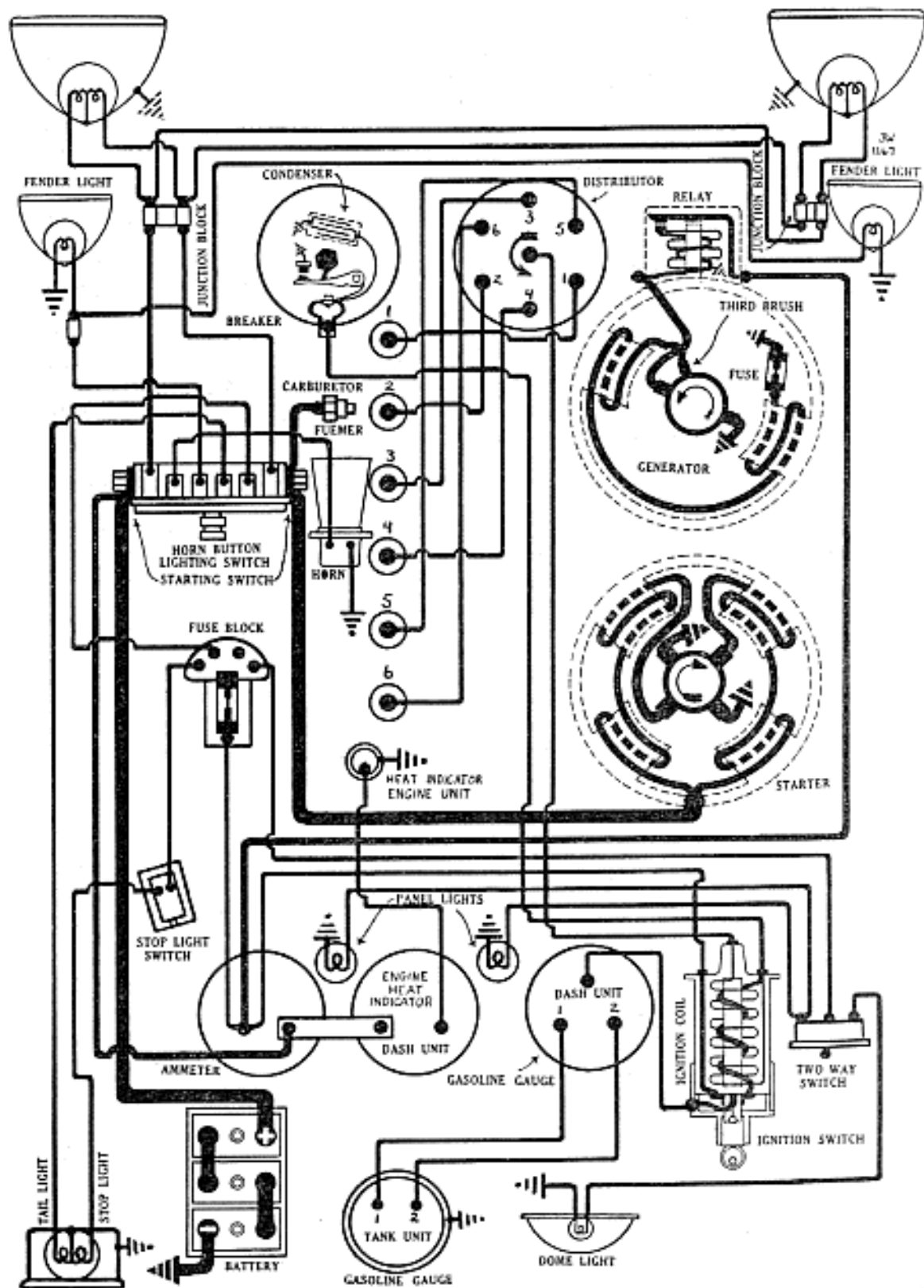


WILLYSKNIGHT

MODEL 87 SERIAL NUMBERS 1001 UP
PRODUCTION STARTED APRIL 1, 1930
AUTO-LITE GENERATING, STARTING SYSTEM
AUTO-LITE IGNITION



BATTERY:—U.S.L., Type 3-HVX-6X-6A, 6 volt. The negative (—) terminal is grounded. Starting capacity (20 minute rate) is 127 amperes for 20 minutes. Lighting capacity (5 ampere rate) is 5 amperes for 23 hours. Battery is mounted on the left frame member under the floor boards of the front compartment.

IGNITION:—Coil Model IG-4083, 4201. The ignition switch is built in the base of the coil. Coil is mounted on back of instrument board with the ignition switch extending through to the face of the instrument panel. Ignition current is 1-3 amperes at 6 volts with engine running and 3.4-5 amperes at 6 volts with engine stopped.

Distributor Model IGC-4004 & 4045. Breaker contacts separate .018-.020 inch. Set contact gap by loosening lock nut on stationary contact mounting stud and turning up stud until correct gap is secured 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 16-20 ounces. Distributor is semi-automatic. Maximum manual advance is 20 degrees (engine). Automatic advance begins at 600 R.P.M. of engine. Maximum automatic advance is 18 degrees reached at 2200 R.P.M. of engine.

Mounting:—Distributor is mounted on accessory drive housing at right of the engine. To remove distributor, disconnect primary lead and spark control wire and remove distributor head with cables intact. Then take out hold-down screw in advance arm and lift distributor from place.

Oiling:—Fill the oiler on the side of the distributor with light engine oil every week or each 250 miles. Every 500 miles remove the distributor head and rotor and oil the wick oiler in the center of the shaft and put one drop of oil on the breaker arm pivot pin. Every 5000 miles put a small bit of vaseline on the face of the breaker cam.

Timing:—Breaker contacts begin to open when the piston entering power stroke reaches a position 8 degrees before top dead center with the manual spark control fully advanced. To set timing, crank engine over until piston No. 1 enters compression stroke. This may be determined by removing the spark plug in cylinder No. 1 and turning engine over until the air compressed in the cylinder is felt escaping when the plug port is closed by hand. Place spark control button in the fully advanced position and turn engine over until the ignition mark on the flywheel 'IGN/' is directly opposite the indicator in the clutch inspection hole. The flywheel mark is 8 degrees before the top dead center mark 'T/C'. Then loosen advance arm clamp screw and rotate distributor until the breaker contacts begin to open. Tighten the clamp screw and see that the rotor is directly opposite the segment connected to the spark plug in cylinder No. 1 (see diagram).

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

Spark plugs:—Spark plugs are $\frac{7}{8}$ -18 S.A.E. Std. Champion No. 1. Gaps are .025 inch.

VALVE TIMING:—The Willys Knight engine is of the sleeve valve type. To time the sleeve valves after dismantling and removing the timing chain cover, remove the idler eccentric collar and sprocket after which the timing chain can be removed. Remove the pipe plug in the exhaust manifold opposite No. 6 cylinder and scrape the carbon from the edges of the sleeve port so that the closing of the port can be checked. Then remove the clutch inspection plate and crank engine over until flywheel mark 'EC' is opposite

the top dead center on the flywheel case. Make sure the mark on the end of the eccentric shaft and the mark on the eccentric shaft sprocket coincide. Then remove spark plug in cylinder No. 6 and place a test lamp over the spark plug port so that the light is visible through the exhaust port. Then turn the eccentric shaft in a clockwise direction until the port closes when the rays from the light will be cut off. Assemble the chain on the crankshaft, idler and generator sprockets. Insert the eccentric shaft sprocket in the chain and set the tension of the timing chain by turning the idler eccentric bushing spring until all slackness is removed from the chain and then turning one additional turn before inserting end in slot of idler stud. With motor set in this position the distributor arm should be under the contact for No. 1 cylinder. The motor can be timed from the front end by bringing the crankshaft on top dead center for Nos. 1 and 6 cylinders. Then set the mark on the eccentric shaft and the mark on the eccentric shaft sprocket in line with the mark on the crankcase. In this position the distributor arm should be under No. 1 cylinder.

Valve specifications. Inlet opens at top dead center and closes 46 degrees or $4 \frac{19}{32}$ inches on the flywheel after lower dead center with the piston 3.842 inches from the top of the intake stroke. Exhaust ports open 50 degrees or 5 inches on the flywheel before lower dead center with the piston 3.726 inches down on the power stroke and close 5 degrees or one-half inch on the flywheel before top dead center with the piston .010 inch before top dead center.

STARTER:—Model MAB-4014. Starter is connected to the engine through a Bendix drive. The direction of rotation is clockwise, viewed from the commutator end. Starter cranks the engine at 140 R.P.M. drawing 250 amperes at 6 volts. Brush spring tension is 44-56 ounces.

Starter Data

Torque	R.P.M.	Volts	Amperes
.6 lb. ft.	1910	5.5	100
3.4 "	1100	5.0	200
6.6 "	695	4.5	300
10.2 "	420	4.0	400
24.0 "	Lock	4.0	720

Mounting:—Starter is sleeve mounted at the right of the transmission at the rear of the flywheel housing. To remove starter, take up front floor boards and disconnect cable. Then take out large pilot mounting screw in housing directly above starter sleeve. Pull starter to rear to clear Bendix drive and lift from place.

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

GENERATOR:—Model GAL-4103. The 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 output. The third brush and mounting plate are held in position by friction between the mounting stud and the end plate. With standard car setting, the maximum charging rate is 12 amperes (hot) at 8 volts reached at 2075 R.P.M. or 23 M.P.H.

Generator Data

Amperes	Volts	R.P.M.
2	6.4	675
6	6.9	835
10	7.3	1025
14	7.65	1275
17.2	8.0	2075
14	7.65	2925

Brush spring tension is 22-25 ounces (main), 31-34 ounces (third brush). Field fuse is 5 ampere capacity. Shunt field current is 4.08-4.52 amperes at 6.0 volts. Motoring, generator draws 4.27-4.73 amperes at 6.0 volts.

Mounting:—Generator is cradle mounted at right of engine and is driven from the chain case. To remove generator, disconnect lead and loosen mounting clamp band. Then disengage coupling and lift generator from place.

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

RELAY:—Model CB-4014. Relay is mounted on the generator. Relay closes at 5.5-6 M.P.H. or 750 R.P.M. when the generator voltage reaches 7-7.5 volts and opens with a discharge current of 0-2.5 amperes. Charging current at closing of contacts is approximately 2 amperes. Relay contact gap is .020-.030 inch. Air gap is .010-.030 inch with contacts closed.

LIGHTING:—Pines 'Finger Tip Control' Switch. Model A-805. Lighting switch, starting switch and horn button are combined in a single unit mounted at the lower end of the steering column and controlled by a button on the steering wheel. Headlights are equipped with double filament bulbs using a second 21 cp. filament instead of dimmers. Headlights are 6-8 volt, 21-21 cp. D.C. Mazda 1110. Fender lights are 6-8 volt, 3 cp. S.C. Mazda 63. Dash and dome lights are each 6-8 volt, 3 cp. S.C. Mazda 63. Stop and tail light is 6-8 volt, 21-3 cp. D.C. Mazda 1158. This is a double filament bulb and the tail light lead must be connected to the 3 cp. filament.

FUSES:—Generator field fuse is 5 ampere capacity. Lighting fuse mounted on fuse block on left front of dash is 20 ampere capacity.