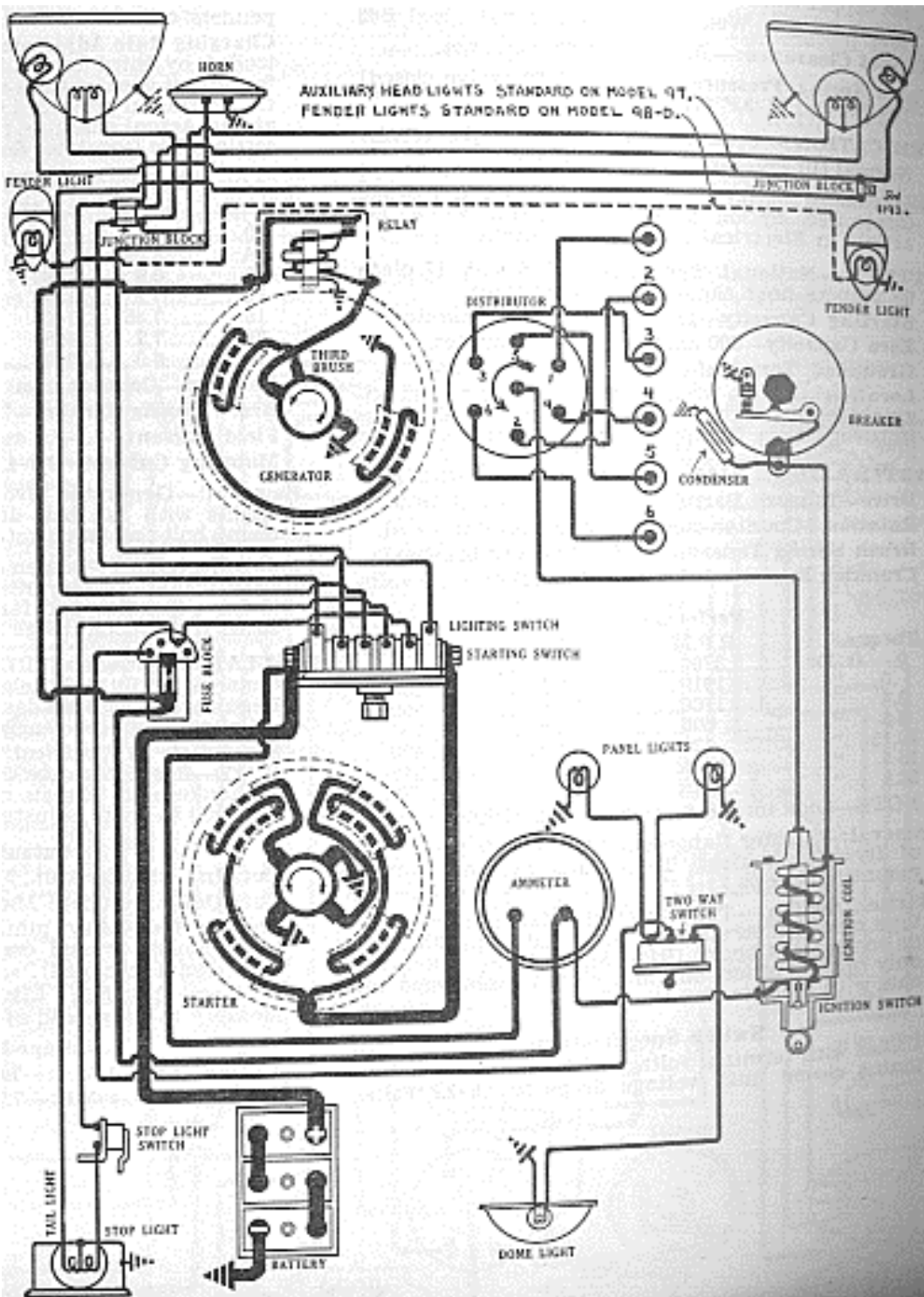


WILLYS SIX

MODELS 97 AND 98-D (1931) SERIAL NUMBERS 1001 UP
PRODUCTION STARTED NOVEMBER 1930
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION



BATTERY:—U.S.L., Type XY-13X-7A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 102 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 17.6 hours. Battery is mounted under the front compartment floor boards on the left side.

IGNITION:—Coil Model IG-4303, 4203. Ignition switch is built in base of the coil. Coil is mounted on the back of the instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1-1.5 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGB-4032. Breaker contacts separate .018-.020 inch. Set contact gap by loosening stationary contact mounting stud and turning up stud until gap is .018 inch with breaker arm on lobe of cam. Resurface contacts when necessary with a fine flat contact file or on a medium hard oilstone. Breaker arm spring tension is 18-21 ounces. Distributor is semi-automatic. Maximum manual advance is 10 degrees (distributor). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 22 degrees (engine) reached at 3200 R.P.M.

Mounting:—Distributor is mounted at left of engine and is driven by an inclined shaft from the camshaft. To remove distributor, disconnect primary lead and manual spark control and remove distributor cap with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Put 5 to 8 drops of light engine oil in the oiler on the side of the distributor every week or each 250 miles of operation. Every 500 miles remove the distributor cap and rotor and put 2 or 3 drops of oil in the oiler in the center of the shaft. Every 5000 miles coat the breaker cam with a light film of vaseline.

Timing:—Breaker contacts begin to open when the piston entering power stroke reaches top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke (the up stroke with both valves closed). Fully advance spark control by pushing spark control button all the way in toward the dash and see that distributor is turned clockwise as far as possible. Remove cover over inspection hole in left front face of flywheel housing. Turn engine over until piston reaches top dead center when the flywheel mark 'IGN/CYL. 1-6' will be directly opposite the indicator mark on the housing. Then loosen advance arm clamp screw and turn distributor until contacts begin to open. Tighten the clamp screw and see that the spark plugs are wired in accordance with the firing order shown on the diagram.

Firing Order:—The firing order is 1-5-3-6-2-4.

Spark Rings:—Spark plugs are 18 MM. Metric. Champion Type C-7. Gaps are .025 inch.

VALVE TIMING:—**INLET VALVES.** Head diameter, 1 $\frac{1}{2}$ inches. Stem diameter, $\frac{3}{8}$ inch. Valve lift, 5/16 inch. Spring pressure, 97-102 pounds (spring length, 1 15/16 inches). Tappet clearance, .004 inch (hot). Inlet valves open 7 degrees before top dead center and close 39 degrees after lower dead center.

EXHAUST VALVES. Head diameter, 1 15/32 inches. Stem diameter, $\frac{3}{8}$ inch. Valve lift, 5/16 inch. Spring pressure, 97-102 pounds (spring length, 1 15/16 inches). Tappet clearance, .006 inch (hot). Exhaust valves open 49 degrees before lower dead center and close 2 degrees before top dead center. The flywheel is marked 'I.O./' for inlet opening and 'E.C./' for exhaust closing of cylinder No. 1. Valve stem guides are removable. Valves with over-size stems are not made.

To Check Valve Timing:—Set tappet clearance No. 1 intake valve at .008". This valve should open with piston .018" before top dead center when flywheel mark 'I.O.' lines up with indicator on housing. Reset tappet clearance at .004" (hot).

To Set Valve Timing:—Sprockets are marked. Mesh chain with sprockets turned so that marks are adjacent and in line with a straightedge across the shaft centers.

STARTER:—Model MZ-4024. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, viewed from the commutator end. Brush spring tension is 44-56 ounces. The starting switch is mounted on the lower end of the steering column and is operated by pulling up on the button on the steering wheel.

Starter Data

Torque	R.P.M.	Volts	Amperes
.65 lb. ft.	2500	5.5	100
2.55 "	1325	5.0	200
4.95 "	750	4.5	300
7.65 "	220	4.0	400
12.2 "	Lock	4.0	550

Mounting:—Starter is flange mounted at left of engine on forward face of flywheel housing. To remove starter, disconnect cable and take out three flange mounting bolts. Then pull starter forward to clear drive and lift from place.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the starter each 500 miles of operation.

GENERATOR:—Model GAL-4131, 4331. Direction of rotation is counter-clockwise, viewed from the commutator end. Generator current regulation is by third brush shunt field. To adjust generator output, remove the commutator cover band and shift the third brush by prying on the brush mounting stud with a screwdriver. Shift the third brush in a counter-clockwise direction to increase the charging rate and in the opposite direction to decrease the charging rate. The third brush is held in position by friction between the brush mounting stud and the end plate. With standard car setting the maximum charging rate is 18 amperes at 8 volts reached at 1900 R.P.M. (cold).

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
18	8.0	1900
14	7.65	2925

Brush Spring Tension:—22-25 ozs. (main), 31-34 ozs. (third brush) on GAL-4131, 8-13 ozs. (all brushes) on GAL-4331.

Field Current:—4.08-4.52 amperes at 6.0 volts.

Motoring Current:—4.27-4.73 amperes at 6.0 volts.

Mounting:—Generator is mounted at left of engine on a special swinging bracket and is driven by the fan belt. To remove generator, disconnect lead and loosen adjustment clamp bolt. Swing generator toward engine and slip off drive belt. Then take out mounting bolt in swing bracket and lift generator from place.

Belt Adjustment. Fan belt tension is adjusted by shifting the generator. To take up fan belt, loosen adjustment clamp bolt and mounting bolt and swing generator to the left or away from the engine until the proper belt tension is secured. Tighten the mounting bolts. The belt should be just tight enough to drive the generator and fan without slipping.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler at each end of the generator every week or each 250 miles of operation. Every 1000 miles fill the grease cup under the bearing retainer on the commutator end of the generator with pure vaseline.

RELAY:—Model CB-4014. Relay is mounted on the generator field frame. Relay contacts close at 675 R.P.M. when the generator voltage reaches 7-7.5 volts and open with a discharge current of .5-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .025-.035 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Finger Tip Control Switch Model A-805. Switch is mounted at the lower end of the steering column and is controlled by a button on the steering wheel. The starting switch, lighting switch and horn button are incorporated in a single unit. Headlights are equipped with double filament bulbs. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Parking lights in headlights (on Model 97) and side lights (on Model 93) are each 6-8 volt, 3 cp. S.C. Mazda 63. Dash light and dome light are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop light and tail light are 6-8 volt, 21-2 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 2 cp. filament.

FUSE:—Lighting fuse on fuse block on front of dash is 20 ampere capacity.