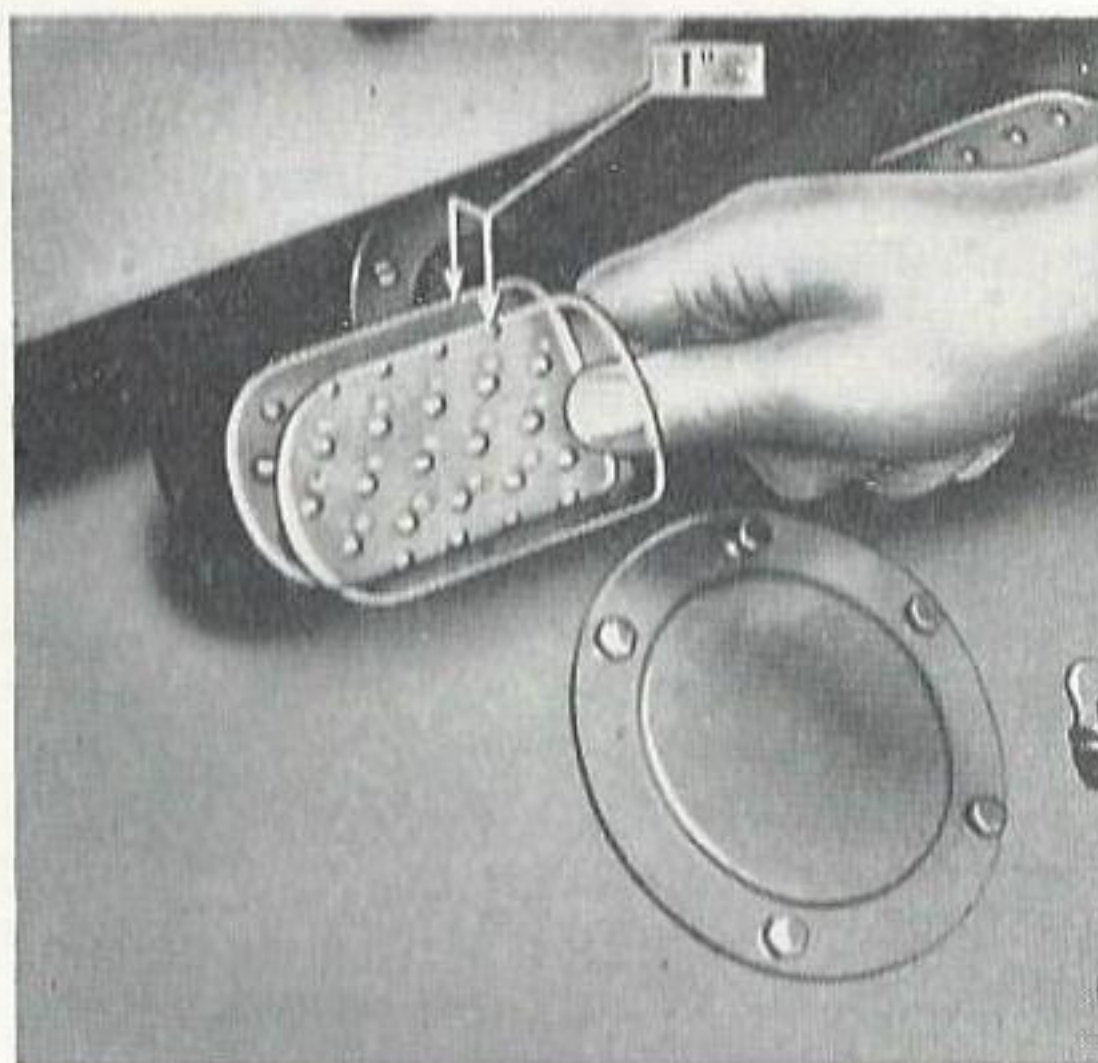


FIG. 28—CLUTCH PEDAL ADJUSTMENT

CAUTION: Avoid the practice of resting the foot continuously on the clutch pedal while driving and do not slip the clutch excessively instead of shifting gears. Slipping the clutch causes excessive heat, with the result that the clutch is finally made inoperative.

TRANSMISSION

The transmission is a three-speed synchromesh unit with remote control steering-post shift. It is bolted to the rear of the flywheel bell housing and is supported on a rubber insulator at the center frame cross member which forms the engine support.

If the shift is not smooth and positive, correction can usually be made in the following manner. First, place the gear shift lever in the neutral position, then remove the shift rod clevis pins at the transmission. Next, make sure the transmission gears are in the neutral position. The gears are in neutral when the two control levers on the side of the transmission are

in such a position that either of the levers can be freely moved while the other remains stationary.

Slip a piece of $\frac{1}{4}$ " [6,35 mm.] snug fitting rod (or a $\frac{1}{4}$ " drill) through the gearshift levers and the housing to assure the correct neutral position of the shift mechanism.

So adjust the shift rod yokes that the clevis pins can be slipped freely into place without moving the control levers on the transmission. Then pull out the alignment rod.

Should unsatisfactory shifting remain after making these adjustments, it is advisable to consult your Willys 'Jeep' Dealer.

OVERDRIVE

Overdrive is optional equipment on all models. The overdrive unit is attached to the rear of the transmission. Overdrive is accomplished by means of planetary gearing. The overdrive is electrically con-

trolled. Most difficulties with the overdrive are electrical. Should trouble develop, it is recommended that you consult your Willys 'Jeep' Dealer.

PROPELLER SHAFT

The drive from the transmission to the rear axle is completed through a propeller shaft equipped with two universal joints. The splined slip joint at the front end of the shaft allows for variations in distance between the transmission and the axle due to spring action.

Examine the propeller shaft periodically for foreign matter which may become wrapped around it. Check for dents or a bent shaft and make sure that the universal joint attaching bolts are tight at all times.

The universal joints have needle type bearings and are so designed

that correct assembly is very simple. No hand fitting or special tools are required.

The journal trunnion and needle bearings are the only parts subject to wear, and when it becomes necessary to replace these parts, the propeller shafts must be removed from the vehicle to make replacement. When reinstalling, note that the splines are to be assembled so the yokes of the universal joints at the front and rear are parallel, avoiding vibration. The U-type attaching bolt nuts should be tightened evenly with approximately the same pressure on each nut.

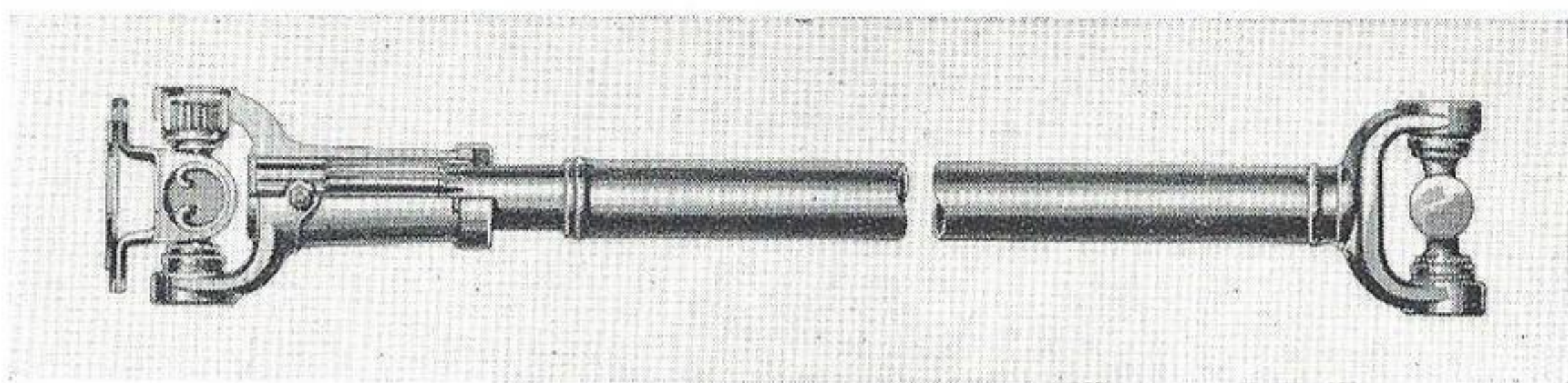


FIG. 29—PROPELLER SHAFT

STEERING SYSTEM

The steering system requires little attention other than proper lubrication and the maintenance of correct wheel alignment.

Incorrect alignment of the front wheels may be caused by striking curbs or other obstructions. Loose-

ness through the steering system will also affect alignment. It is impossible to obtain satisfactory alignment without first adjusting various connections including front wheel bearings.

Correct toe-in of the front wheels is $-\frac{1}{16}$ " to $+\frac{1}{16}$ " [1,60 mm.] which must be accurately measured for satisfactory front tire wear and steering. The best method of checking wheel alignment is by use of a wheel alignment fixture which is available in most well equipped shops. Toe-in cannot be accurately measured by using a straight edge along the sides of the wheels. Toe-in is adjusted by lengthening or shortening the steering tie rod.

Periodic inspection and tightening of the steering parts will aid

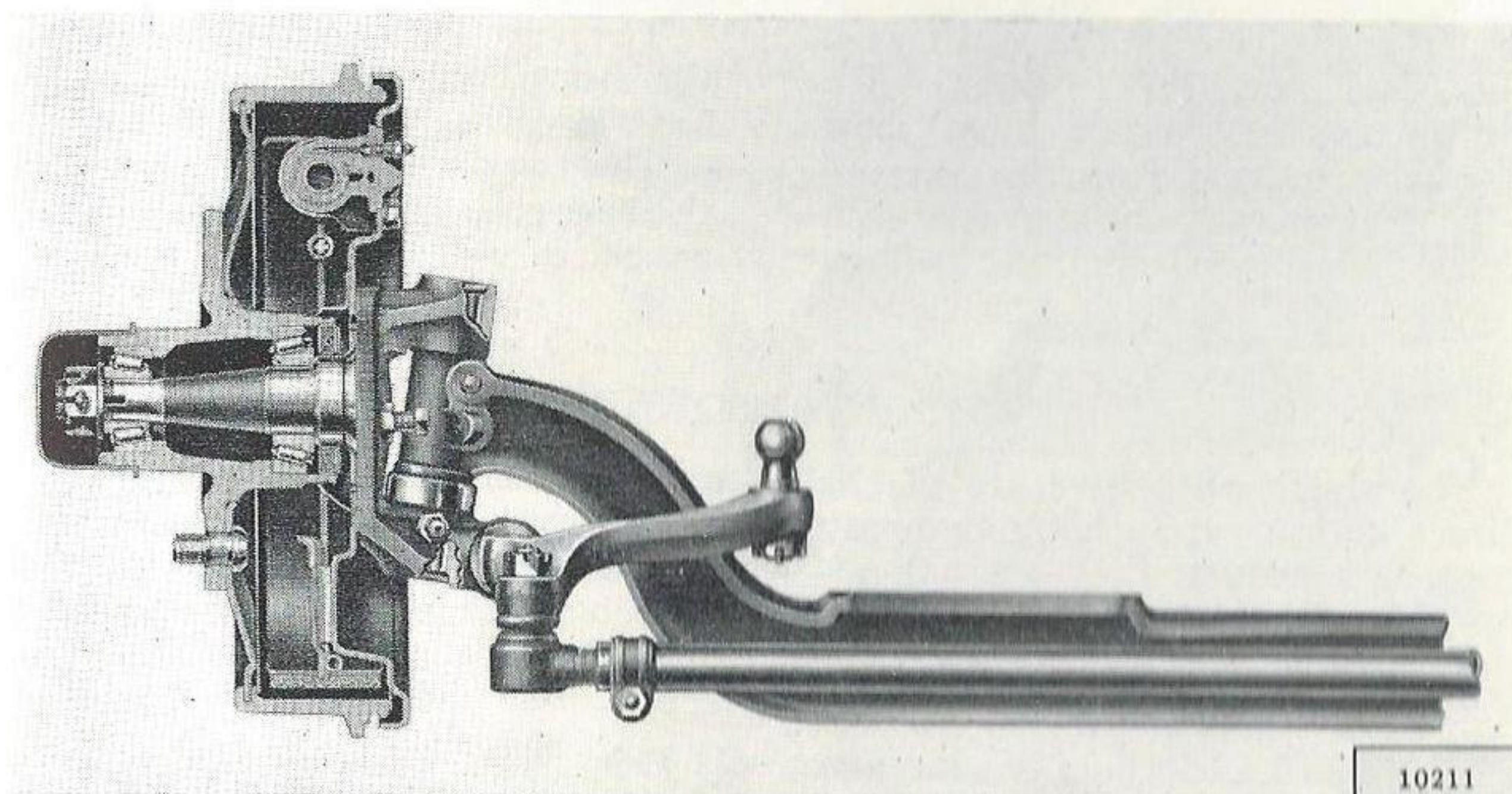
greatly in maintaining alignment. Keep the steering connecting rod ball joints snug but not tight; they must operate freely without lost motion. Keep the steering gear arm tight on the lever shaft and the steering housing bracket tight on the frame.

Do not tighten the steering gear to dampen out steering gear trouble. Should trouble develop, consult your Dealer as he has a definite procedure for the inspection and adjustment of the steering system.

FRONT AXLE

The full-floating front axle is of the conventional I-beam type. The load is carried on thrust type ball

bearings at each spindle and on tapered roller bearings at the wheels.



10211

FIG. 30—FRONT AXLE ASSEMBLY

REAR AXLE

The rear axle is the semifloating type. The end float of the axle shafts is adjusted by shims placed between the brake backing plates and the axle flanges.

To remove a shaft for shim adjustment or replacement, first remove the hub cap, cotter pin and shaft nut. Use a wheel puller to remove the wheel hub. Remove the bolts attaching the brake dust shield and brake assembly. Remove the shield, gasket, grease retainer,

brake assembly and bearing. Pull out the shaft, using care not to lose the bearing adjustment shims or to damage the inner oil seal.

Should the end of a broken shaft be inside the axle housing, the broken end can usually be removed by making a loop in a piece of wire, working the loop over the end of the shaft, and pulling the shaft from the housing with the wire.

When the shaft is replaced, adjust the bearings.

SPRINGS AND SHACKLES

The springs should be periodically examined for broken or shifted leaves, loose or missing rebound clips, angle of the spring shackles and the position of the springs on the axle saddles. Springs with shifted leaves do not have their normal strength. Missing rebound clips may permit the leaves to fan out or break on rebound. Broken

leaves may make the vehicle hard to handle or permit the axle to shift out of line. Keep the spring attaching bolts tight.

The rear ends of the front and the front ends of the rear springs have pivot bolts.

The front ends of the front and the rear ends of the rear springs are shackled.

SHOCK ABSORBERS

The shock absorbers are of the direct action type giving two-way control, however, they are not adjustable. They dampen spring action, as the vehicle passes over irregularities in the road.

The shock absorbers are mounted on rubber bushings at both top

and bottom. Should squeaks occur in the bushings, add a flat washer on the mounting pins to place the bushings under greater pressure and prevent movement between the rubber and metal parts.

DO NOT USE mineral oil to remove squeaks.

BRAKES

The foot brakes are hydraulically actuated in all four wheels. They are of the floating shoe, self-centralizing type and have chrome-nickel alloy drums.

The hand brake is mechanically controlled, through cables, which operate the rear brakes.

In operation, pressure is applied to the hydraulic liquid in the

master cylinder through the foot pedal, forcing the liquid through the lines and into the wheel cylinders. The pressure forces the pistons outward in the wheel cylinders, expanding the brake shoes against the drums. As the pedal is further depressed, higher pressure is built up within the hydraulic system, causing the brake shoes to exert greater pressure against the drum.

As the brake pedal is released, the brake shoe return springs pull the shoes together forcing the fluid out of the cylinders and back into the lines toward the master cylinder.

BRAKE SHOE ADJUSTMENT

When the brake linings become worn, the effective brake pedal travel is reduced. The effective travel may be restored by adjusting the brake shoes.

Before adjusting the brakes, check the spring clip nuts, brake dust shield to axle flange bolts, and wheel bearing adjustments because any looseness in these parts will cause grabby or erratic brake action.

Move the hand brake lever to the released position or as far forward as possible. Be sure the brake pedal retracting spring returns the brake pedal freely to the released position against the toe board. Also make sure that the pedal has approximately $\frac{1}{2}$ " [1,27 cm.] free travel without moving the master cylinder piston, which is necessary to prevent the brakes from dragging due to expansion of the hydraulic fluid.

Brake adjustment is accomplished as follows:

- Jack up all four wheels in a safe manner.
- Centralize the brake shoes in the drums by making a hard brake application and releasing the pedal.

The master cylinder is directly in front of the foot brake pedal and may be reached by raising the hood.

The hydraulic brake system must be bled whenever a fluid line is disconnected or air enters the system due to low fluid level in the master cylinder reservoir. Air in the system will be indicated by a "spongy" pedal. Air trapped in the system is compressible and does not permit pressure, applied to the brake pedal, to be transmitted solidly to the brake shoes. Should bleeding be required, consult your Willys Dealer.

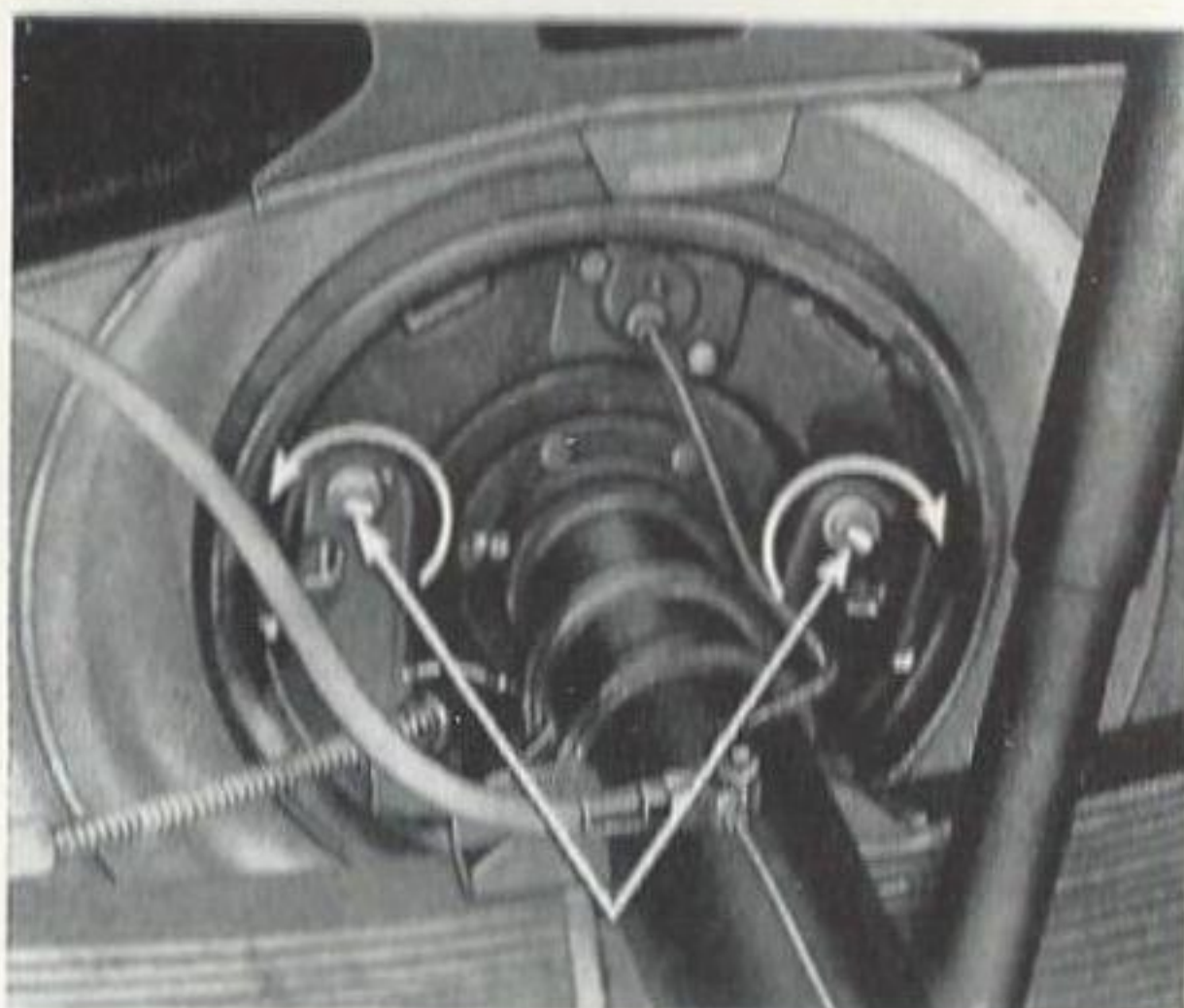


FIG. 31—BRAKE ADJUSTMENT

- At each left front and left rear wheel turn the forward shoe adjusting cam clockwise until the shoe is tight against the drum. Turn the cam in the opposite direction until the wheel rotates freely without brake drag. Turn the rear shoe adjusting cam counter-clockwise until the shoe is tight against the drum, then turn the cam in the opposite direction until the wheel rotates freely without drag.
- At each right front and right rear wheel turn the forward shoe

adjusting cam counterclockwise until the shoe is tight against the drum, then turn the cam in the opposite direction until the wheel rotates freely without drag. Turn the rear shoe adjusting cam clockwise until the shoe is tight against the drum, then turn the cam in

the opposite direction until the wheel rotates freely without drag.

- Remove the jacks.

The brake shoes are self-centralizing so no anchor adjustments are required, also, as the fluid pressure is equal in all parts of the system the brakes are self-equalizing.

HAND BRAKE ADJUSTMENT

The hand brake system should be adjusted only after the foot brakes have been adjusted. Pull up the hand brake control handle two notches before adjusting the brake cable adjusting rod. Loosen the locknut and tighten the adjustment until a slight drag is felt at the rear wheels, then relock the adjusting nut. Release the hand brake control handle and check the rear wheels to be sure that the brakes do not drag.

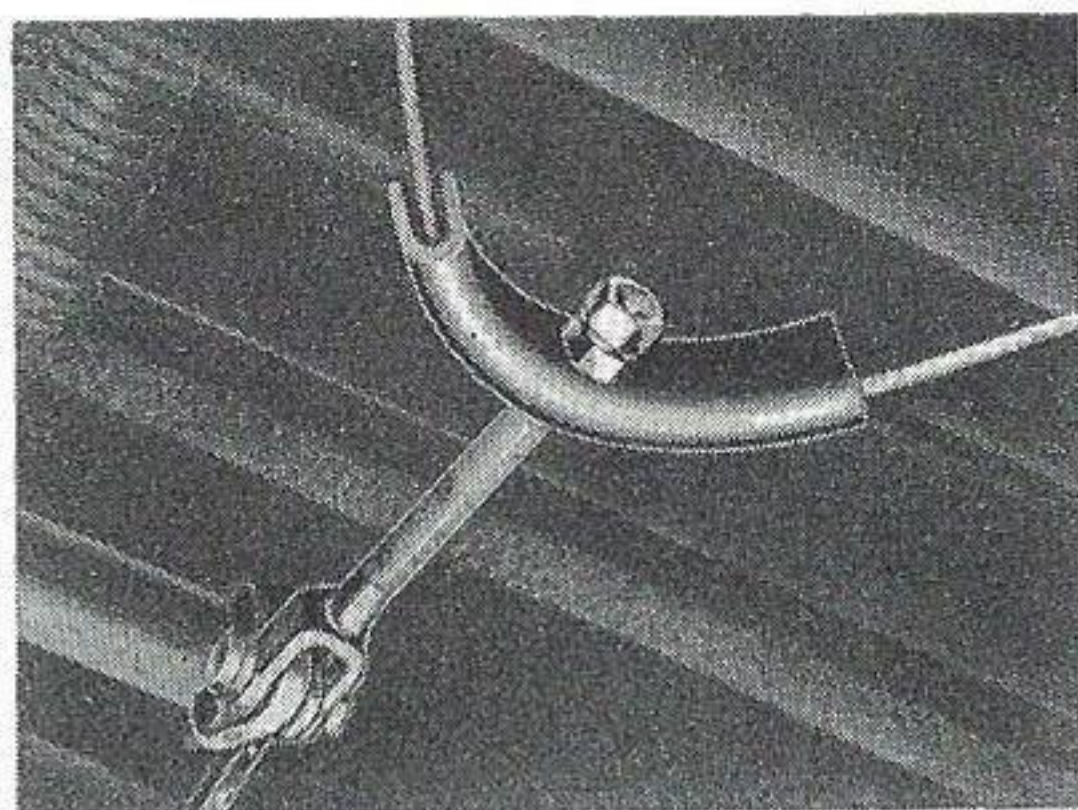


FIG. 32—HAND BRAKE ADJUSTMENT

BRAKE MAINTENANCE

Keep brakes free of grease and oil as they cannot be expected to work well when little braking friction can be obtained between the linings and drums.

The wheel bearings should be lubricated only with wheel bearing grease, also use care that excessive lubricant is not put into the wheel bearings or the differential.

When wheels are removed, wash out the drums with solvent to remove all grease and dirt. Should there be any grease on the brakes, wash them thoroughly. It will be necessary to replace the brake

lining should it become thoroughly saturated with lubricant.

When the rear wheels are removed the hand brake control cables should be lubricated. To lubricate the cables, clean the exposed surfaces, then disconnect the conduits from the brake backing plates by removing the retaining clips. Remove the clamps at the front end of the conduits and slide the conduits forward until the parts of the cables ordinarily covered are exposed. Apply graphite grease liberally to the cables after which reassemble conduits in their original positions.

FRONT WHEEL BEARINGS

Each front wheel is mounted on two opposed tapered roller bearings. These bearings are adjustable for wear and their satisfactory

operation and long life depends upon periodic attention and correct lubrication.

Loose front wheel bearings may cause excessive wear and will affect front wheel alignment. If the bearing adjustment is too tight, the rollers may break or become overheated.

To check the adjustment, first raise the front of the vehicle so the tires clear the floor. Check the brakes to be sure they are free and fully released. With the hands, check the sidewise shake of the wheel. If the bearings are correctly adjusted, shake of the wheel will be just perceptible and the wheel

will turn freely with no drag.

Should the test indicate that adjustment is necessary, remove the hub cap, grease cap, and the cotter pin from the adjusting nut. Spin the wheel and while it is turning very slowly, tighten the adjusting nut until a slight braking effect on the turning wheel is noticed. Then back off the adjusting nut to the nearest cotter pin hole and install a cotter pin. Be sure the wheel turns freely without bind or without side shake.

MAINTENANCE OF FRONT WHEEL BEARINGS

To ensure long service, lubricate and adjust the front wheel bearings as follows:

The bearings should be given more than a casual cleaning. Use a clean stiff brush and suitable grease solvent to remove all particles of old lubricant from the bearings and hubs. After the bear-

ings are thoroughly cleaned, inspect them for pitted races and rollers and check the hub oil seals.

Repack the bearing cones and rollers with the recommended lubricant (see Lubrication Section) and reassemble in the reverse order of dismantling. Adjust them as directed above.

REAR WHEEL BEARINGS

Each rear wheel is carried on a single tapered roller bearing which is adjusted by shims which in original assembly are placed between the right brake backing plate and the axle flange.

Check the wheel bearing adjustment in the same manner as the front wheel. Should the check determine that adjustment is required, remove the hub cap; remove the cotter pin, the axle shaft nut and use a wheel puller to remove the wheel hub. Remove the bolts holding the brake dust shield, the grease and bearing retainer and the brake assembly.

One set of shims only is used in production to adjust both axle shafts. Adjust the bearings to provide .001" to .006" [0,0254 a 0,1524 mm.] end float of the shafts. While

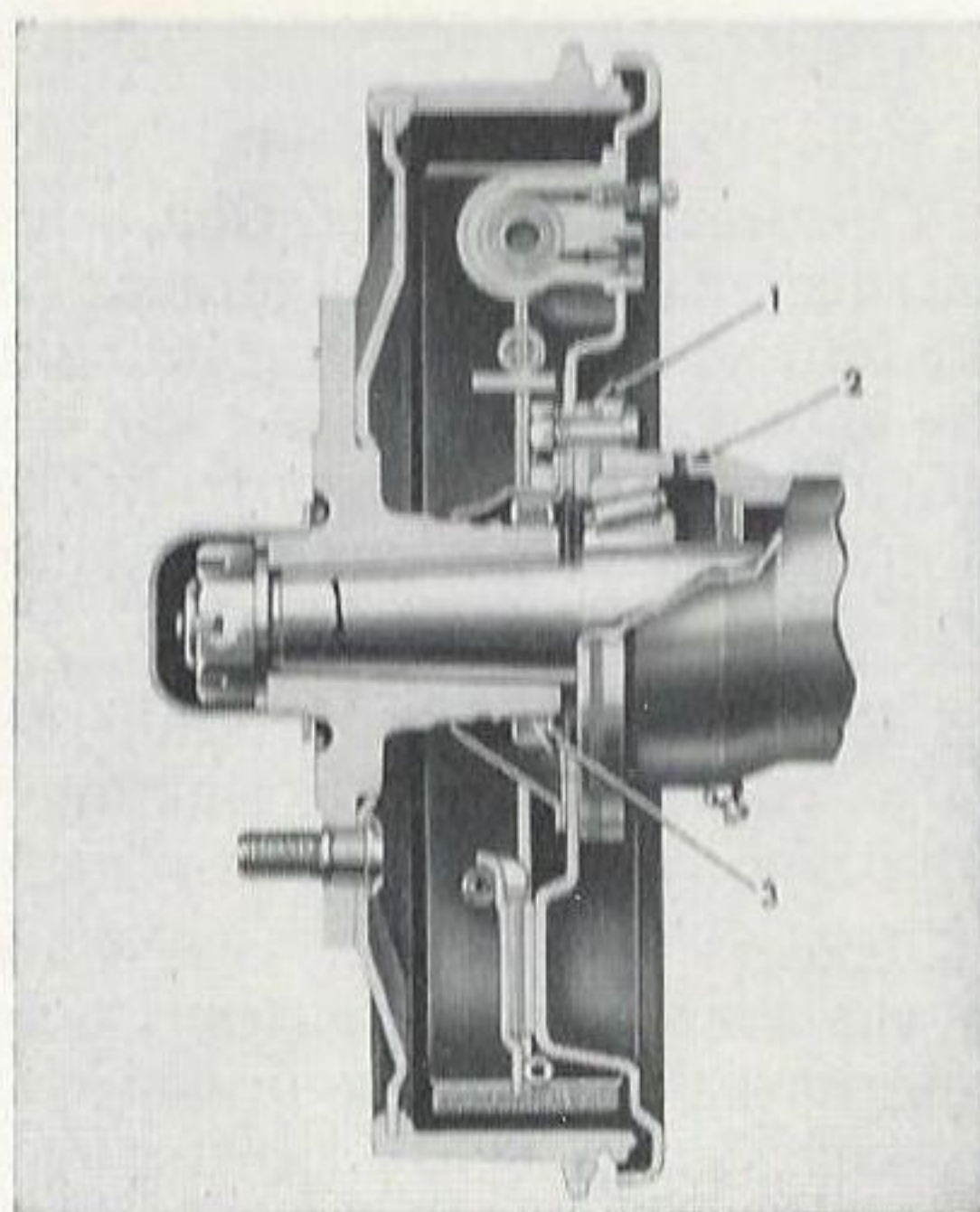


FIG. 33—REAR WHEEL HUB

- 1—Shims
- 2—Vent Hole
- 3—Grease Seal

shims are ordinarily placed back of one bearing only it is in order to add shims at the opposite flange should they be required to correctly

adjust a new bearing or axle shaft.

Examine the grease retainer to be sure it is serviceable; install a new one if in doubt, and reassemble.

MAINTENANCE OF REAR WHEEL BEARINGS

The rear wheel bearings are equipped with lubrication fittings. Lubricate them sparingly to guard against surplus oil saturating the brake linings.

Should it be necessary to adjust the bearings, clean them thorough-

ly and repack them with the recommended lubricant. Should the bearings be removed for any reason it is advisable to install new oil seals to guard against leakage of lubricant.

MOUNTING AND DISMOUNTING WHEELS

The wheel mounting nuts and studs on both left wheels have left-hand threads to prevent them from being loosened by wheel action. The studs are identified by an "L" stamped on the end. The left-hand threaded nuts are identified by a groove cut around the hexagonal faces.

To remove the left wheels, the nuts must be turned to the **RIGHT** and to remove the right wheels, turned to the **LEFT**.

When mounting wheels, alternately tighten opposite stud nuts to prevent wheel runout. After the jack has been lowered, retighten the nuts.

TIRES

Tire pressure, tire rotation, wheel balance, and wheel alignment are the four vital factors that influence the extent of tire life and the ease and safety of vehicle control. Four of the most common tire troubles are:

- Excessive wear around the outer edges resulting from under-inflation.
- Excessive wear in the center of the tread resulting from over-inflation.
- Tire tread worn on one side indicating wheels need realigning.
- Cuplike depressions on one side of the tread indicating wheels need balancing.

The recommended pressures for all tires except "captive air" tires are as follows:

6:70 x 15 4-ply (tubeless) tires:

Front: 27 psi. [1,90 kg-cm²]

Rear: 27 psi. [1,90 kg-cm²]

6:70 x 15 6-ply tires:

Front: 24 psi. [1,69 kg-cm²]

Rear: 32 psi. [2,25 kg-cm²]

7:60 x 15 4-ply tires:

Front: 27 psi. [1,90 kg-cm²]

Rear: 27 psi. [1,90 kg-cm²]

If your vehicle normally carries a full load, two to four pounds [0,14 a 0,28 kg-cm²] can be added to the recommended pressures. But, remember that adding air with a light load means a harsher ride, doesn't help tires, and wears out shock absorbers.

Cross-switch the tires every 6000 miles [9,600 km.]. This practice will even out differences in wear and make a set of tires last longer than they would without cross switching. Refer to Fig. 34 for the recommended rotation method for all except "captive air" tires. When a method of tire rotation is selected, it should be used consistently or the full benefits of tire rotation may be lost.

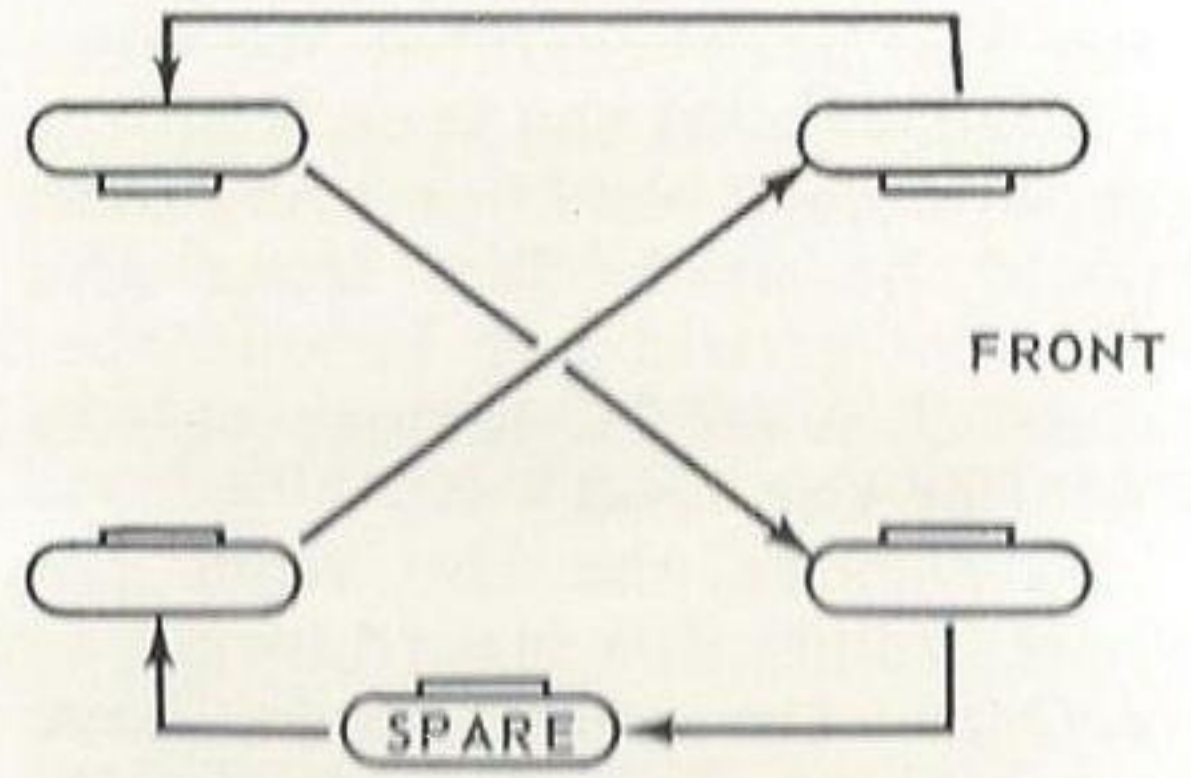


FIG. 34—TIRE ROTATION 10221

"CAPTIVE AIR" TIRES

"Captive air" tires are standard for the F4-134 4x2 Station Wagon. Also, no spare tire is provided as the "captive air" tire can still be driven after a puncture of the outer chamber. Refer to your new vehicle tire warranty in the tire valve kit in the glove compartment. Recommended pressures for the "captive air" tires are:

- 6:70 x 15 4-ply "captive air" tire:
- Front: 20 psi. [1,40 kg-cm²]
(see below)
- Rear: 24 psi. [1,69 kg-cm²]
(see below)

Inner chamber pressures should be maintained 4 pounds [0,28 kg-cm²] higher than the outer chamber pressure recommended above.

- Inflate the inner compartment through the wheel rim valve to the recommended operating pressure.
- Lubricate the inflation needle with glycerine lubricant (both needle and lubricant obtained from the inflation needle kit in the vehicle glove compartment) and work the needle slowly into the sidewall valve.
- Inflate the outer tire chamber through the needle valve to the recommended operating pressure.

UNMOUNTING "CAPTIVE AIR" TIRES

Deflate the tire by removing the core from the rim valve to release the pressure from the inner cham-

ber. It is not necessary to deflate the outer chamber because very little air pressure remains there

Withdraw the inflation needle. It will be found that the inner chamber pressure has increased when the outer chamber was inflated. Inner chamber pressure should be maintained at this increased pressure. When subsequent pressure checks are made, if the pressure has equalized between the two chambers a leak in the safety shield could exist and should be checked for.

Cross-switch "captive air" tires every 6000 miles [9,600 km.]. The recommended rotation method for

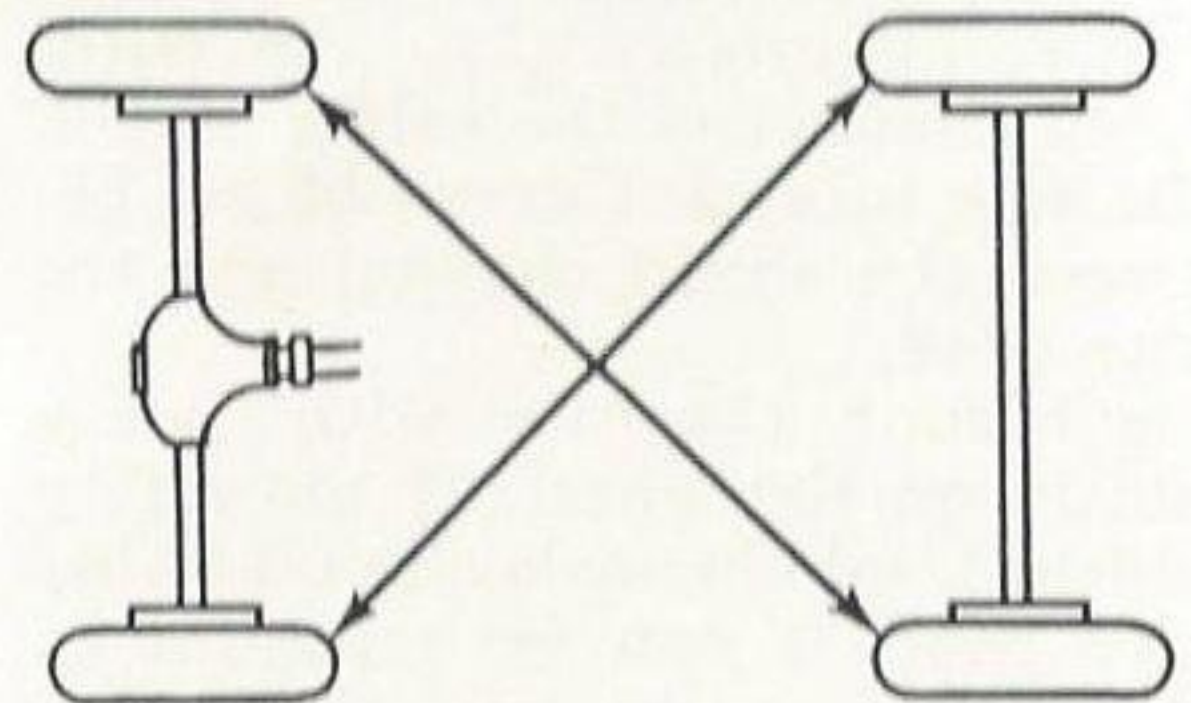


FIG. 35—"CAPTIVE AIR" TIRE ROTATION 10222

"captive air" tires is shown in Fig. 35 as no spare tire is used when "captive air" tires are installed.

ber. It is not necessary to deflate the outer chamber because very little air pressure remains there

after the inner chamber has been deflated. Unseat the bead from the rim. Standard bead unseating tools should be used. Tire irons and hammers should not be used because of possible damage to the shield or tire bead.

To remove the tire from the wheel, follow this procedure:

- Once the tire beads have been unseated, loosen the shield channel which extends over the top tire bead and tuck this bead

channel into the tire.

- Apply a soap solution to the tire bead and wheel rim flange. Then pry the top tire bead over the rim flange using a tire changing machine (tire irons may be used at this step in an emergency).

- Loosen the shield from the bottom tire bead and pull the entire shield from the tire.

- Remove the bottom tire bead from the rim flange.

MOUNTING "CAPTIVE AIR" TIRES

The following procedure should be used to ensure correct mounting of the "captive air" tires:

- Prepare the rim by scraping off all rust and scale, cleaning the bead seats and rim flanges, and inserting the tire valve in the hole in the wheel rim.

- Insert the safety shield. Carefully lay the bead channels of the shield over the tire beads so as to avoid wrinkles.

- Apply a liberal amount of tire mounting lubricant to the outer bead channel of the safety shield. Be sure lubricant does not get between the shield channel and the tire bead.

- Mount the tire with safety shield on the wheel. If the safety shield bead channels slip off either tire bead it can be repositioned

after the tire bead is in the rim well. When the safety shield is properly mounted, the small beaded shield edge will be uniformly visible around both sides of the tire.

- Match the sidewall and rim valves by turning both the tire and shield on the rim.

- Follow the inflation procedures given above.

WARNING: Never use more than 40 psi. [2,81 kg-cm²] inflation pressure to seat the tire beads against the wheel rim flanges because of the danger of breaking the beads at this pressure. If beads do not seat at 40 pounds pressure or less, they must be relubricated and realigned with the wheel rim before the inflation process is repeated.

BODY FINISH

PAINT CARE

Frequent washing with clear water and polishing with a soft cloth or chamois will preserve the original lustre of the finish. Always use cold water in washing the car. Never wash it in the direct rays of

the hot sun and always wait until the sheet metal surfaces are cooled off before washing.

If the exterior finish becomes extremely dirty, and especially when the dirt is allowed to remain

for some time, it may remain dull even after washing. Dullness may also be caused by slight oxidation of the finish due to chemical action of the elements.

All that is needed to remove the dullness, bringing back the original

lustre, is a small amount of good polish. Rub the polish lightly until dry to eliminate a damp surface which will collect dust.

Oxidation of the finish will be reduced to a minimum by periodic application of a good quality wax.

CHROME CARE

The chromium plated parts on your vehicle are protected by a special corrosion inhibiting metal wax.

To retain the wax protection, use only water when cleaning chrome plated parts. Do not use an abrasive or strong cleaning materials such as chrome polish,

steel wool or scouring powder.

Periodically, clean the chrome surfaces and recoat them with a good quality wax. Rust, which may result from surface damage, should immediately be removed and the damaged surfaces reprotected with wax.

STATION WAGON CARPETING

If for any reason the carpet in a Station Wagon model becomes damp, make certain that the doors and the windows are not closed securely until the interior of the vehicle is dried out thoroughly. Otherwise mildewing of the carpet may result.

It is not recommended that the

carpet be removed except for replacement. To clean the floor covering, first brush thoroughly. If soil remains, the use of a volatile-type cleaner is recommended. The cleaning operation should be repeated for heavily embedded stains. Take extreme care not to soak the carpet with cleaner.

EMERGENCY CHART

No adjustment should be made, or any parts tampered with, until the cause of the trouble is ascertained, otherwise adjustments

which are properly made may be destroyed. The trouble should first be analyzed.

STARTING MOTOR WILL NOT TURN ENGINE

- Battery weak.
- Battery connections dirty or loose.
- Battery or engine ground wire connections loose.

● Battery to starting motor wire connections loose at starting motor end.

- Starter switch contacts dirty.
- Solenoid wires loose or broken.

ENGINE FAILS TO START

- No fuel.
- No ignition current. May result from failure to turn on the switch or from a broken or disconnected wire.
- Spark plug points improperly set. Set to .030" [0,76 mm.].
- Distributor points improperly set. Set to .020" [0,51 mm.].
- Cylinders or manifold flooded with fuel. With ignition switch

turned on, choke open (control pushed all the way in), hold accelerator all the way down and rotate engine which will reduce the fuel supply in the cylinders.

● Moisture on high tension terminals of the spark plugs or distributor cap. Wipe terminals dry with a rag.

● Gas mixture too lean. Choking is necessary to start cold engine.

ENGINE STOPS

- Lack of fuel.
- Disconnected wire.
- Lack of oil.
- Carburetor flooding.

- Engine overheated.
- Distributor breaker points dirty or pitted.

ENGINE MISSES AT ALL SPEEDS

- Faulty wiring.
- Fouled spark plugs. The spark plugs should be short circuited one after another by touching a hammer or wood handle screw driver from the cylinder to the terminal of each spark plug. When one is reached which makes no difference in the running of the engine, it is an indication that the plug is at fault. Remove and clean. If porcelain insulator is cracked, install new plug.
- Spark plug points improperly set. Points too close together or too

far apart may cause missing. Spark plug points should be set .030" [0,76 mm.]. Accumulation of carbon or oil on spark plug porcelain. Corrosion on end of spark plug cables at distributor cap connection.

● Distributor faulty. Breaker arm sticking. Points improperly set or burned and pitted. The correct point opening is .020" [0,51 mm.].

- Faulty condenser or coil.
- Water in fuel.
- Engine overheated.

ENGINE MISSES AT LOW SPEED ONLY

- Intermittent flow of fuel.
- Poor ignition or compression.
- Distributor points improperly adjusted or making poor contact.
- Incorrect timing.
- Faulty condenser.
- Spark plug points too far apart (on pull) or too close together (on idle).
- Air leak at carburetor gasket.
- Dirt in crankcase ventilator valve.

LOSS OF POWER

- Ignition improperly timed.
- Lack of fuel or carburetor flooding.
- Dragging brakes.
- Engine overheated because of lack of oil or water.
- Poor compression.
- Improper valve timing.
- Clutch slipping.
- Exhaust pipe or muffler obstructed.

LACK OF COMPRESSION

- Faulty cylinder head gasket.
- Insufficient tappet clearance.
- One or more improperly fitted pistons or piston rings.
- Valves not seating properly.

POPPING BACK THROUGH CARBURETOR

- Dirt in the carburetor. (Fuel pump strainer dirty.)
- Water in fuel.
- Incorrect ignition timing.
- Incorrect valve timing.
- Inlet valves holding open.
- Spark plug wires connected to incorrect plugs.

ENGINE OVERHEATING

- Lack of proper lubrication.
- Stoppage of water circulation, faulty thermostat or lack of water.
- Slipping fan belt.
- Ignition timing improperly set; slow or "late".

ALPHABETICAL INDEX

	Page		Page
A		G	
Adjustment — Brake.....	49	Gearshift Controls.....	12, 18
Adjustment — Clutch.....	45	Generator.....	25, 37
Adjustment — Front Wheel Bearings..	50		
Adjustments — Carburetor.....	32	H	
Aiming Headlights.....	41	Hand Brake.....	12, 26, 50
Air Cleaner.....	24	Headlight Aiming Chart.....	41
Alignment — Front Wheels.....	47	Headlight Dimmer Switch.....	12
Antifreeze.....	36	Heater Controls.....	13
		Hood Latch.....	14
B			
Battery.....	36	I	
Battery Charge Indicator.....	10	Ignition and Starter Switch.....	11
Body.....	54	Ignition Timing.....	39
Brake Adjustment.....	49	Instruments.....	9
Brake Maintenance.....	50		
Brakes.....	48	K	
Breaking-in Period.....	17	Keys and Locks.....	8
C		L	
Carburetor.....	32	Lamp Bulb Trade Numbers.....	42
Choke Control.....	26	Light Switch.....	12, 40
Clutch.....	25, 45	Lighting System.....	40
Clutch Linkage.....	26	Lubrication.....	19
Cooling System.....	33	Lubrication Chart.....	21, 23
D		M	
Differential.....	27	Manufacturer's Warranty.....	4
Distributor.....	25, 38	Master Cylinder.....	26
Draining Cooling System.....	34		
		O	
E		Oil Filter.....	24
Electrical System.....	36	Oil Pressure Indicator.....	9
Emergency Chart.....	56	Overdrive.....	18, 27, 46
Engine Lubrication.....	19		
Engine Serial Number.....	8	P	
Engine Tune-up.....	29	Powr-Lok Differential.....	27
		Propeller Shaft.....	46
F			
Fan Belt.....	35	R	
Front Axle.....	47	Radiator.....	34
Front Wheel Alignment.....	47	Radiator Cap.....	34
Front Wheel Bearings.....	26, 50	Rear Axle.....	48
Fuel Gauge.....	10	Rear Wheel Bearings.....	26, 51
Fuel Pump.....	33		
Fuel System.....	32		
Fuel Tank.....	33		

	Page		Page
S		U	
Seats.....	15	Timing Ignition.....	39
Serial Number Location.....	8	Tires.....	52
Service Mileage Chart.....	28	Transmission.....	26, 45
Shift Pattern.....	12	Tune-up.....	29
Shock Absorbers.....	48	Turn Signal Indicator.....	10
Spark Plugs.....	39		
Specifications.....	6	V	
Speedometer.....	9, 25	Universal Joint — Lubrication.....	26
Springs and Shackles.....	27, 48		
Starting Motor.....	25, 40	W	
Steering Gear.....	25	Water Pump.....	25, 35
Steering System.....	46	Wheel Bearings.....	26, 51
Storage Space.....	16	Wheels.....	52
Switches and Controls.....	11	Windshield Wiper Control.....	13
		Wiring Diagram.....	43, 44
T			
Tail Gate.....	16		
Temperature Gauge.....	10		
Thermostat.....	35		

