

INFORMATION

THE NEW '48'

Packard

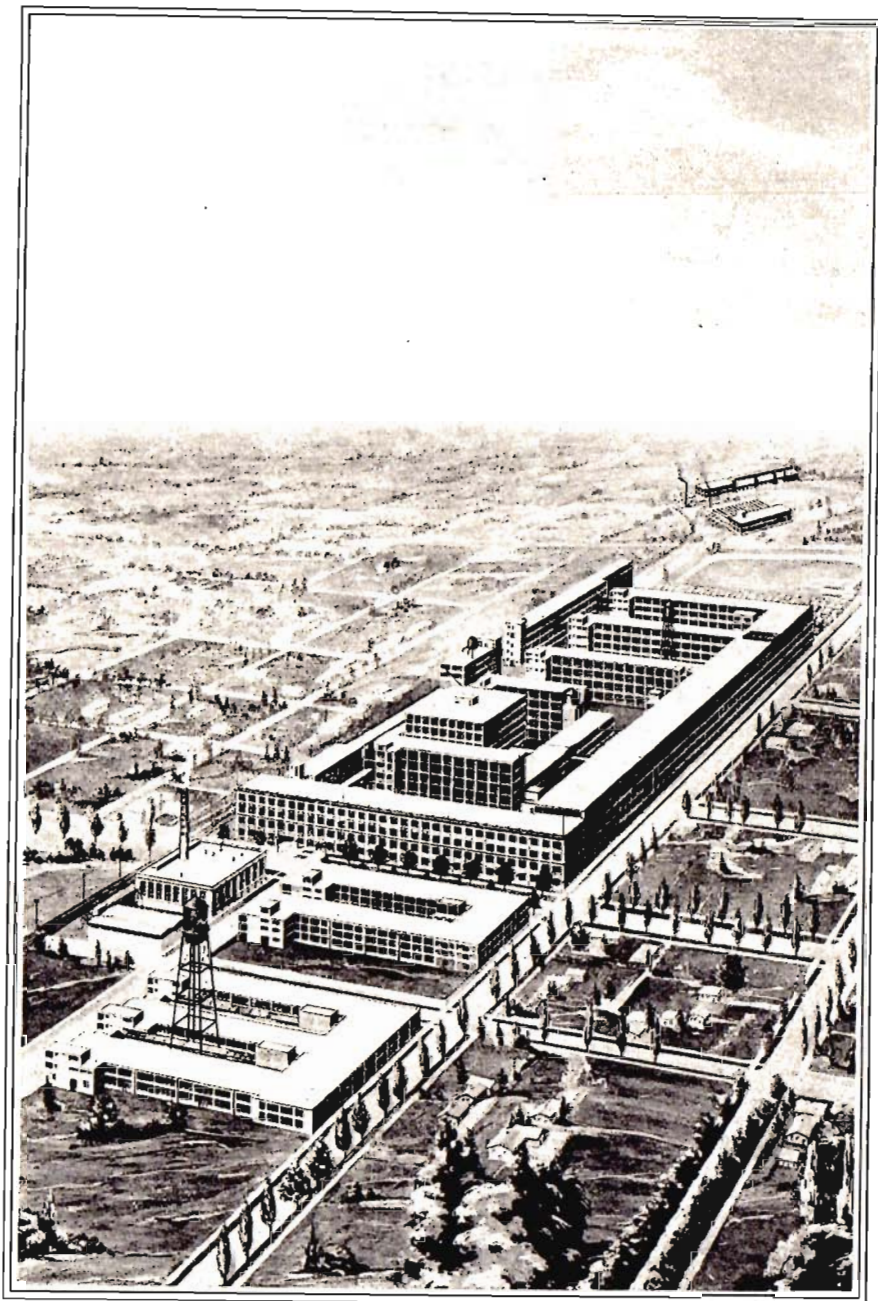
MOTOR CARS



General Information

Operation and Care

Index



Shops of the Packard Motor Car Company, Detroit, Michigan
37 acres of floor space

INFORMATION THE NEW "48"

Packard
MOTOR CARS



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PACKARD MOTOR CAR COMPANY
DETROIT, MICHIGAN

PACKARD ESTABLISHMENTS

FACTORY

Detroit, Michigan

TECHNICAL DEPARTMENT

The Technical Department of the Packard Motor Car Company will furnish, at any time, especially desired information concerning the operation and maintenance of Packard cars.

PACKARD MOTOR CAR COMPANY OF PARIS,

5 RUE NEWTON, PARIS

For the benefit of Packard owners touring abroad, a line of extra parts for the current models is carried. Also the services of an expert mechanic are provided and touring information is supplied. The sale of Packard cars on the continent and the rental of Packard cars, for European touring, are also under the direction of this branch. Telegraphic address—Pacarauto, Paris.

PACKARD DEALERS

Each of whom is equipped to render Packard technical service

Albany	Dominant Motor Company
Amsterdam, N. Y.	Greene & Warnick
Atlanta	H. B. Odell
Baltimore	Mar-Del Mobile Company
Binghamton, N. Y.	R. W. Whipple
Birmingham, Ala.	Charles Denegre
Boston	Packard Motor Car Company of Boston
Bradford, Pa.	Bradford Garage Company
Buffalo	Packard Motor Car Company of New York
Calgary, Alta.	The Chapin Company
Charlotte, N. C.	Osmond L. Barringer
Chattanooga, Tenn.	Bill Jones Automobile Company
Chicago	Packard Motor Car Company of Chicago
Cincinnati	The Citizens Motor Car Company
Cleveland	The Parrish Motor Car Company
Columbia, S. C.	Gibbes Machinery Company
Columbus, Ohio	F. E. Avery
Davenport	Buck Motor Car Company
Dayton	Citizens Motor Car Company
Denver	The MacFarland Auto Company
Des Moines, Iowa	Johnston Motors Company
Detroit	Standard Auto Company
Dusseldorf, Germany	Carl Dreymann
Erie, Pa.	Wolverine Motor Company
Fairmount, W. Va.	Standard Garage Company
Fort Worth, Texas	Allen-Vernon Motor Car Company
Honolulu, T. H.	Von Hamm-Young Company
Houston, Texas	Young & Dwire
Indianapolis	Carl G. Fisher & Company
Jacksonville, Fla.	Julian Howard
Kansas City	Packard-Kansas City Motor Company
Knoxville, Tenn.	Frank A. Carpenter
Lafayette, Ind.	Charles Shambaugh
Los Angeles	California Motor Company
Louisville	Southern Motors Company

Memphis, Tenn.	Jerome P. Parker-Harris Company.
Montreal	Comet Motor Company, Ltd.
Nashville, Tenn.	Imperial Motor Car Company, Inc.
New Orleans	Abbott Automobile Company, Ltd.
New York	Packard Motor Car Company of N. Y.
Omaha, Neb.	Orr Motor Sales Company
Paris, France	Packard Motor Car Company of Paris
Peoria, Ill.	M. M. Baker & Company
Philadelphia	Packard Motor Car Company of Philadelphia
Pittsburgh	Packard Motor Car Company of Pittsburgh
Portland, Ore.	Frank C. Riggs
Providence, R. I.	Packard Motor Car Company of Boston
Quincy, Ill.	T. C. Nichols Motor Car Company
Regina, Sask.	United Motor Company, Ltd.
Richmond, Va.	Gordon Motor Company, Inc.
Rochester, N. Y.	Mandery Motor Car Company
Salt Lake City	Utah Motor Car Company
San Antonio, Texas	Citizens Auto Company
San Francisco	Cuyler Lee
Saratoga Springs, N. Y.	J. A. P. Ketchum
Savannah, Ga.	T. A. Bryson
Scranton, Pa.	Lackawanna Automobile Company
Seattle	J. T. Keena & Company
Shanghai, China	H. S. Honigsberg & Company
St. Johnsbury, Vt.	C. H. Goss Company
St. Louis	Halsey Automobile Company
St. Paul	Joy Bros. Motor Car Company
Spokane, Wash.	John Doran
Tokio, Japan	Sale & Frazer, Ltd.
Toronto, Ont.	The Ontario Motor Car Company, Ltd.
Utica, N. Y.	Central Auto Sales Company
Vancouver, B. C.	Dominion Motor Car Company, Ltd.
Washington, D. C.	The Luttrell Company
Wilmington, N. C.	W. D. McMillan, Jr.
Winnipeg, Man.	Western Canada Motor Car Company, Ltd.
Youngstown, Ohio	The Motormart

INSTRUCTIONS FOR ORDERING PARTS

IT has been found impracticable to provide owners with parts price lists which will be complete and up-to-date at all times. Owners desiring parts information not contained in this book, are referred to Packard dealers, who will be provided with a comprehensive and up-to-date price list for all models.

Parts in most frequent demand are shown in this book. The numbers on the illustrations are for identification of parts only. Owners should order parts by name, and not by number.

PACKARD PARTS

Close interchangeability and continued efficiency are best assured by making replacements only with parts made by the Packard Motor Car Company.

Owners are advised to consult Packard dealers about all repairs, adjustments and replacements, especially with regard to accessories furnished with Packard cars, but not manufactured by us, such as lamps, springs, etc.

ORDERING PARTS

When ordering parts from Packard dealers or the factory, specify:

Shipping directions.

Name of part.

"48," "38," "30," or "18" and year.

Style of car, chassis or body (Touring Car, Limousine, etc.)

Motor number of car.

Color, if part is painted.

TERMS

All prices are net, f. o. b. factory, Detroit, Michigan.

Our responsibility ceases when goods are delivered in good condition to the transportation companies.

All quotations on parts or supplies are subject to change without notice.

Accounts are opened only with Packard dealers.

Orders from individuals which are not accompanied by cash will be sent c. o. d.

TELEGRAPH SHIPPING CODE

Wala	.....	The New Packard	"48"	Touring Car
Walpa	.....	"	"	"48" Phaeton
Walra	.....	"	"	"48" Runabout
Waldb	.....	"	"	"48" Phaeton Runabout
Walda	.....	"	"	"48" Limousine
Walma	.....	"	"	"48" Imperial Limousine
Waloa	.....	"	"	"48" Landulet
Walbb	.....	"	"	"48" Brougham
Walte	.....	"	"	"48" Coupe
Walta	.....	"	"	"48" Imperial Coupe
Waltd	.....	"	"	"48" Salon Limousine
Walba	.....	"	"	"48" Salon Brougham
Walbe	.....	"	"	"48" Cabette
Kerop	.....	For car number		
Kerig	.....	Ship to me (us) by express		
Kerki	.....	" to me (us) by express in care of		
Kerk	.....	" by express to		
Kmole	.....	" " American Express		
Kmunt	.....	" " " in care of		
Kniku	.....	" " " to		
Koker	.....	" " U. S. Express		
Koxid	.....	" " " in care of		
Kpool	.....	" " " to		
Kreos	.....	" " Adams Express		
Kslak	.....	" " " in care of		
Kslem	.....	" " " to		
Kste	.....	" " National Express		
Kwerk	.....	" " " in care of		
Kzout	.....	" " " to		
Kpana	.....	" " Pacific Express		
Kpaoe	.....	" " " in care of		
Kpapa	.....	" " " to		
Kzowa	.....	" with next carload		
Kzpye	.....	" by freight		
Kfton	.....	When and how did you ship parts called for in my (our) telegram of		
Kftu	.....	When and how will you ship parts called for in my (our) telegram of		
Kfunt	.....	When and how did you ship parts called for in my (our) letter of		
Kfwer	.....	When and how will you ship parts called for in my (our) letter of		
Kfwun	.....	When and how did you ship parts called for in my (our) order No.		
Kglas	.....	When and how will you ship parts called for in my (our) order No.		
Kglet	.....	When and how will you ship balance of parts called for in my (our)		
Kged	.....	Do not send parts called for in my (our) telegram of		
Kgich	.....	" " " " in my (our) letter of		
Khar	.....	" " " " in my (our) order No.		
Kiem	.....	Add to my (our) telegraph order of		
Kisen	.....	" " " " letter order of		
Kenge	.....	" " " " order No.		
Knus	.....	Parts ordered in your telegram were shipped by express on		
Knick	.....	Parts ordered in your letter were shipped by express on		
Kord	.....	Parts ordered in your order No. were shipped by express on		
Kuehl	.....	Parts ordered were shipped by American Express on		
Kutz	.....	" " " " U. S. Express on		
Krtig	.....	" " " " National Express on		
Kder	.....	" " " " Adams Express on		
Kpan	.....	" " " " Pacific Express on		

PACKARD WARRANTY

Adopted, January 2, 1912

The seller warrants the motor vehicle for ninety days from the date of delivery. The terms of this warranty are, that the seller shall furnish, gratis, such parts of the vehicle, as shall, under ordinary use and service develop defects in material or workmanship.

In the event a claim for free replacement is made by the buyer, he shall furnish to the seller proof satisfactory to the seller, that the part or parts claimed to be defective were so in fact.

The course to be followed is that the buyer shall notify the seller of his claim, and the latter shall forward, at the expense of the buyer, a new part to replace the one claimed to be defective.

The buyer shall then return the part, claimed to be defective, transportation prepaid, to the seller, who shall in turn forward the part, transportation prepaid, to the factory of the Packard Motor Car Company, at Detroit, Michigan, with a claim for free replacement. The Packard Motor Car Company at Detroit, following its usual custom, will pass upon the part returned as defective, and if the claim is allowed, will credit the seller, who in turn will credit the buyer with the price paid for the new parts used in the replacement.

The seller makes no warranty whatever with respect to tires, rims, or parts not manufactured by the Packard Company.

The buyer understands and agrees that no warranty of the motor vehicle is made or authorized to be made by the seller other than as herein set forth.

WE offer one thousand dollars to anyone who can purchase a new Packard motor car from the factory or authorized agent for less than established price.

PACKARD MOTOR CAR COMPANY
DETROIT, MICHIGAN

OPERATION AND CARE THE NEW '48'

Packard
MOTOR CARS



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GENERAL OPERATION

TO MAKE THE CAR READY

- Wash the car.
Washing directions on page 65.
- Fill the radiator with clean water.
Directions on page 45.
- Fill the gasoline tank.
Directions on page 17.
- Turn on the gasoline.
Directions on page 17.
- Be sure that motor oil reservoir is filled to pet cock level with cylinder oil.
Directions on page 39.
- Be sure that all parts requiring lubrication are supplied with the proper lubricant
The car is shipped from the factory with a supply of oil in all parts. Complete oiling directions are given in the "Schedule of Lubrication," beginning on page 13. The motor oiling system is described in the chapter on "Lubrication System," beginning on page 39.

PRELIMINARY TO STARTING THE MOTOR

- Put the change speed lever in neutral position.
Complete instructions for the operation of this lever on page 53.
- Set the hand brake.
- Open the throttle one-half.
Purpose and operation of the hand throttle lever on the steering wheel and its relation to the pedal accelerator on page 22.
- Turn the auxiliary air valve hand wheel, on the control board, toward "Gas" as indicated by arrow.
To number 3 in warm weather; to number 6 in cold weather. Full starting directions for cold weather, etc., are on page 63.
- If car has been standing for some time, use hand pump to obtain initial pressure in gasoline tank.

TO START THE MOTOR

By the switch

- Turn spark lever to "Retard" position.
- Turn ignition coil switch to "B."
- Press ignition coil button two or three times rapidly.
After motor is started, be sure to turn this button to "Run" position, before throwing the switch to "M" or magneto.
- Advance the spark lever.

By self-starter

- Turn the ignition coil switch to "B."
- Set spark lever to one-third position.
- Crank motor, using self-starter.
Instructions for using self-starter on page 37.

AFTER THE MOTOR STARTS

- Turn the ignition switch to "M."
- Advance the spark lever one-half way.
- Turn the air valve wheel, on the control board, toward "Air" and set it at the point at which the motor runs best.
An experienced operator may obtain a still finer adjustment by resetting with the throttle closed.
- Close the throttle until the motor runs slowly.

TO START THE CAR

- Release the hand brake.
- Push forward the left pedal.
This disengages the clutch. The clutch always must be disengaged while shifting gears.
- Move the change speed lever backward into first speed position.
Gear shifting instructions are on page 53.
- Increase the speed of the motor slightly.
This may be done by advancing the hand throttle lever several notches, or by pressing on the accelerator pedal. An inexperienced operator may perhaps obtain the best results in shifting gears by keeping the hand throttle lever about one-third way open during all shifting operations. The governor will regulate the motor speed.
- Be sure the spark lever is advanced one-half way.
- Engage the clutch.
The car will move forward. Allow it to gain speed.
- Again disengage the clutch.
- Move change speed lever forward through neutral into second speed position.
- Engage clutch and open throttle gradually to increase the motor speed.
Allow the car to gain speed.
- Again disengage the clutch.
- Move change speed lever forward into third speed position.
- Engage the clutch.
Attain the desired speed by pressing with the right foot on the accelerator pedal or by advancing the hand throttle lever.
- Keep the spark lever advanced as far as possible without causing the motor to "knock."

TO CHANGE BACK INTO LOWER SPEEDS

If, on account of a very steep grade, or heavy going, the speed is reduced until the motor labors, the gears should be shifted at once into the next lower speed, as follows:

Disengage the clutch; instantly move the change speed lever back into the next lower speed and engage the clutch.

TO STOP THE CAR

Disengage the clutch, reduce the motor speed and apply the foot brake. When the car has stopped, with the clutch still disengaged, place change speed lever in neutral position, set the hand brake and engage the clutch.

TO REVERSE THE CAR

When the car is stopped, disengage the clutch, push down the change speed lever reverse button, move the change speed lever from the neutral position laterally into the notch on the inner side of the quadrant and engage the clutch.

TO STOP THE MOTOR

Turn switch to off position and, while the motor is still turning from its own momentum, open the hand throttle about one-third and turn the air valve wheel, on control board, toward "Gas."

CARE OF THE CAR

SCHEDULE OF LUBRICATION

OILING

Description of the motor oiling system and its operation and instructions for its care and adjustment, begin on page 39.

EVERY DAY CAR IS IN USE, OR EVERY 150 MILES

With graphite grease.

Motor clutch shifter bearing sleeve grease cup Two complete turns.
Steering connecting rod grease cup.....One complete turn.
Spring bolt grease cups.....One complete turn.

EVERY WEEK, OR EVERY 300 MILES

With cylinder oil.

Shock absorber bearing studs.....Thoroughly.
Rear axle truss rod forward connection.....Thoroughly.
Rear axle brace oilers.....Thoroughly.
Steering knuckle bolt oilers.....Fill.

With graphite grease.

Motor fan bearing grease cup.....Two complete turns.
Rear axle outside bearing grease cups.....One complete turn.
Motor clutch shifter shaft grease cup.....One complete turn.
Steering cross tube grease cup.....One complete turn.

TWICE A MONTH, OR EVERY 500 MILES

With cylinder oil.

Spark and throttle adjusting clevis joints...Thoroughly.
Motor accelerator pedal joints.....Thoroughly.
All brake adjusting clevises.....Thoroughly.
External and internal brake fittings and
connections.....Thoroughly.
Hand brake cam oiler.....Thoroughly.
Hand brake lever ratchet.....Thoroughly.
Foot brake pedal bearing.....Thoroughly.
Change speed lever shaft bearings.....Thoroughly.
Intermediate brake levershaftandconnectionsThoroughly.

With graphite grease.

Motor clutch pedal shaft grease cup.....One complete turn.

With distilled water.

Starting and lighting battery.

EVERY MONTH, OR EVERY 1,000 MILES

With cylinder oil.

Change speed reversing bell crank oiler.....	Fill.
Crank case.....	Drain off dirty oil, flush with kerosene and fill to pet cock level.
Magneto bearing oil wells.....	Few drops.
Motor front gear compartment.....	Drain thoroughly.
Motor generator oil holes.....	Eight or ten drops.
Motor starting crank bearing.....	Eight or ten drops.
Motor generator front clutch.....	Remove cover. Thoroughly.
Motor starter pedal shaft oiler.....	Fill.
Motor starter clutch shaft oiler.....	Fill.
Steering yoke shaft oiler.....	Fill.

With graphite grease.

Front wheel bearings.....	Clean with kerosene and repack.
Rear universal joint.....	Remove grease hole plug and fill with grease again.
Front wheel hub caps.....	Pack.
Steering gear case.....	Fill.
Motor starter interlock shaft grease cup.....	Fill.

With gasoline.

Motor carburetor air valve stem.....	Clean thoroughly. Do not oil.
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With transmission oil.

Front universal joint..... (Half cylinder oil and half transmission oil in cold weather.)	Drain thoroughly, flush with kerosene and fill to pet cock level.
Rear axle case..... (Half cylinder oil and half transmission oil in cold weather.)	Drain thoroughly, flush with kerosene and fill to level of two brass plugs in under side of housing.
Rear axle transmission case..... (Half cylinder oil and half transmission oil in cold weather.)	Drain thoroughly, flush with kerosene and fill to level of brass plug in front cover.

ONCE A SEASON

With graphite grease.

Spring leaves.....	Jack up frame to separate leaves, clean and lubricate thoroughly. Repeat whenever springs squeak.
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SEMI-MONTHLY INSPECTION OF CAR**COMPRESSION IN MOTOR CYLINDERS**

Test the compression in all cylinders to see if it is equal.

If it is not, follow instructions on page 47.

CONDITION OF MAGNETO

All brushes should be entirely free from gum or dirt.

No oil should be used on the distributor or interrupter mechanisms.

Keep the platinum points of both interrupters clean and smooth.

The magneto interrupter points should have an extreme gap of about .015-inch.

A gauge for this adjustment forms part of the magneto adjusting wrench.

The battery interrupter should have an extreme gap of .020-inch.

CARBURETOR

Clean the auxiliary air valve with gasoline so that it will work freely. Do not oil.

SPARK PLUGS

The spark plugs should be clean and the spark gap, between the split center wire and the serrated ring, should be .025-inch.

STARTING AND LIGHTING BATTERY

Keep plates covered by adding distilled water.

Further instructions, regarding care of battery, on page 31.

IGNITION BATTERY

Test battery for voltage.

If voltage drops to 5.4 volts, have it recharged.

IGNITION WIRING

Inspect all terminals to be sure they are tight.

BRAKE ADJUSTMENT

Adjust the brakes so that they will be as tight as possible without dragging.

TIGHT JOINTS AND CONNECTIONS

Keep the spring clips tight.

Adjust steering connections and all nuts, pins, etc., of working joints, to prevent looseness and rattle.

KEEP MECHANISM CLEAN

Keep all working joints, oil holes, etc., free from dirt, and motor and all other parts as clean as possible.

MOTOR GENERATOR

See that commutators are clean, wipe with soft rag free from lint.

GASOLINE SYSTEM

GASOLINE TANK

The gasoline tank, on all models, is a heavy gauge tinned steel tank, located on the rear of the frame.
In filling the tank, pour the gasoline through a chamois skin to free it from water and impurities.

Capacity of tanks for all models—25 gallons.

GASOLINE SHUT-OFF VALVE

The gasoline shut-off is on the left side of the car just above the running board. When perpendicular to the running board, it is shut off; when parallel to the running board, it is open.

GASOLINE TANK WATER PLUG

On the right side of the gasoline tank is a small plug. By removing this plug and jacking up left rear wheel or by running car to the right side of a crowned road it is possible to drain off all the water accumulated in the tank.

GASOLINE DRAIN PLUG

On the bottom of the tank is a plug for draining the gasoline from the tank.
This permits the gasoline tank to be easily flushed.

PRESSURE GASOLINE FEED

The flow of gasoline from the tank to the carburetor on all models is maintained by air pressure.

AIR PRESSURE PUMPS

The air pressure is furnished by an air pump, located on the motor crank case at the rear.

This pump is driven from the inlet cam shaft. It draws air from the motor crank case and forces it under pressure past the relief valve to the gasoline tank.

The hand or emergency pump on the heel board of the driver's seat, provides means of obtaining initial air pressure before the motor is started.

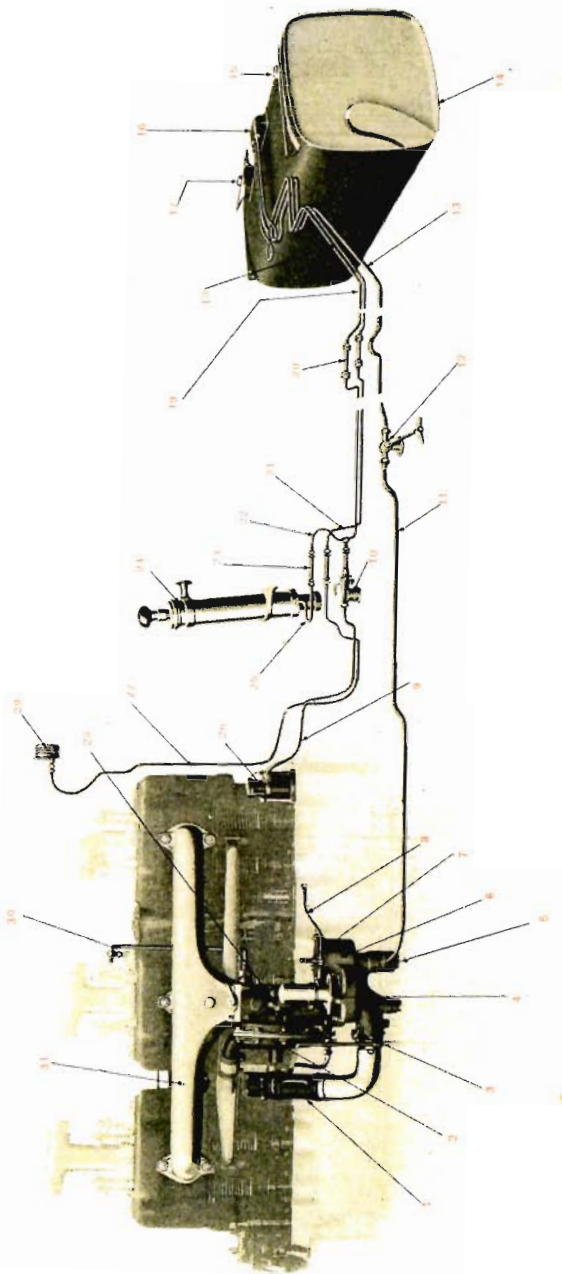
The plunger leather of this pump should be oiled occasionally with Neat's foot oil. Mineral oils improve the operation of the pump only temporarily and tend to dry up the leather.

Plate No. 1—Diagram of Gasoline and Pressure System

Reference Number	Name of Part	Reference Number	Name of Part
1.	Motor carburetor air intake pipe valve	16.	Gasoline tank outlet manifold
2.	Motor governor assembly	17.	Gasoline tank inlet cover
3.	Motor carburetor air shutter lever	18.	Gasoline pressure gauge tube, rear
4.	Motor carburetor air valve	19.	Gasoline pressure tube, rear
5.	Motor carburetor float chamber filter well	20.	Gasoline pressure tube connection, rear
6.	Motor carburetor float chamber	21.	Gasoline pressure gauge tube, intermediate
7.	Motor carburetor needle valve cap	22.	Gasoline pressure tube, intermediate
8.	Motor carburetor air valve control rod assembly	23.	Gasoline pressure tube connection, front
9.	Gasoline power pressure pump tube, front	24.	Gasoline hand pressure pump
10.	Gasoline pressure relief valve	25.	Gasoline hand pressure pump tube, front
11.	Gasoline tube, front	26.	Gasoline power pressure pump
12.	Gasoline shut-off valve	27.	Gasoline pressure gauge tube, front
13.	Gasoline tube, rear	28.	Motor carburetor throttle valve lever
14.	Gasoline tank	29.	Gasoline pressure line gauge
15.	Gasoline tank gauge	30.	Motor carburetor to cylinder hot water tube
		31.	Motor carburetor cylinder inlet manifold

Parts should be ordered by name only, not by number.

Plate No. 1—Diagram of Gasoline and Pressure System



GASOLINE AIR PRESSURE GAUGE AND VALVES

On the dash there is a gauge connected, independently of the pumping system, directly with the gasoline tank, which at all times shows the exact pressure in the tank.

The hand pump should be locked in position, by turning the handle to the right, when the motor is running.

To obtain the air pressure by the hand pump, turn the hand pump handle to the left.

MAINTAINING AIR PRESSURE

There is a relief valve on the pressure system just in front of the hand pump to prevent the pressure in the gasoline tank from rising above the normal limit of two pounds.

The valve may be adjusted if it does not shut off at the proper time.

This valve is also used as a sediment pocket, as it is the lowest point in the gasoline line. It should be inspected and cleaned occasionally.

When a car has been standing over night or becomes cool, an initial flow of gasoline may be obtained by a few strokes of the hand pump.

To prevent leakage of air from the gasoline tank, the filler cap should always be screwed down tightly.

LACK OF PRESSURE

When the indicator on the dash shows that the power pump is not keeping up pressure in the tank, examine all joints on the pressure and gasoline lines to make sure that there are no leaks.

Inspect gasoline tank filler cap to make sure it is screwed on tight. See that gasket is in good condition. See that relief valve is working properly.

GASOLINE SUPPLY LINE

The gasoline pipe from the tank connects with a filter well at the entrance to the carburetor float chamber.

This filter well is provided with a screen which should be removed and cleaned at least once a month. A plug at the bottom of the well provides for the convenient removal of the screen.

CLEANING GASOLINE LINE

The gasoline tank may be easily flushed out by removing the drain plug on the bottom. If it is desired to clean the gasoline and pressure pipes at the same time, it can be done by disconnecting the pipes at the unions.

Flushing the gasoline system should not be necessary except at long intervals if the proper precautions are taken when filling the tank.

Water in the gasoline air pressure line is automatically drained off through the relief valve.

Water in the gasoline tank may be removed by driving to the right of a crowned road and removing the plug on the right side of the gasoline tank.

CARBURETOR FLOAT CHAMBER

The float chamber maintains a constant level, or supply, of gasoline for the carburetor.

The gasoline flows into the float chamber through a needle valve. The height of a copper float regulates the position of two balance levers, which in turn, raise or lower the needle valve to gauge the incoming flow of gasoline.

CARBURETOR MIXING CHAMBER

After leaving the float chamber, the gasoline passes through a nozzle from which it is sprayed into the mixing chamber.

The mixing chamber is a cylindrical chamber around and above the spray nozzle. It is surrounded by a water jacket through which passes warm water taken from the water circulation system by means of a pipe leading from the middle water jacket cover. This maintains a uniform temperature and insures efficiency in mixing the sprayed gasoline with air. The vacuum created by the cylinder pistons, allows air to rush into the mixing chamber through both the primary and the auxiliary air inlets. This air passes through the mixing chamber around the nozzle, atomizes and mixes with the gasoline sprayed through the latter.

It is important that the proportion of air and gasoline in the mixture be correct for all motor speeds. Consequently, although the primary air inlet is open at all times, the auxiliary air inlet valve is controlled by springs, so that while the valve opens slightly at low speed, the increased vacuum of high speed opens it still more, letting in the greater amount of air required to maintain the correct proportion of the mixture.

The carburetor thus automatically produces a correct mixture for all motor speeds, the auxiliary air valve hand wheel on the control board being used only for the regulation of the mixture for starting and to suit different atmospheric conditions.

Do not adjust carburetor.

There is very little chance for the carburetor being out of adjustment. Consult a Packard dealer if there is any question concerning the proper action of the carburetor on account of adjustment.

AUXILIARY AIR VALVE

The auxiliary air valve is in a cage on the outer side of the carburetor.

It is controlled by the tension of two springs, one of which is within the other.

Regulating the tension of the springs adjusts the action of the valve.

The wedge underneath the springs controls their tension, and this wedge is connected with the auxiliary air valve hand wheel on control board.

Turning the air valve hand wheel toward "Gas" provides a rich mixture; turning it toward "Air" provides a rare mixture.

Directions for using hand wheel in starting are given under "General Operation," beginning on page 10.

If the lever is turned too far toward "Air," the consequent rare mixture may cause "spitting back" into the carburetor. If it is turned too far toward "Gas," the consequent rich mixture may cause irregular running and overheating. Experience will dictate the best position for the most efficient running under different conditions.

Clean that auxiliary air valve stem frequently with gasoline, so that it will always work freely.

If the valve sticks, it may cause any or all of the above irregularities.

PRIMARY AIR INTAKE

Primary air intake is from around outside of exhaust header on right side of motor.

This location provides a supply of warm air which prevents condensation in the inlet header, and in cold weather increases the mileage per gallon of gasoline.

The proportion of warm and cold air may be regulated by an adjustable sleeve on the primary air intake pipe.

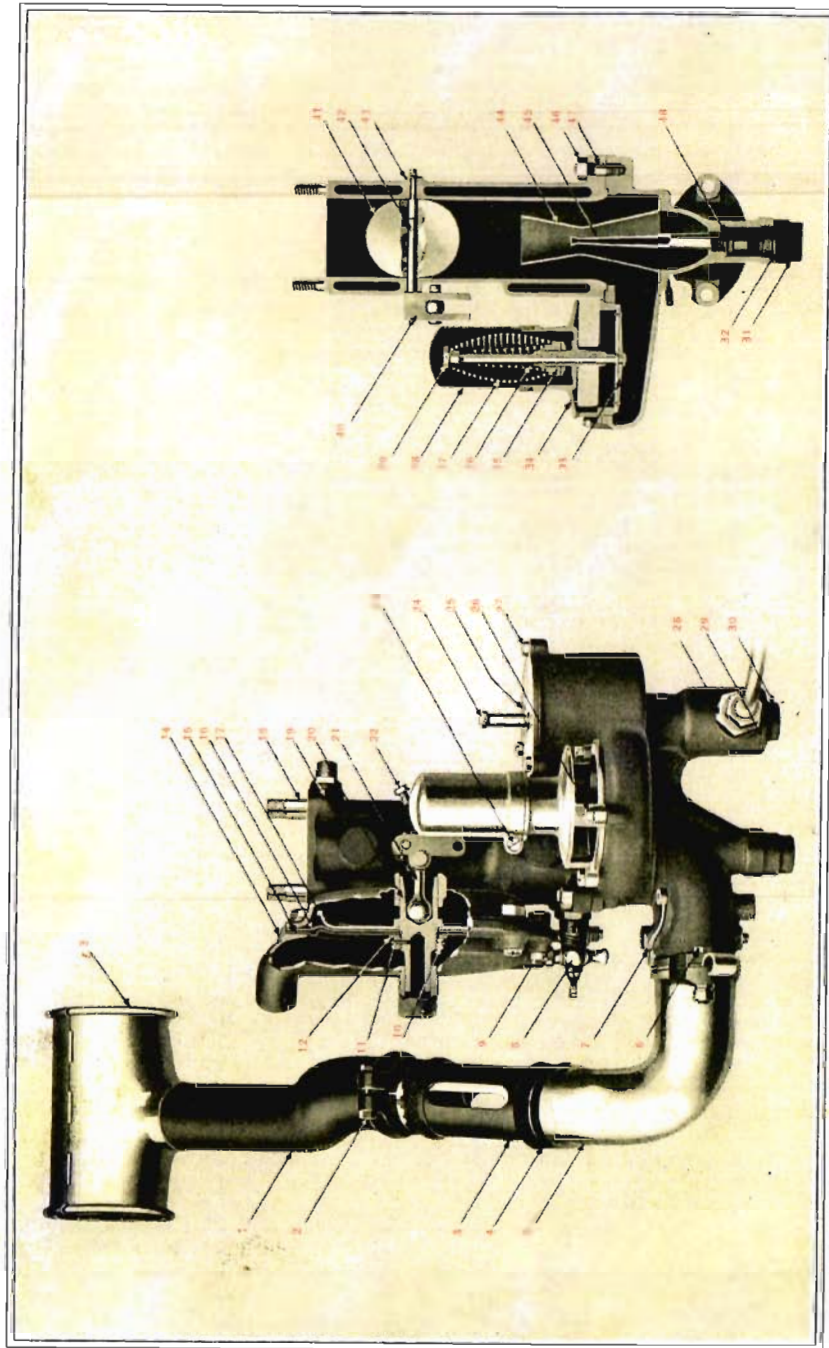


Plate No. 2—Carburetor Assembly

PRIMARY AIR INTAKE SHUTTER

To assist starting in cold weather, there is a shutter in the primary air intake on the forward side of the carburetor.

This shutter is normally opened and is not used when running. It is operated by the hand wheel on the control board, which also operates the auxiliary air valve. By turning the hand wheel clear over to "Choke" the air intake is closed and a rich mixture is drawn into the motor cylinders. The hand wheel should be set back to "Air," and consequently the air intake opened, as soon as the motor is started.

THROTTLE VALVE

The throttle valve is of the butterfly type and is located in the mixing chamber, above the spray nozzle. It is controlled by the hydraulic governor, by the hand throttle lever on the steering wheel and by the accelerator pedal.

The throttle valve does not regulate the quality or richness of the mixture but simply the amount supplied to the motor cylinders through the inlet header.

GOVERNOR

A hydraulic governor of the diaphragm type is part of the carburetor unit.

It is operated by the pressure of the water in the water circulation system.

It consists of a circular chamber divided by a flexible diaphragm of leather and rubber. On one side of the diaphragm is a water space through which passes the water of the circulating system. On the other side is an air space and a plunger head against which the diaphragm presses. The plunger is directly connected with the throttle valve. If a decrease in the load on the motor causes its speed to increase, the pressure of the water, circulated by the pump, increases and, consequently, the diaphragm exerts more pressure toward the rear, tending to move the plunger and thereby close the throttle. As the motor speed decreases, the water pressure against the diaphragm is lessened and the throttle may open. If the load on the motor increases, the opposite action of the governor will result.

Plate No. 2—Carburetor Assembly

Reference Number	Name of Part	Reference Number	Name of Part
1	Motor carburetor air intake pipe, upper.	26	Motor carburetor air valve seat screw.
2	Motor carburetor air intake pipe, upper, clamp bolt.	27	Motor carburetor float chamber cover screw.
3	Motor carburetor air intake pipe valve.	28	Motor carburetor float chamber union female cone.
4	Motor carburetor air intake pipe valve spring.	29	Motor carburetor float chamber filter well gasket.
5	Motor carburetor air intake pipe, lower.	30	Motor carburetor float chamber filter well.
6	Motor carburetor, air intake pipe bolt.	31	Motor carburetor float chamber spray plug cap.
7	Motor carburetor air shutter lever.	32	Motor carburetor float chamber spray plug cap gasket.
8	Motor governor drain cock.	33	Motor carburetor air valve disc.
9	Motor governor cover to body screw.	34	Motor carburetor air valve seat.
10	Motor governor piston nut.	35	Motor carburetor air valve wedge collar.
11	Motor governor piston nut lock wire.	36	Motor carburetor air valve spring, small.
12	Motor governor piston nut washer.	37	Motor carburetor air valve spring, large.
13	Motor carburetor air intake pipe sleeve, lower.	38	Motor carburetor air valve spring cap.
14	Motor governor body cap.	39	Motor carburetor air valve adjusting nut.
15	Motor governor diaphragm, rubber.	40	Motor carburetor throttle valve lever.
16	Motor governor diaphragm, leather.	41	Motor carburetor throttle valve.
17	Motor governor piston head.	42	Motor carburetor throttle valve shaft.
18	Motor carburetor to cylinder inlet manifold stud.	43	Motor carburetor throttle valve shaft washer.
19	Motor carburetor body.	44	Motor carburetor spray mixing tube.
20	Motor governor piston.	45	Motor carburetor spray tube assembly.
21	Motor governor piston rod.	46	Motor carburetor float chamber to carburetor body stud nut.
22	Motor carburetor throttle valve adjusting screw.	47	Motor carburetor float chamber to carburetor body stud.
23	Motor carburetor air valve spring cap clamp screw.	48	Motor carburetor spray plug gasket.
24	Motor carburetor float chamber needle valve cap.		
25	Motor carburetor float chamber cover.		

Parts should be ordered by name only, not by number.

GOVERNOR EFFECT

The governor prevents the motor from racing when the load is removed, as by throwing out the clutch or stopping the car without stopping or shutting down the motor.

The governor also tends to maintain a constant speed of the car within the limits of the hand throttle setting, when road conditions vary.

The action of the governor is an indicator of low water in the radiator, as explained on page 43.

When the engine is stopping, the governor tends to open the throttle and thus assists in charging the cylinders so that the motor will start easily.

USE OF HAND THROTTLE LEVER AND ACCELERATOR

The accelerator pedal is the usual means of controlling the speed of the car.

When pressed downward for increase or released for decrease of speed, its action is instantaneous.

When the accelerator is released, the motor immediately resumes the speed determined by the position of the hand lever on the steering wheel. Although either the hand throttle lever or the accelerator may be used to control the speed of the car, the use of the hand lever is advised for beginners. After confidence in driving has been gained, the more delicate and more nearly instantaneous action of the accelerator will be preferred. In continued fast driving, the hand throttle lever may be advanced part way to increase the speed to any desired point, so that the accelerator pedal need only be used to obtain still higher speed.

Movement of the accelerator pedal when the hand throttle lever is moved is proof of the proper action of the latter.

THROTTLE VALVE STOP

An adjustable stop holds the throttle valve slightly open and thus allows a small amount of mixture to reach the motor cylinders, even when the hand throttle on the wheel is entirely closed.

The minimum amount of mixture for the slowest running of the motor is thus supplied.

To increase this minimum speed, loosen the check nut and screw the stop forward. To decrease the speed, screw the stop backward.

There is ordinarily no occasion to change the adjustment of the throttle valve stop.

IGNITION SYSTEM**GENERAL PRINCIPLE**

The source of the current for the production of the ignition spark in regular running is a high-tension magneto. The current from this is carried through the spark plugs to make the spark. For starting on the switch and for reserve, there is a separate storage battery, providing a low-tension current, from which a secondary, or high-tension current is induced by a coil in the control board on the steering column.

IGNITION BATTERY

The voltage of the battery is 6, and it has a capacity of 40 ampere hours. The charging rate is 5 amperes.

The battery is situated under the front seat on the left side of the body.

The battery should be recharged whenever its voltage drops to 5.4. A safe plan is to recharge it once a month.

Test the battery with a volt-meter twice a month. Ordinarily the battery should be charged by a Packard dealer. Also, all other features in regard to the care of the battery should be referred to the dealer. If, however, it is desired to attend to the charging and other cares of a battery, complete instructions will be furnished, on request, by the Technical Department of the Packard Motor Car Company.

The terminals, where the battery wires are attached to the battery, always should be kept clean and tight.

ACTION OF BATTERY CURRENT

The occurrence of the battery low-tension current in the low-tension winding of the battery coil is timed by the battery circuit interrupter on the magneto.

The interrupter mechanism is operated by a double cam on the armature shaft. The rotation of the shaft completes the battery primary circuit at the times when the battery coil should act to induce high-tension current for ignition successively in the cylinders.

ACTION OF THE MAGNETO CURRENT

The primary or low-tension current, generated by the magneto, is short-circuited in the magneto when the points of the low-tension circuit breaker on the armature shaft are in contact. When these points separate, the instantaneous clearing of the low-tension current from the primary winding induces a high-tension current in the secondary winding.

Thus secondary current and sparks are rhythmically created in the motor cylinders.

THE BATTERY COIL

The battery coil in the control board is provided with both vibrator and non-vibrator circuits.

These circuits are controlled by a push button on the coil switch.

THE COIL NON-VIBRATOR CIRCUIT

The coil non-vibrator circuit is used for starting by the switch when the motor has stopped with the battery interrupter points on the magneto in contact.

With the battery interrupter points in contact, low-tension current is passing through the low-tension winding in the coil. To induce a high-tension current and consequent spark in the cylinder under compression, this low tension circuit is broken by pressing the switch button part way in and immediately releasing it.

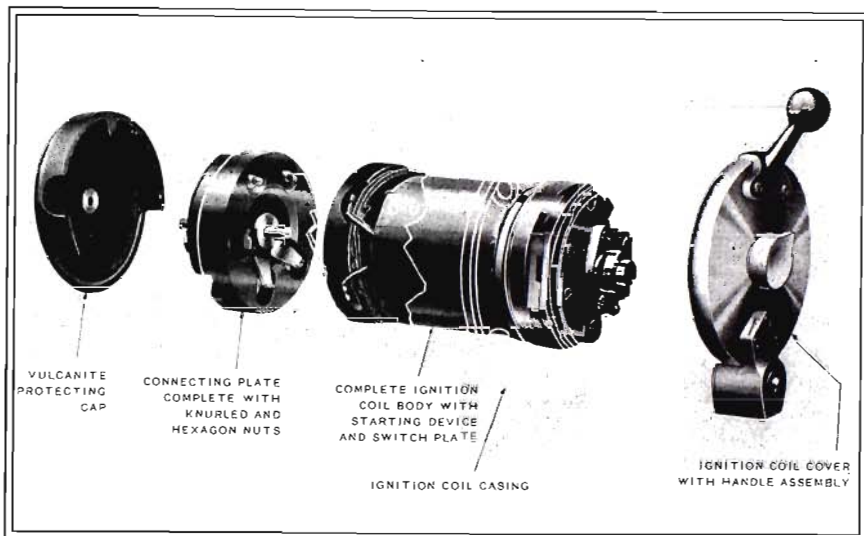


Plate No. 3—Coil Parts (Front View)

The coil non-vibrator circuit is used for running on the battery.

The normal position of the switch button when running on the battery is toward "Run."

THE COIL VIBRATOR CIRCUIT

The coil vibrator circuit is used for starting the motor by the switch when the motor has stopped with the battery interrupter points on the magneto separated.

With the battery interrupter points separated, a low-tension circuit is completed through the vibrator winding of the coil by pressing in the switch button until the coil buzzes. The rapid interruption of the low-tension current by the vibrator produces a high-tension current and consequent spark in the cylinder under compression.

Never run motor on this circuit after starting, always turn coil switch button to "Run."

COIL SWITCH

The coil switch in the control board has three positions.

Turn to "B" to run on battery.

Turn to "M" to run on the magneto.

Turn to "O" to stop ignition.

A key lock permits the switch to be locked in off position.

Never leave coil switch on "B" when motor is stopped, as this ruins the coil.

HIGH TENSION DISTRIBUTOR

A distributor mechanism on the front end of the magneto completes the high-tension circuit through the spark plugs of the respective cylinders in succession, regardless of whether the origin of the current is the battery or the magneto.

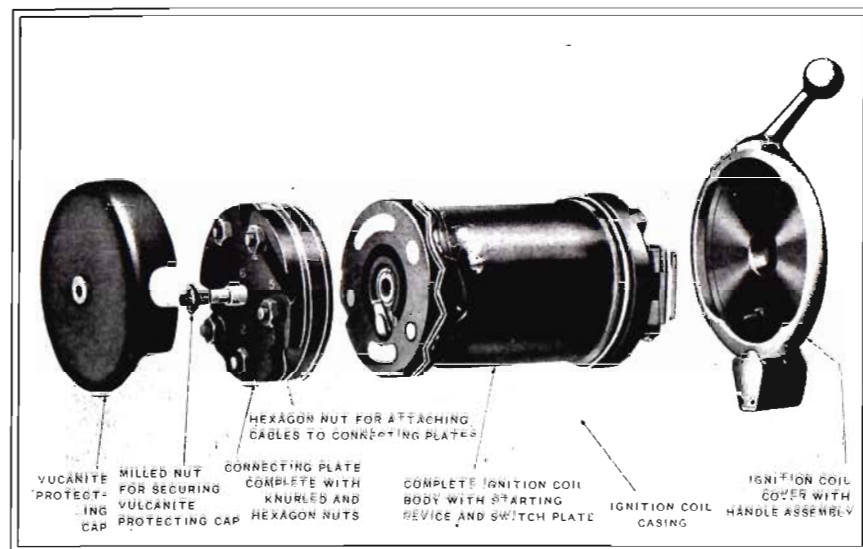


Plate No. 4—Coil Parts (Front View)

BATTERY PRIMARY CIRCUIT

With the switch button turned toward "Run," the battery primary circuit is as follows:

Between the battery and the Number 5 binding post on the coil.

Between Number 1 post on the coil and the battery interrupter post on the magneto where it is grounded when the interrupter points are in contact.

Also a wire from the other battery post is grounded on the frame, thereby completing the circuit.

MAGNETO PRIMARY CIRCUIT

With the switch turned to "B" or to off position, the magneto low-tension circuit is short-circuited by wire between the end of the primary winding on the magneto and the coil binding post Number 2 and by wire between coil post Number 6 and the steering post where the current is grounded.

SECONDARY CIRCUIT

The following high-tension circuit connection applies to the magneto current only.

Between the binding post at the front of the magneto and coil binding post Number 3, whence it passes to the switch contact.

The remaining high-tension circuit connections are common to both magneto and battery currents.

Between coil post Number 4 and the magneto distributor post.

Between each distributor contact terminal and the corresponding spark plug, through a universally jointed knife switch.

Between coil post Number 6 and a point on the rear cylinder where the current is grounded.

The ground is completed through the spark plug body. It is the jumping of the current across the gap between the center wire, or electrode, and the body of the spark plug that forms the spark.

TO RUN WITHOUT THE COIL

Should the coil become inoperative for any reason, the motor may be started and run on the magneto by making the following wiring changes:

Disconnect wire on binding post at front of magneto and wire on magneto distributor post. Connect these two posts with a short wire.
Disconnect the wire on the post to which the flat spring for the retaining cap is attached.

Follow directions on page 11 for starting on the magneto.

FIRING ORDER

The motor cylinders are fired in the following order: one, four, two, six, three, five.

CARE OF THE MAGNETO

The magneto should be lubricated with a few drops of cylinder oil once a month. Be careful not to use an excess of oil.

Further instructions for the care of the magneto on page 15.

THE MAGNETO

The magneto is on the left side of the motor, at the front, and is gear-driven. It develops a high-tension current when the motor is running. See illustration on page 28.

INSTALLING THE MAGNETO

In case the magneto has been removed for any reason, replace as follows:

Open the priming cocks.

Crank the motor until compression begins in Number One cylinder and slowly continue to turn until Number One piston is at the top of its stroke. This point is determined by lining up the dead center mark on the fly wheel with the center mark on the rear cylinder.

Rotate the armature shaft until the distributor brush is on Number One contact.

Slide the magneto into position.

TIMING THE SPARK

When running on the magneto, the time at which the spark occurs in the motor cylinders, relative to the travel of the piston, is controlled by the magneto circuit interrupter. When running on the battery, the time of the spark is controlled by the battery interrupter on the magneto.

By means of connections with the magneto, the spark lever, on the left side of the steering wheel, advances or retards the action of the circuit interrupter and, consequently, advances or retards the time of the spark in the cylinders.

Plate No. 5—Diagram of Ignition System

Reference Number	Name of Part	Reference Number	Name of Part
1	Ignition magneto.	11	Ignition knife switch.
2	Switch-board ignition coil terminal, No. 1 to battery breaker low tension cable.	12	Switch-board ignition coil terminal, No. 6 to switch box ground cable.
3	Switch-board ignition coil terminal, No. 2 to magneto breaker low tension cable.	13	Switch board ignition coil.
4	Ignition battery.	14	Ignition high tension cable to spark plug No. 6.
5	Ignition battery terminal post nut.	15	Ignition high tension cable to spark plug No. 5.
6	Ignition battery terminal post.	16	Switch-board ignition coil terminal, No. 3 to magneto armature high tension cable.
7	Switch-board ignition coil terminal, No. 5 to ignition battery (negative terminal) cable.	17	Ignition high tension cable to spark plug No. 4.
8	Ignition battery (positive terminal) to frame ground cable.	18	Ignition high tension cable to spark plug No. 2.
9	Ignition spark plug.	19	Ignition high tension cable to spark plug No. 1.
10	Ignition knife switch contact.	20	Switch-board ignition coil terminal, No. 4 to distributor high tension cable.
		21	Ignition high tension cable to spark plug No. 3.

Parts should be ordered by name only, not by number.

Plate No. 5—Diagram of Ignition System

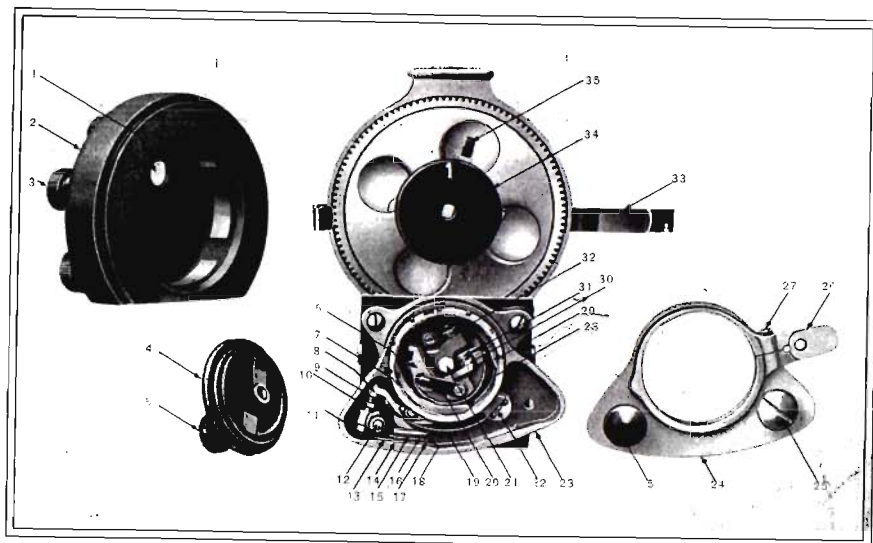


Plate No. 6—Magneto Exterior (Front End)

Reference Number	Name of Part	Reference Number	Name of Part
1	Ignition magneto distributor plate mica window.	19	Ignition magneto battery interrupter lever flat spring.
2	Ignition magneto distributor plate with terminal nuts.	20	Ignition magneto interrupter lever holding spring.
3	Ignition magneto distributor plate terminal nut.	21	Ignition magneto interrupter fastening screw.
4	Ignition magneto interrupter housing fiber cover.	22	Ignition magneto battery interrupter lever spring to block screw.
5	Ignition magneto interrupter housing cover terminal nut.	23	Ignition magneto battery interrupter housing complete.
6	Ignition magneto interrupter lever.	24	Ignition magneto interrupter housing cover and nuts assembly.
7	Ignition magneto interrupter housing segment with oil wick.	25	Ignition magneto interrupter housing cover brass nut.
8	Ignition magneto battery interrupter lever.	26	Ignition magneto interrupter housing timing lever.
9	Ignition magneto battery interrupter short platinum screw.	27	Ignition magneto interrupter housing timing lever screw.
10	Ignition magneto battery interrupter, long platinum screw.	28	Ignition magneto interrupter lever flat spring.
11	Ignition magneto battery interrupter, long platinum screw lock nut.	29	Ignition magneto interrupter housing segment without oil wick.
12	Ignition magneto battery interrupter terminal post.	30	Ignition magneto interrupter short platinum screw.
13	Ignition magneto battery interrupter terminal block bottom mica plate, thin.	31	Ignition magneto interrupter long platinum screw.
14	Ignition magneto battery interrupter terminal block bottom mica plate, thick.	32	Ignition magneto interrupter long platinum screw lock nut.
15	Ignition magneto battery interrupter terminal block top mica plate, thin.	33	Ignition magneto distributor plate holding spring.
16	Ignition magneto battery interrupter terminal block top mica plate, thick.	34	Ignition magneto rotating distributor brush holder with carbon brush and spring.
17	Ignition magneto battery interrupter terminal block.	35	Ignition magneto rotating distributor carbon brush.
18	Ignition magneto battery interrupter terminal block screw plate.		

Parts should be ordered by name only, not by number.

Although combustion of the charge under compression in any cylinder occurs rapidly, it is not absolutely instantaneous. There is a certain point in the travel of the motor piston, corresponding to the motor speed, at which the occurrence of the spark will give the maximum efficiency. Ordinarily the spark occurs and the consequent combustion of the ignited charge starts, just before the piston reaches the highest point of its stroke. However, if the spark is too far advanced for any given motor speed, the maximum effect of the combustion is exerted so long before the piston reaches its highest point, that the motor tends to run backward. If the speed of the motor is sufficient, this tendency is overcome by the momentum of the fly wheel. If, on account of low speed, the momentum of the fly wheel is not sufficient, the car tends to run with a jerky motion and the motor may be "stalled."

In ordinary driving, carry the spark lever as far ahead as possible, without causing a spark knock in the cylinders.

If the spark is too far retarded for the speed of the motor, the maximum effect of the combustion is exerted so long after the piston passes its highest point, that some of the energy is wasted and, not being applied mechanically, remains in the cylinder as heat, tending to overheat the motor.

SPARK PLUGS

The ignition spark jumps across a gap between the split center wire, or electrode, of the spark plug and the serrated ring. If this gap is too wide or too narrow, the efficiency of the motor will be affected and miss-firing may result. The standard adjustment of Packard spark plugs is .020-inch between the split center wire and the serrated ring.

This adjustment gives a good spark for slow running and for hard pulling, as well as for high speed driving.

A wide gap, within reasonable limits, produces good results under light loads or at high speeds. However, when the engine is under a heavy load and the magneto runs slowly, there is a possibility of the spark not jumping across the wide gap, through the highly compressed charge. Thus the motor will miss fire. If the gap is extremely narrow, there is a possibility of miss-firing when running slowly, under a light engine load, because the length of the spark may not be sufficient to properly ignite the charge. Spark plugs set with too wide a gap, when pulling under load, are likely to cause a pop back in the carburetor similar to that caused by lack of gasoline.

The spark plug gap may be adjusted by bending the sections of the split center wire.

The spark plugs should be kept clean to prevent short circuiting.

The spark plugs are insulated with porcelain. If these should become cracked, short circuiting may result and the spark plugs become inoperative.

STARTING AND LIGHTING SYSTEMS

GENERAL PRINCIPLE

A generator is used to furnish current to the battery which supplies the starting and lighting systems. It is built especially for the Packard car and incorporated as an integral part of the motor.

THE BATTERY

The battery, composed of three cells, has a voltage of six and a capacity of over one hundred ampere hours. The battery supplies the current for the lighting and starting systems.

The battery box is attached to the right running board and contains a storage battery, cut-out relay and voltage regulator. The battery is located on the left running board on the runabout.

The battery is charged directly by the generator.

CARE OF THE BATTERY

The battery needs no care further than to fill it with distilled water about every two weeks.

Fill battery with distilled water, using syringe furnished for this purpose, until the liquid is $\frac{3}{8}$ of an inch above the tops of the plates.

Be sure to bring the liquid to this point.

Do not fill above and then drain the excess.

Do not put in acid except in case of spilling the liquid or replacing broken jars.

CARE OF THE MOTOR GENERATOR

The generator should be oiled and inspected once a month, as follows:

Oil rear and front bearings through oil cup at top with a few drops of light oil.

Wipe off commutator with a soft rag.

Put a few drops of oil in the oil cup just behind the motor support arm.

This oils the starting mechanism.

Oil front clutch by removing cover.

LIGHTING SYSTEM

THE LIGHTING SYSTEM

All electric light appliances derive their current from the battery terminals. The generator is attached to these same terminals, thus providing a continuous supply of current.

All wiring for the lights and appliances is part of the chassis and is carried in flexible metal tubing, except those for the electric horn, dome light, gauge light and side lamps. These circuits are connected to the spring terminals on the dash wiring moulding. The large terminal is common to all circuits except gauge light.

An inspection lamp with wire connections is included in the tool box.

Lamp sizes:

1—Headlights—24 Cp., 7 volts, $2\frac{1}{8}$ -inch round bulb.

2—Dash lamps—4 Cp., $7\frac{1}{2}$ volts, 1-inch round bulb.

3—Gauge lamp—4 Cp., 4 volts, $\frac{3}{4}$ -inch round bulb.

Dome light in enclosed bodies, tonneau floor light in open bodies, and tail light, use No. 2. Rear license tag illuminator uses No. 3.

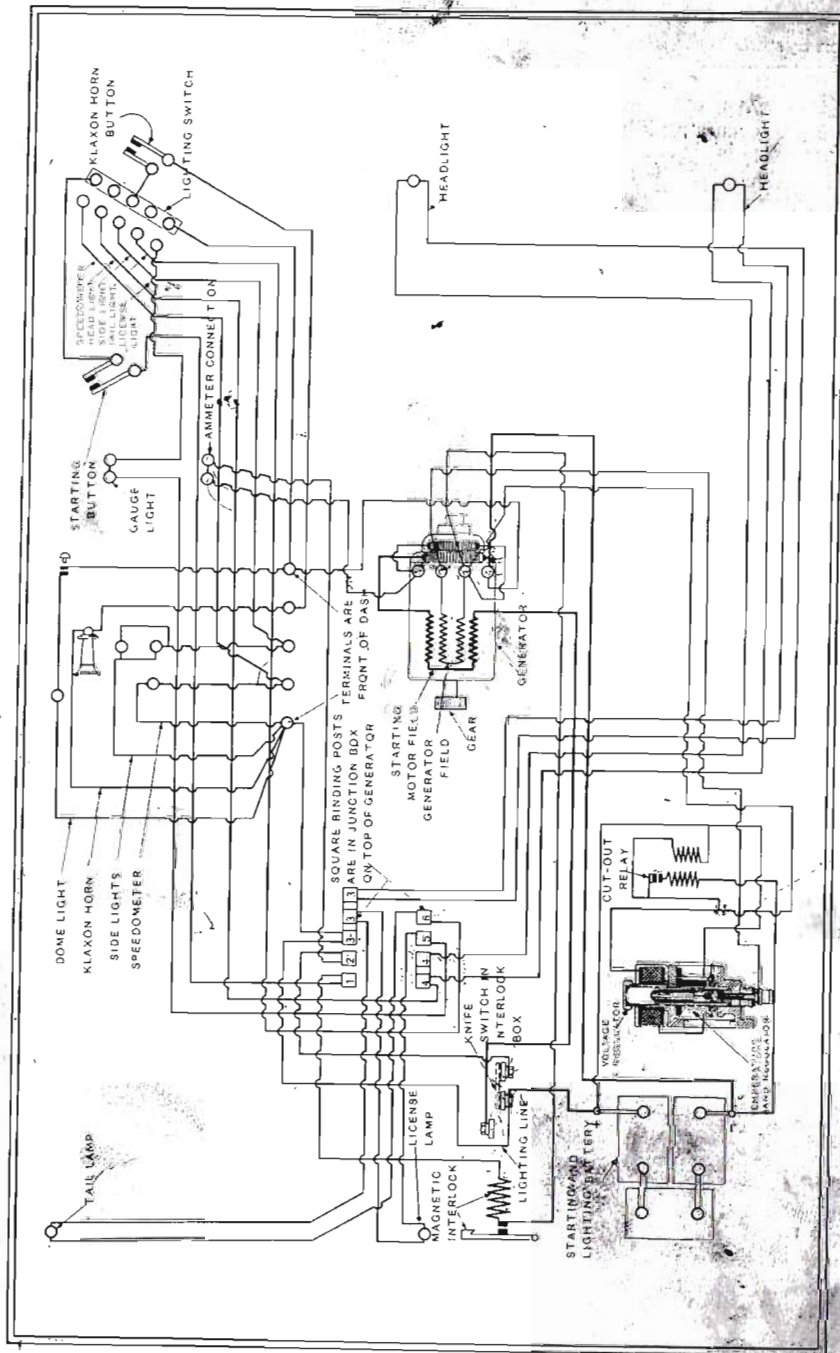


Plate No. 7—Diagram of Lighting and Starting Systems

ELECTRIC SELF-STARTER

THE SYSTEM

The electric starting system consists of a motor-generator at right side of motor; a three-cell storage battery on running board; a voltage regulator and cut-out-relay next the battery; a magnetic interlock and switch at right of clutch housing; a starting button on control board and a starting pedal.

An explanation of the principle of the system follows. A simplified diagram of the starting and charging circuits is shown on page 32; also, a complete diagram of the starting and lighting system on page 30.

All numbers refer to simplified diagram.

THE STARTING BUTTON

When the button (21) is pressed, the current flows from the battery positive (1) through knife switch contacts 2 and 12, which are now in contact, through the ammeter (this should show a 10 ampere discharge to the left, but should immediately drop back to from 3 to 5 amperes) into the generator at 14, through the armature (causing it to revolve at about 100 R. P. M., thus assisting in meshing gears) out at 15, a portion being diverted at 16 through the field and regulator circuit windings, the remainder continuing to 19 instead going through 25 which is an open circuit, goes through the magnetic coil 20 (in the magnetic interlock box to the right of the clutch housing). This magnetic coil now lifts a pawl making a mechanical connection between the shifting pedal and gear train. The current flows to the button 21 and past 22 back to the battery negative pole 11. Push out starting pedal.

THE STARTING PEDAL

When the starting pedal is pushed out it first meshes gears with the revolving gear on the armature shaft and then with teeth on the fly wheel. Pushing pedal clear out fully engages the gears and trips a knife switch in the interlock box, giving full cranking current to the starting motor (the generator unit is actually two separate machines, starting motor and generator, with separate windings). The throwing of the knife switch disconnects the original starting button circuit by disconnecting contacts 2 and 12. The current now flows from 1 to contacts 2 and 3, into the starting motor field 5, through the field winding into the armature at 6, out at 7, to the battery negative pole 11. This current cranks the motor.

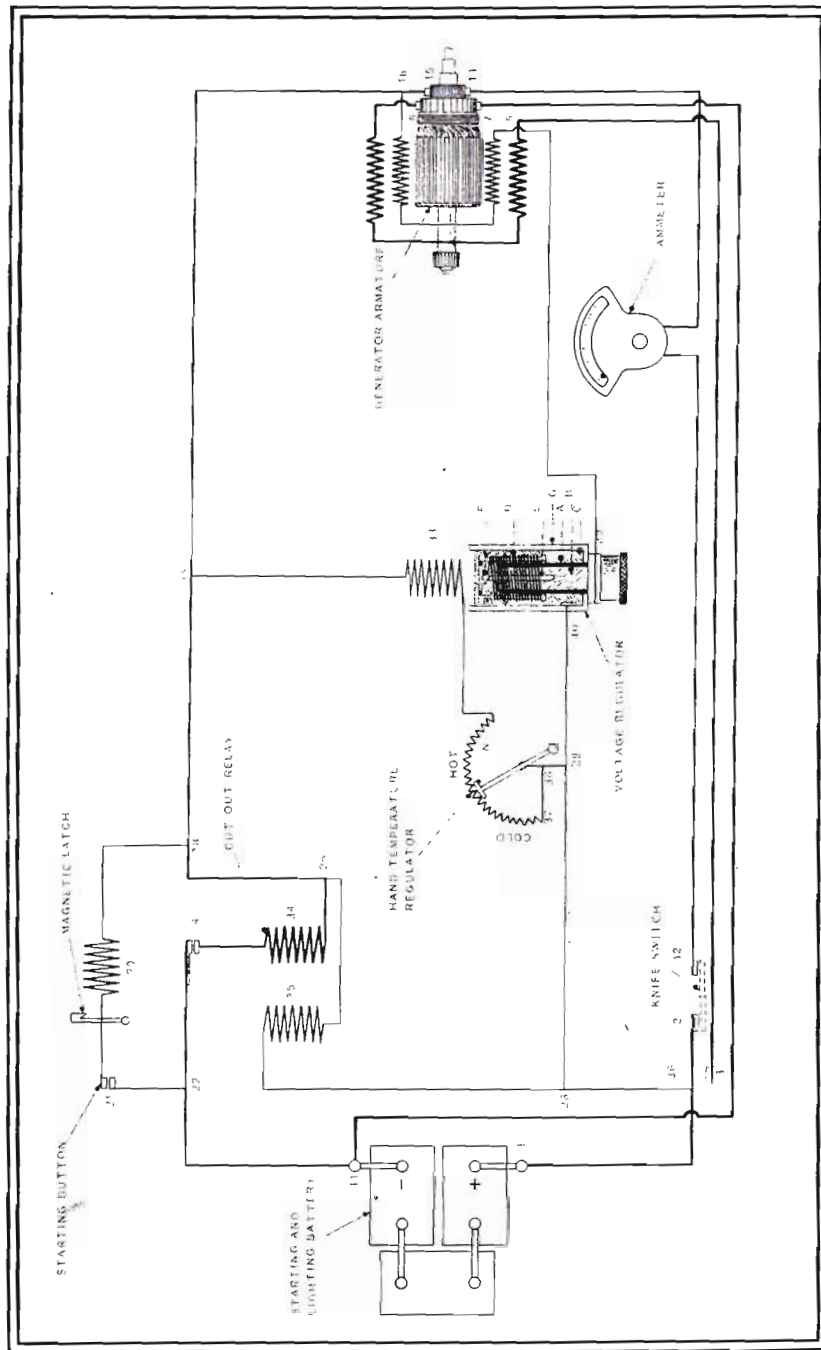
Starting pedal should be released sharply as soon as motor starts firing. Releasing starting pedal throws starting gears out of mesh and returns knife switch again, connecting 2 and 12 and breaks the circuit between 2 and 3.

The motor-generator is now revolving and generates the charging current. This current flows from 14 through the ammeter through 12 and 2 to connection 36. No current can pass through the battery, as the current is broken at 24, causing it to flow through the shunt circuit, through magnetic coil 35, past 25, 18 and back into the generator at 15.

When the current flowing through magnetic coil 35 reaches a pressure of about 7 volts it closes the contact points at 24 and connects the battery directly to the generator.

The generator current now traverses the same circuit as before up to the point 36. While a small portion still takes the same route as formerly, the majority—the main charging circuit, enters the battery positive pole 1, out at 11, passes 22 through contact 24, the magnetic winding 34 (adding holding power to the points), passes on through 25, 18, 17 and 16 into the generator at the brush 15.

Plate No. 8—Simplified Diagram of Electric Starting System



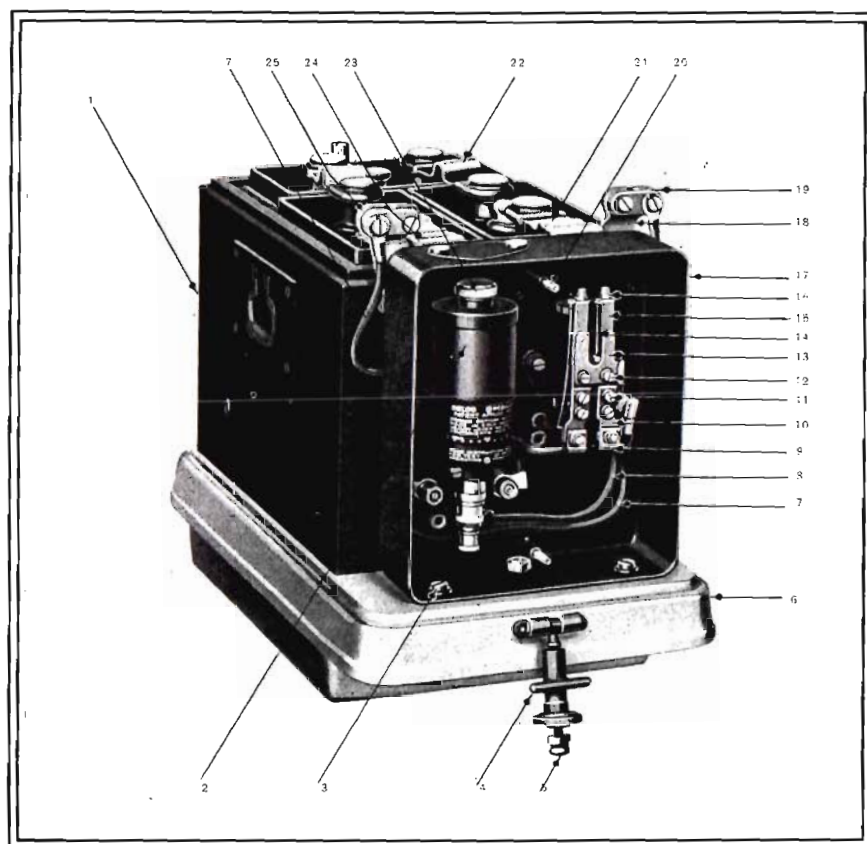


Plate No. 9—Battery and Regulator

Reference Number	Name of Part	Reference Number	Name of Part
1	Battery assembly.	15	Motor generator cut-out relay assembly.
2	Battery voltage regulator assembly.	16	Motor generator cut-out armature adjusting nut.
3	Battery voltage regulator box to base screw.	17	Battery voltage regulator and generator cut-out box assembly.
4	Battery box cover clamp bolt assembly.	18	Battery positive terminal.
5	Battery box cover clamp bolt nut.	19	Battery wire clamp for terminal.
6	Battery box base.	20	Battery voltage regulator box cover stud.
7	Battery to voltage regulator and cut out relay cable assembly.	21	Battery positive strap.
8	Battery to cut-out relay cable assembly.	22	Battery flexible connector.
9	Battery cut-out relay terminal clip.	23	Battery voltage regulator mercury tube assembly.
10	Motor generator cut-out terminal plate.	24	Battery negative strap.
11	Motor generator cut-out terminal plate screw.	25	Battery negative terminal.
12	Motor generator cut-out contact plate screw.		
13	Motor generator cut-out contact plate.		
14	Motor generator cut-out armature spring.		

Parts should be ordered by name only, not by number.

THE VOLTAGE REGULATOR

The generator is a "shunt wound machine" in which the voltage increases with its speed. The voltage at high speeds would cause excessive overcharging of the battery, eventually ruining it. This variation is controlled by the voltage regulator, increasing or lessening the resistance in series with the field winding or in other words by reducing the current flowing through the latter.

The voltage regulator consists of a non-magnetic metal tube "G," an insulating bushing "A" attached to the lower end forming two concentric chambers not electrically connected. The chambers "C" and "B" are filled with mercury which is covered with a special oil preparation which acts as a seal and lubricant.

An iron plunger "H" with a fine wire resistance "D" wound around its lower end (mica insulated from plunger), is immersed in the mercury. The lower end of the winding "D" is electrically connected to the plunger "H" and the upper end is insulated from the tube but electrically connected to the needle "E" at "F." The needle insulated from "H" makes connection with the mercury "C." Current after entering the voltage regulator at 40, must pass through all the windings above the mercury "C" before reaching the needle and passing out at 39. Thus as the length of the wires above the mercury "C" increases, the resistance in the field increases and the amount of current flowing through the field circuit is reduced and vice versa. This raising or lowering of this plunger governs the voltage and is in turn governed by the magnetic winding 33.

This is actually on the outside of the tube "G." The coil 33 is connected to both sides of the generator line (at 17 and at 36 through 29). The voltage or pressure in the line governs the amount of current passing through 33; as the former increases the strength of 33 increases, raising the plunger and weakening the field enough so that the voltage remains constant and vice versa. The generator furnishes approximately a 7-volt current which is enough stronger than a discharged battery (voltage of which is about 5.4) to force through a heavy charging current. As the battery becomes charged its pressure and that of the generator become almost equal and the quantity of current flowing into the battery becomes very small.

TEMPERATURE REGULATOR

On account of the variation of the internal resistance of the storage battery, a higher charging pressure or voltage is required in winter than in summer.

Adjustment is made by moving the lever "N." Moving the lever to the right reduces the resistance in this line and allows a greater amount of current to flow through the magnetic coil 33, thus reducing the generator voltage for hot weather. Moving the lever to the left increases the generator voltage for cold weather.

This is in reality a season regulator and should be adjusted four times a year as follows:

Winter, set at	0°
Spring, " "	50°
Summer, " "	100°
Fall, " "	50°

As a safeguard against bad contact at "N" connection 38 and 37 is made, giving hot weather voltage control in place of no control as would otherwise be the case.

CUT-OUT RELAY

The cut-out-relay acts as a check valve to prevent discharge of the battery when the gasoline motor is not running, or is running at a motor speed below 200 R. P. M.

While the generator has a pressure of 7 volts, the points at 24 are held in contact by 35 and 34. As soon as the generator current becomes so weak.

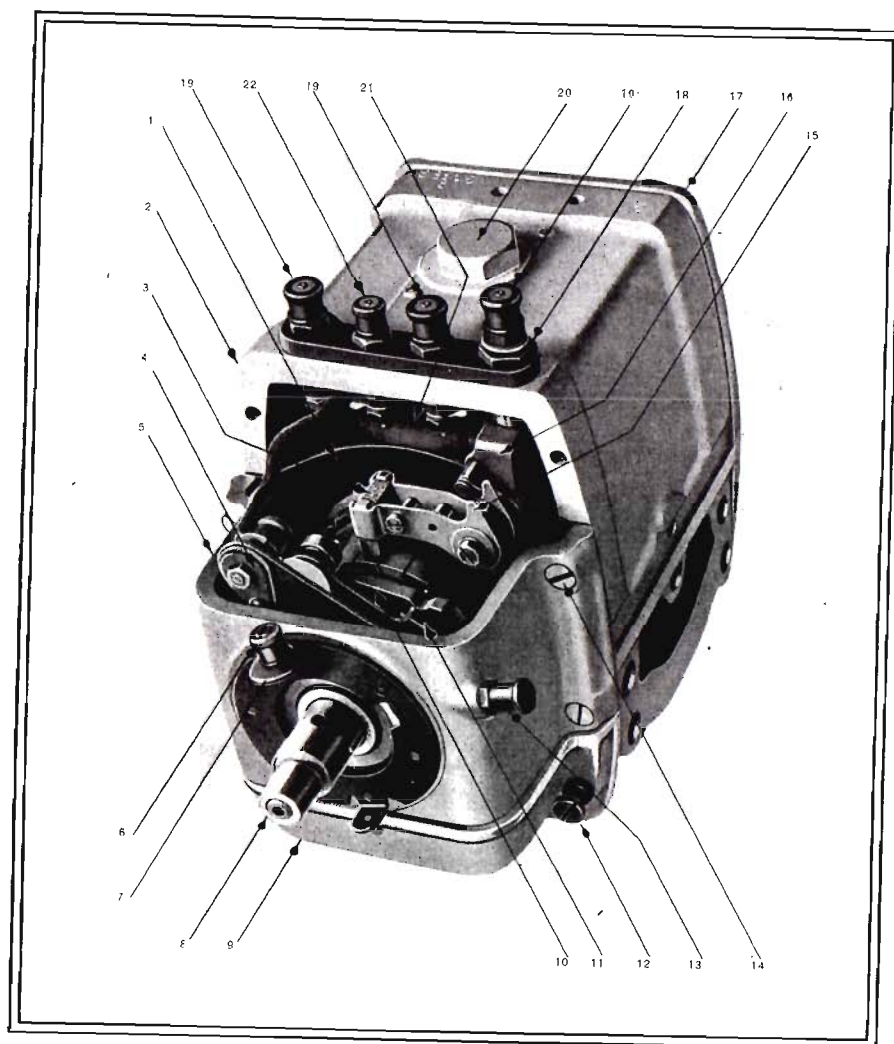


Plate No. 10—Generator

that the battery current overcomes it, the holding action of the coil 34 is changed to a bucking action neutralizing 35 until the separating spring between these points overcomes the magnetic pressure and pulls them apart. Refer to page 33 for action in closing.

OPERATION OF THE SELF STARTER

Turn the auxiliary air valve hand wheel, on the control board, toward "Gas."

To number 3 in warm weather; to number 6 in cold weather.

By turning the hand wheel still further until "Choke" appears, it is possible to close the primary air intake shutter, thus choking the motor and providing a rich mixture for cold weather starting.

Turn spark lever to one-third advance position. Turn the ignition switch to "B." Turn ignition coil button so that it points to "Start." Press down the starting button just forward of the air and gas hand wheel, holding it down until the starting pedal has been pushed forward and the starting mechanism engaged.

In very cold weather, when the motor is cold, the acetylene primer can be used. Hold in the primer button, on the dash, with the foot until the motor starts firing.

As soon as the motor starts firing release the starting pedal, turn the coil switch button to "Run" position, then throw the ignition switch to "M." Adjust the auxiliary air valve hand wheel until the motor runs smoothly.

If motor does not start within two or three minutes do not continue cranking. See that there is gasoline in the tank and that you have sufficient pressure.

In event of any electrical trouble, consult the nearest Packard dealer or call on the Dayton Engineering Laboratories Company, Dayton, Ohio. Do not attempt to correct it or allow local electricians to tamper with it.

Plate No. 10—Motor Generator

Reference Number	Name of Part	Reference Number	Name of Part
1	Motor generator brush (motor) holder plate.	13	Motor generator frame front and rear end ball bearing oiler.
2	Motor generator frame.	14	Motor generator frame front end, center, screw.
3	Motor generator brush (motor).	15	Motor generator brush (motor) and arm assembly.
4	Motor generator brush (generator) holder plate assembly with brushes.	16	Motor generator brush (motor) connector.
5	Motor generator frame, front end, center.	17	Motor generator frame, rear end.
6	Motor generator driving clutch cover spring nut	18	Motor generator frame brush (motor) connector terminal stud.
7	Motor generator frame, front end, bearing retainer.	19	Motor generator frame brush (motor) connector terminal spring nut, large size.
8	Motor generator armature.	20	Motor generator pole piece screw.
9	Motor generator frame, front end, lower.	21	Motor generator field coil assembly.
10	Motor generator brush (generator) spring.	22	Motor generator terminal spring nut, small size screw.
11	Motor generator brush (generator).		
12	Motor generator frame upper and lower cover screw.		

Parts should be ordered by name only, not by number.

LUBRICATION SYSTEM

IMPORTANCE OF LUBRICATION

Lubrication of a car is more important than any other one thing in its care.

Detailed instructions regarding the frequency of oiling the different parts and the proper kind of lubricants to use, are given in the "Schedule of Lubrication," beginning on page 13.

Generally speaking, Crystal Oils are best adapted to Packard cars, "crystal" not referring to any maker's brand.

MOTOR OILING SYSTEM

Cylinders, connecting rods, crank shaft bearings, cam shafts and all parts within the crank case and cylinders are lubricated directly or indirectly by a force feed oiling system.

MOTOR OILING CIRCULATION

The oil is pumped from the crank case oil reservoir through a distributing manifold to the main crank shaft bearings and to the cam, pump and generator shaft bearings. The crank shaft is provided with oil ducts, which carry oil under pressure to the lower connecting rod bearings. The oil then continues, under pressure, through copper tubes to the piston pin bearings. The intermediate cam shaft bearings and other motor parts in the crank case are oiled by spray from the lower connecting rod bearings. Baffle plates limit the amount of spray to cylinder walls to the amount required for light running. When the motor is under heavy load the auxiliary system provides for the increased oil requirements of the cylinders.

There are sediment pockets in front and at rear of oil pump. Also the oil is strained before it enters the pump and again before it reaches the distributing manifold.

AUXILIARY OILING SYSTEM

The auxiliary oiling system manifold, for the lubrication of the piston and cylinder walls, is located on the exhaust side of the motor entering through the cylinder walls. This system is connected to the main system by a by-pass, which is automatically operated by the throttle. When the motor is idling and the throttle closed, the cylinder walls are lubricated by spray from the lower connecting rod bearings. When the throttle is opened one-third way the by-pass starts to open, allowing oil to enter the auxiliary manifold. The oil then lubricates the cylinders and pistons under pressure, the amount of oil varying directly as the throttle opening.

MOTOR OIL SUPPLY

An oil reservoir is formed by the lower section of the crank case. It should be filled with cylinder oil to the level of the pet cock on the left side of the crank case. One gallon of oil fills the crank case to pet cock level and is the normal oil supply.

At this level the connecting rods do not splash the oil unless the car is on a grade of twelve per cent or more.

An indicator is contained in the vent pipe assembly which shows the supply of oil in the crank case.

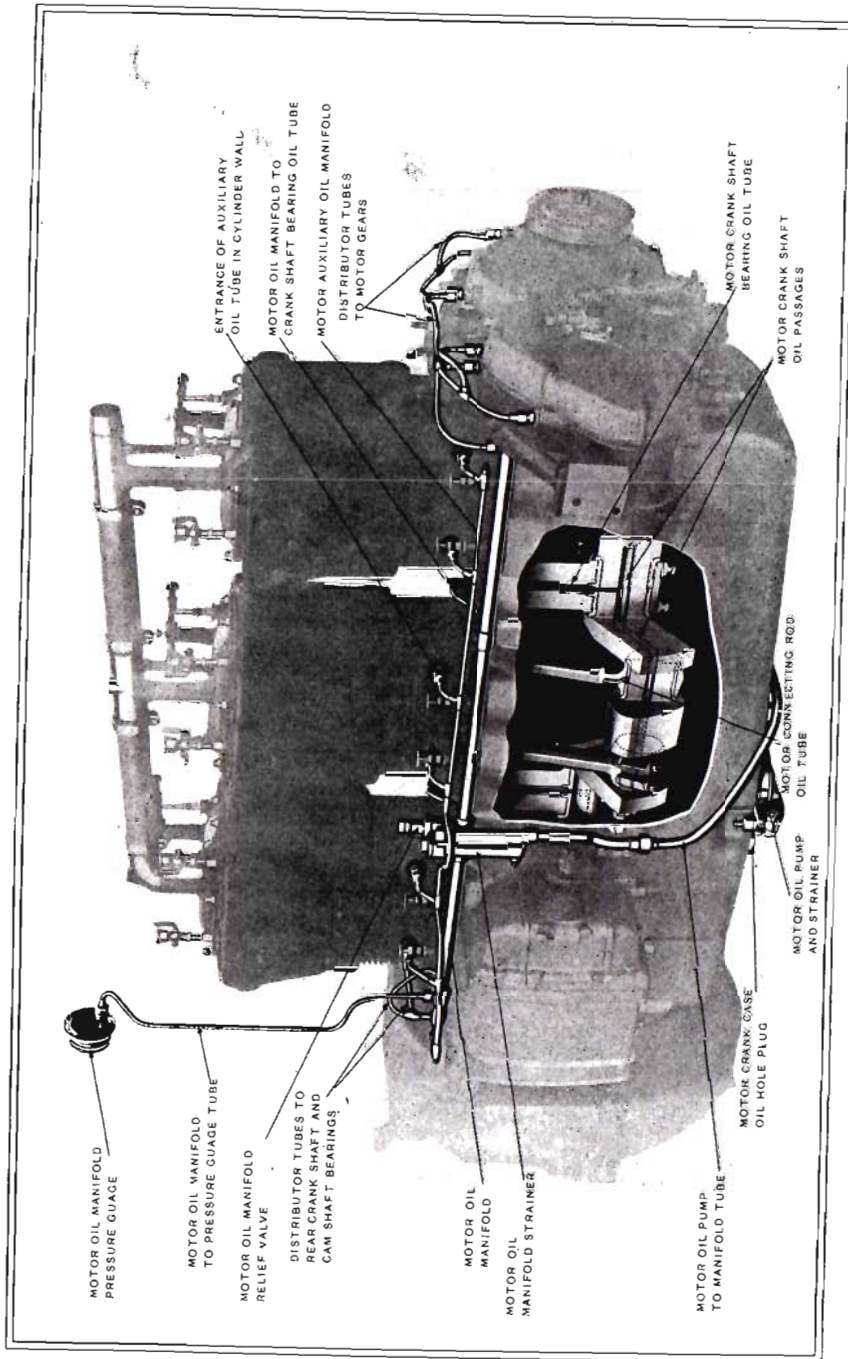
MOTOR OIL PUMP

A gear pump located at the lowest point of the crank case oil reservoir forces the oil through the main feed pipe to the oil manifold on the left side of motor.

The pump is operated by a shaft, driven by a worm gear on the inlet cam shaft.

It may be removed for cleaning or inspection by removing the nuts which hold it to the bottom of the crank case.

Plate No. 11—Diagram of Lubrication System



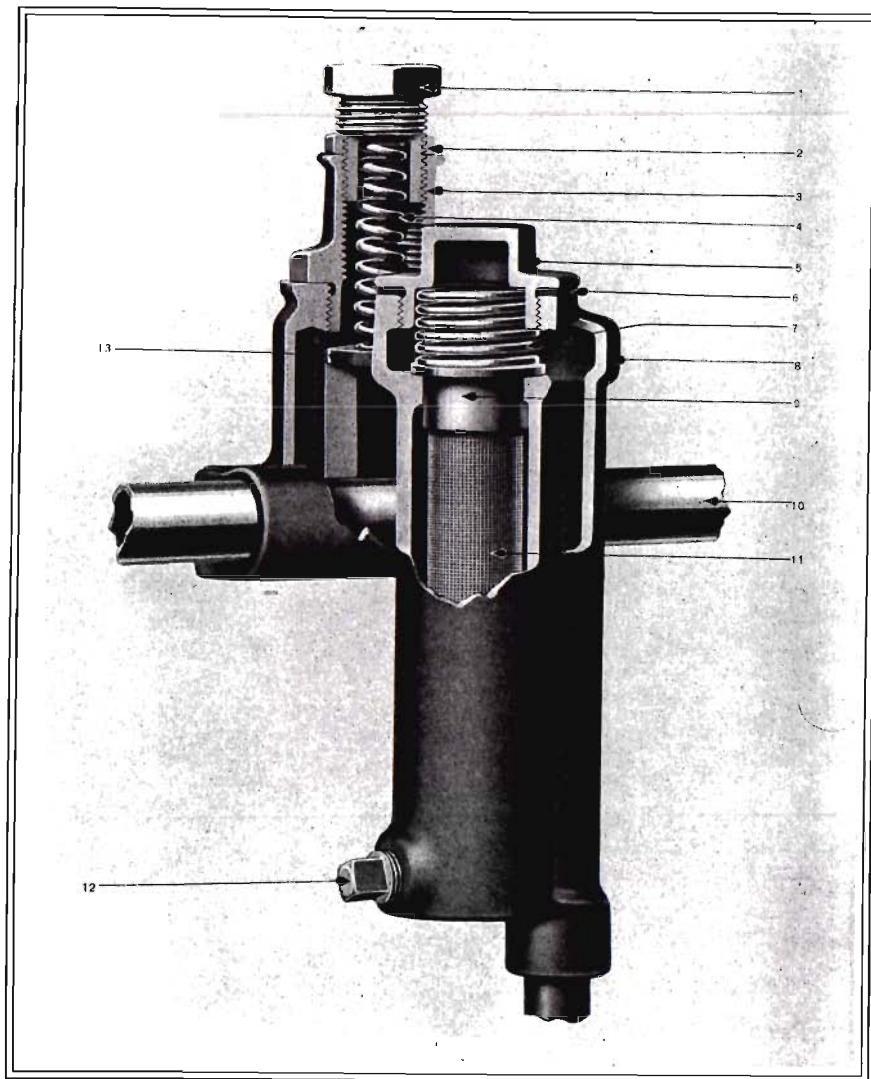


Plate No. 12—Motor Oil Manifold Strainer Body Assembly

Reference Number	Name of Part	Reference Number	Name of Part
1	Motor oil manifold relief valve spring adjuster.	7	Motor oil manifold strainer spring.
2	Motor oil manifold relief valve spring adjusting lock nut.	8	Motor oil manifold strainer housing.
3	Motor oil manifold relief valve cap.	9	Motor oil manifold strainer ring.
4	Motor oil manifold relief valve spring.	10	Motor oil manifold.
5	Motor oil manifold strainer cap.	11	Motor oil manifold strainer assembly.
6	Motor oil manifold strainer cap gasket.	12	Motor oil manifold strainer housing pipe plug.
		13	Motor oil manifold relief valve.

Parts should be ordered by name only, not by number.

MOTOR OIL MANIFOLD

The oil from the pump is forced through a strainer and is then distributed by the motor oil manifold to each of the main crank shaft bearings and to the front end shaft bearings.

The excess of oil from these latter bearings lubricates the motor gears. Two holes between the motor gear compartment and the crank case determine the maximum height of the oil in the gear compartment.

MOTOR OIL STRAINERS

Between the oil pump and the oil manifold there is a basket strainer to free the oil from dirt before it enters the manifold.

Every two weeks, or 500 miles, the oil strainer should be cleaned. To remove, unscrew the cover and lift out the strainer.

There is a strainer in the bottom of the crank case oil reservoir, which covers the entrance to the oil pump. The oil is thus strained before it enters the pump.

The oil pump strainer should be cleaned every month or every 1,000 miles. It may be removed easily when the tumble bolt on the left side of the lower section of the crank case is unscrewed.

OIL SAFETY BY-PASS

Where the pipe from the oil pump enters the manifold, there is a by-pass through which the oil can flow back into the crank case in the rare case of the manifold becoming clogged.

The entrance to the by-pass is closed by a spring-controlled valve which opens when a pressure of approximately 10 pounds is reached.

OIL PRESSURE GAUGE

There is a gauge on the dashboard which shows the oil pressure in the manifold.

The normal running pressure is from 5 to 10 pounds, depending on the speed of the motor.

Failure of the gauge to show pressure after the motor has been running for a few minutes is an indication of lack of oil or of the clogging of the strainers or oil pipes.

The motor should be immediately stopped and the cause determined.

Also excessive pressure on the gauge may indicate the clogging of the system.

OIL SUPPLY

The supply of oil is obtained by pouring oil directly into the crank case through the crank case vent at the left of the motor. Fill to pet cock level.

The pet cock is operated by a lever supported on the carburetor.

When the pet cock is open the bonnet cannot be closed.

DRAINING OIL FROM CRANK CASE

Once a month, or every 1,000 miles, the oil in the crank case should be drained off and a fresh supply poured in.

The old oil may be drained by removing the drain plugs in the two sediment pockets in the bottom of the crank case.

After draining, flush the crank case with kerosene through the vent pipe, replace plugs, and refill to pet cock level with clean oil.

The motor should not be run until the clean oil has been added.

INSUFFICIENT LUBRICATION

If, through oversight, the motor does not receive sufficient lubrication and begins to heat or to pound, it should be stopped immediately.

Allow the motor to cool. Bring the oil in the crank case oil reservoir up to the pet cock level. Fill the radiator with water after the motor is thoroughly cool.

Should there be apparent damage, the motor should be thoroughly inspected without further driving.

If no obvious damage has been done, the motor should be given a thorough shop examination at the earliest opportunity to see that the running without oil has not burned the bearings or caused other trouble.

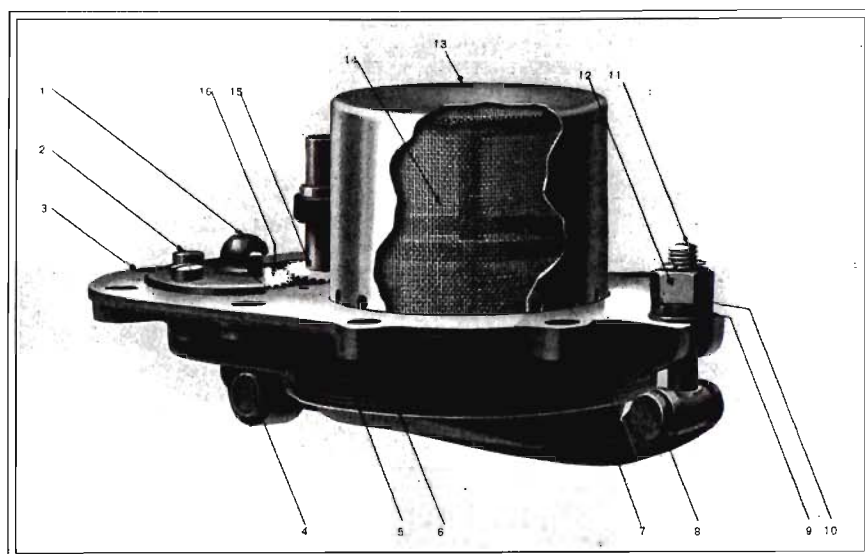


Plate No. 13—Motor Oil Pump and Strainer Assembly

Reference Number	Name of Part	Reference Number	Name of Part
1	Motor oil pump cover.	10	Motor oil pump strainer cover clamp bolt lock washer.
2	Motor oil pump cover to body machine screw.	11	Motor oil pump strainer cover clamp bolt.
3	Motor oil pump body.	12	Motor oil pump strainer cover clamp bolt nut.
4	Motor oil pump strainer cover clamp pin.	13	Motor oil pump strainer cage.
5	Motor oil pump strainer cover gasket.	14	Motor oil pump strainer and reinforcement assembly.
6	Motor oil pump strainer cover.	15	Motor oil pump driving gear.
7	Motor oil pump strainer cover clamp.	16	Motor oil pump driven gear.
8	Motor oil pump strainer cover clamp bolt pin.		
9	Motor oil pump strainer cover clamp bolt washer.		

Parts should be ordered by name only, not by number.

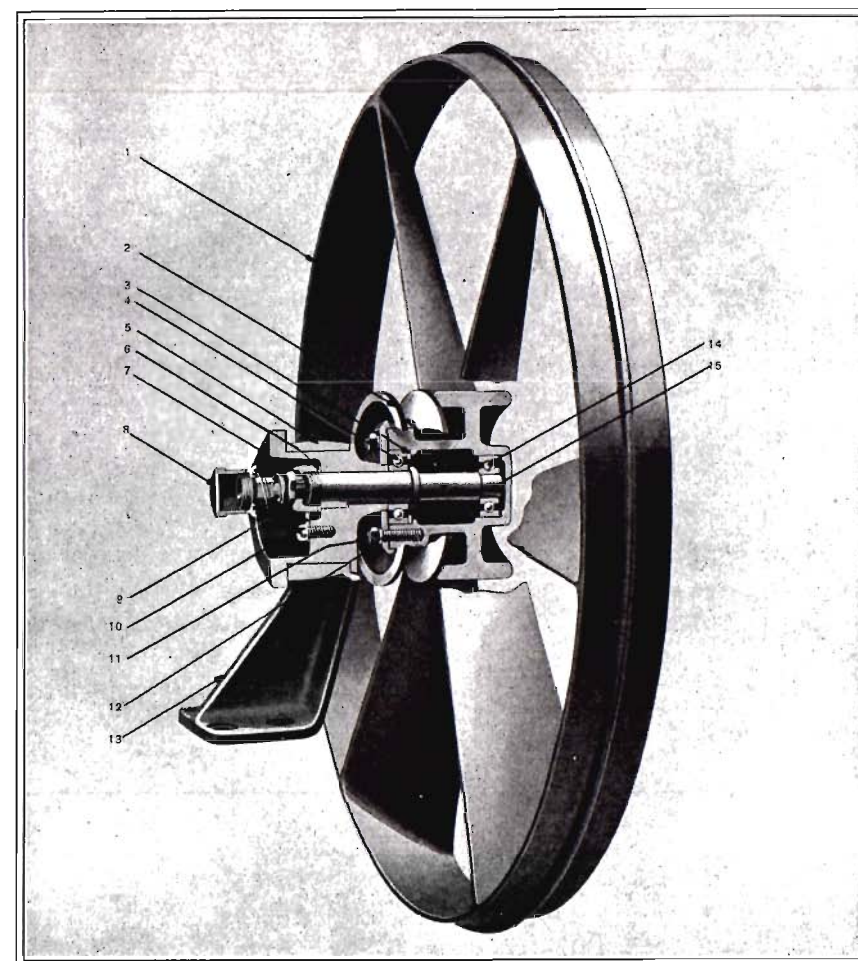


Plate No. 14—Fan Assembly

Reference Number	Name of Part	Reference Number	Name of Part
1	Motor fan.	9	Motor fan bearing spindle nut lock.
2	Motor fan pulley.	10	Motor fan bearing spindle nut lock washer screw.
3	Motor fan bearing washer, rear.	11	Motor fan pulley stud.
4	Motor fan bearing, rear.	12	Motor fan pulley stud nut.
5	Motor fan bearing bracket cap.	13	Motor fan bearing bracket.
6	Motor fan bearing spindle washer.	14	Motor fan bearing, front.
7	Motor fan bearing spindle nut.	15	Motor fan bearing spindle
8	Motor fan bearing grease cup.		

Parts should be ordered by name only, not by number.

WATER CIRCULATION

FILLING THE RADIATOR

Keep the radiator filled with water which is as free from lime and other impurities as possible.

Avoid pouring cold water into an empty or nearly empty water system when the motor is excessively hot.

A pulsating action of the governor, as shown by movement of the accelerator pedal is warning that the radiator is not full.

Any steam or surplus water will escape through a vent pipe, extending from beneath the filler cap downward to the lower corner of the radiator on the left side.

THE WATER PUMP

A centrifugal water pump is attached to the right side of the motor.

It draws water from the bottom tank of the radiator, forcing it through the water inlet manifold into the cylinder water jackets. After circulating around the cylinder walls, the water is forced through the tops of the cylinder jackets, into the top tank of the radiator.

The water passes from the top to the bottom tank through the narrow spaces between the small square tubes which compose the radiator.

A belt-driven fan, behind the radiator, draws a current of air through the radiator to increase the cooling efficiency. The pump is direct driven from the front gear compartment.

DRAINING THE WATER SYSTEM

To thoroughly drain the water from the entire system, open the water system drain cock in the inlet strainer at the base of the pump, the governor water chamber vent cock, the water pump drain cock, and the radiator filler cap.

When the water has ceased to flow from the three pet cocks, run the motor slowly for about a minute.

CLEANING THE WATER SYSTEM

The radiator and the cylinder water jackets should be cleaned occasionally.

To clean the radiator, remove the hose connections and flush out by forcing water under city pressure through it, from the bottom to the top. Avoid excessive pressure. Flush the cylinder jackets in a similar manner, but let the water in at the top and disconnect the hose between the cylinders and the governor so that the water may flow onto the ground without reaching the governor.

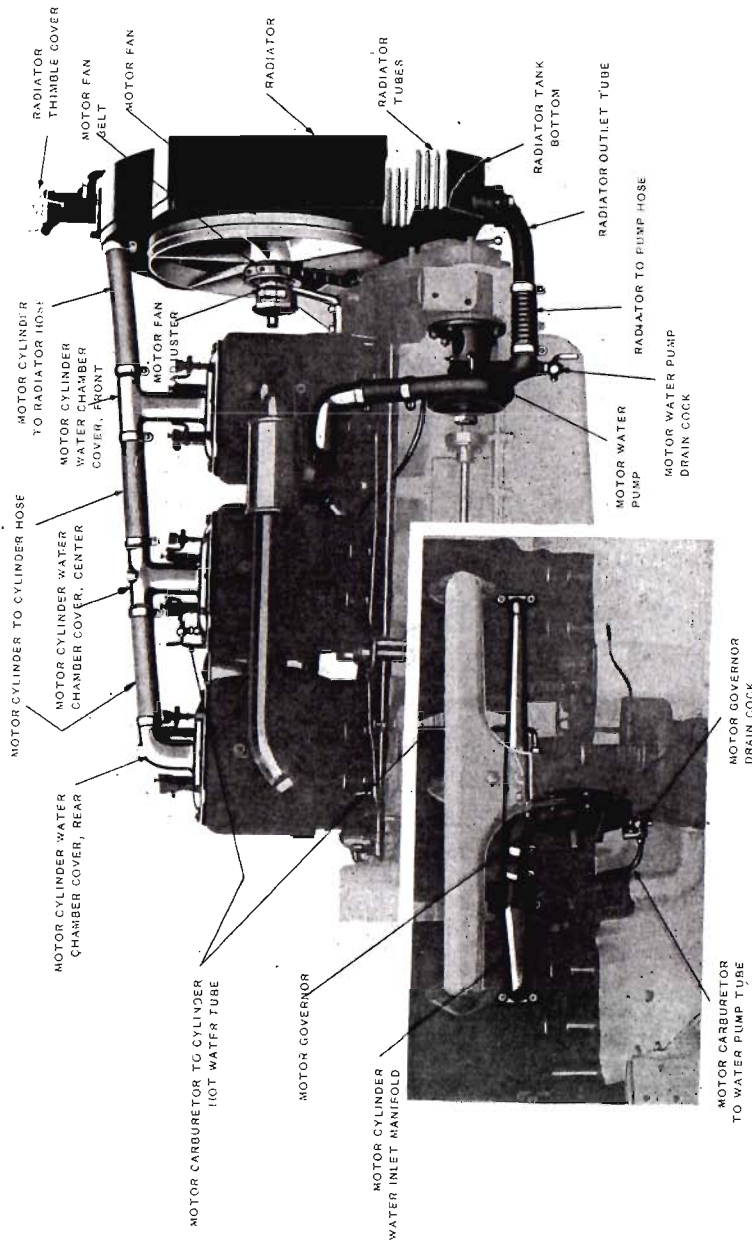


Plate No. 15—Diagram of Water Circulation System

IMPORTANT FEATURES OF MOTOR

RUNNING A NEW MOTOR

Do not, under any circumstances, run a new motor at sustained high speed.
Do not unnecessarily race the motor.

This is extremely injurious and is never of any purpose.

MAINTAINING COMPRESSION

Compression in all cylinders should be equal and up to the standard.

Test the compression occasionally by turning the starting crank until resistance is felt in each of the six cylinders in succession, comparing the result.

Loss of compression is most probably due to imperfectly seating valves, which may be caused either by insufficient clearance between the valve stems and lift rods or by carbon deposit on the valve face.

GRINDING THE VALVES

If the above faults do not exist and yet the valves leak, they should be ground to fit their seats, using a mixture of oil and powdered glass or some prepared valve-grinding paste.

To grind a valve, unscrew the valve chamber plug, remove the valve collar key, valve collar and spring. Take out the valve and clean it thoroughly, also noting whether or not the stem is clean and otherwise in good condition. Stuff rags or waste into the port between the valve chamber and the cylinder, to keep grinding material out of the latter. Then replace the valve upon its seat, and grind by rotating it with a screw-driver, the grinding paste being between the valve and the seat.

Plate No. 16—Intake Side of "48" Motor

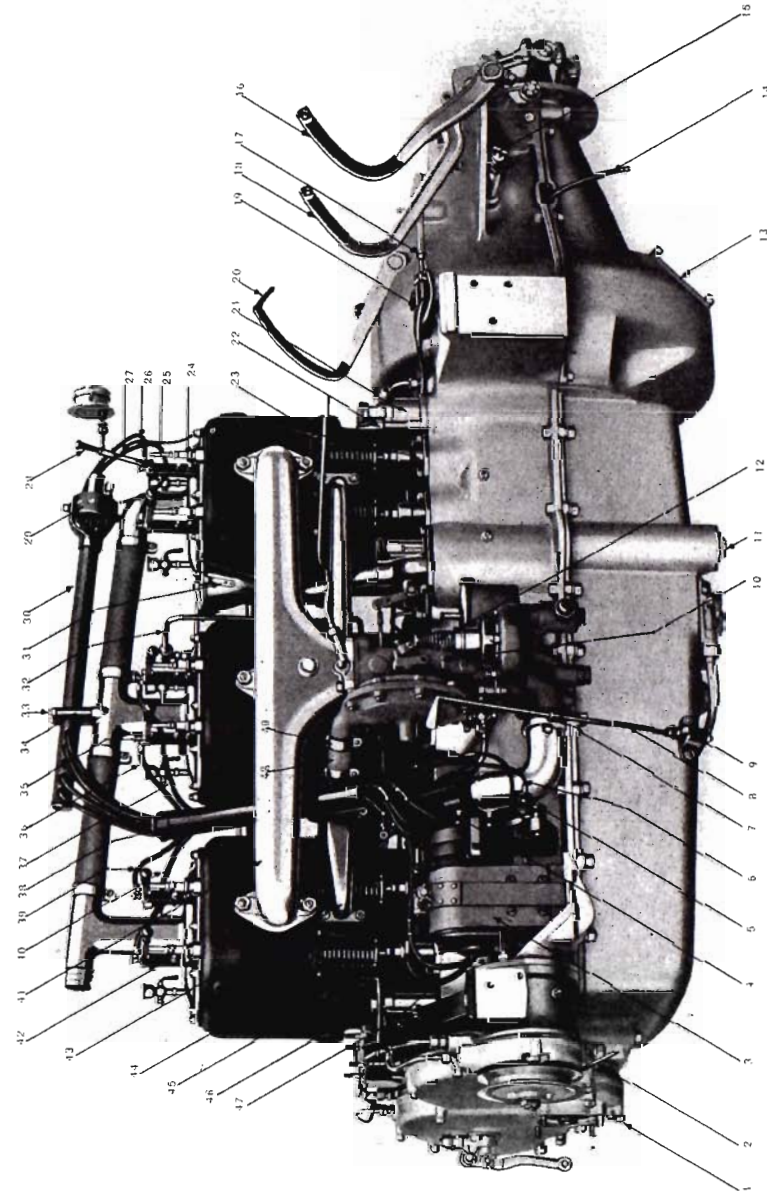


Plate No. 16—Intake Side of "48" Motor

Reference Number	Name of Part	Reference Number	Name of Part
1	Motor gear cover stud nut.	28	Ignition high-tension switch assembly.
2	Motor fan driving pulley oil guard spout.	29	Ignition high-tension cable tube clamp socket block.
3	Ignition magneto.	30	Ignition high-tension cable tube.
4	Motor carburetor air intake pipe valve.	31	Motor crank case oil filler assembly.
5	Ignition high-tension cable tube clamp socket to magneto (terminal No. 1), cable assembly.	32	Motor carburetor to cylinder hot water tube.
6	Ignition high-tension cable tube clamp socket to magneto (terminal No. 2), cable assembly.	33	Ignition high-tension cable tube clamp block acorn nut.
8	Motor crank case overflow valve handle bracket.	34	Ignition high-tension cable tube clamp block assembly.
8	Motor crank case overflow valve handle.	35	Ignition high-tension wire cleats, Nos. 2, 3 and 5.
9	Motor crank case overflow valve assembly.	36	Ignition high-tension cable to spark plug assembly No. 3.
10	Motor carburetor assembly.	37	Ignition high-tension cable to spark plug assembly No. 4.
11	Motor oil level float crank case plug.	38	Ignition magneto cable tube.
12	Motor carburetor air valve spring, large.	39	Ignition high-tension cable to spark plug assembly No. 2.
13	Motor clutch cover, bottom, hand hole cover.	40	Ignition high-tension cable to spark plug assembly No. 1.
14	Motor clutch shifter bearing sleeve grease tube.	41	Motor carburetor cylinder inlet manifold.
15	Motor clutch shifter shaft grease cup.	42	Ignition high-tension wire cleats Nos. 1, 4 and 6.
16	Motor clutch pedal.	43	Motor cylinder water inlet manifold.
17	Motor auxiliary oil valve rear end.	44	Motor valve spring.
18	Foot brake pedal.	45	Ignition high-tension cable tube clamp socket to magneto (terminal No. 3), cable assembly.
19	Motor auxiliary oil valve.	46	Motor crank case flush pipe cap.
20	Motor starter pedal.	47	Ignition high-tension cable tube clamp socket to magneto (terminal No. 4), cable assembly.
21	Gasoline power pressure pump assembly.	48	Motor governor to water inlet manifold hose.
22	Gasoline power pressure pump to crank case stud nut.	49	Motor governor to water inlet manifold hose clamp.
23	Motor valve roller holder guide.		
24	Ignition spark plug assembly.		
25	Ignition high-tension knife switch contact.		
26	Ignition high-tension cable to spark plug assembly No. 6.		
27	Ignition high-tension cable to spark plug assembly No. 5.		

Parts should be ordered by name and by number.

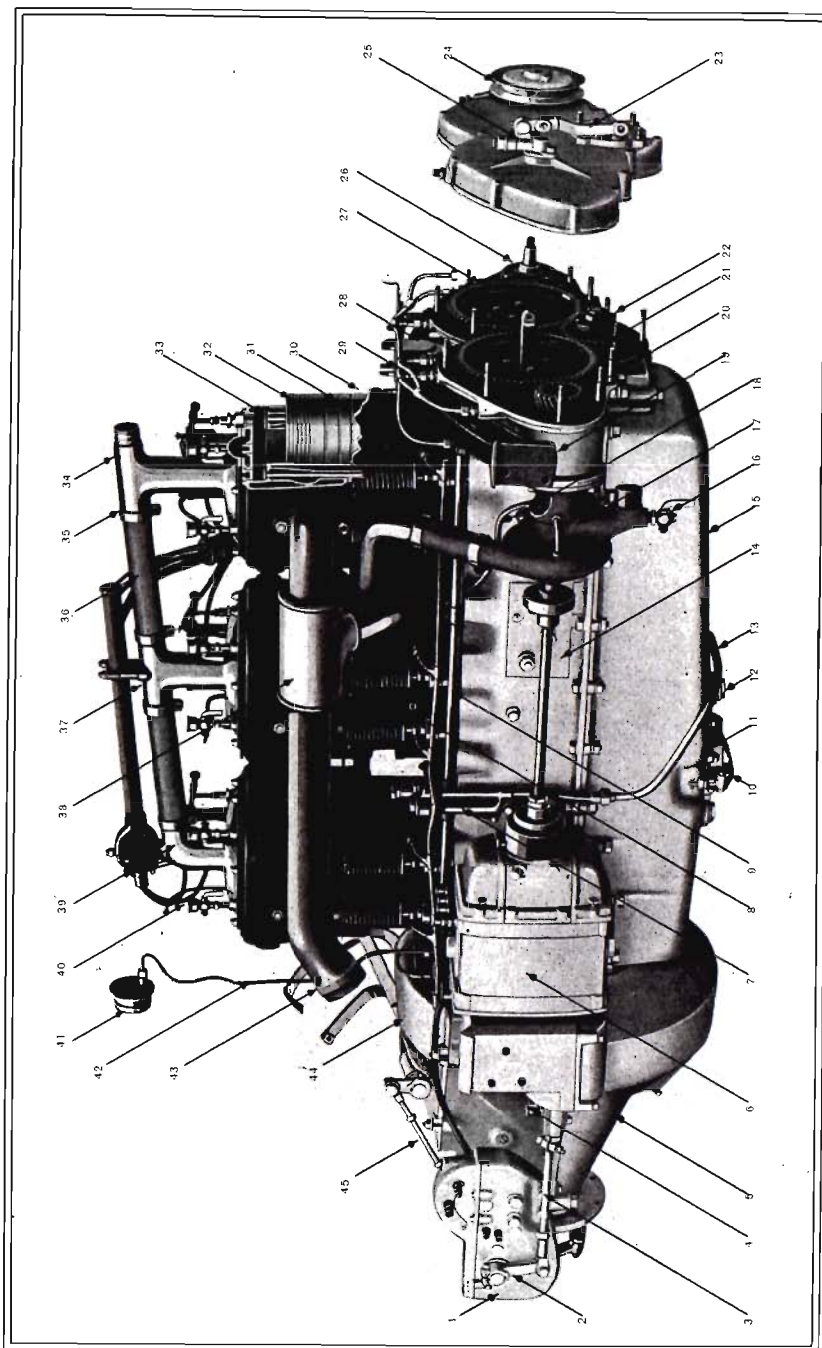


Plate No. 17—Exhaust Side of "48" Motor

Important Features of Motor

OPERATION AND CARE 49

The valve should be ground until it has an even bearing entirely around its face. Carefully remove all grinding compound before finally replacing the valve and starting the motor.

VALVE ADJUSTMENT

The valve roller holders, or lift rods, should be so adjusted that there is a clearance of .002-inch between the lift rod and the valve stem, when the valve is closed.

This adjustment should be made when the motor is warm.

In case of doubt about this clearance consult a Packard dealer.

Care should be taken, when adjusting the valves on the inlet side, that the fingers are not caught between the auxiliary oil manifold and the moving roller holder.

SETTING VALVE CAM SHAFTS

Setting the valve cam shafts is only necessary when the front gear compartment gears have been removed and replaced. It is then properly a job for a Packard dealer's mechanical department. However, an owner or chauffeur who takes entire charge of his car may proceed as follows:

For sake of convenience remove the front fenders.

Open all six priming cocks.

Place the cam shaft gears on the shafts so that the marks on their hubs will line up with the corresponding marks on the shaft flanges.

Mesh the gears so that the marked teeth of each pair will come together as follows: The tooth on the crank shaft gear marked "E" must fit between the two teeth marked "E" on the exhaust cam shaft gear. The tooth on the crank shaft gear marked "I" must fit between the two teeth marked "I" on the inlet cam shaft gear. The tooth on the exhaust cam shaft gear marked "M" must fit between the two teeth marked "M" in the magneto gear.

Establish the correct clearance between the valve stems and roller holders of .002-inch for both inlet and exhaust valves.

Plate No. 17—Exhaust Side of "48" Motor

Reference Number	Name of Part	Reference Number	Name of Part
1	Motor starting magnetic interlock switch box.	24	Motor fan driving pulley.
2	Motor starting gear shifting lever.	25	Motor cam shaft shifter lock.
3	Motor starting gear shifting connecting rod.	26	Motor magneto gear shaft outboard bearing.
4	Motor starting clutch shaft oiler.	27	Motor cam shaft gear.
5	Motor clutch cover bottom.	28	Motor support beam pin lock plate.
6	Motor generator.	29	Motor oil manifold to motor gears distributor tubes assembly.
7	Motor oil manifold strainer housing.	30	Motor piston.
8	Motor auxiliary oil manifold assembly.	31	Motor piston pin.
9	Motor oil manifold assembly.	32	Motor piston ring.
10	Motor oil pump strainer cover clamp.	33	Motor valve.
11	Motor oil pump assembly.	34	Motor cylinder water chamber cover, front.
12	Motor crank case oil hole plug bottom.	35	Motor cylinder to cylinder hose clamp.
13	Motor oil pump to manifold tube.	36	Motor cylinder to cylinder hose.
14	Motor crank case, upper half.	37	Motor cylinder water chamber cover, center.
15	Motor crank case, lower half.	38	Motor carburetor air intake pipe sleeve, upper.
16	Motor water pump casing drain cock.	39	Motor cylinder water chamber cover rear.
17	Motor water pump assembly.	40	Motor cylinder pet cock complete.
18	Motor carburetor to water pump tube.	41	Motor oil manifold pressure gauge.
19	Motor support beam.	42	Motor oil manifold to pressure gauge tube.
20	Motor water pump gear.	43	Exhaust manifold.
21	Motor crank shaft gear.	44	Motor clutch cover, top.
22	Motor starting crank shaft clutch.	45	Motor starter pedal connecting rod.
23	Motor cam shaft shifter shaft lever.		

Parts should be ordered by name only, not by number.

CARBONIZED CYLINDERS

If the motor always knocks when the spark is not retarded, and does not seem to develop the normal amount of power, it is possible that the cylinders are carbonized.

If this is the case, remove the cylinders and scrape the carbon from the piston heads and from the walls of the combustion chambers of the cylinders.

It is desirable to grind the valves after this operation.

THE MOTOR CRANK CASE

The crank case is divided horizontally into two sections.

The uppermost or main section forms the engine base and contains the cam shafts and the seats for the upper half of the crank shaft bearings. The lower half of the crank shaft bearings are held by rigid caps bolted to the upper crank case section. A forward extension contains the gears for operating the cam shafts, water pump and magneto. A rigid integral extension to the rear, supports the clutch shaft, clutch shifter and clutch pedal bearings and, with its covers, completely encloses the fly wheel and clutch.

The lower crank case section is attached to the upper by suitable studs and nuts. It contains the motor oil supply, oil pump and oil pump strainer.

CRANKING THE MOTOR

There is no occasion for continued cranking of the motor.

If the motor does not start readily, look for the reason and correct the trouble instead of attempting to make the motor start by continued cranking.

Correct methods for starting motor with electric self-starter are given under "General Operation," on page 11.

ACETYLENE PRIMER

An acetylene primer is attached to the motor to assist starting when the motor is cold. It is operated by a foot-controlled button on the dash.

Never push in this button until the engine is being turned over by the electric cranking device. Proceed to start as usual and when starting pedal has been pushed out and motor is being turned over, press primer button and hold in until engine fires.

By turning the switch to "B" before charging the cylinders, the gas will ignite when the mixture is right.

Too much acetylene gas will act the same as too rich a gasoline mixture and will not ignite properly.

THE TRANSMISSION

GENERAL PRINCIPLE

Back of the fly wheel, enclosed in the rearward extension of the crank case casting, is a clutch from which the drive is through a long shaft with an encased universal joint at each end to a unit on the rear axle. This unit combines the speed changing gears, final drive bevel gears and differential in a rigid housing.

THE CLUTCH

The dry plate clutch consists of two series of plates which are alternately connected with a casing attached to the fly wheel and with the clutch shaft, the casing plates are faced with special friction material which contacts with the steel clutch shaft, or spider, plates.

A strong coil spring holds all the plates together when the clutch is engaged. The clutch is disengaged by pressure on the left pedal.

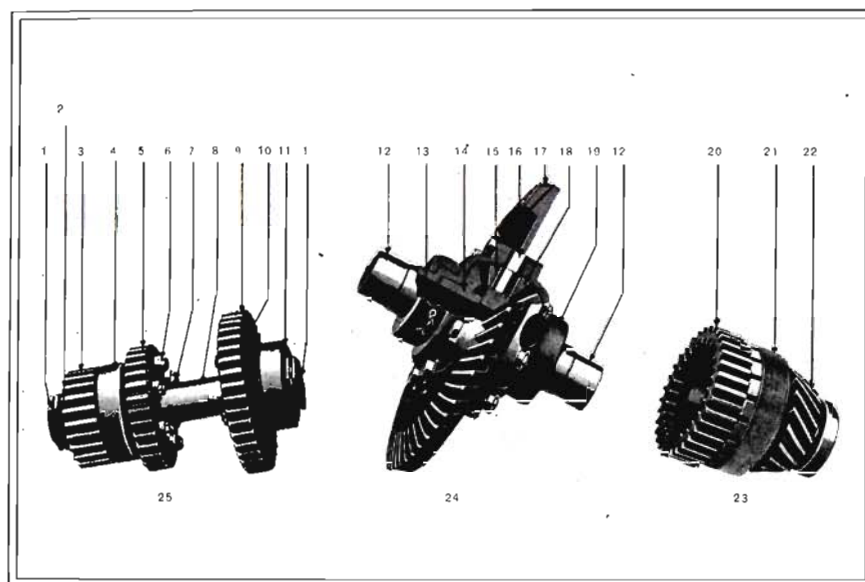


Plate No. 18—Countershaft, Differential Assembly and Direct Drive Gear

Reference Number	Name of Part	Reference Number	Name of Part
1	Transmission countershaft bearing lock nut.	13	Differential adjusting nut set screw.
2	Transmission countershaft bearing lock nut.	14	Differential gear.
3	Transmission countershaft gear.	15	Differential pinion bushing.
4	Transmission countershaft bearing, rear.	16	Differential pinion spider.
5	Transmission second speed gear.	17	Differential driving gear.
6	Transmission second speed gear bolt nut.	18	Differential pinion.
7	Transmission second speed gear bolt.	19	Differential adjusting nut.
8	Transmission countershaft.	20	Transmission direct drive gear.
9	Transmission first speed gear.	21	Transmission driving pinion bearing sleeve.
10	Transmission first speed gear bolt.	22	Transmission driving pinion.
11	Transmission countershaft bearing, front.	23	Transmission direct drive gear assembly.
12	Differential casing.	24	Transmission differential assembly.
		25	Transmission countershaft and gear assembly.

Parts should be ordered by name only, not by number.

CARE OF THE CLUTCH

The clutch plates need no lubrication or other attention.

Oil the clutch shifter bearing as described on page 13.

If the car is not to be used for a period of two weeks or more, the clutch plates should be covered with oil.

Before using again the oil should be washed off the plates by releasing clutch and forcing gasoline onto the plates with squirt gun.

CLUTCH PEDAL ADJUSTMENT

The clutch pedal in the engaged position, if properly adjusted, should have one-half inch free motion or play when the pedal is lifted by hand. If the pedal while in this position is allowed to touch the floor board the full action of the clutch spring is not obtained.

The adjusting link for obtaining the correct adjustment of the clutch pedal is just inside of the clutch cover. By lengthening this link the pedal is brought closer to the floor board and by shortening it the distance between the pedal and floor board is increased.

No other change from the original adjustment of the clutch is needed, as the clutch surfaces are automatic in their compensation for wear.

ACTION OF SPEED CHANGING GEARS

Three forward speeds and one reverse. A double pinion, which slides on the main driving shaft, engages countershaft gears for the first and second speeds, an internal gear clutch for third speed, or direct drive, and an idler gear for reverse drive.

The plan view of the transmission gear on page 54 shows the double sliding pinion in neutral position, no gears being engaged for driving the car.

Sliding the double pinion forward until the first speed pinion engages the first speed gear on the countershaft, drives the car forward on first speed, or at the lowest transmission gear ratio.

Sliding the double pinion from neutral position backward until the second speed pinion engages the second speed gear, drives the car forward on second speed, or at the intermediate transmission gear ratio.

Sliding the double pinion still further backward until it engages internal teeth in the direct drive gear, locks the two sections of the driving shaft together and obtains the third speed forward, or highest transmission gear ratio, by direct drive.

Reverse drive is obtained by movement of a toggle which brings into engagement with the first speed pinion and the first speed gear, a broad

Plate No. 19—Motor Clutch Assembly

Plate No. 19—Motor Clutch Assembly			
Reference Number	Name of Part	Reference Number	Name of Part
1	Universal joint yoke bushing.	21	Motor clutch spring sleeve.
2	Universal joint frame and yoke set screw lock wire.	22	Motor clutch spider plate, drilled.
3	Motor clutch shaft, rear.	23	Motor clutch shifter collar adjusting nut.
4	Motor clutch shaft bearing, rear.	24	Motor clutch shifter collar flange.
5	Motor clutch shaft thrust bearing washer.	25	Motor clutch shifter bearing washer, front.
6	Motor clutch shaft flange bolt.	26	Motor clutch shifter bearing ball retainer assembly.
7	Motor clutch shaft spacer bushing	27	Motor clutch shifter bearing washer, rear.
8	Motor clutch shaft flange bolt nut.	28	Motor clutch shifter collar.
9	Motor clutch shifter bearing sleeve cover.	29	Motor clutch shifter collar lock nut.
10	Motor clutch shifter bearing sleeve.	30	Motor clutch spring adjusting collar lock.
11	Motor clutch clamp.	31	Motor clutch spring adjusting collar.
12	Motor clutch spring.	32	Motor clutch shaft flange.
13	Motor clutch spider plate.	33	Motor clutch shaft spacer and bushing assembly.
14	Motor clutch shaft, front.	34	Motor clutch shaft sleeve.
15	Motor clutch spider end plate.	35	Motor clutch shaft thrust bearing.
16	Motor clutch casing key.	36	Motor clutch shaft collar.
17	Motor clutch casing and keys.	37	Motor clutch shaft rear bearing cap.
18	Motor clutch spider and keys.	38	Universal joint yoke.
19	Motor clutch spider key.	39	Universal joint yoke clamp assembly.
20	Motor clutch casing plate assembly.		

Parts should be ordered by name only, not by number.

faced idler gear that normally is out of engagement, being carried by a swinging yoke below the other gears.

The gear shifter shaft is provided with locks which determine the correct engagement of the gears for any forward speed.

These locks are spring-controlled plungers, which drop into annular grooves on the gear shifter shaft. In making a gear change, the operator may readily tell when the gears are correctly engaged by the check occurring when these plungers drop into the grooves.

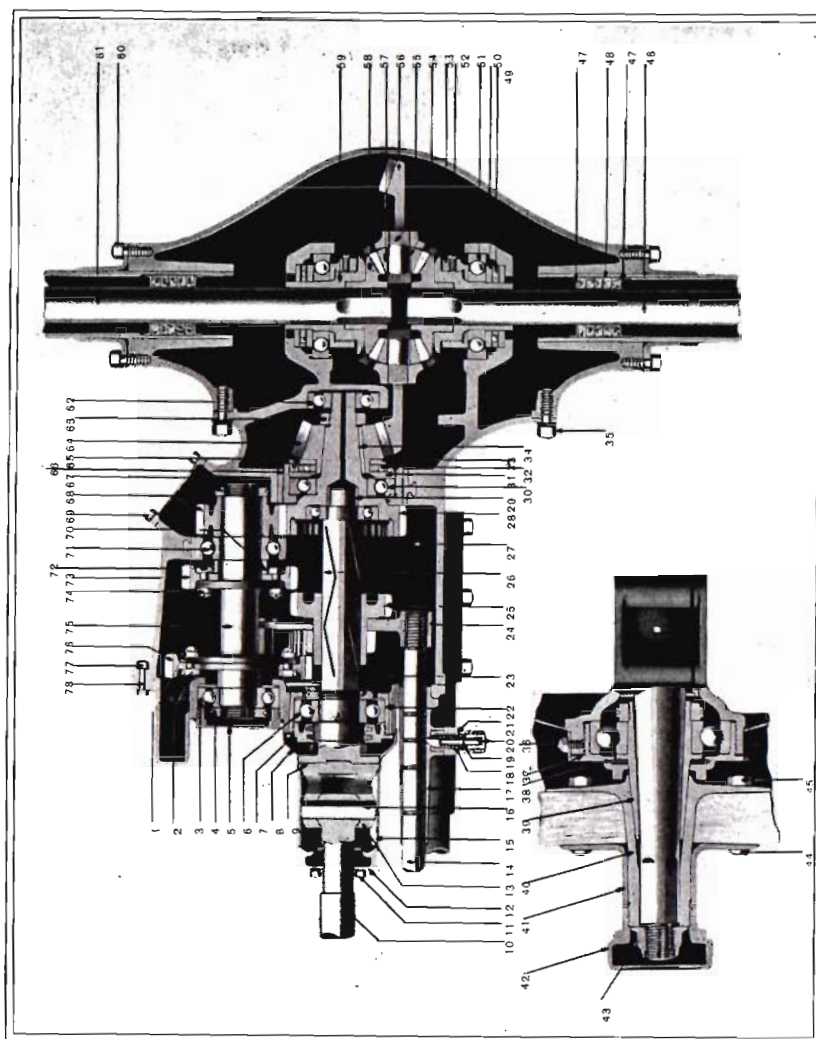


Plate No. 20—Section of Rear Axle and Gear Housing

MOVEMENTS OF CHANGE SPEED LEVER

The three forward speeds and reverse are obtained by different movements of one change speed or gear-shifting hand lever.

The actual operation of making gear changes is described under "General Operation," on pages 11 and 12.

In neutral position, with no gears engaged, the change speed lever is opposite the notch on the inner face of the quadrant.

In first speed position, the hand lever is back of the quadrant slot. In second speed position, the hand lever is ahead of the notch in the side of the quadrant and between the two small positioning stops. These stops assist in bringing the hand lever accurately into second speed position from either direction.

Plate No. 20—Section of Rear Axle and Gear Housing

Reference Number	Name of Part	Reference Number	Name of Part
1	Rear axle transmission first speed gear bolt nut.	36	Rear axle hub bearing retainer key stud.
2	Rear axle transmission first speed gear bolt.	37	Rear axle hub bearing retainer, left.
3	Rear axle transmission countershaft bearing, front.	38	Rear axle hub dust washer.
4	Rear axle transmission countershaft bearing lock nut.	39	Rear axle hub taper bushing, left.
5	Rear axle transmission countershaft front bearing jam nut.	40	Wheel hub, rear.
6	Rear axle transmission driving shaft front bearing.	41	Wheel hub flange, rear.
7	Rear axle transmission driving shaft front bearing jam nut.	42	Wheel hub cap, rear.
8	Universal joint rear dust shield.	43	Rear axle shaft nut.
9	Universal joint frame.	44	Wheel hub bolt, rear.
10	Universal joint shaft end.	45	Wheel hub bolt nut, rear.
11	Universal joint frame end stud nut.	46	Rear axle shaft, left.
12	Universal joint frame end.	47	Rear axle dust washer retainer.
13	Universal joint rear block.	48	Rear axle dust washer.
14	Rear axle transmission gear shifter fork shaft.	49	Rear axle differential thrust bearing ball retainer.
15	Universal joint frame collar.	50	Rear axle differential thrust bearing washer.
16	Universal joint rear block pin.	51	Rear axle differential bearing.
17	Rear axle transmission gear shifter lock.	52	Rear axle differential adjusting nut set screw.
18	Rear axle transmission gear shifter lock spring.	53	Rear axle differential adjusting nut.
19	Rear axle transmission gear shifter lock plunger.	54	Rear axle differential pinion bushing.
20	Rear axle transmission gear shifter lock, spring adjuster.	55	Rear axle differential pinion spider.
21	Rear axle transmission gear shifter lock spring holder.	56	Rear axle differential driving gear.
22	Rear axle transmission driving shaft front bearing sleeve.	57	Rear axle differential pinion.
23	Rear axle transmission driving shaft front bearing lock nut.	58	Rear axle differential gear.
24	Rear axle transmission gear shifter fork.	59	Rear axle differential casing.
25	Rear axle transmission first and second speed pinion.	60	Rear axle tube collar stud nut.
26	Rear axle transmission driving shaft.	61	Rear axle shaft, right.
27	Rear axle transmission case.	62	Rear axle transmission direct drive gear bushing, small.
28	Rear axle transmission direct driving gear.	63	Rear axle driving pinion jam nut.
29	Rear axle transmission direct drive gear bushing.	64	Rear axle driving pinion.
30	Rear axle transmission direct drive gear bearing, large.	65	Rear axle driving pinion bearing jam nut.
31	Rear axle driving pinion thrust bearing washer, large.	66	Rear axle driving pinion bearing sleeve.
32	Rear axle driving pinion thrust bearing ball retainer.	67	Rear axle transmission countershaft bearing lock nut.
33	Rear axle driving pinion thrust bearing washer, small.	68	Rear axle transmission countershaft gear.
34	Rear axle driving pinion key.	69	Rear axle transmission case cone hole cover stud nut.
35	Rear axle case stud nut.	70	Rear axle transmission gear and bearing spacer.
		71	Rear axle transmission countershaft bearing, rear.
		72	Rear axle transmission second speed gear bolt.
		73	Rear axle transmission second speed gear.
		74	Rear axle transmission second speed gear bolt nut.
		75	Rear axle transmission countershaft.
		76	Rear axle transmission first speed gear.
		77	Rear axle transmission case to front end bolt nut.
		78	Rear axle transmission case to front end bolt short.

Parts should be ordered by name only, not by number.

In third speed, or direct drive, position, the hand lever is at the forward end of the quadrant slot.

For reverse drive, the hand lever is brought into neutral position, the reverse button is released and then the lever is carried laterally into the notch on the inner face of the quadrant.

CLEANING AND OILING TRANSMISSION

Complete directions for draining, cleaning and oiling the transmission and differential gear cases are given in the "Schedule of Lubrication," beginning on page 13.

EQUALIZING TRACTION

Tires of the same diameter should always be used on the rear wheels; also tire chains and special treads should always be used in pairs.

Any variation in the diameter of the rear tires or in the traction of the wheels cause the differential to work whenever the car is in motion. The result is considerable loss of power and unnecessary wear of the differential parts.

In an emergency it is better to run with tires of a different size on the front wheels than on the rear. Thus use two 36 by 4½-inch tires on rear wheels with one 36 by 4½ and one 37 by 5-inch tire on front wheels in preference to having tires of unequal size on the rear wheels.

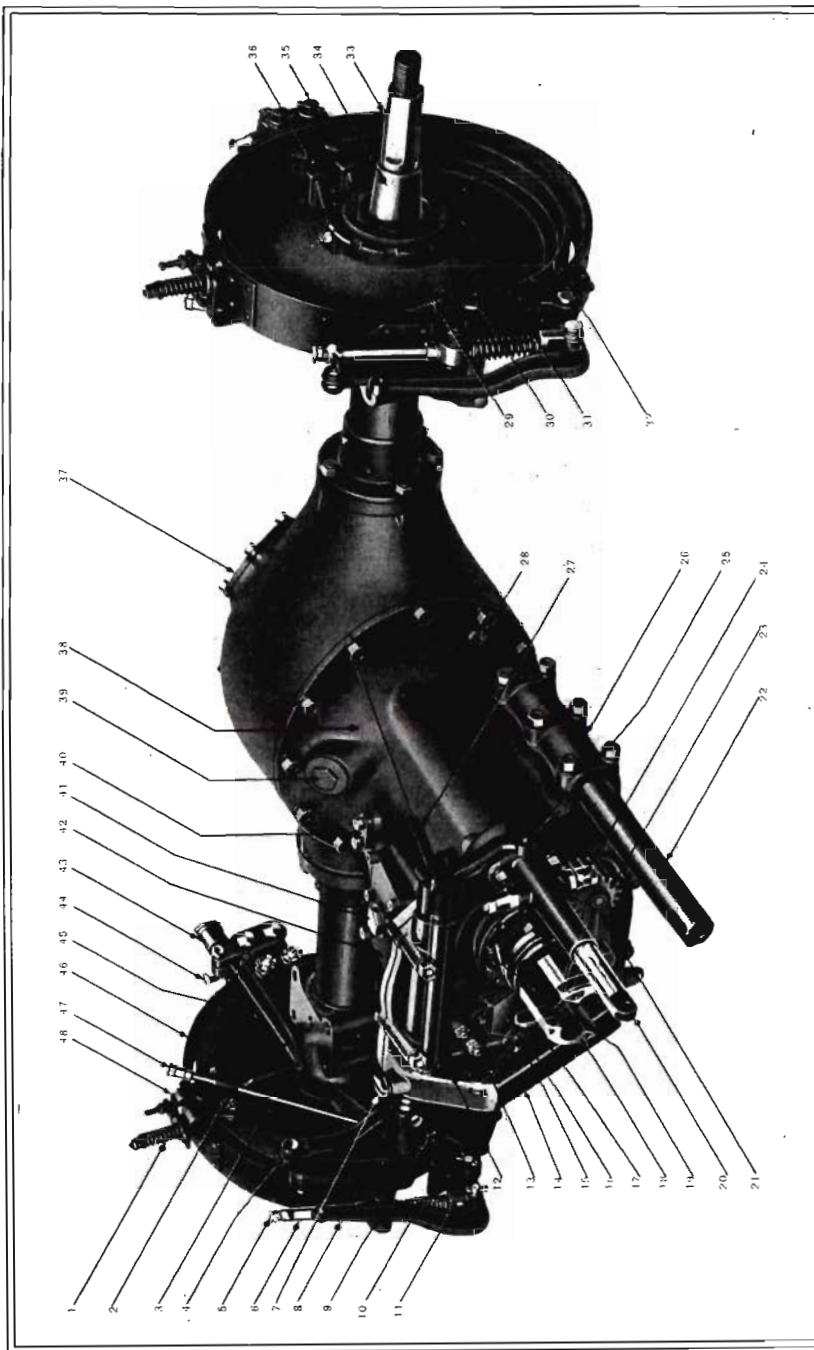


Plate No. 21—Bridge Assembly, Exterior

Plate No. 21—Bridge Assembly, Exterior

Reference Number	Name of Part	Reference Number	Name of Part
1	Foot brake band retracting spring, upper.	24	Rear axle transmission gear shifter lock spring holder.
2	Hand brake cam oiler tube clip, right.	25	Rear axle transmission reversing toggle lever, outside.
3	Hand brake cam oiler tube.	26	Rear axle torque arm cap.
4	Hand brake cam lever.	27	Rear axle transmission reversing toggle lever spring.
5	Foot brake band adjusting handle oiler.	28	Rear axle transmission case oil level hole plug.
6	Foot brake band adjusting handle.	29	Hand brake expanding ring spring.
7	Transmission case front end plug, upper.	30	Hand brake cam, left.
8	Foot brake band lever, right.	31	Rear axle hub bearing retainer, left.
9	Foot brake band guard, right.	32	Hand brake expanding ring, left.
10	Foot brake band adjusting spring.	33	Rear axle shaft, left.
11	Foot brake band lever clevis.	34	Rear axle hub taper bushing, left.
12	Rear axle transmission reversing toggle lever, inside.	35	Foot brake band guide support stud.
13	Rear axle transmission reversing toggle link, threaded.	36	Hand brake expanding ring, right.
14	Rear axle transmission case, front end.	37	Rear axle case hand hole cover.
15	Rear axle transmission countershaft front bearing jam nut.	38	Rear axle transmission case.
16	Rear axle transmission reversing toggle link tapped.	39	Rear axle oil hole plug, large.
17	Rear axle transmission reversing toggle link.	40	Rear axle driving pinion bearing sleeve lock.
18	Universal joint frame.	41	Rear axle oil hole plug, small.
19	Rear axle transmission driving shaft front bearing jam nut.	42	Rear axle transmission case hand hole cover.
20	Rear axle transmission gear shifter fork shaft.	43	Foot brake band support grease cup.
21	Rear axle transmission reversing yoke.	44	Foot brake band oiler.
22	Rear axle torque arm.	45	Foot brake band support grease cup tube.
23	Rear axle transmission reversing pinion.	46	Foot brake band assembly, right.
		47	Hand brake cam oiler.
		48	Foot brake band support plate, right.

Parts should be ordered by name only, not by number.

RUNNING GEAR FEATURES

FOOT AND HAND BRAKES

There is an external contracting hand brake and an internal expanding brake on each wheel. The external or service brakes are operated by the right pedal. The internal or emergency brakes are operated by the hand lever. See illustration on page 56.

Each external brake consists of one continuous band, lined with a special friction material. It is contracted on the brake drum when the pedal is depressed.

The brake band lining should not be permitted to become extremely dry. When necessary, lubricate it by carefully oiling around the outside edge of the brake drum. An excess of oil will cause the brakes to slip.

Each internal brake consists of two metal brake shoes, or segments. One end of each of these shoes is hinged and between the free ends is a cam which is operated by the hand lever. When the hand lever is pulled backward the cam is turned and the brake shoes are separated to bear upon the inner surface of the brake drum.

USING THE BRAKES

Apply the brakes gradually.

When stopping the car or slowing it for rounding corners, reduce the speed as much as possible by closing the throttle, disengage the clutch and then apply the brakes. Do not unnecessarily apply the brakes harshly upon a swiftly moving car.

If the brakes are in good condition, and properly adjusted either the foot or the hand brakes are sufficient to slide the wheels.

When descending very steep hills, assist the brakes by shifting the gears into second speed, engaging the clutch, closing the throttle and allowing the motor to run with the spark slightly advanced.

BRAKE ADJUSTMENT

It is important that the brakes be evenly adjusted, so that when either set is applied, there is the same resistance on each rear wheel.

The equality of adjustment may be determined by noting whether or not the wheels begin to slide at the same time when each set of brakes is forcibly applied.

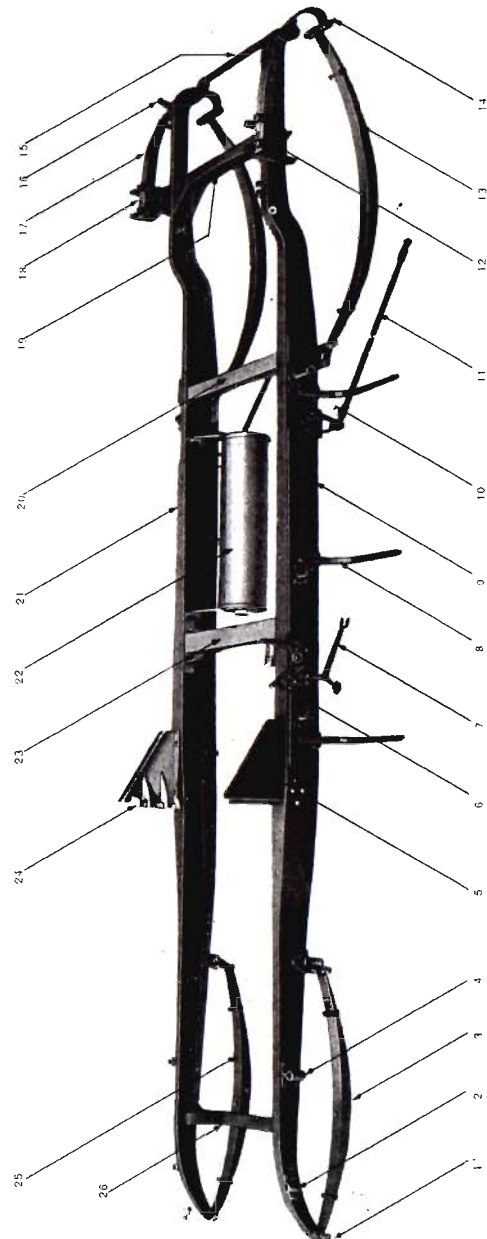


Plate No. 22—Frame Assembly

Plate No. 22—Frame Assembly

Reference Number	Name of Part	Reference Number	Name of Part
1	Front axle spring bolt grease cup cap.	14	Rear axle spring bolt grease cup cap.
2	Headlight bracket, socket, left.	15	Frame, rear end, cross tube.
3	Front axle spring, left.	16	Trunk rack to frame bracket, right.
4	Front fender socket, left.	17	Rear axle spring, upper quarter.
5	Toe board bracket, left.	18	Rear axle spring, upper quarter, plate.
6	Change speed lever sector bracket.	19	Frame, rear end.
7	Change speed reversing bell crank.	20	Frame, rear channel.
8	Running board bracket.	21	Frame, side, right.
9	Frame side, left.	22	Exhaust muffler assembly.
10	Rear axle brace oiler.	23	Frame, front channel.
11	Rear axle brace assembly, left.	24	Toe board bracket, right.
12	Rear axle spring, upper quarter, clip.	25	Front axle spring, right.
13	Rear axle spring, lower half.	26	Frame, front end.

Parts should be ordered by name only, not by number.

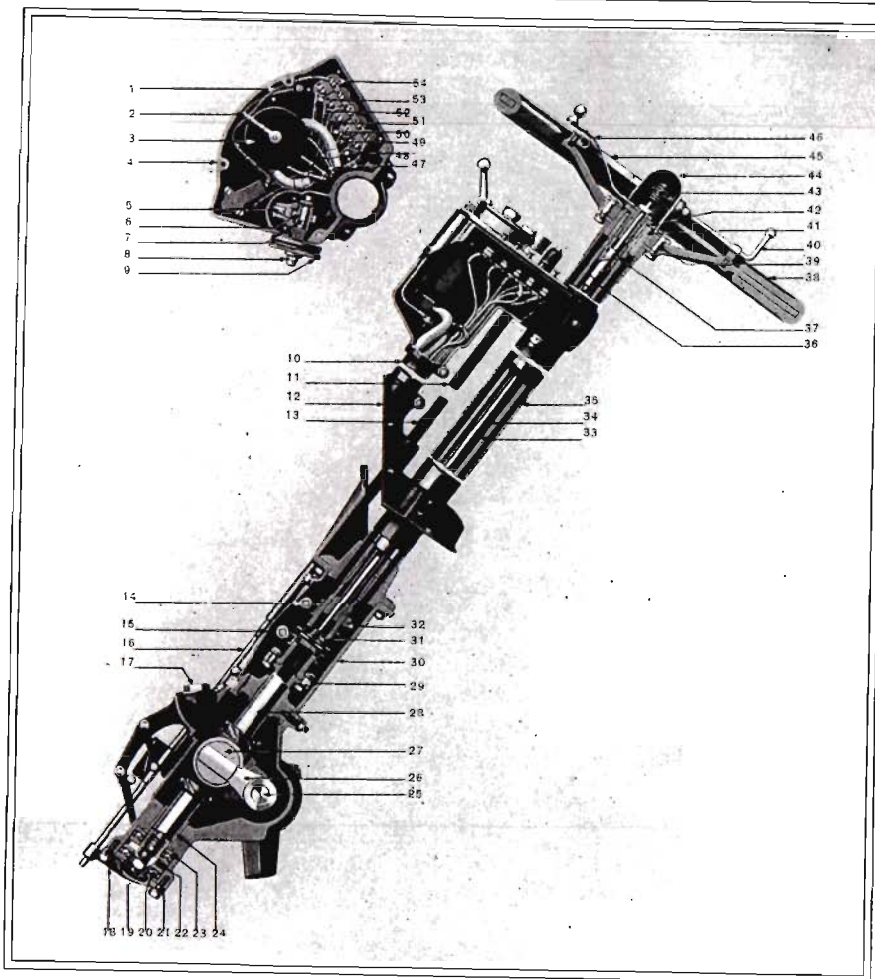


Plate No. 23—Steering Gear Parts

Adjust the foot brakes by means of the "T" or adjusting handle (See diagram, page 56), which operates the adjusting screw, between the brake band actuating bell crank and the brake band end.

It is not desirable to adjust the brakes by means of the connecting rods or brake pedal connections, except to get the proper action of the pedal after the brakes themselves have been adjusted.

Adjust the hand brakes by disconnecting the front end of the rear brake connecting rod on each side and turning up each clevis the necessary amount.
Keep all brakes as tight as possible without dragging.

When the rear of the car is jacked up, the rear wheels should turn easily with brakes released.

THE STEERING GEAR

The steering gear is of the worm and nut type.

Adjustments are required only at extremely long intervals and should, if possible, be made in a Packard dealer's mechanical department.

The exterior steering connections should be frequently inspected, adjusted to prevent looseness and properly lubricated.

See "Schedule of Lubrication," beginning on page 13.

SPRING CLIPS

Keep the spring clips tight.

The object of the spring clips is not only to hold the springs firmly to the axles, but also to prevent movement of the spring leaves between the clips. Preventing this movement minimizes the chance of breakage.

Breakage of spring at the middle is almost invariably caused by loose spring clips.

When the car is new the spring clips should be examined and tightened every day until the stretch of the metal has been taken up. After this, the clips need not be examined oftener than once a week.

In case of breakage of a spring, the rebound spring clips used to keep the spring leaves from separating on the rebound, should be turned in to the dealer with the broken spring.

The rebound spring-clip, which is dated, is needed by the dealer should the spring be returned to the factory for credit inspection.

Plate No. 23—Steering Gear Parts

Reference Number	Name of Part	Reference Number	Name of Parts
1	Switchboard starting switch contact to lighting bus-bar cable assembly.	28	Steering worm and nut assembly.
2	Switchboard ignition coil terminal No. 6 to ground cable assembly.	29	Steering worm frame bolt.
3	Switchboard ignition coil.	30	Steering gear case.
4	Switchboard.	31	Steering post spark control rack shaft, lower end.
5	Switchboard carburetor air control rack pawl.	32	Steering post spark and throttle sleeve.
6	Switchboard carburetor air control rack gear.	33	Steering post.
7	Switchboard carburetor air control hand wheel shaft.	34	Steering post spark control rack shaft.
8	Switchboard carburetor air control hand wheel shaft acorn nut.	35	Steering pillar tube.
9	Switchboard carburetor air control hand wheel shaft.	36	Steering post throttling shaft assembly.
10	Switchboard cable conduit.	37	Steering post throttling screw nut.
11	Switchboard carburetor air control rod assembly.	38	Steering wheel assembly.
12	Steering post carburetor air control to dash bracket.	39	Steering wheel spider bolt.
13	Switchboard carburetor air control to rod sleeve.	40	Steering post spark adjusting lever.
14	Steering post spark and throttle yoke.	41	Steering wheel spider hub.
15	Steering gear case top cover, large.	42	Steering post upper end nut.
16	Switchboard carburetor air control rod extension.	43	Steering post spark adjusting rack.
17	Steering post carburetor air control lever bracket plug.	44	Steering post spark adjusting gear case.
18	Steering gear case cover, bottom.	45	Steering post throttling sector.
19	Steering worm thrust bearing washer, large.	46	Steering post throttling sector lever assembly.
20	Steering worm thrust bearing.	47	Switchboard lighting switch bus to generator terminal, No. 4 cable.
21	Steering gear case bottom cover stud.	48	Switchboard license lamp switch to dash wiring moulding, gauge light terminal cable.
22	Steering worm thrust collar.	49	Switchboard tail lamp switch to generator junction box terminal, No. 6 cable.
23	Steering worm thrust bearing washer, small.	50	Switchboard side lamp switch to dash wiring moulding terminal cable.
24	Steering worm front bearing.	51	Switchboard electric signal button to lighting bus cable.
25	Steering yoke shaft.	52	Switchboard headlight switch to generator junction box cable.
26	Steering yoke.	53	Switchboard speedometer switch to dash wiring moulding terminal cable.
27	Steering yoke trunnion block.	54	Switchboard lighting switch.

Parts should be ordered by name only, not by number.

SHOCK ABSORBERS AND THEIR ADJUSTMENT

Shock absorbers supplement both the front and rear springs of the car, these being attached between the axles and the frame by rigid, permanent brackets.

Before being applied, the shock absorbers are adjusted to provide the correct frictional resistance when the indicator is at zero on the adjusting dial. The nut is then turned to the right to whatever number indicates the proper final adjustment for each, according to the following table:

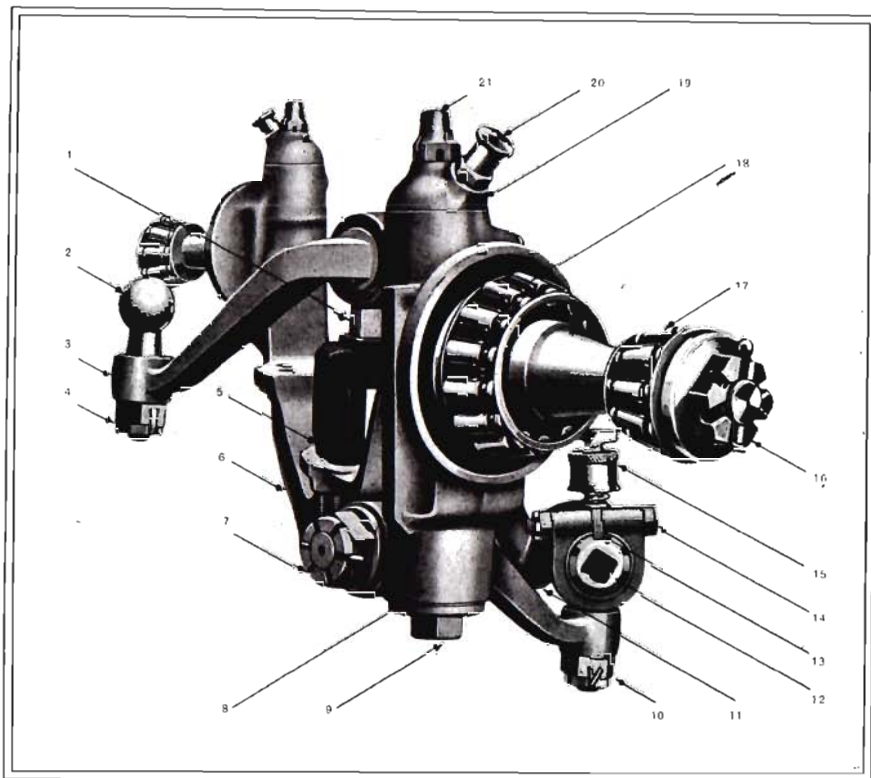


Plate No. 24—Front Axle Parts

Reference Number	Name of Part	Reference Number	Name of Part
1	Front axle spring rubber bumper.	12	Steering cross tube ball socket, outer.
2	Steering knuckle lever, upper, left ball joint.	13	Steering cross tube ball socket, outer, lock plate.
3	Steering knuckle lever, upper, left.	14	Steering cross tube ball casing sleeve bolt.
4	Steering knuckle lever, left, ball joint nut.	15	Steering cross tube ball joint grease cup.
5	Front axle spring clip and rubber bumper retainer.	16	Steering knuckle adjusting nut, left.
6	Front axle.	17	Steering knuckle bearing cone and rollers, out-board.
7	Steering knuckle lever nut.	18	Steering knuckle bearing cone and rollers, in-board.
8	Steering knuckle, left.	19	Steering knuckle cap.
9	Steering knuckle bolt.	20	Steering knuckle bolt oiler.
10	Steering cross tube ball joint nut.	21	Steering knuckle bolt nut.
11	Steering cross tube assembly.		

Parts should be ordered by name only, not by number.

Car	Front	Rear
The New "48" Touring Car, Cabriolet	2	3
The New "48" Phaeton or Phaeton-Runabout	2	3
The New "48" Runabout, Coupe	2	3
The New "48" Limousine or Landaulet	3	5

Wear may necessitate occasional tightening of the adjusting nut past these normal limits.

Special conditions of either city or country driving may warrant somewhat lighter or heavier adjustment.

If extreme wear necessitates replacement of the frictional washers, the shock absorbers must be set to give the normal resistance at zero before being finally adjusted to the above normal degrees for different cars.

The original adjustment preferably should be made by a Packard dealer, but full directions may be obtained from the Technical Department of the Packard Motor Car Company.

COLD WEATHER PROCEDURE

STOPPING THE MOTOR

Before stopping the motor, after any run, almost close the throttle to reduce the speed of the motor and then turn the auxiliary air valve hand wheel, on the control board, clear over to "Gas."

This produces a mixture that is too rich to ignite when the motor is warm and causes the motor to stop, after which the ignition switch should be turned to off position.

Be sure to turn hand wheel back to center when car is left standing—this reduces the tension and will not set the springs on the auxiliary air valve.

PRIMING THE MOTOR

When starting the motor in cold weather it is best to use the acetylene priming device on the dash. For directions, see page 50.

AIR INTAKE SHUTTER

Before starting in cold weather, turn the auxiliary air valve hand wheel clear over to "Choke."

This closes a shutter in the primary intake of the carburetor. When it is shut, mixture drawn from the carburetor will be rich.

After the motor is started, reopen the air intake.

CARBURETOR AIR SHUTTER

In cold weather the adjustable sleeve on the primary air intake pipe should be entirely closed so as to provide only warm air to the carburetor from the primary intake.

RICH MIXTURE FOR STARTING

The above procedure assists starting because a rich mixture is needed in cold weather, as cold air and a cold motor combined make it impossible to obtain an easily ignitable mixture by ordinary procedure.

Ordinarily, if these precautions are taken, there will be no trouble in starting the motor in cold weather.

AUXILIARY AIR VALVE ADJUSTMENT

After the motor has been running for a few minutes, turn the auxiliary air valve hand wheel, on the control board, gradually toward "Air."

Even after the motor is started a richer mixture is required while it is still cold than after it has become warm by running.

COLD WEATHER HINTS

- Do not flood or prime the carburetor.
- Do not start with the throttle wide open.
- Do not crank the motor with the auxiliary air valve hand wheel turned to "Air."
- Do not allow the motor to run on the battery with the spark retarded.

DRAINING WATER SYSTEM

If the car is not to be used during freezing weather, the water circulation system should be thoroughly drained.

The method of draining the water system is given on page 45.

WATER IN GASOLINE LINE

In cold weather, moisture is liable to condense on the inside of the gasoline tank and give trouble by freezing in the gasoline pipe or carburetor. To avoid this trouble, drain the gasoline system several times at the beginning of cold weather.

Directions for draining gasoline system are on page 17.

WATER IN OIL

At frequent intervals the crank case should be drained to be sure no water is present. If this is not done the oil pump screen will become frozen and inoperative, thus preventing oil circulation.

ANTI-FREEZING MIXTURE

During freezing weather, fill the water circulation system with one of the following anti-freezing solutions:

For a temperature not lower than five degrees below zero:

Alcohol.....	15 per cent
Glycerine.....	15 per cent
Water.....	70 per cent

For a temperature not lower than fifteen degrees below zero:

Alcohol.....	17 per cent
Glycerine.....	17 per cent
Water.....	66 per cent

About six gallons of solution are required for a Packard "48" car. Alcohol should be added occasionally to make up for evaporation. The glycerine does not evaporate with the water.

The above solution has been found to be entirely practical and is the best for several reasons. A simple solution of alcohol, while it is not injurious in any way, lowers the boiling point of the water. Consequently, on warm days, with the car standing and the motor running, the solution will tend to boil easily and evaporate. The boiling point of denatured alcohol is about 10 degrees higher than that of wood alcohol.

The use of glycerine raises the boiling point of the solution. It is more expensive than alcohol and is slightly injurious to rubber. All things considered, a combination solution of alcohol and glycerine in water is the most satisfactory.

Do not use a solution of calcium chloride or any alkaline solution, these being injurious to the metal parts.

COLD WEATHER LUBRICATION

As recommended in the "Schedule of Lubrication," beginning on page 13, use cylinder oil during cold weather, instead of the heavier transmission oil, in the front universal joint housing, in the transmission gear case and in the differential housing.

GENERAL FEATURES

WASHING THE CAR

Extreme care should be used in washing the car, especially during the first few months that it is in use.

Varnish requires some time to season thoroughly, and while seasoning, is easily affected. Gasoline or soaps that are injurious to varnish never should be used.

Soap should never be used for washing a car, except for removing grease, and then only the purest are recommended. Use only with plenty of water and rinse the body thoroughly with luke-warm water. Never use extremely hot or cold water for washing the body.

Mud, water, grease or oil should not be allowed to remain on a car longer than it is possible to avoid. This is particularly true of a new car on which the finish may not be thoroughly seasoned.

Soak mud off with plenty of water instead of rubbing it off.

For drying the car after washing, use a clean chamois skin.

It is better to remove heavily accumulated dust by washing rather than by dusting. For ordinary light dusting, a woolen duster is preferable to one made of feathers.

After washing be sure that no water remains in the radiator air spaces.

This precaution avoids the chance of the magneto becoming wet, short-circuited and temporarily inoperative.

CARE OF TOPS

Dust on the outside of Packard standard tops should be removed with a dry or when necessary, a moist cloth. Grease or stains may be removed with a sponge and soap suds.

Use plenty of clean water to remove all traces of soap.

The inside or cloth side should be dusted with a whisk broom or stiff brush. Remove stains with soap and water, but use a brush instead of a sponge.

The cloth side should be treated more carefully than the outside. Impure water or soap may change the color of the lining and make it necessary to go over the entire lining in order to obtain a uniform color.

Carriage dressings and gasoline are generally injurious for either the inside or outside, as they may kill the luster and cause the material to harden.

Packard Standard seat covers may be cleaned in the same way as the lining of Packard Standard tops.

Seat covers may not be dry-cleaned because the interlining gum prevents the passage of the cleaning vapors.

Tops should never be folded or inserted in envelopes while moist, lest the lining mildew and rot.

Do not pull the top straps too tight when the top is raised.

If these straps are drawn too tight their pull may cause the body doors to bind with possible injury to the door moulding.

CARE OF STORED BODY

The body should be stored in a dry place with a subdued even light from all sides.

Varnish on a black ground always has a slight greenish tint. Continue absence of light, as when a body is stored in a dark place or left crated, increases the greenish cast.

Washing the stored body at least twice a month will reduce the change in the color of the varnish.

Varnish that has turned green from storage in a dark place will resume its natural shade after lengthy exposure to the light.

ENAMEL POLISH

A good polish for enameled parts of car may be made of the following:

One pound of washing soda crystals to one pail, or $2\frac{1}{2}$ gallons of water. This should be used as hot as can be comfortably borne on the hand and very briskly applied with a soft rag. Then polish with canton flannel.

SEAT CUSHION AIR VENTS

There is an air vent in the bottom of each seat cushion.

If a rubber apron or anything of a similar nature is carried under the cushion and directly in contact with it, the air vent may be closed, with the result that the cushion will not afford the proper degree of comfort.

NICKEL POLISH

A good rouge, such as a good silver polish, is the best for removing the tarnish from nickel.

Nickel trimmings may be prevented from tarnishing by frequently rubbing the surface with an oily rag. This will keep them bright without polishing.

Do not use brass polish on nickel as the abrasive ingredients scratch the surface.

TOURING INFORMATION

Packard
MOTOR CARS



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AMERICAN TOURING INTERSTATE REGULATIONS

General lighting requirements, two white front lights and one red rear light showing white on license tag.

License	Position of Tags	Speed Limits
ALABAMA Home State License secures same privileges as granted by Home State to non-resident tourists.	Rear	"A reasonable and proper speed" Never over.....30 miles
ARIZONA No State laws; local restrictions.		
ARKANSAS Home State license accepted.	Front and rear	Closely built up sections of cities, towns and villages...15 miles All other places.....20 "
CALIFORNIA Home State license accepted for both car and chauffeur.	Rear	Traversing bridge, dam, sharp curve or steep descent.....4 miles Closely built up sections of cities, towns and villages...10 " Sections not closely built up...15 " Open highway.....20 "
COLORADO No State laws; local restrictions.		
CONNECTICUT Home State license accepted.	Front and rear	When approaching street cars or other public conveyances that have stopped or about to stop.....3 miles Street intersections, turning corners, bridges.....10 miles All other places.....25 "
DELAWARE Home State license accepted, provided Home State gives same privileges.	Front and rear	Street intersections, curves, descents.....6 miles Closely built up sections of cities, towns and villages...12 " All other portions of public highway.....20 miles

License	Position of Tags	Speed Limits
DISTRICT OF COLUMBIA Home State license accepted, provided Home State gives same privileges.	Rear	Crossings.....8 miles Fire limits and meeting vehicles.....12 " Parks.....15 " Outside fire limits.....20 "
FLORIDA Home State license good for 30 days.	Rear	Curves, intersections of roads.....4 miles All other portions of public highway, a reasonable speed.
GEORGIA Home State license good for 30 days.	Rear	Bridges, curves, intersecting highways.....6 miles All other places, reasonable and proper speed.
IDAHO No State laws; local restrictions.		
ILLINOIS Home State license accepted.	Front and rear	Business districts of towns and cities.....10 miles Residence districts of towns and cities.....15 " Open highway.....20 "
INDIANA Home State license accepted.	Front and rear	Closely built up districts of cities, towns and villages...8 miles Districts not closely built up...15 " Open highway (average)....20 "
IOWA Home State license accepted, provided Home State gives same privileges.	Front and rear	Careful and prudent not to exceed.....25 miles Local restrictions.
KANSAS No State laws; local restrictions.		
KENTUCKY Home State license accepted.	Front and rear	Bridges, curves, descents...6 miles Built up districts.....10 " Elsewhere.....20 " Intersections, curves, approaching horses.....8 miles Business sections.....10 " Residence sections.....15 " Open highway.....20 "

License	Position of Tags	Speed Limits
LOUISIANA No State laws; local restriction.		
MAINE Home State license accepted.	Front and rear	Closely built up sections of cities, towns and villages... 8 miles Sections not closely built up... 15 " Open country... 25 " Some towns have special restrictions.
MARYLAND Maryland tag obtainable without cost from Commissioner of Motor Vehicles, provided Home State grants same privileges. Tag good for two periods of seven consecutive days each calendar year. Virginia, West Virginia, New York, Pennsylvania and Delaware license tags accepted in lieu of Maryland tag.	Rear	Closely built up sections of cities, towns and villages... 12 miles Sections not closely built up... 18 " Open highway... 25 "
MASSACHUSETTS Home State license for both car and chauffeur. Good for 10 consecutive days in any one calendar year, provided Home State grants same privileges.	Front and rear	Closely built up sections of cities, towns and villages... 15 miles Intersecting way or turning corner... 8 " Open highway... 20 "
MICHIGAN Home State license for both car and chauffeur, provided Home State grants same privileges.	Front and rear	Business districts of cities, towns and villages or passing horses in open highway... 10 miles Residence districts of cities, towns and villages... 15 " Elsewhere... 25 "

License	Position of Tags	Speed Limits
MINNESOTA Home State license accepted for a period of 30 days.	Front and rear	Bridges, curves, street intersections... 6 miles Business districts and closely built up sections of cities, towns and villages... 10 " Residence sections of cities, towns and villages... 15 " Elsewhere... 25 "
MISSISSIPPI No State laws.		
MISSOURI Home State license for both car and chauffeur good for 20 days.	Rear	Cities and open highway... 25 miles
MONTANA No provision.	No provision.	In cities... 8 miles Elsewhere... 20 "
NEBRASKA Home State license accepted.	Rear	Closely built up sections... 10 miles Not closely built up... 15 " Open highway... 20 "
NEVADA No State laws; local restrictions.		
NEW HAMPSHIRE Home State license for both car and operator good for 10 days.	Front and rear	Curves, intersections of ways... 10 miles Closely built up sections of cities, towns and villages... 15 " Elsewhere... 25 "
NEW JERSEY N. J. license necessary. \$3.00, 10 H. P. or less; \$5.00, 11 H. P. to 29 H. P.; \$10.00, 30 H. P. or more. Special license good for 8 days, license fee \$1.00.	Front and rear	Closely built up sections of cities, towns and villages... 12 miles Intersecting streets or turning corners... 8½ " Elsewhere... 25 " Bill pending to recognize Home State license.
NEW MEXICO No State laws.		

License	Position of Tags	Speed Limits
NEW YORK		
Home State license for both car and chauffeur, provided Home State grants same privileges.	Front and rear	Approaching street cars which have stopped or are about to stop to allow passengers to alight, or embark, slow down or stop. Cities, towns and villages... 15 miles Open highway... 30 "
NORTH CAROLINA		
Home State license accepted.	Front and rear	Bridges, curves, intersecting highways... 5 miles Closely built up sections of cities, towns and villages... 8 " Not closely built up sections... 12 " Open highway... 25 " Slow down to 8 miles on meeting horses.
NORTH DAKOTA		
Home State license accepted.	Rear	Curves, descents or intersecting highways... 7½ miles Cities, towns and villages... 10 " Open highway... 25 "
OHIO		
Home State license for both car and chauffeur.	Front and rear	Closely built up sections of cities, towns and villages... 8 miles Sections not closely built up... 15 " Elsewhere... 20 "
OKLAHOMA		
License necessary.	No provision.	Local restrictions.
OREGON		
Home State license good for 10 days, provided Home State gives same privileges.	Front and rear	Approaching horse-drawn vehicle on highway... 8 miles Elsewhere... 25 "
PENNSYLVANIA		
Home State license good for 10 days, provided Home State gives same privileges.	Front and rear	Closely built up sections of cities, towns and villages where there is a sign "Danger: run slow."... 12 miles Elsewhere... 24 " Must not pass street car when same is stopped to allow passengers to get on or off.
RHODE ISLAND		
Home State license good for 20 days.	Front and rear	Closely built up sections of cities, towns and villages... 15 miles Elsewhere... 25 "

License	Position of Tags	Speed Limits
SOUTH CAROLINA		
No provision.	No provision	At crossings or street intersections... 6 miles Elsewhere... 15 "
SOUTH DAKOTA		
Home State license accepted.	Rear	Closely built up sections of cities, towns and villages... 10 miles Sections not closely built up... 15 " Open highway... 20 "
TENNESSEE		
Home State license good for not more than two weeks in any one place in State.	Front and rear	Open highway... 20 miles Local restrictions in cities, towns and villages.
TEXAS		
No provision.		Closely built up sections of cities and towns... 8 miles Elsewhere... 18 "
UTAH		
Home State license accepted.	Rear	Bridges, intersecting highways... 6 miles Closely built up sections of cities, towns and villages... 10 " Sections not closely built up... 15 " Elsewhere... 20 "
VERMONT		
Home State license for both car and operator, providing Home State gives same privileges.	Front and rear	Cities, towns and villages, and crossing bridges... 10 miles Elsewhere... 25 "
VIRGINIA		
Home State license good for two periods of seven consecutive days in each calendar year.	Rear	Curves and road intersections... 8 miles Closely built up sections of cities, towns and villages... 12 " Elsewhere... 20 "
WASHINGTON		
Home State license accepted.	Rear	Street intersections... 4 miles Closely built up districts of cities, towns and villages... 12 " Elsewhere... 24 "

License	Position of Tags	Speed Limits
WEST VIRGINIA Home State license accepted, provided Home State grants same privileges.	Front and rear	Bridge, dam, intersecting highway..... 5 miles Closely built up sections of cities, towns and villages... 10 " Sections not closely built up... 15 " Open highway..... 20 "
WISCONSIN Home State license accepted.	Rear	Cities, towns and villages... 12 " Elsewhere..... 25 "
WYOMING No State laws; local restrictions.		

CANADIAN REGULATIONS

Upon entering the Dominion, the owner or operator of a car must give a bond for the re-exportation of the car. The bond is good for one year, is procurable through a customs broker and costs \$5.00.

License	Position of Tags	Speed Limits
ALBERTA Home State license good for 20 days only.	Front and rear	Corporate limits of city, town or village..... 10 miles Open highway..... 20 "
BRITISH COLUMBIA Tourists, who are to be in the province 30 days or less, must register with the Supt. of Provincial Police before car is used.	Rear	Within corporate limits of any city, town or village... 10 miles Open highway..... 25 " Wooded sections..... 12 "
MANITOBA Home State of Province license accepted for 30 days.	Front and rear both rigid.	Bridge, dam, culvert, descent, street intersection... 6 miles Closely built up sections of cities, towns and villages... 10 " Not closely built up sections... 20 " Open highway, no provision... 15 " Residence sections..... 15 "

License	Position of Tags	Speed Limits
NEW BRUNSWICK Home State or Province license accepted.	Rear	Closely built up sections of cities, towns and villages... 7½ miles Sections not closely built up... 12 " Open highway..... 15 "
NOVA SCOTIA Home State or Province license accepted.	Rear	Crossing bridges..... 4 miles Cities and incorporated towns..... 12 " Open highway..... 20 "
ONTARIO Ontario license, cost \$4.00.	Front and rear (Ontario tags ONLY)	Passing street car which is stopped to allow passengers to alight or embark... 4 miles Corporate limits of any city, town or village..... 10 " Outside of cities, towns and villages..... 15 "
QUEBEC Home State or Province license accepted provided Home State or Province grants same privileges.	Front and rear	Road intersections, curves and descents..... 4 miles Cities, towns and villages... 9 " Elsewhere..... 15 "
SASKATCHEWAN Saskatchewan license, cost \$10.00.	Rear	Cities, towns and villages... 10 miles Open highway..... 20 "

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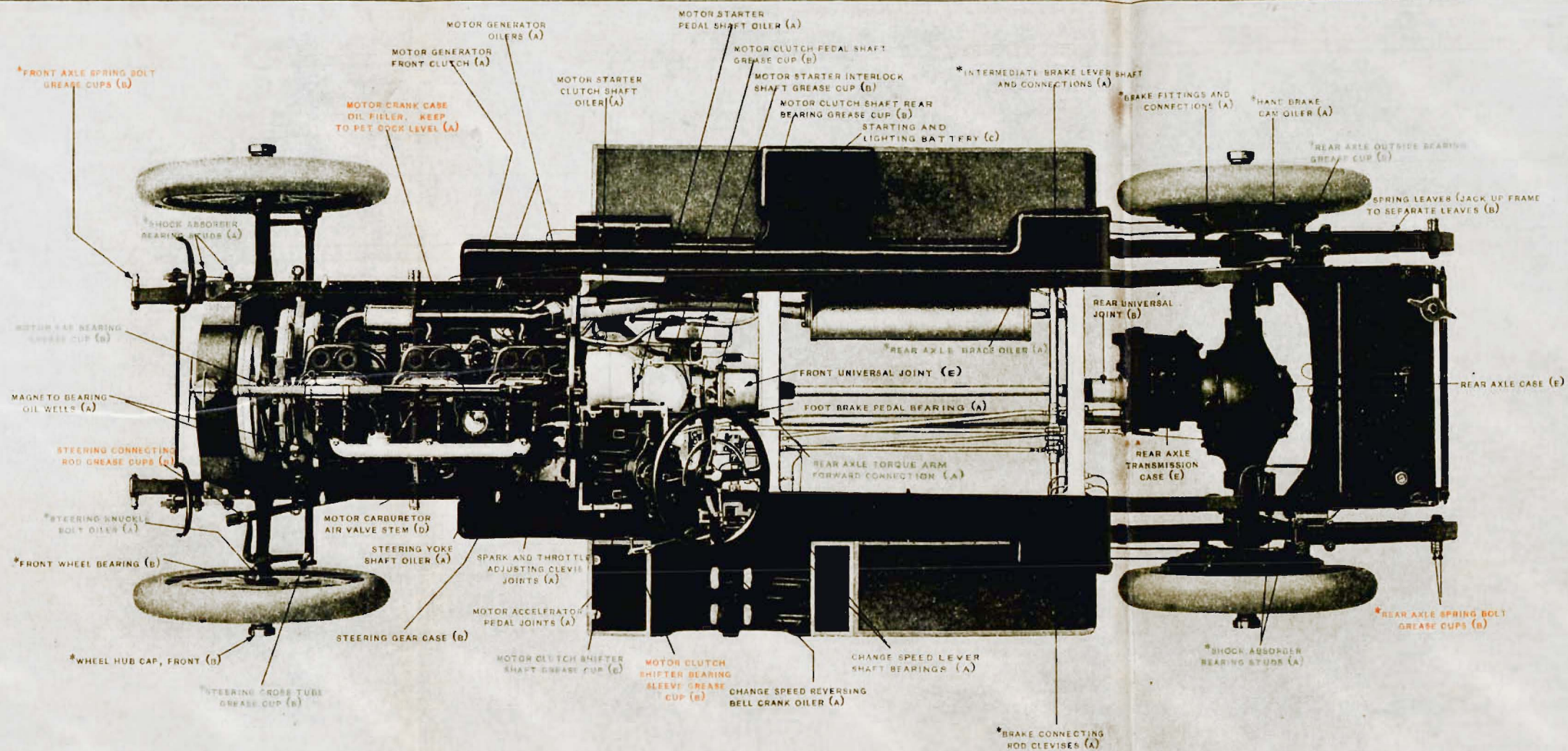
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A CYLINDER OIL
 B GRAPHITE GREASE
 C DISTILLED WATER
 D GASOLINE
 E TRANSMISSION OIL

RED . . . OIL DAILY OR EVERY 150 MILES
 GREEN . . OIL WEEKLY OR EVERY 300 MILES
 BLUE . . . OIL TWICE A MONTH OR EVERY 500 MILES
 BLACK . . OIL MONTHLY OR EVERY 1000 MILES

* BOTH THE PART THUS INDICATED AND THE CORRESPONDING PART ON THE OPPOSITE SIDE OF THE CAR SHOULD BE OILED.