

1940  
**PACKARD**

**One-Ten and One-Twenty**

Models 1800 and 1801



**OWNER'S MANUAL**

**DRIVING, CARE, ADJUSTMENT  
AND EMERGENCY DATA**



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FOR 1800 CARS BEGINNING ENGINE No. C-1501  
FOR 1801 CARS BEGINNING ENGINE No. C-300,001

# Service Policy

## by Distributors and Dealers

It is intended that every owner of a Packard motor car shall receive fair and satisfactory treatment. Should any owner not receive it, we will appreciate being advised.

The original purchaser of a new Packard car will be entitled to the following:

**1. Parts and Labor:** For 90 days after the original delivery of such motor car to the owner, provided the car has not been driven to exceed 4,000 miles, any parts, including all standard equipment, except tires, that may be adjudged by Packard Motor Car Company to be defective under its warranty will be replaced or repaired by any Packard dealer or distributor in the United States and Canada without charge to the owner for material or labor.

**2. Adjustment:** The owner is entitled during this period to receive inspections and adjustments of his new car, by the selling Packard dealer or distributor as indicated on the coupons attached to the Owner's Service card, provided such adjustments are not made necessary by accident, neglect or misuse.

**3. Inspections:** Throughout the life of the car, the owner is entitled to have it tested and inspected without charge every 30 days or 1,000 miles by an authorized Packard Service Station, provided such inspection requires no removal or dismantling of parts or units.

**4. Owner's Service Card:** At the time of delivery, the owner is provided with an Owner's Service Card which will introduce him to any authorized Packard Service Station and entitle him to receive service in accordance with this policy. The owner should carry the card with him at all times so he can present it when necessary.

**5. Tourist Privileges:** When touring, the owner is entitled, upon presentation of the Owner's Service Card, to all of the benefits of this policy during the warranty period at any authorized Packard Service Station in the United States and Canada, provided the date of delivery and name of the dealer from whom the car was purchased are stamped on the plate provided for that purpose on the dash.

**6. Change of Residence:** In case the owner changes his residence from one location to another before the warranty period has expired, the Packard Service Station serving the locality into which the owner moves will, upon presentation of the Owner's Service Card, render any no-charge service to which the owner may be entitled.

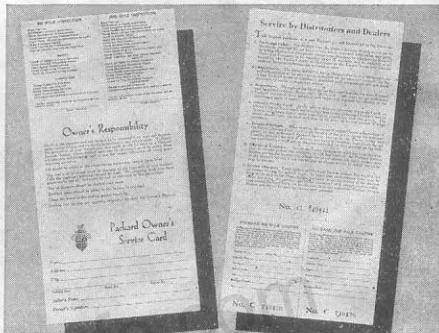
**7. Service Charges:** Every authorized Packard Service Station is provided with a Manual containing the correct charges for service work. In order that maintenance costs may be kept as low as possible, these rates are based on careful studies of the shortest times for doing the service operations consistent with proper workmanship. Guaranteed Packard Parts can be obtained from any authorized Packard Service Station and should be used for replacement purposes.

# As Soon as You Take Delivery



1. Please Make Sure the plate, located on the left side of the cowl, is stamped in the space marked Delivered by—City—Date—. If it is not, ask the dealer to take care of this at once. You will not receive the benefits of the Service Policy unless this plate is stamped.

2. Have you received your Packard Owner's Service Card shown at the right with the two Inspection Coupons attached? This card should be made out by the seller of the car. It enables you to obtain the service described in the Service Policy, should you require this at other than the service station delivering your car.



## New Car "Break-in"

The manner in which any new car is driven for the first 250 miles has a pronounced effect upon its subsequent operation and this applies to the brakes, gears, rear axle and other units, as well as to the engine.

All friction surfaces will burnish themselves to that high surface polish so essential to quietness, smoothness and durability, if not too highly stressed or loaded during the "break-in" period.

The best procedure is to refrain from even momentary wide-open throttle operation. Unless emergency demands it, do not fully open the throttle for acceleration or hill climbing and limit speed to 50 miles per hour until at least 250 miles have been driven. Observance of this advice will pay big dividends in ultimate satisfaction.

## Lubrication-Inspection

Your Packard Dealer will be glad to explain the 10,000-mile Lubrication-Inspection Plan. It will save you money and be helpful in maintaining the quality and excellent performance built into your Packard.

It encourages regular attention which always means longer car life.

Avoids harmful lubrication; some assemblies are damaged by over lubrication. The right lubricant in the right amount at the right time.

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## Starting the Engine

To start a **cold** engine proceed as follows:

1. Turn on ignition switch. Depress accelerator pedal once and allow it to return to the closed position. This engages the low-temperature idle control.
2. Depress clutch pedal fully, then press starter button located on the instrument panel.

**NOTE:** In cold starting, should excessive choking result from failure to turn on ignition—or from any other cause—hold the accelerator pedal in the wide-open position until engine starts, but do not allow cold engine to race.

To start a **hot** or **warm** engine proceed as follows:

1. Turn on ignition switch. Press starter button and hold accelerator pedal in wide-open position until engine starts. **Do not pump** accelerator pedal.

# Ready Reference Data

## Model 1800

### Capacities

Cooling system.....	17 quarts
Crankcase oil.....	5 quarts
Gas tank.....	18 gallons
Rear axle oil.....	5 pints
Transmission.....	2.0 pints
Overdrive unit.....	1½ pints

### License Data and Miscellaneous

Car serial number location.....	Plate at left side of cowl
Engine serial number location.....	Stamped upper left side of block between cylinders 2 and 3
Engine bore and stroke.....	3½" x 4¼"
Engine horsepower A. M. A. rating.....	29.4
Engine piston displacement.....	245.3 cu. in.
Over-all length.....	196½"
Over-all length with trunk rack.....	200½"
Wheelbase.....	122"
Tire pressure—front normal minimum.....	26 lbs.
Tire pressure—rear normal minimum.....	28 lbs.
Tire pressure—front—Station Wagon.....	27 lbs.
Tire pressure—rear—Station Wagon.....	30 lbs.
Tire plies.....	4
Tire diameter.....	16"
Tire width.....	6.25"
Light fuses, location.....	See page 35
Spark plugs.....	10 m.m. AC-104 or Champion Y-4
Spark plug gap.....	.028" + or — .002"
Ignition timing all heads.....	4½° to 6° B. T. D. C.
Tappet clearance, warm.....	Inlet .007", Exhaust .010"
Camber.....	1½°—0+¾°
Caster.....	1½°+ - ½°

### Shipping Weights

Touring Sedan 5-Pass. 4-Door No. 1382.....	3200 lbs.
Touring Sedan 2-Door No. 1384.....	3190 lbs.
Club Coupe 2-4 Pass. No. 1385.....	3165 lbs.
Business Coupe 2-Pass. No. 1388.....	3120 lbs.
Convertible Coupe 2-4 Pass. No. 1389.....	3200 lbs.
For road weight add 140 lbs. to cover fuel and water.	

# Ready Reference Data

## Models 1801 and 1801A

(The 1801A is a Commercial Chassis)

### Capacities, License Data and Miscellaneous

Cooling system	18 quarts	Rear axle oil	6 $\frac{3}{4}$ pints
Crankcase oil	6 quarts	Transmission	2.0 pints
Gas tank	21 gallons	Overdrive	1 $\frac{1}{4}$ pints
Car serial location		Plate at left side of cowl	
Engine serial location		Stamped upper left side of block between cylinders 2 and 3	
Engine bore and stroke	3 $\frac{1}{4}$ " x 4 $\frac{1}{4}$ "		
Engine horsepower A. M. A. rating	33.8		
Engine piston displacement	282 cubic inches		

	1801	1801A
Over-all length	200 $\frac{3}{4}$ "	233 $\frac{3}{4}$ "
Over-all length with trunk rack	205 $\frac{1}{2}$ "	238 $\frac{1}{2}$ "
Wheelbase	127"	160"
Tire pressure—front normal minimum	26 lbs.	28 lbs.
Tire pressure—rear normal minimum	28 lbs.	36 lbs.
Tire pressure—front—Station Wagon	25 lbs.	—
Tire pressure—rear—Station Wagon	30 lbs.	—
Tire plies	4	6
Tire diameter	16"	16"
Tire width	6.50"	7.00"
Light fuses, location	See page 35	
Spark plugs	10 m.m. AC-104 or Champion Y-4	
Spark plug gap	.028" + or — .002"	
Ignition timing standard head	6 $\frac{1}{2}$ ° to 8° B. T. D. C.	
Ignition timing, 6.8 H. C. head	5 $\frac{1}{2}$ ° to 7° B. T. D. C.	
Tappet clearance, warm	Inlet .007", Exhaust .010"	
Camber	$\frac{1}{2}$ °—0+ $\frac{3}{4}$ °	
Caster	$1\frac{1}{2}$ °+— $\frac{1}{2}$ °	

### Shipping Weights

Touring Sedan—4-Door No. 1392	3520 lbs.
Touring Sedan—2-Door No. 1394	3510 lbs.
Club Sedan—4-Door No. 1396	3520 lbs.
Club Coupe—2-4 Pass. No. 1395	3450 lbs.
Business Coupe—2-Pass. No. 1398	3340 lbs.
Convertible Coupe 2-4 Pass. No. 1399	3540 lbs.
Convertible Sedan No. 1397	3710 lbs.
1801A Hearse Chassis	2855 lbs.
For road weight add 160 lbs.	and water.

# Courtesy + Skill = Safety

Automobile engineering has always been devoted to safety and tremendous advances have been made. The modern motor car is, in itself, an amazingly safe machine—infinitely more safe than cars of a few years back and yet, in spite of this, automobile accidents continue to reach shocking totals. A moral seems to be pointed in the fact that in nearly all parts of the civilized world educational campaigns are being conducted to make the public—both motoring and pedestrian—safety conscious.

Undoubtedly there are many drivers who need improvement. In most cases, fortunately, driving skill can be cultivated if there is any desire to become proficient. Deliberate indifference is an unfortunate attitude. Driving can be and is a lot of fun for those who do it well. Think of driving as a game—such as golf or tennis—and approach it with the same enthusiasm and expectancy. The ability to handle a motor car adroitly will give as much pleasure as does ability in any other sport.

**Smooth Driving:** Car operation can be smooth and graceful or it can be harsh and jerky. Acceleration and deceleration can be smooth even though rapid. Smooth operation is the mark of a finished driver.

**Anticipation** of what “the other fellow” is going to do may sound like a fanciful illusion but it can be developed to a remarkable degree and is valuable in promoting safety and smooth driving. It proceeds, of course, from the practiced habit of being highly alert for indications of what is likely to occur.

**Speed:** Modern cars perform so smoothly and quietly that there is no distinct sensation or impression of speed. Even at high speeds they seem to be “floating.” Glance at—and be guided by—the speedometer.

**Negotiating Curves:** Inexpert drivers attempt to maintain speed right up to the entrance, close the throttle, apply the brakes and “man-handle” the car through the curve. This method involves the danger of complete loss of control and does not save any time. A more skillful driver approaches and enters the curve at reduced speed. When the car is safely in the turn, a slight throttle opening will give a stabilizing effect. From about the middle of the turn, the throttle opening can be gradually increased to give maximum acceleration out of the turn. The latter method is decidedly more safe, easier on tires and also faster.

**Passing:** This maneuver is a matter of judgment of speed and distance. Many drivers make but *one* observation of the respective distances between their own car, the car to be passed and the oncoming car. *One* observation is not enough. Develop the habit of making *numerous* careful appraisals of the gap (think of it in terms of feet or yards) between your car and the car to be passed and the gap between the car to be passed and the oncoming car. *Repeated* observations of the two gaps will tell you reliably whether you have room to pass. Persistence in this method will develop a fine sense of “pace and distance” that will add to the safety and pleasure of driving.

**Mountains and Hills:** Safety demands keeping always to the right side of the road. Do not “cut” curves and never pass a car at or near the brow of a hill. To attempt to do so is wantonly criminal.

**Low or Soft Shoulders:** On concrete highways these present definite hazards to fast drivers. To bring a car from such a shoulder back onto the pavement involves—in effect—*climbing a curbstone* and this cannot be done safely at speed. Under such conditions, cars are not responsive to light steering effort and the thoughtless driver who turns the steering wheel sharply in an effort to regain the pavement without first slowing down is courting serious disaster. Safety for passengers burdens the driver with the responsibility of being alert for any indication of a dangerous maneuver on the part of an oncoming driver.

**Skidding:** Turn the front wheels in the direction of the skid, *i. e.*, if the rear wheels are skidding to the right—turn the front wheels toward the right. To avoid a second though less violent skid in the opposite direction, the front wheels should be turned back gradually, as the speed of the rear wheel skid is diminishing, so that at the instant the rear wheel stops sliding, the front wheels will have been returned to the straight ahead position.

**Over-steering** is a fault common to nearly all drivers. Under certain conditions, over-steering is decidedly disadvantageous to say the least. The technique in skidding has been explained but most drivers seem unable to bring themselves to carry out the execution accurately. In the case of skidding, failure to bring the front wheels back as indicated usually results in a greater reverse skid than is necessary. A sharp turn of the wheel in climbing from a low or soft shoulder at speed is difficult to correct rapidly enough and may send the car directly across the road.

**Tire Blow-Out:** The best advice is to urge that nothing whatever be done until the necessity arises. The reason for this is that in many cases a blow-out produces nothing more than a mild tendency to skid and should be handled accordingly, but many persons suffer under the delusion that a blow-out demands heroic measures and proceed to make a harmless situation serious, or even dangerous. It is not possible to predict exactly what will happen in the event of tire failure because it depends entirely upon the conditions that exist at the time. Ordinarily, a blow-out results in skidding that may be mild or severe. If the car is intelligently handled, a blow-out is not apt to cause serious trouble.

**Applying Brakes:** Violent application imposes terrific strains on all parts of the car including brakes and tires and is never advisable unless emergency demands it. Where slippery pavement, skidding or tire blow-out is involved, brake application should be *very cautiously* made.

**Dusty Road Ventilation:** The admission of dust to the front and rear compartments may be quite effectively prevented by closing all the windows and opening the cowl ventilator.

**Starting on Ice or in Mud or Sand:** This can be more readily accomplished if care is taken not to spin the wheels. Use second or even high gear and open the throttle only slightly. First speed may be necessary but don't open the throttle more than is necessary.

**Safety First:** Public officials who shoulder the responsibility of motor car regulation quite logically look to the better class of drivers to set an example for others. May we, in the interest of all concerned, sincerely request that Packard owners "Always Drive Safely."

# Washing and Polishing

Fine lacquers properly applied give Packard cars a finish of high luster that can be maintained indefinitely if given proper attention.

**Washing:** Periodic cleaning is, of course, necessary. Fine dust may be safely removed by dusting wth a soft clean cloth but "scrubbing" a dirty car with dry cloths is almost certain to scratch polished surfaces.

Ordinarily, it is better practice to clean the car by washing with plenty of cold or lukewarm water. Soak the dirt off as much as possible and rinse sponges frequently to remove grit and dirt. Dry with a clean chamois. The use of an ordinary garden hose nozzle—adjusted to give a high velocity stream—will be very useful in removing dirt from the under side of the car and the inside of the wheels. A stiff brush may also be necessary. Avoid washing the car in the sun or at any time when the lacquered surfaces are hot. Never wash the car with hot water.

In sections where salt, calcium chloride or similar chemicals are used on the roads, frequent washing of the car is necessary to preserve the finish. Where cars are to be exposed to freezing temperatures immediately after washing, all water must be removed from the edges of the adjustable windows and doors to prevent sticking due to the formation of ice.

**Polishing:** Weathering and an accumulation of traffic film will produce a dull appearance that washing will not correct. The original high luster can be fully restored by a thorough cleaning with Packard Body Polish or any other properly formulated body polish. The presence of color on the rubbing cloths simply indicates the removal of chalked or dead surface pigment loosened by exposure. All body striping is applied on top of the lacquer and requires careful treatment. Prolonged, vigorous rubbing will damage or may even remove the striping.

Oil or grease spots may also be removed with body polish. With a clean cloth, apply polish to the area of the spot only and polish out with a dry soft clean cloth. Special preparations are available that will remove tar or road oil without damage to the lacquer. Hardened lumps of tar can be more readily removed if first softened with lard or butter. If tar remover dulls the finish, use body polish to bring back the luster. Any lacquered surface upon which alcohol solutions have been spilled should immediately be flushed with water.

**Care of Glass:** Plate glass although hard can quite easily be scratched. Cleaning a dirty windshield when dry by operation of the wiper blade or with dry cloths is apt to cause minute surface scratches that will increase eye strain. Wet or moisten glass before cleaning.

**Chromium Plating:** The ability of chromium to withstand exposure has created the impression that it requires no service attention. Actually, the finest chromium plating is subject to deterioration if neglected.

Among the more common elements that attack chromium plating are: sulphur dioxide present in the air, especially in large industrial centers, calcium chloride used on city streets to melt ice and on dirt roads to prevent dust, also the salt air of coastal territories. When plating is scratched or scuffed to the base metal, ordinary moisture becomes a damaging

agent. Rust, originating at the root of a scratch, will continue to spread underneath the plating unless attended to when it first appears.

Chromium plating is very easy to clean and frequent cleaning is all that is necessary to keep it in first-class condition. First, go over all plated surfaces with a clean cloth moistened with kerosene, follow this with a clean cloth wet with clear water and then rub dry with a soft clean cloth. The rough treatment given car bumpers is apt to damage the plating. Should rust appear, use a mild scouring compound to remove every trace of rust and prevent further oxidation by applying a coat of wax, varnish or clear lacquer over the damaged area.

**Interior:** It is particularly important from the standpoint of personal comfort that the inside of the car be kept clean. Occasionally, the interior should be given a thorough vacuum cleaning.

## Cleaning Upholstery

Where the use of cleaning fluid is indicated, use Packard Fabric Cleaner or a cleaning fluid in which carbon tetrachloride is the principal ingredient. To avoid rings, work from the outside toward the center.

**Battery Acids:** These destroy upholstery if allowed to remain. Neutralize the acids as soon as possible by pouring enough household ammonia water directly on the spot to saturate the fabric as far as the acid extends. Give the ammonia water a full minute to neutralize the acid and then rinse the fabric with a wet clean cloth. Use cold water.

**Blood Stains:** Rub with a clean cloth wet with cold water.

**Candy or Fruit:** Stains should be rubbed with a clean cloth wet with very hot water. If chocolate is present in the candy stain, use lukewarm water. After drying, sponge with a clean cloth wet with cleaning fluid.

**Gum:** Moisten with cleaning fluid and remove with a dull knife.

**Ice Cream:** Rub with a clean cloth wet with very hot water. If this is not satisfactory, use a cloth wet with warm soap suds and rinse with a cloth wet with cold water. After drying, sponge with cleaning fluid.

**Lipstick:** Pour cleaning fluid directly on spot and immediately after hold a clean blotter on the stain. Repeat until clean.

**Shoe Polish:** For black or tan polish, use a cloth wet with cleaning fluid. If white polish cannot be brushed off, wet with cold water, allow it to dry and then brush off.

**Grease or Oil:** Spots should be rubbed with a cloth wet with cleaning fluid. If a considerable amount of grease or oil is present, pour cleaning fluid on stained area and blot with clean blotters.

**Tar:** Moisten with cleaning fluid and remove with dull knife. Sponge with cloth wet with cleaning fluid.

**Paints and Lacquers:** Rub with a cloth wet with turpentine and then sponge with a cloth wet with cold water.

**Water Spots:** Sponge the entire panel with a cloth dampened with cold water then sponge the spots with a cloth moistened with cleaning fluid.

# Controls and Instruments

## Controls

Familiarize yourself with the operation of controls and learn how to interpret the instrument readings before driving your car. The following paragraphs will help you. Refer to Fig. 1 on page 11.

**The gearshift control** mounted on the steering column directly below the hand wheel provides the same standard "H" shift as the former vertical lever. The various gear positions are as follows; *reverse*, lift up on knob and move forward; *low*, lift up and move rearward; *second*, push down and move forward; *high*, push down and move rearward.

**The ignition lock** is located at the lower right of the center panel. Make it a habit to withdraw key when leaving car.

**The starter button** is of the remote control type and is located at the lower left of the center panel.

**The hand throttle** is located at the lower right of the center panel.

**The foot accelerator** should be held in the wide open position when starting a hot engine *but do not pump* the pedal.

**Note:** On cars with Econo-Drive the level road maximum speed is obtained *before* the pedal is all the way down. If the pedal is pushed all the way down when Econo-Drive lock-out knob is "in" it will cause the Econo-Drive mechanism to shift from 4th into 3rd speed.

**The light control switch** is located at the lower left of the center panel. It is of the push-pull type having 3 positions. Pulling out to the first notch provides parking and map reading lights, second notch city or country driving lights. There is also a foot control switch located on the toe-board to the left of the clutch pedal. With the light switch in second notch, depressing the toe-board switch raises both beams to "Country Drive" while a subsequent depression tilts both beams for city driving. A tell-tale light on the face of the speedometer indicates when country driving beam is in use.

**Instrument lighting** is controlled by a combination switch and rheostat located to the right of the speedometer. With the main light switch "on," instrument illumination can be regulated in small steps by turning the rheostat knob, which also controls the map reading light.

On Econo-Drive equipped cars the knob carries a signal jewel which, when illuminated, indicates that the overdrive unit should be engaged. Refer to next page for further details.

**The windshield wiper control** is mounted on top of the panel above the ash tray. Turn the knob to start wiper. **Do not** pull up on the knob. Under certain conditions the electrically driven wiper may continue to operate for a short time after being turned off. This action is normal and need cause no worry.

**The rear view mirror** is eccentrically mounted on a friction type ball and socket swivel and may be adjusted for height or angle.

**Front seat adjustment** is controlled by a latch located at the left end of front seat. Nine separate positions are available. Moving the seat forward elevates the cushion and decreases the seat-back inclination to provide greater comfort and better vision for persons of small stature.

**Sun visors** are swiveled in such a manner that they can be moved to shade either the windshield or the front doors.

**Duplicate sets of keys** are provided with each car. One set fits the ignition and right front door locks, the other set fits the package compartment and rear trunk locks. For greater protection against car theft, lock-cylinders are not numbered. *A record of key numbers* should be made by every owner to facilitate purchase of duplicate keys from Packard dealers in event original keys are lost.

**Optional Econo-Drive Transmission**—The Econo-Drive lock-out knob is mounted on the bottom of the instrument panel to the right of the steering gear column.

To bring the Econo-Drive into operation, proceed as follows: Push the lock-nut knob all the way "in" towards front of car. Now shift gears in the normal manner and when the car speed is above 22 miles per hour, which will be indicated by the illumination of a signal light in knob of the instrument board lighting switch, momentarily remove the foot from accelerator pedal, then return the foot and resume normal driving. The shift into Econo-Drive occurs during the momentary closing of the throttle and car will remain in Econo-Drive until the speed falls below about 17 miles per hour, or until the foot accelerator is pushed all the way down to the extreme limit of its travel. Either of these conditions will cause the Econo-Drive to become temporarily inactive and to bring it into action again it is only necessary to momentarily remove the foot from accelerator pedal whenever the car speed is above 22 miles per hour.

To obtain the full fuel economy advantages of the Econo-Drive form the habit of bringing it into engagement by momentarily lifting your foot from the accelerator as soon as the signal jewel is illuminated.

**To lock out the Econo-Drive or make it inoperative at all speeds**, use the following method: depress clutch pedal fully and pull knob out at any speed under 60 miles per hour. It should be remembered that the Econo-Drive lock-out knob should not be pulled "out" when the car is stationary.

**Convertible coupe tops** are power operated by engine vacuum and controlled by a knob at the lower flange on left side of instrument panel. To lower the top proceed as follows with engine idling:

Unlock top from windshield. Pull and hold out knob of control valve on instrument panel until top has moved into folded position, then release the control knob.

To raise the top proceed as follows:

With engine idling, push and hold in knob on instrument panel until top moves up and rests on top of windshield, then release the knob. Lock top to windshield.

**CAUTION**—The top should not be lowered or raised while the car is in motion. Best results will be obtained with engine running at idling speed.

## Instruments

The oil pressure gauge is mounted with the temperature gauge at the left of the speedometer. This gauge does *not* indicate the quantity of oil in the engine. Normal reading is 45 at 45 miles per hour.

CAUTION: Failure of the gauge to show pressure while engine is running indicates either a lack of oil or some derangement that should be corrected to avoid serious damage to the engine. Refer to Fig. 1.

The water temperature gauge is located with the oil pressure gauge at the left of the speedometer. Most efficient operating temperature is between 150 and 185 degrees or when the hand is at or just slightly to the right of the center dot on face of instrument. The water in the cooling system is boiling when indicator hand is at the 3rd dot. When this occurs stop the car and check the water level in radiator and the condition of fan belt, etc. Water at sea level boils at 212 degrees but at 5000 feet altitude, boiling occurs at approximately 202 degrees.

The battery charge indicator is located with the fuel gauge at the right of the speedometer. This gauge indicates whether the battery is being charged or discharged. The generator regulator is so designed that the indicator will be nearly at zero when battery is *fully charged*. To determine whether generator is charging, turn on the headlights for 10 minutes with engine stopped or turn off the ignition switch, press the starter button and allow the starter motor to crank the engine for about 20 or 30 seconds. Now turn on the ignition switch and run engine at a speed equivalent to 30 miles per hour. If the indicator hand now moves to "Charge" side of dial, the generator is charging.

The gasoline gauge with the ammeter is located at the right of the speedometer. The gauge is electrically operated and will register only when the ignition switch is "On."

A 100 mile speedometer is located in the center of the left instrument panel. Fuel consumption at 60 miles per hour is approximately 50 per cent greater than at 20 miles per hour.

The rectangular plate directly below the ash tray and the medallion in right hand panel are removable to permit installation of a radio and clock respectively.

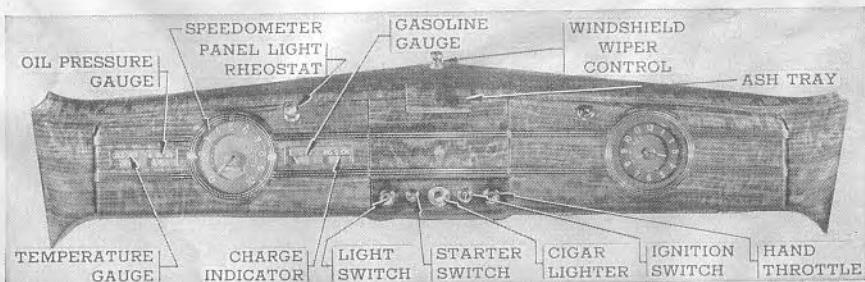


Fig. 1—Front View of Instrument Board

# General Lubrication

The subject of lubrication of the complete automobile should be given careful attention. It is important that the lubrication schedule be followed and that the proper lubricant be used if the car is to give quiet and efficient performance. The use of high grade lubricants will prolong the life of the wearing parts and prove most economical in the long run.

It is now common practice of oil companies to designate their oil by the S. A. E. classification, instead of the old method of designation as light, medium or heavy. The application of the S. A. E. viscosity number to a lubricant is intended only to indicate the body or fluidity of the oil and has no bearing on the quality of the product. Only high quality oils furnished by reputable companies should be used and for accuracy they should be ordered by S. A. E. numbers.

It is essential to add oil, as required, to maintain the correct oil level.

Choose the proper viscosity from the following table in accordance with the lowest temperature expected to be encountered.

## Engine Oil Viscosity

Below minus 10°F.....	10-W plus 10% kerosene
Minus 10°F.....	10-W
Plus 10°F.....	20-W
32°F.....	S. A. E. 30
90°F. extreme summer temperature.....	S. A. E. 40

The best performance of the engine will be obtained by using the correct body (S. A. E. number) of engine oil in the engine crankcase as specified in the above table. The oil should be of a low S. A. E. number in cold weather to provide proper starting and a higher number in warm weather to provide economical consumption.

## When Should Oil Be Changed

Obviously the time between crankcase drains depends entirely upon the driving conditions. In considering the following factors as to when to change the oil it should be kept in mind that good lubrication is low priced insurance against high maintenance costs.

The first change should be made preferably at the end of the first 500 miles, thereafter, 1,000 to 2,000 mile changes are recommended as that most closely approximating average conditions, but the changes should be controlled by the driving conditions as pointed out below.

The engine oil should be changed in accordance with temperature variations rather than according to seasons. In some localities variations in temperature are so extreme that several grades may be required during the course of a year.

Low maintenance costs, long engine life and best performance will be insured by changing the crankcase oil when it becomes contaminated. Driving over dusty roads or through dust storms with dirt-clogged air cleaners introduces abrasive material in the crankcase. If this is not removed immediately by draining the crankcase, harmful engine wear may result.

Hard driving in warm weather causes chemical changes in the oil. Accumulation of the products of these changes is undesirable and may prove harmful to the engine.

In winter, water accumulates in the crankcase from condensation of moisture produced by the burning of the fuel and may freeze and interfere with proper oil circulation. It also promotes rusting and causes clogging of oil screens and passages. While on long continuous drives this water may be removed by the crankcase ventilator, draining is a safer procedure. Light oils should be used for easy starting but very hard driving may thicken them and cause starting trouble.

### **Engine Oil Pan and Filter**

To prevent the accumulation of sludge which is injurious to the engine, the lower oil pan and screen should be removed and cleaned at least once a year.

The optional equipment external oil filter cartridge should be renewed every 8,000 miles—in no case should it be used beyond 10,000 miles.

### **Air Cleaner**

The carburetor air cleaner should be serviced every 2,000 miles or as often as every day if car is driven on extremely dusty roads.

### **Clutch Shifter Bearing**

The clutch shifter thrust bearing is packed with lubricant and permanently sealed by the bearing manufacturer. It requires no further lubrication.

### **Brake Pedal and Equalizer**

The clutch and brake pedal bearings are lubricated by a single pressure gun fitting. The hand brake equalizer should be sprayed with engine oil at each 1000 mile chassis lubrication.

### **Universal Joints**

The roller bearing type universal joint journals are packed with lubricant and sealed. Every 30,000 miles the joints should be taken apart, repacked with No. 2½ cup grease and new cork seals installed. Lubricate slip yoke spline with pressure gun every 1,000 miles.

### **Rear Axle**

Oil should be changed each Fall. A special passenger car duty hypoid oil of S. A. E. 90 viscosity is necessary for hypoid gears as the use of other lubricants may ruin the gear set. See Packard Dealer for a list of approved lubricants or have him attend to this important responsibility.

## Rear Wheel Bearings

Unless a leak develops at the oil seals, bearings will not require lubrication for at least 30,000 miles. At this mileage the shafts should be removed and the bearings packed with No. 3 fibre grease.

## Distributor

Refill and turn grease cup every 1,000 miles. Apply one drop of oil to the breaker arm pivot, a few drops to the wick under the rotor and a small amount of vaseline to the breaker cam.

## Transmission and Econo-Drive

Recommended lubricant for transmission and Econo-Drive is a high grade straight transmission oil of S. A. E. 140 viscosity in warm weather and S. A. E. 90 in cold weather or S. A. E. 80 in extremely cold weather.

The oil level in the transmission should be checked separately from the Econo-Drive unit and maintained flush with the filler plug opening "B" Fig. 2 on the side of the transmission housing.

The Econo-Drive unit is equipped with its own drain and overflow plugs and should be checked separately from the transmission. Oil level in this unit is higher than in the transmission and should be flush with the combination filler and overflow opening "C" on the side of the overdrive housing. Avoid overoiling the transmission by removing plug "B" when filling the Econo-Drive unit.

## Steering Gear

The oil level in the steering gear should be maintained flush with the bottom of filler plug opening. Use S. A. E. 140 straight transmission oil for warm weather and S. A. E. 90 in cold weather, or dilute the summer lubricant with kerosene if desired. Change oil in the Spring.

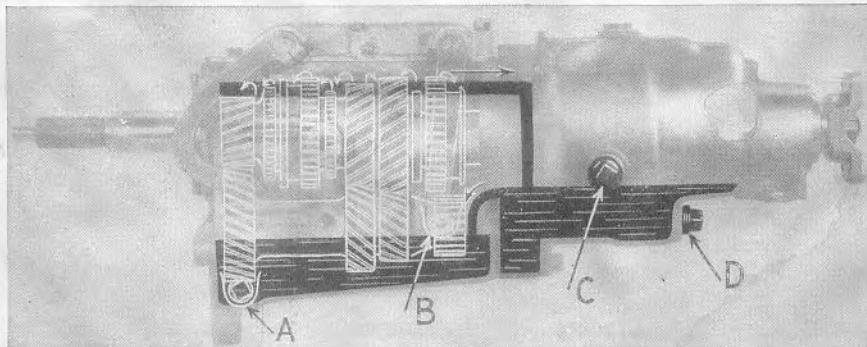


Fig. 2—Note Difference in Oil Levels. Remove Transmission Plug "B" When Filling Econo-Drive to Prevent Overoiling Transmission

# Lubrication Schedule

## 1000 Miles

Knuckle pins	Pressure gun grease	2 lubrication connections
Steering connecting rod	Pressure gun grease	2 lubrication connections
Steering cross tubes	Pressure gun grease	4 lubrication connections
Universal yoke spline	Pressure gun grease	1 lubrication connection
Generator	S. A. E. 30 or 20-W	2 oilers
Starter motor 1800	S. A. E. 30 or 20-W	1 oiler
Starter motor 1801	S. A. E. 30 or 20-W	2 oilers
Distributor	No. 3 cup grease	Refill cup and turn
Clutch and brake pedal	Pressure gun grease	1 lubrication connection
Steering crank	Pressure gun grease	1 lubrication connection

Add a few drops of light oil to the clevis pins, door hinges, dovetails and locks. Grease hood lacing and hinges as needed. Spray hand brake equalizer with engine oil.

Crankcase—refer to "When Should Oil Be Changed" on page 12.

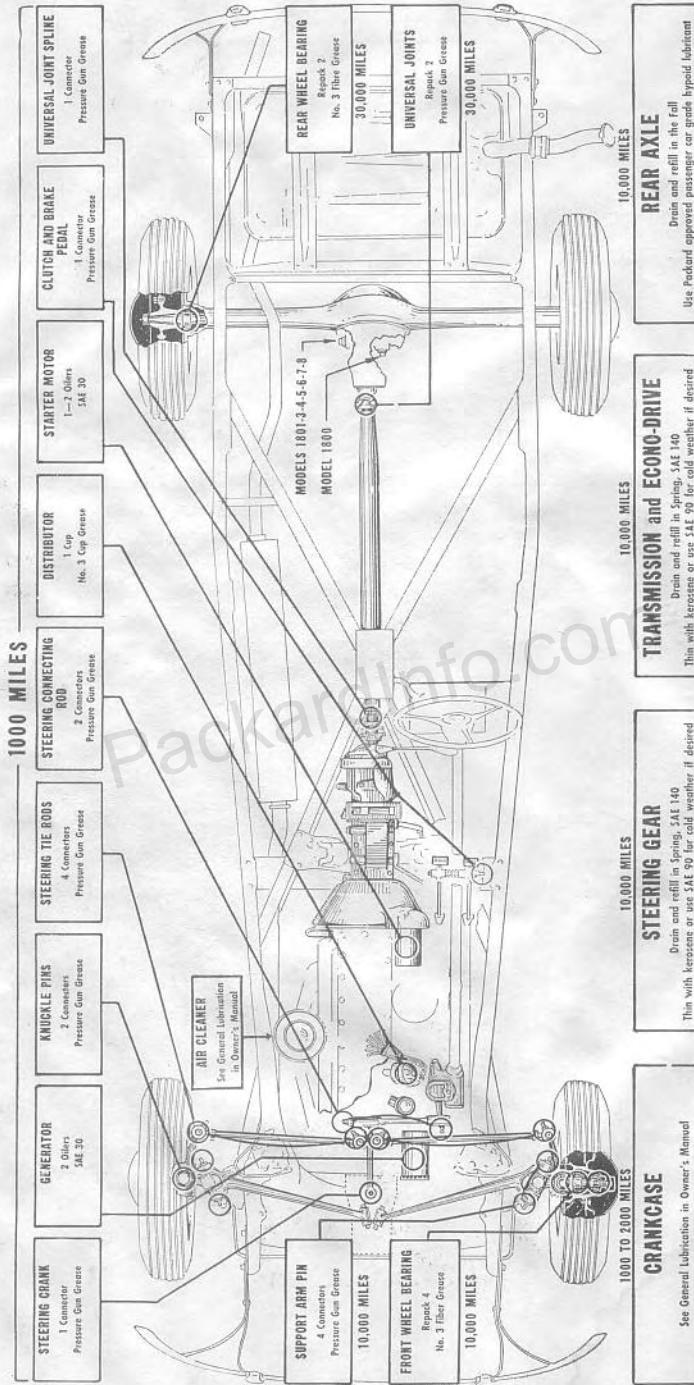
## 10,000 Miles

Support arm outer pins	Pressure gun grease	4 lubrication connections
Front wheel bearings	Fibre grease	(2) Repack
Transmission and Econo-Drive	See Transmission and Econo-Drive on preceding page	Fill to levels
Steering gear	S.A.E. 140—Dilute with kerosene or use S.A.E. 90 for winter if desired	Fill to level
Rear axle	See note	Drain and refill

NOTE: Rear axle gears require a special passenger car duty hypoid lubricant. See Packard dealer for list of approved hypoid lubricants.

## 30,000 Miles

Rear wheel bearings	No. 3 fibre grease	(2) Repack
Universal journals	No. 2½ cup grease	(8) Repack



# Engine

Cylinders and upper crankcase are cast as an integral unit from an iron alloy of high wear resistance. The cast iron cylinder head is attached to the top face of the block by means of studs. Valves are actuated by pressure lubricated mushroom type lifters with self-locking tappet screws operating directly in guide holes machined in the block. The camshaft is driven by a non-adjustable silent chain at the forward end of the engine. Compression ratio 6.39 standard, 6.71 optional for 1800; 6.41 standard, 6.85 optional for 1801.

Cylinder head stud nuts tightening torque should be not less than 740 inch-pounds but should not exceed 760 inch-pounds.

## Pistons and Rods

Piston and connecting rod assemblies can be removed only from the top of the block. When re-installing assemblies, make certain the connecting rod oil squirt holes and piston slots are on the camshaft side of the engine. To avoid possible injury to piston bosses, pistons should be heated to approximately 160° Fahrenheit before dismantling from connecting rods and when fitting new piston pins.

Pistons are aluminum alloy Autothermic strut type, cam ground and tin plated. Correct piston fit is when a .0015" feeler blade  $\frac{1}{2}$ " wide

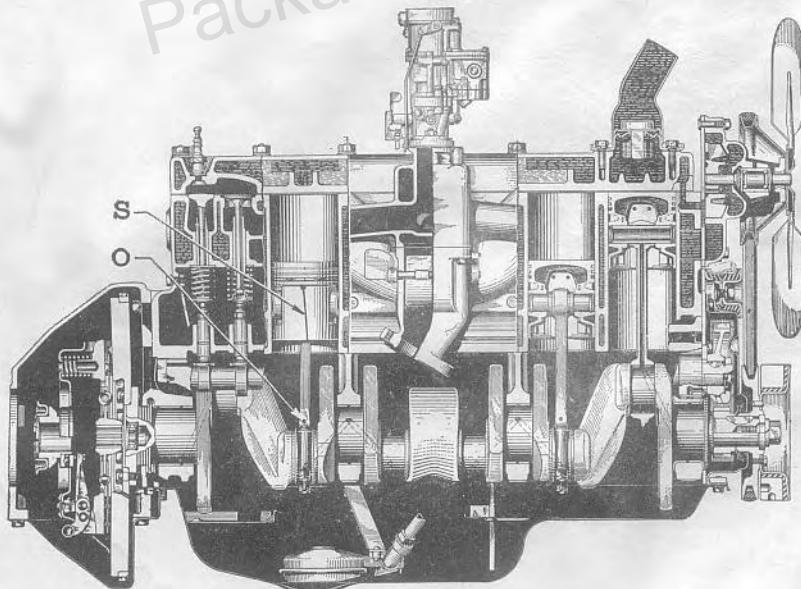


Fig. 4—Side Section of 1800 Engine and Clutch Assembly. Holes "O" and Slots "S" Should Face Camshaft

inserted between bore and non-slotted face of piston requires 12 to 18 pounds upward pull to withdraw.

Floating type piston pins should be a finger push fit in piston bosses with piston heated to 160° Fahrenheit and a similar fit in rod bushings at room temperature. The split type pin bushings **must** be expanded to a tight fit in rod with a suitable burnisher bar before reaming the bushings to final size. Pin diameter all models .875" standard, oversizes .003" and .006". Refer to Fig. 6.

## Bearings

The camshaft, crankshaft and connecting rod bearings are all of the shimless, precision, steel backed, babbitt lined type. They are non-adjustable and should be renewed whenever inspection shows excessive clearance. Crankshaft bearing upper and lower halves may be renewed from below without removing the crankshaft. Any connecting rod bearing may be renewed from below without removing the rod and piston. Diameter of main bearings  $2\frac{3}{4}$  inch; crankpins  $2\frac{3}{32}$  inch nominal. Rod bearing end play on crankpin .004" to .010", crankshaft end play .003" to .008" controlled by No. 1 bearing on 1800, by center bearing on 1801.

NOTE: The patented Palnut is used in place of cotter pins on the connecting rod bearing bolts. Smooth face of Palnut should contact the regular nut. To lock, tighten regular nut to desired tension, spin Palnut on bolt until it just touches regular nut, then tighten Palnut  $\frac{1}{4}$  to  $\frac{1}{8}$  of a turn further.

## Piston Rings

Standard piston ring equipment—, one  $\frac{3}{2}$  inch No. 200 compression ring with Ferrox finish .165 to .175 inch thick, one No. 70 compression ring with Ferrox finish  $\frac{1}{8}$  inch wide by .135 to .145 inch thick and one  $\frac{3}{16}$  inch width by .122 to .130 inch thick X-90 spring expander type oil ring per piston. Top and 2nd compression ring should have .0025" to .003" up and down groove clearance; oil ring .0015" to .002" clearance. Assemble top and oil ring with gap away from camshaft. Install the No. 200 ring with bevel on inside edge pointing up.

## Timing Chain

Chain is a two sprocket non-adjustable type with 58 links  $1\frac{1}{4}$  inches wide by .375 inch pitch. The chains are interchangeable with those used on 1939 cars. On timing chain jobs, remove both fenders and radiator as one assembly. Remove chain and both sprockets together. Valve timing is correct when sprocket marks are aligned as shown in Fig. 5.

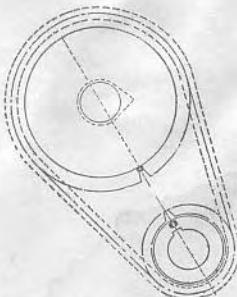


Fig. 5—Sprocket Marks should align as shown

## Valves and Tappets

Recommended tappet clearance is .007 inch for the inlet and .010 inch for the exhaust valves with engine warm and running. Tappet screws are of the self-locking type.

Valve spring pressure 114 to 124 pounds at  $1\frac{5}{16}$ " or with valve wide open. Valve seat angles 30° inlet, 45° exhaust. Valve lift .318" nominal. Valve stems are .340" diameter and guides are straight reamed. Recommended stem to guide clearance inlet .001" to .003"; exhaust .003" to .005". Removal of mushroom tappets requires removal of camshaft. Tappets furnished in oversizes of .001", .002" and .005". Ream for .005" oversize tappets with Packard reamer S.T. 5144. The  $\frac{23}{32}$ " S.T. 5101 reamer designed for models 1700 and 1701 cannot be used on 1800 and 1801 because tappet diameter is now  $5/8$  inch.

Fig. 6—Before Reaming the Split Type Pin Bushings They Must be Tightly Expanded into Rod With a Burnisher

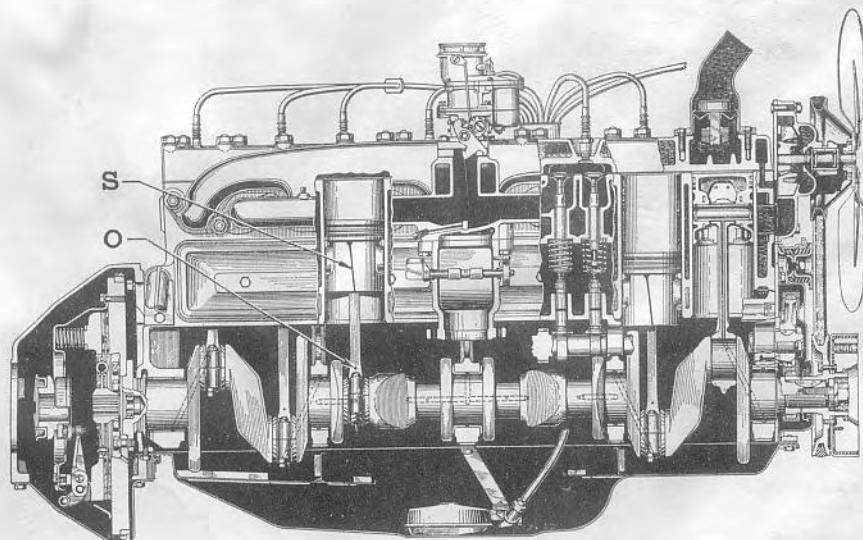


Fig. 7—Side Section of 1801 Engine and Clutch Assembly

## Valve Timing

Inlet valve should start to open one degree before top center with tappet set to .013 inch but a variation of 2 graduations on the flywheel either way is permissible. The "O" marks on sprockets should be together and aligned through shaft centers.

## Oil Pump

Normal oil pressure is 45 pounds at 45 miles per hour.

The oil pump pressure relief valve is not adjustable. Relief valve spring pressure should be 14 pounds plus or minus 2 ounces at  $1\frac{1}{8}$  inches. Use new gaskets "G" when installing pump on engine. Place slot in gear "D" as near parallel with lengthwise centerline of camshaft as possible when the number one piston is  $6^\circ$  to  $8^\circ$  before top center on firing stroke. Punch mark on pump gear should be at the bottom on 1800, at the top on 1801.

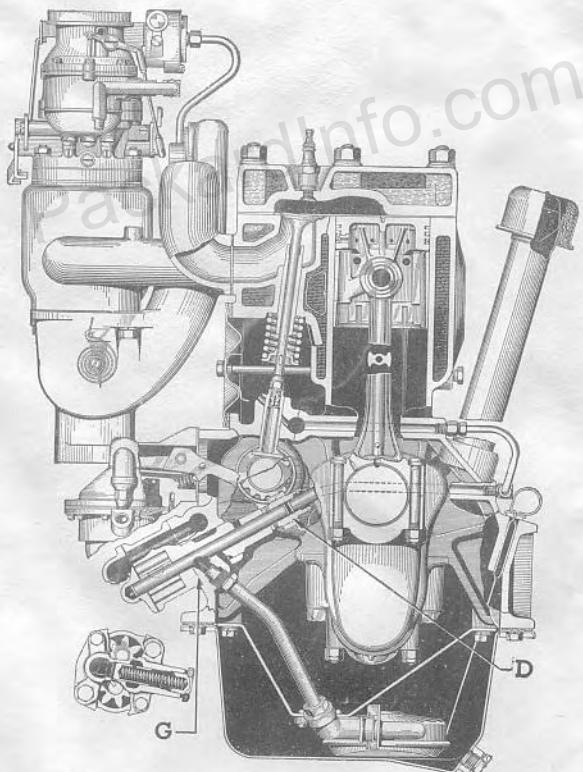


Fig. 8—Details of Oil Pump, Pressure Relief Valve and Distributor Drive on 1801 Engine. The 1800 Engine is Similar

# Cooling System

To drain system remove pipe plug in left side of cylinder block near starter motor and the valve in the front face of lower radiator tank.

The cooling system should be reverse flushed each Spring and Fall and always before adding anti-freeze, to remove a probable accumulation of rust particles and sediment. Half a pint of soluble oil added after flushing will delay subsequent accumulation of rust. Gravity flow of 1800 radiator core 27 gallons per minute, of 1801 core 35 gallons per minute plus or minus one gallon.

## Anti-Freeze Solutions

Anti-freeze solutions of alcohol and water, ethylene glycol and water, or glycerine and water may be used. Alcohol solutions have a lower boiling point than water and are subject to evaporation. The hazard of injuring the car finish with alcohol is reduced by the location of the radiator filler under the bonnet. When alcohol solutions are used, half a pint of soluble oil should be added as a rust inhibitor. A good grade of soluble oil is obtainable from Packard dealers. Ethylene glycol (Prestone) and glycerine (G. P. A.) contain soluble oil and therefore none need be added. Trade marked anti-freezes are also often sold mixed with water and rust inhibitors. When these are used, follow directions on the containers.

Do not save Prestone from one winter to the next. Use new material each year.

It is advisable to shellac the inside of the hose connections when ethylene glycol or glycerine is used, as otherwise there may be a tendency to seep at the joints. If cylinder head has not been removed for a considerable period it is advisable to remove same and renew the head gasket.

The table below indicates quantity, in quarts, of anti-freeze required for protection in the range from 20° above zero to 30° below zero Fahrenheit. Quantities shown are based on a system capacity of 17 quarts for the model 1800 and 18 quarts for the 1801.

Pure Methyl Alcohol	Denatured Alcohol	Prestone (E. Glycol)	Radiator Glycerine	Freezing Point Approximate				
1800	1801	1800	1801	1800	1801			
2.5	2.5	3.0	3.0	3.0	6.5	7.0	20° F. Above zero	
3.5	3.5	4.5	5.0	4.5	4.5	9.5	10° F. Above zero	
5.0	5.0	6.0	6.5	6.0	6.0	12.0	12.5	Zero
5.5	6.0	7.0	7.0	7.0	7.0	14.0	14.5	10° F. Below zero
6.5	6.5	8.0	8.5	7.5	8.0	16.0	16.5	20° F. Below zero
7.0	7.0	9.0	9.5	8.5	9.0	17.0	18.0	30° F. Below zero

NOTE: During the cold weather months have the radiator solution tested occasionally with an hydrometer, especially prior to an expected drop in temperature. This practice may avoid expensive repairs.

**Caution:** Do not use a calcium chloride or an alkaline solution or any anti-freeze compounded from these materials. Such solutions will surely corrode the radiator core and are liable to clog the cooling system.

## Fan Belt Adjustment

Premature failure of either the belt or the pump and generator bearings results from too little or too much belt tension. Recommended tension is 25 pounds measured with a spring scale hooked to the generator in such a manner as to provide a straight pull. If a scale is not available, adjust belt tension to provide one-half inch of thumb pressure deflection between generator and water pump pulleys.

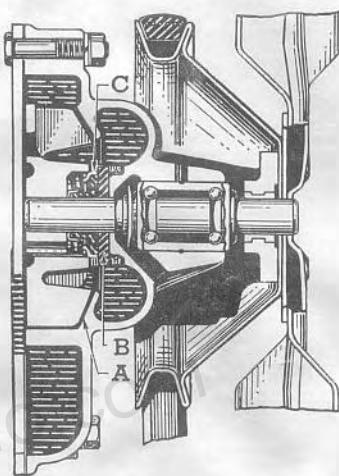
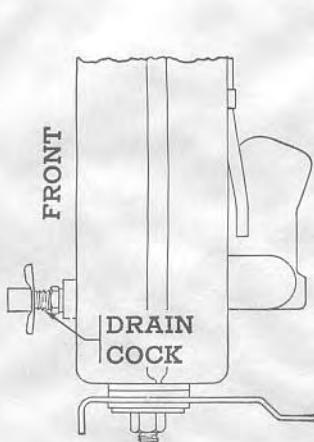


Fig. 9—(Left and Center)—Radiator and Cylinder Block Drain Points. Both Must be Opened to Drain All of the Water from Cooling System

Fig. 10—(Right)—Water Pump is Permanently Lubricated and Incorporates a Spring Loaded Water Seal

## Water Pump

The permanently lubricated pump is of the "packless" type employing a spring loaded sleeve type synthetic rubber seal "C" and a composition thrust and sealing washer "B" Fig. 10. If pump leaks, remove the assembly and renew the sealing elements "B" and "C" or install an exchange factory rebuilt unit.

**Notes for the Mechanic**—To avoid breakage, pump body should be supported when pressing impeller off shaft. Installation will be facilitated by heating impeller in water just under boiling point and by coating shaft and seal with engine oil. Machined face on pump body against which the washer rides must be smooth and flat. If scored, renew the body or resurface if adequate tools are available. Clearance between impeller and housing at "A" should be .012" to .074". Both gaskets should be coated with Perfect Seal grade A paste or equivalent. When installing the composition thrust washer be sure that the smoother face of washer is nearest the fan blades.

# Fuel System

## Fuel Pump

Except for occasional draining of the sediment chamber the fuel pump requires no attention on the part of the owner. Failure of the pump diaphragm will not affect engine oil consumption. The model 1800 cars are equipped with a series AT single unit inverted type pump while that on the 1801 cars is a series AH unit equipped with an air dome. List of repair parts with their Packard and U.M.S. part numbers is shown below.

	1800	1801
Pump assembly.....	1537060	1537067
Rocker arm.....	1537062	1537071
Rocker arm pin.....	1522023	1522023
Rocker pin bushing.....	—	1522024
Oil seal assembly.....	1523122	1523122
Metal bowl.....	1537065	1523130
Screen.....	1523667	1523127
Bowl gasket.....	1523096	1523128
Bail and screw.....	1523231	—
Link.....	1523655	1522077
Diaphragm assembly.....	1523672	1523132
Diaphragm spring.....	1523656	1523124
Rocker arm spring.....	1523118	1523118
Valve and cage assembly.....	1523106	1523106
Valve cage gasket.....	1521953	1521953
Valve plate.....	1523664	1523664
Air dome.....	—	1523319

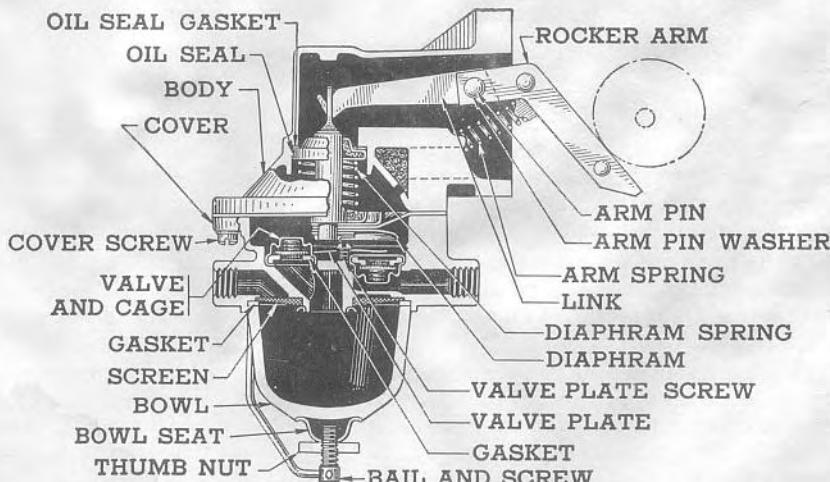


Fig. 11—Fuel Pump Used on Model 1800 is an AC Series AT Unit

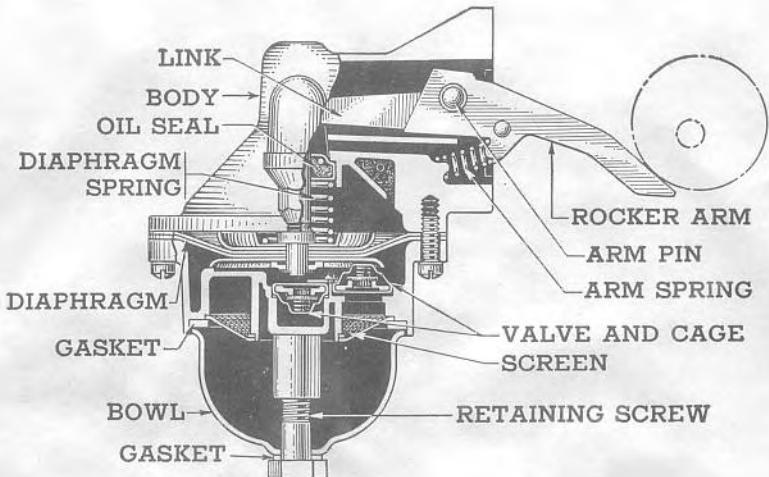


Fig. 12—Fuel Pump Used on 1801 Cars is an AC Series AH Unit

**Repair Notes**—To disassemble rocker arm and its related parts it is first necessary to drill out the counterbored end of the rocker pin. When reassembling, place links, rocker arm bushing, link spacer washers and rocker arm spring in position in body and oil seal assembly. Hold these parts in position with special rocker arm assembling pin, United Motors Service No. 1521581 inserted through rocker arm pin hole in body.

When installing valve and cage assemblies in valve cage seats in cover, make sure that large diameter is placed against the gasket on the inlet side of cover and that the small diameter is assembled into the outlet hole in the cover, thus permitting shoulder of the cage to fit properly against the gasket. **This is important.**

When placing valve cage retainer in position be sure that the curved ends of two of the legs fit snugly against each valve cage.

### Air Cleaner and Silencer

Under ordinary conditions, the unit should be cleaned and refilled every 2,000 miles, or as often as every day where all of the driving is done on extremely dusty roads. Definite mileage intervals cannot be stated due to the natural variation in conditions. The safe procedure in very dusty territory is to check the unit daily and clean if necessary.

Procedure for cleaning the regular equipment cleaner is as follows: Remove wing nut at top of unit, withdraw metallic gauze filter element and plunge up and down in a vessel containing clean gasoline or kerosene. After filter is clean allow to dry then dip in engine oil and reinstall.

To clean the heavy duty oil bath type unit, which is recommended for use on cars operating in dusty territory, first dismount the assembly from the carburetor. Remove metallic gauze filter element and clean as outlined in preceding paragraph. Empty the oil reservoir and clean thoroughly, then refill to level line with approximately a pint of S. A. E. 50 engine oil in summer, or S. A. E. 30 in winter.

## Crankcase Ventilation

Air inlet for the crankcase ventilation system is through the oil filler tube. The cap of this filler tube is fitted with a copper mesh type of air cleaner to prevent dust from entering the crankcase. The cap filter element should be cleaned every 2,000 miles or oftener by plunging up and down in a container of clean gasoline or kerosene. Allow filter to dry, then saturate with S. A. E. 50 engine oil and reinstall.

## Throttle Guard

Cars equipped with Econo-Drive carry the Throttle Guard device to reduce stalling when operating in the road speed range of zero to 20 miles per hour. The guard is operated by manifold vacuum. Refer to Fig. 13.

The device is correctly adjusted when it "cuts in" at 4 miles per hour car speed and "kicks out" at a speed of 9 miles per hour.

Adjustment procedure is as follows: Engine must be properly tuned and carburetor stop-screw adjusted to give 6 miles per hour car speed on level road. Gap between end of diaphragm rod "A" Fig. 13 and carburetor throttle lever should be approximately .060 inch on model 1800 and .020 inch on model 1801 cars. Spring tension screw "B" should be turned in until distance from top of locknut to end of screw is approximately  $\frac{3}{16}$  inch.

Get final adjustment on road with lock-out knob pushed all the way in and gearshift in high gear position. Pull car down to 4 miles per hour slowly with the brakes and without pressure on the accelerator pedal. When the 4 miles per hour point is reached, the throttle guard should "cut in" and temporarily bring the car speed up to 9 miles per hour, then "kick out."

If the "kick out" occurs at higher than 9 m.p.h. increase the gap between diaphragm rod "A" and throttle lever; decrease the gap if the "kick out" occurs below 9 miles per hour. Similarly, if the "cut-in" occurs above 4 m.p.h., decrease the spring tension by turning screw "B" out slightly and if the "cut-in" occurs below 4 m.p.h. increase the spring tension.

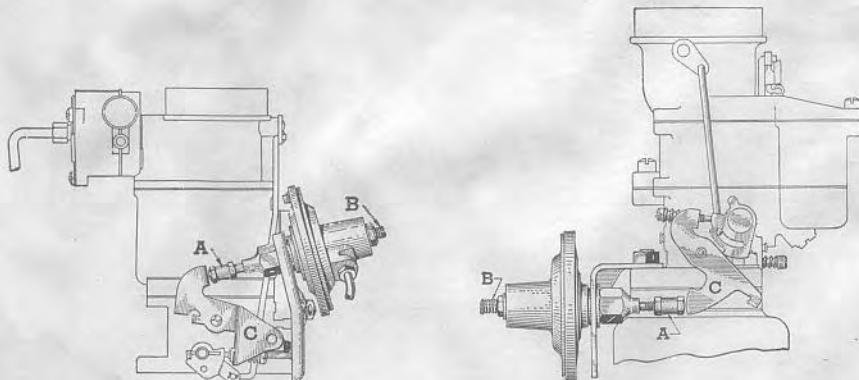


Fig. 13—Throttle Guard for 1800 and 1801 Used on Cars Equipped with Econo-Drive. The 1800 Unit is the Left One

# Carburetor and Choke

## Carburetor

The carburetor used on the model 1800 is a Stromberg single throat type known as the BXOV-26 and the unit on the 1801 is an EE-16 series of the duplex or double throat type. Both carburetors are equipped with the integral thermostat type of automatic choke but the BXOV-26 economizer or power jet is vacuum operated while in the EE-16 the jet is mechanically operated by the accelerating pump piston.

**Idle Mixture Adjustment**—Turn idle adjusting needles "17" Fig. 15 or "15" Fig. 16 out for richer idling mixture. Standard adjustment for the 1800 is one to  $1\frac{1}{4}$  turns open; for the 1801 cars 2 to  $2\frac{1}{2}$  turns open.

**Throttle Stop Screw**—Normal or warm idling speed is controlled by the stop screw "F" Figs. 14 and 18. Adjust screw in or out to produce a car speed of not less than 6 miles per hour with a warm engine and wide open choke valve.

**Fast or Cold Idle Speed**—On the model 1800 cars the fast idle speed is automatically controlled by the lift of the fast idle cam and is therefore not adjustable.

On the model 1801 cars the fast idle speed is controlled by the screw "C" Fig. 14 and adjustment is accomplished as follows: With engine thoroughly warm turn fast idle screw "C" Fig. 14 in, until there is just enough clearance between it and lowest step on cam "D" to permit cam to be moved by hand without dragging on end of screw.

To check the amount of vacuum kick choke opening which also affects the fast idle behavior, hold the throttle lever "G" in closed position against the stop screw "F" with the choke valve "B" wide open. Place fast idle screw "C" on the last step "S" of cam as shown, then move choke valve towards closed position with just enough pressure to take

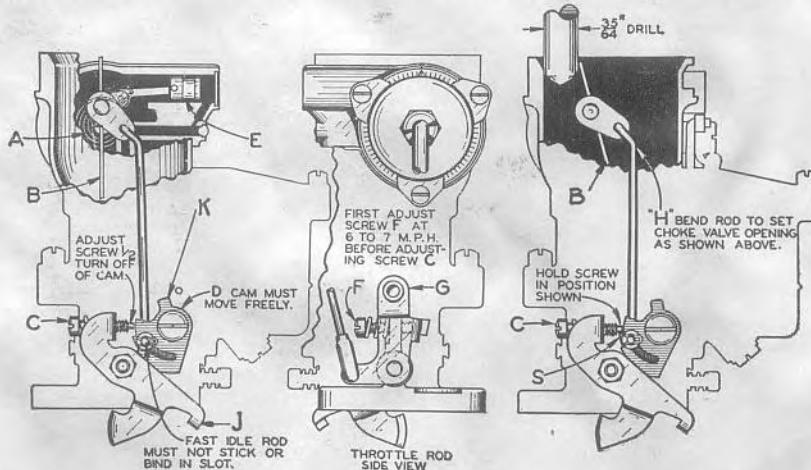
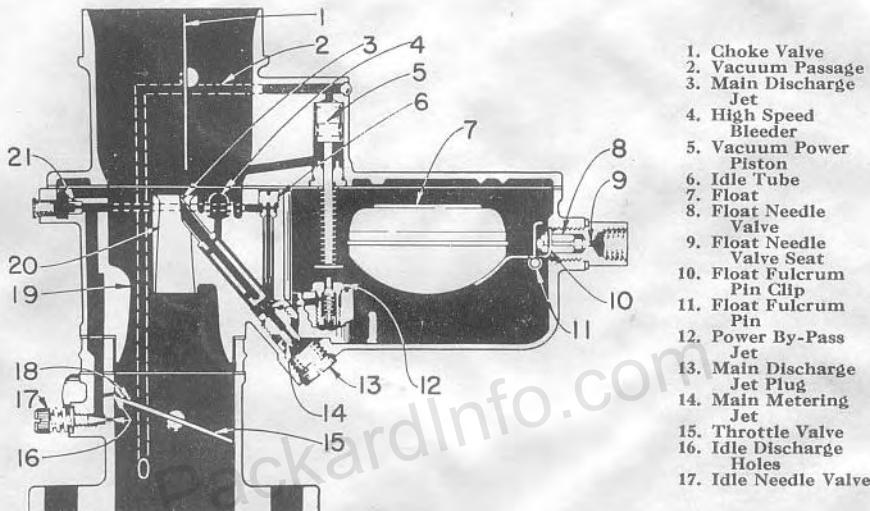


Fig. 14—Views of Carburetor used on 1801, Showing from Left to Right Fast Idle Side, Stop Screw Side and Position for Checking Fast Idle Setting

slack out of linkage. If the distance between edge of choke valve and air horn is now not within the limits of  $\frac{17}{32}$  inch to  $\frac{9}{16}$  inch bend the upper end of choke rod "H" until this dimension is obtained. Bend rod carefully to avoid binding the fast idle mechanism. A  $\frac{35}{64}$  inch drill used as illustrated in Fig. 14 makes an excellent checking gauge.

**Fuel Level**—Recommended fuel level for model 1800 is  $\frac{5}{8}$  inch plus or minus  $\frac{1}{2}$  inch below machined top surface of float bowl with 3 pounds pressure on fuel. Fuel level for 1801 is  $\frac{15}{32}$  inch plus or minus  $\frac{1}{2}$  inch.



- 18. Primary Venturi
- 19. Auxiliary Venturi
- 20. Idle Air Bleeder
- 21. Pump Rod
- 22. Float Chamber Vent
- 23. Piston Conn. Rod
- 24. Pump Duration Spring
- 25. Pump Discharge Nozzle
- 26. Pump Piston
- 27. Pump Piston Exp. Spring
- 28. Pump Inlet Strainer
- 29. Pump Link
- 30. Pump Lever
- 31. Pump Inlet Plug
- 32. Pump Inlet Check
- 33. Pump By-Pass Jet
- 34. Throttle Stop Screw
- 35. Throttle Stop Screw
- 36. Throttle Stop Screw

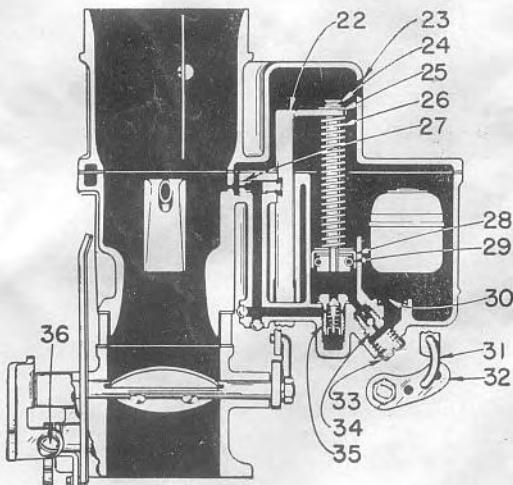


Fig. 15—Schematic Internal Views of BXOV-26 Carburetor Used on Model 1800

**Calibration**—The calibration and parts data below applies to carburetors code "10-39" for the model 1800 and "10-33A" for the 1801. The code designations are stamped on the top of float chamber.

	1800			1801		
	Part No.	Size		Part No.	Size	
Metering jet, standard.....	P-19442	.060"		P-19442	.047"	
Economizer or power jet.....	P-21197	No. 54		P-20752	No. 60	
High speed air bleeder.....	P-24315	No. 70		P-22764	No. 65	
Idle air bleeder.....	P-20750	No. 65		P-23649	No. 60	
Secondary bleeder.....	None	*No. 54		None	No. 38	
Idle tube assembly.....	P-24776	No. 65		P-23663	No. 60	
Idle discharge holes.....	None	Nos. 54-56		None	Nos. 54-58	
Accel. pump piston assembly	P-24039	None		P-24717	No. 54	
(size is for blow-off hole)						
Pump disch. nozzle or tube	None	No. 68			No. 65	
Pump check valve.....	P-18144	None		P-18144	None	
Main discharge jet.....	P-24610	Nos. 28-34		P-23346	No. 32	
Float needle and seat.....	P-24063	.086"		P-23509	.101"	
Hole in throttle valves.....	None	None		None	No. 65	
Pump by-pass jet.....	P-24062	No. 56		In economizer		
Complete set gaskets.....	J-5652G	None		J-5410G	None	
Choke thermostat assembly	P-24626	None		P-24751	None	

**Repair Notes**—Leaking economizer valve will cause excessive fuel consumption. If any mixture is delivered from tube "32" on model 1801 cars at constant speed between 20 to 45 m. p. h. the valve is leaking.

Needle valve should be installed with one corner of triangle down. Accelerating pump on 1800 should deliver 11 c.c. to 14 c.c. of fuel per 10 slow strokes. On the 1801 pump delivery should be 17 c.c. to 21 c.c.

\*In air horn.

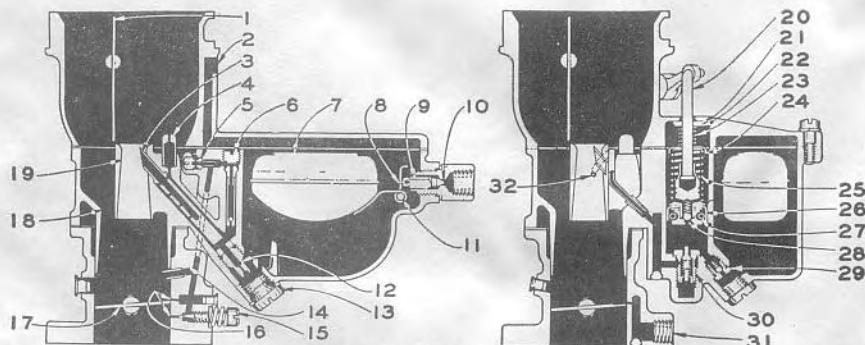


Fig. 16—Schematic Views of Code 10-33A Carburetor Used on Model 1801 Cars

- |                       |                          |                         |
|-----------------------|--------------------------|-------------------------|
| 1. Choke Valve        | 12. Main Metering Jet    | 21. Dust Washer         |
| 2. Float Chamber Vent | 13. Metering Jet Plug    | 22. Retainer Washer     |
| 3. Main Discharge Jet | 14. Secondary Idle Bleed | 23. Dust Washer Spring  |
| 4. High Speed Bleeder | 15. Idle Needle Valve    | 25. Duration Spring     |
| 5. Idle Air Bleeder   | 16. Idle Discharge Holes | 26. Pump Piston         |
| 6. Idle Tube          | 17. Throttle Valve       | 28. Pump Relief Valve   |
| 7. Float              | 18. Primary Venturi      | 29. Pump Inlet Check    |
| 8. Float Needle Clip  | 19. Auxiliary Venturi    | 30. Economizer Jet      |
| 9. Float Needle Valve | 20. Pump Piston Link     | 32. Pump Discharge Tube |
| 10. Float Valve Seat  |                          |                         |

If the tip of main discharge jet or nozzle "3" is wet when engine is idling the fuel level is too high.

It is important that the manifold heat control valve operate freely at all times. Poor idling and delayed action of the automatic choke will result if the valve is frozen in the open position. If frozen in closed position the engine may lack power and will be hard to start when warm.

## Automatic Choke

Note the code number (stamped on top of float chamber) of the carburetor and the number cast on the thermostat cover. On all 1800 carburetor code numbers except 10-39E if the thermostat cover cast number is 5 the "A" mark on cover should register with the index line on the choke housing. If the thermostat cover number is 12 the "A" should be two (2) graduations on the rich side of the index line on housing. However, if the carburetor is a code 10-39E it should carry only a number 12 thermostat which in this case should be installed with the "A" in register with the index line on housing. On all 1801 carburetors "A" should register with index line on housing. After these points have been checked, proceed as follows:

1. Remove carburetor air cleaner and thermostat cover assembly Fig. 17 and test operation of the choke valve. When closed by hand it should drop open freely without the slightest lag. If it does not drop freely remove and clean the vacuum piston and its cylinder with alcohol or acetone and do the same to choke valve shaft and bearings if necessary. Clean all of the choke passages with compressed air.

**Caution**—Do not oil any part of the piston, cylinder or shaft.

2. If mixture is still too rich or too lean during warm-up period, decrease or increase the thermostat spring tension  $\frac{1}{2}$  graduation at a time after loosening the cover screws. Satisfactory results should be obtained by changing the adjustment not more than 2 graduations from the original. If results are not obtained within these limits, renew the thermostat assembly.

**Choke Unloader**—If for any reason the engine should become flooded, the choke valve can be partially opened by depressing the accelerator pedal all the way down. This action admits sufficient air to clear the manifold and is controlled by a lug on either the throttle valve lever or the fast idle lever.

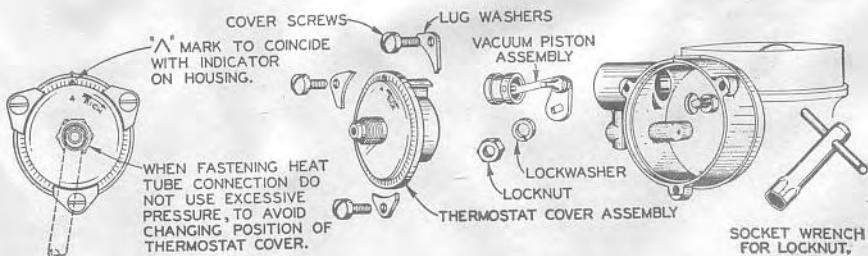


Fig. 17—Exploded View of Automatic Choke Used on 1801.

To check this adjustment on the model 1800 cars proceed as follows: Hold throttle stop screw "F" Fig. 18 on the low lobe of the fast idle cam and against the stop, then move choke valve towards closed position. If the distance between edge of valve and air horn is now not within the limits of  $\frac{11}{32}$  inch plus or minus .015 inch, bend rod "IR" at the point indicated by arrow until this dimension is obtained.

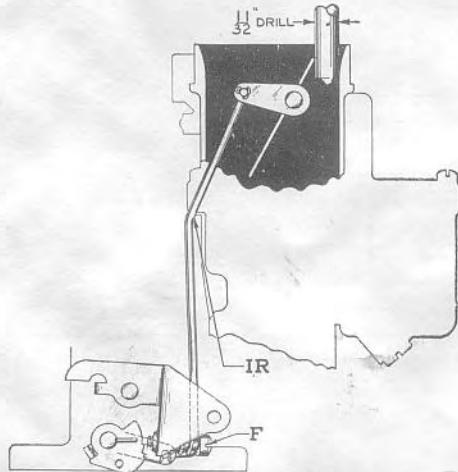


Fig. 18—Method of Checking Choke Unloader on Model 1800

To check the choke unloader on the 1801 cars make sure that ear "J" on fast idle lever contacts the ear "K" and opens choke valve .156 to .187 inch when throttle is wide open. Bend ear "J" to obtain this setting. When making this test be sure to open throttle from the throttle lever side of carburetor not from the fast idle lever side. Refer to Fig. 19.

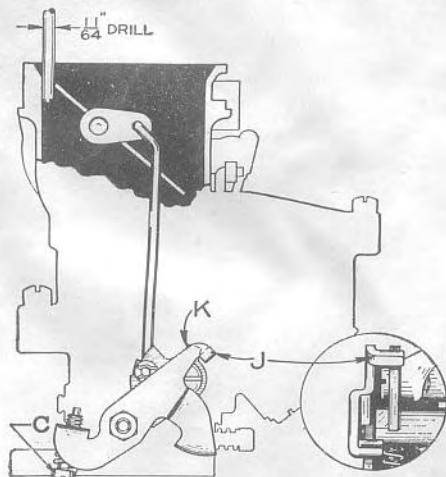


Fig. 19—When Checking 1801 Choke Unloader, Throttle Should be Opened Only From the Throttle Lever Side of Unit

# Electrical System

## Battery

The positive battery cable is grounded to the frame and the negative wire connects the battery with the starter motor. The battery is located in a protected cradle under the front seat and can easily be serviced by removing the cushion and floor plate.

The electrolyte in the battery should always be maintained at the proper level. Distilled water, or if not available, rain water, should be added to each battery cell until the solution is  $\frac{1}{4}$ " above the top of the plates. Use a hydrometer to gauge the condition of the battery which when fully charged should show a reading of 1.280 gravity.

## Starting Motor

The starting motor is fitted to the front face of the flywheel housing on the left side of the engine. It is controlled by a magnetic relay switch on top of the starting motor, operated by a remote button on the instrument board. The starter is equipped with a Bendix shifting mechanism, the pinion of which engages with a steel ring gear shrunk on the flywheel. There are 140 teeth in the starter ring gear on flywheel.

## Manual Control of Starter Switch

In case the remote control on the instrument board fails to operate the starter, due to a broken switch or defective contacts, the main switch contact can be made by pressing the plunger located under the small metal cap in the end of the magnetic switch on top of the starter.

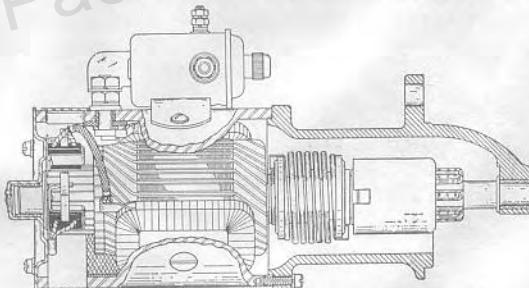


Fig. 20—Auto-Lite MZ-4078 Starter Used on Model 1800

**Repair Data**—The starter used on model 1800 cars is a 4-pole type Auto-Lite model MZ-4078 with Bendix drive. Stalled torque 11.8 pounds-feet at 560 amperes and 4 volts. Running free at 4900 r.p.m. 70 amperes at 5.5 volts. Armature shaft maximum end play  $\frac{1}{16}$  inch. Renewal of ground brush requires re-riveting of holder. Refer to Fig. 20.

The starter on the 1801 cars is a two-pole type Auto-Lite model MAW-4018 and is the same unit as used on 1939 Packard model 1700 and some model 1701 cars. Refer to section 29 page 17 of 1938-1939 Shop Manual for test data.

## Spark Plugs

Spark plugs are either AC-104 or Champion Y-4, size 10 m.m. Tightening leverage should not exceed 50 inch-pounds. Gap should be .028 inch plus or minus .002 inch for all cars. In readjusting the gap bend the side electrode—never bend the center electrode.

## **Ignition Distributor**

The distributors used on the 1800 and 1801 cars are of the single breaker type employing a centrifugal governor for automatic timing control.

Test and repair data for the Auto-Lite distributors used on model 1800 cars are: Breaker point spring tension 17 to 20 ounces. Breaker point gap .020 inch. Governor advance on the IGW-4143 starts at 350 distributor r. p. m.;  $4^\circ$  at 800 r. p. m. and attains a maximum of  $8\frac{1}{2}$  distributor degrees at 2000 distributor r. p. m. The IGW-4143A governor advance starts at 350 distributor r. p. m.:  $5^\circ$  at 800 r. p. m. and attains a maximum of  $9\frac{1}{2}$  distributor degrees at 1600 r. p. m. of the distributor. A variation of  $\frac{3}{4}$  of a degree above or below these figures is allowable. The condenser of .20 to .25 Mfd. capacity is located on outside of housing. **Caution**—The 4143A distributors are to be used **only** on late production cylinder heads stamped 354121 or 354674B on top of head casting.

Test and repair data for the distributors used on 1801 cars are: Breaker point spring tension 17 to 20 ounces. Breaker point gap .015 inch. Governor advance on the IGP-4501 starts at just above 300 distributor r.p.m.;  $3^\circ$  at 400 r.p.m. and attains a maximum of  $8^\circ$  distributor degrees at 1200 distributor revolutions per minute. Governor advance on the IGP-4501A starts at just above 300 distributor r.p.m.;  $6^\circ$  at 800 r.p.m. and attains a maximum of  $11\frac{1}{2}^\circ$  at 1550 distributor revolutions per minute. A variation of  $\frac{3}{4}$  of a degree above or below these figures is permissible. The condenser of .20 to .25 Mfd. capacity is located on outside of housing. IGP-4501 and IGP-4501A are identical except governor advance.

## Ignition Timing

Regardless of the method used make sure that the breaker points are clean, aligned with each other and adjusted to a gap of .020 inch on model 1800; .015 inch on 1801 cars before retiming. With fuel compensator set at zero spark should occur in No. 1 cylinder as per data in table below. Each flywheel graduation is 2 degrees and the mark "UDC1" indicates top center. Use inspection hole in housing below the starter motor. The firing order for model 1800 is 1-5-3-6-2-4; for the 1801 it is 1-6-2-5-8-3-7-4.

CAR	HEAD	B.T.D.C.
1800	All	$4\frac{1}{2}^\circ$ to $6^\circ$
1801	Std. 6.4	$6\frac{1}{2}^\circ$ to $8^\circ$
1801	H. C. 6.85	$5\frac{1}{2}^\circ$ to $7^\circ$

Use high limit timing on carbon-free engines with regular fuel also on engines operating on premium fuel that are not badly carbonized.

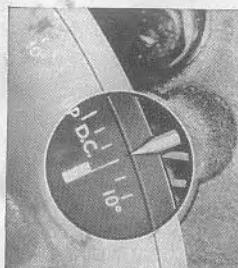


Fig. 21—Each Flywheel Graduation Equals Two Degrees

## Generator

The Auto-Lite GEA-4801A generator is a shunt wound, two pole machine of clockwise rotation at the drive end. Current and voltage control is by means of an external regulator mounted on the dash. The maximum output is 35 amperes at 8 volts. Test specifications are as follows: Brush spring tension 42 to 53 ounces with scale hooked into small hole in the turned up lip of the brush spring arm directly above where it rests on the brush. Field current 1.57 to 1.75 amperes at 6 volts. Motoring free 4.45 to 4.9 amperes at 6 volts. Because of the danger of armature burning out do not run the generator on open battery circuit at speeds above 1500 r.p.m. or for more than a few minutes on open circuit at any speed.

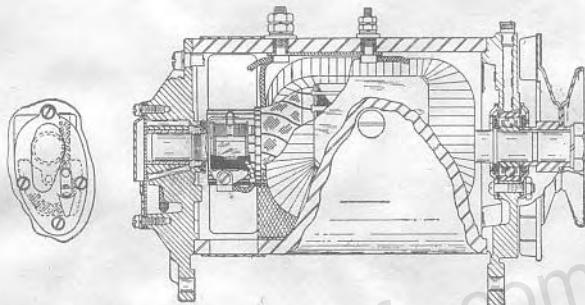


Fig. 22—The Generator is a 35 Ampere Shunt Wound Unit

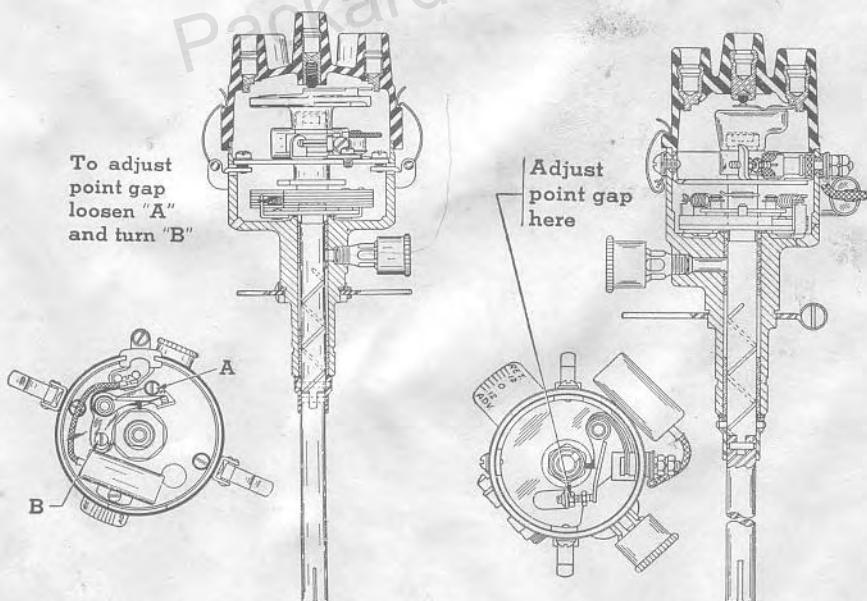


Fig. 23—Right View Shows the Auto-Lite IGW-4143 Distributor for Model 1800.  
Left View is the IGP-4501 Unit used on Model 1801.

## Generator Regulator

Adjustment of the VRP-4002A and 4201A-1 regulators is the same as shown for the 1939 Super Eight unit VRB-4012A on page 95 of the 1938-1939 Shop Manual except that the specifications shown below should be followed.

Voltage unit armature air gap should be .048" to .052".

Operating voltage should be 7.36 to 7.66 volts.

Current unit armature air gap should be .034" to .038".

Operating amperage should be 34 to 36 amperes.

Cut-out points open at 6 amperes maximum discharge.

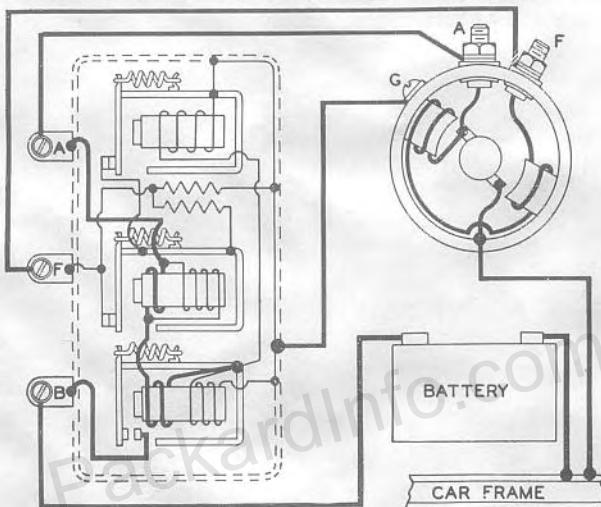


Fig. 24—Internal Wiring VRP-4002A Generator Regulator

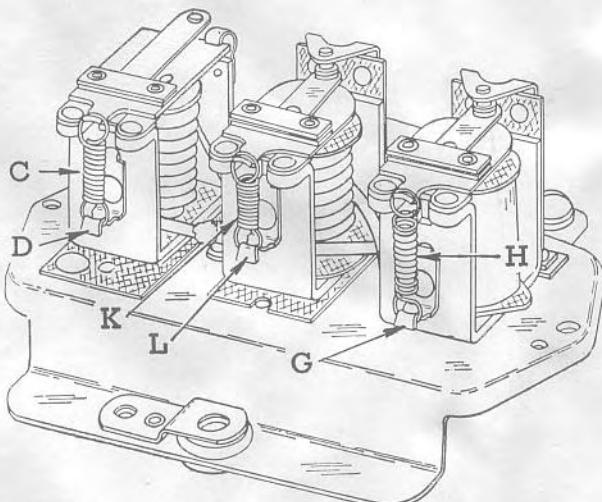


Fig. 25—Spring Hanger "D" Controls Cut-Out Voltage. Hanger "L" controls Generator Amperage and Hanger "G" Charging Voltage.

## Fuses and Circuit Breaker

A thermostatic type of overload relay or circuit breaker is attached to the lower side of the lighting switch shown in Fig. 26. It protects the headlamp wiring circuit in case of overload or short circuit.

Two 20 ampere fuses mounted in clips on the switch frame protect the dome light and accessories circuit (cigar lighter, heater, spotlight, etc.) and a similar fuse enclosed in a socket in the tail lamp line near the light switch acts as a safeguard for the tail lamp circuit. If the tail lamp fuse blows, the instrument light is extinguished. Clock and radio are protected by separate 2 ampere and 14 ampere fuses respectively. These are located in the feed wire to each unit. A 14 ampere fuse is mounted on the windshield wiper motor.

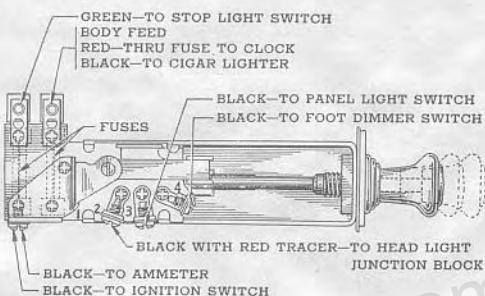


Fig. 26—Main Lighting Switch and Wiring Connections

## Horns

Sparks Withington electric air horns are mounted on the engine and operated by a relay attached to the horn bracket. To remove the horn button, press down, rotate either to the right or left and lift out.

For complete data on minor and major horn adjustments turn to section 37, page 22 of the 1938-39 Shop Manual.

## Headlamps

The 1940 Packard cars carry a new headlighting system known as "Sealed Beam" in which the light source, the reflector, the lens and the gasket are all assembled in one securely sealed unit. When the filament burns out the entire unit is discarded and a new one installed, thereby assuring maximum lighting efficiency throughout the entire life of the car.

This lighting system represents the coordinated effort of the automobile and headlamp manufacturers and has the endorsement and approval of the American Association of Motor Vehicle Administrators, Society of Automotive Engineers, Automobile Manufacturers' Association and organizations interested in National Safety.

"Sealed Beam" headlamps provide two separate and distinct beams, giving considerably more light than has been produced in the past:—

1. A country (upper) beam designed to illuminate the road evenly for a considerable distance ahead of the car. This beam is for use on the open highway when no other vehicles are approaching.

2. A traffic or lower beam is also provided which is low enough on the left side to avoid glare in the eyes of the oncoming drivers. It is intended for use on heavily traveled highways and should always be used when meeting other vehicles. This beam is designed so that it does not throw any dazzling light into the eyes of the approaching driver under any condition of car loading. At the same time the distribution of light is such that the right side of the road is illuminated as far ahead as is practicable without causing glare on curves.

These headlamps have been designed to insure the motorist of maximum safety and comfort for night driving, but to obtain this safety for himself and for others the motorist must be willing and anxious to use his headlighting equipment in the manner intended. Good drivers are always courteous.

The operation of the headlights is a simple one, allowing the motorist to use either the country (upper) or the traffic (lower) beam, as traffic and road conditions demand, by means of a conveniently located foot switch. By pulling the light button on the instrument board to the second or last position, either the country (upper) or traffic (lower) headlamp beams are obtained alternately by operating the foot switch.

When the country (upper) beams are lighted a red pilot bulb in the instrument cluster will be illuminated, making it convenient for the driver to determine when this beam is in use. **Never pass an approaching car with this red light burning.** Always use the traffic (lower) beam when meeting.

By pulling the light button to the first position the parking lamps on the fenders, license plate light and both tail lights are lighted. The parking lamps consume a very small amount of current.

**Renewal of Light Unit**—Two types of "Sealed Beam" headlamp units are available. One of these types is made entirely of hard glass and the other is a composite unit consisting of a metal reflector and a glass lens. Both are completely interchangeable from the standpoint of electrical connections, beam patterns and physical dimensions.

No dust or moisture can get inside the "Sealed Beam" headlamp unit because the reflector and lens are sealed together permanently. This feature eliminates cleaning except for wiping off the outside of the lens and provides proper focusing and maximum light efficiency during the life of the car. The reflector units in both the right and left-hand headlamps are identical and are so designed that they cannot be installed improperly, nor can the electrical connections be attached in any but the right way. This feature makes replacement of a unit extremely simple, as follows:—

1. Remove headlamp door rim as shown in Fig. 27.
2. Loosen but do not remove the three screws holding the retaining ring as in Fig. 28. Do not disturb the aiming screws at the top and on the left side of the unit.
3. Remove retaining ring as shown in Fig. 29 by rotating to the left, allowing the reflector unit to be removed.
4. Remove the reflector plug from the reflector unit. Refer to Fig. 30.
5. Install a new unit by reversing above operations.

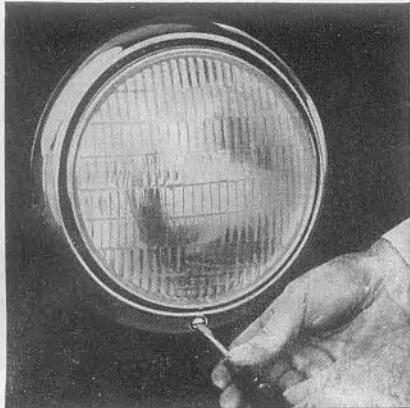


Fig. 27—Removing the Headlamp Outer Rim

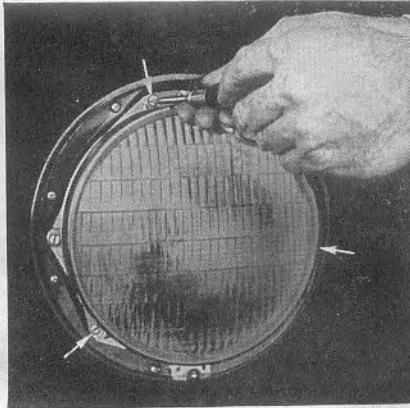


Fig. 28—Three Screws Hold the Retainer Ring in Place

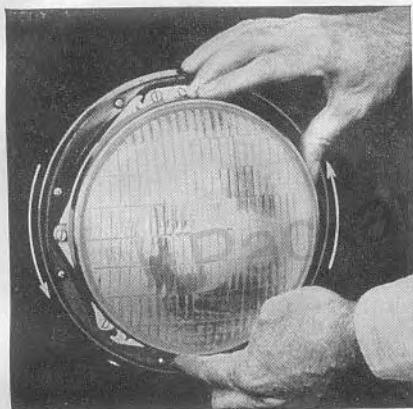


Fig. 29—Turn Retainer Ring Slightly to Release

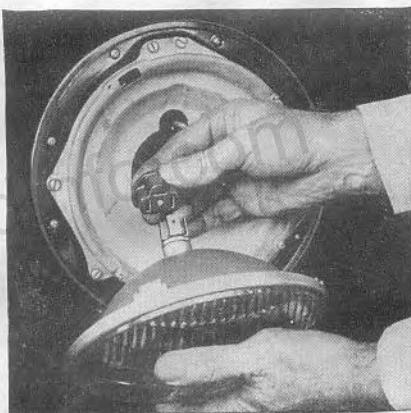


Fig. 30—Reflector Unit is Now Free from Lamp Body

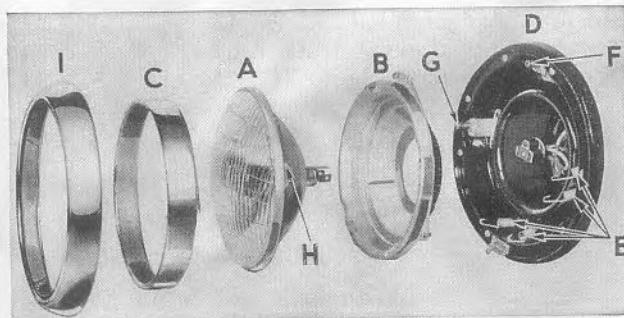


Fig. 31—Parts of the Headlamp Assembly

I—Lamp Rim  
C—Retainer Ring  
A—Reflector Unit

B—Sub-body  
E—Springs

F—Vertical Adj. Screw  
G—Horizontal Adj. Screw

**Headlamp Aiming**—For best road lighting results the aiming screen should be arranged as follows: Measure the height of lamp centers above floor level and stretch a ribbon or mark a line across the screen at the level of a point 3" below the headlamp centers. If your state requires a loading allowance draw this horizontal line "A-A" Fig. 34 below the above mentioned line, by the amount required by your particular state. Locate center of car on screen by sighting past left edge of rear window divider strip and left edge of windshield divider then past the right edges of each, the point midway between these two being the vertical center line which should be temporarily indicated on the screen. Measure the distance between the centers of the lamps then place vertical ribbon marks or draw vertical lines "B-B" and "C-C" Fig. 34 at half this distance on either side of the center line.

Place the car on a level stretch and set the previously arranged screen 25 feet ahead of the car. Pull lighting switch knob out to last notch and depress foot switch until the upper or country beam is lighted. When the upper beam is on, the lower filaments on both lamps are illuminated. Now cover the right lamp and turn the vertical adjusting screw "F" Fig. 32 of the left lamp until hot spot is centered on line "A-A" and screw "G" until centered on line "B-B." Now cover the left lamp and aim right lamp beam until it is similarly centered on lines "A-A" and "C-C." No further adjustment is needed for the traffic or lower beam.

### Lamp Bulbs

Location	Candle-power	Mazda No.	Per Car
Front lamp—1800.....	35-45 watts	GM	2
Front lamp—1801.....	30-40 watts	GE	2
Front fender lamp.....	21-3	1154	2
Instrument board panel light.....	1½	55	3
Glove compartment light.....	0.8	51	1
Instrument board reading light.....	1½	55	2
Rear reading light.....	6	81	1
Headlamp beam signal light.....	0.8	51	1
Stop and tail lamp, early production .....	21-3	1158	2
Stop and tail lamp, late production .....	21-3	1154	2
Stop lamp, trunk rack equipment.....	15	87	2
Tail lamp, trunk rack equipment.....	3	63	2
Instrument board radio control lamp...	1½	55	1 or 3
Dome light.....	6	81	3
Heater indicator and defroster.....	0.8	51	2
Fog light.....	32	1321	1
License plate lamp.....	3	63	1
Backing light.....	15	87	1
Spot light.....	32	1323	1
Clock light.....	1½	55	1
Trunk compartment.....	1½	55	1
Rear compartment radio light.....	0.8	51	2
Speedometer pointer light.....	1½	55	1

## Econo-Drive Controls

An extra winding and set of points in the Econo-Drive control relay prevents stopping of the engine in case of solenoid failure and the switch in the lock-out knob prevents engagement of Econo-Drive when reversing at speeds above the cut-in point. Circuits and wiring are shown on page 41.

The over-travel of the accelerator pedal is utilized to operate the Econo-Drive kick-down switch. When carburetor throttle is just wide open the end of switch plunger should just contact the tappet screw "T" in accelerator lever, shown in Fig. 33. Adjust screw if not to these specifications. Accelerator pedal must have enough over-travel to close switch before bottoming on floor boards.

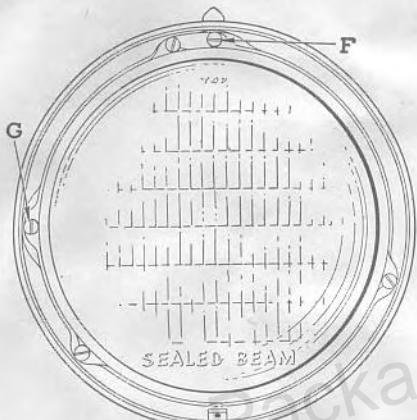


Fig. 32—Vertical and Horizontal Aiming of Headlamps Is Controlled by Screws "F" and "G"

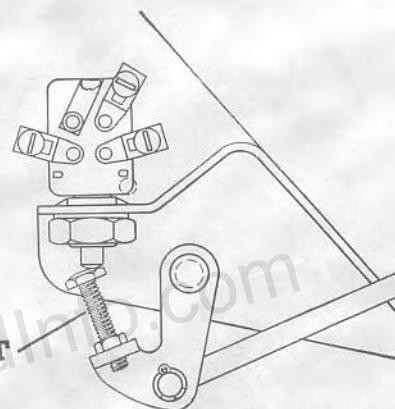


Fig. 33—Screw "T" Should Just Contact Switch Plunger When Throttle Is Just Wide Open

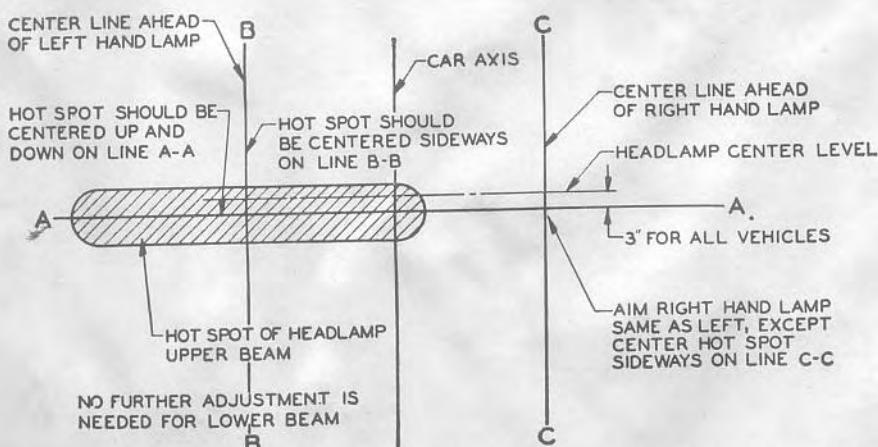
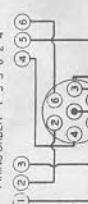


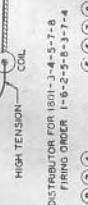
Fig. 34—Left Lamp is Correctly Aimed When Hot Spot is Centered on Lines "A-A" and "B-B" as Shown

TRANSMISSION OVERDRIVE WIRING DIAGRAM

DISTRIBUTOR FOR 1800  
FIRING ORDER 1-5-3-6-2-4



DISTRIBUTOR FOR 1800  
FIRING ORDER 1-6-2-5-8-3-7-4



GLOVE COMPARTMENT LIGHT

CLOCK

HEADLIGHT

READING LIGHT

IGNITION SWITCH

CIGAR LIGHTER

STARTER BUTTON

READING LIGHT

LIGHTING SWITCH

AMMETER

GASOLINE GAUGE

PANEL & READING

SPEEDOMETER LIGHT

BRIGHT LIGHT INDICATOR

PONTER LIGHT

OIL GAUGE

TEMPERATURE GAUGE

CURRENT VOLTAZ. REGULATOR

FOOT BRAKE

SWITCH

STOP LIGHT

SWITCH

HORN

BRAKE

SWITCH

HEADLIGHT

FUNCTION

BLOCK

ACCESSORY WIRING DIAGRAM

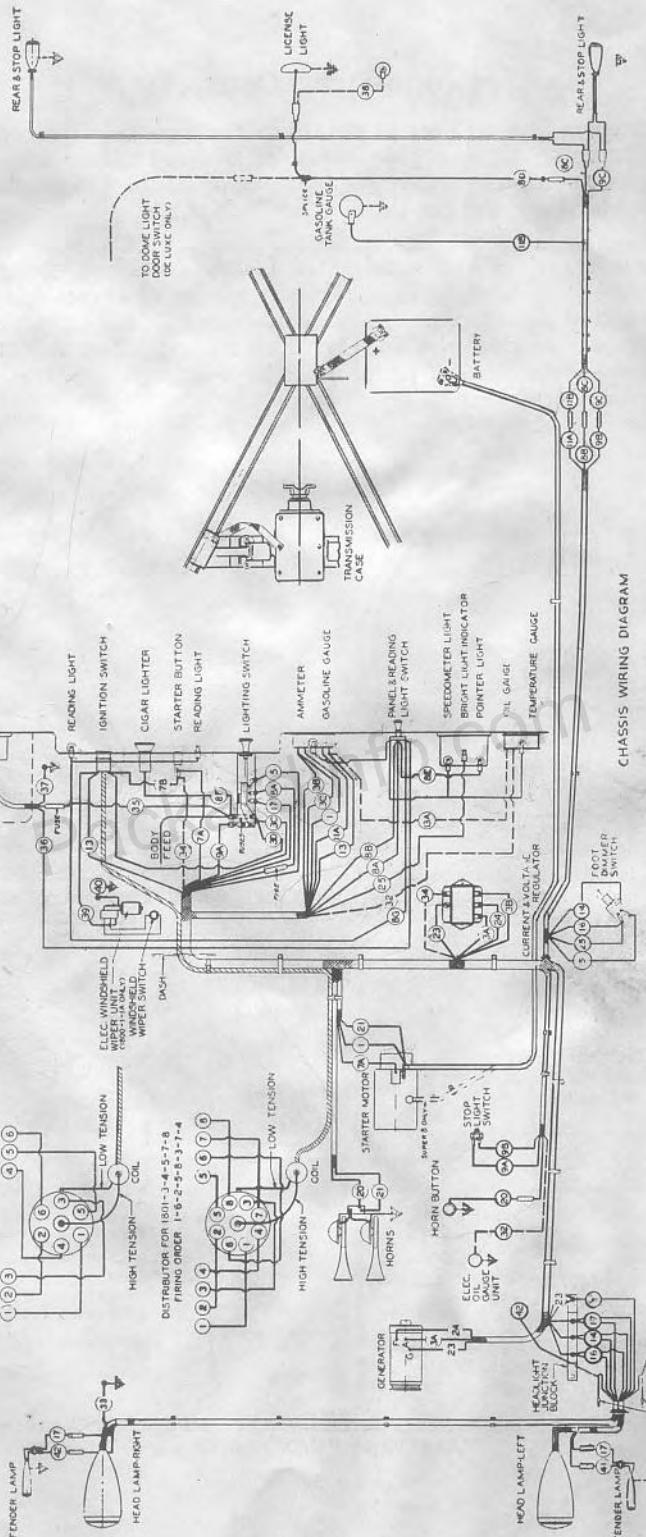


Fig. 35—Chassis Wiring Diagram. Does Not Include Body, Econo-Drive or Accessory Wiring

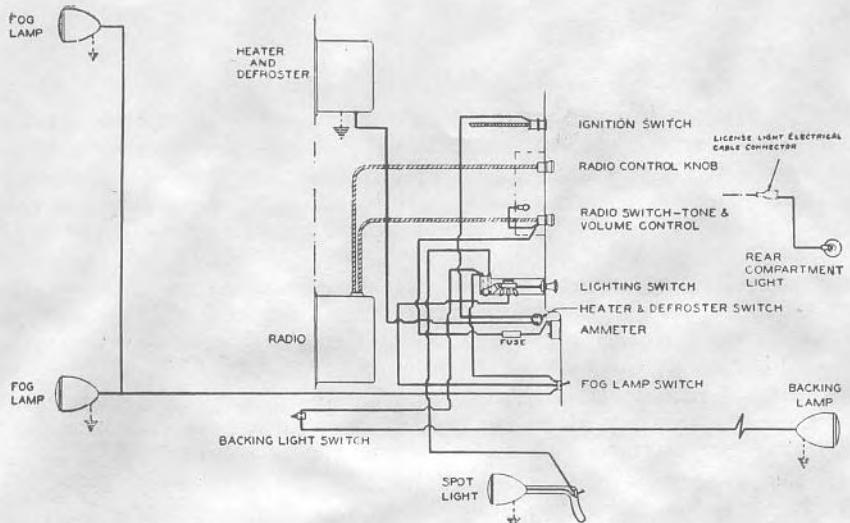


Fig. 36—Accessory Wiring Diagram

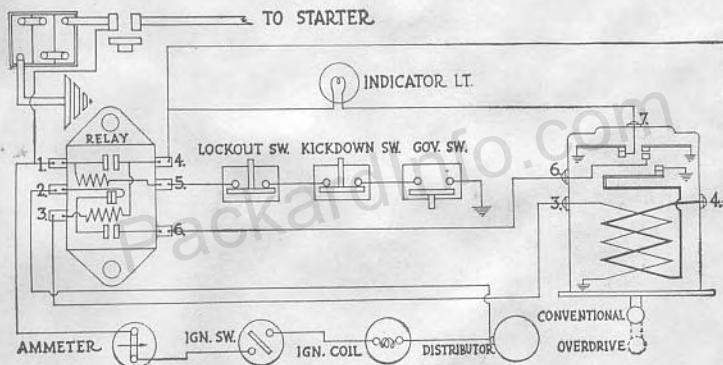


Fig. 37—Circuits of Econo-Drive Control Schematic

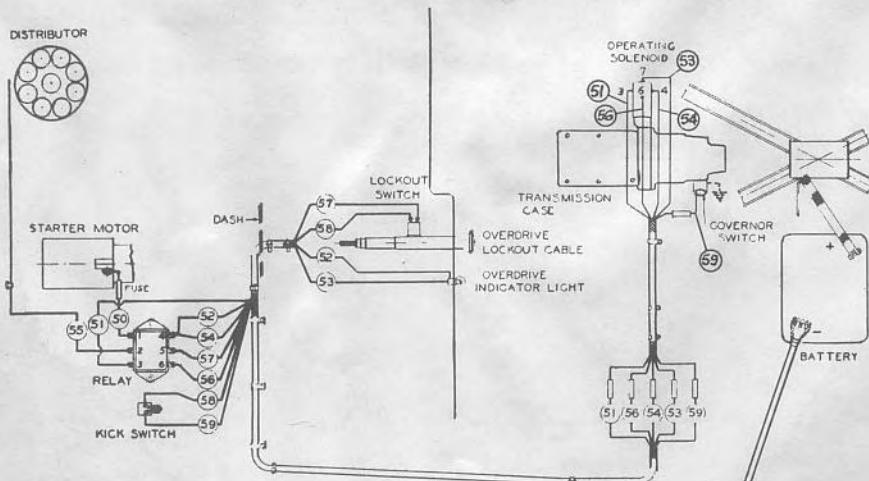


Fig. 38—Econo-Drive Wiring Diagram

## Windshield Wiper

The Stewart-Warner series 645 electric windshield wiper is serviced on both a repair and exchange basis.

**NOTE**—If control button is turned on and then immediately turned off the wiper may continue to operate for several strokes until the thermostat becomes hot. This action is normal and is a safety feature of the design.

**Blade Replacement**—Wiper blades are removed by holding wiper arm away from glass with one hand and pulling end of blade with the other hand. Unless the operation is performed carefully the spring inside the wiper arm may be stretched out of shape.

**Parking and Position Adjustment**—If blades do not park evenly at base of windshield when control switch is turned off, or if one blade is out of synchronism with the other, proceed as follows:

1. Remove both wiper blades and arms.
2. Loosen adjusting screws "B" Fig. 39, at end of each motor link. Adjust right hand unit (viewed from rear of car) by pushing transmission link "A" towards electric motor as far as it will go then pull it out  $\frac{1}{16}$  of an inch and lock the adjusting screws.  
Repeat the operation at the left-hand unit but instead of pushing the transmission link towards the electric motor, pull it out as far

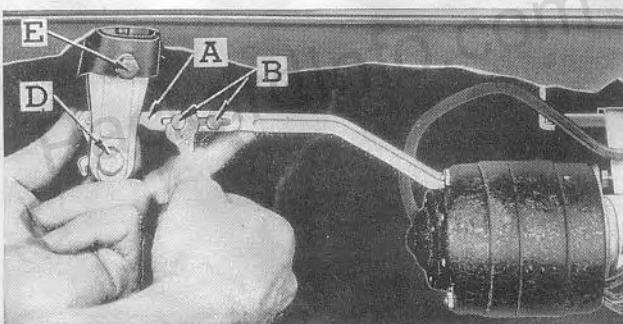


Fig. 39—Synchronizing the Wiper Blades by Adjustment of Links

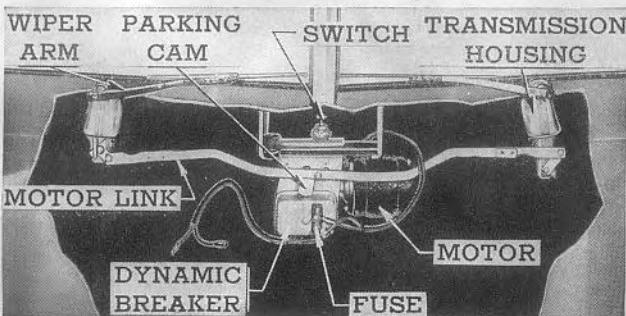


Fig. 40—Installation of Electric Windshield Wiper Assembly

as it will go then push it in towards the electric motor  $\frac{1}{16}$  of an inch and tighten the adjusting screws.

**Removal of Slack**—The only adjustment on the transmission housings is to take up slack in the internal connectors as follows: Make sure that rods are hooked into connectors and that locking screws "B" Fig. 39 are removed from each unit. Now loosen nut "D" and push down the connectors on both sides as shown in Fig. 42 or pull down on link "A" until all slack is removed then tighten nut "D." It is not necessary to remove the transmission housings to make this adjustment.

**Renewal of Transmission Housing**—To remove either of the transmission housings remove wiper arm, also screws "B" and upper nut "E." Do not disturb the lower adjusting nut "D." Remove assembly.

Renewal of transmission gears requires the use of a small spanner wrench such as the Stewart-Warner T-124928. After reassembly and before connecting the motor links be sure to remove slack from the internal connectors as outlined in the preceding paragraph.

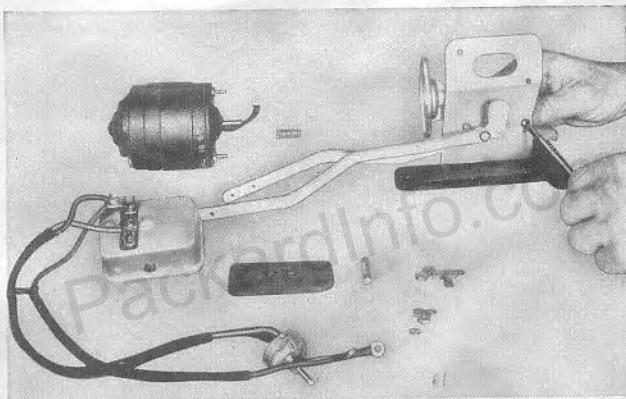


Fig. 41—Sub-assemblies of the Electric Wiper

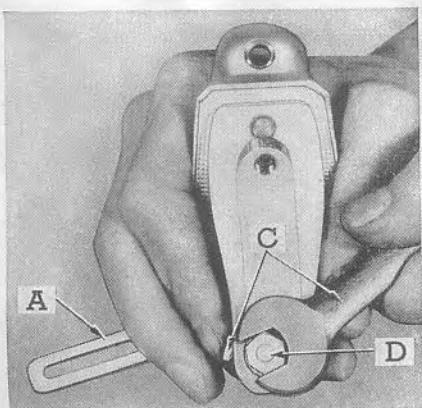


Fig. 42—Removing Slack from Wiper Arm Connectors

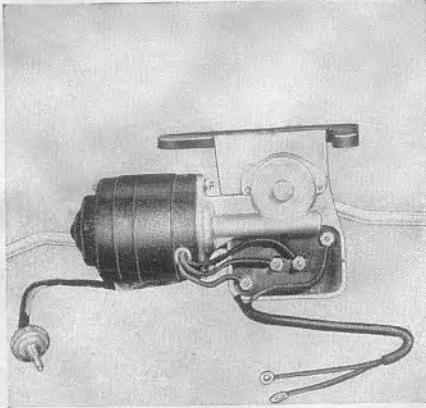


Fig. 43—External Wiring of Motor and Breaker Assembly

# Clutch and Transmission

The only external adjustment of the semi-centrifugal clutch is at the pedal linkage. Pedal should have  $1\frac{1}{2}$  to  $1\frac{3}{4}$  inches of free travel measured between pedal pad and floor board. Adjust by means of the nut "D" on pedal rod shown in Fig. 44.

## Notes for the Mechanic

Clutch construction is the same as used on 1700 and 1701 cars. For repair data on model 1800 clutch refer to section 45 page 26 and for 1801 to section 144 page 69 of the 1938-1939 Shop Manual.

The transmission units except for detailed changes in the control mechanism are the same as used on 1700 and 1701. For repair data refer to 1939 data on pages 26, 27 and 28 in the 1938-1939 Shop Manual.

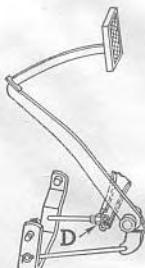


Fig. 44 (Above) — Clutch Pedal Should Have  $1\frac{1}{2}$  to  $1\frac{3}{4}$  Inches Free Travel

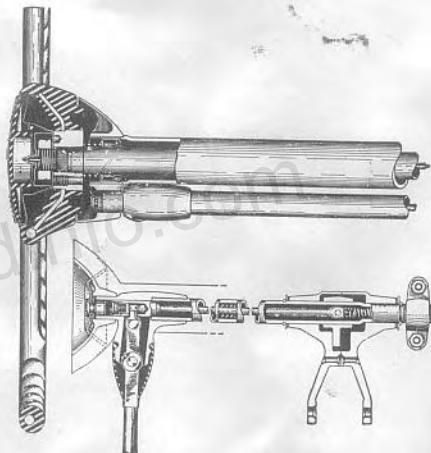
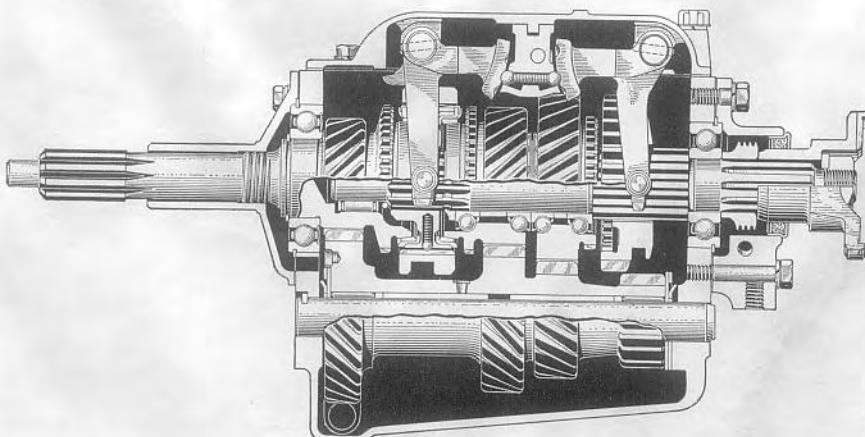


Fig. 45 (Right) — Section Through Steering Column Gearshifter

Fig. 46 (Below) — First and 2nd Speed Gears of Transmission Are Constantly in Mesh



## Econo-Drive Unit

The Econo-Drive unit steps up the propeller shaft speed 38.5 per cent with respect to the engine speed which is the equivalent of reducing the engine speed 27.8 per cent. To find final ratio in Econo-Drive multiply the axle ratio by .722.

The 1940 edition of the Econo-Drive used on Packard 1800 and 1801 cars is improved and internally simplified as compared to the unit used on the 1700 and 1701. The differences between the 1939 and 1940 units are described hereafter.

The fundamental difference is that the centrifugal clutch, with its pawls, springs, etc., which formerly picked up the overdrive gear train, is omitted.

The slotted hub, which carries the sun gear of the planetary train together with its sliding pawl and solenoid has now taken over the function of engaging and disengaging the overdrive. The car speeds at which the sliding pawl engages and disengages are determined by a separate centrifugal governor switch, mounted externally at the rear of the Econo-Drive housing and driven from the speedometer drive gear. Refer to Figs. 47 and 48.

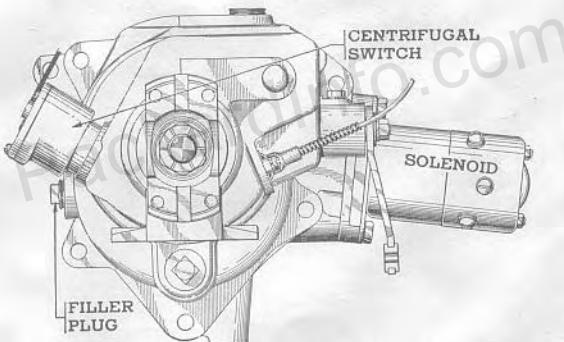


Fig. 47—Rear View of Econo-Drive. The Centrifugal Switch Which Controls Cut-in Speed Is Not Adjustable Except by Changing the Governor Weight Springs

The new solenoid operates in exactly the opposite direction to the old one, so that when the new solenoid is energized it pushes the pawl in, instead of pulling it out, as did the last year's type.

When the car is stationary and at all speeds up to that for which the governor is set, the pawl is in the out position, being held there by a spring. When the car reaches the road speed for which the external governor is set, the governor energizes the solenoid, causing it to push the pawl in towards the slots of the sun gear head where it is caught and held by the balk ring. When the foot is momentarily raised from the accelerator the slowing down of the engine causes the sun gear to rotate in the opposite direction bringing the opening in the balk ring under the pawl and allowing it to engage the slots in the sun gear, thus holding the sun gear stationary, and picking up the Econo-Drive train. The

solenoid main coil is then automatically cut out leaving only a small holding coil energized, this being just strong enough to overcome the pressure of the spring on the pawl stem, and to keep the pawl seated. The holding coil draws a very light current, but is on all of the time that the car is in Econo-Drive.

For forcing back out of Econo-Drive to direct, the throttle is pushed beyond the wide open position, just as in the previous design. This breaks the circuit of the small holding coil and cuts out the ignition for an instant which permits the spring on the stem of the solenoid to withdraw the pawl from its slot in the sun gear head, thus setting the sun gear free, and giving a direct drive.

When the lock-out knob on the dash is pulled the movement of the Econo-Drive shift rail pushes an interlock plunger over into a notch in the side of the pawl, thus preventing it from operating during the period while the car is driven in conventional gear.

The two steel wear plates which formerly formed guides for the pawl are omitted. The bearing mounting at the rear of the Econo-Drive main shaft now consists of one double-row unit "R" which is pre-loaded within itself, thus eliminating the former spacer and preloading washer.

The overrunning clutch construction is practically the same as before but owing to the omission of the centrifugal pawls the rectangular windows have been omitted from the sliding sleeve.

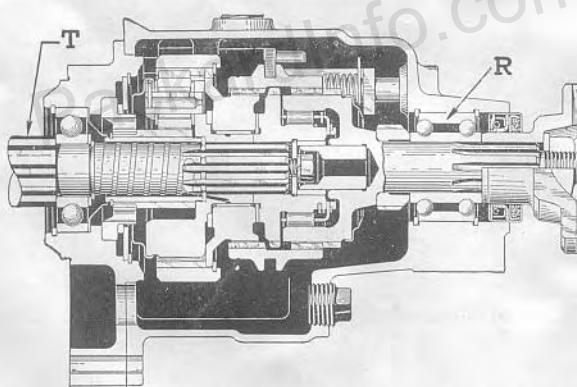


Fig. 48—Sectioned Econo-Drive Unit Which is Bolted to End of Transmission.  
"T" is a Continuation of the Transmission Mainshaft

**Repair Notes**—The external centrifugal governor is calibrated to cut in the Econo-drive at 22 m.p.h. and cut out at 17 m.p.h. approximately. The governor is non-adjustable. Do not shim the governor cover and do not change the spring tension by stretching. If owner insists on higher cut-in speed secure 30 m. p. h. governor from the factory.

It should be remembered that the mainshaft rear bearing "R" requires no preloading and also that the external centrifugal clutch pawls have been omitted. The lock-out knob should clear the knob stop  $\frac{1}{8}$  inch when pushed all the way in.

# Rear Axle, Universals

The rear axle used in Packard cars is a semi-floating unit with hypoid driving gears. The housing cover is welded in place. The driving pinion carries only a bearing adjustment. The pinion mesh position is fixed and non-adjustable. Wheel bearings are semi-permanently lubricated due to the large lubricant reservoir formed by the double oil seals at outer end of each shaft. Standard ratio on 1800 without overdrive 4.36, with overdrive 4.55; standard on 1801 without overdrive 4.09, with overdrive 4.36; standard on 1801A commercial chassis 4.7.

Pinion and differential bearings on the 1801 are same as 1700 and 1701. Bearings in the 1800 are not interchangeable with previous models.

## Notes for the Mechanic

**Pinion Shaft Bearings:** Bearings should be adjusted to the same preload drag of 25 to 30 inch-pounds as used on 1939 models by means of the self-locking flange nut on the pinion shaft.

To adjust preload, draw up the nut until you feel the spacer start to buckle. Check scale pull required to rotate pinion shaft. If pull is less than 25 inch-pounds, tighten nut further until this amount of drag is secured. Refer to pages 35 and 36 of 1938-1939 Shop Manual.

**Important:** Readjust the preload, as just outlined, every time the universal flange nut is loosened or removed. Readjust with both wheels jacked off the floor or with carrier removed.

**Differential side bearings** should be preloaded to a .010" to .012" spread of the bearing support pedestals. To adjust spread, proceed as follows: Loosen each side bearing cap just slightly then back off the right hand (viewed from rear) bearing adjusting nut until ring gear mount is loose in bearings. Make sure that left hand adjusting nut is backed out far enough to provide some backlash between ring and pinion gear. Using a large outside caliper and a .010" feeler blade, caliper from one cap boss to

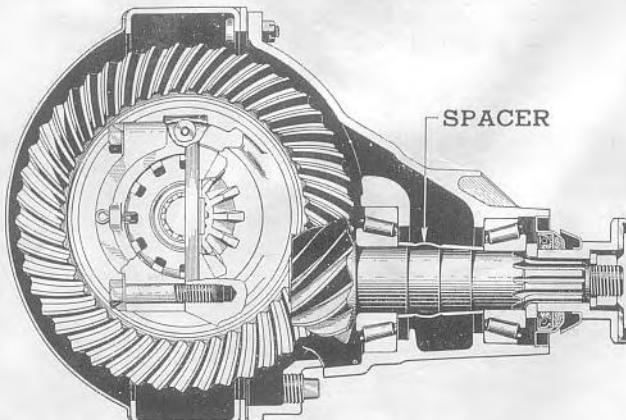


Fig. 49—Model 1800 Differential Carrier. The Unit Used on 1801 Cars is Larger But of Similar Design

the other with the .010" feeler blade interposed between one of the machined bosses and the caliper as shown in Fig. 51. Lock the caliper at this setting. Now tighten the right hand bearing adjusting nut until the previously adjusted caliper (minus the .010" feeler) will just slide over both cap bosses. This gives the desired .010" spread.

Now check backlash between pinion and ring gear teeth. If lash is more than .005" back off the right hand adjusting nut and tighten the left hand nut exactly the same amount until lash is within the .003" to .005" limit. Tighten both caps securely and lock the adjusting nuts.

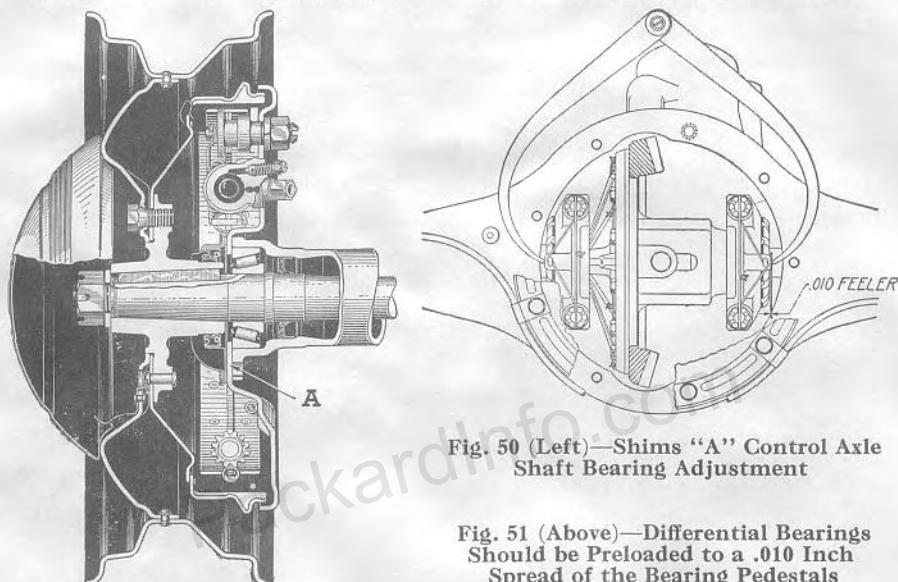


Fig. 50 (Left)—Shims "A" Control Axle Shaft Bearing Adjustment

Fig. 51 (Above)—Differential Bearings Should be Preloaded to a .010 Inch Spread of the Bearing Pedestals

**Wheel Bearings:** End play should be .004" to .007" total. Adjustment is by means of shims "A" in Fig. 50 after unbolting the backing plate and clips holding brake tube to axle housing. End play of less than .050" can be restored to the desired .006" by adjusting at one side only.

### Universal Joints

Roller bearings should be disassembled and repacked every 30,000 miles. *Caution:* The rear universal flange must **never** be tightened indiscriminately because it also controls the adjustment of the pinion shaft bearings. Refer to "Pinion Bearings" preceding for correct procedure.

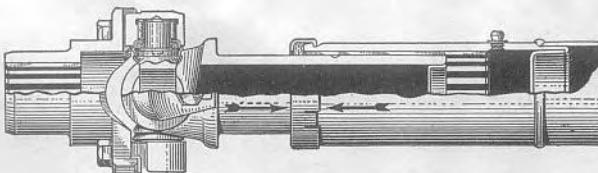


Fig. 52—Arrow on Universal Yoke Must Align With Arrow on Propeller Shaft

# Steering System

## Steering Gear

The gear should be checked for misalignment before proceeding to the actual adjustment. Loosen steering gear to frame bolts enough to permit gear to align itself to the angle determined by height setting of instrument board bracket then retighten the frame bolts securely. Next loosen gear bracket at instrument board so that gear will align itself to the angle determined by the frame bracket. Note this position and if it appears that tightening the instrument board bracket will strain the column, shim the bracket or elongate the mounting holes or both if necessary then retighten. The actual adjustments should be made in the order following:

**A—Up and Down Play**—Turn steering wheel to either stop then back up  $\frac{1}{8}$  turn. Loosen the worm cover screws "A", Fig. 53 about  $\frac{1}{8}$  inch. Remove one thin gasket, being careful not to mutilate the others.

Tighten the cover screws "A" and check to see if all play has been removed. When properly adjusted a pull of not less than  $1\frac{1}{2}$  and not more than  $2\frac{1}{4}$  lbs. (measured at rim end of wheel spoke) should be required to move the steering wheel. If drag is less than  $1\frac{1}{2}$  pounds remove another thin gasket. When executing this test remember that an increase in drag will be encountered, momentarily, as wheel is turned through the "high spot" position. The pull of  $1\frac{1}{2}$  to  $2\frac{1}{4}$  lbs. applies only when gear is off the "high spot," with drag link disconnected.

**B—Roller Shaft End Play**—Turn steering wheel to either stop then back up  $\frac{1}{8}$  turn. Grip hub of roller shaft lever, Fig. 53, and check end play by feel. Adjust to remove all end play by means of the roller shaft adjusting screw "C."

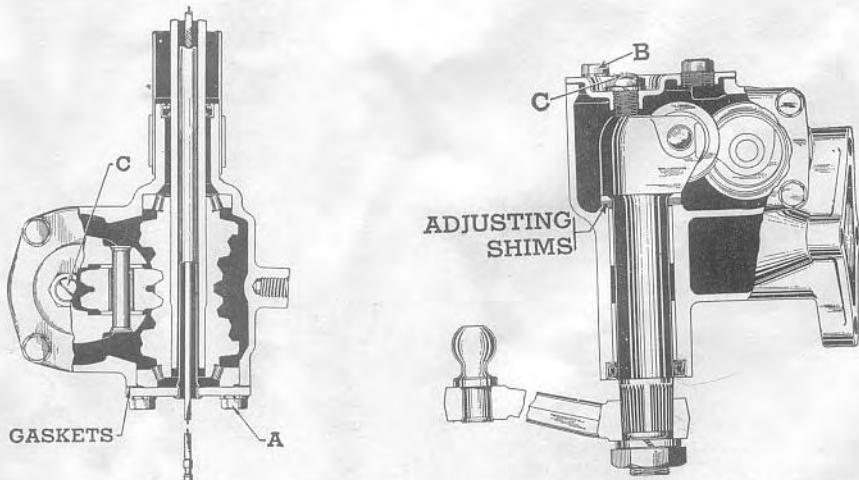


Fig. 53—Steering Gear is of the Integral Housing Type. Wormshaft Bearings and Roller Mesh Should be Adjusted to a Slight Drag as Outlined in Text

**C—Roller Mesh**—Turn steering wheel to "high spot" or mid position. Move roller shaft lever back and forth in direction of normal rotation to determine amount of backlash. If any backlash exists at this time, it will be necessary to remove the roller shaft assembly from the gear housing.

With roller shaft removed, mesh adjustment procedure is as follows:

Remove one of the thin roller shaft adjusting shims and temporarily reinstall roller shaft and cover plate. After tightening the cover screws adjust roller shaft to zero end play by means of the slotted head roller shaft adjusting screw "C."

Check mesh adjustment by rotating steering wheel through the "high spot" or mid position with drag link disconnected. Adjustment is correct when the pull required to move steering wheel through the "high spot" is not less than 3 and not more than  $4\frac{1}{2}$  lbs. If amount of drag at "high spot" is greater than  $4\frac{1}{2}$  lbs., install a thin shim; if less than 3 lbs., remove a thin shim.

**Important:** Since the roller shaft must be removed in either method, it is important to protect the roller shaft oil seal. Protection may be secured by installing a metallic protecting thimble, Packard S. T.-5032, over the splines prior to removal of roller shaft. If this tool is not available, a layer of friction tape must be carefully wound over the splines.

## Column Angle and Head Room

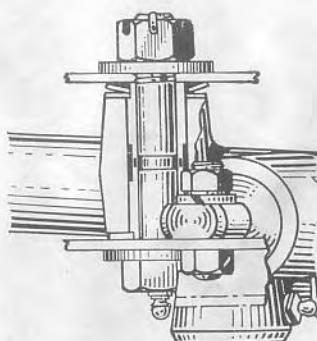
The 1800 steering wheel cannot be lowered although it can be raised about  $\frac{5}{8}$  inch by installing the 1801 steering column bracket. The 1801 steering wheel cannot be raised although it can be lowered a like amount by installing the 1800 column bracket.

The front seat support is of practically the same construction as 1700 and 1701 except that the tapered wooden shim No. 337373 is omitted. Two sets of bolt holes permit a one inch change in fore and aft position. Inserting tapered wedge No. 337373 will raise the seat  $\frac{5}{8}$  inch.

## Steering Crank

The steering crank or intermediate arm and its bearing are exactly the same as used on late production 1700 and 1701 cars. Bearing is automatically preloaded by a spring washer. Castellated nut should be snugly tightened.

Fig. 54—Steering Crank or Intermediate Arm Bearing. A Special Spring Washer Automatically Imparts the Desired Amount of Friction Drag to the Bearing



## Steering Rods

The steering connecting rod or drag link is the same as used on 1700 and 1701. Adjusting plug at steering gear end of drag link should be bottomed then backed off one full turn and the one at opposite end should be backed off two full turns.

Steering cross tubes or tie-rods are of the self-adjusting type but differ from 1700 and 1701 in details of coil springs and ball stud seats in the self-adjusting joints.

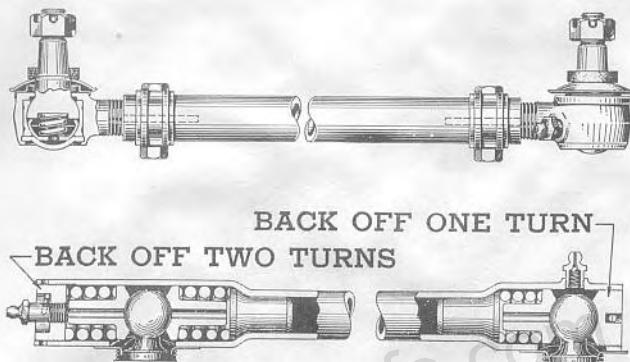


Fig. 55—Top View Shows One of the Two Tie-rods. Lower View is the Drag Link

## King Pin Bushings

These are steel backed bronze of the split type exactly the same as used on 1700 and 1701. They should be brought to size and finish with either a reamer or an .866 inch diameter burnisher bar such as S.T. 5046. King pins .005 inch oversize for correction of worn holes in the pin support are available.

King pin thrust bearings should be preloaded to give a drag of  $3\frac{1}{2}$  pounds to 5 pounds pull when scale is attached to end of spindle. Adjust by means of shims which are available in thickness steps of .001 inch.

## Toe-in

Recommended toe-in is  $\frac{1}{32}$  to  $\frac{1}{16}$  inch measured at or as near hub height as possible.

1. Inflate all tires to recommended pressure. Adjust front wheel bearings. Center the steering worm on "high spot" and front wheels straight ahead before measuring.

2. To adjust toe-in, loosen clamps on both cross tubes then turn both tubes an equal amount. If one cross tube (tie-rod) is longer than the other by more than  $\frac{1}{8}$  inch when road wheels are in "straight ahead" position a bent knuckle arm is indicated.

## Camber

Desired and minimum camber angle is  $\frac{1}{2}^{\circ}$  but a maximum of  $1\frac{1}{4}$  degrees is permissible.

Camber is adjusted by installing the proper offset thimbles in shock absorber arms as shown in Fig. 56. Pilots of zero,  $\frac{1}{16}$ ,  $\frac{1}{8}$  and  $\frac{3}{16}$ " offset are available. A change of  $\frac{1}{16}"$  in amount of offset changes the camber angle  $\frac{1}{3}$  of a degree.

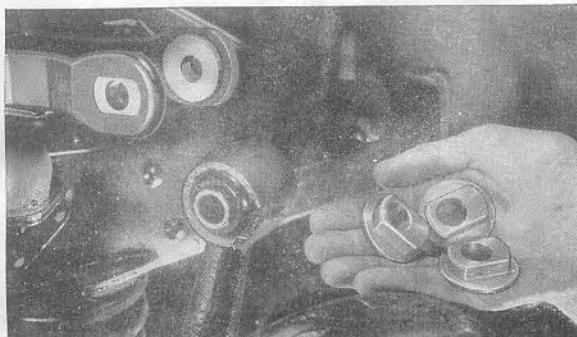


Fig. 56—It is Important to Note Position of Thimbles Because Their Reversal Will Change the Camber Angle

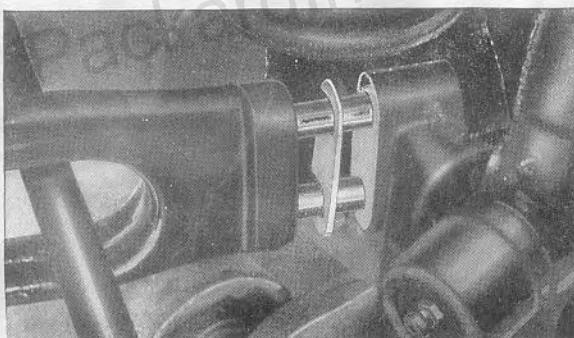


Fig. 57—Showing Installation of Caster Shim

## Caster

Desired caster angle is  $1\frac{1}{2}$  degrees but a minimum of one and a maximum of two degrees is permissible.

Caster is changed by installing the proper Packard tapered shim between forward end of torque arm and the lower support arm, Fig. 57. Shims of one-half and one degree are available. **Caution:** If more than one degree of shims is required to bring caster within limits look for bent parts.

# Chassis Suspension

## Friction Lag

Friction lag in suspension system should not exceed  $\frac{5}{8}$  inch measured as outlined in section 78, page 40 of the 1938-1939 Shop Manual.

## Riding Height

On complaints of unsatisfactory riding or improper road handling, check the riding height front and rear as follows:

Measure front riding height "A" from floor to **top** of frame at center line of front wheel and rear riding height "B" from bottom of frame to top of axle housing as shown in Fig. 58 with body loaded with passengers or ballast as indicated below:

Body Type	Loadings	
	Front	Rear
Sedans 5-Pass.	300 lbs.	375 lbs.
Sedans 7-Pass.	300 lbs.	675 lbs.
1801A-Hearse	300 lbs.	*500 lbs.
Coupes	300 lbs.	225 lbs.

\*Weight of 500 pounds spread over stationary table.



Fig. 58—Riding Height is Measured at "A" and "B"

Height			Height		
Front "A"			Rear "B"		
1800	1801	1801-A	1800	1801	1801-A
18½"	18¾"	19¼"	6¾"	6¼"	6¼"
			*5⅞"	*5¾"	6¼"

\*Applies only to 1800 rear springs marked 720 or 820 pounds and 1801 rear springs marked 780 or 880 pounds on Decalcomania.

If front riding height is not within  $\frac{3}{8}$  inch either way of figure listed, front springs should be renewed or a spacer and insulator installed. Spacers which are available under part 326836 are  $\frac{1}{4}$  inch thick and in combination with insulator 326706 will increase the riding height  $\frac{3}{8}$  inch. Spacer should be installed between top of spring and frame, and the insulator between spacer and spring and between spacers when more than one spacer is used. Never use more than two spacers.

If rear riding height is not within  $\frac{3}{8}$  inch either way of figures tabulated above reset or renew the rear springs.

## Suspension Bearings

**Front Support Arm Outer Bearings**—These caged type roller bearings "E" Fig. 59 differ from those used on models 1700 and 1701 mainly in that one of the two bearings in each assembly **must** be renewed whenever the arm pin or either bearing is removed for any reason. The thrust bearing preload should be one to six pounds and is adjusted as outlined in section 83 on page 41 of the 1938-1939 Shop Manual.

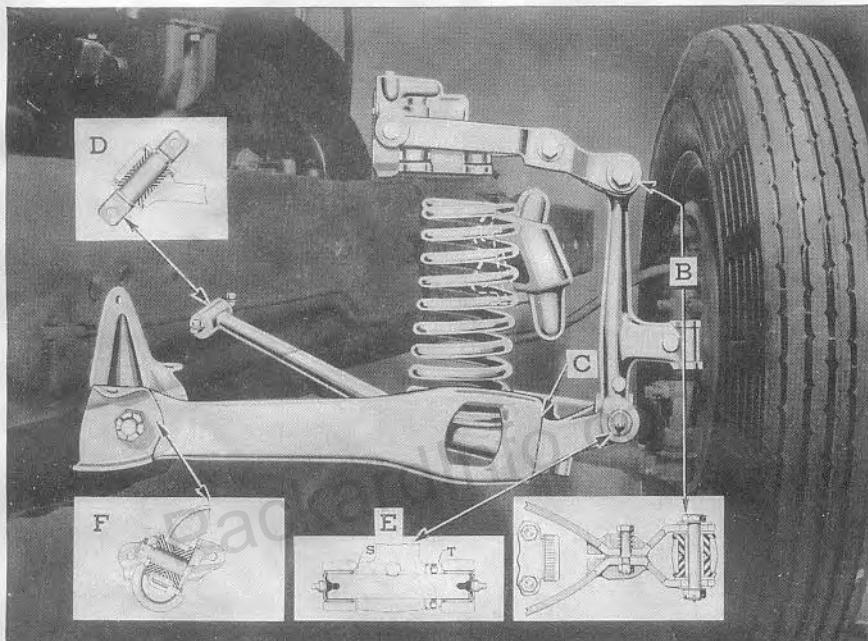


Fig. 59—Rear View of Front Suspension System Right Side. Rubber Bushings Are Used at "B", "D" and "F". Bearings at "E" are Roller Type

**Front Support Arm Inner Bushings**—The inner ends of arms are mounted in Harris type rubber bushings "D" instead of the metal cased type used on 1700 and 1701. There are two bushings per arm, the two being held in place by a snap ring at one end.

Although the bushings may be renewed without using an arbor press they must be installed in the correct neutral angular position as outlined in section 83 on page 41 of the 1938-1939 Shop Manual except that a new aligner gauge will be required.

**Vertical Wheel Support Bushings**—The rubber bushings "B" in upper eye of vertical wheel support are of the Harris type the same as used on 1700 and 1701.

**Torque Arm Mountings**—The rear ends of torque arms are now yoke shaped and are carried on Harris type rubber bushings instead of the ball ends with detachable rubber covering used on 1700 and 1701. Nut at torque arm bushing bolt should be drawn up until frame stamping bottoms against shoulder on bolt. Refer to "F" in Fig. 59.

## **Roll Control Bar**

The roll control or sway bar is now mounted at the front. It is rubber bushed at the frame ends. Nuts at torque arm anchorages should be kept tight.

## **Rear Springs**

Except for changes in arrangement of the inter-leaf inserts the rear springs proper are similar to the 1700 and 1701 equipment. Front mountings are unchanged but the rear shackles are now attached to a spring-steel gooseneck riveted to the frame as shown below.

**IMPORTANT**—Rear springs should not be lubricated.

## **Rear Lateral Stabilizer**

The rear lateral stabilizer and fifth shock absorber on the 1801 are serviced in the same manner as the 1700 and 1701 as outlined in section 86 on page 43 of the 1938-1939 Shop Manual.

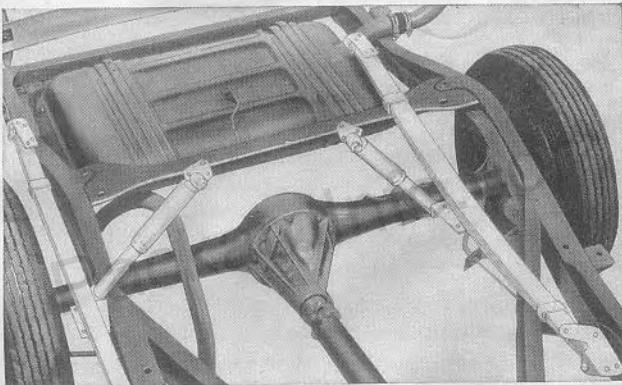


Fig. 60—Rear Suspension Model 1800

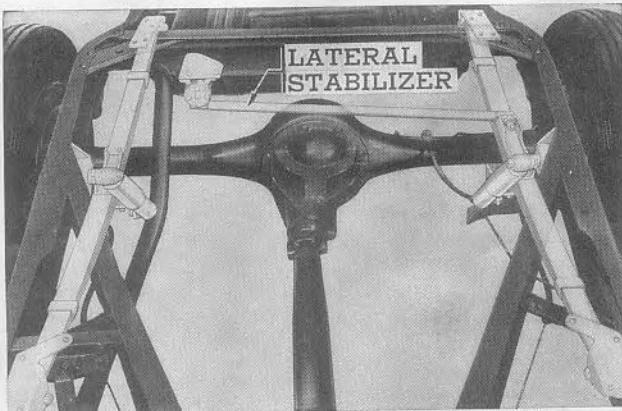


Fig. 61—Rear Suspension Model 1801

## Rear Shock Absorbers (Domestic)

These are of the double action direct acting airplane type of Delco or Monroe manufacture. The Delco and Monroe model numbers are shown in table below. Servicing instructions apply to both makes.

Car Model	Rear Units
1800 Domestic.....	Monroe model 11186, Packard No. 347416
1801 Domestic.....	Delco model 1001-V, Packard No. 351360
1800 Export.....	Delco model 1130-W, Packard No. 347540
1801 Export.....	Delco model 1130-W, Packard No. 351401

The 1801-A commercial car uses the same type of tandem cylinder end-to-end discharge Delco units as the 1700 and 1701 of 1939. Right rear is Delco 1751-Z, left rear 1751-M. For servicing instructions on these shock absorbers refer to section 88, page 44 of the Shop Manual.

**IMPORTANT**—It should be kept in mind that the rear shock absorbers have no filler plugs and must be refilled with **exactly** the specified amount of approved fluid by removing and disassembling the units.

**Refilling**—Method of refilling is as follows: Clamp bottom eye of unit in vise and pull top eye out to fully extended position, Fig. 62.

1. Using the special rod guide spanner wrench S.T. 10047 through the openings in dust shield engage the slots in top guide "K" then unscrew and lift off the top unit which includes the dust shield and the cylinder pressure tube "M". Now remove lower half from vise and pour all of the fluid out of the reservoir tube "L". Tap the compression valve out of the tube.
2. Remove all the fluid from pressure tube by grasping top eye and end of pressure tube in opposite hands and pulling to fully extended position. Be sure all of the fluid is removed from all of the tubes. Remember that absolute cleanliness is essential.
3. Depending on the units being serviced, prepare in a suitable container the amount of approved fluid shown below:

Car Model	Shock Model	Amount Fluid
1800, 1801 Domestic	Monroe 11186 or Delco 1001-V	6 $\frac{3}{4}$ oz. or 199 c.c.
1800, 1801 Export	Delco 1130-W	12 oz. or 359 c.c.

Variation of  $\frac{1}{8}$  ounce or  $3\frac{1}{2}$  c.c. from above is permissible.

Now holding pressure tube in vertical position with piston at top center positon as shown in Fig. 62, fill pressure tube to within  $\frac{1}{4}$  inch of top. Tap the compression valve into place. Pour the remainder of the fluid into the reservoir cylinder and assemble the unit but before doing so be sure to install a new guide gasket "P"—dipped in fluid, under the rod guide.

With unit still mounted as for filling move the upper portion slowly up and down to the limit of travel several times to expel all air from pressure tube.

**Changing Valves**—The compression valve "O" in end of pressure tube is changed as an assembly by following the procedure used for refilling. Refer to table on page 62 for valving calibrations.

The rebound valve is on the shock absorber piston. To change the valve or any of its parts remove the compression valve as in refilling, then with piston at bottom of stroke remove the "staked on" piston nut and valve parts.

Before removing the piston insure its reinstallation in exactly the same position by marking it in relation to the rod.

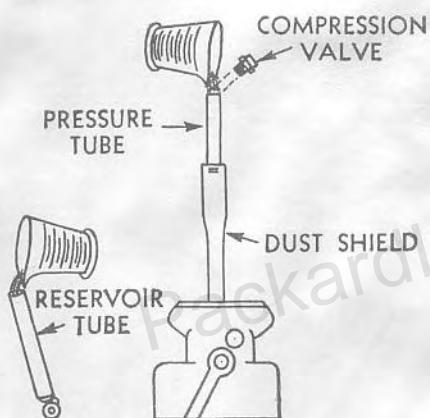
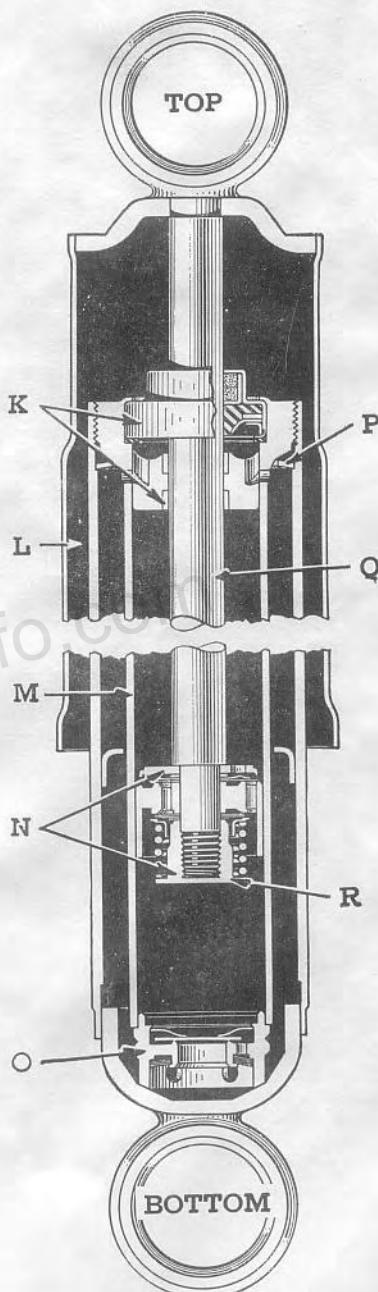


Fig. 62—Rear Shock Absorbers Should Be Disassembled for Refilling

Fig. 63 (Right)—Sectioned One Inch Delco Unit Used on 1801. Many Parts Are Interchangeable with the Monroe

- K—Rod Guide and Seal Assembly
- L—Reservoir Tube
- M—Pressure Tube
- N—Piston and Rebound Valve
- O—Compression Valve
- P—Guide Gasket
- Q—Piston Rod
- R—Piston Nut



Rebound valve calibration on the Delco instruments is varied by changing the valve spring, valve disc and orifice plate while on the Monroe the valve assembly is changed.

If piston rod threads are not in perfect condition, recut with threading die S.T. 10052. Before inserting the piston rod through the seal protect the latter from injury by installing the protective thimble S.T. 10049 (comes with kit S.T. 5150) over the piston rod threads.

Measure piston with micrometer and if it is more than .003 inch out of round install a new one.

After reassembling the valve parts and piston turn piston to original position relative to piston rod by referring to previously made locating marks then tighten nut just firmly. If a new piston has been installed or if the original was not marked at disassembly, check for free movement by moving tube up and down and rotating to find out if piston is binding in cylinder. If piston does not move freely loosen nut and try a new position of piston on rod until freedom is obtained, then tighten piston nut just firmly and stake in place with S.T. 10051.

Valving in each unit is stamped on dust cover after the model number of the unit. If valving is changed be sure to restamp the dust cover to agree with the new valving.

**Tool Requirements**—Tools required for servicing the domestic rear shock absorbers are Rod Guide Wrench, Rod Guide Assembly Thimble and a Calibrated Measuring Vessel. The wrench and thimble are contained in the Packard kit S.T. 5150.

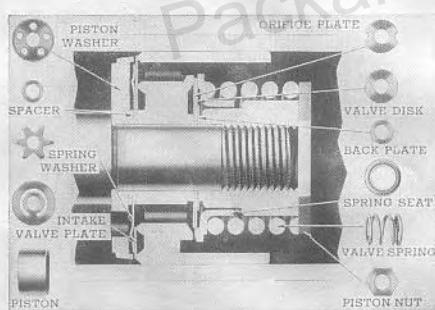
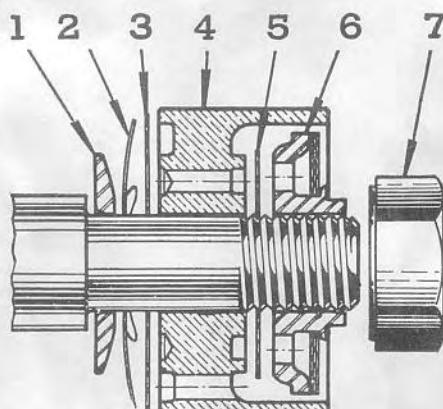


Fig. 64 (Left)—Piston Mounted Rebound Valve for Delco One Inch Models. Parts controlling the Ride Calibration are the Valve Spring, Valve Disc and Orifice Plate. This Valve is Not Serviced as an Assembly.



1. Piston Support Washer
2. Star Spring
3. Intake Valve
4. Piston
5. Metering Washer
6. Relief Valve
7. Nut

Fig. 65 (Right)—Rebound Valve for the Monroe Shock Absorbers, which is Serviced as an Assembly

**Renewal of Seal**—Renewal of the piston rod seal is accomplished by first removing the rebound valve as previously outlined, then with the guide assembly "K" removed from tube, extract the seal with special puller S.T. 10048. Install a new piston rod seal gasket "P" using a piece of  $1\frac{1}{16}$  inch round cold rolled stock to seat the gasket to shoulder on rod guide. Using the same  $1\frac{1}{16}$  inch rod, press down on the new seal until it rests on gasket, being careful not to press hard enough to distort top of seal. Before inserting the piston rod through the seal protect the seal by placing protecting thimble S.T. 10049 on rod.

**Miscellaneous**—Renewal of worn rubber eye grommets will be greatly facilitated by use of liquid soap.

When checking for noise make sure that all units and brackets are bolted tightly to the frame and axle, and that the shock absorber is not striking the frame or other parts. Renew any of the rubber eye grommets that show signs of wear.

If shock absorbers are still suspected after checking all of the points above remove the units from car. If noise disappears when car is driven with shocks removed, disassemble the units and check for broken or loose parts or restricted orifices.

Compression squeaks may be detected by slowly extending the shock absorber approximately  $\frac{2}{3}$  of full length and then rapidly compressing it. To detect rebound squeaks compress shock slowly until closed, then quickly extend it.

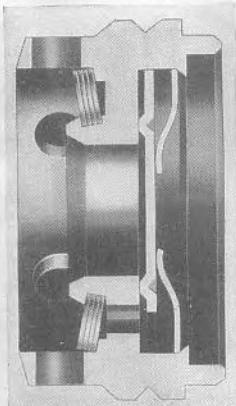
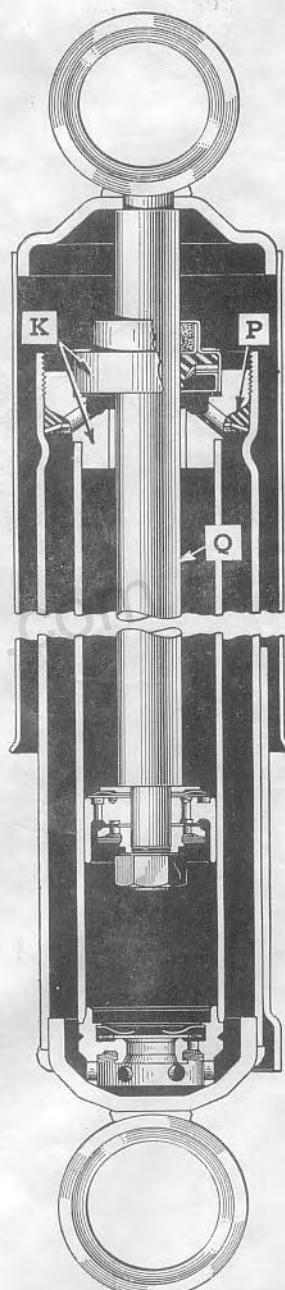


Fig. 66 (Left)—Compression Valve for One Inch Delco Rear Shock Absorber Is Interchangeable with Monroe

Fig. 67 (Right)—Sectioned Monroe Shock Absorber Used at Rear on Model 1800

K—Rod Guide Assembly  
P—Guide Gasket  
Q—Piston Rod



## Shock Absorbers (Export)

Heavy duty shock absorbers having a  $1\frac{3}{8}$  inch diameter piston are used as regular equipment on all export cars and are available on domestic vehicles as special equipment. The oversize heavy duty units may be readily identified by the larger diameter of the dust shield (outer tube) which measures approximately  $2\frac{5}{8}$  inches. Use tool kit S. T.-5151.

**Refilling**—Refilling procedure is the same as for the regular one-inch domestic models except the following: Remove knock-out plug from dust shield to uncover slot for insertion of spanner wrench.

Install new cork and rubber guide gaskets before assembling the unit being sure to place the rubber one on top. When reassembling the pressure tube use thimble Delco No. 583 or the one in Packard S. T.-5151 kit, on piston rod to protect the seal assembly.

After inserting the 12 ounces or 359 c.c. of fluid into the pressure tube and reserve chamber make sure that the notch in rod guide and seal assembly matches the depression in the side of the reserve chamber.

**Important**—Before installing shock absorbers on car check and reset the ride adjustment as outlined in the next paragraph.

**Ride Adjustment**—Shock absorbers are set at "soft ride" position when they leave the factory but since disassembly may change the setting they should always be checked as follows before reinstalling on car:

With shock absorber in collapsed position rotate lower end of unit with arrow on it in the direction arrow points until the adjusting cam, Fig. 70, engages. Hold in this position and measure the distance from arrow to the edge of upper tube. Now rotate further until cam reengages and note whether distance has increased or decreased. If the distance has increased the shock absorber is in the soft ride position, if it has decreased, unit is in firm ride position. This rule should be followed rather than the positions indicated by the "F" and "S" marks on the tube because the marks do not indicate truly after the unit has been once disassembled. The change in collapsed length between these two positions is slightly more than  $\frac{1}{16}$  inch.

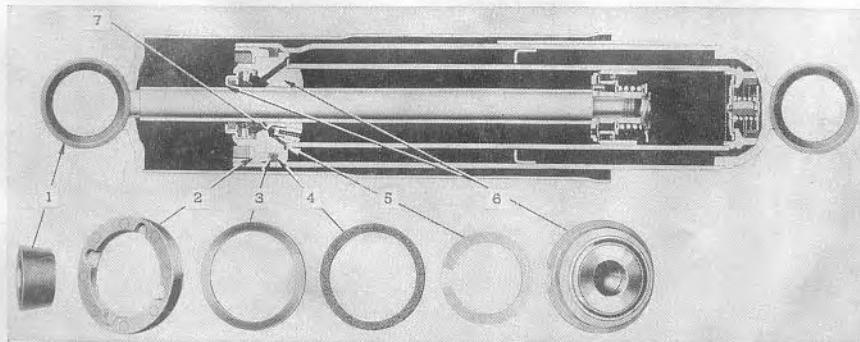


Fig. 68—The  $1\frac{3}{8}$  Inch Delco Unit Used on Export Cars

- |                   |                  |                       |
|-------------------|------------------|-----------------------|
| 1. Rubber Bushing | 3. Rubber Gasket | 6. Rod Guide and Seal |
| 2. Retainer Nut   | 4. Cork Gasket   | *7. Orifice Plug      |
| 5. Baffle Ring    |                  |                       |

**Changing Valves**—The compression valve is serviced as an assembly in the same manner as on the regular one inch units. To disassemble the valve it will be necessary to use the special holding tool of kit S.T.-5151 to hold the assembly, and the special wrench which fits over the valve stem to disassemble the unit.

The rebound valve on the piston rod is serviced as either an assembly or by individual parts. Disassembly procedure is the same as for the one inch models. Reassembly of the parts of this valve requires the special assembling sleeve of kit S.T.-5151 or Delco No. 581. This sleeve fits inside of piston between reinforcing washer and piston and is removed only after the piston nut has been tightened.

Parts which control the ride calibration on compression stroke are spring disk, relief valve spring Fig. 69, and the orifice plug "7" Fig. 68. Calibration parts of the rebound valve are valve spring, spring disk orifice plate and spider spring.

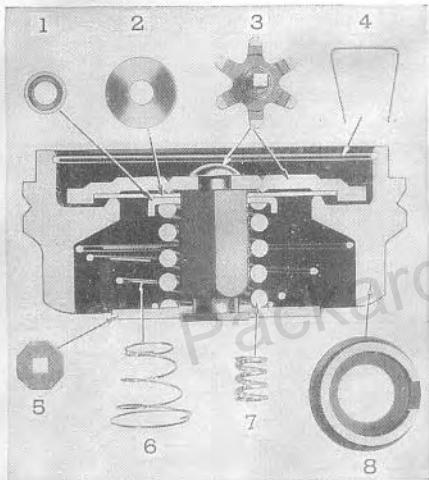


Fig. 69—Compression Valve 1 $\frac{3}{8}$  Inch Shock Absorber

- 1. Spring Cup
- \*2. Spring Disk
- 3. Intake Valve and Stem
- 4. Retainer Clip
- 5. Valve Washer
- 6. Intake Valve Spring
- \*7. Relief Valve Spring
- 8. Cylinder End

\*Indicates a ride calibration item.

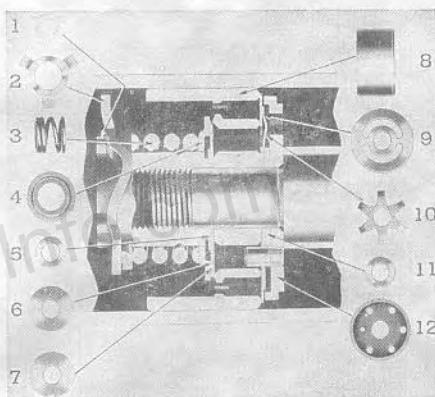


Fig. 70—Rebound Valve Assembly 1 $\frac{3}{8}$  Inch Delco Shock Absorber

- 1. Piston Nut
- 2. Valve Adjusting Cam
- \*3. Valve Spring
- 4. Reinforcing Plate
- 5. Back Plate
- \*6. Spring Disk
- \*7. Orifice Plate
- 8. Piston
- 9. Intake Plate
- \*10. Spider Spring
- 11. Collar
- 12. Washer and Pin

**Renewal of Rod Guide Seal**—The piston rod guide seal cannot be renewed except as an assembly and the sealing elements cannot be purchased separately. To renew the assembly proceed as in installing rebound valve. The baffle ring must be placed with the gap on the opposite side from the orifice plug. Be sure to install protecting thimble of kit S.T.-5151 or Delco No. 496 on piston rod when inserting the piston rod through the seal assembly and rod guide.

## Front Shock Absorbers

Front shock absorbers shown in Fig. 71 are of the double action, parallel cylinder, end-to-end discharge type, listed by Delco as model 2206 A & B.

The 1801-A Commercial car uses the same type of tandem cylinder end-to-end-discharge Delco units as the 1700 and 1701 of 1939. Right front is Delco 1966-D, left front 1966-C. For servicing instructions on these units refer to section 88, page 44 of the 1938-1939 Shop Manual.

**Refilling**—Front shock absorbers should be refilled every 10,000 miles or whenever the units show external leakage, uneven resistance or no resistance when the arm is moved up and down. The front shock absorbers may be refilled on the car as follows: Disconnect arm of each unit at top of vertical wheel support and remove filler plug. With shock arm in mid position use a fluid gun such as Packard S.T. 5119 or Delco 315 and insert a small quantity of Packard Delco fluid. Pump shock arm up and down several times to expel air then insert additional fluid and repeat the pumping procedure until fluid level is even with **bottom** of the filler hole.

Compression, static and rebound valves are accessible for changing by simply removing the external cap nuts. Be sure to use new gaskets when changing valves and if valving is changed use a new external valve nut or restamp the original to agree with the new valve.

It is not practical to repair these units in the field so they will be serviced on an unit exchange basis.

**NOTE**—The rebound valve is the lower valve in front shock absorbers.

### Shock Absorber Valving

Car Model	Front Absorbers		Rear Absorbers	
	Rebound	Compression	Rebound	Compression
<b>For High Type Springs</b>				
1800 Domestic Std. All.....	Code 3-Ed-5	Code 1½-B-1	Code 40-D-1	Code A-2
1800 Export Std. All.....	1-K-4	1-D-1	O-GR15-15	10-C-1
1801 Domestic Std. All.....	3-Ed-5	1½-B-1	4-G-4	J-1
1801 Export Std. All.....	60-J-7	1-D-5	O-GR15-4	8-C-1
<b>For Low Type Springs</b>				
1800 Domestic Std. All.....	3-Ed-5	1½-B-1	40-D-1	A-2
1800 Export Std. All.....	4½-B-4	2½-Bd-5	4-Gr-6	8-B-2
1801 Domestic Std. All.....	3-Ed-5	1½-B-1	4-G-4	i-1
1801 Export Std. All.....	4½-B-4	.70-B-5	4-Gr-8	8-Ad-1

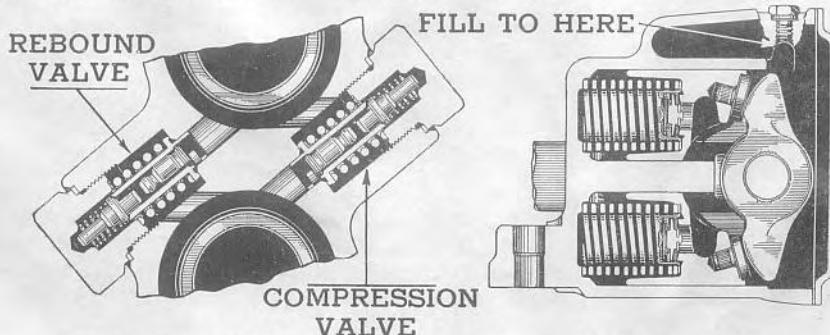


Fig. 71—Front Shock Absorbers Are Delco Parallel Cylinder Type

# Brakes

Service brakes are of the single eccentric-anchor self-energizing type, actuated hydraulically. There are only two shoe adjustments, the eccentric anchor for centering the shoes and the clearance or star wheel adjuster. The shoe eccentric previously used has been eliminated.

The parking brake utilizes the rear wheel service shoes which are actuated mechanically by the hand lever through steel cables.

## Service and Hand Major Adjustment

This adjustment requires removal of the 4 wheels but not the hubs.

1. Jack up all 4 corners of car. Remove road wheels, also inspection covers from drums and backing plates.

Remove clevis pin "A" from each hand brake pull cable. Remove slack from hand lever to equalizer cable by turning the clevis at equalizer end of cable. Apply hand brake lever one notch. Tighten star wheel clearance adjuster "B" at both **rear** wheels until wheels can just be turned with both hands. Remove all slack from pull cables then reconnect cables to equalizer and place hand brake lever in released position.

Back off star wheel clearance adjusters "B" at **rear** wheels only until wheels turn freely.

2. Insert a screwdriver between drum and lining of secondary shoe (rear shoe) and force assembly over until primary shoe is seated solidly against opposite face of drum. Holding the shoes assembly in this position insert a .015 inch feeler blade between lining and drum at upper end of secondary shoe (rear shoe) and turn anchor "D" in direction of forward wheel rotation until feeler is just firmly gripped. Insert .015 inch feeler blade between lining and drum at the lower end of the rear (secondary) shoe and turn star wheel "B" until .015 inch feeler is just firmly gripped.

Recheck clearance at both ends of secondary shoe. If .015 inch clearance cannot be secured, readjust anchor and star wheel until both ends

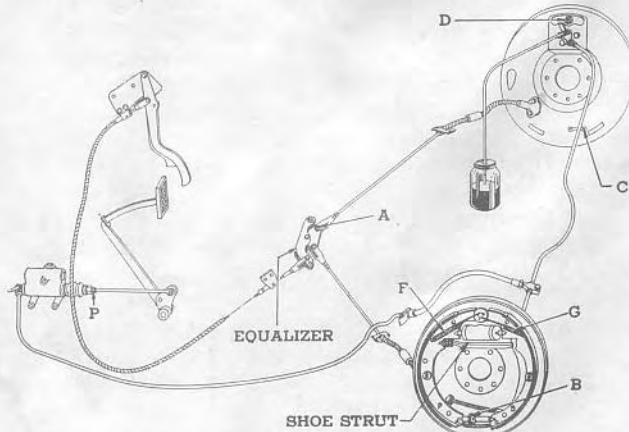


Fig. 72—Rear Portion of Brake System

show same clearance, then tighten lock nuts securely without moving anchors.

Do the same at other 3 wheels.

### Notes for the Mechanic

Brake pedal must have  $\frac{1}{4}$  to  $\frac{1}{2}$  inch free travel before engaging master cylinder piston. If pedal has zero free travel the master cylinder by-pass port will be obstructed by the piston cup and brakes will drag when fluid becomes heated slightly. Adjust at master cylinder push rod nut "P," Fig. 72.

Lining requirements are indicated below:

	1800	1801	1801A
Primary, 4 pieces .....	$1\frac{3}{4}'' \times 10\frac{5}{8}''$	$1\frac{3}{4}'' \times 11\frac{1}{2}''$	$2\frac{1}{4}'' \times 13''$
Secondary, 4 pieces .....	$1\frac{3}{4}'' \times 12''$	$1\frac{3}{4}'' \times 13''$	$2\frac{1}{4}'' \times 13''$
Lining thickness .....	$\frac{3}{16}''$	$\frac{3}{16}''$	$\frac{3}{16}''$

On the 1800 both shoe to anchor springs, "F" and "G," Fig. 72, are painted blue; on the 1801 and 1801A the aluminum colored spring attaches to the primary shoe and the "heavier" yellow spring, to the secondary shoe. Front shoe at each wheel is the primary shoe.

## Tires

Tires are balanced and marked with a red dot to indicate the proper location for the valve stem of the inner tube. The tube should always be installed with the valve stem aligned with the red dot on the tire casing.

To assure maximum tire life and minimum road reaction vibration, switch the location of wheel and tire assemblies at least every 10,000 miles and preferably every 5,000 miles. The recommended method is to move right front tire and wheel to left rear, left rear to right front, left front to right rear and right rear to left front.

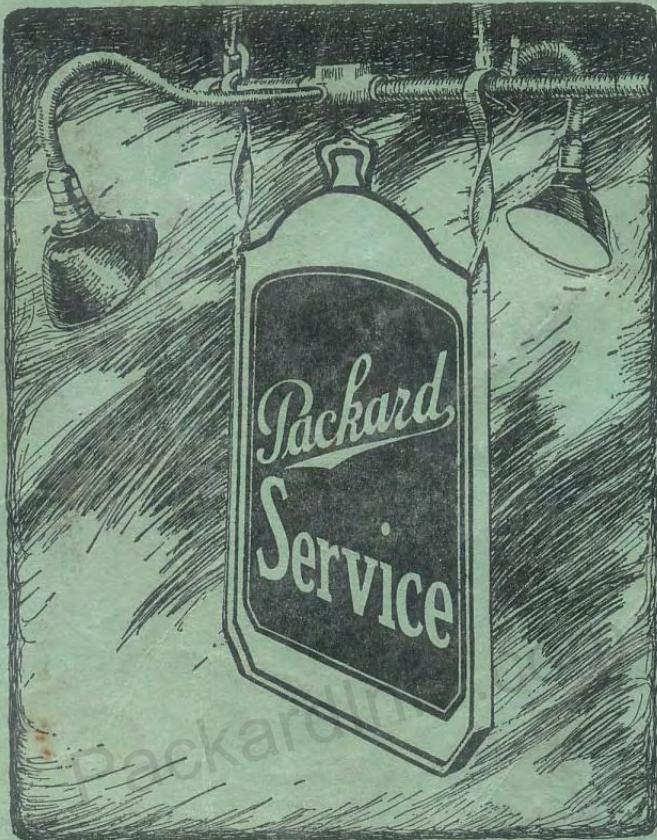
For cars driven at high speeds and for all owners who desire minimum road reaction vibration, the tire and wheel assemblies should be checked for unbalance and rebalanced if necessary at least every 10,000 miles and preferably at 5,000 mile intervals on cars driven most of the time at road speeds above approximately 60 miles per hour.

A good plan to follow in any case is to check the tire and wheel balance every time the assemblies are switched for wear equalization. If a wheel and tire assembly has been rebalanced and a new tire is later installed the new tire and wheel should be rebalanced.

Recommended tire inflation pressures are listed on pages 3 and 4.

## Trunk Shelf

To assure a neat fit of the detachable trunk compartment shelf proceed as follows whenever the spare wheel is removed for any reason: Place spare wheel on trunk floor and install shelf on wheel but do not install the wheel retaining clamp. Move wheel and shelf assembly to the right and forward or backward until edge of shelf conforms to contour of body. Now install wheel clamp and tighten clamp screw securely.



This Sign designates Authorized Service

## Packard Warranty

Packard Motor Car Company has warranted that for a period of ninety days from the date of original delivery to the purchaser of each new Packard car or before such car has been driven 4,000 miles, whichever event shall first occur, it will replace, free of charge, any part or parts thereof, including all equipment or trade accessories, except tires, supplied by it as standard equipment, claimed within that period to be defective and found by the Company upon examination to be so, provided such part or parts are returned to the Company within that period for credit or replacement. Such free replacement does not include transportation charges to or from the Packard factory.

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