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1940 PACKARD

Six, Model 1800
Eight, Models 1801, 1801A

SPECIFICATIONS Models 1800, 1801, 1801A

SIX, 1800

Wheelbase, 122"

SEDANS: Four Door Touring, Two Door Touring, Station Wagon.

COUPES: Business Coupe, Club Coupe, Convertible Coupe.

1940 Models

EIGHT, 1801

Wheelbase, 127"

EIGHT, 1801A (Hearse Chassis)

Wheelbase, 160"

SEDANS: Four Door Touring, Two Door Touring, Convertible Sedan.

COUPES: Business Coupe, Club Coupe, Convertible Coupe.

1940 Motors

MODEL 1800: Six cylinders. Bore, 3 $\frac{1}{2}$ "; stroke, 4 $\frac{1}{4}$ ". Piston displacement, 245 cu. in. Compression ratio, 6.39:1; optional, 6.71:1. H.P., A.M.A. rating, 29.4; brake, 100 at 3200 R.P.M.

MODEL 1801-1A: Eight cylinders. Bore, 3 $\frac{1}{4}$ "; stroke, 4 $\frac{1}{4}$ ". Piston displacement, 282 cu. in. Compression ratio, 6.41:1; optional, 6.85:1. H. P., A.M.A. rating, 33.8; brake, 120 at 3600 R.P.M.

PACKARD, '40—Motor

PISTONS—SIX AND EIGHT: Aluminum alloy, autothermic strut type, cam ground and tin plated. Remove from top of block.

FAN BELT ADJUSTMENT—SIX AND EIGHT: Adjust to scale pull of 25 lbs. at bolt passing through generator lug.

EIGHT

PISTON CLEARANCE — SIX AND EIGHT: Skirt, .0005" to .001". Check with a .0015" feeler gauge $\frac{1}{2}$ " wide inserted between thrust side of piston and cylinder bore. Clearance correct when 12 to 18 lbs. pull required to withdraw feeler blade. Pistons in any one engine must not vary in weight more than 4 grams. Install with slot facing cam shaft side of engine.

PISTON PINS — SIX AND EIGHT: Full floating type secured in piston bosses by snap rings. Fit pin in piston bosses to finger push fit with piston heated to 160° F. In rod bushing, finger push fit at normal room temperature.

PISTON RINGS—SIX AND EIGHT: Two $\frac{1}{8}$ " compression rings and one $\frac{3}{16}$ " expander type oil control ring. All located above piston pin. Gap clearance—Compression rings, .007" to .017"; oil ring, .007" to .015". Groove clearance — Compression rings, .0025" to .003"; oil ring, .0015" to .002".

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". Crank pin diameter, 2-3/32".

CONNECTING RODS—SIX AND EIGHT: Rifle drilled for piston pin lubrication. Length, 7-11/16", center to center. Weight, 1 lb. 15.6 oz. Install with oil hole at crank pin end facing camshaft side of engine. Rod bearing cap bolt nuts tightening torque should be 715 to 725 in. lbs. Nut secured by "palnut". To install, spin "palnut" on cap bolt until it contacts regular nut, tighten finger tight; then tighten $\frac{1}{4}$ to $\frac{1}{3}$ turn more.

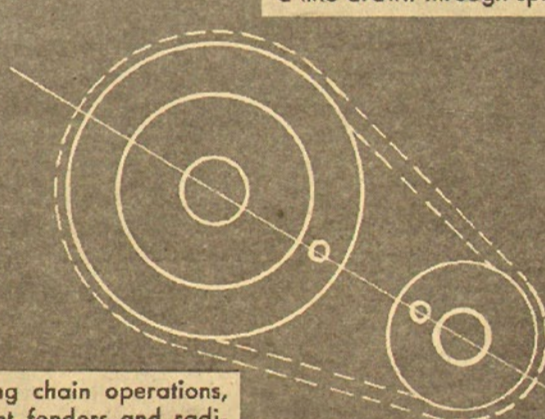
MAIN BEARINGS — SIX AND EIGHT: Steel back, babbitt lined replaceable, precision shell type. Not adjustable. Bearing radial clearance, .001" to .003". On Six, thrust taken at front main bearing. On Eight, thrust taken at center main bearing. End play, Six and Eight, .003" to .008". Bearing cap nut tightening torque, 980 to 1020 in. lbs. Journal diameter, 2 $\frac{3}{4}$ ".

TIMING CHAIN—SIX AND EIGHT: Two sprocket non-adjustable type. When removing chains, both sprockets must be pulled together, requiring special pullers. For correct timing, install so that "O" marks on sprockets are aligned together and fall under a line drawn through sprocket centers.

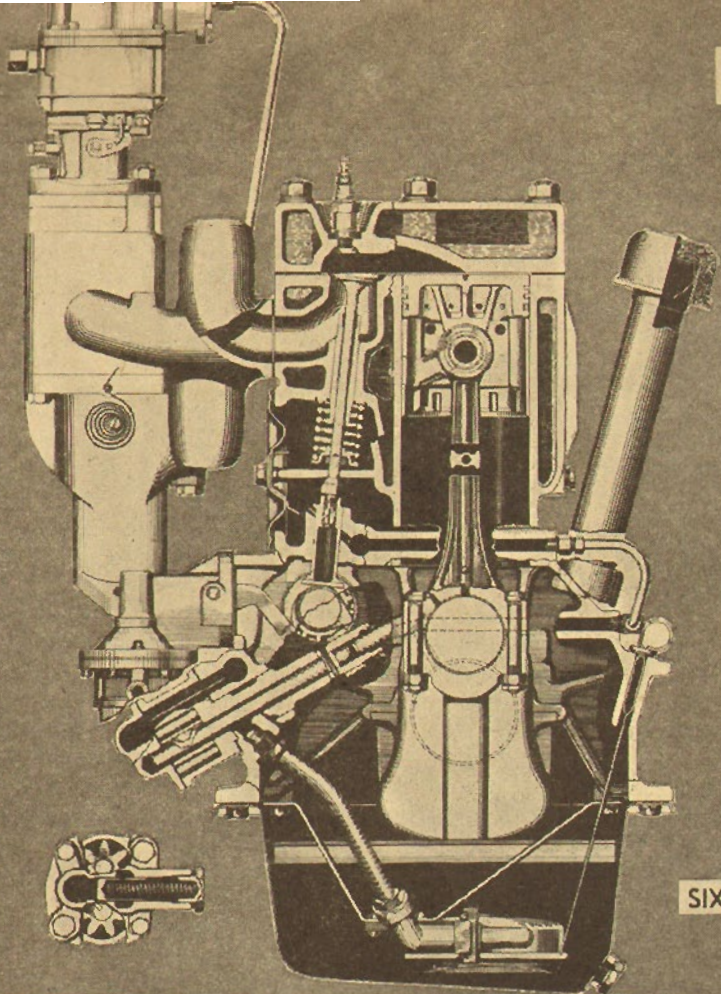
EIGHT

NOTE—On timing chain operations, remove both front fenders and radiator as one assembly.

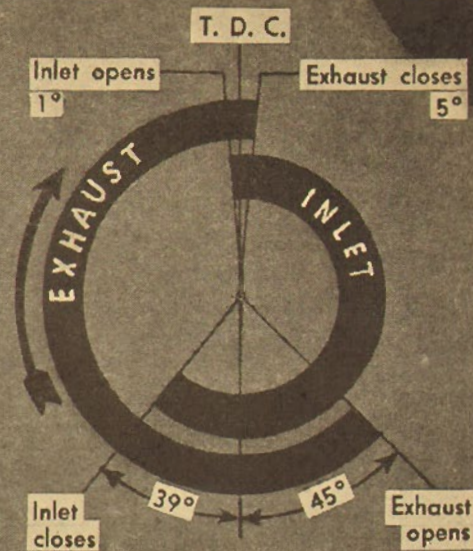
TIMING CHAIN SETTING



Motor—PACKARD, '40



SIX



VALVE TIMING—SIX AND EIGHT

TAPPET CLEARANCE FOR CHECKING TIMING—SIX AND EIGHT: Adjust inlet to .0125"; exhaust at .015" (cold setting).

TAPPET RUNNING CLEARANCE—SIX AND EIGHT: Tappet screws are self-locking type. Adjust with engine at normal operating temperature—Inlet, .007"; exhaust, .010".

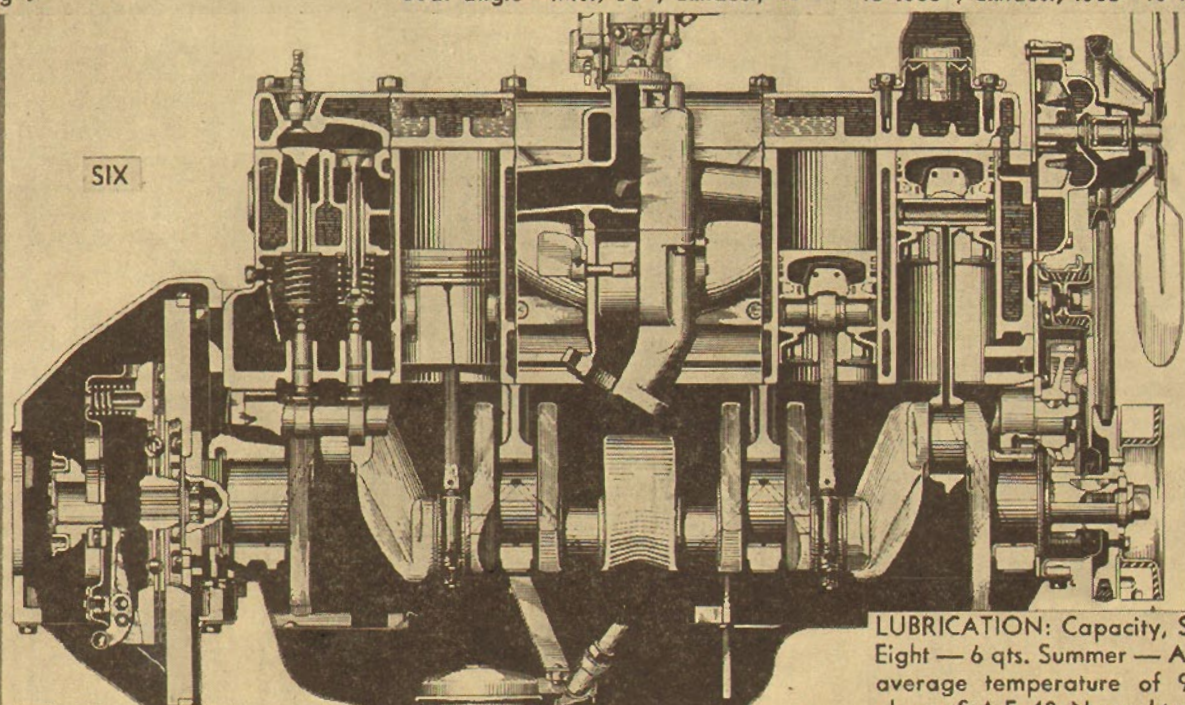
VALVE SPRINGS—SIX AND EIGHT: Spring pressure, when compressed to 1 5/8" length, 47 to 52 lbs. (closed valve). Compressed to 1-5/16" length, 114 to 124 lbs. (open valve).

VALVE GUIDES—SIX AND EIGHT: Straight reamed. Recommended valve stem to guide clearance—Inlet, .001" to .003"; exhaust, .003" to .005".

OIL PUMP INSTALLATION—SIX AND EIGHT: Turn engine until No. 1 piston is 6° to 8° before top center of compression stroke. Engine in this position, install oil pump so that distributor driving slot is parallel to center line of camshaft. Punch mark on pump gear should be at bottom on Six and top on Eight. Locate distributor in place with rotor in position for ignition at No. 1 plug. See "Ignition Timing".

OIL PUMP—SIX AND EIGHT: Gear type. With oil of proper viscosity and engine at normal operating temperature, pressure should be 45 lbs. at 45 M.P.H. Pressure relief valve located in pump body. Not adjustable. Relief valve spring pressure should be 14 lbs. plus or minus 2 oz. when compressed to 1 7/8" length.

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



SIX

CAMSHAFT BEARING—SIX AND EIGHT: Steel back, babbitt lined. Bearing clearance, .001" to .003". Camshaft end play, .002" to .004".

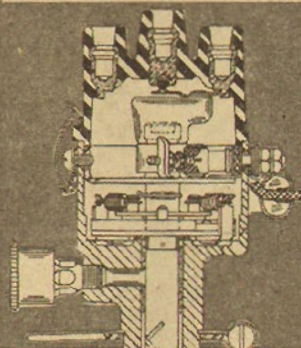
CYLINDER HEAD—SIX AND EIGHT: Cylinder head stud nuts tightening torque should not be less than 740 in. lbs. and should not exceed 760 in. lbs.

LUBRICATION: Capacity, Six—5 qts. Eight—6 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.

PACKARD, '40—Tune-up

FIRING ORDER—EIGHT:
1-6-2-5-8-3-7-4.

FIRING ORDER—SIX: 1-5-3-6-2-4.



SIX

BREAKER POINT GAP—SIX: .018" to .022" (.020" preferred).

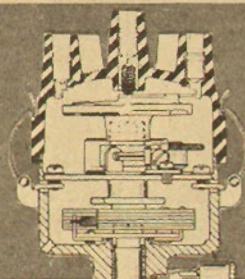
BREAKER ARM SPRING TENSION—SIX AND EIGHT: 17 to 20 oz.

INITIAL IGNITION SETTING—SIX: Standard compression ratio (6.39:1) and optional ratio (6.71:1), 4½° to 6° B.T.D.C.

INITIAL IGNITION SETTING—EIGHT: Standard compression ratio (6.4:1), 6½° to 8° B.T.D.C. Optional ratio (6.85:1), 5½° to 7° B.T.D.C.

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 "Initial Ignition Setting" is in register with pointer at inspection hole in flywheel housing. With fuel compensator set at zero, locate distributor so points just break, rotor in position for ignition at No. 1 plug.

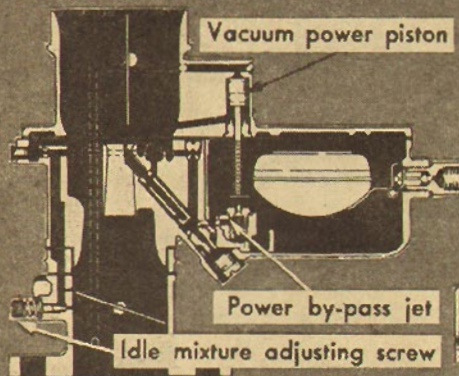
NOTE—Mark "U.D.C. 1" indicates T.D.C. Each graduation on flywheel equals 2°. Use high timing limits on carbon free engines with regular grade fuel. High limits on premium fuels.



EIGHT

BREAKER POINT GAP—EIGHT—.0125" to .0175" (.015" preferred).

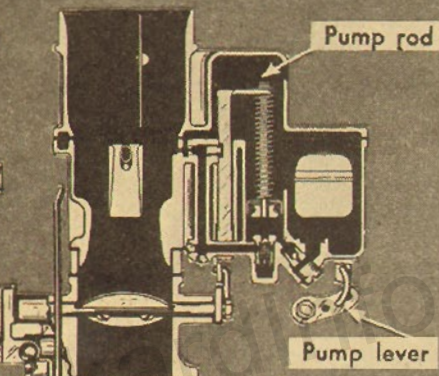
SPARK PLUG GAP—SIX AND EIGHT: .0255" to .0305".



Vacuum power piston

Power by-pass jet

Idle mixture adjusting screw



Pump rod

Pump lever

CARBURETOR—SIX: Stromberg BXOY-26.

CHOKE ADJUSTMENT—SIX AND EIGHT: If warm-up period indicates too rich or lean a mixture, make sure that index line on choke housing is in register with graduation marked "A", which point is 5 graduations rich on Six and 4 graduations rich on Eight, then proceed as follows:

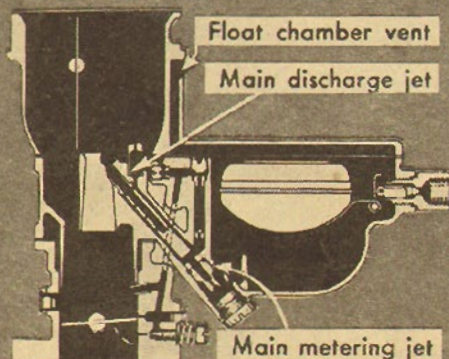
Remove air cleaner and thermostat cover assembly and test operation of choke valve. When closed by hand, valve should drop open without slightest lag. If action is not free, remove and clean vacuum piston and its cylinder with alcohol or acetone. Correct any bearing friction in movement of vacuum piston choke valve shaft by cleaning with alcohol or acetone. Clean all choke passages with compressed air. Reinstall assembly. Do not oil any part of vacuum piston, cylinder or shaft.

With further indications of too rich or lean mixture during warm-up period, decrease or increase thermostat spring tension ½ graduation at a time, after loosening cover screws. Satisfactory results should be obtained by changing adjustment not more than 2 graduations from original setting. If results are not obtained within these limits, renew thermostat assembly.

IDLE MIXTURE ADJUSTMENT—SIX: Initial opening of idle mixture adjusting screw 1¼ turns open. With warm engine and choke valve wide open, adjust throttle lever stop screw to produce a car speed of not less than 6 M.P.H. Adjust idle mixture screw within limits, until engine runs smoothly without stalling. Turning idle mixture screw clockwise leans mixture.

FAST IDLE SPEED—SIX: Automatically controlled by lift of fast idle cam. Not adjustable.

FUEL LEVEL—SIX: Recommended fuel level is 5/8" plus or minus 1/32" below machined top surface of float bowl with 3 lbs. pressure on fuel.



Float chamber vent

Main discharge jet

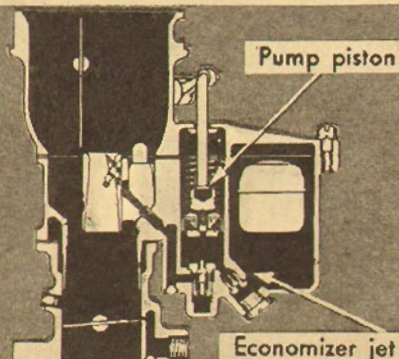
Main metering jet

CARBURETOR—EIGHT: Stromberg EE-16.

IDLE ADJUSTMENT—EIGHT: Initial opening of idle mixture adjusting screws, 2 to 2½ turns open. With warm engine and choke valve wide open, adjust throttle lever stop screw to produce a car speed of not less than 6 M.P.H. Adjust one idle mixture adjusting screw at a time within limits specified until engine runs smoothly without stalling. Turning idle mixture adjusting screw clockwise leans mixture.

FAST IDLE ADJUSTMENT—EIGHT: With engine thoroughly warm, turn fast idle screw until it just contacts last step of fast idle cam; then back off to permit cam to be moved by hand without dragging end of screw. To check, hold throttle lever in closed position with choke valve wide open. Place fast idle screw on last step of cam, then move choke valve toward closed position with just enough finger pressure to take slack out of linkage. In this position, distance measured from upper edge of choke valve to wall of air horn should be from 17/32" to 9/16". Use 35/64" drill as checking gauge. If distance is not within specified limits, bend fast idle rod at upper angle.

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



Pump piston

Economizer jet

Clutch, Transmission — PACKARD, '40

CLUTCH PEDAL ADJUSTMENT — SIX AND EIGHT: Pedal should have from $1\frac{1}{2}$ " to $1\frac{3}{4}$ " free travel measured between pedal and floor board. Adjust pedal rod to obtain this distance.

CLUTCH THROWOUT LEVERS — SIX AND EIGHT: Distance from front face of clutch hub to rear face of throwout levers, when they contact throwout bearing, should be $1\frac{1}{8}$ ". This dimension set at factory, but should be checked on all clutch jobs.

GEAR SHIFT LINKAGE ADJUSTMENT — SIX AND EIGHT: Insert $\frac{3}{16}$ " rod or drill through aligning holes in both steering column lower levers. With transmission levers in neutral position, and steering column lower levers aligned, adjust linkage rods to proper length without changing position of levers.

In high gear position, lug should clear cover not more than $.010$ " and not less than $.005$ "; to adjust, bend lug.

OVERDRIVE DASH CONTROL — SIX AND EIGHT: The lock-out knob should clear knob stop $\frac{1}{8}$ " when pushed all the way in.

LUBRICATION — SIX AND EIGHT: Capacity—Transmission, 2 pts.; overdrive unit, $1\frac{1}{4}$ pts. Gear Oil, Summer, S.A.E. 140. Winter, S.A.E. 90. Extreme cold, S.A.E. 80.

NOTE — Oil level in transmission should be checked separately from overdrive unit and maintained flush with filler plug opening.

TRANSMISSION ASSEMBLY — SIX AND EIGHT

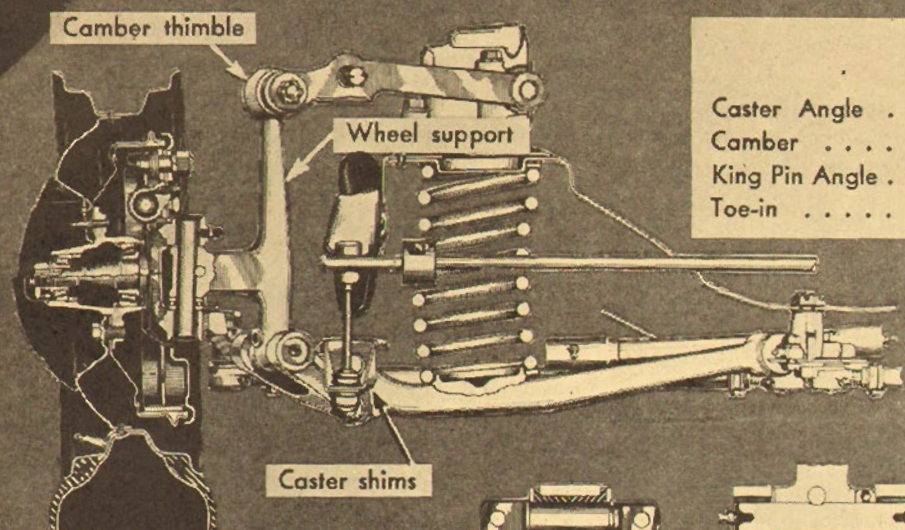
TRANSMISSION REMOVAL — SIX AND EIGHT: Disconnect ground wire and speedometer cable. Disconnect front universal joint and block up propeller shaft against floor pan. Disconnect two shifter control rods, hand brake lever cable at equalizer; if so equipped, disconnect overdrive control cable and rubber mount at rear of overdrive unit. Support rear end of engine with jack, then unbolt cross member from frame and flywheel housing lower cover. Disconnect clutch retracting spring. Disconnect fore and aft restraint rod and remove cap screws holding transmission unit to bellhousing. Remove transmission from engine.

OVERDRIVE UNIT — SIX AND EIGHT

PACKARD, '40 — Steering, Axles

SPECIFICATIONS SIX, EIGHT

Caster Angle . 1° Min. to 2° Max. (1½° preferred)
 Camber ½° Min. to 1¼° Max. (½° preferred)
 King Pin Angle . 1° 54'
 Toe-in 1/32" to 1/16" (Hub Height)



CASTER ANGLE ADJUSTMENT—SIX AND EIGHT: Obtained by installing or removing tapered shims between forward end of torque arm and support arm. Shims of ½° and 1° available. Torque arm front face must seat squarely against support arm without undue strain.

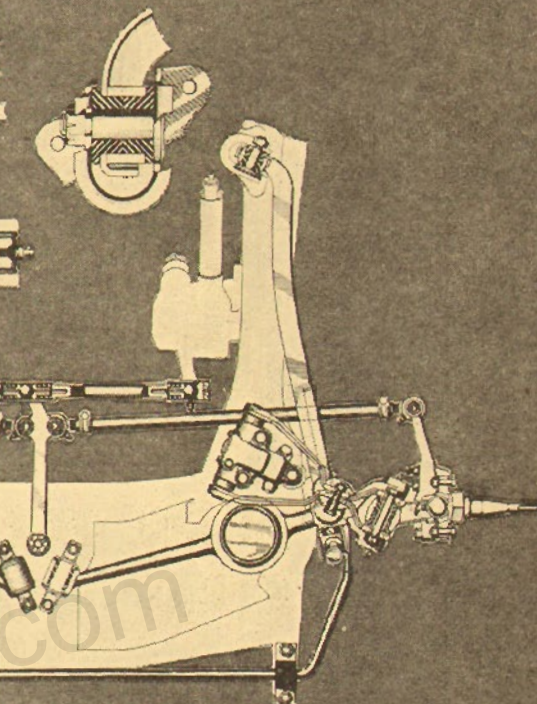
CAMBER ADJUSTMENT—SIX AND EIGHT: Obtained by installing offset pilot thimbles at outer end of shock absorber arm and wheel support bolt. Pilots of zero, 1/16", 1/8", and 3/16" offset are available. A change of 1/16" in amount of offset changes camber approximately 1/3°.

AXLE SHAFT END PLAY—SIX AND EIGHT: Recommended end play, .004" to .007" (total both sides). Adjusted by shim pack at axle bearing cap. If end play is in excess of .050" both bearings must be adjusted.

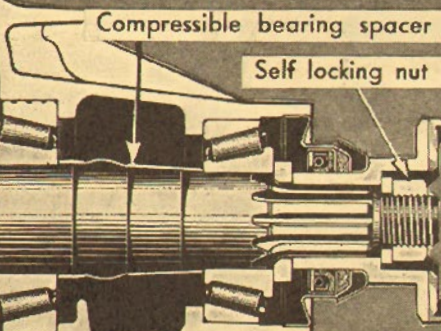
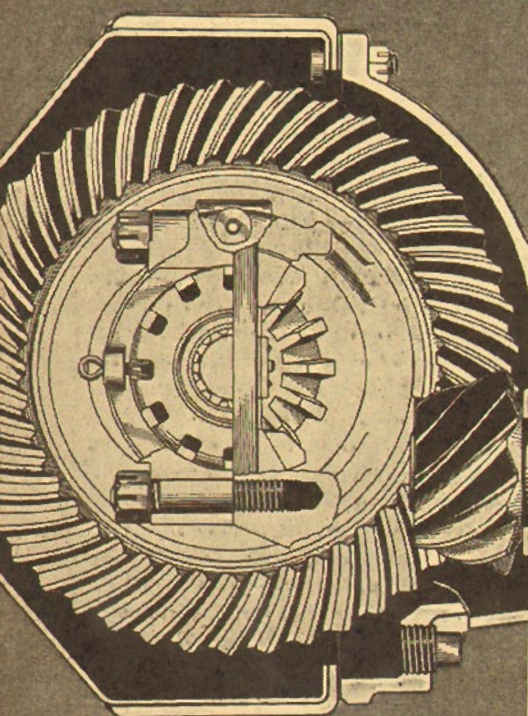
TOE-IN ADJUSTMENT—SIX AND EIGHT: Inflate tires to recommended pressure. Spot steering gear in mid-position, front wheels straight ahead. Adjust by turning each tie rod tube equal amount until specified toe-in is secured. If one tie rod tube is longer than the other by more than 1/8" when wheels are in "straight-ahead" position, check for bent knuckle arm.

PINION SHAFT BEARING ADJUSTMENT—SIX AND EIGHT: Self-locking universal flange retaining nut should be tightened until pinion shaft bearing compressible spacer starts to buckle, providing required bearing preload. Bearing adjustment correct when 25 to 30 in. lbs. is required to rotate shaft.

IMPORTANT — Readjust preload whenever flange nut is loosened or removed. Check with both wheels jacked clear of floor, or with carrier assembly out.



DIFFERENTIAL BEARING ADJUSTMENT—SIX AND EIGHT: A preload of from .010" to .012" spread of bearing pedestals is recommended. To adjust, loosen each side bearing slightly, then back off right-hand bearing adjusting nut until ring gear mount is loose in bearings. Make sure left-hand bearing adjustment nut is backed out far enough to provide some lash between ring gear and pinion. Using a large outside caliper, measure distance from machined surface of one bearing cap to the other with a .010" feeler blade interposed between one bearing cap boss and caliper. Lock caliper at this setting. Tighten right-hand bearing adjustment nut until "set" caliper, minus .010" feeler blade, will just slide over both bearing cap bosses, which will provide required .010" preload spread.



LUBRICATION—SIX AND EIGHT: Capacity, 6 pts. Special passenger car duty Hypoid Gear Lubricant. Summer, S.A.E. 90. Winter, below plus 10° F., S.A.E. 80. Drain each season, or at 10,000-mile intervals.

GEAR LASH—SIX AND EIGHT: Recommended pinion to ring-gear lash should be from .003" to .005". If lash is more than .005", back off right hand bearing adjusting nut and tighten left-hand nut exactly same amount until lash is within specified limit. By turning each nut exactly same amount, previously adjusted spread will not be disturbed.

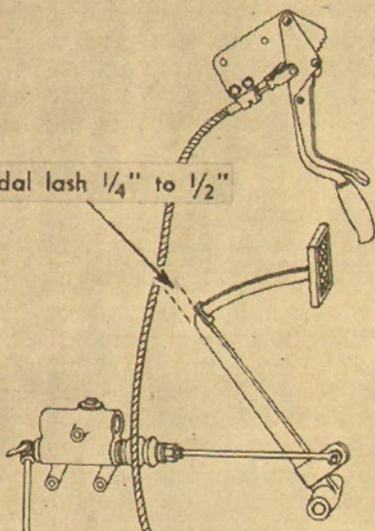
Brakes — PACKARD, '40

SERVICE WEAR ADJUSTMENT — SIX AND EIGHT: Raise all four wheels clear of floor. Disconnect hand brake cables at equalizer and place hand brake lever in first notch. Remove inspection hole cover on brake

backing plate. Expand brake shoes at all four wheels by turning star adjusting wheel (moving outer end of adjusting tool toward axle center) until wheels can just be turned by hand. Adjust length of both hand brake cables to remove slack, then re-con-

nect cables and release hand brake lever. Back off star adjusting wheel an equal number of notches at all four wheels until wheels can be turned freely. Replace adjusting hole covers and test car.

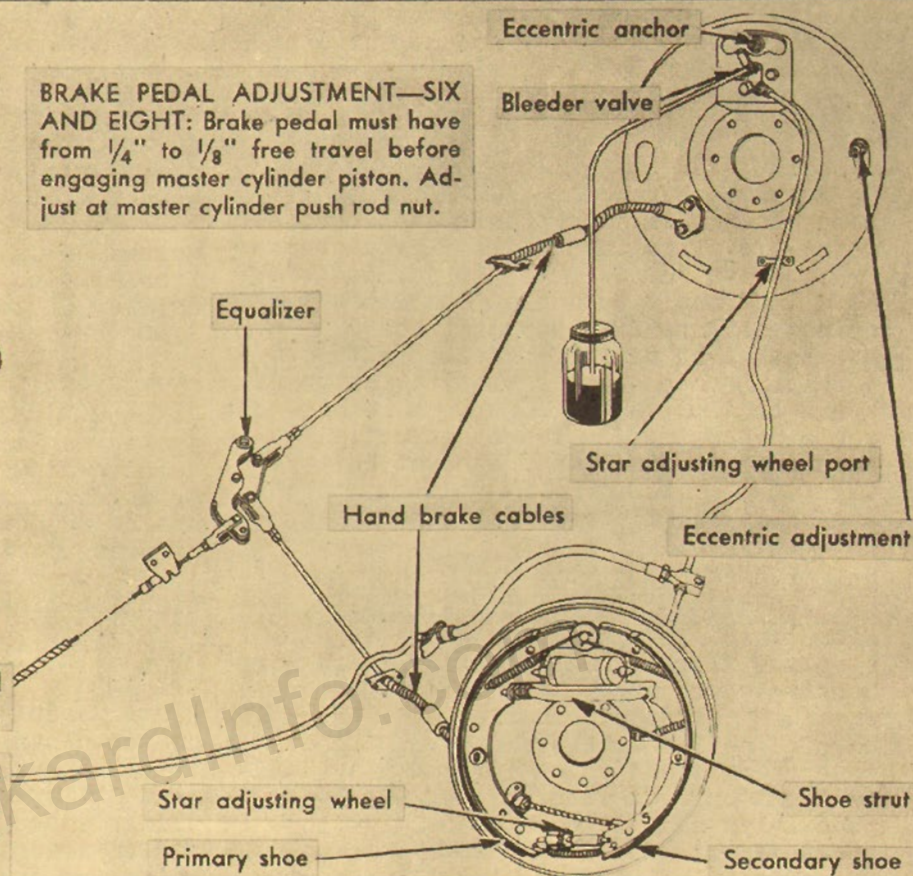
Pedal lash $\frac{1}{4}$ " to $\frac{1}{2}$ "



SIX — Both anchor springs painted blue.

EIGHT — Aluminum colored anchor spring attaches to primary shoe. Yellow spring (heavier) to secondary shoe.

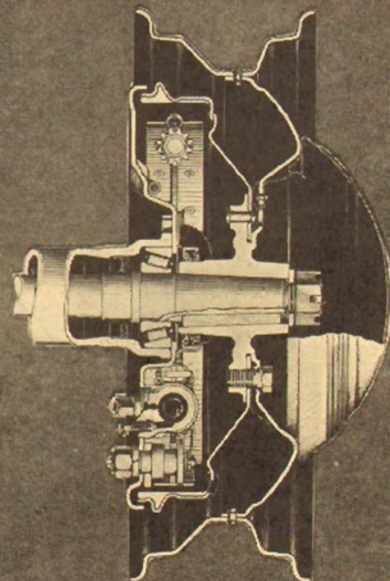
BRAKE PEDAL ADJUSTMENT—SIX AND EIGHT: Brake pedal must have from $\frac{1}{4}$ " to $\frac{1}{8}$ " free travel before engaging master cylinder piston. Adjust at master cylinder push rod nut.



ANCHOR ADJUSTMENT—SIX AND EIGHT: Necessary when shoes are relined or satisfactory wear adjustment cannot be obtained. Raise all four wheels clear of floor and remove wheels. Disconnect hand brake cable at equalizer and place hand brake lever in first notch. Remove inspection hole covers from drum and brake backing plate. Insert a screwdriver between drum and lining of secondary shoe (rear shoe) and force assembly over until primary shoe is seated solidly against opposite side of drum. Loosen anchor lock nut. With primary shoe held against drum, insert a .015" feeler blade between lining and drum at upper end of secondary shoe. Turn eccentric-anchor in direction of forward wheel rotation (to decrease clearance) until feeler blade is firmly gripped. Insert .015" feeler blade between lining and drum at lower end of secondary shoe and turn star adjusting wheel in required direction until feeler blade is firmly gripped. Recheck clearance at both ends of secondary shoe. When correct .015" clearance is obtained at both ends of secondary shoe, tighten anchor lock nuts securely without moving anchor. Repeat same operation at other three

wheels. Adjust and connect hand brake cables as outlined in "Service Wear Adjustment." Replace inspection hole covers and mount wheels.

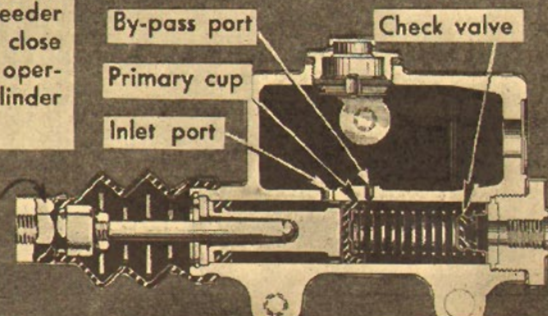
BLEEDING SYSTEM — SIX AND EIGHT: Brake system requires bleeding when lines are disconnected, or whenever air enters system. If main line is disconnected, system must be bled at all four wheels. When disconnected at one wheel, that wheel only must be bled. Be sure to fill master cylinder reservoir and keep it at least half full during bleeding operations. To bleed, remove screw from bleeder connection and attach bleeder tube, allowing free end to hang submerged in brake fluid in clean glass jar. Open bleeder $\frac{3}{4}$ 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.



By-pass port
Check valve
Primary cup
Inlet port

Push rod adjusting nut

MASTER CYLINDER



PACKARD, '40

CENTRIFUGAL GOVERNOR--ECONO-DRIVE: The external centrifugal governor is calibrated to cut in the Econo-drive at 22 M.P.H., and cut out at 17 M.P.H. approximately. Governor is not adjustable. Do not shim governor cover and do not change spring tension by stretching spring. If higher cut-in speed is desired, special spring is available.

STEERING GEAR ALIGNMENT--SIX AND EIGHT: Gear should be checked for alignment before adjusting worm bearings, or roller mesh. To align loosen steering gear to frame bolts sufficiently to permit gear to align itself to angle determined by height setting of instrument board bracket, then retighten frame bolts securely. Loosen gear bracket at instrument board so that gear will align itself to angle determined by frame bracket. If column is strained when bracket bolts are tightened, shim bracket or elongate mounting holes until correct alignment is secured.

STEERING GEAR WORM BEARING ADJUSTMENT--SIX AND EIGHT: Disconnect drag link at pitman arm. Turn steering wheel to either stop and then back 1/8 turn. Loosen worm housing cover screws about 1/8". Remove one thin gasket with knife blade being careful not to mutilate others. Tighten cover screws and check for end play. Adjustment correct when pull of not less than 1-1/2 and not more than 2-1/4 lbs. (measured at rim end of wheel spoke) required to move steering gear in off mid-position range.

ROLLER TOOTH AND WORM ADJUSTMENT--SIX AND EIGHT: Remove pitman arm from roller shaft, using suitable puller. Turn steering gear to mid-position or "high spot". Remove roller shaft housing cover plate and remove roller shaft, being careful not to damage roller shaft oil seal. Remove one thin roller shaft adjusting shim and temporarily reinstall roller shaft and cover plate. After tightening cover plate screws adjust roller shaft to zero end play by means of slotted adjustment on cover plate. Check roller tooth and worm mesh by rotating steering gear back and forth through "high spot". Adjustment correct, when not less than 3 and not more than 4-1/2 lbs. pull (measured at rim end of wheel spoke) is required to move steering gear through mid-position or "high spot", with no lash and zero end play in roller shaft.

STEERING COLUMN ANGLE--SIX AND EIGHT: The steering wheel on Six cannot be lowered but may be raised approximately 5/8" by installing the Eight steering column bracket. On the Eight, steering wheel cannot be raised, but may be lowered approximately 5/8" by installing the Six steering column bracket.

WINDSHIELD WIPER BLADE PARKING POSITION ADJUSTMENT--SIX AND EIGHT: If wiper blades do not park evenly at base of windshield when control switch is turned off, or if one blade is out of synchronism with the other, adjust as follows:

Remove both wiper blades and arms. Loosen adjusting screw at end of each motor link. Adjust right hand unit (viewed from rear of car) by pushing transmission link toward the electric motor as far as it will go, then back 1/16", and lock adjusting screw. Adjust left hand unit by pushing transmission link away from motor as far as it will go, then back toward motor 1/16", and lock adjusting screw.

CLUTCH PEDAL ASSIST SPRING ADJUSTMENT--SIX AND EIGHT: Spring tension may be adjusted to decrease pedal pressure, by turning adjusting nut on rear end of spring hook rod. Pedal pressure should not be reduced to a point where all sense of pressure is lost. Recommended tension is 28 turns on adjusting nut after all slack in linkage and spring is taken up.

OVERDRIVE KICK-DOWN SWITCH ADJUSTMENT--SIX AND EIGHT: The over-travel of accelerator pedal operates overdrive kick-down switch. When carburetor throttle is wide open, tappet screen should be adjusted so that it just contacts end of switch plunger. Accelerator pedal must have sufficient overtravel to open switch before bottoming on floor boards.

THROTTLE GUARD ADJUSTMENT--SIX AND EIGHT: Cars equipped with overdrive provided with throttle guard to prevent engine stalling when operating at road speeds below 20 M.P.H. When adjusting, make sure engine has been properly tuned and throttle lever stop screw adjusted to give 6 M.P.H. car speed on level road. Gap between end of diaphragm rod and carburetor throttle lever should be approximately .060" on Six and .020" on Eight. Adjust diaphragm spring tension adjusting screw until distance from top of lock nut to end of adjusting screw is approximately 3/16".

Final adjustment should be made on road. With overdrive lock-nut knob pushed all the way in and gear shift in high gear, pull car speed down to 4 M.P.H. without pressure on accelerator. When 4 M.P.H. is reached, throttle guard should "cut in" and bring car speed up to 9 M.P.H., then immediately "kick out". If "kick out" occurs above 9 M.P.H., increase gap between diaphragm rod and throttle lever; if below 9 M.P.H., decrease gap. If "cut in" occurs above 4 M.P.H., decrease tension on diaphragm spring; if "cut in" occurs below, increase spring tension.