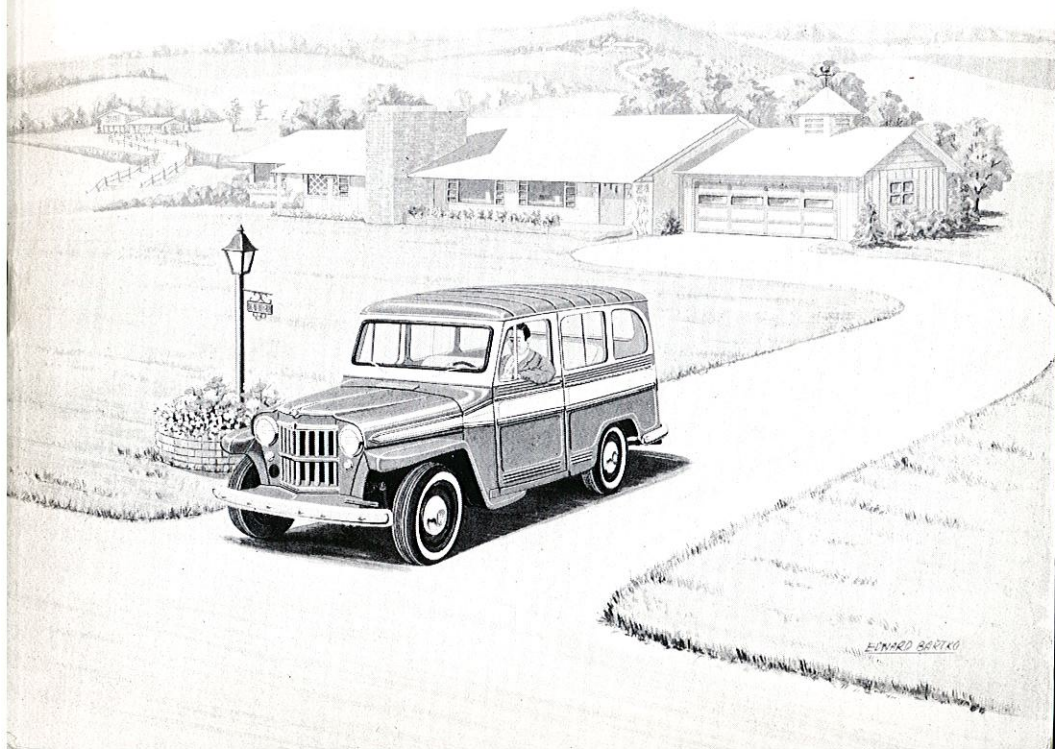


Jeep[®] Station Wagon

and 4 x 2 UTILITY DELIVERY

OWNER'S MANUAL



Jeep[®]
STATION WAGON
UTILITY DELIVERY
2-WHEEL DRIVE

Owner's Manual

Willys Motors, Inc.

TOLEDO 1, OHIO, U. S. A.

Form OM-1035

TABLE OF CONTENTS

	Page
MANUFACTURER'S WARRANTY	4
GETTING ACQUAINTED WITH YOUR Jeep VEHICLE	
SPECIFICATIONS	6
GENERAL INFORMATION	7
SERIAL NUMBERS	8
INSTRUMENTS	9
SWITCHES AND CONTROLS	11
KNOW YOUR 'Jeep' VEHICLE	13
OPERATING YOUR Jeep VEHICLE	
PROPER BREAK-IN	16
DRIVING THE VEHICLE	16
EMERGENCY CHART	18
LUBRICATING YOUR Jeep VEHICLE	
LUBRICATING YOUR 'JEEP' VEHICLE	22
LUBRICATION CHART	22, 25
SERVICE MILEAGE CHART	30
MAINTAINING YOUR Jeep VEHICLE	
ENGINE	31
FUEL SYSTEM	34
COOLING SYSTEM	38
ELECTRICAL SYSTEM	41
WIRING DIAGRAM	43, 44
DRIVING COMPONENTS	51
STEERING SYSTEM	54
BRAKES	54
WHEELS AND TIRES	56
SUSPENSION	61
BODY	61
Jeep APPROVED SPECIAL EQUIPMENT	63

MANUFACTURER'S WARRANTY

The warranty set forth below is the only warranty, expressed or implied, under which Willys Motors, Inc. sells motor vehicles. This warranty also has been adopted as the exclusive warranty, expressed or implied, of Willys Sales Corporation and the other authorized Willys distributors, and has been extended by them to their authorized Willys dealers.

"Willys Motors, Inc., Toledo, Ohio, U.S.A., warrants each new motor vehicle manufactured by it, to be free from defects in material and workmanship under normal use and service, its obligation under this Warranty being limited to making good at its factory any part or parts thereof, including all equipment or trade accessories (except tires) supplied by it, 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 [6.400 km.], whichever event shall first occur, be returned to it with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective.

"As a limitation on the foregoing, Willys shall have no obligation thereunder with respect to any vehicle which shall have been repaired or altered outside of an Authorized 'Jeep' Dealership in any way so as, in the judgment of Willys to affect its stability or reliability, nor which has been subject to misuse, negligence or accident."

The above warranty is in lieu of any implied warranties of merchantability and fitness, and other warranties, expressed or implied, by Willys Motors, Inc., Willys Sales Corporation, and the other authorized Willys distributors.

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.

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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 'Jeep' vehicle 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 'Jeep' vehicle 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.

Keep both your identification card and your service policy in your 'Jeep' vehicle glove compartment at all times so that your policy and your identification are always available.

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.

SPECIFICATIONS

VEHICLE CODE	MODEL	TYPE	ENGINE
58147	F4-134 4x2 SW	Station Wagon	F4-134
54247	F4-134 4x2 UD	Utility Delivery	F4-134
58177	6-230 4x2 SW	Station Wagon	6-230
54277	6-230 4x2 UD	Utility Delivery	6-230

ENGINE	F4-134		6-230	
	Metric		Metric	
Type	F-head		OHC	
Number of cylinders	4		6	
Bore	3 $\frac{1}{8}$ "	79,37 mm.	3 $\frac{11}{16}$ "	84,93 mm.
Stroke	4 $\frac{3}{8}$ "	111,12 mm.	4 $\frac{3}{8}$ "	111,12 mm.
Displacement	134.2 cu. in.	2199,53 cm ³	230 cu. in.	4,24 ltr.
Ignition Timing	5° BTC		5° BTC	
Compression Ratio	7.4 to 1		8.5 to 1	
Compression Pressure	120 to 130 psi	8,4 a 9,1 kg-cm ²	145 to 155 psi	10,1 a 10,8 kg-cm ²
Horsepower (max. brake)	75 at 4000 rpm		140 at 4000 rpm	
Horsepower (SAE)	15.63		26.77	
Torque (max.)	114 lb-ft at 2000 rpm	15,7 kg-m.	210 lb-ft at 1750 rpm	29 kg-m.

		Metric
Wheelbase	104 $\frac{1}{2}$ "	265,4 cm.
Tread (Front and Rear)	57"	144,8 cm.
Road Clearance	7 $\frac{3}{8}$ "	18,74 cm.
Height (over all)		
Station Wagon	68 $\frac{3}{4}$ "	175 cm.
Utility Delivery	71 $\frac{5}{8}$ "	182 cm.
Length (over all)	176 $\frac{1}{4}$ "	447,6 cm.
Width (over all):		
Station Wagon	71 $\frac{3}{4}$ "	182,2 cm.
Utility Delivery	68 $\frac{1}{8}$ "	173,0 cm.

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

	4-cylinder Models		6-cylinder Models	
Gross Vehicle Weight (GVW)				
Station Wagon	4300 lb.	1.950 kg.	4300 lb.	1.950 kg.
Utility Delivery	4500 lb.	2.041 kg.	4500 lb.	2.041 kg.
Weights — approximate:				
Shipping (less fuel, oil, water):				
Station Wagon	2858 lb.	1.296 kg.	2971 lb.	1.348 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 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 'Jeep' Vehicle Dealer's Service Department.

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

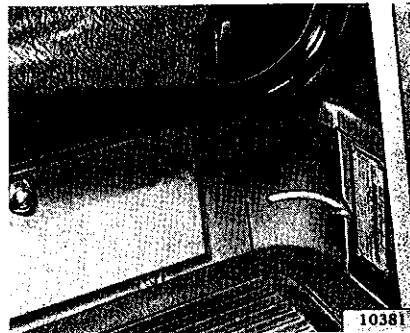
All the information given in this owner's manual consists of factory recommendations that should be used as a guide for properly operating and servicing your 'Jeep' vehicle.

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:

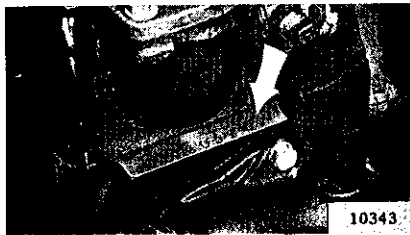


ENGINE SERIAL NUMBER

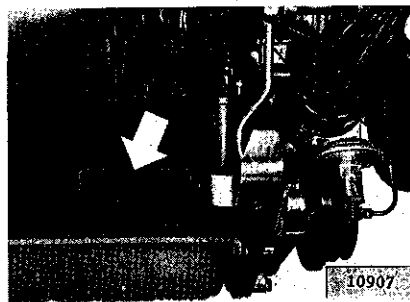
The 4-cylinder engine serial number is stamped on the water pump boss at the front of the engine. The F4-134 engine will have a prefix IT followed by a six-digit serial number, thus: IT-000000.

The 6-cylinder engine serial number is stamped near the left front corner of the cylinder block above the generator. The 6-230 engine will have a prefix SW60C followed by a five-digit serial number, thus: SW60C-00000.

For ready reference, record your engine serial number here.



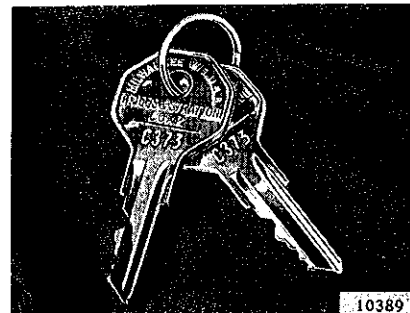
F4-134 ENGINE SERIAL NUMBER



6-230 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 'Jeep' vehicle 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.

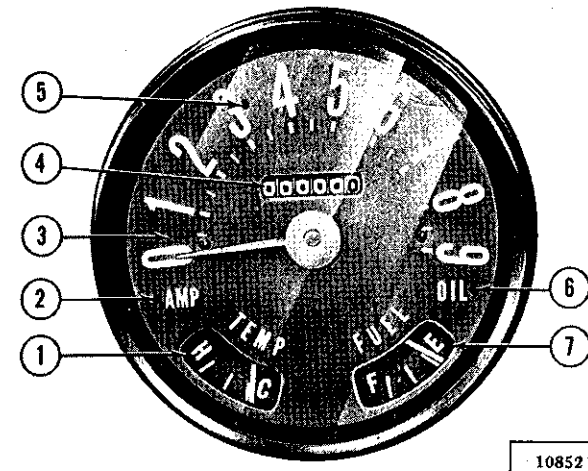


FIG. 1—INSTRUMENTS

- 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. See "Cooling System."

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.

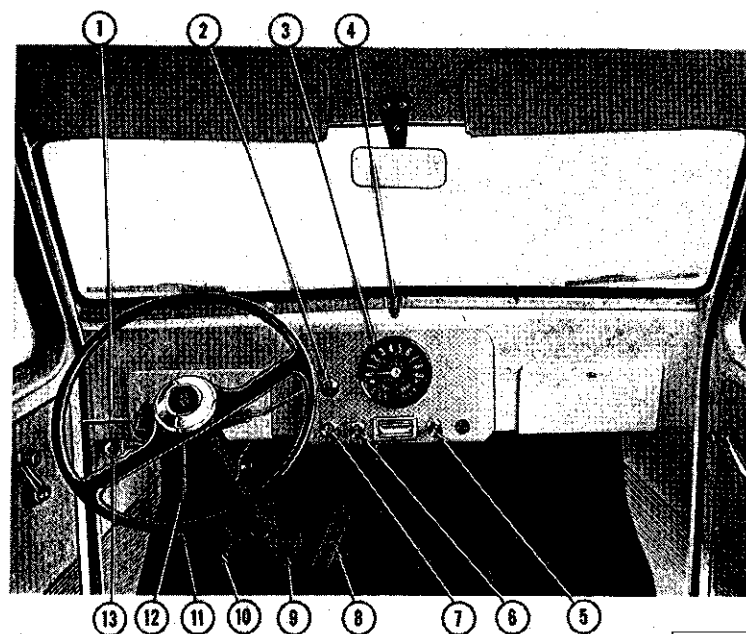
SWITCHES AND CONTROLS

Ignition and Starter Switch

The ignition and starting motor switch are integral. Turn the key to the extreme right (clockwise) to connect the ignition and crank the engine. When the engine starts, immediately release the key as it is spring loaded to automatically return to the "on" position. Avoid

turning the key to the "start" position when the engine is running.

To supply electric current from the battery to operate the heater and other accessories when the engine is not running, turn the key to the extreme left (counterclockwise) position.



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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—Accelerator Treadle
- 9—Brake Pedal
- 10—Clutch Pedal
- 11—Headlight Dimmer Switch
- 12—Hand Brake Handle
- 13—Overdrive Control

Light Switch

The light switch regulates the lighting by being pulled in and out and by being rotated.

The switch has three push-pull positions. When the control knob is pushed in, parking lights, headlights, tail lights, and instrument cluster light are off. Pulling the control knob out half way operates parking lights. Pulling the control knob out all the way operates the

headlights. Both these positions also operate the tail lights and the instrument cluster light.

Rotating the knob clockwise will progressively dim the instrument cluster light.

Rotating the knob (when in any 'pull-out' position) fully counterclockwise will turn on the dome light.

Hand Brake Lever

The 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 lever up to a horizontal position. To release the hand brake, push the lever down to the vertical position.

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. 3 increases the tension applied. Rotating the knob in the opposite direction will decrease the applied tension.

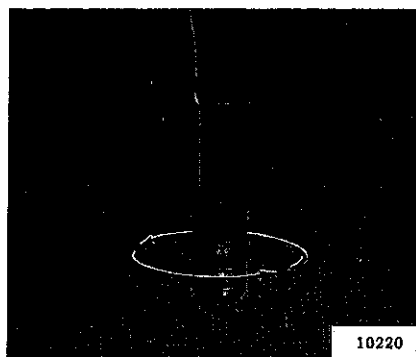


FIG. 3—HAND BRAKE LEVER

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 wipers are operated by turning the control knob. As the control knob is turned

clockwise the speed of wiper operation increases.

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. 4—HOOD LATCH

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.

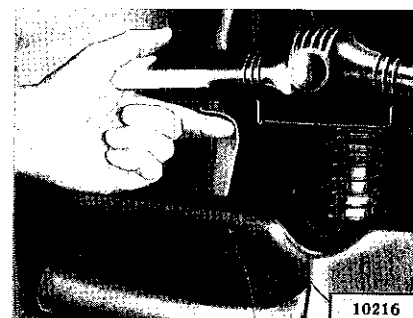


FIG. 5—SAFETY CATCH

Removable Seats

The seats in your 'Jeep' vehicle are covered in tough, durable vinyl

fabric. This long wearing fabric can be cleaned by washing with

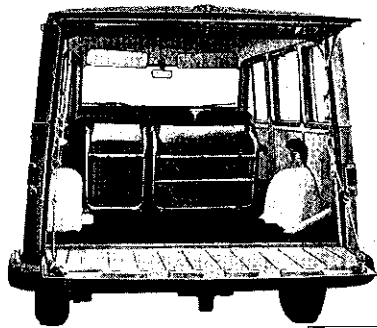


FIG. 6—REMOVABLE SEATS

mild soap and water. The front passenger seat is double hinged, which allows the entire seat to fold forward for easy access to the back seat or cargo compartment. The rear seats are also the double hinged type, and can be folded forward to occupy minimum space and increase the cargo space and floor area.

The rear seats are both removable. To remove the seats, take out the bolts which secure the front legs to the floor brackets, and lift out.

Ventilation

It is not good practice to ride in any vehicle with all windows and vents closed. The body of your 'Jeep' vehicle is ventilated for comfort and safety through a cowl ventilator, adjustable ventilating windows in the front doors, standard front door windows, and sliding side windows on all but the Utility Delivery model.

The cowl ventilator is operated by a hand control lever mounted under the instrument panel at the center. Push the control forward to open the ventilator.

The fresh air heater controls may be set to admit more ventilation on a vehicle so equipped.

To open the ventilating windows in the front doors, lift the lever to the vertical position and push out.

The front door windows raise and lower with hand cranks in the conventional manner.

Side windows slide forward to open. Pull out the latch and push the glass forward. The window is automatically locked when closed by the spring loaded latch.

Driver's Seat Adjustment

The driver's seat may be quickly adjusted to the most comfortable driving position by lifting the lever, located at the lower left front edge of the seat, moving the seat backward or forward.

The Utility Delivery driver's seat is adjusted by removing the attaching wing nuts and moving the seat backward or forward, aligning matching holes in the mounting supports.



FIG. 7—SEAT ADJUSTMENT

Station Wagon Interior

The interior of your Station 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 head-

lining 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.

Tail Gate

The tailgate is strongly braced, and can support 1000 lb. [454 kg.]. With the tailgate down, you have 8½ feet [2.59 m.] 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.

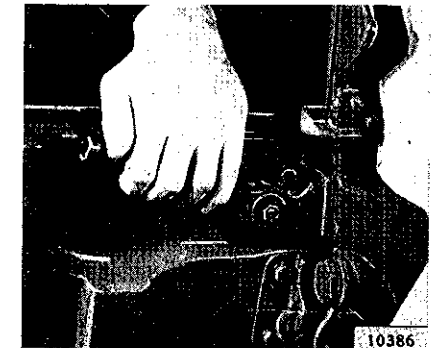


FIG. 8—TAIL GATE LATCH

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.

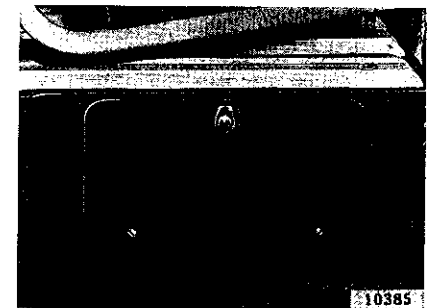


FIG. 9—TOOL COMPARTMENT

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.]

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

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 'Jeep' vehicle dealer inspect your 'Jeep' vehicle at the end of 1000 miles [1,600 km.].

OPERATION

Avoid the practice of resting the foot on the clutch pedal while driving and do not slip the clutch excessively instead of shifting gears.

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.

Starting the Engine

- Shift the transmission shift lever into "neutral" position.
- Pull the choke control out half way. This will also open the gas throttle slightly.
- Place the ignition key in the switch and turn it clockwise to the

extreme right. Hold the key in this position until the engine starts; then release the key. If the engine fails to start in 30 seconds, release the key and wait about one minute before again attempting to start the engine.

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.

- If the engine fails to start in two or three attempts, consult the Emergency Chart at the end of this section.

- Set the choke control at the

best position to keep the engine running for warm-up. As soon as the engine reaches operating temperature, push the choke control all the way in.

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.

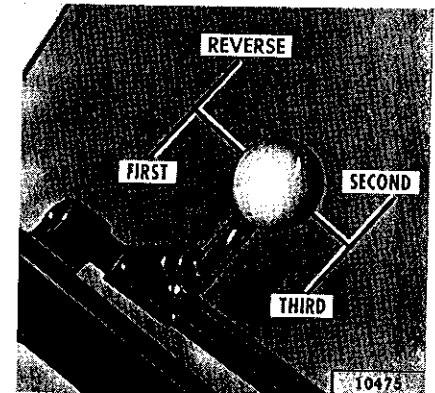


FIG. 10—SHIFT PATTERN

Towing the Vehicle

If your 'Jeep' vehicle is equipped with overdrive and must be pushed

or towed to start the engine, first pull the overdrive control out.

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.

COLD WEATHER OPERATION

Cold Weather Cautions

Cold weather can present many problems if a vehicle is not properly maintained; however, your 'Jeep' vehicle will be dependable in cold weather if given a minimum amount of attention.

- The cooling system must be protected against freezing by the use of antifreeze solutions or drained when not in use (see "Cooling System").

- Light oil should be used in the engine (see "Engine Lubrication").

- The battery should be kept fully charged to provide the additional power necessary to crank a cold engine and furnish a good spark. A discharged battery will

freeze in extremely cold weather which will make battery replacement necessary.

- The carburetor, fuel pump and fuel tank should be kept free from water which will freeze and restrict fuel flow.

- The ignition system should be kept in good condition.

- After driving in wet, freezing weather, swing the front wheels from right to left to wipe off moisture adhering to the steering knuckle oil seals and the spherical surfaces of the steering knuckle housings. This will prevent freezing with resulting damage to the seals.

Cold Weather Starting

Assuming that the above items have been given normal attention, the engine should start promptly, even in extremely cold weather, if the following procedure is used.

- To lessen the load on the starter, release the transmission by depressing the clutch pedal.

- Shut off lights, heater, radio, and other electrical accessories before starting. This will ensure maximum voltage available for both the starting motor and the ignition system.

- Pull the hand choke control all the way out before starting. After the engine has started, push the hand choke control part of

the way in until the engine has reached normal operating temperature. When the "temp" gauge needle rises, push the hand choke control all the way in for better fuel economy.

- Before turning the ignition key to "start", one or two pumps on the accelerator treadle will dump raw gasoline into the intake manifold and help get enough vaporized fuel into the cylinders during very cold weather.

- When the starter is energized, the accelerator should be about half way down to get enough air rushing through the manifold to pick up the fuel and carry it into the cylinders.

HOT WEATHER OPERATION

Hot Weather Cautions

Hot weather does not generally present as many problems as cold weather; however, a little special attention will pay dividends in the form of economy and convenience.

- Check the radiator regularly for sufficient coolant as the rate of evaporation is higher in hot weather.

- Make sure the fan belt is in good condition and properly adjusted.

- Keep the radiator area free of bugs and other things that restrict air circulation.

- Have the water level in the battery checked at 10-day intervals or oftener, if necessary.

- Starting a cool engine in hot weather does not present a problem and the procedure outlined under "Starting the Engine" should be followed.

Starting Flooded Engine

A hot engine is easily flooded and may start hard. If the carburetor is flooded proceed as follows:

- Turn on ignition.

- Depress accelerator treadle to the floor and hold in this position until engine starts. (Do not pump

the pedal.)

- DO NOT pull choke knob out.

- Engage starter.

- When engine starts, release starter and accelerator treadle.

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

	See Paragraph	Page
Battery discharged	Battery	42
Battery connections dirty or loose	Battery	42
Battery cables defective	Battery	42
Battery cable connections loose at ground or starting motor solenoid	Starting Motor	48
Solenoid wire connections loose at solenoid, starting motor, voltage regulator, or ignition switch	Starting Motor	48
Solenoid wires broken	Starting Motor	48
Starting motor inoperative	Starting Motor	48

Engine Fails to Start

No fuel	Fuel Gauge	10
No fuel to carburetor	Fuel System	34
Cylinder or manifold flooded	Fuel System	34
Moisture and dirt on ignition system	Ignition Wiring	46
Engine needs choking	Starting the Engine	16
Plugged exhaust system	Exhaust System	37

Engine Stops

Lack of fuel	Fuel Gauge	10
Lack of oil	Engine Lubrication	22
Disconnected ignition wire	Ignition Wiring	46
Carburetor flooding	Fuel System	34
	Carburetor	35
Engine overheated	Cooling System	38
Distributor breaker points dirty or pitted	Distributor	46
Vapor lock	Fuel System	34

Engine Misses at All Speeds

Faulty ignition wiring	Ignition Wiring	46
Fouled spark plugs	Spark Plugs	48
Spark plug points improperly set	Spark Plugs	48
Spark plug porcelains dirty	Spark Plugs	48
Distributor faulty	Distributor	46
Water in fuel	Fuel Tank	37
Engine overheated	Cooling System	38

Popping Back Through Carburetor

	See Paragraph	Page
Dirt in carburetor	Fuel Pump	36
Water in fuel	Fuel Tank	37
Incorrect ignition timing	Ignition Timing	47
Spark plug wires connected to incorrect plugs	Ignition Wiring	46
Inlet valves holding open	Engine Compression	31

Engine Overheating

Low engine oil level	Engine Lubrication	31
Low coolant level	Radiator Pressure Cap	39
Fan belt slipping	Fan Belt	40
Clogged radiator core	Radiator	38
Faulty thermostat	Thermostat	39
Improper ignition timing	Ignition Timing	47

Engine Misses at Low Speeds

Intermittent flow of fuel	Fuel System	34
	Distributor	46
	Spark Plugs	48
	Ignition Wiring	46
Distributor point improperly adjusted or making poor contact	Distributor	46
	Ignition Timing	47
Incorrect timing	Ignition Timing	47
Spark plug point improperly set	Spark Plugs	48
Poor compression	Engine Compression	31
Air leak at carburetor gasket	Carburetor	35

Loss of Power

Ignition improperly timed	Ignition Timing	47
Lack of fuel	Fuel System	34
	Fuel Pump	36
	Fuel System	34
Carburetor flooding	Fuel Pump	36
	Brake Adjustment	55
Dragging brakes	Brake Adjustment	55
Engine overheated	Cooling System	38
Poor compression	Engine Compression	31
Improper valve timing	Adjust Valve Lash	33
Clutch slipping	Clutch	51
Exhaust system obstructed	Exhaust System	37

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 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 6-230 engine. Whenever the oil level is below the "F" (full) mark, add sufficient oil to bring the level near or to the F-mark but do not fill above this mark.

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 [800 km.], at 2000 miles [3,200 km.], and then every 2000 miles of normal highway driving. Under more severe service, change the oil more often.

Common short trip, stop-and-go driving is the most severe and be-

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.

comes intensified even more in cold weather. In contrast, constant-speed driving on highways is the least severe.

Always drain while crankcase oil is hot as suspended dirt and contaminants will more likely be held in suspension and, therefore, drain out more completely.

- Position drain receptacle under plug.
- Remove drain plug using correct size wrench. Be careful of hot oil.
- Clean drain plug. Inspect and replace gasket if deteriorated.
- When oil has drained, replace and tighten drain plug.
- Check for presence of excess water in the oil that might indicate an internal leak from the cooling system.

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

Engine Oil Classifications

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

- ML — light and favorable service.
- MM — moderate to severe service.

MS — most severe service.

Depending upon the conditions of operation, either MM or MS grade is recommended for Jeep vehicles.

It is also 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.

Mixing Lubricants

Universal joint and wheel bearing sodium base lubricants are used at the factory for initial fill of these bearings.

When sodium base and lithium-base lubricants are mixed, the result is a thinned-out mixture that can bleed through seals. It is therefore important that lubricants with the correct base be used when lubricating 'Jeep' vehicles.

Should oil leaks occur at wheel bearings, or propeller shaft uni-

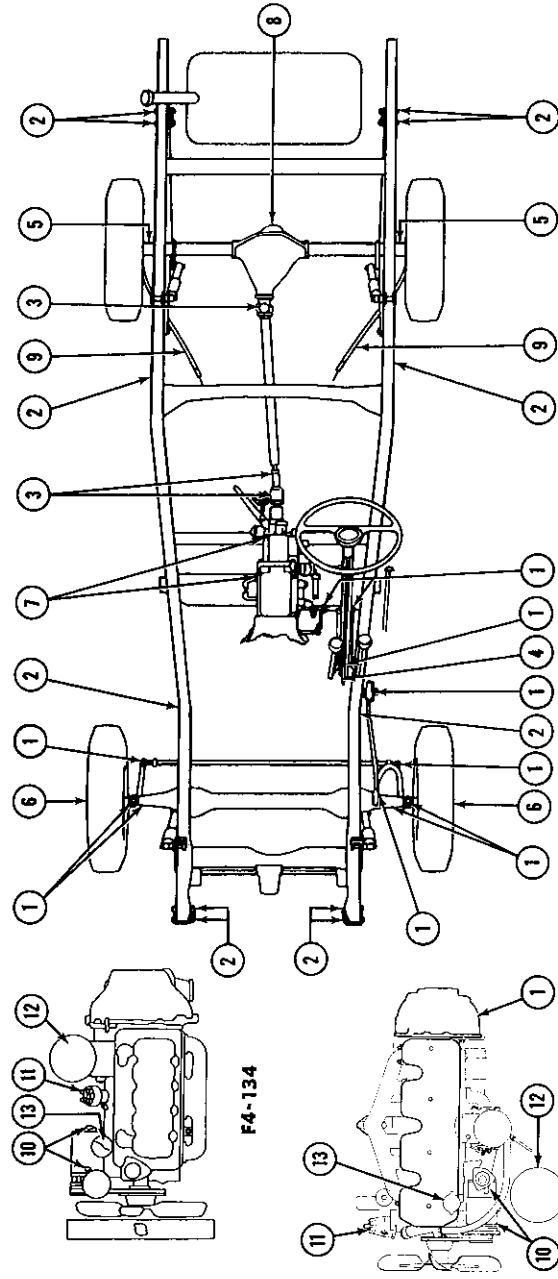
versal joints, the leaks may be caused by a mixture of two types of lubricants. In such cases, the old lubricant should be completely removed before new lubricant is added. Wheel bearings should be thoroughly cleaned, lubricated and reinstalled.

The lubricant in propeller shaft universal joints can usually be replaced by adding new lubricant until all the old lubricant is removed.

Lubrication Fittings

Each 1000 miles [1,600 km.] clean each lubrication fitting indicated by No. 1 on Lubrication Chart and use a pressure gun to lubricate. Be sure that the grease channels are open to provide complete lubrication of bearing surfaces. In some cases it may be necessary to replace the lubrication fittings. In extreme cases it may be necessary to disassemble and clear plugged channels. The following points have lubrication fittings:

- Tie rod: 2 fittings.
- Drag link (steering connecting rod): 2 fittings.
- Clutch pedal.
- Brake pedal.
- Clutch release shaft: 2 fittings.
- Steering knuckles: 4 fittings.
- Spring shackles and pivot bolts: see separate paragraph.
- Propeller shaft universal joints: see separate paragraph.
- Rear wheel bearings: see separate paragraph.



CHASSIS

ENGINE
6-230

FIG. 11—LUBRICATION CHART

Chart No.	ITEM TO BE LUBRICATED	FREQUENCY 1000 miles. = 1600 km.	QUANTITY		LUBRICANT	
			U.S. Imperial Metric	TYPE	GRADE	
1.	Chassis Bearings.....	Each 1000 miles	As required	Chassis Lubricant	Summer Winter	No. 1 No. 0
2.	Spring Shackles 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	Universal Joint Lubricant		No. 1 No. 0
4.	Steering Gear.....	Check each 1000 miles	As required	GL-4		SAE 90 SAE 90
5.	Rear Wheels.....	Sparingly 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.....	{ Check each 1000 miles { Change each 10,000 miles	1 1/2 pts. 1 1/4 pts. 0.8 ltrs. 3/4 pt. 3/8 pt. 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 1/2 pts. 1.0 ltrs.	GL-4*		SAE 90 SAE 90
9.	Speedometer Cable..... Hand Brake Cable.....	Disassemble to lubricate each 12,000 miles [19,200 km.] Disassemble to lubricate each 10,000 miles	As required	Graphbite Grease		Light
10.	Generator.....	Each 1000 miles	As required	Graphbite Grease		Light
11.	Distributor Oiler..... Wick..... Pivot..... Cam.....	Each 1000 miles Each 1000 miles Each 1000 miles Each 1000 miles	2-4 drops Several drops One drop One drop 2 c.c.	Engine Oil Engine Oil Engine Oil Cam Lubricant		Same as engine Same as engine Same as engine Same as engine
12.	Air Cleaner.....	Change each 2000 miles	1 1/2 pts. 1 pt. 0.6 ltrs.	Engine Oil		Same as engine
13.	Engine — F4-134..... Engine — 6-230.....	Change each 2000 miles Change each 2000 miles	4** qts. 3 1/2 qts. 3.8 ltrs. 5** qts. 4 1/2 qts. 4.7 ltrs.	Engine Oil		Same as engine

Not lower than 32°F. [0°C.]
use SAE 30 or 10W-30

Not lower than 10°F. [-12.3°C.]
use SAE 20, 20W,
10W-30, or 10W-20

As low as -10°F. [-23°C.]
use SAE 10W,
10W-30, or 10W-20

Below -10°F. [-23°C.]
use SAE 5W or 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.].

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

Some vehicles are equipped with an oil filter. The unit should be serviced at the end of the first 2000 miles [3.200 km.]. Thereafter, service the unit each 6000 miles [9.600 km.].

Service oil filters on 6-230 engines by replacing the unit. On

F4-134 engines, the unit should be dismantled and cleaned and the filter element replaced.

Always drain the filter at each engine oil change to prevent the old oil contained in the filter from mixing with and contaminating the new oil.

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.

Care of the air cleaner is extremely vital to the life of the engine. Pay particular attention to the amount of dust and dirt in the air taken into the engine through the air cleaner. When dust is not noticeable in the air, service the air cleaner each 1000 miles [1.600 km.]. Whenever the air is noticeably dusty (for example when the vehicle is driven on secondary roads or through fields) then service the air cleaner more frequently. Under extreme continually dusty

and dirty conditions where the vehicle operates in clouds of dust and dirt, service the air cleaner daily.

To service the air cleaner on 6-230 engines, unscrew the wing nut from the bottom of the air cleaner and lift off the air cleaner body. On F4-134 engines, 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.

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.].

Distributor

The distributor shaft is lubricated through an oiler mounted on the side of the housing. Place three

or four drops of light engine oil in the oiler each 1000 miles [1.600 km.]. Also place one drop of light

engine oil on the wick located on the top of the shaft, which is made accessible by removing the rotor arm. Sparingly apply soft grease

to the breaker arm cam. Place a drop of oil on the breaker arm pivot.

Speedometer Cable

Remove the speedometer cable 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 lubrication fittings. Use a hand compressor to

lubricate the trunnion bearings each 1000 miles [1.600 km.]. See "Mixing Lubricants."

Wheel Bearings

Each 10,000 miles [16,000 km.] remove, clean, inspect, and repack the front wheel bearings.

The rear wheel bearings are equipped with lubrication fittings. Above each lubrication fitting is a vent opening through the housing shown as item 2 in Fig. 36. Lubricate every 1000 miles [1.600 km.].

Use a hand compressor and wheel bearing grease, forcing the grease

through the lubrication fitting until it flows from the vent. Vent should be kept unobstructed or grease will back up into the brakes. Do not add grease after it flows from the vent for it may be forced through the wheel keyway onto the outside of the wheel and possibly onto the brakes. See "Mixing Lubricants."

Hand Brake Control

Lubricate all bearings and clevis pins of the hand brake control each 1000 miles [1.600 km.]. Lubricate the brake cables inside the conduits each 10,000 miles [16,000 km.].

To lubricate the cables, clean the exposed surfaces. Then remove the rear wheels and disconnect the conduits from the brake backing plates by removing the retaining clips. Remove the clips from the front end of the conduits and

move the conduits forward until the parts of the cables ordinarily covered are exposed. Apply graphite grease liberally to the cables. Reassemble the cables.

Lubricate all moving parts of the control lever every 1000 miles [1.600 km.]. Lubricate the slide mechanism through the side plate slots with chassis lubricant. Lubricate all other pivot points with SAE 30 motor oil.

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

Maintain the lubricant at filler plug level. To assure this, check the level each 1000 miles [1.600

km.] and add lubricant when necessary. Drain and refill at each 10,000 miles [16.000 km.].

Overdrive

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

manner and at the same time as the transmission.

Differential

Check the level in the differential housing every 1000 miles [1.600 km.] to be sure that the housing is filled to the level of the filler plug opening. Drain and refill the housing every 10,000 miles [16,000 km.]. Do not mix different types

of lubricants. Use a 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 differentials may be identified by the metal caution tag installed under one of the gear cover screw heads. The tag reads "USE LIMITED SLIP DIFF. LUBE ONLY".

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.

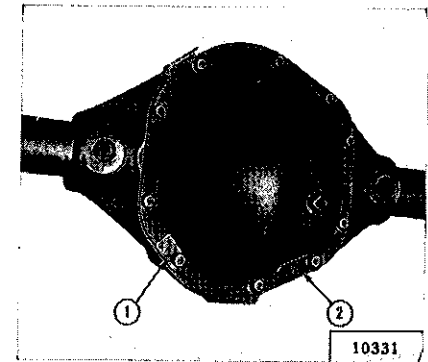


FIG. 12—POWR-LOK DIFFERENTIAL

1—Ratio tag

2—Powr-Lok tag

Body

At each vehicle lubrication place a few drops of oil in the front door hinge oil holes and the tail gate, rear door, and hood hinges. Use a greaseless lubricant sparingly on the door lock striker plates and

engine oil on the door check hinge pins. The hood lock and cowl ventilator control should be oiled for easy operation. When necessary, the window lift mechanism should be lubricated sparingly.

PARTS REQUIRING NO LUBRICATION

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.

Water Pump and Clutch

The water pump bearing and clutch release bearing are prelubri-

cated for life when manufactured and cannot be relubricated.

Starting Motor

The starting motor bearings are lubricated at assembly and require

no further lubrication between starting motor overhauls.

Shock Absorbers

The hydraulic direct-action shock absorbers are permanently sealed and require no periodic lu-

brication service. Also the shock absorber mounting bushings are not to be lubricated.

Service Mileage Chart

This chart shows in graphic form the more important services to be performed at various mileage intervals. These mileage intervals are based on moderate use of your 'Jeep' vehicle. Under more severe operating conditions these intervals should be shortened because more frequent service is required. One thousand miles equals 1,600 km.

OPERATION	VEHICLE MILEAGE IN THOUSANDS												
	500	1	2	3	4	5	6	7	8	9	10	11	12
Chassis Lubrication.....		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change Engine Oil.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Replace Engine Oil Filter Element.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clean Carburetor Air Cleaner.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Check Fluid Level in Battery.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Check Fluid Level in Brake Master Cylinder.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Check Brake Adjustment.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Check Clutch Adjustment.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Check Fan Belt Adjustment.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Check Tire Pressure.....	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tune-up—Engine.....		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clean, Inspect, Repack and Adjust Front Wheel Bearings.....		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change Lubricant in Transmission and Overdrive.....		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change Lubricant in Differential.....		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rotate Tires.....		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Have Willys Dealer Inspect Vehicle.....		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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 'Jeep' vehicle 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 'Jeep' vehicle dealer.

POWER PLANT

Engine Tune-up

For best performance and dependability, the engine should have a tune-up every 6,000 miles [9,600 km.] of operation.

Proper tune-up procedure should include the following:

- 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.

- Remove and clean the ventilator valve and tubes.

- 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 6-230 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 'Jeep' vehicle dealer. Carburetor service is specialized and should not be undertaken unless the unit is thoroughly understood.

Engine Compression

Correct engine compression is necessary for proper operation of the engine. Testing the engine compression requires special tools

and skill. Poor compression can result in loss of engine power and misfiring of the engine at low speeds. Poor compression can re-

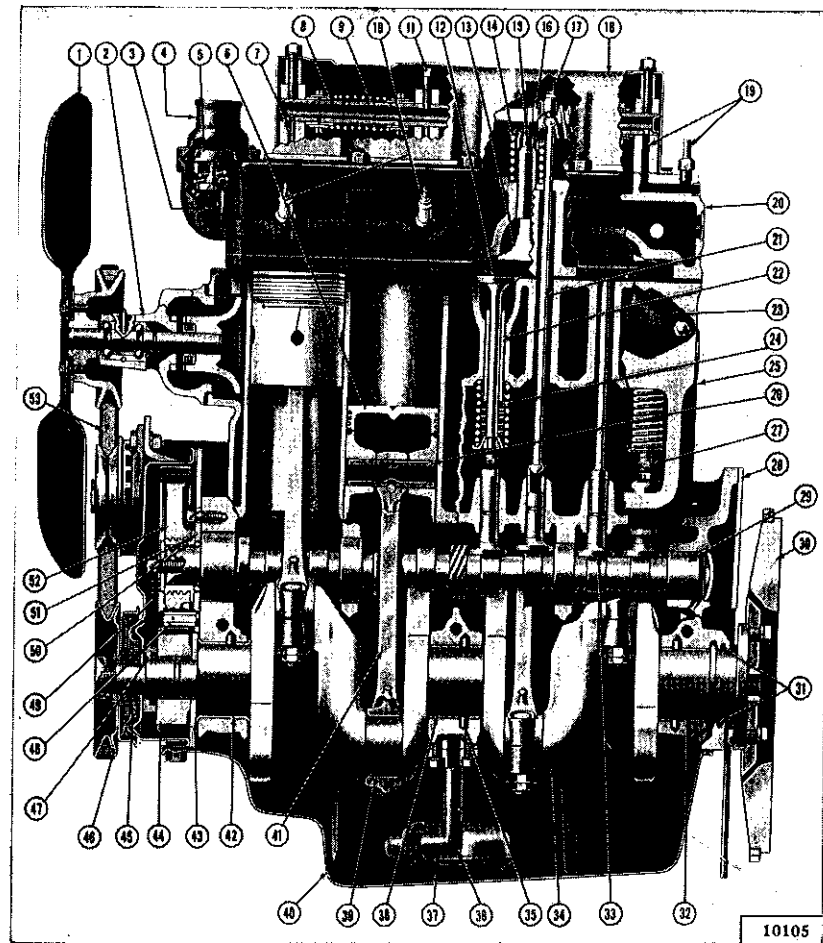


FIG. 13—MODEL F4-134 ENGINE

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 Intake Support |
| 10—Spark Plug | 37—Floating Oil Intake |
| 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 | |

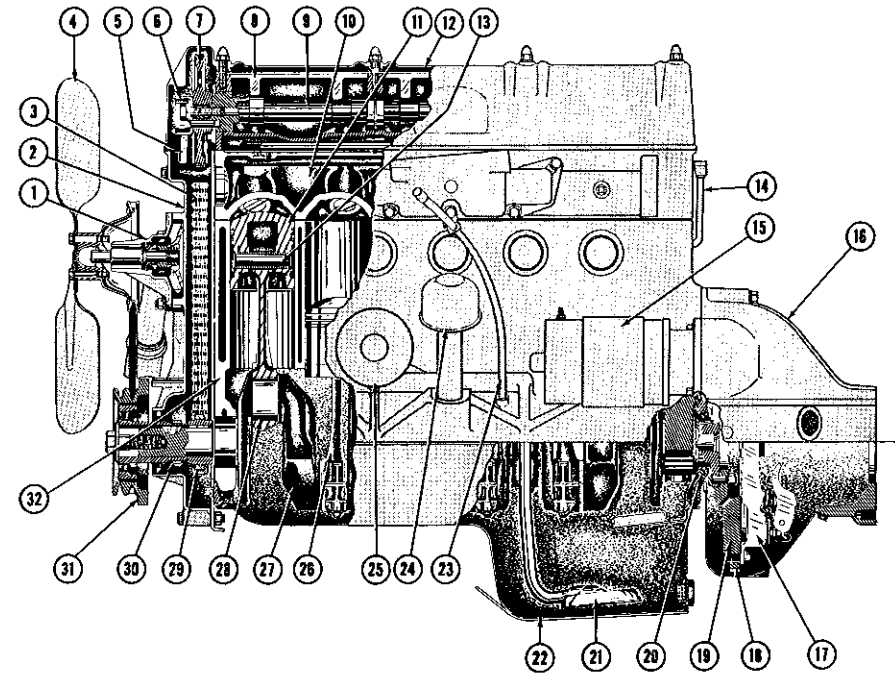


FIG. 14—MODEL 6-230 ENGINE

10926

- | | |
|-------------------------|-----------------------------|
| 1—Water Pump | 17—Clutch |
| 2—Timing Chain Cover | 18—Ring Gear |
| 3—Timing Chain | 19—Flywheel |
| 4—Fan | 20—Crankshaft Rear Oil Seal |
| 5—Fuel Pump Push Rod | 21—Oil Intake Screen |
| 6—Push Rod Eccentric | 22—Oil Pan |
| 7—Camshaft Sprocket | 23—Oil Dip Stick |
| 8—Camshaft Bearing Deck | 24—Crankcase Breather |
| 9—Camshaft | 25—Oil Filter |
| 10—Cylinder Head | 26—Connecting Rod |
| 11—Piston | 27—Crankshaft |
| 12—Rocker Arm Cover | 28—Connecting Rod Bearing |
| 13—Piston Pin | 29—Crankshaft Sprocket |
| 14—Oil Line | 30—Oil Pump Drive Gear |
| 15—Starter | 31—Vibration Damper |
| 16—Bellhousing | 32—Cylinder Block |

sult from insufficient tappet clearance, a faulty cylinder head gasket, one or more improperly fitted pistons or piston rings, or improper seating of the valves. To adjust the

tappet clearance, see *Adjust Valve Lash*. To correct all other causes of poor compression, see your 'Jeep' vehicle dealer.

Adjusting Valve Lash

The valve lash should be set as follows:

- | | |
|----------------|-----------------------|
| 6-230 engine | |
| Intake Valves | — .006"
[0,15 mm.] |
| Exhaust Valves | — .008"
[0,20 mm.] |

- | | |
|----------------|-----------------------|
| F4-134 engine | |
| Intake Valves | — .018"
[0,46 mm.] |
| Exhaust Valves | — .016"
[0,41 mm.] |

Use care in making this adjustment that the measurements are

accurate by using feeler gauges and making sure the rocker arms or

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-

Crankcase Ventilation

The crankcase ventilation system provides thorough, positive ventilation which reduces formation of sludge in the crankcase. Any vapors in the crankcase are carried into the manifold and burned or exhausted.

Be sure that the oil filler tube cap gasket is in good condition. Always keep the cap locked se-

tappets are resting against the lowest surface of the camshaft cam.

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.

curely in place.

When tuning the engine or grinding valves, remove the control valve and tubes and clean them thoroughly. If they are blocked with carbon, the ventilating system will not operate and should the valve fail to seat, it will be impossible to make the engine idle satisfactorily.

FUEL SYSTEM

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

Care and maintenance of the air cleaner is covered in the lubrication section.

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

Should the engine fail to start when cranked by the starting motor, the trouble may be in the fuel system. To locate the trouble, first check the fuel gauge to be sure the fuel tank is not empty. If the fuel tank is not empty, check further to see if fuel is reaching the carburetor. Disconnect the fuel line at the carburetor. Place a container under the open line and briefly crank the engine with the starting motor. If fuel spurts from the end of the line, the fuel lines are clean and the fuel pump is operating properly.

If no fuel leaves the disconnected fuel line, the trouble is in the fuel lines or fuel pump. Clean the fuel pump filtering screen and sediment chamber. (See Fuel Pump). Check fuel lines for kinks or sharp bends. If upon rechecking no fuel leaves the disconnected fuel line, see your 'Jeep' vehicle dealer.

If fuel is reaching the carburetor, the cylinders or manifold may be flooded with fuel. Flooding can usually be detected by a strong odor of fuel at the tail pipe or engine. Flooding is often the result of excessive use of the choke control while attempting to start the engine, or repeated operation of the accelerator pedal before attempting to start the engine. To eliminate flooding, push the choke control all the way in, hold the accelerator pedal all the way down, and crank the engine with the starting motor.

If fuel is reaching the carburetor, the engine is not flooded, the engine

electrical system is operating properly, and the engine will not start, see your 'Jeep' vehicle dealer.

Should the engine stop when it is hot, the trouble may be caused by vapor lock. Vapor lock is the vaporization of the fuel before it enters the carburetor. Allow the engine to cool, then restart it. If vapor lock reoccurs, see your 'Jeep' vehicle dealer.

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 can cause trouble. It may cause the fuel pump valves or the carburetor float valve to become stuck or possibly block the filter screen. Gum formation can be dissolved by acetone, obtainable in most drug stores, or a good commercial fuel system solvent.

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

The carburetor 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 'Jeep' vehicle dealer.

The 6-230 carburetor is the dual downdraft type. It is provided with two idle adjusting screws, and a throttle stop screw.

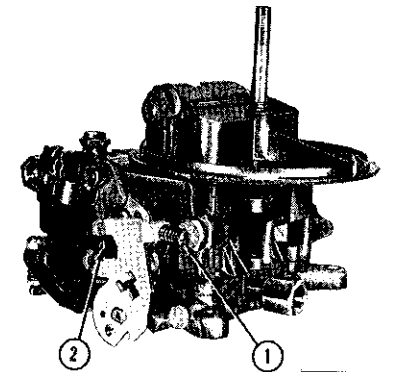
Before adjusting the carburetor, level the vehicle. Then idle the engine. LIGHTLY seat both idle adjusting needles and back them off one full turn. Run the engine at fast idle until operating temperature reaches normal. Adjust throttle stop screw to idle the engine at 550 rpm.

Set each idle adjusting needle to obtain the smoothest running and the maximum speed. If necessary, reset the throttle stop screw to ob-

tain speed of 550 rpm. and recheck idle adjusting needles.

The F4-134 carburetor is the single downdraft type.

There are but two adjustments on the carburetor, one for idling mixture and the other for idling speed. These adjustments should be made together as changing the adjustment on one effects the other.



10924

FIG. 15—6-230 CARBURETOR

1—Throttle Stop Screw
2—Idle Adjusting Screw

Run engine until it reaches normal operating temperature. Push choke knob in all the way. Turn idling mixture adjusting screw, No. 2, in clockwise until it lightly contacts stop, then back it off one to two turns. Let engine idle and turn idling mixture adjusting screw in or out as necessary to obtain a smooth idle. Normal opening is $\frac{3}{4}$ to $1\frac{1}{4}$ turns.

Before adjusting idling speed make sure the choke is pushed in all the way and accelerator and throttle linkage is free so that throttle lever stop screw, No. 1, is against stop. Turn screw in or out to obtain an idling speed of 600 rpm. Do not idle engine below 600 rpm. If necessary, readjust the idling mixture as explained above to obtain a smooth idle.

Lack of gasoline in the carburetor may be caused by the following conditions:

- Gasoline tank empty.
- Leaking tube or connections.
- Bent or kinked tubing.
- Sediment chamber cover on fuel pump loose.
- Clogged (or frozen) fuel lines.
- Dirty screen.

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

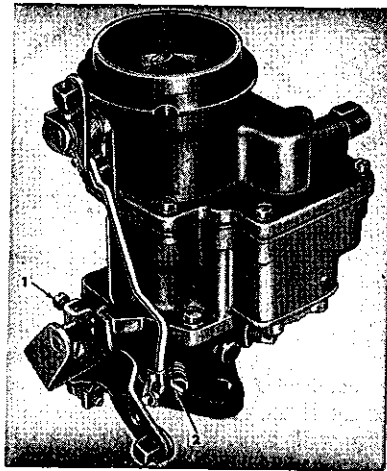


FIG. 16—F4-134 CARBURETOR

- Carburetor inlet valve stuck.

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.

An air leak in the carburetor gasket can cause the engine to misfire at low speeds. Replace faulty gaskets. Make sure the carburetor attaching bolts are tight at all times.

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 re-

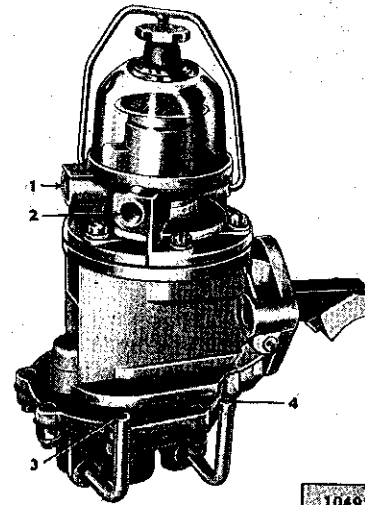


FIG. 17—F4-134 FUEL AND VACUUM PUMP

- | | |
|---------------|-----------------|
| 1—Fuel Inlet | 3—Vacuum Outlet |
| 2—Fuel Outlet | 4—Vacuum Inlet |

pairs 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 'Jeep' vehicle dealer.

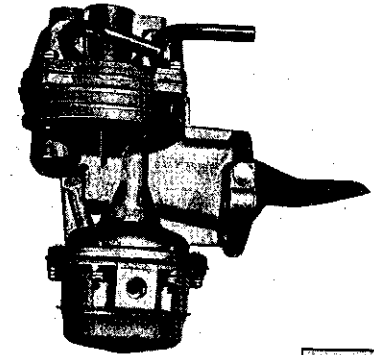


FIG. 18—6-230 FUEL PUMP

Fuel 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.

EXHAUST SYSTEM

The exhaust system consists of the exhaust pipe, muffler, tail pipe, and support straps. Periodically check the system for dents, rust, and loose or broken support straps. A severe dent in any part of the

system can cause loss of engine power. Complete stoppage of the system caused by a severe dent, or by a plugged tail pipe, can make the engine inoperative.

COOLING SYSTEM

The purpose of the cooling system is to maintain the most efficient engine operating temperature under all driving conditions. The coolant in the water passages of the cylinder head and cylinder block absorbs heat generated in the engine. The water pump circulates the coolant through the radiator, where the coolant is cooled by the air stream from the fan. The radiator pressure cap, in addition to providing a seal for the radiator filler neck opening, also controls the pressure in the system. The thermostat controls engine temperature by controlling the flow of coolant.

Maintenance information on the cooling system components is given in the following pages.

The cooling system should be flushed twice a year and checked for leaks, preferably in the spring and fall at the time of changing the antifreeze. Always correct any

cooling system leaks before installing antifreeze. A corrosion inhibitor should be used in the cooling system to prevent the formation of rust and scale. A quality-brand antifreeze will contain a corrosion inhibitor. When the antifreeze is drained in the spring, a corrosion inhibitor should be added with the water.

Should the temperature gauge indicate that the engine is hot, stop the engine and investigate. Make the following checks in the order given by referring to the appropriate paragraphs.

- Check oil level in engine crankcase.
- Check coolant level after removing radiator pressure cap.
- Check for slipping fan belt.
- Check for a clogged radiator.
- Check for a faulty thermostat.
- Check for improper ignition timing.

Radiator

Maintenance of the radiator consists of keeping the exterior of the radiator core clean, the interior free from rust and scale, and the radiator free from leaks. The exterior of the radiator core should be cleaned and the radiator inspected for leaks each 1000 miles [1,600 km.] of normal service of the vehicle.

Cleaning should be performed by

blowing out with air stream or water stream directed from the rear of the radiator. A visual inspection is not sufficient as the accumulation of small particles of foreign material on the core surfaces can restrict cooling without closing the core openings. Examine the radiator carefully for leaks before and after cleaning.

Radiator Hoses

Examine hoses spring and fall for possible need of replacement or tightening. If hoses are collapsed, cracked, or indicate a soft condition on the inside they should be replaced.

When installing hose, clean the

pipe connections and apply a thin layer of nonhardening sealing compound. Hose clamps should be properly located over the connections to provide secure fastening. The pressurized cooling system can blow off improperly installed hoses.

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, 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 a 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.

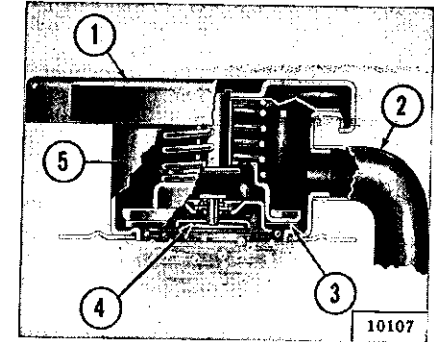


FIG. 19—RADIATOR CAP

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

Draining Cooling System

To completely drain the cooling system, remove the pressure cap and open both drain cocks. One drain cock is located at the bottom edge of the radiator. The other drain cock is in the cylinder block

directly behind the starter on Model 6-230 and under the generator on Model F4-134.

Remove the radiator cap to break any vacuum which might prevent thorough draining.

Thermostat

The cooling system is designed to provide adequate cooling under most adverse conditions. However, it is necessary to employ some device to provide quick warming and to prevent overcooling during normal operation. Automatic control of engine operating temperature is provided by a water flow control thermostat installed in the water outlet at the front of the engine cylinder head. The thermostat is a heat-operated valve. It should always be maintained in working order and the vehicle should never be driven without one installed as there would then

be no control of engine temperature. The temperature at which the thermostat opens is preset and cannot be altered. If the thermostat is faulty, it must be replaced. Should sudden heating of the cooling system occur, the thermostat should be checked first. As a check, remove the thermostat and if overheating is eliminated, install a new one of the same type and rating.

A high-temperature thermostat is available as optional equipment. Whenever this thermostat is installed, the only antifreeze recommended for the cooling system is ethylene-glycol base antifreeze.

Water Pump

The water pump is a centrifugal impeller type.

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.

The pump is designed to give maximum service without adjustments. Should trouble develop, consult your 'Jeep' vehicle dealer.

Fan Belt

The fan and generator are driven by a V-belt. The drive of the V-belt is on the sides of the V. A fan belt that is too tight will cause rapid wear of the generator and water pump bearings. If the belt is too loose, it may slip preventing the water pump from properly cooling the engine or the generator from properly charging the electrical circuit. The fan belt is properly adjusted when it can be deflected $\frac{1}{2}$ " [13 mm.] with strong thumb pressure midway between the fan and generator pulleys. Check this adjustment and inspect the condition of the fan belt at each engine lubrication period. It is good preventive maintenance to replace a badly frayed, worn, or cracked fan belt before it breaks in operation.

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 antifreeze.

Antifreeze Chart

ANTIFREEZE			PROTECTION TO TEMPERATURE SHOWN			
Quarts U.S.	Quarts Imperial	Liters	Methyl Alcohol Fahr.	Cent.	Ethylene Glycol 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 $\frac{1}{8}$	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 $\frac{2}{8}$	-47°	-43,8°
12-Quart System						
2	1 $\frac{3}{8}$	2	15°	-9,5°	19°	-7,2°
3	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3°	-16,1°	10°	-12,2°
4	3 $\frac{1}{8}$	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 $\frac{2}{8}$	-50°	-35,5°	-34°	-36,6°

ELECTRICAL SYSTEM

The electrical system consists of four separate groupings: current supply, starting, ignition and lighting.

The current supply group furnishes current to operate the other three groups. The battery furnishes current when starting the engine or operating at idling speed. The generator furnishes current (both to operate the other groups and to recharge the battery) at higher speeds. The voltage regulator controls the output of the generator. Accessories, such as heaters and radios, obtain their current supply through the ignition switch.

The starting group cranks the engine for starting. The starting switch energizes the starting motor solenoid. The solenoid is an electrical switch for the starting motor which automatically "kicks-out" when the engine starts. The starting motor drives the engine fly-wheel.

The ignition group furnishes the

spark to the combustion chamber to ignite the fuel mixture. The ignition switch opens and closes the circuit. The ignition coil induces high secondary voltage. The distributor makes and breaks the primary circuit and distributes the high tension current in the secondary circuit. The spark plugs provide the spark to the combustion chamber. The high tension wiring is an important part of this system.

The lighting group consists of the lighting switches, lamp bulbs and their sockets, and wiring.

Maintenance information on the components of the electrical system are given in this section of the manual.

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.

Battery

The battery is either a 12-volt, 50 hour capacity or a 6-volt, 105-ampere hour capacity.

Keep the two wing nuts on the hold-down frame snug but tighten only with finger pressure, never with wrench or pliers. This precaution will avoid excessive pressure on the battery case.

Keep the battery terminals and cables clean and tight. A light coat of chassis lubricant applied at the terminals will reduce corrosion. Occasional cleansing around the terminals with soda solution or ammonia will prevent accumulation of corrosive deposits. Do not allow either soda or ammonia to get into the battery cells. Keep the cell caps in place and sealed during the cleaning.

Check the battery every 1000 miles [1,600 km.] with a hydrometer and at the same time check the electrolyte level in each cell; add distilled water to maintain the

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.

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.

Should the engine not turn over when the ignition key is turned to the start position, the battery may be discharged. If so, lights will be dim and the horn will have a weak tone or none at all.

The engine also will not turn over if the battery cables are broken or defective or if the cable

(Text continued on page 45)

LEGEND FOR FIG. 20

- | | |
|---------------------------------|--------------------------------|
| 1—Left Headlamp | F—Temperature Gauge |
| 2—Left Parking and Signal Lamp | G—Fuel Gauge |
| 3—Right Parking and Signal Lamp | H—Instrument Voltage Regulator |
| 4—Right Headlamp | 16—Starter and Ignition Switch |
| 5—Temperature Sending Unit | 17—Horn Button |
| 6—Generator | 18—Dome Light |
| 7—Distributor | 19—Right Tail and Stop Lamp |
| 8—Ignition Coil | 20—License Plate Lamp |
| 9—Starting Motor | 21—Left Tail and Stop Lamp |
| 10—Voltage Regulator | 22—Fuel Gauge Tank Unit |
| 11—Battery | 23—Directional Signal Switch |
| 12—Negative Cable | 24—Directional Signal Fuse |
| 13—Positive Cable | 25—Flasher |
| 14—Main Light Switch | 26—Foot Dimmer Switch |
| 15—Instrument Cluster | 27—Horn Relay |
| A—Upper Beam Indicator | 28—Stop Light Switch |
| B—Auxiliary | 29—Oil Pressure Sending Unit |
| C—Instrument Lights | 30—Horn |
| D—Oil Pressure Indicator | 31—Junction Block |
| E—Charge Indicator | |

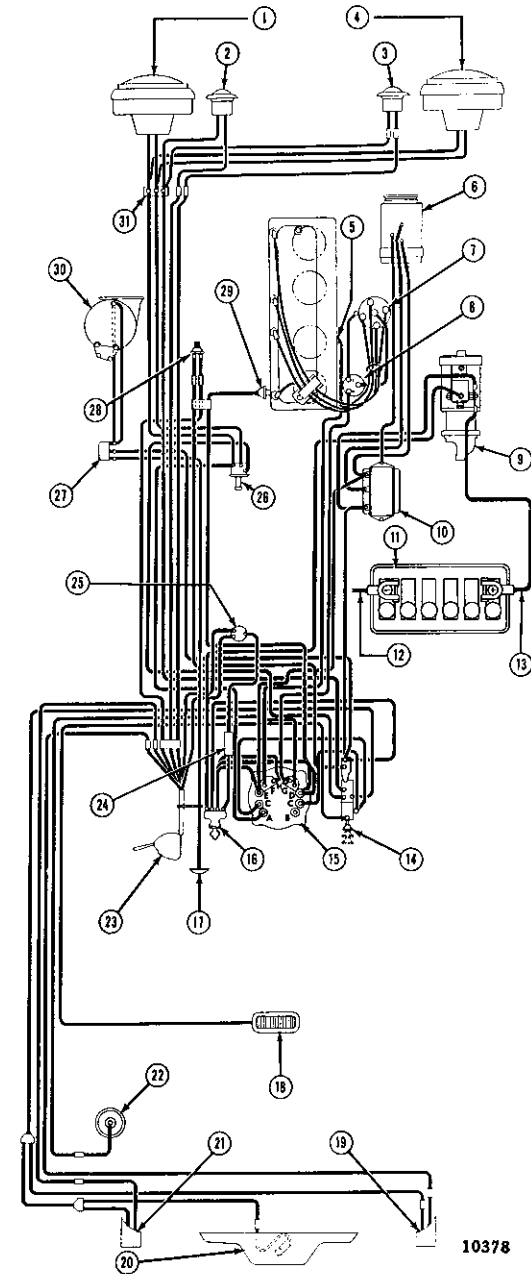
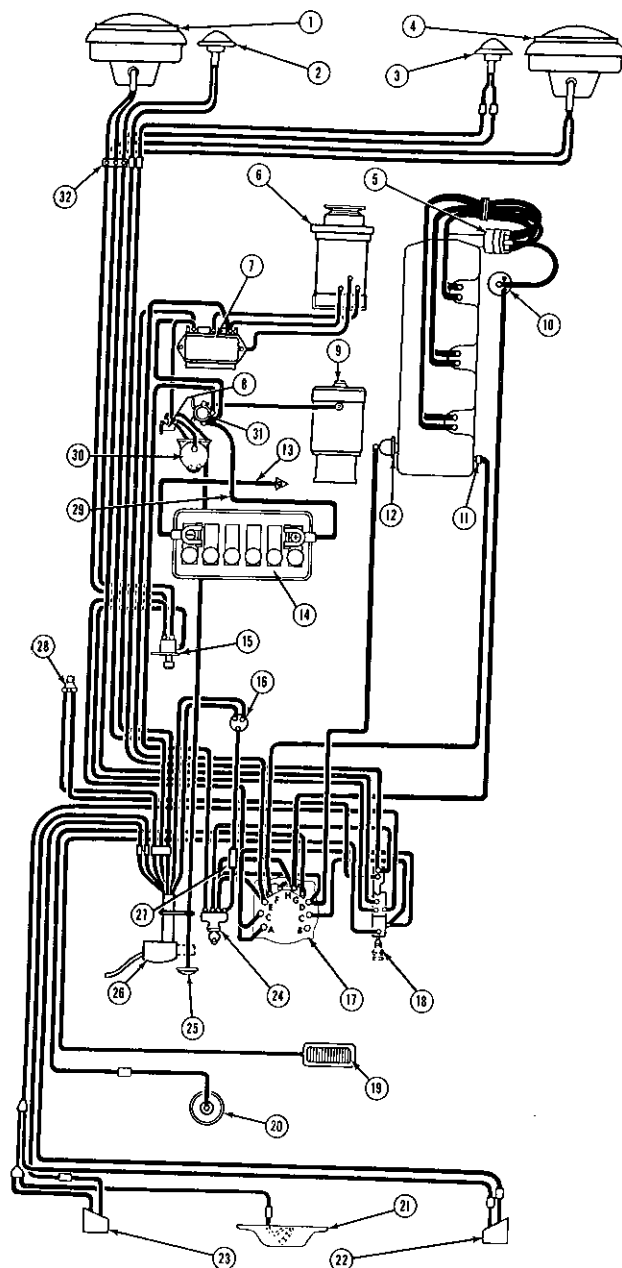


FIG. 20—WIRING DIAGRAM—F4-134 4x2



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FIG. 21—WIRING DIAGRAM—6-230 4x2

connections at the starting motor solenoid or at ground are loose. Defective cables must be replaced; loose connections cleaned and tightened.

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

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.

is a solution of sulphuric acid which, if accidentally spilled on the skin or spattered 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.

Generator

The high-output, air-cooled generator seldom needs service except for periodic lubrication. However, an occasional check of the generator and regulator by an experienced technician is a wise precaution. Your 'Jeep' vehicle dealer has the necessary modern electrical equipment at his disposal with which to perform this check, which should be done at 10,000 mile [16,000 km.] intervals with one

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.

exception. At any time the 'AMP' warning light indicates "no charge" when the engine is running above idling speeds check the charging circuit and correct the fault as soon as possible.

The 'AMP' warning light gives its own warning of a burned-out bulb as normally it should flash intermittently each time the engine is started.

LEGEND FOR FIG 21

- | | |
|---------------------------------|--------------------------------|
| 1—Left Headlamp | D—Oil Pressure Indicator |
| 2—Left Parking and Signal Lamp | E—Charge Indicator |
| 3—Right Parking and Signal Lamp | F—Temperature Gauge |
| 4—Right Headlamp | G—Fuel Gauge |
| 5—Distributor | H—Instrument Voltage Regulator |
| 6—Generator | 18—Main Light Switch |
| 7—Voltage Regulator | 19—Dome Light |
| 8—Horn Relay | 20—Fuel Gauge Tank Unit |
| 9—Starter | 21—License Plate Lamp |
| 10—Ignition Coil | 22—Left Tail and Stop Lamp |
| 11—Oil Pressure Sending Unit | 23—Right Tail and Stop Lamp |
| 12—Temperature Sending Unit | 24—Starter and Ignition Switch |
| 13—Negative Cable | 25—Horn Button |
| 14—Battery | 26—Directional Signal Switch |
| 15—Foot Dimmer Switch | 27—Directional Signal Fuse |
| 16—Flasher | 28—Stop Light Switch |
| 17—Instrument Cluster | 29—Positive Cable |
| A—Upper Beam Indicator | 30—Horn |
| B—Auxiliary | 31—Starter Solenoid |
| C—Instrument Lights | 32—Junction Block |

Voltage Regulator

The generator is designed to produce all the energy required by the ignition and most of the accessories all turned on at the same time. Under most conditions, particularly during daytime driving, this is far more electrical energy than is required. To prevent overcharging the battery, a voltage regulator is provided to reduce generator output as soon as the battery is fully charged. One unit

of the regulator restricts the generator output within safe limits to prevent overheating the generator at sustained high engine speeds.

The regulator must be adjusted with great accuracy; heat as well as voltage and amperage must be considered when adjusting it. Should trouble develop in the regulator, consult your 'Jeep' vehicle dealer.

Ignition Wiring

The ignition wiring includes the wires or cables between the spark plugs, the distributor and the ignition coil. The connections should be kept clean and tight. The ignition wiring should be cleaned periodically by wiping with a dry cloth. The insulation on ignition wiring gradually deteriorates with normal vehicle use. The insulation should be examined once a year.

If the insulation has become hard and brittle, the ignition wiring should be replaced.

Should the engine fail to start, especially in wet weather, the trouble may be caused by dirt and moisture on the ignition cables, spark plugs, and distributor cap. Clean and dry them with a clean cloth. Then start the engine.

Distributor

The distributor delivers the spark to the right cylinder at the right time. It is of dust-proof construction and is operated by a coupling on the oil pump shaft. A mechanical breaker, built in the distributor, opens and closes the primary circuit.

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

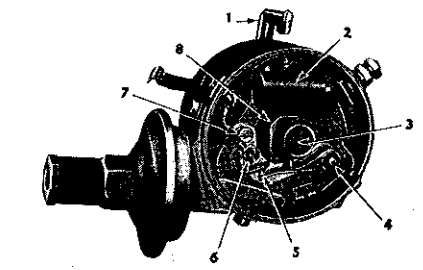


FIG. 22—DISTRIBUTOR
F4-134 ENGINE

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

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.

Correct distributor point gap is very important. Dirty, burned or pitted points may cause misfiring. Points set too close together or too far apart can also cause the engine to misfire. The distributor points are cleaned and adjusted as part of a good engine tune-up. If their condition is questioned, separate the points and inspect them for being pitted or badly burned. Clean the points with a breaker point file. If the points do not clean up with a few strokes of the file they should be replaced.

Should new contact points be installed they should be aligned so as to make contact at the center of the contact surfaces. Bend the stationary contact bracket to secure correct alignment and then check the gap and timing.

To check the distributor point gap, crank the engine or place transmission in high gear and rock the vehicle forward enough to place the movable point cam follower on the peak of cam and check the point opening, using a

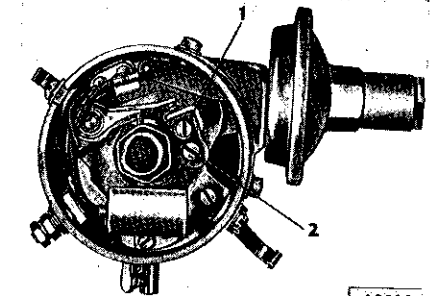


FIG. 23—DISTRIBUTOR
6-230 ENGINE

- 1—Lock Screw
2—Adjusting Screw

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 con-

tinue 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.

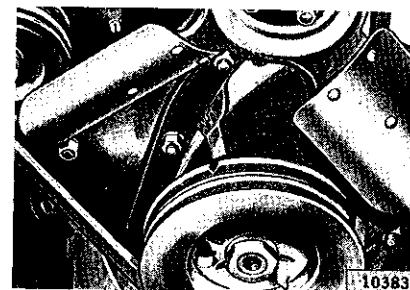


FIG. 24—TIMING MARKS
F4-134 ENGINE

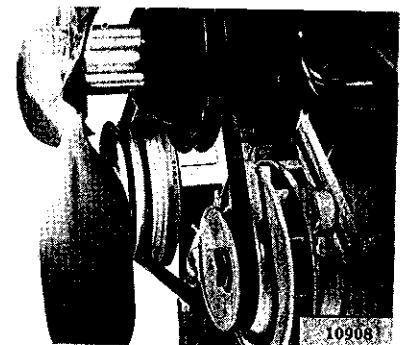


FIG. 25—TIMING MARKS
6-230 ENGINE

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 but do not over-tighten it.

After setting the timing, revolve the crankshaft two complete turns to make sure all backlash is elimi-

nated. 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 'Jeep' vehicle 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.

Spark Plugs

Spark plugs in any vehicle are expendable. They require occasional examination, adjustment, cleaning, and eventually replacement. Old spark plugs reduce your engine efficiency and economy. Replace them when inspection indicates the old plugs cannot be re-conditioned.

Keep spark plug electrodes, terminals and porcelains clean. Fouled spark plugs can cause the engine to misfire. Dirty porcelains can cause hard engine starting, especially in damp weather. If porcelain insulator is cracked, install a new plug.

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. Uni-

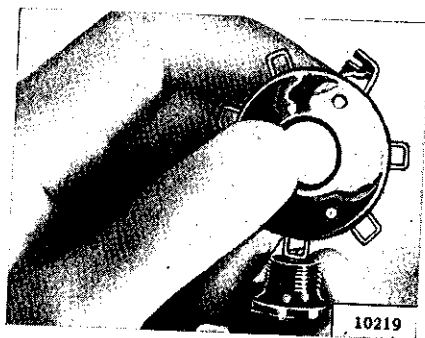


FIG. 26—SETTING GAP

Starting Motor

The starting motor is equipped with sealed type bearings and requires no lubrication. The starting circuit should be checked periodically. The starting circuit includes the starting motor solenoid and wires to the battery, voltage regulator, and ignition switch. All

connections should be clean and tight. Insulation on the wires should not be worn or damaged.

If the starting motor will not turn the engine, although the light and horn operate properly, check the starting circuit. A "click" from the starter solenoid, when the igni-

form gap setting assures smooth engine operation.

It is recommended that spark plugs be replaced at intervals of each 10,000 miles [16,000 km.] of service since the spark loses intensity because of erosion of the electrodes.

tion key is turned to the start position, indicates that wiring in the starter circuit is properly installed. If the wiring is clean and tightly

installed, the trouble is probably in the starter itself and should be referred to your 'Jeep' vehicle dealer.

Bendix Drive

The starter motor is equipped with Bendix Folo-Thru 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 unit and a new Bendix Drive 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 used. The circuit breaker clicks on

and off in the event of a short circuit in the wiring.

The upper and lower headlight beams are controlled by a foot switch located on the toe board at the left of the clutch pedal.

Main Light Switch

Should it be necessary to install a new light switch, refer to the wiring diagram which indicates the correct wires to install on the several terminals.

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

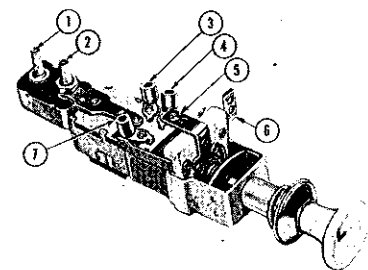


FIG. 27—MAIN LIGHT SWITCH

- | | |
|------------------|-------------------------|
| 1—Battery | 5—Dome Light |
| 2—Auxiliary | 6—Instrument Panel Lamp |
| 3—Parking Lights | 7—Rear Lights |
| 4—Headlights | |

Headlight Aiming

Correct head lamp aiming is important to provide maximum road visibility and safety. To aim the head lamps, a darkened area with a light colored wall is required. The vehicle must be placed on a flat, level surface; square with the wall; and with the head lamps 25 feet [7,6 m.] from the wall, Fig. 28. Inflate tires to recommended pressure. Rock vehicle from side to side

to equalize springs and shock absorbers.

Place a vertical centerline on the wall in line with the center of the vehicle. Place two vertical black lines on the wall, one on each side of the centerline, at a distance equal to the lamp centers. Measure the distance from the floor to the center of each head lamp and place a horizontal black line on the wall cor-

responding to these measurements. Cover the lamp not being aimed. Aim on the lower head lamp beam. The top edge of the high intensity portion of the lower beam should be even with the horizontal line; the left edge should be 2 inches [5 cm.] to the right of the lamp centerline.

If the aim is incorrect, remove the head lamp door screw and remove the door. Adjust the vertical

and horizontal aiming screws in the mounting ring until the beam is correctly aimed. Always bring the beam into final position by turning the aiming screws clockwise so that the sealed beam unit is held under proper tension when the operation is completed. Replace the head lamp door.

Cover the head lamp just aimed, and follow the same procedure for the opposite lamp.

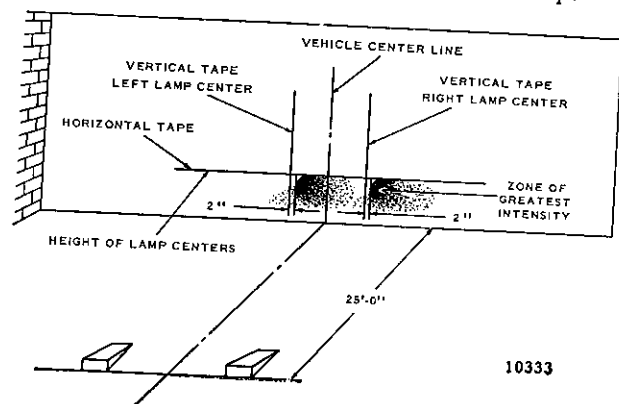


FIG. 28—HEADLIGHT AIMING CHART

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	6006	6012
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		

DRIVING COMPONENTS

The driving components transmit the engine's power to the driving wheels of the vehicle. The clutch interrupts the flow of power while shifting gears. The transmission provides a series of gear ratios which enable the engine to start the vehicle from a standing position, while providing efficient operation at normal operating speeds. The propeller shaft transmits the power

from the transmission to the axle differential, which transmits it to the axle shafts. The axle shafts drive the wheels. The springs connect the axle to the vehicle frame, and the shock absorbers soften the ride. The brakes provide a means of rapidly slowing or stopping the vehicle when desired. Maintenance information is given on the following pages.

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.

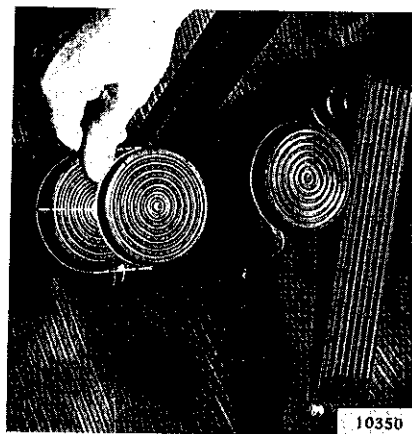


FIG. 29—CLUTCH FREE PLAY

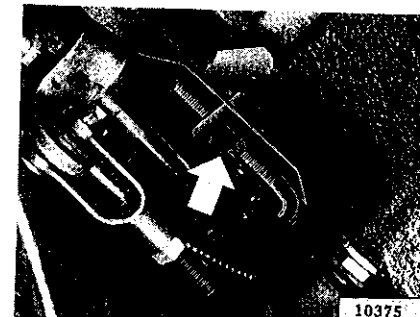


FIG. 30—CLUTCH ADJUSTMENT
F4-134 MODELS

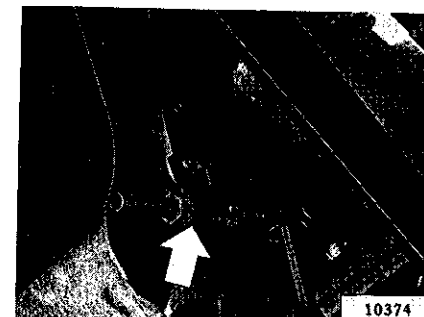


FIG. 31—CLUTCH ADJUSTMENT
6-230 MODELS

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. When adjustment is completed, tighten the lock nut securely.

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 'Jeep' vehicle 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 'Jeep' vehicle dealer.

Propeller Shaft

The drive from the transmission or overdrive 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.

The journal trunnion and needle

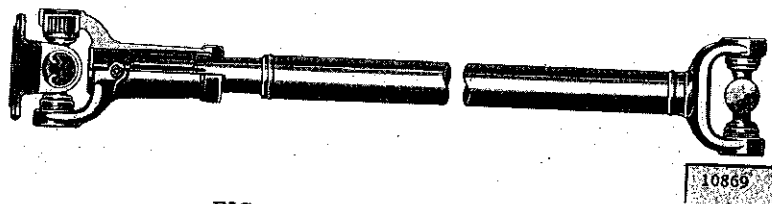


FIG. 32—PROPELLER SHAFT

bearings are the only parts subject to wear, and should it become 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.

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.

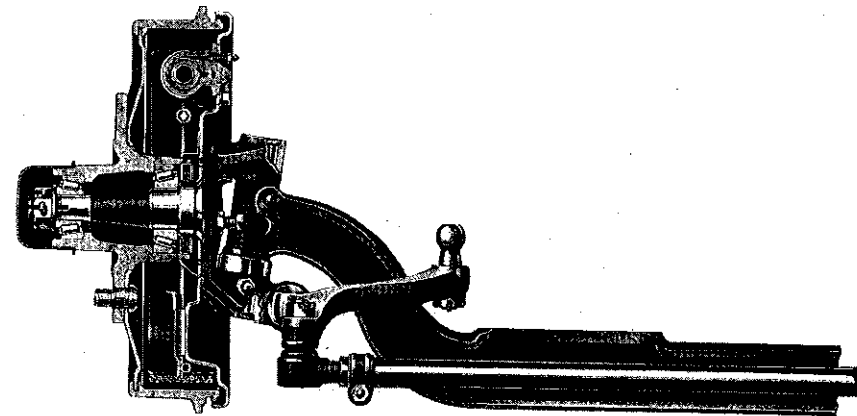


FIG. 33—FRONT AXLE

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.

Powr-Lok Rear Axle

Whenever a vehicle with Powr-Lok differential has one wheel jacked up, extreme care must be exercised to be sure the transmission is in the neutral position whenever the engine is started. If

the transmission is in gear, and the engine is started, the power will be transmitted by the Powr-Lok unit to the rear wheel still on the ground and drive the vehicle off the jack.

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. Looseness 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 $\frac{3}{84}$ " to $\frac{3}{32}$ " [1,2 a 2,4 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 'Jeep' vehicle dealer.

BRAKES

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

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 pres-

sure 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.

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 'Jeep' vehicle dealer.

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:

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

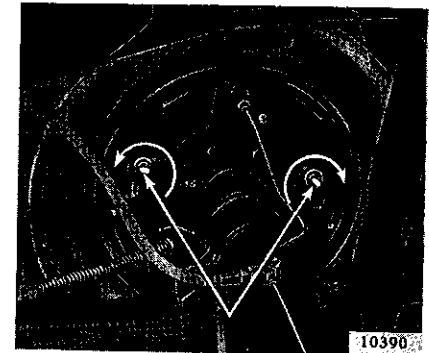


FIG. 34—BRAKE ADJUSTMENT

rear 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.

- 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. First,

turn the end of the hand brake control handle as far as possible in the direction opposite that shown

in Fig. 3. Then pull the handle to the rear, or set, position. Loosen the locknut on the brake cable adjusting rod 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. They must be free from drag. Then turn the end of the control handle in the direction shown in Fig. 3 until the desired tension is obtained.

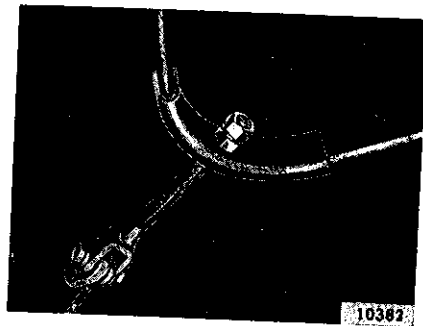


FIG. 35—HAND BRAKE ADJUSTMENT

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 re-

move 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.

Should either the foot or hand brakes require relining or should it be necessary to make a major adjustment, contact your 'Jeep' vehicle Dealer.

WHEELS AND TIRES

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 over-

heated.

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.

Front Wheel Bearing Adjustment

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 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.

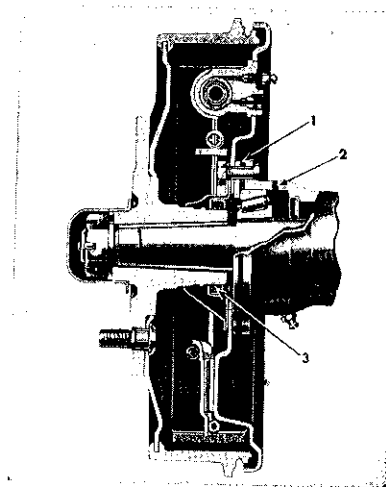


FIG. 36—REAR WHEEL HUB

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

Maintenance of Rear Wheel Bearings

Should it be necessary to adjust the bearings, clean them thoroughly and repack them with the recommended lubricant. Should the bear-

ings 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, or by L-E-F-T stamped on the face of each nut.

Left-hand nuts must be turned to the **RIGHT** to be removed and right-hand nuts turned to the **LEFT** to be removed.

Use the following procedure to dismount and mount wheels.

- Set hand brake. Block the wheels if on a grade.
- Place jack under the bumper in line with the wheel. Direction of movement of the jack is controlled by a lever on the jack housing. Lift the lever when the jack is to be raised, push the lever down when the jack is to be lowered. Raise the jack until it is in contact with the bumper, but do not raise the vehicle.
- Remove the wheel cover if the vehicle is so equipped. Loosen wheel nuts before raising vehicle.
- Raise the vehicle until the tire is off the ground. Remove nuts

and wheel.

- When mounting the wheel on the vehicle, first place the wheel on the studs and replace the stud nuts. Tighten the nuts enough to hold the wheel in proper position. When tightening stud nuts, alternately tighten opposite stud nuts to prevent wheel runout.

- Lower the vehicle and remove the jack. Tighten the nuts securely. Replace wheel covers.

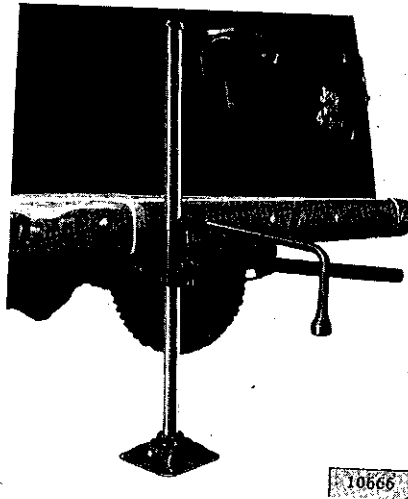


FIG. 37—JACK POSITION

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 'Jeep' vehicle is equipped with tire sizes other than those listed here, ask your 'Jeep' vehicle dealer to recommend correct tire pressures.

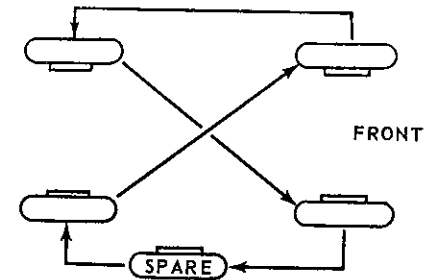
The importance of correct tire inflation cannot be over-emphasized. To secure maximum tire life and most efficient vehicle operation, it is imperative that these pressures be maintained for all normal vehicle operation.

Valve caps should always be used. They should be free of dents and damaged threads. Valve caps protect valve cores by keeping out dust, dirt and moisture.

Cross-switch the tires every 5000 miles [8,000 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. 38 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.

To remove a tire from a drop center rim, first deflate completely

and then force the tire away from the rim throughout the entire circumference until the bead falls



10221

FIG. 38—TIRE ROTATION

into the center of the wheel rim, then with a heavy screw driver or tire removing tool, used opposite the valve, remove one side of the tire at a time and remove the inner tube.

Installation of a tire is made in the same manner by first dropping one side of the tire into the center of the rim and with a tire tool, spring the bead over the wheel rim, using care not to damage the inner tube.

"Captive Air" Tires

"Captive air" tires are standard for the 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: 24 psi. [1,40 kg-cm²]
 - (see below)
 - Rear: 24 psi. [1,40 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. 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 5000 miles [8,000 km.]. The recommended rotation method for "captive air" tires is shown in Fig. 39 as no spare tire is used when "captive air" tires are installed.

Unmounting "Captive Air" Tires

Deflate the tire by removing the core from the rim valve to release the pressure from the inner chamber. 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

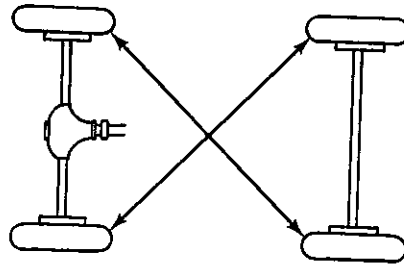
Mounting "Captive Air" Tires

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.



10222

FIG. 39—"CAPTIVE AIR"
TIRE ROTATION

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 tire shield from the tire.

- Remove the bottom tire bead from the rim flange.

- 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 be-

cause 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.

SUSPENSION

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 springs 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.

BODY

Paint Care

Frequent washing with clear water and polishing with a soft cloth or chamois will preserve the original luster of the finish. Always use cold water in washing the vehicle. Never wash it in the direct rays of the hot sun and always wait until the sheet metal surfaces are cooled 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 luster, 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 Interior

The interior of your 'Jeep' Station Wagon was tailored for pleasant appearance, easy maintenance, and rugged use. On some vehicles the floor area behind the driver's seat is protected by hardwood rub strips which aid in loading and unloading heavy or bulky objects. Other vehicles have this area carpeted.

The interior of vehicles equipped with hardwood rub strips is washable. Flush it with a hose (use care to keep the headlining from becoming soaked) and clean it with a damp cloth or chamois.

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.

USE ONLY 'JEEP' APPROVED SPECIAL EQUIPMENT IDENTIFIED BY THIS EMBLEM



'Jeep' Approved Special Equipment is designed to adapt versatile 'Jeep' vehicles to specialized tasks or functions. Such equipment is approved for installation on 'Jeep' vehicles after exhaustive tests by the Willys engineering staff.

of warranty rights for the basic 'Jeep' vehicle when 'Jeep' Approved Special Equipment is ordered and installed.

Items of Equipment Shown

The following pages present pictorially and by description some of the major items of 'Jeep' Approved Special Equipment that can be ordered. Each item is applicable to certain vehicles and although it may not apply to the 'Jeep' vehicle covered in this manual, each item is procurable for use with other 'Jeep' vehicles. The last page of this section presents an additional listing of more items of 'Jeep' Approved Special Equipment. To fulfill your specific needs, your nearest 'Jeep' vehicle dealer is ready to assist you by presenting complete 'Jeep' Approved Special Equipment recommendations.

Exhaustive Tests For Approval

Before any piece of special equipment is approved for display of the 'Jeep' Approved Special Equipment emblem, Willys engineers perform a series of research tests to confirm:

- The item of special equipment is built to the same high standards of 'Jeep' vehicle construction.
- The item of special equipment will more than adequately perform the job for which it is intended.
- The item of special equipment installed on a 'Jeep' vehicle will in no way limit the normal operation of the 'Jeep' vehicle.

Only when it meets these demands will any item of special equipment display the 'Jeep' Approved Special Equipment emblem.

Warranty Preserved

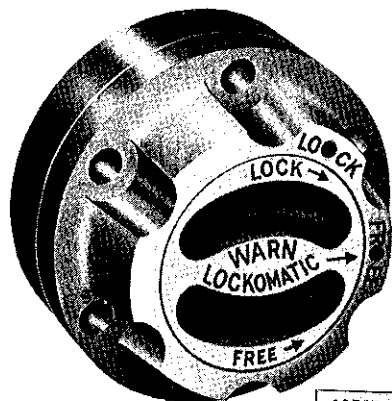
The owner can rest assured that if 'Jeep' Approved Special Equipment is installed on his 'Jeep' vehicle, the warranty under which the new 'Jeep' vehicle is sold will remain unaltered. There is no loss

Authorized Emblem

The emblem shown on this page and the pages following is displayed only on those items of Special Equipment that have passed our stringent engineering tests. A constant check is maintained by Willys engineers to ensure that these standards are continually met. Special Equipment for 'Jeep' vehicles that is approved and carries this emblem is sold exclusively by 'Jeep' vehicle dealers. So, LOOK FOR THIS EMBLEM FOR YOUR ASSURANCE OF QUALITY AND DEPENDABILITY.



SELECTIVE DRIVE HUBS

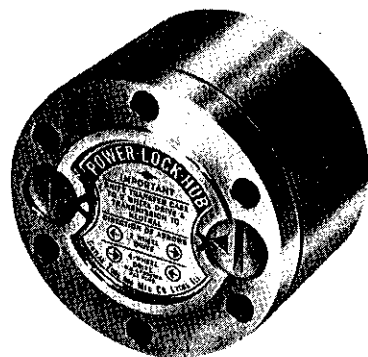


10767

"WARN" 'LOCKOMATIC' HUB

'Jeep' 4-wheel-drive vehicles are world famous for their "go anywhere" ability in rough terrain. The use of selective drive hubs enhances the 2-wheel-drive quality of these vehicles.

The use of selective drive hubs reduces wear on the front end parts,



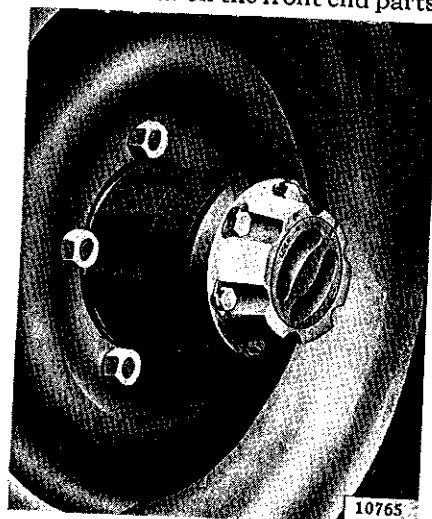
10766

"CUTLAS" 'POWER-LOCK' HUB

reduces wear on tires, provides easier steering, increases gas mileage, and provides the vehicle with more "get away" pep and performance.

The 4-wheel-drive feature requires the use of a front propeller shaft, front axle differential, and front axle shafts. Because these parts are directly connected to the front wheels, they rotate when the vehicle is in motion, even though the vehicle is in 2-wheel-drive. The use of selective drive hubs eliminates the rotation of these parts when the vehicle is in 2-wheel-drive.

Selective drive hubs are available in two types, automatic and manual controlled. The automatic type engages and disengages the front wheels automatically depending on the type of drive in which the vehicle is being operated. The manual controlled type is converted from one type drive to another in a few seconds with a quick turn of the controls.



10765

"WARN" HUB



SNOW PLOWS

Snow clearing and angledozing are among the many jobs for which 'Jeep' vehicles are famous the world over. The addition of a snow plow to a 'Jeep' vehicle provides efficient snow clearing on driveways, walks, roads and streets, and parking lots; on farms, estates, factories, cemeteries, institutions, parks, filling stations, airports, docks, skating ponds, churches, shopping centers, and supermarkets.

'Jeep' approved snow plows are custom-designed for 'Jeep' vehicles. Mountings meet chassis engineers' requirements. All parts are constructed to perform rugged duty, yet are simple in design and easy to attach.

There are two basic types of snow plows available. They are the reversible blade plow and the V-type plow. The reversible blade



10764

"MEYER" SNOW PLOW

is for general purpose snow plowing. It is quickly adjustable for angling left or right, or pushing straight ahead. V-type plows are designed for deep snows and heavy service. The V-type blade divides and rolls the snow to both sides.



10763

"MEYER" SNOW PLOW



WINCHES

One of the most useful and frequently purchased pieces of auxiliary equipment available for installation on 'Jeep' vehicles is the winch. The addition of winches to 'Jeep' vehicles greatly increases the usefulness of these multipurpose vehicles.

A winch enables the vehicle to travel anywhere at any time in any weather. The winch enables a 'Jeep' vehicle to extricate itself, or other vehicles, from any conceivable driving situation under its own power. Gullies, ditches, streams, rocks, mud, snow, icy slopes and extremely steep grades can all be navigated with assurance and safety.

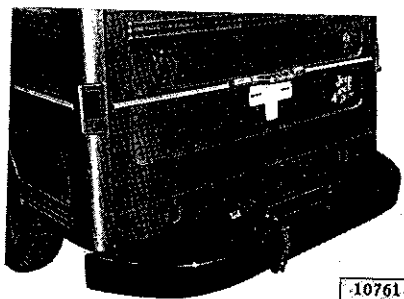
Furthermore, the winch is ideal for towing operations, moving heavy machinery, use as a hoist to load and unload trucks and freight cars, and for positioning equipment. In fact, a winch is recommended any place a steady, smooth and strong pull on a cable will make



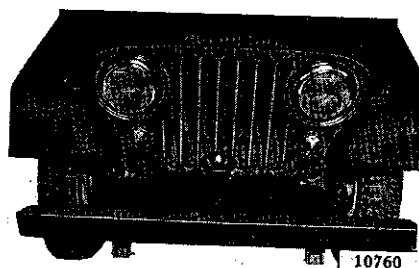
"KOENIG" DRUM WINCH

work easier, safer and more economical.

Two types of winches are available for installation on 'Jeep' vehicles; the drum type and the capstan type. The drum type winch is for heavy duty service. It may be mounted on the front, bed, or rear of the vehicle. The capstan type winch is rated for limited service. It is mounted on the front of the vehicle.



"RAMSEY" DRUM WINCH



"RAMSEY" CAPSTAN WINCH

JEEP-A-TRENCH

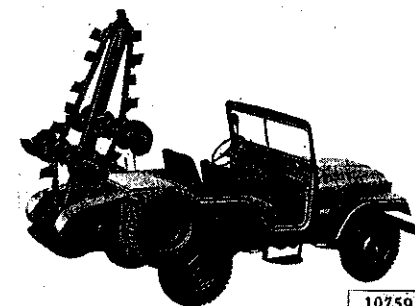


The Jeep-A-Trench is a low cost, money-making, money-saving trench digger. Mounted on a 'Jeep' vehicle, it is a full-fledged trenching machine capable of performing the major portion of the trenching requirements of contractors, utility companies, farmers, and railroads.

The Jeep-A-Trench is ideal for digging foundations and sidewalk curbing, laying cable and piping, laying sewage drains, and tile drainage work.

The mobility of 'Jeep' Vehicles permits the Jeep-A-Trench to operate anywhere, and still maintain road speeds of 40 to 50 miles-per-hour [64 a 80 kph.]. It virtually eliminates set-up and knock-down time.

The Jeep-A-Trench digs trenches faster and more economically than by other conventional methods. It performs jobs formerly done by large, costly trenching equipment.



"AUBURN" 'JEEP-A-TRENCH'

Trenching speeds are variable up to 600 feet-per-hour [183 m.] under ideal conditions. The Jeep-A-Trench is available with boom lengths capable of digging to depths of 3, 5 or 6 feet [1-1,5-1,8 m.]. Digger bits are available for digging trench widths up to 14 inches [35 cm.].

The Jeep-A-Trench has undergone a series of engineering refinements, until today the all hydraulic model requires a minimum maintenance expense.



"AUBURN" 'JEEP-A-TRENCH'

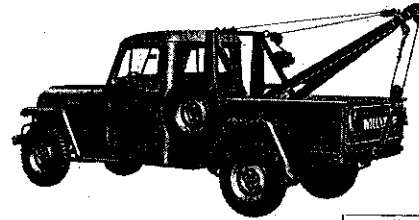


WRECKERS

One of the most popular 'Jeep' approved special equipment items is the wrecker. Service stations, garages, repair shops, and fleet maintenance departments throughout the country own and operate 'Jeep' vehicles equipped with wreckers.

The 4-wheel-drive feature of all 'Jeep' trucks makes these trucks ideal for wrecker service. This feature enables the owner to retrieve disabled vehicles and equipment from remote off-the-road locations. It also permits him to operate under adverse weather conditions, in snow, ice, and mud.

'Jeep' approved wreckers are custom built for 'Jeep' vehicles. Their heavy, reinforced construction is engineered for equal load

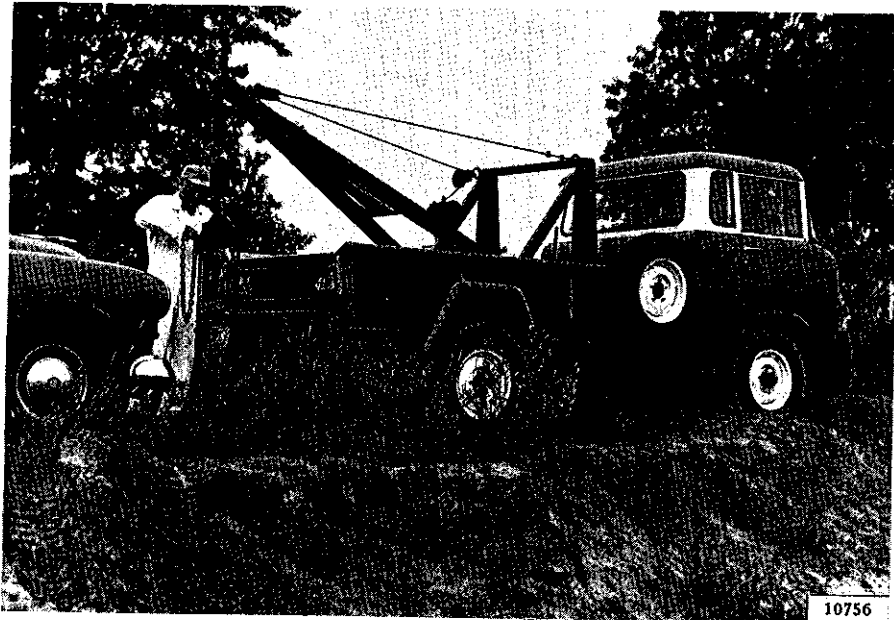


10757

"CANFIELD" WRECKER

distribution. They have been designed for minimum investment. The wreckers are available in low cost manually operated models and in power operated models.

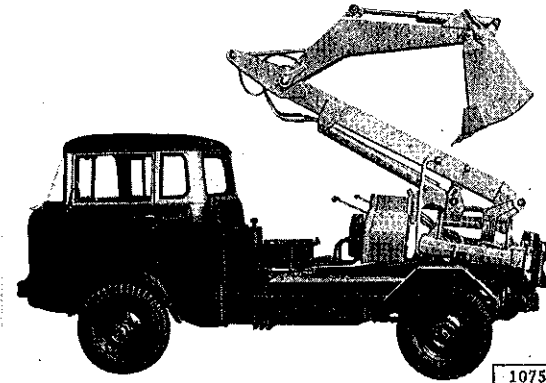
Also available, as optional equipment for use with wreckers, are flasher lights, bumper push plates, and overload springs.



10756

"CANFIELD" WRECKER

BACK HOE



10755

"OTTAWA" BACK HOE

The approved back hoe for Model FC-170 is a multipurpose digger with a broad range of applications. It is specifically designed to fill the gap between hand digging and heavy duty earth moving. The back hoe is used to dig trenches, sump pits, foundations, laterals, gasoline and oil reservoir pits, general excavation, truck loading, and pavement removal.

The back hoe is designed for maximum ease of control, comfort, and visibility. A 190° continuous swing of the bucket is provided, with a 12½ foot [3,8 m.] digging depth. The equipment is quickly

set up, being ready for digging in seconds after arrival at a new job site. Hydraulic laydown shifts the back hoe up and over the rear axle for safe travel at regular road speeds.

Buckets for the back hoes are available in sizes from 14 inches to 30 inches [35 a 75 cm.] in width. Special ejector buckets, that automatically force wet, sticky soil from bucket while dumping, are available. Also available are grave-bellhole buckets for digging straight sides and square corners that need no hand finishing.



10754

"OTTAWA" BACK HOE

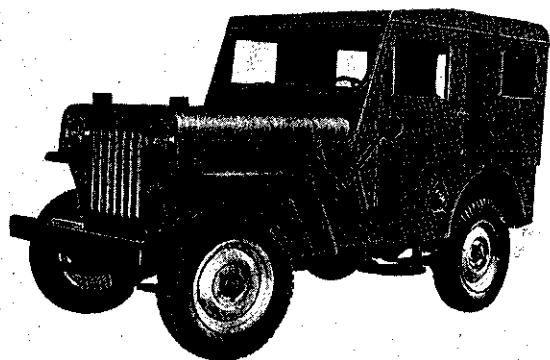


METAL ENCLOSURES

The versatility and utility of 'Jeep' Universals and 'Jeep' Dispatchers is greatly expanded by the addition of metal enclosures. The enclosures provide full protection from the weather, and permit the use of the vehicles every day of the year. The enclosures have rigid strength, long life, and have an attractive appearance.

Maximum protection is provided with metal enclosures as door locks are available to protect valuable cargo. Flush, air tight fit of enclosures provides complete protection against inclement weather.

Safety is another feature of the metal enclosures. They are constructed of heavy gauge steel, braced, and welded. All windows are non-shattering safety glass.

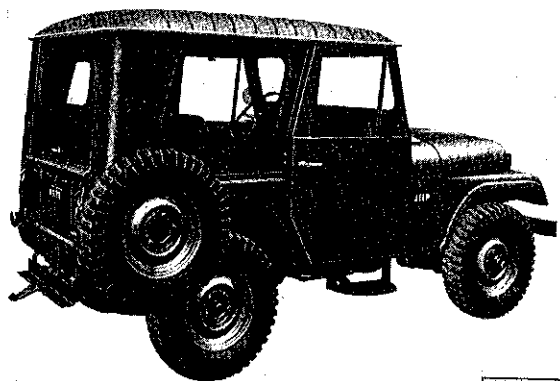


"KOENIG" ENCLOSURE

10753

Comfort for the vehicle occupants is assured by complete protection in inclement weather, and by the ventilation provided by the moveable door windows.

Metal enclosures are available in full cab and half cab models. The full cab models are provided with large rear doors for easy loading of cargo.



"WILLYS" ENCLOSURE

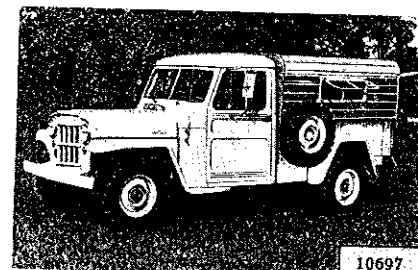
10752



PICKUPBOX ENCLOSURES

The 'Jeep' Pick-Up Truck's utility and versatility is greatly increased by the addition of a panel type enclosure to the pick-up box. The heavy duty aluminum enclosure provides all weather protection against rain, snow, or pilferage.

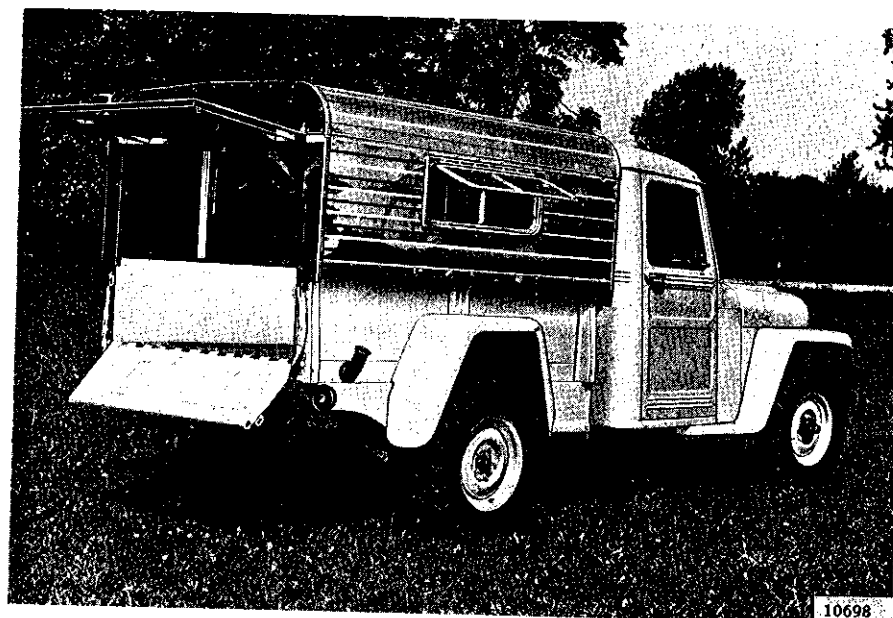
The enclosure converts the truck into a dual purpose vehicle for business or pleasure use. It provides a large protected cargo area for business. The all weather protection and the screened side windows, of the enclosure, combined with the "go anywhere" qualities of the 'Jeep' truck, make it an ideal vehicle for camping and fishing trips.



10697

"Camp-N-Cargo"
PICKUPBOX ENCLOSURE

The enclosure is ruggedly built. All riveted airplane type construction provides greater rigidity. The rubber cushion mounted enclosure is quickly installed using only a screw driver and pliers.



10698

"Camp-N-Cargo" PICKUPBOX ENCLOSURE

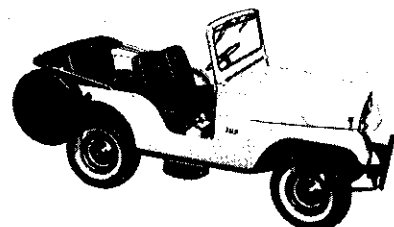


CONVERTIBLE TOPS

Convertible tops enable the driver and passengers to enjoy the real versatility of 'Jeep' Universals regardless of weather. The tops keep out the cold and rain in inclement weather, yet quickly converts for warm weather travel.

The vinyl coated top material is mildew inhibited. It retains its new look wash after wash. Large window areas and wrap-around side windows provide excellent visibility. Doors are easily removed, when desired, from the vehicle. Zipper opening rear curtain rolls and snaps up for easy loading access.

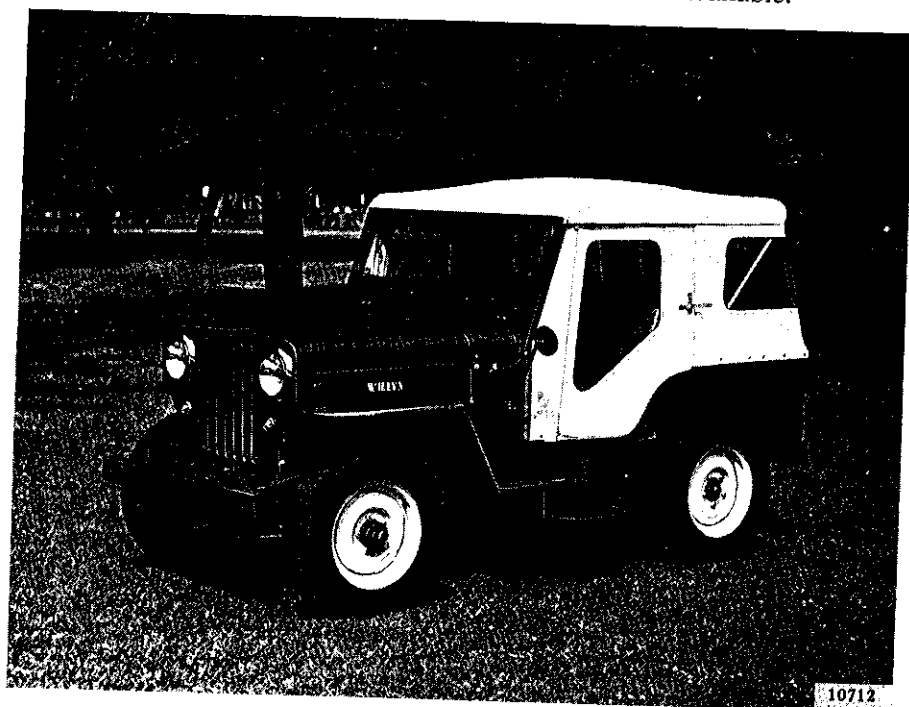
The convertible top quickly con-



"WHITE" CONVERTIBLE TOP

verts without the use of tools. It is easily installed by anyone.

A matching top boot and tire cover are also available.



"WHITE" CONVERTIBLE TOP



ADDITIONAL ITEMS

The 'Jeep' Approved Special Equipment items described in the preceding pages are only a few of the many items available to increase the usefulness and versatility of 'Jeep' vehicles. Some of the additional items available are listed below:

"Stratton" Hydraulic Lift — hydraulic-action lift for operating implements with 3-point engagement.

"Gar Wood" or "Wyatt" Dump Bodies — hydraulic and electric-hydraulic operated.

"Koenig" Side Cabinets — for tool and equipment storage.

"Schramm" Compressors — bed-mounted mobile units.

"Roper Wright" Post Hole Digger — power-driven, mobile unit.

"Dumas" Center Seats and Bench Pads — for 'Jeep' Universals.

"Koenig" or "Canfield" Helper Springs — for additional support under heavy loads.

"Sweepster" Rotary Broom — for cleaning and light snow removal on all pavements.

"Stahl" utility and service bodies for all 'Jeep' trucks.

"Cutlas" Wheel Covers — for improved appearance of all vehicles.

"Howe" Fire Apparatus — complete fire-fighting units.

"Covington" Mowers — rotary type for grass cutting.

"Koenig" Side Step-Plates — for easier, safer loading and unloading.

"Hobart" Welders — bed-mounted, mobile units.

"Meyer" Angledozer — for light and medium duty earth-moving jobs.

"Custom Accessory Sales" Rear Step Bumper — with provision for hitch.

Your 'Jeep' vehicle dealer is your only source of 'Jeep' Approved Special Equipment. Consult him for special equipment designed especially for 'Jeep' vehicles. Only 'Jeep' Approved Special Equipment cannot affect the provisions of the new vehicle warranty. Look for the 'Jeep' Approved Equipment decal. It is your only assurance of complete satisfaction.

Additional items of 'Jeep' Approved Special Equipment may become available from time to time in the future. Such items of newly approved equipment may not display the 'Jeep' Approved Special Equipment emblem. If any question arises as to whether a specific item of special equipment is approved, contact the Special Equipment Supervisor, Willys Motors, Inc., Toledo 1, Ohio.

ALPHABETICAL INDEX

A	Page	G	Page
Adjustment — Brake	55	Generator	26, 45
Adjustment — Clutch	51		
Adjustment — Front Wheel Bearings	56	H	
Adjustments — Carburetor	33	Hand Brake	12, 27, 55
Aiming Headlights	49	Headlight Aiming	49
Air Cleaner	26	Headlight Dimmer Switch	10
Antifreeze Chart	39	Hood Latch	13
B		I	
Battery	42	Ignition and Starter Switch	11
Bendix Drive	49	Ignition Timing	47
Body	29, 61	Instruments	9
Brake Adjustment	55		
Brake Maintenance	56	K	
Brakes	54	Keys and Locks	8
Breaking-in Period	16		
		L	
C		Lamp Bulb Trade Numbers	50
Captive Air Tires	59	Light Switch	12, 49
Carburetor	33	Lighting System	49
Choke Control	26	Lubrication	22
Chrome Care	62	Lubrication Chart	22, 24
Clutch	29, 51		
Clutch Linkage	28	M	
Cold Weather Precautions	40	Manufacturer's Warranty	4
Cooling System	38	Master Cylinder	28
D		O	
Differential	28	Oil Filter	26
Distributor	26, 46	Overdrive	17, 28, 52
Draining Cooling System	39		
		P	
E		Paint Care	61
Electrical System	41	Powr-Lok Differential	29, 54
Emergency Chart	20	Propeller Shaft	52
Engine Ground Strap	45		
Engine Lubrication	22	R	
Engine Serial Number	8	Radiator	38
Engine Tune-up	31	Radiator Hoses	38
		Radiator Pressure Cap	39
F		Rear Axle	53
Fan Belt	40	Rear Wheel Bearings	27, 57
Front Axle	53		
Front Wheel Bearings	27, 56		
Fuel Gauge	10		
Fuel Pump	36		
Fuel System	34		
Fuel Tank	37		

S	Page	U	Page
Seats	13	Thermostat	39
Serial Number Location	8	Timing Ignition	47
Service Mileage Chart	30	Tires	58
Shift Pattern	17	Transmission	28, 52
Shock Absorbers	29, 61	Tune-up	31
Spark Plugs	48	Turn Signal Indicator	10
Special Equipment	63		
Specifications	6	V	
Speedometer	9, 27	Universal Joint — Lubrication	27
Springs and Shackles	26, 29, 61		
Starting Motor	29, 48		
Steering Gear	27		
Steering System	54		
Storage Space	15		
Suspension	61		
Switches and Controls	11		
		W	
T		Water Pump	29, 40
Tail Gate	15	Wheel Bearings	27, 56
Temperature Gauge	10	Wheels	56
		Windshield Wiper Control	12
		Wiring Diagram	43, 44

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