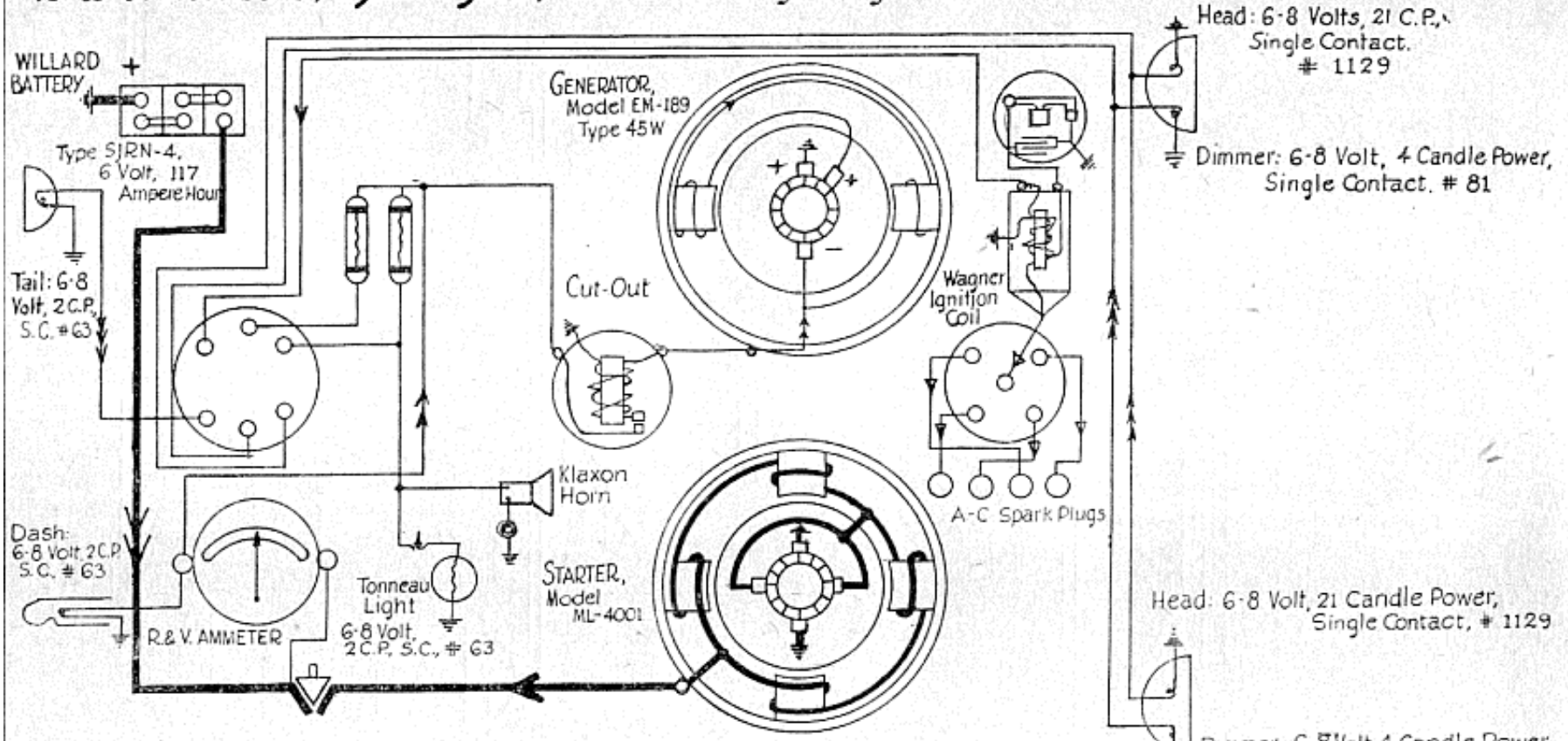
R. & V. KNIGHT, 1921-1922, Model R. Wagner System - AutoLite Starter



BRUSHES: STARTER - Metal 5/8 × 1/2 × 3/8
GENERATOR - Carbon 7/8 × 1 × 1/4

∧ Starting	▲ Ignition Primary
⩓ Charging	△ Ignition Secondary
∧ Shunt	— Wires Insulated
⩓ Lights	— Wires Connected

Compiled and Edited by Automotive Electrical Engineer -1923

GENERATOR OUTPUT:

Hot Test		Cold Test	
Amperes	R.P.M.	Amperes	R.P.M.
2.25	740	0	500
5.80	800	6	670
11.20	1142	12	950
12.00	1600	15	1180
9.00	2100	16-18	1500
7.50	2368	10	2500

Timing: Set contacts so that they open when D.C. mark on flywheel is 1½ inches before indicator, spark lever fully advanced.

Firing Order: - 1-3-4-2

Set A.-C. Spark Plugs to .025 inch

Tungsten Contacts open .020 to .025 inch.

Battery.—Battery is 6 volt, 120 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .016 inch to .018 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism must be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the mark "1-4 U-P" on the flywheel is 2½ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ignition Thermostat.—There is a thermostat in the switch case to open the ignition, preventing battery discharging through the ignition apparatus should ignition switch be left "On" with engine idle, contacts closed. This device is fully described on Page 41.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine through a Bendix drive. Cold engine, tight bearings, heavy oil or other obstructions will cause a high current flow and low speed during cranking operation. When running free, armature should revolve at about 4200 R. P. M., taking 50-55 amperes. Greater speed indicates grounded, short circuited or damp field windings. Greater current or vibrating of the ammeter needle indicates grounded or short circuited armature coils or commutator. Damp armature windings will cause high current or slow speed.

Oiling.—Clean and repack starter bearings with soft cup grease every six months. Put in one or two drops of oil every month to keep grease soft. Do not oil the Bendix drive. Should pinion stick, clean shaft with gasoline.

Generator.—Generator current regulation is by reverse series field. Relay should close at 7-10 M. P. H., or 230-265 R. P. M., of generator armature. Charging current should be .5 to 1.5 amperes at closing and discharge current 0 to 1 at opening.

GENERATOR DATA, MODEL GF

Amperes	R. P. M.
5	430- 490
10	730- 870
12.5	945-1180
15	1225-1660
16-19	2200-2800

A variation of 1.5 amperes from these amounts is allowable. Output may be varied slightly by adjusting brush pressure on commutator. The pressure should be 1 to 1¼ pounds. If operated freely as a motor, armature should revolve at 200 R. P. M., taking 1.8 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take about 1 ampere.

Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-7 volts, 16 cp. Dimmer lamps are 6-7 volts, 4 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp.

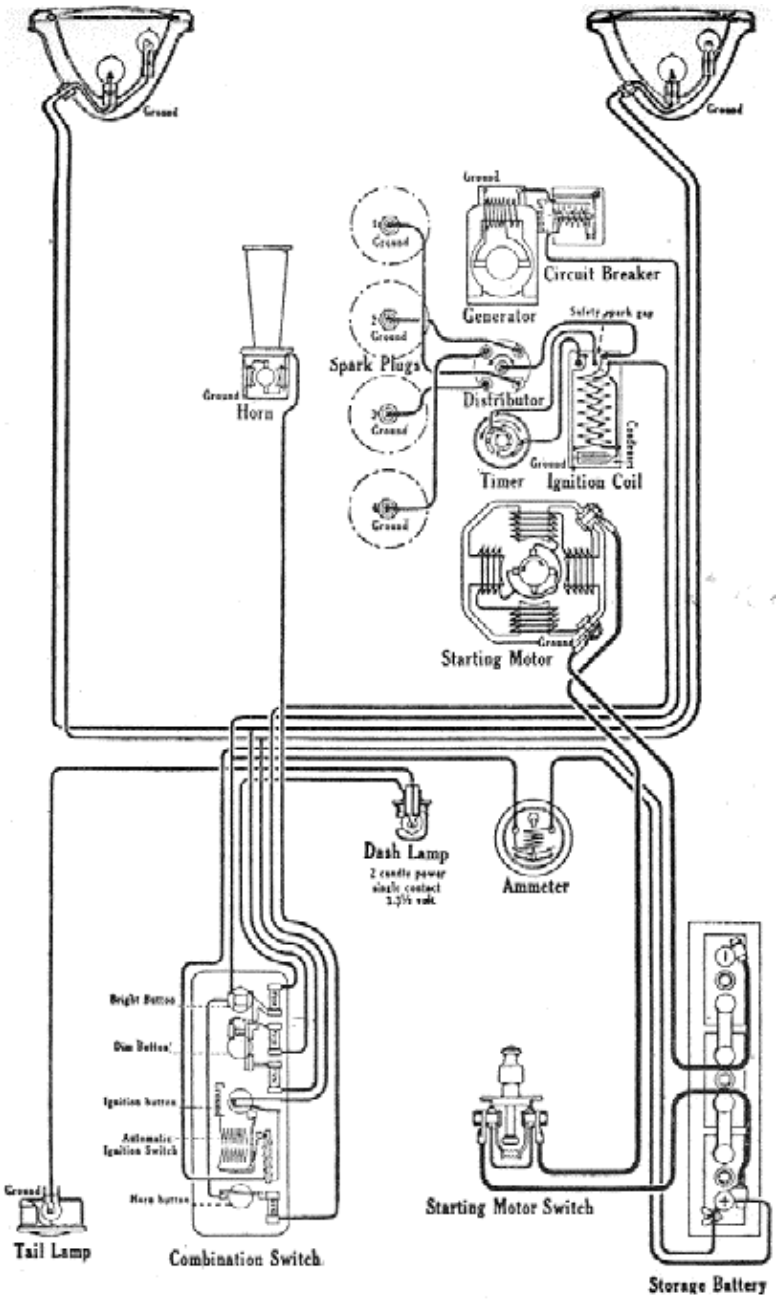
Fuses.—Fuses are 20 ampere.

Model Numbers.—Generator is Model GF 1176. Starter is Model MC 1019 on the first 2400 cars and MC 1126 on later cars. On early cars a Willard OLBA battery was used. On later cars a USL CD 315 D battery is used.

Willys-Knight

Model 88-4 (1916-17)

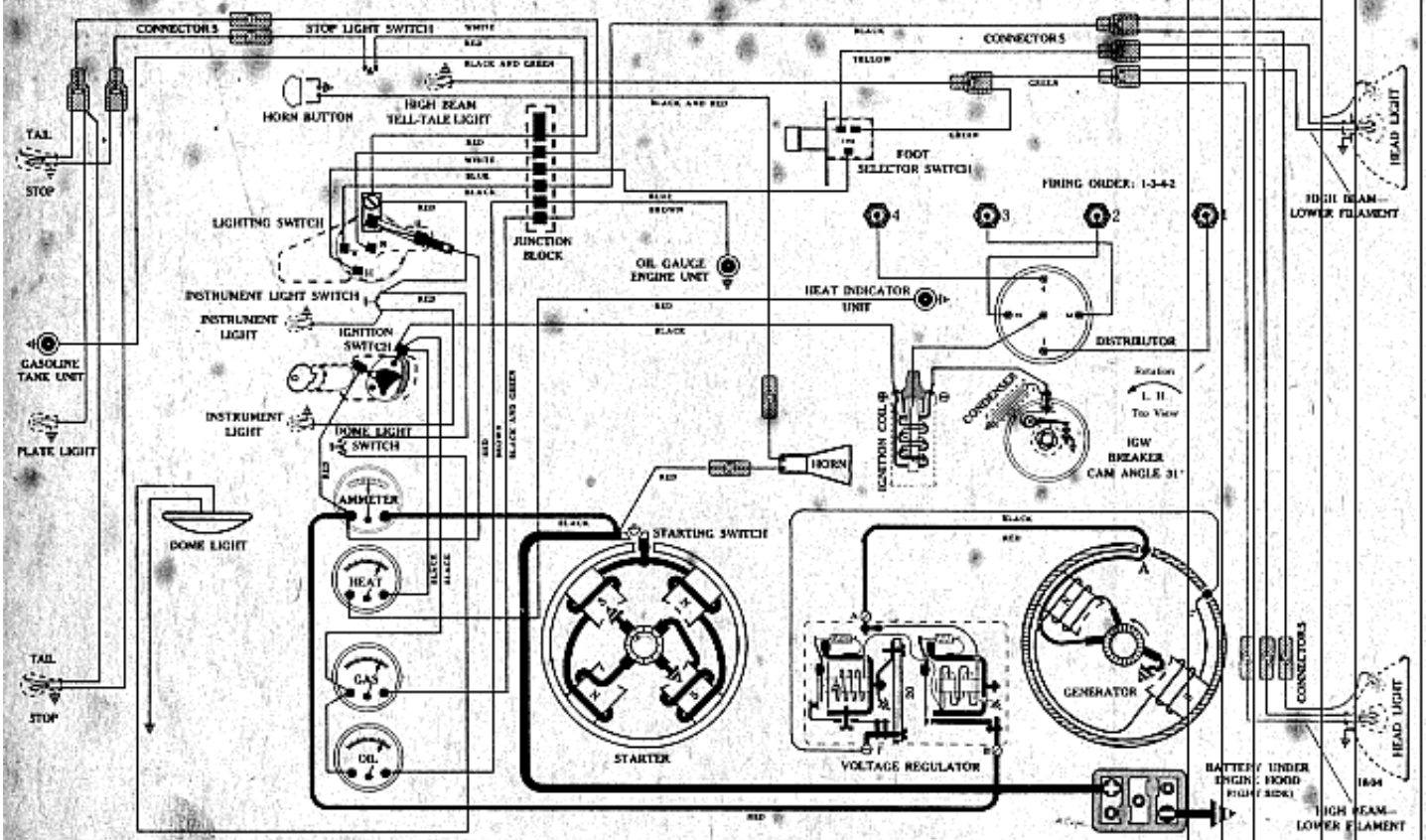
Auto-Lite Starting and Lighting System
Connecticut Ignition



WILLYS

Model 4-40, 4 cyl., (1940)

Engine { Bore 3-1/8 / Stroke 4-3/8



BATTERY

Auto-Lite, AB-13, 6 Volts
Negative Terminal Grounded

Starting Capacity—96 amps. for 20 minutes.
Minutes of Discharge at 300 Amps., Zero Degrees F.—2.
Lighting Capacity—4 amps. for 20 hours (80 amp. hour).
Case—Length, 8-15/16; width, 7; height, 8-15/16 inches.

STARTER

A-L Test 162 Rotation, L. H., Com. End
Auto-Lite, MZ-4064

Connection to Engine—Bendix Drive, type RC10HD.
Running Free—60 amps. at 5-1/2 volts, 5000 R.P.M.
Stall Data—7.8 pound-feet, 420 amps. at 3 volts.
Brush Spring Tension—42 to 53 ounces on each (new brushes). Brush spring tension should be measured by a scale hooked under the brush spring at the bend just beyond the brush, and the reading taken at moment spring leaves the brush. The pull should be exerted at right angles to force exerted by the brush spring.
Starting Switch—Auto-Lite, SW-3737-D, mounted on starter. Switch should not close with less than 2.3 pounds pull, applied at right angles to hole in end of lever.
Armature—Auto-Lite, MZ-2089.

IGNITION

A-L Test 618 Rotation, L. H., Top View
Auto-Lite, IGW-4129

(Full Automatic Spark Advance in conjunction with Vacuum Chamber which moves the entire Distributor.)
Breaker—Contact separation .020 inch.
Cam Angle—41 degrees.
Percentage of Dwell—46%.
Contact Spring Tension—18 to 20 ounces.
Timing—Exact top dead center. Flywheel mark "TC-IGN" located at top center should register with the pointed end of the inspection plate screw.
Spark Plugs—14-MM (Champion type H-10); Gap .025 inch.
Firing Order—1-3-4-2.
Vacuum Distributor Control (Auto-Lite, VC-4010; Test No. 467)—10 degrees advance (Dist.). Starts with vacuum of 3.50 inches of mercury. Requires a vacuum of 15 inches for full travel.
Vacuum Chamber Advance Table—

Inches of Mercury	Degrees Dist. Advance
3.50	Start
4.65	1
5.80	2
6.95	3
8.10	4
9.25	5
10.40	6
11.55	7
12.70	8
13.85	9
15.00	10

WILLYS

Model 4-40, 4 cyl., (1940)

Automatic Advance—9½ degrees (Distributor).

Eng. R.P.M.	Dist. R.P.M.	Degrees Advance (Dist.)
600	300	Start
852	426	1
1104	552	2
1356	678	3
1608	804	4
1862	931	5
2114	1057	6
2366	1183	7
2618	1309	8
2870	1435	9
3000 (Max.)	1500	9½

Condenser—Auto-Lite, IGB-1025. Capacity .20 to .25 microfarads.
Contact Point—Auto-Lite, IGP-33.
Breaker Lever and Point—Auto-Lite, IGW-3028.
Rotor—Auto-Lite, IGB-1239.
Distributor Cap—Auto-Lite, IGB-1241.
Ignition Coil—Auto-Lite, IG-4090-A.
Ignition Switch—H. A. Douglas Mfg. Co., No. 2980.

GENERATOR

Rotation, L. H., Com. End
Auto-Lite, GCJ-4811-A

Performance Date—Gen.-cold.

Amps.	R.P.M.	Volts
0	825	6.20
2	870	6.38
4	915	6.55
6	960	6.70
8	1020	6.89
10	1075	7.05
12	1135	7.22
14	1200	7.38
16	1270	7.53
18	1340	7.70
20	1430	7.89
22	1545	8.05
24	1720	8.20
25	1850	8.30

Motoring Freely—4.0 to 4.4 amps. at 6 volts.
Max. Stall Current—28 to 30 amps. at 5.2 volts.
Field Test—1.9 to 2.1 amps. at 6 volts.
Brush Spring Tension—53 ounces max. on each (new brushes).
Armature—Auto-Lite, GCJ-2006-F.
Third Brush Adjustment—Loosen cover band. Shift third brush by hand. Mounting plate held in any position by friction clamp washers. The third brush should be set 2 bars less 2 micas (min.) to 2 bars less 1 mica (max.) from the insulated main brush.

RELAY-REGULATOR

Auto-Lite, VRR-4004-A Neg. Ground

A combination of Cut-Out Relay and Vibrating Point Voltage Regulator.

Cut-Out Relay

Resistance of Voltage Winding—29.8 to 33.0 ohms.
Points Close—6.4 to 7.0 volts.
Points Open—6.0 amperes maximum discharge.
Contact Point Gap—.015 inch minimum.
Armature Air Gap—.034 to .038 inch.
Armature Spring—12-3/4 turns.

Voltage Regulator

Resistance of Voltage Winding—10.8 to 12.0 ohms.
Resistance Unit—Auto-Lite, TC-51-T, marked "20"; Ohms 19 to 21.
Armature Air Gap—.048 to .052 inch (the distance between core and underside of armature when contacts just open).
Contact Point Gap—.012 inch minimum (armature pressed down against stop pin).
Operating Voltage—7.3 to 7.6 (70° F.).
Armature Spring—14-1/2 turns.

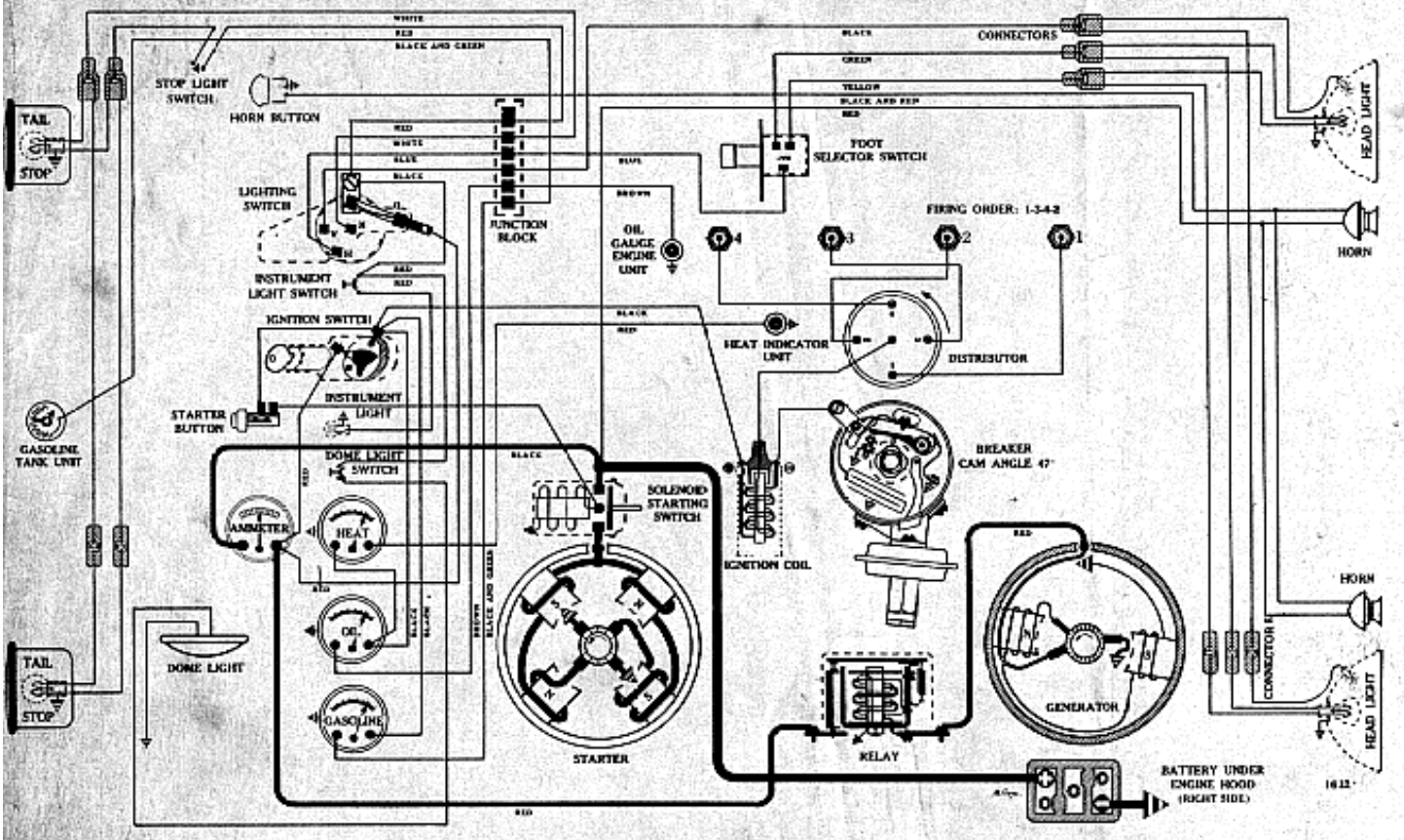
LIGHTING

Switch—H. A. Douglas Mfg. Co., No. 5400.
Location—Behind instrument board.
Fuses—Single 20 amp. fuse (type SFE-20) on switch back, protects all lighting circuits.
Instrument Light Switch—H. A. Douglas Mfg. Co., No. 5624.
Foot Selector Switch—H. A. Douglas Mfg. Co., No. 5530.
Lamps—HEAD--2330; PARK--55; BEAM INDICATOR--51; INSTRUMENT--51 and 63; DOME--63; LICENSE PLATE--63; STOP AND TAIL--1158.

WILLYS

Engine { Bore 3-1/8 / Stroke 4-3/8

Model 38, 4 cyl., (1938)



BATTERY

U.S.L., A-13-A, 6 volts.
Negative Terminal Grounded.

Starting Capacity—96 amps. for 20 minutes.
Minutes of Discharge at 300 Amps., Zero Degrees F.—1.9
Lighting Capacity—3.9 amps. for 20 hours (78 amp. hour).
Case—Length, 8-7/8; width, 7; height, 8-5/8 inches.

STARTER

Rotation, L. H., Com. End
Auto-Lite, MZ-4049

Connection to Engine—Bendix Drive, Type RC10HD.
Running Free—70 amps. at 5-1/2 volts, 4300 R.P.M.
Stall Data—7.8 pound-feet, 420 amps. at 3 volts.
Brush Spring Tension—42 to 53 ounces on each (new brushes).
Push Button Starting Switch—H. A. Douglas Mfg. Co., No. 5617.
Solenoid Starting Switch—Auto-Lite, SS-4001.
Armature—Auto-Lite, MZ-2099.

IGNITION

A-L Test 466 Rotation, L. H., Top View
Auto-Lite, IGS-4007

(Full Automatic Spark Advance in conjunction with Integral Vacuum Chamber).
Breaker—Contact separation .020 inch.
Cam Angle—47 degrees.
Contact Spring Tension—16 to 20 ounces.
Timing—5 degrees or .0103 inch piston travel past top dead center. Loosen screw holding flywheel inspection hole cover, located in left top side of flywheel housing, and swing cover to one side. Flywheel mark "IGN" (located 5 degrees after T.D.C.) should register with the pointed end of inspection plate screw.
Spark Plugs—18-MM (Champion type C-7); Gap .025 inch.
Firing Order—1-3-4-2.
Vacuum Chamber (Auto-Lite, IGT-1028-AS; Test No. 467)—10 degrees advance (Dist.). Starts with vacuum of 3-1/2 inches of mercury. Requires a vacuum of 15 inches for full travel.
Vacuum Chamber Advance Table—

Inches of Mercury	Degrees Dist. Advance
3.50	Start
4.65	1
5.80	2
6.95	3
8.10	4
9.25	5
10.40	6
11.55	7
12.70	8
13.85	9
15.00	10

WILLYS

Model 38, 4 cyl., (1938)

Automatic Advance—degrees (Distributor).

Eng. R.P.M.	Dist. R.P.M.	Degrees Advance (Dist.)
500	250	Start
550	275	1
600	300	2
650	325	3
700 (Intermedi	350	4
970	485	5
1240	620	6
1510	755	7
1780	890	8
2050	1025	9
2320	1160	10
2590	1295	11
2860	1430	12
3130	1565	13
3400 (Max.)	1700	14

Breaker Plate—Auto-Li, IGS-2044 (stamped with the figure 10)
Condenser—Auto-Lite, -2671-K.
Contact Point—Auto-Li, IGP-33.
Breaker Lever and Poin Auto-Lite, IGP-3028-L.
Rotor—Auto-Lite, IG-1
Distributor Cap—Auto-Le, IG-1324.
Flexible Lead (Insulate—Auto-Lite, IGS-49.
Ignition Coil—Auto-Lit IG-4090.
Ignition Switch—H. A. uglas Mfg. Co., No. 2975.

GE RATOR

Rotation, H., Com. End
Auto-Lite, GAM-504-A or GAM-4504-B

Performance Data—Gen. dd.

Amps.	R.P.M.	Volts
0	700	6.40
2	785	6.50
6	960	6.90
10	1100	7.20
12	1320	7.40
16	2400 (Max.)	8.00

Motoring Freely—4.08 to 4.52 amps. at 6 volts.
Max. Stall Current—18 to 20 amps. at 6 volts.
Field Test—3.89 to 4.31 amps. at 6 volts across field coils in series.
Brush Spring Tension—18 to 22 ounces (max.) on each (new brushes).
Armature—Auto-Lite, GAM-2055.
Third Brush Adjustment—Loosen cover band. Shift third brush by hand. Mounting plate held in any position by friction clamp washers.

RELAY

Auto-Lite, CB-4025 (Mounted on Sub Frame)

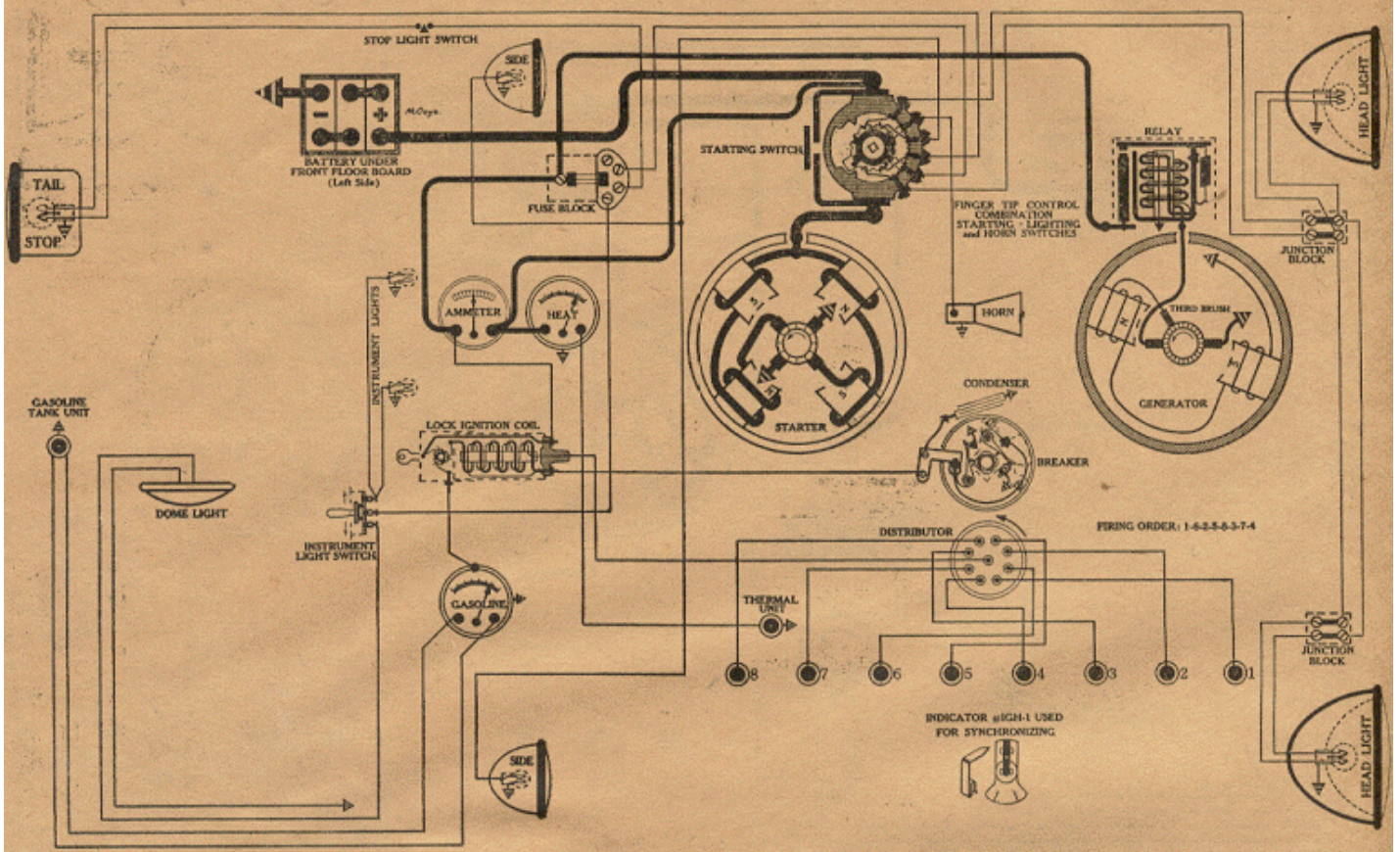
Points Close—6.5 to 7.25 volts.
Points Open—.5 to 3.0 amps. discharge.
Contact Gap—.015 inch minimum (points open).
Armature Air Gap—.034 to .038 inch (points open).

LIGHTING

Switch—H. A. Douglas Mfg. Co., No. 5400-C.
Location—Behind instrument board.
Fuse—Single 20 amp. fuse (type 3A-20) on switch back. Protects all lighting circuits.
Foot Selector Switch—H. A. Douglas Mfg. Co., No. 5530.
Lamps—HEAD—2320; PARK—55; INSTRUMENT—63; DOME—63; STOP AND TAIL—1158.

WILLYS

Model, 8-80, Straight Eight, (1930)



BATTERY

U. S. L., 3-HVX-7X-6A, 6 volts. Negative Terminal Grounded

Starting Capacity—148 amps. for 20 minutes.
Lighting Capacity—5 amps. for 28 hours.
Box—Length, 11¾; width, 7 7/16; height, 9¾ inches.

STARTER

Rotation, L. H., Com. End
Auto-Lite, MAB-4031

Connection to Engine—Bendix drive.
Running Free—60 amps. at 6 volts.
Cranking Engine—160-170 amps. at 5 volts.
Lock Torque—17 pound-feet, 520 amps. at 3 volts.
Brush Spring Tension—24 to 28 oz. on each.
Starting Switch—Located foot of steering column. Operated by pulling up on horn button.

IGNITION

Rotation, L. H., Top View
Auto-Lite, IGH-4013

Breakers—Contact separation .018 inch.
Contact Spring Tension—17 to 19 oz. on each.
Timing—With No. 1 Piston on compression stroke, bring flywheel mark "IGN" opposite pointer, spark fully advanced, rotor opposite No. 1 Dist. Cap Terminal; stationary set of breaker points should just open.
Spark Plugs—Metric (Champion No. 8); Gap .025 inch.
Firing Order—1-6-2-5-8-3-7-4.
Manual Advance—12 degrees (on Flywheel).
Automatic Advance—20 degrees (on Flywheel).

Eng. R.P.M.	Degrees Advance (on flywheel)	Dist. R.P.M.	Degrees Advance (on cam)
800	0	400	0
1600	6	800	3
2400	11	1200	5.5
3200	17	1600	8.5
3600	20	1800	10

Lock Ignition Coil—Auto-Lite, IG-4083.
NOTE: This unit is a combined ignition switch and coil. Impossible to "jump out" ignition switch with wire, to run engine.

GENERATOR

Rotation, L. H., Com. End
Auto-Lite, GAL-4131 (Belt Drive)

Performance Data—Gen. cold.

Amps.	R.P.M.	Volts	Amps.	R.P.M.	Volts
0	650	6.5	10	1075	7.3
2	720	6.6	14	1340	7.7
5	850	7.	16	1800 (Max.)	8.

Motoring Freely—5 to 5½ amps. at 6 volts.
Max. Stall Current—16 to 19 amps. at 6 volts.
Field Test—4.7 amps. at 6 volts across field coils in series.
Field Fuse—(None).
Brush Spring Tension—20 to 24 oz. on each.
Third Brush Adjustment—Loosen cover band. See Fig. 13, P. 7, Sec. AA.

RELAY

Auto-Lite, CB-4014

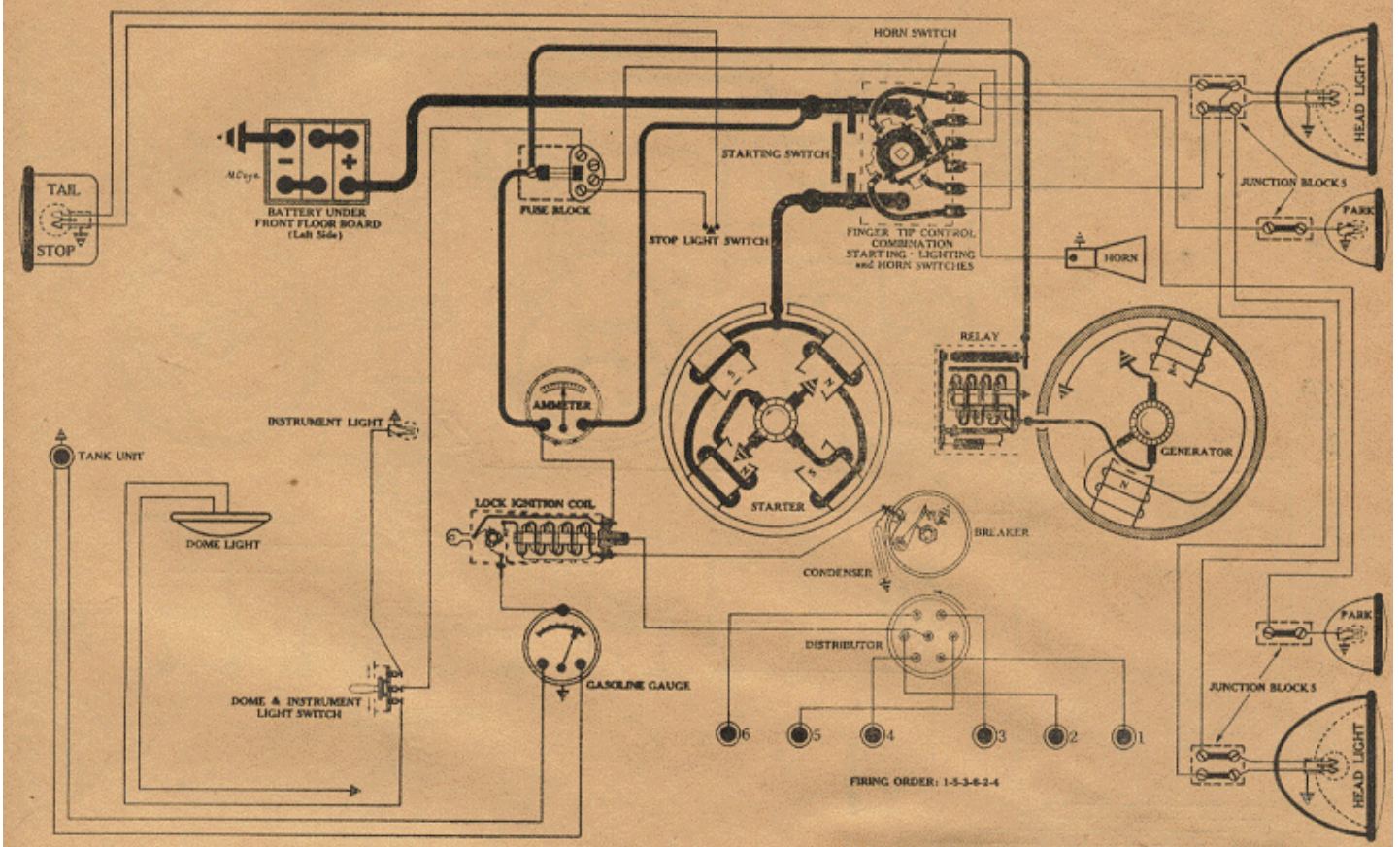
Closes—7 to 7½ volts.
Opens—½ to 2½ amps. discharge.
Contact Gap—.025 to .035 inch.
Core Gap—.010 to .012 inch, contacts closed.

LIGHTING

Switch—Aid Mfg. Co., No. 805.
Location—Foot of steering column. This unit is a combination starting switch, lighting switch, and horn switch, all controlled by horn button on steering wheel.
Fuses—Single 20 amp. fuse mounted on block under engine hood (left side).
Lamps—See P. 3, Sec. AA. HEAD—1110 (Bifocal); SIDE—63; INSTRUMENT—63; DOME—63; STOP and TAIL—1158.
NOTE: This is the old style Ford headlight bulb with two filaments. Make sure the 3 C.P. filament burns for tail light.

WILLYS

Model, 98-B, 6 cyl., (1930)



BATTERY

U. S. L., 3-CVX-6X-7A, 6 volts. Negative Terminal Grounded

Starting Capacity—115 amps. for 20 minutes.
Lighting Capacity—5 amps. for 21 hours.
Box—Length, 10 7/16; width, 7 7/16; height, 9¼ inches.

STARTER

Rotation, L. H., Com. End
Auto-Lite, MAJ-4002

Connection to Engine—Bendix drive.
Running Free—60 amps. at 5.5 volts.
Cranking Engine—180 amps. at 5.2 volts, 200 R.P.M.
Lock Torque—10 pound-feet, 490 amps., 3.6 volts.
Brush Spring Tension—20 to 24 oz. on each.
Starting Switch—Located foot of steering column. Operated by pulling up on horn button.

IGNITION

Rotation, L. H., Top View
Auto-Lite, IGB-4032

Breaker—Contact separation .020 inch.
Contact Spring Tension—17 to 19 oz.
Timing—With No. 1 Piston on T.D.C. power stroke, spark fully advanced, rotor opposite No. 1 Dist. Cap Terminal; breaker points should just open.
Spark Plugs—Metric (Champion No. 11); Gap .025 inch.
Firing Order—1-5-3-6-2-4.
Manual Advance—14 degrees (on Flywheel).
Automatic Advance—22 degrees (on Flywheel).

Eng. R.P.M.	Degrees Advance (on flywheel)	Dist. R.P.M.	Degrees Advance (on cam)
400	0	200	0
800	3	400	1.5
1200	6	600	3
2000	12	1000	6
2400	16	1200	8
3200	22	1600	11

Lock Ignition Coil—Auto-Lite, IG-4083.
NOTE: This unit is a combined ignition switch and coil. Impossible to "jump out" ignition switch with wire, to run engine.

GENERATOR

Rotation, L. H., Com. End
Auto-Lite, GAL-4131 (Belt Drive)

Performance Data—Gen. cold.

Amps.	R.P.M.	Volts	Amps.	R.P.M.	Volts
0	650	6.5	10	1075	7.3
2	720	6.6	14	1340	7.7
5	850	7.	16	1800 (Max.)	8.

Motoring Freely—5-5½ amps. at 6 volts.
Max. Stall Current—16-19 amps. at 6 volts.
Field Test—4.7 amps. at 6 volts across field coils in series.
Field Fuse—(None).
Brush Spring Tension—20 to 24 oz. on each.
Third Brush Adjustment—Loosen cover band. See Fig. 13, P. 7, Sec. AA.

RELAY

Auto-Lite, CB-4014

Closes—7 to 7½ volts.
Opens—½ to 2½ amps. discharge.
Contact Gap—.025 to .035 inch.
Core Gap—.010 to .012 inch, contacts closed.

LIGHTING

Switch—Briggs & Stratton No. 50160.
Location—Foot of steering column. This unit is a combination starting switch, lighting switch, and horn switch, all controlled by horn button on steering wheel.
Fuses—Single 20 amp. fuse mounted on block under engine hood (left side).
Lamps—See P. 3, Sec. AA. HEAD—1110 (Bifocal); PARK—63; INSTRUMENT—63; DOME—63; STOP and TAIL—1158.
NOTE: This is the old style Ford headlight bulb with two filaments. Make sure the 3 C.P. filament burns for tail light.

Willys-Overland

Model 89-6 (1918)

Auto-Lite Starting and Lighting System

Connecticut Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The negative (—) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .016 inch to .018 inch. They are made of tungsten. They will operate properly even though quite rough. Should they become badly worn, affecting the ignition, the inner breaker mechanism should be renewed as directed on Page 50. In an emergency, contacts may be resurfaced enough to give service for 300 or 400 miles by drawing a piece of fine emery cloth between them.

Timing.—Contacts should begin to separate when the mark "1-6 D-C" on the flywheel is 1⅛ inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

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

Spark Plug Gaps.—Spark plug gaps should be about .023 inch.

Ignition Thermostat.—There is a thermostat in the ignition switch case to open the circuit should switch be left "On," engine idle, contacts closed. This device is treated on Page 41.

Oiling.—Refill the cup under the breaker head with pure vaseline and turn down every month. If car is driven more than 1000 miles in a month, this must be done every 1000 miles. Do not put grease or oil in the cup.

Starter.—Starter is connected to the engine through a Bendix drive. It should crank the engine at 100 to 125 R. P. M., taking about 250 amperes. Cold engine, tight bearings, heavy oil or other obstructions will cause a greater current flow and reduce the speed.

Oiling.—Clean and repack starter bearings with soft cup grease every six months.

Generator.—Generator current regulation is by reverse series field. Relay should close at 8-10 M. P. H., or 300-380 R. P. M., of generator armature. Charging current should be .6 to 1.5 amperes at closing and discharge current 0 to 1 ampere at opening.

GENERATOR DATA, MODEL GA

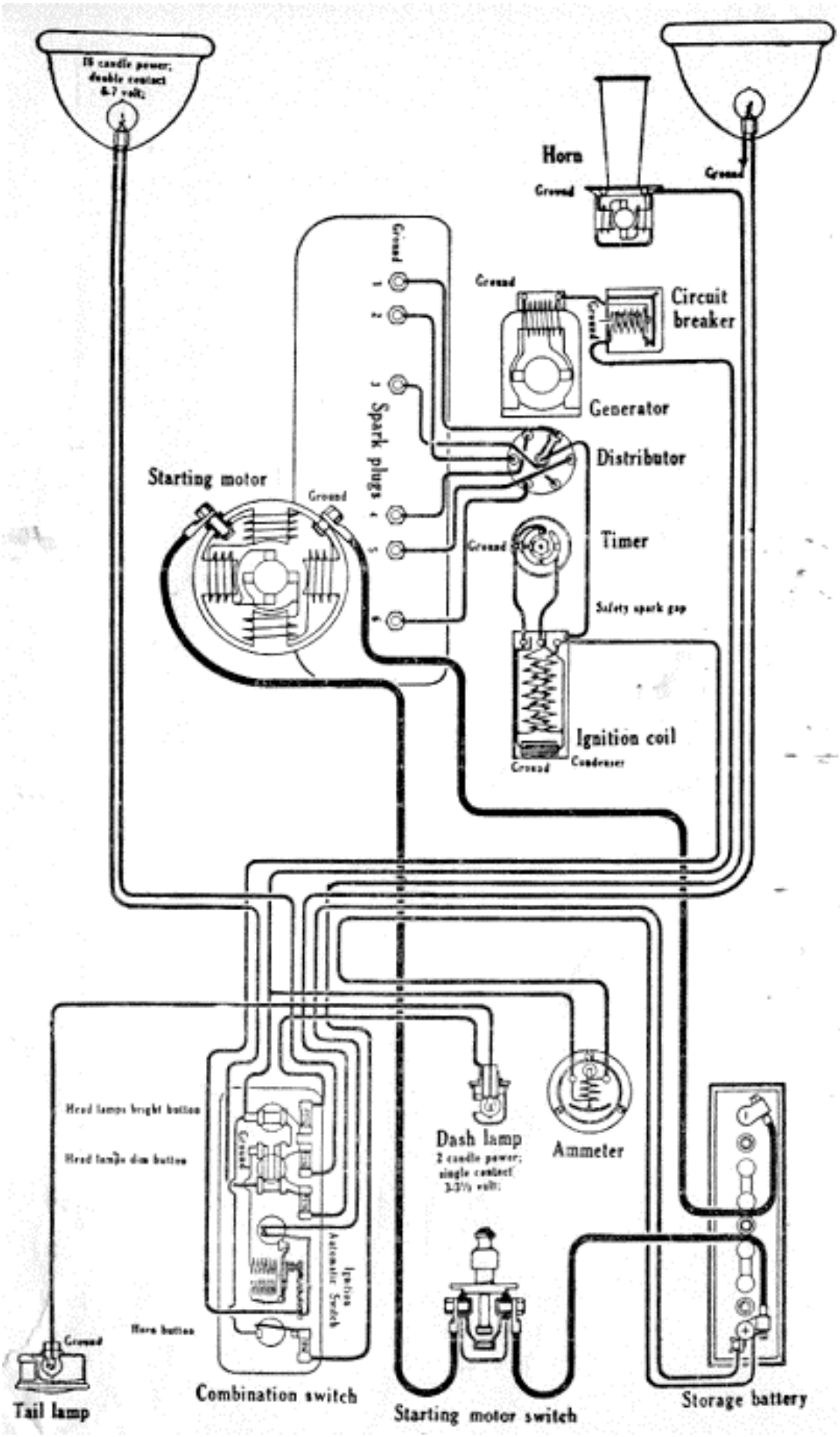
Amperes	R. P. M.
5	550- 560
10	980-1120
12.5	1365-1570
15	1850-2400
16-18	3000-3750

A variation of 1.5 amperes from these rates is allowable. Output may be varied slightly by adjusting brush pressure on commutator. The pressure should be 1 to 1¼ pounds. If operated freely as a motor, armature should revolve at 200 R. P. M., taking 2 amperes. Much higher speed indicates damp, grounded or short circuited field coils. Greater current or lower speed indicates tight bearings or damp, grounded or short circuited armature windings or commutator. Periodic swinging of ammeter needle indicates grounded or short circuited armature coils or commutator bars. Shunt field should take about 1.4 amperes.

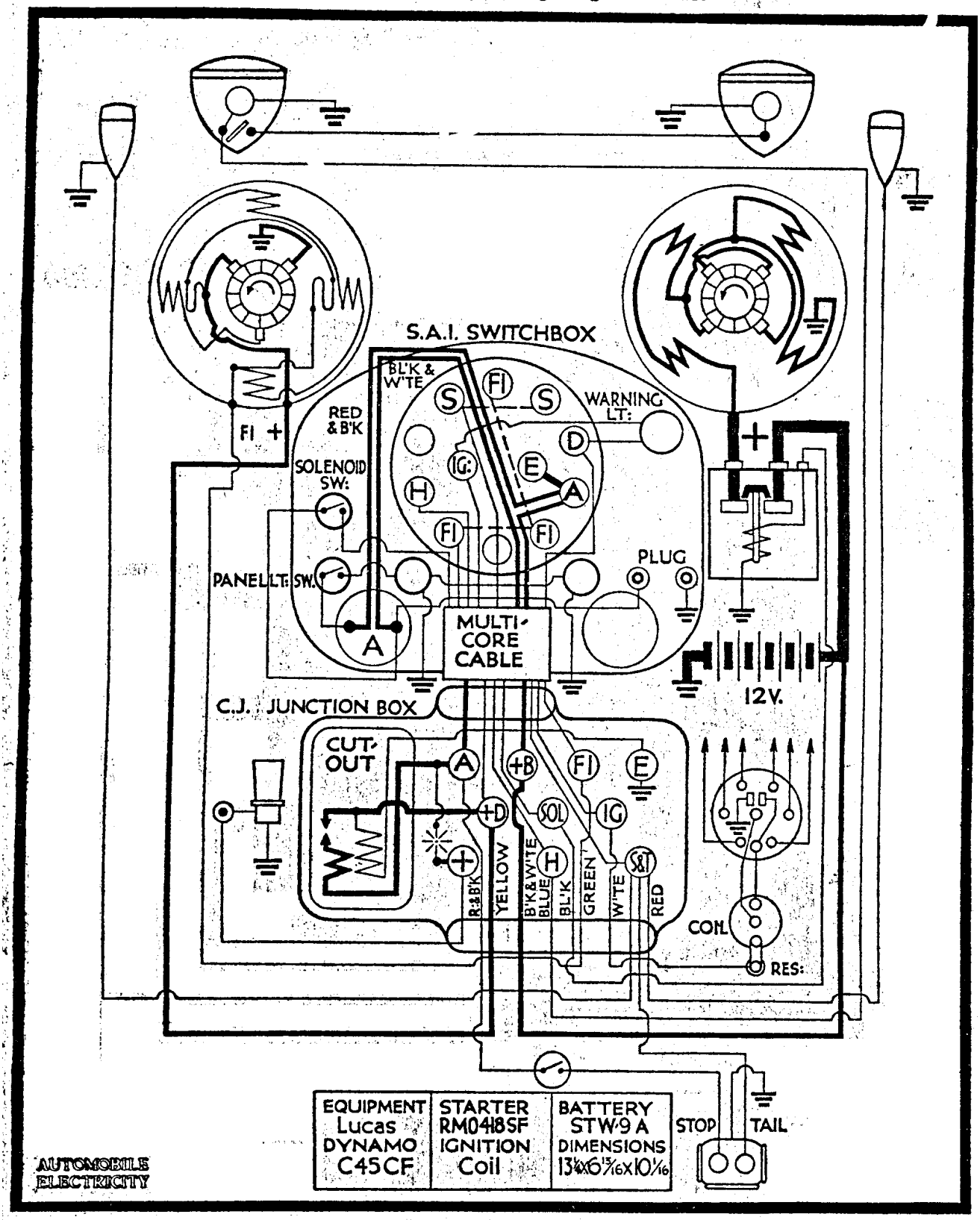
Oiling.—Put 5 or 6 drops of light engine oil in each of the generator oilers every two weeks. If car is driven more than 500 miles in two weeks, the oiling must be done every 500 miles.

Lamps—Head lamps are 6-7 volts, 16 cp. Dash and tail lamps are in series. They are each 3-3.5 volts, 2 cp.

Fuses.—Fuses are 20 ampere.


18 candle power; double contact 6-7 volt;
Horn
Ground
Ground
Ground
Ground
Circuit breaker
Generator
Distributor
Spark plugs
Starting motor
Ground
Timer
Safety spark gap
Ignition coil
Condenser
Ground
Head lamps bright button
Head lamps dim button
Horn button
Ground
Ignition Automatic Switch
Dash lamp
2 candle power; single contact 3-3½ volt;
Ammeter
Tail lamp
Combination switch
Starting motor switch
Storage battery

Automobile Electricity Wiring Diagram—D.213



1929 Whippet Light Six

CABLES REQUIRED. Here again we are giving the Cable numbers of both Ripcgloss and Aluminium armoured cables. Care should always be taken to definitely specify the correct cable numbers when supplies are needed.

HEAD, SIDE & TAIL LAMPS.	Ripcgloss.	Ripaults Cable No. R276/1	DYNAMO.	Ripcgloss.	Ripaults Cable No. R376/1
	Aluminium.	Ripaults Cable No. 276/11		Aluminium.	Ripaults Cable No. 376/11
GENERATOR.	Ripcgloss.	Ripaults Cable No. R376/1	STARTER.	Braided.	Ripaults Cable No. 536/3
	Aluminium.	Ripaults Cable No. 376/11		Aluminium.	Ripaults Cable No. 536/1

(Adot.

WHIPPET SIX

(1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-CVX-6x, 6 volt. Starting capacity is 115 amperes for 20 minutes. Lighting capacity is 5 amperes for 21 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4065. Distributor Model IG-4116-B. Breaker contacts separate .020-.024 inch. They are made of tungsten. Resurface contacts on a medium hard oilstone or with a fine, flat contact file. Ignition current is 1-3 amperes with engine running and 3.4-5 amperes with engine stopped. Distributor is semi-automatic. Manual advance is 30° (on flywheel). Automatic advance begins at 400 R.P.M. and reaches a maximum of 20° (on flywheel) at 2800 R.P.M. of the engine.

Oiling:—Put 5 drops of light engine oil in the oiler on commutator every 1000 miles. Drive end is oiled by splash from gears.

Timing:—Breaker contacts begin to separate when the piston entering power stroke reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

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

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

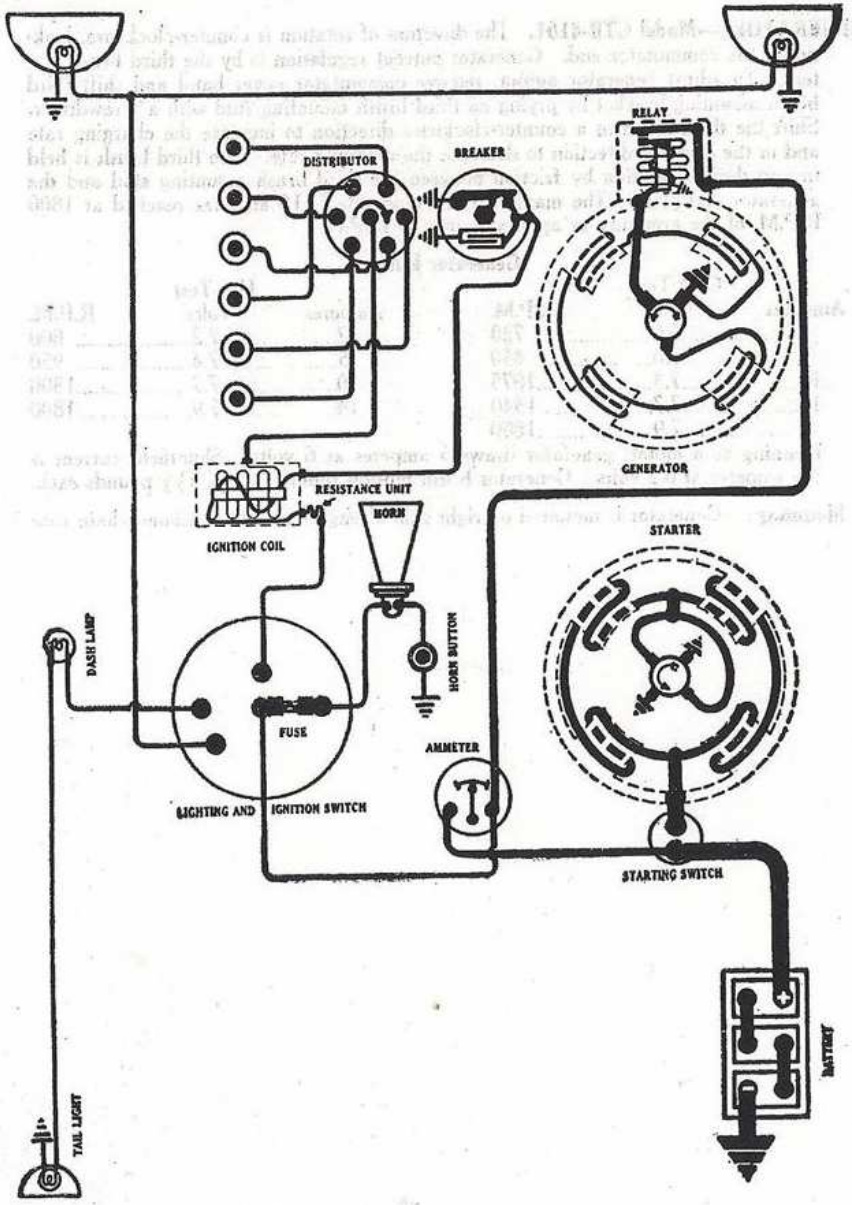
STARTER:—Model MN-4104. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end. Starter cranks the engine at 228 R.P.M. taking 160 amperes at 5.25 volts. Starter brush tension is 1¼-1½ pounds each.

Starter Data.

Torque	R.P.M.	Volts	Amperes	
0 lb. ft.	Free	5.5	45	(Without Bendix)
0 "	Free	5.5	50	(With Bendix)
.5 "	2800	5.5	100	
2.4 "	1450	5.0	200	
4.8 "	950	4.5	300	
7.2 "	650	4.0	400	
13.6 "	Lock	3.0	540	

Oiling:—Put 5 to 10 drops of light engine oil in the oiler on the drive end of the starter every month or each 1000 miles. The commutator end bearing is oilless.

GENERATOR:—Model GP-4105. The direction of rotation is counter-clockwise, looking at the commutator end. Generator current regulation is by the third brush system. To adjust generator output, loosen the commutator cover band and shift the third brush mounting plate by tapping on the third 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 any desired position by friction between the third brush mounting stud and the generator end plate. The maximum charging rate is 17 amperes at 8 volts.



WHIPPET SIX

(1927)

AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

Generator Data

Cold Test			Hot Test		
Amperes	R.P.M.	M.P.H.	Amperes	R.P.M.	M.P.H.
2	440	8	2	660	11.5
5	540	9.5	5	700	12
10	760	13	10	1200	21
14	1050	18.4			

Motoring freely, generator draws 5 amperes at 6 volts. Shuntfield current is 3 amperes at 6.2 volts. Generator brush spring tension should be 1¼-1½ pounds each.

Oiling:—Put 4 or 5 drops of light engine oil in the oiler on the commutator end of the generator every two weeks or each 500 miles. The drive end bearing is oiled by splash from the gear case.

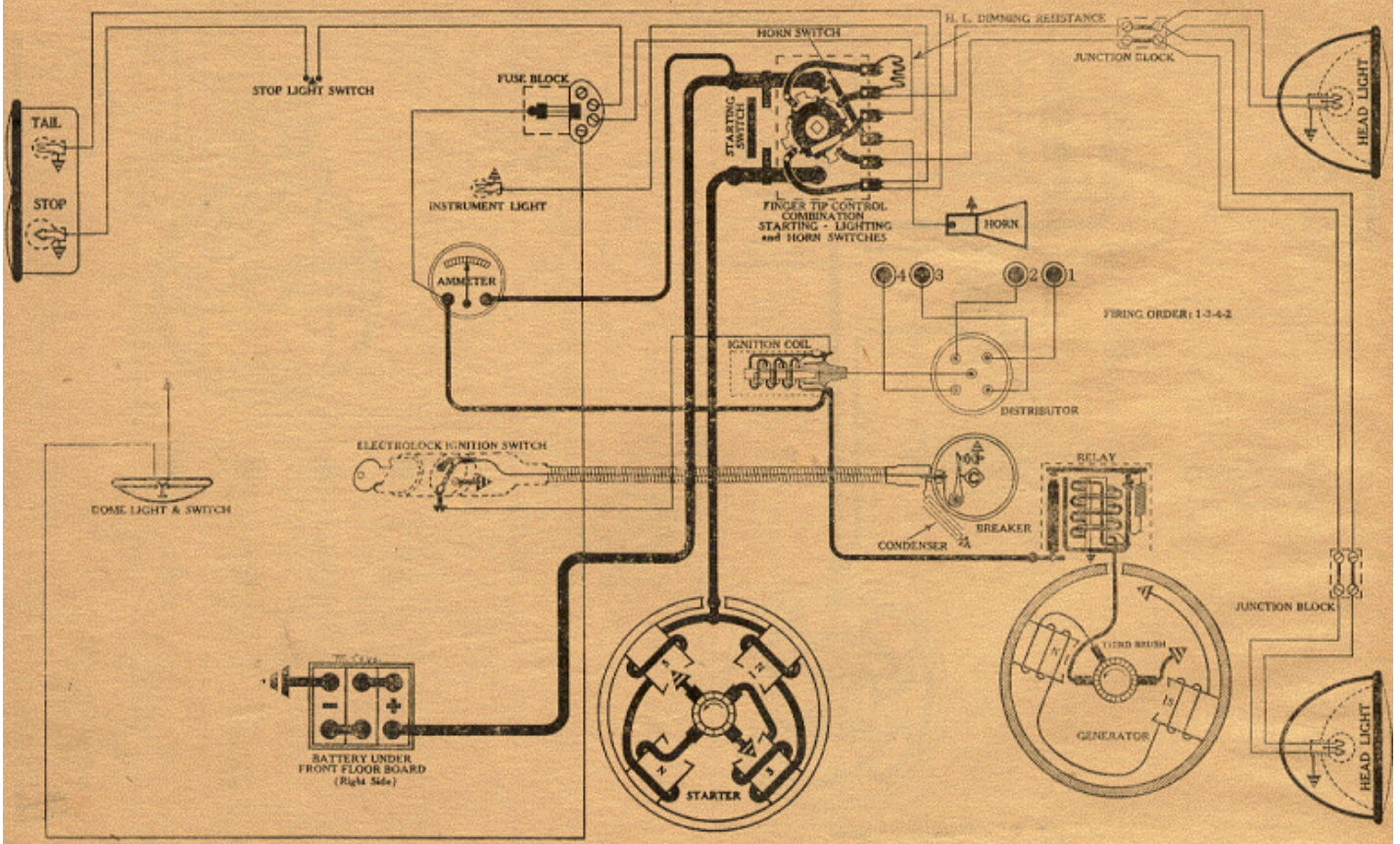
RELAY:—Model CB-4007. Relay is mounted on the generator. Relay contacts close when the voltage of the generator reaches 7-7.5 volts and open with a discharge current of ½-2½ amperes. Contacts separate .025-.035 inch; air gap between relay armature and coil core is .010-.030 inch, contacts closed.

LIGHTING.—Briggs and Stratton Switch Model 39320. Head lamps are 6-8 volt, 21 cp. S. C. Dash and tail lamps are connected in series. They are each 3-4 volt, 2 cp. S. C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.

WHIPPET

Model 96-A, 4 Cyl., (1929-30)



BATTERY

U. S. L., 3-CVX-5X-6A, 6 volts. Negative Terminal Grounded

Starting Capacity—96 amps. for 20 minutes.
Lighting Capacity—5 amps. for 17 hours.
Box—Length, 9 1/16; width, 7; height, 9¼ inches.

STARTER

Rotation, L. H., Com. End
Auto-Lite, MZ-4001

Connection to Engine—Bendix drive.
Running Free—60 amps. at 5.5 volts.
Cranking Engine—180 amps. at 5.2 volts, 200 R. P. M.
Lock Torque—10 pound-feet, 490 amps., 3.6 volts.
Brush Spring Tension—20 to 24 oz. on each.
Starting Switch—Located foot of steering column. Operated by pulling up on horn button.

IGNITION

Rotation, R. H., Top View
Auto-Lite, IGB-4020-A

NOTE: This unit is of the full automatic type; however, the spark may be retarded for starting, and on heavy grades, by pulling out on spark knob.

Breaker—Contact separation .020 to .024 inch.
Contact Spring Tension—18-20 oz.
Timing—See detailed instructions P. 1, Sec. AA.
1—Locate T. D. C. 2—Locate rotor. 3—Set spark.
Spark Plugs—⅞" Semi-Aircraft (AC type Y); Gap .025 inch.
Firing Order—1-3-4-2.
Manual Retard—14 degrees (on Flywheel).
Automatic Advance—24 degrees (on Flywheel).

Eng. R.P.M.	Degrees Advance (on flywheel)	Dist. R.P.M.	Degrees Advance (on cam)
800	0-1	400	0-.5
1200	2	600	1
2400	14	1200	7
3000	20	1500	10
3400	24	1700	12

Coil—Auto-Lite, IG-4065.
Ignition Switch—"Electrolock", Type 9-A. For theory of operation and instructions on servicing see P. 21, Sec. AA.

GENERATOR

Rotation, L. H., Com. End
Auto-Lite, GAL-4116

Performance Data—Gen. cold.

Amps.	R.P.M.	Volts	Amps.	R.P.M.	Volts
0	650	6.5	10	1075	7.3
2	720	6.6	14	1340	7.7
5	850	7.	16	1800	8.

Motoring Freely—5-5½ amps. at 6 volts.
Max. Stall Current—16-19 amps. at 6 volts.
Field Test—4.7 amps. at 6 volts across field coils in series.
Field Fuse—(None).
Brush Spring Tension—20 to 24 oz. on each.
Third Brush Adjustment—Loosen cover band. See Fig. 13, P. 7, Sec. AA.

RELAY

Auto-Lite, CB-4014

Closes—7-7.5 volts.
Opens—½-2½ amps. discharge.
Contact Gap—.025-.035 inch.
Core Gap—.010-.030 inch, contacts closed.

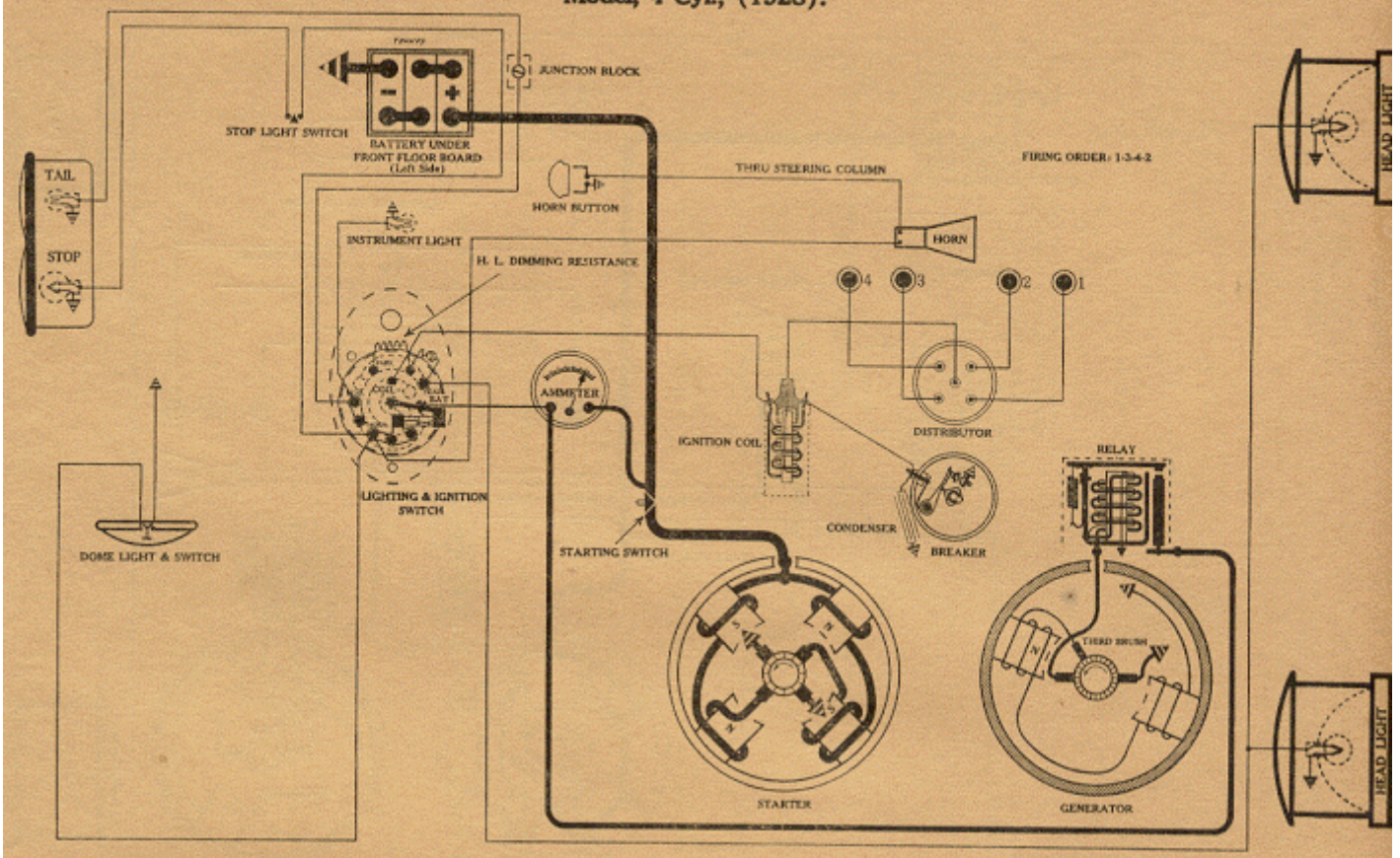
LIGHTING

Switch—Briggs & Stratton 40941 (Early 1929). Briggs & Stratton 50160 (Late 1929-30).
Location—Foot of steering column. This unit is a combination starting switch, lighting switch, and horn switch, all being controlled by horn button on steering wheel. For details of construction and instructions on servicing see P. 28, Sec. AA.
Fuses—Single 20 amp. fuse mounted on block under engine hood (left side).
Lamps—See P. 3, Sec. AA. HEAD—1110 (Bifocal); INSTRUMENT—63; DOME—63; STOP AND TAIL (Single Socket)—1158.

NOTE: This is the old style Ford headlight bulb with two filaments; make sure the S. C. P. filament burns for tail light.

WHIPPET

Model, 4 Cyl., (1928).



BATTERY

U. S. L., 3-CVX-5X-6, 6 volts. Negative terminal grounded
Starting Capacity—96 amps. for 20 minutes.
Lighting Capacity—5 amps. for 17 hours.
Box—Length, 9 1/16; width, 7¼; height, 9¼ inches.

STARTER

Rotation, L. H., Com. End
Auto-Lite, MZ-4001

Connection to Engine—Bendix drive.
Running Free—60 amps. at 5.5 volts.
Cranking Engine—180 amps. at 5.2 volts, 200 R. P. M.
Lock Torque—10 pound-feet, 490 amps., 3.6 volts.
Brush Spring Tension—1¼-1½ lbs. on each.
Starting Switch—Auto-Lite SW4001.

IGNITION

Rotation, R. H., Top View
Auto-Lite, Dist. Type IGB-4001-A

Breaker—Contact separation .020 to .024 inch.
Contact Spring Tension—18-20 oz.
Timing—See detailed instructions P. 1, Sec. AA.
1—Locate T. D. C. 2—Locate rotor. 3—Set spark.
Spark Plugs—⅞ inch regular type A; Gap .025 inch.
Firing Order—1-3-4-2.
Manual Advance—(None).
Automatic Advance—28 degrees (on Flywheel).

Eng. R.P.M.	Degrees Advance (on flywheel)	Dist. R.P.M.	Degrees Advance (on cam)
550	0-1	225	0-.5
800	4-6	400	2-3
1200	12-14	600	6-7
1800	18-20	900	9-10
2200	22-24	1100	11-12
2600	26-28	1300	13-14

Coil—Auto-Lite, IG-4065.

GENERATOR

Rotation, L. H., Com. End
Auto-Lite, GAL-4102

Performance Data—Gen. cold.

Amps.	R.P.M.	Volts
0	650	6.5
2	720	6.6
5	850	7.
10	1075	7.3
14	1340	7.7
16	1800	8.

Motoring Freely—5-5½ amps. at 6 volts.
Max. Stall Current—16-19 amps. at 6 volts.
Field Test—4.7 amps. at 6 volts across field coils in series.
Field Fuse—(None).
Brush Spring Tension—1¼ to 1½ lbs. on each.
Third Brush Adjustment—Loosen cover band. See Fig. 13, P. 7, Sec. AA.

RELAY

Auto-Lite, CB-4007

Closes—7-7.5 volts.
Opens—½-2½ amps. discharge.
Contact Gap—.025-.035 inch.
Core Gap—.010-.030 inch, contacts closed.

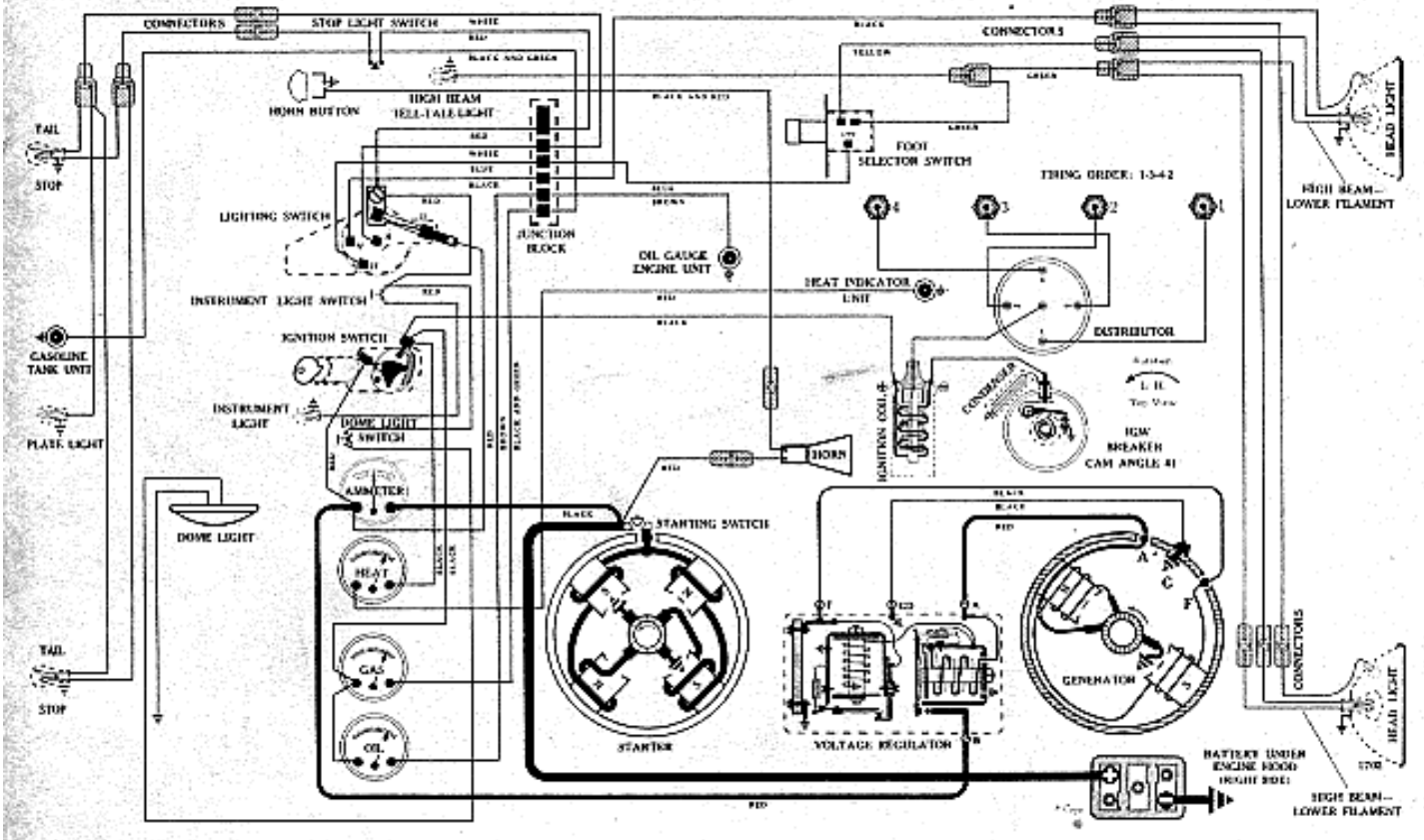
LIGHTING

Switch—Briggs & Stratton, No. 40097.
Fuses—Single 20 amp. fuse mounted vertically on switch back.
Lamps—See P. 3, Sec. AA. HEAD—1129; INSTRUMENT—63; DOME—63; TAIL—63.

OVERLAND

Engine { Bore 3-1/8 / Stroke 4-3/8

Model 39, 4 cyl., (1939)



BATTERY

U.S.L., A-13, 6 volts.
Negative Terminal Grounded.

Starting Capacity—96 amps. for 20 minutes.

Minutes of Discharge at 300 Amps., Zero Degrees F.—1.9

Lighting Capacity—3.9 amps. for 20 hours (78 amp. hour).

Case—Length, 8-7/8; width, 7; height, 8-5/8 inches.

STARTER

A-L Test 162 Rotation, L. H., Com. End
Auto-Lite, MZ-4064

Connection to Engine—Bendix Drive, Type RC10HD.

Running Free—60 amps. at 5-1/2 volts, 5000 R.P.M.

Stall Data—7.8 pound-feet, 420 amps. at 3 volts.

Brush Spring Tension—42 to 53 ounces on each (new brushes). Brush spring tension should be measured by a scale hooked under the brush spring at the bend just beyond the brush, and the reading taken at moment spring leaves the brush. The pull should be exerted at right angles to force exerted by the brush spring.

Starting Switch—Auto-Lite, SW-3737-D, mounted on starter. Switch should not close with less than 2.3 pounds pull, applied at right angles to hole in end of lever.

Armature—Auto-Lite, MZ-2089.

IGNITION

Rotation, L. H., Top View
(Two Different Distributors Used)
Auto-Lite, IGS-4007-B or IGW-4129

A-L Test 618 Auto-Lite, IGS-4007-B

(Full) Automatic Spark Advance in conjunction with Integral Vacuum Chamber)

Breaker—Contact separation .020 inch.

Cam Angle—47 degrees.

Percentage of Dwell—52%.

Contact Spring Tension—16 to 20 ounces.

Timing—Exact top dead center. Loosen screw holding flywheel inspection hole cover, located in left top side of flywheel housing, and swing cover to one side. Flywheel mark "TC-IGN" (located at exact top dead center) should register with the pointed end of inspection plate screw.

Spark Plugs—14-MM (Champion type J-8); Gap .025 inch.

Firing Order—1-3-4-2.

Vacuum Chamber (Auto-Lite, IGT-1028-ES; Test No. 614)—7 degrees advance (Dist.). Starts with vacuum of 5 inches of mercury. Requires a vacuum of 15 inches for full travel.

Vacuum Chamber Advance Table—

Inches of Mercury	Degrees Dist. Advance
5.00	Start
6.42	1
7.85	2
9.28	3
10.71	4
12.14	5
13.57	6
15.00	7

Automatic Advance—9-1/2 degrees (Distributor).

Eng. R.P.M.	Dist. R.P.M.	Degrees Advance (Dist.)
600	300	Start
852	426	1
1104	552	2
1356	678	3
1610	805	4
1862	931	5
2114	1057	6
2368	1184	7
2620	1310	8
2872	1436	9
3000 (Max.)	1500	9-1/2

Breaker Plate—Auto-Lite, IGS-2044-D (stamped with the figure 7).
Condenser—Auto-Lite, IG-2671-K.
Contact Point—Auto-Lite, IGP-33.
Breaker Lever and Point—Auto-Lite, IGP-3028-L.
Rotor—Auto-Lite, IG-1657.
Distributor Cap—Auto-Lite, IG-1324.
Flexible Lead (Insulated)—Auto-Lite, IGS-78.
Ignition Coil—Auto-Lite, IG-4090.

A-L Test 618 Auto-Lite, IGW-4129

(Full Automatic Spark Advance in conjunction with Vacuum Chamber which moves the entire Distributor.)
Breaker—Contact separation .020 inch.
Cam Angle—41 degrees.
Percentage of Dwell—40%.
Vacuum Distributor Control (Auto-Lite, VC-4007; Test No. 626)—7 degrees advance (Dist.). Starts with vacuum of 3.60 inches of mercury. Requires a vacuum of 15 inches for full travel.
Vacuum Chamber Advance Table—

Inches of Mercury	Degrees Dist. Advance
3.60	Start
5.22	1
6.85	2
8.48	3
10.11	4
11.74	5
13.37	6
15.00	7

Automatic Advance—9-1/2 degrees (Distributor).

Eng. R.P.M.	Dist. R.P.M.	Degrees Advance (Dist.)
600	300	Start
852	426	1
1104	552	2
1356	678	3
1608	804	4
1862	931	5
2114	1057	6
2366	1183	7
2618	1309	8
2870	1435	9
3000 (Max.)	1500	9-1/2

Condenser—Auto-Lite, IGB-1025. Capacity .20 to .25 microfarads.
Contact Point—Auto-Lite, IGP-33.
Breaker Lever and Point—Auto-Lite, IGW-3028.
Rotor—Auto-Lite, IGB-1239.
Distributor Cap—Auto-Lite, IGB-1241.
(All other data the same as IGS-4007-B Distributor.)

GENERATOR

Rotation, L. H., Com. End
Auto-Lite, GCJ-4811-A

Performance Data—Gen. cold.

Amps.	R.P.M.	Volts
0	825	6.20
2	870	6.38
4	915	6.55
6	960	6.70
8	1020	6.89
10	1075	7.05
12	1135	7.22
14	1200	7.38
16	1270	7.53
18	1340	7.70
20	1430	7.89
22	1545	8.05
24	1720	8.20
25	1850 (Max.)	8.30

Motoring Freely—4.0 to 4.4 amps. at 6 volts.
Max. Stall Current—28 to 30 amps. at 5.2 volts.
Field Test—1.9 to 2.1 amps. at 6 volts.
Brush Spring Tension—53 ounces max. on each (new brushes).
Armature—Auto-Lite, GCJ-2006-F.
Third Brush Adjustment—Loosen cover band. Shift third brush by hand. Mounting plate held in any position by friction clamp washers. In no case should third brush be adjusted nearer than 1 commutator bar to the insulated main brush. 3 bars (max.) is approximately correct.

RELAY-REGULATOR

Auto-Lite, VRD-4004-A Neg. Ground

A combination of Cut-Out Relay and Vibrating Point Voltage Regulator.

Cut-Out Relay

Resistance of Voltage Winding—35 to 39 ohms.
Points Close—6.4 to 7.0 volts.
Points Open—.5 to 3.0 amps. discharge.
Contact Gap—.015 inch minimum (points open).
Armature Air Gap—.034 to .038 inch (points open).

Voltage Regulator

Resistance of Voltage Winding—10.4 to 11.2 ohms.
Resistance Unit—Auto-Lite, TC-51-T, marked "20"; Ohms 19 to 21.
Armature Air Gap—.0595 to .0625 inch (the distance between core and underside of armature when contacts just open).
Contact Point Gap—.010 to .020 inch (armature pressed down against stop pin).
Operating Voltage—7.3 to 7.6 (70° F.).

LIGHTING

Switch—H. A. Douglas Mfg. Co., No. 5400-C.
Location—Behind instrument board.
Fuse—Single 20 amp. fuse (type SFE-20) on switch back. Protects all lighting circuits.
Foot Selector Switch—H. A. Douglas Mfg. Co., No. 5530.
Lamps—HEAD--2320; PARK--55; INDICATOR--51; INSTRUMENT--51; DOME--63; LICENSE PLATE--63; STOP AND TAIL--1158.

OVERLAND

MODEL 93 (1925-26)
AUTO-LITE GENERATING, STARTING AND LIGHTING SYSTEM
AUTO-LITE IGNITION

BATTERY:—U.S.L. Type 3-CVX-5X. 6 volt. The starting capacity is 96 amperes for 20 minutes. The lighting capacity is 5 amperes for 16.8 hours. The negative (—) terminal is grounded.

IGNITION:—Coil Model IG-4060. Distributor Model IG-4057-A. Breaker contacts separate .018 inch. They are made of tungsten. When the condition of the contacts affects the ignition, remove and resurface on a medium hard oilstone.

Oiling:—Turn up the grease cup on the distributor shaft two turns every month or each 1000 miles if the car is driven more than 1000 miles in a month.

Timing:—Breaker contacts begin to separate when the piston entering power stroke is 20° before top dead center (measured on the flywheel) with the spark control lever in the fully advanced position or when the piston reaches top dead center with the spark control lever and breaker assembly in the fully retarded position.

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

Spark Plugs:—Spark plug diameters are 7/8 inch. Gaps are .025 inch.

STARTER:—Model MN-4104. Starter is connected to the engine through a Bendix drive. The direction of rotation is counter-clockwise, looking at the commutator end.

Starter Data.

Torque	R.P.M.	Volts	Amperes
0 lb. ft.	4000	5.	60
.6 "	2700	5.5	100
2.9 "	1500	5.	200
5.5 "	850	4.5	300
8.2 "	410	4.	400
17.6 "	Lock	4.	600

Oiling:—Put 4 or 5 drops of light engine oil in the starter oilers every month or each 1000 miles if the car is driven more than 1000 miles in a month.

GENERATOR:—Model GP-4103. The direction of rotation is counter-clockwise, looking at the commutator end. Current regulation is by the third brush system. To adjust the charging rate, loosen the generator cover band and the hexagon headed nut holding the third brush mounting arm and shift the third brush. Shifting the brush in the direction of armature rotation increases the charging rate and in the opposite direction decreases the charging rate.

Generator Data.

Cold Test			Hot Test		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	7.	375	0	6.5	475
4	7.2	500	4	6.8	640
8	7.4	650	7	7.4	800
12	7.8	875	10	7.6	1200
16	8.	1600	10.6	7.8	1540
13	7.8	2400	8.2	7.8	2400

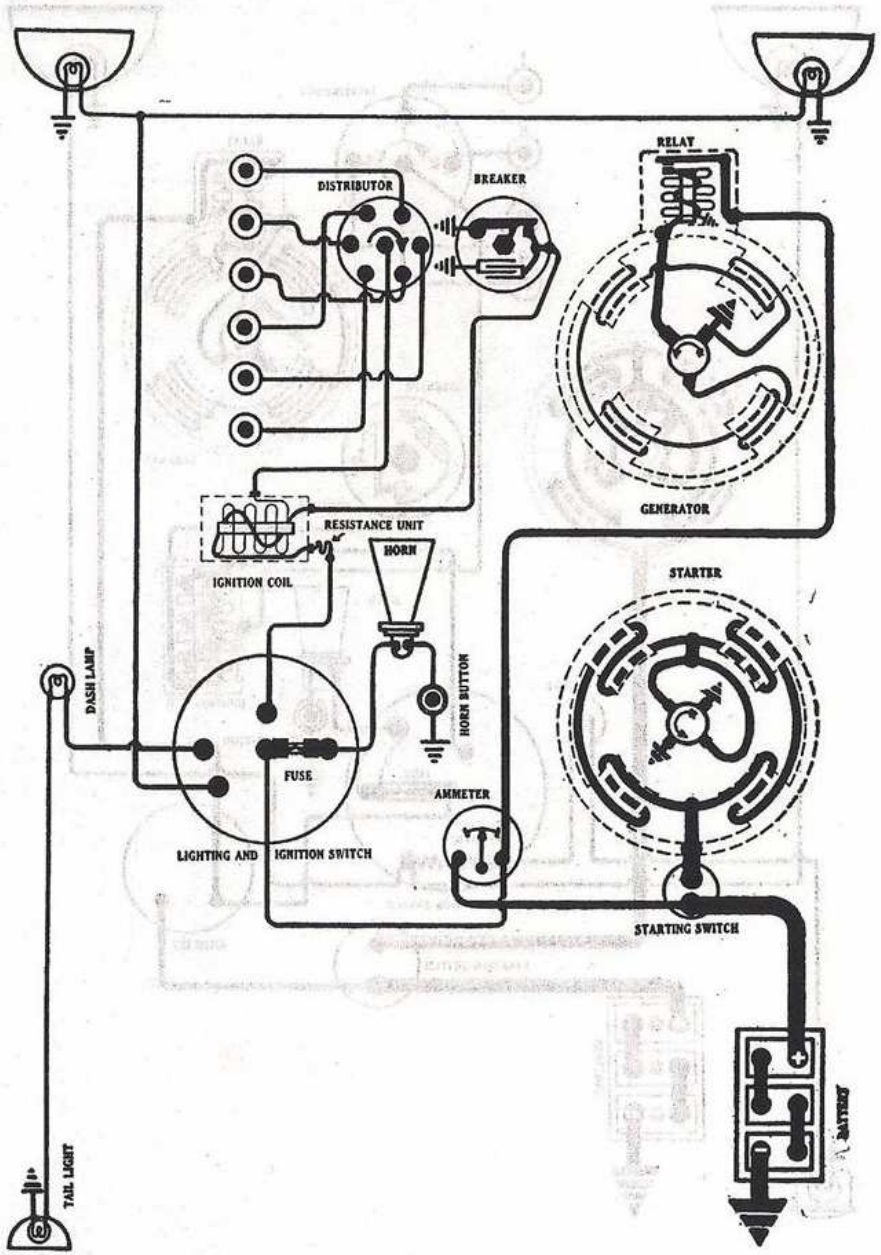
Motoring freely, generator draws 4.5 amperes at 6 volts. Shunt field current is 2.2 amperes at 6 volts.

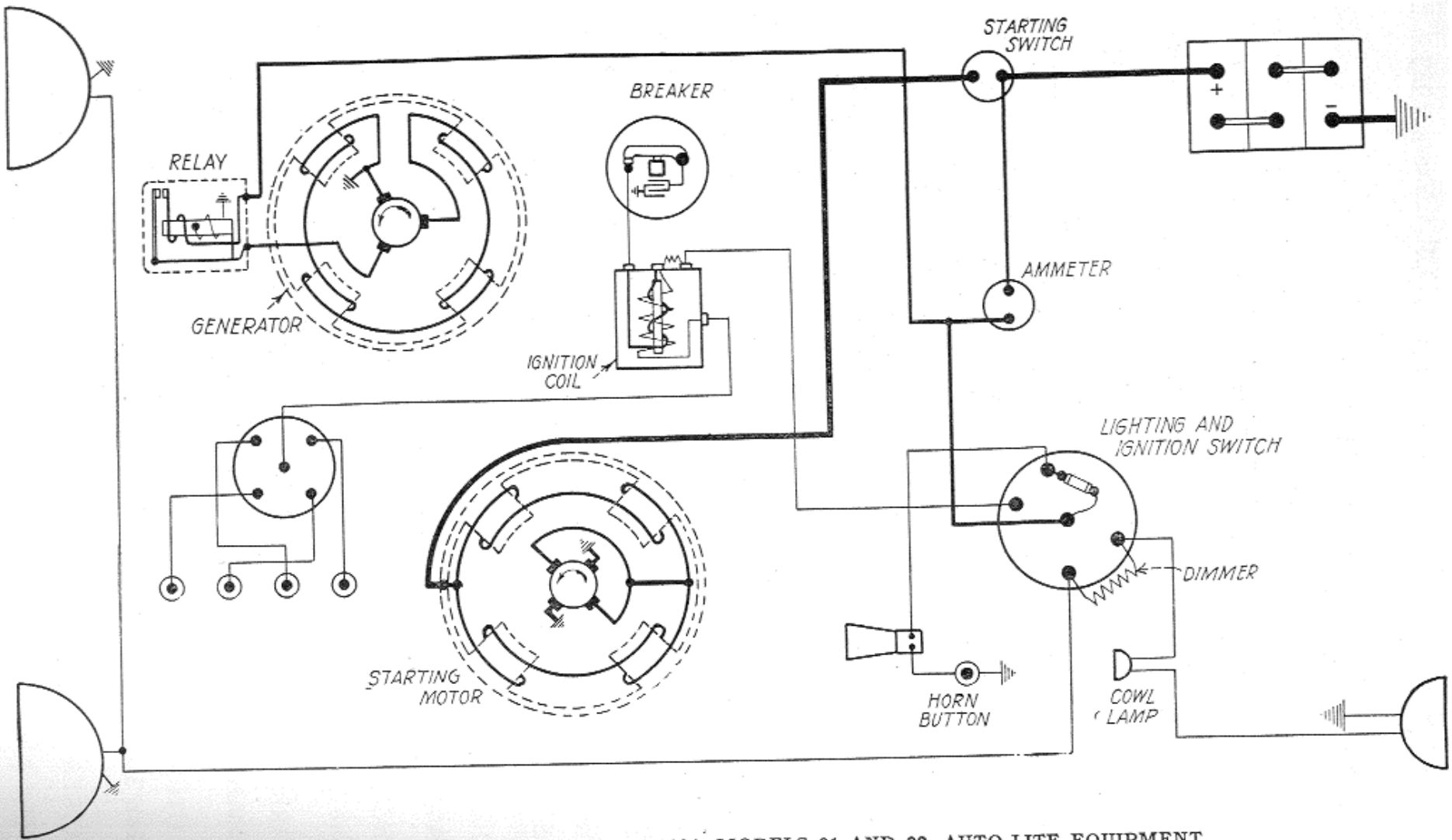
Oiling:—Put 4 or 5 drops of light engine oil in each of the generator bearing oilers every two weeks or each 500 miles if the car is driven more than 500 miles in two weeks.

RELAY:—Relay contacts close at 350 R. P. M. of the generator with a generator voltage of 7.5 volts and open at 250 R.P.M. with a discharge current of 1-2 amperes. Relay contacts separate .025-.035 inch. Air gap between relay armature and coil core is .010-.015 inch, contacts closed.

LIGHTING:—Briggs and Stratton Switch Model 39320. Head lamps are 6-8 volt, 21 cp. S.C. Dash and tail lamps are connected in series. They are each 3-4 volt, 2 cp. S.C.

FUSES:—Generator field fuse is 5 amperes. Lighting fuse is 20 amperes.





OVERLAND WIRING DIAGRAM, 1923-1924, MODELS 91 AND 92, AUTO-LITE EQUIPMENT

OVERLAND Model 91 & 92 Year 1923-24

Auto-Lite Starter & Generator Auto-Lite Ignition

GENERATOR Model: G P | Regulation: Third Brush | Max. Chg. rate: 15 Amps.

Amps. Cut-in	Volts Warm Test	R.P.M.	Amps. Cut-in	Volts Cold Test	R.P.M.
0	7.05	475	0	6.5	390
10	8.0	1200	15	7.5	1200

RELAY Model: G P | Closes: 9 MPH | Opens: 7 MPH | Contact Gap: .025-.035 | Air Gap: .012

STARTING Motor Model: M G | Drive: Bendix | Rotation: Anti-Clockwise

BATTERY U S L Type: CDM-311-X | Capacity: 6 Volts 85 Amps. | Bat. to Frame Con.: Negative

IGNITION Coil Model: I G | DISTRIBUTOR Model: I G | Breaker Contact Gap: .018

FIRING ORDER: 1-3-4-2 | Ignition Timing: 2½" before TDC | SPARK PLUG Size: 1/2" Gap: .025

LIGHTING: Single Contact | Headlamps: 6 V 21 C.P. | Dash & Tail: 3 V 2 C.P. | Side Lamps: 6 V 4 C.P.

ENGINE Bore 3½ Stroke 4 | Cylinder No. 4 L Head | Valve tappet clearance Inlet .003 Exhaust .004

CARBURETOR: Tillotson | COOLING: Thermo | PISTON RING: 3½ X 3/16 | OILING SYSTEM Cap 6 qt. Type: C S

CLUTCH: Plate 8" | REAR AXLE: Semi | Gear Ratio: 4.50 | TRANSMISSION: Own

BRAKES Rear wheel | Position: Trans. or wheel W | Brake lining width & length: Service 1½ X 31½ Hand 1¼ X 10

Overland & Whippet Timken Bearing Data

OVERLAND	Country Club 90 R-75-76 1916-7-8-9		Model 4-T 1919-20-1-2		Model 91 1923		Models 91 92 & 94 4-Cyl. 1924-5-6-7	
	Cone	Cup	Cone	Cup	Cone	Cup	Cone	Cup
Front Wheel Inner	1985	1930	256	2520	256	2520	14131	14274
,, ,, Outer	1351	1330	1751	1730	1751	1730	09074	09194
Differential R.H.	277	274	358	354	358	354	358	354
,, L.H.	277	274	358	354	358	354	358	334

OVERLAND—contd.	6-Cyl. Model 93 1925-6		1 Ton Truck 1925-6-7		Model 93-A 6-Cyl. Whippet 1927		Model 96 4-Cyl. Whippet 1927-8	
	Cone	Cup	Cone	Cup	Cone	Cup	Cone	Cup
Front Wheel Inner	2581	2530	2581	2520	14132	14274	14132	14274
,, ,, Outer	1751	1730	1751	1730	09074	09194	09074	09194
Steering Pivot					T76		T76	
Rear Wheel Inner			420	412			2790T	2729
,, ,, Outer			319	313				
Differential R.H.	358	354	275	2720	358	354	344	333
,, L.H.	358	354	276	2720	358	354	344	333
Bevel Pinion Front			275	2720			2687	2631
,, ,, Rear			3379	3320			2558	2523

OVERLAND—contd.	"Manchester" 25/30 & 30/35 Cwt. 1928-9		Whippet Six Model 98 1928 Model 98A Superior Whippet 6-Cyl. 1929		Model 63 1928		Superior Whippet 4-Cyl. Model 96A 1929	
	Cone	Cup	Cone	Cup	Cone	Cup	Cone	Cup
Front Wheel Inner	419	412A	14132	14274	14132	14274	14132	14274
,, ,, Outer	2558	2523	09074	09194	09074	09194	09074	09194
Steering Pivot			T76		T76		T76	
Rear Wheel Inner			2790T	2729	14137	14274	2790T	2729
,, ,, Outer					14137	14274		
Differential R.H.	377	3720	344	333	358	354	344	333
,, L.H.	377	3720	344	333	358	354	344	333
Bevel Pinion Front			26112	26274	26112	26274	2687	2631
,, ,, Rear			3193	3120	3193	3120	2558	2523
Transmission :— Main Shaft Front ...							19138	19283
,, ,, Rear							1986	1930

Scan courtesy of Auckland Vintage Car Club Library – John Stokes

For detailed bearing specifications, please refer www.timken.com

Please note that the 2790T (obsolete) is designed to fit on tapered axle shaft and is not the same as 2790 designed to fit a straight shaft.

Dixie Magneto

This is a form of the inductor type magneto. The coil is wound around a stationary core. The field has two movable pole pieces which rotate past the ends of this core, thus reversing the direction of magnetism and producing a high tension current by the same elementary process as in the ordinary shuttle wound armatures.

Breaker contacts should open .018 in. to .020 in. Clean contacts with gasoline whenever necessary. If contacts are badly burned or pitted, resurface them with a fine, flat, jeweler's file or a piece of worn No. 00 sandpaper. To remove breaker, first take off breaker cover, remove screw fastening primary cable to magneto, take out the four screws holding breaker to magneto, then remove breaker. Spark gap should be .020 in. to .025 in. Breaker contacts should open when the rotating pole piece is .015 in. to .035 in. past the tip of the stationary pole piece, measured in the direction of rotation of the armature. This setting may be determined with a buzzer connected as shown in Figure 2. The entire coil structure is moved with the breaker mechanism each time the spark is retarded, thus the above position is maintained at all degrees of advance or retard, producing a spark of equal intensity at all positions.

The bearings of magneto are provided with oil cups. These cups should each be filled twice before the magneto is run the first time, and similarly oiled thereafter as follows: On pleasure cars, every 1,000 miles; on trucks, every 500 miles; on aeroplanes, every 25 hours of operation; on tractors, motors boats, and stationary engines, every 20 hours of actual operation. The oil cup on top of the distributor should be filled twice and two drops of oil put in the oil cup at the driving end. Use good light machine oil.

For use on large aeroplane engines, where starting with ordinary ignition system would be difficult, a special starting magneto, known as the Dixie 11-S, is provided. The external wiring diagram of this system is shown in Figure 3 and the internal diagram in Figure 4. The starting magneto is arranged to be turned by hand, or by a gear engagement, to run several times as fast as the service magnetos. It has no high tension winding, but has a primary winding and breaker similar to the ordinary Dixie magneto. When the contacts of the service magneto are closed, the starting magneto has no effect, but when the service magneto contacts open, the starting magneto winding is in series with the primary of the service magneto, thus a vibrating spark is produced in the spark gap.

A simple dual starting system is described on Plate No. 51.

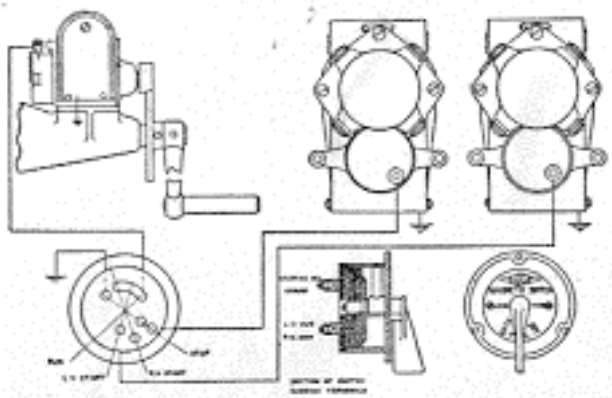


Fig. 3—Wiring diagram of Dixie 11-S starting magneto, with control switch and two service magnetos.

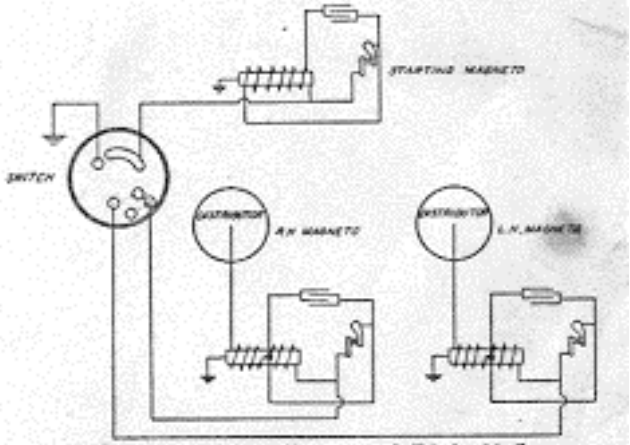


Fig. 4—Internal wiring diagram of Dixie 11-S starting magneto, control switch and two service magnetos.

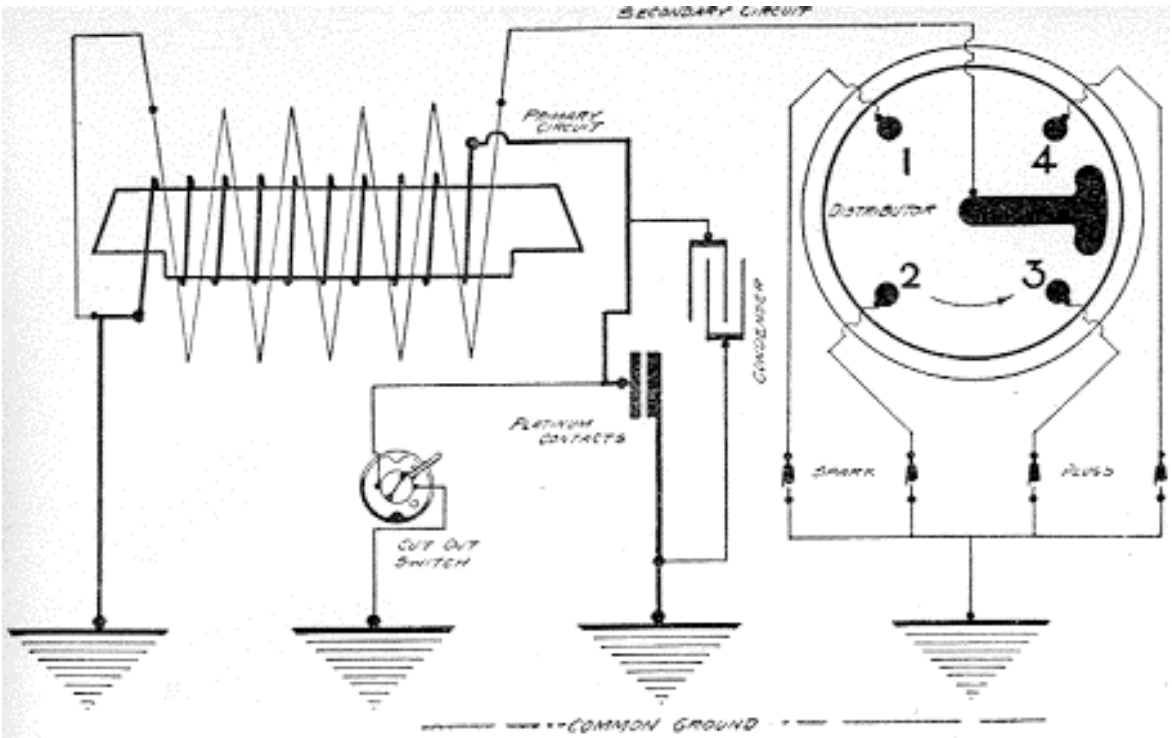


Fig. 1—Internal Wiring Diagram.

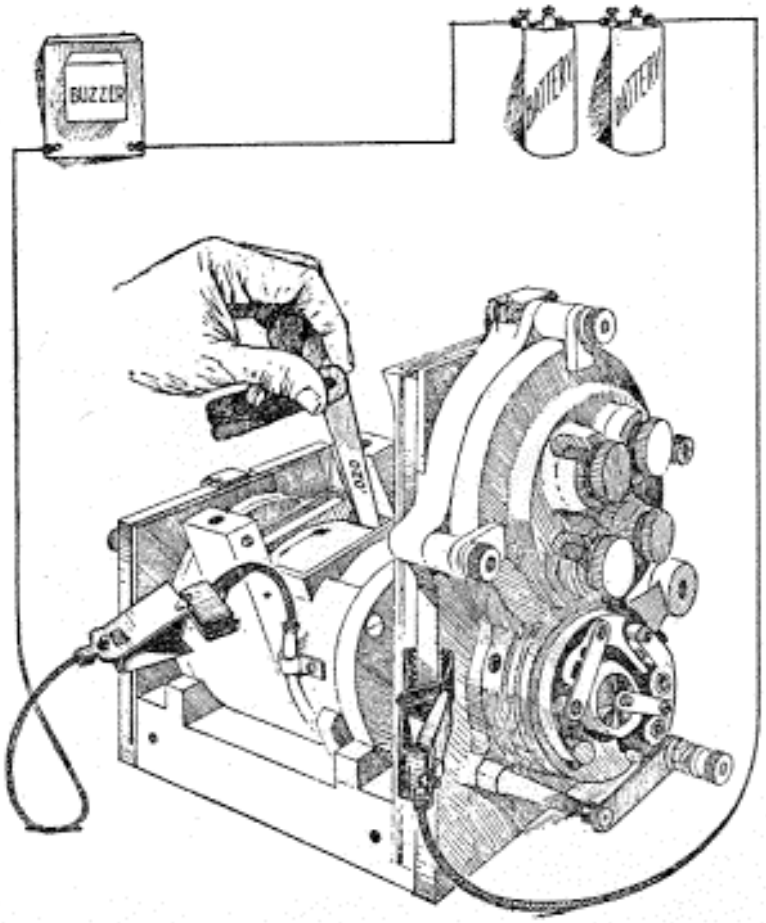


Fig. 2—Method of connecting buzzer to magneto primary circuit, for accurately setting the relation of contact opening, to rotor position.

Overland 75

Auto-Lite Two-Unit Starting and Lighting System

Dixie Magneto Ignition

Storage battery is 6 volt, 75 ampere-hour. It will supply all the lights bright for 10 hours or all lights, head dim, for 30 hours.

Lubricate magneto every 1,000 miles by putting 1 or 2 drops light oil in holes provided. Break occurs when mark 1-4 UP on flywheel is 1¼ in. past indicator, spark fully retarded. Firing order is 1, 4, 3, 2.

Starter is connected to engine by Bendix gear.

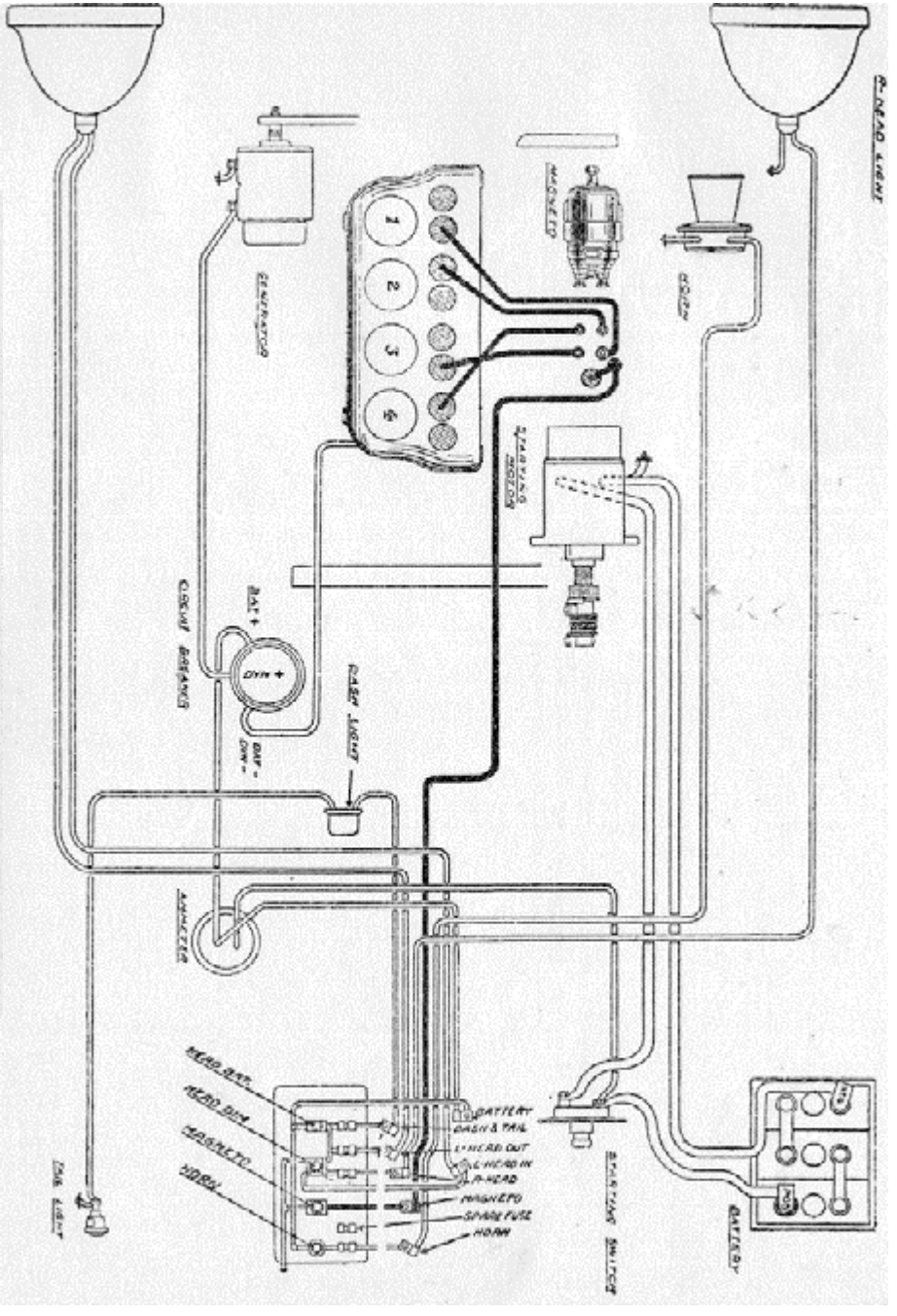
Ammeter shows rate of charge or discharge.

Generator chain driven from crank shaft. Ball bearings are provided. They are packed with grease. Oil with 1 or 2 drops of oil every 1,000 miles. Voltage regulation is by reverse series field. Both brushes must be insulated from frame. Relay closes at 7½ miles per hour. Maximum output of 14 amperes is reached at 20 miles per hour. Output at 15 miles per hour is 10 amperes. Generator must be short circuited if it is to be run with battery disconnected.

Combined ignition and lighting switch is on steering column. (See Plate No. 7.)

All fuses are 20 amperes.

Should the car be hard to start on the magneto, a very small amount of labor will change the magneto to a dual type. To make this change, remove the brass grounding clip which connects the coil winding to the frame of the magneto. Then solder a piece of wire to the upper terminal and run this wire to the negative terminal of the starting switch, taking care to insulate it from the magneto frame and the frame of the car. A ground in this circuit will cause the magneto to fail. When the starting switch is closed the magneto will operate as a dual type, and when the switch is opened it will operate as an independent type, as before the change was made.



Overland

Model 79B (1914) (Serial Nos. 1-45006)
Gray and Davis Starting and Lighting System

Battery.—Battery is 6 volt, 85 ampere-hour. The positive (+) terminal is grounded at the starting motor.

Ignition.—Breaker contacts should separate .025 inch. Should they become badly burned or pitted, resurface with a very fine flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Timer contacts should begin to separate when the mark "U-P 1 and 4" on the flywheel is 1-3/16 inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .020 inch to .025 inch.

Oiling.—Put 2 or 3 drops of light machine oil in each of the magneto oilers every two weeks. At the same time put a very small amount of vaseline on the cam, applying with a toothpick. If car is driven more than 500 miles in two weeks, these attentions must be given every 500 miles.

Starter.—Starter is chain connected to the engine crankshaft. There is an overrunning clutch to prevent engine driving starter. Starter should take 100 amperes at 6 volts when armature is revolving at 3600 R. P. M. Greater current indicates damp, grounded or short circuited windings or commutator bars, or tight bearings. Discharged, dry, or sulphated battery, defective battery connections, defective switch contacts, defective starter connections, dirty commutator, high mica, dirty or sticking brushes, defective connections between armature coils and commutator bars or open circuits are the chief causes of low speed and low current. The clutch is shown in cross section in Fig. 2, Page 188. To disassemble clutch, first remove screws "Z", then remove screws "D", take off retainer "C", remove nut and cotter pin "G", take off retaining washer "X", remove screws "F" remove entire clutch mechanism in direction indicated by arrow "J", remove clutch center "A", remove ball bearing "S", remove ball bearing seat "W" and remove retaining Plate "E".

Oiling.—Bearings are packed with grease. They should be cleaned out and repacked with grease every six months. Put several drops of light engine oil in each of the clutch oilers every week.

Generator.—Generator regulation is by speed regulating governor. As the armature shaft rotates, the weights are thrown out from the center, partially overcoming the spring pressure, thus lessening the friction between the driving and driven discs. As this action is directly proportional to the speed, the armature speed and voltage are held practically constant after a certain predetermined rate is reached. The clutch should be so adjusted that the armature will be driven at 1250 R. P. M., engine running at the equivalent to 10 miles per hour car speed. Generator should deliver 8 amperes at 6.5 volts when running at this speed (1250 R. P. M.). To adjust regulator, first remove cover (No. 1, Fig. 1), then loosen screw (No. 4, Fig. 3) one full turn. Then insert two screwdrivers on opposite sides of shaft, just back of block (See Fig. 4), compress spring and tighten set screw. Bringing governor springs up 1/16 of an inch will increase output 2 amperes. Engine and generator should be normally warm from operation when governor is adjusted. Generator and governor are shown in cross section in Fig. 1. As these machines have all been in use for a number of years, the governor parts on some machines have worn out, or are otherwise in an unsatisfactory condition. If it is not desired to keep up the governor, the machine can easily be changed into a reverse series field regulated type. As machine is built, it charges the battery as a straight shunt generator, compounding only when lights are turned on, the current through the series field tending to increase the output.

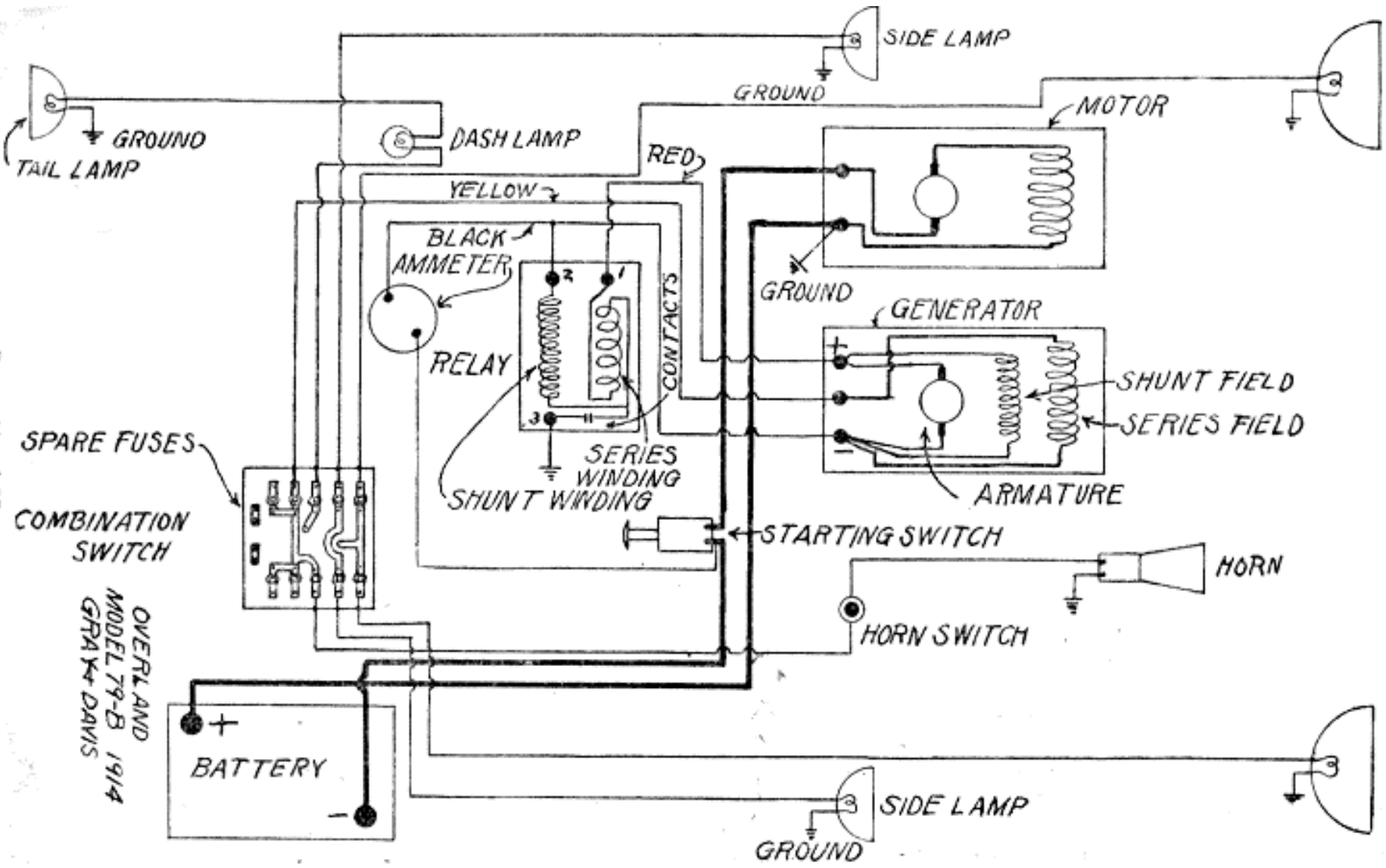

SIDE LAMP
GROUND
MOTOR
GROUND
TAIL LAMP
DASH LAMP
RED
YELLOW
BLACK
AMMETER
RELAY
CONTACTS
SERIES
WINDING
SHUNT WINDING
GROUND
GENERATOR
SHUNT FIELD
SERIES FIELD
ARMATURE
SPARE FUSES
COMBINATION
SWITCH
STARTING SWITCH
HORN
HORN SWITCH
OVERLAND
MODEL 79-B 1914
GRAY & DAVIS
BATTERY
SIDE LAMP
GROUND

PLATE No. 187

Connections of machine as originally wound are shown in Fig. 5. To make the change it will be necessary to provide a means of connecting the armature permanently to the driving shaft. Then remove the series field lead from the negative terminal and connect it to terminal A (Fig. 6). The central post now becomes the positive terminal of the generator, and the lead to the series winding of the relay is changed accordingly. The lead to the lighting switch should then be moved to the negative terminal. It will be noted that there are no external connections to the terminal A. A resistance unit must then be inserted in the shunt field circuit. Use iron resistance wire for this resistance. The exact amount is best determined by experiment as it will vary with the size and kind of wire used. Increasing the length or decreasing the size will decrease the output. Decreasing the length or increasing the size will increase the output. The turns of the coil must be separated so that no two turns touch and well insulated so that it cannot "ground" on any of the metal parts of the machine. It must be secured firmly in place so that it cannot move about due to road shocks. Charging rate should be 3 to 7 amperes at, or more than, 12 miles per hour, lamps off, depending on the state of charge of battery being high when battery is badly discharged and low when battery is nearly or fully charged. Relay should close at 10-12 miles per hour. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them and adjusting before again putting into service.

Oiling.—Oil the driving chain well and put several drops of light engine oil in each of the bearing and clutch oilers every two weeks. If car is driven more than 500 miles in two weeks the oiling must be done every 500 miles.

Lamps.—Head lamps are 6-8 volts, 15 cp. Side lamps are 6-8 volts, 4 cp. Dash and tail lamps are in series. They are each 3-4 volts, 2 cp. All other lamps are 6-8 volts, 4 cp. Single contact base is used on all lamps.

Fuses—Lighting fuses are 10 ampere.

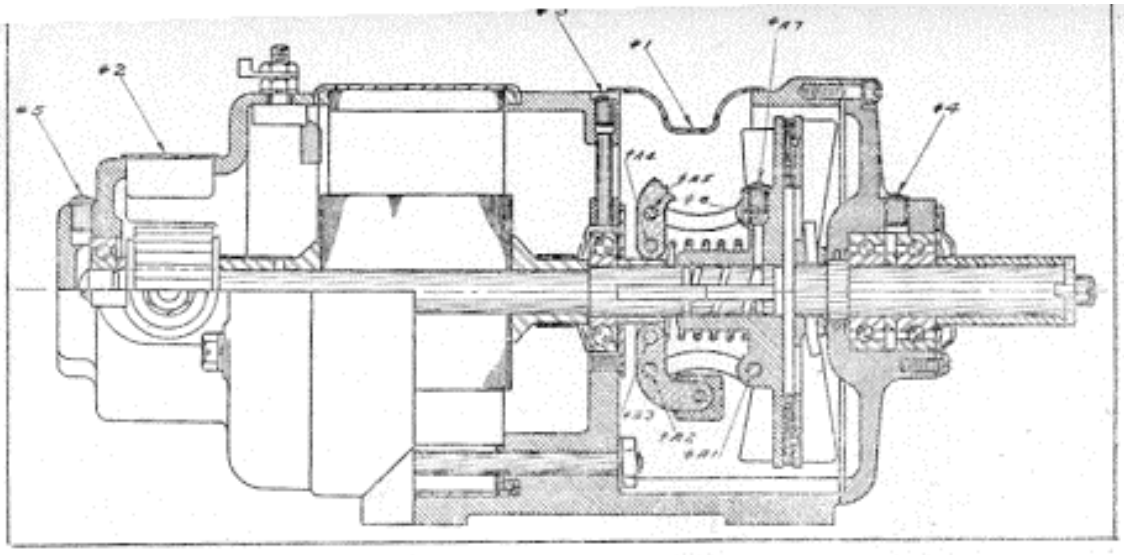


Fig. 1

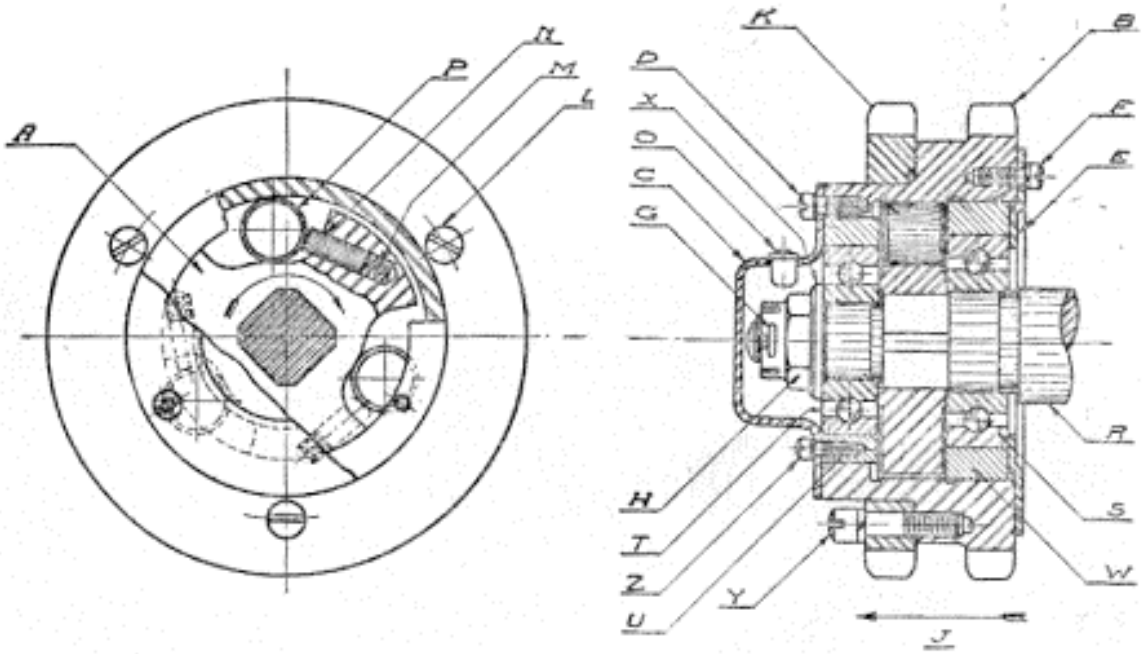


Fig. 2

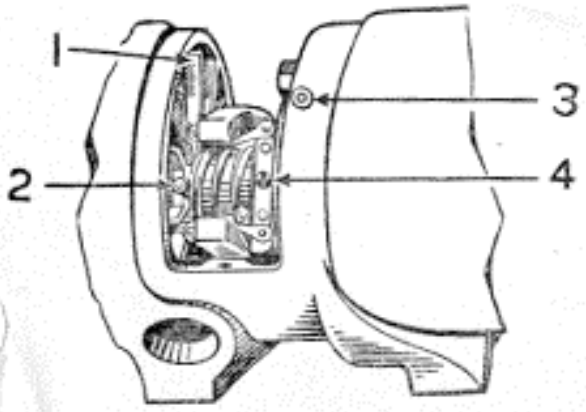


Fig. 3

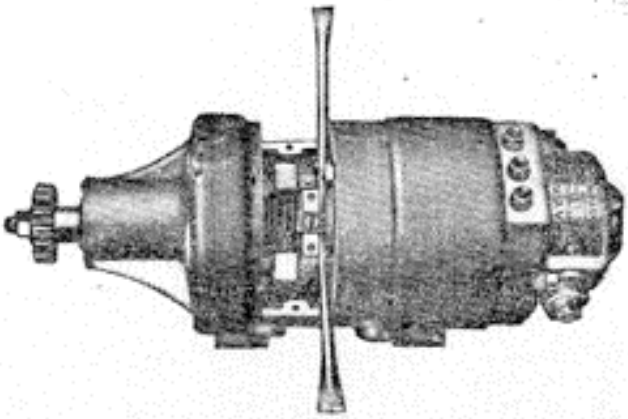


Fig. 4

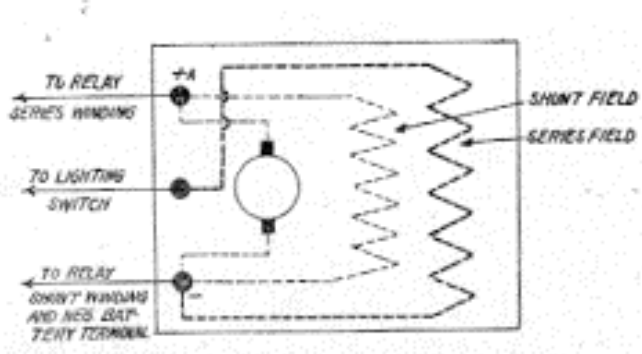


Fig. 5

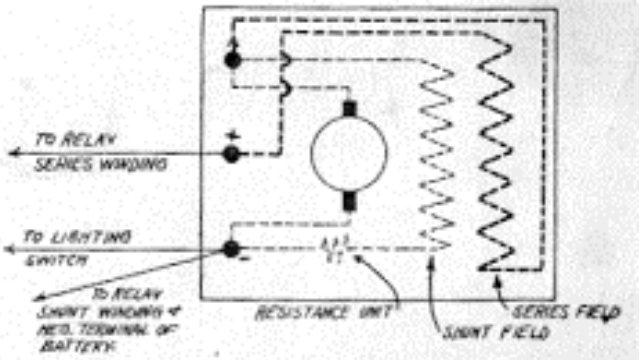


Fig. 6

Overland

Models 69 and 71 (1913)
Auto-Lite Lighting System
Remy Magneto Ignition

Battery.—Battery is 6 volt, 80 ampere-hour. The two wire system is used.

Ignition.—Magneto breaker contacts should separate .018 inch to .022 inch. Should they become badly burned or pitted, affecting the ignition, resurface with a very fine, flat jeweler's file or a strip of worn No. 00 sand paper.

Timing.—Contacts should begin to separate when the top dead center mark "U. P. 1 and 4" on the flywheel is 1-3/16 inches past the indicator, spark control lever and breaker assembly in the fully retarded position.

Firing Order.—The firing order is 1, 3, 4, 2.

Spark Plug Gaps.—Spark plug gaps should be .020 inch to .025 inch.

Oiling.—Put 4 or 5 drops of light machine oil in each of the magneto bearing oilers every month. At the same time put a very small trace of vaseline on the fiber bumper of the contact arm, applying with a toothpick. If car is driven more than 1000 miles in a month these attentions must be given every 1000 miles.

Starter.—These cars were not equipped with electric starter as standard equipment. If car possesses electric starter, it has been added by the owner.

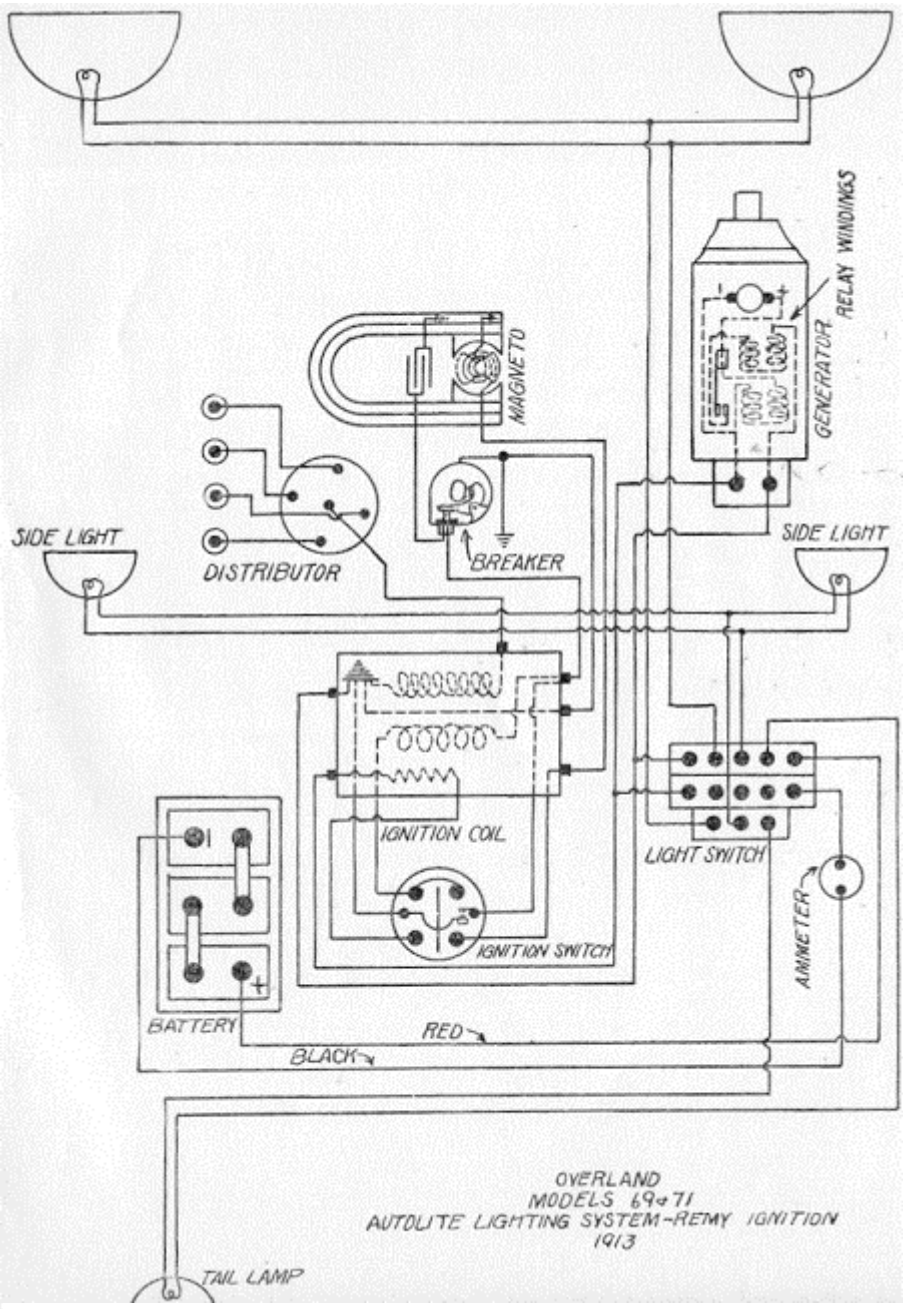
Generator.—The generator is of the permanent field type. Output regulation is by a mechanical governor. With proper adjustment of the governor the maximum armature speed should be 1850 R. P. M., and the output 12 amperes. The generator should deliver 5 amperes at 1100 R. P. M., and 10 amperes at 1620 R. P. M. If output falls considerably below 12 amperes, first clean out any oil or grease which may have collected within the governor drum. If that does not increase the output, move the weights on the governor arm inward until the desired output is obtained.

Oiling.—Generator bearings are packed with soft cup or ball bearing grease. They should be thoroughly cleaned out and repacked with grease every six months.

Relay.—Relay is mounted under the arch of the generator magnets. Relay should close at 800 R. P. M. of generator armature. Charging current should be .5 to 1.5 amperes at closing, and discharge current 0 to 1 ampere at opening of relay contacts. The relay may be removed from the generator for adjustment by removing the brush covers, taking the leads off the brush connections, taking out the screws in the end plate that carries the generator terminals, and then drawing the relay and the brush leads out from under the magnets. Clean relay contacts by drawing a piece of unglazed paper between them. If badly burned or pitted, resurface with a piece of well worn No. 00 sand paper, drawing a piece of unglazed paper between them to remove all grit. Adjust before again putting into service.

Lamps.—Head lamps are 6-7 volt, 5 cp. Side lamps are 6-7 volt, 4 cp. Dash lamp is 6-7 volt, 2 cp. Tail lamp is 6-7 volt, 2 cp.

Model Number.—Generator is No. C-60.



Bendix Rules: Important

. When the shoe operating **cam** has a long and a short side, **long** side (side with greatest lift) always operates the **primary** shoe as shown in Fig. N29I.

Correct cam installation on **double anchor** Duo-Servo models is as follows: with both shoes against their **anchors** and the crankpin **central** between anchor pins, the **center** cam block should contact the **primary** shoe and the **outer** block the secondary shoe. On models with self-aligning cams (super servo), correct cam position is as shown in Fig. N15, Page 50.

2. The **primary** shoe may be identified as the one that is carried **away** from the cam (or wheel cylinder), due to drum rotation when brakes are applied, car going **forward.**

3. The **secondary** shoe on **two-shoe** models may be identified as the one that is carried **toward** the cam (or wheel cylinder), due to drum rotation when brakes are applied, car going **forward.**

4. The **secondary** shoe on **three-shoe** models is the **center** one of the three shoes. Fig. N291.

5. On some two-shoe models the secondary shoe is stamped with an "S" and the primary with a "P" as shown in Fig. N29D, Page 58.

6. **Two** shoe-to-anchor **springs** are used on all **single anchor** Duo-Servo brakes **except** tho hydraulically actuated and those with non-a justable anchors as on Willys models 66D, 96 97D, 98D, 90 and 95 which use only one sprin

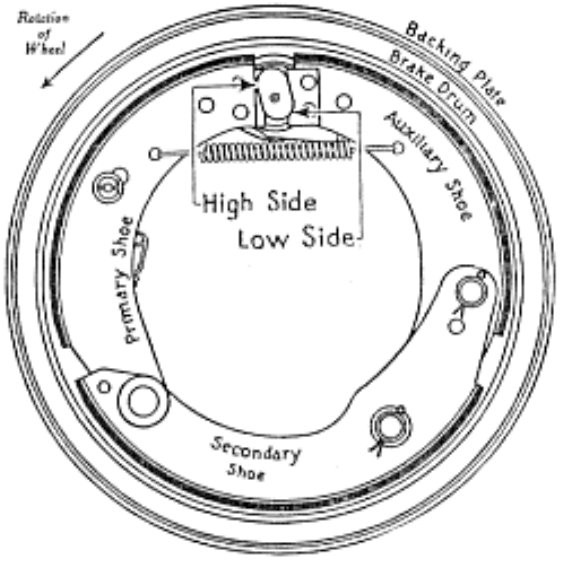


Fig. N29I—Three-shoe model showing correct shoe-cam position

6A. When **two** shoe-to-anchor **springs** are us the **heavier** one is always connected to the sh which "hides" the operating lever. This r applies to both front and rear brakes. The a rangement improves braking in reverse ge

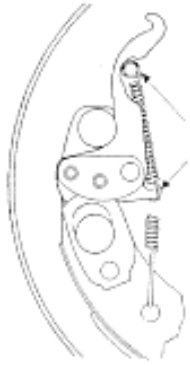


Fig. N29J—Open side of springs should face anchors as shown

7. **Double anchor** Duo-Servo models having t **cable** and **conduit** type of cam control also u only one spring which is always connected the **secondary** shoe at both **front** and r brakes. See Fig. N29D, Page 58.

8. Car manufacturers recommendations so times call for the use of a different lining the secondary shoe. This applies to three-sh and two shoe models. Usually the lining secondary in such cases is denser and so times of lower friction coefficient.

9. Cable **return** springs should always be instal with the **open** side of the spring hook tow the anchor pins as in Fig. N29J. This is imp tant. Reverse installation invites freque breakage in service.

10. When assembling the star wheel adjust mechanism (on all two shoe Bendix brakes) the brake shoes, the grooved end should assembled to the **primary** shoe on the wheels and the **secondary** shoe on the ri wheels. Using this method the hand end of justing tool will always be moved toward axle of the car to expand the shoes.

Bendix Service Notes

Drum Thickness

After a brake drum has been rebored, the metal at the braking surface may be reduced so the drum at that point is too weak to give the required braking results. A new drum should be installed. Should the thickness, when measured with a micrometer, be less than the minimum thickness given in the table below, it is advisable that a new drum be installed.

Brakes of Bendix Manufacture

Brake Size	Brake Type	Minimum Thickness
11 in.	All Types	.111 in.
12 in.	Duo Servo	.137 in.
12 in.	Standard	.111 in.
12 in.	Super Servo	.111 in.
13 in.	Duo Servo	.137 in.
14 in.	All Types	.137 in.
15 in.	All Types	.137 in.
16 in.	Duo Servo	.185 in.
16 in.	3-Shoe Welded Type	.157 in.
17 in.	Duo Servo (3 in. Lining) Cast Drum	.281 in.
17 in.	Duo Servo (4 in. Lining) Cast Drum	.328 in.
17¼ in.	Standard (3 & 4 in. Lining) Cast Drum	.328 in.

Bendix Three-Shoe Brakes

Characteristics of Construction

Bendix 3 shoe brakes are mechanically operated internal expanding type. The brake assembly for each wheel comprises three shoes (primary, secondary and auxiliary) so constructed and actuated as to give a servo or self-energizing action. One end of the **primary** shoe bears against the operating cam. The other end is connected to the **secondary shoe** by means of an **articulating pin.** This articulating pin engages (but is not rigidly fastened thereto) an **eccentric pin** attached to the **backing plate** in such a way as to form an adjustment to compensate for secondary shoe **lining wear.** The **secondary shoe** is hinged at one end to the primary shoe as shown in Fig. N 1, and is anchored to the backing plate at its other end. Acting independently of these two shoes, the **auxiliary shoe** on brakes over 11 in. diameter is anchored at one end to the backing plate while the other end bears against the operating cam. The primary and auxiliary shoes are both held against the operating cam by means of a tension spring known as the P & A spring.

When the brake is applied the operating cam pushes the primary and auxiliary shoes against the drum. The primary not being anchored is free to move and is **dragged** by the contact with drum in the direction of the drum or wheel rotation. This movement of the primary shoe forces both itself and the secondary shoe more tightly against the drum and thus increases the pressure by supplying a self-energizing action. Actually the pressure on the drum caused by this energizing action is much greater than could be exerted by hand or foot through the levers and cams.

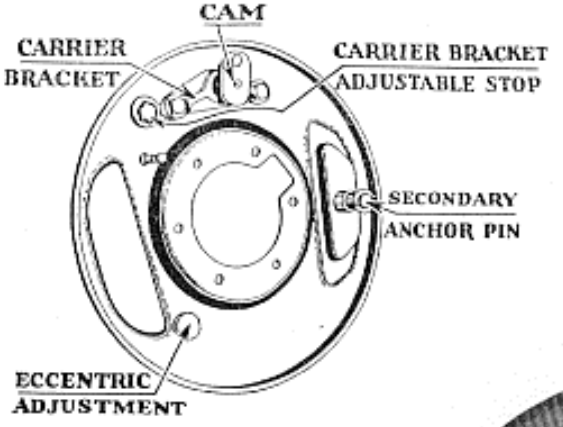


Fig. N2. Wheel side of the same backing plate as shown in Fig. N3. Note single anchor pin

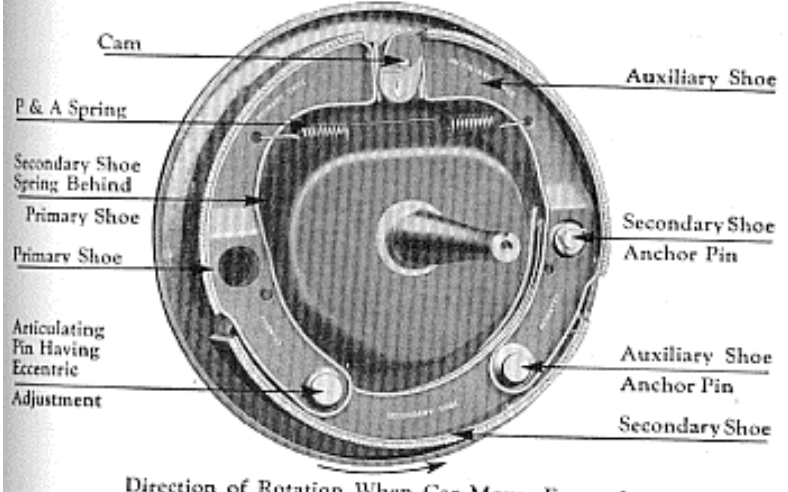


Fig. N1. A Left Front Bendix 3-Shoe Brake Installation. Note this model has two anchor pins

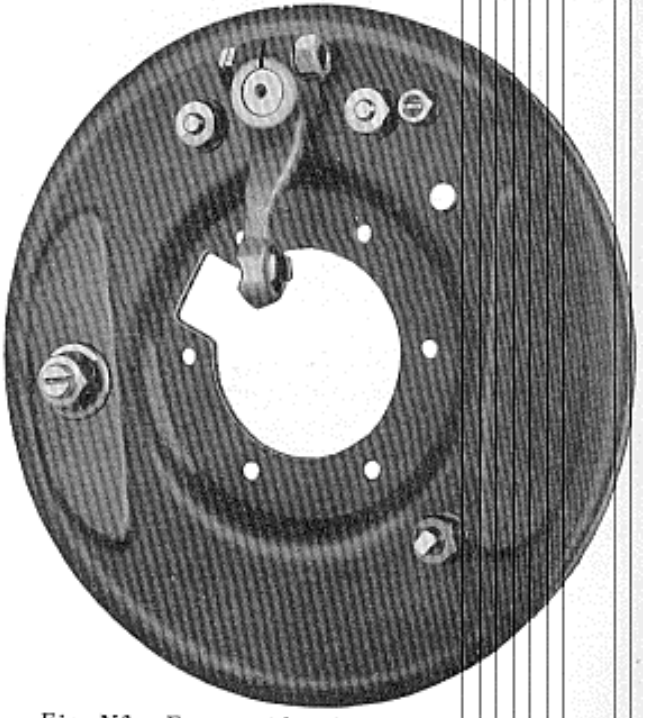


Fig. N3. Frame side of the backing plate for same model brake as shown in Fig. N2

On some Bendix installations the primary and auxiliary shoes are **exactly alike** and **interchangeable.** Exceptions to this rule are the **Super-Servo** and some **special** designs. On the Super-Servo the anchor pins are located **nearer** the center of the backing plate to give additional self-energization. The Super-Servo usually has a double compensating cam and no carrier bracket. See Fig. N6.

All parts of the Bendix wheel brake assemblies are mounted on a circular steel disk known as the backing plate shown in Fig. N2 and Fig. N3. Control of all adjustments is from the **frame** side of the backing plate.

Four Adjustments on 3 Shoe Models

There are four points of adjustment on the 3 shoe brake. One of these is the **eccentric** which functions as an adjustment for re-centering of the shoes to compensate for normal lining wear. It is mounted on the backing plate behind the articulating pin. Control of the eccentric adjustment which is illustrated in Fig. N4 is from the **frame side** of the backing plate.

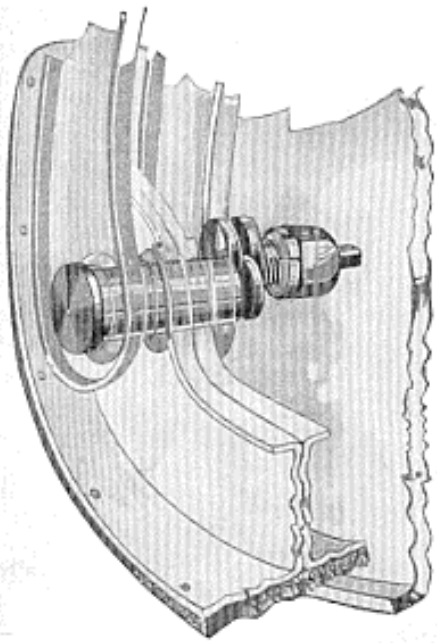


Fig. N4. Phantom view of the eccentric or clearance adjustment used on most models

The second adjustment is the **anchor,** which is the most important of all, since it controls the major or basic centering of the shoes and the effectiveness of the eccentric adjustment.

Most of the 3 shoe models are provided with two anchors although some of the smaller sizes have only one. The anchor pin adjustment which controls shoe centering on the Bendix brakes is fully described under "Major Adjustment."

On the **wheel** side of the backing plate is the **cam support,** which is also known as the **carrier bracket.** On most Bendix installations except the Super-Servo the **carrier bracket** is attached to the backing plate by two bolts which pass through slots in the plate as shown in Fig. N5. Because of these slotted holes it is possible for the carrier bracket to be moved endwise and this forms the **third** point of adjustment. The carrier bracket is bolted to the backing plate sufficiently tight to prevent a movement of the bracket on the backing plate by hand, but **not** so tight but that a tap of a hammer will not move it. The object of this construction is to allow the operating cam to **automatically** center itself between the primary and auxiliary shoes.

An exception to the usual design is the incorporation of a small **cam** that forms a **stop** to prevent the carrier bracket moving too far. See Fig. N2 and Fig. N14, Page 49.

On those installations where carrier brackets are **not incorporated, such as the Super-Servo, Fig. N6** the **cam** itself is slotted so that it can move or "float" slightly. When the self-aligning cam is used the cam ends of shoes are fitted with rollers, as in Fig. N-6.

The fourth point of adjustment controls the angle of the cam operating lever.

On the older models with Lever control the adjustment for angle is by means of a worm mounting of the operating lever called the **worm screw adjustment,** as shown in Fig. N9, Page 48. However, on some of the later Lever type Bendix installations the camshaft operating lever angle is controlled by means of a **threaded button or tapped screw,** as shown in Fig. N10, Page 48. On Perro control installations adjustment of the camshaft levers, front and rear, is by means of serrations or notches on the camshaft. The serration method of adjusting the operating cam levers is sometimes used on the Lever type controls, but at the **rear** wheels only

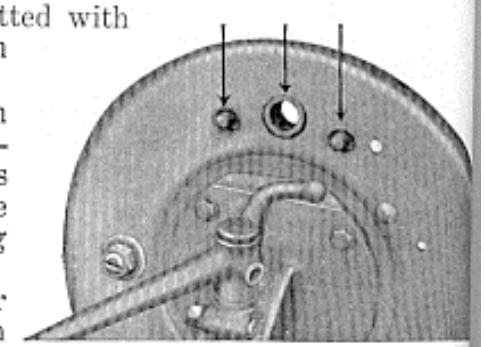


Fig. N5. End arrows show slotted holes which permit centering of the operating cam

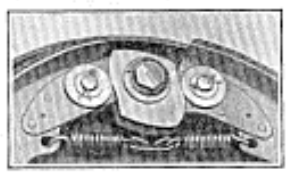


Fig. N6. On self aligning cam models such as this there is no carrier bracket

Three Shoe Lever Control

Adjustment Procedure

In the Bendix lever control, the brake cam is actuated by a control lever attached to the axle of the vehicle. One end of this control lever is ball shaped and bears against a small lever attached to the camshaft, as shown in Fig. N7. The other end of the control is operated by the brake pull rod.

This provides a very simple means of actuating the front brakes without interfering with the movement of the wheels in steering. When the wheels are turned, the flat end of the small lever

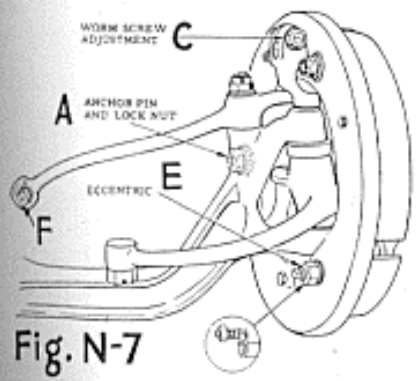


Fig. N-7

Fig. N7. Lever control front brake with worm screw type adjustment

slides over the ball and the relationship between the two remains approximately the same.

As adjusted at the factory, the **center** of the ball is about ¼ to 5/16 in. **behind** the **center of the steering king pin,** when the brakes are **released.** As the brake lining wears, the center of the ball moves slightly forward. Any serious variation from these dimensions will cause the brake to be applied when the car turns a corner. With the ball ends in the correct position the outer brake is released when the car is turning a corner.

Minor adjustment is made as outlined in paragraphs 1 to 7 inclusive.

Front Wheels

1. With all wheels jacked up turn the nuts (F, Fig. N-7-A) on ends of **front** pull rods until **center line of ball on operating lever** is ¼ in. to 5/16 in. **back of** the center line of the steering king pin, with brakes in released position. See Figs. N7 and N8.
2. Next loosen **lock nut** on the **cam** lever **worm-screw** ("C," Fig. N-7) **or** the **button** adjustment ("B," Fig. N-7A) and turn **slotted screw** until brake shoes are **free.**
3. Loosen eccentric adjustment **locknut** (E, Figs. N-7 & N-7-A) and then turn eccentric adjustment screw in **same** direction as wheel revolves when car moves **forward,** until shoes are **tight**

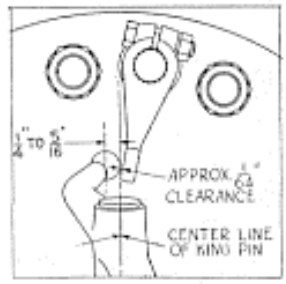


Fig. N8. Center line of ball should be 1/4-5/16 in. back of center line of king pin with brakes RELEASED

against drum. Now **back off** gradually on eccentric until wheel just turns **freely.** Hold eccentric adjusting screw and tighten locknut.

4. Now turn the cam lever wormscrew "C," Fig. N7) **or** button adjustment ("B," Fig. N7A) until wheel **binds,** then **back** off until wheel just turns **freely.** Tighten locknut. Do operations described in paragraphs 2, 3 and 4 to the other front wheel.

Note: Nearly all of the later three-shoe lever-control brakes carried the button type of adjustment instead of the wormscrew. See Fig. N10, Page 48.

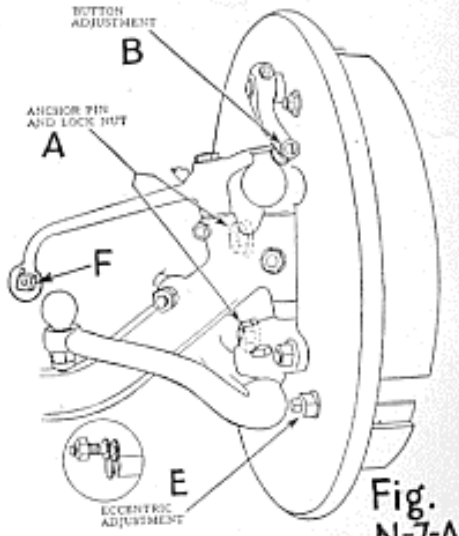


Fig. N7A. Lever control brake with button type adjustment

Fig. N-7-A

Front Brake

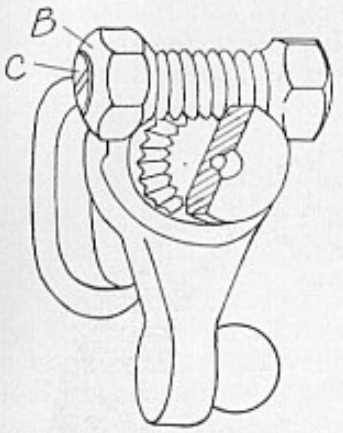


Fig. N9. Section through wormscrew cam lever adjustment used on early lever type control

Rear Wheels

5. If rear brakes are Bendix, **back off** on **rear** pull rod nut until wheel turns freely. Now loosen eccentric adjustment lock nut and turn eccentric adjustment screw (E Fig. N12) in same direction as wheel revolves when car moves forward until wheel drags, then **back off** until wheel is just free. Tighten eccentric adjustment lock nut. **Tighten** rear pull rod ball nut until wheel drags then **back off** until wheel is just free. Repeat this procedure on the other rear brake.

Cam lever at rear brakes should stand at 65 degrees brakes released, as shown in Fig. N12, or just less than perpendicular, brakes **applied.** To change angle of levers, **back off** on pull rod nut and lever clamping bolt then move lever forward or backward on its serrations, as shown in Fig. N21, Page 51.

Equalizing

6. Equalize as follows: Apply brakes by use of **pedal depressor** until the **tightest** wheel can just be turned by hand. Slack off on pull rod nut of tight **rear** wheel and button or worm-screw adjustment at tight **front** wheel until all four brakes are the same.

7. Remove depressor tool from pedal and see that all wheels are free. Make final equalization on testing machine or road, backing off at "tight" wheel as in paragraph 6.

Some cars have been built with wormscrew adjustments on the rear brakes. In these cases the adjustment procedure is the same as for the fronts as outlined in paragraphs 2, 3 and 4.

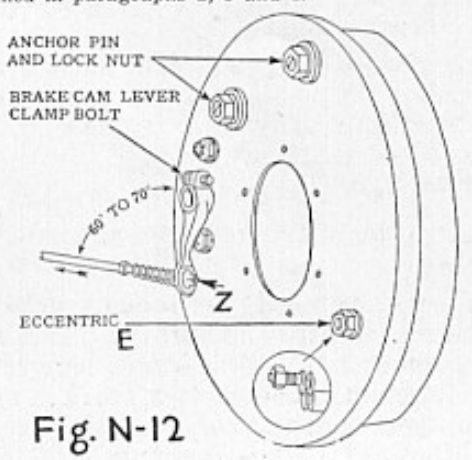


Fig. N-12

Rear Brake

Anchor Adjustment

Anchor pins should be adjusted—

(a) When fitting new lined shoes.

(b) When anchor pin nuts are found loose.

(c) When other adjustments fail to give satisfactory results.

8. To adjust anchors: Turn eccentric adjustment (See Fig. N7, Page 47) **away from** articulating pin and leave loose. Slacken off on **anchor pin nuts** (Fig. N12), then tap both anchors out toward edge of drum. Hold brake on tight by 100-pound load on the end of a 10-in. length monkey wrench applied to control lever. Tap anchor pins on **end** and try to turn wheel **forward** with brake **applied.** Still holding brake on tighten both **nuts** as tight as possible with a 16-in. wrench. Release brake and readjust clearances as outlined in paragraphs 1 to 7 inclusive.

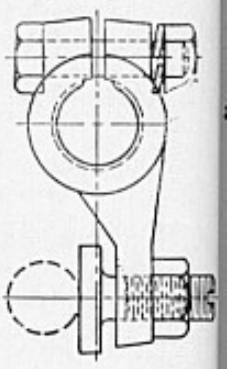


Fig. N10. Button type cam lever adjustment used on some lever control installations instead of the wormscrew

— OR —

8x. Drums with inspection ports permit a more satisfactory anchor adjustment as follows:

(a) **Slack off** eccentric adjustment and slightly **loosen** both anchors. Apply brake by hand and tap anchor nuts lightly.

(b) Using a feeler, adjust upper anchor to give .005 in. clearance at the **heel** (anchored) end of the **secondary** shoe and **lower** anchor to get .005 in. clearance at heel of **auxiliary** shoe. **See Fig. N21a, Page 52.**

(c) Using a feeler, adjust eccentric to get .010 in. clearance at **toe** end (end that is hinged to primary shoe) of **secondary** shoe.

(d) Now insert .010 in. feeler blade in drum hole and, while turning drum, check clearance over remaining length of primary and auxiliary shoe lining. The clearance should be approximately uniform full length. If not, balance by tapping carrier bracket slightly one way or the other. Recheck all clearances, making sure that **toe** of secondary shoe has **twice** as much clearance as heel, then lock all anchors with 10 24 in. wrench.

For data on models having only one anchor see next page.

Models With Single Anchor Pin

On the cam and plate type eleven-inch diameter brake there is only one adjustable anchor pin. This is the secondary anchor pin—the auxiliary pin stopping short of the backing plate and not being attached thereto. In this case the auxiliary pin forms an articulating joint between the secondary and auxiliary shoes. Shoe anchor pin construction of the eleven-inch brake is shown in Figs. N7, Page 47, and N13.

To adjust the secondary anchor pin on this type assembly proceed as follows:

(a) **Loosen** anchor nut A (Fig. N7, Page 47) about one turn. **Do the same to other 3 wheels.**

(b) Turn eccentric adjustment (Fig. N7, Page 47) **away from** articulating pin (by turning it in opposite direction to that in which wheel revolves when car moves forward) until wheel spins freely. **Do the same to other 3 wheels.**

(c) Spin the wheel rapidly or drive the car in a forward direction and apply the brake with **considerable** force. While the brake is still **applied,** tap **each** anchor pin on its **end** and **outwardly,** not less than three times, with a lead hammer to assist its movement.

(d) Tighten the 4 anchor nuts **firmly** with a **16-inch** wrench and readjust eccentric at each brake.

If Bendix brakes do not give satisfactory performance after making these adjustments, check carrier brackets and operating cams, as outlined below.

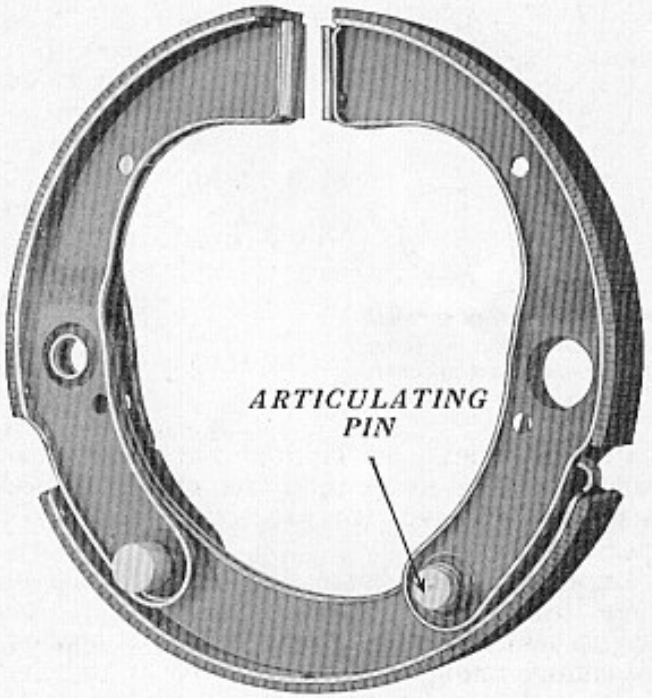


Fig. N13. Eleven-inch type Bendix shoe assembly which has only one adjustable anchor pin. Note stub auxiliary shoe pin

Adjustment of Cam Carrier Brackets

Adjustment of the brake operating cams and their carrier brackets should be made whenever the shoe assemblies are removed and also on all major adjustments.

As already explained the carrier bracket bolts pass through slotted holes so that the bracket can move endwise a little. This end movement allows the cam to center itself between the primary and auxiliary shoes. If the plain washer is bent or the carrier bracket is held too tightly against the backing plate thereby preventing the end movement above referred to, the automatic centering of cam and bracket will not take place and poor brake action will result. Too loose a carrier bracket on the other hand will cause grabby brakes.

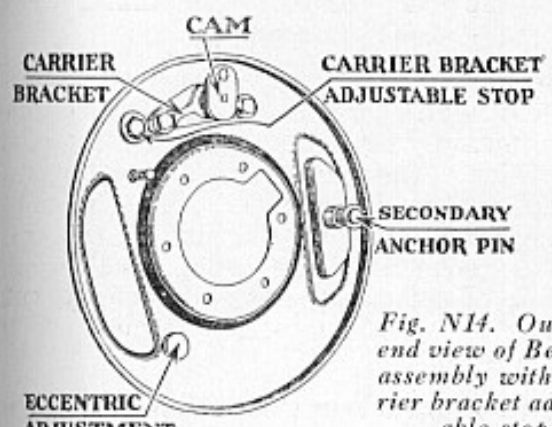


Fig. N14. Outside end view of Bendix assembly with carrier bracket adjustable stop

The carrier bracket may be considered in correct adjustment when it is bolted to the backing plate **tightly** enough to resist movement by **hand** but **loose** enough to be readily moved when tapped with a **hammer.** Examine and make sure that the plain washer is **not bent.** Make sure that the **lock washer is not broken.**

On some models a special cam shaped **stop** is fitted to control the position of the carrier bracket. This construction is shown in Fig. N14. To adjust this type proceed as follows:

(a) Turn each stop **away** from bracket.

(b) Drive car short distance and apply brakes **violently.**

(c) Turn stops until they **touch** bracket, then **back off** slightly and tighten. This should give about 1/32 in. clearance between stop and bracket. The carrier bracket nuts on this type construction should have same tightness as those **without** the stop.

Self Aligning Cams

Some Bendix installations make use of a self-aligning shoe cam as shown at Fig. N15 instead of the usual carrier bracket. On these installations the cam itself is slotted so that it can move

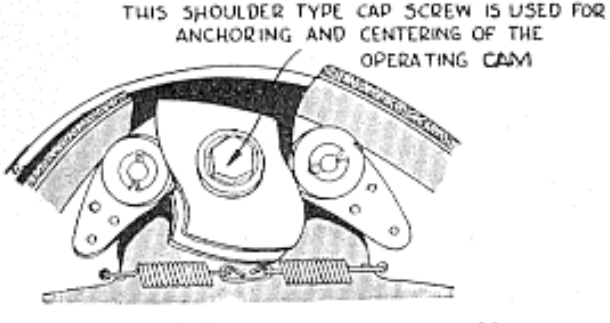


Fig. N15. Self-centering cam assembly as used on some Bendix installations

back and forth on the operating shaft. The cam retaining cap screw has a shoulder which functions as a stop. If it has not been altered or substitution made, the cam should be tight to the hand but loose enough to be moved by a hammer tap when cap screw is turned all the way in.

Removal of Shoe Assemblies

To remove Bendix shoe assemblies proceed as shown in Fig. N16.

Shoe **return springs** should have 35 to 50 lb tension at **installed** length. Removal and reinstallation of these springs can be easily and quickly done by using Bendix spring tongs #10089 and #10089.

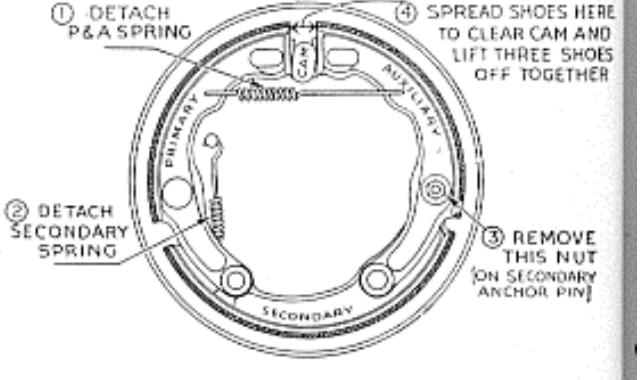
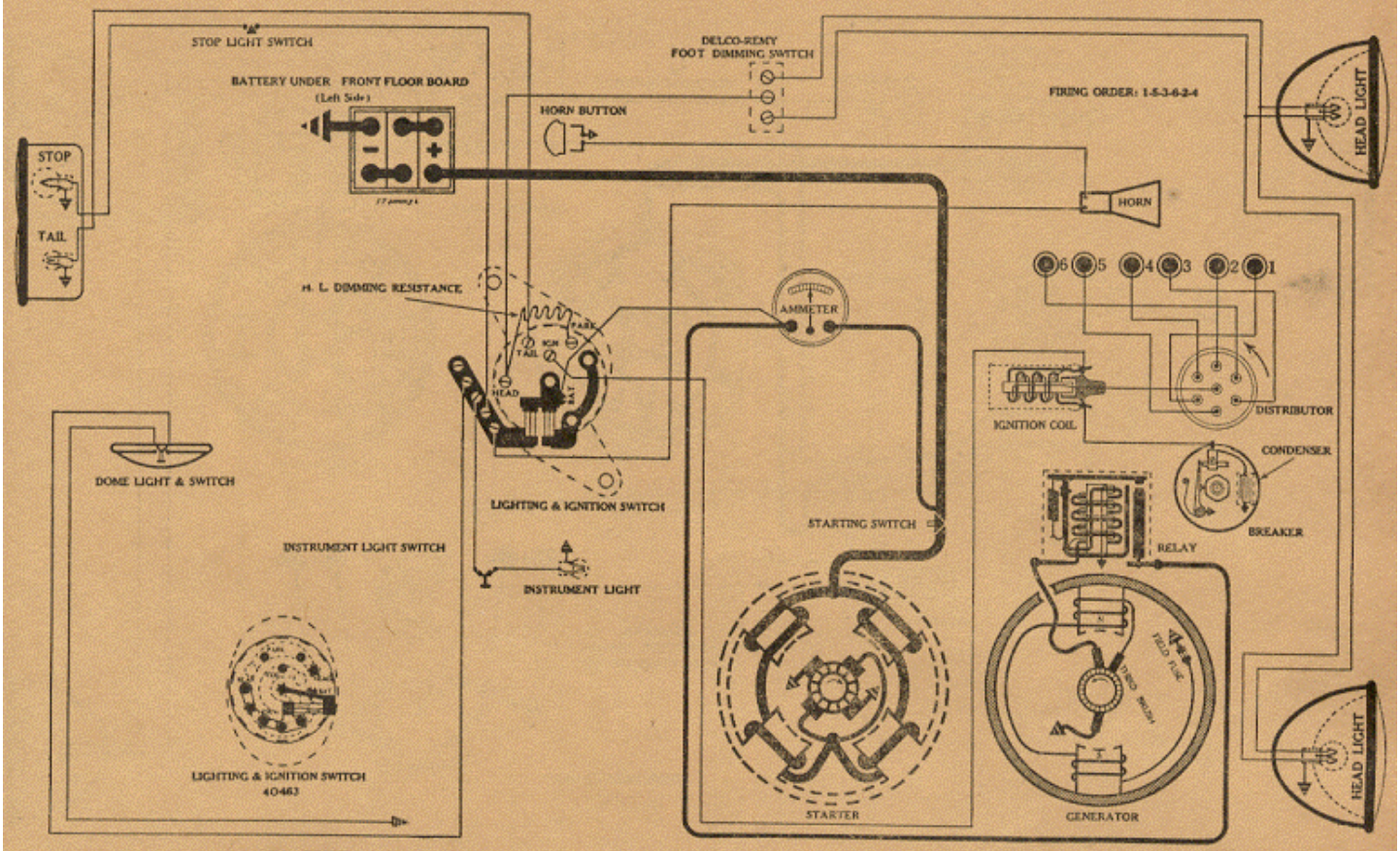


Fig. N16. Shoe assemblies are removed from axle by following above operations in numerical order

FALCON-KNIGHT

1927-28



BATTERY

U. S. L., 3-HVX-7X, 6 volts. Negative Terminal Grounded
Starting Capacity—148 amps. for 20 minutes.
Lighting Capacity—5 amps. for 28 hours.
Box—Length, 11¾; width, 7 7/16; height, 9¾ inches.

STARTER

Rotation, R. H., Com. End
Auto-Lite, MAB-4002

Connection to Engine—Bendix drive.
Running Free—60 amps. at 6 volts.
Cranking Engine—160-170 amps. at 5 volts.
Lock Torque—17 pound-feet, 520 amps. at 3 volts.
Brush Spring Tension—24-28 oz. on each.
Starting Switch—Auto-Lite, SW-4001.

IGNITION

Rotation, L. H., Top View
Auto-Lite, Dist. No. IG-4107B
(Semi-Automatic Spark Advance)

Breaker—Contact separation .020 to .024 inch.
Contact Spring Tension—18-20 oz.
Timing—See detailed instructions P. 1, Sec. AA.
1—Locate T. D. C. 2—Locate rotor. 3—Set spark.
Spark Plugs—⅞ inch regular; Gap .025 inch.
Firing Order—1-5-3-6-2-4.
Manual Advance—20 degrees (on Flywheel).
Automatic Advance—20 degrees (on Flywheel).

Eng. R.P.M.	Degrees Advance (on flywheel)	Dist. R.P.M.	Degrees Advance (on cam)
600	0-1	300	0-.5
1300	8	650	4
2000	16	1000	8
2400	20	1200	10

Coil—Auto-Lite, IG-4065.

GENERATOR

Rotation, L. H., Com. End
Auto-Lite, Type GYA-4202

Performance Data—Gen. cold.

Amps.	R.P.M.	Volts
2	620	6.6
5	700	7.
10	860	7.3
14	1050	7.7
16	1200	7.9

Maximum Charging Rate (cold)—19 amps. at 8 volts or 17.75 amps. at 7.5 volts.
Motoring Freely—5 amps. at 6 volts.
Max. Stall Current—18 amps. at 6 volts.
Field Test—3.8 amps. at 6.2 volts directly across field coils in series.
Field Fuse—5 amps.
Brush Spring Tension—1¼-1½ lbs. on each.
Third Brush Adjustment—Loosen cover band. See Fig. 13, P. 7, Sec. AA.

RELAY

Auto-Lite, CB-4007

Closes—7-7.5 volts.
Opens—½-2½ amps. discharge.
Contact Gap—.025-.035 inch.
Core Gap—.010-.030 inch, contacts closed.

LIGHTING

Switch—Briggs & Stratton No. 40463 (used with 1129 bulbs, 1927).
Fuses—Single 20 amp. fuse mounted on switch back.
Switch—Briggs & Stratton No. , (used with 1110 Bifocal bulbs, 1928).
Fuses—Two, 20 amp. fuses mounted on switch back.
Foot Dimming Switch—Delco-Remy, 465-B.
Lamps—See P. 3, Sec. AA. HEAD—1110 (Bifocal) or 1129; TAIL—63; INSTRUMENT—63; DOME—81; STOP—87.