1941

Packard

OWNER'S MANUAL

ONE-TEN SPECIAL
ONE-TEN DELUXE

Model 1900 - Beginning Engine No. D1551

ONE-TWENTY

Model 1901 - Beginning Engine No. D300051

DRIVING, CARE, ADJUSTMENT AND EMERGENCY DATA

Index

Owner Section—Care and Operation

Shop Section—Maintenance

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.

Service Policy

by Distributers 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 distributer 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 distributer 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.

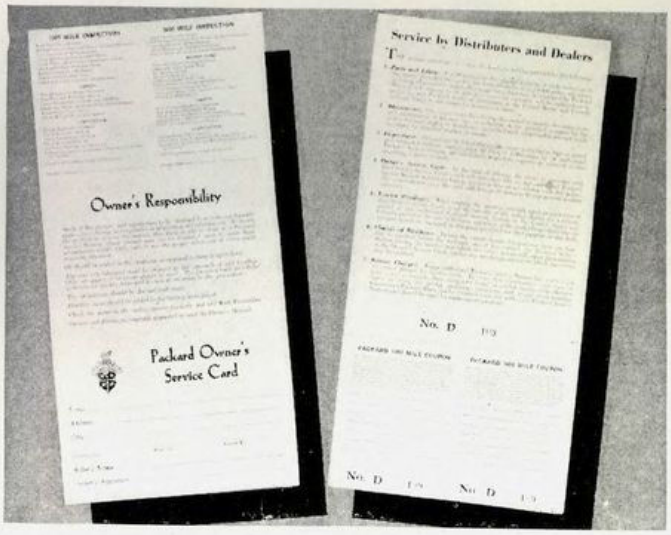
5. **Tourist Privileges:** When touring, the owner is entitled, upon presentation of the Owner's Service Card, to all of the benefits of this policy during the warranty period at any authorized Packard Service Station in the United States and Canada, provided the date of delivery and name of the dealer 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 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.

Lubrication-Inspection Plans

Your Packard Dealer will be glad to explain a Packard 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.

Ready Reference Data
Model 1900

Capacities

Cooling system	15 quarts
Crankcase oil	5 quarts
Gas tank	17 gallons
Rear axle oil	5 pints
Transmission	2 pints
Aero-Drive unit	1¼ 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 cu. in.
Over-all width	73¾″
Over-all length	201 1/16″
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	15″
Tire width	6.5″
Light fuses, locations	See page 37
Spark plugs (10 m. m.)	AC-104 or Champion Y-4
Spark plug gap	.025″ to .030″
Ignition timing all heads	6° B. T. D. C.
Tappet clearance, warm	Inlet .007″, Exhaust .010″
Camber	½° + ¾ — 0
Caster	½° + or — ½°

Shipping Weights

Touring Sedan 5-Pass. 4-Door No. 1482	3260 lbs.
Touring Sedan 2-Door No. 1484	3250 lbs.
Club Coupe 2-4 Pass. No. 1485	3230 lbs.
Business Coupe 2-Pass. No. 1488	3190 lbs.
Convertible Coupe 2-4 Pass. No. 1489	3260 lbs.
Station Wagon No. 1483	3460 lbs.

Add 20 pounds for De Luxe models.

For road weight add 140 lbs. to cover fuel and water.

Ready Reference Data

Models 1901 and 1901A

(The 1901A is a Commercial Chassis)

Capacities, License Data and Miscellaneous

Cooling system	17 quarts	Rear axle oil	6¾ pints
Crankcase oil	6 quarts	Transmission	2 pints
Gas tank	20 gallons	Aero-Drive	1¼ 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 ..... 3¼″ x 4¼″

Engine horsepower A. M. A. rating ... 33.8

Engine piston displacement ..... 282 cubic inches

	1901	1901A
Over-all width	73¾″	74¾″
Over-all length	206½″	242″
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	15″	16″
Tire width	7.00″	7.00″

Light fuses, location ..... See page 37

Spark plugs (10 m. m.) ..... AC-104 or Champion Y-4

Spark plug gap ..... .025″ to .030″

Ignition timing standard head ..... 7° B. T. D. C.

Ignition timing, 6.8 H. C. Head ..... 6° B. T. D. C.

Tappet clearance, warm ..... Inlet .007″, Exhaust .010″

Camber ..... ½° + ¾ — 0

Caster ..... ½° + or — ½°

Shipping Weights

Touring Sedan—4-Door No. 1492	3535 lbs.
Touring Sedan—2-Door No. 1494	3525 lbs.
Club Coupe—2-4 Pass. No. 1495	3470 lbs.
Business Coupe—2-Pass. No. 1498	3360 lbs.
Convertible Coupe 2-4 Pass. No. 1499	3570 lbs.
Convertible Sedan No. 1497	3725 lbs.
Station Wagon No. 1493	3720 lbs.
1901A Commercial Chassis (160″ W. B.)	2915 lbs.

For road weight add 160 lbs. to cover fuel and water.

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.

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.

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.

   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.**

Note: On cars with Aero-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 Aero-Drive lock-out knob is "in" it will cause the Aero-Drive mechanism to shift from 4th into 3rd speed.

Tires

Packard cars are engineered to give Ease of Steering, Comfort in Riding, Safety and Economy of Operation. These features can be materially discounted through neglect of tire pressure.

We recommend the frequent checking and inflation of tires to the pressures listed on pages four and five (at least once a week) and the constant use of standard sealing tire valve caps.

The valve cap is more than a dust cap. It is designed and constructed to positively seal the tire valve opening. Its use is a valuable safeguard to prevent loss of air pressure.

To assure maximum tire life switch the location of wheel and tire assemblies at approximately 5,000 mile intervals. 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.

Tires are balanced and marked with a red dot. The tube should always be installed with the valve stem aligned with the red dot.

For cars driven at high speeds, the tires and wheels should be checked and rebalanced if necessary at approximately 5,000 mile intervals.

The tire and wheel assemblies should be rechecked for balance every time they are switched for wear equalization. When a new tire is installed the new tire and wheel should be balanced.

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 9.

The light control switch is located at the lower left of the instrument panel. It is of the push-pull type having 2 "ON" positions. There is also a foot control switch located on the toe-board to the left of the clutch pedal.

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

When the 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 Lower beam when meeting.

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

The headlamps of the 1941 Packard cars carry a 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.

Instrument lighting is controlled by a combination switch and rheostat located to the right of the light switch. With the main light switch "on," instrument illumination can be regulated in four steps by pulling out on the rheostat knob. If the instrument lights fail to light it indicates that the tail light fuse is burned out. See page 37.

On Aero-Drive equipped cars a green signal jewel located in the instrument panel is illuminated when the proper speed is reached, indicating that the Aero-Drive unit should be engaged.

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.

Front seat adjustment is controlled by a lever 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.

Optional Aero-Drive Transmission—The Aero-Drive lock-out knob is mounted below the instrument panel to the right of the steering gear column.

To bring the Aero-Drive into operation, proceed as follows: Push the lock-out 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 green signal light in the instrument panel, momentarily remove the foot from accelerator pedal, then return the foot and resume normal driving. The shift into Aero-Drive occurs automatically during the momentary closing of the throttle and car will remain in Aero-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 Aero-Drive to shift back to third gear. 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 Aero-Drive form the habit of bringing it into engagement by momentarily lifting your foot from the accelerator as soon as the green signal is illuminated.

To lock out the Aero-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 Aero-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. To prevent damage to the covering material the top should be secured in the well by means of the hold-down straps before the car is operated with the top down. Windows should be lowered slightly before raising top.

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 40 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.

The water temperature gauge is located with the oil pressure gauge at the right 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 left 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.*

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

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.

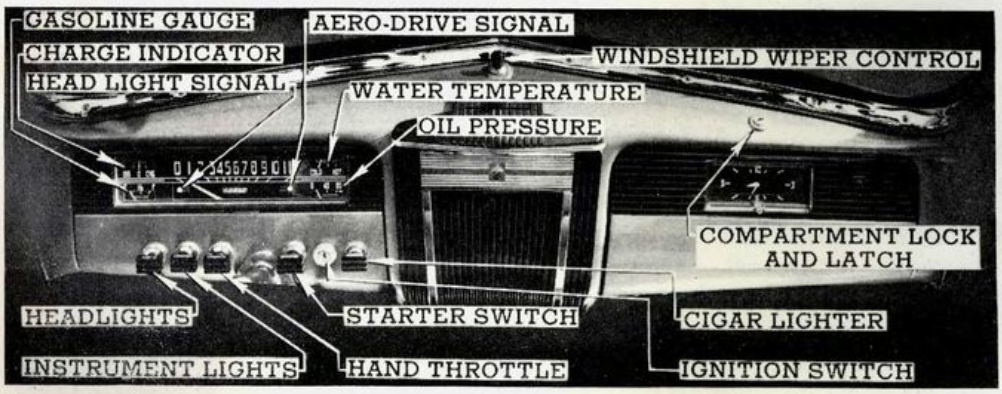


Fig. 1—Front View of Instrument Board

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 with 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.

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 "manhandle" 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. Persistance 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.

Oversteering 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."

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 assured 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. While on long continuous drives this water may be removed by the crankcase ventilator, draining is a safer procedure.

Engine Oil Pan and Filter

To prevent the accumulation of sludge which is injurious to the engine, and is not entirely removed by draining, 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 and Silencer

Under ordinary conditions, the unit should be cleaned and refilled every 5,000 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.

Transmission and Aero-Drive

Recommended lubricant for transmission and Aero-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 Aero-Drive unit and maintained flush with the filler plug opening on the side of the transmission housing. Fig. 2.

The Aero-Drive unit is equipped with its own drain and level 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 filler plug opening. Avoid overoiling the transmission by removing transmission filler plug when filling the Aero-Drive unit.

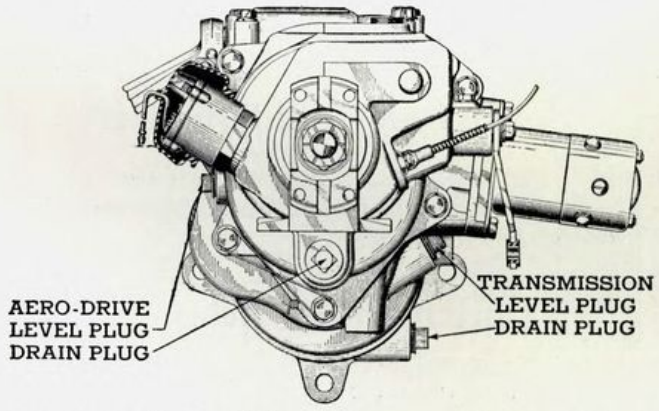


Fig. 2—Rear View of Transmission and Aero-Drive Unit

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.

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.

Universal Joints

The roller bearing cross 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.

The ball and trunion type universal joint used on the front of the 1900 drive shaft has no slip spline. It should be disassembled, cleaned and repacked every 30,000 miles with 2 oz. of heavy fibre grease.

Front Wheel Bearings

The front wheels and hubs should be removed, cleaned and the bearings repacked with No. 3 fibre grease every 10,000 miles.

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.

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.

Clutch Shifter Bearing

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

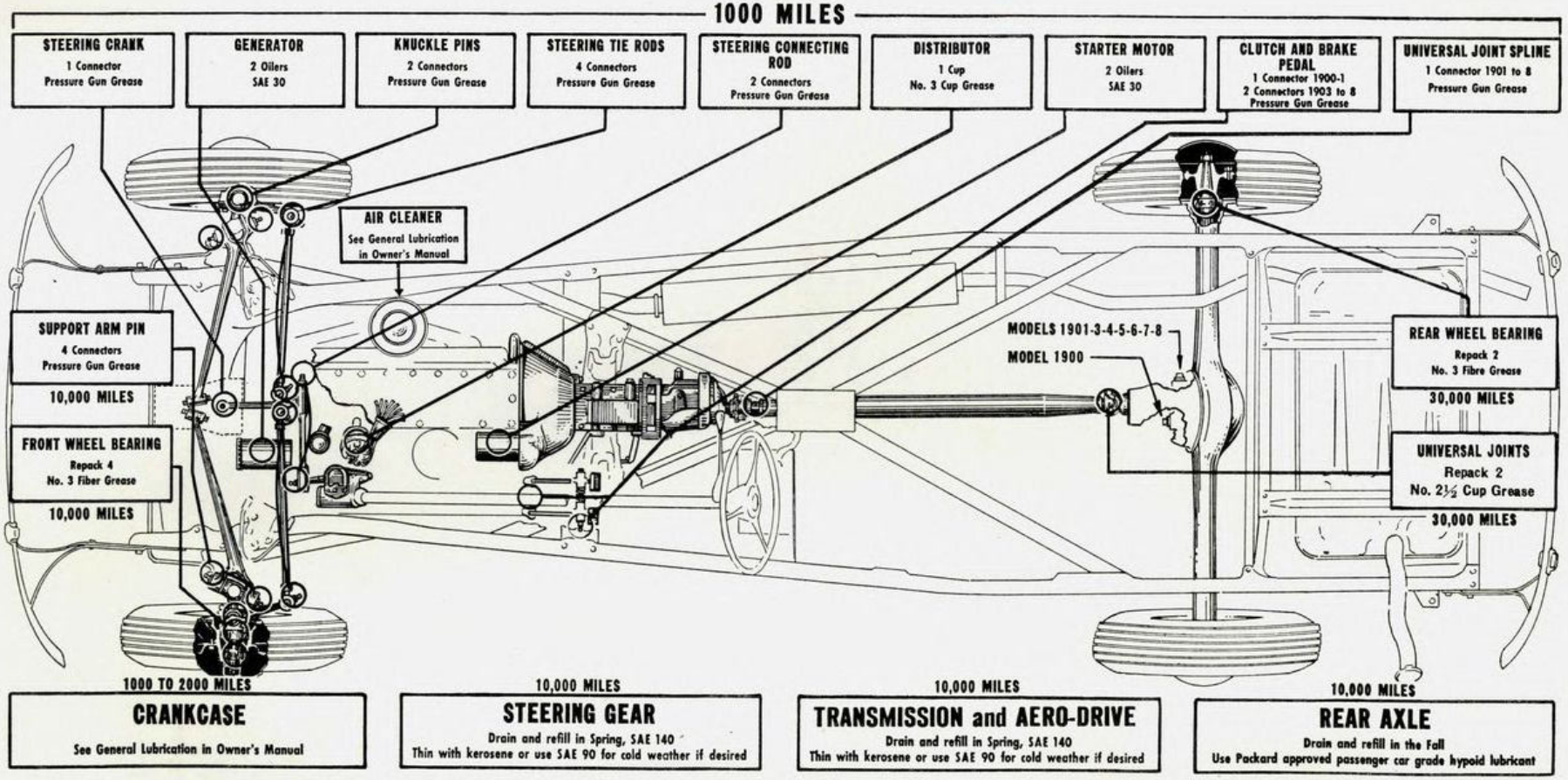


Fig. 3—Lubrication Diagram Showing Points to Lubricate and Types of Lubricant Needed

Cooling System

To maintain the cooling system at its maximum efficiency, to keep it clean and leak-tight, reasonable attention and proper servicing are essential. It should be kept full of a cooling liquid that has been treated with a rust preventive, or inhibitor, to retard the formation of rust and corrosion that normally takes place even with pure water. The use of a properly inhibited or treated anti-freeze during the winter months and then a can of Packard Rust Preventive added to the cooling water during the other months is quite necessary.

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

The cooling system should be cleaned and inspected periodically, that is, every fall and spring, or every 6,000 miles, to keep the radiator free from accumulations that may clog it or otherwise reduce its performance. The use of a cleaner that removes both rust and grease by dissolving action is important. The radiator, engine water jacket and the heater (if the car is so equipped) should be pressure flushed with both air and water after each cleaning. It is also advisable to inspect the water pump, radiator hoses, heater hoses, fan belt, drain cocks, core clean-out plugs, cylinder head joint, etc. for signs of leakage during these cleaning operations. Consult your Packard Dealer on seasonal preparations.

Anti-Freeze Solutions

Among the anti-freeze compounds that have been found satisfactory are those made from ethylene glycol such as "Prestone" brand anti-freeze, denatured ethyl alcohol (or ethanol) and methyl or wood alcohol (or methanol) prepared by reputable manufacturers and treated by them to reduce the rust forming properties of water. When installing anti-freeze solutions the quantity should be determined by the anti-freeze manufacturer's recommendation based on a cooling system capacity of 15 quarts for the 1900 and 17 quarts for the 1901. No inhibitor or treatment should be added to an anti-freeze that already contains an inhibitor.

All anti-freeze should be drained from the cooling system and discarded after one season's use as corrosion inhibitors are weakened and finally exhausted by extended use. It is impossible to predict just how long they will last as much depends on the car—how far and fast it is driven and how well it is maintained. It is good practice to have the freezing protection of the anti-freeze solution checked occasionally during the winter season, especially when colder weather is expected. A reliable anti-freeze tester should be used for this purpose.

CAUTION: Avoid using salt solutions (like calcium chloride); mineral oils (like kerosene); and sugar solutions for anti-freeze compounds as considerable trouble and damage can result.

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 1900; 6.41 standard, 6.85 optional for 1901.

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 ½″ wide

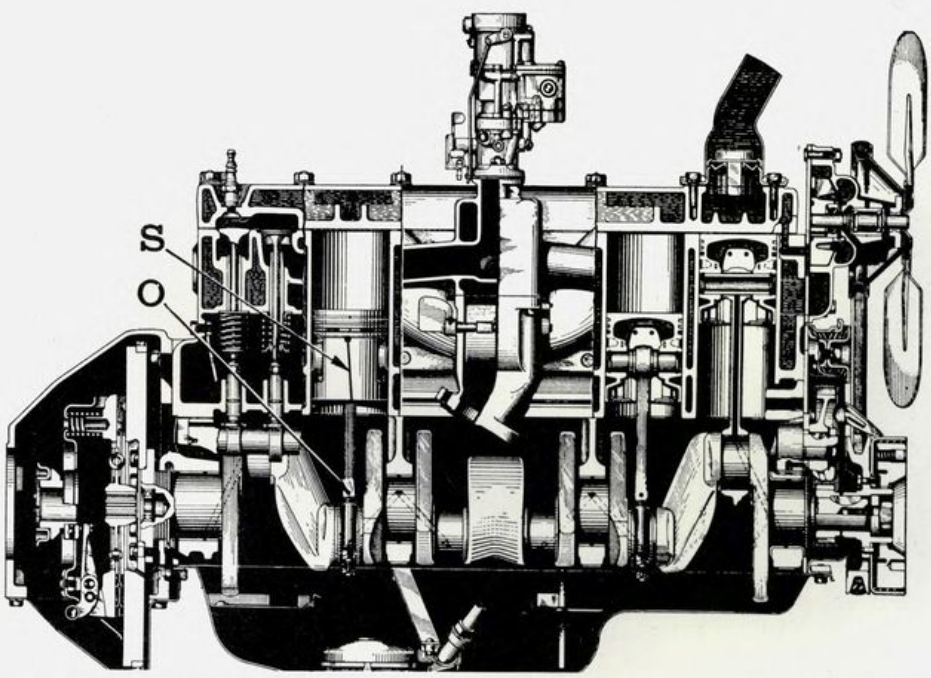


Fig. 4—Side Section of 1900 Engine and Clutch Assembly. Holes "O" and Slots "S" Should Face Camshaft

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. Pin diameter all models .875″ standard, oversizes .003″ and .006″.

Bearings

The camshaft, crankshaft and connecting rod bearings are all of the shimless, precision, steel backed, babbit 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. Rod bearing end play .004″ to .010″, crankshaft end play .003″ to .008″.

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 ¼ to ⅓ of a turn further.

Piston Rings

Standard piston ring equipment—one $\frac{3}{32}$ inch No. K-200 compression ring with Ferrox finish .165 to .175 inch thick for the 1900; .152 to .162 inch thick for the 1901, one No. K-70 compression ring with Ferrox finish ⅛ inch wide by .165 to .175 inch thick for the 1900; .152 to .162 inch thick for the 1901, 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. K-200 top compression ring with bevel on inside edge towards top of the piston. The K-70, 2nd compression ring should be installed with the groove on outer corner toward the bottom of the piston.

Note: K type piston rings have greater wall thickness than S.A.E. wall rings and require extra deep grooves. Do not use S.A.E. wall rings in K ring grooves as ring breakage or over oiling may result.

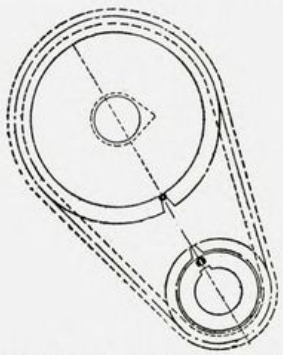


Fig. 5—Sprocket Marks should align as shown

Timing Chain

Chain is a two sprocket non-adjustable type with 58 links 1¼ inches wide by .375 inch pitch. 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.

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 .002″ to .003″; exhaust .004″ 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.

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

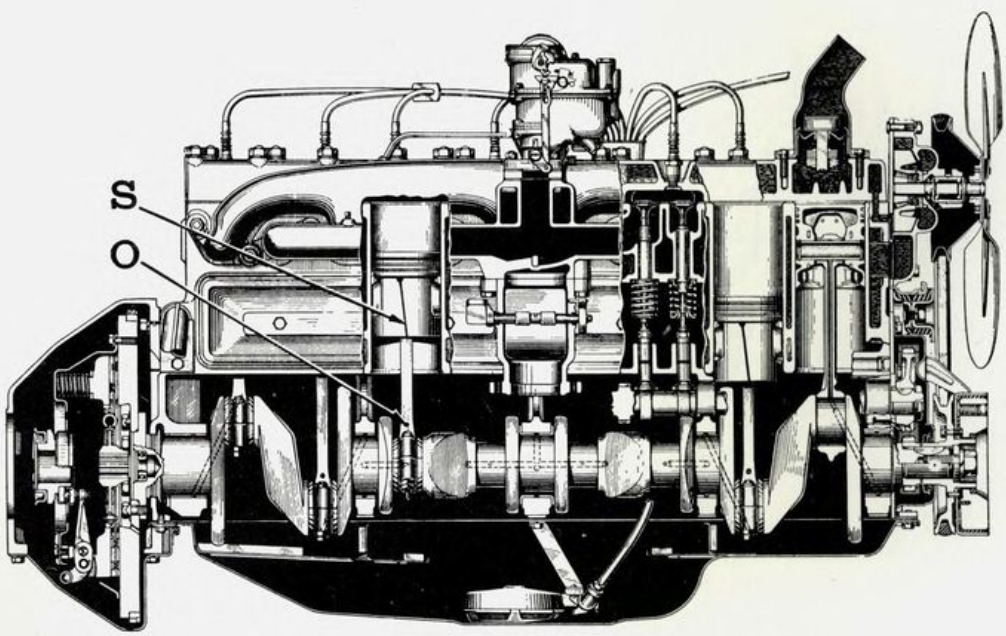


Fig. 7—Side Section of 1901 Engine and Clutch Assembly

Valve Timing

Inlet valve should start to open one degree before top center with tappet set to .013 inch but a variation of 4 degrees either way is permissible. The "O" marks on sprockets should be together and aligned through shaft centers.

Oil Pump

Normal oil pressure is 40 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 7/8 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° to 8° before top center on firing stroke. Punch mark on pump gear should be at the bottom on 1900, at the top on 1901.

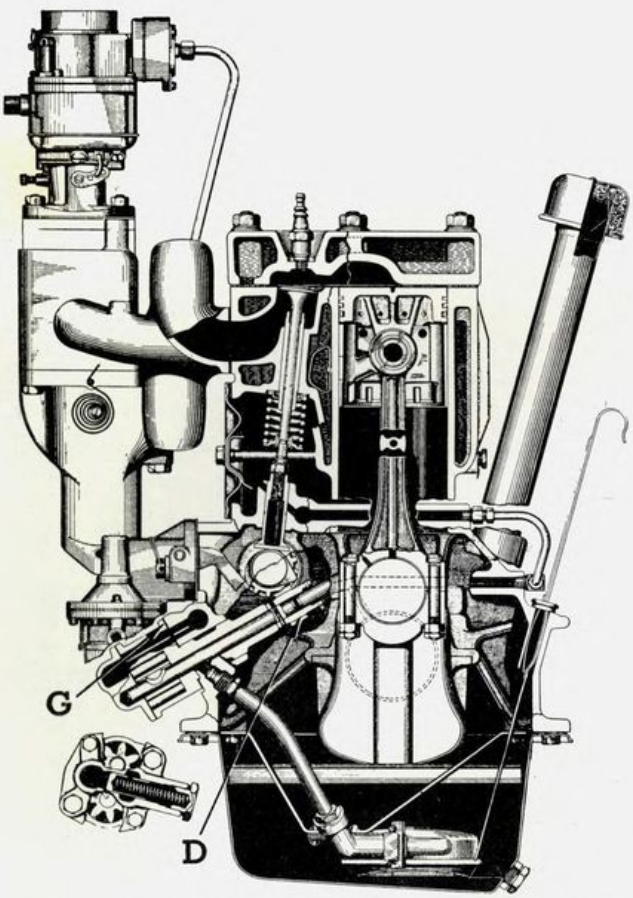


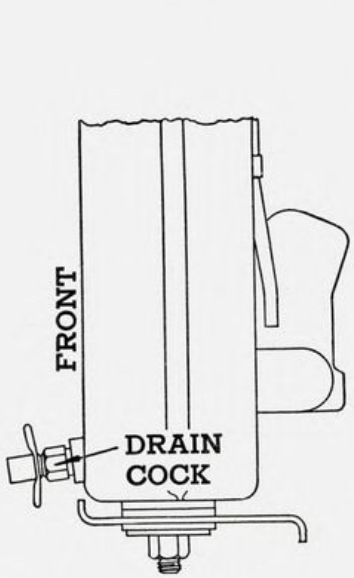
Fig. 8—Details of Oil Pump, Pressure Relief Valve and Distributor Drive on 1900 Engine. The 1901 Engine is Similar

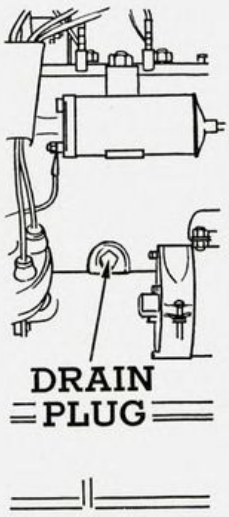
Cooling System

The cooling system of the 1900 has a capacity of 15 quarts. The cellular radiator used on these cars has a gravity flow of 24 gallons per minute. The 1901 cooling system has a capacity of 17 quarts. Tubular radiators are used having a gravity flow of 38 gallons per minute.

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 50 pounds measured with a spring scale hooked to the gene-





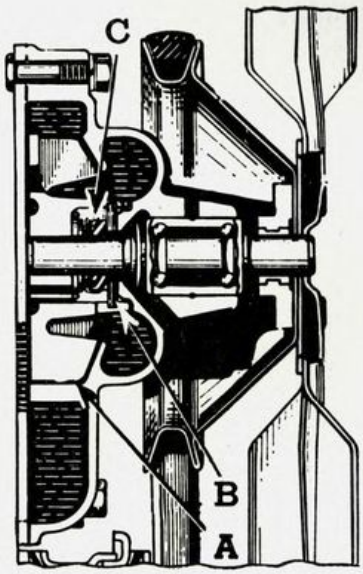


Fig. 9—(Left and Center)—Radiator and Cylinder Block Drain Points. Both Must be Opened to Drain All of the Water from Cooling System

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

rator 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.

Water Pump

The permanently lubricated pump is of the "packless" type employing a spring loaded 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 and coat with grease before assembly.

Radiator Cap

The radiator filler neck is provided with a pressure cap set to release at 4½ pounds per square inch. The cap should be turned down tight to insure its seating against the gasket in the radiator filler neck. When removing the pressure cap it should be cracked slightly to relieve any excess pressure before the cap is completely removed.

Service is by replacement with a new cap or neck gasket or both when required.

Note: Air conditioned cars are fitted with 12 pound per square inch pressure caps.

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

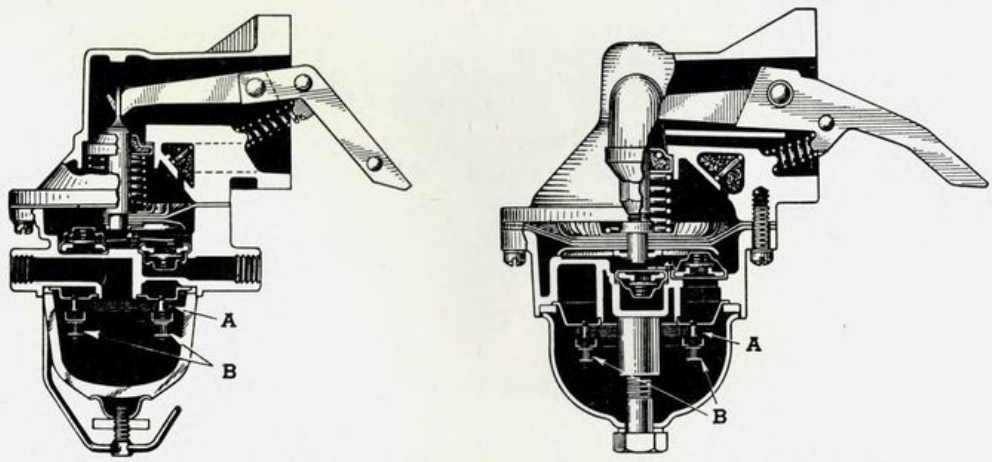


Fig. 11—Fuel Pumps Used on Model 1900 Left, 1901 Right

1900 cars are equipped with a single unit inverted type pump while that on the 1901 cars is similar but equipped with an air dome. Both pumps

are equipped with laminated filters consisting of a number of brass discs "A" Fig. 11, held together by two studs and nuts, "B", through which the gasoline is drawn. Cleaning is accomplished by loosening the nuts and washing in clean gasoline. When reinstalling it is important that the nuts be drawn up tight. If the nuts work loose all filter action is destroyed.

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 S. T. 5175 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 5,000 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

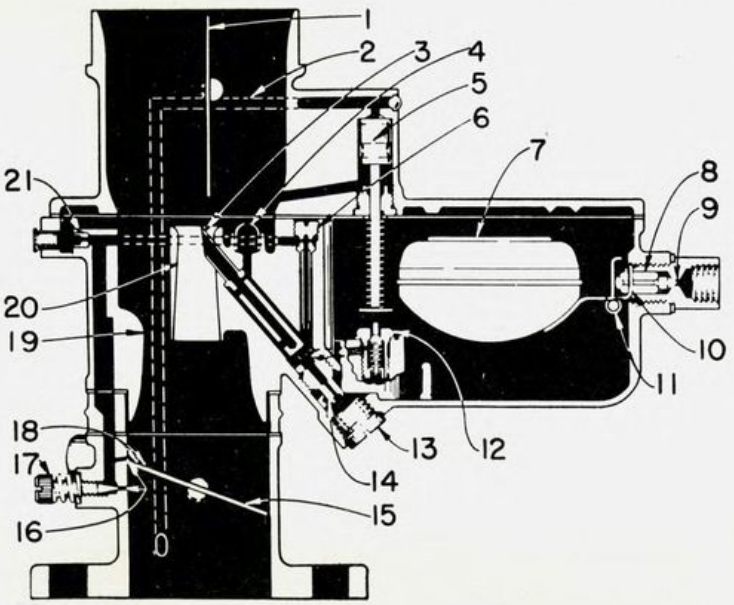
Air inlet for the crankcase ventilation system is through the oil filler tube. The cap of this filler tube is fitted with a copper mesh type of air cleaner to prevent dust from entering the crankcase. The cap filter element should be cleaned every 2,000 miles or oftener by plunging up and down in a container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

Carburetor and Choke

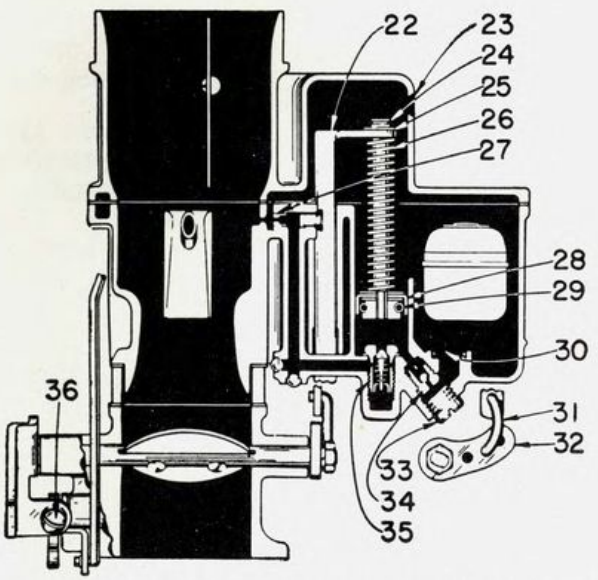
The carburetor used on the model 1900 is a Stromberg single throat type known as the BXOV-26 (Code No. 10-45) and the unit on the 1901 is a Carter 476-S of the duplex or double throat type. Both carburetors are equipped with the integral thermostat type of automatic choke.

1900—Stromberg

Idle Mixture—Turn idle adjusting needles "17" Fig. 12 out for richer idling mixture. Standard adjustment is 1 to 1⅛ turns open.



1. Choke Valve
2. Vacuum Passage
3. Main Discharge Jet
4. High Speed Bleeder
5. Vacuum Power Piston
6. Idle Tube
7. Float
8. Float Needle Valve
9. Float Needle Valve Seat
10. Float Fulcrum Pin Clip
11. Float Fulcrum Pin
12. Power-By-Pass Jet
13. Main Discharge Jet Plug
14. Main Metering Jet
15. Throttle Valve
16. Idle Discharge Holes
17. Idle Needle Valve



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

Fig. 12—Schematic Internal Views of BXOV-26 Carburetor Used on Model 1900

Throttle Stop Screw—Normal or warm idling speed controlled by stop screw "36". Adjust 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—The fast idle speed is automatically controlled by the lift of the fast idle cam and is therefore not adjustable.

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

Calibration—The calibration and parts data below applies to carburetors code "10-45". The code designation is stamped on the top of float chamber.

	1900	
	Part No.	Size
Metering jet, standard	P-19442	.060″
Economizer or power jet	P-24064	No. 53
Idle tube assembly	P-21962	No. 68
Pump check valve	P-18144	None
Float needle and seat	P-21918	.093″
Pump by-pass jet	P-24062	No. 56

Repair Notes—Leaking power by-pass (economizer valve) will cause excessive fuel consumption. Surest method of checking power by-pass is to compare mileage per gallon at 30 m.p.h. with jet "12" plugged off and again with jet in operation. If mileage improves with jet plugged, the valve is leaking. Also check freedom of vacuum power piston "5."

Needle valve should be installed with one corner of triangle down. Accelerating pump on 1900 should deliver 11 c.c. to 14 c.c. of fuel per 10 slow strokes.

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

If a check of the starting and warm-up behavior shows definitely that the carburetor mixture is either too rich or too lean during this period, first make sure that index line on choke housing is lined up with the graduation mark "Λ" on the thermostat cover. This is the normal setting. If adjusting the choke thermostat to the normal setting does not correct the condition proceed as follows:

1. Remove carburetor air cleaner and thermostat cover assembly Fig. 13 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 ½ 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 the throttle valve lever.

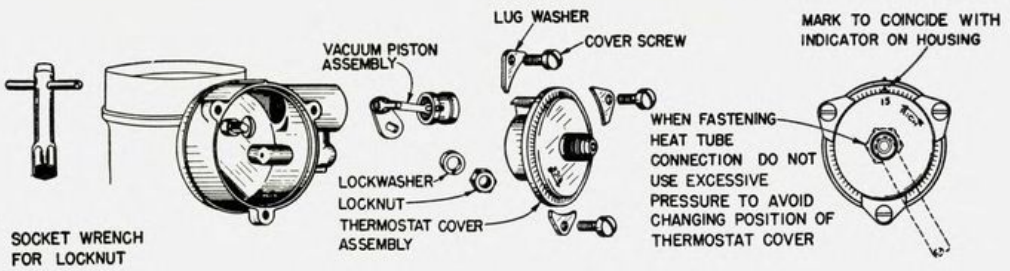


Fig. 13—Exploded View of Automatic Choke Used on 1900.

To check this adjustment on the model 1900 cars proceed as follows:

Hold throttle stop screw "F" Fig. 14 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.

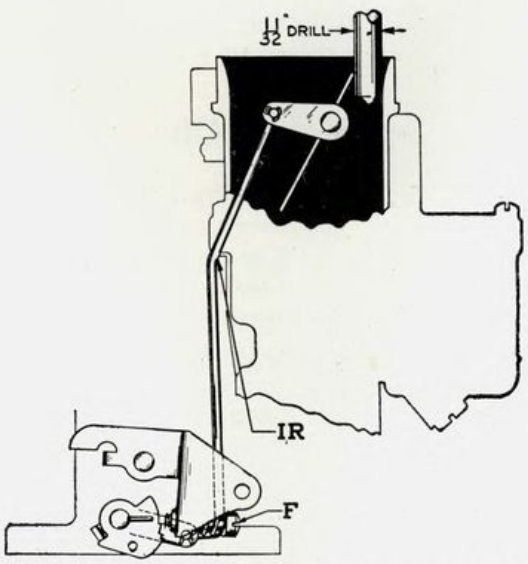


Fig. 14—Method of Checking Choke Unloader on Model 1900

1901-1901A Carter

The 1901 and 1901A are equipped with WD-0 Carter duplex or double throat carburetor known as the model 478-S. In these carburetors the air fuel ratio above the idle range is controlled by throttle operated tapered metering rods which vary the effective opening of the main metering jets.

Idle Mixture Adjustment: Turn idle adjusting screws "A" Fig. 16 out for richer mixture. Standard adjustment is ½ to 1¼ turns out from the seated position.

Throttle Stop Screw: Normal or warm idling speed is controlled by idle stop screw "B" Fig. 18. Adjust the 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: The fast idle, to prevent stalling during the warm up period, is controlled by stop screw "C" Fig. 18. To adjust hold choker valve tightly closed and adjust fast idle stop screw to give .030" opening between edge of throttle valve and bore of carburetor side opposite port. Use gauge No. T109-29 or round wire gauge.

The Float Circuit: Float level should always be checked when the carburetor is worked upon as wear in the float linkage results in a raised float level.

Remove the bowl cover and turn it upside down. Remove the bowl gasket. Take gauge T109-154 ($\frac{5}{32}$") and lay it on the flat portion of the bowl cover as shown in Fig. 15. Always gauge the float at both ends, making sure that the needle is seated.

If float is too high place a finger

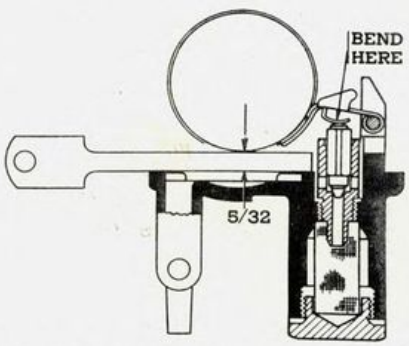


Fig. 15—Use gauge when setting float level.

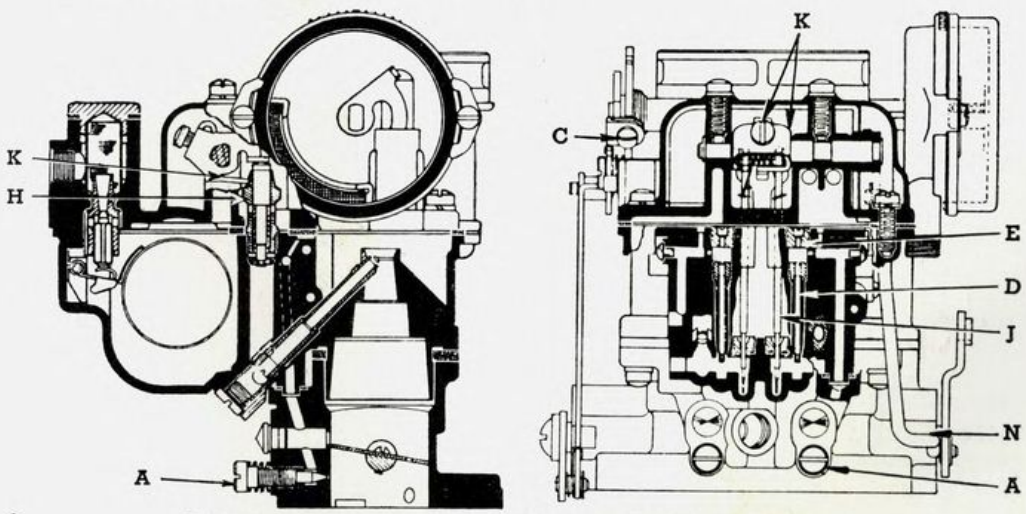


Fig. 16—Sectional views through Carter carburetor

under the float to raise it from contact with the needle and then press down on the float lever lip with a screw driver. Do not use pliers to bend this lip. Bend only a small amount at a time.

Low Speed Circuit: The low speed jets, "D" Fig. 16, are inserted from the top and will be found underneath the plug "E" in which is the by-pass hole for the air to enter. In servicing a carburetor always make sure that the by-pass and air-bleed holes are fully open and that the economizer is not clogged. In cleaning the low speed jet never use wire or drills. If it cannot be cleaned by blowing out with compressed air, use a new jet.

High Speed Circuit: The spring "F" under the piston, "G" Fig. 18, must not be stretched or altered. If in doubt, use a new one. The vacuum piston "G" must be clean and move freely. For altitude operation, use leaner than standard metering rods.

Anti-Percolator: The anti-percolator, "H" Fig. 16, prevents bubbles of vapor from forcing gasoline out of the nozzle when a hot motor stops. If set too high, the anti-percolator will not open. If set too low, the valve will not close when it should and air will be admitted which will make the mixture lean.

Adjustment: With throttle lever adjusting screw backed out and throttle valves tightly closed, with .015″ gauge between lip and anti-percolator valve, Fig. 17, adjust lips on anti-percolator arm to depress anti-percolator valve stems so that the exact centers of the gauge lines are flush with the tops of the anti-percolator plugs. Use T109-22 to adjust.

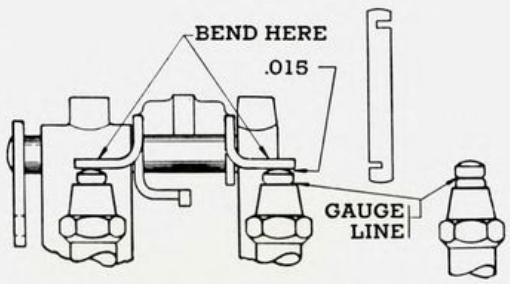


Fig. 17—Adjustment of Anti-percolater valve.

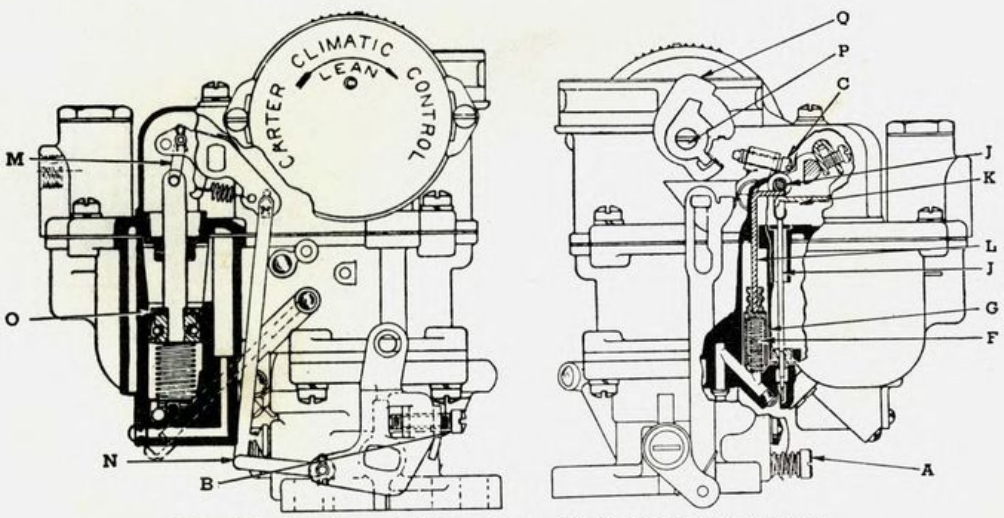


Fig. 18—Sectional views through Carter carburetor.

Metering Rods: The metering rod "J", Fig. 18, controls the flow of gasoline and if adjusted too high or too low, the mixture will be too rich or too lean at certain speeds.

Adjustment: Back out throttle lever adjusting screw. Insert gauge T109-113 in place of metering rod, seating tapered end in metering rod jet. Hold gauge vertical to insure seating. Bend tongue on anti-percolator arm, "K" Fig. 18, using T109-22, so that when the vacuum piston shaft, "L" Fig. 18, is pushed down all the way, with throttle valve seated, metering rod pin will rest lightly on shoulder in notch of gauge. Remove gauge, install metering rod disk and metering rod spring. Be sure metering rod is in jet. If metering rods show wear, replace them. Care must be taken that the vacuum piston, "G" Fig. 18, is clean and dry, shows no wear, and moves freely. A spring of proper length must be under the piston. A new spring should be used whenever the carburetor is repaired.

Pump Adjustment: With pump connector link, "M" Fig. 18, in inner hole in pump arm, and throttle adjustment screw backed out, pump plunger, "O" Fig. 18, should travel $\frac{7}{32}$" from closed to wide open position. Adjustment can be made by bending throttle connector link "N"at lower angle. Use tool T109-75. Pump travel can be measured by using gauge T109-117S, Fig. 19. Difference between reading at wide open and seated throttle should be $\frac{7}{32}$". Projecting portion of indicator should be placed on top surface of pump shaft.

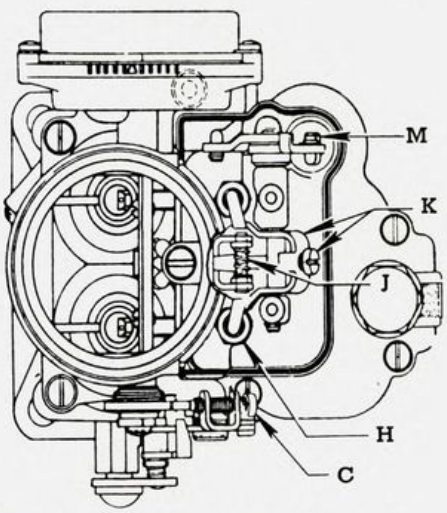


Fig. 19—Plan view of Carter carburetor.

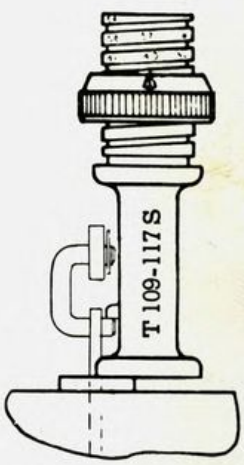


Fig. 20—Gauge used for setting pump travel.

Automatic Choke

The automatic choke, called "Climatic Control" on the Carter carburetor, is a device used in place of the conventional choke control operated from the instrument panel and will give the proper mixture ratios at all temperatures and at all speeds, relieving the driver of this important operation for the starting and driving of a cold motor. It is

of the integral thermostat type with provision for adjustment to suit driving and climatic conditions. For average conditions, center index mark on thermostat housing should be set one notch rich.

If a check of the starting and warm-up behavior shows definitely that the carburetor mixture is either too rich or too lean during the warm up period first make sure that the center index on choke housing is one graduation to the rich side of the reference mark.

If operation is still too rich or too lean disassemble and clean choke mechanism as follows:

To Disassemble: Remove two attaching screws and retainers holding thermostat coil and housing assembly. Remove screw "P" Fig. 18 holding choker trip lever washer and fast idle cam and collar assembly, "Q"." Remove two choke screws and choke valve. Turn choke lever assembly until piston is free from cylinder and remove assembled parts. Do not lose piston pin. Remove piston housing strainer.

Wash all parts, except thermostat spring and housing assembly, in clean gasoline. Then blow through all passages with compressed air. Remove all foreign substances from air horn and parts to allow all parts to work freely. Replace all worn or damaged parts with new.

To Reassemble: Install choke lever assembly and piston. Install choke valve, using new screws. Make certain valve is in perfect alignment and does not bind or rub on inside of air horn bore. Tighten screws securely. Valve should fall open of its own weight after installation. Install fast idle cam and collar assembly, washer and choker trip lever. Tighten screw. Install piston housing strainer.

Install thermostatic coil and housing assembly with notch at bottom. Insert attaching screws and retainers part way and then turn housing counter-clock-wise until notch is one mark rich with center mark on piston housing. Then tighten screws. Instruction for leaner or richer setting is stamped on housing. The position of choke valve will be governed by existing temperature. On a warm day choke valve might be open slightly. On a cold day choke valve is completely closed.

When reassembling carburetor to motor, make certain that tube and joints connecting the manifold to choke are air tight. An air leak in the tube circuit or at the thermostat housing will prevent proper operation of choke.

If warm-up mixture is still unsatisfactory, increase or decrease thermostat tension by moving housing one graduation at a time. If satisfactory results are not obtained after changing adjustment three graduations either way from factory setting, install a new thermostat and cover assembly.

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 ¼" above the top of the plates. High speed driving, particularly during hot weather, causes rapid evaporation of water from the electrolyte. Under these conditions frequent checking is advisable. 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 "A" Fig. 21 in the end of the magnetic switch on top of the starter.

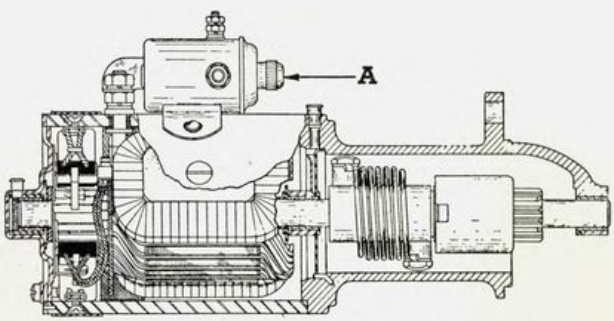


Fig. 21—Auto-Lite MAW-4021 Starter Used on Model 1900-1901

Repair Data—The starter on the 1901 and some 1900 cars is a two-pole type Auto-Lite model MAW-4021 with Bendix drive.

Stalled torque 18 foot pounds at 670 amperes and 4 volts. Running free at 4900 R.P.M., 65 amperes at 5.6 volts armature shaft maximum end play $\frac{1}{16}$ inch. Brush tension 42 to 53 ounces.

To replace grounded brushes it is necessary to cut rivets holding the brush holders and brush ground strip to commutator end plate.

To replace insulated brushes unsolder brush pigtail from field coil and remove old brushes. When inserting pigtail of the new brushes it will probably be necessary to open up slightly the loop in the field coil. Be sure pigtail is inserted full depth of the loop after which it should be clinched to hold pigtail securely in place before resoldering.

Some 1900 cars are fitted with Delco 110 7037 starter motors. Test data on these units: Stalled torque 18 foot pounds at 670 amperes 4.0 volts. Running free at 2500 r.p.m., 125 amperes at 5.5 volts. Armature shaft end play .005 to .050 inches.

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 1900 and 1901 cars are of the single breaker type employing a centrifugal governor and vacuum advance for automatic timing control.

The centrifugal governor is mounted on the distributor drive shaft and is connected to the breaker cam through a yoke. Thus the centrifugal governor controls the advance and retard of the breaker cam. The vacuum control is through a diaphragm in the vacuum housing which is connected by a link to the outside of the distributor housing. Thus the vacuum controls the advance and retard of the complete distributor in its mounting.

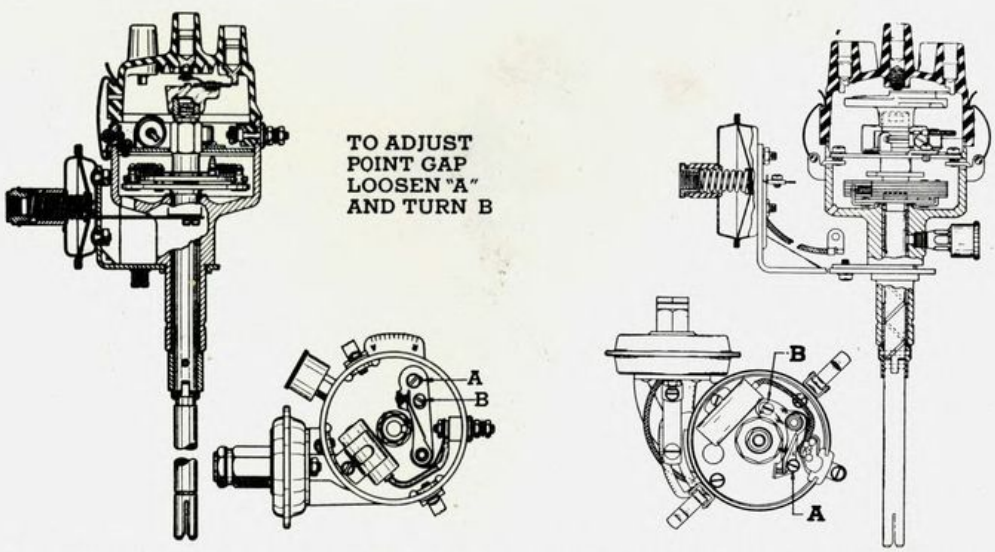


Fig. 22 (Right)—Auto-Lite IGC-4505 Distributor for Model 1900, IGP 4502 for Model 1901 is Similar. Left—Delco 1110092 used on Model 1900

	1900 IGC-4505	1900 111092	1901 IGP-4502
Point Gap	.018″ to .022″	.018″ to .022″	.012″ to .017″
Point Tension	19 to 23 oz.	19 to 23 oz.	19 to 23 oz.
Centrifugal Advance...0	@ 300 r.p.m.	0 @ 300 r.p.m.	0 @ 300 r.p.m.
Starts.....3°	@ 590 r.p.m.	5° @ 800 r.p.m.	3° @ 525 r.p.m.
Full.....9½	@ 1600 r.p.m.	9½ @ 1600 r.p.m.	11½ @ 1550 r.p.m.
Vacuum Advance			
Start	0 @ 6″ HG	0 @ 16″ HG	0 @ 10″ HG
Full	7.5 @ 17″ HG	7½ @ 17″ HG	6° @ 17″ HG
Condenser	28-32 Mfd.		20-35 Mfd.

Note: The centrifugal advance figures should be obtained with the vacuum advance disconnected. A variation of ¾° above or below these figures is permissible.

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 1900; .017 inch on 1901 cars before retiming. With fuel compensator set at zero spark should occur in No. 1 cylinder as per data in table below. The timing marks are stamped on the vibration damper "UDC1" indicates top center.

The firing order for model 1900 is 1-5-3-6-2-4;
for the 1901, 1-6-2-5-8-3-7-4.

CAR	HEAD	B.T.D.C.
1900	All	6°
1901	Std. 6.4	7°
1901	H. C. 6.85	7°

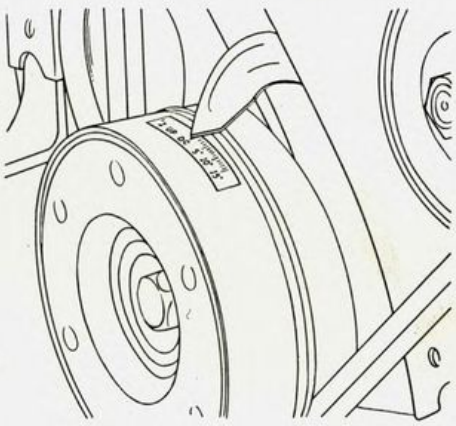


Fig. 23—Ignition Timing Marks Are on Vibration Dampener

Generator

The Auto-Lite GDZ-4801-F generator used on the 1900 and 1901 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 53 ounces maximum with new brushes measured 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 1.60 to 1.78 amperes at 6 volts. Motoring free 4.16 to 4.6 amperes at 6 volts.

The Delco 1102682 generator which is used on some 1900 cars is similar to the Auto-Lite GDZ-4801-F. Maximum output 35 amperes at 8 volts. Test specifications are as follows: Brush spring tension, 25 ounces maximum with new brushes. Field current 1.76 to 1.88 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.

Generator Regulator

The generator regulator mounted on the dash provides a cut-out as well as complete current and voltage regulator. The Auto-Lite VRP-4002-C unit is used on the 1900 and 1901. Some 1900 cars are equipped with the Delco 1118202 regulator. Test data is as follows:

	CUT-OUT		VOLTAGE		CURRENT	
	Auto-Lite	Delco	Auto-Lite	Delco	Auto-Lite	Delco
Resist. of Winding..	31.4 ohms	.....	111.4 ohms	.....	.....	.....
Armature Air Gap..	.034″-.038″	.020″	.048″-.052″	.070″	.048″-.052″	.075″
Contact Point Gap.	.015″ min.	.020″	.012″ min.	.....	.012″ min.	.....
Points Close . . Volts	6.5-7.0	6½ to 7	.....	.....	.....	.....
Points Open . . Amp.	3.0-6.0	4	.....	.....	.....	.....
Operating Amperes.	.....	.....	.....	.....	34-36	32-34
Operating Voltage..	.....	.....	7.2 to 7.4	7.2 to 7.4	.....	.....

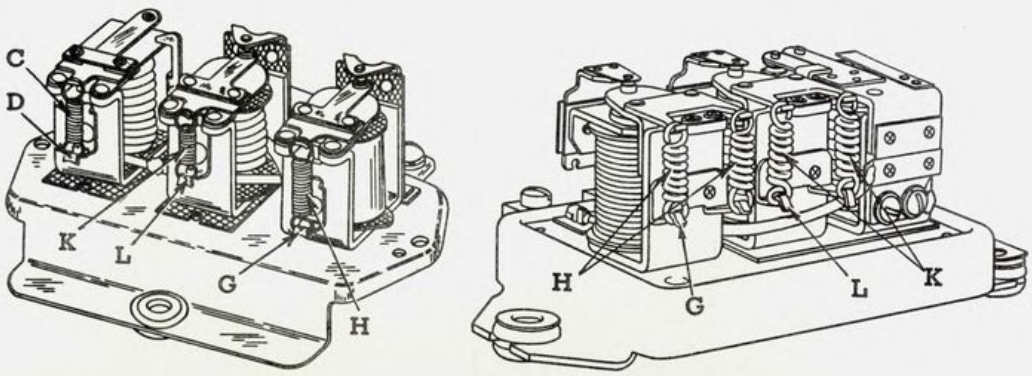


Fig. 25 (Auto-Lite Regulator on Left, Delco on Right)—Spring Hanger "D" Controls Cut-Out Voltage. Hanger "L" Controls Generator Amperage and Hanger "G" Charging Voltage. On Delco Regulator, Make Adjustment only on light Spring

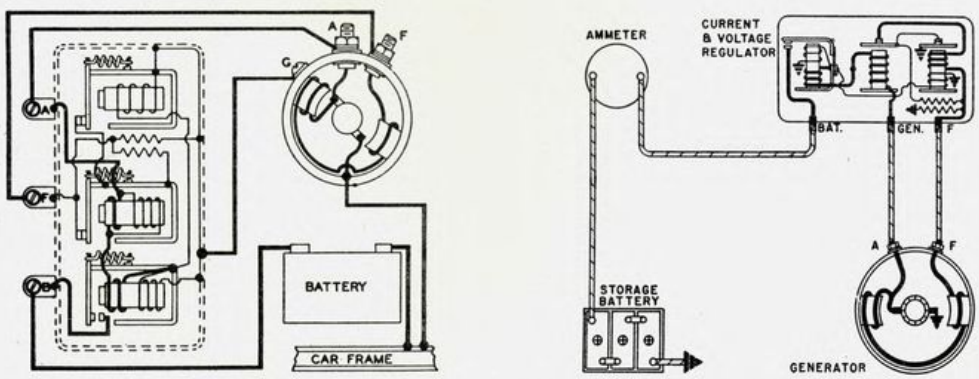


Fig. 26—Internal Wiring Auto-Lite Regulator Left, Delco Right

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. 27. It protects the headlamp wiring circuit in case of overload or short circuit.

A similar type of overload relay is built into the windshield wiper mechanism.

Two 20 ampere fuses mounted in clips on the switch frame protect the body (dome light, etc.) and accessories (stop-light, cigar lighter, heater, spotlight, etc.) circuit. A similar 20 ampere fuse enclosed in a socket in the tail lamp line near the light switch acts as a safeguard for the tail lamp and instrument light circuits. If the tail lamp fuse blows, the instrument light is extinguished. Clock and radio are protected by separate 3 ampere and 14 ampere fuses respectively. These are located in the feed wire to each unit.

On those cars equipped with Aero-Drive there is an additional 30 ampere fuse enclosed in a socket near the starter motor in the line to the relay. This fuse protects the econo-drive circuit and when blown out makes the Aero-Drive inoperative.

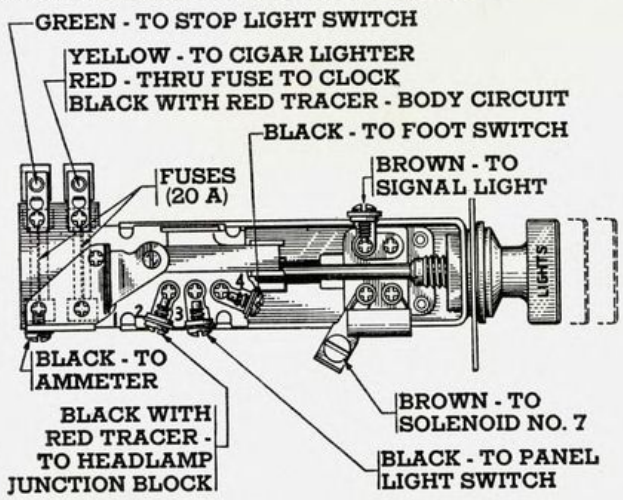


Fig. 27—Main Lighting Switch and Wiring Connections

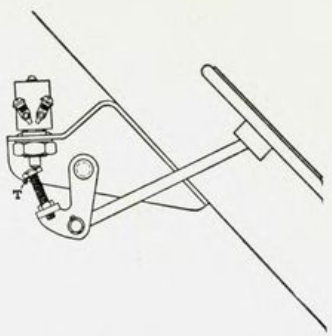


Fig. 28—Screw "T" Should Just Contact Switch Plunger When Throttle is Just Wide Open

Head light switch on Aero-Drive equipped cars has a resistor attached for the purpose of dimming the Aero-Drive signal light when driving at night. Pulling the light, switch knob out to the "On" position automatically cuts in the resistor, thus dimming the signal light whenever the head lights are on.

Aero-Drive Controls

An extra winding and set of points in the Aero-Drive control relay prevents stopping of the engine in case of solenoid failure and the switch in the lock-out knob prevents engagements of Aero-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 Aero-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. 28. Adjust screw if not to these specifications. Accelerator pedal must have enough over-travel to close switch before bottoming on floor boards.

Headlamps

The 1941 Packard cars carry a 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.

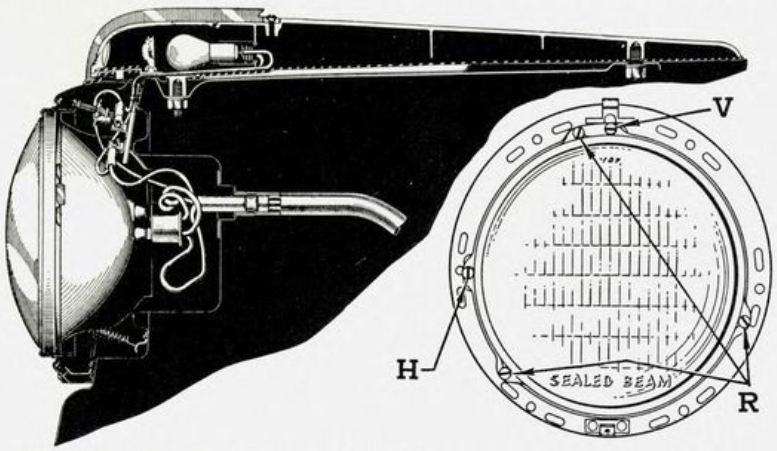


Fig. 29—Section Through Headlamp and Parking Light.

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.

No dust or moisture can get inside the "Sealed Beam" headlamp unit. This eliminates cleaning except for wiping off the outside of the lens. The right- and left-hand headlamps are identical and cannot be installed improperly, nor can the electrical connections be attached in any but the right way. Replacement is as follows:—

1. Remove retaining screw and lift off headlamp door rim.
2. Loosen but do not remove the three screws holding the retaining ring "R" Fig. 29. Do not disturb the aiming screws at the top and on the left side of the unit.
3. Remove retaining ring by rotating to the left, allowing the light unit to be removed.
4. Remove the connector plug from the light unit.
5. Install a new unit by reversing above operations.

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. 30 below the above mentioned line, by the amount required by your particular state.

Locate center of car on screen by sighting through center of rear window past left edge of windshield divider then past the right edge, 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. 30 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 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 "V" Fig. 30 of the left lamp until hot spot is centered on line "A-A" and horizontal adjusting screw "H" 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 lower beam.

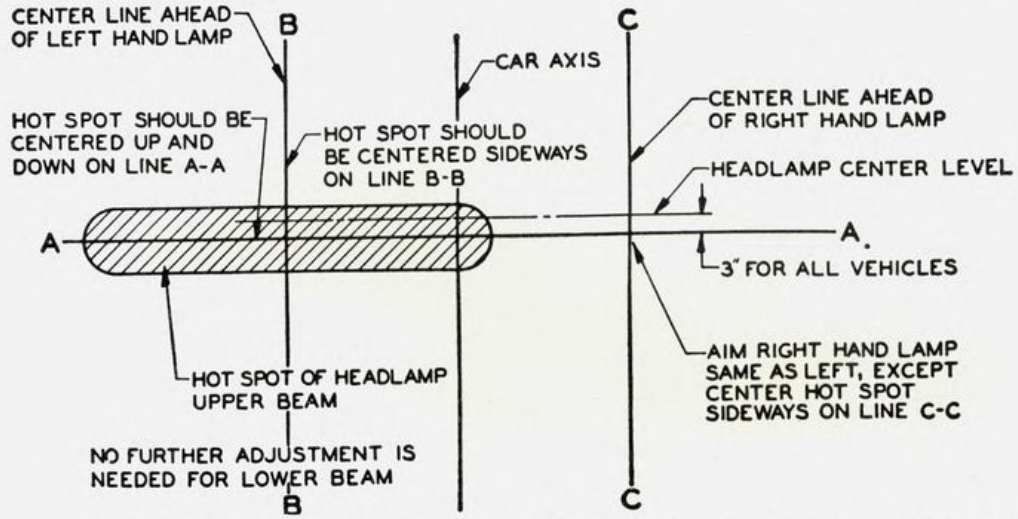


Fig. 30—Left Lamp is Correctly Aimed When Hot Spot is Centered on Lines "A-A" and "B-B" as Shown

Lamp Bulbs

Location	*Candle-power*	*Mazda No.*	*Per Car*
Front lamp	40–30 watts	40–30	2
Front fender lamp	21–3	1154	2
Instrument board panel light	1½	55	2
Glove compartment light	0.8	51	1
Instrument board reading light	1½	55	1
Headlamp beam signal light	0.8	51	1
Aero-Drive indicator light	1½	55	1
Stop and tail lamp	21–3	1154	2
Dome light	6	81	1
License plate lamp	3	63	1
Clock light	1½	55	1
Speedometer pointer light	1½	55	1

Windshield Wiper

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

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. Do not hold arm further away from glass than necessary or the spring inside the wiper arm will be stretched out of shape.

Parking Position and Adjustment—The wiper blades will park evenly only when the wiper switch is shut off and the blades allowed to park before the ignition switch is turned off. If blades do not park evenly at base of windshield or if one blade is out of alignment with the other, proceed as follows:

1. Loosen wiper arm nut several turns and loosen arm on shaft.

2. Move wiper blade to proper parking position and tighten slotted head nut securely.

Note: Blades should have some clearance at bottom of stroke to prevent pounding.

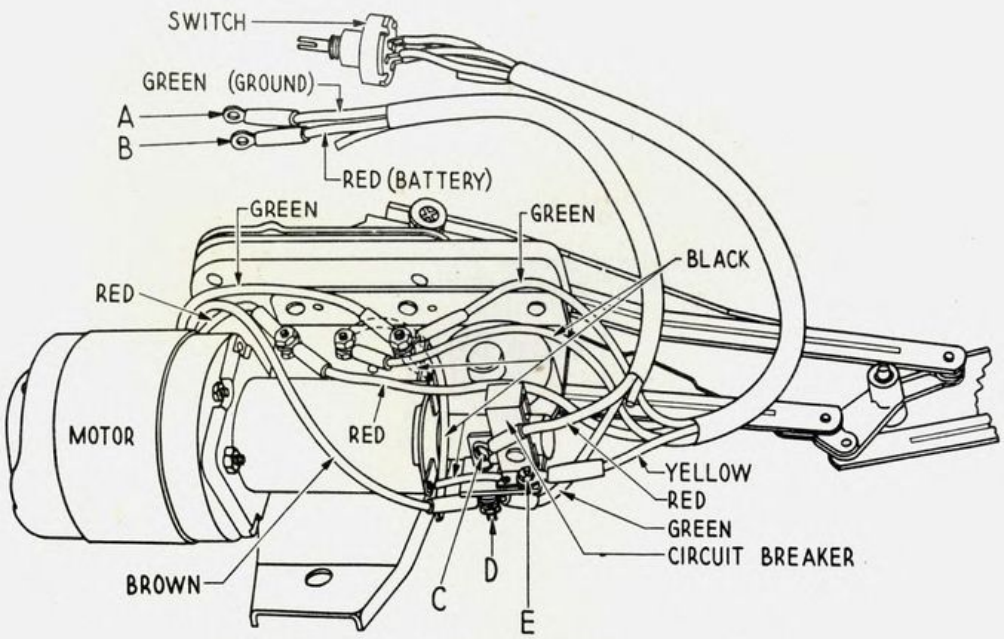


Fig. 30—Electric Windshield Wiper and Wiring

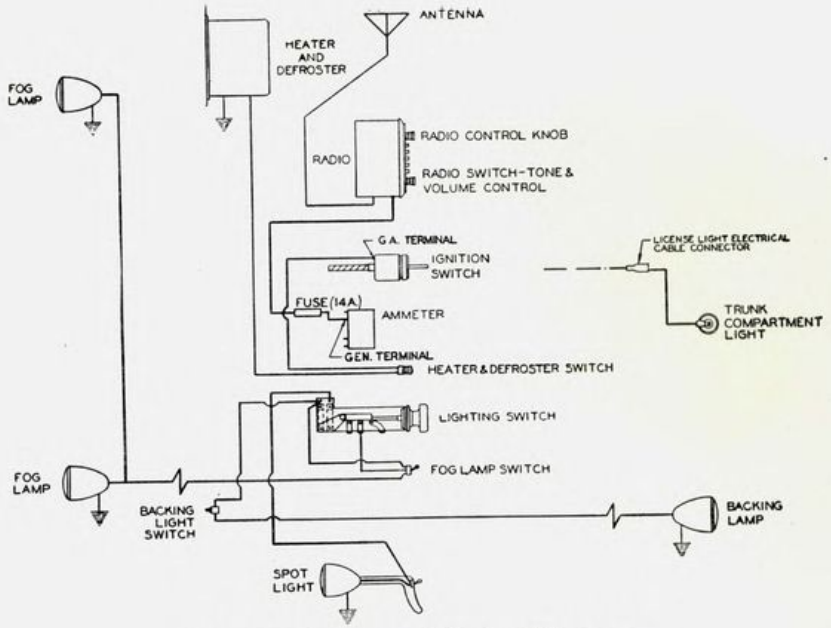


Fig. 31—Accessory Wiring Diagram

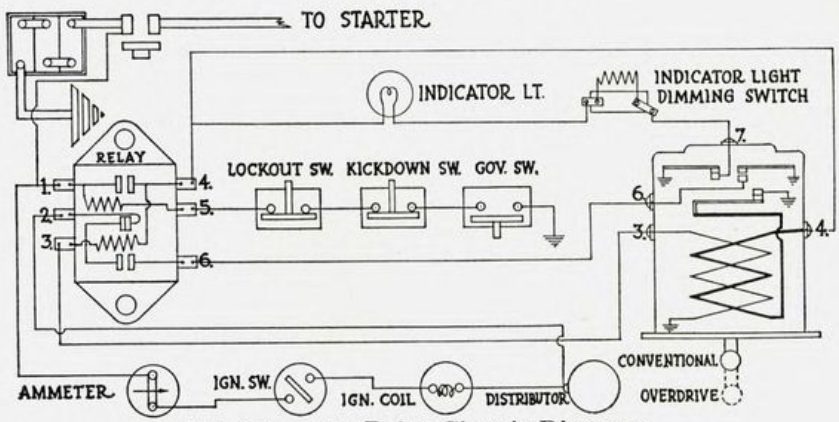


Fig. 32—Aero-Drive Circuit Diagram

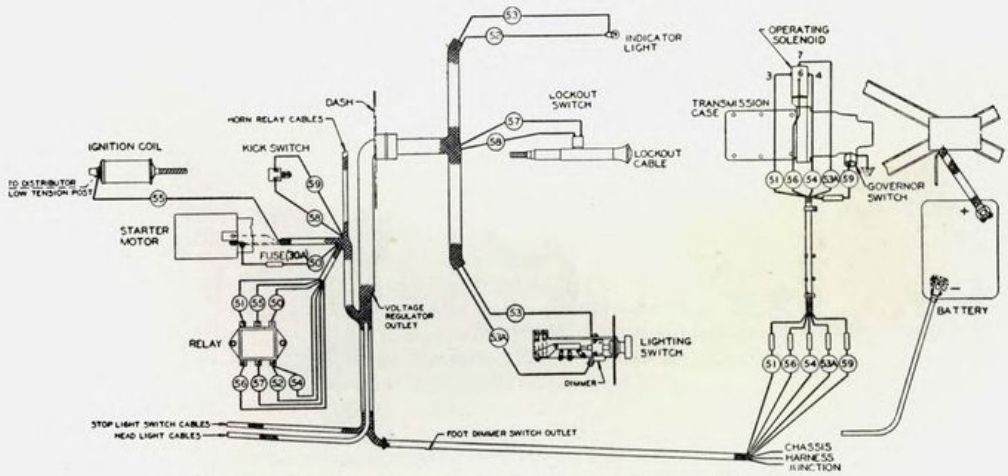


Fig. 33—Transmission Aero-Drive Wiring Diagram

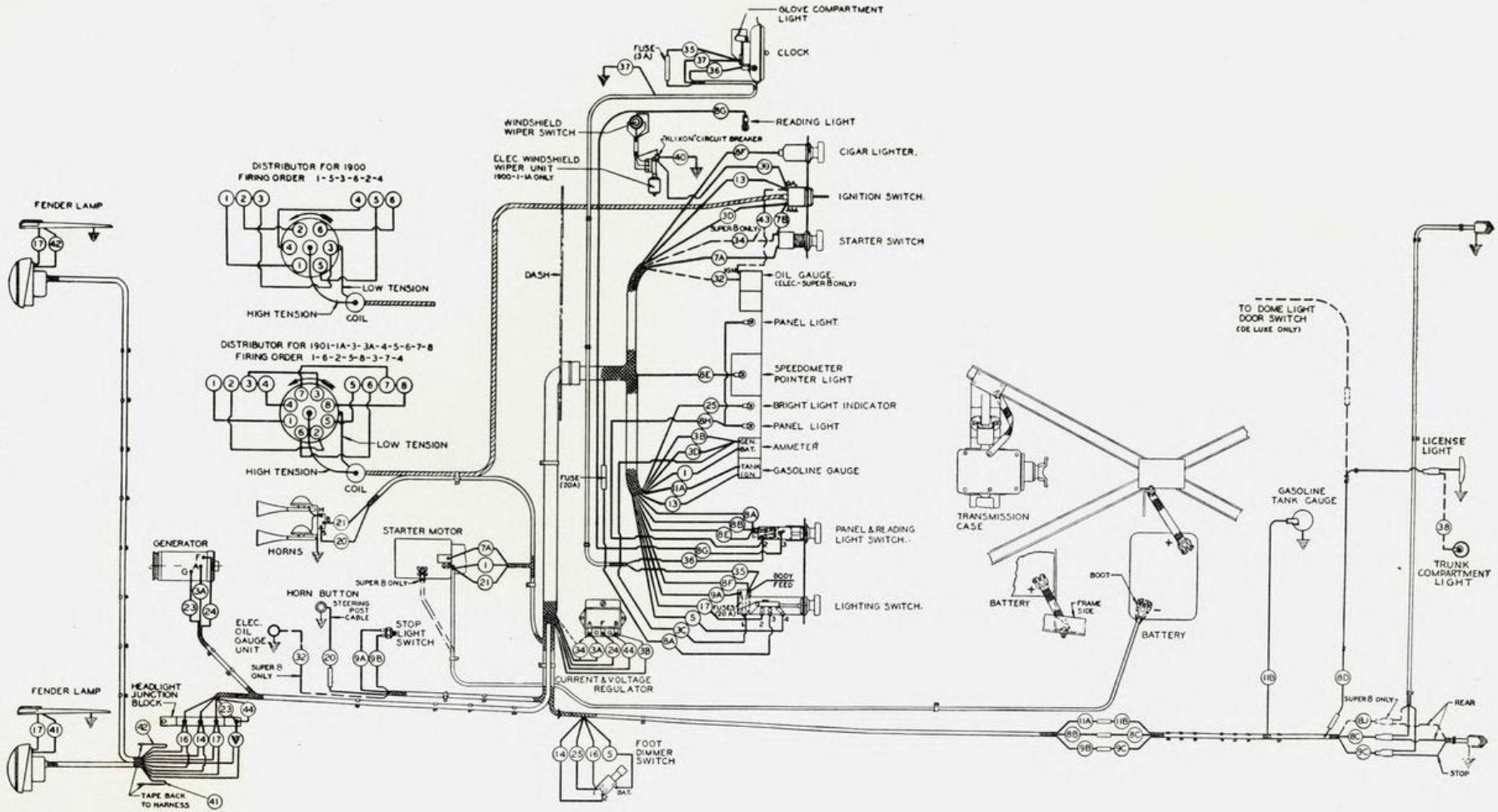

GLOVE COMPARTMENT LIGHT
CLOCK
FUSE (3A)
READING LIGHT
WINDSHIELD WIPER SWITCH
"KLIXON" CIRCUIT BREAKER
CIGAR LIGHTER
ELEC. WINDSHIELD WIPER UNIT 1900-1-1A ONLY
IGNITION SWITCH
STARTER SWITCH
SUPER 8 ONLY
DASH
OIL GAUGE (ELEC.-SUPER 8 ONLY)
PANEL LIGHT
SPEEDOMETER POINTER LIGHT
BRIGHT LIGHT INDICATOR
PANEL LIGHT
AMMETER
GASOLINE GAUGE
FUSE (20A)
PANEL & READING LIGHT SWITCH
LIGHTING SWITCH
BODY FEED
FUSES (20 AMP.)
CURRENT & VOLTAGE REGULATOR
FOOT DIMMER SWITCH
BAT.
DISTRIBUTOR FOR 1900
FIRING ORDER 1-5-3-6-2-4
LOW TENSION
HIGH TENSION
COIL
DISTRIBUTOR FOR 1901-1A-3-3A-4-5-6-7-8
FIRING ORDER 1-8-2-5-8-3-7-4
LOW TENSION
HIGH TENSION
COIL
HORNS
STARTER MOTOR
SUPER 8 ONLY
GENERATOR
HORN BUTTON
STEERING POST CABLE
ELEC. OIL GAUGE UNIT
STOP LIGHT SWITCH
SUPER 8 ONLY
FENDER LAMP
FENDER LAMP
HEADLIGHT JUNCTION BLOCK
TAPE BACK TO HARNESS
TRANSMISSION CASE
BATTERY
FRAME SIDE
BOOT
BATTERY
TO DOME LIGHT DOOR SWITCH (DE LUXE ONLY)
GASOLINE TANK GAUGE
LICENSE LIGHT
TRUNK COMPARTMENT LIGHT
SUPER 8 ONLY
REAR
STOP

Fig. 34

Aero-Drive Wiring

No.	Ga.	Color	Location
50	12	Black	Starter Motor Switch to Relay Post No. 1
51	14	Yellow	Relay Post No. 3 to Solenoid Post No. 3
52	18	Brown	Relay Post No. 4 to Aero-Drive Indicator Light
53	18	Brown	Lighting Switch to Aero-Drive Indicator Light
54	12	Black	Relay Post No. 4 to Solenoid Post No. 4
55	16	Green	Relay Post No. 2 to Ignition Coil—Low Tension Post
56	14	Green	Relay Post No. 6 to Solenoid Post No. 6
57	16	Black with Red	Relay Post No. 5 to Aero-Drive Lock-out Switch
58	16	Black with Red	Kick Switch to Aero-Drive Lock-out Switch
59	16	Black with Red	Kick Switch to Governor Switch
53A	18	Brown	Lighting Switch to Solenoid Post No. 7

Chassis Wiring

No.	Ga.	Color	Location
1	10	Red	Starter Motor Switch to Ammeter
3A	10	Red	Current Regulator to Generator
3B	10	Black	Current Regulator to Ammeter
3C	12	Black	Lighting Switch to Ammeter
3D	12	Black	Ammeter to Ignition Switch
5	14	Black	Lighting Switch to Foot Dimmer Switch
7A	16	Black	Starter Switch to Starter Motor Switch
7B	16	Black	Starter Switch to Ignition Switch (Not Used on Super 8)
8A	16	Black	Lighting Switch to Panel Light Switch
8B	16	Black	Panel Light Switch to Rear Harness Junction
8C	16	Black	Rear Harness Junction to Rear Lights
8D	16	See Drawing	Rear Harness to License Light
8E	16	Black	Panel Light Switch to Speedometer Pointer Light
8F	14	Yellow	Cigar Lighter to Lighting Switch
8G	16	Black	Panel Light Switch to Reading Lights
8H	16	Black	Panel Light Switch to Panel Lights
8J	16	Black	Splice at 8C to Rear Lights (Upper)
9A	16	Green	Fuse at Lighting Switch to Stop Light Switch
9B	16	Green	Stop Light Switch to Rear Harness Junction
9C	16	Green	Rear Harness Junction to Stop Lights
11A	18	Tan with	Gasoline Gauge to Rear Harness Junction
11B	18	Black and Red	Rear Harness Junction to Gasoline Tank Gauge
13	16	Black	Ignition Switch to Gasoline Gauge
14	14	Red	Foot Dimmer Switch to Junction Block and Headlamps (City)
16	14	Green	Foot Dimmer Switch to Junction Block and Headlamps (Drive)
17	16	Black with Red	Lighting Sw. to Junction Block to Lamp Junction and Fender Lamps
20	16	Brown	Steering Post Horn Button to Horn Relay
21	12	Black	Starter Motor Switch to Horn Relay
23	14	Black	Generator to Headlamp Junction Block
24	18	Brown	Current Regulator to Generator
25	18	White	Foot Dimmer Switch to Speedometer Bright Light Indicator
32	16	Yellow with Black	El. Oil Gauge (Panel) to El. Oil Gauge Unit (Motor) (Super 8 Only)
34	16	Black	Current Regulator to Starter Switch (Super 8 Only)
35	18	Red	Lighting Switch to Fuse at Clock
36	18	Black	Clock to Panel Light Switch
37	18	White	Clock to Glove Compartment Door Hinge Screw
38	16	Black	Rear Compartment Light to License Light Electric Cable Connector
39	16	Red	Electric Windshield Wiper Unit to Ignition Switch
40	16	Green	Electric Windshield Wiper Unit to Ignition Switch Mounting Screw
41	16	Yellow	Fender Lamp Left to Lamp Junction Block
42	16	Yellow	Fender Lamp Right to Lamp Junction Block
43	16	Black	Ignition Switch to Electric Oil Gauge (Super 8 Only)
44	14	Black	Current Regulator to Headlight Junction Block

Clutch and Transmission

The only external adjustment of the semi-centrifugal clutch is at the pedal linkage. Pedal should have 1½ to 1¾ inches of free travel measured between pedal pad and floor board. Adjust by means of the nut "D" on pedal rod shown in Fig. 35.

The transmission is constant mesh in all forward speeds with synchronized shift on the second and third speed gears. Shifting is accomplished through a system of levers and rods from gear shifter lever on the steering column. A spring assistor is provided on the shift into second and third gear.

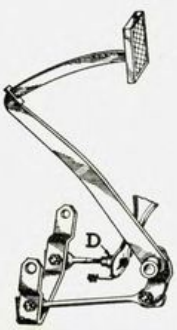


Fig. 35 (Above) — Clutch Pedal Should Have 1½ to 1¾ Inches Free Travel

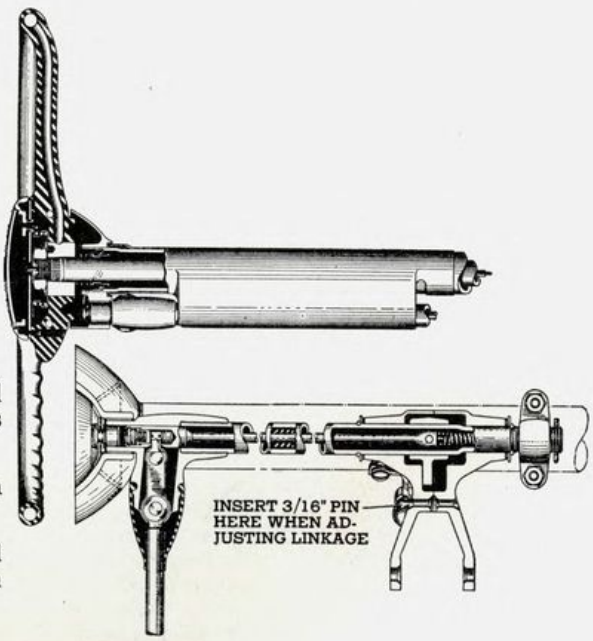
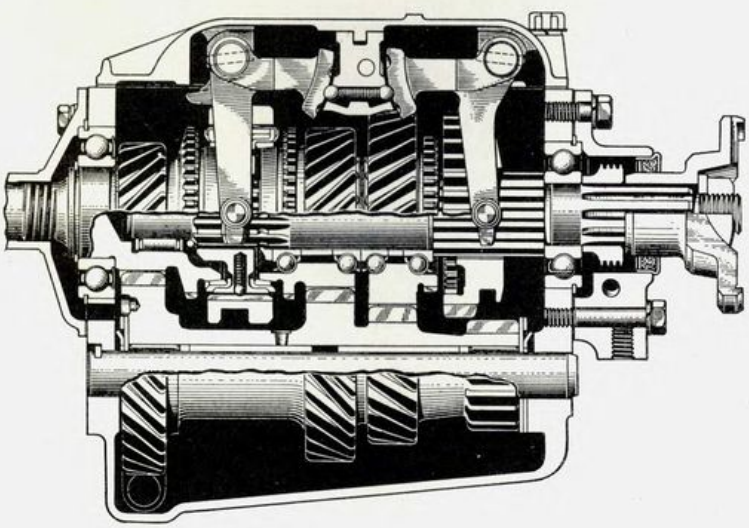


Fig. 36 (Right)—Section Through Steering Column Gearshifter

Fig. 37 (Below)—First and 2nd Speed Gears of Transmission Are Constantly in Mesh



Steering Column Gear Shift

The gear shifter idler assembly is mounted on the brake master cylinder. The second and third speed idler lever is mounted on roller bearings and is fitted with an over center type of assist spring. The reverse and first speed lever is mounted on plain bearings and has no assist.

The roller bearings are packed with lubricant at assembly and no further lubrication is necessary unless they are disassembled. The plain bearings are of the self-lubricating type and require no lubrication.

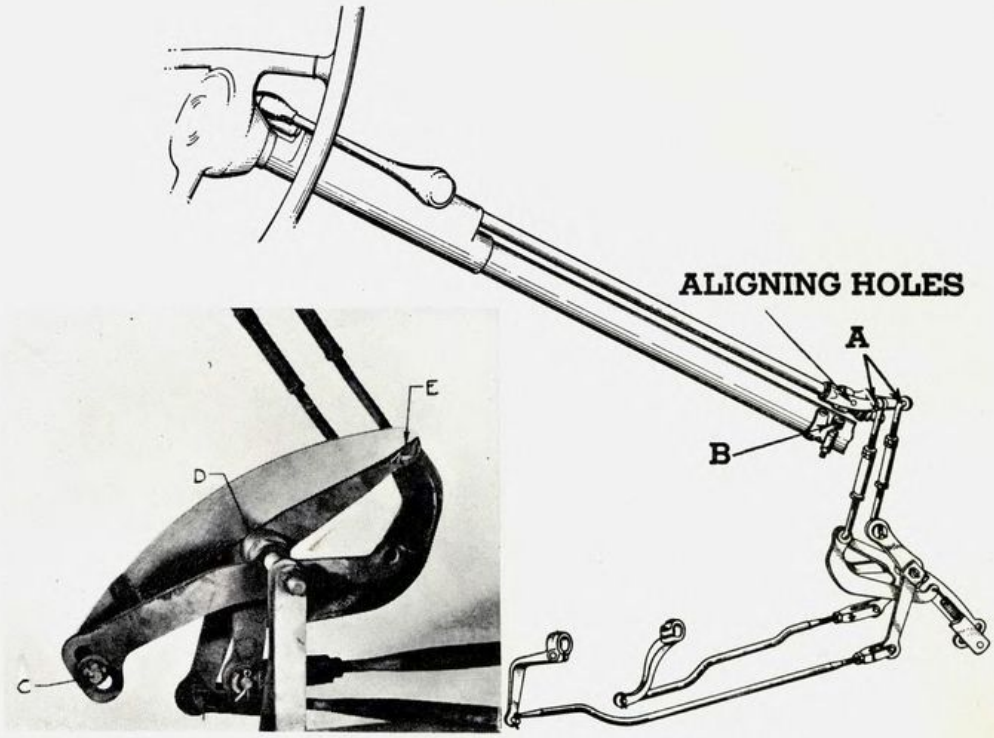


Fig. 38—Steering Column Gear Shift Mechanism

The turnbuckles in the steering column to idler lever rods and the assest spring anchor provide the only adjustment. Remove clevis pins "A" Fig. 38 and remove rods from levers. Locate steering column levers in neutral position by inserting $\frac{3}{16}$ inch pin temporarily through hole in levers. Place transmission gears in neutral position and adjust length of rods by means of turnbuckles until ends of rods will freely enter holes in ends of levers. Tighten lock nuts on turnbuckles, install cotter pins in rods and remove adjusting pin from steering column levers.

To provide the proper assist action the center of the assist spring anchor "C" and the center of the high gear shifter rod "E" must line up with the center of the idler lever bearing "D." Place gauge ST-5209 on "D" and "E" as shown and adjust the assist spring anchor until the gauge just makes contact at "C", "D" and "E."

The second and third speed steering column lever stop "B" Fig. 38 is provided to take up any slack in the linkage when operating in 3rd gear. The stop should be adjusted so that the rubber cap is compressed at least 1/8 inch when the 3rd speed gear is engaged.

Notes for the Mechanic

Clutch driven plates have a spring driven hub with a different predetermined friction lag for standard and Aero-Drive equipped cars. Plates are identified by paint marks on hub—standard blue, Aero-Drive white.

Aero-Drive Unit

The Aero-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 Aero-Drive multiply the axle ratio by .722.

The car speeds at which the Aero-Drive engages and disengages are determined by a separate centrifugal governor switch, mounted externally at the rear of the Aero-Drive housing and driven from the speedometer drive gear. Refer to Fig. 39.

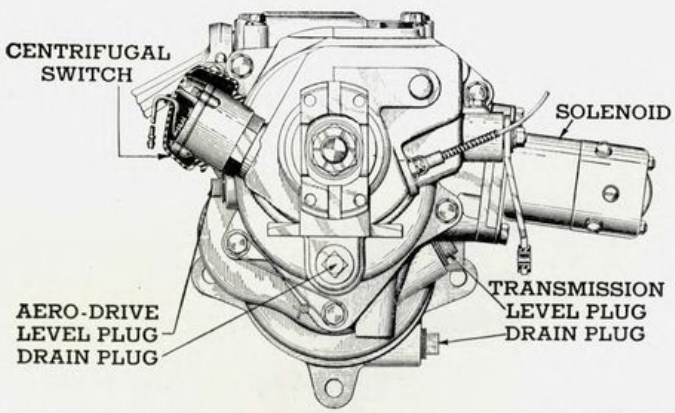


Fig. 39—Rear View of Aero-Drive. The Centrifugal Switch Which Controls Cut-in Speed Is Not Adjustable Except by Changing Switch Unit.

Engagement and disengagement of the Aero-Drive is made by the solenoid which is controlled by the governor switch. When the solenoid is energized it pushes a pawl in, to engage the Aero-Drive. When the solenoid circuit is opened a spring withdraws the pawl and the drive returns to direct.

The accelerator operated kick-down switch and the instrument board lock-out switch are connected in series with the governor switch. See Fig. 32, page 41. Opening either switch, by depressing accelerator to end of its travel, or pulling out lock-out knob, will cut off the current to the solenoid and return the drive to direct until the switch is again closed.

The bearing mounting at the rear of the Aero-Drive main shaft consists of one double-row unit which is pre-loaded within itself.

Repair Notes—The external centrifugal governor is calibrated to cut in the Aero-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 a higher cut-in speed is desired a 30 m. p. h. governor may be secured from the Packard Dealer.

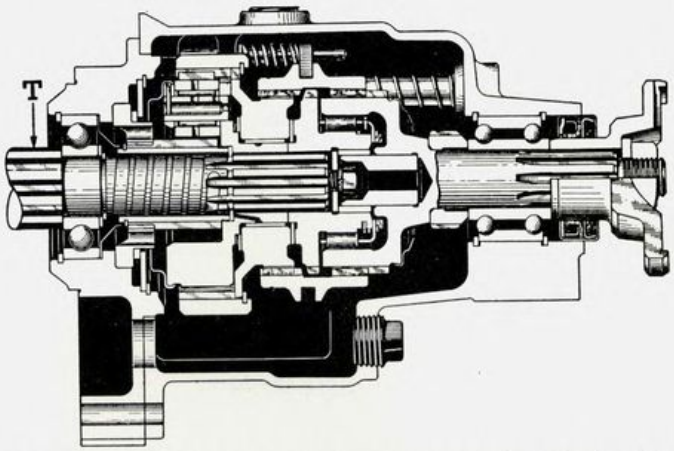


Fig. 40—Sectioned Aero-Drive Unit Which is Bolted to End of Transmission. "T" is a Continuation of the Transmission Mainshaft

It should be remembered that the mainshaft rear bearing "R" requires no preloading. The lock-out knob should clear the knob stop ⅛ 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 1900 without overdrive 4.3, with overdrive 4.55; standard on 1901 without overdrive 4.09, with overdrive 4.36; standard on 1901A commercial chassis 4.7, with overdrive 4.9.

Notes for the Mechanic

Pinion Shaft Bearings: Bearings should be adjusted to a preload drag of 25 to 30 inch-pounds.

To adjust preload, draw up the self-locking flange 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. Do not back off on nut. If preload exceeds 30 inch-pounds install new sleeve and readjust as before.

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.

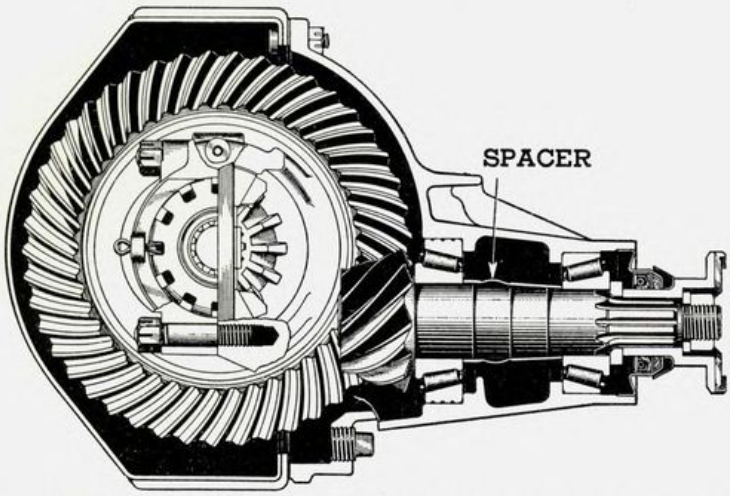
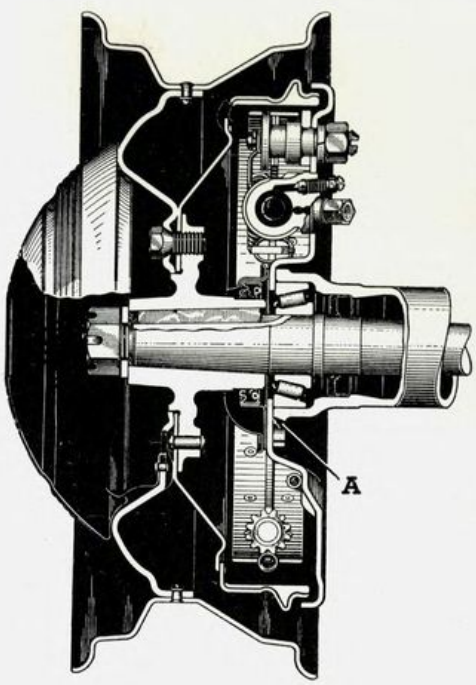


Fig. 41—Model 1901 Differential Carrier. The Unit Used on 1900 Cars is of Similar Design

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



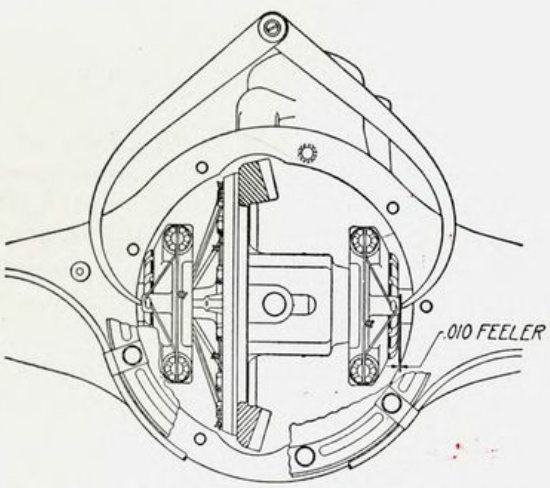


Fig. 42 (Left)—1901-Rear Axle Bearing 1900 is similar. Shims "A" Control Axle Shaft Bearing Adjustment

Fig. 43 (Above)—Differential Bearings Should be Preloaded to a .010 Inch Spread of the Bearing Pedestals

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 the other with the .010″ feeler blade interposed between one of the machined bosses and the caliper as shown in Fig. 43. 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.

Wheel Bearings: End play should be .004″ to .007″ total. Adjustment is by means of shims "A" in Fig. 42 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

The roller bearing cross 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. *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.

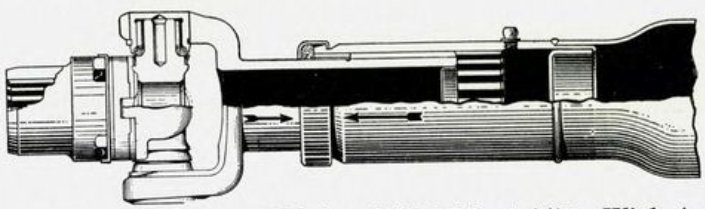


Fig. 44—Arrow on Universal Yoke of 1901 Must Align With Arrow on Propeller Shaft

The front universal joint on the 1900 is of the ball and trunion type thus eliminating the need for a slip spline. These joints are packed with lubricant at the factory and should need no attention for approximately 30,000 miles at which time it should be disassembled and repacked.

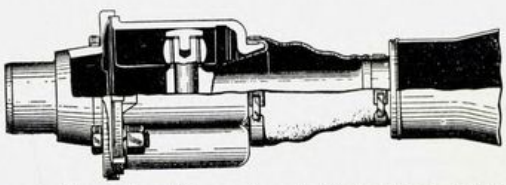


Fig. 45—Ball and Trunion Type front Universal Joint used on 1900

To repack, remove drive shaft from car. Bend back six lugs holding grease cover on front of joint and remove it together with the gasket. Clean out joint thoroughly and repack with 2 ounces of heavy fibre grease made from a high viscosity mineral stock. Do not over lubricate. The leather boot is intended for a dust shield and should contain no grease.

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 ⅛ turn. Loosen the worm cover screws "A," Fig. 46 about ⅛ 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 1½ and not more than 2¼ lbs. (measured at rim end of wheel spoke) should be required to move the steering wheel. If drag is less than 1½ 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 1½ to 2¼ 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 ⅛ turn. Grip hub of roller shaft lever, Fig. 46, and check end play by feel. Adjust to remove all end play by means of the roller shaft adjusting screw "C."

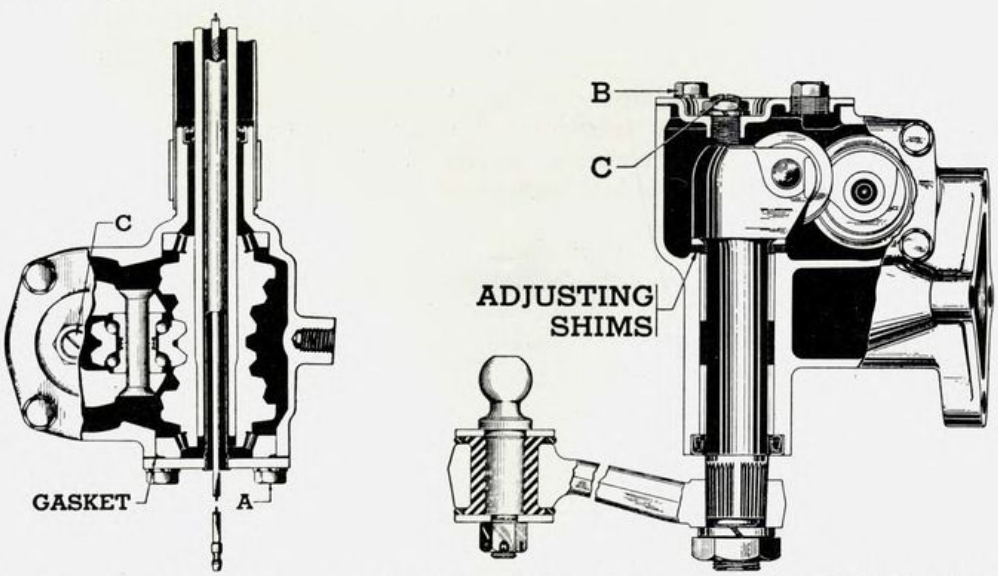


Fig. 46—Steering Gear is of the Integral Housing Type. Wormshaft Bearings and Roller Mesh Should be Adjusted to a Slight Drag as Outlined in Text

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 4½ lbs. If amount of drag at "high spot" is greater than 4½ 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 1900 steering wheel cannot be lowered although it can be raised about ⅝ inch by installing the 1901 steering column bracket. The 1901 steering wheel cannot be raised although it can be lowered a like amount by installing the 1900 column bracket.

The front seat frame rests on two wooden strips which may be removed to lower the seat approximately ½". Two sets of bolt holes permit a one inch change in fore and aft position of the seat. Inserting tapered wedge No. 337373 will raise the seat approximately ⅝ inch.

Steering Crank

The steering crank or intermediate arm and its bearing are automatically preloaded by a spring washer. Castellated nut should be snugly tightened. Arm turns on bushing which is held stationary by tension of nut. Use care not to collapse bushing when tightening nut.

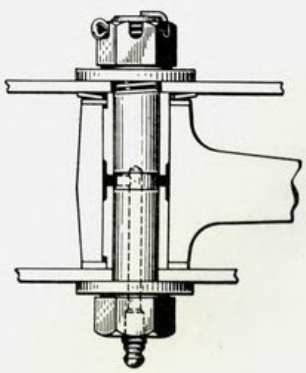


Fig. 47—Steering Crank or Intermediate Arm Bearing. A Special Spring Washer Automatically Imparts the Desired Amount of Friction Drag to the Bearing

Steering Rods

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.

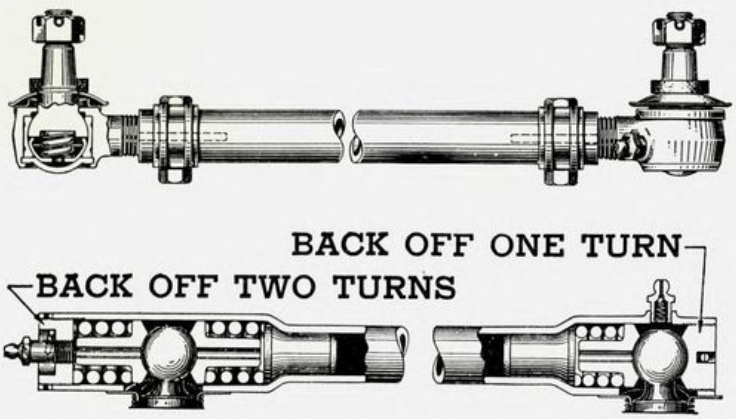


Fig. 48—Top View Shows One of the Two Tie-rods. Lower View is the Drag Link

King Pin Bushings

The king pins are fitted with two roller bearings and an antimony lead thrust bearing.

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 3½ 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 0 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 the high spot. The high spot may be located by turning the steering gear until the mark on the gear case lines up with a similar mark on the steering lever. This should put the wheels in the straight ahead position. Check, using ST-5105 Steering Centering Crank and measuring from center indicator to each brake backing plate. Adjust length of cross tubes until distance is same on both sides and wheels are straight ahead.

2. To adjust toe-in, loosen clamps on both cross tubes then turn both tubes an equal amount, being careful not to move the steering gear off the high spot. After the toe-in has been set the length of the cross tubes should be checked. The distance between the centers of the ball sockets

should be the same within ½". If the difference is more than ½" with the wheels in the straight ahead position, a bent steering knuckle arm is indicated.

Camber

Desired and minimum camber angle is ½° but a maximum of 1¼ degrees is permissible.

Camber is adjusted by installing the proper offset pilot thimbles in shock absorber arms. Pilots of zero, 1/16, ⅛ and 3/16" offset are available. A change of 1/16" in amount of offset changes the camber angle ⅓ of a degree. It is important to note the position of pilots before removing, because their reversal will change the camber angle.

Caster

Desired caster angle is ½ degree but a minimum of zero and a maximum of one degree is permissible.

Caster is changed by installing the proper Packard tapered shim between forward end of torque arm and the lower support arm. 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 ½" measured at center of bottom of the radiator shell in front and at center of rear body panel below trunk door in back.

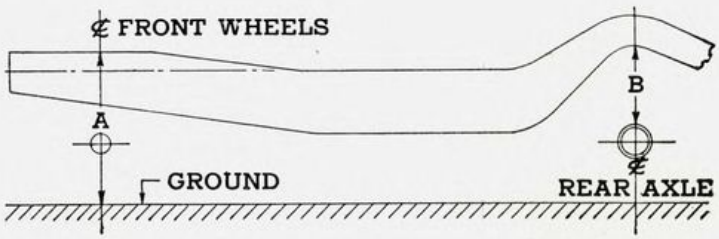


Fig. 49—Riding Height is Measured at "A" and "B"

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. 49 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.
1901A	300 lbs.	*500 lbs.
Coupes	300 lbs.	225 lbs.

*Weight of 500 pounds spread over stationary table.

Height

Front "A"			Rear "B"		
1900	1901	1901-A	1900	1901	1901-A
17 5/8"	18 1/8"	18 3/4"	5 3/8"	5 1/4"	5 3/4"

If front riding height is not within ½ 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 ¼ inch thick and in combination with insulator 326706 will increase the riding height about ⅜ 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 ½ 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 have the caged formed in one piece with the end plug. One of the two bearings in each assembly will be damaged in disassembly and **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 by adding or removing shims.

Front Support Arm Inner Bushings—The inner ends of arms are mounted in Harris type rubber bushings Fig. 50. 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. Use the special aligner gauge ST-5157.

Vertical Wheel Support Bushings—The rubber bushings in upper eye of vertical wheel support are of the Harris type. The nut should be drawn up tight. Spacer sleeve determines the compression of the bushings.

Shock Absorber Arm Damper—The friction damper is correctly adjusted when the self-locking nut is drawn up tight and has bottomed the half arm against the shoulder on the bolt. The gap between the

arm halves where the friction disk rests should be .125 to .135 inch when the bolt through the arm and wheel support arm are disconnected.

Torque Arm Mountings—The rear ends of torque arms are yoke shaped and are carried on Harris type rubber bushings. Nut at torque arm bushing bolt should be drawn up until frame stamping bottoms against shoulder on bolt.

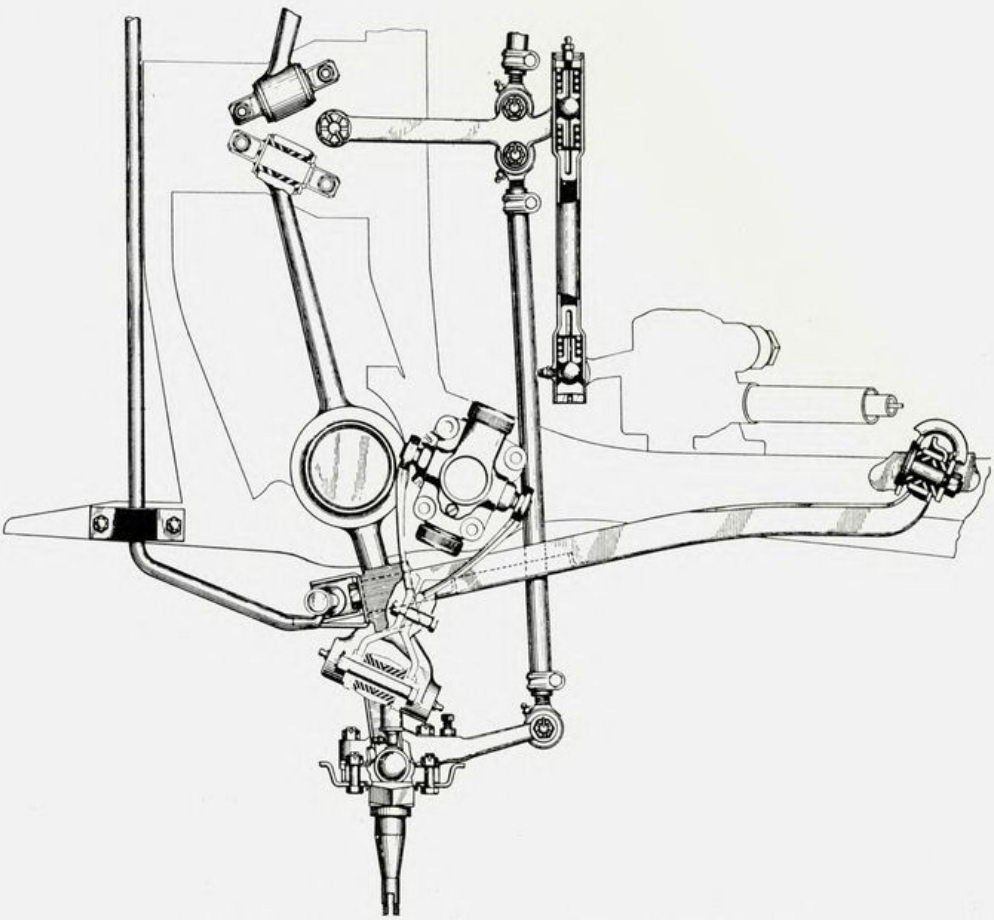


Fig. 50—Plan View of Front Suspension System

Roll Control Bar

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

Rear Springs

Rear springs are of the leaf type with interleaf inserts. Inserts of three different materials are used, arranged in combination to provide calibrated spring control.

IMPORTANT—Rear spring leaves should not be lubricated.

Rear Lateral Stabilizer

The 1901 and 1901A are fitted with a rear lateral stabilizer and fifth shock absorber. The fifth shock absorber arm should have considerable resistance to motion and NO free travel. If free travel is found fill unit with Houde 800-second fluid and pump out air by moving

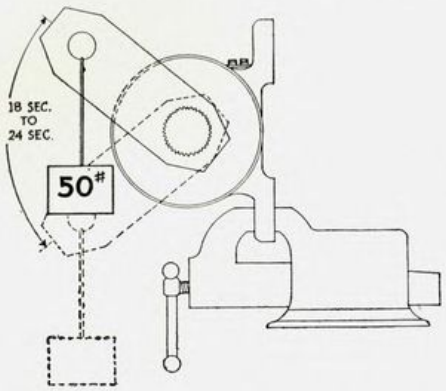


Fig. 51—Method of Testing Fifth Shock Absorber

arm through at last two full strokes. Adjust needle valve in shock absorber shaft so that with 50-pound weight attached to arm 18 to 24 seconds will be required for arm to move from top to bottom limit of travel.

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.

1900	Standard all.....	Monroe model 11422 Packard No. 304630
1901	All Sedans.....	Delco model 1021V Packard No. 364631
	All Coupes.....	Delco model 1021V Packard No. 364632
1901-A	Commercial Chassis....	Delco model 1021V Packard No. 364634

IMPORTANT—The direct-acting 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.

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. Prepare in ST-10046 or other suitable container 6¾ ounces (199 cc) of Packard Delco Shock Absorber Fluid—variation of ⅛ ounce (3½ c. c.) is permissible.
4. Now holding top unit in vertical position with pressure tube fully extended, fill pressure tube to within ¼ inch of top. Tap the compression valve into place. Pour the remainder of the fluid into the reservoir cylinder and before assembling the unit be sure to install a new guide gasket "P," which has been dipped in fluid, under the rod guide. Make sure the flared end of the baffle tube "S" is in place between the rod guide "K" and the gasket "P", Fig. 53.
5. Assemble the unit and with it still mounted in the vise move the upper portion slowly up and down to the limit of travel several times to expel all air from pressure tube.

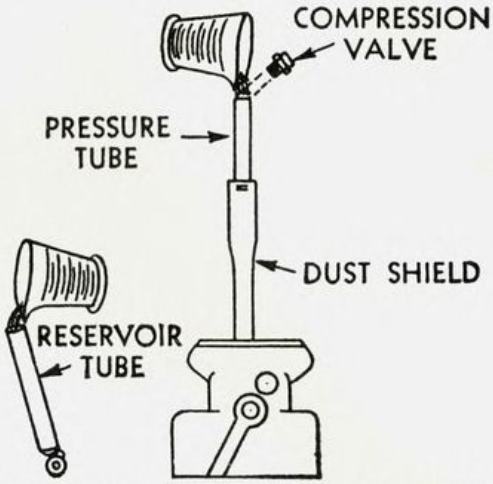


Fig. 52—Rear Shock Absorbers Should Be Disassembled for Refilling

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 60 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 piston nut and valve parts.

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

Rebound valve calibration is varied by changing the valve discs and orifice plate.

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 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 firmly.

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 rear shock absorbers are Rod Guide Wrench, Rod Guide Assembly Thimble and a Calibrated Filler Cup. The complete set of tools is contained in the Packard kit S.T. 5150.

Renewal of Seal—The piston rod seal is not serviced individually. Renew piston rod guide and seal assembly. Before inserting the piston rod through the seal protect the seal by placing protecting thimble S. T. 10049 on rod.

Miscellaneous—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. The shock absorber mounting studs should be adjusted parallel and the rubber grommets neutralized. 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.

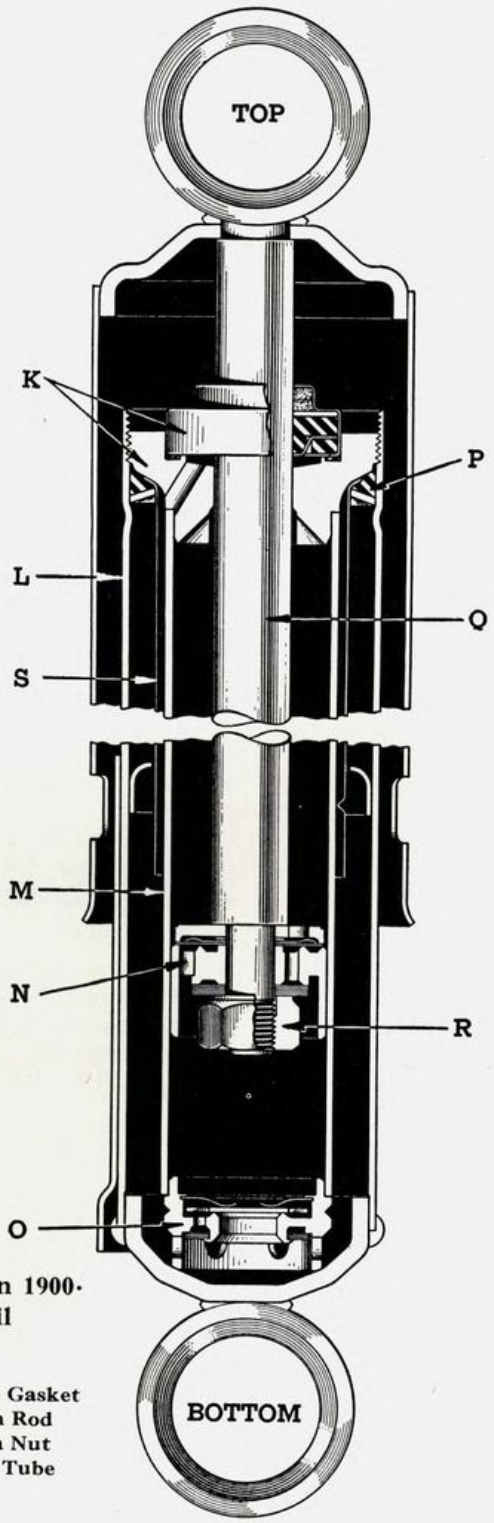


Fig. 53—One Inch Monroe Unit Used on 1900. The Delco Units Vary only in Detail

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
S—Baffle Tube

Rear Shock Absorbers (Export)

Heavy duty Delco shock absorbers having 1⅜ inch diameter piston and 2⅝ inch outer tube are used as regular equipment on export cars. Tool kit S.T. 5151 is required for servicing. Refer to Fig. 63.

Servicing—Refilling and repair procedure is the same as for the domestic models except the following:

Twelve ounces (359 cc.) of fluid is required.

Install new cork and rubber guide gaskets Nos. 3 and 4, Fig. 63' before assembling the unit being sure to place the rubber one on top.

After inserting the 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. 65, 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. The shock absorber is in the soft ride position when distance between arrow and end of tube is greatest. 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.

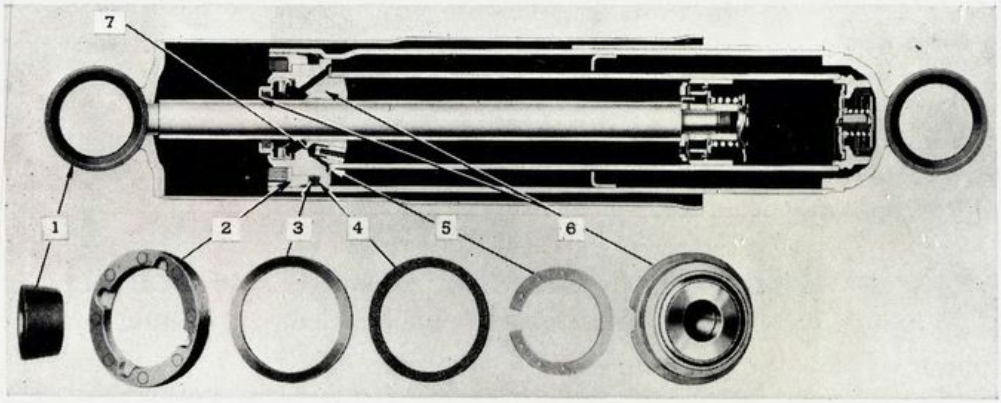


Fig. 63—The 1⅜ Inch Delco Unit Used on Export Cars

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

Changing Valves—The compression valve is serviced as an assembly in the same manner as on the domestic units.

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 domestic 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.

Calibration parts of the rebound valve are valve spring "3", spring disc "6", orifice plate "7" and spider spring "10" shown in Fig. 65.

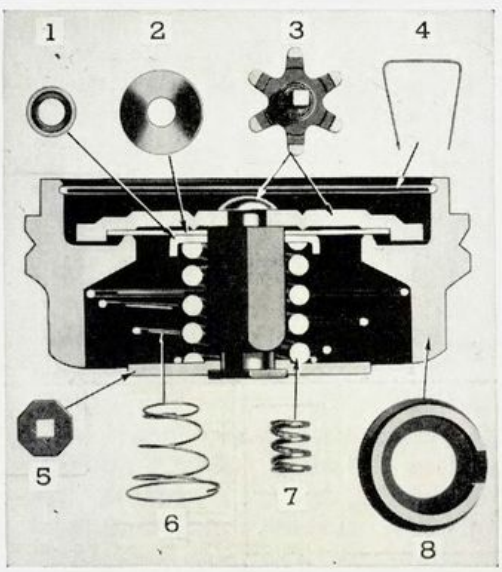


Fig. 64—Compression Valve 1⅜ Inch Delco Rear Shock Absorber

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.

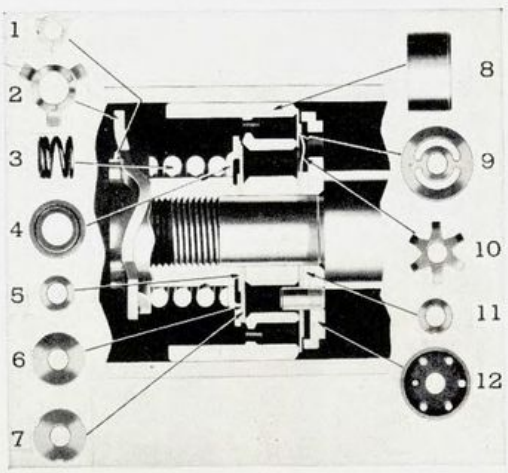


Fig. 65—Rebound Valve Assembly 1⅜ Inch Delco Shock Absorber

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 can be renewed only as an assembly because 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. 54 are of the double action, tandem cylinder, end-to-end discharge type, listed by Delco as model 1966C left and 1966D right.

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 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 is even with **bottom** of the filler hole.

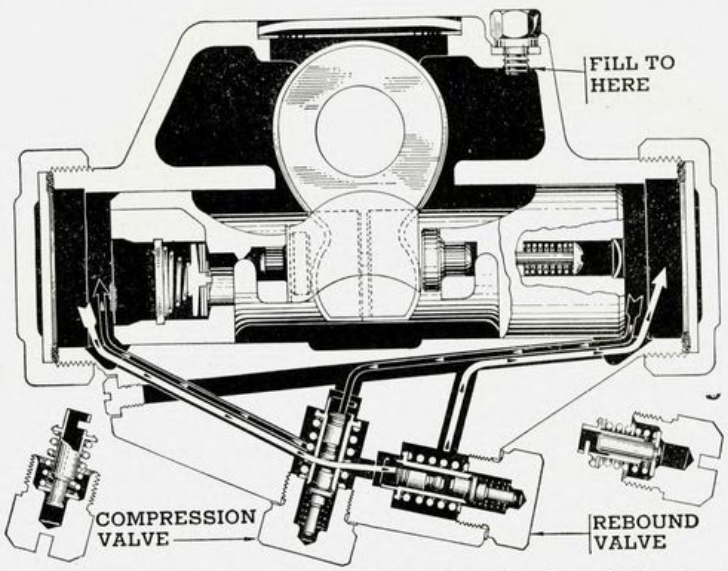


Fig. 54—Front Shock Absorbers Are Delco Tandem Cylinder Type

Compression and rebound valves are accessible for changing by simply removing the external cap nuts. Valve code is stamped on nut. 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.

NOTE—The rebound valve nut points toward the front of the car.

Shock Absorber Valving

	Domestic Front Absorbers		Domestic Rear Absorbers	
	Rebound	Compression	Rebound	Compression
1900 All	3½-A-5	2-A-1	2 4/4	A-2
1901 All Sedans	3½-A-5	2-A-1	1½ 4/4	A-1½
1901 All Coups	3½-A-5	2-A-1	2 4/4	A-2
1091-A Commercial Chassis	2-E-5	1½-B-1	0 5/6	D-2

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

Service and Hand Brake Adjustment

1. Jack up all four wheels. Remove the wheel but do not remove the wheel hubs or drums.

2. Be certain that the linings are in good condition before starting the adjustment. Be sure that the brake pedal is free on its shaft and that the pedal linkage is correctly adjusted.

3. Check the brake fluid level in the reservoir and if necessary add sufficient fluid to bring the level up to within ½ inch of the top of the filler neck.

4. Disconnect the hand brake cables at the cross lever by removing the clevis pin "A." This step is necessary since the cables may be tight enough to hold the shoes away from the anchor pin.

5. Perform the following operations at all four wheels:

   A. Insert a .015″ feeler gauge between the brake lining and drum about 1½″ from the adjusting screw end of the secondary (rear) shoe and expand the adjusting screw "B" until a light drag on the feeler gauge is secured.

   B. Then insert a .015″ feeler between the lining and the drum about 1½″ from the anchor pin end of the secondary shoe lining. This clearance should be slightly less than that of the adjusting screw end of the shoe.

   C. If the clearance is not passable it is necessary to loosen the anchor pin nut "D" and adjust the anchor pin. Turn the anchor pin in the direction of wheel rotation when car moves forward to reduce the clearance. To increase the clearance turn the anchor pin in the opposite direction. At the same time readjust the adjusting screw to maintain .015″ clearance at the adjusting screw end of the shoe.

6. At the rear wheels only, take up the adjusting screws "B" until the drums can just be turned with two hands. At the front wheels take up the adjusting screw until the brakes drag slightly, then release adjusting screw to the first notch where the drum turn freely.

7. To adjust the brake cables—pull the hand brake lever back from the release stop into the first notch of the ratchet sector, then pull the brake cable toward the cross lever with about a 20 lb. pull to remove all slack or lost motion. Adjust the clevises so that the clevis pin "A" can be just easily inserted. Lock the clevis jam nuts and install new cotter pins. Release the hand brake lever.

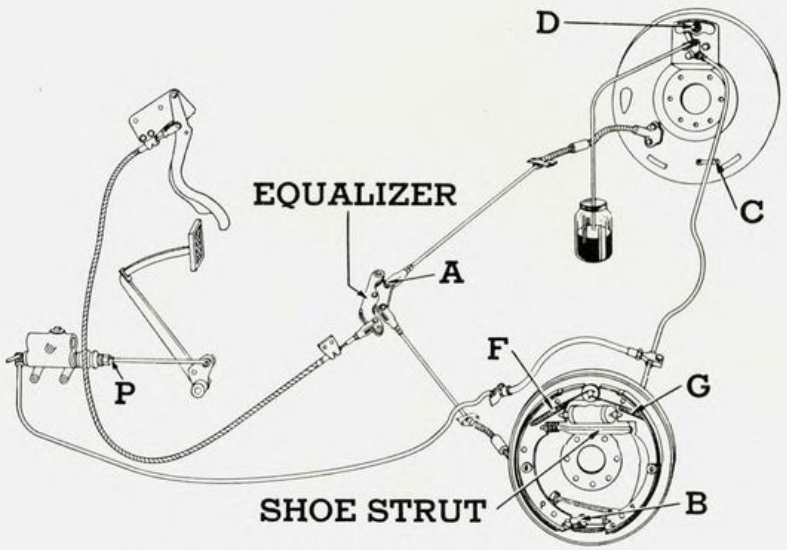


Fig. 55—Rear Portion of Brake System

8. Now release the adjusting screw "B" at the rear wheels until the drums just turn freely.

9. Apply the hand brake and check equalization by turning the rear wheels by hand. To equalize, loosen the tighter brake. Be certain that the inspection and adjusting screw hole covers are properly installed. The brakes are now ready to be tested.

Repair Notes—Brake pedal must have ¼ to ½ 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. 55.

Lining requirements are indicated below:

	1900	1901	1901A
Primary, 4 pieces	1¾" x 10⅝"	1¾" x 11½"	2¼" x 13"
Secondary, 4 pieces	1¾" x 12"	1¾" x 13"	2¼" x 13"
Lining thickness	3/16"	3/16"	3/16"

On the 1900 both shoe to anchor springs, "F" and "G," Fig. 55, are painted blue; on the 1901 and 1901A 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.

Automatic Top—Convertible Coupes

The power for raising or lowering the automatic top is supplied by the car engine vacuum, which is controlled by a valve on the left side of the instrument panel, and two power cylinders located behind the front seats.

The motor vacuum line is connected to the control valve on the instrument panel. On this valve there are also two pipe lines leading to the vacuum cylinders, one to the top of the cylinders and the other to the bottom of said cylinders.

Caution: The top should not be lowered or raised while the car is in motion. Best results will be obtained at engine idling speed, throttle closed. The required vacuum is about 17 inches.

To prevent chafing the covering material the top should be securely fastened in the well with the hold-down straps whenever car is to be operated with top down.

'If the top does not lower or raise with engine running at idling speed and valve control knob in proper position, the following parts should be inspected:

A. Control valve on instrument panel.

B. Pipe lines.

C. Vacuum cylinders.

D. Top folding arm assembly.

A. Control valve should operate freely without leaks. Check hose connections at valve for leaks. Check valve for proper assembly. When the valve has been disassembled, it should be reassembled with a little fibre grease between rotor or slide and the valve body, to provide a perfect vacuum seal.

B. Pipe lines should be free of kinks and leaks and may be checked with a vacuum gauge attached first to the engine to find the intake manifold vacuum, and then by attaching the gauge alternately to each of the tubes which enter the vacuum cylinder. As each tube is checked, the one on the opposite cylinder must be plugged to prevent leakage at that point.

C. Vacuum cylinders should be checked to see that they are not dented or otherwise damaged. Check the piston rod seal at top of the cylinder for leaks. Piston leaks may be checked by disconnecting the piston rod from the top structure and moving it up with the valve knob pulled out, or down with the valve knob pushed in, with engine not running. Vacuum cylinders may be lubricated through the upper hose connection by detaching the hose from the tube and inserting it in 1 oz. container of shock absorber oil, or a half and half mixture of Neat's Foot Oil and kerosene. Operating the cylinder downward will draw in the lubricant.

D. Top folding arm assembly should be checked for binding of top linkage, tight rivets and bolts. It is very important that no bind exist between the cylinder and the piston rods. Make sure that the piston rod and cylinder mounting are directly in line so that the piston can rock freely on its lower connection, otherwise a bind may develop which will ruin the piston rod seal and cause a leak.

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