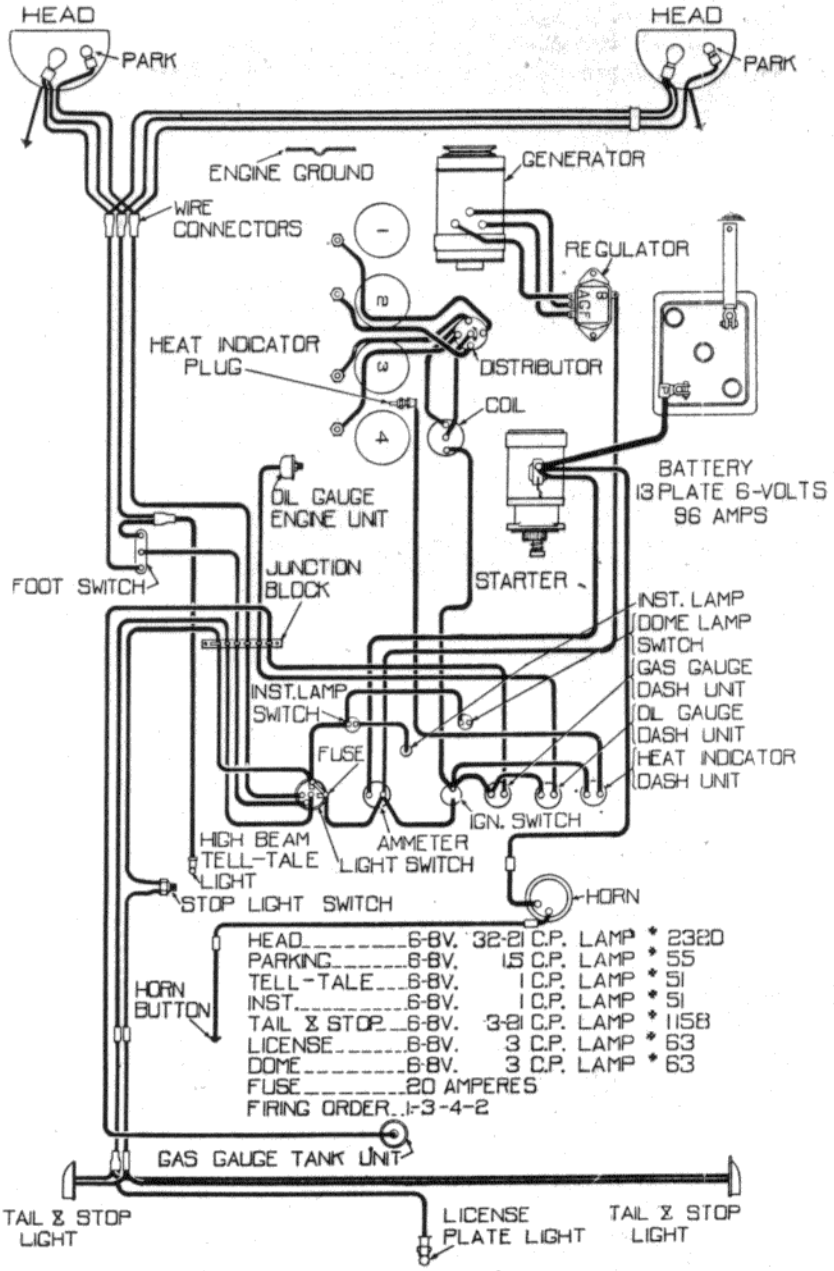
WILLYS-OVERLAND MOTORS, INC.

TECHNICAL DATA

OVERLAND MODEL 39



WIRING DIAGRAM DELUXE SEDAN

The lamp and horn fuse are located on the side of the main light switch which is attached to the forward side of the instrument panel.

LICENSE AND INSURANCE DATA

Location of Serial Number: Plate on front side of frame front cross member at center and on right side of cowl under the hood.

Location of Engine Number: Stamped on right side, front upper corner of cylinder block.

Number of Cylinders	4
Bore of Engine	3⅛ in. (79.37 mm.)
Stroke of Engine	4⅜ in. (111.12 mm.)
Piston Displacement	134.2 cu. in. (2199 cu. cm.)
A. M. A. Rating	15.6 h.p.
Actual Horsepower	61 h.p.

CYLINDER BLOCK

Full length water jackets, front camshaft bearing bushed; reamed diameter 2.188″; rear main bearing cap and block grooved and equipped with woven asbestos oil seal; when servicing, make sure woven asbestos is twisted and tamped tightly in groove and that crankshaft contacts snugly all the way around. Drain plug at right front lower corner of cylinder block.

MAIN BEARINGS

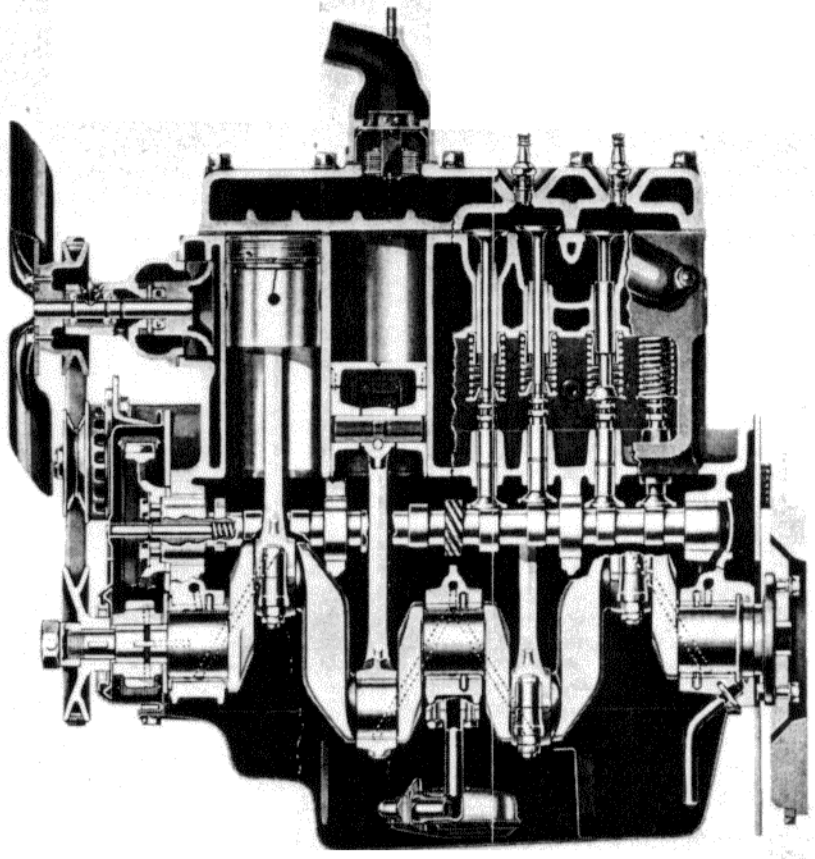
Interchangeable, steel back, babbitt lined; clearance .001″ to .0025″. Thrust taken on front bearing. End play .004″ to .006″, adjusted by shims between crankshaft thrust washer and shoulder on crankshaft.

CONNECTING RODS

Offset at lower end to be installed in engine so that short side of offset is toward nearest main bearing. Oil spray hole in bearing end of rod should be toward right side of motor when viewing motor from flywheel end.

CONNECTING ROD BEARINGS

Spun type, integral with rod and cap. Clearance on crankshaft .001″ to .0025″. Total side clearance .004″ to .009″.



MOTOR SPECIFICATIONS

Bore 3⅛″; Stroke 4⅜″; Displacement 134.2 cu. in.; Taxable H.P. 15.63; Max. H.P. 61 at 3600 R.P.M.; Max. torque 106 at 2200 R.P.M.; Compression ratio 6.35 to 1. Compression pressure 112 lbs. at starting motor cranking speed of 185 R.P.M. with wide open throttle. High altitude cylinder head compression ratio 6.8 to 1.

Timing chain width 1¼″; Timing chain length 47 links. Full pressure lubrication to all crankshaft main and connecting rod bearings, camshaft bearings and pressure through front of crankshaft to timing chain and sprockets.

PISTONS

Aluminum alloy, "T" slot; cam ground, plated; heat insulation groove above top ring. Clearance .002″ to .0025″; check clearance on thrust side of piston with .0025″ feeler gauge ¾″ wide; feeler gauge should have from 5 lbs. to 10 lbs. pull.

Pistons are available in the following over-sizes, .002″; .005″; .010″; .020″; .030″.

CAUTION: Do not use any lapping compound of any kind when fitting pistons. Hone the cylinders until a 5 to 10 lb. drag is secured on a .0025 ribbon feeler gauge ¾″ wide. The gauge should extend the entire length of the piston on the thrust side which is the opposite side from the "T" slot in the skirt.

PISTON RINGS

Width of compression ring 3/32″. Width of oil control ring 3/16″; End gap on all rings .008″ to .013″. Face of compression rings tapered .0005″. The letters "T-O-P" on upper edge of ring indicate proper installation.

PISTON PIN

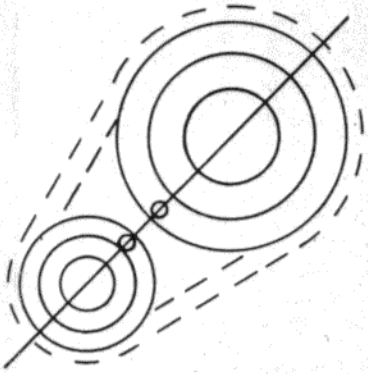
Anchored in rod with clamp bolt; clearance .0001″ to .0009″ in piston which is equivalent to a light thumb-push fit at room temperature of 60° pin size 13/16″.

Piston pins are available in the following over-sizes .001; .002; .003.

CAUTION: When loosening or tightening the piston pin clamp screw in the connecting rod, mount a ½″ steel rod in a vise and slip piston and pin over the steel rod. This will prevent any rod distortion or damage to the piston when using the wrench. As an extra precaution, use a canvas or leather pad as a buffer between the vise and the piston to prevent scratching.

TIMING CHAIN

Not adjustable. Remove camshaft sprocket to replace timing chain. Timing is correct when, with pistons No. 1 and No. 4 at T.D.C., a line drawn between sprocket centers cuts through timing marks on both sprockets.



VALVE TIMING

	Piston Measurements From Top Center	
Inlet opens 9 degrees before top center measured on flywheel	.039″	(9.91 mm.)
Inlet closes 50 degrees after bottom center measured on flywheel	3.772″	(95.81 mm.)
Exhaust opens 47 degrees before bottom center measured on flywheel ...	3.799″	(96.49 mm.)
Exhaust closes 12 degrees after top center measured on flywheel	.054″	(0.14 mm.)
Tappet setting for timing	.020″	(0.51 mm.)
Number of flywheel teeth.....	97	

Set in accordance with flywheel marks exposed through inspection hole at left side of flywheel housing.

VALVES

Head diameter intake $1\frac{17}{32}$″. Exhaust valve dia. $1\frac{15}{32}$″. Valve stem clearance intake valve .0015″ to .00325″. Exhaust valve stem clearance .002″ to .00375″. Angle of both exhaust and inlet seats 45°; valve tappet running clearance intake .014″ cold; exhaust .014″ cold; valve tappet clearance for checking timing .020″; valve spring pressure with valve closed 46½ lb.; with valve open 95½ lb.; free length of valve spring $2\frac{1}{16}$.

CYLINDER HEAD

When installing the cylinder head caution should be exercised to tighten down cylinder head bolts in the following rotation to guard against water leakage into combustion chamber and chance of blowing gasket.

15	9	3	7	13
10	5	1	4	12
11	6	2	8	14

ENGINE MOUNTING ADJUSTMENT

Front mounting adjustment is controlled by the lower nut which should be turned up until the *lower* snubbing rubber expands about ⅛″ or compressed enough so it is hard to turn it with thumb and two fingers. The same adjustment applies to the rear mounting except that the *upper* nut controls the tension of the snubbing rubber.

OIL PRESSURE REGULATION

Oil pressure regulator should be adjusted to delive 30 lbs. pressure at 30 M. P. H. If adjustment is neces sary this may be accomplished by adding or removin steel shims in spring retainer to gain the desire pressure.

AUTOMATIC HEAT CONTROL

The Overland is equipped with a hot spot manifol with automatic heat control

The setting of the thermostat spring should be 8 t 10 inch ounces at 70° F.

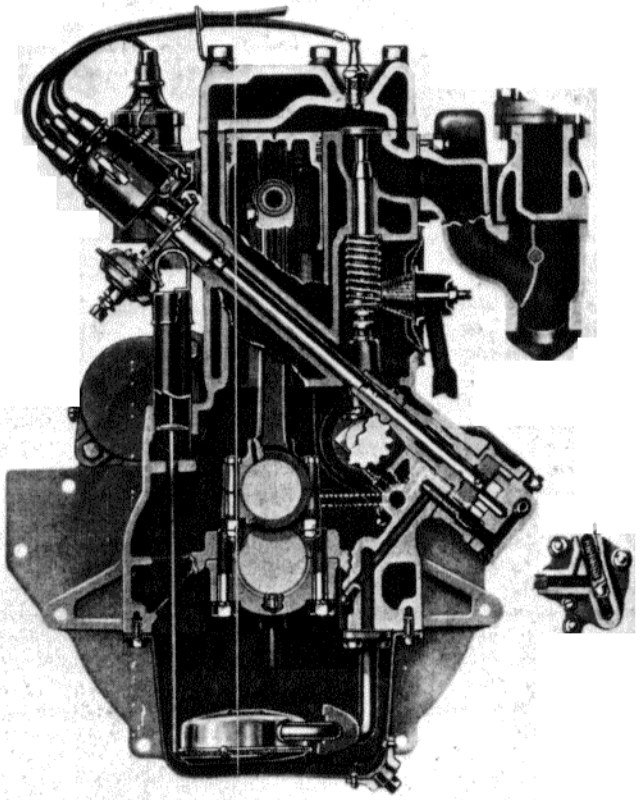
Replacement of thermostatic spring should be mad if reading is other than above.

WATER PUMP

Water pump equipment is of the packless and bal bearing type, requiring no lubrication or packing Should it be necessary to remove and dismantle thi unit special tool equipment No. W-115 and W-11 are necessary. A water pump housing refacer is avail able under tool number W-114.

THERMOSTAT

Water temperature of the engine is controlled by thermostat installed in the top water outlet; openin temperature 140° to 147°. Thermostat should be wid open at 170°.



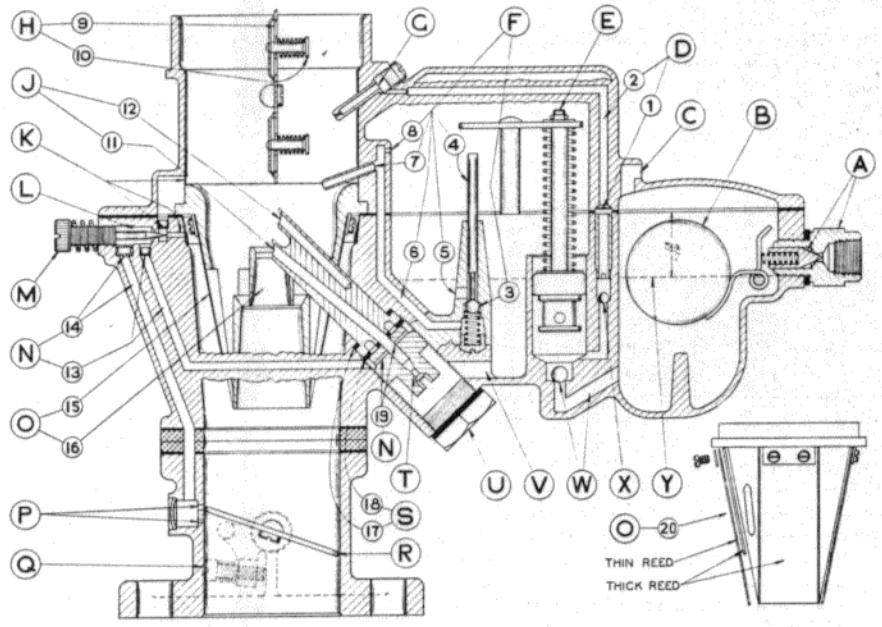
Compression Ratio	Altitude									
	Sea Level	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
6.8 high alt. head.....	125 lb.	120 lb.	116 lb.	112 lb.	108 lb.	103 lb.	99 lb.	95 lb.	91 lb.	86 lb.	82 lb
6.35 standard head	113	109	106	102	98	92	90	86	82	79	75

Compression should be checked with compression gauge at starting motor cranking speed of 185 R.P.M. with wide open throttle.

The 6.8 high altitude head is used only on cars in the Rocky Mountain high plateau area.

CARBURETOR

The new Model 'U-1B' Tillotson carburetor has incorporated a spring loaded inlet needle; set jet, metered to 16-1 air fuel ratio: power jet opening into air stream and reed cage redesigned. The only adjustment deviation from former carburetor being $^{13}/_{16}$" float setting.



A—Inlet Needle and Seat (Spring Loaded)
B—Float
C—Bowl Vent
D—Accelerating Pump Channel and Screen
E—Accelerating Pump
F—Power Jet Mechanism
G—Accelerating Pump Nozzle
H—Choke Shutter
J—Nozzle Outlet
K—Idle Air Supply
L—Idle Mixture Chamber
M—Idle Adjustment
N—Idle Fuel Supply Channels
O—Venturi Passages
P—Idle Discharge Holes
Q—Idle Speed Regulating Screw
R—Throttle Shutter
S—Nozzle Base and Outlet Gasket
T—Nozzle Base
U—Nozzle Channel Plug Screw
V—Nozzle Fuel Supply Channel
W—Accelerating Pump Supply Channel Ball Check
X—Accelerating Pump Discharge Channel Ball Check
Y—Gasoline Level

IGNITION TIMING

Firing Order 1-3-4-2

Crank engine until No. 1 piston is approching T.D.C. of compression stroke. Continue cranking slowly until "IGN" mark on flywheel is in register with pointed end of timing indicator in left side of flywheel housing. Locate distributor so that points just break contact and rotor is in position for ignition at No. 1 spark plug.

The ignition is set on top center with automatic spark control at rest.

In setting ignition timing it is very important that all back lash in distributor mechanism be eliminated by finger pressure on rotor in clockwise direction. Also make sure that vacuum controlled mechanism is free and not stuck in the advanced position.

To advance timing, loosen clamp bolt and rotate distributor body in clockwise direction. Move in opposite direction to retard. Tighten clamp screw.

When oil pump has been removed from engine it is very important when reassembling to see that distributor rotor is at No. 1 spark plug cable terminal position and No. 1 piston on compression stroke with "IGN" timing mark at indicator.

Spark Plug gap, .025"

MOTOR TUNE-UP

Motor must be thoroughly limbered up (at least 1500 miles) to secure best performance and mileage.

1–Make sure motor is compression tight.

2–Clean and adjust spark plugs; set at .025".

3–Clean and adjust breaker points to .020".

4–Turn engine slowly until "IGN" mark on fly wheel registers with pointer. Loosen distributor clamp and move distributor carefully until points just break. Lock distributor and check with timing light.

5–Adjust tappets to .014" clearance with cams pointing down.

6–Make sure vacuum advance of distributor functions.

7–Check fuel pump pressure; 1½ to 2½ pounds is correct.

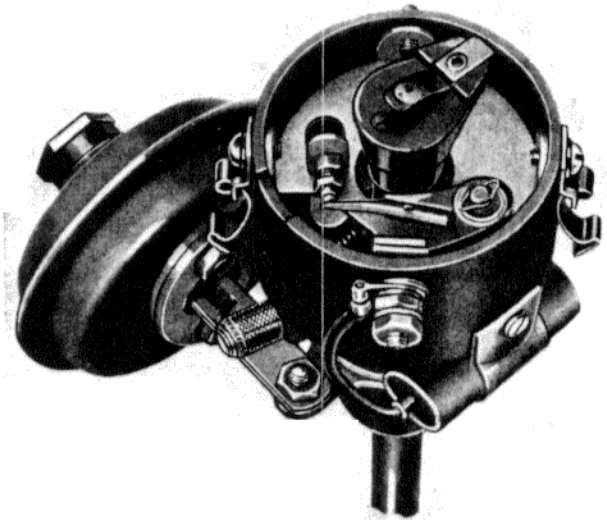
8–Check carburetor gasoline level with engine running and upper part of carburetor removed. Fuel level should be $^{13}/_{16}$" from top edge of carburetor with gasket removed.

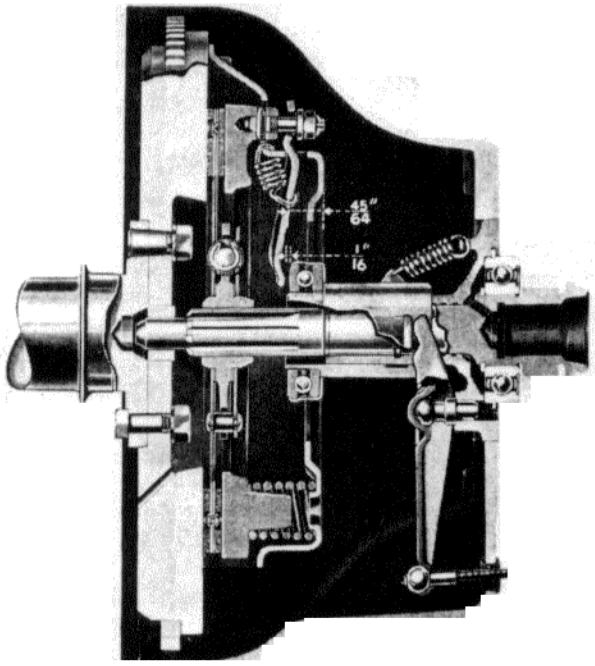
9–Reassemble carburetor and carefully adjust idle adjustment, setting idle regulating screw at equivalent to 9 miles per hour car speed.

10–In cold climates shield radiator to increase under-hood temperature and bring motor temperature to at least 165 degrees. If a type of anti-freeze having a high evaporation point is used the engine temperature can be raised to 185 degrees which will further improve performance and mileage.

DISTRIBUTOR

Contact point gap .020"; Cam angle 41 degrees; Maximum automatic advance 18-20°. Maximum vacuum advance 13-15°. Ignition timing set at top center. Spark plugs, 14mm, Champion J-8. Spark plug gap .025".





CLUTCH

Long Mfg. Co., pressure clutch plate assembly. Borg & Beck driven plate. Single 8" plate; spring center vibration neutralizer; two facings, 1/8" moulded lining. Clutch lever adjustment 45/64" measured from face plate to clutch levers with clutch assembled.

CLUTCH ADJUSTMENTS

The release bearing and clutch pedal must be in their proper positions. No adjustment of the clutch proper is required to compensate for lining wear, but a clearance of approximately 1/16" should be maintained between release levers and release bearing. To obtain this clearance, the clutch pedal should be against under-side of toe board, then adjust the length of the clutch control cable so that pedal has a free movement of 3/4" to 1" from the fully engaged position before resistance of clutch springs is felt.

If for any reason clutch is disassembled, when reassembled, the three release levers must make simultaneous contact on release bearing and the distance from release levers to rear face of clutch back plate be 45/64". This adjustment is accomplished by means of the nut on each of the release levers. When pedal is released and clutch engaged, there should be approximately 1/16" clearance between front face of release bearing and end of levers. When removing the clutch make sure it is marked and reassembled in the original position.

When replacing driven plate, make sure side of plate with longest hub is to rear.

TRANSMISSION

Warner 3-speed; helical cut 2nd gears; spur cut 1st and reverse gears; synchronized 2nd and high gears. Ratios: High—Direct; Low—2.673; Second—1.563; Reverse—3.553.

Capacity 1 pint; SAE 90 Summer and Winter.

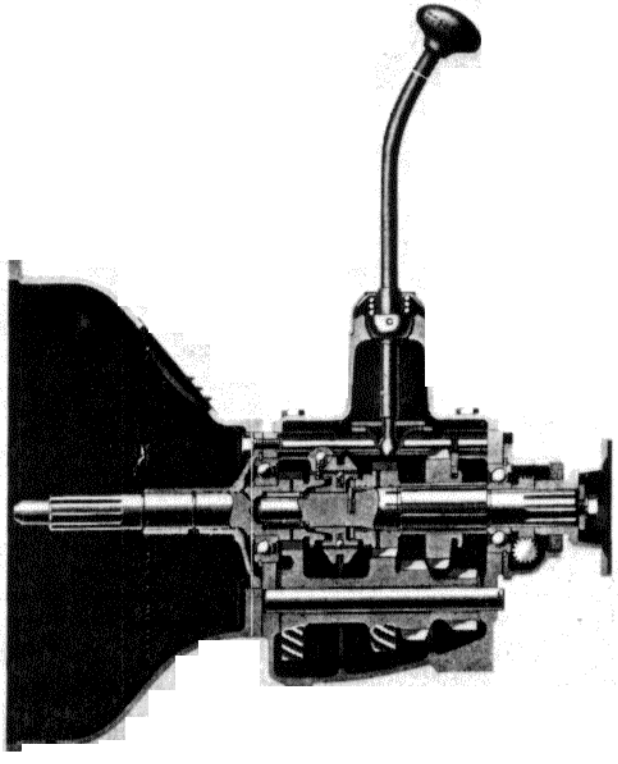
TO REMOVE TRANSMISSION AND CLUTCH

Disconnect battery for safety. Remove front seat cushion and cover door trim. Remove gear shift lever by unscrewing retaining collar at bottom of lever. Remove mat and pull up on accelerating pedal rod to disengage rod from rubber socket. Remove right, then the center toe boards. Loosen radiator to body brace rod. Loosen radiator hold down nuts, not necessary to remove entirely. Disconnect propeller shaft at front end. Disconnect speedometer cable. Remove lower nuts from rear mounting bolts at rear of transmission. Jack up rear of engine with board between jack and oil pan, until mounting bracket at rear of transmission can be removed. Raise transmission, with jack under engine, until it clears cross member. Remove bell housing to motor bolts. NOTE: If aligning bolts are driven in from the rear, reverse them and drive in from the front, which will hold motor plate in position and make bell housing assembling easier. Remove transmission from top. Remove clutch.

NOTE: Not necessary to remove Bell Housing if transmission only is to be removed.

TO INSTALL TRANSMISSION

Reverse above procedure. It is important after pulling up tightly on lower nuts of the mounting bolts that the upper snubbing rubber is expanded about 1/8". Make the adjustment with the upper nuts. See "Engine Mounting Adjustment."



AXLES

FRONT AXLE

FRONT AXLE—Reverse Elliott type; I-beam. Minimum road clearance:—Standard: 8 9/32″; Deluxe, 8 17/32″; Caster Angle 3°; Camber, 2°; Toe-in 1/16″-1/8″; King-pin inclination 7½°.

To properly service Rear Axles: Rear Axle Servicing Kit W-99 should be used. The kit includes Pullers and gauges for proper setting of gears with complete instructions.

TO REMOVE AXLE SHAFT: Remove rear wheel. Remove brake dust shield, grease and bearing retainer and brake assembly. Pull out axle shaft. Guard against losing shims.

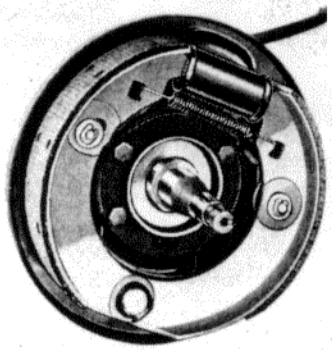
For major rear axle work it is recommended that the axle be removed from the car and the work done on a bench.

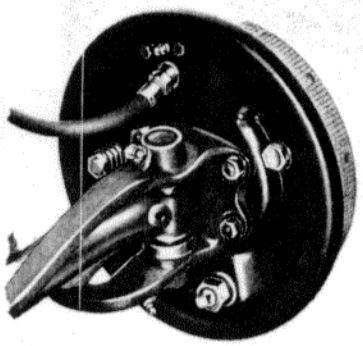
TO REMOVE DIFFERENTIAL: Remove axle shafts. Remove differential housing cover. Remove bearing caps at each side of differential. Remove shims at right side of differential case first, then remove shims at left side. It is important that shims removed from each side be kept together and side of case from which removed be noted so that they can be installed in the same position. The ring gear and pinion should have approximately .005″ lash.

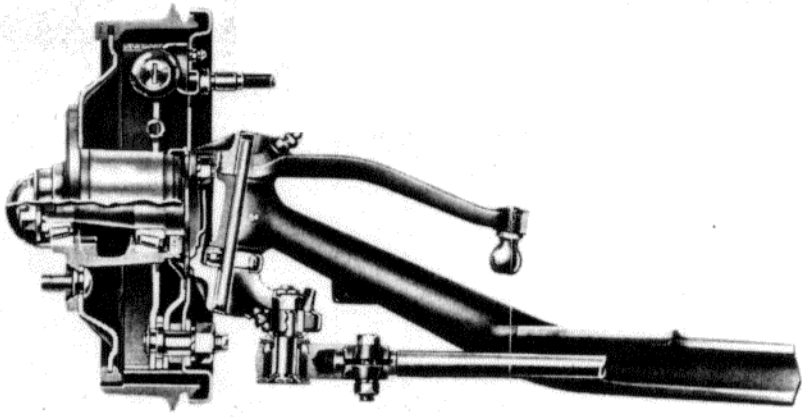
TO REMOVE PINION SHAFT: Remove universal joint companion flange. With brass drift, drive pinion shaft out thru differential housing, driving from front end. Rear bearing cone, rollers and spacer come out with shaft. Remove front bearing and cup, rollers and oil seal at same time by means of long drift. Drive out through front of housing, using clearance notches in housing. Rear bearing cups may be driven out of housing in same manner with long drift, driving from front. Note location and thickness of shims removed.

INSTALLING PINION GEAR OR PINION SHAFT BEARING: To install pinion gear shaft or pinion shaft bearing the positioning shims between front face of rear pinion bearing cup and shoulder in housing should be reassembled just as they were removed.

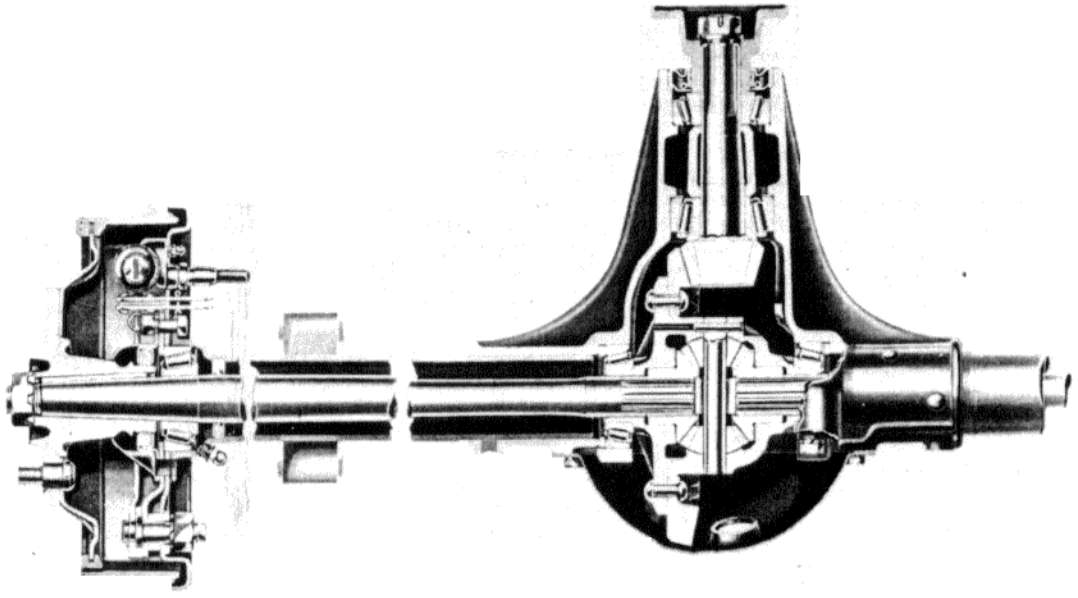
The number of shims required between front bearing cone and spacer determine pinion shaft bearing adjustment, correct shim thickness may be checked as follows:





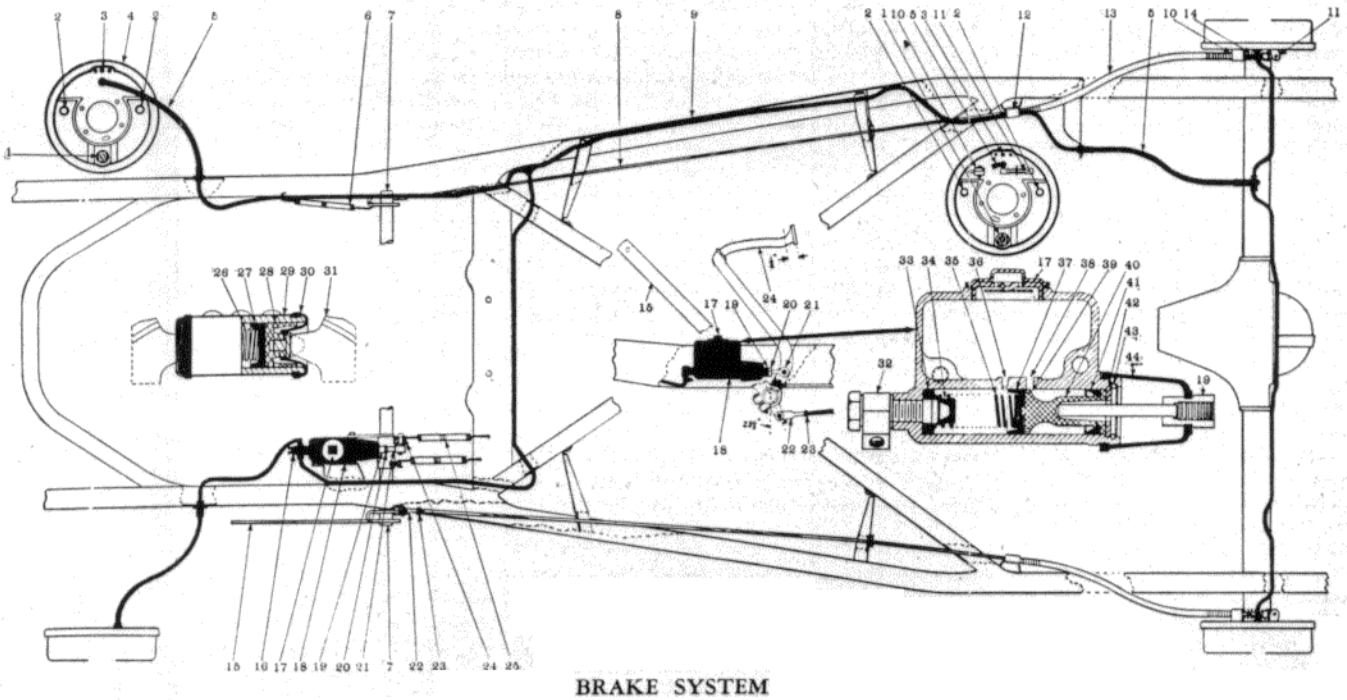


Assemble pinion shaft bearing cup in housing using same shim thickness at back of cup as when removed. Assemble pinion shaft with rear bearing cone and roller into housings. Slip bearing spacer and bearing shims on pinion shaft, using same shim thickness as when removed. Place front bearing and cup on shaft and drive into place against shims in front of spacer. Using a short spacer made of a piece of pipe of proper size placed over end of pinion shaft, pull front bearing cone up tight against bearing spacer with companion flange nut. If shaft turns freely and has end play, determine amount of end play with indicator and remove front bearing cone and take out shims equal to amount of end play plus additional .002″. If shaft turns hard or binds, add shims as required to adjust. Adjustment is correct when 2½ lb. pull on 10″ leverage is required to turn pinion shaft.



LUBRICATION
Capacity, 1¼ pts.
Summer and Winter
S. A. E. 90

BRAKES



BRAKE SYSTEM

1—Brake Shoe Anchor Pin
2—Brake Shoe Adjusting Stud
3—Wheel Brake Cylinder Bleeder Screw
4—Brake Dust Shield
5—Brake Hose
6—Cross Shaft Retracting Spring
7—Brake Cross Shaft
8—Hand Brake Control Cable
9—Brake Tube
10—Hand Brake Cable Bracket, Rear
11—Hand Brake Link
12—Hand Brake Cable Bracket, Front
13—Hand Brake Conduit
14—Hand Brake Return Spring
15—Hand Brake Cross Shaft Lever
16—Stop Light Switch
17—Master Cylinder Filler Cap
18—Master Cylinder and Supply Tank
19—Master Cylinder Push Rod
20—Master Cylinder Eye Bolt Lock Nut
21—Master Cylinder Eye Bolt
22—Hand Brake Cable Adjusting Yoke
23—Hand Brake Cable Adjusting Yoke Lock Nut
24—Foot Brake Pedal
25—Foot Brake Pedal Return Spring
26—Brake Cylinder Cup Spring
27—Brake Cylinder Cup
28—Brake Cylinder Piston
29—Wheel Brake Cylinder
30—Wheel Brake Cylinder Boot
31—Brake Shoe
32—Master Cylinder Outlet Fitting
33—Master Cylinder Valve Seat
34—Master Cylinder Check Valve
35—Master Cylinder Return Spring
36—By-Pass Port
37—Master Cylinder Primary Cup
38—Supply Port
39—Piston Head Fluid Passage
40—Master Cylinder Piston
41—Master Cylinder Secondary Cup
42—Piston Stop Plate
43—Piston Stop Plate Lock Wire
44—Master Cylinder Boot

Wagner-Lockheed, Hydraulic operated. Nickel-chromium alloy iron drums, 9″ diameter. Lining size 1¾″x 3/16″; Length per wheel 18″; Clearance toe .010″ heel .006″. Braking power rear 44%; Hand brake operates on rear wheels. Hand brake location, dash, left of steering. Rear wheel cylinders 7/8″; Front wheel cylinder, 1″; Capacity, approximately, one pint.

BRAKE SHOE ADJUSTMENT (MINOR)
Normal Lining Wear

When the brake lining becomes worn, as indicated by foot pedal going almost to floor board, necessary adjustment can readily be made to bring the brake shoes closer to the drum, as described in the following paragraph.

Jack up the wheels to clear the ground. Adjustment is made by rotating the shoe adjustment cam or bolt with a wrench until the shoe comes in contact with the drum, then back off the adjustment slightly until the wheel rotates freely in either direction of rotation. Proceed in a like manner on the brake shoes of all wheels. To bring the shoe into closer relation with the drum, the adjustment cam or bolt must be turned towards the nearest point of the wheel rim when the wrench is pointing upwards. The tension of the friction spring automatically keeps the cam locked in any position.

BRAKE SHOE ADJUSTMENT (MAJOR)

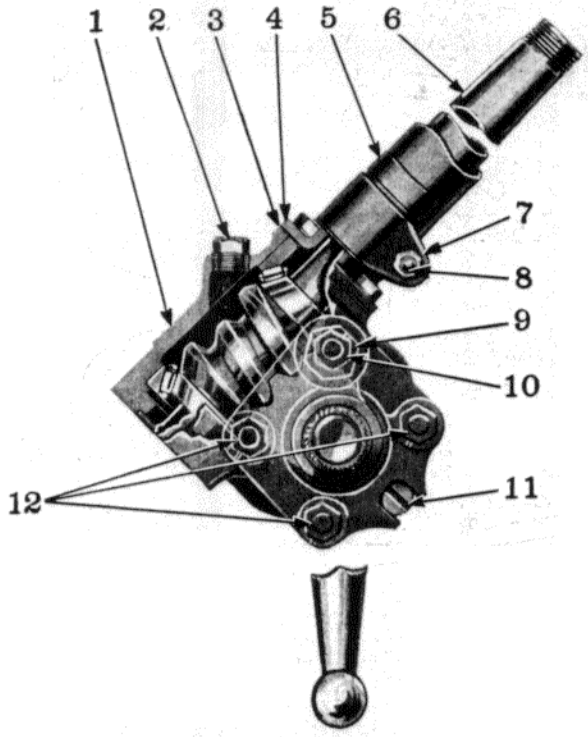
In the event the eccentric anchor pin has been incorrectly adjusted, or when relining the brakes, it is necessary to readjust the eccentric anchor pin to relocate the shoes within the drum, as described in the following paragraph.

With the shoe and lining assemblies installed and the adjusting fixture or brake drum in place, loosen the anchor pin locknut on the rear of the dust shield. Adjustment is made by turning the eccentric anchor pin and rotating the shoe adjustment cam bolt until the shoes are set to the proper clearance, as determined by feeler gauges. The recommended shoe setting is .006″ clearance at the heel or lower end, and .010″ at the top or upper end of brake shoe assembly. The shoe to fixture clearances should be measured with a feeler gauge 1½″ from the ends of the lining. A slot is provided in the brake drum for checking.

BLEEDING BRAKES

If air gets into the brake system it will be necessary to bleed the lines to secure proper operation and a safe brake. First see that the master cylinder reservoir is full of fluid. Brakes should be bled at the wheels by attaching a bleeder drain tube to the bleeder screw, place the end of the tube in a glass jar, then loosen the bleeder screw about ¾ turn. Press brake pedal and let it return slowly to released position. When air bubbles stop appearing in jar close bleeder screw.

CAUTION: Always keep a supply of fluid in the reservoir of the master cylinder.



STEERING GEAR

1—Steering Gear Housing
2—Steering Gear Case Oil Filler Plug
3—Steering Housing Cap Shims
4—Steering Housing Cap
5—Vent Hole Cover
6—Steering Worm Shaft
7—Steering Jacket Clamp
8—Steering Jacket Clamp Bolt
9—Eccentric Adjusting Sleeve
10—Eccentric Sleeve Jam Nut
11—Eccentric Rivet
12—Housing Cover Nuts

TO ADJUST STEERING GEAR

To adjust steering gear, first determine if there is end play in the worm bearings. If play exceeds .010″, remove one shim from under housing cap "4" by loosening the jacket clamp bolt "8" at the lower end of the jacket and move jacket clamp up about ⅜″. Loosen instrument board bracket clamp from steering gear jacket; work jacket down until lower end is against housing cap. Remove housing cap screws and work jacket up until stopped by steering wheel. Remove shim, then reassemble. Take care to locate jacket so top end will clear bottom of wheel recess and tighten jacket clamp as near to the bottom end of jacket as possible.

Jack up front wheels and remove steering connecting link from steering gear arm ball. Wheels should swing through turning radius without tight spots. Loosen frame steering gear case and instrument board gear bracket bolts to allow steering gear to shift, then tighten the steering gear to the frame after which tighten the bracket.

To adjust end play of cross shaft, see that the housing cover nuts "12" and jam nut "10" are tightened securely. Turn hand wheel to extreme left or right and back ⅛ turn. Grip ball arm at shaft, shaft should rotate freely without end play. Adjust with adjustment screw at side of housing next to engine. Lock securely with lock nut and recheck.

To adjust for proper mesh of sector teeth in worm, turn hand wheel to the mid-position. (Steering connecting link previously disconnected.) Shake ball arm to determine amount of lash. Loosen housing cover nut "12" one-quarter turn, and eccentric sleeve jam nut "10" one-half turn. Turn the eccentric adjusting sleeve "9" clockwise, checking the amount of lost motion in the ball arm and adjust to point where lash can just be felt, being sure to finish movement of eccentric adjusting sleeve in clock-wise direction. Turn hand wheel throughout full travel to test for free operation. If too tight, turn eccentric adjusting sleeve counter-clockwise to free and readjust more carefully. Tighten eccentric adjusting sleeve jam nut "10" securely and *follow* with housing cover nuts "12". (THIS IS VERY IMPORTANT.)

Lash in the mesh of the worm and sector teeth should be the same at ⅓ turn of the hand wheel to each side of mid-position. Centralization of tooth contact is made by means of an eccentric rivet adjustment "11"; in making this adjustment start with the sector shaft teeth meshed at the mid-position of the worm which is found by turning the steering wheel to the mid-position of its complete turning limits. Turn steering wheel ⅓ revolution to the right and shake the steering arm to determine the amount of lash at this point. Turn steering wheel ⅔ of a revolution to the left (⅓ revolution to left of center) and shake arm. Lash at this position should be the same as when turned to the right of the center. If there is more lash at left, turn eccentric rivet "11" in a counter-clockwise direction. If the lash is more to the right, turn eccentric rivet "11" in a clockwise direction. Next adjust for proper mesh of shaft teeth in worm as described. Tighten eccentric sleeve jam nut "10" then tighten housing cover nuts "12". It is important that the eccentric sleeve jam nut "10" be tightened first. Finally, replace steering connecting link.