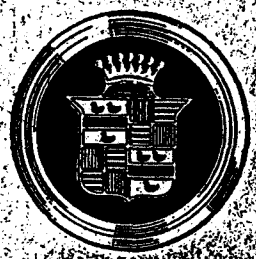
CADILLAC PRELIMINARY SERVICE INFORMATION

355-D—SERIES 10, 20 AND FLEETWOOD
370-D AND 452-D



Service Department
CADILLAC MOTOR CAR COMPANY
DETROIT, MICHIGAN

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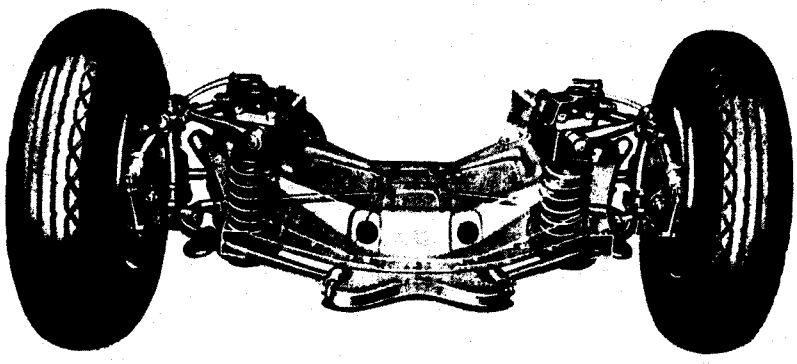

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Front Wheel Suspension

The front end construction of the new Cadillac cars is entirely new and is a distinct departure from conventional design in that the front axle is entirely eliminated. See Fig. 1.

In this new construction, the front wheels are mounted independently of each other. They are fastened directly to the frame with sturdy arms (Fig. 2) hinged in such a way as to permit vertical movement only. The up and down movements of the wheels are controlled by means of special frictionless helical springs instead of the conventional leaf springs. This suspension of the front wheels makes possible a "gliding ride" which eliminates pitching and neck-snapping in the rear seat.

The new helical springs have no function except that of springing the car as they are not depended upon to hold the front wheels in position nor to absorb the driving and braking forces. As a result, it has been possible to redistribute the weight of the car and to soften the front springs to provide maximum riding comfort. Moreover, the front wheel suspension system as used by Cadillac adds materially to the roadability, safety and ease of steering in the new cars.

Inasmuch as the front wheels are mounted independently of each other, it is obvious that either wheel may follow the irregularities of the road without carrying that side of the car with it and without transferring the resultant movement or

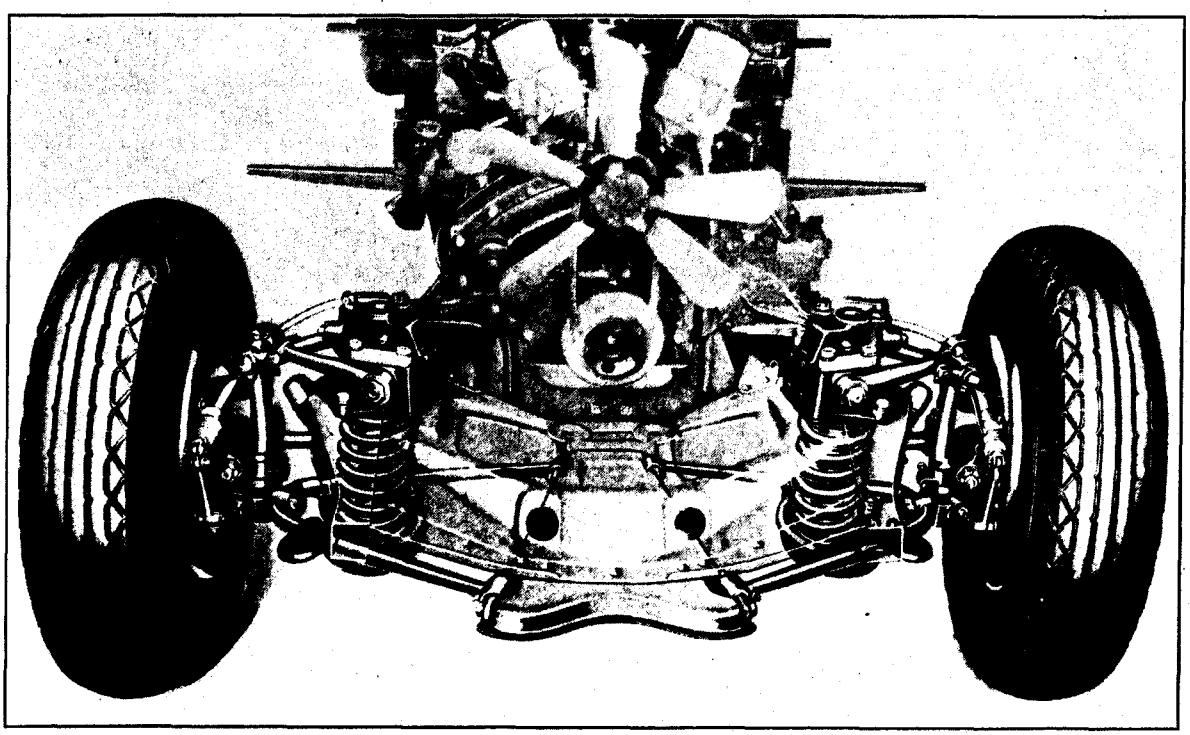


Fig. 1. Phantom view of the front wheel suspension system

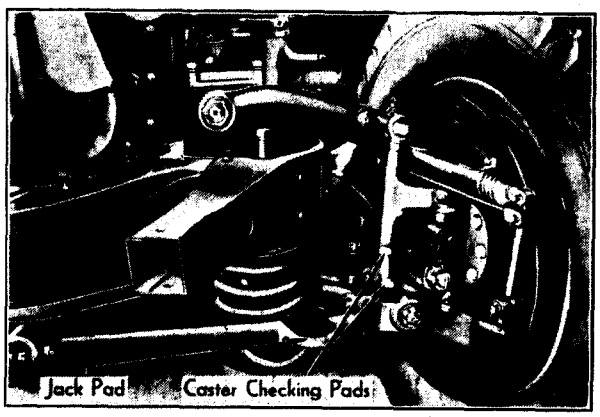


Fig. 2. The front wheels are fastened to the frame with sturdy arms hinged to permit vertical movement only

road shock to the opposite front wheel, thus eliminating one of the greatest contributing factors to front wheel shimmy and car wander.

In cars using a front axle, all movements of one front wheel are transferred directly through the front axle to the opposite front wheel, producing an unstable condition and causing more or less uncontrolled movement of the front wheels.

When a front axle is used, the caster angle is also seriously changed when either the brakes are applied or the chassis springs are in action. With independent suspension of the front wheels, a practically constant caster angle is maintained.

Easy steering has been obtained by the use of a new type of steering mechanism which accurately controls the geometrical relations of the various parts of the front wheel suspension system. See Fig. 3. It was impossible to design a truly accurate steering mechanism of this kind for use with the front axle formerly used because of the several directions in which the axle could move. With

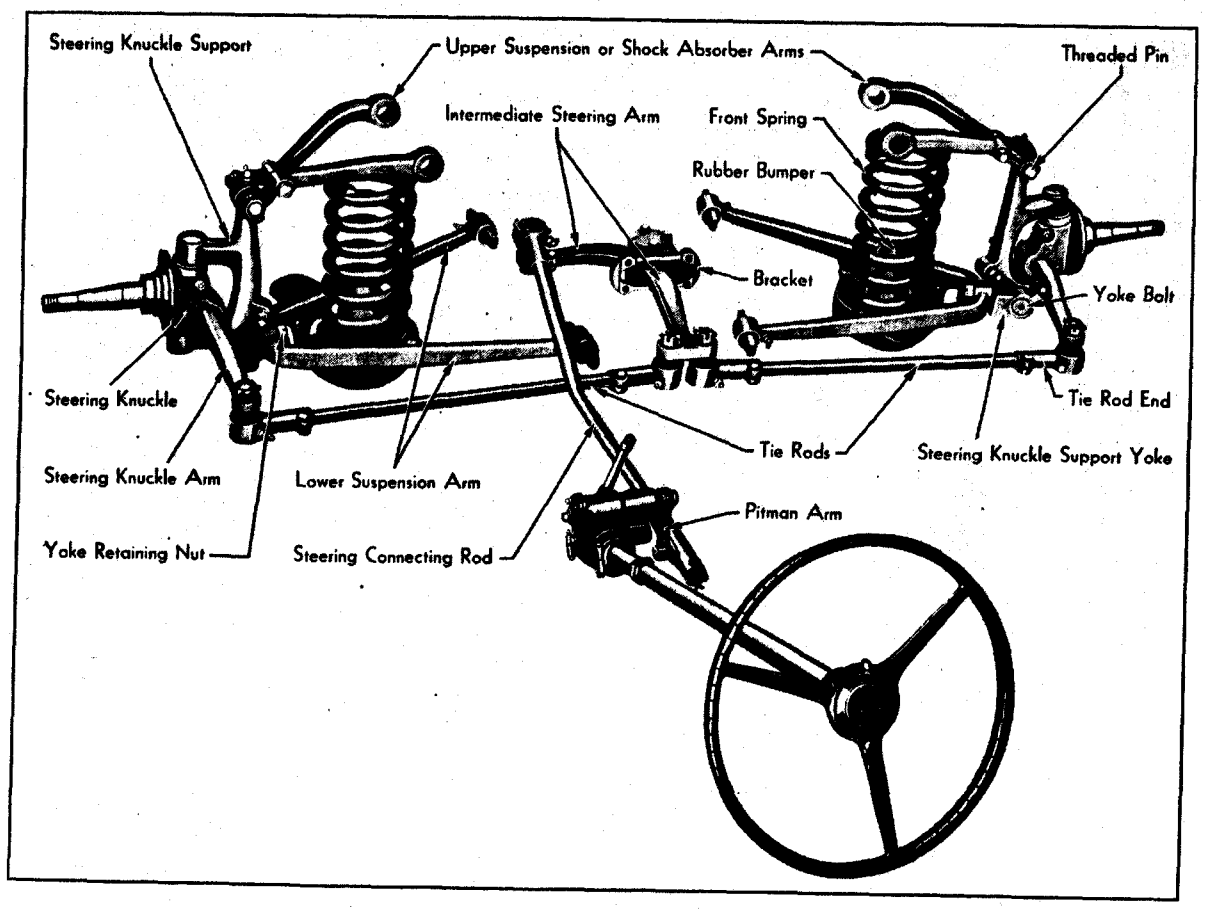


Fig. 3. Nomenclature of the front wheel suspension and steering systems

this new type of steering system, despite the use of very soft acting front springs, the accuracy of steering the car, especially at high speeds is greater than can possibly be obtained with the conventional type of front axle.

The new front wheel suspension system should be thoroughly studied in order that the principles of construction and operation may be well understood. This is necessary for intelligent and efficient servicing of this new assembly.

Adjustments

Maintenance of correct front wheel alignment is of special importance to service.

The amount of caster in the new cars is 1 to 2° with the weight of the car on the front wheels. The caster may be checked in the same manner as on previous model cars or with Tool No. J-631 using it against the pads on the front side of the steering knuckle supports. See Fig. 2. No method should be used, however, that will necessitate raising the wheels off the floor.

Necessary corrections in caster may be made by adjusting the threaded pin (Fig. 4), which connects the shock absorber arms to the upper end of the steering knuckle support. Turning this pin to the right or clockwise on the right side of the car as viewed from the driver's seat moves the top of the steering knuckle support toward the rear, increasing the caster, and turning it oppositely moves the top of the support toward the front, decreasing the caster.

On the left side of the car, the caster adjusting pin is installed with the head toward the front. Therefore, the left pin must be turned to the left or counter clockwise to increase the caster and to the right to decrease the caster. One complete turn of the threaded pin changes the caster one-half degree. After completing the adjustment, the threaded pins should be securely locked in position. Precaution should be taken to adjust both wheels to have exactly the same amount of caster.

Camber of the front wheels should be ¾ to 1½° with the weight of the car on the front wheels. It may be checked in the same manner as in previous cars with the conventional type of front axle. As formerly, no provision is made for changing the amount of camber other than the replacement of parts.

Toe-in of the front wheels should be $\frac{1}{16}$ to $\frac{3}{16}$ in. Adjustment for toe-in is made in the same manner as on previous Cadillac cars, simply by turning the tie rods in or out of the tie rod ends. The tie rod ends, however, are assembled with the right hand threads at the left ends and the tie rods must be turned in the opposite direction to previous Cadillac practice to make the toe-in adjustment. Turning the tie rods in the same direction as the road wheels revolve decreases the toe-in and turning them in the opposite direction increases the toe-in.

When making this adjustment, the rear end of the intermediate steering arm must be exactly at the center of the car. Both tie rods are then turned an equal amount to retain the same distance between the rear end of the intermediate steering arm and the front wheels. Do not adjust one tie rod alone.

The tie rod and intermediate steering arm ends are also new. See Fig. 5. They are, however, similar in construction to those used in earlier Cadillac cars, but differ in the method of adjustment. Adjustment of these ends is made by screwing the plug all the way in, using new Tool No. J-630 and then backing it out ¼ turn.

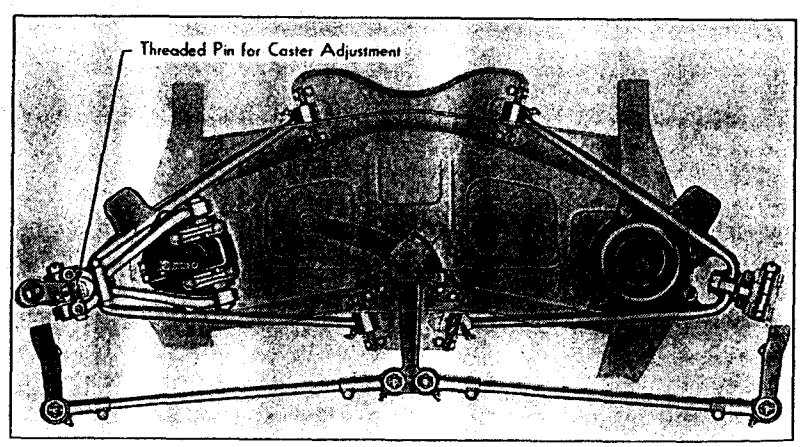


Fig. 4. Front wheel suspension system viewed from above, showing the shock absorber arms at the left and the lower suspension arm at the right

Removal of the tie rod end pivots from the intermediate steering arm may be accomplished with hand screw press Tool No. J-624. To use this tool it may be necessary in some cases to disconnect and raise the outer ends of one or both tie rods to provide clearance between the inner tie rod ends for using the removing tool.

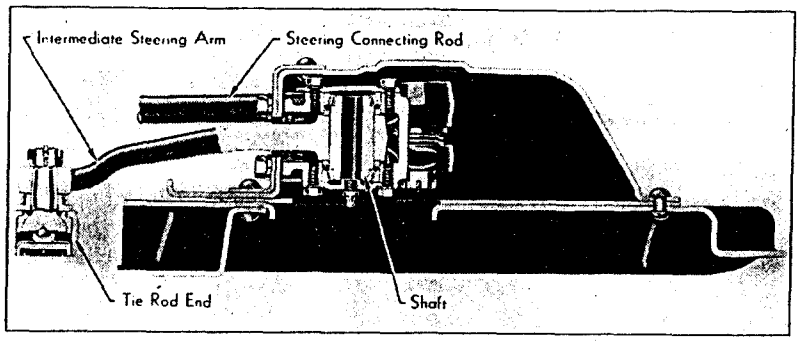


Fig. 5. Sectional view of the intermediate steering arm assembly viewed from the right side

The intermediate steering arm bearings are adjusted by means of shims under the top cover. These bearings should be adjusted so that a load of one to two pounds will be required to move the arm with a spring scale fastened to the end to which the steering connecting rod is connected. Care must be exercised not to get the bearings too tight.

Removal and Disassembly

Disassembly of the front wheel suspension mechanism is obvious upon inspection and no special instructions are necessary except for the removal of the front helical springs and the intermediate steering arm.

To remove a front spring, it is necessary as with the conventional type front axle to support the front end of the chassis in addition to raising the front wheel by means of a jack. With this done, first disconnect the outer end of the tie rod from the steering knuckle arm and then remove the threaded pin connecting the shock absorber arms to the upper end of the steering knuckle support after which swing the front wheel and steering knuckle assembly down out of the way. See Fig. 6. Next, lower the lower suspension arm far enough to release the helical front spring. If the front fenders are in place, removal of the spring can be made much easier by first removing the road wheel.

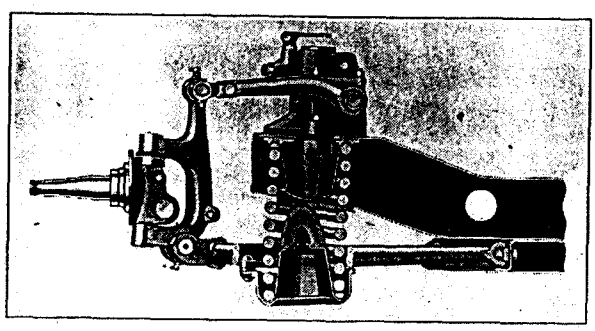


Fig. 6. Sectional view of the left front wheel suspension system viewed from the rear

When removing and installing front helical springs, with the engine out of the chassis it will be necessary to block the top of the frame against the ceiling in order to compress the spring for the removal or installation of the threaded pin at the top of the steering knuckle support. Easier access may be gained to the front wheel suspension mechanism by removing the front fenders and radiator as a unit.

In case it is necessary to remove the steering knuckle support, the support must be disconnected from the lower suspension arm yoke. To do this it is only necessary to remove the yoke bolt and turn out the threaded bushings in the yoke. Inasmuch as this yoke bolt is a taper fit in one of the bushings it may be necessary to force it out under pressure. The yoke retaining nut may be removed if necessary with Tool No. J-602.

When installing the steering knuckle support on the lower suspension arm yoke the threaded bushings should be turned in against the steering knuckle support centering the support in the yoke, after which install the yoke bolt and securely tighten and lock it in position.

After installing the front spring and reassembling the various other parts, the caster must be readjusted as the caster setting is destroyed by the removal of the threaded pin at the top of the steering knuckle support.

To remove the intermediate steering arm, it is necessary first to remove this arm and bracket assembly from the frame. Then the top and bottom covers and bearings are removed and the

shaft pressed out of the steering arm, using the press block J-606-1 and spindle J-606-2. The removal and installation of this shaft will require the use of a large press as it fits very tightly in the arm. The spindle J-606-3 when used with the press block also serves as a depth gauge for locating the shaft in the correct position.

Because of their location, the parts of the front wheel suspension system are more subject to damage by accident than any other part of the chassis. In case of damage to any of these parts, it is recommended that new parts be used. Under no circumstances should any of the parts be repaired.

Several new lubrication points are provided on the front wheel suspension mechanism. These places should be lubricated with chassis lubricant at 1000 mile intervals.

Rear Axle

The construction of the rear axle is essentially the same as in the "C" series cars. Several changes have been made, however, to meet the demand of the new brakes and the Hotchkiss type of drive now employed in the new models. See Fig. 7.

The rear brakes are now operated by pull rods and cables the same as the front ones and the brake cross-shafts on the axle housing have been eliminated. Likewise, the radius rods and torque tube have been discontinued.

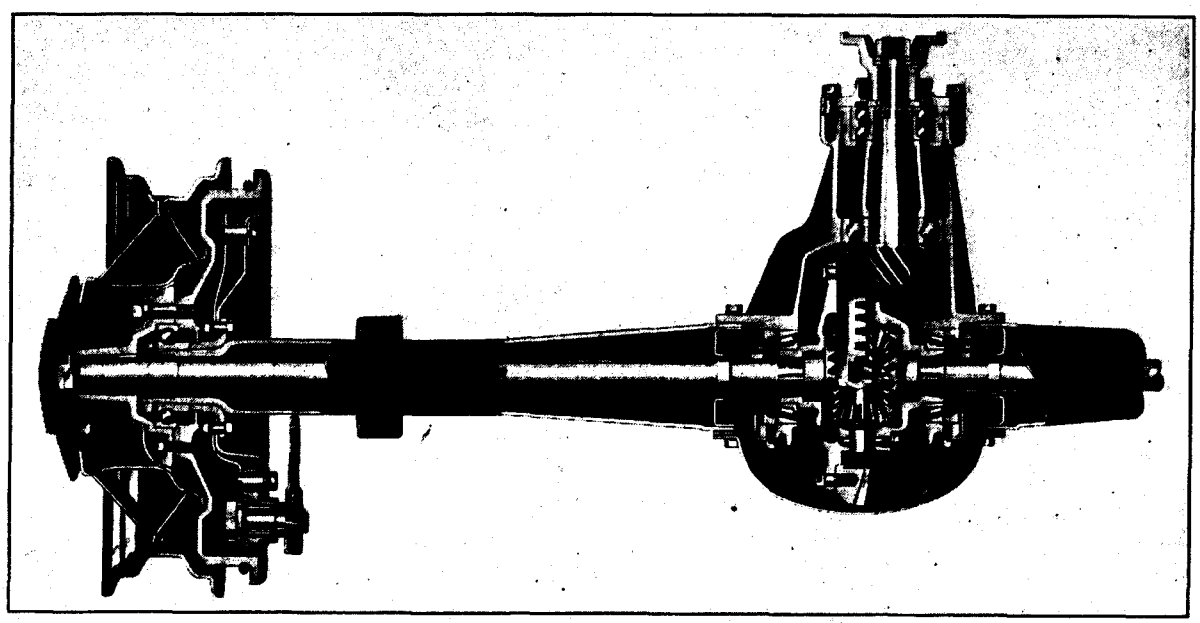


Fig. 7. Sectional view of the rear axle

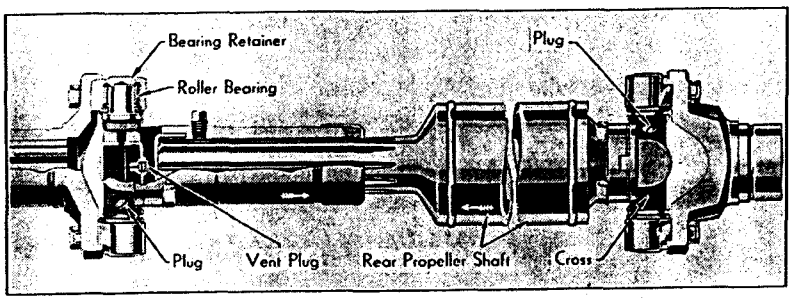


Fig. 8. Rear propeller shaft and universal joints

Only slight changes have been made in the gear ratios of the new models. The new gear ratios are as follows:

Car Model		*Standard Gear Ratio*	*Optional Gear Ratio*
355-D	Series 10 and 20	4.60 to 1	4.36 to 1
	Fleetwood	4.80 to 1	4.60 to 1
370-D		4.80 to 1	4.60 to 1
452-D		4.64 to 1	4.31 to 1

As was previously mentioned, the Hotchkiss type of drive is now employed. With this drive, the car is driven through the rear springs, rather than through a torque tube as formerly.

The propeller shaft is also new. It is made in two sections, a rear section (Fig. 8), which is not enclosed and a front section which is carried in a housing attached to the rear of the transmission. See Fig. 61. Two new type universal joints are used, one at either end of the rear propeller shaft. A cutaway view of the front universal joint is shown in Fig. 9.

The journals of the universal joints oscillate in roller bearings instead of bushings as formerly.

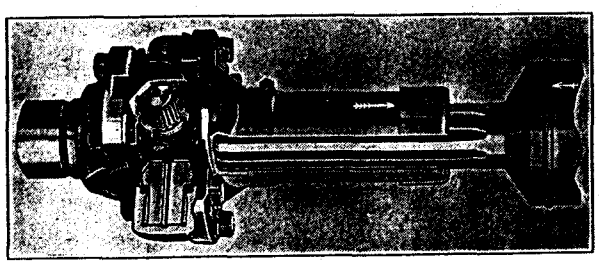


Fig. 9. Cut away view of the front universal joint showing the needle type roller bearings

These journals should be lubricated every 6000 miles. To lubricate the joints it is necessary to remove the screw plug in the cross, and install a grease gun fitting. A grease gun fitting must not be installed permanently as it will affect the balance of the joint.

To remove the new type universal joint it is necessary only to remove the cap screws fastening the bearing retainers or journal caps to the yokes. If a joint is removed and not to be dissassembled opposite retainers should be tied or wired together to keep them in place on the journals of the cross.

Disassembly of the joint after removal from the yokes may be accomplished simply by pulling the retainers off the cross journals and taking out the roller bearings.

Before reassembling a joint, wash all parts thoroughly in gasoline or kerosine and blow them out with air to remove all traces of dirt and grit. This is extremely important in order to insure quietness and long life of the bearing surfaces.

When reinstalling a universal joint, either the original retaining cap screws or screws secured from the Factory Parts Division under Part No. 1405167 should be used. This is important, as these screws are made of special material and heat treated for this purpose.

Ordinary cap screws are not suitable for mounting these new type universal joints. New locking plates should also be used whenever the retaining screws are reinstalled. Care should be exercised to assemble the front universal joint on the rear propeller shaft in the proper position. The arrow on the splined sleeve of the universal joint should be in line with the arrow on the propeller shaft.

The remaining service operations on the rear axle including adjustments for gear mesh are the same as on the "C" series cars.

Body

The bodies on the "D" series cars are new, both in appearance and in constructional detail. See Fig. 10. Particular attention has been given to the insulation of the body to insulate against engine heat and noise.

Frame Details

The sills are made from straight grained wood and are wider than in previous bodies. The rear sill or kickup, on the Series 10 and 20 cars, is laid horizontally the same as the main sill. On the 355-D Fleetwood, the 370-D and the 452-D cars, this part of the sill is made of steel and is formed into a U shape to make it possible to carry the tires in the back of the body. A larger brace is also used in all bodies to hold the side sills to the rear sill.

The body bracing on the Series 10 and 20 cars is similar to that of the "C" Series bodies except that the corner bracket holding the wooden cowl bar to the front pillar is larger and has a gusset at the corner for additional strength. The top windshield header pillar facing from the belt up and the front top corner bracket are welded into one unit. This whole assembly is then bolted and screwed to the wood cowl bar, the front pillars and the roof. The toe riser has also been reinforced for greater strength and is bolted to the dash and screwed to the main sill.

On the 355-D Fleetwood, the 370-D and the 452-D cars, the lower windshield bar or cowl bar, the corner braces holding the instrument board to the front pillars, the pillar reinforcement, and the top windshield header and braces are one massive stamping bolted to the pillars and roof. The lower bracket from the sill to the front pillar has also been made larger than in previous bodies. The toe board riser is of a box construction bolted to the dash and screwed to the main sill, making it stronger than ever before. The cowl bar is of a U section, and is wider in the center to take the windshield wiper.

The cowl panel is made in three sections and then welded into one unit to which the dash is also welded. This front end stamping is then nailed at the bottom of the sill and on the lower part of the front pillar and welded to the upper part of the pillar and around the complete windshield opening.

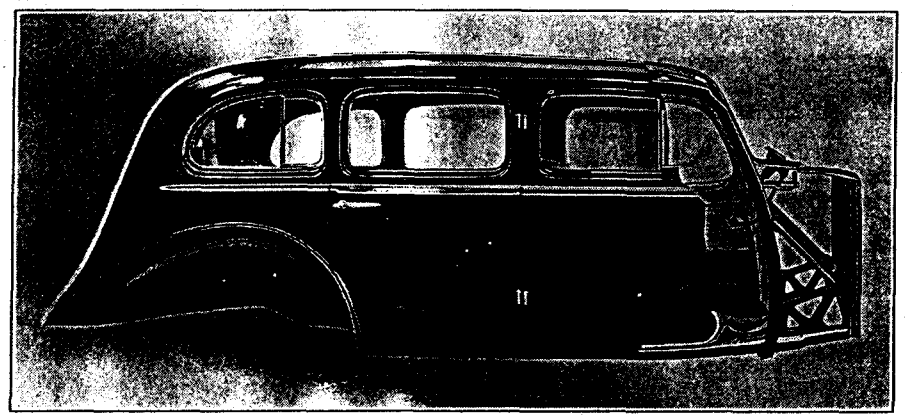


Fig. 10. Typical body showing the front end construction

New diagonal angle iron braces have been added on the back of the Series 10 and 20 bodies to give additional strength. This brace is made of $\frac{7}{8}$ in. angle iron $\frac{3}{16}$ in. thick and is held to the belt rail by machine bolts and to the rear sill by machine bolts and wood screws.

The rear corners above the belt on 355-D Fleetwood, the 370-D and 452-D cars have also been reinforced by a large stamped bracket which extends from the belt rail up to the roof rail and from the rear of the rear quarter window around to the end of the back window. This replaces the conventional wooden cross piece.

BODY STYLES AND JOB NUMBERS

Fisher and Fleetwood Bodies

Body Type	Job Number	Wheel-base
355-D Series 10		
Fisher Bodies		
2-Pass. Sport Coupe	34-728	128″
2-Pass. Convertible Coupe	34-718	128″
5-Pass. All-Weather Phaeton	34-721	128″
5-Pass. Town Coupe	34-722	128″
5-Pass. Sedan	34-709	128″
5-Pass. C. C. Sedan	34-702	128″
355-D Series 20		
Fisher Bodies		
2-Pass. Sport Coupe	34-678	136″
2-Pass. Convertible Coupe	34-668	136″
5-Pass. All-Weather Phaeton	34-671	136″
5-Pass. Sedan	34-659	136″
5-Pass. C. C. Town Sedan	34-652	136″
7-Pass. Sedan	34-662	136″
7-Pass. Imperial Sedan	34-663	136″
355-D Fleetwood		
Standard Fleetwood Bodies		
5-Pass. Sedan	6030-S	146″
5-Pass. Town Sedan	6033-S	146″
7-Pass. Sedan	6075-S	146″
7-Pass. Imperial Sedan	6075	146″
370-D		
Standard Fleetwood Bodies		
5-Pass. Sedan	6130-S	146″
5-Pass. Town Sedan	6133-S	146″
7-Pass. Sedan	6175-S	146″
7-Pass. Imperial Sedan	6175	146″
452-D		
Standard Fleetwood Bodies		
5-Pass. Sedan	6230-S	154″
5-Pass. Town Sedan	6233-S	154″
7-Pass. Sedan	6275-S	154″
7-Pass. Imperial Sedan	6275	154″
355-D Fleetwood		
Special V-Front Fleetwood Bodies		
2-Pass. Coupe	5676	146″
2-Pass. Convertible Coupe	5635	146″
5-Pass. All-Weather Phaeton	5680-S	146″

Body Type	Job Number	Wheel-base
355-D Fleetwood		
Special V-Front Fleetwood Bodies Continued		
5-Pass. All-Weather Phaeton with Division	5680	146″
5-Pass. Coupe (Aerodynamic)	5699	146″
5-Pass. Collapsible Coupe	5685	146″
5-Pass. Sedan	5630-S	146″
5-Pass. Town Sedan	5633-S	146″
5-Pass. Town Cabriolet—metal back	5612-MB	146″
5-Pass. Town Cabriolet—leather back	5612-LB	146″
7-Pass. Sedan	5675-S	146″
7-Pass. Imperial Sedan (Limousine)	5675	146″
7-Pass. Town Cabriolet—metal back	5625-MB	146″
7-Pass. Town Cabriolet—leather back	5625-LB	146″
7-Pass. Limousine Brougham—rear quarter window—metal back	5691	146″
370-D		
Special V-Front Fleetwood Bodies		
2-Pass. Coupe	5776	146″
2-Pass. Convertible Coupe	5735	146″
5-Pass. All-Weather Phaeton	5780-S	146″
5-Pass. Phaeton with Division	5780	146″
5-Pass. Coupe (Aerodynamic)	5799	146″
5-Pass. Collapsible Coupe	5785	146″
5-Pass. Sedan	5730-S	146″
5-Pass. Town Sedan	5733-S	146″
5-Pass. Town Cabriolet—metal back	5712-MB	146″
5-Pass. Town Cabriolet—leather back	5712-LB	146″
7-Pass. Sedan	5775-S	146″
7-Pass. Imperial Sedan (Limousine)	5775	146″
7-Pass. Town Cabriolet—metal back	5725-MB	146″
7-Pass. Town Cabriolet—leather back	5725-LB	146″
7-Pass. Limousine Brougham—rear quarter window—metal back	5791	146″
452-D		
Special V-Front Fleetwood Bodies		
2-Pass. Coupe	5876	154″
2-Pass. Convertible Coupe	5835	154″
5-Pass. All-Weather Phaeton	5880-S	154″
5-Pass. All-Weather Phaeton with Division	5880	154″
5-Pass. Coupe (Aerodynamic)	5899	154″
5-Pass. Collapsible Coupe	5885	154″
5-Pass. Sedan	5830-S	154″
5-Pass. Town Sedan	5833-S	154″
5-Pass. Town Cabriolet—metal back	5812-MB	154″
5-Pass. Town Cabriolet—leather back	5812-LB	154″
7-Pass. Sedan	5875-S	154″
7-Pass. Imperial Sedan (Limousine)	5875	154″
7-Pass. Town Cabriolet—metal back	5825-MB	154″
7-Pass. Town Cabriolet—leather back	5825-LB	154″
7-Pass. Limousine Brougham—rear quarter window—metal back	5891	154″

New type braces have been added on all bodies between the rear roof subrail and the main roof rail.

The No. 1 body bracket is a separate unit in the new cars and is bolted to the front of the dash and to the chassis frame. The construction of this bracket adds materially to the rigidity of the body at the front.

All body retaining bolts are of special hardened steel and the size has been increased from $\frac{7}{16}$ in. to $\frac{1}{2}$ in. Hard shims are used at the No. 1 body bolt and composition shims in place of rubber at the remaining body bolts.

All pillars are of composite wood and steel construction and are held to the sill and the roof rail by heavy brackets and bolts.

Improvements have been made in the method of attaching the side roof rail cover panels to the main and subroof rails. The panels are both nailed and bolted to these rails.

A new rubber material, F.S. 1001, is used to replace glue where there is undue stress. A similar material only lighter is used between all metal brackets and the woodwork to eliminate squeaks and rattles. This antisqueak compound is also sprayed on all panels and inside of the doors before they are assembled to the wood framework to insulate against noise.

The hood antisqueak on the cowl is made in one piece and is held to the cowl by clips spaced about 6 in. apart. The lower ends of the antisqueak are, however, held in place by self-tapping screws at the bottom of the shroud.

The dash is insulated on the inside with $\frac{1}{2}$ in. felt against the dash, $\frac{1}{2}$ in. insulating board and $\frac{1}{8}$ in. K.B. board which is finished to blend with carpet.

The toe and floor boards are made of laminated wood. The center piece, however, is made of steel with a felt underneath and around the edges for sealing against heat and noise.

Doors

All doors are of the overhanging type. A diagonal guide rod has been placed in the front door so that the weight can be more evenly distributed. This diagonal rod fastens on the door at the upper hinge at the door center and extends to the bottom edge of the door on the locking side. At this point a brass take-up nut is conveniently located so that the door may be brought to proper alignment. By adjusting this nut, the door load can be distributed to both hinges and at the same time if the door is away from the top pillar bumper it can be adjusted so that the pressure on the bumper is even.

Locks and dovetails have been improved for easier door operation. The locks are fastened to the door by means of machine screws and wood grip nuts.

New half round lock bolts are used to give easier door operation and greater bearing and strength. Springs have also been added to take up the play in the lock bolts. An oiled spring loaded guide is used to help eliminate any play and to keep the lock bolt oiled.

The doors are fitted with pawl levers which protrude inside of the door. Shutting the door and tripping the pawl lever up locks the door. Opening the door from inside the car through the remote control handle automatically unlocks the door and the pawl lever returns to its original or unlocked position.

All doors can be locked from the inside by pawl levers or from the outside by first tripping the pawl levers up and then holding the outside handle all the way down while closing the door.

Double dovetails in tandem are used on the front doors of the Fleetwood bodies. Single type dovetails are used on the rear doors of these bodies and on both the front and rear doors of Fisher bodies. The shoe has a spring rubber action to keep the door load higher and more uniform and to assist in opening the door.

The hinges are made of cold drawn steel and have been moved in closer toward the body not only for appearance but for additional strength. The hinges continue to have the bronze bushings and the oiling feature. A spiral oil groove has, however, been added on all hinge pins.

Both the front and rear doors on Fleetwood sedans are hinged on the center pillar.

Garnish Mouldings

The garnish mouldings on the Series 10 and 20 Fisher Bodies are made of steel, grained to look

like wood. The finishing panels are attached to the doors separate from the garnish mouldings. These panels have a Meracord inlay. The garnish mouldings for the Fleetwood bodies are made of wood and are furnished either in natural colors or ducoed. Finishing panels are optional on bodies with a V front.

The garnish mouldings on the Fleetwood bodies are invisibly fastened on all doors except at the front pillar. The mouldings are removed and installed in practically the same manner as on the "C" bodies. Visible fasteners are used to retain the garnish mouldings in place on the Fisher bodies. The windshield and back window mouldings are fastened with visible screws at the sides and top.

Ventilators

The new screened cowl ventilator is reversed or open toward the windshield for better ventilation.

Two cowl ventilators are used on V-front bodies. While these ventilators are a part of the body, the top hood panels are pierced for the lid of the ventilators. An adjustment is provided in the ventilator hinge assembly to line up the ventilator lid with the opening in the hood.

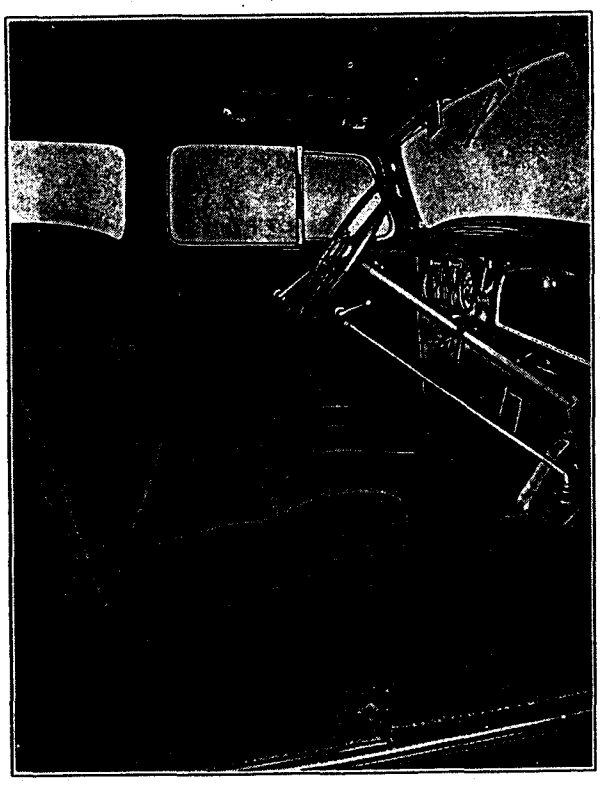


Fig. 11. General arrangement of the driving compartment

A new feature of the I.C.V. front door ventilators is a rain deflector installed at the top of the ventilator opening. The purpose of this deflector is to deflect rain or snow when the ventilator is open for ventilating purposes.

The I.C.V. ventilator on the front part of the door on Convertible Sedan and Convertible Coupes is stationary. The ventilator frame is chrome plated and is bolted to the door. The rear part of the door glass, however, lowers as in the regular closed bodies.

All windshields are stationary the same as in the "C" series cars.

Windshield Wiper

The windshield wiper on Fleetwood bodies with a straight windshield is of a special design with the blades and arms connected in tandem and driven with one vacuum wiper unit. The wiper unit is of the inverted type and is located back of the instrument panel.

Two complete wiper assemblies are used with V-front bodies.

These are fastened to the cowl bar back of the instrument panel and are also of the inverted type.

Only one wiper unit is used on Fisher bodies. This is located inside of the top header board with the toggle ends and a housing on the outside at the bottom of the header. This housing which fastens to the lower part of the outside header must be lined up properly with the gear inside of the toggle end.

To align these parts it is necessary to run the wiper unit a few minutes and then shut it off leaving the gear in the toggle end in the parked position against the header. Then the arm and blade are installed on the housing. The next procedure is to install the housing against the header with the arm and the blade in the parked position. Next install the retaining screws. The teeth on the gear in the housing and in the wiper unit are fine enough to give the proper adjustment. In order to remove the complete wiper unit for any

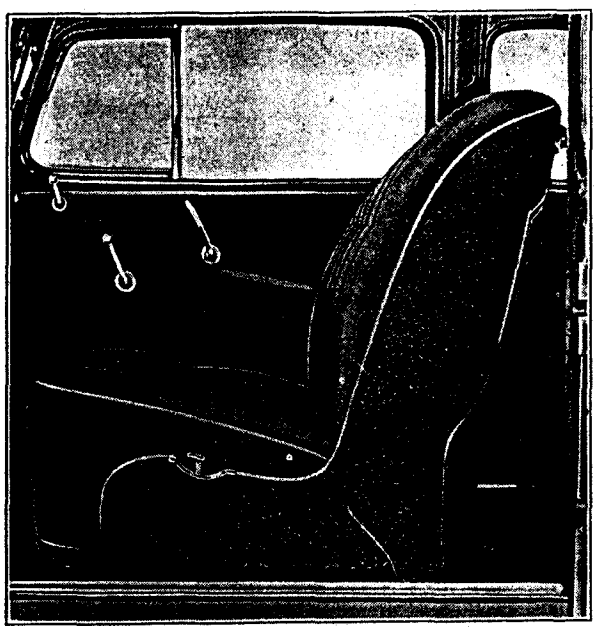


Fig. 12. The front seat adjusting lever is located on the left side rail of the seat

repairs, it is necessary to remove the garnish mouldings, the mirror and the header board.

Visors

Two visors trim covered to match the body upholstery are used. They are adjustable to any desired height, either for windshield or side door protection from the sun.

Instrument Panel

The appearance of the instrument panel has been improved. The instruments are new and the fittings and finishing panel have been redesigned. See Fig. 11. A headlight beam indicator is provided to show which of the headlight beams is in use.

Minor changes have also been made in the glove compartment.

Front Seat

The front seat in the Fisher bodies is adjustable back and forth. In the Fleetwood bodies the back framework of the seat is fastened to the center pillars with only the cushion and the back of the driver's seat being adjustable.

The adjusting lever is located on the left side rail of the seat as shown in Fig. 12. By pulling the lever up, the seat can be adjusted to any desired position.

The Imperial bodies have no front seat adjustment. The V front Fleetwood bodies have an adjustable rear seat cushion and back, the cushion being adjusted by a Tee handle at the bottom and the back by a Tee handle back of the center arm rest.

Arm Rests

An arm rest is provided on both front doors. Rear side arm rests with sash pockets are provided on all cars in addition to the rear center arm rest.

Curtains

The curtains at the back window and the rear quarter windows are concealed.

Keys

All keys are of a new type and are not numbered as in the past. The key number, however, is stamped on a tab which should be broken off and retained by the dealer or distributor upon delivery of the car. A record of the key number should also be kept by the new owner.

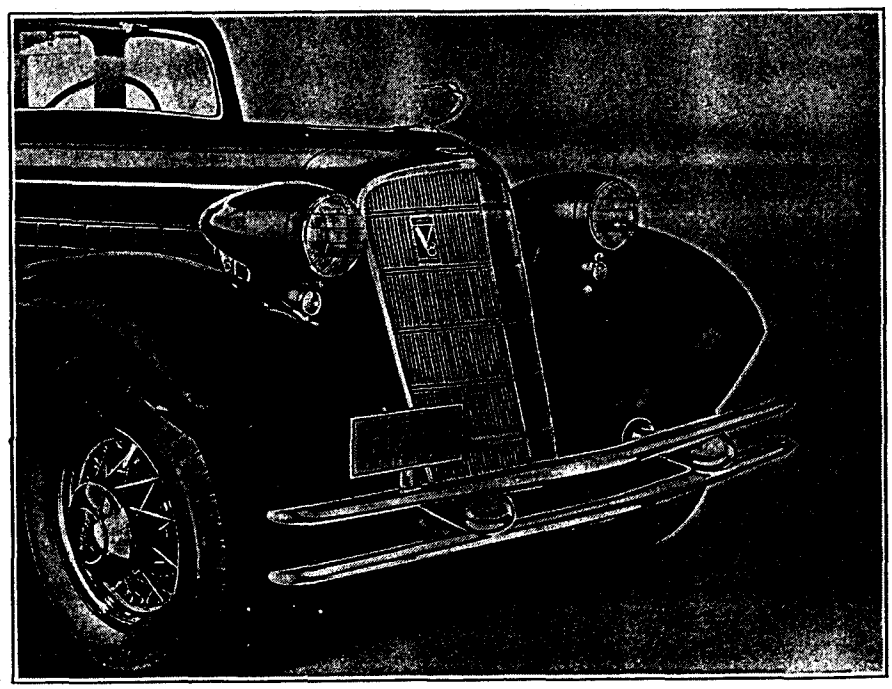


Fig. 13. Typical front end view of car

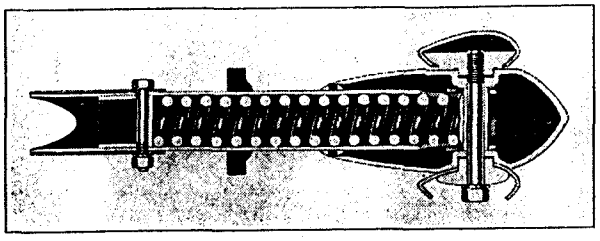


Fig. 14. Sectional view of bumper support

The new keys are of the double edge type and cannot be duplicated by anyone not having a special cutter for them. Duplicate keys, however, can be secured from any Briggs and Stratton distributor or Cadillac dealer or distributor or from the Cadillac factory Parts Division. In case all keys and the key number are lost by the owner replacement keys can be obtained only from the dealer or distributor from whom the car was purchased originally or from the Cadillac factory Parts Division. It is important, therefore, that all owners be cautioned to record the number of their keys when purchasing their car in order to secure replacement keys with the least inconvenience in case the original ones are lost.

Hood

The hoods on all cars are longer than in previous models and extend nearly to the windshield. The new hood port doors on the 355-D and 370-D cars are of the shutter type interconnected to operate in sets of five instead of individually as on former models.

Fenders

The fenders are new in design and appearance but are installed on the body in the same general way as on previous models. See Fig. 13. The method of servicing the front fenders, however, differs from previous practice in that the removal of either fender, the radiator or the radiator casing, or any engine or steering gear part covered by the fenders or radiator, is greatly facilitated by first removing both front fenders, the radiator and radiator casing as a unit, due to the front fender supports being rigidly bolted to the radiator casing.

The removal of the fender and radiator assembly is accomplished simply by draining the radiator, disconnecting the hose and the headlamp wires, removing the hood and loosening the radiator and front fenders from the frame and the running boards. Front fenders are supplied by the factory Parts Division without the supports.

Bumpers

Both the front and rear bumpers are new. They are of the horizontal bar type, of a channel construction, and operate in conjunction with coil springs located in the bumper arms or supports. A sectional view of a bumper support is shown in Fig. 14.

Brakes

The new brakes are essentially the same on all "D" series cars and are similar to the "C" series brakes. See Fig. 15.

A slight change, however, has been made in the new brake hook-up in that the braking power is applied through diagonal pull rods and cables. The position of the brake assister also differs. In the Series 10 and 20 cars the assister is mounted farther back in the frame X-member than in the longer wheelbase cars. Cables are now used to connect the rear pull rods with the rear brakes the same as for the front brakes. Consequently cross-shafts are no longer used on the rear axle housing. This construction eliminates a number of wearing parts.

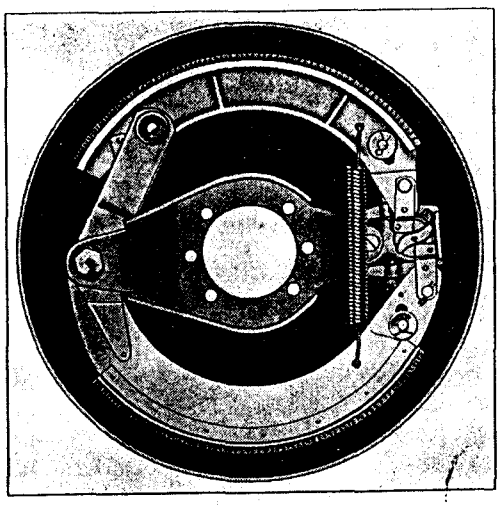


Fig. 15. The front brakes are of the same construction as the rear brakes

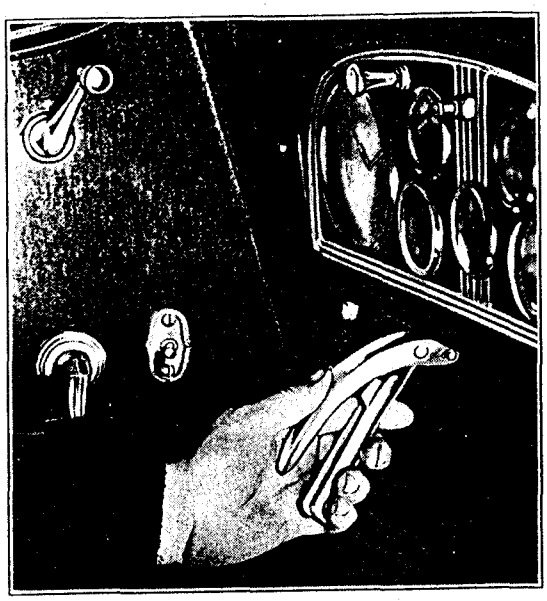


Fig. 16. The hand brake lever is located at the left directly under the instrument panel

The location of the hand brake lever has also been changed. Instead of being mounted on the transmission, this lever is now located underneath and at the left side of the instrument panel as shown in Fig. 16. The hand brake lever is connected to the rear service brake linkage by a cable.

The brake assister used on the "D" series cars is similar in construction and operates on the same principle as the 355-C brake assister. Lubrication and adjustment of the brake assister are practically the same as on the 355-C.

No attempt should be made to disassemble the brake assister. In the event that the assister unit cannot be made to function satisfactorily, it should be returned to the factory on an exchange basis.

Brake adjustments are similar to those on corresponding "C" series cars, except the control for the rear brakes. The method of adjusting the brakes is shown in Figs. 17 and 18, the assister

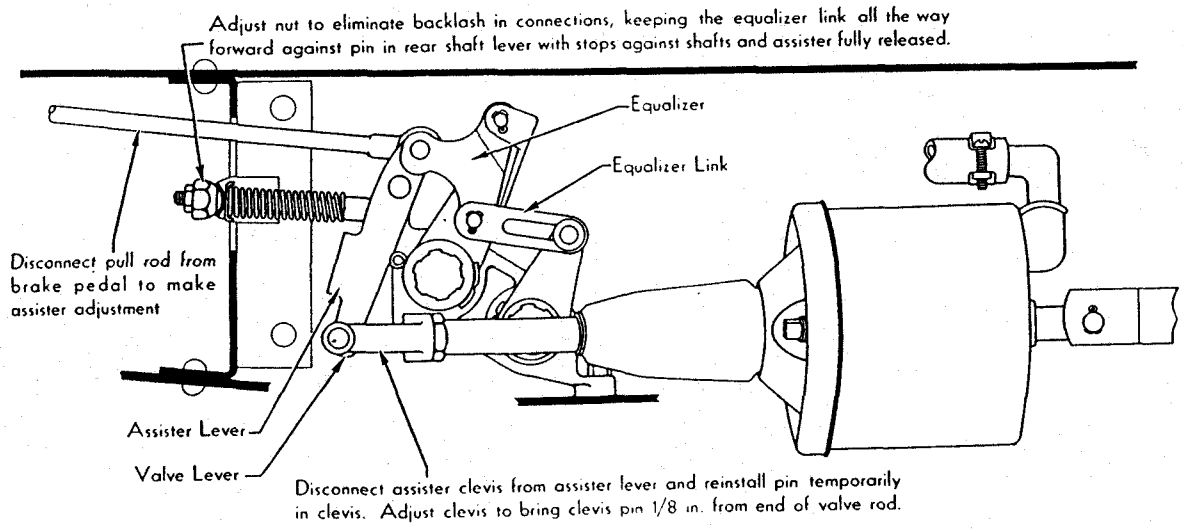


Fig. 17. The Series 10 and 20 brake system differs from that on the 355-D Fleetwood, the 370-D and the 452-D cars principally in the arrangement and adjustment of the assister connections

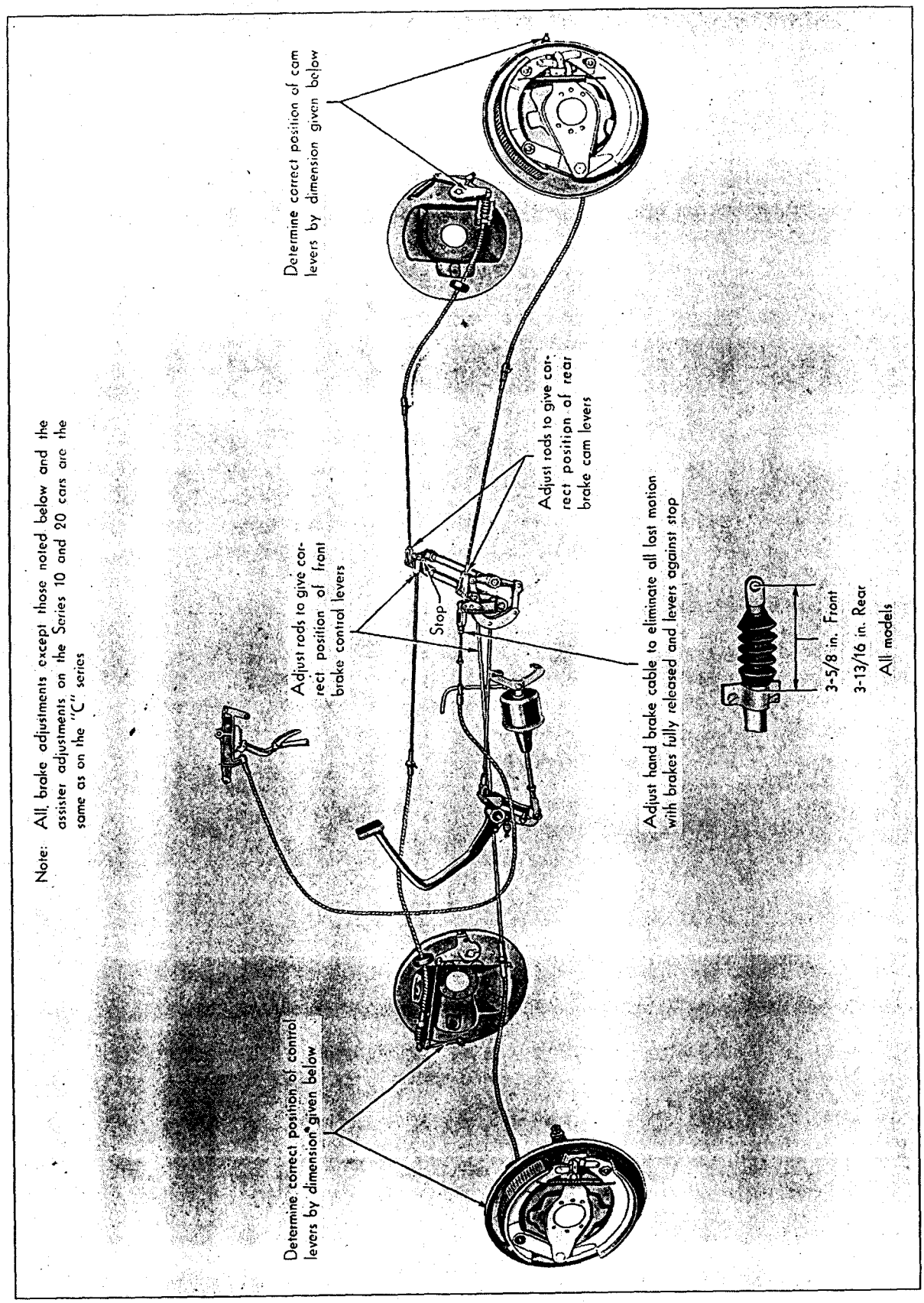


Fig. 18. Connections and adjustments of the 355-D Fleetwood, the 370-D and the 452-D brakes. The Series 10 and 20 brakes are the same except the assister connections

adjustments for the Series 10 and 20 cars being illustrated in Fig. 17. Service operations on the rear brake controls are similar to those on the front control common to the "C" series cars.

Improved Alemite fittings are provided for lubrication of the front and rear brake cables. Lubrication of the cam bearings is done in the same manner as on the "C" series by removing the cams and packing the bearings with chassis grease.

The brake and clutch pedal assembly is new. It is no longer mounted on the transmission but on the side member of the frame. On the Series 10 and 20 cars, the pedal assembly is carried in a bracket attached to the inside of the frame side member while on the longer wheelbase models it straddles the side member with the brake pedal on the inside and the clutch pedal outside. See Figs. 20 and 21.

Clutch

The new clutch used on the 355-D and 370-D cars is shown in Fig. 19 and is essentially the same as the two plate clutch formerly used, but it has been refined to give smoother operation and longer life. The design of the 452-D clutch, however, is the same as used on the "C" series except the spring mounting.

The spring mounting on all clutches is new. The rear driving plate is no longer drilled to receive the individual spring supports. Instead, four new type supports, each carrying three springs, are used. Each of these new supports is riveted to the rear driving plate at two points and in addition is provided with two extensions or legs to provide a four point contact with the driving plate. This construction gives a better distribution of pressure over the driving plate resulting in a more nearly uniform engagement of the clutch over the entire surface of the facings and a better retainment of the springs at high engine speeds.

Due to these new spring supports, together with improvement in the clutch metal, the double lever release mechanism is no longer used in the clutches for the 8 and 12-cylinder engines. Consequently, the clutches are provided with single type release levers. See Fig. 19. The double lever release mechanism, however, is retained in the 452-D clutch due to the necessity of some means of compensation for springiness in the levers and pressure plates in the larger size clutch.

The driven discs for the 370-D clutch have curved spokes the same as in the "C" series and the same precautions should be taken to install the discs with the spokes leading out from the hub in a clockwise direction when viewed from the flywheel side of the clutch. All other clutches use discs with straight spokes.

These improvements in design and metal have also resulted in a better heat balance between the center and outside driving plates, in all clutches. As a result, there is less change in operation between a hot clutch and a cold one. Chattering is also greatly reduced when the clutch is hot.

When servicing the new clutches, it is important that the driven discs be matched. This is necessary to give even contact of both discs for smooth engagement during the initial wear on the facings or the break-in period. The two discs and facing assemblies should be matched so that there is not

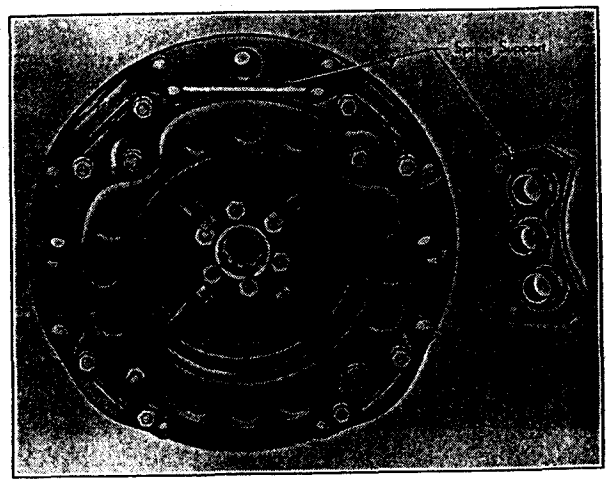


Fig. 19. View of 355-D and 370-D clutch showing the new spring supports

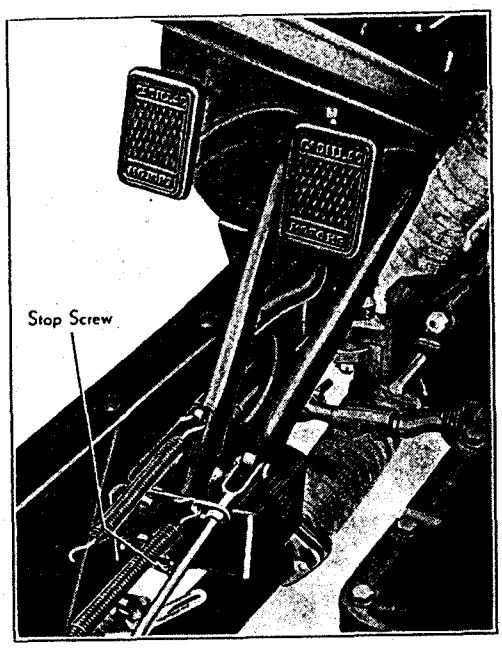


Fig. 20. The Series 10 and 20 pedal assembly showing the clutch pedal stop screw

much more than .005 in. difference in thickness between the two disc assemblies. The total clearance between the clutch facings and the center driving plate should be held to about .030 in.

The outside diameter of the 355-D clutch facing is 9½ in. while that of the 370-D facing is 10 in. and the 452-D facing is 11 in. The 355-D facings have an inside diameter of 6½ in. and the 370-D facings an inside diameter of 5⅞ in. The 452-D facing inside diameter of 6½ in. is the same as on the "C" cars.

The pedal assembly is also new. It is now mounted on the side member on the frame instead of in the transmission as formerly. On the Series 10 and 20 cars, both the clutch and brake pedals are mounted on a bracket inside of the frame side member as shown in Fig. 20, while on all other cars the clutch pedal is mounted outside of the frame side member as shown in Fig. 21. The new locations of the clutch pedal stop screws are clearly shown in these views.

Service operations on the clutch are the same as on the "C" series cars. The clutch release rod and pedal stop adjustments also remain unchanged.

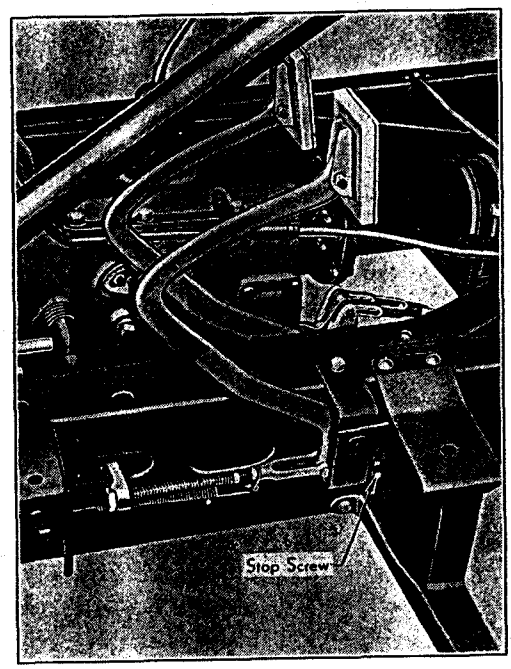


Fig. 21. Pedal arrangement on the 355-D Fleetwood, the 370-D and the 452-D cars, showing the clutch pedal stop screw

Cooling System

The cooling system is essentially the same as on the corresponding "C" Series cars; however, several minor changes have been made.

The new fan is of the five blade asymmetrical type, designed to operate without objectionable noise. In other words the blades are not evenly spaced but staggered around the fan hub as shown in Fig. 22. The fans in all the new cars run in ball bearings (See Fig. 23) and are mounted in practically the same manner as on the 370-C and 452-C engines.

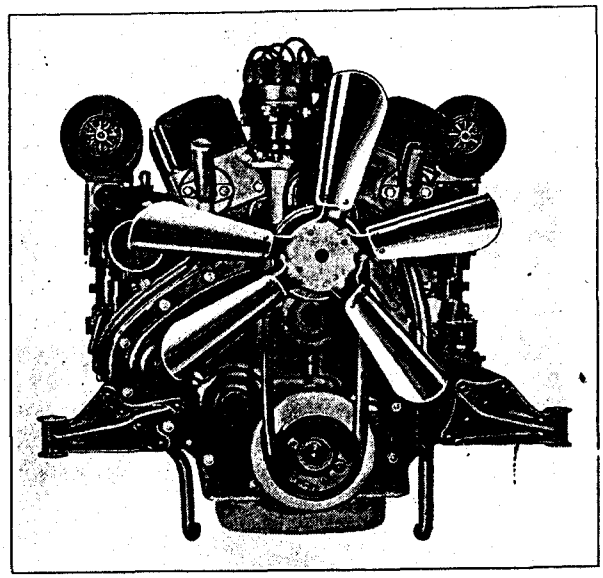


Fig. 22. The fan is of the five blade type with the blades unevenly spaced around the hub

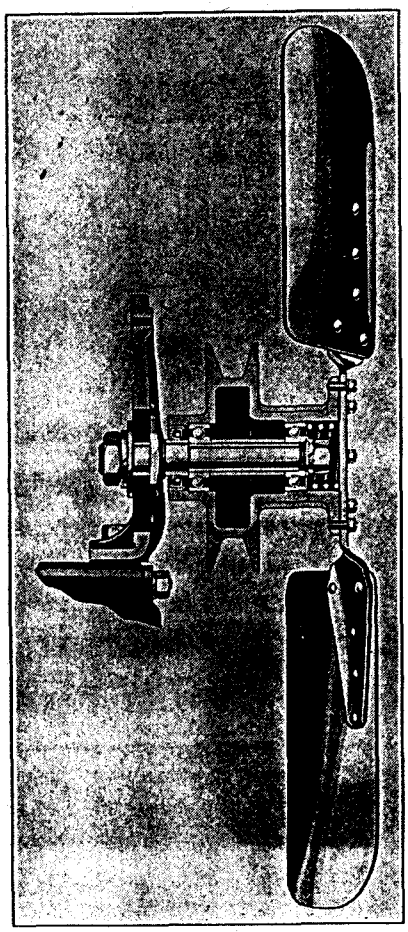


Fig. 23. Sectional view of the fan assembly

No provision is made for lubricating the fan. The fan bearings are packed with lubricant at the factory, which is intended to last for the life of the car. Adjustment of the fan belt is accomplished in the usual manner, simply by raising or lowering the fan to the correct position.

The radiator core, while of the same fin construction as in the "C" series, differs in that the capacity of the upper tank has been greatly reduced. This has been made possible by the increased core area at the bottom due to elimination of provision for cranking the engine by hand.

The radiator shutters and automatic control have been redesigned for the new type radiators. They are, however, similar in construction and operate the same as those on the "C" series cars. The same shutter assembly and thermostat control is used on all models. The radiator casing and grill have been redesigned to conform with the new body lines.

The radiator tie rods are similar to those used in the "C" series except that the new rods are screwed into anchor plates riveted to the dash instead of being held in place by nuts on each side of the dash as formerly. In order to get the proper alignment

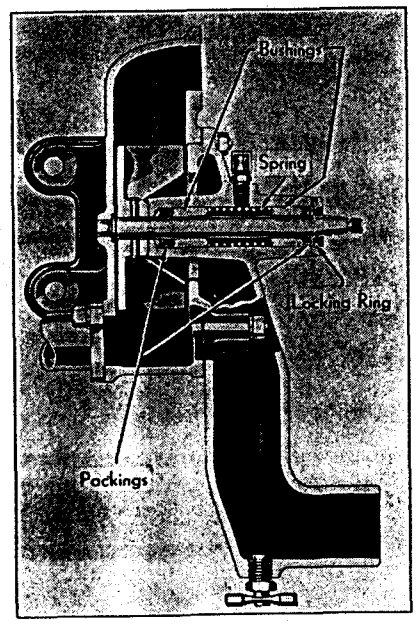


Fig. 24. Sectional view of the 370-D and 452-D water pump

of the radiator it is necessary to screw the tie rods in or out of the anchor plates and then fasten the front end of the rod to the radiator core.

The water pump for the 370-D and 452-D engines is new. It is of the self-adjusting type, and is provided with two "oilite" bushings amply protected by packings to prevent water leakage and to retain the lubricant. See Fig. 24.

The water pump is lubricated through a grease gun fitting.

Electrical System

The electrical system is of the same general arrangement on all the new cars except the ignition circuits. The ignition systems are necessarily different because of the difference in the number of cylinders in the eight, twelve and sixteen cylinder engines. The lighting is the same on all models.

Storage Battery

The storage batteries are the same as used on the corresponding "C" models. The battery mounting, however, is new. See Fig. 25.

The battery on the Series 10 and 20 cars is carried under the front seat in a hanger supported in the X-member of the frame. The battery on all other wheelbase cars is carried under the right front fender in approximately the same location as in the "C" cars. These batteries can be reached from under the hood for adding water.

The storage battery on the Series 10 and 20 cars may be removed from underneath the seat. On the longer wheelbase cars with the battery carried under the right front fender the battery is removed as follows: Remove battery box retaining screws at the top of the frame and then lift the battery and carrier assembly slightly to unlock the carrier from the frame.

Generator

The generator is of the shunt wound current control type. It has no third brush and no adjustment is provided except by the lamp load through a current regulator. In other words, the charging rate is automatically increased when the lights are switched on. See Figs. 26 and 27.

The general construction of the new generator is similar to that of the series "C" generator, the chief external difference being in the current regulator or control. The generator has a ventilating feature for reducing the operating temperature. The conventional cut-out relay, the current regulator, the field fuse and the thermostatic circuit breaker for the head lamps are mounted together in a control box on top of the generator as shown in Fig. 28.

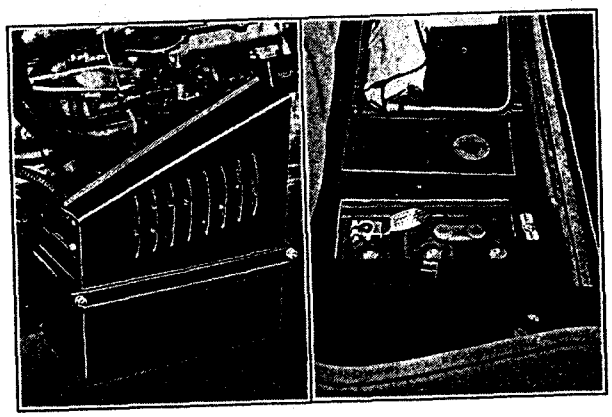


Fig. 25. The battery is located in a compartment under the right front fender on 355-D Fleetwood, 370-D and 452-D cars. On the Series 10 and 20 cars the battery is located under the front seat

The mounting and drive are the same as on the corresponding "C" cars. No service is necessary on the generator except the replacement of parts.

Current Regulator

The current regulator consists in part of two coils that go to make up an electro-magnet. When the cores of these coils are sufficiently energized, the armature is pulled downward against spring tension, opening the contacts and the shunt field current is diverted through a resistance to the ground. This resistance greatly decreases the field current, and the output current flowing through

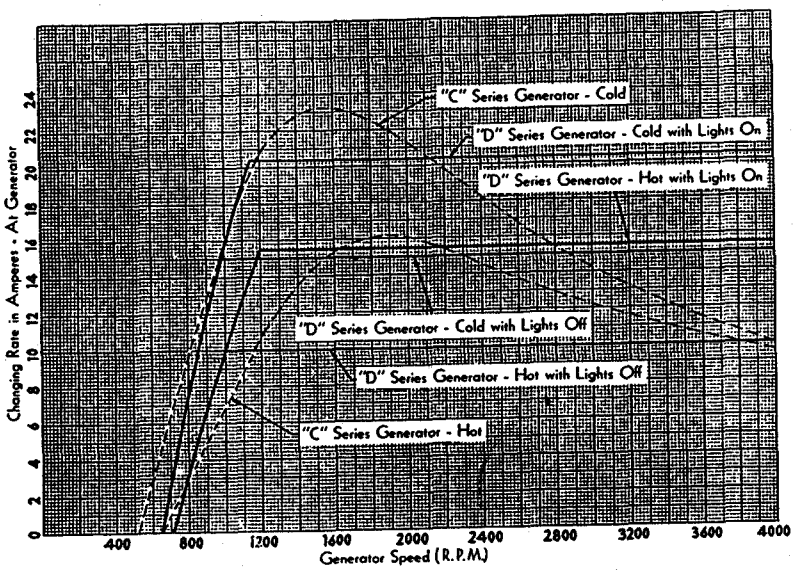


Fig. 26. Typical performance curves of "D" and "C" Series generators. These curves indicate the current output at the generator. The ratio of generator to engine speed is 1.35 to 1 on the 355-D and 1.40 to 1 on the 370-D and 452-D cars

the magnet coils will likewise be decreased to such a point that the spring tension overcomes the magnetic pull on the armature, and closes the contacts. This operation is repeated many times per second, so that the regulator will operate for a reasonably constant current, which will depend upon the spring tension applied to the armature.

From the circuit diagram Fig. 29 it is obvious that the current flowing to the battery also flows through both magnet coils, each of which has 21.5 turns. This regulator is adjusted for 10 amperes with the lights off, and the spring tension is therefore adjusted to equal the magnetic pull of 430 ampere turns. If an 11 ampere light load is now turned on, it will be noted that this current flows through one coil only, and therefore creates 236.5 ampere turns.

Since it requires 430 ampere turns to operate the regulator, the difference between these two, or 193.5 ampere turns, must be furnished by the current flowing to the battery. Since this current flows through 43 turns, we have 193.5 divided by 43, which equals 4.5 amperes to battery. This gives 11 amperes lights, plus 4.5 amperes to battery, or a total generator output of 15.5 amperes. This represents an increase of 5.5 amperes by turning on the lights, or an increase of one-half the light load. Since the lighting current flows through one coil only, it will only have half as much effect per ampere as battery current in operating the regulator. The total number of ampere turns to actuate the regulator remains constant, so that the generator output is increased by half the lighting load.

In contrast to voltage regulators and relays, a current regulator inherently regulates for the same current, either hot or cold. For pleasure cars it seems advisable to increase the cold output to take care of those cars which are being driven only a

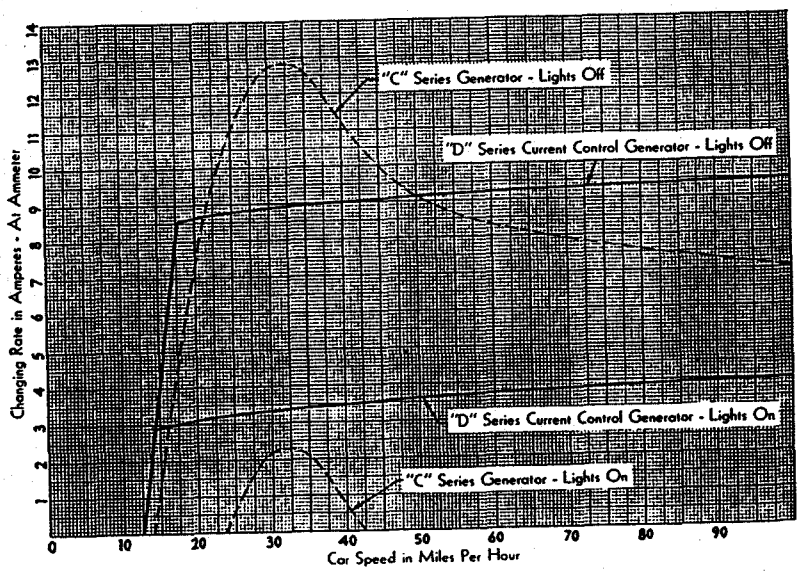


Fig. 27. These performance curves are shown to exemplify the difference in characteristics of the "D" and "C" series generators as indicated by the car ammeter

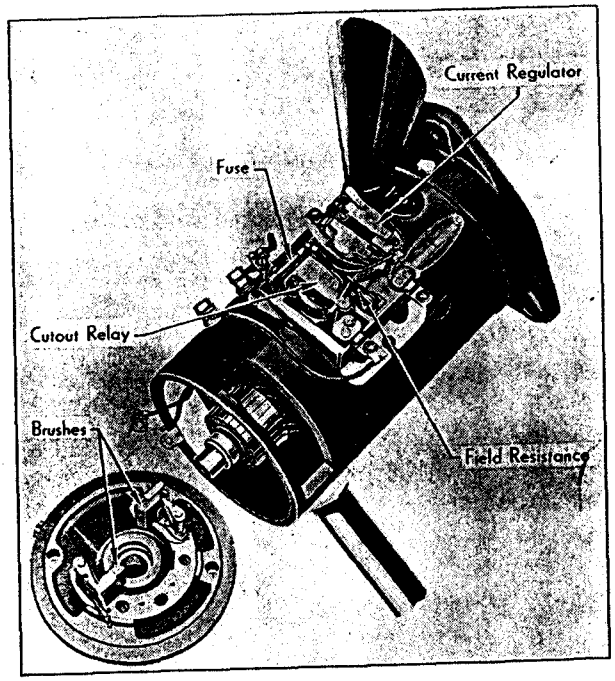


Fig. 28. A new feature of the generator is the control box

few minutes per day, and allow to decrease when hot to prevent overheating the generator and overcharging the battery on cars more continuously in service.

This is provided for in the current regulator by a bimetal armature hinge, which when heated furnishes a force opposing spring tension, and causes the regulator to operate at a lower current when hot. The amount of this difference depends on the relation between the force furnished by this hinge and the spring tension. The spring is used to balance the armature pull at 10 amperes without lights, and this spring tension will therefore vary inversely with the square of the air gap between armature and pole cores.

Temperature compensation will also vary in this manner, and may be decreased by decreasing this gap, or increased by increasing the gap. If the gap is too small, the vibration frequency of the regulator will be low, while if it is too great, the force will be too small to properly operate the armature. A gap of .063 to .070 in. has been found best.

The thermostat is essentially a bimetal blade in series with the lighting circuit, completing the circuit through two silver contacts held closed at ordinary temperatures by inherent spring pressure in the bimetal. The current flowing through the contact blade generates heat, and the design and adjustment is such that when 20 amperes flows with an ambient temperature of 210°F, this heat will be sufficient to cause such a deflection in the contact blade that the points will open. No current will then flow, the blade will rapidly cool, and the contacts again close. The current will therefore be limited, should a short occur in the lighting line. The opening temperature of the thermostat adjusted as above is 375 to 385°F.

The cutout relay is of standard construction and operation. The adjustment of the cutout relay and the regulator is made as follows:

1. *Cutout Relay.* With the armature down, adjust the air gap at the core to .012 to .017 in., and the contact opening with the armature up to .015 to .025 in. Then adjust the spring tension so that the relay closes at 6.75 to 7.25 volts.

2. *Current Regulator.* Adjust the stop which hits the fiber bumper, with the bumper barely touching the stop, to give an air gap between the center of the core and the armature of .063 to .070 in. Then adjust the stop governing the upward travel of armature, so that with armature in the up position there is .005 to .008 in. clearance between the fiber bumper and the stop. The stop governing the down position of the armature should be adjusted so that the point opening when armature is down is .015 to .025 in.

The unit should then be connected to a generator and battery and an 11 ampere light load turned on. The armature spring should next be adjusted so

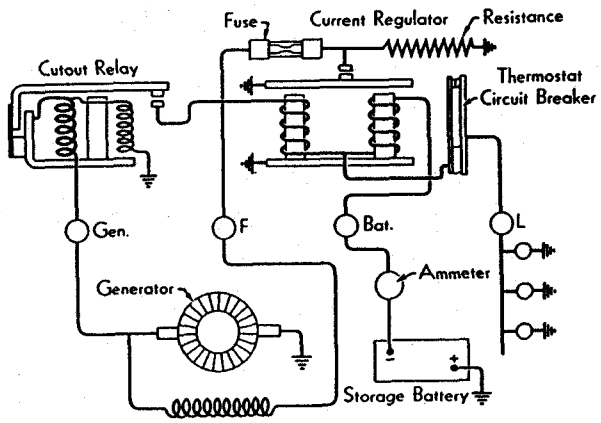


Fig. 29. Diagram of the generator circuit

that the generator output at approximately 3000 r. p. m. is 14.5 to 15.5 amperes with a hot generator or 19 to 21 amperes with a cold one. With the lights off this will give from 9.5 to 10.5 amperes (hot generator) and 14 to 16 amperes (cold generator). The cover should be in place when the voltage and current readings are taken.

Horns

Two matched air-toned horns with long projectors are used on all models. They are mounted on the front side of the dash under the hood. The horn power plant, however, is of practically the same construction and is adjusted in the same manner as on the "C" series cars. The horns are operated through a relay the same as on the "C" series to eliminate the passing of a heavy current through the horn button and minimize the voltage drop in the wiring. The relay is mounted on the horn bracket.

Ignition

The ignition systems are the same as used on the later "C" series cars. The distributor advance mechanism, however, incorporates new advance characteristics to compensate for the higher engine compression ratio used in the new models.

The method of timing the engine is the same as on the corresponding "C" cars. The distributor contact point gap and the spring tension of the contact arms are as follows:

Model	*Gap Between Contacts*	*Spring Tension on Arm*
355-D	.012-.018 in.	19-23 ozs.
370-D	.018-.024 in.	17-21 ozs.
452-D	.014-.018 in.	17-21 ozs.

When the distributor drive shaft and gear are removed and reinstalled, particular care must be exercised to get the driven gear meshed with the camshaft gear in the proper position, otherwise it will not be possible to time the engine correctly. To install a distributor drive shaft, first turn the crankshaft to the firing center (not dead center) for No. 1 cylinder. Then mesh the distributor driven gear with the driving gear on the camshaft so that the slot in the upper end of the distributor shaft is offset towards the rear of the engine. In other words, the narrow part of the shaft at the side of the slot should be at the rear on all 8 and 12 cylinder engines. When installing the distributor drive mechanism on the 8 cylinder engine, care should also be exercised to line up the oil pump shaft so that the driving shaft will drop into position without damaging the oil pump by pushing the pump shaft down through the pump cover. The fuel pump should also be removed before removing the distributor drive mechanism to eliminate interference between the fuel pump drive shaft and the distributor drive shaft.

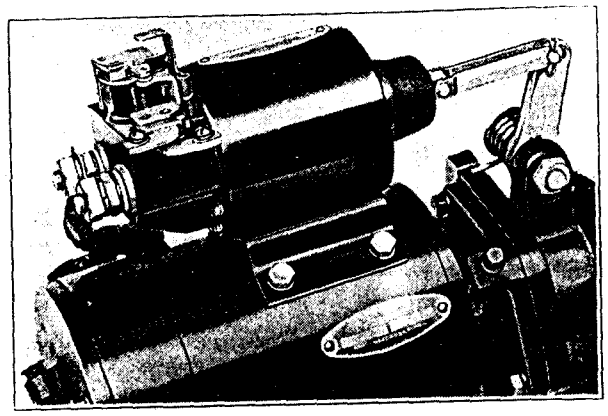


Fig. 30. A new feature of the starting motor is the solenoid control

The ignition coils are new. They are of the same construction but are not interchangeable between the 8 and the 12 and 16 cylinder cars because of different type mountings. The 370-D and 452-D coils are, however, fully interchangeable.

These new coils are similar in appearance to the 530-L service coils formerly used but are of a new design employing heavier windings.

The spark plugs are of the G-7 type and the gap should be adjusted the same as on the "C" series cars.

The flywheel has the usual IG/A mark to indicate the proper timing for full advance. These marks are located 4° ahead of the dead center mark in all engines.

No provision is made for cranking the new engines by hand. To time the ignition on the new cars it is necessary to jack up a rear wheel and turn the engine by the wheel with the transmission in high gear.

Starting Motor

The starting motors and gear engaging mechanism are of the same construction as those used on

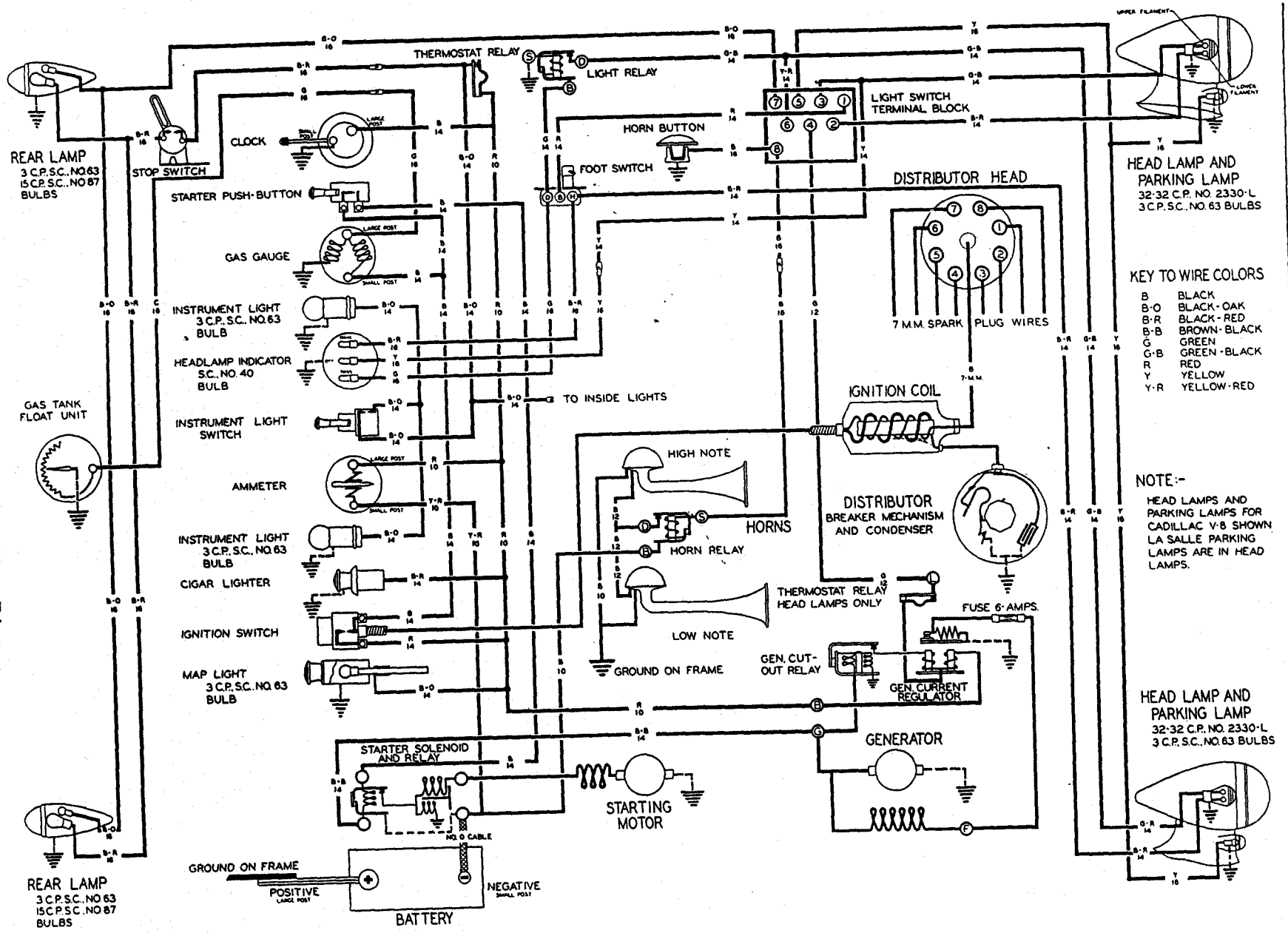


Fig. 31. Cadillac 355-D wiring Diagram

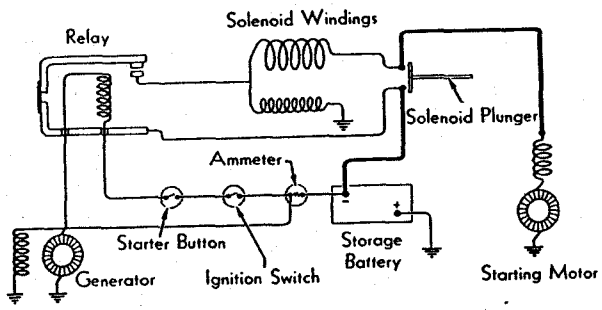


Fig. 32. Diagram of the starting motor circuit

the "C" series cars. The control for the starting motor, however, is entirely new and consists of a solenoid mounted on top of the starting motor, a relay and a starter button on the instrument panel. To start the engine in the new cars, it is only necessary for the driver to turn on the ignition switch and then press in on the hand starter button.

The solenoid operates the starter engaging mechanism and is controlled by a relay both of which are shown in Fig. 30. The relay in turn is controlled by the starter push button on the instrument panel and serves the same purpose in the solenoid and starter button circuit as does the horn relay in the horn circuit; that is, instead of a heavy wire being used between the starter button and the solenoid, heavy wires are used only between the relay and the solenoid. A smaller wire is used between the relay and the starter button. This will eliminate the passing of a heavy current through the starter button and making a voltage drop in the wiring.

The relay is essentially an electromagnet, consisting of a winding and core, a base and an armature. The winding is connected in series with the starter button, the ignition switch and the generator as shown in Figs. 31, 32 and 34. When the core is sufficiently energized, the armature is pulled down closing the solenoid circuit, thus operating the solenoid plunger. The smaller solenoid winding is the holding coil to keep the plunger in the engaged position.

The starter relay is connected in the electrical system in such a way that when the generator is charging, the relay is inoperative. This means that when the engine is running, the starter gear cannot accidentally be engaged. Also when the engine starts running, the solenoid circuit is automatically opened which allows the starting gear to disengage from the flywheel. The relay circuit is controlled by the ignition switch in such a manner that the solenoid is inoperative unless the ignition switch is in the "on" position.

The solenoid serves two purposes. It operates the starter switch and the gear shifting mechanism in the starting motor. When sufficient current is passed through the solenoid winding, the plunger is moved frontward engaging the starter pinion with the flywheel ring gear and also closing the starting motor circuit through the contacts shown in Fig. 33.

There is one adjustment on the starting motor assembly and that is on the solenoid plunger to secure the proper mesh of the starting pinion with the flywheel ring gear. To make this adjustment, the starter should be removed from the engine. Then remove the pin in the upper end of the shifting yoke and push the solenoid plunger all the way in the solenoid after which move the pinion all the way back to what would be the engaged or cranking position if the starter were mounted in the engine, taking out all backlash in the shifter mechanism. Next move the pinion 1/8 in. frontwards away from the end of the housing and adjust the stud in the solenoid plunger by turning it to the right or left as required until the pin may just be inserted at the forward end of the slot.

All other service on the solenoid unit can be obtained from United Motors Service. Distributors

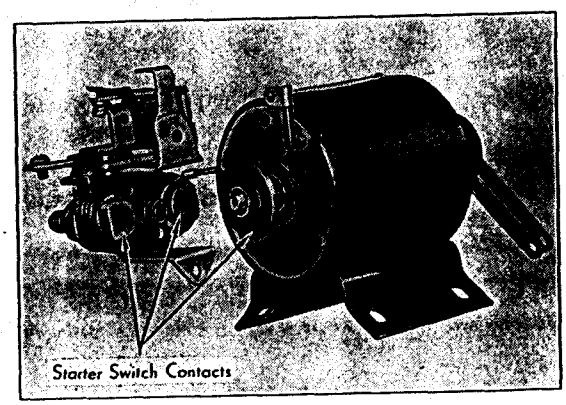


Fig. 33. The starting motor switch forms a part of the solenoid unit

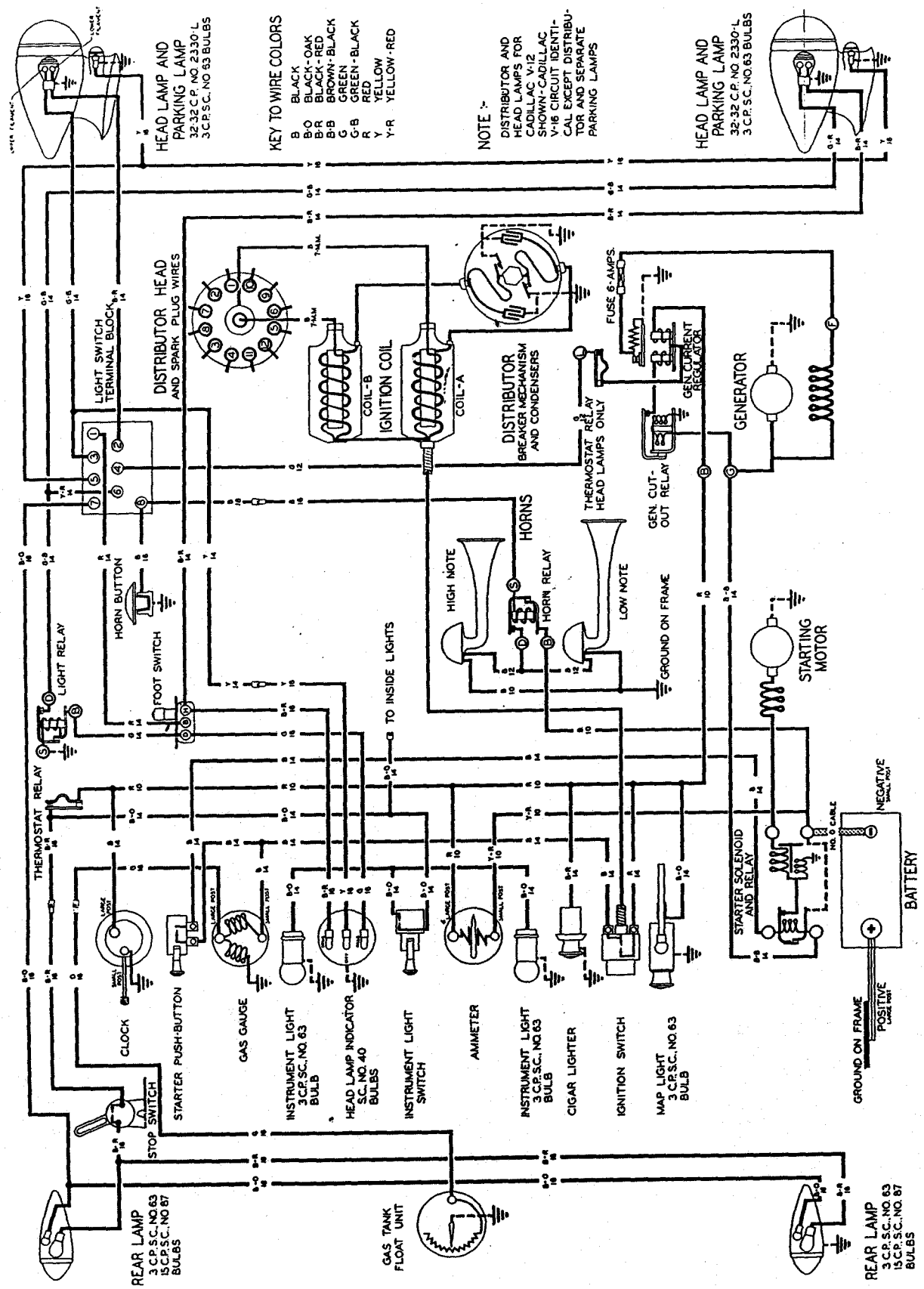


Fig. 34. Cadillac 370-D wiring diagram. The 452-D wiring is the same except for the number of spark plug wires

and Dealers are advised to keep a solenoid unit on hand for exchange to render prompt service.

Wiring

The general arrangement of the chassis and instrument panel wiring is similar to that on the series "C" cars, the wires being grouped in a braided, varnished harness. The wires wherever possible are also carried in protected parts of the frame. Wiring diagrams of the 355-D and 370-D cars are shown in Figs. 31 and 34 respectively. The 452-D wiring arrangement is identical with that of the 370-D except the difference in the number of distributor to spark plug wires.

A new feature of the electrical system is the arrangement of the various relays, circuit breakers and the generator current regulator. All of these devices except the starter, horn and lighting relays and the circuit breaker for the instrument and body lighting circuits are mounted in a control box on top of the generator.

The starter relay is, of course, mounted on the starter solenoid unit and the horn relay mounted on the horn bracket. The circuit control box featured on the previous model cars has been discontinued.

The thermostatic circuit breaker for the instrument and body lighting circuits is mounted back of the instrument panel. The lighting switch relay is mounted on the frame near the steering gear on 355-D cars and on the left front engine support on 370-D and 452-D cars. The lighting switch relay operates in conjunction with the foot lighting switch for controlling the various light beams.

Engine

The new engines are essentially the same as the "C" series. However, several changes have been made that will be of particular interest to service men.

The compression ratios have been increased on all engines, as shown in the following chart:

H. C. (Optional)	H. H. C. (Standard)
355-C—5.7 to 1	5.37 to 1
355-D—5.75 to 1	6.25 to 1
370-C—5.4 to 1	5.6 to 1
370-D—5.65 to 1	6.0 to 1
452-C—5.4 to 1	5.7 to 1
452-D—5.57 to 1	6.0 to 1

This increase in compression ratio necessitates a change in the ignition timing on 355-D engines and the flywheel marks have been changed accordingly. That is, the IG/A marking on the 355-D engines is 4° or approximately ½ inch ahead of the center marks instead of 9° 12′ or 1⅛ inches.

The compression ratio on the 370-D and 452-D engines can be altered the same as in the "C" series by changing the cylinder head gaskets.

New markings are used on the various cylinder heads for identifying the compression ratio. Instead of using the H. C. and H. H. C. markings the ratio is stamped on the head. This stamping is located just above the front spark plug on the 355-D heads and at the end of the cylinder head on the 370-D and 452-D engines in the same position as on the former series.

Cap screws are now used on 355-D engines to retain the cylinder heads in place. Studs, however, are retained in the 370-D and 452-D engines for holding the cylinder heads in position.

Another important change in all "D" series engines is in the use of Lynite pistons with the wearing surfaces of these pistons anodized by an electrolyte process. This process greatly increases the life of the piston as it removes the aluminum oxide and closes the pores of the metal, being practically equivalent to a hardening process.

The pistons also differ from former pistons in that they are finished slightly out of round about .0065 inch on each side as illustrated in Fig. 35. The initial contour of the pistons is such that when the engine is heated to normal running temperature, the pistons conform to the shape of the bore. This piston design is very effective in giving better engine performance due to the better fit of the piston at running temperature.

The pistons are also slotted on one side in the form of a "T." See Fig. 35. The purpose of the

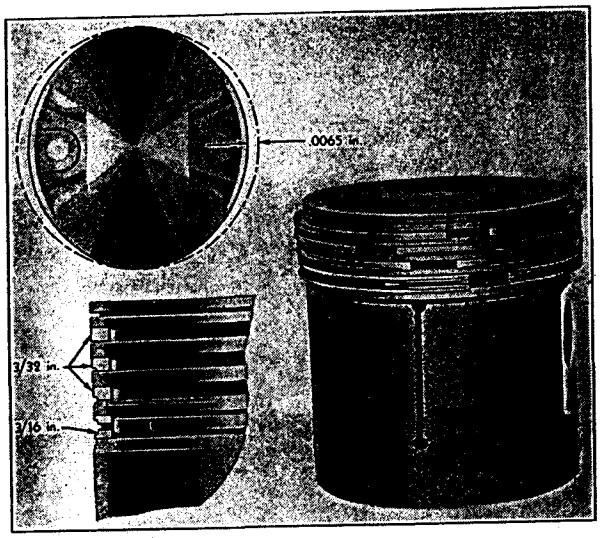


Fig. 35. Piston details

slot is to compensate for expansion of the piston. Four rings, one plain and two notched compression rings and one oil ring are used on each piston as shown in Fig. 35.

Several other changes have been made internally in the engines to give them better performance and longer life; dual valve springs are used on the 355-D; oil bleed holes are provided on the 370-D and 452-D connecting rods; bronze bushings have been added to the valve lifter rollers on all models; two springs are now employed on the 370-D and 452-D dashpots. The cylinder bores in all engines are also honed to a smoother finish for the use of the Lynite pistons.

A slight change has been made in the engine supports on all models to provide a softer mounting. The front and intermediate supports are adjusted in practically the same manner as in the "C" cars. Adjustment of the support at the rear end of the transmission is made by using shims between the upper and lower halves of the rubber retainer. Care must be exercised in adjusting the transmission support not to get it too tight.

A new harmonic balancer is used in the 12 and 16 cylinder engines. This balancer employs rubber as the dampening medium.

The oil filter has been discontinued on the 8 cylinder engines.

The vacuum pump has been redesigned for greater efficiency and longer life.

No major change has been made on many of the parts, such as the camshaft, the front end drive, and the connecting rods on the 355-D, which are of the same design and fully interchangeable with the corresponding "C" series parts. The 355-D cylinder blocks with the double valve springs may be used on "C" series engines either in pairs or individually.

Service Operations on the new engines remain practically the same as on the "C" series, with the exception of the pistons and the piston pins. The new pistons should be installed with the slot in the skirt on the left side of the engine as viewed from the driver's seat. Installation of pistons with the slot on the left side applies to both cylinder blocks of all "D" series engines.

In fitting the new pistons in the cylinders, micrometers must be used to check both the piston and the cylinder bore. Feeler gauges are not suitable for this purpose because of the T-slot and the elliptical shape of the piston. The piston measurement should be taken just below and to the left of the junction of the T-slot.

.0018 in.

The method of installing the piston pins also differs from that formerly recommended for cast iron pistons. With the new Lynite pistons, the piston pins should be a hand push fit in the side opposite the locking screw at room temperature or 70°F. The piston pin should also be a hand push fit in the locking screw side of the piston, but with the piston heated to a temperature of 200 to 210°F.

Exhaust System

The general arrangement of the new exhaust system is similar to that of the "C" series cars. However, a new type muffler is used which assures minimum back pressure and maximum engine power especially at high speeds.

The new mufflers are mounted on the outside of

the frame, as shown in Fig. 36, on the 355-D Fleetwood, the 370-D and the 452-D cars, to remove the exhaust heat from the body. On the Series 10 and 20 cars, the muffler is mounted inside of the frame as on previous models.

Rubber cushions, similar to those used on the "C" cars, are used on the muffler support brackets to prevent exhaust noises being transmitted to the body.

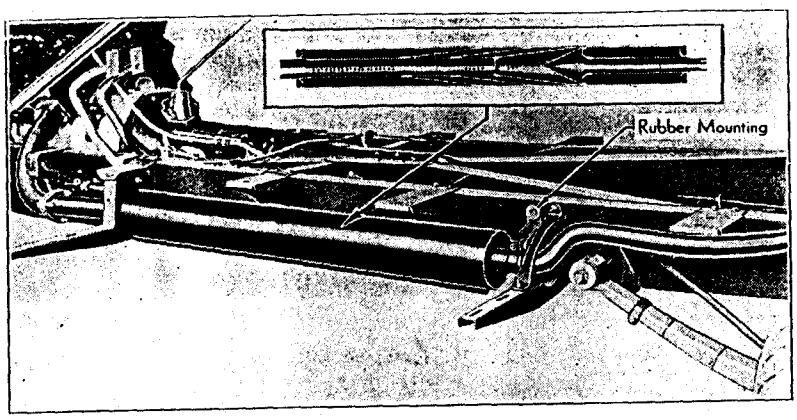


Fig. 36. The new mufflers are mounted outside of the frame except on the Series 10 and 20 cars

Frame

The series "D" frames are entirely new; they are designed to give a low car appearance and embody some new and important features. They are of similar construction on all models, differing principally in dimensions. See Fig. 37.

The front end construction has made it possible to design an extremely rigid frame. The most important units of this frame are the massive front cross member (Fig. 38) and the new X-member (Fig. 39) which is a complete frame in itself. This new frame construction forms a rigid foundation for the body, which minimizes vibration and eliminates twisting or weaving at the front end.

The front cross member is heavily reinforced to provide adequate support for the front wheel suspension system. It also carries part of the steering connections.

The X-cross member extends from the kick-up at the rear to the front cross member and is so constructed as to form a tunnel through which the propeller shaft passes. Beginning at a point near the intermediate engine supports, the front arms of the X-cross member are extended all the way forward parallel to the side members of the frame and are riveted to these side members to form a box section.

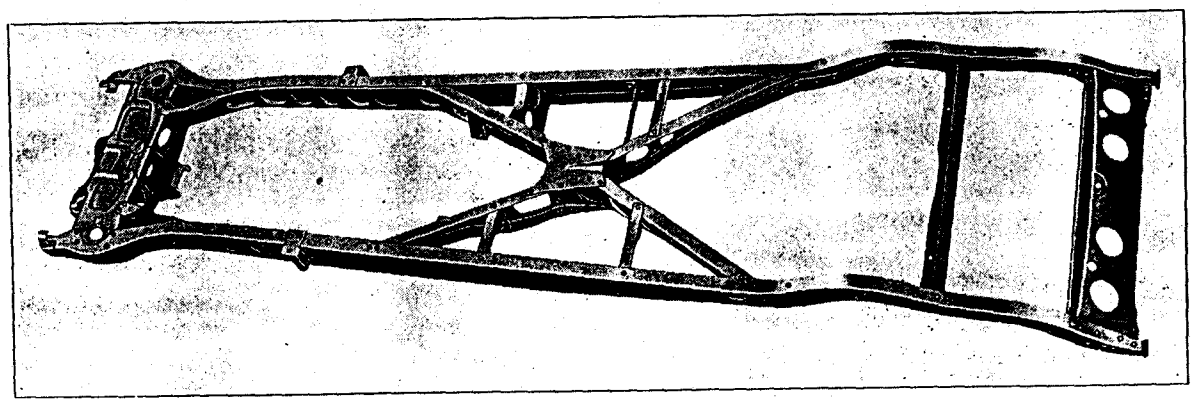


Fig. 37. The new frames are extremely rigid

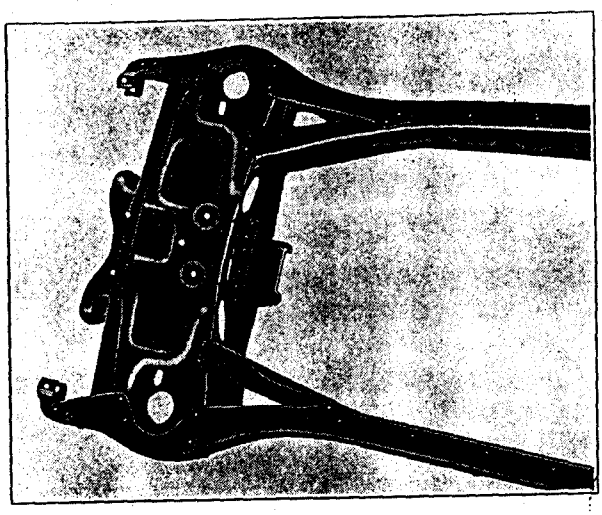


Fig. 38. The front cross member is massive to provide adequate support for the front wheel suspension system

The running board brackets are of an improved type of heavy channel section. The front brackets also serve to support the front end of the exhaust mufflers on the 355-D Fleetwood, the 370-D and the 452-D cars.

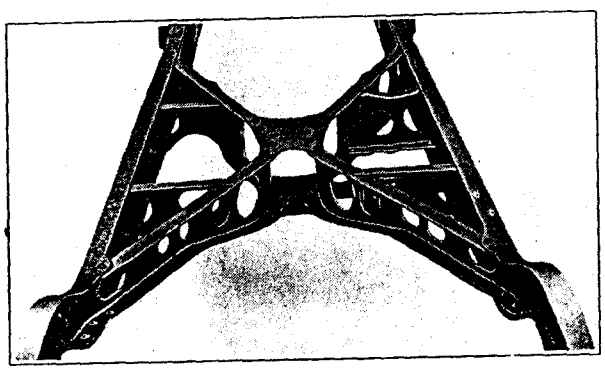


Fig. 39. Rear view of the new frame X-member

Gasoline System

The gasoline system is practically the same on the new models as on the corresponding "C" series, with the exception of the carburetor on the 355-D engines. The intake silencers and air cleaners, while of the same principle as those on "C" series cars have been redesigned to secure fresh cool air through a passage in the radiator casing as shown in Fig. 40. The efficiency of the engine has been greatly improved by using cold air in this manner as better carburetion is secured. All service work on the new intake silencers should be done in the same manner as in previous models.

The new 355-D carburetor is of the expanding air valve type the same as those used on the 12 and 16 cylinder engines and its construction is identical with them. Although the 355-D carburetor is somewhat larger than those used on the 370-D and 452-D models, many of the parts are fully interchangeable.

Like the 370-D and 452-D carburetors, the one used on the 355-D has only one adjustment, the metering pin, which is raised or lowered by screwing it into or out of the fuel orifice. The metering pin is properly adjusted when the carburetor leaves the factory, but if for any reason it should require readjusting, be sure the motor is well warmed up, and then adjust the metering pin carefully at idle speed.

Turning the pin to the right moves the pin upward into the orifice and makes the mixture leaner; turning it to the left increases the orifice and makes the mixture richer.

The idle speed of the engine should be set by means of the throttle adjusting screw to a speed of approximately 320 R. P. M.

When the metering pin is correctly adjusted at idle speed the carburetor is set for maximum engine performance and no other adjustments are required.

The carburetors on all cars can be correctly adjusted on the bench before installing them on the engine. The proper mixture can be obtained by turning the adjusting screw in the bottom of the carburetors in, only until it begins to raise the vanes above the aspirating tube, and then backing it out, 2¾ turns on 355-D carburetors and 4 complete turns on 370-D and 452-D carburetors. This action can be checked only with the carburetor off the engine.

Feeler gauges, as explained on this page, the feeler gauges used must not be more than 1/8 inch in width.

on 355-D and a .004 in feeler gauge on 370-D and 452-D engines will just go between the throttle butterfly valve and the carburetor body with the valve in the closed position. The kicker adjustment is made by setting the choke lever in the open position and turning the kicker screw until a .017 in. feeler gauge on 355-D and a .013 in. feeler gauge on 370-D and 452-D engines will just go between the throttle butterfly valve and the carburetor body with the throttle in the closed position.

All other service work on the new carburetors, such as their removal and disassembly and the replacement of parts is the same as on the "C" series 12 and 16 cylinder engines.

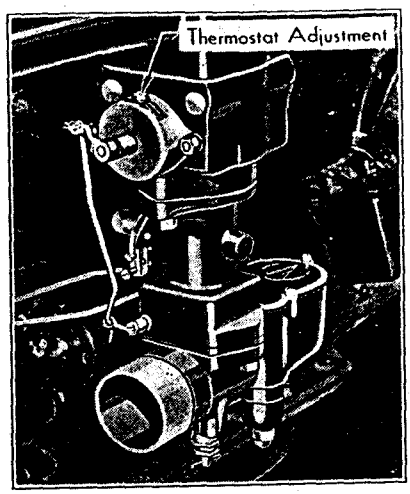


Fig. 41. The purpose of the semiautomatic choke is to keep the engine from stalling and to prevent popping back into the carburetor during the warming up period

Automatic Choke

All cars are equipped with a semiautomatic choke (Fig. 41), which permits a more efficient choking of the carburetor during the warming up period than is possible by the manual choke control. When the engine is cold before starting, the semiautomatic choke is automatically in the choke position.

The manual choke on the instrument panel should be used as necessary when starting a cold engine but should be pushed in immediately after the engine starts. The purpose of the semiautomatic choke is to keep the engine from stalling and to prevent popping back into the carburetor before the engine has reached the proper operating temperature. As the engine warms up, the thermostat starts to open the choke so that when the engine has reached its correct operating temperature, the semiautomatic choke is in the full open position.

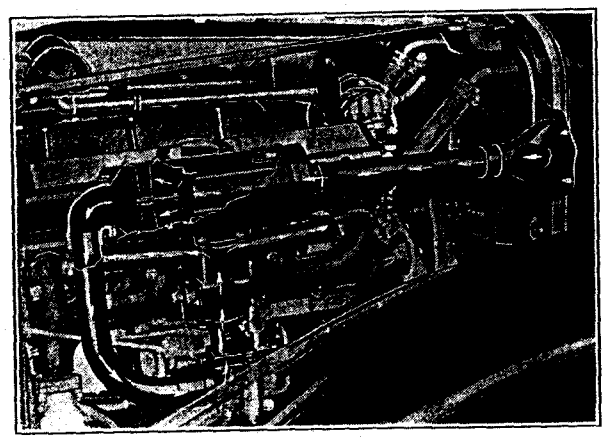


Fig. 40. Cool fresh air for the carburetor is secured through a passage in the radiator casing

Gasoline Tank Filler

The gas tank filler on the Series 10 and 20 cars is located in the left hand side at the rear of the body. The Fleetwood cars have the filler located on the top of the left rear fender. This filler has a double curve where it goes down from the center of the fender through the side of the wheel housing, then through the rear floor down into the tank. The filler is protected from stones and gravel thrown up by the wheel by a specially constructed stone guard which is fastened to the fender and the side of the wheel housing.

On the Fleetwood cars, the inside of the filler neck is protected by a cover which is bolted to the rear floor and inside of the wheel housing. A rubber ring is also used in the wheel housing to keep out dirt.

Lighting System

The new Guide Multibeam three-beam headlamps are used on all series "D" cars. See Fig. 42. These lamps are of the tear-drop design and are carried on streamline supports on the front fenders on 355-D and 370-D cars and on the radiator shell on 452-D cars.

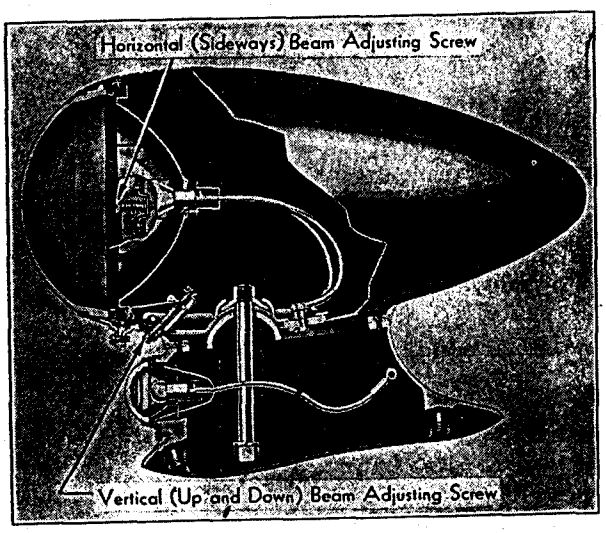


Fig. 42. Sectional view of the new Multibeam headlamp

The Multibeam lighting system is controlled by the conventional switch lever at the hub of the steering wheel. In addition, the country driving and passing beams are further controlled by a foot switch in the toe-board at the left of the clutch pedal. The various headlight beams are readily determined by a beam indicator on the instrument panel.

The parking lamps are integral with the headlamp supports on 370-D and 452-D cars. On the 16 cylinder cars, the parking lamps are built into the crown of the front fenders.

The tail lamps are also new. See Fig. 43. They are streamline in design to match the appearance of the body and fenders. Two reflex buttons are cleverly arranged in the lamp base instead of in the center of the lens as on previous models. The lens is also extended for appearance and to make the tail light and stop light visible from the side of the car. The tail lamp does not include a back-up light.

The circuit breaker for the lighting system is located in the control box on top of the generator.

The Multibeam lighting equipment consists primarily of a special right and left lens, operating in conjunction with special reflectors and prefocused bulbs. This lighting system is legal in all states.

The Multibeam lenses are plainly marked "right" and "left" and are not interchangeable. They are divided into five horizontal sections of vertical flutes as shown in Fig. 44 to spread the light horizontally to the best advantage. The right lens distributes most of its light to the left of the road while the left lens distributes the major portion of its light to the right side.

The reflectors each have five distinct sections as shown in Fig. 44. Each of these sections is scientifically designed to contribute its share to an optically correct vertical distribution of light. The name "Multibeam" is plainly marked on the reflector and no other reflector can be used with the Multibeam lens. The reflectors are adjustable for aiming the light beams up and down without disturbing or loosening the lamp mounting.

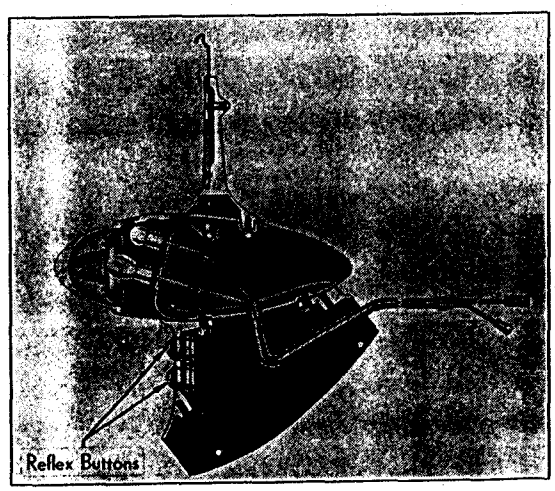


Fig. 43. Sectional view of the tail lamp showing the new reflex buttons

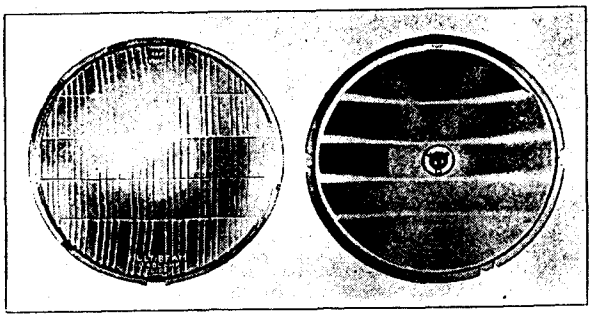


Fig. 44. Multibeam lens and reflector

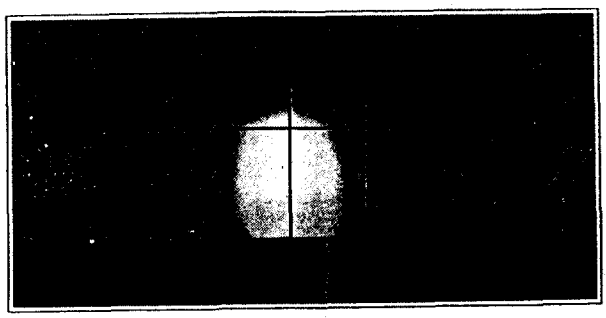


Fig. 46. Upper beam of left headlamp without lens

Three separate and distinct beams of light are obtainable from Multibeam headlamps:

1. An efficient and symmetrical upper or driving beam for the open road.

2. An asymmetrical passing beam, which eliminates the element of danger in passing. This beam is obtained by depressing the left side of the driving beam.

3. A symmetrical lower beam for city driving.

The upper or driving beam is produced by the lower filament of both lamps. The asymmetrical passing beam is produced by the lower filament of the left hand lamp, and the upper filament of the right hand lamp. The symmetrical lower beam is produced by the upper filaments of both lamps.

The Multibeam headlamp bulbs (Fig. 45), are of the prefocus 32-32 candlepower type Mazda No. 2330-L. They are held in the reflector by three small pins projecting through the flat at the apex of the reflector and engaging the button hole slots in the bulb collar. The pressure of the heads of these pins actuated by springs behind the reflector, holds the bulb firmly in the reflector. The three pins in the reflector are unequally spaced, making it impossible to assemble the bulbs in an incorrect position. The base of the bulb is marked "top" to assist in aligning the slots in the bulb collar with the retaining pins.

The Multibeam bulbs are installed in the reflector in a similar manner to the conventional bayonet type bulbs. That is, they are pushed on the pins and turned or rotated slightly clockwise to lock them in position.

It is important that all three pin heads project through the bulb collar slots and that the collar rests flat against the bulb seat before the bulb is turned to lock it in position. When removing the bulb it should be tipped or rocked slightly before it is turned counterclockwise.

Headlamp Adjustment

The new prefocused Multibeam headlamps are equipped with a tilting reflector mechanism that permits aiming the beams up or down by an outside adjusting screw at the bottom of the lamp. See Fig. 42. The beams may also be aimed to the right or left by means of the side adjusting screws under the cork gasket. The beams can therefore

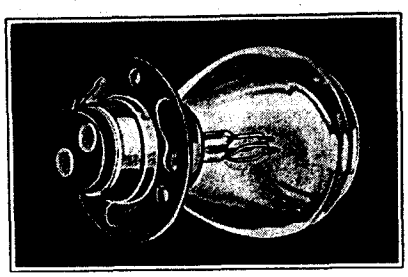


Fig. 45. A special prefocused bulb is used in the Multibeam lighting system

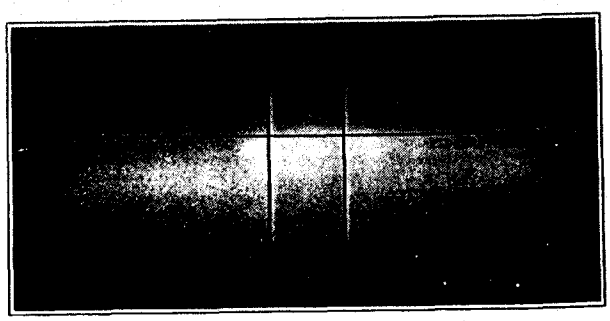


Fig. 47. Upper beam of left headlamp correctly aimed

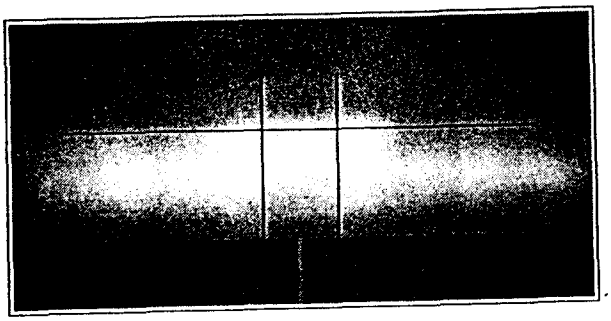


Fig. 48. Upper beam of right headlamp correctly aimed

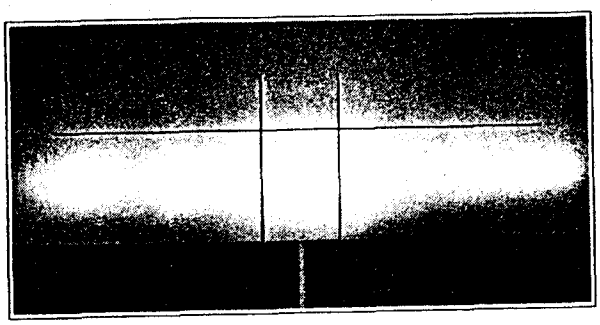


Fig. 50. Passing headlamp beam

be adjusted by means of the adjusting screws making it unnecessary to loosen the lamp on its mounting and disturbing the aim in all directions.

The headlamps are designed for prefocused bulbs so no focusing adjustment can be made. On this account only prefocused bulbs, Mazda No. 2330-L, can be used in these lamps.

To aim the headlamps the car should be placed on a level surface with the headlamps aimed toward and 25 feet from a garage door or other reasonably light colored vertical surface. Then draw a horizontal line on this surface at the level of the headlamp centers. If your state requires a loading allowance, draw this horizontal line the required distance below the level of the lamp centers. Sight through the center of the back window over the radiator cap to determine the center point of the horizontal line and draw vertical lines through points at the right and left of this center point directly ahead of the center of each headlamp.

The lighting switches should be turned to the "Driving" position, which means that the lower filaments will be lighted in both lamps. The headlamp doors must be removed and one of the headlamps covered. The beam from the uncovered lamp should then be centered sideways if necessary on the vertical line directly ahead of it. Aiming to the right can be accomplished by loosening the screw in the right side of the lamp body, or to the left by loosening the left screw. The beams should be adjusted as shown in Figs. 46 to 51 inclusive.

When replacing the headlamp doors, reinstall the cork gaskets with care and be sure to place the door with the "left" lens on the left lamp and the "right" lens on the right lamp. Then check again the driving beams from the two lamps, one at a time.

The driving beam from the left headlamp should have the upper edge of the hot spot at the horizontal line and the left edge at the vertical line directly ahead of the lamp as shown in Fig. 47. The driving beam from the right headlamp should likewise have the upper edge of the hot spot at the horizontal line, but with the maximum intensity centered on the vertical line directly ahead of the lamp and the right cut-off of the hot spot about a foot to the right of this line as shown in Fig. 48.

No further aiming is required for the lower or passing beam.

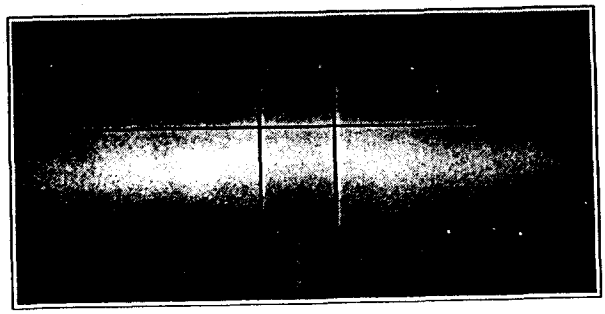


Fig. 49. Upper or driving beam from both headlamps

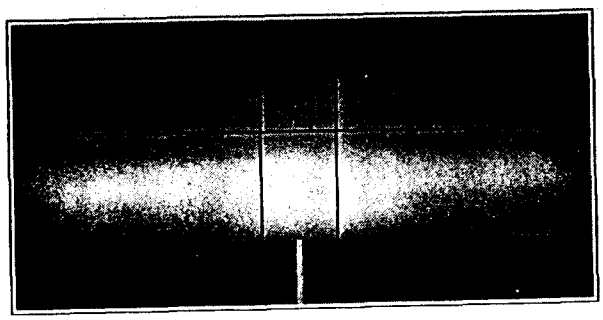


Fig. 51. Lower headlamp beam

Lubrication

Lubrication of the series "D" cars is similar to that of the corresponding "C" models with the exception of a few points. There are, however, several additional points for lubrication on the front wheel suspension system and the body stabilizer links. Lubrication of these parts should be made with chassis lubricant every 1000 miles.

Several lubrication points have also been eliminated on the rear springs. No lubrication is necessary at the front shackles and the upper shackle bolt at the rear end of these springs.

The same kind of lubricant should be used and the same mileage intervals should be observed in lubricating the new cars as for the "C" series.

Improved Alemite fittings are provided at the various points requiring pressure lubrication.

Springs and Shock Absorbers

The front spring and shock absorber equipment on the "D" series cars is entirely new.

Springs

The front springs are of the helical or coil type and are mounted between the frame and the lower suspension arms as shown in Figs. 1, 2 and 6.

The front springs have nothing to do except to spring the car. As a result they can be made as soft acting as desired; a contribution to riding comfort that cannot be obtained with the conventional type front springs. Neither does their springing action vary. This type spring also has the advantage of eliminating road vibration as any movement imparted to the bottom of the spring caused by slight inequalities in the road is absorbed and dies in the bottom coils of the spring and is not transferred to the frame. Large rubber bumpers are installed inside of the coil springs to cushion extreme movement and to assure proper riding comfort.

The riding quality of any car depends primarily upon two factors—the flexibility of the front and rear springs and the distribution of the masses of the car.

The front springs of conventional automobiles are made between two and three times stiffer than the rear springs. This greater stiffness is necessary because the front springs hold the front axle in place for steering stability. Thus, since the front springs are stiffer than the rear springs, the frequency or speed of the oscillations set up at the rear end of the conventional car are different from those at the front. It is this fight between the two ends of the car and not the action of the front or of the rear springs alone that contributes to an undesirable ride. The reduction in front spring stiffness also allows the front wheels to move up and down considerably without affecting the level of the frame and body.

The ride obtained by the new Cadillac cars has two revolutionary characteristics: the passengers are lifted much more gently when striking a heavier bump and the car is no longer pitched but moves slowly up and down on an even keel.

With the new type helical front springs, shackles have been eliminated at the front end and no lubrication is required.

The removal and installation of this type of spring are entirely different from that of the conventional elliptic springs. To remove one of these coil springs, it is necessary first to block up the frame just back of the front wheels as explained under "Front Wheel Suspension." Then the front wheel assembly is jacked up from the floor and the wheel removed. The threaded bolt is next removed from the upper end of the steering yoke,

which connects the shock absorber arm to this yoke. The wheel spindle and supporting yoke are then swung downward and the jack lowered sufficiently to release the spring. Installation of the spring may be accomplished by reversing the order of these operations.

The rear springs are of the conventional elliptic type, but have been redesigned to afford greater riding comfort. They are somewhat longer than the "C" series springs. Spring covers are used but no fittings are provided for lubricating the springs externally.

A feature of the rear springs is the rubber and asbestos composition strip between the eye or No. 1 leaf and the No. 2 leaf and the graphite bronze plates at the ends of the remaining leaves. The purpose of the composition strip is to dampen down the spring action by decreasing the liveliness of the spring and to serve as an antisqueak. The bronze plates in the ends of the other leaves are for the purpose of providing constant lubrication to prevent squeaks.

An important improvement has been made in the spring shackles. The front shackle of the rear springs is of the rubber bushing type, using but a single bolt necessitated by the use of the Hotchkiss type of drive. See Fig. 52. The rear shackles have rubber bushings at the upper bolt and a threaded metal bushing at the lower bolt as shown in Fig. 53.

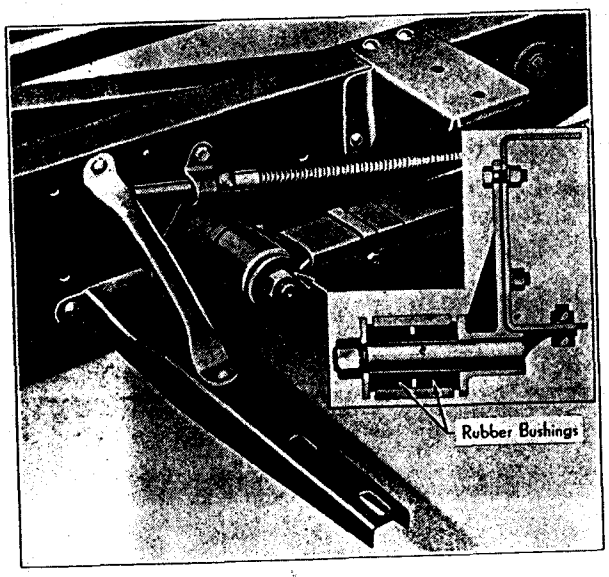


Fig. 52. The front shackle of the rear springs is of the rubber bushing type

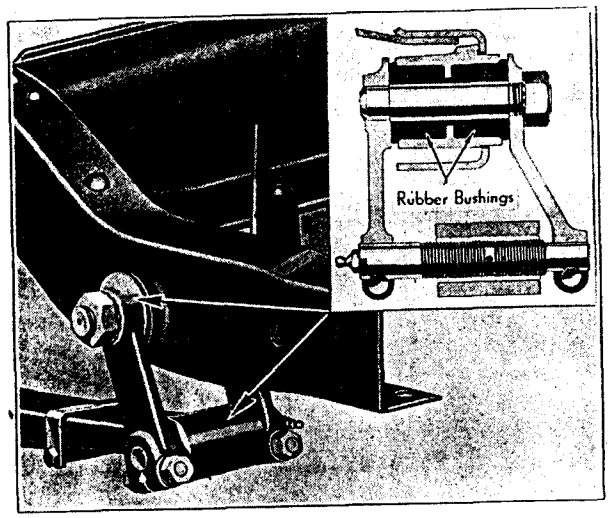


Fig. 53. The rear shackles of the rear springs have rubber bushings at the upper bolt and a threaded metal bushing at the lower bolt

The removal of the rear springs differs somewhat from that in the "C" series cars in that it is necessary to remove the front shackle bracket in order to remove the spring eye from the shackle bolt. This bracket is bolted to the frame and is accessible from underneath the car. It is also necessary to remove this bracket for replacement of the rubber bushings at the front end of the spring.

Jack Pads

To eliminate difficulty in changing tires, jack pads are conveniently placed at both the front and rear ends of the chassis. The front jack pad (Fig. 2) is part of and forged on the lower suspension arm. The rear jack pad is provided on the rear spring clip back of the axle housing.

Shock Absorbers

The shock absorbers are new. The front shock absorbers (Fig. 54) are of the newly improved double acting type and are actually built onto the frame as a structural part of the car. All shock absorbers are of the manual controlled type. The rear shock absorbers, have an additional inertia control feature as shown in Fig. 55, which automatically controls the rebound of the car at the rear.

The inertia valve also automatically compensates for changes in temperature due to the slower or retarded action of the weight in cold weather.

When the car is travelling over smooth roads, where there is very little movement to the frame and body, the inertia valve weight does not move and the shock absorbers function in the regular way.

When the car is travelling over rough roads the frame of the car moves down and the inertia valve weight also moves down but as the frame moves up on the rebound, the inertia weight, which is supported on a coil spring does not move up as fast as the spring, due to its inertia. This action closes the inertia slide valve which makes the rebound check valve inoperative and the compressed oil in the cylinder under this condition must pass through the main control valve.

The action of the shock absorbers, however, is regulated by a hook-up controlled through a lever mounted on the steering column the same as in the "C" series cars. Shock absorbers are alike on all "D" cars and are fully interchangeable with the exception of the valves which necessarily differ on the different models.

The upper suspension arms are a part of the front shock absorber assembly and are not supplied separately from the shock absorbers.

Adding fluid to the shock absorbers is the same as on the "C" series cars. Checking the fluid level in the shock absorbers is called for on the Lubrication Schedule every 6000 miles. Use only Delco Shock absorber fluid in the shock absorbers.

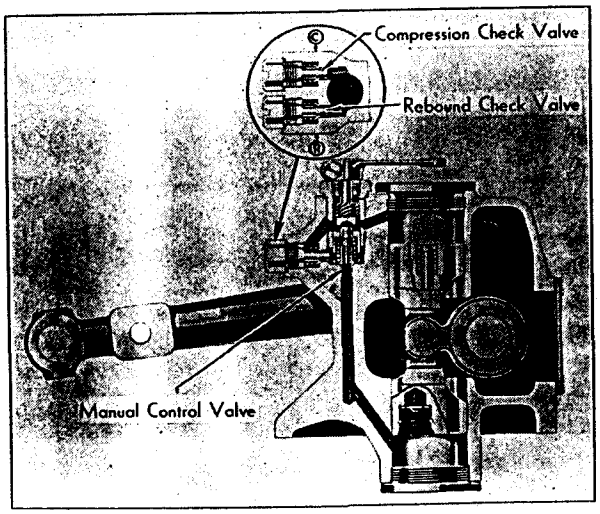


Fig. 54. Sectional view of the front shock absorber

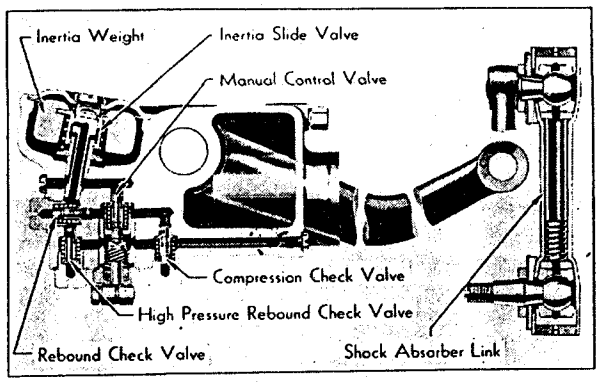


Fig. 55. Sectional view of the rear shock absorber

Body Stabilizer

Another feature which contributes to improved roadability is a new stabilizer bar at the rear of the car as shown in Fig. 56. This unit consists of a steel shaft which extends across the frame just back of the rear axle and is connected to the rear axle by levers and links. The purpose of this device is to oppose any tendency of the body to roll. When one side of the car tends to rise faster than the other, as happens when rounding corners, a twisting action takes place in the spring steel stabilizer bar which reacts to hold the body on an even keel.

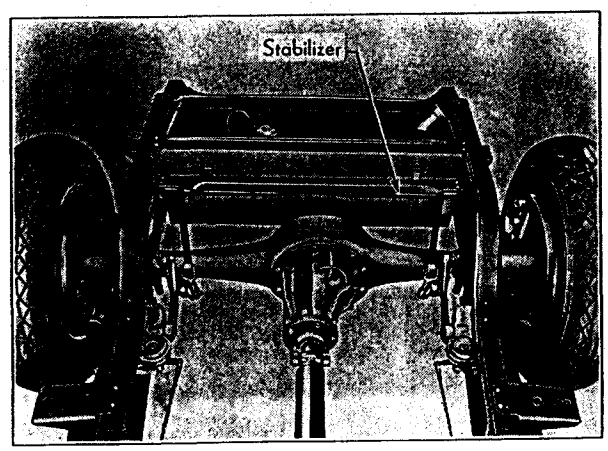


Fig. 56. The stabilizer opposes any tendency of the body to roll

LUBRICATION

Service Information

1. Extreme Pressure Lubricants for Rear Axle and Transmission

There are on the market gear lubricants known as extreme pressure lubricants which are designated by the letters "E.P." following their S.A.E. classification.

These lubricants have been developed for the lubrication of gears. Some of these lubricants should not be used in units that have bronze parts, as they produce an etching action on bronze and will cause it to corrode under severe conditions. Other "E.P." lubricants, however, have been developed that are satisfactory from the standpoint of corrosion.

As all Cadillac and LaSalle cars have bronze parts in the transmission and later cars have bronze thrust washers in the differential, extreme pressure lubricants should not be used unless approved by the Cadillac Motor Car Company.

2. Thinning Gear Lubricant with Kerosine

Gear lubricant for the transmission and differential need be thinned only at the beginning of cold weather if a sufficient quantity of kerosine is added to take care of the lowest expected temperature. The lubricant for the steering gear should not be thinned.

3. Special Items for Lubrication Schedule

The following items cannot be placed on the regular 1000-mile schedule, so they should be performed at the recommended intervals.

Every week—Check tire pressure; check level of liquid in radiator.

When cold weather starts—Replace lubricant in rear axle and transmission, except 452-D transmission, with lighter lubricants or thin the summer lubricant with kerosine.

The engine oil should be drained and replaced with lighter oil as specified or thinned with the proper amount of kerosine.

Flush radiator and add anti-freeze solution in proportions recommended in the Cooling System Section.

At beginning of warm weather—Drain light or thinned lubricant in rear axle, transmission (except 452-D transmission) and engine and replace with fresh lubricant of the proper viscosity for summer driving.

Every 6000 miles—Check level of special fluid in shock absorbers.

Clean carburetor air cleaner. This should be done more often when the car is driven continuously on dusty roads or when considerable dust is in the air.

Every 6000 miles—Remove plug at bottom of oil filter on Cadillac V-12 and V-16 cars and drain out sludge. This can be done on the car.

Every 12,000 miles—Remove and clean engine oil pan and screen.

1935

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Chassis high pressure fittings	G-10	G-10	G-10	G-10
Clutch release bearing and fork	.....	G-12	G-12	G-12
Engine—				
Capacity in quarts	7	8	9	10
Lubricant	.....	.....	.....	.....
See recommendations Page 145.				
Fan	.....	.....	.....	.....
350—Fan and water pump bearings, engine oil front and G-13 rear				
Rear Axle—				
Capacity in pounds	3	6	6	6
Lubricant recommended				
Summer	A-200	A-200	A-200	A-200
Winter	A-110	A-110	A-110	A-110
Fill to level of over-flow opening.				
Steering gear (lubricant recommended)	S-200	S-200	S-200	S-200
Transmission—				
Capacity in pounds	2½	4½	4½	4½
Lubricant recommended				
Summer (except 452-D transmission)	A-200	A-200	A-200	.....
Winter (except 452-D transmission)	A-110	A-110	A-110	.....
452-D Transmission—year round	.....	.....	.....	A-0200
Fill to level of over-flow opening.				
Water pump	G-13	G-13	G-13	G-13
Wheel bearings	G-12	G-12	G-12	G-12

LUBRICATION—SPRINGS AND SHOCK ABSORBERS

Specifications

Lubricants

	G. M. Grade No.	Std. Dept. No.
Chassis lubricant (grease for pressure fittings)	G-10	4640-M
Transmission and rear axle lubricant—	A-200	4510-M
	A-110	4519-M
	A-0200	4593-M
Steering gear lubricant	S-200	4641-M
Water pump grease	G-13	4614-M
Wheel and clutch release bearing lubricant	G-12	4613-M

Engine Oils

Type of Service	Summer	Winter	
	All Temperatures Above 32°	Between 32° and 0° Fahrenheit	Between 0° and 15° Below
Moderate Driving	S.A.E. Visc. 30	20-W	10-W
	These oils are not suitable for prolonged high speed driving and if used under such conditions the oil level must be closely watched, as the rate of consumption will be higher than with heavier oils.		
High Speed Driving	**"Heavy Duty" Oils** Oils having an S. A. E. viscosity of 40-50-60 will show lower oil consumption for prolonged high speed driving than the lighter oils which afford easy starting. Some of these heavy oils demonstrate greater fitness for extreme high speed, due to their meeting certain specifications as to volatility. To make certain of using an oil suitable for this service, consult your Cadillac dealer. Heavy duty oils vary in their suitability for winter use. If a heavy duty oil with sufficiently low cold viscosity is not available and if the car is not kept in a heated garage, the lighter oils specified above for moderate driving must be used to avoid hard starting. In this case, be sure to watch the oil level closely as cautioned above.		

SPRINGS AND SHOCK ABSORBERS

General Description

The spring and shock absorber equipment is very much alike on both Cadillac and LaSalle cars with the exception of the size and shackling of the springs and the use of shock absorber control on the Cadillac models.

SPRINGS

The front springs are of the helical or coil type, while the rear springs are of the semi-elliptic type.

The front springs are mounted between the frame and the lower suspension arms. They have nothing to do except to spring the car as they are not depended upon to absorb the steering and braking stresses. As a result, they can be made as soft-acting as desired for riding comfort. Large rubber bumpers are installed inside of the coil springs to cushion extreme movement and to assure proper riding comfort.

The rear springs have a rubber and asbestos composition strip between the eye or No. 1 leaf and the No. 2 leaf and graphite bronze plates at the ends of the remaining leaves on the Cadillac cars and between the Nos. 2, 3 and 4 leaves on the LaSalle. The purpose of the composition strip is to dampen the spring action by decreasing the liveliness of the spring and to serve as an anti-squeak. The bronze plates in the ends of the other leaves are for the purpose of providing constant lubrication to prevent squeaks.

Rubber pads are also used between the rear springs and the spring perches on the axle housing on LaSalle cars to insulate against noises.

Spring covers are used on the rear springs. Pressure fittings are not provided for lubricating the springs as external lubrication is not required.

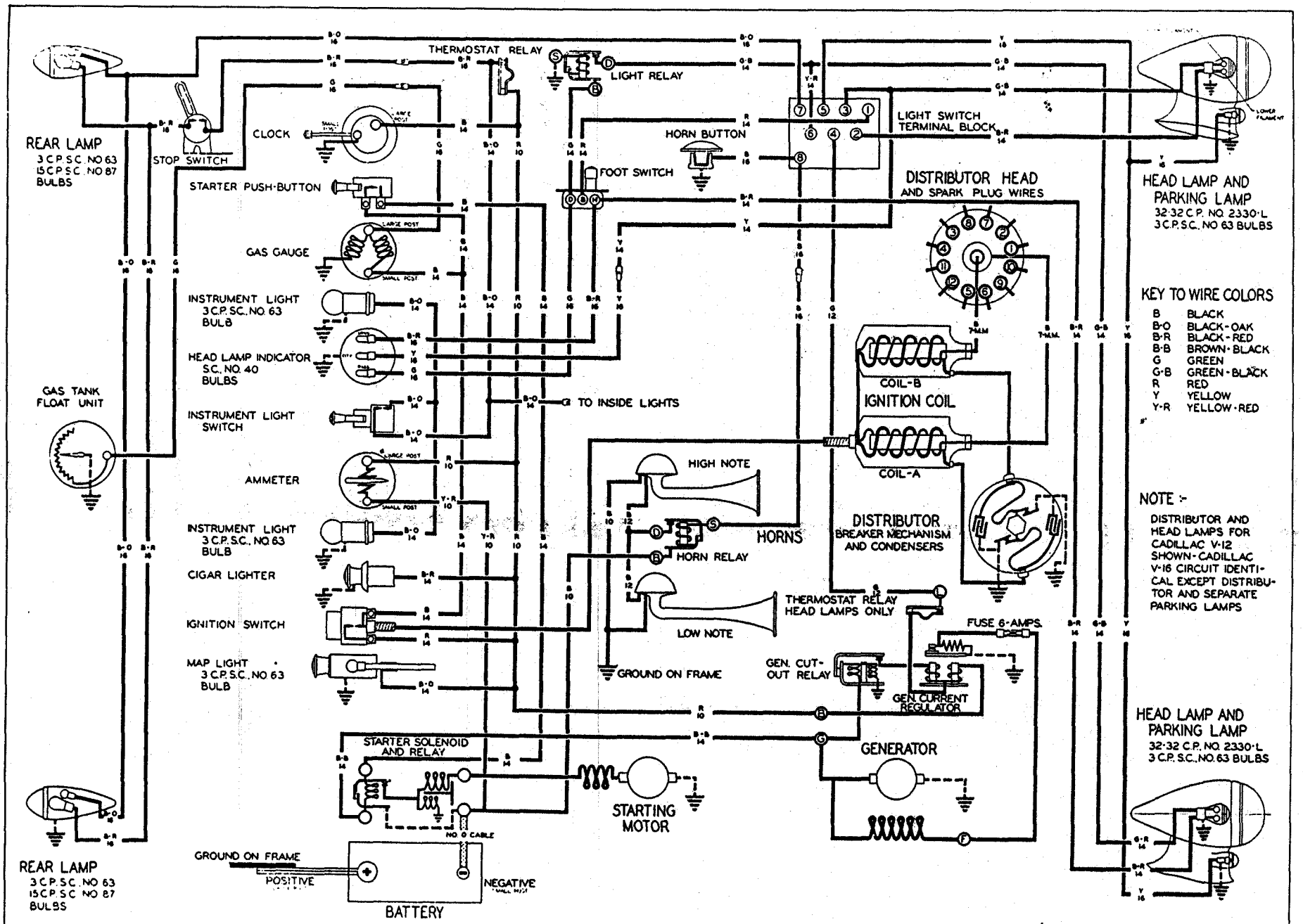
Lubrication Schedule

Cadillac and LaSalle

DO NOT WAIT FOR SCHEDULE LUBRICATIONS BEFORE ADDING ENGINE OIL. THE OIL LEVEL SHOULD BE CHECKED EVERY 100 TO 150 MILES AND OIL ADDED IF THE INDICATOR SHOWS BELOW "FULL." THIS IS ESPECIALLY IMPORTANT ON CARS DRIVEN AT HIGH SPEEDS.					LUBRICANT	LUBRICATION NO. AND MILEAGE AT WHICH DUE											
						1	2	3	4	5	6	7	8	9	10	11	12
						1000	2000	3000	4000	5000	6000	7000	8000	8000	10000	11000	12000
LUBRICATION NOS. 6 AND 12	LUBRICATION NOS. 3 AND 9	LUBRICATION NOS. 2, 4, 8 AND 10	LUBRICATION NOS. 1, 5, 7 AND 11	ADD LIQUID TO RADIATOR	WATER OR ANTI-FREEZE	O	O	O	O	O	O	O	O	O	O	O	O
				ADD ENGINE OIL AS NECESSARY	ENGINE OIL	O		O		O		O		O		O	
				STARTER AND GENERATOR	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
				DISTRIBUTOR OIL CUPS ON CADILLAC FAN OIL CUP ON LASALLE	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
				BRAKE AND RIDE REGULATOR PINS AND CONNECTIONS ON CADILLAC	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
				HAND BRAKE AND CLUTCH RELEASE CONNECTIONS ON LASALLE	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
				ACCELERATOR AND CHOKE SHAFTS	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
				DOOR HARDWARE (USE VASELINE ON STRIKER PLATES AND WEDGES)	LIGHT OIL	O	O	O	O	O	O	O	O	O	O	O	O
				GREASE GUN CONNECTIONS	CHASSIS LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
				DISTRIBUTOR GREASE CUP ON LASALLE	WHEEL BEARING LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
				CLUTCH RELEASE FORK ON CADILLAC	WHEEL BEARING LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
				WATER PUMP	WATER PUMP LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
				*ADD WATER TO STORAGE BATTERY	DISTILLED WATER	O	O	O	O	O	O	O	O	O	O	O	O
				CHECK TIRE INFLATION		O	O	O	O	O	O	O	O	O	O	O	O
			DRAIN AND REPLACE ENGINE OIL		ENGINE OIL		O		O		O		O		O		O
			CLUTCH RELEASE BEARING ON CADILLAC		WHEEL BEARING LUBRICANT		O		O		O		O		O		O
		†TRANSMISSION—ADD LUBRICANT			TRANSMISSION LUBRICANT			O			O			O			O
		†REAR AXLE—ADD LUBRICANT			REAR AXLE LUBRICANT			O			O			O			O
		STEERING GEAR—ADD LUBRICANT			STEERING GEAR LUBRICANT			O			O			O			O
	BRAKE ASSISTER ON CADILLAC				SPECIAL FLUID						O						O
	FRONT WHEEL BEARINGS—ALSO REAR WHEEL BEARINGS ON LASALLE				WHEEL BEARING LUBRICANT						O						O
	UNIVERSAL JOINTS ON CADILLAC				CHASSIS LUBRICANT						O						O
	SPEEDOMETER DRIVE SHAFT				CHASSIS LUBRICANT						O						O
	DRAIN OIL FILTER—370-D—452-D										O						O
**SHOCK ABSORBERS—ADD FLUID					SPECIAL FLUID						O						O
**CLEAN CARBURETOR AIR CLEANERS											O						O
**FLUSH COOLING SYSTEM AND ADD RUST PREVENTIVE											O						O
**CLEAN OIL PAN AND SCREEN						EVERY 12,000 MILES											

*IN SUMMER INSPECT BATTERY EVERY 500 MILES OR AT LEAST EVERY 2 WEEKS.
**RECOMMENDED BUT NOT INCLUDED IN LUBRICATIONS 6 AND 12.
†CHANGE REAR AXLE AND TRANSMISSION LUBRICANT (UNLESS SPECIAL ALL-YEAR LUBRICANT IS USED)—AS REQUIRED FOR LOW TEMPERATURES IN FALL OR WINTER AND AT BEGINNING OF MILD WEATHER IN SPRING.

Plate 51. Lubrication Schedule



Cadillac 370-D wiring diagram. The 452-D wiring is the same except for the number of spark plug wires

Condensed Specifications

CADILLAC V-8 SERIES 10 AND 20

ENGINE—Eight cylinders, V-type L-head valve arrangement. Bore, 3⅜"; stroke, 4 15/16". Piston displacement, 353 cubic inches. Maximum brake horsepower, 130 at 3400 r.p.m. Standard compression ratio, 6.25 to 1.

PISTONS—Lo-Ex aluminum alloy, anodized.

FUEL—Gasoline tank capacity, 22 gallons.

COOLING—Radiator shutter control thermostatic.

BATTERY—Ampere hour capacity, 130.

STARTING MOTOR—Solenoid operated, double reduction gears. Push-button automatic starting device.

GENERATOR—Air-cooled, current controlled.

CLUTCH—Three clutch driving discs, two clutch driven discs. Dry operating.

TRANSMISSION—Triple silent Syncro-Mesh; constant mesh helical gears, ground and lapped.

REAR AXLE—Three-quarter floating; spiral bevel final gearing. Standard gear ratio, 4.60 to 1; optional, 4.36 and 4.80 to 1.

TIRES—Size, 7.00 x 17, 6 ply.

SPRINGS—Independent front suspension. Helical type front springs. Semi-elliptic type rear springs.

STEERING—Worm and double roller steering gear.

BRAKES—Mechanical articulated shoe type with vacuum booster. Cast-iron brakedrums.

FRAME—Wheelbase, Series 10, 128 inches; Series 20, 136 inches. Front tread, 59⅜ inches; rear tread, 62 inches. Over-all length, bumper to bumper, Series 10, 205 inches; Series 20, 213 inches.

The 1935 CADILLAC V-EIGHT

The Cadillac Line *for* 1935

Body Styles and Prices (List F.O.B. Factory)

SERIES 10 CADILLAC V-8 FISHER BODIES

Body Style	*List Price*
5-Passenger Convertible Sedan	$2755
2-Passenger Convertible Coupe	2445
2-Passenger Coupe	2345
5-Passenger Town Coupe	2495
5-Passenger Town Sedan	2495
5-Passenger Sedan	2445

SERIES 20 CADILLAC V-8 FISHER BODIES

Body Style	*List Price*
5-Passenger Convertible Sedan	$2955
2-Passenger Convertible Coupe	2645
2-Passenger Coupe	2545
5-Passenger Town Sedan	2695
5-Passenger Sedan	2645
7-Passenger Sedan	2795
7-Passenger Imperial	2945

CADILLAC FLEETWOOD BODIES (With straight front windshield)

Body Style	*V-8 List Price*	*V-12 List Price*	*V-16 List Price*
5-Passenger Town Sedan	$3345	$4045	$6800
5-Passenger Sedan	3295	3995	6750
5-Passenger Imperial Cabriolet	3695	4395	7150
7-Passenger Sedan	3445	4145	6900
7-Passenger Limousine	3645	4345	7100
7-Passenger Imperial Cabriolet	3845	4545	7300

CADILLAC SPECIAL FLEETWOOD BODIES (With V-type front windshield)

Body Style	*V-8 List Price*	*V-12 List Price*	*V-16 List Price*
5-Passenger Convertible Imp. Sedan	$4295	$4995	$7950
2-Passenger Convertible Coupe	4045	4745	7700
2-Passenger Coupe	3895	4595	7550
Special 5-Passenger Town Sedan	3795	4495	7450
Special 5-Passenger Sedan	3745	4445	7400
Special 5-Passenger Imp. Cabriolet	4145	4845	7800
Special 7-Passenger Sedan	3895	4595	7550
Special 7-Passenger Limousine	4095	4795	7750
Special 7-Passenger Imp. Cabriolet	4295	4995	7950
5-Passenger Town Cabriolet	5495	6195	8950
7-Passenger Town Cabriolet	5595	6295	9050
7-Passenger Limousine Brougham	5495	6195	8950

Optional and Extra Equipment

The following options and extra equipment are available at the extra f. o. b. factory price listed below:

WHEELS

CADILLAC V-8 SERIES 10 AND 20—Standard Equipment—5 wire wheels with extra wheel mounted on carrier at rear (outside).

Optional Equipment—(at additional cost) 6 wire wheels with extra 2 wheels and tires carried in fenderwells.

Chromium finish trim rings available for wire wheels at $1.50 list per wheel.

NOTE—Cadillac Series 10 and 20 Convertible Sedans are built with fenderwell equipment only.

CADILLAC V-8 AND V-12 FLEETWOOD—Standard Equipment—5 wire wheels with extra wheel carried in compartment at rear (inside).

Optional Equipment—(at additional cost) 6 wire wheels with 2 extra wheels and tires carried in fenderwells.

Wheel discs are available at extra cost for all Cadillac V-8 and V-12.

Wood wheels are not available.

WHEEL FINISH

CADILLAC—Each standard color combination has a standard wheel color. Any other single durable color (except opalescent) may be specified without extra charge, but such orders are not subject to cancellation after order has been started in production.

COLOR

CADILLAC—9 Standard color options.

Or any single durable color may be had without extra cost, subject to the usual delay for special color and such orders are not subject to cancellation after order has been started in production.

Opalescent Finish—Available at extra charge and not subject to cancellation after order has been started in production.

Fenders—Standard practice is to finish in same color as body panels. Black may be specified without extra charge but subject to delay.

UPHOLSTERY MATERIALS

CADILLAC V-8 SERIES 10 AND 12—For closed bodies—1 broadcloth, 2 basket weaves and 3 whipcords.

For convertible bodies—3 whipcords and 4 leathers.

CADILLAC V-8 AND V-12 FLEETWOOD—For closed bodies—6 broadcloths and 4 whipcords.

For convertible bodies—4 whipcords and 4 leathers.

Special upholstery materials may be specified at extra charge subject to delay in procuring the required material.

MISCELLANEOUS

RADIATOR SHELL AND LAMPS—Standard practice is to finish same color as body. Chromium plated optional at extra charge except on V-16.

MONOGRAMS—3/8" three-letter block monogram in any color except silver or gold leaf—$10.00 list and net.

TIRES—Cadillac—Firestone, Goodyear or U. S. Royal. Black side wall.

GEAR RATIO—Cadillac V-8 Series 10 and 20—4.36 or 4.60.

Cadillac V-8 and V-12 Fleetwood—4.60 or 4.80.

Cadillac V-16—4.31 or 4.64.

Color and Upholstery Options

STANDARD COLORS

Nine attractive color combinations have been selected for the 1935 Cadillacs. Other colors may be specified without extra charge, but subject to some delay in bringing the cars through production.

The design of the new Cadillac is such that single color application is imperative, there being no mouldings to definitely establish the application of two-tone colors to the car.

Combination No. 61
Body and fenders—Black
Wheels—Black
Wheel Options—Red or Green

Combination No. 62
Body and Fenders—Classic Blue
Wheels—Classic Blue

Combination No. 63
Body and Fenders—Marshall Maroon
Wheels—Vincennes Red

Combination No. 64
Body and Fenders—Thessalon Green
Wheels—Ski Green

Combination No. 65
Body and Fenders—Clio Brown Dark
Wheels—Lamar Tan

Combination No. 67
Body and Fenders—Parkdale Blue
Wheels—Freedom Blue

Combination No. 69
Body and Fenders—Huron Green
Wheels—Ski Green

Combination No. 70
Body and Fenders—Gettysburg Blue
Wheels—Blue Devil Blue Light

Combination No. 72
Body and Fenders—Normandy Gray Dark
Wheels—Pyrenees Blue

UPHOLSTERY OPTIONS

For 1935 Cadillac has added several new fabrics and color shades to its already wide range of upholstery options. In the closed bodies Fisher offers a selection of six fabrics and Fleetwood eleven. There are seven offerings for Fisher convertible models and eight for Fleetwood.

FISHER BODIES
(Series 10 and 20)

Closed Body Styles

2-T 134—Brown Broadcloth
19-T 134—Brown Whipcord
37-T 134—Tan Whipcord
20-T 134—Gray Whipcord
21-T 135—Brown Basket Weave
23-T 135—Gray Basket Weave

Convertible Body Styles

1-T 1334—Black Leather
2-T 1334—Tan Leather
3-T 1334—Gray Leather
6-T 1334—Green Leather
19-T 134—Brown Whipcord
20-T 134—Gray Whipcord
37-T 134—Tan Whipcord

FLEETWOOD CUSTOM BODIES
(Series 30, 40 and 60)

Closed Body Styles

Wiese 4305—Brown Vogue Weave Broadcloth
Wiese 4308—Brown Plain Broadcloth
Wiese 4570—Tan Demi-Corde
Wiese 4571—Tan Plain Broadcloth
Wiese 4540—Taupe Whipcord
Wiese 4307—Gray Vogue Weave Broadcloth
Wiese 4310—Gray Plain Broadcloth
Wiese 4537—Gray Heather Broadcloth
Wiese 4567—Gray Grenelure Broadcloth
Wiese 4569—Gray Demi-Corde
Wiese 4541—Gray Whipcord

Convertible Body Styles

Eagle Ottawa No. 814—Black
Eagle Ottawa No. 815—Tan
Eagle Ottawa No. 816—Green
Eagle Ottawa No. 817—Gray
Wiese 4540—Taupe Whipcord
Wiese 4541—Gray Whipcord
Wiese 4569—Gray Demi-Corde
Wiese 4570—Tan Demi-Corde

NOTE: *For complete information and details on Fleetwood Custom Bodies on V-8, V-12 and V-16, see Book of Fleetwood or Fleetwood Custom Bodies Section of Sales Kit*

CADILLAC 1935 BODY STYLES

The 1935 Cadillac Body Program consists of

CADILLAC V-8

Series 10—128" W.B.—6 Fisher Body Styles
Series 20—136" W.B.—7 Fisher Body Styles
Fleetwood Custom—146" W. B. { 6 Fleetwood Custom Bodies (Straight Front Windshield) / 12 Fleetwood Custom Bodies (V-type Front Windshield)

CADILLAC V-12

Fleetwood Custom—146" W.B. { 6 Fleetwood Custom Bodies (Straight Front Windshield) / 12 Fleetwood Custom Bodies (V-type Front Windshield)

CADILLAC V-16

Fleetwood Custom—154" W.B. { 6 Fleetwood Custom Bodies (Straight Front Windshield) / 12 Fleetwood Custom Bodies (V-type Front Windshield)

SERIES 10 CADILLAC V-8 FISHER BODIES

5 Passenger Convertible Sedan
2 Passenger Convertible Coupe
2 Passenger Coupe
5 Passenger Town Coupe
5 Passenger Town Sedan
5 Passenger Sedan

SERIES 20 CADILLAC V-8 FISHER BODIES

5 Passenger Convertible Sedan
2 Passenger Convertible Coupe
2 Passenger Coupe
5 Passenger Town Sedan
5 Passenger Sedan
7 Passenger Sedan
7 Passenger Imperial

CADILLAC FLEETWOOD BODIES

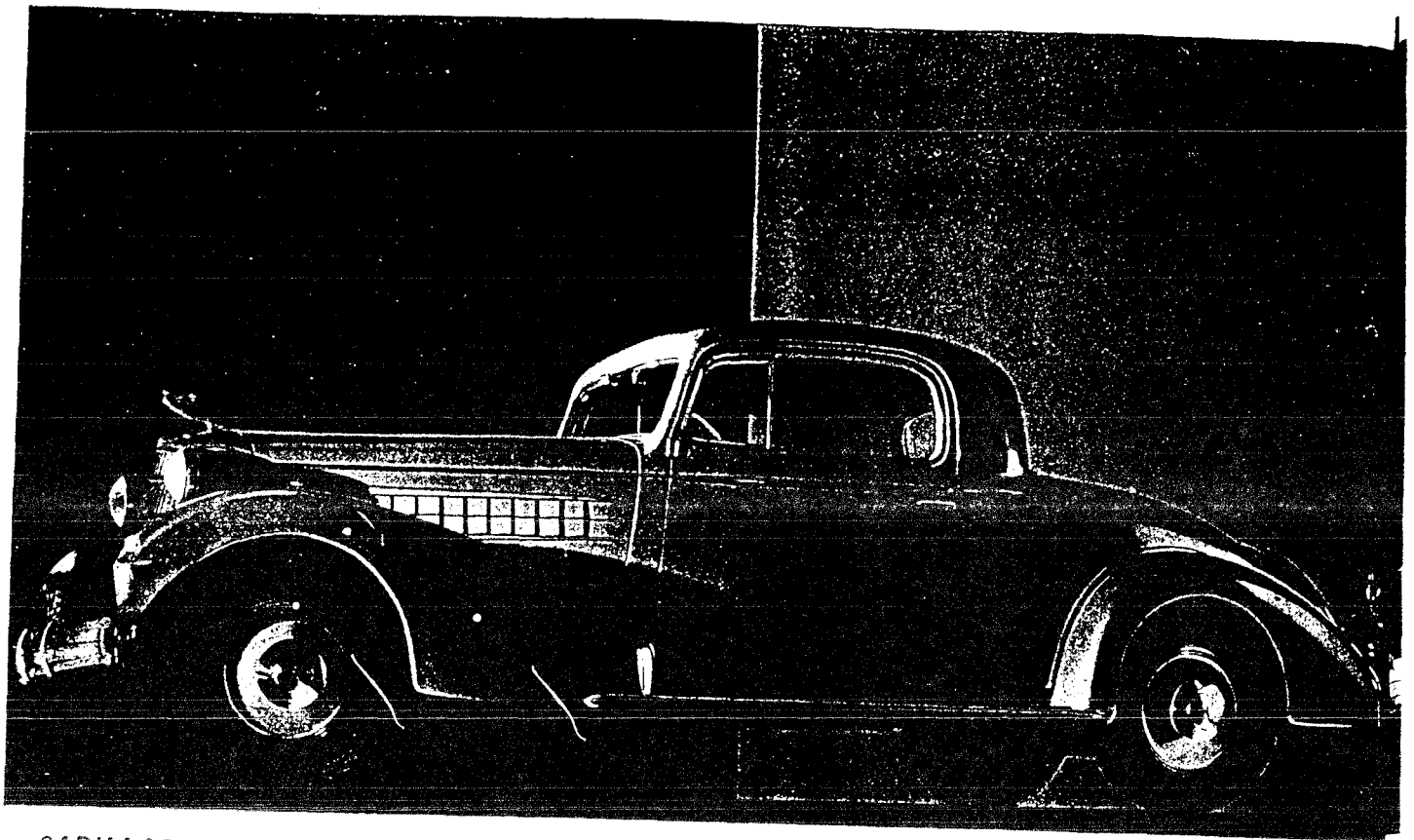
Straight Front Windshield
V-8, V-12 and V-16

5 Passenger Town Sedan
5 Passenger Sedan
5 Passenger Imperial Cabriolet
7 Passenger Sedan
7 Passenger Imperial
7 Passenger Imperial Cabriolet

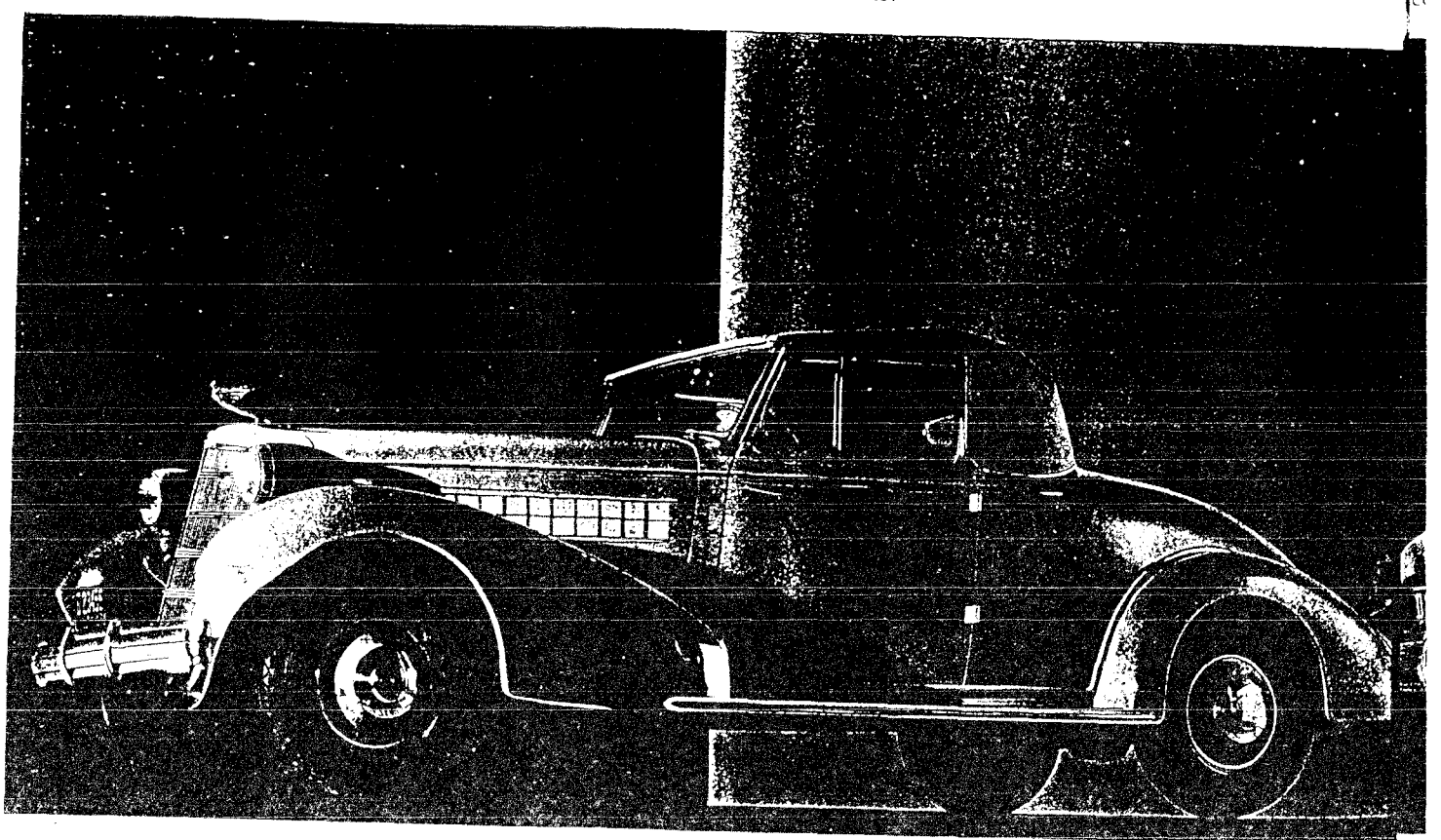
V-Type Front Windshield
V-8, V-12 and V-16

5 Passenger Convertible Imperial Sedan
2 Passenger Convertible Coupe
2 Passenger Coupe
Special 5 Passenger Town Sedan
Special 5 Passenger Sedan
Special 5 Passenger Imperial Cabriolet
Special 7 Passenger Sedan
Special 7 Passenger Limousine
Special 7 Passenger Imperial Cabriolet
5 Passenger Town Cabriolet
7 Passenger Town Cabriolet
7 Passenger Limousine Brougham

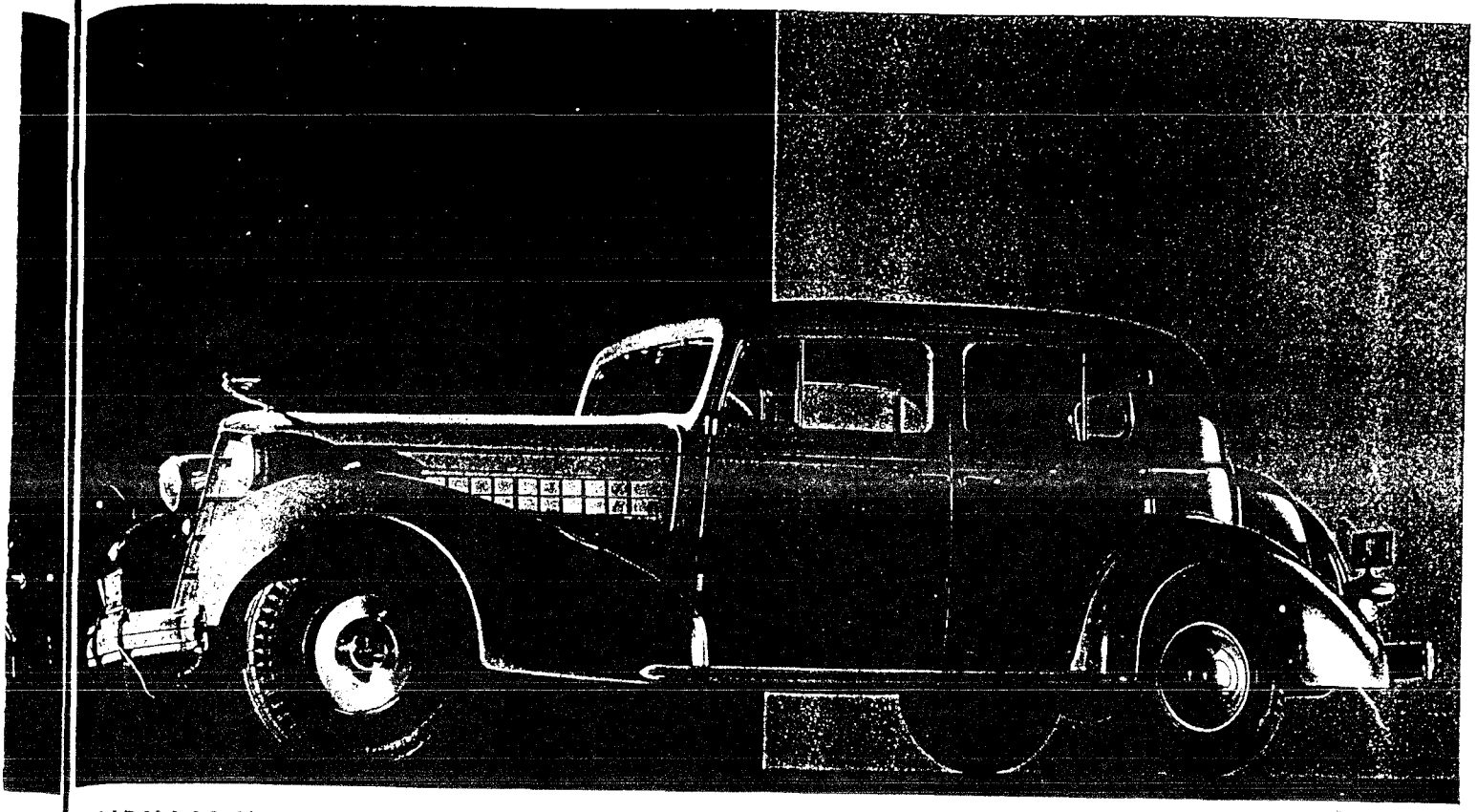
NOTE: For complete information and details on Fleetwood Custom Bodies on V-8, V-12 and V-16 see Book of Fleetwood or Fleetwood Custom Bodies Section of Sales Kit.



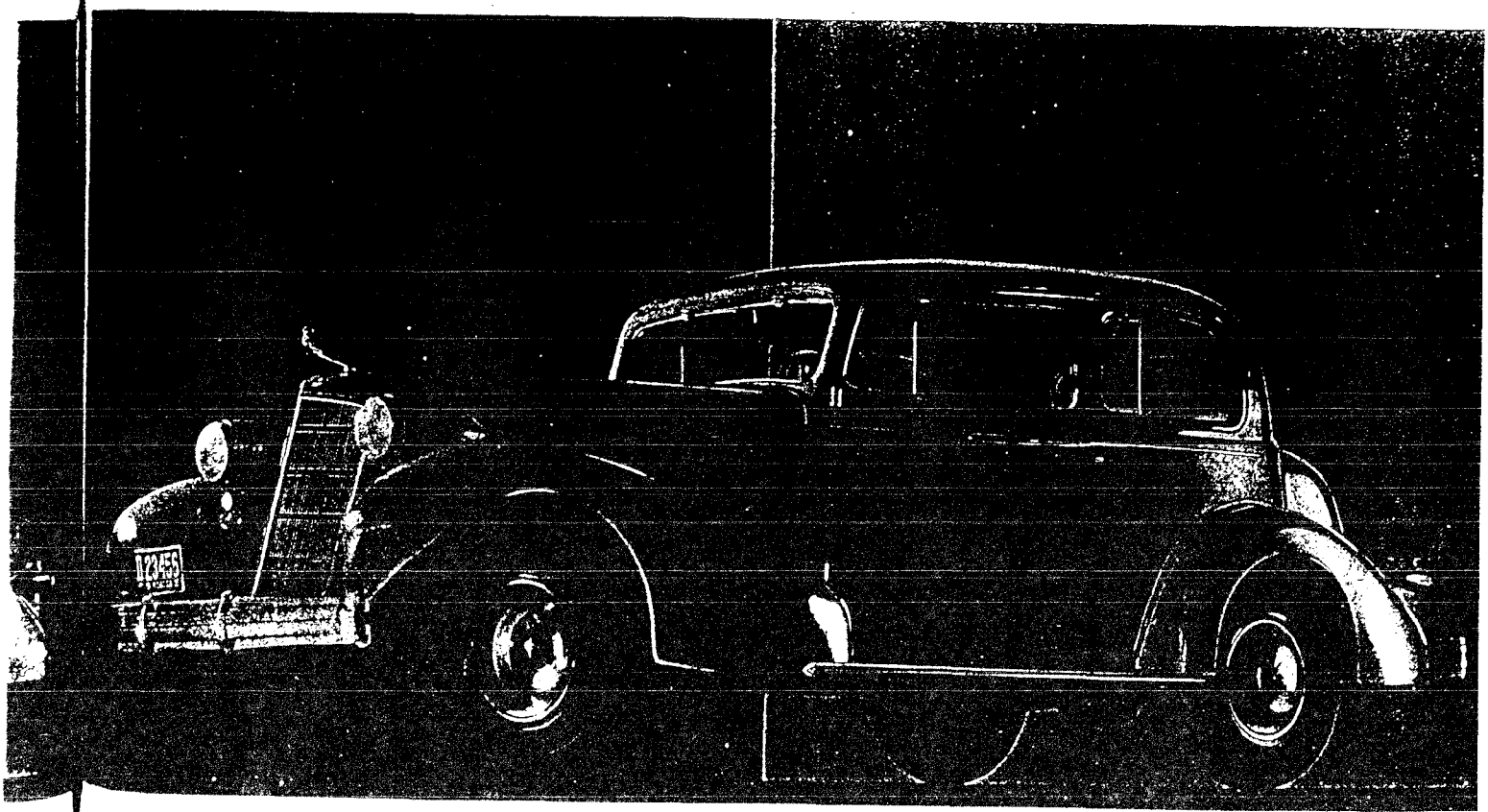
CADILLAC V-8 2-PASSENGER COUPE—The Cadillac Coupe is greatly favored by women, by doctors and oth professional men and by business men. This sleek Coupe captures all the smart exclusiveness of this body style. T driver's seat adjusts instantly for individual comfort. Appointments are rich, and the Fisher No-Draft Ventilati shields driver and passenger alike from unfavorable weather and drafts.



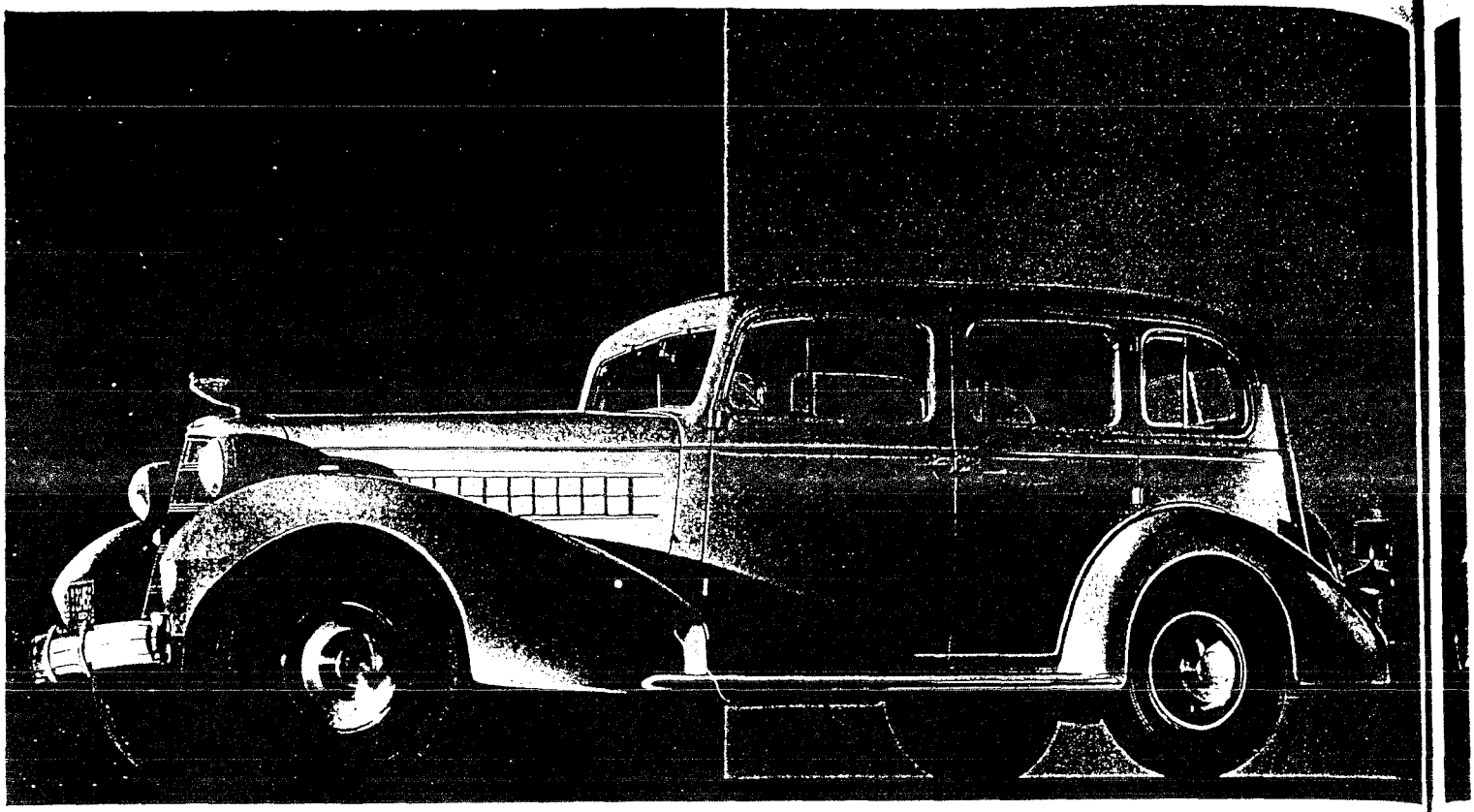
CADILLAC V-8 2-PASSENGER CONVERTIBLE COUPE—Coupe and Roadster in one in the ultra sm Cadillac 2-passenger Convertible Coupe, available on the Series 10 chassis as well as the series 20. As a Coupe, the weather insulation of a permanently closed car is afforded by the thoroughness of Fisher design and constructio The rumble seat provides richly cushioned comfort for two additional passengers.



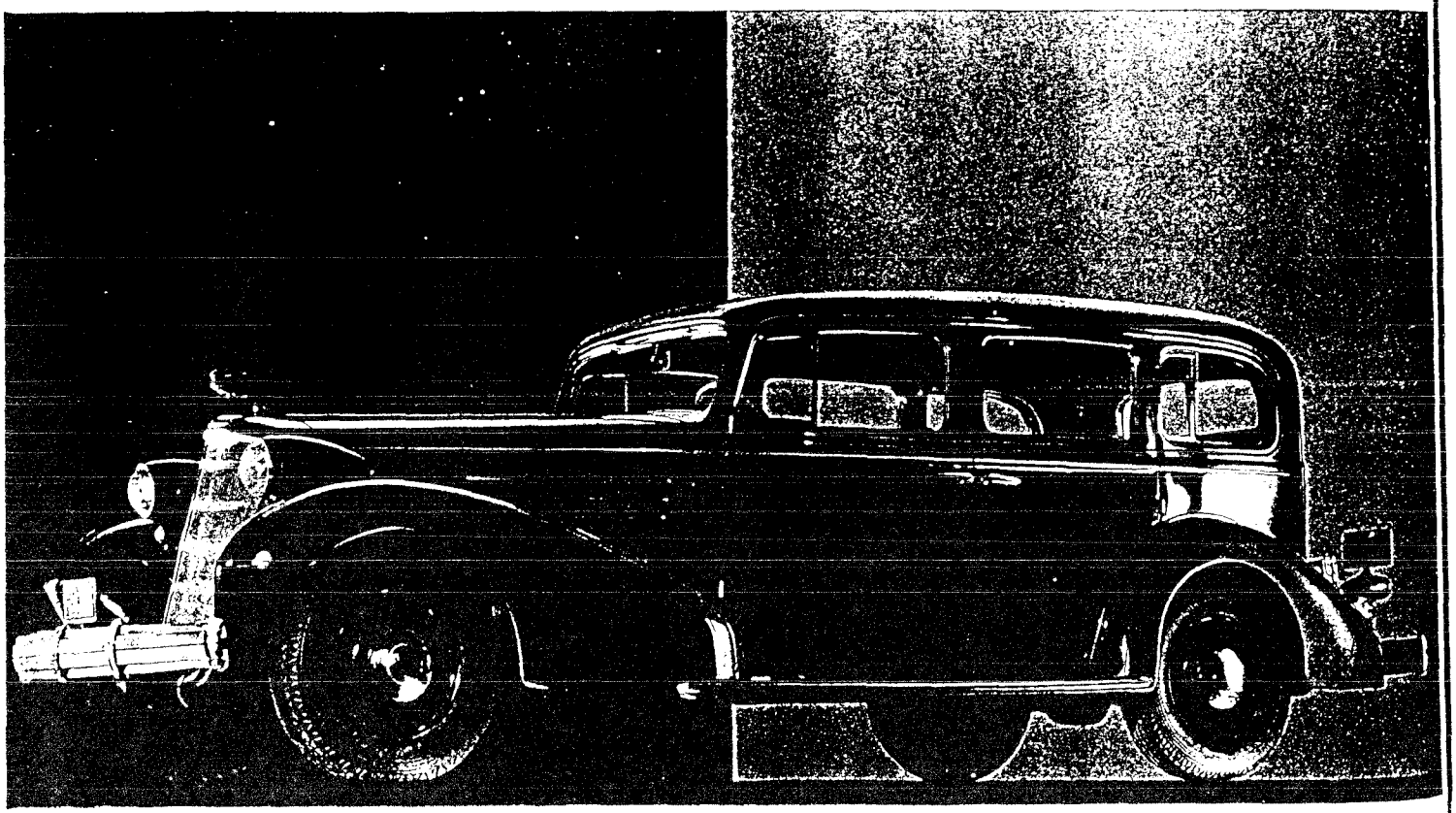
CADILLAC V-8 5-PASSENGER TOWN SEDAN—Many buyers choose the Cadillac 5-Passenger Town Sedan for its ultra smart style. Those who tour extensively are pleased particularly by the unusually large built-in trunk. Fisher No-Draft Ventilation protects all five passengers from chilling gusts of air, and Knee-Action Wheels give the finest of comfortable and safe riding performance.



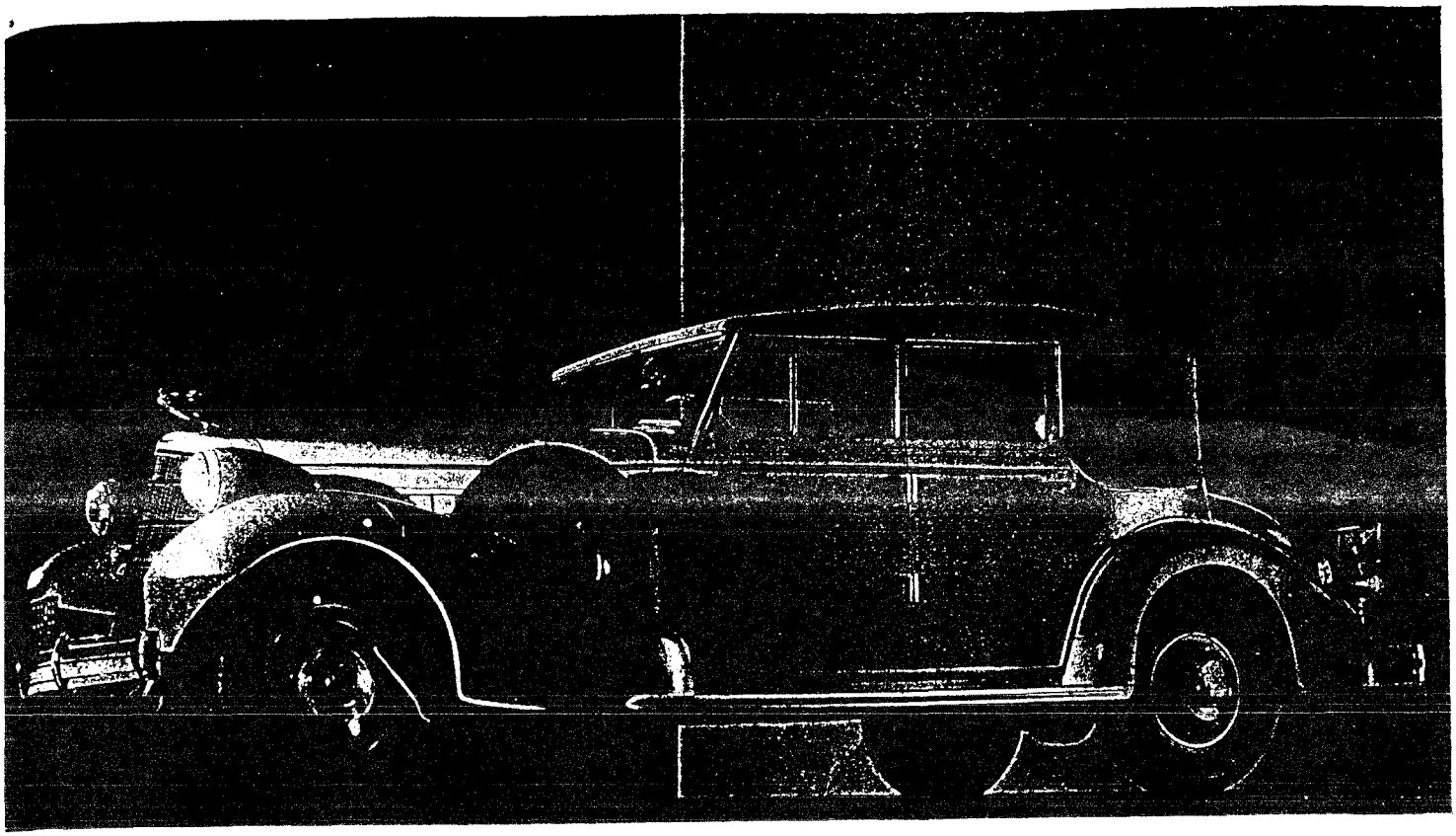
CADILLAC V-8 5-PASSENGER TOWN COUPE—In elegance and luxury, the dignified Cadillac Town Coupe approaches *fine custom creation. Five* may ride in pleasant intimacy, yet with complete comfort. Designers have given this car the distinction of beautiful, long, flowing lines. The built-in trunk is extra large. Knee-Action Wheels give the car steadiness and unusual riding ease.



CADILLAC V-8 5-PASSENGER SEDAN—Widely favored as a family car, the 5-Passenger Sedan is richly commodious, fitted and equipped as becomes Cadillac. Seats are wide, deep, soft and shaped at the most restful angle. As in every new Cadillac, riding qualities are the finest in motoring. Knee-Action wheels contribute a smooth, level riding ease, and No-Draft Ventilation provides individual ventilating selections without annoyance to others.



CADILLAC V-8 7-PASSENGER SEDAN—In beauty and elegance, the 7-Passenger Imperial and the 7-Passenger Sedan are identical. Between the front and rear compartments of the Imperial, a division glass raises to the roof and lowers flush with the body division. Seating, head room and leg room, even with seven passengers, are most generous. Extra passengers have auxiliary seats which are unusually wide and deeply upholstered.



THE CADILLAC V-8, 5-PASSENGER CONVERTIBLE SEDAN—One of the smartest Cadillac models is the 1935 Convertible Sedan. With top down, it becomes a dashing sports car for days that are warm; with top in place it is a comfortable, weatherproof sedan. Four colors in leather and three patterns in whipcord are available for upholstery choice. Disc wheel-covers are offered at small extra cost.

CADILLAC
OPERATOR'S MANUAL



CADILLAC
OPERATOR'S MANUAL



EDITION NO. 355-370-D

In ordering a duplicate of this Manual specify the above number and the engine number of the car.

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CHAPTER I

CADILLAC SERVICE

THE OWNER of a Cadillac motor car has purchased a fine piece of machinery to serve him as a pleasant and dependable means of transportation. The Cadillac provides this means; pleasant because of its fine performance, comfort and ease of control; dependable because of the care with which it was built and because of Cadillac Service, which operates on a standard policy, guaranteeing the owner efficient service everywhere at standard prices under factory regulation.

Cadillac-La Salle Service Stations

Cadillac Service is available wherever Cadillac and La Salle cars are sold. Service stations conducted by Cadillac distributors and dealers are designated as "Authorized Cadillac-La Salle Service Stations," and are identified by the exclusive sign shown on this page. Wherever this sign is displayed, the owner will find an organization prepared to service Cadillac cars. This means proper equipment, factory-trained personnel, a stock of genuine replacement parts and standardized policies and methods.

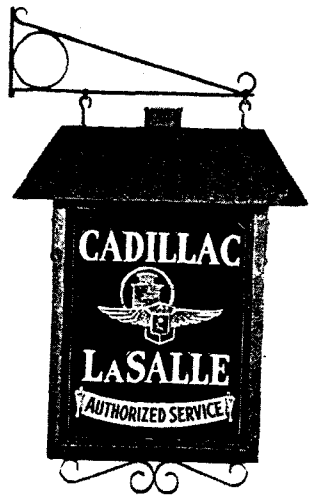

Fig. 1. Authorized Cadillac-La Salle Service Stations display this sign at the service entrance.

The car owner's first and most frequent contact with Cadillac Service naturally will be in the service station of the distributor or dealer who sold him the car and who therefore has the greatest interest at stake in assuring him satisfaction. Cadillac Service is so organized, however, that the owner may feel perfectly free to use his car for extended travel, secure in the knowledge that other Authorized Cadillac-La Salle Service Stations are able and willing to offer the same service benefits to which he is entitled at his local service station.

As an aid to touring owners, Authorized Service Stations are listed under the Cadillac-La Salle trademark in the classified telephone directories of most of the larger cities.

Identification Card

As a means of introduction at other Authorized Cadillac-La Salle Service Stations, every purchaser of a Cadillac car is given credentials in the form of an Identification Card. This card is mailed to the owner by the Cadillac Motor Car Company as soon as delivery of the car is reported by the distributor or dealer. It is supplied in a celluloid case and is intended to be carried in a holder on the car. This holder is located under the cowl in the driving compartment on the right-hand side of the car as shown in figure 3.

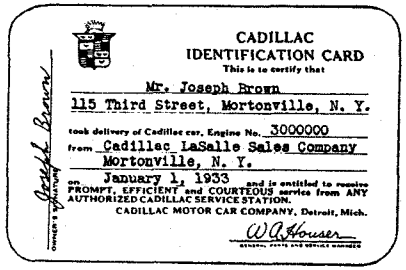
CADILLAC
IDENTIFICATION CARD
This is to certify that
Mr. Joseph Brown
115 Third Street, Mortonville, N. Y.
took delivery of Cadillac car, Engine No. 3000000
from Cadillac LaSalle Sales Company
Mortonville, N. Y.
on January 1, 1933 and is entitled to receive PROMPT, EFFICIENT and COURTEOUS service from ANY AUTHORIZED CADILLAC SERVICE STATION.
CADILLAC MOTOR CAR COMPANY, Detroit, Mich.
W. A. Houser
Joseph Brown
Owner's Signature

Fig. 2. The Identification Card, when properly signed, introduces the owner at any Authorized Cadillac-La Salle Service Station.

Upon presentation of this Identification Card at any Authorized Cadillac-La Salle Service Station, the car owner is assured of standard Cadillac Service under factory regulation.

Care of the Car

A fine piece of machinery, such as the Cadillac, naturally requires a certain amount of care to assure smooth running, dependability and long life, and the owner will derive the utmost in continuous satisfaction and utility from operation of the car by following the instructions given below:

1. Drive the car at moderate speeds for the first 500 miles.

2. Operate the car in accordance with the instructions contained in this manual.

3. Check the engine oil level every 100 to 150 miles and add oil as often as necessary to keep the indicator at "Full."

4. Check the air pressure of the tires at least once a week and keep it up to the recommended pressure—35 pounds front and rear.

5. Add distilled water to the storage battery every 1000 miles, and in warm weather every 500 miles, or at least every two weeks.

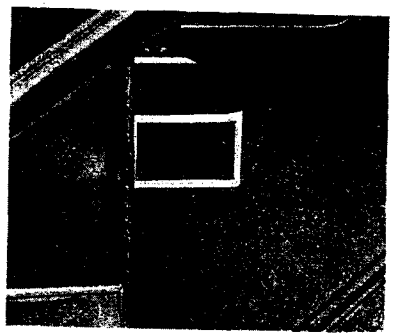

Fig. 3. The Identification Card should be placed in this holder under the cowl.

6. Have the car lubricated every 1000 miles, or approximately once a month, in accordance with the lubrication schedule given on page 10.

7. Have the car inspected by an Authorized Cadillac-La Salle Service Station every 1000 miles, or once a month.

Authorized Service

The first five items above do not necessarily warrant a visit to the service station. The last two, however, require the attention

of those whose knowledge and experience qualify them to perform the required work efficiently and in accordance with factory recommendations.

A car such as the Cadillac, built with skill, precision and fine workmanship, is deserving of the finest care of qualified experts in any service work that may be required. Authorized Cadillac-La Salle Service Stations are qualified to do this work in a manner not to be duplicated elsewhere.

They have a more sincere interest in the operation of the Cadillac owner's car than anyone else could have. Their personnel are specialists, having had more experience on Cadillac and La Salle cars than anyone could have who works on all makes of cars. Furthermore, their personnel secure the benefits of continuous factory training, through the medium of up-to-date, expert information on Cadillac adjustments and service methods, supplied exclusively to them by the Cadillac factory in regular publications and special bulletins.

Preventive Service

Preventive service is the fundamental principle of Cadillac Service. It is based on the knowledge that regular expert attention keeps emergency service at a minimum, assuring continuous satisfactory operation of the car with a minimum of interruption and expense.

The first thought, of course, is the proper protection of all working parts through correct lubrication according to schedule. The second, of great importance, is systematic inspection every 1000 miles, or approximately once a month, so that any necessary adjustments may be made before the need becomes an emergency.

Authorized Cadillac-La Salle Service Stations will make such inspections without charge. Lubrication and any necessary adjustments will then be performed at standard prices under factory regulation after the owner has approved the work and the prices.

Repair Parts

Genuine Cadillac parts, manufactured to the same specifications as the parts originally used in the car, are carried in stock by Authorized Cadillac-La Salle Service Stations. They are sold at uniform prices throughout the United States and are not subject to the addition of handling, excise or other supplementary charges. Printed price lists, published by the Cadillac Motor Car Company, are open to inspection by owners at any Cadillac distributor's or dealer's service station.

Flat Rate Service

Authorized Cadillac-La Salle Service Stations are prepared to offer service to the owner by means of individual operations quoted on a flat rate basis and authorized by the owner as occasion requires.

When a car enters the service station, it is promptly inspected by an expert tester who quotes the owner an exact price, which in practically every case includes material as well as labor, for the work he finds necessary. The owner then authorizes the work at this price and when he receives the bill, this is the price he pays.

Charges prevailing at Authorized Service Stations are based on standard schedules furnished by the Cadillac Motor Car Company. These schedules call for methods and tools approved by the same engineers who designed and built the car, thus assuring the highest quality of work at the lowest possible price. Standard price schedules are open to owners for inspection at any Authorized Cadillac-La Salle Service Station.

Lubrication Agreement

Lubrication according to schedule is the most important service attention required by the car. The Cadillac Lubrication Agreement is made available to Cadillac owners by Authorized Service Stations in order to provide the most convenient and least expensive way of securing this essential service. The Lubrication

Agreement provides, for a period of either 6,000 or 12,000 miles (but within 9 or 18 months), either 6 or 12 scheduled lubrications at a substantial saving over the total cost of the same operations when purchased individually.

The Lubrication Agreement is recognized by all Authorized Cadillac-La Salle Service Stations in the United States, regardless of where it may have been purchased. The owner needs only to present his coupon book and the lubrication work that is due will be performed without any additional charge at any Authorized Service Station.

The holder of a Lubrication Agreement is relieved of the thought of lubrication cost during the entire 6,000 or 12,000 mile period by budgeting his expense beforehand. He needs only take his car to the service station at monthly or 1000 mile intervals and request "schedule lubrication" to obtain all of the lubrication due, performed according to factory specifications.

The surest guarantee of long life and complete motoring satisfaction at the least possible expense is correct lubrication and preventive service rendered every 1,000 miles or once a month by an Authorized Cadillac-La Salle Service Station.

CHAPTER II

LUBRICATION

Lubrication Schedule

THE moving parts of the Cadillac car, built with infinite care and fitted to precision limits, deserve *effective* lubrication to preserve their smooth operating efficiency. Lubrication, to be most effective, must be done systematically at regular mileage intervals. To assist the owner in obtaining proper lubrication, a complete lubrication schedule is reproduced on page 10. This schedule, if faithfully followed, will insure correct lubrication of each moving part. As a further aid to the owner, an illustrated lubrication chart, based on the lubrication schedule, is furnished with this Manual to assist the operator in visualizing the location of the various lubricating points.

The unit of the chart as well as the schedule is 12,000 miles, which is divided into twelve 1000-mile intervals. Corresponding to these is a series of lubricating operations, grouped and numbered consecutively from 1 to 12, intended to be performed successively at each 1000 mileage interval until the 12,000 mile cycle has been completed. At 13,000 miles, the schedule begins again with Lubrication No. 1 and continues through the series of twelve operations.

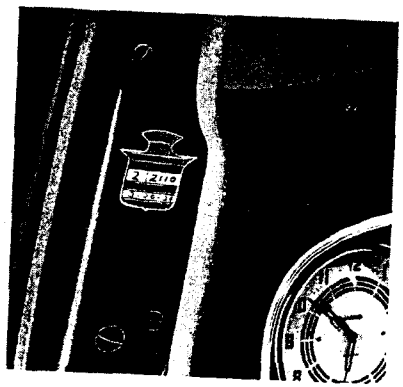

Fig. 4. The lubrication notice plate can be seen by opening the left front door a few inches.

LUBRICATION SCHEDULE

CADILLAC 355-D, 370-D

DO NOT WAIT FOR SCHEDULE LUBRICATIONS. *BEFORE* ADDING ENGINE OIL, THE OIL LEVEL SHOULD BE CHECKED EVERY 100 TO 150 MILES AND OIL ADDED IF THE INDICATOR BALL IS BELOW "FULL." THIS IS ESPECIALLY IMPORTANT ON CARS DRIVEN AT HIGH SPEEDS.

		LUBRICANT	LUBRICATION NO. AND MILEAGE AT WHICH DUE											
			1	2	3	4	5	6	7	8	9	10	11	12
			1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
LUBRICATION NOS. 1, 5, 7 AND 11	ADD LIQUID TO RADIATOR	WATER OR ANTI-FREEZE	O	O	O	O	O	O	O	O	O	O	O	O
	ADD ENGINE OIL AS NECESSARY	ENGINE OIL	O		O		O		O		O		O	
	STARTER, GENERATOR AND DISTRIBUTOR OIL CUPS	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
	BRAKE AND RIDE REGULATOR *PINS AND CONNECTIONS*	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
	ACCELERATOR ROCKER SHAFT	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
	DOOR HARDWARE	LIGHT OIL	O	O	O	O	O	O	O	O	O	O	O	O
	GREASE GUN CONNECTIONS	CHASSIS LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
	WATER PUMP	WATER PUMP LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
	CLUTCH RELEASE FORK	WHEEL BEARING LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
	*ADD WATER TO STORAGE BATTERY	DISTILLED WATER	O	O	O	O	O	O	O	O	O	O	O	O
	CHECK TIRE INFLATION		O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 2, 4, 8 AND 10	DRAIN AND REPLACE ENGINE OIL	ENGINE OIL		O		O		O		O		O		O
	CLUTCH RELEASE BEARING	WHEEL BEARING LUBRICANT		O		O		O		O		O		O
LUBRICATION NOS. 3 AND 9	†TRANSMISSION—ADD LUBRICANT	TRANSMISSION LUBRICANT			O			O			O			O
	†REAR AXLE—ADD LUBRICANT	REAR AXLE LUBRICANT			O			O			O			O
	STEERING GEAR—ADD LUBRICANT	STEERING GEAR LUBRICANT			O			O			O			O
LUBRICATION NOS 6 AND 12	BRAKE ASSISTER	LIGHT MACHINE OIL						O						O
	FRONT WHEEL BEARINGS	WHEEL BEARING LUBRICANT						O						O
	UNIVERSAL JOINTS	CHASIS LUBRICANT						O						O
	SPEEDOMETER DRIVE SHAFT	CHASSIS LUBRICANT						O						O
	DRAIN OIL FILTER—V-12 ONLY							O						O
	**SHOCK ABSORBERS—ADD FLUID	SPECIAL FLUID						O						O
	**CLEAN CARBURETOR AIR CLEANER							O						O
	**FLUSH COOLING SYSTEM AND ADD INHIBITOR							O						O
	**CLEAN OIL PAN AND SCREEN						EVERY 12,000 MILES							O

*IN SUMMER INSPECT BATTERY EVERY 500 MILES OR AT LEAST EVERY 2 WEEKS.
**RECOMMENDED BUT NOT INCLUDED IN LUBRICATIONS 6 AND 12.
†CHANGE REAR AXLE AND TRANSMISSION LUBRICANT—AS REQUIRED FOR LOW TEMPERATURES IN FALL OR WINTER AND AT BEGINNING OF MILD WEATHER IN SPRING.

Fig. 5. Effective lubrication of the Cadillac car can be assured only by following this schedule exactly.

Lubrication Notice

A metal plate in the shape of the Cadillac Crest is provided to serve as a lubrication notice and record. This plate is mounted on the left front door pillar as shown in figure 4.

Authorized Cadillac-La Salle Service Stations, after performing each schedule operation, post on this plate the number of the next operation and the mileage at which it will be due. Thus, when the mileage recorded on the speedometer is the same as the mileage marked on the notice, the car may be taken to any Authorized Cadillac-La Salle Service Station, and, without further ordering other than specifying "schedule lubrication," the car will receive the exact lubrication necessary.

Although the schedule is expressed in terms of miles, the car should be lubricated approximately once each month even though the mileage indicated on the speedometer is less than 1000 since the last lubrication operation was performed. The lubrication work can be done while the car is in the service station for its regular monthly or 1000 mile inspection.

Lubricants

The selection of proper lubricants should be one of the first concerns of the owner in his attention to the lubrication of the car. The lubricants must not only be of high quality but their viscosity and other characteristics must be suited to the purpose for which they are to be used.

Cadillac engineers have worked out in detail the specifications for the lubricant required for each point to meet the particular conditions of speed, load, temperature and kind of metals in contact.

Authorized Cadillac-La Salle Service Stations are prepared to furnish lubricants under these specifications to give the best results in their respective localities. When the car is lubricated by

someone not familiar with Cadillac specifications, lubricants should be called for by the S. A. E. viscosities recommended in the following paragraphs.

Engine Oil

Engine oil recommendations are given in the chart below. It should be noted that different grades of oil are to be used for moderate driving and for prolonged high speed driving in both summer and winter.

TYPE OF SERVICE	SUMMER	WINTER	
	All Temperatures Above 32°	Between 32° and 0° Fahrenheit	Between 0° and 15° Below
MODERATE DRIVING	S.A.E. visc. 30	20-W	10-W
	These oils are not suitable for prolonged high speed driving and if used under such conditions the oil level must be closely watched, as the rate of consumption will be higher than with heavier oils.		
HIGH SPEED DRIVING	"HEAVY DUTY" OILS Oils having an S. A. E. viscosity of 40-50-60 will show lower oil consumption for prolonged high speed driving than the lighter oils which afford easy starting. Some of these heavy oils demonstrate greater fitness for extreme high speed, due to their meeting certain specifications as to volatility. To make certain of using an oil suitable for this service, consult your Cadillac dealer. Heavy duty oils vary in their suitability for winter use. If a heavy duty oil with sufficiently low cold viscosity is not available and if the car is not kept in a heated garage, the lighter oils specified above for moderate driving must be used to avoid hard starting. In this case, be sure to watch the oil level closely as cautioned above.		

Transmission Lubricant

Gear oil of S. A. E. viscosity 160 should be used in the transmission at temperatures above 20° F. For temperatures below

20° F, a light oil of S. A. E. viscosity 90 should be used or the oil used during summer weather should be thinned with kerosine.

Soap greases will not satisfactorily lubricate the transmission gears and should not be used.

Rear Axle Lubricant

Gear lubricant of S. A. E. viscosity 160 should be used in the rear axle. For extremely low temperatures, it may be necessary to change to a light lubricant of S. A. E. viscosity 90 or to thin the lubricant with kerosine.

Steering Gear Lubricant

The selection of the proper lubricant for the steering gear is of special importance, particularly to avoid hard steering in cold weather. A special steering gear lubricant suitable for extreme heat and cold is available and should be used in the steering gear the year round.

Chassis Lubricant

A good grade of chassis lubricant should be used for all chassis points indicated in the lubrication chart as requiring this type of lubricant. Ordinary cup grease is not satisfactory and if, in an emergency, it is used in place of chassis lubricant, the car should again be lubricated within 300 or 400 miles.

Clutch and Wheel Bearing Lubricant

The front wheel bearings and the clutch release bearing and release fork should be lubricated with a good grade of Clutch and Wheel Bearing Lubricant having a high melting point. Ordinary grease, if used at these points, is likely to melt and run on to the brakes or the clutch facings.

Water Pump Lubricant

A water-resistant calcium soap lubricant having a high melting point is recommended for use in the water pump grease cup. Only lubricants of this type should be used; other lubricants will be dissolved into the cooling system liquid. Cup greases and wheel bearing lubricants are entirely unsuited for this purpose.

Engine Lubrication

The supply of engine oil is carried in an oil pan at the bottom of the crankcase and is circulated through the engine by means of a gear pump inside of the crankcase. The oil circulated by this pump lubricates the main and connecting rod bearings, the camshaft bearings, the cylinder walls, the pistons and the piston pins, the front end chains, and the valve mechanism.

There are a few points on the engine that cannot be taken care of by the pressure system and these points should be lubricated

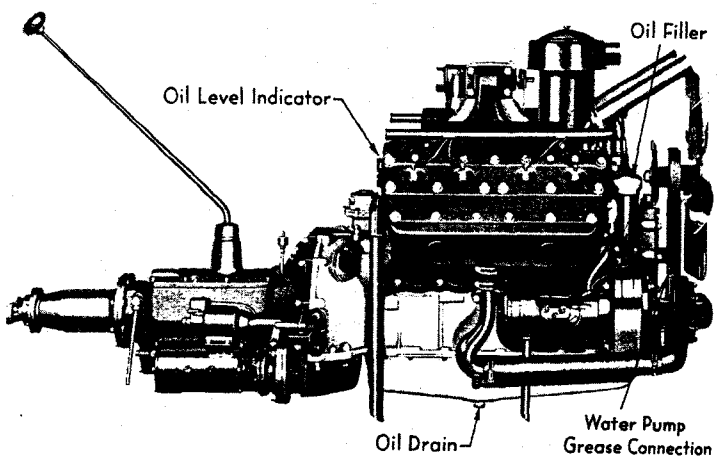

Fig. 6. The external features of the V-8 engine lubricating system.

according to the instructions given in the lubrication chart. This includes the starting motor, the generator, the distributor, and the water pump.

Oil Level

The normal capacity of the oil pan is eight quarts for the V-8 engine and nine quarts for the V-12, which fills it to the level of the screen in the pan. When the oil pan contains the correct amount the oil level indicator (see figures 6 or 7) shows "Full." The oil level should be checked every 100 to 150 miles and, whenever necessary, enough oil should be added to bring the indicator up to "Full." It should never be permitted to drop below "Fill."

Particular attention should be paid to the oil level in case of prolonged driving at high speed. At high speeds

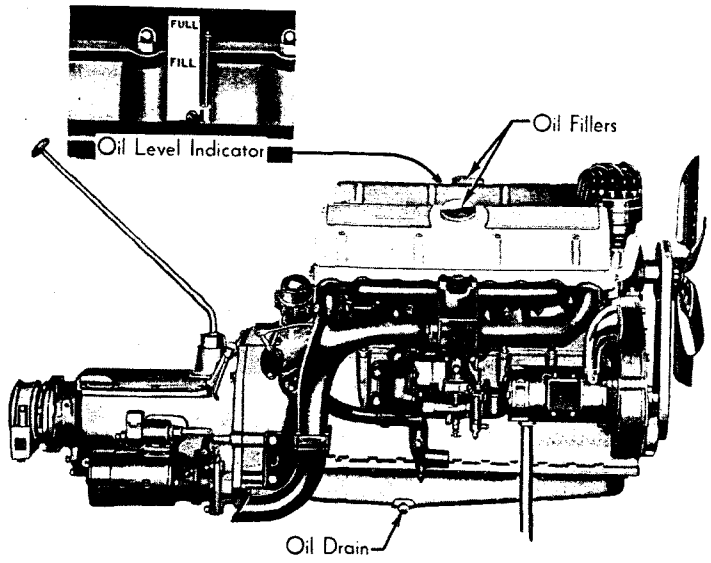

Fig. 7. The external features of the V-12 engine lubricating system.

the oil is consumed many times as rapidly as at city driving speeds and oil must be added more frequently to maintain the proper level.

Crankcase Ventilating System and Oil Screen

Cadillac engines are equipped with a crankcase ventilating system to keep the oil in the best condition possible. The ventilating system, which functions automatically, prevents dilution and contamination of the oil by removing the vapors which seep past the pistons.

A screen in the oil pan removes any solid matter from the oil. The oil pan and screen should be removed and thoroughly washed with gasoline every 12,000 miles to remove any carbon or foreign particles that may have collected. In addition, the V-12 engine is fitted with a self-cleaning oil filter which assures absolutely clean oil for the overhead valve mechanism. It requires no attention other than draining every 6000 miles, as described on page 47.

Changing Engine Oil

The useful life of the engine oil is greatly prolonged by the Cadillac crankcase ventilating system, but the oil pan should be drained and the engine oil replaced every 2000 miles. To drain the oil, simply remove the drain plug (figures 6 and 7) and allow the oil to flow into a receptacle placed under the car. The drain plug should then be reinstalled and tightened securely before pouring in fresh oil.

CHAPTER III

OPERATION

ONE of the first things the driver should do is to familiarize himself with the location and use of the instruments and controls described in this chapter.

Gasoline Gauge

The gauge marked "Gasoline" indicates the quantity of fuel in the tank at the rear of the car. This gauge operates electrically and indicates the quantity of fuel *only when the ignition is turned on.* When the tank is being filled and the driver wishes to check the amount of fuel in the tank, he should first shut off the engine to comply with filling station regulations and then switch on the ignition so that the gauge will operate.

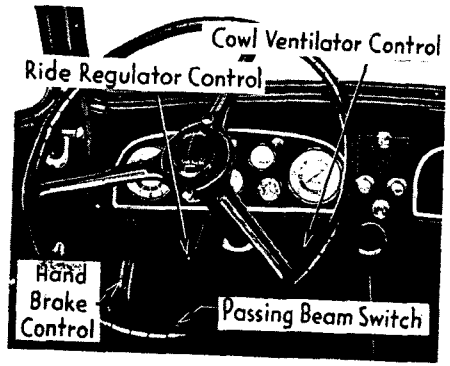

Fig. 8. General arrangement of the driving controls.

Oil Pressure Gauge

The oil pressure gauge indicates only the pressure under which the oil is being forced to the engine bearings. It *does not* indicate the *quantity* of oil in the engine. The gauge should indicate zero as long as the engine is not running, but as soon as it is started and as long as it runs, it should show pressure. If no pressure is indicated when the engine is running, the engine should be stopped at once. Serious damage may result if the engine is run for any length of time whatever with no oil pressure.

Ammeter

The gauge marked "Amperes" indicates the rate of charge or discharge of the battery It does not indicate the total output of the generator at any time nor does it indicate the current drawn by the starting motor when starting the car.

The ammeter should indicate on the charge side most of the time; otherwise more current will be drawn from the battery than is put into it and the battery will eventually become fully discharged. Normally, when no lights are in use, the ammeter

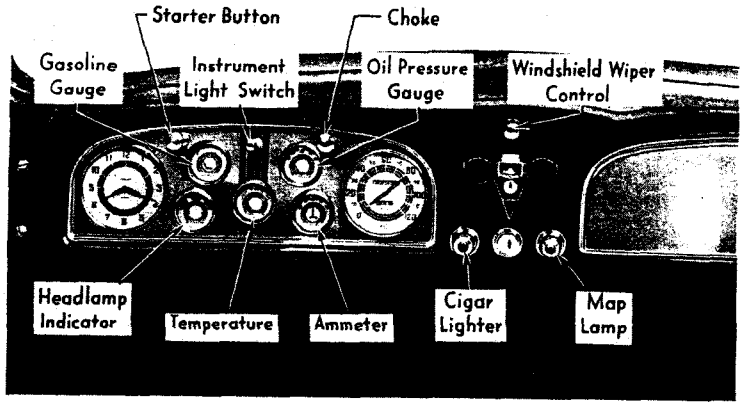

Fig. 9. Arrangement of the instrument panel.

should show "charge" as soon as the car is running ten or twelve miles an hour in high gear. If it fails to show a charge under these conditions, or if it shows a discharge when the engine is not running and no electrical equipment is in use, the cause should be investigated.

Temperature Indicator

The temperature of the cooling liquid is indicated by the gauge marked "Temperature." For ordinary driving, after the engine has warmed up, the indicator should stay within the

"Normal" range, but under conditions of long hard driving, especially in summer weather, it may indicate "Hot." This is to be expected and will not interfere with efficient operation of the engine. If it indicates "Hot" after short runs and under average operating conditions, however, the cause should be investigated. The temperature indicator will always show a temporary rise immediately after stopping the engine. This likewise is a natural condition and is due to the residual heat in the engine.

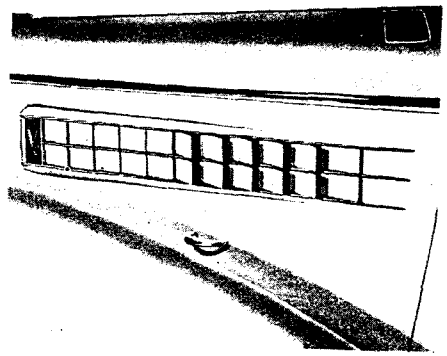

Fig. 10. The hood ports can be opened in groups of five.

The hood is fitted with hood ports which operate in tandem. Ordinarily, these ports should be opened at the beginning of warm weather in the spring and left open until the beginning of cold weather in the fall. Even in the closed position, the ports are open slightly to insure efficient engine cooling.

Throttle Control

The throttle of the carburetor (or of the two simultaneously operated carburetors on the V-12) is controlled by a hand lever and a foot pedal or accelerator. The normal position of the hand lever for driving the car is all the way up to "Closed." In this position the throttle of the carburetor is open just enough to permit the engine to run at idling speed after it is warm.

The hand throttle should be opened only when the engine is to be run at a speed slightly faster than idling, as when warming up the engine. For starting a cold engine, the hand throttle should always be in the fully closed position to insure the proper pro-

portion of gasoline and air getting to the cylinders. The correct throttle opening for starting under these conditions is automatically set when the choke button is operated. Opening the hand throttle increases the proportion of air rather than of gasoline and may make starting difficult rather than easy. For starting a hot engine, however, when the choke is not used, it may be advisable to open the hand throttle part way.

Carburetor Choke Control

The Cadillac carburetors are fitted with a choke control that is partly automatic and partly hand operated. The automatic control provides the correct mixture for warming up the engine, but when *starting* a cold engine, the choke button must be used. The button should be pulled out as far as is necessary to provide the proper mixture while cranking the engine, but as soon as the engine starts, the button should be pushed all the way in.

If the engine still retains heat from previous running, the choke button should not be used without first attempting to start the engine on the normal mixture. If the choke button is pulled out for starting a hot engine the mixture may be made so rich that starting will be impossible.

The choke button is not a priming device. It has no effect whatever on the fuel or the fuel mixture unless the engine is being cranked or is running under its own power. To have any effect, it must be pulled out and kept partly out during the cranking operation.

Starting the Engine

To start the engine, first make sure that the transmission is in neutral and ***the hand throttle is in the fully closed position.*** Then switch on the ignition by turning the key to the right, pull out the choke button (unless the car is warm from previous running), and press the starter button on the instrument panel.

(See Figure 11). Only a moderate pressure is required to close the electrical contact which first engages the starter gears by means of a magnetic device and then turns on the current that cranks the engine.

As soon as the engine starts, release the starter button and push the choke button all the way in. While the engine is warming up, do not open the throttle suddenly or too far, as this may result in "popping back" in the carburetor. The engine should never be raced to warm it up. Racing the engine is not only unnecessary, but ineffective.

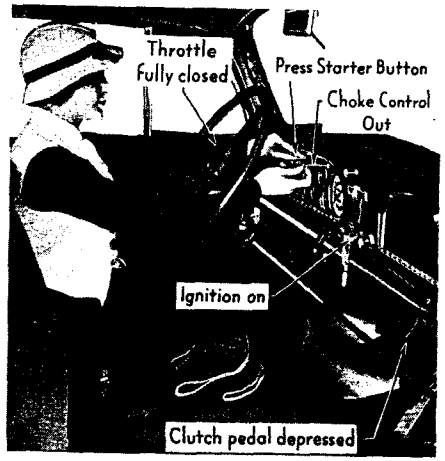

Fig. 11. The position of the hand throttle and the proper use of the choke control are of particular importance in starting the car.

Starting Hints

In cold weather, disengage the clutch to get a quicker start and to relieve the battery of the strain of turning the transmission gears.

If the engine does not start readily, release the starter button and look for the cause.

Check the contents of the gasoline tank.

See that the throttle hand lever is in the correct starting position and that the choke control has been used properly.

If the carburetor is flooded from unnecessary use of the choke control or unnecessary priming with the accelerator pedal (see page 31), move the hand throttle to the fully open position and crank the engine with the starter for 10 to 15 seconds to get rid of the surplus gasoline. Next, return the hand throttle to the normal starting position and try again to start the engine.

Do not run down the battery by too much use of the starting motor when the engine does not start readily. First find the cause; otherwise, the battery may be run down sufficiently to make starting impossible.

Ride Regulation

The driver may control the action of the shock absorbers at any time to suit the conditions of road and speed. The control handle is located beneath the instrument panel on the left-hand side of the car next to the steering column.

In general, the "free." position, in which the handle is down and forward, is for slow speeds over city pavements, while the "firm" or up position is for fast speeds over rough roads, but the driver can best determine by trial the degree of firmness or softness best suited to his requirements under various conditions of car load, speed and the road.

Headlamps

The Cadillac headlamps provide three driving beams: a low beam for city driving or driving on lighted highways, a high beam for country driving, and a beam for country passing that deflects the light largely to the right and out of the eyes of approaching drivers.

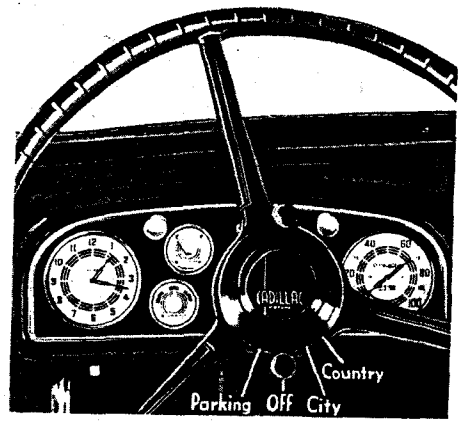

Fig. 12—The positions of the lighting switch lever are indicated here.

The beams are controlled by two switches, a lever at the steering wheel hub and a foot switch at the left of the clutch pedal. The

lever at the steering wheel has three positions beside the "off" position, namely, "parking," "city" and "country." When the lever is in the "country" position, the driving or passing beam can be selected by pressing the foot switch.

A unique feature of the Cadillac lighting system is the headlight indicator dial on the instrument panel, which indicates in illuminated letters which one of the three driving beams is in use, and assures the use of the right beam at the right time without needless switching.

The switch for the instrument panel lights is located at the top center of the panel.

Hand Brake

The hand brake control is located just beneath the left hand end of the instrument panel. In this location it is out of the way and yet easily accessible to the driver's left hand at any time. The hand control operates the rear brake shoes through a special cable connection.

Driving Hints

The driver owes it to other users of the streets and highways as well as himself to drive in such a way that the car is always under his complete control. The driving equipment on the Cadillac car—the brakes, the ride control, the lighting equipment and the synchro-mesh transmission—is designed to afford maximum safety at all times, but there are certain conditions requiring special care to make its use fully effective.

Speed

The Cadillac can be driven at speeds faster than the driver will ever require. The car operates so smoothly that the driver sometimes fails to appreciate the speed at which he is driving. He must, therefore, use judgment in driving to keep the car always

in control. Blind curves, hills, rough roads, side roads and winding roads require a slower speed than smooth concrete straightaways where the driver may see clearly for considerable distance ahead. Where the vision ahead is limited, speed should be kept low enough so that the car can be stopped within a safe distance for any emergency.

Gravel Roads

Adjust the ride regulator control to whatever degree of firmness required to prevent excessive bouncing and side sway. Do not swerve quickly or hold to the outside edge of the road on a curve.

Hills

When approaching the top of a hill, be prepared for any cars coming up the other side.

The transmission should never be shifted to neutral for coasting downhill. If it is desired to coast, keep the transmission in gear and simply disengage the clutch. If the speed of the car becomes excessive while coasting down hill, engage the clutch gradually and use the engine to assist the brakes. It must be remembered that the brakes are subjected to much more severe use on grades, where they must absorb the force of gravity as well as the momentum of the car.

Ordinarily, the resistance offered by the engine with the transmission in high gear, supplemented by moderate use of the brakes, is sufficient to control the speed of the car. If excessive use of the brakes is still required, however, the transmission should be shifted to intermediate.

Slippery Roads

When stopping on slippery pavements, keep the car in gear and the clutch engaged until the car is nearly stopped. Apply the brakes gently. This will minimize the possibility of skidding. Do not attempt sudden stops.

Carbon Monoxide

Always open the doors of the garage before starting the car.

Carbon monoxide, a deadly poison gas, is present in the exhaust of all internal combustion engines and for safety, this gas must be allowed to escape outside the garage. Under normal starting and warming up of the engine in a two car garage enough gas will accumulate in three or four minutes to overcome any occupants. When the choke is used excessively, such as for cold weather starting, the accumulation is more rapid.

Carbon monoxide is colorless, tasteless and almost odorless. It gives no warning.

Open the garage doors before starting the engine.

CHAPTER IV

COLD WEATHER OPERATION

SATISFACTORY operation of the car in freezing temperatures depends upon having the car prepared for cold weather and in giving it the special attentions which are required under such conditions. All the information relating to the care and operation of the car during cold weather has been grouped in this chapter to assist the operator in maintaining the fine performance of the car throughout the winter as well as the summer. This chapter should be reviewed just before the beginning of the winter season so that full benefit may be had of all the suggestions it contains.

Preparing for Cold Weather

Anti-Freezing Solutions

In selecting anti-freezing solutions for winter operation the local conditions and the type of service must be considered. The following information is given to enable the individual owner to more intelligently select the anti-freezing solution best suited to meet his own conditions.

The available commercial materials for preparing anti-freezing solutions for automobile radiators are denatured alcohol, methanol (synthetic wood alcohol), distilled glycerine, and ethylene glycol.

Alcohol and Methanol

Denatured alcohol and methanol solutions have been the most generally used anti-freezing solutions. Denatured alcohol and methanol are widely distributed, afford protection against freezing, and are not injurious to the materials used in the cooling system.

There are two principal objections to denatured alcohol and methanol. These materials are lost by evaporation, especially on heavy runs, and unless the solution in the radiator is tested periodically and sufficient anti-freeze added to replace the loss by evaporation, the engine or radiator, or both, are likely to be damaged by freezing. The car finish is damaged by contact with denatured alcohol or methanol solutions or vapors, and any material accidentally spilled on the finish should be flushed off immediately with a large quantity of water.

Methanol for anti-freeze purposes is sold in the United States in the correct concentration to give the same protection against freezing as denatured alcohol. The table below may be used for both denatured alcohol and methanol.

Lowest Temperature Expected	Per cent by Volume	Specific Gravity (at 60° F.)	
		Denatured Alcohol	Methanol
10 F.	30	.9668	.972
0 F.	38	.9567	.964
—10 F.	45	.9475	.957
—20 F.	51	.9350	.950
—30 F.	57	.9260	.944

Important: The special inhibitor used in the cooling system (see page 44) affects the hydrometer readings of the solution and allowances must be made for the difference. With the inhibitor in the cooling system, the actual freezing temperature of an alcohol or methanol solution is five degrees higher than indicated by the hydrometer. In other words, if the hydrometer reading indicates protection down to zero, the actual protection would be only down to five degrees above zero and similarly throughout the scale.

Glycerine and Ethylene Glycol

Distilled glycerine and ethylene glycol solutions are, in first cost, more expensive than alcohol but, as they are not lost by evaporation, only water need be added to replace evaporation

losses. Any solution lost mechanically, however, either by leakage or foaming, must be replaced by additional new anti-freezing solution. These solutions, under ordinary conditions, are not harmful to the car finish.

The principal objections to glycerine and ethylene glycol are the tendency of these solutions to loosen rust and scale, which form in the water passages of the cylinder blocks and heads, and the difficulty of securing and maintaining tight, leakproof connections. It is absolutely necessary that the entire cooling system be thoroughly cleaned and flushed before glycerine or ethylene glycol is used.

It is also necessary to tighten or replace the cylinder head gaskets, hose connections and pump packing. The cylinder head gaskets must be kept tight to prevent the solution from leaking into the crankcase where it might cause gumming and sticking of the moving parts. The pump packing must be kept tight to prevent air from being drawn into the cooling system, in order to avoid foaming and other difficulties which may result when air is present.

Ethylene glycol (Prestone), sold in the United States for anti-freezing purposes, and radiator glycerine, produced under the formula approved by the Glycerine Producers' Association, are chemically treated to overcome the difficulties mentioned in the above paragraph, and, under normal operating conditions, with tight hose connections and cylinder head gaskets, should be satisfactory for use in the cooling system.

Glycerine and ethylene glycol should be used in accordance with the instructions and in the proportions recommended by the anti-freeze manufacturer. These solutions generally contain inhibitors acting in the same manner as the special inhibitor used in Cadillac cars, and when these solutions are used, the proportion of the inhibitor should not be increased by the use of the special inhibitor in the cooling system. Too large a percentage of the inhibitor will increase rather than retard foaming and result in more rapid formation of rust and scale as well as the loss of the anti-freeze solution by spillage.

Use of Hydrometer

In using a hydrometer to determine the temperature at which a solution will freeze, the test must be made at the temperature at which the hydrometer is calibrated. If the solution is warmer or colder, it must be brought to this temperature or large errors may result. In some cases these errors may be as large as 30 degrees Fahrenheit. Freezing point hydrometers are not interchangeable. A different float is required for denatured alcohol, methanol, glycerine and ethylene glycol.

Salt solutions, such as calcium chloride, magnesium chloride or sodium silicate, kerosine, honey, glucose and sugar solutions are not satisfactory for use in automobile radiators.

Winter Lubrication

Lubrication of the car requires special attention in winter, not only to insure proper protection for the moving parts, but to secure the same ease of operation in starting, steering and shifting gears as during warm weather.

The chart of engine oil recommendations on page 12 gives the proper grade of engine oil to be used for cold weather driving. It will be noticed that lighter oils can be used during cold weather providing the car is not driven at high speeds. "Heavy duty" oils, however, must be used for prolonged high speed driving in winter as well as summer to prevent excessive oil consumption.

The lubricant in the transmission and rear axle should be thinned or replaced with a lubricant of suitable cold viscosity as soon as the gears are hard to shift.

Lubricants approved for use in the steering gear have a low viscosity and a temperature range that permits efficient steering gear action in either hot or cold weather. If Cadillac-approved lubricants are used, therefore, seasonal changes of lubricant will be unnecessary.

Storage Battery

The electrical system of a car has much more to do in winter. The stiffness of the lubricant makes the engine harder to crank in

cold weather and it generally is cranked longer before it starts. The lights are also used to a much greater extent than during the long days of summer. All this means that the battery must be ready for increased demands.

It is a good plan in preparing for the winter season, therefore, to see that the battery is fully charged and that the battery connections are clean and tight. At the same time, the spark plugs, the contact points and the ignition timing should be checked to assure easy starting and smooth performance.

Gasoline System

A small amount of water in the gasoline system during warm weather has little or no effect on the running of the engine. In freezing weather, however, even a small amount of water may freeze and stop the entire flow of fuel to the carburetors. It is important, therefore, to clean the filter and the strainers in the gasoline system before the start of cold weather. (See page 45.) It is also advisable to check the adjustment of the carburetors and the operation of the choke control.

Starting the Engine

The regular starting procedure, as outlined on page 20, should be followed in cold weather but with special emphasis upon the following points:

Clutch Pedal

The clutch pedal should always be disengaged while cranking the engine in winter weather in order to relieve the strain on the battery. With the clutch disengaged, the starter is not called upon to turn the transmission gears which are immersed in lubricant. At ordinary temperatures the resistance created by the gears turning in the lubricant is negligible, but in cold weather, when the lubricant is stiffened considerably, the strain is sufficient to retard the cranking speed and increase the demand on the battery.

Throttle Hand Lever

The correct position of the throttle hand lever for starting in cold weather is the same as for starting a cold engine under other conditions, namely, *in the fully closed position*. It may be necessary, however, as soon as the engine starts, to open the hand throttle slightly in order to permit the engine to idle without stalling until it becomes warm. Never attempt to start a cold engine with the throttle partly open, as this will increase the proportion of air and result in a lean mixture that is difficult to ignite.

Choke Button

Gasoline does not vaporize as readily in cold weather as in warm weather, and in order to supply the cylinders with a gaseous mixture rich enough to be ignited, the proportion of liquid gasoline to air must be increased. This is accomplished by greater use of the choke.

In cold weather, the choke button should be pulled out all the way and held out until the engine starts. Although the button should ordinarily be pushed all the way in as soon as the engine starts, it may be advisable to warm up the engine with the choke button about one quarter out during very severe weather. The button should be kept in this position for not more than one or two minutes at the most.

Priming the Carburetors

In extremely cold weather the carburetors may be primed by quickly depressing and releasing the accelerator pedal a few times. This procedure forces a larger quantity of gasoline into the mixing chambers and provides a richer mixture. The carburetors should never be primed in warm weather or in cold weather when the engine is warm. Excessive priming at any time is likely to make starting difficult rather than easy.

Use of Starter

If the engine does not start readily, release the starter button and look for the cause (see page 21). Avoid particularly continuous cranking for a period of over half a minute. Intermittent cranking for about 8 or 10 seconds imposes far less strain on the battery and is fully as effective for starting.

Use of Accelerator

In cold weather, after the engine is started and before it has run long enough to become warm, the engine cannot deliver its normal power and should not be called on to do so. In accelerating the engine to start the car and in accelerating the car after the transmission is in gear, the throttle should not be opened too suddenly or too far. This merely invites "popping back" in the carburetor and an increase in the amount of excess unvaporized gasoline in the combustion chamber. Unvaporized gasoline in the cylinders washes the oil off of the pistons and cylinder walls, leaving the surface unprotected and open to scoring.

CHAPTER V

EQUIPMENT

The equipment provided on the Cadillac car is designed for the comfort, convenience and protection of the occupants. The driver, therefore, should acquaint himself with the operation of the equipment described in this chapter so that he may derive full benefit from its use as occasion demands.

Locks and Keys

The locks on the car are for protection against theft, and full use should be made of this protection whenever the car is to be left unattended for any length of time whatever.



Fig. 13—The key numbers appear on metal tabs, which should be detached as soon as the car is received.

Two sets of two keys each, which may be distinguished by the shapes of their handles, are provided with the car. Two different keys are provided so that the owner may leave the car temporarily in the hands of another operator without foregoing the protection of the various compartments.

The handle of one key is hexagonal in shape while the other is rounded. The hexagonal shaped key operates the ignition switch, the right front door and the spare wheel carrier. The key with the rounded handle operates the instrument panel package compartment lock, the rear deck lock, the trunk lock on town sedans

and 5-passenger coupes, and the rear door lock on town cars and imperial sedans.

To prevent unauthorized persons from securing keys, the key numbers do not appear either on the keys or on the face of the locks. At the time a new car is delivered, small metal tabs with the key numbers on them are fastened to the keys. As soon as the keys are received, these metal tabs should be removed and either saved or a record made of the key numbers so that in the event both keys are lost, a duplicate key may be easily obtained from a Cadillac distributor or dealer.

Ignition Switch Lock

The ignition switch lock is located in the central part of the instrument panel. This switch makes or breaks the circuit at the ignition coils by means of connections carried through an armored cable. The ignition is switched off when the key is in the vertical position. To turn the ignition on, turn the key about one quarter turn to the right. The key can be removed only when the switch is in the "off" position. *Be sure to remove the key before leaving the car.*

Door Locks

All doors of the car can be locked from the inside merely by pushing up the small button just below the door moulding. These buttons snap to the unlocked position when the doors are closed, *unless* the door handle is being held all the way down while the door is being closed. Whenever the doors are locked from the outside in this fashion, however, be careful not to lock the keys inside the car. The right front door can be locked or unlocked from the outside with the hexagonal handled keys.

Radio

The installation of the Cadillac motor car radio has been anticipated in the design of the Cadillac car. A radio aerial has been built into the car, space has been provided under the cowl for

the set and the speaker, and the instrument panel has been so arranged as to make the radio controls an integral part of the design.

Package Compartment

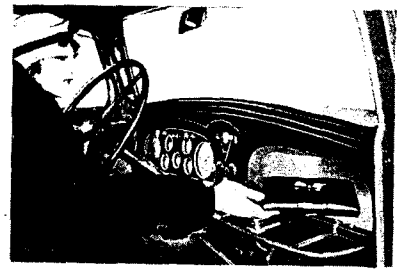

Fig. 14. The compartment on the right-hand side of instrument panel may be used for carrying small articles.

A compartment is provided at the right hand side of the instrument panel for the convenience of the driver in carrying small articles where they will be readily accessible. Maps, gloves, small packages and other articles can be carried there within easy reach The Operator's Manual should be carried in this compartment to be available for handy reference. The door of the compartment swings down to a horizontal position for convenience in resting maps or making notes.

Interior Lights and Switches

A map lamp which may be turned on by pulling it straight out is located so that it may be used to illuminate the driving compartment for reading maps or making notes when driving at night. This lamp is located in the central part of the instrument panel. It may be turned around in its socket to-



Fig. 15. The map lamp may be turned to either side.

ward either side to throw the light in any direction desired.

Dome lights on sedans and town cars and quarter lights on coupes turn on automatically when the doors are opened. When the doors are closed the lights are turned off, but they may also be turned on and off when the doors are closed by a switch located on the right-hand door pillar. Quarter lights on cars having dome lights do not operate with the doors but can be controlled by a switch on the left hand rear door pillar.

Phaeton and All Weather Phaeton cars have a tonneau light operated by the door and by a switch integral with the lamp.

A chart of bulbs for replacement on all of these lights will be found on page 50, Chapter VI.

No-Draft Ventilation

Cadillac closed cars are provided with the "No-Draft" system of ventilation which makes it possible for any occupant, while the car is moving, to control the circulation of air in the area of the car in which he is seated without noticeably affecting any other area. This is accomplished by means of the laterally operated ventilators in the front compartment windows and in the rear-quarter windows in the rear compartment.



Fig. 16. The front ventilators are operated by the smaller of the two cranks.

The No-Draft ventilators are operated by a small crank just

below and toward the front of the windows as shown in the illustration. The ventilator may be turned in or out to obtain the desired circulation by turning this crank. In order to make sure the car is safe against intrusion when the car is to be locked, the ventilators should be tightly closed.

The front compartment is provided with a screened cowl ventilator in addition to the No-Draft system. This ventilator is controlled by the knob at the right-hand side of the steering column and may be opened for increased air circulation in the front compartment as desired.

Windshield Cleaner

The windshield cleaner consists of two wiper blades operated simultaneously by suction from a vacuum pump on the engine. On some models the wiper motors are above the windshield and the control button is located in the center of the windshield header board. On other models the inverted type wipers are used, and on these the control button is located in the center of the instrument panel.

Sun Visor

Sun visors are provided to protect the occupants of the driving compartment from the glare of the sun at either the

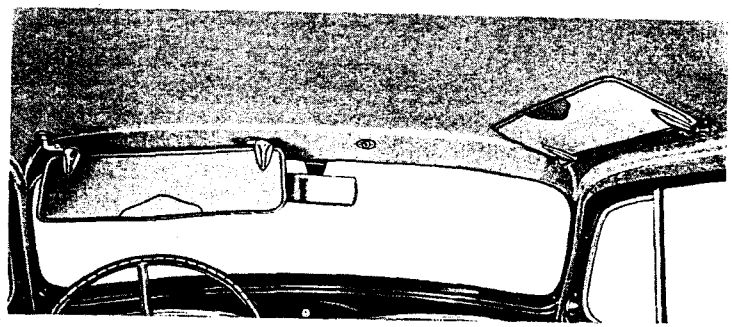

Fig. 17. The sun visors can be clasped in place either at the front or at the side.

front or the sides. The visors are mounted with a swivel in the corner so that they can be swung either above the windshield or the front window. When not in use, the visors fold up to the car roof.

Cigar Lighter

Cordless lighters are provided on the instrument panel and in the smoking sets of the various body styles. These lighters have a green translucent button through which the glow of the heating element may be seen when the lighter is ready for use. To use a lighter, press it all the way into its socket and hold it there until the glow of the heating element is seen; then lift it out.

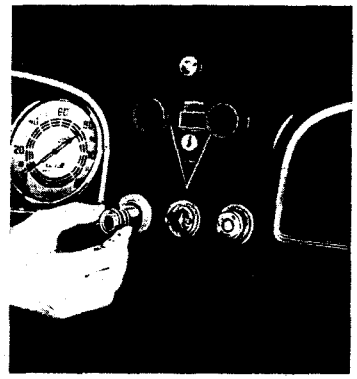

Fig. 18. To operate the cigar lighter press it in its socket, hold until the glow is seen; then remove it.

Adjustable Seat

The driver's seat on closed cars may be adjusted to suit individual requirements and provide the most comfortable driving position. The adjustment can be made by raising the control handle at the left side of the seat base and rolling the seat either forward or backward to the desired location.

Tools

The compartment for the tools is located in the special spare tire compartment in the rear on those cars having this special compartment. On other cars, the tool compartment is located under the front seat.

It is important that the tools be placed in the compartment under the seat in such a way that they do not interfere with the

proper placing of the seat cushion or with the seat adjusting mechanism. The jack should be placed under the driver's seat with the base toward the rear.

Tool equipment provided with the car is as follows:

Hammer
Large Screw Driver
Small Screw Driver
Pliers
Spark Plug Wrench
Crescent Adjustable Wrench
Jack Handle
Jack
Wheel Mounting Wrench
Tool Bag
Operator's Manual

Use of Jack

To facilitate raising the car when a tire is flat, special pads are fitted to the chassis in accessible positions near the front and rear wheels, and the jack ***must*** be placed under these pads or removal of wheels will be exceedingly difficult. The locations of these pads are shown in Fig. 19.

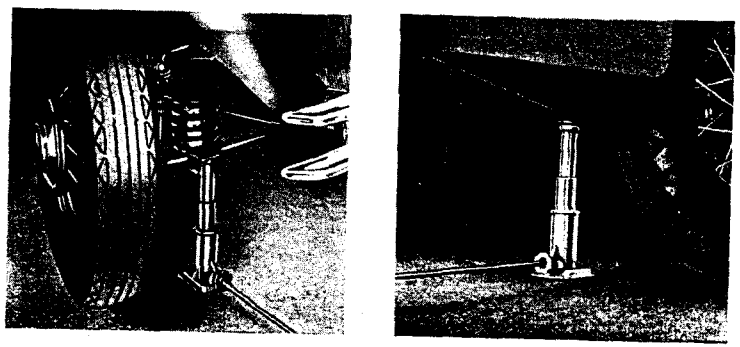

Fig. 19. The jack must be placed under the pad shown at the left when a front wheel must be raised and under the pad shown at the right when a rear wheel must be raised.

Spare Wheel Carrier

Three types of spare wheel carriers are used on the various model Cadillac cars; an external rear carrier of conventional type, a rear carrier in a special enclosed compartment, and fenderwell carriers.

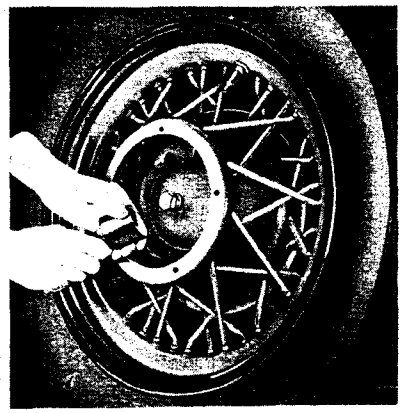

Fig. 20. The bolt head and wheel clamp are accessible after the lock has been removed.

To remove a spare wheel from an external rear carrier or a fenderwell, snap the hub cap off, then unlock and remove the lock from the bolt head, after which the bolt and clamp can be removed and the wheel taken off the carrier or out of the fenderwell.

To reinstall a spare wheel, set it firmly against the wheel support and install the clamp and bolt, tightening the bolt securely. Then install the lock over the bolt head, making sure that the lock plunger enters the groove, and snap the hub cap in place.

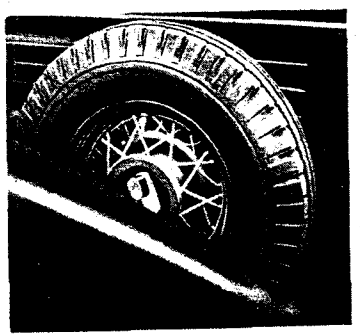

Fig. 21. The spare wheel can be lifted out of the fenderwell after removing the lock, the bolt and the clamp.

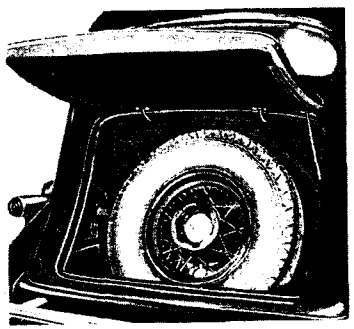

Fig. 22. The spare wheel in the compartment is clamped to the support with the same type of bolt and clamp.

The rear carrier in the compartment is operated in the same manner as the external rear carrier except that a hub cap and lock are not used, as the entire compartment can be locked. Always keep this compartment locked, as it contains the total equipment as well as the spare wheel.

Changing Wheels

If a fully inflated spare tire is always carried, it is only necessary, in case of tire trouble, to remove the wheel with the flat tire and install the spare wheel in its place. Illustrated directions for performing this work are given below.

Fig. 23a. Set the hand brake lever to prevent the car from rolling. Put the jack under the jack pad and jack up the car until an inflated tire would be about 2 inches above the road. Remove the hub cap by snapping it off. Loosen the nuts around the wheel hub by turning them in a counter clockwise direction with the wrench. Remove the nuts and lift the wheel off of the hub. Then swing the front end of the wheel inward and the wheel can be rolled back and out from under the fender.

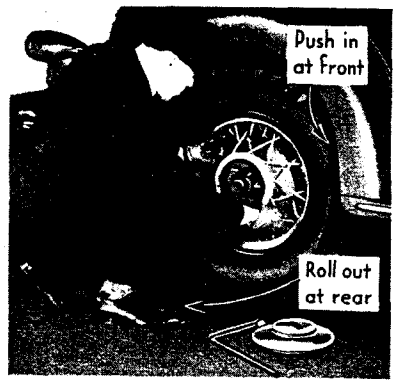

Fig. 23b. To remount the wheel, roll it in under the fender in the reverse of the manner of rolling it out, set it up on the hub and start the nuts by hand; then tighten the nuts with the wrench, but not in rotation. After tightening one nut, tighten the nut directly opposite until all have been securely drawn up.

In drawing up the nuts to the last turn, a slight alternate increase and decrease in resistance may be noticed which simply indicates that the locking feature is taking effect. After all the nuts have been tightened, they should again be tried to make sure that none has been resting on a high point without being sufficiently tight.

Install the hub cap and lower the jack.



CHAPTER VI

GENERAL CARE

NO ATTEMPT has been made to include in this manual directions for making adjustments and repairs to the car. Most Cadillac owners prefer to depend on authorized Cadillac-La Salle service stations for such work as these stations can invariably perform the work more conveniently and economically.

Every owner should, however, know how to perform the few simple operations of general care described in this chapter. These operations are not difficult enough to necessitate a visit to the service station, although this work also can be done in the service station if desired.

Storage Battery

The Delco Storage battery is carried under the front seat on some models and on the others in a compartment beneath the right front fender. In this latter location, the battery is accessible after lifting the right side of the hood.

The battery is filled with an acid solution from which the water slowly evaporates and fresh distilled water must be added to each of the three cells at regular intervals to bring the level up to the bottom of the filling tubes. Distilled water should be added at least every 1000 miles and, in warm weather, every 500 miles or at least every two weeks. Hydrant water or water that has been in contact with metallic surfaces is not satisfactory.

After adding water to the storage battery in freezing weather, the car should immediately be run far enough to thoroughly mix the water with the acid solution. If the car is parked immediately after water is added, the water is likely to stay on top of the acid

solution and may freeze, thus causing extensive damage to the battery.

No attempt should be made to add acid or any so-called "rejuvenator solution" to the battery. Adding anything other than distilled water will materially shorten the life of the battery.

The specific gravity of the acid solution changes as the battery is charged and discharged. The state of charge of the battery can thus be determined by measuring the specific gravity of the solution with a hydrometer. As the battery is charged, the specific gravity of the solution increases, reaching 1.270 to 1.285 when the battery is fully charged. A fully discharged battery has a specific gravity of 1.150 to 1.165.

An accurate test cannot be made immediately after adding distilled water. The hydrometer reading should be taken before water is added, or, if the solution is so low that it cannot be reached, distilled water should be added to bring the solution up to the proper level and the car run for several hours until the solution is properly mixed before the test is made.

Spark Plugs

The spark plugs provide the spark which ignites the gasoline mixture in the cylinders, and smooth and economical engine performance depend largely upon their efficiency. The accumulation of carbon and improper gap setting are generally the cause of inefficient spark plug operation. Their efficiency can be increased in such cases by cleaning out the carbon and by resetting the gap. Authorized Service Stations have equipment that will clean spark plugs quickly, thoroughly, and inexpensively.

Whenever spark plugs are reinstalled in the engine, the firing points should be tested to make sure they are properly spaced. The gap should be .025 to .028 inches, measured with a feeler gauge. All adjustments of the gap should be made by moving the side wire only.

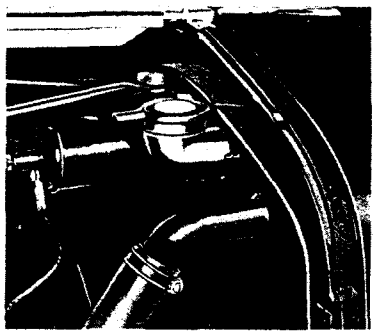

Fig. 24. The radiator filler cap is on the right hand side of the car under the hood.

Cooling System

The radiator filler cap is located on the right hand side of the engine under the hood. When the car is delivered to the owner, the cooling system contains, in addition to the water and whatever anti-freeze is used, a small amount of a special inhibitor which gives the cooling liquid a milky appearance. This inhibitor has particular advantages in reducing foaming and retarding the formation of rust and scale, thus helping to keep the cooling system clean so that it will better perform its cooling action. It is not necessary to add the inhibitor each time water or anti-freeze is added. Whenever the cooling system is drained and refilled, however, it is recommended that ⅓ of a pint (about 6 ounces) of a suitable inhibitor be added. Consult your distributor or dealer concerning the proper inhibitor to use.

In freezing weather a suitable anti-freeze solution, such as those described on page 26, should be used. The inhibitor, although it has no anti-freezing qualities in itself, will blend satisfactorily with any approved anti-freeze but should not be used with any solution already containing a similar inhibitor (see page 27). Allowances must, of course, be made when testing the cooling solution for the effect the inhibitor has on its specific gravity.

Before the start of cold weather, the cooling system should be cleaned and thoroughly inspected to make sure all connections are tight. If the inhibitor is used, this cleaning will suffice for the entire year; otherwise it is advisable to clean it thoroughly every 6000 miles, using the reverse flow method

which is standard at all Authorized Cadillac-La Salle Service Stations.

If this is not possible, a satisfactory cleaning, although not as effective as the reverse flow-method, may be obtained by using the following procedure:

Run the engine until the opening of the radiator shutters indicates that the engine is warm; then stop the engine and open the drain valve on the right-hand side of the engine as shown in figure 25. After the liquid has drained off, refill the cooling system with warm water, run the engine for a few moments, and drain the system. Repeat this operation until the water is clean when it is drained.

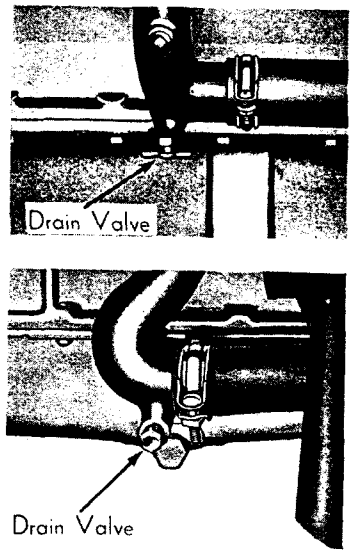

Fig. 25. The cooling system may be drained by opening the one valve. The V-12 is shown above, the V-8 below.

In cases where the accumulation of rust and scale is so great that this method does not clean the system sufficiently, the flushing operation should again be repeated after one or two handfuls of sal soda have been added. Care must be taken, of course, that the cooling system is thoroughly flushed after this operation to clean out all traces of the sal soda, and that none of the solution is allowed to reach the car finish.

Gasoline System

A gasoline filter is provided at the bottom of the fuel pump on the front left-hand side of the engine. Any accumulation of

water or sediment should be cleaned out when it can be seen in the glass bowl.

The bowl may be removed by unscrewing the thumb nut on the underside of the bowl and swinging the yoke to one side. The screen strainer at the top of the bowl usually comes off with the bowl but if it does not, it may be removed by pulling it straight down.

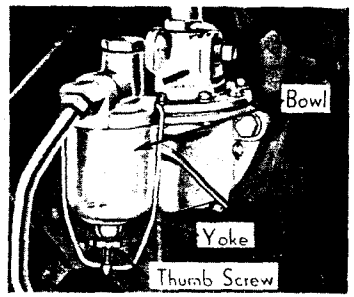

Fig. 26. The gasoline filter should be removed and cleaned whenever water or sediment appears in the bowl.

Any dirt on the strainer should be washed off with gasoline and the bowl should be wiped clean. The bowl should then be reinstalled with the screen on top. Make sure the bowl seats properly against the cork gasket at the top of the filter, swing the yoke into place and tighten the thumb nut

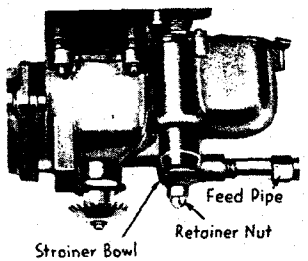

Fig. 27. The strainer in the carburetor may be removed with the bowl by disconnecting the feed pipe and removing the retaining nut.

The strainer on the carburetor where the gasoline enters should also be cleaned periodically. It may be removed by disconnecting the feed pipe and unscrewing the nut at the bottom of the bowl as shown in figure 27. Both the strainer and the sediment chamber should be cleaned in the same manner as the gasoline filter.

Carburetor Air Cleaner

The carburetor intake silencers serve also as air cleaners. The cleaners are designed to catch any dust or lint in the air before it is drawn into the carburetors. They are automatic in operation and require no attention other than periodic cleaning.

The mileage at which the air cleaners requires attention depends entirely upon the conditions under which the car is operated. For normal driving in cities and on hard surfaced roads, cleaning once every 6000 miles is sufficient. Under extreme conditions,

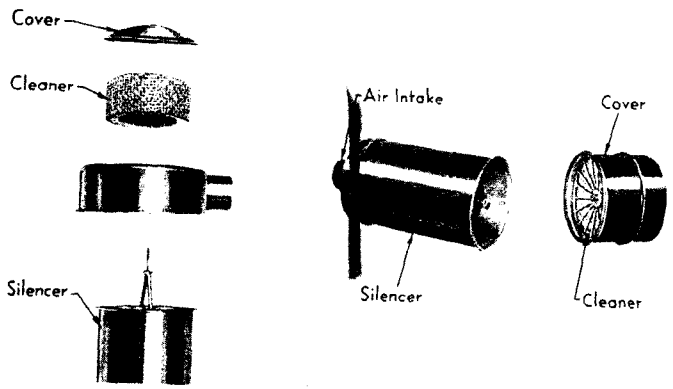

Fig. 28. The air cleaner should be disassembled from the silencer and cleaned at regular intervals. The V-8 cleaner is shown at the left, the V-12 at the right.

however, such as continuous driving on dusty roads or in localities where there is considerable dust in the air, cleaning may be required as frequently as every 2000 miles.

The air cleaners may be lifted out, as shown in figure 28, after the air intake pipes have been disconnected and the covers of the silencers removed. The cover of each silencer is held by a screw in the center of the silencer. After the air cleaner has been removed it should be thoroughly washed in gasoline, permitted to drain and then dipped in fresh engine oil. *Do not wash the cover.*

Oil Filter (V-12 Only)

The oil filter used on the V-12 engine, located at the rear of the engine on the right-hand side, is of the self-cleaning disc type. The engine oil, on the way to the valve mechanism, passes through this filter, depositing any impurities and foreign particles in the receptacle. A connection to the front brake cable automatically

rotates the discs slightly every time the brake pedal is depressed. The filter should be drained every 6000 miles to prevent the accumulation of foreign matter from clogging the discs and allowing the unfiltered oil to reach the working parts of the engine.

Brakes

The importance of the proper operation of the brake system as an essential measure of safety is so great that all service on it should be performed at a service station where proper adjustments and tests can be made with the greatest accuracy. Adjustment should never be neglected so long that the pedal reaches the floor board before the brakes take effect. In case of emergency, however, should this occur, the following temporary adjustment can be made by the driver.

Turn the adjusting nut on the cam lever, shown in figure 29, of each of the four brakes one half a turn in a clock-wise direction. These adjusting nuts lock each sixth of a turn to hold the adjustment.

A permanent adjustment should be made as soon as a service station can be reached.

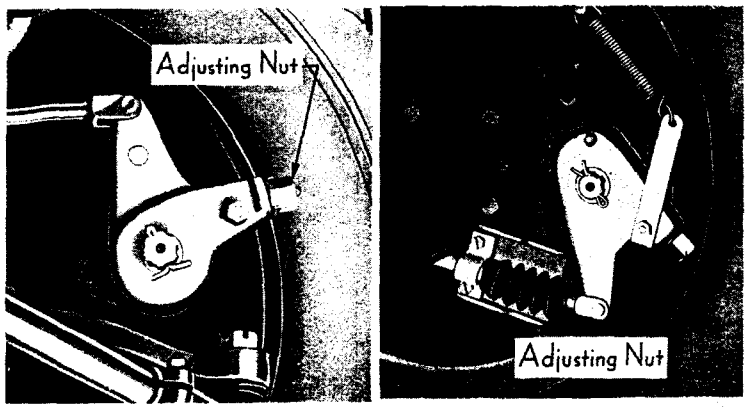

Fig. 29. A temporary brake adjustment can be secured by turning the adjusting nut on each brake one-half a turn clockwise.

Tires

The most important factor in the life of a tire is its inflation pressure. Each tire should be tested at least once a week and the pressure should be kept at 35 pounds front and rear.

With the inflation pressure properly maintained injuries to the tire structure will be kept at a minimum. Severe cuts, however, caused by sharp obstructions in the street or on the road, will invariably appear. If these cuts are neglected, the action of the weather and grit and gravel will in time weaken the tire around those points. If the cuts are sealed immediately by a good vulcanizer, however, these points will be protected and the life of the tire will be lengthened.

Tire Balancing Marks

The tires used on the Cadillac are balanced to offset the weight of the valve stem and if a tire is removed it must be reinstalled in its original position with respect to the rim, otherwise the tire and wheel will be unbalanced.

A small red or black dot branded in the side wall of the tire indicates the point of balance. This mark must always be kept in line with the valve stem.

Lamp Bulbs

In replacing lamp bulbs in any of the lights on the car, the same candle power bulb should be used for replacement as was originally installed. This is particularly important in the case of the headlamps, in which a special 2 filament pre-focused bulb with a flanged base is used. It is a good plan to carry a spare set of these lamp bulbs at all times in the car.

The bulb in the map lamp may be replaced after unscrewing the knob at the end of the shield.

The lamp bulbs used in the car are as follows:

Location	Voltage	Candle Power	Mazda No.
Headlamps	6-8	32-32	2330-L
Rear Lamp (signal position)	6-8	15	87
Rear Lamps (parking. driving)	6-8		
Instrument Lamp	6-8	3	63
Map Lamp	6-8		
Parking Lamps	6-8		
Dome Lamp	6-8		
Quarter Lamps	6-8	6	81
Deck Compartment Lamps	6-8		
Tonneau Lamp	6-8		

Care of Headlamps

The headlamps require periodic cleaning and occasional readjustment. To clean the headlamps, remove both headlamp doors. Clean the lenses with alcohol inside and outside. Carefully wipe all dust from the reflectors and, if necessary, polish them with a soft rag dipped in a mixture of lamp black and alcohol. In polishing reflectors, always rub from the center straight out to the rim; *never* rub in circles.

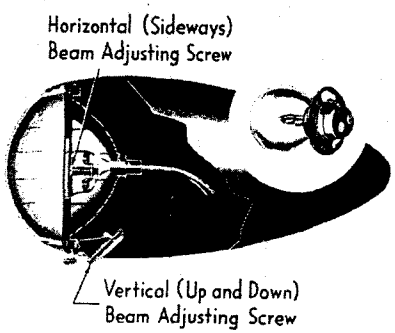

Fig. 30. Sectional view of headlamp, showing adjusting screws for aiming beams. Insert shows special pre-focused bulb.

Inspect the gaskets and replace them if they are damaged or do not register properly. Replace any bulbs that are burnt out or that show signs of blackening. Try the lighting switches in all positions to see that all bulbs burn properly.

The headlamps are designed for prefocused bulbs, so no focusing adjustment can be made in the lamps. On this account, *only prefocused bulbs can be used in these lamps*, and no other bulbs will be satisfactory. Because of this design, aiming is the only adjustment required by the headlamps.

Set-Up for Aiming Lamps

Place the car on a level surface with the headlamps aimed toward and 25 feet from a garage door or other reasonably light colored vertical surface. Draw a horizontal line on this surface at the level of the headlamp centers. If your state requires a loading allowance, draw this horizontal line the required distance below the level of the lamp centers. Sight through the center of the rear window over the radiator cap to determine the center point of the horizontal line and draw vertical lines through points at the right and left of this center point directly ahead of the center of each headlamp.

Aiming the Headlamps

The lighting switches should be turned to the "Driving" position, which means that the lower filaments will be lighted in both lamps. The headlamp doors must be removed and one of the headlamps covered. The beam from the uncovered lamp should then be centered sideways on the vertical line directly

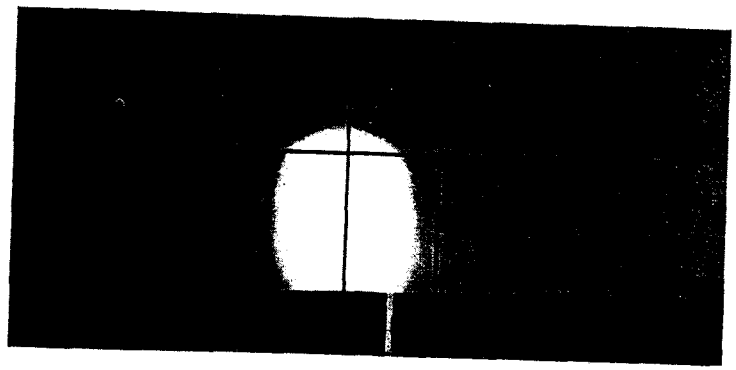

Fig. 31. Correctly aimed upper beam of left headlamp without lens.

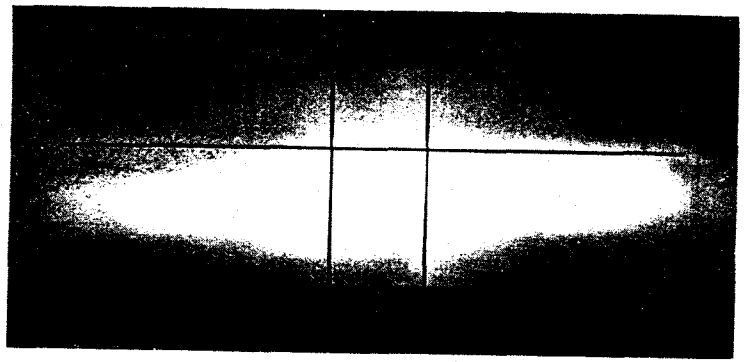

Fig. 32. Correctly aimed upper beam of left headlamp with lens.

ahead of it and the top of the beam should be just at the horizontal line, as shown in Fig. 31 for the left headlamp.

The beam is aimed up or down by means of the adjusting screw at the bottom of the lamp and is aimed sideways by means of side adjusting screws under the gaskets as shown in Fig. 30.

When replacing the headlamp doors, reinstall the cork gaskets with care and be sure to place the door with the "left" lens on the left lamp and the "right" lens on the right lamp. Then check again the beams from the two lamps, one at a time. The beam

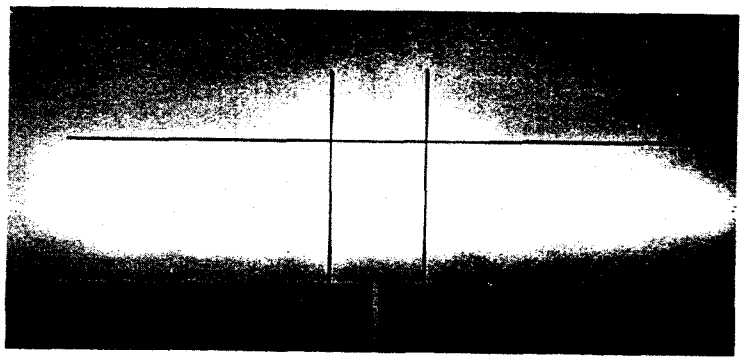

Fig. 33. Correctly aimed upper beam of right headlamp with lens.

from the left headlamp should have the upper edge of the hot spot at the horizontal line and the left edge at the vertical line directly ahead of the lamp as shown in Fig. 32. The beam from the right headlamp should likewise have the upper edge of the hot spot at the horizontal line, but with the maximum intensity centered on the vertical line directly ahead of the lamp and the right cut-off of the hot spot about a foot to the right of this line as shown in Fig. 33.

No further aiming is required for the lower or passing beams.

Storing the Car

If the car is to be stored for any length of time it is important that a few precautions be taken to protect it from deterioration. Blocking up the car to take the weight off of the tires, partially deflating the tires, and placing a cover over the entire body will protect the tires and finish. The engine and the storage battery, however, require special attention.

Oil should be injected into the cylinders while the engine is warm. This may be done by pouring two or three tablespoonsful of engine oil into the spark plug holes after the engine has been run long enough to warm it up. Cranking the engine a few times after this is done will distribute the oil evenly over the pistons and cylinder walls. The cooling system should then be drained.

The battery should be fully charged and the solution should be at the proper level. If possible, arrangements should be made to have the battery charged from an outside source every two months during the storage period.

Body

The body of a Cadillac car is deserving of care and attention the same as the most intricate working parts of the chassis. In recognition of this fact, Authorized Cadillac-La Salle Service Stations displaying the *Complete* Service Sign, shown in figure 34,

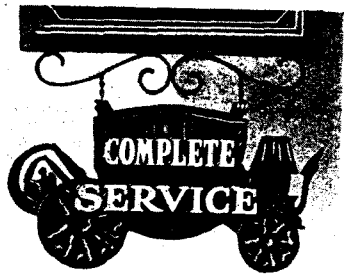

Fig. 34. Authorized Cadillac-La Salle Service Stations displaying this sign are equipped to render complete body service.

at the bottom of the authorized service sign, have equipped themselves to service the body with as much expert skill and care as the chassis. The simple attentions described below, however, are frequently performed by the owner or under his immediate supervision.

Care of the Finish

Keeping the lacquer finish of the car new and lustrous requires only a thorough wiping with a soft dry cloth every few days and an occasional polishing with a recognized lacquer polish. With this care, the car will need to be washed only when considerable mud or dust has accumulated.

Washing of the car can be accomplished simply and easily with plenty of clean cold water, a soft wool sponge and a clean chamois. Soap and hot water are not only unnecessary but undesirable. The dust or mud should be flushed off with a *gentle* stream of water from a hose without a nozzle, using the sponge merely to loosen the dirt. After all the dirt has been removed in this way, the sponge should be squeezed dry and used to pick up the water from the crevices. Thoroughly wet the chamois and squeeze it dry, then rub the finish with it until all of the water has been removed.

Care of the Top

The top may be kept clean by an occasional wiping to remove the dust. This is all the care required to keep the top clean unless grease spots, stains or dirt film occur. In these cases washing with a mild, neutral soap may be resorted to. Gasoline, naphtha, kerosine and fabric cleaners should never be used since such preparations can easily dull the finish and damage the fabric. Soap and water is not harmful and is fully as effective.

Cleaning Upholstery

Regular monthly cleaning of the car interior with a vacuum cleaner and a whisk broom will keep the upholstery in the best of condition and will prevent excessive wear. The whisk broom should be used to loosen the dirt and grit, which causes more rapid wear than use, while the vacuum cleaner should be used to lift out the loosened dirt.

Spots on the upholstery may be cleaned with any good dry cleaner used sparingly. When the cleaner has thoroughly evaporated, fold a piece of cheese cloth four or five times, dampen it, and place it over the spotted surface; then run a hot iron over surface just long enough to raise a good steam. Plush fabrics can be restored to their original appearance by rubbing lightly against the nap with a brush after the fabric has been steamed in this way.

Door Hardware

The lubrication of the body hardware on the car is fully as essential as the lubrication of chassis parts if it is to work smoothly and silently. Directions for the lubrication of door locks, hinges and striker plates every 1000 miles are included on the lubrication chart. These directions should be followed as faithfully as the rest of the chart.

Body Adjustments

Preventive service on the body at regular intervals will keep the appearance of the car at its best and will eliminate more extensive repairs at a later date. This service should include body bolts, tie-down bolts, door adjustments and the operation of window regulators.

Authorized Cadillac-La Salle service stations include the body as well as chassis in the regular monthly or 1000 mile inspection and quote flat rate prices for necessary body service. The necessary work may be authorized by the owner at the time he has chassis adjustments made and the car lubricated.

CHAPTER VII

SPECIFICATIONS AND LICENSE DATA

	V-8	V-12
Bore	3⅜ in.	3⅛ in.
Stroke	4 15/16 in.	4 in.
Piston Displacement	353 cu. in.	368 cu. in.
Horsepower (N. A. C. C.)	36.45	46.9
Engine number	See below	See below
Wheelbase	128 and 136 in., 146 in.	146 in.
Gasoline tank capacity	22, 22, 30 gal.	30 gal.
Engine oil capacity	8 qts.	9 qts.
Cooling system capacity	4¾ gals.	4½ gals.
Transmission capacity	2¼ qts.	2¼ qts.
Rear axle capacity	3 qts.	3 qts.
Tire size	7.00-17	7.50-17
Spark plug setting	.025-.028 in.	.025-.028 in.
Contact point setting	.012-.018 in.	.018-.024 in.

Engine and Unit Assembly Numbers

Each Cadillac car, when shipped, carries an "engine number" which is also a serial number. This is the number to be used in filling out license and insurance applications and in general reference to the car. The engine number is stamped on the right hand side of the crankcase, near the water inlet on V-8 cars, and on the generator drive chain housing on V-12 cars, and is also stamped on the upper surface of the inner frame side bar on the right hand side, just ahead of the cowl.

In addition to the engine or serial number, each Cadillac car has a unit assembly number for the engine, stamped on the upper

surface of the right rear crankcase support arm, and job and body numbers for the body stamped on the right hand side of the cowl under the hood. These numbers are so located that all can be seen upon lifting the right side of the hood.

In ordering replacement parts, always give the engine number of the car and, in addition, the engine unit number when ordering engine parts, and the job and body numbers when ordering body parts.

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CADILLAC-LA SALLE

SHOP MANUAL

CADILLAC—355-D, 370-D, 452-D

LA SALLE—350

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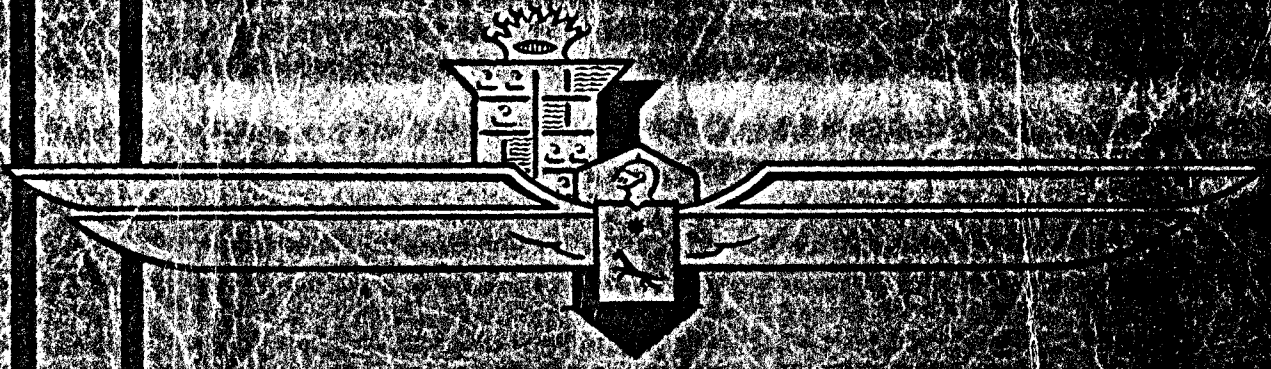

Service Department
CADILLAC MOTOR CAR COMPANY
DETROIT, MICHIGAN

CADILLAC - LA SALLE

SHOP MANUAL

Cadillac 355-D, Series 10, 20 and 30

370-D, Series 40

452-D, Series 60

La Salle 350, Series 50

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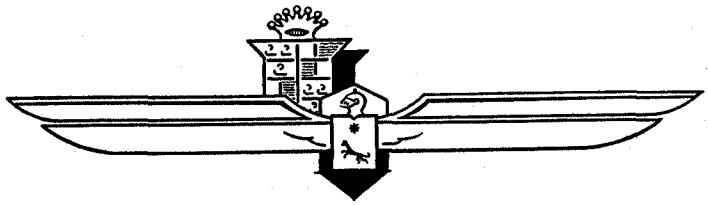

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Service Department
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DETROIT, MICHIGAN

IMPORTANT

Beginning with the "D" series cars, fine thread pitches on all threaded parts up to ½ in. size have been discontinued and a standard pitch adopted. This is in keeping with the standardization of Cadillac parts.

The parts largely affected by this change are studs which formerly had two thread pitches —a standard thread pitch on one end and finer thread pitch on the other end. Another example is where a single thread size has previously been supplied in two or more pitches, all of which have now been eliminated except the newly adopted standard pitch.

This change in thread pitch applies only to parts for "D" series cars except in instances where such parts are supplied for use on previous models. In such cases the necessary new standard threaded parts will be furnished to make the installations.

Service men are cautioned to watch all threaded parts in order to avoid the damaging of threads by mismatching. Use only the threaded parts as supplied by the factory Parts Division when "D" series parts are installed on earlier model cars.

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Introduction

This Shop Manual is a book of reference on the adjustment and repair of Cadillac and La Salle motor cars. It is intended for the use of service men who are already familiar with automobile construction and repairing in general.

At the beginning of each group is a brief description accompanied by service information in the form of notes. Following this is a specification table giving clearances, dimensions and other facts important to service men.

One class of information in the specification tables consists of limits for the clearance between parts subject to wear. The "New limits" are those to be observed when installing new parts. The "Worn limits" are those beyond which it is inadvisable to continue to use the worn parts if quietness of operation and maximum performance are to be expected.

The remaining information is in picture form. The illustrated pages are laid out to show as far as possible in picture form the repair operations, together with the differences and similarities of the various car units. Unless otherwise specified all illustrations apply to both the Cadillac and the LaSalle.

Identification Numbers

Each Cadillac and La Salle car when shipped carries an engine number which is also a car serial number. This is the number to be used in filling out license and insurance applications and in general reference to the car. On Cadillac 355-D cars, this engine number is stamped on a boss on the crankcase near the water inlet on the right-hand side. The Cadillac 370-D and 452-D have the engine number stamped on the upper surface of the generator drive chain housing on the right hand side of the engine. The La Salle engine number is stamped on the top edge of the cylinder block opposite the No. 1 cylinder on the left hand side of the engine.

The various units such as the engine, transmission, etc., also carry unit assembly numbers. These are located as described in the specification tables. It is important when ordering parts to give, not only the engine number of the car, but also the unit assembly number of the unit to which the part belongs.

The style numbers stamped on the body name plate under the hood on the right side of the shroud are useful in identifying the series numbers and wheelbases of 355-D cars which in some cases may be so similar in general appearance as to cause confusion.

The style numbers for the various series numbers and wheelbases of 355-D cars are arranged as follows:

Series No.	Wheel Base	Style Numbers
10	128″	34-701 to 34-750
20	136″	34-651 to 34-700
30	146″	Fleetwood

The Series 30 cars, of course, are all Fleetwood body styles, identified by the name plate on the lower right front corner of the body.

Our Service Department invites correspondence with Service Managers and Shop Foremen on all matters discussed in the Shop Manual.

CADILLAC MOTOR CAR COMPANY

Detroit, Michigan

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FRONT WHEEL SUSPENSION SYSTEM

General Description

The front wheel suspension system is employed on both Cadillac and LaSalle cars. In the front end construction the front road wheels are mounted independently of each other. They are fastened directly to the frame with sturdy arms hinged to permit vertical movement only. See Fig. 1.

The up and down movements of the wheels are controlled by soft acting helical (coil) springs. These springs have no function except that of springing the car as they are not depended upon to hold the front wheels in position or to absorb the driving and braking forces.

With this front end construction, either wheel may follow the irregularities of the road without carrying that side of the car with it and without transferring the resultant movement or road shock to the opposite front wheel. A constant caster angle is also maintained and the geometrical relations of the various parts of the suspension system are accurately controlled.

An intermediate steering arm also forms a part of the front end suspension system. This is a right-angle arm mounted in the front cross-member of the frame and connects the steering connecting rod to the tie-rods. The arm is carried on tapered roller bearings in the Cadillac and on ball bearings in the LaSalle.

Two steering tie-rods are used and the end joints are of the ball and socket type, which are spring loaded to a definite tightness.

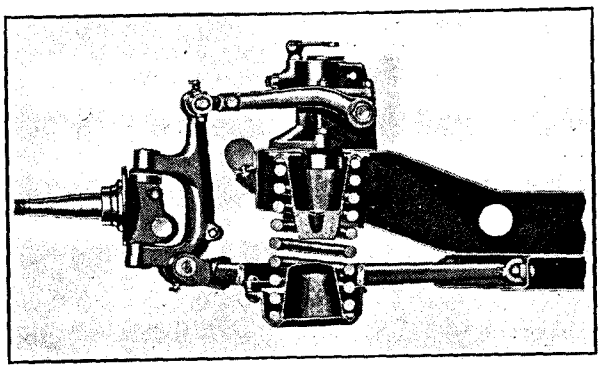


Fig. 1. Sectional view of Cadillac left front wheel suspension system viewed from the rear. Typical of LaSalle.

The front wheel suspension system is of the same general construction on all cars, differing only in minor details. Consequently, the service operations are alike and the adjustments are made in the same way on all series.

Service Information

1. Straightening Bent Parts

Because of their location, the parts of the front wheel suspension system are more subject to damage by accident than any other part of the chassis. Front wheel suspension service, therefore, involves the inspection of parts for alignment and possible straightening.

Heat-treated parts should not be straightened if they are sprung out of alignment more than 5°. To straighten such parts while cold is likely to result in strains and sometimes in cracks not visible to the naked eye. Straightening with heat destroys the effect of previous heat treatment and may result either in overheating, making the steel soft and weak, or in underheating which will make it brittle and easily broken.

Parts which are not heat-treated may be straightened cold if not sprung out of alignment more than 10°.

Welding of parts subjected to severe strain should never be permitted A welded part is never as strong as the original, unbroken metal and the heat required for the welding process changes the structure of the metal around the weld, making it coarse and weak.

2. Stop Screw Adjustment

The steering stop screws should be adjusted to prevent chassis interference with the wheels and the steering gear sector from bottoming in the housing. Both of these conditions can be avoided by setting the stop screws so that the steering wheel can be turned two complete revolutions from center toward both right and left. This provides

FRONT WHEEL SUSPENSION SYSTEM

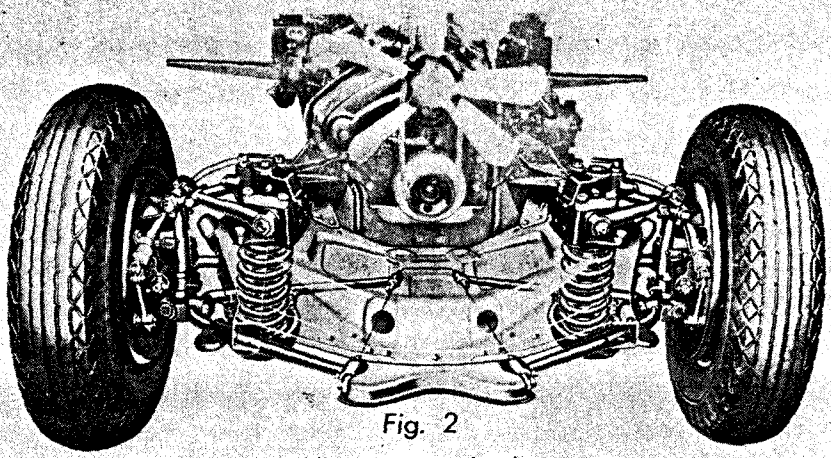


Fig. 2
Phantom View of Cadillac Front Wheel Suspension System—Typical of LaSalle

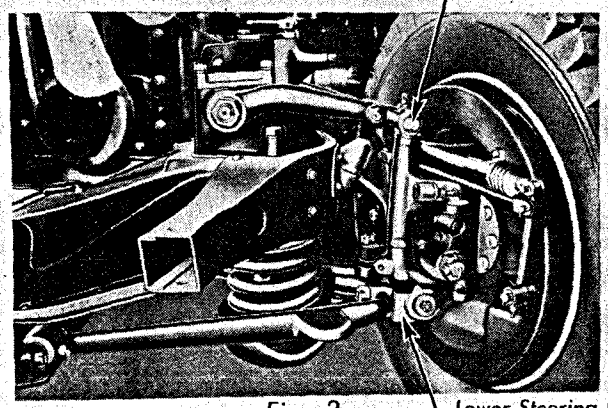


Fig. 3
Front Side of Cadillac Left Front Wheel Suspension System

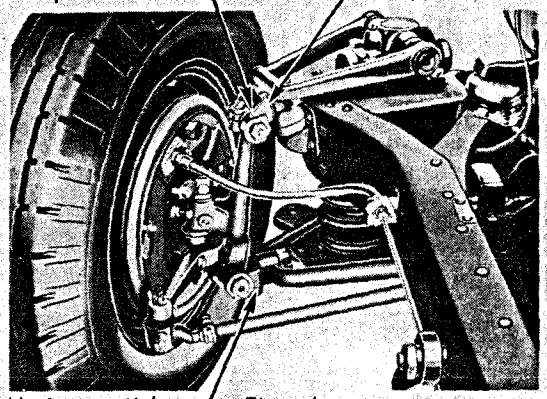


Fig. 4
Rear Side of LaSalle Left Front Wheel Suspension System

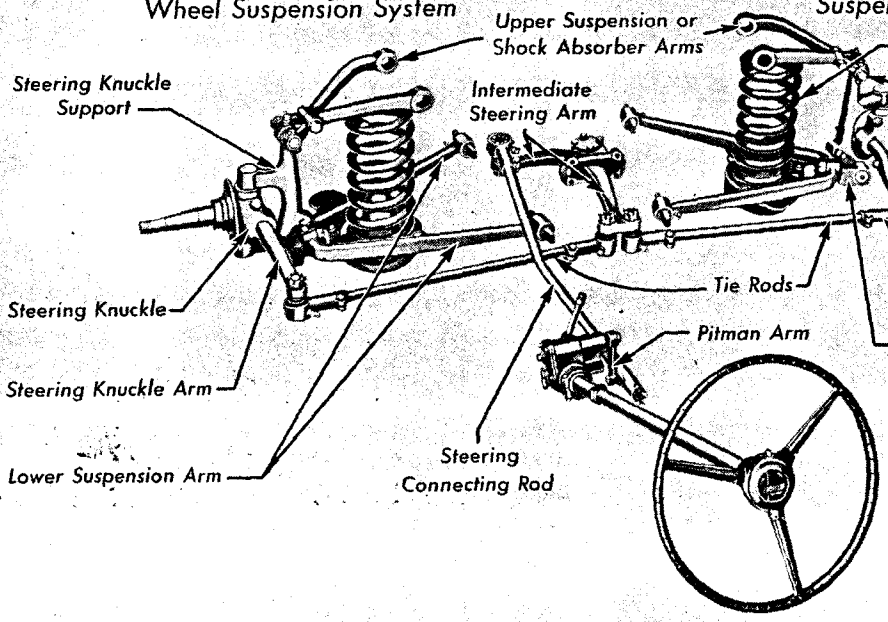


Fig. 5
Component Parts of Front Wheel Suspension System

Plate 1. Front Wheel Suspension System

an ample turning radius without permitting the steering gear to bottom, which might result in damage to the gear.

To set the stop screws, the wheels should first be turned to the exact straight-ahead position and the steering wheel marked with a piece of tape at the high point.

Then turn the steering wheel two complete revolutions to the right and adjust the right-hand stop screw until it rests against the boss on the steering arm. See Fig. 6.

Next set the road wheels straight ahead and turn the steering wheel two complete turns to the left of the straight-ahead position and adjust the left-hand stop screw.

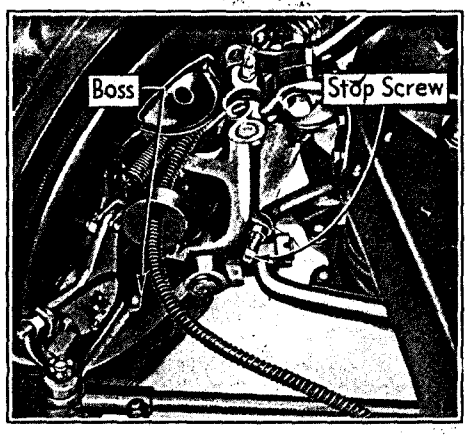


Fig. 6. The stop screw should be adjusted so as to strike the boss when the steering wheel is turned two complete revolutions from the straight ahead position of the front wheels.

3. Removal and Installation of Intermediate Steering Arm

To remove the intermediate steering arm, it is necessary first to disconnect the tie rods and the steering connecting rod from the arm and then to remove this arm and bracket assembly from the frame. The steering connecting rod is fastened to the steering arm in two ways, each of which requires a different method of removal. To disconnect the steering connecting rod from the steering arm on Cadillac cars, the rod is first loosened from the Pitman arm on the steering gear and then the rod screwed out of the end joint on the steering arm. On LaSalle cars, the plug in the front end of the steering connecting rod must be removed to disconnect the rod from the arm pivot ball.

The removal of the intermediate steering arm and bracket assembly in all cars is simply a matter of loosening it from the frame and working it out of position out of the frame cross member.

Disassembly of the Cadillac unit is accomlished by removing the top and bottom covers over the steering arm bearings (See Fig. 7) and then pressing the shaft out of the steering arm, using the press block J-606-1 and spindle J-606-2. The removal and installation of this shaft will require the use of a large press as it is an extremely tight fit in the arm. The roller bearings are next removed and all parts cleaned and checked for wear or other defects.

The LaSalle steering arm fulcrums on a bolt, as shown in Fig. 8 which is removed by taking off the retaining nut and pressing the bolt out from the bottom. The arm is then removed from the bracket and the bearings gently tapped out of position, after which all parts should be thoroughly cleaned and checked.

The intermediate steering arm unit in both Cadillac and LaSalle cars is assembled and installed in the reverse order of its removal and disassembly. Spindle J-606-3 should be used with the press block when assembling the shaft in the Cadillac unit. This tool also serves as a depth gauge for locating the shaft in the correct position.

The intermediate steering arm bearings in the Cadillac unit are adjusted by means of shims under the bearing covers. These bearings should be adjusted so that a load of one to two pounds will be required to move the arm with a spring scale fastened to the end to which the steering connecting rod is connected. Care must be exercised not to get the bearings too tight.

When installing the LaSalle intermediate steering arm, fill the space between the two ball bearings with G-12 lubricant. This is important. The nut on the fulcrum bolt should also be tightened just enough to remove all perceptible up and

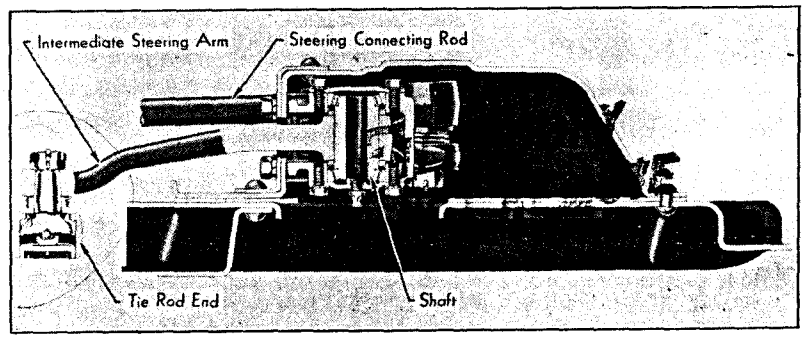


Fig. 7. Sectional view of Cadillac intermediate steering arm assembly. The tie-rod and steering arm ends are adjusted by screwing the plug all the way in and then backing it out ¼ turn. Use tool No. J-630 for turning the plug. The tie-rod ends on the LaSalle are not adjustable.

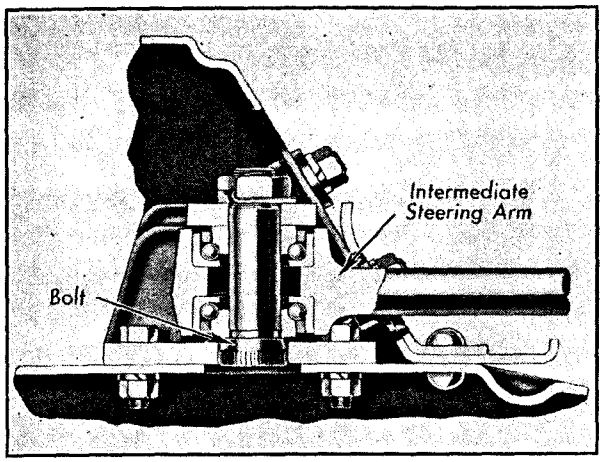


Fig. 8. Sectional view of LaSalle intermediate steering arm assembly.

down play in the bearings without causing them to bind. The arm must move freely.

4. Removal and Installation of Steering Knuckle Support

REMOVAL

To remove the steering knuckle support, it is first necessary to raise the front end of the chassis in addition to raising the front wheel by means of a jack. Then dismount the road wheel and remove the wheel hub and the steering knuckle assembly.

Two types of steering knuckle assemblies are used on the Series 30, 40 and 60 Cadillac cars. The first type is of conventional design, the same as used on the remaining Cadillac and LaSalle models. The second-type knuckle used on these Series cars (See Fig. 9) differs in the method of lubrication and makes few additional precautions necessary when removing and installing the steering knuckle pin. This second-type knuckle is lubricated by a single oiler of the pressure reservoir type, and a felt running the entire length of the steering knuckle pin, crossed at each bushing with a wick to provide contact lubrication at these points. A plunger from the oil reservoir bears against the knuckle pin, and, by means of a flat spot on the pin, is made to pump oil into the felt and wicking each time the wheels are turned in one direction. Lubricating gun tool No. J-599 is required for filling this oiler.

When removing this second-type knuckle, it is of the utmost importance that the wheel spindle be turned at right angles to the car with the wheels pointing straight ahead before removing the knuckle pin. See Fig. 9. If this precaution is not taken, the plunger on the oiler may be damaged or sheared off by the ledge above and below the flat spot on the pin. Turning the spindle at right angles to the car will bring the plunger on the rounded portion of the pin where there is no danger of damage.

With the steering knuckle assembly removed, the threaded pin connecting the shock absorber arms to the upper end of the steering knuckle support is next removed. Unless the support is to be replaced on the LaSalle the threaded pin at the top need not be disturbed as the top yoke may be disconnected from the shock absorber arms. Removing the threaded pin at the top of the support destroys the caster on either the Cadillac or the LaSalle cars. However, measurements can be taken that will make it possible to get the threaded pin back in its original position without the necessity of readjusting the caster with the aid of a caster gauge. Before removing the threaded pin, simply measure the clearance at either side between the support and the shock absorber arms or yoke. See Fig. 10. Then when reinstalling the threaded pin, adjust it to bring the steering knuckle support in the original position according to the measurements taken before the removal of the pin.

The steering knuckle support and lower yoke are next disconnected from the suspension arm. The support and lower yoke should be disassembled on the bench as the yoke bolt is a taper fit in both the bushings and the bolt will require considerable pressure to remove it.

Except on the first few cars, the bushings for the steering knuckle support yoke on the Cadillac models are protected from moisture and loss of lubricant by cover plates and cork gaskets held in place by a separate screw and nut through the hollow taper pin. See Fig. 11.

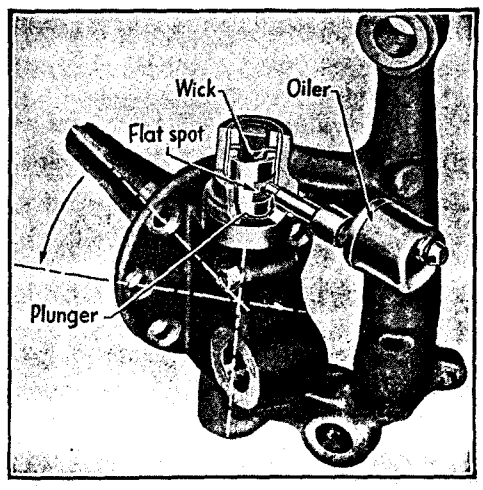


Fig. 9. Wheel spindles provided with pressure reservoir type oiler, must be turned at right angles to the car before removing the steering knuckle pin.

FRONT WHEEL SUSPENSION SYSTEM

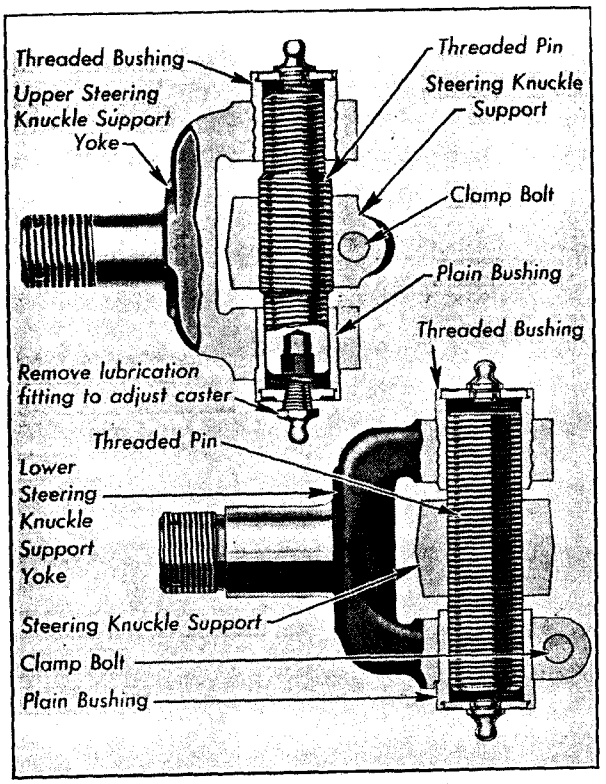


Fig. 10. LaSalle steering knuckle support yokes.

Whenever the taper pin or bushings on the first few cars are replaced, in addition to using the new type pin, the cover plates and gaskets should also be installed. The parts required are as follows:

Quantity Per Car	*Name*	*Part No.*
2	Taper Pins	1409226
4	Cover Plates	1409225
4	Cork Gaskets	1409223
2	Screws	1409222
2	Nuts	1409224

INSTALLATION

When installing the steering knuckle support on the lower suspension arm yoke on **Cadillac** cars the following procedure should be observed.

With *first-type pins* the threaded bushings should be turned in against the steering knuckle support allowing about ⅛-in. more clearance at the rear by installing the threaded bushing with the shoulder at this side. This is necessary to provide full caster adjustment at the top. Both threaded bushings should be turned in the same amount against the support so as to bring their outer ends approximately flush with the outer yoke surface. Before installing the threaded bushings, it is important that both bushings and the support be

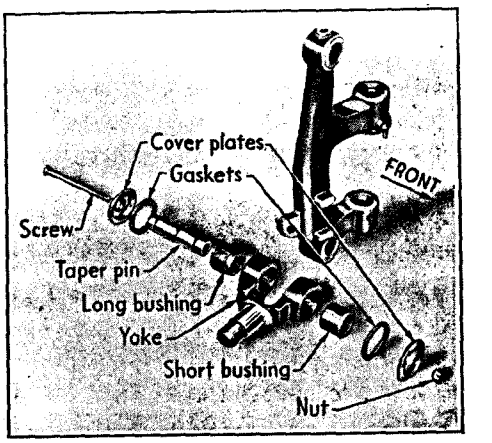


Fig. 11. The small end of the taper pin, stamped "small end" should be inserted from th erear. Likewise, the cover plate screw should be inserted from the rear.

thoroughly cleaned of all dirt to prevent binding of the threads. Then install the yoke bolt and securely tighten and lock it in position.

When adjusting the bushings with the *second-type pin*, the small end of the taper pin, stamped "small end," should be inserted loosely from the rear. With the short bushing in front flush with the front surface of the yoke, and the long bushing in the rear, flush with the rear surface of the yoke, insert the taper pin and adjust the bushings for $\frac{1}{16}$-in. clearance between the boss on the steering knuckle support and the inner face of the front half of the yoke as shown in Fig. 12. When this adjustment is secured, press in the taper pin until the ends are flush with the bushings.

Next install the cork gaskets and cover plates and hold in place with the bolt and nut. The

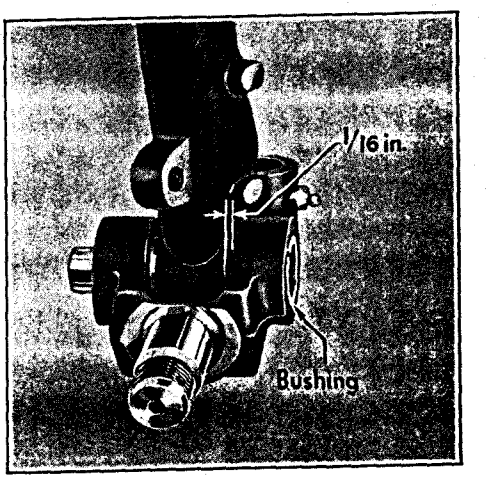


Fig. 12. With the taper pin inserted loosely, the bushings should be adjusted to provide $\frac{1}{16}$ in. clearance between the boss on the steering knuckle support and the inner face of the front half of the yoke.

nut should be drawn only enough to prevent leakage.

When installing the *second-type steering knuckle* in the support, the following procedure should be followed to assure adequate lubrication from the start.

Insert the bottom welch plug and squirt oil in the top opening until the felt is saturated and a pool forms over it.

Insert the top welch plug.

To install a lower yoke (See Fig. 10) on the steering knuckle support on **LaSalle** cars, place the yoke in position on the support and install the threaded pin, turning it in until it projects the same amount on either side of the support and so that the support locking pin can be installed. The plain bushing should then be installed in the side of the yoke with the clamp bolt screwing it on the threaded pin until, with the support centered in the yoke, there is .025 to .050 in. clearance between the hexagonal head on the bushing and the face of the yoke. Then install the threaded bushing in the other side of the yoke and screw it in tight. It may be necessary to change the position of the plain bushing slightly when installing the threaded bushing to allow for engagement of the threads. With the threaded bushing locked in position there should be no binding between the yoke and the threaded pin.

When installing the upper yoke (See Fig. 10) on the steering knuckle support on **LaSalle** cars, turn the threaded pin in the support until, with a $\frac{5}{16}$-in. clearance between the front side of the support and the inside of the yoke, the threaded pin is just flush with the front side of the yoke. Then tighten the clamp screw in the support. Next install the front bushing, screwing it on the threaded pin until the clearance between the front side of the support and the inside of the yoke is reduced to $\frac{1}{4}$ in. and so that the rear bushing can be easily threaded into position. Then install the rear bushing and screw it in tight. With the rear bushing in position, there should be .025 to .050 in. clearance between the hexagonal head on the front bushing and the front face of the yoke. There should be no binding between the yoke and the threaded pin.

After installing the steering knuckle support and reassembling the various other parts on both the Cadillac and the LaSalle, the caster must be readjusted as the caster setting is destroyed by the removal of the threaded pin at the top of the steering knuckle support. This may be accomplished by the use of a caster gauge or by means of measurements taken before the threaded pin is removed, as already explained in this section.

5. Front Wheel Alignment

Front wheel alignment is the mechanics of keeping all interrelated parts affecting steering in proper adjustment. Correct alignment is essential to keep the front wheels in their true running position for easy and efficient steering and the prevention of abnormal tire wear.

The elements involved in front wheel alignment are caster, camber with the inclination of the steering knuckle bolts, toe-in and toe-out on turns. These elements are all related and dependent upon each other. In addition to these elements, there are several other factors that affect the alignment of the wheels: namely, tire inflation, wheel wobble, wheel and tire balance, straightness of wheel suspension parts and the frame, alignment of wheels with frame, adjustment of the wheel and steering knuckle bearings, the steering gear and connections, and the shock absorbers, and proper lubrication of the shock absorbers.

No set rule can be given for the sequence of operations in checking and correcting front wheel alignment. Neither can the exact cause of any form of misalignment be given, as much depends upon the age of the car and consequently the condition of the parts. The factors affecting alignment and the elements of alignment should, however, be checked in the following order as closely as possible.

FACTORS AFFECTING ALIGNMENT

1. Tire Inflation.
   Checking and inflating the tires to the proper pressure is the very first operation of any wheel alignment job.
2. Running of wheels such as out of true, out of balance and not tracking.
3. Adjustment of front wheel bearings.
4. Condition of shock absorbers.
5. Adjustment of steering gear and connections.

Elements of Alignment

6. Caster angle of steering knuckle support.
7. Camber angle and knuckle bolt inclination.
8. Toe-in of front wheels in straight ahead position.
9. Toe-out of front wheels on turns.

Note: All alignment checks should be made with the weight of the car on the wheels.

FRONT WHEEL SUSPENSION SYSTEM

WHEELS AND TIRES

Tire Pressure

One of the most important factors in the maintenance of good steering and in the prevention of excessive tire wear is proper inflation of the tires. See Page 174 for correct tire pressures. Low tire pressure not only causes hard steering and undue tire wear but it also aggravates any tendency of the front wheels to shimmy or tramp. The use of tires of different make, design or size, may also contribute to wheel misalignment.

When a tire is soft or under-inflated, a broad surface is formed at the bottom where it contacts with the ground, which results in excessive tire friction and hard steering. A condition of slight misalignment is also caused by under-inflation which tends to result in erratic performance of the wheels and consequently the steering system.

Wheel Wobble

Wheel wobble must be corrected or eliminated as much as possible before checking the elements of alignment. See Wheel Alignment, Page 173. Any remaining wobble or high spot on the tire should be marked with chalk, as indicated in Fig. 20, to aid in locating the wheels in the proper position when checking the alignment angles.

Excessive wobble will cause spotty tire wear and prevent correct alignment of the axle assembly.

Wheel Eccentricity

The wheels and tires should also run as nearly concentric as possible with the steering knuckle spindle. See Wheel Alignment, Page 173. Aside from causing unnecessary tire wear, eccentricity in wheels and tires also tends to set up a vertical movement in them which is closely associated with shimmy and tramp.

Wheel and Tire Balance

Proper balance of the front wheels, tires and brake drums is another essential factor in the maintenance of good steering. Each wheel assembly should be properly balanced in order to avoid the possibility of tramp or high speed shimmy. Tire balance also affects tire wear. Likewise, the rear wheels should be balanced, as an unbalanced condition will set up vibrations which will affect the performance of the front wheel suspension system as well as the riding quality of the car. See Balancing Tires and Wheels, Page 174.

Tracking of Wheels

Another essential factor in the maintenance of good steering and in the prevention of excessive tire wear is the tracking of the rear wheels with the front ones. Failure of the wheels to track is usually quite obvious upon following the car on the highway.

It is very important to check the position of the rear axle on the springs and to make sure that the spring center bolts are not sheared as these bolts serve to keep the axle in place. If the wheels do not track, and the axle is straight and in the proper position, the wrong type of spring may be in use, the spring eye may be partly straightened out or the frame may be bent.

Wheel Bearings

Correct adjustment of the front wheel bearings is essential for proper performance of the front wheel suspension system and consequently efficient steering. Adjust the bearings as explained on Page 173.

Shock Absorbers

Good steering is more or less dependent on proper performance of the shock absorbers. Front wheel shimmy and tramp are oftentimes traceable to shock absorbers that are incorrectly or unevenly adjusted, improperly lubricated or inoperative. It is imperative that the shock absorbers be checked and properly serviced when found to be out of order. They should also be checked for equal performance and proper lubrication.

Steering Gear and Connections

Another very important factor in maintaining good steering is proper adjustment and lubrication of the steering gear and connections. An incorrectly adjusted steering system may cause any of the steering complaints, even though the front wheels are in correct alignment.

Before any attempt is made to adjust the steering gear, the steering connections should be checked and readjusted or new parts installed if necessary. Binding or excessive looseness in the connections should be tested for by raising the front wheels off the floor and moving the connections by hand.

Correct lubrication of the steering system is also necessary to good steering. The recommendations made in the lubrication section should be followed.

CASTER ANGLE

Caster is the angle of backward inclination between the steering knuckle bolt and vertical. See Fig. 14, Plate 2. The caster angle is obtained by tilting the top of the steering knuckle support back and is established by the design of the front wheel suspension system.

Only a slight amount of caster is necessary to stabilize steering. Excessive caster causes hard steering due, among other factors, to the increasing tendency of the front wheels to toe-in. Too much caster is also undesirable as the weight of the car then has a tendency to turn the wheels in at the front around their respective steering knuckle bolts, resulting in wheel shimmy.

FRONT WHEEL SUSPENSION SYSTEM

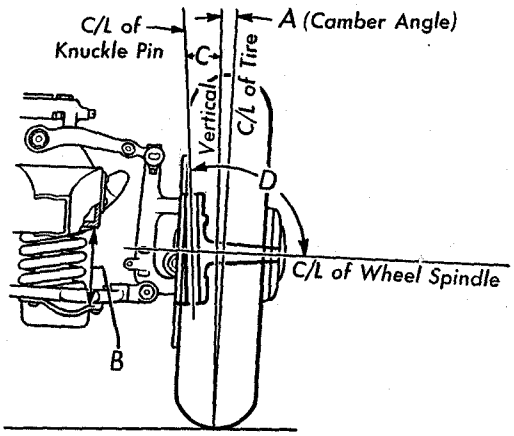


Fig. 13

Elements of Front Wheel Camber

Check camber with top surface of spring support distance "B" below bottom side of frame

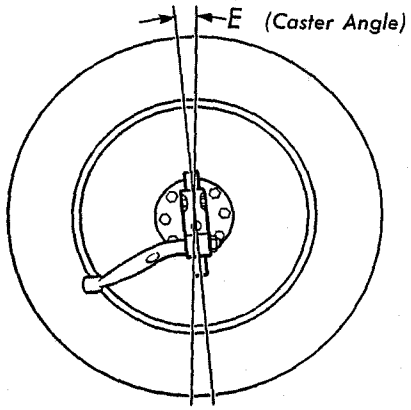


Fig. 14—Front Wheel Caster

Check with caster gauge on level floor. Caster angle may be changed by turning threaded pin at top of steering knuckle support

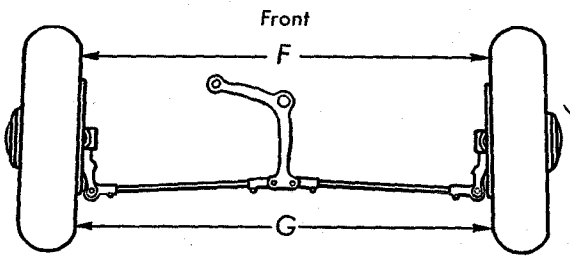


Fig. 15

Front Wheel Toe-in

Check with front wheel aligning gauge. Adjust by turning tie rods

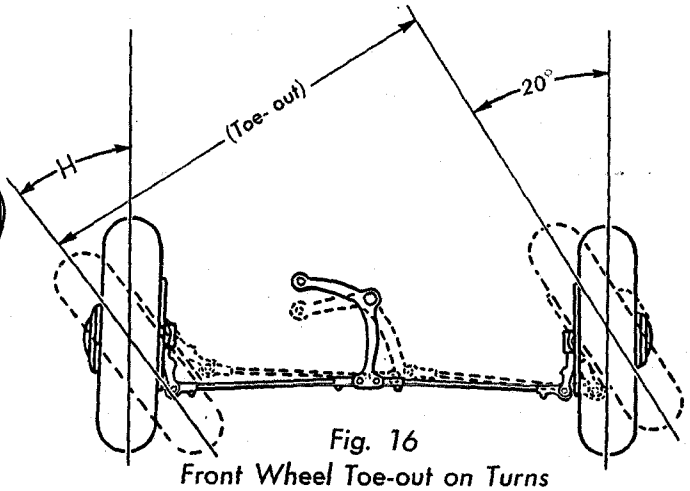


Fig. 16

Front Wheel Toe-out on Turns

Check toe-out of inside wheel with outside wheel set at a 20° angle with the straight ahead position

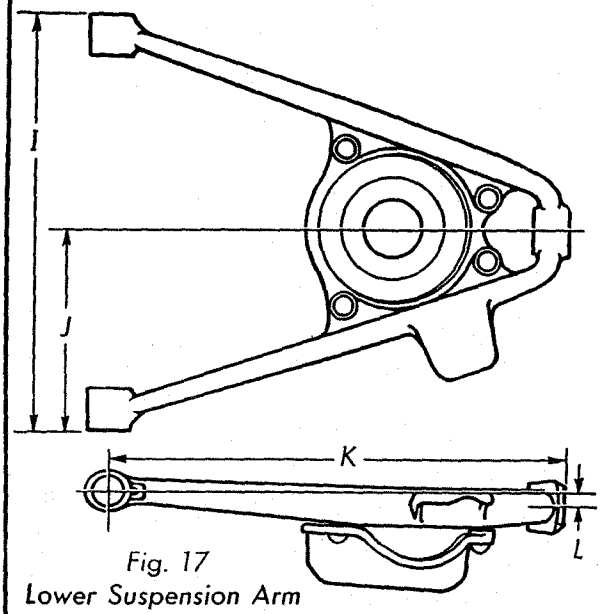


Fig. 17

Lower Suspension Arm

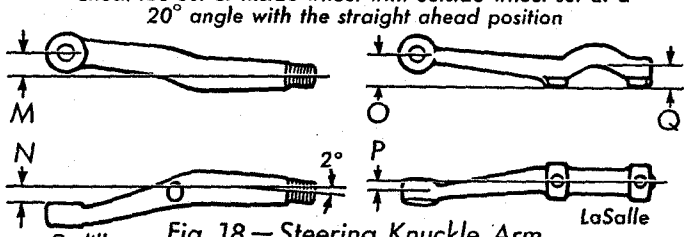


Fig. 18—Steering Knuckle Arm

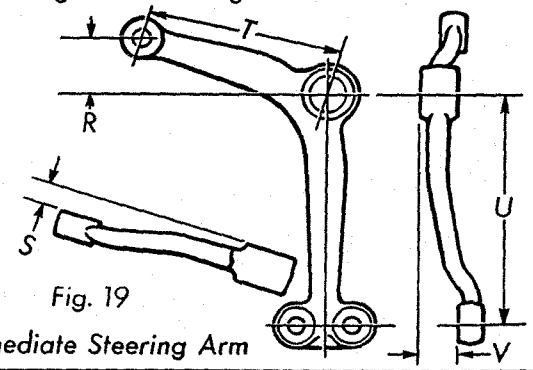


Fig. 19

Intermediate Steering Arm

Plate 2. Alignment of Front Wheels and Suspension Parts (Part 1)

FRONT WHEEL SUSPENSION SYSTEM

Specifications—Figs. 13 to 19, Inclusive

	350	355-D			370-D	452-D
		Series 10	Series 20	Series 30		
A	¼-1°	¾-1½°	¾-1½°	¾-1½°	¾-1½°	¾-1½°
B	3 13/16"	5 3/16"	5 3/16"	5 3/16"	5 3/16"	5 3/16"
C	4° 51'	3½°	3½°	3½°	3½°	3½°
D	95° 51' 10"	95°	95°	95°	95°	95°
E	1½-2°	3°	3°	1°	1°	1°
F-G	"F" should be 0-1/16 in. less than "G" measured against tire side wall 8 in. above floor					
H	1¾-3¼°	2-3½°	2-3½°	2-3½°	2-3½°	2-3½°
I	16⅞"	16⅞"	16⅞"	16⅞"	16⅞"	16⅞"
J	8 7/16"	8 7/16"	8 7/16"	8 7/16"	8 7/16"	8 7/16"
K	18¼"	18¼"	18¼"	18¼"	18¼"	18¼"
L	⅜"	⅜"	⅜"	⅜"	⅜"	⅜"
M	.....	⅞"	⅞"	⅞"	⅞"	⅞"
N	.....	23/32"	23/32"	23/32"	23/32"	23/32"
O	1¼"	.....	.....	.....	.....	.....
P	37/64"	.....	.....	.....	.....	.....
Q	25/32-13/16"	.....	.....	.....	.....	.....
R	1¼"	2 5/16"	2 5/16"	2 5/16"	2 5/16"	2 5/16"
S	2¼"	⅞"	⅞"	⅞"	⅞"	⅞"
T	8 13/16"	7½"	7½"	7½"	7½"	7½"
U	8 11/16"	9 3/16"	9 3/16"	9 3/16"	9 3/16"	9 3/16"
V	1 27/64"	1 11/16"	1 11/16"	1 11/16"	1 11/16"	1 11/16"

Insufficient caster results in car wander which makes it difficult to keep a car travelling ahead in a straight course. Reverse caster results in erratic steering. A car under this condition will tend to go from one side of the road to the other, will turn curves easily but will be difficult to straighten out at the end of the curve.

Adjustment

The amount of caster is 3° on the 355-D Series 10 and 20 Cars, 1° on the remaing Cadillac models and 1½ to 2° on the LaSalle with the weight of the car on the front wheels.

Before checking the caster angle, it is important to remove all extras such as shimmy dampening devices, etc., from the front wheel suspension system. The car is then lowered to bring all of the weight on the wheels, after which it should be moved back and forth a full turn of the wheels to relieve the tire tension. Also see Fig. 20.

The caster angle should come within the limits given above. Equal caster or the same amount within ½ degree on both sides of the car is extremely important. Unbalanced caster will cause a car to pull to one side, usually towards the side with the least amount of caster, causing undue tire wear, hard steering and wheel shimmy.

Necessary corrections in caster are made by adjusting the threaded pin, which connects the shock absorber arms to the upper end of the steering knuckle support.

On Cadillac cars first loosen the yoke on the lower suspension arm and then turn the threaded pin to the right or clockwise on the right side of the car as viewed from the driver's seat to move the top of the steering knuckle support toward the rear, increasing the caster, and turn it oppositely to move the top of the support toward the front, decreasing the caster.

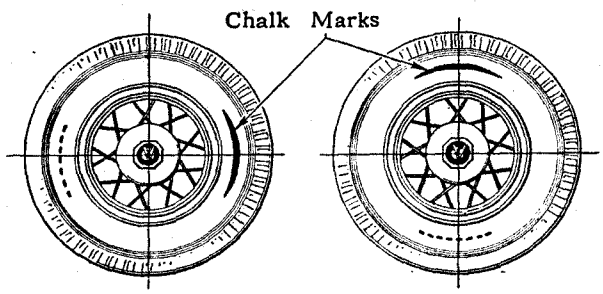


Fig. 20. The front wheels should be turned on their bearings to bring the high spot or that portion of the tire with the greatest run-out toward the front or rear as shown at the left when checking caster, camber, and knuckle pin inclination and at the top or bottom as shown at the right when checking toe-in and toe-out

FRONT WHEEL SUSPENSION SYSTEM

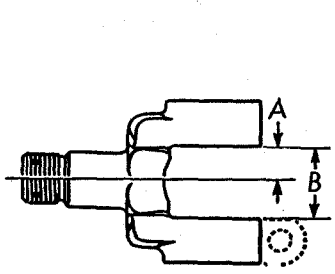


Fig. 21
Lower Steering Knuckle Support Yoke
Dotted lines indicate LaSalle construction.

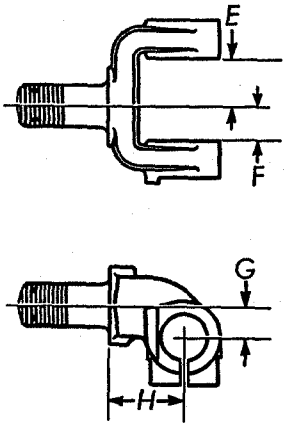
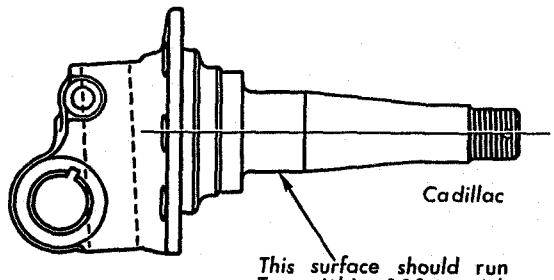


Fig. 22
Upper Steering Knuckle Support Yoke—LaSalle



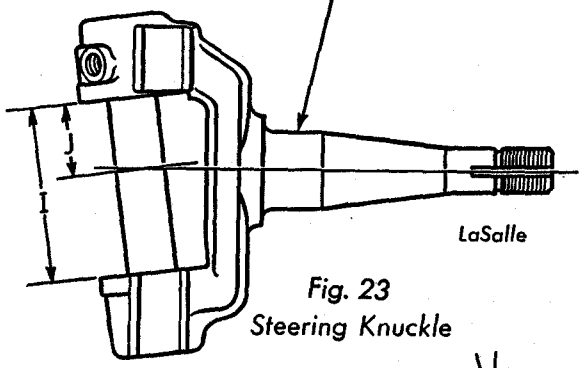
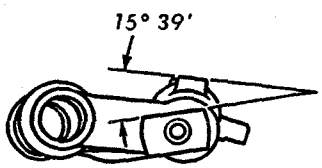
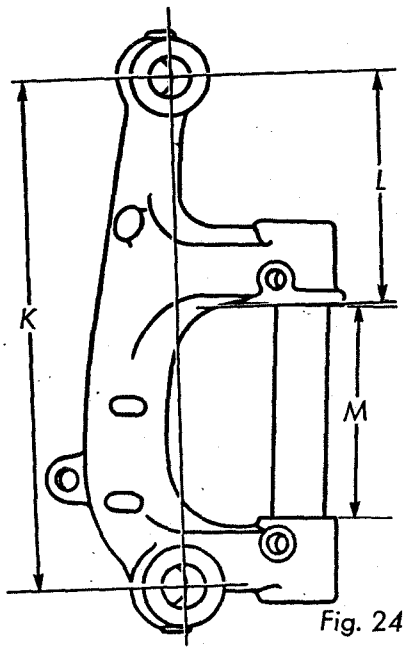


Fig. 23
Steering Knuckle





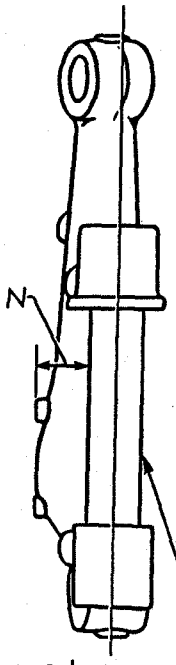


Fig. 24
Steering Knuckle Support
Cadillac

Holes in support should be straight with knuckle pin.

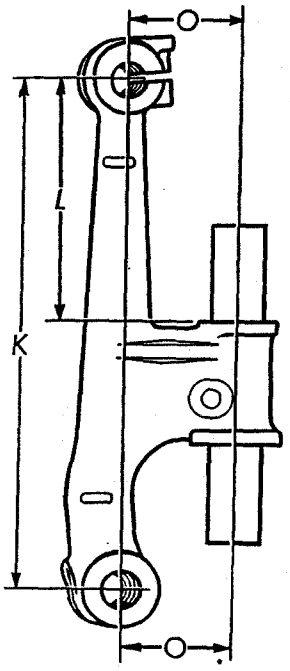


Fig. 25
Steering Knuckle Support—LaSalle

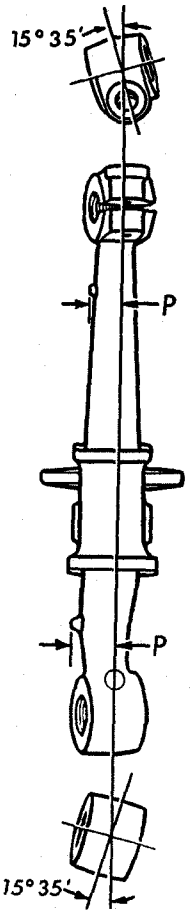


Plate 3. Alignment of Front Wheel Suspension and Steering System Parts (Part 2)

FRONT WHEEL SUSPENSION SYSTEM

Specifications—Figs. 21 to 25, Inclusive

	350	355-D			370-D	452-D
		Series 10	Series 20	Series 30		
A	27/32"	3/4"	3/4"	3/4"	3/4"	3/4"
B	1 11/16"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
C	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
D	1 3/4"	1 3/4"	1 3/4"	1 3/4"	1 3/4"	1 3/4"
E	1 1/16"	.....	.....	.....	.....	.....
F	3/4"	.....	.....	.....	.....	.....
G	5/8"	.....	.....	.....	.....	.....
H	1 1/2"	.....	.....	.....	.....	.....
I	3 3/64"	.....	.....	.....	.....	.....
J	1 1/4"	.....	.....	.....	.....	.....
K	10 7/32"	10 21/32"	10 21/32"	10 21/32"	10 21/32"	10 21/32"
L	4 57/64"	4 53/64"	4 53/64"	4 53/64"	4 53/64"	4 53/64"
M	.....	4 33/64"	4 33/64"	4 33/64"	4 33/64"	4 33/64"
N	.....	1 3/32"	1 3/32"	1 3/32"	1 3/32"	1 3/32"
O	2 15/32"	.....	.....	.....	.....	.....
P	Upper 1 1/2" Lower 3/4"	.....	.....	.....	.....	.....

On the left side of the car, the caster adjusting pin is installed with the head toward the front. Therefore, the left pin must be turned to the left or counter clockwise, as viewed from the front, to increase the caster and to the right to decrease the caster. One complete turn of the threaded pin changes the caster one-half degree. After completing the adjustment, the threaded pins should be securely locked in position. Precaution should be taken to adjust both wheels to have exactly the same amount of caster.

When making the caster adjustment on LaSalle cars, the retaining nuts fastening the steering knuckle support yokes to the upper and lower suspension arms and the clamp screw at the upper end of the support should first be loosened and the lubrication fitting removed from the front bushing in the upper support yoke. The threaded pin in the upper yoke is then turned with an Allen wrench, tool No. J-619, inserted through the hole in the front bushing from which the lubrication fitting was removed. Turn the threaded pin in a clockwise direction to increase the caster and in a counter-clockwise direction to decrease the caster angle on both sides of the car. After completing the caster adjustment tighten the yoke retaining nuts and the support clamp screw and install the lubrication fitting.

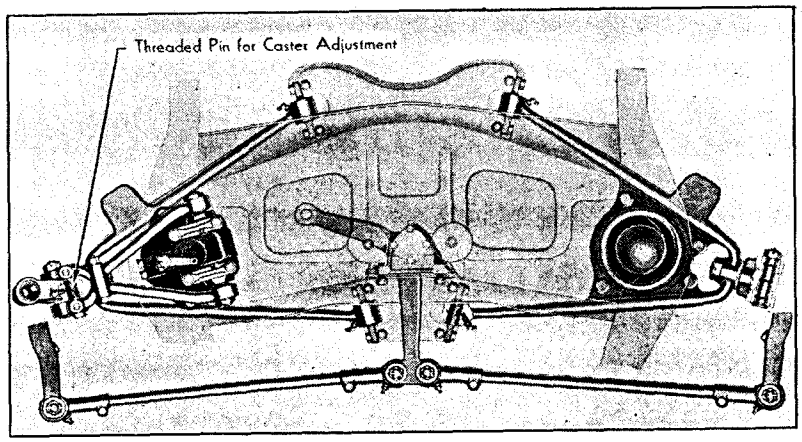


Fig. 26. Front wheel suspension system viewed from above, showing the shock absorber arms at the left and the lower suspension arm at the right.

FRONT WHEEL SUSPENSION SYSTEM

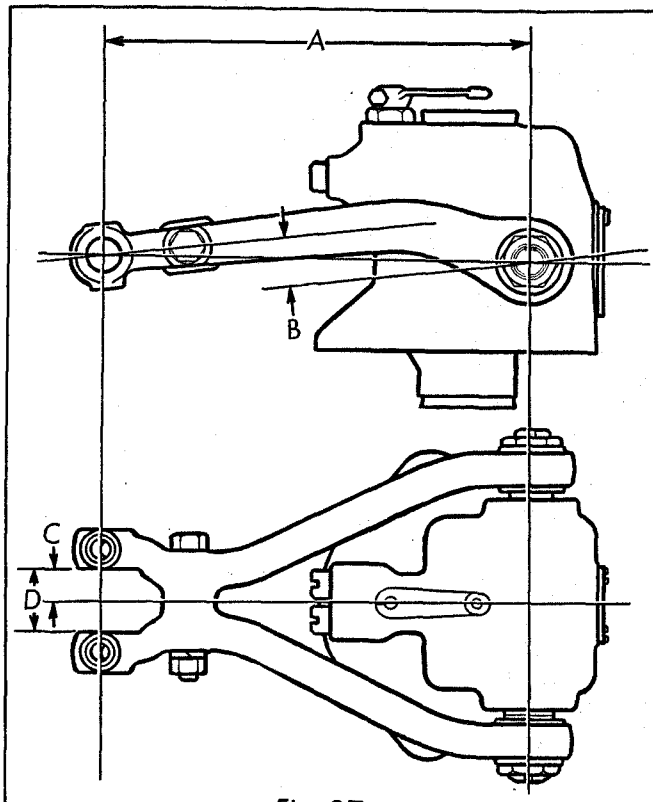


Fig. 27
Front Shock Absorber Arms—Cadillac

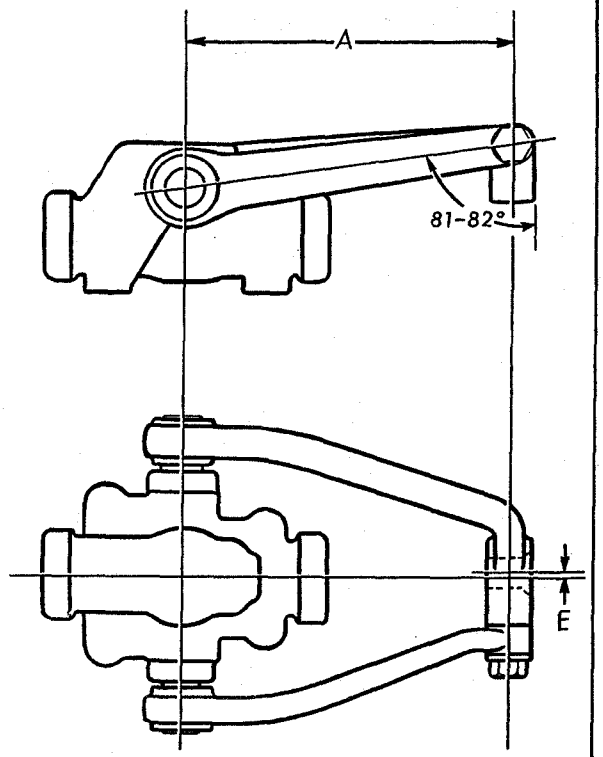


Fig. 28
Front Shock Absorber Arms—LaSalle

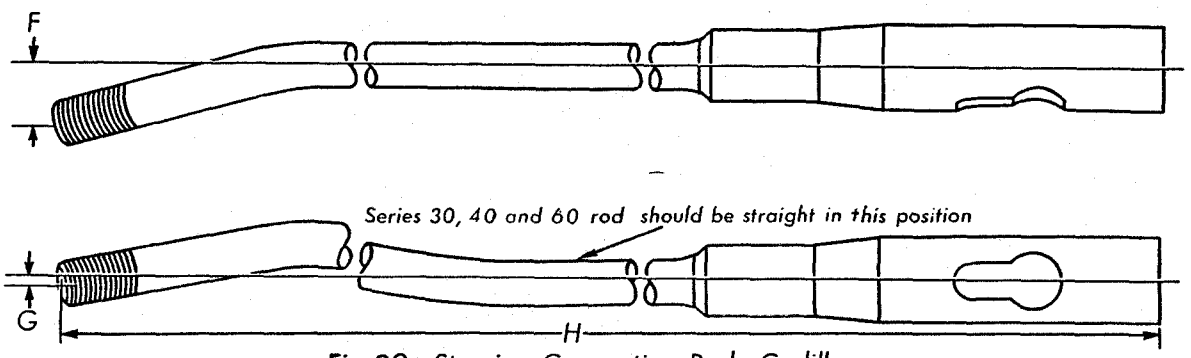


Fig. 29—Steering Connecting Rod—Cadillac

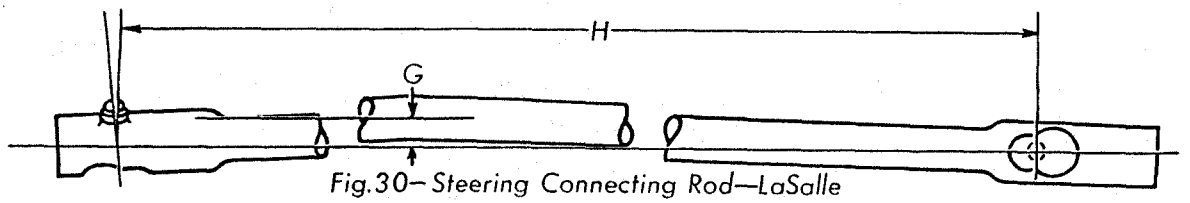


Fig. 30—Steering Connecting Rod—LaSalle

Rod should be straight when turned 90° from position shown.

Plate 4. Alignment of Front Wheel Suspension and Steering System Parts (Part 3)

FRONT WHEEL SUSPENSION SYSTEM

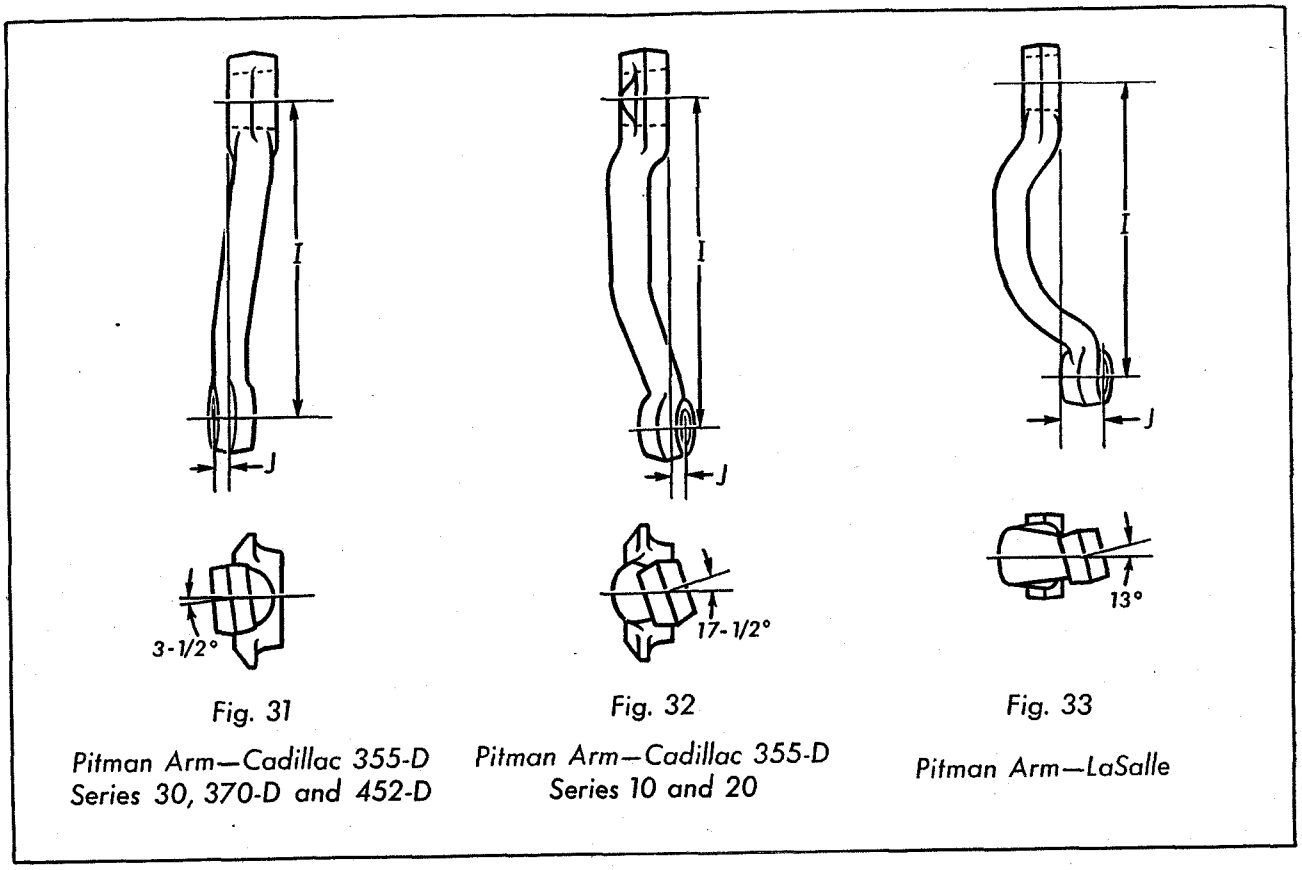


Fig. 31 — Pitman Arm—Cadillac 355-D Series 30, 370-D and 452-D

Fig. 32 — Pitman Arm—Cadillac 355-D Series 10 and 20

Fig. 33 — Pitman Arm—LaSalle

Plate 5. Alignment of Front Wheel Suspension and Steering System Parts (Part 4)

Specifications—Figs. 27 to 33, Inclusive

	350	355-D			452-D	370-D
		Series 10	Series 20	Series 30		
A	$8\frac{21}{64}$″	$10\frac{1}{64}$″	$10\frac{1}{64}$″	$10\frac{1}{64}$″	$10\frac{1}{64}$″	$10\frac{1}{64}$″
B	.....	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{4}$″
C	.....	$\frac{13}{16}$″	$\frac{13}{16}$″	$\frac{13}{16}$″	$\frac{13}{16}$″	$\frac{13}{16}$″
D	.....	$1\frac{5}{8}$″	$1\frac{5}{8}$″	$1\frac{5}{8}$″	$1\frac{5}{8}$″	$1\frac{5}{8}$″
E	$\frac{15}{64}$″	.....	.....	.....	.....	.....
F	0″	$1\frac{1}{8}$″	$1\frac{1}{8}$″	$3\frac{15}{32}$″	$3\frac{15}{32}$″	$3\frac{5}{32}$″
G	1″	$\frac{7}{64}$″	$\frac{7}{64}$″	0″	0″	0″
H	$30\frac{11}{16}$″	$35\frac{3}{8}$″	$35\frac{3}{8}$″	$25\frac{3}{32}$″	$25\frac{3}{32}$″	$34\frac{3}{4}$″
I	$6\frac{1}{2}$″	$7\frac{1}{4}$″	$7\frac{1}{4}$″	7″	7″	7″
J	$\frac{53}{64}$″	$\frac{19}{64}$″	$\frac{19}{64}$″	$\frac{13}{32}$″	$\frac{13}{32}$″	$\frac{13}{32}$″

FRONT WHEEL SUSPENSION SYSTEM

CAMBER

Camber is the outward tilt of the front wheels at the top and results in the bottom of the wheels coming more nearly under the load. See Fig. 13, Plate 2. The purpose of camber is to support the greater part of the car weight on the inner wheel bearings, to reduce side thrust on the steering knuckle bolts, to compensate for looseness and wear in the steering knuckle and wheel bearings and to bring the point of pivot near the center of the tire tread in contact with the road for center point steering.

The many advantages of camber, however, are partially offset by the undesirable effect it has on tire contact with the road. With cambered wheels, the outer edge of the tread rolls on a smaller circumference than the inner edge and this condition increases with an increase in camber or a decrease in the tire inflation pressure. Since the wheel moves straight ahead, a portion of the tire must slip under this condition, causing excessive wear. This is one of the many reasons why the tires should be kept inflated to the recommended pressure.

Reverse camber also causes excessive tire wear due to the inner edge of the tread rolling on a smaller circumference.

Since too much camber is undesirable, some other means is necessary to give the effect of camber which is required for easy steering and minimum wear of parts. This condition is obtained by inclination of the steering knuckle bolts. It is obvious, therefore, that the angle or inclination of the steering knuckle bolts is closely associated with wheel camber in its effect on steering. The angle of the steering knuckle bolts is determined by the design of the front wheel suspension system and varies in different car models

Adjustment

Camber of the front wheels should be ¾ to 1½° on all Cadillac cars and ¼ to 1° on the LaSalle with the top surface of the lower spring support the distance "B," Fig. 13, Plate 2, below the under surface of the frame.

When checking the camber, the front wheels should be turned on their bearings to bring the high spot on the side of the tires in the horizontal plane toward the front or rear of the car as shown in Fig. 20.

The camber angle should come within the limits just given. It should also be the same on both sides within ½ degree. Unequal camber may cause a car to pull to one side usually the one having the greatest camber, thus contributing to wheel shimmy and spotty tire wear.

When the camber angle is found incorrect, the inclination of the steering knuckle bolt should also be checked, because the knuckle or the support may be bent and not the suspension arms. Incorrect inclination of the steering knuckle bolt indicates bent suspension arms or steering knuckle support while wrong camber may be due either to a bent support or suspension arms or to a bent steering knuckle.

An error in camber when due to bent parts should be corrected by the use of new parts.

Changing the camber by the installation of new parts also affects slightly the turning angle of the wheels. Therefore, the toe-out of the wheels on turns should also be checked after making a camber correction.

It is also advisable after making a camber correction to change the tires, putting the front ones on the rear wheels and the rear ones on front, to provide a normal tire contact of the tires on the front wheels with the ground.

Camber corrections are not generally recommended by the factory. Extreme conditions may, however, be encountered in which it is advisable to change the camber setting.

Camber corrections may be made by installing shims between the suspension arms and the yokes on the steering knuckle support. On the LaSalle, a shim installed between the shock absorber arm and the upper yoke on the steering knuckle support increases the camber and a shim placed between the lower suspension arm and the lower steering knuckle support yoke decreases the camber. A $\frac{1}{16}$-in. shim changes the camber approximately $\frac{1}{3}$ degree.

Due to the construction of the Cadillac front wheel suspension system, it is only possible to decrease the camber by placing shims between the steering knuckle support yoke and the lower suspension arm. No change can be made at the upper end of the steering knuckle support or at the lower suspension arm for increasing the camber.

TOE-IN

The setting or adjustment of the front wheels, so that the distance between them is less at the front than at the rear is called toe-in. See Fig. 15, Plate 2. Toe-in is necessary as camber tends to cause the wheels to run out or separate at the front. Sufficient toe-in is necessary, therefore, to compensate for this tendency and make the wheels roll straight ahead.

Excessive toe-in or toe-out will cause abnormal tire wear. Too much toe-in will cause the tread sections to wear with a feathered edge at the inner side. Insufficient toe-in or toe-out of the wheels in the straight ahead position will cause the tread to wear with the feathered edges toward the outside.

Adjustment

Toe-in of the front wheels should be 0 to $\frac{1}{16}$ in. Before the toe-in of the front wheels is checked, the wheels and tires should be made to run as nearly true as possible, regardless of the type of equipment used for measuring the toe-in. To

check toe-in, the front wheels should be in the straight ahead position and when the measurements are taken from the side of the tire the wheels should be turned on their bearings to bring the high spot on the side of the tires in a vertical plane at the top or bottom, as shown in Fig. 20. The toe-in dimensions should come within the limits just given.

Toe-in of the front wheels is adjusted by means of the tie rods and must be set to make the front tires run with a true rolling contact. Turning the tie rods in the same direction as the wheels revolve, when the car moves forward, decreases the toe-in and turning it in the opposite direction increases the toe-in. Large errors in toe-in indicate bent steering knuckle arms. Toe-in must be corrected before checking toe-out on turns.

When making the toe-in adjustment, the rear end of the intermediate steering arm must be exactly at the center of the car. Both tie rods are then turned an equal amount to retain the same distance between the rear end of the intermediate steering arm and the front wheels. One tie rod must not be adjusted alone.

TOE-OUT ON TURNS

In addition to the front wheel settings previously described, there is another very important action of the front wheels, which has a great effect on tire wear. This action is toe-out on turns. See Fig. 16, Plate 2. In other words, when the front wheels are turned to the right or left they separate slightly at the front, depending on the amount of deflection from the straight ahead course, instead of retaining their toe-in relation. The wheel making the inside or smaller circle turns a greater angle than the outside wheel, thus making toe-out necessary on curves. The amount of toe-out increases as the turn increases due to the increasing angle between the wheels.

Toe-out of the front wheels is a result of steering knuckle arm design and is dependent on the alignment of these arms. The setting of the arms is at an angle with one another and with the center line of the car instead of straight back in order to maintain the proper relation of the front wheels on turns. In other words, if these arms were extended back far enough toward the rear of the car they would intersect or cross at a point in front of the rear axle, varying with the wheelbase of the car. The angle of these arms depends upon their length, the wheel base of the car and the distance between the steering knuckle bolts.

Adjustment

Toe-out of the front wheels should be 2 to 3½° on the Cadillac cars and 1¾ to 3¼° on the LaSalle.

The toe-out is checked by turning the wheels to the right or left, locating the outside wheel in a definite position. With the outside wheel set to 20°, the setting of the inside wheel should come to 22-23½° on the Cadillac and 21¾-23¼° on the LaSalle.

Errors in the setting of the inside wheel are due to bent steering knuckle arms. When these arms are bent, the wheels will not turn in the proper relation on curves, which condition will affect the toe-out and result in excessive tire wear. Bent arms, however, will not necessarily affect the straight ahead driving.

When the steering knuckle arms are found bent or sprung out of line they should be replaced with new ones. Before discarding them, however, a careful check should be made to make sure that the steering knuckle support or suspension arms are not bent, the camber and caster are correct, and the same on both sides, the toe-in is correct and the front and rear wheels are parallel.

Front Wheel Alignment Diagnosis Chart

Effect	Cause	Remedy.
Hard Steering (Indicated by tightness in steering system)	Low or uneven tire pressure.	Inflate tires to proper pressure
	Steering gear or connections adjusted too tight.	Test steering system for binding with front wheels off floor. Adjust as necessary and lubricate.
	Steering tie rod ends adjusted too tight. (Cadillac only).	Check for binding with front wheels off floor. Adjust as required and lubricate.
	Insufficient or incorrect lubricant used.	Check lubricant in steering gear and lubricate steering system as required.

FRONT WHEEL SUSPENSION SYSTEM
Diagnosis Chart

Effect	Cause	Remedy
Hard Steering (Continued)	Excessive caster.	Check caster and adjust as necessary.
	Suspension arms bent or twisted.	Check wheel alignment by testing the camber, knuckle bolt inclination and caster. If arms are out of car, check against specifications given in Plate 2. Replace arms with new ones.
	Front springs sagged.	Check overall length of springs. Sagged springs should be replaced with new ones.
	Frame bent or broken.	Check frame for proper alignment and breakage. Repair or replace frame as necessary.
	Steering knuckle bent.	Replace with new knuckle.
Excessive Play or Looseness in Steering System	Steering gear or connections adjusted too loose or worn.	Adjust or install new parts as necessary.
	Steering knuckle bearings worn.	Install new bearings.
	Front wheel bearings incorrectly adjusted or worn.	Adjust bearings or replace with new parts as necessary
Erratic Steering on Application of Brakes	Low or uneven tire pressure.	Inflate tires to proper pressure.
	Brakes incorrectly or unevenly adjusted.	Adjust brakes.
	Front springs weak.	Replace with new springs of correct type
	Insufficient or uneven caster.	Check caster and adjust as necessary.
	Steering knuckle bent.	Replace with new knuckle.
Car Pulls to one Side	Low or uneven tire pressure.	Inflate tires to proper pressure.
	Rear wheels not tracking with front wheels.	Check alignment of rear wheels with front wheels and correct as necessary.
	Brakes incorrectly or unevenly adjusted.	Adjust brakes.
	Shock absorbers incorrectly or unevenly adjusted, improperly lubricated or inoperative.	Check adjustment and correct as necessary. Also make sure they are properly lubricated.
	Wheel bearings adjusted too tight.	Check for binding with front wheels off floor. Adjust bearings and lubricate.
	Toe-in incorrect.	Adjust tie rods to make front wheels toe-in proper amount.
	Incorrect or uneven caster.	Check caster and adjust as necessary.
	Incorrect or uneven camber.	Check camber and correct by replacing parts or using shims as necessary.
	Front springs sagged.	Check overall length of springs. Sagged springs should be replaced with new ones.
	Rear spring eye straightened out.	Replace main or eye leaf or spring assembly.
	Rear axle shifted. (Spring clip bolts loose or center bolt sheared.)	Check spring clips for looseness. Also measure from rear spring bolt to axle housing. This distance should be uniform on both sides of car.

FRONT WHEEL SUSPENSION SYSTEM
Diagnosis Chart

Effect	Cause	Remedy
Car Pulls to One Side (Continued)	Frame bent or broken.	Check frame for proper alignment and breakage. Repair or replace frame as necessary.
	Steering knuckle bent.	Replace with new knuckle.
	Steering knuckle arm bent.	Check by testing toe-out. Replace with new arm.
Scuffed Tires	Tires improperly inflated.	Inflate tires to proper pressure.
	Wheels or tires out of true.	Check for wheel and tire wobble. See that wheels and tires are properly mounted.
	Steering knuckle bearings worn	Install new bearings.
	Toe-in incorrect.	Adjust tie rods to make front wheels toe-in proper amount.
	Uneven caster.	Check caster and adjust as necessary.
	Incorrect toe-out on turns.	Replace steering knuckle arms with new ones.
	Suspension arms bent or twisted.	Check wheel alignment by testing camber, knuckle bolt inclination and caster. If arms are out of car, check against specifications given in Plate 2. Replace arms with new ones.
	Steering knuckle bent.	Replace with new knuckle.
	Excessive speeds on turns.	Caution driver.
Cupped Tires	Tires improperly inflated	Inflate tires to proper pressure.
	Normal cupping of tires.	Explain to owner that such cupping is due to normal action of non-skid tires on the road.
	Wheels, tires or brake drums out of balance.	Balance wheels and tires. Also check for out of balance brake drums and for eccentric or bulged tires and replace as necessary.
	Dragging brakes. (Incorrectly adjusted.)	Adjust brakes.
	Worn steering knuckle bearings or wheel bearings incorrectly adjusted or worn.	Adjust or replace parts as necessary.
	Uneven caster.	Check caster and adjust as necessary.
	Steering knuckle bent	Replace with new knuckle.
Front Wheels Shimmy	Low or uneven tire pressure.	Inflate tires to proper pressure.
	Steering connections incorrectly adjusted or worn.	Adjust or install new parts as necessary.
	Front wheel bearings incorrectly adjusted or worn.	Adjust bearings or replace with new parts as necessary.
	Shock absorbers incorrectly or unevenly adjusted, improperly lubricated or inoperative.	Check adjustment and correct as necessary. Also make sure they are lubricated.
	Steering knuckle bearings worn.	Install new bearings.

FRONT WHEEL SUSPENSION SYSTEM
Diagnosis Chart

Effect	Cause	Remedy
Front Wheel Shimmy (Continued)	Toe-in incorrect.	Adjust tie rods to make front wheels toe-in proper amount.
	Incorrect or uneven caster.	Check caster and adjust as necessary.
	Steering knuckle bent.	Replace with new knuckle.
	Wheels, tires or brake drums out of balance.	Balance wheels and tires. Also check for out of balance brake drums and for eccentric or bulged tires and replace as necessary.
	Wheels or tires out of true.	Check for wheel and tire wobble. See that wheels and tires are properly mounted.
	Steering gear incorrectly adjusted.	Adjust steering gear.
	Insufficient or incorrect lubricant used.	Check lubricant in steering gear and lubricate steering system as required.
	Eccentric or bulged tires.	Replace with new ones.
Front or Rear Wheels Tramp	Wheels, tires or brake drums out of balance.	Balance wheels and tires. Also check for out of balance brake drums and for eccentric or bulged tires and replace as necessary.
	Front springs weak.	Replace with new ones of correct type.
	Shock absorbers incorrectly or unevenly adjusted, improperly lubricated or inoperative.	Check adjustment and correct as necessary. Also make sure they are properly lubricated.
Car Wanders	Low or uneven tire pressure.	Inflate tires to proper pressure.
	Steering gear or connections adjusted too loose or worn.	Adjust or install new parts as necessary.
	Steering gear or connections adjusted too tight.	Test steering system for binding with front wheels off floor. Adjust as necessary and lubricate.
	Steering knuckle bearings worn.	Install new bearings.
	Wheels toe-out in straight ahead position.	Adjust tie rods to make front wheels toe-in proper amount.
	Insufficient or uneven caster.	Check caster and adjust as necessary.
	Steering knuckle bent.	Replace with new knuckle.
	Rear axle shifted. (Spring clip bolts loose or center bolt sheared.)	Check spring clips for looseness. Also measure from rear spring bolt to housing. This distance should be uniform on both sides of car.
	Better tread on rear tires than on front ones.	Change tires putting ones with best tread on front.
Road Shocks	Low air pressure.	Inflate tires to proper pressure.
	Steering gear or connections incorrectly adjusted.	Adjust steering gear and connections.
	Excessive caster.	Check caster and adjust as necessary.

FRONT WHEEL SUSPENSION SYSTEM

Diagnosis Chart

Effect	Cause	Remedy
Road Shocks (Continued)	Shock absorbers incorrectly or unevenly adjusted, improperly lubricated or inoperative.	Check adjustment and correct as necessary. Also make sure they are properly lubricated.
	Front springs weak or sagged.	Check overall length of springs. Replace weak or sagged springs with new ones of correct type.
	Wrong type or size of tires used.	Install new tires of correct type and size.
	Steering knuckle bent.	Replace with new knuckle.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Camber of front wheel (angle with vertical)	¼-1°	¾-1½°	¾-1½°	¾-1½°
Angle between steering knuckle bolt and wheel spindle	95° 51′	95°	95°	95°
Angle between steering knuckle bolt and vertical	4° 51″	3½°	3½°	3½°
Caster angle	1½-2°		1°	1°
Series 10 and 20		3°		
Series 30		1°		
Clearance for jack (tires inflated)	10 1/16″	10 3/16″	10½″	10½″
Clearance, Road, under suspension system (minimum)	7½″		7⅜″	7⅜″
Series 10 and 20		7 3/16″		
Series 30		6⅞″		
Measure with new tires inflated to 35 lbs. on Cadillac and 25 lbs. on LaSalle and no load in car.				
Tie rod joints—				
Adjustment (See Fig. 7)				
Pivot balls out of round—worn limit, not over	.010″	.010″	.010″	.010″
Toe-in of front wheels	0-1/16″	0-1/16″	0-1/16″	0-1/16″
Toe-out on turns with outside wheel set at 20°	1¾-3¼°	2-3½°	2-3½°	2-3½°
Tread	58 15/16″	59⅜″	59⅜″	59⅜″

REAR AXLE

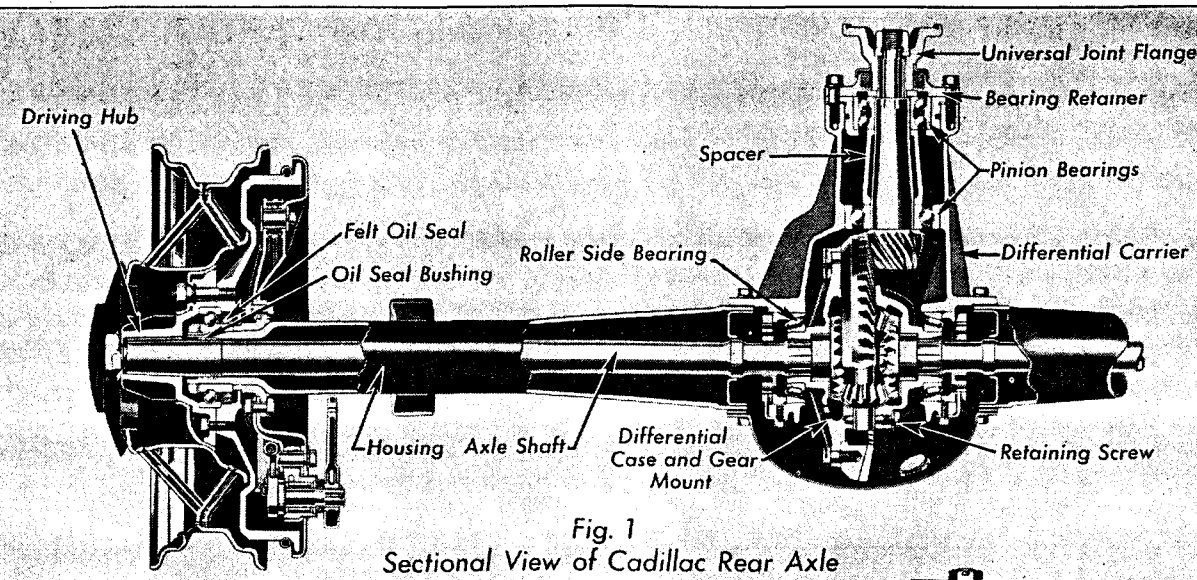


Fig. 1
Sectional View of Cadillac Rear Axle

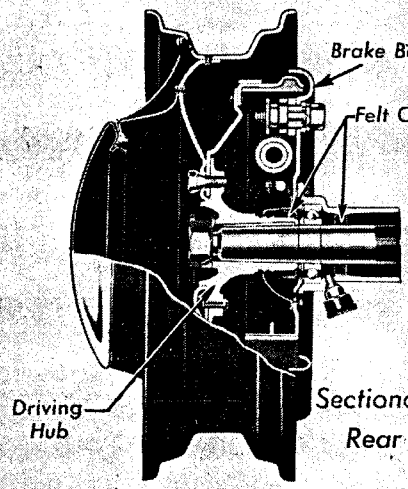


Fig. 2
Sectional View of LaSalle Rear Wheel Assembly

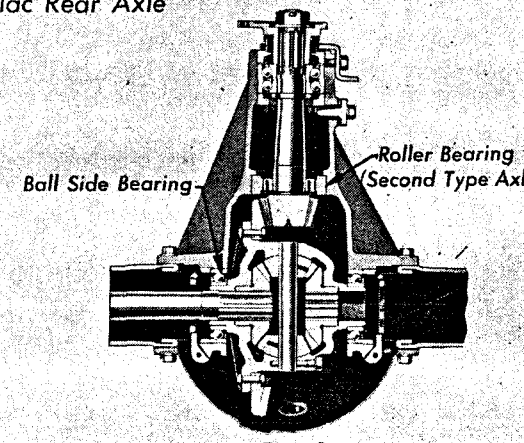


Fig. 3
Sectional View of LaSalle Differential Assembly

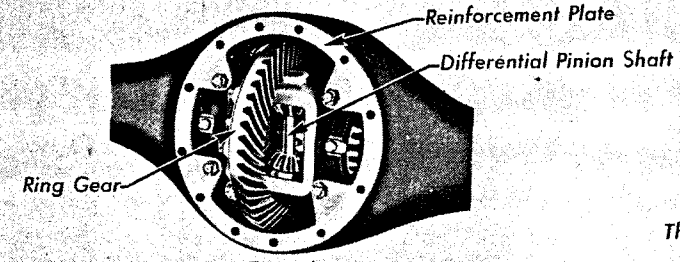


Fig. 4
View Showing Differential Reinforcement Plate

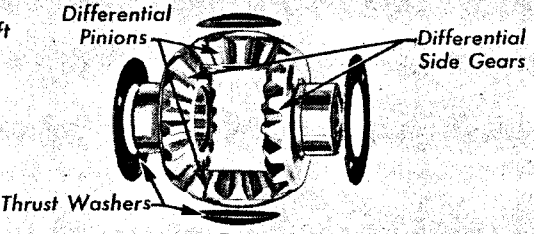
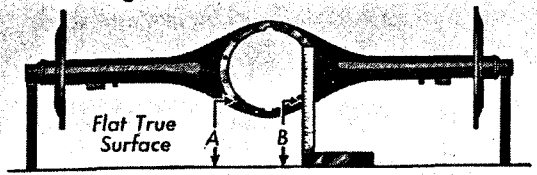
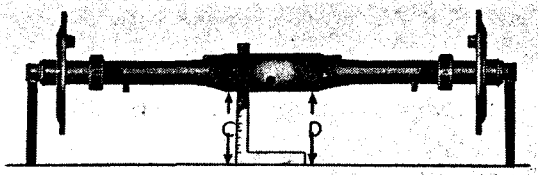


Fig. 5
Differential Gears and Thrust Washers



"A" and "B" when housing is right side up should equal "A" and "B" when housing is upside down



"C" should equal "D" when either face of housing is down

Fig. 6 Rear Axle Housing on V-Blocks for Testing

Plate 6. Rear Axle Details and Alignment

REAR AXLE

General Description

Cadillac rear axles are of the three-quarter floating type. They are similar in construction but differ somewhat in dimensions and in gear ratios. A semi-floating rear axle is used on the LaSalle.

The Hotchkiss type of drive is used on all models and the driving thrust of the rear axle is transmitted through the rear springs.

The rear axle housing is of the banjo type designed for underslung springs. The differential is of the two-pinion type with bronze washers to take the thrust of the side gears and the differential pinions.

The Cadillac differential is carried on tapered roller bearings while the LaSalle differential is carried on ball bearings. Ball bearings are used for the driving pinion on Cadillac and early LaSalle cars. Later LaSalle cars have a roller bearing at the rear end of the pinion shaft next to the pinion gear.

The differential carrier is reinforced by a plate installed between the differential cover and the axle housing and fitting over the cap bolts. This reinforcement adds considerably to the rigidity of the differential carrier.

The axle shafts are keyed to the driving hubs on which the wheels are mounted. This arrangement allows the use of a single annular type ball bearing in each rear wheel to take the load. This construction is typical of both the three-quarter and the semi-floating principles.

Baffle plates are used in the Cadillac axle housing to keep excessive lubricant from getting into the wheel bearings. There is also a threaded bushing in the outer end of each housing tube, which functions as an oil return. Felt grease retainers are used at the outer ends of the LaSalle housing tubes to keep the lubricant in the bearings as they are lubricated by means of individual grease cups.

The propeller shaft in the Cadillac models is made in two sections, a rear section which is not enclosed and a front section which is carried in a housing attached to the rear end of the transmission. A single section propeller shaft is employed on the LaSalle, corresponding to the rear sections on the Cadillac cars. Two universal joints are used, one at either end of the rear propeller shaft. The journals of the universal joints oscillate in roller bearings.

The service operations and adjustments of the rear axle are essentially the same on both the Cadillac models and the LaSalle.

Service Information

1. Differential Carrier Installation on Cadillac 452-D Cars

Before 452-D differential carrier assemblies are shipped by the Parts Division, all lubricant is washed out of the bearings. It is important, therefore, to lubricate the pinion shaft bearings before the assembly is installed, or they are liable to be damaged before the differential lubricant works its way up to them.

Place assembly on end with gears up, and pour about a pint of differential lubricant on the pinion. Leave the assembly in this position until the lubricant has run down through the back bearing and has thoroughly lubricated the front bearing. The assembly is now ready for installation.

After installation, the differential case should, of course, be filled to the proper level.

The pinion and ring gear are properly adjusted at the factory, and this adjustment should not be changed.

2. Removal and Installation of Axle Shaft on LaSalle Cars

To remove the axle shafts on the LaSalle 350 it is necessary first to dismount the wheel and then to remove the wheel hub and brake drum assembly. See Fig. 2, Plate 6. To do this, remove the retaining nut from the end of the axle shaft and pull the hub off the shaft using a wheel puller J-657. The axle shaft is held in the housing by the brake backing plate which is bolted against the outer race of the wheel bearing. To remove the axle shaft, therefore, it is necessary to remove the brake backing plate after disconnecting the brake hose and pull the shaft and bearing assembly out of the housing. In case it is necessary to remove the inner felt grease retainer from the axle housing tube, the grease cup for lubricating the rear wheel bearing must first be removed to prevent interference at this point.

The axle shaft is installed in the reverse order of its removal. After completing the installation

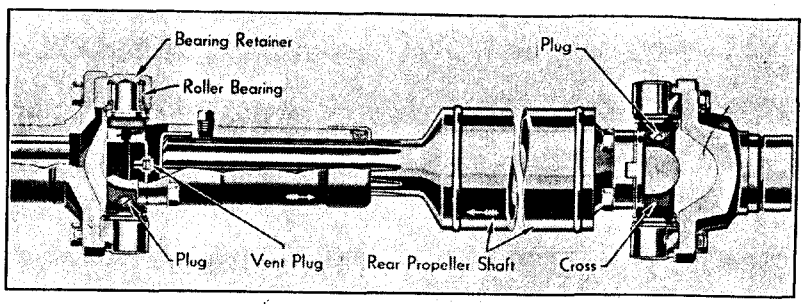


Fig. 7. Cadillac propeller shaft and universal joints. The front universal joint must be installed on the propeller shaft with the arrows on the splined sleeve and on the shaft in line.

it is necessary to bleed the wheel cylinder. Care should also be exercised to install the grease cup and to lubricate the wheel bearing.

3. Removal and Installation of Universal Joints

CADILLAC

To remove the Cadillac universal joints (Fig. 7) it is necessary only to remove the cap screws fastening the bearing retainers or journal caps to the yokes. If a joint is removed and not to be disassembled opposite retainers should be tied or wired together to keep them in place on the journals of the cross.

Disassembly of the joint after removal from the yokes may be accomplished by pulling the retainers off the cross journals and taking out the roller bearings.

Before reassembling a joint, wash all parts thoroughly in gasoline or kerosine and blow them out with air to remove all traces of dirt and grit. This is extremely important in order to insure quietness and long life of the bearing surfaces.

When reinstalling a universal joint, either the original retaining cap screws or screws secured from the factory Parts Division under Part No. 1405167 should be used. This is important, as these screws are made of special material and heat treated for this purpose. Ordinary cap screws are not suitable for mounting these universal joints. New locking plates should also be used whenever the retaining screws are reinstalled. Care should be exercised to assemble the front universal joint on the rear propeller shaft in the proper position. The arrow on the splined sleeve of the universal joint should be in line with the arrow on the propeller shaft.

To lubricate the Cadillac universal joints it is necessary to remove the screw plug in the cross, and install a grease gun fitting. A grease gun fitting must not be installed permanently as it will affect the balance of the joint.

LASALLE

To remove the LaSalle universal joints (Fig. 8) it is necessary first to remove the locking rings from the ends of the bearing races, after which remove the bearing assemblies from the joints. In removing the bearings, care should be taken not to lose any of the rollers as there is nothing to prevent them falling from the races except the bearing lubricant. Before reassembling the joint all parts should be thoroughly cleaned by washing them in gasoline or kerosine and the reservoirs in the journals filled with S.A.E. 160 oil.

When installing the propeller shaft assembly in the car, care should be exercised to assemble the front universal joint in the proper position on the propeller shaft. The arrow in the splined sleeve of the front universal joint should be in line with the arrow on the propeller shaft.

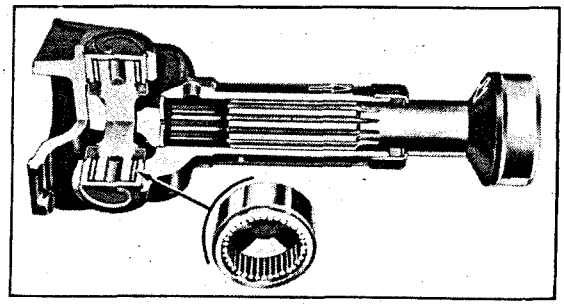


Fig. 8. Cut-away view of LaSalle front universal joint. The joint must be installed in the proper position on the shaft with the two arrows in line as shown in the illustration.

4. Replacement and Adjustment of Rear Axle Ring Gear and Drive Pinion

Ring gears and pinions are supplied by the factory Parts Division in matched sets for service on Cadillac V-8 and V-12 and LaSalle cars.

When adjustments or replacements are necessary on the V-16 differential carrier, the entire differential carrier assembly should be replaced and the old one returned to the factory on the regular exchange basis as in the past. See Note 1.

When the ring gear and drive pinion are replaced, the double-row ball bearing on the front end of the drive pinion shaft should also be replaced. Experience has proved that trouble may develop from wear on this bearing, whenever the gears are worn sufficiently to require replacement,

if the bearing is not replaced at the same time the gear replacement is made.

It is also advisable to replace the cork and felt gaskets for the front pinion bearing.

Complete instructions for replacing and adjusting the rear axle gears are given below:

REMOVAL AND DISASSEMBLY

The replacement of the rear axle ring gear and drive pinion necessarily requires the removal and disassembly of the differential gear assembly. To remove this unit, it is necessary first to remove the propeller shaft and axle shafts. See Notes 2 and 3. Then the differential cover and reinforcement plate are removed, after which the differential gear assembly is dismounted or taken off of the differential carrier. See Figs. 1 and 3, Plate 6.

The differential gear assembly is disassembled in the following order.

1. Remove caps for differential side bearings and take out adjuster rings.

2. Remove differential unit.

3. Remove ring gear from differential case or gear mount on Cadillac cars. The ring gear is riveted to the gear case on the LaSalle and both parts must be replaced in case of wear or damage to either one.

4. Remove drive pinion, front bearing retainer, bearings and bearing spacer.

NOTE--Do not lose or damage the shims between the front bearing retainer and the front end of the differential carrier on the Cadillac.

5. Wash parts in gasoline or kerosine and dry with air after which check all parts carefully.

The differential pinions and side gears may be removed by removing the retaining screw in the pinion shaft and driving out this shaft. It is not necessary to remove these gears, however, for replacing the ring gear and drive pinion on the Cadillac.

Examine the bearings, the bearing mounts and the differential gears. They should be smooth, free from pits and the gears and bearings should not be chipped or broken.

The flange of the Cadillac differential case should also be checked for wobble and eccentricity; it should run true laterally and radially within .001 in. or .004 in. when tested on the back of the ring gear. A convenient way to making this test is to install the differential case and bearings in position in the carrier and check the flange with a dial indicator clamped to the carrier or bearing cap studs using holder HM91220.

The hubs of the differential side gears should have no more than .005 in. radial clearance in the differential case. End-play in these gears should not exceed .020 in.

The two differential pinion gears should have a clearance of not more than .010 in. on the pinion shaft and not more than .020 in. backlash with the side gears.

REASSEMBLY AND INSTALLATION

Reassembly of the differential gear assembly is accomplished in the following order:

1. Install bearings and bearing spacer on the drive pinion shaft.

2. Install drive pinion and bearings in differential carrier, being sure to install the spacing shims between the front bearing retainer and the front end of the differential carrier on the Cadillac. Next install the universal joint flange and make an initial adjustment on the drive pinion as explained in section "Adjustment of Drive Pinion." Tighten flange retaining nut on the front end of the drive pinion shaft and lock it in position.

NOTE—Lubricate the drive pinion bearings when installing them to insure initial lubrication.

3. Install differential side gears and pinions (provided these gears are removed).

4. Install ring gear on differential case on Cadillac cars. Tighten retaining screws securely using an 18-inch wrench and lock with wire. Wire two screws together, installing the wire in such a way that tension of the wire on the screws will tend to tighten the screws rather than loosen them. The ring gear for LaSalle cars is supplied riveted to the gear case.

5. Install differential unit in position in differential carrier, after which install the adjuster rings and the bearing caps.

6. Make initial adjustment of gear mesh. See section "Adjustment of Ring Gear."

7. Install the axle shafts (See Note 2), lubricating the felt washers in the wheel.

8. Install rear axle under car.

9. Adjust gear mesh as explained under "Testing Ring Gear for Proper Tooth Contact."

10. Install reinforcement plate, differential cover and fill differential to proper level with recommended transmission and rear axle lubricant.

Adjustment of Gear Mesh

In the design of the rear axle provision is made for adjusting the drive pinion and ring gear so that the teeth may be meshed correctly, and for locking all adjustments securely. Ordinarily old gears that have been running noisy for some time cannot be adjusted satisfactorily to eliminate the noise. In such cases it is necessary to replace the gears with new ones.

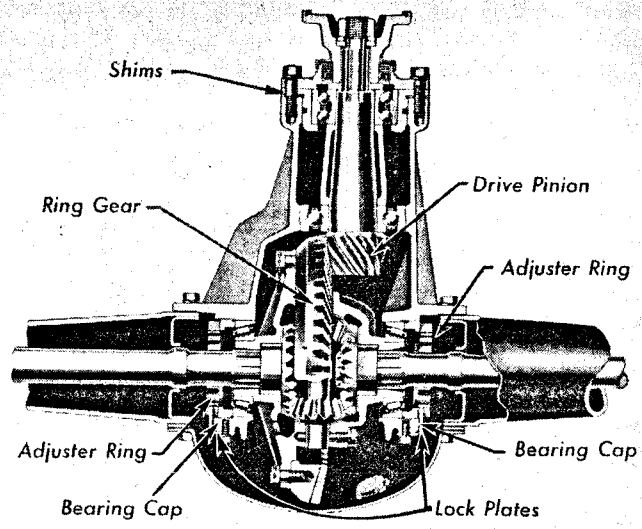


Fig. 9

Cadillac Rear Axle Gear Assembly

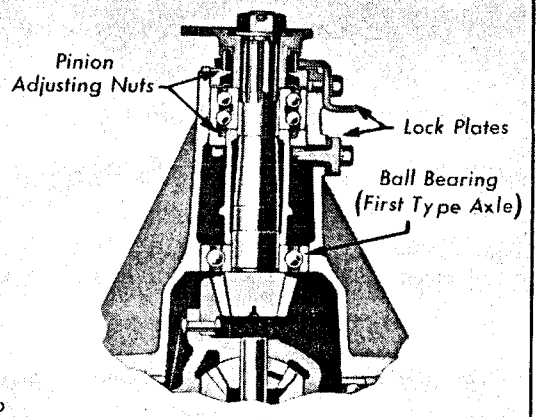


Fig. 10

LaSalle Drive Pinion Assembly

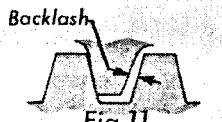


Fig. 11

Backlash between drive pinion and ring gear should be .004 to .012 in. Check with dial indicator

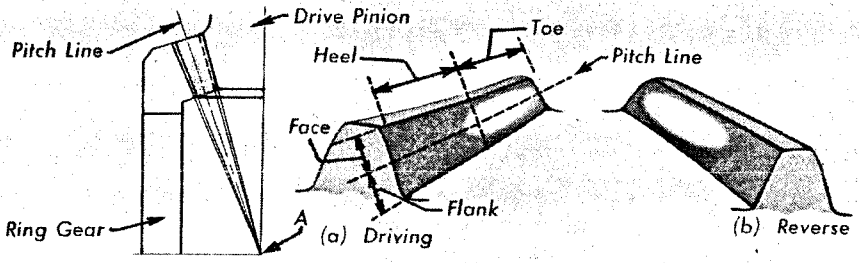
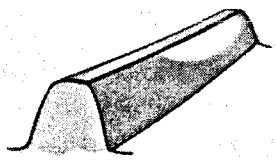


Fig. 12–Correct Ring Gear Tooth Contact



Face Contact - Ring Gear Tooth. Correct by moving drive pinion toward ring gear

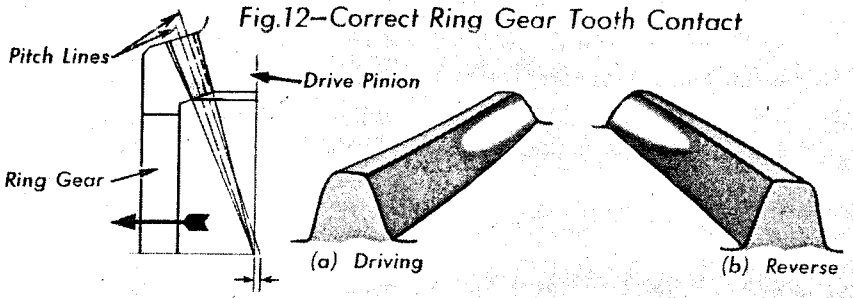
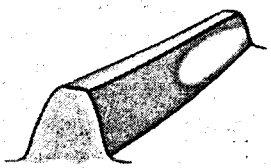


Fig. 14–Excessive Toe Contact — Ring Gear Tooth

To correct contact increase backlash between gears (keeping it under .012 in.) by moving ring gear away from drive pinion



Flank Contact - Ring Gear Tooth. Correct by moving drive pinion away from ring gear

Fig. 13

To change profile contact on ring gear teeth, move pinion endwise by installing shims of different thickness between front pinion bearing retainer and front end of differential carrier

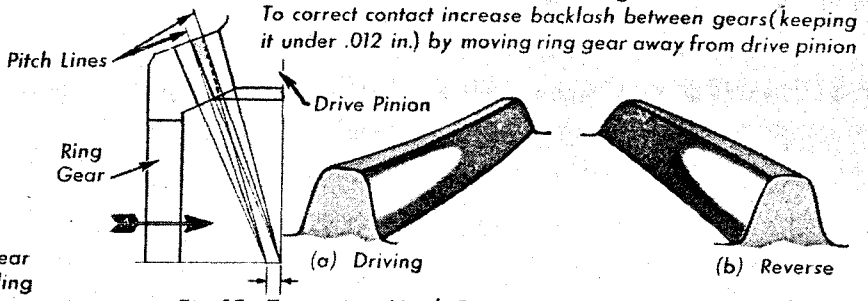


Fig. 15–Excessive Heel Contact — Ring Gear Tooth

To correct contact decrease backlash between gears (keeping it over .004 in.) by moving ring gear toward drive pinion

Plate 7. Details of Rear Axle Gear Adjustment

REAR AXLE

A ring gear and drive pinion are shown in Fig. 12, Plate 7, set in the proper running position, and in this position all tooth dimensions, theoretically, converge to cone center "A." In this position, only the pitch lines of the ring gear and drive pinion coincide; and although all other proportions of tooth shape converge toward the cone centers of the gears, they are in no place parallel to the pitch line.

It is, therefore, evident that the shifting of gears from the correct position, results in throwing the pitch lines out of parallel and changing the contact of the gear and pinion from a full contact toward either the toe or the heel of the ring gear. (See Figs. 14 and 15, Plate 7). If the ring gear is moved away from the drive pinion the contact is moved toward the heel; if the gear is moved closer to the pinion, the contact is moved toward the toe of the gear teeth. The reason for this is that when the ring gear is moved away from the pinion the heel of the tooth will be last in mesh. If the gear is moved toward the pinion, the backlash or clearance is first taken up at the toe.

Before an attempt is made to adjust the gear mesh, the rear axle lubricant should be drained and the gears cleaned.

Adjustment of Drive Pinion

An initial adjustment may be made on the Cadillac drive pinion when putting the differential and pinion assembly together by installing the proper number of shims between the front pinion bearing retainer and the front end of the differential carrier. Use sufficient shims to give a total thickness of .075 to .090 in. These shims are supplied by the factory Parts Division in thickness of .010 in., .015 in. and .035 in.

The LaSalle driving pinion is adjusted by means of threaded nuts instead of shims. Turning these nuts (use Tool No. HM-575 on front nut) in a clockwise direction, as viewed from the front, moves the pinion rearward toward the ring gear and turning them in a counter-clockwise direction moves the pinion frontward away from the ring gear. When making this adjustment back off the leading nut one or more notches and tighten the trailing nut an equal amount.

The final adjustment of the drive pinion is made according to the tooth contact as explained under "Testing Ring Gear for Proper Tooth Contact."

Adjustment of Differential Side Bearings

To adjust the differential side bearings, it is necessary first to remove the locking plates for the adjuster rings and to loosen the bearing caps slightly. The adjusters are then turned to tighten the bearings so that a pull of 8 to 10 pounds, measured at the circumference of the ring gear, is required to turn this gear. This test can be made with a spring scale hooked on one of the ring gear teeth as shown in Fig. 16. An initial pull of about 15 pounds will be required to start the gear, but as soon as it is started the pull should drop to 8 to 10 pounds.

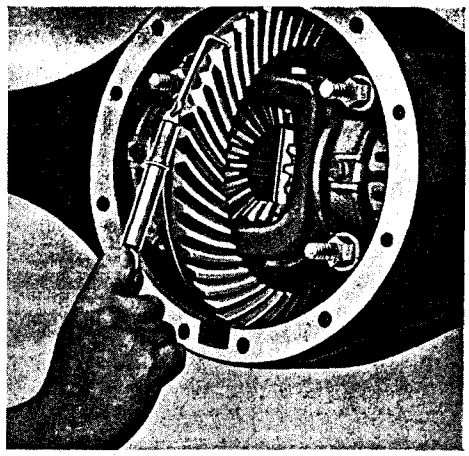


Fig. 16. Checking adjustment of differential side bearings. A pull of 8 to 10 pounds should be required to turn the ring gear.

After the adjustment is completed, the bearing caps must be tightened and the locking plates installed.

Adjustment of Ring Gear

The adjustment of the ring gear is made by moving the ring gear and differential case sideways. This is accomplished by turning the adjuster rings for the differential side bearings an equal amount as required. Although the ring gear tooth contact is the next important consideration, the backlash should be checked before checking for tooth contact, as both backlash and tooth contact are controlled by the same adjustment and backlash must be kept within the specified limits of .004 to .012 in. on the Cadillac while adjusting the tooth contact.

The amount of backlash necessary to give the proper tooth contact with the pinion adjustment correctly made on the LaSalle is etched on the end

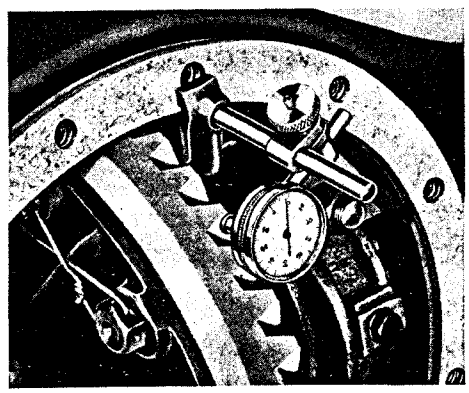


Fig. 17. Checking backlash between ring gear and drive pinion with dial indicator and holder, tool No. HM-91220. Backlash should be .004 to .012 in. in Cadillac cars. On LaSalle cars the amount of backlash should correspond to the number etched on the end of the pinion gear.

of the pinion gear teeth. Such markings as L-43, L-5-7, etc., will be found. The numeral following the letter "L" such as 4 or 5 indicates the recommended backlash in thousandths of an inch.

When checking the backlash the axle shafts should be pulled out of the differential side gears and the drive pinion held stationary. The amount of backlash can be meausred by means of a dial indicator with holder, tool No. HM-91220, clamped to the axle housing and in contact with a tooth on the ring gear as shown in Fig. 17. If the backlash is within these limits the gears can be checked for proper meshing.

Correct meshing of the ring gear and drive pinion can best be determined by painting the working surface of the ring gear teeth with red lead mixed with gasoline as a thinner, or Prussian blue, as explained under "Testing Ring Gear for Proper Tooth Contact."

After the correct position for the ring gear is found, the adjustment of the bearings should be checked. The bearing caps are then tightened and the locking plates and differential cover are installed, after which the differential should be properly lubricated.

Testing Ring Gear for Proper Tooth Contact

Correct meshing of the gears can best be determined by first painting the working surfaces of the ring gear teeth with red lead thinned with gasoline, or Prussian blue, and turning the ring gear several revolutions by hand and then noting the tooth contact obtained on the ring gear under load. When the gears are turned the red lead or Prussian blue is wiped off at the point where the teeth of the ring gear and pinion mesh.

It is important to make this test by hand first so that an initial adjustment can be made if the gears are not correctly meshed. The tooth form may easily be ruined by running the gears under load when not correctly meshed.

To test the gear mesh under load the rear wheels should be raised off the floor and driven in both directions with the engine. The necessary load can be obtained by applying the brakes. Care should be taken in making this test not to run the ring gear more than ten or twelve revolutions at a time before checking the tooth contact. If the bearings and gears are in proper adjustment, the lengthwise tooth contact on the ring gear, which is the contact along the length of the tooth, and the profile tooth contact on the ring gear, which is the contact from top to bottom of the tooth, will appear as shown in Fig. 12, Plate 7 (a) for the forward speeds and as shown in (b) for the reverse speed.

It will be noted that the tooth contact for the forward speeds under light load is at the small end or "toe" of the tooth. This is necessary due to spring in the housing and the bearings under driving loads in the forward speeds, under which condition the tooth contact will shift toward the large end or "heel" of the tooth. Under no conditions should the tooth contact on the ring gear under light load be at the heel of the tooth, as a heavy load on the gears in any of the forward speeds would tend to concentrate the load at this point.

In reverse, the tooth contact does not shift as far toward the heel under load as the driving contact. It is, therefore, permissible to have the contact on the reverse side more nearly at the center of the tooth than is the case on the driving side.

The profile contact, or the contact from top to bottom, on the face and flank of the tooth, may appear at any position throughout the length of the tooth. For proper meshing of gears the greater part of the profile contact on the ring gear should be about the middle of the tooth at the pitch line slightly below the outer edge. Referring to Fig. 12, it will be noted that the contact surface for the ideal condition extends only slightly below the pitch line and almost to the edge of the tooth. If the contact surface favors a lower position on the flank of the ring gear tooth, as shown in Fig. 13, the profile contact is too low. If, on the other hand, the contact surface is totally above the pitch line and also shows a decided contact on the top point or face of the tooth, the profile contact is too high.

To correct a low profile or flank contact, move the drive pinion away from the ring gear. This adjustment will increase the backlash and it may be necessary to move the ring gear toward the drive pinion to keep the backlash within the limits. Changing the position of the ring gear will alter the lengthwise contact on the tooth and to obtain correct tooth contact, illustrated in Fig. 12 (a) and (b), several adjustments for lengthwise and profile contact, may be required.

To correct a high profile or face contact, move the drive pinion toward the ring gear. This will decrease the backlash and it may be necessary to move the ring gear away from the pinion to maintain the proper amount of backlash. Changing the position of the ring gear will change the lengthwise contact on the tooth and to obtain a correct tooth contact, illustrated in Fig. 12 (a) and (b) several adjustments for lengthwise and profile contact may be required. After obtaining the proper tooth contact under load, check the backlash to see if it is within the limits.

When the "toe" contact on both the driving and reverse sides of the tooth is extended too close to the end of the tooth as shown in Fig. 14 (a) and (b) respectively, increase the backlash between the gears, keeping it under .012 in. by moving the ring gear away from the drive pinion. This may

REAR AXLE

also change the profile or top-to-bottom contact slightly which should be changed by adjusting the pinion.

To correct an excessive "heel" contact on both the driving and reverse sides of the tooth, illustrated in Fig. 15 (a) and (b) respectively, decrease the backlash between the gears, keeping it over .004 in. by moving the ring gear toward the drive pinion. This may change the profile contact slightly as when correcting a "toe" contact, which will also necessitate changing the pinion adjustment

If the tooth contact obtained under load varies widely from the tooth contact illustrated and described, it would indicate that the gears are worn. In this event, the gears should be replaced.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Axle housing out of true, not over *Use front wheel alignment gauge to check alignment of rear wheels.*	$\frac{3}{32}$"	$\frac{3}{32}$"	$\frac{3}{32}$"	$\frac{3}{32}$"
Axle shaft length, left side (overall)	30 7/8"	33 5/8"	33 5/8"	33 5/8"
Axle shaft length, right side (overall)	30 7/8"	36 3/16"	36 3/16"	33 3/16"
Axle shaft out of true, not over	$\frac{1}{32}$"	.010"	.010"	.010"
Clearance for jack (tires inflated)	9 3/4"	10 1/2"	10 13/16"	10 13/16"
Clearance, Road, under rear axle (minimum) *To be measured with tires inflated to 35 lbs. on Cadillac and 30 lbs. on LaSalle and no load in car.*	8 7/16"	8 7/16"	8 13/16"	8 1/4"
Gear ratios—				
Standard except Series 30	4.78 : 1	4.60 : 1	4.80 : 1	4.64 : 1
Series 30	.....	4.80 : 1	.....	.....
Optional—Except Series 30	.....	4.36 : 1	4.60 : 1	4.31 : 1
Series 30	.....	4.60 : 1	.....	.....
Lubrication—				
Oil capacity	3 lbs.	6 lbs.	6 lbs.	6 lbs.
Grade recommended See Lubrication Section.	.....	.....	.....	.....
Propeller shaft length—				
119-in. wheelbase	45 15/16"	.....	.....	.....
128-in. wheelbase	.....	43 7/16"	.....	.....
136-in. wheelbase	.....	51 7/16"	.....	.....
146-in. wheelbase	.....	54 7/16"	54 7/16"	.....
154-in. wheelbase	.....	.....	.....	54 7/16"
To be measured from center of rear universal joint to center of front universal joint with front joint pushed all the way on the shaft.				
Propeller shaft out of true, not over *Measured at center of shaft.*	.010"	.010"	.010"	.010"
Propeller shaft, side clearance between splines and hub of front universal joint—				
New limits	.001-.0045"	.001-.004"	.001-.004"	.001-.004"
Worn limits, not over	.006"	.006"	.006"	.006"
Tread	60 1/2"	62"	62"	62"
Type of axle	Semi-floating	3/4 Flt.	3/4 Flt.	3/4 Flt.
Unit number location All models—Rear surface of housing at lower R. H. side.	.....	.....	.....	.....

BODY

Body Types and Style Numbers

Body Type	Style Number	Wheel-base
355-D (Cadillac)—Series 10		
Fisher Bodies		
2-Pass. Sport Coupe	34728	128″
2-Pass. Convertible Coupe	34718	128″
5-Pass. All-Weather Phaeton	34721	128″
5-Pass. Town Coupe	34722	128″
5-Pass. Sedan	34709	128″
5-Pass. C. C. Sedan	34702	128″
Series 20		
Fisher Bodies		
2-Pass. Sport Coupe	34678	136″
2-Pass. Convertible Coupe	34668	136″
5-Pass. All-Weather Phaeton	34671	136″
5-Pass Sedan	34659	136″
5-Pass. C. C. Town Sedan	34652	136″
7-Pass. Sedan	34662	136″
7-Pass. Imperial Sedan	34663	136″
Series 30		
Standard Fleetwood Bodies		
5-Pass. Sedan	6030-S	146″
5-Pass. Town Sedan	6033-S	146″
5-Pass. Imperial Cabriolet—leather back	6030-FL	146″
5-Pass. Imperial Brougham—metal back	6030-FM	146″
7-Pass. Sedan	6075-S	146″
7-Pass. Imperial Sedan	6075	146″
7-Pass. Imperial Cabriolet—leather back	6075-FL	146″
370-D (Cadillac) Series 40		
Standard Fleetwood Bodies		
5-Pass. Sedan	6030-S	146″
5-Pass. Town Sedan	6033-S	146″
5-Pass. Imperial Cabriolet—leather back	6030-FL	146″
5-Pass. Imperial Brougham—metal back	6030-FM	146″
7-Pass. Sedan	6075-S	146″
7-Pass. Imperial Sedan	6075	146″
7-Pass. Imperial Cabriolet—leather back	6075-FL	146″
7-Pass. Imperial Brougham—metal back	6075-FM	146″
452-D (Cadillac) Series 60		
Standard Fleetwood Bodies		
5-Pass. Sedan	6030-S	154″
5-Pass. Town Sedan	6033-S	154″
5-Pass. Imperial Cabriolet—leather back	6030-FL	154″
5-Pass. Imperial Brougham—metal back	6030-FM	154″
7-Pass. Sedan	6075-S	154″
7-Pass. Imperial Sedan	6075	154″
7-Pass. Imperial Cabriolet—leather back	6075-FL	154″
7-Pass. Imperial Brougham—metal back	6075-FM	154″
355-D (Cadillac) Series 30		
Special V-Front Fleetwood Bodies		
2-Pass. Coupe	5776	146″
2-Pass. Convertible Coupe	5735	146″
5-Pass. All-Weather Phaeton	5780-S	146″
5-Pass. All-Weather Phaeton with Division	5780	146″
5-Pass. Coupe (Aerodynamic)	5799	146″
5-Pass. Collapsible Coupe	5785	146″
5-Pass. Sedan	5730-S	146″
5-Pass. Town Sedan	5733-S	146″
5-Pass. Town Cabriolet—metal back	5712-MB	146″
5-Pass. Town Cabriolet—leather back	5712-LB	146″
5-Pass. Imperial Cabriolet—leather back	5730-FL	146″
5-Pass Imperial Brougham—metal back	5730-FM	146″
7-Pass. Sedan	5775-S	146″
7-Pass. Imperial Sedan (Limousine)	5775	146″
7-Pass. Imperial Cabriolet—leather back	5775-FL	146″
7-Pass. Imperial Brougham—metal back	5775-FM	146″
7-Pass. Town Cabriolet—metal back	5725-MB	146″
7-Pass. Town Cabriolet—leather back	5725-LB	146″
7-Pass. Limousine Brougham—rear quarter window—metal back	5791	146″
370-D (Cadillac) Series 40		
Special V-Front Fleetwood Bodies		
2-Pass. Coupe	5776	146″
2-Pass. Convertible Coupe	5735	146″
5-Pass. All-Weather Phaeton	5780-S	146″
5-Pass. Phaeton with Division	5780	146″
5-Pass. Coupe (Aerodynamic)	5799	146″
5-Pass. Collapsible Coupe	5785	146″
5-Pass. Sedan	5730-S	146″
5-Pass. Town Sedan	5733-S	146″
5-Pass. Town Cabriolet—metal back	5712-MB	146″
5-Pass. Town Cabriolet—leather back	5712-LB	146″
5-Pass. Imperial Cabriolet—leather back	5730-FL	146″
5-Pass. Imperial Brougham—metal back	5730-FM	146″
7-Pass. Sedan	5775-S	146″
7-Pass. Imperial Sedan (Limousine)	5775	146″
7-Pass. Imperial Cabriolet—leather back	5775-FL	146″
7-Pass. Imperial Brougham—metal back	5775-FM	146″
7-Pass. Town Cabriolet—metal back	5725-MB	146″
7-Pass. Town Cabriolet—leather back	5725-LB	146″
7-Pass. Limousine Brougham—rear quarter window—metal back	5791	146″
452-D (Cadillac) Series 60		
Special V-Front Fleetwood Bodies		
2-Pass. Coupe	5776	154″
2-Pass. Convertible Coupe	5735	154″
5-Pass. All-Weather Phaeton	5780-S	154″
5-Pass. All-Weather Phaeton with Division	5780	154″
5-Pass. Coupe (Aerodynamic)	5799	154″
5-Pass. Collapsible Coupe	5785	154″
5-Pass. Sedan	5730-S	154″
5-Pass. Town Sedan	5733-S	154″
5-Pass. Town Cabriolet—metal back	5712-MB	154″
5-Pass. Town Cabriolet—leather back	5712-LB	154″
5-Pass. Imperial Cabriolet—leather back	5730-FL	154″
5-Pass. Imperial Brougham—metal back	5730-FM	154″
7-Pass. Sedan	5775-S	154″
7-Pass. Imperial Sedan (Limousine)	5775	154″
7-Pass. Imperial Cabriolet—leather back	5775-FL	154″
7-Pass. Imperial Brougham—metal back	5775-FM	154″
7-Pass. Town Cabriolet—metal back	5725-MB	154″
7-Pass. Town Cabriolet—leather back	5725-LB	154″
7-Pass. Limousine Brougham—rear quarter window—metal back	5791	154″
350 (LaSalle) Series 50		
Standard Fleetwood Bodies		
2-Pass. Coupe	34178	119″
2-Pass. Convertible Coupe	34168	119″
5-Pass. Sedan	34159	119″
5-Pass. Club Sedan (solid quarter)	34182	119″

1935 CADILLAC BODY DIMENSIONS

	SERIES 10						SERIES 20						
	5 Town Sedan	5 Sedan	2 Conc. Coupe	5 Conv. Coupe	5 Town Coupe	2 Sport Coupe	5 Town Sedan	5 Sedan	7 Sedan	7 Imperial	2 Conv. Coupe	5 Conv. Sedan	2 Sport Coupe
Headroom													
Front Seat (Seat to headlining)	38	38	37	38	37	37	38	38	38	38	37	38	38
Rear Seat " " "	36	36	-	36	36	-	36	36	36	36	-	36	36
Center of Body(Floor to Headlining)	47½	47½	-	47	47½	-	47½	47½	47½	47½	-	47½	-
Seat Width													
Front (Shoulders	52	52	52	52	52	52	52	52	52	52	52	52	52
Front (Hips	48	48	48	48	47	47	48	48	48	48	48	48	48
Front (Knees	44	44	44	44	43	43	44	44	44	44	44	44	44
Rear (Shoulders	55	52	-	52	52	-	55	55	52	52	-	52	-
Rear (Hips	47	46½	-	46½	48	-	48	46½	46½	46½	-	46½	-
Rear (Knees	53	55	-	46	53	-	54	46	46	46	-	46	-
Folding Seat (each	-	-	-	-	-	-	-	-	20	20	-	-	-
Seat Height													
Front (Floor to top of cushion)	12	12	12	12	12	12	12	12	12	12	12	12	12
Rear " " " " "	13	13	-	13	13	-	13	13	13	13	-	13	-
Folding " " " " "	-	-	-	-	-	-	-	-	14	14	-	-	-
Seat Depth													
Front (Front to back of seat cush)	18	18	18	18	18	18	18	18	18	18	18	18	18
Rear " " " " " "	19	19	-	19	19	-	19	19	19	19	-	19	-
Folding " " " " " "	-	-	-	-	-	-	-	-	15	15	-	-	-
Seat Back Height													
Front	22	22	22	22	22	22	22	22	23	23	22	22	22
Rear	24	26	-	24	24	-	25	24	24	24	-	24	-
Folding	-	-	-	-	-	-	-	-	19	19	-	-	-
Leg Room Distance													
Front of Rear Seat to back of F.Seat	13	21	-	16	11	-	16½	29½	34½	34½	-	16	-
Front of Rear Seat " " Folding "	-	-	-	-	-	-	-	-	10	10	-	-	-
Front Folding " " " F. Seat	-	-	-	-	-	-	-	-	8	8	-	-	-
" Front " " Dash	26½	26½	26½	26	26½	26½	26½	26½	26½	25	26½	25	26
Distance from front seat back to pedals	37	37	37	37	37	37	37	37	37	37	37	37	37
Body width overall (inc. fenders)	76½	76½	76½	76½	76½	76½	76½	76½	76½	76½	76½	76½	76
Body width overall (to panels only)	61	62	60	60	60	60	61	62	62½	62½	60	60	60
Car length overall (bumper to bumper	207½	all models					215½	all models					
Distance from Rear Axle to back of body	36	36	36	36	36	36	36	36	36	36	36	36	36
Size of Rear Trunk or Deck Opening (Door Dim.) Width across	39¼	-	36½	38¾	39¼	36½	39¼	-	-	-	36½	39½	36
Depth of cover or door	10	-	26½	11	10	26½	11	-	-	-	26½	13¼	26
Size of Trunk-Width across outside	51	-	-	47½	51	-	51	-	-	-	-	51	-
Height inside	19	-	-	16	18	-	19	-	-	-	-	14½	-
Depth inside	17	-	-	15½	18½	-	18½	-	-	-	-	23	-

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1935 LA SALLE BODY DIMENSIONS

	5-Pass Sedan	2-Pass. Coupe	2-Pass. Conv. Coupe	5-Pass. Club Sedan
Headroom				
Front Seat (Seat to headlining)	38½	38	38	38½
Rear Seat " " "	36	-	-	36
Center of Body (Floor to Headlining)	47	-	-	47
Seat Width				
Front (Shoulders	52	52	52	52
Front (Hips	51	51	51	51
Front (Knees	47	47	47	47
Rear (Shoulders	52½	-	-	52½
Rear (Hips	47½	-	-	47½
Rear (Knees	55	-	-	55
Seat Height				
Front (Floor to top of cushion)	12	12	12	12
Rear " " " " "	14½	-	-	14½
Seat Depth				
Front (Front to back of seat cushion)	18½	18½	18½	18½
Rear " " " " " "	19	-	-	19
Seat Back Height				
Front	22	22	22	22
Rear	25½	-	-	25½
Leg Room Distance				
Front of Rear Seat to Back of Front Seat	14½	-	-	14½
Front of Front Seat to Dash	27	27	27	27
Distance from front seat back to pedals	37	37	37	37
Body width overall (inc. fenders)	73½	73½	73½	75½
Body width overall (to panels only)	62	62	60	62
Car length overall (bumper to bumper)	202-3/8	all models		
Distance from rear axle to back of body	41	41	41	41
Size of rear trunk or deck opening				
(Door dim.) Width across	40	39½	39½	40
Depth of cover or door	23	32	27½	25

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BODY

General Description

The bodies are of the same rugged construction on both Cadillac and LaSalle cars but differ in appointments, trim, beading and other minor details.

In much of the frame-work construction glued joints are eliminated and metal brackets are used to hold the wood parts in place without touching each other. This arrangement, together with the anti-squeak compound used between the metal brackets and the woodwork, reduces the possibility of squeaks and rattles. The anti-squeak compound is also sprayed on all panels and inside of the doors before they are assembled to the wood framework to insulate against noise.

The body panels are of one-piece design with no separate mouldings. The drip mouldings are stamped into the roof rail panel, forming an integral part of it. This construction eliminates the possibility of wood rot, squeaks and Duco chipping at these points.

The body is insulated against drumming noise and engine heat with felt and insulating board which is finished to blend with the carpet. The openings in the toe-boards for the controls are closed with tight fitting rubber grommets.

All bodies are provided with the no-draft ventilating system, which includes pivoting glass panels in all front doors and in the rear quarter windows on 5- and 7-passenger sedans and the rear doors on Town Sedans and Town Cars, and the cowl ventilator which is reversed or open toward the windshield for efficient ventilation. Rain deflectors are installed at the top of the ventilator openings to deflect rain or snow when the ventilator is open. The ventilating panels are controlled by handles or cranks conveniently located just below the window.

Hard Shims are used at the No. 1 body bolt and composition shims at the remaining body bolts. The body retaining bolts are of special hardened steel ½-in. in diameter.

The toe and front floor boards are made of laminated wood. The center piece, however, is made of steel with felt underneath and around the edges for sealing against heat and noise.

FRONT SEAT

The front seat in the Fisher bodies is adjustable back and forth. In the Fleetwood bodies the back framework of the seat is fastened to the center pillars with only the cushion and the back of the driver's seat being adjustable.

The adjusting lever is located on the left side rail of the seat. By pulling the lever up, the seat can be adjusted to any desired position.

The Imperial bodies have no front seat adjustment. The V-front Fleetwood bodies have an adjustable rear seat cushion and back, the cushion being adjusted by a Tee handle at the bottom and the back by a Tee handle back of the center arm rest.

An arm rest is provided on both front doors. Rear side arm rests with slash pockets are provided on all cars in addition to the rear center arm rest.

DOORS

Both the front and rear doors on Cadillac Fleetwood Sedans and the front doors on the LaSalle body are hinged on the center pillar. The rear doors on the LaSalle and Cadillac Fisher bodies are hinged at the rear and the front doors on the Fisher bodies are hinged on the front pillar in the conventional way. Two hinges are used on each door. Each hinge has two bronze bushings and a chromium plated hinge pin which is provided with spiral oil grooves. All-Weather Phaetons have Fleetwood type barrel hinges, while the hinges on the open models are all concealed.

An adjusting rod is provided in the front door so that the weight can be evenly distributed. This diagonal rod fastens on the door at the upper hinge at the door center and extends to the bottom edge of the door on the locking side. At this point a brass take-up nut is conveniently located so that the door may be brought to proper alignment. By adjusting this nut, the door load can be distributed to both hinges and at the same time if the door is away from the top pillar bumper it can be adjusted so that the pressure on the bumper is even.

The dovetails are self-adjusting to facilitate door alignment. Double dovetails one above the other are used on the front doors of the Fleetwood bodies. Single type dovetails are used on the rear doors of these bodies and on both the front and rear doors of Fisher bodies. The shoe has a spring rubber action to keep the door load higher and more nearly uniform and to assist in opening the door.

Half-round lock bolts are used. Springs are also provided to take up the play in the lock bolts. An oiled spring loaded guide is used to help eliminate play and to keep the lock bolt oiled.

The door locks are of such design as to permit the locking of all doors, including the right front door, from the inside.

The locks are fitted with a pawl lever or trip button which protrudes inside of the door. Shutting the door and tripping the pawl lever up locks the door. Opening the door from inside the

car through the remote control handle, automatically unlocks the door and the pawl lever returns to its original or unlocked position.

All doors can be locked from the inside by the pawl levers or from the outside by first tripping the pawl levers up and then holding the outside handle all the way down while closing the door.

The outside door handles are fastened with a set screw through the face of the lock. This screw is concealed underneath the chromium plated lock finishing plate.

The inside door handles (window regulator handles, remote control handles and windshield regulator handle) are serrated on their shafts and locked in place by a small plunger located inside of the handle hub. Later type no-draft ventilator regulator handles, however, which are installed on the finishing panel, are locked to the shaft with a set screw in the shank of the handle.

WINDOWS

The door windows have vertical guides and do not depend on the glass run channels for support. The glass run channels are made in one piece, eliminating the possibility of noise at the joints. The channels have chromium-plated edges and inserts of special carpet material.

The garnish mouldings on the Series 10 and 20 Fisher Bodies and on the LaSalle are made of steel and are retained in place by visible screws at the sides and top. The garnish mouldings on the Fleetwood bodies are invisibly fastened on all doors except at the front pillar.

The trigger type lock is employed at the lower side of the door window garnish mouldings on these bodies while a bayonet lock is used at the rear quarter windows.

Because the garnish moulding fastenings are invisible on the Cadillac Fleetwood bodies, it is necessary to know where they are located on the various mouldings before proceeding to remove the moulding. In general, the method is to hold the bottom of the garnish moulding with a lock of either the bayonet or trigger type. The sides and top of the mouldings are held by plates which slip under the glass run channels and are held by screws through the channels.

The finishing panels are attached to the doors separate from the garnish mouldings. These panels are held in place by hanger plates and bayonet locks.

Both the windshield and the rear quarter windows are stationary. The garnish mouldings around these windows are fastened with visible screws at the sides and top.

The curtains at the back window and the rear quarter windows are concealed.

WINDSHIELD WIPER

The windshield wiper on Fisher bodies is of the swinging arm type with two arms operated in tandem by a single motor on the inside of the top header board. The windshield wiper on Fleetwood bodies with a straight windshield is of similar design but with the wiper unit inverted back of the instrument panel.

Two complete wiper assemblies are used with V-front bodies. These are fastened to the cowl bar back of the instrument panel and are also of the inverted type.

KEYS

All keys are of the double-edge type and are not numbered. The key number, however, is stamped on a tab which should be broken off and retained by the distributor or dealer upon delivery of the car. A record of the key number should also be kept by the owner.

These keys cannot be duplicated by anyone not having a special cutter for them. Duplicate keys, however, can be secured from any Cadillac distributor or dealer, or from the Cadillac factory Parts Division or from any Briggs and Stratton distributor.

In case all keys and the key number are lost by the owner, replacement keys can be obtained only from the distributor or dealer from whom the car was purchased originally, or from the Cadillac factory Parts Division. It is important, therefore, that all owners be cautioned to record the number of their keys when purchasing their car, in order to secure replacement keys with the least inconvenience in case the original ones are lost.

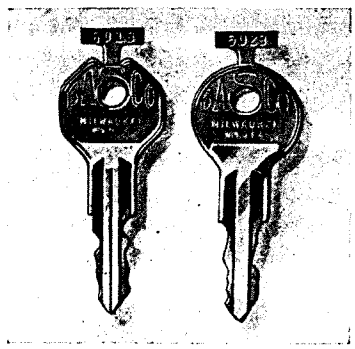


Fig. 1. The key numbers appear on metal tabs which should be detached by the distributor or dealer.

BODY

Service Information

1. Insulating Against Heat in LaSalle Front and Rear Compartments

Excessive heat in the front compartment of LaSalle 350 cars may be generally traced to two sources, the opening between the front body bracket and the toe-board riser, and the metal pan under the front seat.

The opening at the toe board riser may be plugged with blue wadding approximately 12 in. x 14 in. rolled tightly on the 14 in. dimension. This gives a roll about 2 in. in diameter and 12 in. long. To install the wadding, remove the cowl side trim pads, place the wadding roll in the openings between the toe board riser and the cowl metal panel, and force it in place with a screw driver and mallet until the opening is well sealed but not enough to bulge the cowl panel on the outside surface.

Heat entering from the metal pan under the front seat may be overcome by placing a sheet of thin asbestos or jute padding over the entire pan.

In case of heat entering the rear compartment, the exhaust pipe should be inspected to make sure that there is at least one inch clearance between the exhaust pipe and the rear seat pan. If it is less than this amount, loosen the exhaust tail pipe bracket located slightly to the rear of the kick-up of the frame over the axle, move the tail pipe into position to provide the proper clearance, and tighten the bracket.

If there is sufficient clearance and the heat is still apparent, it is advisable to install a sheet of asbestos on the upper side of the seat pan. The asbestos sheet should be at least 8 in. square and $\frac{1}{16}$ in. thick to effectively insulate against heat.

2. Care of Top Coverings

The only attention required by top coverings, aside from periodic inspection for checks and possible leaks, is an occasional cleaning with clear water.

The use of top dressings on the top is not recommended, either to restore the lustre or to prevent leaks. Neither is a top dressing recommended as a preventive of deterioration, as most dressings contain some sort of solvent that causes the top covering to deteriorate.

Grease and oil will also damage top material. It is important therefore to avoid the use of oils of any nature, including kerosine, mineral oils, vegetable oils, animal oils or waxes. For this reason also, avoid the use of oil in eliminating squeaks in the roof construction.

3. Cleaning Khaki Top Materials

Top dressing of any kind and cleaning fluids containing oil, naptha, gasoline, energine, strong chemicals, or any other liquid which will dissolve rubber, should never be used on the khaki top material of convertible and open models. As these tops are made of double texture material impregnated with rubber, such preparations would disintegrate the rubber content and ruin the fabric.

The safest cleaning method is to use warm water and a sponge or brush; if necessary, Ivory soap may be applied sparingly, but care must be taken that all the soap is washed off. Most of the soiled spots can be cleaned up by using only a piece of clean art gum or pure gum rubber.

It is also important to see that the top material is thoroughly dry before the top is lowered.

4. Installing Colored Tops

When replacing or installing colored roof material on closed bodies, it is important that a neutral shade of top material and a special lacquer mixture be used to assure a satisfactory job. The top material may be obtained from the factory Parts Division under Part No. 4024867, and the plasterizer for the special mixture may be obtained under Part No. F-127 in pint and gallon cans.

The special lacquer mixture can be made up by mixing one part of plasterizer with two parts of raw lacquer to which, when thoroughly agitated, four parts of thinner should be added. The complete mixture should be thoroughly agitated just before it is sprayed on the top material.

The color of any top material other than the neutral shade will show through the lacquer, and if the plasterizer mixture is not used, the lacquer may crack and peel. If the correct procedure is followed, however, an entirely satisfactory job can be done.

Four coats of the mixture should be applied to the top material, the first a light or mist coat. In cases where the color is to be "Classic Blue" or a similar transparent color, a ground coat of black should be applied first.

5. Cleaning Car Upholstery

Care must be exercised in cleaning upholstery material and floor carpets used in car interiors. Some of the fabrics are impregnated with a rubber backing, originally applied as a solution, which binds the nap securely. Use of too much cleaning fluid tends to dissolve this backing, thus loosening the nap.

To avoid this, cleaning fluids should be used sparingly on any upholstery, especially pile. An additional safeguard is the use of factory-approved fluids which are selected for their factor of safety as well as for efficiency in cleaning.

Water stains on upholstery material can easily be removed by brushing off the material thor-

oughly and then cleaning it with a cloth dampened with Cadillac cleaner. The cleaner should be used sparingly. Let the upholstery dry and smooth over lightly with a very hot iron applied through a damp cloth.

6. Cleaning Chromium-Plated Parts

While chromium-plated parts do not require repeated polishing like nickel, they should be cleaned occasionally to restore the lustre and protect the plating from deterioration.

It is particularly important to clean the plated parts on the chassis, which are exposed to the road elements. In winter, salt and calcium chloride, used on the streets to remove ice, are splashed upon the car, and in summer, the same is true of dust-laying chemicals. Frequent cleaning will prevent these chemicals from acting on the plating.

Chromium-plated parts which have been subjected to the action of chemicals of this sort may require more than cleaning, depending upon the length of time and the strength of the chemicals. In such cases, polishing with a good metal polish will usually remove the discoloration and restore the lustre. Wiping with a cloth dampened in kerosine will help to protect the plating from further deterioration.

Discoloration of chromium-plated parts under the action of chemicals used on roads and pavements, is not an abnormal condition and is not an indication of defective plating.

7. Door Garnish Moulding Fastenings on All-Weather Phaetons and Convertible Coupes

On all-weather phaetons, the door garnish mouldings are held in place by three trigger locks on the front doors and by two trigger locks on the rear doors.

The door garnish mouldings on Convertible Coupes are held in place by three trigger locks.

8. Servicing Locks

All locks used on both Cadillac and LaSalle cars are different than used on previous models and designed to make it practically impossible, with ordinary precautions, for anyone to break in the car or its compartments, or to unlock the ignition. This system, however, places greater responsibility on the owner and the distributor or dealer if inconvenience is to be avoided in case the keys are lost.

The lock number does not appear on any of the locks, and, at the time the car is delivered, appears only on a removable tab on the key. When the car is delivered it is extremely important that the distributor and dealer make a record of the number on the Unit Number Record Card, and that the owner be given the number and fully instructed as to the importance of keeping a permanent record. The tab should then be broken off of all keys before delivering the car to the owner.

The locks are operated by a double-bitted key. The lock tumblers are machined to limits of .001 in. and the keys must be cut accurately, not only for height but also for the angle between the teeth if it is to operate the lock. This simply means that the lock cannot be operated except by an exact duplicate of the key originally provided with the lock.

Service to locks and keys presents somewhat more difficulty than in the past as a result of the greater protection offered. Service to the lock cylinders will not be difficult since the cylinders will be provided by the factory Parts Division with the tumblers uncut. The cylinder can then be cut to fit the key by inserting the key in the cylinder and, holding the cylinder with a special jig, grinding or filing off the tumblers flush with the cylinder.

Key cutting machines are available to Cadillac distributors and dealers through the Briggs and Stratton Corporation, Milwaukee, Wisconsin. Every service station with a sufficient volume of business should have one of these machines in the interest of good service. Keys for all 1934 General Motors cars can be cut on these machines.

Service stations which do not have one of the cutting machines can have keys cut at the factory or through the nearest Briggs and Stratton distributor.

It should not be necessary to replace any lock cylinders on account of the key or lock sticking. Proper lubrication, in most cases, will overcome any tendency to stick, but locks which do not respond to this treatment may be corrected by cutting a new key on the preformed key blanks as furnished by the factory Parts Division.

Correct lubrication and accurate cutting of the lock cylinders and keys is of prime importance with the close fitting units of the current type locks and keys. Following are instructions and precautions for servicing this type of lock. Care should be taken to follow these instructions explicitly.

THE IMPORTANCE OF LOCK LUBRICATION

1. In order to provide better theft protection for the current Series cars, Cadillac employes

locks and keys of a new design manufactured to much closer limits than ever before. Close fits need lubrication.

2. All locks should be lubricated regularly. The first lubrication should be given before a new car is delivered and as a part of the regular 1000 mile lubrication schedule thereafter. Also make it a part of your regular inspection operation and wash job. Lubricate all cylinder locks—ignition, door, tire, trunk compartment, etc.

Recommended Oils and Their Uses

3. Avoid lubricants with a paraffin wax base or drying lubricants that leave a wax or gummy film after drying, that congeal or that freeze easily in cold weather.

Suggested lubricants follow:

(a) Use light oil, such as 3-in-One, Finol, Sewing Machine oil, typewriter oil or any of the light recognized oils.

4. This oil may be applied by the usual gun method by squirting in key hole or putting oil on the key and inserting it several times to carry the oil into the cylinder. After the operation is completed wipe the key off so that the oil will not be carried into pockets and purses.

5. Regular penetrating oils, paraffin wax base oils and dry lubricants should not be used.

HARD ENTERING KEYS

6. Occasionally locks will be found where the keys do not enter easily. If this difficulty cannot be remedied by lubricating, check the following:

(a) Burrs on Key—Check and remove burrs on keys, if any. Burrs may be removed by a mill file.

(b) Burrs on Sleeve—Checking for and removing burr on sliding dust cover, if any.

(c) Key Insertion—Make sure key is fully inserted before trying to turn.

(d) Freezing—Due to Water in Cold Weather—In cold weather keys may enter hard because of ice or frost that is formed within the lock. Application of heat for a moment or so, by applying a cigar lighter, match or even the warmth of the hand will usually free it.

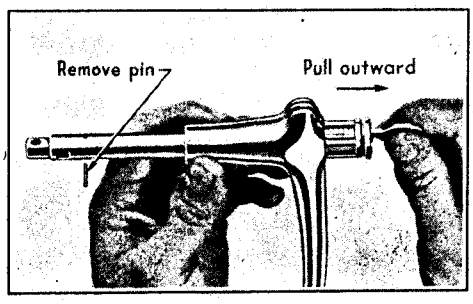


Fig. 2. To remove a door handle lock cylinder, remove the retaining pin and pull the cylinder out with the key.

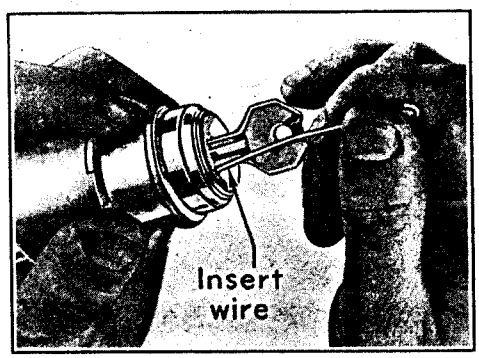


Fig. 3. With the plunger of an ignition or tire lock cylinder depressed by inserting a wire in the hole of the cylinder, turn the key clockwise and pull outward to remove the cylinder.

This condition can be greatly relieved by blowing the water out of the cylinders on outside locks or any other cylinders, which may be affected, with an air hose and oiling as instructed in paragraphs Nos. 3 and 4.

(e) Hard Operating Keys—If key should be extremely hard to enter, as received from factory, try cutting a duplicate key from a partially cut blank, as furnished by the factory Parts Division, with your regular Briggs & Stratton key cutting equipment.

REMOVING LOCKS

7. Door Handle—Remove the cylinder by removing the retaining pin at the lower end of the shank and drawing cylinder out with the key inserted, as shown in Fig. 2.

8. Ignition and Tire Locks—Remove cylinders by inserting the key in the lock and turning in clockwise direction until it stops, then insert paper clip or pointed stiff wire into the hole provided for the cylinder to depress the plunger, and continue to turn in clockwise direction and then pull out, removing the cylinder, as shown in Fig. 3.

9. Trunk Lock—Remove retainer pin at the base of the lock with a drift or other small instru-

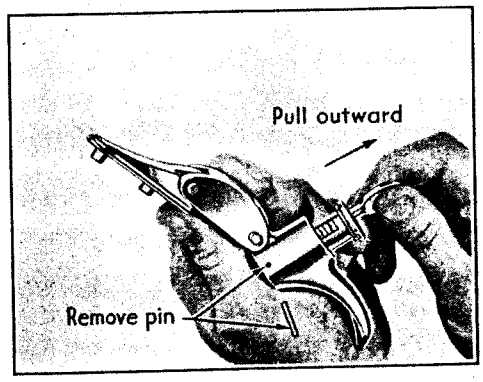


Fig. 4. After removing the pin from a trunk lock, the cylinder may be pulled out.

ment, and cylinder can be easily pulled outward, as shown in Fig. 4.

10. Fender Well Tire Lock and Glove Box Lock —Insert key, turn clockwise and compress lock case plunger as far back as possible, pulling out on cylinder as shown in Fig. 5.

On some of the early cars, the slot for the cylinder retainer of the tire carrier lock was machined too wide with the result that the cylinder may slip forward and bind the key when attempting to remove the key from the lock. In such cases, the key may be removed by pushing in on the lock cylinder while the key is withdrawn.

Tire carrier lock cylinders should be checked to make sure that the groove is not too wide. The groove should not be more than .090 inch wide, which may be checked by means of the shank of a new $\frac{3}{32}$-inch drill as shown in Fig. 6. The shank of the drill should not drop in the groove at any point around the entire circumference of the cylinder. If it does, the groove is too wide.

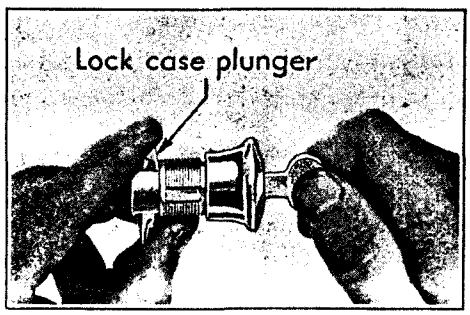


Fig. 5. To remove the cylinder from fender well tire locks and glove box lock, insert key and turn clockwise, compress lock case plunger and pull out cylinder.



Fig. 6. The shank of a new $\frac{3}{32}$-in. drill should not drop in the groove of a tire carrier lock cylinder at any point.

REPAIRS TO LOCK CYLINDER

11. In coding the lock cylinder, care should be taken to push the key all the way in before dressing down the cylinders; otherwise the tumblers will not be coded accurately.

The tumblers must be filed flush with the cylinder without, however, removing any metal from the die-casting.

After the tumblers are filed flush, the key should be removed and all burrs dressed off. It is a good plan also to chamfer the sides of the tumblers slightly, but not the narrow ends. These ends must not be rounded.

The sleeve should be inspected before installing the cylinder to make sure that it has no burrs and that the cylinder does not bind in it. In case of binding, it may be advisable to dress down the inside of the sleeve just enough to avoid binding.

All filings should be thoroughly washed out of the sleeve and cylinder, and the tumblers should be lubricated by placing a small amount of light machine oil on the key and working it in and out of the cylinder.

In any case of harsh operation of locks already in service, the sticking ordinarily can be overcome by this same process, working the key in and out with a slight amount of oil, and in stubborn cases with a slight amount of oil and graphite.

SERVICING INSTRUCTIONS

12. When cutting service keys or coding cylinders, always use the approved Briggs & Stratton service tools and genuine partially cut key blanks. If instructions are followed, all work can be done quickly, easily, accurately and without loss of material due to spoilage.

(a) CAUTION: Do not attempt to code any uncoded cylinders for ignition, door or other locks by any other method than described in the instructions accompanying the approved Briggs & Stratton cylinder coding tool and these service instructions. Only by this method can satisfactory results be assured. Grinding or sawing off tumblers is not satisfactory.

9. Replacing Ventilator Glass

Replacement of the ventilator glass is the same on all cars and can be accomplished without removing the ventilator assembly or disturbing the garnish moulding or control handle. Since the glass is a tight press fit in the channel, special tools should be used for removing and installing it.

The removal of the ventilator glass requires the use of a puller, Part No. B-176. If the ventilator glass is to be reinstalled or used again, friction tape should be used between the puller clamp and the glass to prevent the clamp from marring or scratching the glass surface.

The glass is installed by pushing it into the channel using the replacing tool, Part No. B-175. Before installing a ventilator glass, first place 2-inch strips of glass filler over the top and bottom edges of the glass, arranging the strips at the rear end of the edge so that they will come under the ends of the channel when the glass is installed in position. Then wrap the three edges of the glass that go in the channel with a single strip of the glass filler. This filler is a special tape obtainable from the factory Parts Division in rolls of any length desired. Two thicknesses of this filler tape are available. Thin filler can be secured under Part No. 4035726 and medium filler under Part No. 4035727. If necessary, in extreme cases, two thicknesses of thin filler can be used.

After wrapping the glass with the filler, spring the two ends of the glass channel slightly together or toward each other and start the glass in the channel a few inches by hand, placing the glass in the lower end first and then forcing it into the upper end.

If either the top or the bottom edge of the glass feeds in faster than the other one when forcing the glass into the channel, the replacing tool should be adjusted up or down to change the pressure point, bringing it closer to the edge which is lagging. The lagging edge should also be tapped gently with a block of wood and hammer to assist in forcing the glass evenly into the channel. The glass should be pressed in even with both ends of the glass channel.

The ends of the channel are then pressed down on the glass and the ends of the glass filler trimmed off even with the edge of the channel.

If the weather strip loosens from the retainer, it should be cemented in place with FS-681 ventilator cement and allowed to dry for at least an hour under pressure.

10. Removing Ventilator Control Handle

On cars with the finishing panels, the ventilator crank is fastened to the panel by means of four lugs. On these cars, the crank is removed and installed with the finishing panel, sliding on the regulator shaft when the panel is installed in position. The crank can be removed from the panel by simply straightening the lugs and pulling out the entire crank and bushing.

Later cars have these handles locked securely to the shaft with a ¼-in. 8 x 32 set screw, Part No. 4056802. In any case where the ventilator handles on early cars come loose on the shaft, the set screw may be installed.

To install the set screw, the handle should be drilled and tapped under the shank so that the set screw will be concealed when the handle is in place.

On cars not equipped with finishing panels, the ventilator crank locks to the regulator shaft by means of a small plunger located inside the hub. This type of handle is removed by releasing the plunger with the special tool No. HMB-127 for removing the window regulator and remote control handles.

11. Removing Door Finishing Panel

The door finishing panels are separate from the garnish moulding, and are held in place by bayonet locks and a row of nails in the top flange. In removing the panel, these nails must be removed before the finishing panel may be lifted from the bayonet locks.

The correct procedure for removing the finishing panels is, first to remove the garnish moulding; next remove the nails from the top flange of the finishing panel; then lift the panel to loosen it from the bayonet locks and pull it out away from the door to disconnect the ventilator crank from the regulator shaft.

12. Position of Door Handles

The remote control handles on the front compartment doors of 355-D Series 10 and 20 cars should be located two notches from vertical toward the front of the car as shown in Fig. 7.

When installing the handle it should first be set on the shaft in the vertical position just far enough to feel the splines catch; then back off the handle just enough to turn it to the correct position. In this way the splines may be counted as the catch is felt when turning the handle.

It is extremely important that the door handle be set at no more than two notches from vertical as in that position there is sufficient clearance to avoid striking the window regulator handle. Any lower, however, the remote control handle may interfere with the arc of the window regulator handle.

The window regulator handles on all doors should be set so that the knob points down toward the rear at a 45 degree angle when the window is fully closed.

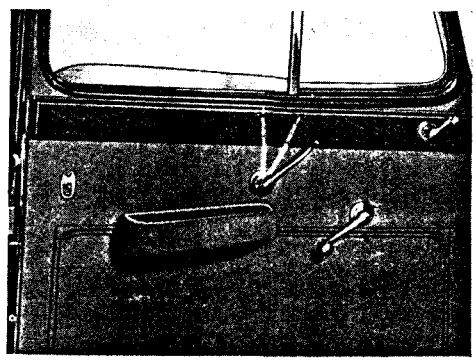


Fig. 7. The remote control handle on 355-D, Series 10 and 20, cars should be set two notches from vertical toward the front of the car.

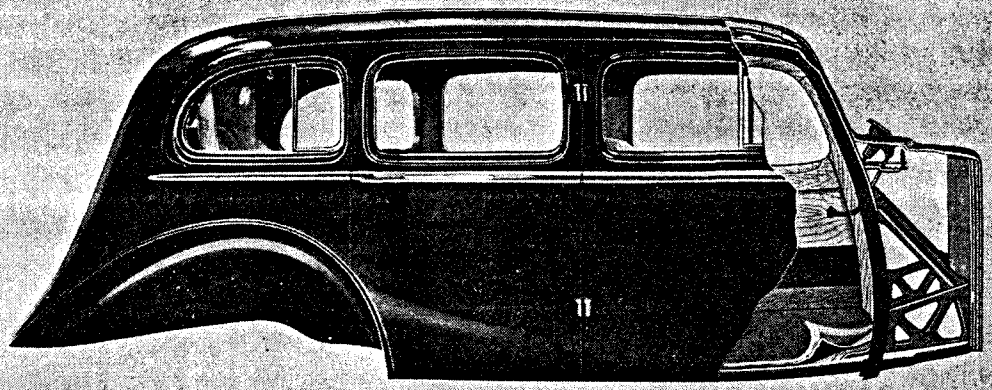


Fig. 8

Body showing Front End Construction

Remove damaged ventilator glass with puller, Part No. B-176. Install ventilator glass with replacing tool, Part No. B-175.

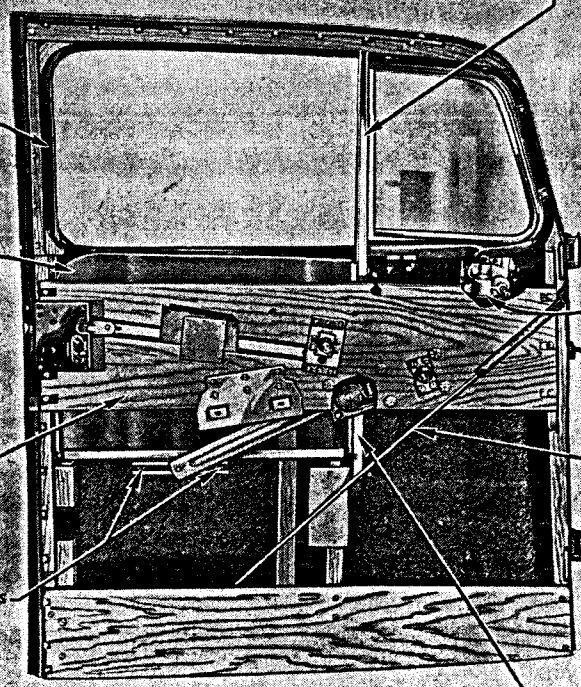


Fig. 9

Front Door

with garnish moulding and trim removed

Plate 8. Body and Front Door Details—Cadillac. Typical of La Salle

With the handle in this position, the window will tend to lock in the closed position with greater facility and any road vibration in the car will not tend to lower the window.

13. Replacing Ventilator Assembly

The replacement of the ventilator assembly necessarily requires the removal of the old ventilator from the car and the installation of the new one. This necessitates the removal and installation of the garnish moulding, the belt finishing panel (on cars using finishing panels) and the trim. It is not necessary, however, to remove the trim panel entirely but merely to loosen it around the window and lock board, or regulator board, as in the case of the rear quarter windows, and pull it away from the door or body far enough to provide easy access to the ventilator and board assemblies.

14. Replacing Door Ventilators

The removal and installation of the door ventilator and regulator assemblies are practically the same on all cars. There are, however, slight differences in operation between the front doors and the rear doors. The removal and installation of these assemblies should be performed in the following way. See Plates 8 and 9.

1. Remove garnish moulding. This includes the auxiliary moulding strip between the ventilator and the window glass on rear doors.

2. Remove belt finishing panel. (Cars provided with finishing panels.)

3. Remove ventilator control handle. (Cars not provided with belt finishing panels.)

4. Remove inside door handles.

5. Loosen trim around window and slightly below lock board and pull away from door far enough to make lock board accessible.

6. Remove filler board at top of lock board. (Front doors only.)

7. Remove retaining screws in weather strip retainer.

8. Remove ventilator assembly by pulling out at the top and lifting up to disengage drive shaft from regulator.

9. Remove lock board, including corner blocks, and regulator.

The installation of the ventilator assemblies and regulators is accomplished in the opposite order of their removal.

When installing the door ventilator assembly seal it in place with FS-745 rubber dough.

When installing the garnish moulding, it is necessary to work the lip or flange of the ventilator weather strip out over the garnish moulding. This is rather difficult to do without damaging the weather strip or moulding except by the use of a heavy string or cord. See Fig. 12, Plate 9. To use the string, a knot is first tied in each end and the string then wrapped around the weather strip inside of the flange close to the retainer. The garnish moulding is next installed and pressed firmly against the weather strip. With the garnish moulding held in this position, the string is pulled out starting at one end, pulling the flange out over the garnish moulding. Care should be exercised to remove the string gently; otherwise the weather strip may be damaged.

15. Replacing Rear Quarter Window Ventilator

The removal and installation of the rear quarter window ventilators is practically the same as on the doors. The ventilator regulator, however, is more accessible as it is mounted on a small board and is easily removed. See Fig. 11. The ventilator assembly and regulator are removed as follows:

1. Remove garnish moulding and belt finishing panel. (Cars provided with finishing panels.)

2. Remove ventilator control handle.

3. Loosen trim around window and regulator board directly below window.

4. Remove weather strip from vertical channel between ventilator and window glass, pulling it out from the center first.

5. Remove retaining screws in weather strip retainer.

6. Remove ventilator assembly by pulling out at top and lifting up to disengage drive shaft from regulator.

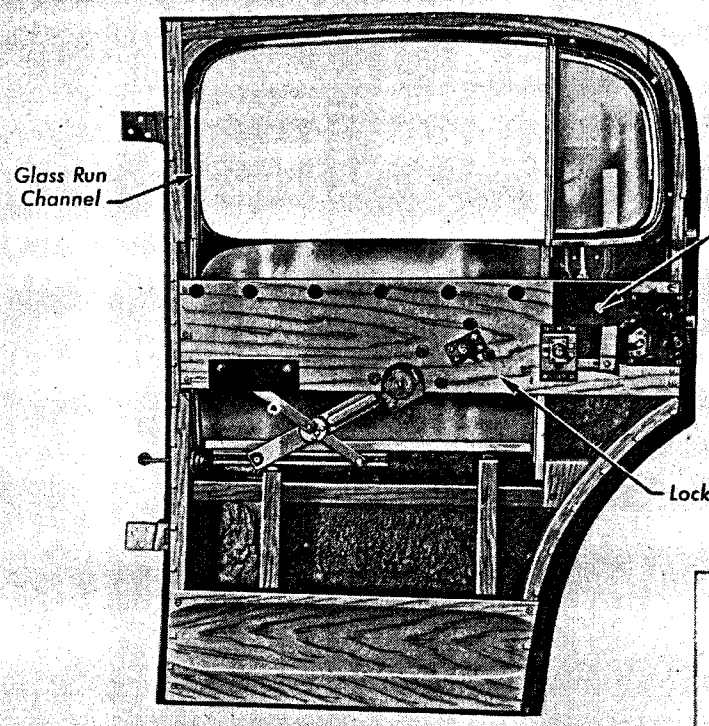
7. Remove regulator mounting board and take off regulator if necessary.

The regulator and ventilator assemblies are installed in the reverse order of their removal.

The ventilator assembly should be sealed in place with FS-745 rubber dough.

To install the weather strip between the ventilator glass and the window glass, install the ends first and then force the remainder of the strip in position, keeping the ends in line with those of the ventilator weather strip.

When installing the garnish moulding, the weather strip flange around both the ventilator and the window must be worked out over the moulding. This can be accomplished by using a heavy string in the same manner as on the front and rear door ventilators, as explained in Note 14.



Remove damaged ventilator glass with puller, Part No. B-176.
Install ventilator glass with replacing tool, Part No. B-175.

Fig. 10

Rear door with garnish moulding and trim removed

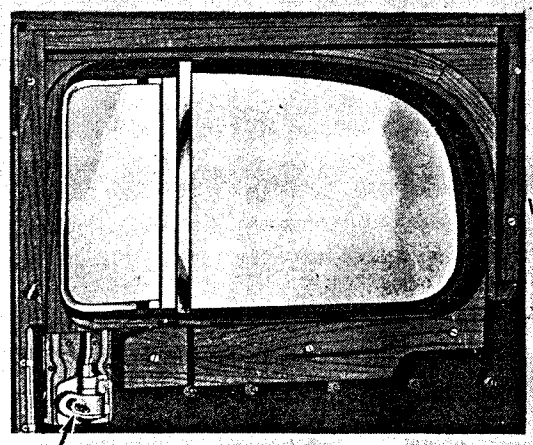


Fig. 11

Rear quarter window with garnish moulding and trim removed

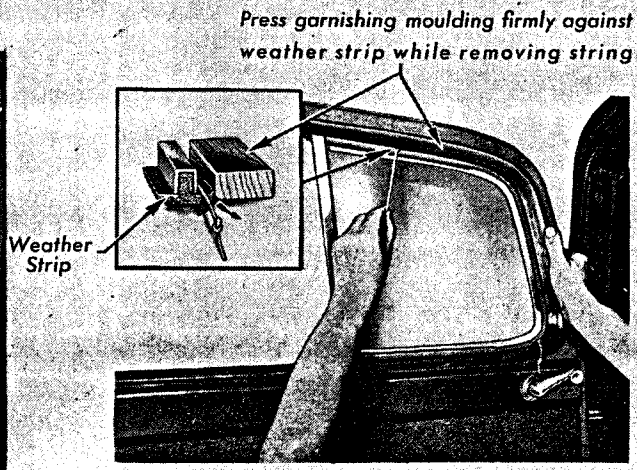


Fig. 12

When installing garnish moulding, use string or cord to pull flange of weather strip out over moulding. Pull string gently to avoid damaging garnish moulding

Plate 9. Rear Door and Rear Quarter Window Details—Cadillac. Typical of La Salle

16. Replacing Window Glass

The construction of the door and body windows differ somewhat from each other, making it necessary to use a different procedure for removing and installing them. Their removal and installation, however, is not difficult when the proper procedure is known and followed.

The replacement of the window glass can be performed without disturbing the No-Draft ventilator assembly.

FRONT DOOR WINDOWS

To remove the window glass from the front doors, proceed as follows:

1. Remove garnish moulding, belt finishing panel and inside door handles, including the ventilator control handle.

2. Loosen trim around window and slightly below lock board filler board.

3. Remove filler board and lock pillar corner block at top of board.

4. Loosen trim at bottom of door just far enough up to reach the window lift cam (See Fig. 9, Plate 8) at the lower edge of the glass with the glass in its lowest position. Removal of the trim entirely is not recommended as it would then be necessary to relocate the trim on the door when installing it.

5. Remove retaining screws in lift cam and pull cam slightly away from bracket on glass channel.

6. Remove first screw at lower end of glass run channel, or remove channel if necessary.

7. Loosen vertical division channel and swing out of position to clear glass.

8. Raise glass all the way up out of the window opening, pulling the top edge out just enough to clear the door.

9. Remove metal channel from old glass for installation on new glass whenever the glass is to be replaced.

Install the front door glass in the opposite order of its removal. Install the garnish moulding as explained in Note 14.

REAR DOOR WINDOWS

The removal and installation of the rear door window glass can be accomplished simply by removing the garnish moulding and the glass run channel, running the glass up and disengaging the glass channel from the window regulator operating arm.

If the glass is to be replaced, the metal channel should be removed from the old glass and installed on the new glass.

The glass is installed in the opposite way from its removal. The garnish moulding, however, should be installed as explained in Note 14.

REAR QUARTER WINDOWS

The rear quarter windows are stationary and their replacement is merely a matter of removing and installing the glass and channel assembly. The removal of the glass and channel assembly is accomplished by pulling it out of the window opening through the inside of the body after first removing the garnish moulding, loosening the trim around the window and removing the retaining screws in the glass channel.

The glass is installed in the reverse order of its removal except that the glass channel should be sealed in place with FS-745 rubber dough. The garnish moulding should also be installed as explained in Note 14.

BACK WINDOW

The back window glass and channel assembly is retained in place by the garnish moulding which is installed under pressure. To remove the glass, therefore, it is simply a matter of removing the garnish moulding after turning the retaining screws all the way out, and pulling the window and channel assembly out towards the front of the car. Before doing this be sure to remove the rear seat cushion to avoid damaging it.

The glass channel should be removed from the old glass for installation on the new glass whenever the glass is to be replaced.

When installing the rear window glass and channel assembly, seal it in place with No. 60 more-tite bedding putty. Also make sure that the rubber weather strip showing outside of the car is even all around the window opening. Any uneveness can be corrected by shimming on the inside. The garnish moulding is then installed and pressed firmly against the glass while fastening it in place.

Tool, Part No. B-177, should be used to press the garnish moulding firmly in place while installing the retaining screws. Care should be taken when using this tool not to exert too much pressure against the pillar posts as they may be sprung, preventing the doors from closing properly.

17. Replacing Windshield Glass

The windshield is of the solid, non-adjustable type on all closed bodies. The glass is carried in a rubber weather strip which is held in place by the garnish moulding. The windshield glass is removed as follows:

1. Remove garnish moulding. (Do not disturb lower panel on top rear face of instrument board.)

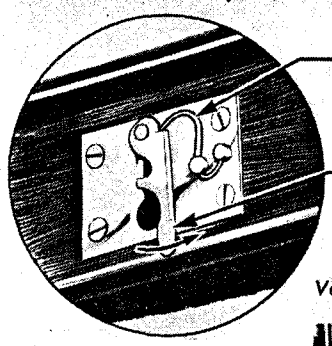


Fig. 13
Trigger Lock
To unlock, move trigger in direction indicated by arrow.

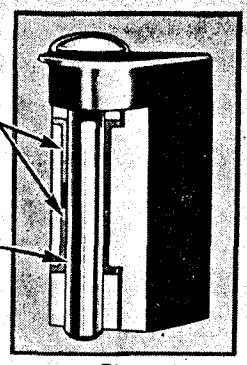


Fig. 14
Cut-away view of door hinge showing bronze bushings

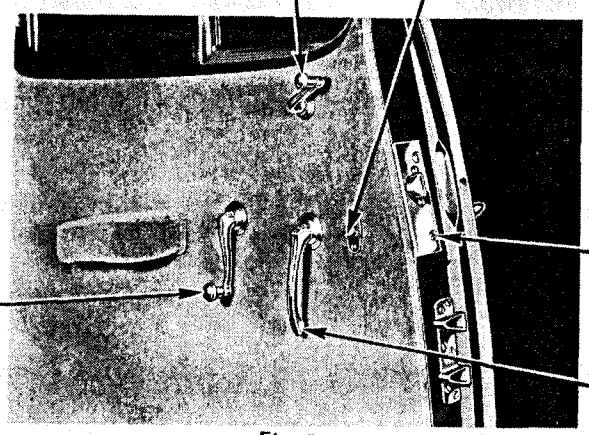


Fig. 15
Typical door showing lock and remote control handles

Plate 10. Door Details

2. Remove metal clips on pillars, which hold windshield glass in place.

3. Pull top of glass back to clear header board and lift out of lower weather strip.

The windshield glass is installed in the following manner:

1. Place a little vaseline on the lower edge of the glass and install it in the lower weather strip.

Additional help may be required to enter the glass in the weather strip channel as it is necessary to open the channel from both sides of the glass with screw drivers or some other form of flat tool.

2. Push top of glass forward into position and install metal clips to keep it in place.

3. Seal lower right and left corners of windshield where cutouts are made for wiper tube and aerial lead-in wire. To do this plug the openings with cotton, pressing it firmly in place. Also pack some additional cotton in back of the weather stripping for about two inches up from the lower edge of the glass. Then coat the cotton with FS-745 rubber dough. It is also advisable to seal the windshield glass in position by coating the front side and edges of the glass channel with rubber dough.

4. Install garnish moulding.

In order to make the windshield leak-proof, the garnish moulding must be pressed firmly against the weather strip while fastening it in place. This can be accomplished by using tool, Part No. B-177 braced against the front side of the door. Too much pressure should not be applied against the garnish moulding as it might damage the moulding or the pillars or break the glass.

18. Correcting Sticking Lock Bolts

The lock bolts on the doors of Fleetwood cars sometimes fail to snap out readily while there is any pressure on the remote control handle. As a result, it is difficult to close the doors in the usual manner by pulling them shut with the remote control handle.

This condition may be due to a slight misalignment between the door lock housing and the remote control housing, which are welded together, resulting in binding between the slotted end of the lock bolt and the pin for the remote control or to interference in the lock assembly between the lock bolt and the locking lever.

The remedy is to remove the lock mechanism from the door and correct any misalignment. If the lock housing is out of line with the remote control housing clamp the lock housing in a vise,

and line up the remote control housing by tapping it with a hammer. The alignment is satisfactory when there is clearance between the pin and both sides of the slot as shown in Fig. 16.

Interference between the lock bolt and locking lever may be corrected by properly lining up the dog on the locking lever so that it clears the corner of the lock bolt. To do this, the lock must be removed and the handle turned, to check the clearance at the narrowest point. It should be at least $\frac{1}{32}$-inch.

If the clearance is less than $\frac{1}{32}$-inch, it may be increased by striking the opposite end of the dog as indicated.

19. Correcting Sticking Front Doors on Fleetwood Bodies

Sticking of the front doors usually occurs at the upper front or rounded corner of the door. Whenever this is encountered, the paint on the door edge should be scraped off a little, and if the material beneath the paint is brass, the brass edge can be filed down just enough to provide the clearance necessary to prevent rubbing.

If the metal beneath the paint at this corner is not brass, no filing should be attempted. Instead, the door alignment should be altered by a slight adjustment of the adjusting rod inside of the door. This brace rod can be adjusted, upon opening the door, by means of a screw head in the bottom edge of the door near the front. See Fig. 9, Plate 8.

Tightening this brace rod tends to force the door upward and back, while loosening it tends to let the door drop slightly down and forward. A slight adjustment of this rod will frequently provide the correct clearance all along the outer edge. Only a slight adjustment should be made, as this adjustment tends also to move the door in and out from the body.

Further correction in the front door alignment, if necessary, can be made by changing the body shims in three places: at the front of the body, under the windshield pillar post, and under the center of the front door. The shims under the center hinge pillar should never be changed to correct front door alignment, as they also affect the alignment of the rear doors.

Ordinarily, the addition of shims under the windshield pillar posts will correct sticking of the front doors. These shims tend to raise the body slightly and thereby provide additional clearance at the top. If the front doors fit too loosely at the top, shims can be removed from under the windshield pillar posts or added at the point under the center of the door itself.

In cases where the door fits too tightly at the front edge only, springing the door hinges a little will usually provide the remedy. To do this, place

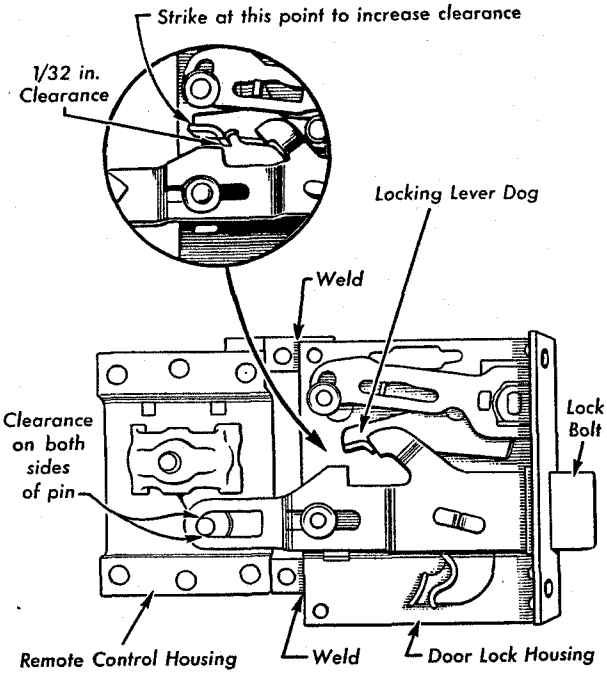


Fig. 16. Drawing of door lock. Proper clearances are necessary at the points indicated to prevent sticking of the lock bolt

a sheet of metal about $\frac{1}{8}$-inch thick between the inner ends of both door hinges and, by opening the door and pressing against it, spring the hinges a little. If this operation does not provide sufficient clearance, it will be necessary to mortise the hinge a little deeper in the pillar.

20. Installing Rubber Bumpers on Doors

Later Series 10 and 20 cars have a rubber bumper, Part No. 4047382, installed on the front pillar post to prevent any possibility of the door bumping against the pillar. In any case where this condition occurs on early cars, the bumper may be installed. To do this it is simply necessary to drill a hole with a No. 35, 36 or 37 drill in the front pillar about 10 in. above the upper door hinge and install the rubber bumper, attaching by means of the screw, Part No. 4049528.

21. Cleaning Door Drain Holes

A few cases of staining of the trim at the lower part of the door have been found to result from the drain holes in the bottom of the door being plugged-up with dirt, permitting water to accumulate and overflow the bottom board.

Care should be taken to make sure these drain holes are open to avoid any possibility of staining the upholstery from the accumulation of water.

BRAKES

General Description

The Cadillac and LaSalle brake systems are entirely different. Mechanical brakes are used in all of the Cadillac models while hydraulic brakes are employed on the LaSalle. The hand brakes on the LaSalle, however, are controlled through mechanical linkage.

CADILLAC BRAKES

Cadillac brakes have two internal self-energizing shoes in each of the four wheel brake units. The floating or upper brake shoes are energized with the forward motion of the car and do most of the braking. For this reason, they are made of aluminum alloy and are provided with a thicker lining (¼-in.) than the lower shoes. The anchored or lower shoes are energized with the backward movement of the car. As these shoes do less braking they are made of steel and are provided with thinner linings of $\frac{3}{16}$ in. thickness.

The aluminum alloy shoes naturally expand more than the cast iron brake drums under the heat generated by the use of the brakes. This compensates for the tendency of the drums to expand away from the shoes. The result is that Cadillac brakes are just as effective toward the bottom of a long hill as they are when first applied at the top.

The cam end of each brake shoe has a pivoted link which rests against the brake operating cam. Thus, instead of a sliding contact between the cam and the brake shoes, there is a rolling contact between the cam and the pivoted links. This construction prevents wear on the cam and the ends of the brake shoes and reduces friction at this point.

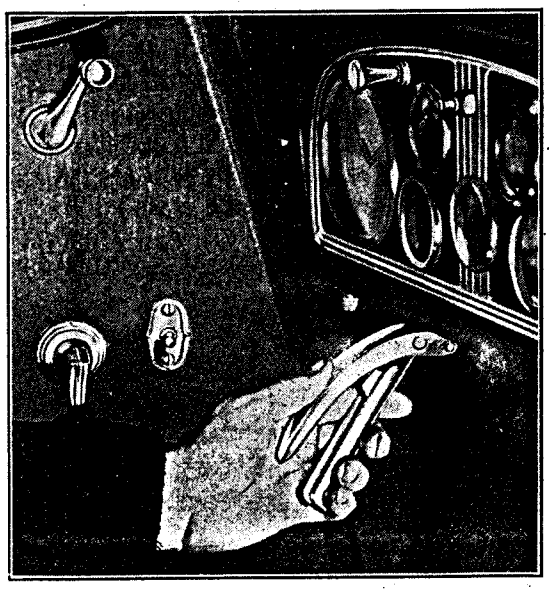


Fig. 1. The hand brake lever on all Cadillac cars is located at the left directly under the instrument panel.

The cam, operating the shoes, is mounted on a pivoted bracket so as to be self-centralizing. This construction allows the cam to follow the energized brake shoe without first applying the non-energized shoe, thereby insuring equal wear on the brake linings as well as soft acting brakes. The cam has a splined shaft on which is mounted an especially designed operating lever. The hub of this lever is broached to fit over the splined shaft and is connected to the casing of the cam lever by an adjustable link. When the nut on the outer end of the link is turned, the hub turns with relation to the lever itself, thereby changing the position of the brake operating cam. This construction permits the simplest known method of brake adjustment.

A coil spring surrounds each brake drum to give additional cooling surface and to absorb noise produced by vibrations in the drum.

Both the front and rear brakes are operated by diagonal pull-rods and cables extending through the frame side bars to the brake assembly on the wheels. The cables are carried in reinforced, flexible casings or conduits. Fittings are provided for lubricating both the front and rear brake cables. Lubrication of the cam bearings is done by removing the cams and packing the bearings with chassis grease.

The foot pedal operates the brakes on four wheels, while the hand brake lever operates the rear brakes only. Thus, only one set of shoes is needed for both braking systems.

The hand brake lever is located underneath and at the left side of the instrument panel and is connected to the rear service brake linkage by a cable. See Fig. 1.

The brake and clutch pedal assembly is mounted on the side-member of the frame. On the Series 10 and 20 cars, the pedal assembly is carried in a bracket attached to the inside of the frame side-member while on the longer wheelbase models, it straddles the side-member with the brake pedal on the inside of the frame.

A vacuum brake assister is used on all Cadillac cars. It is connected at the rear to the frame X-member and at the front end to a relay lever on the Series 10 and 20 and to a lever on the pedal shaft in the longer wheelbase models. It is operated by vacuum from the intake manifolds.

BRAKES

The force thus developed is applied to the relay or pedal lever and is added to the force applied by the driver to the pedal. Although the assister is connected to the pedal assembly, it does not interfere with the pedal action, and the foot brakes can be applied whether the engine is running or not. Also, the assister does not affect the adjustments of the brakes or any of the brake connections up to the pedal.

The control is positive, the valves being regulated by the movement of the pedal itself. The assister develops power only while the brake pedal is moving forward. As soon as the pedal stops, the assister ceases to build up any force and merely helps to hold the position which has been reached. The assister releases automatically when the pedal is released.

No attempt should be made to disassemble the brake assister. In the event that the assister unit cannot be made to function satisfactorily, it should be returned to the factory on an exchange basis.

The service operations and adjustments of the brakes are the same on all models except the Series 10 and 20. The only difference in these models is that the brake assister is mounted farther back in the frame X-member than in the longer wheelbase cars.

LaSALLE BRAKES

While the foot brakes on the LaSalle cars are of the hydraulic type, the hand brakes are mechanically operated. In this system the brakes are operated by means of a column of fluid forced through connecting pipes from a master cylinder operated by the foot pedal into cylinders attached to the brake shoes. As this liquid is incompressible, it transmits the foot pedal pressure to each wheel brake shoe by means of displacement of pistons in both the master and wheel cylinders. Inasmuch as the pressure must be equal in all parts of the system, no braking action can take place until all the shoes are in contact with the drums.

The brake system consists of a master cylinder in which the hydraulic pressure is originated; four wheel cylinders in which the hydraulic pressure is applied to operate the brake shoes against the wheel drums; a reservoir or supply tank for the operating fluid, and the tubing and flexible hoses connecting the master cylinder to the wheel cylinders.

The master cylinder is mounted on the frame at the left side underneath the front floor boards and is integral with the supply tank in which the compensating features are incorporated. This unit performs two functions. Its primary function is to maintain a constant volume of fluid in the system at all times, regardless of expansion due to heat or contraction due to cold. The secondary function is its action as a pump during the bleeding operation.

The wheel cylinders are of the floating, single-piston type. The cylinder is anchored to one brake shoe while the piston is connected to the other shoe by means of a link.

The front wheel cylinders have a larger bore than the rear cylinder; consequently the front and rear cylinders are not interchangeable. This arrangement of the wheel cylinder gives a braking ratio of 56 per cent on the front and 44 per cent on the rear.

The pistons in both the master cylinder and the wheel cylinders are provided with cup packings which act as seals to prevent the loss of brake fluid and consequently the braking pressure.

The hand brake lever operates the rear wheel brakes through a mechanical linkage. The hand lever is connected by a pull-rod to a cross shaft mounted on the X-member of the frame. This cross shaft in turn is connected to each rear brake with a steel cable. The rear brake shoes are operated mechanically through a curved lever and strut rod, within the brake unit to which the operating cable is connected.

Service Information

1. Brake Assister Service

No attempt should be made to disassemble the brake assister on Cadillac cars and service it in the field. In the event that the assister unit cannot be made to function satisfactorily, it should be returned to the factory on an exchange basis.

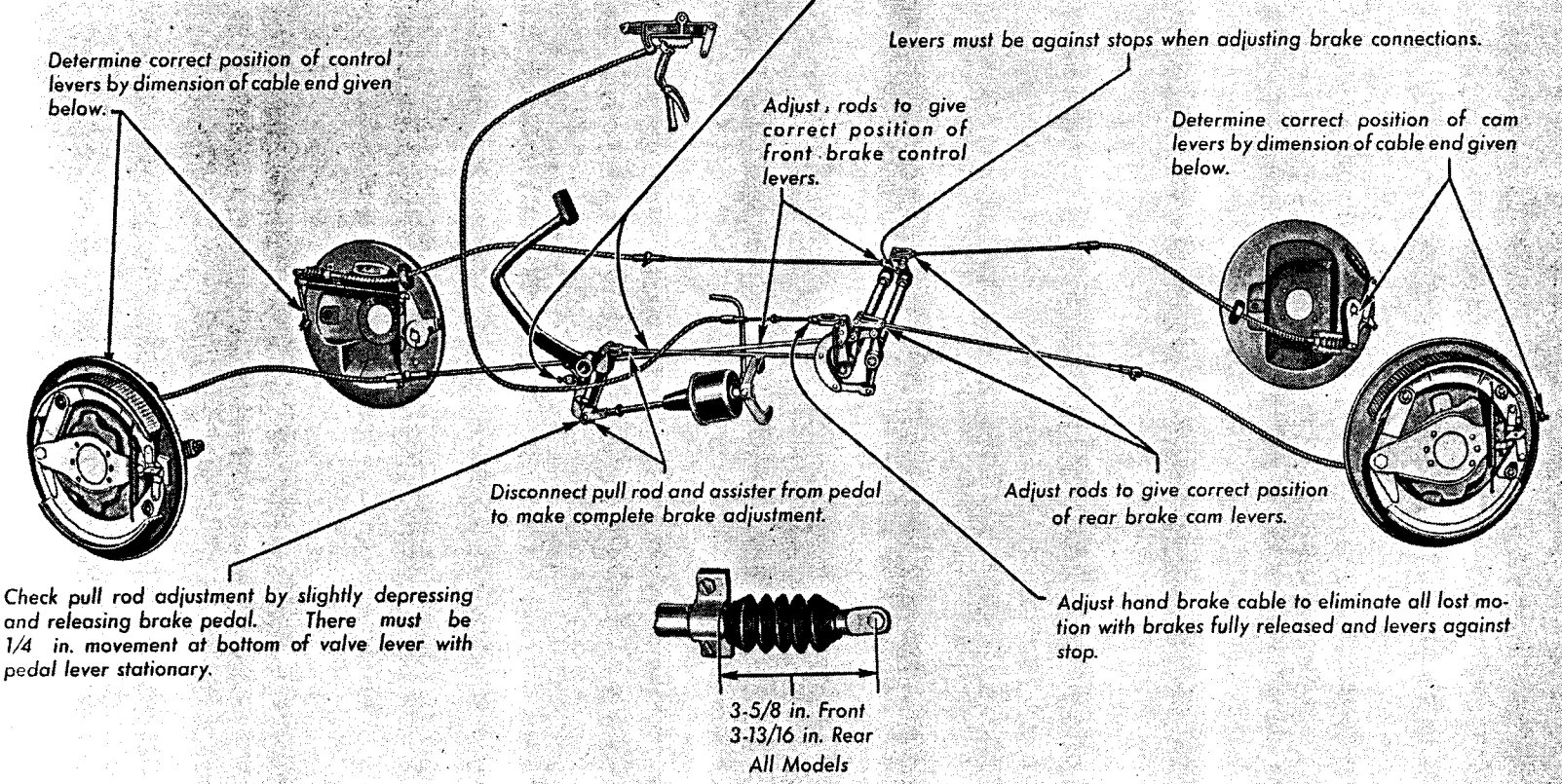
2. Regrinding Brake Drums

The brake drums supplied by the Parts Division are finish-machined at the factory before being shipped. This eliminates the necessity of finish-machining the drum after installing it on the wheel. Careful alignment of the drum on the hub, however, is of particular importance.

There is a limit to the amount of metal that can safely be removed from a drum when regrinding. The drums must not be ground out more than .030 inch over the original limit of the inside diameter. When brake drums are too thin, the excessive heat that frequently develops will cause them to distort and warp. Also the enlarged inner diameter of the

When relining brakes, back off cam nuts before readjusting.

Note: Adjustment of connections, when necessary, should precede adjustment of cams. Make all adjustments of connections in released position.



Cadillac 355-D Series 30, 370-D and 452-D brake system illustrated.

Cadillac 355-D Series 10 and 20 same except rocker shafts and connections and location of brake assister.

Plate 11. (Fig. 2) Brake Connections and Adjustments—Cadillac

Note: Unless brake connections are known to be O.K. check them as shown in Plate 11 before proceeding with cam adjustments.

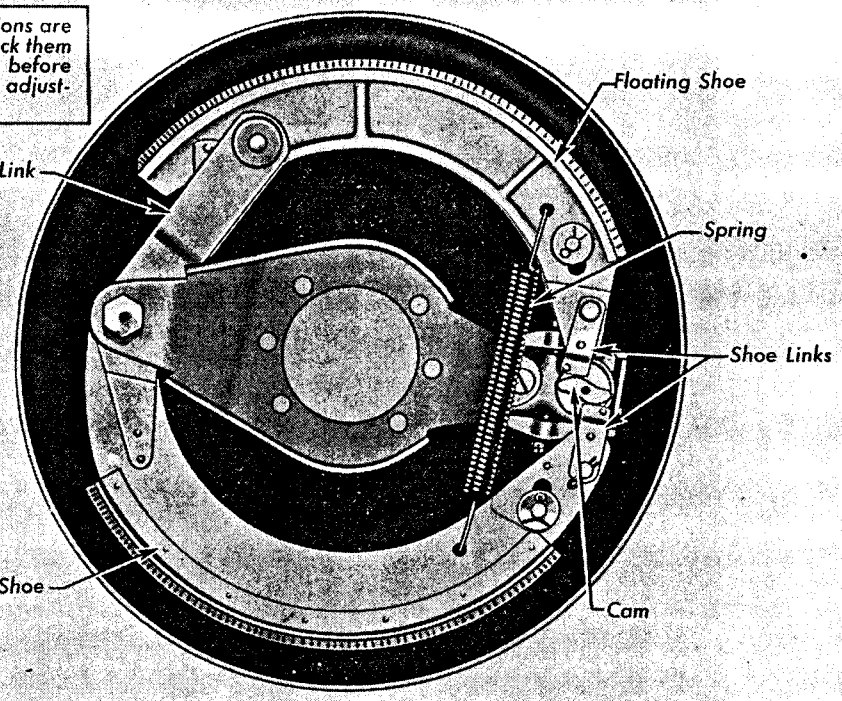
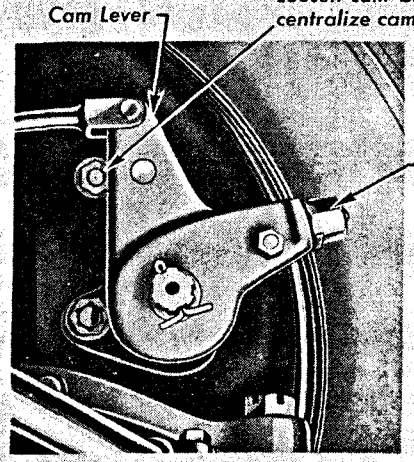


Fig. 3 – Typical Brake Assembly

Loosen cam bracket locking nut and apply brakes firmly to centralize cam bracket. Tighten nut before releasing brakes.



Check for equalization between right and left. If O.K. turn down on all four adjusting nuts same number of turns until pedal travel is approximately 2-1/4 inches. (1-1/6 turns equals 1 inch pedal travel.)

If equalization is not O.K. first turn down nuts until all four brakes just drag; then back off nuts same number of turns to give proper pedal travel. Recheck for equalization and make further adjustment if necessary.

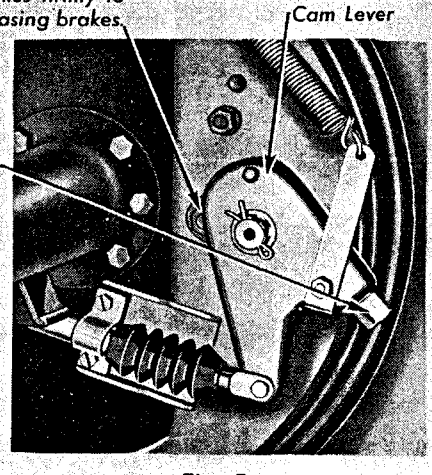


Fig. 4
Front Brake Adjustment

Fig. 5
Rear Brake Adjustment

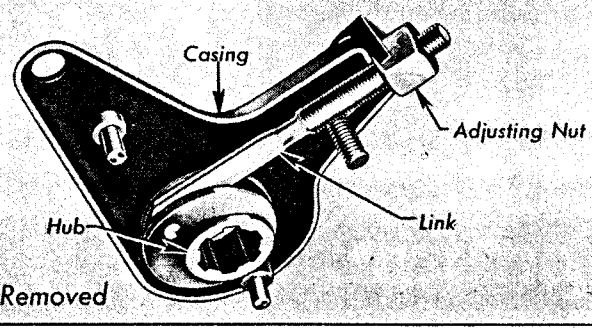


Fig. 6
Cam Lever with Half of Casing Removed

Plate 12. Brake Details and Adjustments—Cadillac

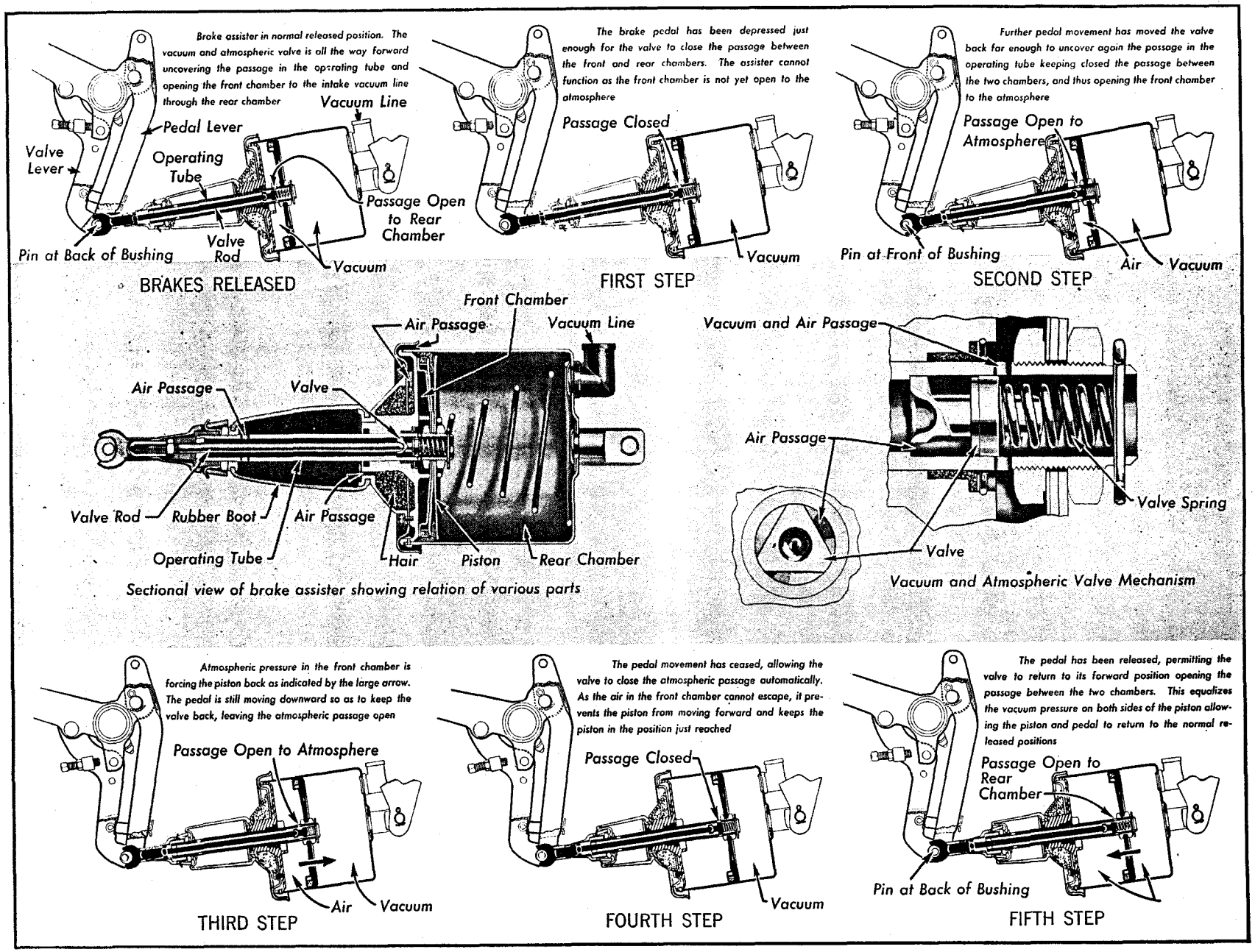


Plate 13. (Fig. 7) Diagrams Showing Operations of Vacuum Brake Assister—Cadillac

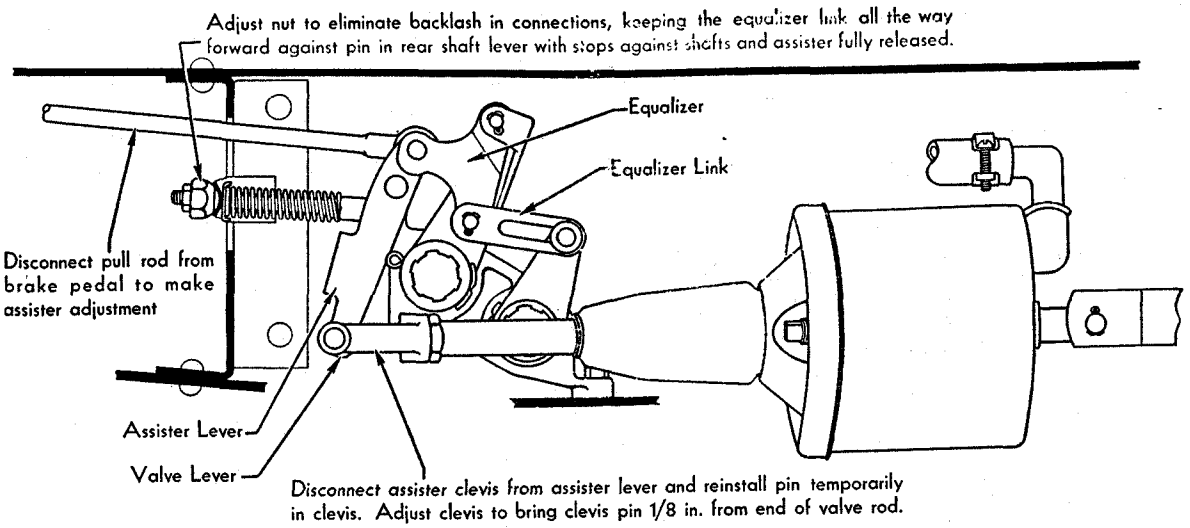


Fig. 8 — Brake Assister Adjustments on Cadillac 355-D (Series 10 and 20) Cars

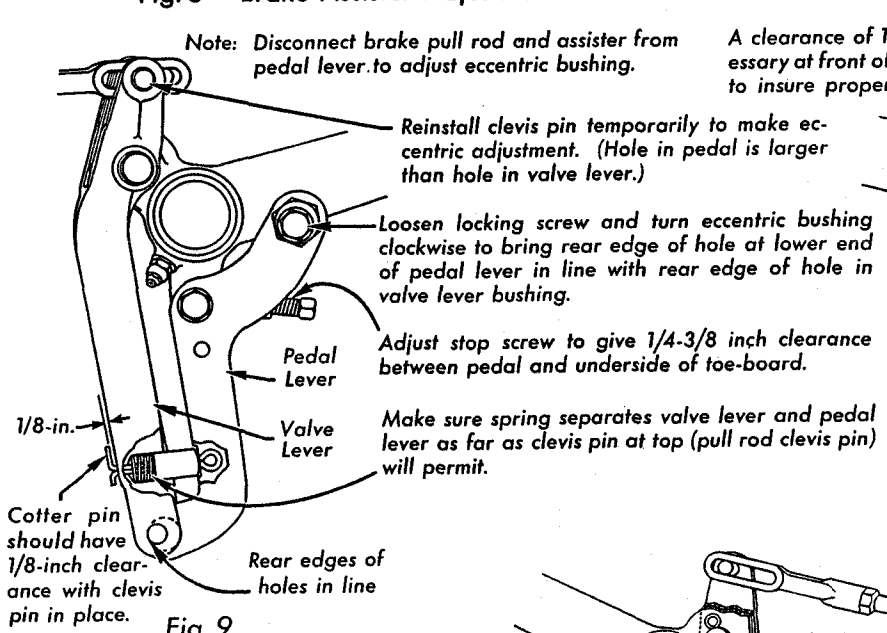


Fig. 9

Eccentric Bushing Adjustment

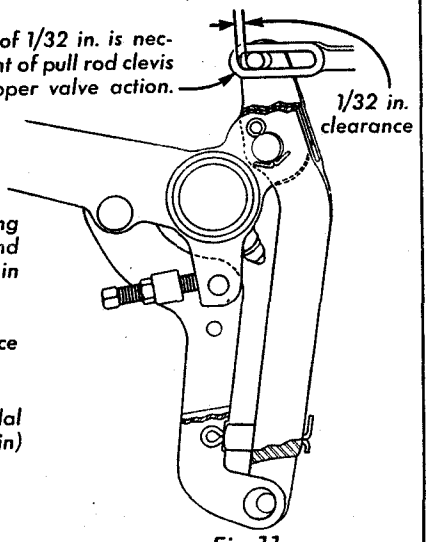


Fig. 11

Pull Rod Adjustment

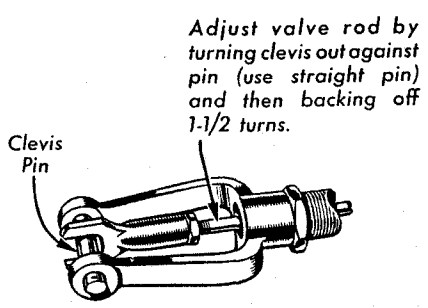


Fig. 10 — Valve Rod Adjustment

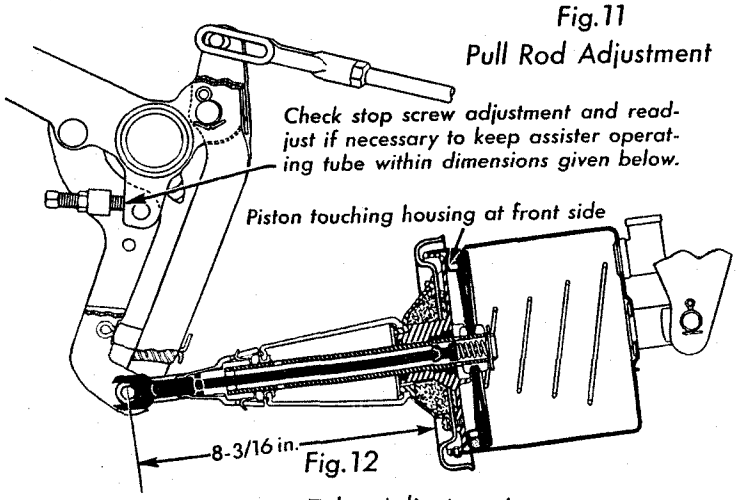


Fig. 12

Operating Tube Adjustment with Tube Connected to Pedal

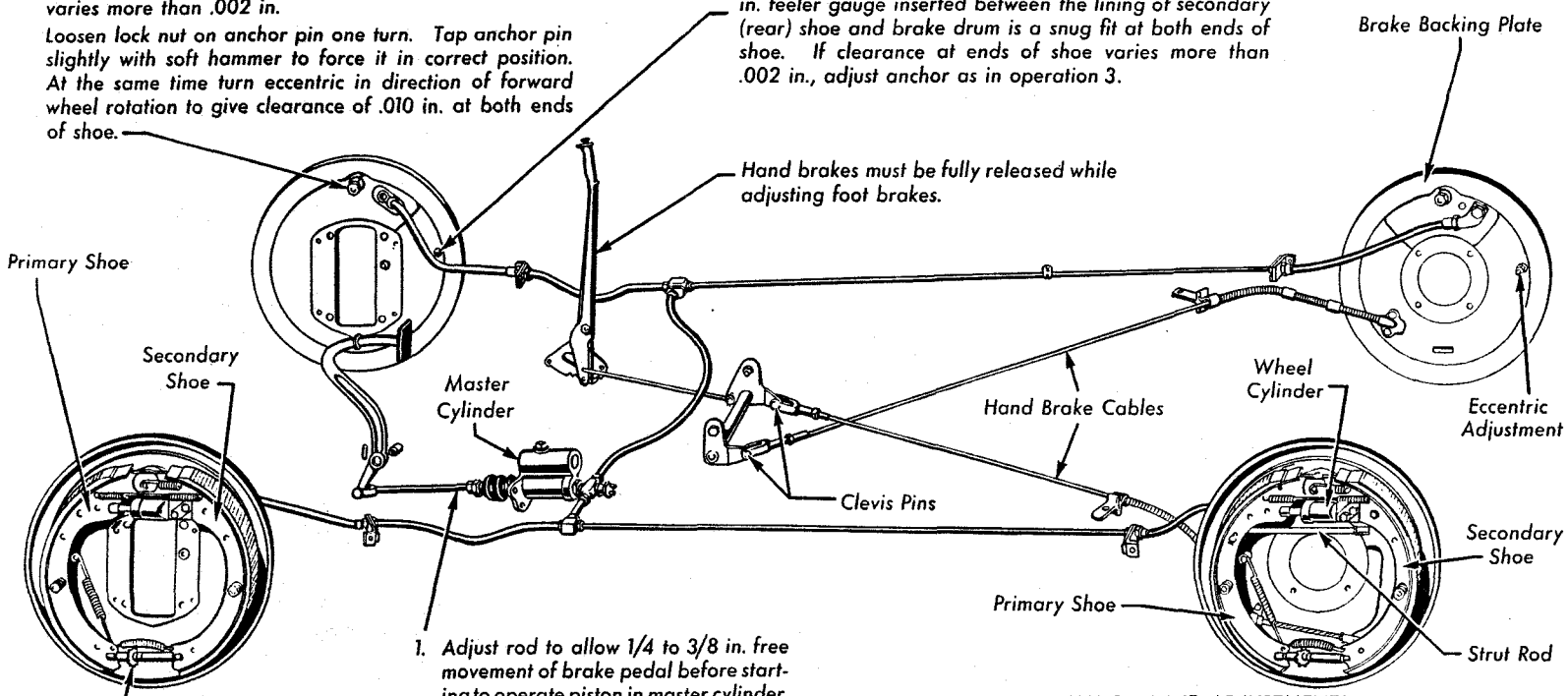
Plate 14. Brake Assister Adjustments—Cadillac

Plate 15. (Fig. 13) Brake Connections and Adjustments—LaSalle

Note: To adjust brakes, first jack up car and dismount road wheels. Then remove inspection hole covers from brake drum and brake backing plate. Repeat foot brake adjustments given below uniformly at all four wheels.

3. *Adjust anchor if clearance on ends of secondary shoe varies more than .002 in.*
   Loosen lock nut on anchor pin one turn. Tap anchor pin slightly with soft hammer to force it in correct position. At the same time turn eccentric in direction of forward wheel rotation to give clearance of .010 in. at both ends of shoe.

2. *Turn eccentric in direction of wheel rotation until a .010 in. feeler gauge inserted between the lining of secondary (rear) shoe and brake drum is a snug fit at both ends of shoe. If clearance at ends of shoe varies more than .002 in., adjust anchor as in operation 3.*



1. *Adjust rod to allow 1/4 to 3/8 in. free movement of brake pedal before starting to operate piston in master cylinder.*

4. *Adjust primary shoe by turning notched adjusting screw until a light drag is felt on the brake drum; then turn screw in opposite direction until drum is free of drag.*

HAND BRAKE ADJUSTMENTS

A. *Release foot brakes fully.*

B. *Apply hand brakes until strut rod just starts to operate brake shoes.*

C. *Keep shoes in position obtained in operation "B" and fully release hand brake lever.*

D. *With brakes as in operations "B" and "C", adjust clevis on front end of brake cable so that pin will just enter holes in clevis and lever on cross shaft.*

E. *Repeat adjustments on other rear brake*

(Readjust cable clevises if brakes drag with hand brake lever in fully released position.)

drum may prevent proper action of the cam. The thickness of the drums should be measured ½ in. from the outer flange.

3. Installation of Brake Lining to Avoid Squeaking Brakes

To avoid squeaking brakes on Cadillac cars, when relining the brakes, two corrective measures should be applied. The lining should be chamfered $\frac{1}{32}$ in. for a distance of about ¾ in. at the ends as shown in Fig. 14 on both shoes of all four brakes. In addition, the slight bulge which occurs around the rivet holes when countersunk should be ground off with a file or with emery cloth wrapped around a block of wood.

It must also be remembered that the thickness of the lining differs on the upper and lower shoes. The lining on the upper or floating shoe is ¼ in. thick while that on the lower or anchored shoe is $\frac{3}{16}$ in. thick.

On all except the first few cars a $\frac{1}{16}$ in. washer, Part No. 120394, is installed on the guide pin for both the upper and lower shoes on each brake to increase the tension of the spring against the brake shoe and dampen out the high pitched vibration which sometimes causes squeaking brakes. On the first few cars this washer was not used and it may be necessary to install it to eliminate the squeak. The washer should be installed at the inner end of the guide pin between the retainer for the spring and the shoulder on the pin at the brake dust shield.

4. LaSalle Brake Adjustment (See Plate 15)

1. Jack up car, dismount wheels and remove the inspection hole covers from the brake drum and braking plate. Also make sure that the hand brakes are fully released.

2. At each wheel loosen the lock nuts on the eccentric and the anchor pin, and insert a .010 in. feeler gauge between the lining on the secondary (rear) shoe and the brake drum.

3. Tap the anchor pin slightly with a soft hammer in the direction necessary for it to assume the correct position. At the same time turn the eccentric in the direction of forward wheel rotation to give a clearance of .010 in. at both ends of the secondary shoe, after which retighten both lock nuts. The clearance at each end of the secondary shoe should not vary more than .002 in. plus or minus from the thickness of the feeler gauge. If the variation is greater than .002 in., the anchor pin should be readjusted. Do not readjust the anchor pin unless an inspection shows that an adjustment is necessary.

4. Adjust primary shoe by turning notched adjusting screw outward, using tool HM-13985 until a light drag is felt on the brake drum. Moving the outer end of the tool toward the center of the wheel expands the shoes. Then turn the notched adjusting screw in the opposite direction until the brake drum is completely free of brake drag.

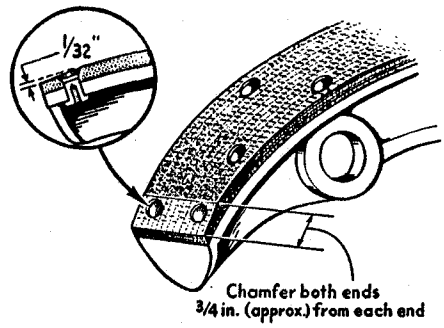


Fig. 14. Cadillac brake lining should be chamfered at both ends

5. Install the adjusting hole cover and the drum inspection hole cover.

6. Repeat the preceding operations uniformly at all four wheels.

HAND BRAKE ADJUSTMENT

With the foot brakes fully released, apply the hand brakes slowly until all slack is taken up in the brake linkage and the strut rod just starts to operate the brake shoe in one wheel unit. Then, keeping the brake shoes in this position by holding on the brake cable, fully release the hand brake lever and adjust the clevis on the front end of the cable so that the clevis pin will just enter both the clevis and the hole in the outer end of the lever on the brake cross shaft. Repeat this operation on the other rear brake. Readjust the cable clevises if the brakes drag with the hand brake lever in the fully released position.

FOOT PEDAL AND MASTER CYLINDER ADJUSTMENT

The adjustment of the operating rod connecting the brake pedal to the master cylinder in LaSalle cars should be checked and readjusted if necessary to provide proper clearance where it seats in the cylinder piston. There should be sufficient clearance at this point to allow ¼ to ⅜ in. free movement of the brake pedal before it starts the piston on the pressure stroke. This adjustment is important and should not be neglected as the cup must clear the port in the master cylinder when the piston is in the disengaged position, otherwise the compensating action of the master cylinder will be destroyed and the brakes will drag.

5. Bleeding the LaSalle Brake System

Whenever the pipe line is disconnected from the master cylinder, the brake system must be bled at all four wheels. When, however, a pipe is disconnected from any individual wheel cylinder, that wheel cylinder only must be bled.

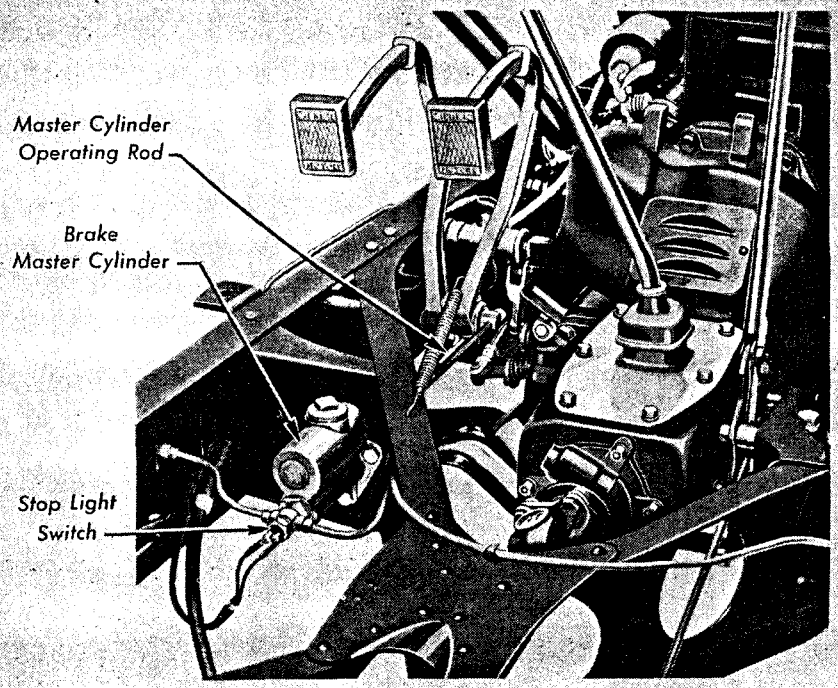


Fig. 15
View Showing Brake Controls

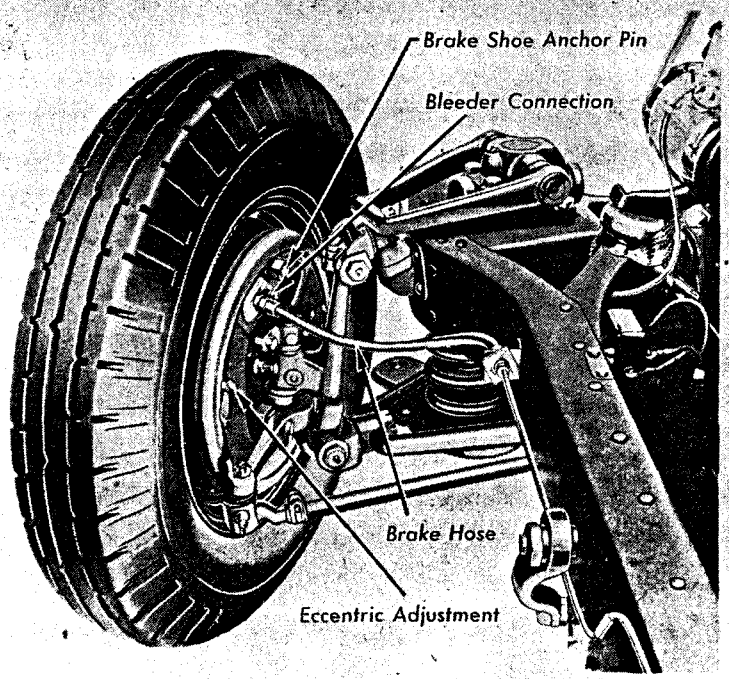


Fig. 16
View Showing Eccentric Adjustment
and Bleeder Connection

Plate 16. Master Cylinder and Brake Connections—La Salle

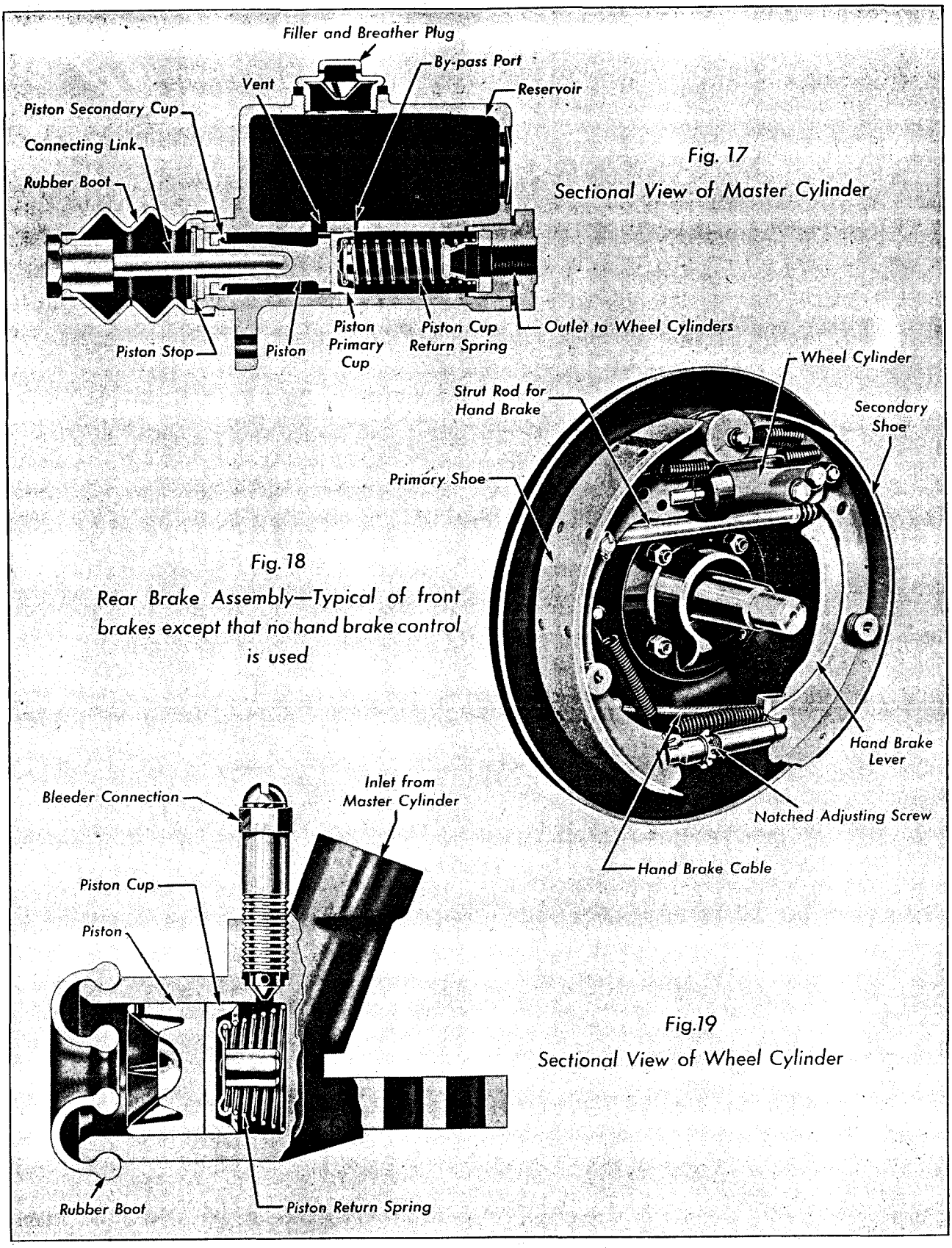


Fig. 17
Sectional View of Master Cylinder

Fig. 18
Rear Brake Assembly—Typical of front brakes except that no hand brake control is used

Fig. 19
Sectional View of Wheel Cylinder

Plate 17. Brake Cylinders and Wheel Assembly—LaSalle

Before bleeding the system, it is important to fill the supply tank with genuine Lockheed Special No. 5 brake fluid and to keep this tank at least one-half full of fluid during the bleeding operation.

To bleed the brake system, first remove the cap screw from the end of the bleeder connection on one of the wheel units and attach the bleeder drain, Tool No. J-628, allowing it to hang in a clean container such as a pint fruit jar. Then unscrew the bleeder connection three-quarters of a turn and depress the foot pedal by hand, allowing the pedal to return to the disengaged or released position slowly to prevent air from being drawn back into the system. This gives a pumping action which forces the fluid through the tubing and out at the wheel cylinder, carrying with it any air that may be present. Depressing the foot pedal five to seven times is usually sufficient to bleed a line.

Watch the flow of brake fluid from the hose, keeping the end of the hose below the surface of the fluid, and when all air bubbles cease to appear or when the stream is a solid fluid mass, close the bleeder connection.

Repeat the bleeding operation at each of the remaining brake units, next bleeding the one diagonally opposite the one just bled rather than bleeding the lines in order around the car. For instance, if a right front brake line is bled first, the left rear line should next be bled, then the left front one followed by the right rear. It has been found that air pockets can best be eliminated by bleeding the lines in this order.

The fluid withdrawn in the bleeding operation should not be used again. Replensih the fluid in the supply tank after each cylinder is bled. Should the supply tank be drained during the bleeding operation, air will enter the system and rebleeding will then be necessary after the supply tank is filled. Sufficient brake fluid should also be added to fill the supply tank after each bleeding operation is completed and whenever the tank is found to be less than one-half full of liquid.

In removing the supply tank filler plug, extreme care must be used to prevent dirt from entering the master cylinder.

6. Replacement of LaSalle Brake Shoe Assemblies

1. Jack up car.

2. Remove all four wheels and the wheel hub and brake drum assemblies. Do not depress the foot pedal when one or more of the brake drums are removed.

3. Disconnect hand brake cable clevises at brake cross shaft.

4. Remove brake shoe hold-down cups and springs.

5. Disconnect brake shoe return spring and shoe connecting springs.

6. Disconnect the secondary shoes from the wheel cylinders.

7. Remove the shoes and disconnect the hand brake cables from the hand brake operating levers at the rear brakes.

8. Check the lining wear. Install new linings or complete reconditioned shoes if the linings are worn nearly flush with the rivets. Different types of linings are used on the primary and the secondary shoes. The shoes must be correctly installed with the primary shoe at the front and the secondary shoe at the rear. The primary shoe may be identified by the letter "P" stamped on the web near the adjusting screw end. The letter "S" is stamped in the same position on the end of the secondary shoe.

9. If necessary to true brake drums, do not grind out more than .030 inch over the original limit of the inside diameter.

10. Check the steering knuckle pin bushings for looseness.

11. Tighten the bolts that hold the dust shields or backing plates to the rear axle and the front wheel spindles.

12. Install the brake shoes, being sure to install the additional spring at the top of the secondary shoe. Readjustment of the notched adjusting screw and centralization of the shoes at the eccentric adjustments is necessary to allow the hubs and drums to be assembled in place.

13. Install the wheel hub and drum assemblies and the wheels.

14. Check the front wheel bearings for looseness. Readjust the bearings if necessary.

15. Check the spring U-bolts and the rubber insulators between the rear axle and the springs and adjust if necessary as follows:

Tighten the U-bolts with uniform tension, keeping the lower pads flat with the bottoms of the springs. Tighten the nuts equally until the rubber starts to squeeze out beneath the edges of the retainers, after which tighten the lock nuts securely.

16. Adjust brake as outlined in Note 4.

7. Removal and Disassembly of LaSalle Brake Unit in Wheel

1. Remove wheel and wheel hub and brake drum assembly.

2. Disconnect the flexible hose assembly from the wheel unit. It is not necessary to disconnect the flexible hose unless the backing plate assembly is to be removed from the car. The backing plate may be dismounted for service on the front axle without disconnecting the flexible hose. The rear brake hose should be disconnected when the rear

brake backing plate is to be removed to avoid stretching the hose. The hand brake cable, however, need not be disconnected. When dismounting the front backing plate assembly for work of this nature, support it on a box of blocking to prevent placing undue strain on the flexible hose.

3. Remove the bolts holding the dust shield or backing plate to the steering knuckle or axle and dismount the complete brake assembly. When removing the rear brake assembly from the car, the hand brake cables must be disconnected at the cross shaft.

4. To reinstall the brake assembly, reverse these operations and bleed the lines if the flexible hose assemblies were disconnected.

The front and rear wheel cylinders are not interchangeable. The front wheel cylinders may be identified by the larger bore.

8. Lubricating Brake Dust Shield on LaSalle Cars

A popping noise may sometimes occur in the LaSalle 350 brakes when they are applied in forward speed after having been applied in reverse. This is generally a result of the edge of the shoe hanging slightly on the bosses of the dust shield before centralizing.

In such cases, the edges of the shoes should be smoothed up where they contact with the bosses on the dust shield and lubricated slightly.

A suitable lubricant for this purpose is furnished by the Bendix Brake Corporation under the name "Lubri-Plate," which may be obtained from the nearest Bendix dealer. Care should be taken in applying the lubricant to make sure that none is permitted to get on the brake lining.

This procedure should eliminate any objectionable popping. It should be remembered, however, that the centralizing action of the brakes may result in a slight click when the brakes are applied in reverse. This noise is hardly noticeable and should cause no annoyance.

9. Correcting Squeaking Brakes on Cadillac Cars

When squeaking brakes are encountered on later Cadillac cars, brake shoe guides such as used on early cars, may be installed at both the upper and lower shoes. The parts required for this installation on each car are as follows:

Quantity	Name	Part No.
8	Guide plates	1410962
8	Guide pins	1410875
8	Springs	231186
8	Spring seats	493998
8	Spring cups	493997
16	Mounting screws	120854
16	Washers	120380
16	Nuts	120375

The installation of these parts may be greatly simplified by the use of a locating tool for the guide plates, which can be made up from a block of wood. The finished block should be about $1\frac{3}{8}$ in. wide, $1\frac{1}{2}$ in. high, and $\frac{9}{16}$ in. thick. One end of the block should be rounded accurately to an $8\frac{5}{8}$ in. radius, with one edge of the radius chamfered about $\frac{3}{8}$ in. A $\frac{3}{16}$ in. inset should be cut in the block at the end opposite the radius, exactly $1\frac{1}{4}$ in. from the center of the radius.

The two guide assemblies are installed on each brake, one at each shoe, in the following manner:

1. Remove the wheel and brake drum.
2. Remove both brake shoes.
3. Locate the center of each of the two bosses in the brake dust shield and draw a verticle centerline to the top and bottom of the dust shield by sighting from these points.
4. Place the locating tool just described, on the flange of the dust shield and rest the edge of the guide plate in the inset of the tool. With the guide plate centered on the centerline, the two $\frac{17}{64}$ in. holes for the mounting screws may be located and drilled.
5. Mount the guide plates, inserting the mounting screws from the car side of the dust shield and installing the washers and nuts on the outer side.
6. Drill the $\frac{5}{16}$ in. hole for the guide pin in the brake dust shield, using the guide plate as a template. Make sure that all burrs are removed from the edges of the hole.
7. Cut away the metal between the drain hole and the brake dust shield in the stamping welded to the shield above the steering knuckle. This is necessary to permit installation of the pin for the upper guide assembly.
8. Locate and drill a $\frac{7}{16}$ in. hole in the web of the pressed steel brake shoe on a center $8\frac{1}{4}$ in. from the closest edge of the anchor pin hole and $1\frac{1}{32}$ in. from the edge of the flange.
9. Locate and drill a $\frac{7}{16}$ in. hole in the web of the aluminum brake shoe on a center $1\frac{1}{16}$ in. from the center of the reinforcement rib nearest to the link and $\frac{27}{32}$ in. from the edge of the flange.
10. Check the clearance between the guide plates and the brake dust shield to make sure it is approximately $\frac{3}{8}$ in. This can be done by placing the locating tool under the guide plate in the locating position. The plate may be bent to provide the desired clearance.
11. Install the brake shoes on the dust shield.
12. Insert the guide pins from the rear of the brake dust shield through the guide plates and the brake shoes.
13. Install the spring seat, the spring and the cap over the guide pin. The end of the pin is flattened and the cap is slotted so that the cap can be locked in place by turning it 90° after installing over the pin.
14. Install the brake drum and the wheel.

BRAKES

LaSalle Brake Diagnosis Chart

Effect	Cause	Remedy
Brake Pedal Goes All Way Down to Toe Board	Normal wear on linings.	As the brake linings wear it becomes necessary to set the shoes closer to the brake drums. This condition is indicated by the necessity for pumping the brake pedal several times before the brakes become effective. When adjusting the brakes the drums should be cool and the shoes should be set as close to the drums as possible without dragging. The shoe anchor pins should not be disturbed when making this adjustment to compensate for lining wear.
	Leaks in brake system.	A leak in the pipe connections will allow the pedal, under pressure, to go gradually to the toe board. A cup leak does not necessarily result in loss of pedal travel, but is indicated by a loss of fluid in the supply tank. If no leaks are found either at the wheels or the connections, the master cylinder should be removed and the bore checked for scratches and scores.
	Air in brake system.	Air in the brake system will cause a springy, rubbery action of the brake pedal. If a sufficient quantity of air is present in the system, the brake pedal will go to the toe board under normal pressure. All air in the brake system must be expelled by bleeding as explained in Note 5.
	No fluid in supply tank.	The fluid level in the supply tank should be checked. Should the tank become empty, air will be introduced into the system, necessitating bleeding as explained in Note 5.
Brakes Drag at All Wheels	Mineral oil in brake system.	Mineral base oil, such as engine oil and kerosine, when present in the brake system will cause the cylinder cups to swell and distort, making it necessary to replace all rubber parts. To correct this condition, the brake system should be flushed with alcohol and refilled with standard Lockheed brake fluid.
	Port hole in master cylinder closed.	It is imperative that the port directly ahead of the master cylinder piston cup be open when the brakes are released. Should this port be blocked by the piston cup, not returning it to its proper release position, the pressure in the system will gradually build up forcing all brakes to drag. Loosening one of the bleeder screws at the wheels will relieve the system of pressure and give temporary relief. The bleeder screw must be tightened before the car is driven.
Brake Drags at One Wheel	Weak or broken brake shoe return spring.	Replace spring with a new one.
	Brake shoes set too close to drum.	Readjust shoes to eliminate dragging as outlined in Note 4.
	Cylinder cups distorted.	The rubber cylinder cups will swell and become distorted if kerosine, gasoline or any other similar fluid is used instead of alcohol to flush the brake system or to clean these parts. Under this condition the return action of the shoes will be retarded and the brake drums will heat. The remedy is to replace the cups with new ones, washing them and flushing the brake system with alcohol and then to dip the new parts in brake fluid before reassembling them.
	Loose or defective wheel bearings.	Adjust or replace bearings with new ones as necessary.

BRAKES
Diagnosis Chart

Effect	Cause	Remedy
Car Pulls to One Side When Brakes are Applied	Oily linings.	Install new linings or complete reconditioned shoes. Oily linings must not be cleaned and used again.
	Brake shoes improperly adjusted.	This condition is evidenced by one wheel sliding before the others. The car may also pull to one side or drift when the brakes are applied with the front brakes improperly adjusted. The brakes must be readjusted with approximately the same clearance at all wheels as outlined in Note 4.
	Dust shield, or backing plate, loose on steering knuckle or axle.	A loose dust shield or backing plate will permit the brake assembly to shift on the retaining bolts. Tighten backing plate and readjust the shoes.
	Different makes of linings used.	Different makes of linings have different braking efficiency. Linings other than those specified by the factory may cause a car to pull to one side when the brakes are applied. Install new linings or complete reconditioned shoes.
	Tires not properly inflated.	Inflate front tires to 25 lbs. and rear tires to 30 lbs. pressure.
Springy Pedal Action	Brake shoes improperly adjusted.	This condition is evidenced by one wheel sliding before the others. The car may also pull to one side or drift when the brakes are applied with the front brakes improperly adjusted. The brakes must be readjusted with approximately the same clearance at all wheels as outlined in Note 4.
	Air in brake system.	Air in the brake system will cause a springy, rubbery action of the brake pedal. If a sufficient quantity of air is present in the system, the brake pedal will go to the toe board under normal pressure. All air in the brake system must be expelled by bleeding as explained in Note 5.
Excessive Pedal Pressure Necessary to Stop Car	Brake shoes improperly adjusted.	This condition is evidenced by one wheel sliding before the others. The car may also pull to one side or drift when the brakes are applied with the front brakes improperly adjusted. The brakes must be readjusted with approximately the same clearance at all wheels as outlined in Note 4.
	Incorrect linings used.	Install new linings or complete reconditioned shoes. Poor grades of brake linings lose their gripping qualities after a few thousand miles. As the frictional quality of the lining decreases the pressure on the brake pedal must naturally be increased to get the equivalent stop.
	Oily linings.	Install new linings or complete reconditioned shoes. Oily linings must not be cleaned and used again.
	Lining making only partial contact with drum.	Grind off high spots on lining and readjust brakes as necessary.
Too Light Pedal Pressure (Brake Action Severe)	Brake shoes improperly adjusted.	This condition is evidenced by one wheel sliding before the others. The car may also pull to one side or drift when the brakes are applied with the front brakes improperly adjusted. The brakes must be readjusted with approximately the same clearance at all wheels as outlined in Note 4.
	Dust shield or backing plate, loose on steering knuckle or axle.	A loose dust shield or backing plate will permit the brake assembly to shift on the retaining bolts. Tighten backing plate and readjust the shoes.
	Oily linings	Install new linings or complete reconditioned shoes. Oily linings must not be cleaned and used again.

BRAKES

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Braking area (foot brakes)—total in square inches	207	237.7	237.7	237.7
Braking power division	56% front 44% rear	60% front 40% rear	60% front 40% rear	60% front 40% rear
Clearance between lining and drum (approx.)	.010″	.007″	.007″	.007″
Clearance between pedal and under side of toe-board	¼-⅜″	¼-⅜″	¼-⅜″	¼-⅜″
Cylinder bore, front wheel	1 1/16″			
Cylinder bore, rear wheel	15/16″			14.995-15.005
Drums (See Note 2)—				
Inside diameter	11.995-12.005″	14.995-15.005″	14.995-15.005″	15.995-16.005″
Out of round, not over	.007″	.007″	.007″	.007″
Measured inside on braking surface of drum ½ in. from flange.				
Run out, maximum, with drum installed	.010″	.010″	.010″	.010″
Lining—				
Length per wheel	25 7/8″	29 27/32″	29 27/32″	29 27/32″
Forward (top) shoe		15 19/32″	15 19/32″	15 19/32″
Reverse (bottom) shoe		14¼″	14¼″	14¼″
Thickness	3/16″			
Forward (top) shoe		.245-.260″	.245-.260″	.245-.260″
Reverse (bottom) shoe		.183-.198″	.183-.198″	.183-.198″
Width	2″	2″	2″	2″
Type	Moulded	Woven	Woven	Woven
Springs—				
Lever pull back springs (outside of front and rear brakes)				
Free length inside loops (approx.)		10″	10″	10″
Tension in pounds stretched to 10¾ in. between loops		10-12	10-12	10-12
Shoe retracting spring at cam end of shoes on Cadillac and adjusting screw end on LaSalle—				
Free length inside loops (approx.)	3 1/16″	7½″	7½″	7½″
Tension in pounds—				
Stretched to 3 5/16 in. between loops	41½-49½			
Stretched to 8 15/16 in. between loops		60-70	60-70	60-70
Primary shoe retracting spring (lower) —				
Free length inside loops (approx.)	5 11/16″			
Tension in pounds stretched to 6¼ in. between loops	31½-38½″			
Secondary shoe retracting spring (upper) —				
Free length inside loop (approx.)	2 33/64″			
Tension in pounds stretched to 2⅝ in. between loops	18-22			
Brake shoe connecting spring (anchor end of shoes)—				
Free length inside loop (upper)	6 7/64″			
Tension in pounds stretched to 6 1/16 in. between loops	36-44			
Type of brakes	Hydraulic	Mechanical with Vacuum Assister	Mechanical with Vacuum Assister	Mechanical with Vacuum Assister

CLUTCH

General Description

Both the Cadillac and LaSalle clutches are of the dry-disc type. They differ in construction, however, but are serviced in somewhat the same manner except that the LaSalle clutch may be completely serviced in the field.

The factory does not supply any of the component parts of the various pressure plate assemblies for the Cadillac clutch, inasmuch as specially designed equipment is necessary to adjust the assembly properly. The only individual parts furnished for this clutch are the driven discs. When any of the other parts need replacing, it will be necessary to install a complete clutch assembly.

CADILLAC CLUTCH

The clutch used on Cadillac cars has three driving plates and two driven discs. The center driving plate carries four driving studs which extend through both the front and rear plates.

The rear plate is a part of the spring pressure plate assembly which also includes the release mechanism. The springs are carried in supports which are riveted to the rear driving plate at two points and in addition is provided with two extensions or legs to provide a four-point contact with the driving plate.

A double-lever release mechanism is used on the 452-D clutch to avoid springiness in the levers and pressure plate, insuring uniform engagement of the clutch over the entire surface of the facings.

The driven discs for the 370-D clutch have curved spokes. All other clutches use discs with straight spokes.

The mounting of the clutch is extremely simple. It is necessary to take off only four nuts to remove the entire clutch assembly from the flywheel.

The service operations on the clutch are the same on all Cadillac cars.

LASALLE CLUTCH

The LaSalle clutch is of the single-plate type. The clutch is released through a graphite release bearing which is mounted on the clutch release yoke. The release bearing contacts with a plate attached to the inner ends of the release levers.

Each release lever is pivoted on a floating pin, which remains stationary in the lever and rolls across a short flat portion of the enlarged hole in the eyebolt when the clutch is disengaged. The outer ends of these eyebolts extend through holes in the clutch cover and are fitted with adjusting nuts by which each lever is located in the correct position.

The outer ends of the release levers engage the pressure plate lugs by means of struts, which provide knife edge contact between the outer ends of the levers and the pressure plate lugs, eliminating friction at this point.

No adjustments for wear are provided in the clutch itself. An individual adjustment is provided, however, for locating the release levers in manufacturing, but they are locked in place and should not be disturbed, unless the clutch is disassembled for the replacement of parts.

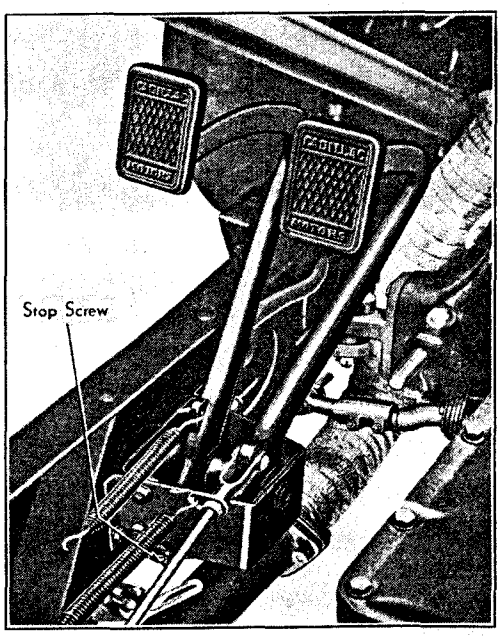


Fig. 1. Series 10 and 20 Cadillac pedal assembly, showing clutch pedal stop screw.

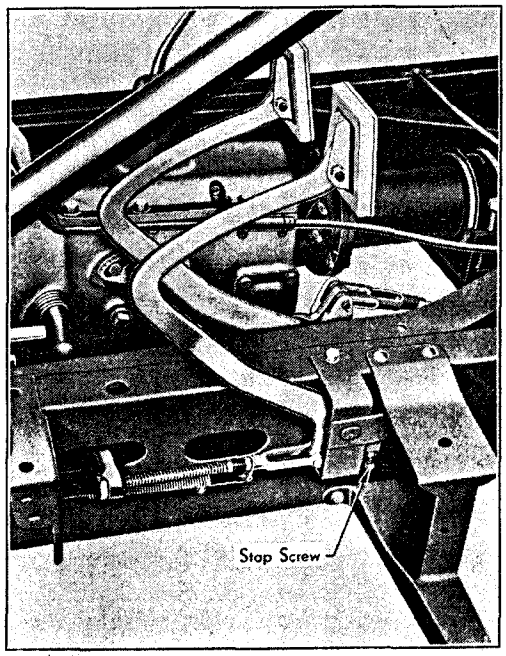


Fig. 2. Pedal arrangement on 355-D Series 30, 370-D and 452-D cars, showing the clutch pedal stop screw.

CLUTCH

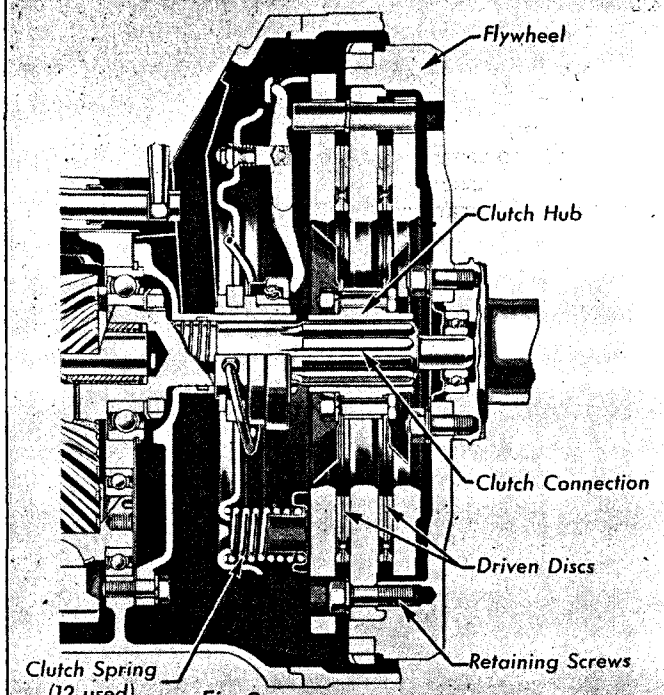


Fig. 3
Sectional View of Cadillac 355-D and 370-D Clutch

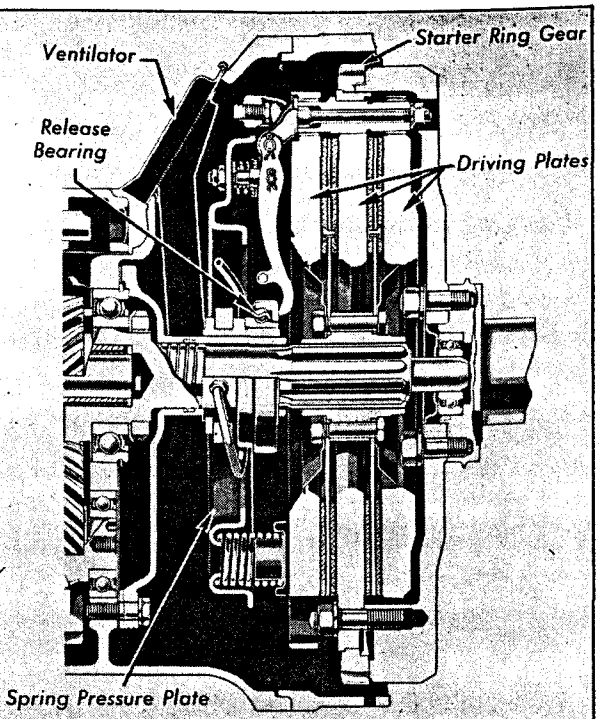


Fig. 4
Sectional View of Cadillac 452-D Clutch

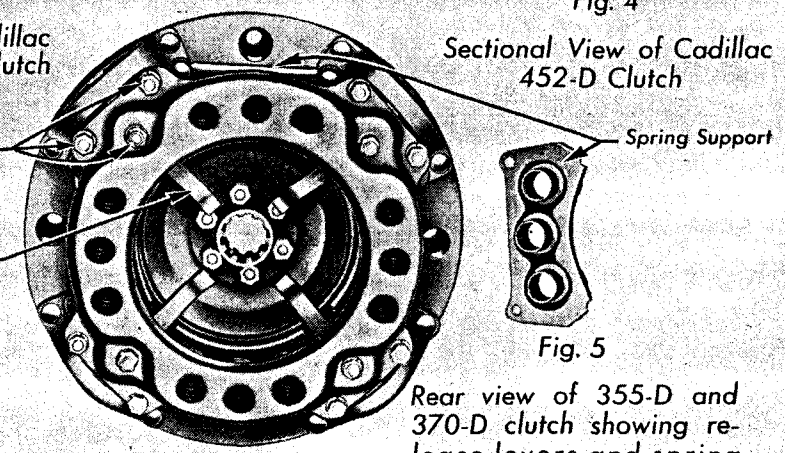


Fig. 5
Rear view of 355-D and 370-D clutch showing release levers and spring support

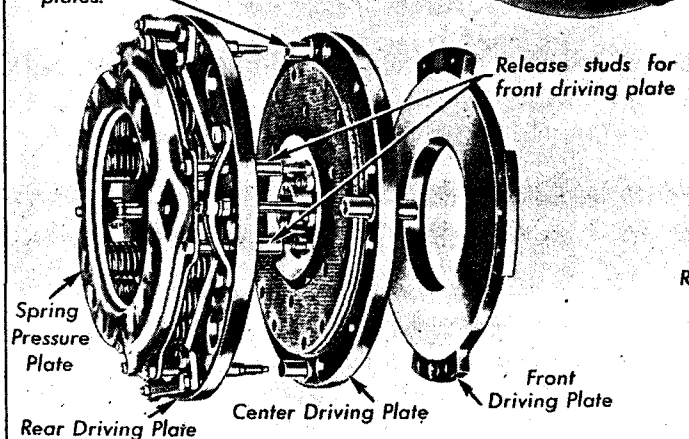


Fig. 6
Exploded View of 452-D Clutch

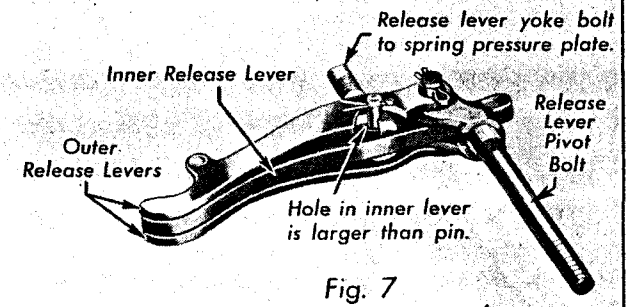


Fig. 7
Clutch Release Lever Assembly Used on 452-D Clutch

Plate 18. Clutch Details—Cadillac

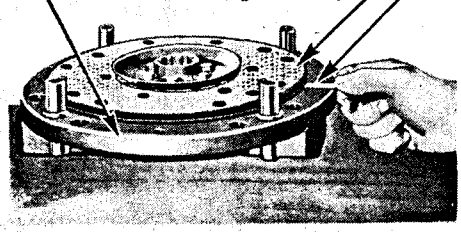


Fig. 8

Measuring total clearance between clutch facings and center driving plate. This total clearance should be held to .025-.040 in., .030 in. being recommended.

Spacers should be installed between driven disc and clutch hub as necessary to give proper clearance between facings and center driving plate. Unnecessary to have spacer between each disc and hub.

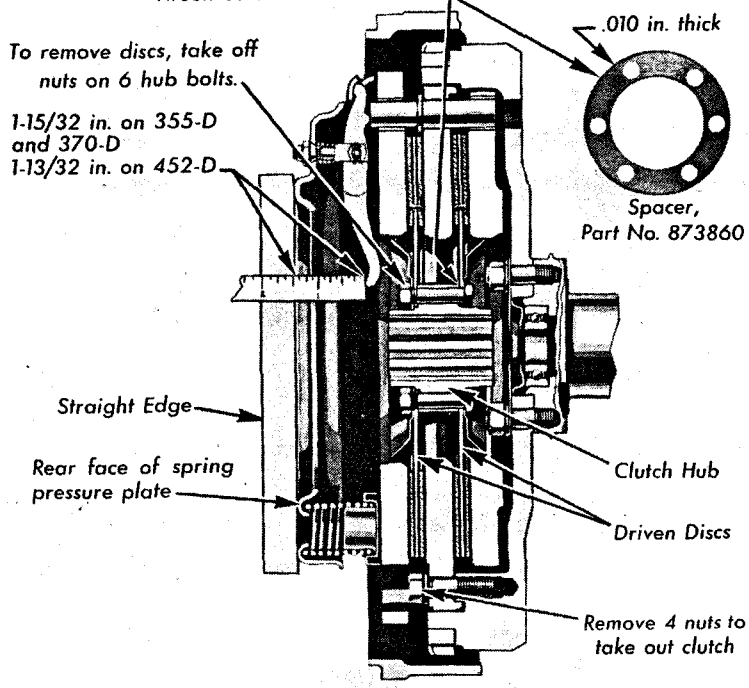


Fig. 9

Replace driven discs if distance between outer end of release levers and plane of rear face on spring pressure plate is less than the amount given on the illustration.

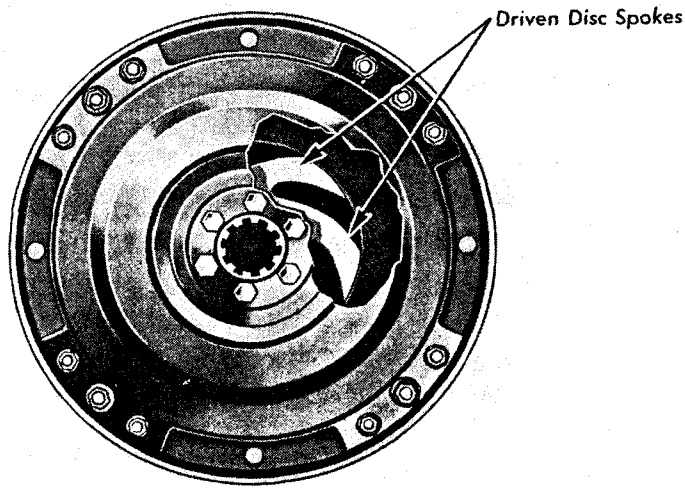


Fig. 10

Driven discs with curved spokes must be properly installed. The spokes should lead out from the hub in a clockwise direction when viewed from the flywheel side of the clutch.

Plate 19. Driven Disc Details—Cadillac

CLUTCH

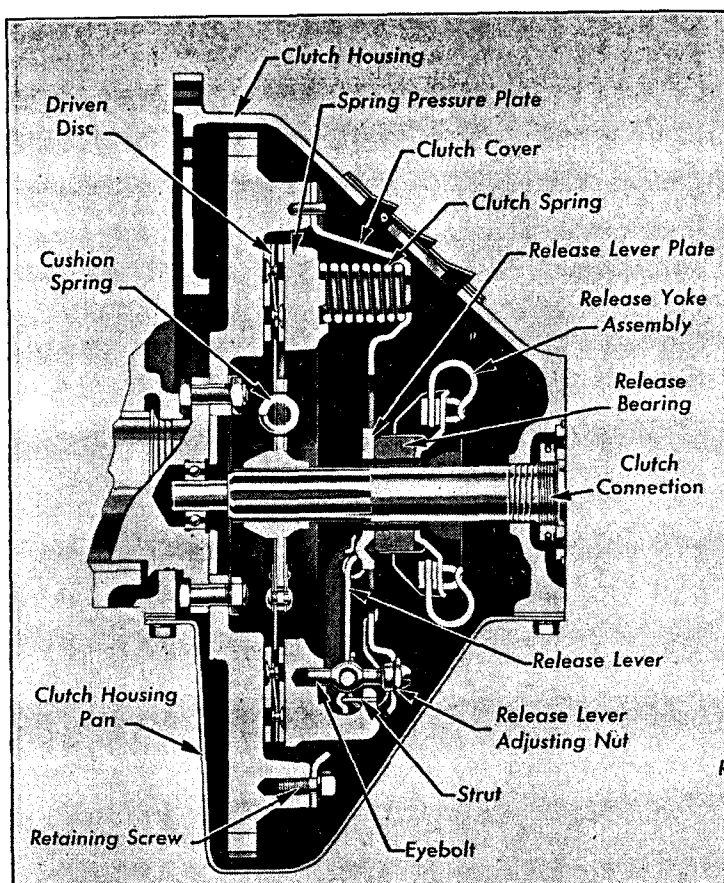


Fig. 11
Sectional View of Clutch

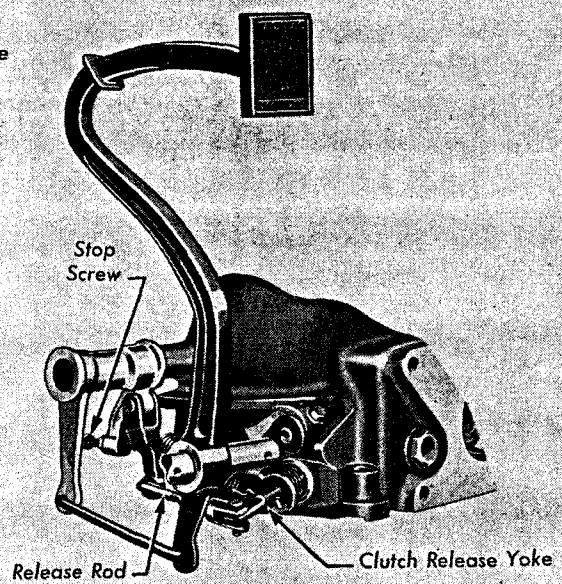


Fig.12
Clutch Pedal Connections

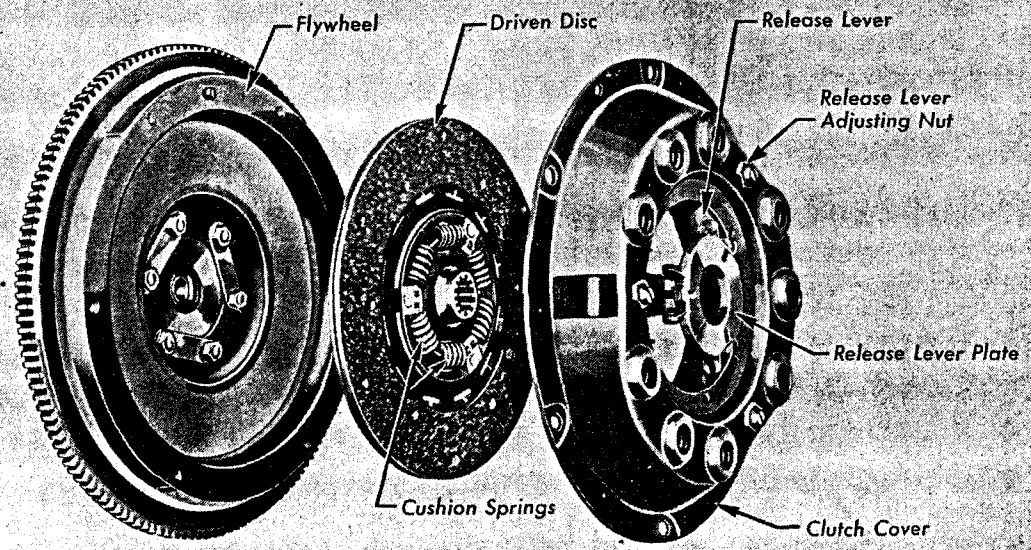


Fig.13
Exploded View of Clutch

Plate 20. Clutch Details—LaSalle

CLUTCH

Service Information

1. Cadillac Clutch Balance

Cadillac clutches are properly balanced before they leave the factory and each of the three plates is marked in line so that the plates can be lined up without rebalancing any time the clutch is disassembled. The marking consists of a circle in which a letter may appear. If the circles on each of the three plates are lined up whenever the clutch is reassembled after disassembly, there should be no difficulty experienced of an out of balance condition.

2. Servicing the LaSalle Clutch

REMOVAL AND DISASSEMBLY

To remove and disassemble the LaSalle clutch, proceed as follows:

1. Disconnect the front universal joint (or remove propeller shaft), dismount the transmission and remove the clutch housing and pan. See note in Operation No. 3.

2. Mark the flywheel, cover and spring pressure plate with a center punch so that the clutch parts may be reassembled in the same position on the flywheel. This is important because the clutch assembly is balanced.

3. Loosen the retaining screws, holding the clutch on the flywheel, a turn or two at a time until the spring pressure is released (this should be carefully done to prevent springing the flanged edge of the clutch cover). The retaining screws can then be removed and the complete clutch with the driven disc lifted off of the flywheel.

NOTE: The clutch may be removed from the underside after taking off the removable frame cross member and the clutch housing pan if desired without disturbing the clutch housing. The retaining screw for the clutch release yoke must also be loosened before the clutch can be removed.

If it is found necessary to replace any parts of the cover assembly, this unit can be dismantled, reassembled and adjusted with the aid of an arbor press as follows:

1. Place the clutch cover on the bed of the press with a block under the spring pressure plate so arranged that the cover is left free to move down. Place a block or bar across the top of the cover, resting it on the spring bosses.

2. Compress the cover with the spindle of the press and while holding it under compression, remove the adjusting nuts. Next slowly release the pressure to prevent the springs from flying out.

3. The cover can then be lifted off after which all parts should be cleaned and inspected.

4. Inspect the springs and replace them if they show signs of overheating due to clutch slippage. If the springs have been overheated, they will show a pronounced blue color, indicating the temper has been drawn, or else the paint will be burned off the springs. If the heating has continued long enough, the springs will have a dark gray color, indicating that the temper has been entirely removed from them.

5. Inspect the facings and replace the driven disc assembly if the facings are worn nearly to the rivet heads or are oil soaked.

6. Remove the release levers. To do this, grasp the lever and eyebolt between the thumb and fingers so that inner end of the lever and the upper end of the eyebolt are as near together as possible, keeping the eyebolt pin seated in its socket in the lever. The strut can then be lifted over the ridge on the end of the lever, allowing the lever and eyebolt to be lifted off the pressure plate.

REASSEMBLY AND INSTALLATION

The clutch is reassembled and installed in the reverse order of its removal and disassembly.

When installing the clutch cover, care should be taken to arrange it and the pressure plate in the correct position according to the markings made on these parts before they were removed. Also make sure that the springs remain in their seats.

After installing the cover and while holding the clutch under compression in the press, turn down the adjusting nuts on the eyebolts until they are just flush with the ends of the eyebolts.

It is a good plan to release the pressure on the clutch several times before taking it out of the press to permit all moving parts to settle into their working positions. This can be done with the press, by applying the spindle to the inner ends of the clutch release levers.

Satisfactory operation of the clutch is largely dependent on accurate adjustment of the release levers to bring the face of the pressure plate parallel with that of the flywheel. This cannot be accomplished by setting the levers parallel to the face of the release bearing after the clutch has been assembled to the flywheel, because of variation in thickness of the driven disc assembly. The only accurate method is to adjust the release levers with the pressure plate held parallel to the flywheel by a clutch lever adjusting disc, Tool No. J-285. The setting of the release levers should not vary more than .005 in. between one lever and the others.

Whenever a new clutch disc or transmission is installed in the LaSalle, care should be taken to fit the clutch disc hub to the clutch connection shaft. This may be done by applying graphite to

the splineways on the hub of the clutch disc and working it back and forth on the splines of the clutch connection shaft.

The installation should never be made with a tight fit inasmuch as a spinning clutch will result. If the fit is too tight to be worked out with the graphite, it may be necessary to lap the splineways.

When mounting the clutch on the flywheel, install the driven disc with the side on which the cushion springs project the most towards the transmission or rear of the car. The disc is also marked "FLYWHEEL SIDE" on one side to indicate its correct position in the flywheel. Be sure also to line up the driven disc with the pilot bearing using an aligning arbor Tool No. J-497-1, before tightening down the cover retaining screws. Tighten all of the retaining screws before removing the aligning arbor.

After the transmission and the floor boards have been installed, check the foot pedal adjustments and readjust if necessary.

CAUTION

Do not under any circumstances let the transmission hang in the clutch assembly when removing or installing the transmission.

Do not put oil or kerosine in the clutch. Keep the facings dry and free from oil.

3. Clutch Control Adjustments

The only adjustment ordinarily required on the LaSalle clutch control is that of the stop screw. See Fig. 12, Plate 20. This screw should be adjusted to give the pedal 7/8 to 1 1/8 in. free travel. If this adjustment does not provide suitable clearance between the pedal and the underside of the toe boards readjust the release rod to allow 3/8 to 5/8 in. clearance at this point. The pedal pad should also come in contact with the toeboard when it is pressed all the way down to disengage the clutch. If it is necessary to spring the pedal to make the pad touch the toe board. increase the pedal clearance under the toe boards.

No other adjustments are necessary. Do not turn the release lever adjusting nuts on the clutch, as this would throw the pressure plate out of position and cause the clutch to chatter.

4. Removal of Locking Pins When Installing LaSalle Clutch

LaSalle 350 clutches, as furnished by the Parts Division, are provided with three L-shaped locking pins for the clutch fingers to simplify installation of the clutch past the clutch release bearing. When the clutch is installed, it is extremely important that these locking pins be removed; otherwise they will drop into the clutch housing and may cause considerable damage.

These pins are released when the cover plate is tightened in position.

5. Lubrication of LaSalle Clutch Release Bearing

In case of a squeak in the LaSalle 350 clutch release bearing, it can usually be overcome by applying a small amount of graphite lubricant, consisting of one part engine oil and one part graphite, to the face of the carbon bearing. This bearing can be reached by simply removing the removable frame cross member and the clutch housing pan. It is not necessary to remove the complete clutch assembly.

6. Removal of Transmission

Extreme care must be taken when removing the transmission to support the rear end so as to hold the transmission in perfect alignment with the clutch until the clutch connection shaft has been pulled all the way out of the clutch hub.

If the rear end of the transmission is allowed to drop down or is raised too high while the clutch connection shaft is still in the clutch hub, the clutch driven discs will be sprung out of shape. This must be avoided.

CLUTCH

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Clearance between—				
Driving plates and driving pins				
New limits	.....	.001-.0025"	.001-.0025"	.001-.0025"
Worn limit, not over	.....	.008"	.008"	.008"
Hub and splines on clutch connection shaft				
New limits	.0005-.002"	.0005-.002"	.0005-.002"	.0005-.002"
Worn limit, not over	.005"	.005"	.005"	.005"
Release bearing sleeve and extension on transmission bearing cap				
New limits	.....	.001-.004"	.001-.004"	.001-.004"
Worn limit, not over	.....	.006"	.006"	.006"
Pedal and bottom of toe-board	3/8-5/8"	1/4-3/8"	1/4-3/8"	1/4-3/8"
Disc facings—				
Area—total in square inches	94.25	150.8	205..6	247.6
Diameter inside	6 1/8"	6 1/2"	5 7/8"	6 1/2"
Diameter outside	9 7/8"	9 1/2"	10"	11"
Number used	2	4	4	4
Thickness	.130-.136"	.120-.130"	.120-.130"	.135-.145"
Material	Woven	Woven	Woven	Woven
Driven disc with facings—				
Number used	1	2	2	2
Thickness—				
New limit (minimum)	.350"	.295"	.285"	.335"
Worn limit, not over	.275"	.220"	.210"	.260"
Driving plates, number of	1	3	3	3
Pedal (clutch) free play	7/8-1 1/8"	1 1/4-1 1/2"	1 1/4-1 1/2"	1 1/4-1 1/2"
Pressure springs—				
Number used	9	12	12	12
Color	Tan	.....	.....	.....
Free length—minimum	2 15/32"	.....	.....	.....
Compression pressure, compressed to 1 11/16 in.	127-133 lbs.	.....	.....	.....
Release bearing—				
Thickness, new limit	3/4"	.....	.....	.....
Worn limit, not under	9/16"	.....	.....	.....
Spring, retracting for clutch pedal—				
Free length inside loops	9 3/4"	6 1/4"	5 1/2"	5 1/2"
Tension in pounds—				
Stretched to 16 1/4 in. between loops	25	.....	.....	.....
Stretched to 10 1/2 in. between loops	.....	28	.....	.....
Stretched to 10 3/4 in. between loops	.....	.....	32	32
Type	Plate	Plate	Plate	Plate

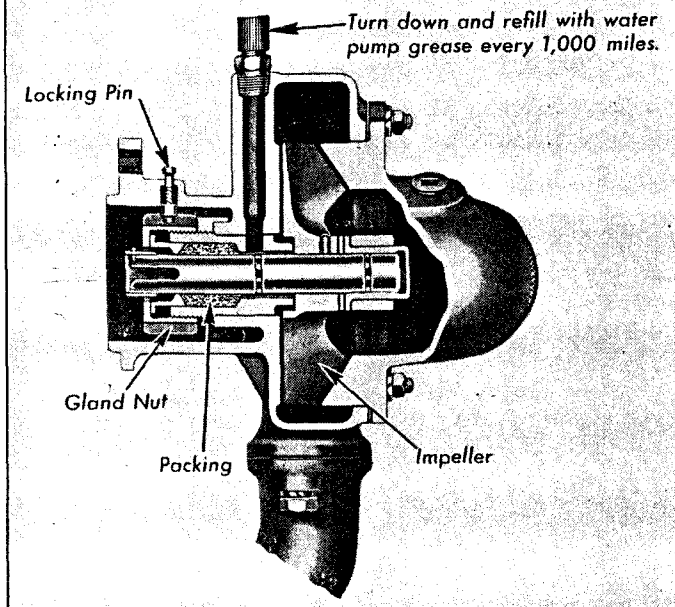


Fig. 1
Sectional View of Cadillac 355-D Water Pump

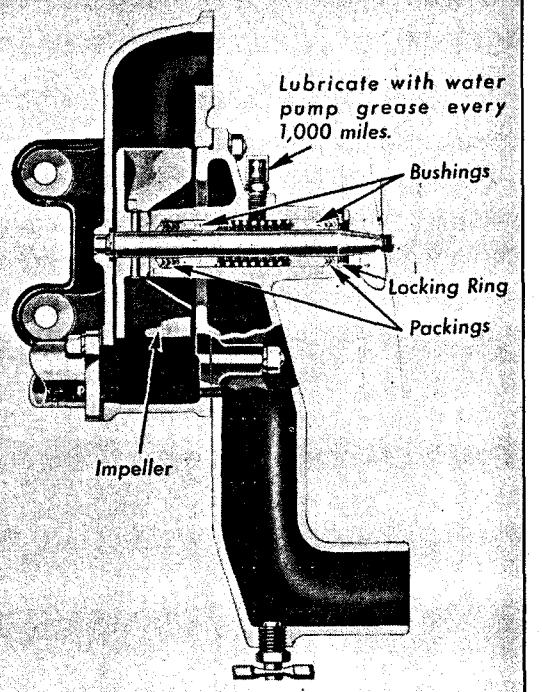


Fig. 2
Sectional View of Water Pump—Cadillac 370-D and 452-D

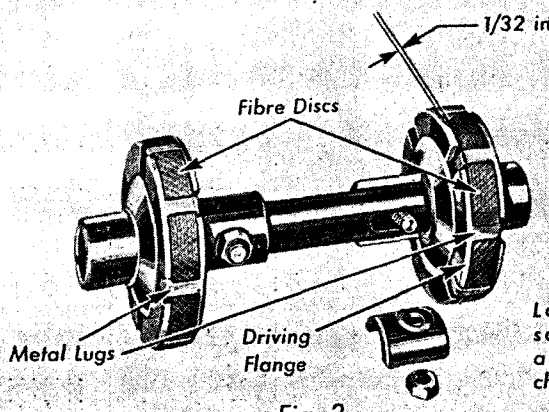


Fig. 3
Cadillac 370-D Water Pump Drive. Typical of 452-D

Fibre disc couplings should have at least 1/32 in. total play or clearance endwise between discs and driving flanges. Water pump should be lined up to give equal clearance at all points between fibre discs and driving flange.

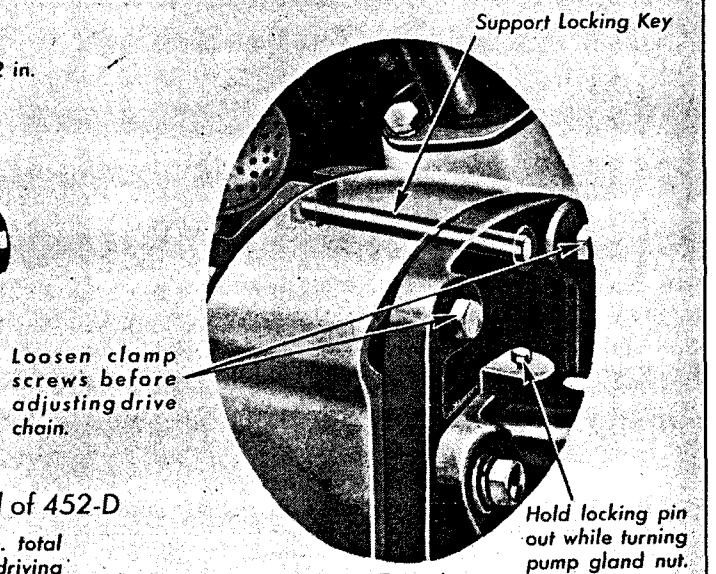


Fig. 4
Water Pump Mounting—Cadillac 355-D

Plate 21. Water Pump Details and Drive Adjustments—Cadillac

COOLING SYSTEM

General Description

The Cadillac and LaSalle cooling systems are of similar arrangement except the water pump and the temperature control. The water pumps differ both in construction and location on the various car models. Temperature control is accomplished on the Cadillac cars by thermostatically operated shutters in front of the radiator while on the LaSalle a thermostat valve is located within the water passages.

The radiator on all cars is of the full-bonded fin construction with special louvers in the fins to increase the dissipating capacity.

CADILLAC COOLING SYSTEM

The general arrangement of the Cadillac V-8 cooling system is practically the same as that of the 12- and 16-cylinder cars.

A built-in chromium-plated grille is used in front of the radiator and is a part of the radiator casing. It adds greatly to the appearance of the car and is easily cleaned.

The fan on all Cadillac engines, except in later Series 10 and 20 cars is of the asymmetrical type with the five blades staggered or unevenly spaced around the fan hub. The later Series 10 and 20 fans have six blades evenly spaced. The fan is carried on ball bearings. No provision is made for lubricating the fan bearings as they are packed with lubricant at the factory, which is intended to last for the life of the car.

The water pump used on the 8-cylinder engines is of the single outlet type, and is mounted on the front of the timing chain case, while that on the 370-D and 452-D engines is of the double outlet type, and is mounted on the right-hand side of the crankcase, back of the generator. On this pump there is an outlet for each cylinder block.

The water pump on the 370-D and 452-D cars is driven from the rear end of the generator through a short shaft having a flexible coupling at each end. It is of the self-adjusting type, and is provided with two oilite bushings amply protected by packings to prevent water leakage and to retain the lubricant. The water pump is lubricated through a grease gun fitting.

LASALLE COOLING SYSTEM

The water pump is of the centrifugal type, mounted on the front end of the cylinder block. It is also mounted on the same shaft as the fan assembly and is driven by the fan belt. The pump shaft is carried on a bronze bushing at the impeller end and in a ball bearing at the fan end. End thrust of the fan and pump assemblies is taken by the ball bearing. The cup for oiling the ball bearing may be reached through a hole in the fan pulley.

Water temperature is automatically controlled by a thermostat valve located in the cylinder head water outlet casting and a spring loaded by-pass valve located in the water pump housing. When the water is cold, the thermostat valve closes the passage between the cylinder jackets and the upper part of the radiator. Under this condition, water is forced past the by-pass valve directly into the pump and back into the cylinder jackets without going through the radiator, permitting the engine to reach quickly, an efficient operating temperature. As soon as the water reaches a temperature of 145 to 150° F., the thermostat starts to open and the by-pass valve returns to its seat, allowing the water to circulate through the radiator. The thermostat should be fully open before the water temperature reaches 165° F.

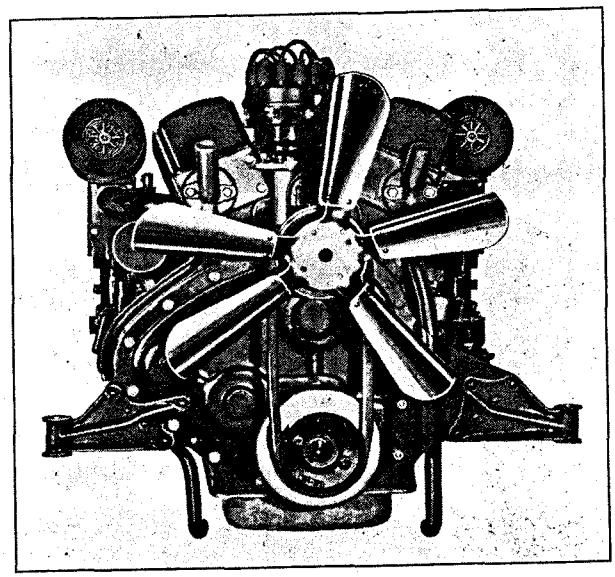


Fig. 5. The fan blades on all Cadillac engines except in later Series 10 and 20 cars are staggered or unevenly spaced around the fan hub. Later 10 and 20 Series and the LaSalle fan has the blades evenly spaced.

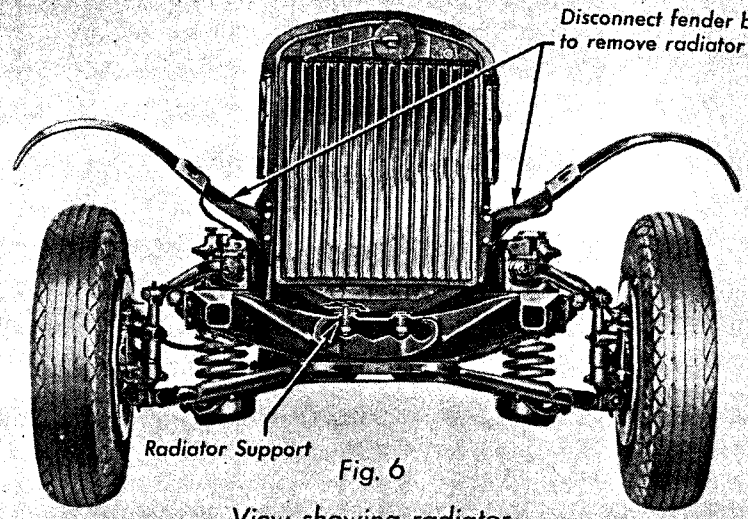


Fig. 6

View showing radiator mounting and fender braces—Cadillac

Single support without spring used on LaSalle.

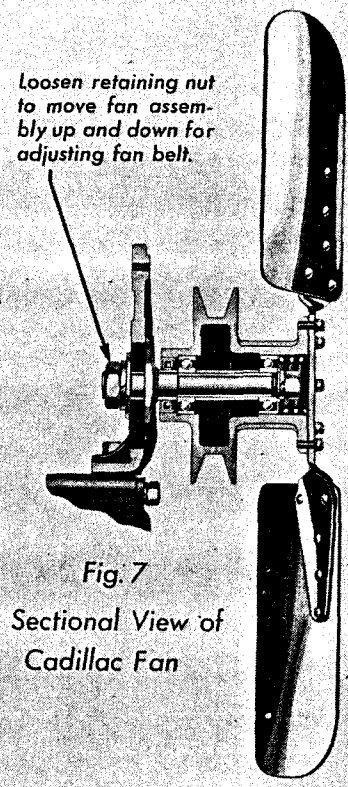
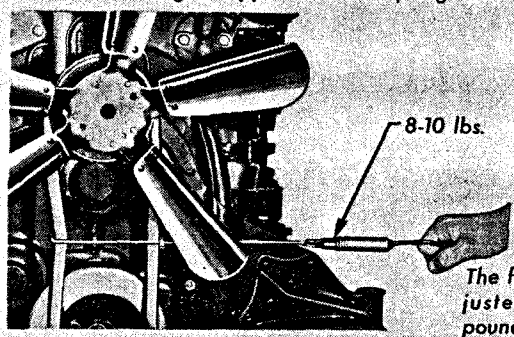


Fig. 7

Sectional View of Cadillac Fan



The fan belt should be adjusted so a pull of 8-10 pounds is necessary to bring outer faces of belt within 5 in. of each other

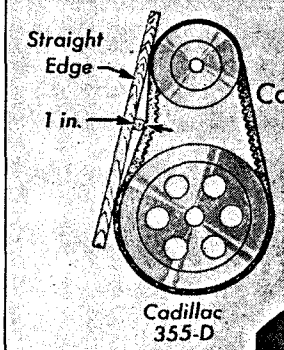


Fig. 8

Correct adjustment of fan belt

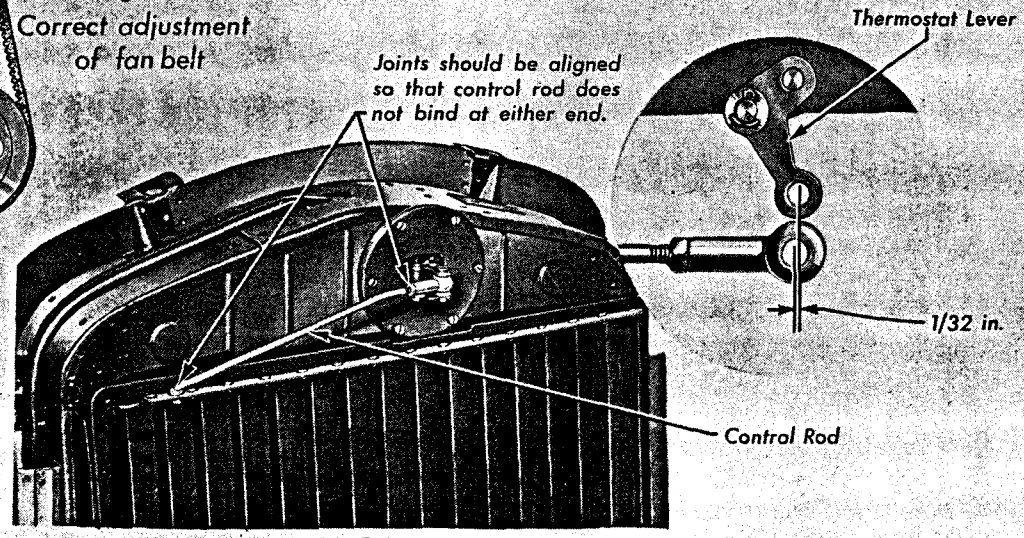


Fig. 9

Front view of radiator showing thermostat and shutter control

Plate 22. Cooling System Details—Cadillac Radiator Mounting Typical of LaSalle

COOLING SYSTEM

Service Information

1. Flushing Cooling System

The cooling system should be flushed out every 6000 miles to prevent the excessive accumulation of sediment and scale.

Disconnect lower hose from radiator and attach flushing hose to radiator outlet. The water pressure for this flushing operation should not exceed 20 to 25 pounds or the radiator may be damaged. The flushing should be continued until water runs clean from the lower hose connection.

2. Using Soluble Oil in Cooling System

The use of water soluble oil in the cooling system is recommended as an aid in keeping the system clean by reducing sludge and retarding rust formation.

When soluble oil has not previously been used in the cooling system of a Cadillac or LaSalle car, about ½ pint should be used. If the oil has been used previously, upon draining and refilling, ⅓ of a pint (six ounces) is sufficient to keep the cooling system in good condition.

When soluble oil is first used in the system, a thin protective film is deposited over the cooling surfaces. Any excess oil mixes with the cooling liquid and, although a slight amount has a tendency to prevent foaming by increasing the surface tension of the liquid, too much will result in violent foaming with consequent loss of cooling liquid.

Before adding soluble oil to cars already in service, the cooling system should be thoroughly cleaned and flushed. Soluble oil itself is merely a preventive; its cleaning properties are negligible. With the cooling system clean, the soluble oil will have a chance to do its work; otherwise the formation of rust, although retarded to some extent, will continue under the scale already formed.

It is not necessary to add soluble oil each time water is added. The 6 ounces added after the cooling system has been drained and flushed is sufficient until the next draining.

Soluble oil has no anti-freeze qualities in itself but it will blend satisfactorily with any approved anti-freeze. The same proportions of antl-freeze should be maintained with or without the use of the oil.

Important—Hydrometer readings are affected by the soluble oil and allowances must be made for the difference. If an alcohol or methanol solution is used its freezing temperature will be five degrees higher than indicated by the hydrometer. For instance, if the hydrometer reading indicates 0°F., the corrected reading would be 5° above zero. In the case of a glycerine or ethylene glycol solution, however, the five degrees should be subtracted making the solution good to 5° below when the hydrometer indicates 0°F.

3. Adding Liquid to Cooling System

The elbow used for the radiator filler does not permit seeing into the upper tank. It is therefore necessary to use a new method of determining the proper cooling liquid level.

The cooling system should be filled to a point where the liquid can just be seen in the filler neck. It should not be more than this, particularly when anti-freeze is used, because of the possibility of loss through surging and sloshing.

Whenever the cooling system has been completely drained, the engine should be kept idling while refilling the cooling system. If this procedure is not followed, the water pump may become air-bound and will fail to circulate the liquid until it becomes hot enough to boil. This would result in loss of liquid which is serious when anti-freeze is used.

Idling the engine is not necessary when simply adding liquid to bring up the level.

4. Servicing Cadillac Radiator Thermostat

Beginning with engine numbers 3102588 on V-8, 4100016 on V-12 and 5100010 on V-16, a second-type radiator thermostat is used which permits the shutters to open at a lower temperature than formerly. As a result of this change, engine operating temperatures will be a little lower in cold weather, and there will be less likelihood of loss of volatile anti-freeze solutions due to boiling or surging.

The second-type thermostat is set to start opening the shutters at a temperature of 135° F., and to have them fully opened at a temperature of no more than 147°. Only the second-type thermostat will be supplied for service.

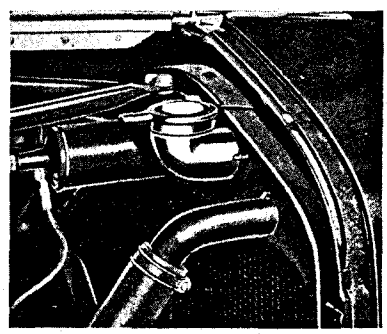


Fig. 10. The radiator filler cap is under the hood on all cars

COOLING SYSTEM

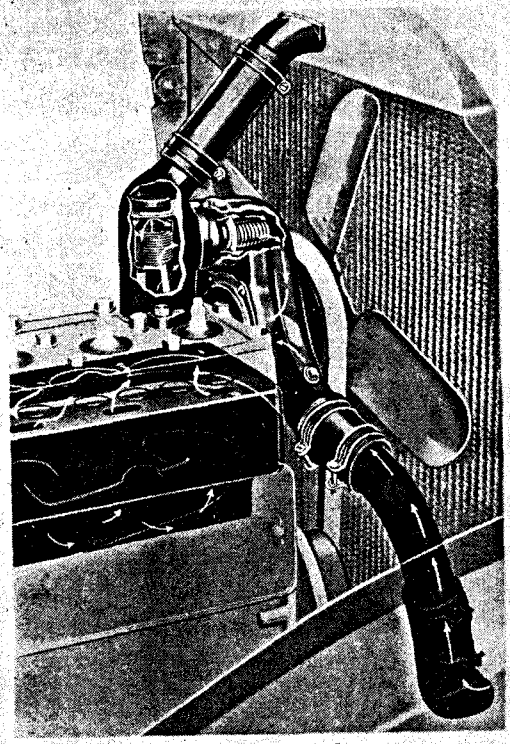


Fig. 11—Cut-away View of Water Pump

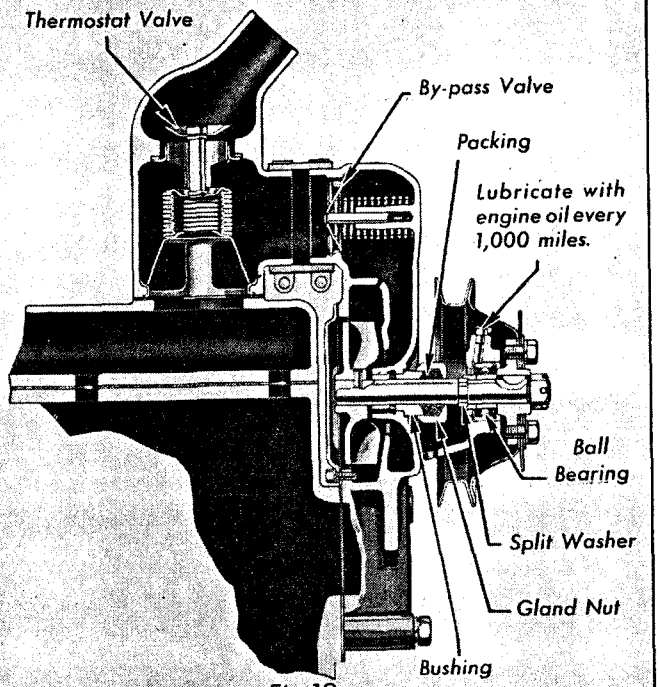


Fig.12 Sectional View of Water Pump

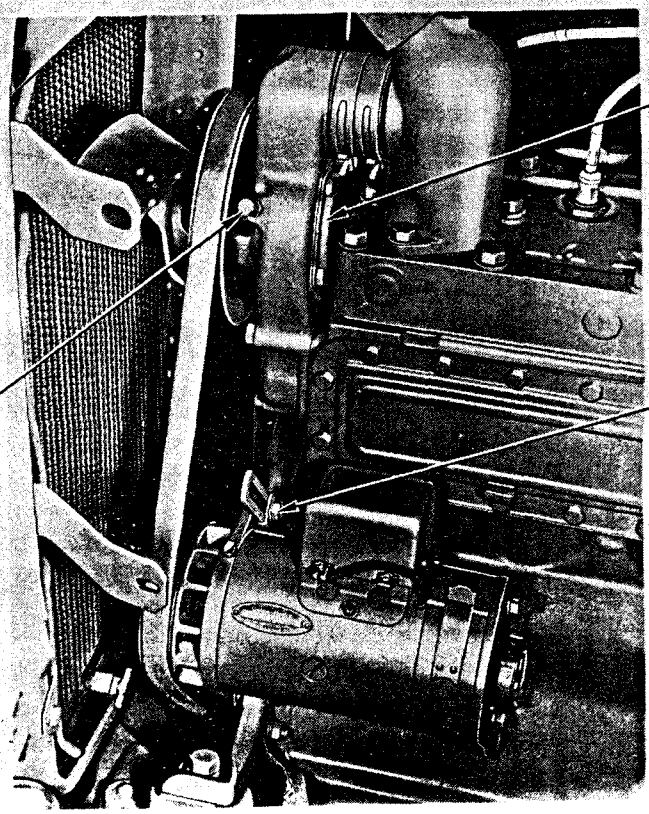


Fig.13—View of Water Pump and Generator Drive

Plate 23. Cooling System Details—LaSalle

Second-type thermostats can be identified by the number 31-10 stamped on the outer flange, whereas the first type were numbered 30-99. Any thermostats stamped with both of these numbers have been reworked into the second type, and are therefore satisfactory for use.

In cases of serious complaint of loss of volatile anti-freeze by boiling on cars prior to the above engine numbers, the second-type thermostat should be installed. This thermostat will correct the condition except when very strong solutions of alcohol or methanol are used. Solutions strong enough to protect down to below zero will evaporate under hard driving even with the second-type thermostat. For very low temperatures, a permanent anti-freeze should be used.

Whenever a second-type thermostat is installed in place of a first type, an identifying ring of white paint should be marked on the radiator upper tank around the right inlet pipe by the filler neck. Replacement of the thermostat is accomplished in the following manner:

1. Remove radiator casing as explained in Note 10.

2. Remove the old radiator thermostat.

3. Install the new thermostat, and test for operation at the correct temperature.

4. Install radiator casing as explained in Note 10.

5. Tightening Water Pump Packing

Care should be taken in tightening the gland nut on 355-D and LaSalle water pumps when the fabric type of packing is used to make sure the packing does not exert too much pressure on the pump shaft causing it to bind. Should this occur, the packing would soon wear out, permitting water leakage.

In order to make sure of a proper seal, draw the gland nut up very tight, back it off, and again draw it up to a point where it just touches the packing.

When replacing the packing, it is a good plan to lubricate it slightly before installing to avoid the possibility of its breaking up.

6. Disassembling LaSalle Water Pump

To disassemble the water pump it is necessary first to remove it from the engine. Then remove the fan, the pulley and the retaining nut at the front end of the shaft, after which pull off the fan hub. Next remove the back cover and push the impeller and shaft out through the rear of the housing, being sure to remove the split lock washer (Fig. 12, Plate 23) just in front of the gland nut. This washer is held together with a collar and can be removed after pushing the impeller shaft back about ¼ in. An adjustable gland nut is provided for tightening the packing to prevent water leaks around the pump shaft.

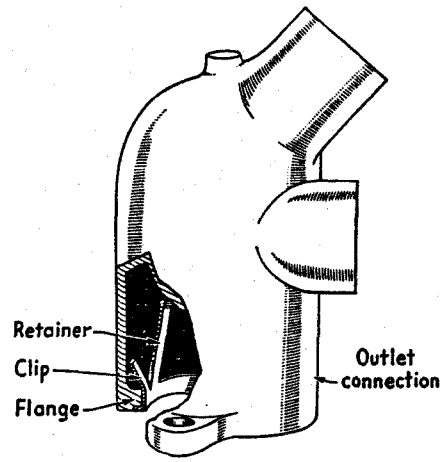


Fig. 14. The clips on the thermostat retainer in the LaSalle cylinder head water outlet should be crimped over the outlet connection flange to keep the retainer in position

7. Installing Retainer in Water Outlet Connection

When installing the thermostat retainer in the cylinder head water outlet on LaSalle 350 cars, it is important that the clips in the sidewalls of the retainer be crimped over the inner flange of the outlet connection as shown in Fig. 14. If this is not done there is a possibility that the retainer might shift to one side under the connection when installed on the engine, and prevent the outlet from being tightened enough to prevent water leakage. If this should occur and the cap screws were forced, the connection might be cracked or broken.

8. Stopping Water Leaks Around LaSalle Cylinder Head Screws

On all except the first few LaSalle 350 cars, a cup-shaped washer, Part No. 391798, is used under each cylinder head cap screw. This washer takes up some of the difference in expansion and contraction of the metal of the head and the screws, and helps assure a tight connection.

In case of water leakage at the cap screws on the first few cars, this washer should be installed. If this does not remedy the leak, it may be advisable to replace the original cap screws with Cadillac cylinder head cap screws, Part Number 1408707, in addition to installing the cup-shaped washer.

9. Removing Radiator Core

The LaSalle radiator core may be removed over the engine without disturbing the radiator casing. This can be accomplished as follows:

1. Remove the hood, the radiator brace rods and the carburetor air silencer.

2. Remove the water pump and the thermostat unit.

3. Loosen the radiator core from its mounting, the radiator casing and the lower hose connection.

4. Carefully lift the radiator core out over the engine.

Note: The fenders should be well protected with covers.

By removing the radiator core and the grille, easy access may be gained to the front end of the engine for working on the timing chain, the harmonic balancer or for the removal and installation of the camshaft.

With the Cadillac cars, it is necessary to remove the radiator casing as explained in Plates 24 and 25 before the radiator core can be removed. This procedure is necessary as the core cannot be removed over the engine in any of the Cadillac models.

10. Removal and Installation of Cadillac Radiator Casing (Typical of LaSalle)

Note: Instructions for the removal and installation of the radiator casing are given below because of the care required in these operations. Adequate protection of the finish on the headlamps and fenders is the greater part of the job. If proper precautions are taken in this respect, there should be no necessity for any touching-up when the job is complete. The fenders should be protected in the area next to the radiator casing by several strips of masking tape. It is important that none of the surface at this point be exposed.

REMOVAL

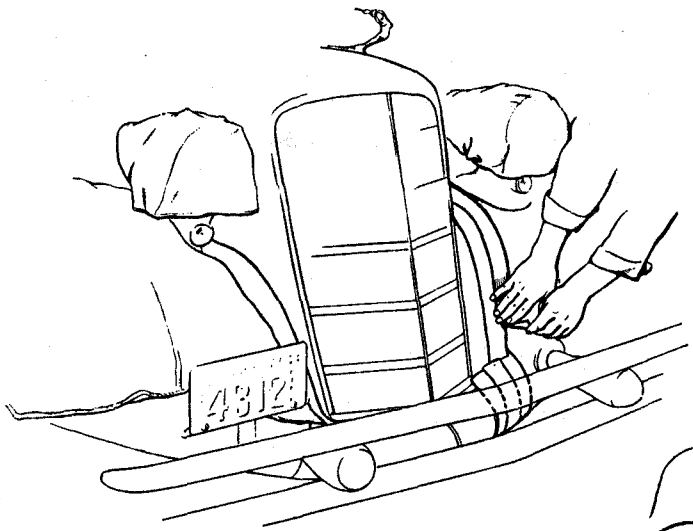


Fig. 15 (Left)

Protect both front fenders and headlamps with shop covers and place three parallel strips of 1½-in. masking tape on each fender, beginning about 6 in. back of the rear edge of the radiator casing and continuing forward and downward flush with the casing to the extreme front edge of the fender along side the lower grill

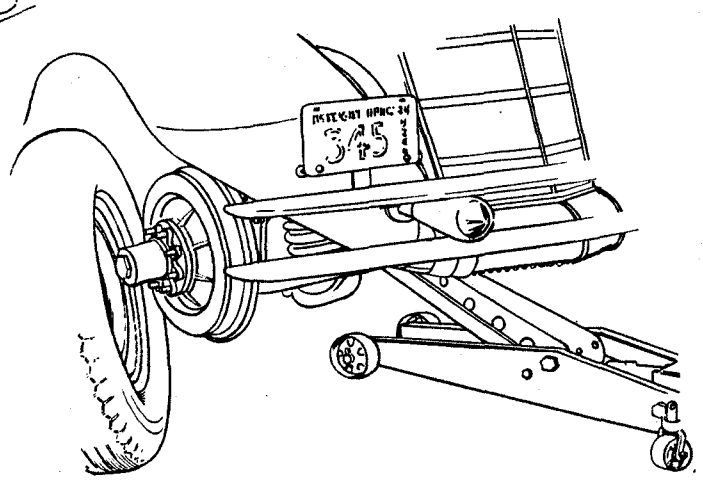


Fig. 16 (Right)

Remove the hood, jack up the front end of the car, using a hydraulic jack bearing at the center line of the front cross member, and remove both front wheels

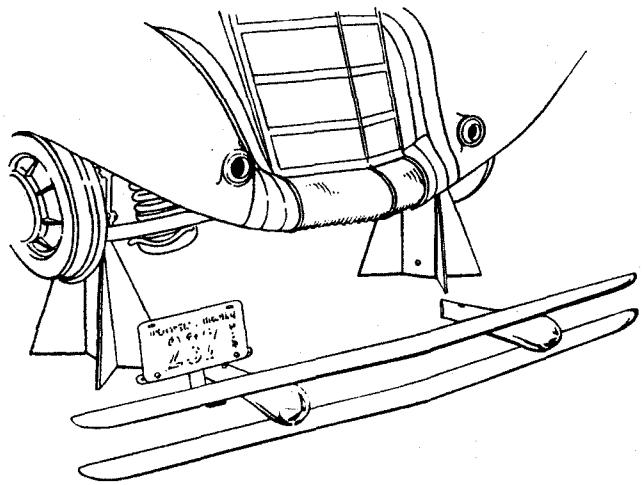


Fig. 17 (Left)

Place blocks under the lower suspension arms and remove the jack. Remove the front bumper by removing the two bolts attaching the bumper supports to the frame and pulling the bumper straight forward

Plate 24. Removal of Radiator Casing (Part 1)

COOLING SYSTEM

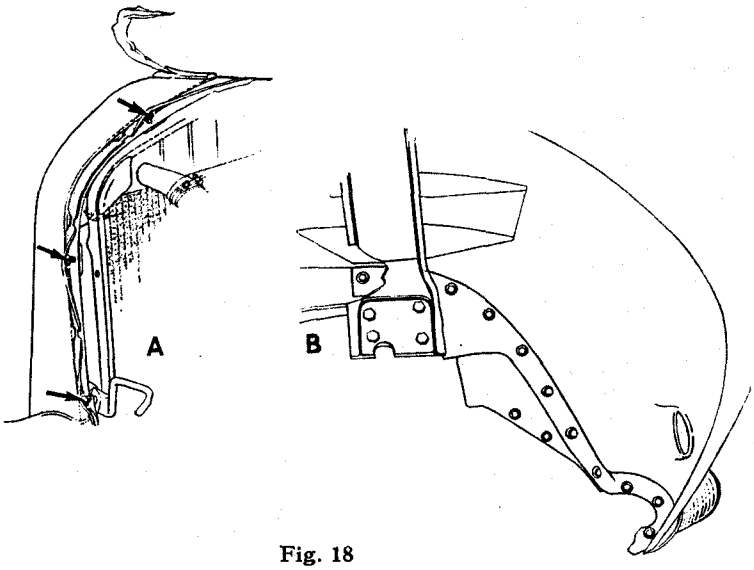


Fig. 18

Remove the six screws under the anti-squeak strip attaching the radiator casing to the core. (Three each side)

Remove all bolts attaching the front fenders to the radiator casing beginning with the bolt under the fender brace and continuing to the extreme front of the car. Also remove the two bolts holding the dust shield to the casing. After removing the fender bolts, loosen but do not remove the four bolts attaching the fender brace to the frame

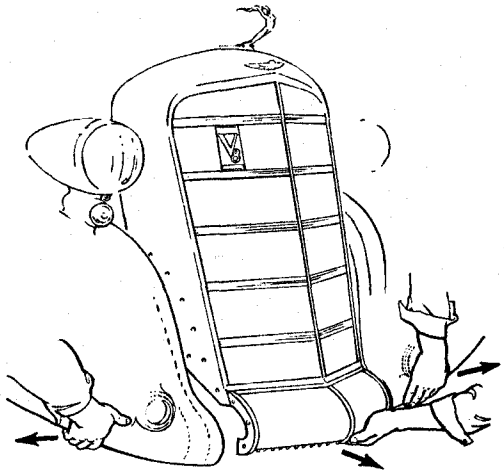


Fig. 20

Spread the fenders outward by pulling on the outer edge of the fenders and at the same time pull the bottom of the radiator grill straight forward approximately three inches

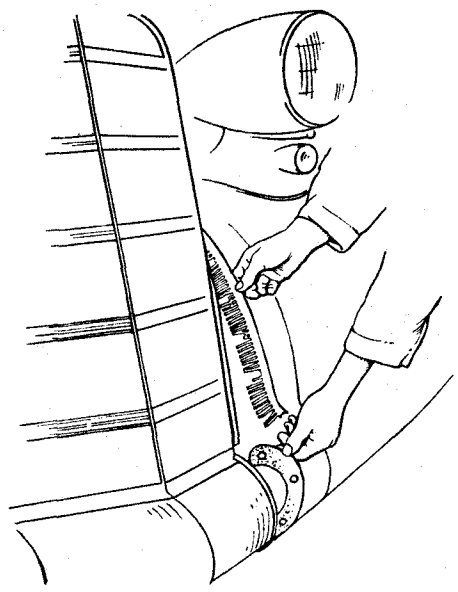


Fig. 19

Remove the fender lace between the fender and the radiator casing on both sides. Also remove the anti-squeak between the lower grill and the fender on both sides

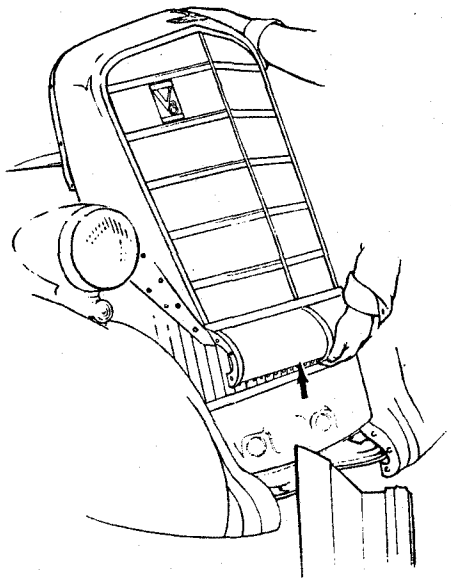


Fig. 21

Lift the casing upward, sliding it over the core until it is free of the fenders; then remove it from the core. The dust shield will drop out of the casing.

Plate 25. Removal of Radiator Casing

COOLING SYSTEM

INSTALLATION

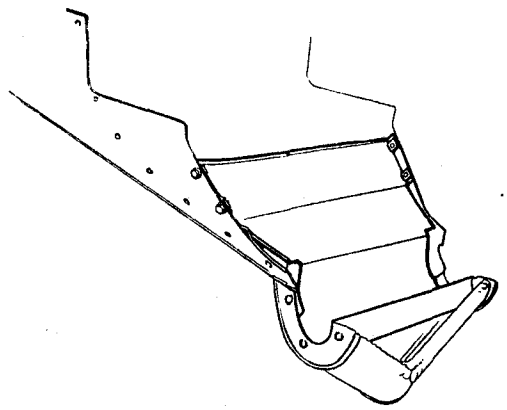


Fig. 22

While the radiator casing is off the car, install the dust shield on the casing, attaching by means of the two screws on each side

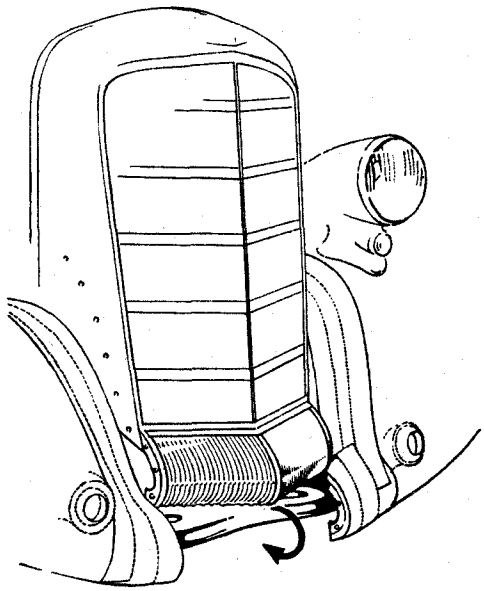


Fig. 23

Place the casing over the radiator core, starting with the lower edge of the lower radiator grill about even with the headlamp brackets; then slide the casing straight downward over the core between the two fenders to where the fenders flare forward for the lower grill. At this point the grill should be pulled outward, down and over the lower suspension arm anchor plate on the frame

On some of the first cars the dust shield is turned under the anchor plate more than necessary, and in such cases it may be necessary to pry the shield over the anchor plate at this point in the procedure

Insert the anti-squeak between the fenders and the lower grill; line up the holes in the fender with those in the casing with the aid of a punch and install all bolts *loosely*. Next install the leather lacing between the fenders and the casing

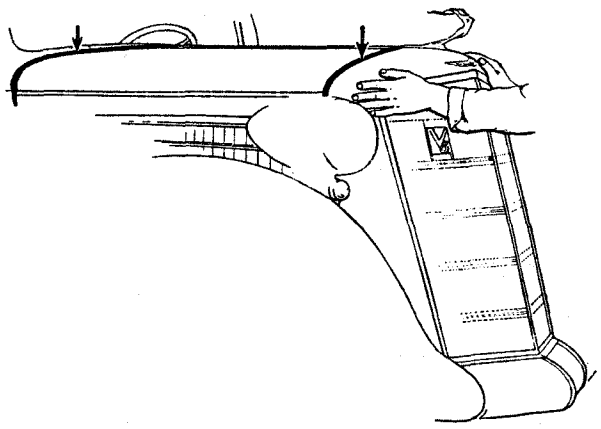


Fig. 24

Install the hood while the fender bolts are still loose; align the hood with the radiator shell and cowl, and then tighten all fender bolts, starting with the three bolts at the lower grill, and the four bolts attaching the fender brace to the frame

Install the six screws attaching the radiator shell to the core. Then install both front wheels and the front bumper. Inserting the bumper tubes through the rubber grommets can be facilitated by the application of soft soap

Plate 26. Installation of Radiator Casing

COOLING SYSTEM

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Fan				
Belt—				
Length—center to center (Cadillac)	.....	7″	14¼″	14″
Length—outside (LaSalle)	52 7/8″	.....	.....	.....
Width	51/64″	7/8″	7/8″	7/8″
Blades—				
Pitch at tip of blade (spiral blades)	1¾″	.....	2 1/16″	2 1/16″
Series 10 and 20 (early cars)	.....	2 1/16″	.....	.....
Series 10 and 20 (later cars)	.....	1 15/16″	.....	.....
Series 30	.....	2 1/16″	.....	.....
Number used	4	.....	5	5
Series 10 and 20 (early cars)	.....	5	.....	.....
Series 10 and 20 (later cars)	.....	6	.....	.....
Diameter	18″	20¾″	20¾″	20¾″
Ratio of fan R.P.M. to engine R.P.M.	.95 to 1	.83 to 1	.90 to 1	.90 to 1
Hose Connections				
Cylinder to radiator (top), (2 used on Cadillac)—				
Diameter, inside	1½″	1¼″	1¼″	1¼″
Length	5 7/8″	10¼″	7 5/8″	9 1/8″
Cylinder to elbow (2 used)—				
Diameter, inside	.....	2¼″	.....	.....
Length	.....	1¼″	.....	.....
Elbow to pump—				
Diameter, inside	1¾″	1 5/8″	.....	.....
Length	3″	16 5/8″	.....	.....
Pump to radiator (two used on 350, 370-D, 452-D)—				
Diameter, inside	1¾″	1¾″	1¾″	1¾″
Length	2 5/8″, 3″	8 5/8″	4″	4″
Radiator				
Anti-freeze solution—				
Alcohol or methanol required for 10° F.	11.4 pts.	11.4 pts.	10.8 pts.	13.7 pts.
Specific gravity at 60° F.—				
Alcohol—denatured No. 5	.9668	.9668	.9668	.9668
Methanol	.9720	.9720	.9720	.9720
Per cent by volume	30	30	30	30
Alcohol or methanol required for 0° F.	14.3 pts.	14.3 pts.	12.7 pts.	17.3 pts.
Specific gravity at 60° F.—				
Alcohol—denatured No. 5	.9567	.9567	.9567	.9567
Methanol	.9640	.9640	.9640	.9640
Per cent by volume	38	38	38	38
Alcohol or methanol required for —10° F.	17.1 pts.	17.1 pts.	16.2 pts.	20.5 pts.
Specific gravity at 60° F.—				
Alcohol—denatured No. 5	.9475	.9475	.9475	.9475
Methanol	.9570	.9570	.9570	.9570
Per cent by volume	45	45	45	45
Alcohol or methanol required for —20° F.	19.4 pts.	19.4 pts.	18.4 pts.	23.3 pts.
Specific gravity at 60° F.—				
Alcohol—denatured No. 5	.9350	.9350	.9350	.9350
Methanol	.9500	.9500	.9500	.9500
Per cent by volume	51	51	51	51
Alcohol or methanol required for —30° F.	21.7 pts.	21.7 pts.	20.5 pts.	26.0 pts.
Specific gravity at 60° F.—				
Alcohol—denatured No. 5	.9260	.9260	.9260	.9260
Methanol	.9440	.9440	.9440	.9440
Per cent by volume	57	57	57	57

This table is based on use of 188 proof denatured alcohol or of anti-freeze methanol 155 proof.

COOLING SYSTEM

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Area of radiator core in square inches	412	483	483	504
Capacity of cooling system (See Note 3)	4.6 gal.	5 gal.	4.6 gal.	5.7 gal.
Manufacturer's number, location of Rear of lower tank on R. H. side.	.....	.....	.....	.....
Water temperature control	Thermostat and By-Pass	Thermostat and Shutter	Thermostat and Shutter	Thermostat and Shutter
Water Pump				
Clearance between— Impeller and pump body New limits Worn limit, not over	.055-.070″ .080″	.055-.070″ .080″	.070-.085″ .095″	.070-.085″ .095
Pump shaft and bushings New limits Worn limit, not over	.001-.0025″ .005″	.001-.003″ .005″	.001-.003″ .005″	.001-.003″ .005″
End play in pump shaft New limits Worn limit, not over	....	....	.0065-.025″ .050″	.0065-.025″ .050″

ELECTRICAL SYSTEM

General Description

Cadillac and LaSalle electrical systems are of the same general arrangement except the ignition circuits. The ignition systems are necessarily different because of the difference in the number of cylinders in the eight-, twelve- and sixteen-cylinder engines.

STORAGE BATTERY

The Delco storage batteries, used in the Cadillac and LaSalle cars, are of large capacity. The battery on the Series 10, 20 and 50 cars is carried under the front seat in a hanger, supported in the X-member of the frame. On all other Series cars it is carried under the right front fender and can be reached from under the hood for adding water.

GENERATOR

The Delco-Remy generators used on Cadillac and LaSalle cars are of the shunt-wound current control type in which the charging rate automatically increases when the head lights are switched on. The generator has a ventilating feature for reducing the operating temperature. The conventional cut-out relay, the current regulator, the field fuse and the thermostatic circuit breaker for the head lamps are mounted together in a control box on top of the generator.

HORNS

Both the Cadillac and the LaSalle are equipped with matched air-toned horns with long projectors, which are mounted on the front side of the dash under the hood.

The horns are operated through a magnetic relay which in turn is operated by the horn button. Instead of a heavy wire being used between the horn button and the horns, heavy wires are used only between the horns and the relay which is mounted on the horn bracket. A smaller wire is used between the horn button and the relay. This eliminates the passing of a heavy current through the horn button and minimizes the voltage drop in the wiring, giving a more nearly uniform voltage at the horns.

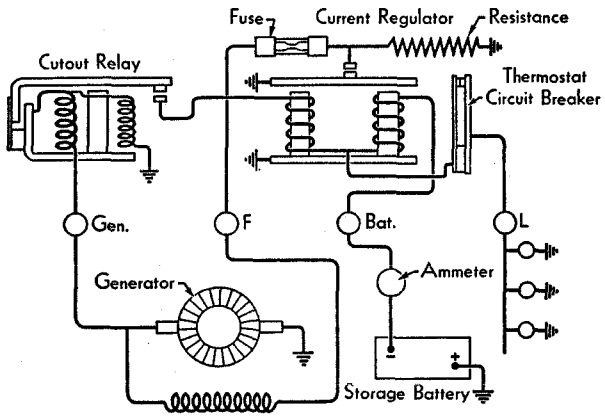


Fig. 2. Diagram of the generator circuit.

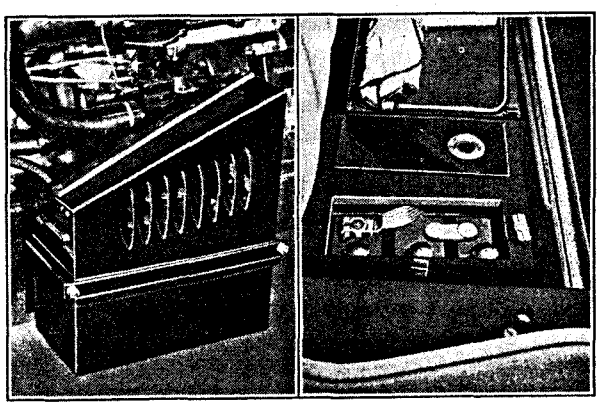


Fig. 1. The storage battery is located in a compartment under the right front fender on 355-D Series 30 370-D and 452-D cars. On the Series 10 and 20 cars and the LaSalle the battery is located under the front seat

IGNITION

On Cadillac 8 and LaSalle cars, the ignition system is of the same general arrangement. On the 370-D and 452-D cars, the ignition systems are also similar, but consist of two separate circuits one for each cylinder block, controlled by the same switch. Each circuit has its own coil, contact points, condenser and set of distributor terminals.

The distributors are fully automatic, no manual advance being provided. The 355-D distributor is provided with a single set of contact points. All other distributors are of the double-breaker type. The contact arms operate alternately and are mounted at an angle of 30° for the LaSalle and at 22½° for the 370-D and 452-D.

The breaker cam on the 355-D, 370-D and LaSalle is integral with the distributor shaft and the timing

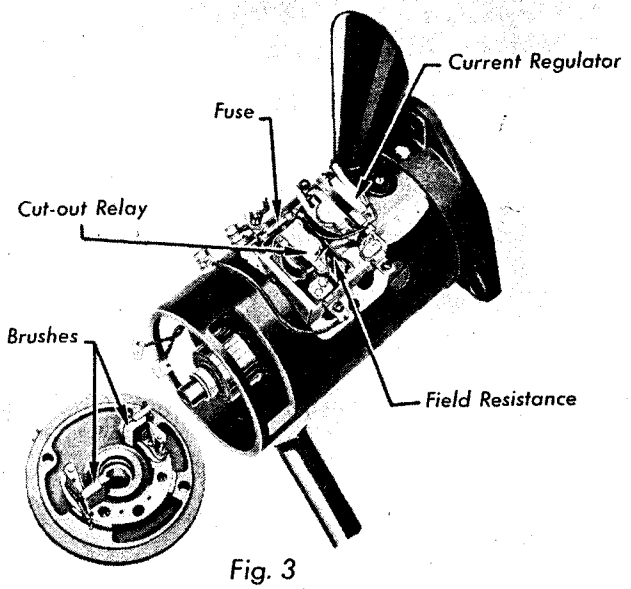


Fig. 3

Cadillac Generator—Typical of LaSalle except Ventilating System

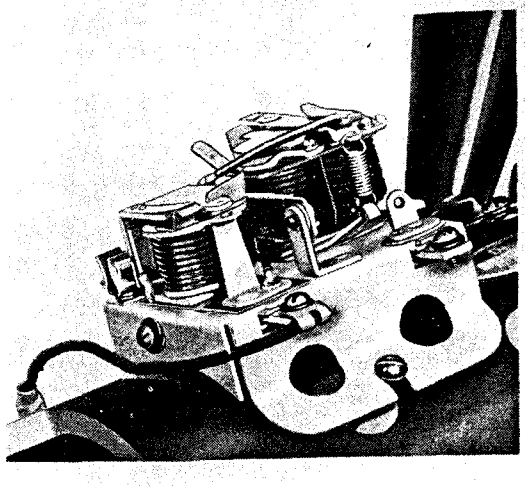


Fig. 4

Close-up of Generator Control Box Unit

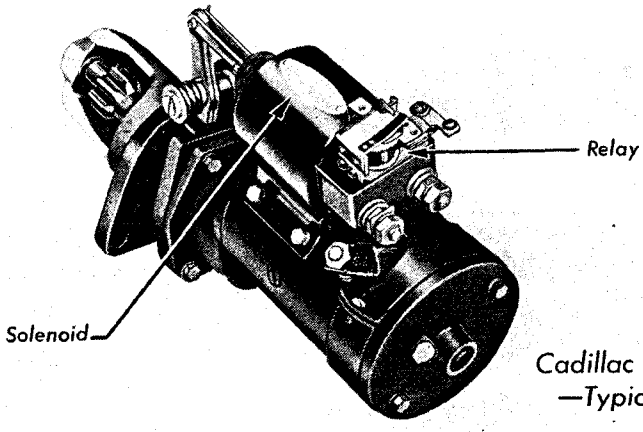


Fig. 5

Cadillac Starting Motor —Typical of LaSalle

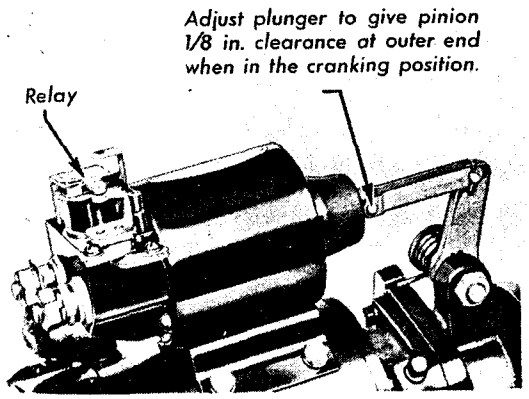


Fig. 6

Starting Motor Solenoid Control

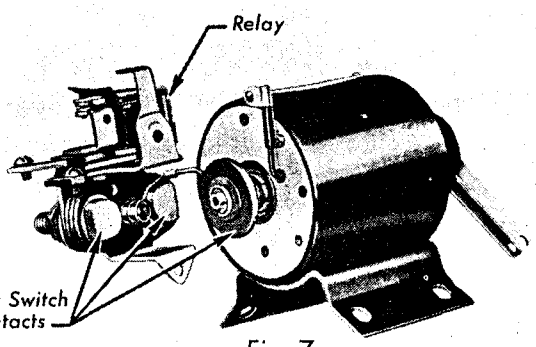


Fig. 7

View of Solenoid Unit, Showing Starter Switch

Plate 27. Generator and Starting Motor Details

of the contact arm for the No. 1 cylinder is done by rotating the distributor on its support. A pointer and graduated dial indicates the amount the distributor is moved. The right-hand contact arm in the 452-D distributor is timed either by turning the cam or rotating the distributor. The second breaker arm on these models is mounted on an adjustable plate and is timed by an eccentric adjustment which must be synchronized with the other arm. Adjustment of this plate does not disturb the contact point gap.

The breaker cam has eight lobes on the Cadillac 355-D distributor, six on the 370-D, eight on the 452-D and four on the LaSalle.

The automatic spark control mechanism is the same on all models.

The 370-D and 452-D distributors have a special double-end rotor which distributes the high tension current to the right-hand cylinders from one end, and to the left-hand cylinders from the other end. The end which takes care of the right-hand cylinders is connected to the terminal in the center of the distributor cap. The other end of the rotor, which provides for the left-hand cylinders, is connected to the off-center coil terminal.

The contacts at the end of the 370-D distributor rotor are not exactly 180° apart because of the alternate 45° and 75° firing intervals of the engine. A 45° interval (on the crankshaft) comes after each of the right-hand cylinders fires and a 75° interval comes after each of the left-hand cylinder fires.

The cylinders in all "V" type engines are numbered from the front, according to location, rather than firing order. The 355-D engines have the even-numbered cylinders on the left side and the odd-numbered cylinders on the right side. On the 370-D and 452-D, the numbering system is just the reverse to that of the 8-cylinder engines with the even-numbered cylinders on the right and the odd-numbered on the left.

STARTING MOTOR

The starting motors used are of the same general construction, differing principally in the size, the number of poles, and in the reduction gears. Those used on the 8-cylinder cars are of the four-pole type, while those on the 12-and 16-cylinder cars are of the six-pole type. Four brushes are standard in all starting motors except the V-12 and the V-16 motors which have six brushes. The Cadillac starting motor has double reduction gears while the LaSalle motor has only single reduction gears.

The control for the starting motor consists of a solenoid and relay mounted on top of the starting motor and a starter button on the instrument panel. To start the engine, it is only necessary for the driver to turn on the ignition switch and to press in on the hand starter button.

The solenoid operates the starter engaging mechanism and is controlled by a relay. The relay, in turn, is controlled by the starter push-button on the instrument panel and serves the same purpose in the solenoid and starter button circuit as does the horn relay in the horn circuit; that is, instead of a heavy wire being used between the starter button and the solenoid, heavy wires are used only between the relay and the solenoid. A smaller wire is used between the relay and the starter button. This eliminates the passing of a heavy current through the starter button and making a voltage drop in the wiring.

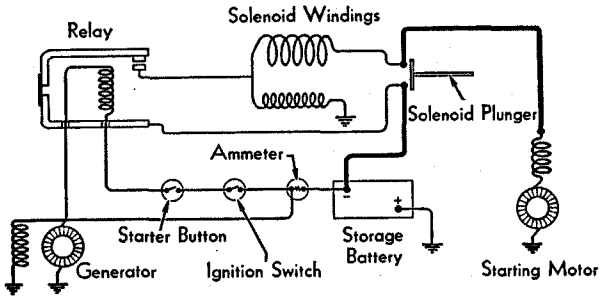


Fig. 8. Diagram of the starting motor circuit

The starter relay is connected in the electrical system in such a way that when the generator is charging, the relay is inoperative. This means that when the engine is running with the generator charging, the starter gear cannot accidentally be engaged. Also, when the engine starts running, the solenoid circuit is automatically opened, which allows the starting gear to disengage from the flywheel. The relay circuit is controlled by the ignition switch in such a manner that the solenoid is inoperative unless the ignition switch is in the "on" position.

The solenoid serves two purposes. It operates the starter switch and the gear shifting mechanism in the starting motor. When sufficient current is passed through the solenoid winding, the plunger is moved to engage the starter pinion with the flywheel ring gear and closes the starting motor circuit through the contacts.

The starting motor cranks the engine through internal reduction gears.

WIRING

The general arrangement of the chassis wiring is the same in all models. The wires are grouped in a braided varnished harness and wherever possible are carried in a corner of the frame side bar.

A feature of the electrical system is the arrangement of the various relays, circuit breakers and the

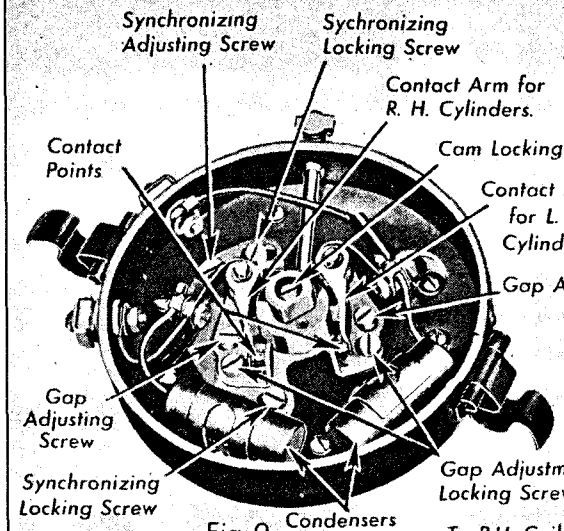


Fig. 9
Top view of Cadillac 452-D timer-distributor with cap and rotor removed. Typical of 370-D. and 350-D.

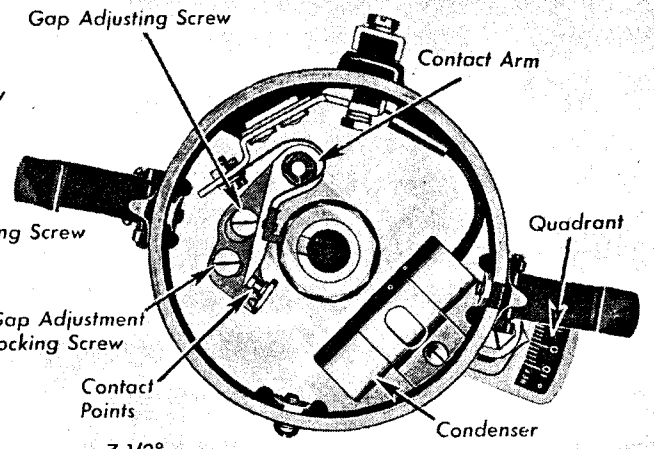


Fig. 12
Top view of timer-distributor with head and rotor removed—Cadillac 355-D.

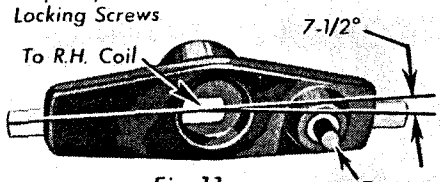


Fig. 11
Distributor Rotor—Cadillac 370-D

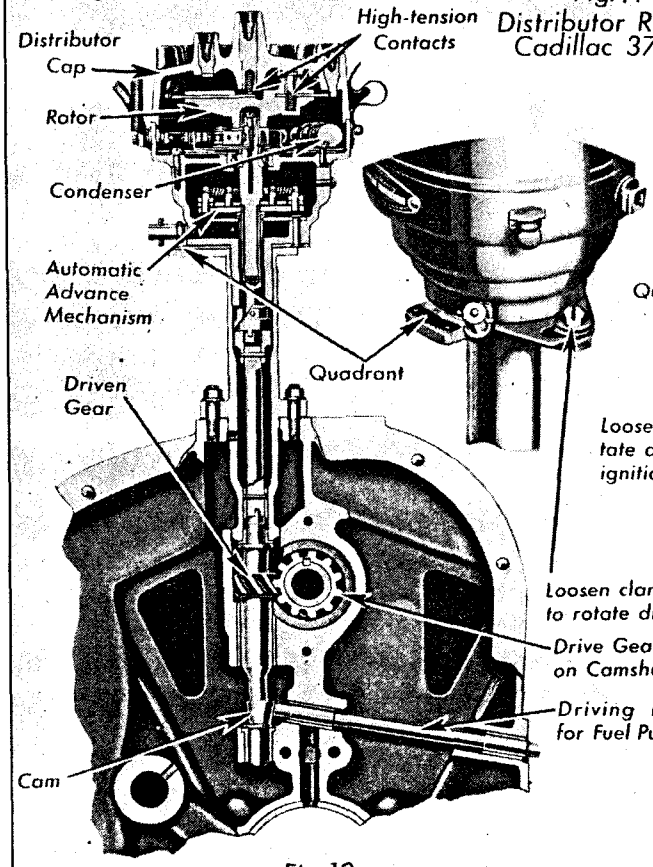


Fig. 10
Sectional view of Cadillac 370-D timer-distributor and Drive. Typical of 452-D.

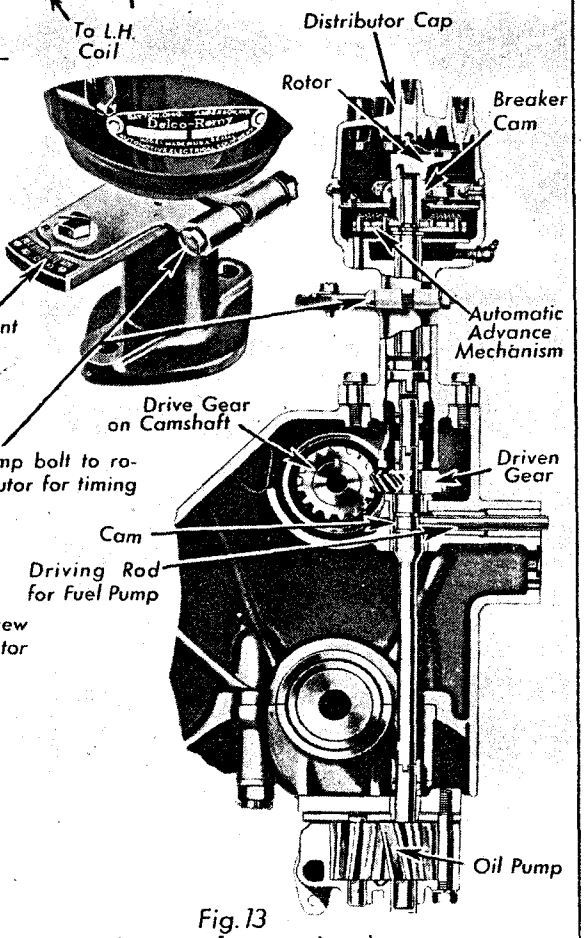


Fig. 13
Sectional view of timer-distributor and Drive — Cadillac 355-D.

Plate 28. Ignition Distributor

generator current regulator. All of these devices, except the starter, horn and lighting relays and the circuit breaker for the instrument and body lighting circuits, are mounted in a control box on top of the generator.

The starter relay is, of course, mounted on the starter solenoid unit and the horn relay mounted on the horn bracket. The thermostatic circuit breaker for the instrument and body lighting circuits is mounted back of the instrument panel. The lighting switch relay is mounted on the frame near the steering gear on 355-D and LaSalle, and on the left front engine support on 370-D and 452-D cars. The lighting switch relay operates in conjunction with the foot lighting switch for controlling the various light beams.

Service Information

1. Connections for Electrical Accessories

When installing additional electrical equipment, such as radios, heaters, spot lights, cigar lighters, etc., it is important to make sure that they are properly connected so that they will not interfere with the normal operation of the circuit breaker and at the same time protect the circuit in case of a short or ground.

When spot lights or other special lighting equipment, except radios, are installed, it is best to connect them to the open terminal on the thermostatic circuit breaker mounted back of the instrument panel. Connections for radios unless otherwise recommended in the instructions accompanying the unit should be made directly to the discharge terminal of the ammeter.

2. Battery Terminal Corrosion

See that the battery terminals are clean and free from corrosion. Warm water, poured slowly over the corroded battery terminals will dissolve the copper sulphate that has been deposited so that it can be brushed off and flushed away easily. The terminals and battery posts should be wiped with a cloth saturated with household ammonia or a solution of water and bicarbonate of soda (baking soda). These alkaline solutions will neutralize any acid that may be present on the parts to be cleaned. Do not allow any of the alkaline solution to get into the cells of the battery. After the parts are cleaned they should be given a heavy coat of vaseline or grease to retard further corrosion.

3. Battery Electrolyte Tests

The Electrolyte (battery solution) should be tested with a hydrometer. The specific gravity as registered by the hydrometer should be 1.270 to 1.290 at 60° F. when the battery is fully charged. A gravity reading of 1.150 or below indicates that the battery is entirely discharged.

Whenever a reading under 1.250 is due to a temporary abnormal demand for current through excessive use of lights or starter, the charging rate should be sufficient to bring the battery up to a fully charged condition again. If the electrolyte tests below 1.225, the battery should be recharged from an outside source.

4. Adding Water to Storage Battery.

The correct level for the battery electrolyte is just below the bottom of the filler tubes. If the liquid comes above the bottom of the tubes it may be forced up and overflow because of pressure generated within the battery by its "gassing."

Inspect the battery every 1000 miles during the winter and every 500 miles (or every two weeks) during the summer, to make sure the electrolyte is up to the proper level. Only distilled water or fresh water kept in a glass, rubber or porcelain lined container, should be used to replace liquid lost through evaporation.

If electrolyte has been lost through overflow or spilling, it should be replaced by a competent battery repair man.

5. Winter Care of Storage Battery

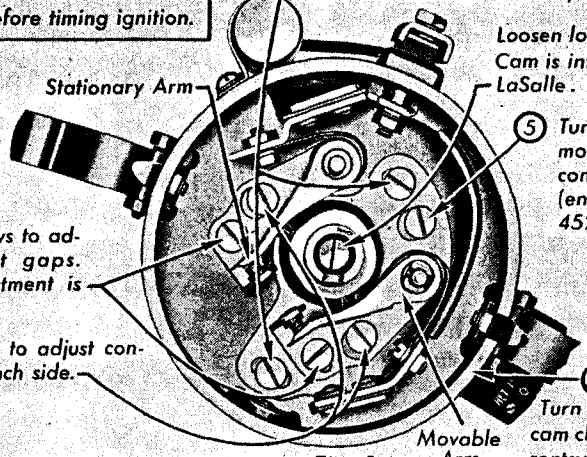
The condition of the storage battery is one of the most important factors in easy starting. Even with winter lubricants, the engine is stiffer in cold weather and more power is required to turn it over. At the same time, the drain on the battery is increased in winter because, in addition to the greater power required in starting, the days are shorter requiring greater use of lights, and heaters with electric blowers are frequently used. All of this simply means that the battery must be in top condition from the start and must be kept in that condition throughout the cold weather season.

Battery trouble in any weather can be avoided with a little care and attention. The battery is a perishable item, and gradually deteriorates during any period of inactivity. This deterioration is shown in a gradual dropping of the specific gravity of the solution in the cells.

Ordinarily a battery not in use requires a freshening charge every 30 to 60 days to prevent rapid deterioration. A regular schedule for charging works out most satisfactorily, but in any case, a close check should be kept on the condition of the battery through records of the specific gravity of each cell taken every two weeks. The battery should be charged whenever the specific gravity drops below 1.225.

ELECTRICAL SYSTEM

Note: Recondition contact points or install new ones as necessary-before timing ignition.



(4) Loosen locking screws to synchronize contacts or to time moveable contacts with IG/A flywheel mark for No. 1 cylinder.

Loosen locking screw to turn cam on 452-D. Cam is integral with shaft on 370-D and LaSalle.

(5) Turn eccentric screw to synchronize movable contacts or until movable contacts just separate with end of rotor (end for R.H. cylinders on 370-D and 452-D) in line with insert { No. 6 for 350 / No. 4 for 370-D / No. 8 for 452-D } on distributor cap and the IG/A mark * (given below) opposite the pointer.

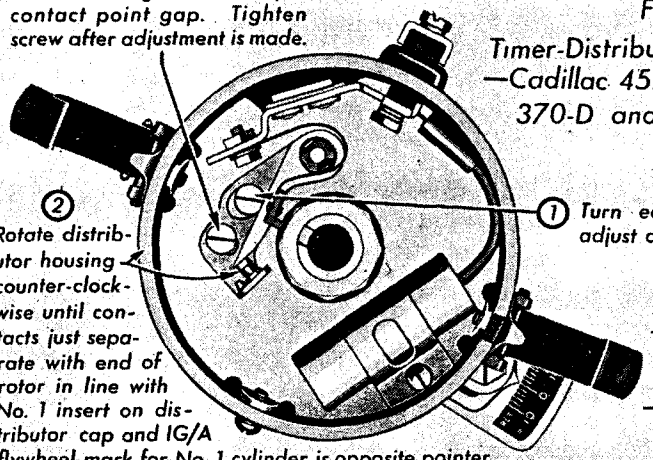
(1) Loosen locking screws to adjust contact point gaps. Tighten after adjustment is made.

(2) Turn eccentric screw to adjust contact point gap on each side.

(3) Turn housing counter-clockwise (turn cam clockwise on 452-D) until stationary contacts just separate with end of rotor (end for L.H. cylinders on 370-D and 452-D) in line with No. 1 insert on distributor cap and IG/A flywheel mark for No. 1 cylinder opposite pointer (see Fig. 16).

* { 350 — IG/A for No. 6 cylinder / 370-D—IG/A for 4 and 10 cylinders / 452-D—IG/A for 8 and 10 cylinders }

Fig. 14 Timer-Distributor Adjustments —Cadillac 452-D—Typical of 370-D and LaSalle 350



Loosen locking screw to adjust contact point gap. Tighten screw after adjustment is made.

(2) Rotate distributor housing counter-clockwise until contacts just separate with end of rotor in line with No. 1 insert on distributor cap and IG/A flywheel mark for No. 1 cylinder is opposite pointer. Hold cam against direction of rotation to eliminate backlash.

(1) Turn eccentric screw to adjust contact point gap.

Fig. 15 Timer-Distributor Adjustments —Cadillac 355-D

Contact Point Gap	
LaSalle 350	.018-.024 in.
Cadillac 355-D	.012-.018 in.
370-D	.018-.024 in.
452-D	.014-.018 in.

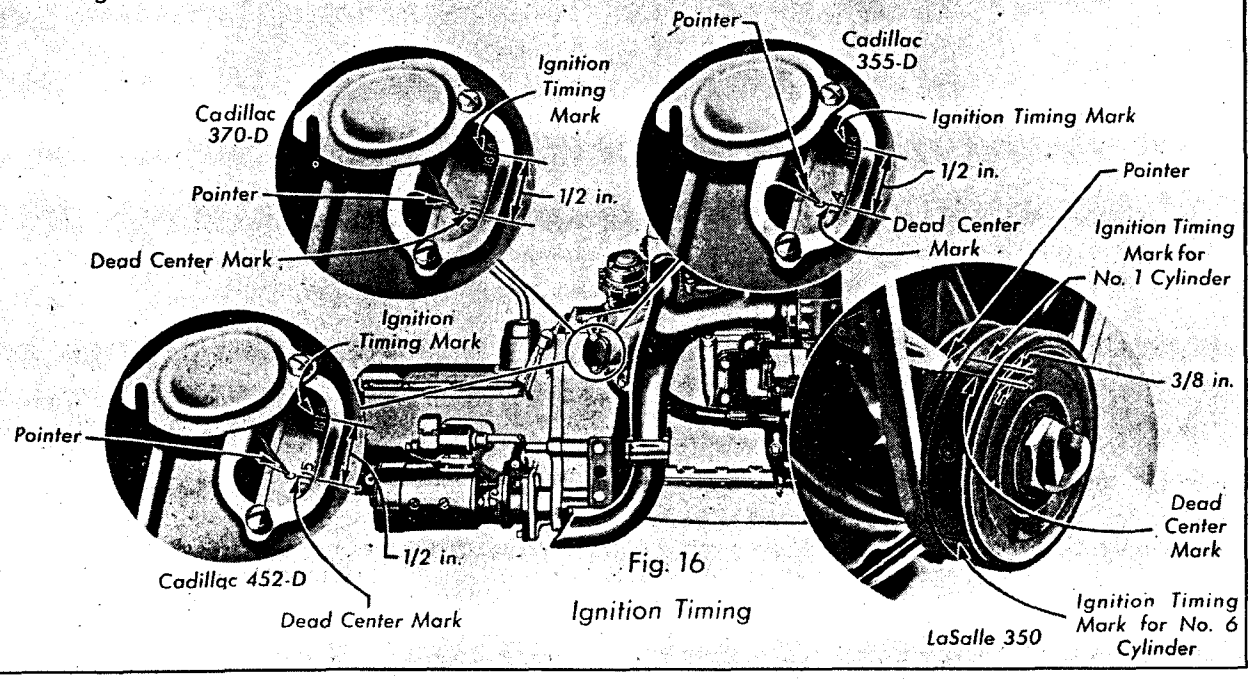


Fig. 16 Ignition Timing

Plate 29. Ignition Timing

Batteries in cars on display or in storage can be charged without removing the battery from the car by using any good portable charger. The charger should be connected to the storage battery or the negative terminal on the charger can be connected to the "Bat" terminal on the current regulator. If the car is to remain in storage for any considerable time, however, it is advisable to remove the battery and turn it over to the battery department for care and attention.

The battery must be kept fully charged or nearly so and the proper level of the liquid must be maintained if the battery is to perform satisfactorily. Ordinarily with the car in use the generator will keep the battery charged but there is only one way to make sure and that is to test the battery at regular intervals.

If the specific gravity is 1.250 or above, the battery may be safely assumed to be in satisfactory condition.

If the reading is below 1.225 the battery should in every case be removed and charged.

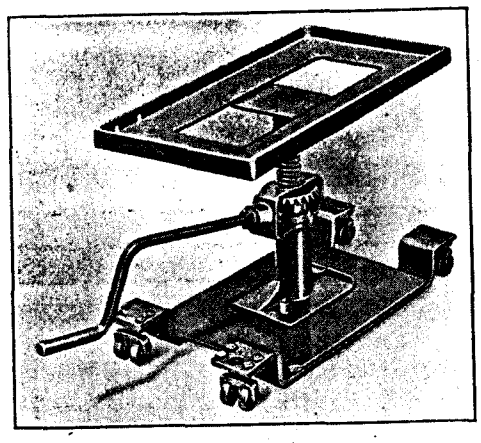


Fig. 17. Construction of battery lift which may be made up in any service station. The platform should be of sufficient size to accommodate the V-16 battery, about 7½ in. by 15 in., with sides just high enough to prevent the battery from slipping off

6. Removing Storage Battery

The storage batteries are mounted differently from previous models and require a different procedure for removal and installation. In all but the Series 10 and 20 Cadillac cars, the battery must be taken out from underneath the car.

The battery is located under the front seat at the right-hand side of the car on Cadillac 10 and 20 Series cars and at the left-hand side on Series 50 LaSalle cars. On Series 30, 40 and 60 Cadillac cars, the battery is located under the right front fender next to the frame. See Fig. 1.

Cadillac 10 and 20 Series batteries may be removed by loosening the two support bolts from the under side of the car, and lifting the battery out from above.

The LaSalle 350 battery is held in a box supported by two metal straps hooked over two long carriage bolts running lengthwise of the car. The bolt holes in the left-hand side of the support bars are elongated, permitting the left-hand bolt to be moved far enough aside to clear the strap hooks.

To remove the LaSalle battery, loosen the bolts, lift the battery enough to clear the left-hand bolt, then move the bolt toward the frame side bar and drop the battery and box together. The battery can be unhooked and dropped with greater ease from the driving compartment.

To remove the battery from Cadillac 30, 40 and 60 Series cars, first remove the dust cover by removing the nuts from the outer side of the box. Next remove the two cap screws holding the battery box straps to the frame; then lift the battery enough to unhook it from the frame, move it toward the outside of the car enough to clear the frame, and lower the battery. Because of the necessity of working from beneath the car, two men are required to remove and install the battery on these cars.

A lift may be made at slight expense which makes it possible for one man to remove and install the battery on Series 30, 40 and 60 cars. The lift, shown in Fig. 17, consists of a jack with a platform for the battery mounted on an underslung base plate equipped with casters. The platform should be of sufficient size to hold the V-16 battery, about 7½ in. x 15 in., with sides just high enough to prevent the battery from slipping off. The base plate should be of approximately the same size as the platform to keep the lift from becoming top heavy, and should be underslung to provide maximum clearance. The standard Cadillac jack with a short crank may be used for the lift.

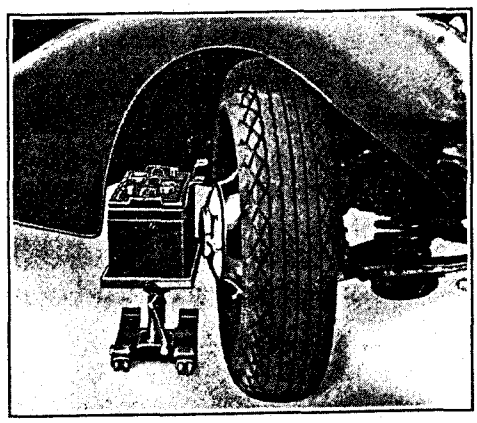


Fig. 18. The battery on the lift may be rolled in or out with the front wheels cramped

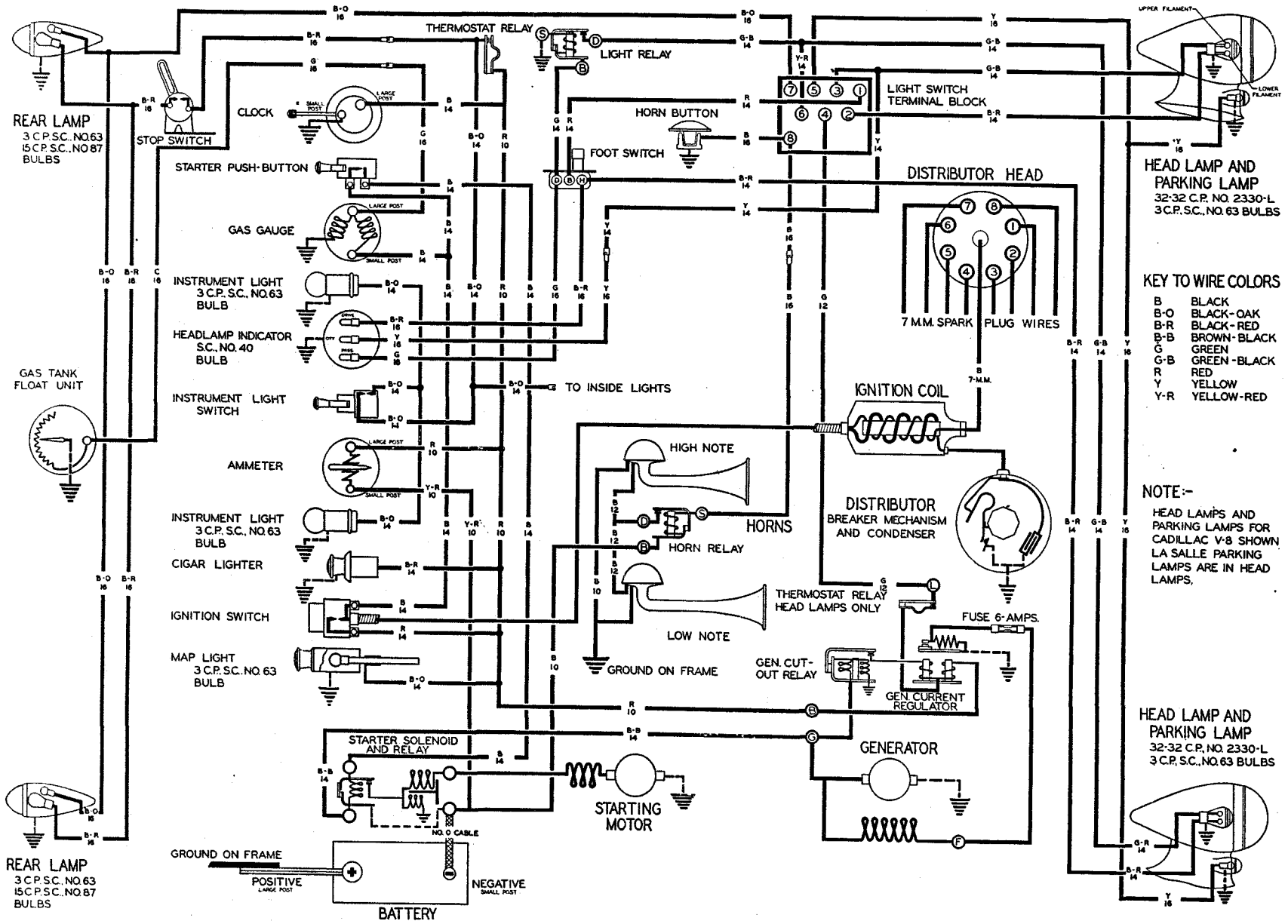


Plate 30. (Fig. 19) Cadillac 355-D Wiring Diagram

This lift may be rolled under the car between the right front wheel and fender after cramping the wheel toward the right as shown in Fig. 18. There is sufficient clearance to roll the lift in and out with the battery on the platform.

With this lift, the battery may be raised sufficiently to unhook the straps from the frame, rolled outward to clear the frame, lowered, and rolled out from under the car with no difficulty whatever by one man. For installing the battery, the lift may be used with equal ease to lift the battery into position, move it over to hook on to the frame, and hold it in place while the straps are attached

Because of its small size, this lift is especially useful in that it may be carried in a Residential Service Unit or a service car for removing and installing the battery in an emergency call.

7. Running Engine with Storage Battery Disconnected

If it should ever be necessary to operate the engine without the battery connected in the circuit, the generator must be grounded first or it will be damaged. One end of the grounding wire should be connected to the "Gen" terminal on the current regulator and the other connected to the ground under one of the control box mounting screws.

8. Removing Generator Control Box Cover

The cover to the control box on the generator is held in place by two screws. When these two screws are removed, the cover should be removed by pulling as straight up as possible. If it is necessary to work the cover off, however, this should be done by rocking the cover fore and aft, lengthwise of the car—not sidewise, to and from the engine.

If the cover is rocked to and from the engine, there is a possibility of bending the contacts on the current regulator or the cut-out relay, or both, preventing the generator from charging the battery. These contacts extend out almost to the cover toward the engine and frame sides of the control box so that the cover, if rocked in these directions, may possibly strike them. The cover should be rocked only fore and aft, lengthwise of the car.

In any case where the generator is not charging the battery, these contacts should be inspected to make sure that they have not been bent out of adjustment.

9. Generator Cut-out Relay Adjustments

Before attempting to adjust or remove the cut-out relay or current regulator on either the Cadillac or LaSalle car, it is important that the battery be disconnected to avoid any possibility of an accidental short circuit burning out the windings.

In case of a short circuit, or if the cut-out relay is closed by any chance, the windings will receive a discharge of about 30 amperes which is sufficient to burn them out. This possibility may be avoided by disconnecting the battery before beginning any work on these units. If the relay is closed by any chance, it should be opened immediately by hand.

The adjustment of the cut-out relay and the regulator is made as follows:

1. **Cutout Relay.** With the armature down, adjust the air gap at the core to .012 to .017 in., and the contact opening with the armature up to .015 to .025 in. Then adjust the spring tension so that the relay closes at 6.75 to 7.25 volts. See Plate 27.

2. **Current Regulator.** Adjust the stop which hits the fiber bumper, with the bumper barely touching the stop, to give an air gap between the center of the core and the armature of .055 to .060 in. Then adjust the stop governing the upward travel of the armature, so that with the armature in the up position there is .006 to .008 in. clearance between the fiber bumper and the stop. The stop governing the down position of the armature should be adjusted so that the point opening when the armature is down is .015 to .025 in.

The unit should then be connected to a generator (running) and battery and an 11 ampere light load turned on. The armature spring should next be adjusted so that the generator output at approximately 3000 r.p.m. is 14 to 16 amperes with a hot generator or 19 to 22 amperes with a cold one. With the lights off this will give from 9 to 11 amperes (hot generator) and 13 to 16 amperes (cold generator). The cover should be in place when the voltage and current readings are taken.

10. Adjustment of Air-Tone Horns

The air-tone horns used on both the Cadillac and LaSalle cars are adjusted for tone at the factory and ordinarily it should not be necessary to readjust them unless they have been tampered with. In any case of poor horn tone, the difficulty will ordinarily be found to result from one of the following causes:

Low battery—Make sure that the battery is in good condition and fully charged, also that the battery connections are clean and tight.

Poor electrical contacts—Check the contacts to make sure they are not burned or dirty.

Horn relay faulty—Make sure the relay is operating properly.

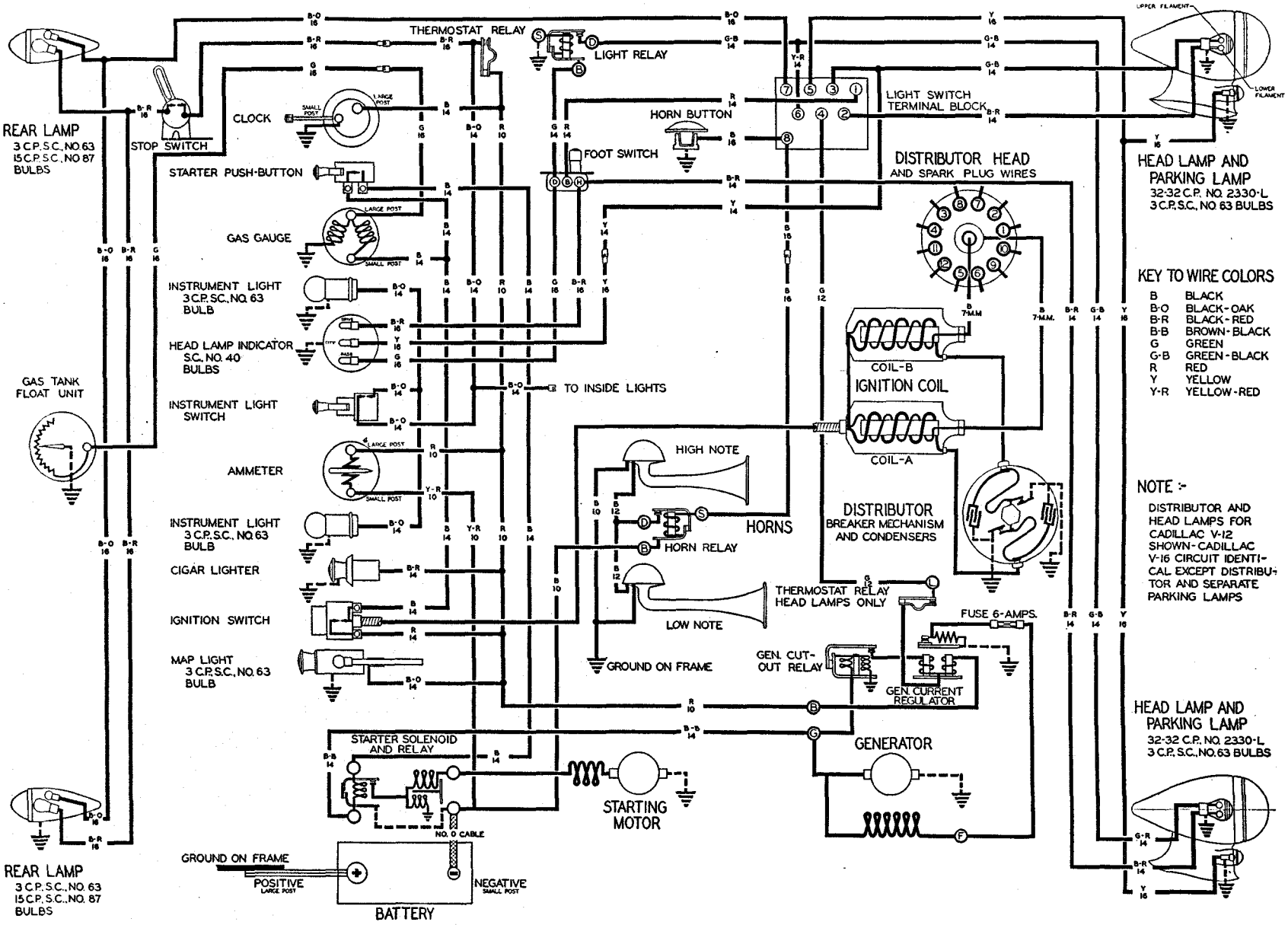


Plate 31. (Fig. 20) Cadillac 370-D Wiring Diagram. The 452-D Wiring is the Same Except for the Number of Spark Plug Wires

Projector and power unit not properly matched —The short projector should be installed on the power unit marked "S" on the cover facing the front of the car. The long projector should be installed on the power unit marked "L."

In most cases a defect in the tone can be corrected by checking the above points. If not, the air gap between the armature and the field should be checked as a last resort. This gap requires extremely accurate setting and should not be touched until all other possibilities have been exhausted.

If the air gap is out of adjustment, it should be set within .003 in. of parallel and to the following limits:

Low note..... .045 to .050 in.
High note..... .036 to .040 in.

11. Removal and Installation of Distributor Drive Shaft

When the distributor drive shaft and gear are removed and reinstalled on Cadillac cars, particular care must be exercised to get the driven gear meshed with the camshaft gear in the proper position, otherwise it will not be possible to time the engine correctly. To install a distributor drive shaft, first turn the crankshaft to the firing center (not dead center) for No. 1 cylinder. Then mesh the distributor driven gear with the driving gear on the camshaft so that the slot in the upper end of the distributor shaft is offset towards the rear of the engine. In other words, the narrow part of the shaft at the side of the slot should be at the rear on all 8- and 12-cylinder engines. When installing the distributor drive mechanism on the 8-cylinder engine, care should also be exercised to line up the oil pump shaft so that the driving shaft will drop into position without damaging the oil pump by pushing the pump shaft down through the pump cover. The fuel pump should also be removed before removing the distributor drive mechanism to eliminate interference between the fuel pump drive shaft and the distributor drive shaft.

12. Correcting Starter Solenoid Difficulties

The solenoid starter used on current model Cadillac and LaSalle cars is so designed that after the generator is charging, there is no possibility of the starter engaging should the button on the instrument panel be accidentally depressed. The generator is not charging, however, until the idling speed is sufficient to operate the cut-out relay. To avoid any possibility of the starter engaging while the engine is running, the idling speed should be kept high enough to keep the ammeter indicating on the "Charge" side.

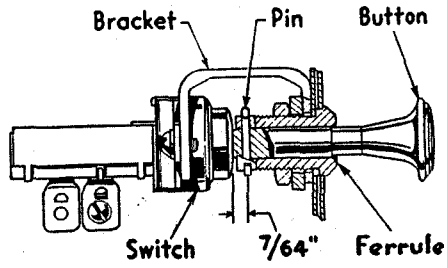


Fig. 21. In case of automatic engagement of the starter switch the points indicated should be investigated in the switch assembly

In case the starter engages as soon as the ignition is turned on, the following causes should be investigated and corrected as necessary.

The bracket (Fig. 21) holding the push button switch behind the instrument panel may be bent out of position, closing the circuit without the instrument panel button being depressed.

The instrument panel button may bind in its ferrule.

If the bracket is bent inward, bringing pressure to close the switch, it should be bent outward to line up the switch and the instrument panel button. If it is bent outward out of line, it may cause either the switch or the instrument panel button to bind.

The first step in correcting binding in the switch or instrument panel button is to find the actual cause. If the bracket is bent outward, to close the switch, the instrument panel button may have to be pushed in far enough for the taper of the button to bind on its ferrule, or may result in the switch being pushed at an angle and binding in the switch housing. The remedy is to line up the switch and button by bending the bracket into its proper position.

If the travel of the button is too great, the ferrule may be chamfered out to prevent binding. The switch should be inspected to make sure that it operates freely and that it is depressed not more than enough to prevent rattle while the instrument panel button is in the fully released position. If it is unduly depressed and is not out of alignment, it may be necessary to grind down the end of the instrument panel button. The end of the button rod should extend out not more than $\frac{7}{64}$ in. as measured from the face of the rod to the center of the hole for the cotter pin.

The only possibility of the starter engaging while the generator is charging is a ground in the No. 14 black wire from the starter switch to the relay. Such a ground may result if the relay cover is struck a blow hard enough to drive the edge of the cover through the insulation around the black wire terminal port, or if the wire is grounded anywhere in its harness.

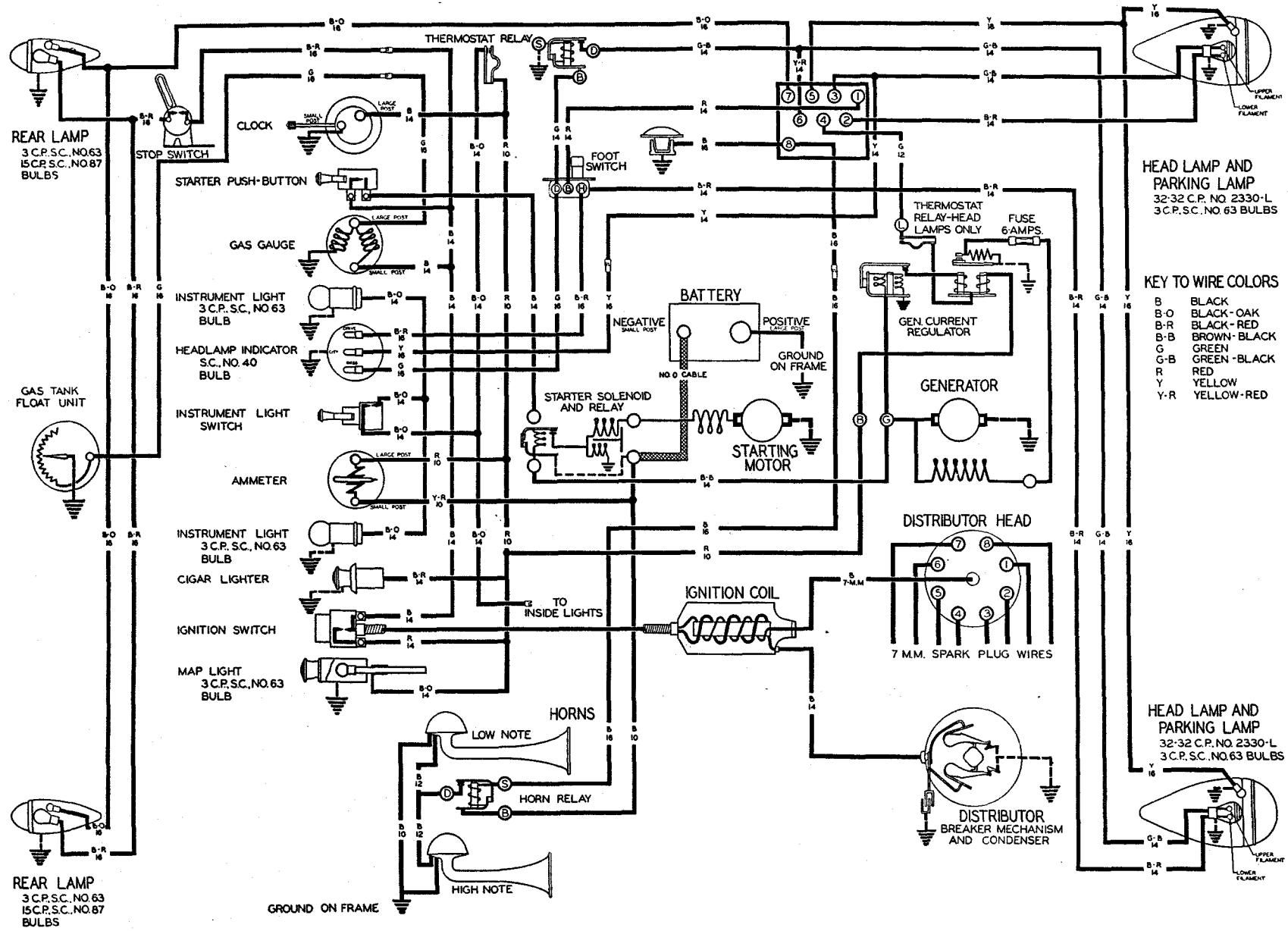


Plate 32. (Fig. 22) LaSalle 350 Wiring Diagram

To test for a ground in the wire itself, disconnect it at the push button and relay, ground one end, and connect a test light or buzzer at the other end. This will indicate whether or not the line is grounded. In case of a "floating" ground, it may be necessary to move the dash harness at various points to produce the ground.

13. Starting Motor Solenoid Plunger Adjustment

There is one adjustment on the starting motor assembly and that is on the solenoid plunger to secure the proper mesh of the starting pinion with the flywheel ring gear. To make this adjustment, the starter should be removed from the engine. Then remove the pin in the upper end of the shifting yoke and push the solenoid plunger all the way in the solenoid after which move the pinion all the way back to what would be the engaged or cranking position if the starter were mounted on the engine, taking out all backlash in the shifter mechanism. Next move the pinion 1/8 in. away from the end of the housing toward the disengaged position and adjust the stud in the solenoid plunger by turning it to the right or left as required until the pin may just be inserted at the forward end of the slot.

14. Dictograph Phone Replacement

The phone units in Fleetwood Imperial and Town cars are installed in matched pairs. If it is ever necessary to replace either unit, they should both be removed and a new matched pair installed in their places.

In the event of weak signals with pairs known to be properly matched, check carefully for loose connections and possible shorts or grounds in the wiring caused by staples or tacks.

15. Ball Bearing Service

When the ball bearings are removed from the generator or distributor, they should be thoroughly cleaned by spinning them in gasoline or kerosine and blowing out with compressed air until all foreign matter and grease are removed. The bearings should then be oiled immediately with clean engine oil and inspected.

Inspect each bearing by rotating it by hand with pressure on the outer race. If the bearing feels smooth under pressure and rotates easily it may be reinstalled in the car. If the bearing feels rough and does not rotate easily, it should be replaced with a new one.

Before installing the ball bearing in the car, it should be packed solid with a high melting point sodium base grease (Fiske No. 220-A, or its equivalent), which lubrication should be good for approximately 15,000 miles.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Battery				
Delco type number	17 DW	17 DW	21 CW	25AW
Capacity, ampere hour—				
20 hour rate	130	130	160	190
20 min. rate	156	156	195	234
Charging rate on bench—				
Start in amperes	10	10	10	10
Finish in amperes	8	8	8	8
Plates, number of	17	17	21	25
Terminal grounded	Positive	Positive	Positive	Positive
Voltage—rated	6	6	6	6

ELECTRICAL SYSTEM

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Current Regulator and Cut-Out Relay				
Delco type number	5541	5541	5541	5541
Regulator—				
Contact pressure in ozs.	2-2½	2-2½	2-2½	2-2½
Air gap between armature and core	.055-.060"	.055-.060"	.055-.060"	.055-.060"
Gap at fibre bumper with armature up	.006-.008"	.006-.008"	.006-.008"	.006-.008"
Contact gap (point opening) with armature down	.015-.025"	.015-.025"	.015-.025"	.015-.025"
Current regulation in amperes with generator running at speed capable of charging 25 amperes minimum—				
With 11 amp. light load				
Cold	19-22	19-22	19-22	19-22
Hot (205-215° F.)	14-16	14-16	14-16	14-16
With lights off				
Cold	13-16	13-16	13-16	13-16
Hot (205-215° F.)	9-11	9-11	9-11	9-11
Cut-out relay—				
Air gap between armature and core	.012-.017"	.012-.017"	.012-.017"	.012-.017"
Hold contacts together lightly while measuring air gap.				
Contact gap (point opening)	.015-.025"	.015-.025"	.015-.025"	.015-.025"
Operation—				
Contacts close—No. of volts approximately	6.75-7.25	6.75-7.25	6.75-7.25	6.75-7.25
Corresponding car speed 12 M.P. H				
Contacts open—at discharge in amperes	0-2	0-2	0-2	0-2
Generator				
Delco-Remy type number	961-C	933-B	933-C	933-C
Armature—				
Commutator out of round, not over	.002"	.002"	.002"	.002"
End-play in ball bearing (Side movement between races), not over (See Note 15)	.012"	.012"	.012"	.12"
Charging rate, normal, in amperes—				
Cold—lights off	14.25	15	15	15
Cold—lights on	19.75	20.5	20.5	20.5
Hot—lights off	12.00	10	10	10
Hot—lights on	16.25	15.5	15.5	15.5
Armature speed for normal charging rate	.....	.....	.....	.....
Constant rate above 1200 R.P.M. or car speed of 16 M.P.H. on 350, 370-D, 452-D and 20 M.P.H. on 355-D.				
Measured with testing Ammeter at Generator terminal				
Current regulation	.....	.....	.....	.....
All models—Shunt wound generator.				
Fuse for generator field—				
Capacity	6 amps.	6 amps.	6 amps.	6 amps.
Ratio of generator R.P.M. to engine R.P.M.	1.35 : 1	1.35 : 1	1.4 : 1	1.4 - 1
Starts to charge (cut-out contacts close) at armature speed in R.P.M.	600-650	650-750	650-750	650-750
Voltage—rated	6	6	6	6
Horn				
Delco-Remy (Klaxon) type number	K33B	K33B	K33B	K33B
Air gap between armature and field core				
Low note	.045-.050"	.045-050"	.045-.050"	.045-.050"
High note	.036-.040"	.036-.040"	.036-.040"	.036-.040"

ELECTRICAL SYSTEM

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
HORN—Cont'd				
Current consumption in amperes at 6 volts				
Low note	12-14	12-14	12-14	12-14
High note	11-13	11-13	11-13	11-13
Number used	2	2	2	2
Ignition				
COIL				
Delco-Remy type number	539-B	539-D	553-E	553-E
DISTRIBUTOR				
Delco-Remy type number	662-P	661-V	667-C	4118
Angle between contact arms	30°	.....	22½°	22½°
Contact point gap	.018-.024″	.012-.018″	.018-.024″	.014-.018″
Firing order	.....	.....	.....	.....
350—1-6-2-5-8-3-7-4 355-D—1-2-7-8-4-5-6-3 370-D—1-4-9-8-5-2-11-10-3-6-7-12 452-D—1-8-9-14-3-6-11-2-15-10-7-4-13-12-5-16	NOTE: Cylinders are numbered from the front, alternating between the two sides on the V-type engines. On 355-D, No. 1 is right front; On 370-D and 452-D, No. 1 is left front.			
Radial (side) play in distributor shaft ball bearing, not over (See Note 15)	.....	.....	.002″	.002″
Spark advance (degrees on flywheel)—				
Manual advance on distributor	20°	20°	28°	28°
Automatic (Maximum)	28°	22°	36°	34°
Tension of contact arm spring—in ounces	17-21	19-23	17-21	17-21
Timing mark (IG/A) ahead of center	8° ⅜″	4° ½″	4° ½″	4° ½″
LaSalle—Timing marks on harmonic balancer *Cadillac—Timing marks on flywheel*				
SPARK PLUGS				
A. C. type number	G-6	G-6	G-6	G-6
Use cooler plug with lower number to remedy pre-ignition and a hotter plug with a higher number to remedy fouling.				
Gap	.025-.027″	.025-.027″	.025-.027″	.025-.027″
Thread	Metric 18 mm.	Metric, 18 mm.	Metric, 18 mm.	Metric, 18 mm.
IGNITION SWITCH				
Delco-Remy type number	431-G	539-D	431-E	431-F
Starting Motor				
Delco-Remy type number	727-N	728-U	580	580
Lock torque in ft. lbs.	15	28	35	35
Lock amperage	600	600	600	600
Lock voltage	3	3	3	3
Armature				
Clearance between shaft and bearings (bushings), not over	.010″	.010″	.010″	.010″
Commutator out of round, not over	.002″	.002″	.002″	.002″
End play, not over	.030″	.030″	.030″	.030″
Brushes				
Number used	4	4	6	6
Gear Ratios				
Ratio between armature pinion and driven gear on sliding pinion shaft	.....	2 : 1	1.9 : 1	1.9 : 1
Ratio between sliding gear and flywheel	.....	12.5 : 1	12.5 : 1	12.5 : 1
Ratio between armature pinion and flywheel	16.1 : 1	26 : 1	21 : 1	21 : 1
Gears				
Number of teeth in armature pinion	.....	14	15	15
Number of teeth in driven gear on sliding gear shaft	.....	29	25	25
Number of teeth in sliding gear	9	9	9	9
Number of teeth in flywheel gear	145	113	113	113
Number of poles	4	4	6	6
Relay				
Air gap between armature and core	.008-.012″	.008-.012″	.008-.012″	.008-.012″
Hold contacts together lightly while measuring air gap				
Contact gap (point opening)	.035-.045″	.035-.045″	.035-.045″	.035-.045″

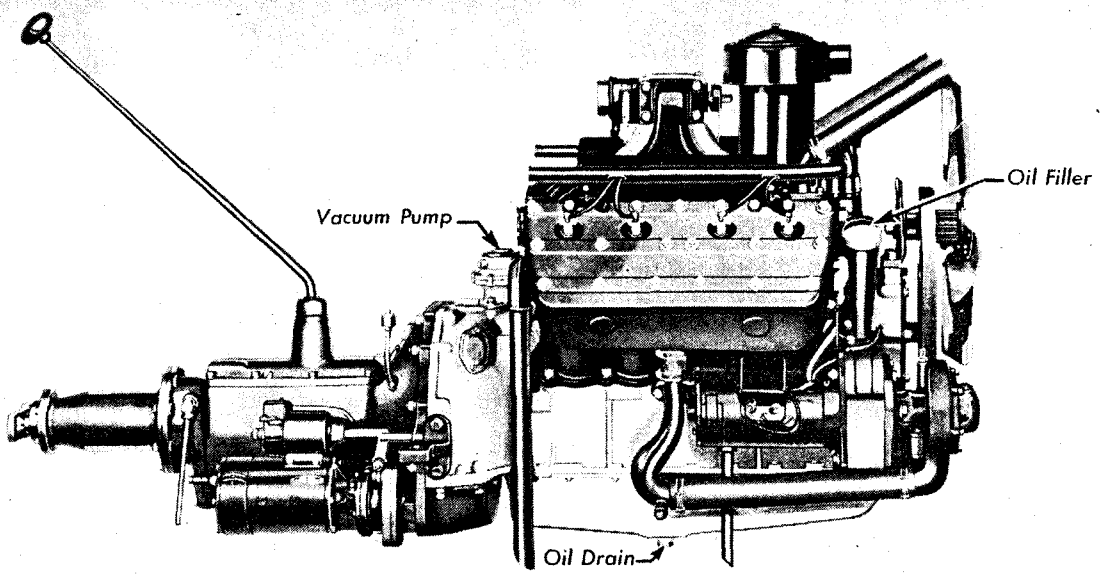


Fig. 1

View Showing Right Side of 355-D Engine

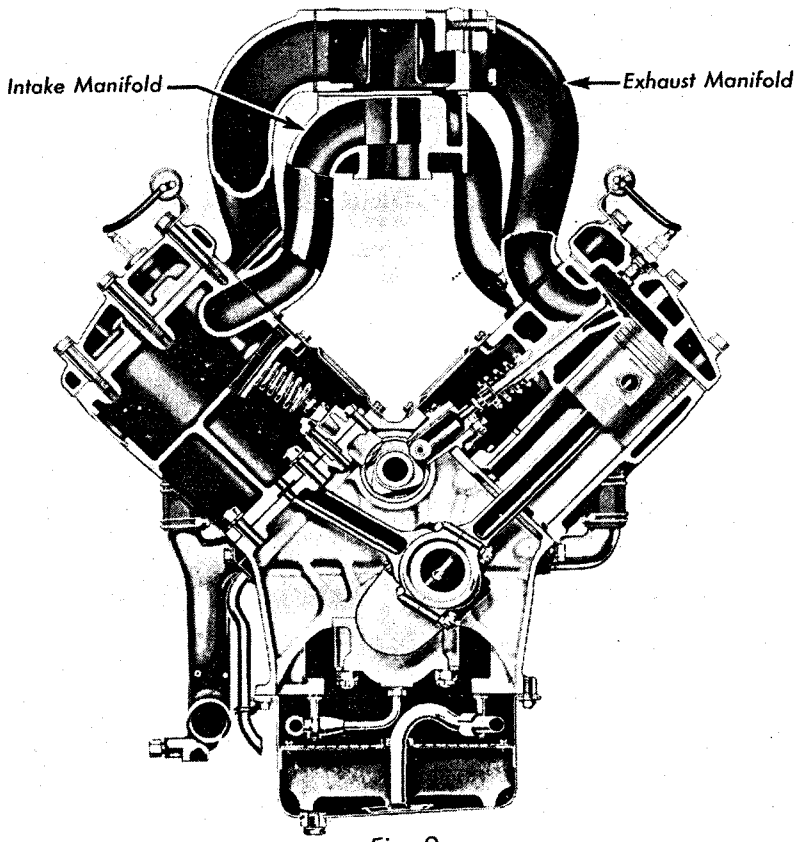


Fig. 2

Cross-sectional View of 355-D Engine

Plate 33. Cadillac 355-D Engine

ENGINE

General Description

The chief difference between the Cadillac and LaSalle engines is that all of the Cadillac engines are of the "V" type, while the LaSalle engine is of the straight type with all of the cylinders in one line.

CADILLAC ENGINE

The Cadillac V-8 engines have a 90° angle between the cylinder blocks. The intake manifold is arranged to supply all cylinders with the same amount of fuel mixture. Each of the four end cylinders receives fuel through separate individual passages. The intake manifold is heated by the exhaust gas in the exhaust header.

These engines, as well as the 12- and 16-cylinder engines, are mounted in rubber at five points—one at each side at the front, one at each side at the rear of the crankcase and one at the rear of the transmission. The support brackets at the front end of the engine are at the sides of the front cover and rest on the frame in the 370-D and 452-D and on the X-member in the remaining cars. The supports at the rear of the crankcase are attached to the frame side bars and the one at the rear of the transmission to a special cross-member connected to the "X" member of the frame.

The 370-D and 452-D engines are of the same general design, with a 45° angle between the cylinders. This gives ample room on the outside of the cylinder blocks for manifolds and carburetors.

A harmonic balancer is used on the front end of the 370-D and 452-D crankshaft in addition to counter weights forged integral with the crankshaft cheeks.

The 370-D and 452-D engines have overhead valves which are provided with an automatic adjusting mechanism. This mechanism automatically maintains zero valve clearance and effectively overcomes the objectionable noise usually characteristic of this type of valve.

The lubrication of all engines is full-force feed to all bearings including the valve rocker arms on the 370-D and 452-D. The oil filter on the 12- and 16-cylinder engines is connected in the line leading to the valve mechanism to eliminate any possibility of foreign matter getting into the dashpots of the automatic adjusting mechanism and interfering with their operation.

The pistons on all engines are of the aluminum alloy type with the wearing surfaces anodized by an electrolytic process. This process greatly increases the life of the piston as it provides a hard aluminum oxide surface, being practically equivalent to a hardening process.

The pistons are also finished slightly out of round about .0065 inch on each side at the top end. The initial contour of the pistons is such that when the engine is heated to normal running temperature, the pistons conform to the shape of the bore. This piston design is very effective in giving good engine performance due to the close fit of the piston at running temperature.

The pistons are also slotted on both sides with the slot in one side in the form of a "T." The purpose of these slots is to compensate for expansion of the piston.

The compression ratio of the 370-D and 452-D may be changed by merely using a cylinder head gasket of different thicknesses. To change to lower compression a special gasket with a sheet steel insert of a definite thickness between the layers of asbestos should be used. This makes it possible to change to a lower compression at a very slight cost wherever the fuel situation demands it.

This method of changing the compression ratio is not practical on L-head engines, because of the fact that it involves less expense to change cylinder heads on an L-head engine.

The 12- and 16-cylinder engines are the only Cadillac engines on which the factory sanctions carbon burning. When this operation is performed properly, the results are quite satisfactory in these engines. On V-8 engines, however, where it is a simple operation to remove the cylinder heads without interfering with the valve mechanism, the carbon can be removed to better advantage by scraping.

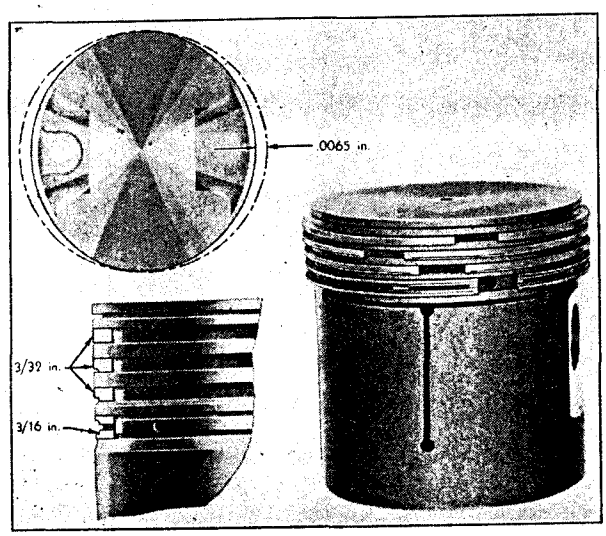


Fig. 3. Details of Cadillac Pistons. LaSalle pistons are same except for size and ring arrangement

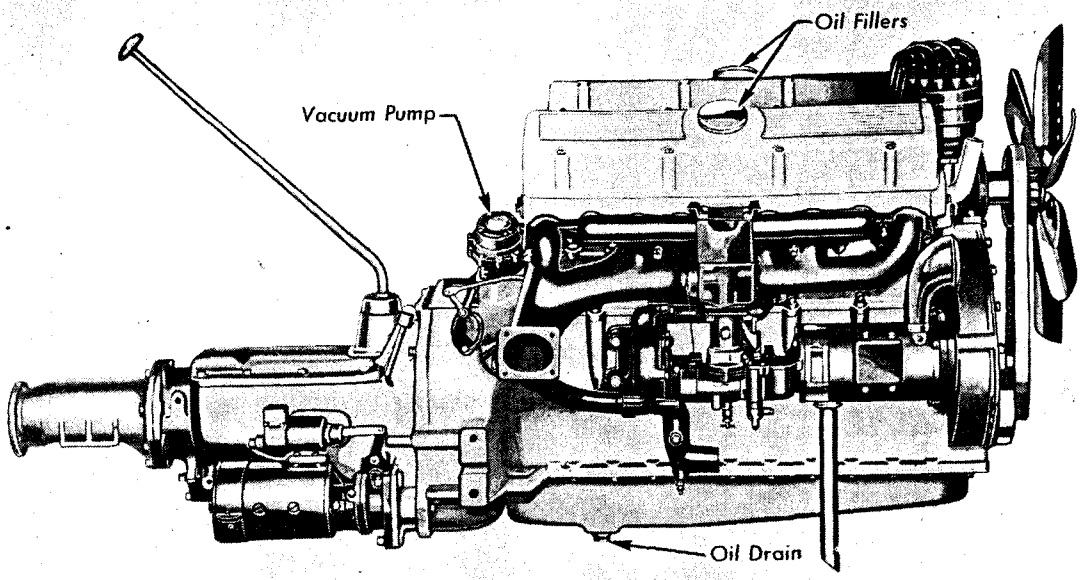


Fig. 4

View Showing Right Side of 370-D Engine

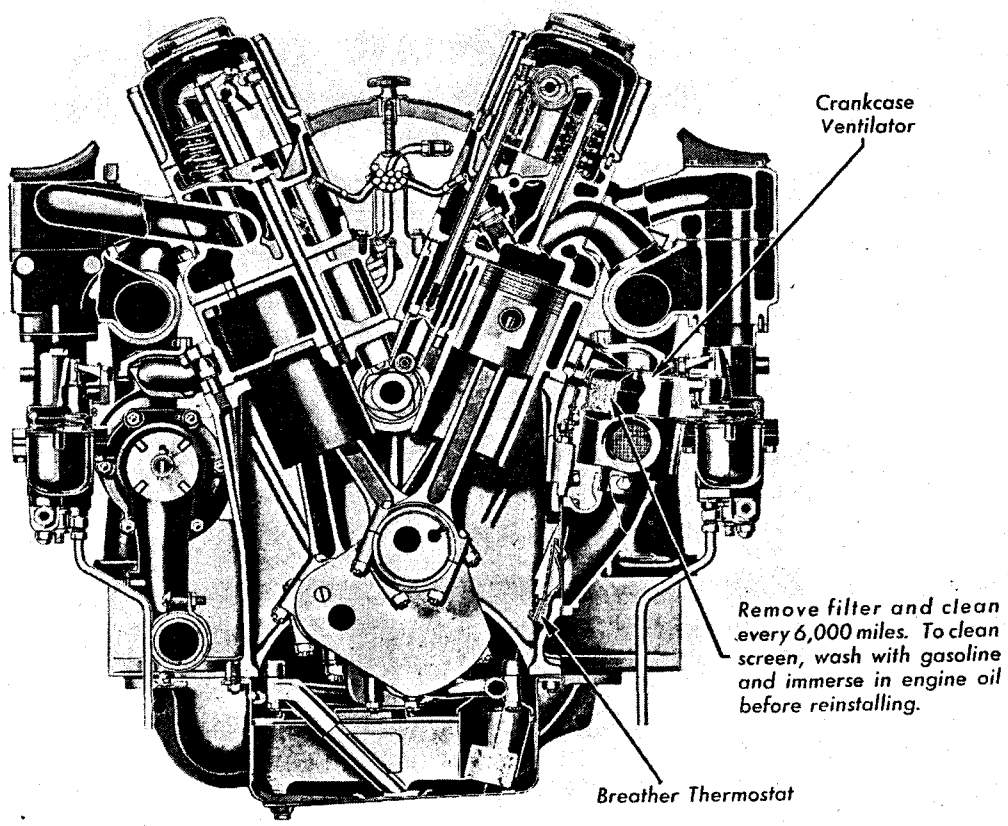


Fig. 5

Cross-sectional View of 370-D Engine—Typical of 452-D Engine

Plate 34. Cadillac 370-D Engine. Cross-sectional View Typical of 452-D Engine

ENGINE

The vacuum pump used on all models is of the diaphragm type and acts only as a booster to augment the manifold suction for operating the brake assister and the windshield wiper at the higher engine loads with full throttle opening. It is located on top of the crankcase at the rear end of the engine.

LaSALLE ENGINE

While the LaSalle engine is of the straight eight type, the valve arrangement is similar to that in the Cadillac V-8 engine in that the engine is of the L-head design. The cylinder block and upper crankcase are integral which construction differs from the Cadillac principle.

The crankshaft is carried in five main bearings and is provided with a torsional vibration damper or harmonic balancer at the front end to neutralize periodic vibration. End thrust of the crankshaft is taken on the upper half of the front main bearing by means of a flange on the bearing end and a steel thrust washer back of the crankshaft timing sprocket.

The LaSalle pistons are of the aluminum alloy type, the same as used on the Cadillac engines. Like the Cadillac pistons, the LaSalle pistons are anodized by an electrolytic process which provides a hard aluminum oxide wearing surface.

The connecting rod bearings are of the steel-backed, shell type. Replacement of these bearings may be made without replacing the connecting rods.

Service Information

1. Removing Camshaft from 370-D and 452-D Engine

When removing the camshaft from these engines, two important points in procedure must not be overlooked. The vacuum pump and the distributor drive shaft must be removed before any attempt is made to draw out the camshaft.

The gear on the distributor drive meshes with a gear on the camshaft. An attempt to remove the camshaft without first removing the distributor drive shaft will damage the driven gear by striking against the blank sides of the camshaft gear.

2. Connecting Rod Alignment

The alignment of Cadillac and LaSalle connecting rods by straightening is not recommended as the rod is liable to return to its former shape because of the toughness of the alloy steel used in its construction.

In an emergency, if straightening must be resorted to, the rod is more liable to hold its shape if it is bent a little farther than necessary and then bent back again until it is straight to offset the tendency of the metal to assume its original shape.

When checking the alignment of the connecting rod assembly, both sides of the rod should be tested by reversing it on the alignment fixture because of the possibility of the fixture being slightly out of square. Both sides of the piston should rotate parallel with the face of the fixture.

3. Assembly of Connecting Rods

When assembling connecting rods to the crankshaft in Cadillac engines, be sure that the numbers on the rods are towards the bottom of the engine and that they correspond with the numbers of the caps. The connecting rod assemblies in the LaSalle engine are installed with the oil hole in the top side of the connecting rod hub for the crankshaft bearing toward the camshaft.

The pistons in both Cadillac and LaSalle engines should be assembled on the rods so that the "T" slot in the skirt will be on the left side of the engine as viewed from the driver's seat.

4. Connecting Rod Clearance

Check clearance in connecting rod bearings with dial indicator (Tool No. HM-196-B) and holder.

Do not attempt to adjust connecting rod bearings. If clearance exceeds limits given install new bearings in the LaSalle engine and new or rebabbited rods in Cadillac engine. Return old Cadillac rods to the factory for exchange. No credit will be allowed on rods if cap or rod has been dressed down.

The same conditions govern the return of rods which have been rebabbited by outside repair shops and which are damaged or bear punch or file marks used for identification purposes. Mechanics should attach numbered metal tags to the rods as they are removed from the engine, or lay them in trays in the right order to identify them instead of marking them with a punch or file.

The LaSalle connecting rod bearings may be removed and installed without removing the piston and connecting rod assembly from the engine or disturbing the oil lines. This may be accomplished, since the bearings are of the shell type, after removing only the connecting rod bearing cap.

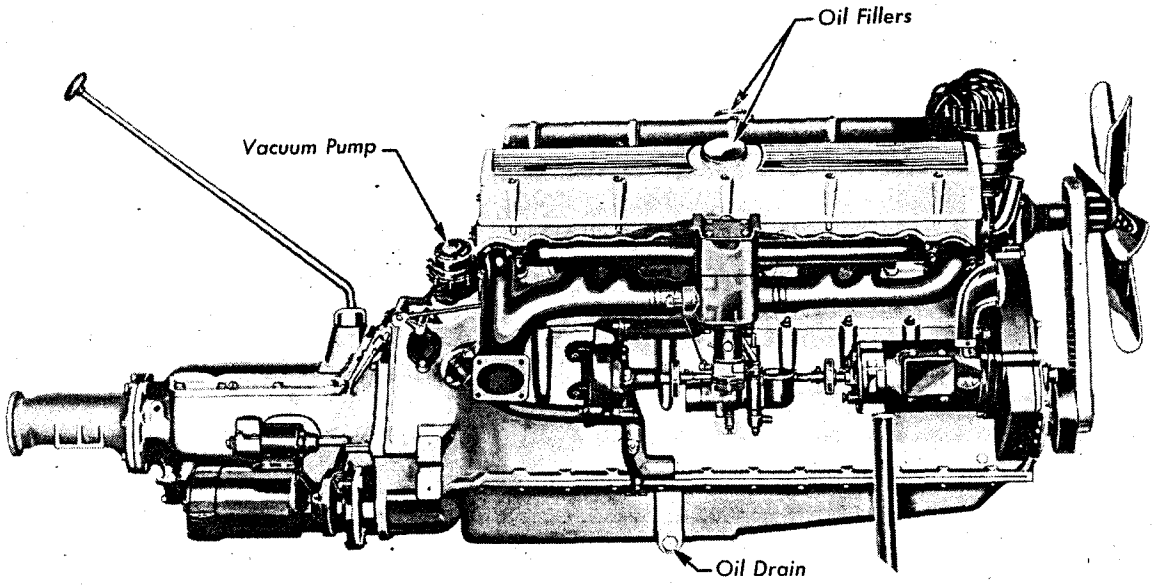


Fig. 6

Side View of Cadillac 452-D Engine

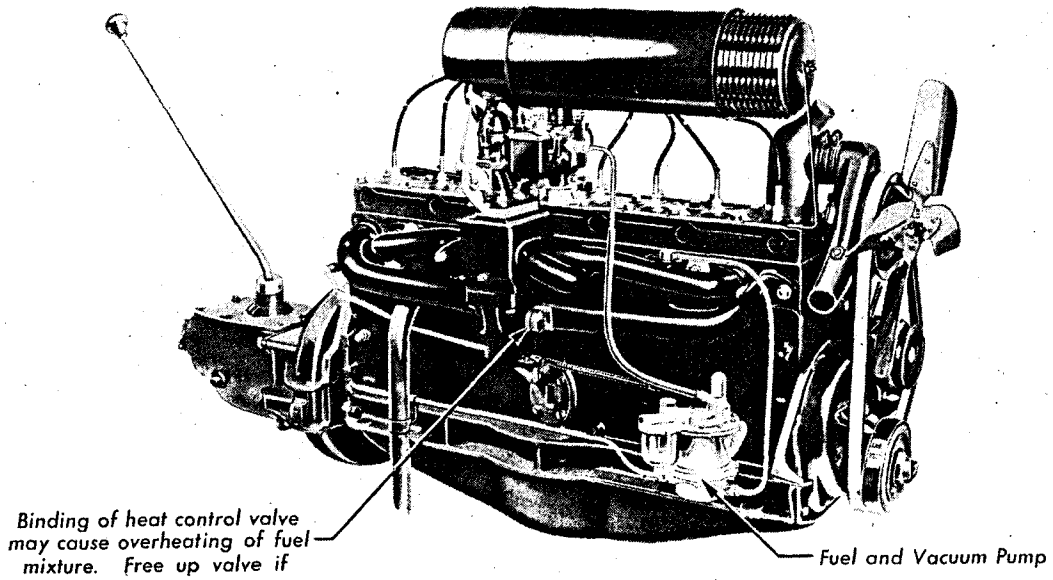


Fig. 7

Side View of LaSalle Engine

Plate 35. Cadillac 452-D and LaSalle 350 Engine

5. Worn Limits for Cylinder Block

When ordering first or second oversize cylinder blocks from the factory, care should be exercised in determining the amount of wear on the blocks returned for exchange as this wear on the replaced blocks should determine the size of blocks to order.

If the standard size cylinder blocks show less than .012 in. wear or out-of-round they may be returned in exchange for first oversize blocks. If the wear exceeds .012 in. but is less than .027 in., second oversize blocks should be ordered for installation on the car.

6. Piston Clearance (See Plate 42)

Two feeler ribbons of different thickness should be used for fitting anodized aluminum pistons. These ribbons should be from ⅜-inch to ½-inch wide, and, for convenience, from 8 to 10 inches long. The thickness for the various series should be as follows:

Car Series No.	Thin Gauge	Thick Gauge
Cadillac V-8	.002 in.	.0025 in.
LaSalle, Cad. V-12, V-16	.0015 in.	.002 in.

The feeler ribbon, the piston and the cylinder wall should be clean and the ribbon must be free from kinks and wrinkles when fitting the pistons.

The ribbon should be exactly in line with the center of the thrust face during the fitting process and on the side opposite the vertical slot in the piston skirt. With the feeler in place in the cylinder and the piston in its running position, the piston should drop of its own weight with the thin feeler and hold tightly in place with the thick feeler.

For convenience the fit trials may be made with the upper end of the piston just sufficiently above the top of the cylinder to hold it with the fingers.

Pistons for the LaSalle 350 are furnished in five sizes under the following part numbers:

Part No.	Size
1096295	Standard
1098567	.003 in. oversize
1098563	.005 in. oversize
1096325	.015 in. oversize
1096327	.030 in. oversize

IMPORTANT: Before ordering pistons for replacement, it is extremely important that the size of the cylinder bores be determined by actual measurement. This is essential because the cylinder bore may have been increased by refinishing and there is no identification to indicate the size other than by measuring at the time of replacement. This is the only way to be sure of avoiding error in ordering.

Oversize V-8, V-12 and V-16 cylinder blocks will be supplied on an exchange basis.

7. Removing and Installing Piston Pins

To remove a piston pin from the aluminum alloy pistons, first place the piston in boiling water to expand the piston pin hole, and then push the pin out by hand from the smaller side (the locking screw side) toward the larger side, opposite the locking screw. See Fig. 33, Plate 42.

An arbor press should never be used under any circumstances to remove the piston pin. This procedure would seriously distort or crack the piston.

When installing a piston pin, the pin should be lubricated with engine oil and installed with a light hand push fit in the side opposite the locking screw with the piston heated to a temperature of about 70°F. The piston pin should also be a light hand push fit in the locking screw side of the piston but with the piston heated to a temperature of about 200 to 210° F.

8. Removing and Installing Piston Pin Bushings

The removal and installation of the split-type piston pin bushings requires the use of special tools. A kit of tools (Tool No. HMJ-250) is furnished for this purpose.

The bushing should be removed in an arbor press and should be started by giving the handle of the press a sudden jerk instead of a steady pull. After the bushing is started it will move out quite freely. The connecting rod should then be thoroughly cleaned of all chips and dirt.

The bushing cannot be pressed into the connecting rod in the usual manner. Instead, it is pressed in the rod and expanded with an expanding bar to press the bronze into very close contact with the steel rod. It is then burnished, leaving a long hard-wearing bearing surface.

To install a piston pin bushing, proceed as follows:

(1) Install the bushing in the side of the connecting rod having the large chamfer in the bearing for the crank pin. Make sure that the oil hole in the bushing is in line with the oil hole in the connecting rod and the split is at right angles to the length of the rod.

(2) Press bushing in rod using bushing replacer, tool No. HMJ-250-3. Use a 2 or 3-ton bench arbor press.

(3) Expand the bushing with Expanding Bar (Tool No. HMJ-250-1). If the bushing protrudes

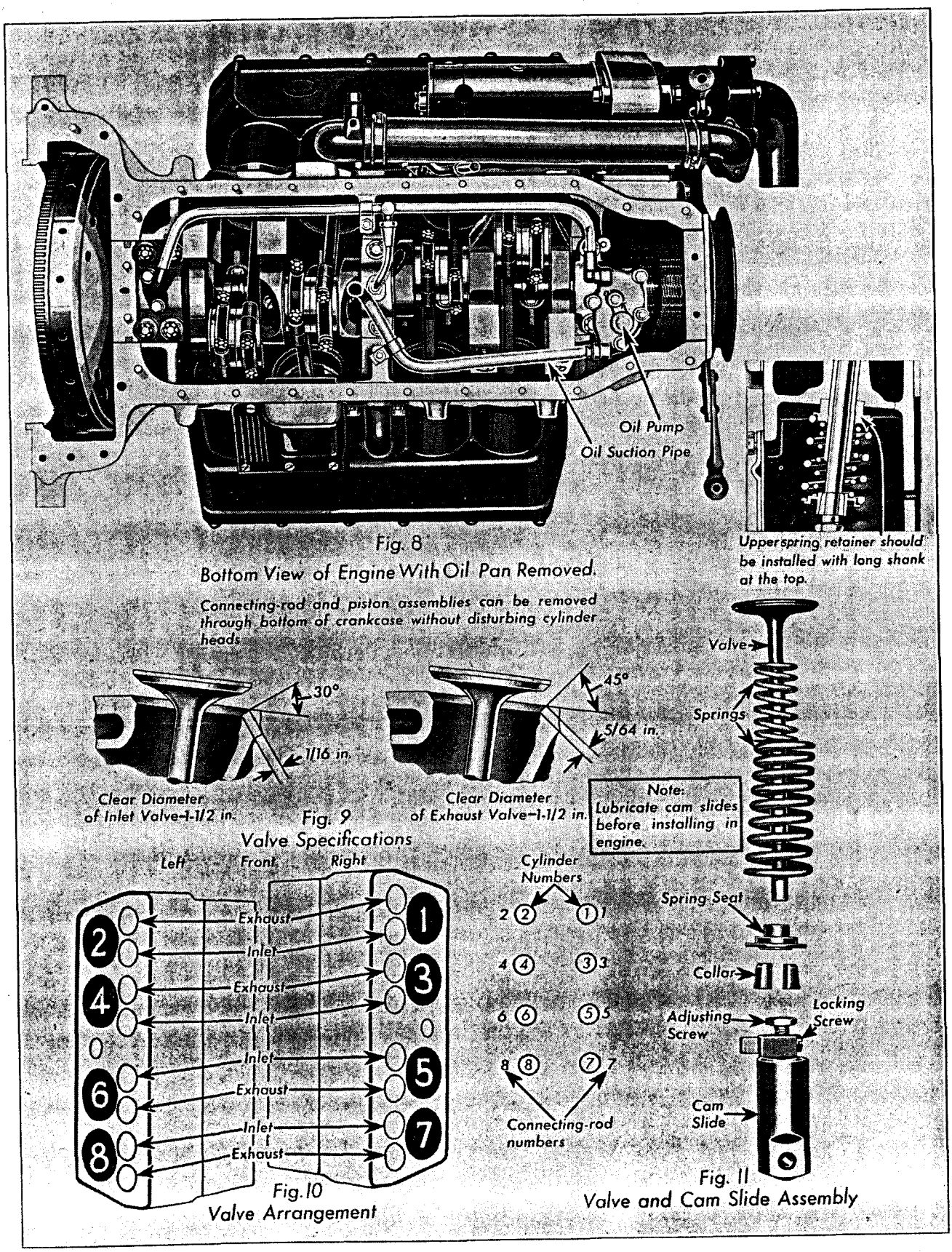


Fig. 8
Bottom View of Engine With Oil Pan Removed.

Connecting-rod and piston assemblies can be removed through bottom of crankcase without disturbing cylinder heads.

Fig. 9
Valve Specifications

Fig. 10
Valve Arrangement

Fig. 11
Valve and Cam Slide Assembly

Plate 36. Bottom View of Engine and Valve Details—Cadillac 355-D

through the connecting rod, file it flush with the rod before burnishing.

(4) Burnish bushing by passing burnishing tool No. HMJ-250-2 through the bushing. When expanding or burnishing a bushing, use a heavier bench arbor press of about 4 tons capacity.

Use kerosine as a lubricant when expanding and burnishing the bushing.

If the bushing moves during the burnishing process, it is too loose and another one should be used.

If the proper clearance between the piston pin and the bushing is not secured after the burnishing tool is passed through the bushing, the burnishing operation should be repeated to increase the size of the piston pin hole.

The press plate (Tool No. HMJ-250-4) should be used for expanding and burnishing the bushing. This plate has two holes—one which is used for assembling, expanding and burnishing and the other for removing the bushing.

After installing the bushing the parts should be thoroughly cleaned and the oil passages blown out with air to remove chips and dirt.

9. Fitting Oil Rings

In fitting new rings, the edge clearance should be from perfectly free to a clearance of .0035 in. maximum, measured with a .0035-in. feeler inserted opposite the solid section of the ring. The ring must be pressed into the groove when this measurement is taken.

10. Installing Cadillac 355-D Cylinder Head Gaskets.

Proper installation of the steelbestos type cylinder head gasket is essential to secure maximum effectiveness. When installing these gaskets, the following procedure should be observed.

First, saturate both sides of the gasket with engine oil. This will prevent the gasket from sticking to the head or block. Then install the gasket and securely tighten down the head. Next start the engine and run it until it is hot, and once more tighten the cap screws, turning them down as tightly as is possible without danger of stripping the threads.

11. Care of Valve Silencers

The automatic valve silencers used on the 370-D and 452-D cars are built to very close limits. The mechanism must, therefore, be kept clean and free from particles of carbon and other foreign matter.

Whenever the valve cover is removed and the valve silencers are exposed, they should be covered to prevent dust and dirt from lodging on the mechanism and finding its way into the dashpots. Small particles of dirt or carbon becoming lodged in the mechanism may cause noisy operation.

Other possible causes for improper operation of the valve silencers are:

1. Leakage of the check valve.

2. Incorrect clearance between the plunger and the cylinder walls.

3. Damage due to improper installation.

Leakage of the check valve in the plunger is most generally due to particles of foreign matter being lodged on the seat of the valve. This can ordinarily be corrected by washing it carefully with gasoline and blowing it out with compressed air.

To assure the check valve being seated properly, it should be revolved on its seat by hand.

Incorrect clearance between the plunger and the cylinder wall may result from the interchanging of the plungers. It should be noted that the plungers and dashpots are marked to insure correct assembly. The number of marks etched on the plunger should correspond with the number of marks appearing on the dashpot casting.

12. Adjustment of Valve Spring Pressure on V-12 and V-16 Engines

The relation between valve spring pressure and valve travel on V-12 and V-16 engines is such that each .010 inch of travel is equivalent to 2.73 pounds of pressure. In consequence, the seating pressure of the valves may be reduced considerably by the slight increase in travel occasioned by a valve refacing and reseating operation. Reduced valve seating pressures would, moreover, affect engine performance to a noticeable degree, especially in making cold-weather starting more difficult, and in some cases might cause the valves to burn.

To control the valve seating pressure it should accordingly be checked after valve refacing operations on V-12 or V-16 engines. Tool, Part No. J-444 should be used for making this test.

The correct seating pressure for the valves on V-12 and V-16 engines, with both valve springs properly installed, is from 48 to 63 pounds. If the pressure is less than 48 pounds, one or more spacers should be installed under the valve spring retainers. A spacer .040 inch thick is available for this purpose, under Part No. 889407. Each spacer will raise the seating pressure 10.9 pounds.

Each valve should be tested separately and one or more spacers installed as required. In case of an extremely low seating pressure, the valve springs should be checked against the specifications given on Page 117 to make sure that they have not lost tension and shortened in use.

13. Burning Carbon on 370-D and 452-D Cars

While the most satisfactory way of removing carbon from automobile engines is by scraping, the labor involved in removing the cylinder heads with the overhead valve mechanism on the V-12 and V-16 engines sometimes render scraping im-

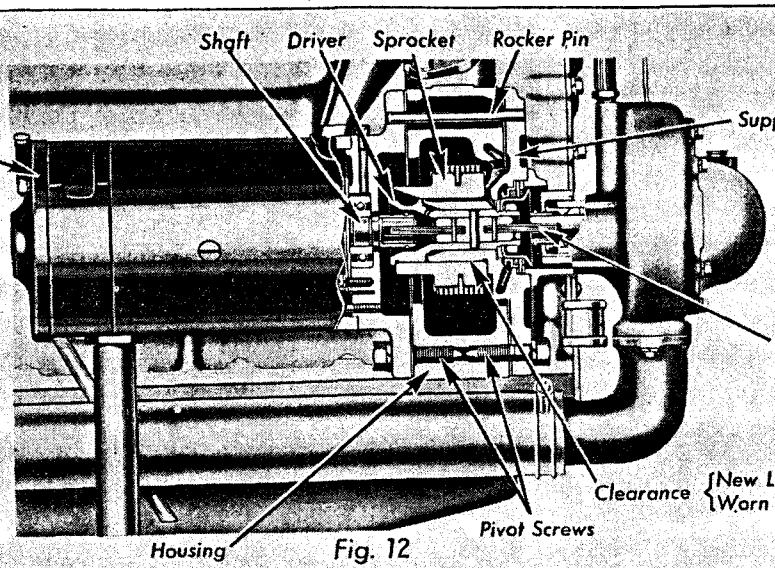


Fig. 12
Sectional View of Generator and Water Pump Drive

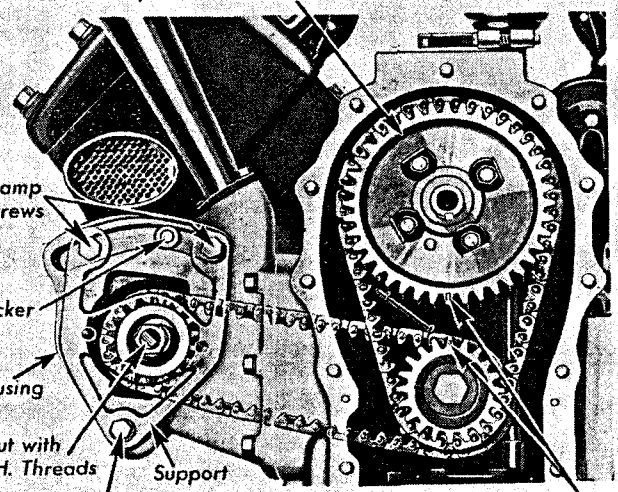


Fig. 13
Front End Chains

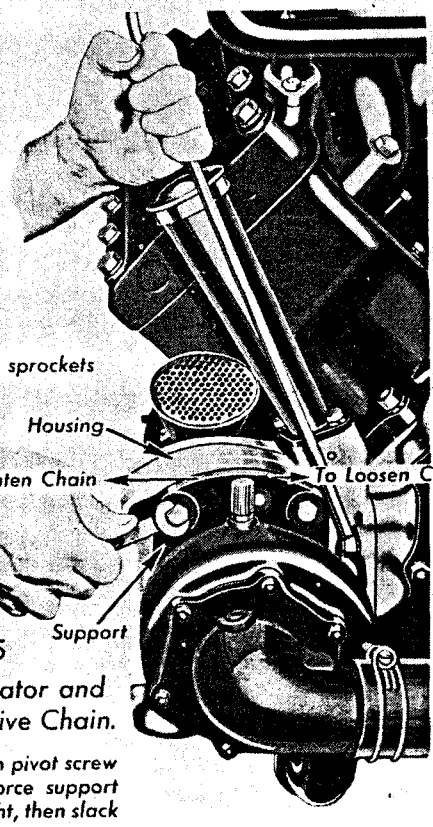


Fig. 15
Adjusting Generator and Water Pump—Drive Chain.
To adjust chain, loosen pivot screw and clamp screws, force support over until chain is tight, then slack off support 1/8 in.

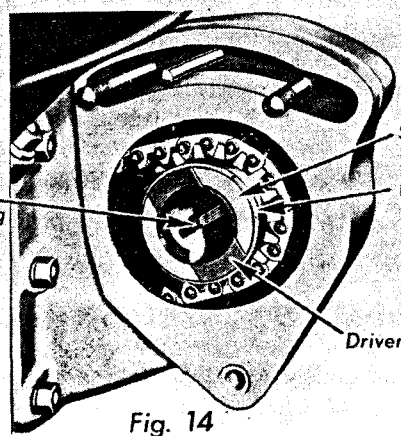


Fig. 14
Remove sprocket and driver through rear opening.

Plate 37. Generator and Water Pump Drive—Cadillac 355-D

practicable. Burning the carbon, if properly done, will give good results on these engines at a much lower cost to the owner.

If this method is used, the carbon should be allowed to burn slowly to obtain the best possible results. Quick burning will do only a partial job. The rate of combustion can be controlled by the proper regulation of the oxygen supply to the combustion chamber.

While the carbon is being burned, particular care must be taken to prevent injury either to the valves or to the external fittings on the engine. The proper procedure is as follows:

Remove the spark plug wires and distributor cover, or use a suitable asbestos cover plate to protect them during the burning operation.

Remove all spark plugs.

The next step is a matter of extreme importance, that is, to be sure the valves are both closed in the cylinder being burned. If the valves are not closed, they are very likely to be overheated, causing them to warp.

The only positive way to make sure the valves are closed is to use a test light and crank the engine to the firing point on that cylinder. See Fig. 20, Plate 38.

Allow the carbon to burn slowly until it has all been burned.

Burn out all of the left-hand cylinders first, in the order in which they fire; then burn the right hand cylinders. The firing order, is, of course, indicated on the distributor cap.

Removal of carbon in the V-8 engines should be done by scraping as in the past.

14. Main Bearing Clearance

Use dial indicator and special fixture (Tool No. HM-65530) for checking bearing clearances. If bearings are found to be worn beyond specified limits they should be replaced. Replacement bearings are furnished to exact size and do not require reaming or scraping. No shims or liners are used on the main bearings and no attempt should be made to take up if worn.

Always install new wooden plugs in grooves in sides of rear main bearing cap in Cadillac engine to prevent oil leaks around the cap. These plugs should be well greased to facilitate installation in the grooves.

15. Cleaning Oil Filter on 370-D and 452-D

A Cuno disc-type self-cleaning oil filter is used on the 370-D and 452-D cars.

The oil, in circulating through the filter, passes between thin rotating discs, stacked one upon another, and separated a few thousandths of an inch by a series of thin stationary plates. The filtering discs are mounted on a shaft which extends above the filter and is connected to the brake linkage in such a way that the discs are rotated a partial turn each time the brakes are applied.

When the filtering discs are rotated the accumulated sediment is scraped off by the stationary plates and falls to the bottom of the tank.

The only attention required is the draining of the tank every 6000 miles.

16. Using Stud for Removing V-8 Cylinder Heads

The cylinder blocks used on Cadillac V-8 cars are not equipped with studs for attaching the cylinder heads. Instead, cap screws are used because of the necessity of turning the head slightly counter-clockwise, when removing, to clear the hood shelf.

When removing or installing cylinder heads, particular care must be taken to hold the head in position. If this precaution is not taken, there is a possibility of the head striking and bending those valves which are open.

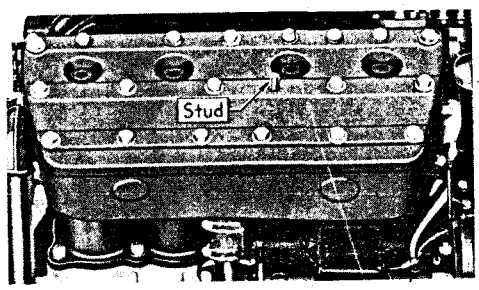


Fig. 16. When removing the cylinder head on V-8 engines, replace one of the center cap screws with a stud before removing the remaining screws to prevent the head from sliding down and damaging the valves.

A good way to avoid this possibility is to replace one of the two center cap screws with a stud before removing the remainder of the screws as shown in Fig. 16. The head will then be held in position until it is lifted off, pivoting on the one stud when turned to clear the hood shelf.

A stud can be made by sawing off the head of a $\frac{7}{16}$ in. x 14 American National thread cap screw, about 3 in. long. The cap screw, part number 122340, used at the front and rear bumper tube support brace can be used for this purpose.

17. Adjusting Cadillac Engine Supports

Before aligning the engine, all supports should be loosened and the intermediate engine support brackets should be loosened from the frame by removing the bolts from the casting.

The intermediate support bracket is attached to the frame by means of three bolts, the two lower ones with the heads inside of the channel of the frame side bar with the nuts toward the engine. The upper bolt faces the opposite direction with the head toward the engine and the nut inside the side bar channel. On later cars, an opening has

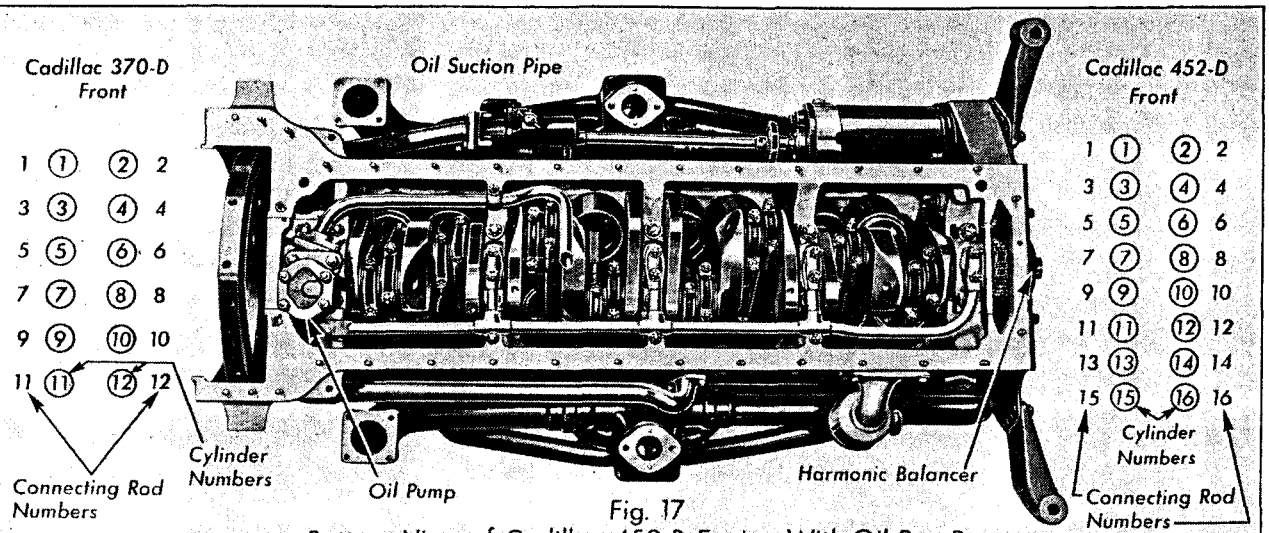


Fig. 17

Bottom View of Cadillac 452-D Engine With Oil Pan Removed. Typical of 370-D which has four less cylinders.

Connecting-rod and piston assemblies can be removed through bottom of crankcase without disturbing cylinder heads.

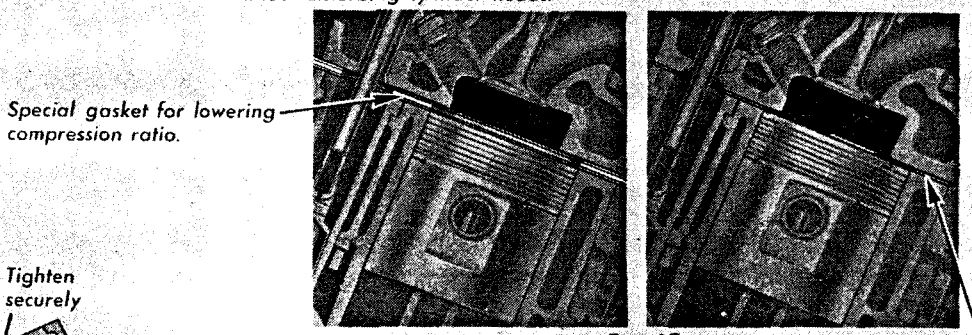


Fig. 18

The compression ratio is lowered by using a special cylinder head gasket having a metal insert.

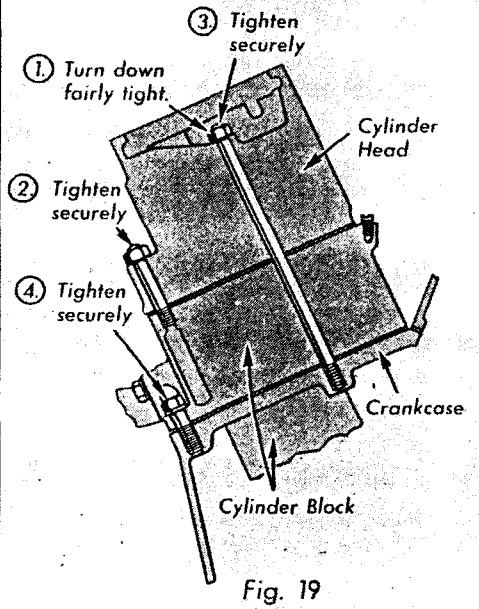


Fig. 19

Order for tightening stud nuts on 370-D and 452-D cylinder heads.

Tighten nuts in each row gradually.

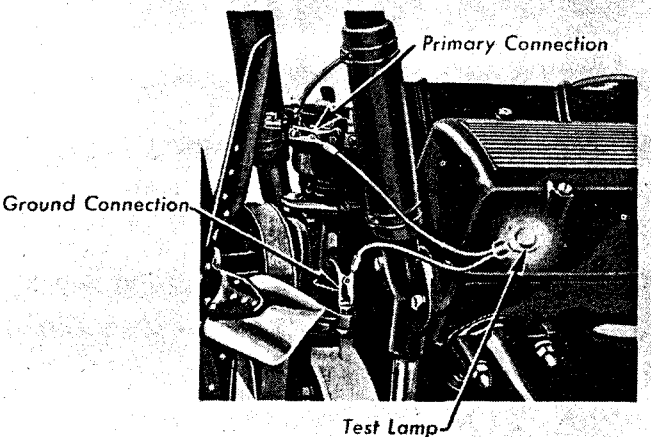


Fig. 20

Locating firing center with test lamp for burning carbon.

Make sure both valves are closed by cranking engine until lamp lights with spark control in retarded position.

Plate 38. Bottom View of Engine and Cylinder Details—Cadillac 370-D and 452-D

been cut in the frame side bar to facilitate tightening the upper bolt in the support bracket.

The holes in the intermediate support brackets are enlarged to permit proper alignment. On some of the first 355-D cars, the flat washer on the three bracket bolts was $\frac{1}{16}$ in. thick. In some cases, these thin washers tended to bend inward through the bolt hole, resulting in loosening of the bracket on the frame.

On later cars a $\frac{1}{8}$ in. washer has been used to prevent this possibility. Whenever the engine supports are to be tightened, make sure that the $\frac{1}{8}$-in. washers, Part No. 881129, are used.

Adjust the engine supports as follows:

1. Place engine weight on front and rear supports.

2. Tighten nuts on front support through bolts until lower retainer contacts with rubber, then take up nut $\frac{1}{2}$ turn more and lock.

3. Leave support loose on frame cross member. On Series 10 and 20 cars tighten nuts on upper two studs of rear support to secure this support to front propeller shaft housing.

4. Tighten nut on through bolt in intermediate supports just enough to take up all clearance between rubbers and retainers.

Check the space between each intermediate support bracket and the frame. If there is more than $\frac{1}{32}$ in., insert shims as required. Shims $\frac{1}{32}$ in. in thickness may be obtained from the factory Parts Division under Part No. 1405840.

5. Install shims under rear support to raise rear end of engine until, with the weight of the engine on the rear support, the bolts through the intermediate support bracket can be started into the clinch nuts in the frame side bar. Insert shims between side bar and casting as needed to prevent cocking of through bolts. Tighten these bolts securely with engine raised as just explained.

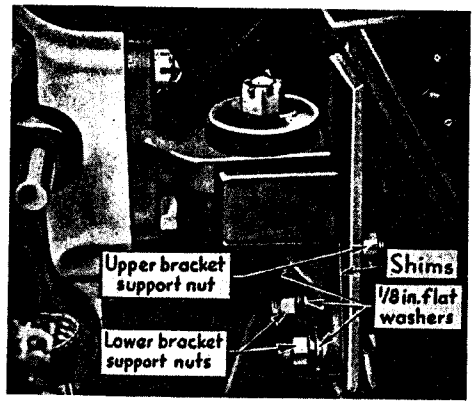


Fig. 21. The intermediate support bracket on the Cadillac engines should be tightened to the frame as the final operation in adjusting the engine supports

6. Remove three shims, or equivalent to $\frac{3}{16}$ in. from under rear support and tighten support to cross member.

7. Tighten nuts on through bolt in intermediate supports to take up all clearance of parts, then give nut $\frac{1}{2}$ turn more and lock. See Fig. 21.

18. Tightening Engine Cover Plate Screws

When installing the cap screws in the water jacket cover plate of LaSalle 350 engines, it is important that they be drawn up only enough to assure a good seal of the gasket but not tight enough to mash the copper cap screw gaskets or to warp the edge of the cover plate.

In case of leakage at this point, the cover plate should be inspected to make sure the edge is not warped. If it is warped, the edge must be straightened before the leakage can be stopped.

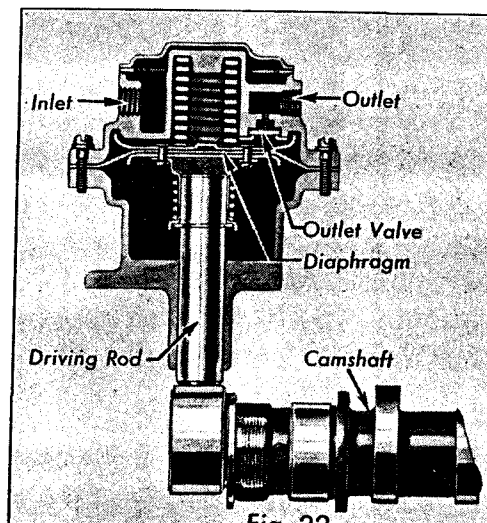


Fig. 22
Sectional View of Cadillac Vacuum Pump

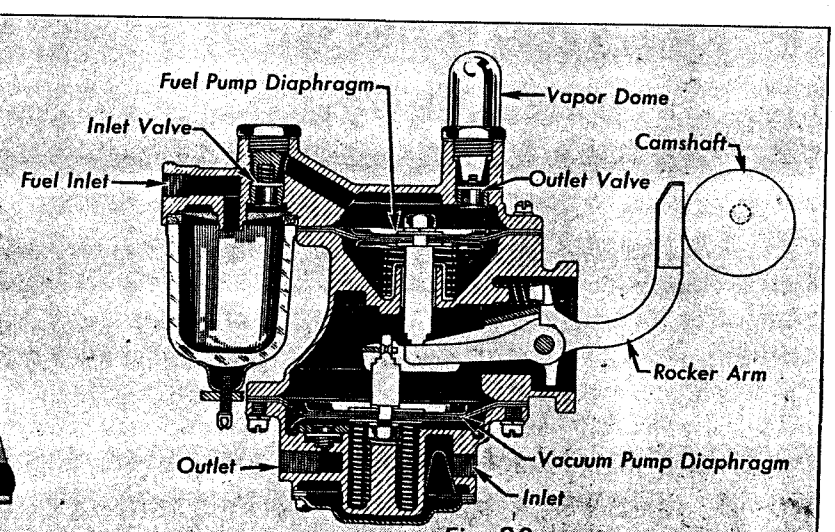
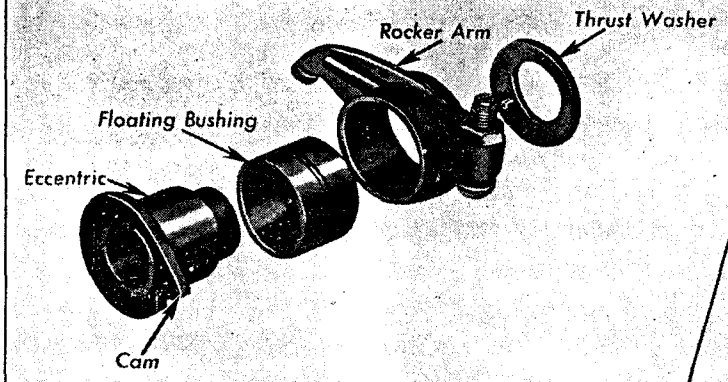


Fig. 23
Sectional View of LaSalle Fuel and Vacuum Pump Unit

Plate 39. Sectional Views of Cadillac Vacuum Pump and LaSalle Fuel and Vacuum Pump Unit



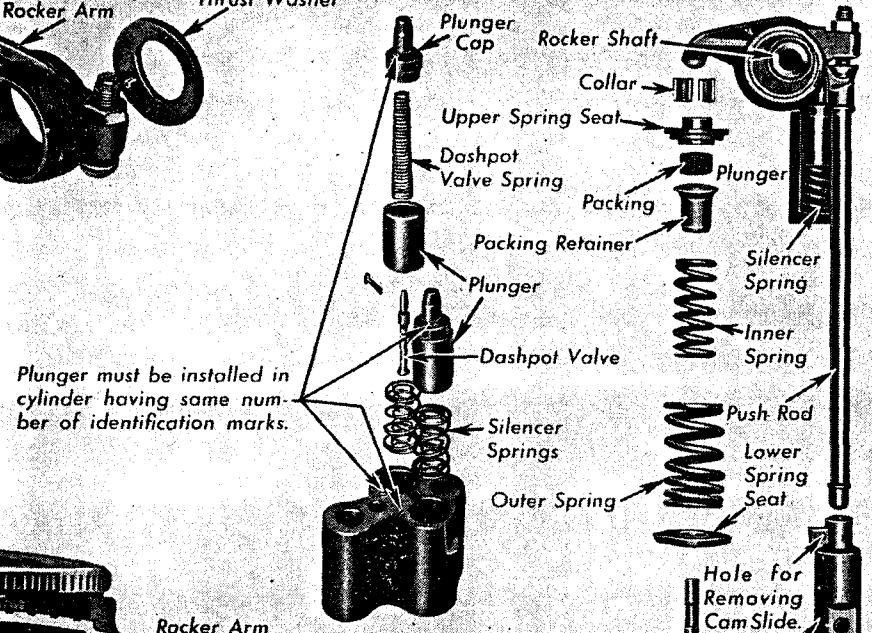
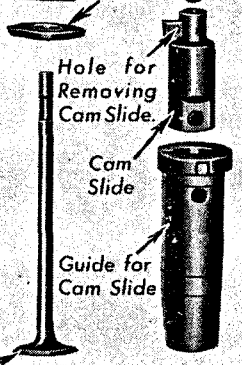


Fig. 25
Valve Silencer and Rocker Arm Disassembled



Note:
Lubricate cam slide before installing in engine.

Fig. 26
Valve and Cam Slide Disassembled

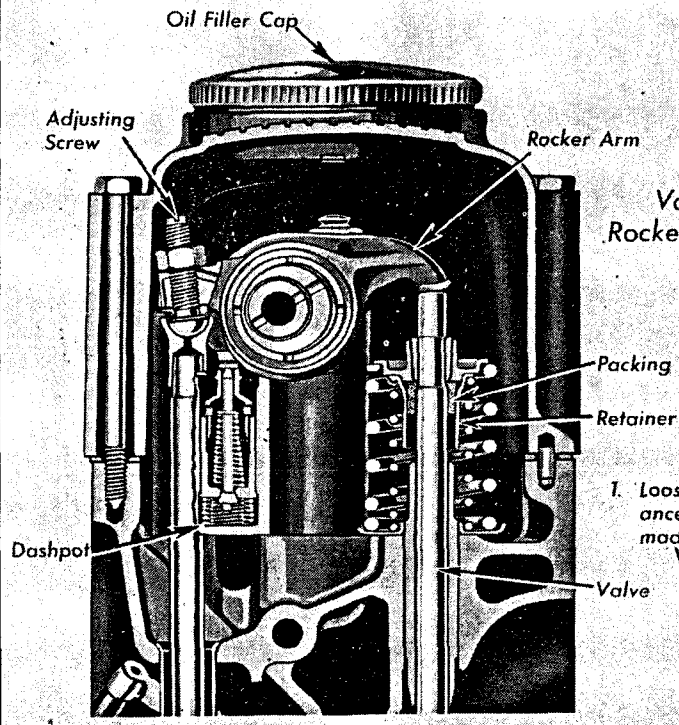
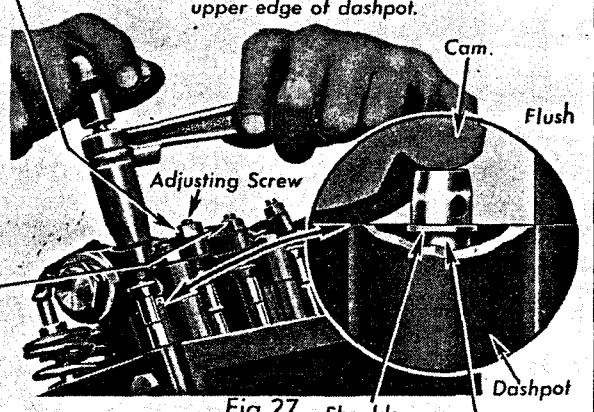


Fig. 24
Sectional View of Valve Operating Mechanism

1. Loosen lock nut to adjust valve clearance. Tighten after adjustment is made.

2. Push plunger down until bottom of hole is on level with or slightly below upper edge of dashpot.



3. Turn adjusting screw down until all clearance is taken up at both ends of rocker arm. Release plunger and back off adjusting screw to locate plunger in correct position.

Fig. 27
Valve Adjusting
Back off adjusting screw until shoulder on plunger is flush with dash pot.

Plate 40. Valve Details—Cadillac 370-D and 452-D

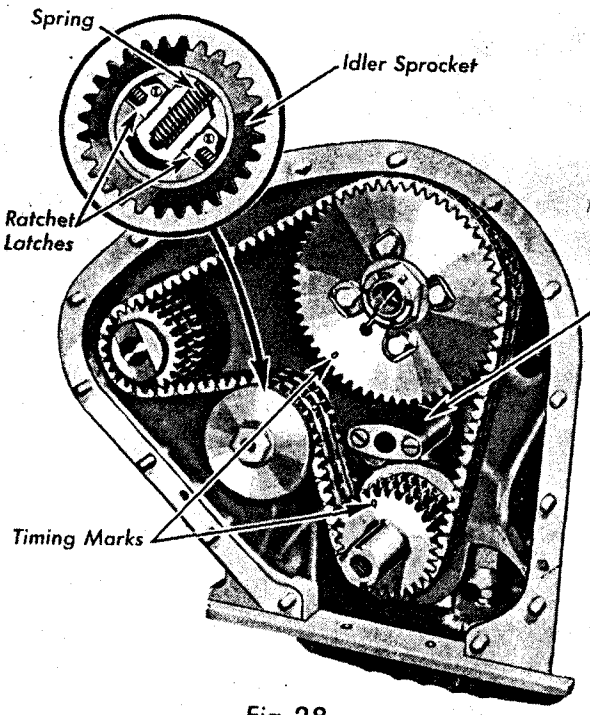


Fig. 28
Slack in timing chain is taken up by idler sprocket moving toward camshaft

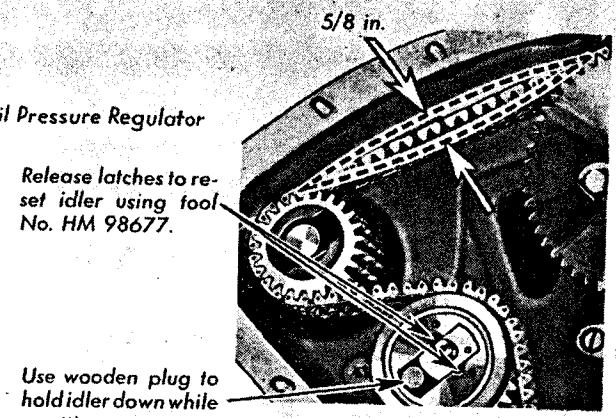


Fig29
Resetting Chain Adjuster

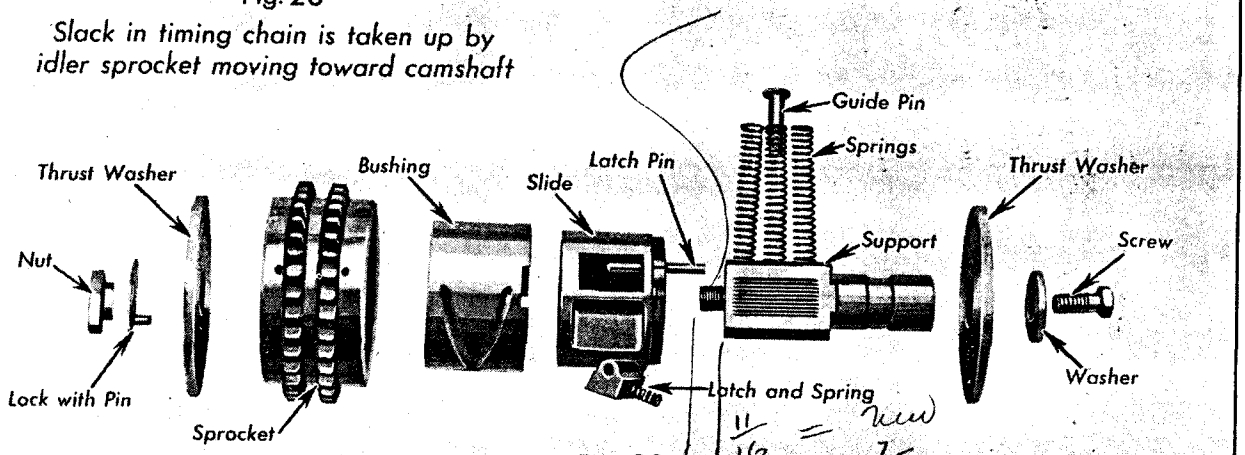


Fig. 30
Exploded View of Automatic Chain Adjuster

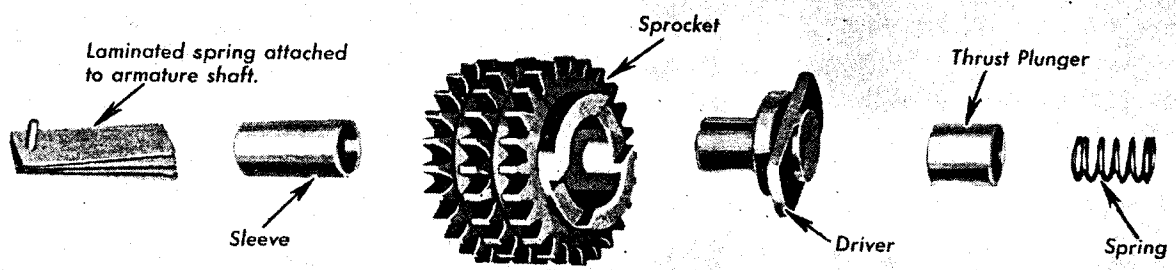
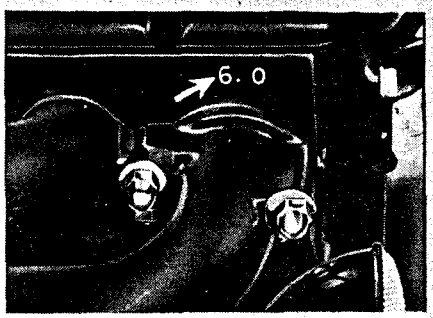
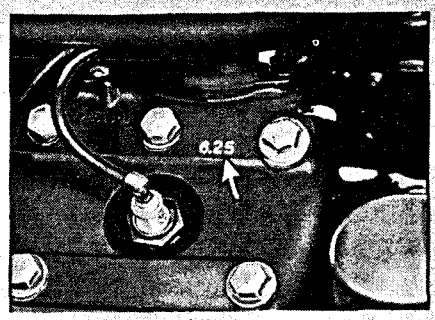


Fig. 31
Exploded View of Generator Driver

Plate 41. Front End Drive—Cadillac 370-D and 452-D



Cadillac 370-D — Typical of 452-D



Cadillac 355-D

Fig. 32

Cylinder Head Identification

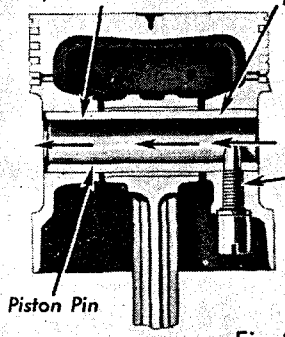


Fig. 33

Removal of Piston Pin from Aluminum Pistons

To remove piston pin, heat piston in boiling water and push pin out by hand in direction indicated by large arrows.

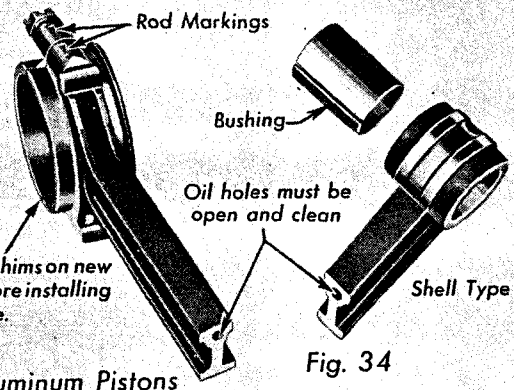


Fig. 34

Cadillac Connecting Rod

Connecting rods for all models including the LaSalle are rifle bored for lubrication of piston pin.

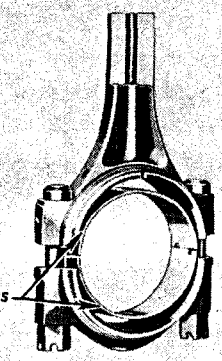
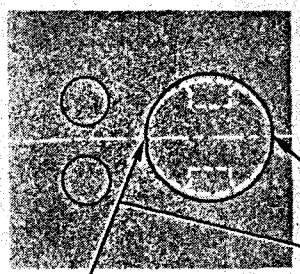


Fig. 35

LaSalle Connecting Rod

Feeler Gauge Thickness	Thin Gauge	Thick Gauge
Cadillac 355-D	.002 in.	.0025 in.
Cadillac 370-D, 452-D, LaSalle	.0015 in.	.002 in.



The feeler gauge must be placed at high spot of piston opposite vertical slot.



Fig. 36

Checking Fit of Aluminum Pistons

With the feeler in place in the cylinder and the piston in its running position without rings, the piston should drop of its own weight with the thin feeler and held tightly in place with the thick feeler.

Plate 42. Piston and Connecting Rod Details

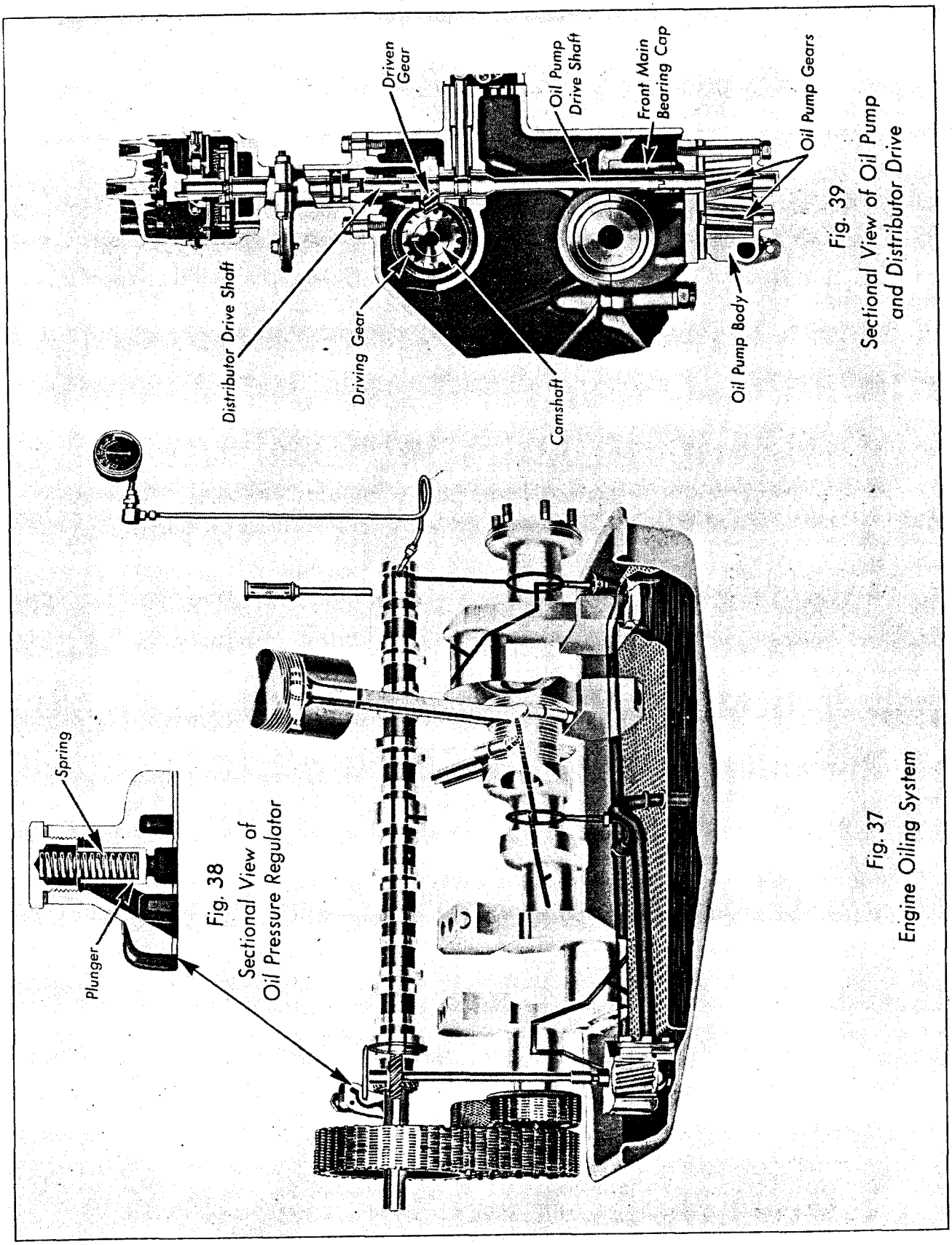


Fig. 39 Sectional View of Oil Pump and Distributor Drive

Fig. 38 Sectional View of Oil Pressure Regulator

Fig. 37 Engine Oiling System

Plate 43. Oiling System—Cadillac 355-D

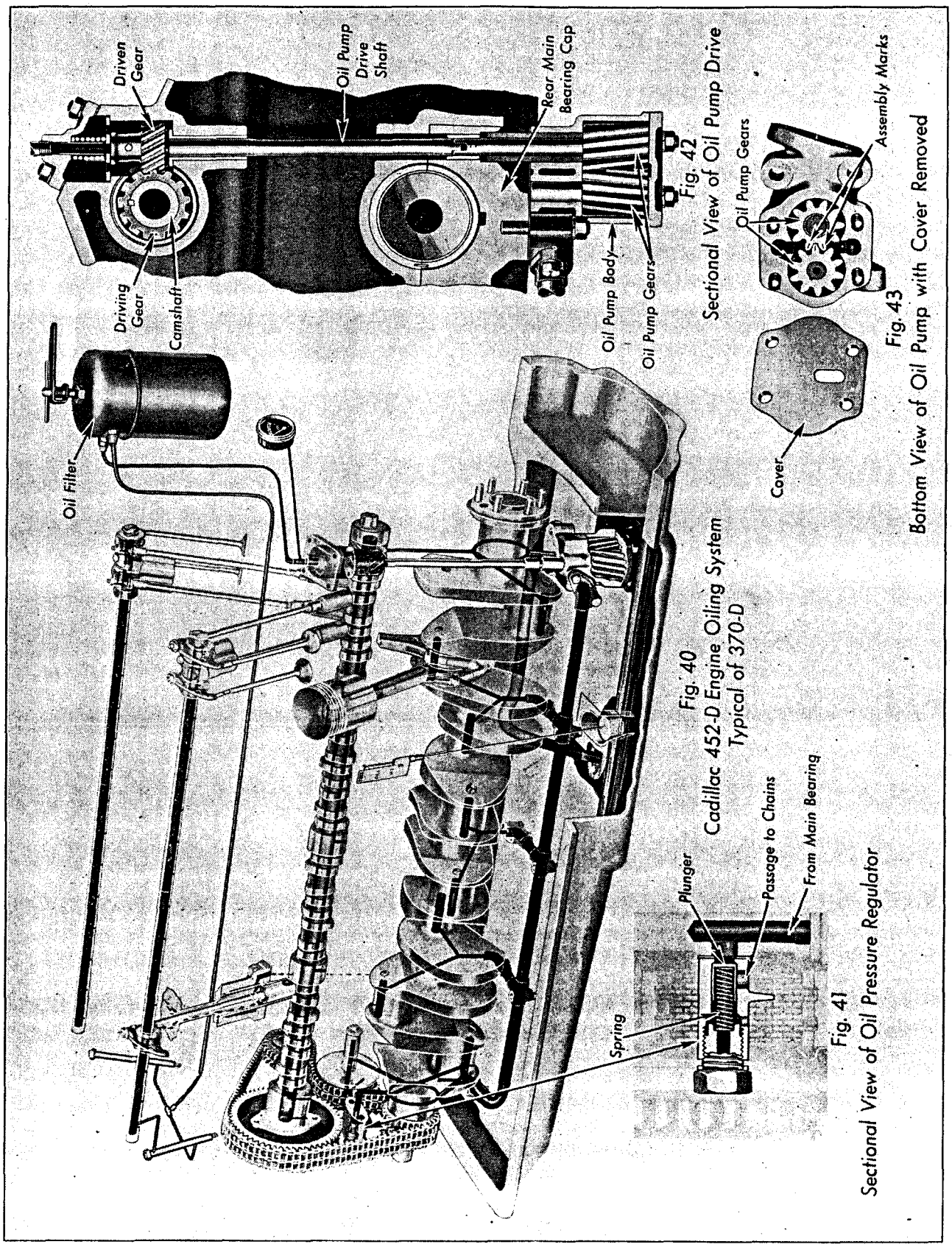


Plate 44. Oiling System—Cadillac 452-D. Typical of 370-D

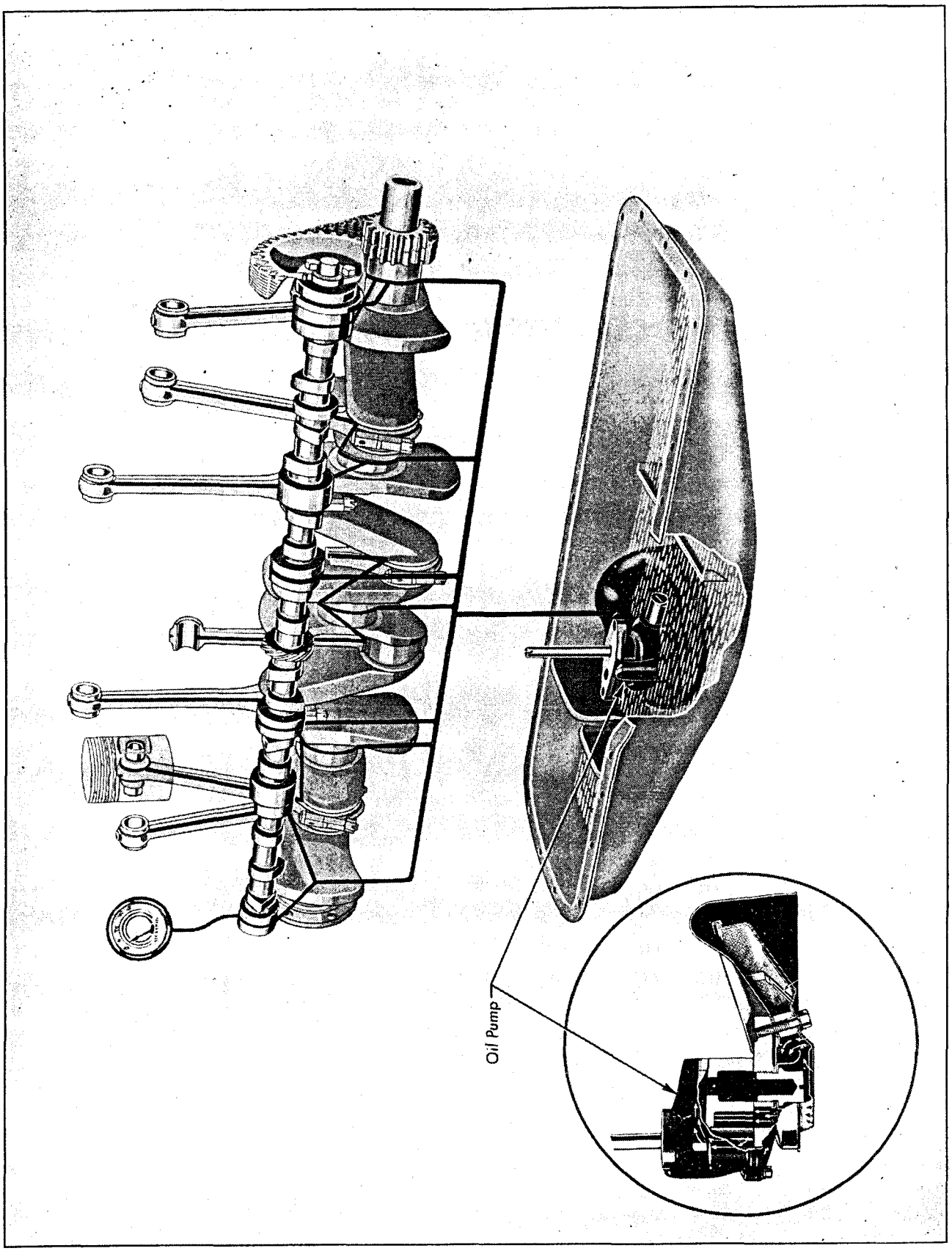


Plate 45. (Fig. 44) Oiling System—LaSalle 350

ENGINE

The vellumoid gasket, Part No. 1408901, should be sealed with shellac or a sealing compound.

The copper cap screw gaskets should be inspected to make sure they are of the rolled copper type, Part No. 394123, instead of the copper-asbestos type used on the first cars. They should also be inspected to make sure that they are not mashed out of shape.

When installing the cap screws, the threads should be dipped in clear Duco and installed while still wet. The screws should be drawn up uniformly just tight enough to assure a good seal of the vellumoid gasket—not tight enough to mash the copper washers or warp the cover plate.

19. Servicing the Vacuum Pump

Service on the vacuum pump can be obtained from A C. service stations. However, replacement of the valves and the diaphragm can be accomplished simply by taking the pump apart. Do not under any circumstances separate the two parts of the housing without holding the pump head securely because of the strong pressure of the diaphragm return spring. If care is not taken in removing the screws which hold the pump together, the top will fly off and possibly cause serious personal injury to some one.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Angle between cylinder blocks	.....	90°	45°	45°
Bore	3″	3⅜″	3⅛″	3″
Compression ratio—				
Standard	6.5 : 1	6.25 : 1	6.0 : 1	6.0 : 1
Optional	5.5 : 1	5.75 : 1	5.65 : 1	5.57 : 1
Compression pressure in pounds—				
At 1000 R.P.M.	161.8	148.5	145.0	153.5
At 2500 R.P.M.	182.6	159.0	159.0	159.5
Horsepower—				
Rated (taxable)	28.8	36.45	46.9	57.5
Developed at 3000 R.P.M.	.....	120	.....	.....
Developed at 3400 R.P.M.	91	.....	133	169.2
Model	350	355-D	370-D	452-D
Stroke	4¼″	4 15/16″	4″	4″
Piston displacement in cubic inches	240.3	353	368	452
Points of suspension, number of	6	5	5	5
Valve arrangement	L-head	L-head	I-overhead	I-overhead
Engine unit number location	.....	.....	.....	.....
350—Upper rib of crankcase on left side of engine.				
355-D, 370-D, 452-D—Upper surface of right rear engine support				
Engine number location (Same No. as Serial No.)	.....	.....	.....	.....
350—Top edge of cylinder block, left side, opposite No. 1 cylinder				
355-D—Boss on crankcase near water inlet on right side of engine				
370-D, 452-D—Upper surface of generator drive chain housing on right side of engine				
Camshaft				
Bearing clearance				
New limits	.002-.004″	.0027-.0037″	.0011-.0026″	.0011-.0026″
Worn limits, not over	.005″	.005″	.005″	.005″
Bearings out of round, not over	.005″	.005″	.005″	.005″
Diameter and length of bearings—				
No. 1 (front)	2.3120-2.3135″ x 1 9/32″	1⅛ x 1.802″	2 x 3″	2 x 3″
No. 2	2.2495-2.2510″ x 1 1/16″	2.3392 x 1.00″	2⅛ x 1⅜″	2⅛ x 1⅜″
No. 3	2.1870-2.1885″ x 1 1/16″	2.3392 x 1⅛″	2⅛ x 1⅜″	2⅛ x 1⅜″
No. 4 (rear on 355-D and 370-D)	2.1245-2.1260″ x 1 1/16″	1⅝ x 1 11/16″	2⅛ x 2 15/16″	2⅛ x 1⅜″
No. 5 (rear on 452-D)	2.0628-2.0635″ x 1 1/16″	.....	.....	2⅛ x 2 15/16″
No. 6 (rear on 350)	1.8120-1.8135″ x 1 1/16″	.....	.....	.....
End play in camshaft				
New limits	.....	.005-.015″	.004-.008″	.004-.008″
Worn limit, not over	.....	.020″	.015″	.015″
Number of bearings	6	4	4	5

ENGINE

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Chains				
Camshaft chain—				
Adjustment	None	None	Automatic	Automatic
Number of links	46	54	110	110
Pitch	½"	½"	⅜"	⅜"
Type—				
Morse No.	.....	766	766 Duplex	766 Duplex
Whitney No.	CL-250	.....	.....	.....
Width	1¼"	1¾"	1½"	1½"
Generator and water pump drive chain—				
Adjustment—Slack measured at top of sprocket housing	.....	⅛"	.....	.....
Number of links	.....	58	Only one chain used. See "Camshaft chains" for details	
Pitch	.....	½"		
Type—Morse No.	.....	766	.....	.....
Width	.....	1¼"	.....	.....
Connecting Rods				
Center to center length	9"	10½"	9¼"	9¼"
Clearance between—				
Bushing and piston pin (See Note 7)	.....	.....	.....	.....
Lower bearing and crankpin (See Note 4)				
New limits	.001-.003"	.001-.0025"	.001-.0025"	.001-.0025"
Worn limit, not over	.006"	.006"	.006"	.006"
Diameter and length of connecting rod bearings	$2\frac{19}{64}$ x $1\frac{19}{64}$"	2⅜ x 1⅜"	2½ x 1⅛"	2½ x 1⅛"
End play in lower bearing				
New limits	.0055-.0105"	.006-.012"	.006-.012"	.006-.012"
Worn limit, not over	.015"	.015"	.015"	.015"
Piston pin lubrication	.....	.....	.....	.....
Force feed—connecting rods rifle-bored.				
Crankshaft and Main Bearings				
Crank pin diameter	2.248-2.249"	2.375"	2.500"	2.500"
Crank pin out of round, not over	.004"	.004"	.004"	.004"
Diameter and length of main bearing journals—				
No. 1 (front)	2⅜ x 1⅝"	2⅜ x $1\frac{15}{16}$"	2⅝ x $2\frac{3}{16}$"	2⅝ x $2\frac{3}{16}$"
No. 2	$2\frac{9}{16}$ x 1½"	2⅜ x 1⅝"	2⅝ x 1⅜"	2⅝ x 1⅝"
No. 3 (rear on 355-D)	2⅝ x 1⅝"	2⅜ x 2⅞"	2⅝ x 1½"	2⅝ x 1½"
No. 4 (rear on 370-D)	$2\frac{11}{16}$ x 1½"	.....	2⅝ x $3\frac{9}{16}$"	2⅝ x $3\frac{3}{8}$"
No. 5 (rear on 452-D and 350)	¾ x $1\frac{25}{32}$"	.....	.....	2⅝ x $3\frac{9}{16}$"
Diameter and length of crankpin journal	2⅜ x 1⅜"	2⅜ x 2¼"	2½ x 2¼"	2½ x 2¼"
End play in crankshaft				
New limits	.0035-.0065"	.001-.005"	.001-.005"	.001-.005"
Worn limit, not over	.012"	.010"	.010"	.010"
Harmonic balancer used	Yes	No	Yes	Yes
Length of crankshaft—overall	$43\frac{15}{16}$"	$28\frac{25}{32}$"	$35\frac{13}{16}$"	$44\frac{5}{16}$"
Length of crankshaft—front to rear bearings inclusively	$34\frac{1}{32}$"	$23\frac{25}{32}$"	$30\frac{25}{32}$"	$39\frac{9}{32}$"
Main bearing clearance (See Note 14)				
New limits	.001-.003"	.001-.0015"	.001-.0015"	.001-.0015"
Worn limit, not over	.005"	.004"	.004"	.004"
Main bearing journal out of round, not over	.005"	.005"	.005"	.005"
Number of main bearings	5	3	4	5
Lubrication				
Crankcase capacity	7 qts.	8 qts.	9 qts.	10 qts.
Thinning lubrication with kerosine See Lubrication Section.	.....	.....	.....	.....
Oil Filter				
Make	.....	.....	Cuno	Cuno
Oil Pump				
Backlash between spiral drive gears, not over	.018"	.018"	.018"	.018"
Clearance between—				
Bushing and drive shaft				
New limits	.001-.0025"	.001-.0025"	.001-.0025"	.001-.0025"
Worn limits, not over	.010"	.010"	.010"	.010"

ENGINE

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Oil Pump—Cont'd				
Idler gear bushing and shaft				
New limits	.001-.0025"	.001-.0025"	.001-.0025"	.001-.0025"
Worn limit, not over	.005"	.005"	.005"	.005"
Pump body and gears				
New limits	.0025-.0085"	.003-.005"	.003-.005"	.003-.005"
Worn limit, not over	.010"	.008"	.008"	.008"
End play in pump gears				
New limits	.0025-.0065"	.003-.008"	.002-.004"	.002-.004"
Worn limit, not over	.015"	.020"	.015"	.015"
End play in spiral gear on drive shaft				
New limits	.003-.010"	.005-.015"	.009-.015"	.009-.015"
Worn limit, not over	.015"	.020"	.020"	.020"
Gasket thickness, pump cover	.007"	.009-.011"	.....	.....
Pressure Regulator				
Adjustment	None	None	None	None
Clearance between plunger and housing				
New limits	.003-.005"	.003-.006"	.003-.006"	.003-.006"
Worn limit, not over	.008"	.008"	.008"	.008"
Pressure, normal when oil is warm—				
Idle speed	15 lbs.	30 lbs.	.....	.....
60 M.P.H.	.....	.....	30 lbs.	30 lbs.
Spring				
Free length (approximately)	$3\frac{27}{32}$"	$1\frac{3}{4}$"	$1\frac{3}{4}$"	$1\frac{3}{4}$"
Pressure at $1\frac{3}{4}$ in.	{7 lbs. $9\frac{1}{4}$ oz. {7 lbs. $13\frac{1}{4}$ oz.	.....	.....	.....
Pressure at $1\frac{5}{16}$ in.	.....	{1 lb. 14 oz. {2 lb. 2 oz.	{1 lb. 14 oz. {2 lb. 2 oz.	{1 lb. 14 oz. {2 lb. 2 oz.
Valve opens at	$7\frac{3}{4}$ lbs.	11 lbs.	14 lbs.	14 lbs.
Pistons and Cylinders				
Cylinder bore out of round, not over	.001"	.001"	.001"	.001"
Piston clearance (See Note 6)	.....	.....	.....	.....
Cylinder bore, standard	3"	$3\frac{3}{8}$"	$3\frac{1}{8}$"	3"
All bores in same block are held within .002 in. of each other.				
Cylinder bore oversize	.....	.....	.....	.....
Oversize cylinders are honed to fit the pistons with which they are supplied.				
Piston Pins				
Clearance between—				
Pin and bushing				
New limits	.0002-.0009"	.0002-.0008"	.0002-.0008"	.0002-.0008"
Worn limit, not over	.0015"	.0015"	.0015"	.0015"
Pin and piston (See Note 7)	.....	.....	.....	.....
Diameter—standard	$\frac{7}{8}$"	$\frac{7}{8}$"	$\frac{7}{8}$"	$\frac{7}{8}$"
Piston pin lubrication	.....	.....	.....	.....
Force feed—connecting rods rifle-bored.				
Piston Rings				
Clearance between ring and sides of grooves in piston				
New limits				
Compression rings	.0015-.0028"	.0015-.0028"	.0015-.0028"	.0015-.0028"
Oil rings	.0013-.0026"	.0013-.0026"	.0013-.0026"	.0013-.0026"
Worn limit, not over	.004"	.004"	.004"	.004"
Gap between ends—				
New limits				
Compression rings	.007-.012"	.007-.012"	.007-.012"	.007-.012"
Oil rings	.007-.015"	.007-.015"	.007-.015"	.007-.015"
Worn limit, not over	.025"	.025"	.025"	.025"
Number of compression rings	2	3	3	3
Number of oil rings	2	1	1	1
Width of rings—				
Compression	$\frac{1}{8}$"	$\frac{3}{32}$"	$\frac{3}{32}$"	$\frac{3}{32}$"
Oil (upper on 350)	$\frac{1}{8}$"	$\frac{3}{16}$"	$\frac{5}{32}$"	$\frac{5}{32}$"
Oil (lower on 350)	$\frac{5}{32}$"	.....	.....	.....

ENGINE

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Valve Mechanism				
Clearance between—				
Camslide and guide				
New limits	.0005″	.001-.0025″	.001-.0025″	.001-.0025″
Worn limits, not over	.005″	.005″	.005″	.005″
Camslide roller and pin				
New limits	.....	.0017-.003″	.0017-.003″	.0017-.003″
Worn limit, not over	.....	.004″	.004″	.004″
Furnished only in complete assemblies of camslide with button, roller and screw.				
Valves, Exhaust				
Clearance between—				
Stem and guide				
New limits	.00225-.00425″	.0025-.0045″	.001-.0025″	.001-.0025″
Worn limit, not over	.006″	.006″	.005″	.005″
Stem and camslide	.009-.010″	.010″	Automatic	Automatic
Adjust while engine is cold.				
Clear diameter (port opening)	$1\frac{9}{32}$″	$1\frac{1}{2}$″	$1\frac{1}{4}$″	$1\frac{1}{4}$″
Length—overall	$5\frac{9}{32}$″	$6\frac{1}{2}$″	$6\frac{1}{4}$″	$6\frac{1}{4}$″
Lift	$\frac{5}{16}$″	$\frac{23}{64}$″	$\frac{11}{32}$″	$\frac{11}{32}$″
Seat angle	30°	45°	45°	45°
Seat width	.042-.052″	$\frac{5}{64}$″	$\frac{5}{64}$″	$\frac{5}{64}$″
Stem diameter	$\frac{11}{32}$″	$\frac{3}{8}$″	$\frac{11}{32}$″	$\frac{11}{32}$″
Valves, Inlet				
Clearance between—				
Stem and guide				
New limits	.00125-.00325″	.0015-.0035″	.001-.0025″	.001-.0025″
Worn limit, not over	.006″	.006″	.006″	.006″
Stem and camslide	.006″	.006″	Automatic	Automatic
Adjust while engine is cold.				
Clear diameter (port opening)	$1\frac{13}{32}$″	$1\frac{1}{2}$″	$1\frac{3}{8}$″	$1\frac{3}{8}$″
Length—overall	$5\frac{9}{32}$″	$6\frac{17}{32}$″	$6\frac{1}{4}$″	$6\frac{1}{4}$″
Lift	$\frac{5}{16}$″	$\frac{23}{64}$″	$\frac{11}{32}$″	$\frac{11}{32}$″
Seat angle	30°	30°	45°	45°
Seat width	.042-.052″	$\frac{1}{16}$″	$\frac{5}{64}$″	$\frac{5}{64}$″
Stem diameter	$\frac{11}{32}$″	$\frac{3}{8}$″	$\frac{11}{32}$″	$\frac{11}{32}$″
Valve Springs				
Free length—				
Inner valve spring	.....	1.944″	1.944″	1.944″
Outer valve spring	$2\frac{9}{16}$″	2.215-2.235″	2.215-2.235″	2.347-2.378″
Pressure in pounds, inner valves—				
Compressed to 1.751 in. (valve closed)	.....	18-21 lbs.	18-21 lbs.	18-21 lbs.
Compressed to 1.407 in. (valve open)	.....	49-54 lbs.	49-54 lbs.	49-54 lbs.
Pressure in pounds, outer valves—				
Compressed to 2¼ in. (valve closed)	43	.....	.....	.....
Compressed to 1.922 in. (valve closed)	.....	48-52 lbs.	48-52 lbs.	48-52 lbs.
Compressed to $1\frac{29}{32}$ in. (valve open)	96	.....	.....	.....
Compressed to 1.578 in. (valve open)	.....	111-120 lbs.	111-120 lbs.	111-120 lbs.
Spring must not show any set when compressed with coils touching.				
Valve Timing				
Intake opens—Before top center (.006 in. clearance on 355-D and .0118 in. on 350)	T. D. C.	6°	T. D. C.	T. D. C.
Intake closes—after bottom center (.006 in. clearance on 355-D and .0118 in. on 350)	42°	42°	44°	44°
Exhaust opens—before bottom center (.010 in. clearance on 355-D and .0118 in. on 350)	40°	38°	39°	39°
Exhaust closes—after top center (.010 in. clearance on 355-D and .0118 in. on 350)	10°	2°	5°	5°

EXHAUST SYSTEM

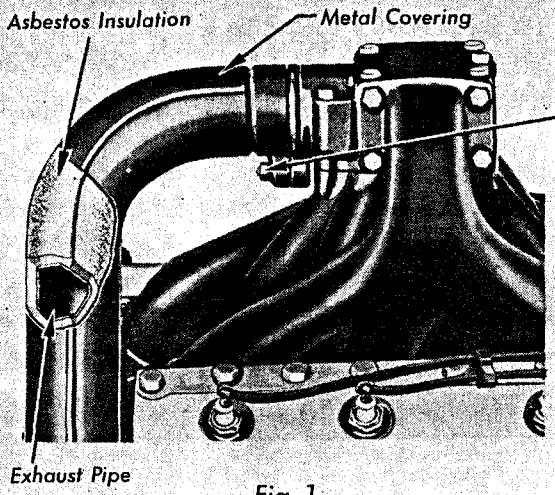


Fig. 1

Metal covering cut away to show asbestos insulation—Cadillac 355-D

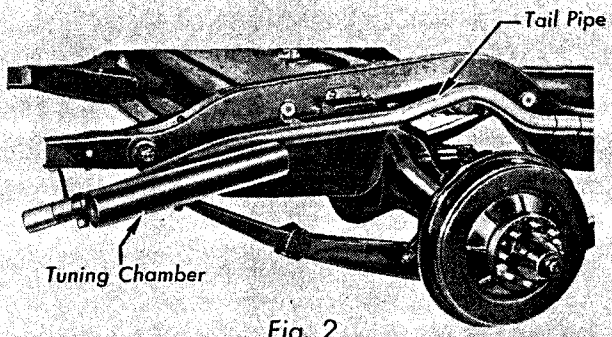


Fig. 2

Tuning Chamber on Tail Pipe—Cadillac 355-D, 370-D and 452-D

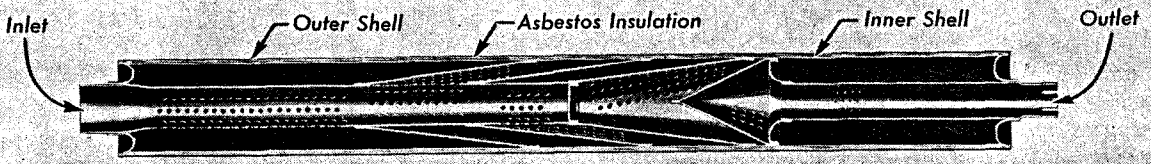


Fig. 3

Cut-away View of Cadillac Muffler

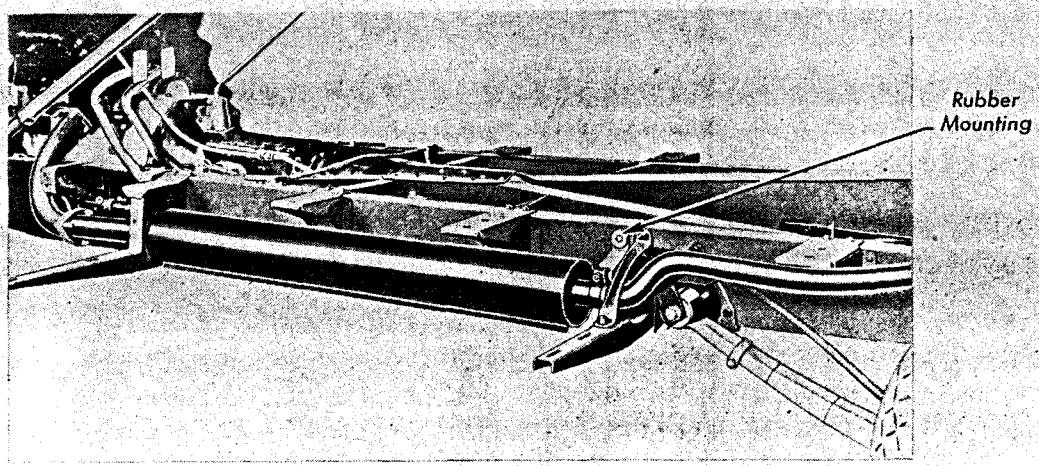


Fig. 4

Muffler Mounting on Cadillac 355-D Series 30, 370-D and 452-D Cars

Plate 46. Exhaust System Details

EXHAUST SYSTEM

General Description

The arrangement of the exhaust system differs on the various type engines. On the Cadillac V-8 the exhaust manifolds are connected at the top to the manifold header to which is connected a single exhaust pipe leading to the muffler.

The exhaust gases pass from the cylinders through the manifolds to the header and out through the exhaust pipe. The flow of hot gases through the header heats the fuel mixture quickly to assist in more thorough vaporization of the fuel.

Two entirely separate exhaust systems are used on both the Cadillac 370-D and 452-D, one system for each block of cylinders. Each of these exhaust systems includes an exhaust manifold, an exhaust pipe, a muffler and a tail pipe.

The 370-D exhaust manifold is in two sections and the 452-D manifold is in three sections to allow for expansion. These sections are connected by tight fitting leak-proof sleeves.

The front section of the 370-D exhaust manifold carries the upper part of the intake header. The center section of the 452-D manifold contains part of the heat chamber for heating the gases passing from the carburetor to the intake manifold.

The LaSalle manifolds are constructed with a heater body to provide a by-pass for the exhaust gases around a portion of the inlet manifold, to insure a more nearly uniform vaporization of the fuel mixture especially when the engine is cold.

The flow of exhaust gases through the heater body is regulated by a thermostatically controlled heater valve. Two thermostat springs are used to control the action of the heater valve, and hold the valve closed under pressure when the manifold is cold, thereby diverting the exhaust gases around the inlet manifold. **With the manifold cold (65 to 70° F.) and the heater valve closed, each spring should have ¾ to ⅞ of a turn wind up.** As the manifold becomes hot, the heater valve automatically opens and permits the exhaust gases to pass directly into the exhaust pipe and muffler.

The exhaust pipes on the Cadillac cars are covered with a heavy asbestos insulation to prevent excessive heat under the hood and in the body, and to muffle the exhaust noises.

Cadillac mufflers have an asbestos lining between two shells which are welded together at the ends. The purpose of the asbestos lining is to deaden or muffle the exhaust noises. This lining also serves as a heat insulator and less heat is dissipated under the body. Rubber cushions, are used between the muffler support brackets and the frame on all models to prevent the exhaust vibrations being transmitted to the body.

In addition to the muffler on the Cadillac cars, a silencing chamber, consisting of a piece of pipe about two feet long, is mounted above and connected near the rear end of the tail pipe. This chamber acts on the same principle as the tuning chamber in the carburetor air silencer.

The mufflers on the Series 30, 40 and 60 cars are mounted on the outside of the frame to permit a more rigid frame construction. On the remaining Series cars, the muffler is mounted inside of the frame in the conventional way.

Service Information

1. Crackling Noises in Manifolds

Some V-16 engines when new, give out a crackling noise after a long run when the ignition is shut off. This noise will be heard only in some new engines and is caused by the contraction of the manifold sections as the exhaust manifolds cool. This condition will not injure the engine and is automatically eliminated after the manifolds and blocks have taken a permanent set.

To correct this condition smooth up the faces and corners of the manifold flanges with emery paper and spread thinly a paste made up of graphite and oil, over the contacting surfaces. Finally pull up the flange nuts tightly but without excessive strain.

2. Installing Exhaust Manifold Gaskets

Exhaust manifolds are subject to such extreme variations in temperature that the metal expands and contracts to a considerable degree. This results in "creeping" on the manifold gaskets which has no undesirable effect unless the bolts are drawn up too tight.

The manifold bolts should be tightened while the engine is running and should be drawn up just enough to stop all exhaust leaks. If the bolts are tightened too securely, the "creeping" of the manifold may rip the copper of the gasket and permit the gasket to burn out.

The possibility of V-12 and V-16 intake and exhaust gaskets blowing out can be greatly reduced by coating them with graphite before installing. Coating the gaskets with graphite makes it easier for the manifold to expand and contract without pulling or wrinkling the gasket which may in some cases cause the gasket to blow out.

FENDERS

Service Information

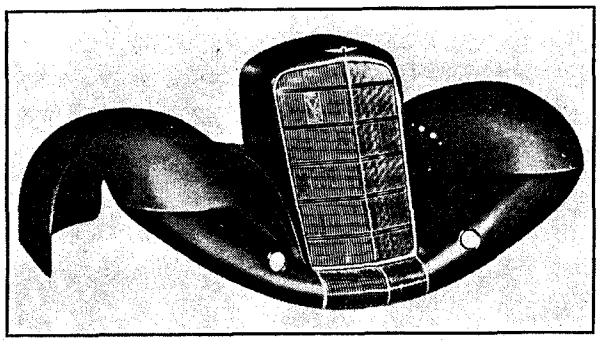


Fig. 1. The front fenders and radiator casing may be removed as a unit as illustrated, or these parts may be removed individually

1. Installing Baffles on Fender Splash Shields

Except on a few early Series 10 and 20 Cadillac and LaSalle cars, the louvres in the fender splash shields are eliminated and a baffle is installed on the frame to prevent mud and water from being thrown over the engine and dash. Parts for making this installation on these early cars are available under the following part numbers. The quantities given are per car.

Quan.	Name		Part No.
1	R. H. baffle plate	LaSalle	1409411
		Cadillac	1409395
1	L. H. baffle plate	LaSalle	1409412
		Cadillac	1409396
6	¼ in. x 20 screws		120706
6	Lock washers		120380
6	Flat washers		59882
4	Rubber bumpers		1409394
4	Split rivets		110060
8	Flat washers		131014

Before installing the baffle plates, the louvres in the splash shields should be flattened out. On LaSalle cars it will also be necessary to cut away a section of the flange at the rear of the splash shield as indicated in Fig. 3.

Holes for mounting the baffle plates on the frame should be located, drilled, and tapped for a ¼ in. x 20 screw. On Series 10 and 20 cars, the center line of the holes should be 1 inch from the outside edge of the frame with the hole at the rear 1 inch from the outside edge of the frame with the hole at the rear 1 inch from the body bracket, the second hole, 6¾ in. from the first, and the third 10¼ in. from the second as shown in Fig. 2.

On the LaSalle the holes should be located on a center line $\frac{23}{32}$ in. from the outside edge of the frame at intervals of 4⅜ in., 5⅞ in., and 11¼ in., starting from the body bracket as shown in Fig. 3.

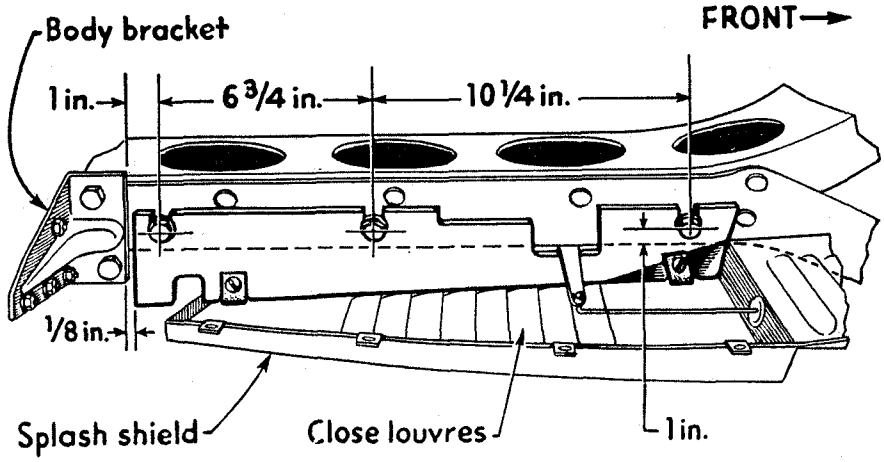


Fig. 2. Cadillac R. H. Baffle. The baffle should be adjusted so that the rubber bumpers bear against the splash shield before tightening the bolts to the frame.

FENDERS—FRAME

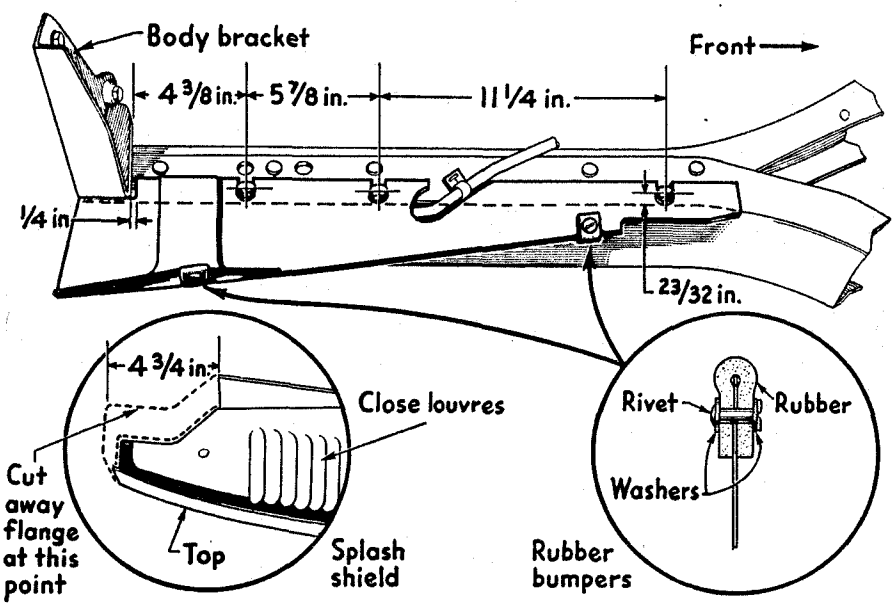


Fig. 3. LaSalle R. H. Baffle. On LaSalle cars it is necessary to cut away the rear portion of the flange on the splash shield as indicated to clear the baffle

The rubber bumpers should be installed on the baffle plate in the holes provided, one at the front and one at the rear. The rubber should be folded over the edge of the baffle and attached by means of the rivet, Part No. 110060, with one of the flat washers, Part No. 131014, on each side as shown in Fig. 3.

The baffle plates should then be installed on the frame. The rear edge of the plate on Series 10 and 20 cars should be 1/8 in. ahead of the body bracket whereas on the LaSalle, the edge of the cut-out in the baffle plate should be 1/4 in. ahead of the body bracket.

The baffle plates should be attached by means of the screws, Part No. 120706, with a flat washer, and a lock washer under the head. Before tightening these screws the baffle plate should be adjusted to bear against the splash shield.

2. Installing LaSalle Front Fender Braces

The right-hand and left-hand front fender supports used on LaSalle 350 cars are identical except for the location of the mounting holes for attaching the support to the frame. On both right and left-hand supports the lower front hole is 1/8 in. higher than the lower rear hole.

If the wrong support is used on either side it will rub against the shock absorber housing and, on rough roads, may result in a slight noise. In case of such a noise occurring at this point, the location of the mounting holes should be checked to make sure that the correct support has been used.

FRAME

General Description

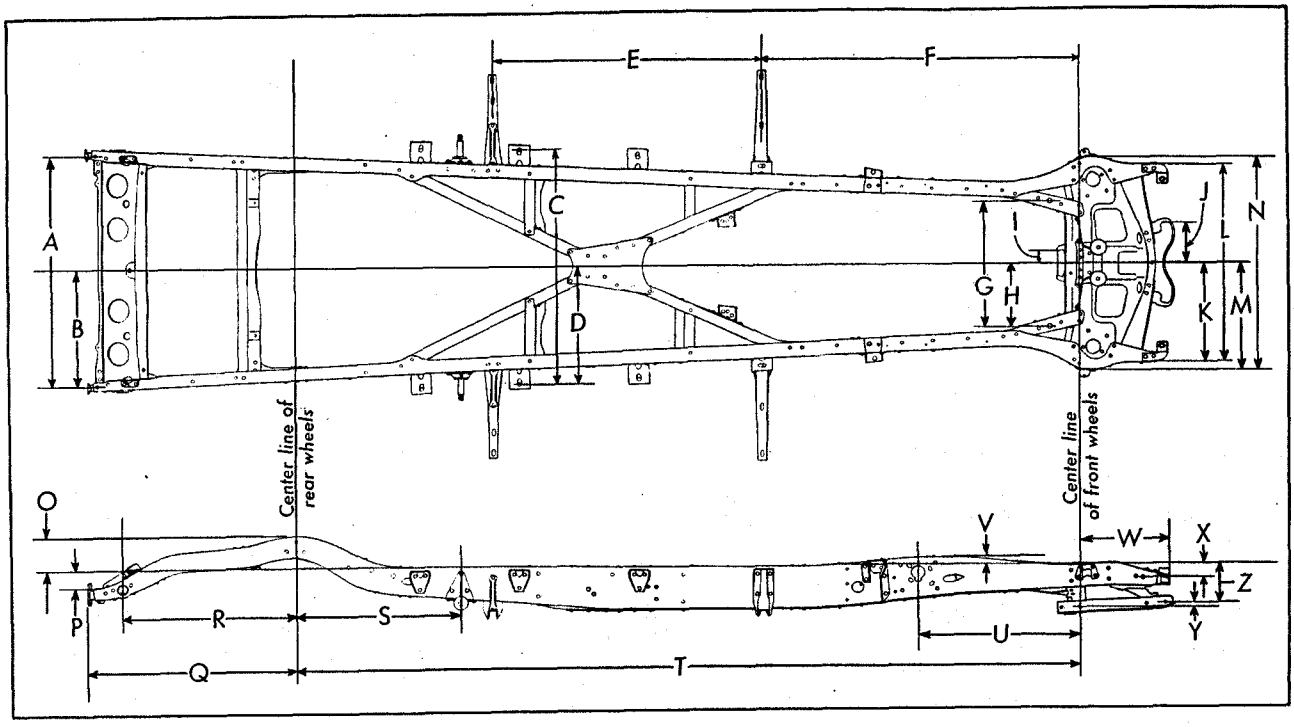
Cadillac and LaSalle frames are of the same general construction differing only in dimensions and in minor details.

The frame is extremely rigid due to the massive front cross-member and the X-member which is a complete frame in itself. This frame construction forms a rigid foundation for the body, which minimizes vibration and eliminates twisting or weaving at the front end.

The front cross-member is heavily reinforced to provide adequate support for the front wheel suspension system. It also carries part of the steering connections.

The X-cross-member extends from the kick-up

FRAME



Specifications

	350	355-D			370-D	452-D
		Series 10	Series 20	Series 30		
A(*B)	*46 21/32"	43 1/32"	42 3/4"	43 1/16"	43 1/16"	43 1/16"
C(*D)	42 21/32"	43 3/8"	43 1/8"	48"	48"	48"
E	33"	38 1/4"	46 1/4"	53"	53"	53"
F	57"	55"	55"	55"	55"	63 5/8"
G(*H)	17 25/32"	23"	23"	23"	29 5/8"	29 5/8"
I	† 2 3/64"	2 3/16"	2 3/16"	2 3/16"	2 3/16"	2 3/16"
J	† 7 1/16"	7 15/32"	7 15/32"	7 15/32"	7 15/32"	7 15/32"
L(*K)	37"	36 13/32"	36 13/32"	32 7/8"	32 7/8"	32 7/8"
N(*M)	38 1/8"	39 3/32"	39 1/8"	39 1/16"	39 1/16"	39 1/16"
O	6 1/8"	5 7/8"	5 7/8"	6 1/8"	6 1/8"	6 1/8"
P	‡ 3 3/16"	3 27/64"	3 27/64"	21/32"	21/32"	21/32"
Q	35 7/16"	35 51/64"	35 51/64"	39 3/4"	39 3/4"	39 3/4"
R	26 23/32"	30"	30"	31 3/4"	31 3/4"	31 3/4"
S	25 17/32"	29"	29"	33"	33"	33"
T	119"	128"	136"	145 1/2"	145 1/2"	154 1/8"
U	25 1/2"	28 1/16"	28 1/16"	.....	.....	.....
V	§ 9/16"	1 17/32"	1 17/32"	13/16"	13/16"	13/16"
W	12 3/16"	15 1/4"	15 1/4"	15 3/16"	15 3/16"	15 3/16"
X	‡ 1 1/4"	2 5/32"	2 5/32"	1 3/8"	1 3/8"	1 3/8"
Y	.....	49/64"	49/64"	49/64"	49/64"	49/64"
Z	◆ 7 9/32"	7"	7"	6 5/8"	6 5/8"	6 5/8"

*Measurement taken outside of frame. §Amount of kick-up at front end of frame. ★(B = ½ of A) (D = ½ of C) (H = ½ of G) (K = ½ of L) (M = ½ of N)
†Measurement taken from center of outer hole. ‡Measurement taken from center line of bumper.
◆Measurement taken from lower surface of reinforcement plate at front end. Distance from lower surface of reinforcement plate at rear end to top side of frame side bar is 8 3/32 in.

Plate 47. (Fig. 1) Frame Alignment

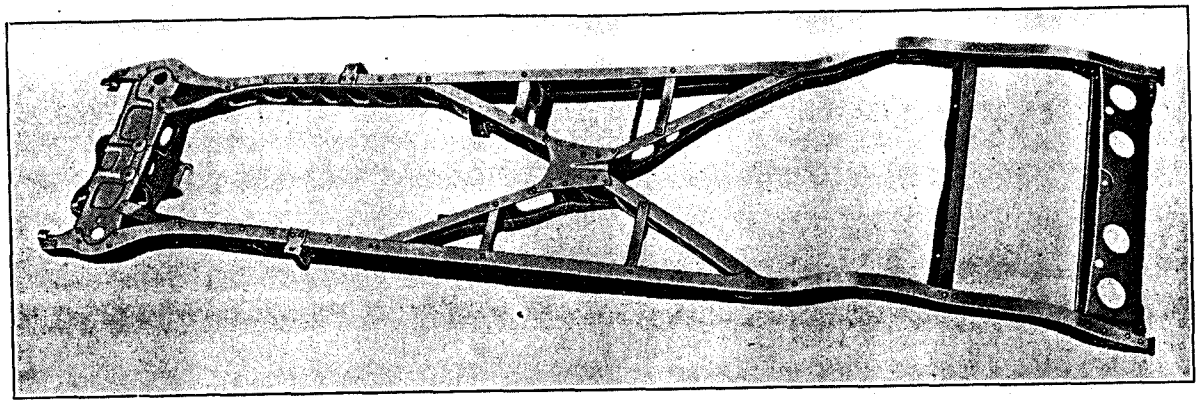


Fig. 2. The X-member of the frame is a complete frame in itself, extending from the kick-up at the rear to the front cross member. From the intermediate engine supports forward, the X-member is riveted to the frame side rails to form a box section.

at the rear to the front cross-member and is so constructed as to form a tunnel through which the propeller shaft passes. Beginning at a point near the intermediate engine supports, the front arms of the X-cross-member are extended all the way forward, parallel to the side members of the frame and are riveted to these side members to form a box section. See Fig. 3.

The LaSalle frame is further strengthened by a removable cross-member which is located at the front end of the body.

The running board brackets on all models are of heavy channel section. The front brackets also serve to support the front end of the exhaust mufflers on the Series 30, 40 and 60 cars.

Service Information

1. Snapping Noise in Frame

Some frames give out a "popping" or "snapping" noise at the front end when the brakes are applied. These noises originate at the front end of the frame where the front end of the "X" member leaves the side bar and joins the radiator cross member. See Fig. 5.

This condition may be corrected by substituting the eight rivets on the lower flange of the frame with $\frac{7}{16}$ in. — 20 S. A. E. bolts.

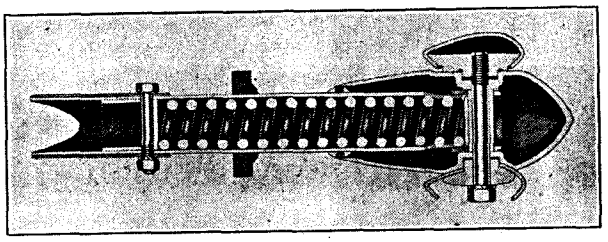


Fig. 4. Sectional view of bumper support. Typical of all models.

To do this, drill out the eight rivets from underneath, using a $\frac{13}{32}$-inch drill, and then reaming the holes just large enough to provide a snug fit for the $\frac{7}{16}$-inch bolts. When installing the bolts, draw the nuts up on the lock washers as tightly as possible.

This entire operation can be performed without removing sheet metal or any other parts. It is not necessary to change the rivets in the upper flange.

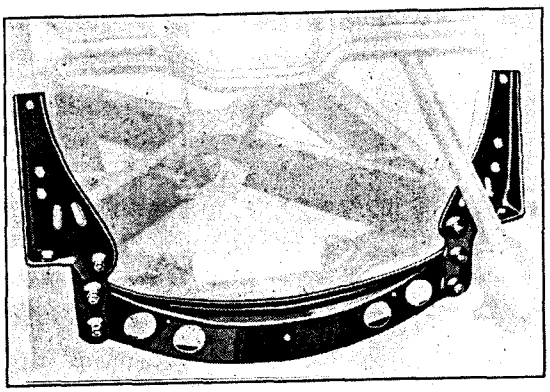


Fig. 3. The LaSalle frame is further strengthened by a removable cross member under the rear end of the engine. This cross member must be removed to dismount the clutch housing pan for working on the clutch from the under side.

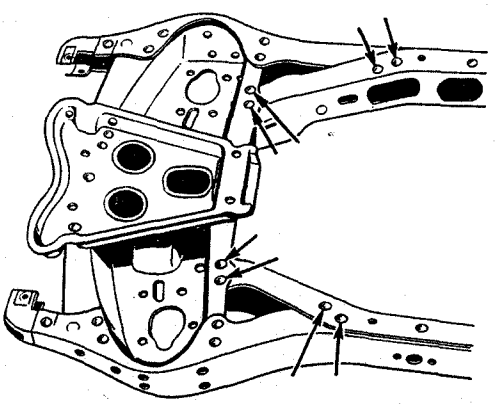


Fig. 5. Underside view of frame, showing rivets to replace with $\frac{7}{16}$ in.-20 S. A. E. bolts to eliminate snapping noise in frame

FRAME

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Car				
Chassis model designation	350	355-D	370-D.	452-D
Series Number—				
119 in. W. B.	50	.....	.....	.....
128 in. W. B.	.....	10	.....	.....
136 in. W. B.	.....	20	.....	.....
146 in. W. B.	.....	30	40	.....
154 in. W. B.	.....	.....	.....	60
Serial number location (Same No. as engine No.)	.....	.....	.....	.....
350—Top surface of frame side bar, left side, just ahead of dash and midway between front and rear ends under body. Also on front side of frame cross member, at center, just ahead of gasoline tank.				
355-D, 370-D, 452-D—Top surface of frame side bar, right side, just ahead of dash and midway between front and rear ends under body. Also on front side of frame cross member, at center, just ahead of gasoline tank.				
First serial number	2,100,001	3,100,001	4,100,001	5,100,001
Length of car—overall with bumpers (except Series 10 and 20 with visible carrier)				
119 in. W. B.	202 7/16"	.....	.....	.....
128 in. W. B.	.....	205 3/4"	.....	.....
136 in. W. B.	.....	213 3/4"	.....	.....
146 in. W. B.	.....	227 9/16"	227 9/16"	.....
154 in. W. B.	.....	.....	.....	240"
Length of car—overall with bumper (Series 10 and 20 with visible carrier)				
128 in. W. B.	.....	207 1/2"	.....	.....
136 in. W. B.	.....	215 1/2"	.....	.....
Wheelbase (nominal)—				
Series 10	.....	128"	.....	.....
Series 20	.....	136"	.....	.....
Series 30	.....	146"	.....	.....
Series 40	.....	.....	146"	.....
Series 50	119"	.....	.....	.....
Series 60	.....	.....	.....	154"
Width of car overall (approximately)	73 1/4"	76 5/8"	76 5/8"	72 23/32"
Frame				
Side bar—				
Depth (maximum)	6 1/32"	.....	8 1/8"	8 1/8"
Series 10	.....	7"	.....	.....
Series 20	.....	7 3/4"	.....	.....
Series 30	.....	8 1/8"	.....	.....
Thickness (maximum)	9/64"	.....	1/8"	1/8"
Series 10	.....	9/64"	.....	.....
Series 20	.....	5/32"	.....	.....
Series 30	.....	1/8"	.....	.....
Width (maximum)	2 1/2"	.....	2 3/16"	2 3/16"
Series 10	.....	2 1/4"	.....	.....
Series 20	.....	2 3/4"	.....	.....
Series 30	.....	2 3/16"	.....	.....
All measurements taken at deepest part of frame				
Width of frame at—				
Front end	37"	.....	32 7/8"	32 7/8"
Series 10	.....	36 13/32"	.....	.....
Series 20	.....	36 7/16"	.....	.....
Series 30	.....	32 7/8"	.....	.....
Rear end	46 27/32"	.....	45 7/16"	45 7/16"
Series 10	.....	44 5/8"	.....	.....
Series 20	.....	44 5/8"	.....	.....
Series 30	.....	45 7/16"	.....	.....

GASOLINE SYSTEM

General Description

The general arrangement of the gasoline system is practically the same on all cars. The 370-D and 452-D systems differ slightly, however, as each of these cars has two carburetors.

The gasoline line from the rear supply tank is mounted outside of the frame channel where the air sweeping by tends to cool the gasoline and thereby prevents the possibility of vapor lock. Sharp bends and low spots in the fuel line have also been eliminated by running the line as nearly straight as possible from the tank to the fuel pump.

CADILLAC CARBURETOR

The Cadillac carburetors are of the expanding air vane type. They are simple in construction with no thermostats and have only one adjustment, which controls the mixture by varying the flow of fuel rather than the air.

The carburetors used on the various Cadillac models are of the same construction but differ in size and other minor details. The 370-D and 452-D carburetors are identical with the exception of the size of the metering pin. Right and left carburetors also differ in the control levers. The name plate marking identifies the type of carburetor; 370-D carburetors are Type R-13 and L-13; 452-D carburetors are Type R-14 and L-14. Otherwise the carburetors on these car models are fully interchangeable. The carburetor consists chiefly of two units; namely, the main metering unit and the auxiliary unit.

The *main metering unit* consists of a pair of air valves or vanes, hinged at their lower ends and opening upwards to admit air to the mixing chamber. These vanes have fingers which engage a control aspirating tube, raising it as the vanes open. This aspirating tube is attached to a spring loaded hollow stem and piston working in a dashpot, the piston carrying the fuel metering orifice in its lower end. An adjustable tapered metering pin projects into this orifice.

The *auxiliary unit* combines an auxiliary power jet, an accelerating pump and a priming passage for starting. The operation of the auxiliary unit is controlled by the registering of ports in the starting sleeve, which line up with passages in the throttle body. The starting sleeve rotates with the starting lever (choke lever) and the pump plunger and piston move downward as the throttle is opened.

For normal running the fuel enters the carburetor float bowl through the strainer and float needle valve and is maintained at constant level by the float and float needle valve.

Air enters the carburetor through the air inlet and lifts the vanes as it passes upwards into the mixing chamber. The weight of these vanes combined with the pressure exerted by the dashpot spring causes a partial vacuum to exist in the mixing chamber, which draws fuel from the aspirating tube. The quantity of the fuel flowing is controlled by the tapered metering pin; at idle speed the vanes are almost closed and the metering pin almost fills the orifice in the air valve piston. As the vanes rise to admit more air, the aspirating tube also rises and the metering orifice becomes larger due to the taper on the metering pin. This combination maintains the correct ratio of fuel and air for average running.

For maximum power at any speed a richer mixture is required than is necessary for part throttle running. The power jet supplies the required extra fuel while the throttle is held open beyond the point which would give a road speed of about 60 miles per hour. At this throttle position the pump plunger has travelled downward and has shut off the air vent to the power jet, therefore, the suction on the discharge nozzle draws fuel from the pump cylinder up through the hollow stem of the pump plunger and through the power jet into the mixing chamber. At part throttle positions below 60 miles per hour road speed this power jet does not supply fuel since it is vented to the outside air through the air vent hole in the upper part of the starting sleeve.

The quantity of fuel drawn from the power jet is controlled by the air bleed hole in the pump plunger stem.

For rapid acceleration it is necessary to supply a momentarily rich mixture. This extra fuel is supplied by means of the accelerating pump.

A rapid opening of the throttle causes a rapid downward movement of the pump plunger and piston, forcing fuel up through the hollow stem of the pump plunger and out through the discharge nozzle into the mixing chamber. The fuel in the pump cylinder cannot escape back into the float chamber because of the check valve in the bottom of the pump cylinder.

In general, for steady driving conditions up to 60 miles per hour on level roads, the fuel is all supplied from the aspirating tube. When the throttle is opened suddenly an additional charge of fuel is supplied from the accelerating pump, and if the throttle is held open as for hard pulling or high speed, extra fuel continues to flow from the pump discharge nozzle through the power jet.

All Cadillac cars are equipped with a *semi-automatic choke*, which permits a more efficient choking of the carburetor during the warming up

GASOLINE SYSTEM

Note: Adjustment for engine idling speed should precede carburetor adjustments. Adjust throttle stop screws to make engine idle at about 320 R.P.M.

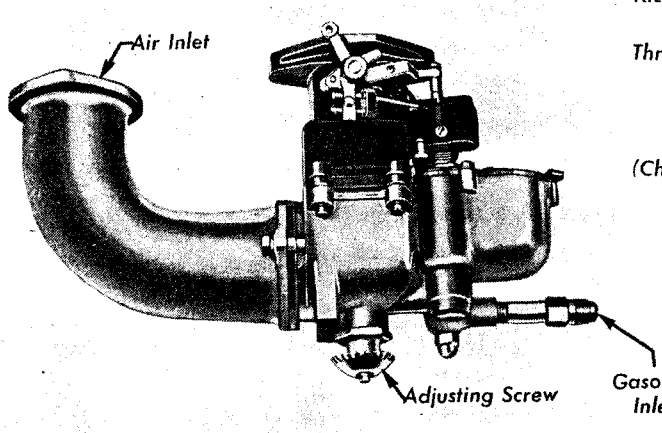


Fig. 1
Outside View of 355-D Carburetor

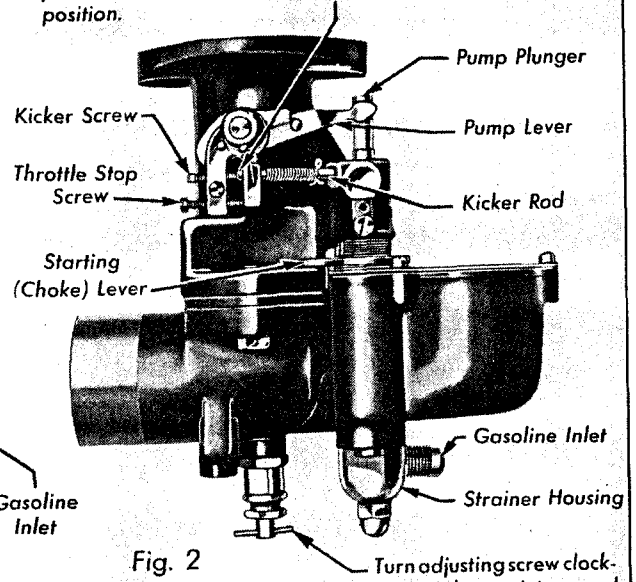
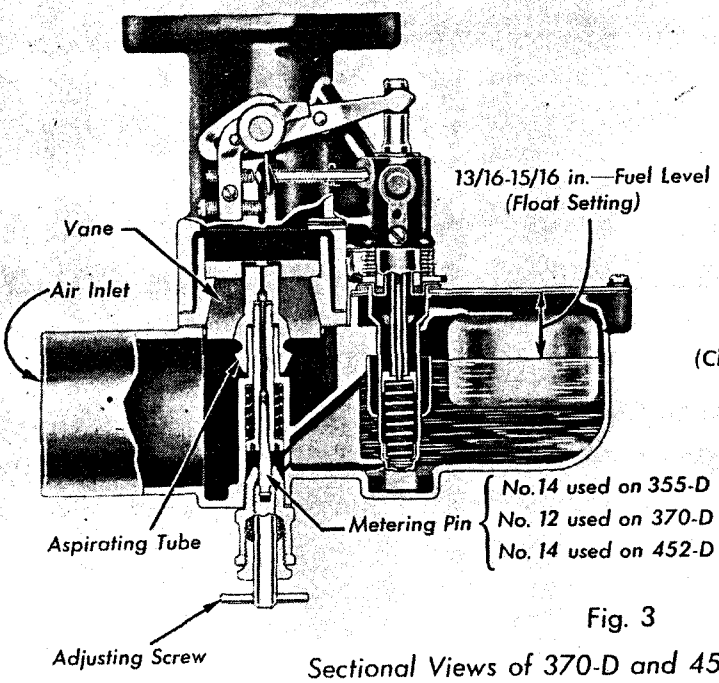


Fig. 2
Carburetor Adjustments—
All Cadillac Models



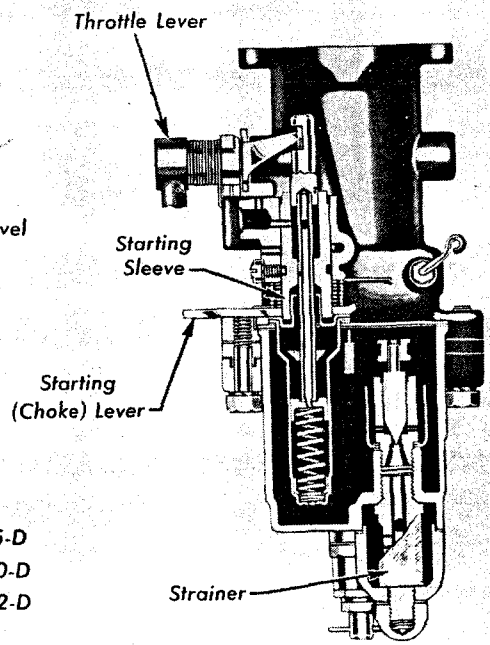


Fig. 3
Sectional Views of 370-D and 452-D Carburetor—
Typical of 355-D Carburetor

Plate 48. Carburetor Details and Adjustment—Cadillac

period than is possible with a manual choke control. When the engine is cold before starting, the semi-automatic choke is automatically in the choke position.

The manual choke on the instrument panel should be used as necessary when starting a cold engine but should be pushed in immediately after the engine starts. The purpose of the semi-automatic choke is to keep the engine from stalling and to prevent popping back into the carburetor before the engine has reached the proper operating temperature. As the engine warms up, the thermostat starts to open the choke so that when the engine has reached its correct operating temperature, the semi-automatic choke is in full open position.

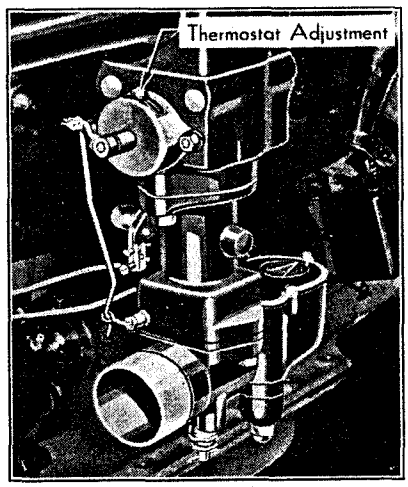


Fig. 4. The purpose of the semi-automatic choke on Cadillac engines is to keep the engine from stalling and to prevent popping back into the carburetor during the warming up period

LaSALLE CARBURETOR

The LaSalle carburetor, is of the dual, or double-barrel, downdraft type and operates on the air bleed principle. There is one barrel for each group of four engine cylinders, each having a separate main metering jet and an adjustable idle needle valve. Both barrels receive fuel and air from one float chamber and a single air intake respectively. See Fig. 9.

Incorporated in the carburetor are an economizer which insures a lean, economical mixture at normal driving speeds and automatically supplies the richer mixture necessary for maximum power at high speeds and a full automatic choke control which eliminates hand choking.

Gasoline enters the carburetor through the float chamber in the conventional way. Air enters through the air inlet at the top and places suction on the main discharge jet, or the idle discharge holes depending on the amount of throttle opening. The main metering jets are of the fixed type and control the flow of gasoline during the intermediate speeds of part throttle opening up to approximately 60 miles per hour. From the metering jet the fuel passes into the main discharge jet where it is mixed with air from the high speed bleeder and flows into the carburetor barrel down to the intake manifold.

Fuel for the idle speeds is drawn through the idle tube where it is mixed with air from the idle air bleeder and is discharged through the idle discharge holes.

When the car has reached a speed of about 60 miles per hour, a richer mixture is required than that necessary for normal throttle opening. At this speed the economizer by-pass valve is forced down by the pump piston, allowing gasoline to flow through the economizer valve and discharge through the restriction, or pump discharge nozzle. All gasoline from the economizer is controlled by these restrictions.

For smooth rapid acceleration and flexibility, it is necessary to supply momentarily an extra amount of gasoline when the throttle is opened. On the up stroke of the accelerator pump piston, gasoline is drawn through the inlet check valve into the pump cylinder. On the down stroke the compression closes the check valve and forces the economizer by-pass valve open. The fuel is then discharged through the pump discharge nozzles into each of the carburetor barrels. When the throttle is opened part way, only a small amount of fuel is discharged; however, when the throttle is continuously held fully opened gasoline flows steadily through the restrictions. This gives the richer mixture that is required for maximum power.

The *choke control* on the LaSalle *is fully automatic* and is governed by vacuum and heat of the engine which makes it positive acting under all conditions. The vacuum control piston is built into the throttle valve body.

The thermostat unit, which offers resistance to the choke valve opening when the engine is cold, is attached to the exhaust manifold on the engine side where it can absorb heat from the exhaust gases. At temperatures below 70° F., the thermostat has sufficient tension to close the choke valve. After the engine has started and sufficient heat is created, the thermostat gradually loses its tension. When the engine has reached a water temperature of 120°, the choke valve should be in the wide open position.

The choke valve in the carburetor is off center and, therefore, has a tendency to move toward the open position. This condition, with the aid of the inrushing air, acts against the tension of the thermostat to maintain the proper mixture ratio

GASOLINE SYSTEM

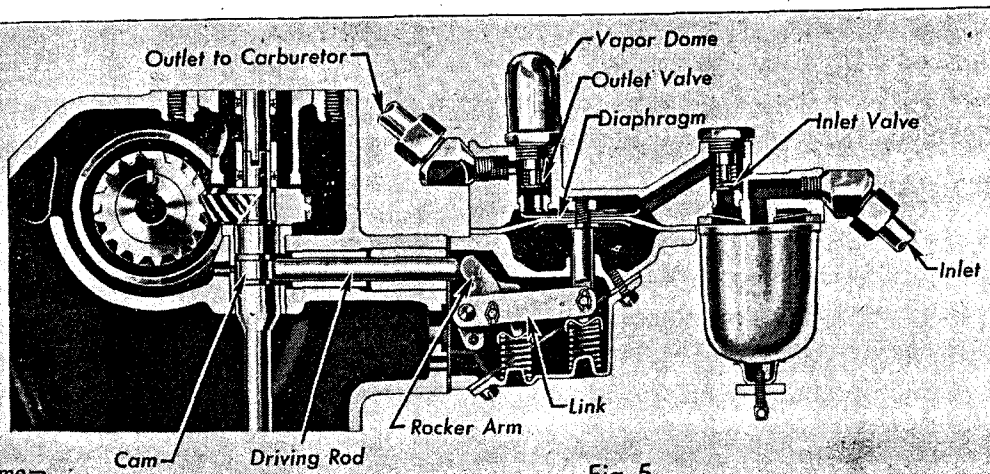


Fig. 5
Sectional View of Cadillac Fuel Pump and Drive

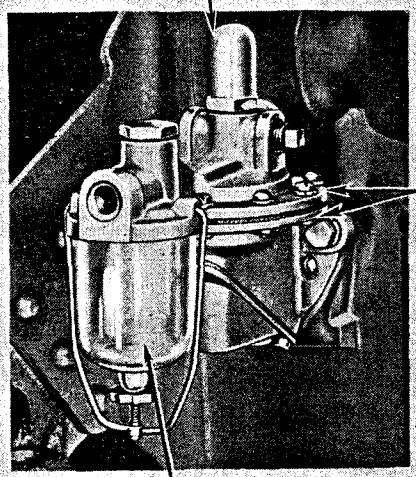


Fig. 6
Cadillac Fuel Pump

Pump Housing must not be disassembled unless necessary special tools for reassembling are available.

Clean gauze unit by washing in gasoline to remove all dirt from gauze and dry with an air hose. Then dip in light engine oil and allow to drain before re-installing on silencer. Install gauze unit on silencer with louvers pointing down.

For normal driving in cities and on hard surfaced roads, clean air cleaner once every 6,000 miles. Under extreme conditions, such as continuous driving on dusty roads, or in localities where there is considerable dust in the air, cleaning may be required as frequently as every 2,000 miles.

Note: Do not wash intake silencer or cover containing fabric pad.



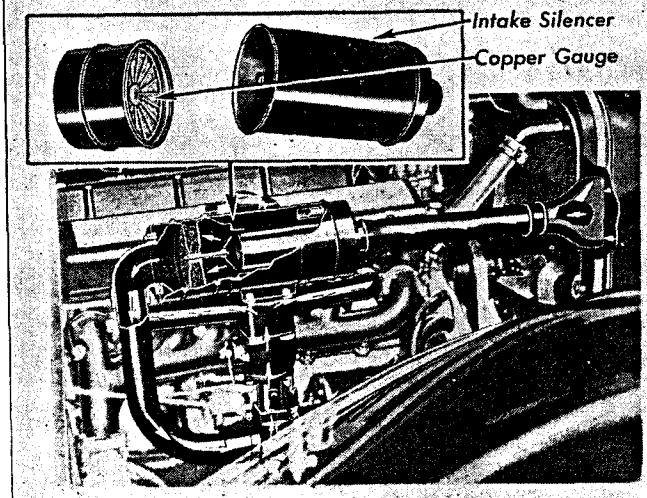


Fig. 7
Carburetor Air Intake System on 370-D and 452-D

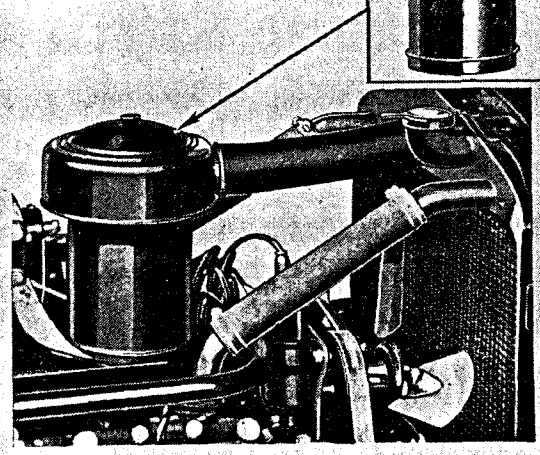


Fig. 8
Carburetor Air Intake System on 355-D

Plate 49. Fuel Pump and Carburetor Air Intake—Cadillac

during the warming-up period. As the engine becomes warm, the tension of the thermostat gradually lessens and the inrushing air becomes the dominant force, thus moving the choke valve to the wide open position for normal operating temperatures.

INTAKE SILENCER

An intake silencer is used on all models. The silencer silences the intake noises at all engine speeds under various throttle openings. There are no moving parts or baffle plates on these silencers.

A feature of the air silencer is the copper gauge air cleaner which is designed to catch any dust or lint in the air before it is drawn into the carburetor. It is automatic in operation and requires no attention other than periodic cleaning and oiling.

The intake silencers on the Cadillac cars are connected to the radiator in such a way as to secure fresh, cool air through a passage between the radiator core and casing instead of using the warm air from under the hood. This arrangement permits the use of higher compression and greater spark advance and results in increased power and engine performance.

FUEL PUMP

The fuel feed on all cars is by a fuel pump. This pump on the Cadillac models is operated by a push (driving) rod riding against a cam on the distributor shaft and is located at the front of the engine on the left, in the coolest position under the hood. The fuel pump on the LaSalle, which is combined into a single unit with the vacuum pump for operating the windshield wiper, is operated by the camshaft. It is located at the front of the engine on the right side.

The principal moving element of the fuel pump is a diaphragm actuated through a series of levers and rods. When the diaphragm assembly is pulled down, it creates a vacuum in the pump chamber which allows the atmospheric pressure in the rear tank to force gasoline into the sediment bowl and through the strainer and inlet valve into the pump chamber.

The diaphragm is moved upward on the return stroke by pressure of the diaphragm spring. On this stroke the gasoline is forced from the pump chamber through the outlet valve, into the vapor dome and thence to the carburetor.

When the carburetor bowl is filled and the inlet needle valve closes, a back pressure is created in the fuel pump chamber. This pressure holds the diaphragm down against the pressure of the diaphragm spring, and keeps it in this position until more fuel is needed in the carburetor and the needle valve open.

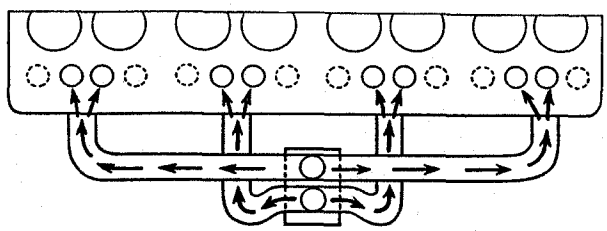


Fig. 9. Diagram showing fuel distribution in LaSalle engine. Each carburetor barrel supplies fuel to four engine cylinders

The rocker arm in the Cadillac pump is in two pieces, operating together when the diaphragm is working up and down. When fuel is not required and the link or lower part of the operating lever is held down at one end by the diaphragm pull-rod, the upper part operates in the usual way. This is made possible by the fact that the lever operates against the link only in the downward direction, the upward movement of both parts being accomplished by spring pressure. A second spring is provided for keeping the lever in contact with the driving rod at all times.

GASOLINE TANK FILLER

The gasoline tank filler on the Cadillac Series 10 and 20 cars is located in the left-hand side at the rear of the body. On all other Cadillac models and the LaSalle the filler is located on the top of the left rear fender.

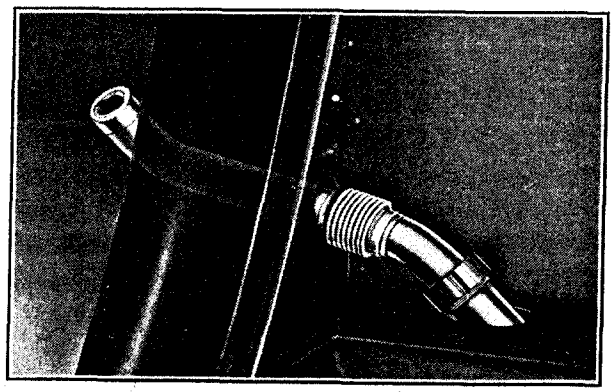


Fig. 10. View showing arrangement of gasoline tank filler on Series 30, 40, 60 and LaSalle cars. The rear fender is removed in this illustration. The filler on the Series 10 and 20 cars is at the rear of the body.

GASOLINE SYSTEM

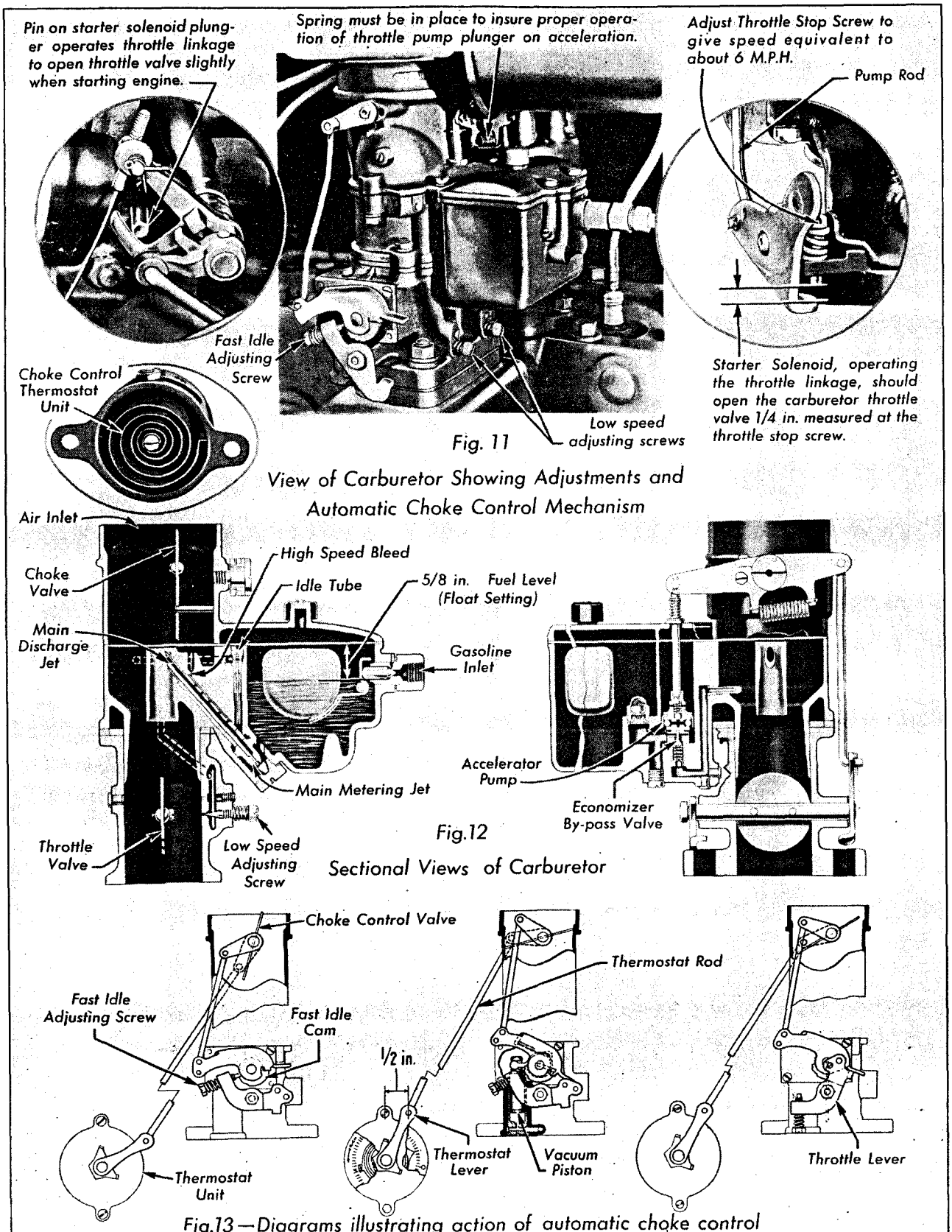


Plate 50. Carburetor and Automatic Choke—LaSalle

This filler has a double curve where it goes down from the center of the fender through the side of the wheel housing, then through the rear floor down into the tank. The filler is protected from stones and gravel thrown up by the wheel by a specially constructed stone guard which is fastened to the fender and the side of the wheel housing.

On the cars using Fleetwood bodies, the inside of the filler neck is further protected by a cover which is bolted to the rear floor and inside of the wheel housing. A rubber ring is also used in the wheel housing to keep out dirt.

Service Information

1. Cadillac Carburetor Adjustment

The carburetors used on all Cadillac cars have only one adjustment, the metering pin, which is raised or lowered by screwing it into or out of the fuel orifice. See Plate 48. The metering pin is properly adjusted when the carburetor leaves the factory, but if for any reason it should require adjusting, be sure the engine is well warmed up, and then adjust the metering pin carefully at idle speed.

Turning the pin to the right moves the pin upward into the orifice and makes the mixture leaner; turning it to the left increases the orifice opening and makes the mixture richer.

It is necessary, when adjusting these carburetors, to make the semi-automatic choke thermostat inoperative. Simply warming up the engine is not enough because raising the hood cools the thermostat enough to apply the choke slightly. If the connection to the automatic choke thermostat is blocked in the off position, the choke will be closed, permitting accurate adjustment.

Whenever the carburetor is to be adjusted, therefore, the connection to the automatic choke should be blocked down so that the choke is in the fully "off" position. After the carburetor has been correctly adjusted, the adjusting screw should be turned an additional one-fourth to one-half turns to the "rich" side and the choke connection released.

Another precaution that should be observed in adjusting these carburetors is to make sure that the hand choke control is fully released by seeing that the choke lever on the carburetor is up against the stop.

Failure to observe these precautions will result in an overlean mixture, which will invariably manifest itself in back-firing in the muffler. In any instances of back-firing, therefore, the first thing to be done is to readjust the carburetor with the thermostat blocked open, and the hand choke fully released.

The idle speed of the engine should be set by means of the throttle adjusting screw to a speed of approximately 320 R. P. M.

After the carburetor has been satisfactorily adjusted in the idling position to a speed of approximately 320 R. P. M., the throttle adjusting screw should be turned slightly more toward the rich side but not more than ¼ of a turn. The car operates more satisfactorily on a slightly rich mixture than on a lean mixture, and this additional ¼ of a turn toward the rich side will help to prevent any possibility of popping back.

After the throttle stop screw adjustment is completed the automatic choke connection should be released. The thermostat should not be tampered with. It is properly adjusted at the factory, and ordinarily requires no further adjustment. If it has been tampered with, however, it can be adjusted by loosening the adjusting nut and sliding the thermostat stop until a pull of 12.9 ounces on V-8 cars and 5.2 ounces on V-12 and V-16 cars is required to hold the thermostat arm in a horizontal position. This should be done at a temperature of 70°F.

The carburetor can be correctly adjusted on the bench before installing it on the engine. The proper mixture can be obtained by turning the adjusting screw in the bottom of the carburetor until it begins to raise the vanes above the aspirating tube and then backing it out 2¾ turns on 355-D carburetors and 4 complete turns on 370-D and 452-D carburetors.

The idling adjustment can be made by turning the throttle stop screw until a .006 in. feeler gauge on 355-D and a .004 in. feeler gauge on 370-D and 452-D engines will just go between the throttle butterfly valve and the carburetor body with the valve in the closed position. The feeler gauge must not be more than ⅛ in. in width. The kicker adjustment is made by setting the choke lever in the open position and turning the kicker screw until a .017 in. feeler gauge on 355-D and a .013 in. feeler gauge on 370-D and 452-D engines will just go between the throttle butterfly valve and the carburetor body with the throttle in the closed position.

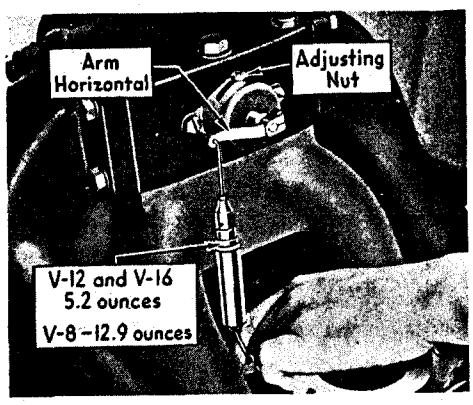


Fig. 14. The thermostat in the semi-automatic choke on Cadillac cars should be adjusted by loosening the adjusting nut and sliding the thermostat stop until the required pull as indicated to hold the arm in a horizontal position is obtained

Proper adjustment of the carburetor and choke controls should prevent any possibility of popping back in normal acceleration or deceleration. In case of continued popping back with the carburetor and the choke controls properly adjusted, the cause will usually be found in the contact points or in the ignition timing. In retiming the ignition, the flywheel timing indicator should be set on or slightly ahead of the IG/A mark. It should not be set behind the IG/A mark nor any more than ⅛ in. ahead of the mark.

2. Equalizing Carburetor Adjustment—370-D and 452-D

The adjustments of the two carburetors on the 370-D and 452-D cars should be equalized to secure smooth running of the engine. The best method to follow is to use an equalizing gauge. The gauge is connected to the intake manifolds after both the brake assister and vacuum lines are disconnected. The throttle rod must also be disconnected from the right-hand carburetor.

A preliminary adjustment of the metering pins and throttle on both carburetors is then made to bring the idling speed at approximately 320 R. P. M.

To determine whether or not the engine is running at the correct idling speed, remove the oil filler cap from one of the valve covers and hold a finger on one of the valve rocker arms so that the movements of the rocker arm may be counted. At 320 R. P. M. the valve will open forty times in fifteen seconds.

Make sure that the gauge hangs straight and check the level of the mercury in the tube. When the metering pins and throttle stop screws are properly adjusted, both columns of mercury should be at the same height and the engine should run smoothly at 320 R. P. M.

If the columns of mercury are not at the same level and the engine speed is too fast, reduce the speed by backing off the throttle stop screw on the side on which the mercury column is the lower. If the speed is too slow, turn the throttle stop screw in a little on the side on which the mercury column is higher.

If the mercury columns are at the same level and the engine speed is too fast or too slow, adjust both throttle stop screws, turning them exactly the same amount to secure the correct idling speed, at the same time keeping the mercury columns at the same level.

Re-check the metering pin adjustments and idling speed on both carburetors, making sure that the mercury columns are maintained at the same level.

Adjust the right-hand throttle control rod to exactly the right length so that the clevis pin can be slipped into place without changing the engine speed.

A further check should be made on the throttle adjustment by running the engine at approximately 1000 R. P. M. and noting the mercury level in the gauge. If the columns are not practically level, a slight readjustment of the right-hand throttle control rod will be necessary. Finally run the engine again at idling speed and check the mercury columns again. A very slight readjustment of the throttle control rods may be necessary to bring them to the proper level again.

If an equalizing gauge is not available, the following method may be used to equalize the carburetor adjustment.

Disconnect the coil wire for the right-hand cylinder block. Adjust the metering pin of the left-hand carburetor in the same manner as when using mercury tube and set the throttle stop screw so the engine will just turn over without stalling.

Then disconnect the coil wire for the left-hand cylinder block and adjust the metering pin and the stop screw on the right-hand carburetor in a similar manner.

With the metering pins and throttle stop screws on both carburetors properly adjusted, the engine should idle at about 320 R. P. M.

Inasmuch as some air is drawn into the manifold of the carburetor being adjusted through the vacuum brake assister connection on the opposite intake manifold, the foregoing adjustment will probably be slightly rich when all cylinders are operating. To correct this, it may be necessary to screw up slightly each metering pin adjustment. This can best be checked by listening to exhaust and making final adjustment with both sides firing.

When a satisfactory adjustment of both carburetors has been secured, adjust the length of the

right-hand throttle control rod very carefully, so that the pin will slip into place without affecting the throttle opening on either carburetor. This adjustment must be made very accurately so as not to disturb the throttle equalization. While testing the car on the road the above adjustments should be rechecked to be sure they are satisfactory.

3. LaSalle Carburetor Adjustment

LOW SPEED OR IDLING ADJUSTMENT

Before making this adjustment the engine should be warmed up and the manifold and windshield wiper connections made tight. The idle speed of the engine should be set by means of the throttle stop screw to a speed equivalent to about 6 miles per hour. The idle needle valves control the gasoline for low speed adjustment. Turning the needles out gives a richer mixture, and turning them in gives a leaner mixture. See Plate 50.

Taking one side of the carburetor at a time, turn the inner needle valve (the one toward the engine) in slowly until the engine begins to lag or run irregularly, then slowly turn it out until the engine begins to roll. Finally, very slowly, turn in the adjustment again just enough so that the engine runs smoothly for this throttle opening. This adjusts the mixture to the four cylinders which are fed by the inner barrel of the carburetor. Adjust the outer needle valve so that the other four cylinders fed by the outer barrel, or the one away from the engine, fire smoothly. It may be necessary after completing this adjustment to decrease the engine speed slightly.

FUEL LEVEL

Accurate float level setting is particularly essential to satisfactory starting when the engine is hot. The level is set at the factory at $\frac{5}{8}$ in. below the top surface of the float bowl as shown in Fig. 12, Plate 50. In other words, the level of the fuel in the float bowl should be $\frac{5}{8}$ in. below the top edge of the bowl, measured with the bowl cover removed. This setting may be changed if necessary by bending the float arm where it meets the float, up or down to give the desired position.

To check the float level proceed as follows: Disconnect the secondary ignition wire at the coil. Remove the upper part of the carburetor, which includes the float chamber cover, after disconnecting the choke rod and throttle pump rod.

Draw enough gasoline out of the float chamber to permit the needle valve to open.

Lay a flat piece of metal over the float chamber and throttle pump passage, but with the main air intake uncovered, and crank the engine for two or three seconds with the starter, to refill the float chamber to its normal operating level.

The level should then be measured in the throttle pump passage, as due to the normal tilt of the engine and carburetor the level is highest at this point.

While the float chamber cover is off, the needle valve should be inspected to make sure that it does not bind on its seat. Replacement of first-type needle valves and seats with second-type parts, is recommended on early cars where correction of the float setting does not give satisfactory starting.

The difference between the first-and second-type parts is in the diameter of the float needle valve seat. First-type seats have a diameter of .130 inch and second-type seats a diameter of .093 inch. This smaller size seat gives a more constant fuel level in the float chamber and reduces likelihood of carburetor "loading" or hard starting when the engine is hot.

Only second-type needle valves and seats are available and are supplied by the Parts Division as a unit under Part No. 1409270.

FAST IDLE ADJUSTING SCREW

Before adjusting the fast idle adjusting screw, Fig. 11, Plate 50, the throttle stop screw should be adjusted for the proper idling speed with the engine warm. The fast idle adjusting screw is next screwed down or turned in to contact with the low flat or small diameter on the cam with the choke valve fully open and then screwed out about $\frac{1}{2}$ turn so as to allow a .010 in. clearance between the end of the adjusting screw and this cam diameter.

4. Thermostat Setting

To check the thermostat in the automatic choke control, it is necessary to remove the complete thermostat unit, Fig. 11, Plate 50, from the manifold and proceed as follows, using a master thermostat gauge, Part No. 1406781, as a guide.

1. Unhook the thermostat spring from the prong on the indicator.

2. Move the thermostat lever to the stop nearest the top mounting screw hole and measure the distance from the center line of this hole to the center line of the hole in the arm.

This distance should be exectly $\frac{1}{2}$-inch as indicated in Fig. 13, Plate 50. If it is more or less, loosen the retaining screw and bring the lug on the hub of the thermostat against the thermostat lever to locate this position and tighten the retaining screw securely.

3. Use a piece of twine or a rubber band to hold the arm in this position. Do the same with the master thermostat.

4. Immerse both thermostats in water and let them remain for at least one minute to equalize their temperatures. The exact temperature of the water is not important, although it should approximate room temperature to avoid rapid changes when removed for adjustment.

5. With a pair of calipers, measure the distance on the master thermostat from the far edge of the lug on the hub of the thermostat lever to the bent end of the spring. Then check this same distance on the other thermostat and adjust as accurately as possible by moving the lug after loosening the adjusting screw.

6. Resubmerge both thermostats for at least one minute, and then recheck the distances and readjust as required.

7. Scrape off the old center punch mark on the dial of the corrected thermostat and make a new mark opposite the new position of the pointer.

8. Reinstall the thermostat on the car and, when reconnecting it, note whether there is $\frac{1}{32}$ inch clearance between the lever and the stop when the choke valve is fully closed. If not, readjust the lever on the choke valve shaft to provide this clearance.

NOTE: The master thermostat is a sensitive gauge and should be handled with care. Careless or rough treatment will render it inaccurate.

If a master thermostat gauge is not available, the following method may be used to adjust the thermostat setting.

1. Unhook the thermostat spring from the adjustable lug.

2. Move the thermostat lever to the stop nearest the mounting screw hole which is at the top and measure the distance from the center line of this hole to the center line of the hole in the lever. This distance should be exactly ½ in. If it is more or less, loosen the retaining screw and bring the lug on the hub of the thermostat against the thermostat lever to locate this position and tighten the retaining screw.

3. Allow the thermostat unit to cool or warm until it has reached a temperature of 70°F. It is a good plan to submerge the thermostat in water of the correct temperature to insure getting the proper adjustment.

4. After the thermostat has reached this temperature revolve the indicator to the zero marking on the thermostat plate. In this position the hook of the thermostat should come flush with the indicator prong.

5. Revolve the thermostat pointer to the prick punch marking, which is six graduations rich and is the original setting made at the factory. If the thermostat hook does not come against the indicator prong when the pointer is at the zero marking it will be necessary to recalibrate the thermostat as follows:

On cars prior to engine No. 2102805, this thermostat is set twelve graduations rich. The new setting of six points rich permits considerably easier starting of a cold engine and greatly improves the carburetor performance during the warm-up period.

Thermostat settings on earlier cars need not be changed unless cold starting difficulty is experienced, in which case the thermostat should be readjusted.

6. Before proceeding to recalibrate make sure that the thermostat has reached 70° temperature. Revolve the pointer so that the hook on the thermostat comes flush with indicator prong with the thermostat lever held against the lug on the thermostat hub. This will then place the indicator pointer at a different position which will be the new zero location. This new position should be stamped on the plate and the old marking obliterated.

7. Hook the thermostat onto the prong and revolve the pointer six notches rich and lock in position.

8. Reinstall thermostat unit in the manifold and with the choke valve in the closed position attach the thermostat rod to the thermostat lever, holding the lever against the lug. With the choke valve fully closed the thermostat lever on the carburetor should be in a horizontal position.

9. Again loosen the retaining screw and move the lug away from the thermostat lever to allow $\frac{1}{32}$ in. clearance or less with the carburetor choke valve in the closed position.

5. Throttle Pump Rod Connection (See Fig. 11)

The throttle pump operating rod should be connected to the inner hole in the lever assembly on the throttle valve shaft, except on cars operating in severely cold climates. This rod should be inspected in all cases of over-rich operation, to make certain that it is in the inner hole in the lever.

In order to obtain full power mixture the throttle pump rod should swing past dead center on the throttle lever with a $\frac{9}{32}$ to $\frac{5}{16}$ in. drill inserted between the throttle butterfly valve and the carburetor body with the valve in the closed position. This setting can be changed if necessary by bending the throttle pump rod to give the desired action.

6. Kicker Rod Adjustment

In cases of hard starting, the very first adjustment to check, is the starter solenoid kicker rod adjustment. See inserts, Fig. 11, Plate 50. The kicker rod should be adjusted to open the throttle while the engine is being cranked so that there is ¼ inch clearance between the lever on the throttle shaft and the throttle stop screw. This measurement must be taken while the starter is cranking the engine.

If the throttle does not open the correct amount when the starter is operated, do not change the throttle stop screw. Instead, readjust the yoke at the rear end of the kicker rod where it is connected to the lever on the right end of the accelerator rocker shaft. If sufficient clearance cannot be obtained by making the adjustment at this

point, additional clearance may be obtained by springing the entire rocker shaft, thereby moving the hooked lever on the opposite end of the rocker shaft toward or away from the kicker pin on the solenoid as necessary.

7. LaSalle Engine Flooded

Should the LaSalle engine become flooded for any reason it can be cleaned out by fully depressing the accelerator to open the choke valve, and holding the accelerator down a few seconds while cranking the engine. This action rotates the throttle lever in a counter-clockwise direction to bring the ear on the throttle lever against the choke control lever, forcing the choke valve to open.

8. Leakage at Fuel Gauge Unit on LaSalle Gasoline Tank

In a few early cars, the steel washers were used at each of the screws holding the fuel gauge unit to the gasoline supply tank. If leakage occurs at this point the lock washers and the flat steel washers should be discarded and lead washers, Part No. 1409489, installed. Later cars are provided with lead washers.

9. Installing Fuel Pump Studs

On later LaSalle cars the fuel pump is attached to the engine crankcase by means of studs instead of cap screws, as on the early cars. This permits the use of lock washers in place of copper washers used under the cap screws, and provides a tighter mounting.

In any cases of oil leakage between the crankcase and the pump on earlier cars, the screws and copper washers should be replaced with studs and nuts. The following are the new parts required:

Quantity	Name	Part Number
2	Studs	880250
2	Lock washers	120214
2	Nuts	120376

The cap screws and copper washers that are removed should be discarded.

10. Servicing the Fuel Pump

The service operations which can be performed on the fuel pump without special tools are the cleaning of the filter and the replacement of the filter parts, the vapor dome, and the inlet and outlet valves. Under no circumstances should the pump housing be disassembled unless the necessary special tools for reassembly are available.

Service on the fuel pump can be obtained from A. C. service stations, which have special tools and spare parts.

Distributors and larger Dealers are advised to keep a pump on hand for exchange to render prompt service. Distributors who wish to make all pump repairs themselves can secure the necessary tools from any A. C. service station.

11. Gasoline Gauge Adjustment

If the gasoline gauge does not register correctly and the variation from accuracy is the same over the entire scale, a readjustment of the float on the tank unit should correct the trouble. The float adjusting screw at the side of the float rod gear is accessible, if the tank unit of the gauge system is removed from the tank.

Accurate readings between 0 and 4 gals. should not be expected.

12. Interference of Trunk with Gasoline Filler on Series 20, 7-Passenger Sedans

On the first few Cadillac Series 20, 7-Passenger Sedans with fenderwell tire equipment, the folding trunk rack at the rear is so located that a trunk carried on this rack is liable to interfere with the filling of the gasoline tank. This condition is corrected on later cars by the use of the same trunk rack as has been used on Town Sedans. This trunk rack extends farther out from the body and allows ample room for filling the tank.

In any cases of complaint of filling the gasoline tank when a trunk is carried on the folding trunk rack, some additional clearance for the filling nozzle can be secured by rotating the filler neck extension 90° as follows:

Remove the gasoline tank from the car. Remove the sheet metal screw that holds the filler neck extension to the filler neck and turn the extension 90° so that the extension points to the left side of the car. Punch a new hole in the extension and reinstall the sheet metal screw. This operation will automatically move the filler opening $\frac{5}{16}$-inch toward the left of the car and will provide sufficient room in most instances. The hole for the filler in the body is large enough to permit this change being made.

If the foregoing is not enough, it will be necessary to change the trunk rack over to the type used on Town Sedans. To do this, the entire trunk rack does not need to be replaced; it is only necessary to install the following parts in place of the corresponding parts on the original trunk rack:

1	Hinge, R. H.	1408226
1	Hinge, L. H.	1408227
1	Corner bracket, R. H.	1408222
1	Corner bracket, L. H.	1408223
1	Bracket on bumper, R. H.	1408287
1	Bracket on bumper, L. H.	1408288
1	Tie rod, R. H.	1408286
1	Tie rod, L. H.	1408748

This change should not be made unless a trunk is actually carried on the rack. Interference with the rack itself when folded can only be overcome by unfolding the rack while the tank is being filled. The trunk and rack will also extend approximately three inches farther over the rear bumper than the original trunk and rack.

GASOLINE SYSTEM—HOOD

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Air cleaner and intake silencer, make of	A.C.	A.C.	A.C.	A.C.
Feed	.....	.....	.....	.....
All models—A. C. fuel pump	.....	.....	.....	.....
Gasoline line location				
350—Outside of right frame side bar.				
355-D—(Series 10 and 20) Below right frame side bar				
355-D (Series 30), 370-D, 452-D,—Below left frame side bar.				
Gasoline gauge (electric) make of	A.C.	A.C.	A.C.	A.C.
Tank (supply) capacity	20 Gal.	.....	30 Gal.	30 Gal.
Series 10 and 20	.....	22 Gal.	.....	.....
Series 30	.....	30 Gal.	.....	.....
Carburetor				
Float setting	5/8″	13/16-15/16″	13/16-15/16″	13/16-15/16″
Fuel level below top surface of bowl See Plates 48 and 50	1 1/4″	2″	1 1/2″	1 1/2″
Size	.....	14	12	14
Size of metering pin	Plain tube	Expanding vane	Expanding vane	Expanding vane
Type				
Throttle shaft end play	.0015″	.0015″	.0015″	.0015″
New limit, not over	.005″	.005″	.005″	.005″
Worn limit, not over				
Heat control	Thermostatic	.....	.....	.....
Choke Control	Automatic	Semi-Automatic	Semi-Automatic	Semi-Automatic
Unit number location	.....	.....	.....	.....
350—Bottom flange front side.				
355-D, 370-D, 452-D—Top side of top flange under gasket.				

HOOD

Service Information

1. Raising the Hood

When raising the hood on early Cadillac or LaSalle cars not provided with hood rest brackets, it should be set upright with the heavy rubber bumper on the hood cover resting on the anti-squeak strip on the cowl as shown in Fig. 1.

In addition to preventing damage to the finish of the hood, this method makes it possible to raise both sides of the hood at the same time. Later cars are equipped with a hood rest bracket on each side of the cowl in which the hood may be rested securely in the raised position.

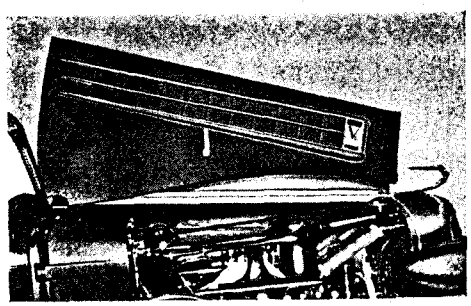


Fig. 1. When the hood is raised on early cars not provided with hood rest brackets, it should be supported by the rubber bumper on the corner of the hood resting on the cowl

HOOD

These hood rest brackets may be installed on earlier cars, using the following parts:

Quan.	Name	Part No.
2	Brackets	1409783
2	Screws	134429
2	Nuts	120375
2	Lock Washers	120380
2	Plain Washers	120392
2	Plain Washers	52232

When raising the hood, particular care should be taken not to mar the finish of the headlamps. Because of their streamline design, these lamps are somewhat longer than previous types, and extend back to a point where they may be marred by careless raising of the hood.

2. Removing Hood

The hood may be removed by removing the two hood straps from the tie-rods; then removing the two screws in the front hood bracket, lifting the front end, and drawing the hood toward the front of the car and over the radiator casing. It is not necessary to remove the rear bracket.

Because of the size and weight of the hood and the width of the car, this operation is a bit awkward. A tool can be made up in any shop that will assist considerably in lifting the hood off of the car.

This tool consists of a single piece of board about 2¾ in. x 2 in. approximately five or six feet long, cut as shown in Fig. 2. The blocks holding the hood side panels in position should be cut inward, at an angle, and padded to prevent any possibility of marring the finish.

To use the tool, it is simply necessary to raise both panels of the hood, slide the tool between the tie-rods and the hood hinge until the hinge rests in the center slot as shown in Fig. 2.; then, holding the front part of the hood side panel with one hand, lift the hood over the front of the car.

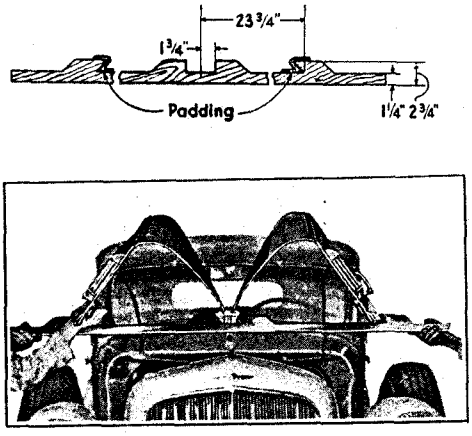


Fig. 2. View showing tool for removing hood.

3. Installing Hood Port Brace

The center moulding of the hood ports on later Cadillac cars is further braced at the midpoint of its length by an anchor block welded in the chrome strip and bolted to a brace mounted crosswise on the assembly as shown in Fig. 3. This construction holds the moulding more rigid and prevents any possibility of noise arising at this point.

In any case where a rattle on early cars at certain speeds is traced to the hood port assembly, this brace may be installed. The parts required for each car as just listed are furnished under assembly No. 1098544.

Quan.	Name	Part No.
2	Center moulding with anchor block	1404056
2	Brace	1408321
2	Spacers	1408320
2	Screws	132760
4	Screws	131893
4	Lock washers	121841
4	Hex nuts	882095
2	Lock washers	116117

This installation may be made without removing the hood port assembly from the hood. The original moulding may be removed from the hood after removing the screw and the stud nut holding the strip at the rear of the hood panel and the screw at the front of the hood port assembly under the medallion. The front screw may be reached after removing the two stud nuts holding the medallion and removing the medallion.

The new moulding may then be installed, attaching with the original screws and nuts. The brace should be attached in a vertical position by means of the screw, Part No. 132760, with a spacer, Part No. 1408321, between the anchor block and the brace, and a lock washer, Part No. 121841, between the brace and the screw head.

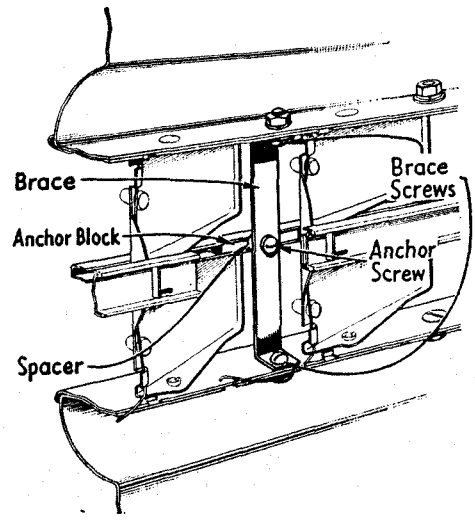


Fig. 3. The hood port brace may be installed on later Cadillac cars without removing the hood port assembly.

With the brace in the vertical position, the angles at the ends are against the flange of the hood port assembly and may be drilled with a $\frac{5}{32}$ in. electric drill, drilling through the brace, the flange of the hood port, and the flange of the hood panel, both top and bottom. The brace may then be attached to the flange of the hood panel and the port assembly with the screws, Part No. 131893, the lock washers, 116117, and the nuts, 882095.

4. Installing Hood Corner Protectors

When installing the rubber hood corner protectors it is important that the button be pulled all the way through the hole in the hood. The proper method of installing these protectors is first to slip the flange over the edge of the hood and then pull the button through the hole in the hood with a pair of narrow long-nosed pincers. Both edges of the button should be squeezed together when pulling the button through the hole. If only one edge of the button is grasped, the edge may be torn as it is pulled through.

LIGHTING SYSTEM

General Description

The Multibeam three-beam lighting system is used on both the Cadillac and LaSalle cars. The headlamps are of the tear-drop design and are carried on streamline supports on the front fenders on the 355-D and 370-D cars and an the radiator shell on the 452-D and LaSalle cars.

The Multibeam lighting system is controlled by the conventional switch lever at the hub of the steering wheel. In addition, the country driving and passing beams are further controlled by a foot switch located in the toe-board at the left of the clutch pedal. See Fig. 2.

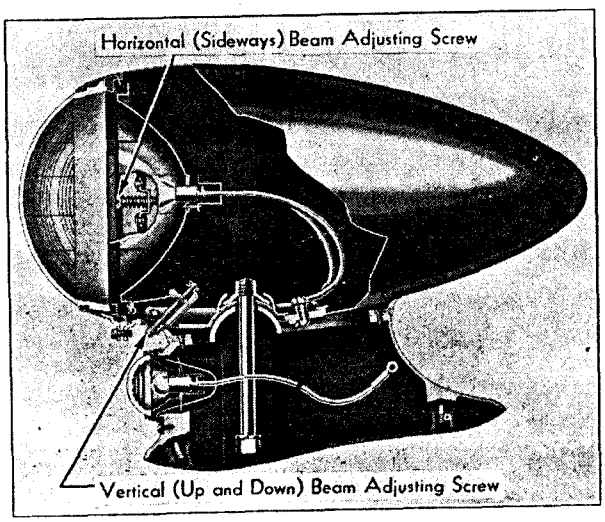


Fig.1. Sectional view of Cadillac Multibeam headlamp and parking lamp showing beam adjusting screws. The LaSalle headlamps are similar except that no beam adjusting screws are provided and the parking lamp bulbs are located in the upper part of the reflectors.

A visible beam indicator on the instrument panel shows which of the three headlight beams is in use, thereby overcoming the uncertainty and objectionable necessity of operating the foot dimmer to determine the beam position.

The parking lamps are integral with the headlamp supports on the 355-D and 370-D cars. On the 452-D cars, the parking lamps are built into the crown of the front fenders. The parking light bulbs are installed in the upper part of the headlamp reflectors on the LaSalle.

The tail lamps are streamline in design to match the appearance of the body and fenders. Two reflex buttons are arranged in the lamp base on Cadillac cars while only one button is used in the LaSalle tail lamp. The lens is also extended for appearance and to make the tail light and stop light visible from the side of the car. The tail lamp does not include a back-up light.

The circuit breaker for the lighting system is located in the control box on top of the generator.

The Multibeam lighting equipment consists primarily of a special right and left lens, operating in conjunction with special reflectors and prefocused bulbs. This lighting system is legal in all states.

The Multibeam lenses are plainly marked "right" and "left" and are not interchangeable. They are divided into five horizontal sections of vertical flutes to spread the light horizontally to the best advantage. The right lens distributes most of its light across the road while the left lens distributes the major portion of its light to the right side.

The reflectors have five distinct sections, each of which is scientifically designed to contribute its

LIGHTING SYSTEM

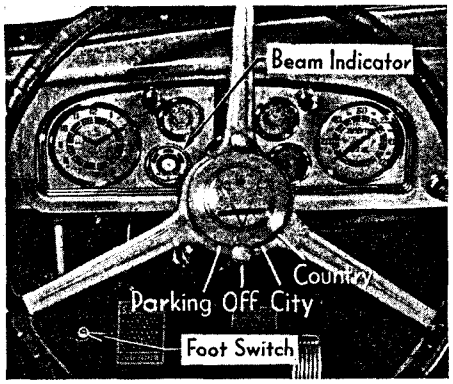


Fig. 2. Illustration showing the lighting switches and beam indicator on Cadillac 452-D instrument panel. Typical of all models including the LaSalle.

share to an optically correct vertical distribution of light. The name "Multibeam" is plainly marked on the reflector and no other reflector can be used with the Multibeam lens. The reflectors on the Cadillac cars are adjustable for aiming the light beams without disturbing or loosening the lamp mounting. The LaSalle headlamps are not provided with tilting reflectors. Therefore, the aiming of these headlamps is accomplished by turning the lamps on the ball and socket mounting.

Three separate and distinct beams of light are obtainable from Multibeam headlamps:

1. An efficient and symmetrical upper or driving beam for the open road.

2. An asymmetrical passing beam, which eliminates the element of danger in passing. This beam is obtained by depressing the left side of the driving beam.

3. A symmetrical lower beam for city driving.

The upper or driving beam is produced by the lower filament of both lamps. The asymmetrical passing beam is produced by the lower filament of the left-hand lamp, and the upper filament of the right-hand lamp. The symmetrical lower beam is produced by the upper filaments of both lamps.

The Multibeam headlamp bulbs are of the prefocus 32-32 candlepower type Mazda No. 2330-L. They are held in the reflector by three small pins projecting through the flat at the apex of the reflector and engaging the button hole slots in the bulb collar. The pressure of the heads of these pins, actuated by springs behind the reflector, holds the bulb firmly in the reflector. The three pins in the reflector are unequally spaced, making it impossible to assemble the bulbs in an incorrect position. The base of the bulb is marked "top" to assist in aligning the slots in the bulb collar with the retaining pins.

Only standard National Mazda or Tung-Sol bulbs should be used.

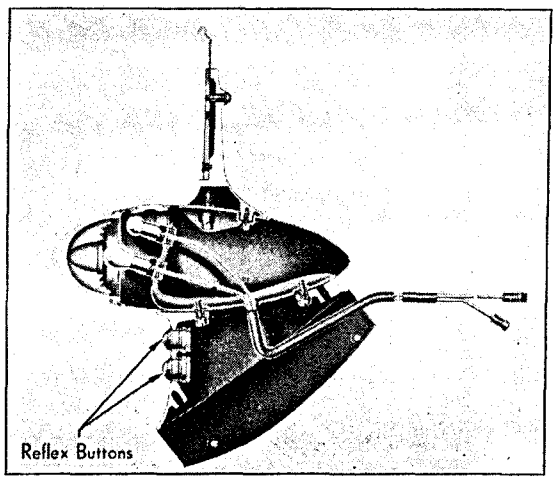


Fig. 3. Sectional view of Cadillac tail lamp, showing reflex buttons. Typical of LaSalle tail lamp.

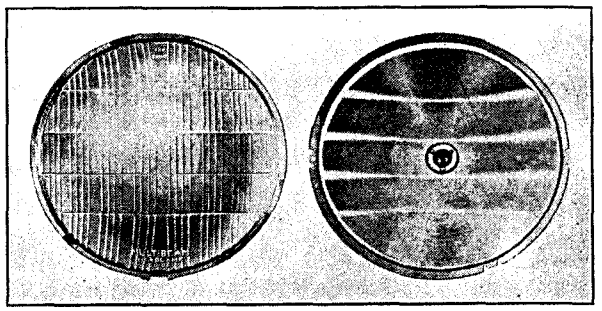


Fig. 4. Multibeam headlamp lens and reflector.

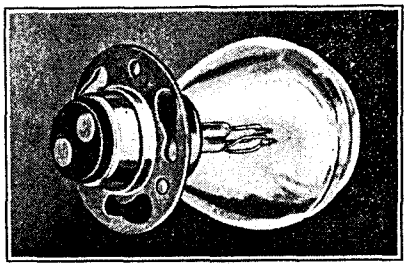


Fig. 5. Only standard National Mazda or Tung-Sol bulbs, 32-32 candlepower Mazda No. 2330-L, should be used in the Multibeam headlamps.

LIGHTING SYSTEM

Service Information

1. Headlamp Adjustment

The prefocused Multibeam headlamps on the Cadillac cars are equipped with a tilting reflector mechanism that permits aiming the beams up or down by an outside adjusting screw at the bottom of the lamp. The beams may also be aimed to the right or left by means of the side adjusting screws under the cork gasket. On the LaSalle, the headlamps must be loosened on their mounting to aim the beams.

To aim the headlamps the car should be placed on a level surface with the headlamps aimed toward and 25 feet from a garage door or other reasonably light colored vertical surface. Then draw a horizontal line on this surface at the level of the headlamp centers. If your state requires a loading allowance, draw this horizontal line the required distance below the level of the lamp centers. Sight through the center of the back window over the radiator cap to determine the center point of the horizontal line and draw vertical lines through points at the right and left of this center point directly ahead of the center of each headlamp. See Fig. 9.

The lighting switch on the steering column should be turned to the "Country" position and the button on the toe board in the "Driving" position as indicated by "Driving" in red on the headlamp indicator dial. This means that the lower filaments will be lighted in both lamps. The headlamp doors must be removed and one of the headlamps covered. The beam from the uncovered lamp should then be centered sideways if necessary on the vertical line directly ahead of it. Aiming to the right on the Cadillac can be accomplished by loosening the screw in the right side of the lamp body, or to the left by loosening the left screw. The beams should be adjusted as shown in Figs. 6 to 8 inclusive.

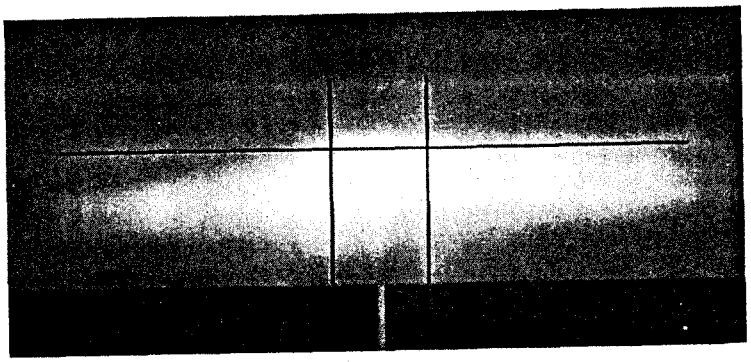


Fig. 7. Correctly aimed upper beam of left headlamp with lens.

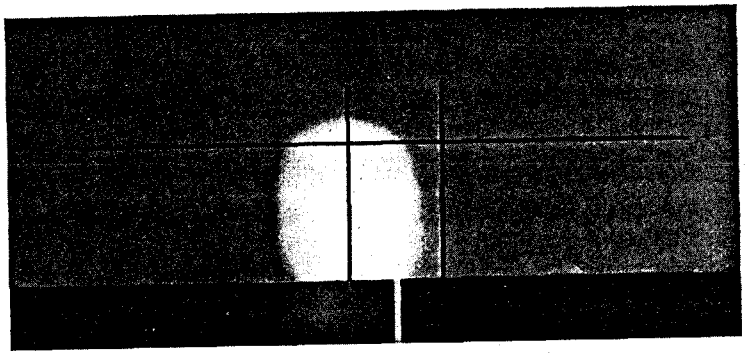


Fig. 6. Correctly aimed upper beam of left headlamp without lens.

When replacing the headlamp doors, reinstall the cork gaskets with care and be sure to place the door with the "left" lens on the left lamp and the "right" lens on the right lamp. Then check again the driving beams from the two lamps, one at a time.

The driving beam from the left headlamp should have the upper edge of the hot spot at the horizontal line and the left edge at the vertical line directly ahead of the lamp as shown in Fig. 7. The driving beam from the right headlamp should

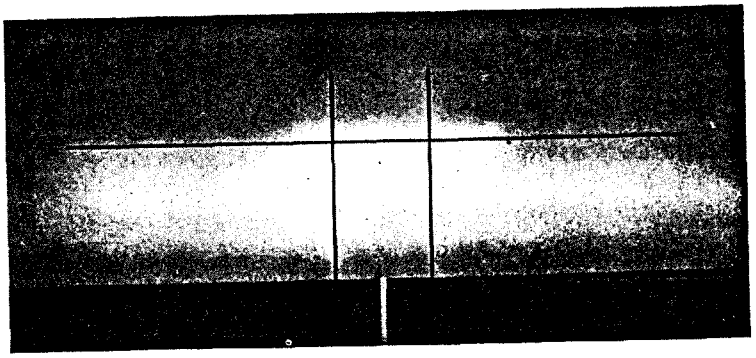


Fig. 8. Correctly aimed upper beam of right headlamp with lens.

likewise have the upper edge of the hot spot at the horizontal line, but with the maximum intensity centered on the vertical line directly ahead of the lamp and the right cut-off of the hot spot about a foot to the right of this line as shown in Fig. 8.

No further aiming is required for the lower or passing beam.

2. Replacing Headlamp Bulbs

The Multibeam headlamp bulbs are installed in the reflector in a similar manner to the conventional bayonet type bulbs. That is, they are pushed on the retaining pins and turned or rotated slightly clockwise to lock them in position.

It is important that all three pin heads project through the bulb collar slots and that the collar rests flat against the bulb seat before the bulb is turned to lock it in position. When removing the bulb it should be tipped or rocked slightly before it is turned counterclockwise

Only standard National Mazda or Tung-Sol bulbs, 32-32 candlepower Mazda No. 2330-L, should be used.

3. Headlamp Misalignment Frequently Caused by Pushing Car

Misalignment of headlamps is oftentimes caused by workmen pushing against the headlamps when moving the car. The headlamps should never be used for this purpose.

4. Cleaning Headlamp Reflectors

Great care should be exercised in polishing the headlamp reflectors to preserve the reflecting qualities. A good cleaning paste can be made by mixing rouge or talcum powder with alcohol. Dry lamp black and alcohol are just as satisfactory and may be more convenient. Apply the paste with a clean soft cloth and rub from the center outward in straight lines. Never polish reflectors with a circular motion because the fine circular lines break up the light rays and appreciably reduce the illumination.

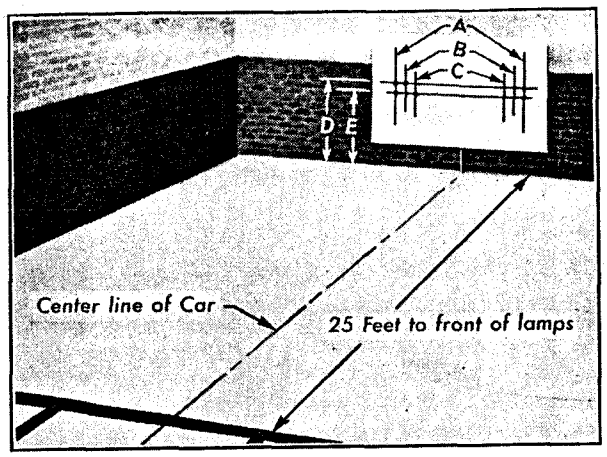


Fig. 9. Markings for adjustment of head lamps
Distance between lamp centers:
A—37¼ in. (355-D and 370-D)
B—34½ in. (452-D)
C—30 11/16 in. (350)
Height of lamp centers above floor:
D—40⅛ in. (370-D and 452-D)
E—39 in. (350 and 355-D)

5. Removing Map Lamp Bulb Shield

To remove the map lamp bulb shield, first pull the lamp out far enough to bring the end of the threaded shaft on the plunger about flush with the rear edge of the lamp cylinder. Then turn the bulb shield slowly until the hole in the plunger comes opposite the one in the lamp cylinder. Next, insert a nail or its equivalent in these holes to keep the plunger from turning and unscrew the bulb shield from the cylinder. The bulb shield has a right-hand thread.

The bulb shield is installed in the reverse order of its removal.

LIGHTING SYSTEM

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Bulb Data				
Voltage—all bulbs	6-8	6-8	6-8	6-8
Stop lamp—				
Candle power	15	15	15	15
Contact	Single	Single	Single	Single
Mazda No.	87-L	87-L	87-L	87-L
Dome (closed cars)—				
Candle power	15	15	15	15
Contact	Single	Single	Single	Single
Mazda No.	87-L	87-L	87-L	87-L
Parking lamp—				
Candle power	3	3	3	3
Contact	Single	Single	Single	Single
Mazda No.	63-L	63-L	63-L	63-L
Headlamp—				
Candle power	32-32	32-32	32-32	32-32
Contact	Double	Double	Double	Double
Mazda No.	2330-L	2330-L	2330-L	2330-L
Instrument (dash) lamps—				
Candle power	3	3	3	3
Contact	Single	Single	Single	Single
Mazda No.	63-L	63-L	63-L	63-L
Map reading lamp—				
Candle power	3	3	3	3
Contact	Single	Single	Single	Single
Mazda No.	63-L	63-L	63-L	63-L
Rear quarter lamp				
Candle power	6	6	6	6
Contact	Single	Single	Single	Single
Mazda No.	81-L	81-L	81-L	81-L
Tail lamp—				
Candle power	3	3	3	3
Contact	Single	Single	Single	Single
Mazda No.	63-L	63-L	63-L	63-L
Headlamps				
Lens diameter	7″	7″	7″	7″
Switches				
Delco-Remy type number—				
Lighting	487-J	.....	487-H	487-H
Series 10 and 20	.....	487-J	.....	.....
Series 30	.....	487-H	.....	.....
Stop Light	.....	474-R	474-R	474-R
Stoplight switch adjustment	.....	.....	.....	.....
Switch in "ON" position with brake pedal depressed ¾ to 1 in.				

LUBRICATION

Service Information

1. Extreme Pressure Lubricants for Rear Axle and Transmission

There are on the market gear lubricants known as extreme pressure lubricants which are designated by the letters "E.P." following their S.A.E. classification.

These lubricants have been developed for the lubrication of gears. Some of these lubricants should not be used in units that have bronze parts. as they produce an etching action on bronze and will cause it to corrode under severe conditions. Other "E.P." lubricants, however, have been developed that are satisfactory from the standpoint of corrosion.

As all Cadillac and LaSalle cars have bronze parts in the transmission and later cars have bronze thrust washers in the differential, extreme pressure lubricants should not be used unless approved by the Cadillac Motor Car Company.

2. Thinning Gear Lubricant with Kerosine

Gear lubricant for the transmission and differential need be thinned only at the beginning of cold weather if a sufficient quantity of kerosine is added to take care of the lowest expected temperature. The lubricant for the steering gear should not be thinned.

3. Special Items for Lubrication Schedule

The following items cannot be placed on the regular 1000-mile schedule, so they should be performed at the recommended intervals.

Every week—Check tire pressure; check level of liquid in radiator.

When cold weather starts—Replace lubricant in rear axle and transmission, except 452-D transmission, with lighter lubricants or thin the summer lubricant with kerosine.

The engine oil should be drained and replaced with lighter oil as specified or thinned with the proper amount of kerosine.

Flush radiator and add anti-freeze solution in proportions recommended in the Cooling System Section.

At beginning of warm weather—Drain light or thinned lubricant in rear axle, transmission (except 452-D transmission) and engine and replace with fresh lubricant of the proper viscosity for summer driving.

Every 6000 miles—Check level of special fluid in shock absorbers.

Clean carburetor air cleaner. This should be done more often when the car is driven continuously on dusty roads or when considerable dust is in the air.

Every 6000 miles—Remove plug at bottom of oil filter on Cadillac V-12 and V-16 cars and drain out sludge. This can be done on the car.

Every 12,000 miles—Remove and clean engine oil pan and screen.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Chassis high pressure fittings	G-10	G-10	G-10	G-10
Clutch release bearing and fork	.....	G-12	G-12	G-12
Engine—				
Capacity in quarts	7	8	9	10
Lubricant	.....	.....	.....	.....
See recommendations Page 145.				
Fan	.....	.....	.....	.....
350—Fan and water pump bearings, engine oil front and G-13 rear				
Rear Axle—				
Capacity in pounds	3	6	6	6
Lubricant recommended				
Summer	A-200	A-200	A-200	A-200
Winter	A-110	A-110	A-110	A-110
Fill to level of over-flow opening.				
Steering gear (lubricant recommended)	S-200	S-200	S-200	S-200
Transmission—				
Capacity in pounds	2½	4½	4½	4½
Lubricant recommended				
Summer (except 452-D transmission)	A-200	A-200	A-200	.....
Winter (except 452-D transmission)	A-110	A-110	A-110	.....
452-D Transmission—year round	.....	.....	.....	A-0200
Fill to level of over-flow opening.				
Water pump	G-13	G-13	G-13	G-13
Wheel bearings	G-12	G-12	G-12	G-12

LUBRICATION

Lubrication Schedule

Cadillac and LaSalle

DO NOT WAIT FOR SCHEDULE LUBRICATIONS BEFORE ADDING ENGINE OIL. THE OIL LEVEL SHOULD BE CHECKED EVERY 100 TO 150 MILES AND OIL ADDED IF THE INDICATOR SHOWS BELOW "FULL." THIS IS ESPECIALLY IMPORTANT ON CARS DRIVEN AT HIGH SPEEDS.		LUBRICATION NO. AND MILEAGE AT WHICH DUE											
	LUBRICANT	1	2	3	4	5	6	7	8	9	10	11	12
		1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
LUBRICATION NOS. 1, 5, 7 AND 11 — ADD LIQUID TO RADIATOR	WATER OR ANTI-FREEZE	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — ADD ENGINE OIL AS NECESSARY	ENGINE OIL	O		O		O		O		O		O	
LUBRICATION NOS. 1, 5, 7 AND 11 — STARTER AND GENERATOR	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — DISTRIBUTOR OIL CUPS ON CADILLAC FAN OIL CUP ON LASALLE	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — BRAKE AND RIDE REGULATOR PINS AND CONNECTIONS ON CADILLAC	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — HAND BRAKE AND CLUTCH RELEASE CONNECTIONS ON LASALLE	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — ACCELERATOR AND CHOKE SHAFTS	ENGINE OIL	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — DOOR HARDWARE (USE VASELINE ON STRIKER PLATES AND WEDGES)	LIGHT OIL	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — GREASE GUN CONNECTIONS	CHASSIS LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — DISTRIBUTOR GREASE CUP ON LASALLE	WHEEL BEARING LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — CLUTCH RELEASE FORK ON CADILLAC	WHEEL BEARING LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — WATER PUMP	WATER PUMP LUBRICANT	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — *ADD WATER TO STORAGE BATTERY	DISTILLED WATER	O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 1, 5, 7 AND 11 — CHECK TIRE INFLATION		O	O	O	O	O	O	O	O	O	O	O	O
LUBRICATION NOS. 2, 4, 8 AND 10 — DRAIN AND REPLACE ENGINE OIL	ENGINE OIL		O		O		O		O		O		O
LUBRICATION NOS. 2, 4, 8 AND 10 — CLUTCH RELEASE BEARING ON CADILLAC	WHEEL BEARING LUBRICANT		O		O		O		O		O		O
LUBRICATION NOS. 2, 4, 8 AND 10 — †TRANSMISSION—ADD LUBRICANT	TRANSMISSION LUBRICANT			O			O			O			O
LUBRICATION NOS. 2, 4, 8 AND 10 — †REAR AXLE—ADD LUBRICANT	REAR AXLE LUBRICANT			O			O			O			O
LUBRICATION NOS. 2, 4, 8 AND 10 — STEERING GEAR—ADD LUBRICANT	STEERING GEAR LUBRICANT			O			O			O			O
LUBRICATION NOS. 3 AND 9 — BRAKE ASSISTER ON CADILLAC	SPECIAL FLUID						O						O
LUBRICATION NOS. 3 AND 9 — FRONT WHEEL BEARINGS—ALSO REAR WHEEL BEARINGS ON LASALLE	WHEEL BEARING LUBRICANT						O						O
LUBRICATION NOS. 3 AND 9 — UNIVERSAL JOINTS ON CADILLAC	CHASSIS LUBRICANT						O						O
LUBRICATION NOS. 3 AND 9 — SPEEDOMETER DRIVE SHAFT	CHASSIS LUBRICANT						O						O
LUBRICATION NOS. 3 AND 9 — DRAIN OIL FILTER—370-D—452-D							O						O
LUBRICATION NOS. 6 AND 12 — **SHOCK ABSORBERS—ADD FLUID	SPECIAL FLUID						O						O
LUBRICATION NOS. 6 AND 12 — **CLEAN CARBURETOR AIR CLEANERS							O						O
LUBRICATION NOS. 6 AND 12 — **FLUSH COOLING SYSTEM AND ADD RUST PREVENTIVE							O						O
LUBRICATION NOS. 6 AND 12 — **CLEAN OIL PAN AND SCREEN		EVERY 12,000 MILES											

*IN SUMMER INSPECT BATTERY EVERY 500 MILES OR AT LEAST EVERY 2 WEEKS.
**RECOMMENDED BUT NOT INCLUDED IN LUBRICATIONS 6 AND 12.
†CHANGE REAR AXLE AND TRANSMISSION LUBRICANT (UNLESS SPECIAL ALL-YEAR LUBRICANT IS USED)—AS REQUIRED FOR LOW TEMPERATURES IN FALL OR WINTER AND AT BEGINNING OF MILD WEATHER IN SPRING.

Plate 51. Lubrication Schedule

LUBRICATION—SPRINGS AND SHOCK ABSORBERS

Specifications

Lubricants

	G. M. Grade No.	Std. Dept. No.
Chassis lubricant (grease for pressure fittings)	G-10	4640-M
Transmission and rear axle lubricant—	A-200	4510-M
	A-110	4519-M
	A-0200	4593-M
	S-200	4641-M
Steering gear lubricant	G-13	4614-M
Water pump grease	G-12	4613-M
Wheel and clutch release bearing lubricant		

Engine Oils

Type of Service	Summer	Winter	
	All Temperatures Above 32°	Between 32° and 0° Fahrenheit	Between 0° and 15° Below
Moderate Driving	S.A.E. Visc. 30	20-W	10-W
	These oils are not suitable for prolonged high speed driving and if used under such conditions the oil level must be closely watched, as the rate of consumption will be higher than with heavier oils.		
High Speed Driving	**"Heavy Duty" Oils** Oils having an S. A. E. viscosity of 40-50-60 will show lower oil consumption for prolonged high speed driving than the lighter oils which afford easy starting. Some of these heavy oils demonstrate greater fitness for extreme high speed, due to their meeting certain specifications as to volatility. To make certain of using an oil suitable for this service, consult your Cadillac dealer. Heavy duty oils vary in their suitability for winter use. If a heavy duty oil with sufficiently low cold viscosity is not available and if the car is not kept in a heated garage, the lighter oils specified above for moderate driving must be used to avoid hard starting. In this case, be sure to watch the oil level closely as cautioned above.		

SPRINGS AND SHOCK ABSORBERS

General Description

The spring and shock absorber equipment is very much alike on both Cadillac and LaSalle cars with the exception of the size and shackling of the springs and the use of shock absorber control on the Cadillac models.

SPRINGS

The front springs are of the helical or coil type, while the rear springs are of the semi-elliptic type.

The front springs are mounted between the frame and the lower suspension arms. They have nothing to do except to spring the car as they are not depended upon to absorb the steering and braking stresses. As a result, they can be made as soft-acting as desired for riding comfort. Large rubber bumpers are installed inside of the coil springs to cushion extreme movement and to assure proper riding comfort.

The rear springs have a rubber and asbestos composition strip between the eye or No. 1 leaf and the No. 2 leaf and graphite bronze plates at the ends of the remaining leaves on the Cadillac cars and between the Nos. 2, 3 and 4 leaves on the LaSalle. The purpose of the composition strip is to dampen the spring action by decreasing the liveliness of the spring and to serve as an anti-squeak. The bronze plates in the ends of the other leaves are for the purpose of providing constant lubrication to prevent squeaks.

Rubber pads are also used between the rear springs and the spring perches on the axle housing on LaSalle cars to insulate against noises.

Spring covers are used on the rear springs. Pressure fittings are not provided for lubricating the springs as external lubrication is not required.

SPRINGS AND SHOCK ABSORBERS

The front shackle of the rear springs on the Cadillac cars is of the rubber bushing type, using but a single bolt necessitated by the use of the Hotchkiss type of drive. The rear shackles have rubber bushings at the upper bolt and a threaded metal bushing at the lower bolt. Threaded shackles are used at both ends of the rear springs on the LaSalle.

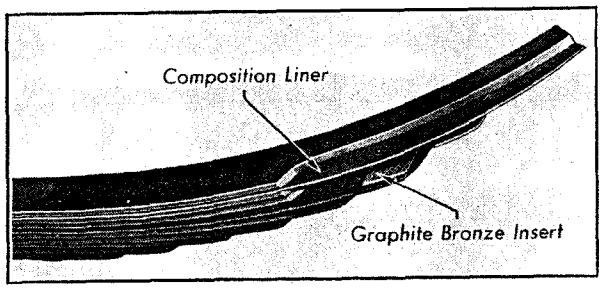


Fig. 1. Cutaway view of rear spring, showing composition liner and graphite bronze inserts, which provide adequate lubrication

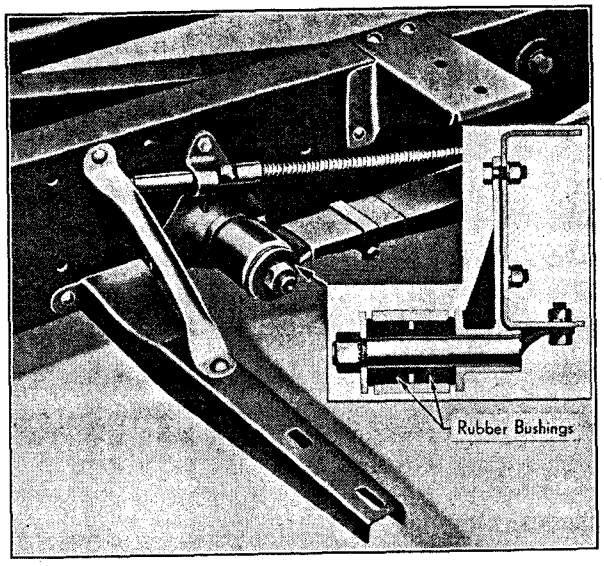


Fig. 2. The front end of the rear springs on Cadillac cars is carried on rubber bushings

SHOCK ABSORBERS

Both the Cadillac and LaSalle shock absorbers are of the two-way or double-acting type. The action of the Cadillac shock absorbers is also manually controlled by a lever mounted on the instrument panel, which, operating through a system of rods and levers, regulates the spring pressure on the control valves in the shock absorbers.

The degree of control is adjustable to different positions. The design is such that the "Free" position (control lever down) gives a soft boulevard ride. The "Firm" position (control lever up) gives the maximum control necessary at high speeds on rolling, gravel roads.

The front shock absorbers are actually built onto the frame as a structural part of the car. The upper suspension arms are a part of the front shock absorber assembly and are not supplied separately from the shock absorbers.

The rear shock absorbers on Cadillac cars have an additional inertia control feature which automatically controls the rebound of the car at the rear. When the car is traveling over smooth roads, where there is very little movement to the frame and body, the inertia valve weight does not move and the shock absorbers function in the regular way.

When the car is traveling over rough roads, the frame of the car moves down and the inertia valve weight also moves down but as the frame moves up on the rebound, the inertia weight, which is supported on a coil spring does not move up as fast as the frame, due to its inertia. This action closes the inertia slide valve which makes the rebound check valve inoperative and the compressed oil in the cylinder under this condition

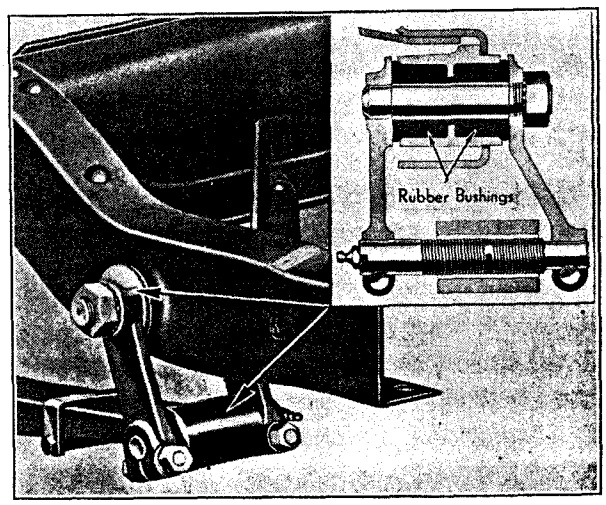


Fig. 3. The rear shackles of the rear springs on Cadillac cars have rubber bushings at the upper bolt and a threaded metal bushing at the lower bolt.

must pass through the high pressure inertia check valve.

Cadillac Shock absorbers are also of the two-stage type. That is, an additional or auxiliary spring is provided on the control valve to give more rigid control in the firm positions of the dash ride regulator. This auxiliary spring is effective only for the last .040 in. of control screw travel.

BODY STABILIZER

A stabilizer bar is employed at the rear of both Cadillac and LaSalle cars to oppose any tendency of the body to roll. This unit consists of a steel shaft which extends across the frame just back of the rear axle and is connected to the rear axle by levers and links. When one side of the car tends to rise faster than the other, as happens when rounding corners, a twisting action takes place in the spring steel stabilizer bar which reacts to hold the body on an even keel.

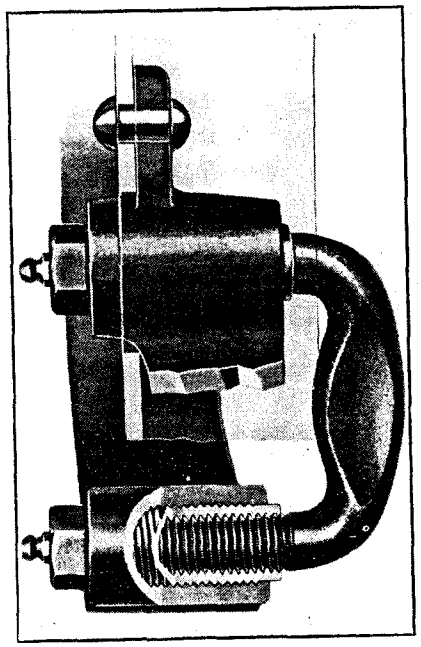


Fig. 4. Cut-away view of LaSalle rear spring rear shackle. The shackle is removed by screwing out the threaded bushings

Service Information

1. Servicing Shock Absorbers

The only service ordinarily required on Cadillac or LaSalle shock absorbers is for the correction of either noisy operation or unsatisfactory riding qualities.

Noisy operation is usually due to looseness somewhere in the shock absorbers or linkage. The first thing to do, therefore, is to check and tighten the entire shock absorber mechanism. This means, first of all, checking and tightening the shock absorbers on the frame; making certain that the arm is tight on the splined shaft; going over and tightening all of the linkage, and adjusting the control levers and making sure that the entire control mechanism is tight.

In making this check-up, it is not enough simply to look at the connections and decide that they "look" sufficiently tight; a wrench must be used at every point and everything well-tightened. Particular pains must be taken to reach relatively inaccessible places. Nothing can be assumed to be correct; everything must be tested.

It is also important in cases of noisy operation, as well as in other shock absorber complaints, to make certain that all four shock absorbers are filled with shock absorber fluid to the correct level and that there is no air in the cylinders or passages. In case of complaint, it is necessary to bleed all four shock absorbers to get all of the air out of the cylinders and passages. To do this properly, make sure that the shock absorber is correctly mounted and thoroughly tightened to the car frame, then remove the filler plug and fill with shock absorber fluid. Reinstall the plug securely and, with the link disconnected, move the shock absorber arm up and down several times the full length of its travel.

This operation of adding fluid, reinstalling the plug and working the arm should be repeated until all of the air is worked out of the shock absorber. This may take three or four operations. The shock absorber is satisfactorily bled when no more fluid can be added after working the arm in the manner just described, or when there is absolutely no play in the arm. Always have the filler plug tightly in place, when moving the arm, otherwise more air will be drawn into the shock absorber fluid.

In cases of unsatisfactory riding, correction can ordinarily be made by putting the shock absorbers into good operating condition.

Unsatisfactory riding may be caused by insufficient shock absorber fluid, dirt in the fluid, or improper setting of the control levers. The first thing to be done in cases of complaint is to check

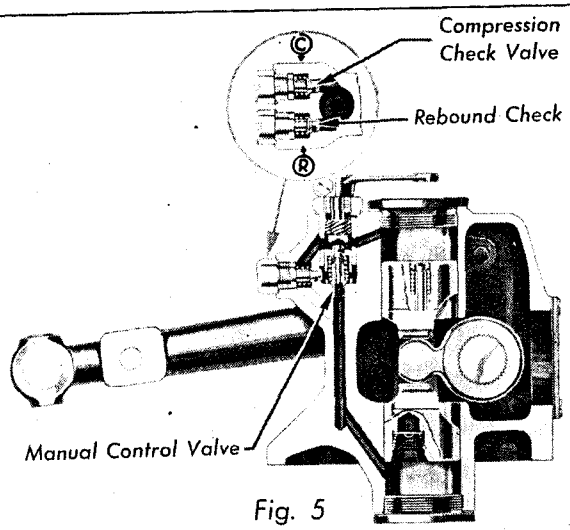


Fig. 5
Sectional View of Cadillac Front Shock Absorber

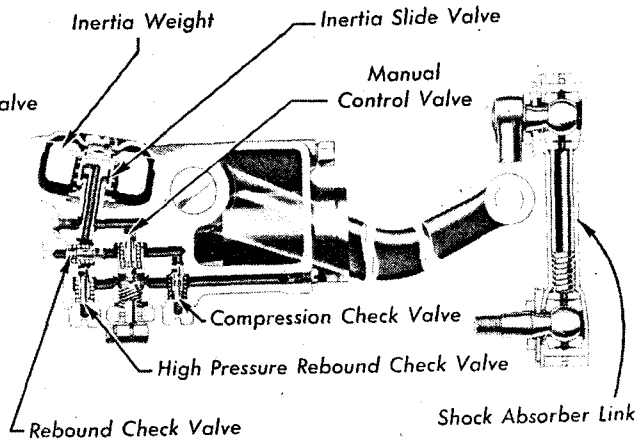


Fig. 6
Sectional View of Cadillac Rear Shock Absorber

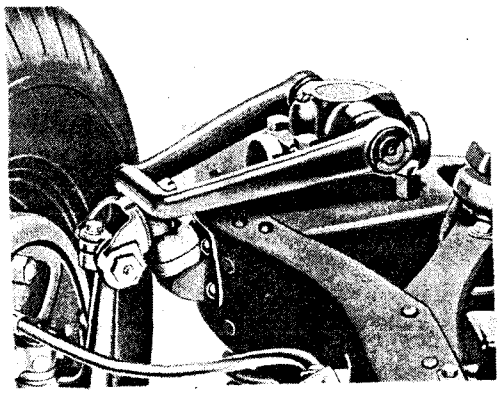


Fig. 7
LaSalle Front Shock Absorber

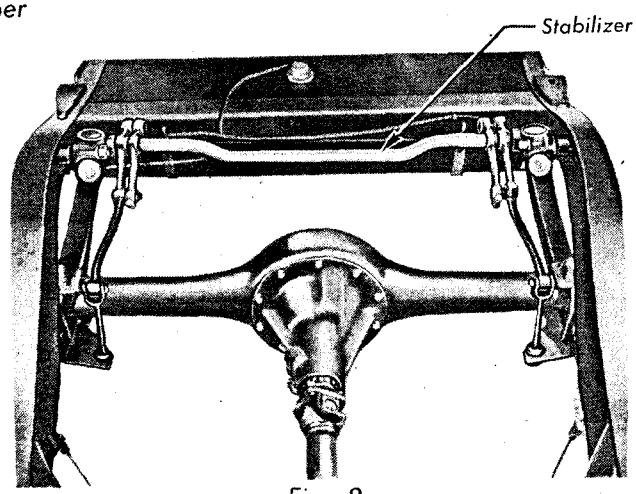


Fig. 8
View of LaSalle Rear Shock Absorber Mounting and Body Stabilizer

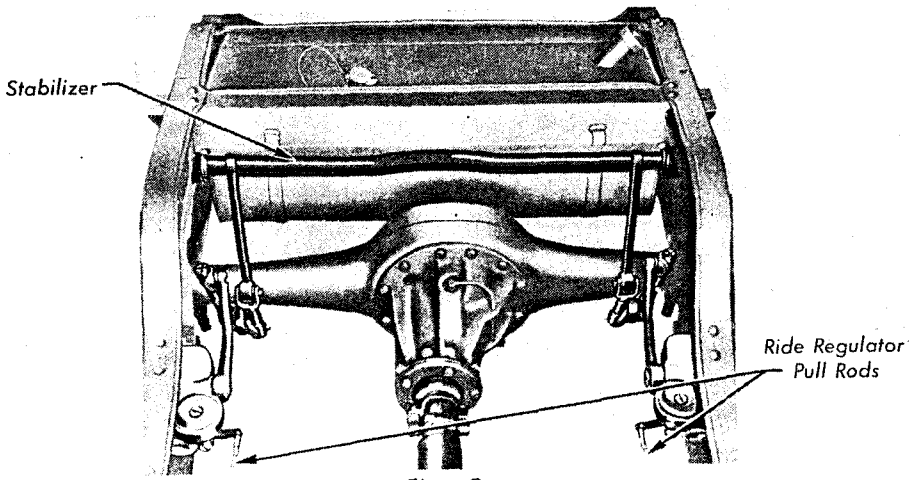


Fig. 9
View of Cadillac Rear Shock Absorber Mounting and Body Stabilizer

Plate 52. Shock Absorber and Body Stabilizer

the level of the fluid in the shock absorbers. Insufficient fluid can be corrected by careful bleeding and refilling as previously described.

Only after it is known that all shock absorbers contain the proper amount of fluid should any other tests be made to determine the cause of unsatisfactory riding qualities.

Dirt in the shock absorber fluid may cause unsatisfactory operation by causing the valves to stick. In such cases the difficulty can usually be recognized by moving the shock absorber arm up and down. The presence of dirt on the valves will be indicated by the lack of resistance in one or both directions. In case dirt is present, the shock absorber should be removed, thoroughly cleaned and blown out with air, and refilled with clean shock absorber fluid.

2. Adjustment of Cadillac Ride Regulator Connections

The greater softness of the front springs made possible by the front wheel suspension system has made variations in the ride regulator setting on the Cadillac models more readily apparent than on previous model cars. For this reason, accuracy is required in making the ride regulator adjustments to give the maximum advantages of the new type springing.

The correct procedure for adjusting the ride regulator control on the "D" series cars differs somewhat from that employed on previous models and deserves close attention.

It is important that all four shock absorbers be in the same position of control at the same time, and operate simultaneously throughout the full range of the hand control on the steering column.

The ride regulator connections are correctly adjusted if the control valve at each shock absorber is in the fully closed position when the regulator handle is in the "firm" position, which is all the way up. To secure this adjustment, proceed as follows:

1. Put ride regulator handle at steering column in the "firm" position, which is all the way up.

2. Disconnect the rod from the control lever at each of the four shock absorbers.

3. Turn each control lever to the fully closed or compressed position. In this position, it should be at an angle of 45 degrees to the center line of the car.

4. If any of the control levers are not in the correct position, they should be readjusted on the control shaft, by loosening the locking screws and turning them to the correct position.

5. Adjust the yokes on the rods at the **right** front and **right** rear shock absorbers so that the control levers are in the fully closed position at the same time, with all slack in the rods taken up.

6. Move the regulator handle up and down two or three times, returning it to the "firm" position. Then check both right-hand control levers to see that they are still in the fully closed position. If not, shorten one or both rods still further.

7. Shorten or lengthen the yoke at the **left rear** shock absorber so that the control lever is in the fully closed position. Again move the regulator handle and again check both **rear** control levers. If the left rear control lever closes before the right, lengthen the left-hand rod rather than shorten the right-hand rod to obtain proper synchronization.

8. Adjust the yoke at the **left front** shock absorber so that the control lever is in the fully closed position. Again move the regulator handle and again check both **left-hand** levers,

9. Make sure that the screws holding the shock absorbers to the frame are tight and that the pivots at the lower ends of the rear shock absorber links are also tight. In order to tighten the shock absorber link pivots properly, the stabilizer links should be temporarily disconnected.

This procedure coordinates the control levers so that the lever on each shock absorber is fully closed when the hand control on the steering column is all the way up in the "firm" position. With all four shock absorbers in the "firm" position at the same time, they will operate simultaneously throughout the full range of control.

It is important that the above order be followed exactly as given, beginning with the yoke adjustment on the right-hand side of the car. Note that after the two right-hand shock absorbers are adjusted, the left rear shock absorber is adjusted to correspond with the right rear, and the left front is then adjusted to correspond with the left rear. Thus, after the two right-hand shock absorbers are adjusted, the remaining shock absorbers are synchronized individually in order with those already synchronized.

Satisfactory shock absorber operation depends largely on tight connections, and on this account all of the shock absorber connections should be tightened whenever any work is done on them. It is particularly important that the shock absorbers themselves be thoroughly tightened to the frame.

3. Removal and Installation of Rear Springs

The removal of the rear springs differs somewhat from that in previous Cadillac and LaSalle cars. To remove a rear spring on Cadillac cars, it is necessary first to disconnect the spring from the rear axle and the rear spring shackle and to remove the nut on the front spring bolt. Then, with the rear end of the spring dropped down, it can be tipped slightly and removed from the front spring bolt. On LaSalle cars it is necessary to remove the front spring bracket in order to remove the spring

eye from the shackle bolt. This bracket is bolted to the frame and is accessible from underneath the car. It is also necessary to remove the rear springs on Cadillac cars for replacement of the rubber bushings at the front end of the springs. All springs are installed in the reverse order of their removal.

4. Removing and Installing Front Springs

To remove a front spring, it is necessary to support the front end of the chassis in addition to raising the front wheel by means of a jack. With this done, first remove the road wheel and disconnect the outer end of the tie rod from the steering knuckle arm. Then disconnect the lower yoke from the lower suspension arm and swing the steering knuckle unit upward out of the way. Next, lower the lower suspension arm far enough to release the helical front spring.

Installation of the front springs may be accomplished by reversing the order of these operations being sure to install the rubber bumper at the top of the spring.

When removing and installing front helical springs, with the engine out of the chassis it will be necessary to block the top of the frame against the ceiling in order to compress the spring for disconnecting or attaching the lower yoke to the lower suspension arm.

5. Installing Spring Insert Between Eye Leaf and Composition Liner

Graphite bronze inserts are used between the eye leaf and the composition liner at both ends of the rear springs on later Cadillac and LaSalle cars. These inserts are the same as the inserts used between the lower leaves, and they serve the same purpose of providing inter-leaf lubrication.

In instances of rear spring squeaks on earlier cars, correction may be made by installing these graphite bronze inserts between the eye leaf and the composition liner of each rear spring. No new inserts are required—remove the lowest inserts from between the leaves on both Cadillac and LaSalle cars. These lower inserts need not be replaced.

To install these inserts in their new location, it is not necessary to remove the springs from the car. The change may be effected easily in the following manner:

1. Remove the metal covers.

2. Spread the leaves which contain the lowest inserts with a screw driver.

3. Push out the inserts and flatten the prongs by which they are held in place.

4. Spread the number 1 and 2 leaves with the screw driver and install the inserts ½ in. from the ends of the second leaf with the graphited side of the inserts next to the eye leaf.

Friction between the ungraphited side of the inserts and the composition liner will hold the inserts in place when the screw driver is removed.

5. Install the covers.

Rear springs should not be lubricated, as lubrication between the leaves will affect the riding qualities of the car and disintegrates the composition liner.

6. Spring Arch

Spring arch is the distance from the center line of the bushings to the surface of the spring seat next to the axle. The spring seat surface is at the bottom of top mounted springs and at the top of underslung springs.

To measure the spring arch invert the spring on a timber or I-beam of sufficient length laid across a platform scale and apply a load by means of a jack braced against a joist or timber above. The load specification for each spring is given in the spring chart.

SPRINGS AND SHOCK ABSORBERS

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Springs				
Type—				
Front	Helical Semi-elliptic	Helical Semi-elliptic	Helical Semi-elliptic	Helical Semi-elliptic
Rear				
Front Springs—				
Length, Free	14-14 5/16"	15 1/8-15 3/4"	15 1/8-15 3/4"	15 1/8-15 3/4"
Diameter, outside	5 3/8"	5 1/2"	5 1/2"	5 1/2"
Rear Springs—				
Length (center to center)	54 1/4"	.....	66"	66"
Series 10 and 20	.....	60"	.....	.....
Series 30	.....	66"	.....	.....
Width	2"	2 1/4"	2 1/4"	2 1/4"
Lubrication	.....	.....	.....	.....
All models—graphite bronze inserts				
Spring shackle type	Threaded	Rubber and Threaded	Rubber and Threaded	Rubber and Threaded

Rear Spring Chart

(See Note 6)

Car Model	Spring Arch *Arch in In.	Spring Arch Load in Lbs.	Number of Leaves	‡Part Number
350				
2-Pass. Cars	7/16-7/8"	1100	9	1096300
5-Pass. Cars	7/16-7/8"	1275	10	1096301
2- and 5-Pass. Cars—Heavy duty springs	7/16-7/8"	1350	10	1096317
355-D—Series 10				
2-Pass. Cars	3/16"	1100	9	1096281
5-Pass. Coupes	3/16"	1250	9	1096280
5-Pass. Cars (except 5-Pass. Coupes)	3/16"	1250	9	1096280
355-D—Series 20				
2-Pass. Cars	3/16"	1100	9	1096281
5- and 7-Pass. Cars	3/16"	1300	10	1096282
355-D—Series 30				
2 Pass. Cars, 5-Pass. Coupes	3/16"	1275	9	1096274
5-Pass. Cars (except 5-Pass. Coupes)	3/16"	1500	10	1096275
7-Pass. Cars (except 154" W.B.)	3/16"	1500	10	1096275
370-D				
2-Pass. Cars	3/16"	1275	9	1096274
5- and 7-Pass. Cars (except 154" W.B.)	3/16"	1600	10	1096278
452-D				
2-Pass. Cars, 5-Pass, Coupes	3/16"	1350	9	1096277
5-Pass. Cars (except 5-Pass. Coupes)	3/16"	1675	10	1096276
7-Pass. Cars	3/16"	1675	10	1096276
355D and 370-D (154" W. B.)	3/16"	1675	11	1096279

*Measure to top of springs.

‡Parts Division numbers apply to springs with covers and appear only on springs furnished for service.

STEERING GEAR

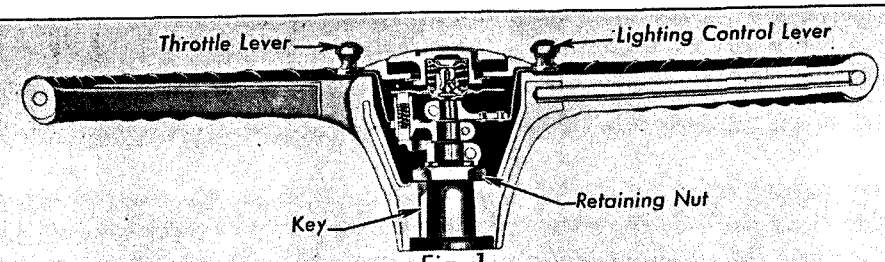
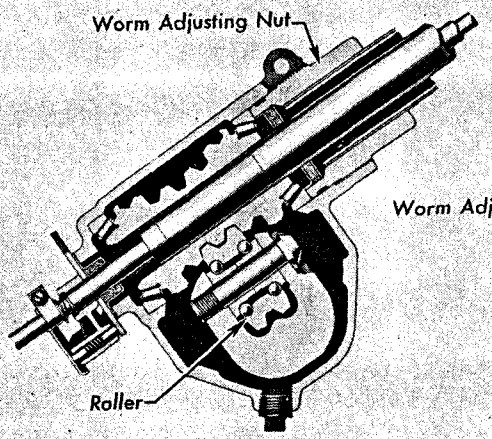
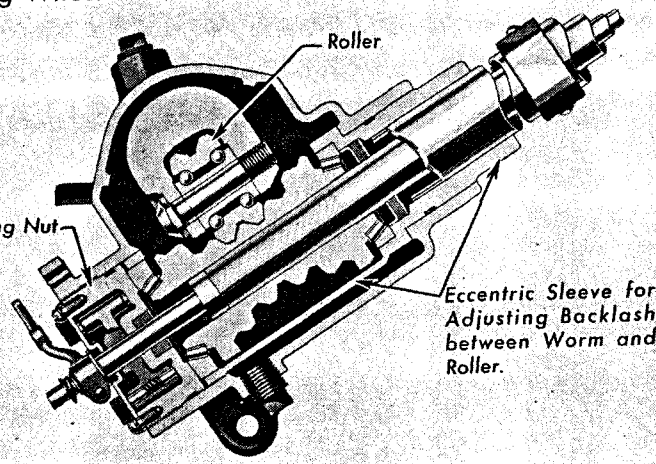


Fig. 1
Typical Steering Wheel and Control





Sector shaft housing differs in some convertible cars to permit supporting steering gear from top of frame

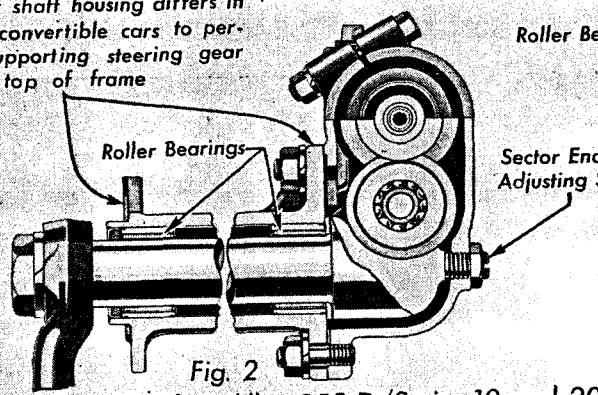


Fig. 2
Sectional Views of Cadillac 355-D (Series 10 and 20) Steering Gear—Typical of LaSalle

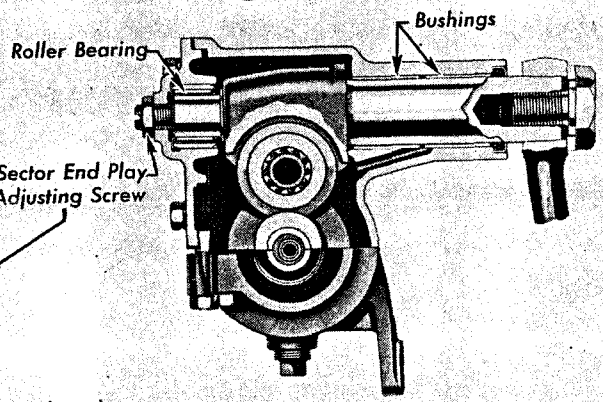


Fig. 3
Sectional Views of Cadillac 355-D (Series 30), 370-D and 452-D Steering Gear

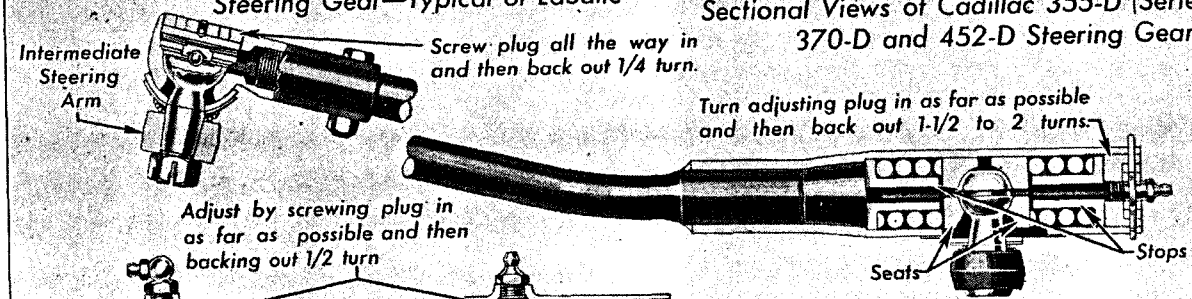


Fig. 4
Sectional View of Cadillac Steering Connecting Rod

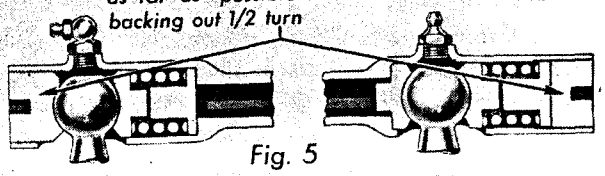


Fig. 5
Sectional View of LaSalle Steering Connecting Rod Ends

Plate 53. Steering Gear and Connections

STEERING GEAR

General Description

Cadillac and LaSalle *steering gears* are of the worm and double roller type, differing in size and other minor details. Two types of steering gears are used. The one used on the Series 10 and 20 Cadillac cars and on the LaSalle is mounted inside of the frame side member in the conventional manner. The other steering gear, used on the Series 30, 40 and 60 cars, is mounted outside of the frame and is inverted with the sector at the top. The construction of the two steering gears is similar with the exception of the provisions for making the adjustments.

The worm in both steering gears is of the conventional hour-glass type. It does not engage directly with the sector but operates the sector through a double-tooth roller. The roller is carried on two rows of ball bearings with the bearing cones clamped in the forked end of the sector by the roller bolt. These bearings take both the radial and thrust loads. The worm is mounted between two tapered roller bearings. Roller bearings are also employed on the sector shaft. See Plate 53.

The steering wheel has three spokes to give full vision of the instrument panel. It has a steel core with the hub, the spokes and the rim welded into one piece. The core is covered with hard rubber composition, which construction gives a sturdy, yet light, easily gripped wheel.

The *steering connections* consists mainly of the usual steering connecting rod together with an intermediate steering arm and two tie-rods. The intermediate steering arm is used to connect the steering connecting rod to the tie-rods. The tie-rods connect the intermediate arm to the steering knuckles in the wheel assembly. This arrangement gives center point steering control.

The tie-rods move independently of each other in accordance with the individual movement of each front wheel, thereby maintaining the proper relationship between these parts. The intermediate arm is simply a right angle arm mounted in the front cross member of the frame. It is carried on tapered roller bearings in Cadillac cars and on ball bearings in the LaSalle.

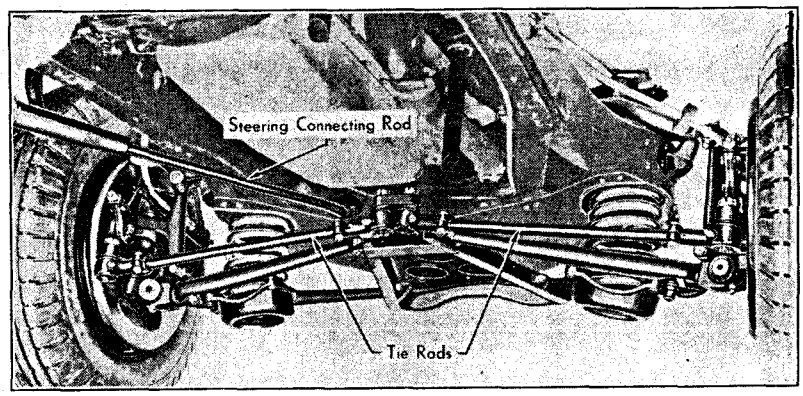


Fig. 6. Two tie rods are used on all cars to connect the intermediate steering arm to the steering knuckle arms. When adjusting toe-in, both tie rods must be adjusted to bring the rear end of the intermediate steering arm at the center of the car with the front wheels in the straight-ahead position.

Service Information

1. Steering Gear and Steering Connection Adjustments

The adjustment for end-play of the worm in the Series 30, 40 and 50 steering gears is located at the bottom as shown in Fig. 3, Plate 53. To make this adjustment it is necessary to loosen the lower clamp and turn the worm adjusting nut, using Tool No. J-632, until the proper tightness of the bearings is secured. Backlash between the worm and roller is adjusted by turning the worm sleeve at the top with Tool No. J-633. This sleeve adjustment is similar to the worm bearing adjustment on the smaller steering gear.

The adjustment for end-play of the worm in the Series 10, 20 and 50 steering gears (Fig. 2,

STEERING GEAR

Tire Inflation	
CADILLAC — ALL SERIES	
All Wheels	35 lbs.
LASALLE	
Front Wheels	25 lbs.
Rear Wheels	30 lbs.

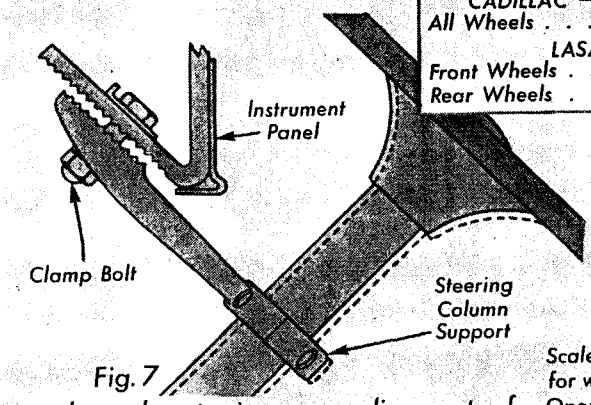
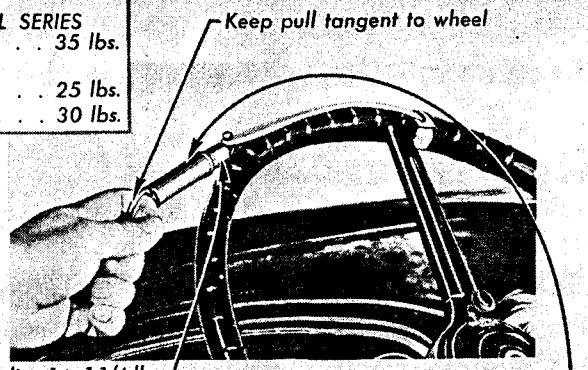


Fig. 7

Binding due to incorrect alignment of steering column can be corrected by adjusting support on instrument board



Scale Reading 1 to 1-1/4 lbs. for worm adjustment. (See Operation 3, Fig. 10)

Tool No. HM-119929

Fig. 8

Checking pull necessary to turn steering wheel

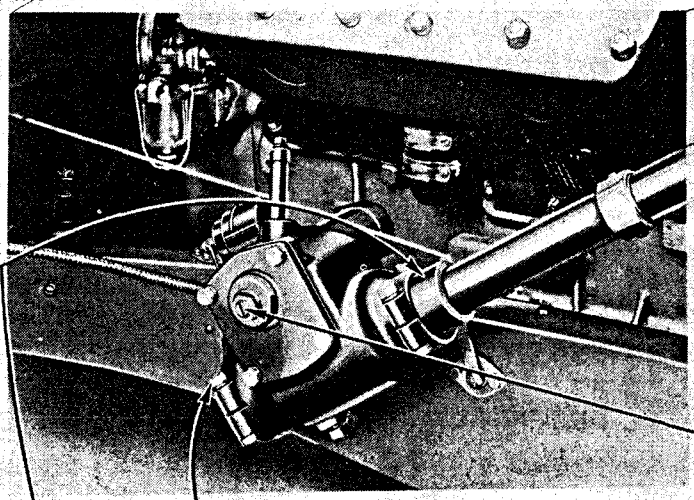


Fig. 9
Steering Gear —Cadillac 355-D (Series 30), 370-D and 452-D

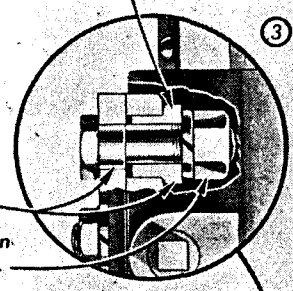
④ Turn eccentric to adjust backlash between worm and roller and to give a pull of 2 to 2-1/4 lbs. on steering wheel with roller on high point. With new gears used less than 1000 miles a pull of 2-1/4 to 2-3/4 lbs. should be necessary.

Backlash between worm and roller should be approximately the same with the steering wheel turned within one revolution from either extreme position.

① Back worm adjusting nut off slightly after loosening clamp bolt.

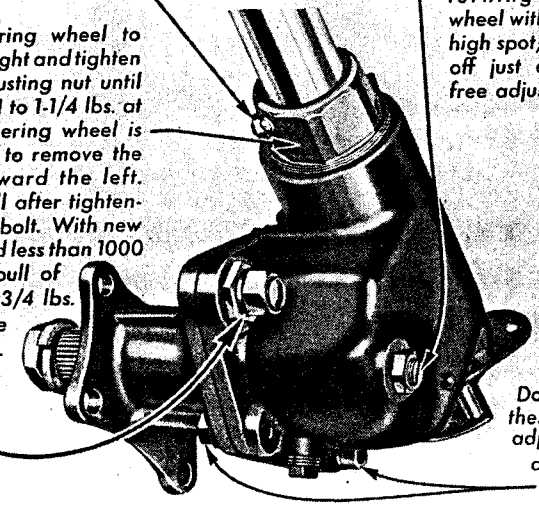
② Turn adjusting screw in against roller shaft until all play is taken up, and slight binding is felt when turning steering wheel with roller off high spot; then back off just enough to free adjustment.

③ Turn steering wheel to extreme right and tighten worm adjusting nut until a pull of 1 to 1-1/4 lbs. at rim of steering wheel is necessary to remove the wheel toward the left. Check pull after tightening clamp bolt. With new gears used less than 1000 miles, a pull of 1-1/2 to 1-3/4 lbs. should be necessary.



To unlock the two eccentrics, use two wrenches and hold both while turning bushing.

Loosen nut 1/6 turn to adjust bushing.



Do not loosen these bolts when adjusting worm and roller backlash.

Note: If front wheels do not point straight ahead when roller is on high point of worm, turn steering connecting rod in or out of intermediate steering arm end on Cadillac cars or adjust the tie rods on LaSalle cars.

Fig. 10— Cadillac 355-D (Series 10 and 20) Steering Gear. Typical of LaSalle

Plate 54. Steering Gear Adjustments

STEERING GEAR

Plate 53) is at the top the same as on previous model Cadillac cars.

An adjusting screw is provided in the side of the housing on both steering gears for regulating the end play in the sector shaft.

To adjust the wheel position with respect to the steering gear on Cadillac cars it is necessary to disconnect the steering connecting rod from the Pitman arm and then turn this rod in or out of the front end attached to the intermediate steering arm as the case may require. On LaSalle cars, the wheel position may be changed by adjusting the tie-rods.

The rear end of the Cadillac steering connecting rod is adjusted by screwing the plug all the way in and then backing it out 1½ to 2 turns using Tool No. J-630. Both ends of the La Salle connecting rod are adjusted in the same manner except that the plugs are backed out ½ turn.

When adjusting the Cadillac steering connecting rod to the proper length, the tie rod end of the intermediate steering arm must be located in the center line of the car and the front wheels must have the proper toe-in and be in a straight ahead position. This is important to insure proper relation of the front wheels, the intermediate steering arm and steering gear.

2. Steering Gear Complaints

In case of complaints on hard steering, first check the front tires to see that they are properly inflated and installed correctly to preserve proper wheel balance. Also check the wheel balance and adjust as necessary.

Hard steering is more often caused by incorrectly adjusted steering connections than by improper steering gear adjustment. Therefore, before adjusting the steering gear to take care of a complaint of hard steering, be sure to check the steering knuckles and connections to make sure that they are not too tight.

If these operations do not correct the difficulty, the steering gear should be readjusted.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Connecting Rod (Drag Link)				
Joint springs—				
Free length	1 1/16"	1.470-1.500"	1.470-1.500"	1.470-1.500"
Pressure in pounds when compressed to ⅞ in.	250-350	.....	.....	.....
1 23/64 in.	.....	265-315	265-315	265-315
Steering Gear				
Ratio (steering gear only) except Series 30	18¾ : 1	22 : 1	20 : 1	20 : 1
Series 30	.....	20 : 1	.....	.....
Steering wheel diameter	18½"	18½"	18½"	18½"
Turning radius—				
Radius of circle swept by outer tire wall of front tire.				
119 in. W. B.	19' 9"	.....	.....	.....
128 in. W. B.	.....	21'	.....	.....
136 in. W. B.	.....	22'	.....	.....
146 in. W. B.	.....	22' 3"	22' 3"	.....
154 in. W. B.	.....	.....	.....	23' 6"
Type	Worm and roller	Worm and roller	Worm and roller	Worm and roller
Unit number location	.....	.....	.....	.....
All models—on top of steering gear housing.				

TRANSMISSION

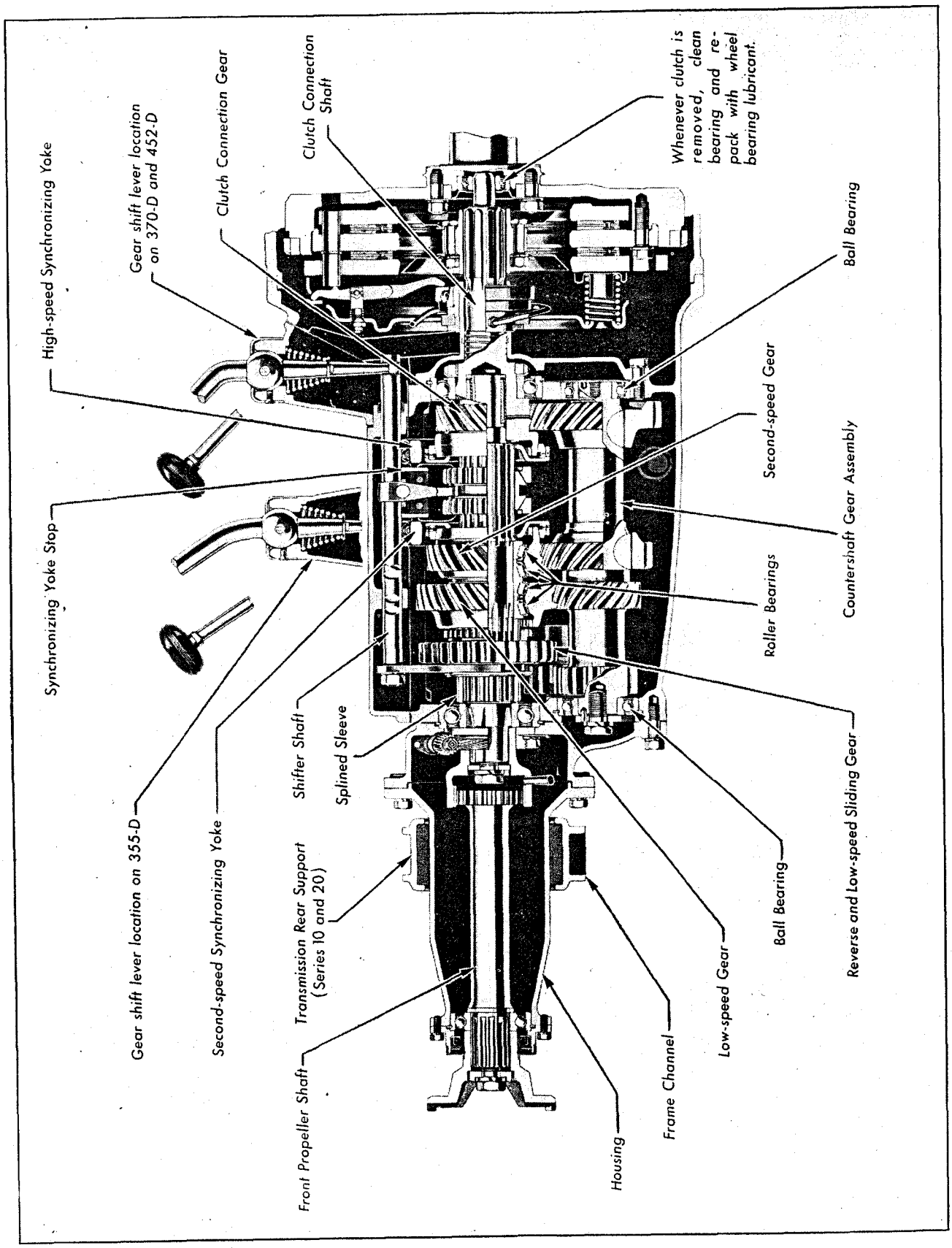


Plate 55. (Fig. 1) Sectional View of Transmission—Cadillac

TRANSMISSION

General Description

Two types of Synchro-mesh transmissions are used. The conventional Cadillac rocking yoke type transmission is used on all Cadillac models, while the inertia type transmission in which the synchronizing drums are operated by detent springs is used on the LaSalle.

The synchronizing mechanism in both type transmissions consists primarily of two cone-type friction clutches, one for second gear and one for high gear. Each clutch consists of a sliding drum lined with a bronze ring and a steel cone on the gear.

The synchronizing drums in the Cadillac transmission are operated by rocking yokes pivoted on eccentrics which are fastened to adjusting quadrants on the outside of the transmission case. These quadrants are graduated as a guide to the amount of movement. Moving these plates up or down shortens or lengthens the yoke travel.

The rocking movement of the yokes is accomplished through cams machined on the shifter shafts. These cams engage the rollers of the two plungers which can be moved up and down in cylinders or dashpots, filled with oil, in the upper part of the yokes.

Synchronization in the LaSalle transmission is accomplished primarily by the use of flat detent springs, located in the splines of the main shaft under the high-and-second-speed coupling and secondly, by bevel faced slots on the coupling coming in contact with cams on the synchronizing drum fingers. The slots in the coupling in passing over these fingers produce the required pressure on the drums to force them in contact with the cones to equalize the speeds of the gears so that engagement of them can be made quietly and without clashing.

The synchronizing mechanism is not necessary on the low and reverse gears because shifting into the low and reverse speed positions is only required when the car is standing still.

Helical gears are used to give complete running silence in all forward speeds, low as well as second and in the LaSalle transmission reverse as well. The teeth of these gears are cut at an angle of 45 degrees (30° for low and reverse on later cars) giving maximum quietness and wear, and are accurately ground and lapped after hardening, insuring quiet operation under all running conditions.

Gear silence is further assured in the Cadillac transmission by the use of large anti-friction bearings which hold the gears rigidly in alignment. The constant-mesh gears on the main shaft run on tapered roller bearings, while the main shaft and countershaft are carried in large ball bearings.

The arrangement of the gear shift lever differs in the Series 40 and 60 cars in that it is mounted forward on the clutch housing. On all other cars this lever is mounted on the transmission cover in the conventional manner.

Two types of shifting mechanism are used on the LaSalle transmission. On early cars, interlocking plates are employed to operate the shifter yokes. The interlocking plates are not used in later cars and the gear shift lever operates in the shifter shafts in the same manner as in the Cadillac transmission.

In the early LaSalle transmissions using the interlocking plates, the shifter shafts are carried in bosses on each side of the transmission case. The low and reverse shaft is on the left, with the shifter fork at the rear end; and the high and second speed shaft is on the right, with the shifter fork just ahead of the center.

The lower end of the control lever actuates the shifter forks through the two interlocking plates in the top cover. See Fig. 2.

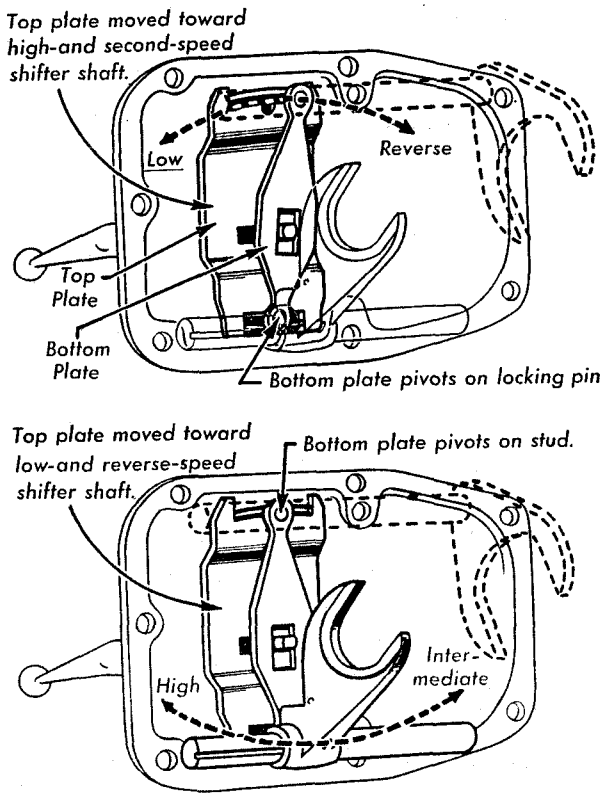


Fig. 2. Drawings showing action of interlock plate in first type LaSalle transmission. The top view shows the movement of these plates when shifting into low or reverse speed and the bottom view shows their movement when shifting into high or second (intermediate) speed.

TRANSMISSION

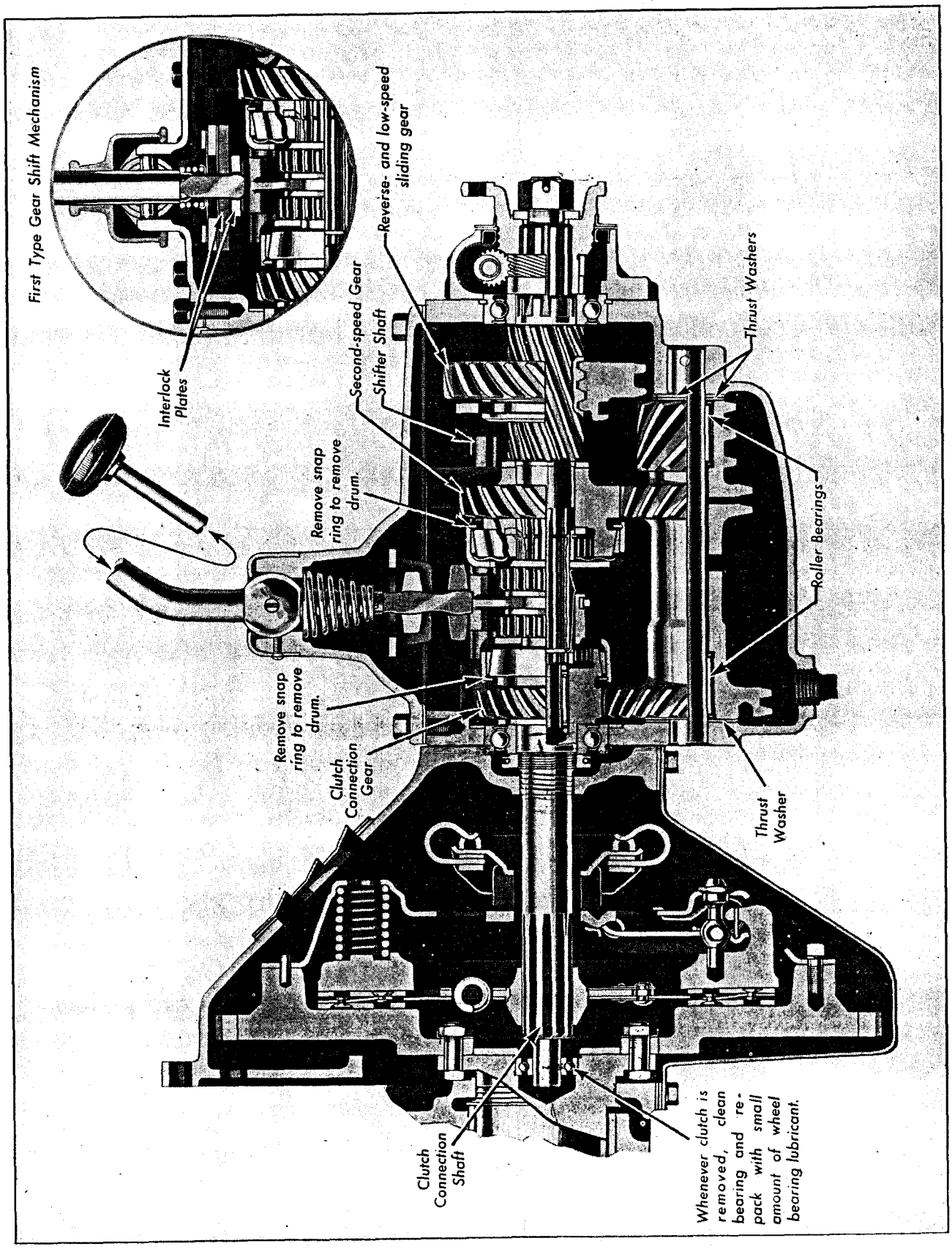


Plate 56. (Fig. 3) Sectional View of Transmission—LaSalle

When shifting into low or reverse, the lower end of the control lever moves to the right and slides the top plate toward the high- and second-speed shifter shaft. This action holds the shaft stationary and makes the shifter fork locking pin act as a pivot for the bottom plate. Forward or backward movement of the control lever then moves the bottom plate and through it moves the low and reverse shifter shaft into either gear.

When shifting into second-speed or high, the lower end of the control lever moves to the left and slides the top plate toward the low and reverse shaft, holding this shaft stationary and making the stud in this end of the bottom plate act as a pivot. Forward or backward movement of the control lever then moves the bottom plate and through it moves the high- and second-speed shaft into either position.

The transmission breather on the Cadillac models is located at the rear end of the transmission on the rear bearing retainer housing. No breather is provided on the LaSalle.

The rear end of the Cadillac transmission is used as an additional point of support for the engine. The LaSalle transmission is supported at the sides instead of at the rear as in the Cadillac cars.

The service operations and adjustments of the transmission are the same on all Cadillac cars. Those on the LaSalle transmission necessarily differ because of the different construction.

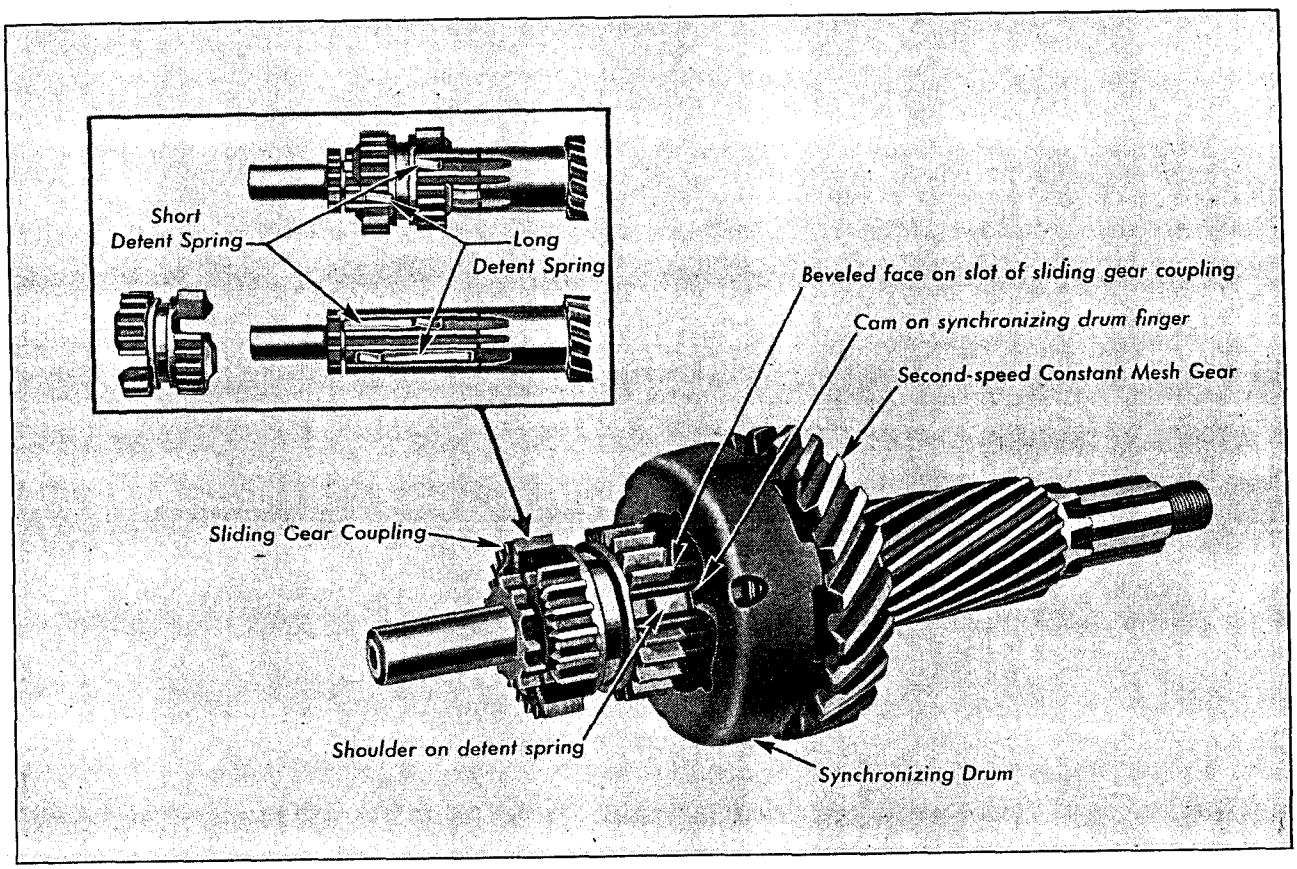


Plate 57. (Fig. 4) Transmission Second-speed Synchronizing Mechanism—LaSalle

Operation of Synchronizing Mechanism in LaSalle Transmission

The operation of the synchronizing mechanism (Fig. 4) in shifting from neutral to second speed is briefly as follows:

When the gear shift lever leaves neutral, it operates the shifter shaft and fork which in turn move the sliding gear coupling back towards the second-speed constant-mesh gear. As the sliding coupling travels rearward on the main shaft, it comes in contact with the shoulders on the second-speed detent springs and carries these springs along with it. The detent springs in moving back contact with the second-speed synchronizing drum and force it in contact with the cone on the second-speed gear. The gear is thereupon rapidly brought to the same speed as the drum.

At this point, further movement of the gear shift lever forces the sliding coupling over the shoulders of the detent springs as the springs have reached the limit of their travel. Continued movement of the gear shift lever moves the coupling further back forcing the beveled faces on the coupling against the cam surfaces on the drum

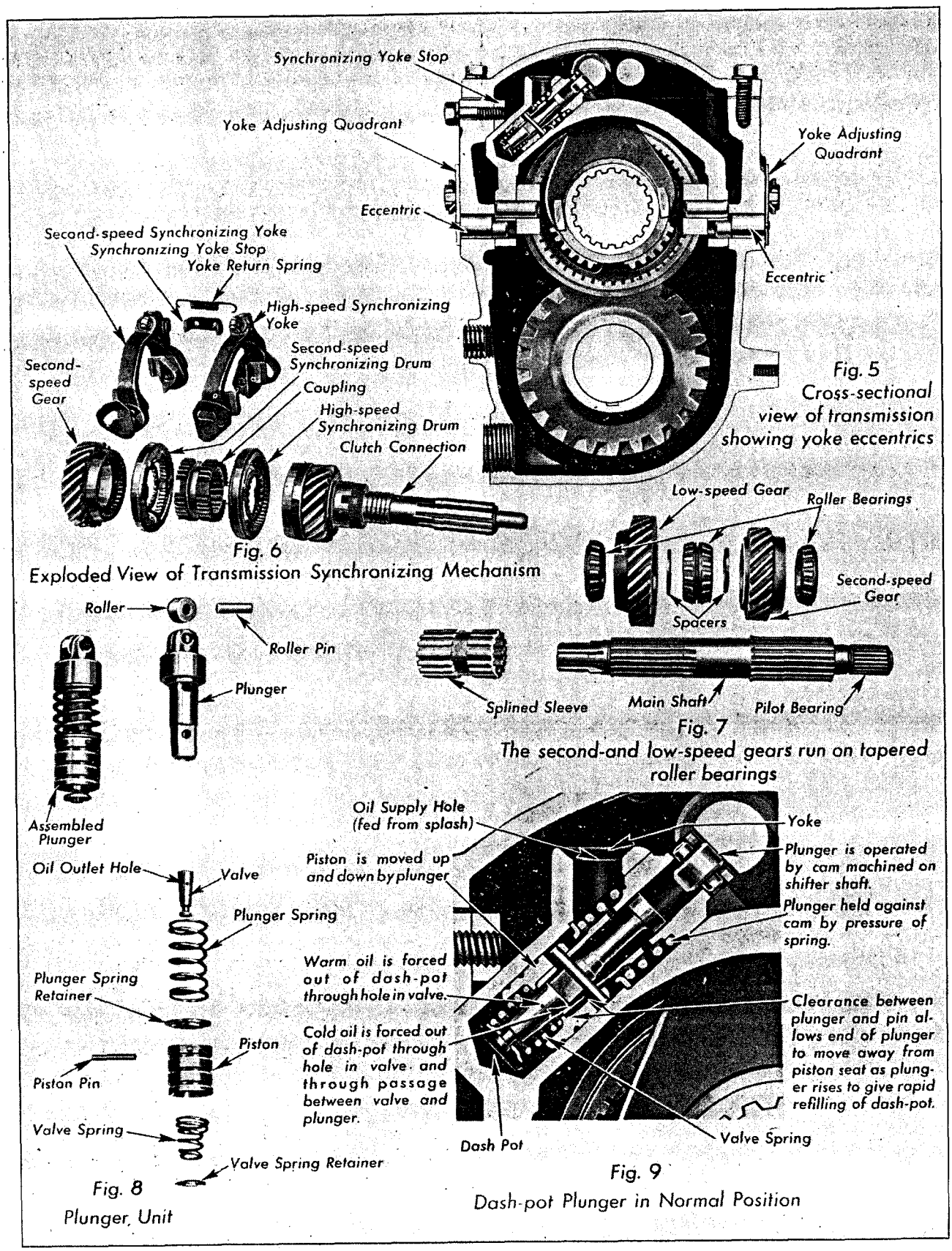


Plate 58. Transmission Synchronizing Mechanism—Cadillac

fingers. This action of the beveled faces on the coupling pushing against the cam surfaces on the drum fingers, forces the drum to turn slightly with respect to the coupling to permit the coupling to slide through the drum slots for meshing with the internal teeth in the second-speed gear. This meshing of the coupling with the second-speed gear internal teeth is accomplished noiselessly because the coupling and the gear are revolving at the same speed.

A similar series of operations take place when the transmission is shifted from neutral to high gear.

Service Information

1. Removing Transmission (See Note 6)

When removing the transmission, it is not necessary to disturb the rear axle as the propeller shaft can be removed by disconnecting the universal joints. The removal of the transmission may be accomplished as follows:

1. (All cars). Disconnect rear universal joint and remove propeller shaft.

2. (Cadillac only). Remove transmission rear support, together with the channel or cross member bolted to the frame, which carries this support.

3. (Cadillac only). Remove front propeller shaft housing together with the front propeller shaft and universal joint. The removal of this assembly is necessary on the larger cars and is recommended on the shorter wheelbase cars in order to lighten the transmission to facilitate handling.

4. (Cadillac only). Disconnect clutch release mechanism.

5. (All cars). Disconnect transmission, pulling it straight back until the clutch connection is all the way out of the clutch hub.

The transmission is installed in the reverse order of operations.

2. Fitting Transmission Dowel Pins

The dowel pins in the crankcase on Cadillac cars are a tight fit instead of a loose fit in the transmission case as on previous models.

If either pin is slightly cocked, it will throw the transmission out of alignment with the crankcase. In such event, the transmission might jump out of high gear.

In case of jumping out of high gear on these cars, the dowel pin hole in the transmission case should be relieved enough so that the pin does not contact with the transmission when in position, but serves simply as a guide pin. In this way, the effect of the dowel pin on the alignment of the transmission will be eliminated.

3. Transmission Requires New Lubricant in Springtime

The lubrication schedule specifies that transmission lubricant should be drained and replaced at the beginning of warm weather.

This is particularly important on synchro-mesh transmissions because if it is not done, the thinned lubricant will affect the operation of the synchronizing mechanism. The transmission may clash if the lubricant is too thin.

In servicing a transmission for shifting, the very first thing to do is to make sure that the proper amount of the correct lubricant is used.

After adding lubricant to the LaSalle 350 transmission, ample time should be allowed before replacing the plug so that the excess lubricant may drain out down to the level of the bottom of the filler hole. If this precaution is not taken, pressure built up in the transmission may force the lubricant into the clutch housing where it may reach the clutch facings.

4. Installation of Speedometer Cable Flange

Two different distances between centers of speedometer driving gear and driven gear are used, one for pinions with 15 to 19 teeth and one for pinions with 20 to 24 teeth. To make this possible, the end of the speedometer cable is eccentric. In one position the cable gives the correct center distance for pinions with 15 to 19 teeth. When revolved 180 degrees the cable gives the correct distance for pinions with 20 to 24 teeth. The flange on the cable end has the figures "15-19" on one side and "20-24" on the other side. The cable should always be turned so that the figures corresponding to the number of teeth on the pinion are on top.

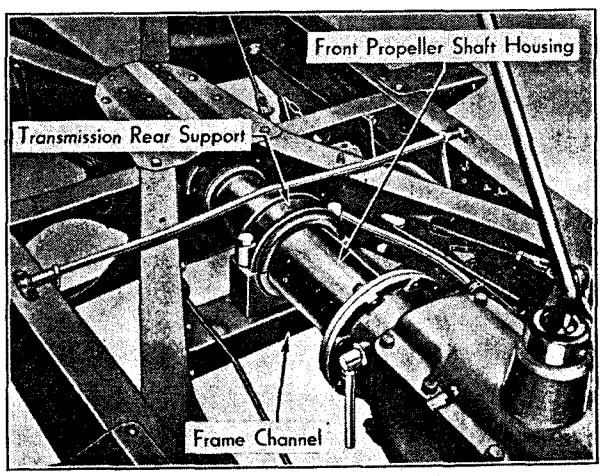


Fig. 10. The frame channel carrying the transmission support on Cadillac cars, must be removed before the transmission can be dismounted.

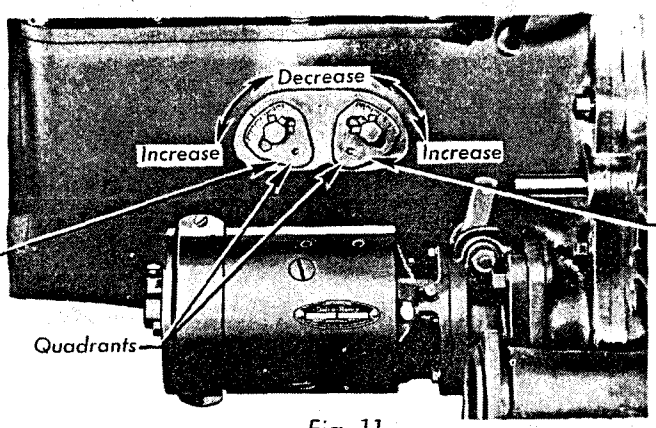


Fig. 11

Quadrants for adjusting yoke travel

To adjust yoke travel, move two quadrants for each yoke equal distances and locate them in same position to keep yoke pivots in proper alignment.

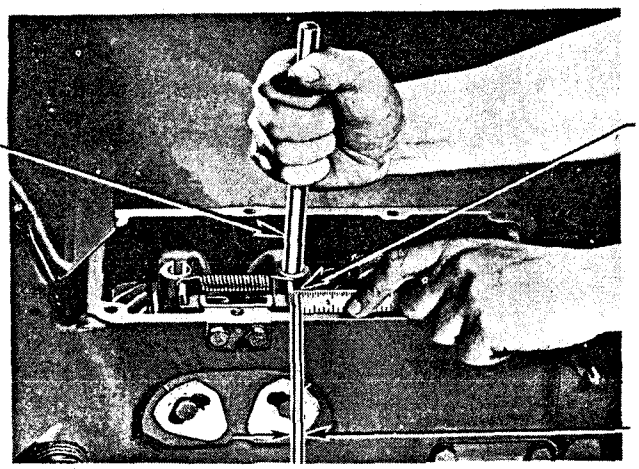


Fig.12

Measuring Yoke Travel

Remove transmission cover to check yoke travel. Adjust yoke travel by moving quadrants as shown in Fig. 11.

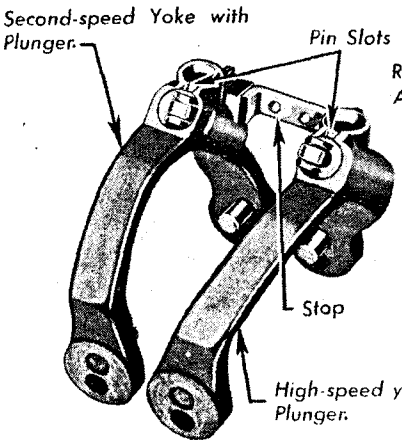


Fig.13

Yoke Assembly

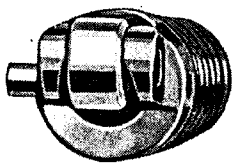


Fig.14

Plunger Unit

Plate 59. Transmission Adjustments—Cadillac

5. Determining Correct Speedometer Gear by Rolling Radius

Occasionally there are owners who desire to install on their cars tires of a different make from standard, or tires of special sizes. Any change in the make or sizes of the tires affects the speedometer reading and, in many cases, a new speedometer gear will be necessary.

It is impossible to specify the correct gear merely from the nominal size of the tire. Tires of various makes differ. It is necessary to know the "rolling radius" in order to determine the correct speedometer gear.

To find the rolling radius of any tire, simply measure the distance from the center of the hub cap of a rear wheel to the pavement.

Before doing this, however, make sure that the tires are inflated to the correct pressure and that the car is weighed down to its normal load.

Once the rolling radius is known, the correct gear can be determined by referring to the specification table.

Speedometer Pinion Chart

Car Model	Gear Ratio	Number of Teeth on Pinion	Part Number	Rolling Radius
350 (Series 50) (7.00 x 16 in. Tires)	4.78 to 1 (Std. on Series 50)	24	553729	13 11/16 to 14 1/16 in. (Fast) 14 1/16 in 14 3/16 to 14 7/16 in (Slow)
355-D (Series 10 and 20) (7.00 x 17 in. Tires)	4.60 to 1 (Std. on Series 10 & 20)	22	848124	14 7/16 to 14 3/4 in. (Fast) 14 3/4 in. 14 3/4 to 15 1/16 in. (Slow)
	4.36 to 1 (Optional on Series 10 & 20)	21	848123	14 5/16 to 14 11/16 in. (Fast) 14 11/16 in. 14 11/16 to 14 7/8 in. (Slow)
	4.80 to 1 (Optional on Series 10 & 20)	23	848125	14 7/16 to 14 3/4 in (Fast) 14 3/4 in 14 3/4 to 15 in. (Slow)
355-D (Series 30) (7.00 x 17 in. Tires)	4.80 to 1 (Std. on Series 30)	23	848125	14 7/16 to 14 3/4 in. (Fast) 14 3/4 in. 14 3/4 to 15 in. (Slow)
	4.60 to 1 (Optional on Series 30)	22	848124	14 7/16 to 14 3/4 in. (Fast) 14 3/4 in. 14 3/4 to 15 1/16 in. (Slow)
370-D (Series 40) (7.50 x 17 in. Tires)	4.8 to 1 (Std. on Series 40)	22	848124	15 to 15 3/8 in. (Fast) 15 3/8 in. 15 3/8 to 15 13/16 in. (Slow)
	4.6 to 1 (Optional on Series 40)	21	848123	15 1/16 to 15 7/16 in. (Fast) 15 7/16 in. 15 7/16 to 15 3/4 in. (Slow)
	5.11 to 1 (Optional on Series 40)	23	848125	15 1/4 to 15 11/16 in. (Fast) 15 11/16 in. 15 11/16 to 16 1/8 in. (Slow)
452-D (Series 60) (7.50 x 17 in. Tires)	4.64 to 1 (Std. on Series 60)	21	848123	15 1/8 to 15 9/16 in. (Fast) 15 9/16 in. 15 9/16 to 15 3/4 in. (Slow)
	4.31 to 1 (Optional on Series 60)	20	848122	14 3/4 to 15 1/4 in. (Fast) 15 1/4 in. 15 1/4 to 15 5/8 in. (Slow)
	4.07 to 1 (Optional on Series 60)	19	848178	14 3/4 to 15 1/8 in (Fast) 15 1/8 in. 15 1/8 to 15 9/16 in. (Slow)

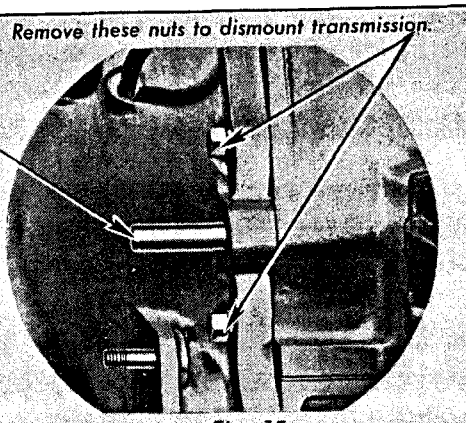


Fig. 15

Removing Transmission from Engine

When reinstalling the transmission, the engine support bolts should be loosened to permit the rubber cushions at all supports to equalize; the support bolts are then readjusted.

Pilots are used for guiding the transmission during its removal and installation to prevent springing the clutch discs.

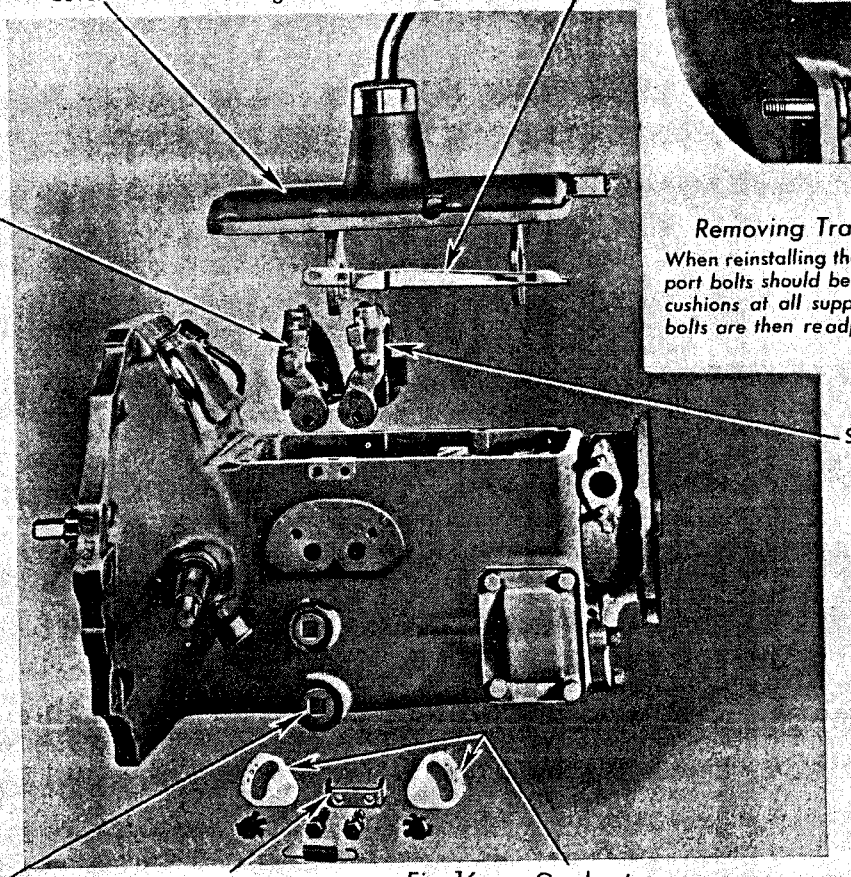
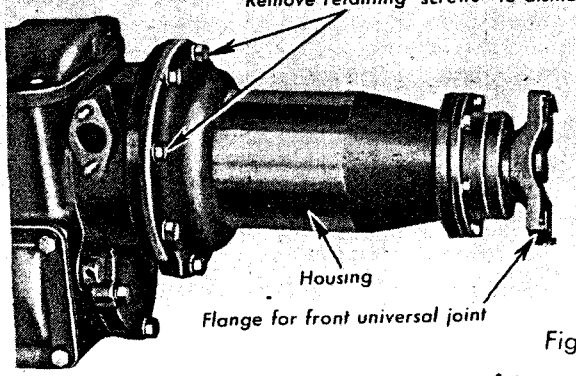


Fig. 16

The first step in disassembling the transmission is to remove the cover and synchronizing yokes. The remaining operations are performed in the manner and order shown in the following illustrations.



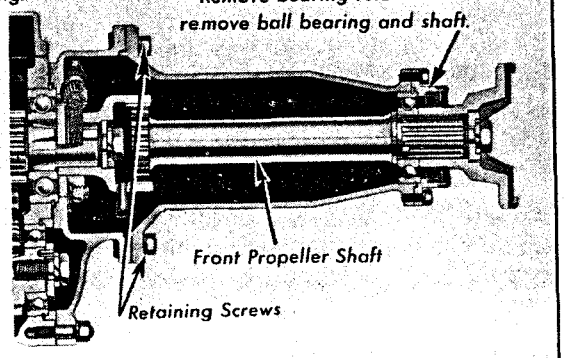


Fig. 17

External and Sectional Views of Front Propeller Shaft and Housing Assembly

Plate 60. Removal and Disassembly of Transmission (Part 1)—Cadillac

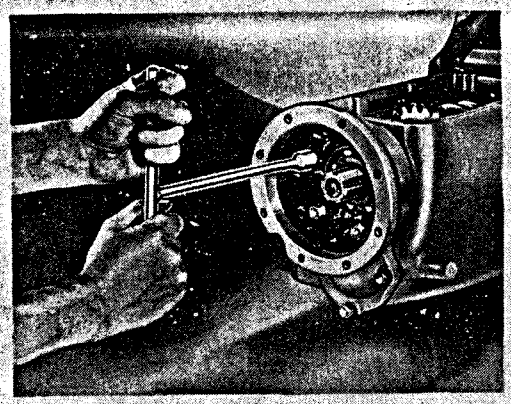


Fig. 18 (Left)
Removing retaining screws to remove universal joint housing

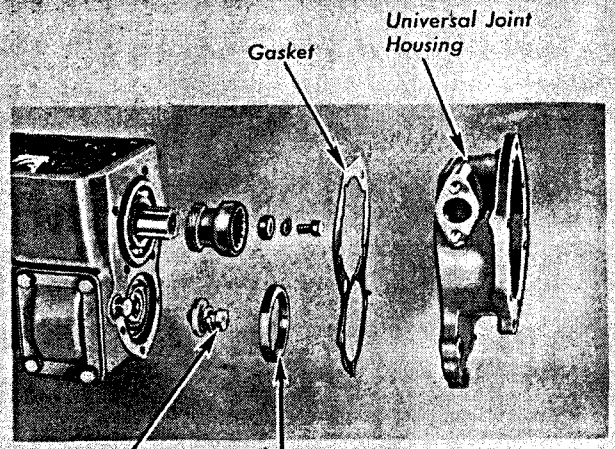


Fig. 19 (Right)
Exploded View of Universal Joint Housing and Countershaft Rear Bearing Washer



Fig. 20 (Left)
Removing Reverse Idler Gear

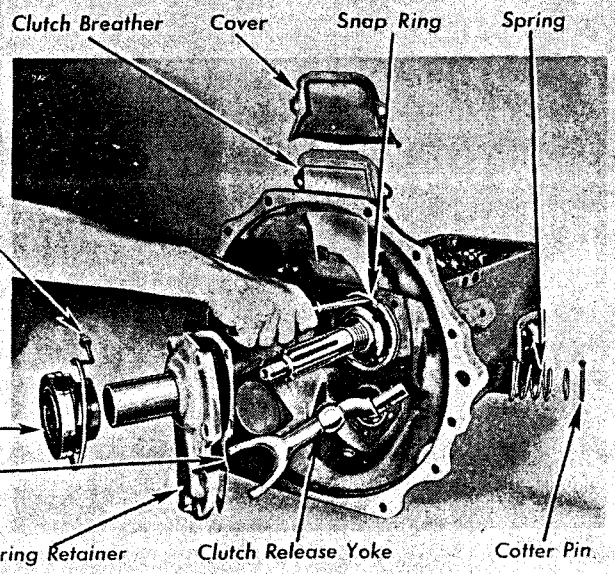


Fig. 21 (Right)
Removing snap ring from clutch connection bearing

Plate 61. Disassembly of Transmission (Part 2)—Cadillac

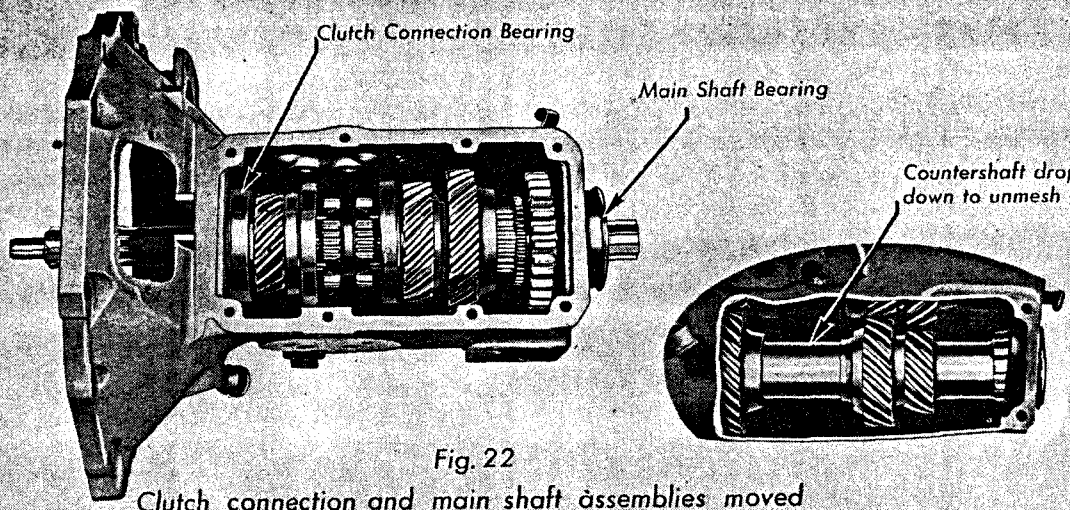


Fig. 22
Clutch connection and main shaft assemblies moved toward rear of transmission case to unmesh gears.

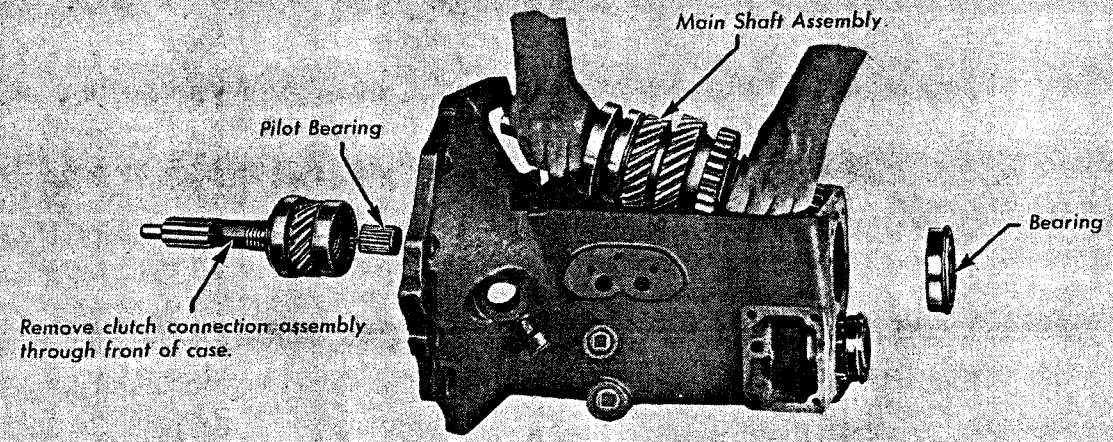


Fig. 23
Removing main shaft assembly from top of case
The main shaft is disassembled by pulling off splined sleeve together with the low-and second-speed gears and bearings.

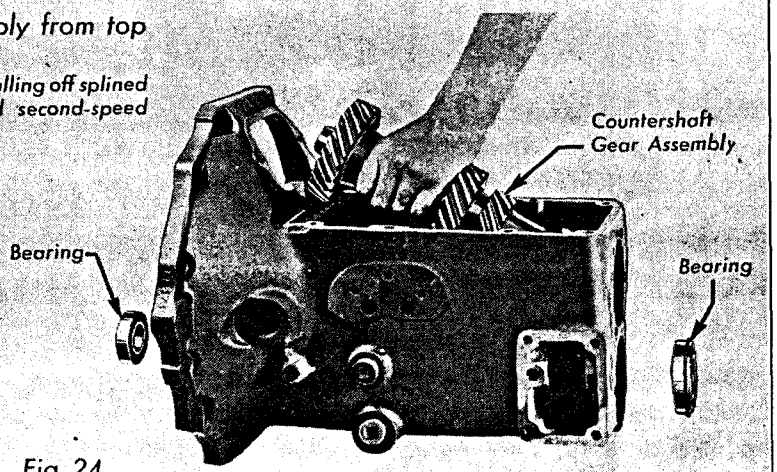


Fig. 24
Removing countershaft gear assembly from top of case

Plate 62. Disassembly of Transmission (Part 3)—Cadillac

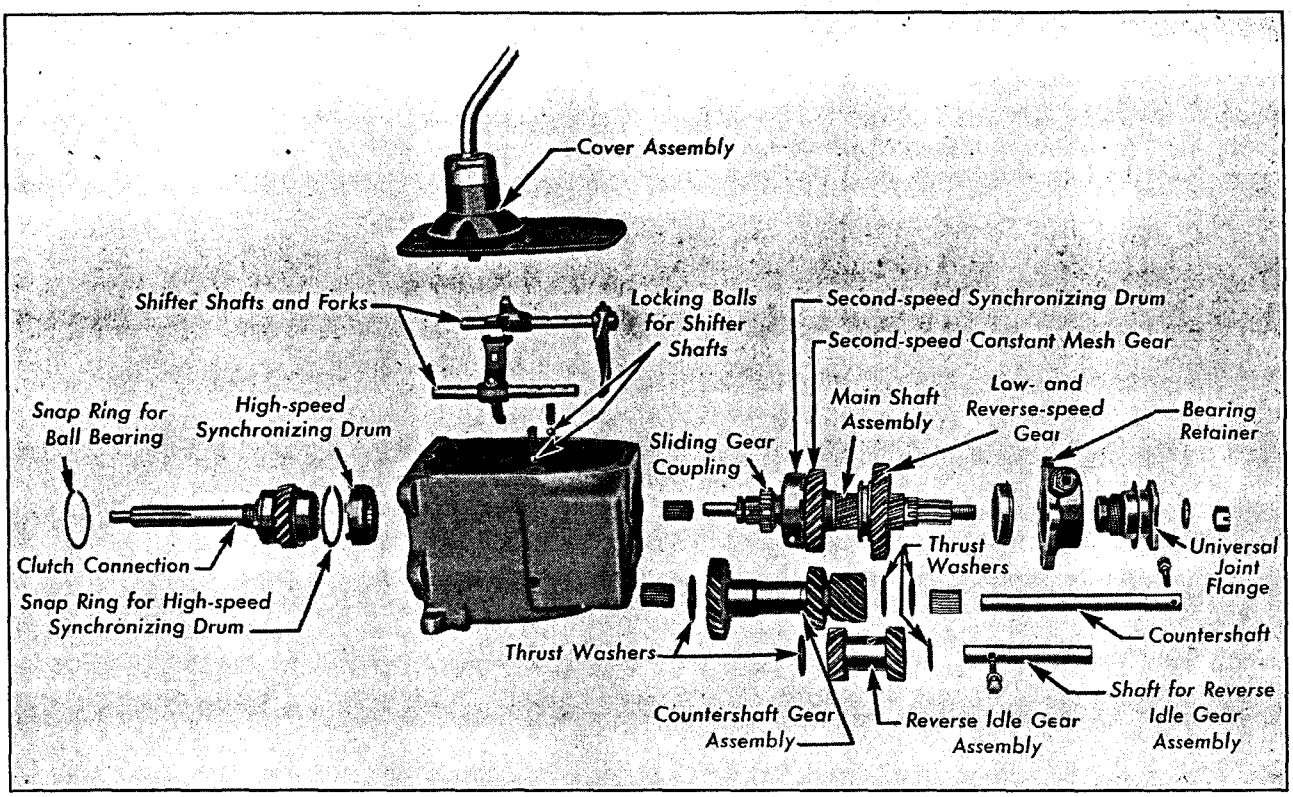


Plate 63. (Fig. 25) Exploded View of LaSalle Transmission

6. Removal and Disassembly of LaSalle Transmission

(See Plate 56 for sectional views of first- and second-type transmissions).

The transmission is mounted on the clutch and flywheel housing and may be removed without disturbing the clutch after first removing the propeller shaft. Precaution should be taken when removing the transmission to keep the clutch connection assembly in position. This assembly is loose in the case and, when the transmission is out of the car it is free to slip out far enough for the four fingers of the high-speed synchronizing drum to pull out of the splines in the main shaft.

As long as the transmission is in high gear this will make no difference because the main shaft turns with the clutch connection and the fingers of the synchronizing drum will therefore always engage with the same splines of the main shaft. If the transmission is not in high gear, however, and this should occur, the clutch connection is free to turn independently of the main shaft and the fingers might easily engage with a different set of splines.

Should this occur, the high-speed synchronizing drum would be rendered inoperative, and it would be necessary to remove the transmission top cover to realign the synchronizing drum with the proper main shaft splines.

For this reason **it is extremely important that the transmission be kept in high gear whenever removing or installing it in the car.** If it is to remain out of the car for any length of time a brace should be installed across the face of the transmission case to hold the clutch connection in place.

Disassembly of the transmission may be accomplished as follows:

1. Drain transmission.

2. Remove cover assembly and the two shifter shaft locking springs.

3. First type transmission—Remove two interlock plates which operate the shifter forks. (See insert Plate 56.)

4. Remove shifter shafts and forks, being careful not to lose the locking balls.

5. Remove universal joint flange and bearing retainer.

6. Remove countershaft, allowing countershaft gear assembly to drop to bottom of transmission housing.

7. Remove snap ring from inner circumference of the high-speed synchronizing drum and move clutch connection gear forward as far as possible.

8. Remove main shaft assembly by pulling back to disengage from clutch connection gear and taking it out through top of transmission housing.

9. Remove snap ring from bearing on clutch connection shaft and remove clutch connection gear assembly by pulling it back and taking it out through the top of the housing.

10. Remove countershaft gear assembly, being careful not to lose the two bronze and one steel thrust washers.

11. Remove reverse idle gear assembly after removing lock screw and driving out shaft, being careful not to lose the two bronze thrust washers.

Disassembly of the main drive shaft assembly may be accomplished in the following manner:

1. Remove low-and-reverse-speed gear.

2. Remove high-speed drum and gear coupling, being careful not to lose the six (three short and three long) detent springs.

3. Remove snap ring in second-speed synchronizing drum and take drum off second-speed gear, being careful not to lose or damage the release spring in the drum.

4. Remove snap ring and take second-speed constant-mesh gear off shaft.

Reassembly of the transmission may be accomplished in the reverse order of its disassembly.

The detent springs should be installed on the main shaft as shown in Plate 57. The long and short detent springs should be alternated around the shaft with the long springs arranged to engage the high-speed drum and the short springs arranged to engage the second-speed drum.

The interlock plates in the first type transmission should be installed with the narrow one at the bottom and the wide one at the top. The lugs on the ends of the narrow plate should also extend upward and the short end of both plates should be toward the high speed shifter shaft.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Gear ratios—				
Low speed	2.68 to 1	2.40 to 1	2.40 to 1	2.40 to 1
Second speed	1.70 to 1	1.47 to 1	1.47 to 1	1.47 to 1
High speed (direct drive)	1 to 1	1 to 1	1 to 1	1 to 1
Reverse speed	2.90 to 1	2.49 to 1	2.49 to 1	2.49 to 1
Lubrication	.....	.....	.....	.....
See Lubrication Section.				
Oil capacity	2½ lbs.	4½ lbs.	4½ lbs.	4½ lbs.
Unit number location	.....	.....	.....	.....
All models—on flange next to flywheel bell housing.				
Mainshaft Assembly				
Clearance between—				
Splines on mainshaft and splineways on drums				
New limits	.....	.0065-.009"	.0065-.009"	.0065-.009"
Worn limit, not over	.....	.015"	.015"	.015"
Splines on mainshaft and splineways in sliding gear coupling				
New limits	.0002-.001"	.0005-.0015"	.0005-.0015"	.0005-.0015"
Worn limits	.005"	.005"	.005"	.005"
Splines on mainshaft and splineways in low and reverse speed gear or sleeve				
New limits	.0002-.001"	.000-.001"	.000-.001"	.000-.001"
Worn limit, not over	.003"	.003"	.003"	.003"
Splines on mainshaft sleeve and splineways in low and reverse speed gear.				
New limits	.....	.0005-.0015"	.0005-.0015"	.0005-.0015"
Worn limit, not over	.....	.005"	.005"	.005"
Clutch connection shaft out of true, not over	.002"	.0025"	.0025"	.0025"
Main shaft out of true, not over	.001"	.0025"	.0025"	.0025"

69 and 70
Missing

WHEELS, RIMS AND TIRES

General Description

The wheels are of small diameter, the rim diameter being 17 inches on the Cadillac and 16 inches on the LaSalle.

Wire wheels are standard on Cadillac cars while disc wheels are standard on the LaSalle, both type of wheels being provided with drop center rims. These rims have a strong section and are free from noise. Detachable discs are furnished for installing on the Cadillac wire wheels to give the appearance of disc wheels.

Spare wheels and tires are carried on Series 10 and 20 cars in fenderwells or on a visible carrier at the rear of the car, which is designed to conform with the new body lines. On all other cars the tires are carried in fenderwells or concealed in the rear deck.

The tires are of unusually large cross section especially designed for the drop center rims. The correct pressure for these tires is 35 pounds front and rear on the Cadillac, and 25 pounds front and 30 pounds rear on the LaSalle. It is important that the pressures be maintained in order to avoid undue tire wear.

JACK PADS

To eliminate difficulty in changing tires, jack pads are conveniently placed at both the front and rear ends of the chassis. The front jack pad is forged on the lower suspension arm. The rear jack pad is located on the rear spring clip back of the axle housing.

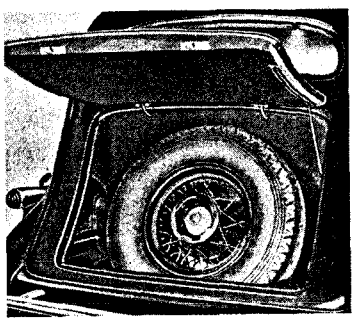


Fig. 5. The spare wheel in the rear compartment of Cadillac cars is clamped to the support with a bolt and clamp which must be removed to remove the wheel

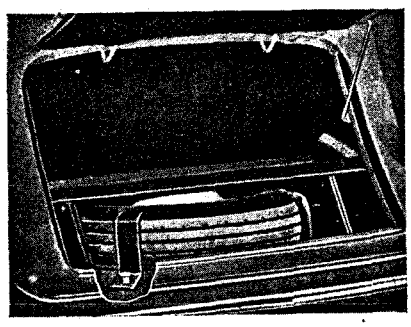


Fig. 6. The spare wheel in the rear compartment of LaSalle cars is held in place with two large clamps

Service Information

1. Removing and Installing Cadillac Wheels

Because of the streamlining of the cars, the openings in the fenders for removing and installing the wheels are somewhat smaller in diameter than the outside diameter of the tires. This, however, will present no difficulties in removing and installing the wheels, provided the proper procedure is followed.

In the first place, raising the wheels at the axle will tend to move the wheel deeper in the fender. For this reason, jack pads have been provided at each of the four wheels, placed at a point where the car will be raised first, allowing the wheels to drop below the upper edge of the fender opening. It is extremely important that the wheel be raised at the jack pad whether in the shop or on the road.

The wheel needs to be raised only enough to clear the road—1½ to 2 inches should be the maximum. This provides ample clearance, and makes it much easier to handle the wheel in mounting and unmounting.

After the wheel is raised, the wheel mounting nuts should be removed and the wheel dropped to the floor. No attempt should be made to draw the wheel straight out of the fender.

For removing rear wheels, after dropping the wheel to the floor, the wheel should be turned slightly, and rolled out toward the rear of the car as shown in Fig. 8. In some cases it may be necessary first to roll the wheel slightly into the front part of the fender before it will clear the rear edge where it is to be rolled out.

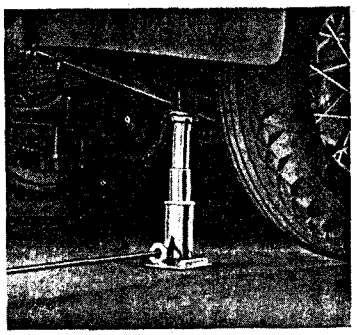


Fig. 7. The jack should be placed under the pad on the spring clip when a rear wheel must be raised.

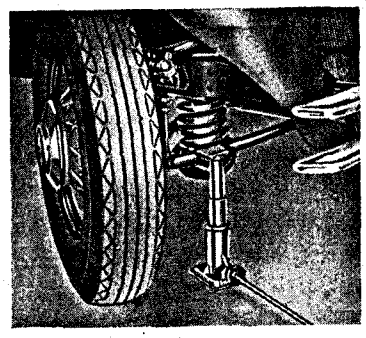


Fig. 9. The jack should be placed under the pad on the lower suspension arm when raising a front wheel.

For removing front wheels, after dropping the wheel to the floor, it should be turned slightly and rolled out toward the front of the car as shown in Fig. 10. If necessary, the front wheel also may be rolled into the rear of the fender, enough to clear the front edge, before rolling the wheel out toward the front of the car.

Mounting of the wheels on the hubs may be accomplished in the reverse of the above procedure.

2. Mounting Wheels

When mounting the road wheels, it is important that the retaining nuts be drawn up evenly so that the wheel rests squarely on the mounting surface before turning the nuts down tight. If this precaution is not taken the wheels may run out slightly, resulting in wobbling and increased tire wear.

The mounting nuts on the wheel should be partially tightened, drawing up the nut directly opposite the one last drawn up until all have been drawn up equally. After all the nuts have been drawn up in this manner they should be securely tightened. If this procedure is followed, there should be no run-out.

In mounting the wheels, provision has been made for holding the mounting nuts securely in place by machining both the cones of the nuts and the sockets of the wheel mounting flange to a slightly eliptical shape. Thus, when the nuts are drawn up tightly and the long axis of the nut cone fits the long axis of the socket, the nut is held securely.

When the nut is being drawn up, an increase in resistance will be apparent as the long axis of the nut is across the short axis of the cone. In some cases the resistance may be sufficient to seemingly indicate that the nut is secure. After the opposite nut has been tightened, however, tension may be reduced sufficiently to permit making another half or even full turn of the first nut.

3. Removing and Installing Large Hub Caps on V-16 Cars

The large hub caps used on 452-D cars are held in place in the same manner as on the previous 16-cylinder cars by lugs engaging the wheel flange. These caps are removed by turning them to the left until the catch is felt to release and then pulling straight out.

To install the hub cap, place it in such a position that the lugs of the cap fit into corresponding notches in the hub and, pressing the hub cap firmly against the wheel, turn the hub cap its full limit —about one sixth of a turn to the right.

It is important that the hub cap be pressed firmly against the wheel when installing in order to compress the sponge rubber in the disc enough to permit the hub cap lugs to catch securely. If the hub cap is not securely caught and turned the limit, it may come off and be lost.

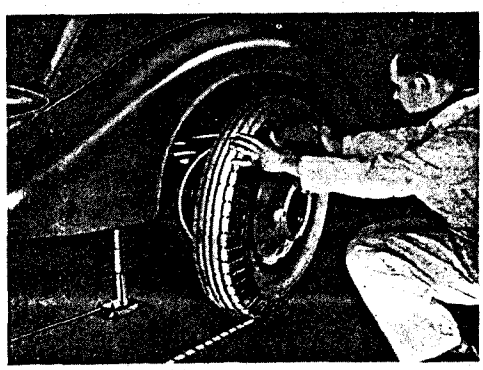


Fig. 8. To remove a rear wheel, it should be pushed in at the front and rolled out toward the rear of the car.

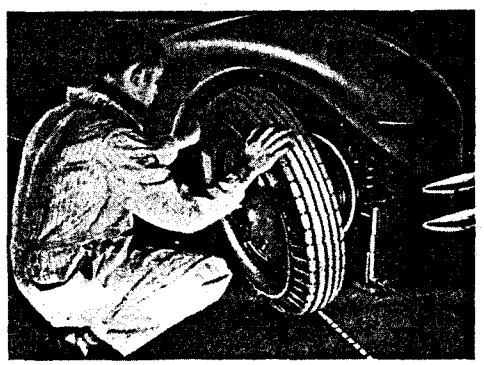


Fig. 10. To remove a front wheel, it should be pushed in at the rear and rolled out toward the front of the car.

4. Removing and Installing Wire Wheel Trim Rings

The removal and installation of the chromium plated trim rings on Cadillac wire wheels requires the use of only two special tools which can be made in any service station.

For removing the rings, all that is needed is a screw driver with the blade bent at a 90° angle about two inches from the end, and ground down to a thin flat edge as illustrated in Fig. 11. By slipping this edge under the ring and prying up at several points, the ring can be easily removed with little or no damage to the finish of the wheel. The ring, however, will usually be damaged beyond repair, necessitating its replacement with a new one.

A padded block (Fig. 12) is all that is required for installing the rings. A block of wood about 6 in. x 3 in. x ¾ in. should be shaped at one end to fit the curve of the ring and this end covered with a piece of leather or felt to protect the ring and the finish of the wheel. The leather or felt should extend high enough along the sides of the block so that there will be no possibility of the wood touching the wheel. Any nails, screws or tacks used to hold the padding should be countersunk to protect the wheel finish.

To install the ring, simply place it in the proper position on the wheel and tap it into place using the block. It should be tapped carefully around the entire circumference to prevent damage. If sufficient care is taken, little or no scratching of the wheel finish should result.

The trim rings on LaSalle wheels are bolted to the wheel discs. To remove these rings, it is simply a matter of dismounting the discs and removing the retaining nuts on the ring bolts.

5. Installing LaSalle Tires

When installing tires on early LaSalle wheels without the valve stem extension, it is important that the valve stem rim nut be drawn up tight to draw the stem as far through the rim as possible. If the nut is not drawn up tight enough, the valve stem may not extend through the wheel disc far enough to permit easy inflating with the usual compressed air chuck.

Later cars have an additional cap or extension, Part No. 115147, installed on the valve stem which allows for easy inflation even when the valve stem rim nut is not drawn up tight enough. This cap may be installed on the early LaSalles in any case where there is a possibility of the tire not being properly installed.

6. Tightening Wheel Discs

The wheel discs on later LaSalle 350 cars are held in place on the wheel by heavier rivets somewhat larger in diameter than those used on early cars to assure a more secure attachment.

In any case where the rivets loosen on early cars, the rivets should be replaced with $\frac{7}{16}$ in.—10 x 24 slotted hexagonal head screws, Part No. 1408281, lock washers, Part No. 120217, and nuts, Part No. 120361.

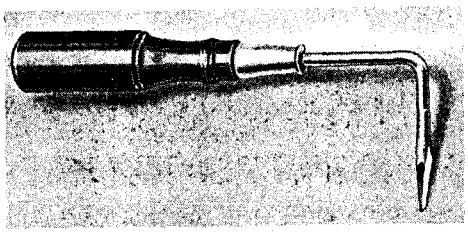


Fig. 11. Bent screwdriver for removing wire wheel trim rings.

7. Front Wheel Bearing Adjustment

The procedure to follow in adjusting the front wheel bearings is first to make sure that the wheel is all the way on the spindle. Then tighten the adjusting nut as tight as possible by hand using a wrench with a handle 12 to 15 in. long, after which back off the nut one third turn or two flats. If the cotter pin cannot be placed in position without changing the adjustment, tighten instead of loosen the adjusting nut until it can be secured with the cotter pin. It is preferable to have the adjustment on the tight side rather than the loose side provided it is not necessary to tighten the nut more than ½ the distance to the next cotter pin slot.

CAUTION: When adjusting the front wheel bearings, care should be taken not to mistake play in the knuckle bolt for play in the wheel bearings.

8. Wheel Alignment

The wheels or tires should not wobble or run-out side-ways more than $\frac{3}{32}$ in. measured on the side walls of the tire with it properly inflated. Such wobble is the result of a bent wheel, looseness in the wheel or steering knuckle bearings or in the steering connections or improper mounting of the wheels. These parts should, therefore, be checked for correct adjustment, proper alignment and wear whenever excessive wobble is encountered.

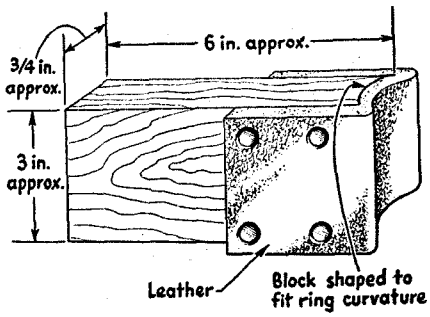


Fig. 12. Padded block for installing wire wheel trim rings.

WHEELS, RIMS AND TIRES

The wheels and tires should also run as nearly concentric as possible with the steering knuckle spindle; that is, they should not run eccentric more than $\frac{1}{16}$ inch. Run-out or eccentricity of the wheels and tires in excess of this amount can oftentimes be corrected by deflating the tire and changing its position on the wheel.

Excessively uneven tire wear on individual wheels is an indication of misalignment or maladjustment.

Normal tire wear, however, is uneven between the front and rear wheels because of the difference in the function of the front and rear tires. For this reason it is advisable to interchange the tires as rights and lefts between front and rear every 4000 miles; that is, the right front tire should be interchanged with the left rear and the left front with the right rear. This has the advantage of reversing the direction which the tire turns at the same time that its position on the car is changed, and thus equalizes the wear by subjecting all tires to equal amounts of all types of wear throughout their useful life. Interchanging the tires in this manner will substantially increase the safe-driving life of the tires.

9. Balancing Tires and Wheels

Tires are usually balanced to offset the weight of the valve stem and if removed the tire tube must be reinstalled in its original position with the valve stem in line with the balancing mark on the outside of the tire, otherwise the tire and wheel will be unbalanced.

The wheel itself should also be in proper balance. This can be effected frequently by shifting the tire around in relation to the tube so that the valve stem will be at the lighter side of the tire. In other cases, it will be necessary to rebalance the wheel itself, using detachable weights, such as supplied by the factory Parts Division, placing them on the light side of the wheel and as nearly under the center of the tire as possible. These weights are made in two styles, one for the rolled edge drop center rim and one for the plain type rim. The part numbers of these weights are as follows:

892498—Balancer for rolled edge rim
1280290—Balancer for plain type rim

To balance a wheel, first remove it from the axle. Then remove the felt washers and clean out the grease from the bearings. Mount the wheel upright on a suitable stand (a steering knuckle clamped in a vise will do) and test the wheel by rotating it slowly, allowing it to stop itself. When the wheel stops, the heavier point will be at the bottom. Mark this point and the uppermost point of the wheel; then turn the wheel until these points are in a horizontal position. Install balancing weights on the light side until the wheel balances in the horizontal position.

When this is accomplished, if the wheel has been balanced with the tire off, the tire must be installed in the proper position to preserve this balance. The wheel bearings should then be repacked with approved wheel bearing grease and the felt washers reinstalled before putting the wheel on the car again.

10. Location of LaSalle Jack Pads

The jack pad on LaSalle 350 rear springs should be about 14½ inches to the rear of the center of the axle housing in order to assure sufficient lift with the jack furnished with the car. In any case where difficulty is experienced in raising the car sufficient to remove and install the wheels, the location of the pad should be checked, and moved to the proper position.

Specifications

Subject and Remarks	LaSalle	Cadillac		
	350	355-D	370-D	452-D
Wheels and Rims				
Brake drum out of round, not over. *Checked with drum mounted on wheel.*	.007″	.007″	.007″	.007″
Rim—				
Type	Drop center	Drop center	Drop center	Drop center
Diameter	16″	17″	17″	17″
Width	4.50″	4.00″	4.19″	4.19″
Tires				
Balancing mark location. *Mark on tire should be placed in line with valve stem.*	.....	.....	.....	.....
Pressure in pounds—				
Front	25	35	35	35
Rear	30	35	35	35
Size	7.00 x 16″	7.00 x 17″	.750 x 17″	7.50 x 17″

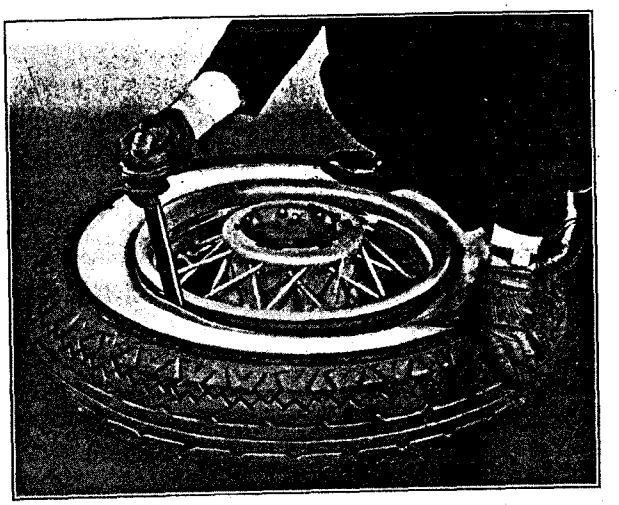


Fig. 13 (Left). Starting the first tire bead over the rim flange

Deflate the tube completely and remove the rim nut on the valve stem. Loosen both beads from the bead seats, using a tire tool if necessary. Stand on the tire, oposite the valve stem, with the feet about 15 in. apart, to force the bead into the rim well.

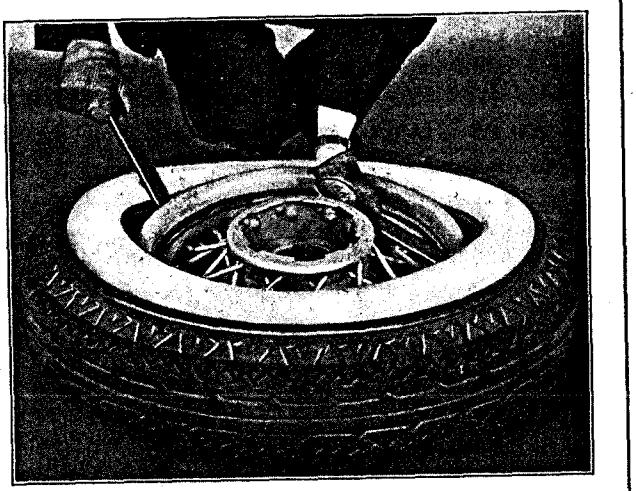


Fig. 14 (Right). Prying short lengths of the first tire bead over the rim flange

Insert two tire tools, about 8 in. apart, between the bead and the rim flange near the valve. Leaving one tool in position, pry short lengths of the bead over the flange with the other until the entire bead has been removed.

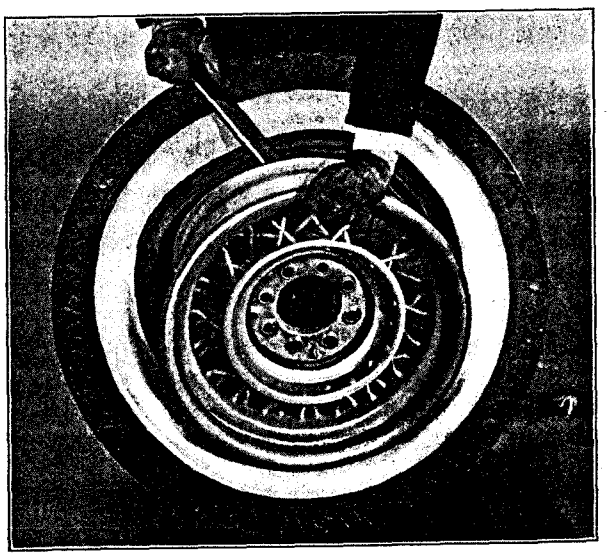


Fig. 15 (Left). Removing the wheel from the second tire bead

Remove the inner tube before attempting to remove the second bead. Raise the wheel to an upright position, insert a tire tool between the second bead and the rim flange at the top side of the wheel and pry the wheel out of the tire. This operation will be simplified if the soft tip of the bead is first coated with vegetable oil soft soap.

Plate 65. Removing Tire from Drop Center Rim

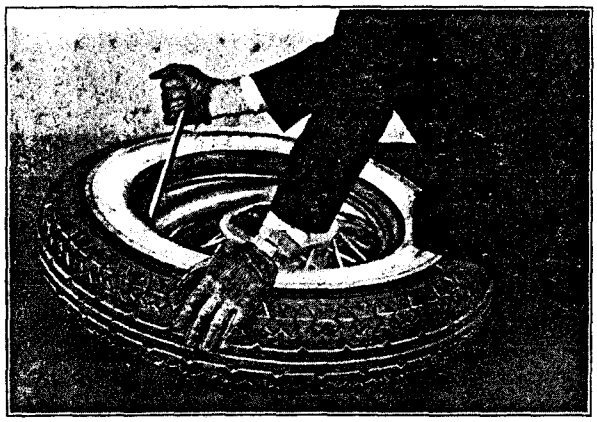


Fig. 16 (Left). Installing the first tire bead over the rim flange

Coat both beads of the tire with vegetable oil soft soap before reinstalling the tire. Inflate the tube until barely rounded out and insert in the tire with the stem at the tire balancing mark. Place the tire on the rim, guiding the valve through the hole, and apply the rim nut loosely. Push the bottom bead down into the well at the valve and force the remaining portion of the bead over the rim flange, using a tire tool if necessary.

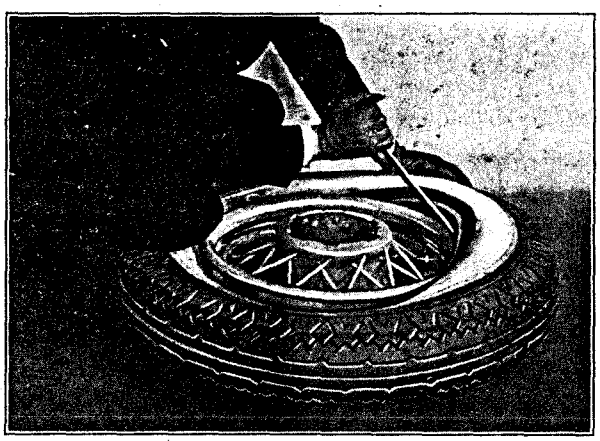


Fig. 17 (Right). Installing the second tire bead over the rim flange

Force the top bead over the rim flange and into the well at the point opposite the valve. Kneeling on this side of the tire to hold it in the well, pry short lengths of the remaining portion of the bead, working around the rim until the entire bead is in place. Always keep as much of the top bead in the well as possible while prying the remainder of the bead.

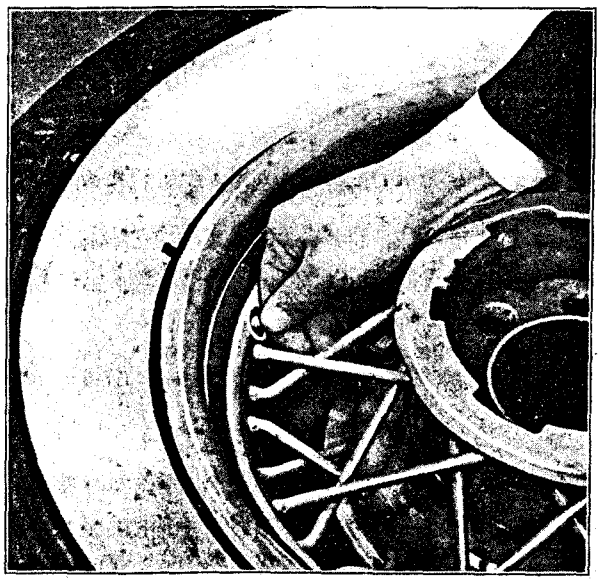


Fig. 18 (Left). Testing tube for pinching

Remove the rim nut and push the valve stem back into the casing as far as possible without letting go of the stem to make certain that the tube is not pinched under the bead; then reapply the rim nut. With the wheel flat on the floor, inflate the tire slowly, making sure that both sides of the tire are centered on the rim.

Plate 66. Installing Tire on Drop Center Rim

COLOR COMBINATIONS

Lacquers are not carried in stock. The factory will secure and ship as quickly as possible any standard colors not available locally, but cannot guarantee the color to be an exact match of that on the car, as all colors may change slightly due to climatic conditions and exposure to the weather.

Series 35-50

x Comb. Code No.	BODY AND SHEET METAL Color Name	Color No.	Mfgr.	WHEELS Color Name	Matching Color No.
75	Black	2462048	Dupont	Black Vincennes Red Ski Green	 20527 020308
76	Admiral Blue	24650534	Dupont	Admiral Blue	24650534
77	Richmond Maroon	24451793	Dupont	Romany Red	20525
78	Meadow Grass Green	24650745	Dupont	Kildare Green—Dark	24650723
79	Shirley Green	24650662	Dupont	Scarab Green	24650537
80	Canyon Gray	24651788	Dupont	Indiana Gray	20157
81	Purvis Gray	24650989	Dupont	Como Blue	24650876
82	Canton Blue	24650661	Dupont	Marquis Blue	943219
83	Diana Cream	24651466	Dupont	Diana Cream	24651466
84	Samerkand Gray	2446224	Dupont	Ski Green Vincennes Red	020308 20527
85	Army Blue	24650469	Dupont	Eton Blue	24650634
86	Regal Maroon	24450721	Dupont	Romany Red Dulux	20525

Series 36-50

87	Black	2462048	Dupont	Black Vincennes Red Gretna Green	 20527 24650784
88	Corinthian Maroon	2446789	Dupont	Cartaret Red	24550852
89	Ridge Green	24651956	Dupont	Gretna Green	24650784
90	Phantom Metallic	20251576	Dupont	Phantom Metallic	20251576
91	Nahkoda Blue	24650679	Dupont	Nahkoda Blue	24650679
92	Rain Green	2464931	Dupont	Rain Green	2464931
93	Carlisle Beige Light	2466828	Dupont	Moon Mist	24650988
94	Dusty Grey	24651073	Dupont	Dusty Grey	24651073
95	Colonial Cream	24650974	Dupont	Colonial Cream	24650794
96	Admiral Blue	24650534	Dupont	Admiral Blue	24650534
97	Antelope Metallic	20251574	Dupont	Antelope Metallic	20251574
98	Vineyard Green Metallic	20252209	Dupont	Vineyard Green Metallic	20252209

Series 36-60

1	Black	2462048	Dupont	Black Vincennes Red Gretna Green	 20527 24650784
2	Regent Maroon	24450721	Dupont	Cartaret Red	24450852
3	Dartmouth Green	24650467	Dupont	Scarab Green	24650537
4	Cannon Smoke	2463337	Dupont	Vincennes Red	20527
5	Tunis Blue	24651995	Dupont	Tunis Blue	24651995
6	Scarab Green	24650537	Dupont	Scarab Green	24650537
7	Arno Blue	2466548	Dupont	Arno Blue	2466548
8	Pomerang Brown	24651997	Dupont	Arno Blue	2466548
9	Classic Blue	2465673	Dupont	Classic Blue	2465673
10	Harlequin Metallic	20251964	Dupont	Harlequin Metallic	20251964
11	Clipper Blue Metallic	20251629	Dupont	Clipper Blue Metallic	20251629

Series 36-70, 75, 80, 85

30	Black	20488	R & M	Black Vincennes Red Gretna Green	 20527 24650784
31	Classic Blue	22290	R & M	Classic Blue	22290
32	Marshall Maroon	20693	R & M	Cartaret Red	24450852
33	Thessalon Green	23367	R & M	Scarab Green	24650537
34	Cannon Smoke	21151	R & M	Vincennes Red	20527
35	Tunis Blue	20230	R & M	Tunis Blue	20230
36	Klamath Green	23468	R & M	Scarab Green	24550537
37	Clio Brown—Dark	28878	R & M	Lamar Tan	28937
38	Pomerang Brown	28941	R & M	Arno Blue	2466548
39	Lochinvar Gray Iridescent	P.S.103	R & M	Vincennes Red	20527

x Code Comb. No. will be found on Body Plate on dash.

UPHOLSTERY CHART NO. 2

Series 35-50, 36-50, 60, 70, 75, 80, 85, 90

Upholstery used on Cushions and Back Rests only - except where bodies are trimmed the same throughout.

Code No.	Description	Trim No.	Part No.	Side Wall Material Trim No.	Side Wall Material Part No.	Headlining Material Trim No.	Headlining Material Part No.
9	Black Leather	1T1336	4066943	1T1336	4066943		
10	Tan Leather	2T1336	4066968	2T1336	4066968		
11	Blue-Gray Leather	4T1336	4066948	4T1336	4066948		
12	Green Leather	5T1336	4068668	5T1336	4068668		
13	Brown Bedford	13T136 or W4725	4065033	15T136	4065039	17T136	4065043
14	Brown Plain Cloth	14T136 or W4726	4065034	15T136	4065039	17T136	4065043
16	Brown Basket Weave	16T136 or W4727	4065035	16T136	4065035	17T136	4065043
17	Taupe Plush	37T136	4066988	37T136	4066988	38T136	4066989
18	Gray Bedford	18T136 or W4729	4065036	19T136	4065040	21T136	4065044
19	Brown Bedford	19T134 or W4556	4046366	15T136	4065039	4T134	4045764
20	Gray Basket Weave	20T136 or W4731	4065037	20T136	4065037	21T136	4065044
21	Brown Figured Cloth	21T135 or W4645	4059488	21T135	4059488	22T135	4059489
22	Light Tan Bedford	22T136 or W4733	4065038	23T136	4065042	24T136	4065045
23	Gray Figured Cloth	23T135 or W4657	4059497	23T135	4059497	24T135	4059498
24	Gray Bedford	20T134 or W4557	4046367	7T134	4045787	24T135	4059498
25	Tan Bedford	37T134 or W4572	4046368	38T134	4045789	39T134	4045792
50	Tan Broadcloth	63T134 or W4594	4046384	63T134	4046384	34T135	4063421
51	Gray Broadcloth	65T134 or W4585	4046386	65T134	4046386	35T135	4063422
52	Tan Bedford	69T134 or W4611	4049301	63T134	4046384	34T135	4063421
53	Gray Bedford	70T134 or W4612	4049272	65T134	4046386	35T135	4063422
70	Black Leather	6T1336	4068669	6T1336	4068669		
71	Tan Leather	7T1336	4068670	7T1336	4068670		
72	Tan Bedford	72T136	4068687	73T136	4068688	74T136	4068689
73	Tan Broadcloth	73T136	4068688	73T136	4068688	74T136	4068689
74	Black Leather	1T1336	4066943	1T1336	4066943		
75	Gray Bedford	75T136	4068690	76T136	4068691	77T136	4068692
76	Gray Broadcloth	76T136	4068691	76T136	4068691	77T136	4068692
77	Taupe Plush	37T136	4066988	37T136	4066988	38T136	4066989
78	Bluish Tan Broadcloth	78T136	4068693	78T136	4068693	79T136	4068694
	Brown Pattern Cloth	1T136 or W4717	4068675	1T136	4068675	4T136	4068678
	Brown Bedford	2T136 or W4718	4068676	3T136	4068677	4T136	4068678
	Brown Plain Cloth	3T136 or W4719	4068677	3T136	4068677	4T136	4068678
	Gray Pattern Cloth	5T136 or W4720	4068679	5T136	4068679	8T136	4068682
	Gray Bedford	6T136 or W4721	4068680	7T136	4068681	8T136	4068682
	Gray Plain Cloth	7T136 or W4722	4068681	7T136	4068681	8T136	4068682
	Tan Plain Cloth	9T136 or W4723	4068683	9T136	4068683	10T136	4068684
	Blue-Gray Figured Cloth	11T136 or W4724	4068685	11T136	4068685	12T136	4068686
	Black Leather	13T1336 or EO.814	4068671	13T1336	4068671		
	Tan Leather	14T1336 or EO.815	4068672	14T1336	4068672		
	Gray Leather	15T1336 or EO.817	4068673	15T1336	4068673		
	Green Leather	16T1336 or EO.816	4068674	16T1336	4068674		
	Brown Bedford	40T134 or W4540	4046376	41T134	4046377	41T134	4046377
	Gray Figured Cloth	46T134 or W4537	4046382	46T134	4046382	12T136	4068686

UPHOLSTERY CHART NO. 2 (Continued)

Series 35-50, 36-50, 60, 70, 75, 80, 85, 90

Upholstery used on Cushions and Back Rests only - except where bodies are trimmed the same throughout.

Code No.	Description	Trim No.	Part No.	Side Wall Material Trim No.	Side Wall Material Part No.	Headlining Material Trim No.	Headlining Material Part No.
	Gray Vogue Cloth	49T134 or W4307	4026545	7T136	4068681	7T136	4068681
	Gray Plain Cloth	51T134 or W4310	4026548	51T134	4026548	52T134	4049261
	Brown Vogue Cloth	55T134 or W4305	4026543	3T136	4068677	3T136	4068677
	Brown Plain Cloth	57T134 or W4308	4026546	57T134	4026546	58T134	4049272
	Tan Plain Cloth	61T134 or W4571	4049275	61T134	4049275	62T134	4049276
	Gray Plush	63T136	4071089	63T136	4071089	21T136	4065044
	Gray Plush	63T136	4071089	63T136	4071089	8T136	4068682

— 1935 —

La Salle, Series 50

(BODY BY FLEETWOOD)

Style		List	Delivered
6330-S	5-Passenger Sedan	$1545.00	

5 disc covered steel wheels standard equipment. U. S. Royal 7.00-16 Black sidewall tires standard equipment

Suggested Minimum Equipment

Torpedo Radiator Ornament	$ 20.00
License Frames	7.00
For Cars with 5 Wheels	
Spare tire and tube	
For Cars with 6 Wheels	
Fender wells, 2 disc covered spare wheels, with tires	90.00

V-8 Cadillac, Series 10

(BODY BY FISHER)

2-Passenger Coupe	$2345.00	
2-Passenger Convertible Coupe	2445.00	
★5-Passenger Convertible Sedan	2755.00	
5-Passenger Town Coupe	2495.00	
5-Passenger Town Sedan	2495.00	
5-Passenger Sedan	2445.00	

Series 20

(BODY BY FISHER)

2-Passenger Coupe	2545.00	
2-Passenger Convertible Coupe	2645.00	
★5-Passenger Convertible Sedan	2955.00	
5-Passenger Town Sedan	2695.00	
5-Passenger Sedan	2645.00	
7-Passenger Sedan	2795.00	
7-Passenger Imperial	2945.00	

5 wire wheels standard equipment.

7.00-17 Black sidewall tires standard equipment.

★ Five Passenger Convertible Sedan list price includes fender wells, 2 spare wheels and tires and folding trunk rack. Not available with 5 wheel equipment.)

Suggested Minimum Equipment

Goddess radiator ornament	$ 20.00
License frames	7.00
For Cars with 5 Wire Wheels	
Spare tire and tube	
For Cars with 6 Wire Wheels	
Fender wells, 2 spare wheels and tires and folding trunk rack	110.00
Wheel discs in color, per set (5)	20.00
Wheel discs in color, per set (6)	24.00

V-8 Cadillac, Series 30

(BODY BY FLEETWOOD)

Style		List	Delivered

Body Styles with Straight Windshield

6033-S	5-Passenger Town Sedan	$3345.00	
6030-S	5-Passenger Sedan	3295.00	
6030-FL	5-Pass. Imperial Cabriolet	3695.00	
6075-S	7-Passenger Sedan	3445.00	
6075	7-Passenger Limousine	3645.00	
6075-FL	7-Pass. Imperial Cabriolet	3845.00	

Body Styles with Modified "V" Windshield

5676	Coupe, with inside auxiliary seats	3895.00	
5635	Convertible Coupe, with inside auxiliary seats	4045.00	
5680	Convertible Sedan, with Imperial partition	4295.00	
5633-S	Special 5-Pass. Town Sedan	3795.00	
5630-S	Special 5-Passenger Sedan	3745.00	
5630-FL	Special 5-Passenger Imperial Cabriolet	4145.00	
5675-S	Special 7-Passenger Sedan	3895.00	
5675	Special 7-Pass. Limousine	4095.00	
5675-FL	Special 7-Passenger Imperial Cabriolet	4295.00	
5612	5-Pass. Town Cabriolet	5495.00	
5625	7-Pass. Town Cabriolet	5595.00	
5691	7-Passenger Limousine Brougham	5495.00	

5 wire wheels standard equipment.

7.00-17 Black sidewall tires standard equipment.

Suggested Minimum Equipment

Goddess radiator ornament	$ 20.00
License frames	7.00
For Cars with 5 Wire Wheels	
Spare tire and tube	
For Cars with 6 Wire Wheels	
Fender wells, 2 spare wheels and tires	130.00
Wheel discs in color, per set (5)	20.00
Wheel discs in color, per set (6)	24.00
Flexible spoke steering wheel	15.00

V-12 Cadillac, Series 40

(BODY BY FLEETWOOD)

Style		List	Delivered

Body Styles with Straight Windshield

6133-S	5-Passenger Town Sedan	$4045.00	
6130-S	5-Passenger Sedan	3995.00	
6130-FL	5-Pass. Imperial Cabriolet	4395.00	
6175-S	7-Passenger Sedan	4145.00	
6175	7-Passenger Limousine	4345.00	
6175-FL	7-Pass. Imperial Cabriolet	4545.00	

Body Styles with Modified "V" Windshield

5776	Coupe, with inside auxiliary seats	4595.00	
5735	Convertible Coupe, with inside auxiliary seats	4745.00	
5780	Convertible Sedan, with Imperial partition	4995.00	
5733-S	Special 5-Pass. Town Sedan	4495.00	
5730-S	Special 5-Passenger Sedan	4445.00	
5730-FL	Special 5-Passenger Imperial Cabriolet	4845.00	
5775-S	Special 7-Passenger Sedan	4595.00	
5775	Special 7-Pass. Limousine	4795.00	
5775-FL	Special 7-Passenger Imperial Cabriolet	4995.00	
5712	5-Pass. Town Cabriolet	6195.00	
5725	7-Pass. Town Cabriolet	6295.00	
5791	7-Passenger Limousine Brougham	6195.00	

5 wire wheels standard equipment.

7.50-17 Black sidewall tires standard equipment.

Suggested Minimum Equipment

Goddess radiator ornament	$ 20.00
License frames	7.00
For Cars with 5 Wire Wheels	
Spare tire and tube	
For Cars with 6 Wire Wheels	
Fender wells, 2 spare wheels and tires	140.00
Wheel discs in color, per set (5)	20.00
Wheel discs in color, per set (6)	24.00
Flexible spoke steering wheel	15.00

V-16 Cadillac, Series 60

(BODY BY FLEETWOOD)

Style		List	Delivered
Body Styles with Straight Windshield			
6233-S	5-Passenger Town Sedan	$6800.00	_____
6230-S	5-Passenger Sedan	6750.00	_____
6230-FL	5-Pass. Imperial Cabriolet	7150.00	_____
6275-S	7-Passenger Sedan	6900.00	_____
6275	7-Passenger Limousine	7100.00	_____
6275-FL	7-Pass. Imperial Cabriolet	7300.00	_____
Body Styles with Modified "V" Windshield			
5876	Coupe, with inside auxiliary seats	7550.00	_____
5835	Convertible Coupe, with inside auxiliary seats	7700.00	_____
5880	Convertible Sedan, with Imperial partition	7950.00	_____
5833-S	Special 5-Pass. TownSedan	7450.00	_____
5830-S	Special 5-PassengerSedan	7400.00	_____
5830-FL	Special 5-Passenger Imperial Cabriolet	7800.00	_____
5875-S	Special 7-Passenger Sedan	7550.00	_____
5875	Special 7-Pass. Limousine	7750.00	_____
5875-FL	Special 7-Passenger Imperial Cabriolet	7950.00	_____
5812	5-Pass. Town Cabriolet	8950.00	_____
5825	7-Pass. Town Cabriolet	9050.00	_____
5891	7-Passenger Limousine Brougham	8950.00	_____

5 Wire Wheels, disc covered, standard equipment.
7.50-17 Black sidewall tires standard equipment.

List Price of Cadillac V-16, series 60, includes either 5 wheel equipment with spare tire or 6 wheels, fender wells and two extra tires. Also Goddess ornament in gold or silver finish, Cadillac Master Radio and Flexible Steering Wheel.

ACCESSORIES

Price List

(Prices include complete installation and Federal Excise Tax)

Cadillac Metal Tire Covers for LaSalle with fender wells	Pair	$35.00
For Cadillac V-8, V-12 or V-16 with fender wells	Pair	40.00
For Cadillac V-8, Series 10 and 20 rear mounting	Each	20.00
Cadillac Metal Cover Mirrors	Pair	20.00
Cadillac Auxiliary Mirror		8.00
Cadillac License Frames	Pair	7.00
Cadillac Moto-Pack		5.85
Cadillac Motor Car Radio—Master		89.50
Cadillac Motor Car Radio—Standard		59.50
Cadillac Steam Heater (Front Compartment)		35.00
Cadillac Trunks and Cases—		
Standard trunk only		85.00
Equipped with 3 standard cases		122.00
Equipped with 4 standard cases		134.00
Equipped with 3 standard long cases		130.00
Equipped with genuine cowhide cases		195.00
Equipped with aerotype linen cases		175.00
Cadillac Fleetwood Trunk and Cases—		
Fleetwood trunk only		95.00
Equipped with 3 standard cases		132.00
Equipped with 4 standard cases		144.00
Equipped with 3 standard long cases		140.00
Equipped with genuine cowhide cases		205.00
Equipped with aerotype linen cases		185.00
Cadillac Lorraine Driving Light		27.50
Cadillac Fleetwood Robe		45.00
Cadillac Double Alpaca Robe		20.00
Cadillac Alpaca and Plush Robe		20.00
LaSalle Steel Tire Chains		8.00
Cadillac Steel Tire Chains—V-8		9.00
Cadillac Steel Tire Chains—V-12, V-16		13.50

(Prices include installation but Excise Tax to be added)

LaSalle Torpedo ornament		20.00
Cadillac Goddess ornament		20.00
Cadillac Wheel Discs		
Set of 5		20.00
Set of 6		24.00
Flexible Spoke Steering Wheel		15.00
Cadillac Fleetwood Trunk Rack		35.00
Cadillac Fleetwood Trunk Rack Platform		15.00

PRICE LIST

◆

LaSalle Series 50

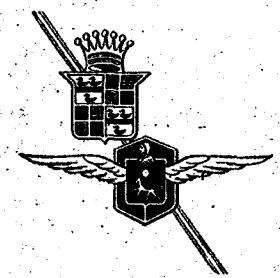
◆

1935

V-8 Cadillac Series 10-20-30

V-12 Cadillac Series 40

V-16 Cadillac Series 60



January 5, 1935

All prices f. o. b. Detroit
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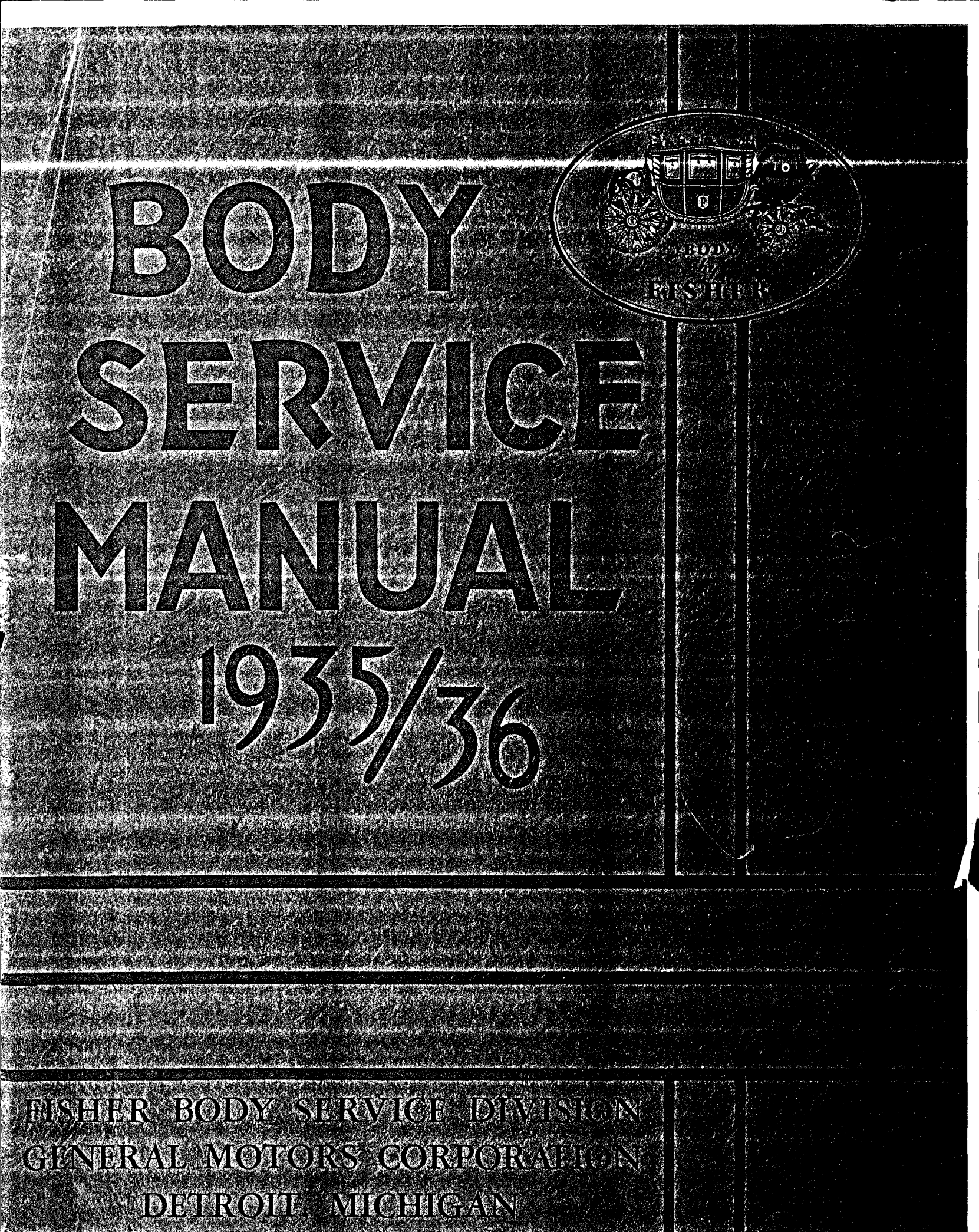
CADILLAC MOTOR CAR COMPANY
Detroit, Michigan, U.S.A.



BODY SERVICE MANUAL 1935/36

FISHER BODY SERVICE DIVISION
GENERAL MOTORS CORPORATION
DETROIT, MICHIGAN

FISHER BODY SERVICE MANUAL

1935-36 CONSTRUCTION

FOREWORD

The 1934 Fisher Body Service Manual covered details of Construction and Service on 1934 and 1935 Models of the Fabric Roof Type Bodies.

When the Fisher Turret Top Type Bodies were brought out there were so many structural changes, radically different from former Models, that it was found necessary to publish this 1935-1936 Manual to cover information on the Turret Top Body Construction and its Service.

The Illustrations and Descriptions apply to LaSalle, Oldsmobile and Pontiac. Generally they will apply to Chevrolet also. Where Chevrolet is constructed differently it will be indicated.

This 1935-1936 Manual presents, in illustrations and detail description, parts and sections of the Body, in such a way that the Repair Man may form his own opinion as to how such parts function, and how to have access to them for Service.

The main part of the Manual covers 1935 Turret Top Construction and Service, and a Supplement in the back of the Manual describes the structural changes in 1936 Models and such service information as is necessary for their maintenance to which the 1935 Section does not apply.

FISHER BODY SERVICE DIVISION

GENERAL MOTORS CORPORATION

DETROIT, MICHIGAN

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Fisher Body Service Manual

1935 and 1936

1935 TURRET TOP BODY CONSTRUCTION

In the 1935 Turret Top Body Construction there are many departures from the former methods of Body Building. Instead of building a Wood Skeleton Framework complete, then applying the Panel Metal Stampings over it and attaching them with nails and screws as in former Models the building of the 1935 Turret Top Body is started in directly the opposite manner.

The Panel Metal Stampings and Metal Braces are fitted together in a Body Jig and welded into one Solid Shell after which the Wood, Upholstery, and Glass Parts are built into this Metal Shell forming a Body.

Such Wood Parts as are used, are for the purpose, mainly of forming Foundations for attaching Upholstery parts, to form Frames for Glass Openings, and to act as Sound Deadeners.

All 1935 Fisher Turret Top Bodies are similarly constructed, the principal differences being in the designing of the Body which necessitates different shapes and sizes of Panels and locations of the Welding Lines. These will be fully covered under the description of the various Units of the Body on Page 7 and subsequent pages.

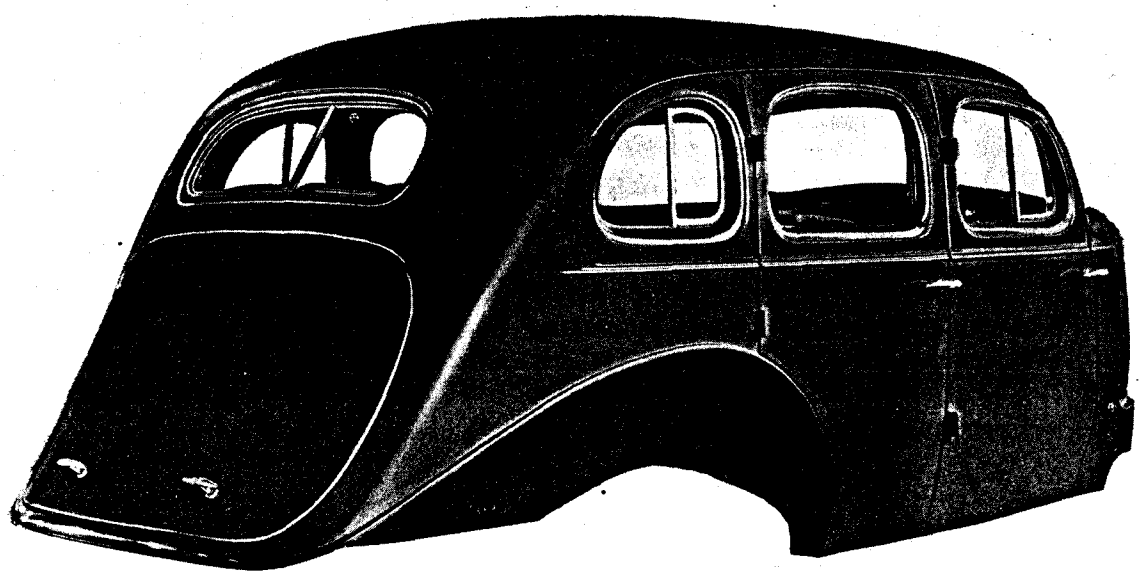

Illustration No. 1
1935 Regular Sedan.

SEDAN

The Luggage Compartment in the Regular Sedan Body Style is built-in with a Shelf for luggage and with a Compartment beneath the Shelf for the Spare Tire. The Lid is supplied with a Locking Handle and adjustable Hinges. (On the earlier 1935 Bodies there were two Locks and two Handles used.) The Lid is sealed against entrance of moisture by having a molded rubber Weatherstrip cemented to and extending entirely around the underside edge of the Lid.

The Body Styles on which this Type of Construction is used are:

35-2009	Pontiac 8 Regular Sedan
35-2109	Pontiac 6 Regular Sedan
35-2109A	Pontiac 6 Regular Sedan
35-3609	Oldsmobile 6 Regular Sedan
35-3809	Oldsmobile 8 Regular Sedan
35-5009	La Salle 8 Regular Sedan

SEDAN TOURING

The Touring Sedan is constructed exactly as the Regular Sedan except for parts that form the Rear Luggage Compartment.

The Designing of this Style Body is such that a Trunk effect is built into the rear of the Body to give more space for Luggage than was possible with the Rear Compartment Construction in the Regular Sedans.

The Rear Quarter Panels are extended to form the sides to which the Roof Panel and Rear End Panel are welded forming a Trunk Opening that is later fitted with a Trunk Lid.

The Construction of the Front End Assembly is, with very few exceptions the same on all Sedans, Coaches, and Closed Coupes.

The Trunk Lid is provided with a molded rubber Weatherstrip and has exposed Hinges. The Trunk Locking Device is similar to the one used on the Regular Sedan.

The Body Styles on which this type of Trunk Construction is used are:

35-2019	Pontiac 8 Touring Sedan
35-2119	Pontiac 6 Touring Sedan
35-2119A	Pontiac 6 Touring Sedan
35-3619	Oldsmobile 6 Touring Sedan
35-3819	Oldsmobile 8 Touring Sedan
35-5019	La Salle 8 Touring Sedan
35-1019	Chevrolet Master Touring Sedan

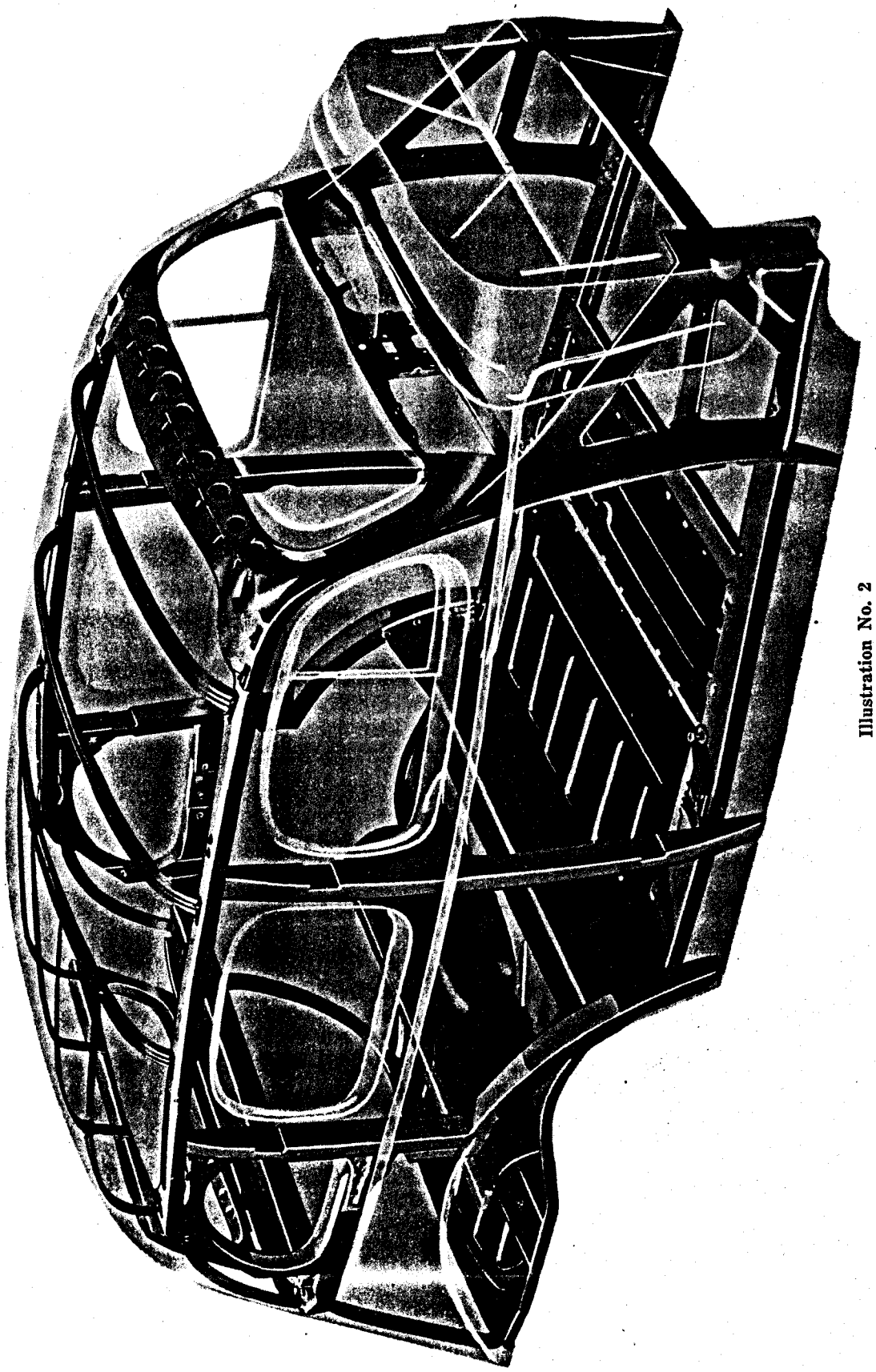

Illustration No. 2
Phantom View of Regular Sedan.

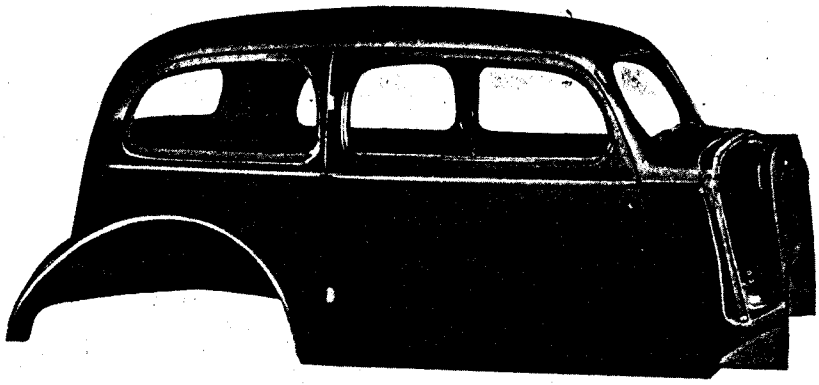

Illustration No. 3
Chevrolet Coach.

COACH

The Coach and Touring Coach Body Shells are alike in every way except the Rear Luggage Compartment.

The Touring Coach is designed with a built-in Trunk instead of a Rear Luggage Compartment.

These features on the Coaches are similar to those on the Sedans.

The Coach Front End Assemblies are identical with Sedans and Closed Coupes. On the Six Cylinder Cars, the Body has a Bucket Type Seat for driver and passenger, while on the Eight Cylinder Car, a divided back full Front Seat is standard.

The main differences of construction between the Coach and Sedan are in the Rear Quarter Section. The Coach has a wider (adjustable) Rear Quarter Window with one wide Door instead of two narrower Doors as in the Sedan. The fact that the Coach Rear Quarter Window is adjustable, means that there must be a water drain provided as is illustrated on Page 47. NOTE—This Drain is not provided on Body Styles with Rear Quarter Window Ventilator Assemblies.

COACH

35-2001	Pontiac 8 Regular Coach
35-2101	Pontiac 6 Regular Coach
35-2101A	Pontiac 6 Standard Coach
35-3601	Oldsmobile 6 Coach
35-3801	Oldsmobile 8 Coach

COACH TOURING

35-1011	Chevrolet Master Touring Coach
35-2011	Pontiac 8 Master Touring Coach
35-2111	Pontiac 6 Master Touring Coach
35-2111A	Pontiac 6 Standard Touring Coach
35-3611	Oldsmobile 6 Touring Coach
35-3811	Oldsmobile 8 Touring Coach
35-5011	La Salle Coach

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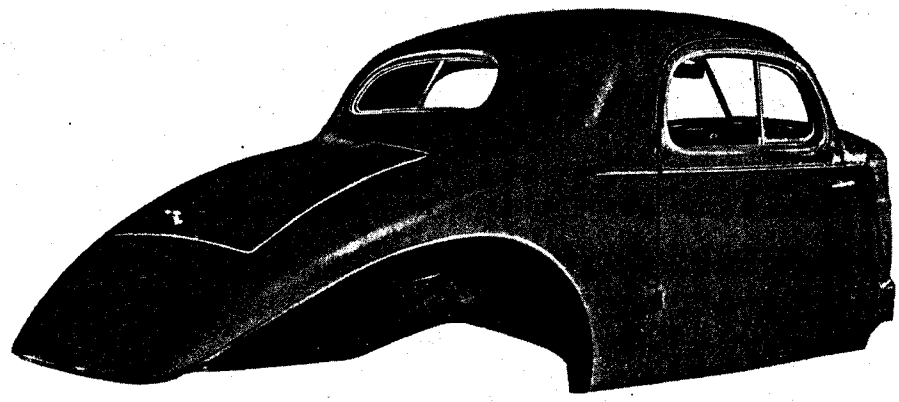


Illustration No. 4
Coupe.

COUPE

The Two Passenger Business Coupe is constructed with the same Front End as is used in the Sedans and Coaches. The Deck Opening at the rear is provided with a gutter and drain pipe, while the Rear Deck itself is designed to form a large luggage Compartment. The Deck Lid is weatherproofed with a molded rubber gasket attached to the under side of the Lid and is hinged with concealed type Hinges to the Deck Upper Bar. The Lock and Locking Handle actuate the Lock Bolt to the Striker Plate which is attached to the Deck Lower Bar. An additional space for spare tires and luggage is directly back of the Seat.

The Body Panels are all welded together into a unit and nailed around the Deck Lid Opening Frame which is formed by: Two Wood Deck Side Rails, and the Deck Upper and Deck Lower Bars. The Drain Gutter in the Deck Opening is nailed to these Rails and Bars. The Rear Quarter Panel is nailed to the Body Hinge Pillar at the Door Opening.

35-2007	Pontiac 8 Business Coupe
35-2107	Pontiac 6 Business Coupe
35-2107A	Pontiac 6 Standard Business Coupe
35-3607	Oldsmobile 6 Business Coupe
35-3807	Oldsmobile 8 Business Coupe
35-1207	Chevrolet 6 Standard Business Coupe
35-1207A	Chevrolet 6 Standard Business Coupe

COUPE (SPORT)

The Two Passenger Sport Coupe is similar to the Business Coupe except that the Deck Lid is hinged at the lower edge to brackets supported by the Floor instead of at the Deck Upper Bar as in the Business Coupe. *(See Illustration No. 116.)*

The Deck Lid is upholstered to form a Back Rest and a Rumble Seat Cushion is installed on the Seat Risers on the Floor. The Rear Quarter Panels cover the side of the Body from the Door Opening to the Rear End Panel.

The Deck Lid of this Style Body is similar in shape and size to the Business Coupe Lid.

The Body Panels are similar in both Styles and are constructed and attached in a similar fashion.

SPORT COUPE SOLID QUARTERS (RUMBLE)

35-2057 Pontiac 8 Sport Coupe
35-2157 Pontiac 6 Sport Coupe
35-3657 Oldsmobile 6 Sport Coupe
35-3857 Oldsmobile 8 Sport Coupe
35-5077 La Salle Sport Coupe
35-1057 Chevrolet Master Sport Coupe
35-1257A Chevrolet Standard Sport Coupe

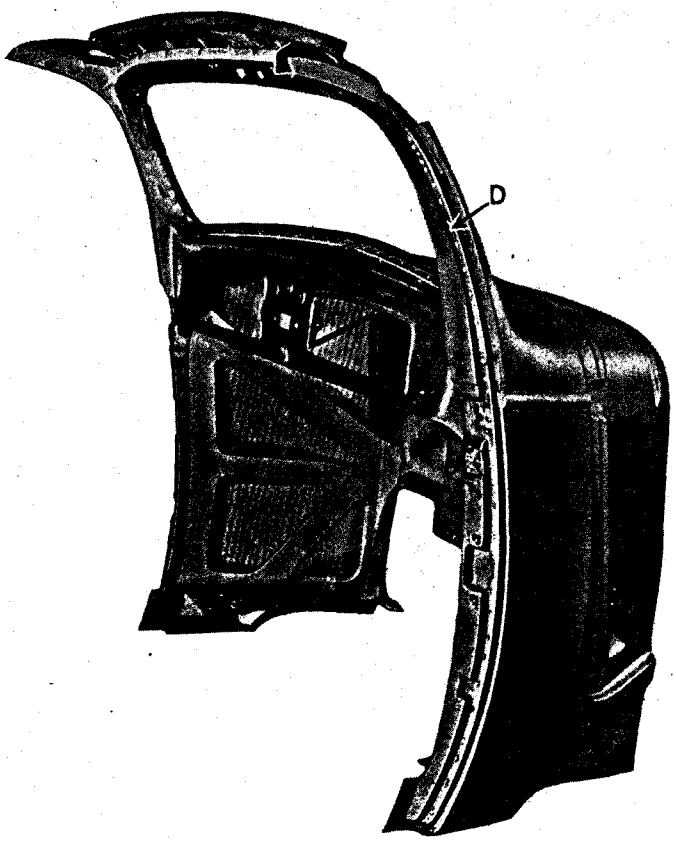


Illustration No. 5
Front End Assembly.

BODY FRONT END ASSEMBLY

The Body Front End Assembly for the 1935 Fisher Turret Top Bodies is that section of the Body forward of the Front Doors and reaches from the Roof to the Sills as shown in Illustration No. 5. It is composed of several Steel Stampings and formed Steel Braces which are welded and riveted together to form a single unit known as the Body Front End Assembly.

To describe the construction of this unit, it is necessary to divide these component parts into two main groups:

1. Front End Frame Parts.
2. Front End Outer Panels. (Cowl and Dash.)

FRONT END FRAME

The Frame of the Front End Assembly is composed of five major parts:

Front End Frame Upper.
Front End Frame Side Brace, Right and Left.
Front End Frame Leg, Right and Left.

The Front End Frame Upper *(See Illustration No. 6)* is a steel stamping that has the following characteristics:

It forms the Windshield Opening.

It forms the base to which the Windshield Garnish Molding is screwed.

It forms the Instrument Panel.

It forms the Facings of the upper portions of both Front Pillars.

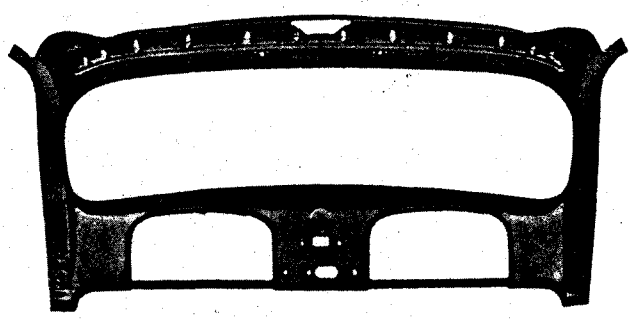


Illustration No. 6
Front End Frame Upper.

It forms the Windshield Header Panel.

It forms the anchorage for the Headlining Tacking Strip at the front.

It is the base to which the Cowl Panel, Roof Panel and other parts are welded.

In short, this Front End Frame Upper is an important part for it serves many purposes in the upper portion of the Body Front End Assembly. It is torch welded to the Metal Roof Side Rails *(See Illustration No. 10 at A)* and welded likewise to the Front End Frame Leg in *Illustration No. 9 at A.*

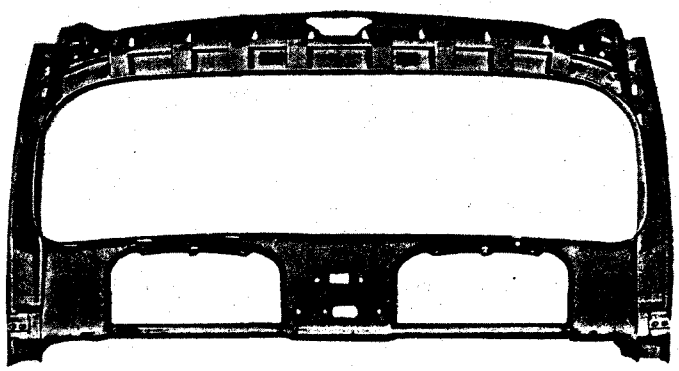


Illustration No. 7
Reverse View of Front End Frame Upper.

The Front End Frame Side Brace, *(See Illustration No. 8)* is a triangular steel stamping designed to brace the Front Body Pillar to the Dash and Sill. It is electrically spot welded to the Front End Frame Upper (Instrument Panel) to the Front End Frame Leg and to the Dash. It is bolted and screwed to the Main Side Sill. *(See Illustration No. 9 at C.)* The Toe Board Brace is also spot welded to it and to the Dash.

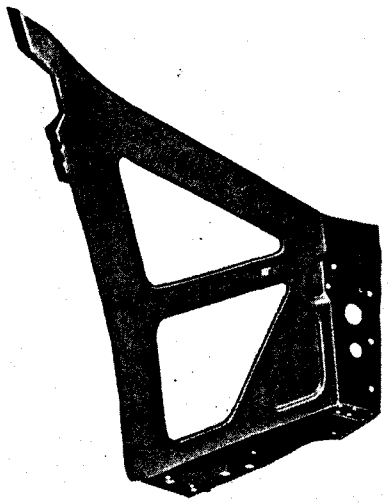


Illustration No. 8
Front End Frame Side Brace.

The Front End Frame Leg is a steel stamping that reaches from the Front End Frame Upper *(See Illustration No. 9 at A)* to the sill at "B". This stamping forms the lower half of the Front Body Pillar Facing to which the Front End Side Brace and the Cowl Side Panel is spot welded, forming the lower portion of the Front Body Pillar.

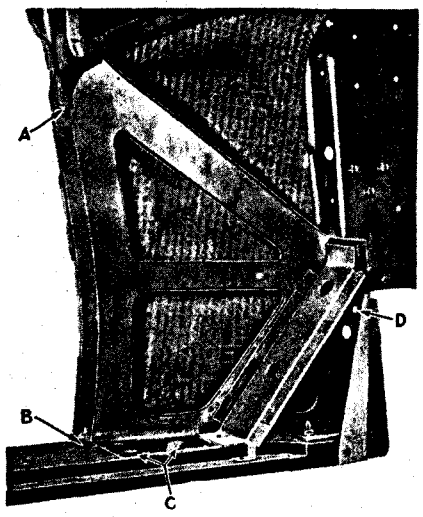


Illustration No. 9
Front End Frame Side Brace Assembled.

FRONT END OUTER SHELL

The Front End Outer Shell is composed of four major Panels:

Cowl Upper Panel.
Cowl Side Panel, Right.
Cowl Side Panel, Left.
Dash Panel.

The Cowl Upper Panel is a steel stamping that covers the upper portions of the two Front Body Pillars and the top of the Cowl section. It is welded to the Roof Panel *(See Illustration No. 11 at E)* with a torch weld; to the Cowl Side Panels at "B" with an electric butt weld; to the Dash at "C" with an electric spot weld, and to the Front End Frame Upper *(See Illustration No. 5 at D)* by spot welding. The top of the Cowl Upper Panel is stamped out to receive the Cowl Ventilator Assembly. *(See Illustration No. 11 at A.)*

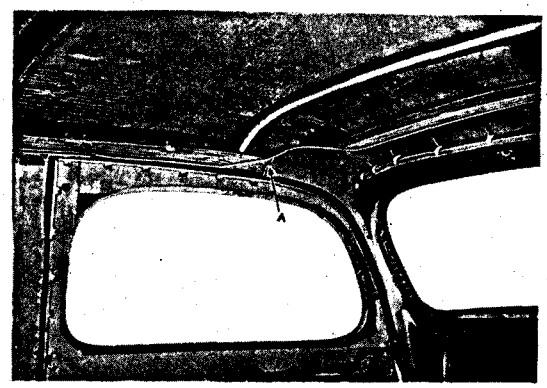


Illustration No. 10
Roof Front Corner.

The Cowl Side Panel is a Steel stamping that covers the side of the Cowl from the Main Side Sill to the belt line.

This Panel is electrically butt welded to the Cowl Upper Panel on a line above the Belt Molding. *(See Illustration No. 11 at B.)*

It is spot welded to the Front End Leg along the Front Body Pillar and also spot welded to the Dash Panel. Its attachment to the Main Side Sill is through the Dash and Front End Frame parts to which it is spot welded.

Lugs or anchor nuts are attached to the lower front of the Cowl Side Panel. These lugs are tapped to receive the Front Fender Bolts. *(See Illustration No. 11 at D.)*

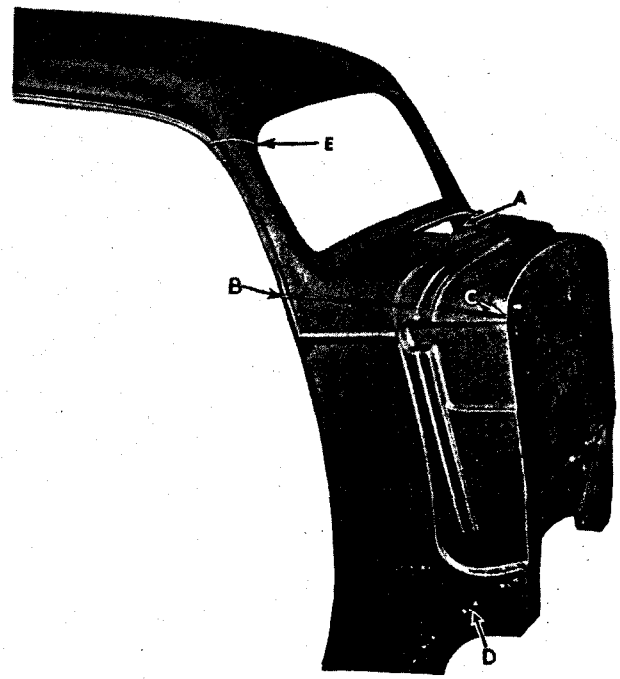


Illustration No. 11
Cowl Side Panel.

The Dash Panel is a steel stamping spot welded to the Cowl Upper Panel and the Cowl Side Panels similar to the Former Style Bodies. *(See Illustration No. 12.)* At the lower ends of the Dash, *(See Illustration No. 13 at A)*, a Dash to Sill Brace is riveted through the Dash and through the Dash to Chassis Frame Brace. The same rivets anchor both of these Braces to the Dash. These Braces form an anchorage for attaching the Body Main Side Sill to the Chassis Frame.

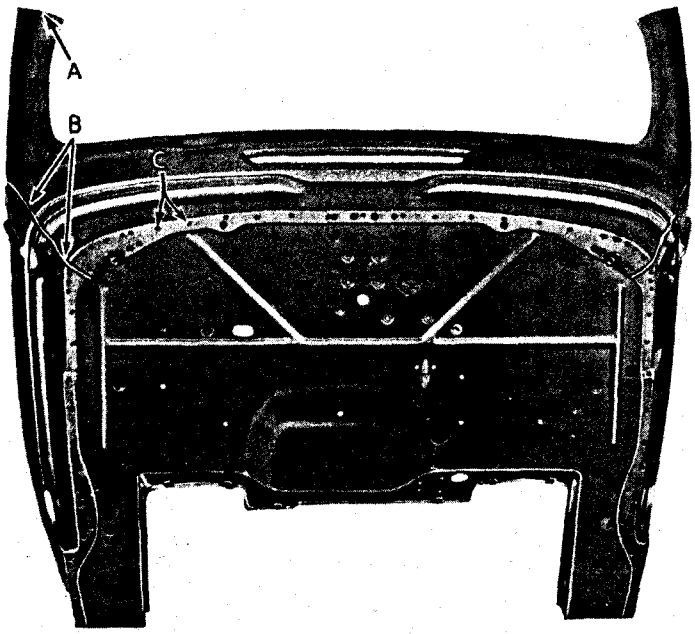


Illustration No. 12
1935 Dash Panel.

The Dash to Chassis Brace, *(See Illustration No. 13 at A)*, is used on some Style Bodies, while a differently formed Brace is required for other Style Bodies, all serve a similar purpose, being riveted to the Dash and Dash to Sill Brace in approximately the same manner.

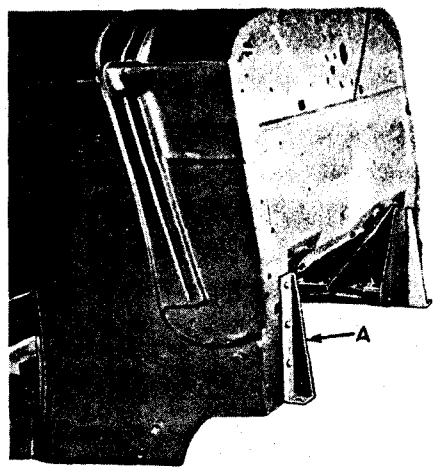


Illustration No. 13
Dash to Chassis Frame Brace.

COWL VENTILATOR LID

To adjust the spacing around the Lid, loosen the adjusting screws in the Hinge Plate. Close the cover and while one man is holding it down in correct position, another workman may tighten the adjusting screws. Holes are elongated to allow for adjustment. Tension of the Lid to the Rubber Gasket is obtained by means of the Adjustable Control Arm. *(See Illustration No. 14.)*

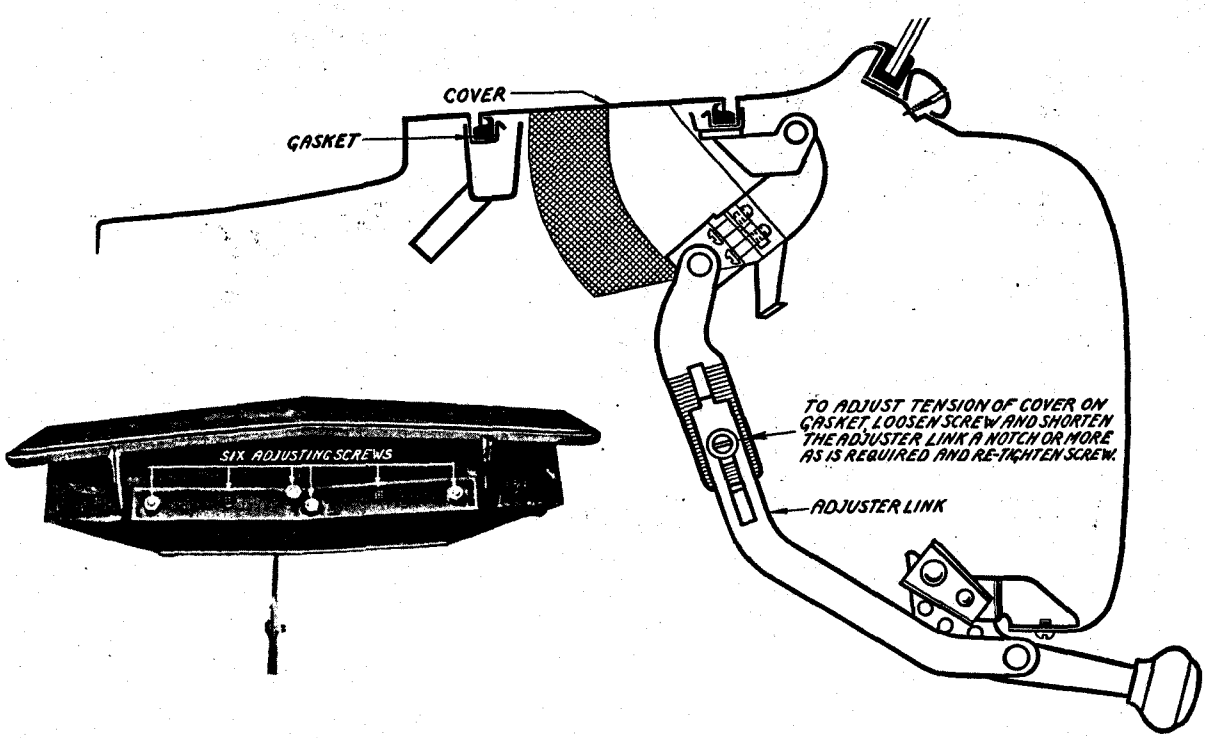


Illustration No. 14
Cowl Ventilator.

TURRET TOP ROOF CONSTRUCTION

The Roof Structure of a Fisher Turret Top Body is composed of one Roof Panel, two Roof Side Rails (metal) Right and Left, two Roof Side Rail Fillers (wood) Right and Left, three Metal Roof Bows, (Sedan and Coach) Headlining Rear Supports, (Four of which are spot welded at their front end to the No. 3 Roof Bow), A Dome Lamp Block and the Sound Silencer Felt.

The Roof Panel is a single steel stamping that covers the entire Roof from the Windshield Opening at the front, to the Trunk, Deck or Compartment Opening at the rear; and from the top of the Door Openings on the right side, across to the top of the Door Openings on the left side. It is made of one sheet of cold drawn steel of sufficient gauge and crown for strength. The Drip Moldings are pressed into this Roof Panel as is also the Rear Window Opening. The strength of the Roof Panel is due not so much to the gauge of the steel as to the hardness of the metal and the crowning of its shape.

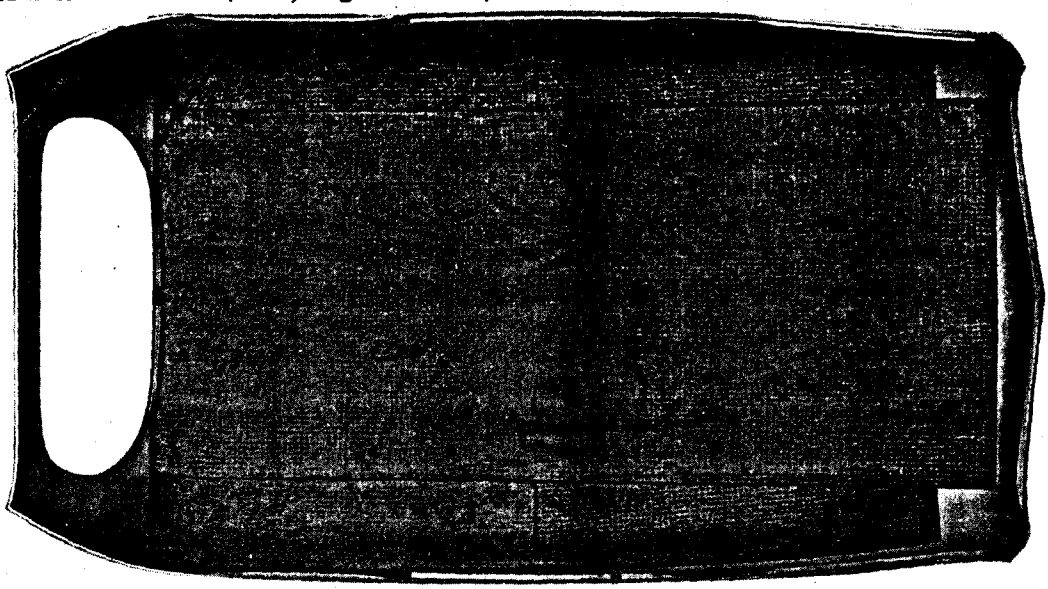


Illustration No. 15
Turret Roof (Inside View).

The Roof Panel is ELECTRICALLY SPOT WELDED to the other Body Panels as follows:

To the Front End Frame Upper at the top of the Windshield Opening.

To the Roof Side Rails over the top of the Doors and Rear Quarter Window Openings.

To the Rear Quarter Panels from the rear end of the Drip Molding to the Rear Body Hinge Pillar.

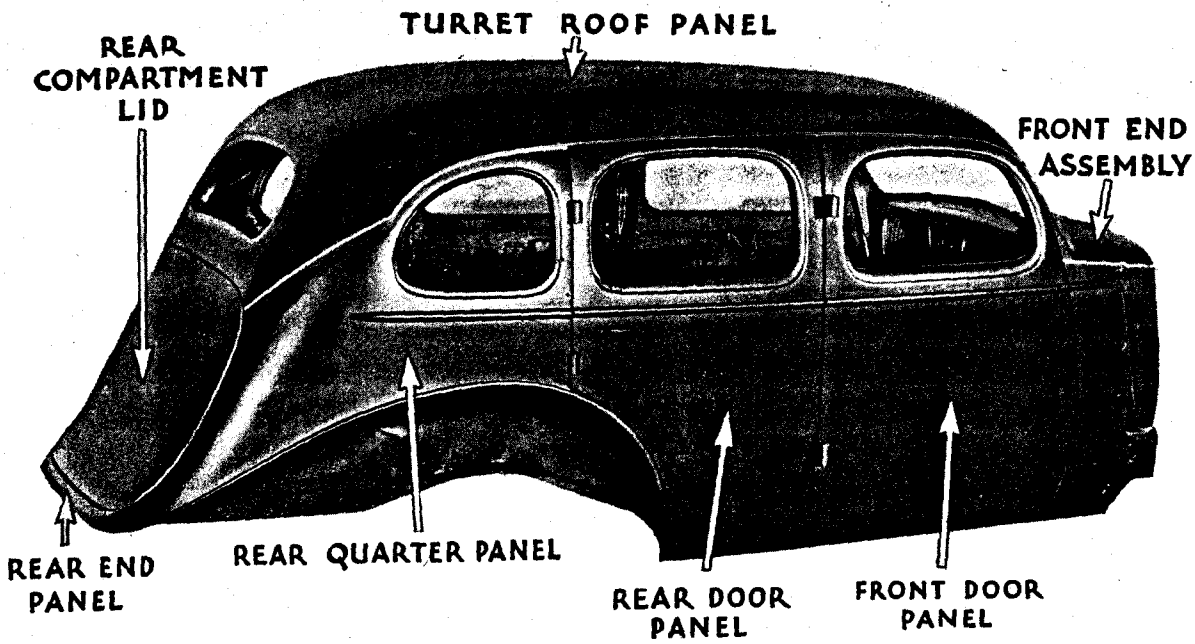


Illustration No. 16
Regular Sedan Showing Welding Lines and Panel Names.

To the Gutter at the top of the Trunk or Rear Compartment Opening.

The Spot Welding used at the Drip Molding and Rear Quarter Panel joint is shown in Illustration No. 22 at "A". This weld is made as close to the breakover as possible and is a continuous spot weld with the spots over-lapping each other.

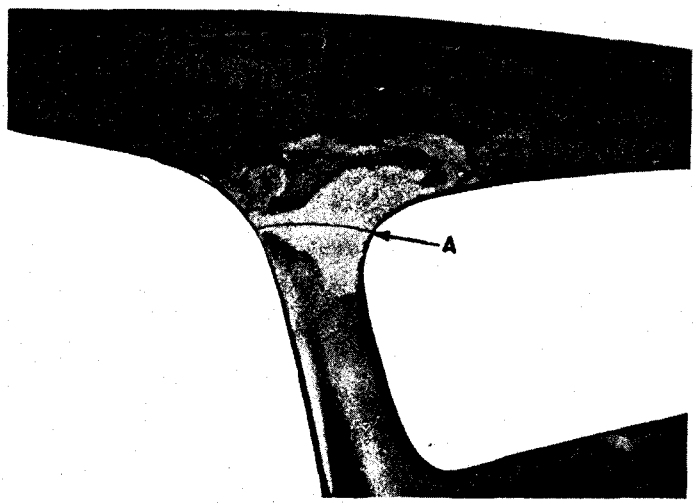


Illustration No. 17
Weld (Turret Roof to Upper Cowl Panel).

The Roof Panel is TORCH WELDED at the following points:

To the Upper Cowl Panel at the top of the Front Body Pillars. *(See Illustration No. 17 at A.)*

To the Rear Quarter Panels from the end of the Drip Molding to the Trunk or Rear Compartment Opening. *(See Illustration No. 19.)*

To the Top of the Center Body Pillar Cover.

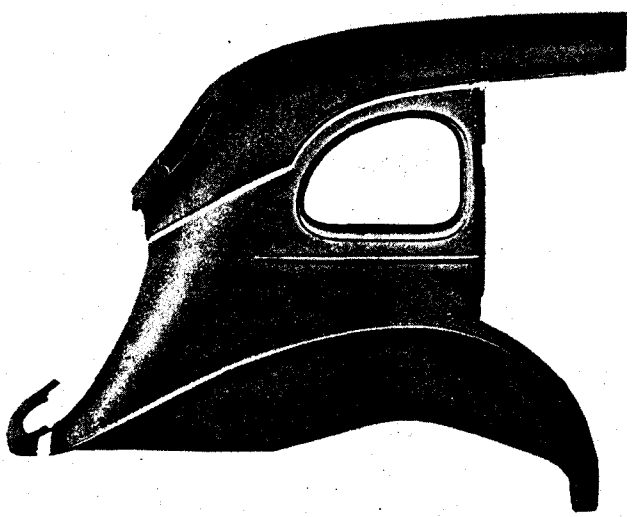


Illustration No. 18
Junction of Turret Roof and Quarter Panel.

ROOF SIDE RAILS

The Roof Side Rails are steel stampings extending from the Front End Frame Upper to which they are torch welded, *(See Illustration No. 10 at A)* back to the Rear Body Hinge Pillar Top Brace to which they are bolted. They are spot welded along their entire length to the flange on the Roof Panel at the lower edge of the Drip Molding. The Roof Side Rails also act as Metal Facings above the Door Openings.

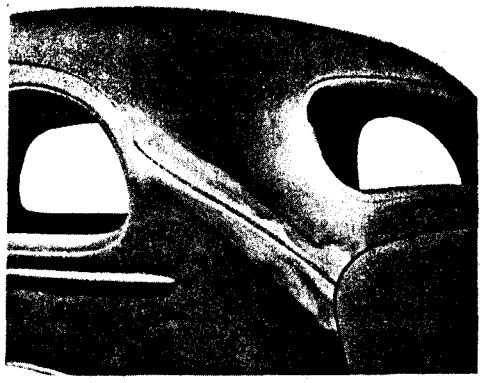


Illustration No. 19
Rear Roof Weld (Regular Sedan).

The Roof Side Rail Fillers are hard wood Parts that extend the full length of the Roof Side Rails. The Steel Roof Bows and the Top Brace on the Rear Body Hinge Pillar and Center Pillar are bolted to the Roof Side Rail and its Filler. *(See Illustrations No. 2 and 97.)*

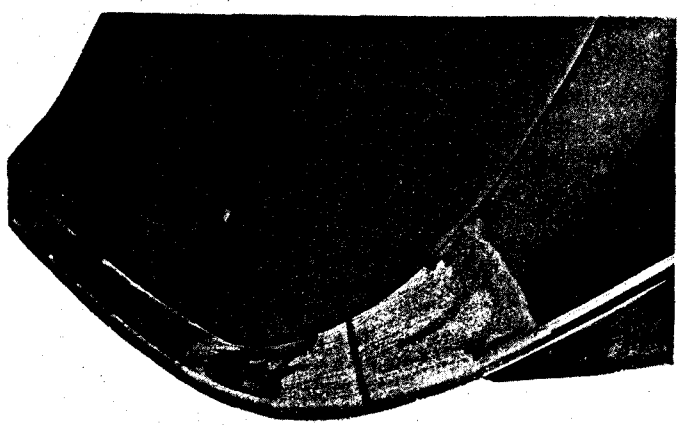


Illustration No. 20
Lower Rear Corner Weld (Regular Sedan).

The Roof Bows are steel stampings anchored at each end with two bolts through the Roof Side Rail and Filler Assembly. The Bows are designed to re-enforce the Roof Panel as well as support the Headlining *(See Illustration No. 25.)* In the top face of each Roof Bow two Rubber Fillers are inserted to prevent chafing on the Roof Panel Sound Silencer Felt which is cemented to the Roof Panel.

The Sound Silencer Felt is a composition matting that is cemented to the inside of all major Body Panels with Compound F.S. 1044. Whenever this Felt is removed for repair operations to a Panel, new Felt should be installed to cover the bared metal. The purpose of it is to Deaden Sound as well as to act as a Heat Insulation.

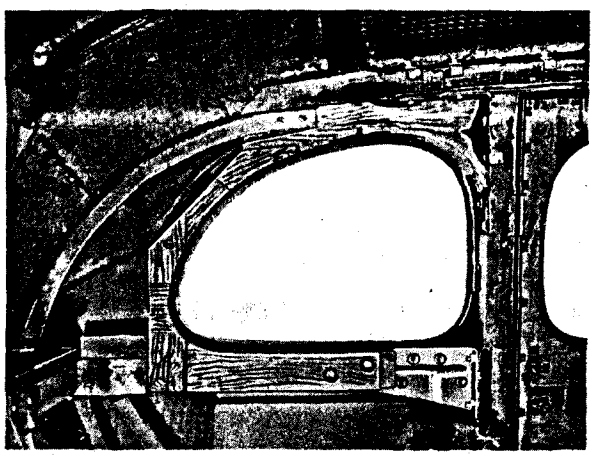


Illustration No. 21
Upper Rear Quarter (Interior View).

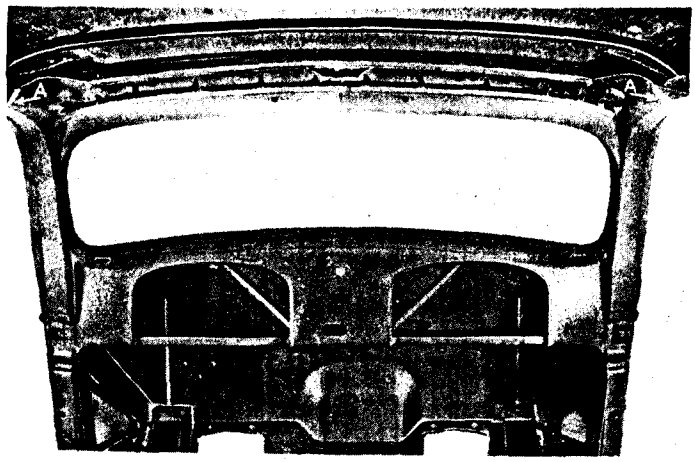


Illustration No. 24
Interior Front Section of Roof.

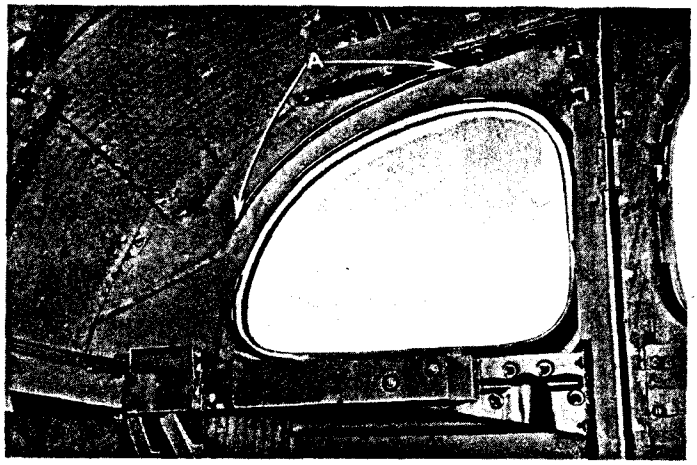


Illustration No. 22
Upper Rear Quarter (Interior View) Less Wood.

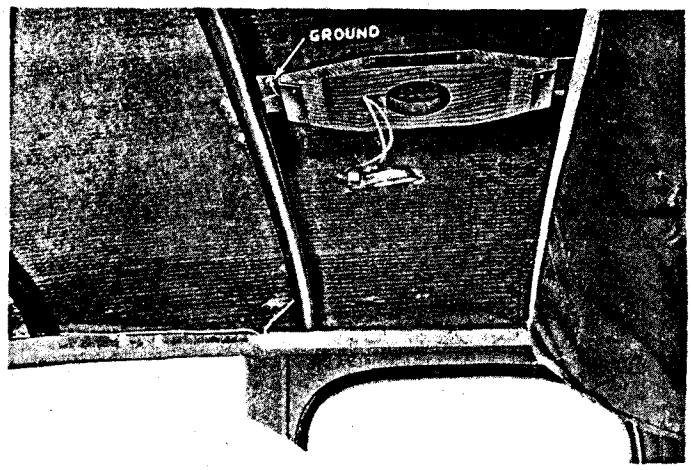


Illustration No. 25
Dome Lamp Block and Dome Lamp Wiring.

DOME LAMP WIRING

The Hot Wire for the Dome Lamp follows back along the Right Side of the Roof Panel and down the Body Center Pillar to the Switch and then up again to No. 2 Roof Bow and along this Roof Bow to the Dome Lamp; from the Dome Lamp it runs to a screw in the Dome Lamp Block Support Bracket to which it is attached forming the Ground through the metal Bows. *(See Illustration No. 25.)*

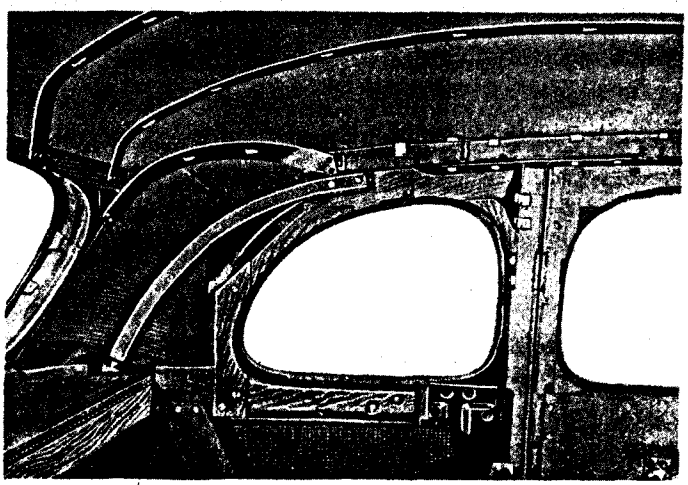


Illustration No. 23
Rear Roof Interior Showing Position of Headlining Rear Supports.

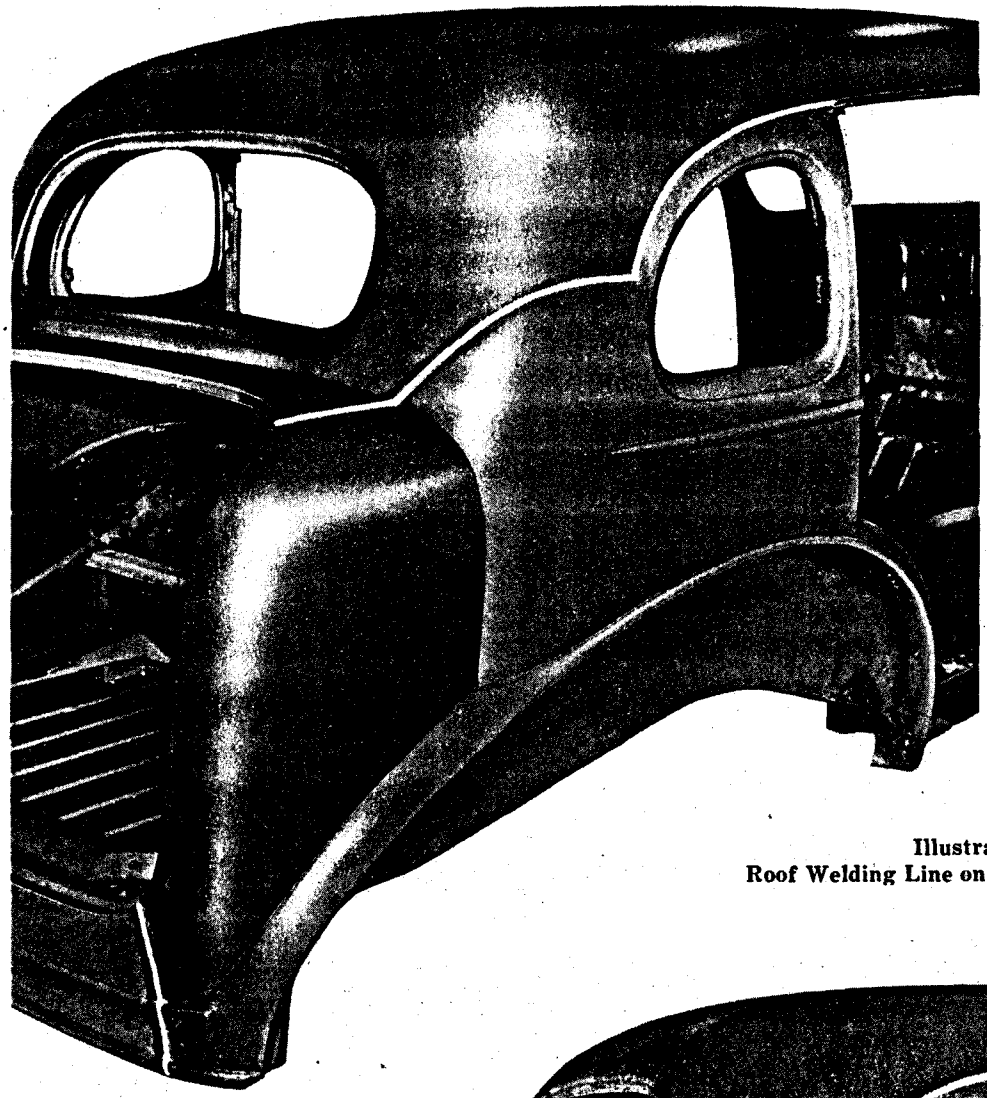


Illustration No. 26
Roof Welding Line on a Chevrolet Touring Sedan.

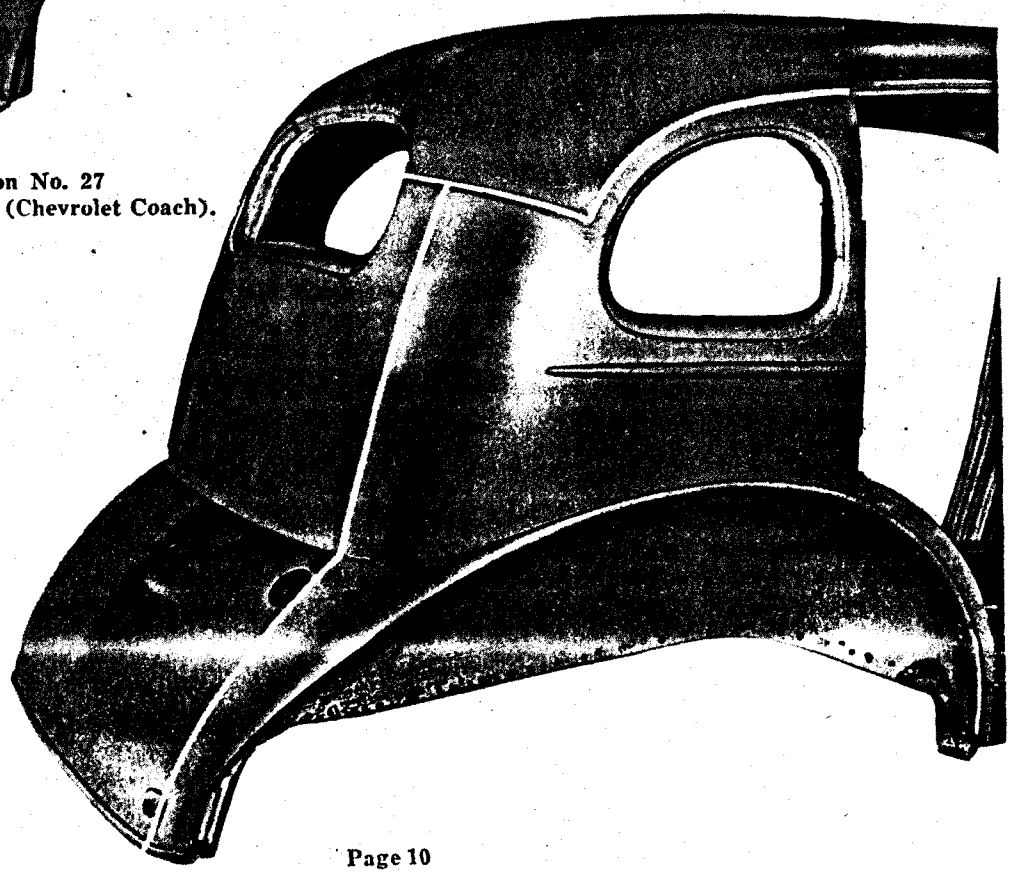


Illustration No. 27
Roof Welding Line (Chevrolet Coach).

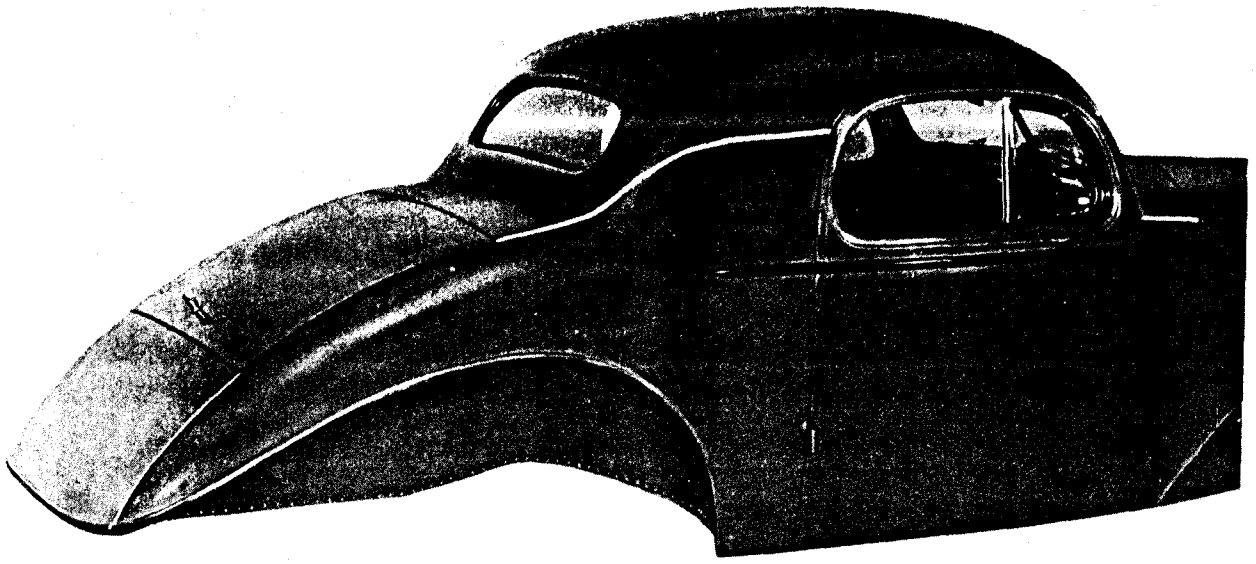


Illustration No. 28
Welding Line of a Business Coupe (Pontiac, Oldsmobile, La Salle).

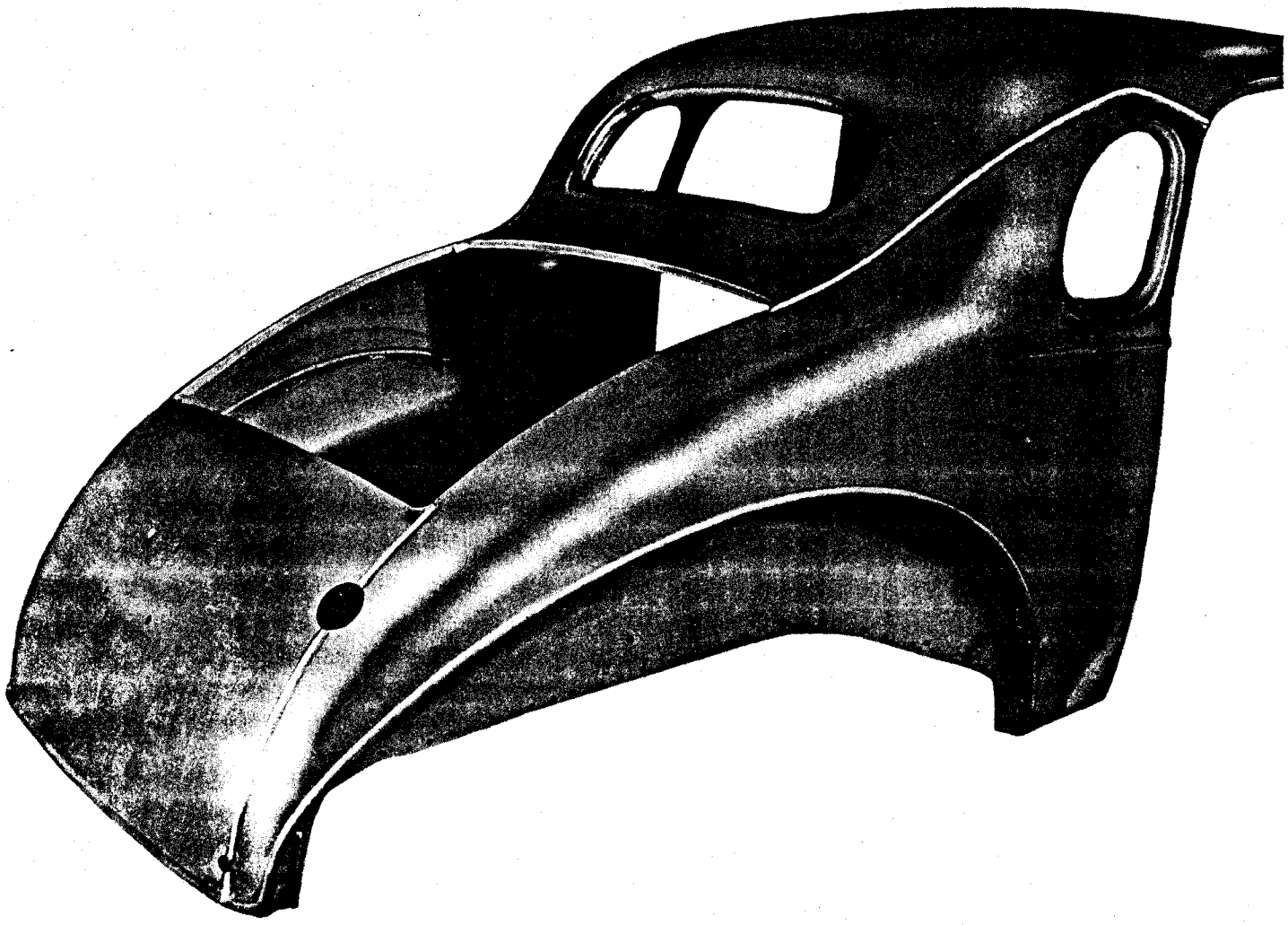


Illustration No. 29
Welding Lines of a Chevrolet Coupe.

FLOOR CONSTRUCTION
(La Salle, Oldsmobile, Pontiac)

The Floor Construction of the 1935 Fisher Turret Top Bodies as built for assembly on the Pontiac, Oldsmobile and La Salle cars, is different in many respects from the Floor Construction of Bodies that were built for former Models of these cars.

This forms the frame of the front section of the Floor Assembly. To this the Cowl and Dash Panel of the Front End Assembly, the Pillars, Rocker Panels and Floor Pans are attached. The Floor Pans are screwed to the Cross Sills and Main Sills and are set in compound to seal the body against entrance of dust, water, and air. They are insulated with matting and compound for deadening sound. Matting provides heat insulation.

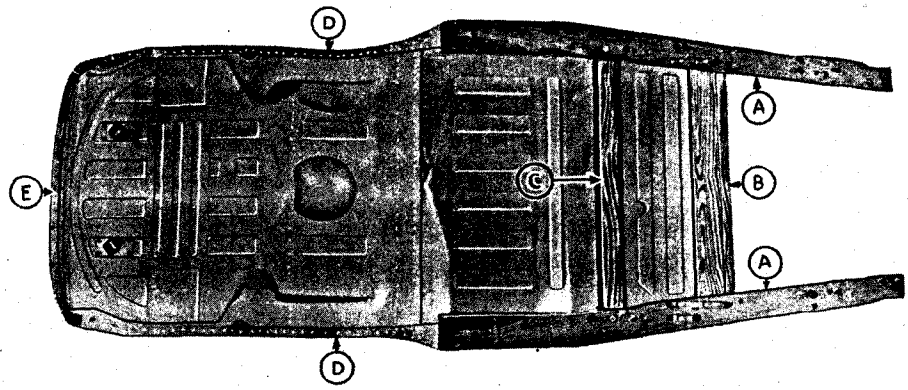


Illustration No. 30
Under View of Floor Construction.

Prior to 1935, Fisher Bodies were produced with Wood Roof Bows, Wood Floor Boards, etc. This year, however, with the advent of the 1935 Turret Top, not only more metal and less wood is used in the Upper Body Structure, but also in the Under Body Framing as well. Refer to Illustration No. 30 (Under-Body View.)

The rear section of the Floor Assembly is composed of six main parts:

Kickup Sill, Right and Left. See D.
Rear Floor Pan. See G.
Rear Seat Pan. See H.
Spare Tire Retainer. See J.
Rear End Sill. See E.

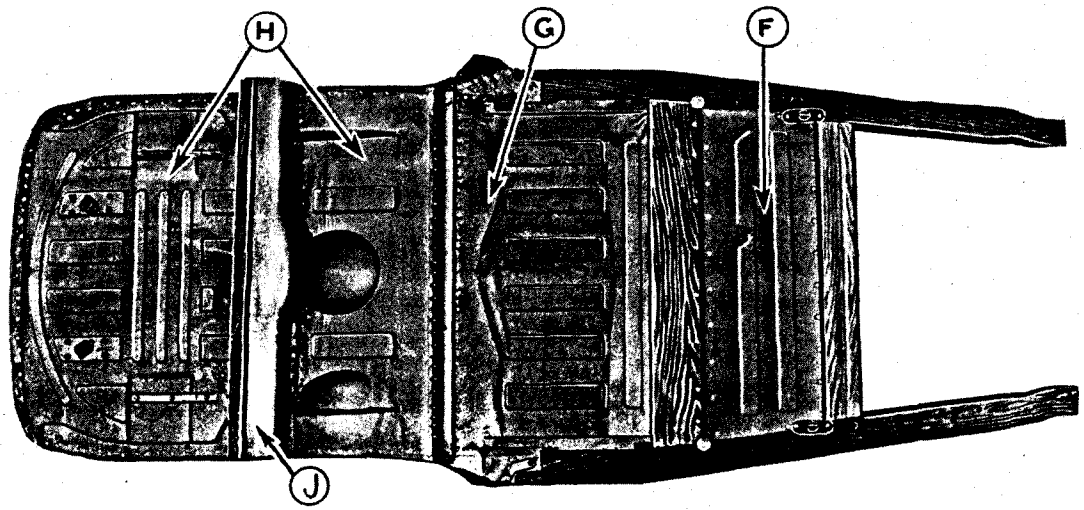


Illustration No. 31
Upper View of Floor Construction.

The Main Sills and the Cross Sills are the only wood members in this Floor Sub-Assembly. The rear section of the Floor is made up entirely of steel stampings.

The Right and Left Main Sills "A" are joined together by the Wood Cross Sills "B" and "C" by mortise and tenon joints set in compound and held with wood screws.

These steel stampings are all spotwelded together into one unit. This rear section is then attached to the front section of the Floor Assembly with screws and bolts; it is also reinforced by being spotwelded to the outer panels and Pillar Braces.

The Steel Kickup and Rear End Sill are used as a Foundation to which the Body Outer Panels are spotwelded when the

Floor Assembly is formed into the Body Shell. The Rear Body Hinge Pillar has a metal brace screwed to it at the bottom. This Pillar to Sill Brace is attached with bolts and screws to the Body Main Sills but is spotwelded to the Kickup Sill and Floor Pans. *(See Illustration No. 32 at A.)*. This is an important Brace binding many parts together and it therefore

All Floor Pans are impressed with corrugations that serve to brace and stiffen the Pans.

These impressed sections are later filled with Sound Silencing Board or Matting which is cemented to the Floor Pans in these impressions.

Compound and soft rubber Fillers are used to seal the joints

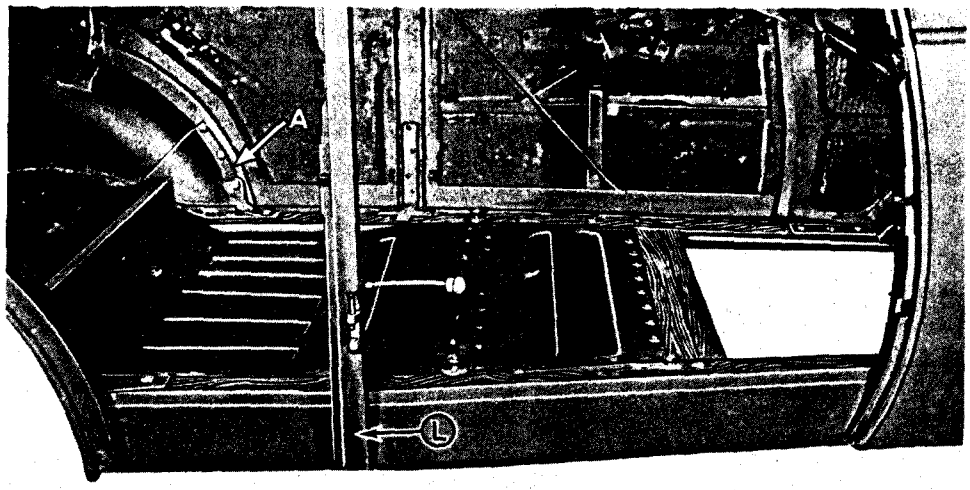


Illustration No. 32
Center View of Floor Pan and Sill Construction.

should be kept rigidly tight and solid at all times.

The Body Center Pillar is attached at the Floor by means of a steel brace screwed to the Pillar and to the Body Main Sill. The Pillar extends down below the Sill and has a bolt located under the Pillar Cover *(See Illustration No. 32 at L)* that projects through the Sill Cover Panel and has a metal plate

where the Body Panels, Floor Pans and Body Sills are attached together. This is to prevent dust and air leaks. Either F.S. 1040 or 1039 compound may be used for sealing or cementing these Body Parts.

In most 1935 Body Styles the Rear Floor Carpet is cemented and fastened to the Floor and Sills which further helps to

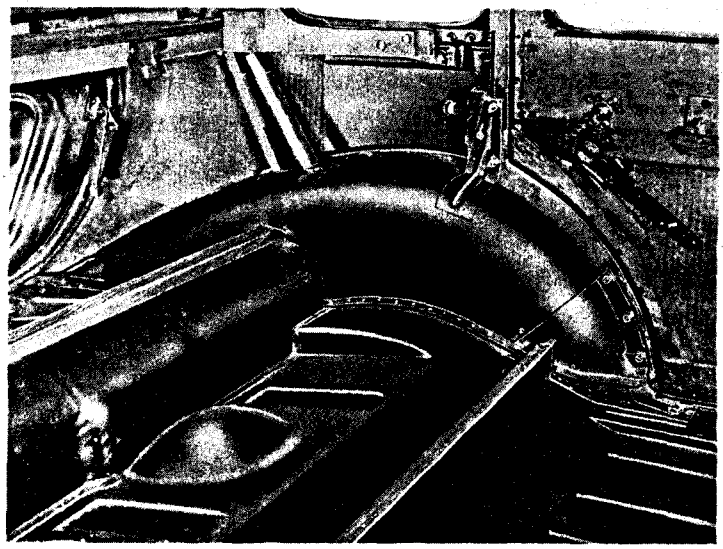


Illustration No. 33
Close Up of Rear Seat Pan and Seat Riser.

and nut that binds the parts together, acting as a stiffener or bracer for the Panel.

At the Front Body Pillar the Main Sill joins the Front End Frame Assembly by having the Front End Frame Side Brace (which is part of the Front Body Pillar) bolted and screwed to the Main Sill. *(See Illustration No. 9 at C.)*

sound-silence as well as dust-seal the Floor joints. These fastenings will have to be loosened to roll back the edges of the Carpet if the Body Bolts are to be adjusted for Body Alignment. They should be re-fastened down again when work is completed.

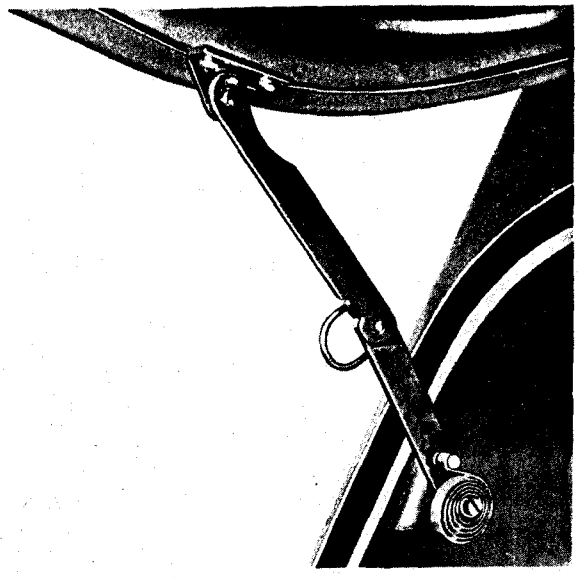


Illustration No. 34
Early Type Rear Compartment Trunk Lid Support.

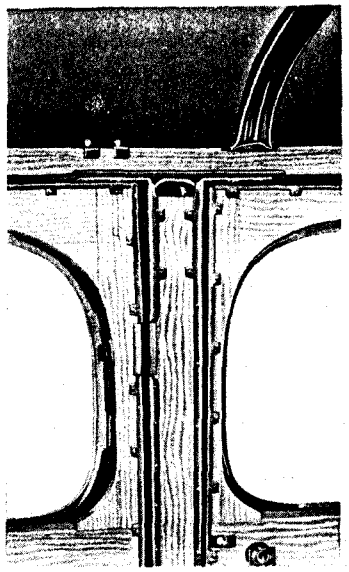


Illustration No. 37
Center Body Pillar to Roof Rail Brace.

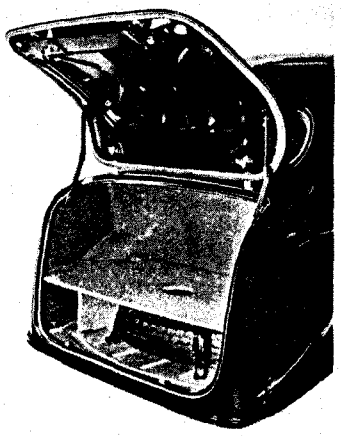


Illustration No. 35
Trunk Opening, Showing Floor Construction, Luggage Shelf, and Spare Tire Retainer.

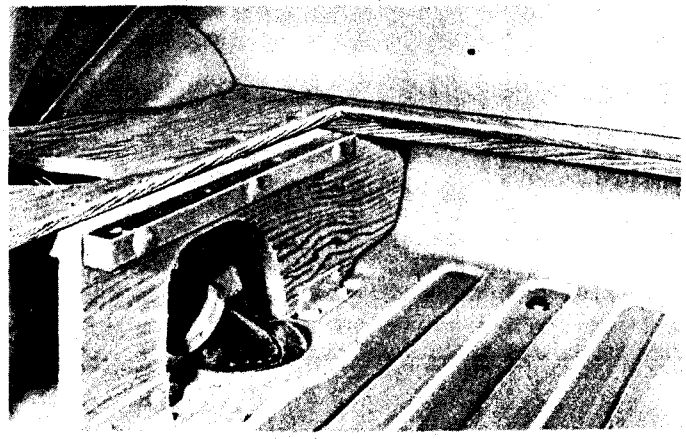


Illustration No. 38
Trunk Floor Pan Construction, (Chevrolet) Showing Luggage Shelf Board Disassembled.

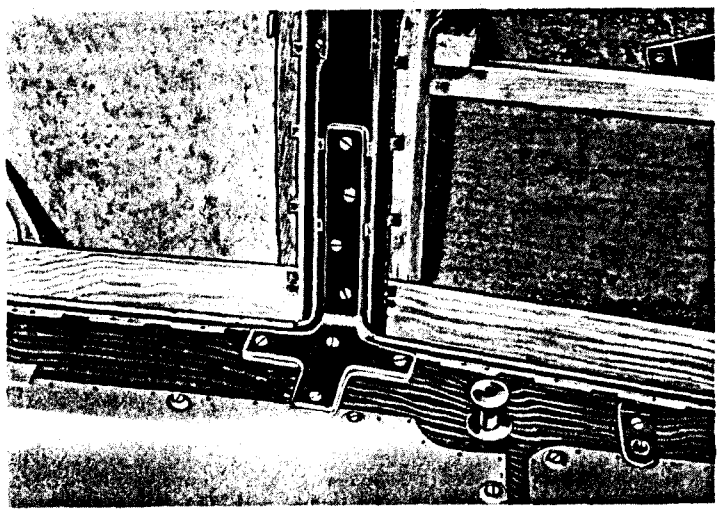


Illustration No. 36
Close Up of Center Body Pillar Brace and Sill.

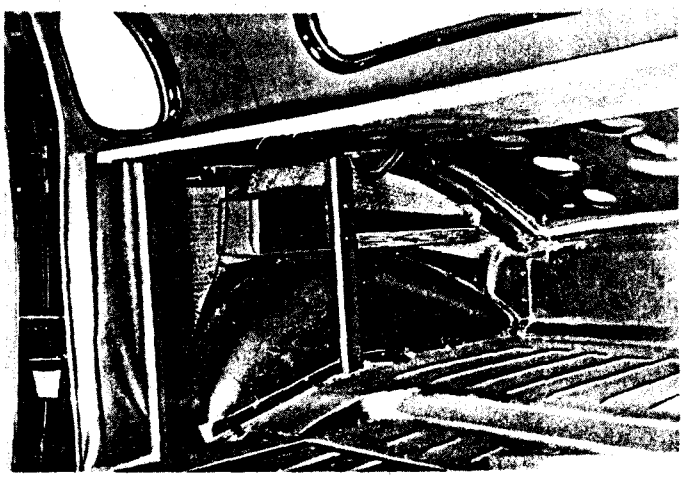


Illustration No. 39
Coupe Rear Floor Pan Construction.

BACK WINDOW FRAME AND GUTTER ASSEMBLY

The Back Window Frame and Gutter Assembly consists of the Back Window Frame, the Parcel Shelf Board, and the Rear Compartment Gutter and Hinges. The Back Window Frame acts as a Stiffener and Sound Deadener for the Back Window Opening in the Turret Roof Panel and is held in position by nailing to the Window Opening Flanges of this Panel. The Back Window Frame, at its Lower Bar is attached to the Rear Compartment Lid Hinge Brackets with bolts *(See Illustration No. 40 at A)*, while the Upper Bar of this frame acts as an anchorage for the Headlining Rear Metal Supports which are held in place with screws. *(See Illustration No. 28.)*

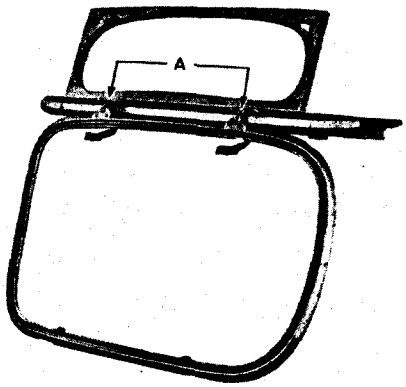


Illustration No. 40
Back Window Frame Assembly Showing Compartment Gutter and Compartment Lid Hinges.

The Parcel Shelf Board is bolted at each end to the top side of the Rear Quarter Belt Bar.

In some style Bodies the front edge of this Board is equipped with Metal Hangers on which the Rear Seat Back Cushion is suspended. In all later Style Bodies the Hangers were not used. Three wood screws coming through from the Rear Compartment hold the Seat Back Cushion Frame to the Parcel Shelf Board.

The Brackets of the Rear Compartment Lid Hinges are bolted to the under side of this Board.

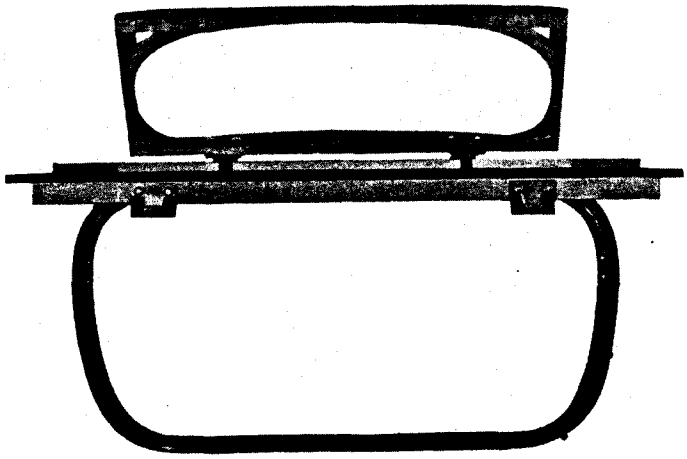


Illustration No. 41
Reverse View of Back Window Frame Assembly Showing Rear Seat Back Hangers.

The Rear Compartment Gutter shown in Illustrations No. 40 and 41 is a heavy steel stamping shaped so as to form the framing of the opening for the Rear Compartment. It is spotwelded to the Body Panels at the top, bottom and sides of the Rear Compartment Opening. The Compartment Lid Hinges are riveted to this Gutter Assembly and partly support both the Parcel Shelf Board and the Back Window Frame. The extreme rear edge of the Turret Roof Panel is flanged into the groove of this Gutter Assembly and is held securely by Spot Welding. The Lock Strikers are welded to this Gutter at the bottom.

The Back Construction has had a decided change in 1935 Styles.

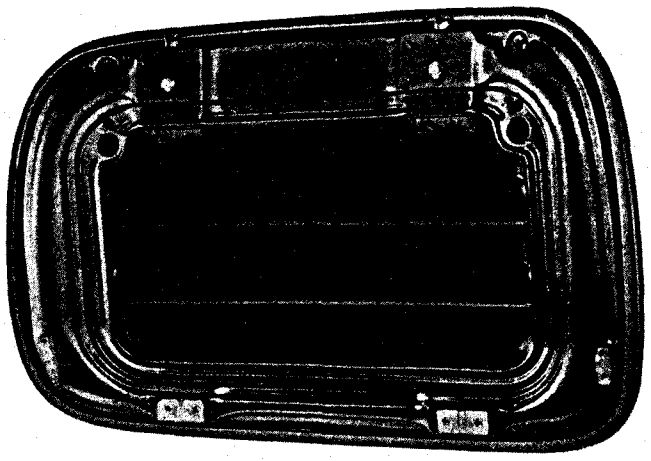


Illustration No. 42
Inside View of Rear Compartment Lid Early Style.

On the Pontiac, Olds and La Salle Bodies the Roof Panel covers the surface down to the Rear Compartment and Trunk Openings, thus eliminating the Back Panel that had been used on the conventional type Body. (The Chevrolet Coach and Sedan—Regular Styles have a Back Panel that extends from the Rear Window Opening down to the Rear End Floor Assembly.) *(See Illustration No. 27.)*

The Trunk Lid and Rear Compartment Lid are constructed of Outer and Inner Panels, both of which are spotwelded together all around the edge forming one unit. A metal Retainer is spotwelded to this assembly around the edge into which the Rubber Weatherstrip is cemented.

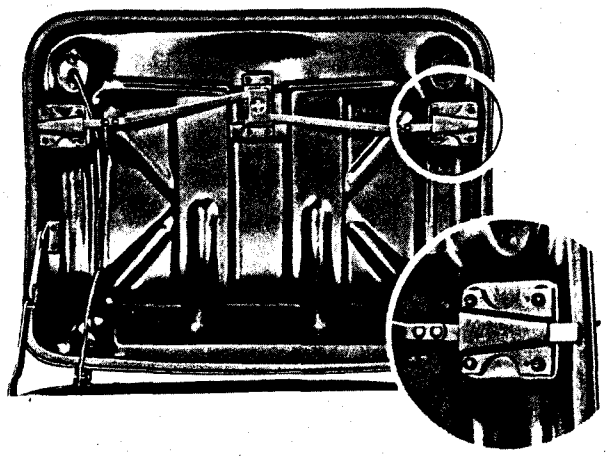


Illustration No. 43
Trunk Lid Showing Eccentric Gate Lock, (1935 Styles).

There were two types of Compartment Lids used in 1935, the early one with two Locks and Locking Handles and the later type with only one Locking Handle. The later type single Lock actuates two Lock Bolts by remote control. The bolts engage under the Gutter at both sides of the Gutter Opening.

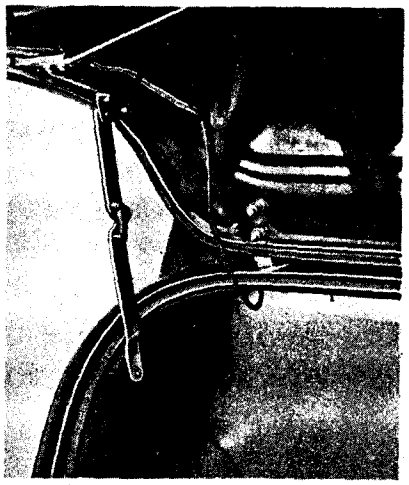


Illustration No. 44
Late Type Rear Compartment or Trunk Lid Support.

The eccentric Gate Lock on the Trunk and Compartment Lid shown in Illustration No. 43 is a manually controlled Lock. Service men and car owners are cautioned not to slam the Lid shut when the Lock Bolt (shown in the same Illustration) is in an extended position.

If this were to be done repeatedly the Drain Gutter on the Trunk or Compartment will be bent out of shape and the Lock Bolt itself may be rendered inoperative.

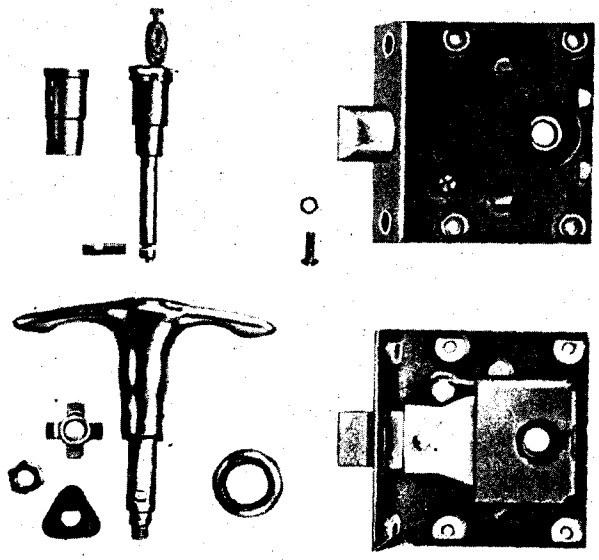


Illustration No. 45
Component Parts of the Rear Compartment Lid Lock.

COUPE DECK

The Steel Shell of the Coupe Deck is composed of the two Rear Quarter Side Panels, the Rear End Panel and the rear portion of the Roof Panel which are all welded together into one unit. *(See Illustration No. 28.)*

The framework of the Deck Opening is formed by the Deck Side Rails and the Upper and Lower Deck Bars. These units are joined at right angles and are set (in compound) with screws, bolts and metal braces.

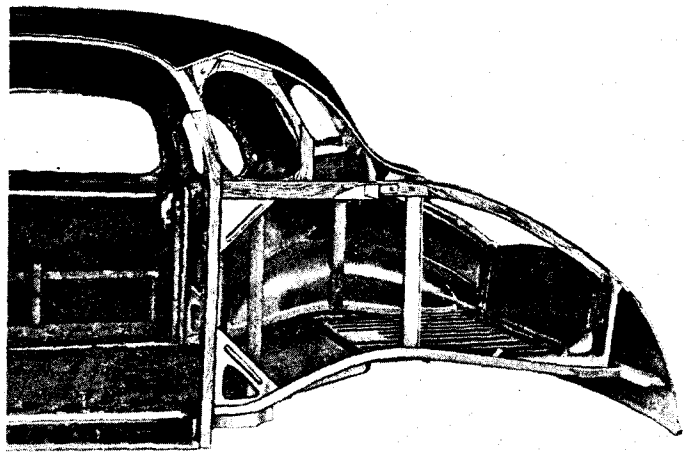


Illustration No. 46
Coupe Deck Framework.

The Lid of the Business Coupe has concealed Hinges anchored with bolts to the Deck Upper Bar.

A single Lock and Locking Handle are used on each of these Types.

The "Water Drain Gutter and Drain Pipe Assembly" is nailed to the wood framework surrounding the Deck Lid Opening.

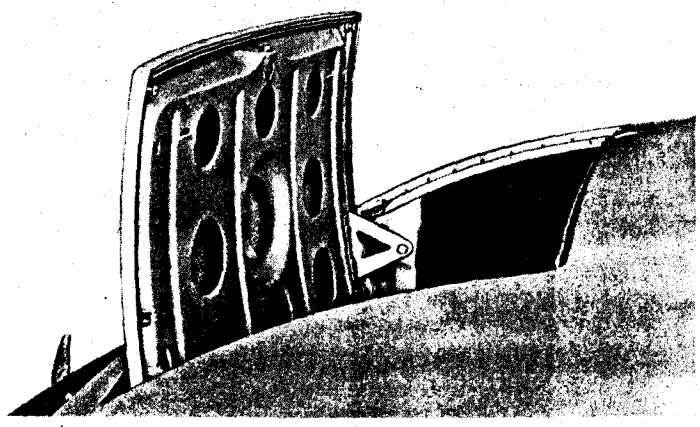


Illustration No. 47
Sport Coupe Deck Lid.

The Lid of the Sport Coupe (Rumble) is pivoted with bolts through the Hinge Plates that are attached with screws to the ends of the Deck Lid and to the *Deck Side Rail to Sill Braces*, which are anchored at the top to the Deck Side Rail and at the bottom to the Floor.

By removing the two Pivot Bolts, (Right and Left) the Lid may be removed by simply lifting out. These Pivot Bolts may also be used to adjust the Deck Lid as the cage nuts in the Side Rail to Sill Brace are adjustable.

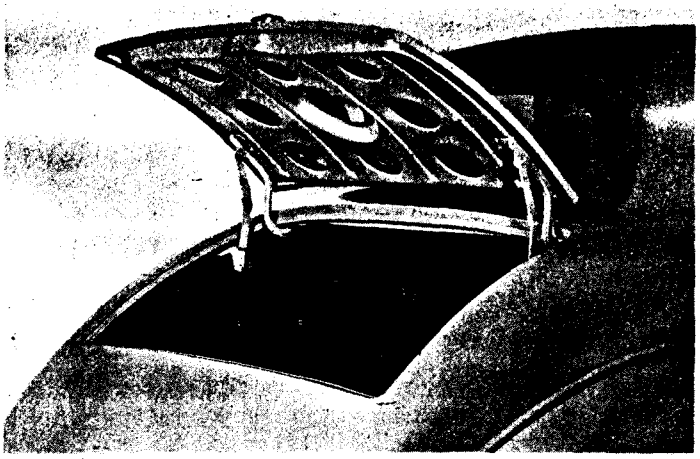


Illustration No. 48
Business Coupe Deck Lid.

REAR QUARTER PANEL

The Rear Quarter Panel covers one side of the Rear Quarter of the Body. It is stamped out of one piece of steel and serves the following purposes: It forms:

The Rear Quarter Window Opening.
The Housing of Rear Wheel.
The Anchorage for Rear Fender.
The Right or Left Side of Luggage or Trunk Compartment.

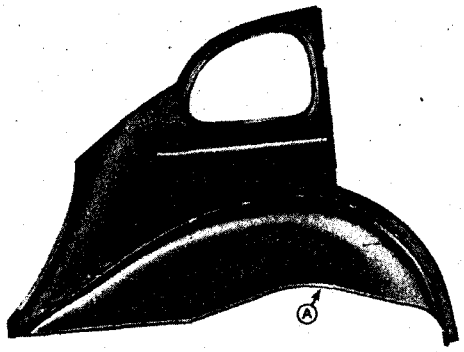


Illustration No. 49
Interior View of Rear Quarter Panel, Showing Flange at "A" For Welding to Steel Kickup and Rear End Sill.

The Rear Quarter Panel is spotwelded to the Roof Panel from the Door Opening to the rear end of Roof Drip Molding and a Torch Weld is used from the rear end of this Drip Molding to the Rear Compartment or Trunk Opening upper corner. Another Torch Weld is used at the Lower corners of the Opening, joining the Rear Quarter Panel and the Rear End Panel.

At the Floor the Rear Quarter Panel is spotwelded to the Kickup Sill from the Door opening to the Rear End Sill. On the Sedans and Coaches it is also spotwelded to the Rear Compartment or Trunk Gutter. It is nailed to the Body Hinge Pillar and around the Rear Quarter Window Frame.

DOORS

With but few exceptions, the Doors are constructed similarly in 1934, 1935 and 1936 Bodies. One exception is that on the 1935 Turret Top Styles, the Front Doors are hinged to the Center Pillar instead of the Body Front Pillars.

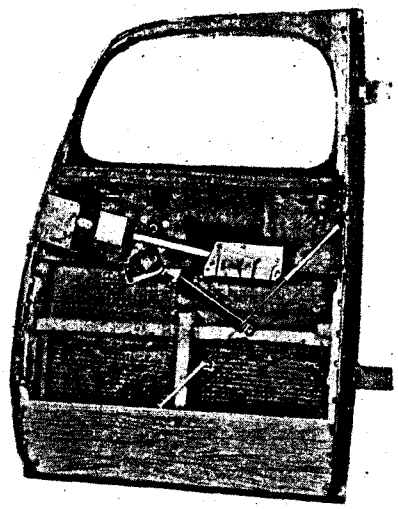
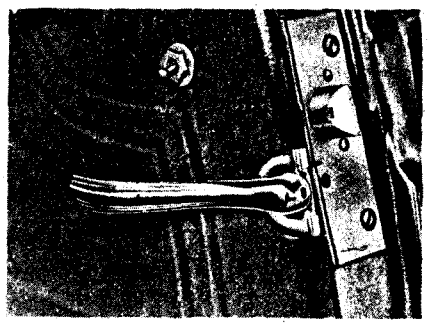


Illustration No. 50
Inside View of a Sedan Front Door.

The Door Weatherstrips of 1936 and the later type 1935 Bodies are attached to the Door Flange by being inserted into the Door Weatherstrip Metal Retainer which has been spotwelded to the Door Flange. The early type 1935 Bodies had these Weatherstrips cemented with F.S. 1039 either to the rabbeted edge of the Door Opening or on the Door Flange.

Either type is equally effective if properly applied. Part No. 4064663. *(See Illustration No. 55.)*



Later Type 1935
Handle.

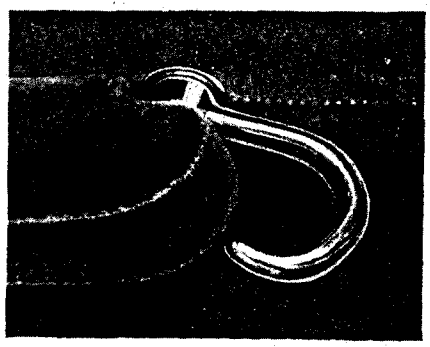


Illustration No. 51
Early Type 1935 Remote Control Handle.

On the early 1935 Bodies, a Remote Control Inside Door Handle was used that fitted into the Door Arm Assembly.

This was changed later and the Door Inside Handle was attached to the inside end of the Door Outside Handle Assembly which eliminated the Remote Control Link.

The Door Inside Locking Device is a Toggle type. The Toggle Bar is held in place by means of the Escutcheon Plate which is threaded into the Door Lock Plate.

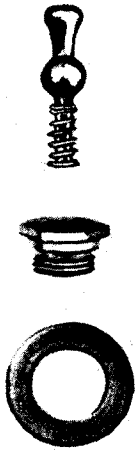


Illustration No. 52
Door Inside Locking Device Parts.

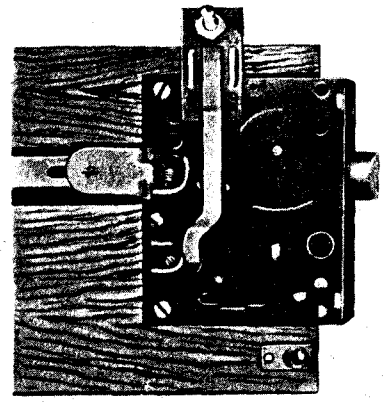


Illustration No. 53
Door Inside Locking Device Assembled.

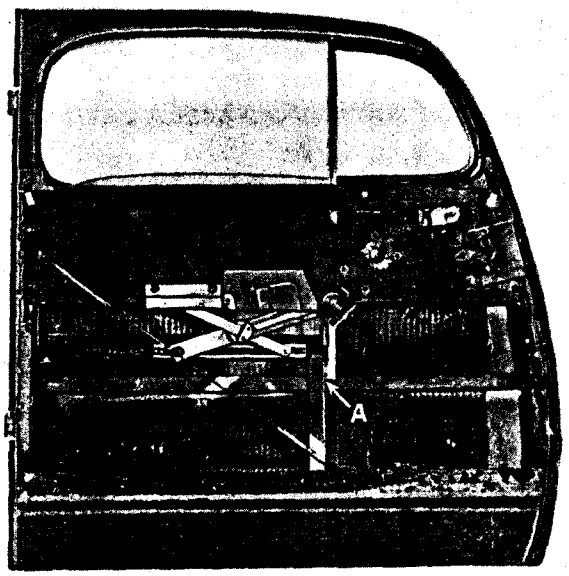


Illustration No. 54
Inside View of Door Regulator Board, Hardware Attached.

Door Frame Parts are not serviced. If a Door is damaged beyond repair of parts, a new "Door in the Prime" should be ordered.

Door Trim Parts, Hardware Parts, Glass and Regulator Board are serviced.

It has been found that the cost of repairing a badly damaged Door will more than equal the cost of a New Door. 'A New Door in the Prime" will be in true and proper alignment which cannot always be said of a repaired Door.

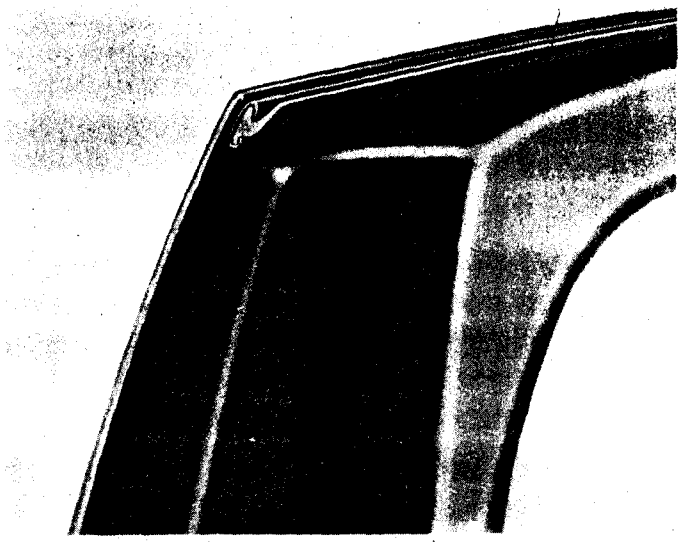


Illustration No. 55
Door Rubber Weatherstrip and Retainer.

DOOR VENTILATOR ASSEMBLY

The Independently Controlled Ventilation (I.C.V.) used on all Fisher Body Styles operates by forming a ventilation outward or inward as desired.

A Ventilator turned open a few inches will drain air out of the Body without causing a noticeable draft.

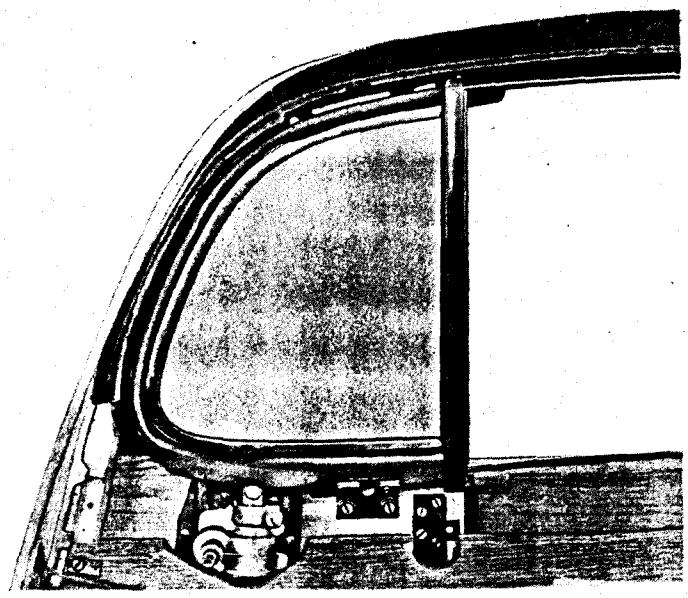


Illustration No. 56
Front Door Ventilator (Inside View).

This Ventilator is controlled by a turn of the Handle and may be turned to supply any desired amount of Ventilation.

The Regulator is composed of a Worm Gear Assembly enclosed and sealed in a casing that is lubricated for indefinite use. Parts, such as Glass, Glass Channel, Weatherstrip and Regulator are serviced.

The Glass Channel Frame is pinioned at the top and bottom. The bottom Bearing is supplied with a tension device to take up any wear or looseness. *(See Illustration No. 58 at B.)*

This assembly is pinioned into a Retainer Frame and its Channel Rubber Weatherstrip that form-fits the Glass Channel tightly to prevent water leaks.

The Retainer is attached with screws to the Door Lock Pillar, Door Header and Door Belt Bar.

All 1935 Ventilator Glasses are Laminated Safety Plate.

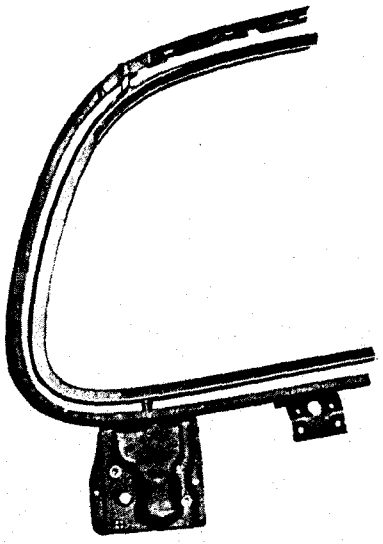


Illustration No. 57
Front Door Ventilator (Outside View).

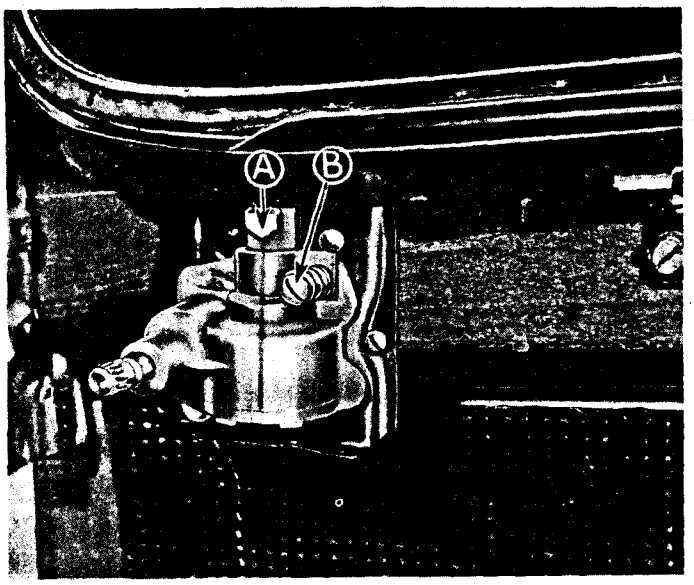


Illustration No. 58
Front Door Ventilator Regulator Mechanism.

DOOR OUTSIDE HANDLE

The Door Outside Handle is composed of a Diecast Handle cast to a steel shaft.

It is designed as a safety device against breaking and entering the car.

If the Handle is turned by force to break the Lock, the Handle will shear off a key in the shaft which allows the Handle to turn without damage to the Lock itself. This prevents entering the car and a possible theft of car contents.

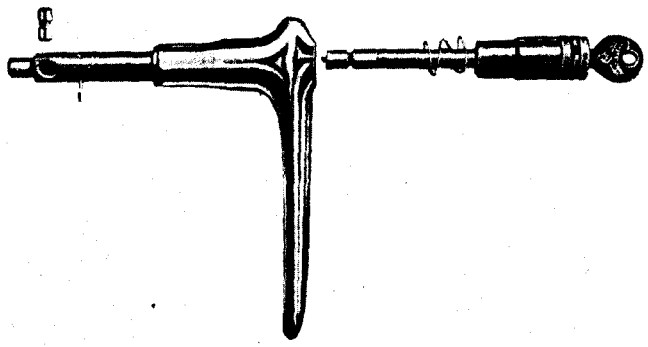


Illustration No. 59
Door Outside Locking Handle Assembly.

DOOR LOCK

The Door Lock is a unit made up of necessary working parts assembled into a two plate riveted case. Parts are not serviced.

The Lock Case has a Felt Oil Reservoir providing for lubrication of the Lock Bolt. *(See Illustration 61 at A.)*

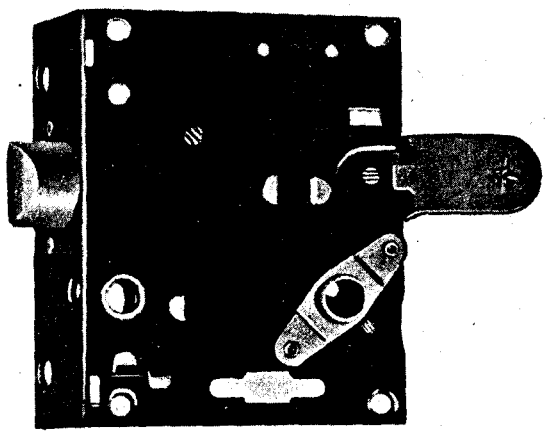


Illustration No. 60
Outside View of Door Lock.

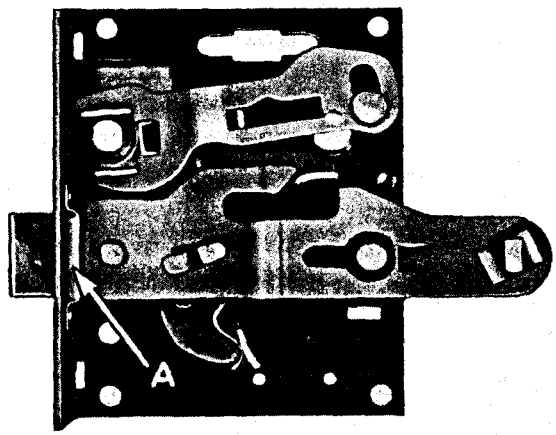


Illustration No. 61
Inside View of Door Lock.

DOOR HINGES

The Door Hinge is composed of two halves, (Male and Female), Pin and Bronze Bushings. The Female half is installed on the Body Pillar and its two lips are drilled for a drive fit for the Hinge Pin.

The Male half is installed on the Door and its single lip drilled large to admit a Bronze Bushing on the upper and lower side which are pressed in place then reamed to a slight clearance for the Hinge Pin. *(See Illustration No. 62.)*

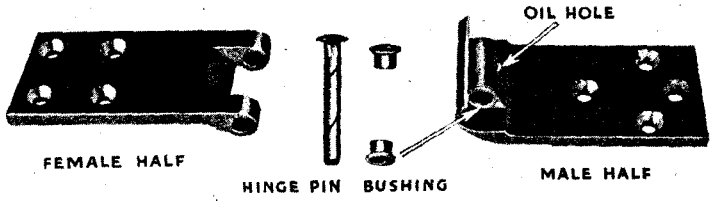


Illustration No. 62
Door Hinge Assembly.

HINGE PIN

The Hinge Pin is hardened and copper plated. It is also spiral grooved for oil. The proper place to oil a Hinge is through the Oil Hole provided in the Male Half. A Pressure Type Oil Can should be used when forcing oil in the Hinge Oil Hole. *(See Illustration No. 67.)*

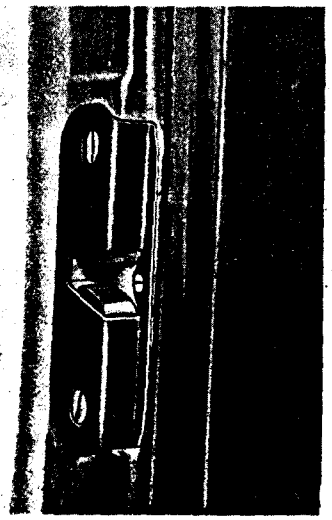


Illustration No. 63
Door Dovetail Bumper Assembly.

THE DOOR DOVETAIL BUMPER

The Door Dovetail Bumper Assembly is a unit the parts of which are not serviced separately.

It is composed of two Shoes, each of which is backed up with two rubber encased coiled springs. These are housed in a metal case which is clinched to a Cover Plate.

When the Door is closed the Wedgeplate is forced between the two Shoes and the springs are compressed. The Wedgeplate should enter between the Shoes centrally.

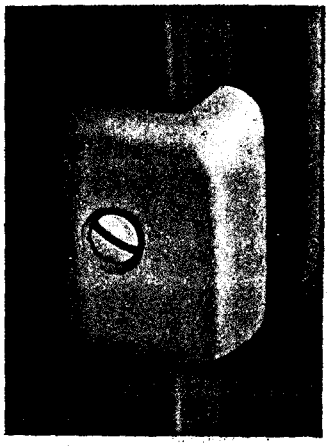


Illustration No. 64
Front Door Rubber Bumper Upper.

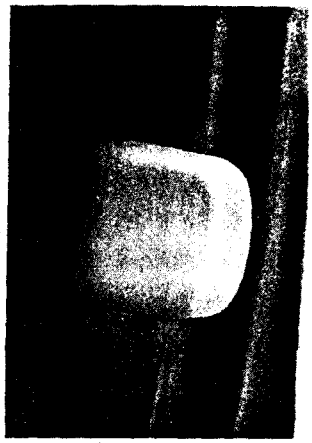


Illustration No. 65
Rear Door Rubber Bumper 1935.

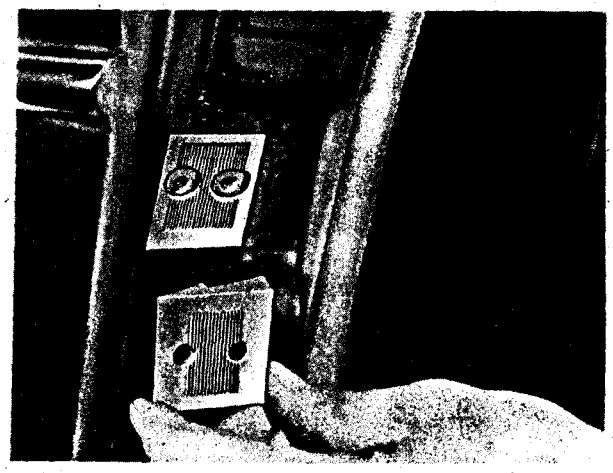


Illustration No. 66
Adjustable Striker Plate (Front Pillar) 1935.

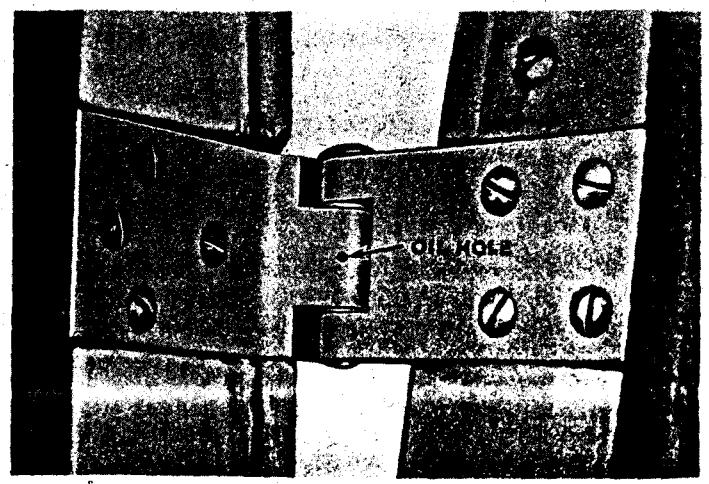


Illustration No. 67
View Showing Oil Hole in Hinge Assembly.

1935 REMOVAL AND REPLACEMENT

DOOR OUTSIDE LOCKING HANDLE

The Door Outside Handle, (Right) has a Locking Cylinder and Key. The Handle is a hollow shell into which the Cylinder and detachable Shaft is housed.

To remove the Cylinder, simply drive out the Pin, *(See Illustration No. 68)* and pull out the Cylinder with the Key.

The Cylinder is removed from its Shaft Assembly by sliding the Sleeve from the Cylinder down on the Shaft and disconnecting the Shaft from the Cylinder.

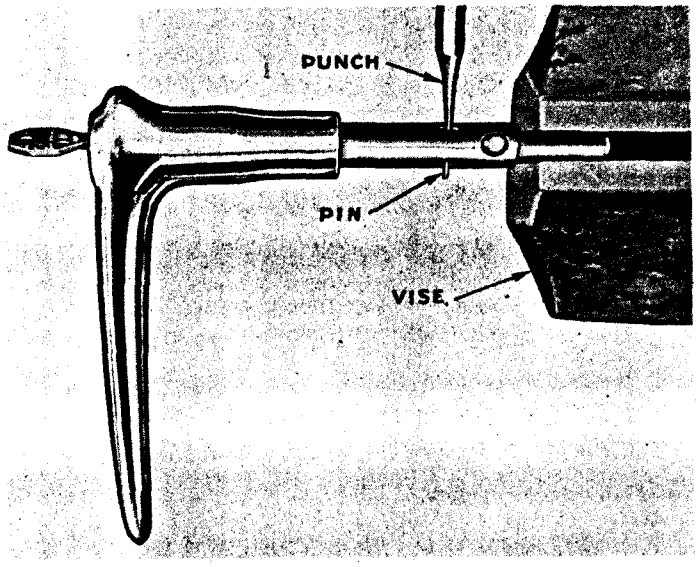


Illustration No. 68
Outside Door Handle Lock Cylinder Removal.

After reassembling the Cylinder to the Handle again, make sure the Retaining Pin is inserted and swaged to secure it to place.

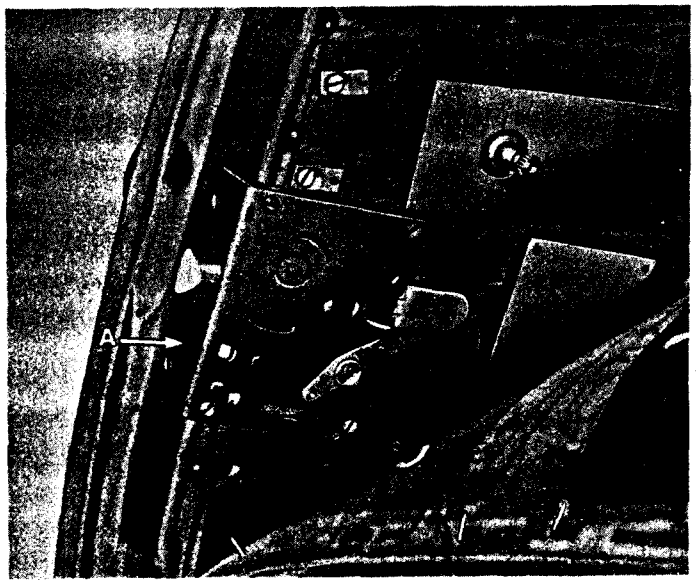


Illustration No. 69
Location of Outside Door Handle Retaining Screw.

To remove the Door Outside Handle, remove with a small screw driver the Retainer Screw to be seen through a hole in the face of the Door Lock. This screw when taken out will release the Handle to be pulled out of the Door.

Note: On the larger Bodies a Finishing Plate must be removed to expose this Retaining Screw. Illustration No. 59 shows the various parts of the Door Outside Locking Handle Assembly.

On the later type 1935 Bodies the Front Door Inside Pull to Handle was applied on the inside of the Door Outside Handle and retained by a small screw through the Inside Handle.

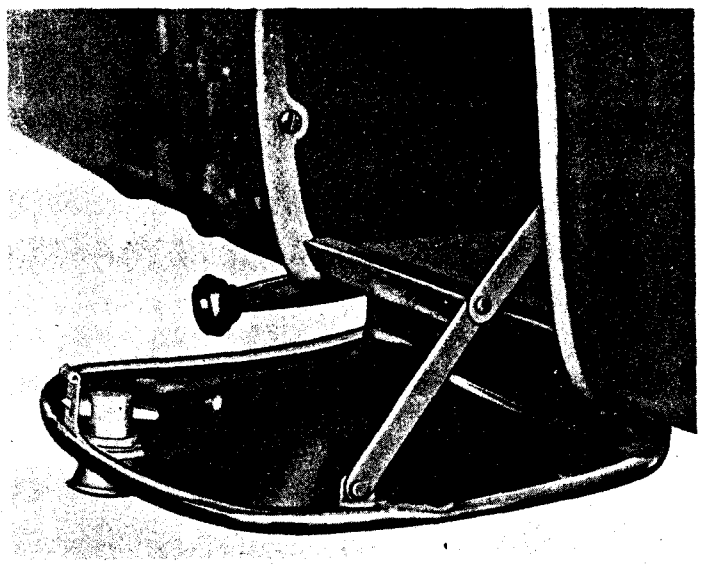


Illustration No. 70
1935 Glove Compartment Lid.

GLOVE COMPARTMENT

The Glove Compartment Box may be removed by taking out two screws at the top, one screw on each side and three at the bottom around the inside of the Glove Compartment Box opening. The Lid is removed by taking out one screw through the Support Bracket and the two screws in each of the Hinges.



Illustration No. 71
1935 Glove Compartment Lock Cylinder Removal.

GLOVE COMPARTMENT LOCKING DEVICE

The Lock and Knob Assembly used on the 1935 Lids *(See Illustration No. 71)* consists of a:

Knob
Lock Bolt and Tension Spring
Lock Cylinder and Key
Retainer Nut and Washer
Striker Plate
Friction Catch (On Instrument Panel).

1. To unlock—turn Key to left.

2. To remove Lock Cylinder—while Key is in unlocked position compress slender end of Lock Bolt against the Spring as shown in Illustration No. 71, turn Key to left and remove Cylinder with Key. The Lock Bolt and Spring may now be removed together.

3. To remove Knob—perform operation No. 1 and No. 2 and then remove Nut and Striker and remove Knob.

4. To replace Cylinder and Key—Insert Lock Bolt and Spring Assembly as in Illustration No. 71 and insert Key and Cylinder Assembly. Push in on the Key and turn to the right, to allow the Lock Bolt to snap into place.

The Lid is held in closed position by means of the Lock Striker snapping past the Friction Catch.

The Friction Catch Spring is attached to the metal flange above the Lid Opening with two rivets.

Two Rubber Bumpers on either side of the Friction Catch are for the purpose of exerting tension on Lid to eliminate chatter at the Lock.

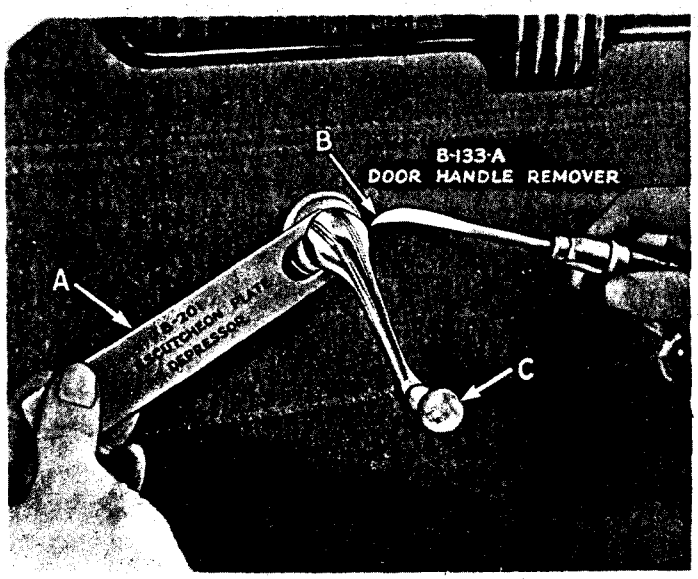


Illustration No. 72
Method of Removing Door Inside Handle.

DOOR INSIDE HANDLE

To remove Handle:

1. Insert tool between the Handle and Escutcheon Plate as in Illustration No. 72. Rotate tool until it is beneath Knob C.
2. Insert tip of Tool No. B-133 under one end of Retainer Spring and push out Spring.
3. Remove the Handle.

To install:

1. Replate the Escutcheon Plate.
2. Insert the Handle over the Spring Installing Tool and snap the Spring to position in Handle Slot. *(See Illustration No. 73.)*
3. Remove tool from Handle and place Handle on Regulator Shaft in the correct position and strike it a sharp light blow with a Rubber Mallet.

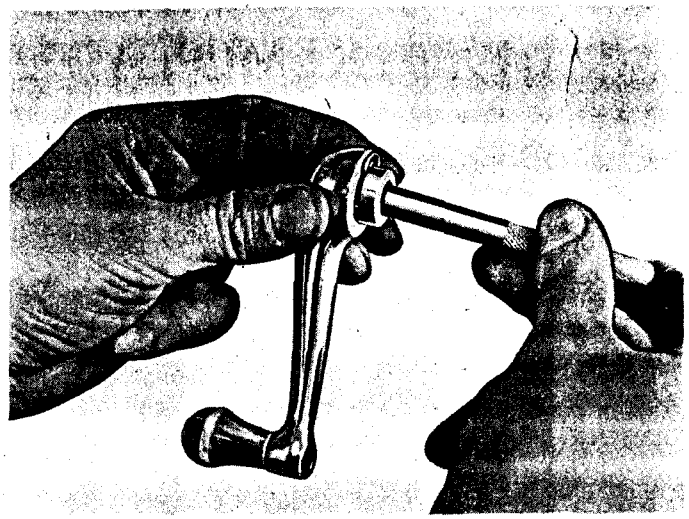


Illustration No. 73
Installing Door Inside Handle.

DOOR HINGE

To Remove the Door Hinge Assembly:

1. Remove Hinge Screws and Bolts.
2. Close the Door and remove Hinge.

To Remove a half Hinge:

1. Remove Hinge Pin.
2. Remove all Screws and Bolts in the Hinge half.
3. Separate and remove the Hinge half.

Tool No. B-170 Hinge Pin Remover should be used where Hinge Pin is difficult to remove. Ordinarily a Drift Punch and Hammer will suffice.

TO REMOVE DOOR CHECK LINK

Front Door:

1. Loosen the Front Door Trim Pad from the bottom to a point just above the Check Link.
2. Screw off the nut from threaded end of Link.
3. To remove Link from Center Pillar screw out the barrel nut from rear face of Pillar.

Rear Door:

1. Loosen Rear Quarter Trim Pad.
2. Screw off nut from Link.
3. To remove Link from Door loosen Door Trim Pad at bottom and unscrew the Link from the "T" nut in Door Pillar.

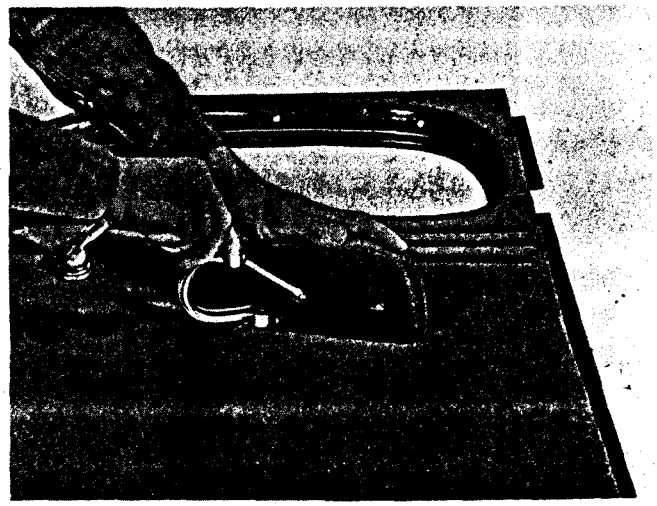


Illustration No. 74
Door Arm Rest Removal.

DOOR ARM REST

To Remove:

1. Remove two long Screws from underside of Arm Rest.
2. Lift Arm Rest from Bracket.

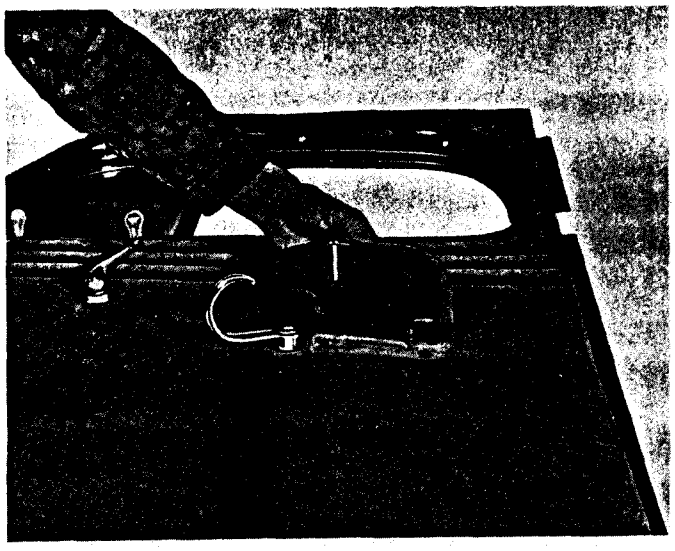


Illustration No. 75
Door Arm Rest Removal.

TO REMOVE FRONT DOOR GLASS

1. Remove Window Garnish Molding.
2. Remove Upper Glass Run Channel *(See Illustration No. 76 at A).*
3. Remove (2) Screws from Center Division Channel at Door Header.
4. Remove Door Ventilator Handle and Door Safety Locking Rod Handle.

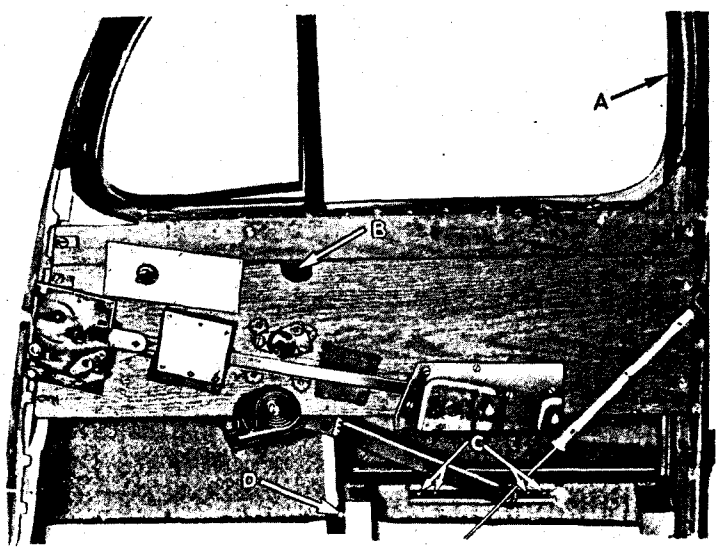
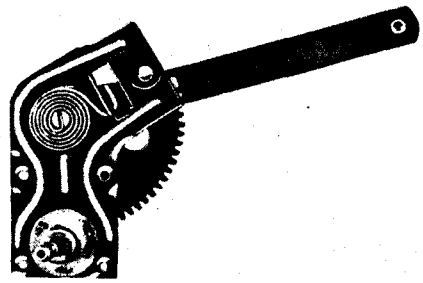


Illustration No. 76
Front Door Glass Removal.

5. Loosen the Door Trim Pad at Window Opening and remove the top section of the Regulator Board.
6. Remove (3) screws from Center Division Channel at "B."
7. Loosen the Lower Half of Door Trim Pad and remove (2) screws at lower end of Center Division Channel at "D."
8. Remove the two screws at each end of the Glass Sash Channel at "C."
9. Remove Glass from Window Opening.

TO REMOVE REAR DOOR GLASS

1. Remove the Garnish Molding.
2. Remove the Glass Run Channel Upper.
3. Remove the two Wood Corner Blocks.
4. Raise Glass, disconnect it from the Regulator Arm and remove from Door.



Front Door Window
Regulator (Sedan).

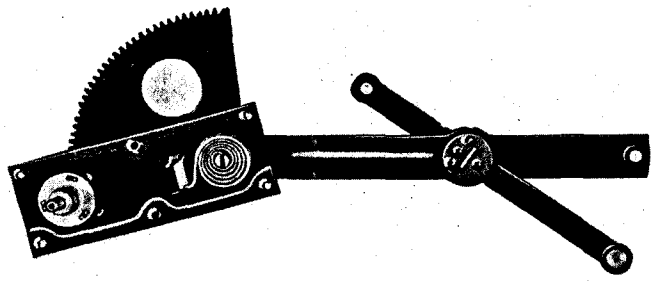


Illustration No. 77
Front Door Window
Regulator (Coach).

DOOR WINDOW REGULATOR

To Remove:

1. Remove Garnish Molding and Arm Rest.
2. Remove all Door Handles and the Safety Locking Rod Handle.
3. Loosen Door Trim Pad and remove it from Door.
4. Remove Sash Channel Cam Screws (2 screws in each end).
5. Remove Regulator Board.
6. Remove Regulator.

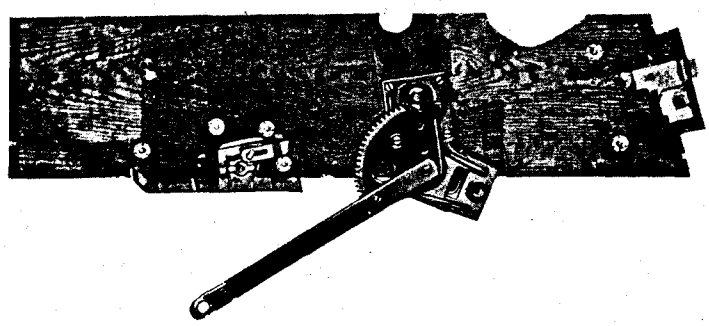


Illustration No. 78
Front Door Window Regulator Board and Mechanism.

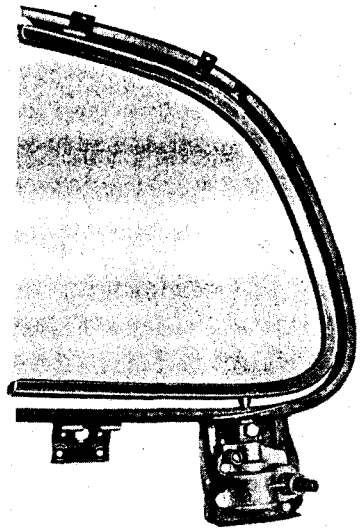


Illustration No. 79
Front Door Ventilator Assembly.

DOOR VENTILATOR ASSEMBLY

To Remove:

1. Remove Door Garnish Molding.
2. Remove Ventilator Regulator Handle.
3. Loosen Door Trim Pad at top.
4. Remove top section of Regulator Board.
5. Remove ten screws from Retainer and Regulator Base.
6. Remove the entire Assembly.

DOOR VENTILATOR REGULATOR

A new Door Ventilator Regulator may be replaced on the Assembly by removing the entire Assembly from the Door and cutting the two white metal lugs and two rivets in the Regulator Back Plate then by removing the "Hex" screw, remove the old Regulator.

Rivet the New Regulator to place and install in Door.

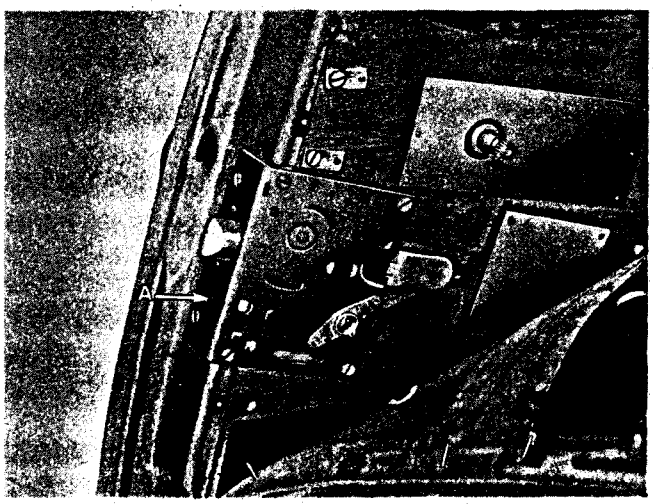


Illustration No. 80
Door Lock Removal.

FRONT DOOR LOCK

To Remove:

1. Remove the Garnish Molding.
2. Remove Inside Safety Lock Rod Handle. (Unscrew the Escutcheon Nut)
3. Remove the Door Outside Handle.
4. Remove the screws in Lock Face.
5. Loosen the Door Trim Pad near the Lock and remove the screws in the Lock Casing.
6. Remove Lock by disengaging it from the Remote Control Link.

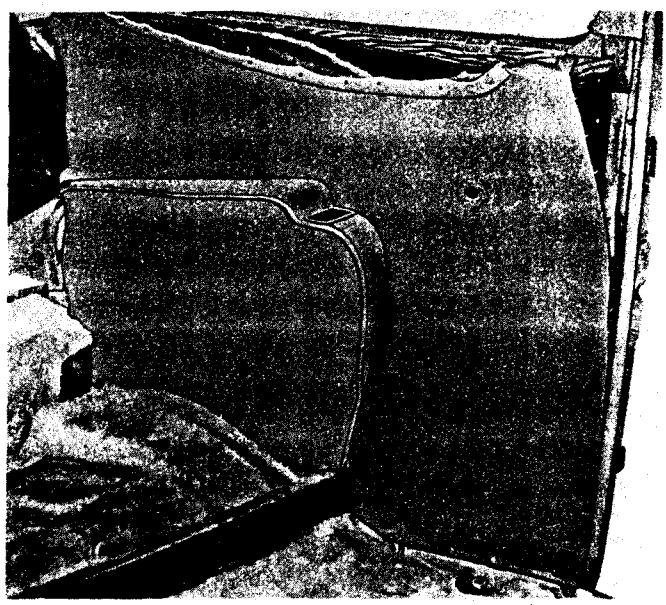


Illustration No. 81
Rear Quarter Window Regulator Board Removal.

REAR QUARTER REGULATOR BOARD

To Remove:

1. Remove Rear Seat Cushion.
2. Remove Rear Seat Back.
3. Remove Quarter Window Garnish Molding.
4. Remove Regulator Handle.
5. Draw the tacks on Trim Pad and its foundation Board along the Window Opening and down far enough to clear the Regulator Board.
6. Remove Regulator Board. (A Wood Screw going up from the outside under the Fender Anchors the Arm Rest to the Wheelhousing in some Style Bodies. Remove this screw.)

REAR QUARTER VENTILATOR ASSEMBLY (SEDAN)

To Remove:

1. Remove the Garnish Molding.
2. Remove the Regulator Handle.
3. Release the Lower Quarter Trim along Window Opening.
4. Remove Screws holding the Ventilator Assembly to the Window Framing.
5. Loosen the Assembly and Remove towards inside of car.

BACK WINDOW GLASS

To Remove:

1. Remove Garnish Molding.
2. Loosen Glass in Channel and remove Glass. On some Styles it is necessary to remove the Curtain.

REAR SEAT BACK

To Remove:

1. Remove Rear Seat Cushion.
2. Remove two screws at the Floor that hold the Seat Back Frame.
3. Through Rear Compartment or Trunk Opening, remove tacks holding the cardboard Baffle to the Rear Seat Back Frame, then remove three screws entering the top of Rear Seat Back.
4. Lift out the Seat Back.

ADJUSTABLE FRONT SEATS

To Remove:

1. Remove Front Seat Cushion on Models where not permanently set.
2. Remove bolts anchoring Seat Mechanism and Stop to Floor. *(See Illustration No. 82 at A.)*
3. Move Seat forward to disengage guides on underside of Seat Frame from those anchored to the Floor.

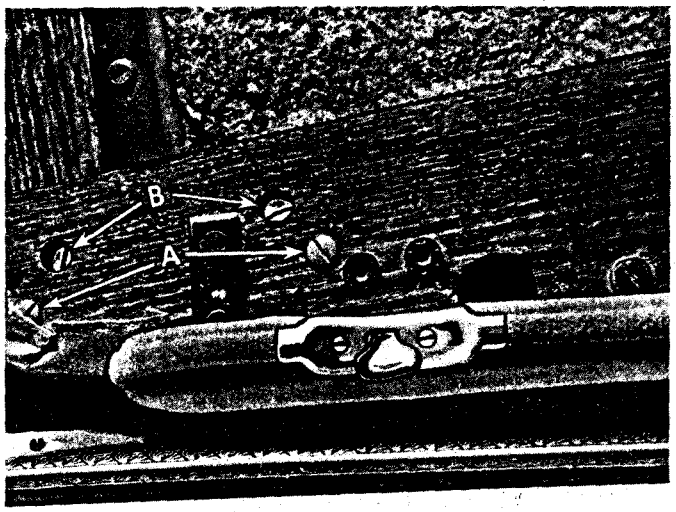


Illustration No. 82
Adjustable Front Seat Removal.

WINDSHIELD

Windshield Garnish Molding Removal

To remove a Windshield Garnish Molding:

1. Tape the Instrument Panel along the Garnish Molding.
2. Remove the Rear View Mirror.
3. Remove the twenty Molding Screws and Washers.

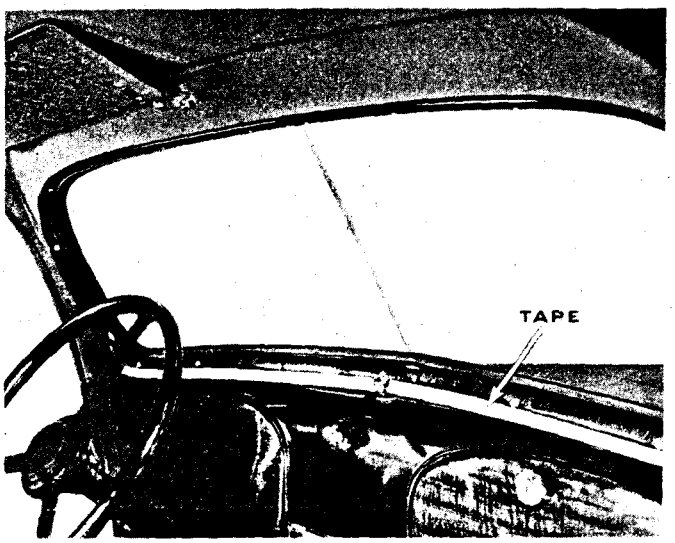


Illustration No. 83
Windshield Opening Taped for Glass Removal.

4. With a flat tool pry out the Garnish Molding at the top joint far enough to separate the joint.
5. Pry down on one end and pull its upper corner free from opening.
6. Bend and pull the Molding free from lower corner.
7. Free the other side of Molding likewise.

To Replace Molding:

1. Insert one lower corner.
2. Bend and press the upper corner to place.
3. Care for the other side likewise.
4. Engage the free ends at joint and press in at the joint.
5. Install screws, washers, and Rear View Mirror.

NOTE—The two short Garnish Molding Screws should be in the lower center two holes.

WINDSHIELD WIPER HOUSING CAP GASKET

The Windshield Wiper Housing Cap Screws hold the Housing in position. This means that if the screws are entirely removed for any reason the Housing drops out of position and may necessitate the removal of the Glove Compartment Housing in order to replace the Wiper Housing. These screws should be only loosened to remove the Gasket or replace it. If this Gasket does not fit correctly a water leak may occur. If the Cap is not packed with grease, water may be forced through the Wiper Drive Shaft Bearing causing a water leak. These water leaks may be mistaken for Windshield water leaks.

WINDSHIELD GLASS REMOVAL AND REPLACEMENT (ONE SIDE)

In the replacement of a cracked Windshield Glass, it is imperative that the cause of the Glass breakage (other than by accident) should be determined and corrected. Body men in various parts of the country have made a practice of placing a new Glass in the Windshield Opening without taking this fact into consideration and as a result the car comes back into the shop with the Windshield cracked in approximately the same place, the owner is aggravated, and the time, labor and material used in Glass replacement is lost.

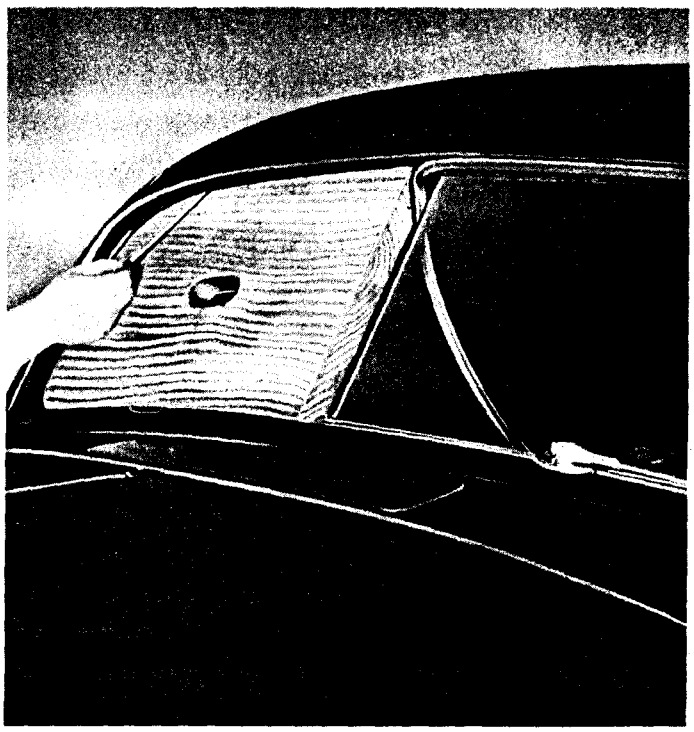


Illustration No. 84
Checking Windshield Opening.

The reason some Windshield Glasses crack is that somewhere around the Windshield Opening an obstruction or high spot is binding on the Glass. This strain becomes emphasized by wind pressure, extremes of temperature, or the motion of the car. The following information on the procedure of replacing a cracked Windshield Glass will be found helpful.

1. On the inside of the Body, apply Painter's Masking Tape along the top edge of the Instrument Panel adjacent to

the Windshield Garnish Molding to prevent marring the finish.

2. Remove Garnish Molding Screws and Rear View Mirror Bracket, also loosen screws in Windshield Wiper Housing Cap to release the Rubber Gasket.
3. Pry the Molding down at the joint and pull away far enough to separate the ends, then remove the Molding, one side at a time.
4. Remove the Center Division Channel and Weatherstrips.
5. Loosen Glass from Rubber Channel and remove Glass leaving Channel cemented to place.
6. Loosen Rubber Channel from Windshield Opening and clean off all old compound.

IMPORTANT—After cleaning out all the old sealing compound from the Glass Opening, examine the Opening at the point where the Glass cracked and remove, or correct any obstruction, that may be found. Place the new Glass in position and see that it does not tilt, or rock, but lies on a flat plane against the outer flange of the Windshield Opening. Or, better still, use a hardwood Template made to the shape of the Glass as shown in Illustration No 84.

whatever it may be, of the Windshield Glass cracking should be removed before a new Glass is installed.

7. Apply new compound No. F.S. 1039 to the Windshield Opening.
8. Starting at the bottom of the Center Division, insert the new Glass into the Windshield Rubber Weatherstrip and work the Rubber on to the bottom of the Glass. Follow this procedure around the Glass, finishing up at the top Center Division of the Rubber Weatherstrip. Push Glass and rubber Weatherstrip into the Windshield Opening. See that the Channel Outer Lip is pulled out over the Reveal all the way around the Glass. By placing a stout cord cemented with a few drops of F.S. 1039 Compound under the lip on the Rubber Channel with the two ends of the cord loose at the Center Division and then wetting the Rubber Channel with soap water the assembly can be easily slipped into place. By holding the Glass in position and pulling on one end of the cord carefully the lip of the Windshield Rubber Channel can be brought out over the edge of the Windshield Opening Reveal.
9. Re-install Windshield Garnish Molding by starting at the bottom and lower corners of the Molding and following up the side, pressing firmly to position. Finish installing the Garnish Molding at the top center by engaging the ends of the Molding together and press it into position. If one end of the Molding overlaps the other end, insert a scratch awl or prick punch in the end screw hole and pry the ends apart until they snap into place.
10. Set all Garnish Molding Screws, but do not tighten.
11. On the outside of the Windshield Opening, work or straighten out the lip of the Windshield Rubber Weatherstrip, so that it lies in correct position and then set the Garnish Molding Screws evenly to place.

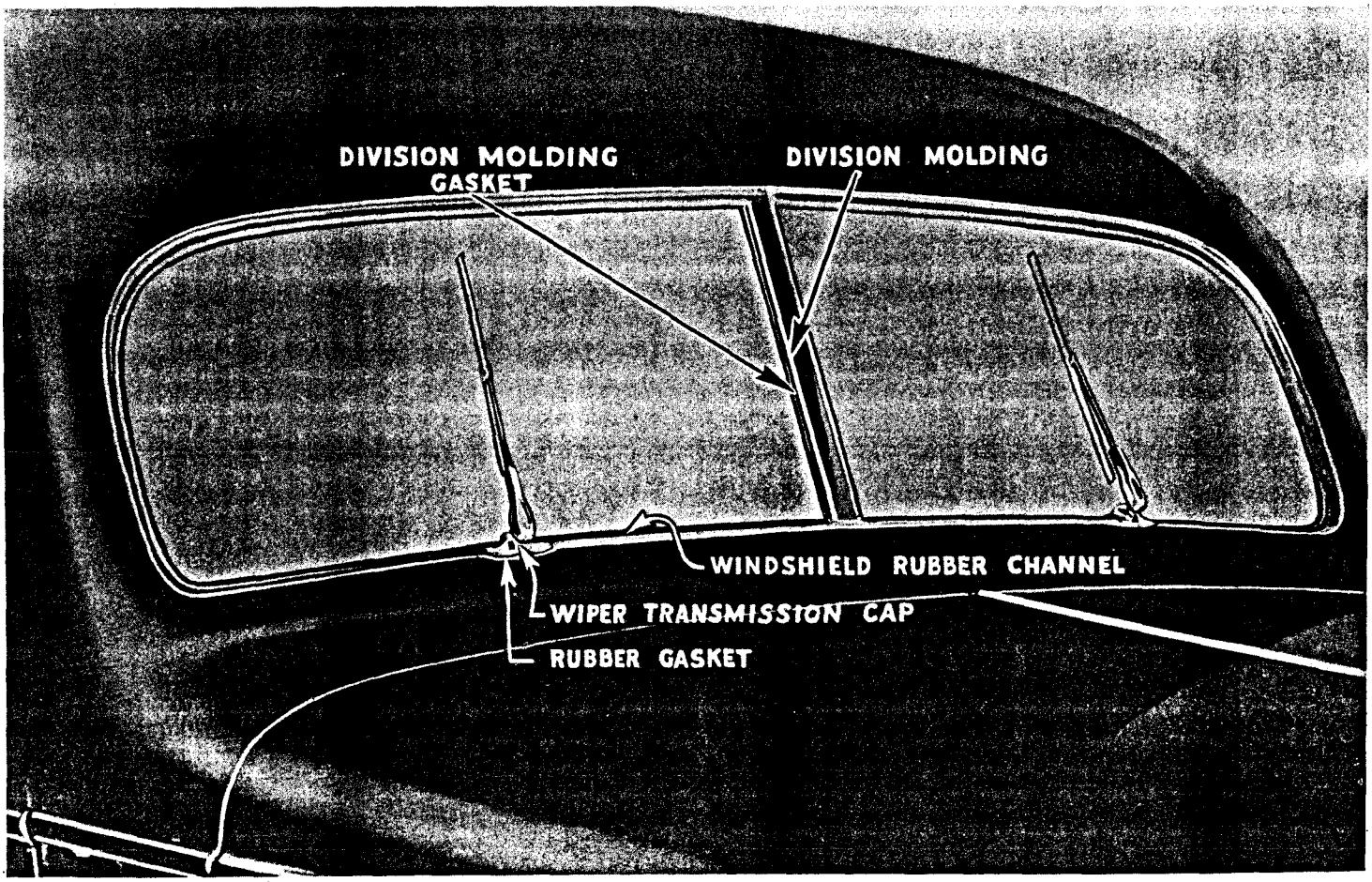


Illustration No. 85
1935-1936 Windshield Assembly.

This Template must lie flush, or on a flat plane, against the outer flange of the Windshield Opening. Use a Feeler Gauge, as shown in the same illustration, to determine if the Opening is in correct alignment. It may be necessary to peen the Windshield flange to make it conform squarely with the Template, the weld at the upper corner of the Windshield Opening may be protruding too far, or the Windshield Wiper Housing Cap *(See Illustration No. 150 at A)* may have been tightened in such a manner that it binds on the Windshield Glass. The cut out on the top of the Cowl, for the Windshield Wiper Mechanism *(See Illustration No. 149 at A)* may also be exerting too much tension against the Glass. The cause,

12. Replace the Windshield Center Division Channel and Weatherstrip, applying Compound F.S. 1039 to the outer Weatherstrip only. In tightening the screws of this Channel, start at the center screw first, then the top and bottom. Tighten to a snug fit only.
13. Seal under the outer lip of the Windshield Rubber Weatherstrip around the entire Windshield Opening. Also, under the Windshield Wiper Housing Cap Gasket, use Compound F.S. 1040 in gun B.-182.
14. Remove masking tape and clean up Glass.

NOTE—In an early description of Windshield Glass replacement given out by the Fisher Body Service Division, the complete Windshield Glass removal was advocated when only one Glass was cracked. We have found, however, that with proper care it is only necessary to remove the Glass that is damaged.

HEADLINING REMOVAL (EARLY TYPE)

To Remove:

1. Remove Rear Seat Cushion.
2. Release Trim Board on the back of Rear Seat Back Assembly and the three wood screws that are screwed into top of Seat Back. Remove the two machine screws retaining the Rear Seat Back at bottom.

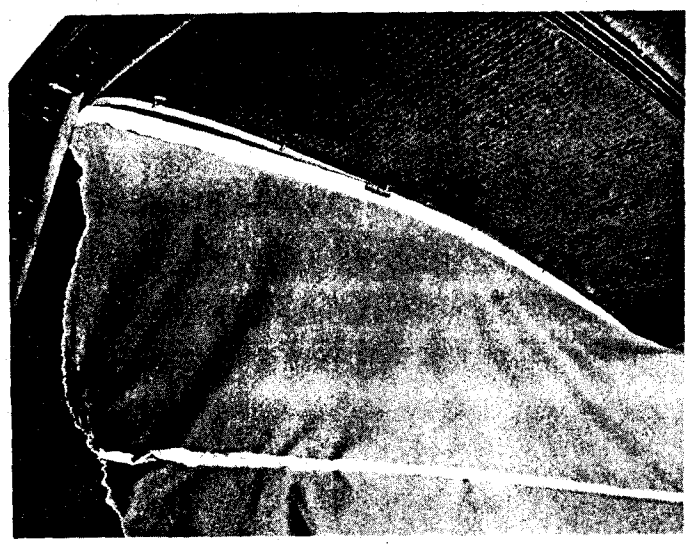


Illustration No. 86
Method of Attaching Headlining to Roof Bows.

3. Remove Trim Assembly from top of Rear Seat Package Shelf Board.
4. Release entire upper edge of Rear Quarter Upper Trim Assembly.
5. Remove Rear Window Garnish Molding, Dome Lamp Assembly and Rear Window Curtain Brackets.
6. Remove tacks from Headlining at Rear Quarter and across the back at Shelf Board and Rear Window Opening.
7. Remove Sun Visors and Visor Brackets. Release top edge of Over Windshield Trim Strip and remove tacks from Headlining.

   NOTE—In many shops the workmen remove the Garnish Moldings from the Windshield and Rear Quarter Windows in order to remove the tacks in the Foundation Board rather than simply loosen the Trim Assemblies above the Moldings. This requires more time but a beginner can be sure of a neater appearing Trim job when finished if the moldings are removed. Remove three Windshield Garnish Molding screws at upper outside corners and release lower front corner of Headlining over Front Door at Retaining Plate and remove the four screws retaining it at the front end.

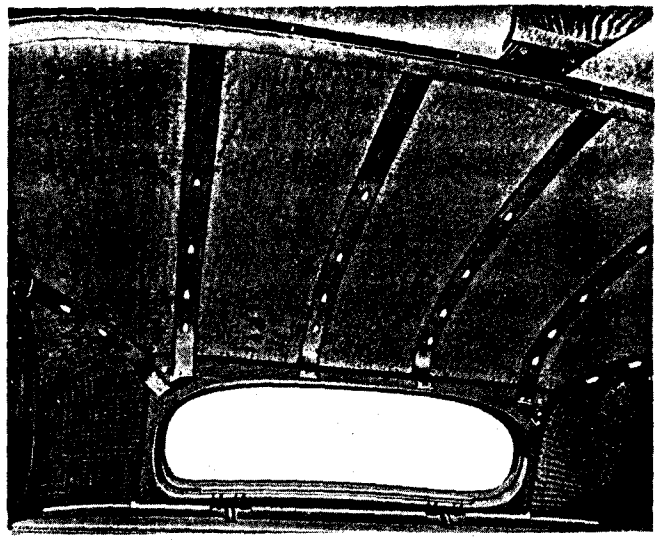


Illustration No. 87
Headlining Rear Supports.

8. Continue releasing Headlining from its retaining Plate along Roof Rails. The Headlining Installing Tool should be used to avoid damaging Retaining Plate.
9. Disengage Headlining Listing Wires from Retainer Hooks on Roof Bows and Supports.

INSTALLATION OF HEADLINING

1. Fold Headlining at center lengthwise and mark the center with chalk.
2. Match center line of Headlining to the center line of Roof and engage Headlining Rear Listing Wire to the proper Headlining Support Hooks, continue to the front and attach all Wires to their respective Hooks.

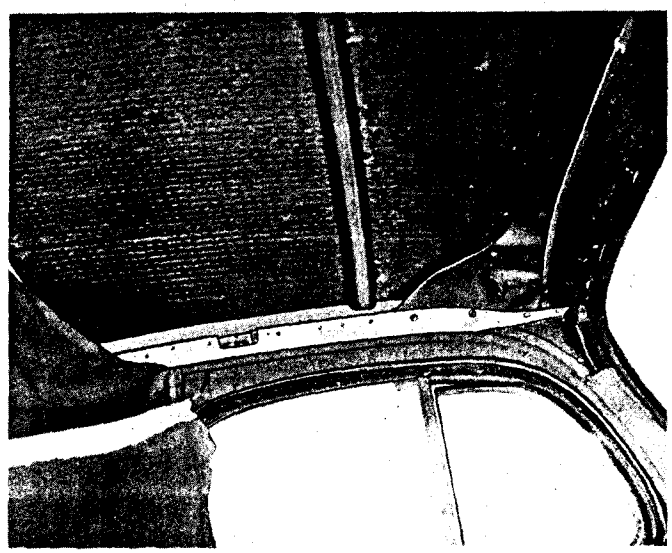


Illustration No. 88
Headlining Metal Retainers.

CAUTION—In attaching Wires to these Hooks, be sure to smooth the Listing so as to take the stretch of the Headlining to insure proper tightness.

3. Tack front end of Headlining to the tacking strip above the Windshield.
4. Apply paste to the back of the Over Windshield Trim Strip and refasten to place with brads drawing Trim over the head of the brad.
5. Tuft the Headlining under the lower edge of the Headlining Retainer Plates above the Doors and tack Headlining to the Rear Window Frame.

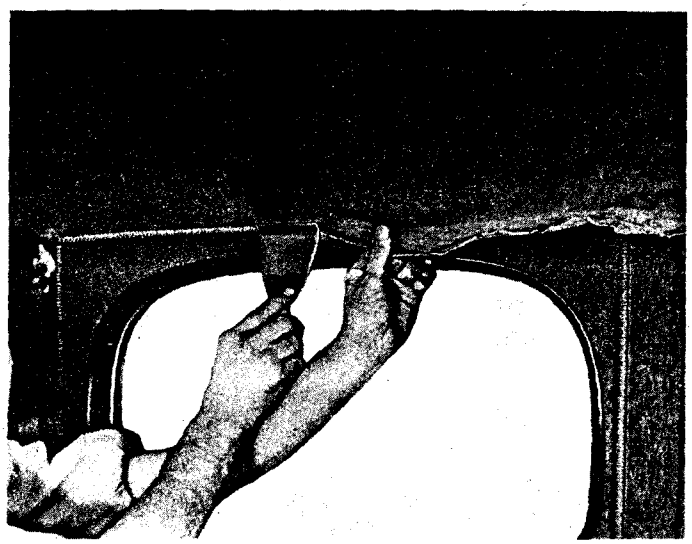


Illustration No. 89
Headlining Installation Tool.

6. Tack the Headlining to the Rear Seat Parcel Shelf Board and over Rear Quarter Windows and at the Rear Quarter Upper Trim Strip.
7. Reinstall Rear Quarter Upper Trim Pad with brads and draw the Trim over brad heads.
8. Tack and cut out Headlining at Dome Lamp Block, and install Dome Lamp Assembly.
9. Tack the Rear Seat Parcel Shelf Board Trim in place.
10. Install Rear Window Garnish Molding and Rear Window Curtain.
11. Install the Rear Seat Back Assembly. Rear Seat Cushion and retack the cardboard to the rear of Seat Back Assembly.

NOTE—For a description of Headlining removal and replacement on later 1935 Body Styles. *(See Index.)*

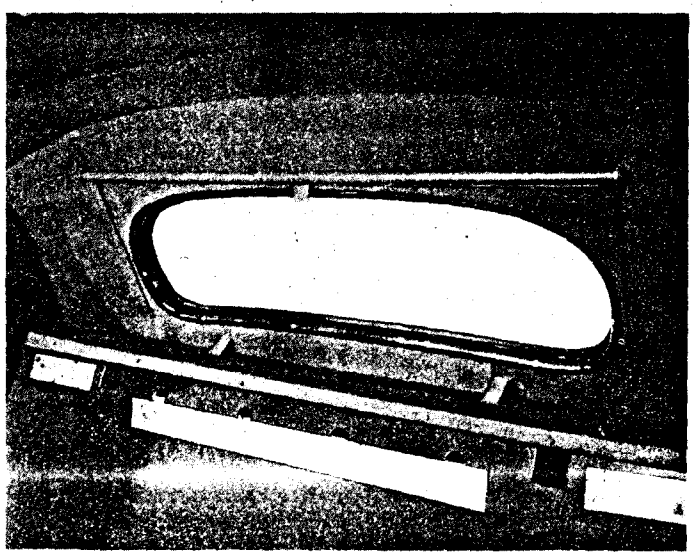


Illustration No. 90
Parcel Shelf Board Trim.

LOWER REAR QUARTER TRIM REMOVAL

The Rear Quarter Arm Rest is a part of the Rear Quarter Lower Trim Assembly. This Assembly including the Arm Rest is made up of a waterproof Foundation Board formed to fit the contour of the Wheel Housing *(See Illustration No. 91 at A.)* over which the Foundation Wadding and Trim Material are assembled. To remove the Rear Quarter Lower Trim Assembly proceed as follows:

1. Remove the Rear Seat Cushion and Cushion Back:

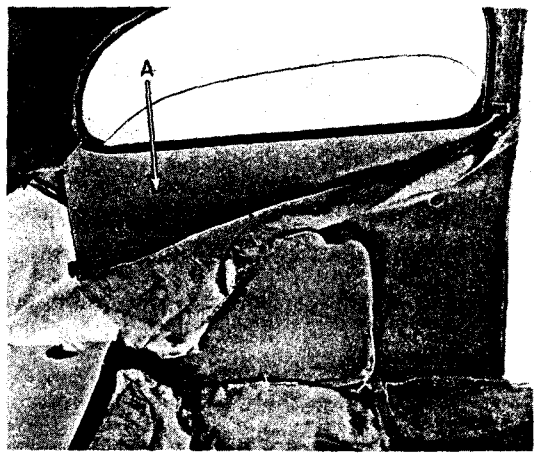


Illustration No. 91
Lower Quarter Trim Partially Removed.

2. Remove Rear Quarter Window Garnish Molding.
3. Remove Rear Quarter Window Regulator or Ventilator Handle.
4. On the outside of the car, remove the screw from under the Wheelhousing holding Arm Rest in place. *(See Illustration No. 92 at B.)*
5. Turn back the Floor Carpet and remove tacks from Tacking Strip holding Trim Assembly to Sill and Rear Body Hinge Pillar.
6. Remove tacks from Trim Stick holding Trim Assembly at the Rear.

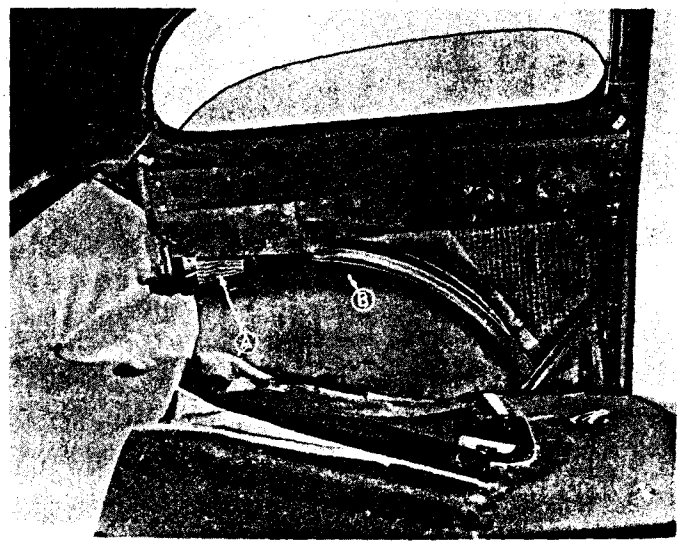


Illustration No. 92.
Lower Quarter Trim Removal.

7. Remove tacks holding Trim Assembly to the top edge of the Rear Quarter Regulator Board. After this operation, turn down the Trim Material and remove the tacks holding the Cardboard Foundation of the Assembly to the Regulator Board. *(See Illustration No. 91 at A.)*
8. Carefully pry loose the Trim and Cardboard Foundation from the Rear Body Hinge Pillar.

UPPER REAR QUARTER TRIM REMOVAL

The Upper Rear Quarter Trim is assembled to the Cardboard Foundation before it is installed in the Body. This complete Assembly is removed as follows:

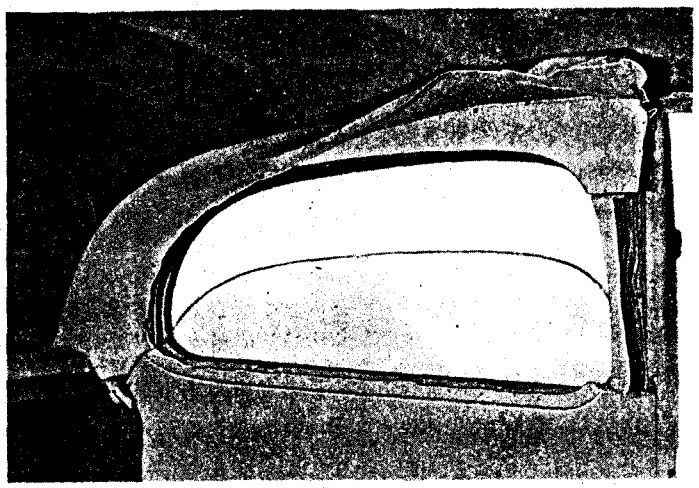


Illustration No. 93
Upper Quarter Trim Removal.

1. Remove the Rear Seat Cushion and Cushion Back.
2. Remove the Rear Quarter Window Garnish Molding.
3. Loosen and turn back the Trim on top of the Parcel Shelf Board at corner.
4. Untack the Trim around the upper and rear part of the Quarter Window Opening, also from the top of the Parcel Shelf Board at the corners.
5. Remove tacks holding the Cardboard Foundation of this Assembly to the Rear Body Hinge Pillar, Side Roof Rail Filler, Rear Quarter Pillar and upper Rear Quarter Trim Stick.

DOOR TRIM PAD REMOVAL

In order to adjust or repair Door Mechanical Hardware Parts, it may be necessary to remove the Trim Pad from the Door. In some cases, the upper or lower part of this Assembly may be loosened sufficiently to make the needed adjustment, while in cases of damage to the Trim Pad itself, complete removal may be necessary. To completely remove a Door Trim Pad proceed as follows:

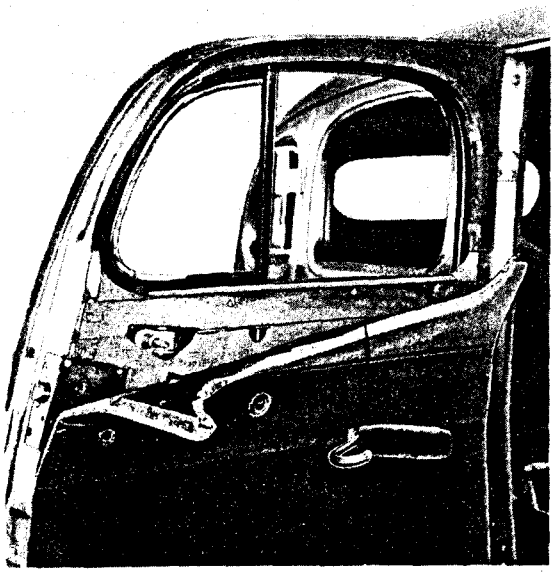


Illustration No. 94
Door Trim Pad Removal.

1. Remove the Door Window Garnish Molding.
2. Remove the Door Arm Rest.
3. Remove the Regulator and Remote Control Handles.
4. Remove the Inside Safety Lock Rod Handle.
5. Untack the Trim Pad from the top edges of the Regulator Board.
6. Turn down the cloth of the Trim Pad and remove the tacks holding the Cardboard Foundation of this Assembly to the Regulator Board.
7. Starting in the vicinity of the Door Lock, insert a screwdriver between the Trim Pad and the Door Lock Pillar and pry the Pad loose.
8. Follow this procedure and pry the Pad loose from the Door Hinge Pillar.
9. Finish this operation by detaching the Pad from the Door Bottom Board in a similar manner.

SUN VISOR INSTALLATION

The Sun Visor on the left side above the Windshield is standard on most style Bodies. On some, the right side Sun Visor is also standard equipment.

On those cars having only the left side installation, if the right side one is to be added, care should be used not to tear the Headlining when placing the Bracket in position.

The Headlining has to be stretched tightly for appearance sake and the added tension of the Bracket may tear it loose at the edges. By gently smoothing it toward the Roof Side Rail, enough slack may be gained to suffice.

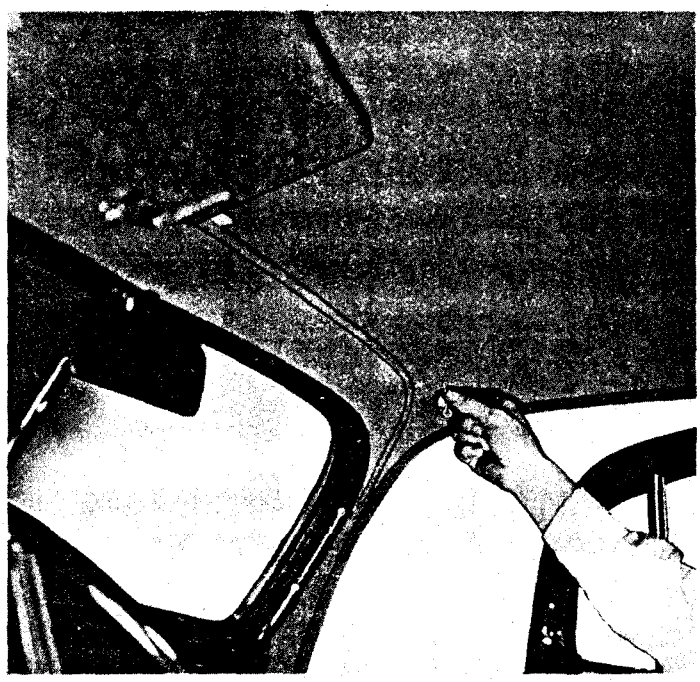


Illustration No. 95
Sun Visor Installation.

NOTE—If Headlining is stretched too tight at this point it may be a good policy to loosen it at this corner to prevent tearing.

As shown in Illustration No. 95 locate the threaded holes and install the Visor Bracket and Screws. The locations for the Socket and Escutcheon, above the Windshield and above the Door Opening may easily be found after the Visor Pivot Bracket is screwed into place. By cutting a hole through the Trim and Foundation Cardboard at these locations the Escutcheons may be pressed into the openings provided.

REAR QUARTER WINDOW GLASS REMOVAL (SEDAN)

1. Remove Garnish Molding.
2. Release the Trim where tacked around Opening.
3. Remove the Screws holding the Window Metal Retainer at the top, bottom and back.
4. Loosen the outside lip on Rubber Channel and remove Assembly from inside.

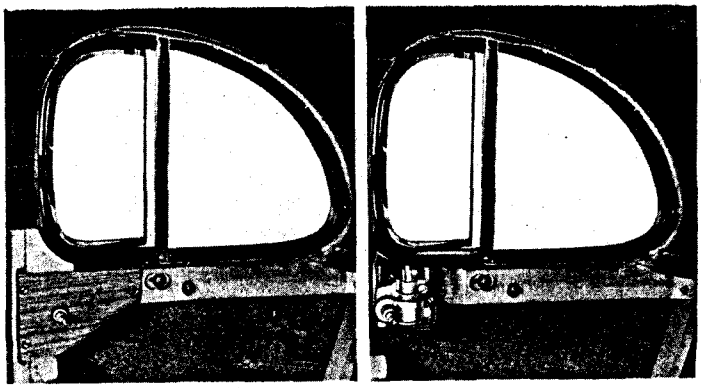


Illustration No. 96
Sedan Rear Quarter Window Glass Removal.

REAR QUARTER WINDOW GLASS (COACH)

To Remove:
1. Remove Garnish Molding.
2. Remove Rear Seat Cushion and Cushion Back. (Pontiac, Oldsmobile, LaSalle).
3. Loosen Lower Quarter Trim Pad and its Foundation from the Opening.
4. Remove the upper section of Regulator Board.
5. Remove Glass Run Channel Upper.
6. Remove the two screws in each end of Glass Sash Channel
7. Remove Glass.

DOOR (FRONT)

To Remove:
1. Remove Slotted Sleeve Nut from rear side of Center Pillar to release the Door Check Link.
2. Remove the Door Hinge Pins. (Tight Hinge Pins are easily removed with Hinge Pin Removing Tool No. B-170.
3. Remove Door.

DOOR (REAR)

To Remove:
1. Loosen the Trim Pad on Door and remove the Nut and Rubber from Link.
2. Remove the Hinge Pins.
3. Remove the Door.

ROOF BOW (FRONT BOW)

To Remove:
1. Remove Headlining back beyond the Bow.
2. Remove two bolts at each end of Bow.
3. Slide Bow at one end and remove it.

ROOF BOW (SECOND BOW)

To Remove:
1. Remove Headlining back beyond the Bow.
2. Loosen Bow from Dome Lamp Board.
3. Remove Dome Lamp Wiring from Bow.
4. Remove 2 Bolts from each end of Bow and remove it.

ROOF BOW (REAR BOW)

Headlining Rear Supports

To Remove:
1. Remove Headlining back to Rear Window.
2. Loosen Dome Lamp Board.
3. Loosen Headlining Rear Supports from Back Window Frame.
4. Remove bolts at each end of Bow.
5. Remove the Bow with Headlining Supports.

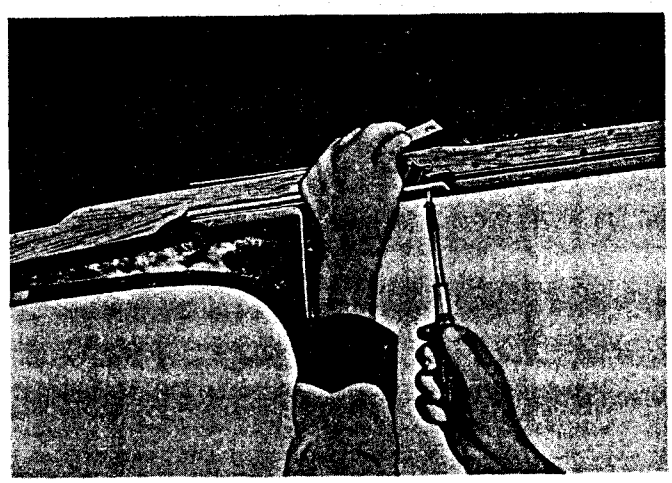


Illustration No. 97
Side Roof Rail Filler Removal.

ROOF SIDE RAIL FILLER

To Remove:
1. On a Coach, remove the Rear Quarter Window Frame. On a Sedan, remove the Rear Quarter Window and Window Frame.
2. Release the Headlining along the Roof Rail and back eighteen inches on the Roof Bows.
3. Remove all bolts through Roof Rail Filler.
4. Remove Filler.



Illustration No. 98
Removing Side Roof Rail Fillers.

ROOF PANEL INSULATION FELT REMOVAL

1. Remove the Upholstery necessary to expose the Felt.
2. The Felt may be removed by scrapers or by the flat heated tip of an electric Soldering Copper. It is seldom removed in condition to be used again. New Felt must be installed to cover space.

FISHER TURRET TOP ROOF PANEL REMOVAL

Sometimes a body man is faced with the necessity of either REPAIRING or REPLACING a Turret Top Roof Panel. The decision must be made by him and his decision is to be governed by the conditions existing. It depends upon how badly the Roof Panel is damaged, whether the parts are available, competence of workmen, time available, and the cost.

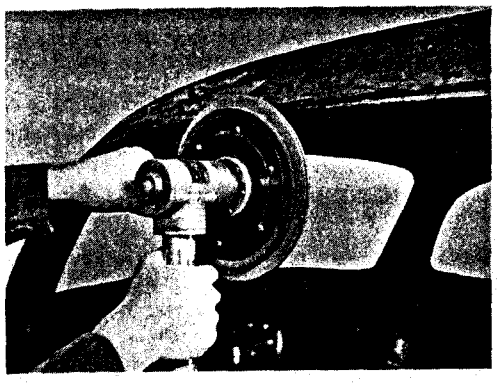


Illustration No. 99
Cutting Turret Roof Along Drip.

A good body Metal Bumping Man can straighten out and REPAIR almost any damaged Panel, and again a good body Metal Welder and Finisher may be able to make a REPLACEMENT at less cost and time. The cost to REPAIR may exceed the cost of REPLACEMENT. We'll say he decides to REPLACE the Roof Panel. In preparation for this operation it will be necessary first, to remove the Headlining and all Trim adjacent to it. Remove the Doors, Windshield, Rear Quarter and Back Window Glasses. Remove Roof Bows, Side Roof Rail Fillers, and Rear Quarter Window Frames.

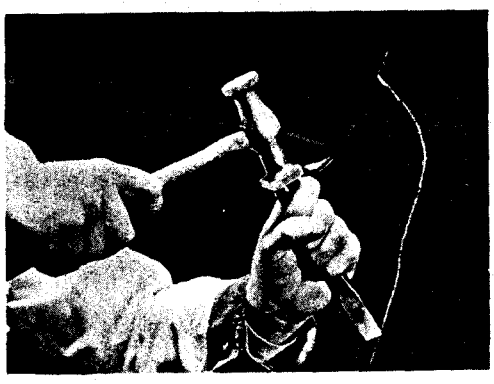


Illustration No. 100
Method of Cutting Roof Panel at Rear Quarter.

To remove a Turret Top Roof Panel, cut along Roof Drip Molding with a Grinding Wheel or Disc.

REMOVAL OF THE ROOF PANEL

Starting at the front of the Roof Drip Molding at its outer edge, with a flexible shaft and Grinding Disc, cut through the metal along its edge from the front of the Molding to its rear point. *(See Illustration No. 99.)* Then, by using the edge of the Grinding Wheel, cut through the Panel metal ½" above the welding line from the rear end of the Drip Molding to the Rear Window (Chevrolet) or to the Rear Compartment or Trunk Opening on the larger Cars. Cut above both Front Pillar welds in the same manner. The Roof Panel spot welds can be cut with a sharp thin Cold Chisel and heavy Hammer at the following locations:

Top Flange of the Windshield Opening.
Door Opening Flanges at the top of the Front Pillar.
Top flange of the Rear Compartment or Trunk Opening.

Remove nails from the flange in the Rear Window frame. Use a hack saw or chisel to separate any parts still holding and lift off the Roof Panel. Now with a sharp thin Cold Chisel and Hammer separate the spot welds that hold the remaining portion of the Roof Panel to the Roof Side Rails

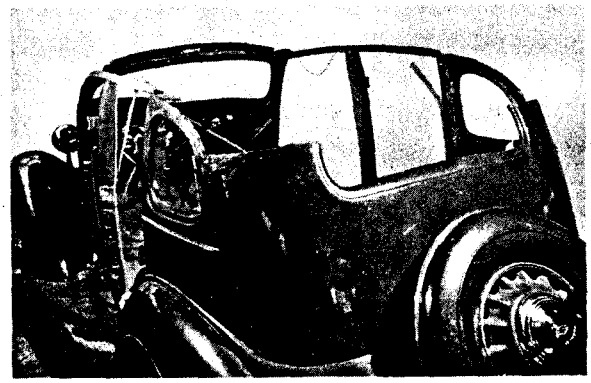


Illustration No. 101
Chevrolet Sedan with Turret Roof Removed.

and Rear Quarter Panels and clean away all traces of rough spots at spot welds with a Grinding Wheel. If any Panel edge be bent or otherwise out of line, it should be trued up with a Dolly Block and Hammer or Mallet. This is done in order to have a smooth surface on which to fit the new Roof Panel. If the new Roof Panel does not have the Sound Silencer Felt already cemented to it the Felt should be cemented to place before the Roof Bows are installed.

1935 SERVICE FEATURES

DOOR ALIGNMENT

The ten different drawings illustrated under Door Alignment Instructions represent ten different conditions of Door mis-alignment commonly met with in body shop work. Each is a problem to be solved before its correction is attempted. The main drawing (No. 102) shows a Body in perfect Door alignment and is to be the gauge of perfection with which the ten mis-aligned Doors are to be compared. The two drawings of Hinges (Nos. 103 and 104) show the two methods of inserting spacers between the Hinge Plate and the Body Hinge Pillar. Drawing No. 103, labeled correction No. 1, shows the spacer inserted inside to draw the Door closer to the Hinge Pillar and therefore farther away from the Lock Pillar. Correction No. 2 (shown in Drawing No. 104) shows the spacer inserted outside to push the Door farther away from the Hinge Pillar and therefore closer to the Body Lock Pillar at the front.

The two drawings, corrections No. 1 and 2, should be studied until you are familiar with their purpose, then by glancing at each of the ten different mis-aligned Door Conditions, its Correction will be easily understood.

DOOR ALIGNMENT INSTRUCTIONS

To align the Doors of a Body correctly, where one or all the Doors are fitting badly, the body workman should *start by checking the vertical spacing* at the Hinge side of the Rear Door. To do this, proceed as follows:

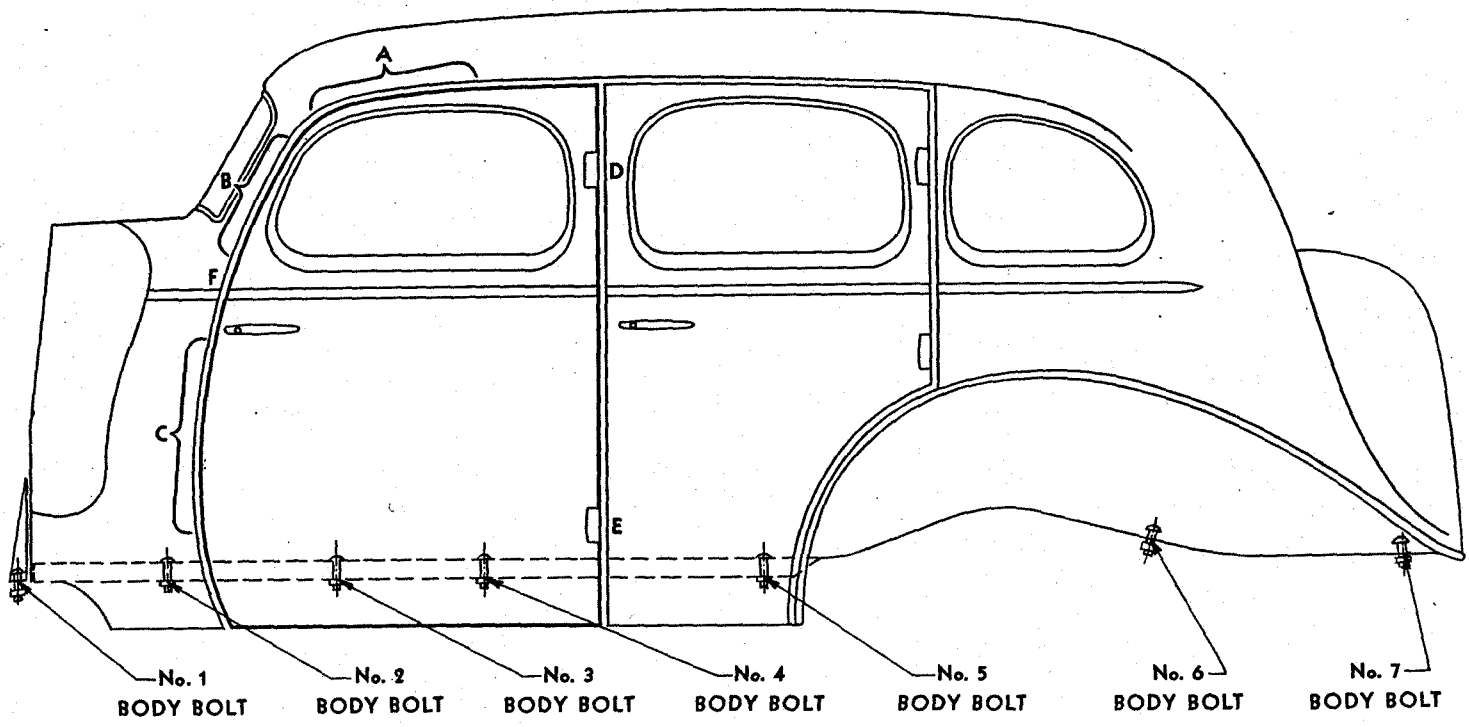
1. Remove the Door Wedge Plate.
2. Remove the Door Side Rubber Bumpers.
3. Make sure all Hinge Screws are tight.
4. Close Door and check Vertical Spacing, making sure it is equal from top to bottom. If necessary, the spacing should be equalized by inserting a spacer between the Hinge half and the Body Hinge Pillar and tighten screws securely.

Correction No. 1 shows where to install a spacer to move the Door back so as to make the spacing at the Hinge side of the Rear Door narrower and therefore wider at the Lock side.

Correction No. 2 shows where to install the spacer to move the Door ahead so as to make the spacing at the Hinge side of the Rear Door wider and therefore narrower at he Lock side.

NOTE—These spacers may be made of hard, waterproof cardboard, or better still, cut from sheet lead ⅛" thick which may be hammered to any desired thickness. The spacer should be ⅜" wide and as long as the Hinge is wide. After the above operations have been done if the Rear Door is then low at the Belt Molding and at the Roof, the Door must be raised by adding additional shims at Body Bolt (No. 5) nearest the Hinge Pillar.

If the Rear Door is too high at the Belt Molding and too close to the Roof, the Door must be lowered by taking a shim out at No. 5 Body Bolt to lower the Door.



NORMAL DOOR ALIGNMENT
Illustration No. 102

Next, install the Door Wedge Plate and the Door Side Bumpers.

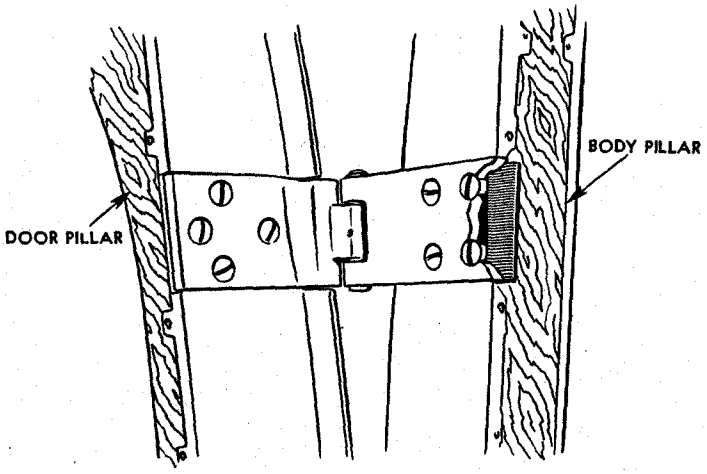
After, the Rear Doors are in good fitting, adjust the Front Doors in the same manner, remembering that all Belt Moldings must be reasonably in line to make a good fitting Door.

The directions for Door alignment given above, if followed carefully, will align any ordinary set of Doors. It must be remembered that checking for alignment should start at the Rear Door, always.

IMPORTANT

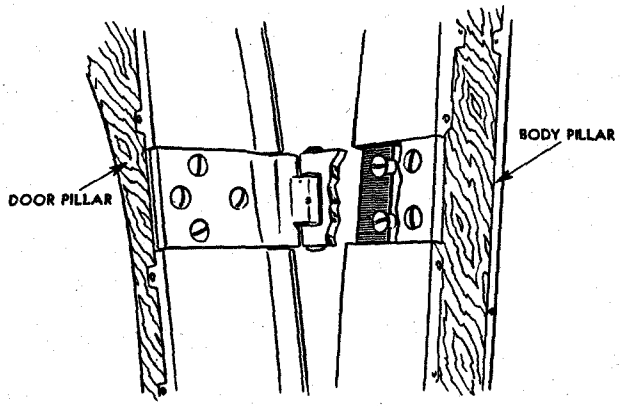
Except for an accident, a Door will remain in shape almost indefinitely. When a Door fits the Door Opening badly it is either improperly hinged to the Body Hinge Pillar which will show at the vertical spacing on the Hinge Side of Door or the Door Opening is out of true by improper shimming at the Body Bolts.

If the lower edge of the Front Door projects away from the Body at the Lock side it may easily be corrected by a turn or two on the adjusting nut on the Door Stiffener Rod which goes diagonally across the Door from the Belt at the Hinge side down to the Door Bottom Board at the Lock side. (This nut is to be found on the underneath edge of the Door Frame).



CORRECTION NO. 1
SPACER INSIDE ON BODY PILLAR
Illustration No. 103

Correction No. 1 shows where to install a spacer in order to draw the Door closer to the Hinge Pillar, so as to make the spacing narrower at the Hinge side of the Door and therefore wider at the Lock side.



CORRECTION NO. 2
SPACER OUTSIDE ON BODY PILLAR
Illustration No. 104

Correction No. 2 shows where to install a spacer in order to push the Door further away from the Hinge Pillar, so as to make the spacing wider at the Hinge side of the Door and therefore narrower at the Lock side.

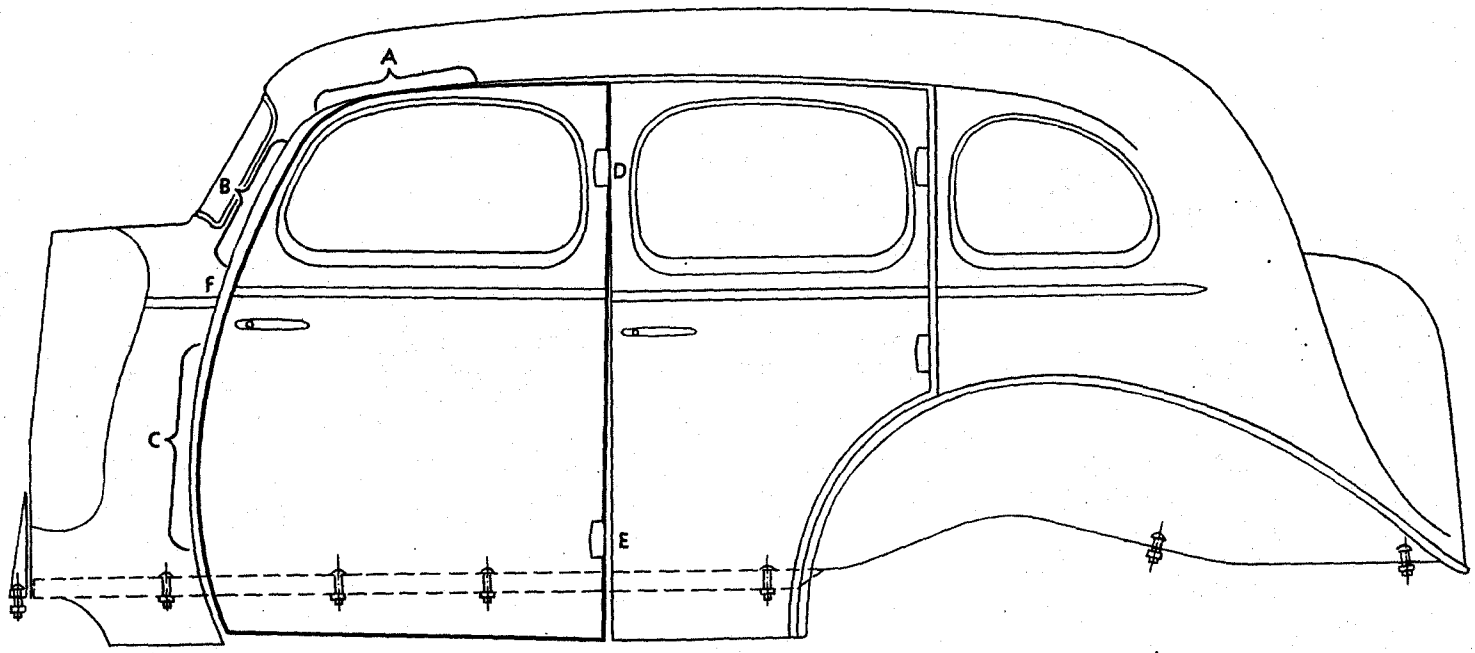


Illustration No. 105
CONDITION: Too CLOSE at A and D. Too WIDE at B. Too HIGH at F.
REMEDY: Use CORRECTION NO. 2 at D.

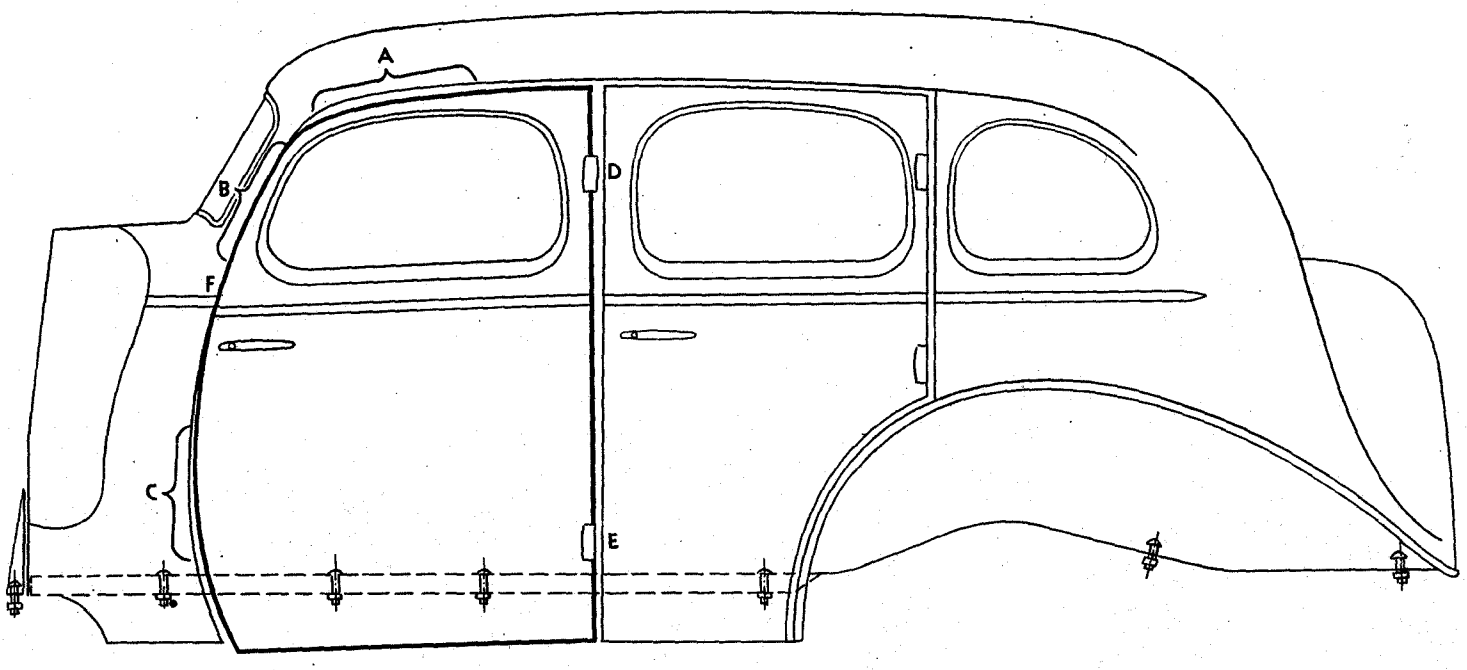


Illustration No. 106
CONDITION: Too CLOSE at B. Too WIDE at A and D. Too LOW at F.
REMEDY: Use CORRECTION NO. 1 at D.

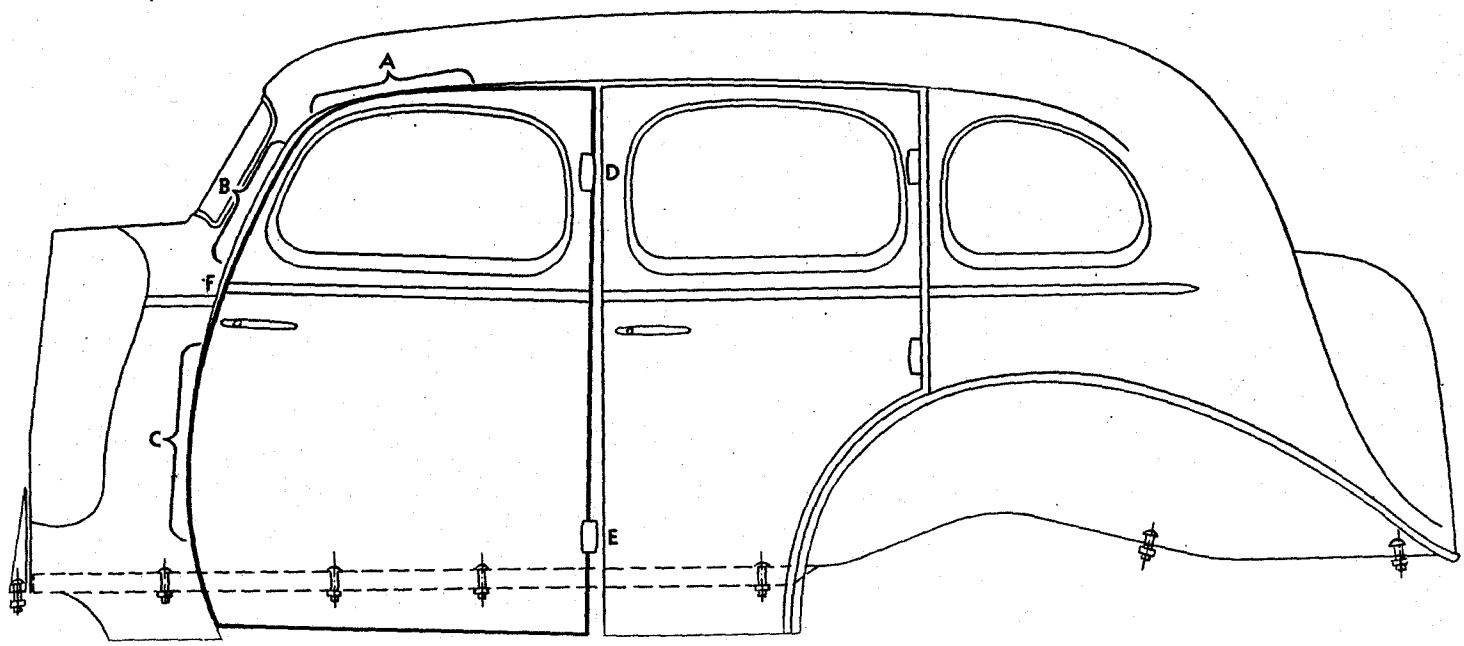


Illustration No. 107
CONDITION: Too CLOSE at A and C. Too WIDE at E. Too HIGH at F.
REMEDY: Use CORRECTION NO. 1 at E.

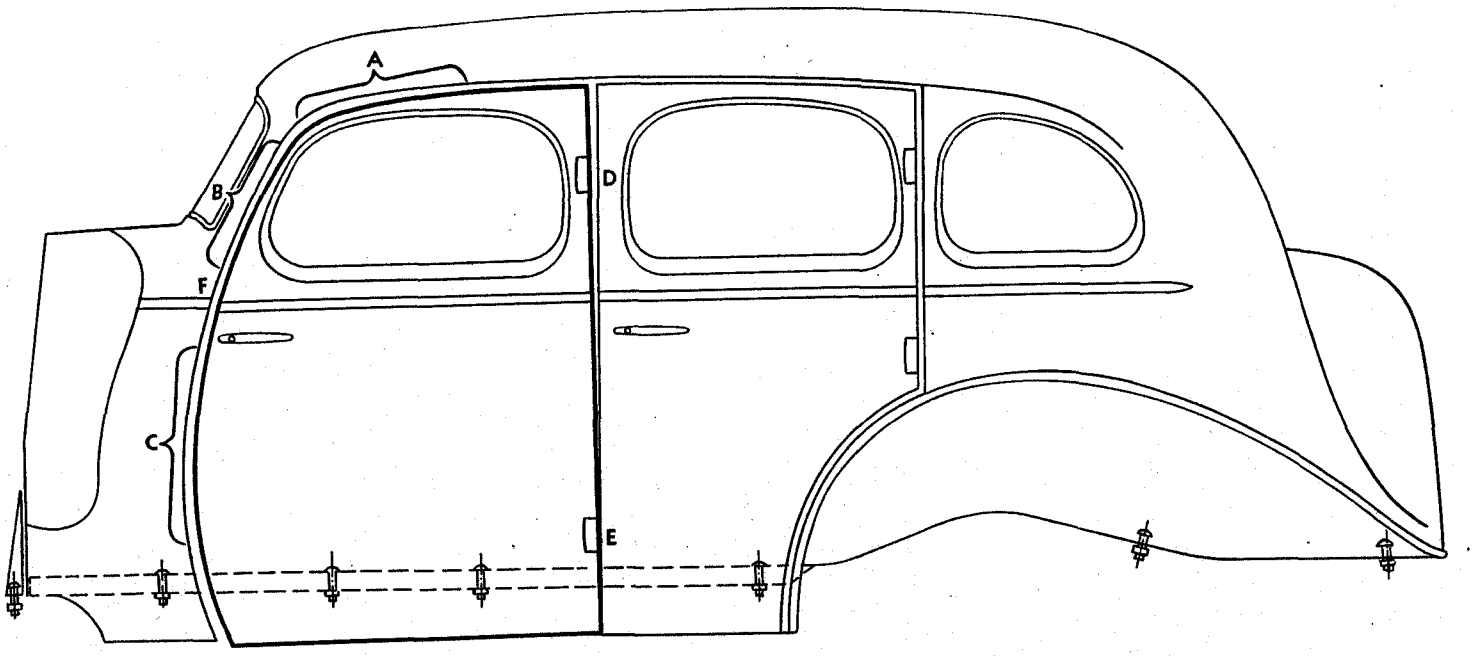


Illustration No. 108

CONDITION: Too CLOSE at E. Too WIDE at A and C. Too LOW at F.

REMEDY: Use CORRECTION NO. 2 at E.

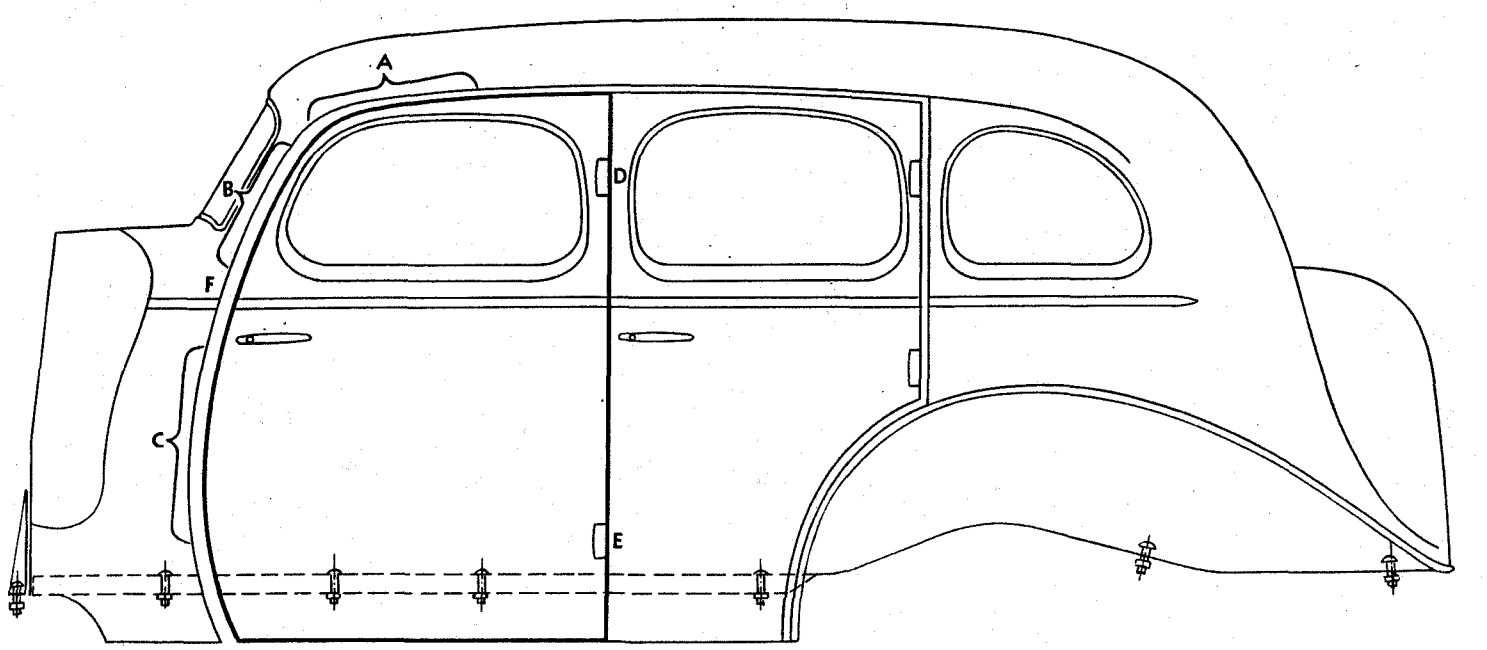


Illustration No. 109

CONDITION: Too CLOSE at D and E. Too WIDE at B and C.

REMEDY: Use CORRECTION NO. 2 at E and D.

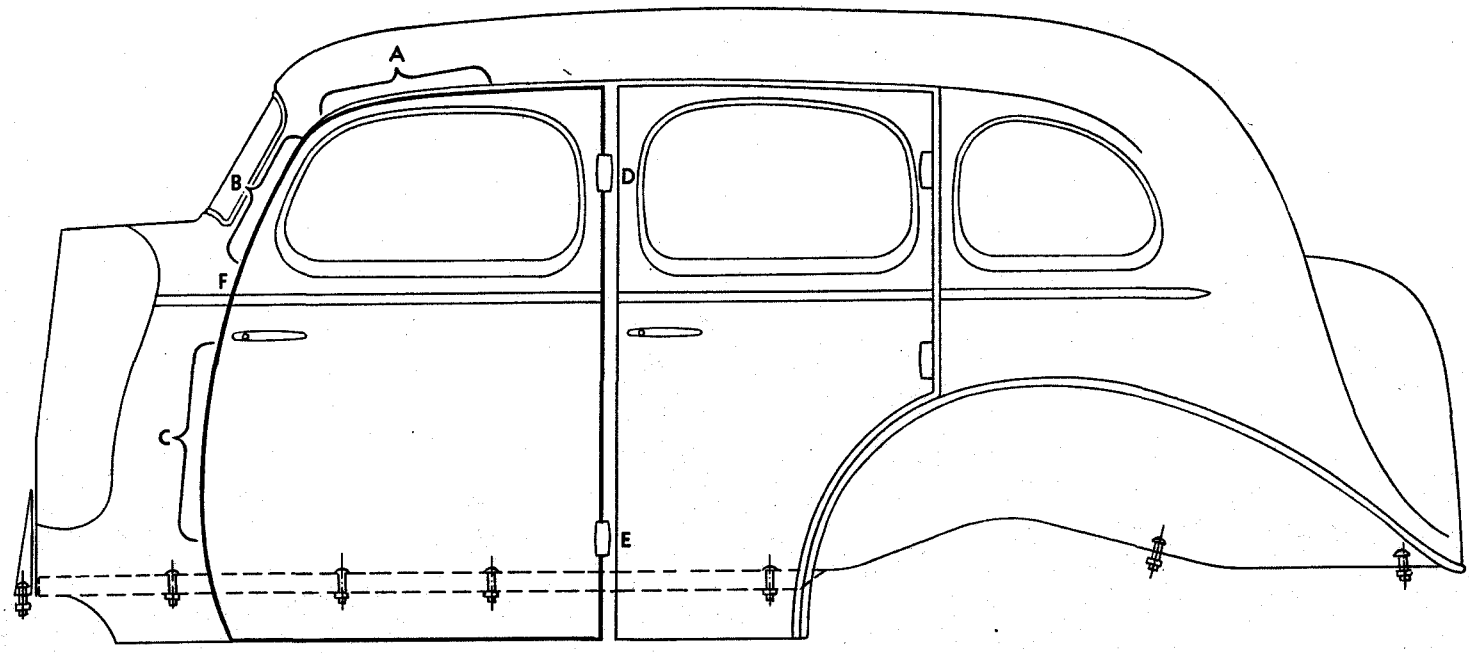


Illustration No. 110
CONDITION: Too CLOSE at B and C. Too WIDE at D and E.
REMEDY: Use CORRECTION NO. 1 at E and D.

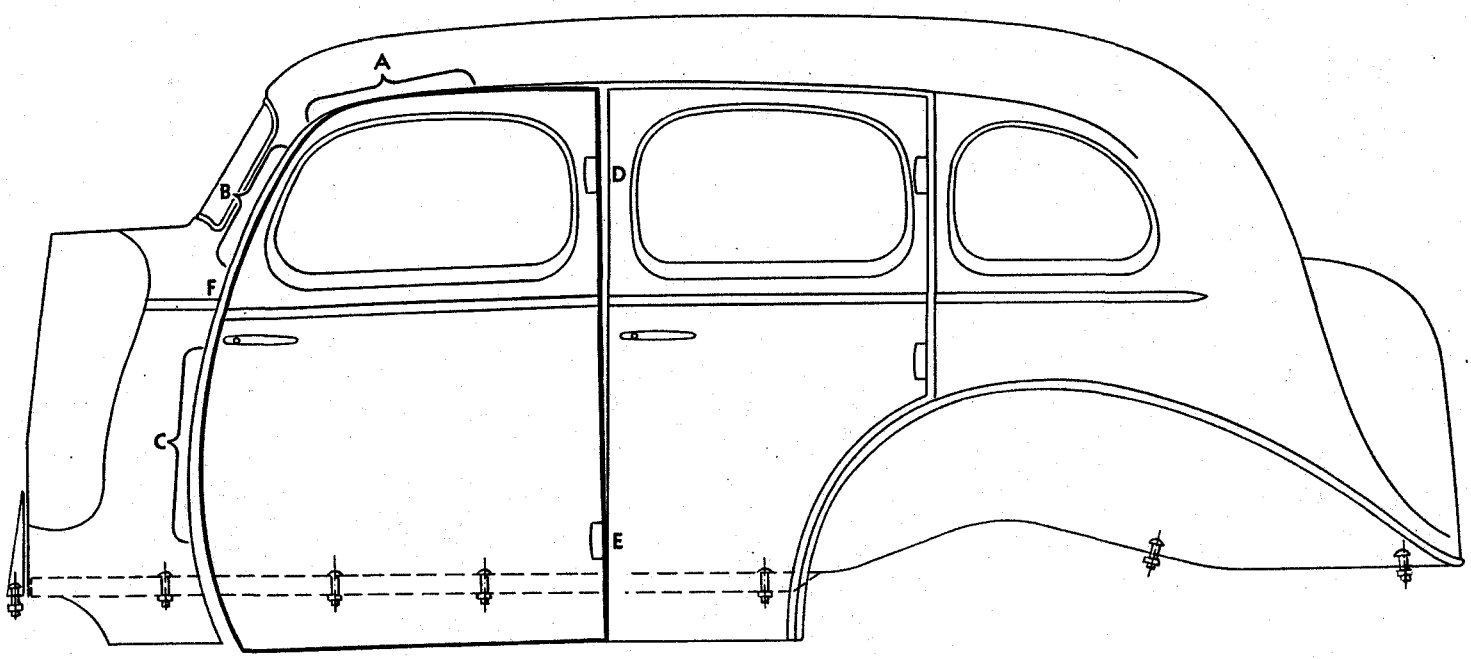


Illustration No. 111
CONDITION: Too CLOSE at A and E. Too WIDE at C. Too LOW at F.
REMEDY: Calk up on Drip Molding at A and use CORRECTION NO. 2 at E.

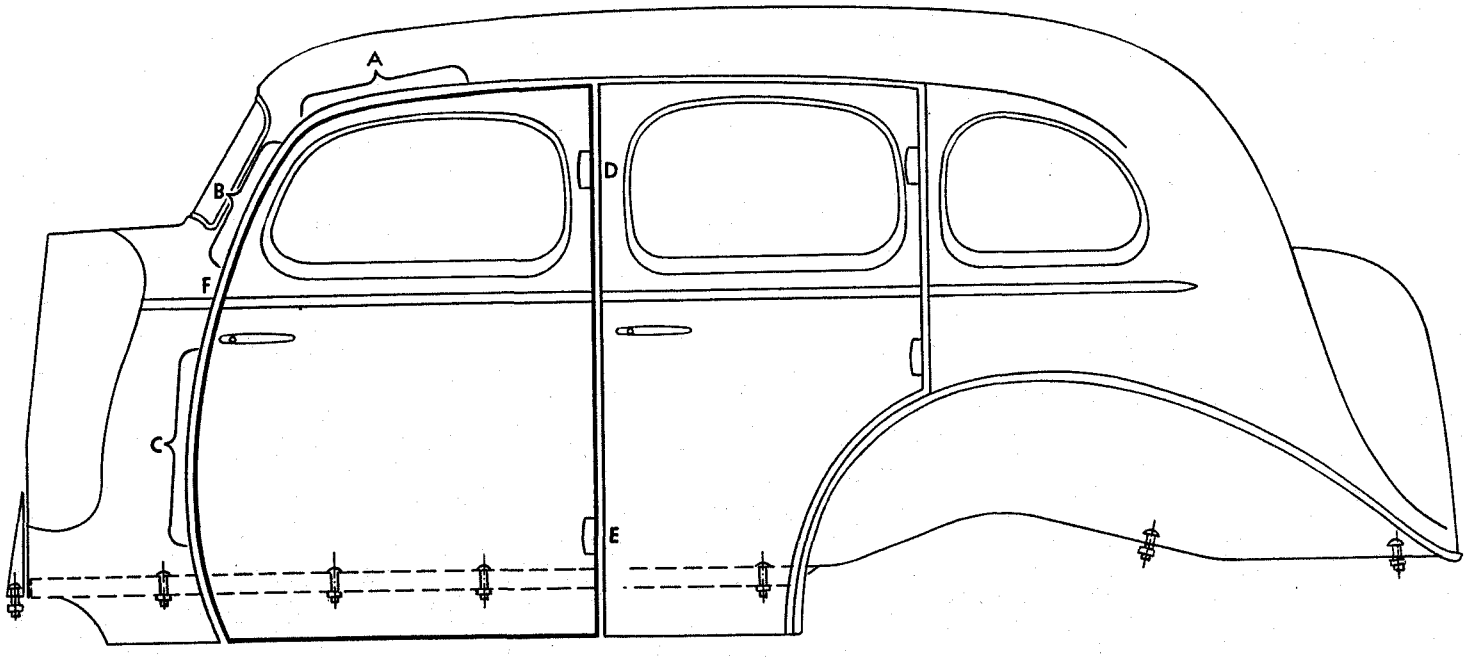


Illustration No. 112

CONDITION: Too WIDE at A only.

REMEDY: Add Solder on the Door Flange or Lower the Drip Molding at A. (See ILLUSTRATION NO. 195.)

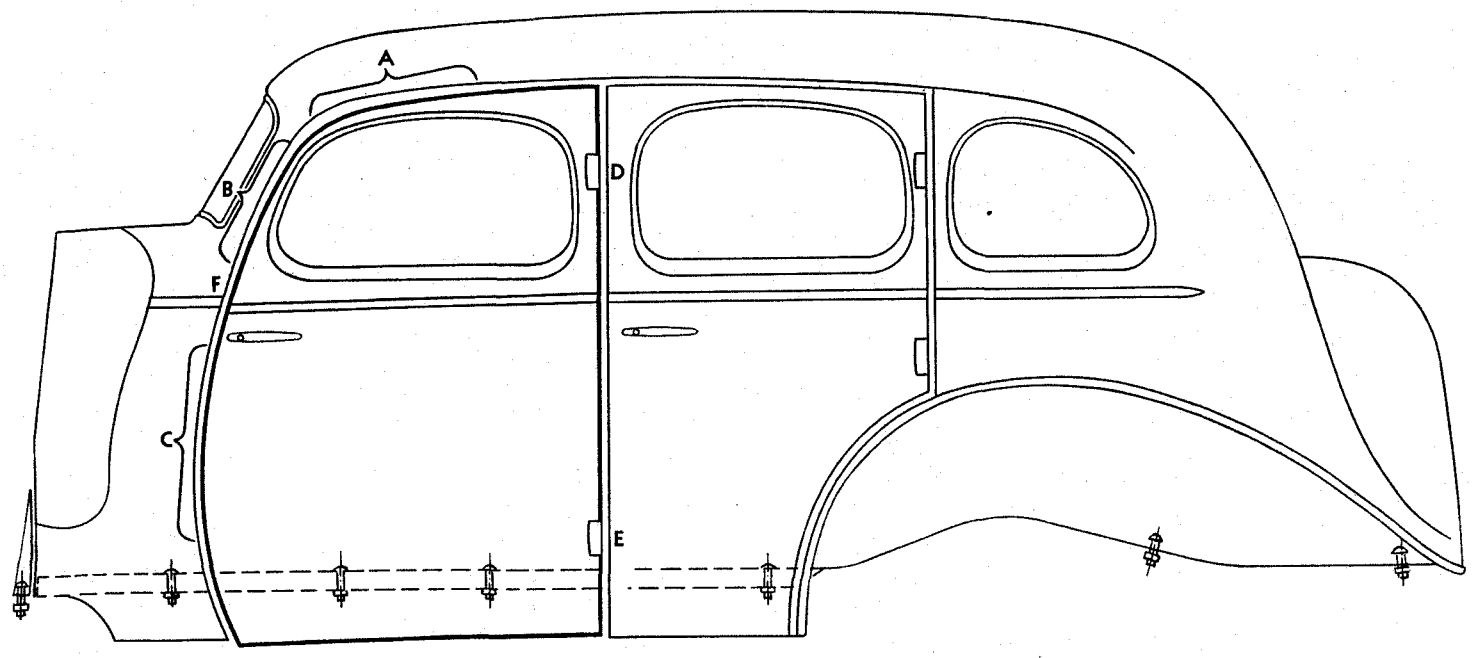


Illustration No. 113

CONDITION: Too WIDE at A. Too LOW at F.

REMEDY: Add shimming at No. 4 Body Bolt. If this makes the Rear Door low, place a thin shim at No. 5 Body Bolt.

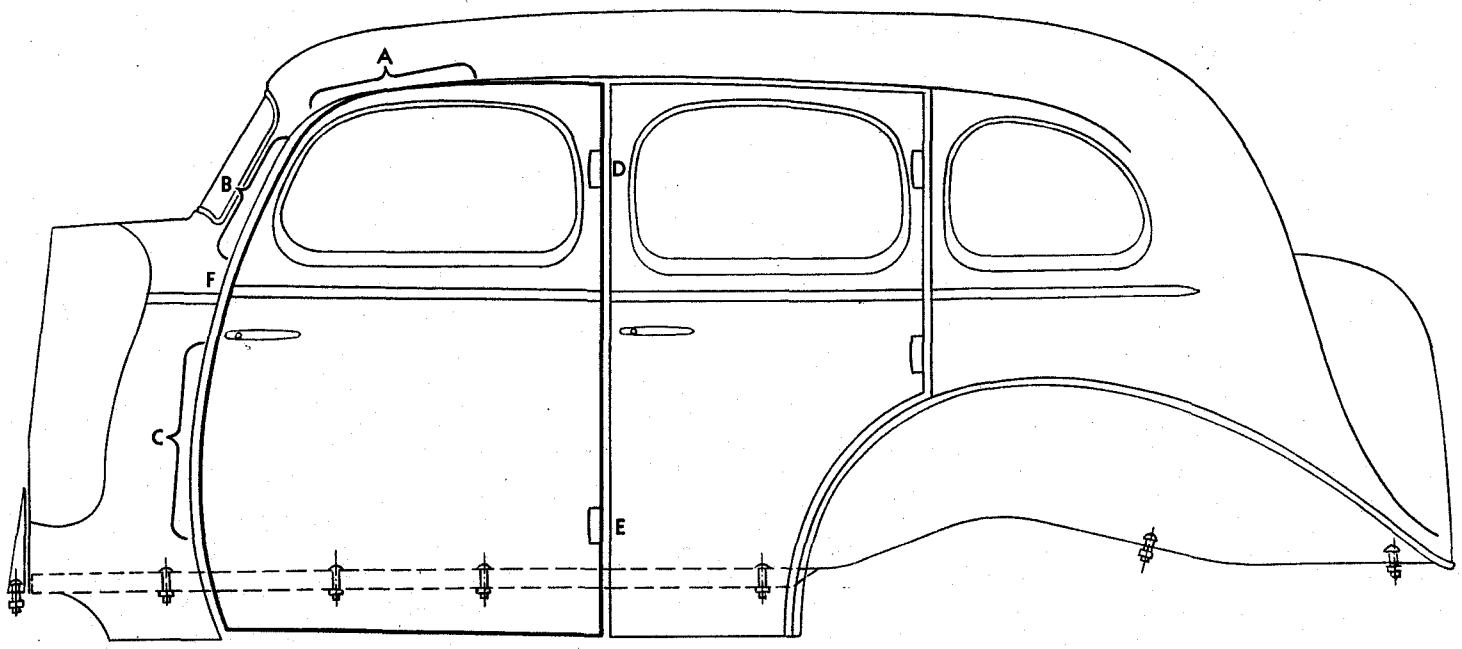


Illustration No. 114
CONDITION: Too CLOSE at A. Too HIGH at F.
REMEDY: Add shimming at Nos. 1 and 2 Body Bolts or Remove part of shim at No. 4 Body Bolt.

TO ADJUST SPACING AROUND A BUSINESS COUPE DECK LID OR REAR COMPARTMENT LID

To adjust a Rear Compartment Lid or a Business Coupe Lid:

1. Loosen the Hinge screws on the Lid. (Have workman get in the car with a lamp and tools.)
2. Close Lid and adjust the spacing around the Lid by inserting Wood Wedges where needed.
3. Tighten the Hinge screws from inside.

NOTE—On Trunk Lids it may require filing out the screw holes.

On Sport Coupe Lids: To adjust the Lid *sidewise*, bend the right and left Hinge Arm Plates enough to shift the Lid. To adjust the Lid *back* or *ahead*, *up* or *down*, loosen the bolt at the pinion joint and move the Lid in direction desired, then tighten the bolt securely.

All Coupe Lids have Adjustable Rubber Bumpers to maintain the height of Lid Level as well as proper pressure at the Lock Bolt and Striker Plates.

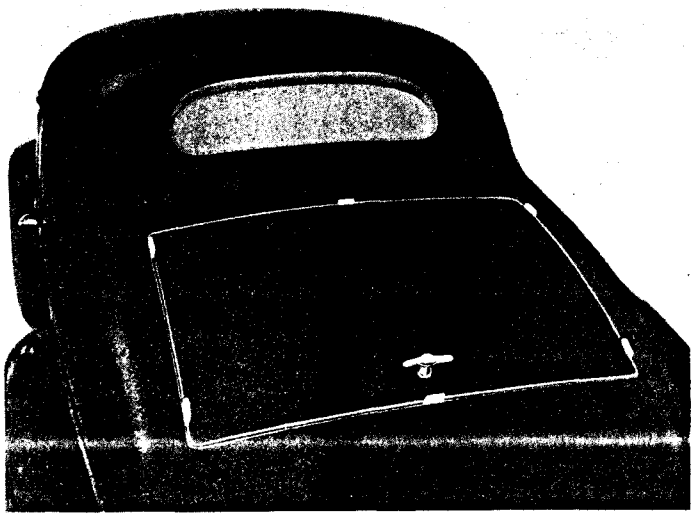


Illustration No. 115
Coupe Deck Lid Spacing.

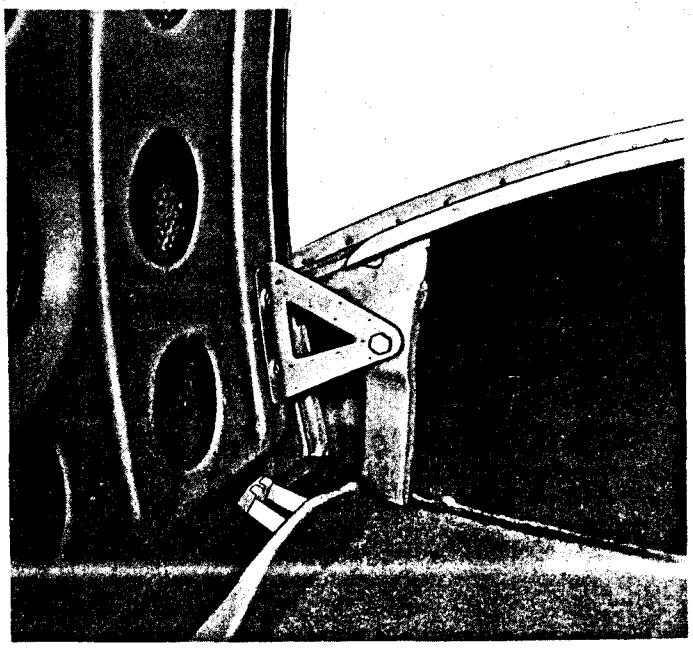


Illustration No. 116
Sport Coupe Deck Lid Hinge Arm.

FRONT DOOR VENTILATOR GLASS FIT

A Door Ventilator Glass sometimes will not close because the Door at the Hinge side at top front corner is sprung out from the Body. The Glass will close at top but not at bottom. By bringing the Door in to the Body where sprung, will automatically correct the fit of the Ventilator Glass. *(See Illustration No. 179.)*

The Ventilator Regulator *(See Illustration No. 117)* has two adjusting screws:

"B" may be adjusted to exert more or less friction on the Shaft to cause the Ventilator to operate loose or stiff.

"A" may be tightened in case the Ventilator Shaft is loose in the slot and causes the Glass Frame Assembly to flutter.

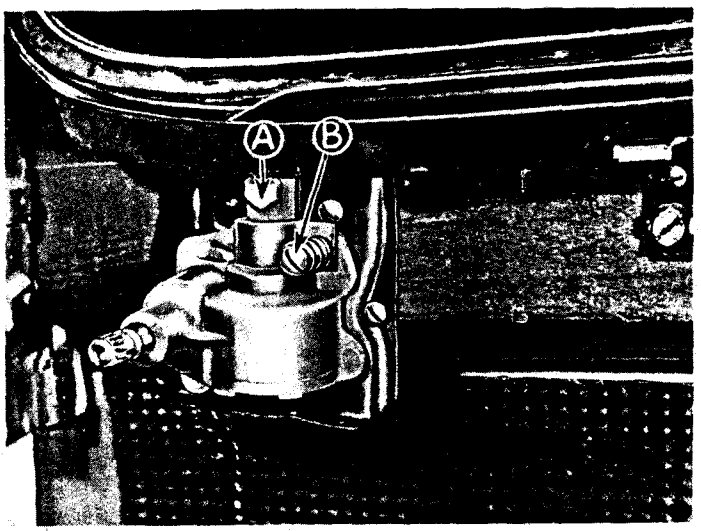


Illustration No. 117
Door Ventilator Regulator.

DOOR VENTILATOR

1. Handle comes off: Replace the Handle Retaining Spring in the slot as in Illustration No. 73 and install Handle properly.
2. Drive Shaft too tight to turn: Release tension at screw *(See Illustration No. 117 at B.)*
3. Handle turns but Glass does not operate: Either Handle is not entirely on Shaft or Shaft is broken.

If Shaft is broken the Assembly should be removed and replaced with a new part or assembly.

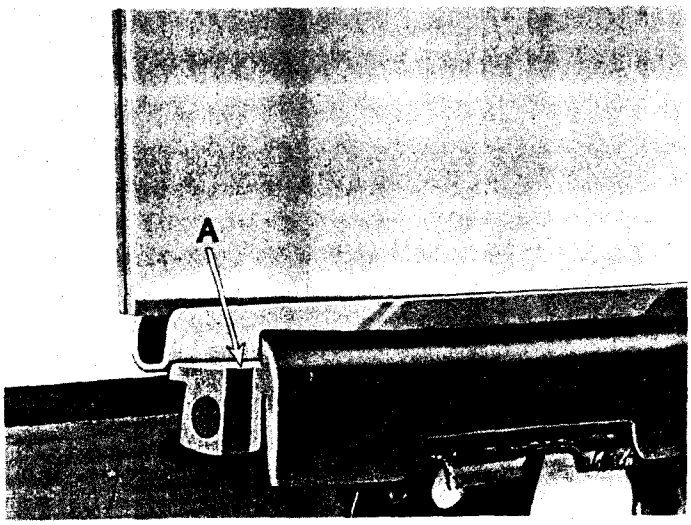


Illustration No. 118
Ventilator Glass Channel Pulled Away From Glass.

FRONT DOOR VENTILATOR GLASS AND CHANNEL ASSEMBLY

1. Glass Channel dragging on Weatherstrip. *(See Illustration No. 118 at A.)*

This is usually caused by the end of the Channel pulling away from Glass.

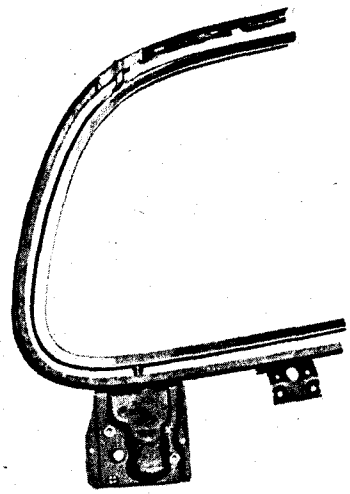


Illustration No. 119
Door Ventilator Outside View.

Remedy: Insert a thin strip of Glass Filler Part No. 4046323 between Glass and Channel and press the Channel on Glass with the Ventilator Glass replacing tool B-180 or other suitable clamp.

If Channel drags on Weatherstrip at bottom but is not pulled loose from Glass, loosen Bolt *(See Illustration No. 117 at A)*, pry the Glass Channel up 1/16" and tighten the bolt again.

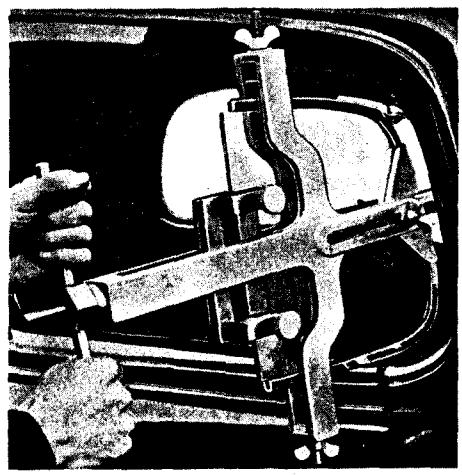


Illustration No. 120
Tool For Removing and Installing Ventilator Glass.

NOTE—Make sure the Weatherstrip is down tight in its Retainer, otherwise it may cause the Glass Channel to drag.

2. Glass and Channel Assembly loose (flutters).

Either the bolt needs tightening or the Shaft (riveted to the Glass Channel) is loose or broken from the Channel. To tighten the rivets or replace the Glass Channel Assembly, the whole Ventilator unit should be removed from the Door. After the unit is removed from the Door, remove the bolt at A, Illustration No. 117, and by spreading the frame gently the Glass Channel Assembly may be separated from it for replacement.

FRONT SEAT ADJUSTING

The Front Seat Regulator is adjusted by means of two screws shown in Illustration No. 121 at B, through holes in the wood frame of Seat these screws are made accessible. Turn them to the right, with a screwdriver to tighten them, turn to the left to loosen.

Correct adjustment is where all unnecessary play is taken up but still does not bind or hinder movement of Seat.

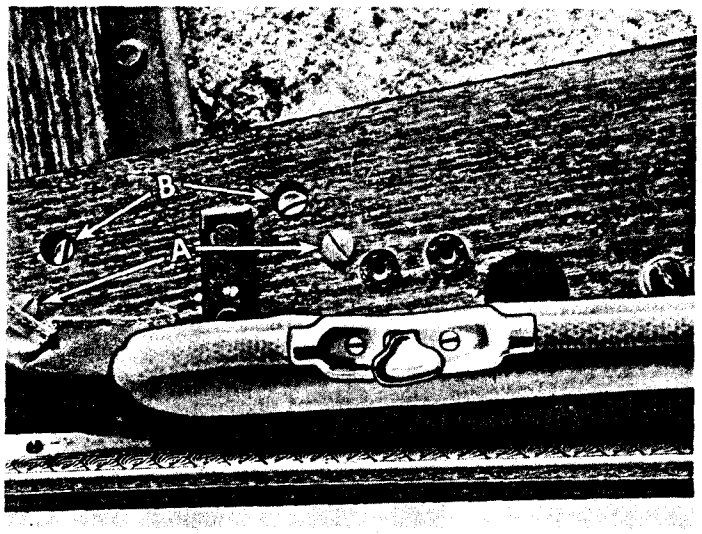


Illustration No. 121
Adjustable Front Seat Mechanism.

Under each rear corner of the Seat Frame a Spring Track slides over a mushroom shaped Seat Support which is anchored to the Sill.

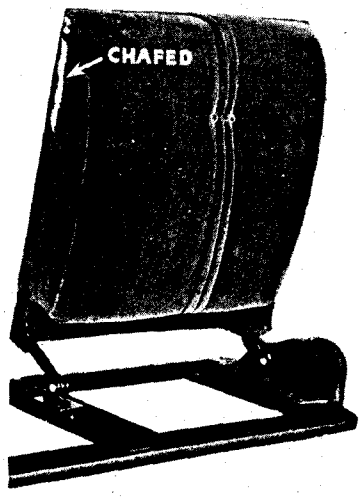


Illustration No. 122
Divided Front Seat Chafing at Top.

FRONT SEAT BACK DIVIDED TYPE (Folding)

The two halves of the Divided Type Front Seat Back used on some Coaches have a tendency in some cases to chafe or rub together at the top of their center division. *(See Illustration No. 122.)*

To prevent the Seat Backs from chafing, the later series have Sliding Plates pressed in the Floor to hold the Seat Center Support higher and therefore tend to spread the Seat Backs apart at the top.

The earlier series may be equipped at a small cost with Sliding Plates to answer the same purpose by ordering Package Part Number 544348 which includes Plate, Screws and Instructions.

The Instructions follow:

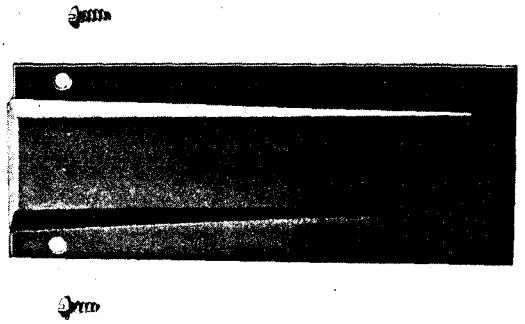


Illustration No. 123
Slide Plate

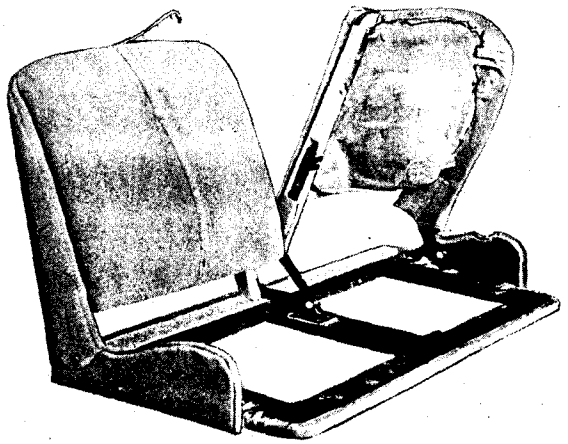


Illustration No. 124
Divided Front Seat Back Repair.

INSTALLATION OF 544348 SLIDE PLATE

(To be used on early type Two Door Sedans equipped with Divided Seats)

1. Slide Seat to full forward position.
2. Fold Floor Carpet back and insert tapered end of Slide Plate between Seat Center Support and Floor Pan, then draw the Plate back until it fits in the cut out of the Floor Carpet.
3. Using the holes in the Slide Plate for a guide, drill or prick punch small holes in the Floor Pan and insert sheet metal screws furnished in this package.

Replace Carpet and inspect operation of the Seat to see that it moves freely.

FRONT SEAT DIVIDED BACK REPAIR

Where the Front Seat Divided type Backs are chafing together and the Slide Plate has been installed but its installation does not separate the Backs sufficiently, the Randall Molding may be set lower into the wood frame in order to give more clearance between Backs.

The necessary operations follow:

1. Loosen Randall Molding by prying off.
2. Loosen Upholstery where tacked to expose the wood frame as at A in No. 24.
3. Cut away the wood ¼" deep at top tapering off to nothing about 8" down.
4. Re-install Upholstery and Molding.

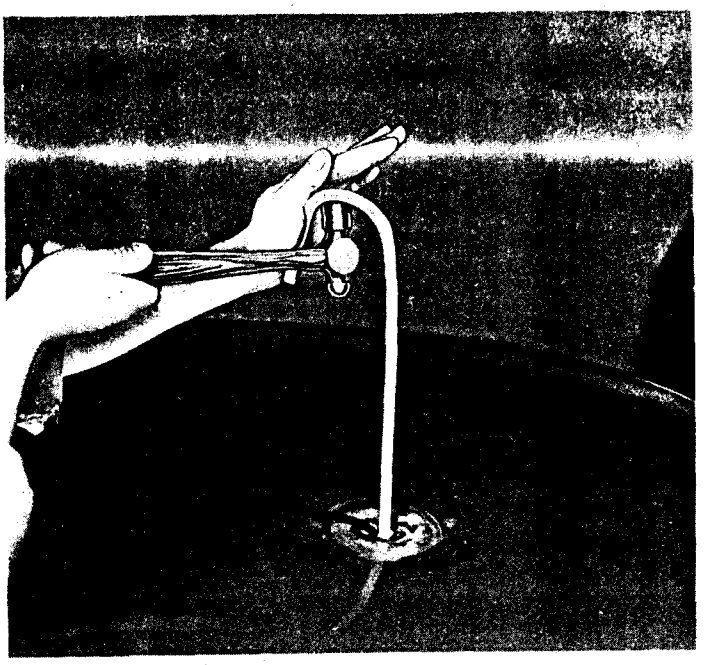


Illustration No. 125
Roof Panel Dent Removal.

ROOF PANEL DENT REMOVAL

A small dent in the Roof or other Body Panel usually may be brought out without removing the Headlining or other Trim Parts.

Scrape the center of the spot down to the metal and tin the spot with half-and-half solder.

Solder one end of a bar of solder to the tinned spot and bend the bar as in Illustration No. 125. Bump up on this Hooked Bend to pull the dent out. If the dent is a long one, attaching the solder bar at different locations and repeating this operation will raise the depression. After it is raised it may be leveled by filing surplus solder off and using a body spoon to hammer against to bring it down in spots. Do not use a torch on the panel as excessive heat of torch may buckle the Roof Panel badly and is a fire hazard unless the Upholstery is removed.

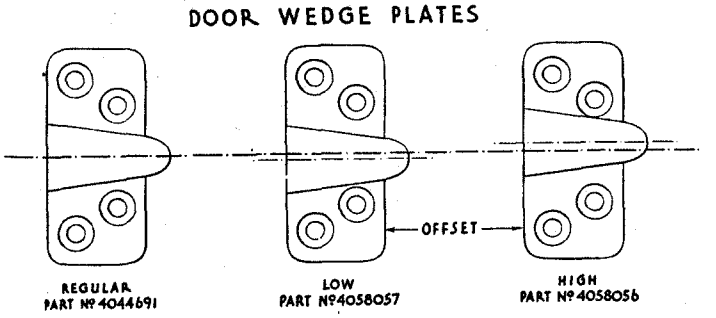


Illustration No. 126

OFFSET WEDGE PLATES

Body men may run across a condition where the Door is in correct alignment and yet the Door Wedge Plate does not enter the Dovetail Bumper Assembly centrally. To overcome this condition, Offset Wedge Plates are made available for Service. These Wedge Plates are made so that the wedge part of the Plate is offset 1/16" off center, and are serviced under Part numbers 4058056 and 4058057, Right High and Right Low respectively. A Right Side High Plate, by simply reversing it, may be used as a Left Side Low Plate. *(See Illustration No. 126.)*

A Wedge Plate should not be hammered or bent off center as this not only ruins the Wedge Plate, but bends the Plate in such a manner that it sets up a cutting action which will eventually damage the Shoes in the Dovetail Bumper assembly.

SERVICE ON WEDGE PLATES

In making adjustments on Doors, the operator before starting to make a correction, should find out what condition is causing the Door trouble. A few minutes' study of a certain Door condition and the cause of it, may sometimes save a lot of unnecessary work. For instance, some hard closing Doors may be traced directly to the Wedge Plate on the Door.

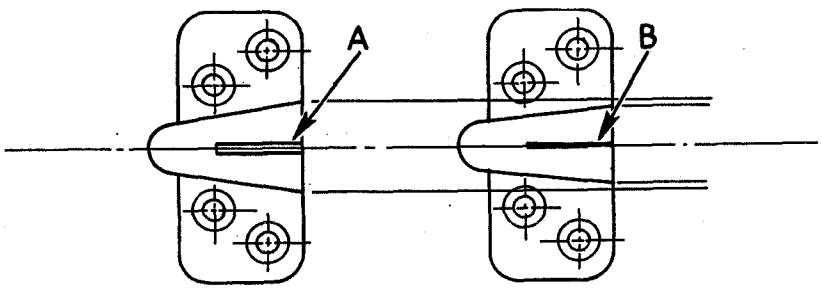


Illustration No. 127

The Wedge Plate may jam or wedge in between the Shoes of the Dovetail Assembly too tightly making it necessary to slam the Door with undue force to close it. A condition of this kind may be taken care of by removing the Wedge Plate from the Door and with a Hack Saw blade cut a slot in the wedge part of the Plate approximately ¾" long. *(See Illustration No. 127 at A.)* After cutting the slot, the Wedge Plate can be compressed about 1/16" as shown at B in the same illustration, allowing for easier closing of the Door.

There are also cases where the Door may be in correct alignment and yet the front face of the Wedge Plate shown at A in Illustration No. 128 binds on the inner part of the Dovetail Assembly at B, making the Door hard to open and close, besides causing a Door Noise at this point. Some Body men in order to remedy this have been in the habit of grinding the front face of the wedge on the Wedge Plate in order to get clearance and in so doing have materially weakened the Wedge Plate. For a correction of this kind remove the Wedge Plate and with a flat sharp chisel cut away enough stock in the Pillar so that the Wedge Plate can be countersunk approximately ⅛" into the Pillar thus providing sufficient clearance at the inner part of the Dovetail Assembly and allowing for an easier closing Door.

In a Door that fits too close to the center Body Pillar, the Door Lock Bolt may project through far enough to strike on the Metal Pillar Cover and cause a chafing noise.

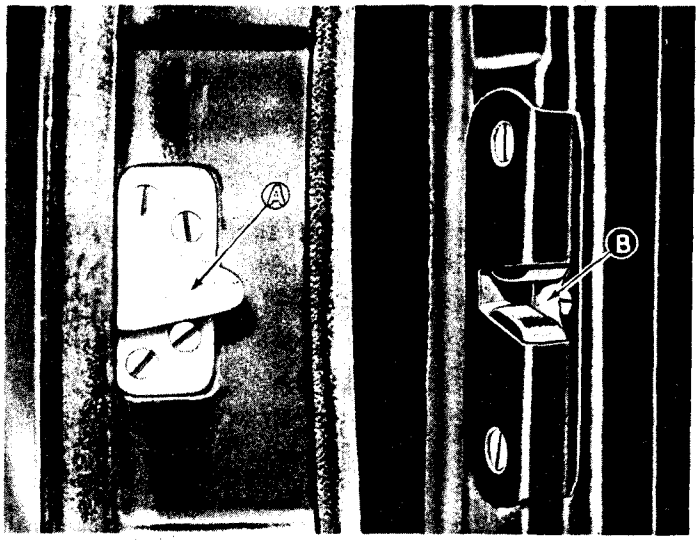


Illustration No. 128
Door Wedge Plate and Dovetail Assembly.

To correct this the Door Hinge halves should be either compressed closer together or the Hinge shimmed to move the Door farther away from the Body Lock Pillar. The condition may also be remedied if the depression at the Striker Plate is calked deeper.

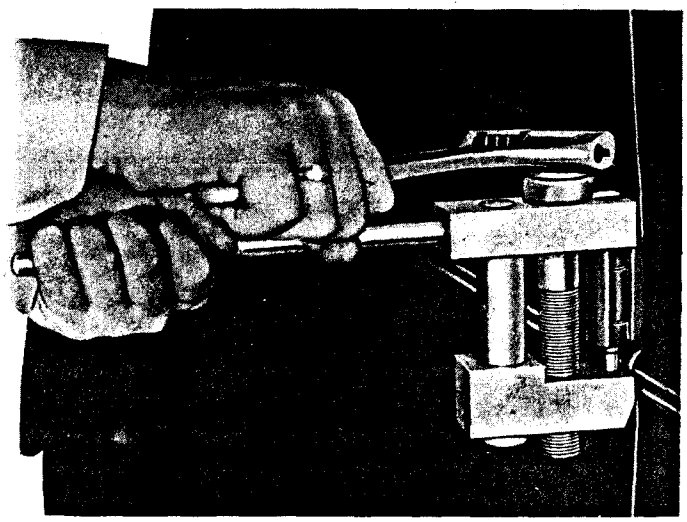


Illustration No. 129
B-170 Hinge Pin Remover.

DOOR HINGE

The Door Hinge consists of two halves, male and female. In the male half are pressed two Bronze Bushings that form bearings which turn on the Hinge Pin. The Hinge Pin has two spiral grooves for conducting the lubricant that is to be injected in an oil hole in the inside center of the male half with a pressure oil gun. See Lubrication, page 70.

The Hinge Pin is knurled just below the head in order to grip the Pin solid in the upper hole of the female half of the Hinge that is bolted to the Body Pillar. The Hinge Bushings are removed with Tool B-128 and installed with Tool B-129. A Reamer, B-130, is used to ream them to a close fit.

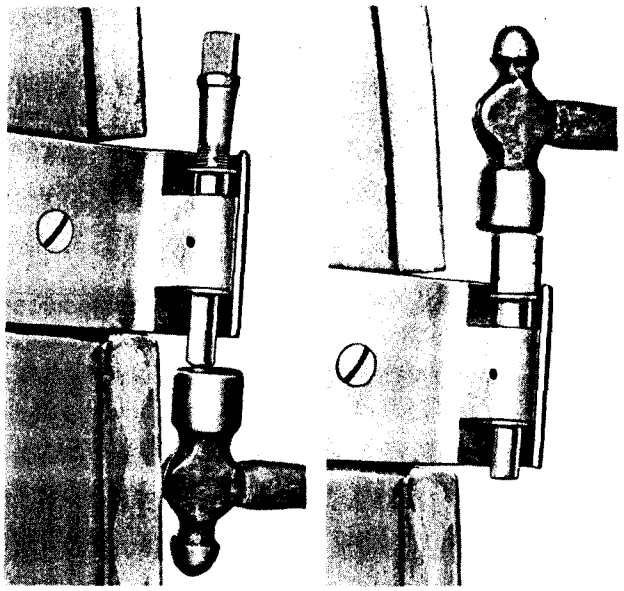


Illustration No. 130

DOOR SIDE RUBBER BUMPER

Door Side Rubber Bumpers serve the purpose of pushing or pressing the Lock side of Door *out* from the Body.

The Striker Plate holds the Door *in* to the Body. The Bumpers and Strikers should always function in this manner.

If there is too little pressure the Door will rattle at the Striker Plate. If too great, it will cause the Door to be hard to close and create too much cutting action at the Bolt and Striker.

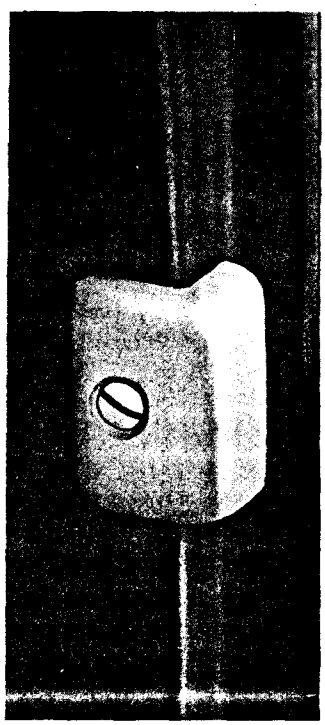


Illustration No. 131
Close-up of 1935 Front Door Side Rubber Bumper Upper

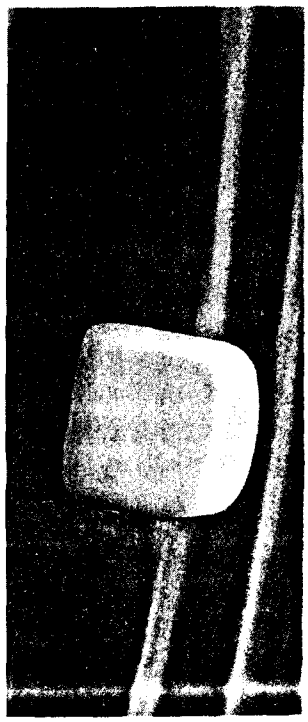


Illustration No. 132
1935 Door Side Rubber Bumper Lower Front Door and Rear Door

WEATHERSTRIPS

Door Rubber Weatherstrips must be in good condition to function properly.

Loose, torn, or damaged rubber strips should be replaced if necessary with new strips.

Weatherstrips Part No. 4064663 (57¾" long) should be used on 1936 Doors. This rubber is inserted into the Metal Retainer as shown in Illustration No. 133. The same type rubber may be also used on 1935 Bodies by cementing to the Door Flange with compound F. S. 1039. Apply cement to the base of the rubber and also to the Door Flange. Allow to dry thoroughly (about one hour) before installing the rubber.

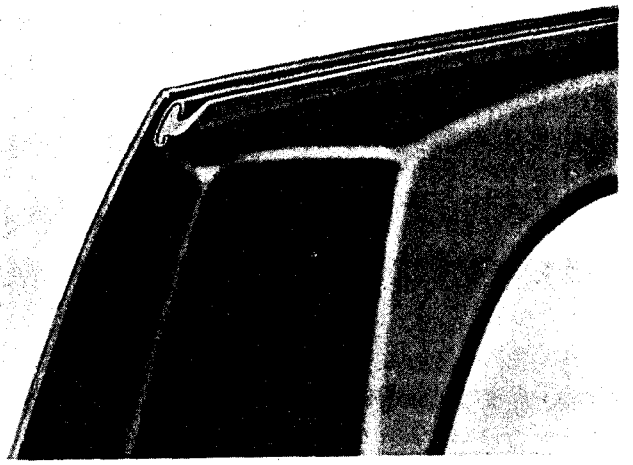


Illustration No. 133
Door Upper Weatherstrip.

NOISE AT THE DOOR UPPER WEATHERSTRIP

A snapping or ticking noise at the location of the Door Header usually may be corrected by rubbing the Door Upper Weatherstrip with graphite or in some cases removing the Weatherstrip from its Retainer and graphiting its base in the Retainer.

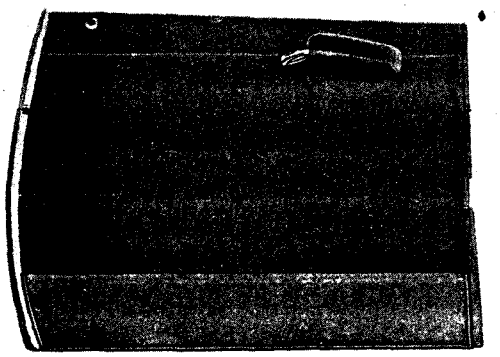


Illustration No. 134
Front Door Bottom Carpet Assembly.

DUST LEAKS BELOW DOORS

The Windhose on the Sill Plate is designed to project out far enough to contact the Carpet on the bottom of the Door to keep out dust from that source. The Door should fit correctly to allow the Windhose to contact snugly all the way across the bottom of the Door.

A shim of cardboard placed under the upper edge of the Door Carpet helps to make a tighter fit against the Windhose. If Windhose is broken or worn, it should be replaced with new.

WINDHOSE

Windhose is also used to seal the space at top and sides of Doors. If they do not touch the Door they do not stop air entrance. If they set too close to the Door they will bind and cause hard closing Doors. Sometimes tight fitting Windhose may be softened by gently bending or pressing them back with the hand. In others it may be necessary to remove and reset them to proper pressure when Door is closed.

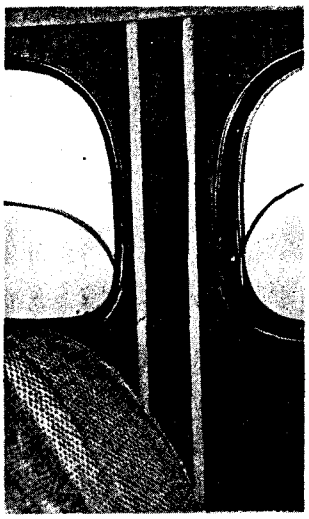


Illustration No. 135
Windhose on Center Body Pillar, pinched.

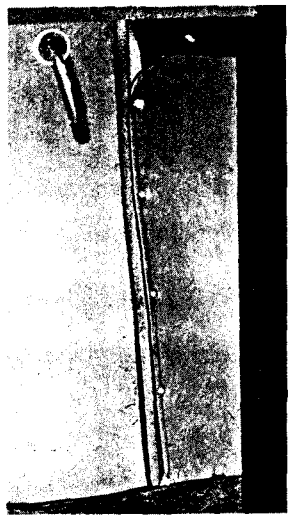


Illustration No. 136
Windhose on Front Body Hinge Pillar, too loose.

Should the Windhose at the Door curl away from the opening, therefore not making close contact with the Door, it may be corrected by inserting a strip of celluloid behind the Windhose to stiffen or bolster it with more tension.

DOOR CHECK NOISE

A Door Check Link that is twisted or strained out of alignment may make a Door Noise.

Re-alignment will correct it.

Adjust the Link with a hammer or wrench to proper alignment to relieve strain.

The Rubber Bumper that screws on the threaded end of the Check Link may be strained over far enough to rub on the metal Panel. Straighten to alignment and blow dry Graphite into the Link Opening in the Door to stop a rubbing squeak.

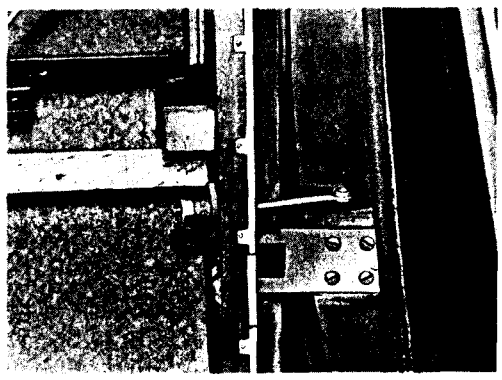


Illustration No. 137
1935 Door Check Link.

DOOR TRIM PAD TRIM CUT AT EDGE

The Door Trim Pad should set flush with edge of the Door. If it projects over the edge of the Door frame it may chafe on the Door Rubber Bumpers, or on the Door Opening Facing and cut or wear through the upholstering of Trim Pad.

When this occurs, the Door should be checked for alignment and corrected if necessary, then the Trim Pad may be removed and the Trim Cover loosened from the nails. The Nailing Strip may be removed from the Foundation and ¼" cut off the Foundation edge. Clinch the Nailing Strip back on the Foundation and stretch the Trim Cover over the nails again.

Many times the cut or torn Trim may be whip stitched allowing it to be stretched over the nails and not show after the Pad has again been installed. If this cannot be done a new Trim Pad may be necessary.

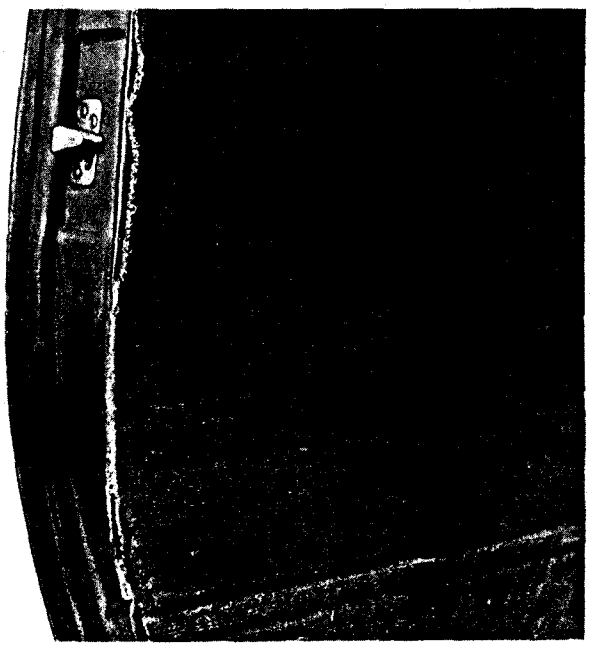


Illustration No. 138
Door Trim Pad Cut at Edges.

DOOR NOISES

Door Noises May Be Listed as Follows:

1. Door Lock Bolt and Striker Plate.
   - A—Dry: Needs Lubricating.
   - B—Loose: Needs tightening or resetting of screws.
   - C—Worn: Needs new Striker.
   - D—Crooked fit: Reset Striker Plate.
   - E—Lock Bolt Grounding: Door should be moved back, away from Pillar. See door alignment.
2. Door Wedge Plate grounding on Dovetail Case. *(See Illustration No. 128.)*
3. Door Flange Grounding on Body Facings. (Adjust the Side Rubber Bumpers.)
4. Door Hinge Screws Loose (tighten screws.)
5. Door Hinge Pins worn. *(See Index.)*
6. Door Rubber Weatherstrip chafing on Facing. *(See Index.)*
7. Door Ventilator Glass Flutter. *(See Index.)*

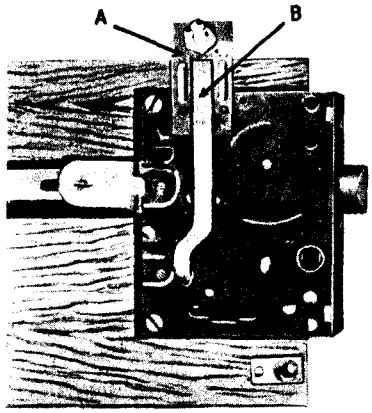


Illustration No. 139
Door Inside Safety Lock.

DOOR INSIDE SAFETY LOCK

The Inside Safety Locking Rod Handle sometimes may work hard or stick. This is caused by the sliding bar *(See Illustration No. 139 at B)* binding against the wood Regulator Board. To correct this:

1. Remove Garnish Molding.
2. Remove the Toggle Escutcheon.
3. Release the Trim to expose the Lock.
4. Pry the metal plate A out and insert spacer between edge of it and Regulator Board which will free up the tension on the sliding bar.

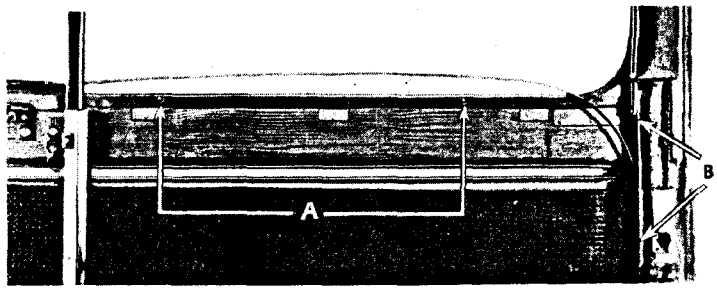


Illustration No. 140
Button Rubber Bumpers at Window Opening.

DOOR GLASS BREAKAGE

A Door Glass sometimes becomes chipped at the top due to the following causes:

1. Glass vibrates against Door Metal Flange at Window Opening when Glass is down.
2. Glass vibrates against Garnish Molding when Glass is down.

Some styles of the later production bodies have Button Rubber Bumpers inserted into the Garnish Molding and in the Window Opening to act as a bumper for the Glass.

If needed on earlier production bodies, bumpers may be easily installed by cementing small pads of rubber to the Window Opening Flange and to the Window Garnish Molding. *(See Illustration No. 140 at A.)*

Tighten up on the Glass by inserting thin strips of waterproof cardboard back of the Glass Run Channels. *(See Illustration No. 140 at B)* or remove the screws *(See Illustration No. 54 at A)* and cut away the wood block to set the bracket ⅛" deeper. This will take up the surplus end movement of the glass also.

LUBRICATING PARTS OF BODY

Door Lock

The Door Locks are lubricated when installed at the factory and usually need no attention for the first two years except at the Lock Bolt Oil Reservoir Felt which should be dampened with machine oil every two months or so. Many customers object to oil being used on the Lock Bolt as it does rub off on clothing. To correct this objection Door Ease may be applied to the Lock Bolt or Striker Plate instead of the oil. Both should not be used at the same time.

When a Lock works hard and needs oiling, it should be removed from the Door, washed in gasoline, dried, then oiled at working parts. If time does not permit this, simply spray it through the Lock Bolt with Penetrating Dripless oil by means of an Atomizer.

NOTE—Use dry powdered Graphite to lubricate Door Locking Handles and other Lock Cylinders, Convertible Coupe Window Glass Run Channels, Door Check Link Rubber Buffers, and all Black Rubber Body Parts where chafing occurs.

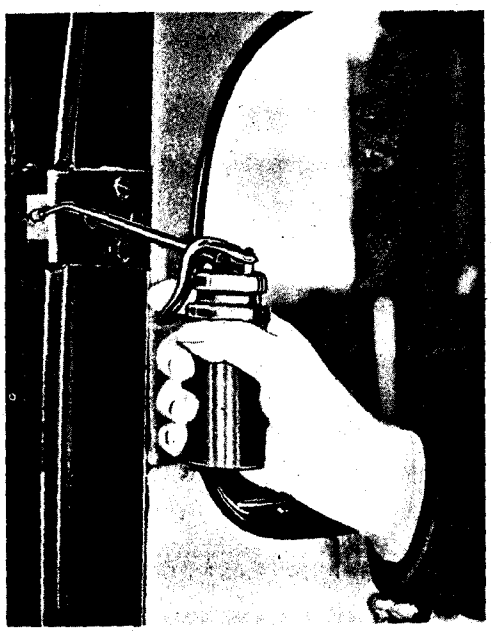


Illustration No. 141
Hinge Lubrication—Showing Plewes Oiler in Hinge Hole.

Door Handle Cylinder

To Lubricate a Door Handle Lock Cylinder or any other Lock Cylinder such as a Deck Lid, Trunk Lid or Glove Box Lid, clean it thoroughly with gasoline or carbon tetrachloride, blow out and dry, then lubricate with Dry Powdered Graphite and nothing else.

NOTE—Hinckley Myers Co. and Kent Moore Organization sell a Lock Cleaning and Lubricating Kit that has cleaning fluid and Powdered Graphite, with a small cleaning Gun and a Graphite Gun for their application.

It also has three key extractors to remove broken keys from Lock Cylinders. (See Lubrication.)

The Door Hinges should be oiled with a good grade of machine oil such as Penetrating Dripless Oil, by forcing it in the oil hole on the inside of Hinge with a pressure oil gun or oil can. Do not oil a Hinge by applying oil to outside or on the Head of the Hinge Pin. Open Door to find oil hole.

Door Window Regulators

The Door Window Regulator moving parts should be lubricated one or two times a year by raising the Door Trim Pad from the bottom and oiling and greasing them.

Door Check Link

Use oil at the pivot joint and dry graphite on the Rubber Bumper.

Hood Lacings

Clean excess oil or grease off the Lacing with gasoline and apply Door Ease Grease Stick by rubbing it on the surface.

Door Wedge Plate and Dovetail Bumper Assembly

An application of Door Ease Grease Stick is the cleanest and most efficient method of lubricating these parts. Clean off all old grease before applying Grease Stick. Give the parts a light coating only, as a heavy coating is wasteful and collects grime that may rub off on clothing.

Hood Catches

The Hood Catch Bearings should be oiled. Grease Stick should be used at the Plate.

Hood Hinges

Hood Hinges require penetrating oil two or three times a year. The Dripless Oil handled by Hinckley Myers Co. is ideal for this. It penetrates very quickly and the solvent evaporates leaving a film of heavy oil that lubricates but does not run.

WATER LEAKS

Trunk

Water leaks may occur in the Trunk at the Hinges, Gutter, and sometimes at the Handle Ferrule.

The Hinge is attached to the Lid and Body Panel by screws that screw into threaded lugs molded in the Hinge. The lugs are inserted through holes in the Panel. These holes should be sealed by soft washers (rubber or lead) or by waterproof compound applied on the lugs before tightening the Hinge to place. This water leak may either drip on the luggage or collect in between the two Panels of the Lid and run out when Lid is raised.

Where the Handle Ferrule or an Emblem goes through the Trunk Lid a water leak may occur and the way to correct it is to remove or loosen them and seal with either a rubber washer or an application of F. S. 1039 compound.

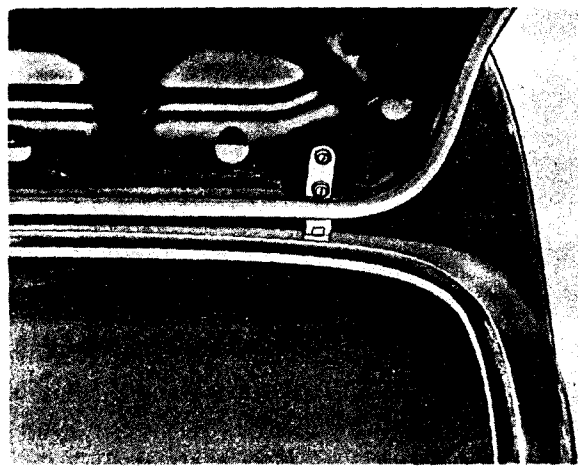


Illustration No. 142
Trunk Gutter.

Where the water leaks in at the Gutter, it usually occurs at the top corners of the Lid.

The correction for this is to chalk the gutter and close the lid. The Chalk will show on the Rubber Weatherstrip on the Lid where the Gutter touches. Where it does not show, the Gutter should be raised with a wood mallet or hammer until it does show.

It is a good idea to check around the Gutter to see that the Quarter or Back Panel is flanged down tightly to the Gutter on Coupe Style Bodies. Any loose Flanges should be sealed with compound or closed down to place with a hammer.

See also water leak at Deck Lid.

COUPE DECK LID AND REAR COMPARTMENT LID

The Coupe Deck Lid is shielded against water leaks by having a Rubber Weatherstrip cemented to the under edge of the Lid. This Weatherstrip when the Lid is closed, fits down tightly on the rim of the Drain Gutter around the Deck Opening preventing water from entering. If the Weatherstrip does not contact evenly around the edges of the Gutter it should be made to do so by raising the Gutter with a hammer at the low points. Chalking the rim of the Gutter and then closing the Lid will show if the Weatherstrip is contacting properly.

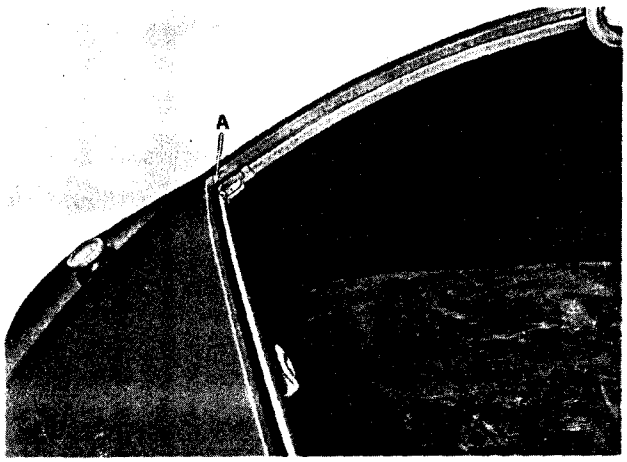


Illustration No. 143
Coupe Deck Gutter and Drain Hole.

When a water leak is noticed in the Deck Compartment the Gutter also should be examined for a hole. A spot weld burned through or a screw or nail hole may have been overlooked. These may easily be sealed with Liquid Solder or Compound F. S. (1039). See that the Gutter Drain Pipes at the lower ends of Gutter are not plugged. *(See Illustration No. 143 at A.)*

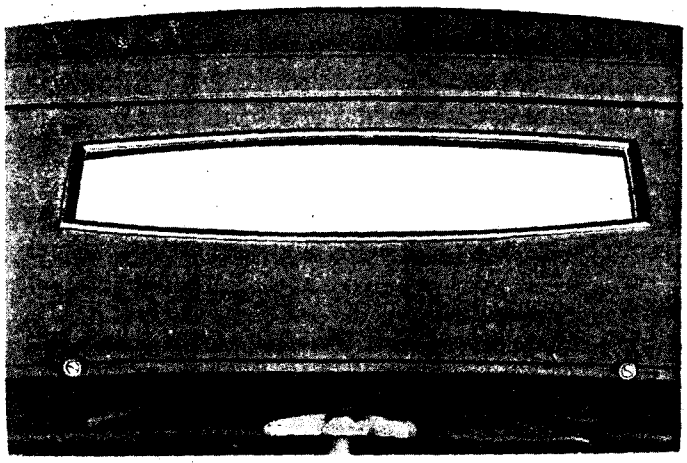


Illustration No. 144
Convertible Style Back Window.

BACK WINDOW (CONVERTIBLE STYLE)

A water leak at the Convertible Coupe or Phaeton Rear Curtain Window may come in around the Glass or from the joint of Top Cover and Curtain at the Rear Roof Bow.

If it is at the Glass, the Glass should be removed from the frame and either resealed with F. S. 796 Compound or a wider Glass installed if necessary as the Window Frame may have become spread away from the Glass requiring a wider Glass.

If the leak comes in at the joint of the Top Cover and Curtain, remove the Molding and seal the joint with F.S. 796 Compound then install the Molding while Compound is soft.

If water is wicking up on the Rear Quarter Lining at the Belt Line it may be corrected as follows:

1. Remove the Finishing Molding.
2. Whisk broom clean the Back Curtain.
3. With a clean paint brush or cloth apply clear Protection Waterproofing to the entire Back Curtain and especially along the tacked edges.
4. Re-install the Finishing Molding.
5. Let dry thoroughly before wetting.

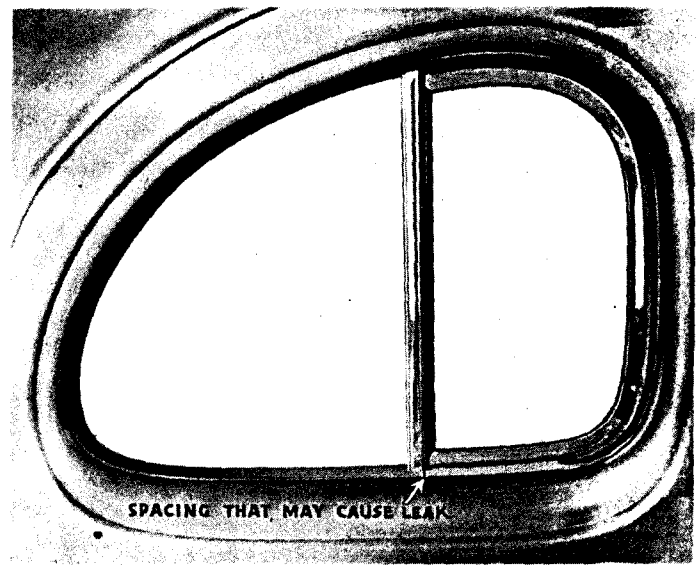


Illustration No. 145
Water Leak at Rear Quarter Window.

BACK WINDOW SEDAN

The Back Window Glass is set in a Rubber Channel similar to the Windshield and needs to be sealed also with F.S. 1039 Compound. In case of a water leak at the Back Window it usually requires only a sealing at the Channel Outer Lip with the B-182 Sealing Gun using F.S. 1040 or 1039 thinned down to the consistency of cream. (Use high test gasoline for thinning.)

REAR QUARTER WINDOW (SEDAN)

Water Leaks at a Sedan Rear Quarter Window may come through the joint at the junction of the two Rubber Channels that surround the Glasses. *(See Illustration No. 145.)*

It may enter at the Ventilator Shaft where it inserts through the Rubber Channel or at the Rubber Channel Outer Lip.

An application of F.S. 1040 Compound under the Outer Lip of the Channels, also at the junction of the Channels and at the Ventilator Shaft should stop entrance of water.

COACH REAR QUARTER WINDOW WATER LEAK

Cause: Water overflows at the Drain Pan under the Coach Rear Quarter Window, wetting the lower Quarter Trim, Floor Carpet and Padding.

On some of the early 1935 Coach Bodies, (Turret Top Styles), if the drain for the Rear Quarter Window at the base of the Body Hinge Pillar becomes clogged, it causes the

water to overflow. On most complaints of this kind, if the Drain Hole mentioned is cleaned out, the trouble will be corrected.

However, in some cases, the water may run down behind the Drain Pan instead of running into the Pan, or the water may splash against the Trim Pad and run down to the Floor, soaking the Trim and the Carpet. In the last two cases, the following corrective work may be necessary:

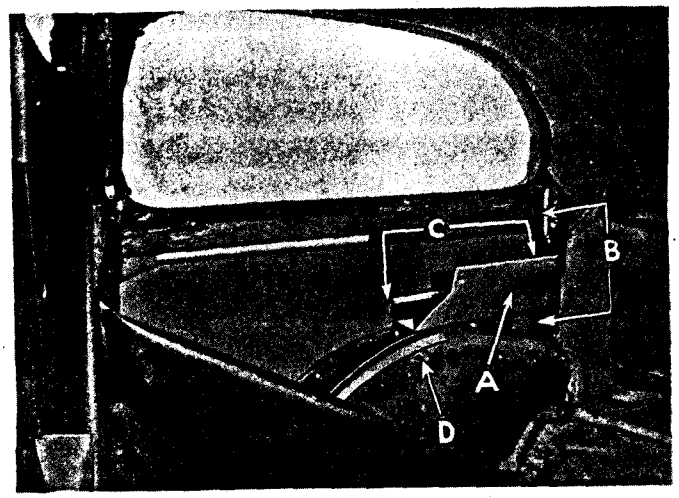


Illustration No. 146
Rear Quarter Window Drain Before Baffle Is Installed.

NOTE—This applies only to early Coaches not having the hollow lip Sash Weatherstrip.

1. Remove Rear Seat Cushion and Cushion Back.
2. Remove Rear Quarter Window Garnish Molding.
3. Run the Glass down and remove the upper Glass Run Channel.
4. Remove the Window Regulator Handle and the Rear Quarter Lower Trim Pad. NOTE—The Rear Quarter Arm Rest is a part of the Lower Quarter Trim and is held in place by a Wood Screw which is accessible from the outside under the Wheelhousing.
   (See Illustration No. 146 at D.)
5. Remove upper and lower Regulator Boards and Quarter Window Glass.

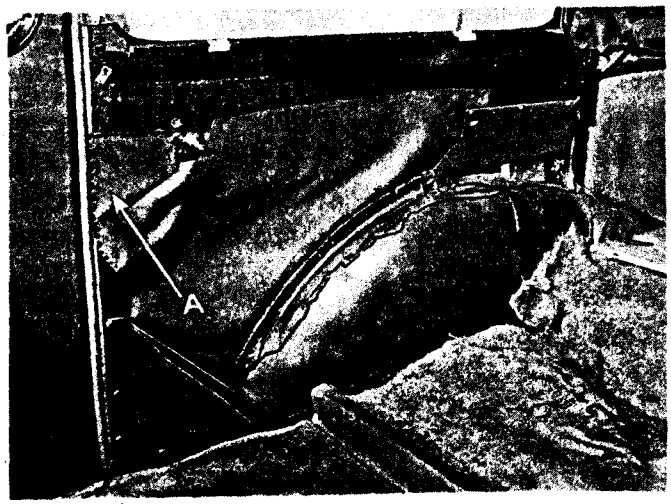


Illustration No. 147
Rear Quarter Window Drain After Baffle Is Installed.

6. Remove oblong metal Drain Pan on top of the Wheelhousing at the base of the Rear Quarter Pillar. *(See Illustration No. 146 at A.)* Also, remove Lower Glass Run Channels and their Retainers from the Rear Quarter Pillar and the Rear Body Hinge Pillar.
7. Seal between the Rear Quarter Pillar and the Rear Quarter Panel with a combination of cotton waste and F.S. 1039 Compound *(See Illustration No. 146 at B.)*
8. Re-install the Drain Pan above the Wheelhousing making sure sufficient sealing compound is used where it contacts the Rear Quarter Pillar and the Quarter Panel. *(See Illustration No. 146 at C.)* In brief, make sure that all the water that might enter at the Window will find its way into the Pan. Re-install the Rear Quarter Lower Glass Channels and their Retainers to their original locations.
9. Cut a piece of roof covering material to be used as a Rain Baffle and place it in position as shown in Illustration No. 147 (glazed side toward Body Panel), tacking it first to the Rear Body Hinge Pillar, *(See Illustration No. 147 at A)* and tuck the lower left hand skirt of the material behind the Rear Body Hinge Pillar-To-Sill Brace, down to the Sill. The balance of the skirt is then trimmed and cemented to the inside edge of the rubber Drain Gutter and the Drain Pan. (Use F.S. 1039 Cement.)
10. Install the Window Glass and Regulator Boards. Tack the Rain Baffle to the lower Regulator Board *(See Illustration No. 147.)*
11. Re-assemble the Quarter Trim and Arm Rest, Upper Glass Run Channel, Garnish Molding, Cushion and Seat Back Assemblies.

NOTE—This information is to be used only on exceptional cases where other methods have failed. Time for this work is usually about three hours for one side.

COWL VENTILATOR

To adjust the spacing around the Cowl Ventilator Lid, loosen the adjusting screws in the Hinge Plate. Close the Lid and insert wood wedges in the spacing around the Lid to equalize and hold it in position.

Tighten the adjusting screws.

The holes are elongated to allow for adjustment. Tension of the Lid to the rubber Gasket is obtained by means of the Adjustable Control Arm. *(See Illustration No. 14.)*

COMPOUNDS

There are so few necessary Compounds needed for service on Bodies that there is no excuse for a Dealer not having a limited quantity of all of them on hand at all times.

F.S. 1039 is used to cement or seal all rubber Weatherstrips, rubber Moldings, wood joints and metal Panel joints where dust or water leaks may occur.

F.S. 1040 is a similar cement to F.S. 1039 except that it is thinner in consistency so that it may be used in the Sealing Gun B-182 for sealing the outer lips on the Windshield, Back Window and Rear Quarter Window Rubber Channels. (High Test Gasoline may be used to thin either 1039.or 1040 to the proper creamy consistency for this purpose.)

F.S. 1044 is a heavy paste used to cement the Insulation Felt and other silencing pads to the Metal Panels, Roof and Floor.

F.S. 796 is a thick yellow waterproof paste used to cement heavy upholstery such as Carpet and Boarded Trim to the Door, to the Rear Quarters and above the Windshield and Doors.

F.S. 731 is a white rubber Trimmer's Cement used to paint the backs of all upholstery parts when building up a Boarded Trim Assembly such as a Door Trim Pad or Over Windshield Trim Strip.

This makes only Five Compounds needed in a Body Shop where complete Repair is done in Servicing a Turret Top Body. They may be ordered from Hinckley-Myers Co. or Kent Moore Organization.

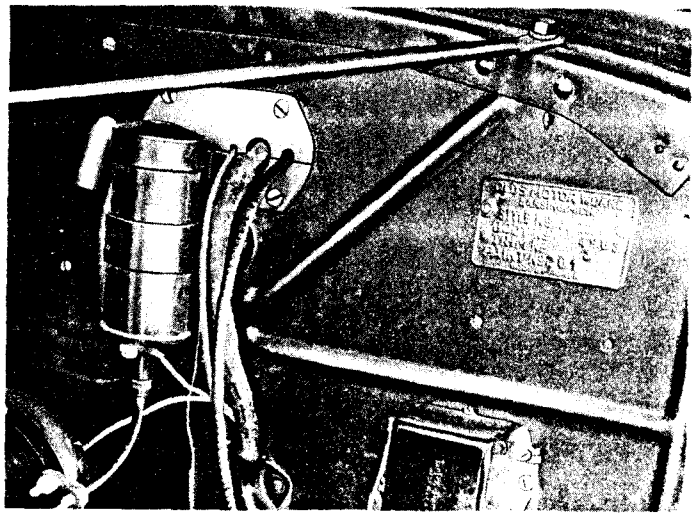


Illustration No. 148
Wiring Through Dash.

DASH

The Dash is punched with many holes through which Wires, Cables, etc., run. The extra space around the Wire is usually rubber grommeted to exclude water which is splashed against it by the Fan. Water leaks on the Floor Pans under the Cowl sometimes may be traced to a missing Grommet or a drip off the Cables. Compound F.S. 1039 may be used to close the small openings at the holes where these Cables enter.

WINDSHIELD SEALING

There are *three* sealing operations to be noted when making a Windshield installation:

1. Windshield Rubber Channel surrounding both glasses (right and left). This is sealed with Compound F.S. No. 1039 which is brushed on the Windshield Flange before the Windshield Glass and Rubber Channel are installed. The Garnish Molding with its twenty screws holds it in position firmly. *(See insert, Illustration No. 149 at A.)*
2. Windshield Center Division Channels and Gaskets. This sealing is done by setting with proper pressure the four screws that hold the outer and inner Center Division Channels together against their Gaskets.
3. Windshield Rubber Channel Outer Lip that projects out over the Windshield Opening Reveal. This is sealed with Compound F.S. 1040 with the aid of a Sealing Gun B-182. The nozzle is inserted beneath the rubber lip and Compound is pressed into the space between the lip and the metal Panel, as at "B". This applies to the Back Window and Sedan Quarter Windows as well.

If these three locations are properly sealed the Windshield cannot leak.

Many times a loose Windshield Wiper Housing Gasket may cause a leak that might be called a Windshield leak.

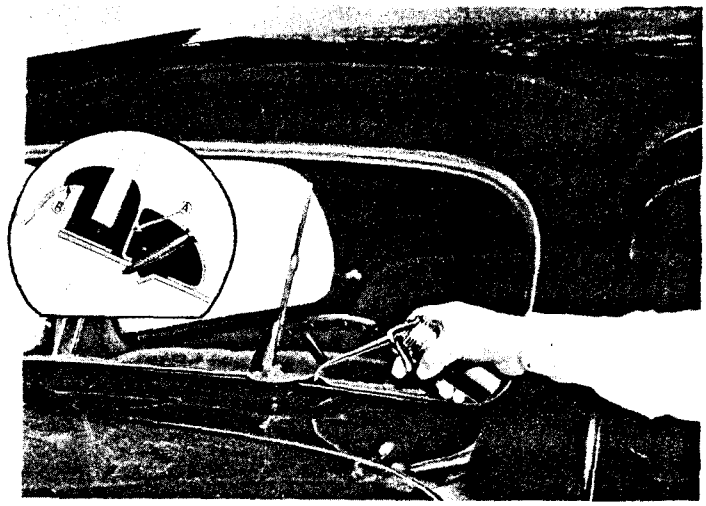


Illustration No. 149
Windshield Sealing.

WINDSHIELD WIPER HOUSING CAP OR GASKET

A Water leak may sometimes be found at the Gasket of the Windshield Wiper Housing Cap.

The Cap may not fit down tightly or the Gasket may have been squeezed out of place.

Loosen the Cap Screws and adjust the Gasket and see that the Cap fits tightly.

The Drive Shaft in the Cap may not be packed with grease thus allowing water to be sucked through at the Shaft. This water may run down the Instrument Panel and drip off on the Floor or it may enter the Instruments and fill the space back of their cover glasses.

Remove the Cap and repack it with grease and see that the Cap and Gasket is properly fitted before the screws are tightened.

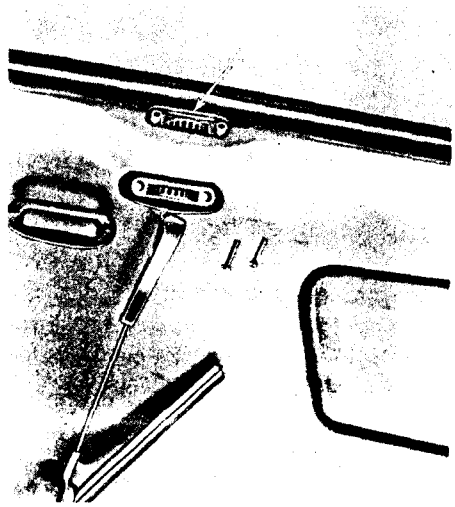


Illustration No. 150
Exploded View of Windshield Wiper and Parts.

WINDSHIELD (GLASS BREAKAGE)

When a Windshield Glass "strain breaks" the cause of this breakage should be removed before another Glass is installed.

The Windshield Opening Flanges against which the Glass Assembly sets should be as near a perfect plane as possible.

One of the Garnish Molding Screws may have been set too taut which would strain the Windshield Glass at an uneven place in the Opening Frame causing a break in the Glass.

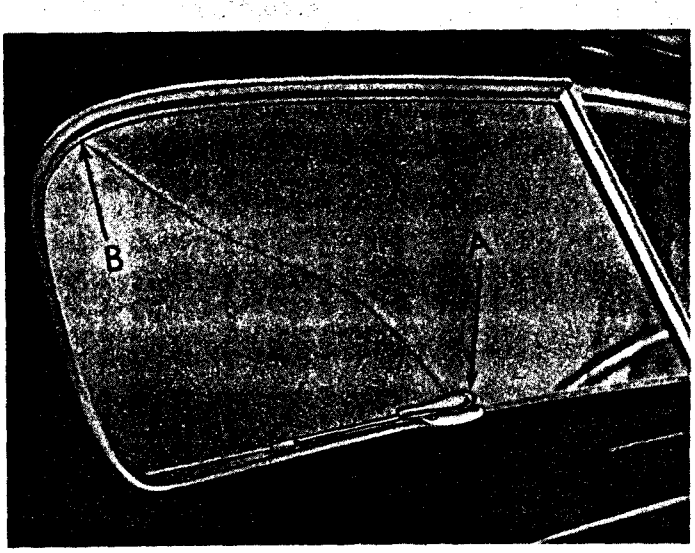


Illustration No. 151
Strain Break, Windshield Glass.

In checking the Opening for unevenness a Template or the Windshield Glass itself should be used with a Feeler Gauge to check for raised or hollow places *(See Illustration No. 152.)*

These uneven places should be leveled to a plane by calking. *(See Illustration No. 153.)*

NOTE — All old Compound should be cleaned off the Flanges with a solvent (Kerosene) or scraped off, before trying the Template and Feeler.

All screws in the Windshield Garnish Molding should be evenly tensioned.



Illustration No. 152
Checking Windshield Opening Using Glass as Template.

WINDSHIELD GLASS REMOVAL

One of the Windshield Glasses may be removed without disturbing the other Glass if care is taken to loosen it and the Rubber Channel without damage. If the Channel is damaged, both Glasses must be removed to replace the Channel.

The 1935 Windshield glass is $\frac{1}{32}$" larger vertically than 1936 Glass, therefore they are not interchangeable.

The Windshield Wiper Housing and Gasket must be removed before Windshield Rubber Channel is removed. *(See Illustration No. 151 at A.)*

CHECKING WINDSHIELD OPENING

The Windshield Opening Checking Template shown in Illustration No. 151 is to be used with .010" Feeler Gauge to determine any high or low spots on the Windshield Opening Frame, that may have caused the Glass to break. These locations should be marked with crayon.

Remove the Template.

Any high spots found should be calked back to a plane surface. *(See Illustration No. 153.)*

This Template may be made up of laminated hardwood as illustrated, and may be used on the following cars:

1936 Olds, Pontiac, Buick, Buick 40 and 60, La Salle and Cadillac 60.

1935 Olds, Pontiac and La Salle.

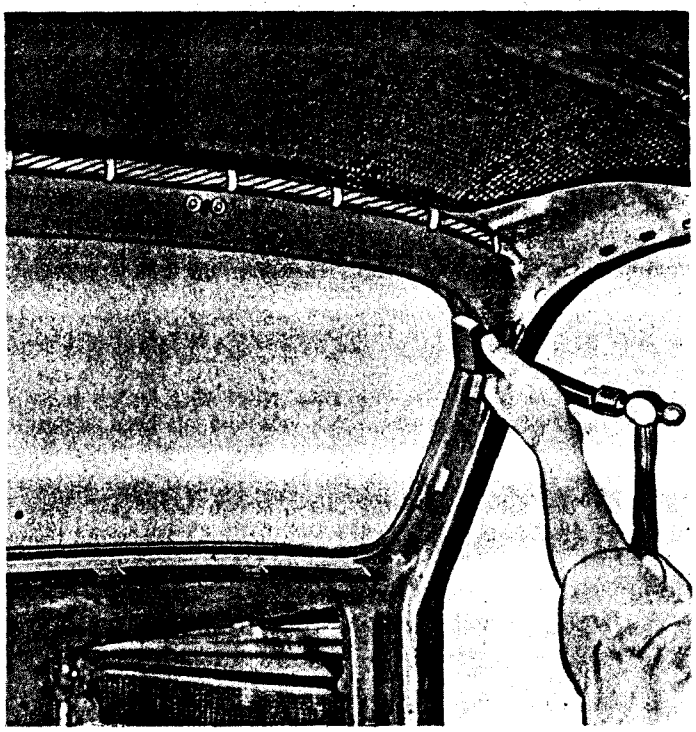


Illustration No. 153
Calking Windshield Opening Flange.

WINDSHIELD OPENING LEVELING

A Windshield Opening Frame that shows an uneven surface against which the Glass Assembly is to set, is leveled by using a calking tool and hammer as illustrated above.

Place the calking tool on the bulge and tap it with a hammer. Then try the Template and Feeler Gauge again and repeat these operations until the Template fits all the way around the opening and does not tilt or rock.

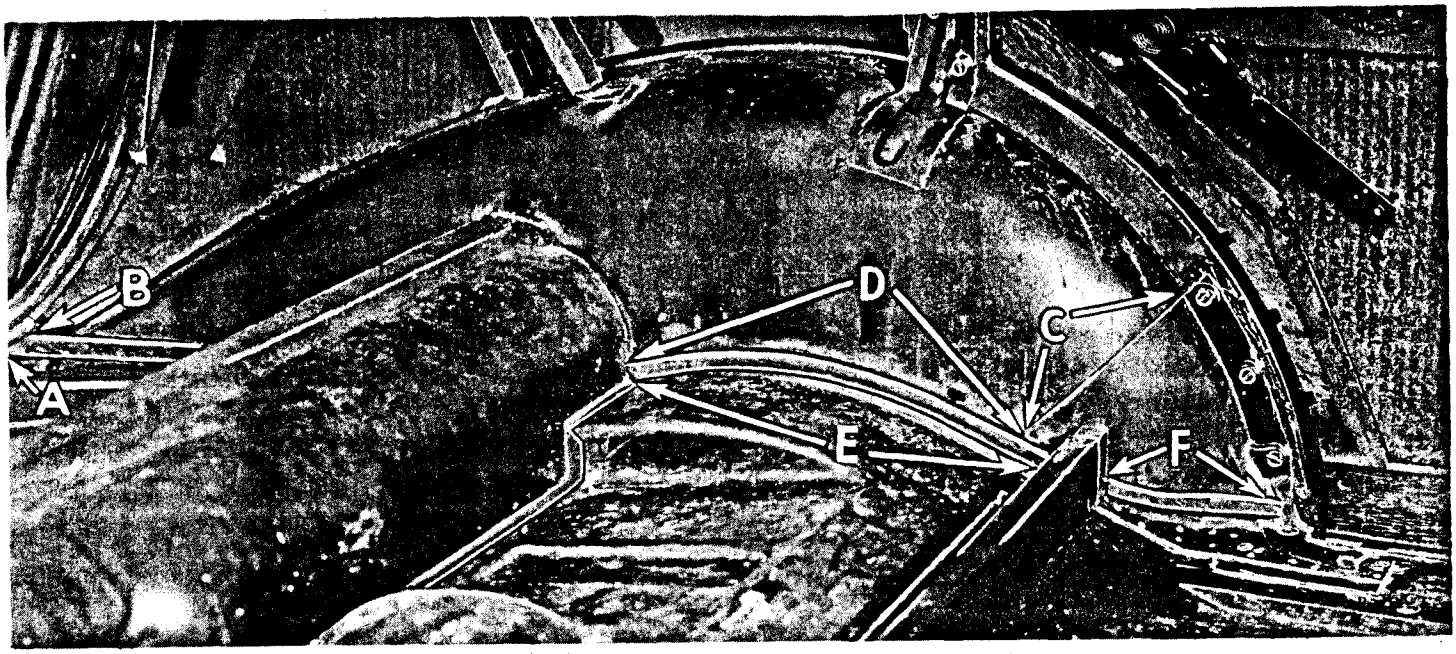


Illustration No. 154
Showing Where to Inspect for Possible Dust Leaks.

DUST LEAKS

Dust that may accumulate within the body of a car when traveling along a dusty highway, may be thrown or churned up by the wheels and under carriage of the car itself. The movement along the road of streamlined cars has a tendency to cause an indraft or suction of air into the body. This suction takes place at any small unsealed opening or crevice; which in the case of dust leaks occurs particularly along the sides of the Floor Pans, Wheelhousing and bottom of Door Openings. If the air enters at any small opening as mentioned, dust will enter, also. Most of the indraft of air at the points described can be counteracted to a great extent by opening the Cowl Ventilator. However, on dust complaints, the Floor construction should be thoroughly inspected.

The lettered points in Illustration No. 154 show where to examine the Floor Construction for entrance of dust.

On some style Bodies, dust may enter at a bolt hole or at a point where a Grommet has loosened or been removed. Sealing at these points may correct the trouble.

For the sealing of the Sedan Floor against dust leaks we suggest the following information which will, also, give a general idea as to the possible location on other style bodies as well.

1. Remove Rear Seat Cushion, Rear Seat Back, Trunk Luggage Shelf (or Compartment Shelf), Spare Tire, etc.
2. Loosen the Trim, Carpets and other Floor coverings along the sides of the Floor from the Rear Body Hinge Pillars to and across the Rear End Panel.
3. Examine for and seal all possible air entrances between the Floor Pans and the Body Sills as well as all unnecessary openings around the Wheelhousing.

In Illustration No. 154, points A, B, and C may be sealed or calked with cotton batting and Compound F.S. 1039, while at D, E and F it is only necessary, in many cases, to use the Compound.

NOTE—The water drain holes at the bottom of the Rear Body Hinge Pillars, and at the Sills on Coaches must be left open, or if dust is entering at these points coarse hair dipped in oil may be stuffed lightly into the drain holes.

The Rear Floor Construction on Coupes, Trunk and Rear Compartment Style Bodies should receive special attention. For instance, in Illustration No. 155, the rubber Grommet

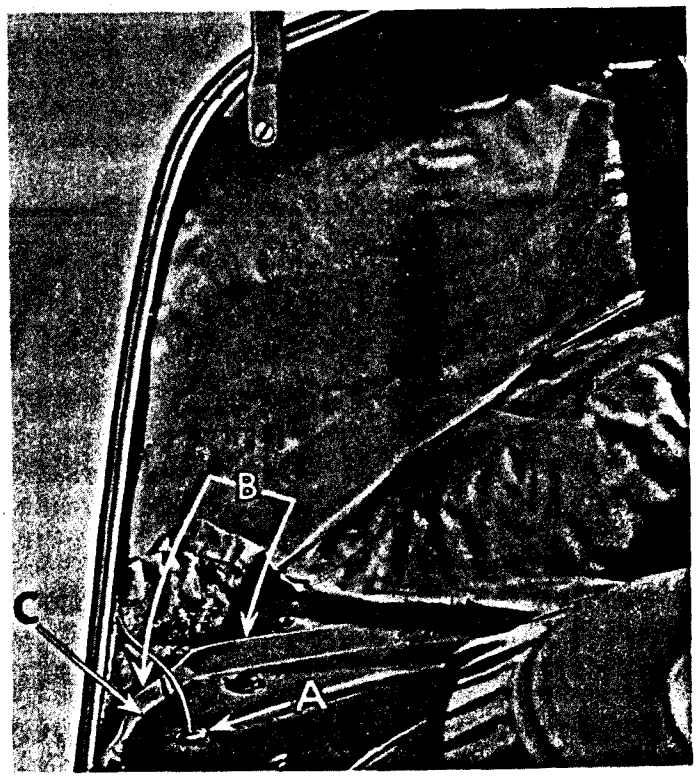


Illustration No. 155
Wheelhousing and Trunk Rear Corner.

shown at "A" may not cover the wiring outlet sufficiently. This can be sealed with Compound F.S. 1039. In the same Illustration, if dust enters at points "B," these particular openings should be calked with a combination of cotton batting and F.S. 1039. At "C," where the metal Floor Pan is spotwelded

to the Rear End Sill, it may also be necessary to seal with Compound. Before a sealing operation is attempted all accumulated dust in crevices around the Floor Construction should be blown out with an air hose in order that the sealing compound may have a better adhesion. Such sealers as glue, shellac or putty, etc., are not recommended for sealing purposes. Elastic compound sealers such as F.S. 1039 are best for this purpose.

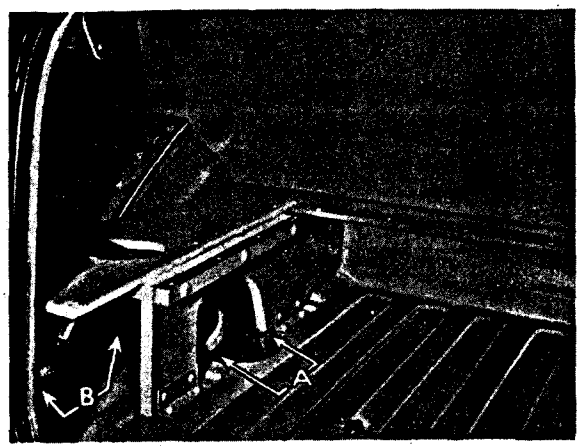


Illustration No. 156
Rear Floor Pan and Gas Tank Filler Pipe.
(Chevrolet)

On some style bodies, such as a Chevrolet Two Door Sedan, a possible dust leak may occur where the Gas Tank Filler Pipe goes through the Rear Floor Pan. It will be noticed in Illustration No. 156 at "A" that the Filler Pipe is insulated from the Floor Pan by a sponge rubber gasket which, in some cases, may have slipped out of position allowing entrance of air and dust. This point should be thoroughly inspected and sealed, also sections of the Floor Pan construction at "B" as shown in the same Illustration.

UPHOLSTERY

Upholstery Cloth, commonly spoken of as "Trim" may be divided generally into two main groups.

1. Flat Cloth: Broadcloth, Worsted, Whipcord, Tweeds, Cheviots.
2. Pile Fabrics: Mohair, Plush, Velvets and Velours.

In the first group, the Warp is interwoven with the "Filler" which constitutes the finish and entire surface of the cloth. In use, the wear is on this entire exposed surface and for the same reason, the entire surface is subjected to discoloration from grime and dirt.

In the second group, the Pile or Nap Fabrics have the Pile interwoven with the Filler into the Warp with the vertical Pick of Nap projecting up beyond the Filler surface and therefore the wear is on the ends of these Picks rather than on the Filler. Likewise the grime and dirt is usually deposited on the Nap. Most Pile fabrics used in Body Trimming are coated on the back with a layer of latex (rubber) to aid in preventing the Pile from pushing through the body of the cloth. When cleaning this type of Trim, care must be used not to saturate the base of the fabric with a solvent, such as Gasoline, Carbon Tetrachloride etc., or this rubber backing may be dissolved and the fabric damaged.

Solvent cleaners of this nature should be used sparingly by simply dampening the cleaning cotton and applying it with as little saturation and rubbing action as possible.

There is another Cleaning Agent of a different type that is very good in instances where grease, grime, and dust are to be removed from an entire Trim part such as Seat Cushions or Door Trim Pads. This material is a liquid and is to be used by whisking a small quantity of it to a complete foam, then applying the foam alone to the fabric with a sponge. With gentle rubbing over the entire Pad the ammonia and soap in the liquid do a very satisfactory job. It takes longer to dry than a cleaning solvent, but it has been found to be better for certain kinds of cleaning problems.

CHROMIUM PLATE CLEANING

Chromium Plate should be kept clean and free from salt or soot as well as other road grime.

The surface should be wiped with a damp cloth or, if necessary, use kerosene to clean off rust discoloration and road oil or tar.

Chromium does not require a polish as does nickel, German silver and other softer plates which usually require an abrasive to create a brightness.

FINISH

Duco is a quick drying spraying Lacquer with which nearly all of G. M. Car Bodies are surfaced.

When we speak of the "finish," we mean the smoothness or lustre of the Lacquer surface.

After Lacquer is sprayed, no matter how many times the surface has been gone over (coats), it is rough, dull and pebbly and has to be sanded or rubbed smooth which creates a lustre surface.

Once the pebbly surface is rubbed smooth it need not be rubbed again for this purpose. It does require cleaning, however, and as often as appearance demands.

Many owners and dealers believe in "——izing" their cars. Many of these "——izing" waxes are good and may add to the life of a polished Duco finish. This finish does not usually last very long, therefore it has to be "re——ized" several times a year. In order to "——ize" them, the surface is rubbed again and again with grits and abrasives to clean them prior to their re-waxing operations. In these "Abrasive Rubbings" lies a great deal of trouble.

The Lacquer is eventually rubbed or ground off to such a point that there is very little or no Lacquer left, especially on the high spots, Moldings, Crowns, Edges, etc.

For this reason alone the use of waxes and "——izings" has never been fully recommended by Corporations responsible for the durability of the finish.

It is not the waxing operations as much as the repeated preparatory rubbing operations that leave the surface bare and discolored in spots and cause the owner to be dissatisfied or to complain about his car's appearance.

Wax wears off faster in some portions of the body than in others. If all portions of the surface could be kept equally well covered, the Finish could probably be preserved for some time. But unfortunately this does not happen. Some parts are wax covered and others are not, therefore, there is a difference in wearing which results in discolorations. If harsh abrasives are used, the Lacquer will not survive many cleanings.

DuPont's or McAleer's Polish, or their equal, does create a brilliant temporary polish and lustre.

If a Wax Finish is desired, it should be applied over a thoroughly cleaned surface and if required, use only a mild cleaner, free from harsh abrasives. After this cleaning operation, if the Lacquer shows thin or rubbed through, it should be lacquered or spotted in before any wax is applied.

Damaged portions of Lacquer may be spotted in, in many cases, if the proper Under Coats, Color and Operations are used.

If wax had been used on the Lacquer, this must be *entirely* removed from the *entire surface* to be re-spotted. Use half Thinner and half high-test gasoline to clean wax off for spot-spraying. Feather edge the spot with a wide bevel down to the Prime Coat or bare metal.

Apply Primer and let dry thoroughly. Apply Surfacer if necessary, and let dry. Sand to feather edge.

Apply Under Coats. Let dry and then sand it.

Apply finish coats. Let dry and use Rubbing Compound to reduce the eggshell finish to a lustre.

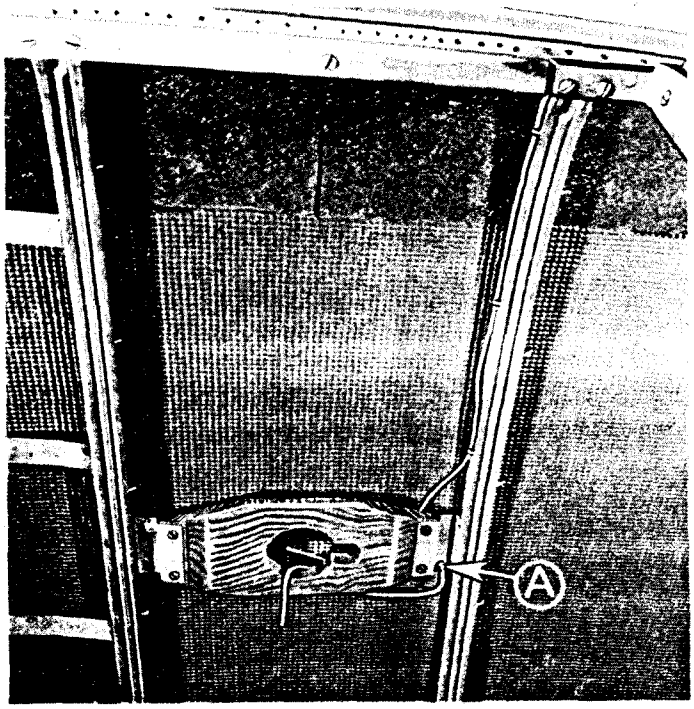


Illustration No. 157
Dome Lamp Wiring.

DOME LAMP AND WIRING GROUND

The Dome Lamp Block is held between the second and third Roof Bows with machine screw to metal Supports which are spotwelded to the Roof Rear Bow.

The screws have Sleeve Nuts on the upper side of the Lamp Block.

The Wiring Ground Wire is fastened with a screw at "A" to the Metal Supports, grounding through the metal Bow to the Roof Side Rail. The Wire to the Switch follows the Roof Bow over to the right Side Roof Rail and down the Pillar to the Switch. The Dome Lamp Case is attached to the Block with wood screws that may be seen by turning the Lamp Cover to one side and removing.

MEMORANDUM

1936
FISHER TURRET TOP BODY CONSTRUCTION

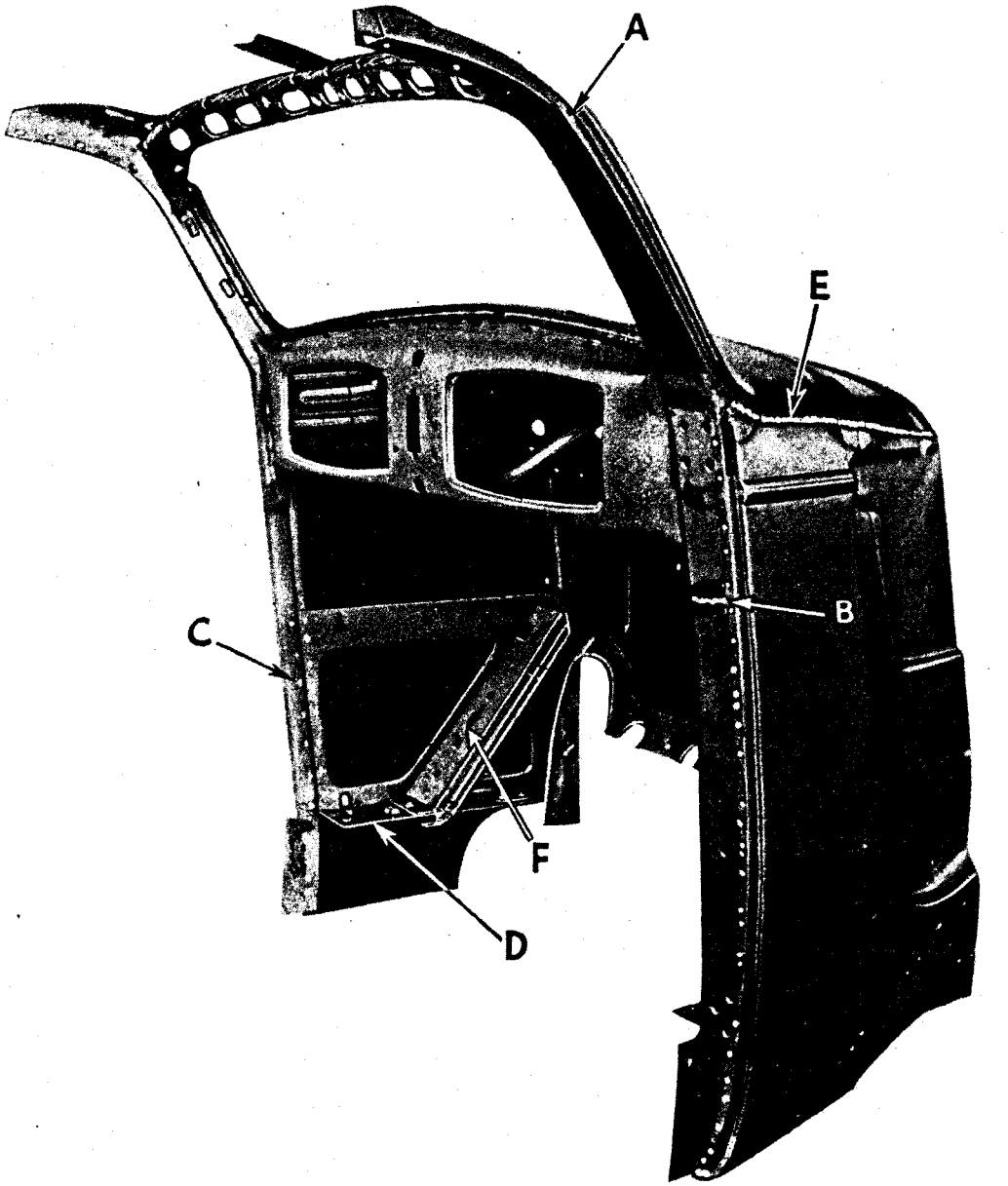


Illustration No. 158

1936 BODY FRONT END ASSEMBLY

1936
FISHER TURRET TOP BODY CONSTRUCTION

In describing the 1936 Body Front End Assembly it is to be noted that this assembly is divided into two principal parts. First: The Front End Frame which is composed of various steel units welded together to form a framework or foundation for the metal outer panels and, Secondly: The Front End Outer Shell or Cowl Panels which are assembled and welded to this framework to form a complete unit familiarly known as the Cowl and Dash Assembly. *(See Illustration No. 158.)*

FRONT END FRAME

The Front End Frame is made up of seven main parts which may be described as follows:

Front End Frame Upper: This forms the entire Windshield Opening and includes the Windshield Header, Front Roof Corner Braces, Instrument Panel, and the upper part of the Front Body Hinge Pillars. The Front End Frame Upper is torch welded to the metal Side Roof Rail shown at "A" in Illustration No. 159 and is likewise welded to the Front End Frame Leg. *(See Illustration No. 158 at B.)*

Front End Frame Leg. Right and Left: This forms the lower section of the Front Body Hinge Pillar and Pillar Facing. It is torch welded to the Front End Frame Upper at "B" and also spotwelded to the Front End Side Brace *(See Illustration No. 158 at C.)*

Front End Side Brace. Right and Left: This is an angular steel stamping used as a reinforcement for the lower side section of the Cowl. It is electrically spotwelded to the Lower Leg of the Front Body Hinge Pillar and to the Dash. The bottom part of this Brace is flanged to the top side of the Main Side Sill to which it is bolted and screwed. *(See Illustration No. 158 at D.)* The Toe Board Brace (F in the same Illustration) is also an integral part of the Front End Side Brace.

Front End Frame to Dash Panel Brace. Right and Left: This is a new reinforcement used on 1936 Cowl and Dash Assemblies. This Brace is spotwelded to the Front Body Hinge Pillar in the vicinity of the upper Hinge, strengthening the Pillar at this point, and is also spotwelded to the upper part of the Dash Panel at a point where the Radiator Tie Rods are anchored. On some style bodies the center part of this Brace on the left side of the Cowl is equipped with anchor nuts for the attachment of the Emergency Brake Lever. *(See Illustration No. 160 at A.)*

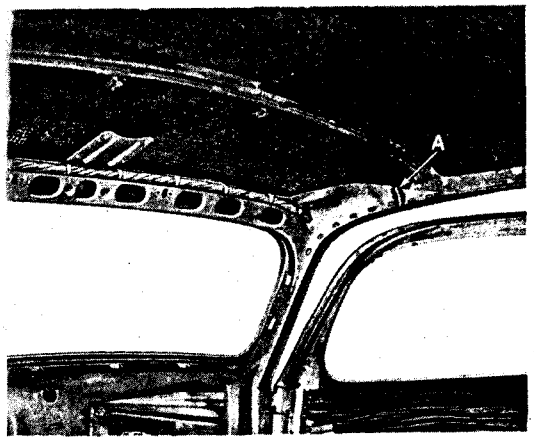


Illustration No. 159
Interior View of Upper Front Corner of 1936 Body Front End Assembly.

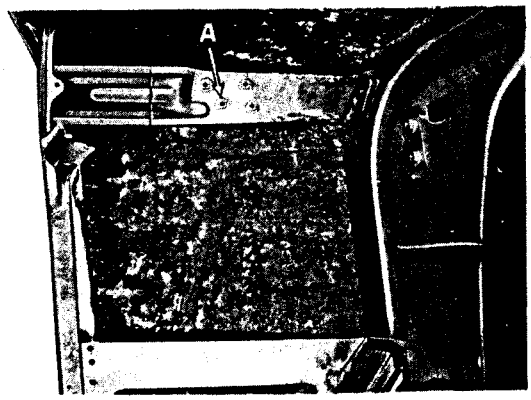


Illustration No. 160
Front End Frame to Dash Panel Brace.

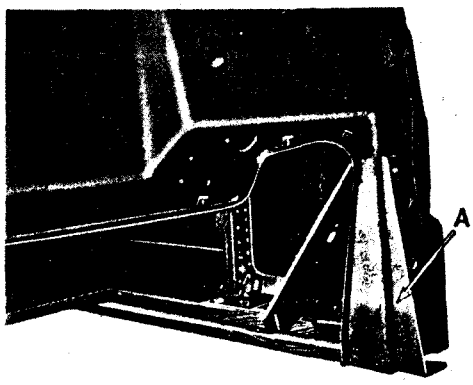


Illustration No. 161
Dash to Chassis Frame Brace.

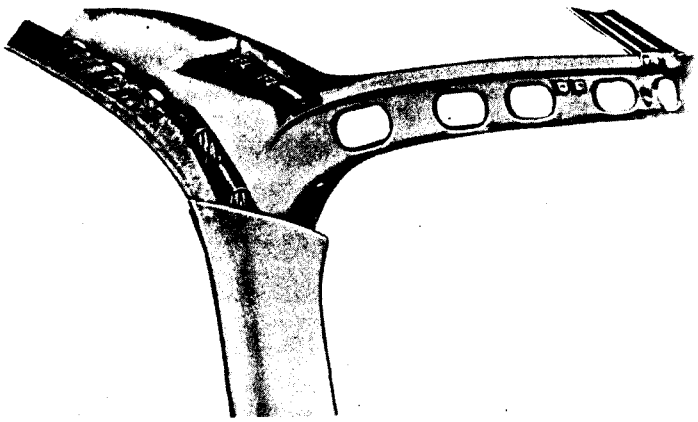


Illustration No. 162
Cut Away View of Front End Frame Upper.

FRONT END OUTER SHELL

The 1936 Front End Outer Shell is made up of four major Panels as follows:

Cowl Upper Panel: This is a steel stamping that embraces the top of the Cowl and also the upper section of both Front Body Hinge Pillars. It is torch welded to the Turret Roof Panel *(See Illustration No. 158 at A)* and is flanged around the sides and lower part of the Windshield Opening where it is spotwelded to the Frame of the Cowl Assembly. It is joined to the Cowl Side Panels by an electric butt weld and is flanged and spotwelded to the upper edge of the Dash. The top center of the Cowl Upper Panel is cut out to receive the Cowl Ventilator Drain Gutter and the Cowl Ventilator Hinge Arm both of which are spotwelded to the under side of this panel around the opening. The Cowl Ventilator Lid and its adjustment is similar to 1935 construction. (A description of this Lid is given on Page No. 6.)

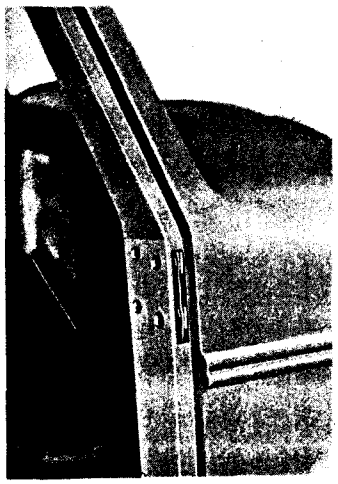


Illustration No. 163
Upper Hinge "Cut Out" in Front Body Hinge Pillar Showing Location of Cage Nuts for Holding Hinge Screws.

Cowl Side Panel. Right and Left: The Cowl Side Panel forms the side section of the Front End Outer Shell. It is indented and pressed to form moldings and offsets which conform with the general design of the body itself. This Panel is electrically butt welded to the Cowl Upper Panel at a point slightly above the Belt Molding, the weld extending from the Door Opening to the Dash. *(See Illustration No. 158 at E.)* At the Front Body Hinge Pillar this Panel is offset slightly and then flanged around the Pillar where it is spotwelded to place. The Cowl Side Panel is likewise flanged over the front side of the Dash Panel where it is also spotwelded.

Dash Panel: The Dash Panel is made of sheet steel, stamped and pressed with offsets to give rigidity across the front of the Cowl Assembly. The Dash is perforated at various places for the insertion of wiring and other equipment while the inside of the Panel is insulated with heavy jute matting called "Dash Insulator Assembly" which acts as a heat resistor and sound deadener. The Dash Panel is electrically spotwelded to the flanges of the Cowl Upper Panel and the Cowl Side Panels.

Two Braces are located at each lower corner of the Dash, one on the outside of the Panel called a Dash to Chassis Frame Brace, *(See Illustration No. 161 at A)*, and the other on the inside of the Panel called a Dash to Sill Brace. The same rivets through both Braces securely anchor them to the Dash.

The shape of the Dash to Chassis Frame Braces of different make cars varies, due to the difference in the manner of attachment to the car frame or motor support.

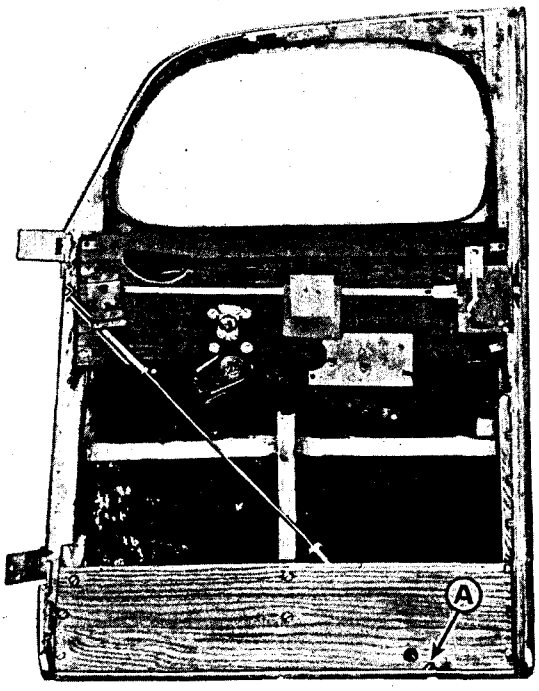


Illustration No. 164
1936 Composite Front Door Showing Door Stiffener Rod and Interior Hardware Parts.

FRONT DOORS

1936 Front Doors are hinged to the Front Body Hinge Pillar. The Cowl and the Pillar at this section of the Body are held to a more vertical line to allow for a more uniform suspension of the Door. The Front Pillar at the location of the Hinges is reinforced and anchor nuts are used in conjunction with bolts to securely anchor the Hinges to this Pillar.

The 1936 composite Front Door is similar to that of the 1935 Door, except that the Hinges, Locks, Wedge Plate, Door Check, and Stiffener Rod are located on the opposite Pillar of the Door. The Door operates similarly although the Lock and Hinge sides are reversed. *(See Illustration No. 164.)*

ALL METAL DOORS

1936 CHEVROLET STANDARD BODIES ONLY

CHEVROLET METAL DOORS (1936)

On some Standard 1936 Chevrolet Bodies, All Metal Doors are being used. In the following paragraphs a description of this Door is given together with Illustrations showing its inner construction. Although this metal Door, minus Hardware, Trim and Glass, is serviced as a unit, there are however two principal parts in the construction as follows:

2. Door Inner Panel

This stamping comprises the inner framework of the Door and includes such portions formerly known as the Door Hinge Pillar, Door Lock Pillar, Door Bottom Bar, and Regulator Board. The part of this panel that is used as the Regulator Board is perforated and pressed with offsets for the accommodation of the Door Mechanical Hardware, and is also insulated across its center with Sound Silencer Felt.

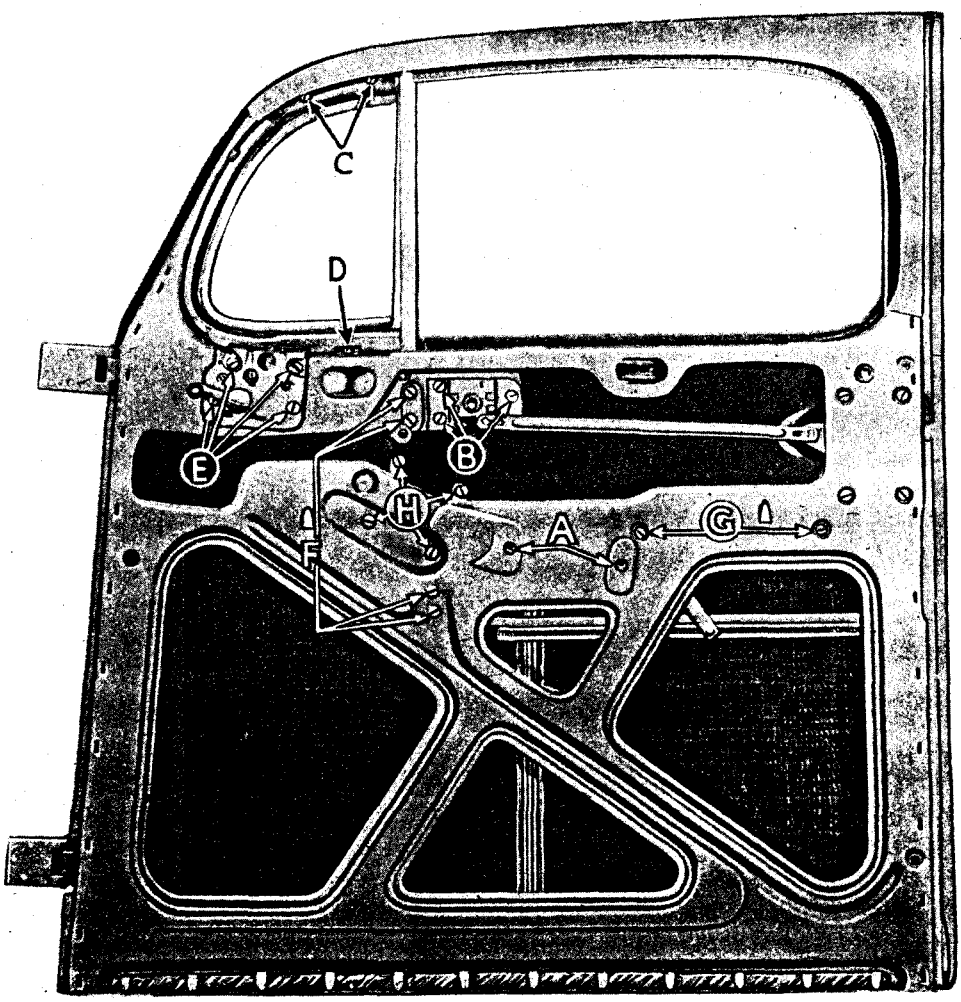


Illustration No. 165
Inside View of Chevrolet All Metal Door.

1. Door Outer Panel

This is a one-piece steel stamping comprising the Outside Panel of the Door. The inner surface of this panel is insulated with Sound Silencer Felt and is reinforced at its center by a vertical metal strainer or stiffener which is spotwelded to the bottom and also to the belt of the panel, directly below the Window Opening.

In the Assembly of the Door Outer and Door Inner Panel, the edges of the Outer Panel are formed over and spotwelded to the flanges of the Inner Panel. At various points in the Window Opening additional metal reinforcements are used to bridge the Panels together at this point. To this Door unit the Door Mechanical Hardware Parts including the Door Trim Pad, Ventilator Assembly and Door Glass are added. (See the description of these parts on pages 57, 58 and 59.)

DOOR TRIM PAD REMOVAL
ALL METAL DOORS

1. Remove the Door Window Garnish Molding.
2. Remove Remote Control Handle, Regulator Handles, Inside Locking Device, and Door Arm Rest.
3. With a screwdriver carefully pry the Trim Pad loose from the Door Lock Pillar and Door Hinge Pillar. Complete this operation by prying the Pad loose along bottom edge.
4. Lift the Trim Pad up to disengage it from the two hooks on the Inner Panel and remove.

NOTE—Along "B" in Illustration No. 166 the Door Trim Pad is not attached to the top edge of the Inner Panel but is held in place by the lower flange of the Door Window Garnish Molding.

DOOR TRIM PAD REPLACEMENT

1. Engage the slots in the Foundation of the Trim Pad over the hooks on the Inner Panel. *(See Illustration No. 166 at C.)*
2. Align the Trim Pad and with a wood Mallet drive the barbed nails on the Trim Pad into the slots on the Door Lock Pillar and Door Hinge Pillar. Complete this operation by fastening the bottom edge of the Trim Pad to the nailing strip at the bottom of the Door. *(See Illustration No. 166 at D.)*
3. Install Regulator Handles, Remote Control Handle, and Inside Locking Device.
4. Install Door Arm Rest and Window Garnish Molding.

NOTE—In the event a nail breaks away from the Binding Strip on the Door Trim Pad, the nail can be replaced by simply turning back the trim material on the Door Trim Pad where the nail is broken off, and inserting a Replacement Tab. This Replacement tab has a nail welded to it and is serviced under part No. 4073068. (See drawings of this part.)

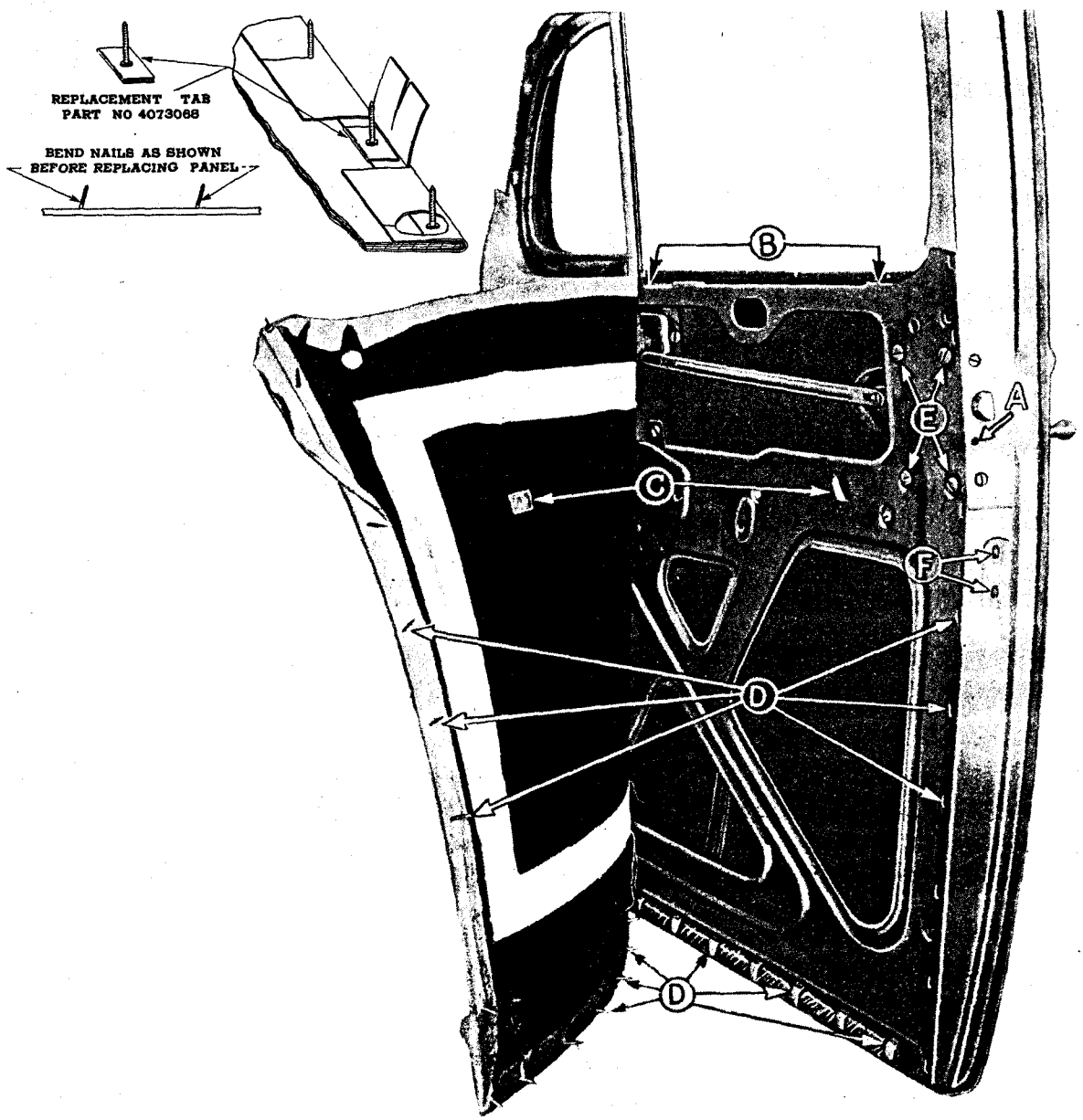


Illustration No. 166
All Metal Door Trim Pad Removal.

OUTSIDE DOOR HANDLE REMOVAL

The Outside Door Handle is removed by turning the Door Handle sufficiently to locate and remove the Door Handle Retaining Screw, which is accessible through a small hole in the front face of the Door Lock directly below the Lock Bolt. *(See Illustration No. 166 at A.)*

DOOR WINDOW GARNISH MOLDING REMOVAL

The Door Window Garnish Molding is removed by taking out the self-tapping screws holding this Molding in position in the Window Opening. Two types of metal screws are used. The Garnish Molding is held to the upper part of the Door Lock Pillar by self-tapping machine screws, while in the balance of the Molding, self-tapping wood screws are used.

DOOR REMOTE CONTROL OR REGULATOR HANDLE REMOVAL

Both of these Handles are fitted to splined spindles on their mechanisms and are held in position by a Door Inside Handle Retaining Spring. To remove, press the Ferrule surrounding the shank of the Handle in towards the Door Pad and remove the Door Inside Handle Retaining Spring which is visible through a cut out slot in the shank of the Handle. (See Illustration No. 72.)

DOOR ARM REST REMOVAL

The Door Arm Rest is removed as follows: On the under side of the Arm Rest remove two screws holding the Door Arm Rest Finishing Plate. When this plate is lowered out of position it exposes the heads of two machine screws which go through the Arm Rest and Door Trim Pad at an angle and into anchor nuts in the Door Inner Panel. *(See Illustration No. 165 at A.)* By taking out these screws, the Arm Rest is readily removed.

NOTE—Bodies that have an Arm Rest on the left Door only, are fitted with anchor nuts on the right Door also, so that an Arm Rest may be installed without removing the Trim Pad. These anchor nuts may be located by pressing on the Trim Pad with the fingers. The holes in the Trim Pad Foundation are already punched out.

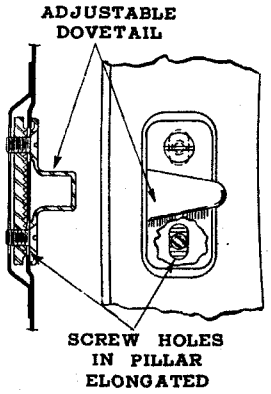


Illustration No. 167

DOOR WEDGE PLATE

Another adjustment of note on the Metal Door is the Wedge Plate on the Lock Pillar. The holes in the Lock Pillar for the Wedge Plate are elongated and in conjunction with movable anchor nuts the Wedge Plate may be adjusted up or down to enter the Dovetail Assembly on the Body Pillar centrally. *(See Illustration No. 166 at F.)*

DOOR HINGES

The Door Hinges where attached to the Metal Door Pillar, may be adjusted in or out to bring the Door closer or further away from the Body. This is taken care of by horizontally elongated holes in the Hinge Pillar. Each Door Hinge is held to the Door Pillar by three stud bolts. The Hinges are inserted through cut outs in the Door Outer Panel. Hexagon head Hinge Bolts go through the Hinge Pillar and are threaded into the Hinges securely, anchoring them to place.

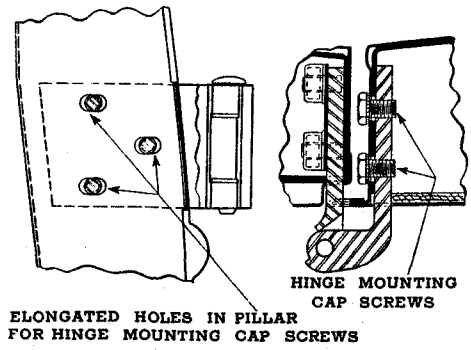


Illustration No. 168

DOOR VENTILATOR ASSEMBLY REMOVAL

1. Remove Garnish Molding.
2. Loosen the Trim Pad in the vicinity of the Door Ventilator Regulator mechanism.
3. Remove two screws holding top of Ventilator Assembly to Window Opening. *(See Illustration No. 165 at C.)*
4. Remove one bolt and nut holding Ventilator Assembly to the top edge of Door Inner Panel. *(See Illustration No. 165 at D.)*
5. Remove four machine screws holding Ventilator Regulator Mechanism to Door Inner Panel. *(See Illustration No. 165 at E.)*
6. Open Ventilator Glass slightly and pry top of Assembly in.
7. Close Glass and remove Ventilator Assembly.

DOOR WINDOW GLASS REMOVAL

1. Remove Door Trim Pad.
2. In the Window Opening take out screws holding Upper Glass Run Channel and remove channel.
3. Remove Center Division Channel by taking out two screws at top of Channel in the Window Opening and also the screws holding this Channel to the Door Inner Panel. *(See Illustration No. 165 at F.)*
4. With Glass down, remove four screws holding the Cam to the Channel on the bottom of the Glass.
5. Remove Glass through the Door Window Opening.

DOOR WINDOW REGULATOR ASSEMBLY REMOVAL

1. Remove Door Trim Pad.
2. Remove screws holding Regulator Cam to Door Glass Lower Sash Channel.
3. Remove two screws from Regulator Guide on Door Inner Panel. *(See Illustration No. 165 at G.)*
4. Remove four screws holding Regulator Assembly to Door Inner Panel. *(See Illustration No. 165 at H.)*
5. Push the Regulator Assembly in so as to clear the spindle of this mechanism from the Inner Panel and slide the arm from the Regulator Guide.
6. Remove Regulator Assembly from the bottom part of Door.

DOOR LOCK ASSEMBLY REMOVAL

1. Remove Door Trim Pad.
2. Remove Outside Door Handle.
3. Remove six machine screws holding the Door Lock Assembly to the Door Inner Panel. Two of these screws are through the Pillar Facing of the Door. *(See Illustration No. 166 at E.)*

NOTE—In removing the Door Lock it is also necessary to remove the Remote Control Mechanism in order to disconnect the Remote Control Connecting Link from the Lock.

4. After screws are taken out, the Lock may be released and removed from the lower part of the Door.

REMOTE CONTROL ASSEMBLY REMOVAL

The Remote Control Mechanism is removed by taking out the three machine screws *(See Illustration No. 165 at B.)* The screw holes in this mechanism are slotted to allow for adjustment of the Remote Control Connecting Link.

1936
HEADLINING REMOVAL AND REPLACEMENT

1936 AND LATE TYPE 1935 HEADLINING REMOVAL

The Removal and replacement of the Headlining in a Turret Top Fisher Body is an operation that a great many Body Men seek to avoid, fearing perhaps they may either damage or tear the Trim in its removal or make an unsightly job in replacing it. This so-called "fear" is based mostly on the lack of knowledge in knowing where to start and how to finish an operation of this kind. Knowing how to remove and replace a Headlining wholly or in part, is most essential in any body shop where many times it is necessary to get to the Roof structure

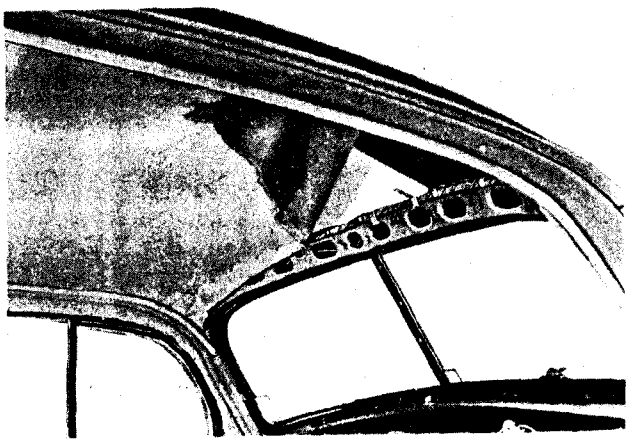


Illustration No. 169
View Showing How Headlining is Attached Above Windshield.

for service purposes. Once a Body Man removes or replaces a Headlining he acquires a certain confidence in himself towards doing Trim Work and eventually with a little practice becomes proficient in all kinds of Trim work.

Clean Hands and Proper Tools are essential, a medium size Screwdriver and a Tack Hammer are the Trim Tools most frequently used. The following is the procedure for removing a 1936 Sedan Headlining:

1. Remove the Rear Seat Cushion.
2. Remove the Rear Seat Back, by taking out the screws at the lower corners of the Seat Back where attached to the Floor Seat Riser. Remove the three screws holding the Rear Seat Back to the Parcel Shelf Board. (Through the Trunk or Compartment Opening at the rear.)

   In removing the Seat Back, care should be taken not to tear the cardboard Baffle which is tacked to the rear of the Seat Back and to the Seat Riser on the Floor of the car. These tacks should be removed.
3. Remove Windshield Garnish Molding and Rear Vision Mirror. NOTE—The Instrument Panel should be taped to protect it when removing the Garnish Molding. Many expert workmen (trimmers) can loosen or remove a Headlining without removing the Windshield Garnish Molding or the Two Rear Quarter Window Moldings.

   They may save a few minutes time in doing this, but it is dangerous for the average workman who has not had much practice at this line of work to do it this way.

   Once the Foundation Trim Cardboard is bent badly, or broken it is difficult to make a good looking finished job. Therefore we recommend the longer method.
4. Remove Sun Visors and Brackets.
5. Remove Dome Lamp Lens and Case and untack Headlining around this opening.

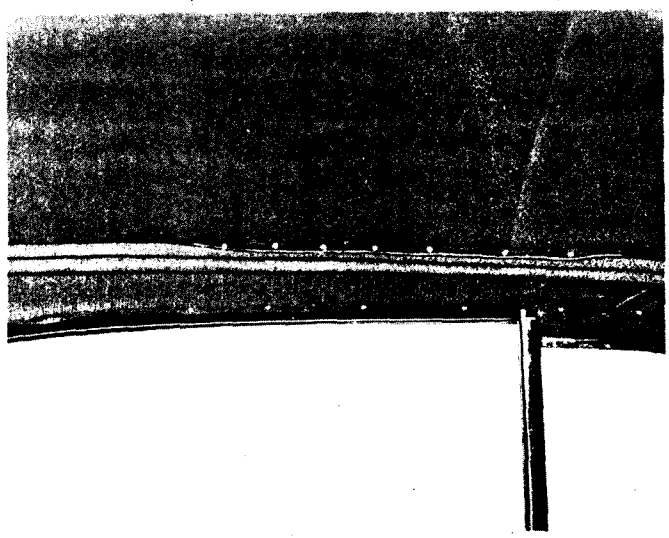


Illustration No. 170
Wire-on Molding Bent Down Showing Headlining Tacked to Side Roof Rail Filler.

6. Remove Rear Quarter Window Garnish Molding.
7. Remove Back Window Curtain and Brackets.
8. Remove Back Window Garnish Molding.
9. Remove Parcel Shelf Board Trim and untack Headlining from the Parcel Shelf Board and around Back Window Opening.
10. Remove Over Windshield Trim Strip by first loosening the skirt of the Trim where cemented to the Windshield Opening, then by turning this fabric upward remove tacks holding the Foundation to the Tacking Strip above the Windshield.
11. Remove the Upper Rear Quarter Trim by first untacking the skirt of this assembly around the upper part of the Window Opening and then by removing the tacks from the cardboard Foundation.
12. Untack the Headlining from the Trim Strip across the top of the Windshield. (At this point it is advisable to mark the center of the Headlining and the center of the tacking strip in order to better locate the approximate center when replacing the Headlining. This idea should be carried out at the center of each Roof Bow and Headlining Listing as the work proceeds.

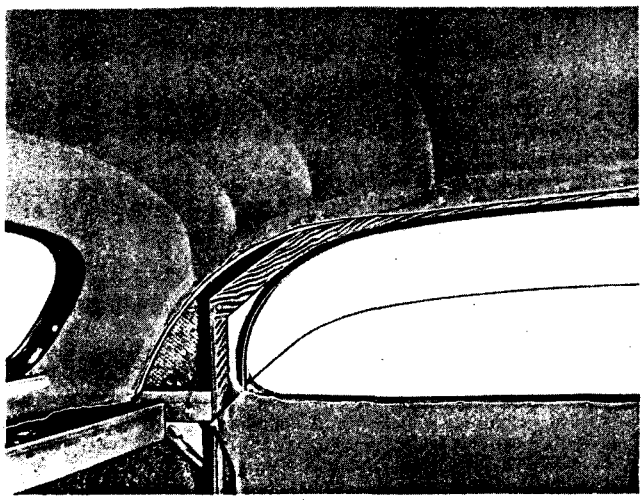


Illustration No. 171
How Headlining is Attached to the Side Roof Rail Filler and Upper Rear Quarter Trim Stick.

13. With the fingers turn down the Wire-on Molding along the Side Roof Rail Filler and untack the Headlining. At the first Roof Bow, a white muslin hem or "listing" as it is called, will be found sewed across the reverse side of the Headlining. This wire Listing is attached to the front side of each Roof Bow by protruding metal hooks.
14. Unhook the Listing from each Roof Bow and follow this procedure to the rear of the body, removing Headlining from Roof Bows, and Headlining Rear Supports.

    NOTE—The Hooks on the Headlining Rear Supports should be opened carefully with a Screwdriver.

    Never remove Trim such as a Headlining, by prying the tacks loose from the front face of the Trim. Body Men removing Trim in this manner have little or no control over the Screwdriver in the event it slips thereby tearing or ruining the Headlining. In removing Trim of this nature use a proper edged Screwdriver and a Tack Hammer. Insert the Screwdriver under the Trim and under the head of the tack. Tap the Screwdriver with a Hammer sufficient to loosen the tack and remove it.

HEADLINING REPLACEMENT

1. Starting at the Rear Center Headlining Supports, directly above the Rear Window, attach the Listing Wire and the center of the Headlining to the hooks on these Supports. Work towards the sides of the body attaching Headlining to the other Supports and bending the retaining hooks securely to place with a light tap of the hammer.

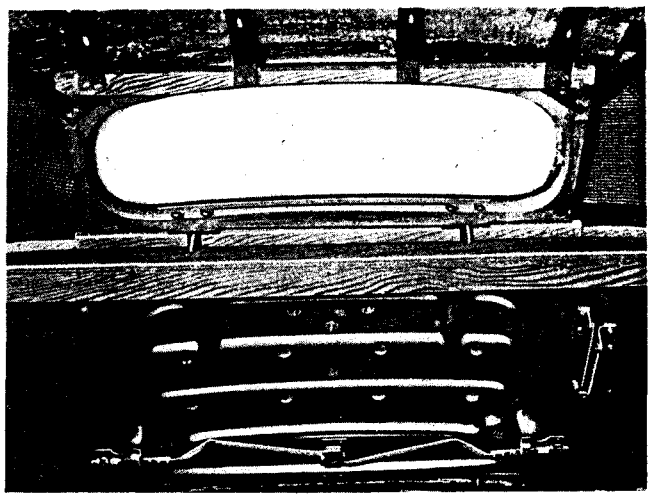


Illustration No. 172
Roof Construction Showing Headlining Rear Supports.

2. Follow this procedure towards the front of the car attaching Headlining to each Roof Bow making sure the opening in the Headlining for the Dome Lamp is in its proper location.
3. Starting at the center and working toward each corner, tack the Headlining to the Tacking Strip directly above the Windshield. Make sure the openings in the Headlining for the Sun Visor Brackets are properly located.

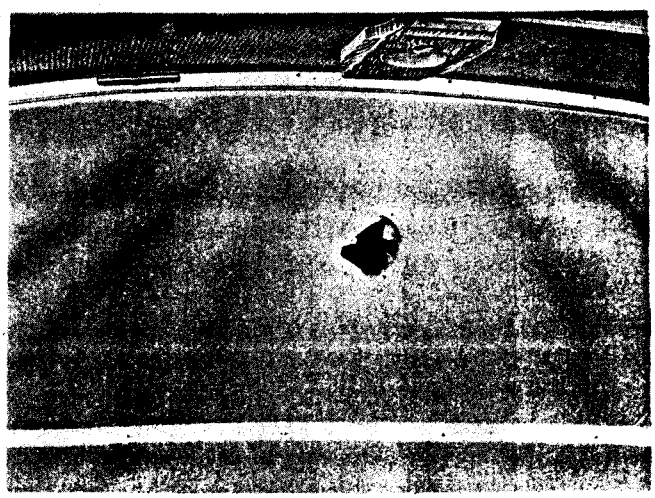


Illustration No. 173
Installation of Headlining to Metal Roof Bows.

4. Tack the Headlinig to the Rear Window Opening, starting at the top center and finishing at the bottom.
5. Tack the Headlining to the top of the Parcel Shelf Board and finish up at the upper rear corners, stretching the Headlining only sufficiently to take out any fullness in the material.

6. Now tack the Headlining to the Side Roof Rail Filler so that it will not show a draw or fullness along its entire length. Bend the Wire-on Molding back in place.
7. Install Upper Rear Quarter Trim and Over Windshield Trim Strip. Install all Hardware Parts, Garnish Moldings and Back Window Curtain and Brackets.

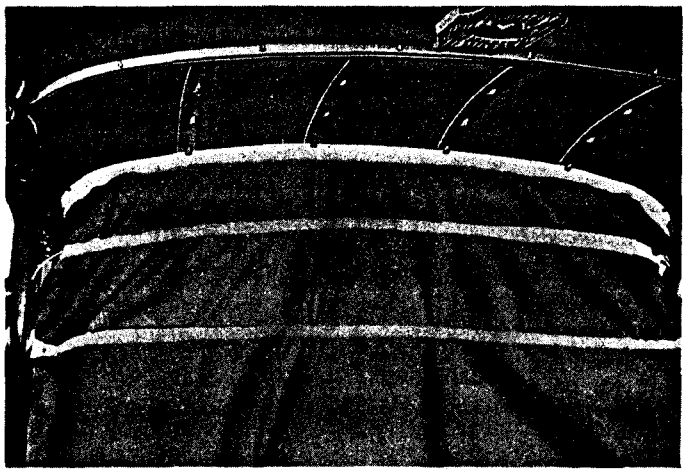


Illustration No. 174
Headlining Attached to Rear Supports.

NOTE—When installing the Windshield Garnish Molding, the two lower center screws are shorter than the other eighteen screws so as not to interfere with the Windshield Wiper Mechanism. Also note: The paper wrapped piano wires running through the Headlining Listings are of different lengths. If removed for any reason see that each one is replaced in its proper Listing.

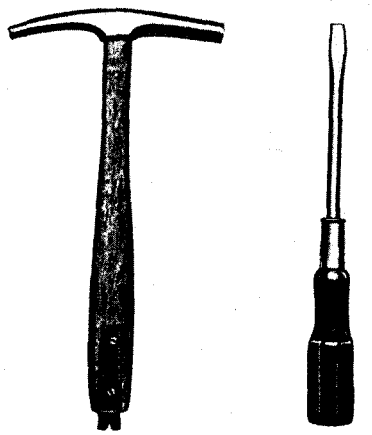


Illustration No. 175
Tools Necessary for the Removal and Replacement of Trim.

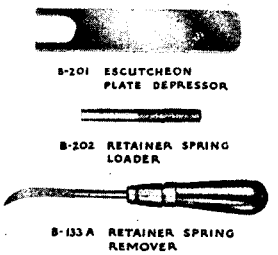


Illustration No. 176
Tools for Inside Door Handle Removal.

MEMORANDUM

1936
SERVICE FEATURES

DOORS

There is perhaps no other part of a Body structure subject to more actual use than are the Doors of an automobile body. When one considers the number of times the Doors are opened and closed, sometimes with force, the weight of the Doors themselves on the Hinges and Dovetail Assemblies; the continual use of Door Handles and Regulator Handles with the operation of Windows up and down, it is only reasonable to suppose that Doors and their mechanical parts certainly need maintenance from time to time. This is particularly true of the Front Doors.

Barring an accident, a Door will remain in shape almost indefinitely. When a Door fits the Door Opening poorly, it is either improperly hinged to the Body Hinge Pillar, which will show at the vertical spacing on the hinge side of the Door, or the Door Opening is out of true, usually by reason of improper shimming of the Body on the Chassis.

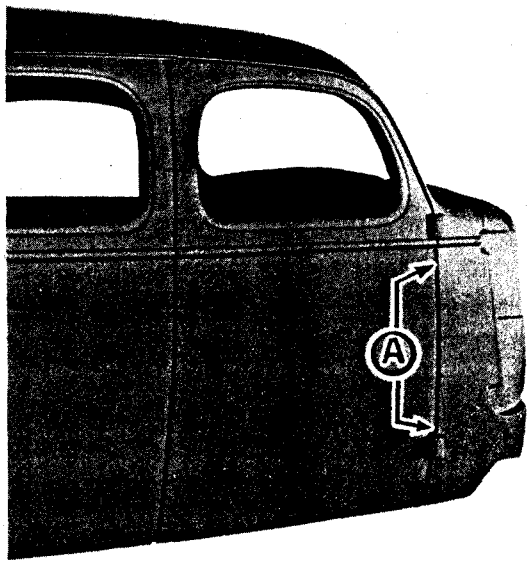


Illustration No. 177
Front Door Vertical Spacing.

CHECKING A 1936 FRONT DOOR

In order to get a proper check on the fit of a Front Door, it is necessary to remove the Wedge Plate from the Door and also the Door Side Rubber Bumpers. This allows the Door to act free on the Hinges.

1. Check the Vertical Spacing at the Hinge side of the Door.
2. Check the Lock Side of the Door for Belt Molding Alignment.
3. Check for a Sprung Door. Door Flanges should be flush with the Body Panels except at the Roof Drip Molding.

Any one of the above three conditions may be the cause or the effect of a badly fitted Door and under separate Headings each of these conditions will be further explained with the necessary correction given.

1. VERTICAL SPACING

(Wedge Plate and Door Side Rubber Bumpers are removed.)

1. Check the Vertical Spacing at the Hinge side.
(See Illustration No. 177 at A.)

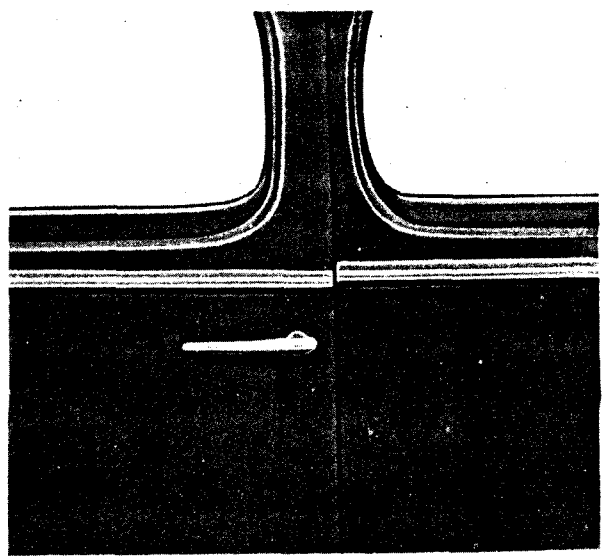


Illustration No. 178
Belt Molding Alignment.

On some Bodies this spacing width may be $\frac{3}{32}$ inch and on others ¼ inch, but it should be nearly equal from top to bottom.

Unequal spacing indicates either loose screws or a bent Hinge.

Loose Hinge Screws should be tightened securely. A bent Hinge should be removed and straightened, as follows:

1. Remove Hinge Pin and Hinge Screws from bent half.
2. Separate at joint and remove the Hinge half.
3. Place in Bench Vise up to the bend.
4. Straighten with hardwood block and heavy hammer.

2. BELT ALIGNMENT

(Wedge Plate and Rubber Bumpers are out.)

Vertical Spacing is equally spaced. Rear Door (if a Sedan is used) is in alignment.

2. The Door Belt Molding must line up with the Belt Molding on the Body Panels. If it does not, the Door is spoken of as too high or too low.

To correct, adjust the shim at the Body Bolt nearest the Body Pillar where the Door is hung. (No. 2 Body Bolt.)

Loosen No. 1, No. 2, No. 3 Body Bolts and adjust the shim thickness at No. 2 Body Bolt and probably at No. 1. If Door is low increase thickness of Shim. If Door is High decrease thickness of Shim, then adjust all Bolts to proper tightness.

3. FRONT DOOR SPRUNG OUT AT TOP

3. Condition.

Upper Front Corner of the Front Door juts out beyond the Body Pillar and Roof Drip Molding. The weather is scooped into the Door Flange. The Windhose stands away from the Door.

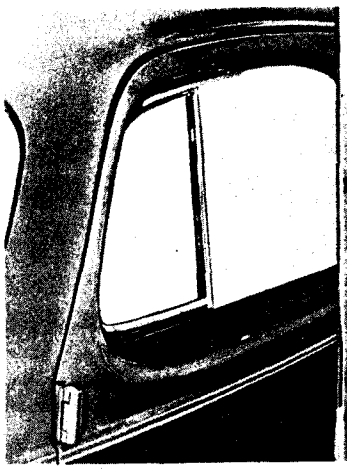


Illustration No. 179
Front Door Sprung Out at Upper Corner.

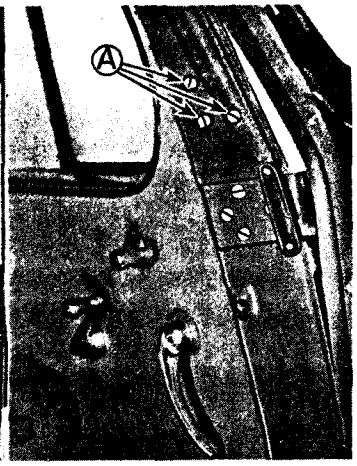


Illustration No. 180
Location of Screws on Door Hinge Pillar.

To correct:

1. Open Door and loosen three screws at "A".
2. Open Door Ventilator.
3. Insert a padded board (4 feet long) between the top of the Door and the Body Front Pillar and pry the Door Pillar in about ¼ inch at the same time securely tighten the three screws. *(See Illustration No. 181.)* This may also cause the Door Ventilator Glass to close more evenly against the Door Division Channel.

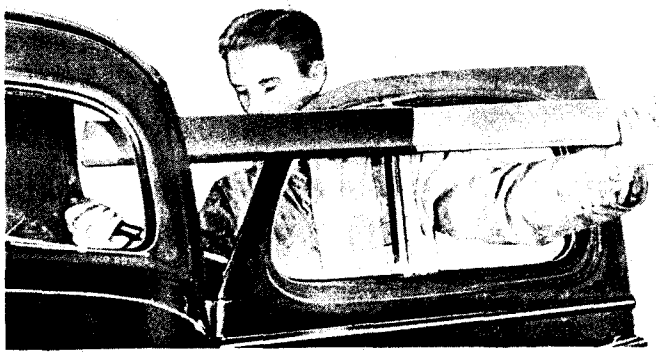


Illustration No. 181
Position of Padded Board for Prying Door.

FRONT DOOR SPRUNG OUT AT BOTTOM

Condition:

The Lower Rear Corner of Front Door stands out away from the Body when the Door is closed. *(See Illustration No. 182 at A.)*

To correct:

Turn the Door Stiffener Rod Nut clockwise to tighten the Rod and pull the Door in at that point. *(See Illustration No. 164 at A.)* If the Door is sprung in at this point it may indicate the Stiffener Rod is drawn too tightly.

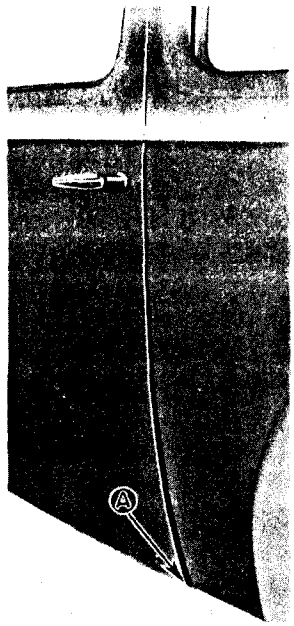


Illustration No. 182
Front Door Sprung Out at Lower Corner.

REAR DOOR
(Sprung Out at Bottom)

The bottom of a Rear Door may become sprung out away from the Body and allow weather and dust to enter. This may be corrected as follows:

1. Remove Door Trim Pad.
2. Make up and install a 2-inch Strap Iron Strainer as shown in Illustration 181.
3. Set screws at one end of Strap.
4. Block the Door open at the Lock and strain it in at the bottom. While pressure is on, set the screws at the other end, slanting the screws so as to draw the Strap tightly.
5. Replace Trim Pad.

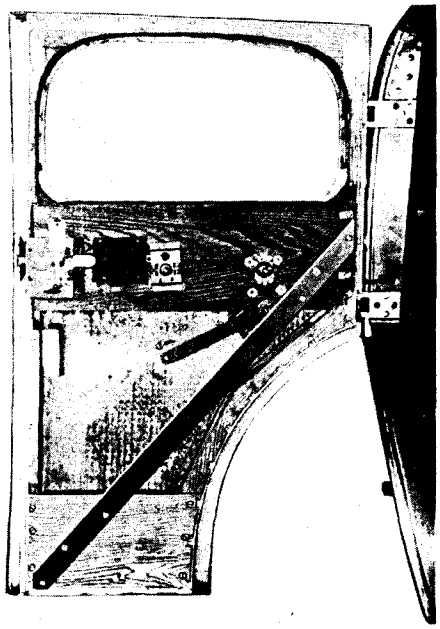


Illustration No. 183
Method of Attaching Strainer to Rear Door.

DOOR TRIM CARPET WATER SOAKED

All the water that enters at the Door Window Opening normally flows out at the Water Drain Holes in the bottom of the Door. However, there are some cases of where water follows down the Door Pillars or comes in through the Door Lock along the inside of the Door Trim Pad Lining and finally soaks the Door Trim Carpet at the bottom of the Door.

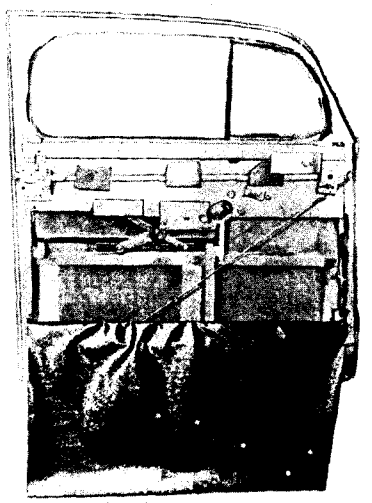


Illustration No. 184
Door Rain Baffle Partly Installed.

To correct this install a Rain Baffle in the Door under the Trim Pad as follows:

1. Remove the Door Trim Pad.
2. Remove the cardboard trim Pad Lining.
3. Clean out all Water Drain Holes.

NOTE—If the Drain Holes are clogged the Door may fill up and cause the Door Trim Pad to become water soaked. This should be examined first and if necessary, corrected. In cases of this kind the installation of the Rain Baffle may not be required.

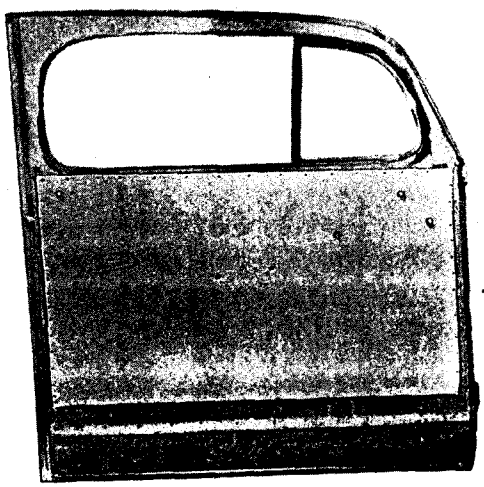


Illustration No. 185
Door Rain Baffle Installed.

4. Cut a piece of glazed fabric the size of the Door Trim Pad but one inch less in width. Tack the lower edge of this fabric to the upper edge of the Door Bottom Board as in Illustration No. 184 (glazed side towards the Door). Tack the top edge of this material to the Regulator Board as in Illustration No. 183, and finally tack both sides of this material to the Door Pillars making sure the edges of it do not show when the Trim Pad is again installed.
5. Reinstall the Door Trim Pad, Handles, and Garnish Molding.

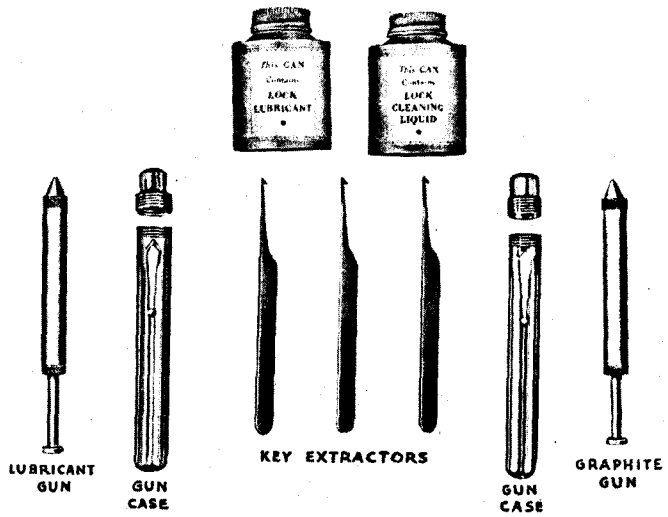


Illustration No. 186
Kit No. KMO-166 Used for Cleaning Lock Cylinders.

LOCKING HANDLE CYLINDER LUBRICATION

Door Locking Handle Cylinders require cleaning and lubrication occasionally but they should never be oiled.

Oil will collect dust and grime that eventually will clog and make it inoperative.

To clean a Lock Cylinder, spray it inside with cleaning solvent to cut and dissolve the grease and oil. Work the key in it to see that it is in working order, then after the solvent has evaporated, spray with powdered Graphite to Lubricate.

The Lock Cleaning and Lubricating Kit No. KMO-166 is an ideal outfit for this purpose, and makes the job a short one.

FRONT DOOR (LEFT SIDE) LOCKING HANDLE

The Locking Handle on 1936 Bodies (Right and Left Front Doors) are interchangeable.

But when installing one on the Left Front Door the hole for the Handle Shaft, through the wood, must be reamed out larger. A $\frac{1}{2}$ inch Drill will do.

ROOF AND BODY PANEL INSULATION FELT

Early 1936 Turret Top Bodies are insulated with a Black Felt. If this material has to be removed for any reason it should be replaced with the Brown Felt Part No. 601778 and cemented to place with F.S. 1044.

In very cold winter weather any loose Insulation Felt may cause a ticking noise as it touches and pulls away from the cement.

The Brown Felt adheres more firmly than the Black Felt and is less liable to create a noise.

Felt and Cement are obtained from Hinckley Myers Co., Jackson, Michigan.

NOISE AT FRONT END OF ROOF RAIL FILLER

A noise occurring at the front end of the Roof Rail Filler and Roof Rail may be corrected by:

1. Release Headlining at Roof Rail Filler.
2. Loosen screws and Bolts through facing of Roof Side Rail.
3. Wedge up the Roof Rail Filler and
4. Apply 1039 compound between Filler and Roof Rail.
5. Remove the Wedge then tighten Bolts and Screws.
6. Replace the Headlining where loosened.

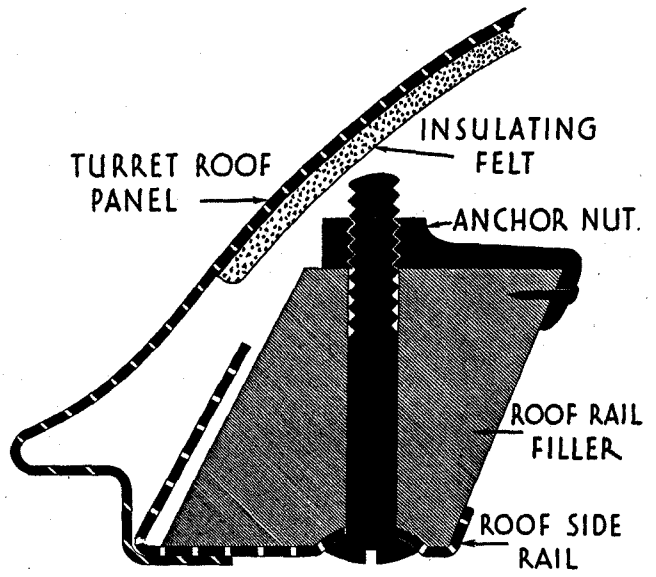


Illustration No. 187
Cross Section View of Side Roof Rail and Filler.

NOISE AT ROOF RAIL BOLTS AND NUTS

A noise along the Roof Side Rail may be caused by:

1. *Bolt* projecting through too far touching Roof Panel.
2. Anchor *Nut* touching Panel.
3. A Loose Nut, screw or nail wedged between metal parts.

Remedy:

1. Release Headlining along location of noise and examine for cause.

   A long Bolt should be removed and cut off.

   A contacting Nut should be turned to clear the Panel.

   Any Free Objects should be removed.

NOISE IN FRONT PILLAR

The Front-End Frame Upper (Inside frame of Front Pillar) has a flange that extends along the outer edge of the Pillar from the Roof to the Cowl Belt Line. This metal flange may project out far enough to contact the Cowl Metal Panel. *(See Illustration No. 188 at B.)* Feeling a snap noise at this point with the hand will indicate contact.

To remedy this at "B":

Remove Cowl Trim Pad.

Insert long slender metal Spoon as at "C" in cut. Pry the flange metal away from Panel.

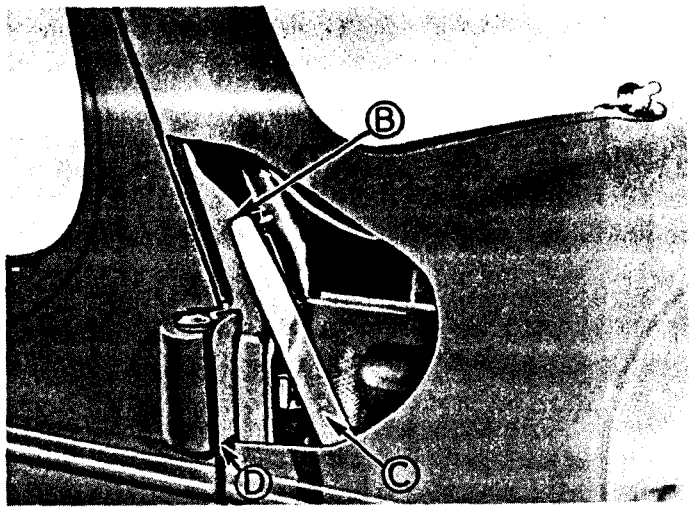


Illustration No. 188
Noise at the Belt Section of the Cowl.

Care should be exercised not to ding the Outer Panel.

NOTE—A noise at this location at "D" may be caused by a Hinge Half chafing the Cowl metal.

Remedy—Remove Hinge Half and file clearance at the Hinge cutout in the Panel, coat Hinge Half with compound F.S. 1039 and reinstall. This will also seal against water leaks.

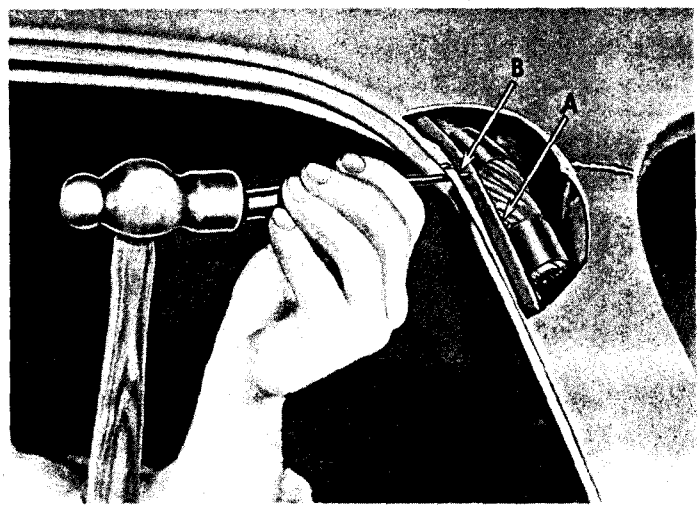


Illustration No. 189
Noise at Upper Front Pillar Section.

Illustration No. 189 shows a cut-away section of the Front Body Pillar located at the Torch Weld. This weld is sometimes sunk deep enough to touch on the inner flange of the Front End Framework, which causes a noise that is very difficult to locate.

"A" shows the flange of the Inner Framework.

"B" shows where weld may contact flange.

If there is a noise at this location try the following correction: Drill ⅛ inch hole in the Pillar Facing as illustration shows. Insert a nail set or slender drift punch in the hole till it touches the flange as at "B". A tap or two with a hammer may relieve the contact.

SERVICING SEAT CUSHIONS

Cushions on Older Models and often on New Cars require re-padding or re-tieing to satisfy some customer's requirements.

One of the easiest and quickest methods of tieing the Springs and Padding to the Frame is by "Hog Rings".

Tool No. B-20A and a supply of rings are assets to any trim shop.

Loose Spring Coils, Frame Wires and Padding are easily clamped to place much quicker and stronger than by sewing.

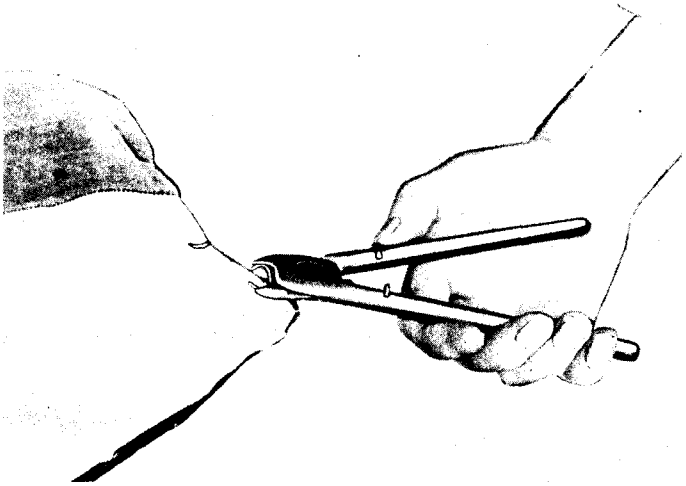


Illustration No. 190
Hog Ring Pliers Used on Cushion Trim.

FRONT SEAT (DIVIDED TYPE) SLIDING PLATE INSTALLATION TO PREVENT SEAT BACKS FROM CHAFING

In 1935 and early 1936 Two Door Sedans with the Divided Front Seats, if the Backs are too close together they may be separated by installing a "Sliding Plate" under the Center Support on the Seat Frame. (Package Part No. 544348.)

Install it as follows:

Slide the Seat to full forward position.

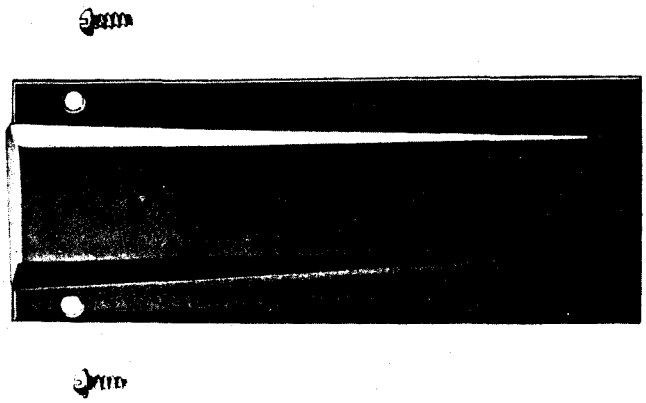


Illustration No. 191
Slide Plate Used on Divided Front Seats.

Folding the Carpet back and insert tapered end of Slide Plate between the Seat Center Support and Floor Pan, then draw the Plate back until it fits in the cutout of the Floor Carpet.

Using the holes in the Slide Plate for a guide drill or prick punch small holes in the Floor Pan and insert Sheet Metal Screws furnished in the package.

Replace Carpet and inspect operation of the Seat to make sure it works freely.

TRUNK WATER LEAKS

The Trunk Lid Panel is drilled at several places to accommodate the Hinge Lugs, Handle Ferrule and Emblem screws.

Sometimes these are not sealed against water entrance. An examination, or water test may reveal a water leak at one of them. Sealing with F.S. 1039 or rubber washers is the correction.

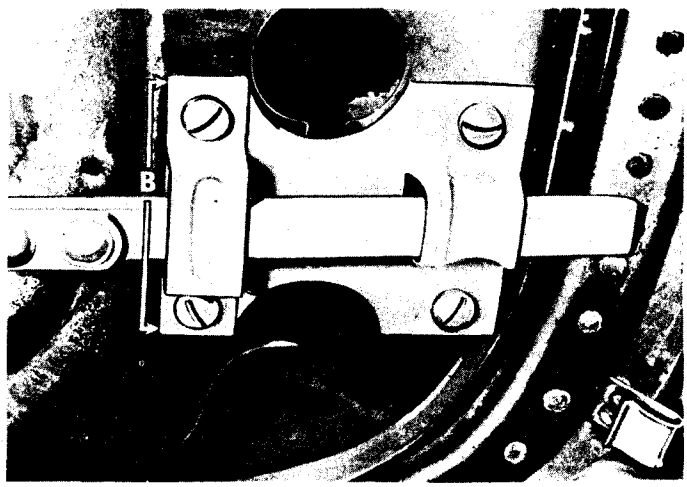


Illustration No. 192
Close-up of Trunk Lid Lock Bolt.

NOISE AT TRUNK LID LOCK BOLT

A noise at the Trunk Lid Lock Bolt at the Gutter may be caused by:

1. Lack of Lubrication.
2. Looseness at Lock Bolt.

Corrections:

1. Chafing of the Lock Bolt on the Gutter may be corrected by adding a Lubricant such as "Door Ease" or "Graphite Grease."
2. Looseness may be caused by loose Lock Screws. Tighten screws. Lack of tension may require a shim placed under the Lock Plate. *(See Illustration No. 192 at B.)*

TRUNK LID LOCK RUBBER BUMPER

The late type Trunk Lid Lock has a rubber bumper attached to each Lock Bolt.

The purpose of this rubber bumper is to keep the Lid from shifting from side to side and becoming noisy.

This late type Lock only is serviced.

To install this Lock to an early type Lid, the Lid must be re-operated as follows:

1. Remove the old Lock.
2. Cut away the small portion of sheet metal on the Lid Inner Panel. *(See Illustration No. 193 at A.)*
3. Install the new Lock Assembly.

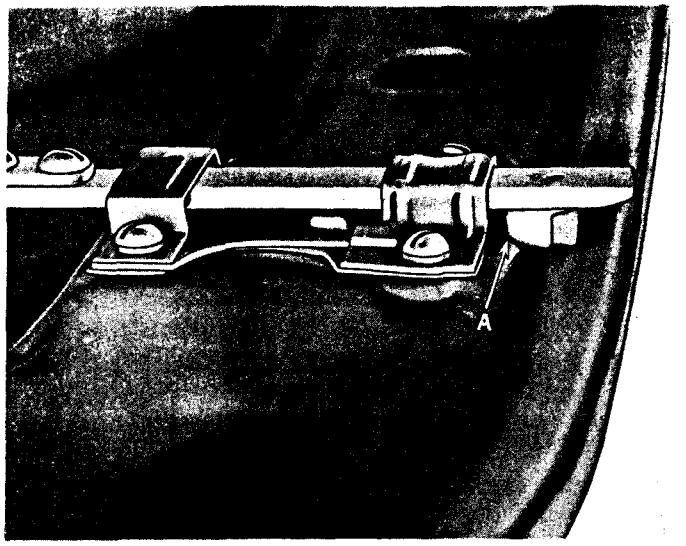


Illustration No. 193
Rubber Bumper on Trunk Lid Lock.

PHILLIP'S HEAD SCREW

In some later 1936 Bodies the Garnish Molding Screws are of the Phillip's Head type.

A Special Screwdriver is made for these screws. *(See Illustration No. 194.)*

An ordinary screwdriver bit of small size may be used where no tension is required.

When these screws are used no washer is required with them as is used with the standard screw.

For the Part Number of the three sizes of the Phillip's Head Screw used on the Moldings *see Index.*

Part No. 4060747 and 4073158 are oversized and are to be used only when the threads on the regular screws are stripped.

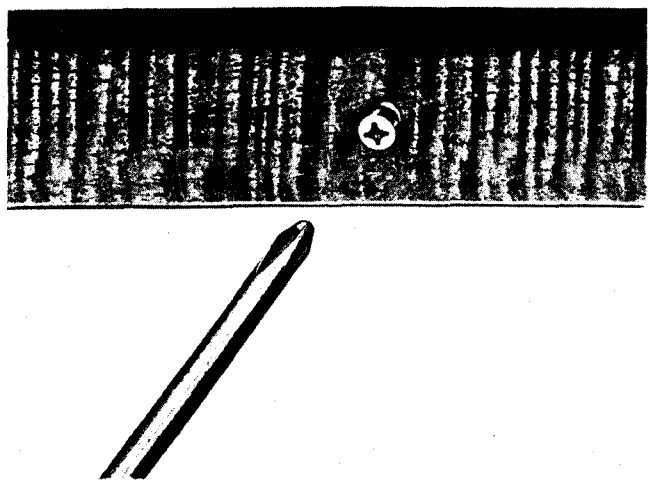


Illustration No. 194
Phillip's Head Screw and Screw Driver.

ARCHED DOORWAY

After a Body straightening operation, it may sometimes leave the doorway arched out of true. This is quite noticeable after the Door is hung. While the spacing at the Hinge side and Lock side are correct and the Door Dovetail Wedge Plate enters centrally, yet there is an uneven wide spacing above the Door.

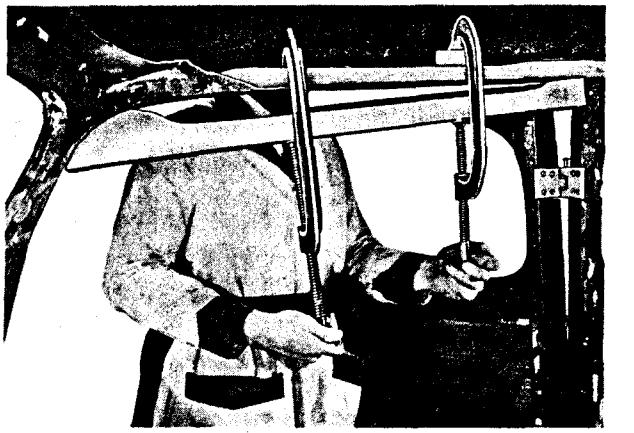


Illustration No. 195
Door Opening Straightening Operation.

Two Clamps and a Wooden Bar as shown in Illustration No. 195 may be used to bring down the Roof Side Rail to fit at the top of the Door.

By tightening the clamps the Side Roof Rail Assembly is forced down sufficiently to correct the difference.

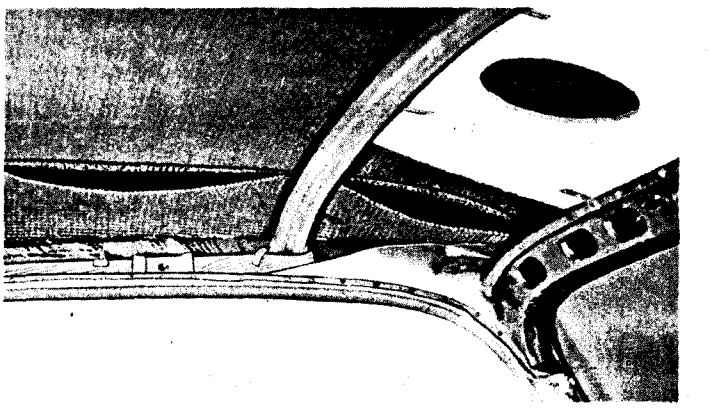


Illustration No. 196
Roof Panel Insulating Felt Loose.

ROOF PANEL INSULATING FELT

In the 1936 Turret Top Bodies there were two kinds of Insulation Felt used.

1st: Black, heavily impregnated Felt.

2nd: Brown Impregnated Soft Felt.

If for any reason the Black 1st type Felt becomes loose it may cause a "snap" noise in extremely cold weather. This is caused by the loose pieces alternatingly touching and pulling loose from the cement on the Panel. *(See Illustration No. 196.)*

If this becomes offensive and must be corrected, the old Felt should be removed and reinsulated with the softer Brown Felt 601778 with Compound F.S.-1044.

It is necessary to remove the Headlining back as far as the Back Window Frame for its installation.

HOW TO FOLD CONVERTIBLE COUPE TOPS (1936)

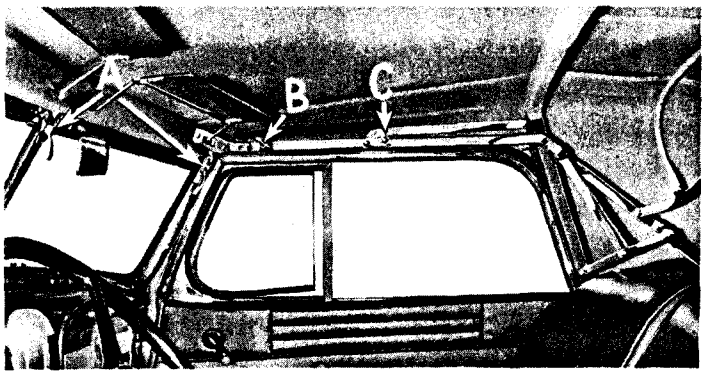


Illustration No. 197

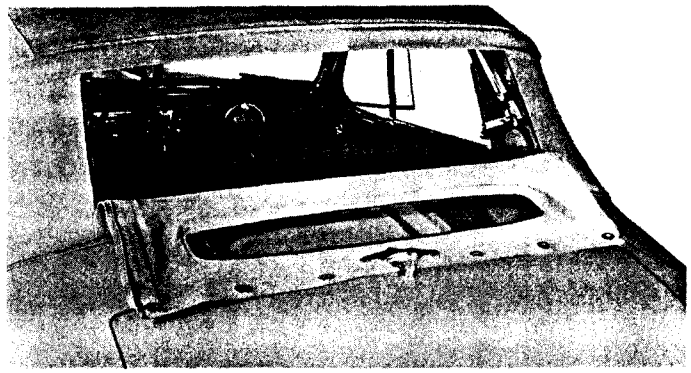


Illustration No. 198



Illustration No. 199

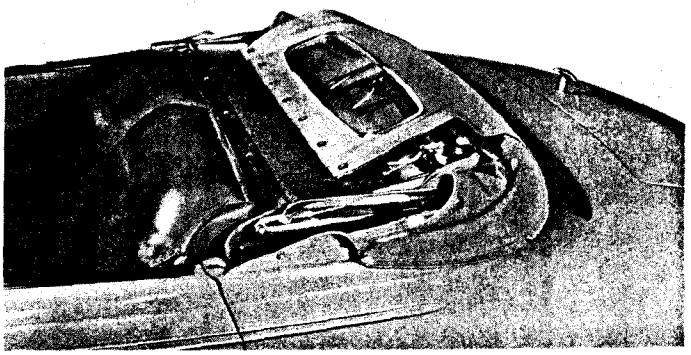


Illustration No. 200

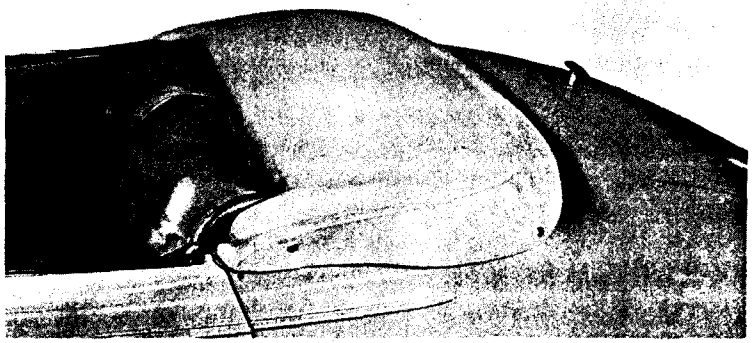


Illustration No. 201

1. Loosen Snap Fasteners on Side Roof Rails, and on Rear Quarter.
2. Release Zipper Fasteners on Back Curtain and lay Curtain out on Deck. (See Illustration No. 198.)
3. Release Toggle Fasteners over Windshield at center and sides. (See Illustration No. 197 at A.)
4. Release Wing Nut (See Illustration No. 197 at B) and remove Side Roof Rails.
5. Break joints in Slat Irons (See Illustration No. 197 at C) and push Top back as shown in Illustration No. 199. See that Top Covering and Pads are clear of Top Irons (See Illustration No. 199 at A).
6. Fold Top down into Compartment and fold Back Curtain over Bows. (See Illustration No. 200.)
7. Fasten Top Hold Down Straps and install Dust Boot (See Illustration No. 201).

GLOVE COMPARTMENT LOCKING DEVICE
1936 BODY STYLES

The Knob on the Door of the Glove Compartment on 1936 body styles has incorporated in it a Latch for holding the Door closed, also a Locking Cylinder. A description of this Lock and its operation is given below.

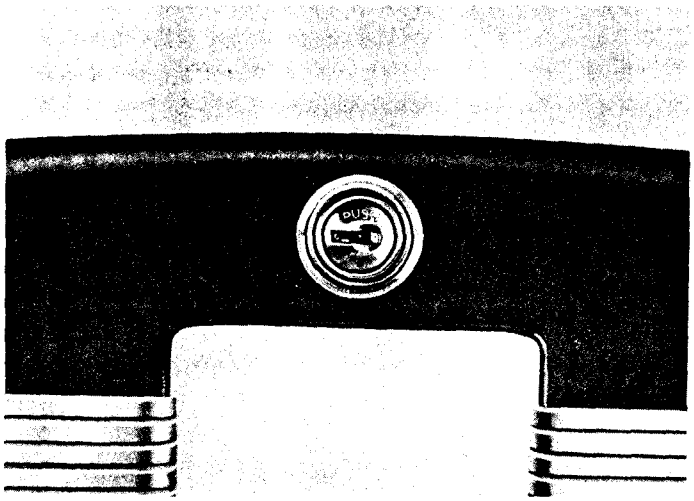


Illustration No. 202
Glove Compartment Door Knob.

To Unlock the Door: Insert the key and turn to the right.

To Open the Door: Grasp the Knob between the first and second fingers and press in on the Knob center, this disengages the Latch from the Latch Striker allowing the Door to open.

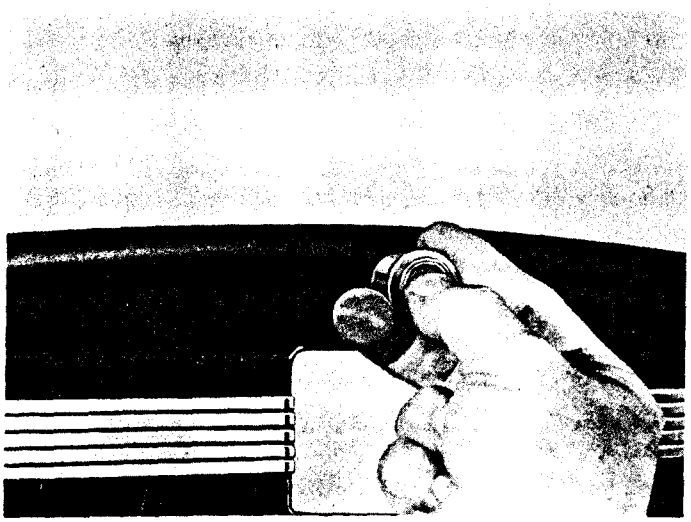


Illustration No. 203
Method of Opening Door.

To Remove the Lock Cylinder From the Knob: Compress the Latch *(See Illustration No. 204 at A)* against the spring and turn key to the right as far as it will go, lift out Cylinder with key. To replace the Lock Cylinder simply reverse this operation.

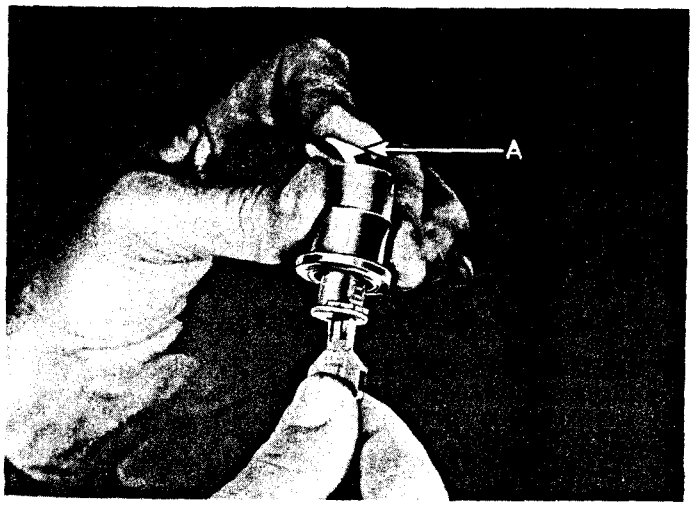


Illustration No. 204
Method of Removing Locking Cylinder.

To Remove the Knob From the Door: Open the Door, remove the screw, lock washer and retainer.

Illustration No. 205 shows the principal parts that make up the Glove Compartment Locking Device, consisting of the Locking Cylinder, the combined Locking Knob and Latch, the Locking Knob Retainer, screw and washer, and the Lock Striker.

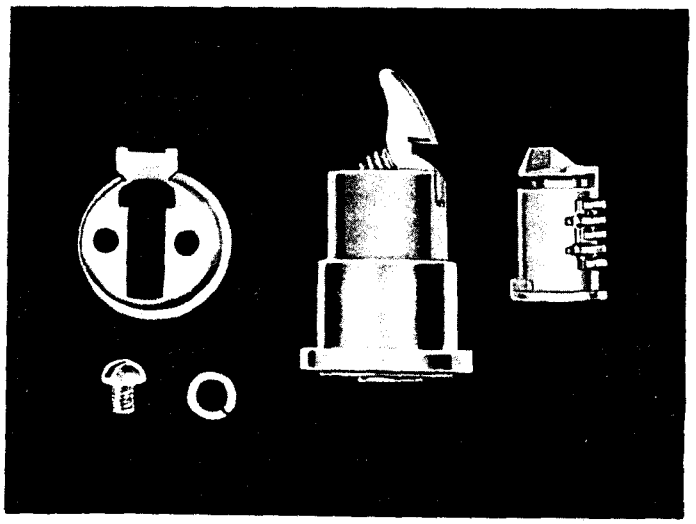


Illustration No. 205
Component Parts of Glove Compartment
Locking Device.

LUBRICATION

1. OIL, DRIPLESS PENETRATING OIL. This oil is thinned down with a solvent that easily penetrates tight places and cuts the grease or oil allowing it to enter.

The solvent soon evaporates and leaves a film of heavy oil that will not run under ordinary heat and will not drip on other parts. This qualifies this oil for many uses around the Body. Hinckley Myers carries it in several size containers; such as B-198-2 Pint size cans and B-198-3 Quart size cans.

This lubrication should be used on the following parts and locations:

Door Hinges.
Door Locks.
Door Check.
Door Window Regulator Bearings.
Trunk Hinges.
Trunk Lock.
Trunk Supports.
Deck Lid Hinges.
Deck Lid Lock.
Deck Lid Support.
Hood Hinges.
Hood Catch Bearings.
Cowl Ventilator.

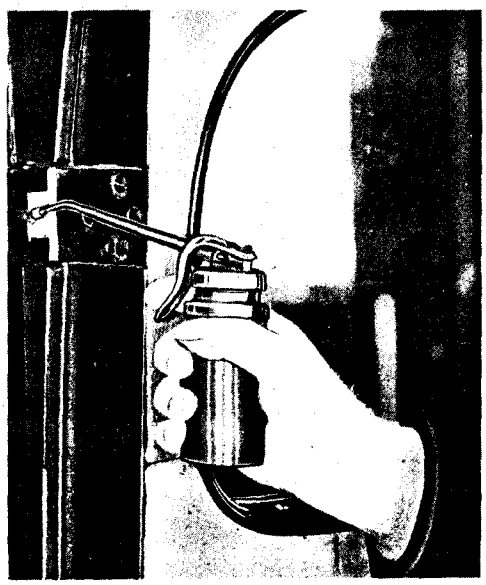


Illustration No. 206
Door Hinge Lubrication.

2. DOOR EASE GREASE STICK is a heavy non-staining lubricant that leaves a film to lubricate but does not rub off or stain clothing. Only a small amount is needed which answers the purpose better than a large quantity.

This lubrication should be used on the following parts and locations:

Door Lock Striker Plate.
Door Lock Bolt.
Door Dovetail Bumper Wedgeplate.
Trunk Lock Bolt.
Deck Lid Lock Bolt.
Deck Lid Lock Striker Plate.
Hood Lacings.
Hood Catch.

3. GRAPHITE in "Microfyne" powdered form penetrates into crevices by blowing it in, with the gun. Graphite lubricates where slow moving flat surfaces occur and where oil or grease might collect dust and gum the surface.

This lubrication should be used on the following parts and locations:

Door Rubber Bumpers.
Door Weatherstrips.
Convertible Coupe Window Glass Runs.
Door Locking Handle Cylinders.
All Rubber Weatherstrips.

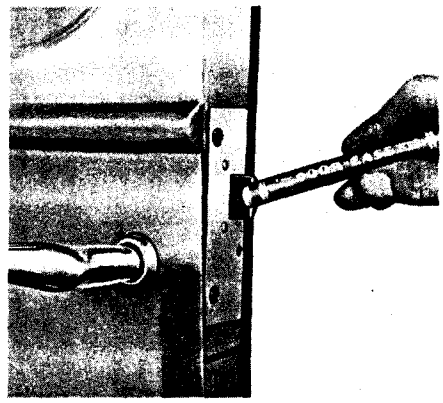


Illustration No. 207
Door Lock
Bolt Lubrication.

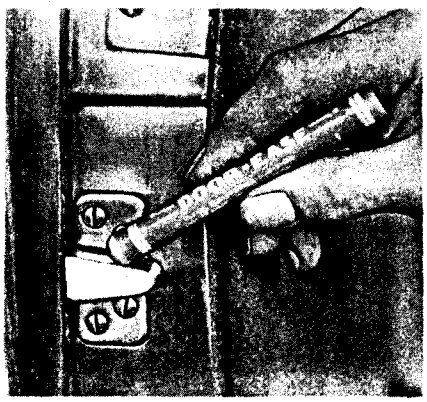


Illustration No. 208
Door Wedge
Plate Lubrication.

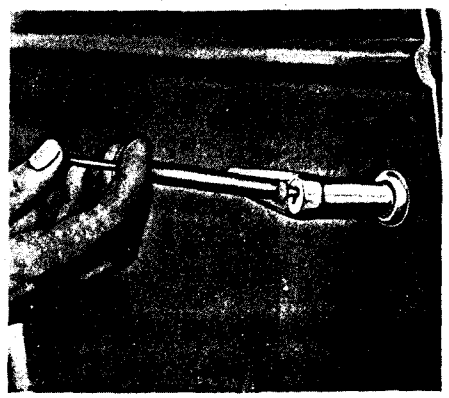


Illustration No. 209
Door Locking
Handle Graphite
Lubrication.

SOFT CUP GREASE (WATERPROOF)

This lubrication should be used on the following parts and locations:

Windshield Wiper Housing Cap.
Door Window Cam Channels.
Adjustable Front Seat Gear.

GENERAL INSTRUCTIONS FOR THE REMOVAL OF STAINS FROM AUTOMOBILE TRIM

1. Use clean cloths at all times and be sure a clean portion of the cloth is used throughout any operation.

2. A Neutral (Non-alkaline) soap similar to Lux, Ivory or Palmolive is recommended in cases calling for soap suds.

3. The use of Hot Water is to be avoided in removing Stains, except where absolutely necessary. If it must be used, extreme care should be exercised and it should be wiped off immediately, before it has a chance to run.

4. Do not use any gasoline as a cleaning solvent which is colored or which contains tetraethyl lead.

5. Do not use Bleaches or Reducing Agents such as the following, inasmuch as their use tends to weaken the fabric and change or bleach the color of the goods:

Chloride of lime.

Javelle Water.

Hydrogen peroxide.

Sodium hydrosulphite.

Potassium permanganate.

Chlorine or Chlorine water.

Sulphurous acid (sulphur dioxide).

Sodium thiosulphate (Photographers' hypo).

6. Carbon tetrachloride cleaning solvents and chloroform are non-inflammable. Most other types of cleaning solvents are inflammable and care must be exercised in handling them.

Chloroform should be used carefully and in small quantities so that vapors are not inhaled.

Do not breathe the fumes of cleaning solvents since they are usually poisonous in large quantities.

The steaming of velvet upholstery will raise the pile and restore the original beauty and lustre in cases where the pile has become slightly flattened after long, hard use.

INSTRUCTIONS FOR REMOVAL OF SPECIFIC TYPES OF STAINS

BLOOD

Blood—Rub the Stain with a clean cloth wet with cold water until no more of it will come out. Care must be taken so that clean portions of cloth are being used for rubbing the Stain.

This treatment should remove all of the Spot. If not, then pour a little household ammonia water on the Stain and after a lapse of about one minute continue to rub the Spot with a clean wet cloth. Nothing further can be done to remove the Stain, thereby making its removal practically impossible.

CANDY

Candy—Candy Stains other than candy containing chocolate can be removed by rubbing with a cloth wet with very hot water. If it is not then completely removed, sponging the spot (after drying) with a cloth wet with carbon tetrachloride will usually clear up the Stain.

Candy Stains resulting from cream and fruit-filled chocolates can be removed better by rubbing with a cloth soaked in lukewarm soap suds, together with scraping while wet, with a dull knife. This treatment is subsequently followed with a rinsing by rubbing the spot with a cloth wet with cold water.

Stains resulting from chocolate or milk chocolate can be removed better by rubbing the Stain with a cloth wet with lukewarm water. After the spot is dry it should be sponged with a cloth wet with carbon tetrachloride or chloroform.

CHEWING GUM

Chewing Gum—Moisten the Gum with carbon tetrachloride and work the Gum off the fabric with a dull knife while still moist.

FRUITS—LIQUOR AND WINE

Fruits—Liquor and Wine—Fruit Stains of practically all kinds can be removed by treatment with very hot water. Wet the Stain well by pouring a little hot water (boiling if possible) directly on the spot. Scrape all excess pulp, if any, off the fabric with a dull knife. Then rub vigorously with a cloth wet with very hot water. If this treatment does not suffice, sponging after drying with a clean rag wet with carbon tetrachloride is the only further treatment recommended.

Soap and water is not recommended, as it will more than likely set the Stain and thereby cause a permanent discoloration of greater magnitude than the original Stain. Drying the cloth by means of heat (such as by the use of an iron) is also not recommended for the same reason.

GREASE AND OIL STAINS

Grease and Oil Stains—If an excessive amount of Grease has been spilled on the material, as much as possible should be removed by scraping with a dull knife or spatula before any further treatment is attempted.

Grease and Oil Stains may be removed by sponging and rubbing with a clean cloth wet with any one of several solvents, such as carbon tetrachloride, chloroform, benzene, ether, or motor gasoline (free from tetraethyl lead). In general, carbon tetrachloride is the best Grease remover. To lessen the possibility of grease rings, start well outside the spot and rub toward it with a circular motion. Care should be taken to use a clean portion of cloth to rub the Stain. Several cloths may be necessary.

To alleviate the possibility of ring formation and to confine the Grease or Oil to as small an area as possible, the following procedure may also be advantageous: Pour a small amount of the solvent directly on the spot and immediately press a white blotter very firmly on the spot. Repeat this procedure, using clean sections of blotting paper until the blotting paper no longer absorbs any Grease.

If, after repeated treatments with the solvent a dirty stain remains, due to particles of dirt contained in the Grease, the following treatment will probably be of advantage: Rub the spot with a clean rag saturated with lukewarm suds. Rinse off the soap by sponging with a clean cloth wet with cold water.

ICE CREAM

Ice Cream—The same procedure is recommended for the removal of Ice Cream Stains as that used in removing fruit Stains.

If the Stain is persistent, rubbing the spot with a cloth wet with warm soap suds may be used to some advantage after the initial treatment with hot water. This soap treatment will of course be followed by a rinsing by rubbing with a clean cloth wet with cold water. After drying, a sponging with carbon tetrachloride will clear up the last traces of the Stain, by removing fatty or oily matter.

LIPSTICK

Lipstick—The compositions of various brands of Lipsticks vary; therefore, some Lipstick Stains may be removed more easily than others.

Pour a little chloroform or carbon tetrachloride on the Stain and immediately press a blotter firmly on the spot. Repeat this procedure using new sections of blotting paper until the blotter no longer shows Stain.

WATER SPOTS

Water Spots on Upholstery Parts can be removed as follows: Sponge the entire panel showing the Stain with clean cloth wet with cold water. Sponge the spot with a rag wet with chloroform or carbon tetrachloride or other good solvent cleaner.

BATTERY ACIDS

Battery Acids when spilled on Upholstery Parts may be neutralized with Baking Soda solution or Household Ammonia in water if applied immediately but these spots are usually not found until the acid is dried on the part and by that time the cloth has been damaged beyond repair.

Battery Acid eats the Fiber out of the cloth very quickly and any cloth used in Automobile Bodies will be damaged before a neutralizer can be applied.

SPECIAL INSTRUCTIONS FOR THE CARE OF MOHAIR AUTOMOBILE TRIM

DUST

Dust and Dirt particles that fall on the surface of Mohair sift down between the thousands of pile fibres, and are not ground into the material. They are easily removed with a whisk-broom, carpet beater, or vacuum cleaner. For general cleaning and dusting, the Seats should be removed. In so doing, dirt along the sides and rear of the Seats falls to the bottom and can easily be wiped off. If beaten, the Cushion should be held upside down so that all the dust will fall away from it. Blows should be lightly administered. If a whisk-broom or vacuum cleaner is used, it is not absolutely necessary to remove the Seats, but it is preferable.

SPOTS

Grease Spots can be readily cleaned from Mohair because they are broken up by the tips of the pile. In removing Spots, apply a small quantity of good cleaning fluid to a clean cloth, start well outside the area of the Grease Spot and work towards it. Repeating this several times, using a clean part of the cloth each time, you will remove the spot without leaving a circle of Grease and Dirt along the edge. Allow to dry thoroughly; then brush with a Whisk-broom. See detailed instructions under Specific Types of Stains.

WASHING WITH SOAP AND WATER

Mohair can be washed safely with Soap and Water. Use luke-warm water and a neutral soap. The suds should be good and frothy, not watery. They should be applied in moderate quantities with a damp cloth, sponge, or soft brush. Rub with the pile not against it. Soap suds should be removed with a clean damp cloth or sponge, then wipe the surface several times with a dry cloth. While the material is still damp, brush it lightly with a whisk-broom or brush of medium stiffness. Brush with the pile. Permit air to circulate freely over the wet upholstery. When dry, again brush with the pile.

BODY SERVICE SMALL PARTS LIST

Fisher Body Service Part Number	Description
4059932	Windshield Garnish Molding Screw 1½"—8.
4059932	Back Window Garnish Molding Screw 1½"—8.
4058830	Windshield Garnish Molding Screw 1⅛"—8.
4060747	Windshield Garnish Molding Screw 1½"—9.
4062333	Windshield Garnish Molding Screw Washer.
142325	Windshield Division Molding Screw.
143307	Windshield Division Molding Screw Washer.
143326	Door Lock Striker to Pillar Screw.
4065094	Windshield Wiper Transmission Gasket.
137429	Sun Visor Bracket Screw (1935-1936).
4024646	Body Name Plate Retainer Screw.
4061630	Front Body Pillar Trim Support Screw.
4058858	Glove Compartment Lid Support Screw.
4059822	Glove Compartment Rubber Bumper.
107076	Windshield Wiper Transmission Cap Screw (1935).
107077	Windshield Wiper Transmission Cap Screw (1936).
4033542	Door Handle Retaining Screw (1936).
4034846	Door Window Lower Sash Cam Screw.
114602	Door Window Lower Sash Cam Screw Washer.
4064826	Front Door Hinge Screws (1936).
141407	Front Door Window Garnish Molding Screw (Self Tapping).
4063396	Door Arm Rest Screws (1935-1936).
4037956	Door Arm Rest Retainer to Frame Screw.
4260037	Door Inside Handle Retaining Spring.
4053369	Door Side Bumper (Small).
4058998	Door Side Bumper (Large).
4063520	Button Type Front Door Hinge Pillar Bumper.
4049528	Button Type Front Door Hinge Pillar Bumper Screw.
4049528	Hinge Spacing Weatherstrip Screw.
4049528	Parker-Kalon Screws ¼".
4025352	Window Anti-Rattler Bumper.
4023559	Door Hinge Pin (1935-1936).
4014898	Door Hinge Bushing (1935-1936).
4058056	Door Wedge Plate Offset (Right Side High).
4058057	Door Wedge Plate Offset (Right Side Low).
4064392	Parker-Kalon Screws ⅜".
601778	Roof Insulating Felt (1935-1936).
4066648	Door Opening Lower Weatherstrip.
4064663	Front Door Upper Weatherstrip.
4066759	Hinge Spacing Weatherstrip.
4060703	Shroud Top Ventilator Gasket.
4058826	Windshield Rubber Channel.
363253	Windshield Division Molding Filler (Inner).
4058832	Windshield Division Molding Filler (Outer).
4073128	Windshield Garnish Molding Screw Phillips Head 1½"—8.
4073129	Windshield Garnish Molding Screw Phillips Head 1⅛"—8.
4073158	Windshield Garnish Molding Screw Phillips Head 1½"—9.
4048681	Front Door Garnish Molding Machine Screw.



Windshield Garnish Molding Screw.



Garnish Molding Screw Washer Part No. 4062333





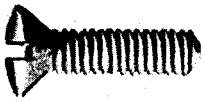
Windshield Garnish Molding Screw Phillip's Head Type.



Parker-Kalon Screw ¼".



Part No. 141407 Front Door Window Molding Screw. (Self Tapping.)



Part No. 137429 Sun Visor Bracket Screw (1935-36).



Part No. 142325 Windshield Division Molding Screw.



Part No. 143307 Windshield Division Molding Screw Washer.



Part No. 4064826 Front Door Hinge Screws (1936).



Part No. 4033542 Door Handle Retaining Screw (1936).



Part No. 4034846 Door Window Lower Sash Cam Screw.



Part No. 114602 Door Window Lower Sash Cam Screw Washer.



Part No. 4061630 Front Body Pillar Trim Support Screw.

Windshield, Back Window and Quarter Window Garnish Molding Screw.

This screw is furnished in the following sizes:

Part No. 405932—1½" long No. 8.

Part No. 4058830—1⅛" long No. 8.

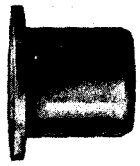
Part No. 4060747—1½" long No. 9.

Windshield, Back Window and Quarter Window Garnish Molding Screw, Phillips Head Type.

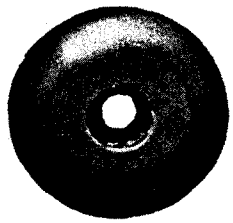
This screw is furnished in three sizes same as standard above and is used on some Oldsmobile Bodies (1936) only. Part No. 4073128—4073129—4073158 respectively. No Washer is required.

Part No. 4049528 Parker-Kalon Screw ¼".

Also used as a Hinge Spacing Weatherstrip Screw and a Button Type Front Door Hinge Pillar Bumper Screw under the same Service Number.



Part No. 4014898 Door Hinge Bushing (1935-1936).



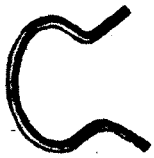
Part No. 4063520 Button Type Front Door Hinge Pillar Bumper.



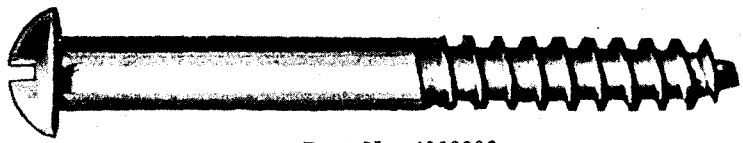
Part No. 4059822 Glove Compartment Rubber Bumper (1935).



Part No. 4025352 Window Anti-Rattler Bumper.



Part No. 4260037 Door Inside Handle Retaining Spring.



Part No. 4063396 Door Arm Rest Screw (1935-36).



Part No. 143326 Door Lock Striker to Pillar Screw (1935).

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