

# PAIR and TUNE-UP MANUA

## Illustrated Service Procedure and Specifications for

### 1937 PACKARD

Six, 115      Eight, 120C

#### SPECIFICATIONS

##### Series 115, 120C

##### SIX, 115

Wheelbase, 115"

SEDANS: Four-Door Touring, Two-Door Touring.

COUPES: Business Coupe, Convertible Coupe, Club Coupe.

##### 1937 Models

##### EIGHT, 120C

Wheelbase, 120"

SEDANS: Four-Door Touring, Two-Door Touring.

COUPES: Business Coupe, Convertible Coupe, Club Coupe.

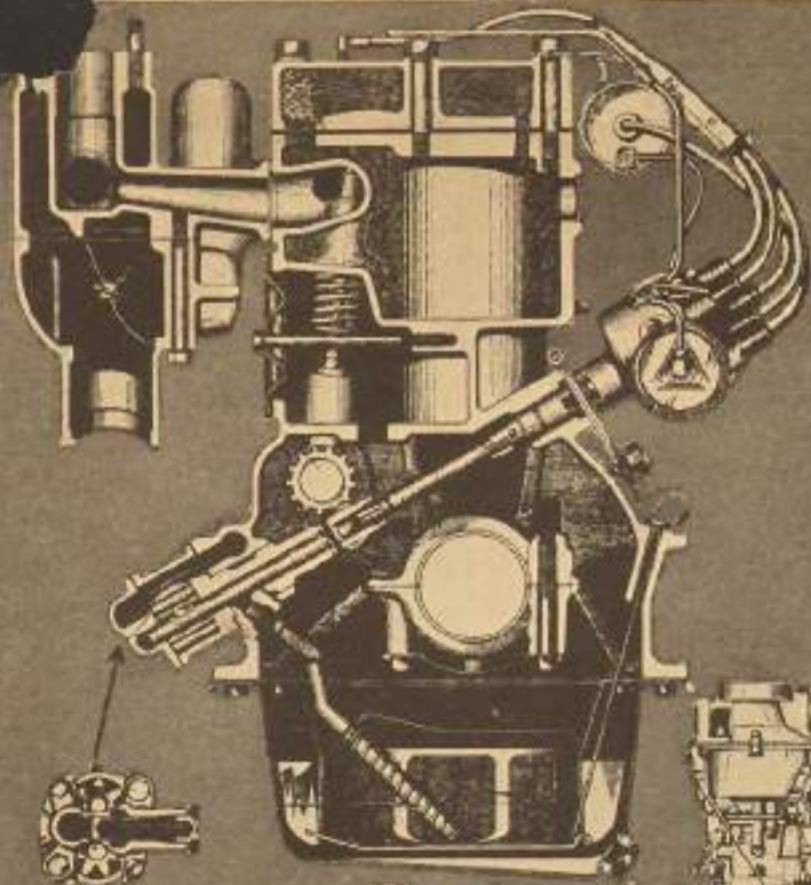
ENGINE NUMBER: Stamped on boss, left side of block near distributor.

##### 1937 Motors

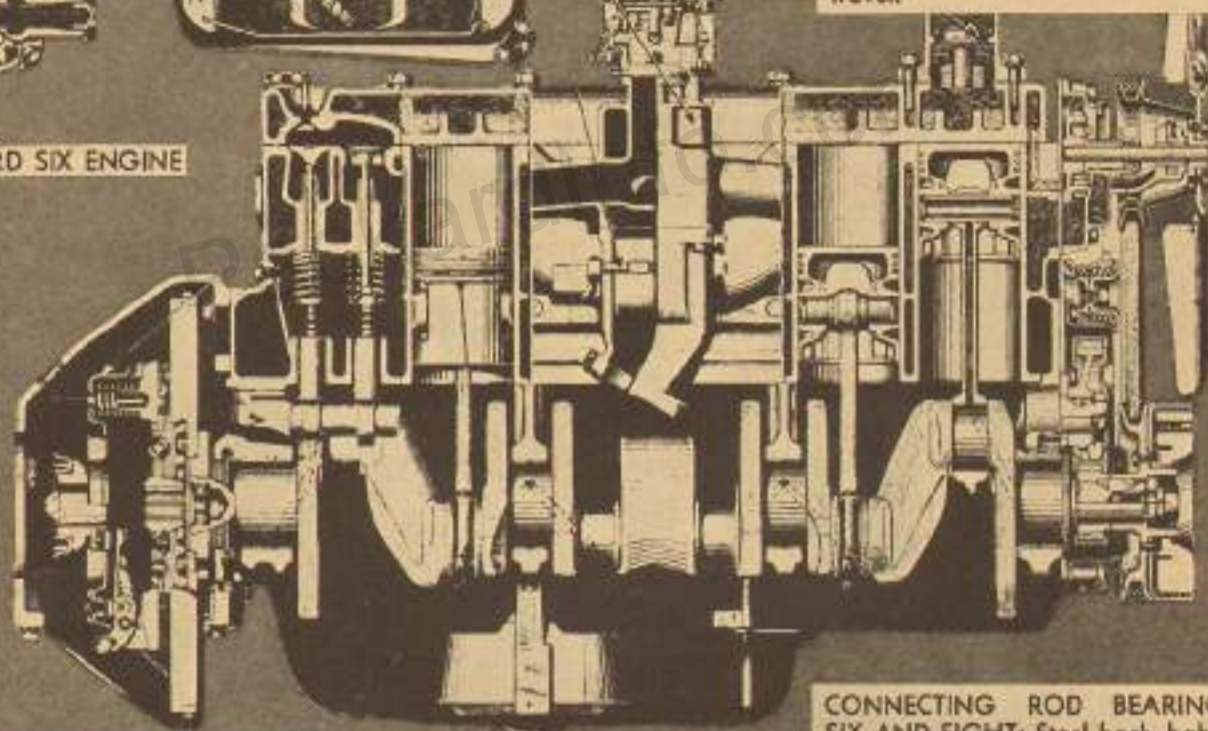
SERIES 115: Six cylinder. Bore, 3-7/16"; stroke, 4 1/2". Piston displacement, 237 cu. in. Compression ratio, 6.3:1; optional, 6.75:1. H.P., A.M.A. 28.4; brake, 100 at 3600 R.P.M.

SERIES 120C: Eight cylinder. Bore, 3-3/16"; stroke, 5". Piston displacement, 320 cu. in. Compression ratio, 6.4:1; optional, 7:1. H.P., A.M.A. 32.5; brake, 130 at 3200 R.P.M.

# PACKARD Six, Eight, '37 — Motor



PACKARD SIX ENGINE



**VALVE TIMING, SIX AND EIGHT:** With No. 1 exhaust valve tappet adjusted at .017", insert a .004" feeler blade between tappet screw and valve stem. Turn engine in normal direction until feeler blade is just released (exhaust valve closed). In this position, pointer at flywheel housing should be in register with 2 1/2 graduations or 5° past 1 U. D. C. mark on flywheel. Each graduation equals 2° flywheel travel.

**PISTONS, SIX AND EIGHT:** Aluminum alloy, strut type, cam ground, tin-plated. Remove from top of block. Skirt clearance, .0015". Check with .0015" feeler gauge 1/2" wide inserted between thrust side of piston and cylinder wall. Clearance correct when 12 to 18 lbs. pull required to withdraw feeler.

**PISTON PINS, SIX AND EIGHT:** Floating type, secured in piston bosses by snap ring. Fit to pistons at finger push fit with piston heated at 160° F. in rod bushings, finger push fit at room temperature. Heat piston to remove or assemble.

**PISTON RINGS, SIX AND EIGHT:** Two 1/8" compression rings and one 3/16" oil ring. Gap clearance—Compression and oil, .007" to .015". Groove clearance—Top compression and oil ring, .002" to .0025". Lower compression, .0015" to .002". Assemble top compression and oil ring with gap away from camshaft, Lower compression facing camshaft.

**CONNECTING RODS, SIX AND EIGHT:** Rifle drilled for piston pin lubrication. When assembled, oil squirt hole in big end of rod and piston slot should face camshaft side of engine.

**CONNECTING ROD BEARINGS, SIX AND EIGHT:** Steel back, babbitt lined, replaceable precision shell type. Not adjustable. Radial clearance, .0005" to .0015". Side play, .004" to .010".

**OIL PUMP, SIX AND EIGHT:** Gear type. With oil and engine at normal operating temperature, pressure should be 35 lbs. at 30 M. P. H. Pressure relief valve located in pump. Not adjustable. Spring pressure when compressed to 2" length, 5 to 8 lbs. With No. 1 piston on T. D. C. of compression stroke, install oil pump so that distributor drive slot is parallel with center line of camshaft. Distributor rotor in position to fire No. 1 plug.

# Motor — PACKARD Six, Eight, '37

**VALVE RUNNING CLEARANCE, SIX AND EIGHT:** With engine at normal operating temperature—Inlet, .009"; exhaust, .010".

**VALVE SEATS, SIX AND EIGHT:** Seat angle—Inlet, 30°; exhaust, 45°.

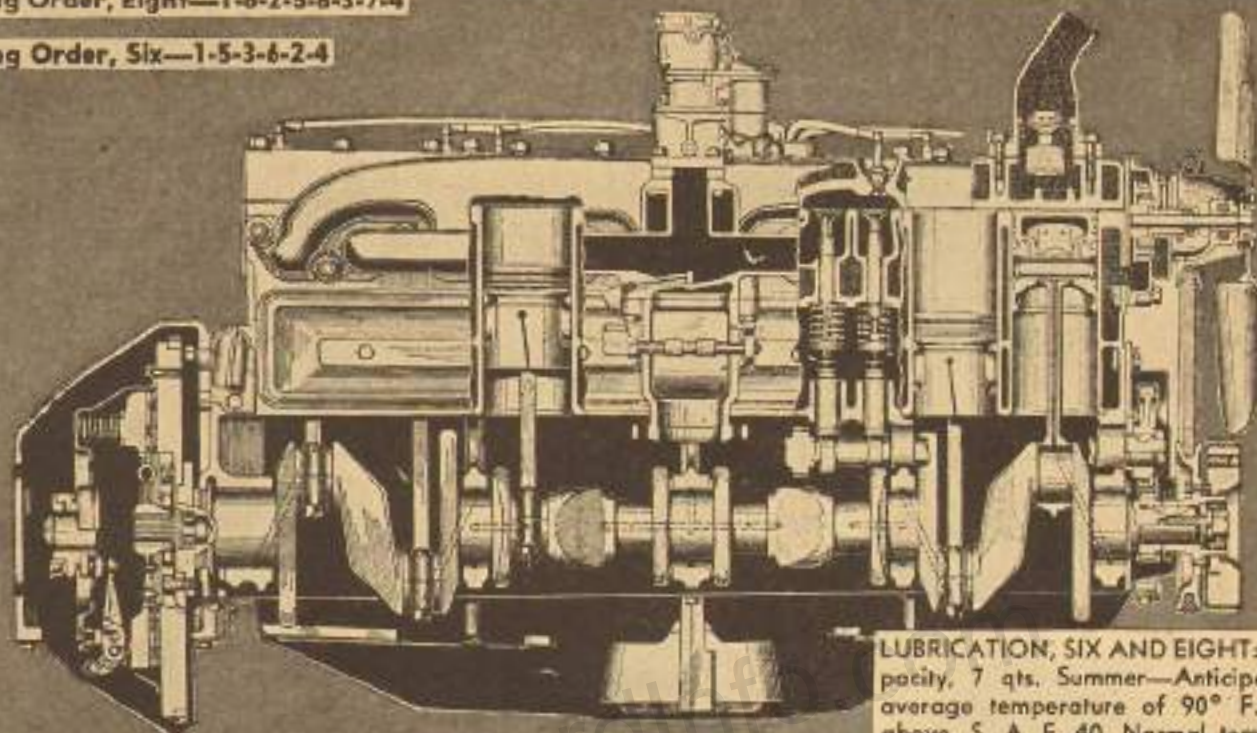
**CAMSHAFT BEARINGS, SIX AND EIGHT:** Steel back, babbitt lined, precision type. Bearing clearance, .001" to .003". Endplay, .002" to .004".

**WATER PUMP, SIX AND EIGHT:** Remove fan blades to install packing. Heat impeller in boiling water for easy removal or installation. Clearance between front face of impeller and housing, .021" to .039". From rear face of impeller hub to front face of plate, .005" to .015".

## PACKARD EIGHT ENGINE

**Firing Order, Eight—1-6-2-5-8-3-7-4**

**Firing Order, Six—1-5-3-6-2-4**



**VALVE SPRINGS, SIX AND EIGHT:** Pressure, when compressed to  $1\frac{5}{8}$ " length, 36 to 44 lbs. Compressed to  $1\frac{5}{16}$ " length, 105 to 113 lbs.

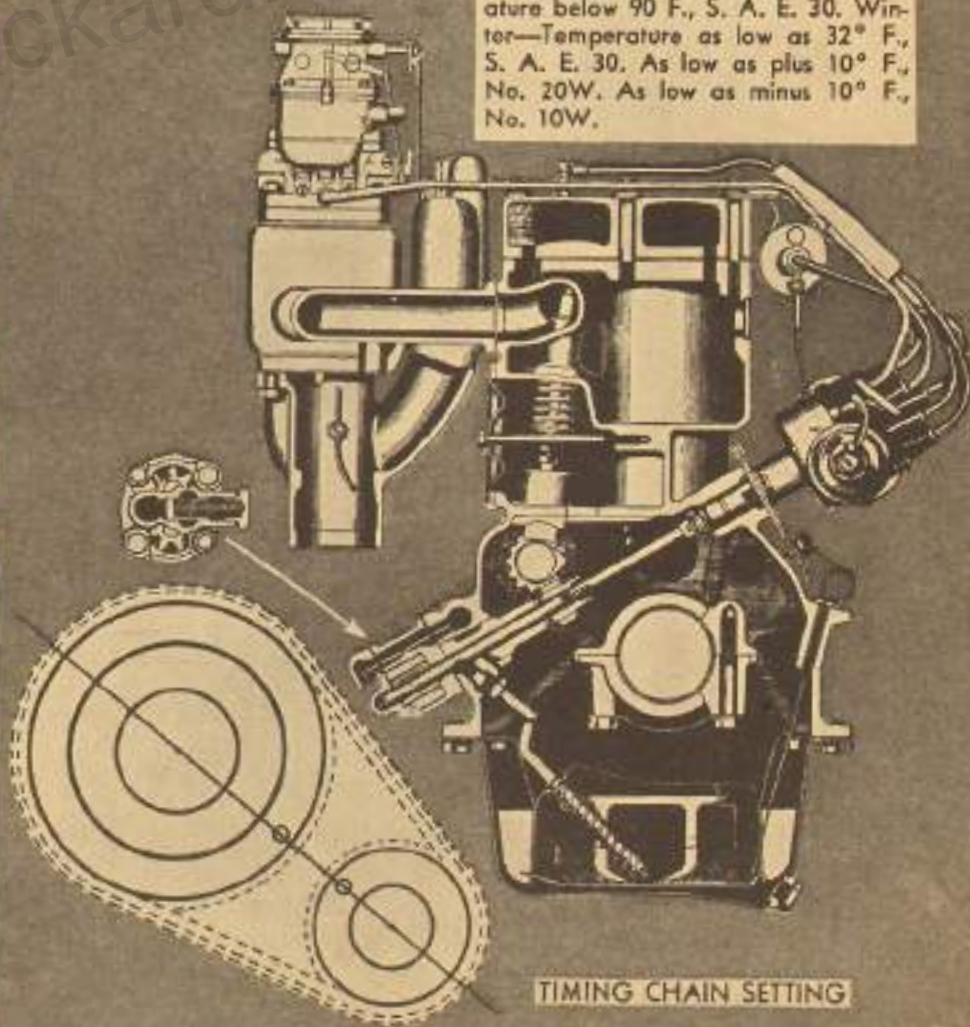
**VALVE GUIDES, SIX AND EIGHT:** Valve guides are taper reamed with smallest diameter at bottom. Minimum stem to guide clearance, .0005" at bottom.

**MAIN BEARINGS, SIX AND EIGHT:** Steel back babbitt lined, replaceable precision shell type. Not adjustable. Radial clearance, .001" to .003". Endplay, .003" to .008".

**FAN BELT ADJUSTMENT, SIX AND EIGHT:** Adjust to scale pull of 25 lbs., attaching scale hook to bolt passing through generator lug; or  $\frac{1}{2}$ " thumb pressure deflection at a point midway between fan and generator pulleys.

**TIMING CHAIN, SIX AND EIGHT:** Two sprocket non-adjustable type. When removing, pull both sprockets together. Timing correct when sprocket marks are together and fall under a line drawn through sprocket centers. On timing chain jobs, remove both fenders and radiator as one assembly.

**LUBRICATION, SIX AND EIGHT:** Capacity, 7 qts. Summer—Anticipated average temperature of 90° F., or above, S. A. E. 40. Normal temperature below 90 F., S. A. E. 30. Winter—Temperature as low as 32° F., S. A. E. 30. As low as plus 10° F., No. 20W. As low as minus 10° F., No. 10W.



TIMING CHAIN SETTING

# PACKARD Six, Eight, '37 - Tune-Up

## CONTACT POINT GAP:

Six, .015" Eight, .012" to .018"

## BREAKER SPRING TENSION:

Six, 19 to 23 oz.

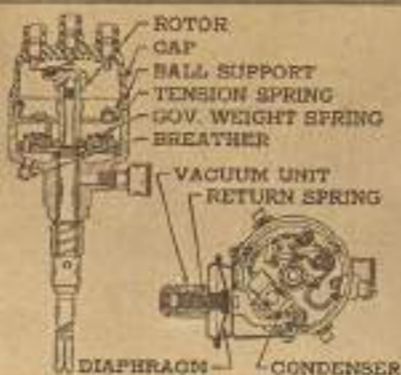
Eight, 18 to 20 oz.

Firing Order, Six—1-5-3-6-2-4

Firing Order, Eight—1-6-2-5-8-3-7-4

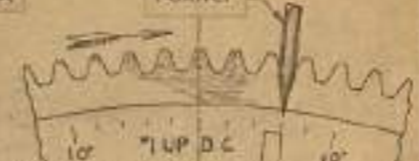
## IGNITION TIMING, SIX AND EIGHT:

Turn engine until No. 1 piston is approaching T. D. C. of compression stroke. Stop when specified flywheel mark as given in "Ignition Setting" is in register with pointer at inspection hole in flywheel housing. With fuel compensator set at "0", locate distributor so points just break, rotor in position for ignition at No. 1 plug.



SIX

Pointer



IGNITION SETTING, SIX: Standard compression ratio, 4° to 6° or 2 to 3 flywheel graduations B. T. D. C. Optional ratio (aluminum, 7:1), 2 1/2° to 4° or 1 to 2 flywheel graduations B. T. D. C.



SPARK PLUG GAP, SIX AND EIGHT:

.026" to .030"

EIGHT Pointer



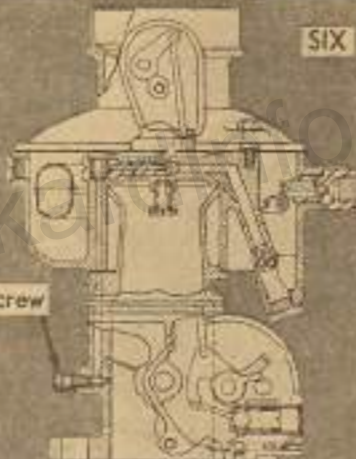
IGNITION SETTING, EIGHT: Standard compression ratio, 7° or 3 1/2 flywheel graduations B. T. D. C. Optional ratio (aluminum, 7:1), 4° or 2 flywheel graduations B. T. D. C.

## CARBURETOR

### IDLE SPEED ADJUSTMENT, SIX:

Initial setting for idle mixture adjusting screw 1/2 to 1 1/2 turns off seat. To adjust, with warm engine turn idle mixture adjusting screw right or left, within limits given until engine runs smoothly. Turning screw clockwise leans mixture.

Idle mixture adjusting screw



SIX

### IDLE SPEED ADJUSTMENT, EIGHT:

With warm engine turn one idle mixture adjusting screw at a time until engine runs smoothly. Turning idle mixture adjusting screw clockwise richens mixture.

FUEL LEVEL, EIGHT: Recommended fuel level should be 15/32" plus or minus 1/32", below machined top surface of float bowl with 2 1/2 to 3 lbs. pressure on fuel.

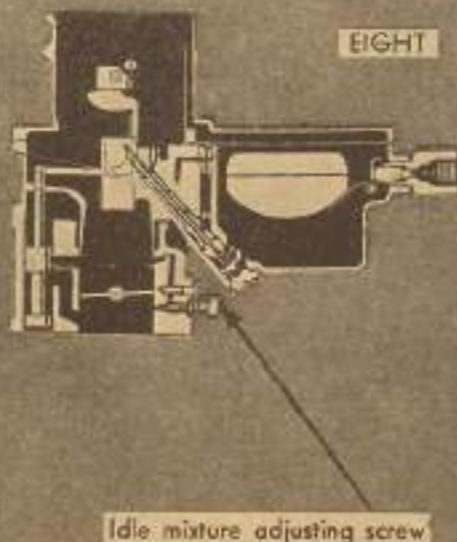
FUEL LEVEL, SIX: Recommended fuel level should be 1/2" plus or minus 1/32", below machined top surface of float bowl with 2 1/2 to 3 lbs. pressure on fuel.

### CHOKE ADJUSTMENT, EIGHT:

If warm-up period indicates too rich or lean a mixture, disconnect choke valve link rod and test operation of choke valve. When closed by hand, valve should open freely without slightest lag. If action sticks, remove choke valve shaft and clean with alcohol. Do not oil. Remove thermostat and check adjustment. Initial setting should be when pointer on inner plate is aligned with prick punch mark 10 or 11 graduations in rich direction from "O" mark on main plate. To adjust, turn inner plate screw. Check bearing friction and free movement of vacuum piston and reinstall assembly to manifold. Adjust link rod so that thermostat lever is 1/16" away from combination stop pin and adjusting screw, when choke valve is fully closed. With further indications of too rich or lean mixture, remove thermostat and increase tension of spring one graduation at a time. If satisfactory adjustment cannot be obtained after changing adjustment 5 graduations from original initial setting, replace thermostat unit.

CHOKE ADJUSTMENT, SIX: If warm-up period indicates too rich or lean a mixture, remove thermostat assembly and test operation of choke valve. When closed by hand, valve should open freely without slightest lag. If action is sticky, remove choke valve shaft and clean with alcohol or crocus cloth. Make sure choke valve does not bind in air horn. Correct any bearing friction in movement of thermostat lever and vacuum piston. Do not oil any part of linkage. Adjustment of thermostat spring correct when punch mark on plate aligns with similar mark on housing. Adjust by turning screw until marks are aligned. With further indication of too rich or lean mixture, remove thermostat and increase tension of spring 1/2 graduation at a time. If satisfactory adjustment cannot be obtained after changing adjustment five graduations from original setting, replace thermostat unit.

CHANDLER GROVE MODEL AOC-2



EIGHT

Idle mixture adjusting screw

STROMBERG MODEL EE-14

# Clutch, Transmission — PACKARD Six, Eight, '37



**CLUTCH PEDAL ADJUSTMENT, SIX, EIGHT:** Adjustment for pedal lash made at pedal linkage. Pedal should have a free travel of  $1\frac{1}{2}$ " to 2" measured between pedal pad and floor board.

**NOTE:** Transmission sliding gears should be marked before dismantling to insure reinstallation in original position. Do not shift gears with the transmission cover removed, as synchromesh balls and springs will jump out. To install balls and springs, use clamping band ring compressor.

**CLUTCH SPRING PRESSURE:** Six— Provided with 6 clutch springs. When compressed to a length of  $1\frac{9}{16}$ " pressure should be 150 to 160 lbs. Eight—Has 9 clutch springs. When compressed to  $1\frac{9}{16}$ " pressure should be 112 to 120 lbs.

**CLUTCH REMOVAL:** Remove transmission assembly. Depress clutch pedal and insert a wedge, or its equivalent, between each release finger and clutch cover. Remove clutch release bearing. Remove clutch pedal rod by removing retaining cotter pins. Remove cover plate cap screws and withdraw clutch. Remove assembly from below.

**DISASSEMBLE TRANSMISSION:** Remove universal flange, speedometer pinion, rear bearing cap and lock plate at end of housing. Remove front bearing cap. Drive counter shaft to the rear. Remove clutch shaft from front. Move main shaft with gears to rear until bearing is released from case, then pass up through main cover opening. Remove counter shaft cluster gear. Drive reverse idler shaft out to rear.

**COUNTERSHAFT:** Countershaft cluster should be in place before reverse idler is installed. Fit should be free in case with no perceptible end play. Use a tapered arbor in inserting regular countershaft through roller bearings, making sure that lug on bronze washer at each end is aligned with corresponding slots in case.

**LUBRICATION:** Capacity, 1 quart or 2 lbs. Summer, S. A. E. 160; winter, S. A. E. 90.

**TRANSMISSION REMOVAL:** Clear floor boards. Drop propeller shaft. Disconnect speedometer and ground cables. Remove clutch housing lower cover, engine stabilizer and right and left transmission supports, removing right support at frame. Support rear of engine with jack and remove 4 bolts holding transmission to clutch housing.

To install transmission, move engine to the right as far as possible and reverse the above procedure.

# PACKARD Six, Eight, '37 — Steering, Axles

## SPECIFICATIONS, SIX AND EIGHT

Caster Angle	2° min. to 3° max. (2½° preferred)
Camber	¼° min. to 1¼° max. (1° preferred)
Toe-in	1/32" to ¼"
King Pin Angle	1½°

SIX  
13⅞" plus or minus ¼"  
(car loaded)

EIGHT  
13½" plus or minus ¼"  
(car loaded)

**TOE-IN ADJUSTMENT:** Inflate tires to recommended pressure. Check front wheel bearings. Center steering gear worm on "high spot," front wheels straight ahead. Distance measured from brake backing plate to first frame rivet back of bumper, should be equal on both sides. If the difference is found to be more than ½", lengthen tie rod on short side until both wheels are centered. Adjust toe-in by turning each cross tube same amount until 1/32" to 1/16" is obtained. Toe-in measurement made at hub height at center of tire tread.

**CASTER ANGLE:** Adjustment obtained by installing or removing tapered shims, between forward end of torque arm and wheel support arm. Shims of ½° and 1° available.

**CAMBER ANGLE:** Adjusted by installing offset pilot thimbles at outer end of shock absorber arm and support bolt. Pilots of zero, 1/16", ¼" and 3/16" offset are available. A change of 1/16" changes camber 1/3°.

**NOTE** — Caster angle should be checked with car loaded as follows: Five passenger bodies, 300 lbs. on front seat and 395 lbs. on rear seat. Two to four passenger bodies, 300 lbs. in front seat and 150 lbs. in rear compartment or rumble seat.

**WHEEL SUPPORT LOWER BEARING:** Adjustment correct when preloaded to 3 to 8 lbs. Pull measured at top of wheel support eye with king pin, backing plate and shock absorber bolt removed. Adjust by adding or removing shims. Shims available in steps of .001".

**PINION SHAFT BEARINGS:** Adjusted to a preload or drag of 25 to 34 inch pounds. The self-locking flange nut should be tightened until it buckles the spacer sufficiently to require a pull of 5 to 6 lbs. (measured on wrench handle 5" out from center of socket) to rotate the pinion shaft.

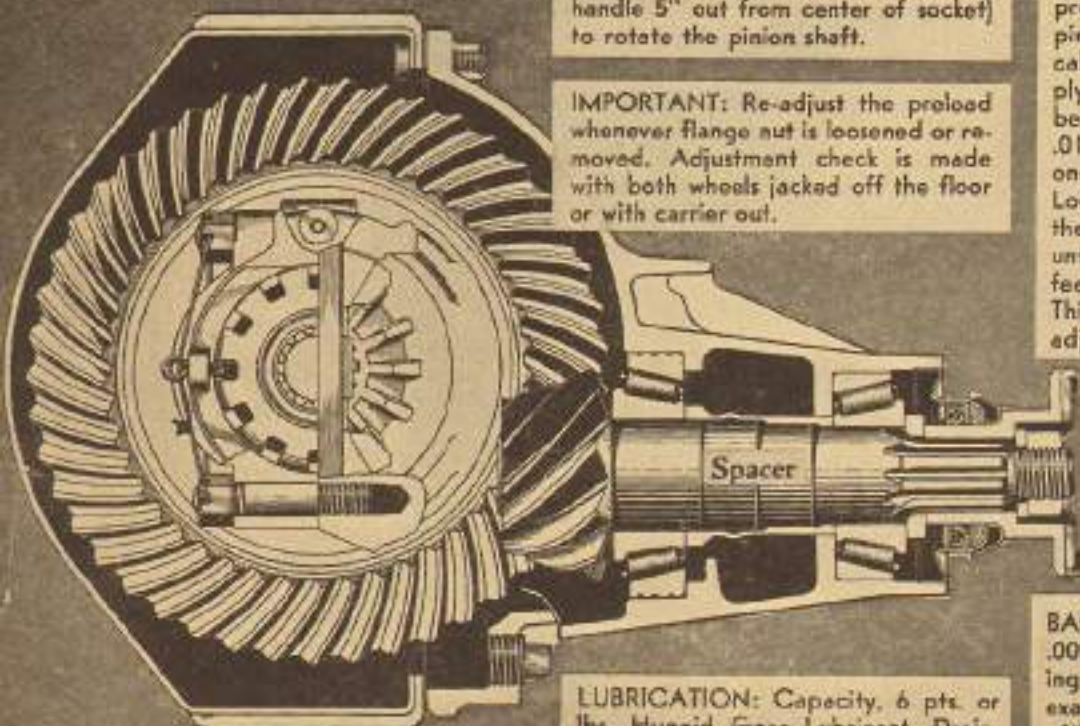
**IMPORTANT:** Re-adjust the preload whenever flange nut is loosened or removed. Adjustment check is made with both wheels jacked off the floor or with carrier out.

**LUBRICATION:** Capacity, 6 pts. or lbs. Hypoid Gear Lubricant. Drain, flush and refill at 10,000 mi. intervals. Use light motor oil or flushing oil to clean axle housing. NEVER use kerosene, or gasoline for flushing.

**DIFFERENTIAL SIDE BEARINGS:** Should be adjusted to a preload of from .010" to .012" spread of the bearing support pedestals. Loosen each side bearing cap just slightly, then back off the right hand (viewed from rear) bearing adjusting nut until ring gear mount is loose in bearings. Make sure that the left hand adjusting nut is backed out far enough to provide some lash between ring and pinion gears. Use a large outside caliper and a .010" feeler blade. Apply caliper from finished boss of one bearing cap to the other with the .010" feeler blade interposed between one of the bosses and the caliper. Lock caliper at this setting. Tighten the right hand bearing adjusting nut until "set" caliper (minus the .010" feeler) will just slide over both bosses. This indicates desired .010" spread adjustment.

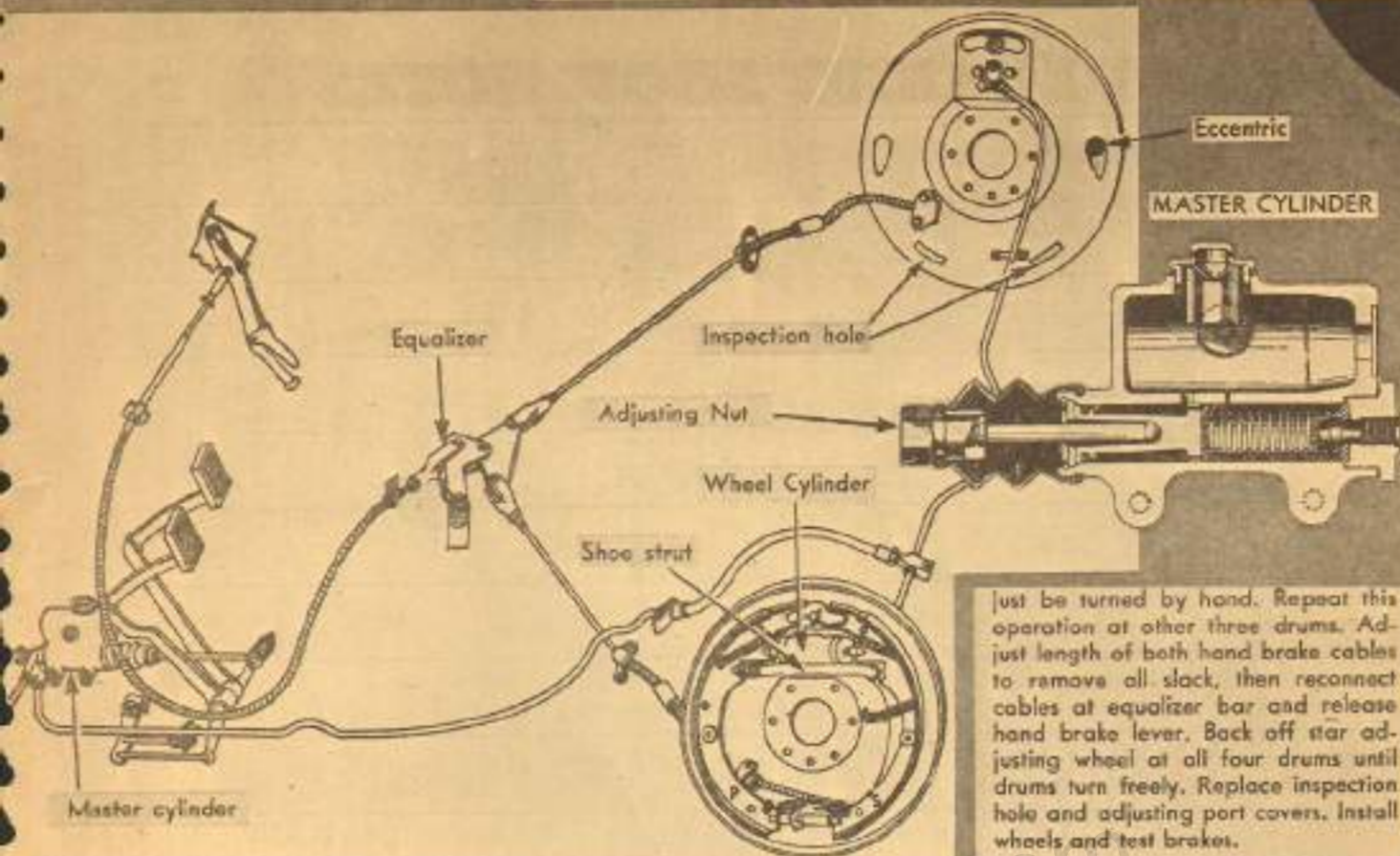
**BACK-LASH:** If lash is more than .005" back off the right hand adjusting nut and tighten the left hand nut exactly the same amount until lash is within the .003" to .005" limit. By turning each nut the same amount, back-lash may be adjusted without disturbing preload spread adjustment of bearings.

## REAR AXLE



**AXLE SHAFT END PLAY:** Adjustable by means of shim pack. End play, .004" to .007"

# Brakes — PACKARD Six, Eight, '37



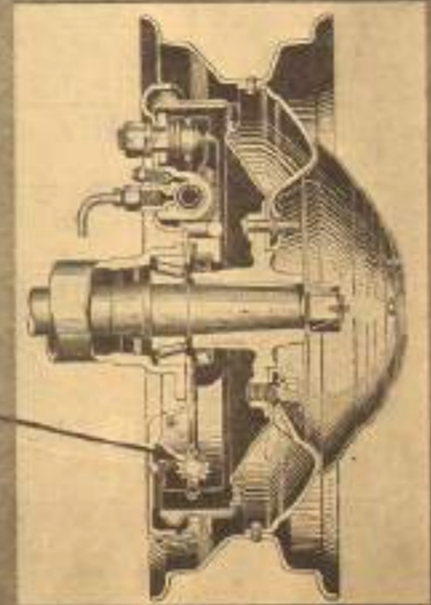
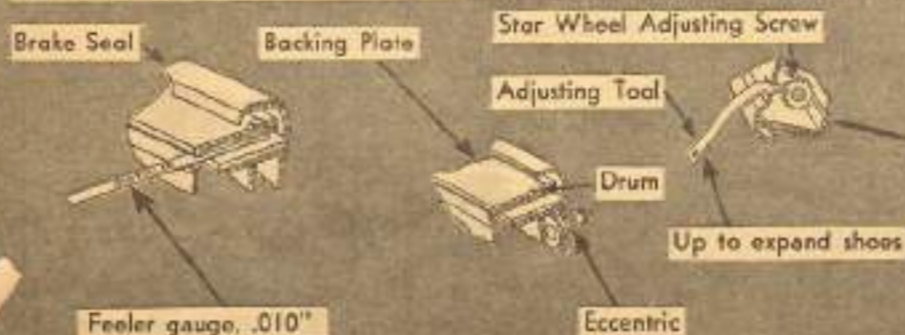
just be turned by hand. Repeat this operation at other three drums. Adjust length of both hand brake cables to remove all slack, then reconnect cables at equalizer bar and release hand brake lever. Back off star adjusting wheel at all four drums until drums turn freely. Replace inspection hole and adjusting port covers. Install wheels and test brakes.

**ADJUSTMENT FOR WEAR, SIX AND EIGHT:** Raise wheels clear of floor. Disconnect hand brake cables at equalizer bar and place hand brake lever in first notch. Loosen eccentric adjustment lock nut and turn eccentric in direction of forward wheel rotation until secondary shoe contacts drum, then back off eccentric until wheel just turns freely and tighten lock nut. Remove shoe adjusting port cover on brake backing plate. Turn star adjusting wheel moving outer end of adjusting tool toward axle center until wheel can just be turned with both hands. Adjust length of both hand brake pull cables to remove all slack, then reconnect cables and release hand brake lever. Back off star adjusting wheel at all four wheels until wheels just turn freely. Replace adjusting part covers and test brakes.

**MAJOR ADJUSTMENT, SIX AND EIGHT:** Necessary when shoes are relined, or when satisfactory wear adjustment cannot be obtained. Raise car clear of floor and remove wheels. Disconnect hand brake cables at equalizer and place hand brake lever in first notch. Remove inspection hole cover on drum and insert a .010" feeler blade between lining and drum at lower end of secondary shoe. Loosen eccentric adjustment lock nut and turn eccentric in direction of forward wheel rotation until feeler blade is firmly gripped. Hold eccentric position and tighten lock nut. Loosen anchor lock nut one turn. Insert .010" feeler blade between lining and drum at upper end of secondary shoe and turn anchor in desired direction until feeler blade is firmly gripped. Hold anchor position and tighten lock nut. Recheck clearance at both ends of secondary shoe. Remove shoe adjusting port cover on brake backing plate. Turn star adjusting wheel, moving outer end of adjusting tool toward axle center, until drum can

**BLEEDING SYSTEM, SIX AND EIGHT:** Brake system requires bleeding when lines are disconnected, or whenever air enters system. Be sure to fill master cylinder reservoir and keep it at least half full during bleeding operation. To bleed, remove screw from bleeder connection and attach bleeder tube, allowing free end to hang submerged in brake fluid. Use clean glass jar. Open bleeder valve  $\frac{3}{4}$  turn and depress pedal slowly and allow to return slowly. Continue this action until fluid passing from bleeder tube shows no air bubbles, then close bleeder valve. When bleeding operation is completed, fill master cylinder reservoir.

**PEDAL ADJUSTMENT, SIX AND EIGHT:** Pedal must have from  $\frac{1}{4}$ " to  $\frac{1}{2}$ " free travel before engaging master cylinder piston. Adjust at master cylinder push rod.



# PACKARD SHOP NOTES

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