CADILLAC - LA SALLE

SHOP MANUAL

for

1940

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SHOP MANUAL
FOR 1940

COVERING

CADILLAC 40-62, 72, 60S, 75, 90

LA SALLE 40-50, 52

SERVICE DEPARTMENT
CADILLAC MOTOR CAR DIVISION
GENERAL MOTORS CORPORATION
DETROIT, MICHIGAN

QUICK REFERENCE INDEX. To use, move either the hand or selection tool directly over the section you desire to reference. Simply click once with the mouse button and the manual will automatically jump to that section.

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Printed in U. S. A.
6M 9-39

INTRODUCTION

This Shop Manual is a book of reference on the adjustment and repair of the 40-Series Cadillac and LaSalle motor cars. It is intended for the use of service men who are already familiar with automobile construction and repairing in general, and with Cadillac-LaSalle construction in particular.

Construction features and service operations which have remained substantially unchanged for several seasons are covered very briefly in this manual. Such subjects have been treated more in detail in the Shop Manuals for 1939 and 1937, and we suggest that service men refer to these manuals for such information.

Models Included

Information is given in this Manual covering the following series cars:

Series	No. of Cylinders	Bore and Stroke	Displacement	Wheelbase	Starting Engine No.
40-50 LaSalle	V-8	3⅜″ x 4½″	322 cu. in.	123″	2,320,001
40-52 LaSalle	V-8	3⅜″ x 4½″	322 cu. in.	123″	4,320,001
40-62 Cadillac	V-8	3½″ x 4½″	346 cu. in.	129″	8,320,001
40-72 Cadillac	V-8	3½″ x 4½″	346 cu. in.	138″	7,320,001
40-60S Cadillac	V-8	3½″ x 4½″	346 cu. in.	127″	6,320,001
40-75 Cadillac	V-8	3½″ x 4½″	346 cu. in.	141″	3,320,001
40-90 Cadillac	V-16	3¼″ x 3¼″	431 cu. in.	141″	5,320,001

In presenting information within the various groups, the LaSalle construction is covered first, then the 40-62 Cadillac and, finally, the larger Cadillac cars. This order has been followed because it gives first the information on the larger volume cars.

Identification

Each Cadillac and LaSalle car when shipped carries an engine number which is also a serial number. This is the number to use in filling out license and insurance applications and in general reference to the car. The engine number is stamped on the car in the location indicated:

Series 40-50, 52, 62, 72, 60S and 75—On the crankcase just behind the left cylinder block, parallel to the dash, and on the left frame side bar opposite the steering gear.

Series 40-90—On the upper rear corner of the left cylinder block, parallel to the cylinder head, and on the left frame side bar opposite the steering gear.

The body style number, job number, and paint and trim numbers are stamped on a plate attached to the front of the dash under the hood on the left side on all models. The body style numbers are listed on page 4.

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

BODY

Detailed service information on body repairs is not included in this manual because such information is issued by the Fisher Body Service Division through the medium of body service manuals and bulletins which are available to all Authorized Cadillac-LaSalle Distributors and Dealers.

BODY STYLES

Series 40-50 (123" Wheelbase)—Fisher Bodies

2	Coupe....40-5027	Quarter windows, full width auxiliary seat, luggage and spare tire under deck.
2	Convertible Coupe....40-5067	Fabric top, blind quarter, full width auxiliary seat, spare tire under deck.
5	Touring Sedan, 2-Door....40-5011	Built-in trunk, spare tire in trunk, divided front seat back, wide rear windows.
5	Touring Sedan, 2-Door....40-5011A	Same as 40-5011, but with Sunshine Turret Top.
5	Convertible Sedan....40-5029	Built-in trunk, spare tire in trunk, fabric top, blind quarter.
5	Touring Sedan, 4-Door....40-5019	Built-in trunk, spare tire in trunk.
5	Touring Sedan, 4-Door....40-5019A	Same as 40-5019, but with Sunshine Turret Top.

Series 40-52 (123" Wheelbase)—Fisher Bodies

2	Coupe....40-5227	Quarter windows, full width auxiliary seat, luggage and spare tire under deck.
5	Touring Sedan, 4-Door....40-5219	Built-in trunk, spare tire in trunk, blind quarter.

Series 40-62 (129" Wheelbase)—Fisher Bodies

2	Coupe....40-6227	Quarter windows, full width auxiliary seat, luggage and spare tire under deck.
5	Touring Sedan, 4-Door....40-6219	Built-in trunk, spare tire in trunk, blind quarter.

Series 40-72 (138" Wheelbase)—Fleetwood Bodies

5	Touring Sedan, 4-Door....40-7219	Built-in trunk, spare tire in trunk.
5	Touring Sedan, Division....40-7219F	Same as 40-7219, but with Glass Division.
7	Touring Sedan....40-7223	Built-in trunk, spare tire in trunk, 2 auxiliary seats.
7	Imperial Sedan....40-7233	Built-in trunk, spare tire in trunk, Imperial Division, 2 auxiliary seats.

Series 40-60S (127" Wheelbase)—Fleetwood Bodies

5	Special Sedan, 4-Door....40-6019S	Built-in trunk, spare tire in trunk, blind quarter, chrome window frames.
5	Special Sedan, 4-Door....40-6019S-A	Same as 40-6019S, but with Sunshine Turret Top.
5	Special Sedan, 4-Door....40-6019S-F	Same as 40-6019S, but with Glass Division.

Series 40-72 Business Cars (138" Wheelbase)

7	Business Touring Sedan....40-7223L	Built-in trunk, spare tire in trunk, livery trim, wide exposed auxiliary seats.
7	Business Touring Imperial....40-7233L	Built-in trunk, spare tire in trunk, livery trim, wide exposed auxiliary seats, Imperial Division.

Series 40-75 Business Cars (141" Wheelbase)

7	Business Touring Sedan....40-7523L	Built-in trunk, spare tire in trunk, livery trim, wide exposed auxiliary seats.
7	Business Touring Imperial....40-7533L	Built-in trunk, spare tire in trunk, livery trim, wide exposed auxiliary seats, Imperial Division.

BODY

Series 40-75 and Series 40-90 (141" Wheelbase)—Fleetwood Bodies

	V-8 Style Numbers	V-16 Style Numbers	
2 Coupe	40-7557	40-9057	2 Opera seats, spare tire under deck, quarter windows.
5 Coupe	40-7557B	40-9057B	Full width rear seat, quarter window, spare tire under deck.
2 Convertible Coupe	40-7567	40-9067	Fabric top, 2 opera seats, spare tire under deck, blind quarter.
5 Touring Sedan, 4-Door	40-7519	40-9019	Built-in trunk, spare tire in trunk.
5 Touring Sedan, Division	40-7519F	40-9019F	Built-in trunk, spare tire in trunk, Glass Division.
5 Formal Sedan	40-7559	40-9059	Built-in trunk, spare tire in trunk, Glass Division, blind quarter, leather roof, 2 opera seats.
5 Town Sedan	40-7539	40-9039	Built-in trunk, spare tire in trunk, close coupled, blind quarter, metal roof.
5 Convertible Sedan	40-7529	40-9029	Built-in trunk, spare tire in trunk, division, optional opera seats, fabric top, blind quarter.
7 Touring Sedan	40-7523	40-9023	Built-in trunk, spare tire in trunk, 2 auxiliary seats.
7 Imperial Sedan	40-7533	40-9033	Built-in trunk, spare tire in trunk, Imperial Division, 2 auxiliary seats.
7 Formal Sedan	40-7533F	40-9033F	Built-in trunk, spare tire in trunk, Imperial Division, blind quarter, leather roof, 2 auxiliary seats.
7 Town Car	40-7553	40-9053	Built-in trunk, spare tire in trunk, blind quarter, leather roof, removable canopy over chauffeur's seat, 2 auxiliary seats, front compartment leather-trimmed.

OTHER BODY REFERENCES

FRAME

The frames used on the 40-50, 52, 62, 72 and 60S Cadillac and LaSalle cars are of the familiar X-type construction with side bars curved at the front to enclose partially the helical front springs. The frames of these cars are similar in design, although there are differences in dimensions and other details, due to varying wheelbases and other body requirements.

The frames used in 40-75 and 90 cars are likewise similar to each other in design, differing mainly in dimensions. These frames have straight sidebars with the front spring pads formed by an extension of the front cross member.

Commercial car frames of all series are much the same as their corresponding series passenger car frames, but with differences in length and heavier construction features.

1. Checking Frame Dimensions

The easiest and most accurate method of checking frame dimensions is by the use of tram gauges. When using tram gauges, however, be sure to keep the crossbar level when making all measurements, to insure accuracy.

The "plumb bob" method may be used for measuring frame dimensions if tram gauges are not available. Using this method, it is only necessary to have a piece of cord attached to an ordinary surveyor's plumb bob. When measuring the distance between two points, the free end of the cord should be placed at one of the points, allowing the plumb bob to hang just off the floor. A chalk mark should be made on the floor just under the tip of the plumb bob. This operation should be repeated at the other point and the distance between the chalk marks on the floor, being equal to the desired distance, may be easily measured with a rule.

It is essential when using this method of checking frame dimensions to have the car on a level floor to obtain any degree of accuracy in the measurements.

2. Checking Frames for Twist

1. Place car on section of level floor.

2. Measure distance from bottom of front end of left side bar to floor. Repeat measurement for right side bar.

3. If front ends of the right and left side bars are not same distance from floor, raise lower side bar with a jack until it is an equal distance from floor.

4. Measure distance from back end of bottom of left side bar to floor. Repeat measurement for right side bar.

5. Any difference of these dimensions above ½-inch is an indication of a twisted frame.

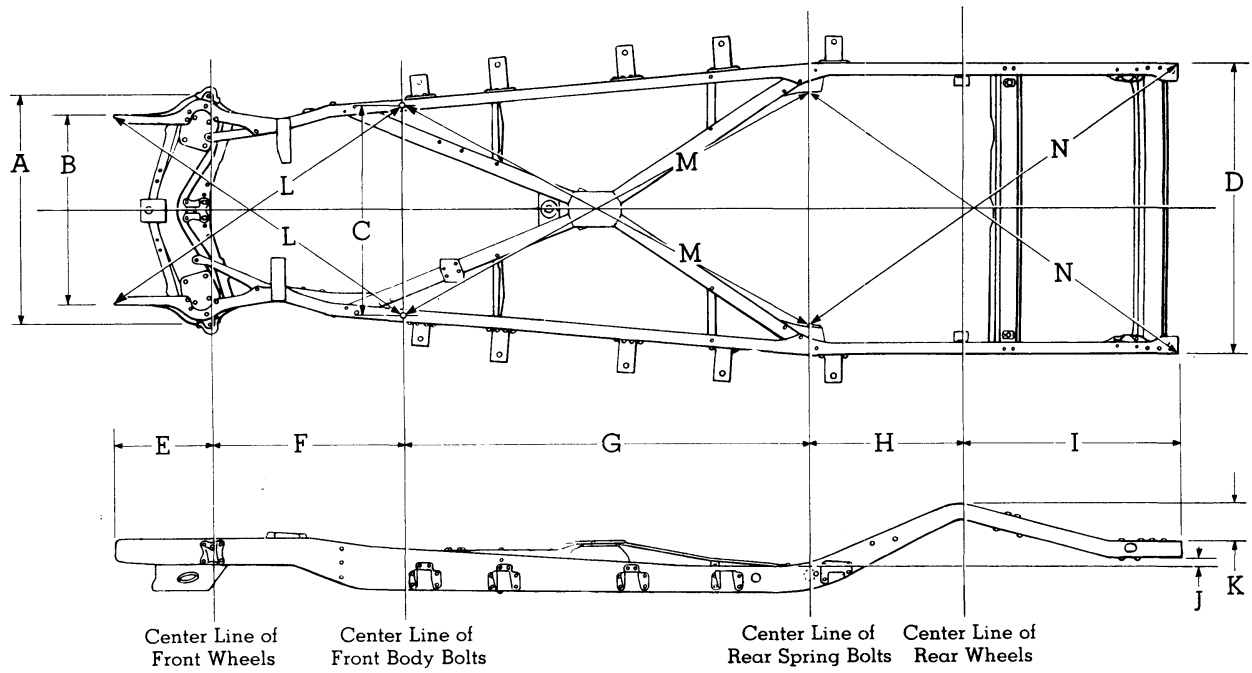


Fig. 1. Frame Checking Dimensions Typical of All Series

FRAME

6. If frame is found to be twisted upon overall measurements, measure distance from similar points on each side bar to floor, starting from front of frame. The first difference in measurements encountered indicates that twist is between that point and the last equal points measured.

3. Replacement of Front Cross Member

Removal—

1. Hoist front end of car and place stands under frame side members at rear of engine.

2. Remove bumper, fender and radiator assemblies, and engine side pans.

3. Remove flexible gasoline hose and fuel pump and disconnect gasoline line.

4. Remove front brake pipe and disconnect brake hoses.

5. Disconnect and remove pitman arm, steering connecting rod and idler lever (or intermediate steering arm) as a group.

6. Disconnect stabilizer links and remove front stabilizer bar.

7. Disconnect shock absorber links and front suspension lower control arms at cross member and remove coil springs.

8. Cut all rivets and spot-welds holding cross member to frame, taking care not to distort rivet holes.

9. Spread frame side bars with a jack and remove old front cross member.

Installation—

1. Install new cross member in place and secure temporarily with one bolt on each side member.

2. Attach cross member to frame with hot rivets if equipment is available.

3. Bolt cross member to frame side bars if necessary.

(Over)

FRAME DIMENSION CHART

Dimension	40-50	40-52	40-62	40-72	40-60S	40-75 40-90	40-50 Com'l	40-72 Com'l	40-75 Com'l
A	40⅛"	40⅛"	40⅛"	40⅛"	40⅛"	24⅞"	40⅛"	40⅛"	24⅞"
B	35½"	35½"	35½"	35½"	35½"	26¼"	35½"	35½"	26¼"
C	35⅞"	35⅛"	35⅛"	35⅛"	35⅝"	28⅝"	35⅞"	35¼"	28⅝"
D	48"	48"	48"	50⅞"	49½"	49¼"	50⅞"	50⅞"	49¼"
E	15"	15"	15"	15"	15"	15"	15"	15"	15"
F	28¼"	25"	31"	31"	31¾"	33"	28¼"	31"	33"
G	59⅜"	72½"	72½"	82"	70"	79¼"	105½"	108¾"	99⅜"
H	25½"	25½"	25½"	25½"	25¼"	29"	25½"	25½"	29"
I	34½"	34½"	34½"	38½"	36⅞"	38¼"	38½"	38½"	38¼"
J	⅝"	⅝"	⅝"	1"	1⅛"	2½"	1"	1"	2½"
K	7¼"	7¼"	7¼"	8¾"	6¼"	7¼"	8¾"	8¾"	7¼"
L	55¾"	53¼"	57¾"	58"	58⅜"	*56⅞"	55⅞"	58"	56¾"
M	78⅝"	81¼"	81¼"	90½"	79½"	87¼"	112⅜"	115¼"	105⅞"
N	73⅞"	73⅞"	73⅞"	78⅞"	76⅝"	82"	78⅞"	78⅞"	81⅞"

(*) 55" on 40-90

FRAME DIMENSION KEY

A—Maximum spread of side bars at front cross-member. (Minimum spread on 40-75, 90 and 40-75 Com'l.)

B—Distance from outside of front end of left side bar to outside of front end of right side bar.

C—Distance from left front body bolt to right front body bolt. (Body bolt may be on outrigger on some models.)

D—Distance from outside of rear end of left side bar to outside of rear end of right side bar.

E—Distance from front end of side bar to center line of front wheels.

F—Distance from center line of front wheels to center line of front body bolts.

G—Distance from center line of front body bolts to center line of rear spring bolts.

H—Distance from center line of rear spring bolts to center line of rear wheels.

I—Distance from center line of rear wheels to rear end of side bar.

J—Distance from bottom of side bar at rear end to normal top of side bar.

K—Distance from top of side bar at rear end to top of side bar at center line of rear wheels.

L—Distance from outside of left front bumper support to frame bolt to right front body bolt and vice versa.

M—Distance from left front body bolt to inner end of right rear spring bolt and vice versa.

N—Distance from inner end of left rear spring bolt to outside rear corner of right side bar and vice versa.

FRAME

Note: When bolting cross member to frame, use bolts with a ¼-inch unthreaded shank. Line up corresponding holes in cross member and frame, ream one hole, insert bolt and tighten nut, proceeding in a similar manner until cross member is completely bolted to frame. Peen threads on bolts, but do not use lock washers (flat washers are satisfactory) or spot-weld between bolt and nut.

4. Weld cross member to frame, duplicating original welds.

5. Reassemble all parts in reverse order of disassembly procedure.

6. Bleed brakes.

7. Check and adjust caster, camber and toe-in.

CHASSIS MODEL DESIGNATION

Series	Wheelbase	Overall Length	Tread, Front	Tread, Rear
40-50	123″	206¾″	58″	59″
40-50 Coml.	159¼″	244⅞″	58″	62½″
40-52	123″	210⅞″	58″	59″
40-62	129″	215 13/16″	58″	59″
40-72	138″	227 1/16″	58″	62½″
40-72 Coml.	165¼″	253 13/16″	58″	62½″
40-60S	127″	216⅞″	58″	61″
40-75	141″	228 9/16″	60½″	62½″
40-75 Coml.	161⅜″	248 11/16″	60¾″	62¾″
40-90	141″	225 11/16″	60½″	62½″

OTHER FRAME REFERENCES

FRONT WHEEL SUSPENSION

Independent front wheel suspension is used on all 40-Series Cadillac and LaSalle cars. One system is used on Series 40-50, 52, 62, 72 and 60S cars, and a similar system is used on Series 40-75 and 90. These systems are the same in principle, but differ in construction details.

1. Correction of Front Wheel Misalignment

Front wheel alignment is the mechanics of keeping all the interrelated factors affecting the running and steering of the front wheels in proper adjustment. The following factors should be checked and put in proper setting, **exactly in the order given,** when testing the wheel alignment of any car.

Tire Pressure—The correct tire pressures for the 40-Series cars are given on page 58.

Trueness, Balance, and Tracking of both front and rear wheels. (See page 58.)

Adjustment of Front Wheel Bearings. (See page 58.)

Condition of Shock Absorbers. (See page 18.)

Condition of All Bushings and Bearings.

Adjustment of Steering Gear and All Steering Connections. (See page 53.)

Caster Angle of Steering Knuckle Support. (See following notes.)

Camber Angle and Knuckle Pin Inclination.

Toe-in of Front Wheels in Straight Ahead Position.

Toe-out of Front Wheels on Turns.

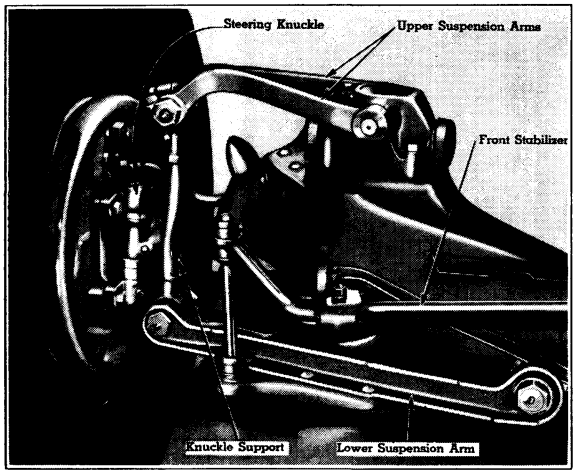


Fig. 2. Steering Knuckle and Support Series 40-50, 52, 62, 72 and 60S

2. Caster Adjustment

Caster is the forward or backward angle of inclination between the steering knuckle pin and vertical. See Figure 3.

When checking caster, it is important to take the readings with the weight of the car on the front wheels, and to position the wheels as shown in Figure 5. The caster angle should come within the limits given in the specification table and be equal within ½° or less on both sides of the car.

Series 40-50, 52, 62, 72 and 60S—1. Loosen clamp screw at upper end of steering knuckle support.

2. Remove lubrication fitting from front bushing at upper suspension arm.

3. Insert wrench, Tool J-720, through hole from which lubrication fitting was taken and adjust caster by turning threaded pin until desired caster setting is secured.

Turning threaded pins in a clockwise direction increases caster, and vice versa. It is important to turn the pin **in complete turns only** so as not to change the camber setting.

4. After completing the adjustment to recommended specifications, tighten clamp screws and reinstall lubrication fittings.

Series 40-75 and 90—1. Loosen retaining nuts fastening steering knuckle support yokes to upper and lower suspension arms.

2. Loosen clamp screw at upper end of steering knuckle support.

3. Remove lubrication fitting from front bushing of upper support yoke.

4. Insert wrench, Tool J-720, through the hole from which the lubrication fitting was taken and adjust caster by turning the threaded pin until the desired caster setting is secured. Turning threaded pin in a clockwise direction increases caster, and vice versa.

5. After completing adjustment to recommended specifications, tighten yoke retaining nuts and support clamp screws, and reinstall lubrication fittings.

3. Camber Adjustment

Camber is the inward or outward tilt of the front wheels at the top. See Figure 4.

When checking the camber, the front wheels should be turned so that the high spot on the tires is in a horizontal plane as shown in Figure

FRONT WHEEL SUSPENSION

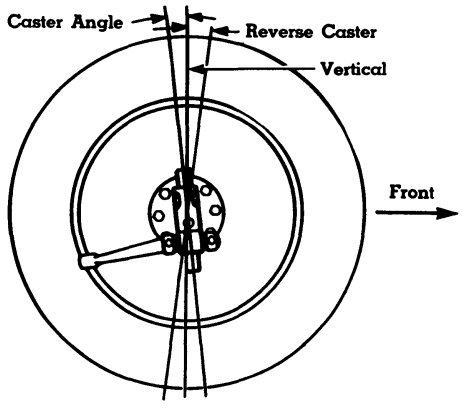


Fig. 3. Front Wheel Caster

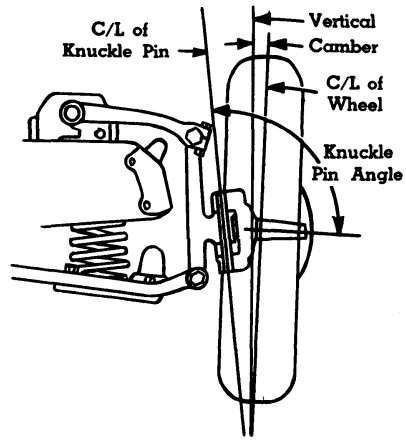


Fig. 4. Elements of Front Wheel Camber

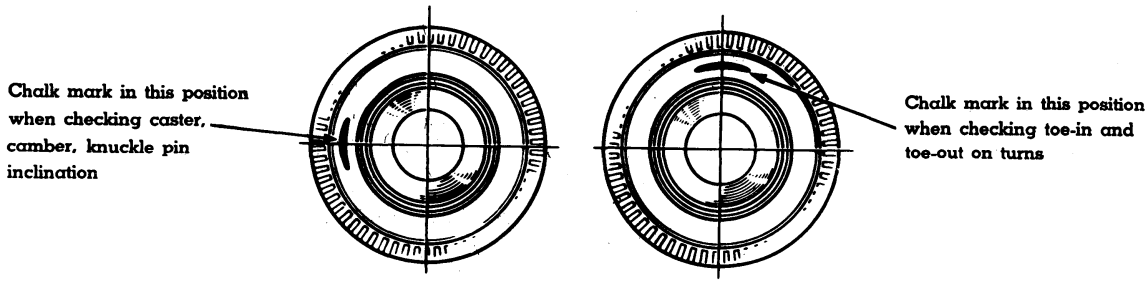


Fig. 5. Location of point of greatest run-out on front wheels when checking alignment factors.

5. The camber angle should be within the limits given in the specification table and equal within ½° or less on both sides of the car.

Knuckle Pin Angle—If camber is incorrect, the inclination of the steering knuckle pin (Figure 4) should be checked according to the specifications on page 14. An incorrect angle indicates bent suspension arms or steering knuckle supports. Bent parts should be replaced.

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

Series 40-50, 52, 62, 72 and 60S—1. Loosen clamp screw at upper end of steering knuckle support.

2. Remove lubrication fitting from front bushing of upper support yoke.

3. Insert wrench, Tool J-720, through hole from which lubrication fitting was removed, and adjust camber by turning threaded pin until desired adjustment is secured. Make adjustments on each side as nearly equal as possible.

> **Note:** Since the camber adjustment is controlled by the eccentric action of the threaded pin, ½ turn in either direction gives the maximum adjustment.

4. After completing adjustment to the recommended specifications, tighten the knuckle support clamp screws and install the lubrication fittings.

Series 40-75 and 90—1. Remove retaining nut and spacers from the steering knuckle support yoke at the lower suspension arm.

2. Remove steering knuckle support yoke and reinstall with spacers rearranged so as to secure the correct camber.

Normally, there is one spacer between the yoke and the suspension arm and one between the suspension arm and the retaining nut. To **decrease** camber, place both spacers between the yoke and the suspension arm; to **increase** camber, place both spacers between the suspension arm and the retaining nut.

3. After completing the adjustment according to specifications and as nearly equal on each side as possible, reinstall the steering knuckle support yoke retaining nut, tighten securely and lock in position.

4. Toe-In Adjustment

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." The purpose of toe-in is to make the wheels roll straight ahead and compensate for the tendency of cambered wheels to roll in a circle. When measuring at the wheel rim with equipment that is used while car is at rest, toe-in should be $\frac{1}{32}$ to $\frac{3}{32}$". For this setting, the camber should not be less than ½° positive.

When measuring with equipment that indicates side-slip in feet per mile while the car is in motion, the setting should preferably be 2 to 6 feet per mile, with a camber setting of approximately ½° positive. In general practice, 4 feet per mile toe-out to 8 feet toe-in is considered passable, but if readjustment is to be made, the 2 to 6 feet per mile limits should be maintained.

When checking toe-in, the wheels and tires should be made to run as nearly true as possible and the readings should be taken only when the front wheels are in a straight ahead position and with the steering gear on its high point. The high spot on the side of the tires should be in a vertical plane, as shown in Figure 5, when testing on stationary equipment.

Toe-in readjustment is made on Series 40-50, 52, 62, 72 and 60S cars by turning the tie rod adjusters at the outer ends of each tie rod after loosening the clamping screws. On Series 40-75 and 90 cars, the tie rods themselves are turned to make the adjustment. Be sure to turn both rods or both adjusters an **equal amount** in order to maintain correct position of steering gear high spot.

When adjustment has been completed according to the recommended specifications, tighten all clamp screws.

5. Toe-Out on Turns

The toe-out of the front wheels on turns is a factor of front wheel alignment that is determined by the design. It is, however, important as a check to indicate bent or damaged parts.

Toe-out develops when the front wheels are turned to the right or left, depending on the amount of deflection from the straight ahead course, because of the difference in the arc made by the inside wheel as compared with that of the outside wheel.

Toe-out is checked by turning the wheels to the right or left, locating the outside wheel in a definite position and determining the setting of the inside wheel. (See specifications.)

Errors in the angle of the inside wheel are usually due to accidental bending of steering knuckle arms, which should be corrected by replacement.

6. Removal and Installation of Steering Knuckle and Knuckle Pin (All Series)

1. Lift front end of car from floor with jack or hoist.
2. Remove car wheel, wheel hub and brake drum assembly, and wheel bearings.
3. Disconnect tie rod at steering knuckle arm pivot ball joint.
4. Remove brake dust shield.
5. Remove locking pin from steering knuckle support.
6. Remove dust caps at upper and lower knuckle pin holes, tap out steering knuckle pin, and disassemble steering knuckle support from steering knuckle, taking care not to damage thrust bearings.

On Series 40-75 and 90 cars, the needle bearings at top and bottom of steering knuckle pin should be removed from steering knuckle to complete the disassembly.

Installation should be made in the reverse order of operations. Proper lubrication of parts when assembling is most important.

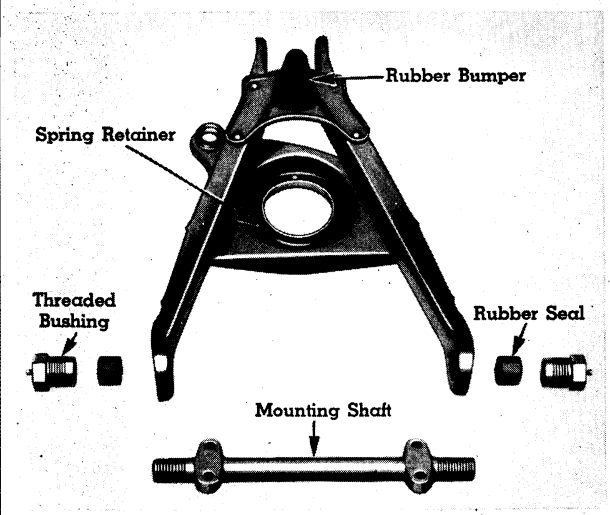


Fig 6 Lower Suspension Arm - Disassembled Series 40-50, 52, 62, 72 and 60S

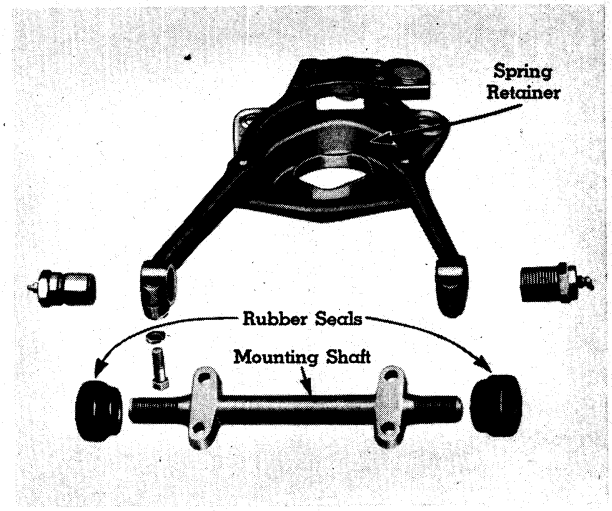


Fig. 7 Lower Suspension Arm - Disassembled Series 40-75 and 90

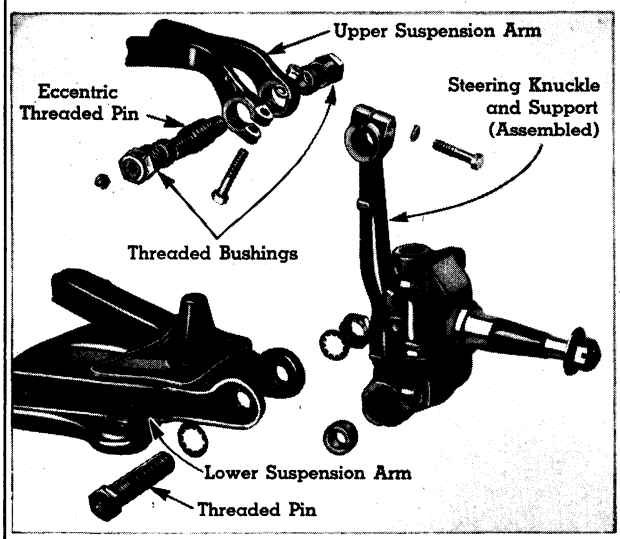


Fig. 8 Steering Knuckle Assembly Series 40-50, 52, 62, 72 and 60S

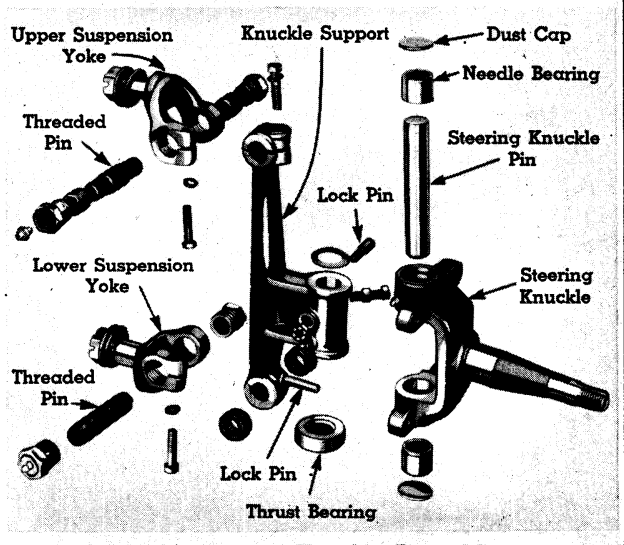


Fig. 9 Steering Knuckle Assembly Series 40-75 and 90

7. Removal and Installation of Steering Knuckle Support

Removal from Series 40-50, 52, 62, 72 and 60S cars:

1. Remove steering knuckle as previously explained.

2. Place jack under lower suspension arm to support coil spring while disconnecting upper end of steering knuckle support.

3. Disconnect front stabilizer.

4. Loosen clamp screw at upper end of steering knuckle support.

5. Loosen clamp screw in upper suspension arm at threaded pin.

6. Mark the position of the threaded pin so that the correct caster and camber position can be maintained when reassembling.

7. Remove threaded bushing at rear end of threaded pin.

8. Remove lubrication fitting at front end of threaded pin, insert wrench, Tool No. J-720, and remove threaded pin from steering knuckle support and upper suspension arm.

9. Swing the steering knuckle support outward at top to free from car.

Note: Helical car spring can be removed at this point, if desired, by lowering jack under lower suspension arm.

10. Remove threaded pin from lower suspension arm, which will release steering knuckle support as final operation.

Installation—The reverse order of operations will serve as a guide for reassembly.

When assembling the threaded pins at the upper and lower ends of the steering knuckle support, it is important to install the pins as nearly as possible in their original position because the eccentric pin at the top controls the caster and camber adjustment. The caster and camber should be checked when the installation is completed.

Removal—From Series 40-75 and 90 cars.

1. Remove steering knuckle, as previously explained.

2. Place jack under lower suspension arm to support coil spring while disconnecting upper end of steering knuckle support.

3. Disconnect stabilizer link.

4. Remove retaining nut which holds steering knuckle support yoke to upper suspension arm.

5. Swing steering knuckle support outward at top to free from upper suspension arm.

Note: Helical car spring can be removed at this point, if desired, by lowering jack under lower suspension arm.

6. Remove retaining nut that fastens steering knuckle support yoke to lower suspension arm.

7. Remove steering knuckle support yoke assembly.

8. Loosen clamp screws at upper and lower steering knuckle support yokes and upper end of steering knuckle support.

9. Mark the position of the threaded pin so that it will be possible to reassemble the unit in its original position to maintain proper alignment.

10. Remove threaded bushing and pin assembly at ends of steering knuckle support.

Installation—The reverse order of operations will serve as a guide for reassembly.

When assembling the threaded pins at the upper and lower ends of the steering knuckle support yokes, it is very important to assemble them in their original position so that the correct wheel alignment relationship will be maintained.

The final step is to check the elements of front wheel alignment to make sure that all adjustments are correct.

8. Replacing Lower Suspension Arms and Front Coil Springs (All Series)

1. Remove front wheel, hub, bearings, and steering knuckle support, as previously explained.

2. Remove coil spring by lowering jack and dropping outer end of lower suspension arm to the floor.

3. Remove suspension arm by removing mounting shaft support bolts at frame cross member.

4. Place suspension arm and mounting shaft assembly on bench and disassemble mounting shaft from arm.

Installation—The reverse order of operations will serve as a guide for installation.

When installing the lower suspension arms, see that the coil springs have insulators at each end and are properly seated in their retainers when lifting the suspension arm with the jack for assembly of the steering knuckle support.

Lubricate all parts thoroughly after installation.

9. Straightening Bent Parts

The straightening of bent parts in the front wheel suspension system should be attempted only within the following limits:

Parts should not be straightened if they are sprung out of alignment more than 5°. To straighten parts while cold is likely to result in stresses and sometimes in cracks invisible to the naked eye, which will render the part unsafe for use. **Straightening with heat will destroy the effect of previous heat treatment,** leaving the steel either soft and weak or brittle and easily broken.

Welding of parts subjected to severe strain should never be permitted because the welding process will change the structure of the metal around the weld, rendering it unsafe for further use.

FRONT WHEEL SUSPENSION

FRONT WHEEL SUSPENSION SPECIFICATIONS

	40-50 40-52	40-62 40-60S	40-72	40-75	40-90
Camber of front wheels	0 to ¾°	0 to ¾°	0 to ¾°	0 to ½°	0 to ½°
Angle between steering knuckle pin and wheel spindle	95° 6′	95° 6′	95° 6′	95° 1′	95° 1′
Caster angle	−1¾ to −2¾°	−1¾ to −2¾°	−1¾ to −2¾°	−½ to −1°	−½ to −1°
Shock Absorbers					
Compression valve	2 CD 1	2 CD 1	2 CD 1	OBX	OBX
Rebound valve	2 DX	2 DX	2 DX	1.25 BX	1.25 BX
Note: Valve markings are stamped on outside cap.					
Fluid	Delco	Delco	Delco	Delco	Delco
Type No.	1946GH	1946GH	1946GH	1951CD	1951CD
Springs, car	See Spring Data Chart.				
Steering gear and connections	See Steering Section, Page 53.				
Toe-in (at rest)	1/32-3/32″	1/32-3/32″	1/32-3/32″	1/32-3/32″	1/32-3/32″
Side slip, in feet per mile	2 to 6	2 to 6	2 to 6	2 to 6	2 to 6
Toe-out on turns:					
With outside wheel set at 20°, inside wheel angle should be	22¼ to 23¾°	22¼ to 23¾°	22¼ to 23¾°	22¾ to 24¼°	22¾ to 24¼°
Tread, front	58″	58″	58″	60½″	60½″

FRONT SPRING DATA CHART

Series	5 or 6 Wheel	Part Number	Normal Height	Coil Inside Dia.
40-50, 52	5	1428430	9 13/16	3 11/16
40-60S, 62	5	1428431	9 13/16	3 11/16
40-50-72	6	1428432	9 13/16	3 11/16
40-72	5			
40-60S, 62	6	1428433	9 13/16	3 11/16
40-50-72	Com.	1428429	9 13/16	3 11/16
40-75	5	1413789	9 13/16	4⅛
40-75	6	1413790	9 13/16	4⅛
40-75	Com.	1413791	9 13/16	4⅛
40-75	Bus	1420237	9 13/16	4⅛
40-90	5	1413790	9 13/16	4⅛
40-90	6	1413791	9 13/16	4⅛

OTHER FRONT SUSPENSION REFERENCES

REAR WHEEL SUSPENSION

The rear axles used on all 40-Series Cadillac and LaSalle cars are of the same design, although they differ in axle ratios and in size. The construction features are apparent from Figure 10.

1. Removal and Installation of Axle Shafts

1. Dismount the road wheel.
2. Remove retaining nut from end of axle shaft.
3. Remove dust seal from rim of brake drum.
4. Pull wheel hub and brake drum assembly off shaft.
5. Disconnect brake line.
6. Remove brake dust shield.

Note: The axle shaft is held in the housing by the dust shield which, when bolted in place, bears against the outer race of the wheel bearing.

7. Pull the shaft and bearing assembly out of the housing, using Tool J-838. Be careful not to damage grease retainer next to inner side of wheel bearing.

Installation—The axle shaft is installed in the reverse order of its removal. It will be necessary to bleed the brake line, which was disconnected to remove the dust shield.

2. Removal and Installation of Differential Carrier

Any service on the differential carrier assembly should be handled by replacement of the complete assembly. No disassembly or adjustment of this unit should be attempted in the service station. To replace the assembly:

1. Disconnect rear universal joint.
2. Remove axle shafts. (See Note 1.)
3. Remove cap screws holding carrier to axle housing and take out entire assembly.

To Reinstall—Reverse the above procedure.

3. Replacement of Oil Seals

Whenever the axle shaft oil seal or the pinion shaft oil seal (the transmission extension oil

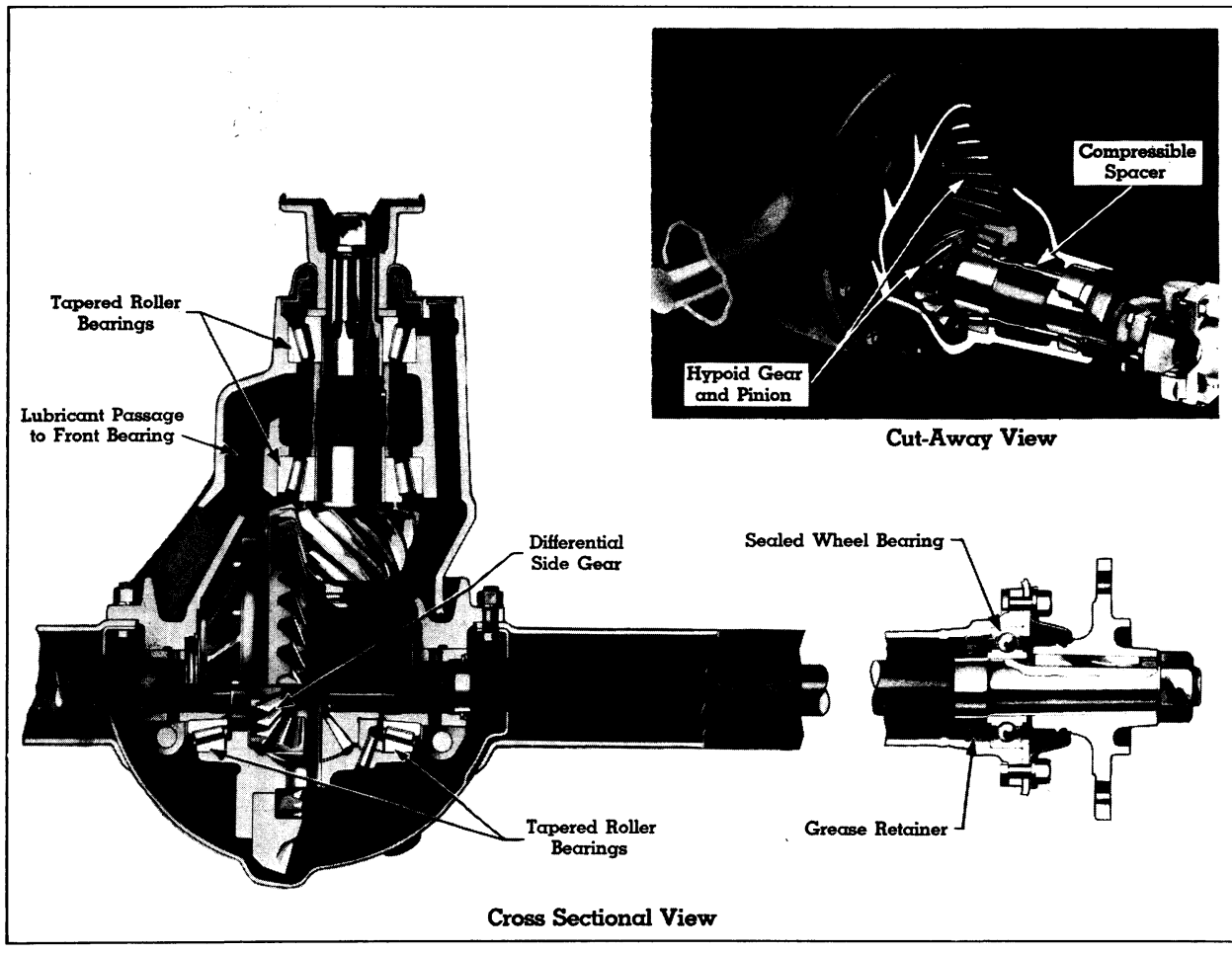


Fig. 10. Rear Axle—All Series

REAR WHEEL SUSPENSION

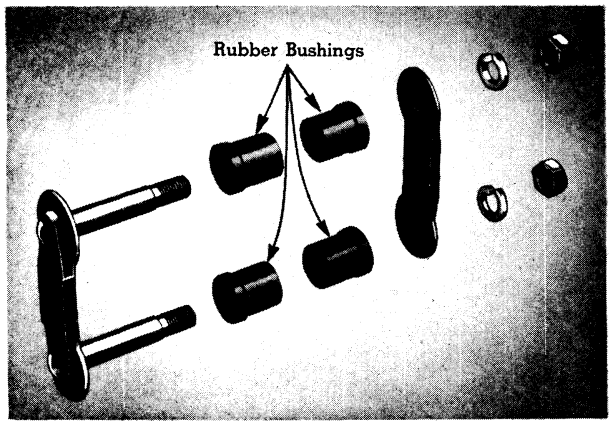


Fig. 11 Rear Spring Shackle
Series 40-50, 52, 62 and 72

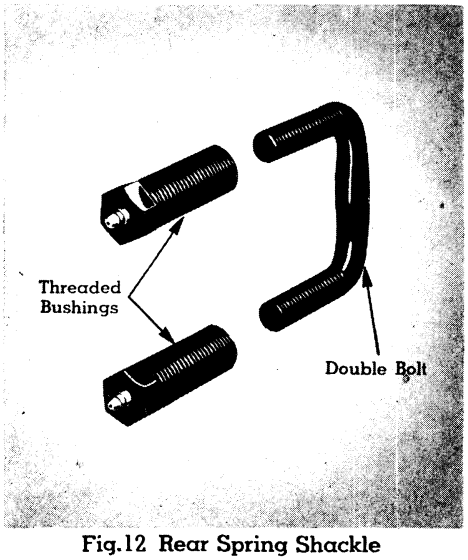


Fig. 12 Rear Spring Shackle
Series 40-60S

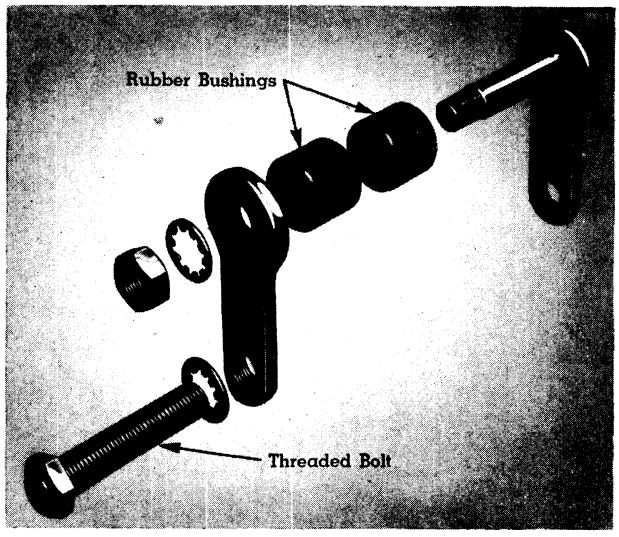


Fig. 13 Rear Spring Shackle
Series 40-75 and 90

seal, also) are removed for any reason, a new oil seal and retainer must be installed.

An adequate stock of oil seals should be kept on hand, and care exercised to keep them in good condition. Guard against any bending or denting of the seals, as this may cause leakage after installation. Even a fingernail scratch across the leather may provide a channel for oil to seep through.

Seals should be kept in parts stock in a covered container filled with SAE-10 or 10-W oil, in order to keep the leather soft and pliant. A seal should have been soaked in oil for at least 24 hours before using.

Before installing a seal, wipe the counterbore into which the seal is pressed and carefully remove any nicks or burrs in the counterbore. That portion of the shaft or yoke against which the oil seal bears should also be polished to remove any minute nicks or burrs before the shaft or yoke is installed. The inner surface of the oil seal leather should be coated with wheel bearing grease at installation. The outside diameter of the oil seal metal shell should be coated with some good sealer such as Permatex or P.O.B. sealer compound before installation.

The oil seal must be pressed squarely into the bore and must be pressed home to its seat. To assure proper installation, use the correct installing tool. Tool J-1355 is used for installing the axle shaft seal on all 40-Series except 40-75 and 90, on which Tool J-1356 is used. Tool J-1357 is used for the pinion shaft oil seal on all 40-Series, and Tool J-1354 is used for the transmission extension oil seal on all 40-Series.

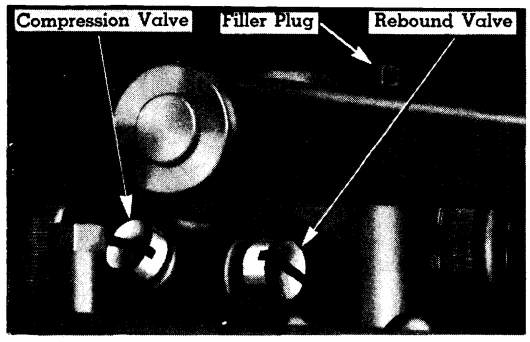


Fig. 14 Left Front Shock Absorber
Series 40-50, 52, 62, 72, and 60S

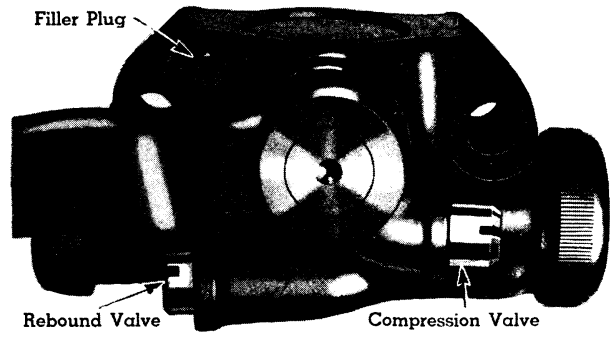
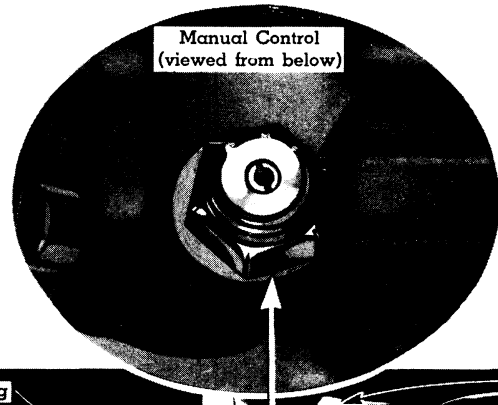


Fig. 15. Left Rear Shock Absorber
Series 40-50, 52, 62, 72 and 60S



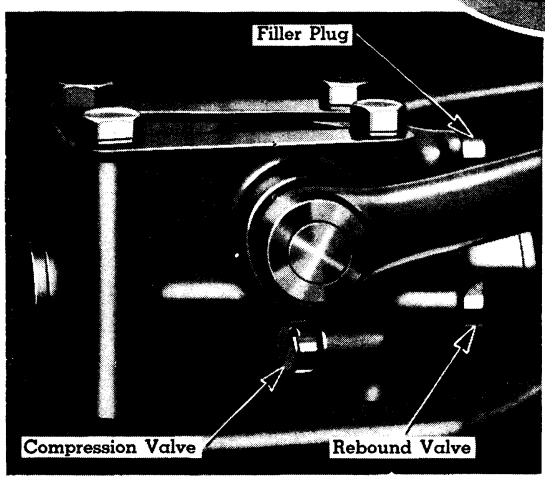


Fig. 16. Left Front Shock Absorber
Series 40-75 and 90

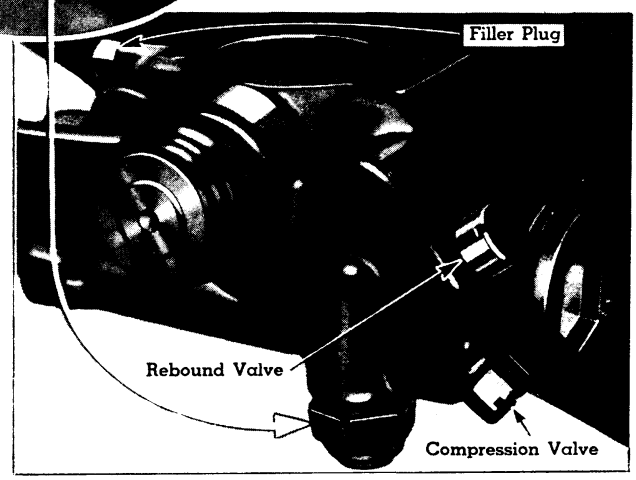


Fig. 17. Left Rear Shock Absorber
Series 40-75 Typical of 40-90

4. Removal and Installation of Spring Shackles

The spring bolts at the front end of the rear springs are easily removed or installed without interference from any sheet metal parts. Removal of these bolts is simply a matter of removing the retaining nut and pulling the bolt out of its rubber bushings.

To reinstall, reverse the above procedure.

Disassembly and assembly procedure for 40-Series rear spring shackles is apparent from Figs. 11, 12, and 13.

Removal of a rear spring requires removal of the front bolt, the U-bolts that clamp the spring to the rear axle, the spring shackle bushing on Series 60S, and the complete disassembly of the spring shackles on all other series.

5. Adjustment of Rear Shock Absorbers

The adjustment of the rear shock absorbers on Series 40-75 and 90 cars is made by pushing

up on the locking cap and turning the adjustment operating shaft with a screw driver until the desired "ride" position is secured. The adjustment has three positions—soft (S), medium (M) and firm (F). The firm position is with the operating shaft turned in a clockwise direction to the (F) position, etc.

Any complaints of abnormal bottoming at high speeds or under severe conditions can be corrected by setting the shaft in the (F) position. It is important that both rear shock absorbers be adjusted to the same position of control.

6. Shock Absorber Service

The only service ordinarily required by the shock absorbers, aside from periodic checking of the liquid level, is the correction of either noisy operation or unsatisfactory riding qualities.

Noisy operation of shock absorbers is usually due to looseness in the shock absorbers or linkage. In case of such trouble check and tighten the entire shock absorber mechanism. In making this check-up, it is not enough simply to make a visual inspection and decide that the connections look sufficiently tight; a wrench must be used at every point and everything well tightened.

It is also important to make certain that all four shock absorbers are filled with shock absorber fluid and that there is no air in the cylinders or passages. In case of complaint, it may be 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.

7. Adjustment of Rear Stabilizer

The cross link rear stabilizer ordinarily does not require readjustment from the original factory setting. Whenever the stabilizer has been removed during service operations on the rear axle or springs, however, it is important to reinstall the stabilizer bar with the correct adjustment.

This is accomplished merely by having the car loaded only to normal curb weight (no passengers, but full tank of gasoline) and then installing the stabilizer, attaching it first to the axle and then to the bracket on the frame, adjusting the length of the bar so that the pivot enters the frame bracket without forcing.

REAR WHEEL SUSPENSION SPECIFICATIONS

Subject and Remarks	40-50	40-52 40-62	40-52 40-60S	40-52 40-72	40-75	40-90
Axle housing out of true, not over	1/16"	1/16"	1/16"	1/16"	1/16"	1/16"
Axle Shaft—						
Length	31 5/8"	31 5/8"	32 5/8"	33 3/8"	32 5/16"	32 5/16"
Out of true (at ground surface near splines) not over	.006"	.006"	.006"	.006"	.006"	.006"
Gear ratio	3.92	3.92	3.92	4.31	4.58	4.31
Shock Absorbers:						
Compression valve	1J1	1A1	1C1	1A1	1.5X	1.5X
Control valve	....	....	....	....	CX	CX
Rebound valve	1.5NX	1.5NX	1.5NX	1.5NX	.25-5X	.25-5X
Note: Valve markings are stamped on rear cap.						
Type Number	1751VW	1751VW	1751GH	1751VW	2010CD	2010CD
Fluid	Delco	Delco	Delco	Delco	Delco	Delco
Springs, car	See Rear Spring Data Chart.					
Tread, rear	59"	59"	61"	62 1/2"	62 1/2"	62 1/2"

REAR WHEEL SUSPENSION

REAR SPRING DATA CHART

Series	No. of Passengers	Part Number	Width of Spring	No. of Leaves
40-50, 52	2	1435964	2	8
40-62	2	1435965	2	8
40-50, 52	5	1435966	2	8
40-62	5	1435967	2	8
40-50, 52, 62	Heavy Duty	1435968	2	9
40-60S	5	1424332	2	9
40-72	5 and 7	1437621	2	10
40-72	Livery	1437622	2	10
40-50, 72	Com.	1437623	2	11
40-75, 90	2	1425655	2¼	9
40-75, 90	5 and 7	1425656	2¼	10
40-75	Export and Livery	1425659	2¼	11
40-75	Com.	1425657	2¼	12
40-75	Bus	1426764	2¼	13

OTHER REAR SUSPENSION REFERENCES

BRAKES

The braking system used on 40-Series Cadillac and LaSalle Cars comprises service brakes of the hydraulic type combined with a hand lever that operates the rear brake shoes through a mechanical linkage.

The service brake system consists of a combined fluid supply tank and master cylinder, in which the hydraulic pressure is originated; four wheel cylinders in which the pressure is applied to operate the brake shoes against the wheel drums; and the tubing and flexible hoses connecting the master cylinder to the wheel cylinders.

1. Brake Adjustment (Service Brakes)

Series 40-50, 52, 62, 72, and 60S—1. Jack up car, dismount all four wheels, and remove adjusting hole covers from brake dust shields.

2. Disconnect cables to rear brakes at equalizer in frame X-member.

3. Adjust pedal operating rod by loosening lock nut and turning connecting link in or out until grommet under floorboards is compressed to ¾ inch when operating rod is against stop in master cylinder. (See Figure 18.)

> **Note:** This adjustment is important! Piston primary cup must clear by-pass when brake pedal is disengaged, otherwise brakes will drag.

4. Insert a .015 inch feeler gauge through inspection slot in drum while slot is opposite adjusting (lower) end of secondary shoe and, by moving feeler up along secondary shoe, wedge entire shoe assembly forward, as far as possible.

5. Expand shoes by means of notched adjusting screw (sometimes called a "star wheel")

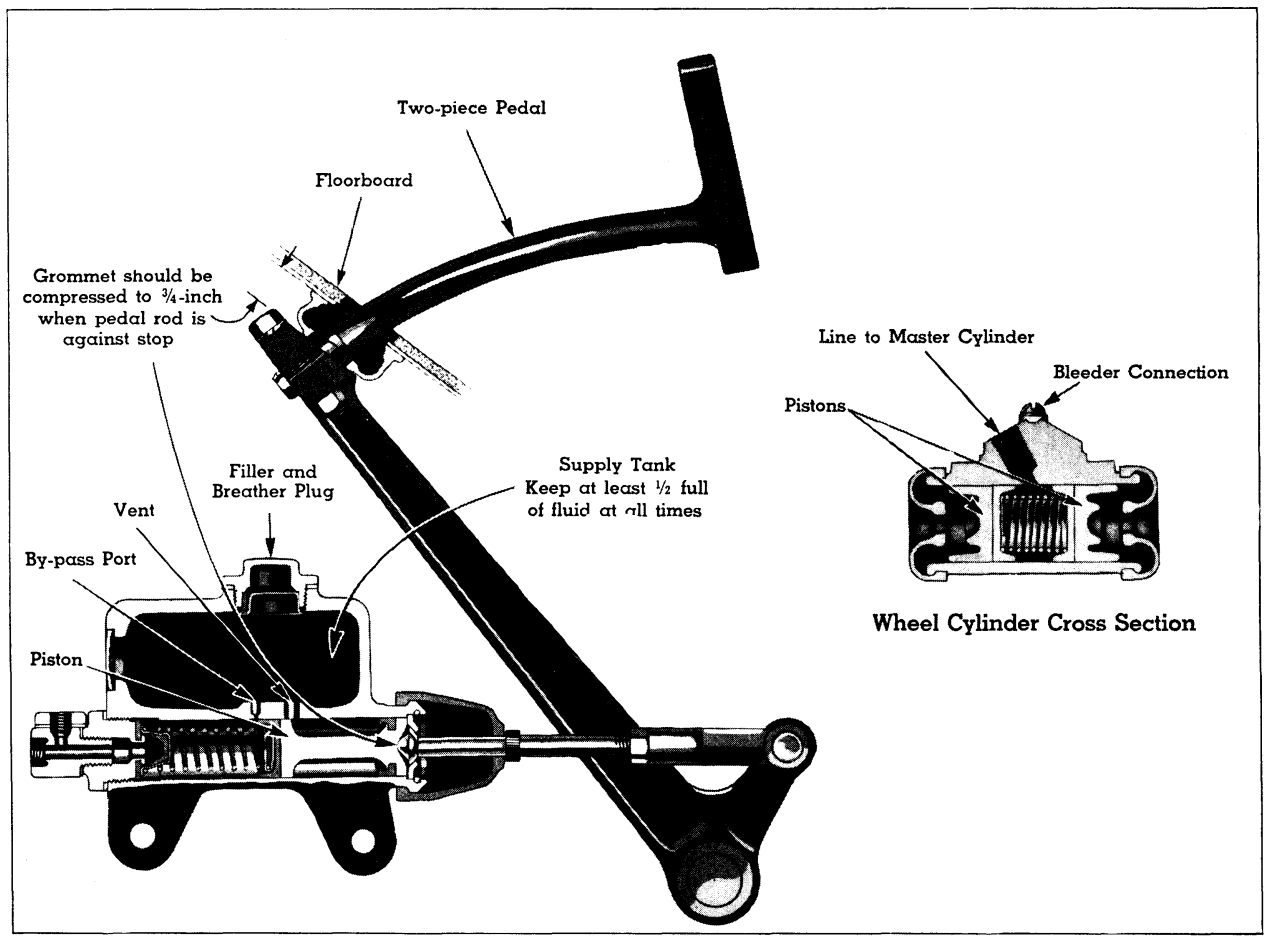


Fig. 18. Brake Master Cylinder and Pedal
Series 40-50, 52, 62 (Cylinder typical of all series)

until primary shoe contacts drum securely and secondary shoe is snug against feeler.

6. Then back off adjusting screw just enough to establish a clearance of .015 inch, one and one-half inches from each end of secondary shoe. This will provide correct operating clearances for both primary and secondary shoes.

7. If .015 inch clearance cannot be secured at each end of the secondary shoe, loosen anchor pin lock nut and turn eccentric anchor pin in direction required to equalize clearances. Retighten lock nut and recheck clearances.

8. Reinstall adjusting hole cover.

9. Repeat operations 4 through 8 uniformly at each of the four wheels.

10. Reconnect and adjust hand brake cables.

Series 40-75 and 90—1. Jack up car, dismount all four wheels, and remove adjusting hole covers from dust shields.

2. Disconnect cables to rear brakes at equalizer in frame X-member.

3. Adjust pedal operating rod to allow ¼ to ⅜-inch free movement of brake pedal before it starts piston on pressure stroke.

4. Loosen lock nut at eccentric adjustment. Insert a .010-inch feeler between lining on secondary shoe and drum.

5. Clearance between lining and drum can be taken up to the required .010 inch by turning eccentric in direction of forward wheel rotation.

6. If .010 inch clearance cannot be secured at both ends of secondary shoe, readjust anchor pin by loosening lock nut and turning eccentric anchor pin in direction required to equalize the clearances. Retighten lock nut, and recheck clearance at both ends of shoe.

7. Clearance between primary brake shoe and drum is secured by turning notched adjusting screw. Expand shoes until brake drags. Then turn back until brake drum is free of drag.

8. Reinstall adjusting hole cover.

9. Repeat steps 4 through 8 uniformly for each of the four wheels.

10. Reconnect and adjust hand brake cables.

2. Hand Brake Adjustment

1. Make sure foot brakes are fully released.

2. Disconnect hand brake cables at equalizer.

3. Tighten adjustment at both rear wheels until drums can just be turned by hand.

4. With hand brake lever in fully released position, pull cables taut and adjust clevises so that clevis pins can just be inserted.

5. Back off adjustment of shoes at both rear brakes until wheels are free (15 to 20 notches).

3. Relining Brakes

1. Jack up car.

2. Remove all four wheels.

3. Remove wheel hub and brake drum assemblies.

> **Note:** Do not depress brake pedal when one or more brake drums are removed.

4. Disconnect hand brake cables at equalizer.

5. Remove brake shoe hold-down cups and springs.

6. Disconnect brake shoe return springs and shoe connecting springs.

7. Attach piston clamp, Tool No. J-718, to wheel cylinder and remove brake shoes.

8. Disconnect hand brake cables from hand brake operating levers at rear brakes.

9. Install new linings.

10. If it is necessary to true brake drums, do not grind out more than .030 inch over original limit of inside diameter. (See Specifications.)

11. Check steering knuckle pin bushings for looseness.

12. Tighten bolts that hold dust shields to rear axle and front wheel spindles.

13. Install brake shoes, brake shoe hold-down cups and springs, and return springs and connecting springs. The piston clamp can then be removed.

14. Install wheel hub and drum assemblies, and wheels.

> **Note:** Readjustment of notched adjusting screw and centralization of shoes at eccentric adjustment (on 40-75 and 90) may be necessary to permit assembly of hubs and drums.

15. Adjust front wheel bearings.

16. Check rear spring U-bolts and rubber insulators between rear axle and springs, and adjust if necessary as follows:

Tighten U-bolts to uniform tension of from 45 to 52 foot pounds, on Series 40-50, 52, 62, 72 and 60S cars and from 55 to 65 foot pounds on Series 40-75 and 90 cars, keeping lower pads flat with bottoms of springs.

17. Adjust brakes as outlined in Note 1.

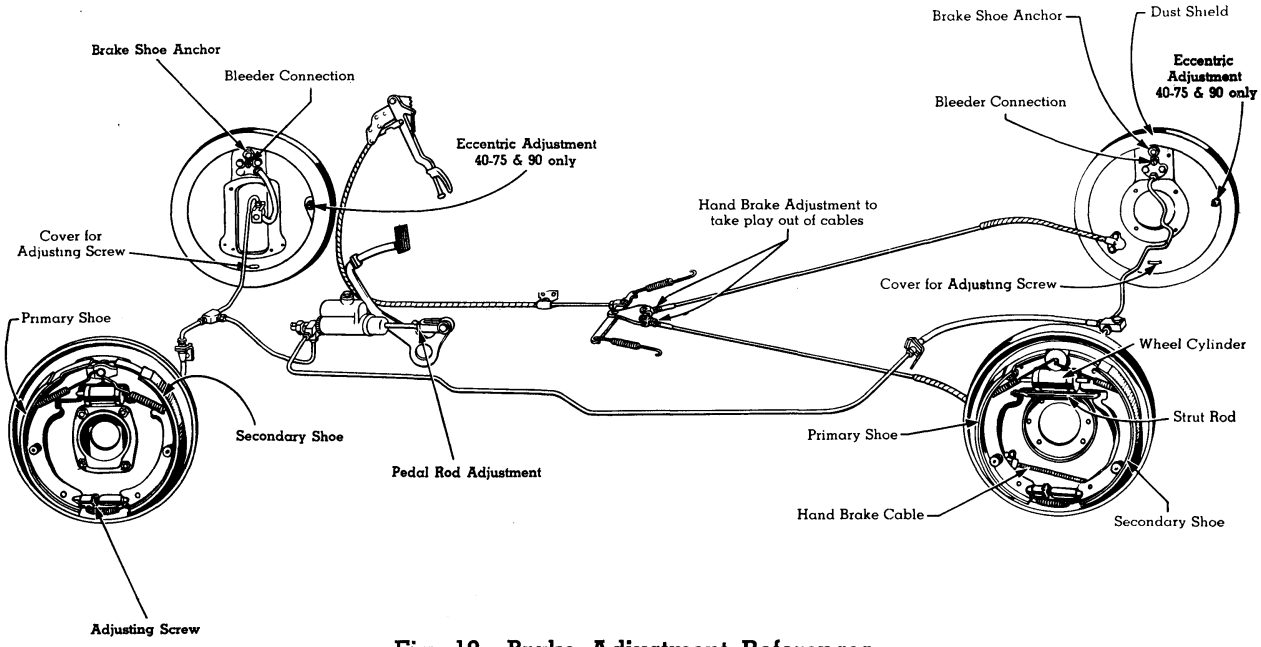


Fig. 19. Brake Adjustment References Typical of All Series

4. Lubricating Brake Dust Shields

A popping noise may sometimes occur in the 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 bosses and lubricated slightly.

A suitable lubricant for this purpose is furnished under specification number G-2½-B (Lubriplate). Care should be taken in applying lubricant to make sure that none is permitted to get on the brake lining.

The 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.

5. Remachining Brake Drums

When remachining brake drums in the service station, drums must not be ground down more than .030 inch beyond original limit of inside diameter. See Specification Table for brake drum size. When brake drums are too thin, the intense heat that frequently develops may cause them to distort or warp. Drum thickness should be measured ½ inch from outer flange.

Replacement brake drums supplied by the Parts Department are finished at the factory before being shipped. This eliminates necessity for further finishing after installing on wheel.

BRAKES

BRAKE SPECIFICATIONS

Subject and Remarks	40-50 40-52	40-62 40-60S	40-50 Com'l 40-72 40-72 Com'l	40-75 40-75 Com'l 40-90
Braking area (foot brakes), in square inches	196	208	233	258
Drums—				
Inside diameter	11.995–12.005″	11.995–12.005″	11.995–12.005″	13.995–14.005″
Out of round not over	.007″	.007″	.007″	.007″
Clearance between lining and drums	.007–.010″	.007–.010″	.007–.010″	.007–.010″
Remachining (See Note 5)				
Fluid	Delco Super No. 9	Delco Super No. 9	Delco Super No. 9	Delco Super No. 9
Lining—				
Length, primary	11 17/32″	11 17/32″	11 17/32″	13 21/32″
Length, secondary	12 31/32″	12 31/32″	12 31/32″	15 1/32″
Width, front	2″	2 1/4″	2 1/4″	2 1/4″
Width, rear	2″	2″	2 1/2″	2 1/4″
Thickness	3/16″	3/16″	3/16″	1/4″
Composition	Molded	Molded	Molded	Molded

OTHER BRAKE REFERENCES

OTHER ENGINE REFERENCES

ENGINE

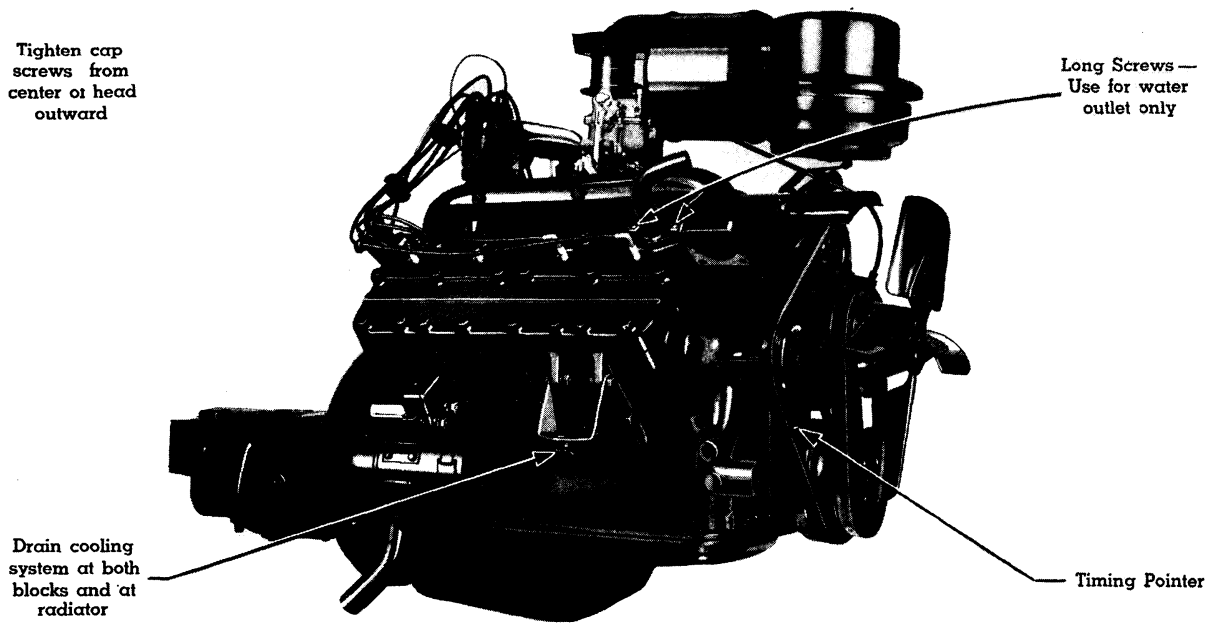


Fig. 20. Right Side View of Series 40-50
Typical of all 40-Series V-8's

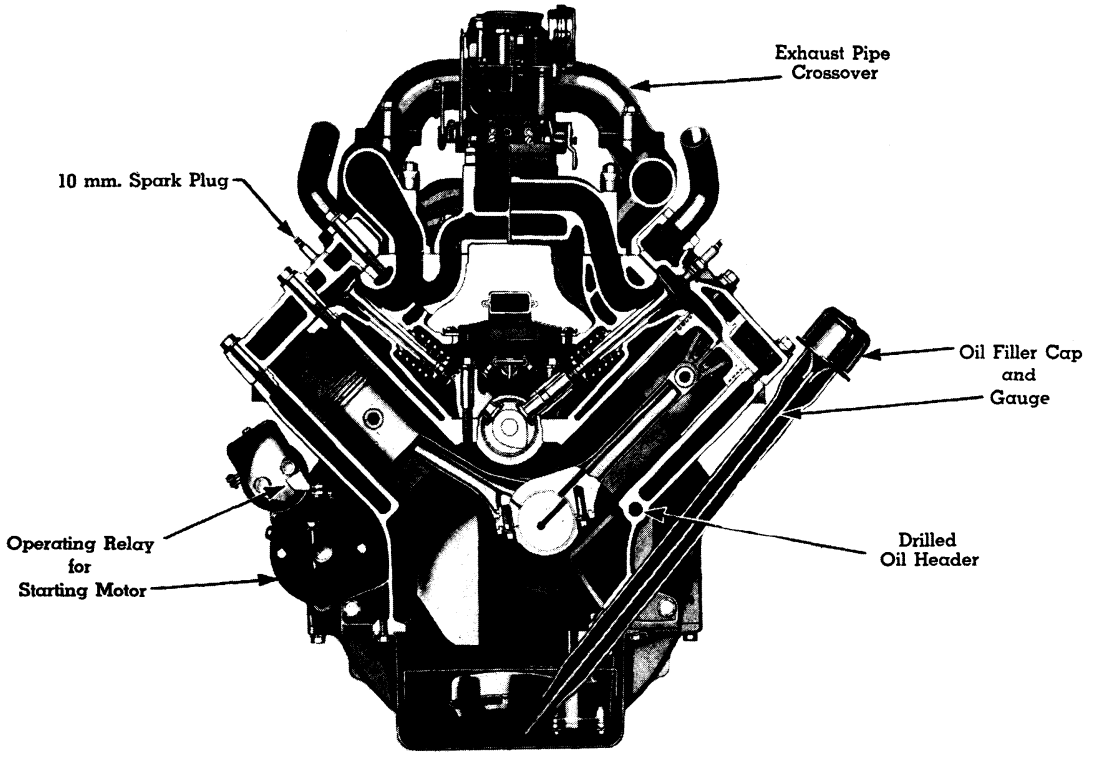


Fig. 21. Cross Sectional View of Series 40-50
Typical of all 40-Series V-8's

ENGINE

Three different engines are used in the 40-Series Cadillac and LaSalle cars. A 322 cubic inch 90° V-8 engine is used in 40-50 and 52 LaSalles, a 346 cubic inch 90° V-8 engine in 40-62, 72, 60S and 75 Cadillacs, and a 431 cubic inch 135° V-16 engine in the 40-90 Cadillac.

TORQUE TIGHTNESSES

The tightness of the attaching bolts of various engine parts is very important to avoid distortion and permanent injury of the parts. A torque wrench should always be used on these engine bolts so that they can be accurately tightened according to the torque tightness specifications which are given on Page 77.

1. Cylinder Numbering

The left front cylinder is number one cylinder on all 40-Series cars. Cylinder numbering is by arrangement rather than firing order. The cylinders in the left block are odd-numbered, those in the right block are even-numbered.

2. Cylinder Head Service

The cylinder heads used on 40-50 and 52 LaSalle engines are also used on 40-72 and 75 Cadillac engines. On LaSalle engines, which have a 3⅜ inch bore, they provide a 6.25 to 1 compression ratio; whereas on 40-72 and 75 engines, which have a 3½ inch bore, they provide a 6.70 to 1 ratio. The cylinder heads used on 40-62 and 60S engines provide a 6.25 to 1 ratio with the 3½ inch bore.

Perfect Seal Gasket Paste is recommended for use when installing cylinder head gaskets. This paste remains in a semi-fluid state which provides a good seal, yet permits easy disassembly. The copper-faced cylinder head gaskets used on V-16 engines do not require gasket paste.

Cylinder head gaskets are interchangeable between right and left sides on all 40-Series engines. Be careful not to reverse gaskets when installing.

Thorough tightening of the cylinder head cap screws is necessary to insure a leak-proof connection. Tighten the screws from the center of the head outward. First, tighten while the engine is cold—then warm up the engine thoroughly and retighten.

On V-8 engines, the two cap screws used at each water outlet connection have oversize heads and are ½ inch longer than the others. Use these screws **only at the water outlet connection.** If installed at any other point, they may break through the water jacket and irreparably damage the entire engine block.

When reinstalling cap screws on V-16 cylinder heads, make sure that the short screws are installed along the lower edge of the head.

3. Changing Compression Ratios (V-8 Engines)

All 40-Series engines are equipped with high compression cylinder heads. In the event that a lower compression ratio is required to meet certain operating conditions or burn low octane fuels, this can be secured on V-8 engines by installing special shims between the cylinder heads and blocks.

4. Replacing Flywheel Ring Gear

It is not necessary, when a flywheel ring gear is damaged, to replace the entire flywheel. The old ring gear can be driven off the flywheel, and a new one heated and installed.

The ring gear can be heated either on a hot plate or in an oven. A suitable oven can be made by cutting an oil drum 5 or 6 inches from the bottom and making a cover to fit.

The gear should be heated to from 350 to 400°F., but no hotter. The temperature can be checked with an ordinary oven thermometer. If a hot plate is used, two ⅛-inch pieces of solder can be placed on opposite edges of the gear. When the solder starts to melt, the gear is hot enough.

Caution: Do not heat the gear with a welding torch or over a direct flame. Uncontrolled heat will destroy the temper of the gear.

5. Removing and Installing Piston Pins

Removal—Series 40-50, 52, 62, 72, 60S and 75.

1. Remove snap rings that hold piston pin in place in piston.

2. Place piston in boiling water to expand piston pin hole.

3. Push piston pin out of piston by hand from raised rib side of piston hole boss as shown in Figure 22.

> **Note:** Never use an arbor press to remove piston pins because pressure may distort or crack piston. New snap rings should always be used to replace those removed.

Installation—

1. Lubricate piston pin with engine oil.

2. Heat piston in boiling water.

3. Push pin into piston by hand from side opposite boss with raised rib.

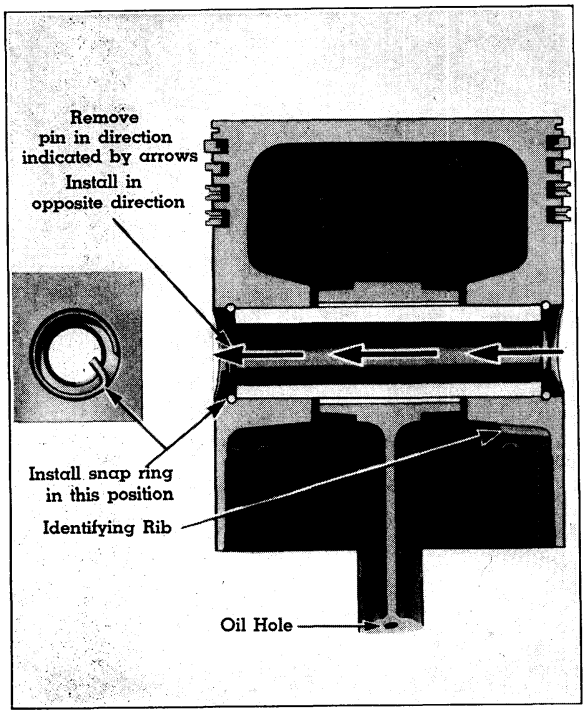


Fig. 22. Cross Section of Piston Series 40-50, 52, 62, 72, 60S and 75

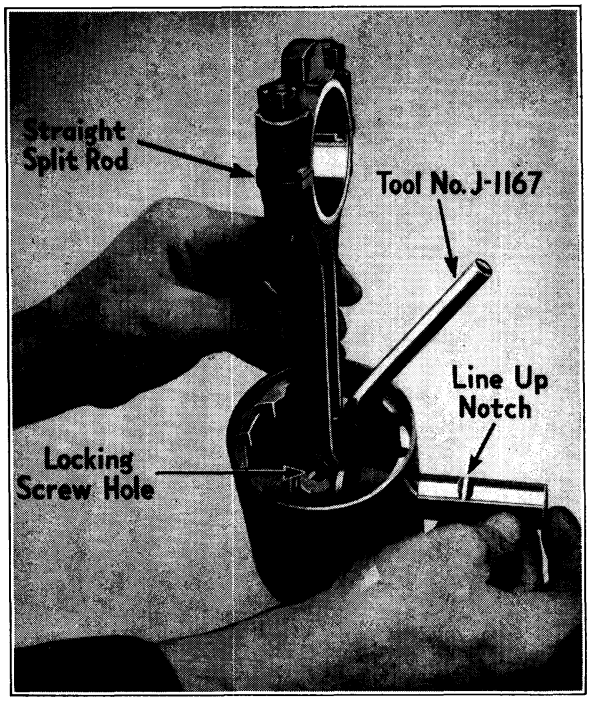


Fig. 23. Installation of Piston Pin Series 40-90

Removal—Series 40-90.

1. Remove locking screw from upper end of connecting rod.

2. Spread split end of rod by installing Tool No. J-1167, tapping it gently in place.

3. Drive piston pin out of piston and rod, using a brass drift.

Installation—

1. Spread split end of rod with Tool J-1167.

2. Assemble pin in piston and rod in correct position, lining up notch in pin with locking screw hole in rod, as shown in Figure 23.

3. Tap pin into place and turn locking screw part way in before removing spreading tool.

4. Tighten locking screw assembly.

6. Measuring Piston Clearance

When fitting the anodized aluminum pistons, two feeler gauges are required—one .002" thick, the other .0025". The gauge is placed between the cylinder and piston next to the T-slot in the piston. The piston should drop of its own weight with the thin feeler and hold tightly in place with the thick feeler.

Feeler gauge ribbons should be ⅜ to ½ inch wide and 7 to 10 inches long. They must be clean and free from kinks or wrinkles when fitting pistons.

7. Removal and Installation of Connecting Rods and Pistons

Connecting rod and piston assemblies are removed from **above** on all 40-Series engines. The big ends of V-8 connecting rods are split at an angle to make removal through the bores possible.

Always inspect crankshaft journals carefully whenever connecting rods are removed. A rough or scored crank pin will result in further failure if it is not corrected before the engine is reassembled.

Pistons should be assembled to the rods on **all** series so that the T-slot in the skirt will be on the left side of the engine.

The rod bearing caps are attached with special type cap screws. To tighten them, use a wrench with a T-handle no more than 12 inches across.

The lock washers used under the V-8 cap screws are of special design and material. When reassembling, new lock washers, available only from the Cadillac Parts Department, must be used.

When assembling connecting rods to crankshaft, make sure that numbers on rods are toward bottom of engine, and that they correspond with, and are on the same side as, the numbers on the caps.

8. Connecting Rod Alignment

Alignment of connecting rods should be checked before reinstallation, as even slight misalignment can cause excessive oil consumption. Both sides of the rod and piston assembly should be tested on an alignment fixture. Tool No. J-874CL can be secured for making these tests.

When straightening connecting rods, the rod will hold its shape better if bent a little further than necessary and then bent back until straight. Otherwise it may return to its former shape, due to the toughness of the steel used in its construction.

9. Replacing Connecting Rod Bearings

Connecting rod bearings are shell type of steel-backed babbitt. Bearings worn beyond the limits given on page 40 can be replaced without removing the rod assembly simply by removing the caps and replacing the upper and lower bearing halves.

Upper and lower bearing halves are not interchangeable in V-8 engines because of the oil holes in the upper bearing for the connecting rod oil passages. Make sure always that the upper half is installed correctly in the rod, or no oil will reach the piston pins and cylinder walls.

10. Replacing Main Bearings

Shell type main bearings of steel-backed babbitt are used. End thrust is taken by the center main bearing on both V-8 and V-16 engines. Bearings worn beyond the limits given on page 40 should be replaced. No attempt should be made to shim, file, or otherwise take up worn bearings. To make replacement:

1. Remove cap and take out worn lower shell.
2. Rotate crankshaft in reverse direction to turn upper shell out of crankcase, using a flattened cotter pin in the oil passage hole to contact the shell and force it out.
3. Place new upper shell on crankshaft journal with locating lug in correct position, and rotate shaft to turn shell into place.
4. Install lower shell in cap and reinstall cap.

When reinstalling rear main bearing cap, always install new cork plugs in grooves at sides of cap to prevent oil leaks. Grease plugs well to facilitate installation.

Caution: Always clean oil lines and crankcase thoroughly before installing new main or connecting rod bearings.

11. Replacing Rear Main Bearing Oil Seal

Installation of a new rear main bearing oil seal in both V-8 and V-16 engines requires use of Tool No. J-1177. After crankshaft has been removed from engine and worn packing taken out, proceed as follows:

1. Remove rear main bearing shells to avoid possible damage.
2. Install a length of new packing in groove in crankcase and drive up into place, using Tool No. J-1177, and pounding with a hammer on handle of tool.
3. With tool held in position, cut off each end of packing flush with bearing edge.
4. Repeat operation in bearing cap. An arbor press will provide the best means of forcing packing in place and holding it while cutting.

12. Camshaft Removal and Installation (V-8 Engines)

Removal—

1. Dismantle engine by removing generator, carburetor, fuel and vacuum pump, manifolds, valve lifter assemblies, etc., so that camshaft can be removed.
2. Remove radiator grille, radiator, and engine front cover.
3. Remove transmission and flywheel housing.
4. Remove camshaft.
5. Remove camshaft bearings, if necessary, by pushing them out of engine bearing supports, in which they are a press fit. Special Tool No. J-829 is recommended for this operation.

Installation—

1. If new bearings are used, paint outside surfaces with white lead.
2. Install front bearing, then rear bearing, and then center bearing, piloting installing Tool J-829 at other two points in each instance. Be sure to line up oil holes properly.
3. Reinstall camshaft, front cover, clutch housing and transmission.
4. Reassemble engine.

13. Camshaft Removal and Installation (V-16)

This operation requires removal of radiator and fender assembly as a unit, crankcase balancer and pulley, front cover, timing chain and camshaft sprocket, valves and valve lifters, fuel pumps and vacuum pump.

Before jacking up the front of the engine to remove crankshaft balancer and pulley, be sure

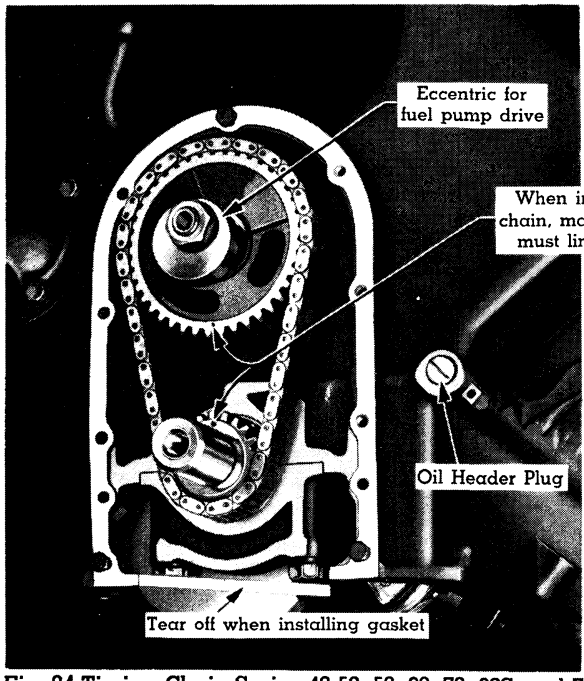


Fig. 24 Timing Chain Series 40-50, 52, 62, 72, 60S and 75

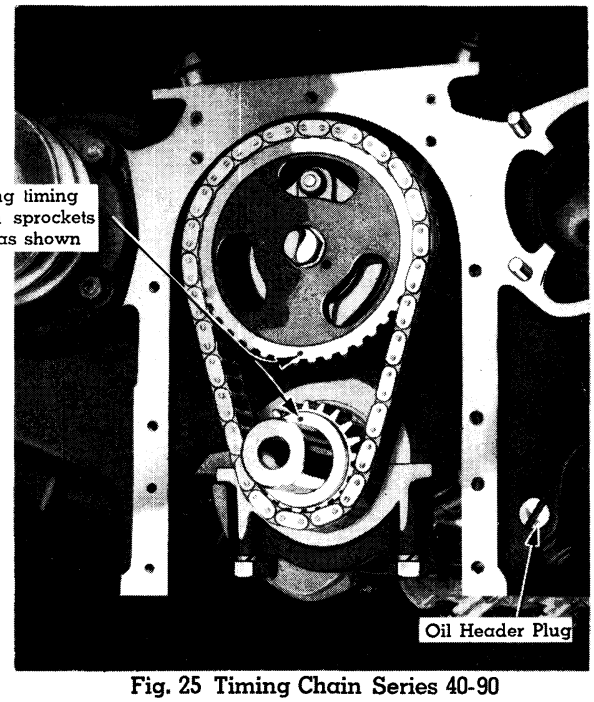


Fig. 25 Timing Chain Series 40-90

to disconnect flexible pipes from gasoline lines to fuel pumps.

Camshaft Removing Tool J-1210 is practically indispensable. It is attached to front of camshaft by turning it into tapped hole for sprocket screw. When so attached, tool permits easy removal and reinstallation of shaft.

After reinserting camshaft, make certain that front camshaft bearing is properly installed. Due to the offset of the holes, there is only one correct way to reinstall the bearing. Do not attempt to force it in an incorrect position.

14. Replacing Timing Chain and Sprockets

Engine timing chains and sprockets should be assembled and installed as a unit. Care should be exercised to see that the timing marks are properly lined up as shown in Figure 24.

Pilot, Tool No. J-836, should be used on end of camshaft when installing chain and sprockets on V-8 engines. Do not attempt to force camshaft sprocket on shaft, as this might damage distributor and oil pump drive gear on rear camshaft bearing.

The front cover plate gasket of all engines is an open-end gasket, but for easier handling is supplied with a closed end. When installing this gasket, therefore, tear off the lower portion at perforation.

15. Removing and Installing Valves

V-8 engines—It is necessary to remove the valve lifter assemblies before removing valves from V-8 engines. Then valve lifter J-257-X is used to compress springs for removal of valve spring retainers and locks.

Before reinstalling valve lifter assemblies, valve stems should be checked for proper length, using valve stem length gauge J-1055 to measure distance from end of valve stem to heel of cam. If valve stems are found to be too long when checked in closed position, they should be ground off until the tool will slide into place. Valve lifters should be disassembled and cleaned before being reinstalled.

If Tool J-1055 is not available, it will be necessary to install valves, valve springs and lifters and check clearance between stems and lifters, which should be .030-.070 inch.

Series 40-90—The procedure for removing valves from V-16 engines differs in two ways from the V-8 procedure. First, valves must be removed **before** individual valve silencer assemblies can be removed. Second, a different valve lifter, Tool No. J-1211, must be used.

When removing valve lifter and silencer assemblies, it is important to keep them in order and reinstall them in the same guide hole from which they were removed. Two sizes of lifters are used—the larger size must be installed in

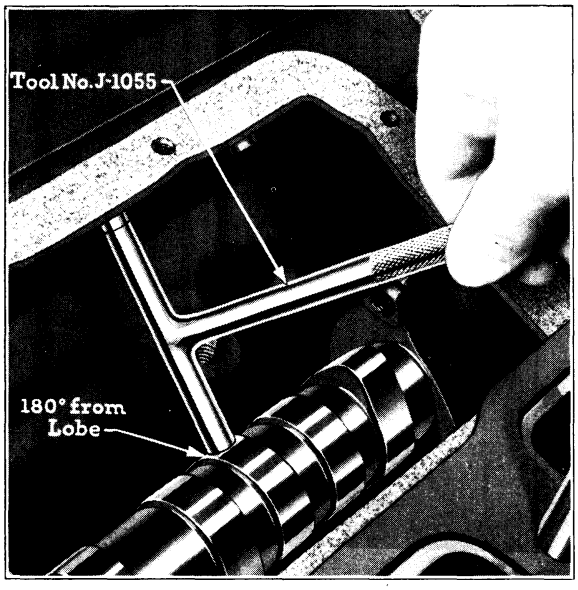


Fig. 26. Checking Valve Stem Length Series 40-50, 52, 62, 72, 60S and 75

the large holes and the smaller size in the small holes.

The large size lifters can be identified by a letter "B" stamped in the oil groove. The large guide holes are also identified by a "B" stamped beside the hole. Both sizes of lifters are stocked by the Parts Department. When ordering valve lifters be sure to specify which size is needed.

16. Noisy Operation of Valve Lifters

Noisy operation of the hydraulic valve mechanism may be due to:

1. Incorrect Oil Level—The oil level should never be above nor more than one quart below the "7-quart" or "Full" mark on the indicator. If the level is too high, foaming may result; if too low, air may enter the pump inlet. In either case, noisy valve action may result.

2. Improper Oil Pr · ·ure—If valve action is noisy after oil is hot, determine oil pressure at silencer pipe. Pressure here should be 3 to 5 pounds when gauge on dash reads 12 to 15 pounds.

Incorrect oil pressure usually results from a leak in the oiling system (see Note 17), a stuck or improperly operating oil pressure relief valve, scored parts, or faulty operation of oil pump.

3. Weak Valve Lifter Plunger Springs—These can cause noisy valve operation by permitting excessive plunger movement and wear. To check these springs, remove the silencer units, disassemble each unit, clean thoroughly, dry each part and reassemble the unit. Then check the pressure required to compress each plunger spring dry.

If the strength of these springs is such that less than 6 or 7 pounds is required to compress them, the hydraulic unit should be replaced. The valve cylinder and plunger are mated and should be replaced as a unit.

4. Dirty, Scored or Worn Valve Lifter Parts—A recurring tap or click synchronized with the valve action indicates trouble in single silencer units, which should be disassembled and checked for:

Dirt or foreign particles, which can be cleaned after disassembly by wiping with a soft cloth and washing in gasoline.

> **Note:** The engine oil pan should always be removed and cleaned when dirt has been responsible for sticking. The oil passages in the lifter guides should also be cleaned thoroughly.

Pitting and scoring of the surfaces, which may result from gritty particles, excessive wear or damage during installation. This condition requires replacement of the hydraulic unit (cylinder and plunger). It is not necessary to replace the valve lifter body.

Incorrect clearance between the cylinder and plunger, which is usually caused by mismating of the parts. The hydraulic cylinder and plunger are carefully fitted in manufacture and are not interchangeable.

Reassembly—When reassembling the silencer parts, note the following:

Ball check should rattle when cylinder unit is shaken.

Plunger should bounce back when pressed quickly into cylinder and released.

Plunger spring should be locked into cylinder body with a twist of plunger.

Cylinder should slide smoothly into lifter body when free of oil.

Re-oil assemblies thoroughly when reinstalling.

There must be .030-.070 inch clearance between valve stem and top of plunger, measured with no oil in hydraulic unit and with plunger and plunger spring fully depressed. Measure this clearance with feeler gauge when new silencer parts are installed and when valves are reseated. If clearance is less than .030, grind a few thousandths off the end of the valve stem.

17. Engine Oiling System

V-8 Engines—The gear type oil pump is bolted to the bottom of the crankcase at the left of the rear main bearing. The pressure regulator is built into the pump body. Oil enters the pump through a screened and floating intake, and is forced through a drilled passage to the oil header, which is drilled lengthwise along the left side

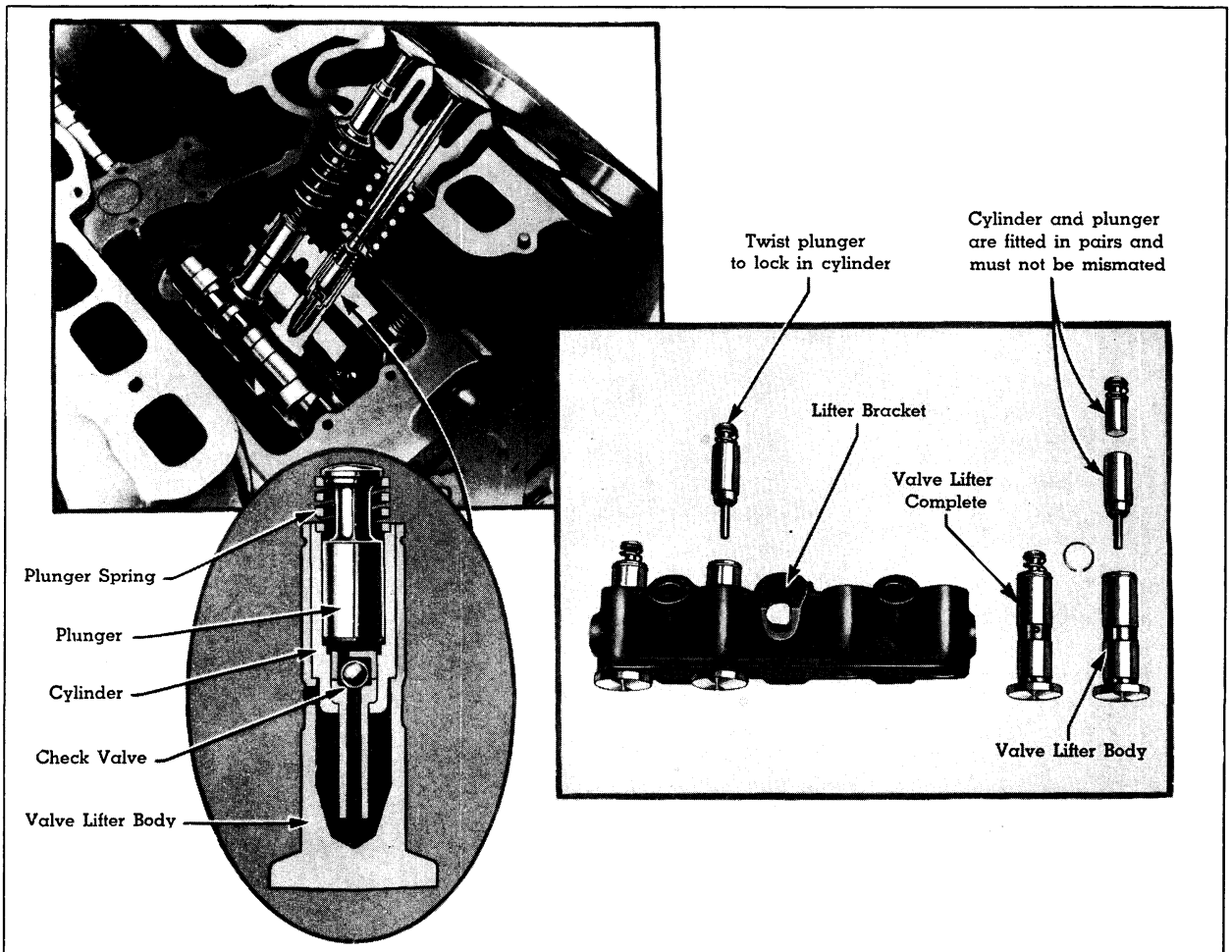


Fig. 27. Arrangement of Valves, Valve Lifters, and Silencer Parts Series 40-50, 52, 62, 72, 60S and 75

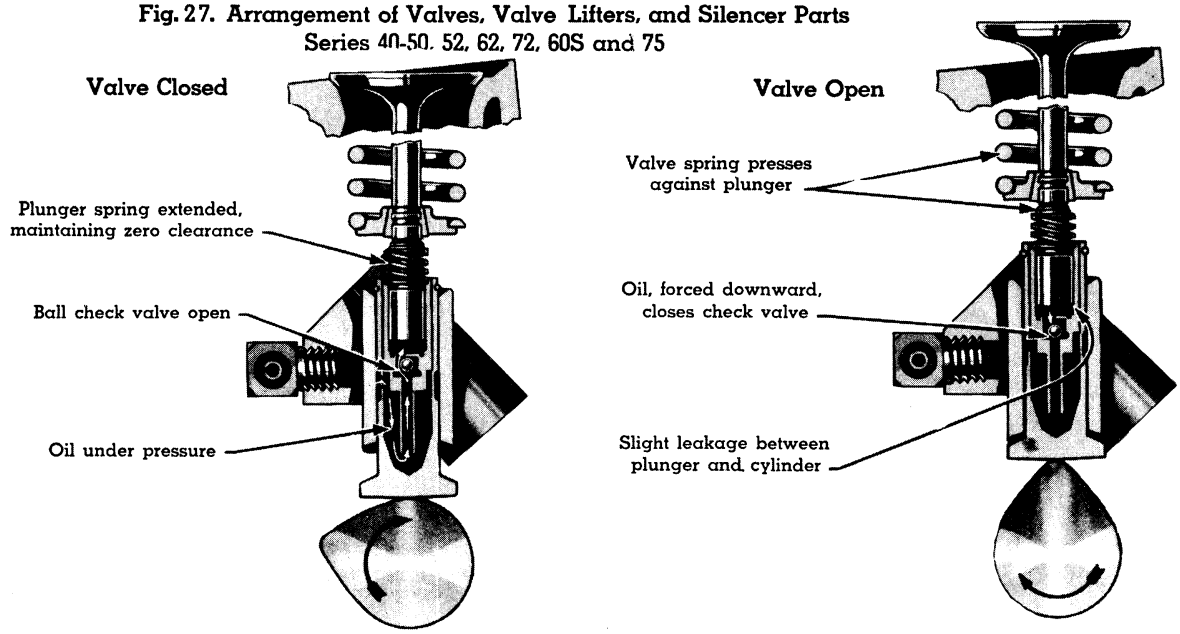


Fig. 28. Operation of Valve Silencer Mechanism

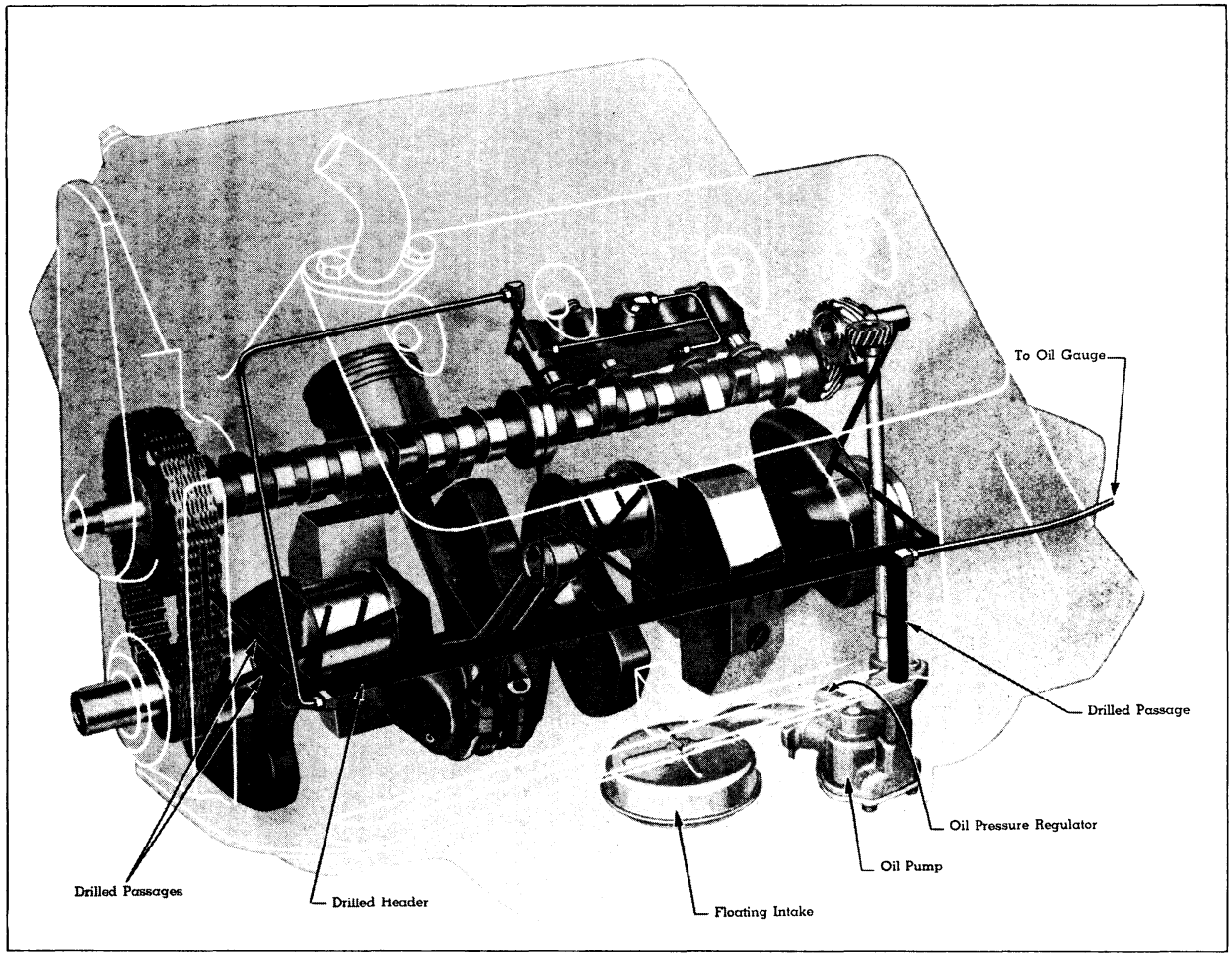


Fig. 29. Engine Oiling System
Series 40-50, 52, 62, 72, 60S and 75

of the crankcase. From the header, other drilled passages branch through the support webs to the main and camshaft bearings.

Oil from the main bearings passes through drilled passages to the crank pins, where part lubricates the connecting rod bearings, part flows up to the piston pins, and part is squirted out to lubricate the cylinder bores.

Oil is carried from the rear camshaft bearing to the distributor and oil pump driveshaft and gears, and from the front bearing to the timing chain. Oil is piped from the header to the hydraulic valve lifters.

V-16 Engines—The V-16 oiling system is the same in principle as the V-8 system, except for the greater number of drilled passages for bearings and for the following specific differences:

Pressure lubrication of the piston pins is not employed.

The oil pump driveshaft bearing, the two distributor driveshafts, and eccentrics for driving the two fuel pumps are lubricated directly by passages connected with the main bearing supply. The timing chain and sprocket are lubricated by oil which has passed the front camshaft bearing.

A pipe leading from the main oil header carries oil to the two small headers along both sides of the camshaft. Oil from these headers passes to the hydraulic valve silencers. The headers are interconnected, and at the rear of the left-hand header there is a non-adjustable auxiliary relief valve.

18. Fan and Generator Belt Adjustment

The fan belt on V-8 engines is adjusted by raising or lowering the fan bracket. The water pump and generator belt on these engines is adjusted by changing the position of the generator. The dual belts that drive the fan and water

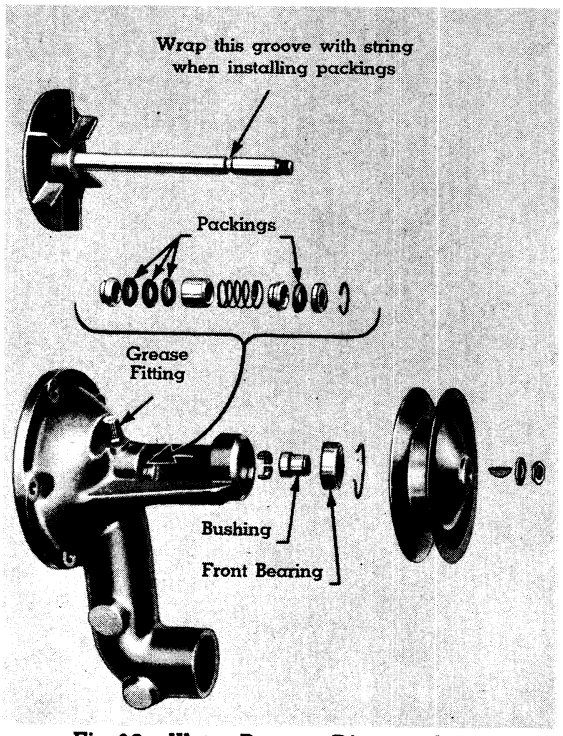


Fig. 30. Water Pump — Disassembled Series 40-50, 52, 62, 72, 60S and 75

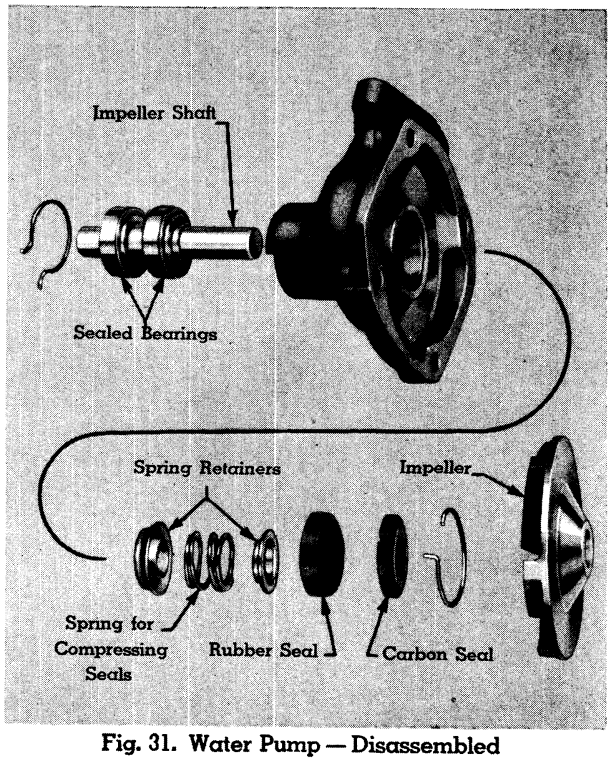


Fig. 31. Water Pump — Disassembled Series 40-90

pumps on the V-16 engine are adjusted at the fan bracket, and the V-16 generator belt at the generator.

All of these belts are adjusted by tightening the respective brackets until there is no free movement or looseness in the belts, yet without straining the belts. This adjustment applies to all 40-Series belts, and is the same for both new and used belts.

If it is necessary to replace one of the dual belts on V-16 engines, both belts must be replaced, and the new belts that are installed must be a matched pair secured from the factory Parts Department.

Only belts properly matched for length at the factory will operate satisfactorily in the V-16 engine.

19. Water Pump Service

Disassembly of the V-8 water pump for replacement of parts is performed in the following manner: (Water pump off car.)

1. Remove belt pulley.
2. Remove snap ring.
3. Push impeller rearwards and remove split washer in back of front bearing.
4. Remove lock ring at front end of rear bushing.
5. Remove impeller and shaft.
6. Remove rear bushing assembly toward front, being careful not to lose any parts.
7. Remove front bearing by forcing it out toward the front.
8. Remove bushing from front bearing.

Reassembly, in general, is the reverse of the disassembly operations. To assemble the pump packings on the shaft, install pilot, Tool No. J-831, on the end of the shaft and insert in the pump body. Also, wind string around the recess near the end of the shaft to present a smooth surface on which to slide the packings.

Disassembly Series 40-90—

1. Remove pump from engine and remove belt pulleys by taking out four pulley cap screws.
2. Press pulley drive flange off impeller shaft, supporting flange in an arbor press and press out shaft.
3. Remove lock ring for bearings at front of shaft, and while supporting front end of pump housing casting, press pump shaft out of impeller.

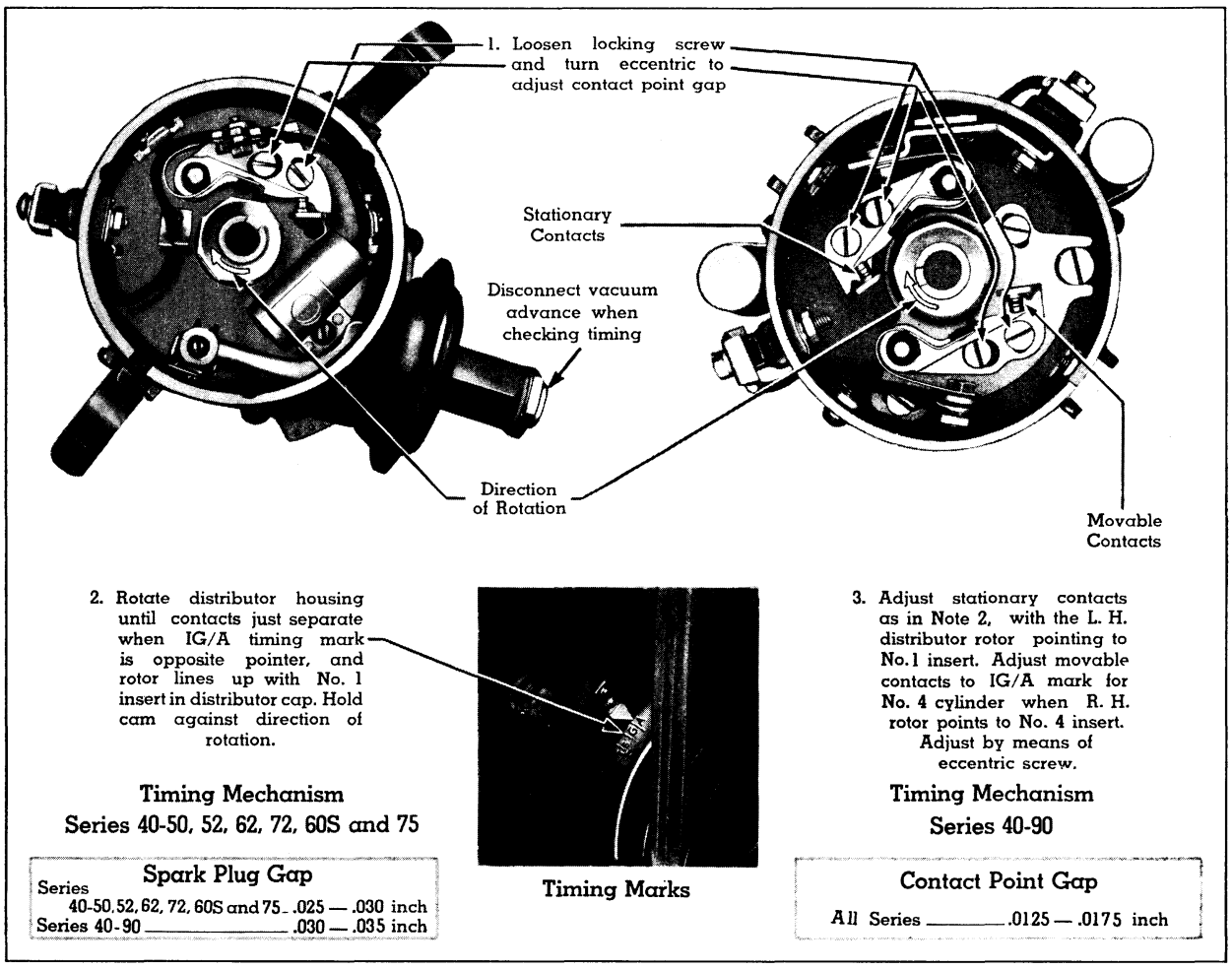


Fig. 32. Ignition Adjustments—All Series

4. Remove lock ring at rear, and take out carbon ring, rubber seal, spring and retainers. Note carefully order in which these pump parts are disassembled so that reassembly may be performed correctly. (See Figure 31.)

Reassembly—is the reverse of the above procedure, but with special emphasis on the following points:

1. Spread a light coating of water pump grease on contact surfaces of rubber seal and on carbon ring that rides on impeller. These surfaces must be lubricated when assembled so as to be water tight.

2. After assembly, check clearance between forward face of impeller and pump housing. This should be not less than .015 inch nor more than .025 inch.

New Pumps—Occasionally, a new pump or a newly rebuilt pump will be found to leak slightly, indicating that the carbon seal has not seated properly on the face of the impeller. Normally this condition will correct itself in a very few miles.

20. Ignition Adjustments

Detailed instructions on spark plugs, contact points and ignition timing are given in Figure 32.

> **Note:** When connecting or disconnecting the vacuum line to the distributor, use a wrench to hold the nut on the vacuum advance housing in order to avoid straining the vacuum unit and causing it to leak.

The V-16 ignition circuit is illustrated in Figure 33. All of the timing adjustments for the V-16 system are made in the left-hand timer distributor unit. The only attention required by the right-hand distributor is correct installation, as explained in Note 21, and lubrication.

21. Installation of Distributor Driveshaft

When the distributor driveshaft and gear on V-8 engines is installed, care must be exercised

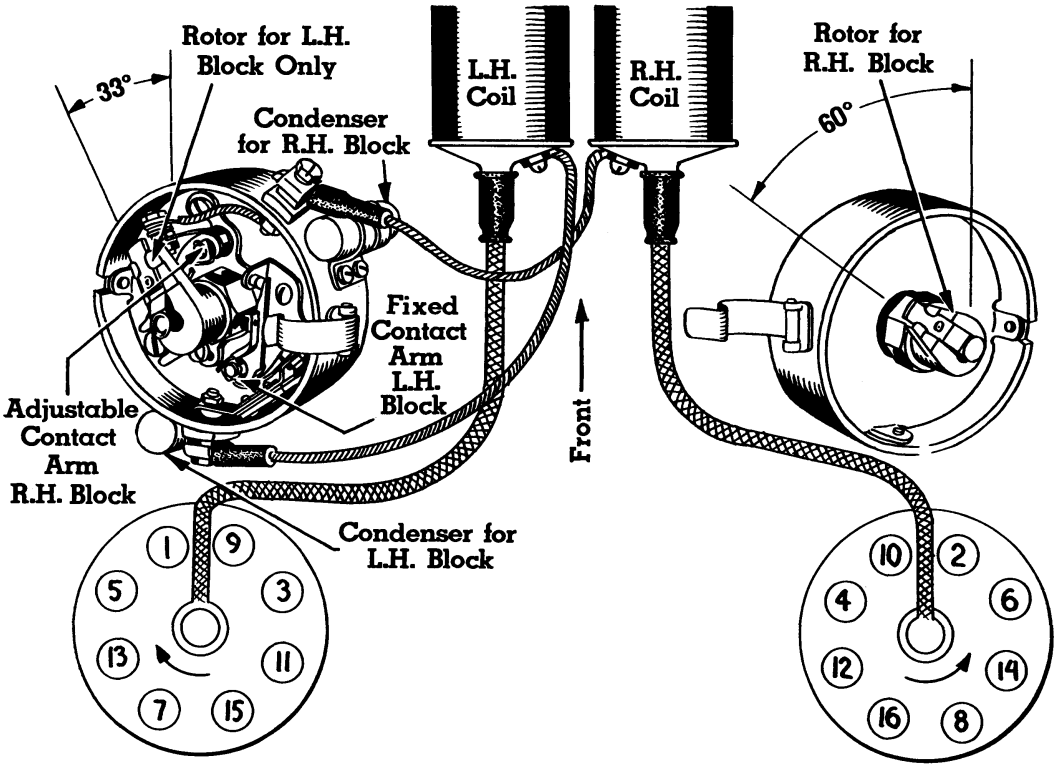


Fig. 33. Ignition Circuit—Series 40-90

to get the driven gear meshed with the camshaft gear in the proper position, otherwise it will be impossible to time the engine correctly.

First turn crankshaft to firing center for No. 1 cylinder. Then mesh distributor driven gear with driving gear on camshaft so that slot in upper end of driveshaft coupling is offset toward left-hand or rear side of the engine. In other words, narrow part of coupling at slot should be to the left or rear.

> **Note:** Make sure that the driveshaft extending down to the oil pump is properly lined up. Otherwise, damage might result from pushing pump shaft through pump cover.

The slots in the driving rods for the V-16 distributors are not offset, and it is therefore possible to install these distributors 180° out of time. In order to insure correct installation, turn the crankshaft to firing center for No. 1 cylinder and install the distributors with the rotors pointing forward and to the left. In the correct positions, the L.H. rotor points 33° to the left of the forward position, and the R.H. rotor points 60° to the left, as shown in Figure 33.

22. Replacing V-8 Distributor Drive Idler Gear Support

The idler gear that drives the distributor and oil pump driveshaft on Series 40-50, 52, 62, 72, 60S and 75 engines is carried on a support fastened to the rear end of the crankcase.

To remove the support:

1. Remove transmission, clutch, clutch housing, left rear valve tappet assembly and idler gear.

2. Remove oil sealing screw and retaining screw from top of housing.

3. Push support out toward rear of car.

Reverse above procedure for installation, exercising care to force locking screw down tight while tapping pilot lightly with a hammer.

23. Removing Ignition Coil Cover

Insert Tool J-726 between coil body and cover. Revolve coil clockwise and cover counter-clockwise to remove cover.

CARBURETOR ADJUSTMENT

STROMBERG CARBURETOR—SERIES 40-62, 72, 60S AND 75

When starting a cold engine on cars fitted with Stromberg carburetors, the accelerator should be depressed slightly and then released, **before** cranking the engine. This will assure correct setting of the fast idle.

ENGINE

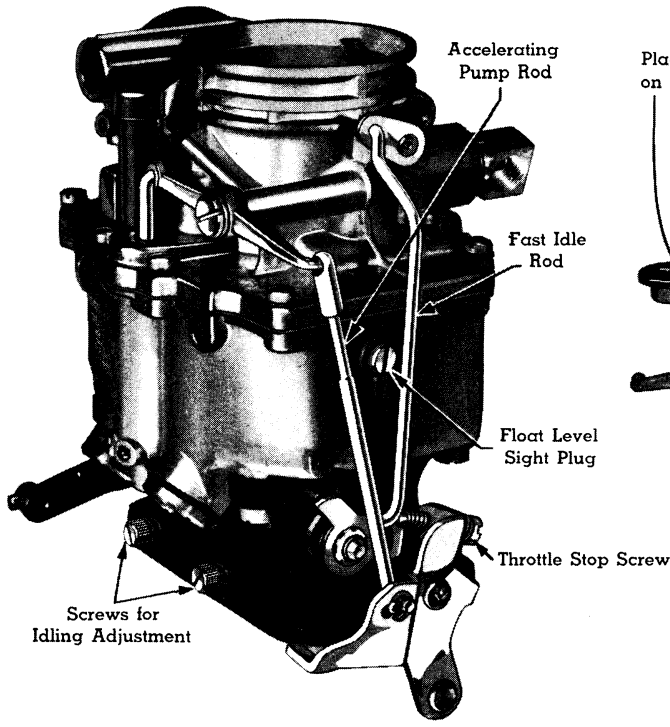


Fig. 34 Idling Adjustments

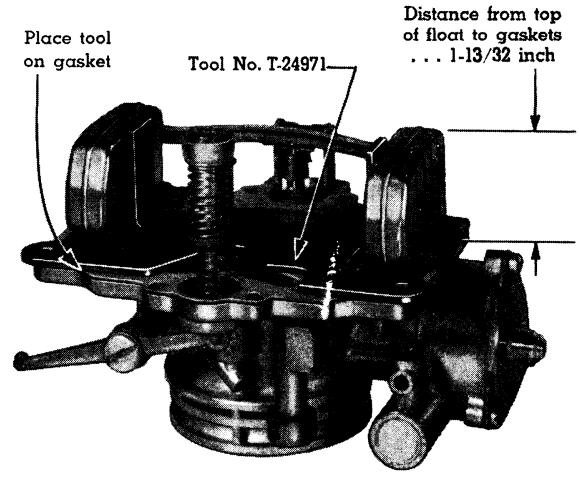


Fig. 35
Float Level Adjustment

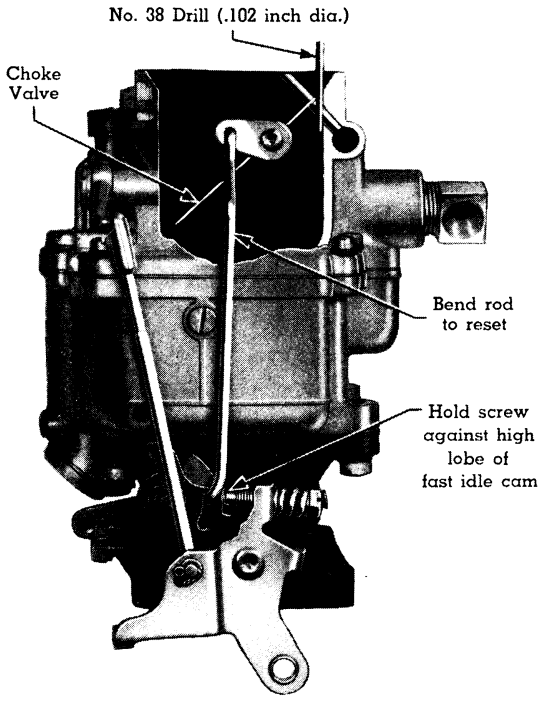


Fig. 36 Fast Idle Adjustment

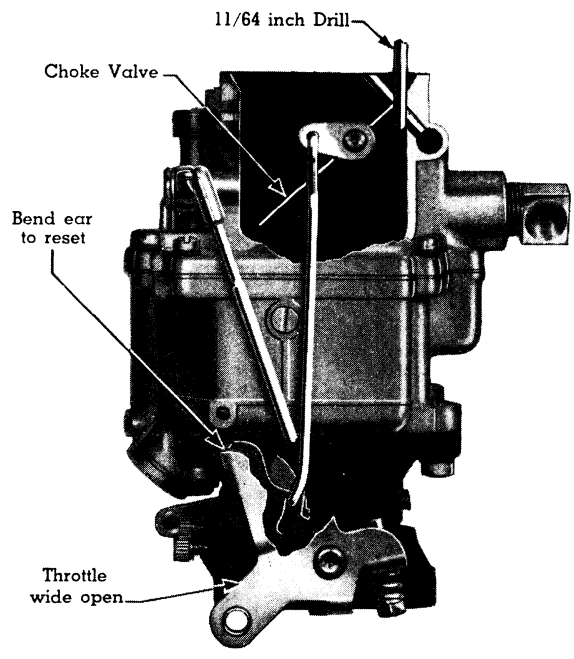


Fig. 37 Choke Release Adjustment

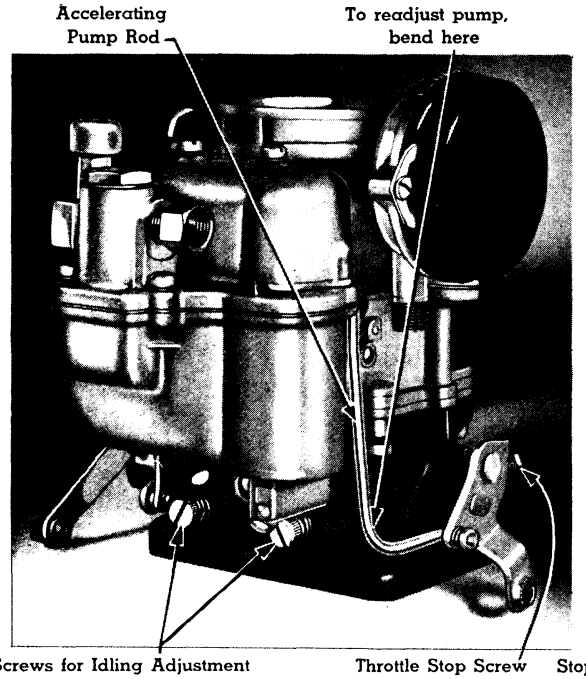


Fig. 38. Idling Adjustments

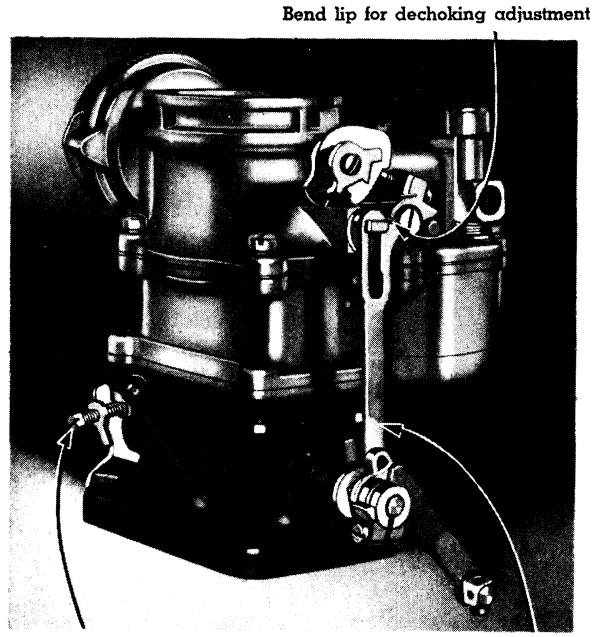


Fig. 39. Fast Idle Adjustment

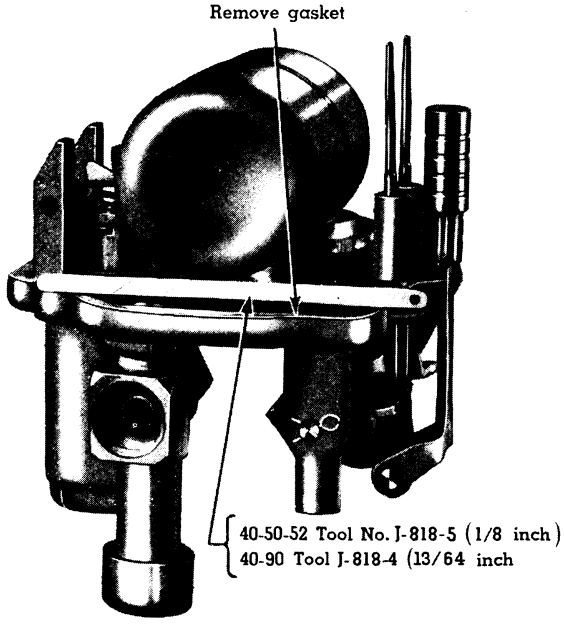


Fig. 40. Float Level Adjustment

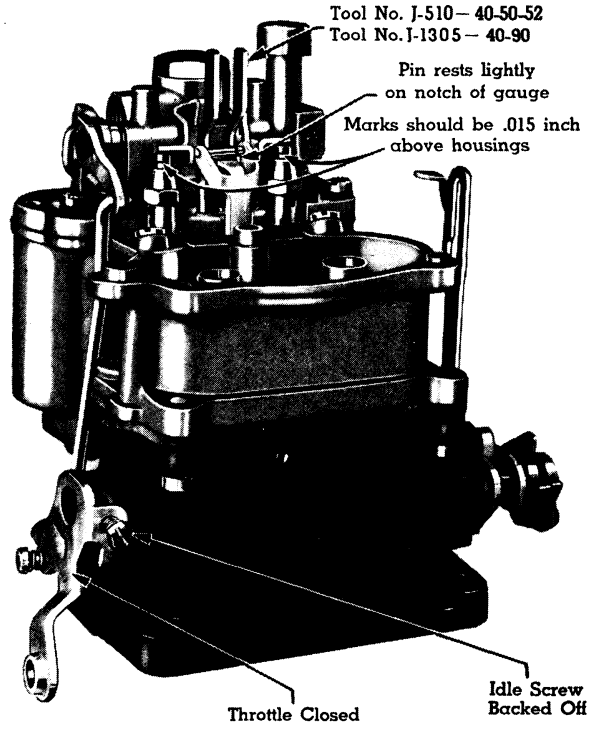


Fig. 41. Metering Rod Adjustment

ENGINE

24. Idling Adjustment

1. Run engine until it is thoroughly warm so that choke valve is wide open and throttle stop screw is on slow idle.

2. Set throttle stop screw so that engine speed approximates 7 to 8 m.p.h. in high gear on level road.

3. Adjust two idle adjustment screws so that engine runs smoothly without loping or stalling at this speed. (See Figure 34.)

Note: Turn screws clockwise to lean mixture and counter-clockwise to enrich mixture.

25. Float Level Adjustment

The gasoline level should be set to $\frac{5}{8}$ inch below the top surface of the float chamber.

The level corresponds to the lower level of the sight plug when the engine is idling, and may be checked without disassembling the carburetor.

Important: The float level can be checked only while the engine is running. Do not, however, start the engine while the carburetor cover is removed.

If the float level requires resetting, bend the float lever arm at the point adjacent to the fulcrum pin. Tool No. T-24971 should be used to re-check the position of the floats when the carburetor is disassembled. When the floats are properly set, the tops will be flush with the tops of the vertical guides of the tool, as shown in Figure 35.

If the special tool is not available, the float location can be checked by measuring from the top of the float to the gasket. This distance should be $1\frac{3}{32}$ inches.

26. Accelerating Pump Adjustment

Two holes are provided in the throttle lever for the accelerating pump rod. This rod should normally be placed in the inner hole, which provides the shorter stroke. In cases where a richer charge is required, the rod can be placed in the outer hole.

27. Fast Idle Adjustment

To check the fast setting of the carburetor:

1. Hold throttle stop screw against high lobe of fast idle cam.

2. Move choke valve as far as possible to closed position.

3. Insert a No. 38 drill (.102"-dia. in the opening. (See Figure 36.)

4. If this amount of opening is not obtained, bend fast idle rod lightly at point just below choke shaft.

28. Choke Release Adjustment

To correct a flooded condition, the choke valve can be partially opened by depressing the accelerator pedal all the way. This action can be checked as follows:

1. Hold throttle in fully open position.

2. Measure space between top of choke valve and side of carburetor air horn. (See Figure 37.) This should be between .156 and .187 inch. It can be measured best by inserting a drill of $\frac{11}{64}$" diameter in opening.

3. If readjustment is required, bend ear on throttle lever to correct position.

29. Choke Control Disassembly

1. Disconnect heat tube from thermostat housing.

2. Remove carburetor from manifold.

3. Remove thermostat cover.

4. Remove vacuum piston from housing.

5. Clean piston and cylinder walls with a clean rag saturated with acetone or alcohol. Blow out all channels with compressed air. Clean screen on inside of cover by blowing out with compressed air, being careful not to distort screen.

Reassembly—1. Place vacuum piston in cylinder with slot on piston assembled down. Assemble lever on choke stem.

Note: Do not use any type of lubricant on piston or in cylinder.

2. Place vacuum piston gauge T-25046 on choke housing with small hole fitted over pin of choke lever and indicator mark lined up with projection on housing.

3. Place a No. 70 drill (.028 inch) between choke valve and air horn.

4. Assemble serrated washer, lockwasher and locknut, tightening merely by hand. Check choke valve opening.

5. Remove drill and tighten lock nut with wrench T-25047.

6. Reassemble cover, as explained in following note, and reconnect heat tube.

30. Thermostat Setting

The thermostat is calibrated to give satisfactory performance with the blends of gasoline ordinarily used. When installing thermostat cover see that edge of screen is not crimped or creased, as this would cause leakage.

Locate thermostat hook at bottom of housing and then rotate cover in "RICH" direction until mark "O" coincides with projection on housing. Place lugs in position and fasten cover screws securely.

Note: When assembling heat tube connection nut onto thermostat cover, do not use excessive pressure to avoid changing position of cover.

CARTER CARBURETOR SERIES 40-50, 52 AND 90

When starting a cold engine on cars fitted with Carter carburetors, the accelerator should be pressed slowly all the way to the floorboards and released, **before** cranking the engine. This will assure the correct setting of the automatic choke.

31. Idling Adjustment

The procedure given for making the idling adjustment on the Stromberg carburetor will also apply to the Carter carburetor. (Figure 38.)

32. Float Level Adjustment

1. Remove air horn assembly and float bowl cover and disengage metering rods by removing metering rod arm pin.

2. Invert float bowl cover, holding needle seat away and float in horizontal position.

3. Measure distance between metal rim for cover gasket and nearest point of float. Be sure gasket is removed.

4. Bend lip of float lever if measurement shows improper setting. The correct float level setting is $\frac{1}{8}$ inch for 40-50 and 52 engines and $\frac{3}{64}$ inch for 40-90 engines.

Note: Tool J-818-5 (40-50 and 52), and Tool J-818-4 (40-90) are convenient for measuring this distance.

33. Automatic Choke Adjustment

Except for a check of the moving parts to see that they operate freely and an occasional cleaning of the hot air line and screen, no adjustment of the automatic choke control unit should be necessary. If the initial and part throttle running mixture is too lean or too rich, revolve the thermostat housing as indicated on the housing face. Ordinarily the choke setting mark in the housing should be set exactly opposite the large mark on the carburetor flange.

34. Accelerating Pump Adjustment

With pump connecting link in place and throttle stop screw backed out, pump plunger should travel $\frac{3}{32}$ inch from closed to wide open position. Readjustment can be made by bending throttle connector rod at a lower angle.

35. Metering Rod Adjustment

This adjustment should be made when reassembling a carburetor. Proceed as follows:

1. Insert two metering rod gauges, Tool No. J-1305 on the 40-50 and 52 or Tool No. J-510 on the 40-90, in place of metering rods. Be sure gauges seat in metering rod jets.

2. Install metering rod pin and pin spring in metering rod arm.

3. Rest a screwdriver lightly on metering rod arm until pin rests on shoulders of notches in both gauges. A slight bend in metering rod arm may be necessary to equalize setting of two pins.

4. With throttle valves seated and metering rod pin resting lightly on notches in both gauges, and throttle fully closed, tighten anti-percolator arm screw.

5. Remove gauge and metering rod pin and install metering rods, discs, metering rod spring, pin, and pin spring. Hook spring onto metering rods.

36. Anti-Percolator Adjustment

Before reassembling the carburetor after making the metering rod adjustment, check the anti-percolator jet adjustment. These jets are in correct adjustment when the scored marks on the jets are .015 inch above the tops of the jet housings with the throttle fully closed as shown in Figure 41.

If the adjustment is incorrect, it can be reset readily by bending the metering rod arms with Tool No. J-787.

Note: The easiest way to check this adjustment is to insert a .015 inch feeler between jets and metering rod arms and then to set arms so that scored marks line up with tops of housings.

37. Slow and Fast Idle Adjustment

1. Make sure that correct slow idle adjustment (7 to 8 m.p.h.) has been made.

2. With fast idle screw resting against high lobe of fast idle cam, check clearance between throttle lever adjusting screw and carburetor casting stop, as shown in illustration. (See Figure 39.)

3. Adjust clearance to final setting of .023 inch for correct operation. Tool No. J-668 provides an accurate means of measuring.

38. Dechoking Adjustment

1. Check distance between upper edge of choke valve and wall of carburetor air horn when throttle is fully open.

2. Measure opening, which should be approximately 1/8 inch, and bend lip on fast idle connector rod that contacts choke trip lever, if it is necessary to change position of valve.

With throttle wide open, push choke valve open. Choke should lock in wide open position. Closing throttle will release choke valve. If it does not lock, recheck dechoking adjustment.

39. Equalizing V-16 Carburetor Adjustment

The adjustments of the two carburetors on the Series 40-90 engines 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 the vacuum lines are disconnected.

If the speed is too slow, turn the throttle stop screw in a little on the side on which the mercury column is higher.

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.

40. Cleaning Carburetor Air Cleaner

The filtering unit of the carburetor air cleaner on all 40-series cars should be serviced every 2,000 miles or oftener if extreme dust conditions are encountered. The correct procedure for servicing the cleaners is as follows:

1. Remove cleaner from car.
2. Remove cover of cleaner, wire mesh unit and metal screen from reservoir.
3. Pour oil out of reservoir and clean all parts thoroughly with gasoline, taking particular care to wash all accumulated dirt and dust out of wire mesh.
4. Dry all units thoroughly with air and install reservoir and metal screen.
5. Pour one pint of S.A.E. 50 engine oil (S.A.E. 40 for winter temperatures) in the reservoir.
6. Reassemble cleaner and install on car.

Note: New cars are shipped from the factory without oil in the air cleaner. One pint should be installed before the car is put into service.

41. Servicing Fuel and Vacuum Pumps

The service operations that can be performed on the fuel and vacuum pumps without special tools are the cleaning of the filter and replacement of the filter parts, the vapor dome, and the inlet and outlet valves.

Service on the fuel pumps or vacuum pumps, whether of a combination unit or separate type, can be obtained from A.C. or United Motors Service Stations, where special tools and repair parts are available. Distributors who wish to make repairs in their own stations can purchase the necessary tools at an A.C. service station.

42. Engine Support Adjustment

All of the engine supports on V-8 engines, and the front and intermediate supports on V-16 engines require no adjustment, but should be installed with the attaching parts tightened securely. The rear support for V-16 cars should be adjusted by turning down the nut finger tight and then turning an additional half turn with a wrench.

ENGINE SPECIFICATIONS

Subject and Remarks	40-50, 52	40-62, 60S	40-72, 75	40-90
Bore	3⅜"	3½"	3½"	3¼"
Stroke	4½"	4½"	4½"	3¼"
Compression ratios	6.25-1	6.25-1	6.70-1	6.75-1
Compression pressures (lb. per sq. in.)				
At 1000 R.P.M.	155	155	170	180
Horsepower—				
Rated (taxable)	36.45	39.20	39.20	67.60
Developed at 3400 R.P.M.	130	135	140	....
Developed at 3600 R.P.M.	....	....	....	185
Piston displacement in cu. in.	322	346	346	431
Points of suspension, number	3	3	3	5

ENGINE

Subject and Remarks	40-50, 52	40-62, 60S	40-72, 75	40-90
CAMSHAFT				
Bearing clearance—				
New limits	.0015-.0033″	.0015-.0033″	.0015-.0033″	.0013-.0025″
Worn limits, not over	.0045″	.0045″	.0045″	.004″
Bearing out of round, not over	.002″	.002″	.002″	.002″
Number of bearings	3	3	3	5
CHAINS				
Camshaft chain—				
Adjustment	None	None	None	None
Number of links	62	62	62	62
Morse Type No.	C-3682-R	C-3682-R	C-3682-R	C-3682-R
Width	1¼″	1¼″	1¼″	1¼″
CONNECTING RODS				
Clearance between bearing and shaft—				
New limits	.0015-.0025″	.0015-.0025″	.0015-.0025″	.0015-.0025″
Worn limits, not over	.0045″	.0045″	.0045″	.0045″
End-play on lower bearings	.008-.014″	.008-.014″	.008-.014″	.008-.014″
CRANKSHAFT AND MAIN BEARING				
Crankpin diameter	2.4590-2.4595″	2.4590-2.4595″	2.4590-2.4595″	1.9988-1.9993″
Crankpin out-of-round, not over	.00025″	.00025″	.00025″	.00025″
Clearance, main bearings—				
New limits	.0015-.0025″	.0015-.0025″	.0015-.0025″	.0015-.0025″
Worn limits, not over	.005″	.005″	.005″	.005″
Main bearing journals, out-of-round, not over	.00025″	.00025″	.00025″	.00025″
End-play in crankshaft—				
New limits	.001-.005″	.001-.005″	.001-.005″	.001-.005″
Worn limits	.010″	.010″	.010″	.010″
OIL PUMP				
Backlash between drive gears, not over	.008-.012″	.008-.012″	.008-.012″	.008-.012″
Clearance between pump body and driveshaft—				
New limits	.0010-.0025″	.0010-.0025″	.0010-.0025″	.0010-.0025″
Worn limits, not over	.005″	.005″	.005″	.005″
Clearance between pump body and gears—				
New limits	.002-.004″	.002-.004″	.002-.004″	.002-.004″
Worn limits, not over	.006″	.006″	.006″	.006″
End-play in pump gears—				
New limits	.001-.004″	.001-.004″	.001-.004″	.001-.004″
Worn limits, not over	.006″	.006″	.006″	.006″
OIL PRESSURE REGULATOR				
Clearance between valve plunger and housing—				
New limits	.0020-.0035″	.0020-.0035″	.0020-.0035″	.0020-.0035″
Worn limits, not over	.005″	.005″	.005″	.005″
Normal pressure at 30 M.P.H. (min.)	25 lbs.	25 lbs.	25 lbs.	25 lbs.
Idle	15 lbs.	15 lbs.	15 lbs.	15 lbs.
Spring—				
Free length (approx.)	2 25/64″	2 25/64″	2 25/64″	2 19/32″
Pressure at 1 13/32″	5¾-6¼ lbs.	5¾-6¼ lbs.	5¾-6¼ lbs.	....
Pressure at 1 15/32″	....	....	....	7¼-7¾ lbs.
Valve opens at	30 lbs.	30 lbs.	30 lbs.	30 lbs.
PISTONS AND CYLINDERS				
Cylinder bore out of round, not over	.0005″	.0005″	.0005″	.0005″
Taper, not over	.0003″	.0003″	.0003″	.0003″
Piston Clearance (see note)				
Bottom of skirt	.0020-.0025″	.0020-.0025″	.0020-.0025″	.0020-.0025″
Cylinder bore, standard	3.3745-3.3765″	3.5000-3.5020″	3.5000-3.5020″	3.2500-3.2520″
Piston skirt diameter—standard	3.3726-3.3746″	3.4979-3.4999″	3.4979-3.4999″	3.2483-3.2503″
Piston skirt diameter—oversize—				
.003″ oversize	3.3761-3.3776″	3.5014-3.5029″	3.5014-3.5029″	....
.005″ oversize	3.3781-3.3796″	3.5034-3.5049″	3.5034-3.5049″	3.2538-3.2553″
.010″ oversize	3.3831-3.3846″	3.5084-3.5099″	3.5084-3.5099″	3.2588-3.2603″
.015″ oversize	3.3881-3.3896″	3.5135-3.5149″	3.5135-3.5149″	3.2638-3.2653″
.030″ oversize	3.4031-3.4046″	3.5284-3.5299″	3.5284-3.5299″	3.2788-3.2803″

ENGINE

Subject and Remarks	40-50, 52	40-62, 60S	40-72, 75	40-90
PISTON PINS				
Clearance between pin and bushing—				
New limits	.0002-.0008″	.0002-.0008″	.0002-.0008″	....
Worn limits, not over	.0018″	.0018″	.0018″	....
Clearance between pin and piston—				
New limits	....	....	....	.0001-.0006″
Worn limits, not over	....	....	....	.0018″
PISTON RINGS				
Clearance between rings and sides of grooves in piston—				
Top compression ring	.0023-.0041″	.0023-.0041″	.0023-.0041″	.0030-.0043″
Bottom compression ring	.0013-.0026″	.0013-.0026″	.0013-.0026″	.0013-.0026″
Oil rings	.0013-.0026″	.0013-.0026″	.0013-.0026″	.0013-.0026″
Gap between ends—				
Compression rings	.007-.012″	.007-.012″	.007-.012″	.007-.015″
Oil rings	.007-.015″	.007-.015″	.007-.015″	.007-.015″
Number of compression rings	2	2	2	2
Number of oil rings	2	2	2	1
Width of compression rings—				
Top Ring	3/32″	3/32″	3/32″	3/32″
Bottom ring	1/8″	1/8″	1/8″	1/8″
Width of oil rings	5/32″	5/32″	5/32″	3/16″
VALVES, EXHAUST				
Clearance between stem and guide—				
New limits	.0022-.0042″	.0022-.0042″	.0022-.0042″	.0020-.0040″
Worn limits, not over	.005″	.005″	.005″	.005″
Clearance between stem and camslide (With hydraulic unit compressed)	.030-.070″	.030-.070″	.030-.070″	.030-.070″
Clearance between lifter bracket and camslide—				
New limits	.0010-.0024″	.0010-.0024″	.0010-.0024″	....
Worn limits, not over	.0035″	.0035″	.0035″	....
Clearance between crankcase and camslide—				
New limits	....	....	....	.0015-.0025″
Worn limits, not over	....	....	....	.0035″
Distance between valve stem and heel of camshaft	3.000″	3.000″	3.000″	....
Head diameter, over-all	1.626-1.636″	1.626-1.636″	1.626-1.636″	1.370-1.380″
Stem, length over-all	5 33/64″	5 33/64″	5 33/64″	5 39/64″
Stem, diameter	.3405-.3415″	.3405-.3415″	.3405-.3415″	.3405-.3415″
Lift	.345″	.345″	.345″	.302″
Seat angle	45°	45°	45°	45°
Seat width (minimum)	.075″	.075″	.075″	.075″
Seat eccentricity, not over (total indicator reading)	.0015″	.0015″	.0015″	.0015″
VALVES, INLET				
Clearance between stem and guide—				
New limits	.0012-.0032″	.0012-.0032″	.0012-.0032″	.0010-.0030″
Worn limits, not over	.005″	.005″	.005″	.005″
Clearance between stem and camslide (with hydraulic unit compressed)	.030-.070″	.030-.070″	.030-.070″	.030-.070″
Clearance between lifter bracket and camslide—				
New limits	.0010-.0024″	.0010-.0024″	.0010-.0024″	....
Worn limits, not over	.0035″	.0035″	.0035″	....
Clearance between crankcase and camslide—				
New limits	....	....	....	.0015-.0025″
Worn limits, not over	....	....	....	.0035″
Distance between valve stem and heel of camshaft	3.000″	3.000″	3.000″	....
Head diameter, over-all	1.876-1.886″	1.876-1.886″	1.876-1.886″	1.495-1.505″
Stem, length over-all	5 33/64″	5 33/64″	5 33/64″	5 19/32″
Stem, diameter	.3415-.3425″	.3415-.3425″	.3415-.3425″	.3415-.3425″
Lift	.335″	.335″	.335″	.290″
Seat angle	45°	45°	45°	45°
Seat width (minimum)	.075″	.075″	.075″	.075″
Seat eccentricity not over (total indicator reading)	.0015″	.0015″	.0015″	.0015″

ENGINE

Subject and Remarks	40-50, 52	40-62, 60S	40-72, 75	40-90
VALVE SPRINGS				
Free length	2.210″	2.210″	2.210″	2.074″
Pressure in pounds—				
Compressed to $1\frac{59}{64}$″ (valve closed)	66	66	66	....
Compressed to $1\frac{37}{64}$″ (valve open)	145	145	145	....
Compressed to $1\frac{25}{32}$″ (valve closed)	....	....	....	50
Compressed to $1\frac{15}{32}$″ (valve open)	....	....	....	100
VALVE TIMING				
Intake opens	T.D.C.	T.D.C.	T.D.C.	6° B.T.C.
Intake closes	42° A.B.C.	42° A.B.C.	42° A.B.C.	28° A.B.C.
Exhaust opens	52° B.B.C.	52° B.B.C.	52° B.B.C.	44° B.B.C.
Exhaust closes	10° A.T.C.	10° A.T.C.	10° A.T.C.	12° A.T.C.
FAN				
Belt—				
Length—center to center	$7\frac{11}{16}$-$7\frac{13}{16}$″	$10\frac{13}{32}$″-$10\frac{19}{32}$″	$10\frac{13}{32}$″-$10\frac{19}{32}$″	$11\frac{3}{4}$-$11\frac{7}{8}$″
Width	$1\frac{1}{64}$″	$1\frac{1}{64}$″	$1\frac{1}{64}$″	$\frac{5}{8}$″
Type	34° Vee	34° Vee	34° Vee	38° Vee
RADIATOR				
Hoses—cylinder block to radiator (top)—				
Diameter, inside	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{2}$″
Length	R.H. $9\frac{1}{2}$″ L.H. $8\frac{1}{2}$″	$11\frac{1}{4}$″	$11\frac{1}{4}$″	$10\frac{1}{4}$″
Hose—radiator to water pump—				
Diameter, inside	2″	2″	2″	$1\frac{3}{4}$″
Length	Moulded	$6\frac{3}{4}$″	$6\frac{3}{4}$″	Moulded
WATER PUMP				
Clearance between impeller and pump body	.050-.092″	.050-.092″	.050-.092″	.015-.025″
Clearance between pump shaft and bushings—				
New limits	.0010-.0025″	.0010-.0025″	.0010-.0025″	....
Worn limits, not over	.0035″	.0035″	.0035″	....
Packing spring—				
Free length	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{4}$″	....
Pressure in pounds compressed to $\frac{1}{2}$″	$2\frac{1}{2}$-3	$2\frac{1}{2}$-3	$2\frac{1}{2}$-3	....
Springs must show no set when compressed with coils touching.				
IGNITION				
Coil, Delco-Remy type number	1115128	1115128	1115128	553-E
Distributor, Delco-Remy type number	1110806	1110806	1110806	1110601-L.H. 1110602-R.H.
Angle between contact arms	....	....	....	$22\frac{1}{2}$°
Contact point gap	.0125-.0175″	.0125-.0175″	.0125-.0175″	.0125-.0175″
Tension of contact arm spring in ounces	19-23	19-23	19-23	19-23
Timing mark (IGA) ahead of center	5°	5°	5°	6°
Spark plugs—				
AC Type number	104	104	104	104
Gap	.025-.030″	.025-.030″	.025-.030″	.030-.035″
Thread	10 mm.	10 mm.	10 mm.	10 mm.
Ignition switch—				
Delco-Remy type number	1116282	62 —1116282 60S—1116275	72—1116282 75—1116275	1116283
V-8 Firing order	1, 8, 7, 3, 6, 5, 4, 2			
V-16 Firing order	1, 4, 9, 12, 3, 16, 11, 8, 15, 14, 7, 6, 13, 2, 5, 10			
CARBURETION				
Make	Carter	Stromberg	Stromberg	Carter
Model	WDO-460-S	AAV-26	AAV-26	407-S (L.H.) 408-S (R.H.)
Size	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{4}$″	$1\frac{1}{8}$″
Float level setting (Fuel level below top surface of bowl)		$\frac{5}{8}$″	$\frac{5}{8}$″	
Fuel pump—				
Delivery per stroke	22-25 c.c.	22-25 c.c.	22-25 c.c.	18-21 c.c.
Operating pressure	$3\frac{1}{2}$-5 lb.	$3\frac{1}{2}$-5 lb.	$3\frac{1}{2}$-5 lb.	3-$4\frac{1}{2}$ lb.

CLUTCH

1. Removal of Clutch from Car

1. Remove transmission, after disconnecting front universal joint and placing a jack under engine oil pan.

2. Remove clutch housing pan.

3. Mark flywheel and clutch pressure plate assembly so that they can be reassembled in same position, and thus retain proper balance.

4. Loosen retaining screws that hold clutch on flywheel, a turn or two at a time, until spring pressure is fully released.

5. Remove retaining screws and take clutch assembly and driven disc from flywheel.

2. Installation of Clutch in Car

1. If either a new clutch disc or a new transmission is to be installed, check fit of splines on clutch disc hub and clutch connection shaft. A free fit is necessary to prevent clutch drag. Lubri-plate or graphite grease applied to splines will aid in proper assembly.

2. Install driven disc and pressure plate assembly loosely on flywheel, making certain first, that driven disc is installed with oil guard toward rear, and second, that balance marks on flywheel and pressure plate are in line.

3. Center hub of driven disc, using aligning arbor, Tool No. J-1031, and tighten retaining screws securely.

4. Reinstall clutch housing pan and transmission.

Caution: Under no circumstances allow the transmission to hang in the clutch assembly when removing or installing, as this would bend or otherwise damage the driven disc.

5. Finally, check clutch pedal free play, and adjust to within $\frac{7}{8}$-$1\frac{1}{8}$ inches.

3. Disassembly of Pressure Plate Assembly

1. Place pressure plate assembly in arbor press with a block under spring pressure plate, so arranged that cover is left free to move down.

2. Place a block or bar across top of cover, resting it on spring bosses, and place assembly under compression.

3. Remove retaining screws which hold clutch release lever clevises in place.

4. Slowly release the pressure from press and remove spring cover.

5. Remove springs and clutch release levers by removing clutch release lever pivot pins and disassembling yokes and rollers.

4. Reassembly of Pressure Plate Assembly

1. Inspect springs carefully and replace them in complete sets if they show signs of having been overheated. If springs have been overheated, they will show a pronounced blue color, indicating the temper has been drawn, or else paint will be scorched or burned off. If heating has continued long enough, the springs will have a dark gray color, indicating that the temper has been entirely removed from them. The free height of the springs should be checked against the specifications, page 45.

2. Place pressure plate in arbor press and set clutch springs on it in a vertical position, seating them on the insulators resting on the small bosses.

3. Reinstall clutch release levers.

4. Apply a small amount of water pump grease (G13) to driving lugs.

5. Place cover on top of assembled parts, taking care that clutch levers are in position and that tops of pressure plate springs are properly seated under seats in cover.

6. Lay a bar across cover and slowly compress assembly, making sure that pressure plate lugs are guided through the proper holes in cover.

7. Insert screws holding lever pivot clevis to cover plate, holding clevis square while tightening screw.

8. Release and apply pressure on assembly several times so that all moving parts will settle into their working position.

9. Remove pressure plate assembly from press and adjust clutch release levers.

5. Adjustment of Clutch Release Levers

Before adjustment is attempted, levers must be worked several times to center the bearings. The only accurate method of adjusting clutch release levers is by use of Universal Clutch Lever Adjusting Gauge, Tool No. J-285-C, as follows:

1. Place gauge in flywheel in position normally occupied by driven disc.

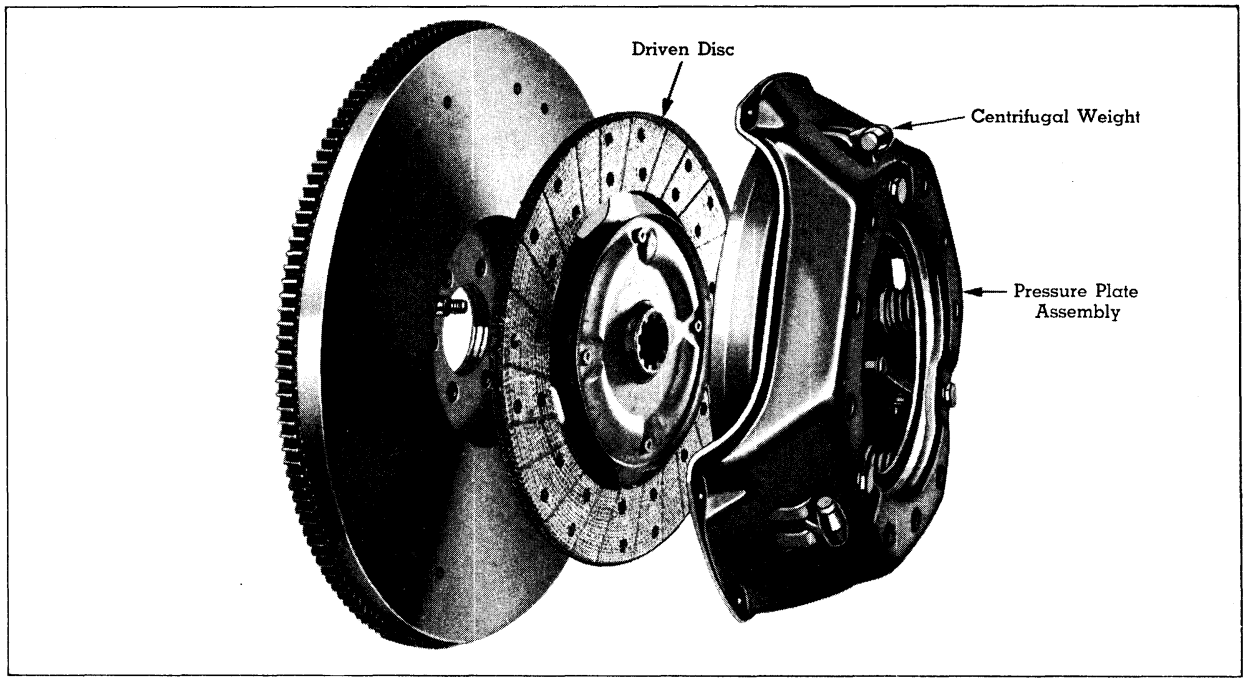


Fig. 42. Clutch—Disassembled
Typical of 40-50, 52, 62, 72, 60S and 75

2. Mount pressure plate assembly on flywheel, turning holding screws a turn or two at a time so as not to spring cover.

3. Center the gauge plate.

4. Lay a short straight edge across center boss of gauge, as a guide for positioning clutch levers.

5. Set adjustable boss in tool to height of lowest lever.

6. Tap clevis mounting screw head, using 8-ounce hammer, in order to bend pressure plate cover assembly slightly while holding the lever down, until all levers are the same height.

This method gives the most accurate adjustment and does not necessitate breaking the staking to readjust the levers.

6. Squeaks in Clutch Mechanism

The cause of clutch squeaks is most likely to be contact between the driving lugs and the clutch pressure plate assembly where the lugs project through the lower plate.

Squeaks at this point can best be eliminated by placing a thin coating of water pump grease on a feeler gauge and then passing the gauge between the points of contact.

Another method of greasing is to disengage the clutch fully and rub the grease on the exposed part of the bearing surface. Engaging and disengaging the clutch a number of times will then allow the grease to work down through the pressure plate holes.

A second source of clutch squeaks is at the clutch pedal adjusting nut. This squeak is best cured by backing the ball nut off its seat and applying a thin coating of grease on the bearing surface.

7. Lubrication of Pilot Bearing

Whenever the transmission or clutch is removed for any reason, the clutch connection pilot bearing should be inspected to make sure that it is in good condition and adequately lubricated.

This bearing should always be lubricated lightly with wheel bearing grease, if removed from the car at any time, but too much lubricant should not be used because of the possibility of grease reaching the clutch plates.

8. Removal of Locking Pins

Clutches as furnished by the Parts Department are provided with three locking pins or blocks, one at each clutch release lever.

When the clutch is installed and the cover plate tightened in position, these pins or blocks are released. **It is extremely important that these pins be removed;** otherwise, they will drop into the clutch housing and may cause considerable damage when the car is put into operation.

CLUTCH

9. Balancing Clutch

Balance is a vital factor in the clutch. To secure proper balance, it is necessary, first of all, to reassemble the clutch according to the balance marks put on the rotating parts before disassembly. After the clutch has been reinstalled, jack up the rear wheels and run the engine from 24 to 30 m. p. h. (speedometer reading) for the V-8 cars and from 32 to 38 m. p. h. for the V-16 cars, and note whether there is any excessive vibration. If there is, the clutch must be rebalanced in the following manner:

Install one or two 1/8" thick washers with a $\frac{5}{16}$" diameter hole on one of the clutch pressure plate assembly cap screws, starting at the point where the clutch has been drilled for balancing. This will make the condition either better or worse. Then on repeated trials, add or take away one or two washers at each screw until a satisfactory balance is achieved.

CLUTCH SPECIFICATIONS

Subject and Remarks	40-50 40-52	40-62 40-60S	40-72 40-75	40-90
Clearance between hub and splines on clutch connection shaft—				
New limits	.0013-.0035"	.0013-.0035"	.0013-.0035"	.0013-.0035"
Worn limits	.0045"	.0045"	.0045"	.0045"
Disc facings—				
Diameter inside	6¾"	7"	7"	7"
Diameter outside	10"	10½"	11"	11½"
Thickness	.137"	.137"	.137"	.137"
Number used	2	2	2	2
Material	Woven	Woven	Woven	Woven
Driven disc with facings—				
Number used	1	1	1	1
Number dampener springs used	8	8	8	None
Thickness (overall compressed)	.309-.318"	.306-.316"	.306-.316"	.306-.316"
Runout, not over	.025"	.025"	.025"	.025"
Pedal (clutch) freeplay	⅞ to 1⅛"	⅞ to 1⅛"	⅞ to 1⅛"	⅞ to 1⅛"
Pressure springs—				
Number used	9	9	9	12
Color	Yellow	Yellow	Yellow	Red
Free length	2 5/16"	2 5/16"	2 5/16"	2 11/32"
Pressure in pounds compression to 1 9/16"	145-150	145-150	145-150	120-130
Spring, retracting clutch pedal—				
Free length, inside loops	10½"	10½"	*8 9/16"	8 9/16"

*40-72 spring is 10½"

OTHER CLUTCH REFERENCES

TRANSMISSION

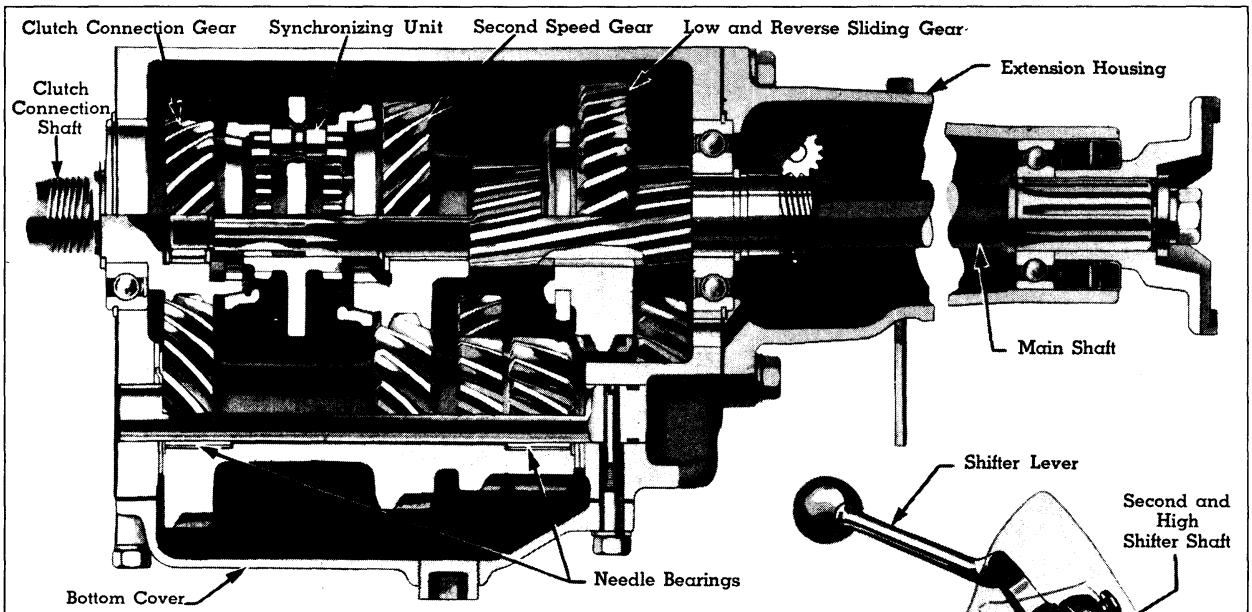


Fig. 43. Transmission Cross Section

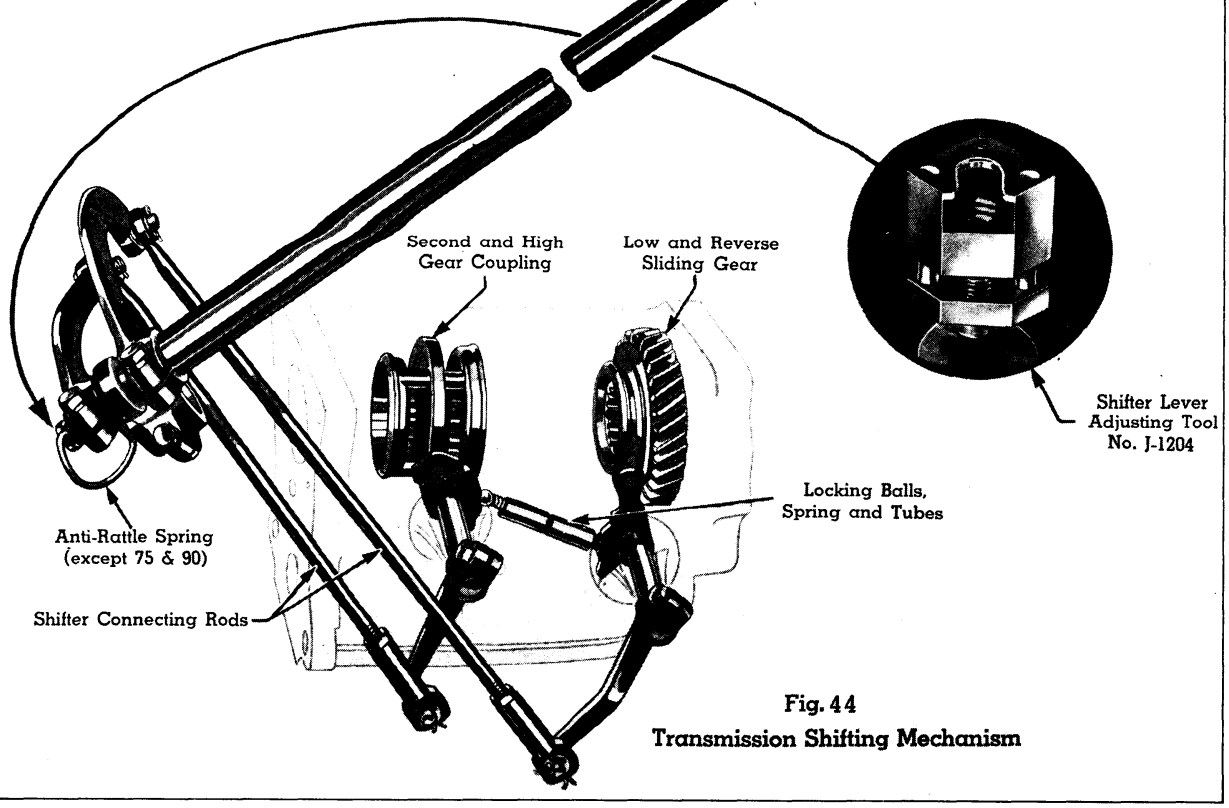


Fig. 44
Transmission Shifting Mechanism

TRANSMISSION

1. Adjustment of Shifter Connecting Rods

The shifter connecting rods between the transmission and the outer ends of the shifting levers may be adjusted in the following manner:

1. Place shifter control lever in neutral, between second and high gear.

2. Lengthen or shorten adjustable end of low and reverse shifter connecting rod until control lever may be lifted into low or reverse gear without interference.

This adjustment must be accurately made, otherwise it will be impossible to cross over from high and second to low and reverse, and may cause the transmission to slip out of gear. Slipping out of gear may also be due to a binding in the rubber bushings of the shifter connecting rods, or to a loose rear motor support.

2. Hard Shifting

Hard shifting may be due to:

1. Driver may not lift shifter lever high enough when shifting into low and reverse.

2. Front seat adjustment may be incorrect. Attempting to shift while sitting back in seat with right arm in a straightened position is much harder than when sitting forward and shifting with arm bent at right angles.

3. Incorrectly adjusted shifter connecting rods.

4. Incorrectly adjusted steering column control.

5. Incorrectly adjusted clutch pedal.

6. Dragging or spinning clutch.

7. Improper or insufficient lubricant in transmission.

8. Damaged gears caused by improper shifting.

9. Wear on high and intermediate synchronizing drums.

10. Broken detent springs.

3. Adjustment of Shifter Levers

1. Disconnect rods leading to transmission, and remove anti-rattle spring.

2. Apply Tool No. J-1204 to lower end of second and high shifting shaft and tighten screw slightly.

3. Loosen clamping screw on second and high lever.

4. Turn screw on tool until two pounds tension is required to move the second and high lever back and forth—as measured with a spring scale attached to the outer end of the lever.

5. Tighten lever clamping screw and remove tool.

The low and reverse shifter lever does not require adjustment. (See Note 6.)

4. Disassembly of Shifting Mechanism

1. Remove steering wheel as explained in steering section, page 57.

2. Remove anti-rattle spring.

3. Remove second and high lever at lower end of shifting column.

4. Loosen clamp screw holding low and reverse lever in place so that lever will slip off when shaft and tube for shifting mechanism are pulled upward.

5. Remove cross-over spring at upper end of shifting column.

6. Loosen clamp screw holding upper shifter housing to steering column.

7. Lift upper housing, with shifter control lever and shifting tube and shaft attached, from steering column.

8. Remove pin and collar at lower end of second and high shifting shaft.

9. Pull second and high shifting shaft out of low and reverse shifting tube.

10. Remove gear shift lever.

11. Pull low and reverse shifting tube out of housing.

5. Assembly of Shifting Mechanism

1. Install low and reverse shifting tube in housing with lug pointing away from center of housing.

2. Hold gear shift control lever in place and install second and high shifting shaft inside shifting tube.

3. Slip two spring washers with concave sides up, over bottom end of second and high shifting shaft and hold in place against end of low and reverse tube.

4. Install collar at lower end of second and high shifting shaft and press locking pin in place.

5. If bracket holding lower end of shifting tube to steering column has been removed, it should be reinstalled with clamping bolt washer in slot in steering column.

6. Push housing with shifting shaft and shifting tube down next to steering column until lower end of the second and high shifting shaft is an inch or two away from lower bracket.

7. Holding shifting tube and shaft in this position, push low and reverse shifter lever over end of low and reverse shifting tube.

8. Push shifting shaft through bracket.

9. Install second and high lever on end of shifting shaft, using two anti-rattle spring washers with concave sides up between lever and bracket, and install anti-rattle spring.

10. Lower or raise shifter housing below steering wheel so that shifter control lever does not strike housing at any point, and tighten clamp screw.

11. Install cross-over spring.

12. Install steering wheel.

13. Adjust and tighten shifter levers as explained in Note 3.

14. If shifter connecting rods were removed, they should be installed and adjusted as explained in Note 1.

6. Replacement of Steering Column Shifter Shaft or Tube

The adjustment between the inner shaft and the outer tube is definitely maintained by a collar on the lower end of the inner shifter shaft. In the event that it is necessary to replace either the tube or the shaft, the following instructions for drilling collar locking pin hole in the second and high shifter shaft in correct location must be observed:

1. Assemble second and high shifter shaft, low and reverse shifter tube, shifter lever and housing on bench.

2. Slip collar on lower end of the second and high shifter shaft, omitting two anti-rattle spring washers which go between the collar and low and reverse shifter tube.

3. Pull second and high shifter shaft through low and reverse shifter tube until there is no clearance between upper ends of shaft and tube.

4. Place a combination of feeler gauges between collar and tube, giving .036″ clearance.

5. Holding collar in this position, drill and ream for the pin, using No. 32 drill and a ⅛″ reamer (.1245—.1255″).

6. After collar and shaft have been drilled and reamed, slip off collar and install two anti-rattle spring washers with concave side up and reinstall collar and pin to shaft.

7. Removal and Installation of Transmission

1. Place jack under engine at back end of oil pan, using a wooden block to prevent damage to oil pan.

> **Note:** This operation need not be performed on 40-90 cars, because this model has five engine supports.

2. Disconnect front and rear universal joints, and remove propeller shaft.

3. Disconnect engine rear support at transmission extension.

4. Remove crossmember that carries engine rear support.

5. Disconnect speedometer cable.

6. Remove shifter connecting rods at levers on transmission.

7. Loosen transmission cap screws holding transmission to bell housing and, while supporting transmission at rear end so that clutch connection shaft can be kept in line with clutch hub, slide transmission back.

8. Plug drain hole for clutch connection shaft bearing to prevent loss of lubricant.

9. Remove transmission from car, lowering front end first.

Caution: Do not allow transmission to hang on clutch connection shaft or carry transmission by clutch connection shaft as this will spring clutch disc or injure the front mainshaft bearing.

Installation—This procedure is the reverse of that given for removal with the following precaution:

Connect shifter connecting rods to control levers last, after transmission is in place. Adjust shifter connecting rods as explained in Note 1.

8. Disassembly of Transmission

1. Remove speedometer driven gear adapter housing and speedometer driven gear.

2. Remove universal joint flange from rear end of mainshaft.

3. Remove cap screws holding extension housing to case and remove housing.

4. Remove transmission cover.

5. Remove countershaft through rear end of case, and remove countershaft cluster gears, washers, spacers and needle bearings.

Caution: Handle gears and bearings with care to avoid nicks, and protect them against dirt and grit.

6. Remove lock screws and pry clutch connection shaft and bearing out of the front end of the transmission case.

7. Remove sliding coupling and synchronizer off front end of mainshaft.

8. Remove lock ring holding second speed gear in place, using Tool No. J-1007.

9. Tap main shaft and bearing out of rear end of case, and remove gears from shaft.

10. Tap reverse idler gear shaft out of back end of case, and remove reverse idler gear and thrust bearings.

11. Remove shifting levers and remove shifting lever shafts through inside of case, taking care not to lose interlock spring, balls or tubes.

9. Assembly of Transmission

When assembling parts of the transmission which are supported on needle bearings, care should be taken to assemble these parts to prevent the possibility of scoring the rollers or the surfaces they contact, as this will cause a noisy transmission. Gear teeth also should be carefully handled and inspected for nicks or burrs, as carelessly handled gear teeth will also cause the transmission to be noisy.

1. Install second and high speed lever and shaft in neutral position, making sure that the shoe is properly in place.

2. Install ball, tube and spring interlock assembly inside of case, compressing spring and locking balls.

3. While spring is compressed, install low and reverse shifter shaft with sector in neutral position, making sure shoe is in place.

4. Install new cork seals, at outer end of shift shafts, using Tool J-1169.

5. Install shifter levers into place on their respective shafts.

6. Tap reverse idler gear shaft partly into place and install steel-backed babbitt thrust washer at rear, making sure that clip in washer fits in slot in case.

7. Put a new cork seal on outer end of shaft.

8. Place reverse idler gear on shaft. Install idler gear replacer pilot, Tool J-1010, at front and extend through boss sufficiently to hold front thrust washer in position. Tap shaft into position, making sure that hole for locking screw on inner end of shaft lines up properly with hole in bottom of case.

9. Hold low speed shifter gear in contact with shifter shoe and insert main shaft through end of case and low speed shifter gear.

10. Install second speed gear on forward end of main shaft.

11. Install thrust washer and lock second speed gear in place with new lock ring, using special tool J-1007.

12. Slip sliding coupling and synchronizer on front end of shaft.

13. Install needle bearings in clutch connection main shaft pilot, using Tool No. J-1170, and lock them in place with a new lock ring.

14. Tap clutch connection shaft and bearing into place and install outer lock ring and screws.

15. Tap rear main shaft bearing into place.

16. Start countershaft through back end of transmission and install needle bearings and retaining washers in countershaft cluster gear, using Tool No. J-1184.

17. Install bronze thrust washers in place, at front and rear ends, and steel washer at rear end, and start countershaft gear assembly on countershaft.

18. After placing new cork seal on outer end of shaft, tap it into place and align lock hole at rear end of shaft with hole in case.

19. Install gasket and cover, making sure that the two long locking screws that hold the reverse idler gear shaft and countershaft in place are installed in the proper holes.

20. Install extension housing gasket and slip extension housing on over back end of mainshaft.

21. Tap extension rear bearing in place.

22. Install cap screws holding extension to transmission case and tighten securely.

23. Install rear oil seal in place with care, using Tool No. J-1354.

24. Install front universal joint assembly.

25. Install speedometer driven gear and speedometer driven gear adapter housing in place, revolving it slightly to make sure it meshes properly with gear on rear main shaft.

26. Re-fill transmission with 2½ pints of SAE 90 lubricant.

TRANSMISSION

TRANSMISSION SPECIFICATIONS

Subject and Remarks	40-50 40-52	40-62 40-60S	40-72 40-75	40-90
MAINSHAFT ASSEMBLY				
Backlash between splines on mainshaft and splineways on sliding gear coupling—				
New limits	.0005-.001″	.0005-.001″	.0005-.001″	.0005-.001″
Worn limits, not over	.003″	.003″	.003″	.003″
Backlash between splines on mainshaft and splineways in low and reverse gear—				
New limits	.004-.007″	.004-.007″	.004-.007″	.004-.007″
Worn limits	.010″	.010″	.010″	.010″
Clutch connection shaft out of true, not over	.0015″	.0015″	.0015″	.0015″
Mainshaft out of true, not over	.0015″	.0015″	.0015″	.0015″
Clutch connection shaft pilot bearings—				
Diameter of needle bearings	.2180-.2182″	.2180-.2182″	.2180-.2182″	.2180-.2182″
Number of needle bearings used	14	14	14	14
Diameter of mainshaft pilot	.7631-.7636″	.7631-.7636″	.7631-.7636″	.7631-.7636″
Diameter of clutch connection shaft counterbore	1.2002-1.2010″	1.2002-1.2010″	1.2002-1.2010″	1.2002-1.2010″
Mainshaft yoke out of round, not over	.002″	.002″	.002″	.002″
REVERSE IDLER GEAR ASSEMBLY				
Clearance between bushing and shaft—				
New limits	.0020-.0035″	.0020-.0035″	.0020-.0035″	.0020-.0035″
Worn limits	.005″	.005″	.005″	.005″
End-play in gear, not over	.006-.018″	.006-.018″	.006-.018″	.006-.018″
COUNTERSHAFT ASSEMBLY				
Countershaft needle bearings—				
Diameter of needle bearings	.1248-.1250″	.1248-.1250″	.1248-.1250″	.1248-.1250″
Diameter of countershaft	.9993-.9998″	.9993-.9998″	.9993-.9998″	.9993-.9998″
Diameter of countershaft gear cluster, counterbore	1.2498-1.2506″	1.2498-1.2506″	1.2498-1.2506″	1.2498-1.2506″
SHIFTING MECHANISM				
Clearance between shifter shafts and transmission case—				
New limits	.0020-.0035″	.0020-.0035″	.0020-.0035″	.0020-.0035″
Worn limits	.005″	.005″	.005″	.005″
Interlock spring—				
Free length	$2\frac{23}{32}$″	$2\frac{23}{32}$″	$2\frac{23}{32}$″	$2\frac{23}{32}$″
Pressure in pounds compressed to $1\frac{31}{32}$″	10-13	10-13	10-13	10-13

OTHER TRANSMISSION REFERENCES

FUEL TANK AND EXHAUST

1. Removal and Installation of Gasoline Tank

1. Drain tank.
2. Raise rear end of car from floor with chain fall.
3. Disconnect filler tube hose at lower clamp.

Note: Remove short filler neck extending through the fender and its rubber grommet from Series 40-60S cars.

4. Disconnect gasoline line.
5. Move tail pipe to right of car, away from tank, on Series 40-50, 52, 62, and 72 cars.
6. Remove tank support straps.
7. Lower tank to disconnect gauge wire on float unit.
8. Remove tank from car.

2. Removal and Installation of Mufflers

Series 40-50, 52, 62, and 72—1. Disconnect rear tail pipe clamp at rear frame cross member.

2. Disconnect pipe clamp at rear end of muffler and pull tail pipe rearward.
3. Loosen pipe clamp at front end of muffler.
4. Pull muffler rearward and remove from car.

Series 40-60S, 75 and 90—1. Remove tail pipe extension on muffler outlet.

2. Disconnect support brackets on rear cross member.
3. Loosen pipe clamp at front end of muffler.
4. Pull muffler rearward and remove from car.

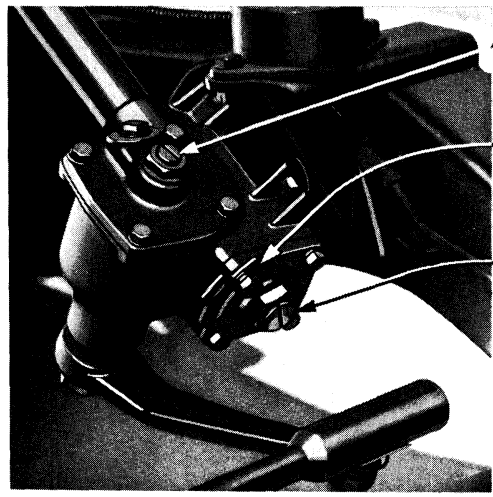
The installation procedures of the mufflers are approximately the reverse of their respective removal procedures. Two precautions are necessary, however—First, be sure the end of the muffler upon which the word "inlet" is stamped is installed toward the front on Series 40-50, 52, 62 and 72 cars. Second, make certain that all muffler support rubbers are properly aligned so as not to be under initial strain.

GASOLINE TANK CAPACITIES

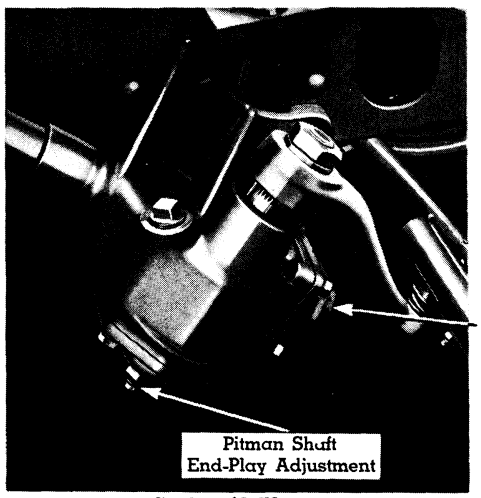
40-50, 52	22 gallons
40-62, 60S	22 gallons
40-72	24 gallons
40-75, 90	26 gallons

OTHER FUEL TANK AND EXHAUST REFERENCES

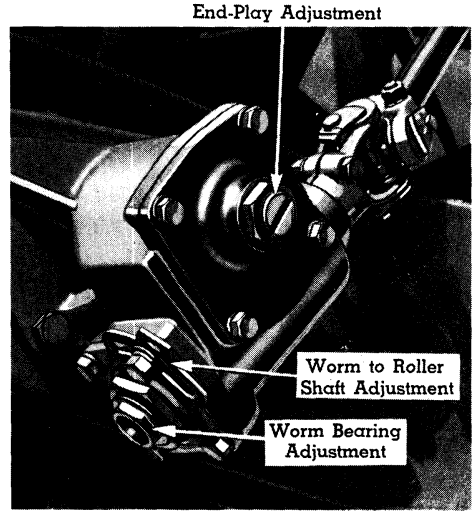
STEERING GEAR



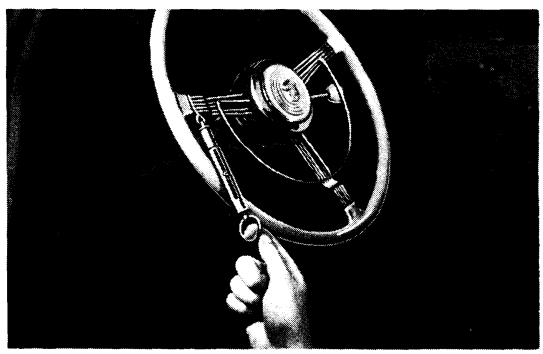
Series 40-50, 52, 62 and 60S



Series 40-72



Series 40-75 and 90



Checking Steering Adjustments

Fig. 45. Steering Gear Adjustments

STEERING GEAR

1. Adjustment of Worm and Roller Type Steering Gear

The worm and double roller type steering gears used on Series 40-50, 52, 62, 60S, 75 and 90 cars are adjusted according to the following procedure. In making adjustments, follow this order exactly.

Roller Shaft End-Play Adjustment—Disconnect drag link at pitman arm. Turn steering wheel within 1/8 turn of its extreme travel either way. The pitman arm in both of these positions will permit a slight movement, equal to the backlash between the roller and the worm. The arm should move freely, but have no perceptible end-play. The adjusting screw must be positively held in position while setting the lock nut. The end-play should never be set with a drag in an attempt to introduce friction to overcome "nervousness" or chuckles at the steering wheel.

Worm Bearing Adjustment—Back off adjusting screw (or nut) slightly after loosening lock nut. Turn steering wheel to within 1/8 turn of its extreme travel either way. Tighten adjusting screw (or nut) until wheel can be moved easily in both of these positions, requiring a slow pull of not less than 3/4 pound, nor more than one pound at rim of steering wheel. New cars driven less than 1,000 miles should require a pull of not less than one pound, nor exceeding 1 1/4 pounds at the rim of the wheel. Check pull once more after tightening lock nut.

Worm-to-Roller Shaft Adjustment—Turn eccentric to adjust backlash between worm and roller. A slow pull on rim of steering wheel should require 1 1/2 to 2 pounds to turn wheel through the straightaway position or high spot range. Cars driven less than 1,000 miles should have a pull from 2 to 2 1/2 pounds through high spot range. The eccentric sleeve adjustment must always be made so that worm is advanced toward roller when eccentric nut is tightened. If nut is tightened when worm is backing away from roller, extra looseness may result after only slight use.

High Spot Adjustment—When steering gear is properly adjusted, roller will contact worm without any backlash between the teeth for a range of 90° or more as measured at steering wheel. This range is called the "no-backlash" range, and its center is commonly called the "tight" or "high" spot of the steering gear. It is very important that the center of the no-backlash range (high spot) be within 10° of the straightaway position of the wheels. To obtain this adjustment, the straightaway position of the wheels may be changed by adjustment of the tie rods. If a change in the setting of the tie rods is necessary, the **toe-in** of the wheels should be re-checked.

Drag Link Adjustment—When the adjustment of the steering gear has been carefully completed, the drag link should be reconnected to the pitman arm. The drag link end nut at the pitman arm must be turned up tight and backed off 1 1/2 turns. If this adjustment should permit a slight amount of wander at high speeds, the drag link end nut should be backed off only 3/4 to 1 turn. The drag link adjustment is very important to minimize the possibility of road shock on one hand, or wander at high speeds on the other hand. Minimizing road shock requires the entire 1 1/2 turns, whereas minimizing wander requires less backing off.

2. Operation and Adjustment of Recirculating Ball Steering Gear

An entirely new recirculating ball type of gear is used on 40-72 series cars. The operation of this gear, illustrated in Figure 46, is as follows:

Rotation of the worm causes the nut to rise or fall as in the usual type of worm and nut gear, but instead of sliding contact between these parts, the balls provide an almost friction-less rolling contact.

When the steering wheel is turned to the left, the worm turns in the same direction and moves the nut downward. The balls meanwhile roll between the worm and the nut, working their way up the steering shaft. As they reach the top of the nut, they enter one of the two return chambers through which they are directed downward to be reintroduced at a lower point. When a right turn is made, the nut moves upward and the balls circulate in the reverse direction.

This type of gear requires only two adjustments, which must be made according to the following instructions:

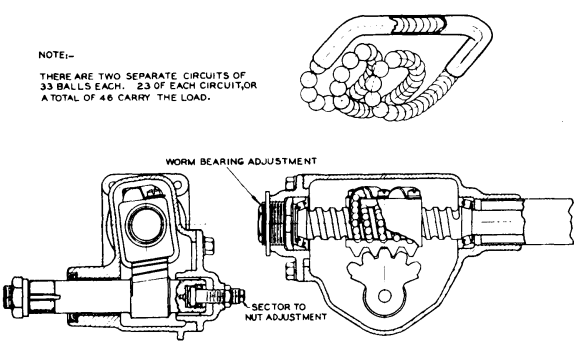
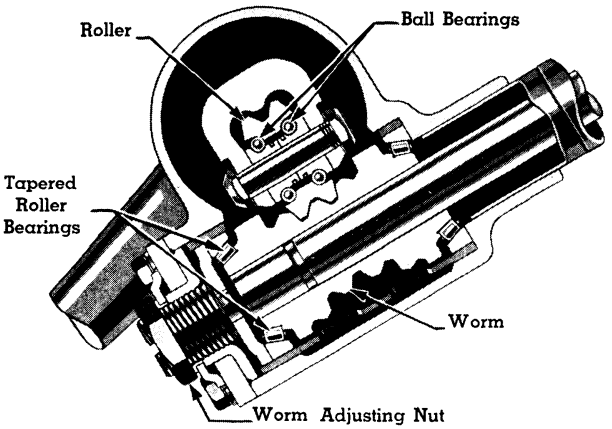


Fig. 46. Recirculating Ball Type Steering Gear Series 40-72

STEERING GEAR



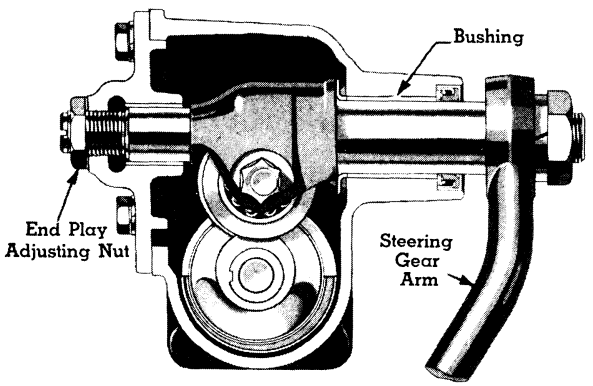


Fig. 47. Steering Gear Sectional Views
Series 40-50, 52, 62, 60S

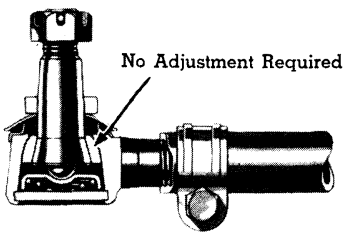


Fig. 48. Steering Tie Rod End
Series 40-50, 52, 62, 72, 60S

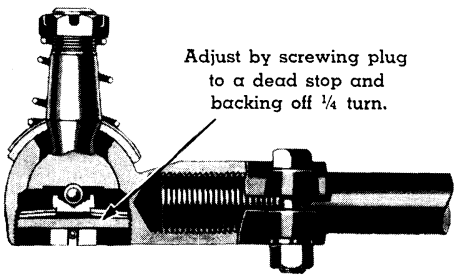


Fig. 49. Steering Tie Rod End
Series 40-75 and 90

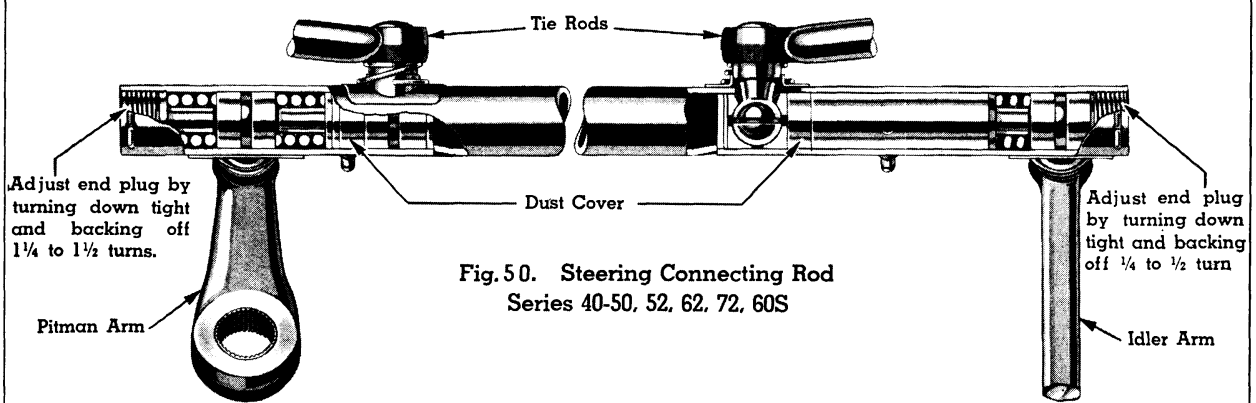


Fig. 50. Steering Connecting Rod
Series 40-50, 52, 62, 72, 60S

Fig. 51. Steering Connecting Rod
Series 40-75 and 90

STEERING GEAR

Worm and Nut Adjustment — Disconnect drag link at pitman arm. Loosen steering column bracket. Loosen lock nut and back off pitman shaft adjusting nut a few turns. Turn steering wheel until it is within one turn of extreme end of travel.

Note: Do not turn steering wheel hard against stops.

Measure the pull at the rim of the steering wheel which is required to keep the wheel in motion off the high spot. This should be between ¾ pound and one pound. New cars driven less than 1,000 miles should require a pull of not less than one pound, nor more than 1¼ pounds. If readjustment is necessary, loosen the lock nut and turn the worm adjusting screw (Fig. 45) as required. Retighten lock nut when adjustment is correct, and check the pull once more after tightening lock nut.

Before re-attaching steering column bracket, note whether or not the bracket can be tightened without springing the column. If not, shim the bracket or loosen the steering gear mounting bolts and shift the gear to eliminate the condition. Then tighten the bracket and recheck the pull at the steering wheel rim. If it has increased materially, there is still a sprung condition in the column which must be corrected.

Pitman Shaft End-Play Adjustment — Conclude the adjustment by tightening the pitman shaft thrust screw. (Fig. 45.) The correct tightness is secured when a slow pull on the rim of the steering wheel requires 1½ to 2 pounds to pull the wheel through the high spot range, except on cars driven less than 1,000 miles, which should require a pull of from 2 to 2½ pounds. Finally, retighten the lock nut.

It is also important with this gear that the center of the high spot range be within 10° of the straightaway position, although this gear has a much wider high spot range (350° as compared with 90°). Adjustment, if required, can be made by changing the tie rods.

When re-connecting the drag link after making the steering gear adjustment, the drag link end nut at the pitman arm must be turned up tight and backed off 1½ turns.

3. Disassembly and Assembly of Recirculating Ball Steering Gear

1. Remove steering wheel (See Note 9).
2. Disconnect drag link at pitman arm.
3. Remove steering gear and column assembly from car.
4. Remove upper bearing for steering column.
5. Loosen lock nuts and back off both steering gear adjusting nuts.
6. Remove side cover bolts and pull side cover about 2″ out of housing. This will draw pitman shaft partially out of housing and will disengage gear and nut.
7. Remove end cover bolts and take off end cover, and with it the lower worm bearing, cup and thrust washer.
8. Grasp lower end of steering worm and draw steering shaft and nut assembly out of housing. Be sure shaft is held in horizontal position so that nut does not move against stops.

Note: Disassembly of the worm nut is not recommended.

Assembly—1. Assemble replacement steering shaft and nut assembly into housing. Before removing tape holding steering nut in place on worm **observe following instructions:**

"After removing tape, nut will be free and great care must be taken to keep nut from running to the end of the thread on worm. This may be avoided by grasping nut in one hand and steering shaft in the other when handling. Always lay assembly in horizontal position, do not stand vertical, as nut will run to the end by its own weight, causing damage to ball return mechanism."

2. Replace end cover, with lower worm bearing, cup, thrust washer, and gasket. Assemble and tighten end cover bolts and lock washers.
3. Assemble upper bearing spring seat and spring, upper bearing washer and cotter pin and steering wheel. Then adjust worm bearings.
4. Rotate steering wheel until nut is approximately in center of travel. Make sure that center tooth of gear will enter center tooth space of nut, and push side cover and gasket into place. Assemble and tighten side cover bolts and lock washers.

has a much wider high spot range (350° as move filler plug, and fill gear with steering gear lubricant.

6. Assembly of pitman arm to gear is best deferred until gear is in place in car. Arm is then to be assembled to gear in such a position that front wheels will be in straight ahead position when nut is in center of travel.

STEERING GEAR

4. Removal and Installation of Tie Rods

Series 40-50, 52, 62, 72, and 60S—1. Remove pivot nuts holding tie rods to steering arms and disconnect tie rods from steering arms.

2. Unscrew plug and remove ball seat holding idler lever to right end of steering connecting rod.

3. Disconnect idler lever from steering connecting rod and lower right end of connecting rod, allowing spring, spacer assembly and ball seat to slide out end of rod.

4. Disconnect right tie rod from steering connecting rod.

5. Unscrew end plug and remove spring ball seat and safety plug from left end of steering connecting rod.

6. Disconnect pitman arm from steering connecting rod and lower left end of steering connecting rod, allowing spring, spacer assembly and ball seat to slide out end of rod.

7. Disconnect left tie rod.

Installation—The tie rods and parts should be assembled in the reverse order of disassembly with the following additions:

1. Lubricate pitman arm, idler arm and tie rod balls with chassis lubricant when assembling.

2. Adjust right, or idler lever end, of steering connecting rod by screwing end plug up tight and backing it off ¼ to ½ turn.

3. Adjust left, or pitman arm end, of steering connecting rod by screwing end plug up tight and backing it off 1¼ to 1½ turns.

5. Removal and Disassembly of Idler Lever

Series 40-50, 52, 62, 72 and 60S—1. Disconnect idler lever from steering connecting rod as explained in Note 4.

2. Remove two bolts holding idler lever to frame side member and turn frame end of lever out of threaded bushing at lever joint.

Assembly and Installation—Assemble and install the idler lever in the reverse order of removal. Tighten the idler arm support ¼ to 1¼ turns after it seats firmly against the rubber bushing.

6. Removal of Intermediate Steering Arm

Series 40-75 and 90—1. Disconnect steering connecting rod from steering gear arm.

2. Loosen clamp screw on steering connecting rod at intermediate steering arm ball joint assembly.

3. Remove steering connecting rod by unscrewing rod from steering arm ball joint assembly.

4. Disconnect tie rods at other end of intermediate steering arm by removing nuts holding pivot ball assemblies to arm using Tool No. J-624-A.

5. Remove intermediate steering arm bracket assembly by removing the four bolts holding it to frame cross member.

6. Remove retaining nut bolt, intermediate steering arm, and bearings to complete disassembly.

Installation—The reverse order of operations may be used as a guide for installation of this unit.

When installing the intermediate steering arm, it is important to make sure that the ball bearings are properly lubricated with (G-12) wheel bearing grease before installation. Also, when tightening the nut on the fulcrum bolt, care should be exercised to draw the nut up just enough to remove all perceptible play in the bearings without causing them to bind.

7. Removal of Steering Universal Joints

Series 40-75 and 90—1. Loosen clamps at upper universal joint, lower joint and steering worm shaft.

2. Slide shaft as far as possible up into upper universal joint.

3. Remove shaft and lower universal joint from steering worm shaft.

4. Pull shaft off upper universal joint and remove upper universal joint.

Installation—1. Install upper universal joint on steering shaft.

2. Insert intermediate shaft in upper universal joint as far as possible.

3. Install lower universal joint on steering worm shaft and insert intermediate shaft.

4. Tighten clamp holding lower joint to steering worm shaft and clamp holding upper universal joint to steering column shaft.

5. Tighten clamp holding upper universal joint to intermediate shaft and clamp holding lower universal joint to intermediate shaft.

8. Correction of Steering Universal Joint Chuckle

Series 40-75 and 90—1. Loosen clamp screw holding lower universal joint to steering worm shaft.

2. Insert pinch bar or heavy screwdriver between bottom of lower yoke and top of steering gear base, and force yoke upward approximately 1/32 of an inch.

> **Note:** If it is impossible to force this yoke upward, loosen clamp screw holding the upper universal joint upper yoke to steering column shaft. Force assembly downward and then tighten clamp screw.

3. Holding lower yoke up with bar, tighten clamp screw securely.

9. Removal of Steering Wheel—All Series

1. Press horn cap down and turn left or right until catch is released, and remove cap.

2. Remove gasket, sponge rubber ring, retainer, horn button spring and steering wheel hub nut.

3. Remove horn ring (flexible steering wheels).

4. Remove steering wheel.

10. Assembly of Steering Wheel—All Series

1. Slip steering wheel over end of steering column shaft so that middle spoke is vertical and directly opposite notch in end of steering column shaft.

2. Reinstall horn ring (flexible wheels).

3. Tighten steering wheel hub nut down thoroughly, using a wrench with an 18-inch handle.

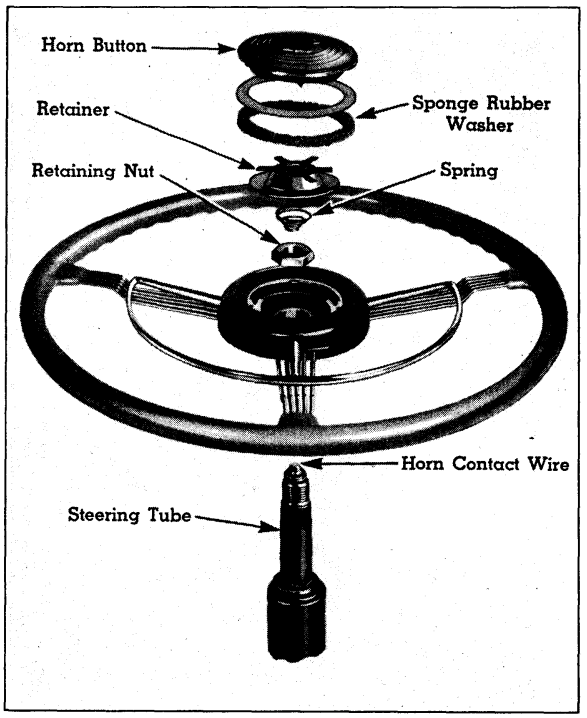


Fig. 52. Steering Wheel—Disassembled Typical of All Series

4. Place small end of horn button spring over horn terminal and install retainer as shown in Figure 52.

5. Install sponge rubber ring around edges of wheel hub and press horn cap down in place and turn left or right until lugs slip under hub clips.

OTHER STEERING REFERENCES

WHEELS AND TIRES

1. Wheel Run-Out and Eccentricity

The wheels should not run out (wobble) more than $\frac{3}{64}$" as measured on the side of the rim, at the base of the tire. Run-out is the result of a bent wheel, an improperly mounted wheel, worn knuckle bearings or steering connections. These parts should be checked for correct adjustment, proper alignment, and wear whenever excessive run-out is encountered.

The wheels should also run concentric with the steering knuckle spindle within $\frac{3}{64}$" measured on the upper flange of the rim with the tire removed.

Wheel run-out, eccentricity, and balance are closely associated with steering complaints and with front wheel alignment. Further information on these conditions will be found under "Front Wheel Suspension."

2. Balancing Tires and Wheels

Tires are balanced to offset the weight of the valve stem and, if removed, the tire should be reinstalled in its original position. The valve stem should be in line with the balancing mark on the outside of the casing, otherwise the tire and wheel will be unbalanced.

The wheel itself should be in proper balance. An out-of-balance wheel can be corrected by the use of detachable balancing weights, supplied by the factory Parts Department. The weights are placed on the light side of the wheel.

The most satisfactory method of balancing wheels is by means of a dynamic wheel balancing machine. If this type of machine is not available, however, proceed as follows:

First, remove wheel from axle and clean out the grease from the bearings. Mount it upright on a suitable stand, and test 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 also the uppermost or lightest point; then install two balancing weights on the rim opposite each other and 90° away from the light and heavy points. Move these weights equally toward the light side until the wheel is in balance.

This operation should be performed with the tire on the rim. If the tire was off, it will have to be installed as recommended above, and the balance rechecked. The wheel bearings should then be repacked with wheel bearing grease and the wheel reinstalled.

Recheck the wheel balance on a road test.

3. Front Wheel Bearing Adjustment

In adjusting the front wheel bearings, first make sure that the wheel is all the way on the spindle. Then tighten the adjusting nut securely, using a wrench with a handle 8 or 9 inches long, rotating the wheel at the same time to seat all parts. After a thorough tightening, back off the nut $\frac{1}{12}$ turn (½ flat). If the cotter key cannot be installed in this position, loosen the adjusting nut until it can be installed.

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.

The rear wheel bearings on all series cars are of the self-lubricating type and require no adjustment.

TIRE SPECIFICATIONS

Subject and Remarks	40-50 and 52	40-62	40-60S	40-72	40-75 and 90
Inflation pressures	24 lbs.	26 lbs.	28 lbs.	28 lbs.	32 lbs.
No. of plies	4	4	4	4	6
Size	7:00 x 16	7:00 x 16	7:00 x 16	7.50 x 16	7.50 x 16

OTHER WHEELS AND TIRES REFERENCES

CHASSIS SHEET METAL

1. Opening the Hood

To raise the hood top panel on V-8 cars, tilt the radiator ornament back. This will release both the manual catch and the automatic safety catch. Compensating springs in the hinges help to raise the panel and hold it in position.

The hood top panel on V-16 cars has two manual catches. Tilting the radiator ornament releases the first catch, after which the panel can be raised far enough to reach in and release the safety catch.

The hood side panels can be removed easily to provide better access to the engine. Each panel is held in place by a screw at each upper corner and three screws along the lower edge. (The V-16 has clips along the lower edge.) Remove all five screws and take out panel.

2. Removal and Installation of Hood

1. Raise hood top panel and remove side panels.

2. Disconnect horn wire (except on V-16).

3. Lower top panel.

4. Remove cap screws holding each hood hinge to cowl.

5. Tilt ornament to release catch and lift off hood top panel.

Installation—1. Make sure that hood hinges are in closed position.

2. Place hood top panel in position on car, being very careful to center hood panel at cowl, and to secure proper clearance between shoulder of cowl and rear edge of panel.

3. Insert and tighten the upper front cap screw for each hood hinge.

4. Raise the hood about 10 inches and, while holding it in this position, insert and tighten the remaining hood hinge cap screws.

5. Reconnect horn wire and reinstall hood side panels.

3. Replacement of Grilles

Replacement of radiator grilles and fender grilles is a simple operation on 40-Series V-8 cars. The radiator grille can be removed by taking out half-a-dozen screws. Fender grilles can be removed by removing the radiator grille and taking out the attaching screws. Installation is simply the reverse of removal.

4. Alignment of Hood, Radiator and Front Fenders

The radiator, radiator grilles and front fenders are constructed so that they may be removed or installed as a unit. Individual parts may also be removed and reinstalled separately, usually without affecting alignment.

When all or most of the front sheet metal parts are removed and reinstalled, the entire front end assembly should be realigned at one time. First of all, the hood top panel should be properly centered and installed, as explained in Note 2, and the fender and grille assembly should then be aligned to the hood. Attempts should **not** be made to install the fender and grille assembly first and then align the hood to fit.

The radiator grilles and fender grilles should be assembled and installed as a unit, and only bolted loosely in position until the proper alignment with the hood top panel and cowl is obtained. The hood top panel should be kept in the lowered position while checking alignment.

Enlarged bolt holes at the rear of the fenders permit easy horizontal and vertical alignment of this part of the assembly. The hole in the frame cross member for mounting the radiator support is also enlarged to permit forward and back alignment, and shims placed under the mounting bolt provide a means of up-and-down alignment.

After the alignment is correct, all attaching bolts or cap screws should be tightened securely, and the radiator tie rods turned up until they are snug. Do not attempt to change the alignment by tightening these tie rods as this may distort the radiator shutter frame. Always check the shutters for free operation after adjusting the tie rods.

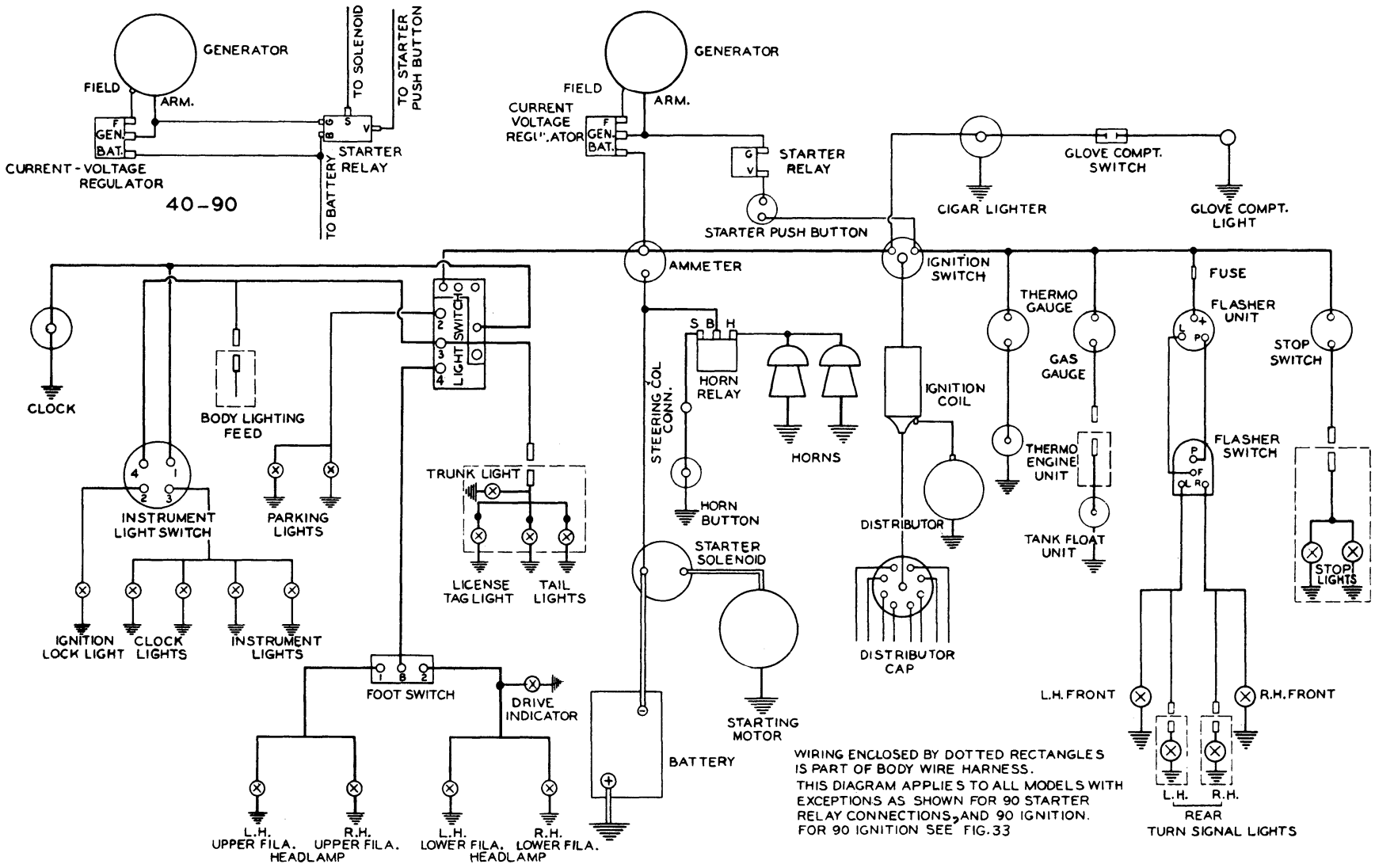


Fig. 53. Circuit Diagram—All Series

ELECTRICAL

1. Battery

The battery sizes and capacities are given in the specification tables. The battery on Series 40-50, 52, 62 and 72 cars is located under the left front floorboards. The battery on Series 40-60S, 75 and 90 cars is just outside the R. H. frame side bar in front of the dash and accessible from under the hood.

2. Generator

The generators on all 40-Series cars are located in the engine vee behind the fan, and are belt driven. Both a current and a voltage regulator are used to provide accurate charging rate control.

The generator charging circuit is a part of the Circuit Diagram, Fig. 53. The charging rate curves are shown in Fig. 54. The regulator box mounting and connections are shown in Fig. 55.

3. Generator Circuit

The battery must always be disconnected before disconnecting any wires in the generator circuit or any wires in the harness opening at the regulator box.

This precaution is necessary to prevent any possibility of loose connections being grounded in a way that will reverse the generator polarity —a condition which may cause serious damage to the charging circuit.

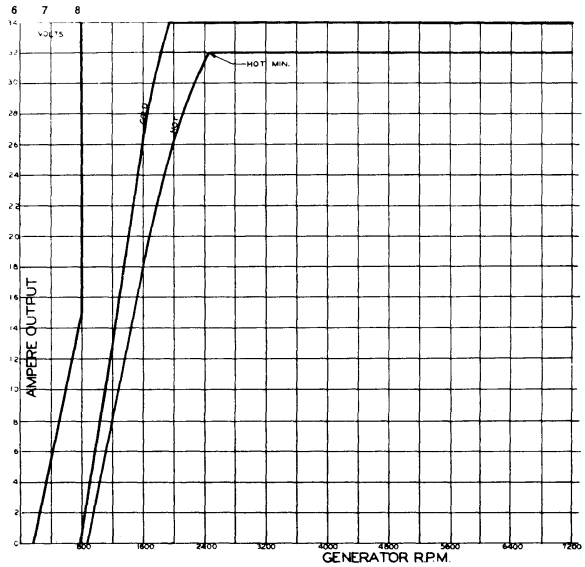


Fig. 54. Generator Charging Rate

Never run or test the generator on open circuit. If it should ever be necessary to operate the engine with the battery disconnected, the generator must be grounded or both generator and regulator will be damaged.

4. Starting Motor Circuit

The starting motor is engaged, when the button on the dash is depressed, by means of a solenoid relay, and switch mounted together on the starter housing. The solenoid first engages the starter pinion with the flywheel gear and then closes the switch for the cranking current.

If the starter should engage as soon as the ignition is turned on, this means either that the starter switch is sticking or that there is a ground in the starter switch circuit.

To prevent starter engagement while the engine is running, the starter is connected back to the generator in such a way that when the generator is charging a reverse current flows through the starter relay and keeps it open, rendering the dash switch inoperative. There are two conditions, however, that may cause accidental starter engagement.

1. The idling speed may be so low that the generator is not charging. The idling speed should always be set high enough to keep the ammeter indicating on the "charge" side.

2. There may be a ground in the wire from the starter relay to the generator regulator.

5. Starter Pinion Adjustment

The starter solenoid linkage should be adjusted so that the total travel of the starter pinion gear is $\frac{23}{32}$" to $\frac{25}{32}$" from the released posi-

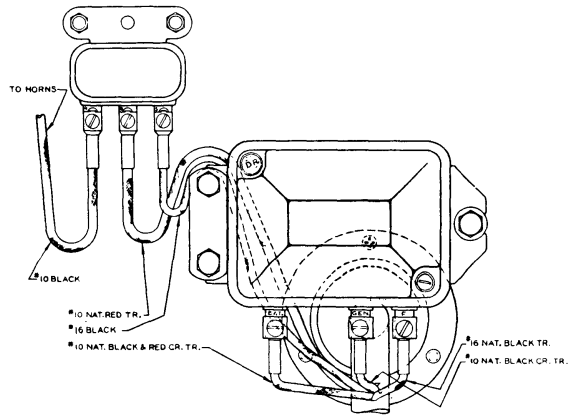


Fig. 55. Regulator Connections

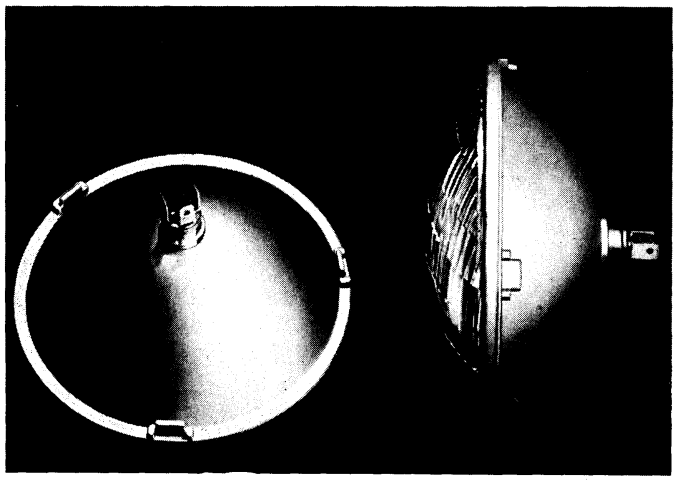


Fig. 57 "Sealed Beam" Headlight Unit

Fig. 58 Wiring Connector for "Sealed Beam" Unit

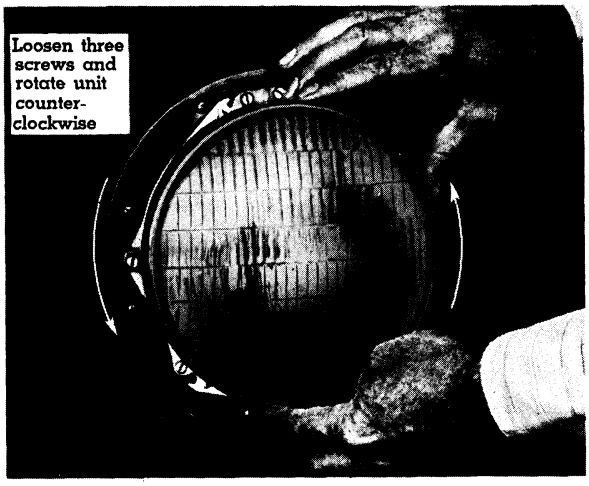


Fig. 59 Removing "Sealed Beam" Unit

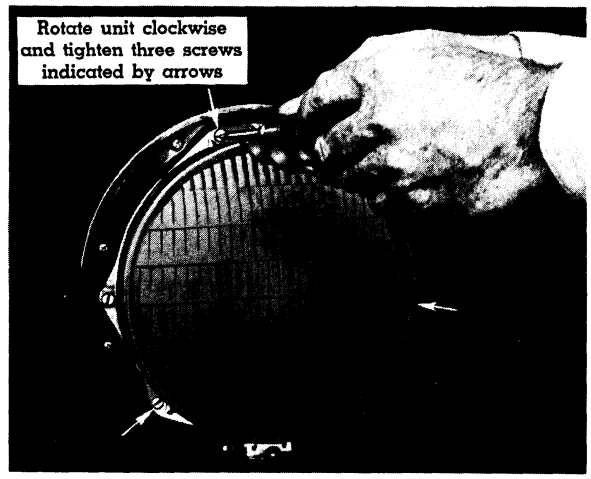


Fig. 60 Reinstalling "Sealed Beam" Unit

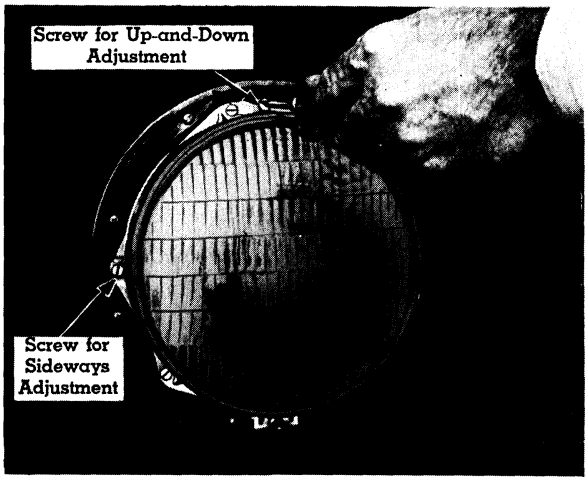


Fig. 61 "Sealed Beam" Aiming Adjustments

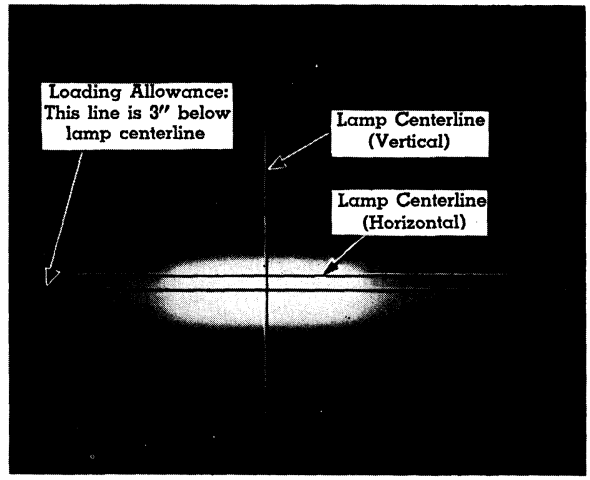


Fig. 62 Upper Beam Pattern of Left Lamp

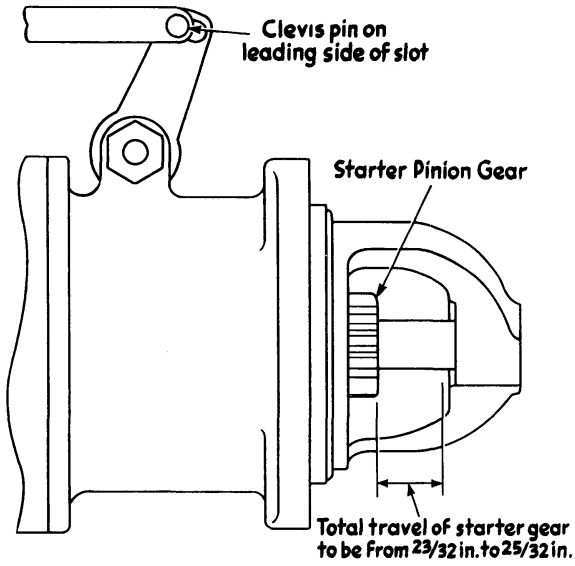


Fig. 56. Starter Solenoid Adjustment

tion to the point where the cranking current is switched on, (See Fig. 56).

To make this adjustment, the starter should be removed from the car and connected to a test battery. If the travel is incorrect, it can be changed by lengthening or shortening the adjustable shifter plunger pin in the solenoid.

Note: When the shifting link is being pushed toward the solenoid, the clevis pin in the rear end of the link should be kept on the **leading** side of the shift lever slot.

6. "Sealed Beam" Headlighting

A new "Sealed Beam" headlighting system is used on all 40-Series cars. With this system, the filament, reflector, lens and gasket are all assembled in one securely sealed unit. When a filament burns out or a lens is broken, the entire unit is discarded and a new one installed.

This system assures maximum lighting efficiency throughout the entire life of the car. Also, maintenance has been greatly simplified, requiring only aiming of the beams and replacement of burned out or broken units. The increased cost of these replacement units has been offset by providing them with a longer filament life than has been possible in previous headlamp bulbs.

"Sealed Beam" headlamps provide two separate beams, selected by a foot switch:

1. A country (upper) beam, which illuminates the road evenly for a considerable distance ahead of the car, for use on the open highway when no other vehicles are approaching.

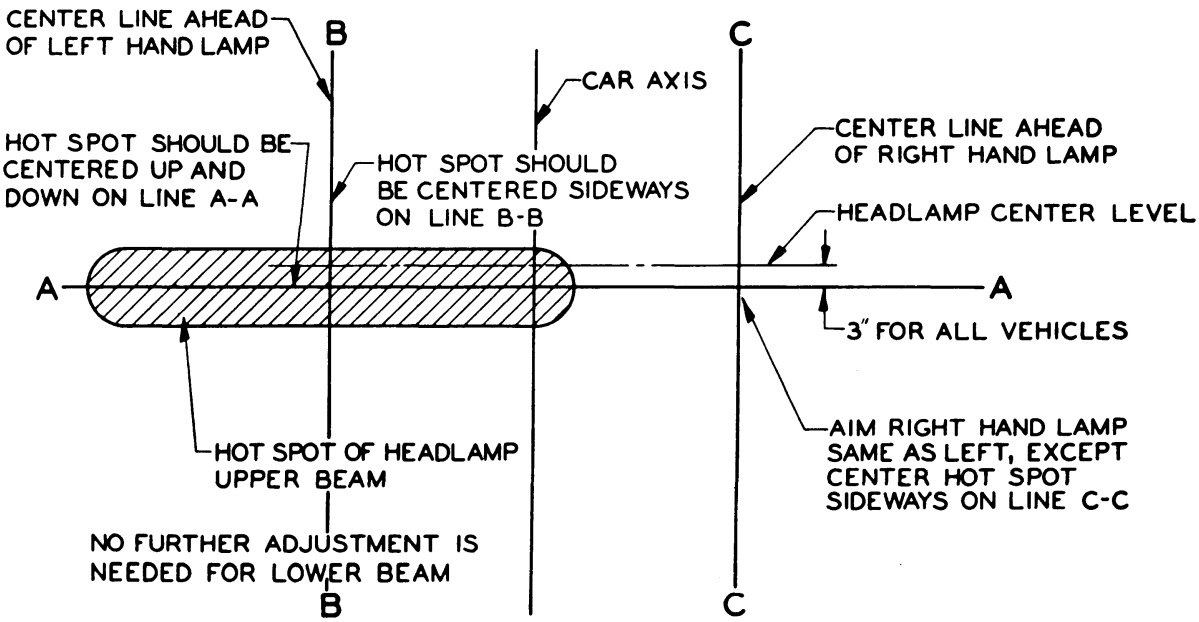


Fig. 63. Headlamp Aiming Diagram

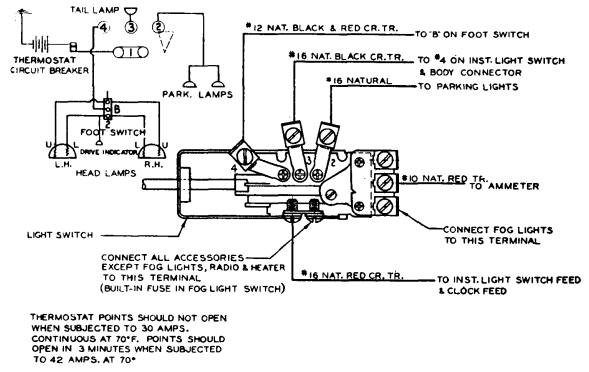


Fig. 64. Lighting Switch Connections

2. A traffic (lower) beam, which is low enough on the left side to avoid glare in the eyes of oncoming drivers, for use on heavily traveled highways and whenever meeting other vehicles.

Lamp Construction—The "Sealed Beam" reflector unit is held to the sub-body by a retainer ring and three screws which may be loosened for removal of the unit. (See Fig. 59.) The sub-body forms a ball and socket joint with the lamp housing, and is held to the housing by four coil springs, the vertical adjusting screw and the horizontal adjusting screw.

With this type of mounting, the horizontal light beam adjustment can be made without disturbing the vertical light beam setting, and vice versa. The lamp unit is provided with three locating lugs which fit into corresponding slots in the sub-body. These lugs are so located that the reflector unit can only be mounted in one position.

7. Replacement of Headlamp Reflector Unit

Two types of "Sealed Beam" headlamp units are used. One is made entirely of hard glass, and the other is a composite unit consisting of a metal reflector and a glass lens. Both are completely interchangeable from the standpoint of electrical connections, beam patterns, and physical dimensions. Furthermore, they are so designed that they cannot be installed improperly, nor connected incorrectly. The same unit is used in both right-hand and left-hand headlamps.

1. Remove headlamp door rim.
2. Loosen (but do not remove) the three screws holding the retaining ring.
3. Remove retaining ring by rotating counterclockwise and remove reflector unit.
4. Remove connector plug from reflector unit.
5. Install new unit by reversing above operations.
6. Re-aim the headlamps after a new lamp unit is installed.

8. "Sealed Beam" Headlamp Aiming Adjustment

Independent adjustment of both horizontal and vertical aims is provided in "Sealed Beam" headlamps. The adjustment screws are accessible from the front of the lamp after first removing the door rim.

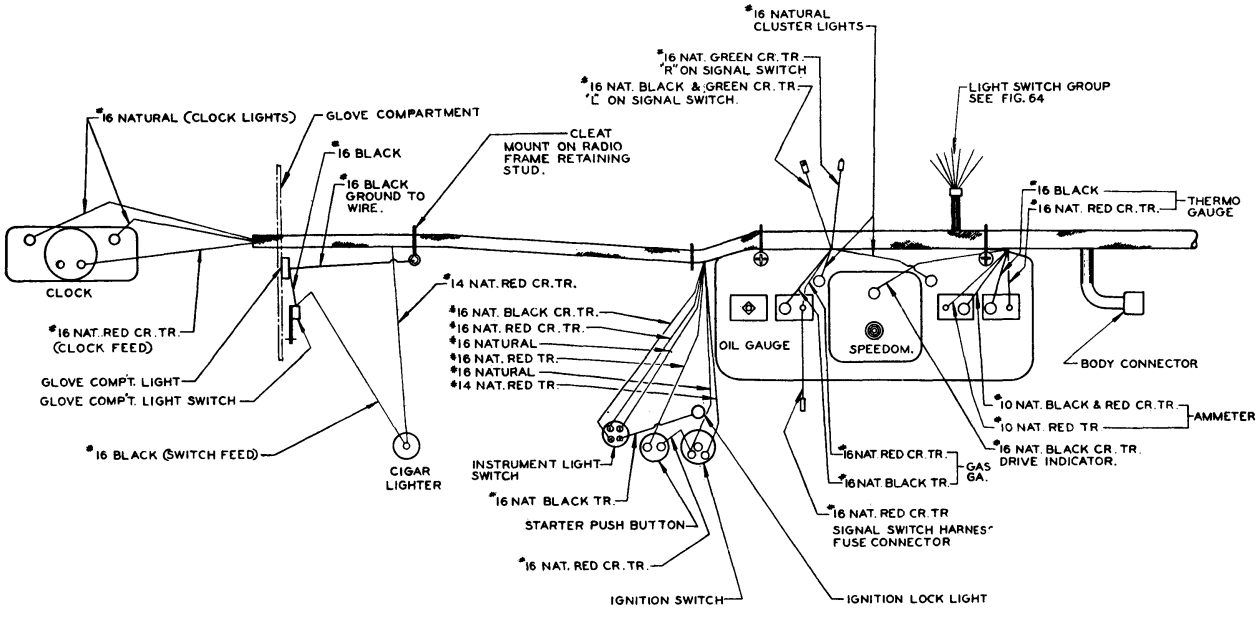


Fig. 65. Instrument Panel Connections

If a headlamp aiming screen is to be used in the service station, it should be marked according to the following dimensions:

	Distance Between Lamp Centers	Lamp Centers* to Ground
40-50, 52	46¼″	32″
40-62	29¾″	35¼″
40-72	29¾″	38¼″
40-60S	28¾″	35½″
40-75	28¾″	38½″
40-90	32½″	34″

To make the adjustment:

1. Place lighting switch in the position that produces the country (upper) beam. The lower filaments in both lamps are then illuminated.

2. Remove headlamp door rim.

3. Cover one lamp and then adjust the beam from the other lamp both up-and-down and sideways as required until the center of the zone of highest intensity falls on the intersection of the horizontal line (3″ below the headlamp center) and the vertical line directly ahead of the lamp. (See Figs. 62 and 63.)

4. Repeat the operation for the other lamp.

No further adjustment is needed for the traffic (lower) beam.

9. Direction Indicator Bulbs

The direction indicators on the first 40-Series cars have 21 c. p. bulbs in the front lamps and 32 c. p. bulbs in the rear. On later cars, 21 c. p. bulbs are used both for front and rear.

In replacing bulbs for the rear indicators, it is important always to use the same type as was originally installed. This is necessary, first of all, because the resistance unit in the circuit which causes the flashing action is so closely calibrated that a unit designed for the 21-32 c. p. circuit will not function properly in a 21-21 c. p. circuit, and vice versa.

Furthermore, the bulbs cannot be used interchangeably. The 32 c. p. bulb requires a single contact socket, whereas the 21 c. p. bulbs used for this circuit is the Mazda No. **1154L** bulb, with 21 and 3 c. p. filaments, and is accordingly used in a double contact socket. The 3 c. p. filament of this bulb is not used for any purpose.

10. Removal of Instruments

The individual instruments can be disassembled from the instrument panel after disconnecting the battery—first in pairs, and then singly. In removing or installing instruments, care must be exercised not to bend the pointers or to otherwise damage the delicate working parts.

*For loading allowance, draw horizontal line 3 inches below headlamp centers.

To assure against damage to the pointers, which are mounted in front of the dials, stops are located on the back of the panel. When an instrument cluster is to be removed, the screws must be taken out and the cluster moved down until the stops are cleared, then the cluster can be lifted out without damage to the pointers.

The outside glass over the group of instruments can be replaced, but it is necessary first to remove the entire instrument cluster, after which the screws holding the outside moulding can be taken out and the outside glass replaced. The inside glass on which the instrument calibrations are painted must be removed from the back of the instrument cluster after it has been completely disassembled. The glass in the clock panel can be replaced after removing the clock and the glass and moulding assembly.

11. Gasoline Gauge Service

If the gasoline gauge **does not register** when ignition switch is turned on—

1. This may be caused by a break in the line between the dash unit and the ignition switch.

If the gauge shows **full** under all conditions—

1. This may be caused by a break in the line between the dash unit and the tank unit. To remedy this, check line and all connections.

2. Tank unit burned out. Replace tank unit.

3. Tank unit improperly grounded, due to loose mounting screws or paint under the screw-heads. Tighten screws holding the tank unit. Ground tank to chassis and test.

If gauge shows **Empty** under all conditions—

1. This may be caused by wires being reversed on dash unit. To correct this trouble, reattach wires to proper terminal.

2. Dash unit not "grounded." Ground or replace dash unit.

3. Lead to tank unit grounded or tank unit rheostat continually grounded.

If gauge is inaccurate throughout entire range:

This condition may indicate the need for readjustment of the lock screw for the magnetic coils operating the needle. The lock screw is on the bottom of the dash unit on the left-hand side. To readjust, loosen the screw and re-set to the correct readings. It is, of course, necessary to have a float unit in the circuit and to recheck the readings by filling the tank.

In some instances, incorrect readings are due to a bent float arm. The remedy in this case is bending the arm back to its normal position.

The work in locating the trouble will be considerably simplified if an extra tank unit is available, as this can be connected up temporarily with the gauge by a short piece of wire, and grounding the tank unit to the chassis. The float can then be moved to the "Full" and "Empty" positions. If the dash unit indicates the corresponding positions, the trouble is confined to the tank unit and wiring.

12. Inoperative Clocks

Should an instance occur where a clock on a 40-Series car is found to be inoperative, the ground connection should be inspected. The two ears which support the clock also serve as a ground connection.

The parts of the panel upon which the two ears rest should be thoroughly cleaned and scraped free of any foreign matter. The nuts holding the clock to the panel also must be tightened securely.

If a clock should still prove to be inoperative after the ground connections have been checked, it should be removed from the car and tested on a separate battery. If it is still inoperative, it should be replaced.

13. Installing Electrical Accessories

When installing additional electrical equipment, such as heaters or spot lights, they should ordinarily be connected to the thermostat relay (the "fuse" of the lighting system) as shown in Figure 64 so that the new circuit will also be protected by the relay.

Cadillac radios or fog lights should, however, be connected to the feed terminal on the relay or to the discharge side of the ammeter, as these accessory circuits have their own fuse protection.

If the owner installs so much electrical equipment that the total normal load causes the relay to vibrate, it will be necessary to connect some of the equipment direct to the discharge side of the ammeter. Equipment so connected will not have circuit breaker protection.

BULB DATA CHART

Location	Candle Power	Contact	Mazda No.
Headlamp—See Note 7.			
Fender lamp (indicator and parking)	21-3	Double	1154L
Rear lamp (stop and tail)	21-3	Double	1154L
Rear lamp (indicator, first type*)	21-3	Double	1154L
Rear lamp (indicator, second type*)	32	Single	1133
Dome light	15	Single	87
Quarter light	15	Single	87
License lamp	3	Single	63
Instrument lights	1.5	Single	55
Clock light	1.5	Single	55
Radio light	1.5	Single	55
Trunk light	1.5	Single	55
Glove compartment light	1.5	Single	55
Beam indicator	1	Single	51
Lock lamp	1	Single	51

*See Note No. 9.

OTHER ELECTRICAL REFERENCES

ELECTRICAL

ELECTRICAL SPECIFICATIONS

Subject and Remarks	40-50 40-52	40-60S 40-62	40-72 40-75	40-90
Battery				
Delco type number	17K2W	17K2W	17K2W	19Q1WL
Capacity, ampere hours	115	115	115	125
Charging rate on bench—				
Start in amperes	10	10	10	10
Finish in amperes	8	8	8	8
Terminal grounded	Positive	Positive	Positive	Positive
Plates, number of	17	17	17	19
Generator—				
Delco type number	1102661	1102661	1102661	1102666
Armature—				
Commutator out of round, not over	.002″	.002″	.002″	.002″
Charging rate, min., hot, in amp.	32	32	32	32
at R.P.M.	2450	2450	2450	2450
at M.P.H.	27	27	24.5	25
Voltage regulator setting—				
Closed circuit in volts at 70° F.	7.5-7.9	7.5-7.9	7.5-7.9	7.5-7.9
Closed circuit in volts at 150° F.	7.4-7.6	7.4-7.6	7.4-7.6	7.4-7.6
Delco number for complete regulator	1118202	1118202	1118202	1118202
Starting motor—				
Delco type number	1107912	1107912	1107912	000783
Armature—				
Clearance between shaft and bearings, not over	.010″	.010″	.010″	.010″
Commutator out of round, not over	.002″	.002″	.002″	.002″
End-play, not over	.030″	.030″	.030″	.030″
Relay—				
Air gap between armature and core	.010-.014″	.010-.014″	.010-.014″	.010-.020″
Hold contacts together lightly while measuring air gap.				
Contact gap (point opening)	.030-.045″	.030-.045″	.030-.045″	.015-.030″
Horns				
Delco type number	1999519-20	1999519-20	1999519-20	K-33-D
Air gap between armature and field core—				
Low rate	.042-.046″	.042-.046″	.042-.046″	.045-.050″
High rate	.032-.036″	.032-.036″	.032-.036″	.036-.040″
Current consumption in amperes at 6 volts	16-18	16-18	16-18	12-14

RADIATOR

1. Removal of Radiator Filler Cap

The radiator cap used on all 40-Series cars is of the bayonet type with a safety catch.

To remove the cap, it is first rotated toward the left until the stop is reached. In this position, the cooling system becomes vented to the atmosphere. The cap should be left in this safety position until all pressure or steam has been relieved. The cap is then removed by further rotation to the left.

2. Radiator Rust Preventive

Cadillac Cooling System Inhibitor is recommended to safeguard the cooling system against the formation of rust and scale. C-60 Soluble Oil may also be used as a rust preventive. One-quarter of a pint of C-60 oil is all that should be applied to the cooling system at one time.

Many anti-freeze solutions, particularly the non-volatile types, contain a rust inhibitor. When these anti-freezes are used, no other inhibitor should be added.

Warning: Do not under any circumstances allow anti-freeze to remain in the system all summer, and do not attempt to use anti-freezes a second winter, as the rust inhibitor in the solutions loses its effectiveness after a period of use.

3. Draining the Cooling System

There are three drain cocks in the cooling systems of all 40-Series cars. One is located at the side of each cylinder block and one located on the radiator outlet casting at the bottom of the radiator.

In order to assure a complete drainage of the cooling system, be sure to open all three drain cocks and to have the engine hot when draining.

When refilling the cooling system, it should be filled with a cooling solution to within one inch below the bottom of the filler neck.

4. High Reading Thermostat

In areas where extreme cold weather is encountered, it may be necessary to install a special high reading thermostat in order to secure more satisfactory results from a hot water heater. The operating temperatures for both standard and high reading thermostats are shown in the table.

Thermostat Operating Table
All 40-Series

Standard Thermostat	
Starts to Open	153-158°F.
Fully Open by	175°F.
High Reading Thermostat	
Starts to Open	168-173°F.
Fully Open by	190°F.

Note: It is not advisable to use volatile anti-freezes with high reading thermostats because of the possibility of solution loss due to the higher operating temperatures.

5. Removing Radiator Thermostat

The radiator thermostat may be replaced and the shutters adjusted on the series 40-50, 52, 62, 72, 60S and 75 cars after raising the hood. The thermostat in series 40-90 cars is located on the engine side of the radiator and can also be replaced without removing other parts.

6. Adjustment of Thermostat Shutters

1. Make sure cooling system is cold (below thermostat opening temperature).

2. Disconnect thermostat lever from shutter control rod.

3. Lengthen adjustable end of control rod until eye of rod is $\frac{1}{16}$" past hole in thermostat lever, thus putting an initial pressure on the shutters tending to hold them closed.

4. Force eye of control rod into line with thermostat lever, by pushing rod to right, and install clevis pin.

7. Vacuum Tests for Radiator Clogging

1. **Remove radiator filler cap** and attach vacuum gauge or a mercury manometer to water pump drain fitting.

Note: It is necessary to install either a 37-series fitting with a ¼ to ⅛ inch pipe reducing bushing or a plain tube fitting to avoid air leakage at this point.

2. Jack up car and run engine until solution has been warmed to between 160 and 180°.

3. Accelerate engine to a speed of 60 m.p.h., and take reading on vacuum gauge or mercury manometer. If vacuum exceeds 5 inches of mercury this is evidence of at least partial radiator clogging or restriction.

RADIATOR

Note: The vacuum reading may be low even though the radiator is clogged, because the water pump impeller is badly corroded and eaten away. In such cases, the pump impeller must be replaced.

8. Air and Water Leakage Tests

The following test procedure will show the presence of air leakage at cylinder head gaskets and at the water pump:

1. Fill cooling system completely. Do not leave any air or expansion space as in normal filling.

2. Install a radiator cap, without a pressure valve, or a cap in which pressure valve has been drilled.

3. Secure a glass jar of from one-half to one gallon capacity and fill it half full of water. Secure also a length of ⅜-inch rubber tubing, attaching one end to radiator overflow pipe and submerging other end in water in jar.

4. Jack up car and run engine with transmission in high gear. Evidence of leakage from water pump or cylinder head gaskets will be a bubbling of air through rubber hose into jar.

Cylinder head gasket leakage is most evident at speeds not over 10 m.p.h. but operating under full load or wide open throttle, a condition secured by momentarily applying the brakes.

Water pump leakage is most evident at higher speeds (around 60 m.p.h.) and with little or no load.

9. Air and Water Leakage Correction

Cylinder head gasket leakage can be corrected by installing new gaskets and insuring leakproofing by applying Perfect Seal Gasket Paste.

Water pump leakage in an otherwise normal cooling system can usually be remedied by replacing worn pump parts, such as packing glands or shafts. A water pump in good condition will, however, leak air at high speeds if the radiator is so badly clogged that there is a high restriction at the pump inlet.

10. Removal of Radiator Core Assembly

Series 40-50, 52, 62, 72, 60S and 75.

1. Drain radiator and remove hoses.
2. Remove radiator tie rods.
3. Disconnect thermostat to shutter rod at thermostat.

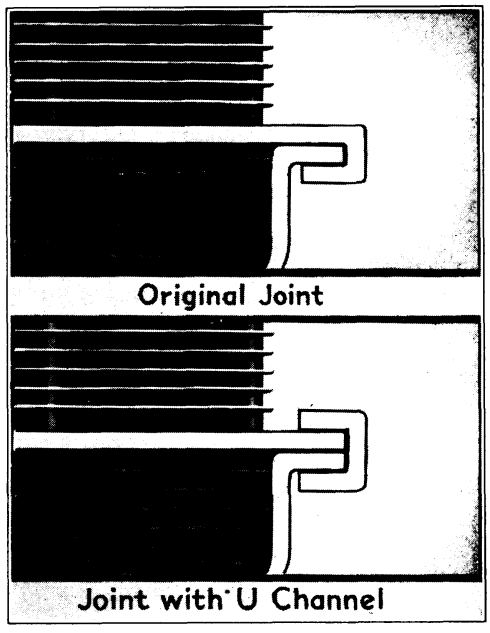


Fig. 66. Radiator Core-to-Tank Joints Typical of 40-50, 52, 62, 72, 60S and 75

4. Remove air cleaner, generator and fan.
5. Disconnect headlight wiring at terminal block on right fender.
6. Loosen headlight harness clinch straps on radiator and remove harness.
7. Remove cap screws holding radiator to cradle assembly, on each side of radiator.
8. Lift out radiator core assembly.

Installation—

The reverse of the above operations will serve as a guide for installation of the radiator core assembly.

Series 40-90

1. Drain radiator and remove hoses.
2. Remove radiator tie rods.
3. Remove ignition coils on radiator.
4. Remove generator and fan.
5. Remove inlet elbow on left fuel pump to avoid damaging radiator.
6. Remove cap screws holding radiator to cradle assembly, on each side of radiator.
7. Lift out radiator core assembly.

Installation—

The reverse of the above operations will serve as a guide for installation of the radiator core assembly.

RADIATOR

11. Disassembly of Radiator Core Assembly

Due to the construction of the radiator core assembly, the top tank should never be removed for service purposes and then reinstalled on the same core.

> **Note:** A top tank can be removed and reinstalled on a **new** radiator core, as new cores are equipped with header plates, the flanges of which can be clinched over to make a joint similar to the original one.

When it is necessary to disassemble the core, the **bottom** tank should be removed as follows:

1. Remove anchorage and outlet casting and melt solder on header-to-tank clinch joint.

2. Pry open and break off the clinch joints with any flat, narrow tool **on the engine side of the tank and straight part of ends only.**

3. Slide tank out toward the rear without changing the clinch joints on the front side.

12. Assembly of Radiator Core

In order to install the bottom tank to the core in as strong a manner as possible, a "U" channel should be constructed to slip over the header-to-tank clinch joint. It may be made from a piece of ordinary .025 to .035 inch sheet brass, $\frac{3}{8}$ inch wide by 25 inches long. (See Fig. 66.)

The brass should be bent over a piece of flat stock to make a "U" channel approximately .100 inch inside the "U" with $\frac{1}{8}$ inch legs. Small Vee-shaped scallops should be cut in the legs of the channel a short distance in from each end to facilitate bending around the corners of the tank.

RADIATOR SPECIFICATIONS

Subject and Remarks	40-50, 52	40-60S	40-62 72, 75	40-90
Area of core in square inches	400	400	400	506
Capacity of cooling system	25 qts.	24½ qts.	24½ qts.	30 qts.

Note: For hose lengths and other cooling specifications, see Page 42.

OTHER RADIATOR REFERENCES

LUBRICATION

1. Engine Oil Recommendations

During cold weather an oil should be used that will permit easy starting at the lowest atmospheric temperature that is likely to be encountered.

When the engine crankcase is being refilled, the oil should be selected, not on the basis of the atmospheric temperature existing at the time of the change, but on the anticipated minimum temperature for the entire period during which the oil is to be used.

The viscosity grades of engine oil for use at the various cold weather temperatures are as follows:

If you anticipate that the minimum atmospheric temperature will be:	Use the grade indicated:
Not lower than 32°F. above zero	20-W or SAE-20
As low as 10°F. above zero	20-W
As low as 10°F. below zero	10-W
Below 10°F. below zero	10-W plus 10% kerosene

Note: 10-W oil plus 10% kerosene is recommended only for those territories where temperature falls below 10°F. below zero for long periods.

During summer weather, use of 20-W or SAE-20 engine oil will permit better all-round performance of the engine than will the heavy body oils. SAE-30 oil may be used if it is expected that the average prevailing daylight temperature will be 90°F. or above, or if the car is regularly driven at high speeds.

2. Changing Engine Oil

Under normal driving conditions, draining the crankcase and replacing with fresh oil every 2000 miles is recommended. (On a new car, the oil should be changed at the end of the first 1000 miles.)

Under adverse driving conditions, it may become necessary to drain the crankcase oil more frequently. These conditions would include:

1. Driving through dust storms or on extremely dusty roads may contaminate the engine oil in spite of the engine air cleaners.

2. During extremely cold weather, frequent starts, low operating speeds, and short runs may contaminate the oil with water condensation inside the crankcase.

Drain the crankcase only after the engine has been heated to normal operating temperature. The benefit of draining is to a large extent, lost if the crankcase is drained when engine is cold.

Whenever the crankcase oil is changed, the copper gauze in the crankcase ventilating breather cap should be cleaned in gasoline and dipped in engine oil. The carburetor air cleaner should also be cleaned and reoiled. (See Note 40, Engine Section).

3. Engine Accessories

Engine accessories which require periodic lubrication include, on V-8 engines, the starting motor, generator, water pump, distributor, and carburetor air cleaner.

Only the distributors and the air cleaners require attention on V-16 engines. The oil filter cartridge on V-16 engines should be changed every 6,000 miles.

Detailed lubrication instructions on these items are included in the Lubrication Chart, Figs. 68 and 69.

4. Cleaning Engine Oil Pan and Screen

Cleaning the engine oil pan and intake float screen is recommended on all series engines at 12,000-mile intervals.

It is also a good plan, when the oil pan is down for periodic cleaning, to inspect the connecting rod and crankshaft bearings.

5. Rear Axle Lubrication

Passenger Car Duty Hypoid Lubricant should be used in the rear axles of 40-Series cars. SAE-90 grade lubricant should be used all season, except in localities where winter temperatures are consistently below zero. At such times SAE-80 may be used.

The lubricant level should be inspected every 1,000 miles and fresh lubricant added, if necessary. The lubricant should be drained, the differential thoroughly flushed, and refilled with fresh hypoid lubricant every 6,000 miles.

LUBRICATION

	Lubrication Number											
	1	2	3	4	5	6	7	8	9	10	11	12
Every 1000 miles												
Oil starter and generator oil cups (none on V-16)	●	●	●	●	●	●	●	●	●	●	●	●
Oil hand brake connections	●	●	●	●	●	●	●	●	●	●	●	●
Oil clutch release mechanism	●	●	●	●	●	●	●	●	●	●	●	●
Oil distributor cam wick (2 on V-16)	●	●	●	●	●	●	●	●	●	●	●	●
Lubricate distributor grease cup (2 on V-16)	●	●	●	●	●	●	●	●	●	●	●	●
Lubricate water pump (except V-16)	●	●	●	●	●	●	●	●	●	●	●	●
Lubricate chassis connections	●	●	●	●	●	●	●	●	●	●	●	●
Lubricate body hardware	●	●	●	●	●	●	●	●	●	●	●	●
Add water to battery	●	●	●	●	●	●	●	●	●	●	●	●
Add liquid to radiator	●	●	●	●	●	●	●	●	●	●	●	●
Check tire inflation	●	●	●	●	●	●	●	●	●	●	●	●
Inspect steering gear lubricant	●	●	●	●	●	●	●	●	●	●	●	●
Inspect transmission lubricant level	●	●	●	●	●	*	●	●	●	●	●	*
Inspect rear axle lubricant level	●	●	●	●	●	*	●	●	●	●	●	*
Every 2000 miles												
Drain and replace engine oil		●		●		●		●		●		●
Clean filter in crankcase ventilating breather		●		●		●		●		●		●
Clean carburetor air cleaner		●		●		●		●		●		●
Every 6000 miles												
* Drain, flush and refill transmission						●						●
* Drain, flush and refill rear axle						●						●
Replace oil filter cartridge (V-16 only)						●						●
Every 12000 miles												
Clean, repack and adjust front wheel bearings												●

Fig. 67. Lubrication Schedule
All Series

LUBRICATION

6. Transmission Lubrication

The recommended lubricant for year-round use in all 40-Series Cadillac and LaSalle transmissions is SAE-90 gear lubricant or SAE-90 EP gear lubricant. The SAE-90 Hypoid Lubricant recommended for the rear axle is also satisfactory for use in the transmission.

The transmission lubricant level must be inspected every 1,000 miles and lubricant added as needed. The transmission must be drained, flushed and refilled with fresh lubricant every 6,000 miles.

7. Water Pump Lubrication

The water pump on all 40-Series V-8 cars is equipped with one covered lubrication fitting at the water pump packing side of the impeller housing. Water pump grease (G-13) should be applied every 1,000 miles on all series. The water pumps on the 40-90, V-16 cars have sealed bearings and do not require lubrication. The water pump should not be lubricated with the engine running.

8. Distributor Lubrication

A grease cup* is provided for lubricating the distributor driveshaft bearing on all 40-Series engines. Every 1,000 miles Water Pump Grease (G-13) should be applied. The application of a slight amount of water pump grease to the timer cam every 1,000 miles is also beneficial.

A felt wick* located in the center of the timer cam beneath the rotor provides a means of lubricating the distributor advance mechanism. Engine oil should be applied every 1,000 miles.

9. Steering Gear Lubrication

Special steering gear lubricant, meeting the S-200 specifications, is required for use in the steering gears of all 40-Series cars the year-round. The lubricant level should be inspected every 1,000 miles and additional lubricant added to bring the level to the filler plug opening.

10. Wheel Bearing Lubrication

The front wheel bearings on all series cars require repacking with wheel bearing grease and readjustment every 12,000 miles. When lubricating these bearings, always use grease meeting the G-12 specifications. The adjustment of the front wheel bearings is discussed in the section on wheels and tires, page 58.

The rear wheel bearings on all series cars are of the self-lubricating type and require no lubrication.

*One on each distributor on V-16 engines.

11. "Oil Can" Lubrication

There are a number of points on the engine and chassis which, although not provided with a lubrication fitting, will operate more freely if given regular oiling.

Most important of these points are the hand brake cables, levers and brackets, clutch release connections, hood hinges and throttle and choke connections on the dash and the engine. Engine oil should be applied to these points with an oil can every 1,000 miles to assure free operation.

12. "Grease Gun" Connections and Lubrication

Lubrication fittings for use with a grease gun are used wherever practical on the engine and chassis of all 40-Series cars. All of the points on the car that are provided with grease gun connections should be lubricated every 1,000 miles. The locations of these points are given in the Lubrication Charts, Figs. 68 and 69.

13. Lubricating Front Suspension System

The threaded pins and bushings of the front wheel suspension system require thorough lubrication every 1,000 miles. It is important that the weight of the car be off the bearings, to assure lubrication at the contacting surfaces.

When lubricating these parts, therefore, the front end of the car must be lifted with a jack placed under the center of the front cross member so that the front suspension system is entirely relieved of weight.

14. Rear Spring Lubrication

The rear springs of all 40-Series cars have waxed liners between each spring leaf. These springs require no lubrication in service. Do not attempt to lubricate them. The rubber bushings used in the rear spring bolts should not be lubricated.

15. Body Hardware

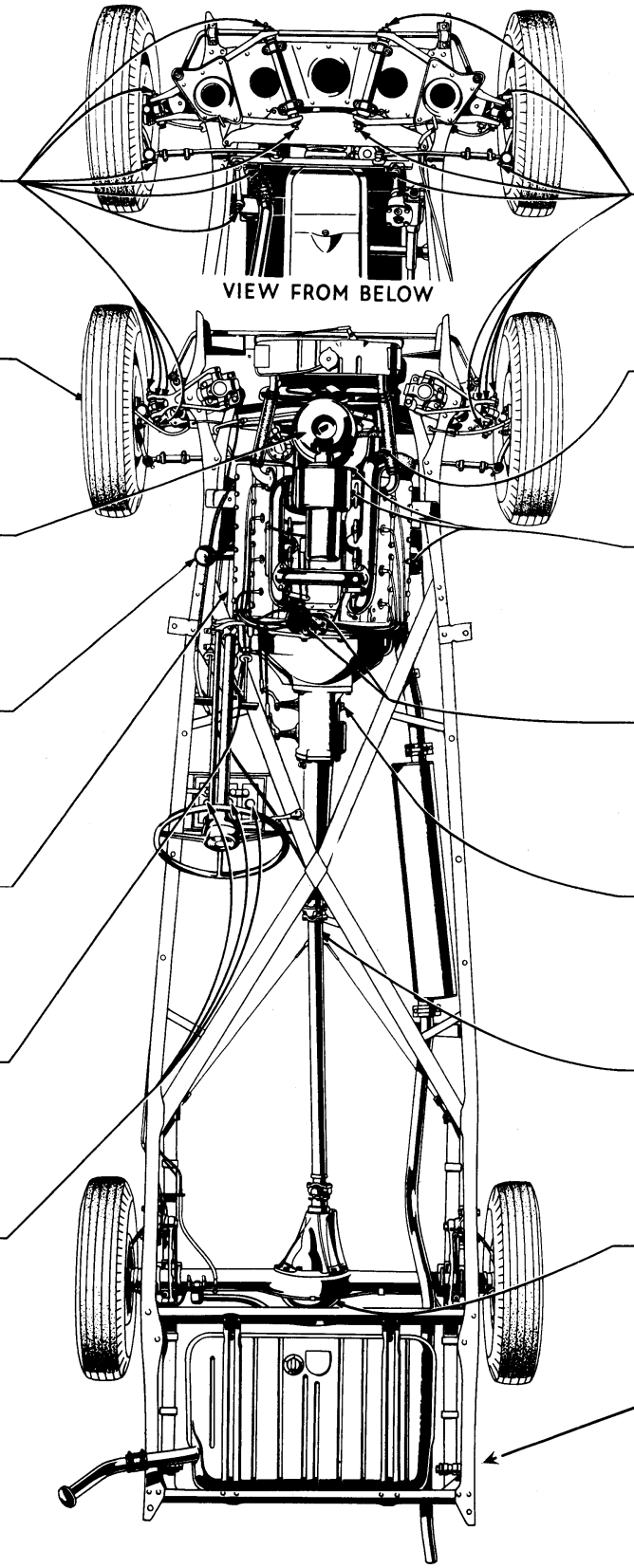
Lubrication of the body hardware is an important part of each 1,000-mile lubrication operation. The following items should be performed.

1. Lubricate the hinge pins on visible type hinges sparingly with stainless oil.

2. Apply a small amount of washable wax to the door lock bolts and striker plates.

Lubrication of concealed door hinges on 40-50 Series cars requires the use of a special grease gun, Tool No. KMO-265 with which chassis lubricant is used.

LUBRICATION



Front Wheel Suspension

10 on R. H. Side

Apply chassis lubricant to connections with grease gun at points shown.

Every 1000 miles

Front Wheel Bearings

Each front wheel

Remove bearings, clean, repack with wheel bearing lubricant and readjust.

Every 12,000 miles

Air Cleaner

Remove air cleaner filtering unit, drain and refill with one pint of S. A. E. 50 engine oil and reinstall.

Every 2000 miles

Engine Oil Filler

Check oil level every 100 to 150 miles and add oil as required.

Drain crankcase and refill with oil of correct grade.

Every 2000 miles

Steering Gear

Add steering gear lubricant to bring level up to filler.

Every 1000 miles

Pedals and Clutch Rocker Shaft

3 fittings

Apply chassis lubricant to connection with grease gun.

Every 1000 miles

Storage Battery

(Under hood at right on 60S)

Add distilled water to bring level up to bottom of filler tubes.

Every 1000 miles

In warm weather check level every two weeks.

"Oil Can" Lubrication

Apply a few drops of engine oil to the connections for the hand brake, the hood hinges, and the clutch release mechanism.

Every 1000 miles

Front Wheel Suspension

9 on L. H. Side

Apply chassis lubricant to connections with grease gun at points shown.

Every 1000 miles

Water Pump

Remove fitting cap and apply water pump lubricant with grease gun.

Every 1000 miles

Starter and Generator

1 oil cup on starter
2 on generator

Apply a few drops of engine oil with oil can.

Every 1000 miles

Timer-Distributor

Turn down grease cup and refill with water pump lubricant. Apply vaseline to cam and a drop of engine oil to cam wick.

Every 1000 miles

Transmission

Add transmission lubricant to bring level up to filler hole.

Every 1000 miles

Drain, flush and refill with fresh lubricant.

Every 6000 miles

Universal Joint Splines

Apply chassis lubricant to connection with grease gun.

Every 1000 miles

Rear Axle

Add Hypoid lubricant to bring level up to filler hole.

Every 1000 miles

Drain, flush and refill with Hypoid lubricant.

Every 6000 miles

Rear Spring Shackles

2 each side on 60S only

Apply chassis lubricant to connections with grease gun.

Every 1000 miles

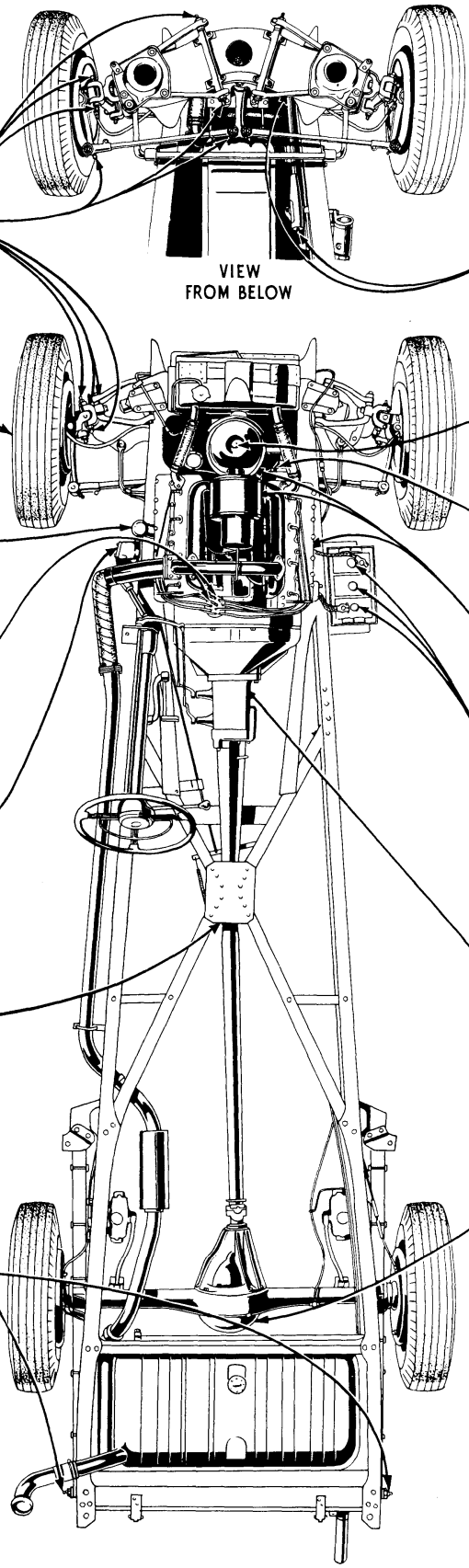
Body Hardware

Apply a few drops of light oil to door hinges. Clean all door striker plates and wedges and apply a small amount of washable wax.

Every 1000 miles

Fig. 68. Lubrication Chart Series 40-50, 52, 62, 72, 60S

LUBRICATION



Front Wheel Suspension

10 points each side

Apply chassis lubricant to connections with grease gun at points shown.

Every 1000 miles

Front Wheel Bearings

Each front wheel

Remove bearings, clean, repack with wheel bearing lubricant and readjust.

Every 12,000 miles

Engine Oil Filler

In center of V-16 engine

Check oil level every 100 to 150 miles and add oil as required.

Drain crankcase and refill with oil of correct grade.

Every 2000 miles

Timer-Distributor

2 at front on V-16 engine

Turn down grease cup and refill with water pump lubricant. Apply vaseline to cam and a drop of engine oil to cam wick.

Every 1000 miles

Steering Gear

Add steering gear lubricant to bring level up to filler.

Every 1000 miles

Universal Joint Splines

Apply chassis lubricant to connection with grease gun.

Every 1000 miles

Rear Spring Shackles

1 each side

Apply chassis lubricant to connections with grease gun.

Every 1000 miles

"Oil Can" Lubrication

Apply a few drops of engine oil to the connections for the hand brake, the hood hinges, and the clutch release mechanism.

Every 1000 miles

Oil Filter

V-16 engine only

Disassemble filter and replace cartridge.

Every 6000 miles

Steering Connecting Rod

2 as shown

Apply chassis lubricant to connections with grease gun.

Every 1000 miles

Air Cleaner

2 on V-16 engine

Remove air cleaner filtering unit, drain and refill with one pint of S. A. E. 50 engine oil and reinstall.

Every 2000 miles

Water Pump

V-8 engine only

Remove fitting cap and apply water pump lubricant with grease gun.

Every 1000 miles

Starter and Generator

V-8 engine only
1 oil cup on starter—2 on generator

Apply a few drops of engine oil with oil can.

Every 1000 miles

Storage Battery

Add distilled water to bring level up to bottom of filler tubes.

Every 1000 miles

In warm weather check level every two weeks.

Transmission

Add transmission lubricant to bring level up to filler tube.

Every 1000 miles

Drain, flush and refill with fresh lubricant.

Every 6000 miles

Rear Axle

Add Hypoid lubricant to bring level up to filler hole.

Every 1000 miles

Drain, flush and refill with Hypoid lubricant.

Every 6000 miles

Body Hardware

All Series

Apply a few drops of light oil to door hinges. Clean all door striker plates and wedges and apply a small amount of washable wax.

Every 1000 miles

Fig. 69. Lubrication Chart Series 40-75 and 90

LUBRICATION

16. Approved Lubricants

Nine different types of lubricants (not including engine oil) are required for satisfactory lubrication of 40-Series Cadillac-LaSalle cars.

Specification No.	Lubricant
A-9-HL	Passenger Car Duty Hypoid Lubricant
A-90-EP	Transmission Lubricant
S-200	Steering Gear Lubricant
G-2½-B	Brake Plate Grease (Lubriplate)
G-11	Chassis Lubricant
G-12	Wheel Bearing Grease
G-13	Water Pump Grease
C-60	Soluble Oil for Cooling System
G-19	Petrolatum for Battery Terminals

Detailed specification sheets covering each of these types of lubricant are available upon request to the Factory Service Department.

CAPACITIES

	40-50, 52	40-62, 60S	40-72, 75	40-90
Engine Crankcase	7 qts.	7 qts.	7 qts.	11 qts.
Transmission	2½ pts.	2½ pts.	2½ pts.	2½ pts.
Rear Axle	5 pts.	5 pts.	6½ pts.	6½ pts.
Cooling System	25 qts.	24½ qts.	24½ qts.	30 qts.
Gasoline Tank	22 gal.	22 gal.	26 gal.*	26 gal.

*24 gallons on 40-72

OTHER LUBRICATION REFERENCES

TORQUE TIGHTNESS SPECIFICATIONS

Location	Size	Ft. Lbs. Torqu. Min.	Maxe
FRONT SUSPENSION			
Shock absorber bolts—All Series	1/2-20	100	115
Shock absorber connecting links—All Series	1/2-20	40	48
Suspension arms to frame—Series 40-50, 52, 62, 72 and 60S	7/16-20	60	70
Series 40-75, 90	1/2-20	85	100
Knuckle to brake backing plate and steering arm—Series 40-50, 52, 62, 72 and 60S	7/16-20	60	70
Series 40-75, 90	1/2-20	90	100
Front stabilizer to frame—All Series	7/16-20	50	60
REAR SUSPENSION			
Differential carrier to axle housing—All Series	3/8-24	30	35
Brake backing plate to axle housing—Series 40-50, 52, 62, 72 and 60S	3/8-24	35	40
Series 40-75, 90	7/16-20	50	55
Rear shock absorber to frame—All Series	9/16-18 or	50	55
	5/8-18	120	140
Shock absorber connecting links—All Series	1/2-20	40	48
Front of rear spring—Series 40-50, 52, 62	Special	65	75
Series 40-60S, 72	Special	90	110
Rear spring bushing and hanger bushing—All Series	Special	65	75
Rear stabilizer—Series 40-60S, 72, 75, 90 (Toggle adj. type)—			
Frame end	9/16-18	120	130
Lower end bolts	1/2-20	80	90
Axle end	9/16-18	120	130
Universal joint screws—All Series	5/16-24	15	20
ENGINE			
Wrist pin clamp screw—Series 40-90	5/16-24	20	25
Intake and exhaust manifold—All Series	3/8-24	25	30
Connecting rod bolts—All Series	Special	55	60
Cylinder head bolts—All Series	7/16-14	70	75
Flywheel to crankshaft—All Series	7/16-20	65	70
Main bearing caps to crankcase—Series 40-90	1/2-13	100	110
Main bearing caps to crankcase—Series 40-50, 52, 62, 72, 60S and 75	9/16-12	130	140
Spark plugs—All Series	Spec. 10 mm.	7	10
Fan support to bracket—All Series	5/8-11	85	95
FUEL TANK AND EXHAUST			
Gas tank brackets and strap to frame—Series 40-50, 52, 62, 72, 60S	5/16-24	10	15
Gas tank brackets and strap to frame—Series 40-75, 90	3/8-24	20	30
Gas tank strap draw bolts—Series 40-60S	3/8-24	2	3
Gas line fittings—All Series	.....	10	15
Support brackets, exhaust pipe to frame—All Series	5/16-24	10	15
Rubber mountings for muffler—tighten the 5/16-24 and 1/4-20 nuts just enough to flatten lock-washers—All Series.			
Exhaust system "U" bolts—All Series	1/4-20	7	8
Self tapping screws for muffler supports, mud pan, and gas line—All Series	.....	10	15
STEERING			
Intermediate steering arm—Series 40-75, 90—Bracket bolt	3/8-24	20	25
Tie rods—Series 40-50, 52, 62, 72, 60S—Pivot to steering arms	1/2-20	50	60
Series 40-50, 52, 62, 72, 60S—Clamp bolt on tubes	.....	8	10
Series 40-50, 52, 62, 72, 60S—Idler lever threaded bushing	.....	60	70
Series 40-75, 90—Pivot to steering arms	5/8-18	75	90
Series 40-75, 90—Clamp bolts in ends	3/8-16	10	12
Steering gear to frame—Series 40-50, 52, 62, 72, 60S	7/16-14	40	45
Series 40-75, 90	1/2-13	70	75
MISCELLANEOUS			
Wheel mounting nuts—All Series (Taper seat nut)	1/2-20	110	120
Bumper to brackets—All Series	1/2-13 or 1/2-20	80	90
Bumper brackets to frame—All Series	1/2-13 or 5/8-18	80	90

SPECIAL TOOLS

Available through the Hinckley-Myers Company, Jackson, Mich.

Tool No.	DESCRIPTION	Series
BODY		
B-133-A	Door Handle Lock Ring Remover	All
B-175	Ventilator Glass Installer	All
B-176	Ventilator Glass Puller	All
B-177	Garnish Moulding Installer	All
B-182	Sealing Compound Gun	All
B-206-B	Phillips Head Screwdriver (1″ Shank)	All
B-208-A	Phillips Head Screwdriver (Heavy Duty)	All
KMO-265	Concealed Hinge Lubricator	40-50
FRONT SUSPENSION		
J-602	Control Arm Yoke Nut Wrench	40-75 & 90
J-720	Caster Angle Adjuster	All
REAR SUSPENSION		
J-766	Shock Absorber End Cap Wrench	40-50, 52, 62, 72, 60S
J-838	Rear Axle Shaft and Bearing Puller	All
J-1284	Rear Wheel Puller	40-50, 52, 62, 72, 60S
J-1355	Axle Shaft Oil Seal Installing Tool	40-50, 52, 62, 72, 60S
J-1356	Axle Shaft Oil Seal Installing Tool	40-75, 90
J-1357	Pinion Shaft Oil Seal Installing Tool	All
BRAKES		
HM-13985	Brake Adjusting Tool	All
HM-20001	Brake Feeler Gauge	All
J-627	Hydraulic Brake Bleeder Wrench	All
J-628	Hydraulic Brake Drain Assembly	All
J-713	Brake Master Cylinder Refiller	All
J-718	Brake Cylinder Clamps (4)	All
J-760-A	Brake Cylinder Clamps (4)	All
J-854	Brake Anchor Pin Nut Wrench	All
ENGINE		
HM-937	Piston Inserter Set	All
HM-109626	Carburetor Equalizing Gauge	40-90
J-257-X	Valve Lifter Remover and Replacer	40-50, 52, 62, 72, 60S, 75
J-505-CL	Carter Carburetor Kit	40-50, 52, 90
J-507	Plunger Assembly Sleeve	40-50, 52, 90
J-508	Jet Extractor	40-50, 52, 90
J-510	Pair Metering Rod Gauges	40-90
J-511	Carburetor Anti-Percolator Nut Wrench	40-50, 52, 90
J-668	Throttle Opening Gauge	40-50, 52, 90
J-787	Metering Rod Bending Tool	40-50, 52, 90
J-816-1	3/16″ Jet Wrench	40-50, 52, 90
J-816-2	1/4″ Jet Wrench	40-50, 52, 90
J-816-4	7/16″ Jet Wrench	40-50, 52, 90
J-816-5	Jet Wrench Handle	40-50, 52, 90
J-816-6	11/32″ Jet Wrench	40-50, 52, 90
J-818-4	13/64″ Float Level Gauge	40-90
J-818-5	1/8″ Float Level Gauge	40-50, 52
J-1136	Carburetor Throttle Gauge	40-50, 52
J-1305	Metering Rod Gauges	40-50, 52
J-1306	Ball Retaining Ring Tool	40-50, 52
J-730	Valve Lock Inserter	40-90
J-822	Crankshaft Dowel Remover	All
J-826	Valve Stem Guide Replacer	40-50, 52, 62, 72, 60S, 75

Tool No.	DESCRIPTION	Series
ENGINE—Continued		
J-827	Valve Lifter Bracket Installer	40-50, 52, 62, 72, 60S, 75
J-829	Camshaft Bearing Remover, Replacer and Aligner	40-50, 52, 62, 72, 60S, 75
J-831	Pilot Thimble—Water Pump Impeller Shaft Assembly	40-50, 52, 62, 72, 60S, 75
J-834	Rear Main Bearing Cap Puller	40-50, 52, 62, 72, 60S, 75
J-836	Camshaft Sprocket Installing Pilot	40-50, 52, 62, 72, 60S, 75
J-874-CL	Connecting Rod and Piston Alignment Fixtures	All
J-874-X	Connecting Rod Alignment Fixture	All
J-1038	Valve Guide Remover and Installer	40-90
J-1055	Valve Stem Length Gauge	40-50, 52, 62, 72, 60S, 75
J-1136	Spark Plug Gauge	All
J-1167	Wrist Pin Remover and Installer	40-90
J-1177	Rear Main Bearing Oil Seal Compressor	All
J-1210	Camshaft Puller	40-90
J-1211	Valve Spring Compressor	40-90
J-1212	Distributor Drive Shaft Aligning Gauge	40-90
J-1275	Spark Plug Wrench	All
KMO-223	Valve Lapping Suction Cup	All
KMO-242	Connecting Rod Socket	All
KMO-248	Water Pump Lubricator	All
*SER-360	Stromberg Carburetor Kit	40-62, 72, 60S, 75
*T-19099	Main Jet Plug Screwdriver	40-62, 72, 60S, 75
*T-23844	Metering Jet Socket Wrench	40-62, 72, 60S, 75
*T-24733	Power Piston and Float Bender Tool	40-62, 72, 60S, 75
*T-24924	Metering Jet Socket Wrench	40-62, 72, 60S, 75
*T-24947	Main Discharge Jet Remover	40-62, 72, 60S, 75
*T-24968	Grip Handle	40-62, 72, 60S, 75
*T-24970	By-pass Jet and Check Valve Tester	40-62, 72, 60S, 75
*T-24971	Float Gauge	40-62, 72, 60S, 75
*T-25046	Choke Gauge	40-62, 72, 60S, 75
*T-25047	Choke Stem Nut Socket Wrench	40-62, 72, 60S, 75
*T-25056	Choke Valve Stop Gauge	40-62, 72, 60S, 75
CLUTCH		
J-285-C	Clutch Finger Equalizing Gauge	All
J-288	Straight Edge—For Setting Clutch Fingers	All
J-688-C	Clutch Drive Plate Indicating Fixture Complete	All
J-688-5	Arbor for J-688-C Fixture	All
J-1031	Clutch Aligning Arbor	All
K-361-R	Clutch Pilot Bearing Puller	All
TRANSMISSION		
J-1007	Snap Ring Removing and Replacing Pliers	All
J-1010	Idler Gear Replacer Pilot	All
J-1169	Transmission Shifter Shaft Oil Seal Inserter	All
J-1170	Clutch Connection Shaft Needle Bearing Lock Ring Replacer	All
J-1184	Transmission Needle Bearing Loader	All
J-1204	Transmission Lower Shifter Lever Adjuster	All
J-1354	Extension Housing Oil Seal Installing Tool	All
STEERING		
J-624-A	Intermediate Steering Arm Screw Press	40-75 & 90
J-1032	Steering Up and Down Lock Nut Wrench	40-50, 52, 62, 60S, 75
MISCELLANEOUS		
J-1264	Torque Wrench	All
J-1272-C	Vacuum Aerial Er d Mill	All

*Available through Bendix Products Division, South Bend, Indiana.