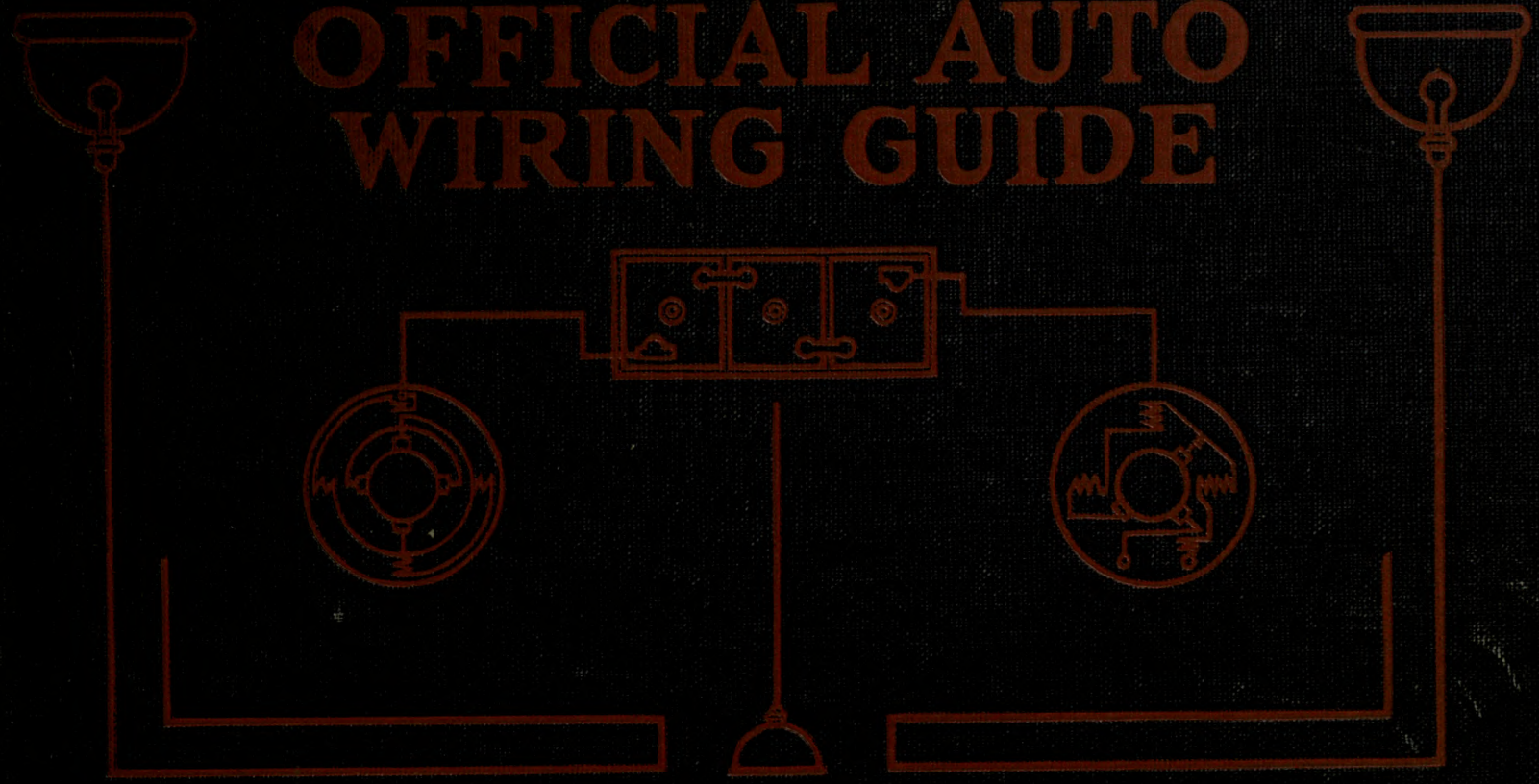


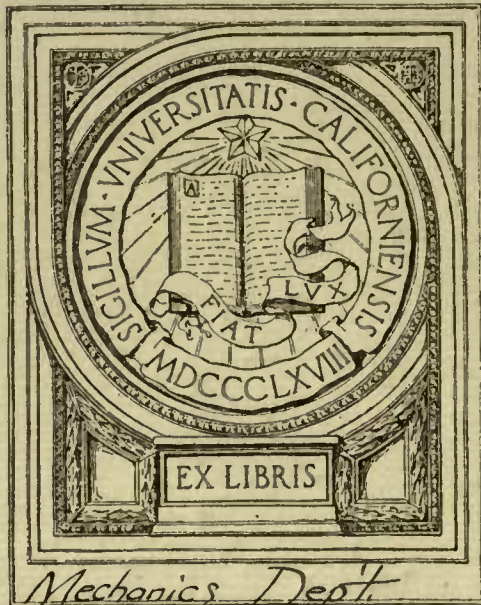
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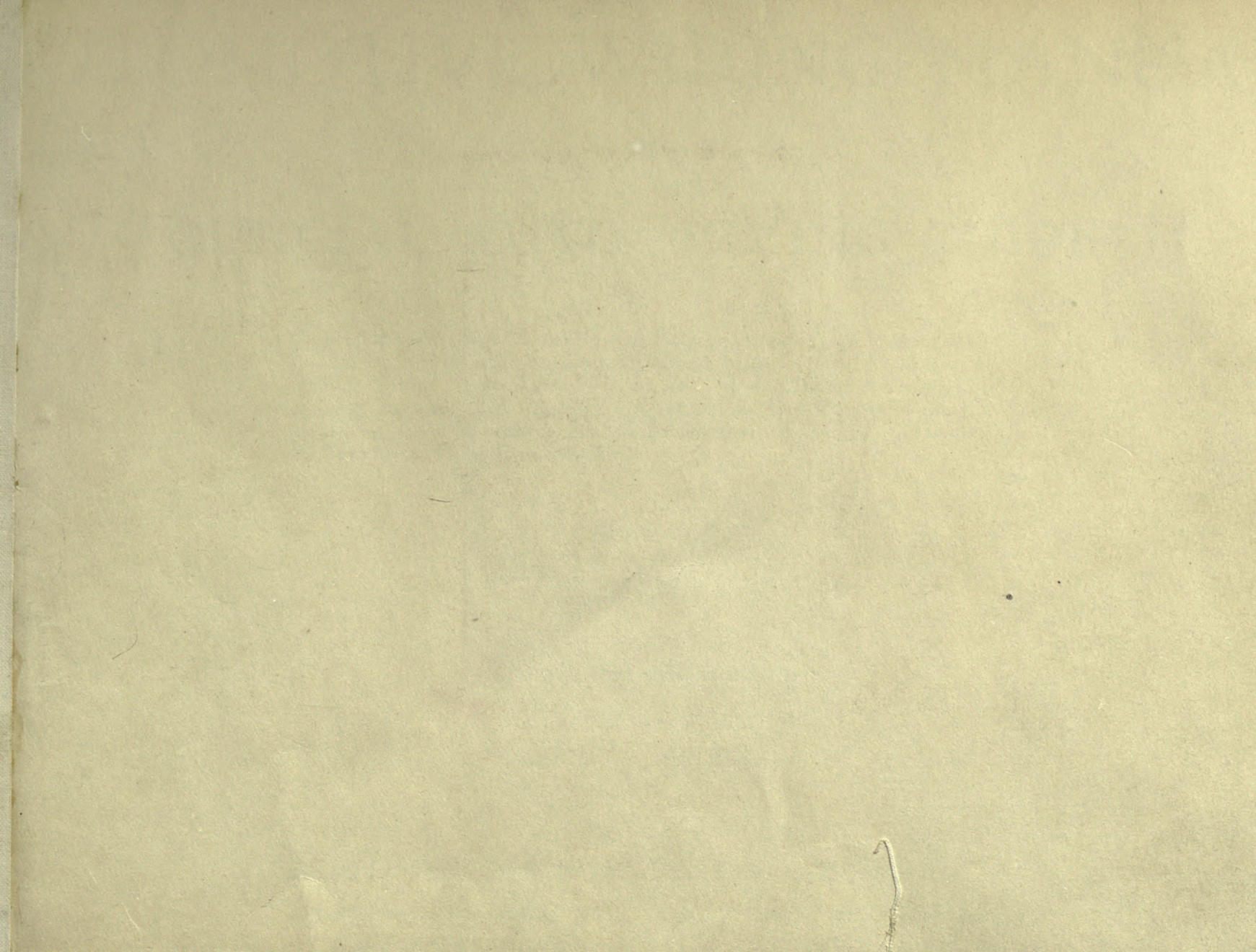
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“OFFICIAL AUTO WIRING GUIDE”

Containing Guaranteed Correct Circuit Diagrams Covering all Motor Cars from 1912 to 1919 inclusive; Internal Wiring Connections of Generators, Starting Motors, Controllers, Switches, etc., of all Electric Starting and Lighting Systems; also Practical Instructions on Construction, Testing, Repairing and Maintenance of Storage Batteries, Generators, Starting Motors, Coils, Controllers, Magnetos, etc.

By HARRY L. WELLS
in collaboration with Allan J. Pierson
and Datus M. Pierson,
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F O R E W O R D

 TO those in the trade the Automotive Wiring Manual will prove of very great value. Its purpose is to simplify electrical service on Motor Cars.

This Manual plainly describes in full detail, the wiring circuits, internal and external, of every make of starter, generator, coil, cut-out, etc., and furnishes all necessary information for quickly finding and rectifying trouble in a manner easily understood by those having only a minor knowledge of electrical equipment. Technical engineering data is not given because such data is not necessary.

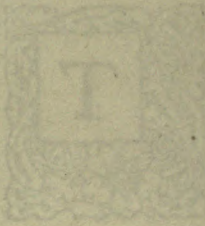
We guarantee the contents of this Manual to be absolutely correct. The internal wiring circuits and standard diagrams have all been most carefully prepared, and the information covering coils, batteries, motors, etc., is complete and accurate. By studying the general instructions, you will readily see how easily electrical circuits may be traced, and appreciate the simplicity of trouble finding, making tests and adjustments and rendering prompt and efficient service to the car owner.

We have observed the splendid and rapid strides made, practically unaided, by automobile mechanics in their efforts to render service on electrical apparatus, and we know that with the aid of this Manual, or Guide, the problem of efficient electrical service is solved.

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The Publishers

CIRCUIT DIAGRAMS OF CARS

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Abbott-Detroit	1916-17	6-44	Remy	1	Buick	1916	54-55	Delco	
Allen	1914-15	33 and 34	Westinghouse	2	Buick	1915	C-24 and C-25	Delco	
Allen	1914-15	35	Autolite	3	Buick	1915	C-36, 37, 54, 55	Delco	
Allen	1916	37 Dimmer Bulbs	Westinghouse	4	Buick	1916	D-44, 45, 54, 55	Delco	
Allen	1916	37 Dimming Resist.	Westinghouse	5	Buick	1917	D-6, 44, 45, 46, 47		
Allen	1917	Classic Model	Westinghouse	6	Buick	1917-18	D-34, 35, E-34, 35	Delco	
Allen	1918-19	41	Autolite	7	Buick	1918-19	E-Six, 44, 45, 46, 47, 49, 50	Delco	
Alter	1915		Remy	8	Buick Truck	1915	C-4	Delco	
American	1914	Underslung	Disco	9	Buick Truck	1916	D-4	Delco	
American	1917-18	A	Westinghouse	10	Cadillac	1912		Delco	
Anderson	1916	100-A-B	Westinghouse	11	Cadillac	1913		Delco	
Apperson	1913		Ward-Leonard	12	Cadillac	1914		Delco	
Apperson	1913	4-45 and 4-55	Esterline	13	Cadillac	1915	"8" Type 51	Delco	
Apperson	1913	45 and 55	Gray & Davis	14	Cadillac	1916	"8" Type 53	Delco	
Apperson	1914	4-45, 6-45, 6-58	Bijur	15	Cadillac	1917-18-19	55 and 57	Delco	
Apperson	1915	4-40 and 6-45	Bijur	16	Cartercar	1914	7	Delco	
Apperson	1915		Westinghouse	17	Cartercar	1915	9	Delco	
Apperson	1916	6-48 and 8-58	Westinghouse	18	Case	1914-15	O	Westinghouse	
Apperson	1916-17	6-48, 8-58, 8-17, 6-17	Bijur	19	Case	1914-15	R	Westinghouse	
Apperson	1918-19	8-18-A	Bijur	20	Case	1914-15	S	Westinghouse	
Auburn	1913-14-15		Remy	21	Case	1915	R	Westinghouse	
Auburn	1914	4-40, 4-41, 6-45, 6-46	Remy	22	Case	1916	T	Westinghouse	
Auburn	1915	6-40	Delco	23	Case	1917	T	Autolite	
Auburn	1916	4-38, 6-38, 6-40	Remy	24	Case	1918-19	U	Westinghouse	
Auburn	1916	6-40-A	Delco	25	Chalmers	1913-14	17, 18, 19	Gray & Davis	
Auburn	1917-18-19	6-39	Remy	26	Chalmers	1914	24	Entz	
Auburn	1918	6-44	Delco	27	Chalmers	1915	26	Entz	
Austin	1917-18	Highway King "12"	Delco	28	Chalmers	1915	29	Entz	
Bell	1916	16	Ward-Leonard	29	Chalmers	1915-16	32 and 6-40	Westinghouse	
Bethlehem Trucks	1918	D1, E1, F1	Gray & Davis	541	Chalmers	1916	35	Westinghouse	
Briscoe	1915	B-15	Splitdorf-Apelco	30	Chalmers	1917-18	Six-30, 35A, 35B	Westinghouse	
Briscoe	1916	4-38	Splitdorf-Apelco	31	Chalmers	1918-19	35-C & Early 1919	Westinghouse	
Briscoe	1916	8-38	Splitdorf-Apelco	32	Chandler	1913		Westinghouse	
Briscoe	1917-18-19	4-24	Splitdorf-Apelco	33	Chandler	1914		Westinghouse	
Brown	1916		Allis-Chalmers	34	Chandler	1914-15		Gray & Davis	
Buick	1914	B-24 and B-25	Delco	35	Chandler	1916		Westinghouse	
Buick	1914	B-36 and 37	Delco	36					

CIRCUIT DIAGRAMS OF CARS—Continued

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Chandler	1916	17	Gray & Davis	72	Detroit Electric		62, 63, 64, 65, 66	—	106
Chandler	1917-18-19	Light Weight Six	Gray & Davis	73	Detroit	1915	D	Remy	107
Chevrolet	1915	H-2, H-3, H-4 (Early Models)	Autolite	74	Detroit	1916	6-45	Autolite	108
Chevrolet	1915	H-2, H-3, H-4 (Mid-Season)	Autolite	75	Detroit	1917	6-45	Autolite	109
Chevrolet	1915	H-2, H-3, H-4 (Late Models)	Autolite	76	Dixie Flyer	1916-17	L-3	Dyneto	110
Chevrolet	1915-16	H-2½, H-3, H-4	Autolite	77	Dixie Flyer	1918	L Series 35	Dyneto	111
Chevrolet	1916-17	490 (One Cable)	Autolite	78	Dodge		Single Wire Starter Mag. Ign.	North East	112
Chevrolet	1916-17	490 (Two Cables)	Autolite	79	Dodge		Single Wire Starter Delco Ign.	North East	113
Chevrolet	1917-18	F-2 and F-5	Autolite	80	Dodge		Two Wire Starter Delco Ign.	North East	114
Chevrolet	1918	D-4 and D-5	Autolite	81	Dodge	1915		North East	115
Cole	1912	30 and 40	Ward-Leonard	82	Dodge	1916		North East	116
Cole	1913	4-40, 4-50, 6-60	Delco	83	Dodge	1916	Internal Diagram	North East	117
Cole	1914	4	Delco	84	Dodge	1917-18-19	30	North East	118
Cole	1914	6	Delco	85	Dorris	1913	H	Westinghouse	119
Cole	1915-16	4-40 and 6-66	Delco	86	Dorris	1913-14	H	Westinghouse	120
Cole	1915	6-50	Delco	87	Dorris	1914	I	Westinghouse	121
Cole	1916	8-50	Delco	88	Dorris	1915	I-A-4	Westinghouse	122
Cole	1917-18-19	8-60	Delco	89	Dorris	1916	I-A-6	Westinghouse	123
Commerce Truck		E	Remy	90	Dorris	1917	I-B-6	Westinghouse	124
Crawford	1915	6	Westinghouse	91	Dorris	1918-19	I-C-6 & Early 1919	Westinghouse	125
Crawford	1916		Westinghouse	92	Dort	1916	4 and 5	Splitdorf-Apelco	126
Crow-Elkhart	1916	25-30	Disco	93	Dort	1916	5	Westinghouse	127
Crow-Elkhart	1916-17	CE-30-33	Dyneto	94	Dort	1916	With and Without Ammeter	Westinghouse	128
Crow-Elkhart	1917-18-19	33-35 & K34-K36	Dyneto	95	Dort	1917	9	Westinghouse	129
Cunningham	1913-14	M	North East	96	Dort	1918-19	11	Westinghouse	130
Cunningham	1916	4	Westinghouse	97	Elcar	1916		Splitdorf-Apelco	131
Cunningham	1916-17	V	Westinghouse	98	Elcar	1917-18-19	D, E, F, and G	Dyneto	132
Cunningham	1918-19	V-3	Westinghouse	99	Elgin	1917-18-19	6 & 1919 "H"	Wagner	133
Daniels	1916-17-18	A-8	Westinghouse	100	Empire	1915	31 and 40 (Sep. Lgt. and Ign.)	Remy	134
Dart	1916	B and C	Westinghouse	101	Empire	1915-16	33	Remy	135
Davis	1915	38-A-B-C	Westinghouse	102	Empire	1916	40 and 45	Autolite	136
Davis	1916	C-38, 6-E, 6-G	Delco	103	Empire	1916	60	Autolite	137
Davis	1917-18	6-H, 6-I, 6-K	Delco	104	Empire	1916-17-18	45 & 51	Autolite	138
Deering Magnetic	1918		Owen	105					

CIRCUIT DIAGRAMS OF CARS—Continued

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Empire.....	1917-18-19	50, 70, 70-A, Early '19	Autolite.....	139	Franklin.....	1913-14...	Series 3-M.....	Entz.....	170
Enger.....	1914.....	.....	North East.....	140	Franklin.....	1914-15-16	Series 6-M Coupe & Berline.....	Entz.....	171
Enger.....	1916-17...	Twin Unit Twelve..	Westinghouse.....	141	Franklin.....	1914-15-16	Series 6-M Runabout & Tour.....	Entz.....	172
Essex.....	1919.....	.....	Delco.....	644	Franklin.....	1914-15-16	Series 6-M Sedan... Sedan Type.....	Dyneto.....	173
Excelsior Motoreycle.	.....	C.....	Splitdorf.....	142	Franklin.....	1915.....	Berliner Type.....	Dyneto.....	174
Fiat.....	1914.....	.....	Westinghouse.....	143	Franklin.....	1916.....	8-M, Runabout, Touring, Sedan...	Dyneto.....	176
Fiat.....	1914.....	.....	Gray & Davis.....	144	Franklin.....	1916.....	Series, 9, All Models	Dyneto.....	177
Fiat.....	1914-15...	.....	Westinghouse.....	145	Galt.....	1913.....	.....	North East.....	178
Fiat.....	1915.....	Single Wire.....	Rushmore.....	146	S. G. Gay & Co.....	1915.....	.....	Allis-Chalmers.....	179
Fiat.....	1916-17...	E-17 Chassis.....	Westinghouse.....	147	G. M. C. Truck.....	1917.....	15, 25, 26, 30, 31, 40, 41, 70, 71, 100, 101	Delco.....	180
Fiat.....	1917.....	.....	Bosch-Rushmore.....	148	Glide.....	1913-14...	36-42.....	Westinghouse.....	181
Fiat.....	1917.....	.....	Westinghouse.....	149	Glide.....	1914.....	30.....	Westinghouse.....	182
Fiat.....	1917.....	C-3 Chassis.....	Bosch.....	150	Glide.....	1915.....	30.....	Westinghouse.....	183
Firestone Columbus..	1913.....	.....	North East.....	151	Glide.....	1916-17...	Six-40.....	Westinghouse.....	184
Fischer.....	1916.....	.....	Remy.....	152	Glide.....	1918.....	Light Six-40.....	Westinghouse.....	185
Ford.....	.....	.....	A. B. C.....	248	Grant.....	1915-16...	4.....	Allis-Chalmers.....	186
Ford.....	.....	Standard Wiring ..	.....	153	Grant.....	1915-16...	6.....	Allis-Chalmers.....	187
Ford.....	.....	.....	Disco.....	154	Grant.....	1916.....	.....	Allis-Chalmers.....	188
Ford.....	.....	Two Unit.....	Disco.....	155	Grant.....	1916-17-18	K.....	Wagner.....	189
Ford.....	.....	B Revised.....	Dyneto.....	156	Grant.....	1918.....	G.....	Wagner.....	190
Ford.....	.....	.....	Everready.....	157	H. A. L.....	1916-17-18	12.....	Westinghouse.....	191
Ford.....	.....	.....	Fischer.....	249	Halladay.....	1913-14...	G & 32.....	Electro.....	192
Ford.....	1919.....	Coupe and Sedan...	Ford.....	645	Halladay.....	1915.....	6-40.....	Westinghouse.....	193
Ford.....	.....	Type GSL-101-103..	Genemotor.....	599	Halladay.....	1916.....	R.....	Westinghouse.....	194
Ford.....	.....	Type GSL-102.....	Genemotor.....	598	Harley - Davidson Motoreycle.....	.....	.....	Remy.....	195
Ford.....	.....	Single Unit.....	Gray & Davis.....	158	Harley - Davidson Motoreycle.....	1916-17...	.....	Remy.....	196
Ford.....	.....	Two Unit.....	Gray & Davis.....	159	Harroun.....	1917-18...	AA1.....	Remy.....	197
Ford.....	.....	33.....	Heinze-Springfield ..	160	Havers.....	1914.....	.....	North East.....	198
Ford.....	.....	33 Internal Wiring ..	Heinze-Springfield ..	161	Haynes.....	1913.....	24.....	Leece-Neville.....	199
Ford.....	.....	.....	Leece-Neville.....	162	Haynes.....	1914.....	26, 27, 28.....	Leece-Neville.....	200
Ford.....	1913.....	.....	North East.....	163	Haynes.....	1914.....	26, 27, 28 (Vulcan Elec. Gear Shift).	Leece-Neville.....	201
Ford.....	.....	D Type 1210.....	North East.....	164					
Ford.....	.....	D Type 1252.....	North East.....	165					
Ford.....	.....	.....	Simms-Huff.....	166					
Ford.....	.....	.....	Westinghouse.....	167					
Four-Wheel Drive Truck.....	.....	.....	North East.....	168					
Franklin.....	1913-14...	Series 2-D-H-M...	Entz.....	169					

CIRCUIT DIAGRAMS OF CARS—Continued

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Haynes.....	1915.....	30.....	Leece-Neville.....	202	Inter-State.....	1913-14... 45.....	Apelco.....	236	
Haynes.....	1916.....	34 & 35.....	Leece-Neville.....	203	Inter-State.....	1915-16-17-18 TF.....	Remy.....	237	
Haynes.....	1916-17... 36, 36-R, 37.....	Leece-Neville.....	204	Inter-State.....	1915-16-17-18 T & TR.....	Remy.....	238		
Haynes.....	1917-18-19 40, 40-R, 41.....	Leece-Neville.....	205	Jackson.....	1913.....	43.....	Autolite.....	239	
Haynes.....	1918-19... 38, 39, 39-S.....	Leece-Neville.....	206	Jackson.....	1914-15... 46.....	North East.....	240		
Henderson.....	1913-14... ..	Ward-Leonard.....	207	Jackson.....	1915.....	46.....	Autolite.....	241	
Herff-Brooks.....	1915.....	Splitdorf-Apelco.....	208	Jackson.....	1915.....	48 & 6-40.....	Delco.....	242	
Herff-Brooks.....	1916.....	Splitdorf-Apelco.....	209	Jackson.....	1915-16... 44.....	North East.....	243		
Hollier.....	1916.....	8.....	Splitdorf-Apelco.....	210	Jackson.....	1916.....	34.....	Autolite.....	244
Hollier.....	1917.....	166.....	Allis-Chalmers.....	211	Jackson.....	1916.....	68.....	Autolite.....	245
Hollier.....	1918.....	188-206.....	Splitdorf.....	212	Jackson.....	1916.....	348.....	Autolite.....	246
Holmes.....	1918-19... 1.....	Dyneto.....	213	Jackson.....	1917-18... 349—All 1918 Models	Autolite.....	247		
Howard.....	1917.....	Delco.....	214	Jeffery.....	1915.....	Four.....	U. S. L.....	250	
Hudson.....	1913.....	37 & 54.....	Delco.....	215	Jeffery.....	1915.....	Chesterfield 6.....	Bijur.....	251
Hudson.....	1914-15... 6-40.....	Delco.....	216	Jeffery.....	1916.....	462.....	Bijur.....	252	
Hudson.....	1914-15... 6-54.....	Delco.....	217	Jeffery.....	1917.....	671.....	Bijur.....	253	
Hudson.....	1916.....	6-40.....	Delco.....	218	Jeffery Rapid Service Truck.....	1016.....	Bijur.....	254	
Hudson.....	1916-17-18-19 Super-Six.....	Delco.....	219	Jordan.....	1916-17... 60 & B.....	Bijur.....	255		
Hupmobile.....	1914-15... HA.....	Westinghouse.....	220	Jordan.....	1918-19... 60.....	Bijur.....	256		
Hupmobile.....	1915.....	K.....	221	King.....	1915.....	C-4.....	Ward-Leonard.....	257	
Hupmobile.....	1916.....	N.....	222	King.....	1915.....	8.....	Ward-Leonard.....	258	
Hupmobile.....	1916-17... N.....	Westinghouse.....	223	King.....	1916.....	E.....	Ward-Leonard.....	259	
Hupmobile.....	1918-19... R & Early 1919.....	Bijur.....	224	King.....	1917-18-19 EE—1919 "G".....	Ward-Leonard.....	260		
Hupmobile.....	1919.....	Westinghouse.....	646	Kissel Kar.....	1913-14... 4-40, 6-48, 6-60.....	Esterline.....	261		
Imperial.....	1913.....	34.....	North East.....	225	Kissel Kar.....	1914.....	4-40.....	Esterline.....	262
Imperial.....	1914.....	32, 34, 44, 54, 56, 39	North East.....	226	Kissel Kar.....	1915.....	4-36.....	Westinghouse.....	263
Imperial.....	1914.....	34.....	North East.....	227	Kissel Kar.....	1915-16-17 6-42.....	Westinghouse.....	264	
Indian Motorcycle.....	Splitdorf.....	228	Kissel Kar.....	1916.....	4-32 & 4-36.....	Westinghouse.....	265
International Harvester Truck.....	.....	.....	North East.....	229	Kissel Kar.....	1917-18... Double Six.....	Westinghouse.....	266
International Harvester Truck.....	1916-17... F & H.....	Bosch.....	230	Kissel Kar.....	1918-19... Hundred Point Six..	Remy.....	267		
International Harvester Truck.....	1918.....	F. G. H. K.....	North East.....	231	Kline Kar.....	1913-14... B4-40, 6-50, 6-60, C4-30.....	Rushmore.....	268	
International Harvester Truck.....	1918.....	All Models.....	North East.....	232	Kline Kar.....	1916-17-18 6-36.....	Westinghouse.....	269	
Inter-State.....	1909-10-11 25 to 34, incl.....	Ignition Only.....	233	Knox Truck.....	.....	35 & 36.....	Bijur.....	270
Inter-State.....	1912.....	40, 41, 42.....	Apelco.....	234	Krit.....	1915.....	North East.....	271	
Inter-State.....	1912.....	50, 51, 52.....	Apelco.....	235	L. P. C.....	1915-16... ..	Remy.....	272	

CIRCUIT DIAGRAMS OF CARS—Continued

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Lexington.....	1915.....	4-K & 6-L.....	Westinghouse.....	273	Mercer.....	1915.....	22-70.....	U. S. L.....	305
Lexington.....	1916.....	6-N.....	Westinghouse.....	274	Mercer.....	1916.....	22-70.....	U. S. L.....	306
Lexington.....	1916-17...	O.....	} Westinghouse.....	275	Mercer.....	1917-18...	22-73.....	U. S. L.....	307
Lexington.....	1918-19...	R.....			Mercer.....	1918-19...	22-74.....	Westinghouse.....	308
Liberty.....	1917-18...	10-A-B.....	Delco.....	276	Meteor.....	1917.....	75-80.....	Delco.....	309
Liberty.....	1919.....	10-B.....	Wagner.....	647	Metz.....	1914.....	22.....	North East.....	310
Lippard-Stewart Truck.....	1916.....	M.....	Dyneto.....	277	Metz.....	1915-16-17	22-25.....	Gray & Davis.....	311
Lippard-Stewart Truck.....	1917.....	M-2.....	Remy.....	278	Metz.....	1917-18...	G.....	Westinghouse.....	312
Locomobile.....	1911-12-13	30.....	} Rushmore.....	279	Michigan.....	1913.....		North East.....	313
Locomobile.....	1911-12...	38, 48.....			Michigan Hearse.....	1917.....			Delco.....	314
Locomobile.....	1913.....		Adlake.....	280	Mitchell.....	1913.....		Esterline.....	315
Locomobile.....	1915-16...		Westinghouse.....	281	Mitchell.....	1916.....	8.....	Westinghouse.....	316
Locomobile.....	1915-16...	38 & 48.....	Westinghouse.....	282	Mitchell.....	1917-18...	C-42.....	Westinghouse.....	317
Locomobile.....	1917-18-19	38 & 48 & 1919 "4-48"	Westinghouse.....	283	Mitchell.....	1917-18-19	D-40.....	Splitdorf.....	318
Lozier.....	1913-14...	77.....	Gray & Davis.....	284	Mitchell-Lewis.....	1914.....		Remy.....	319
Lozier.....	1915-16-17	82 & 84.....	Gray & Davis.....	285	Mitchell-Lewis.....	1914.....	A40-50-70.....	Remy.....	320
Lyons-Knight.....	1914.....		North East.....	286	Mitchell-Lewis.....	1915.....	4.....	Splitdorf-Apelco.....	321
McFarlan.....	1915.....		Westinghouse.....	287	Mitchell-Lewis.....	1916.....		Splitdorf-Apelco.....	322
McFarlan.....	1916.....		Westinghouse.....	288	Moline-Knight.....	1912-13-14	MK-40.....	Ward-Leonard.....	323
McFarlan.....	1917-18-19		Westinghouse.....	289	Moline-Knight.....	1914-15...	MK-50.....	Wagner.....	324
Madison.....	1916-17-18		Remy.....	290	Moline-Knight.....	1916-17-18	MK-40-50.....	Wagner.....	325
Maibohm.....	1917.....	A.....	Disco.....	291	Moline-Knight.....	1917-18-19	C & G.....	Wagner.....	326
Maibohm.....	1918.....	B.....	Wagner.....	292	Monitor.....	1919.....		Dyneto.....	648
Marion-Handley.....	1916-17...	K-A-B.....	Westinghouse.....	293	Monroe.....	1915.....	M-2.....	Autolite.....	327
Marmon.....	1913.....	32-4.....	North East.....	294	Monroe.....	1917.....	3.....	Autolite.....	328
Marmon.....	1913.....	48.....	} North East.....	295	Monroe.....	1917-18...	4-5 & 6.....	Autolite.....	329
Marmon.....	1914.....	41 & 48.....			Moon.....	1914.....	42, 6-50.....	Delco.....	330
Marmon.....	1915.....	41.....	Bosch.....	296	Moon.....	1915.....	4-38, 6-40.....	Delco.....	331
Marmon.....	1916-17...	34.....	Bosch.....	297	Moon.....	1916.....	6-30, 6-40.....	Delco.....	332
Marmon.....	1916-17-18-19	34.....	Bijur.....	298	Moon.....	1917-18...	6-43.....	Delco.....	333
Maxwell.....	1914-15...		Simms-Huff.....	299	Moon.....	1917-18-19	6-66.....	Delco.....	334
Maxwell.....	1915.....		Gray & Davis.....	300	Moore.....	1917-18...	30.....	Dyneto.....	335
Maxwell.....	1917.....	25.....	Simms-Huff.....	301	Moreland Truck.....		1½, 2½, 3-Ton.....	Westinghouse.....	336
Maxwell.....	1918-19...	25.....	Simms-Huff.....	302	Moreland Truck.....		2X & 5X.....	Westinghouse.....	337
Maxwell 1-Ton Truck			Autolite.....	303	Nash.....	1917.....	671.....	Bijur.....	338
Mercer.....	1914.....	35.....	Rushmore.....	304	Nash.....	1917-18...	681-2-3-4 & Early 1919	Delco.....	339
					Nash Two-Ton Truck			Bijur.....	542
					Nash Two-Ton Truck		4017-A.....	Bijur Internal.....	543

CIRCUIT DIAGRAMS OF CARS—Continued

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Nash 4-Cylinder Truck.....			Autolite.....	544	Oldsmobile.....	1918-19...	45-A.....	Delco.....	373
National.....	1914.....	Six.....	Remy.....	340	Olympian.....	1917.....	35.....	Autolite.....	374
National.....	1915.....		Westinghouse.....	341	Overland.....	1913.....	69 & 71.....	Autolite.....	375
National.....	1916.....	Highway Six (Series AC).....	Westinghouse.....	342	Overland.....	1913.....	69 & 71.....	U. S. L.....	376
National.....	1916.....	Highway Twelve...	Westinghouse.....	343	Overland.....	1914.....	79-B.....	Gray & Davis.....	377
National.....	1917-18...	Highway Six.....	Westinghouse.....	344	Overland.....	1915.....	80-C & 80-T & R...	Autolite.....	378
National.....	1917-18-19	Highway Twelve...	Bijur.....	345	Overland.....	1915.....	81-LD & T-R.....	Autolite.....	379
Nelson Le Moon Truck			Westinghouse.....	346	Overland.....	1915.....	82.....	Autolite.....	380
New Era.....	1916.....		Allis-Chalmers.....	347	Overland.....	1916.....	86.....	Autolite.....	381
Oakland.....	1913.....	35.....	Deaco.....	348	Overland.....	1916.....	75T & 75LD.....	Autolite.....	382
Oakland.....	1913.....	35.....	Westinghouse.....	349	Overland.....	1916.....	83-B-DE.....	Autolite.....	382
Oakland.....	1913.....	35 Special.....	Deaco.....	350	Overland.....	1916.....	83-LD-EX-T-R...	Autolite.....	383
Oakland.....	1913.....	35 & 42.....	Deaco.....	351	Overland.....	1916.....	83-T-EX-LD-B-D- E & R.....	Autolite.....	384
Oakland.....	1913.....	42.....	Deaco.....	352	Overland.....	1916.....	86.....	Autolite.....	385
Oakland.....	1913.....	42 & 60.....	Delco.....	353	Overland.....	1917.....	85-4-T-R-C & SN..	Autolite.....	386
Oakland.....	1914.....	36.....	Delco.....	354	Overland.....	1917.....	85-6-C-SN-T-R...	Autolite.....	387
Oakland.....	1914.....	43.....	Delco.....	355	Overland.....	1917.....	86-B.....	Autolite.....	388
Oakland.....	1914.....	48 & 62.....	Delco.....	356	Overland.....	1917.....	90-T & 90-CL-R...	Autolite.....	389
Oakland.....	1915.....	37.....	Delco.....	357	Overland.....	1918.....	90-SN-PLD-R-O-ex.	Autolite.....	390
Oakland.....	1915.....	49.....	Delco.....	358	Owen Magnetic.....	1917.....	0-36.....	Owen.....	391
Oakland.....	1916.....	32-B.....	Remy.....	359	Owen Magnetic.....	1918.....	42.....	Owen.....	392
Oakland.....	1916.....	38.....	Delco.....	360	Packard.....	1913.....	48.....	Bijur.....	393
Oakland.....	1916.....	32-B.....	Delco.....	361	Packard.....	1914.....	1-38 & 3-48.....	Delco.....	394
Oakland.....	1917.....	34.....	Delco.....	362	Packard.....	1914.....	2-38 & 4-48.....	Bijur.....	395
Oakland.....	1916-17...	50.....	Delco.....	363	Packard.....	1915.....	3-38 & 5-48.....	Bijur.....	396
Oakland.....	1917.....	34.....	Delco.....	363	Packard.....	1916.....	125 & 135.....	Bijur.....	397
Oakland.....	1918-19...	34-B.....	Delco.....	364	Packard.....	1917-18...	2-25 & 2-35.....	Bijur.....	398
Old Hickory Truck..	1916-17-18		Dyneto.....	365	Packard.....	1918-19...	3-25 & 3-35.....	Bijur.....	399
Oldsmobile.....	1914.....	54.....	Delco.....	366	Packard Truck.....	1918.....	E.....	Bijur.....	400
Oldsmobile.....	1915.....	42.....	Delco.....	367	Paige.....	1916.....	G-6 & H-6.....	Gray & Davis.....	401
Oldsmobile.....	1916.....	43.....	Delco.....	368	Paige.....	1916-17...	6-46, 6-38, H-6....	Gray & Davis.....	402
Oldsmobile.....	1916.....	44.....	Delco.....	369	Paige.....	1918-19...	6-39 & 6-55.....	Gray & Davis.....	403
Oldsmobile.....	1916-17...	45.....	Delco.....	370	Pan-American.....	1918.....	G4 & G5.....	Gray & Davis.....	404
Oldsmobile.....	1917.....	37.....	Delco.....	371	Panhard Trucks....	1918.....	A & B.....	Autolite.....	405
Oldsmobile.....	1918.....	37.....	Remy.....	372	Partin-Palmer.....	1915.....	38.....	Allis-Chalmers...	406

CIRCUIT DIAGRAMS OF CARS—Continued

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Partin-Palmer	1917	32	Disco	407	Regal	1917-18	J	Autolite	441
Partin-Palmer	1918	Ultra 4-Forty			Reo	1914	R	Remy	442
Paterson	1914	32 & 33	Delco	408	Reo	1915	R & M	Remy	443
Paterson	1915	4-32 & 6-48	Delco	409	Reo	1916	M & U	Remy	444
Paterson	1916	6-42	Delco	410	Reo	1916	R & S	Remy	445
Paterson	1917-18-19	6-45, 6-45R, 1919 "6-46"	Delco	411	Reo	1917	M-N-R & S	Remy	446
Pathfinder	1915		Westinghouse	412	Reo	1917	R-4	Remy	447
Pathfinder	1916		Westinghouse	413	Reo	1918-19	T & U & Early 1919	Remy	448
Pathfinder	1916	One-B	Delco	414	Reo Truck	1917		Remy	449
Pathfinder	1917	12	Delco	415	Republic Truck			Remy	450
Peerless	1915	55	Gray & Davis	416	Republic Truck			Westinghouse	451
Peerless	1916	56-57FF	Gray & Davis	417	Republic Truck		10-11	Westinghouse	452
Peerless	1917-18-19	56-2FF	Autolite	418	Riker Truck	1918		Westinghouse	453
Peerless	1918-19	56	Autolite	419	Riddle Coach and Hearse	1917		Delco	454
Pierce-Arrow	1914	38-C-2	Westinghouse	420	Roamer	1916		Bijur	455
Pierce-Arrow	1914-15	48-B	Westinghouse	421	Roamer	1917	R-A	Bijur	456
Pierce-Arrow	1915	38-C	Westinghouse	422	Roamer	1918-19	D-4-75 & C-6-54	Bijur	457
Pierce-Arrow	1915	48-B-3	Westinghouse	423	Ross	1916-17	8	Robbins & Meyer	458
Pierce-Arrow	1916	Tour. & Encl. Cars	Westinghouse	424	Russell		32 & 48	Bijur	459
Pierce-Arrow	1917-18	38-48-66	Westinghouse	425	Saxon	1915	Four	Ward-Leonard	460
Pierce-Arrow Two-Ton Truck			Westinghouse	545	Saxon	1915-16	Six	Gray & Davis	461
Pilot	1916-17-18	6-45	Delco	426	Saxon	1916	S-2	Ward-Leonard	462
Premier	1914	M	Remy	427	Saxon	1917	B-5-R	Wagner	463
Premier	1915	M	Remy	428	Saxon	1917	S-4	Wagner	464
Premier	1915	MJ	Remy	429	Saxon	1918-19	Y-18		
Premier	1917-18-19	6-B & 6-C	Delco	430	Sayers & Scovill	1916	4	Delco	465
Pullman	1913		North East	431	Sayers & Scovill	1916	6	Delco	466
Pullman	1915		Splitdorf-Apelco	432	Scripps-Booth	1916	Six-39 & 40	Remy	467
Pullman	1916		Splitdorf-Apelco	433	Scripps-Booth	1916-17-18	C4, D8, H	Wagner	468
Pullman	1916		Splitdorf-Apelco	434	Seagrave	1916	6	Westinghouse	469
Pullman	1917	434	Splitdorf	435	Service Trucks		(With Generator 450)	Westinghouse	470
Regal	1913-14	N	Rushmore	436	Service Trucks		(With Generator 760)	Westinghouse	471
Regal	1914	C	Rushmore	437	Simplex	1917	5	Bosch	472
Regal	1915-16	E	Dyneto	438	Speedwell	1914-15		Westinghouse	473
Regal	1915-16-17	4 & 8	Dyneto-Connecticut	439	Sphinx	1915-16		Splitdorf-Apelco	474
Regal	1917	J	Heinze	440	Standard	1915	4	Westinghouse	475

CIRCUIT DIAGRAMS OF CARS—Continued

CAR	YEAR	MODEL	SYSTEM	PAGE	CAR	YEAR	MODEL	SYSTEM	PAGE
Standard	1916	8	Westinghouse	476	Velie	1917	28	Remy	506
Standard	1916-17	E	Westinghouse	477	Velie	1918	38 & 39	Remy	507
Standard	1917	F	Apelco	478	Warren	1913-14		North East	508
Standard	1918-19	G	Westinghouse	479	Wayne	1915		Splitdorf-Apelco	509
Standardized Military Truck		Class B	Delco	546	Westcott	1914	O-30	Jesco	510
Stearns	1913	4 & 6	Gray & Davis	480	Westcott	1915	U-6 & O-35	Delco	511
Stearns-Knight	1914	4	Westinghouse	481	Westcott	1916	41 & 51	Delco	512
Stearns-Knight	1915	Light Four	Gray & Davis	482	Westcott	1916	U-50 & O-35	Delco	513
Stearns-Knight	1915-16-17-18-19	Series 32	Westinghouse	483	Westcott	1917-18-19	Series 17, 18, Early '19	Delco	514
Stearns-Knight	1916	8	Westinghouse	484	White	1913		Entz	515
Stearns-Knight	1916-17	SKL-4	Westinghouse	485	White	1914	GAG	White-Entz	516
Stearns-Knight	1916-17-18-19	S-K-8	Westinghouse	486	White	1914	GAGR	White-Entz	517
Stephens	1917	65	Autolite	487	White	1916-17		White	518
Stephens	1917	60-65			White	1917-18-19	GM & Early 1919	Leece-Neville	519
Stephens	1918	70-74-75-78	Delco	488	Willys-Knight	1916	84-C	Autolite	520
Stephens	1919	74 & 76			Willys-Knight	1916	84-R		Autolite	521
Stevens-Duryea	1915	D-6	Delco	489	Willys-Knight	1916	84 & 84-T	Autolite	522
Studebaker	1914	Four	Wagner	490	Willys-Knight	1916	84T, 84BT, 83R	Autolite	523
Studebaker	1915	EC-SD-5	Wagner	491	Willys-Knight	1917-18	88-4-C	Autolite	524
Studebaker	1915	35-EG	Wagner	492	Willys-Knight	1917-18	88-4-LIM	Autolite	525
Studebaker	1916-17	Series 17 & 18	Wagner	493	Willys-Knight	1917-18	88-4-SN	Autolite	526
Studebaker	1918-19	SH, EG, EH	Wagner	494	Willys-Knight	1917-18	88-4T, 88-4-LIM, 88-4-SN	Autolite	527
Stutz	1914-15		Remy	495	Willys-Knight	1917-18	88-8-C & R	Autolite	528
Stutz	1916-17		Remy	496	Willys-Knight	1917-18	88-8-SN	Autolite	529
Stutz	1918-19		Remy	497	Willys-Knight	1917-18	88-8-T	Autolite	530
Sun	1917	Light Six	Remy	498	Willys-Knight	1917-18	88-8-TC	Autolite	531
Sweeny Tractor	1916-17		Remy	499	Willys-Knight	1918	89-CLR-SN & T	Autolite	532
Templar	1918-19	445 & Early 1919	Remy	500	Winton	1915	21	Bijur	533
Union Motor Truck	1916-17		Autolite	501	Winton	1915	21	Gray & Davis	534
Universal Tractor		Governor Generator	Remy	547	Winton	1915	21-A	Bijur	535
Van Blerek Marine Engine			North East	502	Winton	1916	22	Bijur	536
Velie	1915-16	15	Gray & Davis	503	Winton	1917-18	22	Bijur	537
Velie	1916	22	Remy	504	Woods Dual-Power	1917	1600	Woods	538
Velie	1917	27	Remy	505	Woods Dual-Power	1918	1700	Woods	539
					Yale	1917	K-8	Disco	540

STANDARD AND INTERNAL WIRING DIAGRAMS

SYSTEM	DIAGRAMS OF	PAGE
Adlake.....	Standard wiring with Internal of Regulator.....	548
Allis-Chalmers.....	Standard wiring, Single Unit, with B. & S. Instr. Panel.....	549
Allis-Chalmers.....	Single Unit—Internal wiring.....	550
Allis-Chalmers.....	Motor-Generator with Regulator (Late Model).....	551
Atwater-Kent.....	Ignition System.....	552
Autolite.....	Internal Circuits. Mod. G. H. Genr.; Mod. M. Motor.....	553
Autolite.....	Standard wiring, Series Dimmer, Grounded System Connecticut Ignition, Type H & N-D Switch.....	554
Autolite.....	G B Generator. Field Winding Internals.....	555
Autolite.....	GC, GD Generators. Field Winding Internals.....	556
Autolite.....	GG Generator. Internal Connections.....	557
Autolite.....	MD, MC, MF Motors. Internal Circuits.....	558
Autolite.....	G H Generator. Internal Connections Clockwise Rotation..	559
Autolite.....	G H Generator. Internal Connections. Counter Clockwise Rotation.....	560
Bijur.....	Internal Circuits.....	561
Bijur.....	Generator with Regulator. Internal Circuits. Standard Connections.....	562
Bijur.....	Two Terminal Type L 61 Generator. Internal Circuits.....	563
Bijur.....	Single Terminal Type L 61 Generator. Internal Circuit. Grounded System.....	564
Bijur.....	Front Head Type L 61 Generator. Internal Circuit. Grounded System.....	565
Bijur.....	1918 Demountable Type Voltage Regulator. Internal Circuits.....	566
Bosch.....	Starting and Lighting System.....	567

SYSTEM	DIAGRAMS OF	PAGE
Bosch-Rushmore.....	Internal Circuits.....	568
Connecticut.....	Igniter System.....	569
Connecticut.....	Internal Circuits.....	570
Connecticut.....	Automatic Ignition System.....	571
Connecticut.....	Ignition. Internal Circuit. Type O Switch, GA Coil and No. 16 Igniter.....	572
Deaco.....	Voltage Regulator and Generator.....	573
Delco.....	Motor-Generators, All Models.....	574 to 579
Delco.....	1912-13 6-24 Volt System. Internal Motor and Generator Control.....	580
Delco.....	Control Panel 6-24 Volt System.....	581
Delco.....	Voltage Regulator. Internal Circuit.....	582
Detroit.....	R-S Motor-Generator. Installation for cars not originally equipped.....	583
Disco.....	Standard wiring, Generator Model 100, Motor Model 200....	584
Disco.....	Single Unit Standard Wiring.....	585
Disco.....	Standard, Two Unit, Diagram Models 30 to 39.....	586
Disco.....	Standard, Two Unit, Diagram Models 40 to 49.....	587
Disco.....	12-Volt Motor-Generator with Regulator.....	588
Dyneto.....	Standard wiring, for Entz Starting and Lighting System....	589
Dyneto.....	Standard wiring, Single Unit, 4-Terminal Unit, Models A & B	590
Dyneto.....	Standard wiring, Two Unit, DA Motor, GA Generator.....	591
Dyneto.....	Internal.....	592
Dyneto.....	Motor Generator. Internal Connections.....	593
Dyneto-Entz.....	Chalmers and White Installation.....	594
Eisemann.....	Internal G-4 Magneto.....	595

STANDARD AND INTERNAL WIRING DIAGRAMS—Continued

SYSTEM	DIAGRAMS OF	PAGE	SYSTEM	DIAGRAMS OF	PAGE
Eisemann.....	External E M Magneto. Dual Ignition.....	595	Wagner.....	Motor 36-T, Generator 45-T.....	616
Esterline.....	Generator with Automatic Cut-Out.....	596	Wagner-Ward-Leonard	Two Unit 6-12 Volt System.....	617
Fischer.....	Double Deck Model for Fords.....	597	Ward-Leonard.....	Voltage Regulators.....	618
Ford.....	For Coupe and Sedan Models.....	645	Ward-Leonard.....	Generator with Regulator Cut-Out.....	619
Genemotor.....	Type G S L 102. Standard wiring and Internal Circuit.....	598	Westinghouse.....	Standard wiring, Separately Mounted Regulator.....	620
Genemotor.....	Type G S L 101. Standard wiring.....	599	Westinghouse.....	Standard wiring, Single Reduction Motor, Vertical Ign.....	621
Genemotor.....	Type G S L 103. Standard wiring.....	599	Westinghouse.....	Double Reduction Motors: Switch for Auto. Screw Pinion Shift.....	622
Gray & Davis.....	Standard Grounded System, 1913-14.....	600	Westinghouse.....	Horizontal and Vertical Ignition Systems.....	623
Gray & Davis.....	Standard, Two-Wire System, 1913-14.....	601	Westinghouse.....	3rd Brush Generators. Separate and Self-Cont. Cut-Out and Starting Motor.....	624
Gray & Davis.....	Standard Grounded System, 1915.....	602	Westinghouse.....	Generator Frame 150-750.....	625
Gray & Davis.....	Standard Grounded System, 1915, Internal wiring.....	603	Westinghouse.....	Motors, Generators, Switches, Relay Regulators, Cut-Outs, etc.....	626 to 631
Gray & Davis.....	Two Unit, Internal.....	604	Westinghouse.....	Round Generator with separate Regulator-Vertical Ignition (S.G.L. Reduction Motor) Ammeter, Fuse Block, Start- ing Switch, Rev. Lighting and Ignition Switch.....	632
Heinze-Springfield...	Two Unit—Intenal Circuits.....	605	Westinghouse.....	Standard Motor, Lighting and Ignition Generator, 2-Gang Lighting and Ignition Switch, Ammeter and Fuse Block.....	633
Heinze Magneto Circuits	L-T-4.....	639	Westinghouse.....	Third Brush Generator, Separate Cut-out, Starting Motor, Starting Switch.....	634
Jesco.....	Internal.....	606	Westinghouse.....	Third Brush Generator and Self-Contained Cut-out, Starting Motor, Starting Switch.....	635
Leece-Neville.....	Cut-Out and Generator. Motor and Generator.....	607	Westinghouse.....	Lighting and Ignition Frame No. 760, Right Hand Rotation.....	636
National.....	Standard wiring.....	608	Westinghouse.....	Starting Motor Connections.....	637
North East.....	Models A. & B.....	609	Westinghouse.....	Separately Mounted Regulator.....	638
North East.....	Models D & G.....	610			
Philbrin.....	Duplex Ignition System. Internal and External wiring.....	611			
Remy.....	Internal Circuits.....	640-1-2-3			
Rushmore.....	Standard wiring.....	612			
Simms-Huff.....	Internal Circuits.....	613			
Splitdorf-Apelco.....	12-Volt Motor-Generator with Cut-Out.....	588			
U. S. L.....	12-24-Volt External Regulator.....	614			
Wagner.....	Motor-Generator with Regulator.....	551			
Wagner.....	12-Volt Single Unit, Motor-Generator, Early Models.....	615			

ELECTRICITY AND MAGNETISM

Electricity and magnetism are now used so extensively and vitally in connection with the ignition, starting and lighting of gas cars, trucks, motorcycles, etc., that an explanation of a few of the fundamentals may remove some of the fear that many mechanics have toward such electrical equipment. The operation, care and repair of the electrical systems are identical from a basic idea on all makes of cars. This being the case, if one understands the *why* of any unit of any system, one can readily locate and correct faults or troubles, thus keeping the system in proper operation.

Electricity as it is used in conjunction with the automobile, or motor truck, is called dynamic, or moving, to differentiate it from static electricity, which is generated by the rubbing together of two different materials. An example of static electricity is the crackling that is heard very often when rubbing a cat's back or combing one's hair with a rubber or vulcanite comb. In order to generate dynamic electricity or make use of it to do mechanical work, one must employ magnetism.

Magnetism, in the permanent form, is most evident in steel or iron and may be defined as that property of a body which enables it to attract or repel iron or steel. This characteristic is due to an invisible force radiating from the magnet in lines, called magnetic lines of force, coming out from one "pole" of the magnet and entering the other. The pole from which these lines leave the magnet is called the north pole, and if the magnet were free to move with no outside influence this pole would always point toward the north pole of the earth.

Since the lines of force always emanate from the north pole of a magnet and enter the south pole, it can readily be seen that like poles of two magnets repel one another and unlike poles attract. Similarly, if any magnet, free to move, be acted upon by the field of another magnet, it will take such position as will have all of the lines of force both flowing in the same direction.

A magnet may be of two forms, one in which the magnetism remains as a permanent characteristic and the other in which the magnetic influence must be supplied from without. Inasmuch as any wire carrying an electrical current is surrounded by a magnetic field, and because this field is multiplied over and over by winding the wire into the form of a coil, all turns being in the same direction, the method of utilizing this magnetic influence is by winding the coil around an iron core. Examples of the two forms of magnets are, first, the large permanent horse shoe magnets of the magneto, and second, the field coils and field pole pieces of the electric starting motor or generator.

Electricity is the name given to a conveyor of energy, but an accepted definition has never been formulated. A great many of its uses are known and its action is well understood, together with its limitations, but what it really is still remains to be discovered.

To begin with, there must be a difference of pressure (voltage) between the two sides or lines of an electric circuit in order that a current will flow. This condition is analogous to

that of water flowing in a pipe in that there must be a difference in pressure between any two points before any water can flow. Also, any conductor of electricity opposes the flow of current thru it; this characteristic is called resistance. From experiments it has been determined that the resistance of any conductor varies inversely with the area and directly with the length of the conductor. An equation has been constructed which will give either the voltage, current, or resistance of the whole, or any part of a circuit when the other two are known, that is, the current flowing thru any circuit is equal to the voltage impressed upon the circuit divided by its resistance.

The distributing system for electrical equipment on motor cars is designed with the same care as any other important element thereof. In the design, the engineer takes into account the current to be carried, as well as the permissible voltage drop thru the conductors and connections. This voltage drop thru any part or the whole of an electrical circuit can be measured with a voltmeter of suitable calibration. For example: take a three-foot length of wire and send a current thru it, having one terminal of a voltmeter connected to one end of the wire and the other terminal of the meter to the other end of the wire; a voltage will be registered which is proportional to the size of the wire and to the amount of current flowing. If the size of the wire is increased, or the current is reduced, a smaller voltage drop will be recorded and vice versa. From this it will be seen that the wires of any circuit must be of sufficient size to carry the current for that circuit without a prohibitive voltage drop, which means a loss of power thru the conductor. This loss of power makes itself evident in the form of heat, for the conductor becomes hot if too much current is forced thru it.

The same explanation holds for the condition of poor or good contact at the various connections in the circuit. The poor contact would correspond to the small wire with heavy current in that there would be an excessive loss of voltage at that point. A terminal may be tight mechanically to the binding post, but rust or corrosion will cause it to make a very poor contact. In case the lamps burn dim or the starter fails to operate with everything else in apparent good order, try all contacts with the voltmeter, measuring the drop in the same way as in measuring that thru a wire. The test points explained below may show a continuous circuit, but a poor connection could introduce a high resistance that would virtually open the circuit when its normal current tends to flow.

STARTING MOTORS

The starting motor, as used in connection with motor vehicles, is a device for converting electrical energy into mechanical work. When the starting switch is closed, allowing the current to flow from the battery thru the starter, two electro magnets are brought into play, one being that of the field coils or stationary part of the machine, and the other the armature, both being coils of wire conveying an electric current. As the armature is free to move within certain limits, and is a magnet operated upon by an external magnetic influence, it will turn to allow its own lines of force to run coincident with those of the field coils. Due to the construction of the armature having coils over its entire circumference, new coils are being magnetized continuously, thus keeping the armature in rotation. The available power from any electric motor depends, as seen from the above, upon the relative magnetic strength of the two magnetic fields. Therefore,

if either or both are effected by short circuit, open circuit, poor contact, or ground, the strength of the machine will be reduced proportionately.

GENERATORS AND IGNITION COILS

One of the fundamental principles of electricity is that if the number of magnetic lines of force passing thru any closed coil or closed electrical circuit be changed, a voltage will be induced in this coil which will cause a current to flow, the magnetic effect of which is to oppose the change in the original number of lines of force. The voltage, as induced, depends upon the length of time required to change the magnetic influence,—the more rapid the change, the higher the voltage. The operation of all direct current generators, as well as gasoline motor ignition systems, depends upon this principle.

In the case of the generator, the number of magnetic lines of force threading any coil of the armature is a maximum when the plane of the coil is at right angles to the path of the field force from the field coils. This can be readily seen if we take, as an example, a two-pole generator with a single coil on the armature. If we imagine the poles to be in the horizontal position and the plane of the coil in the vertical position we have a condition of maximum number of lines of force threading the coil. Now, if we turn the coil thru any appreciable angle, the field coils and pole pieces remaining stationary, the number of lines of force is decreased and a voltage is generated (the amount depends upon the speed of rotation) in the coils of the armature. By increasing the number of coils in the armature the voltage is increased and kept more nearly constant.

The commutator on the end of the armature shaft is for reversing the current as it leaves the armature, since it is a fluctuating or alternating current that is generated in the coils. This can be readily seen because the number of lines of force is increased during one-half of the revolution and decreased during the other half.

In the case of ignition systems, we have a similar condition, namely, the change in the number of lines of force threading the coil. Ignition coils, primary and secondary, are wound about the same iron core so that any change in magnetic influence of one is transmitted directly to the other with a minimum of loss. When current is flowing thru the primary or low voltage coil of the system, from a battery, in the case of battery ignition, and self-generated by the magnets, in magneto ignition, it builds up a heavy magnetic field, the lines of force of which thread the secondary. When this current is cut off by the opening of the breaker points, this magnetic influence ceases. The change in the number of lines of force thru the primary causes a countervoltage to be induced in the primary, the current from which must be absorbed or a bad arc develops at the breaker points. The condenser, a vital part of all ignition systems, is employed for this work, as further described herein.

Inasmuch as both the primary and secondary coils are wound on the same core, the effect of the change in the magnetism of the primary has the same result in the secondary in that a voltage is induced. The coil relationship is such that this secondary voltage is very high and forces itself across the gap of the spark plug, causing the ignition spark.

IGNITION

The internal combustion motor derives its power from the expansive force developed by the charge of gas which is compressed in the explosion chamber being suddenly raised from a low to a high temperature. To raise the temperature of this gas one must supply heat. This heat is generated by the burning of a part of the gas (gasoline) which is compressed. As in the case of any burning material, a definite length of time is required, depending upon the quantity, before the material is entirely consumed. This last statement must be borne in mind at all times when considering ignition problems.

To start the burning of any combustible substance an igniting flame or its equivalent, the heat value of which is measured by the inflammability of the substance, must first be applied. This igniting flame, in the case of the gas in an automobile engine, is supplied by the spark which occurs between the electrodes of the spark plug. It is very essential that this spark occur at the proper time relative to the position of the piston in the cylinder as well as that the valves be in the proper position. The gas must be compressed to its highest point when the combustion is completed. Were there no time element to be considered in the burning of the gas, ignition could take place when the piston is at its highest point. However, in order to have the motor operate at its proper efficiency, the spark is so set that the charge is ignited before the piston reaches the top dead center. Since the amount of this advance of the spark before center depends on the speed of the motor as well as its load, considering all forms of ignition the same, provision both manual and automatic is made for varying the

sparkling position. If the ignition takes place too early, the motor will have a knock that is very characteristic, whereas if it be too late, loss of power and excessive heating will be noted.

In the majority of battery ignition systems the breaker cam is held to the drive shaft with some form of friction device. This cam can be easily moved and thus change the sparking position beyond the limits of the control lever. In the high tension magneto the breaker mechanism is permanently located on the armature shaft, usually with some form of key. For this reason the only method of altering the sparking position beyond the range of the control lever is thru the driving yoke or timing gears of the motor. Alteration of the relationship between the distributor gear and armature gear does not affect the sparking position of the magneto, but does move the high tension conductor relative to the segments in the distributor when the magneto spark occurs.

There are at present two distinctive types of ignition in use on automobile engines, namely, battery ignition and magneto. The principle of operation of each is the same and it is identical with that of the generators, i. e., the inducing of a voltage in a coil of wire by changing the number of magnetic lines of force threading the coil. The ignition system is made up of a *primary* and a *secondary* coil, a primary circuit breaker, a condenser and a distributing system for both the primary and secondary current. The primary coil is one of a comparative few number of turns of rather heavy wire wrapped around a core of soft iron. This coil, as its name implies, is the first one to function in the operation of the

ignition system. The secondary coil is composed of a greater number of turns of very small wire. Since the secondary coil depends upon the changes in the magnetic influence of the primary coil, and in order to eliminate as much as possible the loss of this magnetic influence thru leakage, both the primary and secondary coils are wound upon the same core. The primary circuit breaker is a mechanism used for opening the primary circuit at regular predetermined intervals. The condenser functions in the ignition system in the same way as an air chamber on a water pump, that is, it absorbs the surge in the pressure at one interval and discharges the accumulated pressure at another interval. An electrical condenser is made up of a number of sheets of electrical conducting material, usually tin or aluminum foil, separated by sheets of insulating material, such as paper or mica. Its complete operation is outlined below. The primary distribution system, in the case of battery ignition, is that set of wires which feed the primary current from the battery to the coil and breaker points, and in the magneto that wire or system of wires which are used to short circuit the magneto primary circuit breaker and thus make it inoperative. The secondary distribution system is that which distributes the secondary or high voltage current from the secondary coil to the spark plugs. In the case of multi-cylinder motors this secondary distribution system usually takes the form of a distributor head moulded from a high tension insulation with inserts moulded in place. The high tension current is fed to the center of the distributor head and thru some form of rotor distributed to these inserts and from them thru the spark plug wires to the plugs.

In both the single spark battery ignition and high tension magneto ignition the primary coil is first energized, its magnetic field encircling and threading the secondary coil. Upon

opening the circuit of the primary coil this magnetic influence ceases, which induces a high voltage in the secondary coil. In the design of the ignition unit the relationship between the primary and secondary coils is such that this induced voltage is sufficient to jump the gap at the plug. At the time of opening the primary circuit there is a considerable voltage induced in the primary coil itself and this voltage tends to force current thru the gap at the breaker points even after they have been slightly opened. Were this condition allowed to exist the breaker points would very soon burn away. It is at this point that the condenser functions. Instead of the arc forming at the breaker points the condenser, thru what we may term its elastic characteristic, absorbs the current from this self-induced voltage and almost immediately discharges it back thru the primary coil. Since a reversal of the direction of flow of the current reverses the direction of flow of the magnetic lines of force, the discharge of the condenser reduces the length of time required for the number of lines of force threading the secondary coil to change from maximum to zero. This reduction of the time element for the change increases the secondary voltage because the induced voltage in any coil depends upon the time rate of change of the magnetic influence threading the coil.

The action of the high tension magneto is identical with that of the battery ignition, altho the resultant operating characteristics differ. The high tension magneto, being a self-contained unit, develops its own primary energy thru the rotation of the armature between the poles of the strong horse shoe magnets. The generation of this primary current is explained by again referring to the topic of generators in that the number of magnetic lines of force is changed by the rotation of the armature in the magnetic field. The primary

circuit breaker of the high tension magneto is so located that the contact points open when the primary current is at its greatest value. The magneto armature, under this condition, is usually from one-eighth to five-thirtyseconds of an inch of leaving the pole shoe, when the spark control lever is in the fully retarded position. Since the primary voltage, together with the primary current, increases with an increased speed of rotation of the armature, it is possible to break the primary circuit earlier in the relative position of armature and pole pieces.

There is one characteristic in high tension magneto ignition that is not found in battery ignition, due to the rotation of the secondary coil in the magnetic field. This causes what is called the "after burning" of the spark. Also, since the current as generated in the primary coil of the magneto is alternating, the direction of flow thru the breaker points is reversed every time that they separate. This fact reduces the tendency of burning of the points and eliminates the formation of a cone and crater condition which is so often found on battery ignition systems which have no current reversing feature incorporated in the ignition switch.

CUTOUTS OR REVERSE CURRENT RELAYS

The cutout or reverse current relay automatically connects and disconnects the generator to the battery. When the generator is at rest, the contacts are held open by a tension spring on one of the cutout contacts. When the generator attains a speed sufficient to develop a voltage of 6.5 volts, in the case of 6-volt systems, the cutout is automatically closed and the generator is connected to the battery.

A cutout consists of an iron core having two windings thereon, namely, a shunt and a series winding. The shunt winding is connected across the generator so as to receive the full voltage of the generator across the terminals, and when the machine attains a speed at which it develops a voltage over that of the battery, the shunt winding is sufficiently energized to close the cutout. When the cutout is closed a small current is caused to flow in the series winding connected in the main circuit from the generator to the battery, and this coil is energized. The pull due to the series winding, which is much greater than that of the shunt, reinforces the pull due to the shunt winding and firmly holds the contacts of the cutout in their closed position.

When the speed of the generator is decreased to a value at which its voltage is lower than that of the battery, or when the generator is at rest, a momentary discharge of the battery thru the series winding takes place and demagnetizes the coil. The instant the coil is demagnetized, the tension spring attached to the cutout pulls its contact arm away from the core and opens the circuit.

VOLTAGE REGULATORS

Most voltage regulating units consist of a core having a single winding, this winding being connected across the generator. The current in the winding and the resulting magnetic pull of the core will depend upon the pressure developed by the generator. Opposite one end of the core is a vibrating reed or contact arm, which is spring retracted away from the

core. When this reed is spring retracted away from the core it makes contact so that there is a by-pass around a resistance coil, which is in series with the field winding of the generator. With the vibrating reed in this position, the shunt field winding receives the full pressure developed by the generator. With increasing generator speed the voltage increases until the armature develops 7.75 volts, in case of a 6-volt system, and at this electrical pressure the regulator begins to function and will maintain 7.75 volts across the generator brushes at all higher speeds.

With increasing generator speed the voltage will tend to rise above 7.75. If, however, this value is exceeded by a very small amount, the increased pull on the vibrating reed of the regulating unit will overcome the spring pull and it will be drawn towards the core, thus opening the contacts and inserting the resistance in the generator field circuit. The added resistance in the field circuit decreases the exciting current in the field winding and the voltage developed by the armature tends to drop below the normal value of the 7.75 volts. If the voltage drops slightly below the normal, the pull of the spring on the regulator reed predominates and it again moves away from the core and closes the contacts which short circuits the resistance and permits the exciting field current to increase. This cycle of operations is repeated at rapid intervals and maintains the generator voltage constant at all speeds above the critical value at which it develops 7.75 volts with the resistance cut out of the field circuit.

The rapidity of vibration depends, to a large extent, upon speed, the regulator reed vibrating one hundred to one hundred and fifty times per second. The actual voltage developed by the generator is made up of a series of very fine ripples

above and below a straight line, the mean value of these ripples being 7.75 volts, the constant value for which the regulator is adjusted.

CONSTANT CURRENT GENERATORS. (Third brush regulation)

The voltage regulation of all third brush generators is effected by means of the reactive magnetic flux set up by the current flowing thru the armature.

The amount of current generated depends primarily upon the speed at which machine is driven and the position of the regulating brush with respect to the two main brushes.

Beginning at zero speed, the voltage is, of course, zero, and with increasing speed the voltage increases until the armature develops 6.5 volts, at which value the shunt coil of the cutout is sufficiently energized to cause the cutout switch to close.

After the cutout is closed, the generator begins to deliver current to the battery.

The constant current generator has a single shunt winding distributed over its poles and the regulation is effected by having this winding connected between one of the main generator brushes and an auxiliary or regulating brush. The maximum current generated depends upon the location of the third brush with respect to the main brush to which one side of the shunt field is connected. Moving the third, or regulating brush, in the direction of rotation of the armature, increases the generator output, and in direction opposite to the rotation of armature decreases the output.

LOCATION AND CORRECTION OF FAULTS

With the foregoing information and the following blueprints one can readily repair or adjust any part of the electrical equipment of any car. However, just as the repair and adjustment of the mechanical elements of the car require special tools and gauges, satisfactory work on the electrical equipment necessitates the use of electrical tools and measuring instruments.

Probably the most universal and convenient tool for checking various points about the electrical equipment, both assembled or removed from the car, is a pair of test points. A very satisfactory set of test points can be made from an electric light extension cord by cutting one of the conductors and soldering a brass point made from one-quarter inch brass rod six inches long, to each end, or extension of the cut wire. With the plug in the light socket and the current turned on, the lamp will light if the points are in contact, either directly or thru some electrical conductor, and will not light if the points are not in contact. With these test points it is possible to determine the presence as well as the location of open or short circuit, cross connections and grounds. As an illustration of the use of the test points: it is desired to locate trouble in a two-unit starting and lighting system of which one pole of both the motor and generator is normally grounded. The difficulty is that the battery does not stay charged. The generator is found to be of the third brush controlled type and mechanical corrections, such as cleaning the commutator, sanding in the brushes and tightening all of the connections does not correct the fault. First remove the inherent ground connection and insulate all of the brushes from the commutator. This can be done very easily by placing a piece of paper between each brush and the commutator. Also remove the connection to the battery or cutout relay. The generator circuits are now isolated, and by referring to

the blueprint showing the internal connections of the unit one can determine the correct connections and circuits. For instance, the shunt field is connected across the third brush and the positive post of the machine. If we place one of the test points on the third brush and the other on the positive post of the generator, the lamp will light if the circuit be continuous, but not if the circuit be open. If this shunt field be open there is no magnetic field thru which the armature must rotate to generate any current. One usually finds an open circuit of this nature in the leads connecting the different coils of the field or that leading to the brush or brush pigtail. Correction can be made by soldering intact and winding tape over the connection. Supposing that the circuits are all complete, then test for short circuit or grounds. The blueprints show what these circuits should be and one can very readily, with the test points, determine whether or not they be properly connected to or insulated from each other.

One of the more common troubles encountered is that of grounds or failure of the insulation between the conductors of the machine and the machine frame. This condition, if present, can be determined by testing for circuit between the conductors of the various circuits and the machine frame. For instance, as in the case just cited, of the generator with brushes insulated from the commutator, place one of the test points on one of the brushes and the other point on any part of the machine frame. In case of ground, the lamp will light. The armature can be tested for ground by placing one of the test points on the commutator and the other on the armature shaft. If ground is found in the armature coils, as well as short or open circuit, it is advisable to return the complete armature to the factory for repair since very extensive equipment is necessary to properly dip in insulating varnish and bake after the coils have once been disturbed. This same

practice should prevail when one encounters difficulty within any coil of wire used in connection with electrical work when the coil has been treated with varnish. Supposing a ground were found between a field coil and the pole piece; correction can be made by inserting suitable insulation between the coil and pole piece at that point where the insulation is broken.

Failure of the insulating bushings or washers that are used with the binding post studs which act as the conductors through the machine frame or housings can be corrected only by replacement of the bushings or washers.

The wear of the brushes leaves a carbon dust deposit on all of the parts in the commutator end of the machine, and if this accumulation becomes sufficient, short circuit or ground will ensue which makes the machine inoperative. It is very essential that the commutator end of the machine be kept clean and free from this dust at all times as it tends to work into the bearing points of the brush holder, causing the latter to become so sluggish in its action that the brush cannot follow the variations of the commutator. With this condition present excessive arcing at the brushes results, and the brushes and commutator will both burn away in a very short time, necessitating new brushes, turning off the commutator and possibly new brush springs. Another condition that will cause excessive arcing at the brushes is that of high mica in the commutator. The copper may wear away faster than the insulation, the latter projecting above the surface somewhat. In all generator commutators the mica should be undercut about 1-32 inch with a hack saw blade, which will eliminate this difficulty.

No garage can be considered complete unless an ammeter and a voltmeter of suitable calibration be listed in their equipment. The electrical equipment of an automobile may

be satisfactory in every way, apparently, and still give the owner of the car a great deal of trouble. For example, the generator may be charging the storage battery when the motor is running but still the battery does not hold its charge. One may suppose that the charging rate of the generator is not sufficient to keep the system in condition but without some means of measuring the actual current flowing he remains in the dark. Further it is very inconvenient, at times, to test for short or open circuit or ground with the test points. For example, it is desirable to determine whether an open circuit exists on a lighting circuit on a car. By placing the ammeter in that particular circuit with the switch in the "on" position one can determine whether current be flowing or not. If there is current flowing, which is in excess of that drawn by the lamp, a short circuit exists which permits the current to flow thru the circuit, but not thru the lamp which is of rather high resistance.

Again, the test points may show continuity of circuit but still no current will flow when in its normal operation. This condition would be caused by a loose or dirty connection in the circuit which introduces a high resistance and causes an excessive voltage drop at that point which, tho allowing current to flow when the higher voltage of the test lamp circuit is employed, virtually opens the circuit on the lower voltage. This condition is usually found more in the starting system than the lighting or generating, and its location can *sometimes* be determined by the heating of the connection. However, the more satisfactory method is to measure the voltage drop, with the current turned on, across all of the connections in the circuit, with a voltmeter of suitable scale and calibration. That which shows the greatest drop is, of course, the one that is giving the trouble. For example, a starting system fails to operate even tho the battery be fully charged and all

connections tight. The commutator of the starting motor is inspected, sanded smooth if necessary and still the starter will not crank the motor. By measuring with a voltmeter the drop across the various connections, we find that the voltage thru the starting switch is very much lower than that of the battery. This condition would absolutely prohibit sufficient current reaching the starter to develop any appreciable power. Upon disassembling the switch a very unsatisfactory contact surface would be found, either burned or dirty or, due to loss of tension of the springs, the contact surfaces are not held together tight enough.

A further use of the ammeter and voltmeter together is to test for open or short circuits in armature coils. To test for an open circuited coil, disconnect the field coils from the machine, but leave the brushes in contact. Now connect a dry cell in the circuit so that about eight amperes will flow thru the armature. With a pair of soft points as leads from the voltmeter, measure the voltage drop between adjacent bars of the commutator. A sudden increase in this voltage drop indicates an open circuited coil, whereas a drop indicates a short circuited coil.

The same instruments may be used to determine the presence of a short or open circuit in the field coils of a machine. If one wishes to test the series field of a motor or generator it is advisable to use either a dry cell or place a resistance in the circuit so that the flow of current will not be excessive, but the shunt field may be connected directly across the storage battery which is used on the car. With this current flowing the voltage drop across each coil of the field winding should be the same. If the current does not flow there is an open circuit present, but if the circuit is continuous and there is a material decrease in the voltage drop across one coil of the field, this particular coil is short circuited.

Another characteristic of a voltmeter is that the voltage reading across any potential is decreased in direct proportion to the amount of any external resistance that be connected in series with the voltmeter. For example, if one takes the voltage reading across a storage battery and finds it to be six volts, direct reading, and then connects the positive terminal of the battery to the positive terminal of the voltmeter, using one lead from the negative terminal of the battery and one from the negative terminal of the voltmeter as test points across, say, the secondary coil of a magneto or battery ignition system, a very much lower voltage will be read. In this way, by comparing with a good coil, detection of short or open circuit can be made. This method of test is very satisfactory when working with resistances that are too high to allow current to flow thru the test lamp points or when test points from the lighting circuit are not available.

The following tabulations will give one a key to the location of faults that are the more probable and those which are the most prevalent. Certain of the difficulties are very characteristic and easily corrected, but others, while very apparent in effect, are at times very confusing in their cause. However, after a little experience, the operation of a defective piece of apparatus will show its cause as readily as one can determine faulty operation of any of the mechanical equipment. For example, a short circuited generator armature fails to charge the battery, the generator has a growling noise which disappears when the shunt field is opened, by either raising the brush from the commutator or removing the shunt field fuse, providing the machine is so protected. The short circuited coil will show itself by charred insulation, since all of the current generated by the machine is absorbed in the short circuited coil. A short circuited or grounded motor armature

coil, in case of grounded machines, makes itself apparent by slow cranking and by drawing excessive current from the battery when cranking. An open in the charging circuit causes serious arcing at the generator brushes and the lamps burn very brightly when the generator is being driven above its cut-in speed, providing the open be between the cut-in relay and the battery. If it be between the relay and the generator or in the relay itself, the arcing at the brushes will be noticed. If the machine be protected by a shunt field fuse, the fuse will operate if the machine is run on open circuit at a speed considerably above that at which the generator cuts in. A short circuited condenser in the ignition system manifests itself by failure of the unit even though current be flowing as shown by an ammeter. In a magneto, there will be no spark at the plug and if the instrument be removed from the car, it will be noted that the resisting torque of the armature is the same with or without the breaker mechanism in place. An open circuited condenser causes a very weak spark from the secondary coil and excessive arcing at the contact points. In testing a condenser with test points, it is necessary to use direct current in order to obtain positive results. The method of test is to put one test point on each terminal of the condenser for a short time and then, with the test points still in contact with the condenser, short circuit the condenser. If it be in proper condition, a very characteristic snap will be heard. A short circuited condenser will, of course, show continuous circuit and were an ammeter placed in the primary circuit, it would be noted that there is no interruption of the current flow on opening the breaker points.

A very disagreeable condition that is at times encountered is that of short circuit in the distributor head of the ignition system. This can be located by determining whether current is fed to the distributor head. If so and none reaches the

plug or reaches the same plug all of the time, short circuit is present. This difficulty cannot be determined by the test lamp due to its comparatively low voltage, that of the ignition system being capable of 10,000 volts.

IMPORTANT POINTS TO REMEMBER.

In all electrical circuits there must be a path for the return of the current, either through the frame of the car or machine or through an insulated conductor.

Do not forget to disconnect the battery before making any tests with the test points.

Be sure that the circuit to be tested is isolated and the test lamp will not indicate continuity through some other path.

Always remove the ground connection from inherently grounded machines before testing for ground.

Study the circuit diagram before disconnecting any wires.

In reassembling electrical equipment, be careful not to damage the insulation.

Do not allow any insulated conductor to be clamped between two metal surfaces in a way to destroy the insulation.

Solder all connections well so that vibration will not break them open.

Never grease nor oil the commutator on a motor or generator.

Oxidized or dirty contact points in an ignition system keep the circuit open and allow no current to flow.

The vibration of the car causes conductors to move more or less, so do not crowd terminals.

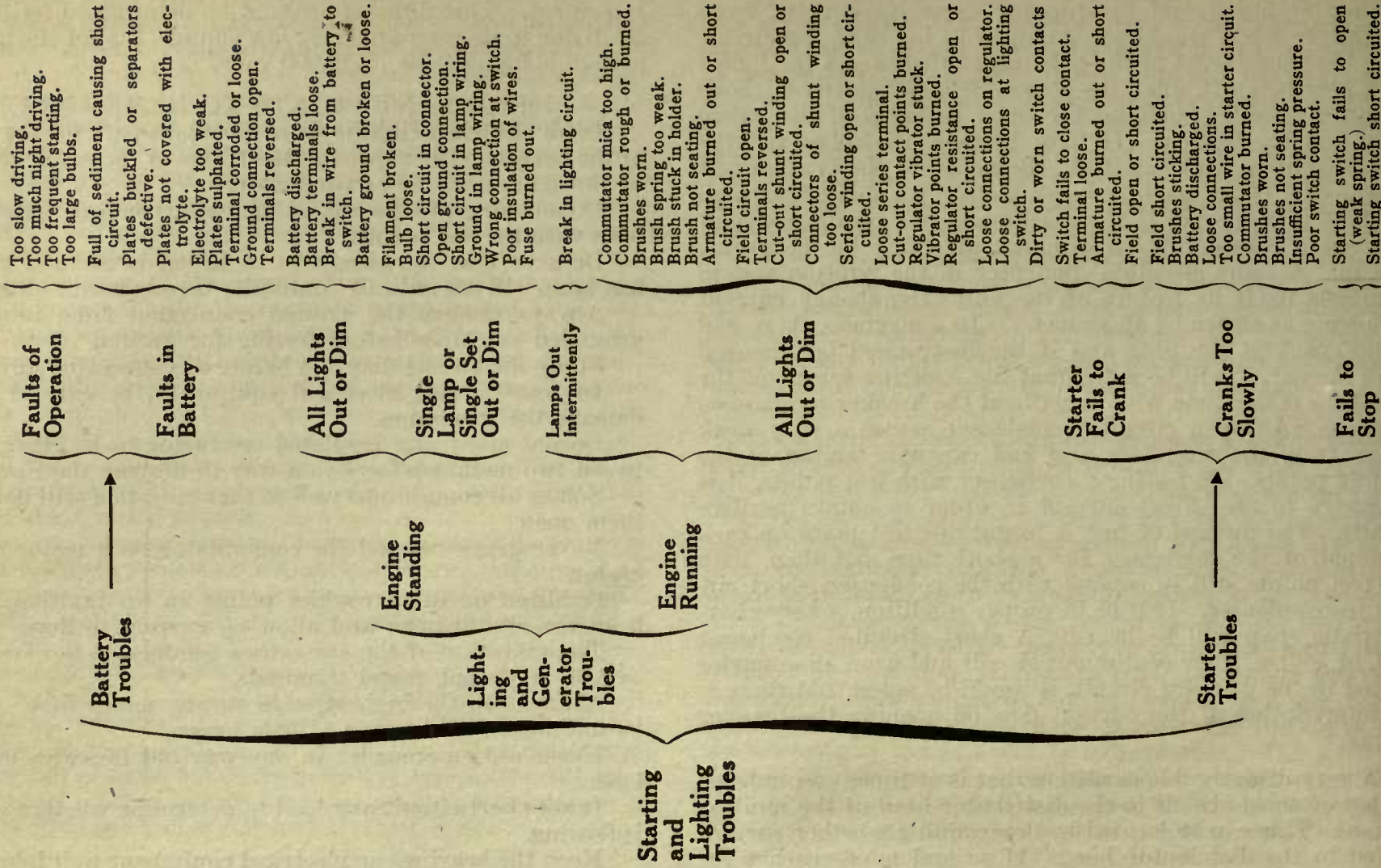
Always use the highest scale on any meter first. If this be too high, then try one a little lower.

Never use an ammeter in any way but in series with the load.

Don't short circuit any load to determine whether current is flowing.

Keep the bearings on electrical equipment well lubricated.

Chart of Starting and Lighting Troubles



THE STORAGE BATTERY

As an explanation of the action of a so-called storage battery will be of material help to the mechanic in locating and correcting faults in this element of the electrical system, a few fundamental comparisons will be made.

The storage battery is improperly named, in that the electrical energy is not actually stored in the battery, although the action is very similar to that of storage and discharge of electricity. The storage, or secondary cell, is an electro-chemical unit, and derives its ability and usefulness as a convenient conveyor of electrical energy entirely through the medium of chemical action and reaction, just as gasoline is a convenient carrier of mechanical energy. The energy from gasoline is released and converted into work through chemical action—(explosion)—in the cylinder of the engine. Now, were it possible that the waste gases from the cylinder—the exhaust—could, with the same cost in energy that is given up at the time of explosion, be converted back into gasoline, it would be a chemical reaction.

In the case of the storage battery we have a very similar condition, with this exception, that the “exhaust” or waste material is not dispelled into the air but *remains in the battery*.

Starting with a fully charged battery, having all of its potential energy in the form of the positive and negative plates, peroxide of lead and soft spongy metallic lead respectively, and the electrolyte, we have the condition analogous to that of the compressed gasoline and air mixture in the cylinder just prior to the explosion. If any current is withdrawn from the battery, chemical action immediately starts, and its degree is in direct proportion to the current withdrawn. In other words, the amount of chemical action in-

creases with the amount of current withdrawn; slight action when merely burning lamps and heavy action when cranking the motor with the starter.

Each constituent of the mixture, as in all complete chemical changes, has a definite function to perform. In the storage battery, a part of the peroxide of lead of the positive (brown) plate, and the spongy lead of the negative (gray) plate, are converted, by taking some of the acid of the electrolyte, into sulphate of lead, which are small white crystals and when formed are difficult to dissolve in water or electrolyte. The combination of removing acid from the electrolyte, as well as the addition of water (both taking place while the current is being withdrawn from the battery), tend to weaken or make less dense the electrolyte, hence the drop in gravity with discharge.

From this it is apparent that the resulting materials from the discharge of the battery remain in the battery and, inasmuch as the chemical action of a storage battery is reversible, if the conditions are reversed the materials will be converted back into their respective initial forms by so-called charge. This completes the cycle of the storage battery when in proper condition and not abused.

One of the characteristic and chronic abuses that a storage battery must withstand is that of excessive sulphation, or the battery being “sulphated.” This condition may arise from operating a starting battery which is being charged whenever the motor is running above the “cut-in” speed of the generator, in a partially charged condition for a considerable time. Also, if a battery, either lighting or starting or a combination of the two, be left idle for an extended period in a

discharged state, the same condition results. This is due to the minute crystals of lead sulphate, which are formed on both plates of all lead batteries during discharge, slightly dissolving in the electrolyte, and recrystalling out, one upon the other, until there are appreciable crystals formed, making a white and shiny layer over the whole plate. A battery in this condition acts very similarly to one which is worn out,—in that its capacity in ampere hours has fallen far below the manufacturer's rating, leading one to believe that a great deal of the active material has fallen out of the plates. The remedy for a sulphated battery is a long, slow over-charge, at about one quarter the normal charging rate. This continued over-charge is necessary because of the difficulty of breaking the sulphate down by means of an electric current. In fact, the fault is corrected in part only after the treatment prescribed. Great care should be exercised in this charge, as well as for any other correction or in the operation of a storage battery, that the temperature of the electrolyte never exceeds 100 degrees Fahrenheit. Temperatures above this point are accompanied by a hardening of the plates, resulting in lower terminal voltage on discharge, and carbonizing of the separators which reduce their insulating value and cause premature failure.

Failure of insulation in a storage battery, as well as any internal short circuit due to foreign material or high sediment, is shown by partial or total loss of voltage of that cell, or if only a very slight internal short circuit, by rapid loss of charge.

Evidence of a broken jar is very apparent through leakage of the electrolyte.

Breakage of a pillar post or strap connector is noticeable either by the wobble, or excessive heat generated at the faulty connection when the battery is being discharged at a high rate.

One condition that may confront the battery repair man which is very easily explained, but at times difficult to detect, is the failure of separator insulation due to excessively strong electrolyte. The strong acid very rapidly attacks the wood fiber of the separator and makes it appear as mussy wet chocolate. The specific gravity of the electrolyte in this case is usually at least 1320 and the voltage on charge is normal but falls off rapidly on discharge. Remedy for this fault, in case the plates have not been too heavily sulphated, is replacement of separators and very low electrolyte, bringing the gravity back with a slow charge.

REPAIRING BATTERIES

LEAD CONNECTOR—SEALED TYPE

Before starting to dismantle a battery, a sketch should be made showing the inter-cell connections and position of terminals for guidance in re-assembling.

To remove terminals and cell connectors center-punch the tops of each over the terminal posts and drill to a depth of $\frac{3}{4}$ inch, using $\frac{5}{8}$ inch drill for 12 volt batteries and $\frac{7}{8}$ inch for 6 volt batteries. Do not drill deeper than necessary as it involves extra labor in building up the post again when re-assembling.

To remove top connections after being drilled, place a flat piece of steel along edge of case to prevent marring or crush-

ing of edges; then use lever underneath connector and pry off. Brush off the accumulation of lead and dirt from top of battery. Care should be exercised to keep foreign substances from the inside of the battery, especially metal which may become lodged between the plates and cause short circuiting.

Remove vent plugs and blow in the holes in the covers. This should always be done before bringing an open flame near the battery, as an explosive gas, (hydrogen), is generated in the battery during both charge and discharge. Explosion of this gas in the confined space of the battery cell usually results in a broken jar. The moulded rubber vent plugs being very brittle and easily broken, the use of pliers for their removal is not advisable.

Soften the sealing by playing a soft flame over the compound. Care must be taken so that the flame does not burn the covers. It is best to play the flame back and forth, not steadily in one place as this will cause the compound to melt and run. A small flame used for several minutes brings better results than a strong flame which melts only the surface compound and leaves that below hard.

Use a heated screw driver (to prevent adhering) and dig out the compound. After all the compound has thus been removed apply the flame to the inside of the jar (through vent tube) for an instant, then run a hot putty knife around the edges between jar and cover.

Place the battery on the floor and, holding firmly between the feet, grasp the terminal posts with two pairs of pliers and lift the element and cover out together. Let the elements rest

at an angle on top of jars to drain. While the elements are draining, apply flame around the terminal posts and lift off covers.

If separators are in good condition, and a jar replacement only is necessary, set the element in electrolyte or water until ready to replace. If separators are to be changed, separate the positive and negative groups by grasping the elements firmly by the posts and working slowly back and forth.

The smallest opening in a separator may cause a short circuit which may not be discovered until the battery has been in use again for some time. When separators have turned black, they are carbonized and their life is virtually gone. To remove separators, take a long bladed knife and run it between the plate and the separator. It is always best to renew the separators. Separators should never be allowed to become dry, but should be kept immersed in a very weak solution of electrolyte.

Inspect plates to determine whether or not they require replacement. If battery has been overheated through overcharging or short circuiting, this will be indicated by brittle and buckled plates, with active material granular and falling away from the grid. Plates in this condition will have to be replaced.

The condition of the positive plates can be ascertained by using the blade of a knife. If they are fairly hard and have neither lost too much of their surface nor become extremely buckled they can be used again.

The condition of the negative plates is very often such that they may be used again with new positives. In this case the negative group should be immersed in water to prevent the plates from drying out through heating by exposure to the air.

Occasionally it happens that one or two plates in a group require replacement while the balance of the plates are in good condition. In this case new plates may be used in replacement. A group of buckled plates which, when re-assembled, will not go into the jar readily, should be replaced with a new group.

Invert the case over a sink and thoroughly cleanse the jars by inserting a hose and injecting a stream of water into each. Be sure that all sediment and foreign matter is removed before replacing the elements.

Inspect the jars carefully for cracks or holes. Jars exhibiting such, regardless of the size of the imperfections, should be replaced with new ones.

To remove a jar fill it with boiling water and allow it to stand for a few minutes. This will loosen the sealing compound surrounding the jar. Grasp the edges of the jar with two pairs of pliers and pull it straight up. Care should be used so as not to damage adjacent jars.

The new jar should be heated before being placed in the case. When the jar has been heated either with boiling water or flame, it should be pushed into place, taking care that the top of the jar is level with the others. If not lined up, the top connectors will be uneven, and as a result present a very amateurish-looking job.

To assemble an element, place the positive and negative groups on a clean, flat surface. Always make sure that it is free from lead scrapings or foreign substances of any kind, as these substances will adhere to wet separators, which will cause short circuiting of the plates. Intermesh the positive and negative group. As the negative group contains one more plate than does the positive, both outside plates will be negative.

Lay the element on its edge and insert the separators between each pair of plates, the grooved side of the separator next to the positive plate. Carefully check up separators after assembling, as omitting a separator would cause considerable trouble.

Take the element by the pillar posts and lower gently into the jar. This should be done very carefully to avoid breaking the jar.

If the cover does not fit close to the terminal posts, or the wall of the jar, the openings should be calked to prevent the melted sealing compound from flowing into the jar.

Pour the compound so that it will fill all spaces and reach to a height level with the top of the case. Also see that it flows evenly over the whole surface.

Before applying connectors, see that the terminal posts are free of all compound and dirt.

Using an ordinary pocket knife, clean the inside of the connectors. Then clean the tops of the connectors with a file, to remove dirt and oxide, so that they can be properly united.

Before applying the terminal connectors, test all cells with a voltmeter to see if they are set up properly. The connectors should be applied so that the positive of one cell is connected to the negative of the next cell.

In welding connectors and terminals to the posts, fuse the top of the post with the edges of the hole in the connector. Melt strips of lead and allow the molten metal to run into the hole in the connector. Care must be taken to see that the top of post and the inside edges of the connectors are properly melted together before adding additional lead. If this is not done, poor contact will result. Care should be taken not to melt the outer edges of the connectors.

After burning the connectors and terminals, mark the positive terminal (+) and the negative (-).

CHARGING

Fill battery with electrolyte and start to charge at one half the normal charging rate and continue until gravity stops rising. During the development charge take occasional temperature readings and if the temperature of any cell exceeds

100° F., lower the charging rate, or discontinue charge until the cell cools. The strength of the electrolyte used for filling the battery largely depends upon the condition of the plates. If all new plates are used, gravity should be 1.300; if positive renewal, 1.285; if old and sulphated plates, 1.100, and if old and not sulphated plates, 1.250.

If the battery has new plates, twice its rated capacity will be required for the development charge. If the plates are old and badly sulphated, more time may be required.

Any cells which have not been repaired should be left out of the circuit during the first half of the developing charge. They may then be connected into the circuit and the whole battery brought to full charge.

When the charge is complete, adjust the gravity of the electrolyte to 1.280 to 1.300. To do this remove some electrolyte from the cell and replace with pure water until desired gravity is reached; or remove electrolyte from the cell and replace with 1.400 acid, according to whether the cell reading is high or low.

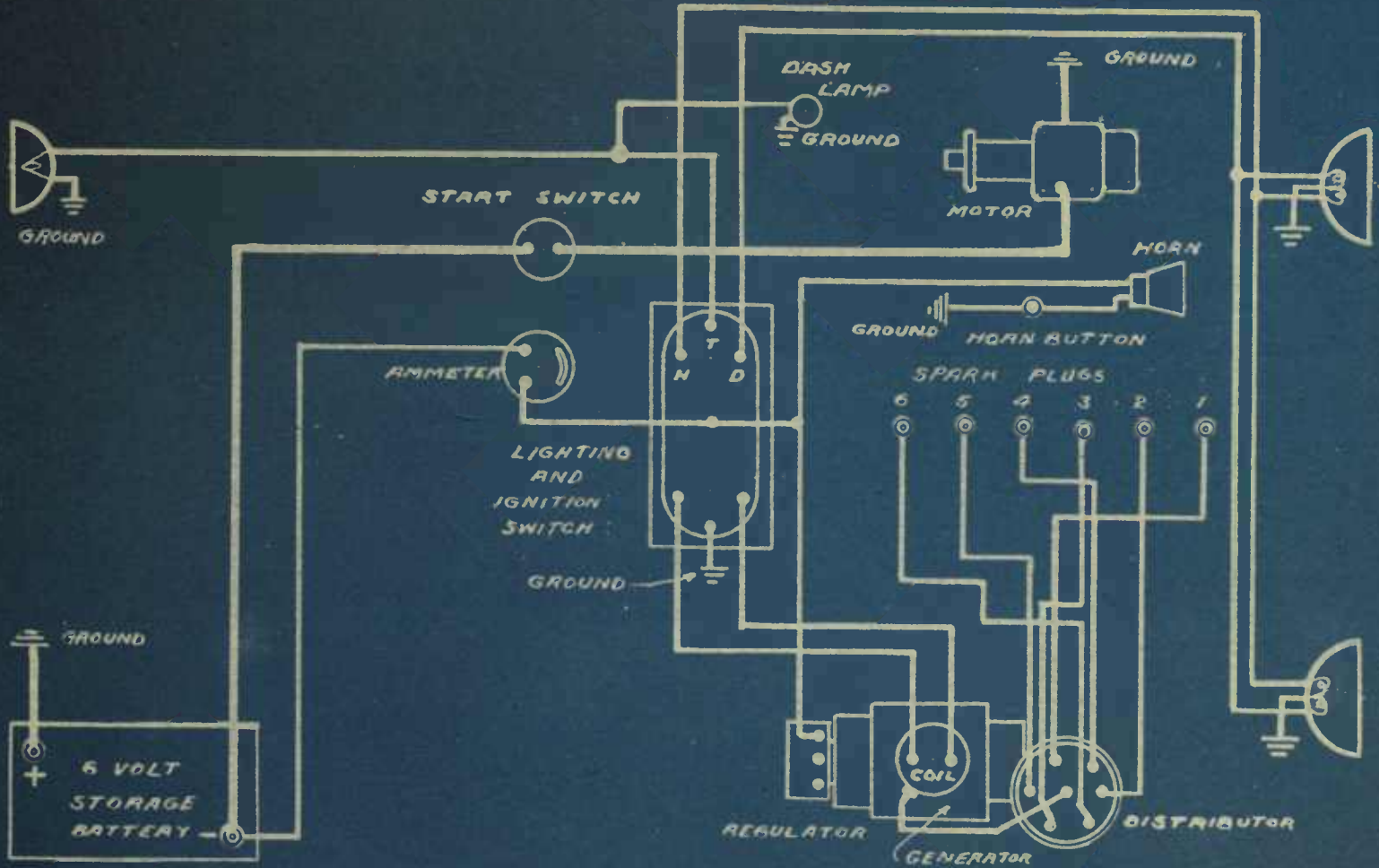
Clean off the top and sides of battery, cover terminals and connectors with vaseline and the battery is then ready for service.

ABBOTT-DETROIT
REMY SYSTEM

MODEL 6-44

1916-1917

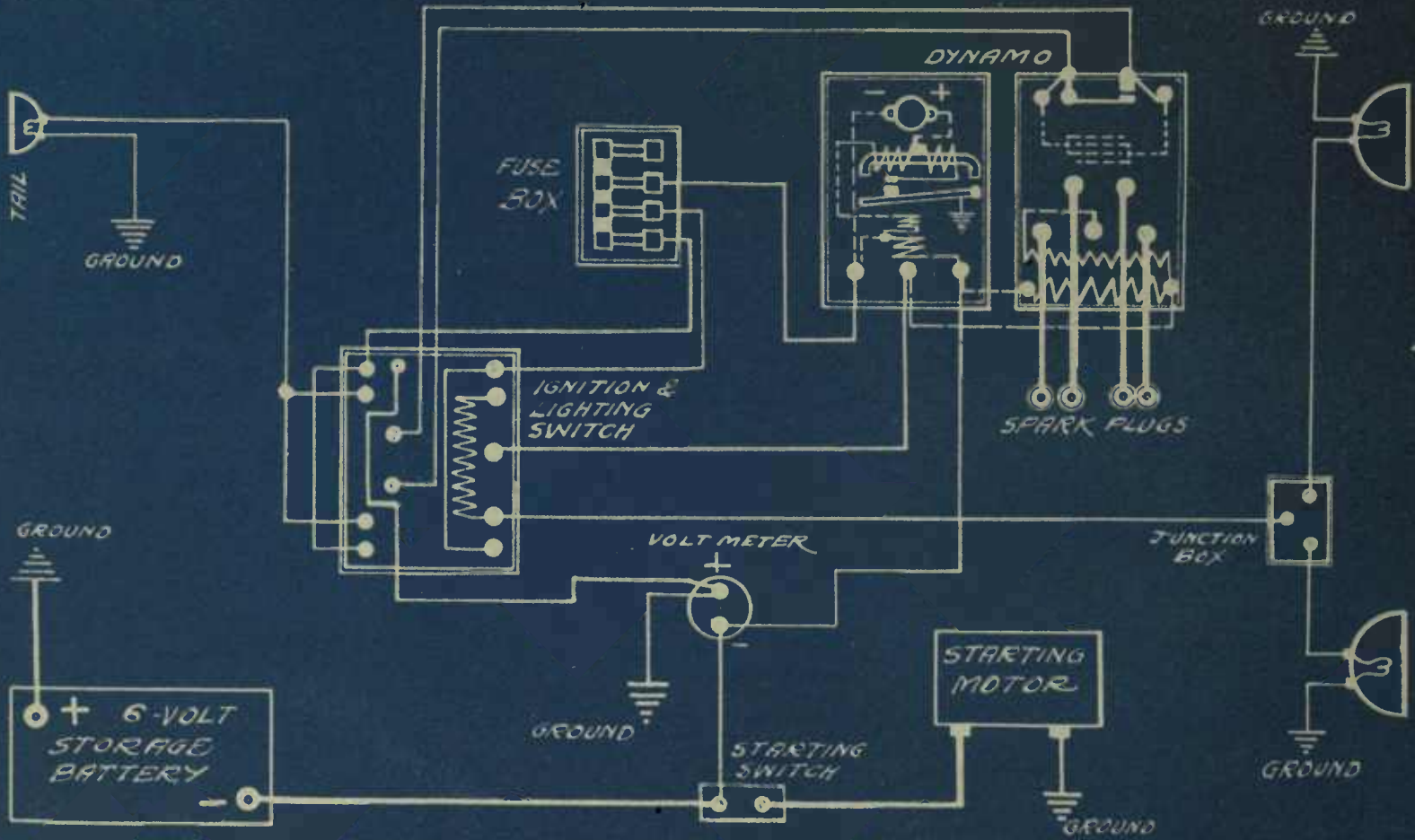
FROM REMY MANUAL



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ALLEN 1914-15 "34" "33"
WESTINGHOUSE SYSTEM

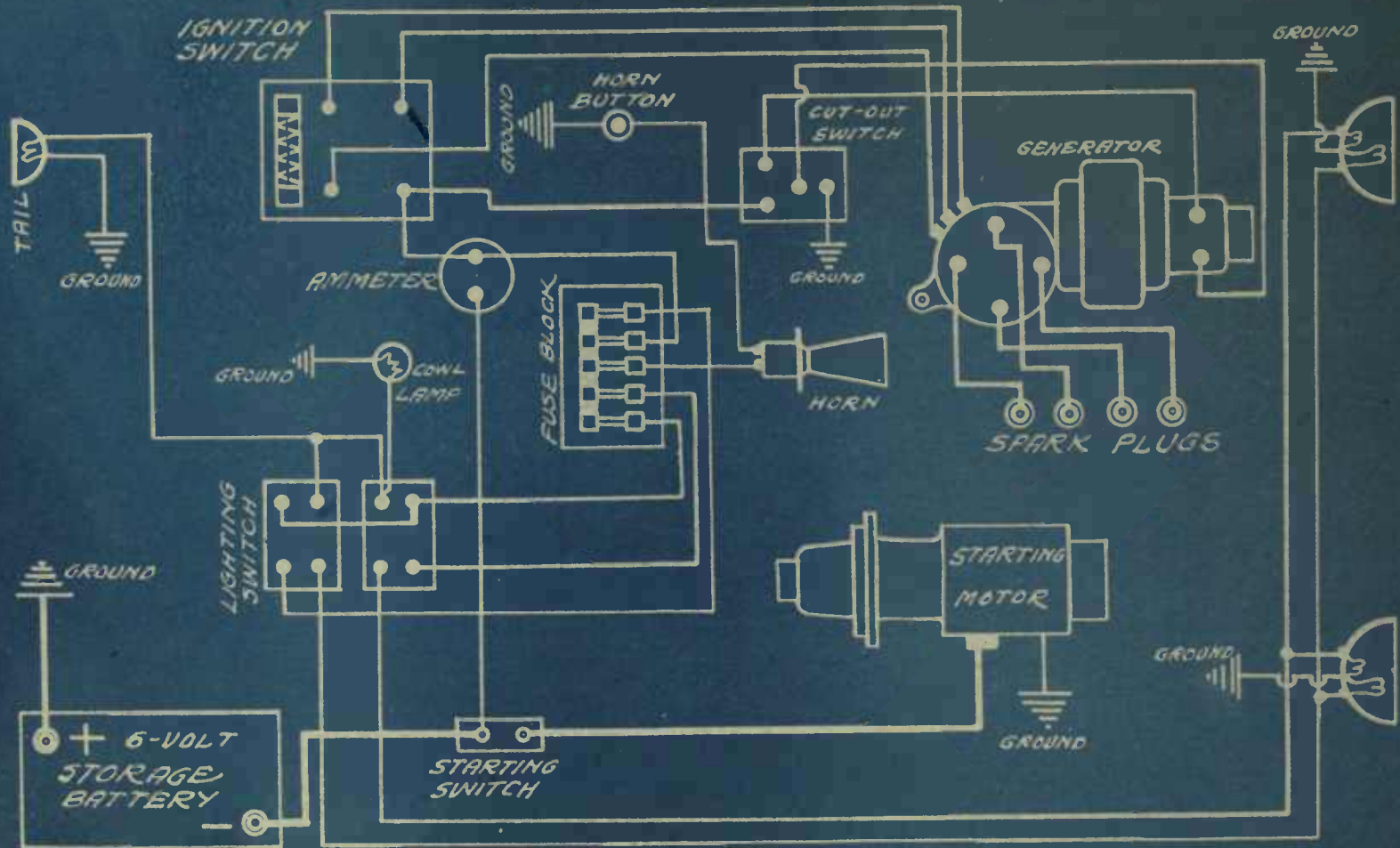
FROM ALLEN BR. 45M.112



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ALLEN 1916 "37"
WESTINGHOUSE SYSTEM WITH DIMMER BULBS

FROM ALLEN BR. ASM.110

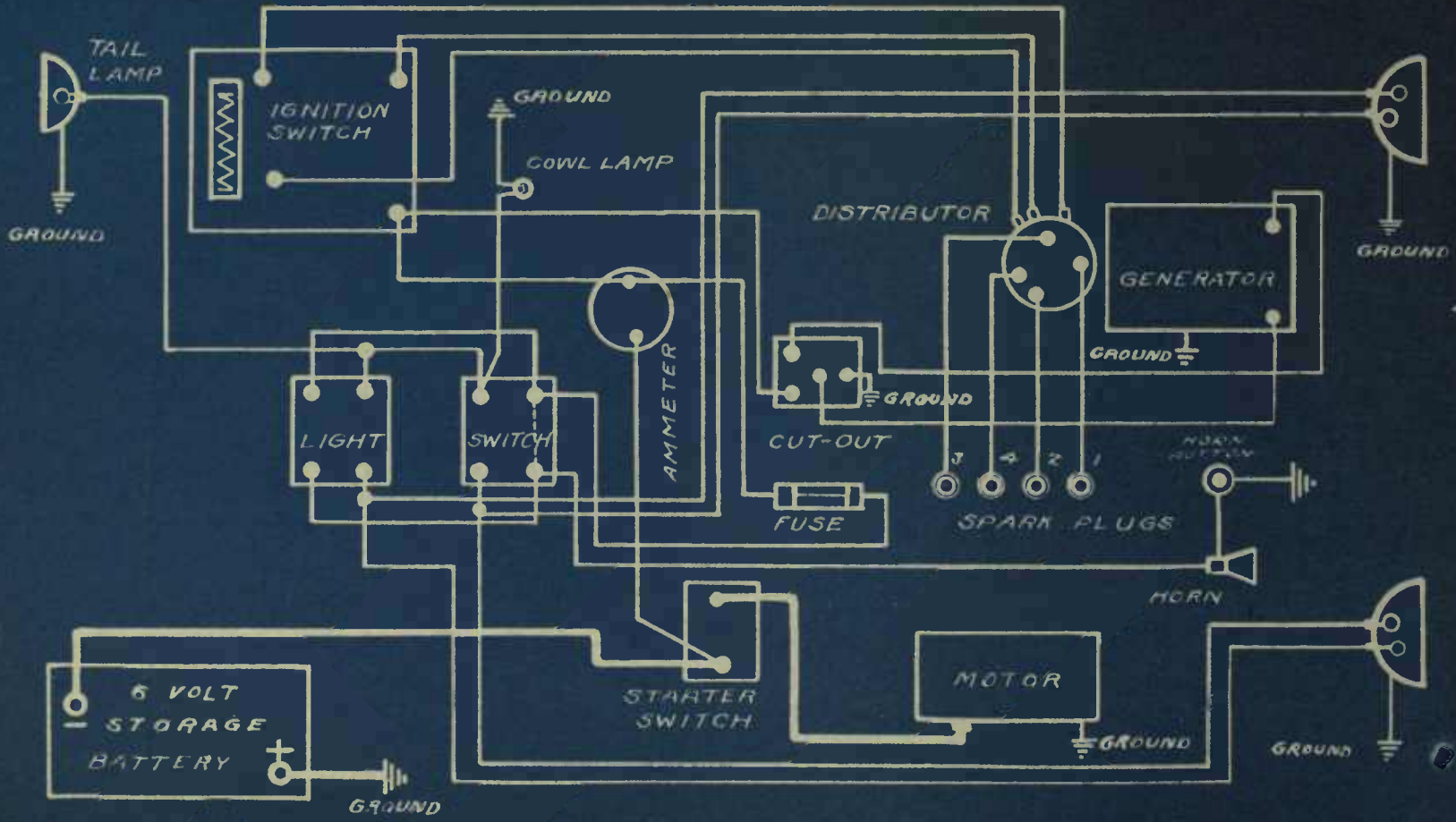


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ALLEN 1917
WESTINGHOUSE SYSTEM

CLASSIC MODEL

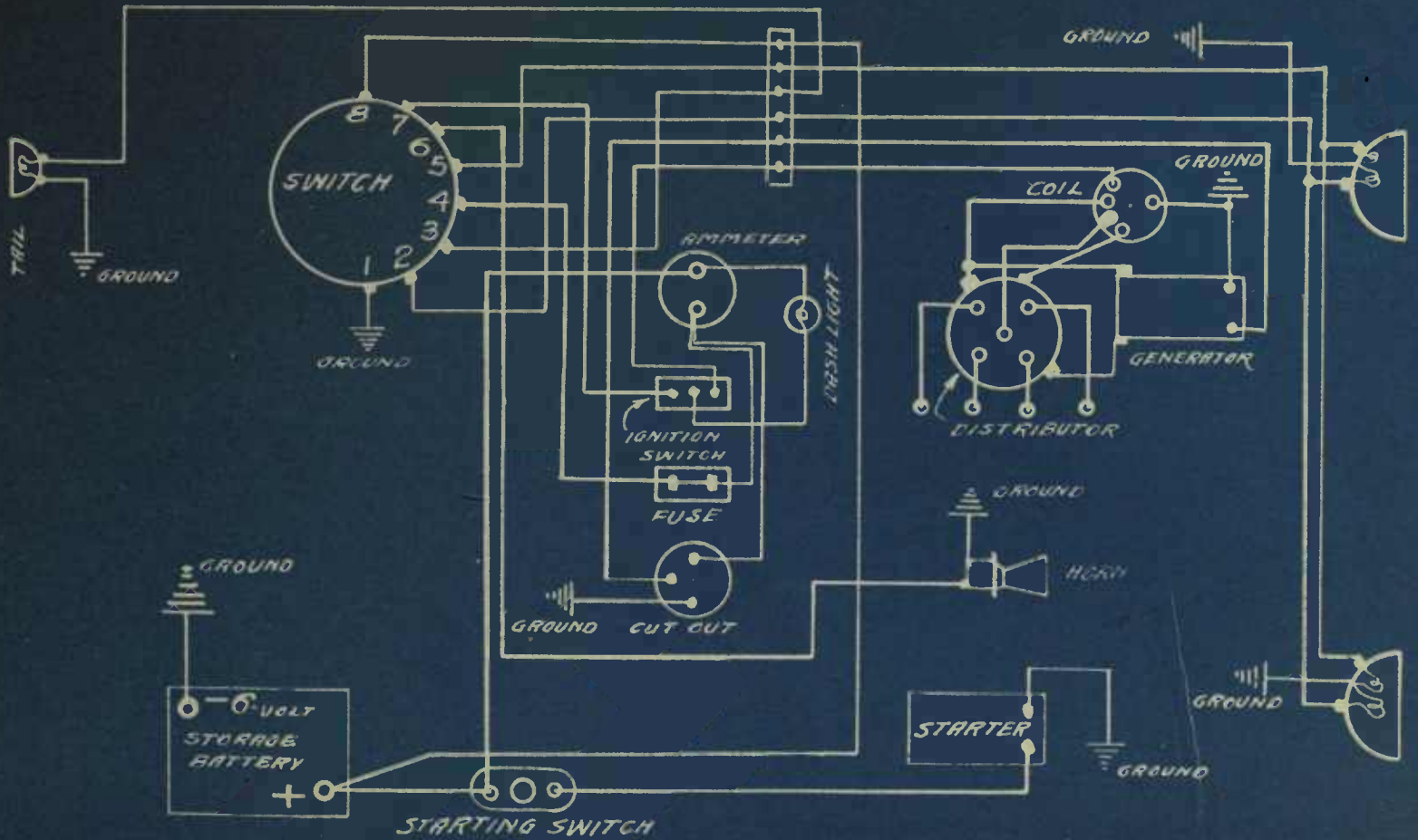
FROM MER5, B.P. 5M127.



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ALLEN 1918-19 "41"
AUTOLITE SYSTEM - CONN. IGN.

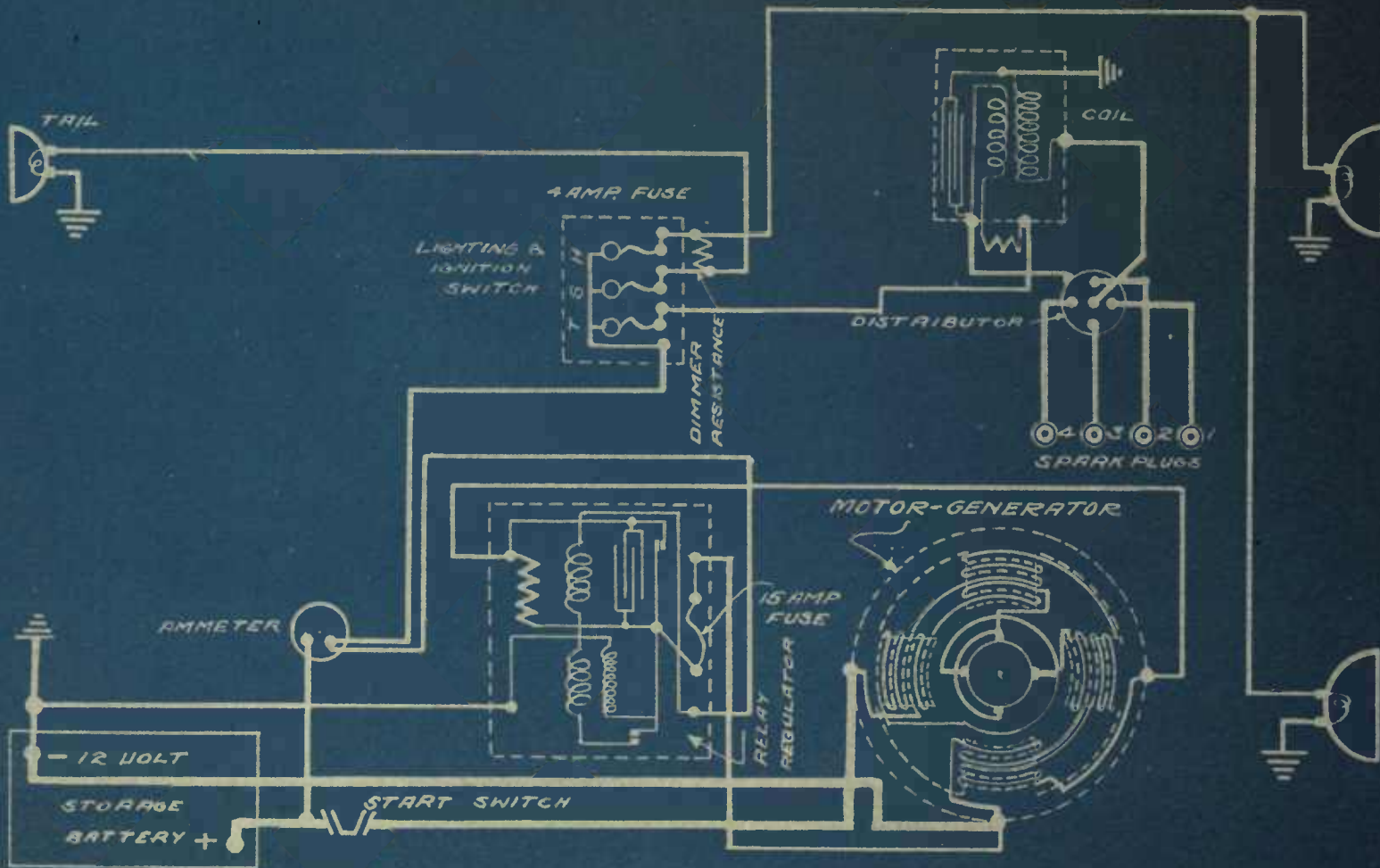
FROM FACTORY BR. ASM. 190



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ALTER 1915
REMY SYSTEM

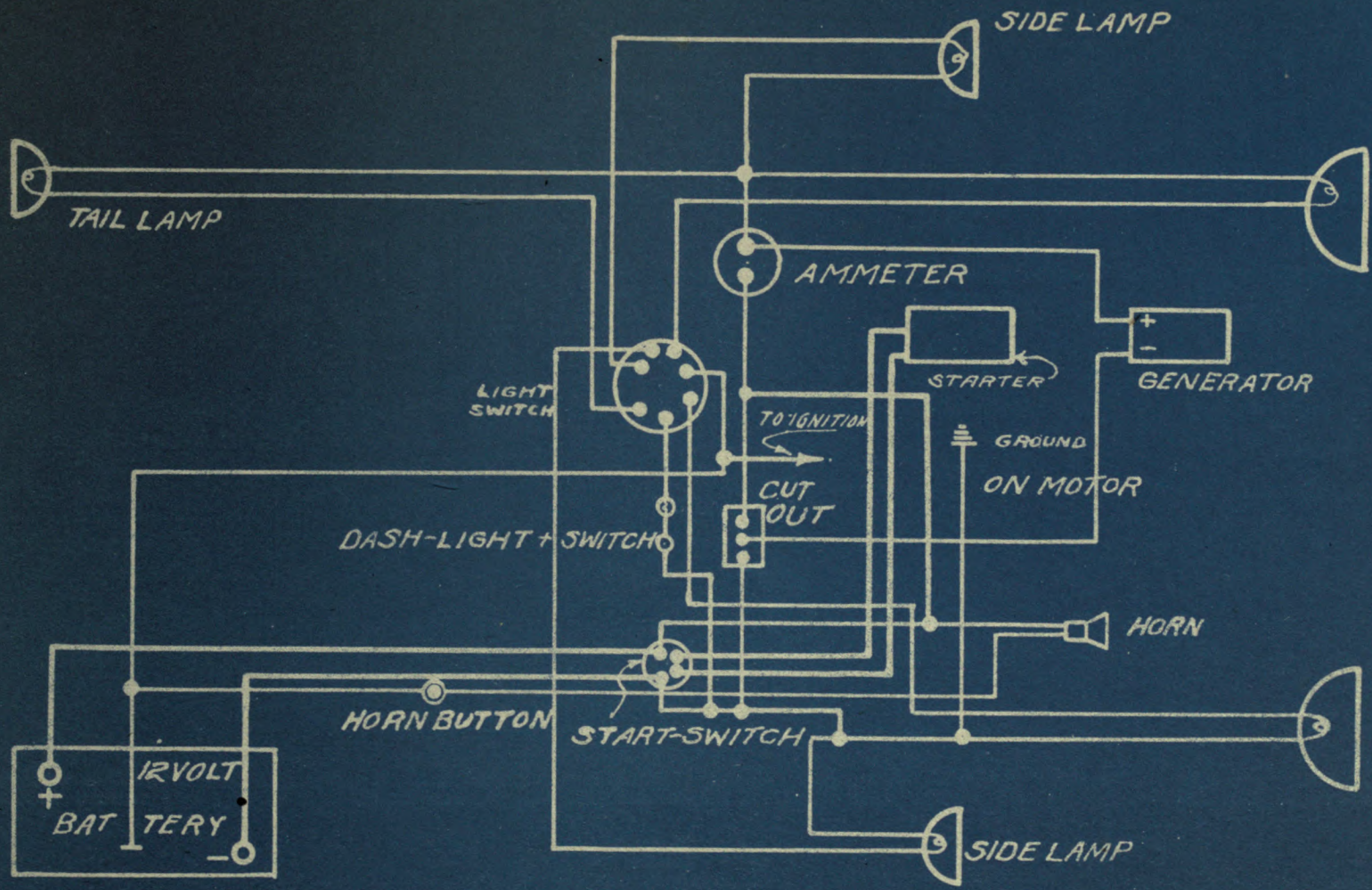
FROM REMY MANUAL.



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AMERICAN 1914
DISCO SYSTEM

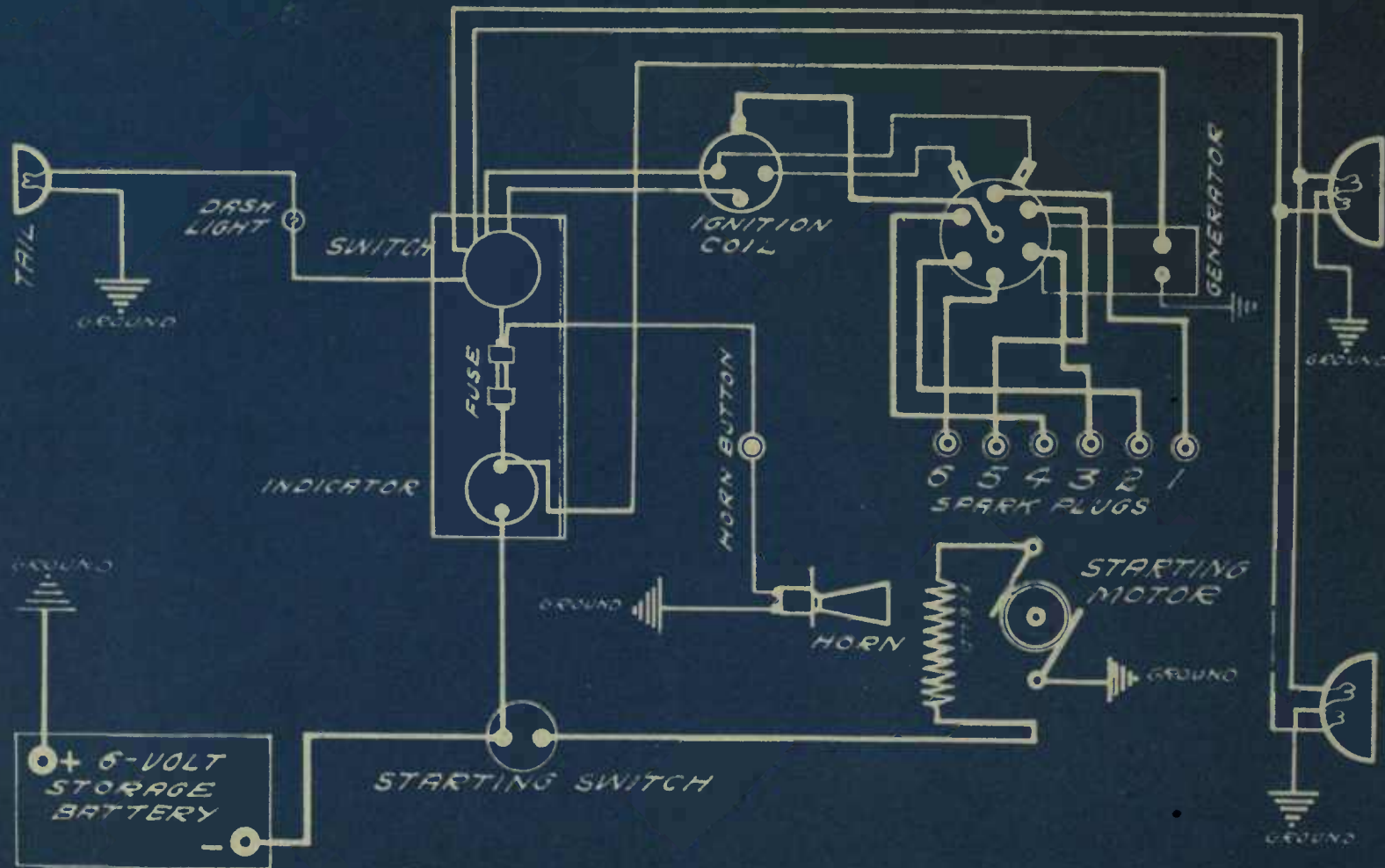
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AMERICAN 1917-1918 "A"
WESTINGHOUSE SYSTEM

FROM MFRS. BP 9-A-16

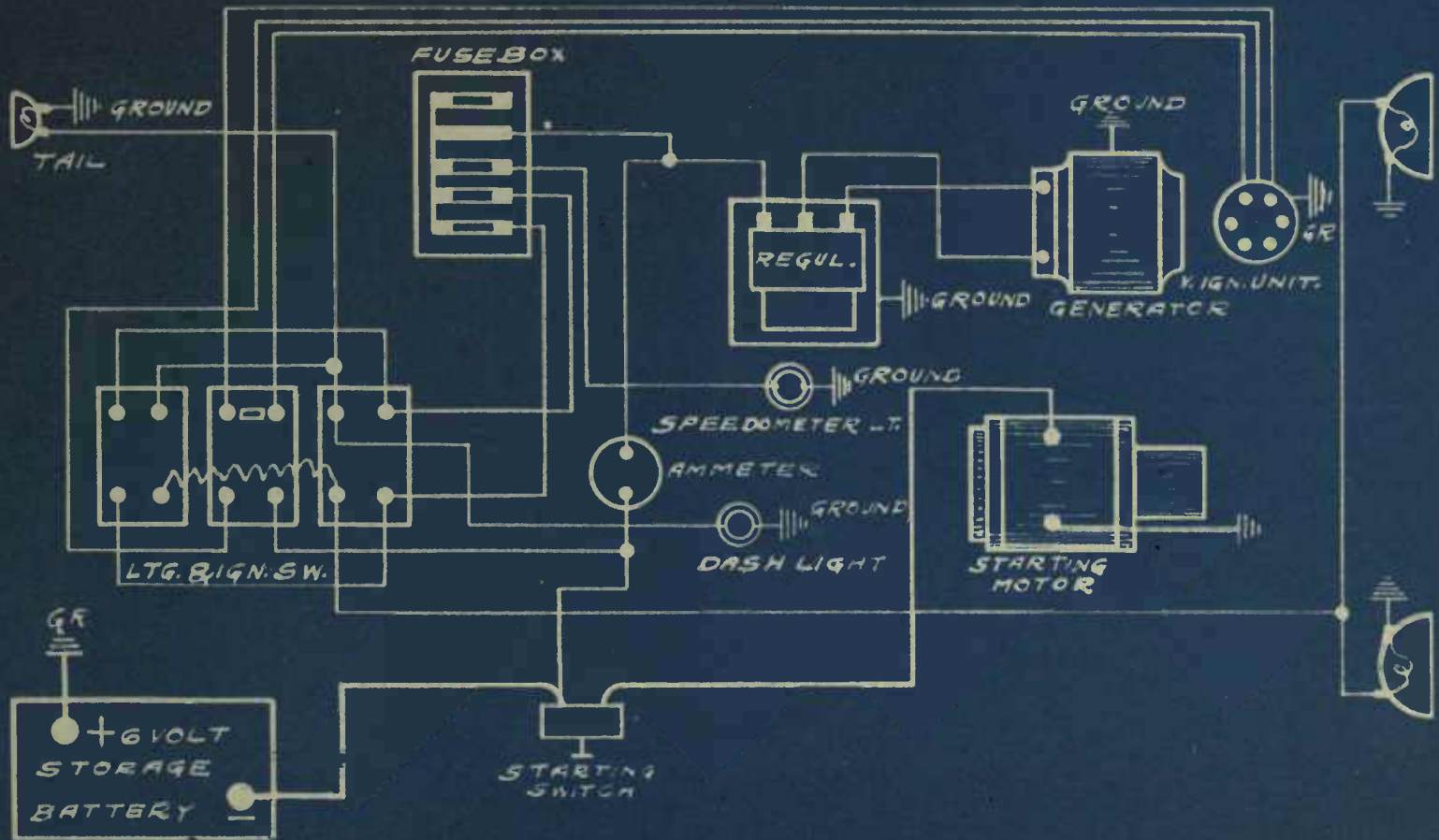


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ANDERSON 1916 100A-B

WESTINGHOUSE SYSTEM

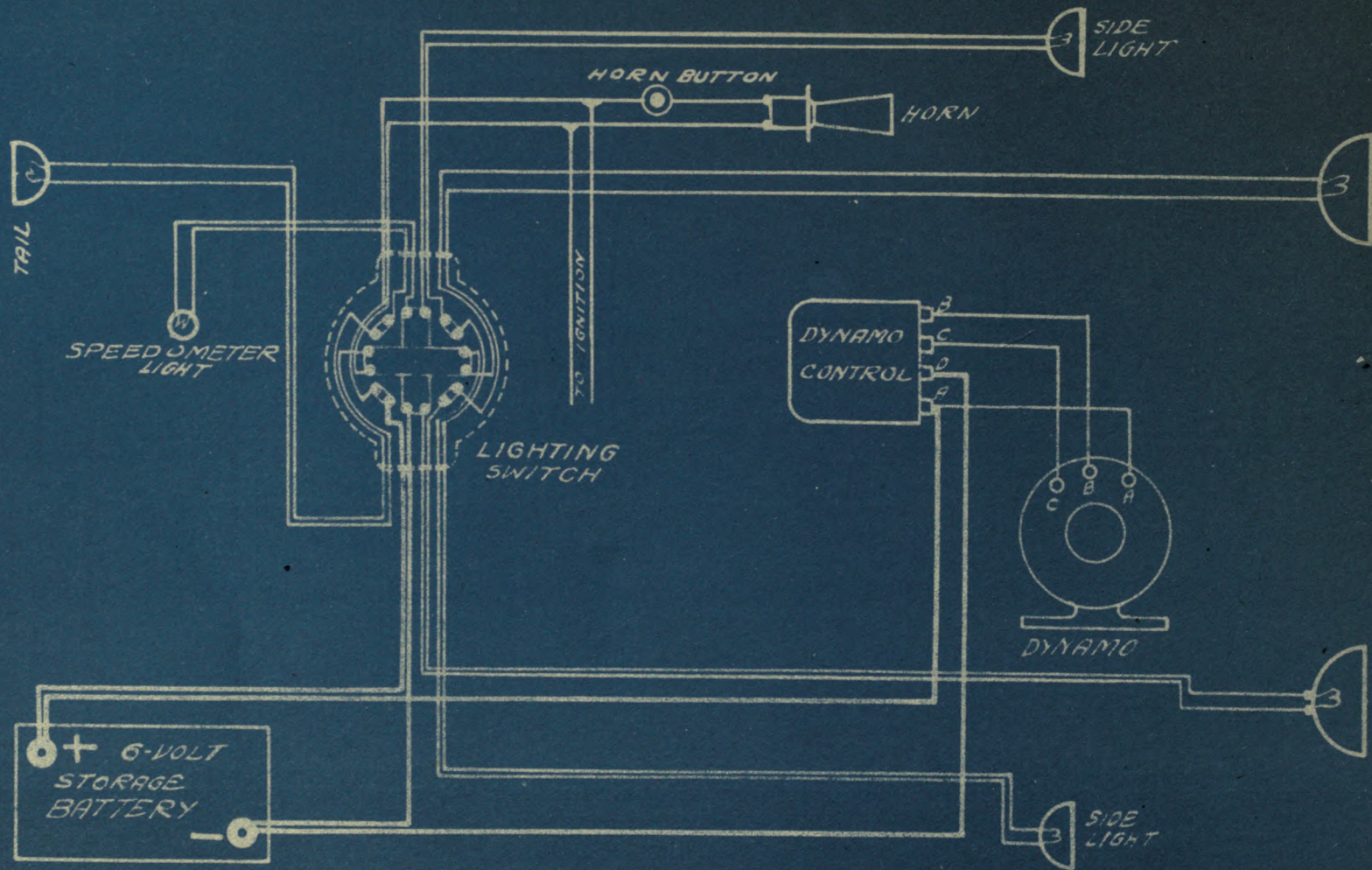
FROM WEST. PLATE 38



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APPERSON 1913
WARD-LEONARD DYNAMO SYSTEM

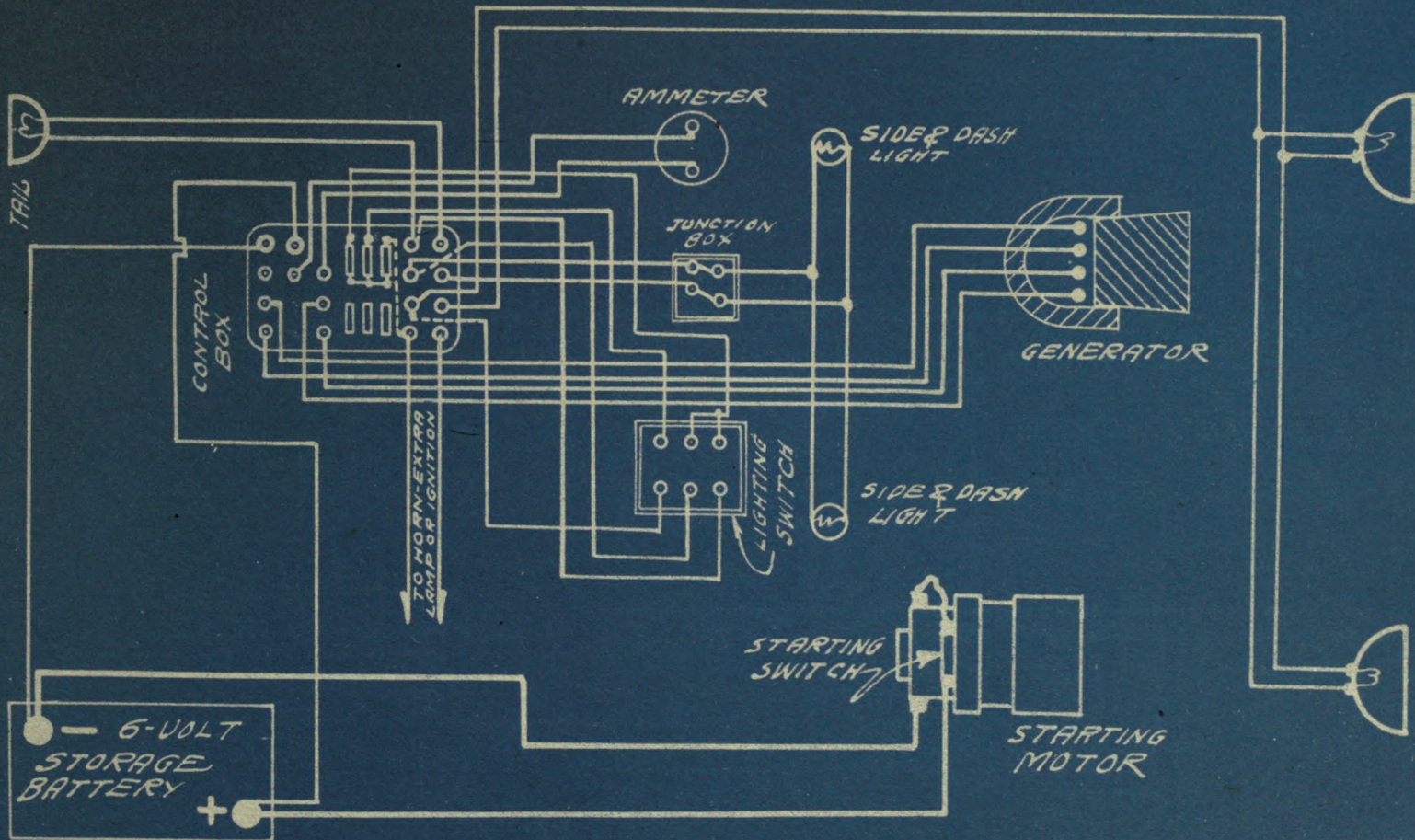
FROM A.B.P. 3890



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APPERSON 1913 "4-45" & "4-55"
ESTERLINE SYSTEM

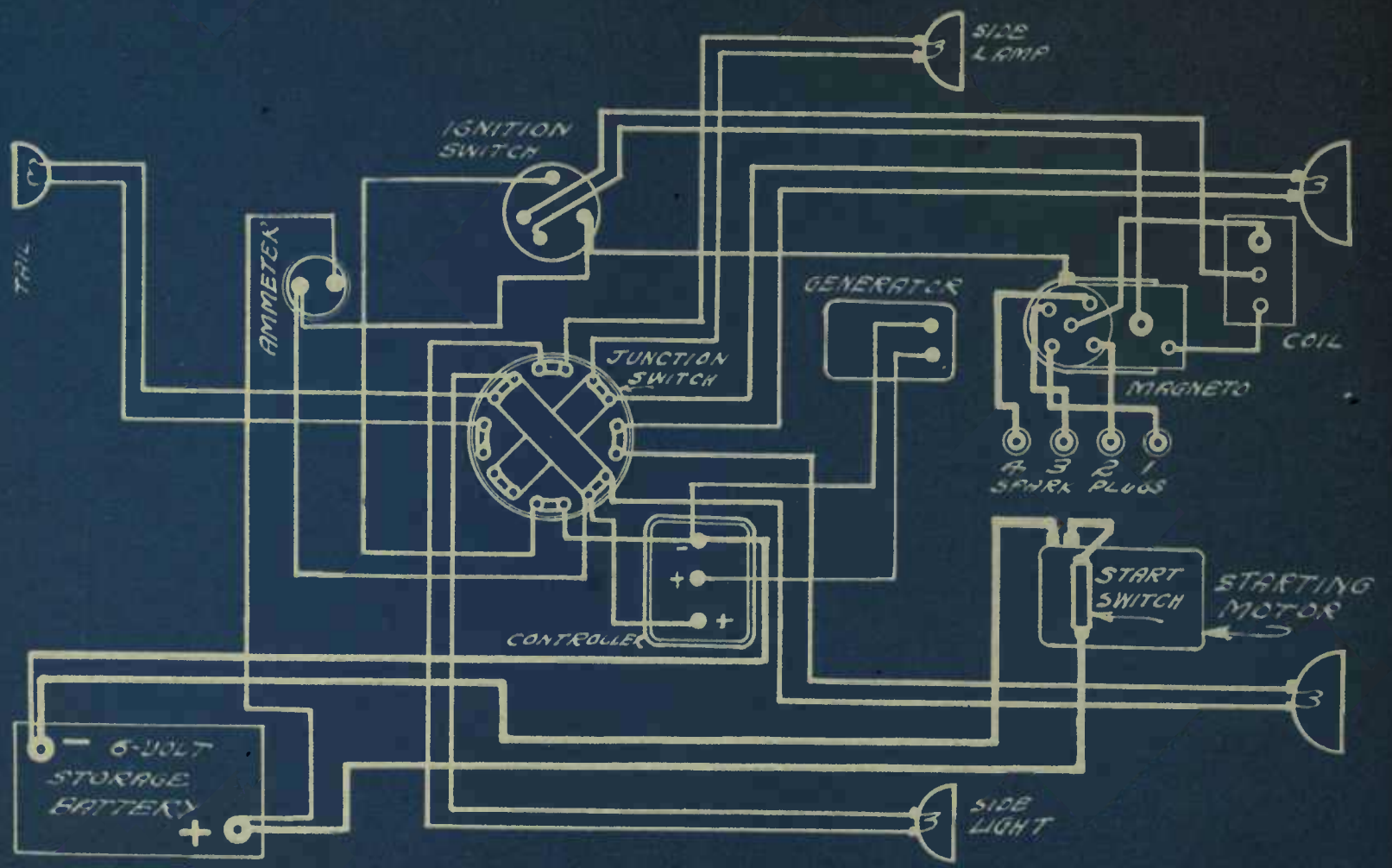
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APPERSON 1913 "55" & "45"
GRAY & DAVIS SYSTEM

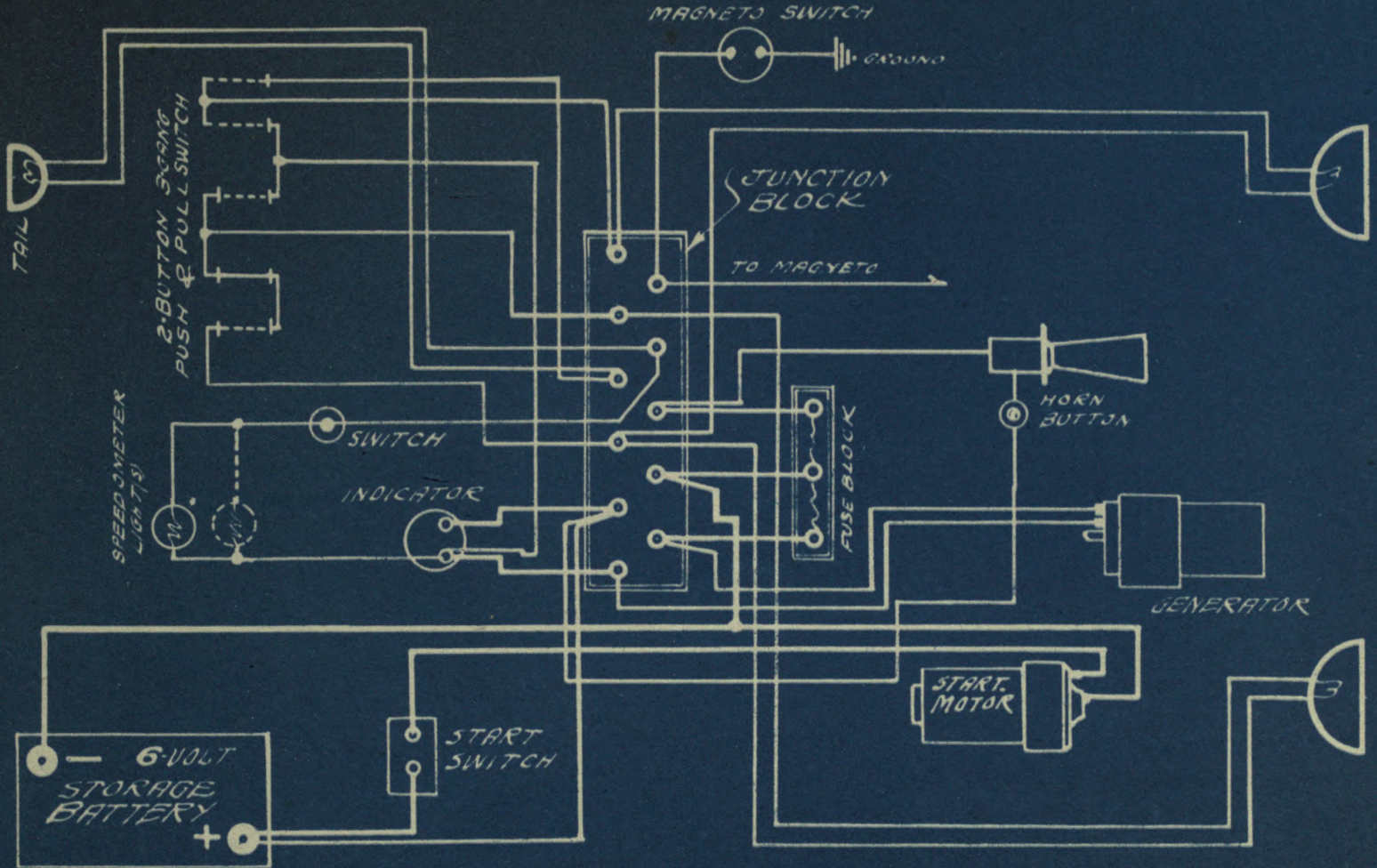
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APPERSON 1914 "4-45" "6-45" "6-58"
BIJUR SYSTEM

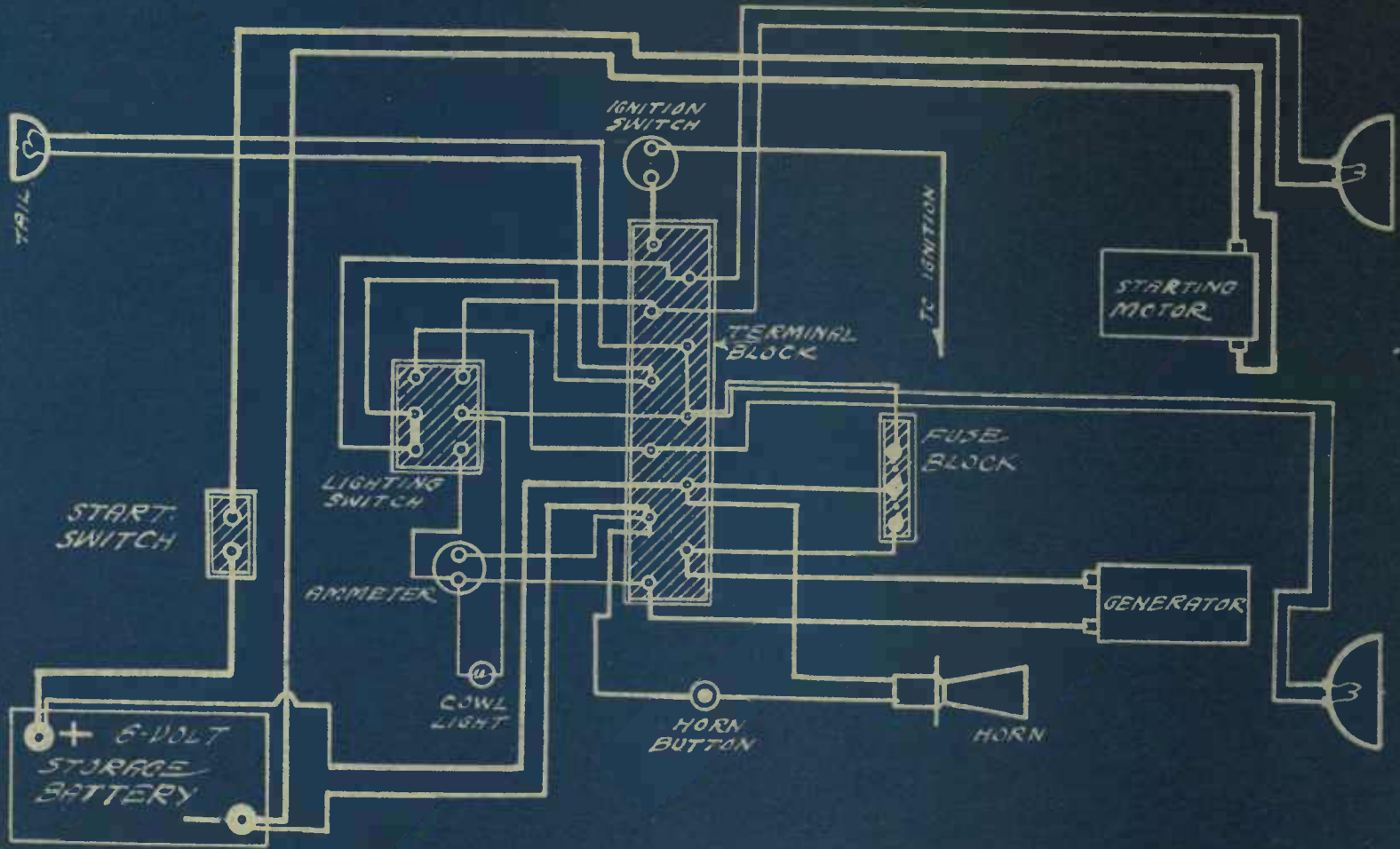
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APPERSON 1915 "4-40" "6-45"
BIFUR SYSTEM

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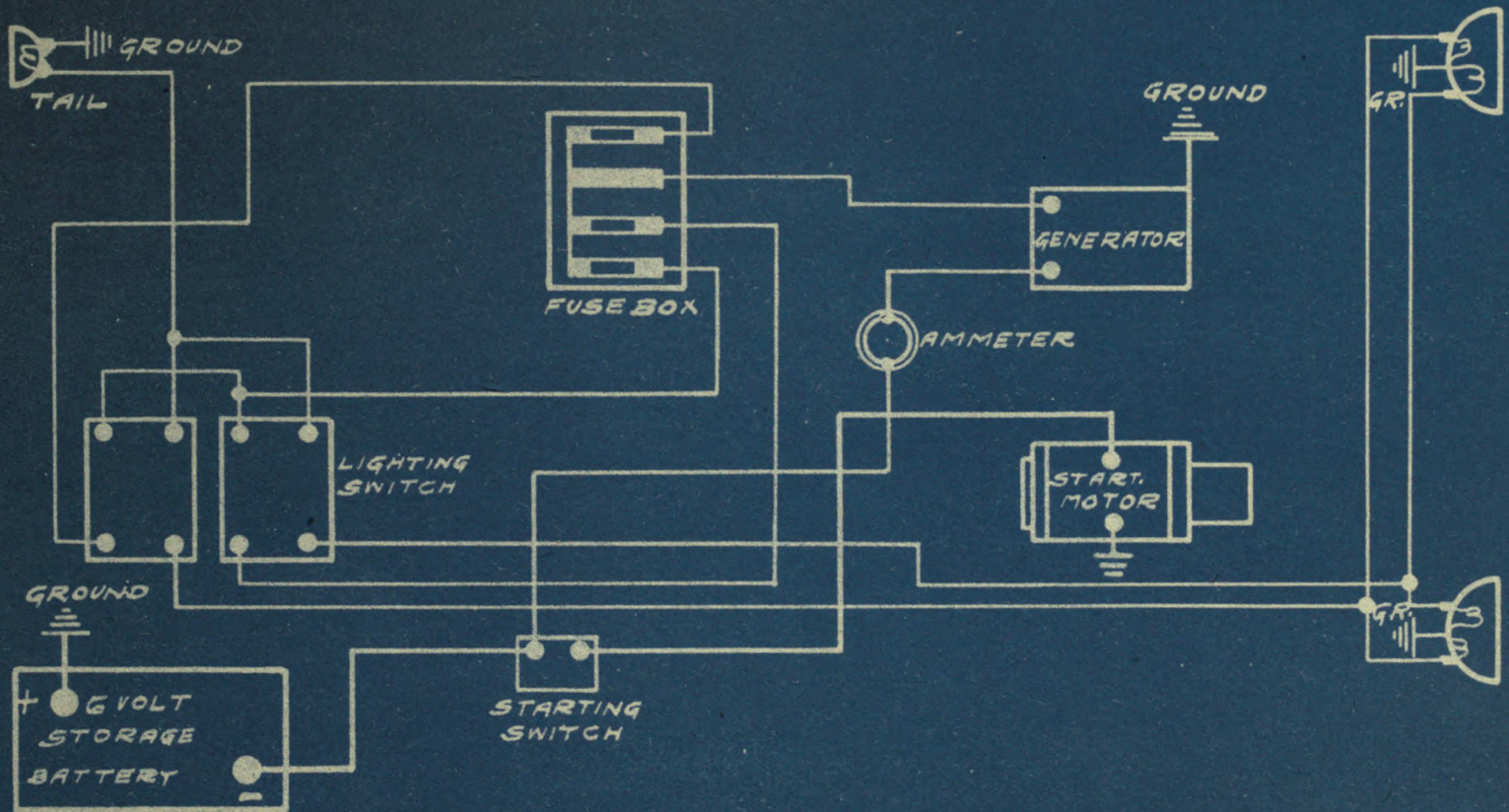


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APPERSON 1915

WESTINGHOUSE SYSTEM

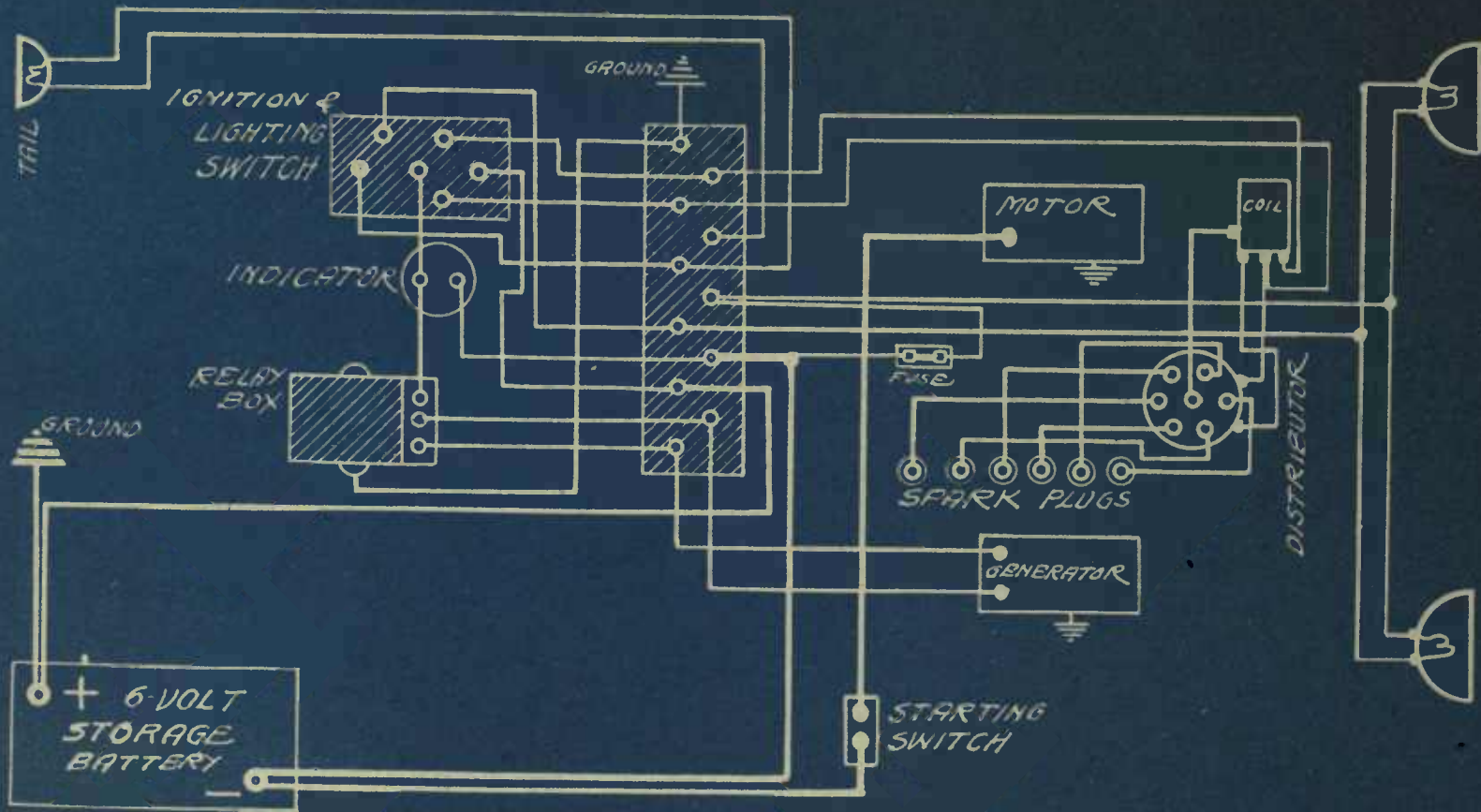
FROM WEST. PLATE 39



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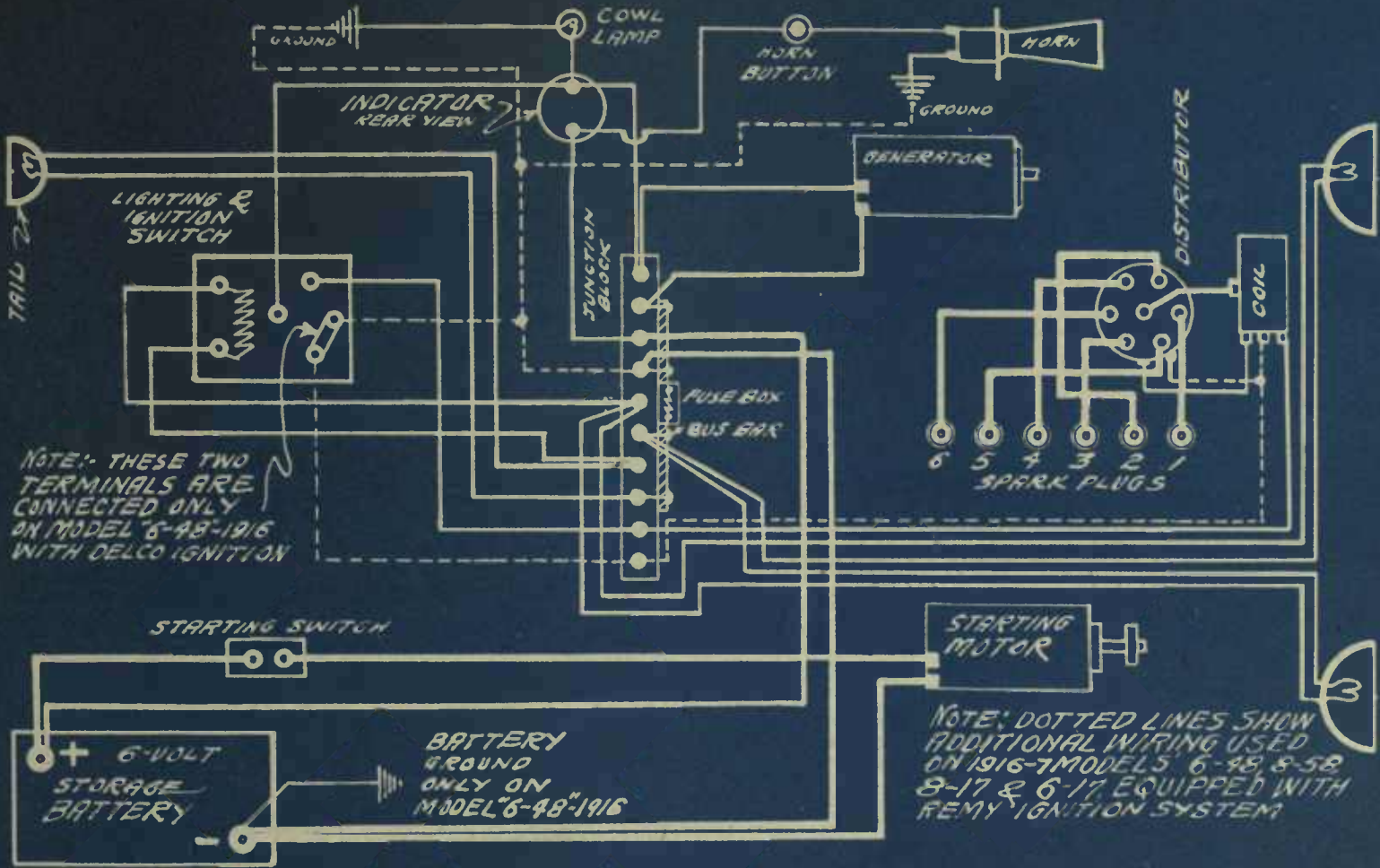
APPERSON 1916 "6-48" "8-58"
WESTINGHOUSE SYSTEM

FROM MFRS BR. 5357



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APPERSON 1916 "6-48" "8-58" & 1917 "8-17" "6-17" FROM MARS. BR. 6150 & 5398
 BITUR SYSTEM



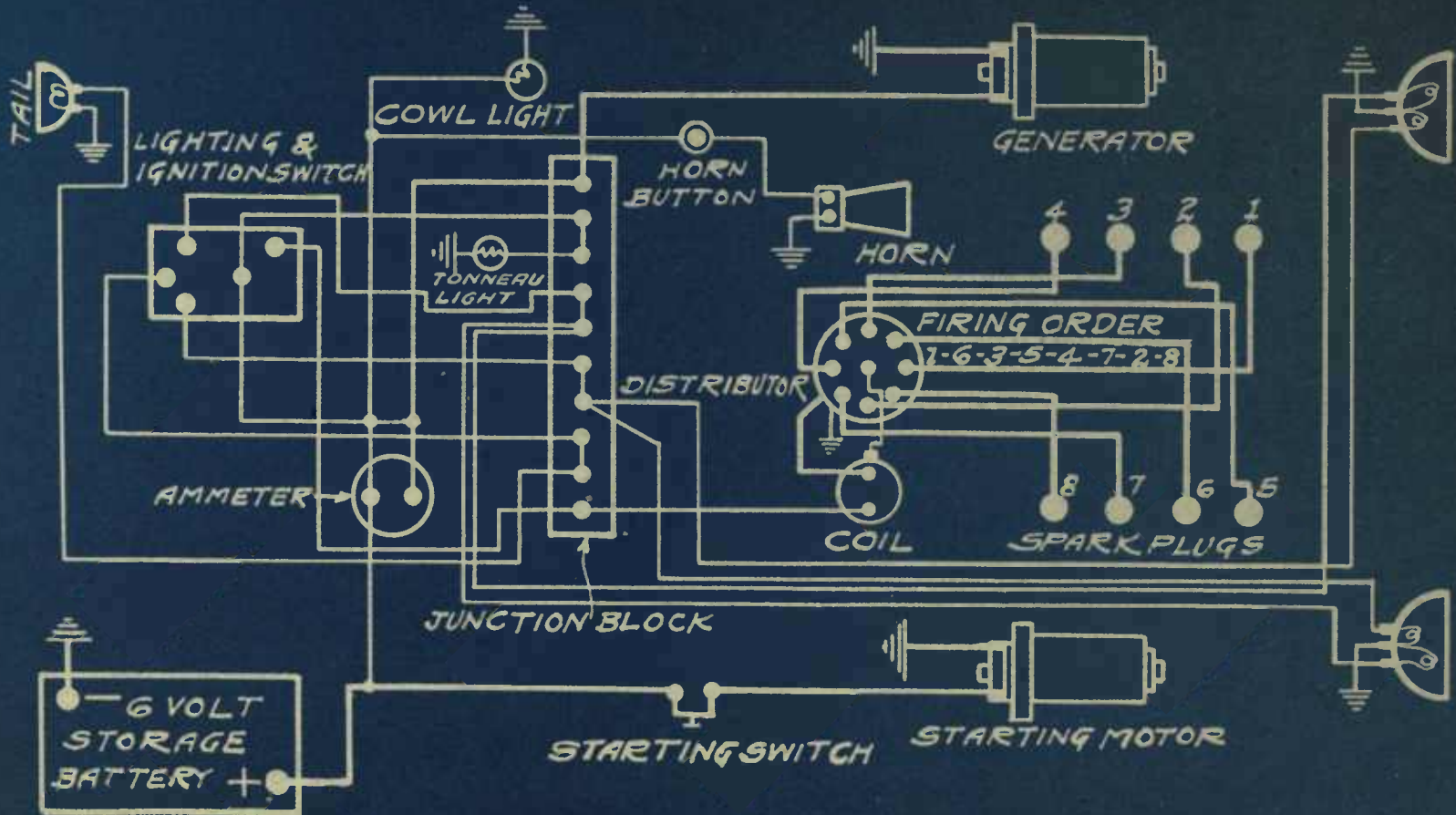
NOTE: THESE TWO TERMINALS ARE CONNECTED ONLY ON MODEL "6-48"-1916 WITH DELCO IGNITION

NOTE: DOTTED LINES SHOW ADDITIONAL WIRING USED ON 1916-7 MODELS "6-48", "8-58", "8-17" & "6-17" EQUIPPED WITH REMY IGNITION SYSTEM

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APPERSON 1918 - 8-18-A - 1919
BIJUR SYSTEM

FROM MFRS. B/P 7480

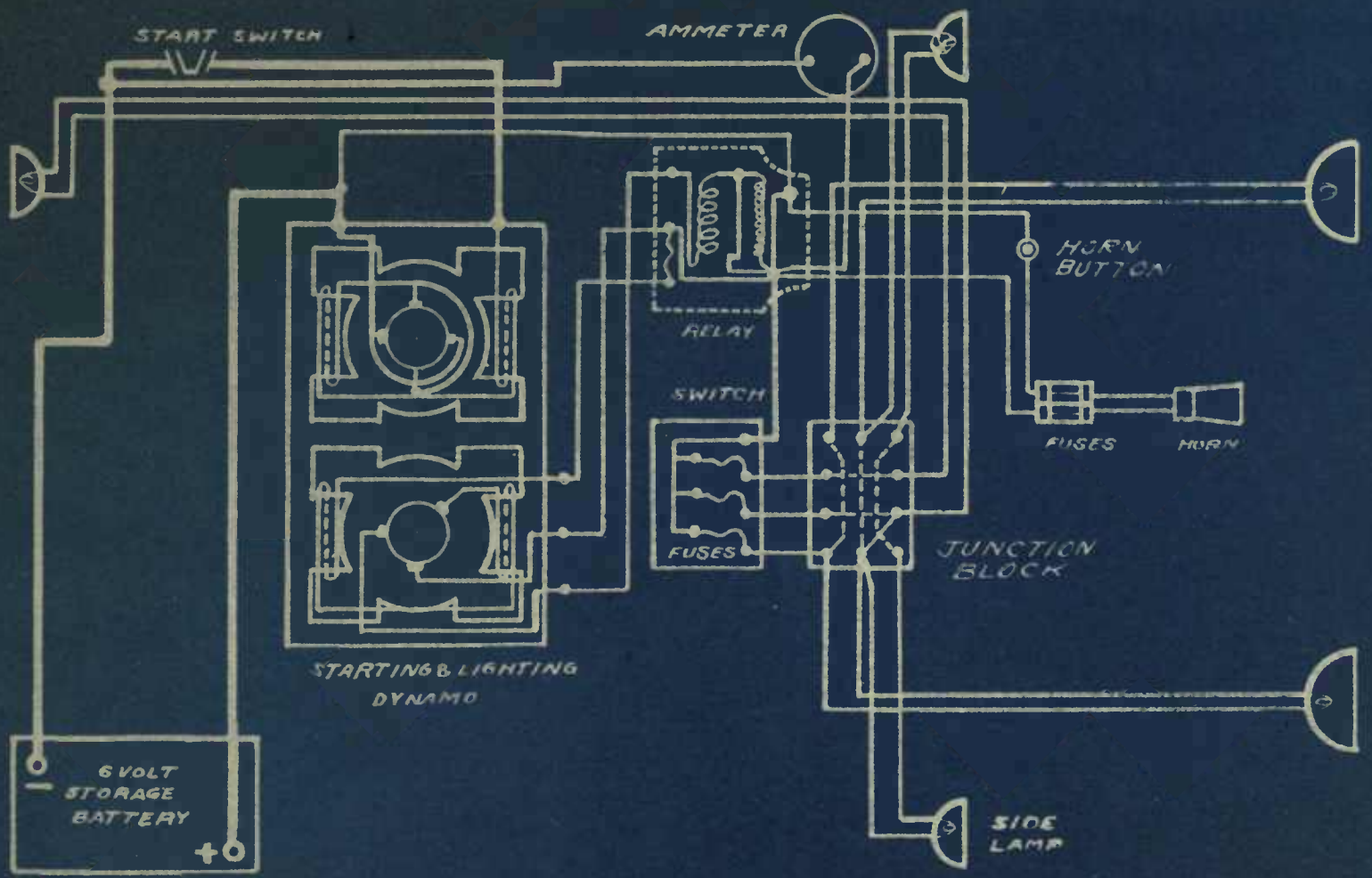


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AUBURN 1913-14-15

REMY SYSTEM

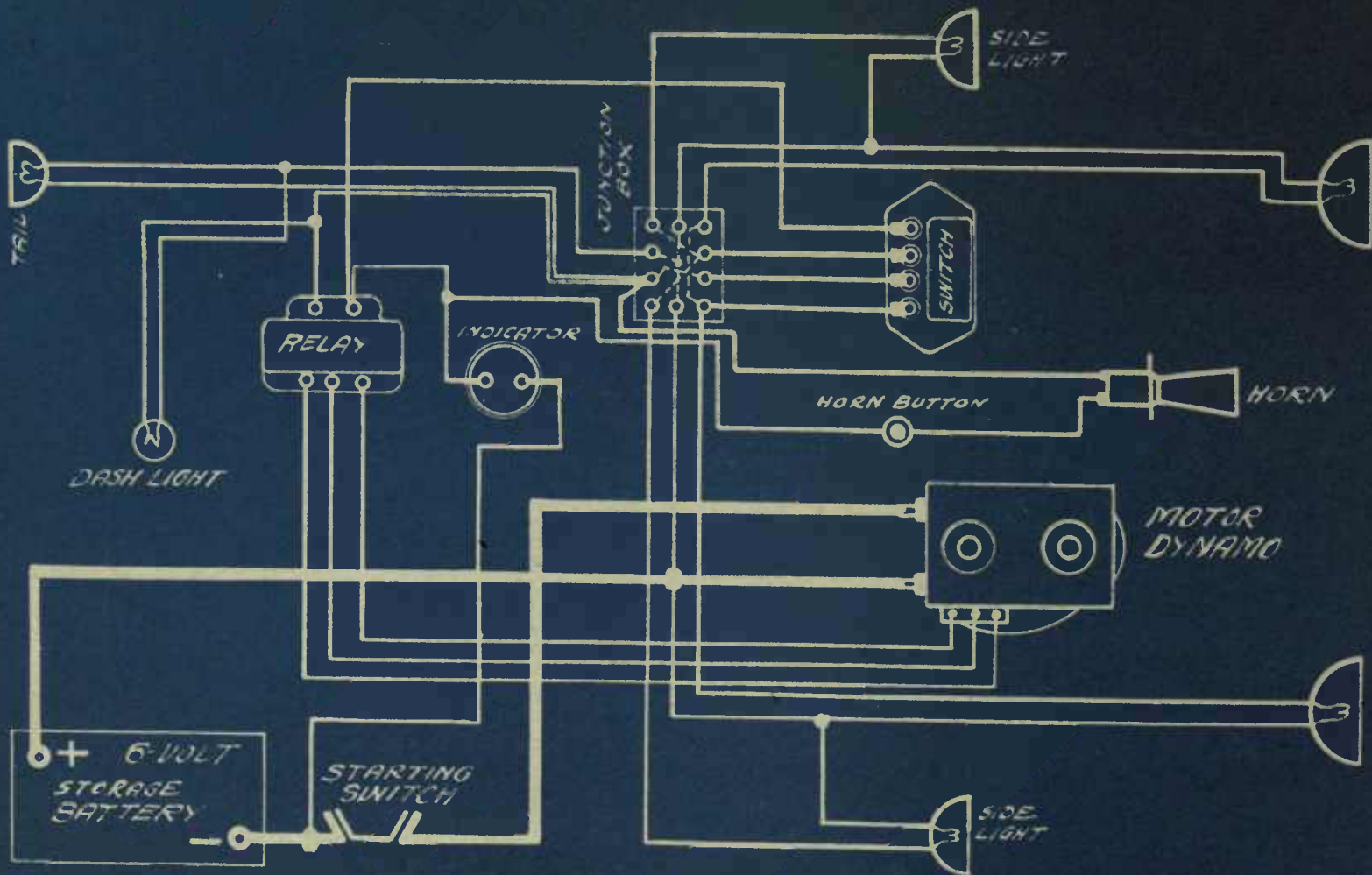
FROM REMY MANUAL



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AUBURN 1914 4-40-4-41-6-45 & 6-46
REMY SYSTEM

FROM MERS. PLATE

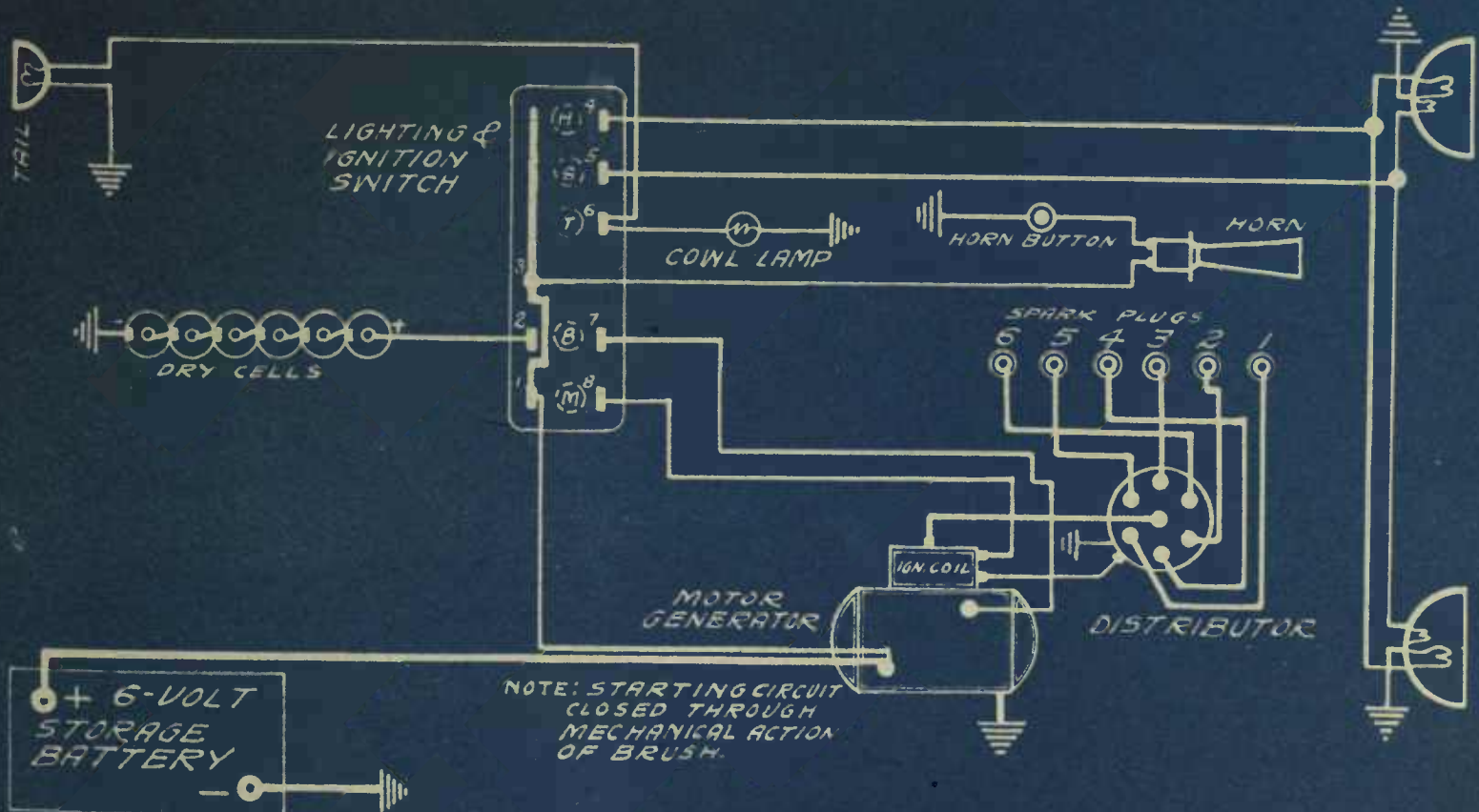


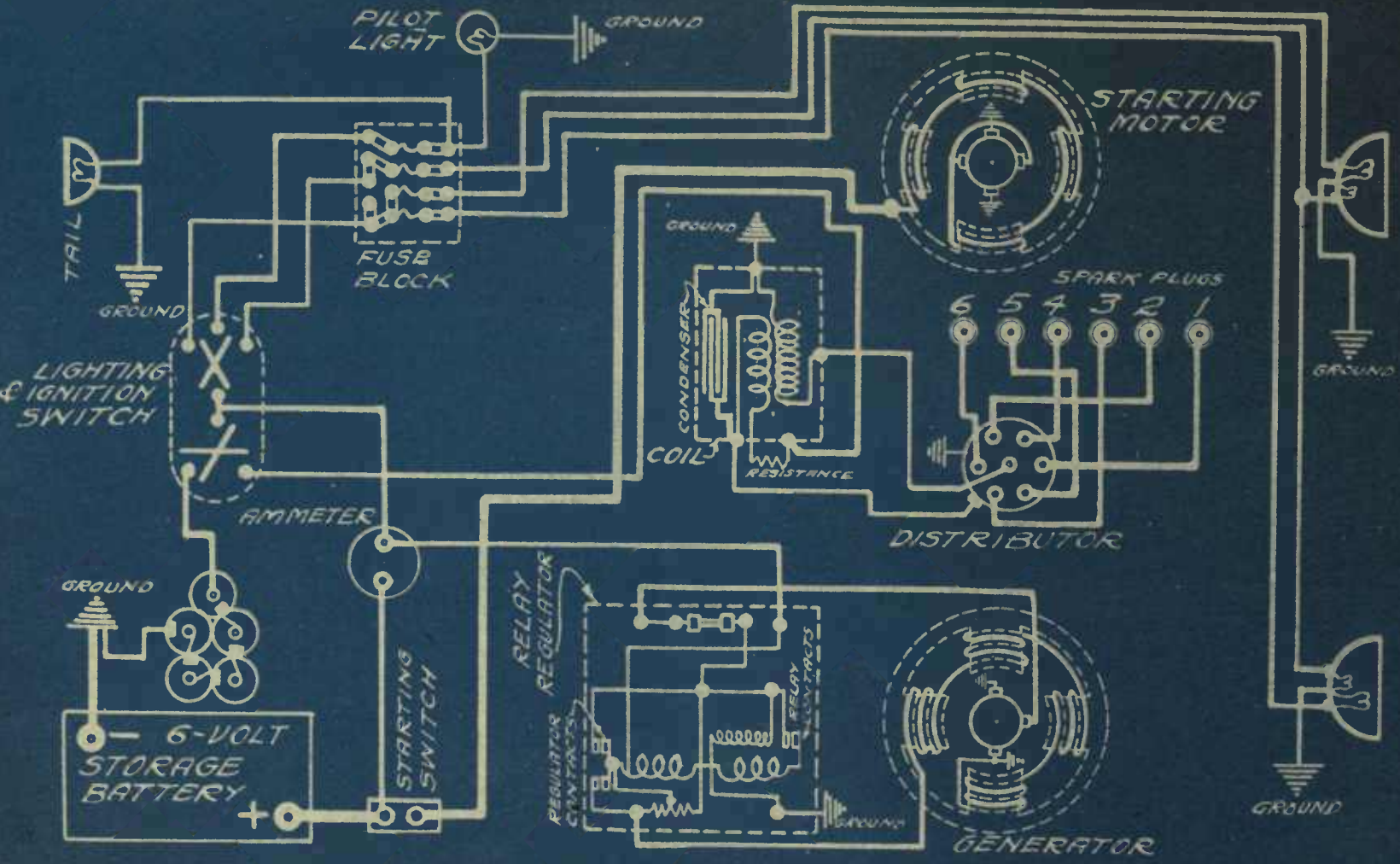
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AUBURN 1915 "6-40" DELCO SYSTEM

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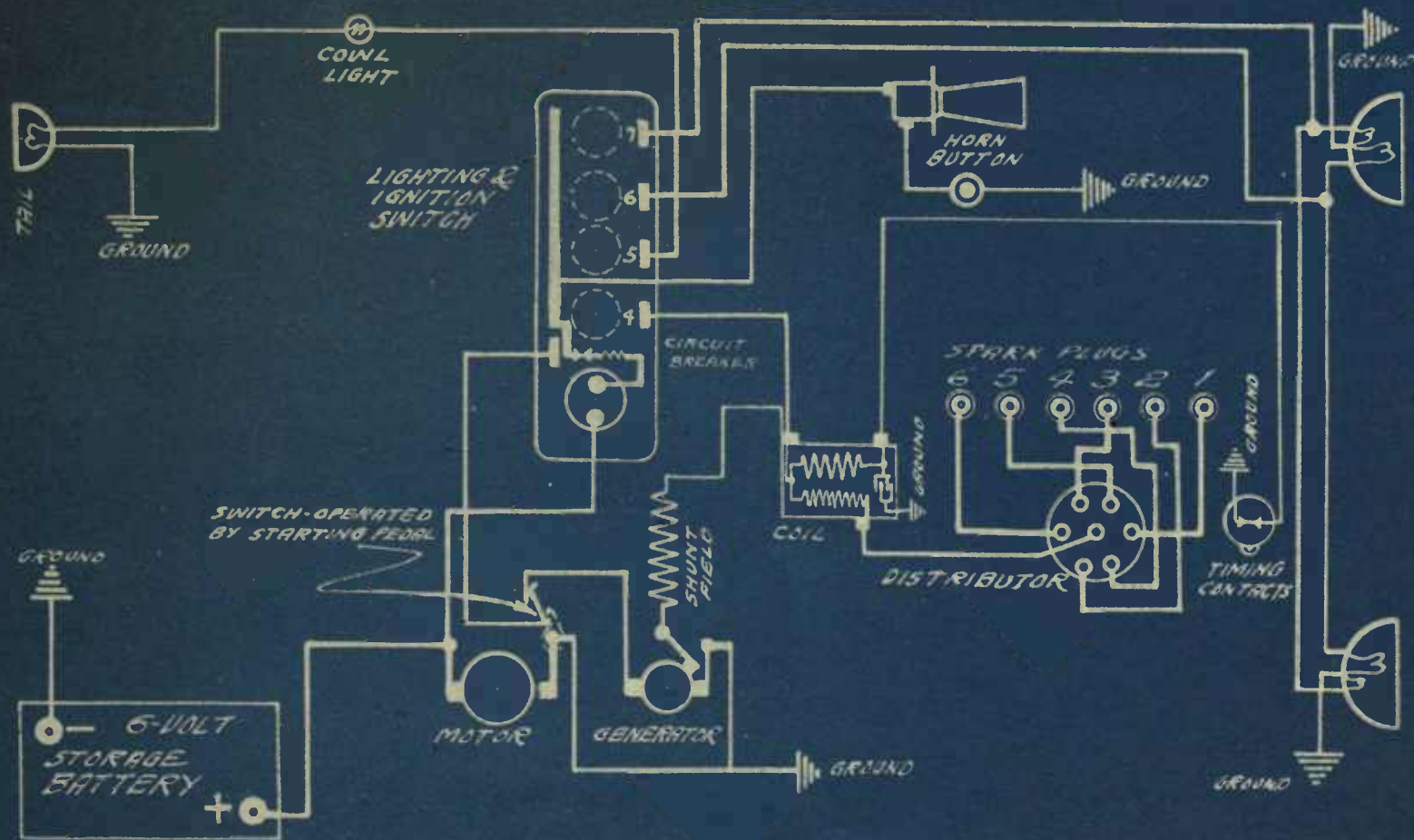
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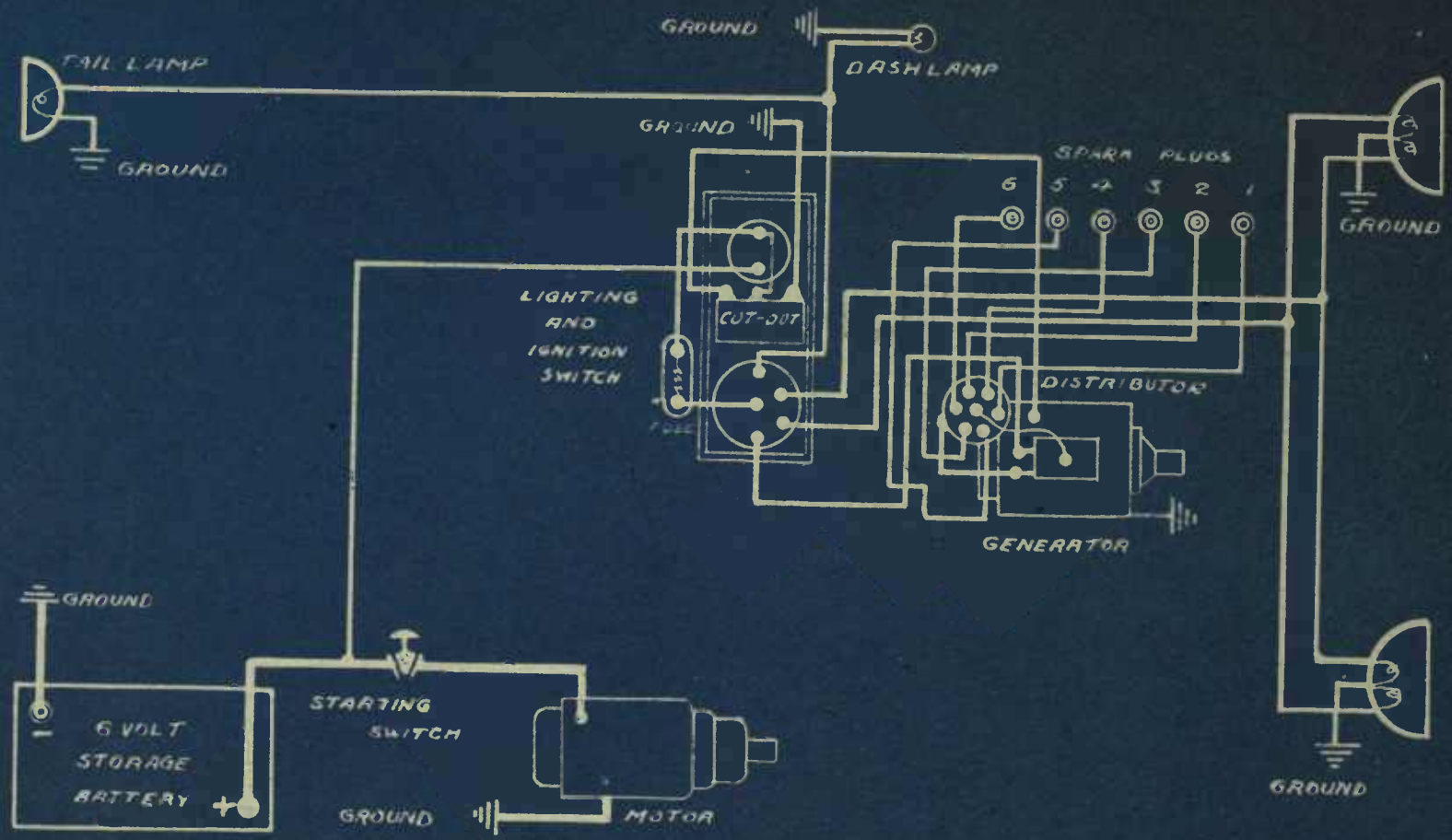
AUBURN 1916 "6-40-A"

DELCO SYSTEM

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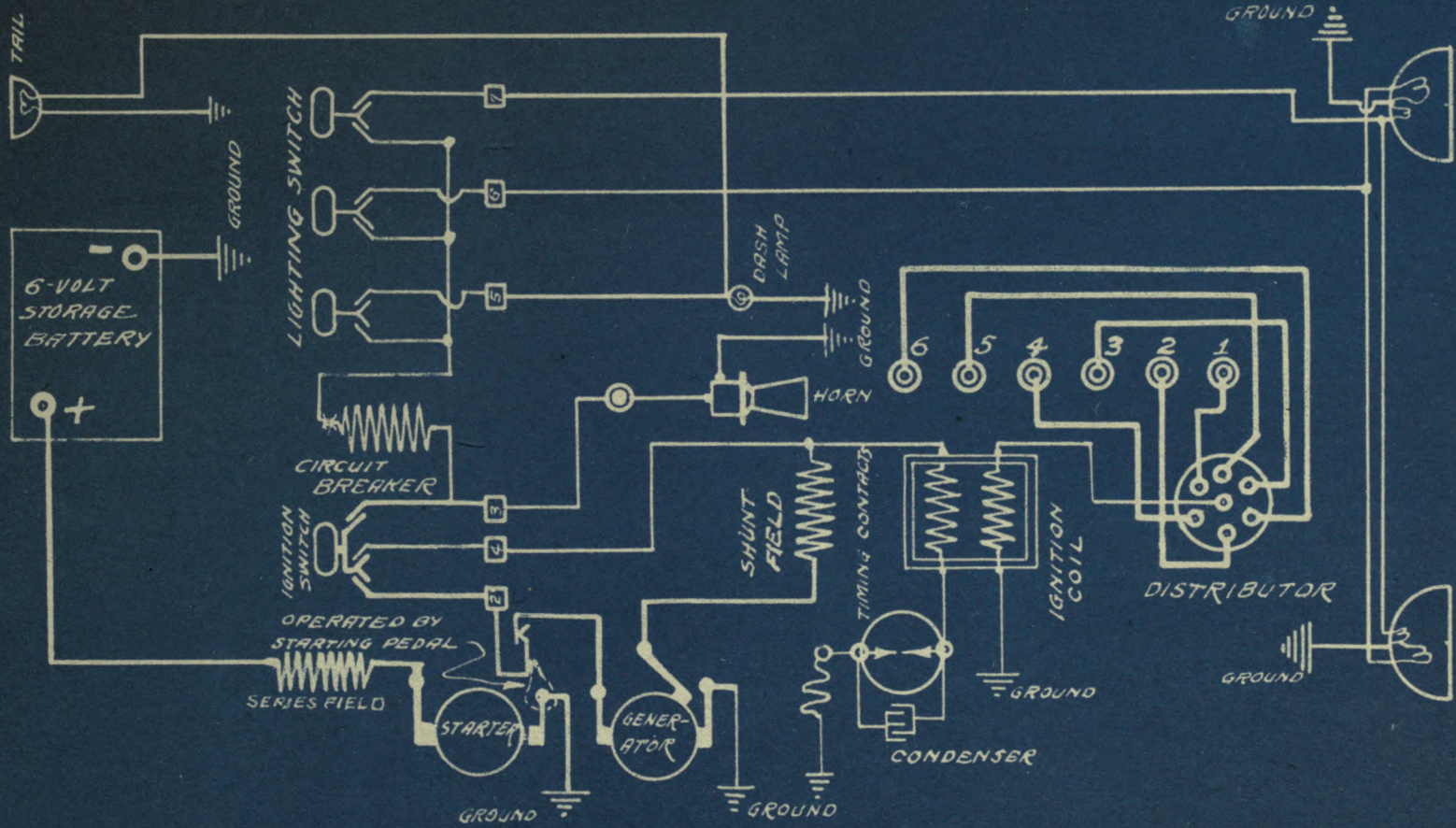
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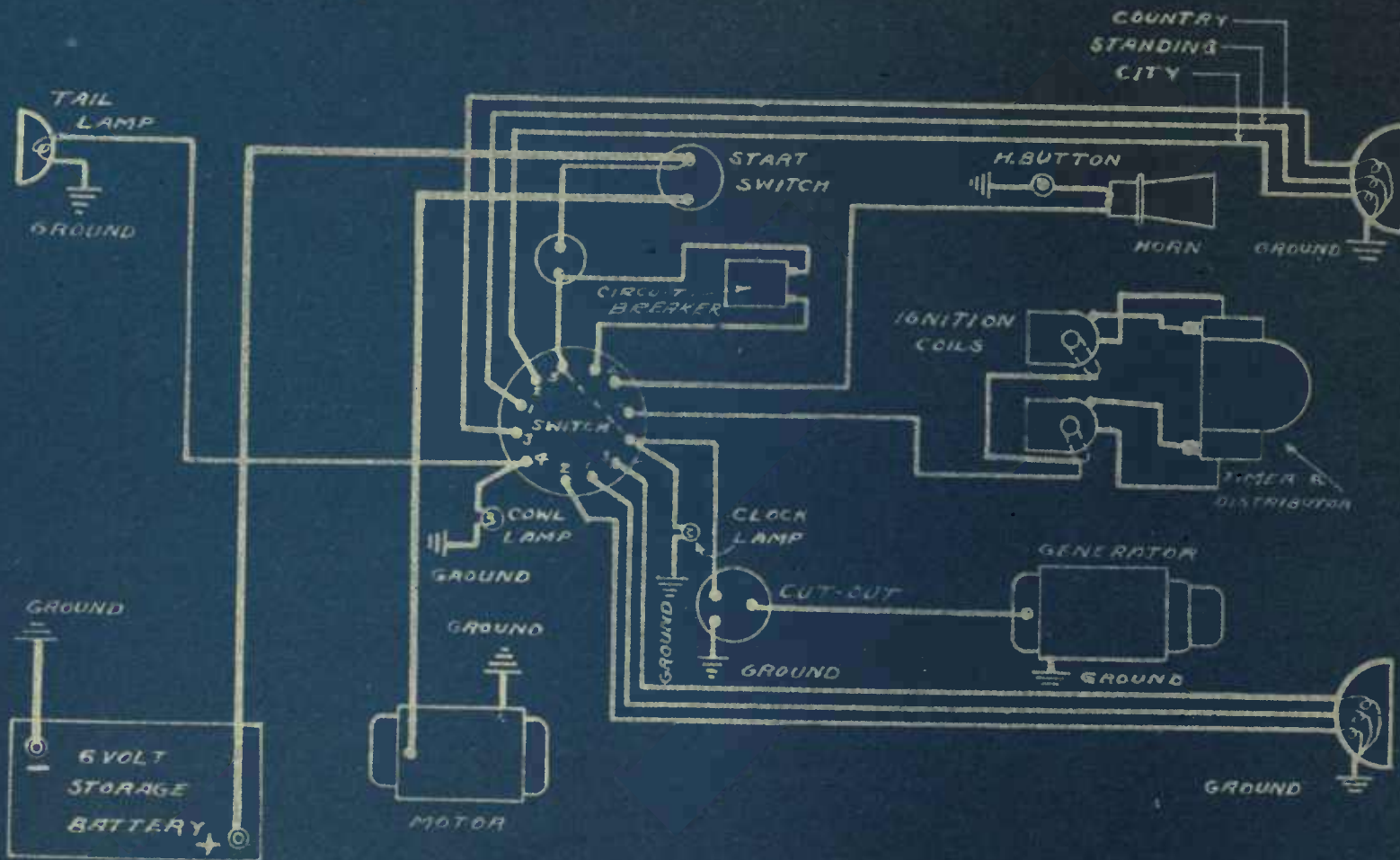
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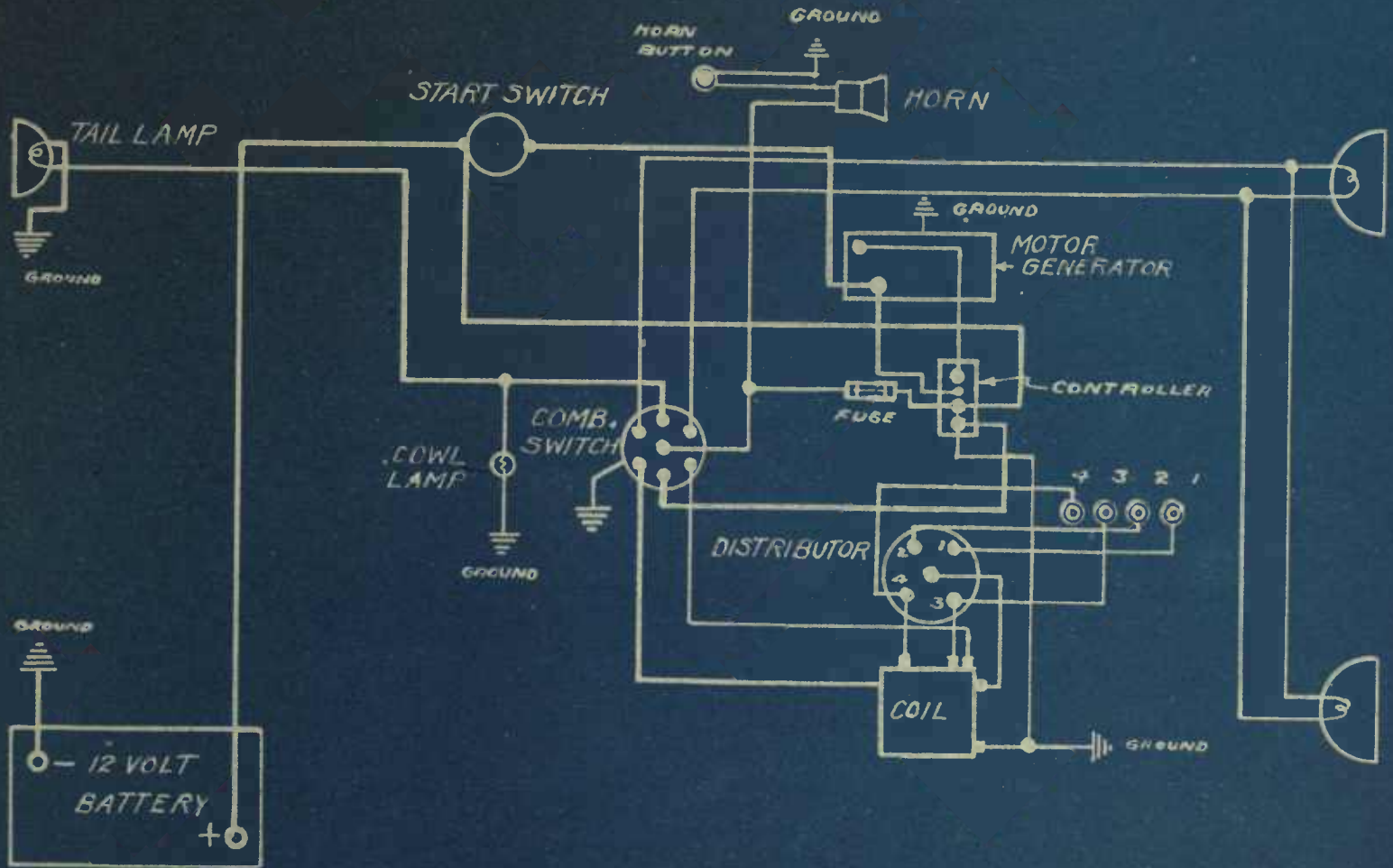
AUSTIN HIGHWAY KING 12 1917-1918

DELCO SYSTEM

FROM MFRS. B.P.



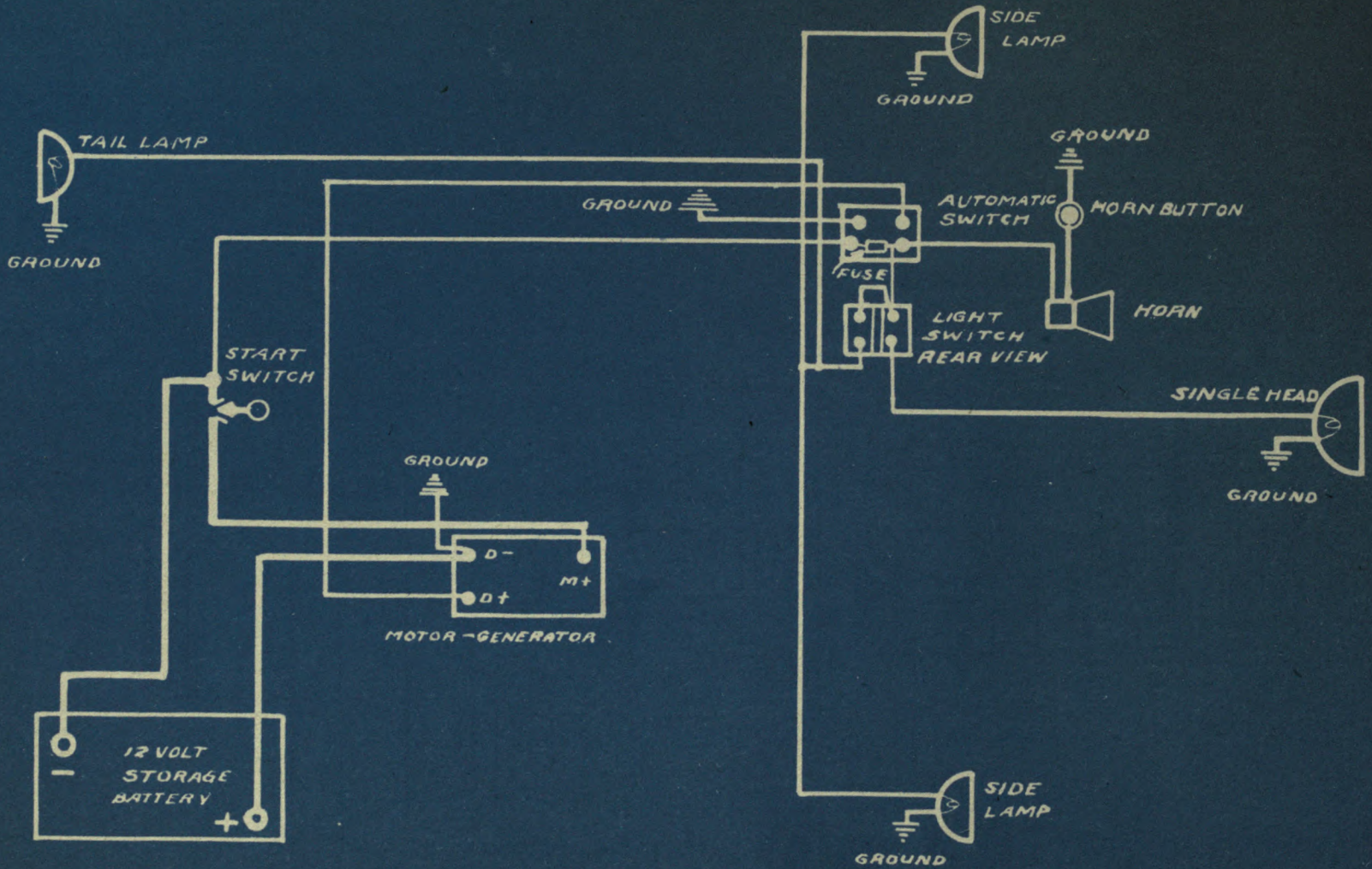
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BRISCOE "B15" 1915
SPLITDORF-APELCO SYSTEM

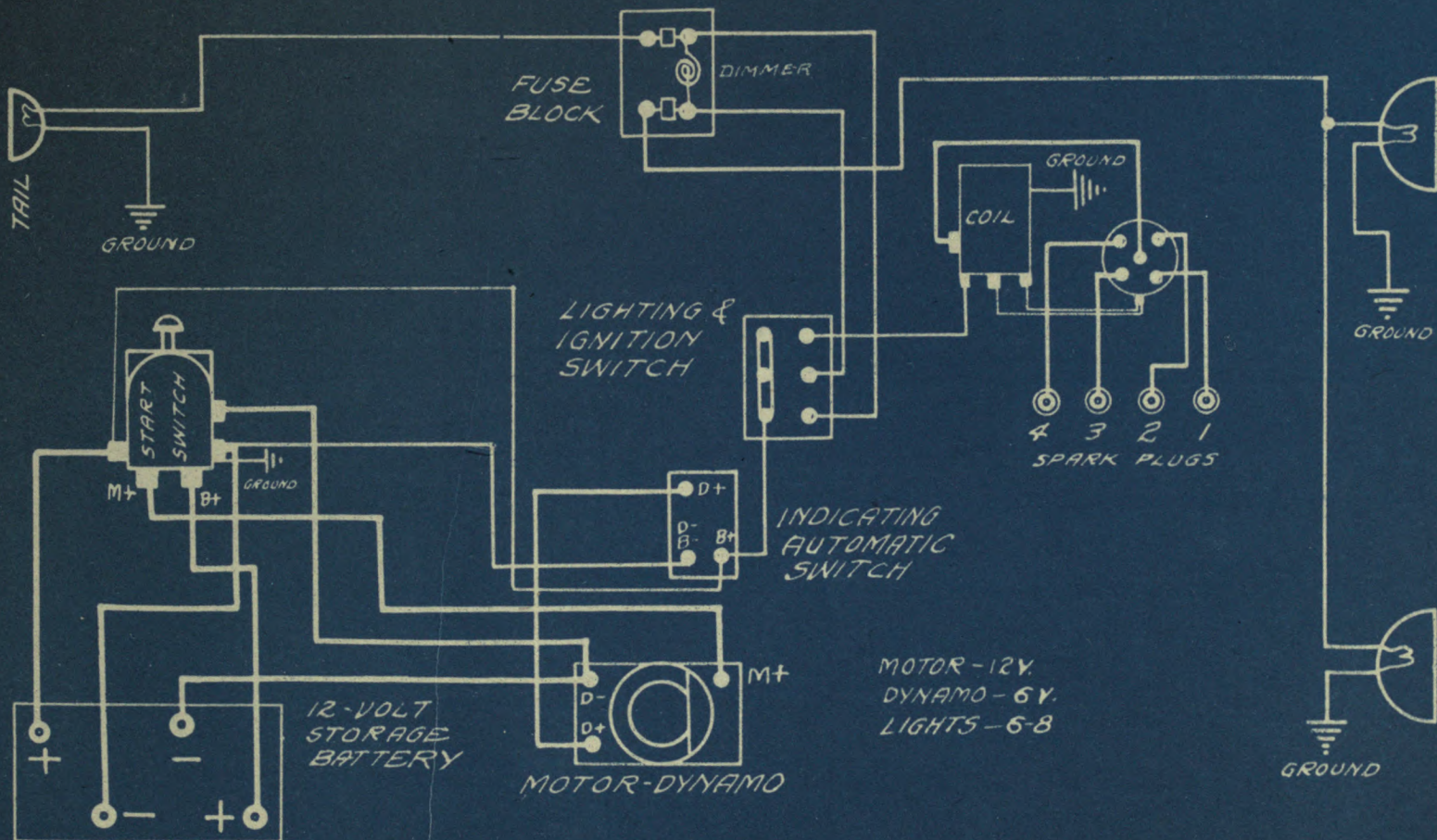
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BRISCOE 1916 4-38
SPLITDORF-APELCO SYSTEM

FROM SPLIT. AP. MANUAL

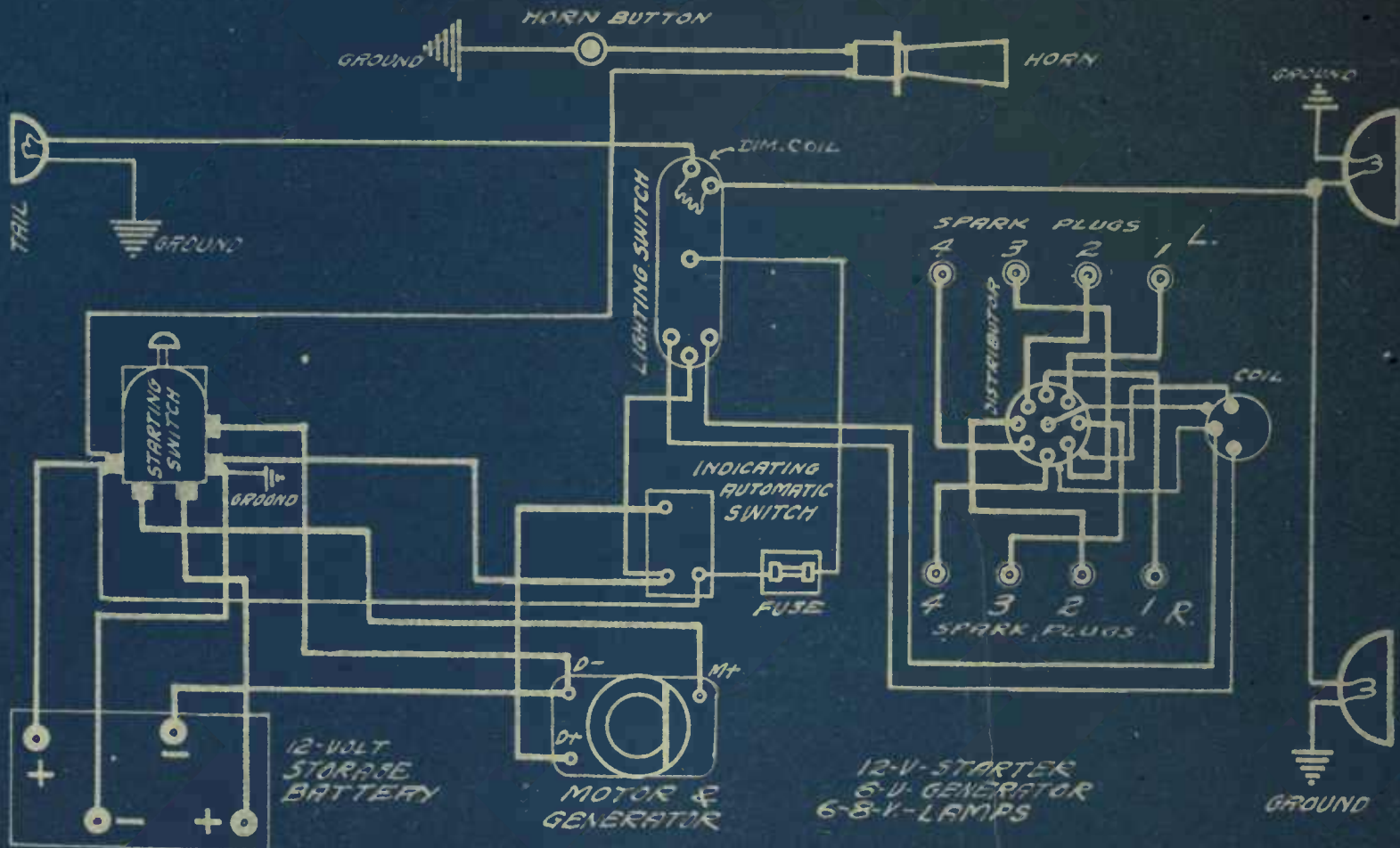


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BRISCOE 1916 8-38

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BRISCOE 1917-1918-1919

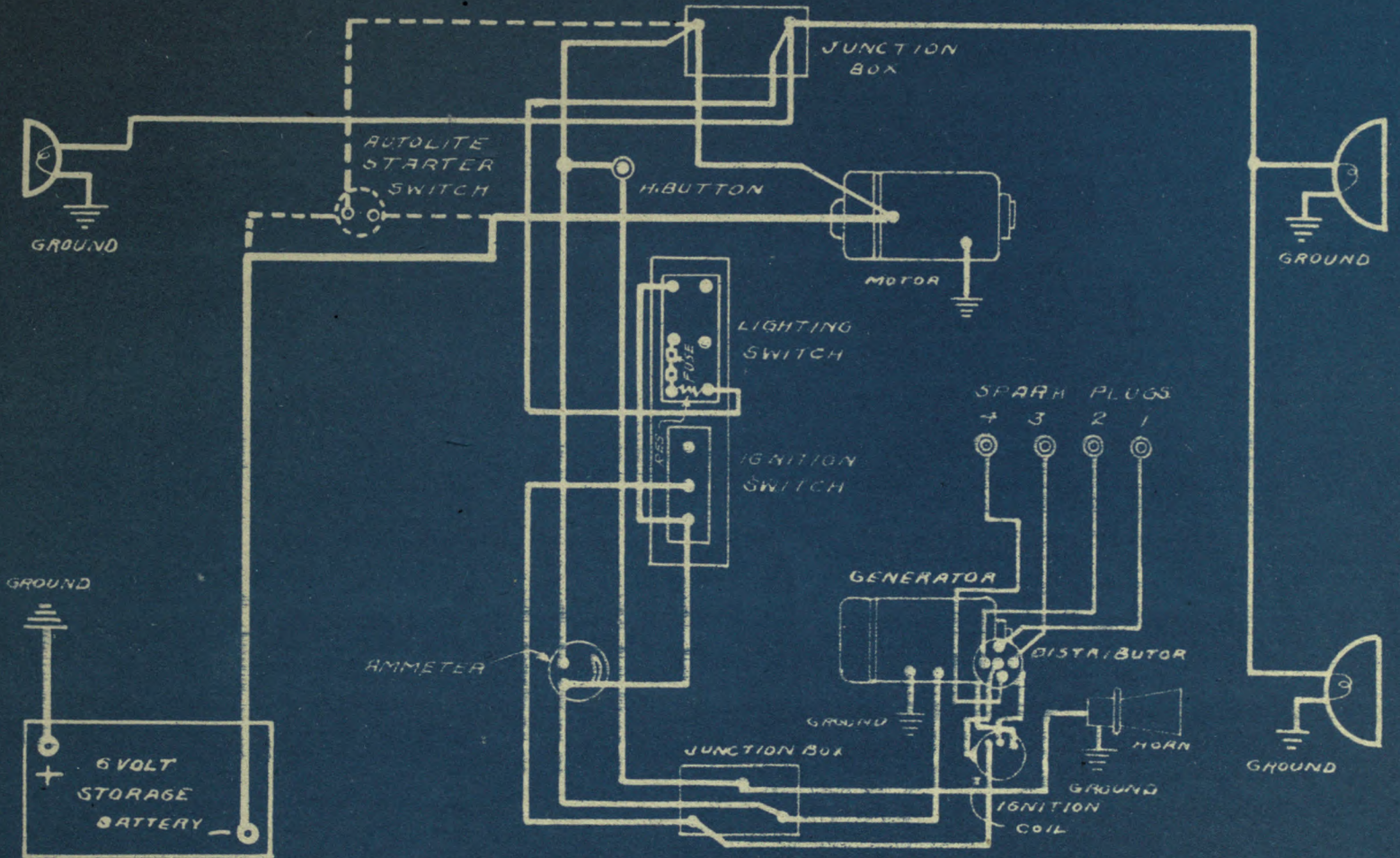
4-24

SPLITDORF-APELCO SYSTEM

CONN. IGN. 1919 MODELS.

FROM BRISCOE B.P. 25300A.

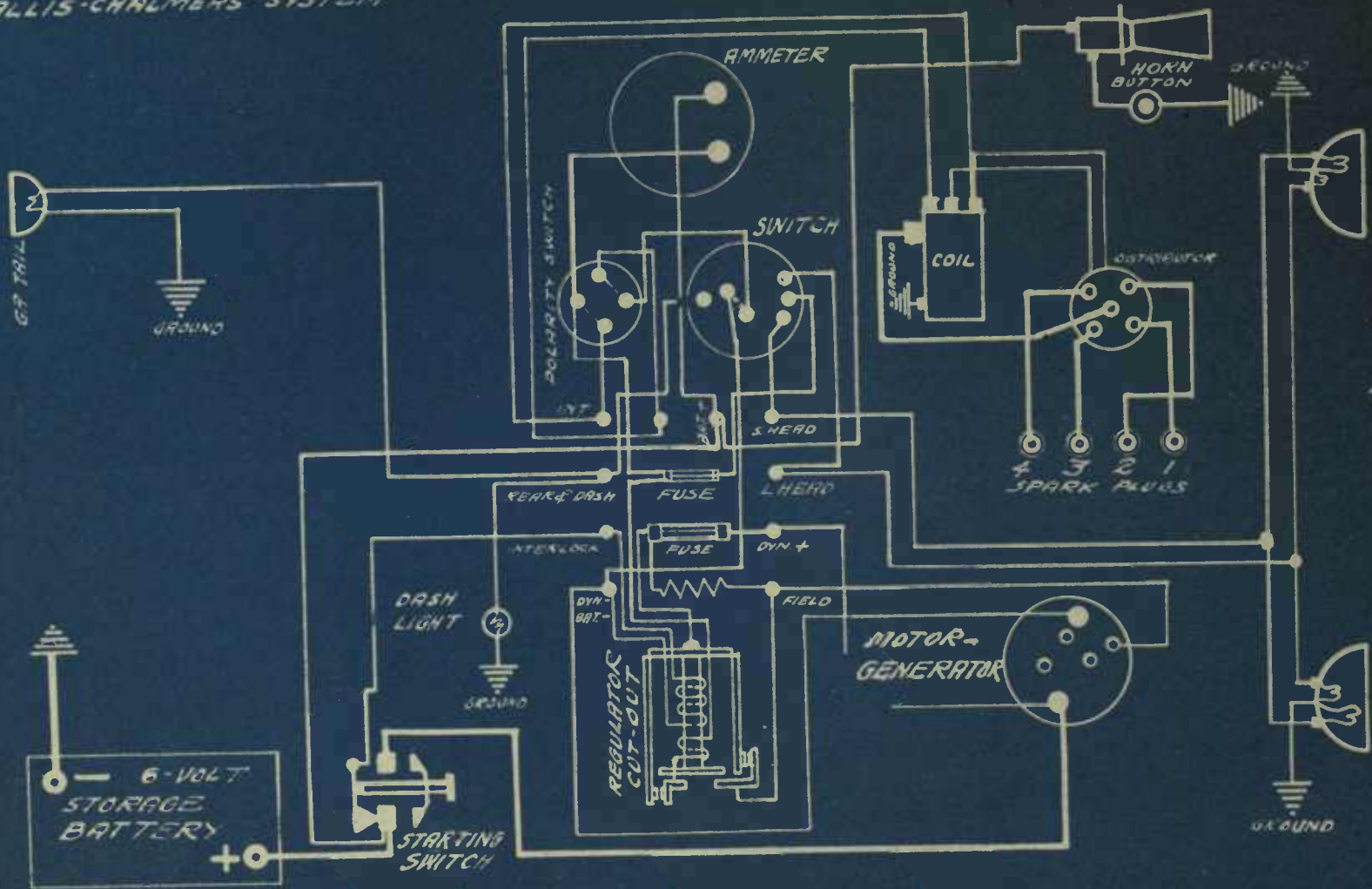
CHANGES IN WIRING FOR AUTOLITE SYSTEM ON 1918 MODELS SHOWN IN DOTTED LINES



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BROWN 1916
ALLIS-CHALMERS SYSTEM

FROM A.C.B.P. SM-10687

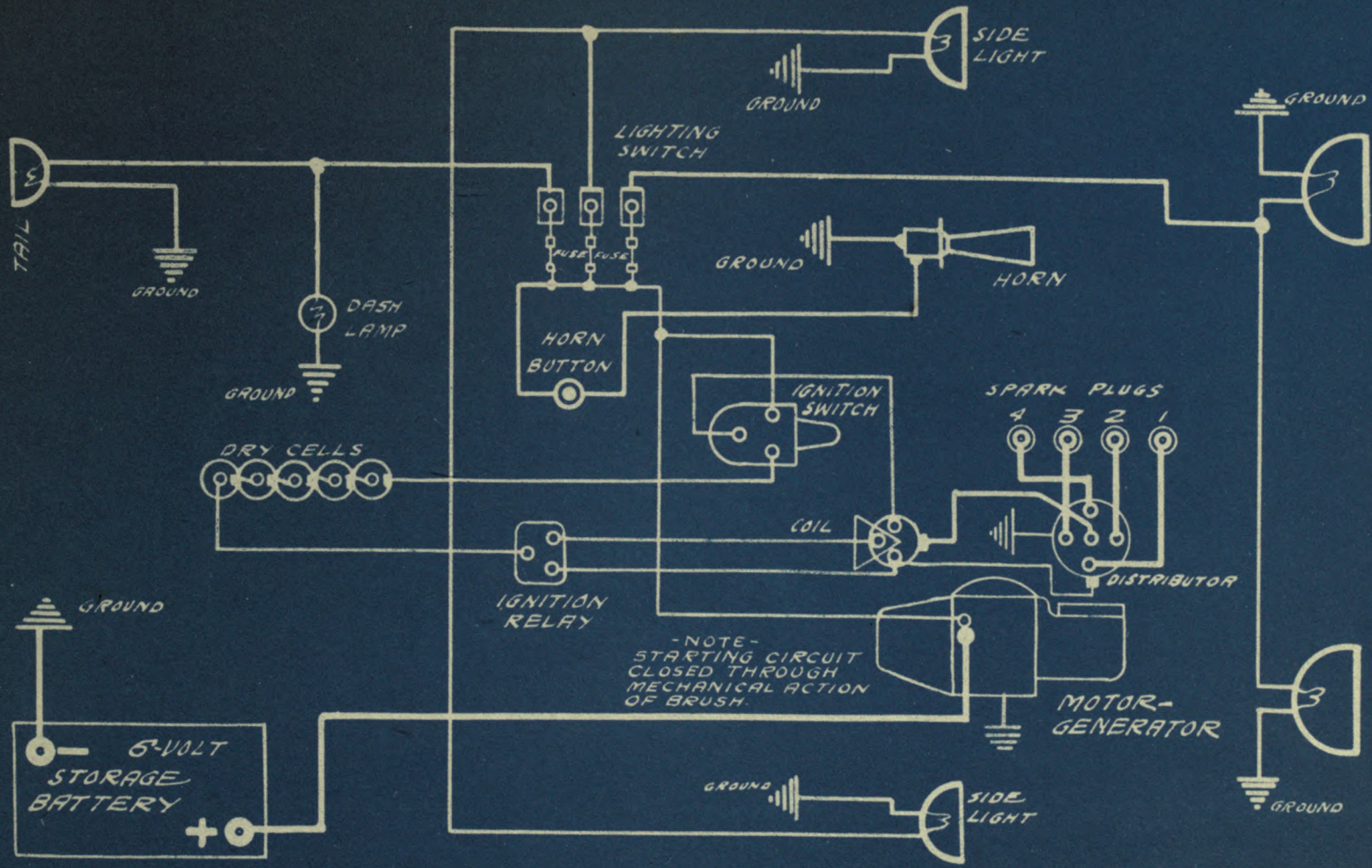


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BUICK 1914 B-24 & B-25

DELCO SYSTEM

FROM DELCO MANUAL

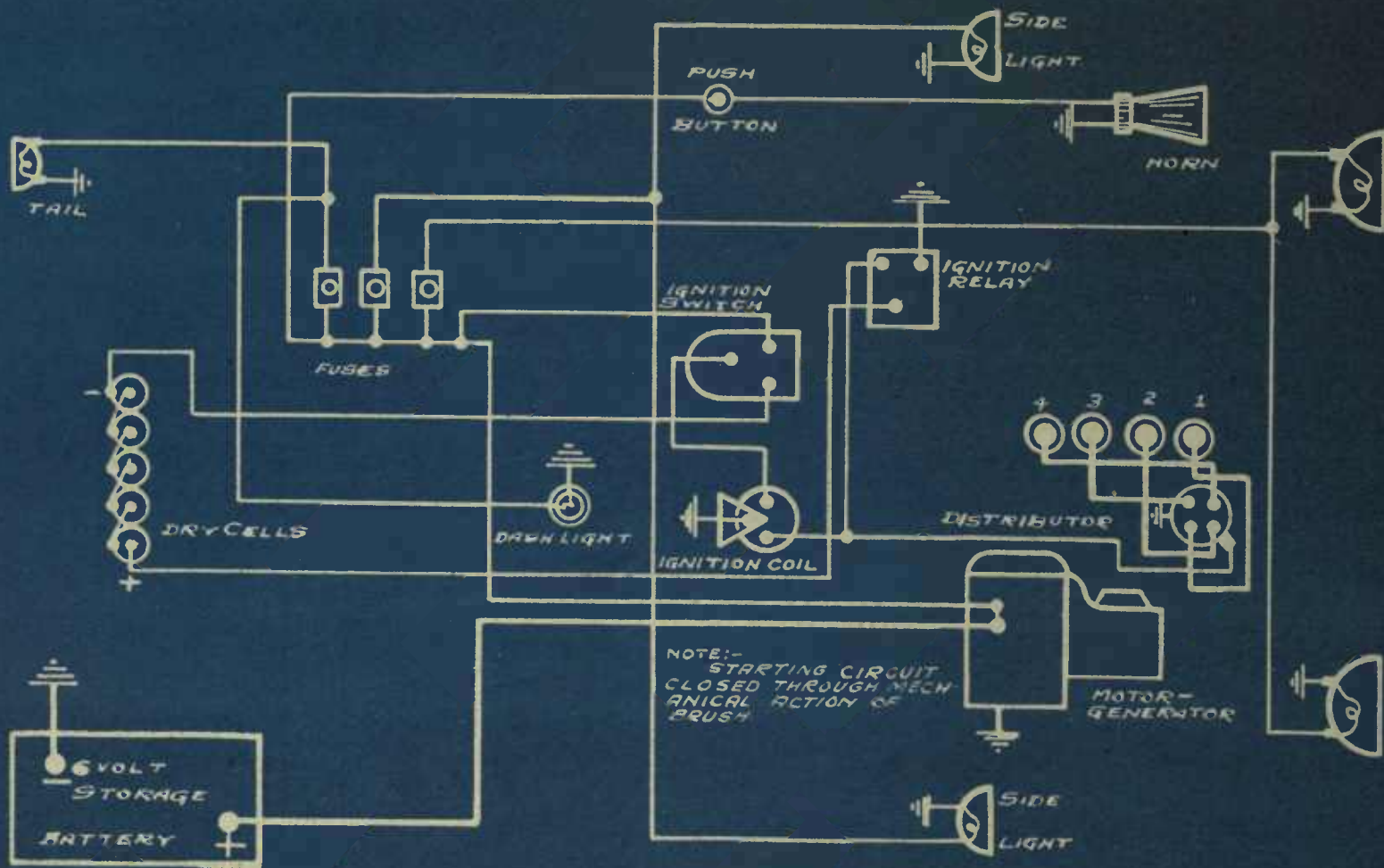


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BUICK 1914 B-36-37

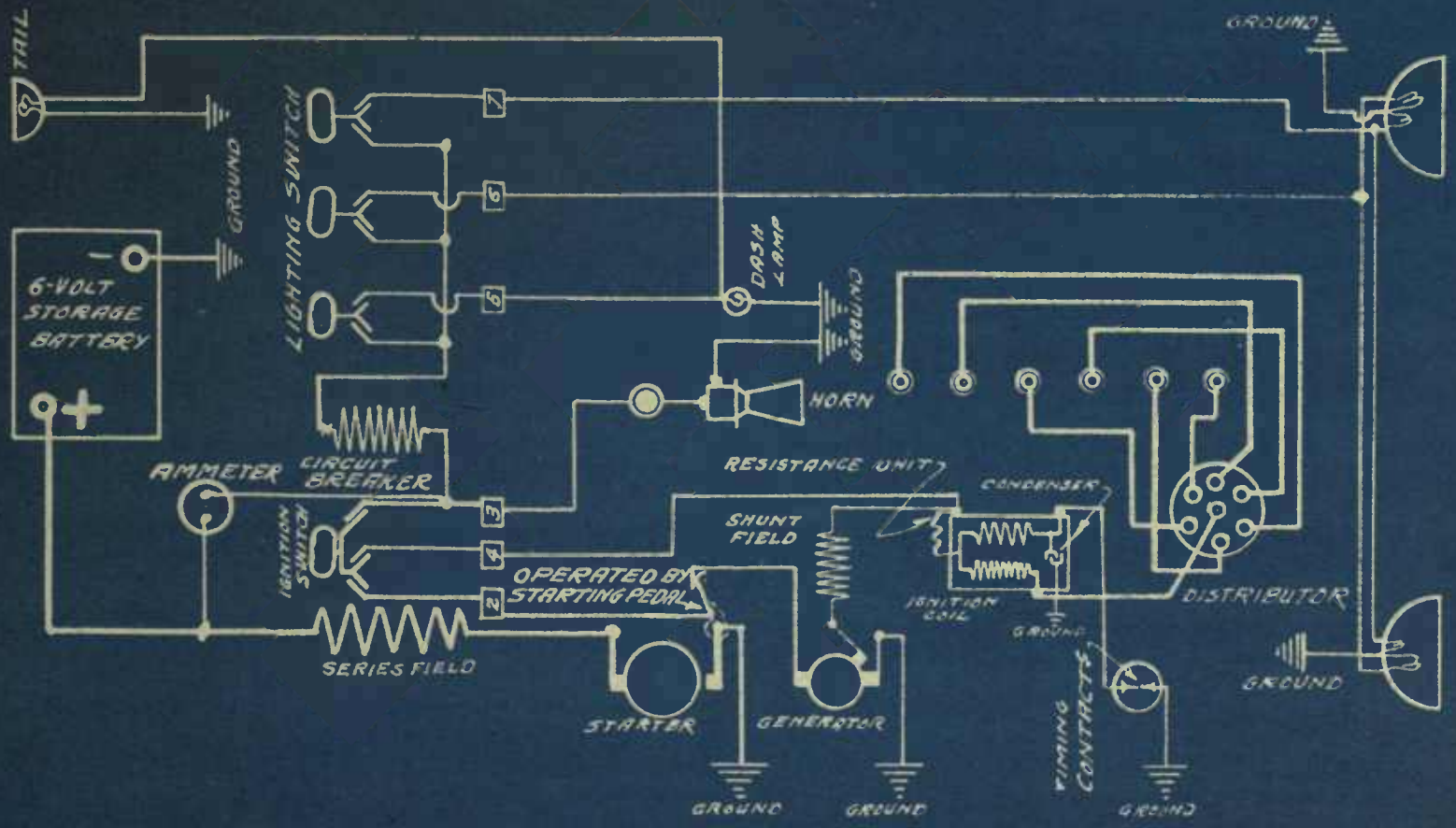
DELCO SYSTEM

FROM DELCO MANUAL



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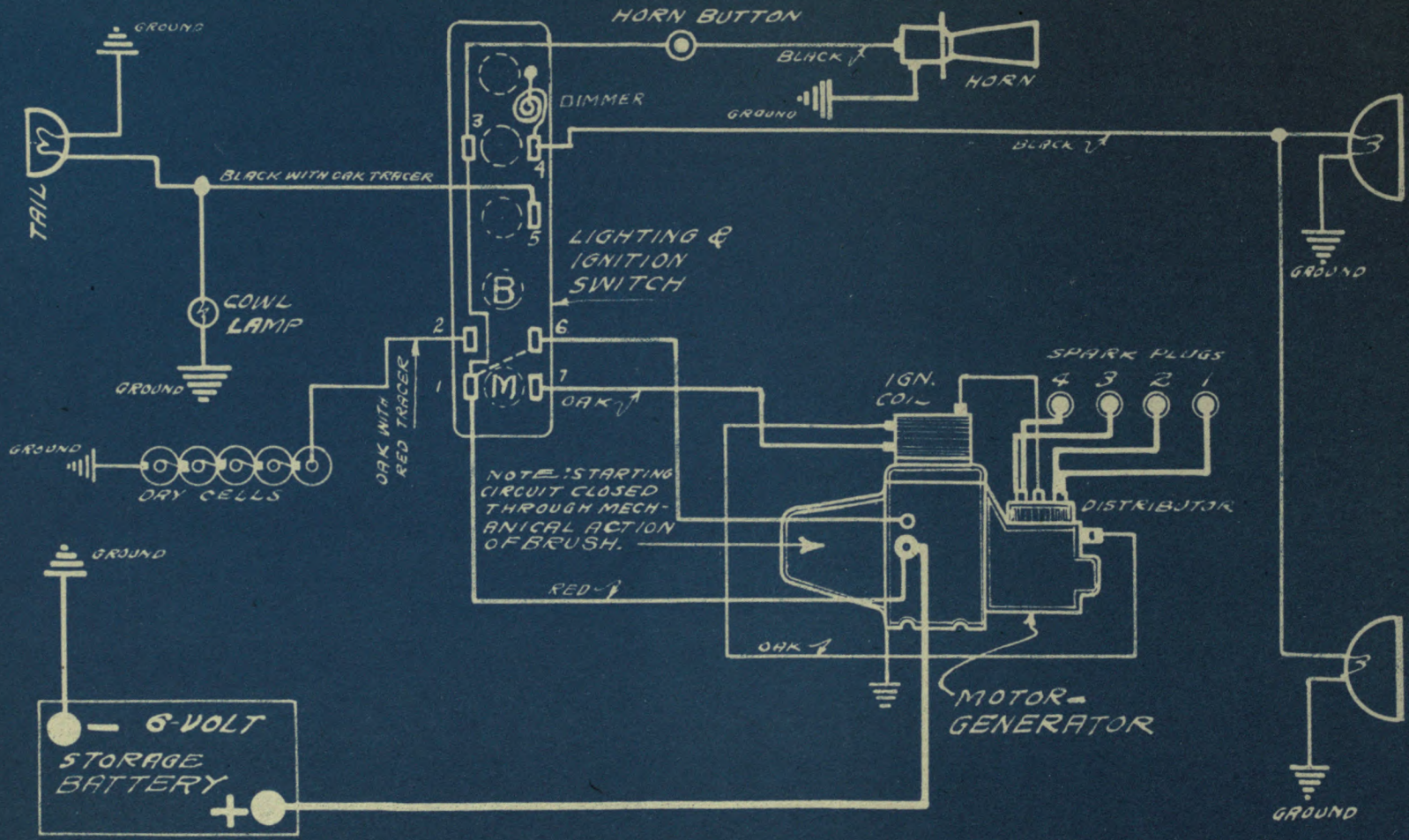
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BUICK 1915 C-24 & C-25

DELCO SYSTEM

FROM BUICK INST. BK.



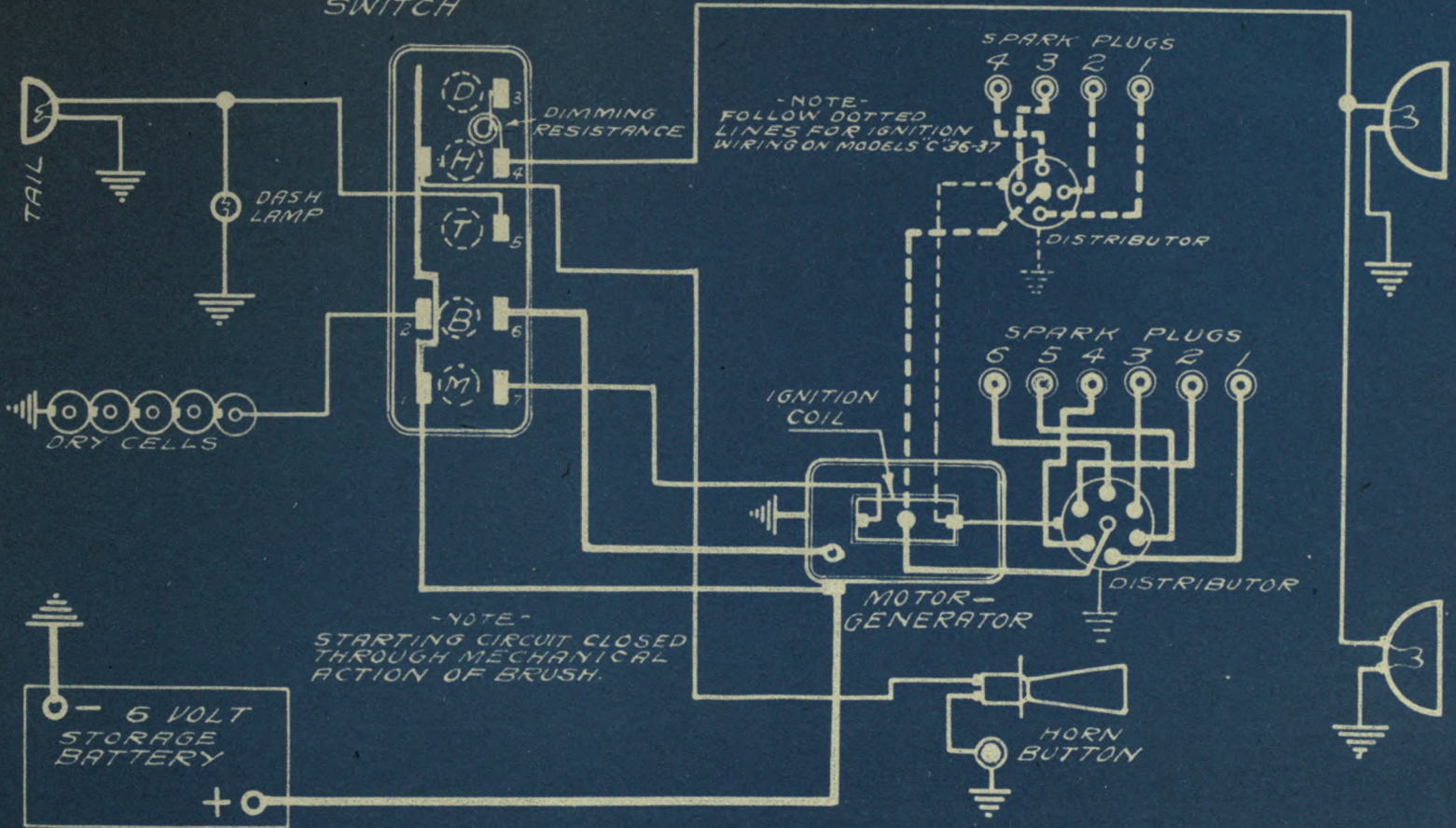
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BUICK 1915 "C" 36-37-54-55

DELCO SYSTEM

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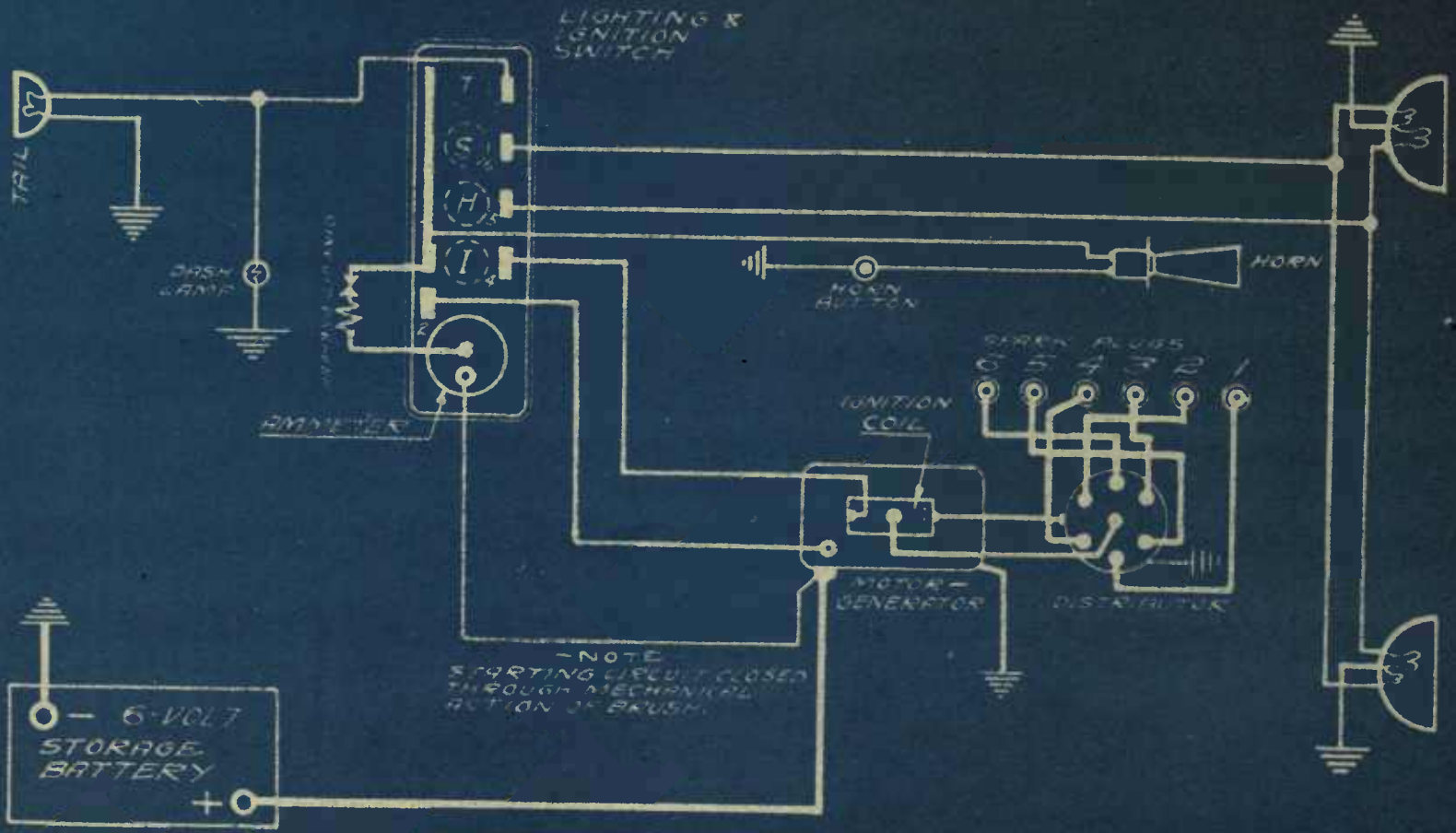
LIGHTING & IGNITION SWITCH



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BUICK 1916 D-44-45-54-55
DELCO SYSTEM

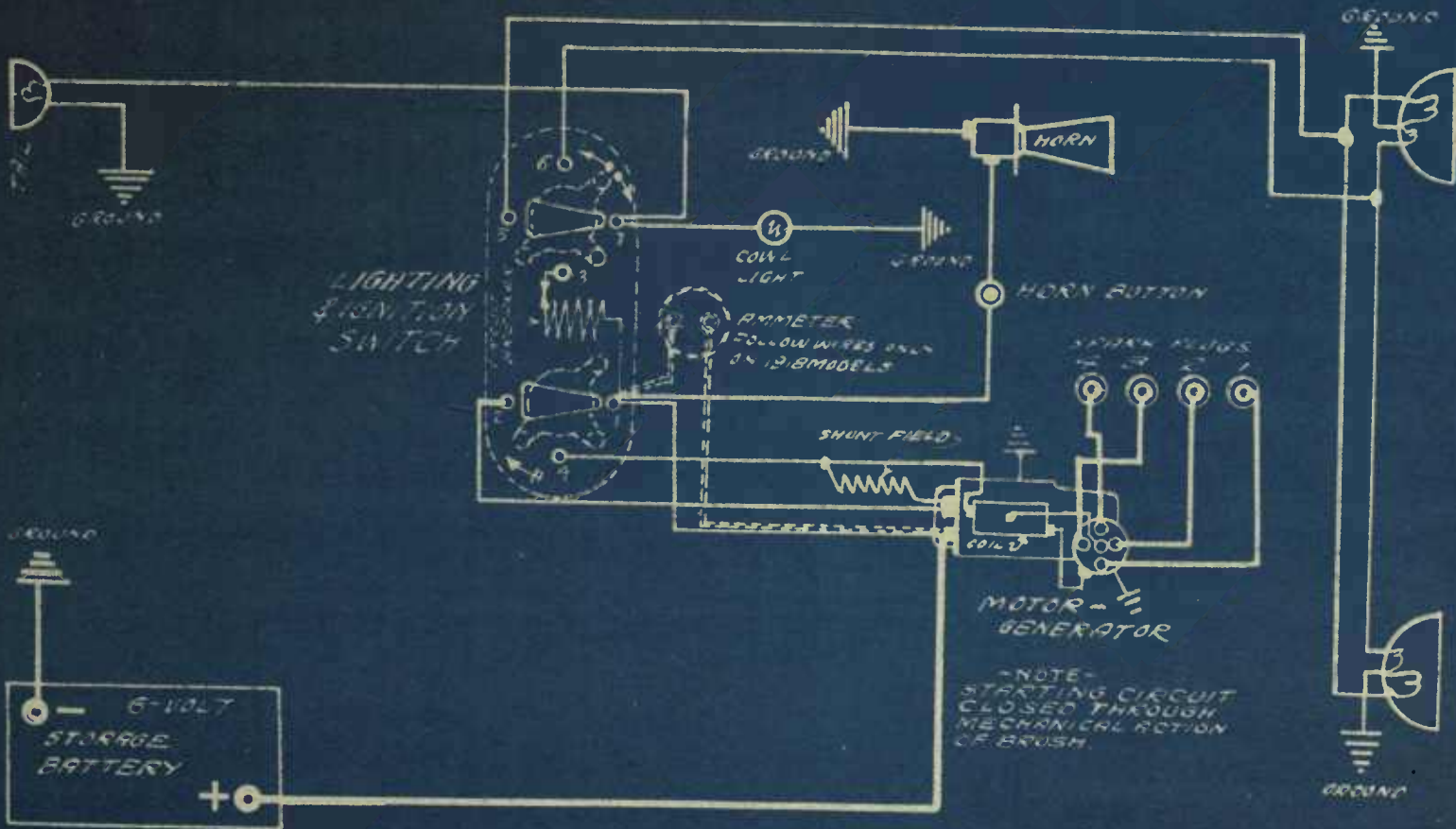
1917 D-6-44-45-46-47
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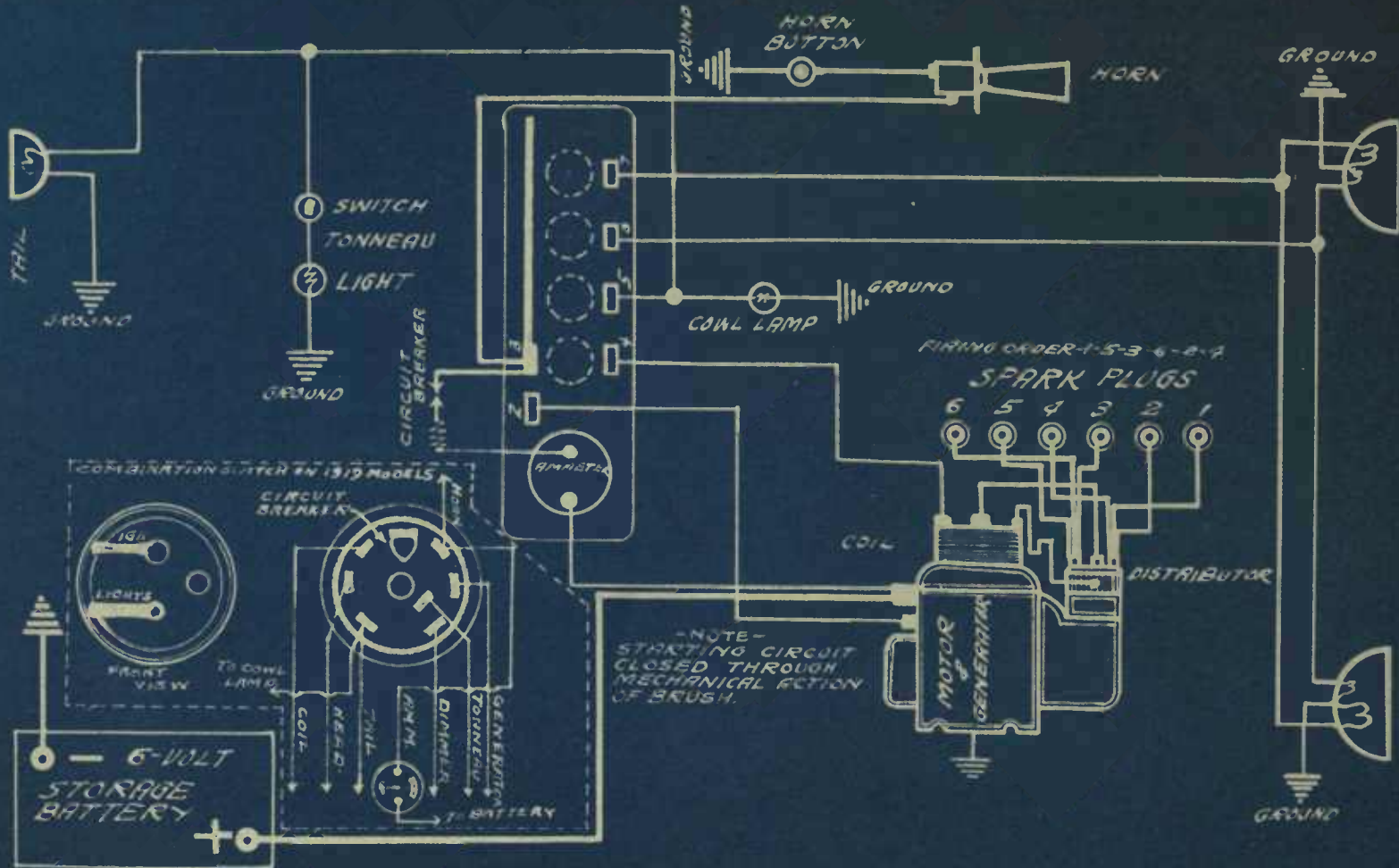
BUICK 1917, D-34-D-35=1918, E-34-E-35
JELCO SYSTEM

FROM BUICK INST. BKS.



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BUICK-1918 E-SIX-44,45,46,47,49, & 50 -1919 "H" SERIES
 DELCO SYSTEM FROM B/P 40381.

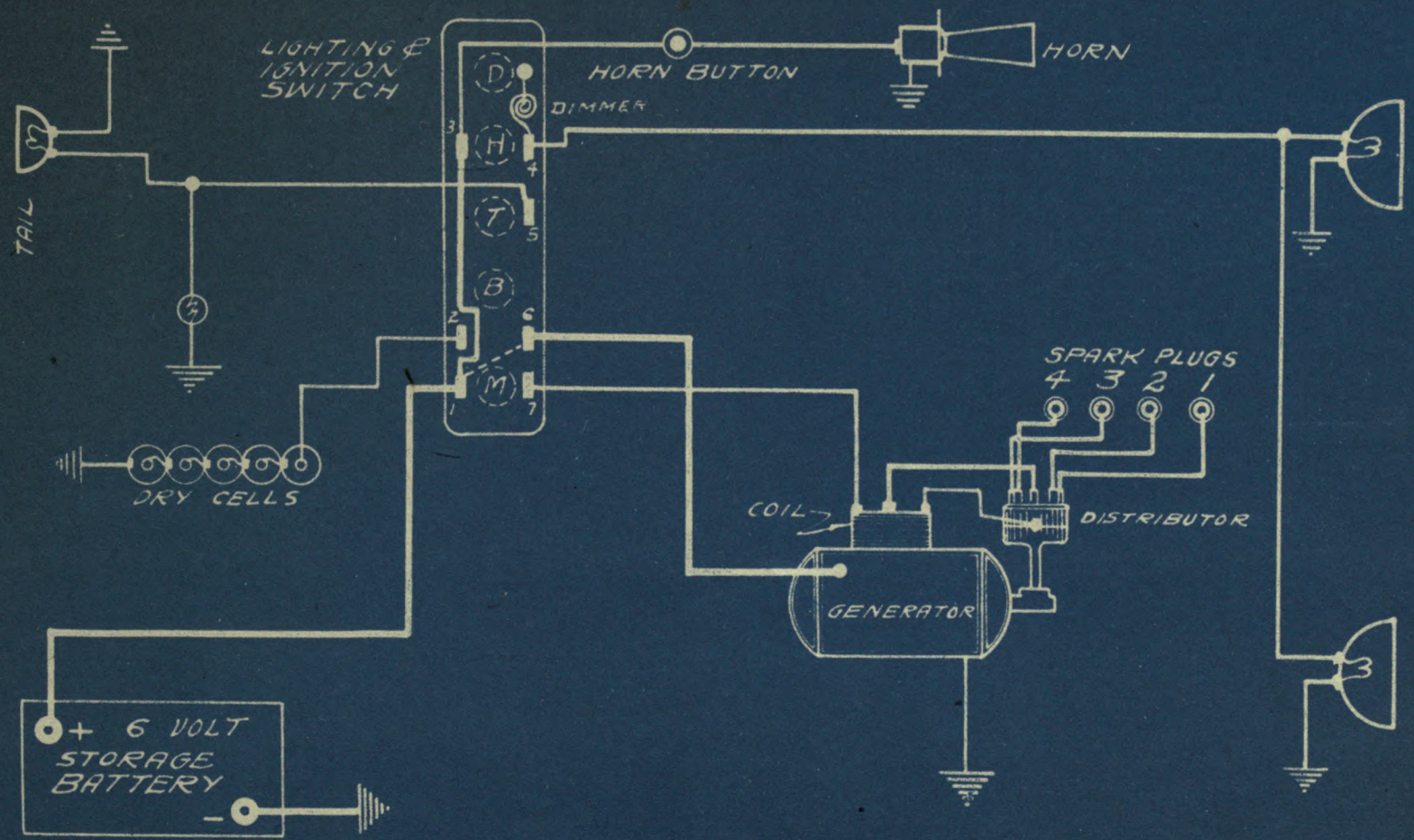


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BUICK TRUCK 1915 C-4
DELCO SYSTEM

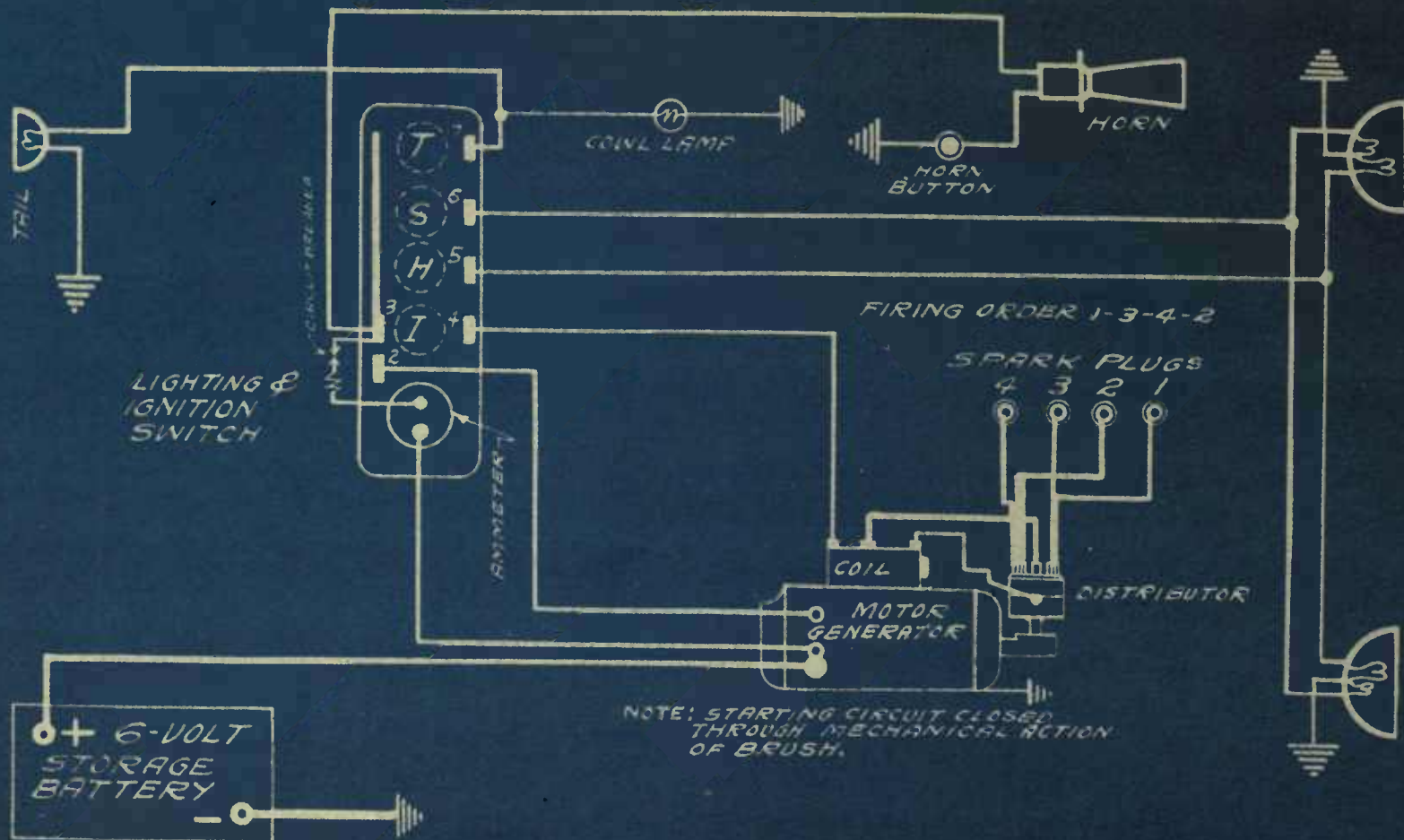
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BUICK TRUCK 1916 D-4
 DELCO SYSTEM

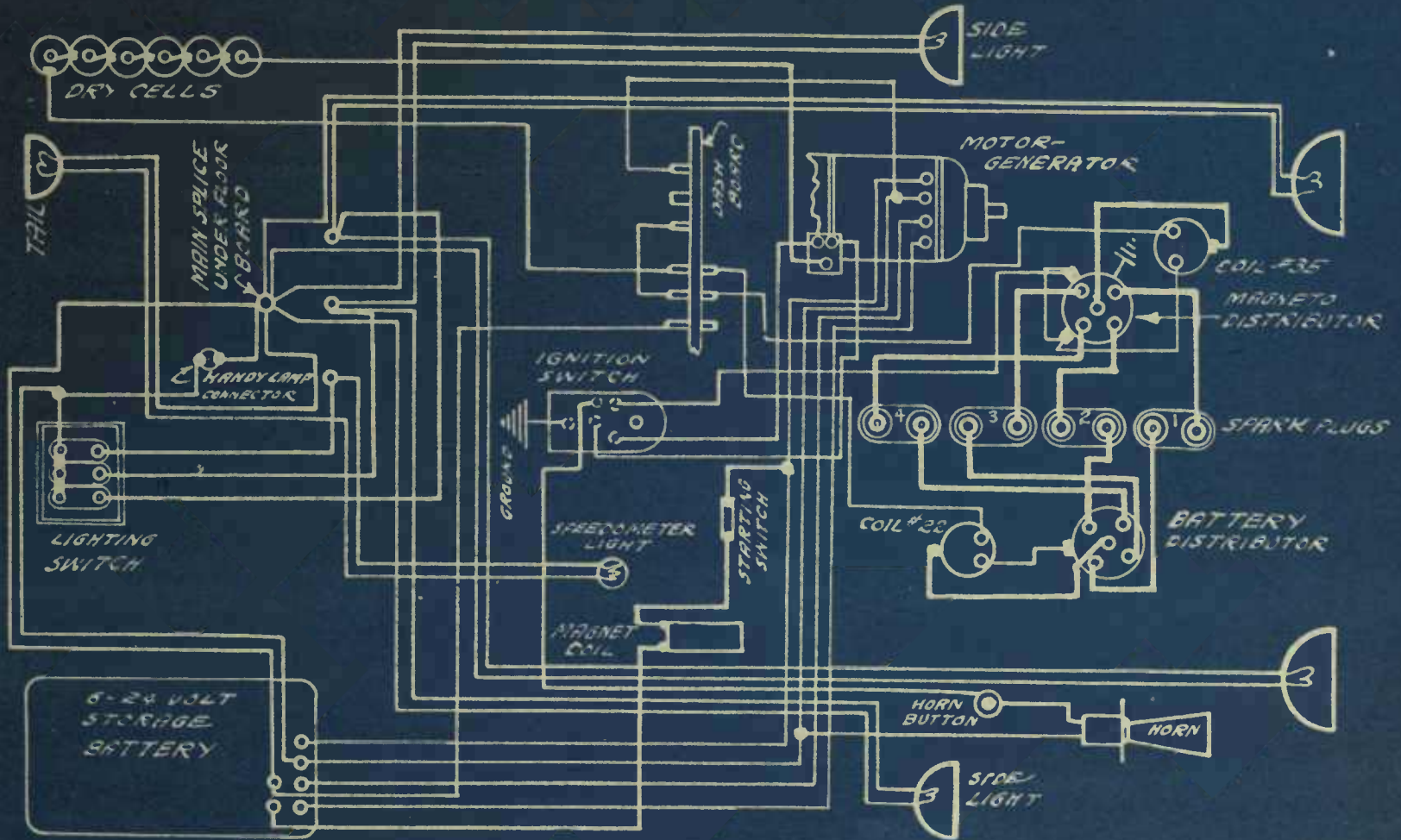
FROM DELCO MANUAL



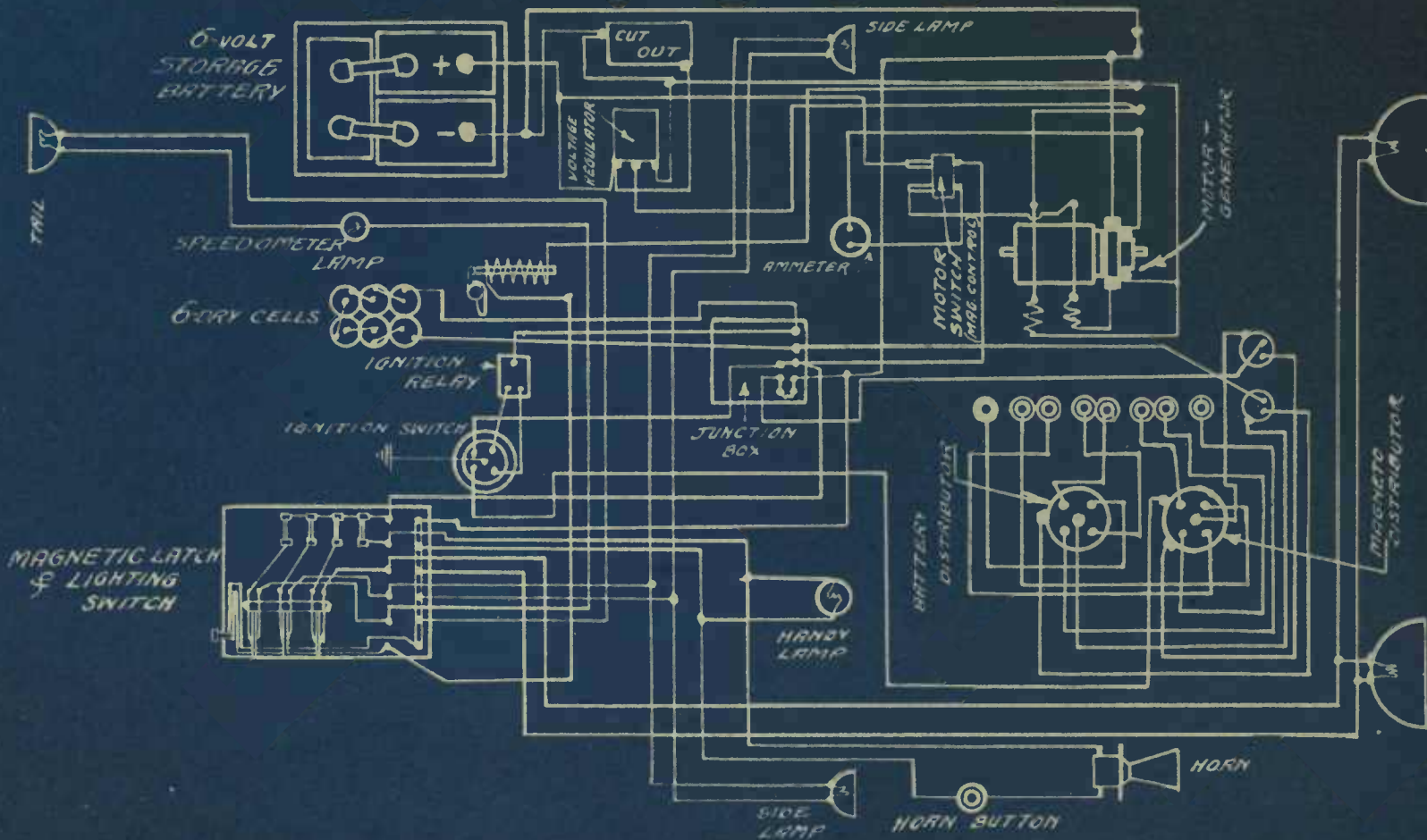
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CADILLAC 1912
DELCO SYSTEM

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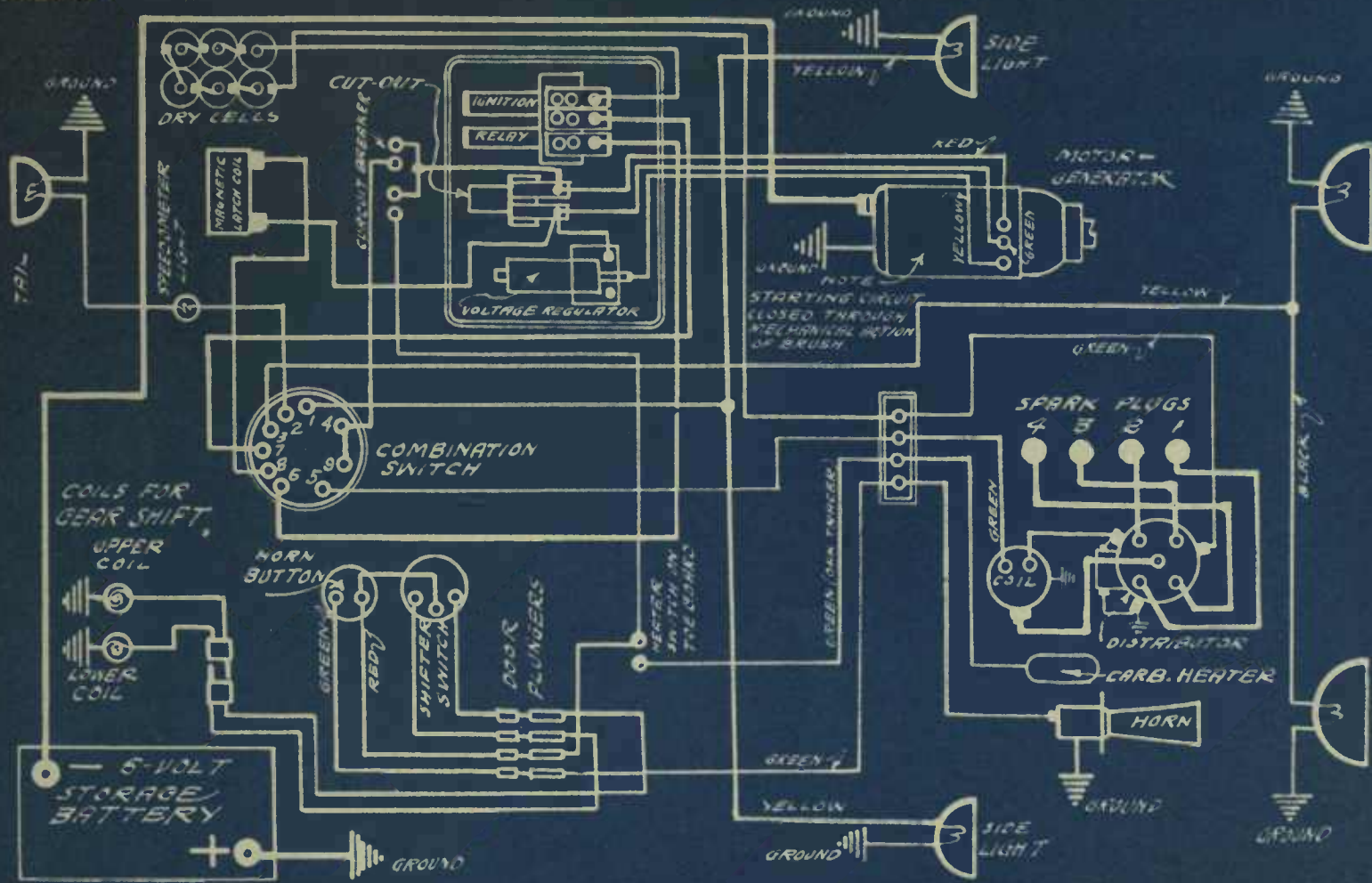


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CADILLAC 1914

DELCO SYSTEM

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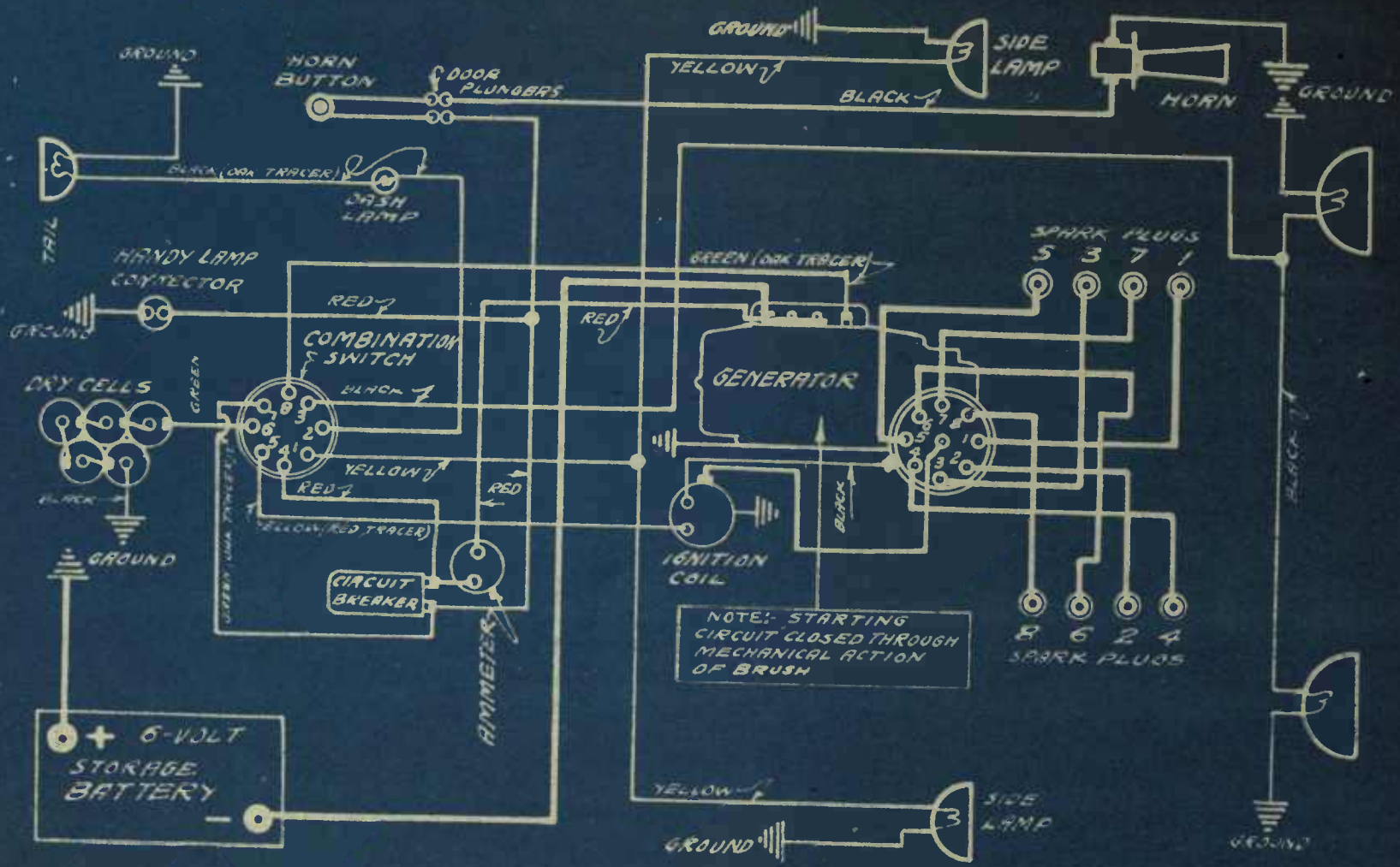


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CADILLAC 1915 "8" TYPE 51

DELCO SYSTEM

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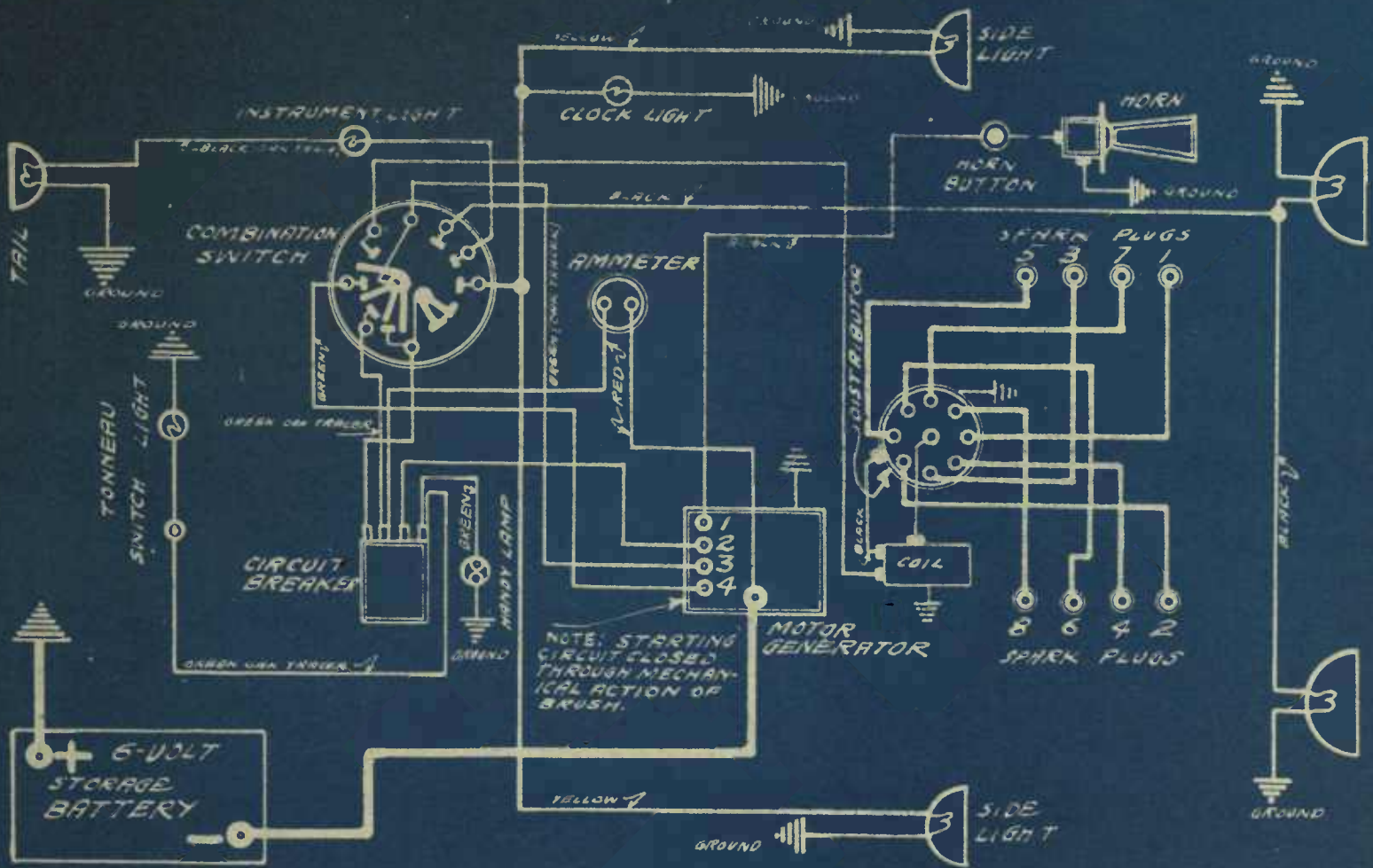


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CADILLAC 1916 "B" TYPE 53

DELCO SYSTEM

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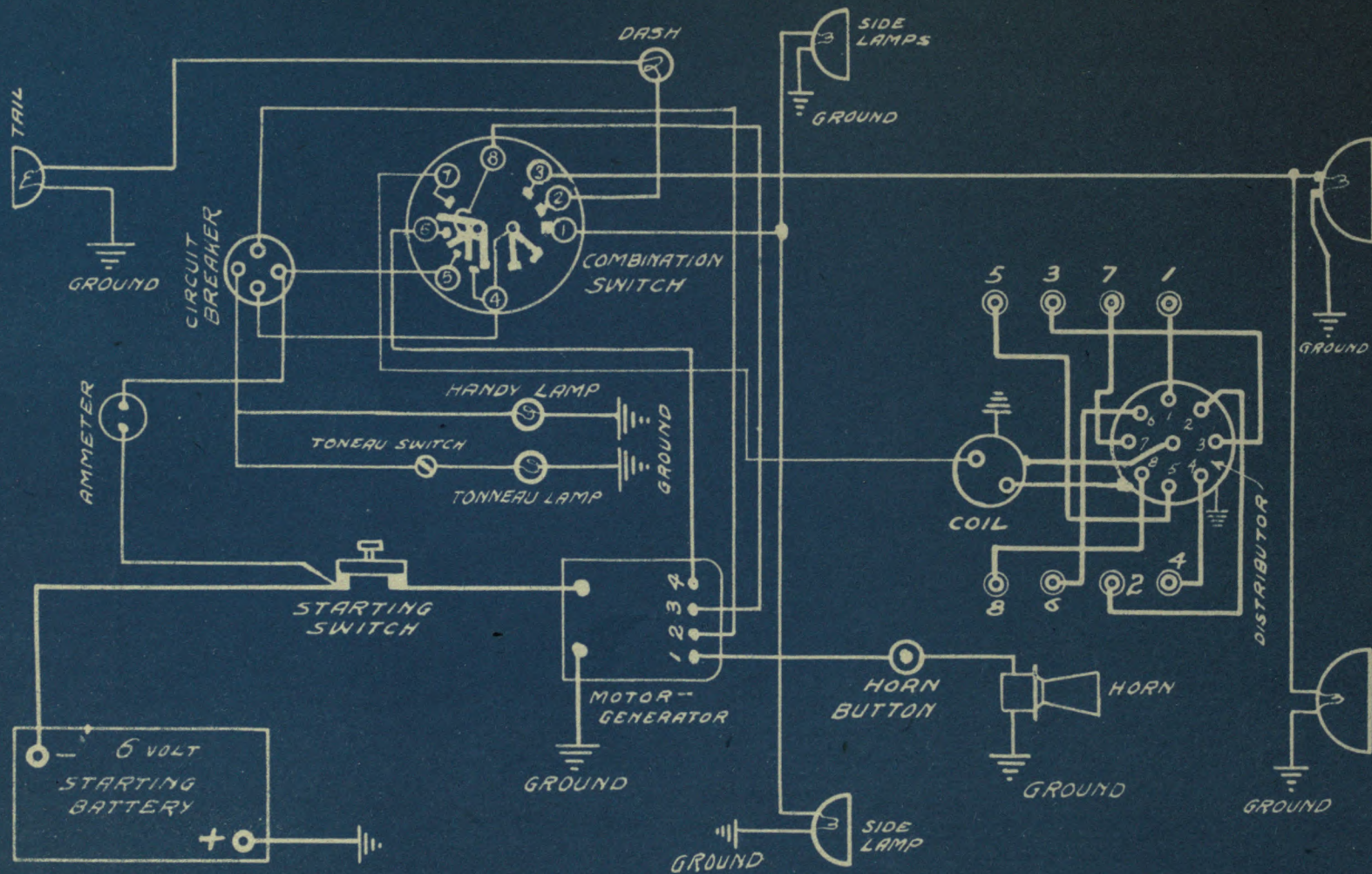


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CADILLAC 1917 - "55" 1918-1919 - "57"

FROM MFR'S. B.P. 38377

DELCO SYSTEM

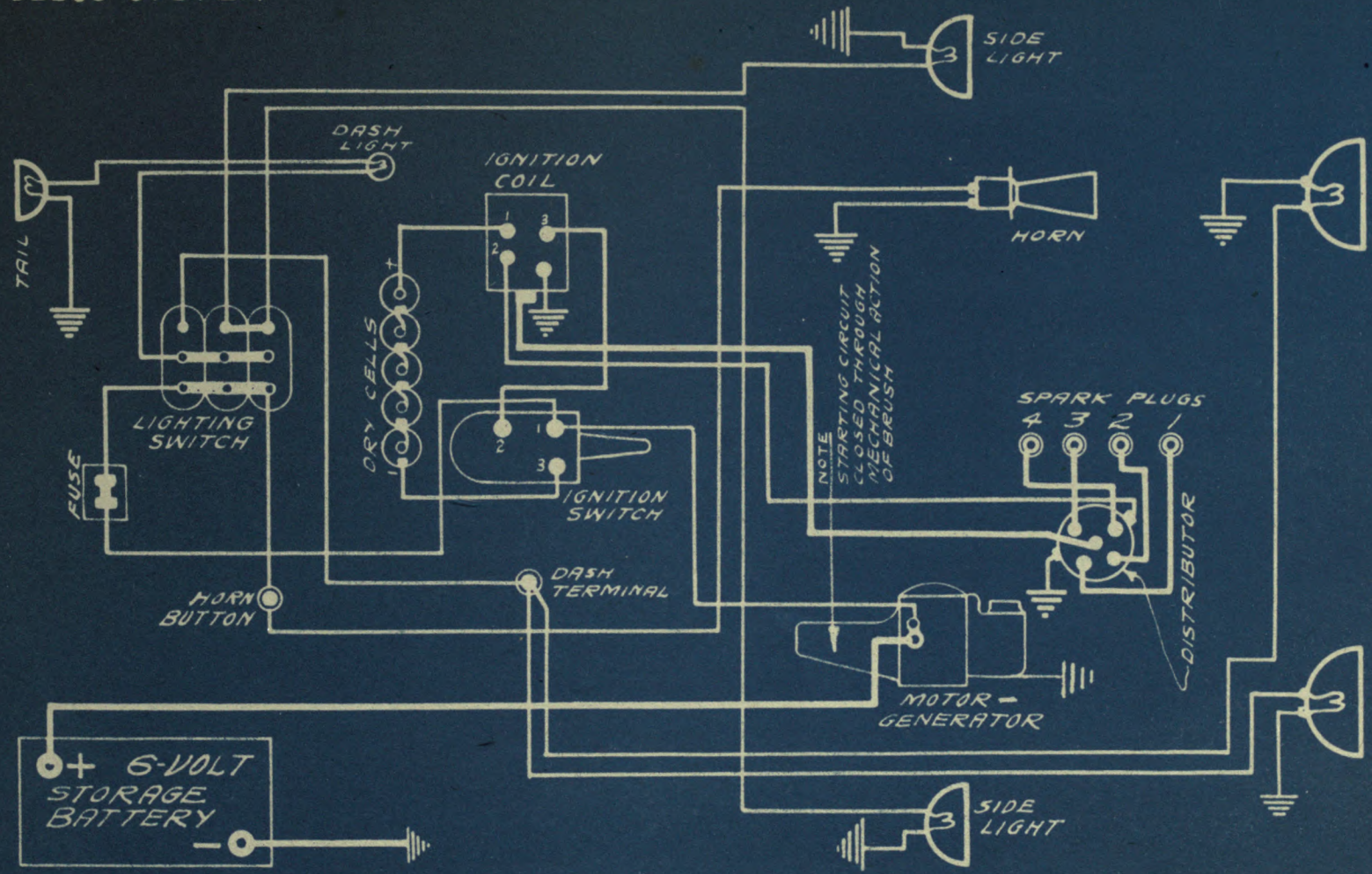


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CARTERCAR 1914 "7"

DELCO SYSTEM

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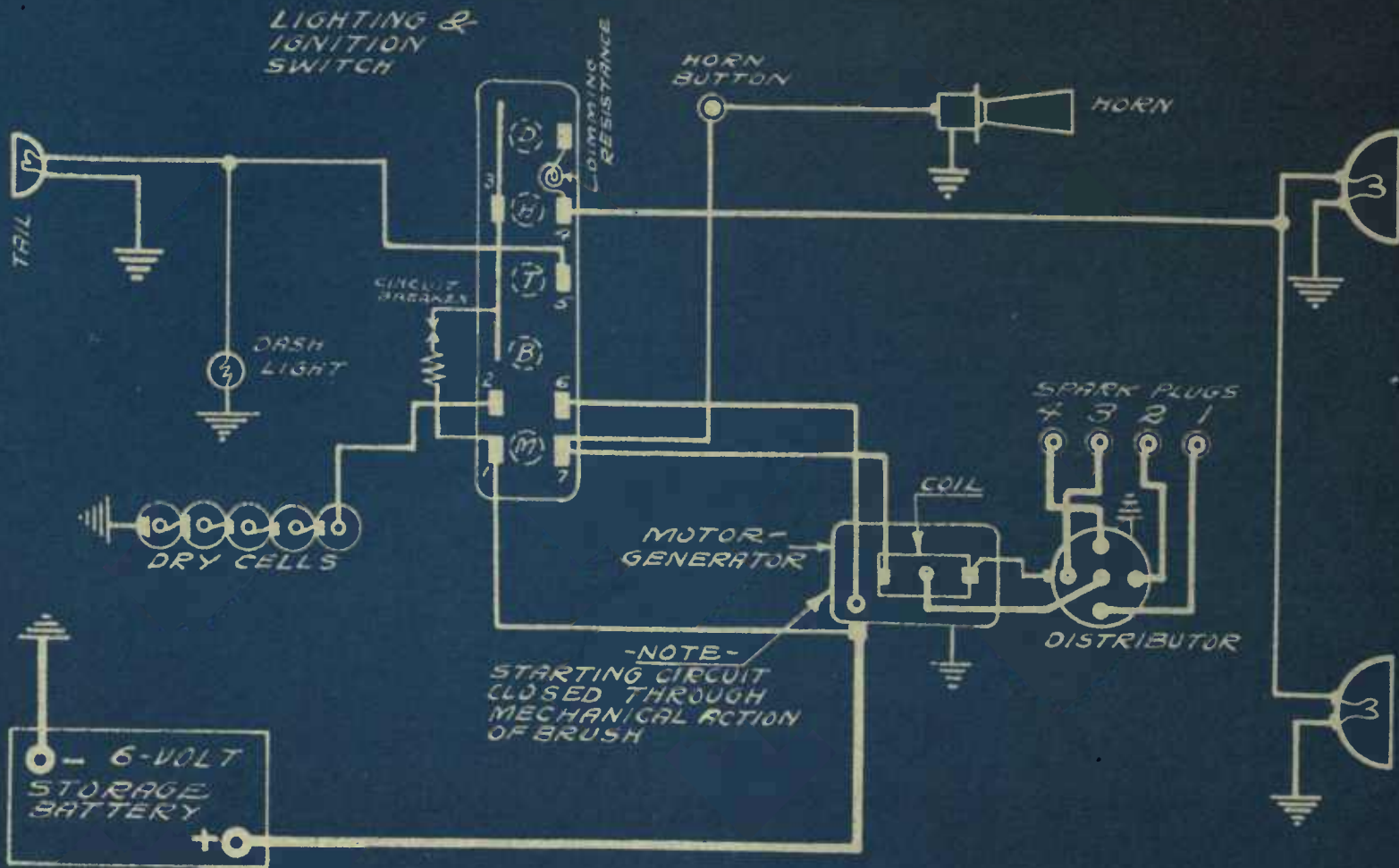


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CARTER CAR 1915 MODEL 9

DELCO SYSTEM

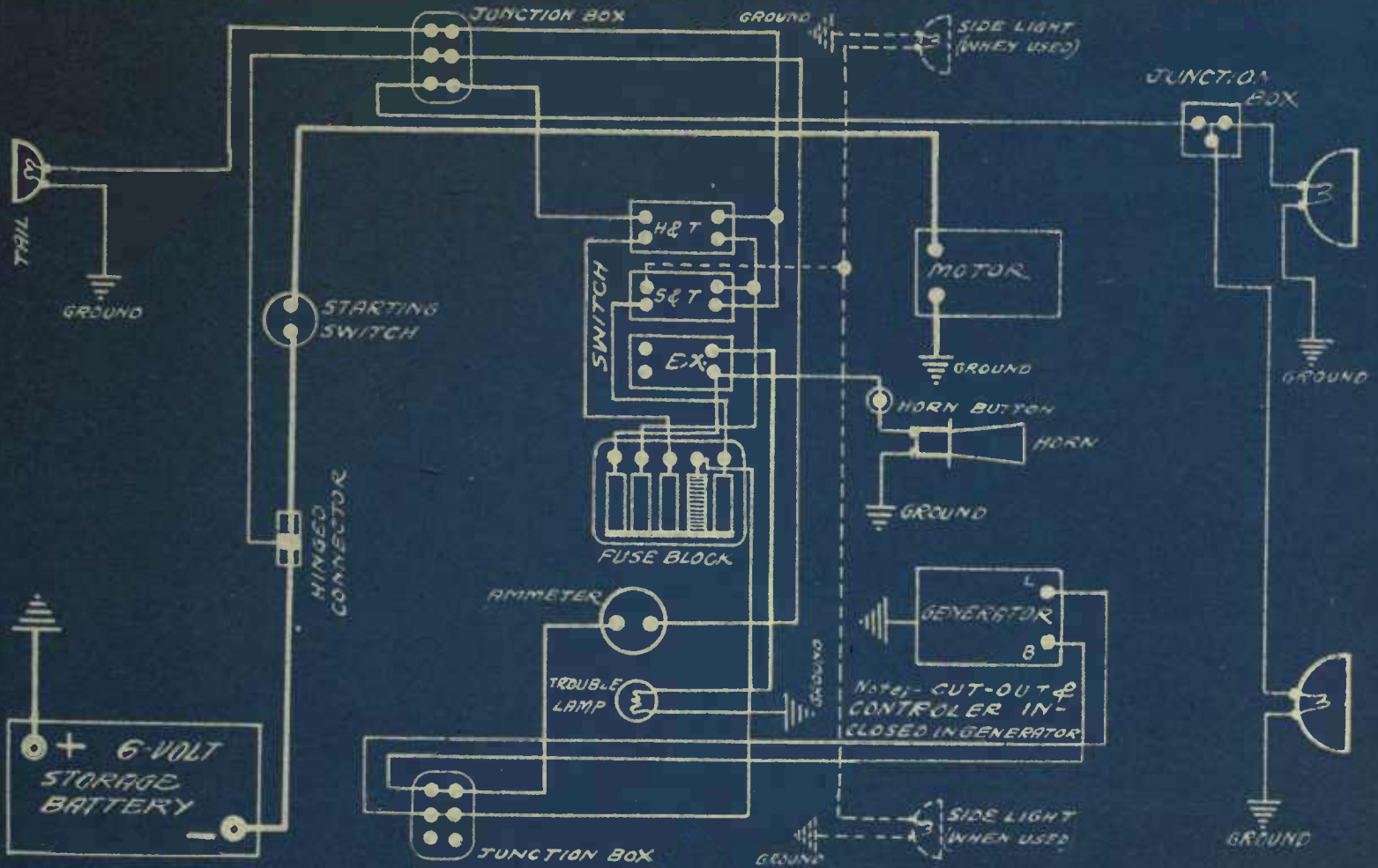
FROM DELCO MANUAL



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CASE 1914-5 "O"
WESTINGHOUSE SYSTEM

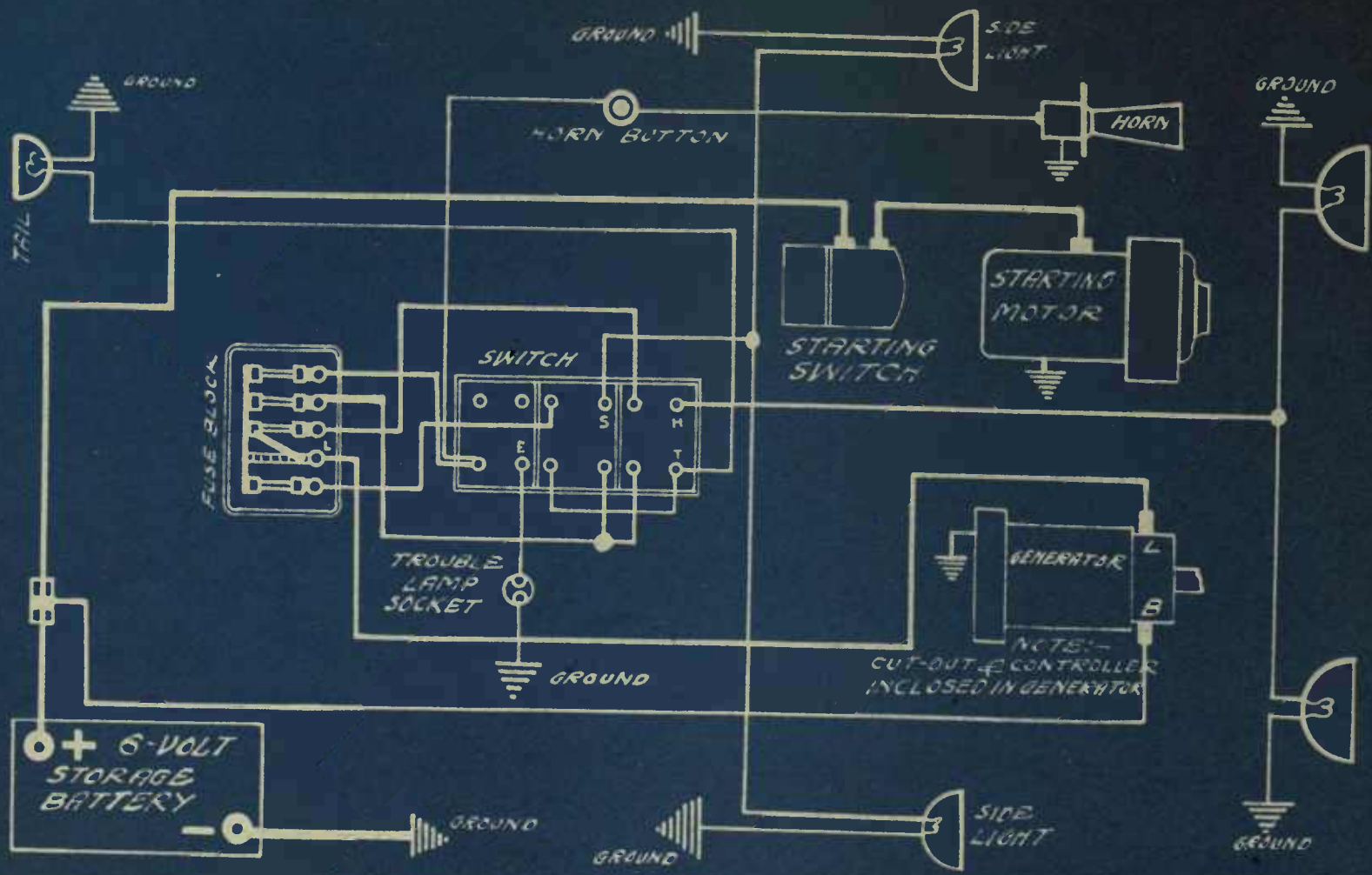
FROM CASE BR 256 & 257



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CASE 1914-1915 MODEL "R"
WESTINGHOUSE SYSTEM

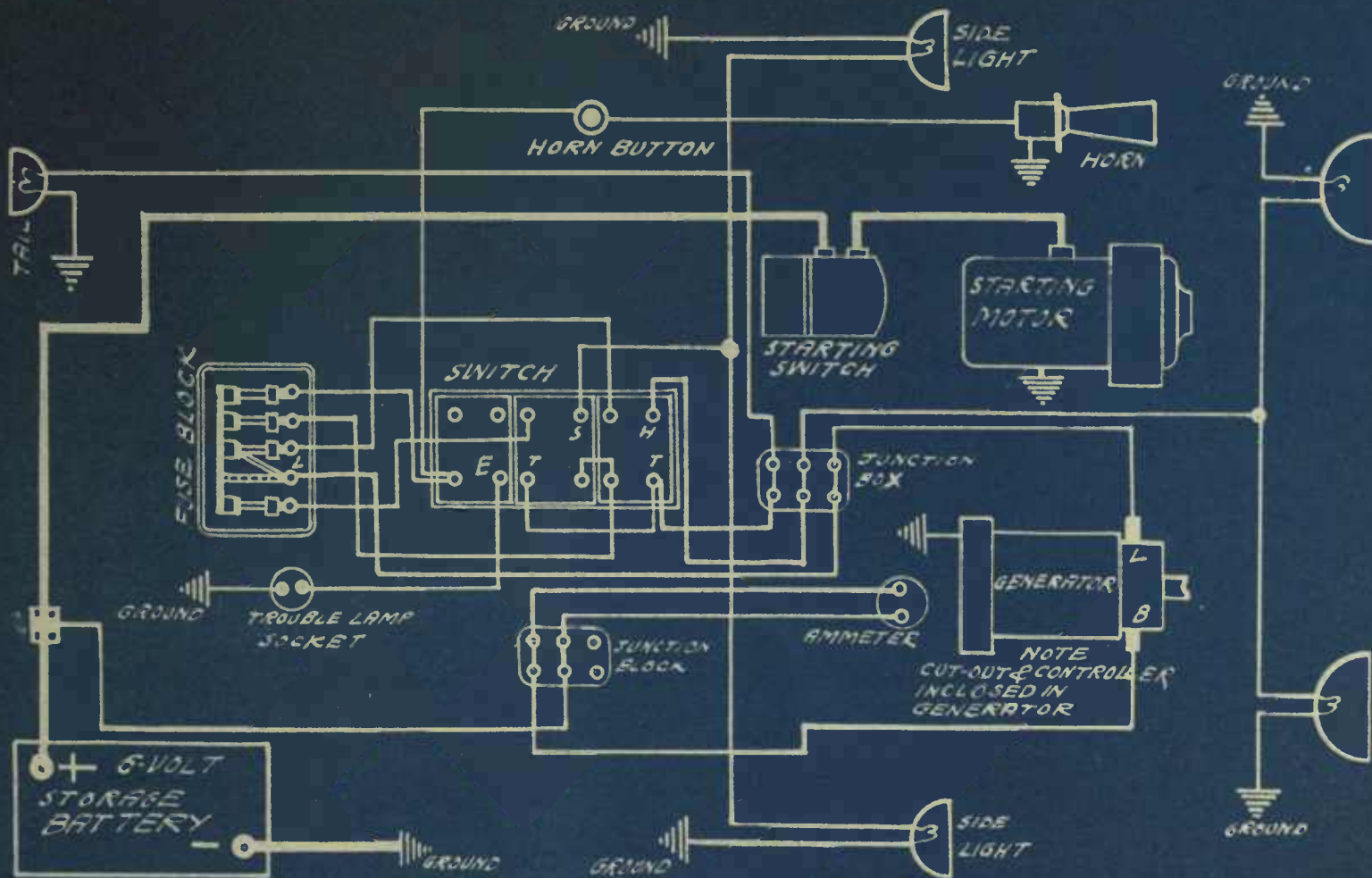
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CASE 1914-1915 "5"
WESTINGHOUSE SYSTEM

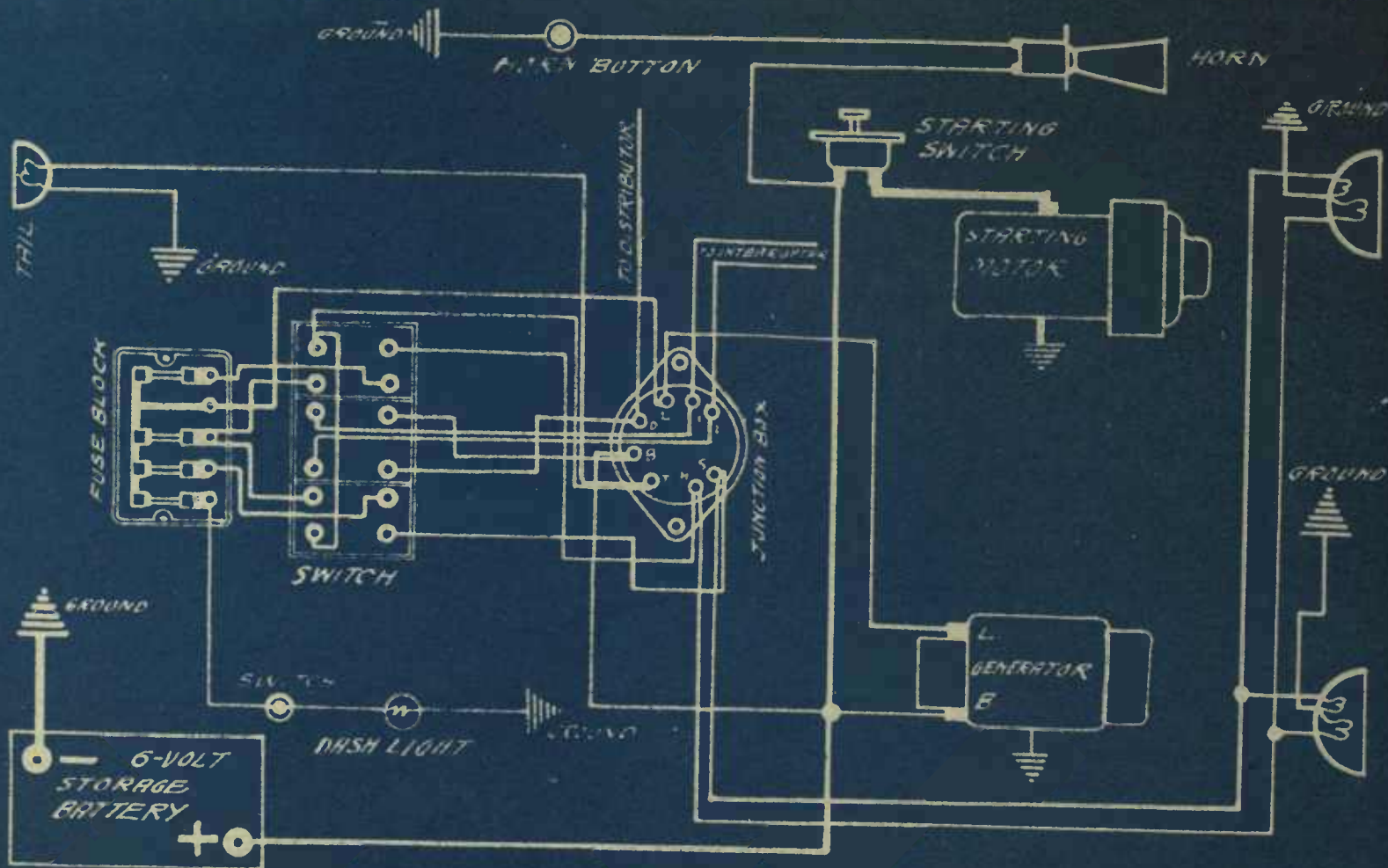
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CASE 1915 MODEL "R"
WESTINGHOUSE SYSTEM

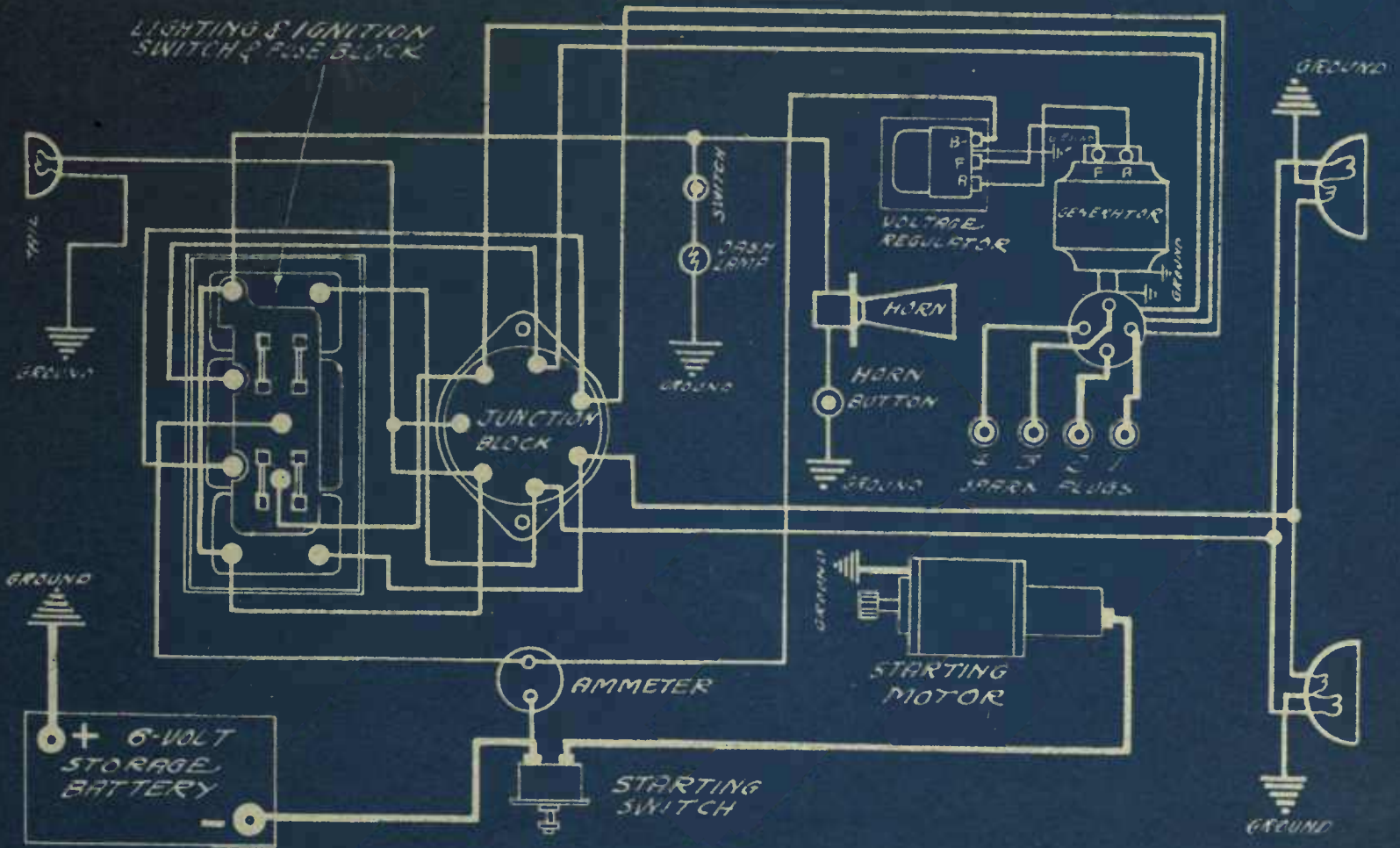
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CASE 1916 "T"
WESTINGHOUSE SYSTEM

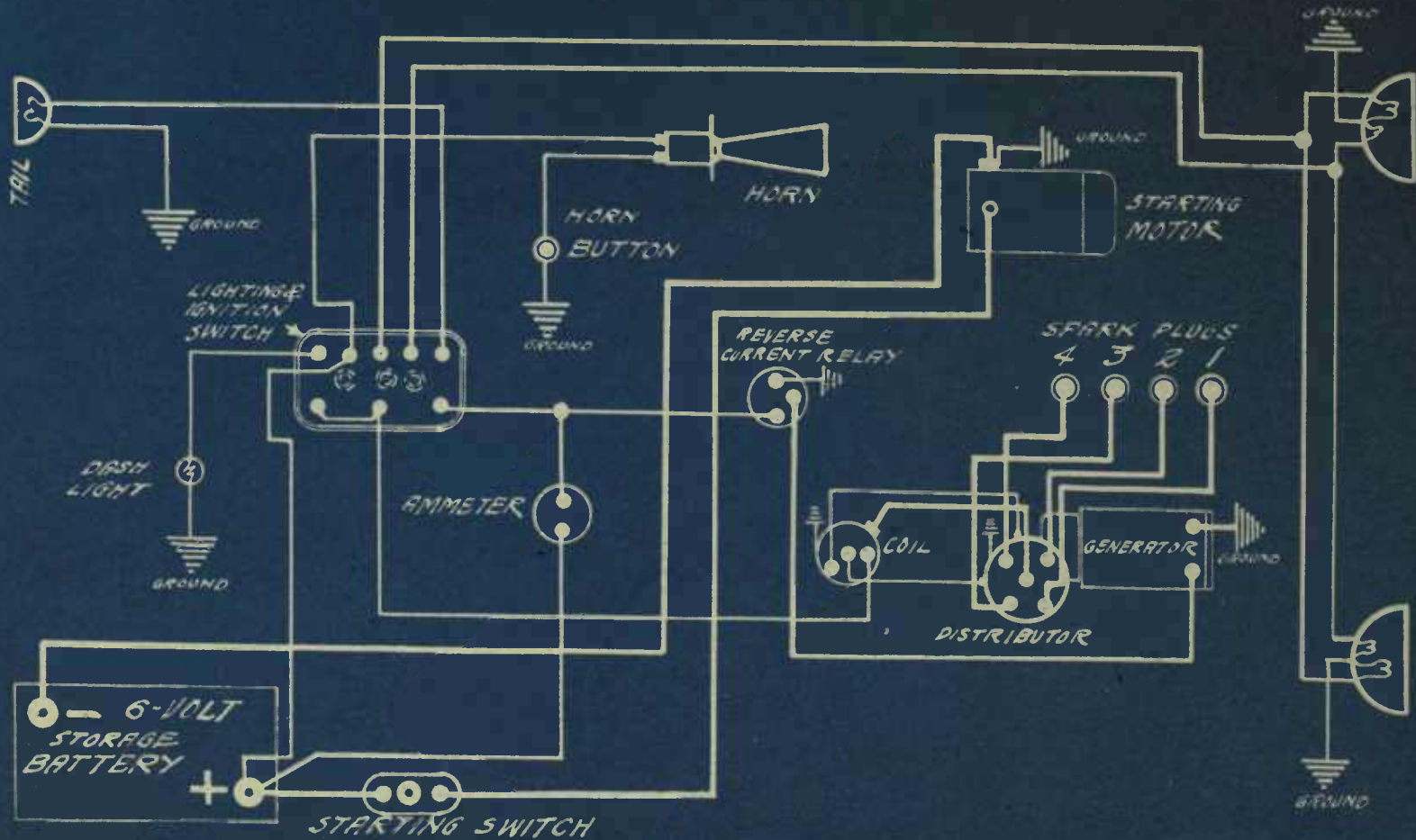
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CASE 1917 "T"
AUTOLITE SYSTEM

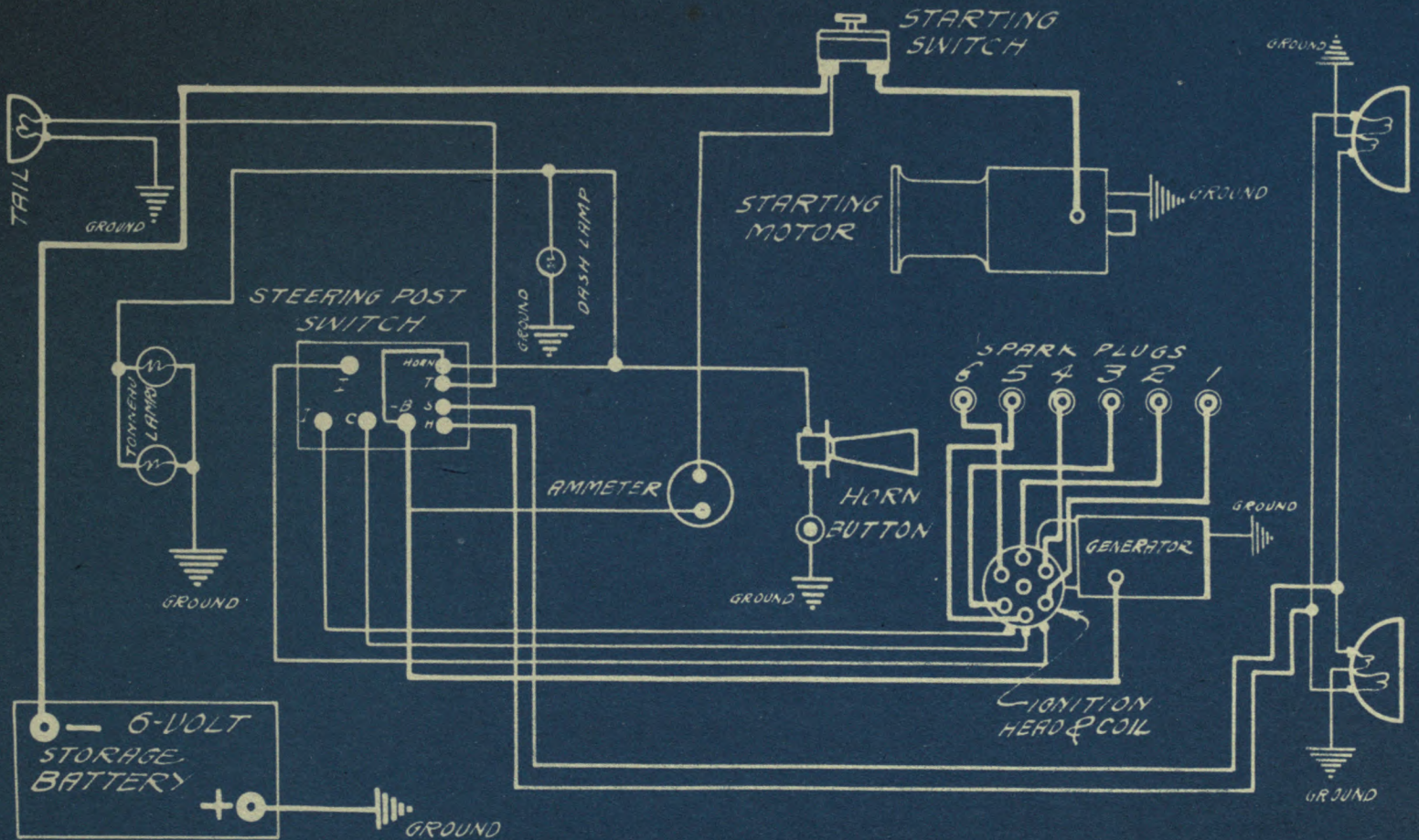
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CASE 1918 "U"
WESTINGHOUSE SYSTEM

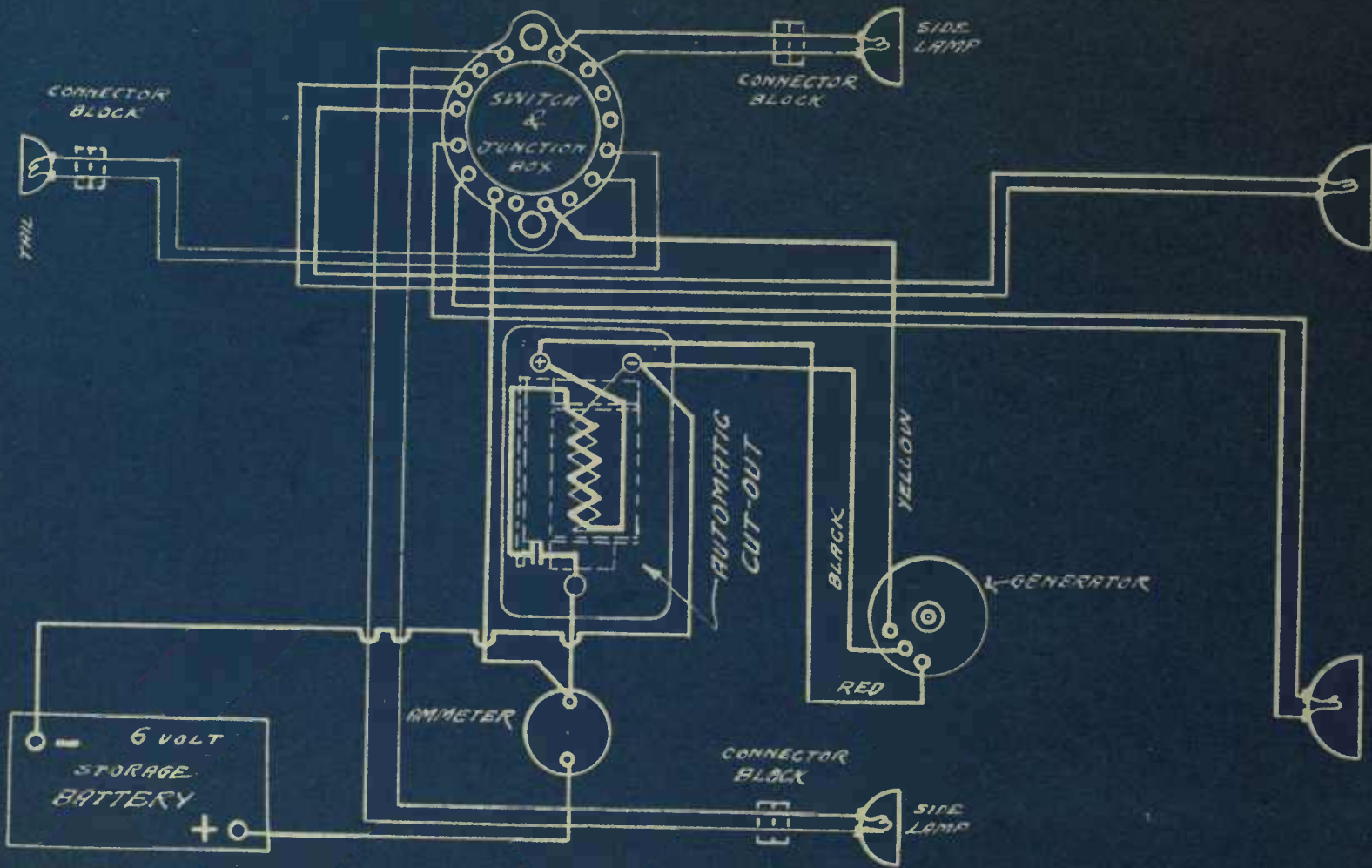
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CHALMERS-1913-1914- MODELS 17, 18, 19.
GRAY & DAVIS SYSTEM

FROM MNFRS. BP. N-1-635

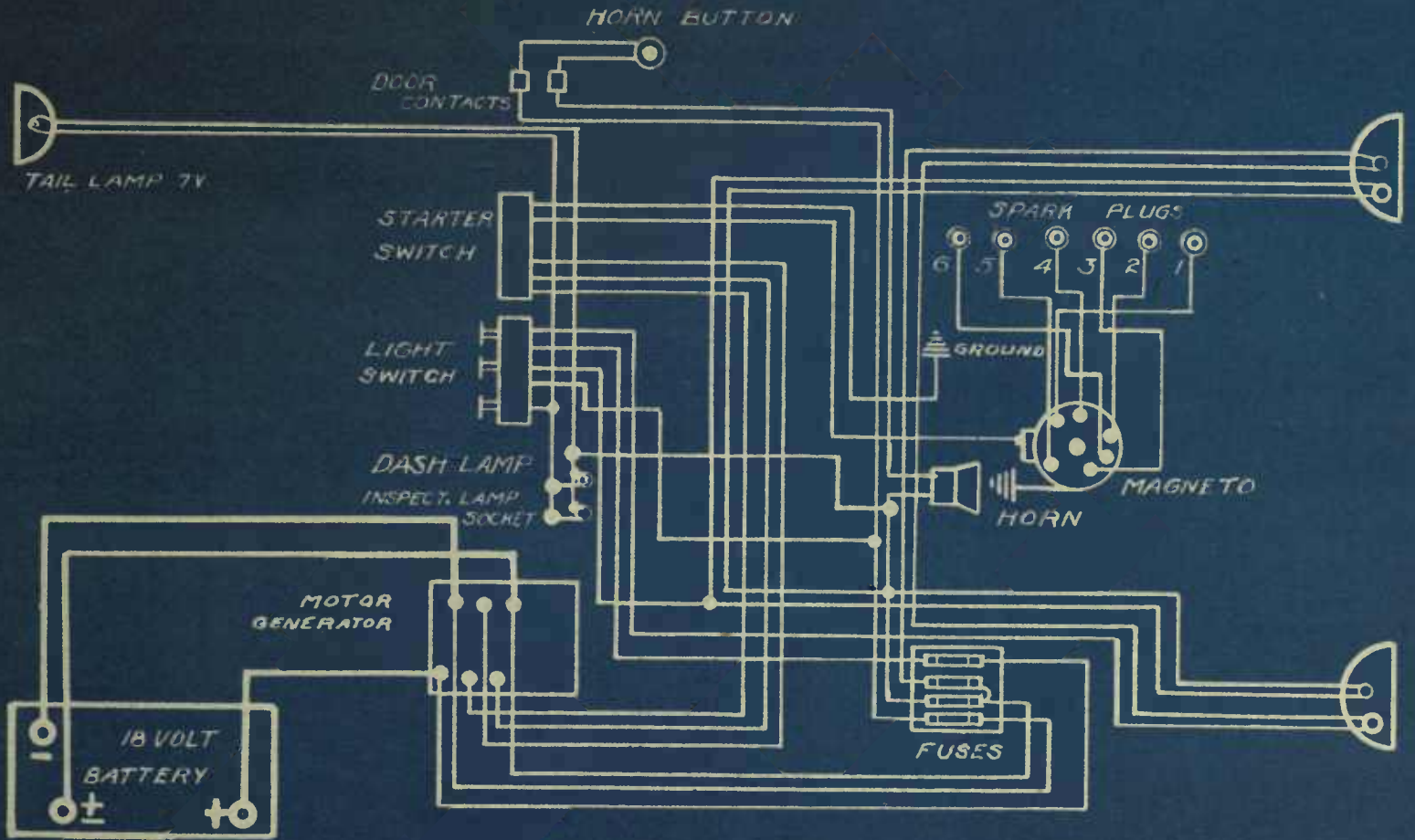


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CHALMERS 1914 "24"

ENTZ SYSTEM

FROM CHALMERS BPN-1-996.

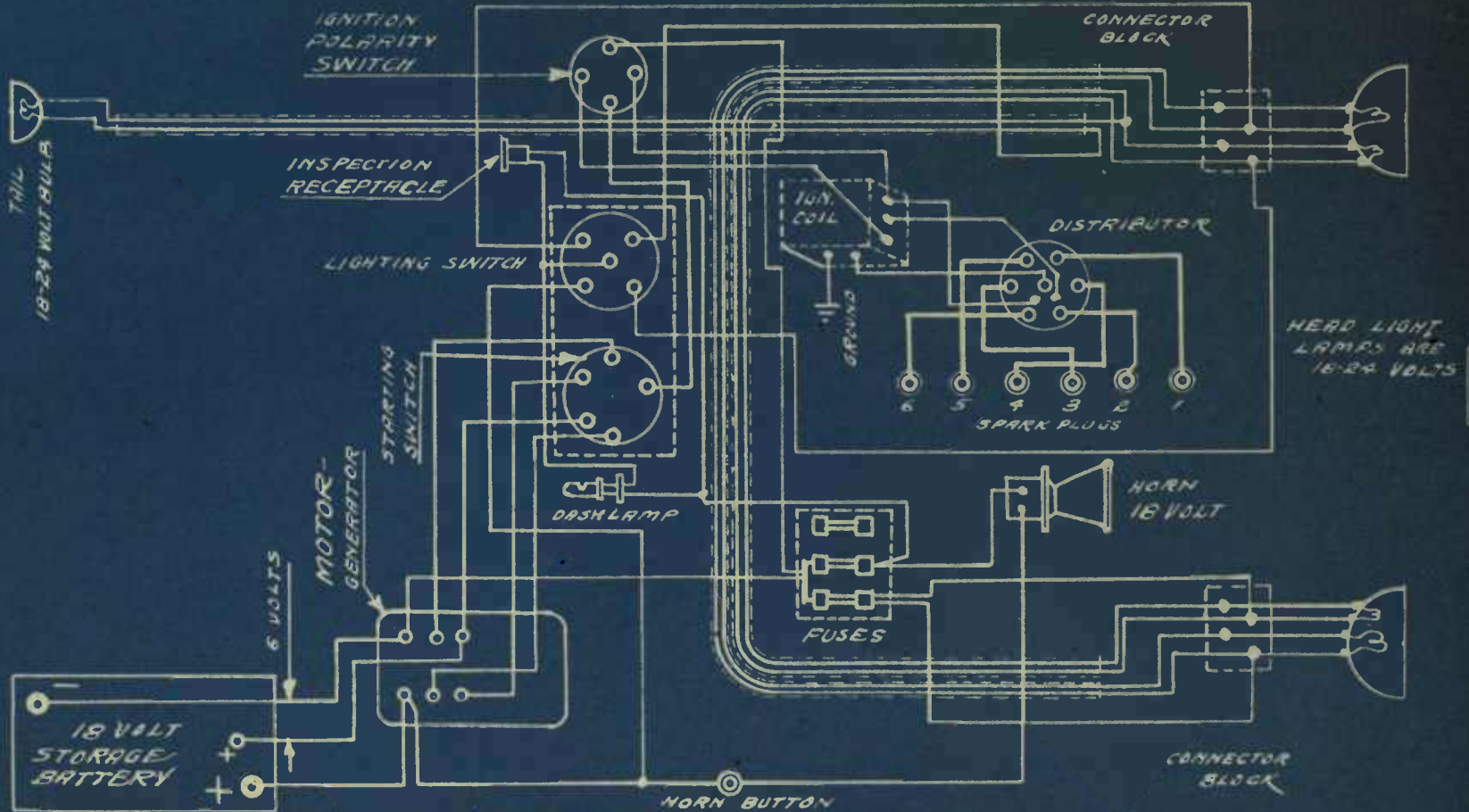


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CHALMERS 1915 MODEL 26

ENTZ SYSTEM

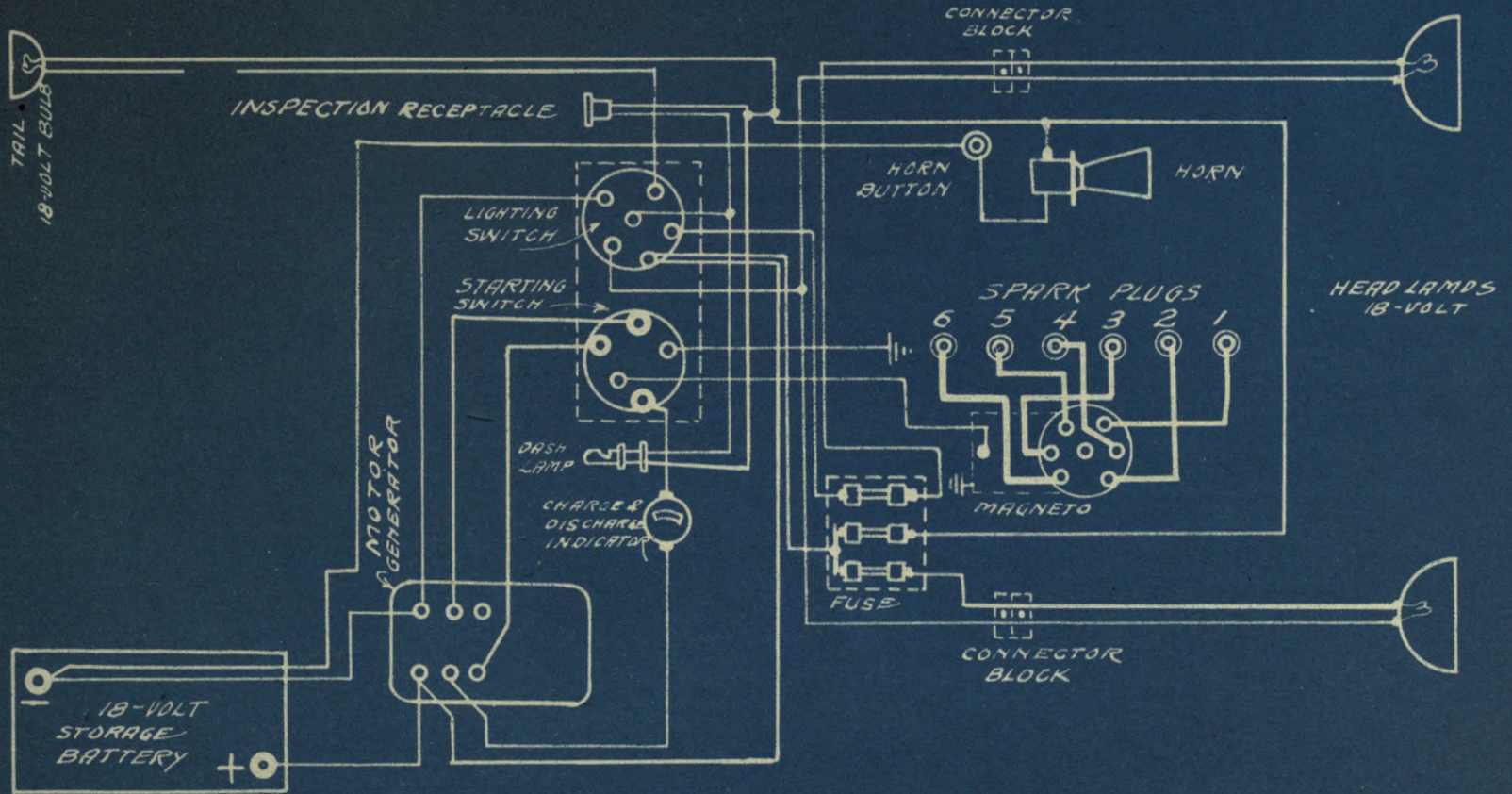
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CHALMERS 1915 MODEL 29 ENTZ SYSTEM

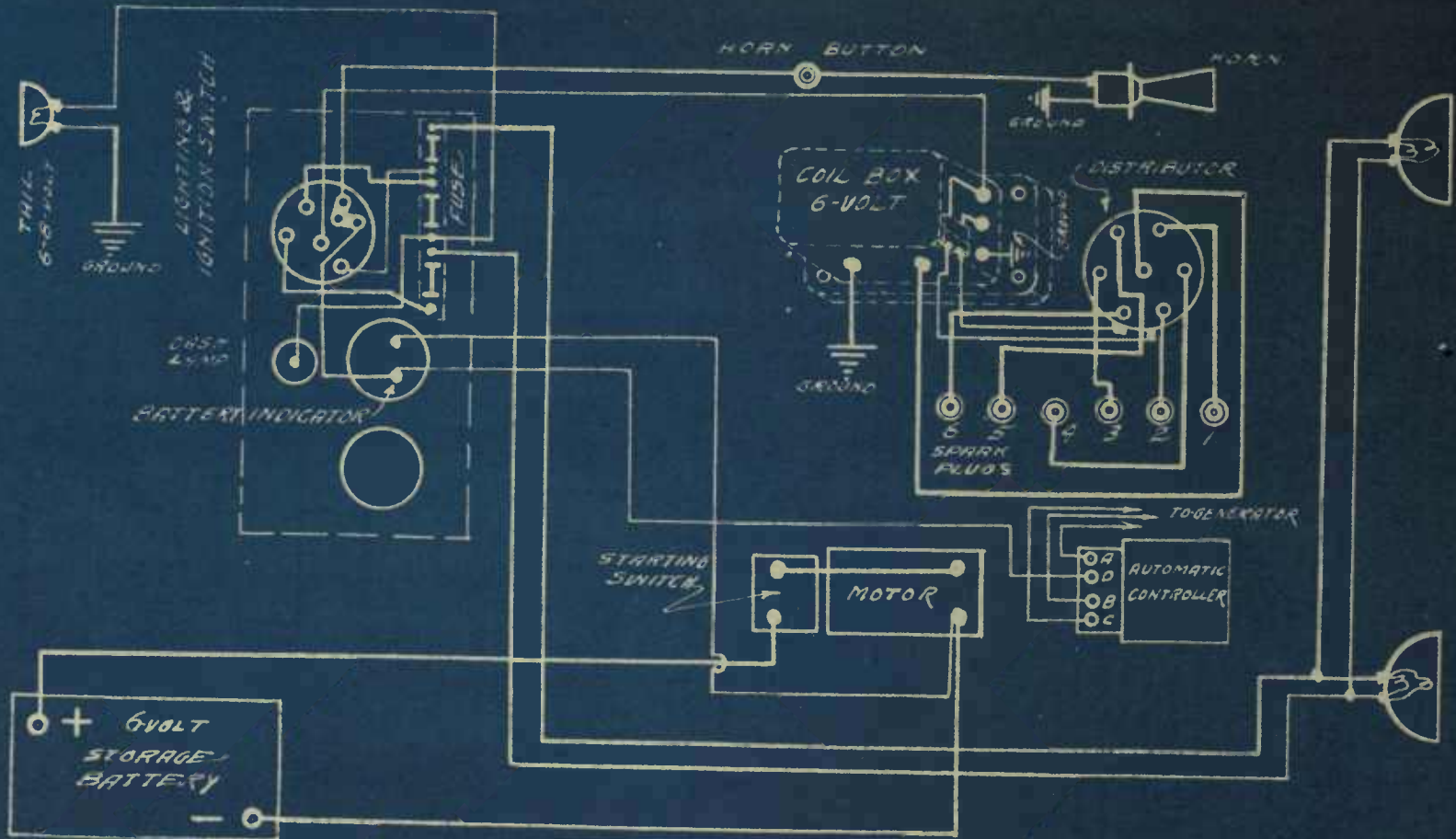
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CHALMERS 1915-1916 MODELS 32 6-40
 WESTINGHOUSE SYSTEM USED AFTER FIRST 3000 CARS

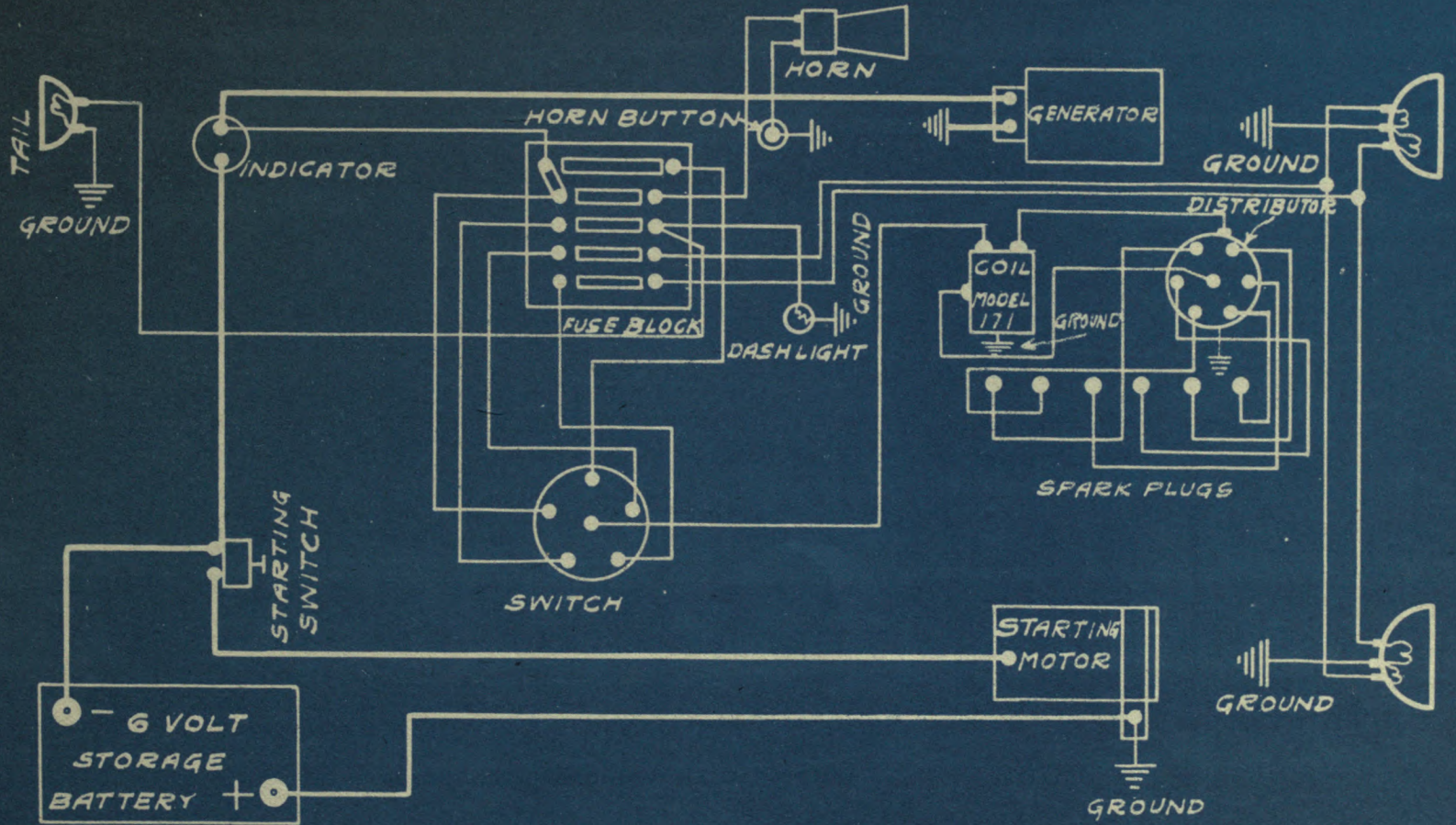
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CHALMERS 1916 "35"
 WESTINGHOUSE SYSTEM
 REMY IGNITION

FROM REMY INST. BOOK



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CHALMERS SIX30 MODEL 35A & 35B 1917-1918

WESTINGHOUSE SYSTEM

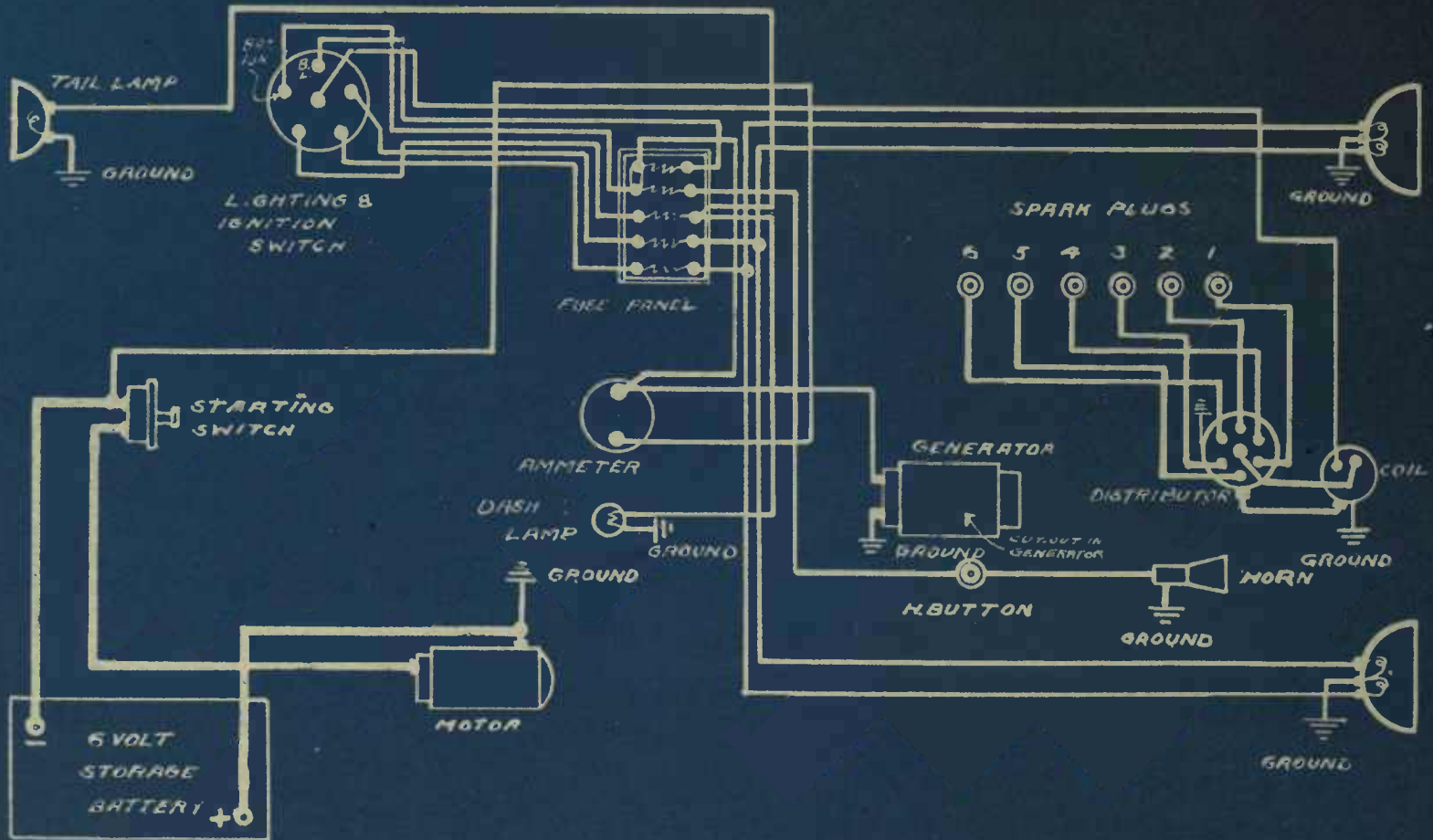
USED ON CARS WITH SERIAL NUMBERS

FROM MFRS B.P.

82001 TO 84000

N-1-1573

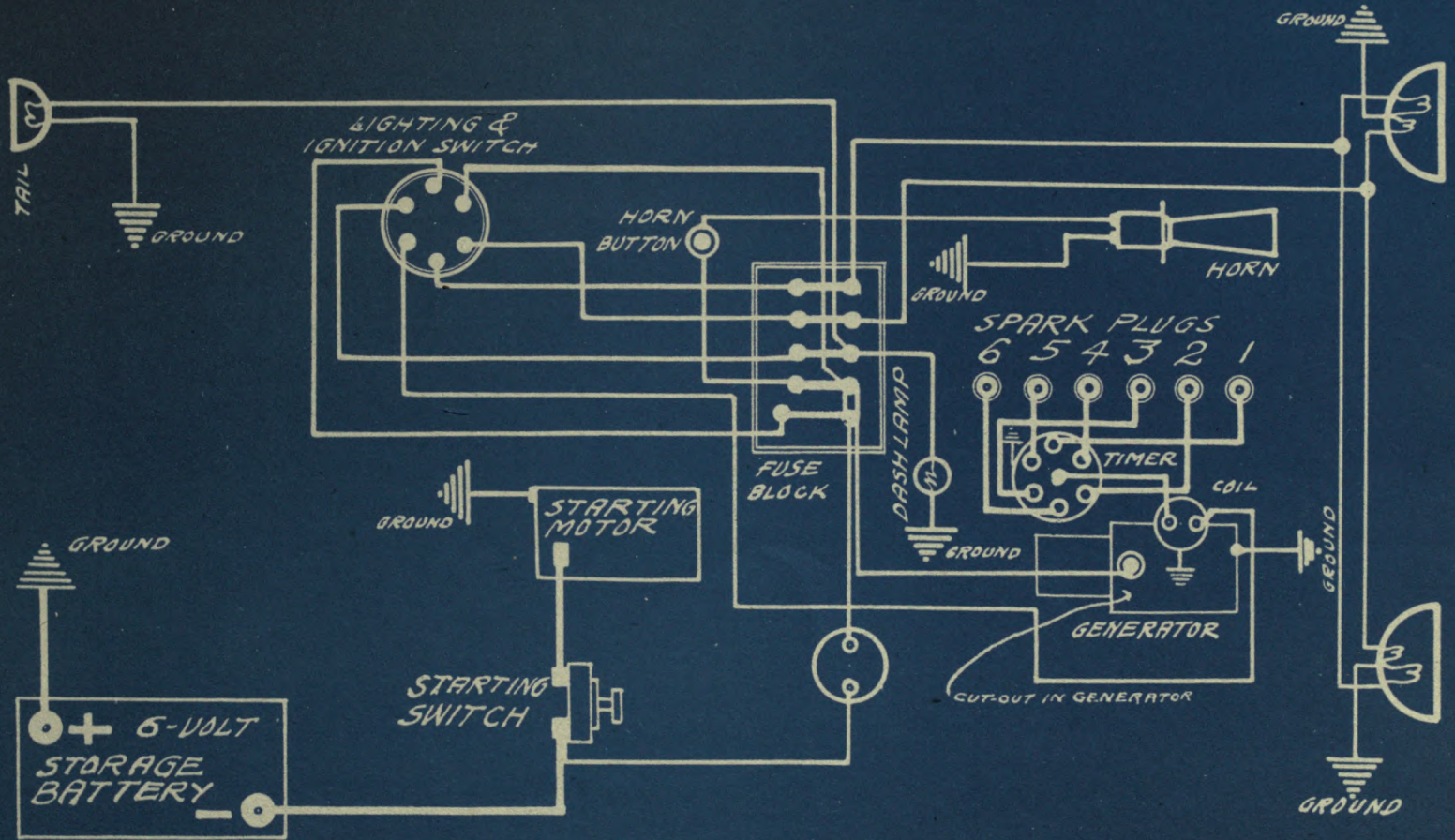
94001 TO 111000



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CHALMERS 1918 35-C EARLY 1919 FROM MFRS. B.P. N-1-2631
 WESTINGHOUSE SYSTEM REMY IGN.

USED AFTER 1ST/1000 MODEL 35-B SPECIALS

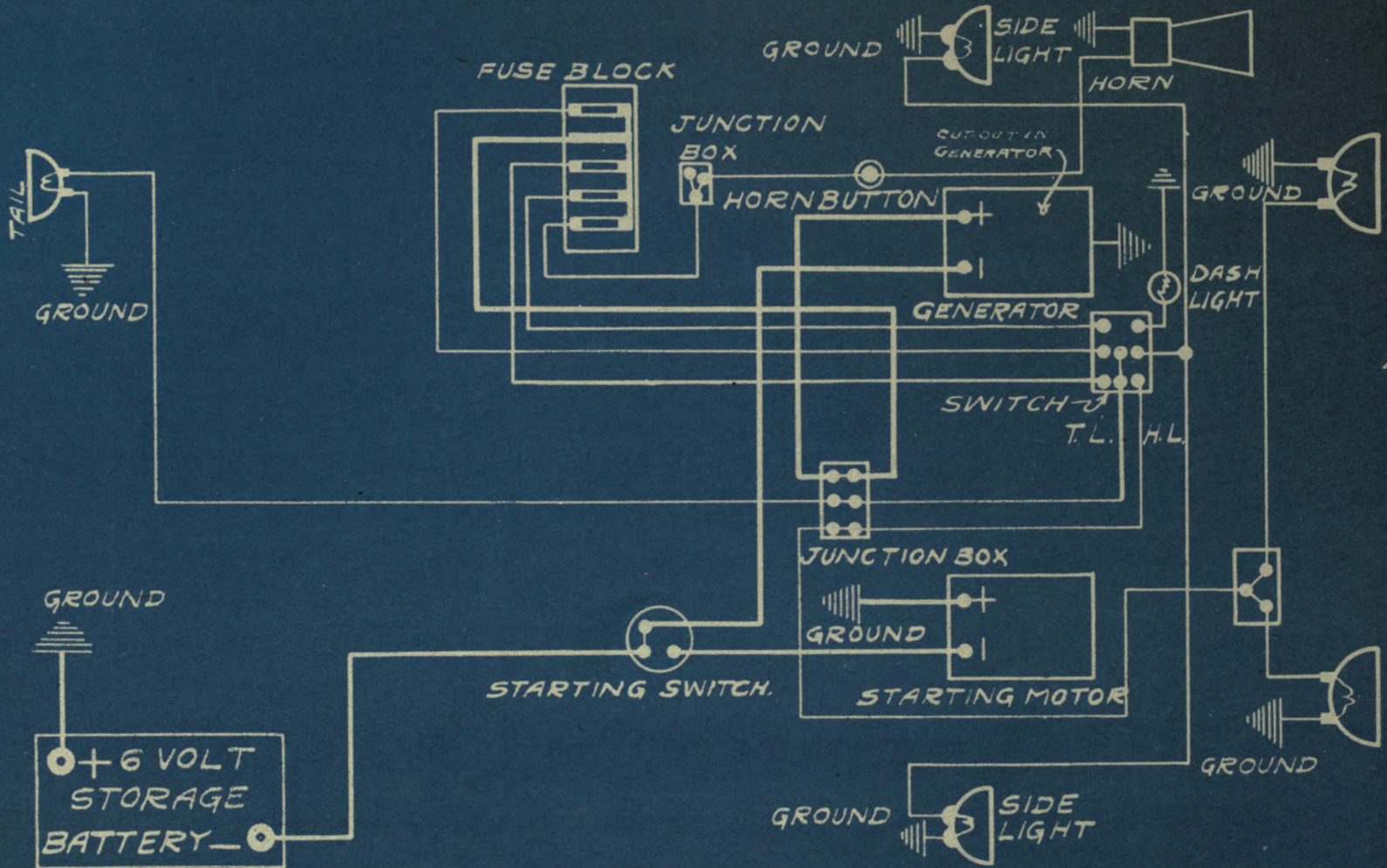


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CHANDLER 1913

WESTINGHOUSE SYSTEM

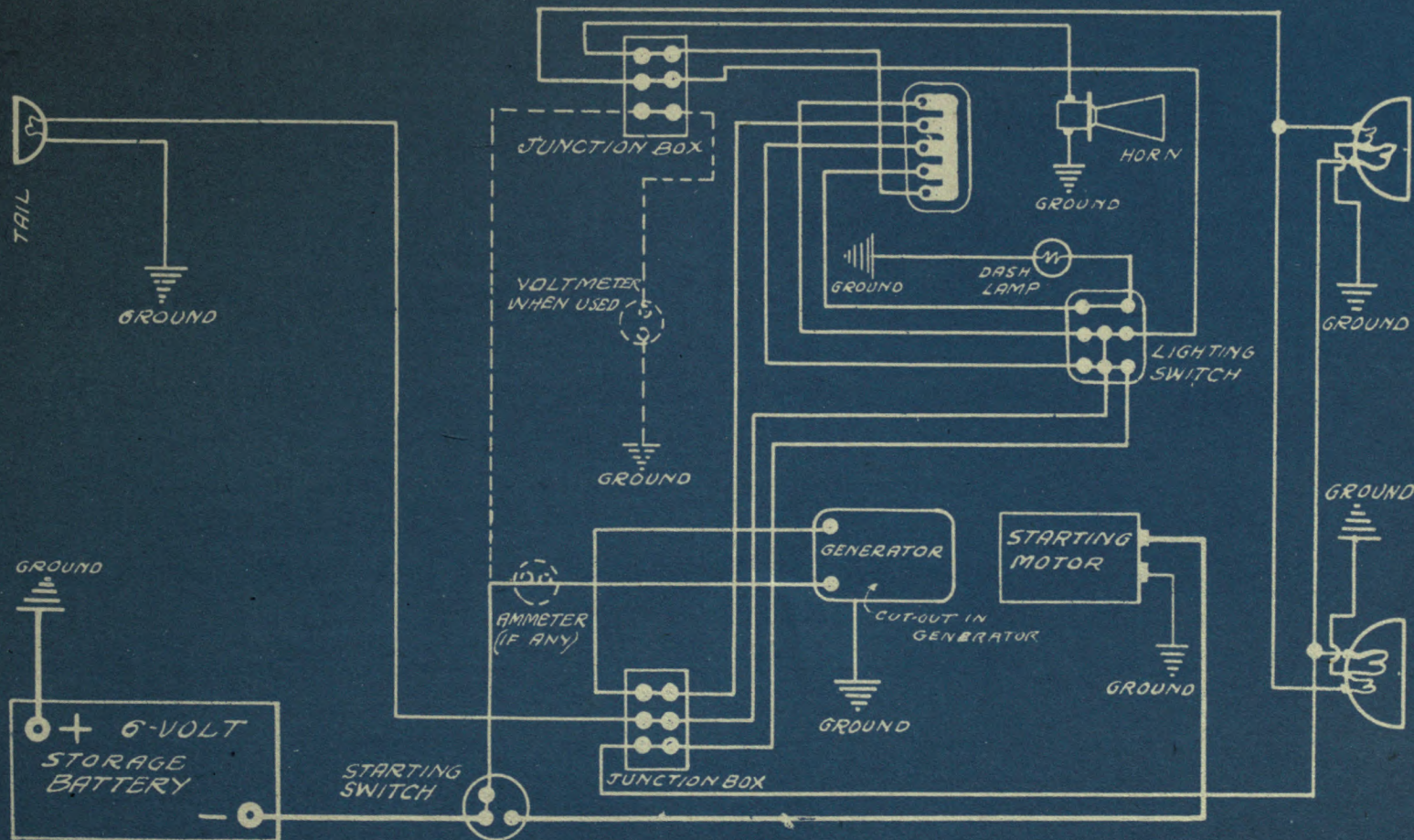
FROM MFRS. B.P 290



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CHANDLER 1914 WESTINGHOUSE SYSTEM

FROM MFRS BP.2120

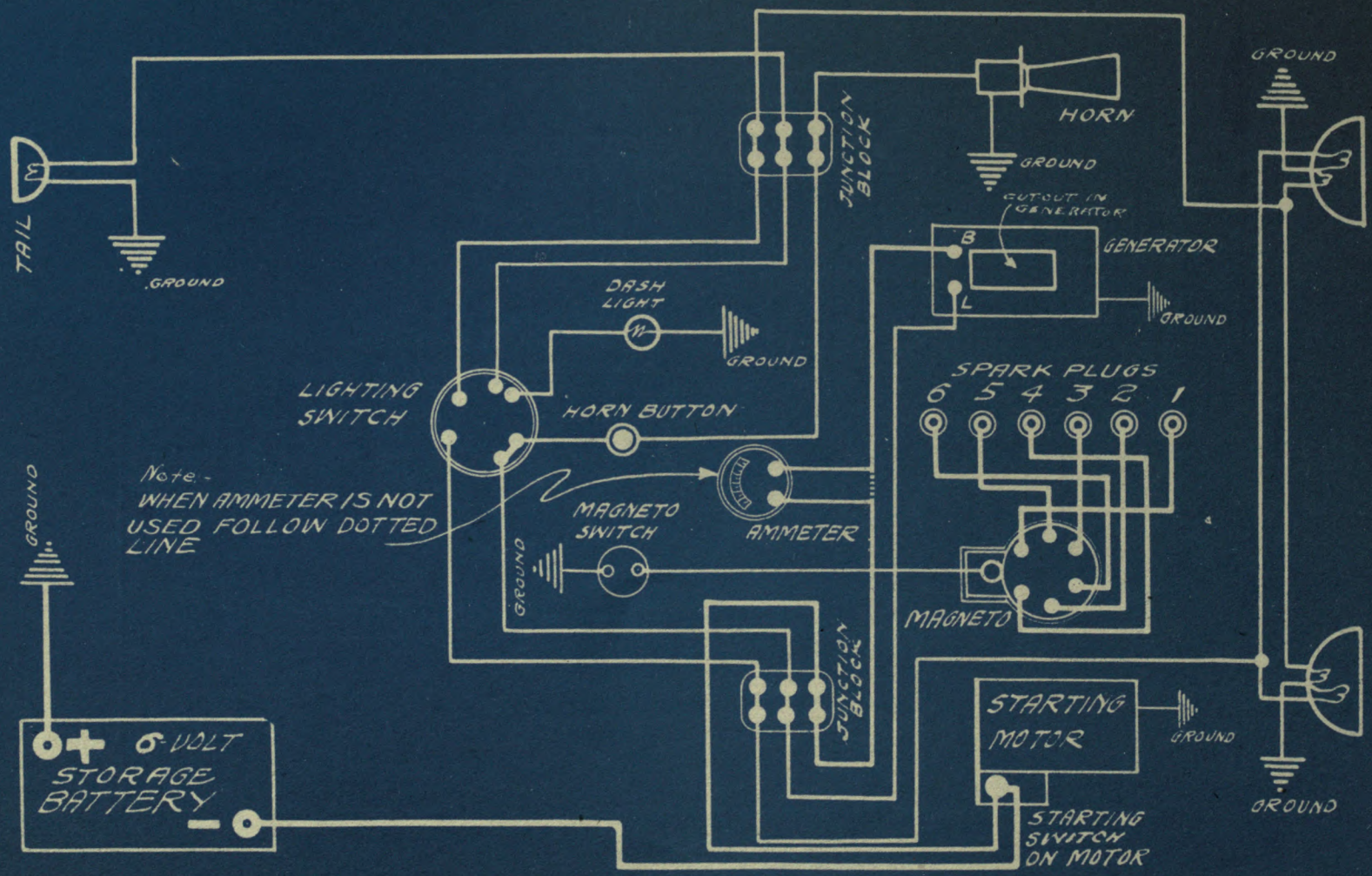


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CHANDLER 1914-1915

GRAY & DAVIS SYSTEM

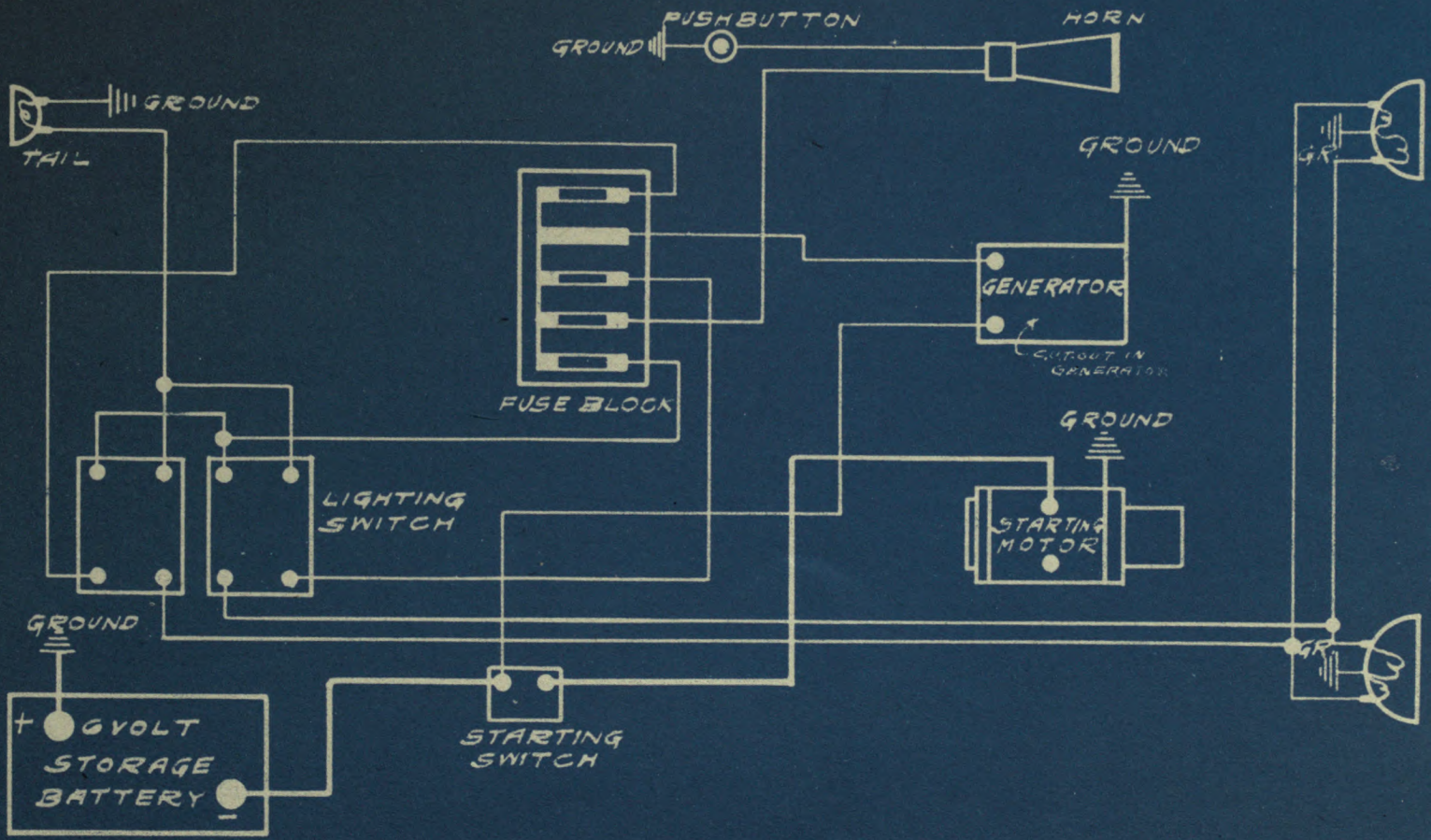
FROM MFRS. BP. 2340 & BP. 2440



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CHANDLER 1916 WESTING HOUSE SYSTEM

FROM WEST. PLATE 45

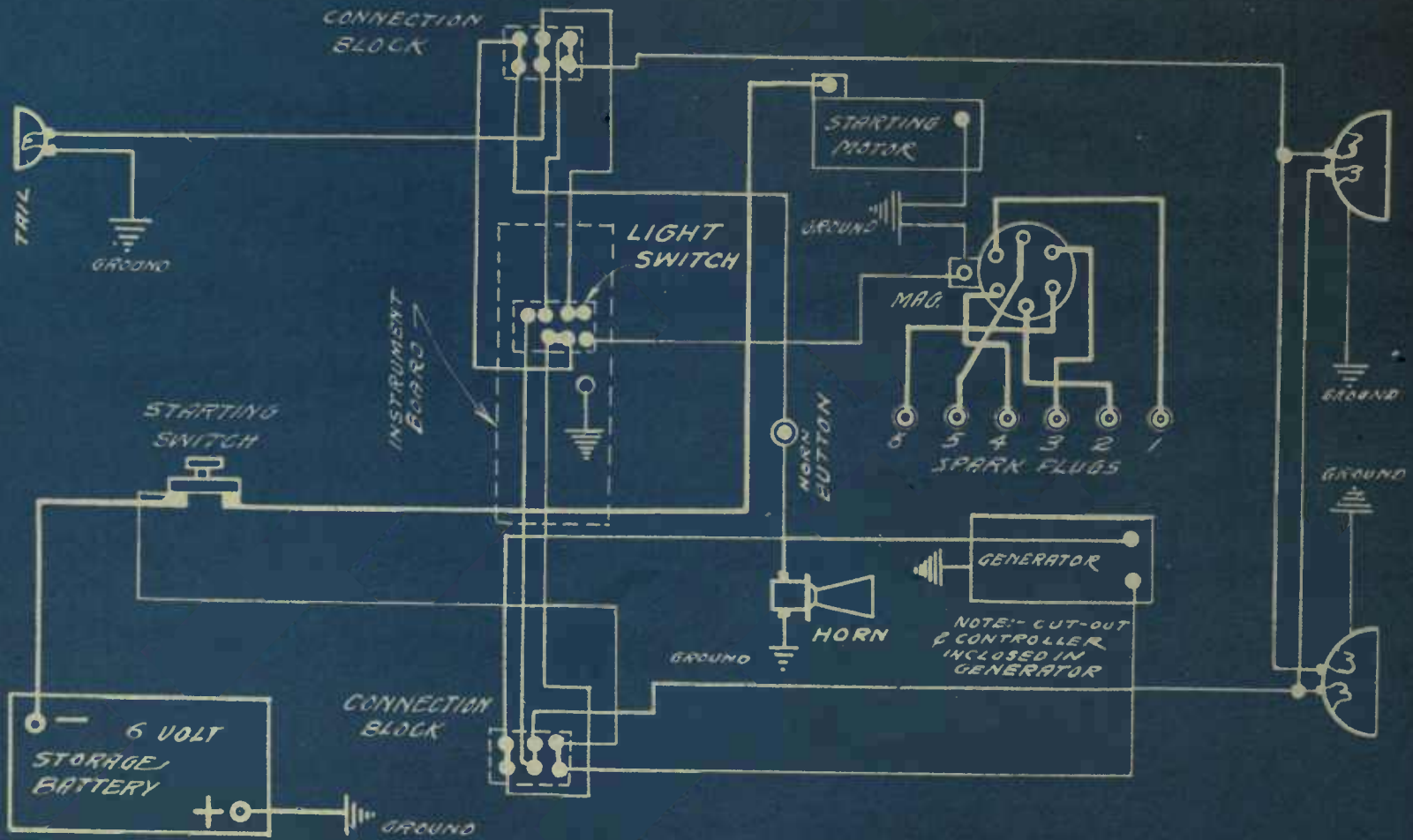


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CHANDLER 1916 "17"

GRAY & DAVIS SYSTEM

FROM MFRS. BP. 2324



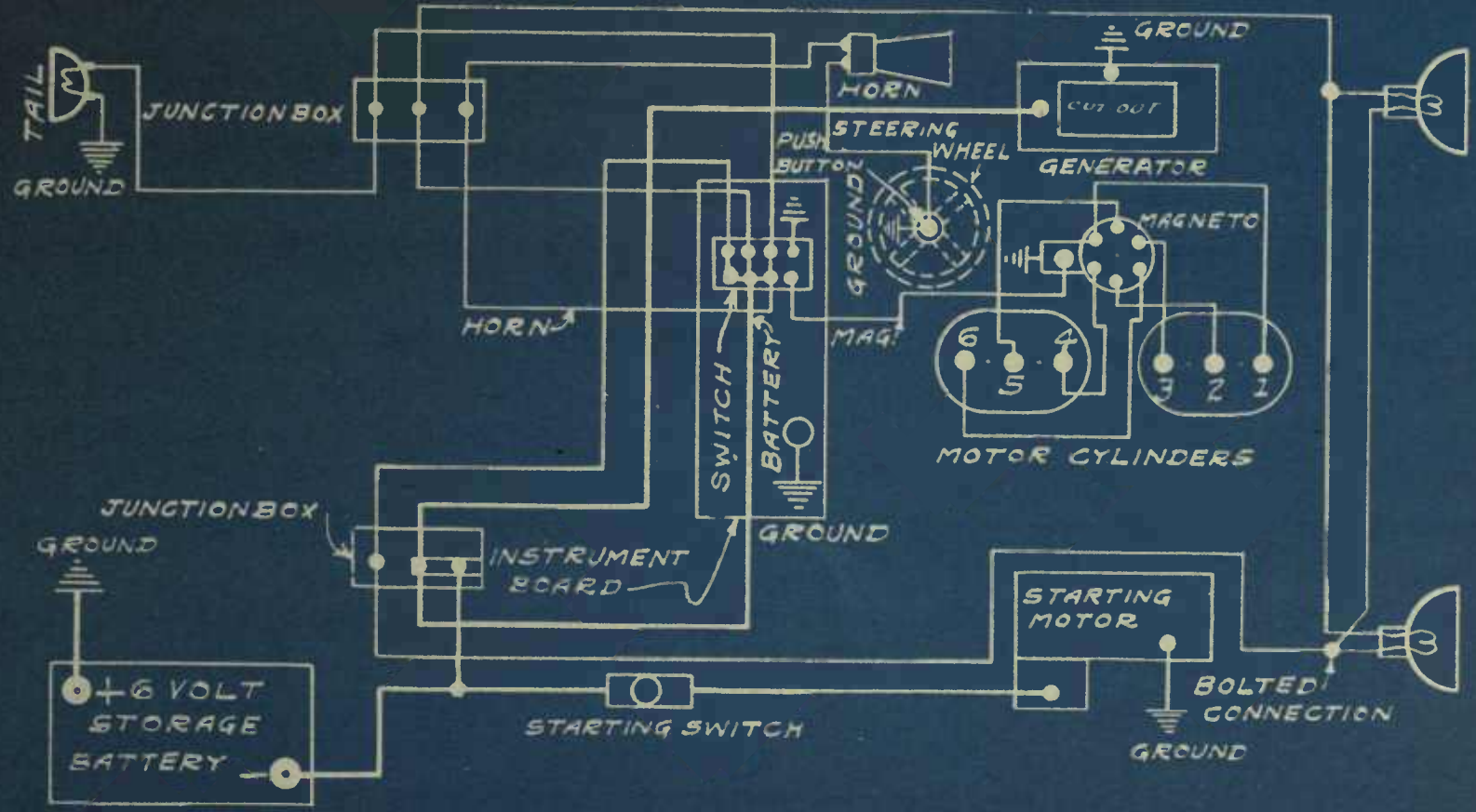
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CHANDLER 1917-1918 LIGHT WEIGHT SIX 1919

GRAY & DAVIS SYSTEM

FROM MFRS. B.P 2489

APPLIES TO CARS NUMBERED FROM 35001



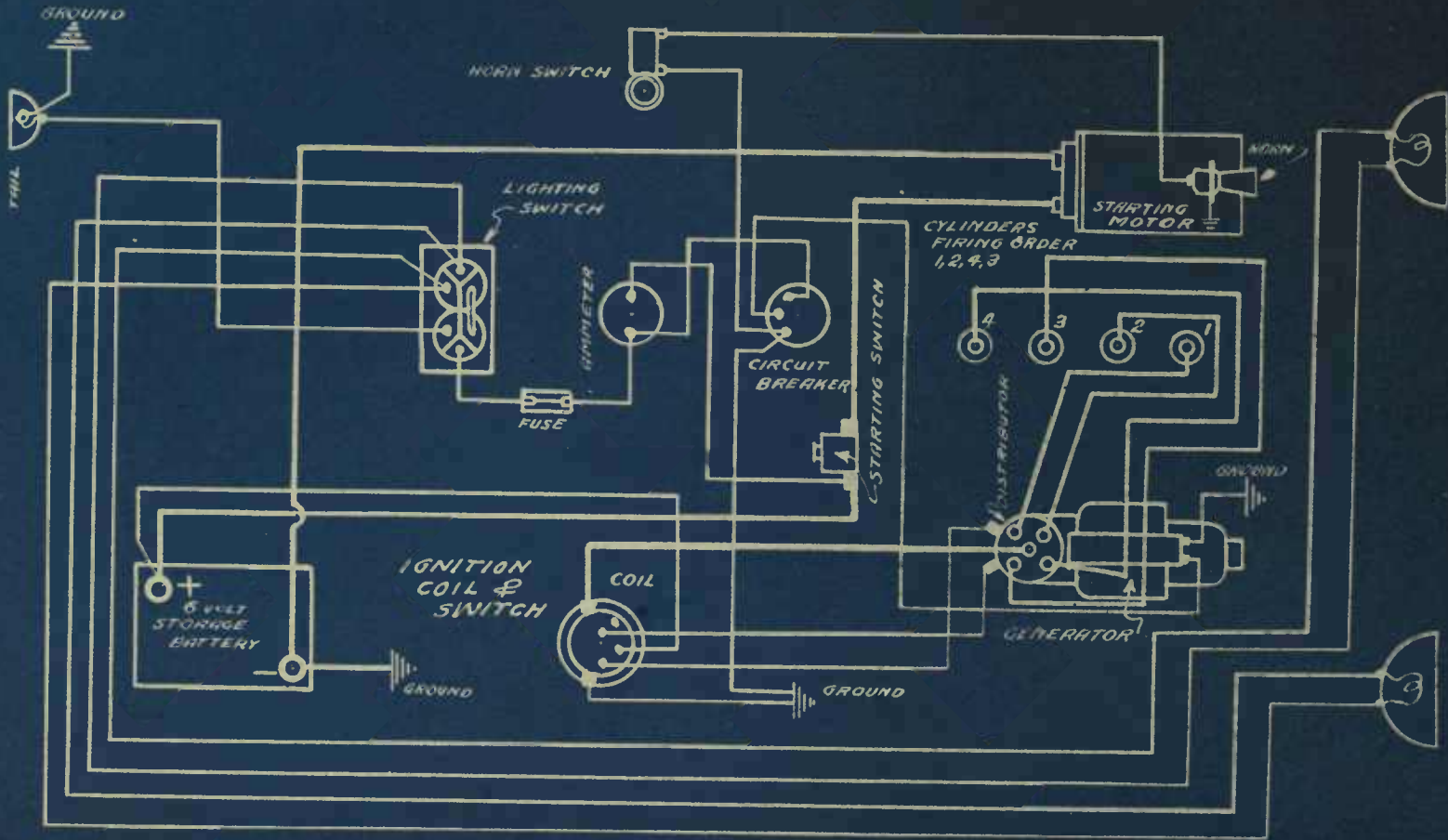
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CHEVROLET
AUTOLITE SYSTEM

1915

H2-H4-H3
-EARLY MODELS-

FROM B.P. 22590-B



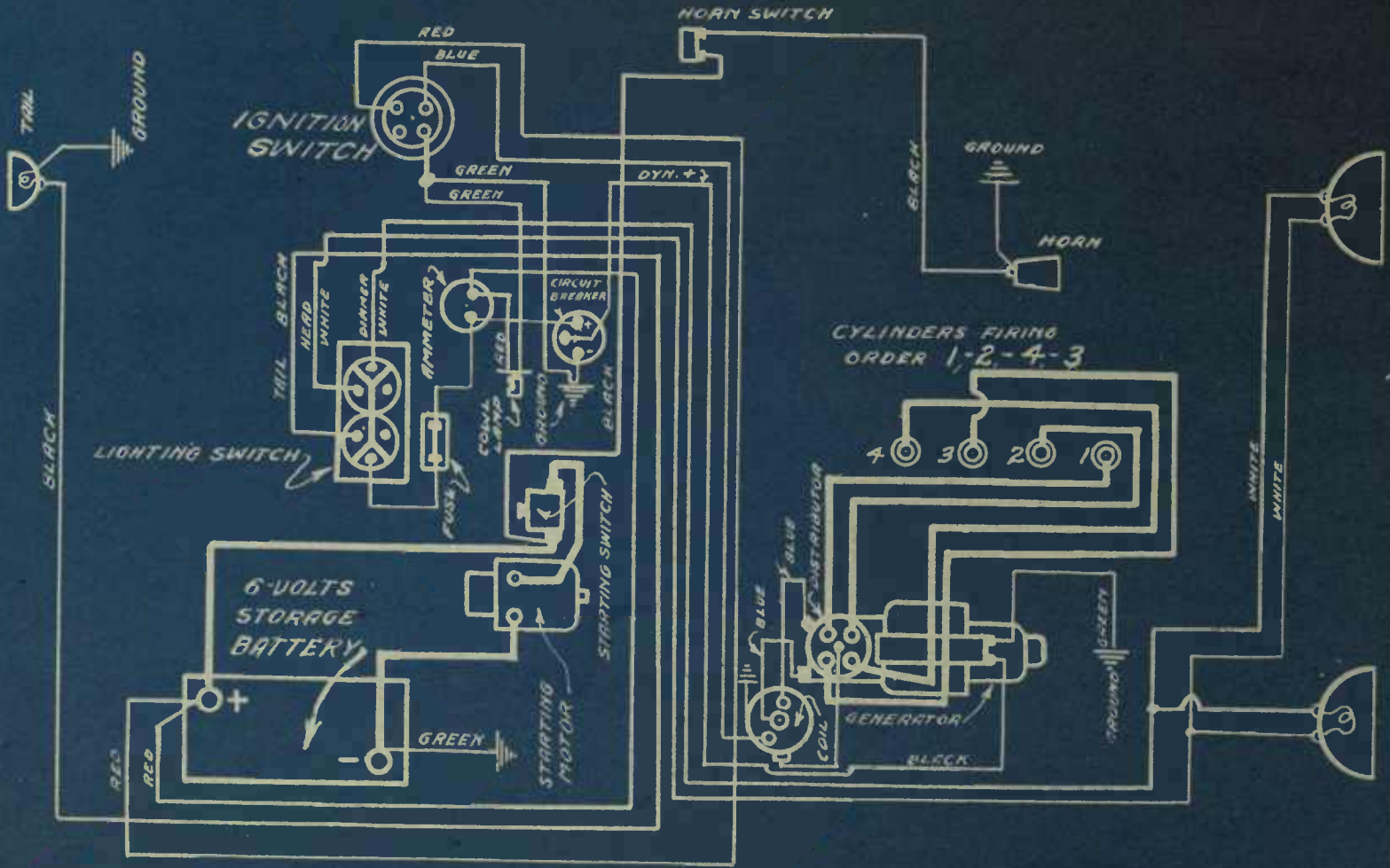
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CHEVROLET
AUTOLITE SYSTEM

1915

H2-H3-H4
(LATE MODELS)

FROM BP 22816-B

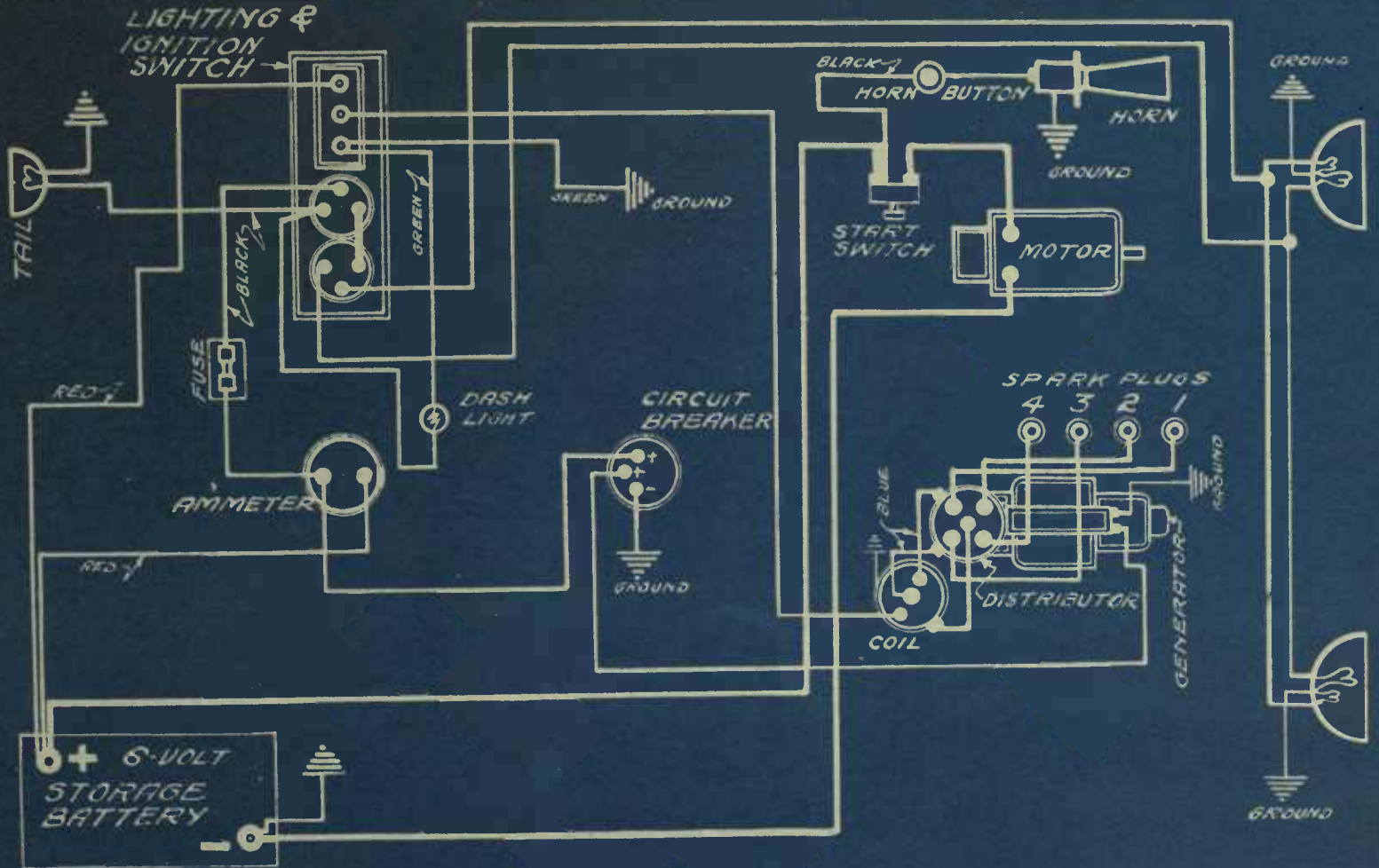


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CHEVROLET 1915-1916 H2½-H3-H4

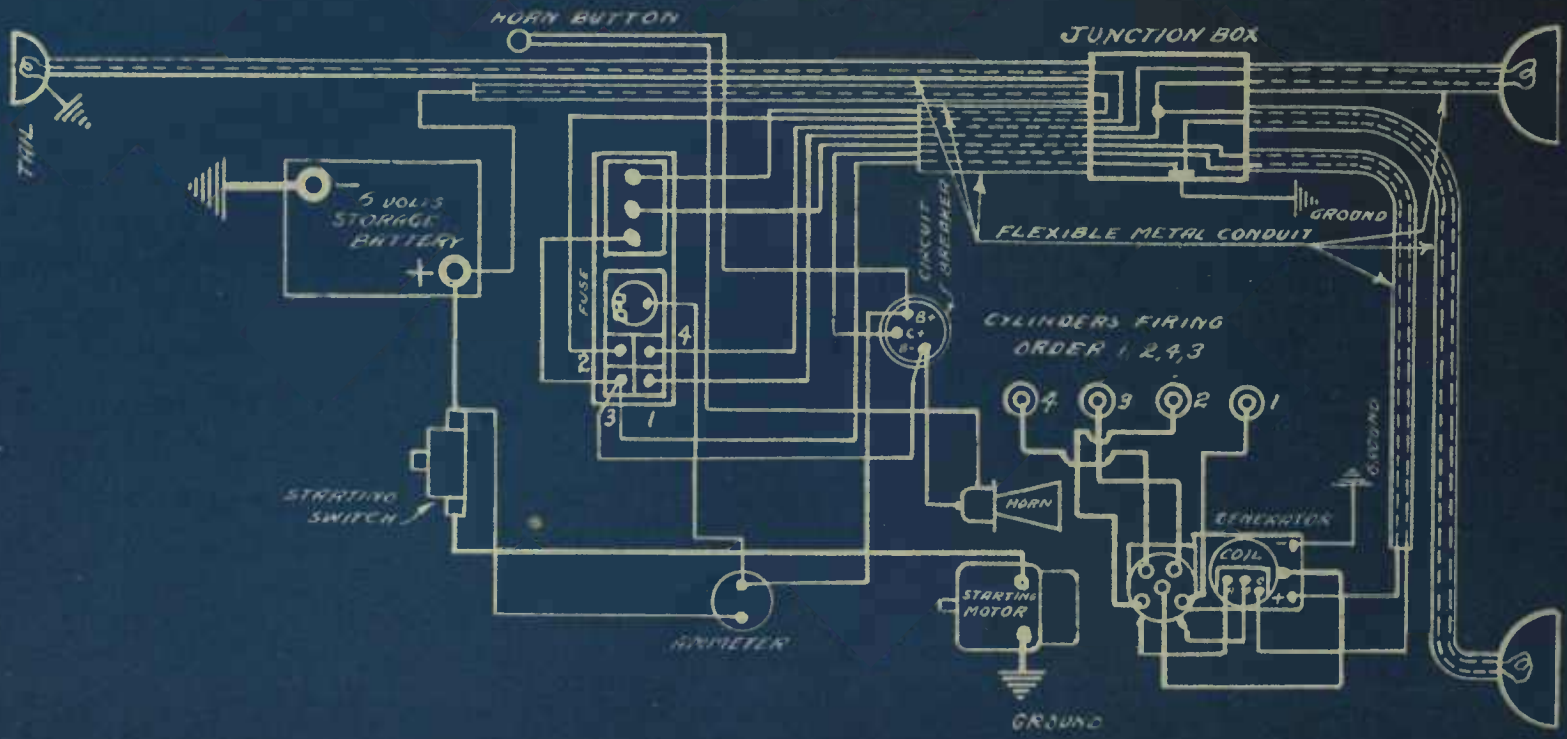
AUTOLITE SYSTEM

FROM MAR. 5, 1915, BR. 23051-B.



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CHEVROLET 1916-17 "490" FROM **BP. H368**
AUTOLITE SYSTEM
 FOR CARS EQUIPPED WITH ONE CABLE FROM STARTING MOTOR TO BATTERY



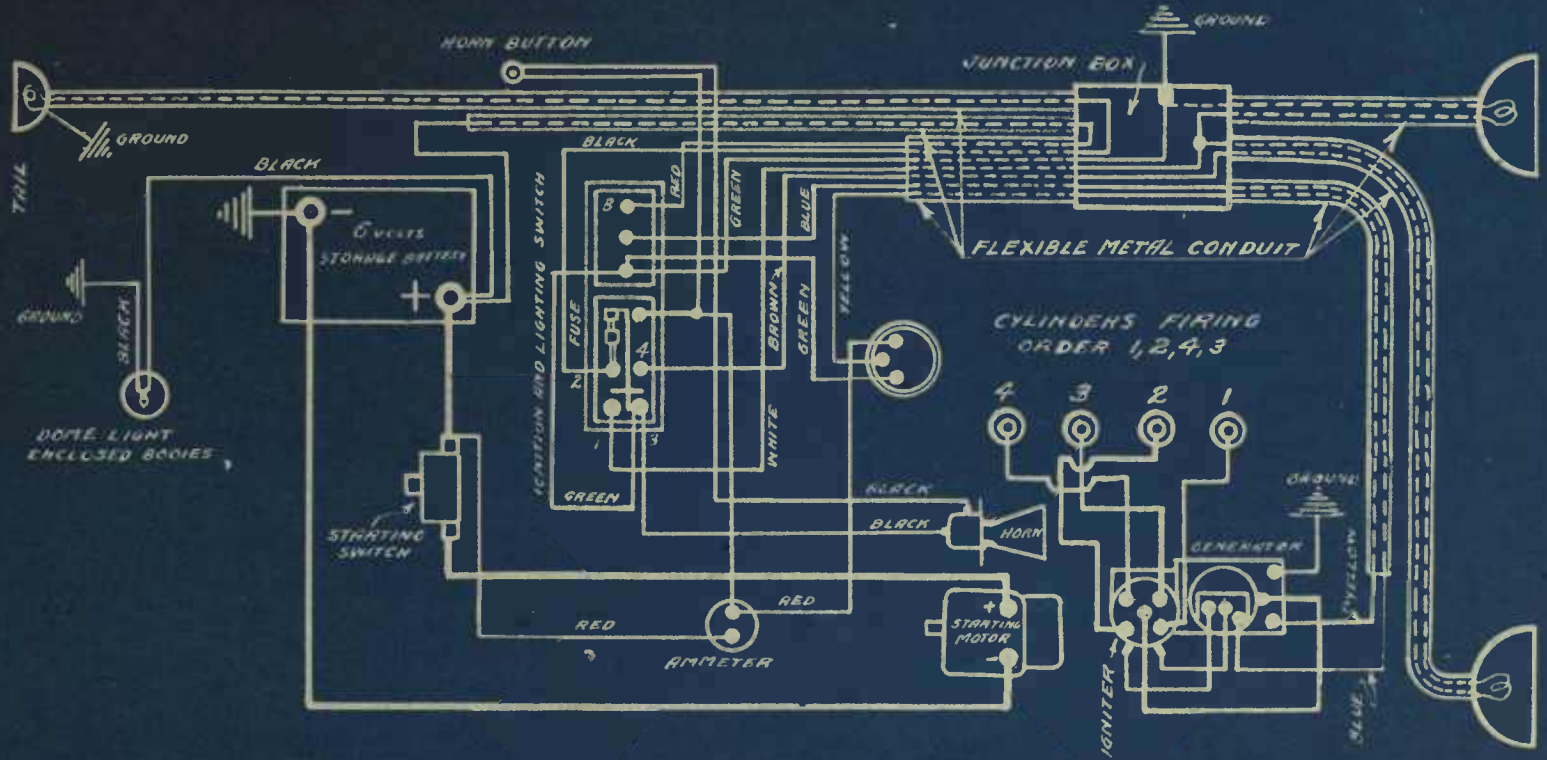
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CHEVROLET 1916-1917 AUTOLITE SYSTEM

"4-90"

FROM BP. H671

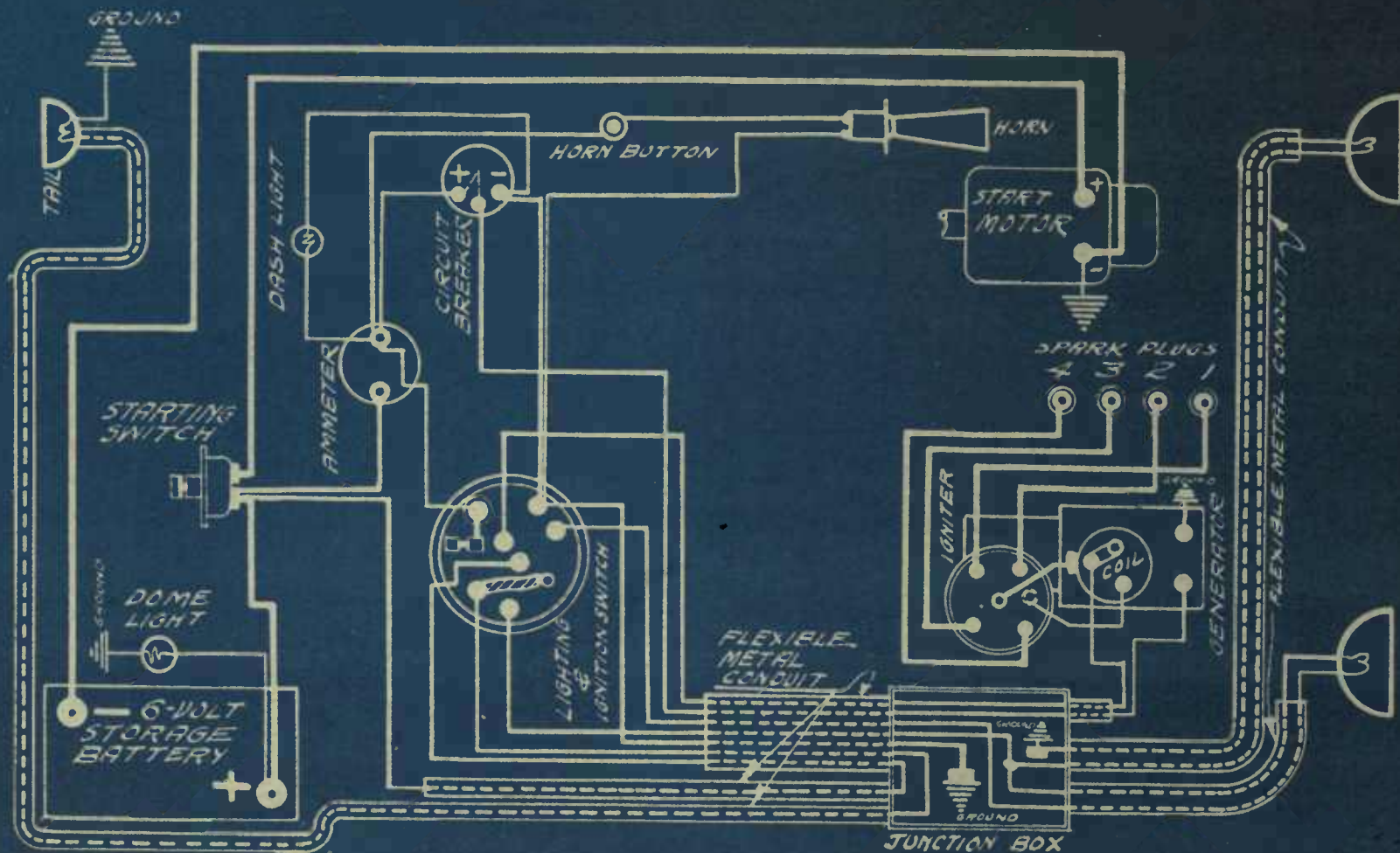
FOR CARS EQUIPPED WITH TWO CABLES FROM STARTING MOTOR TO BATTERY



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CHEVROLET 1917-1918 "F-2" & "F-5" AUTOLITE SYSTEM

FROM MFRS. BP. 40602

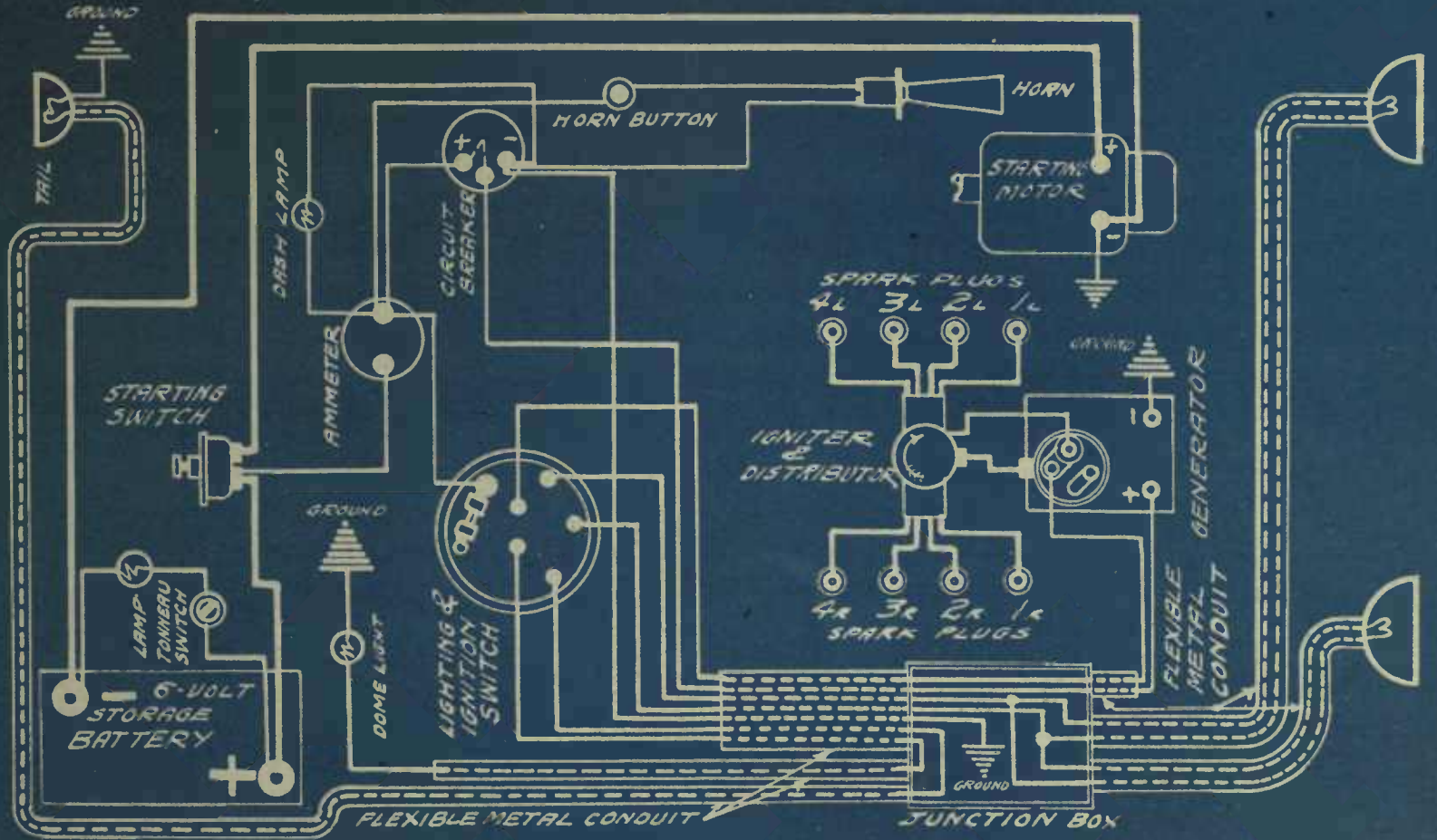


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CHEVROLET 1918 D-4 & D5 AUTOLITE SYSTEM

FROM MFRS. BP. 42419

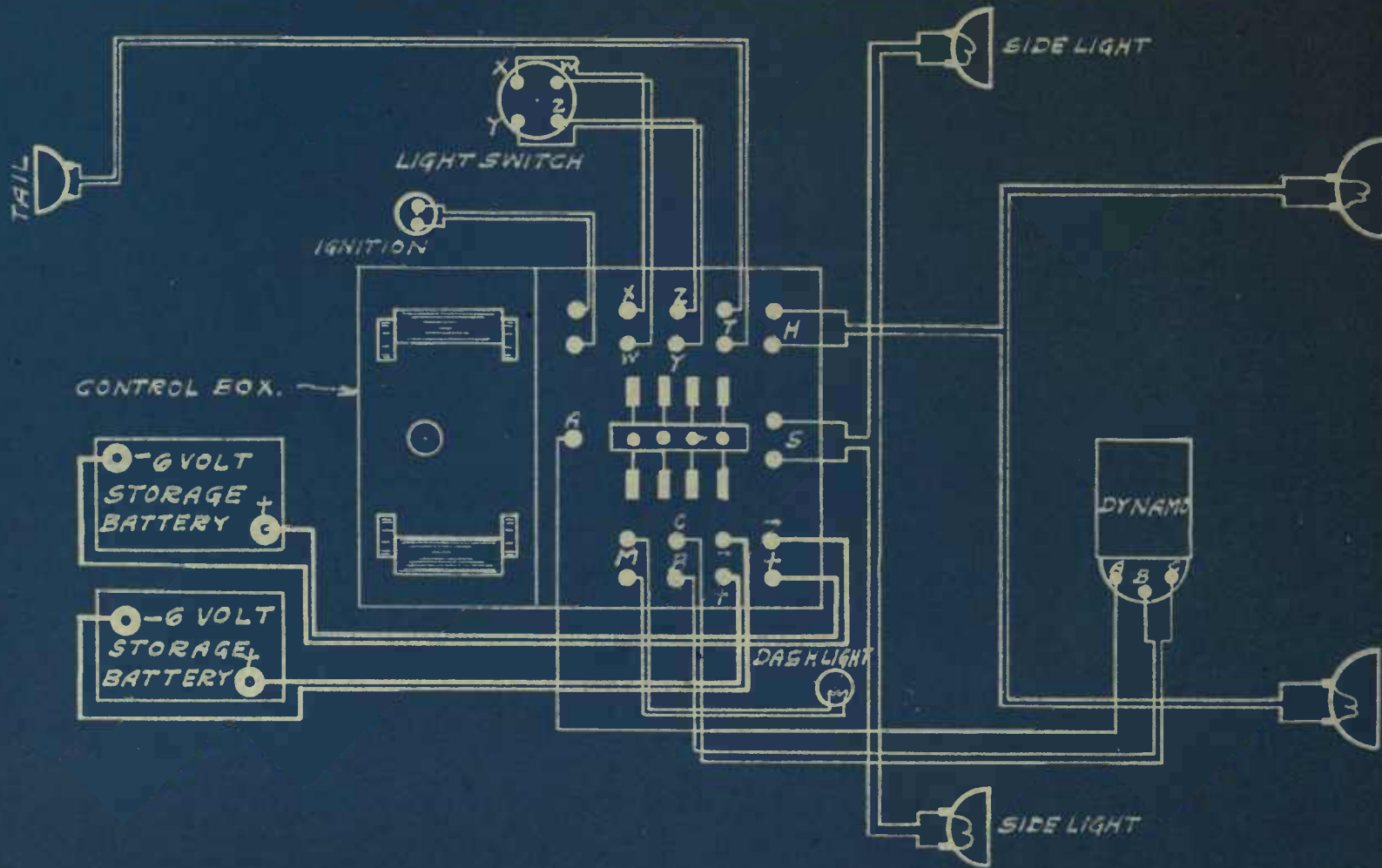
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COLE 1912 30-40

WARD - LEONARD LIGHTING SYSTEM

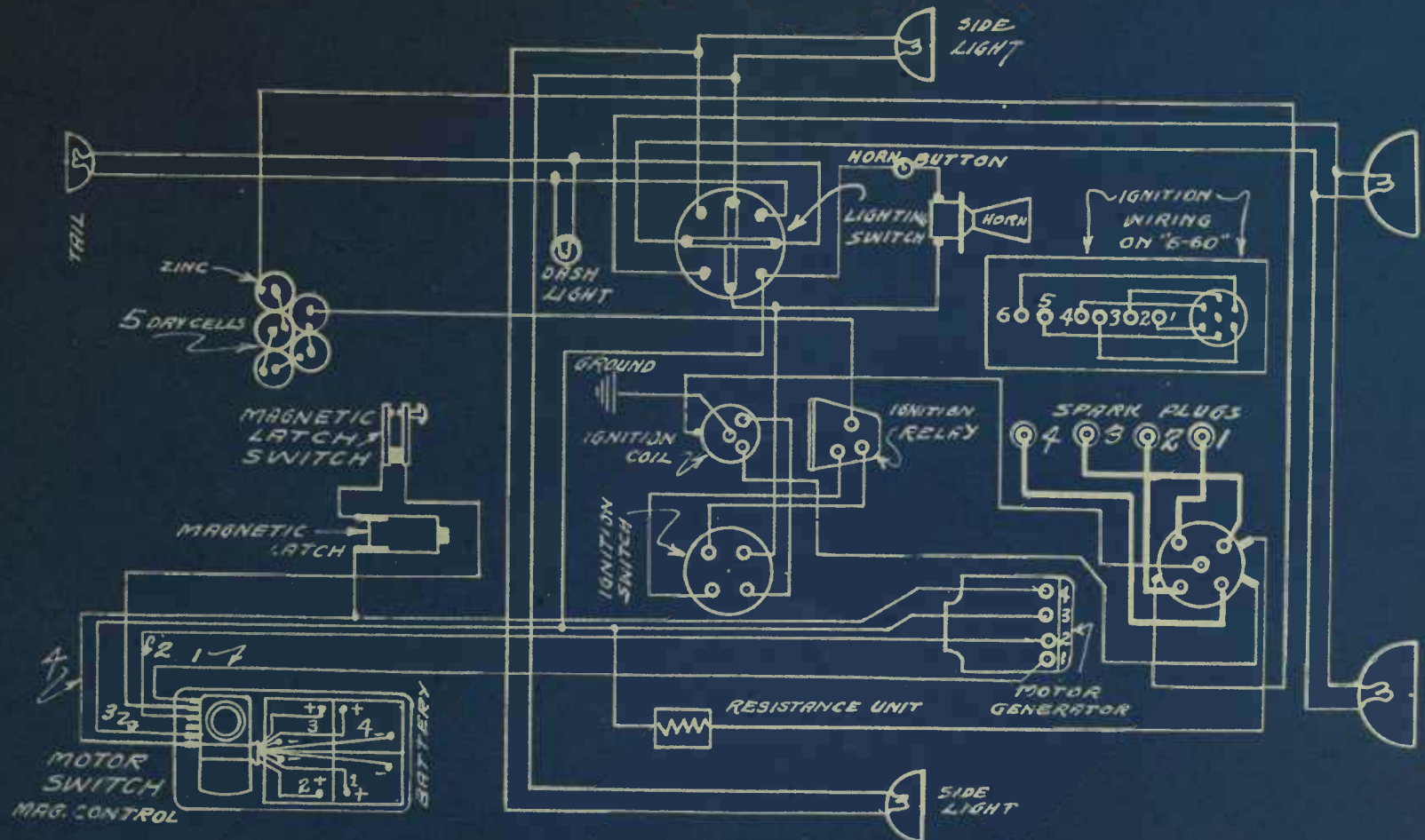
FROM WARD - LEONARD BULLETIN



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COLE 1913 4-40 4-50 6-60
 DELCO SYSTEM.

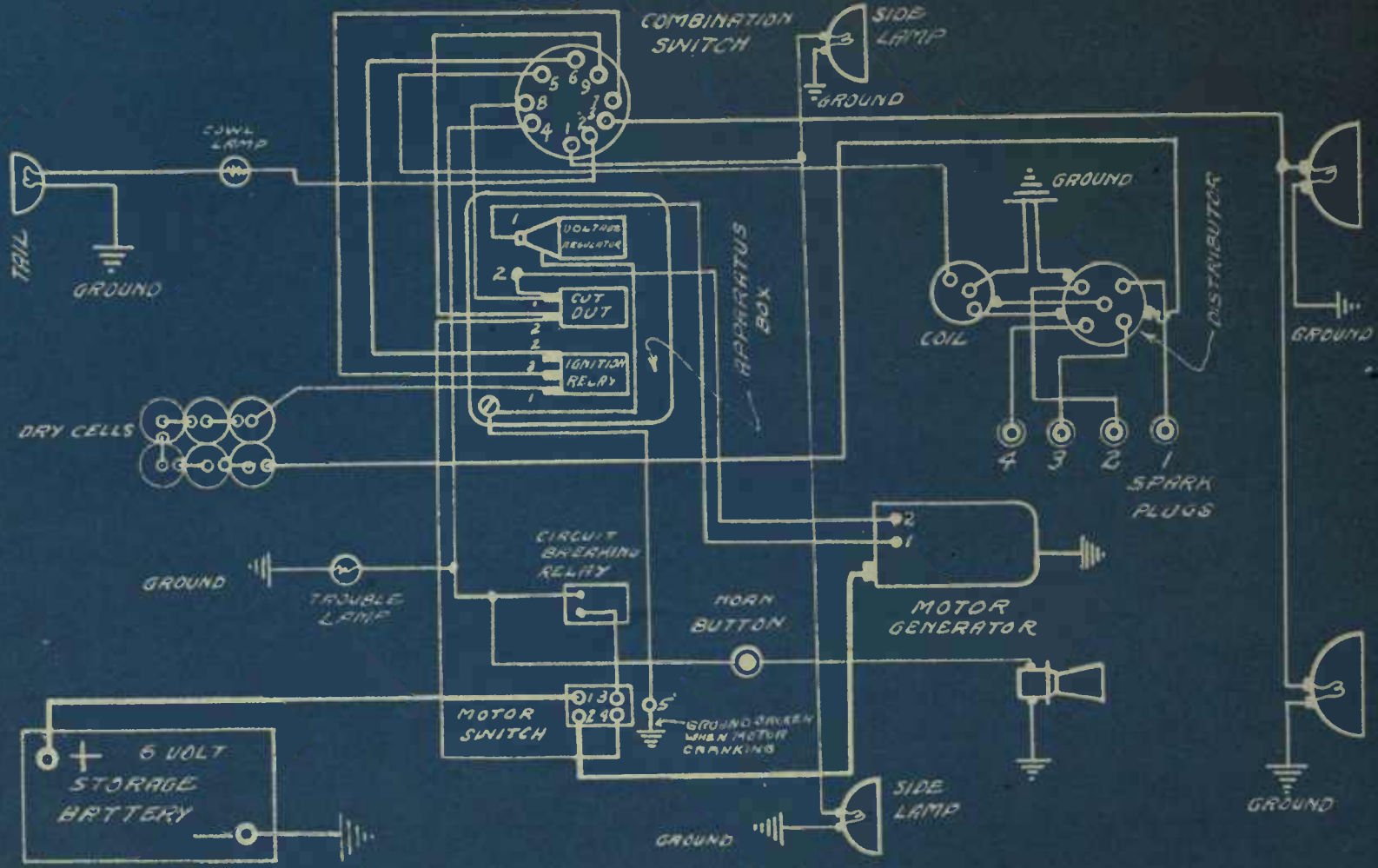
(FROM DELCO MANUAL
 1915-2ND EDITION)



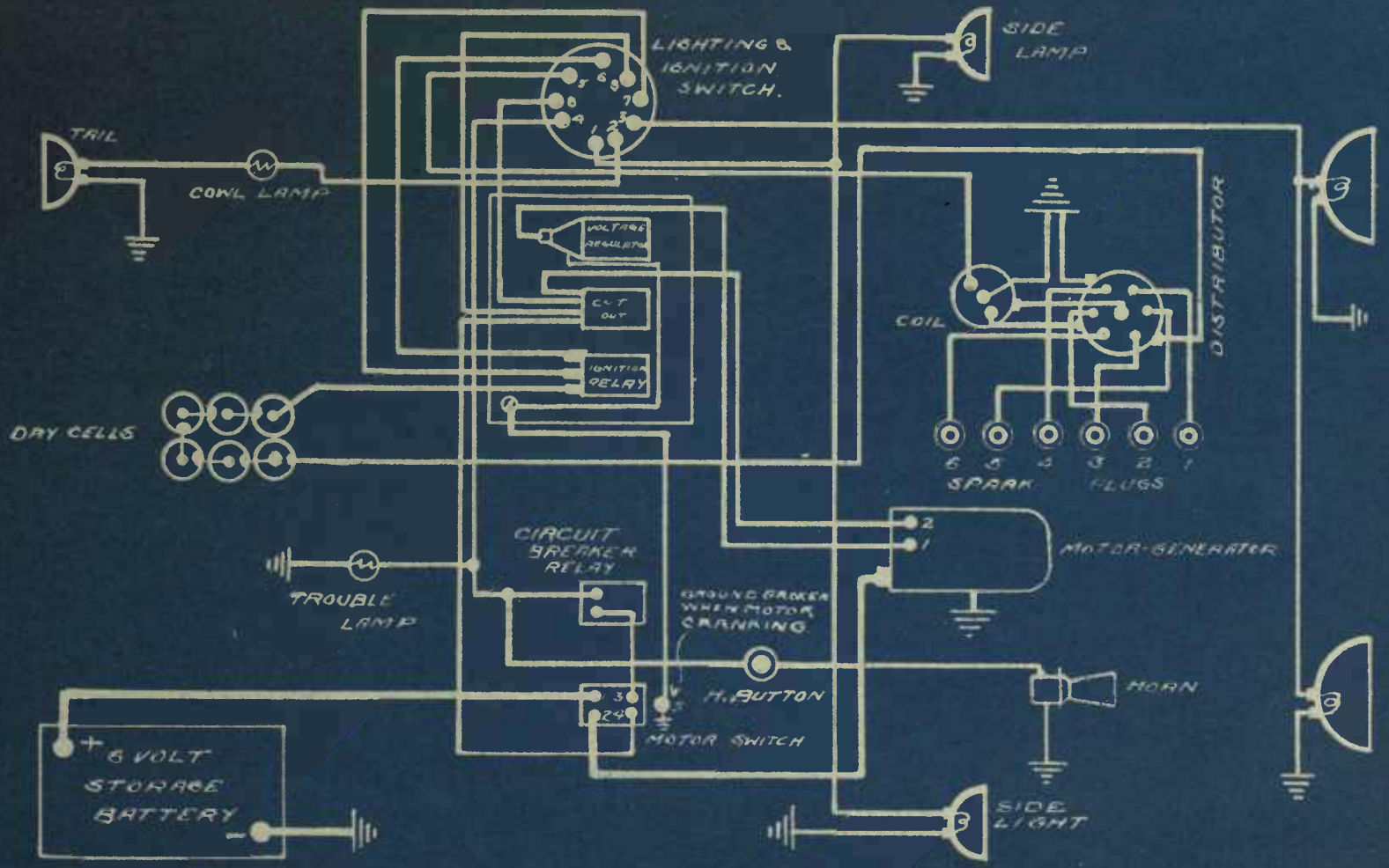
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COLE 1914 "4"
DELCO SYSTEM

FROM DELCO MANUAL



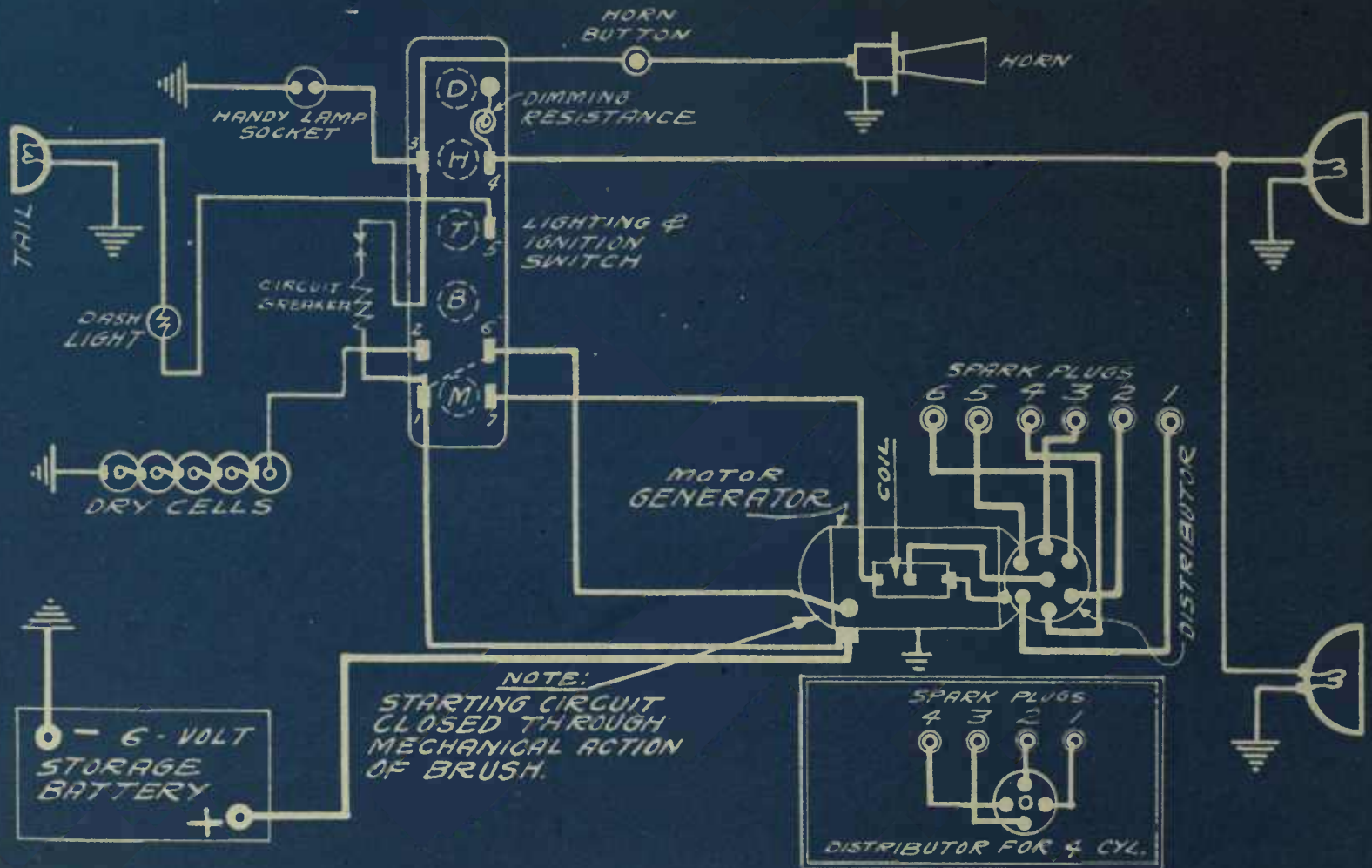
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COLE 1915 "4-40" & 1916 "6-66"
 DELCO SYSTEM

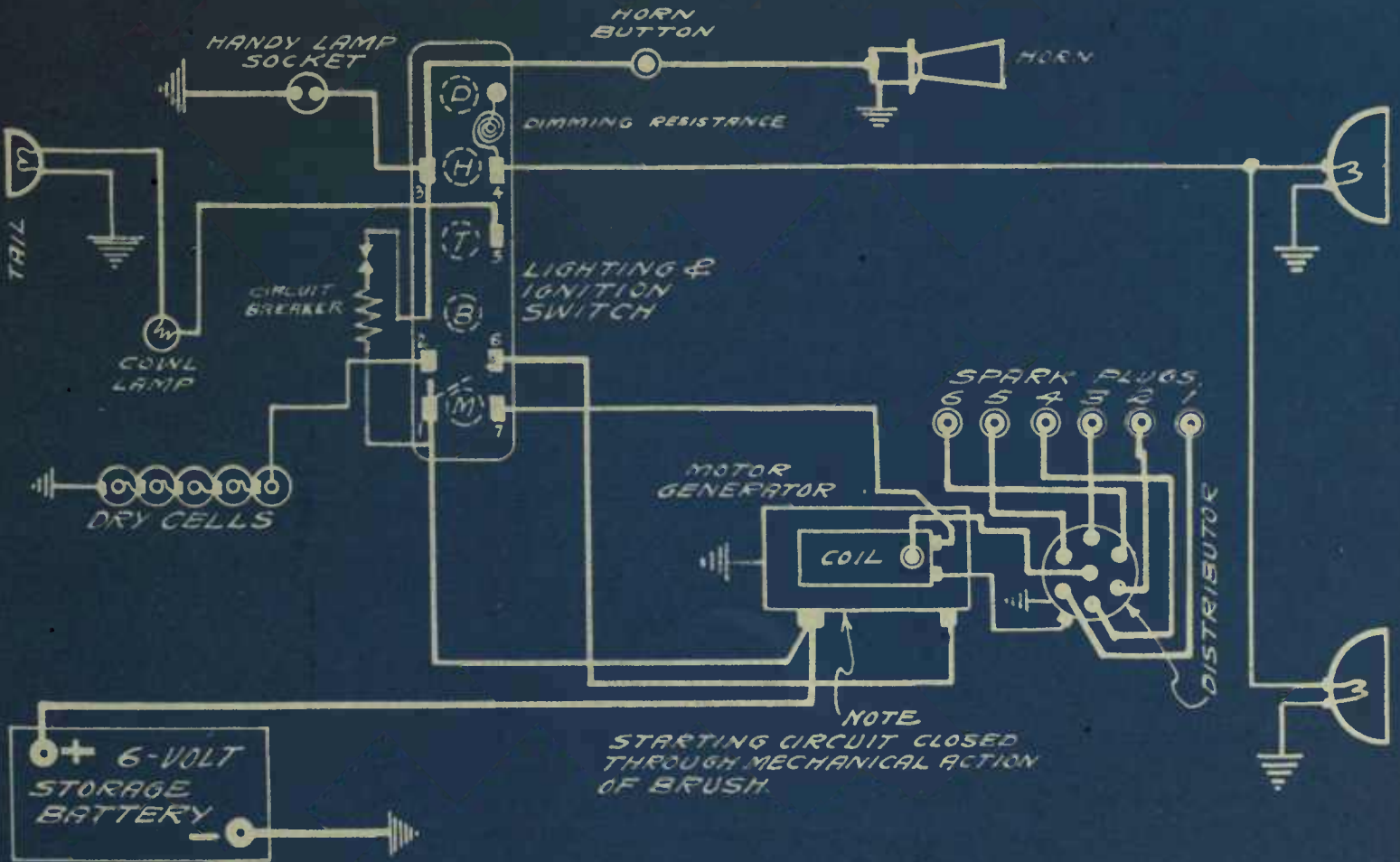
FROM DELCO MANUAL

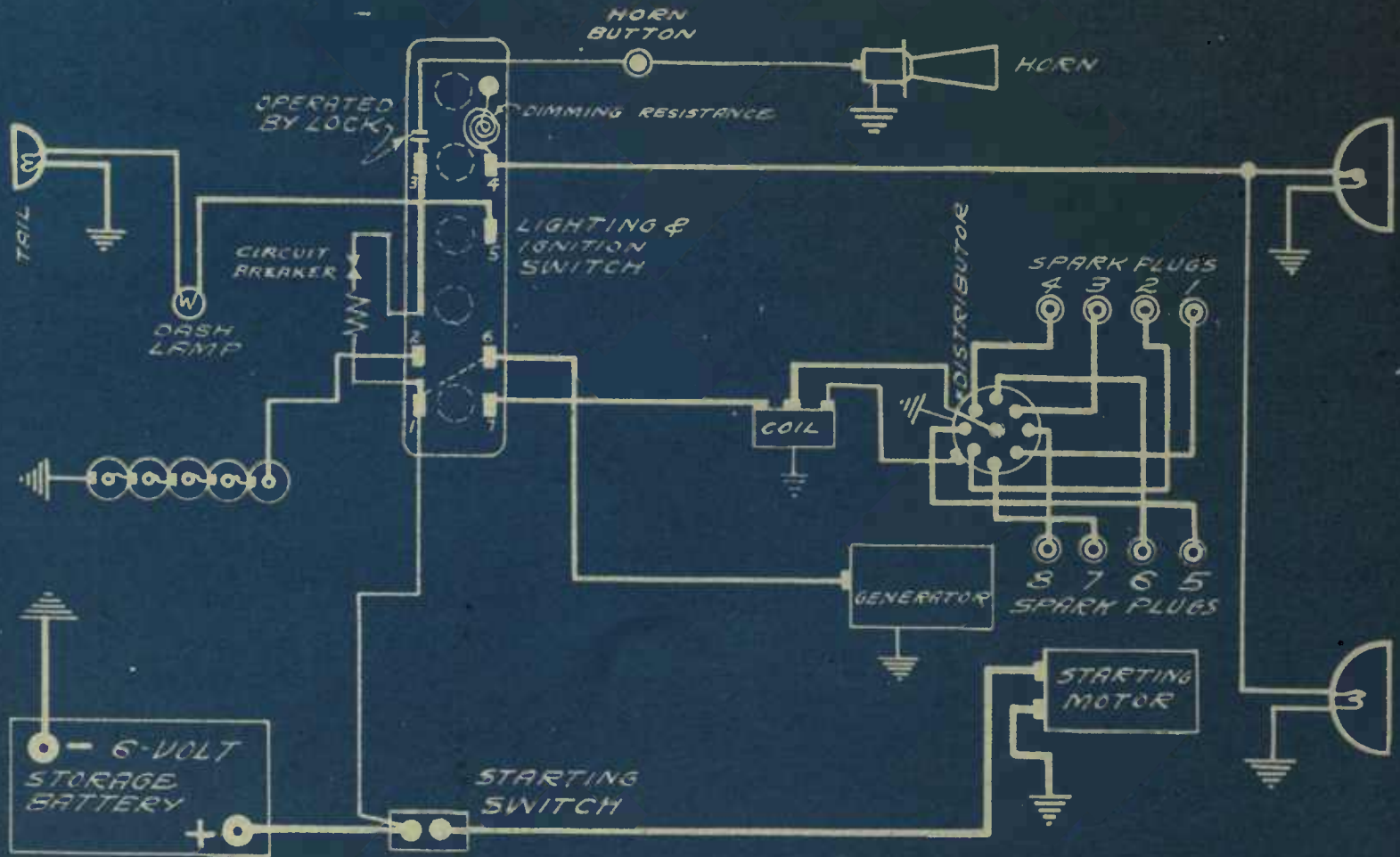


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COLE 1915 "6-50"
DELCO SYSTEM

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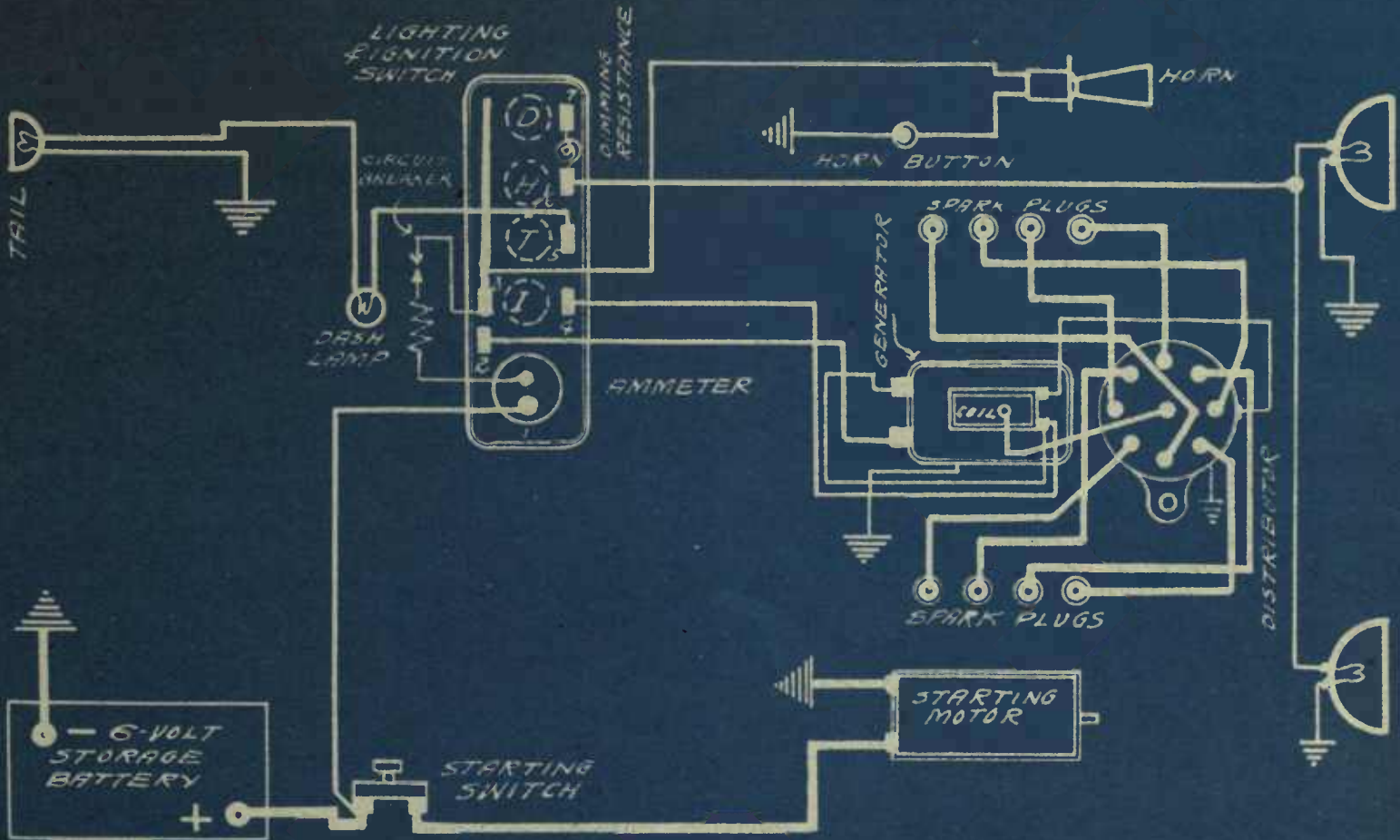




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COLE 1917-18 "8-60" EARLY 1919
 DELCO SYSTEM

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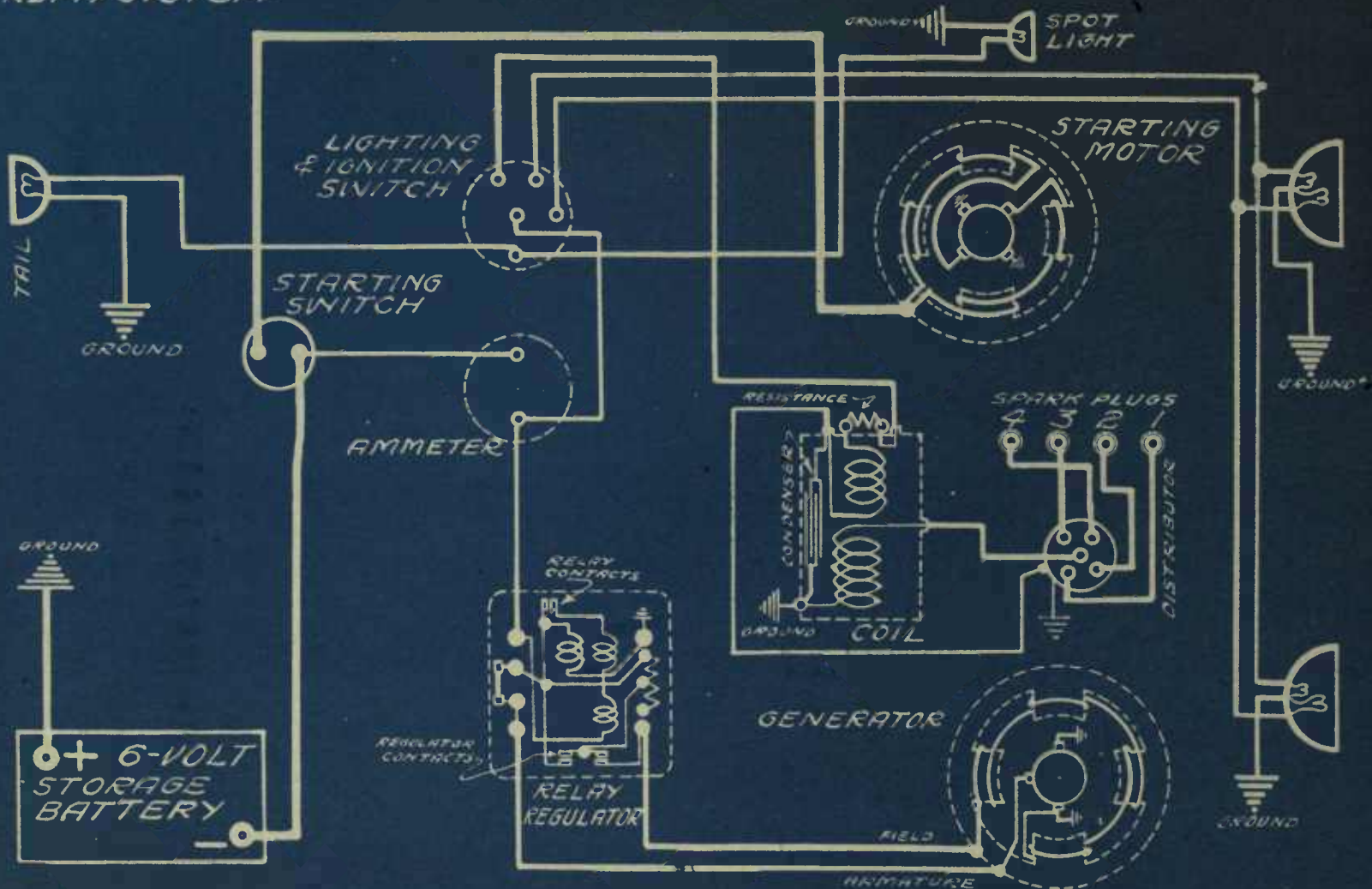


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COMMERCE TRUCK REMY SYSTEM

"E"

FROM REMY MANUAL

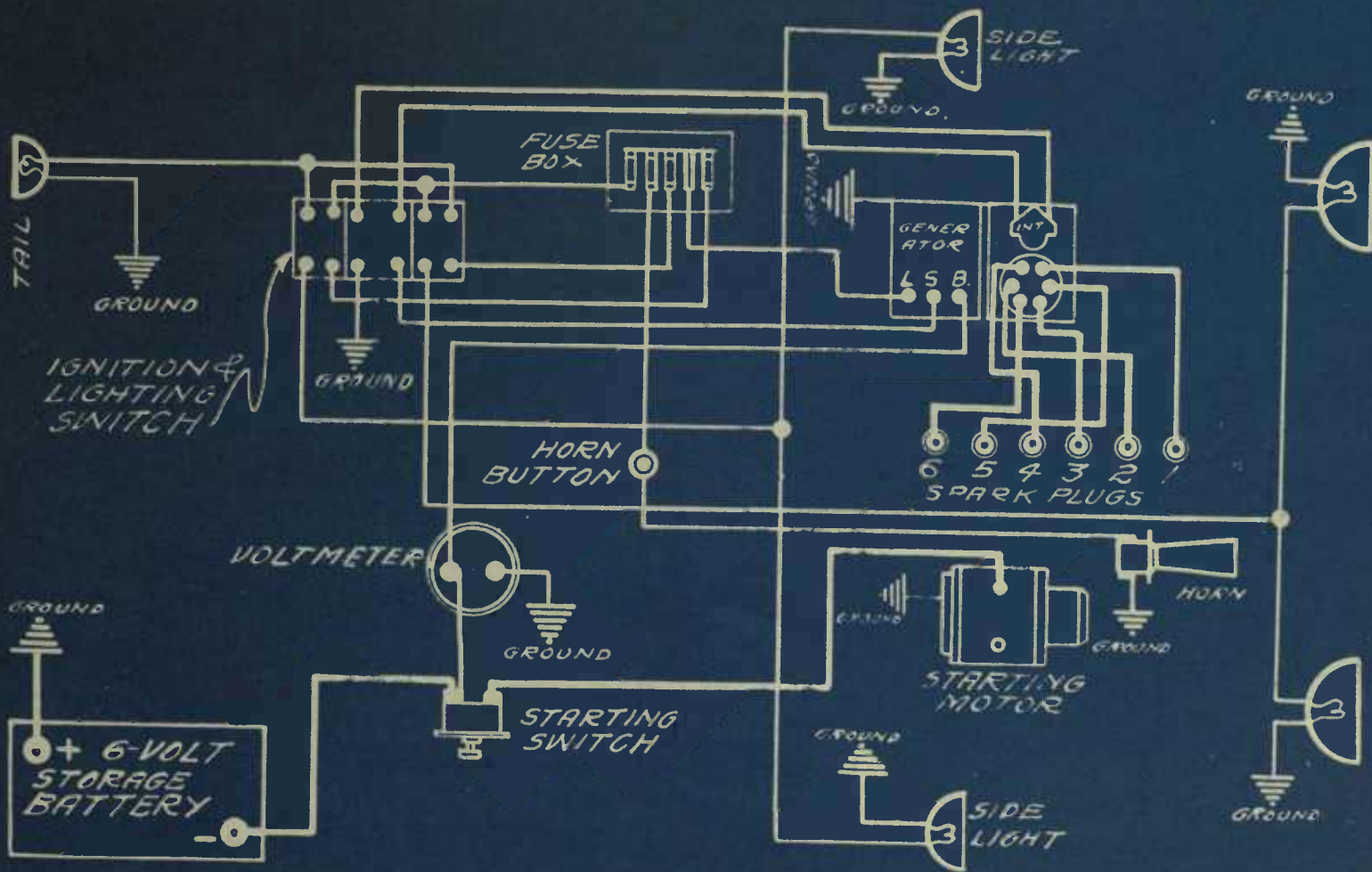


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CRAWFORD 1915 "6"

WESTINGHOUSE SYSTEM

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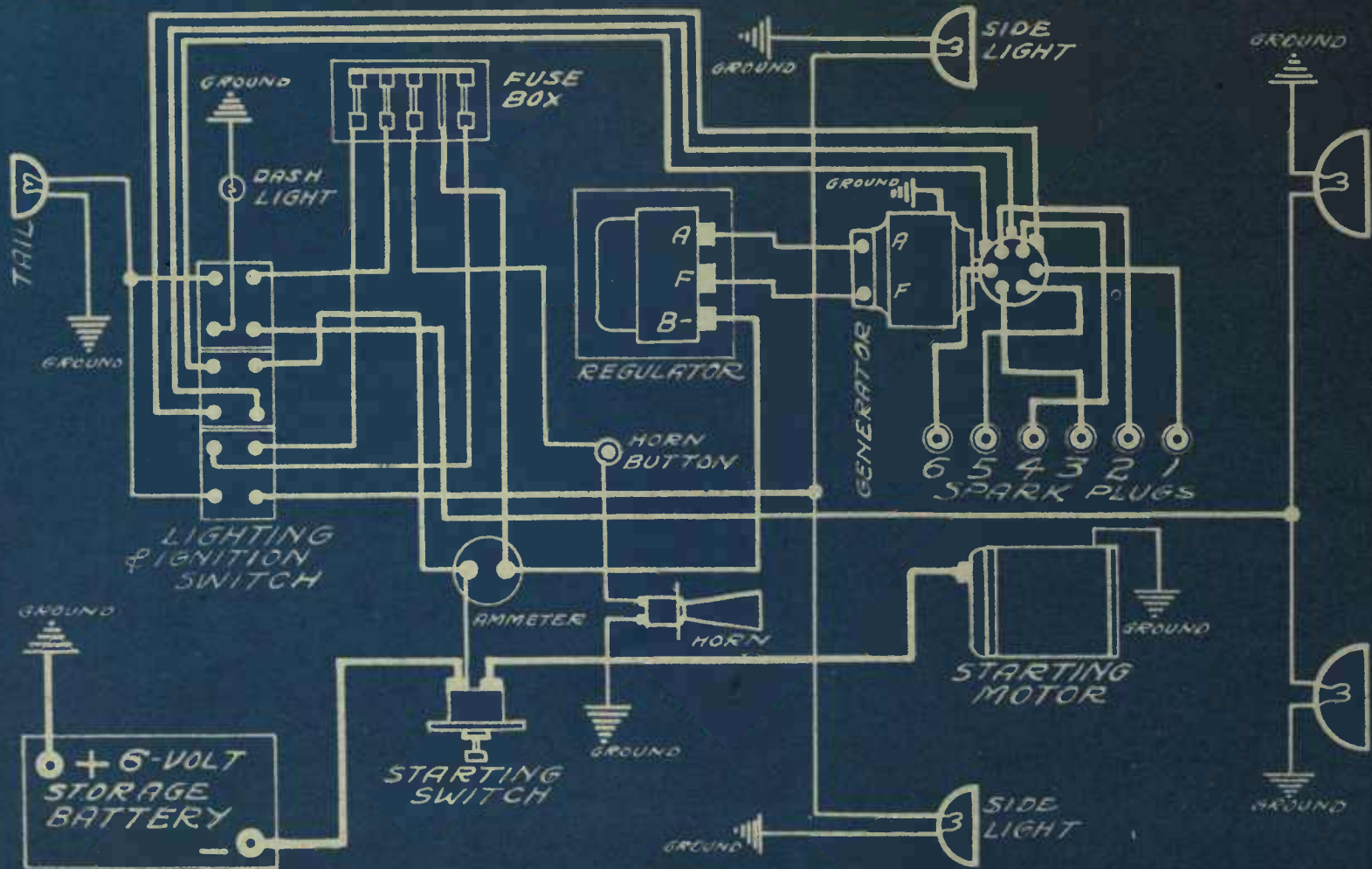


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CRAWFORD 1916

WESTINGHOUSE SYSTEM

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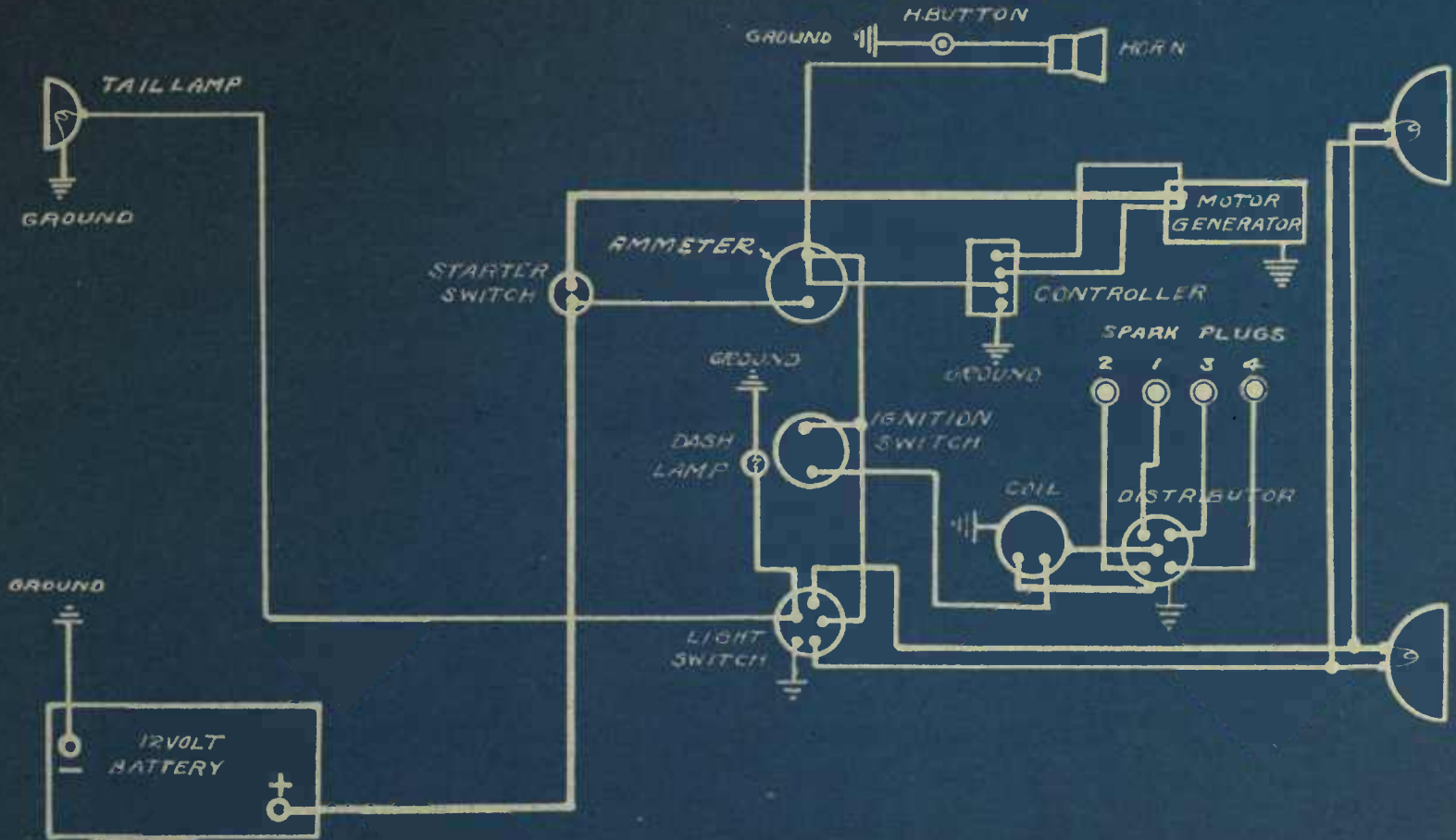
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CROW-ELKHART 1916 25-30

DISCO SYSTEM

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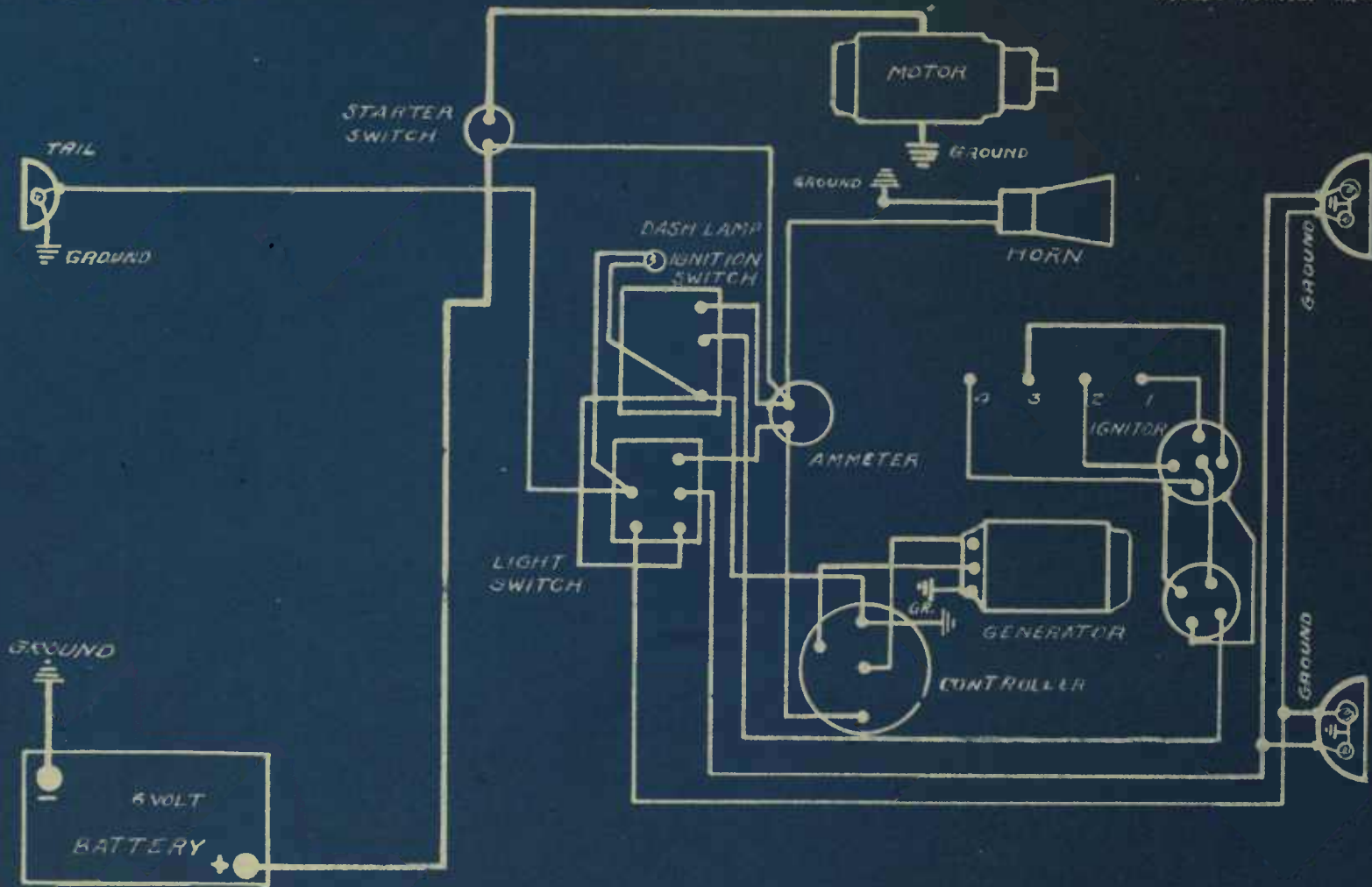
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CROWELKHART 1916-7
DYNETO SYSTEM

CE 30 & 33

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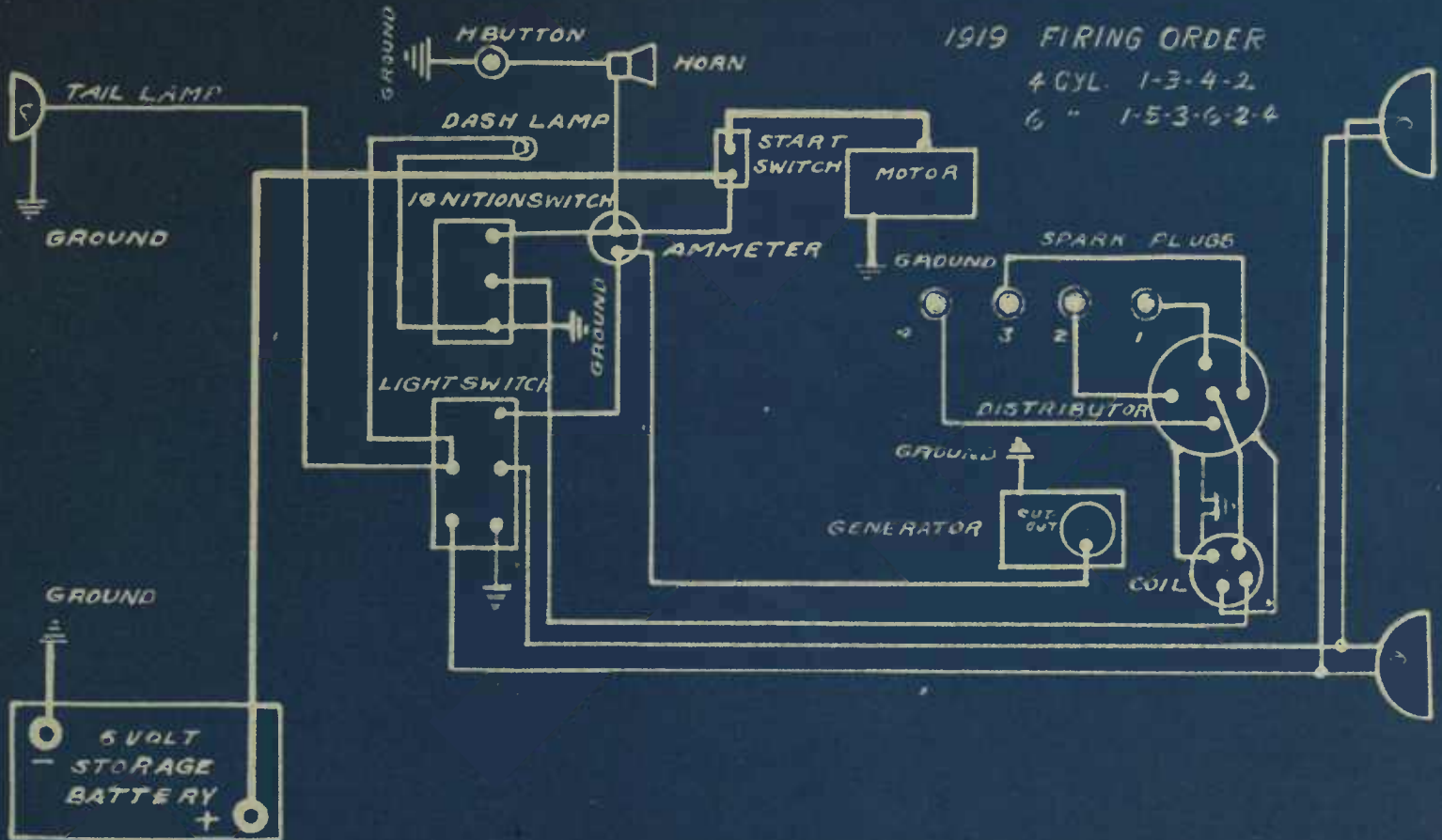


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CROW-ELKHART 1917 33-35 1918 K34-K36
 1919

DYNETO SYSTEM

FROM MFRS. DIAGRAM.

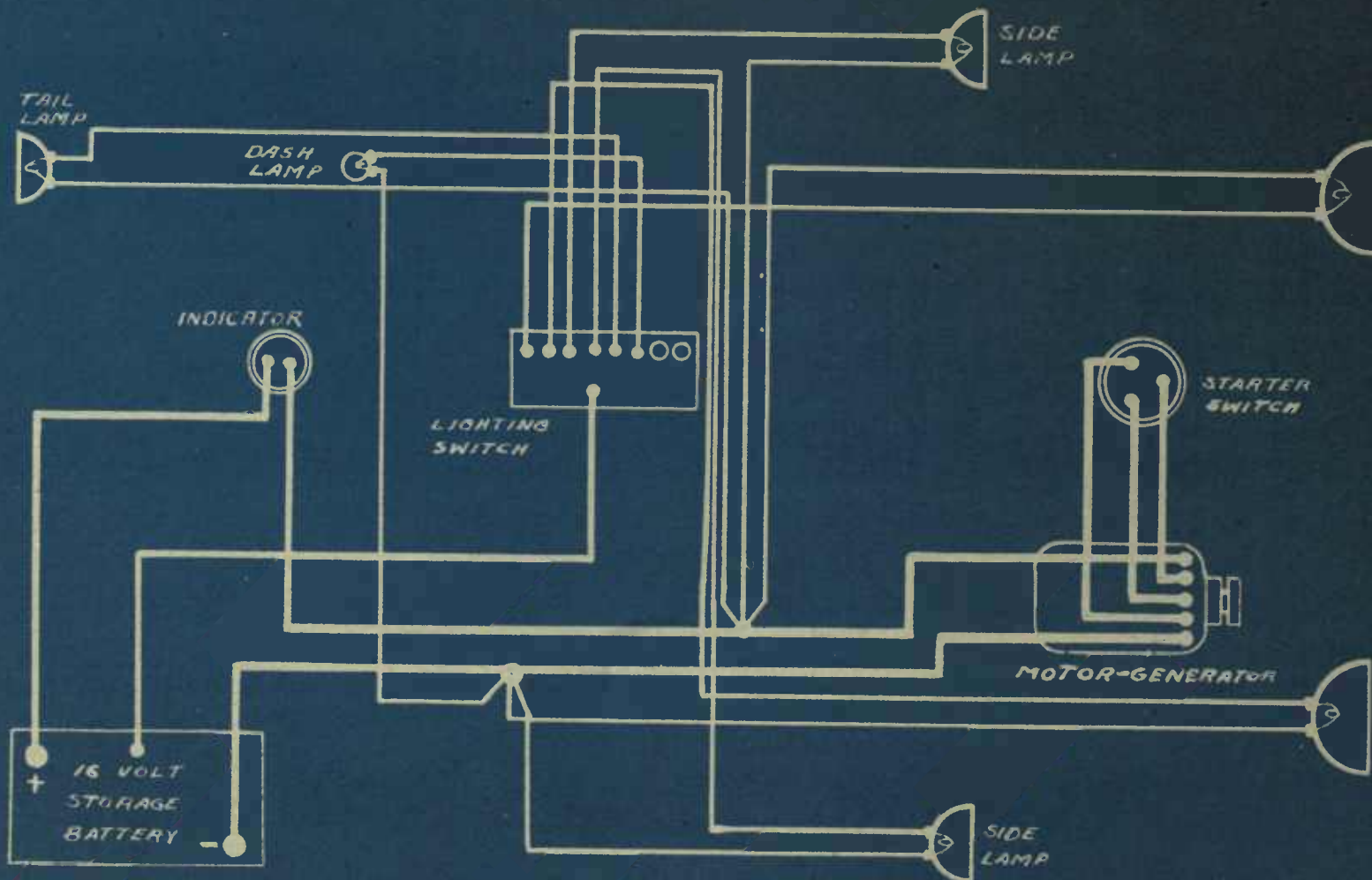


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CUNNINGHAM 1913-14 MODEL "M."

NORTHEAST SYSTEM

FROM N-E. PLATE No. 270.

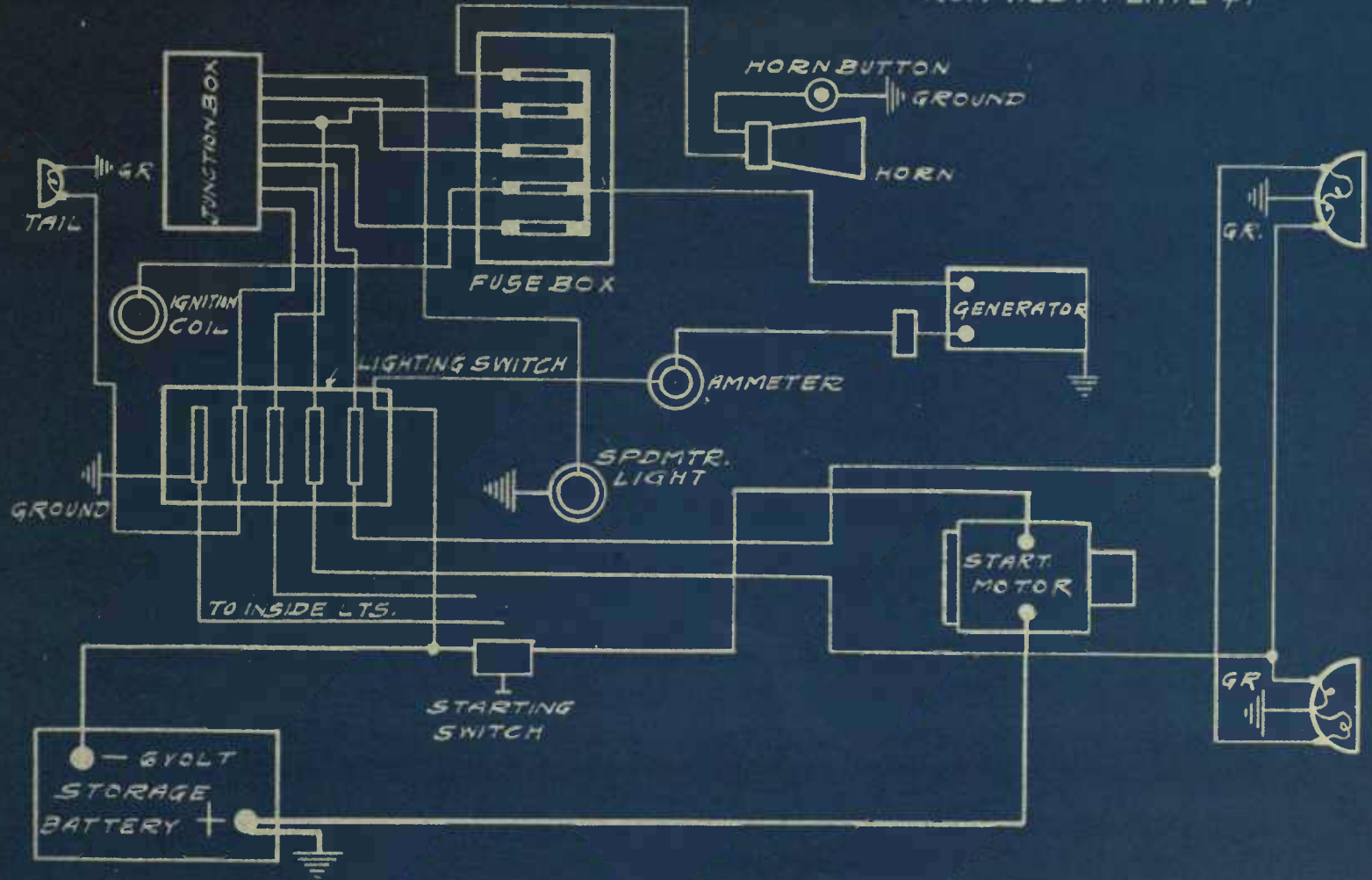


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CUNNINGHAM 1916 "4"

WESTINGHOUSE SYSTEM

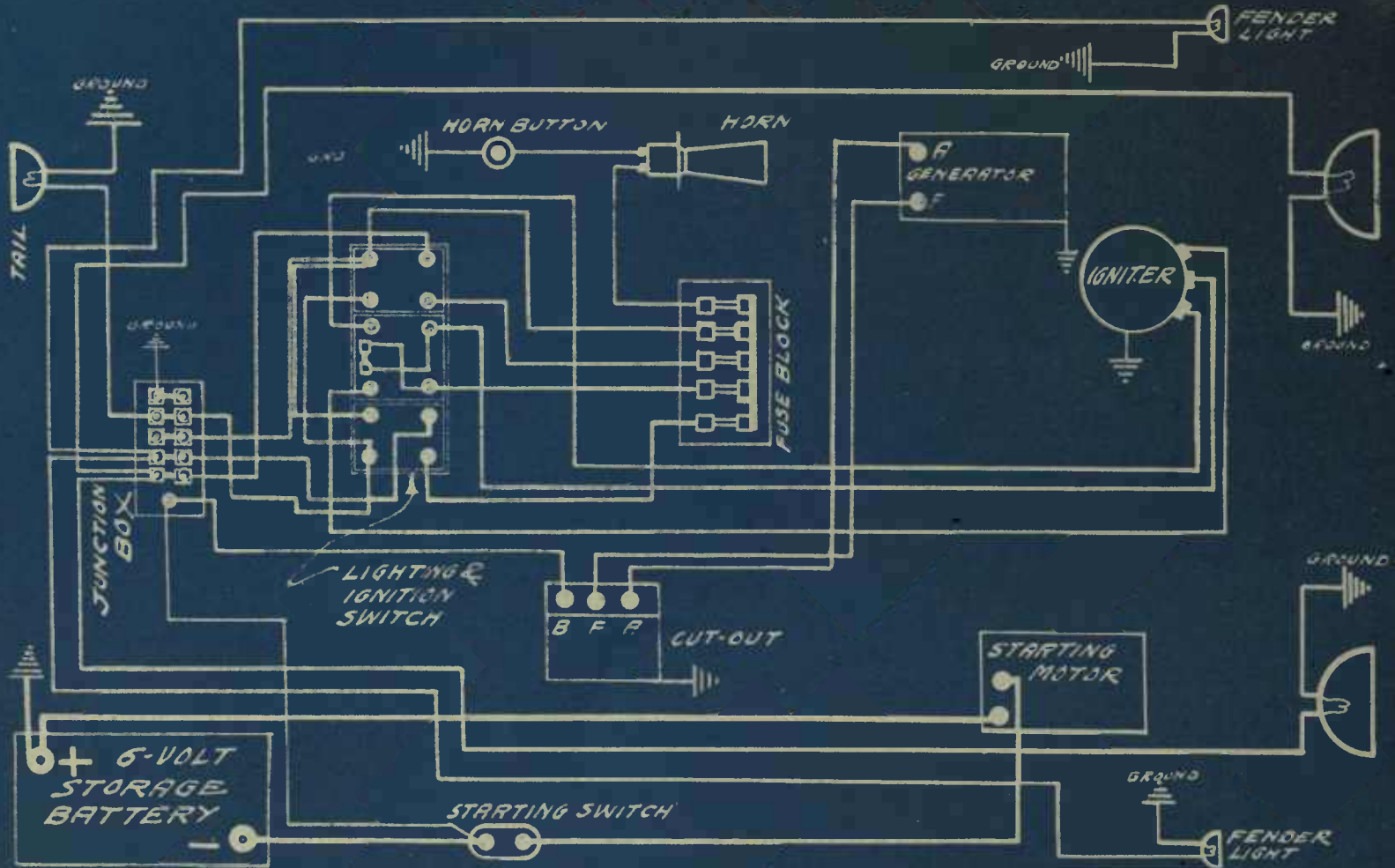
FROM WEST. PLATE 47



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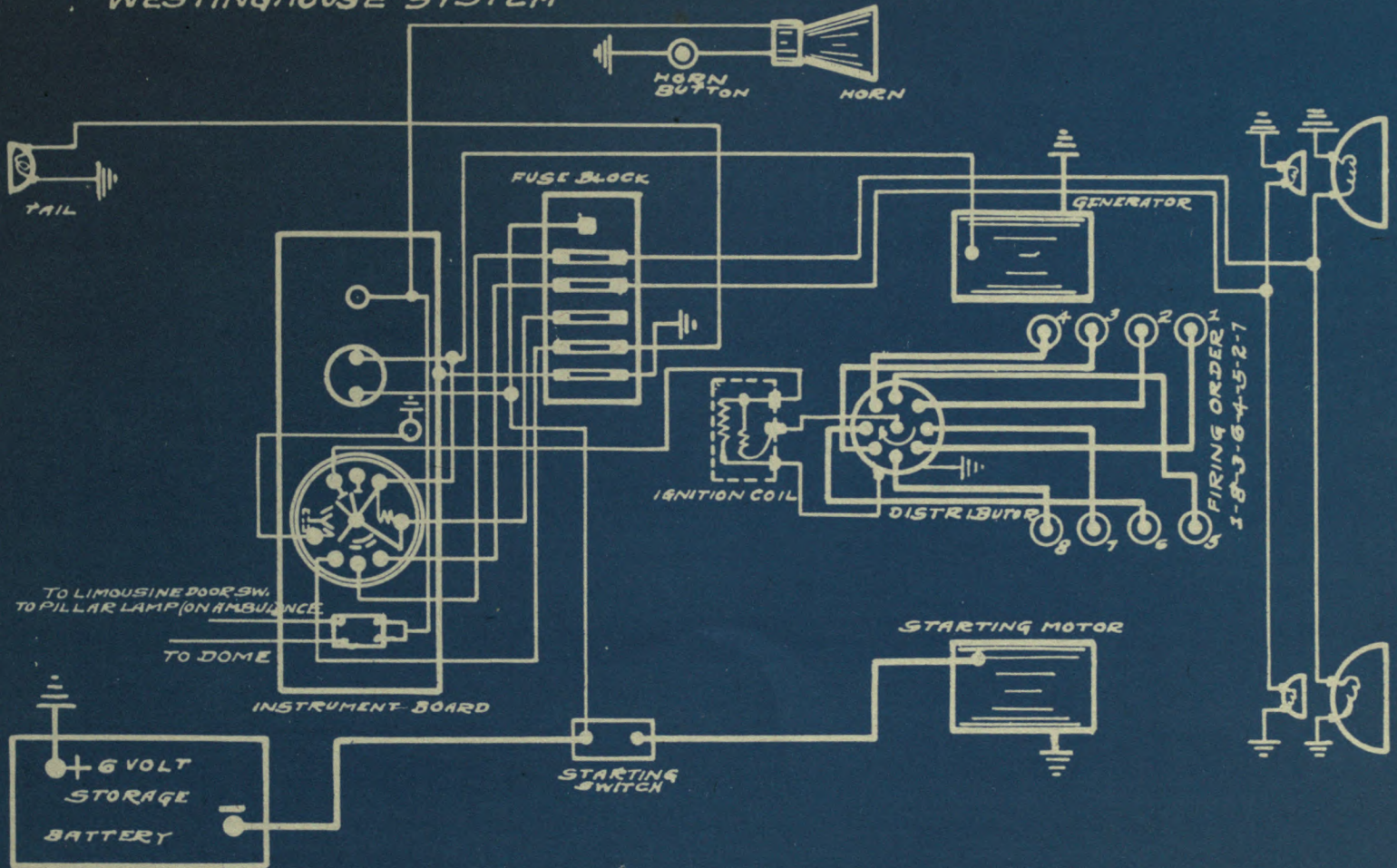
CUNNINGHAM 1916-1917 "V"
WESTINGHOUSE SYSTEM

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CUNNINGHAM 1918 V-3 1919 V-3
DELCO SYSTEM (IGNITION) FROM MFRS. INST BOOK
WESTINGHOUSE SYSTEM

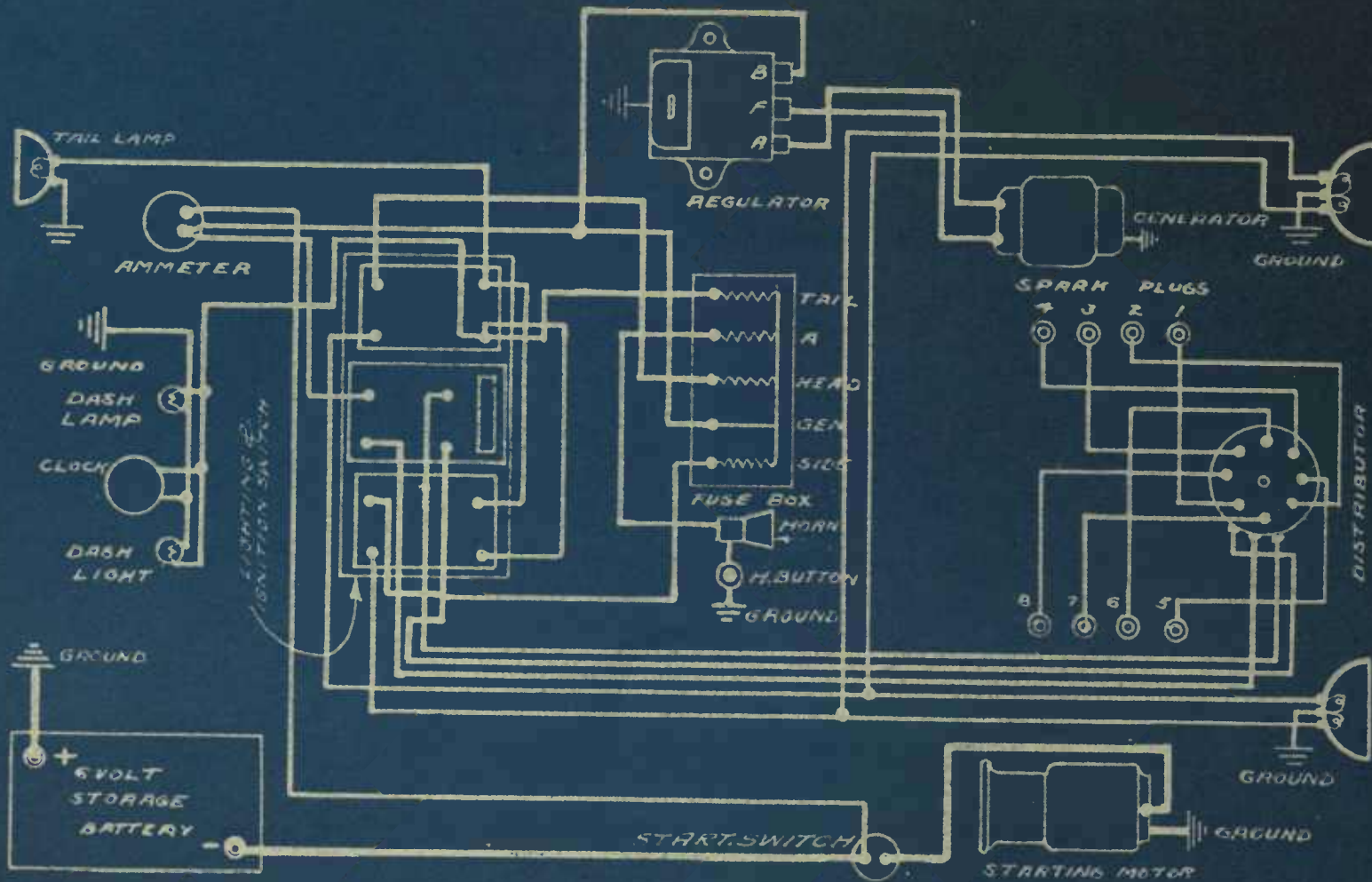


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DANIELS 1916-1917-1918 "A8"

WESTINGHOUSE SYSTEM

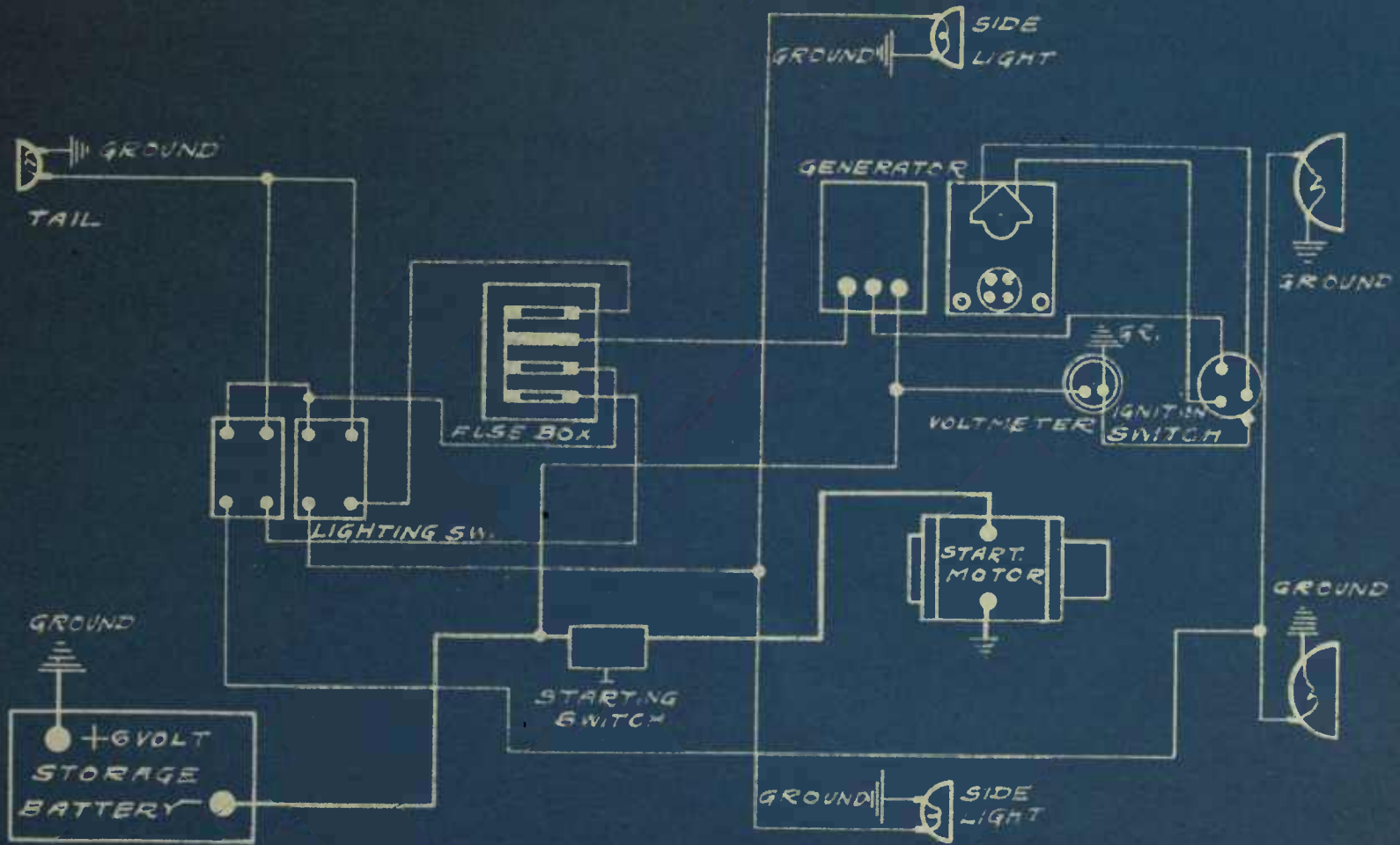
FROM MERS. B.R.



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DART 1916 B&C
WESTINGHOUSE SYSTEM

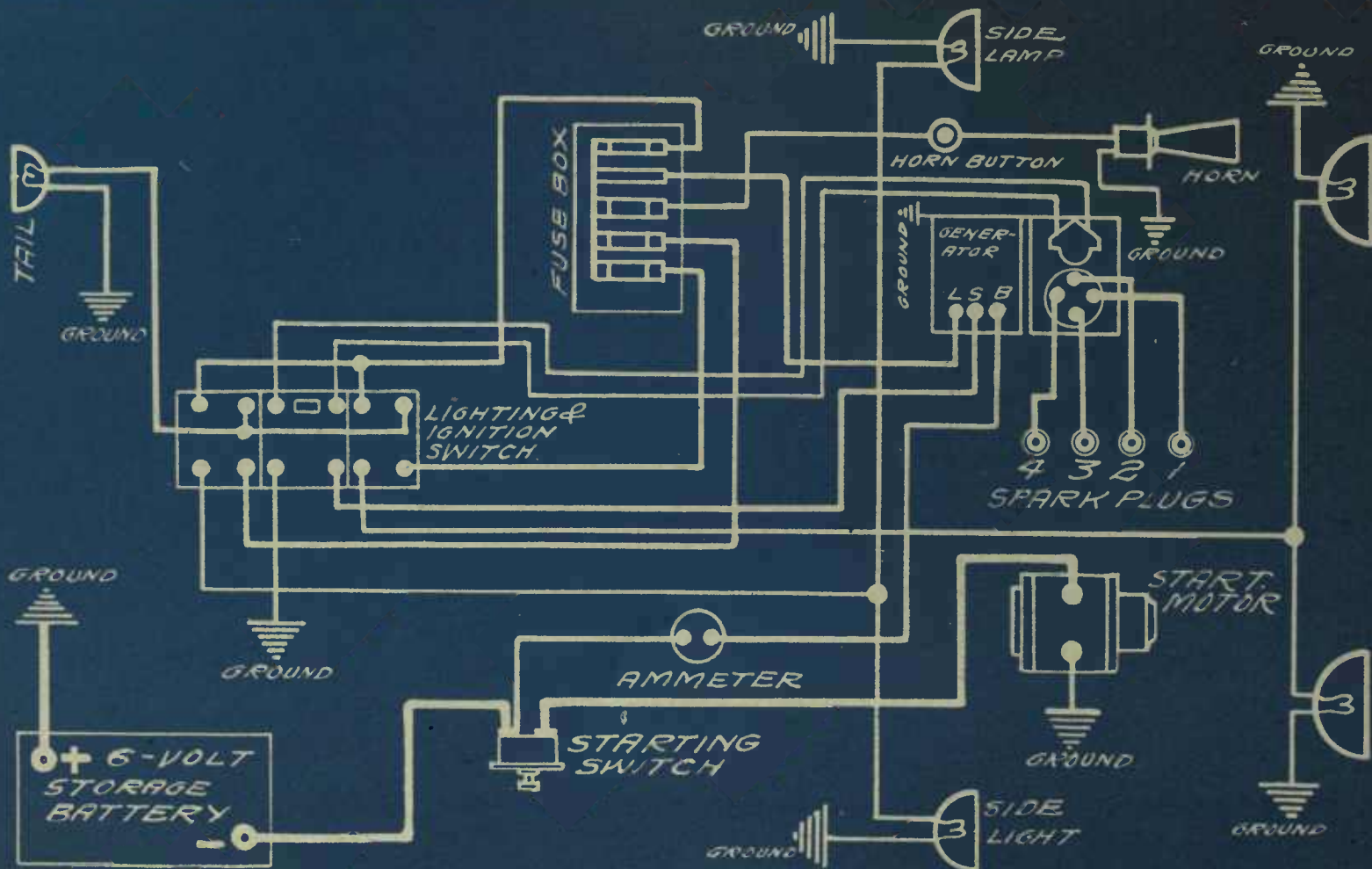
FROM WEST PLATE 51



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DAVIS 1915 38-A-B-C
WESTINGHOUSE SYSTEM

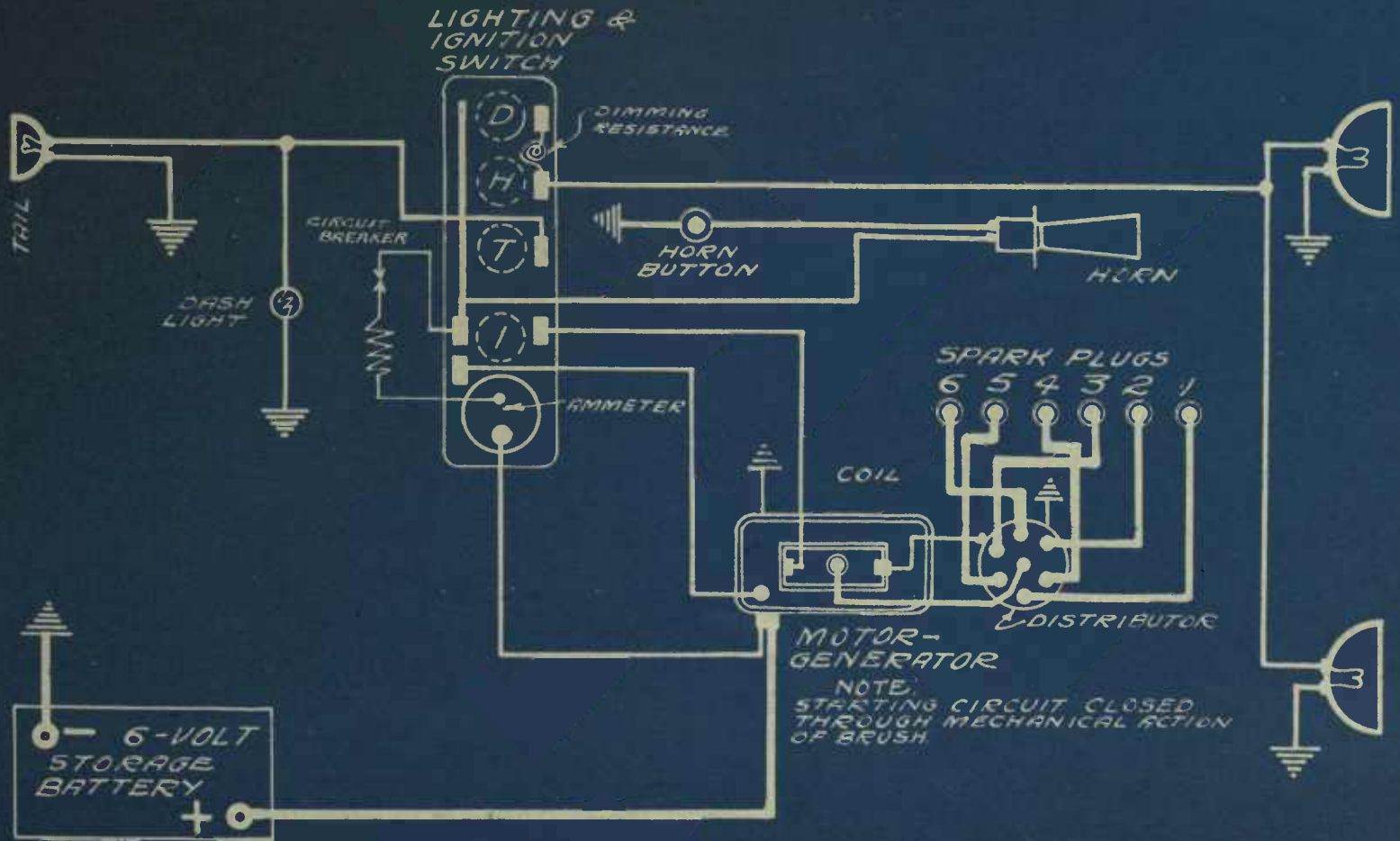
FROM WEST. DWG. 59



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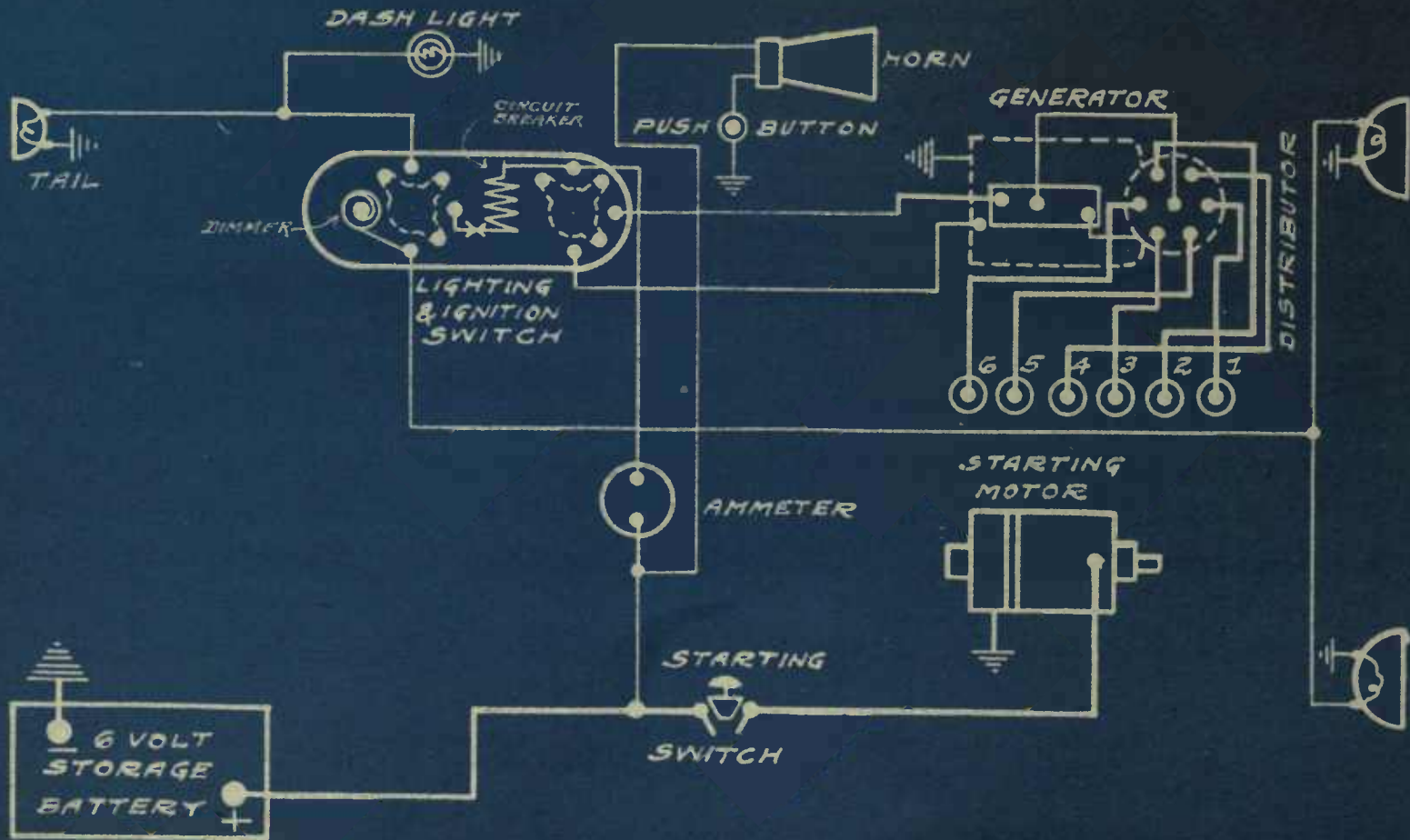
DAVIS 1916 C-38 6-E 6-G
DELCO SYSTEM

FROM DELCO MANUAL



DAVIS 1917-18 6-H 6-I & 6-K DELCO SYSTEM

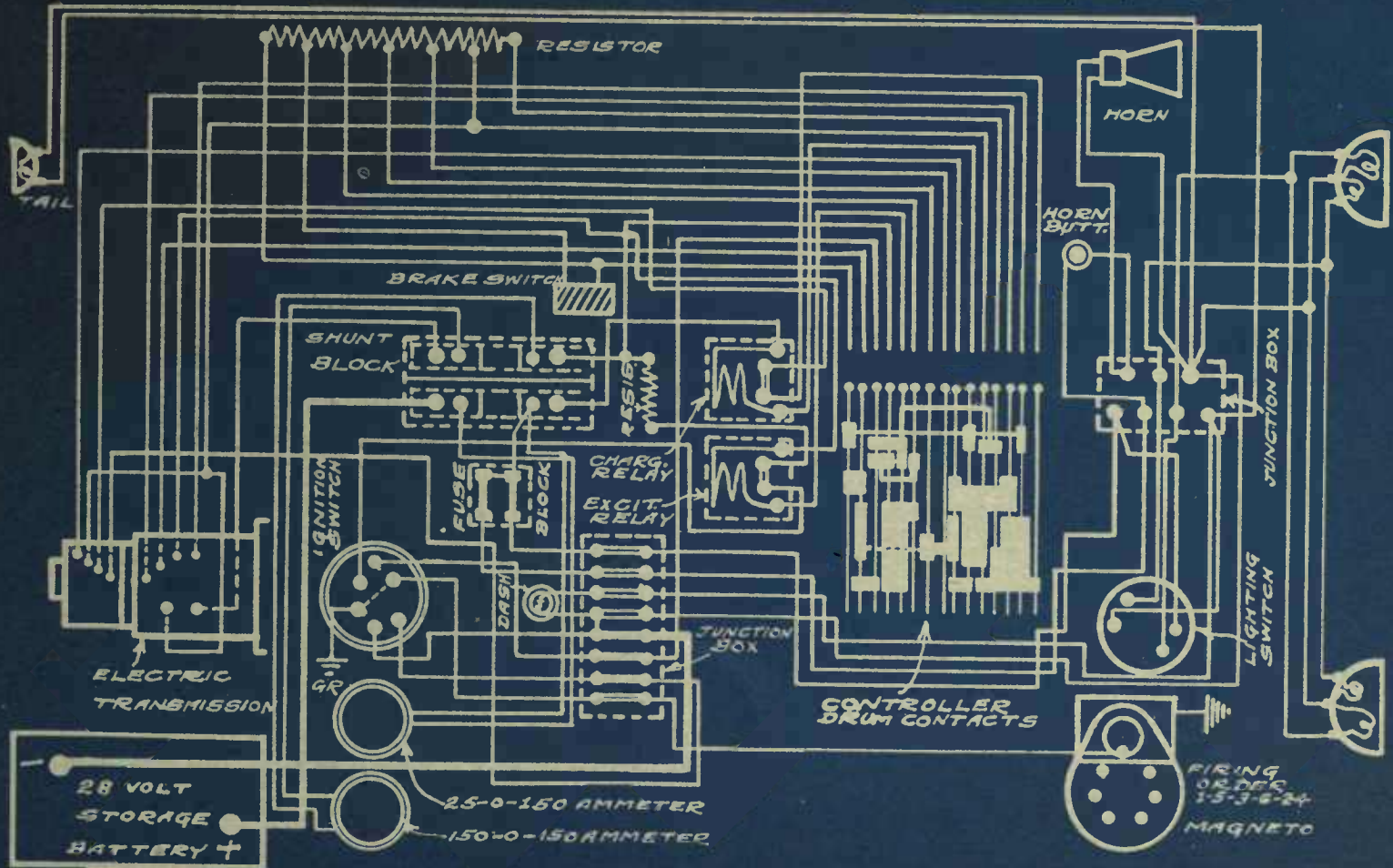
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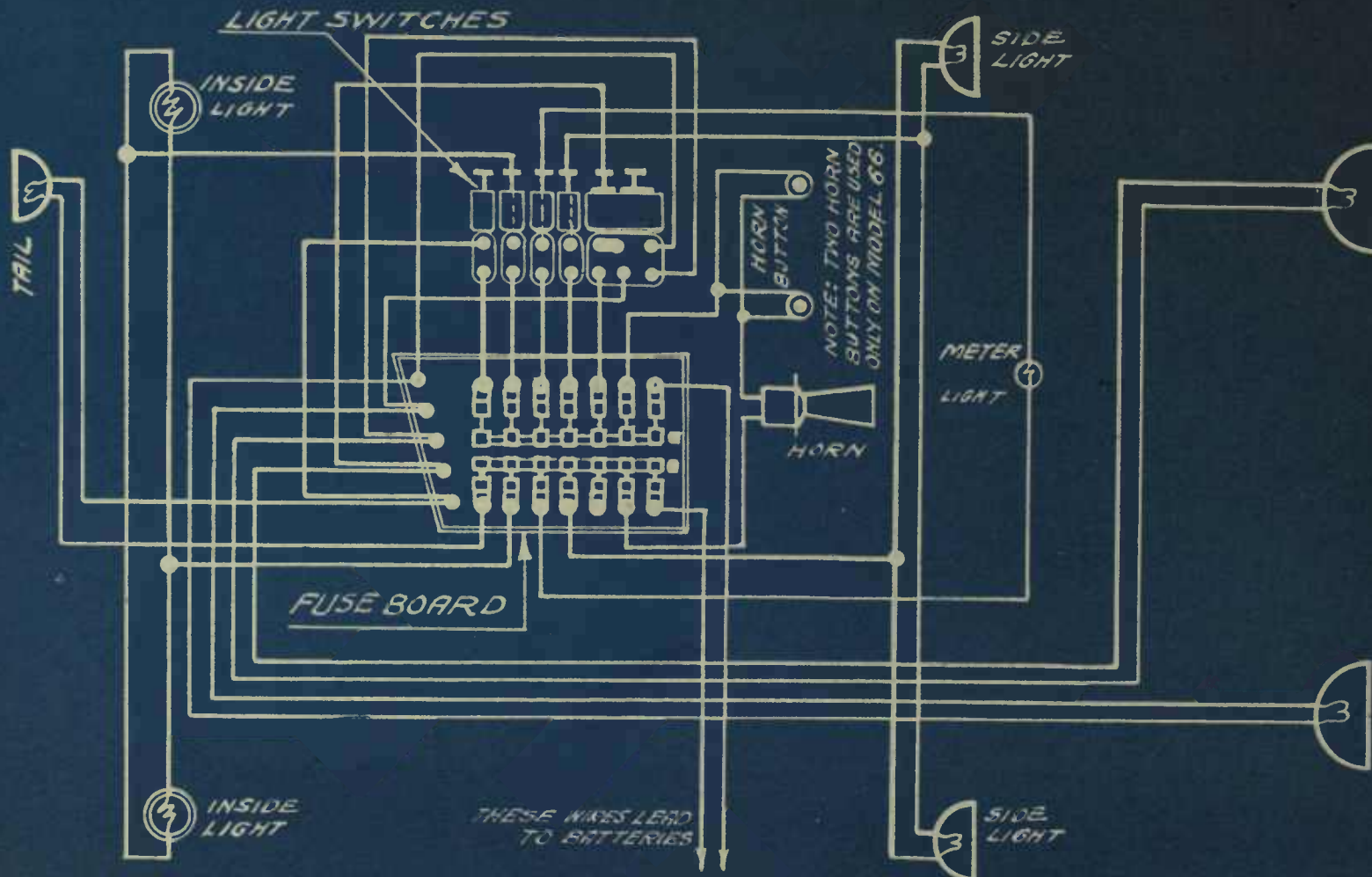
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DEERING MAGNETIC 1918 OWEN SYSTEM

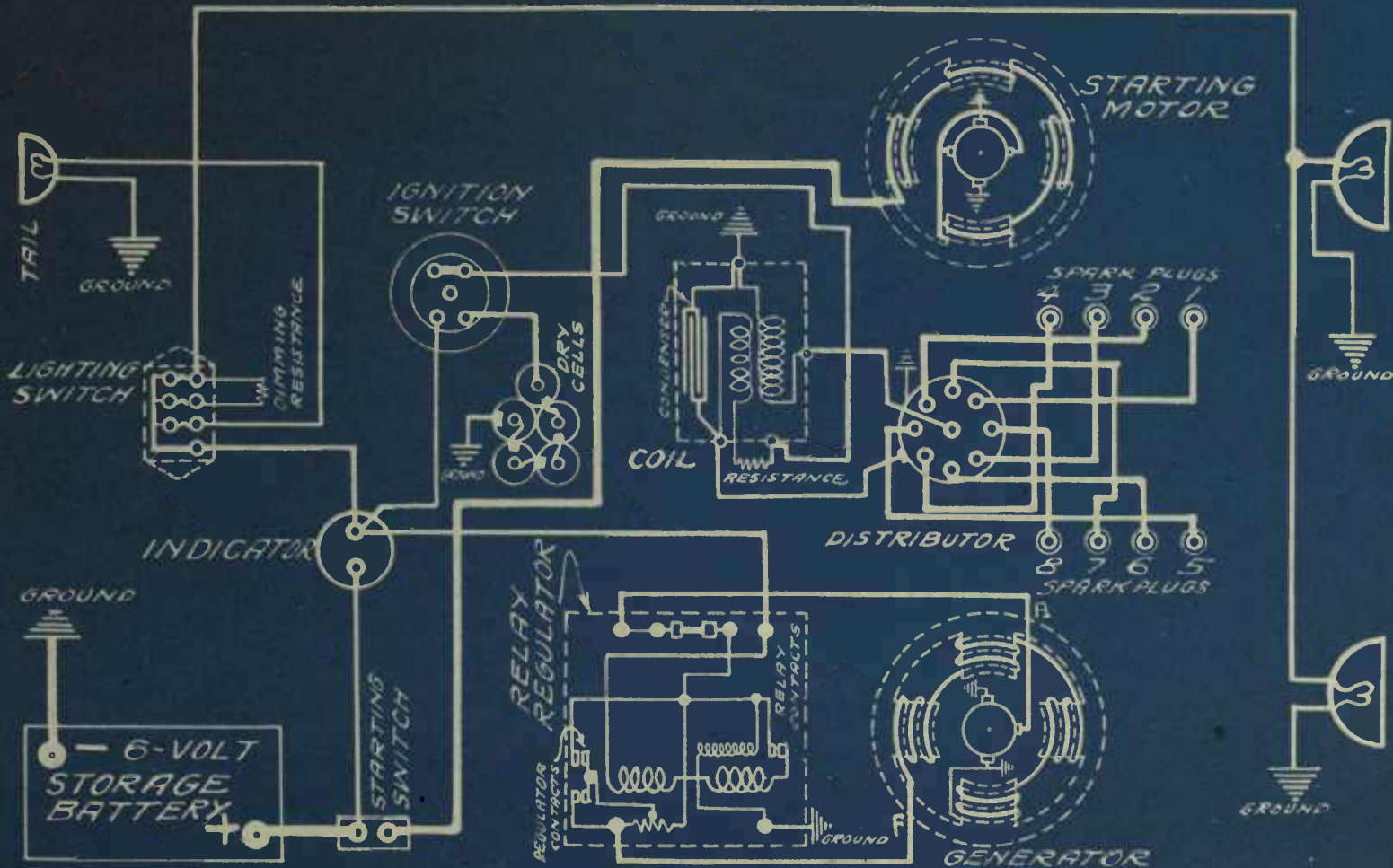
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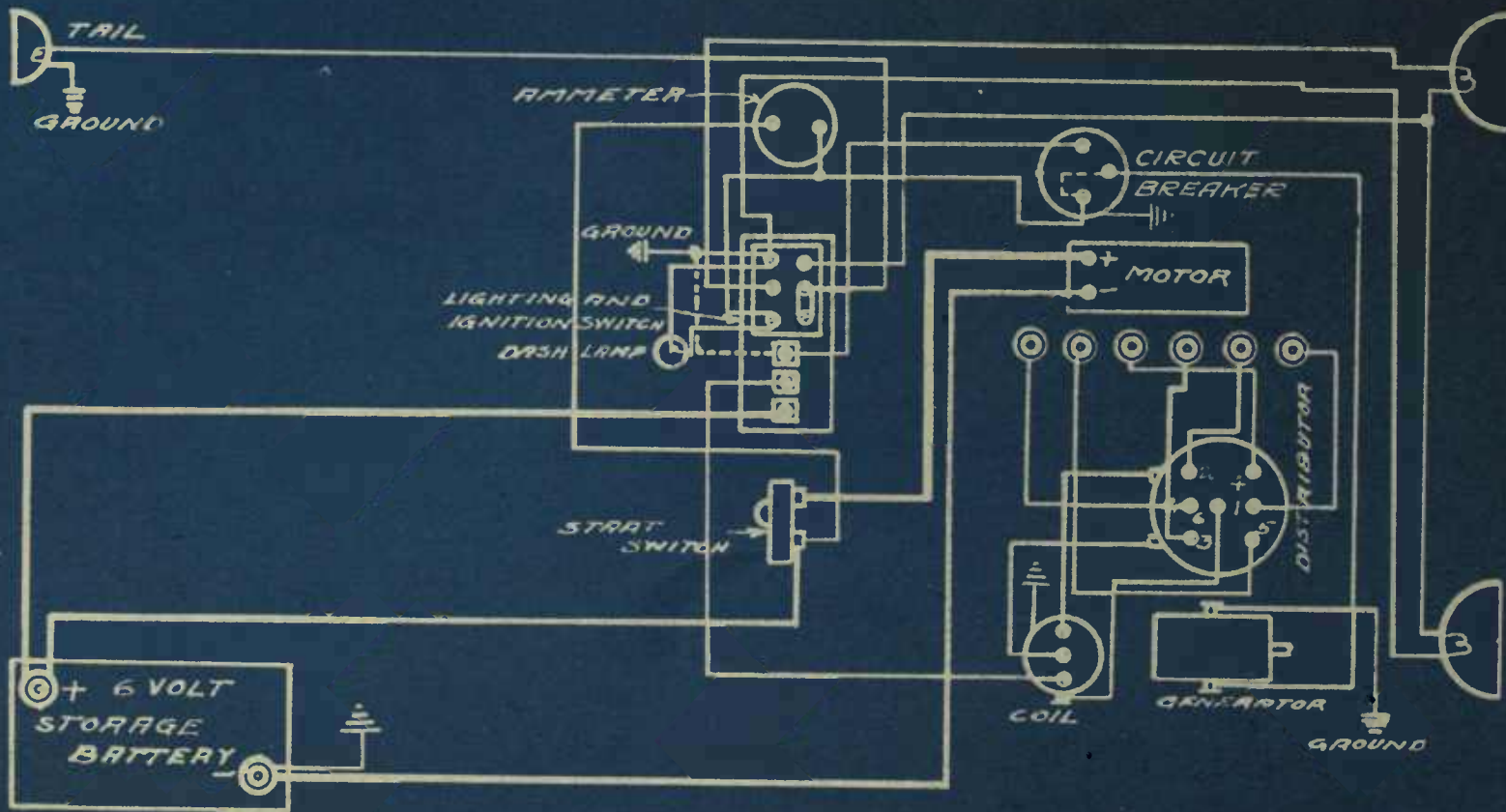
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DETROITER 1916 "6-45"
AUTOLITE SYSTEM

FROM AUTOLITE B.F.

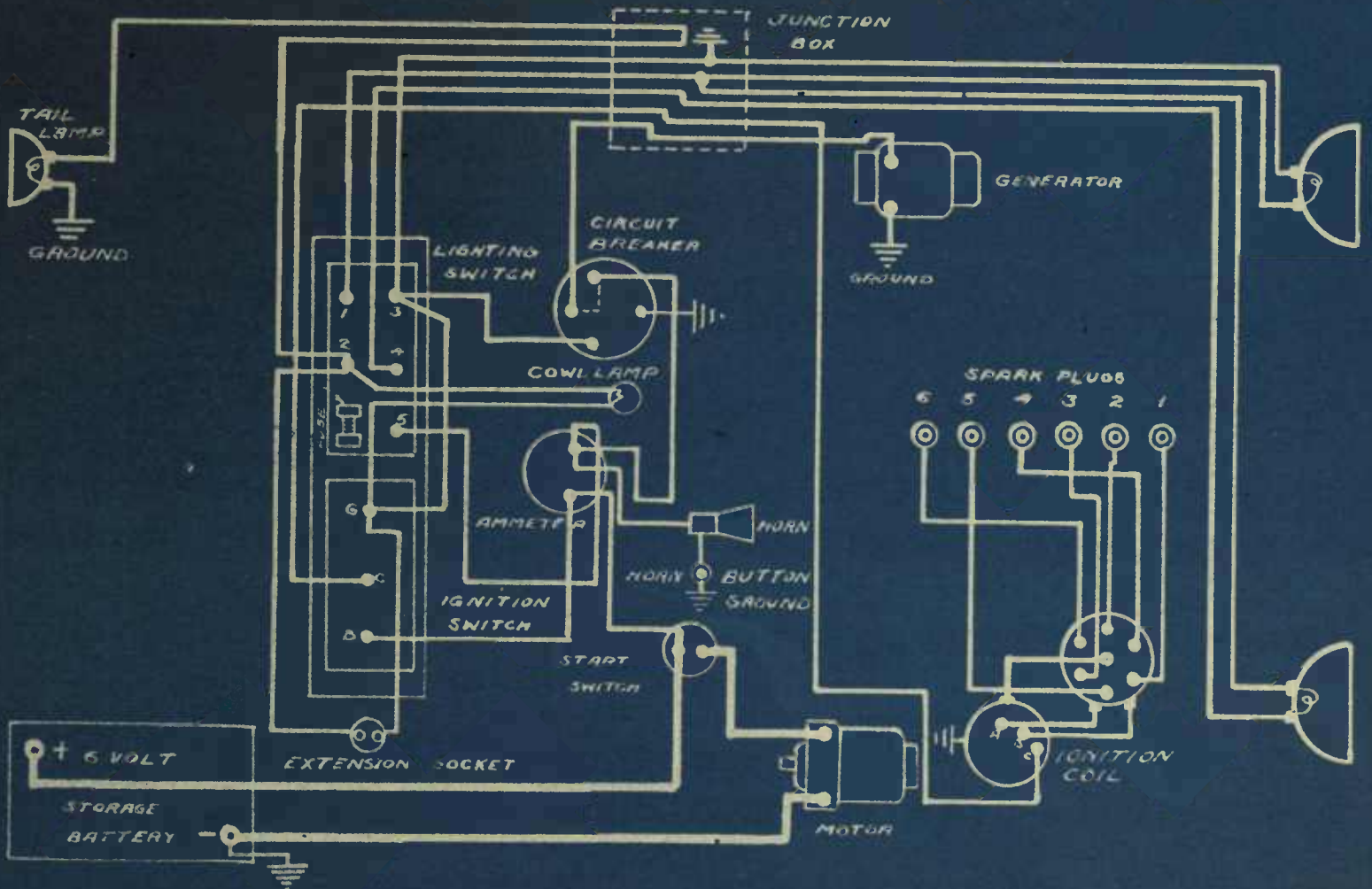


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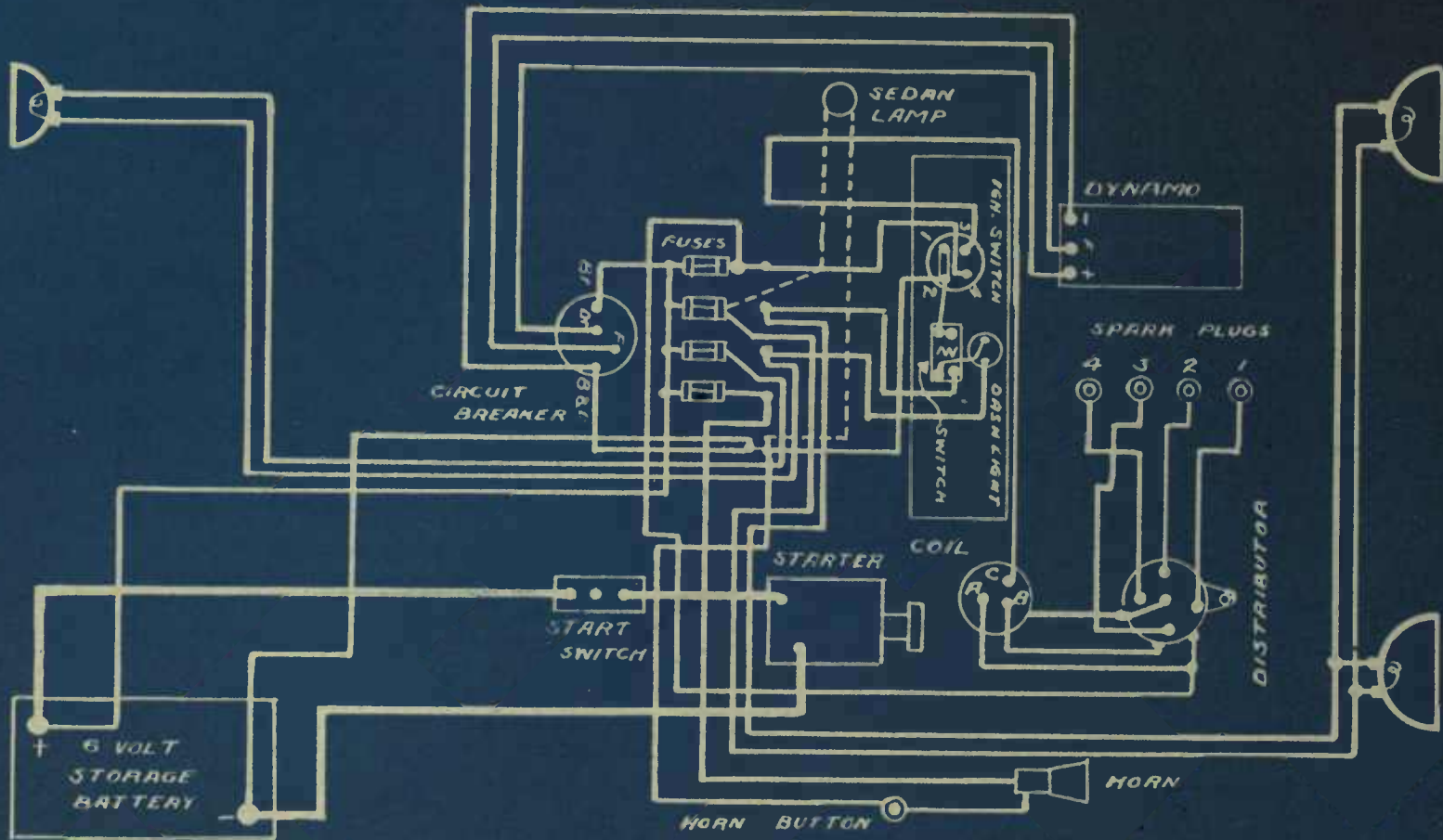
DETROITER MODEL 6-45 1917

AUTO-LITE SYSTEM

FROM MEAS. B.P.M-526



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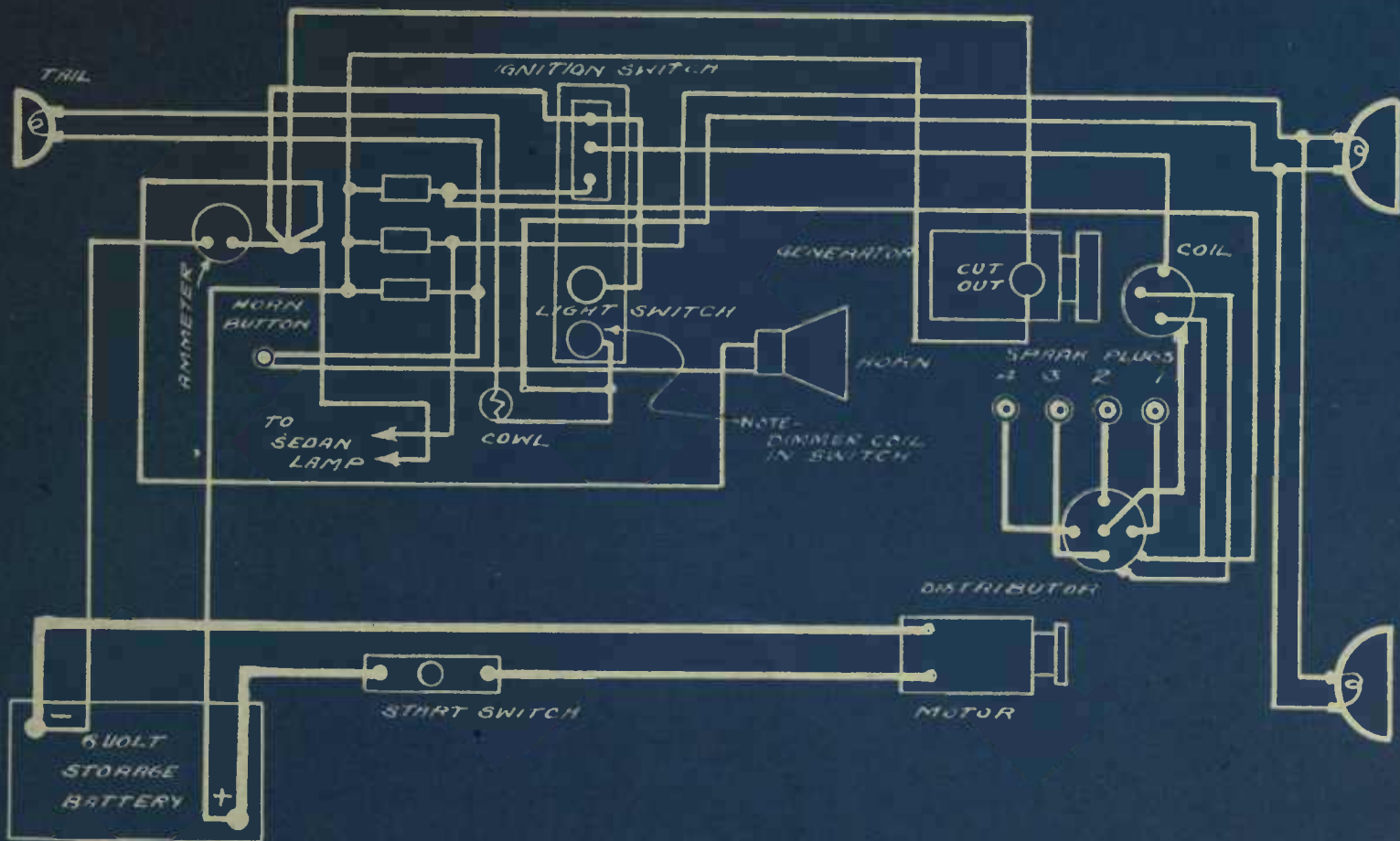


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DIXIE FLYER
DYNETO SYSTEM

MODEL "L"
CARS 3500 & ABOVE

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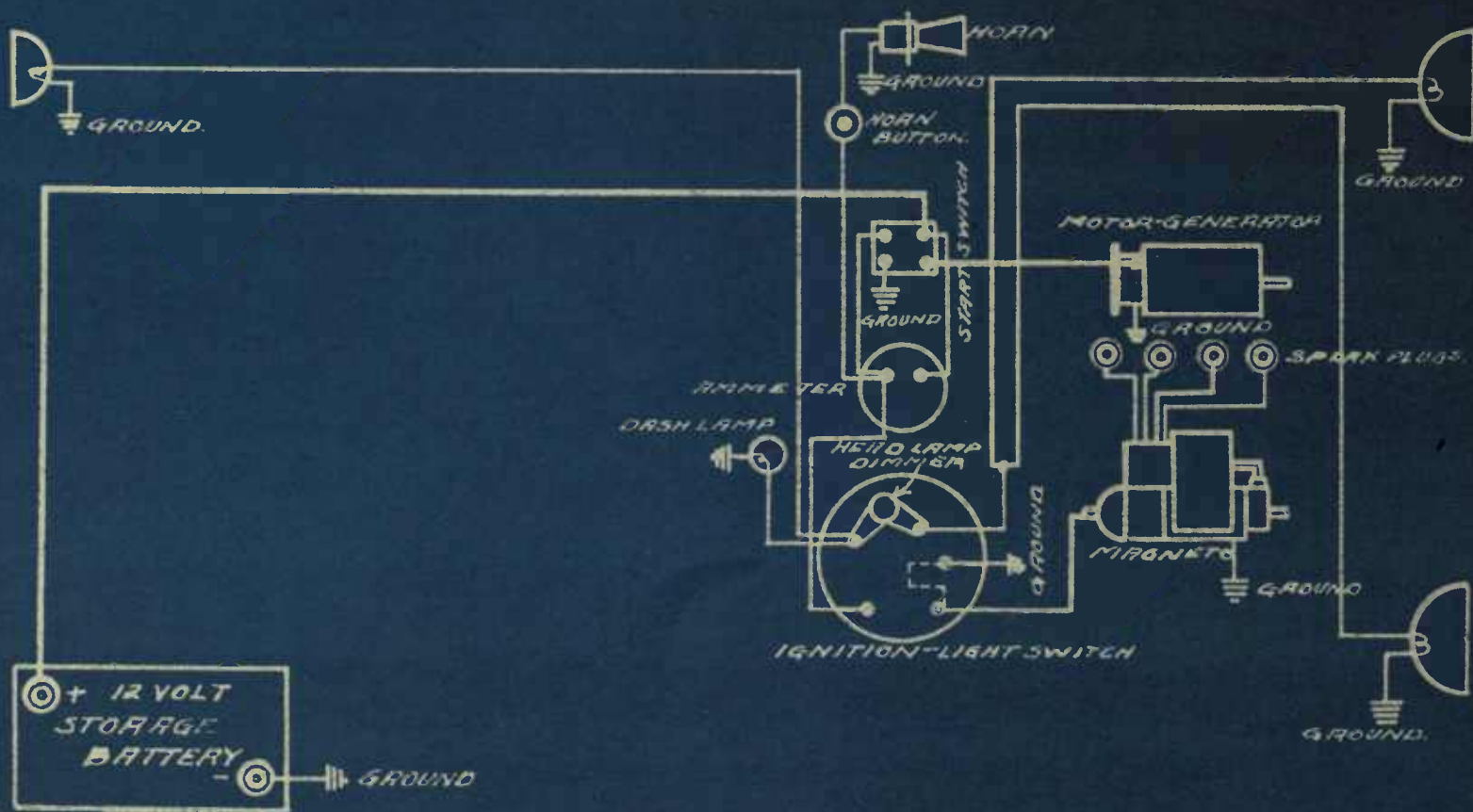


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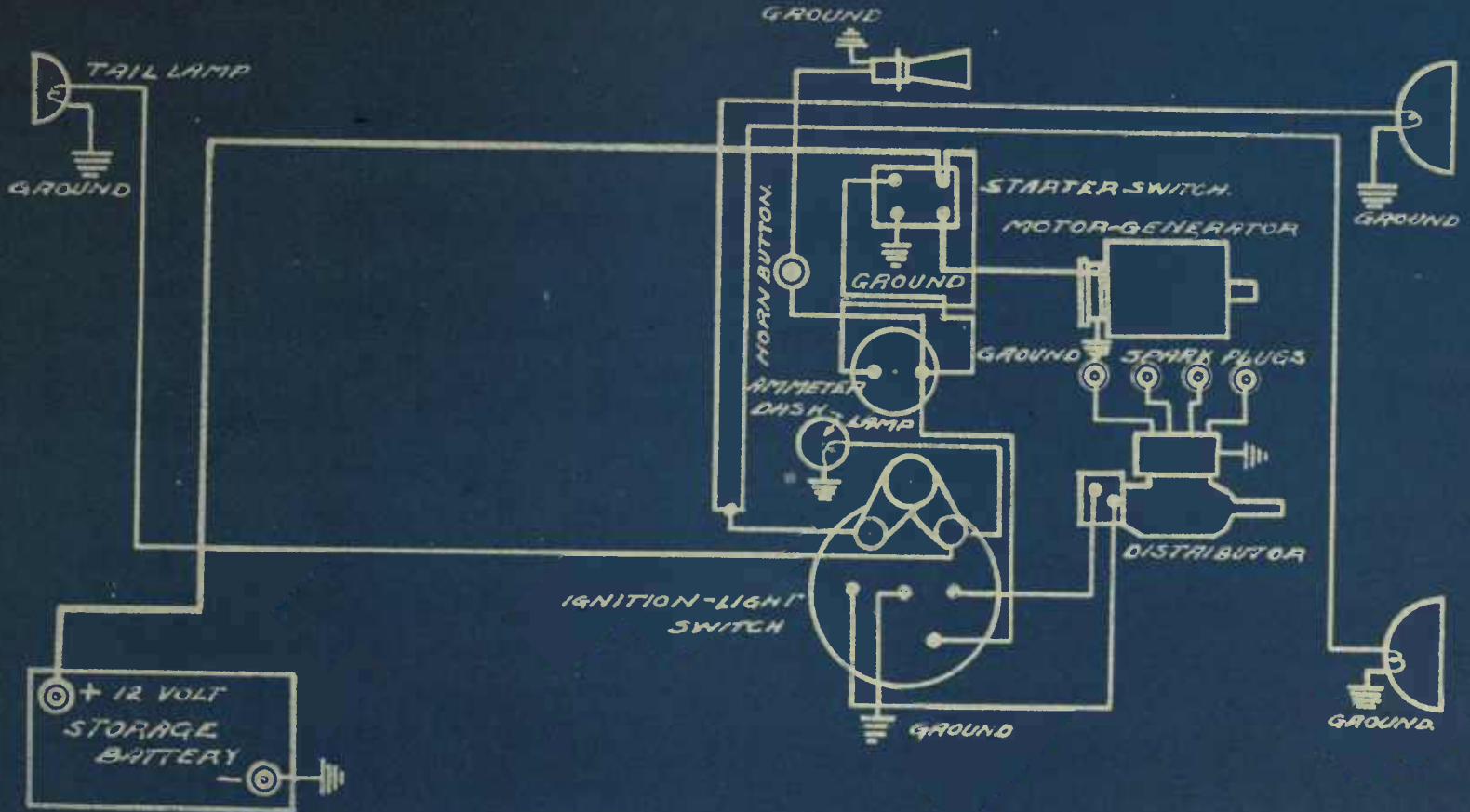


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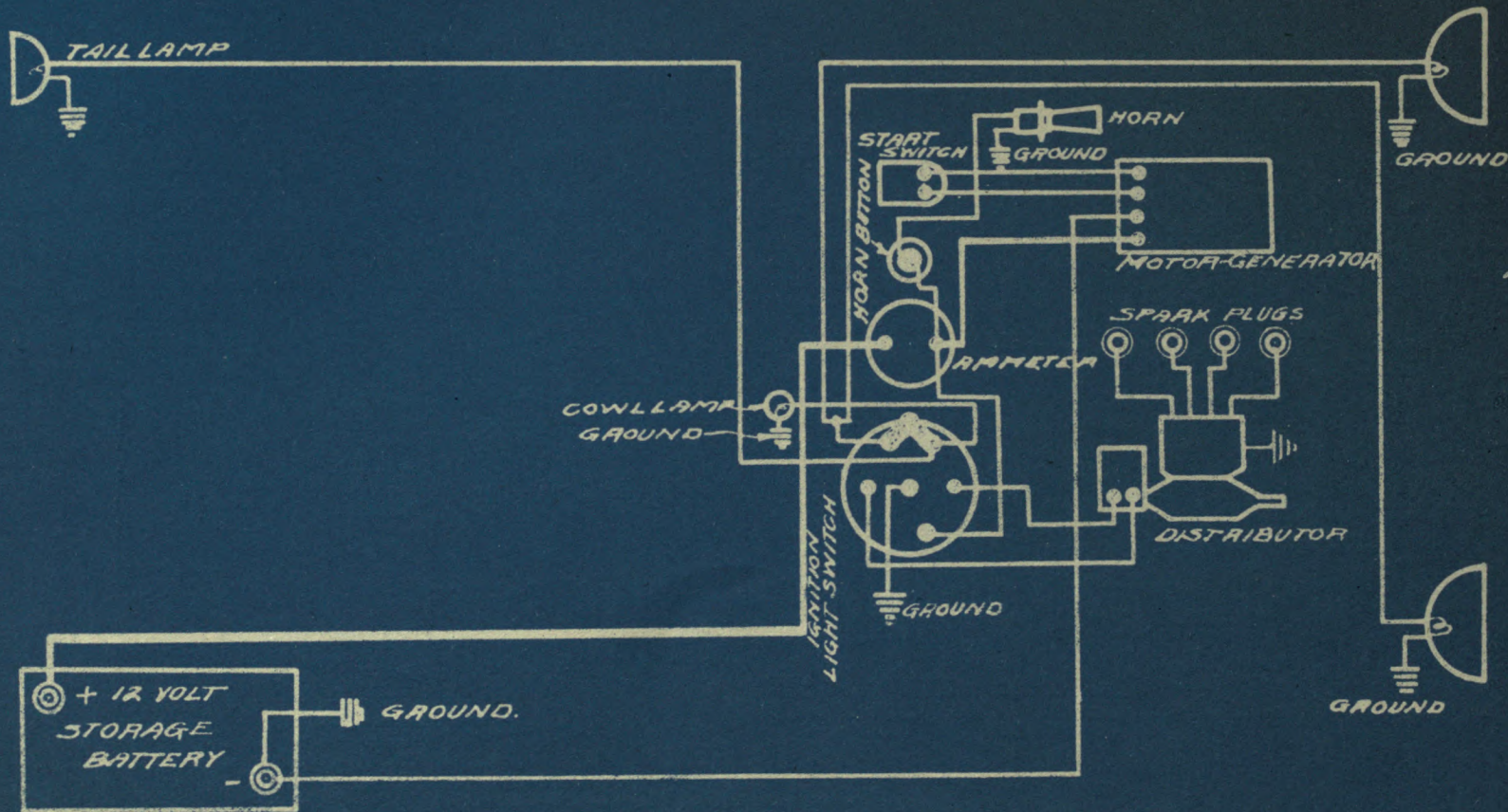


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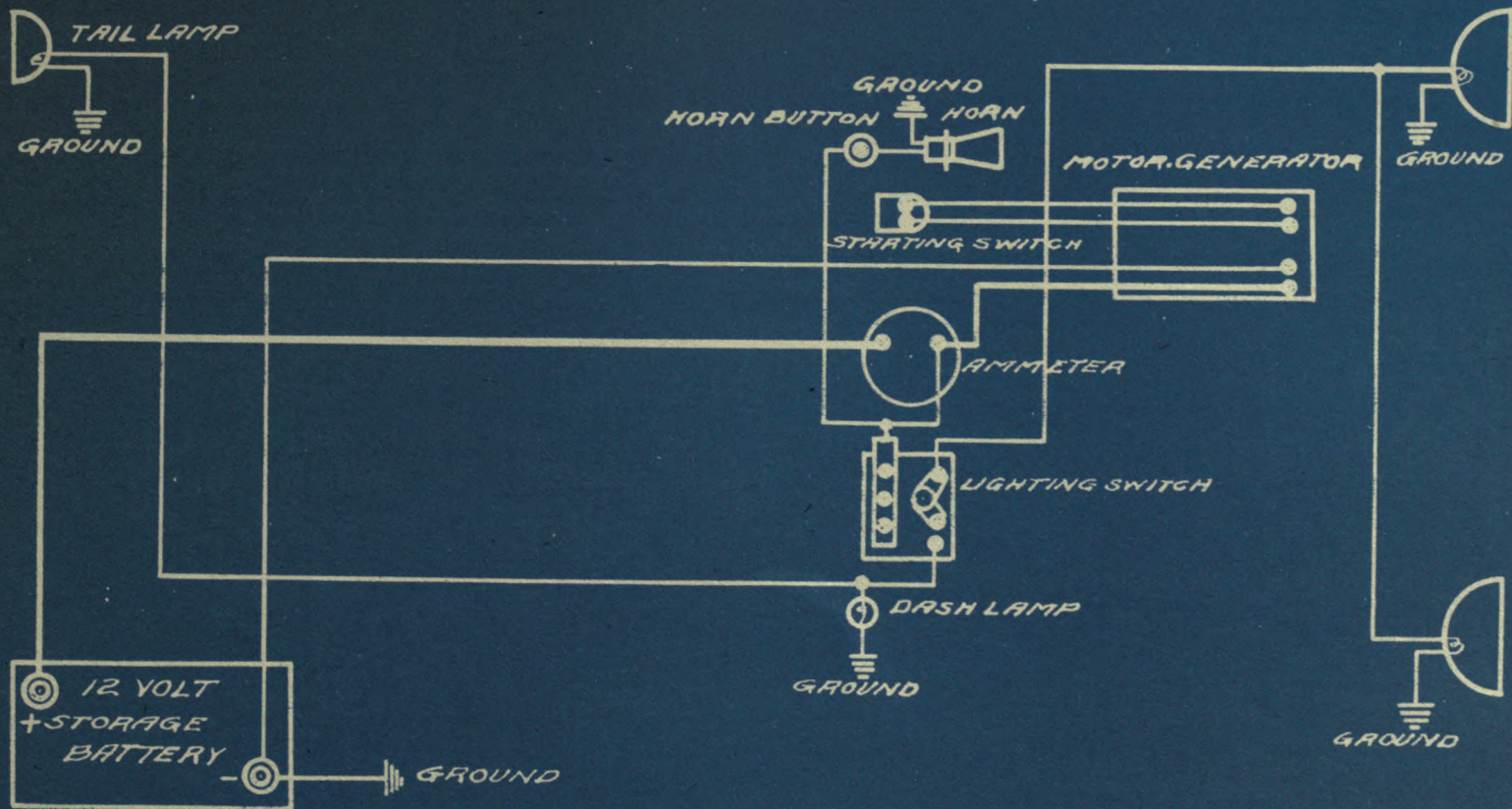
NORTH-EAST-TWO WIRE STARTER-DELCO IGNITION.



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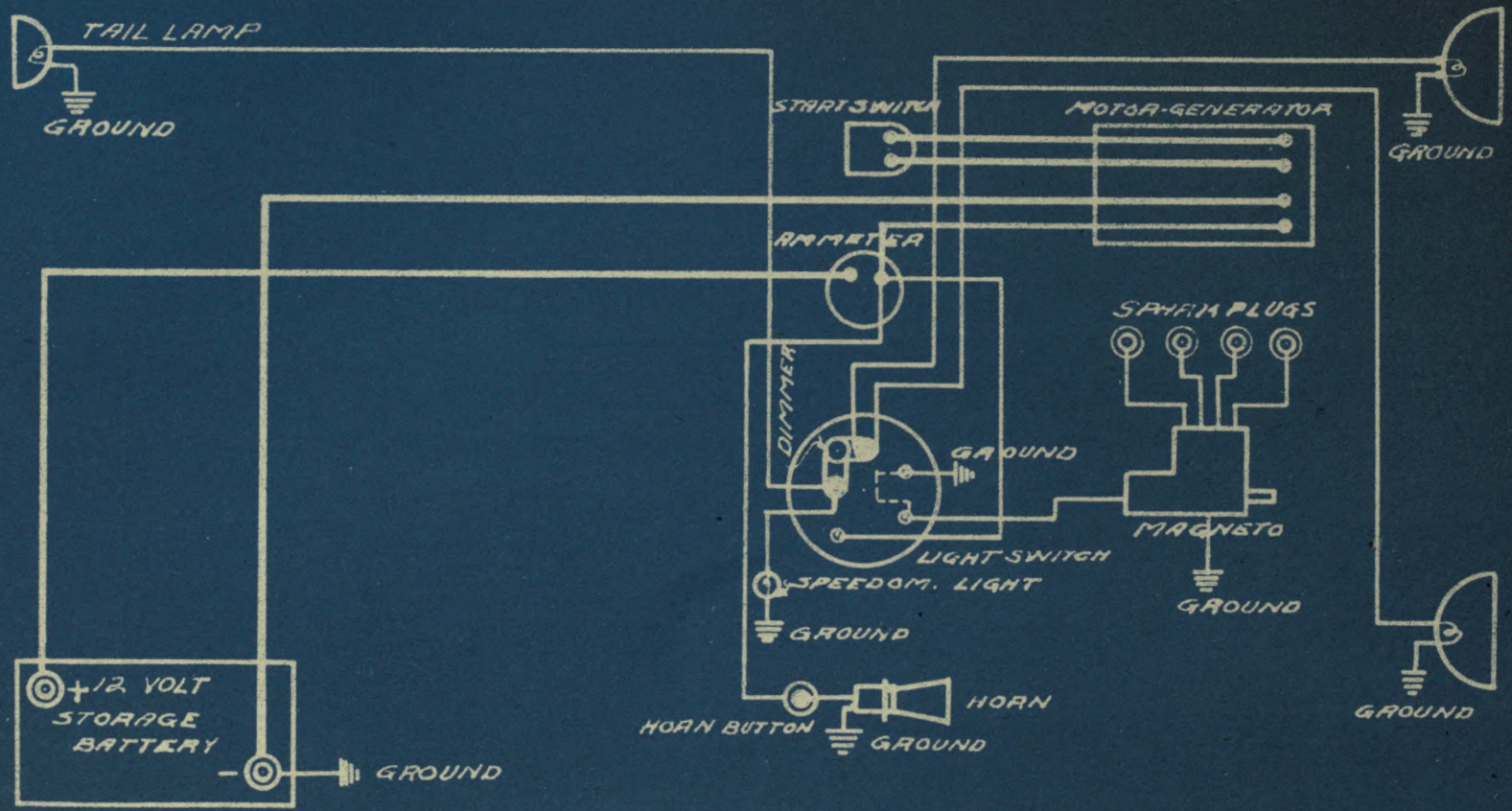
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DODGE 1916
NORTH-EAST SYSTEM

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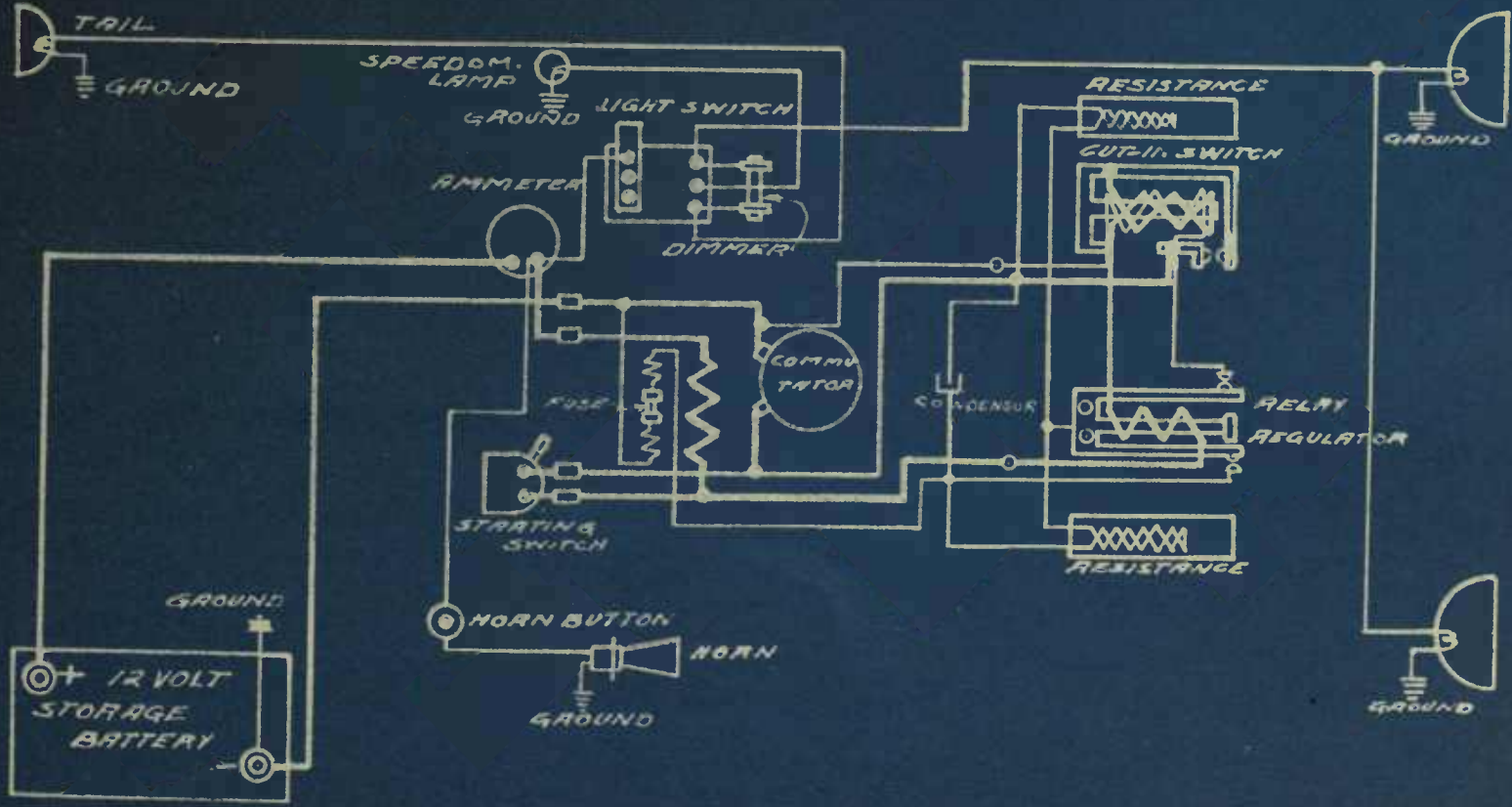
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NORTH-EAST - INTERNAL DIAGRAM

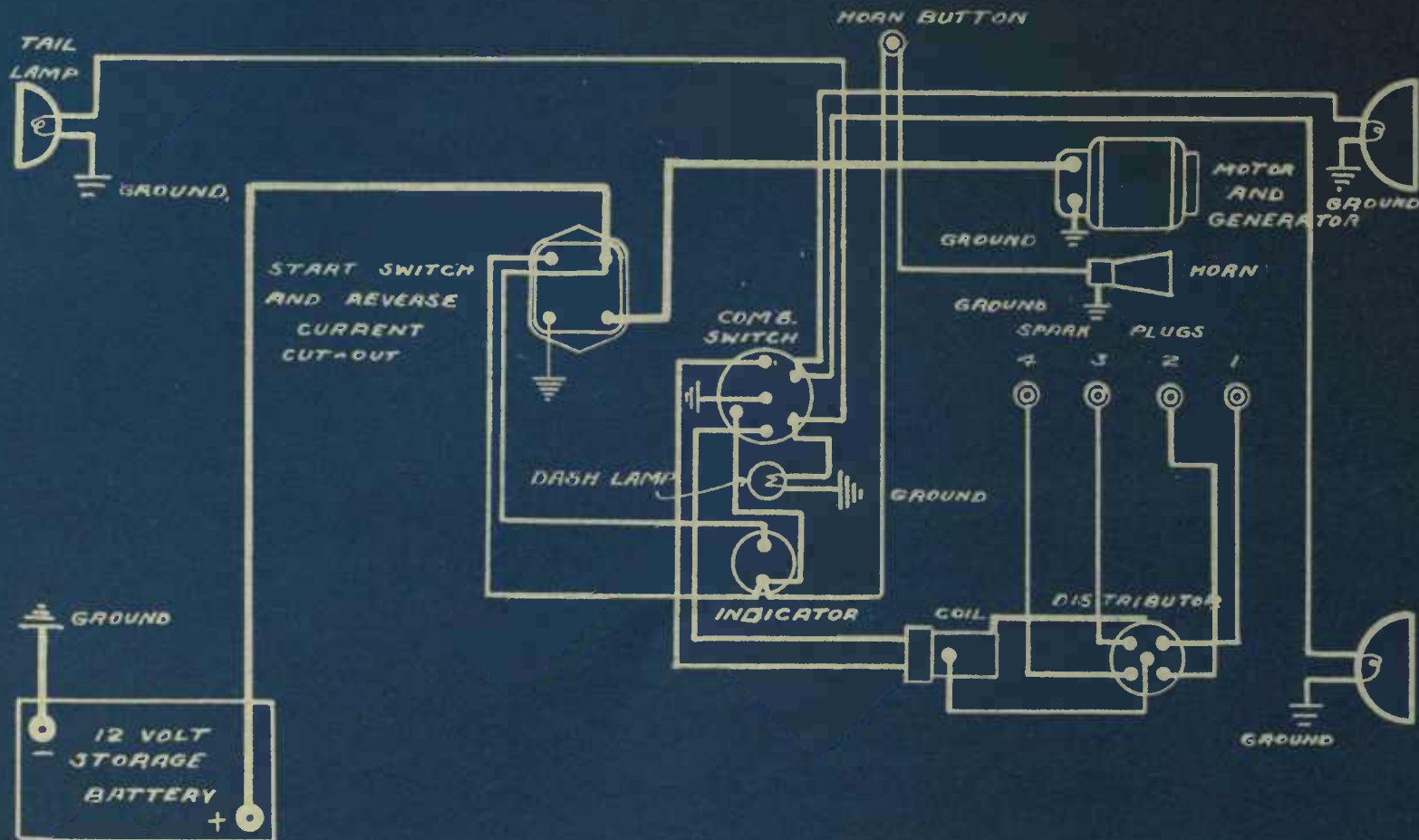
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NORTHEAST SYSTEM

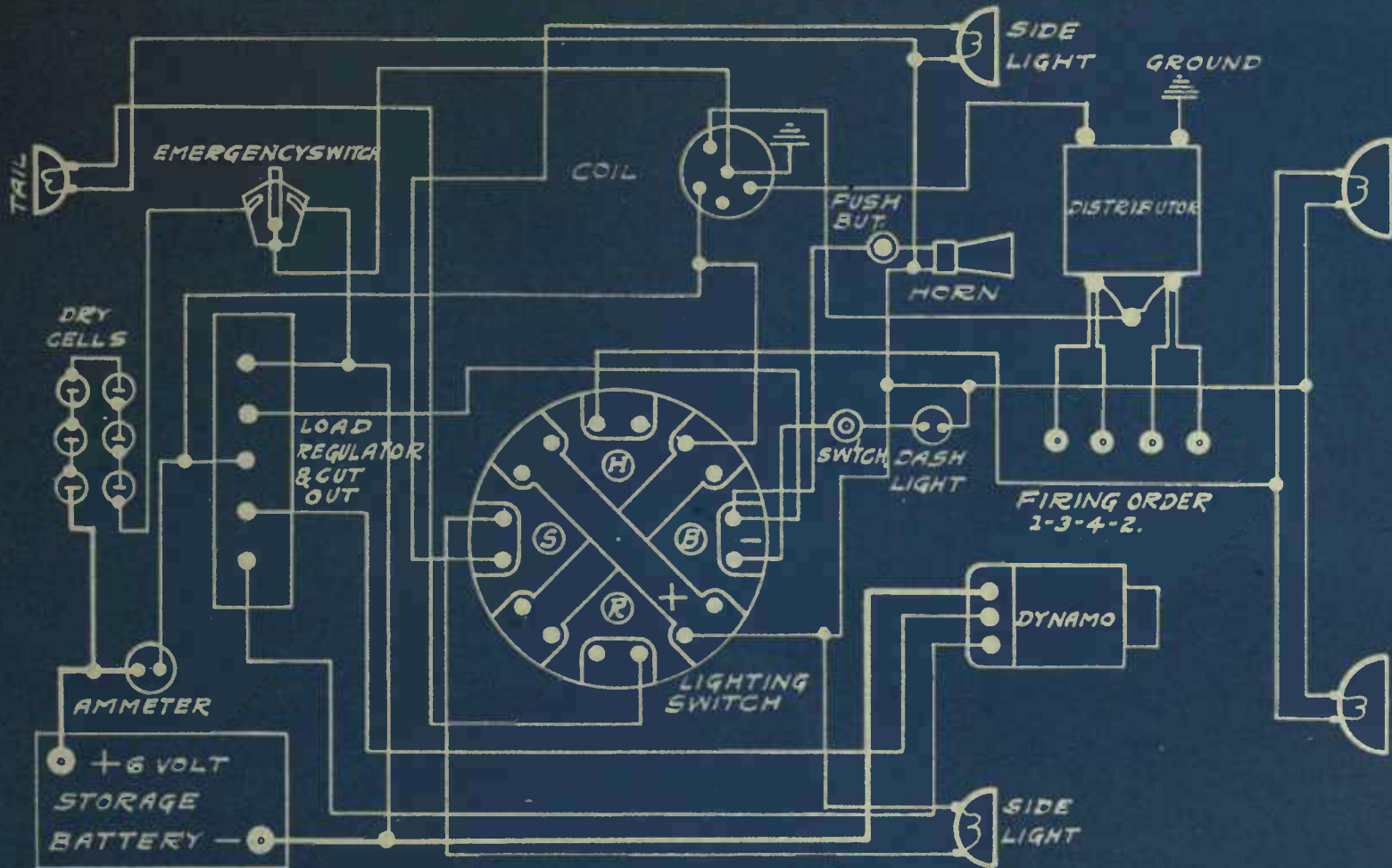
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DORRIS 1913 "H" WESTINGHOUSE SYSTEM

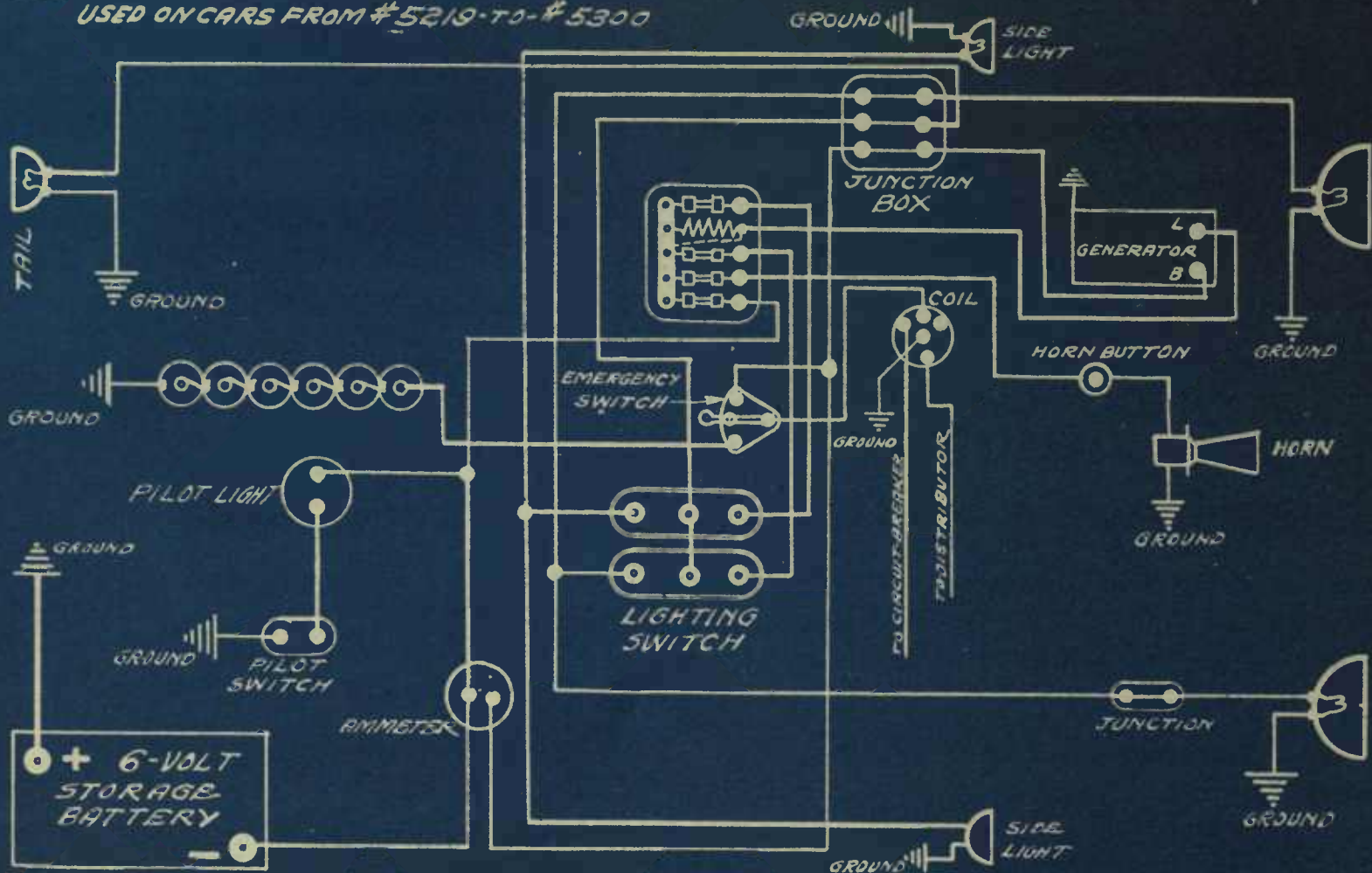
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DORRIS 1913-1914 MODEL "H"
WESTINGHOUSE SYSTEM
 USED ON CARS FROM #5219 TO #5300

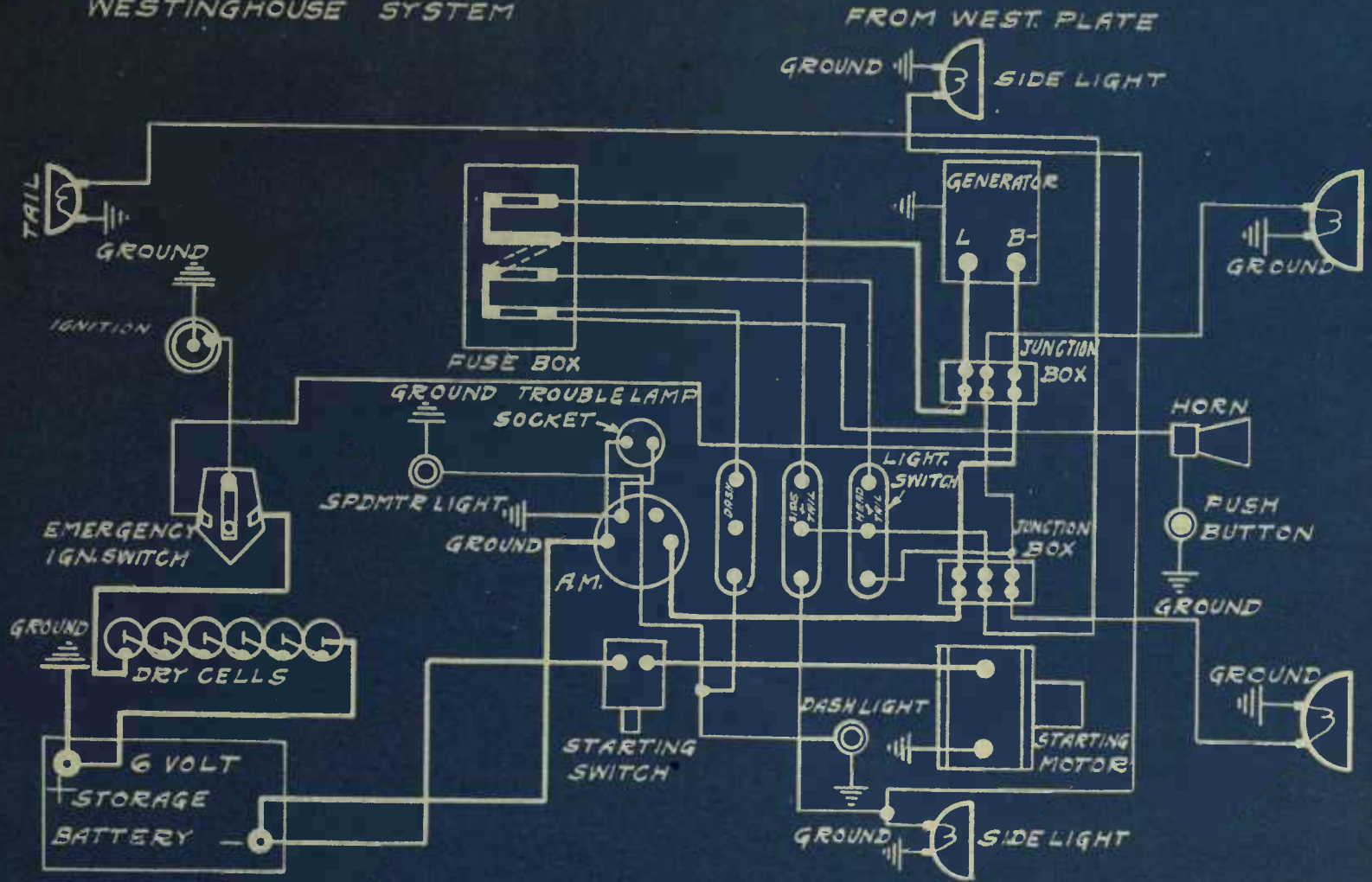
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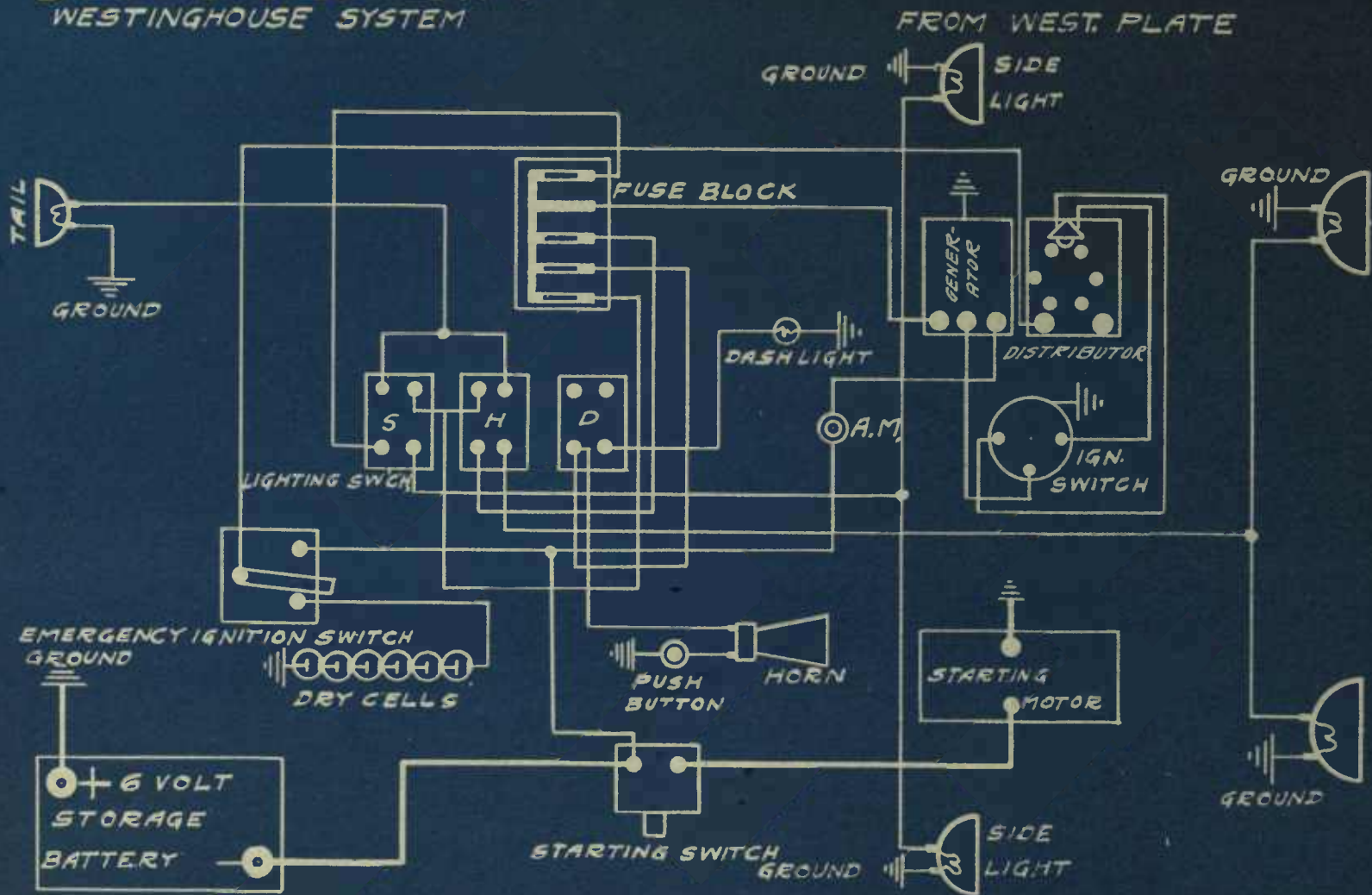
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DORRIS 1914 ⁶⁶ I
WESTINGHOUSE SYSTEM

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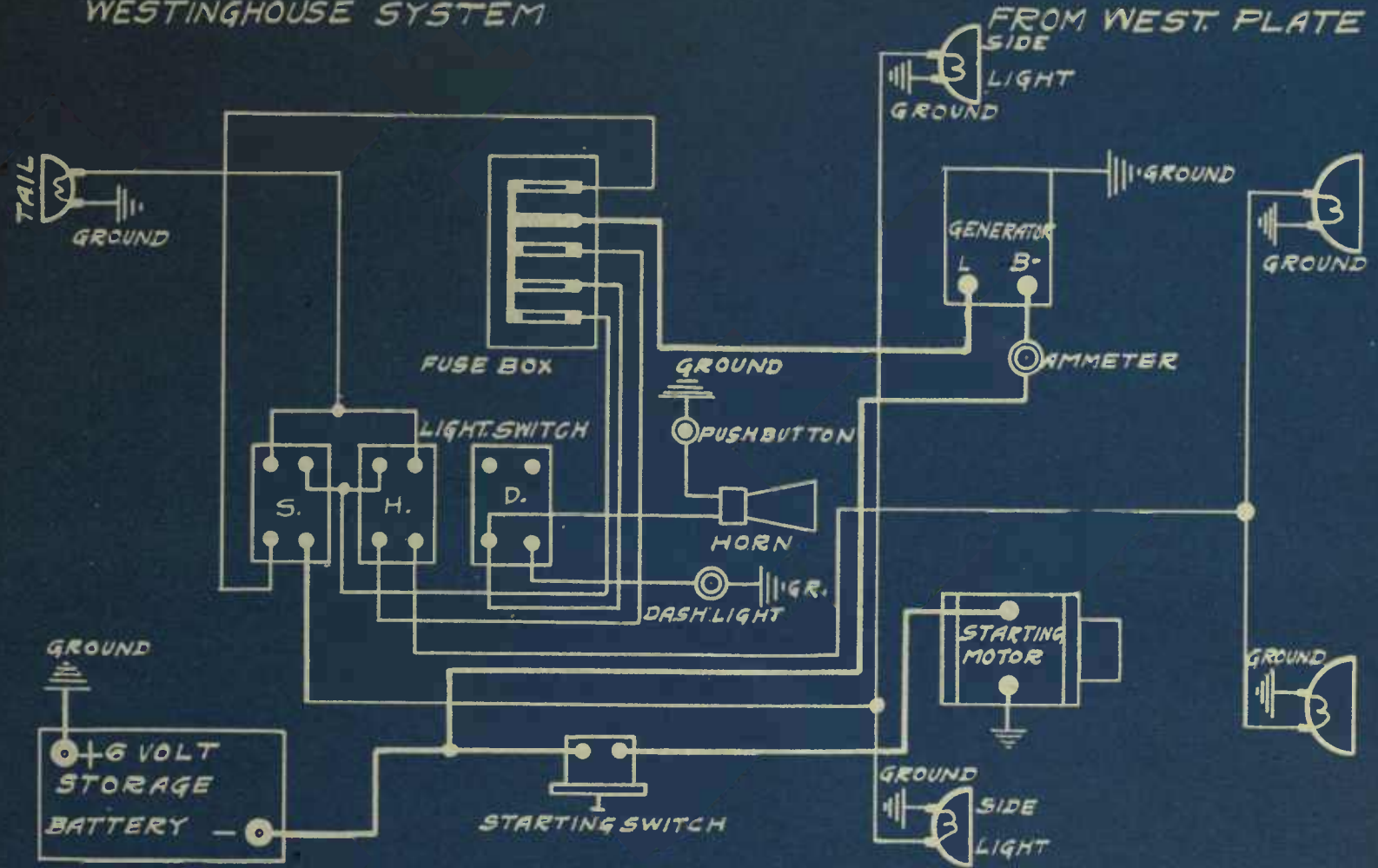
DORRIS 1915 "I-A-4" WESTINGHOUSE SYSTEM



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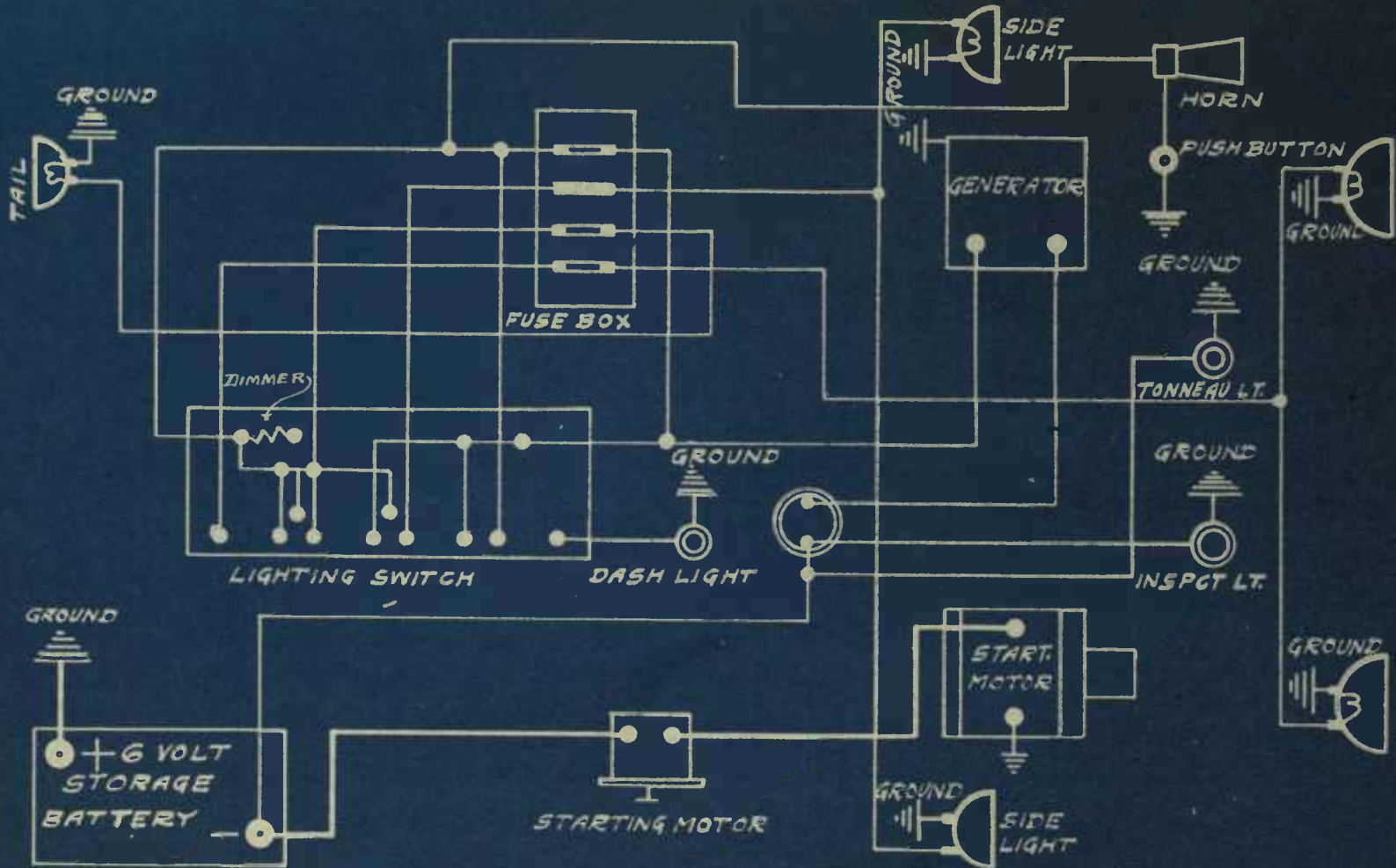
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DORRIS 1917 "I-B-6" WESTINGHOUSE SYSTEM

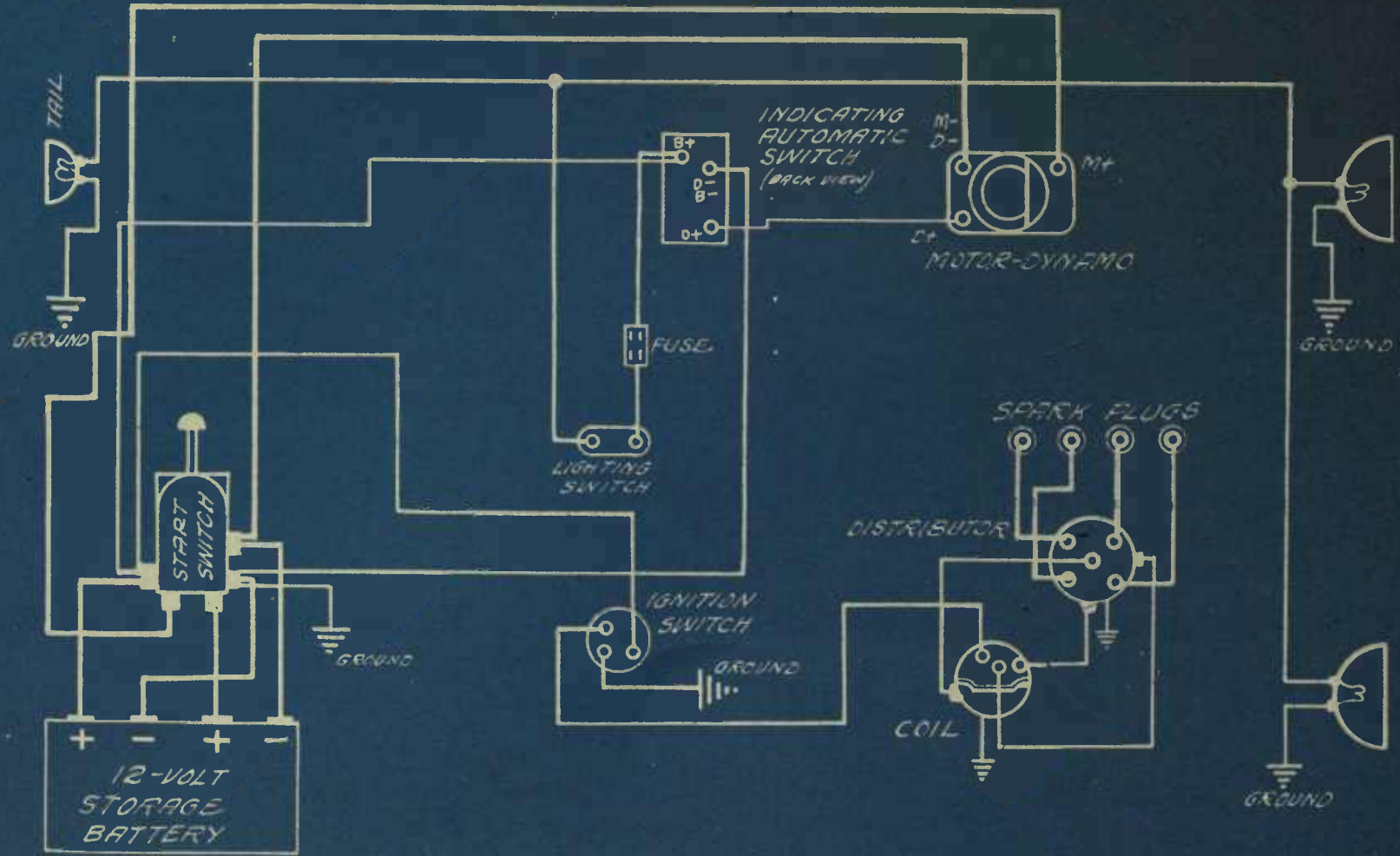
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DORT 1916 "4" & "5"
SPLITDORF-APELCO SYSTEM

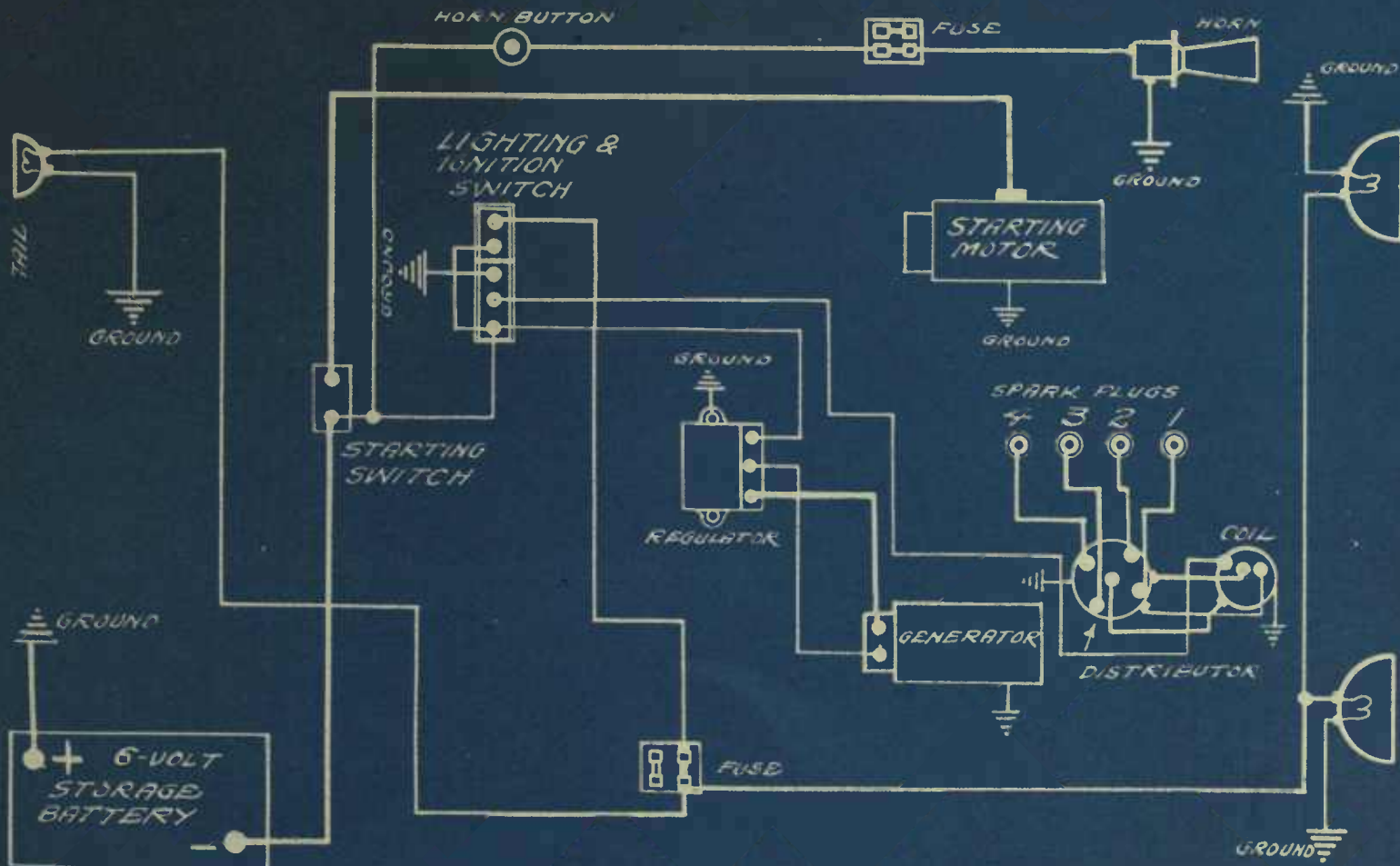
FROM SPLIT-AP. MANUAL



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DORT 1916 "5"
WESTINGHOUSE SYSTEM

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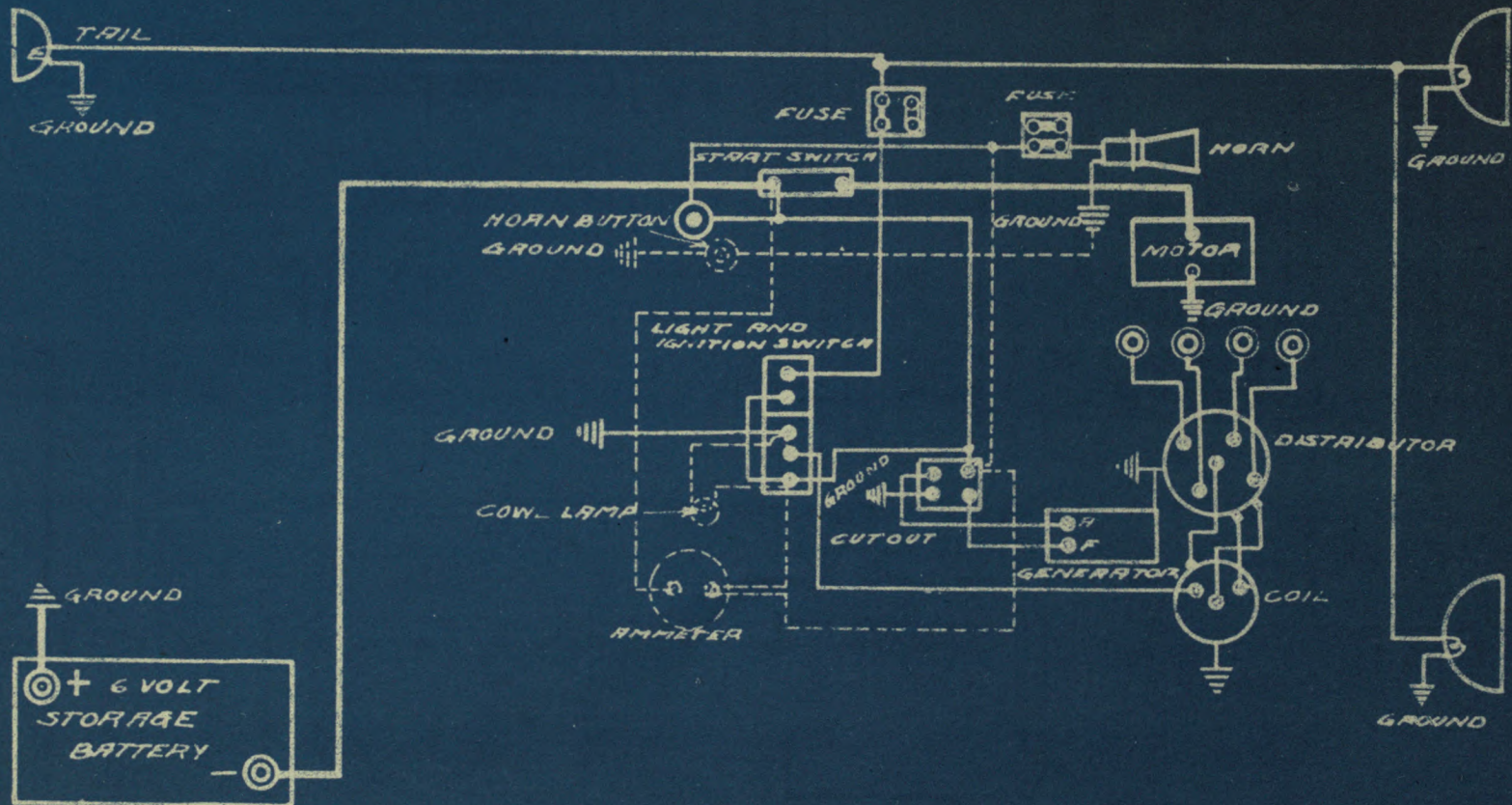
DORT 1916

FROM DORT DIAGRAMS

WESTINGHOUSE WITH AND WITHOUT AMMETER

NOTE:-

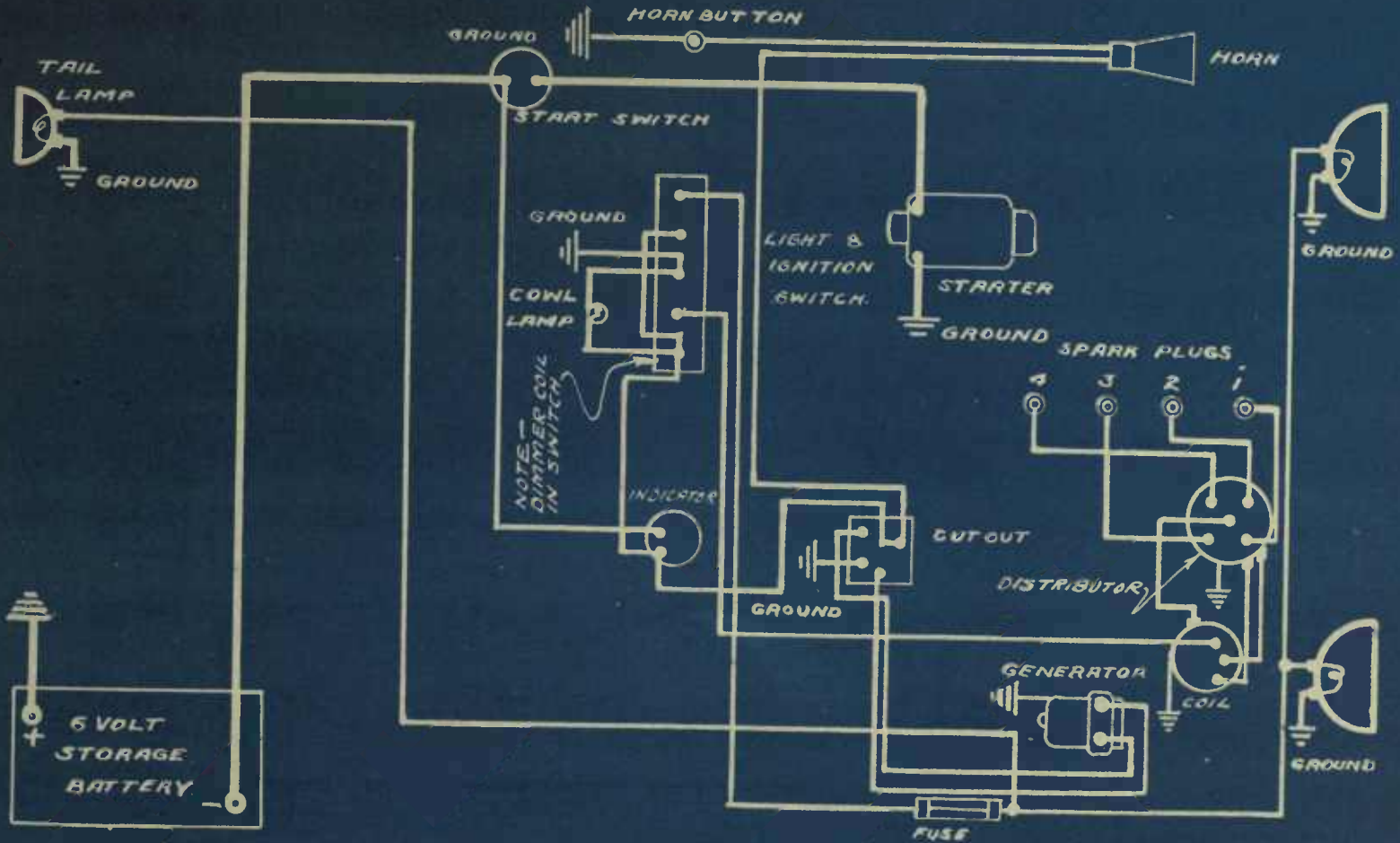
SOLID LINES SHOW CONNECTIONS WHEN
AMMETER IS NOT USED. DOTTED LINES
SHOW CONNECTIONS WHEN AMMETER
IS USED.



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DORT MODEL 9 1917
WESTINGHOUSE SYSTEM

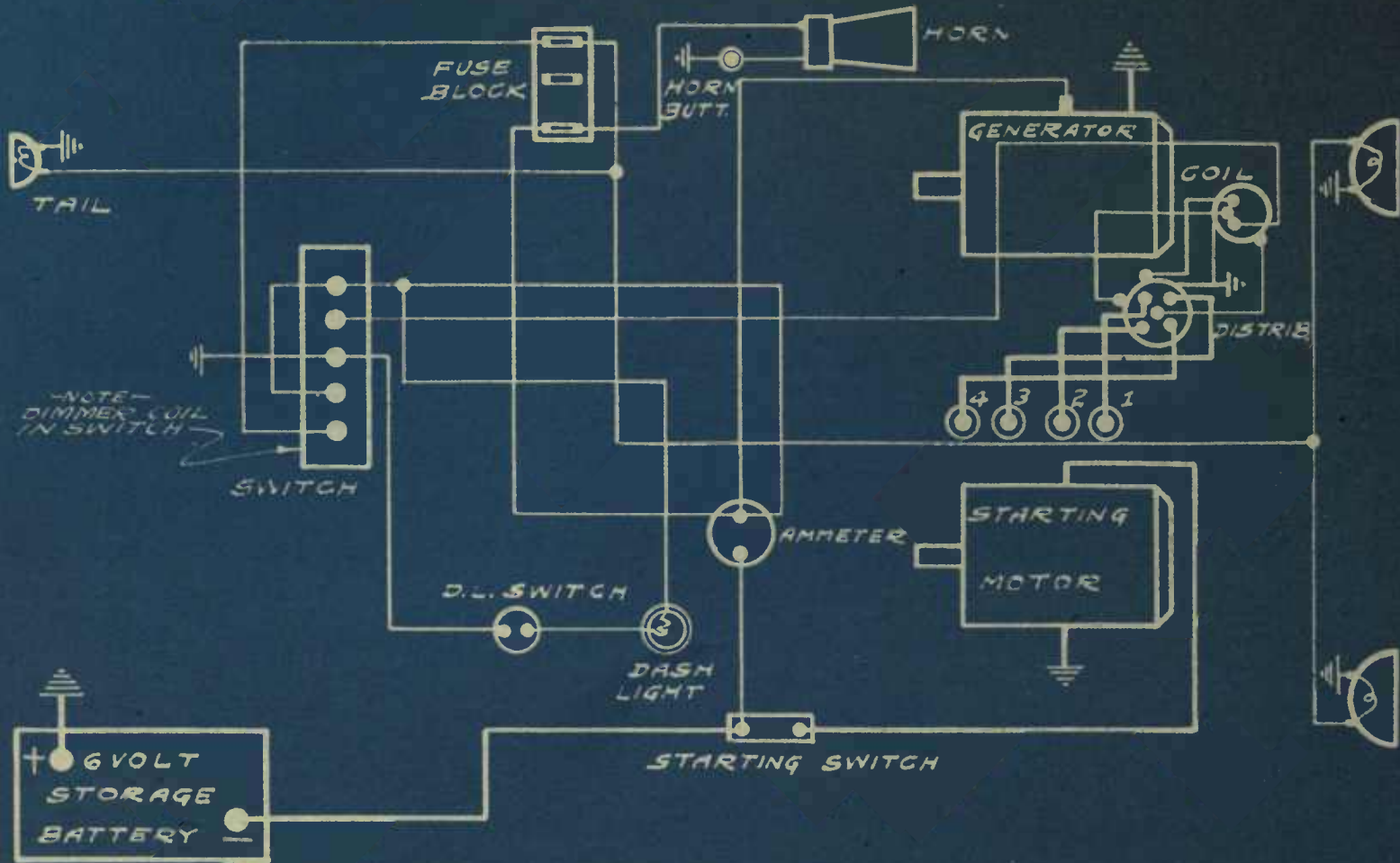
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DORT 1918 1919
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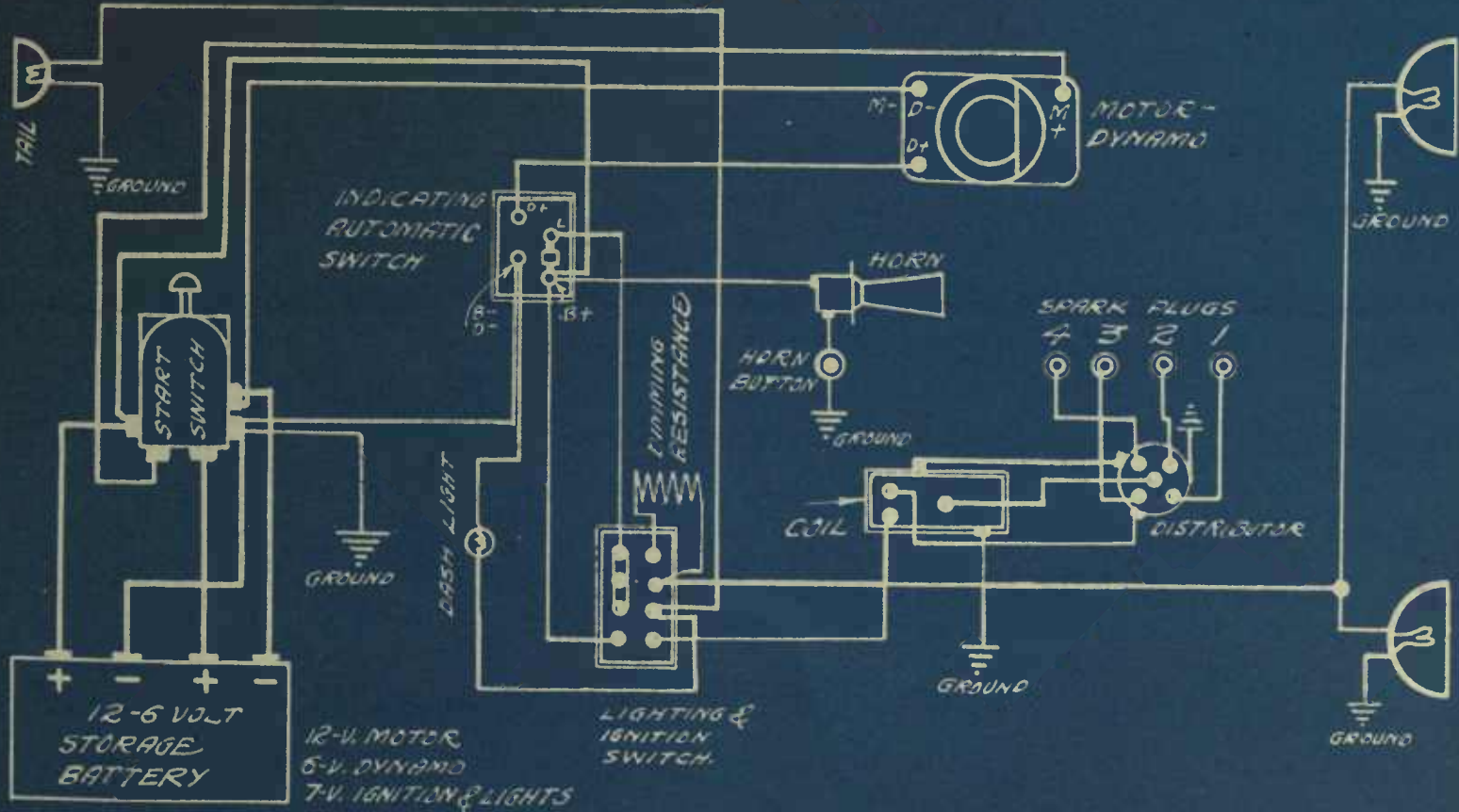


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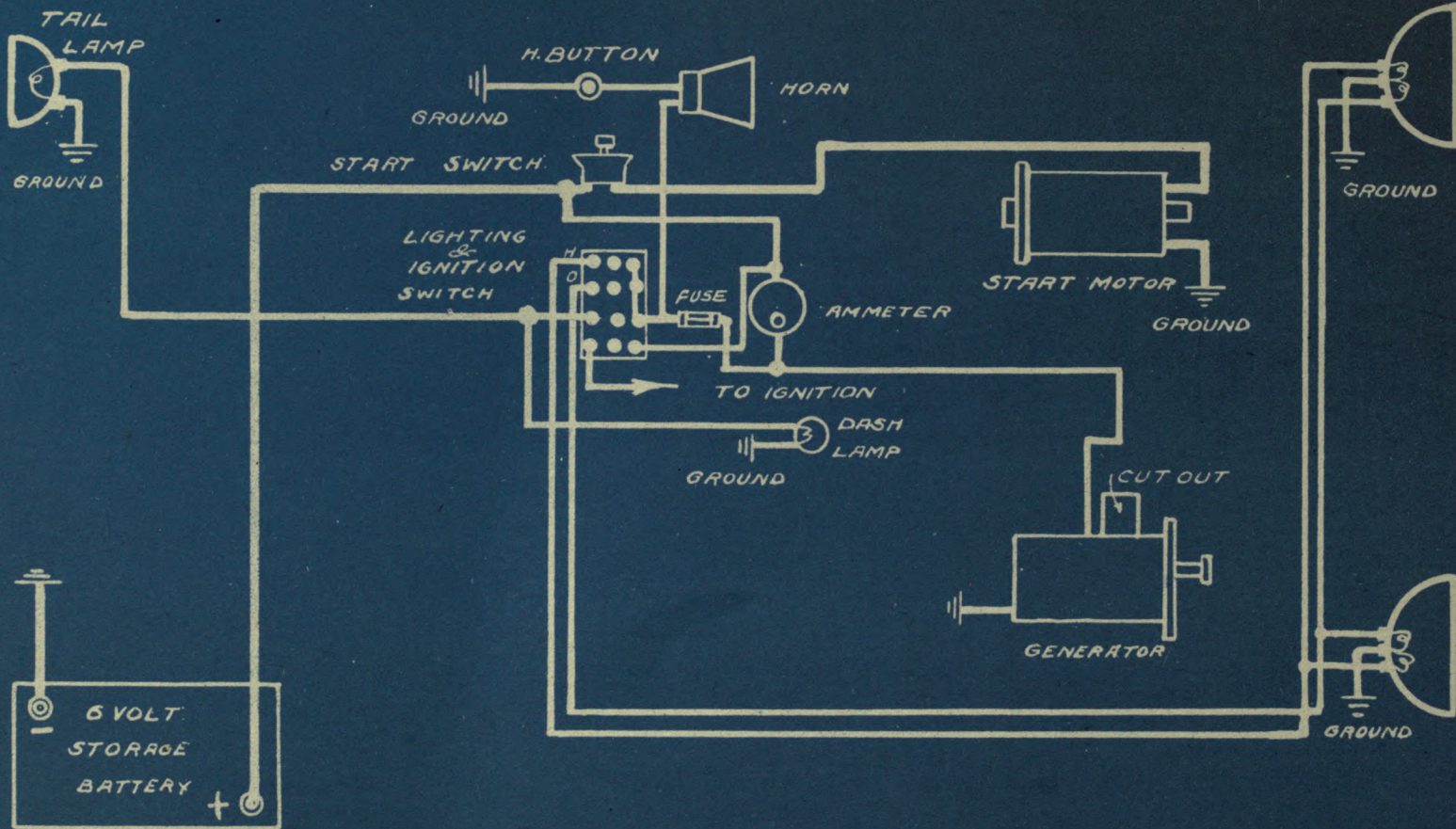


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ELCAR MODELS - D-E-F & G
DYNETO SYSTEM

1917-1918 - 1919

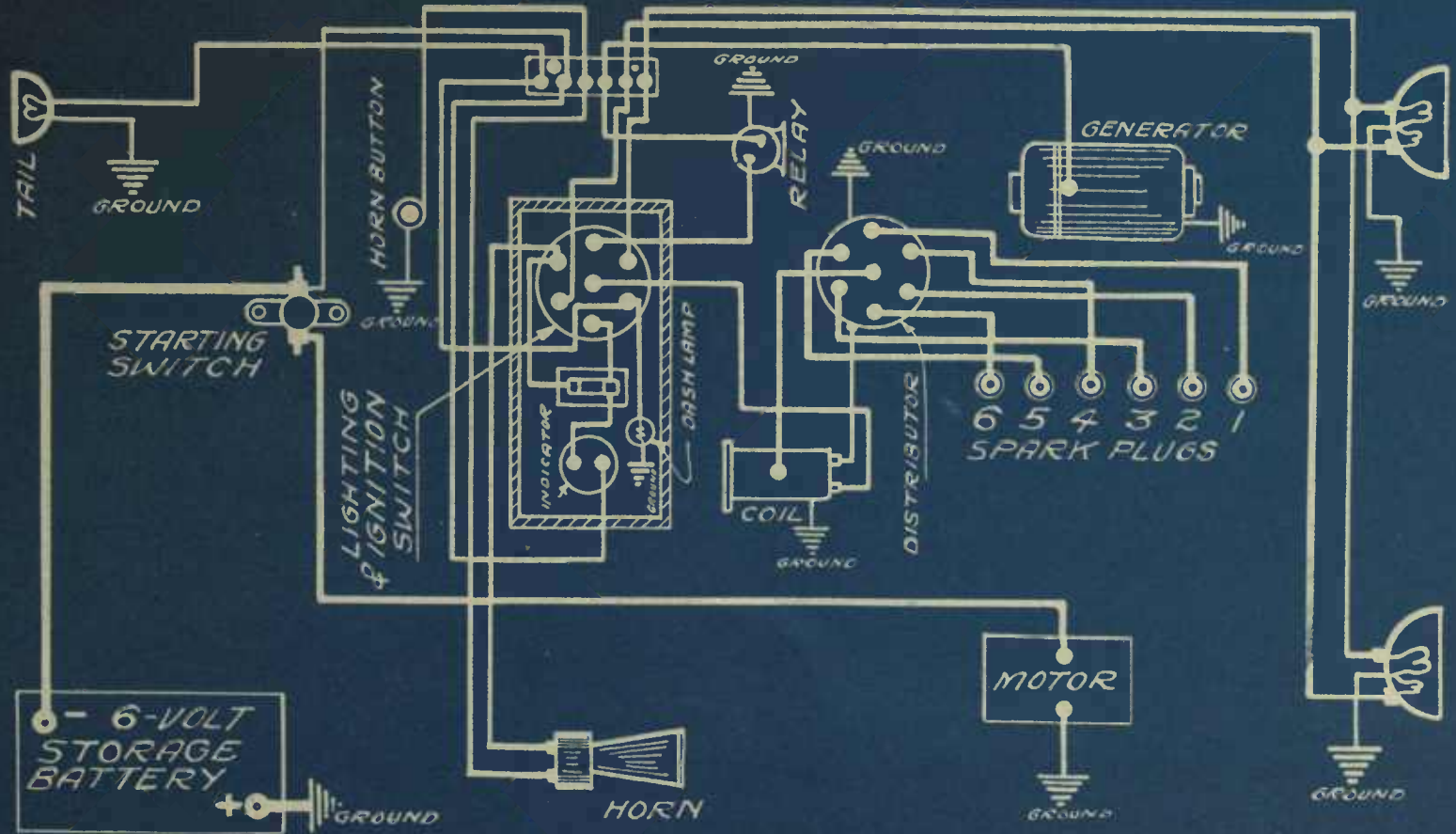
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ELGIN 1917-1918 "6" 1919"H"
 WAGNER STARTING & LIGHTING SYSTEM
 REMY IGNITION SYSTEM

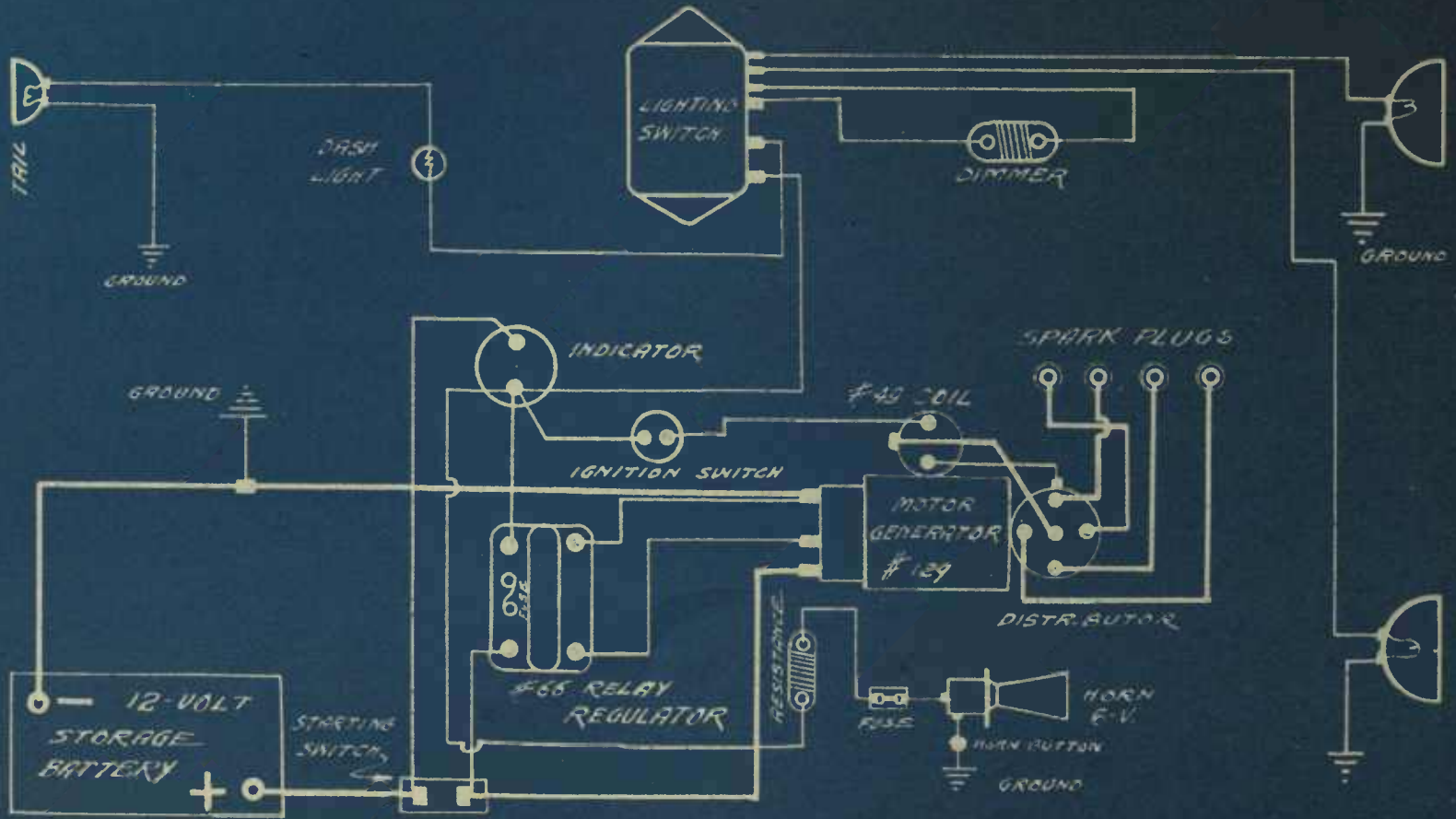
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EMPIRE 1915 MODEL 31-40
REMY SYSTEM (SEPARATE LIGHTING & IGNITION SWITCH)

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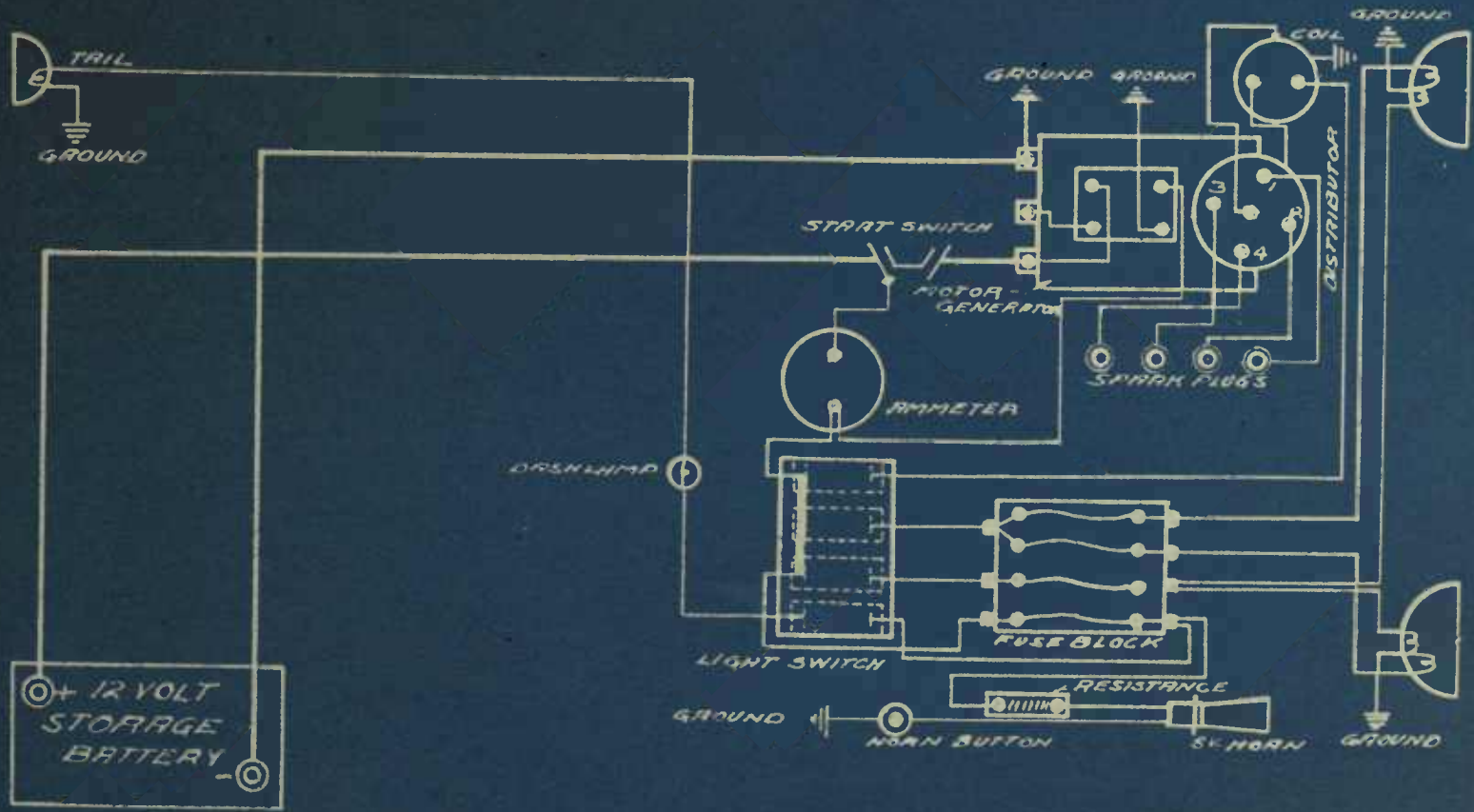


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EMPIRE 1915-16 "33" REMY SYSTEM

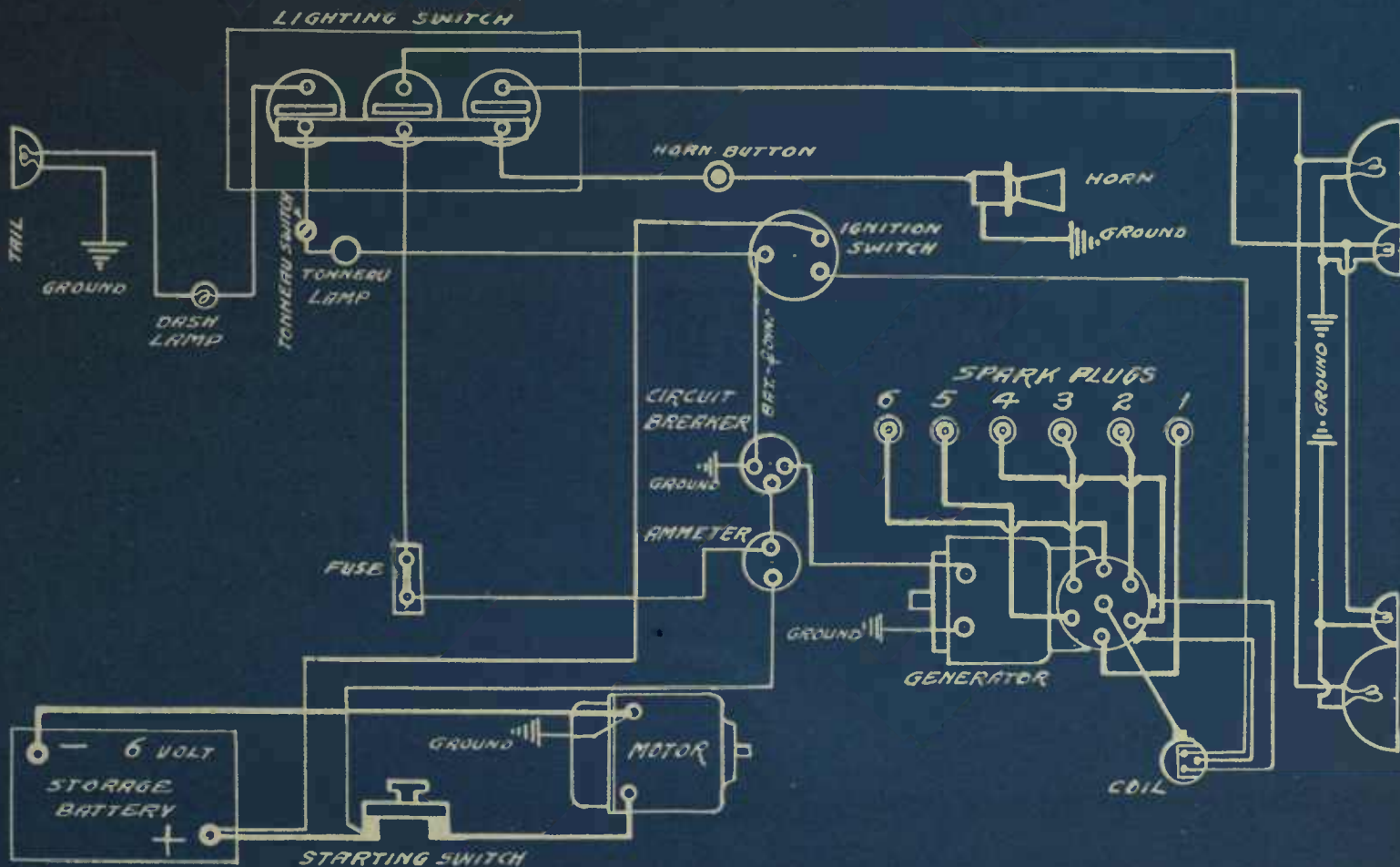
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EMPIRE 1916 MODEL 60 AUTOLITE SYSTEM

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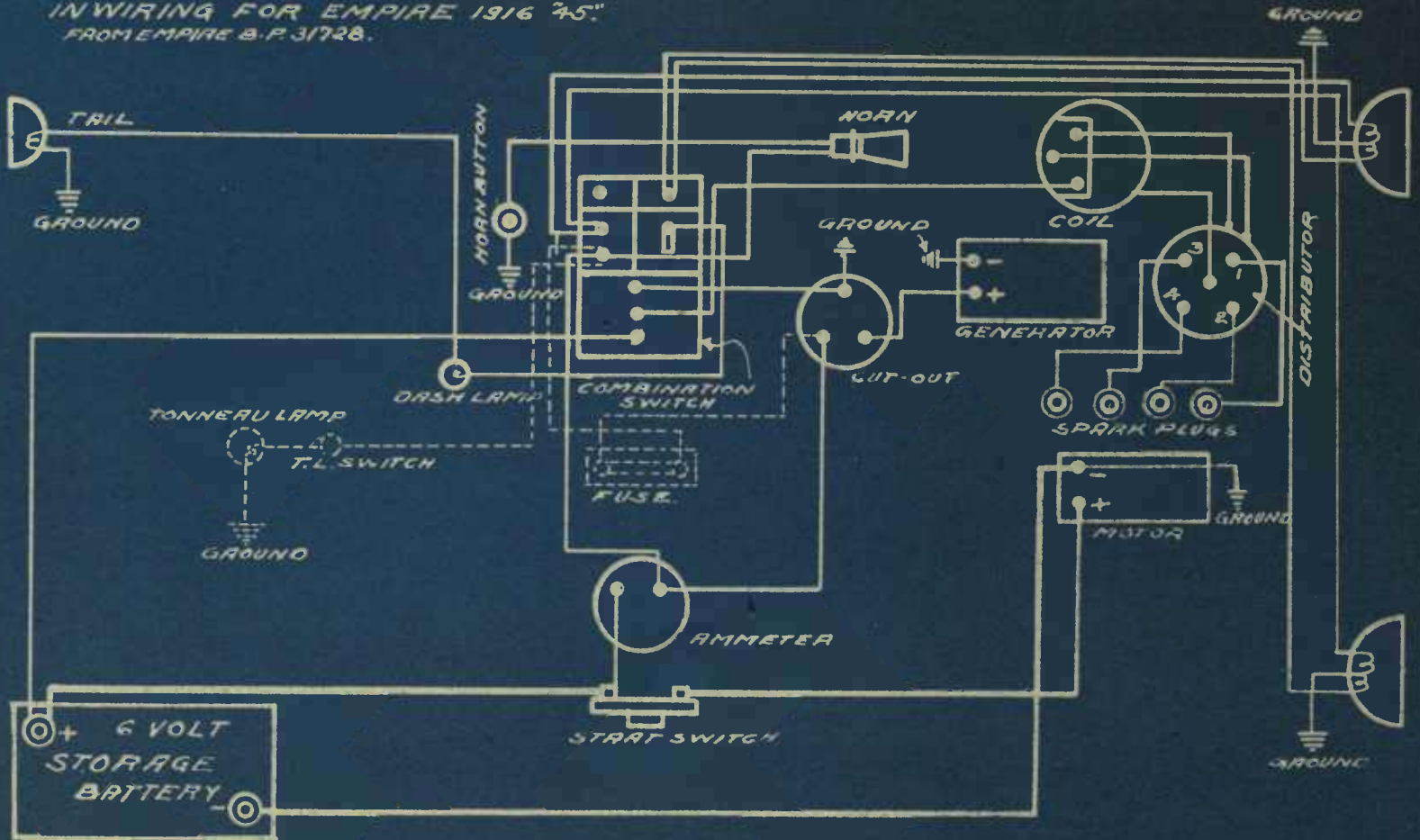
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EMPIRE 1916-17-18 45 & 51

FROM EMPIRE B.P. 32863-A

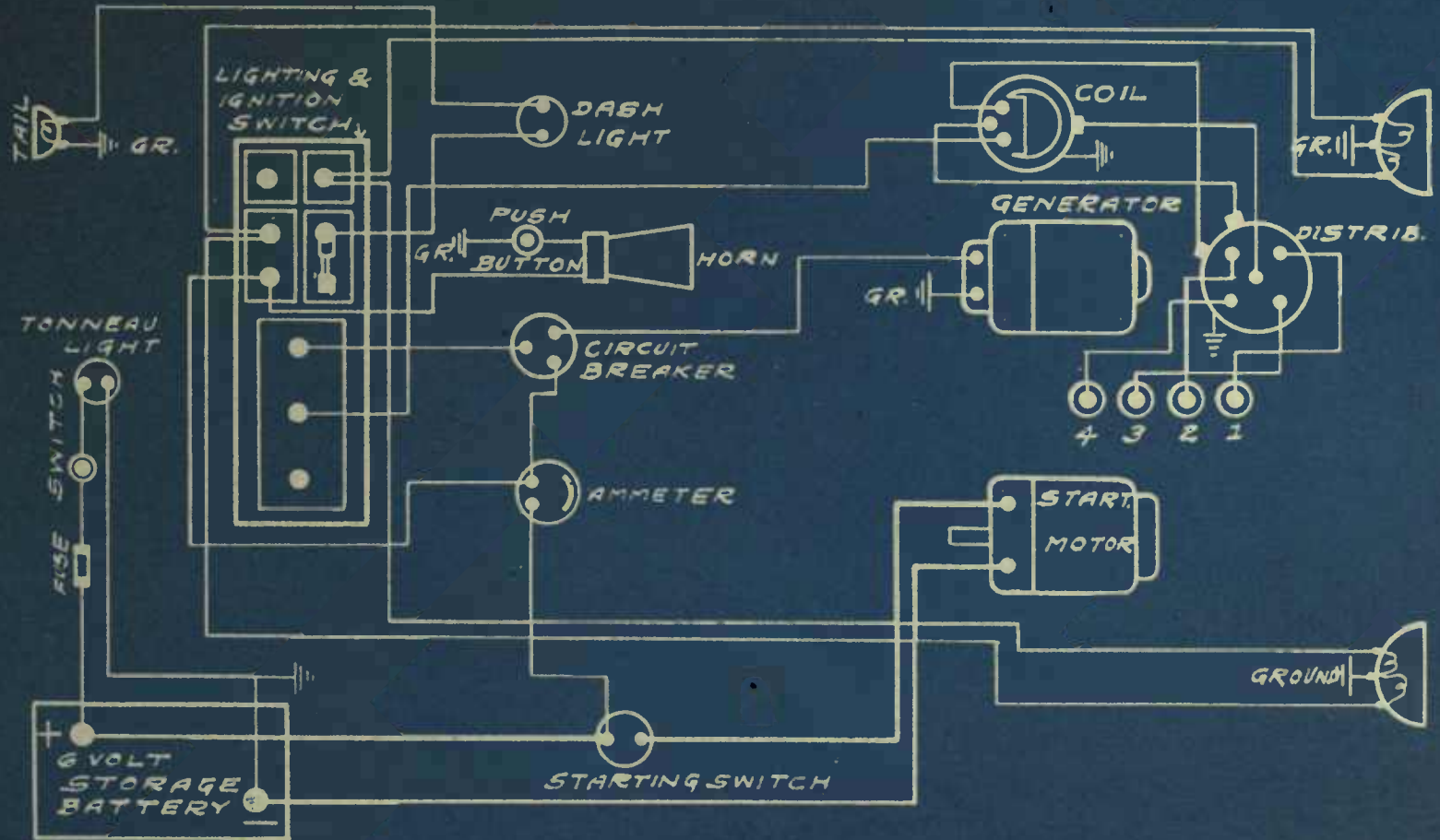
AUTOLITE SYSTEM CONN. I.G.N.

*DOTTED LINES INDICATE CHANGES
IN WIRING FOR EMPIRE 1916 "45"
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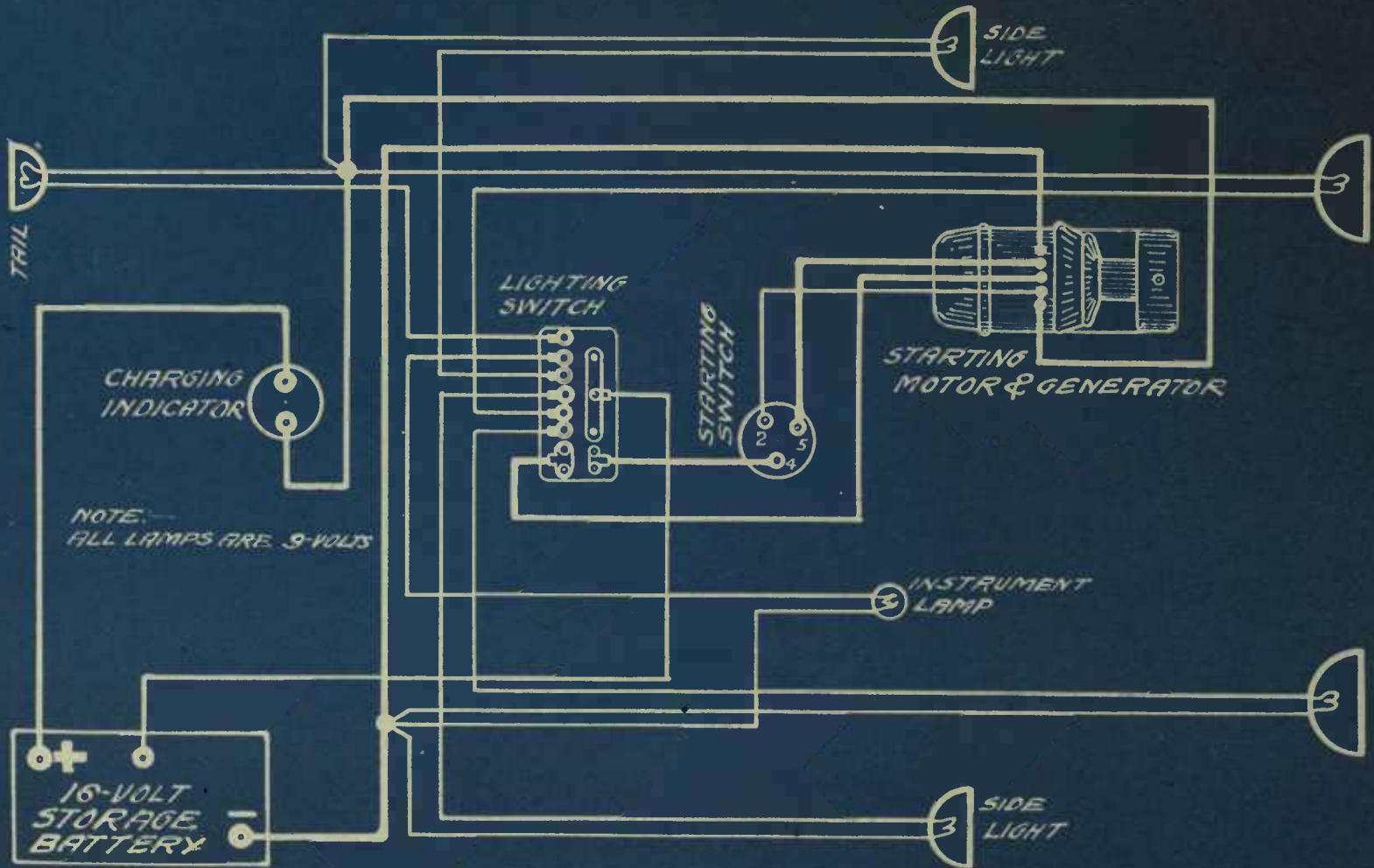
EMPIRE 1917-18 50-70-70A 1919
 AUTOLITE SYSTEM CONN. IGN. FROM EMPIRE B/P-32862-A



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ENGER 1914
NORTH EAST SYSTEM

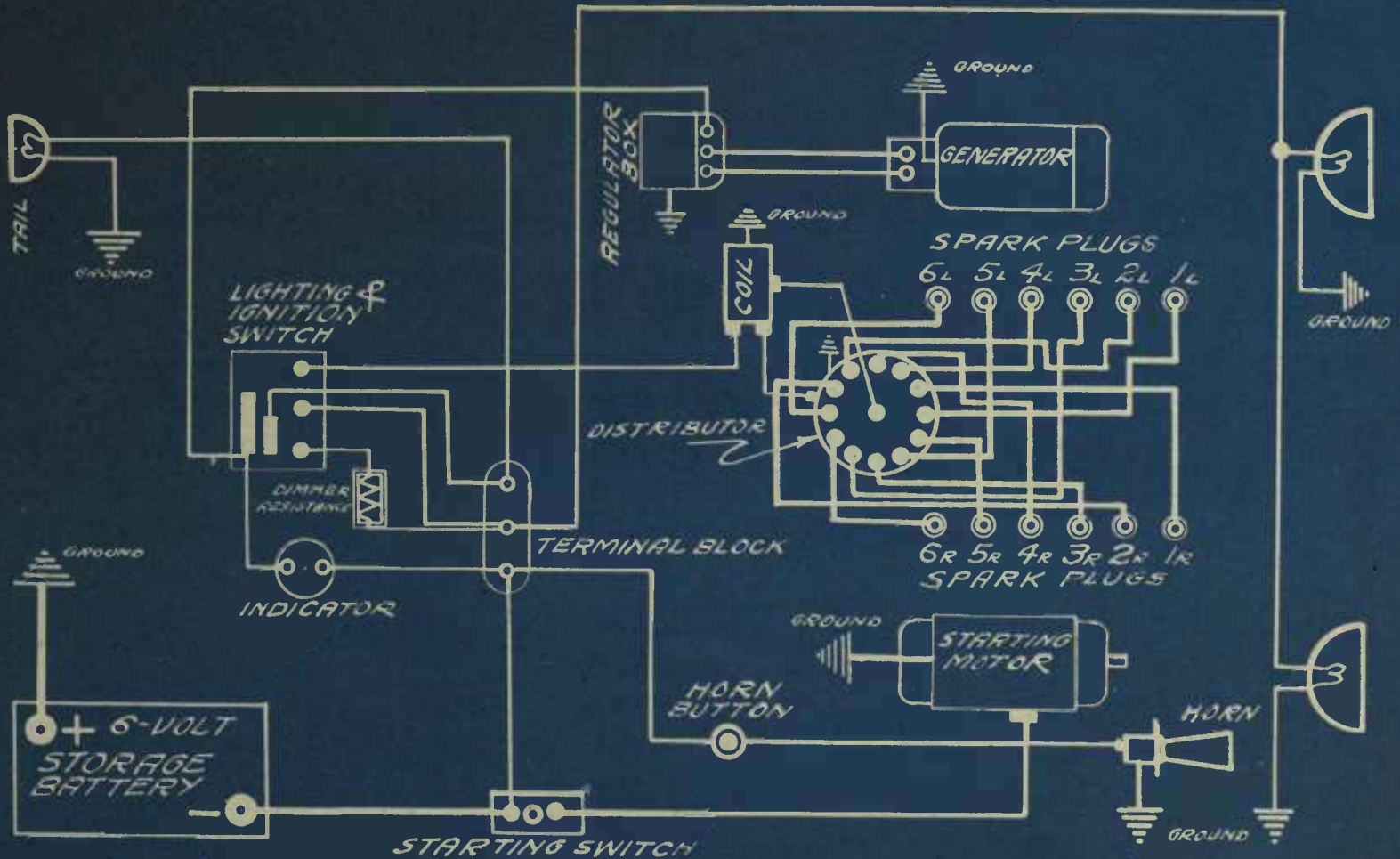
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**ENGER 1916-7 TWIN-UNIT TWELVE
WESTINGHOUSE STARTING & LIGHTING SYSTEM
REMY IGNITION SYSTEM**

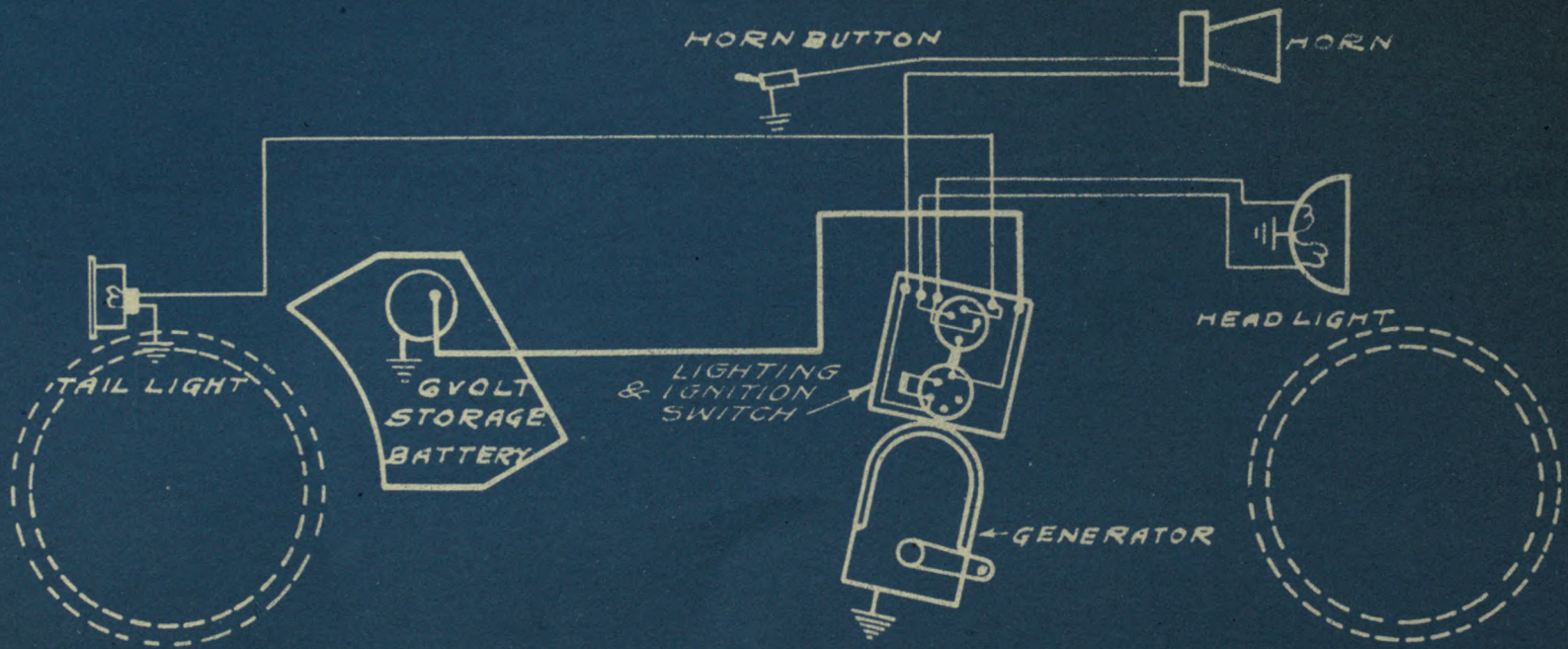
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EXCELSIOR MOTORCYCLE "C"

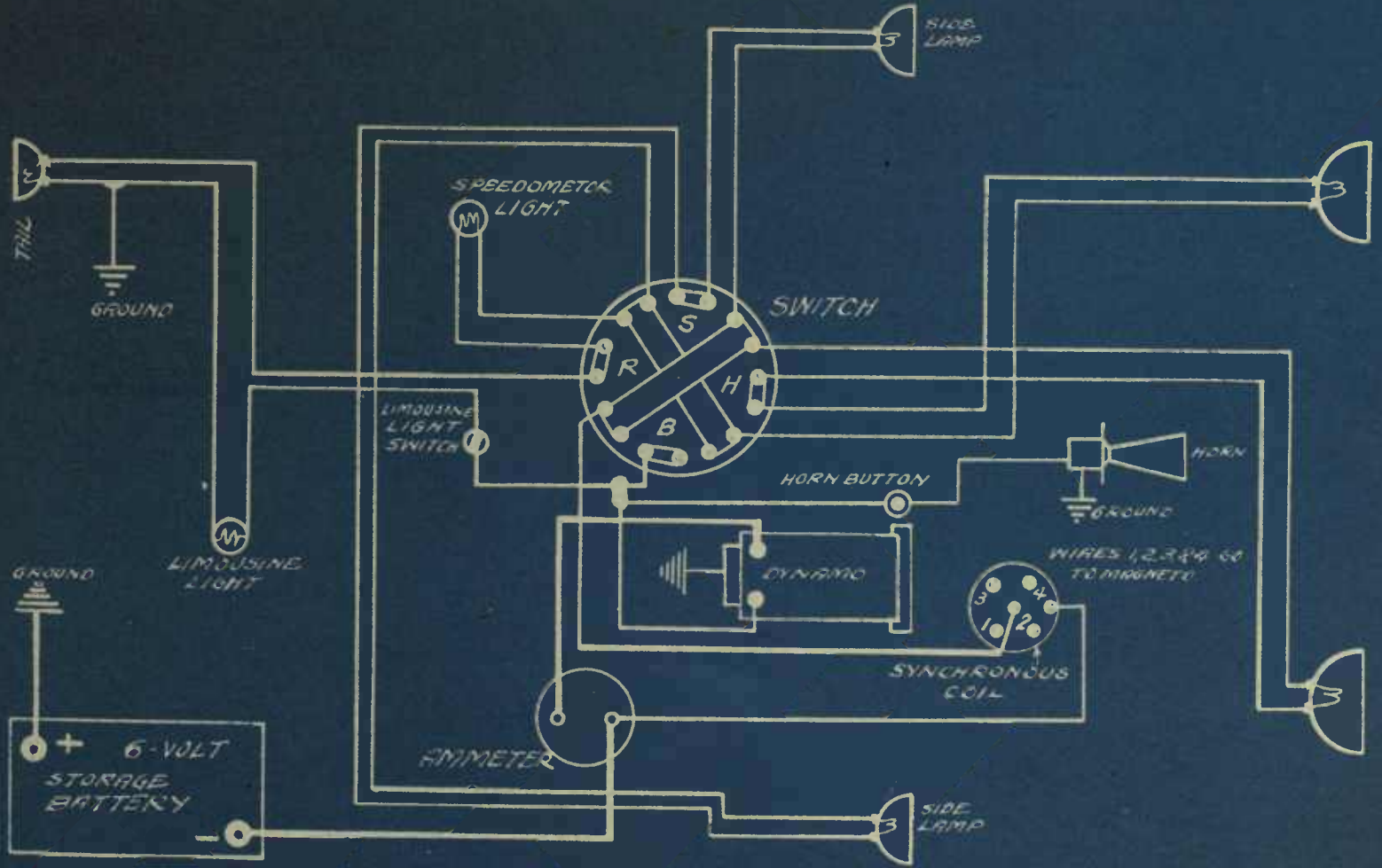
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F-I-A-T 1914
WESTINGHOUSE LIGHTING SYSTEM

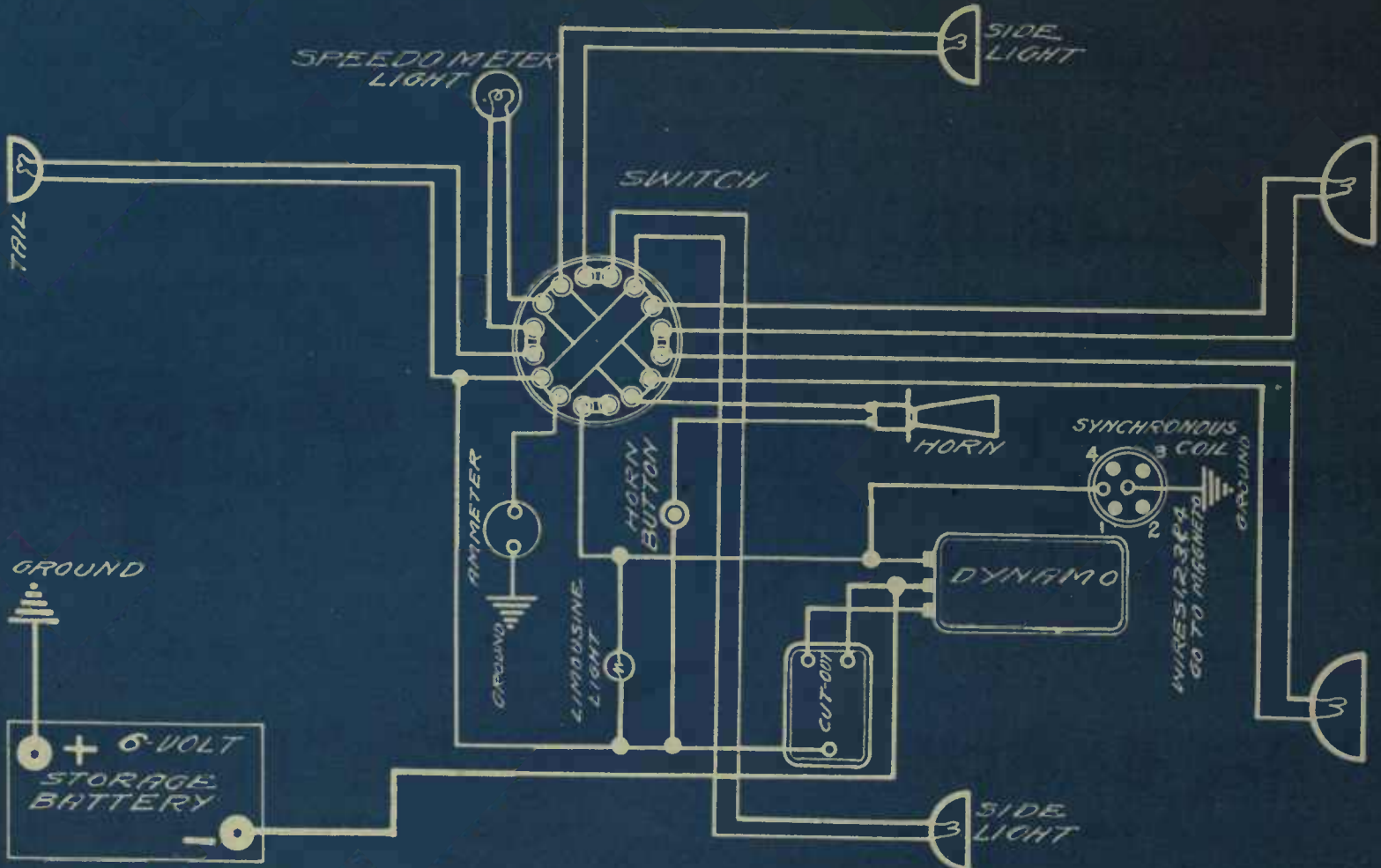
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F-I-A-T 1914
 GRAY & DAVIS SYSTEM

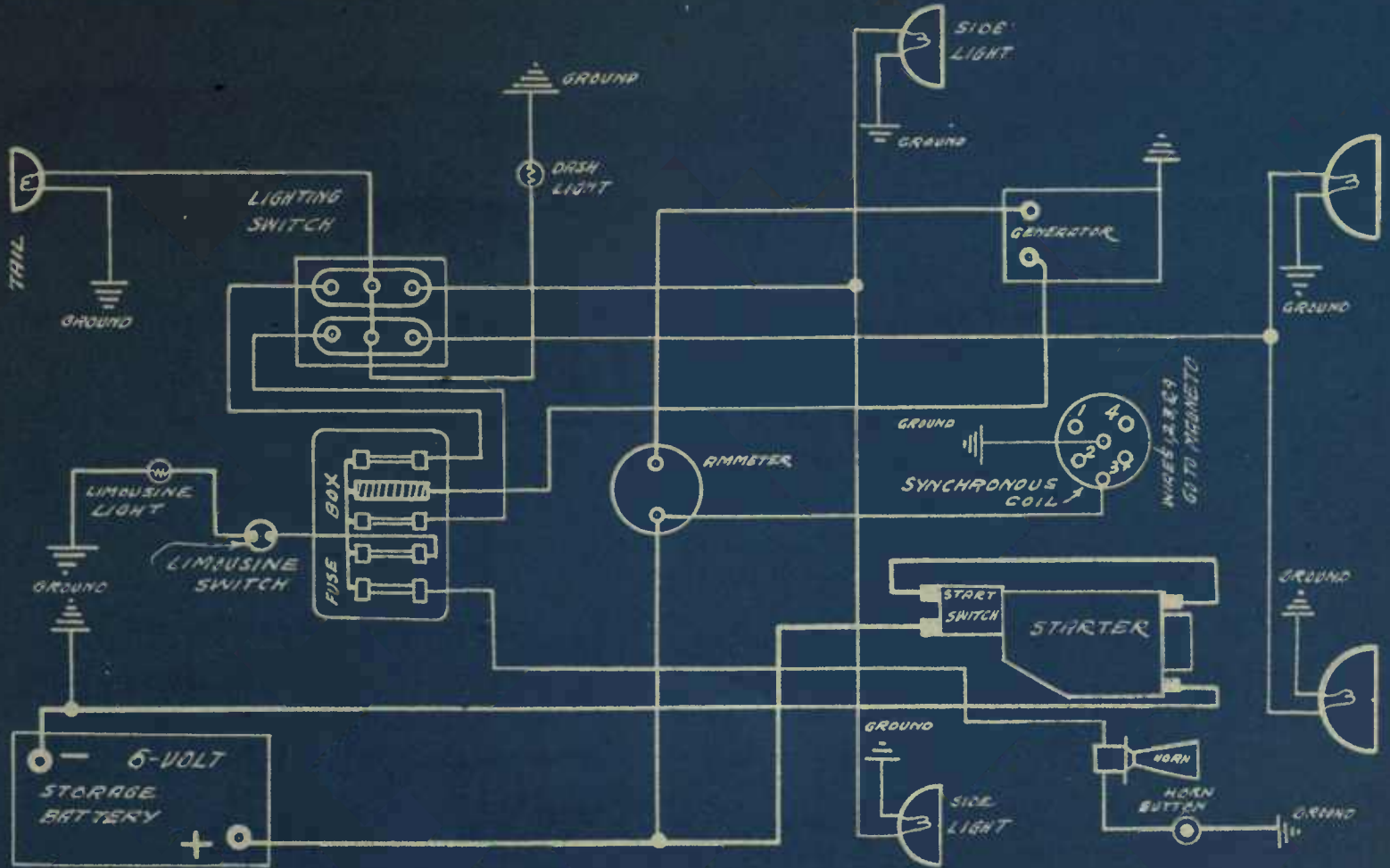
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F-1-A-T 1914-1915
WESTINGHOUSE SYSTEM

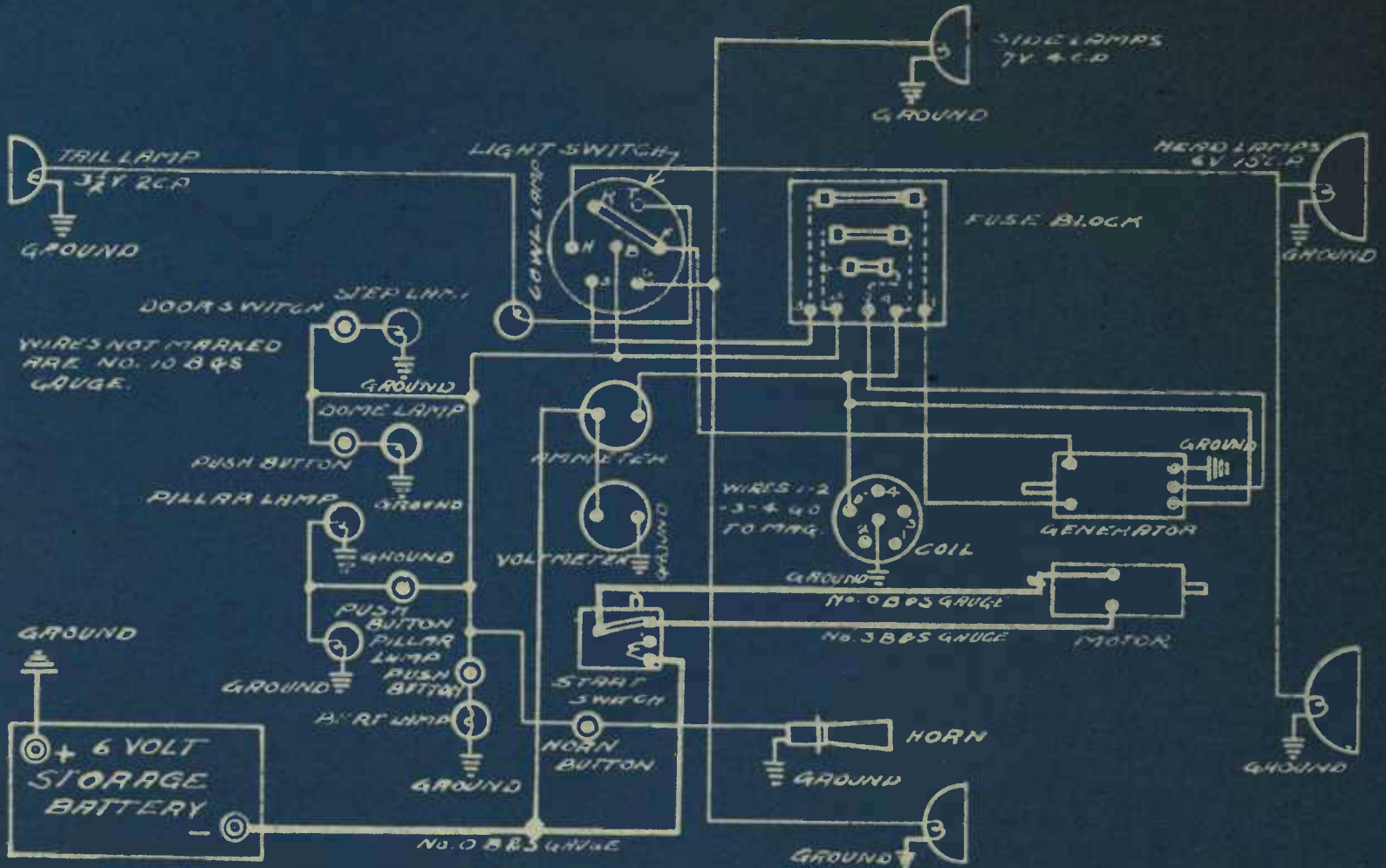
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F.I.A.T 1915
RUSHMORE SINGLE WIRE SYSTEM

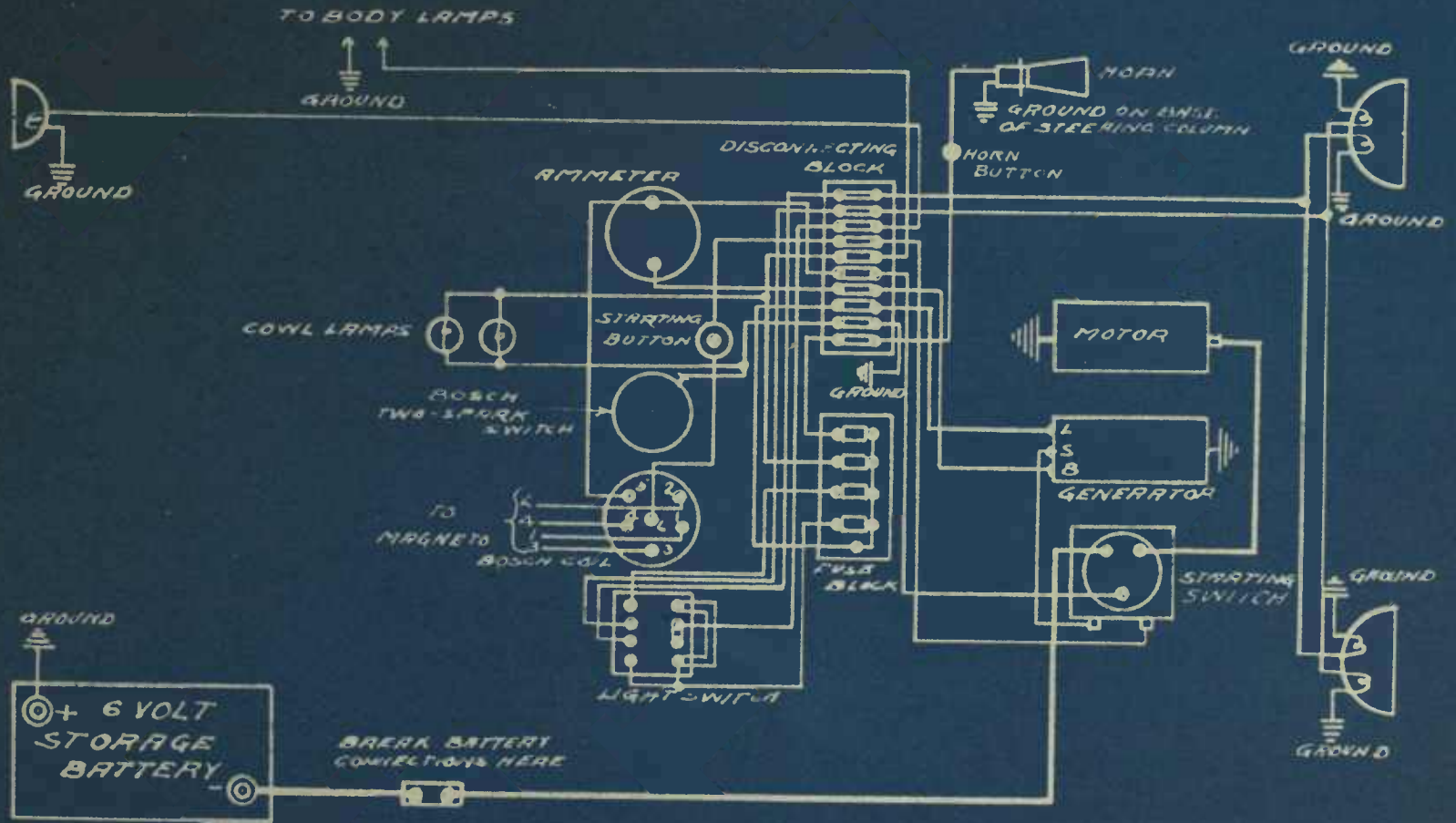
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F.I.A.T. 1916-17 E-17 CHASSIS
WESTINGHOUSE SYSTEM

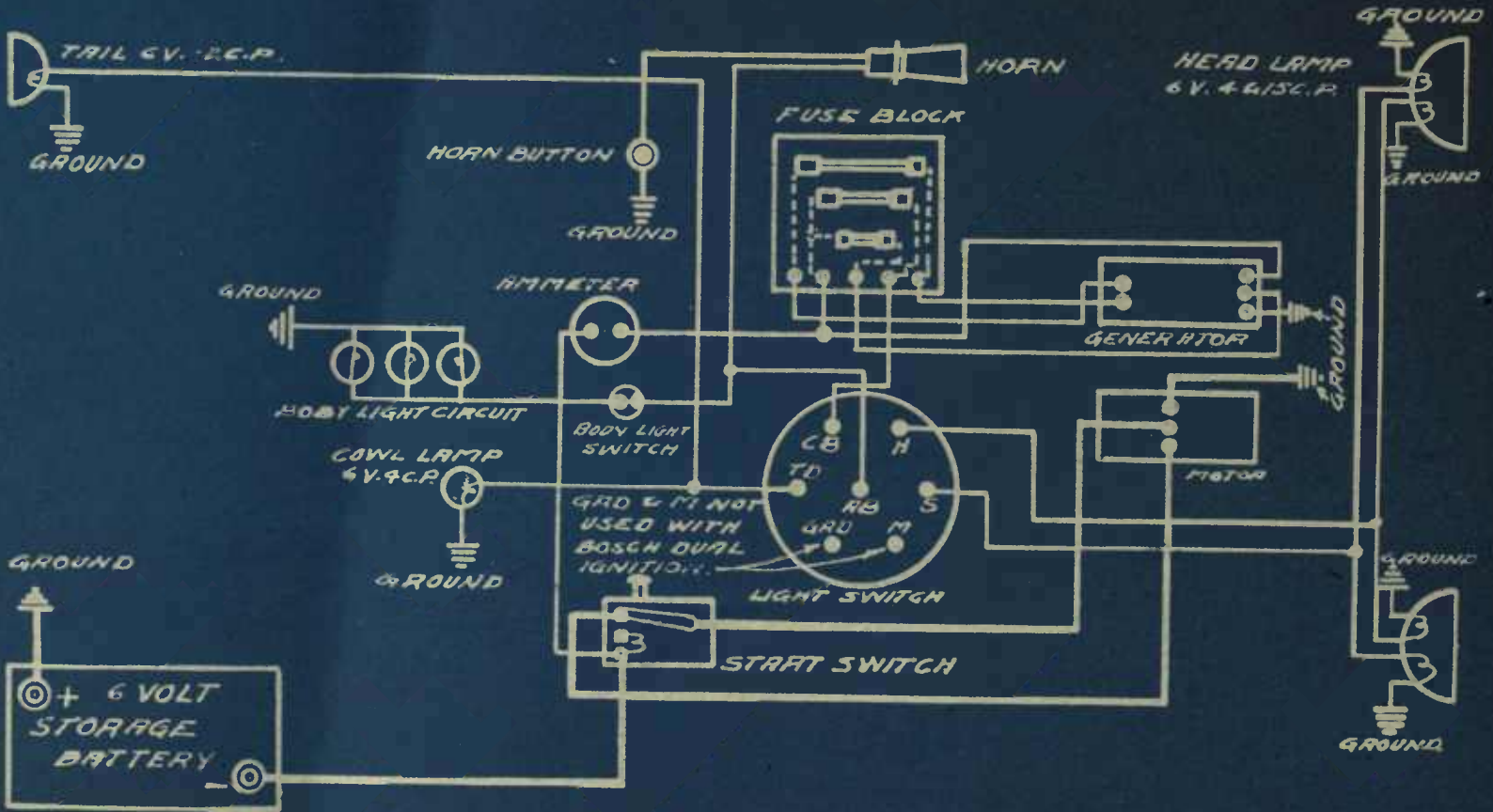
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F.I.R.T 1917
 BOSCH-RUSHMORE SYSTEM

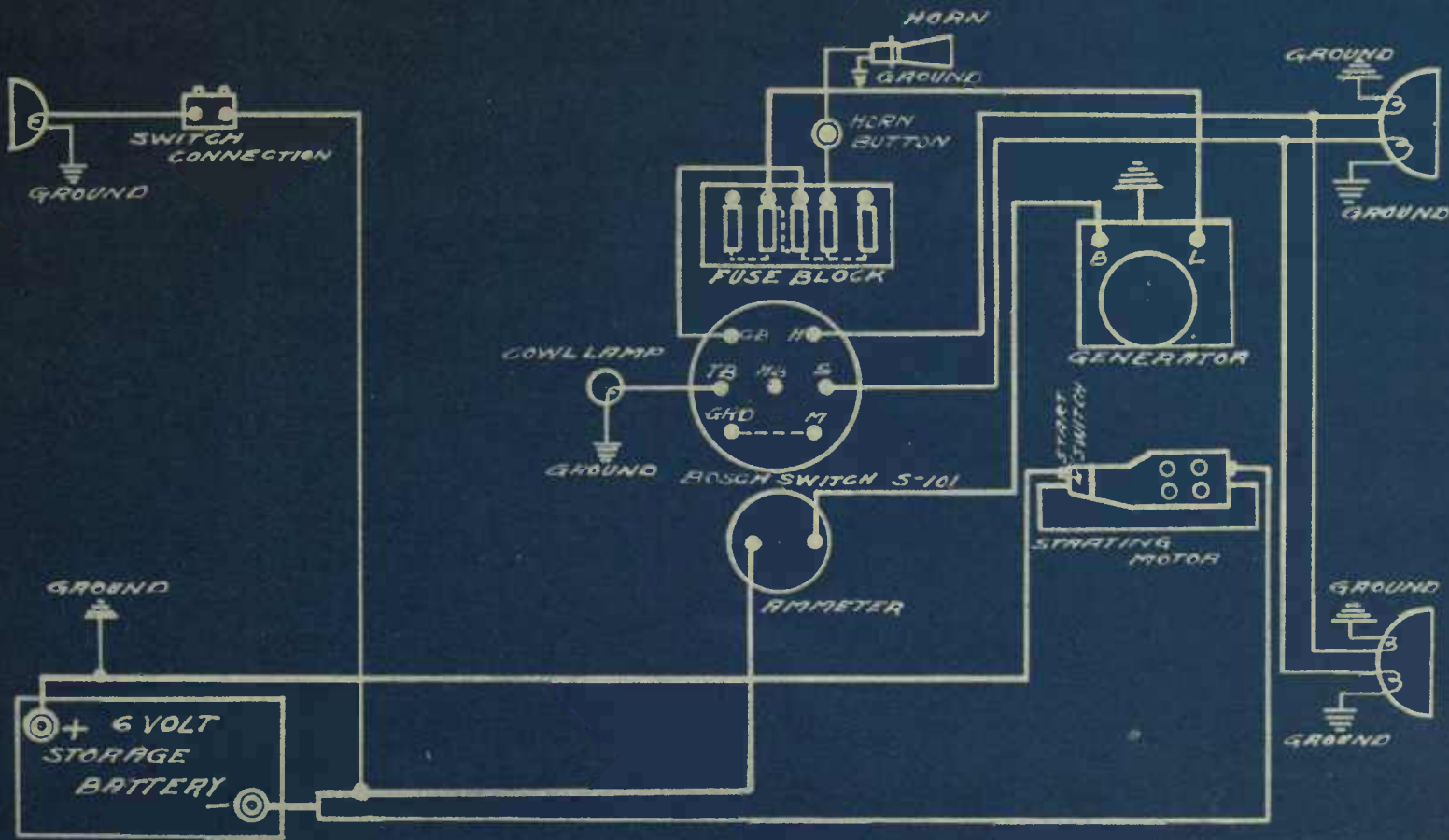
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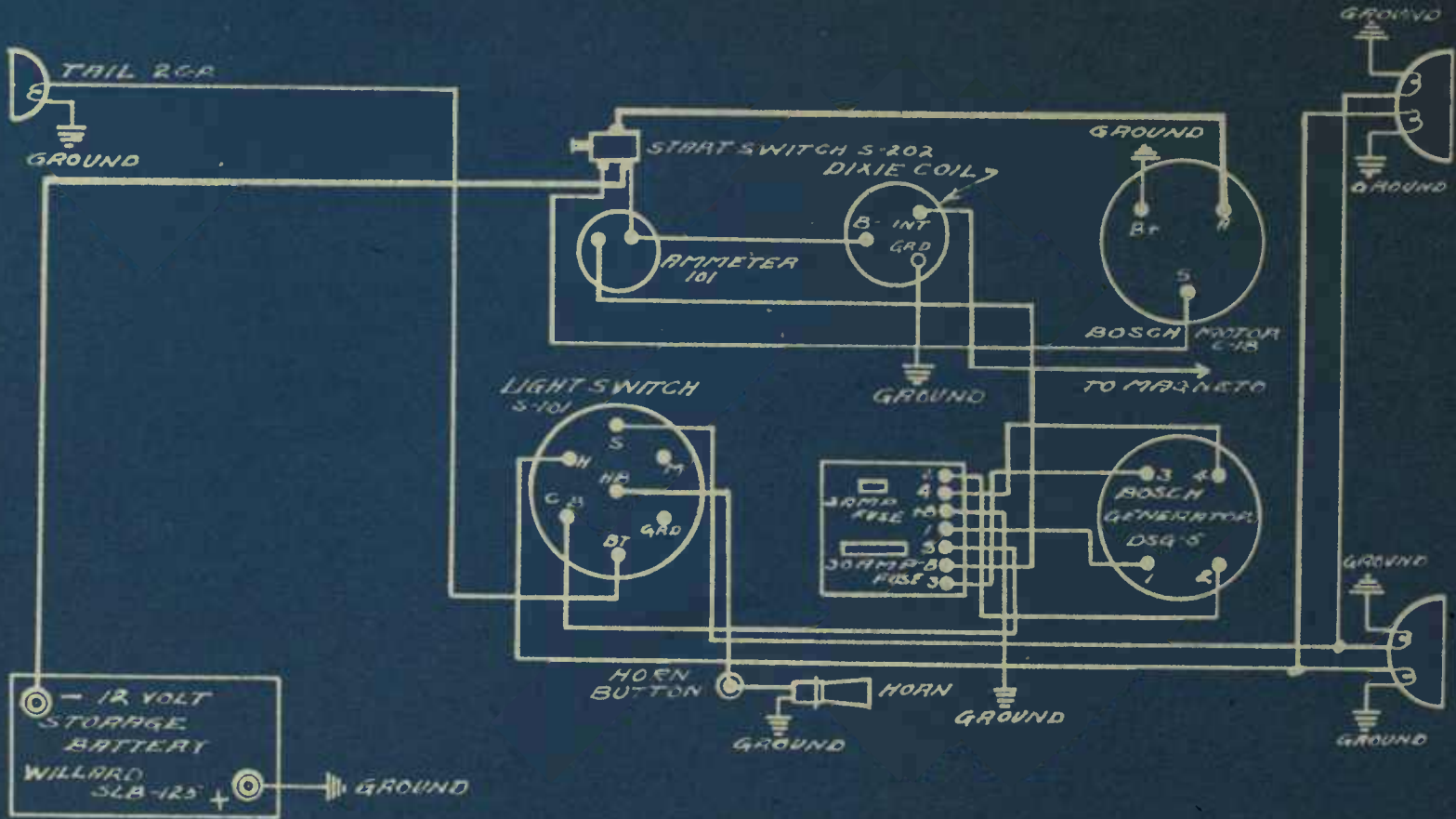
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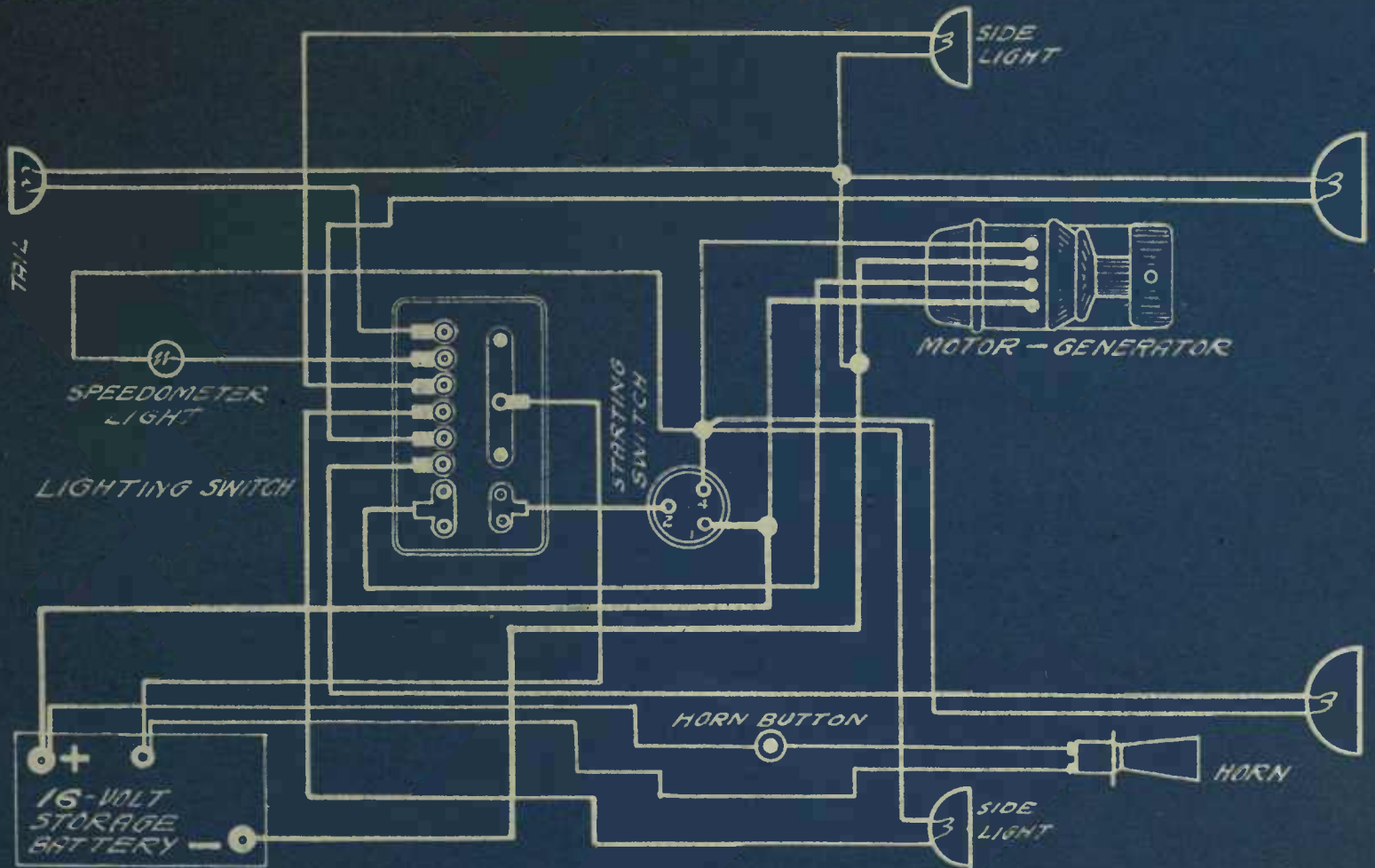


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*FIRESTONE-COLUMBUS 1913
NORTH-EAST SYSTEM*

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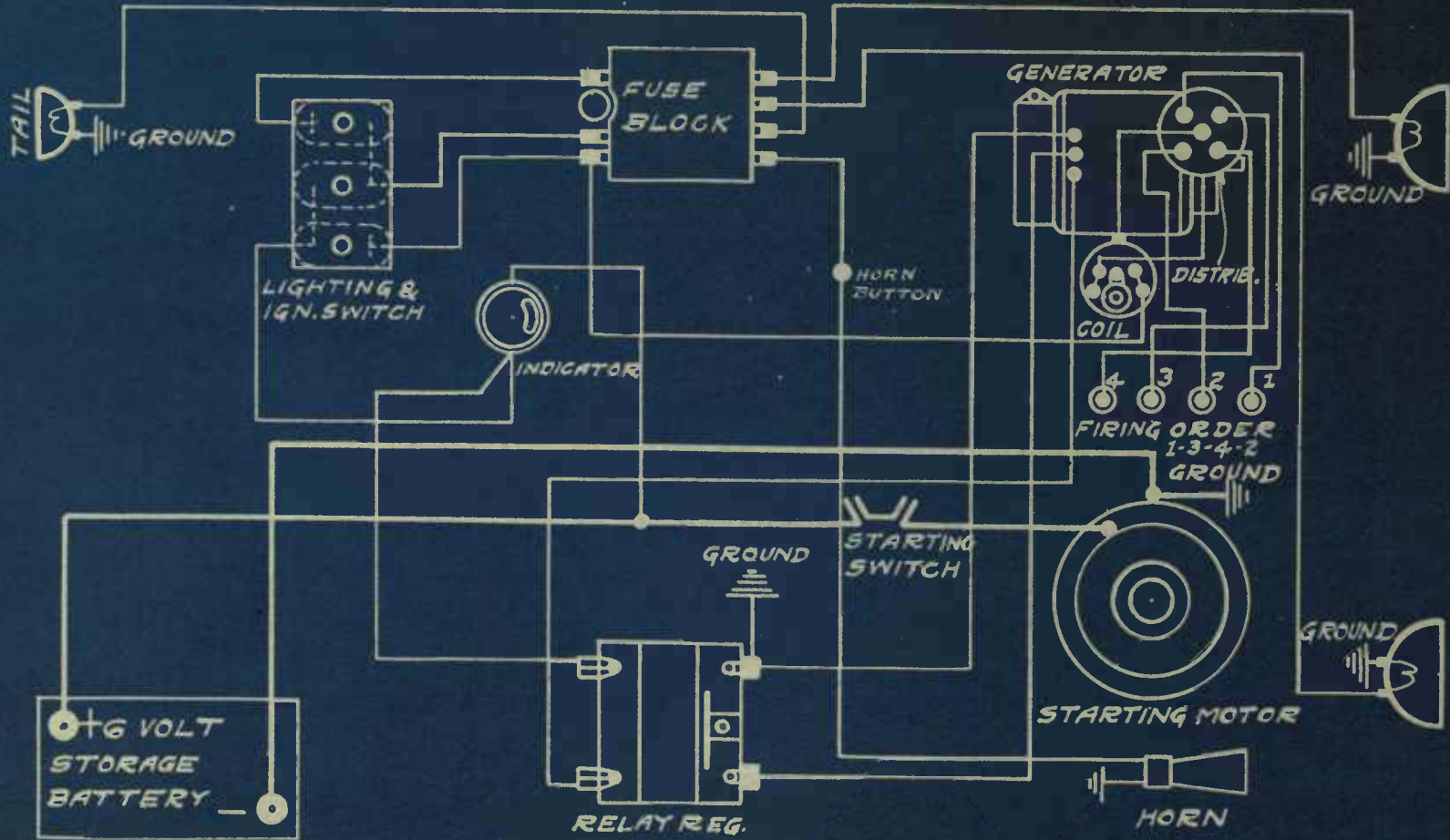
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REMY SYSTEM

FROM REMY PLATE

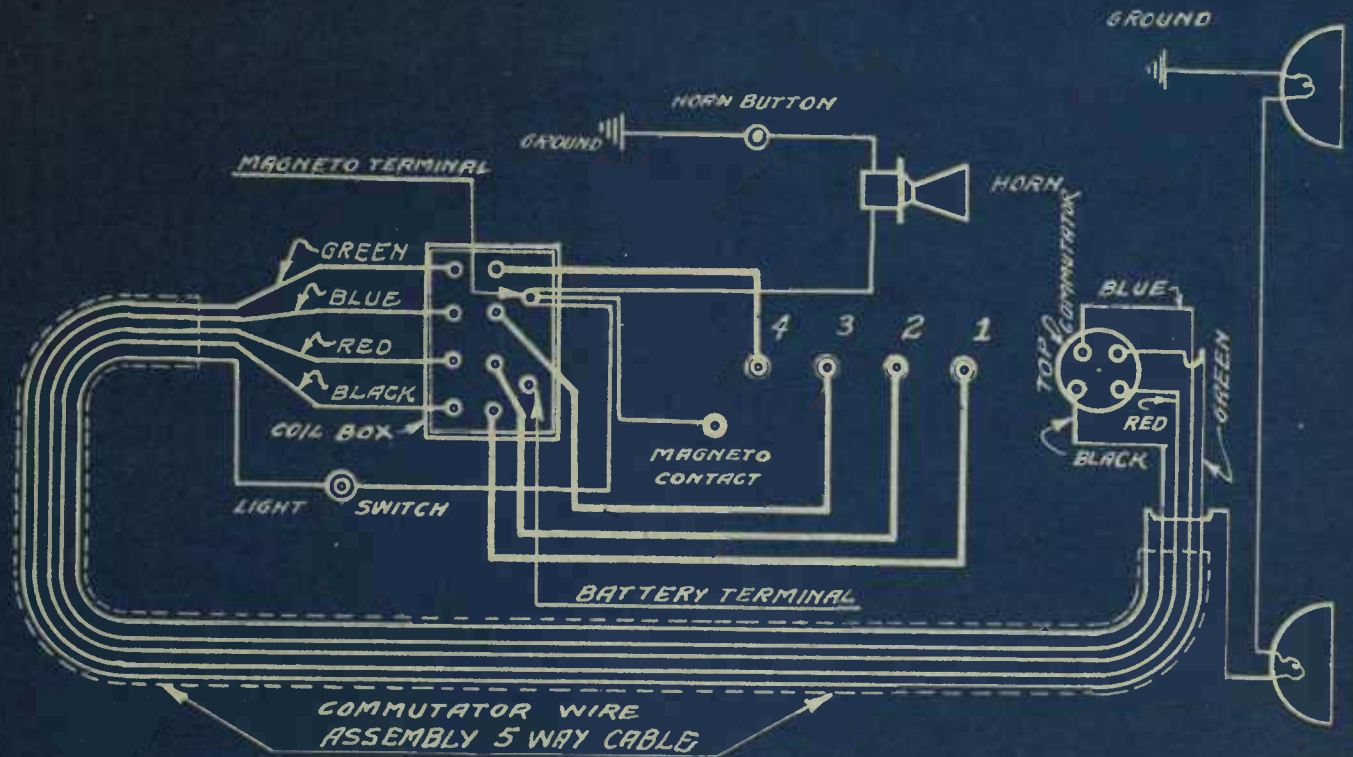


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FORD STANDARD WIRING

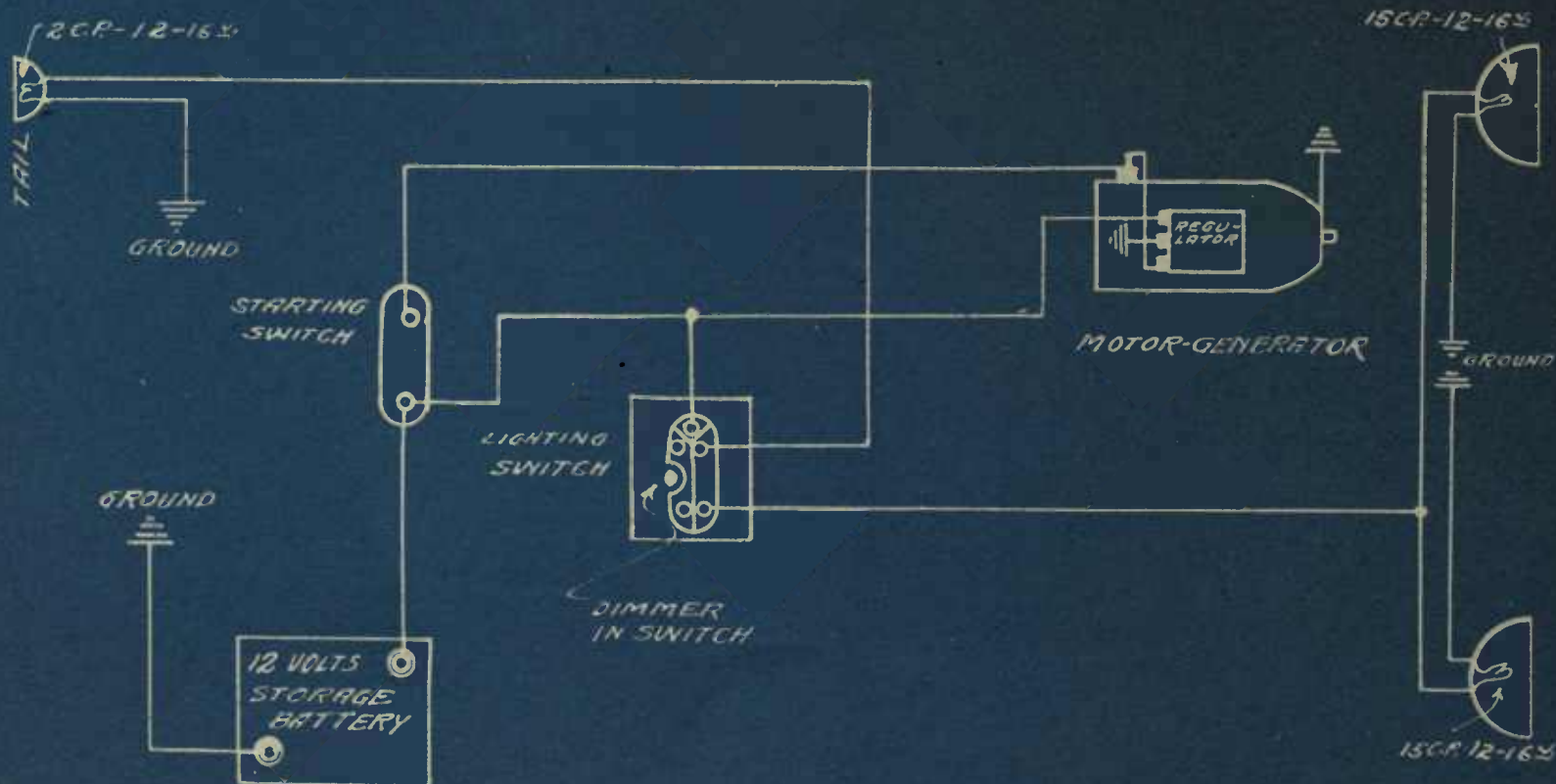
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FORD DISCO STARTING & LIGHTING SYSTEM

FROM DISCO CIRCULAR



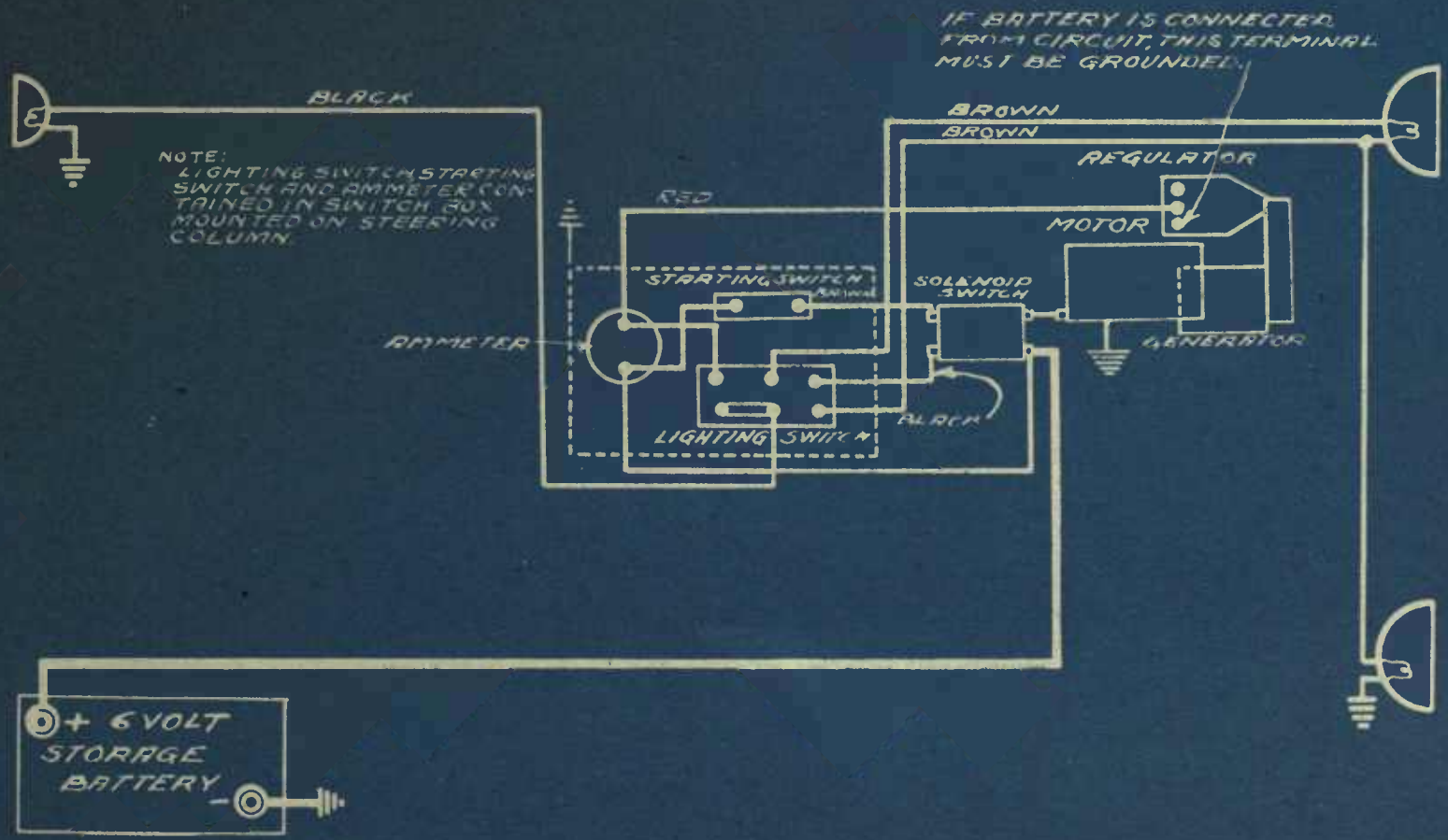
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DISCO TWO UNIT STANDARD INSTALLATION

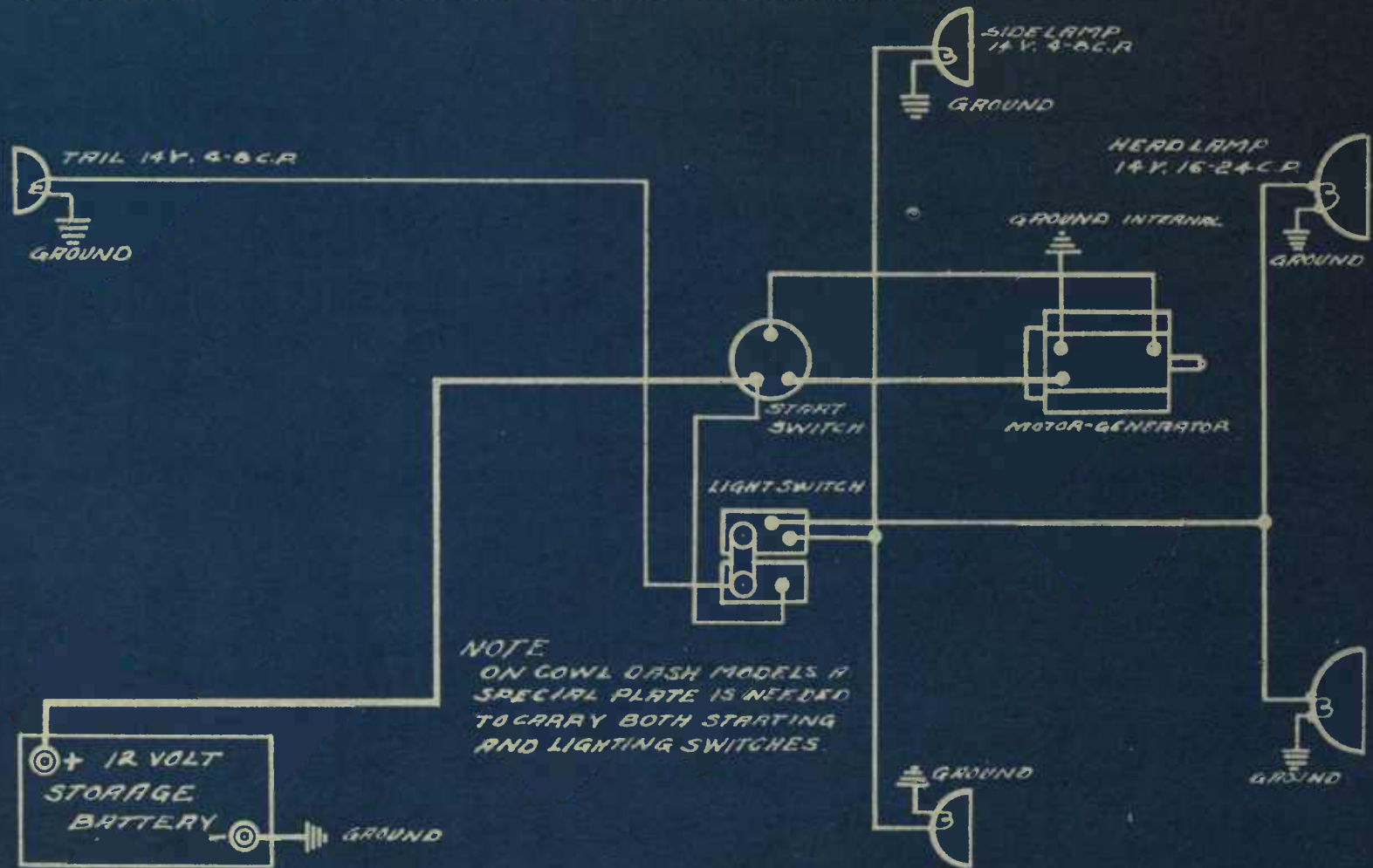
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FORD DYNETO MODEL "B" REVISED STANDARD DIAGRAM

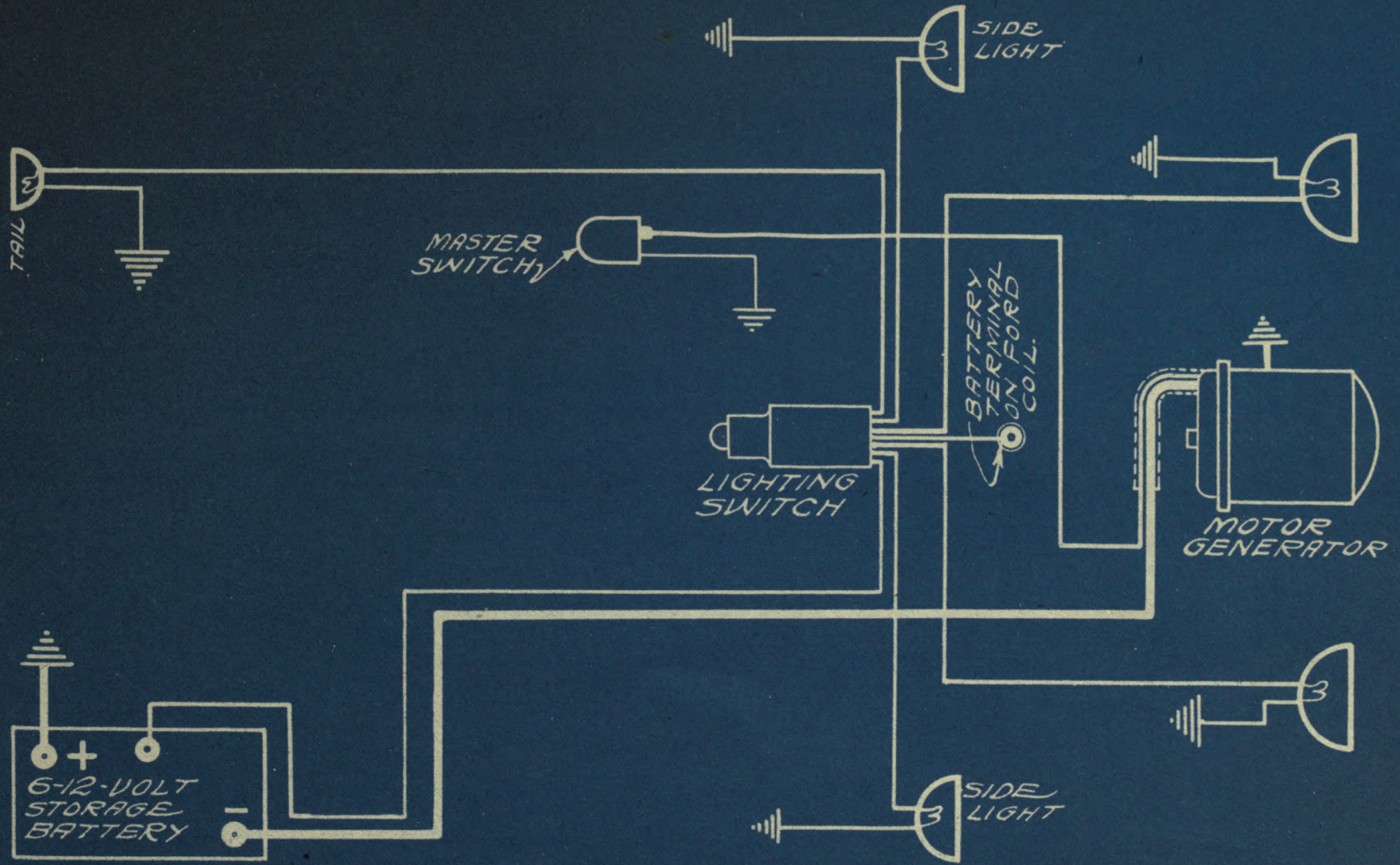
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FORD EVEREADY SYSTEM

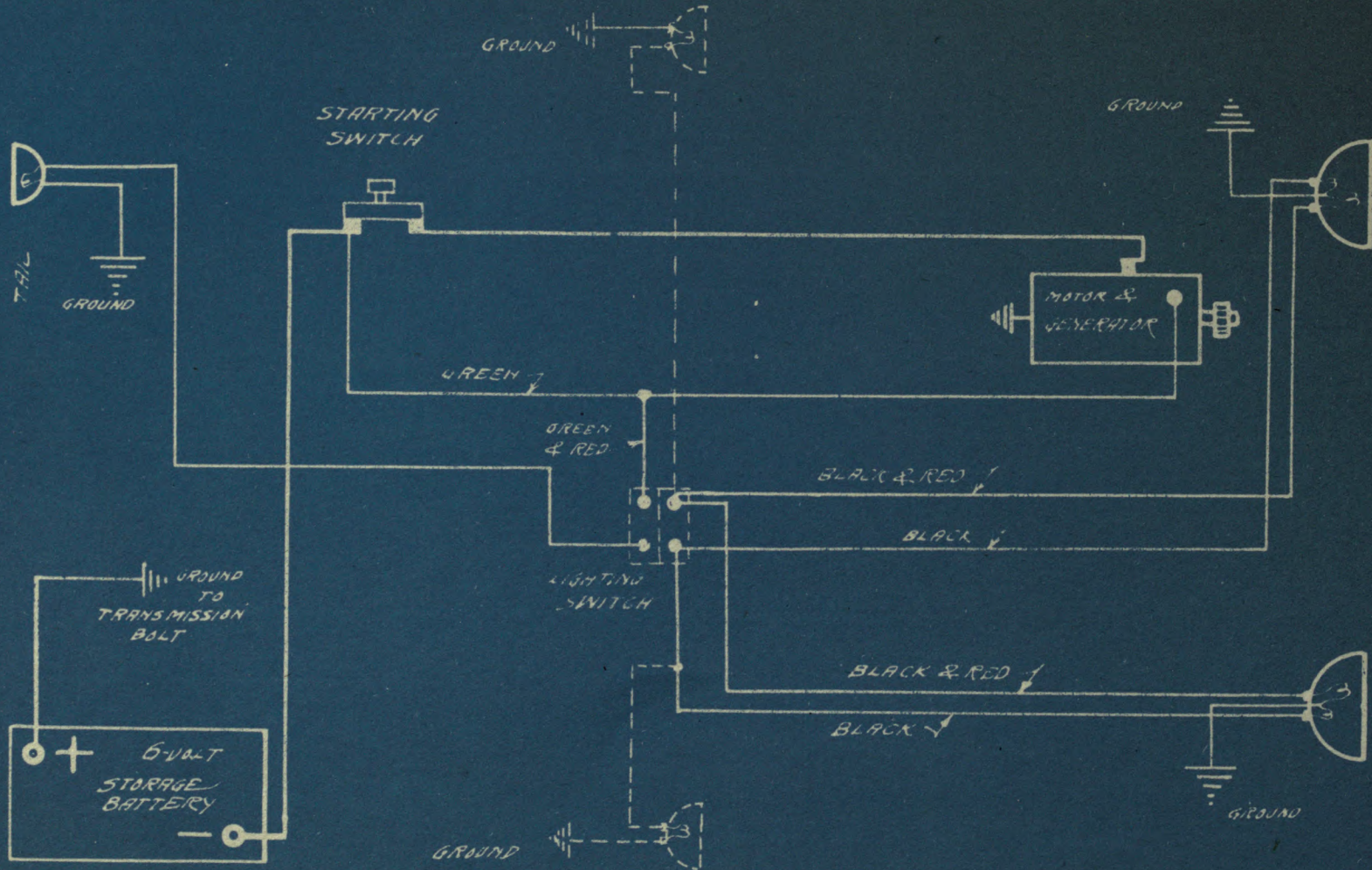
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GRAY & DAVIS SYSTEM - SINGLE UNIT -

FROM G. & D. INST. BOOK

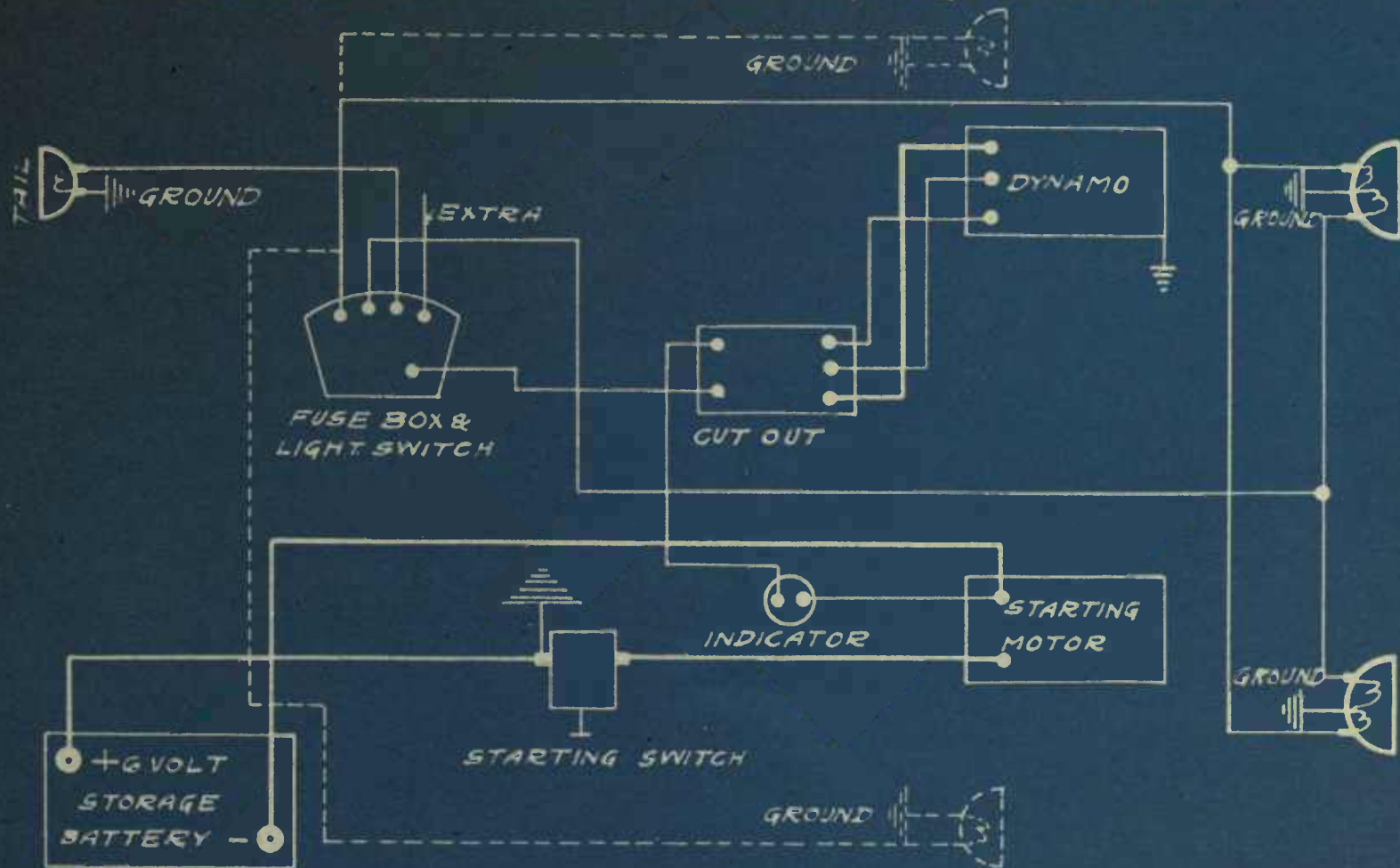


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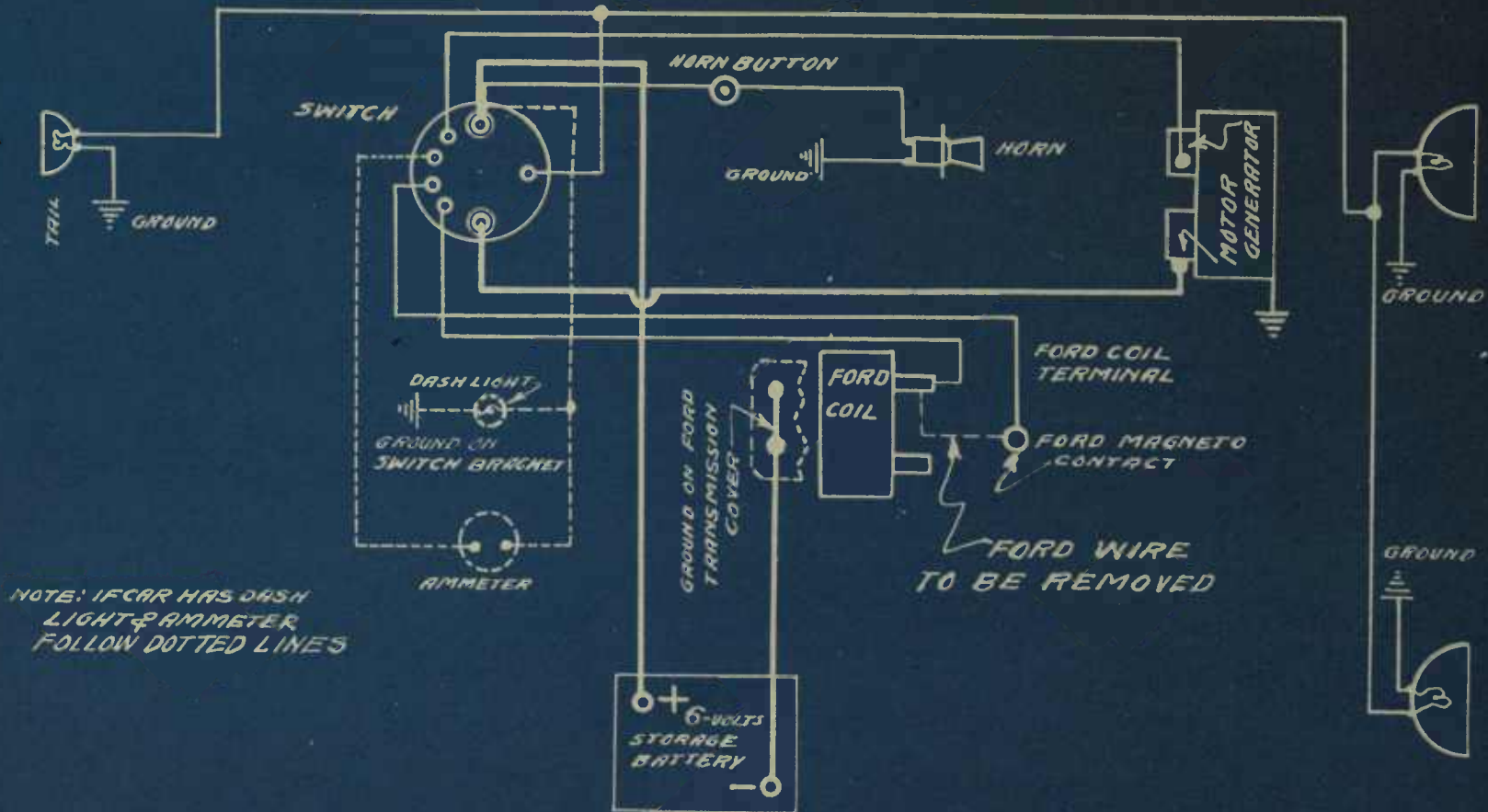
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GRAY & DAVIS SYSTEM - TWO UNIT -

FROM GRAY & DAVIS BULLETIN Y. T.



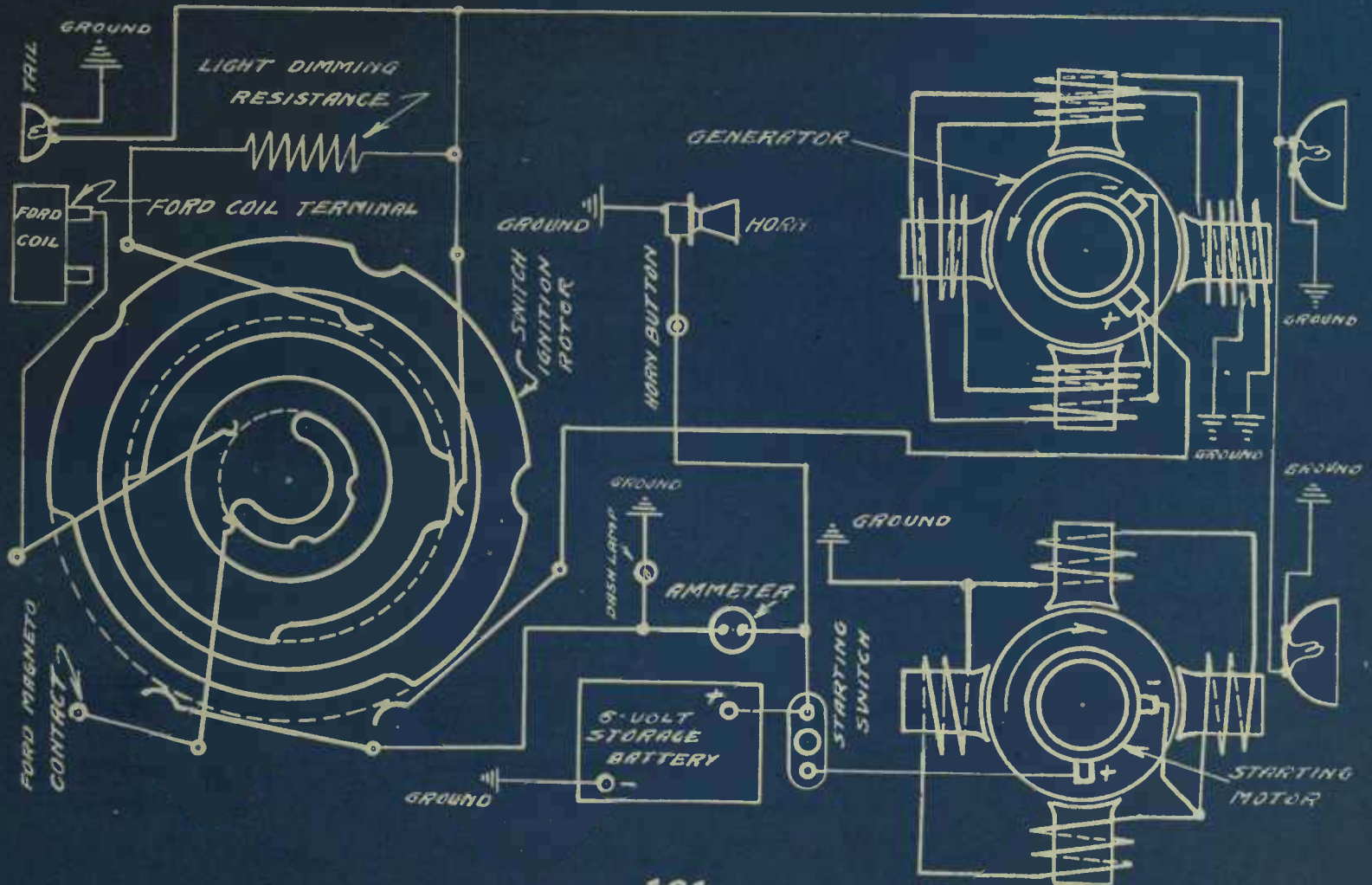
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HEINZE-SPRINGFIELD SYSTEM

FROM FACTORY BR 1655
- MODEL 33 - INTERNAL WIRING

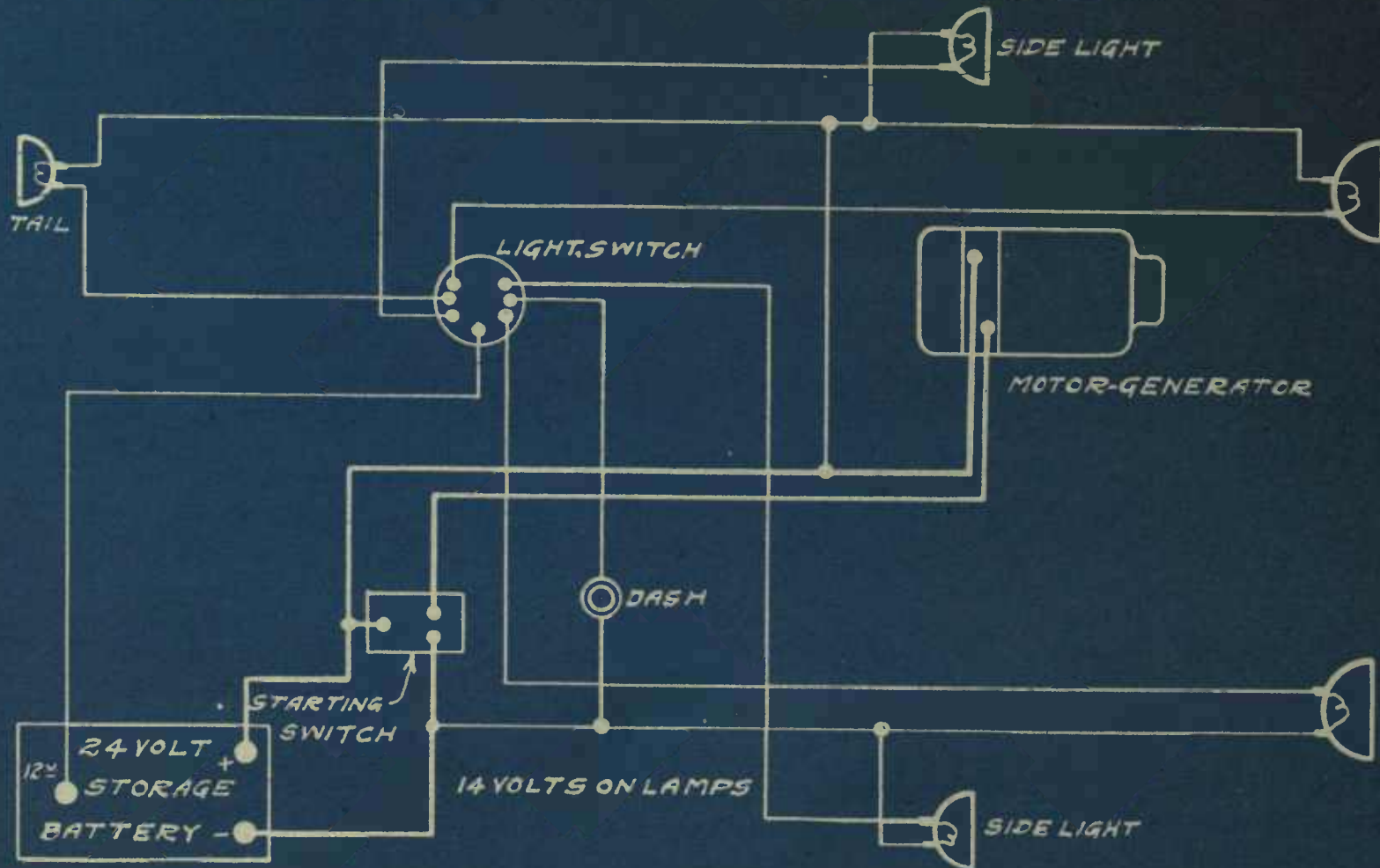


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LEECE-NEVILLE SYSTEM

FROM L-N. BULLETIN

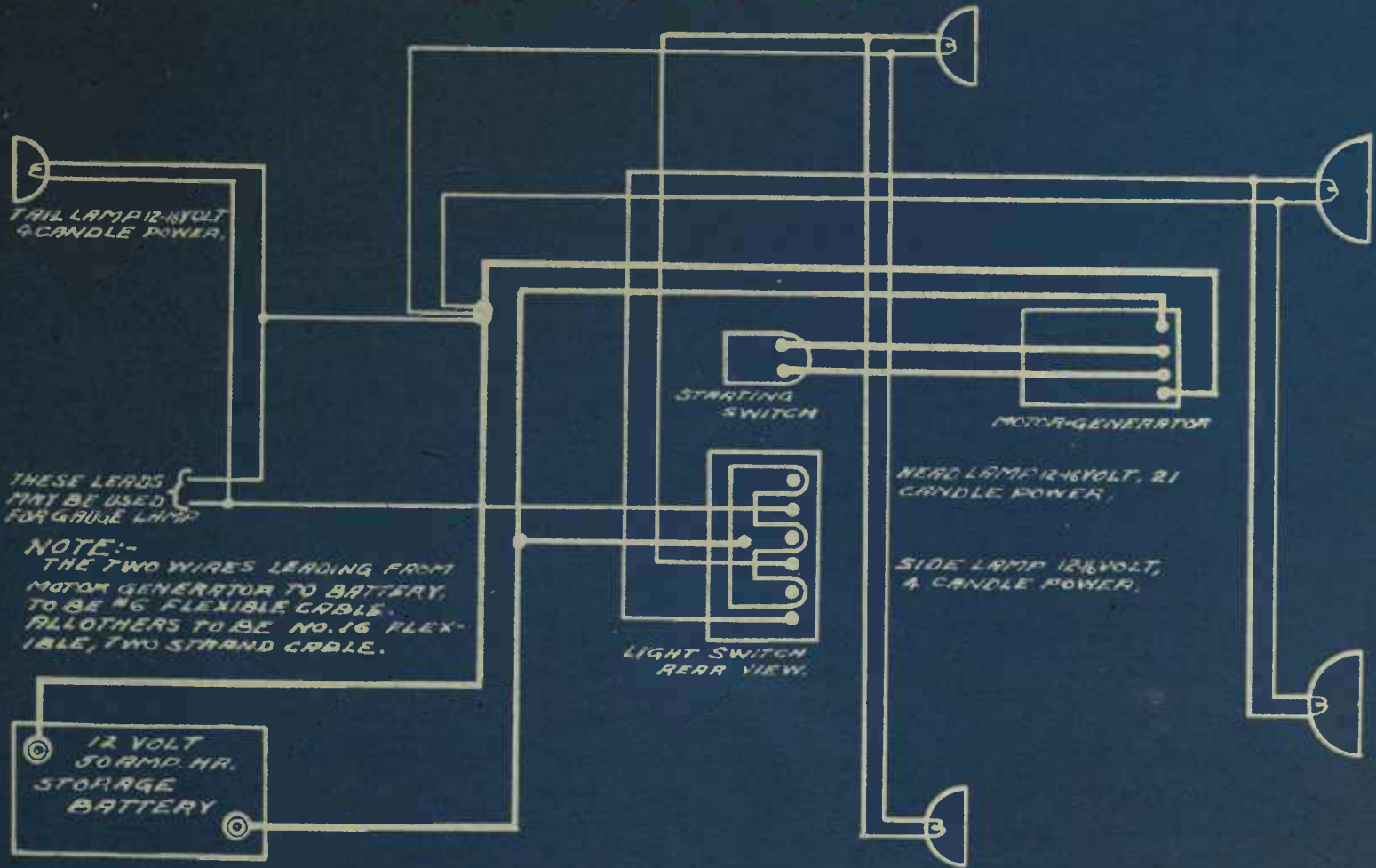


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FORD 1913

NORTH-EAST SYSTEM

FROM NORTH-EAST BULLETIN NO. 23

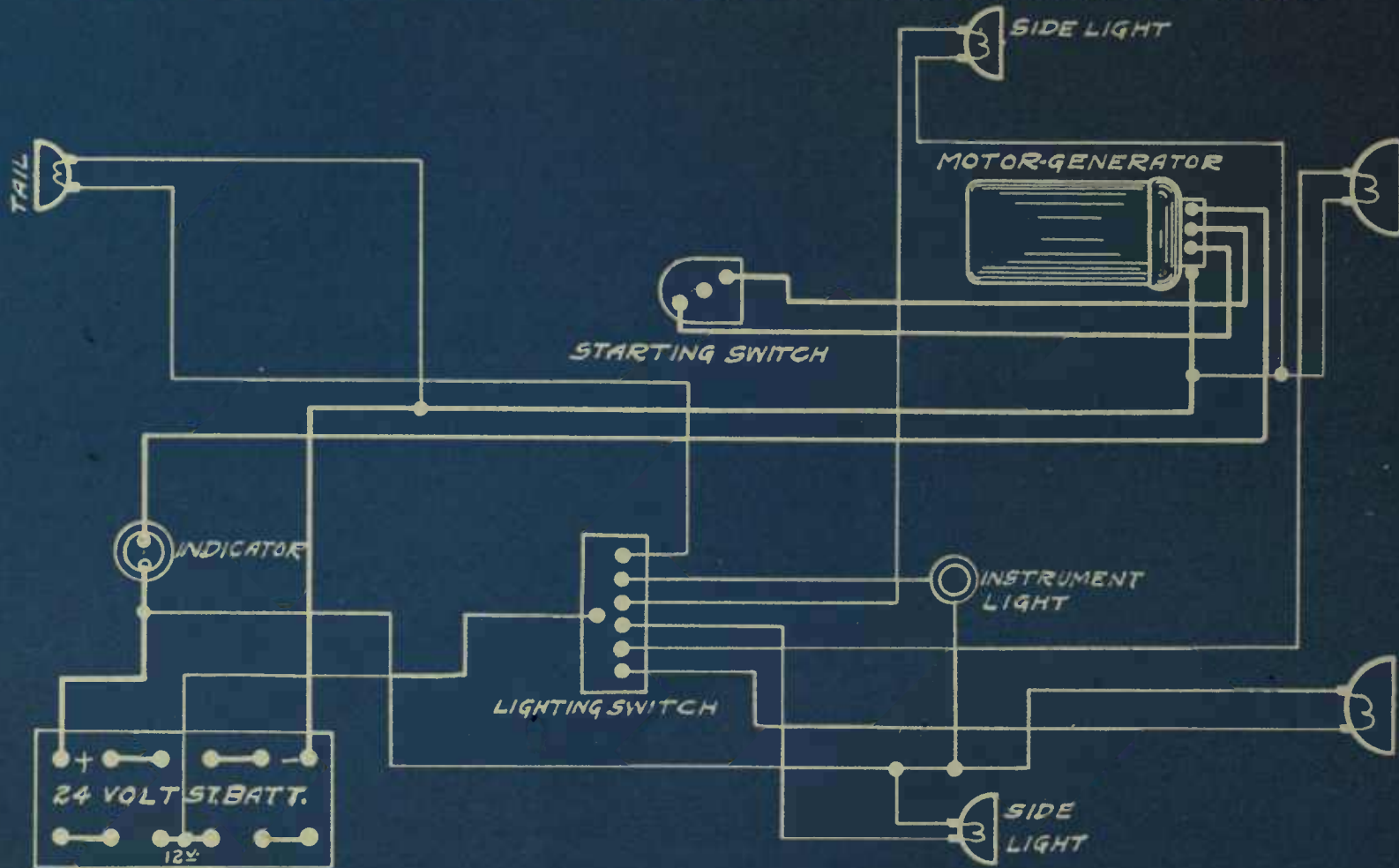


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NORTH-EAST SYSTEM MODEL "D" TYPE 1210

FROM NORTH-EAST PLATE 430

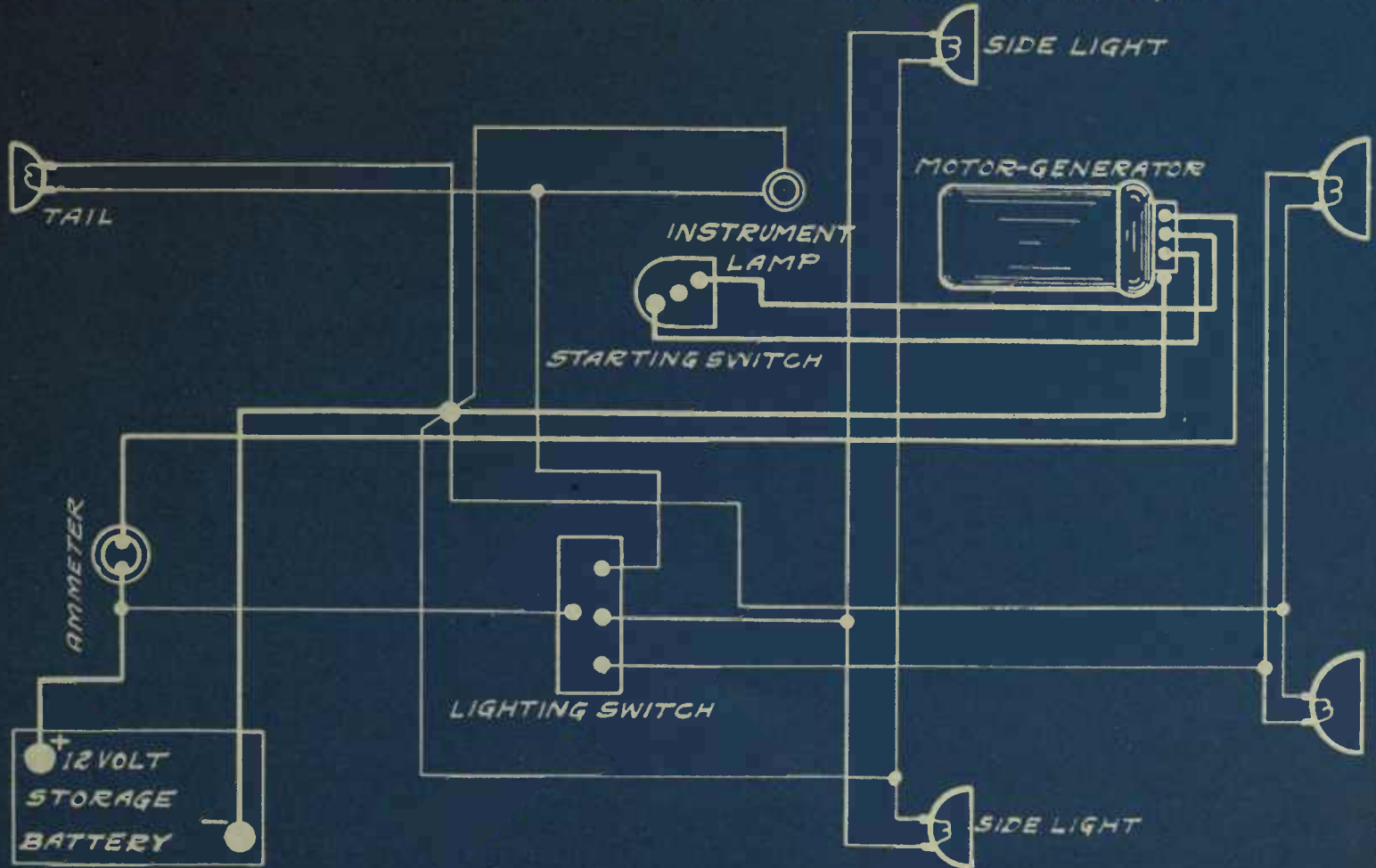


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NORTH-EAST SYSTEM MODEL "D" TYPE 1252

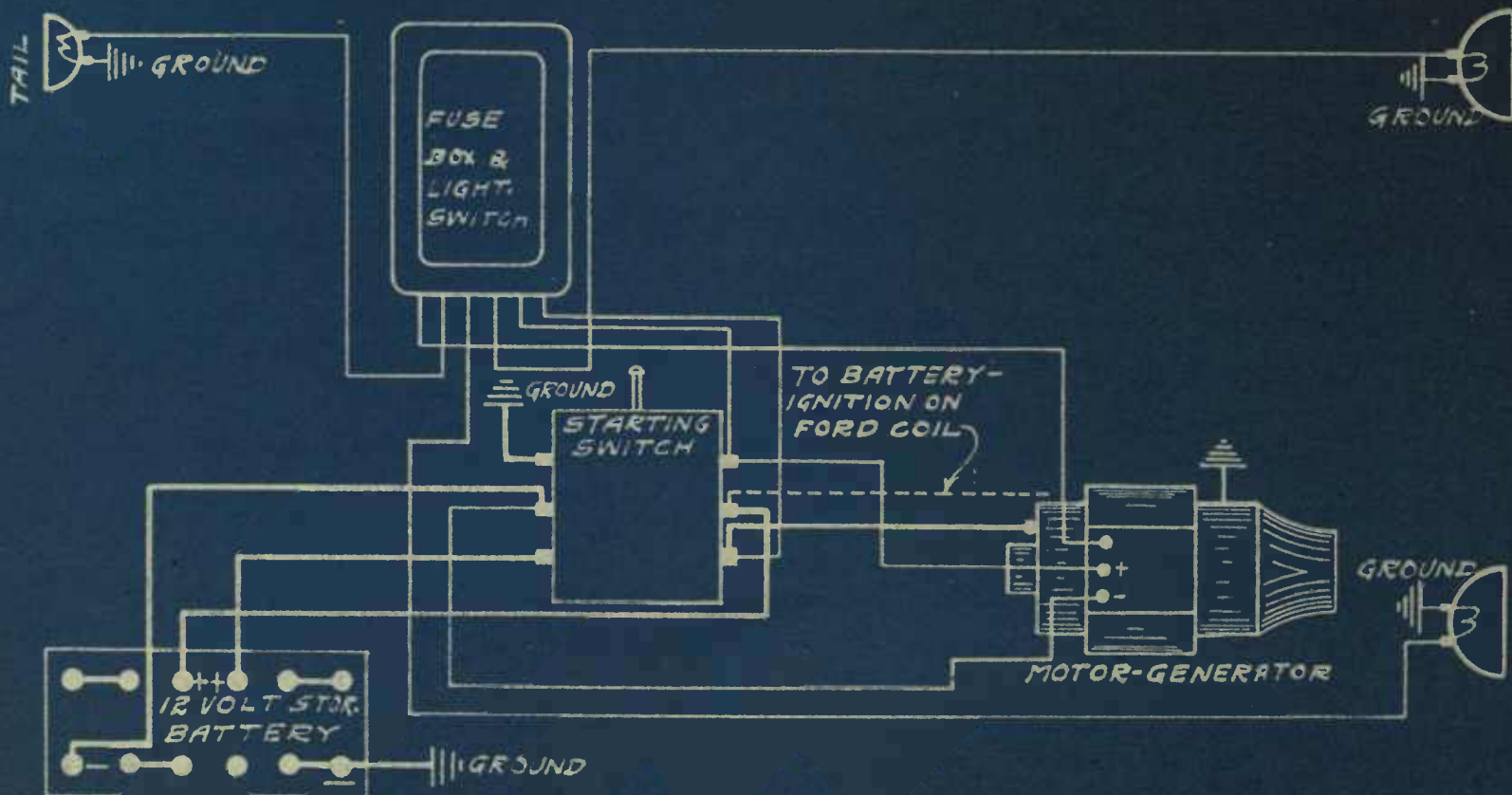
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FORD
SIMMS-HUFF SYSTEM

FROM SIMMS-HUFF BULLETIN 16

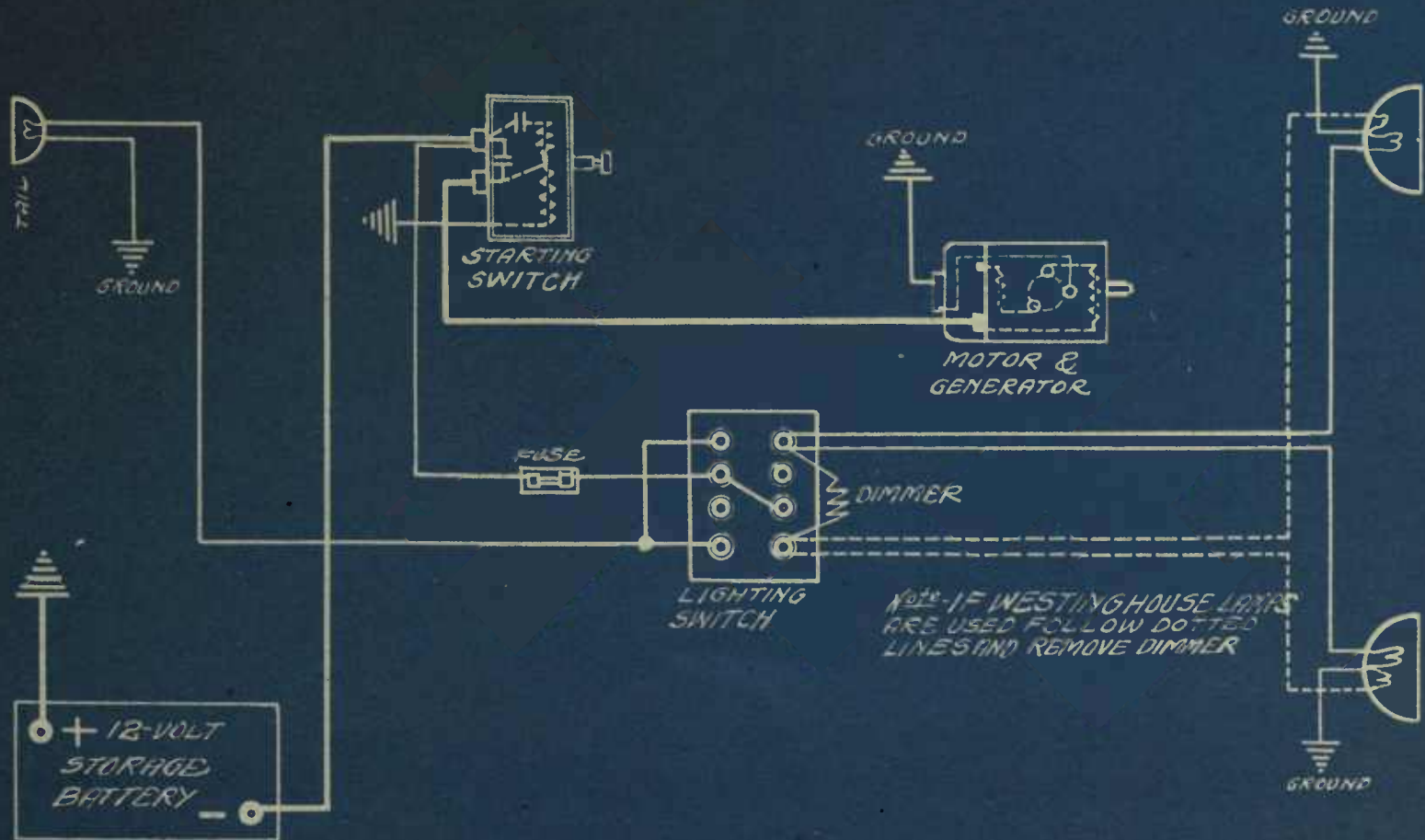


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FORD WESTINGHOUSE SYSTEM

FROM WEST. INST. BK. 5157-B

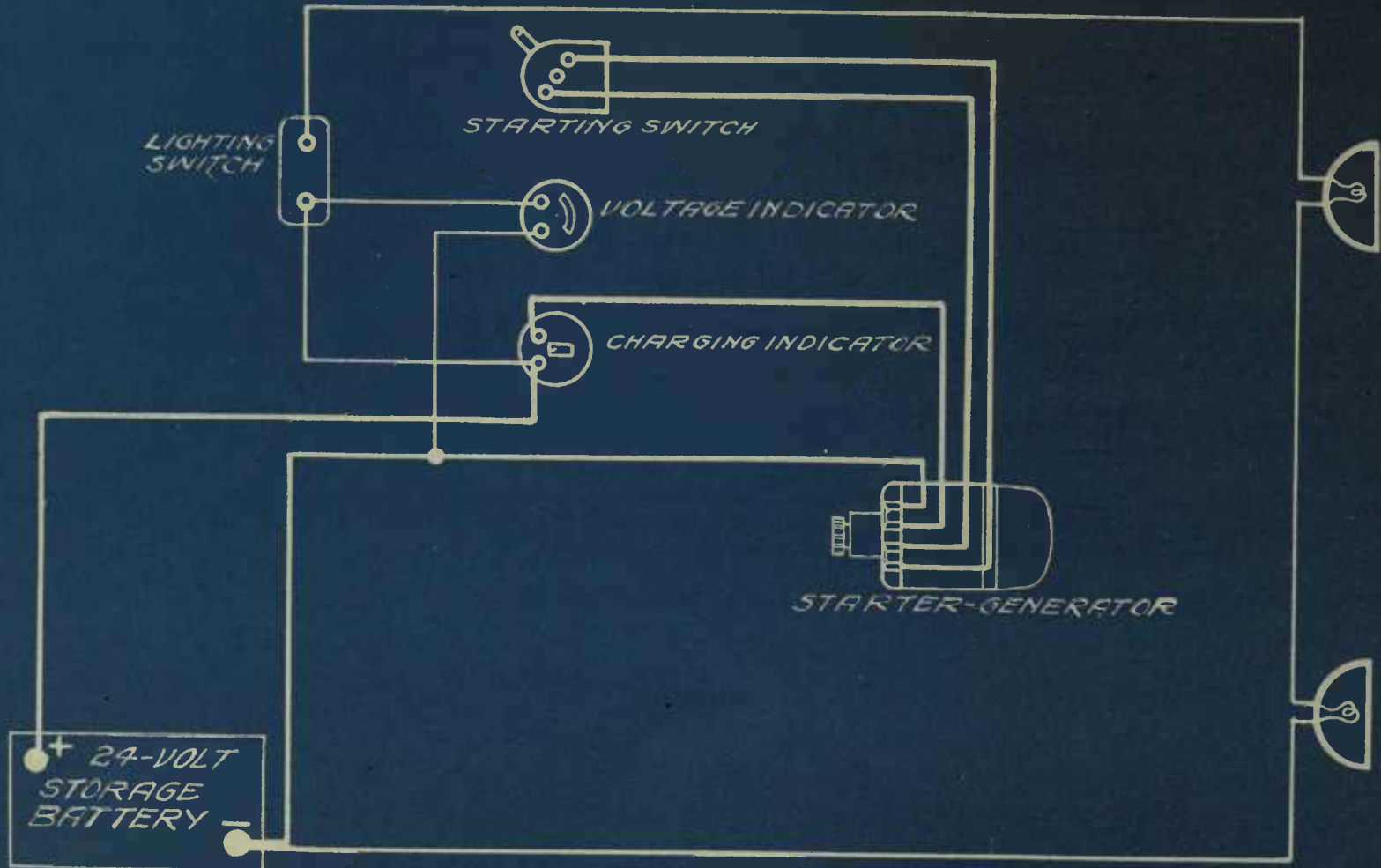
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FOUR WHEEL DRIVE TRUCK

NORTH-EAST SYSTEM

FROM N.E. PLATE 410

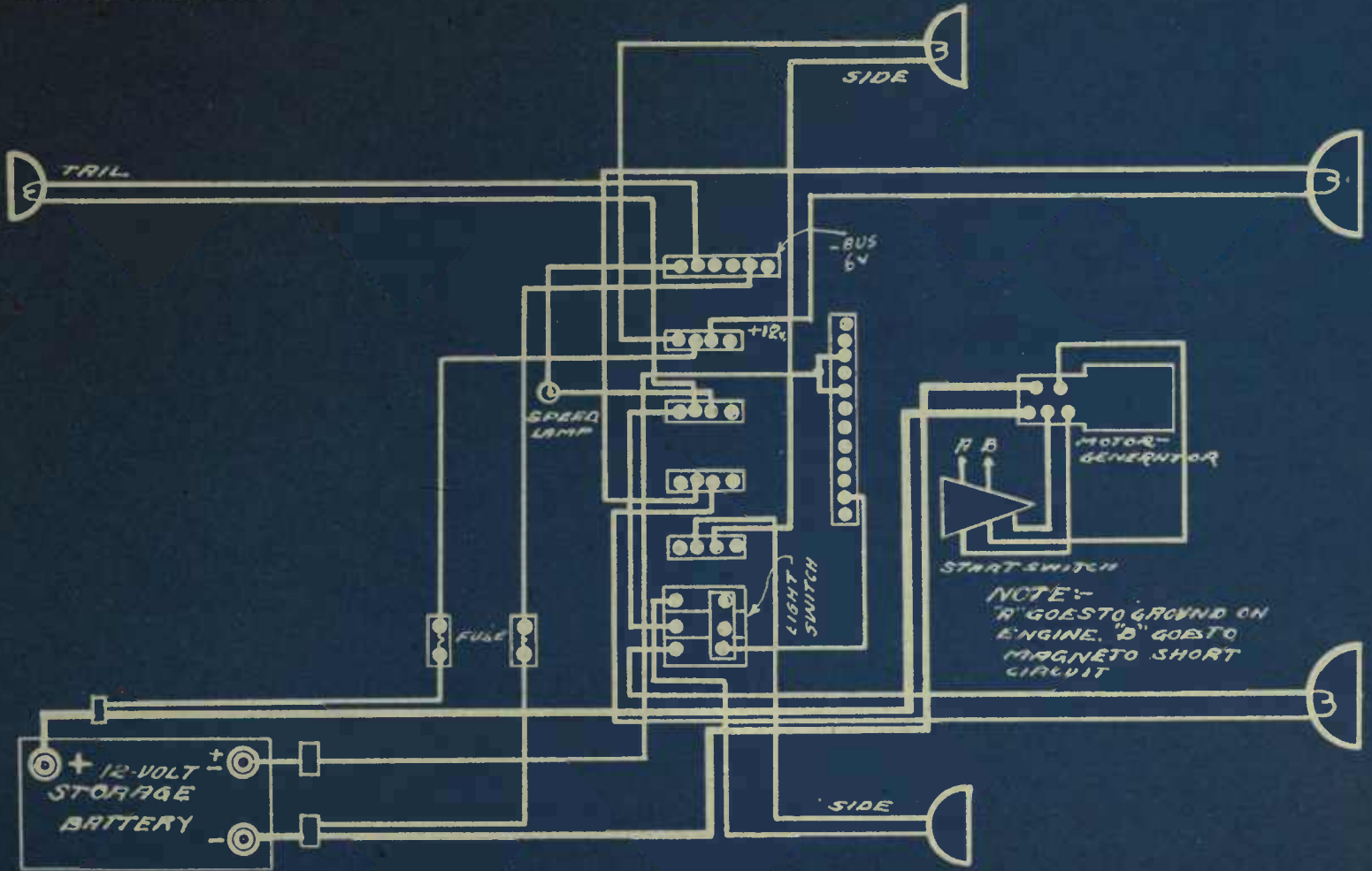


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FRANKLIN 1913-14 SERIES 2-D-H-M
ENTZ SYSTEM

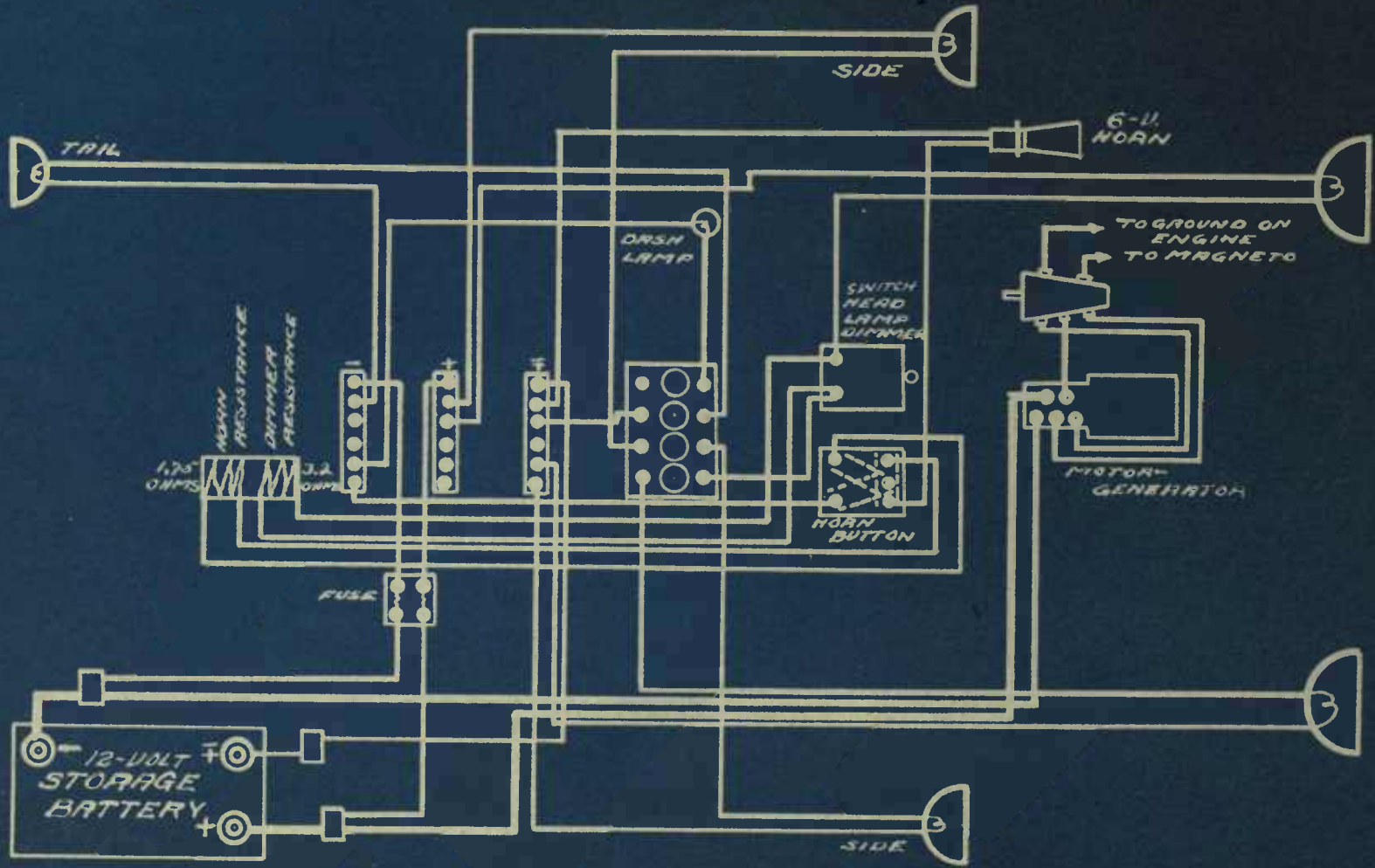
FROM FRANKLIN B. P. 18252 & 18597

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FRANKLIN 1913-14 SERIES 3-M ENTZ SYSTEM

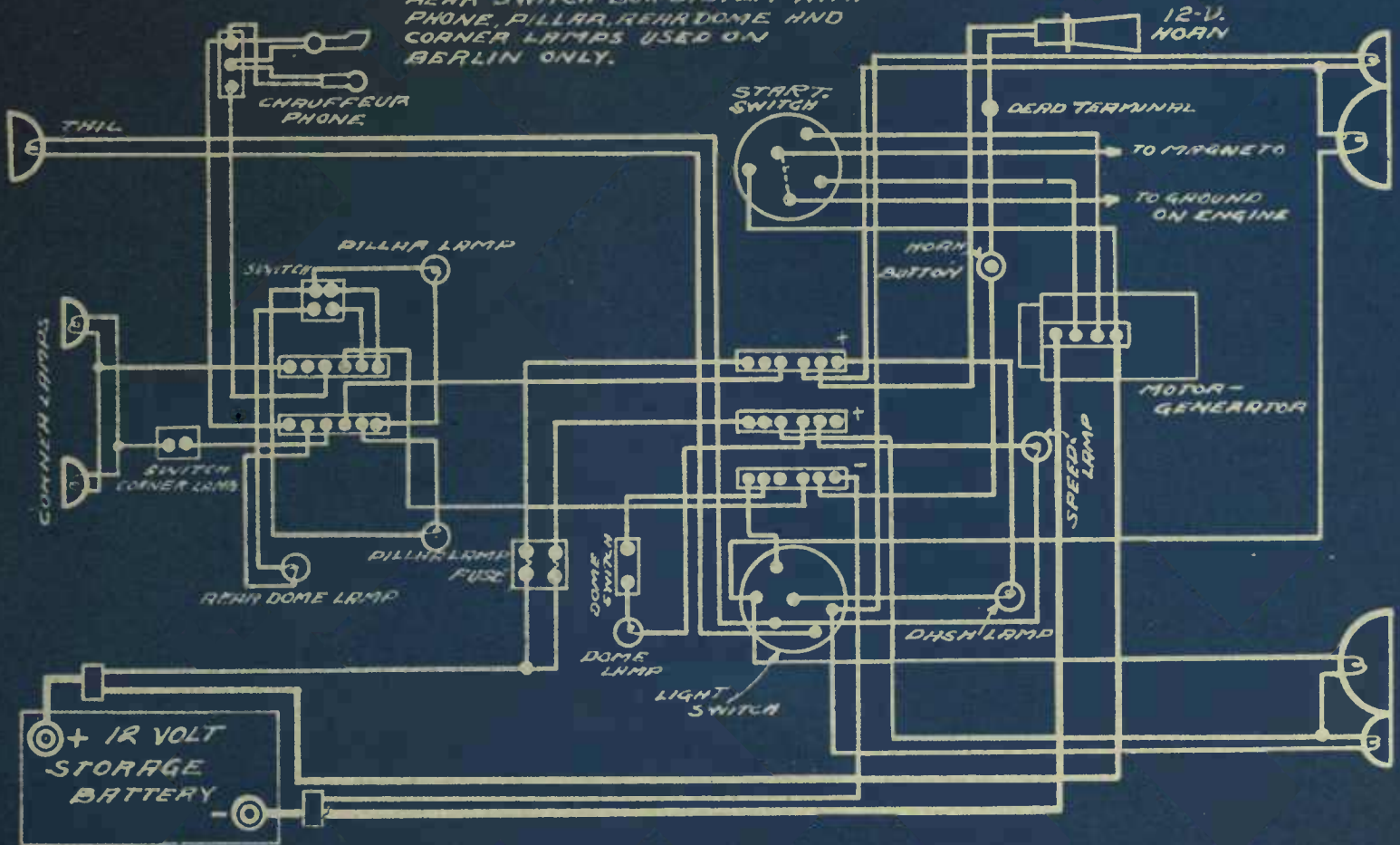
FROM FRANKLIN B. P. 17359 & 18537.



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FRANKLIN 1914-15-16 SERIES 6-M FROM FRANKLIN B.P. 19659 & 19731
ENTZ SYSTEM USED ON COUPE & BERLIN TYPES

NOTE:-
 REAR SWITCH BOX SYSTEM WITH
 PHONE, PILLAR, REAR DOME AND
 CORNER LAMPS USED ON
 BERLIN ONLY.

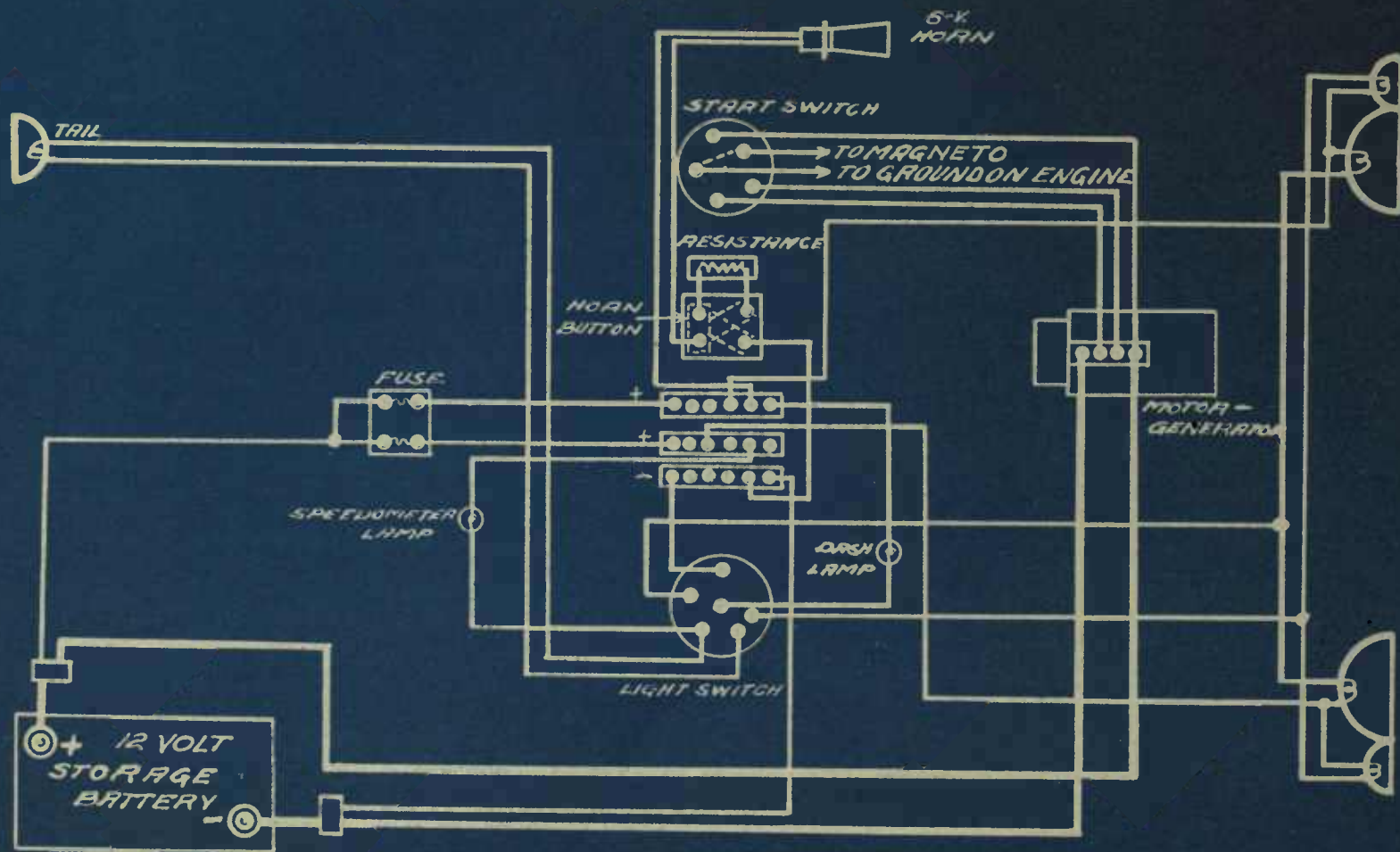


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FRANKLIN 1914-15-16. SERIES 6-M

FROM FRANKLIN B. P. 19591

ENTZ SYSTEM USED ON RUNABOUT & TOURING TYPES

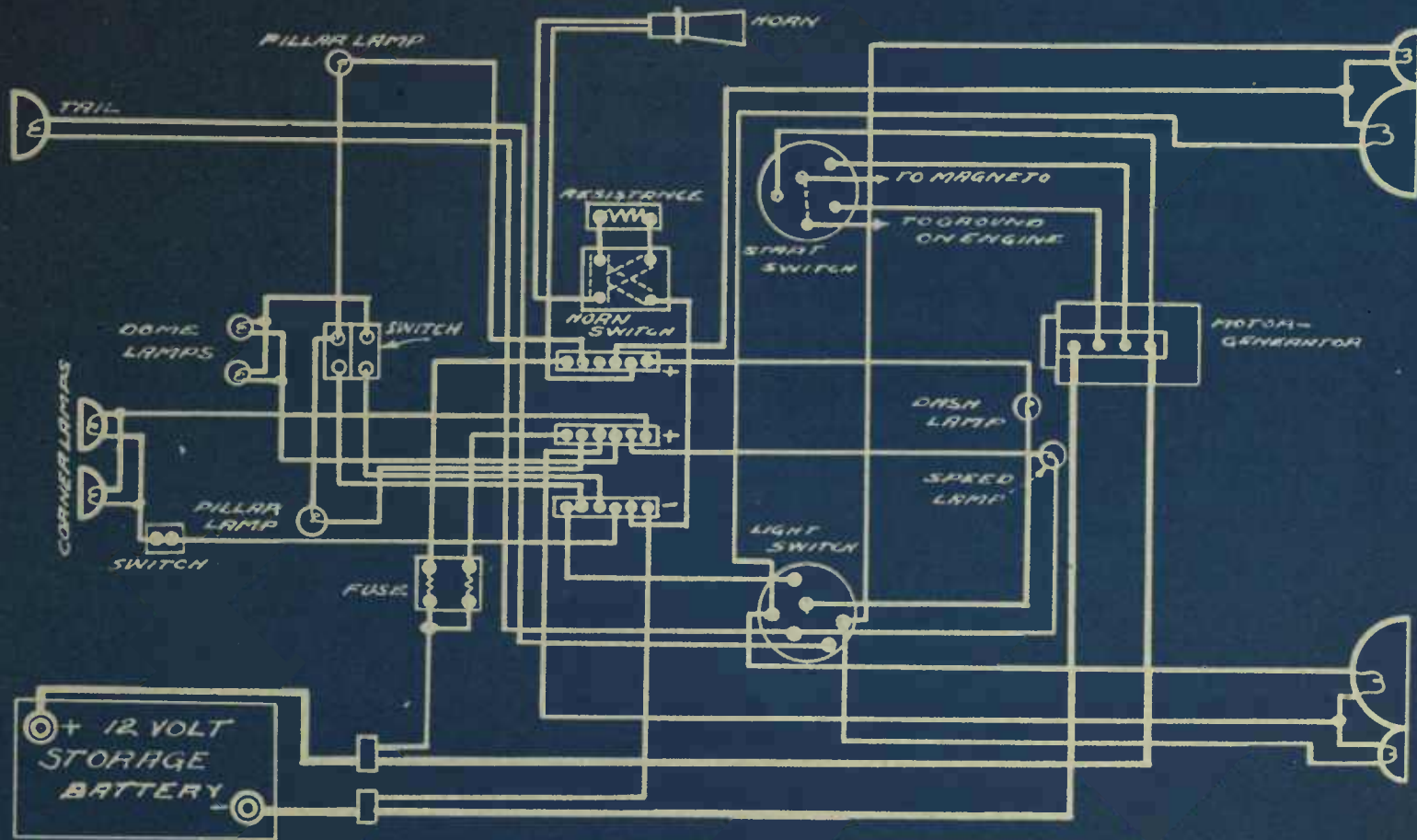


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FRANKLIN 1914-15-16 SERIES 6-M

ENTZ SYSTEM USED ON SEDAN TYPE

FROM FRANKLIN B.P. 19787

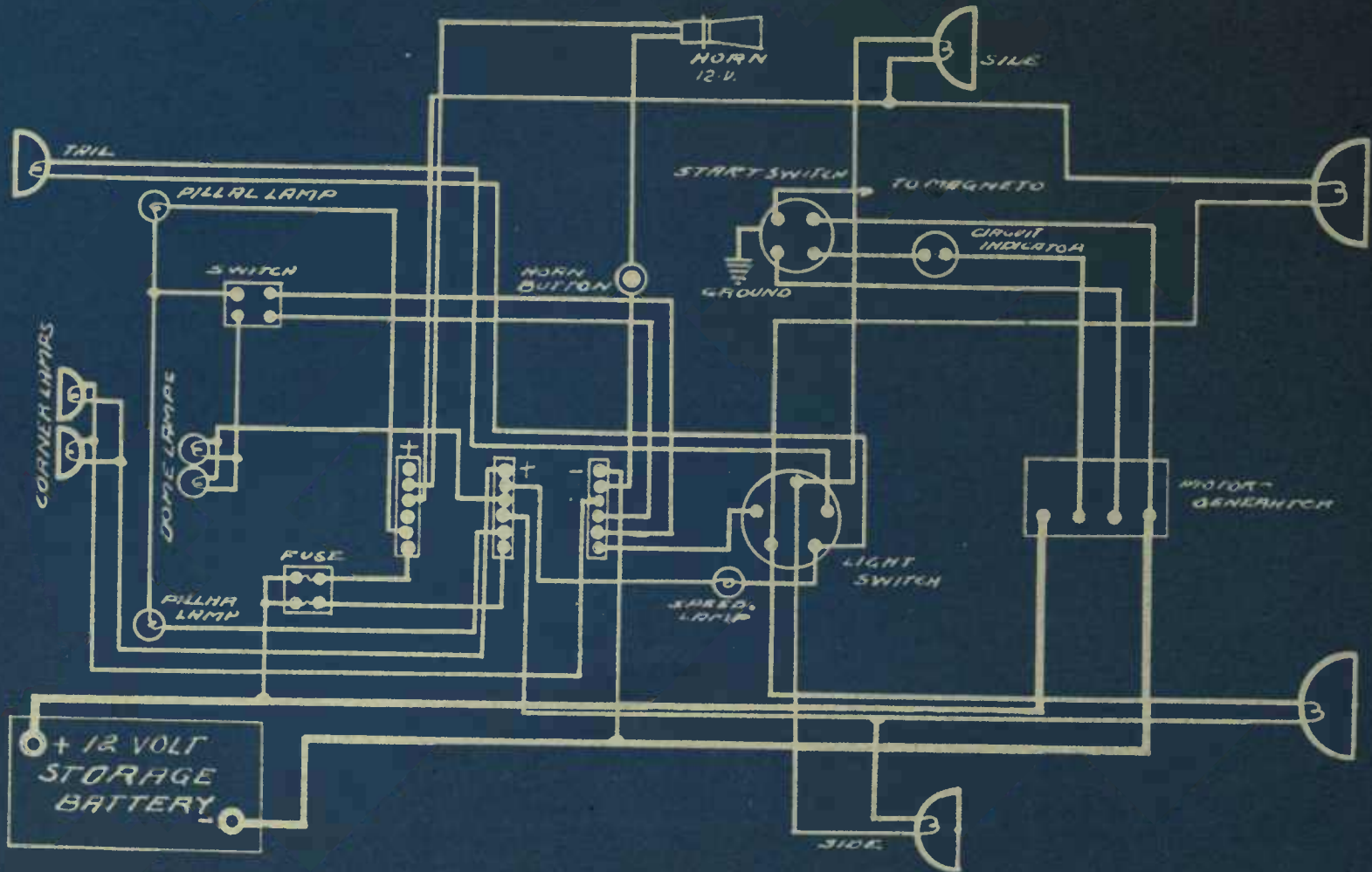


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FRANKLIN 1915

DYNETO SYSTEM USED ON SEDAN TYPE

FROM FRANKLIN 6P 20028

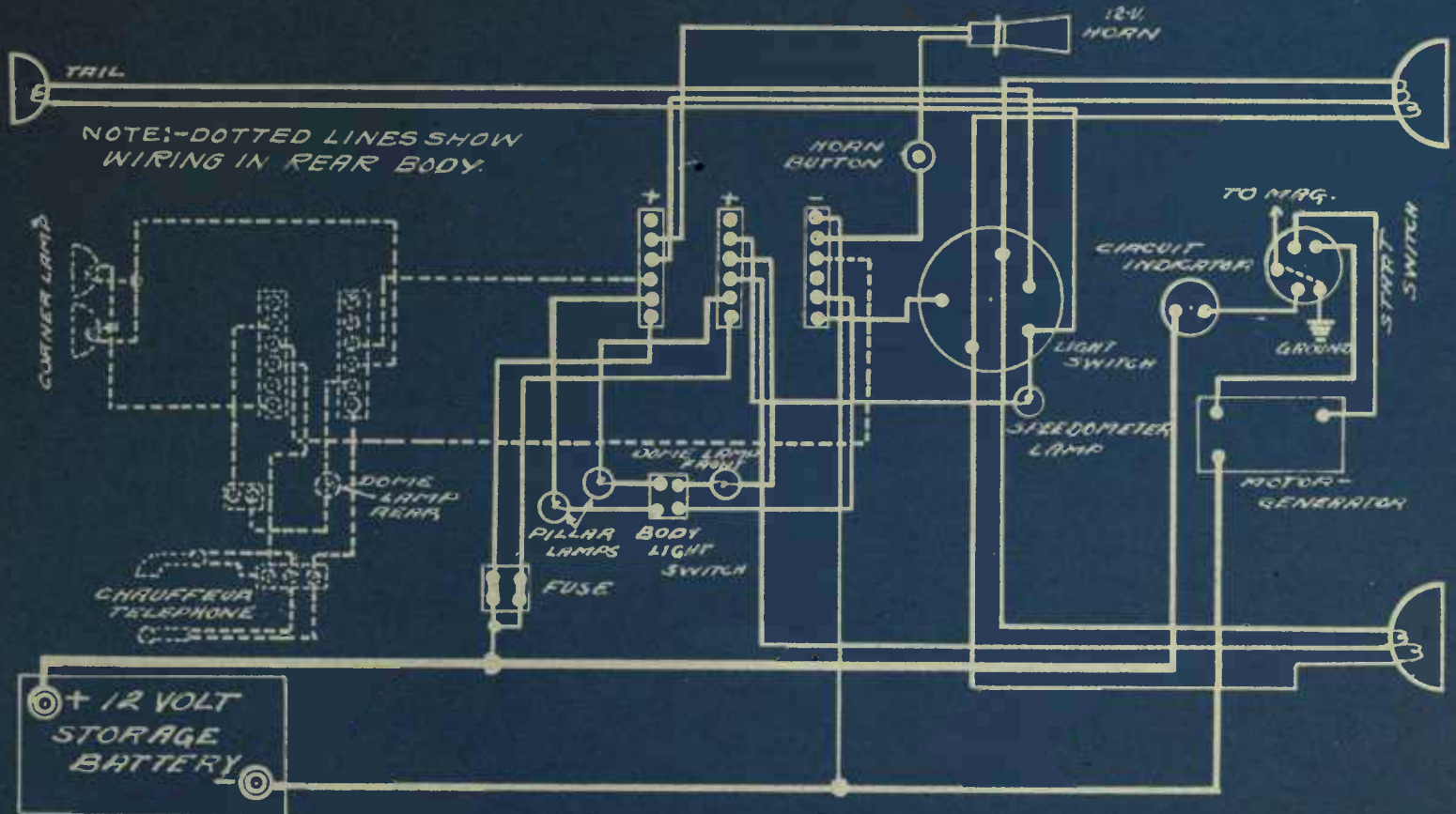


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FRANKLIN 1916

DYNETO SYSTEM USED ON BERLINER TYPE

FROM FRANKLIN B.P. 20542



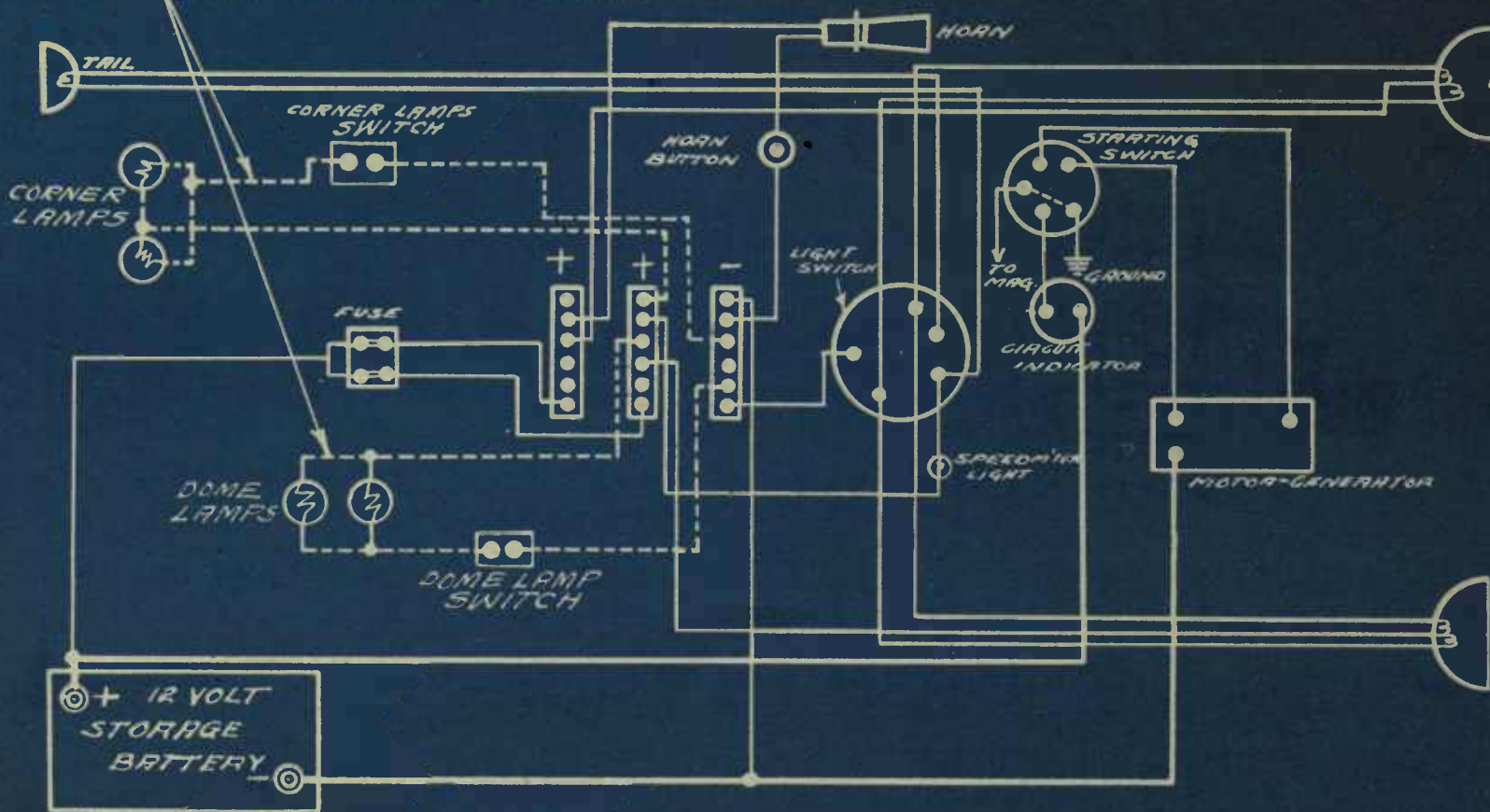
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FRANKLIN 1916 SERIES 8-M

DYNETO SYSTEM USED ON RUNABOUT - TOURING - CONVERTIBLE SEDAN TYPES

FROM FRANKLIN B.P.20711

NOTE: DOTTED LINES SHOW ADDITIONAL WIRING AS USED ON SEDAN TYPES.



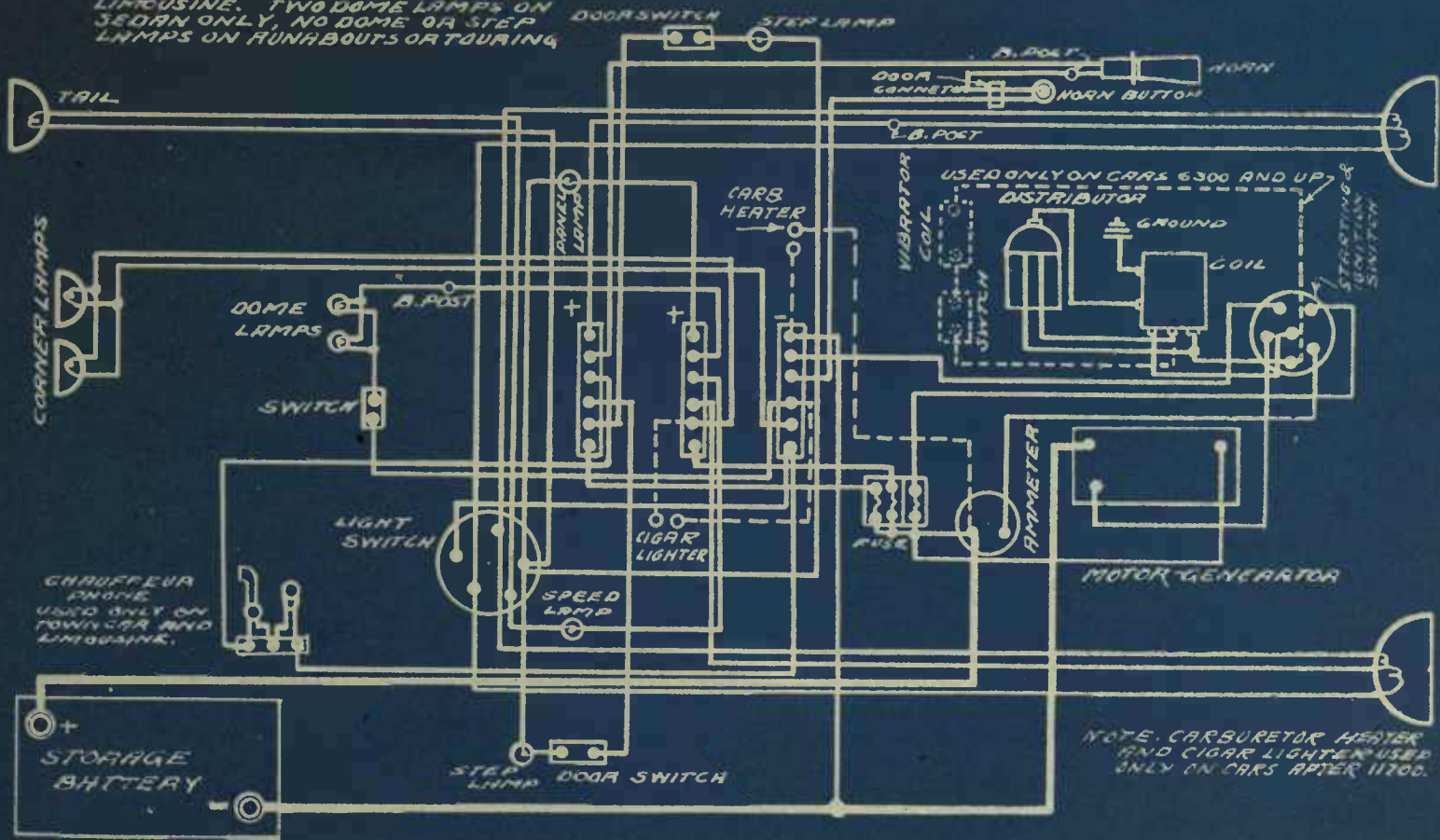
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FRANKLIN 1917-18 SERIES 9 1919

FROM FRANKLIN BLUE PRINTS

DYNETO SYSTEM - R-K IGNITION USED ON ALL MODELS - FIRST 8700 CARS

NOTE:-
CORNER LIGHTS USED ONLY ON
BRADDOCK, SEDAN, TOWN CAR AND
LIMOUSINE. TWO DOME LAMPS ON
SEDAN ONLY, NO DOME OR STEP
LAMPS ON RUNABOUTS OR TOURING

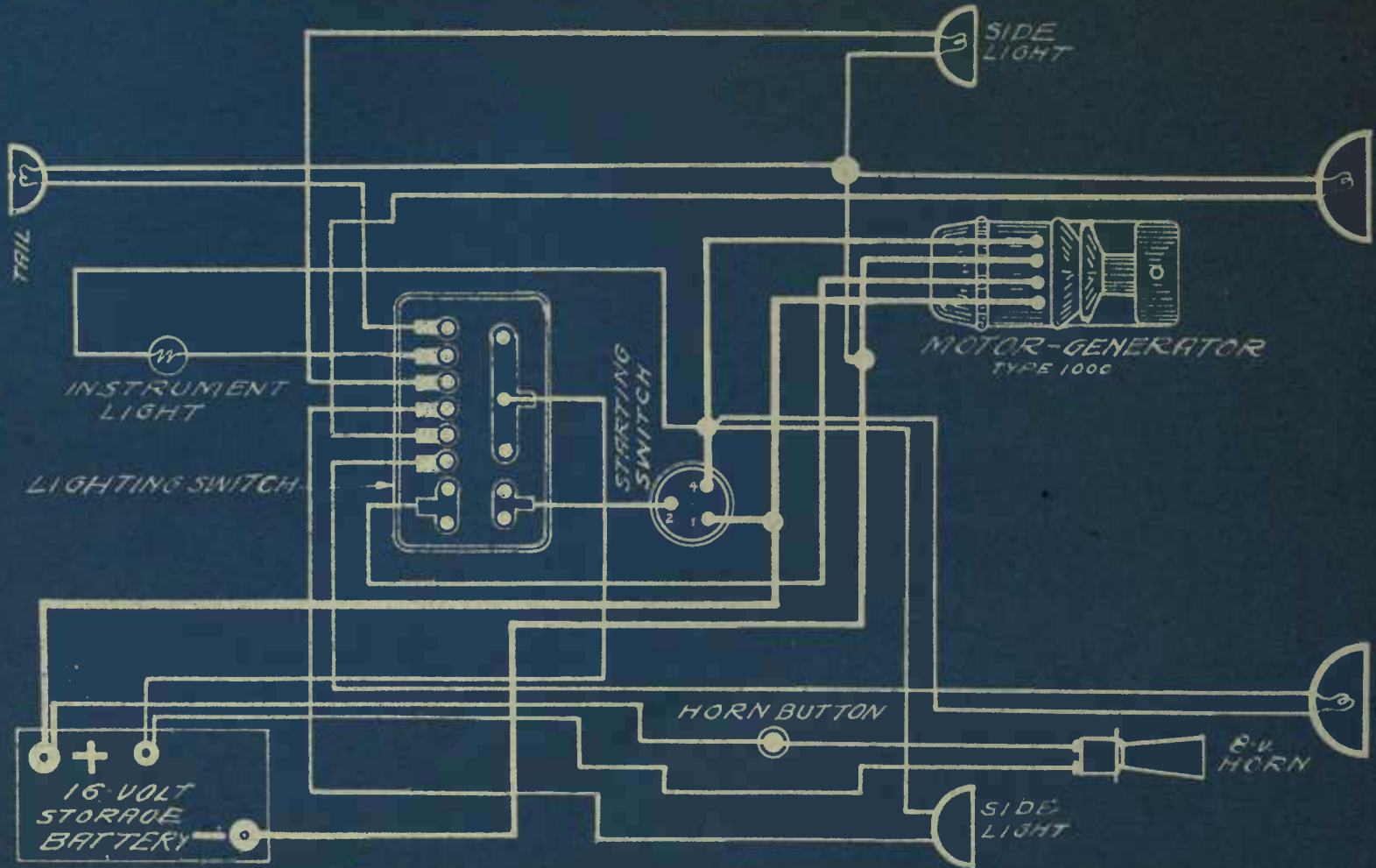


NOTE. CARBURETOR HEATER
AND CIGAR LIGHTER USED
ONLY ON CARS AFTER 11700.

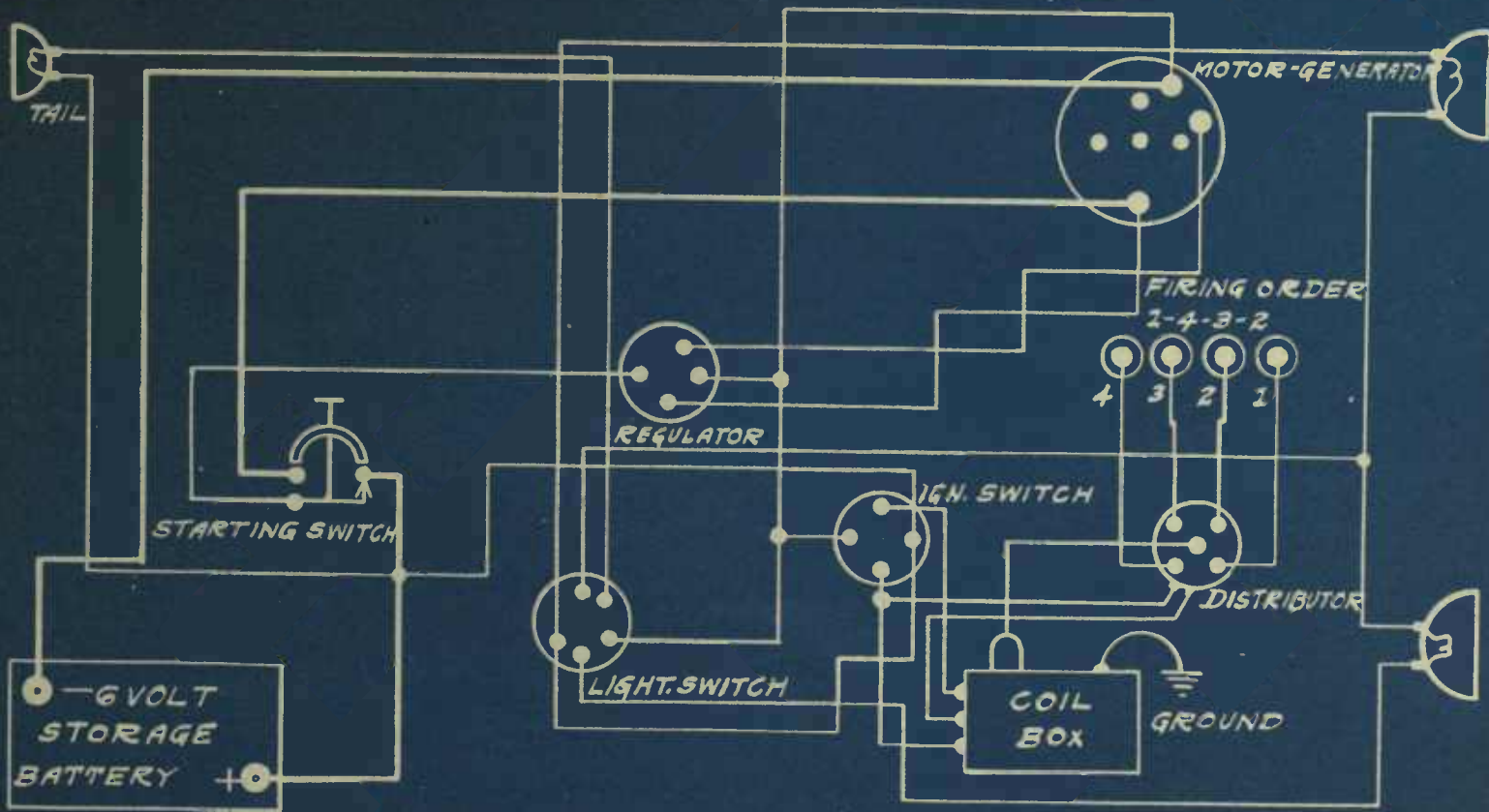
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GALT 1913
NORTH-EAST SYSTEM

FROM N-E PLATE 150

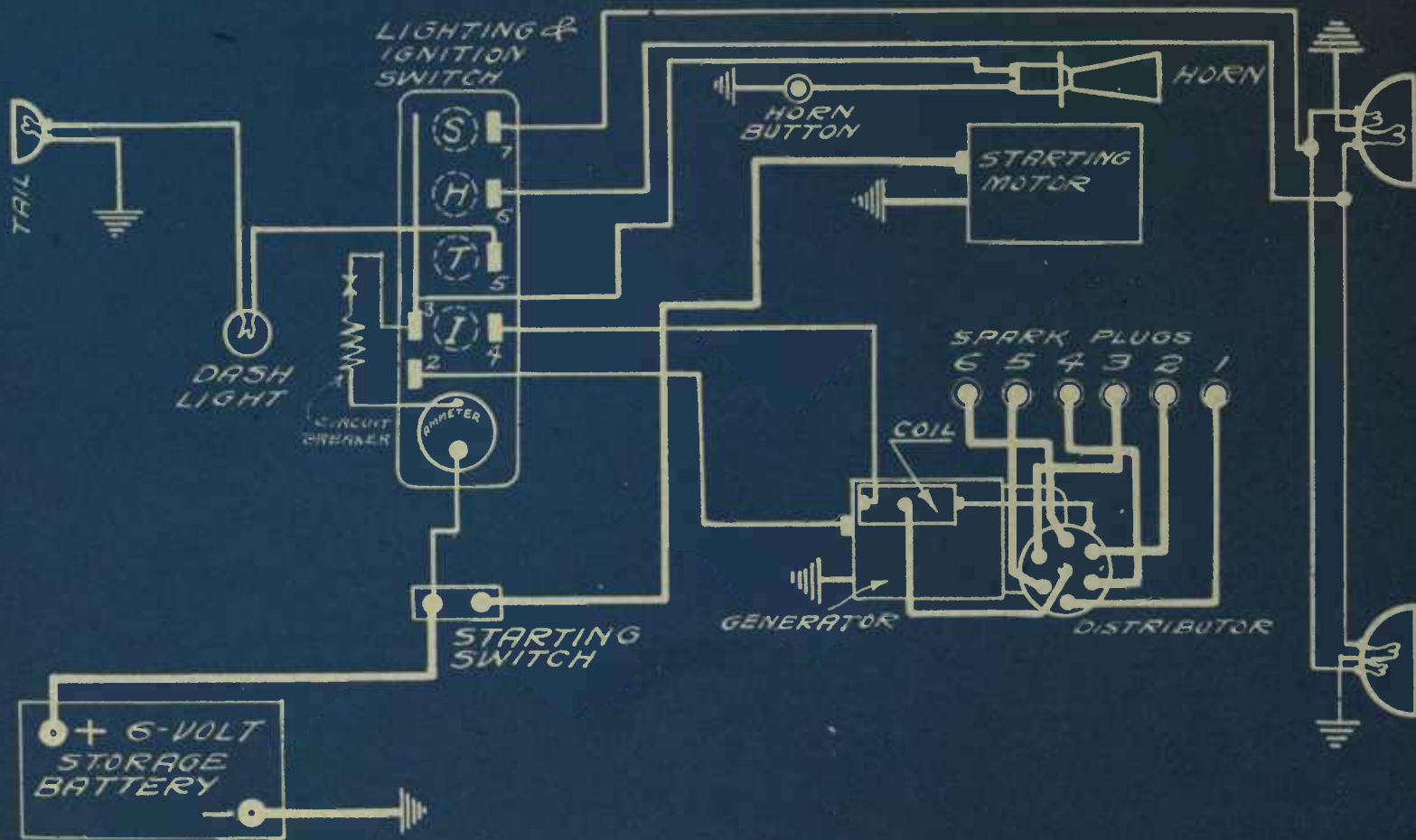


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G. M. C. TRUCK 1917 MODELS 15, 25, 26, 30, 31, 40, 41, 70, 71, 100, 101
 DELCO SYSTEM FROM DELCO MANUAL

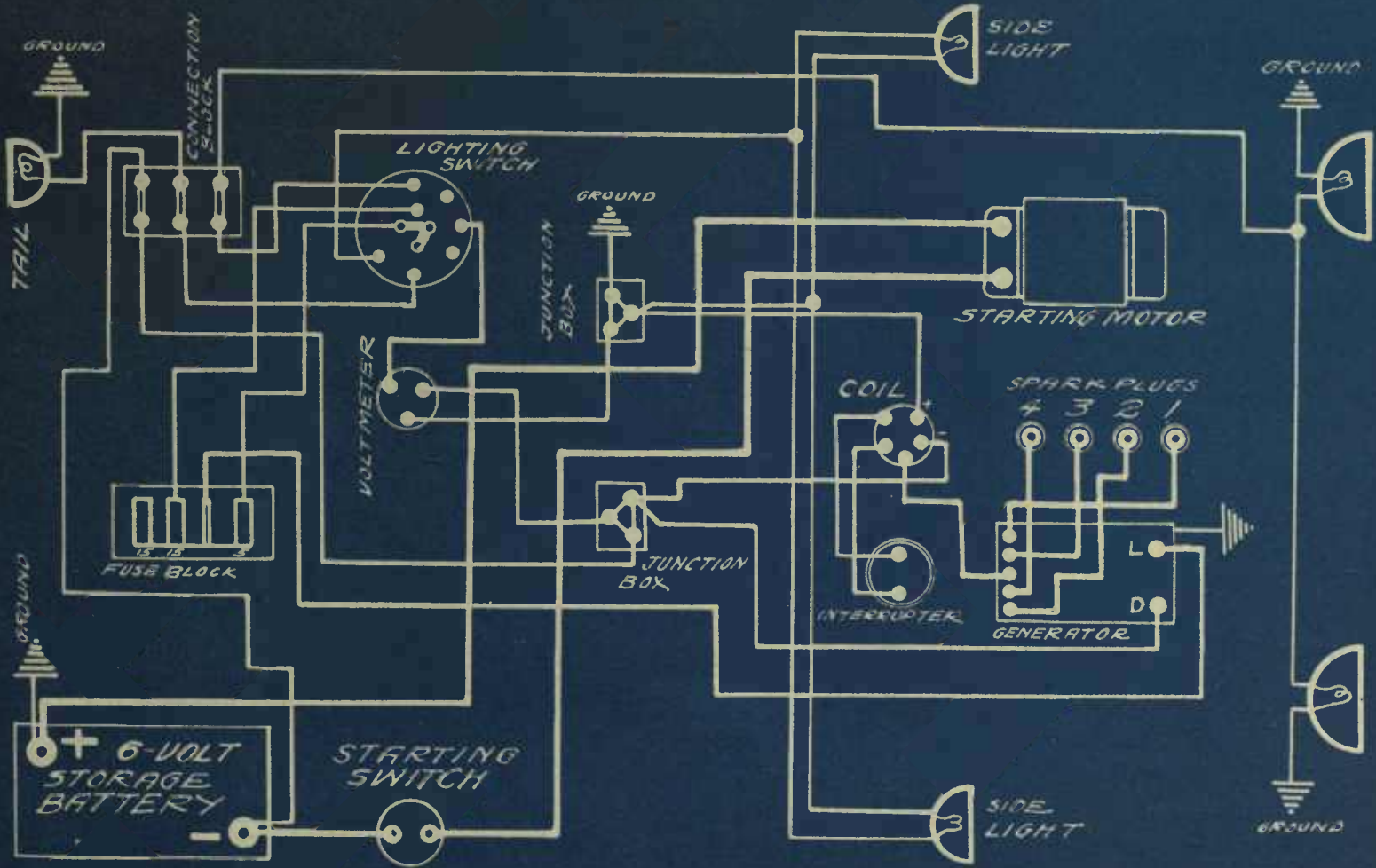


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GLIDE 1913-1914
WESTINGHOUSE SYSTEM

36-42

FROM MFRS. BLUE PRINT
- USED ON CARS 5282 AND UP -

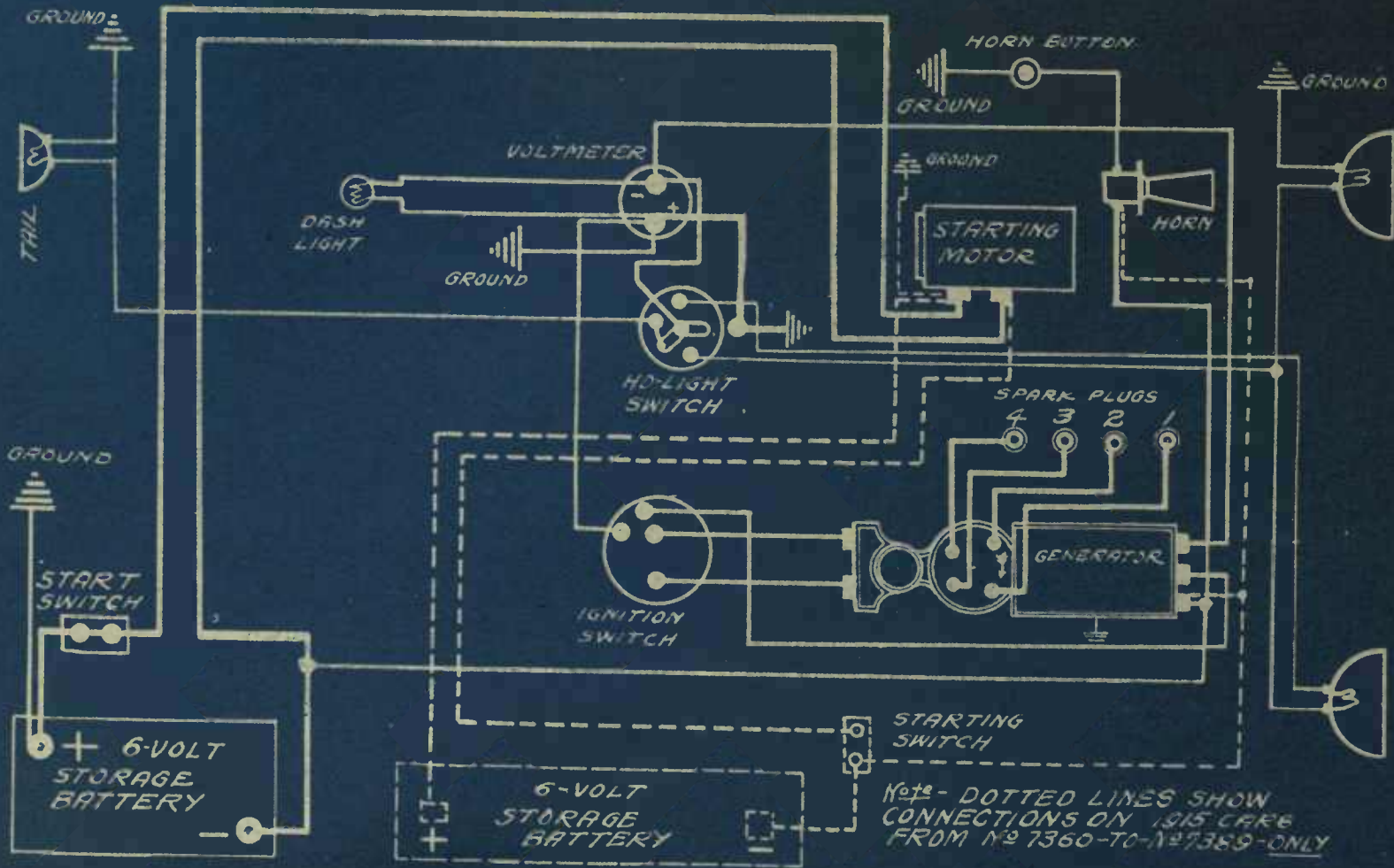


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GLIDE 1914 - MODEL-30

WESTINGHOUSE SYSTEM (USED ON CARS FROM #7000-TO-#7360)

FROM MFRS. BP 14-696

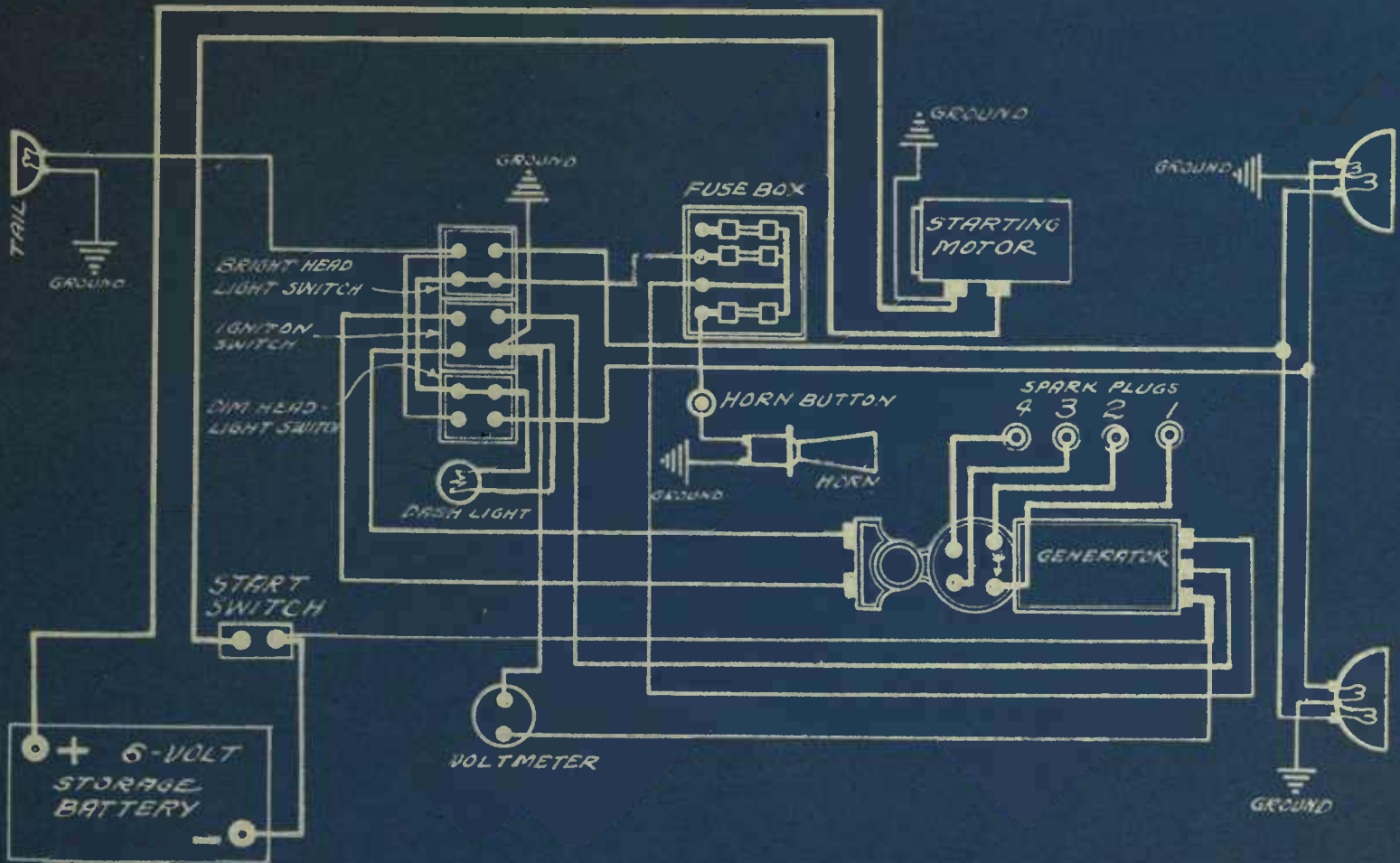


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GLIDE 1915 MODEL 30

WESTINGHOUSE SYSTEM (USED ON CARS FROM #7389-TO-#7698)

FROM MFRS BP. 14-696

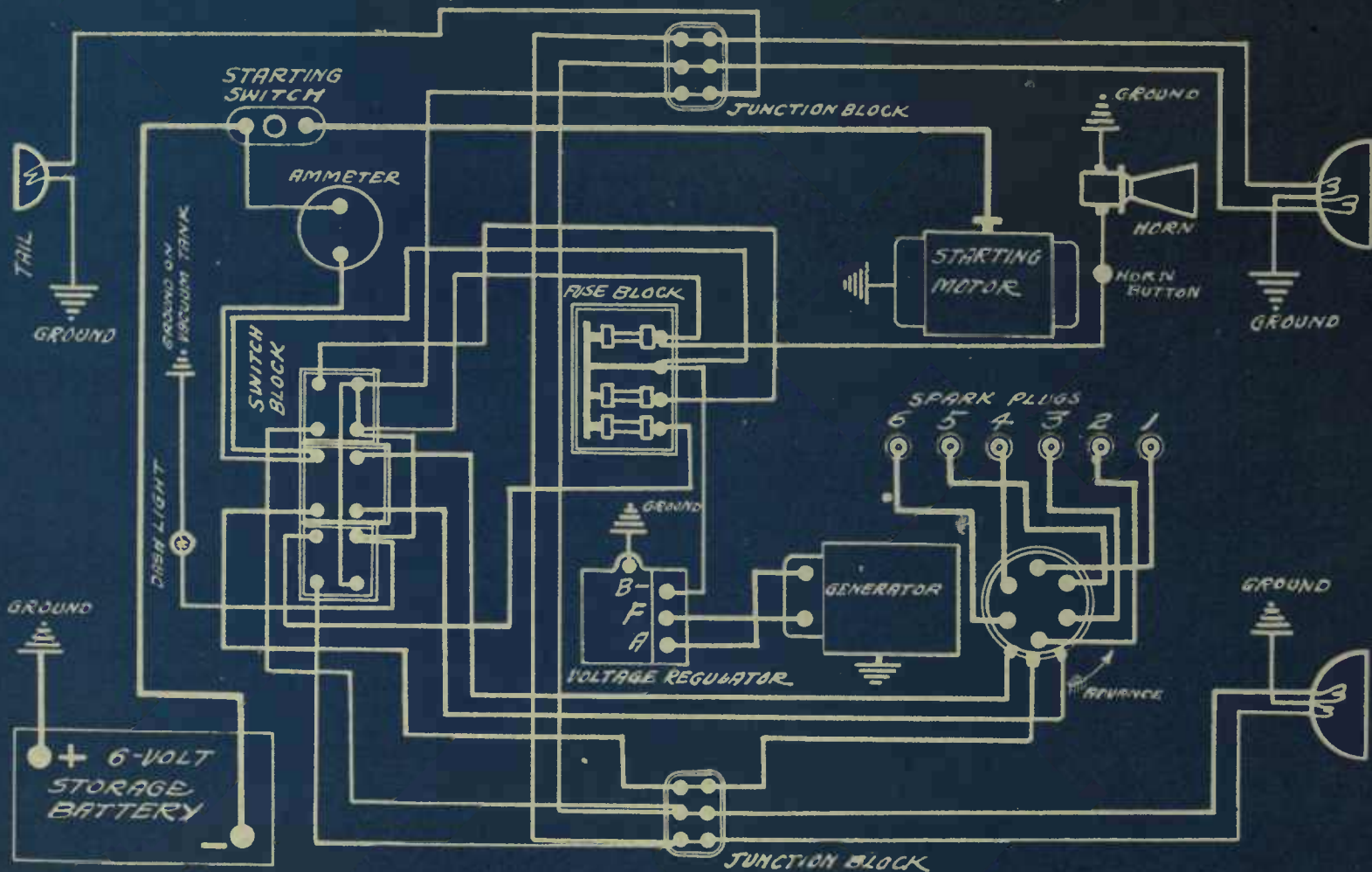


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GLIDE 1916-1917
WESTINGHOUSE SYSTEM

SIX-40
(USED ON CARS FROM #9000-TO-#10255)

FROM MFRS BP. 16-696



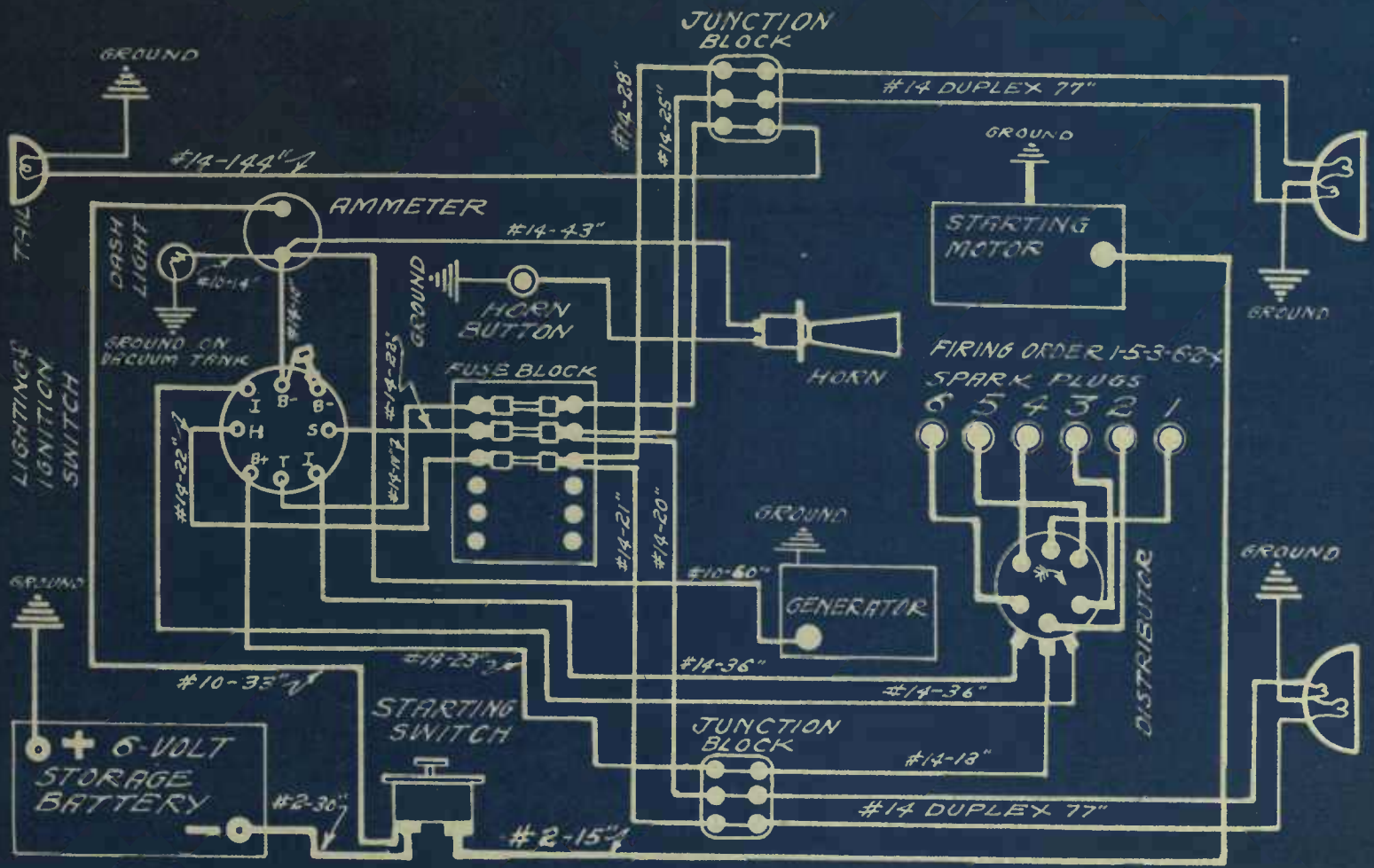
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GLIDE 1918 LIGHT SIX 40

WESTINGHOUSE SYSTEM

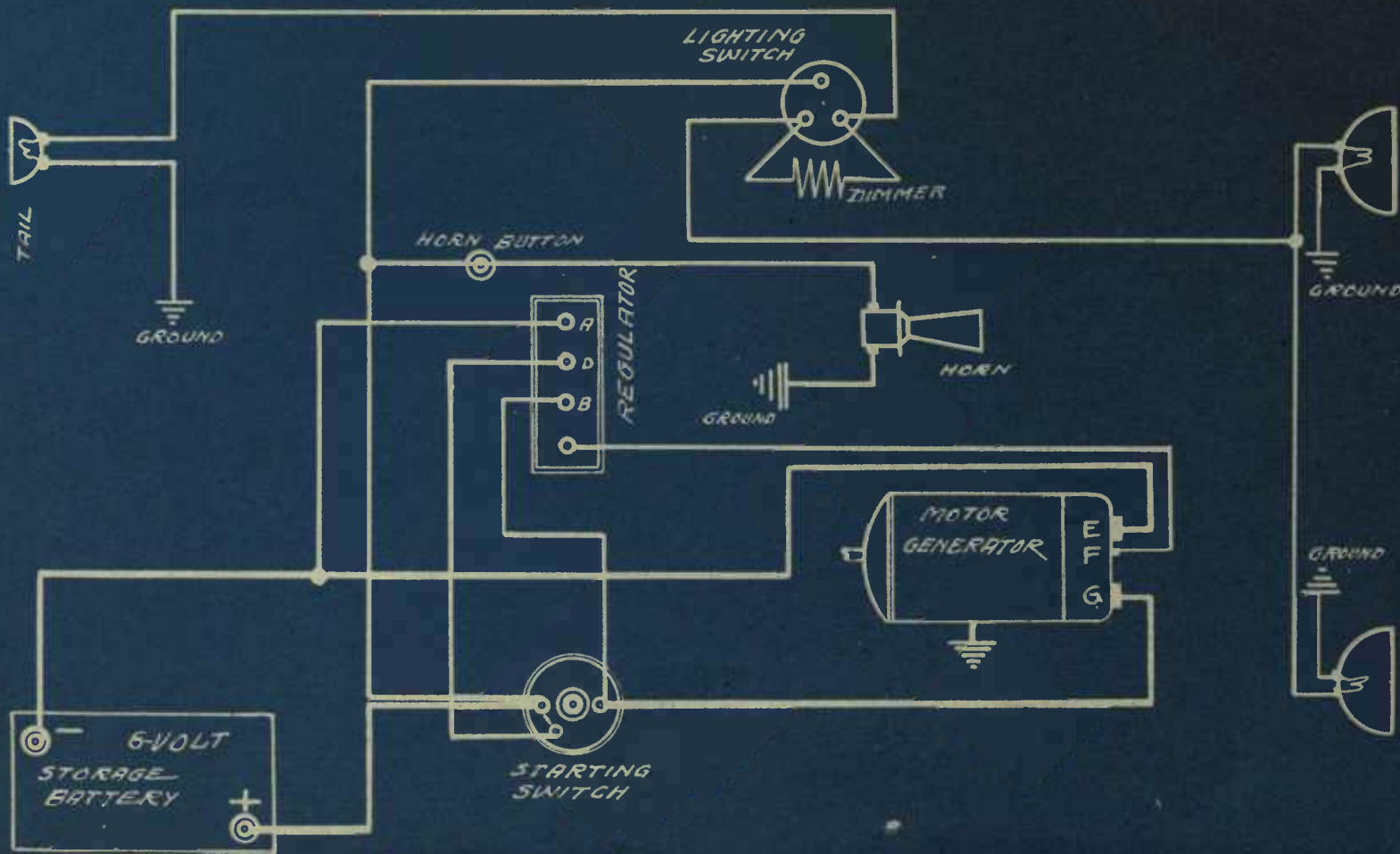
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GRANT 1915-1916 "4"
ALLIS-CHALMERS SYSTEM

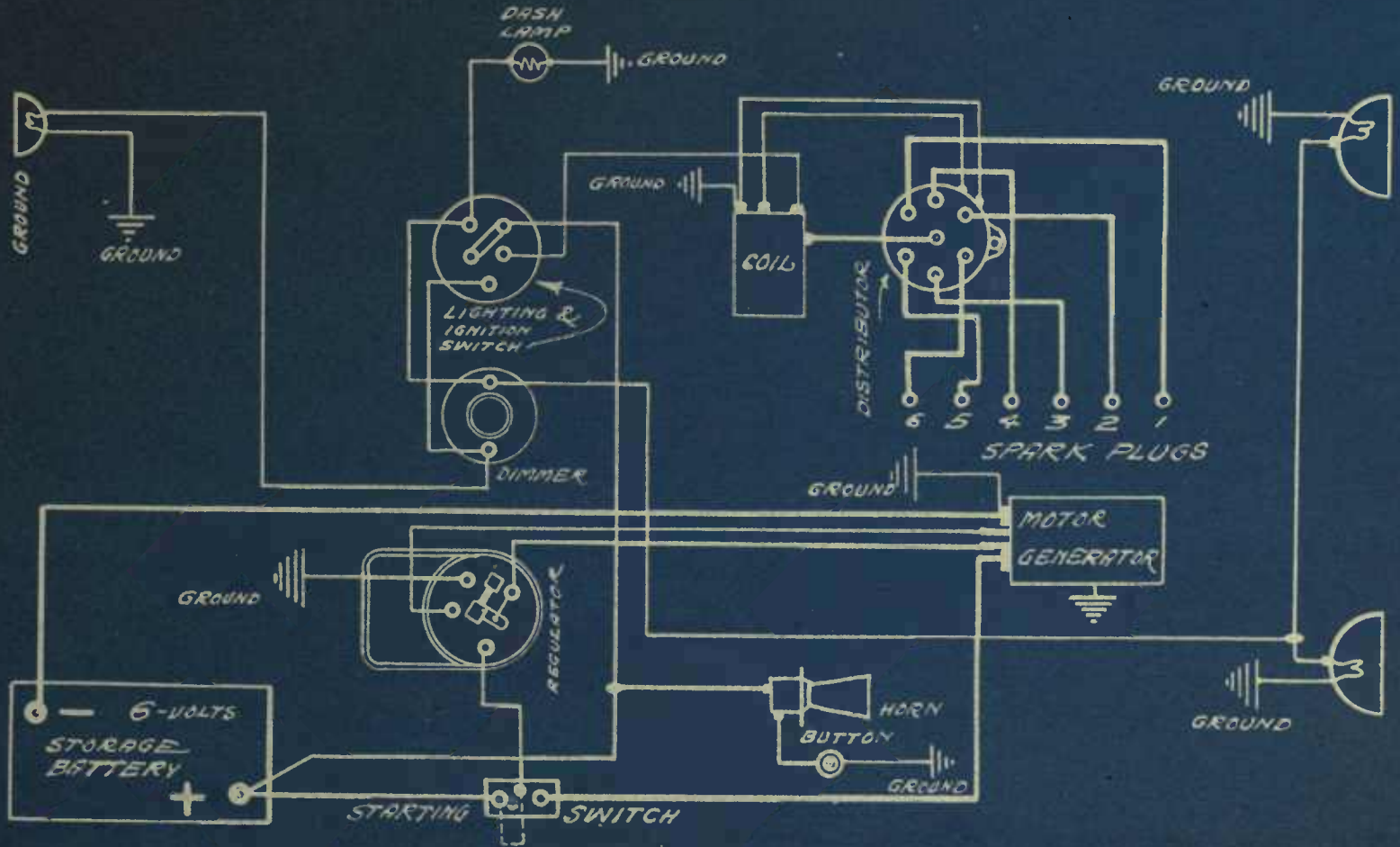
FROM A.-C. BP. SK10377



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GRANT 1915-1916 "6"
ALLIS-CHALMERS SYSTEM

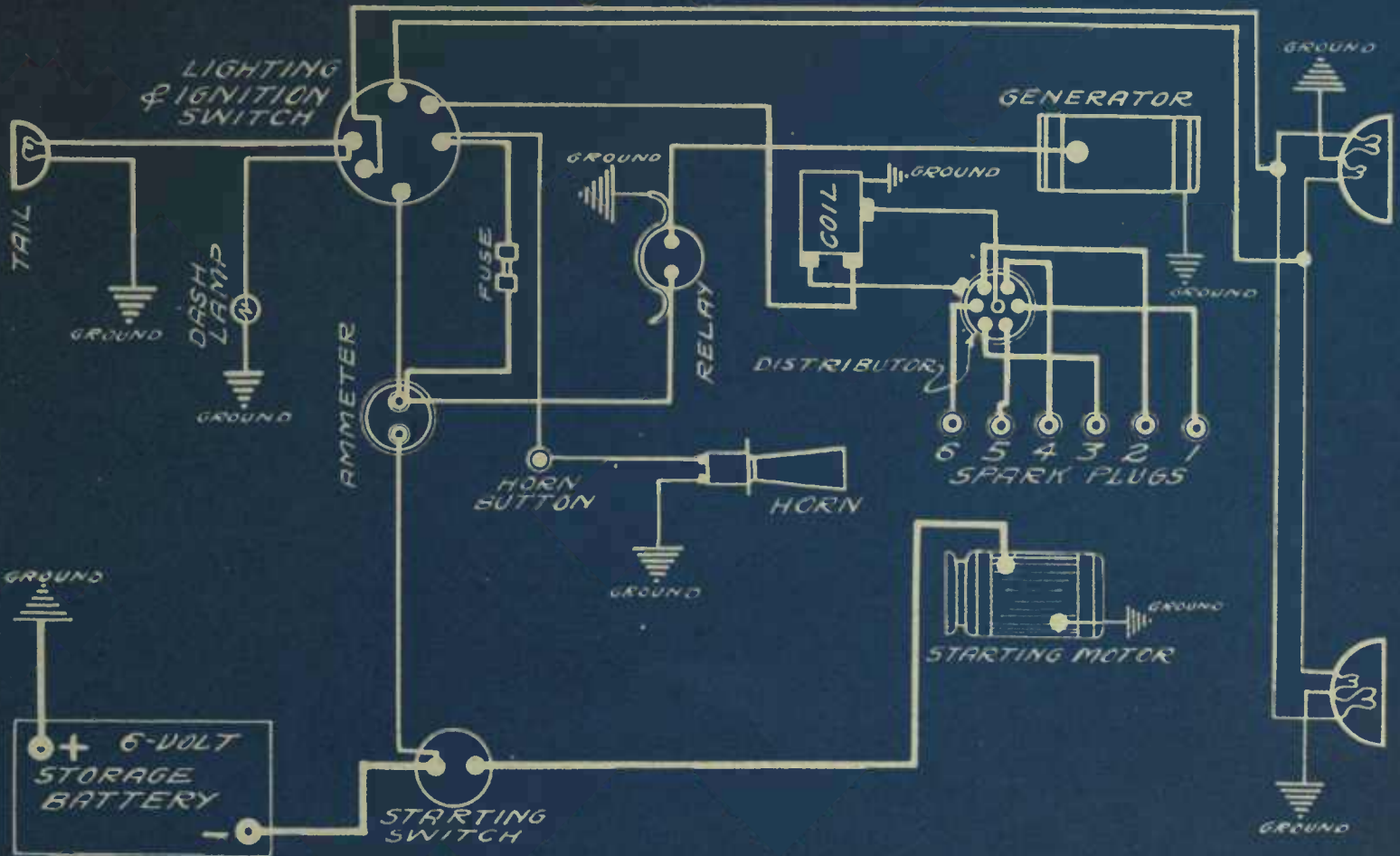
FROM MFRS. BP. 7-T-26



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GRANT 1916-17-18 "K"
 WAGNER SYSTEM WITH REMY IGNITION

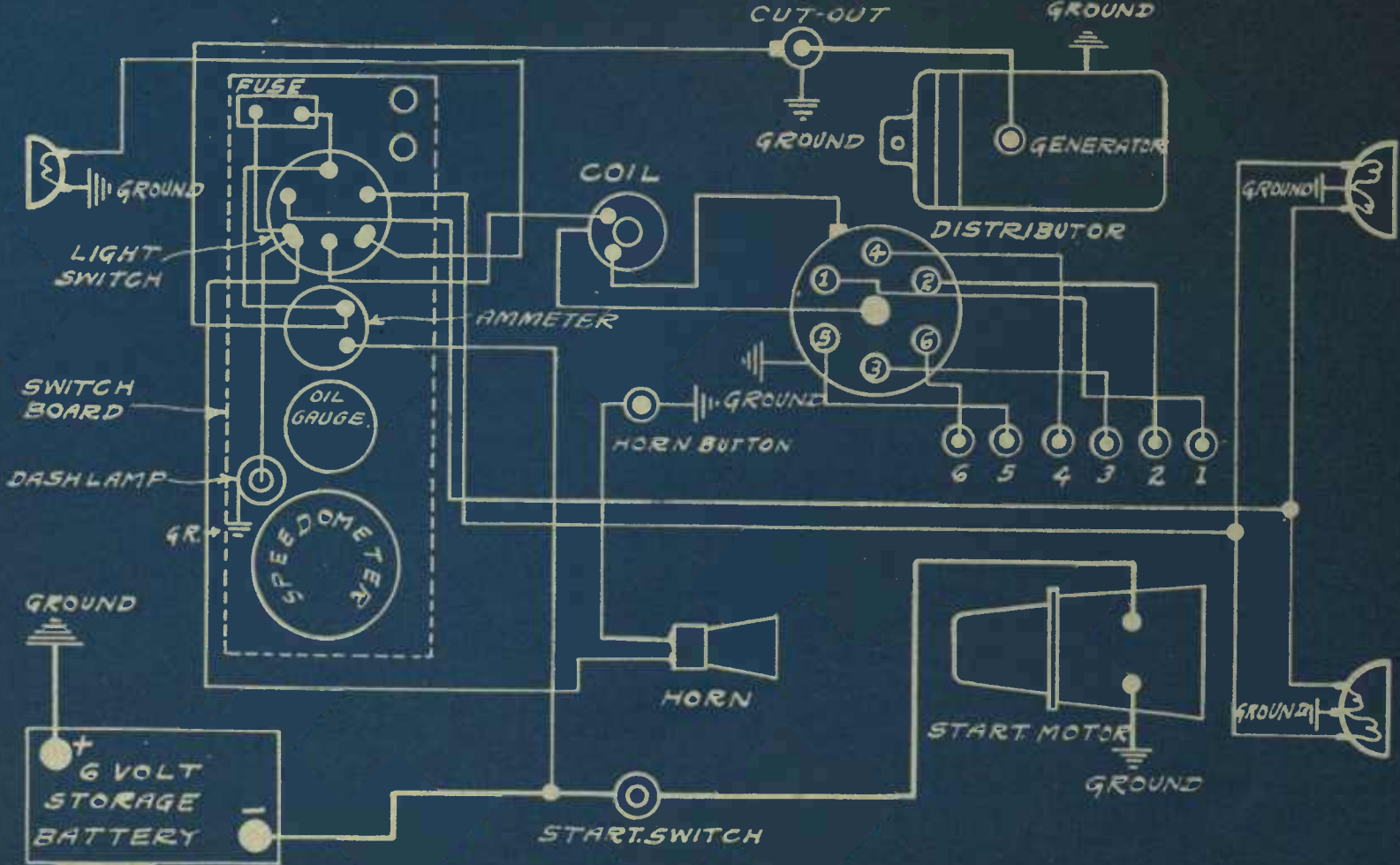
FROM REMY MANUAL



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GRANT 1918 "G" WAGNER SYSTEM

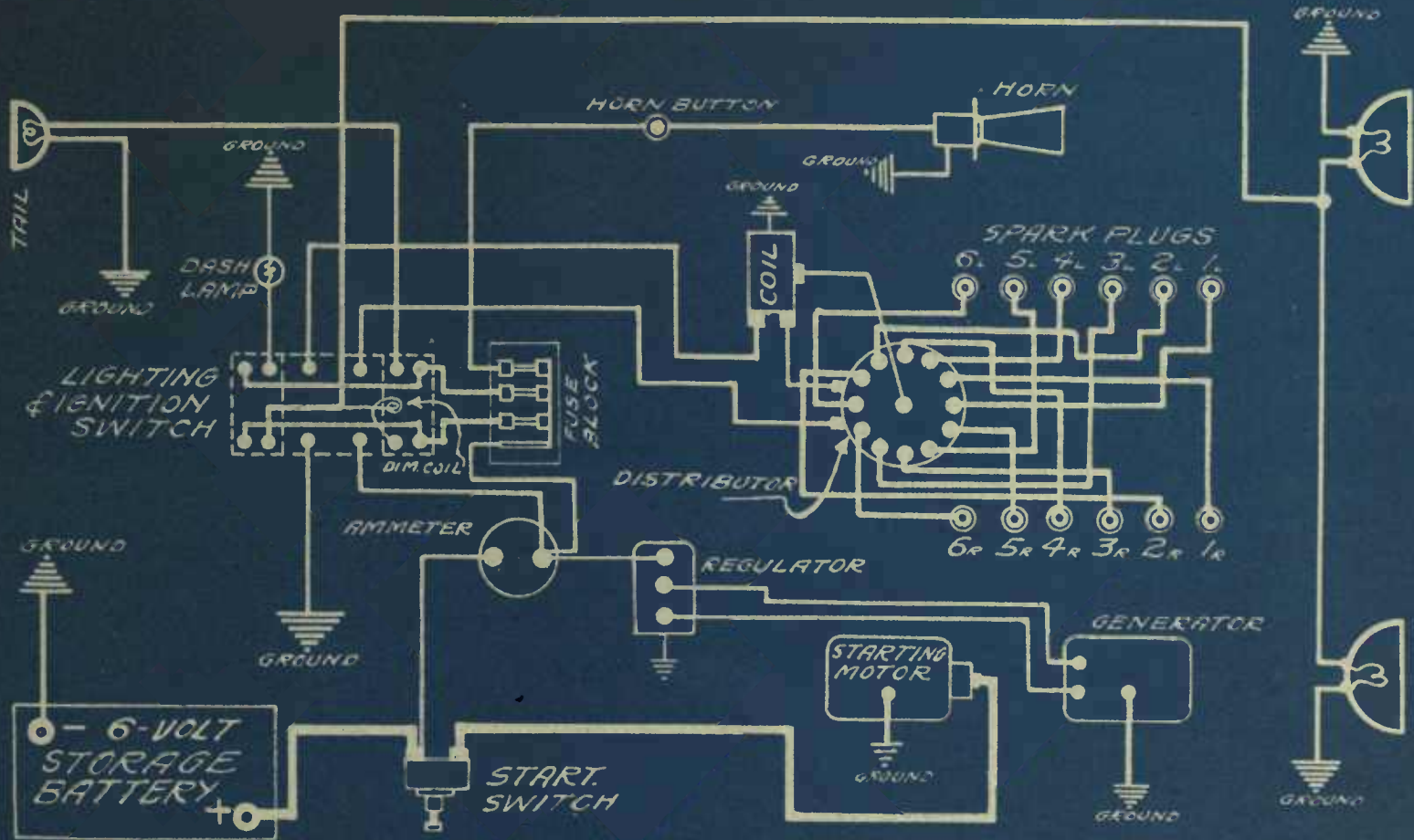
FROM MNFRS. B.P. 5896



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H. A. L. 1916-17-18 "12"
 WESTINGHOUSE STARTING & LIGHTING SYSTEM
 REMY IGNITION SYSTEM USED ON 1916-17 CARS
 DELCO IGNITION SYSTEM USED ON 1918 CARS

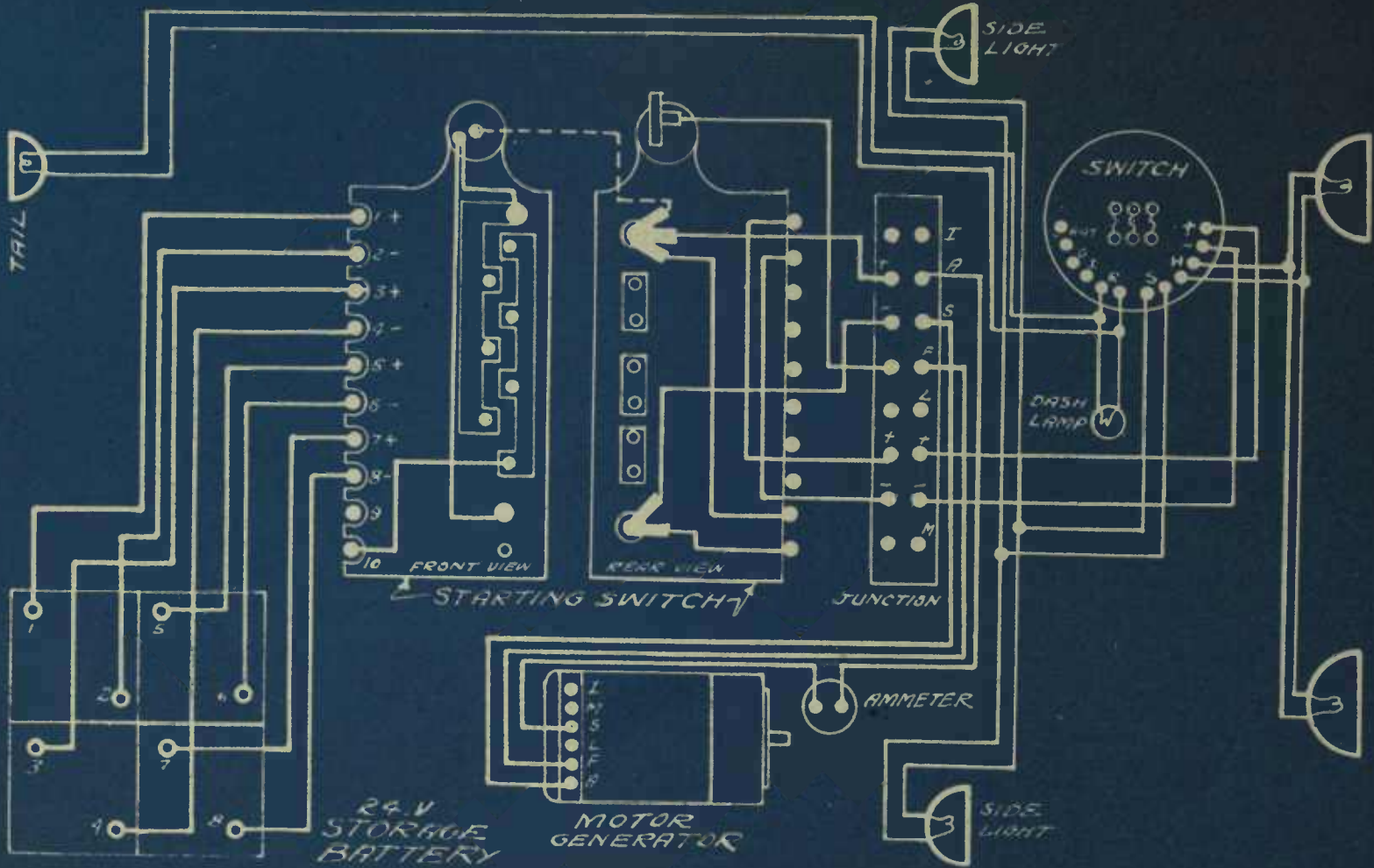
FROM REMY MANUAL



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HALLADAY 1913-1914 "G" & "32"
ELECTRO SYSTEM

FROM MERS. BP #1



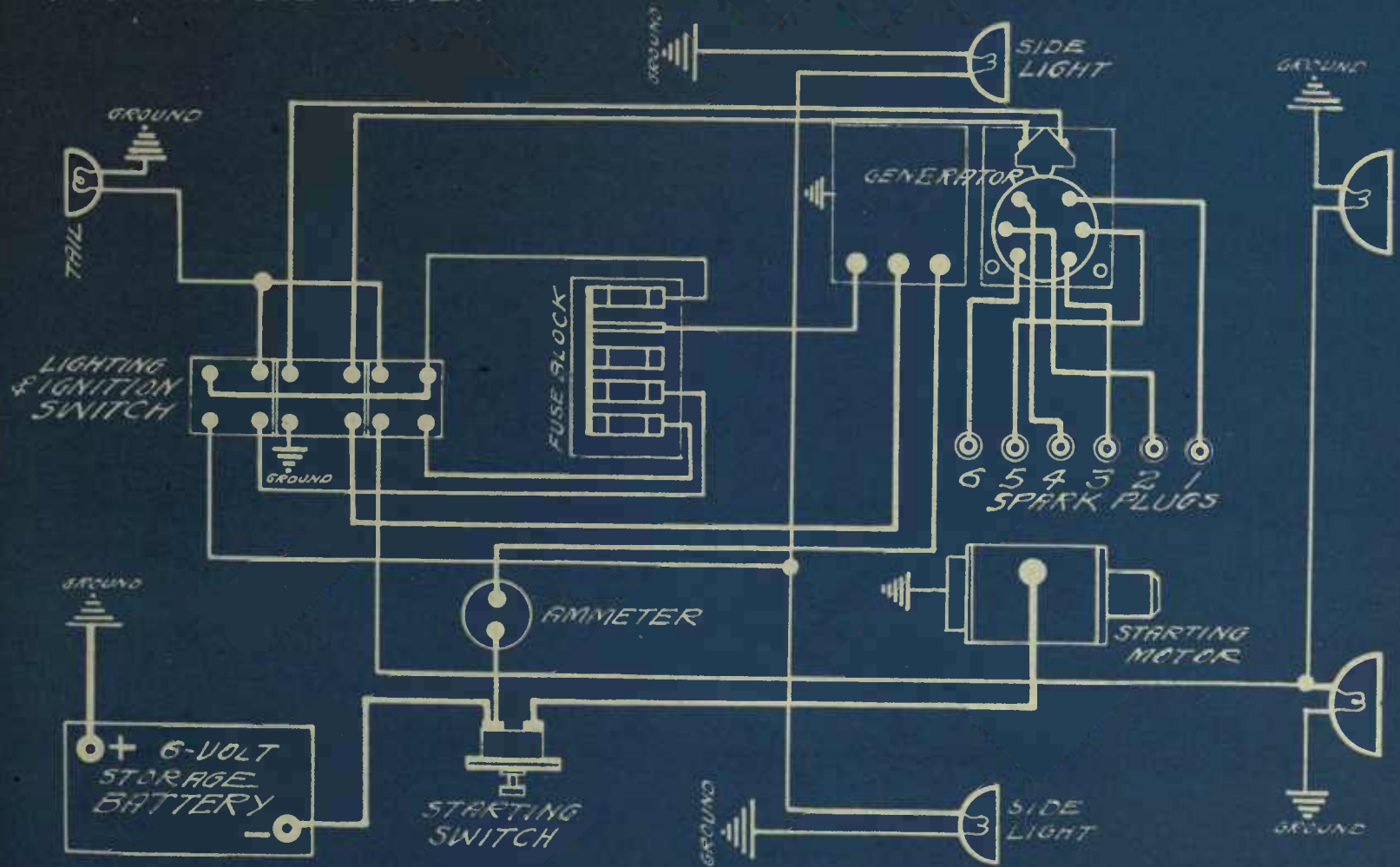
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HALLADAY 1915 "6-40"

WESTINGHOUSE SYSTEM

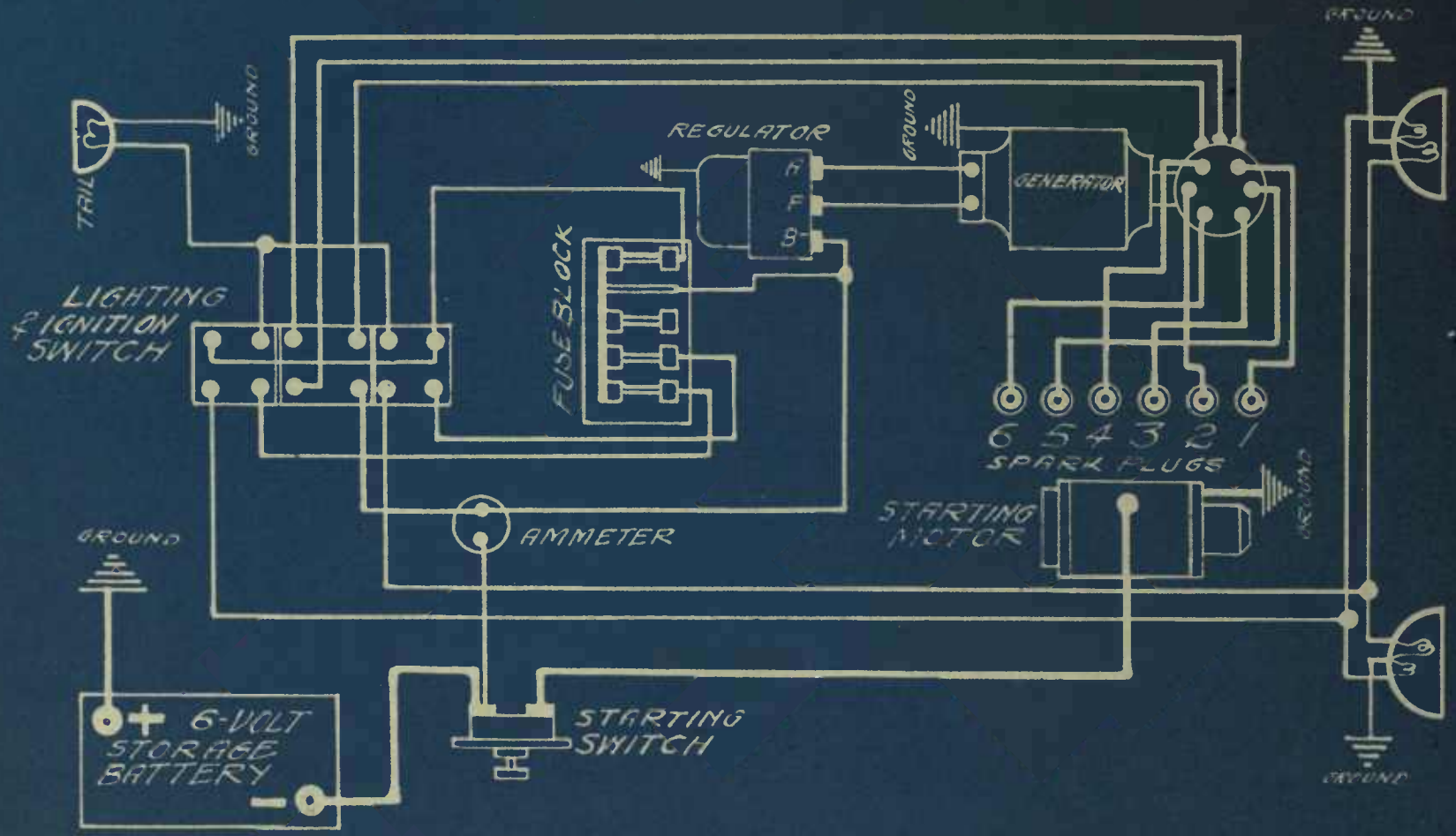
FROM MFRS. BP.#3

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HALLADAY 1916 "R"
WESTINGHOUSE SYSTEM

FROM MFRS. BR#2

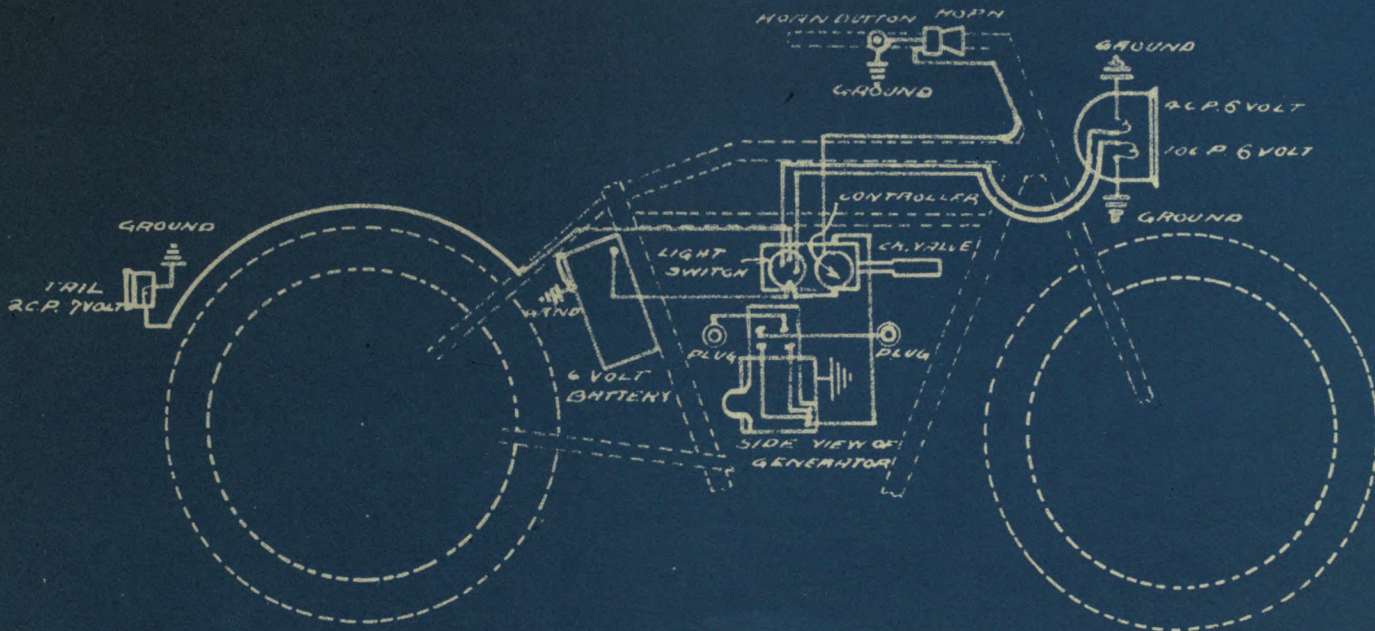


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HARLEY DAVIDSON MOTORCYCLE 1915

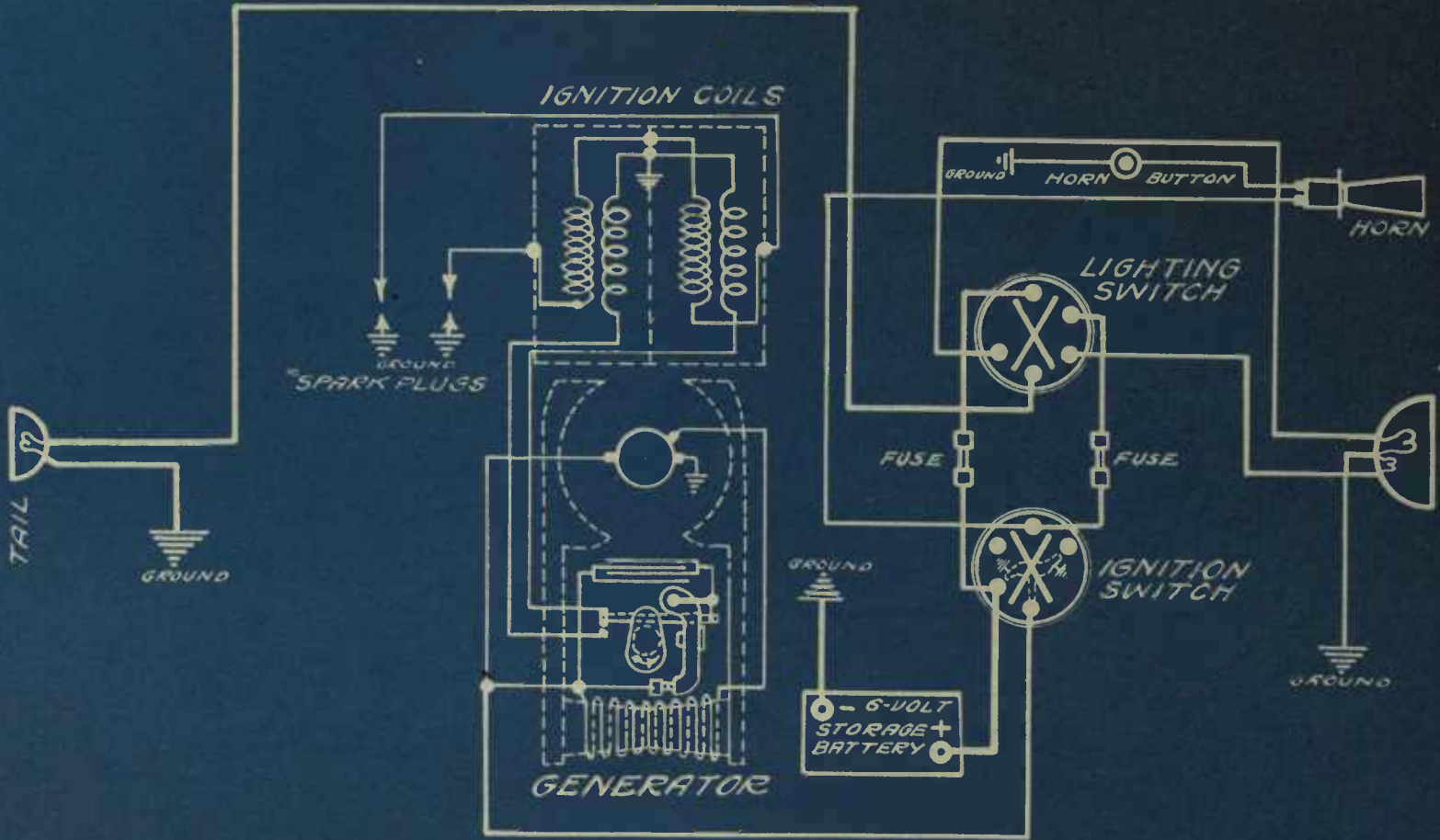
REMY SYSTEM

FROM REMY DIAGRAM



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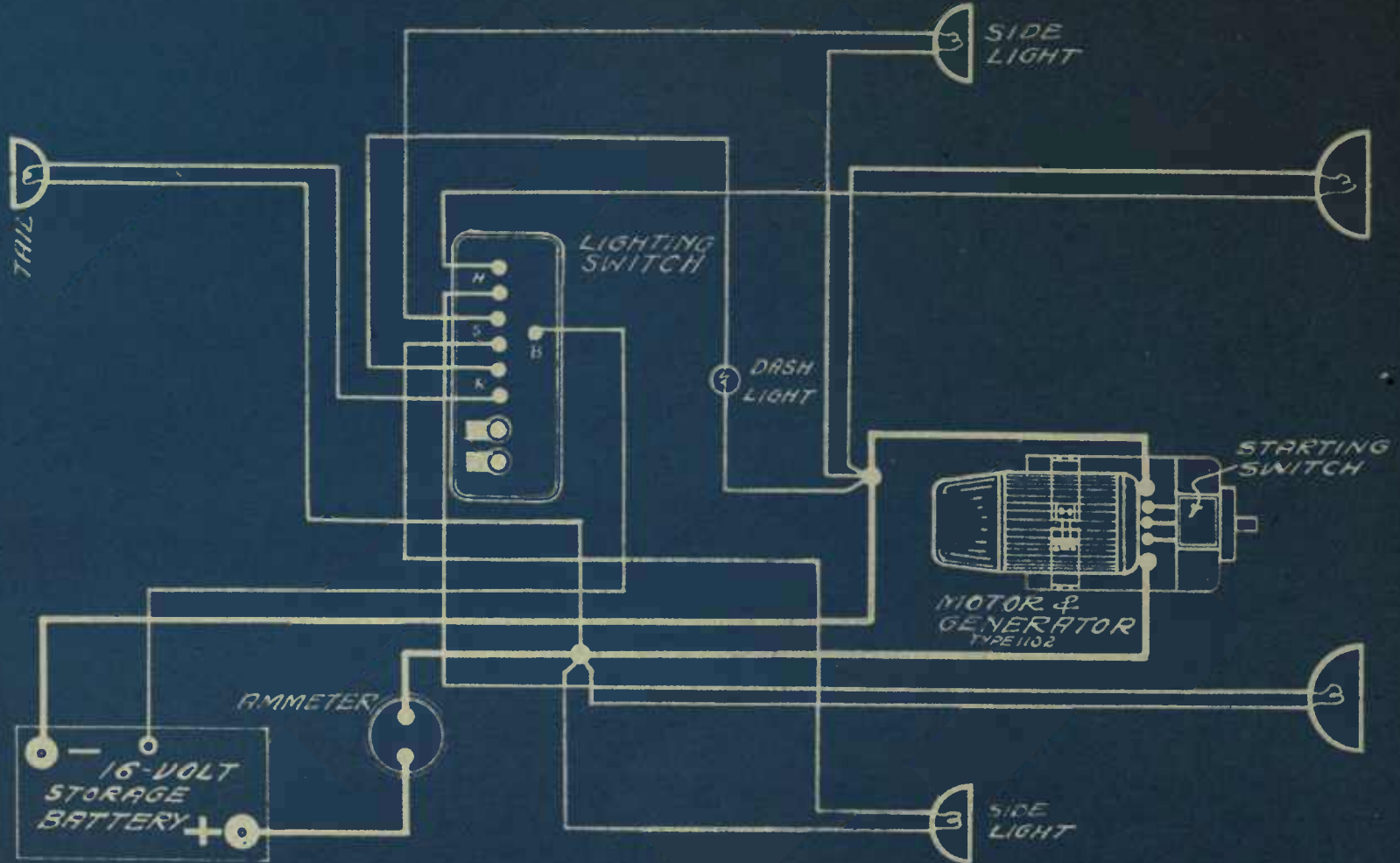
HARLEY DAVIDSON MOTORCYCLE 1916-17 FROM REMY MANUAL
 REMY SYSTEM



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HAVERS 1914
NORTH-EAST SYSTEM

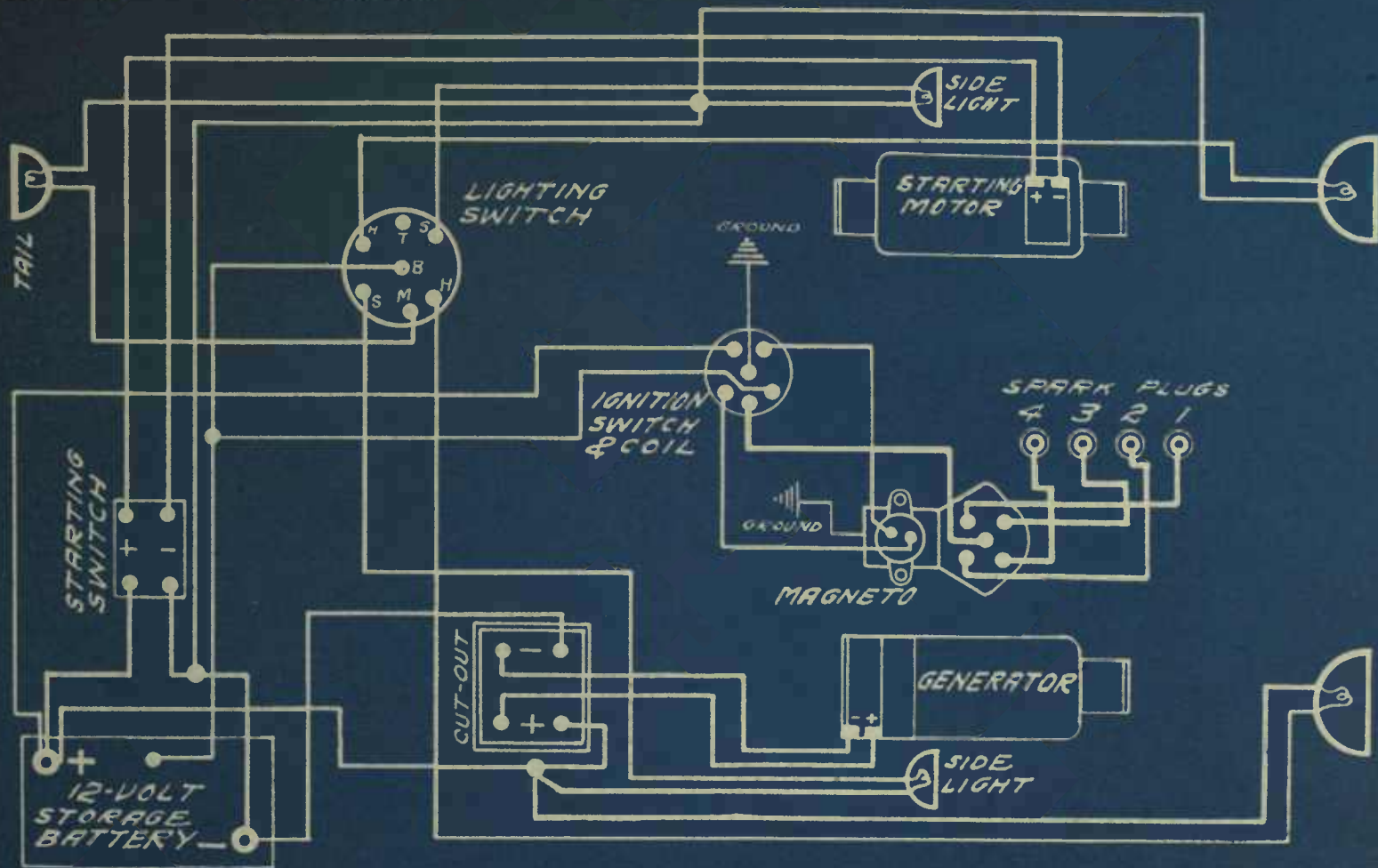
FROM N.-E. PLATE 280



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HAYNES 1913 "24"
LEECE-NEVILLE SYSTEM

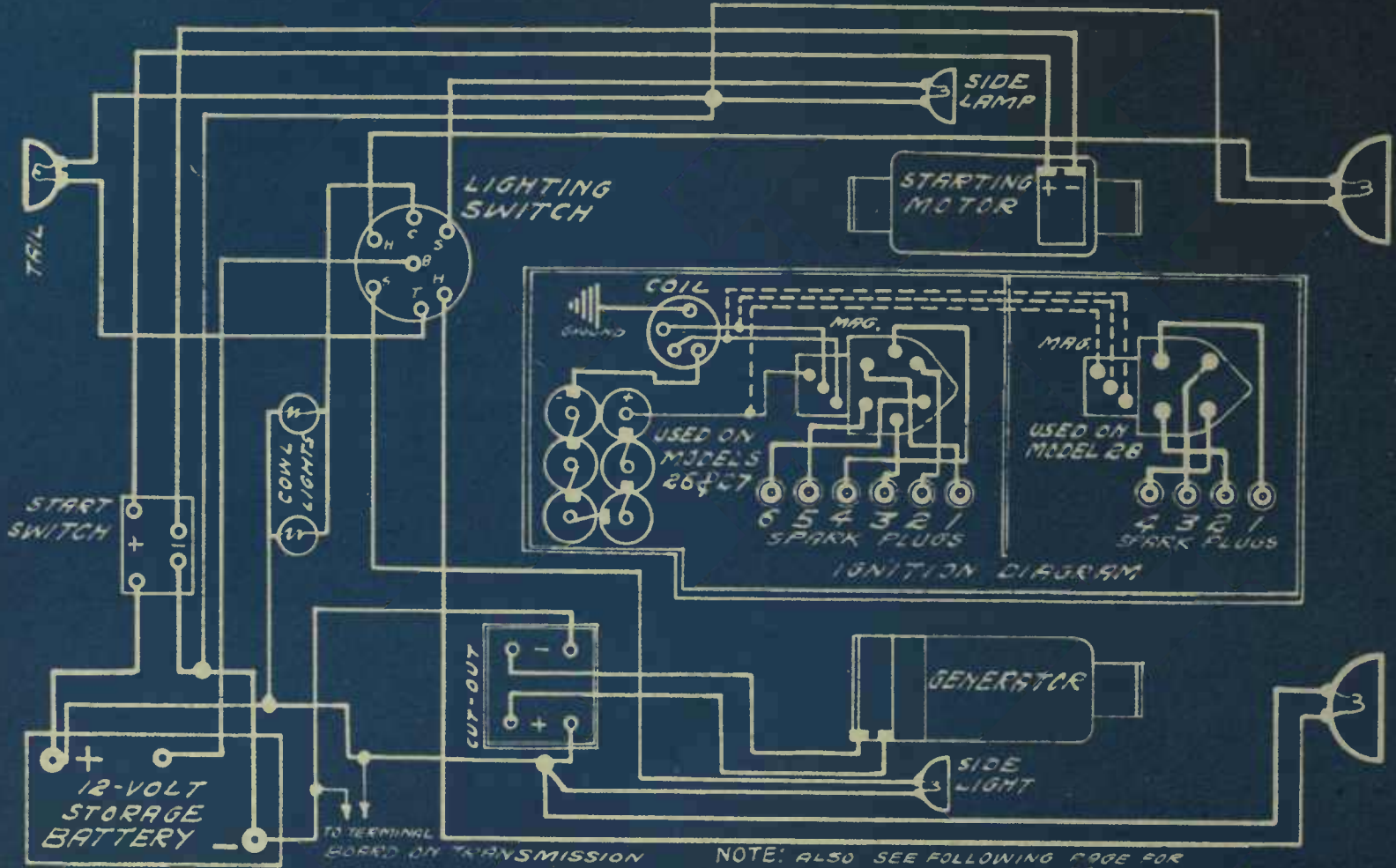
FROM MFRS. BP M-24 & SK-621



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HAYNES 1914 26-27-28
 LEECE-NEVILLE SYSTEM

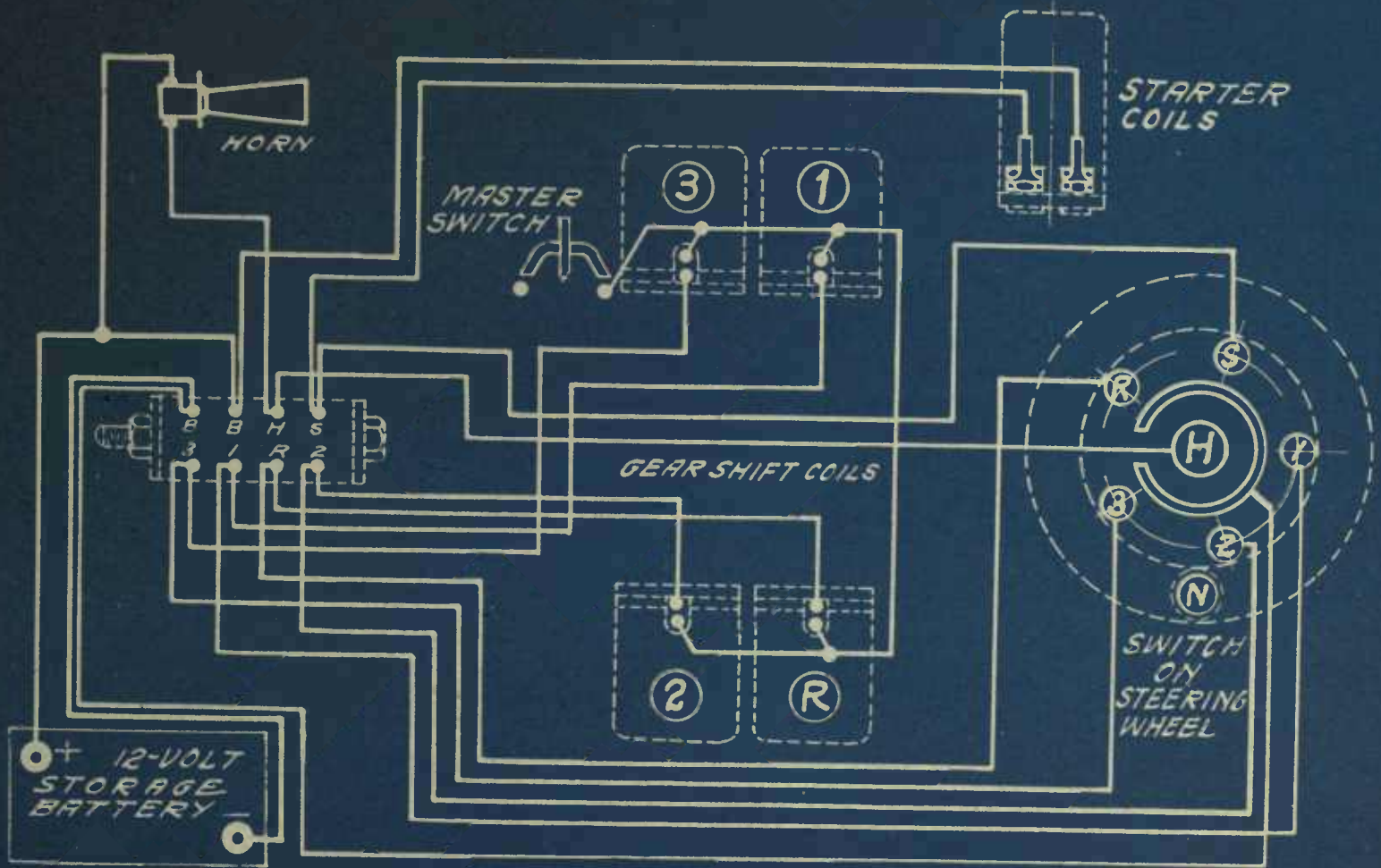
FROM MFRS. BR 5593-4-5



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HAYNES 1914 26-27-28
VULCAN ELECTRIC GEAR SHIFT

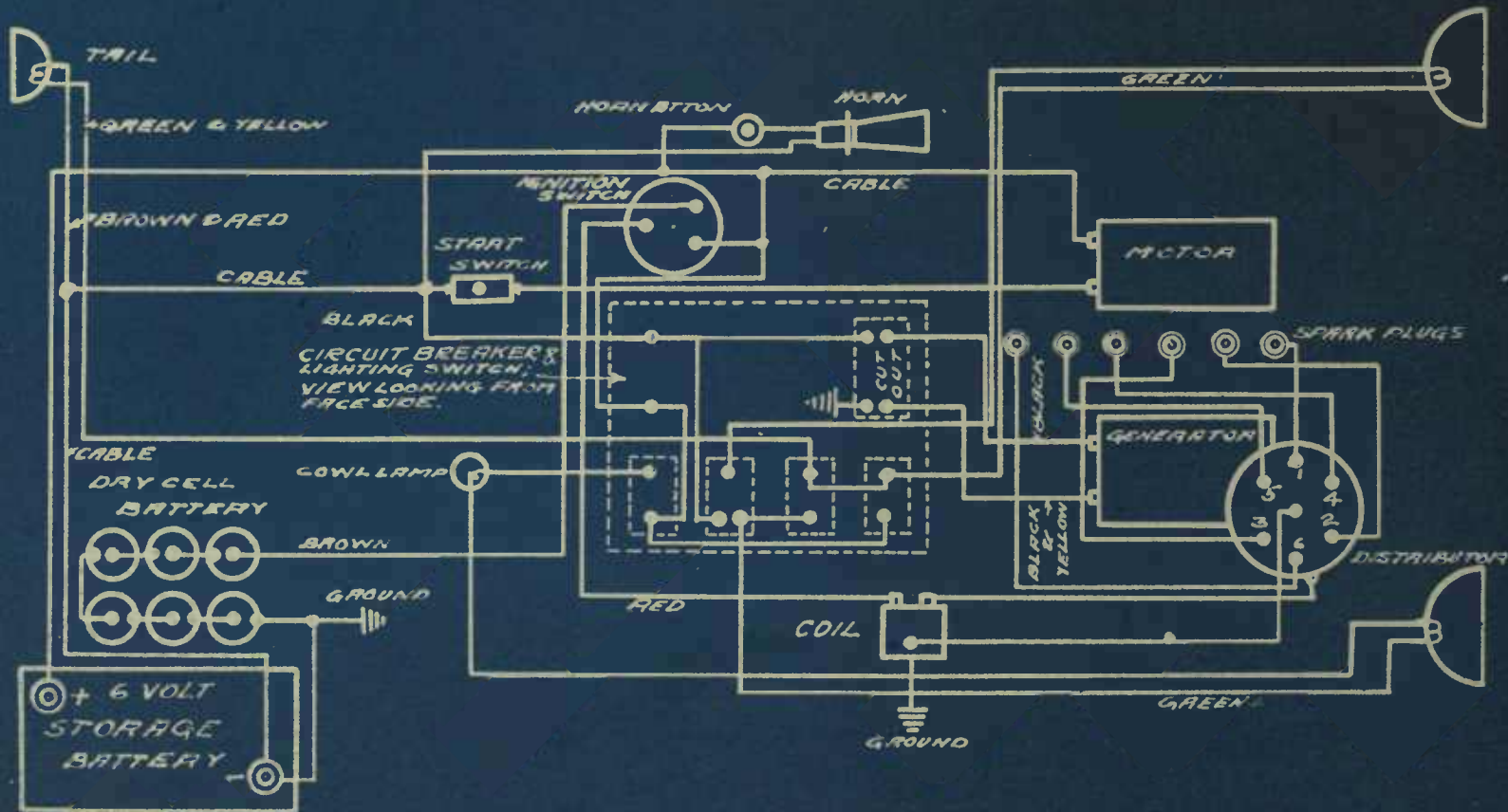
FROM MFRS. BP 5557



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HAYNES 1915 MODEL 30 LEECE-NEVILLE SYSTEM

FROM HAYNES B.P. B-9626

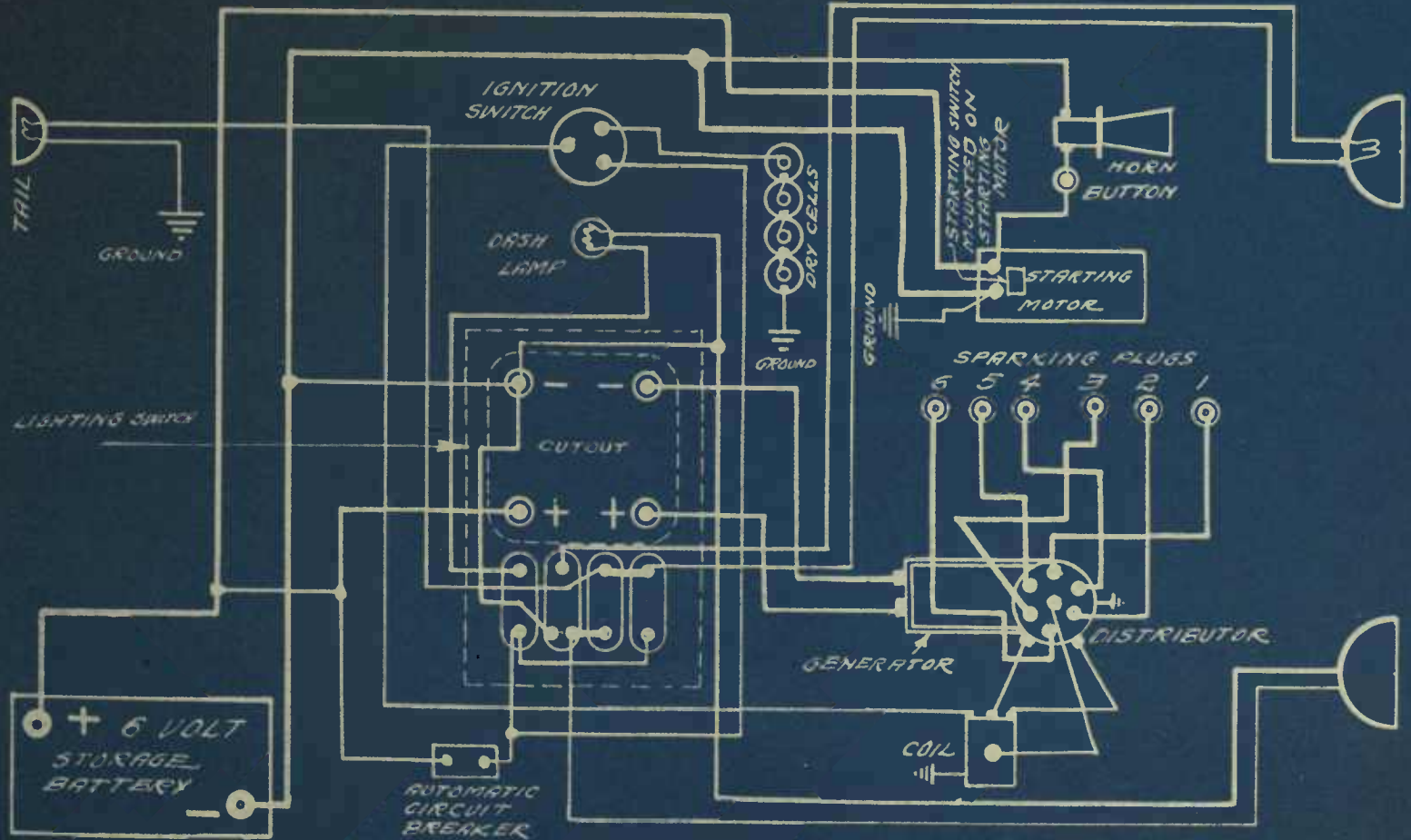


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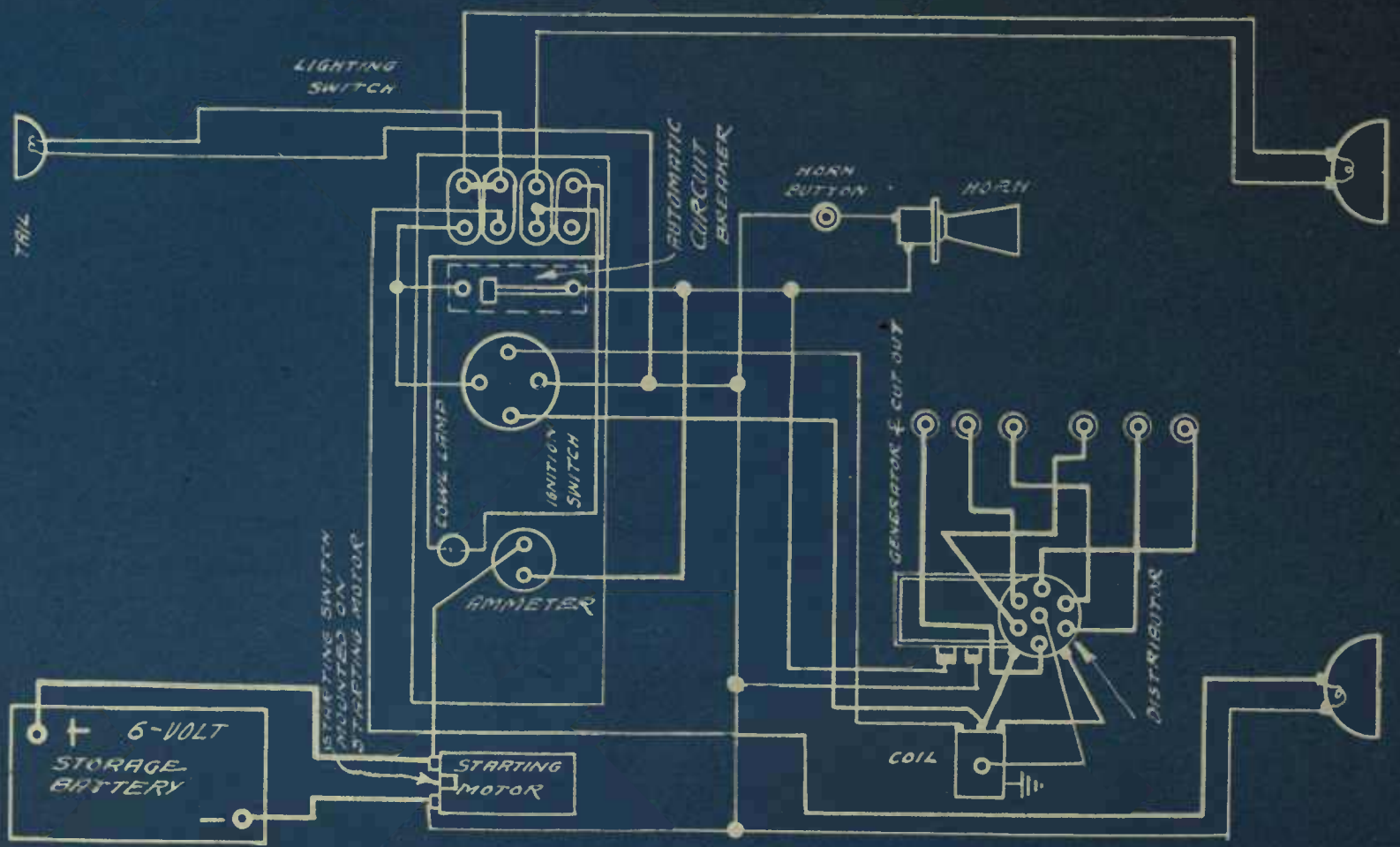
HAYNES 1916 34 & 35

LEECE-NEVILLE SYSTEM
REMY IGNITION

FROM MFRS. BR. 11134



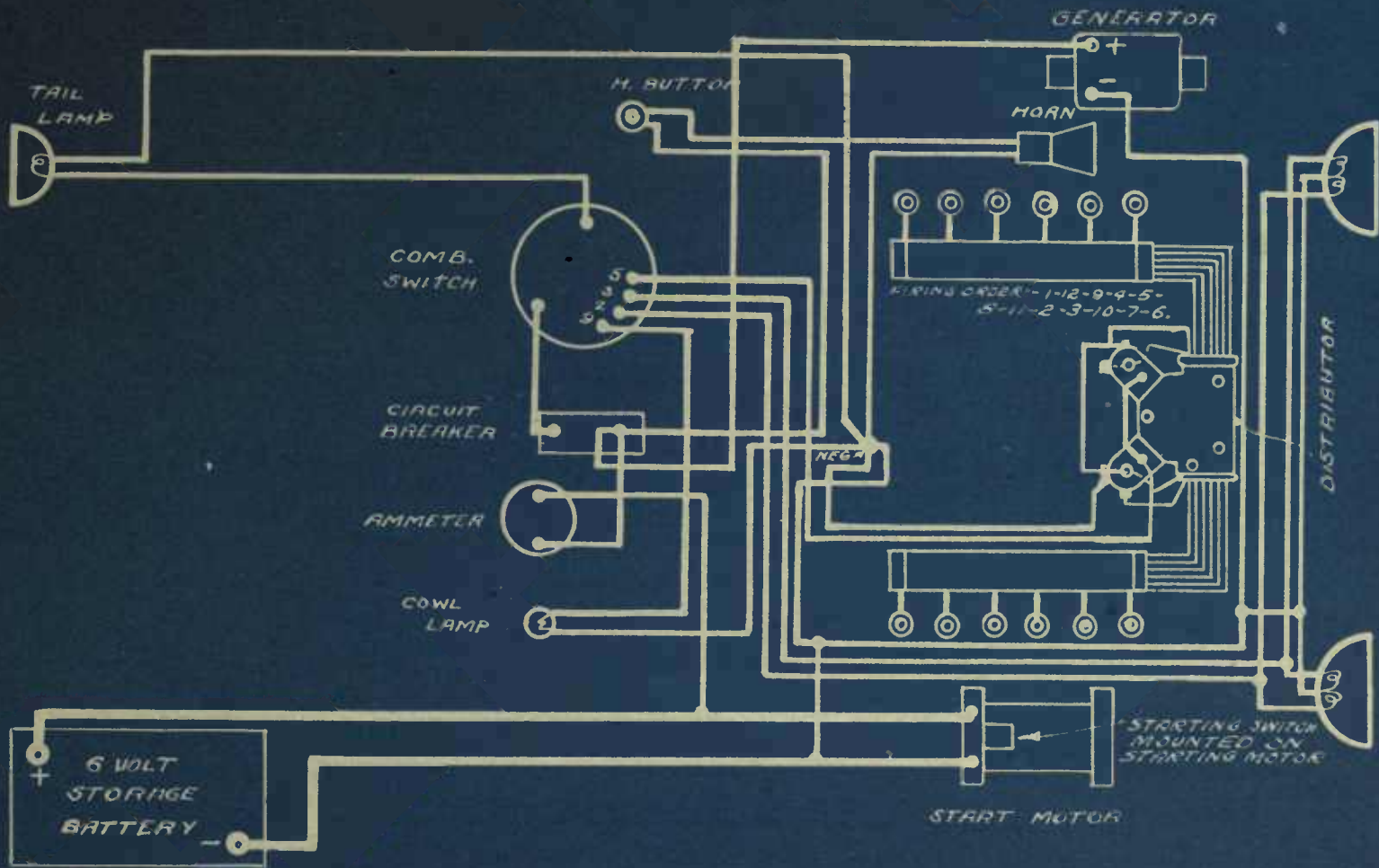
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HAYNES 12 MODELS 40-40R-41
LEECE-NEVILLE SYSTEM, REMY 16N.

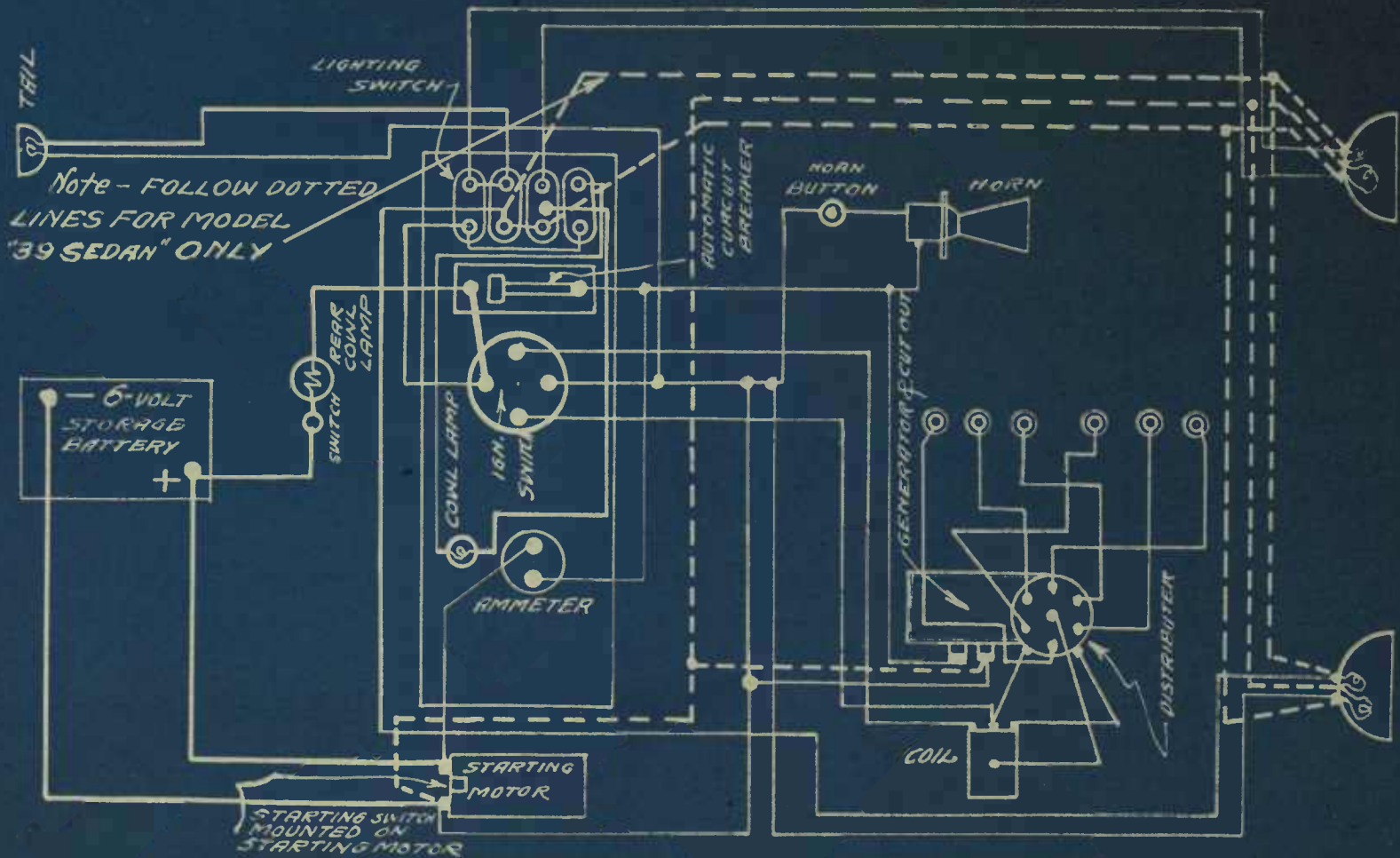
1917-1918-1919
FROM MECS. B.D. 12724



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HAYNES MODELS 38-39-39-S 1918-1919
 LEECE-NEVILLE SYSTEM REMY 16N.

FROM FIG. 3P. 16S44 & 15025

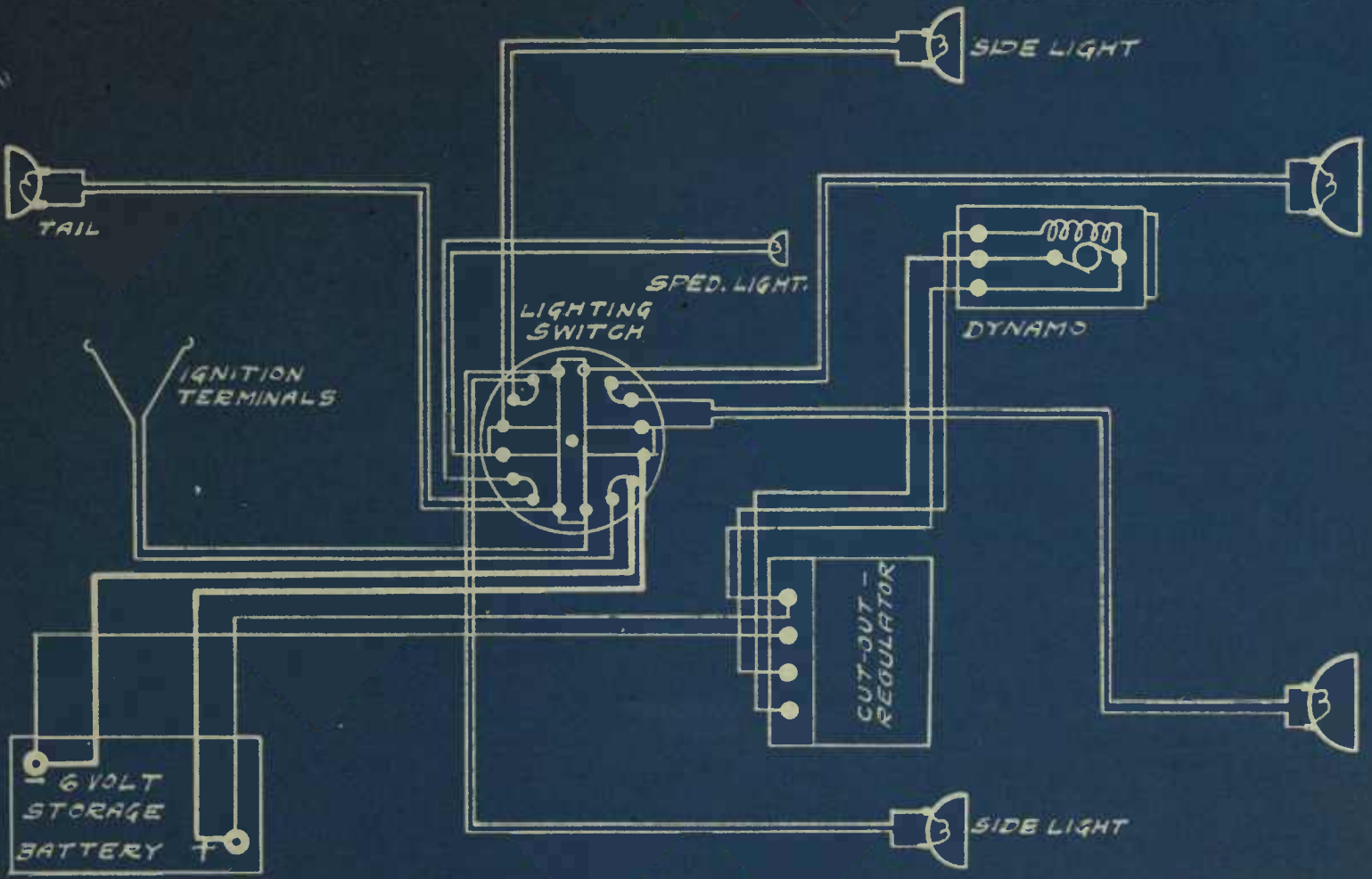


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HENDERSON 1913-14

WARD-LEONARD SYSTEM

FROM WARD-LEN. BULLETIN

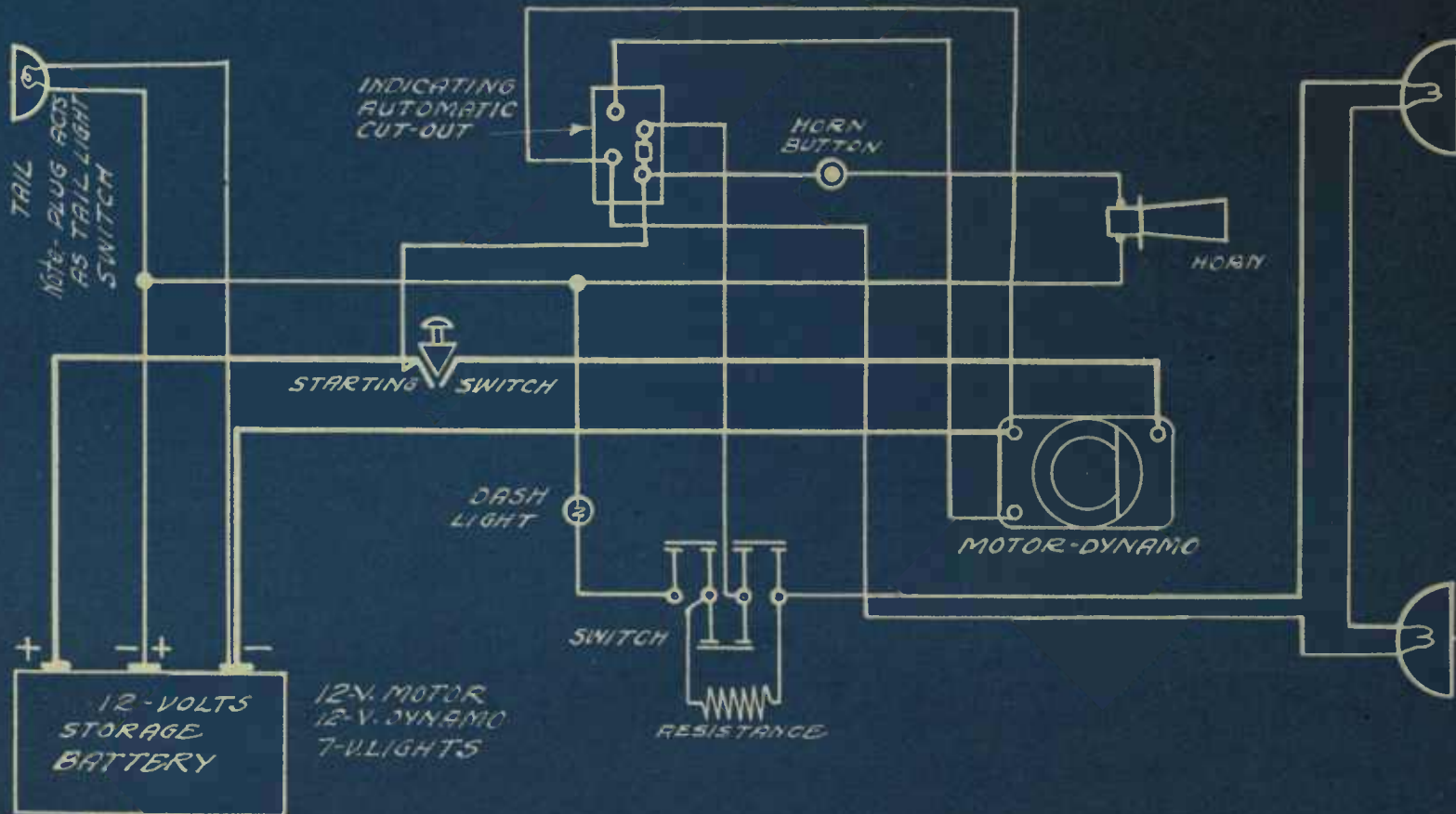


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HERFF-BROOKS 1915

SPLITDORF-APELCO SYSTEM

FROM SPLIT-AP MANUAL

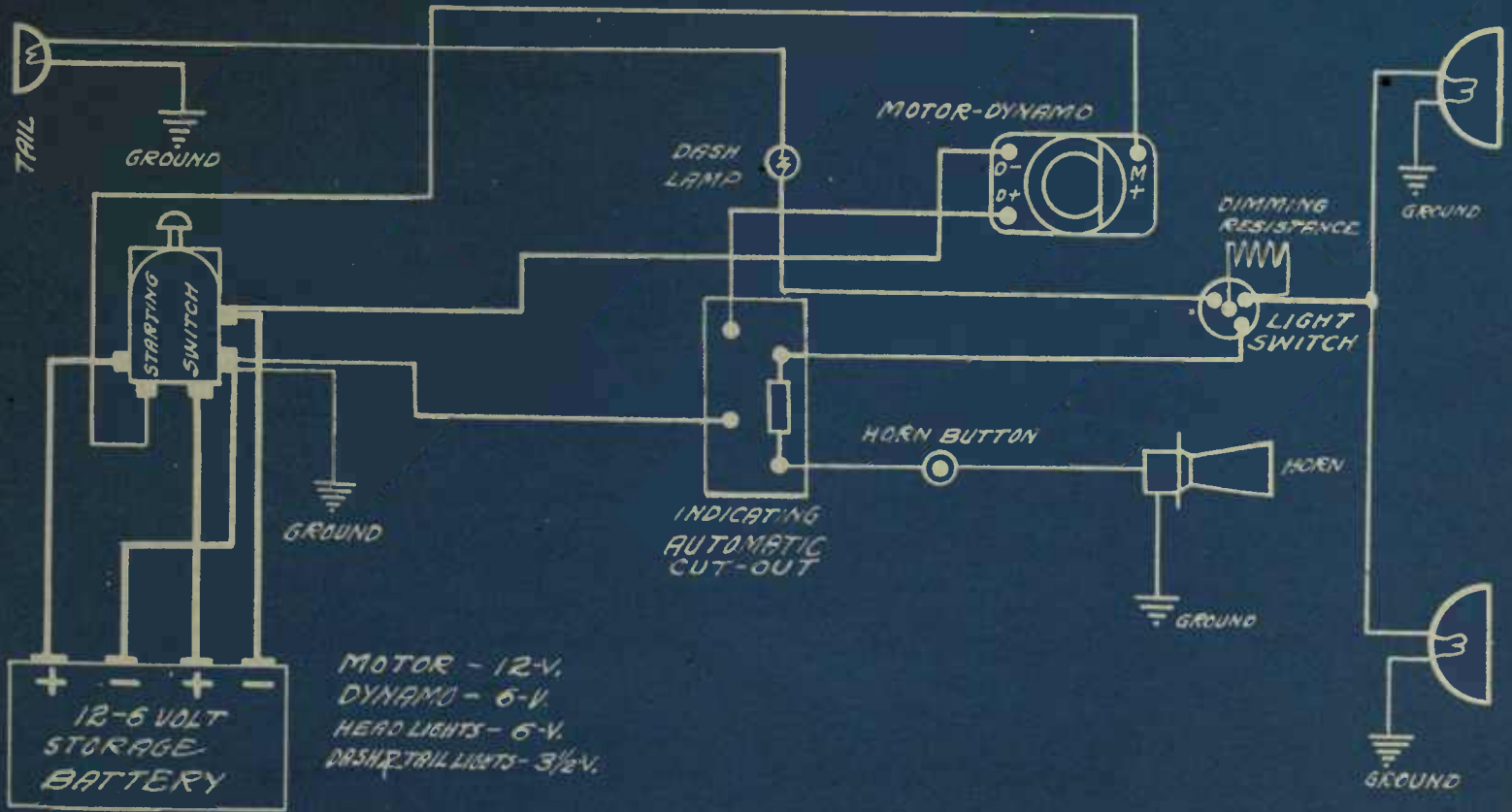


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SPLITDORF-APELCO SYSTEM

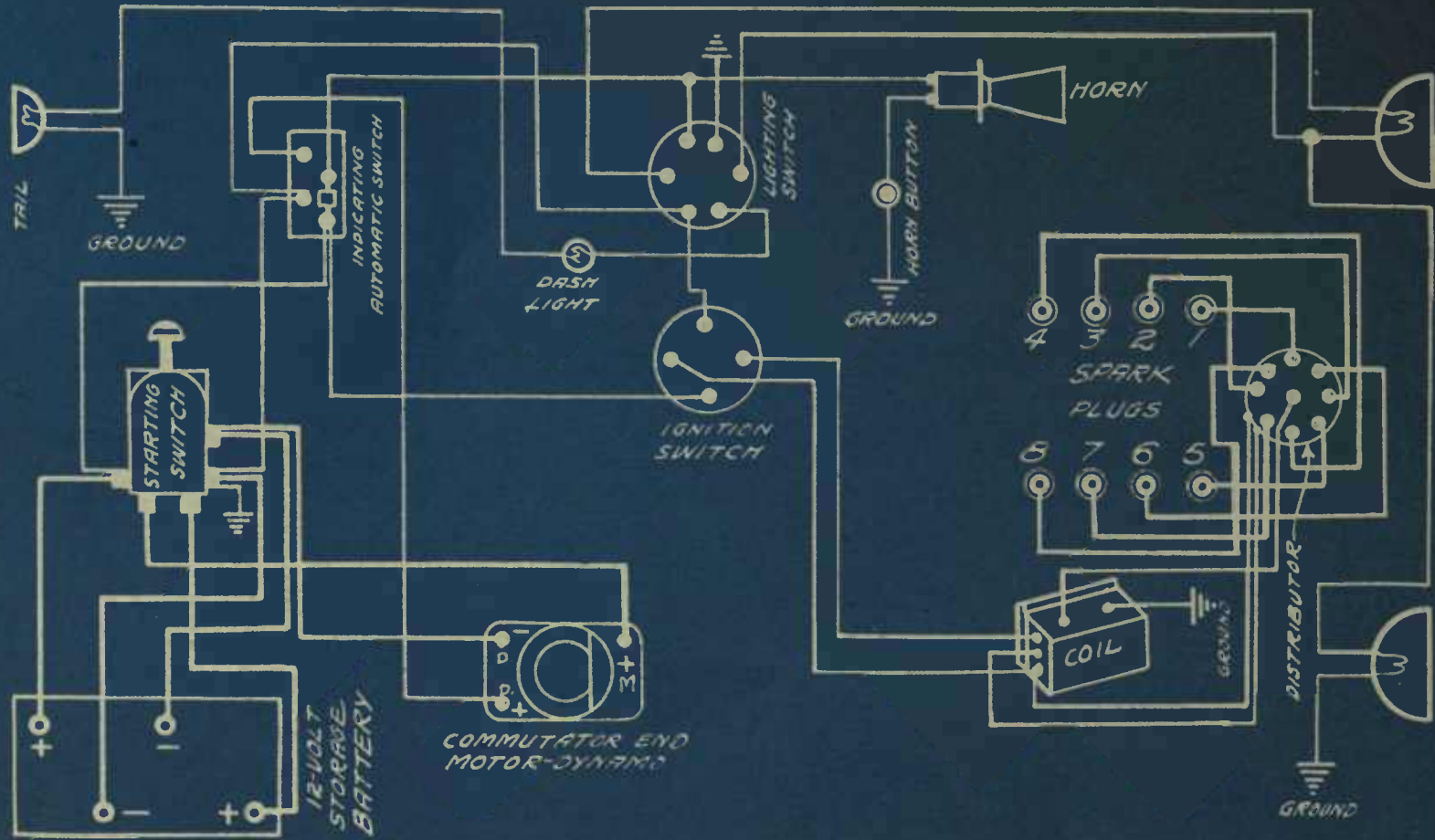
FROM SPLIT-AR MANUAL



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HOLLIER 1916 "8"
SPLITDORF-APELCO SYSTEM

FROM SPLIT-APR MANUAL

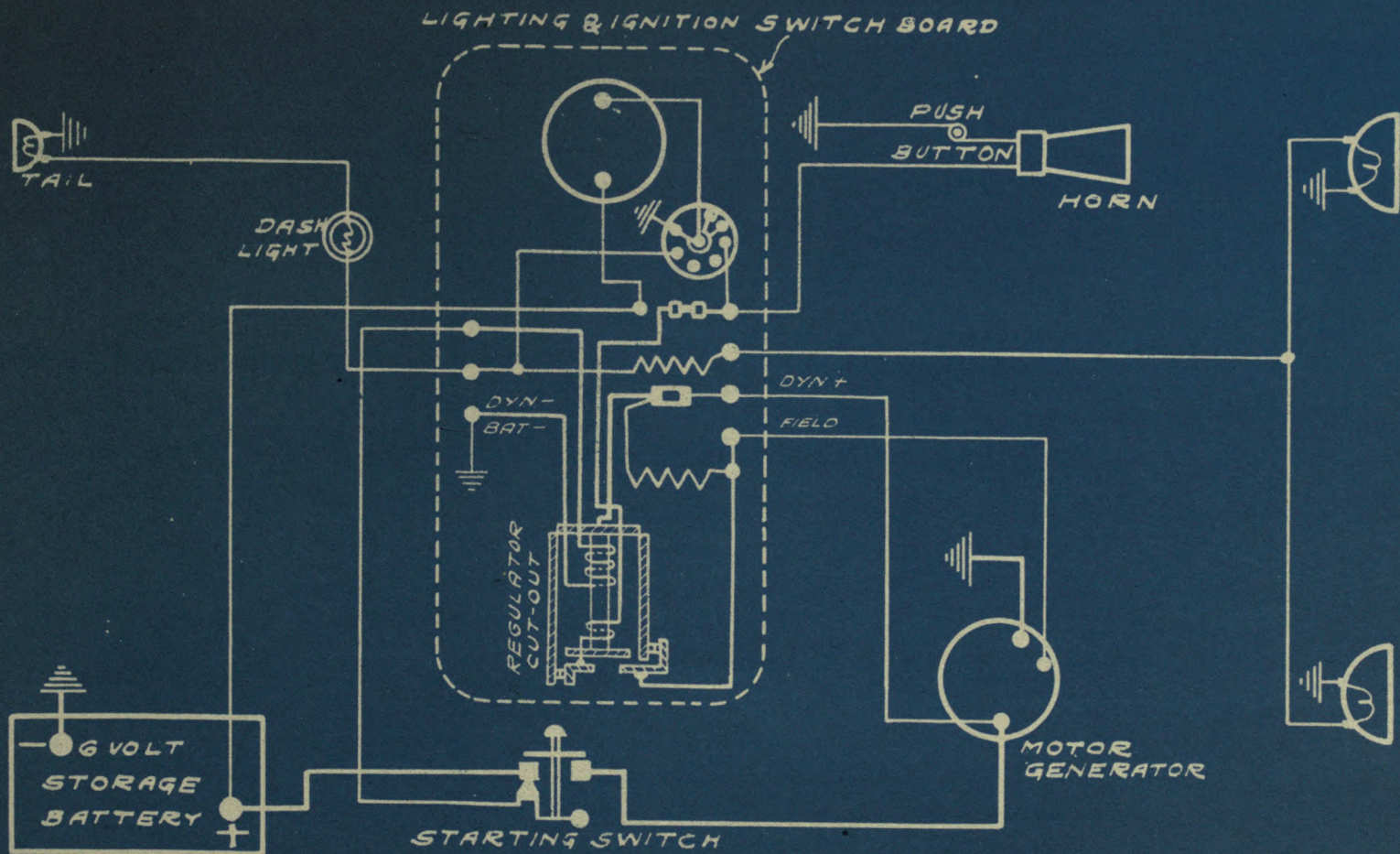


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HOLLIER 1917 166

ALLIS-CHALMERS SYSTEM

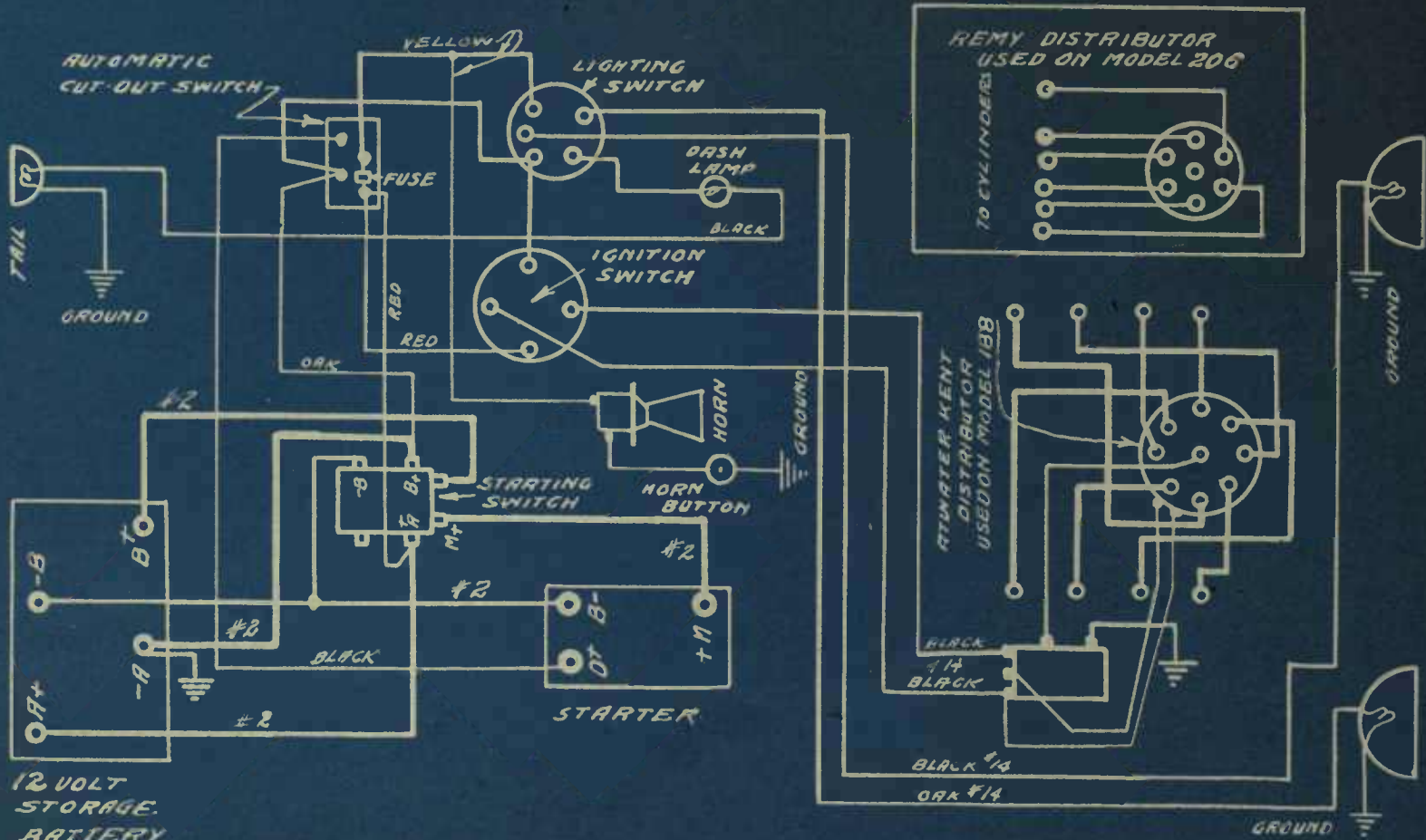
FROM A-C. B/P S.K. 10876



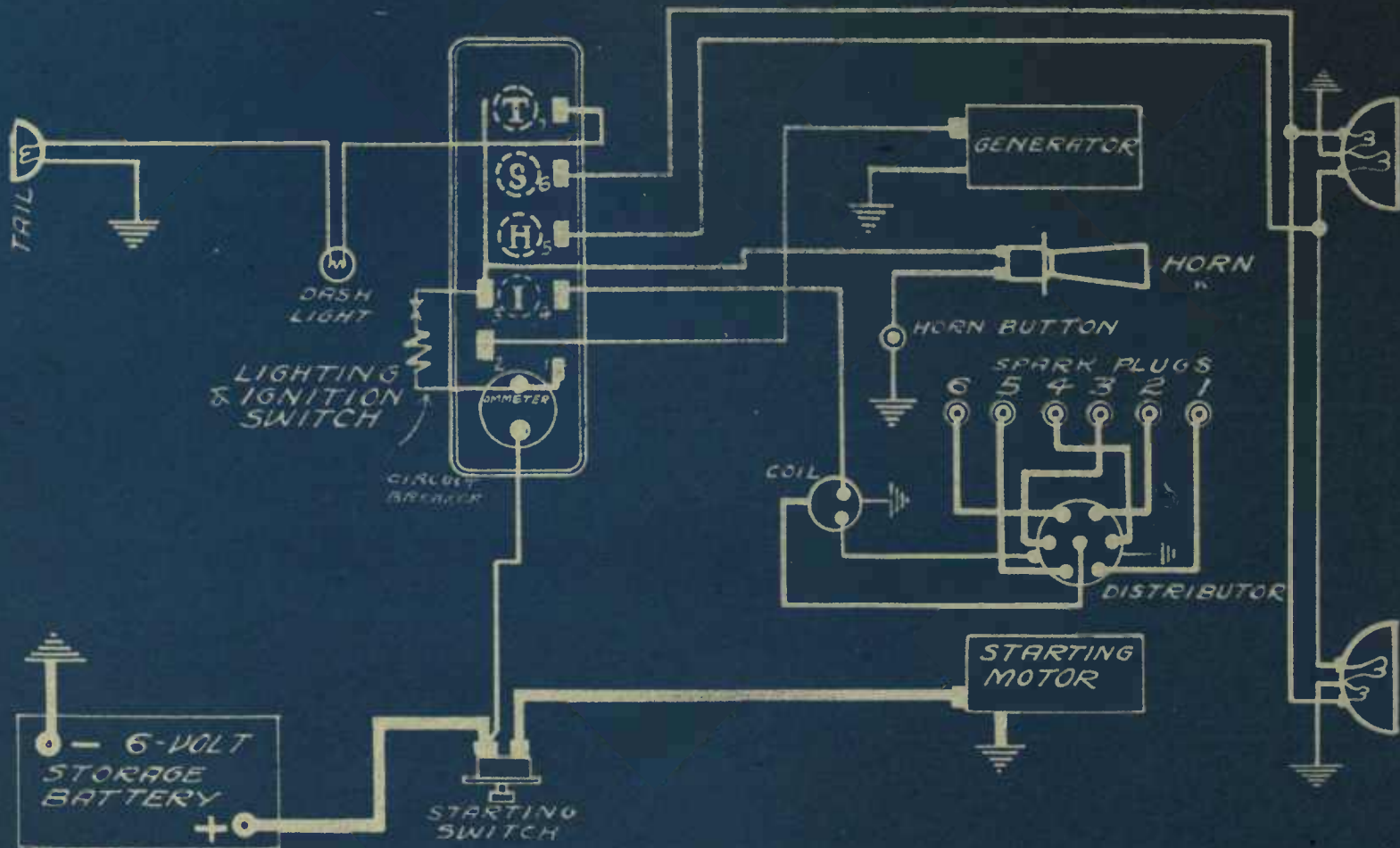
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HOLLIER MODEL 188 206 1918 SPLITDORF STARTING & LIGHTING SYSTEM

FROM FACTORY BP.-3019



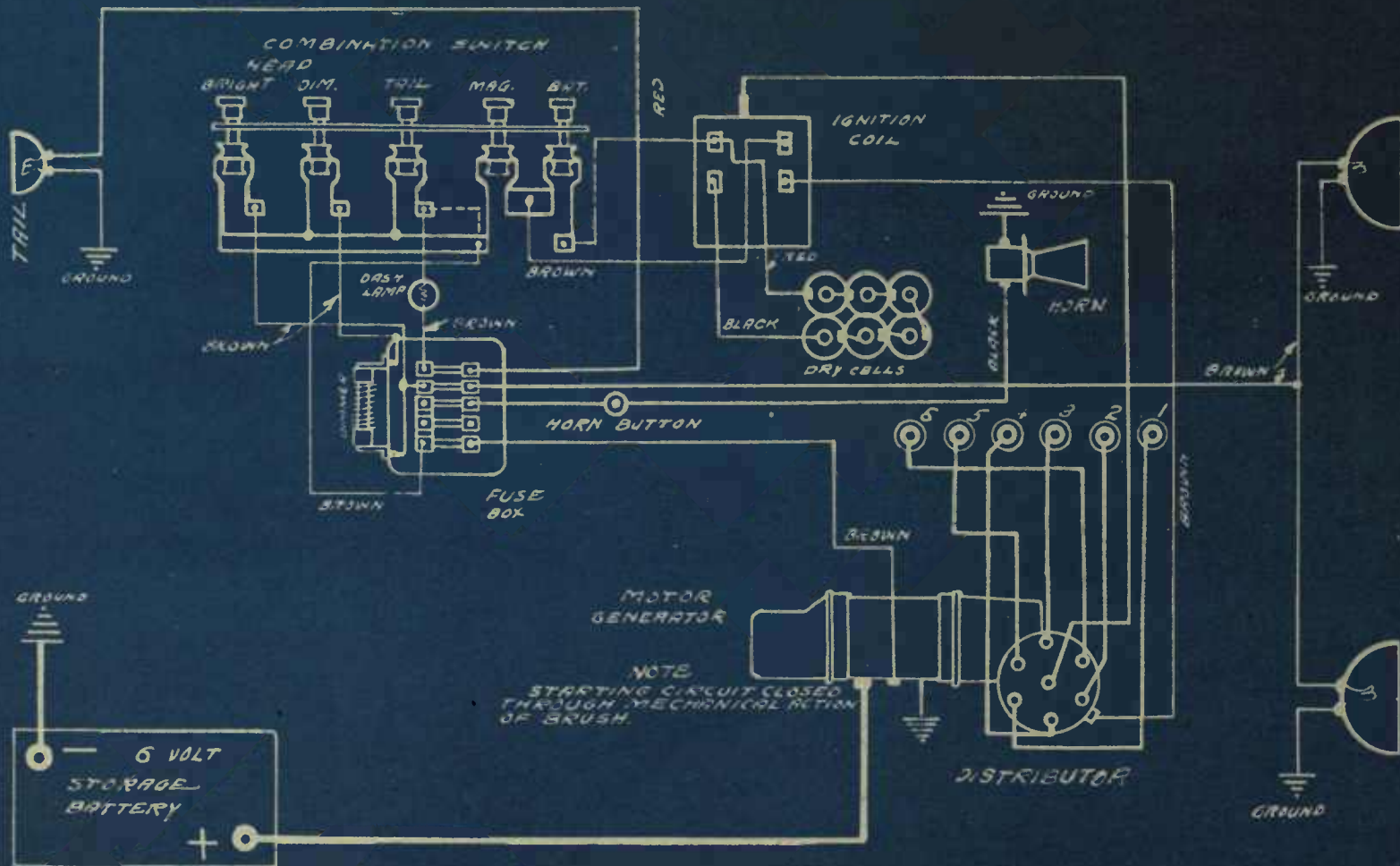
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HUDSON 1914-1915 6-40
 DELCO SYSTEM

FROM HUDSON INST. BOOK

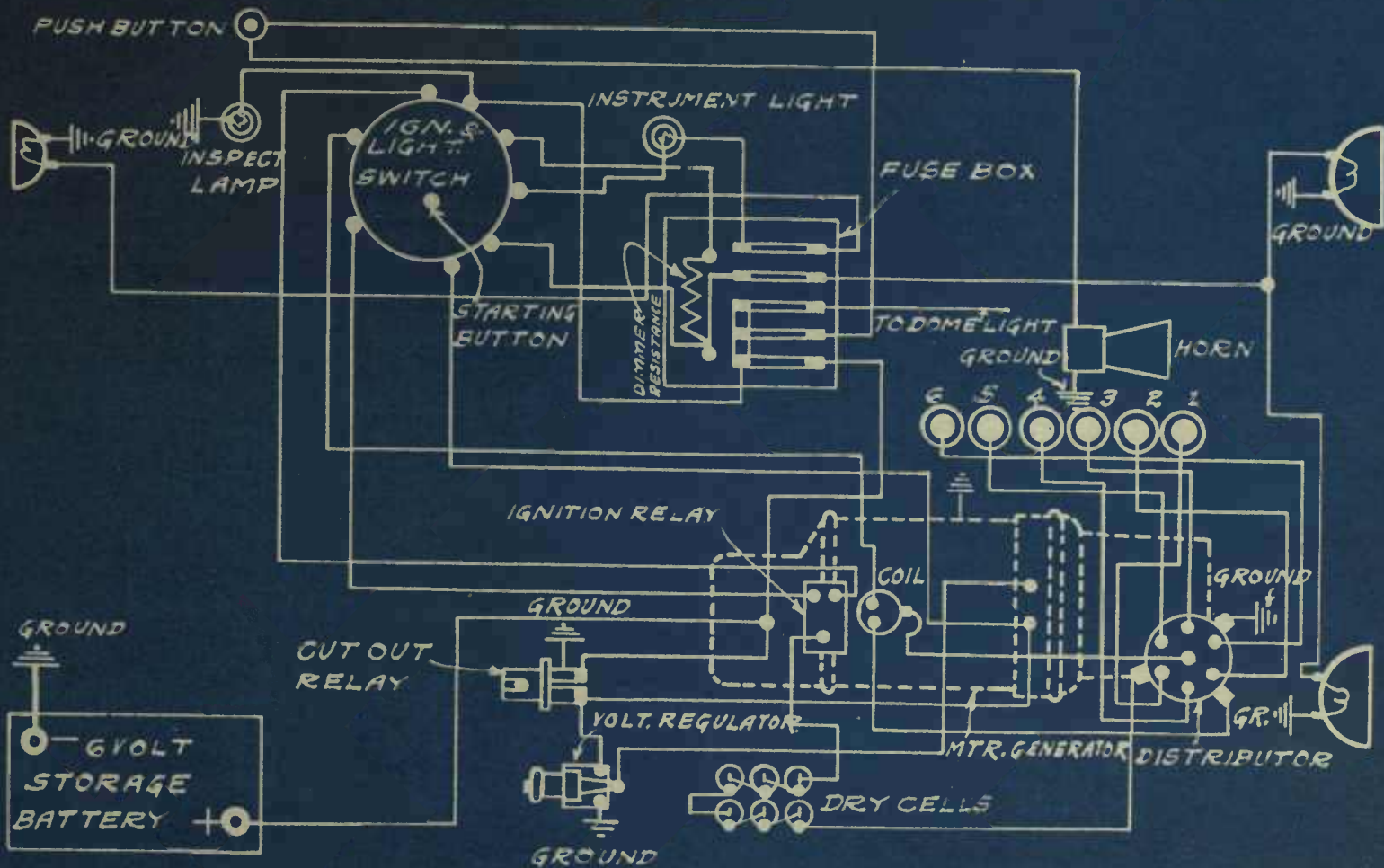


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HUDSON 1914-15 6-54

DELCO SYSTEM

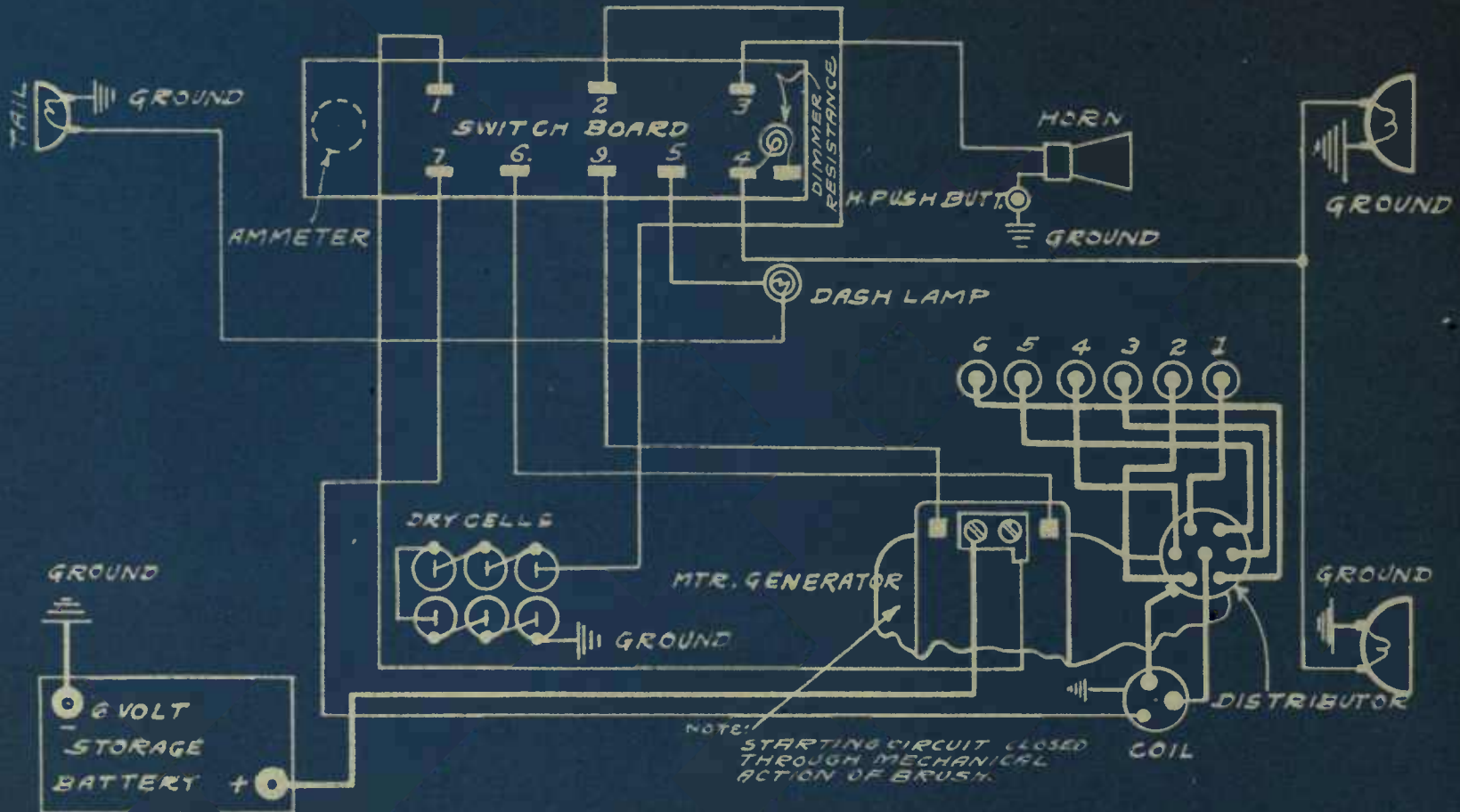
FROM HUDSON INCEPT #125



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HUDSON 1916 6-40
 DELCO SYSTEM

FROM HUDSON INSERT *125

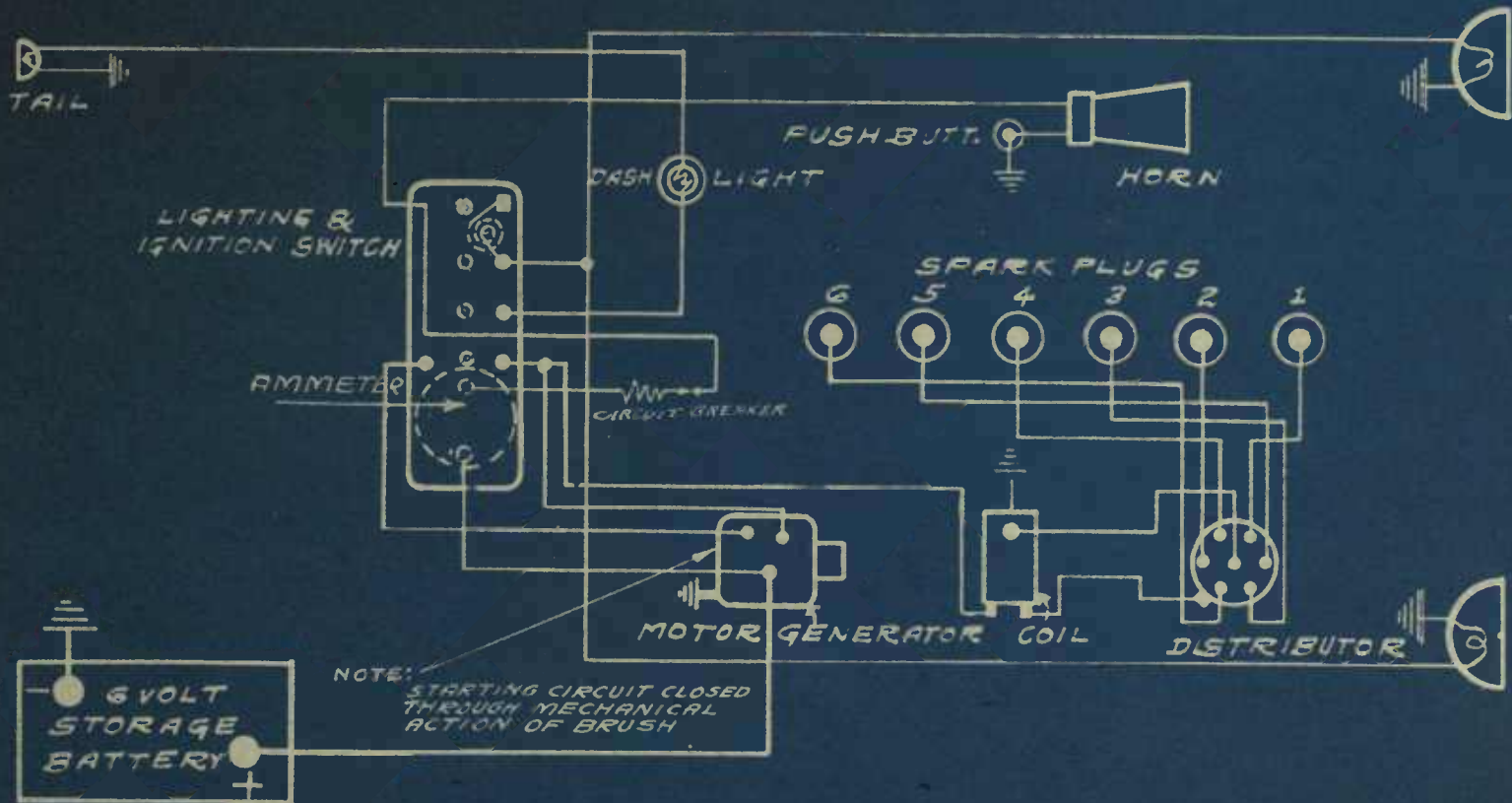


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HUDSON SUPER-SIX 1916-17-18-19

DELCO SYSTEM

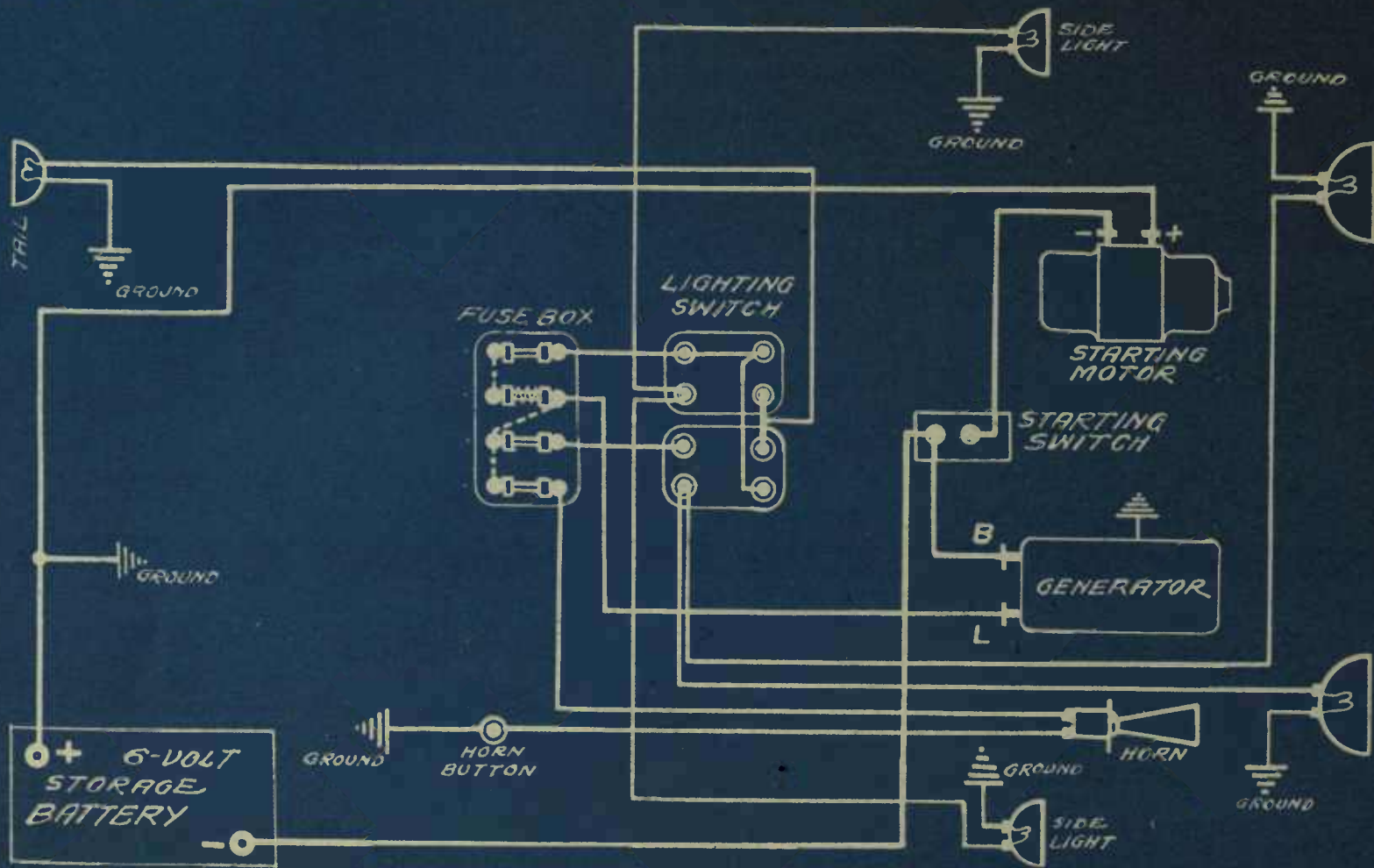
FROM FACTORY B/P 1432



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HUPMOBILE 1914-1915 "HA"
WESTINGHOUSE SYSTEM

FROM HUPP. BP. HA-5274

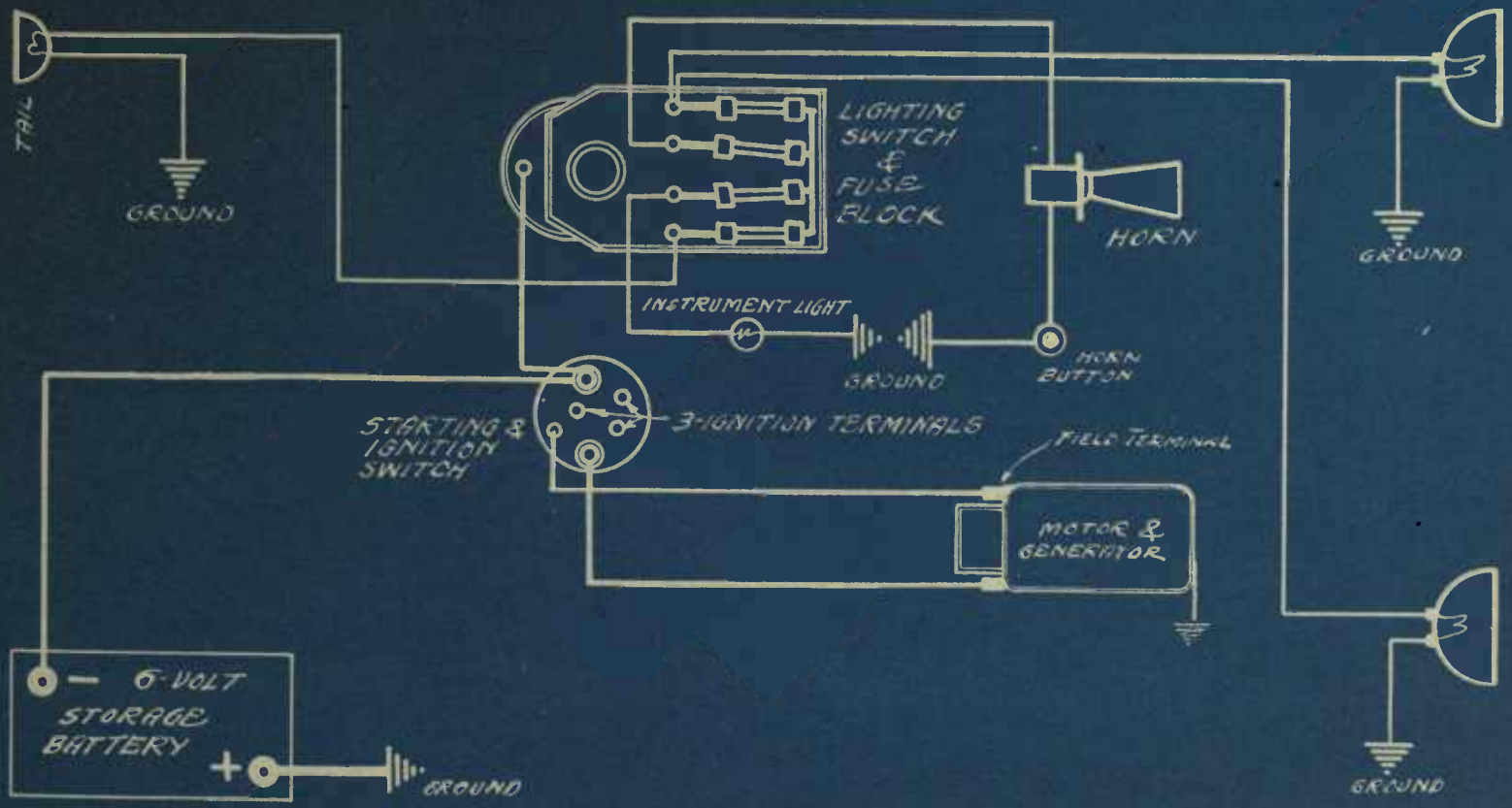


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HUPMOBILE 1915 "K"
WESTINGHOUSE STARTING & LIGHTING SYSTEM

FROM HUP. B.P.K-24000

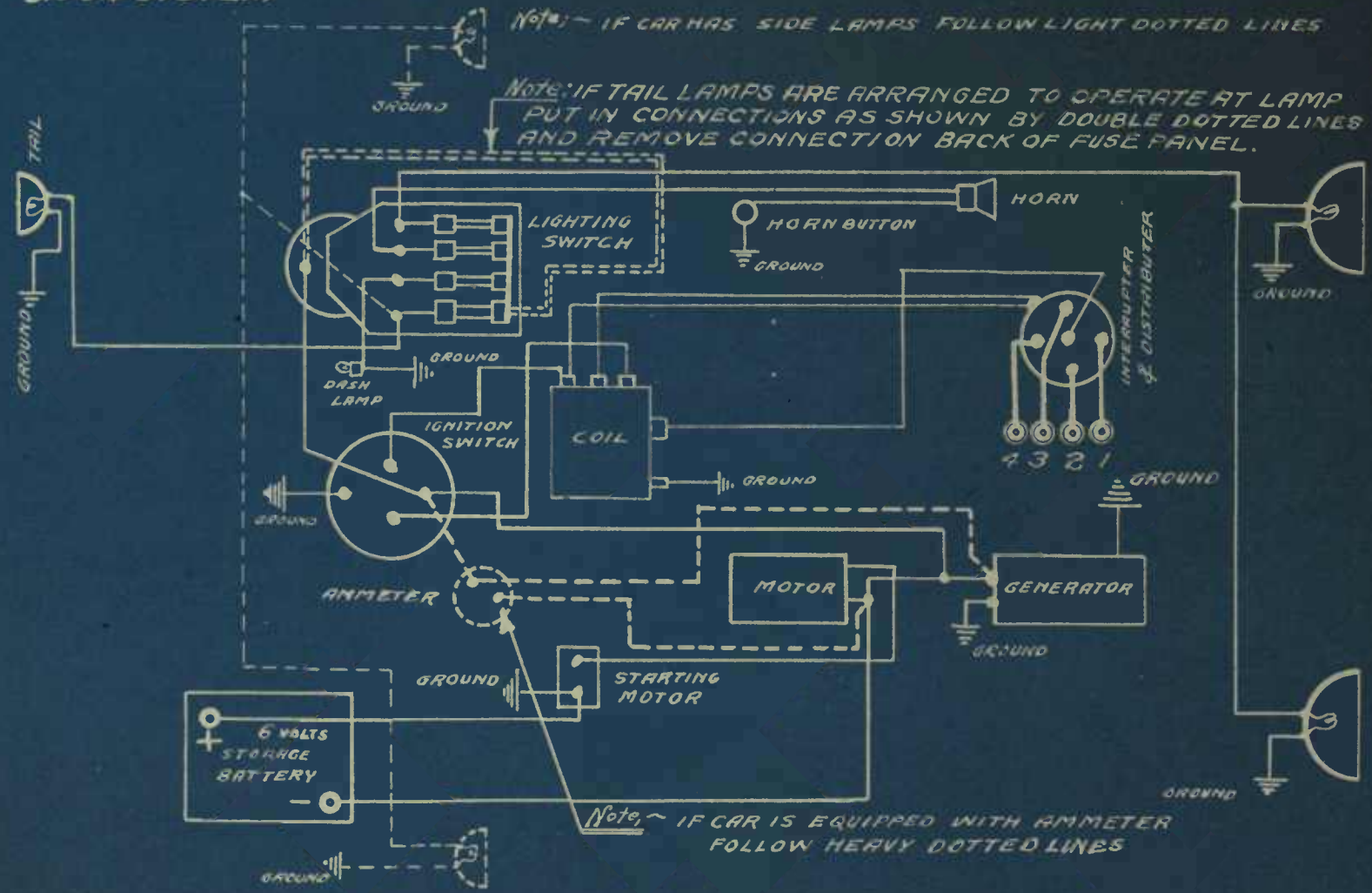
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HUPMOBILE 1916 "N"

BIJUR SYSTEM

FROM-BP -40391-41825-41618-41081

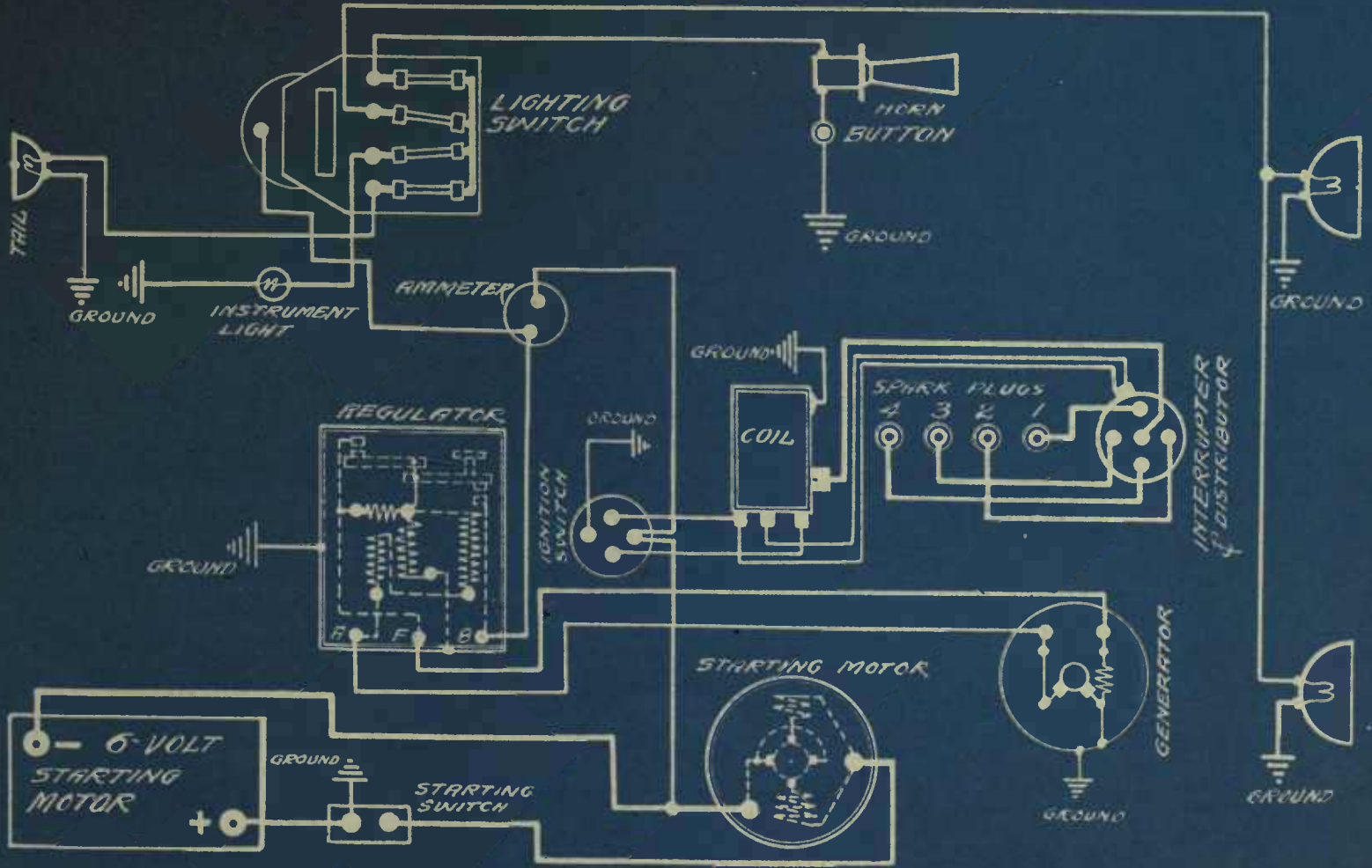


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HUPMOBILE 1916-7 "N"

WESTINGHOUSE SYSTEM & ATWATER-KENT IGNITION

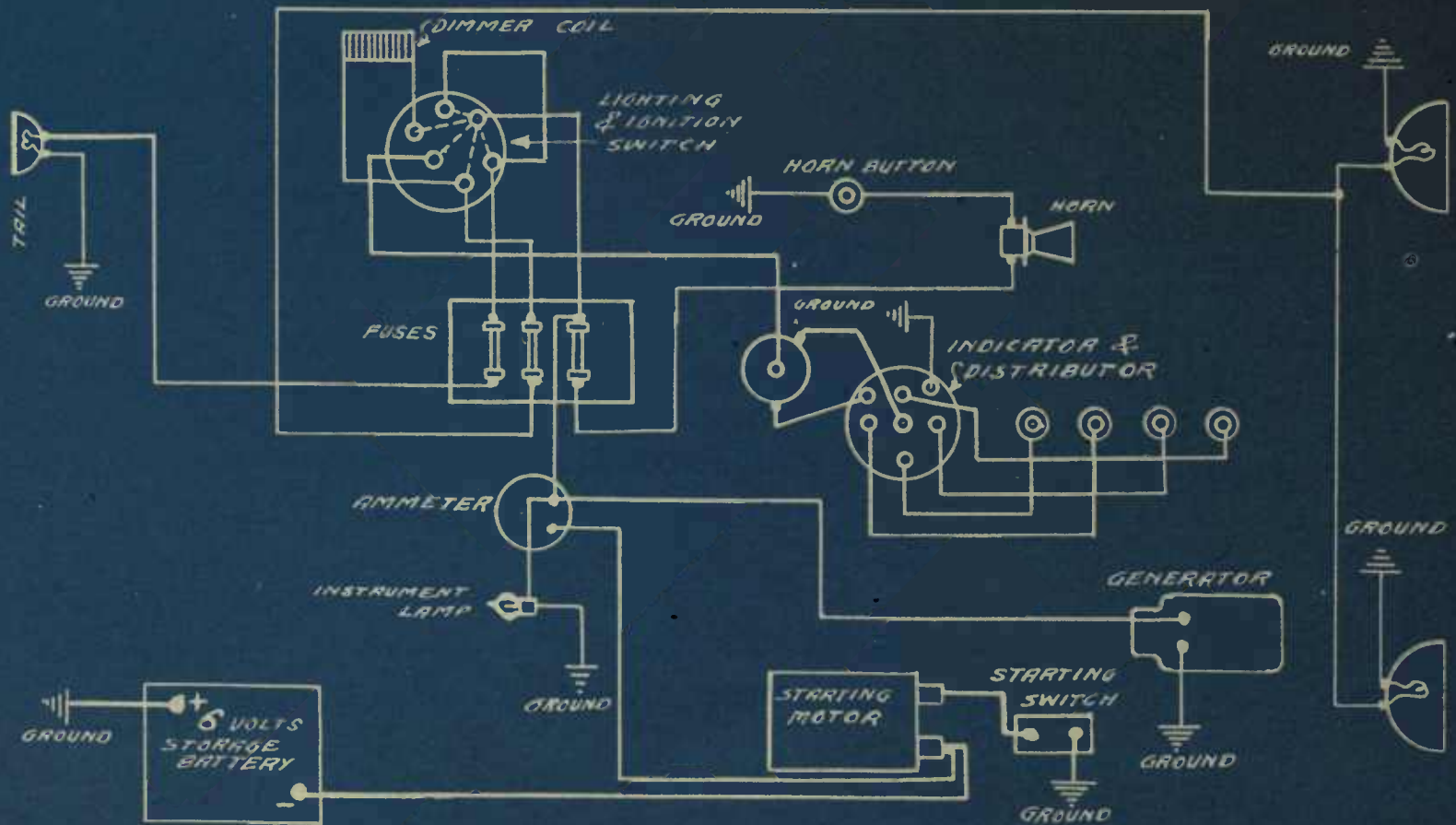
FROM MFRS. BP 43155



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HUPMOBILE 1918 "R" EARLY 1919
BITUR SYSTEM ATWATER KENT IGN.

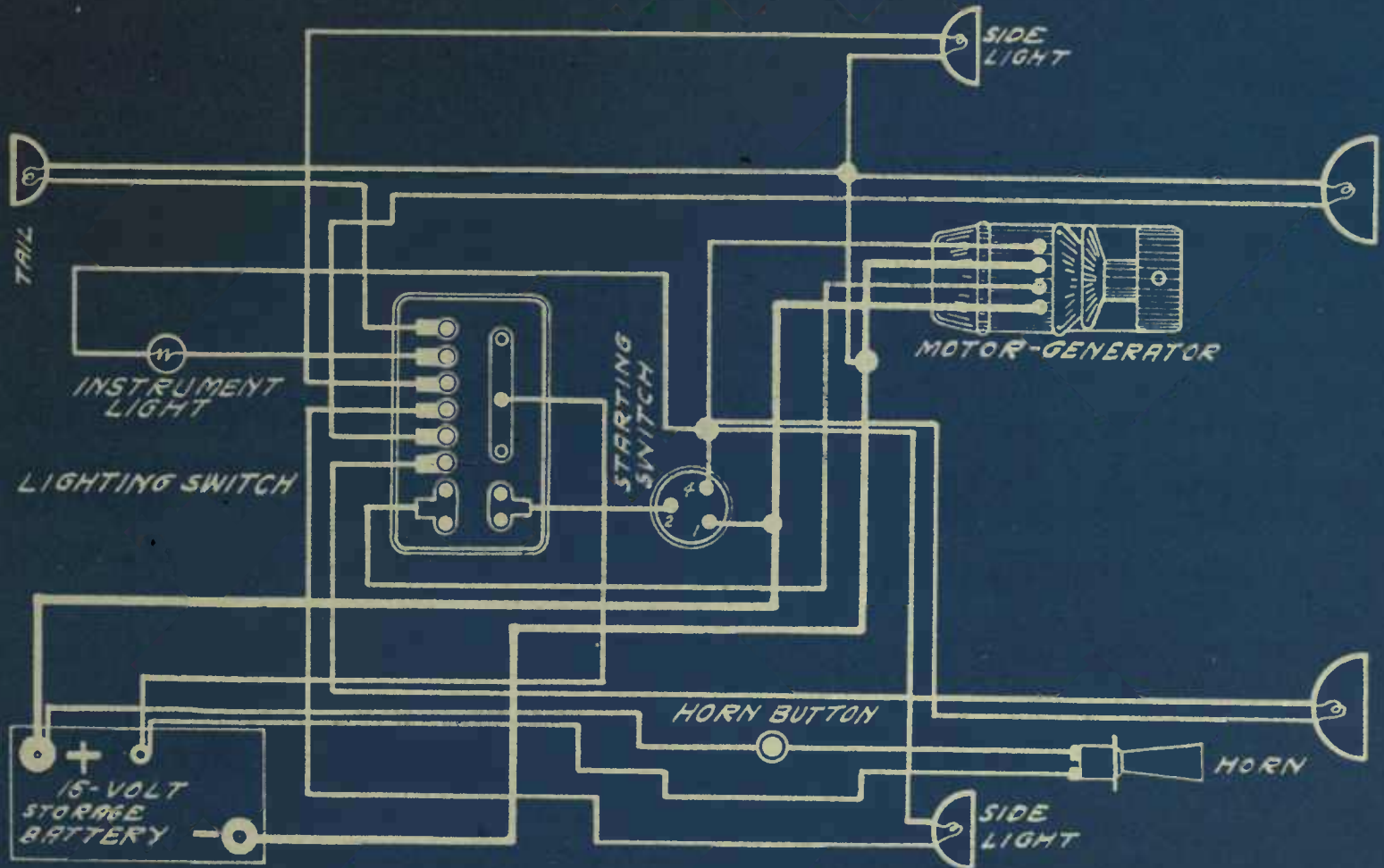
FROM FACTORY BR. 45545



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IMPERIAL 1913 "34"
NORTH-EAST SYSTEM

FROM N.-E. PLATE 180

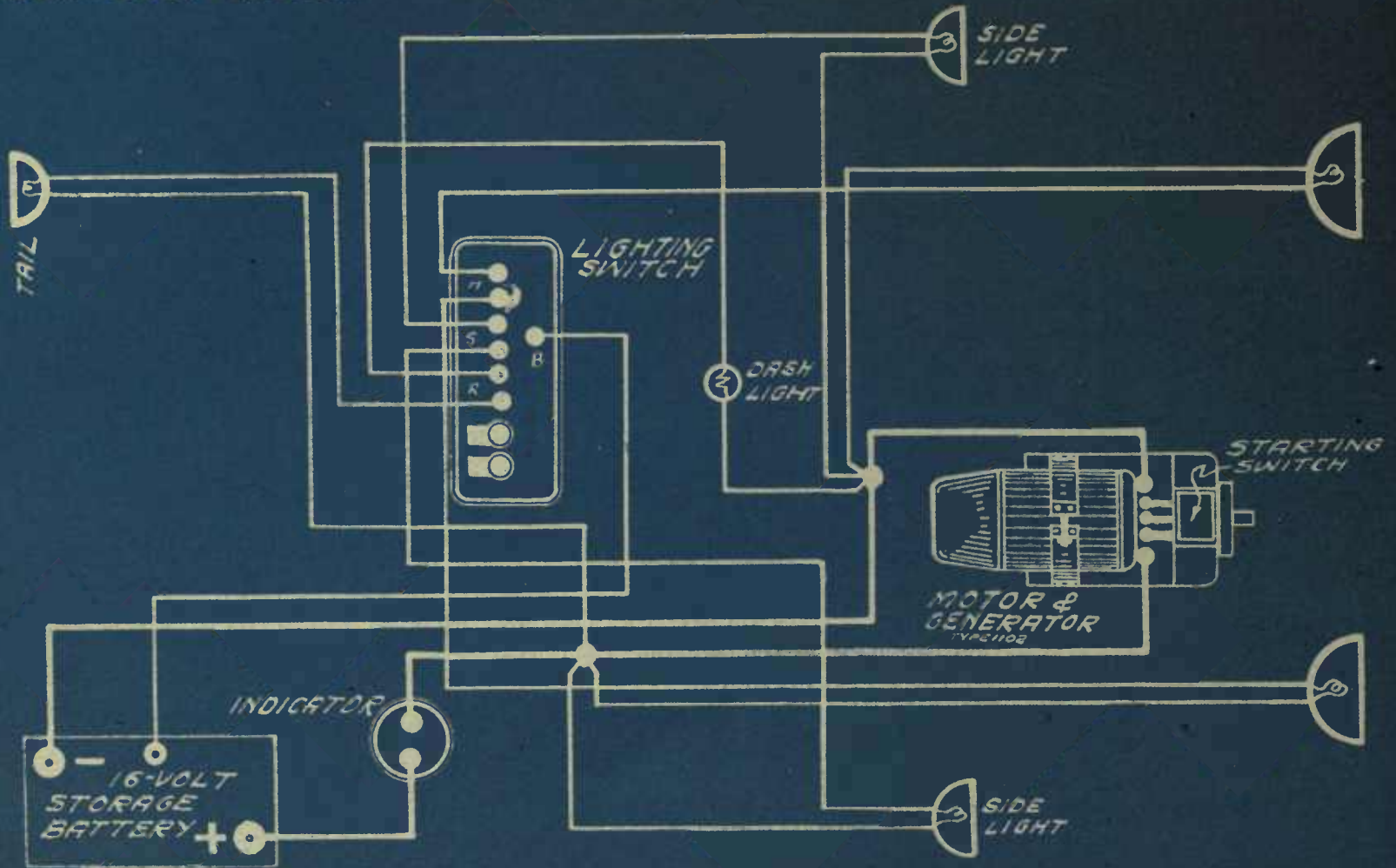


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IMPERIAL 1914
NORTH-EAST SYSTEM

32-34-39-44-54 & 56

FROM N.E. PLATES
220-230-240



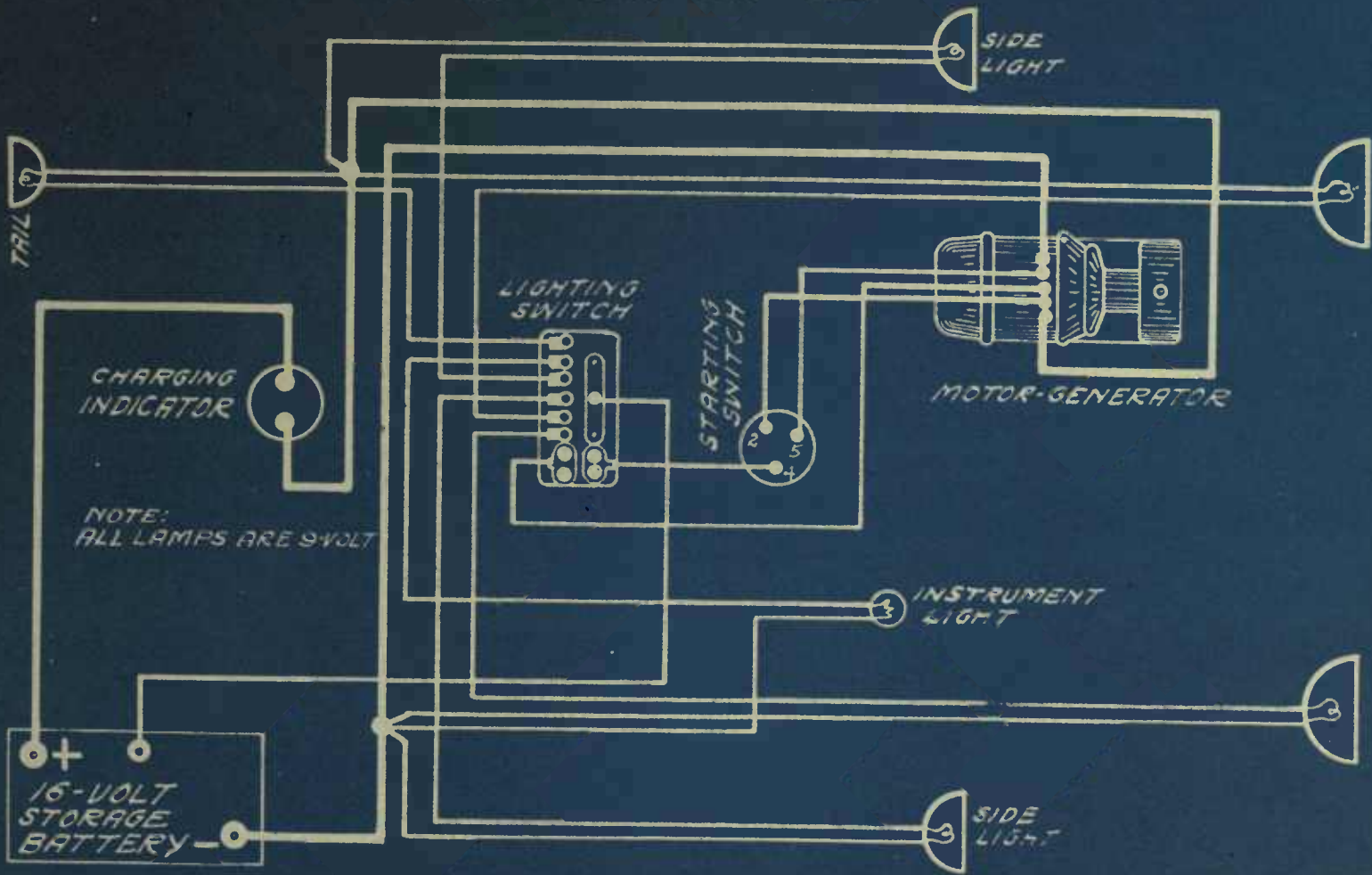
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IMPERIAL 1914 "34"

NORTH-EAST SYSTEM

USED ON EARLY 1914 MODEL

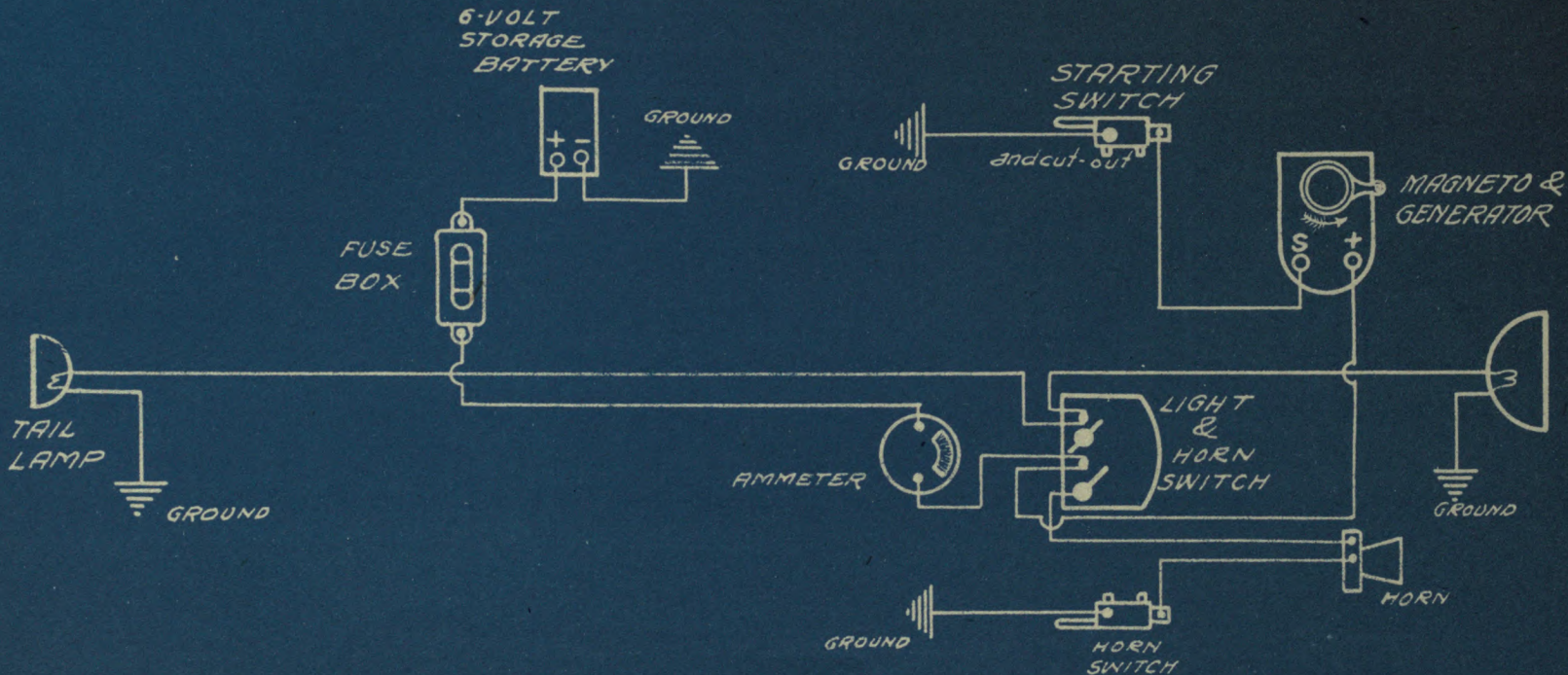
FROM N-E. PLATE 190



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INDIAN MOTORCYCLE SPLITDORF SYSTEM

FROM SPLIT. MANUAL

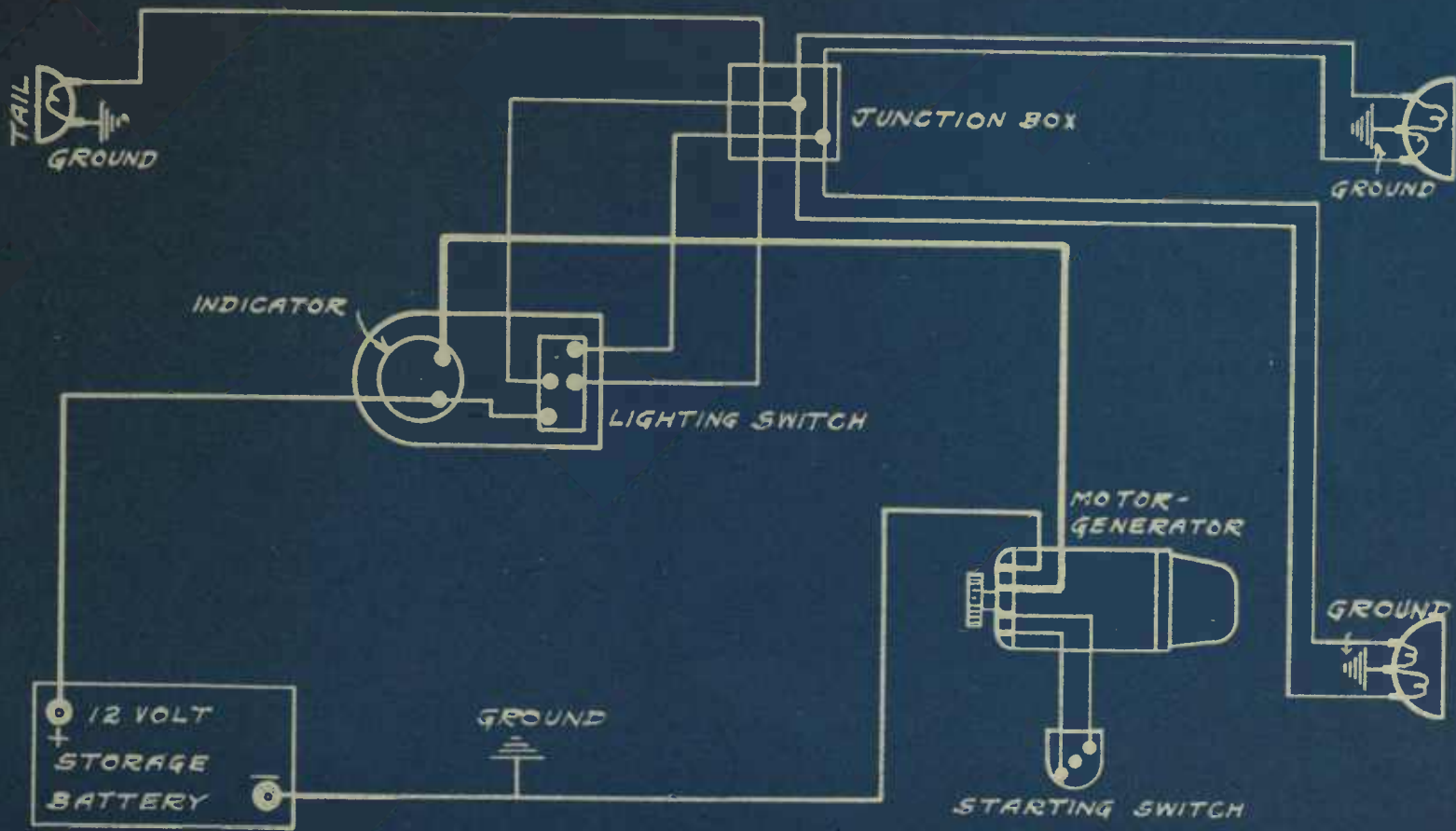


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INTERNATIONAL HARVESTER TRUCK

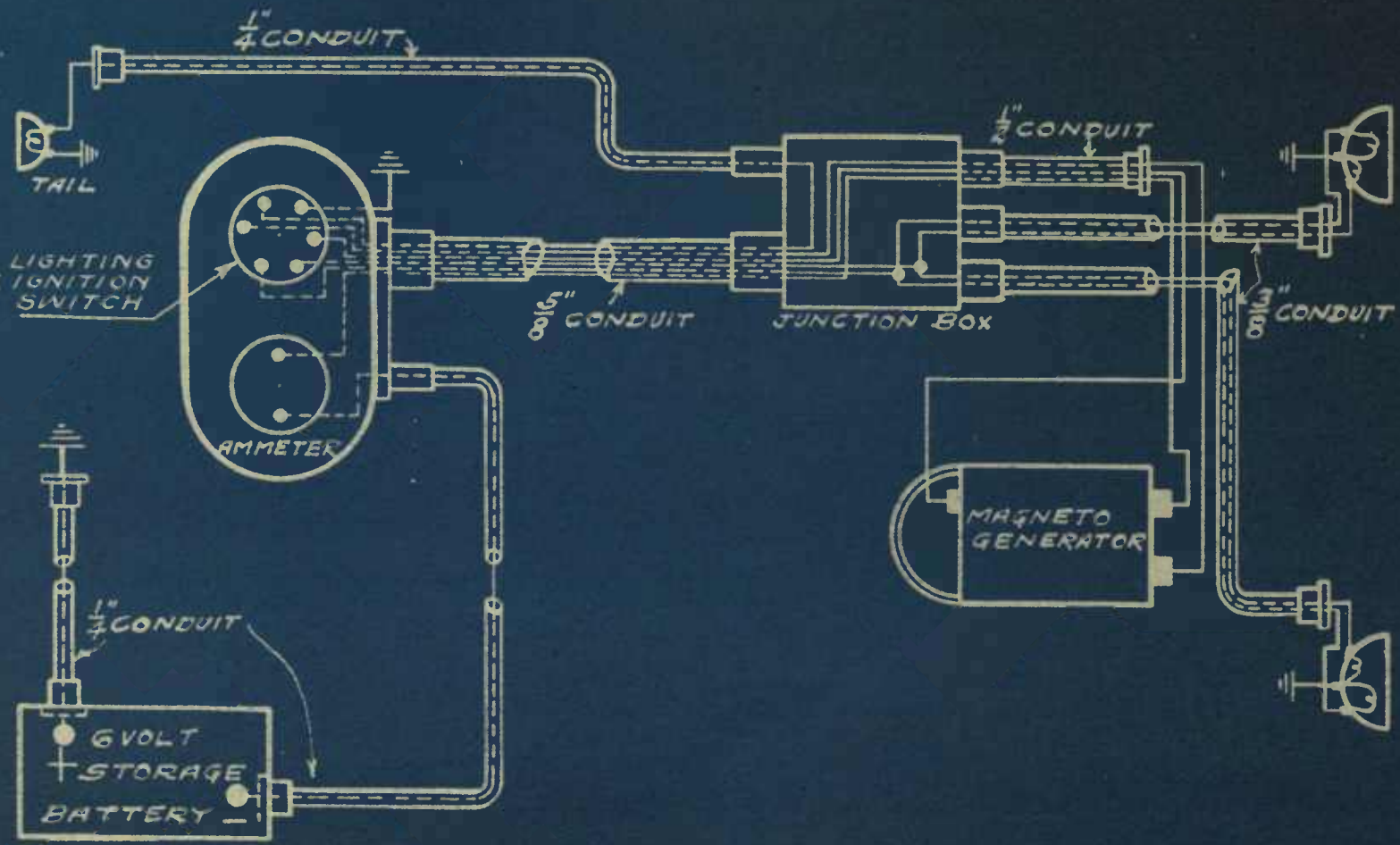
NORTH-EAST SYSTEM

FROM NORTH-EAST PLATE 380



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INTERNATIONAL HARVESTER TRUCK 1916-17 "F&H"
 BOSCH SYSTEM FROM MFRS. B/P 7420-H

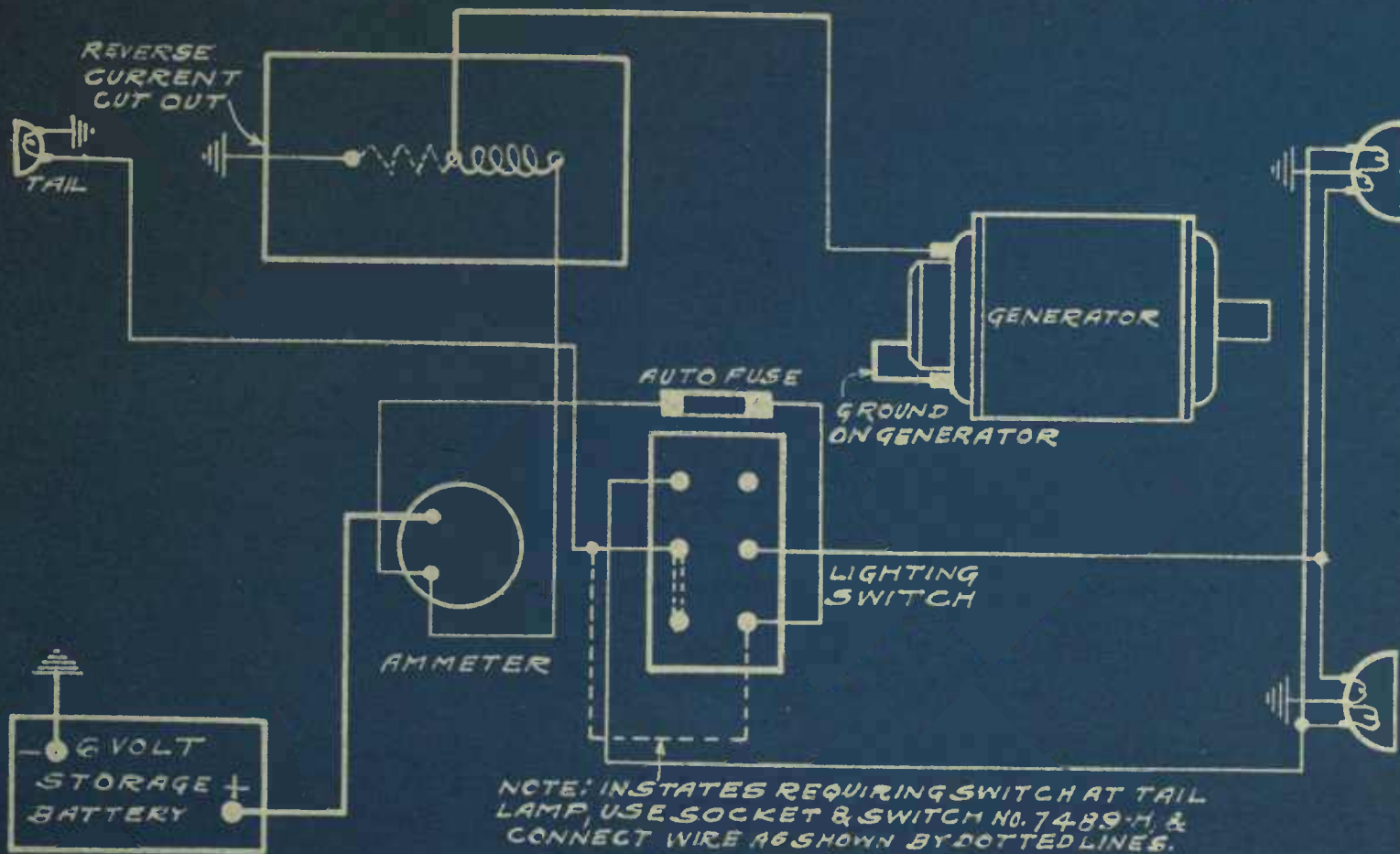


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INTERNATIONAL HARVESTER TRUCK 1918 F-G-H&K

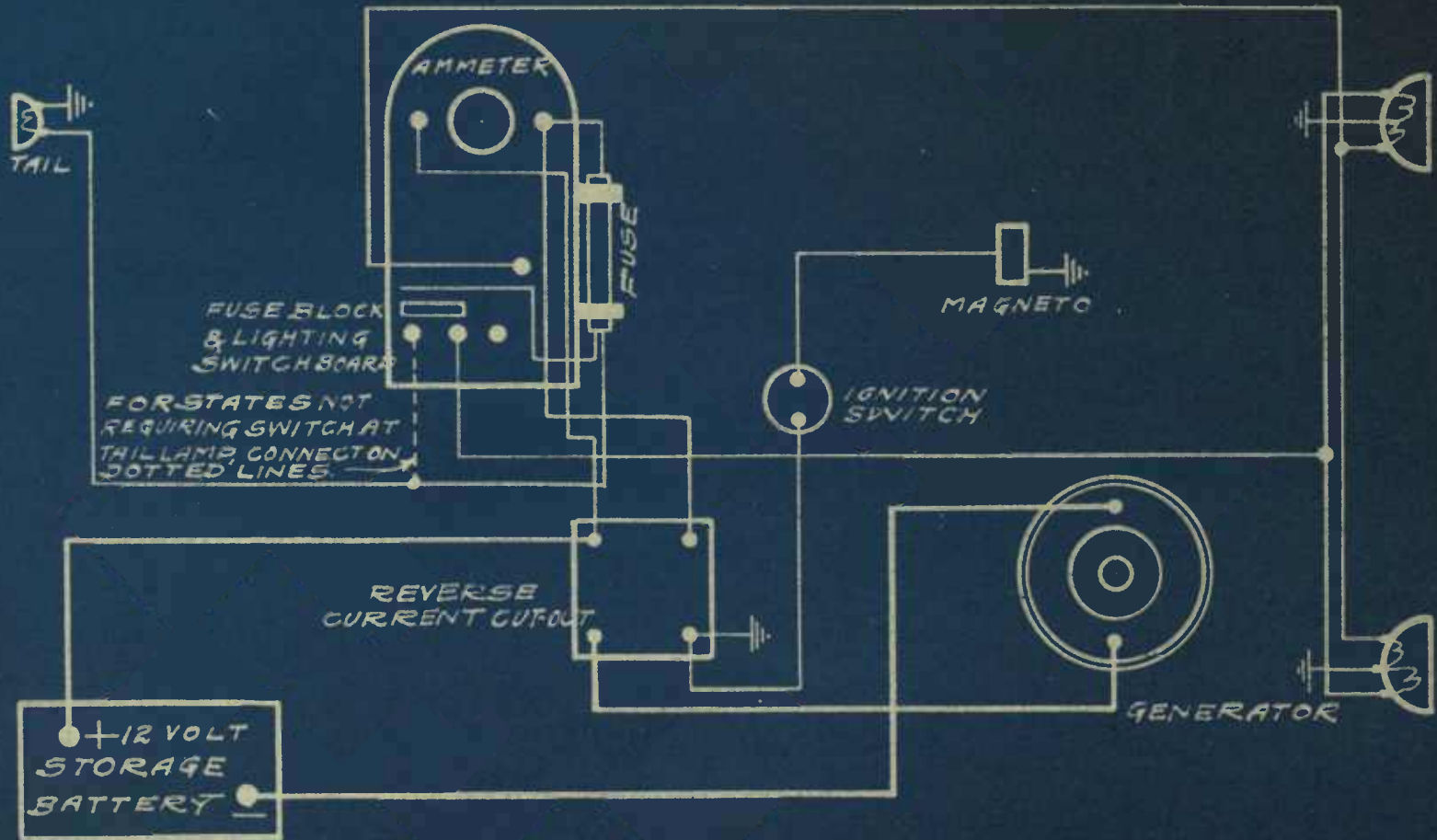
NORTHEAST LIGHTING SYSTEM

FROM MFRS. S/P 7441-H



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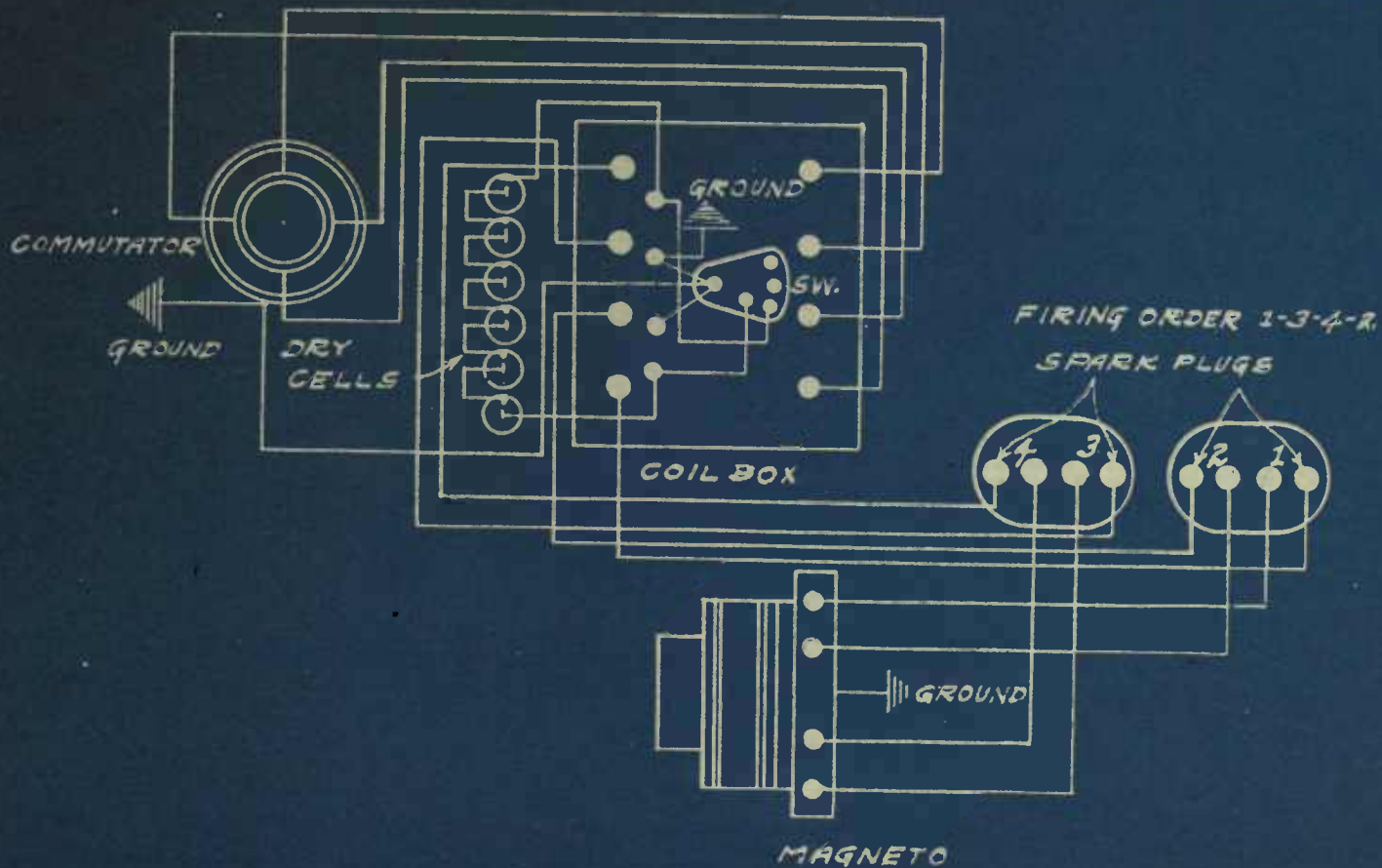
INTERNATIONAL HARVESTER TRUCK 1918 ALL-MODELS
 NORTHEAST SYSTEM FROM MFRS. 3/P



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INTER STATE 1909-10-11 25T034 INCL.
IGNITION WIRING

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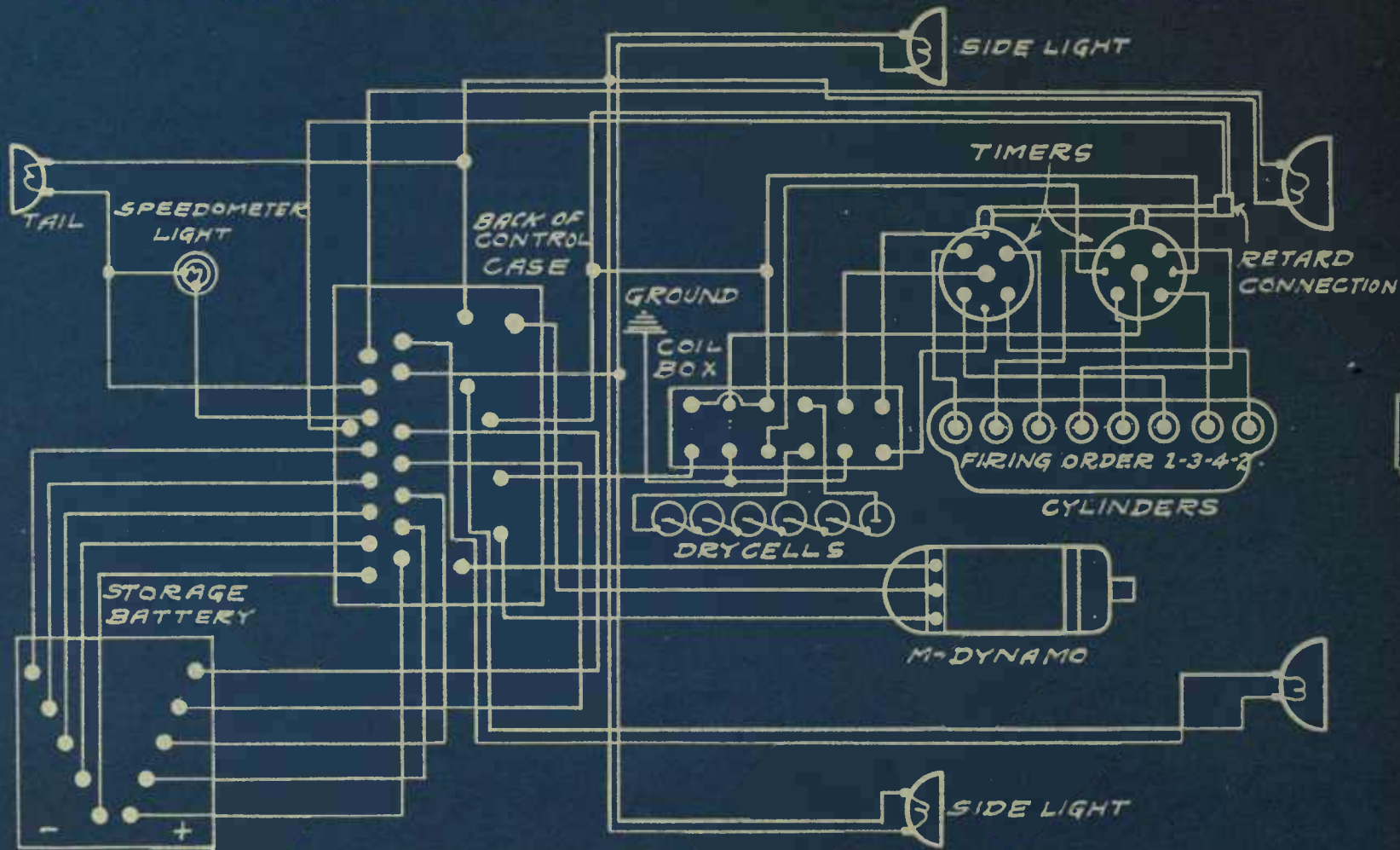


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INTER STATE 1912 40-41-42

STARTING & LIGHTING WIRING APELCO SYSTEM

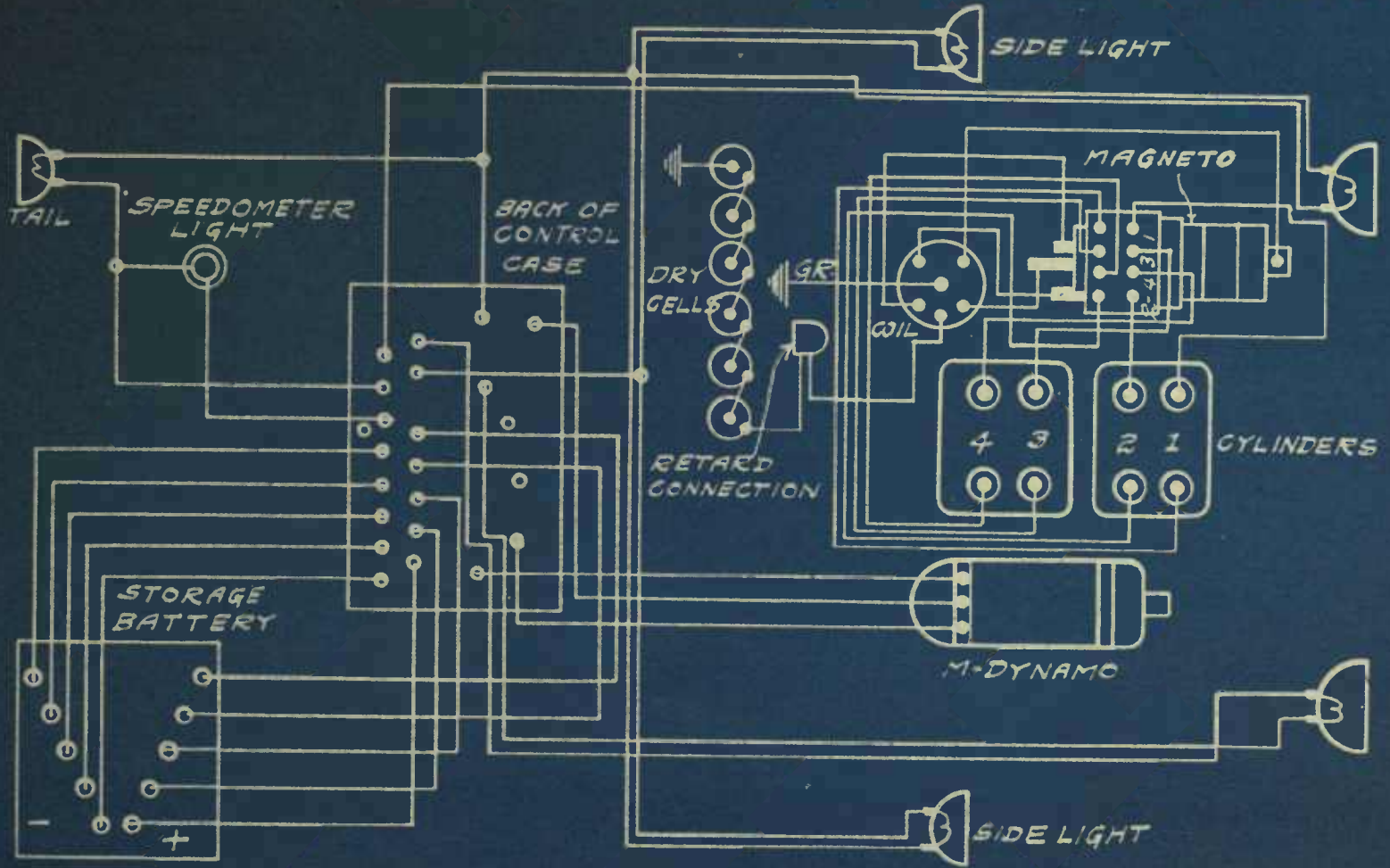
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INTER STATE 1912 50-51-52
AFELCO SYSTEM

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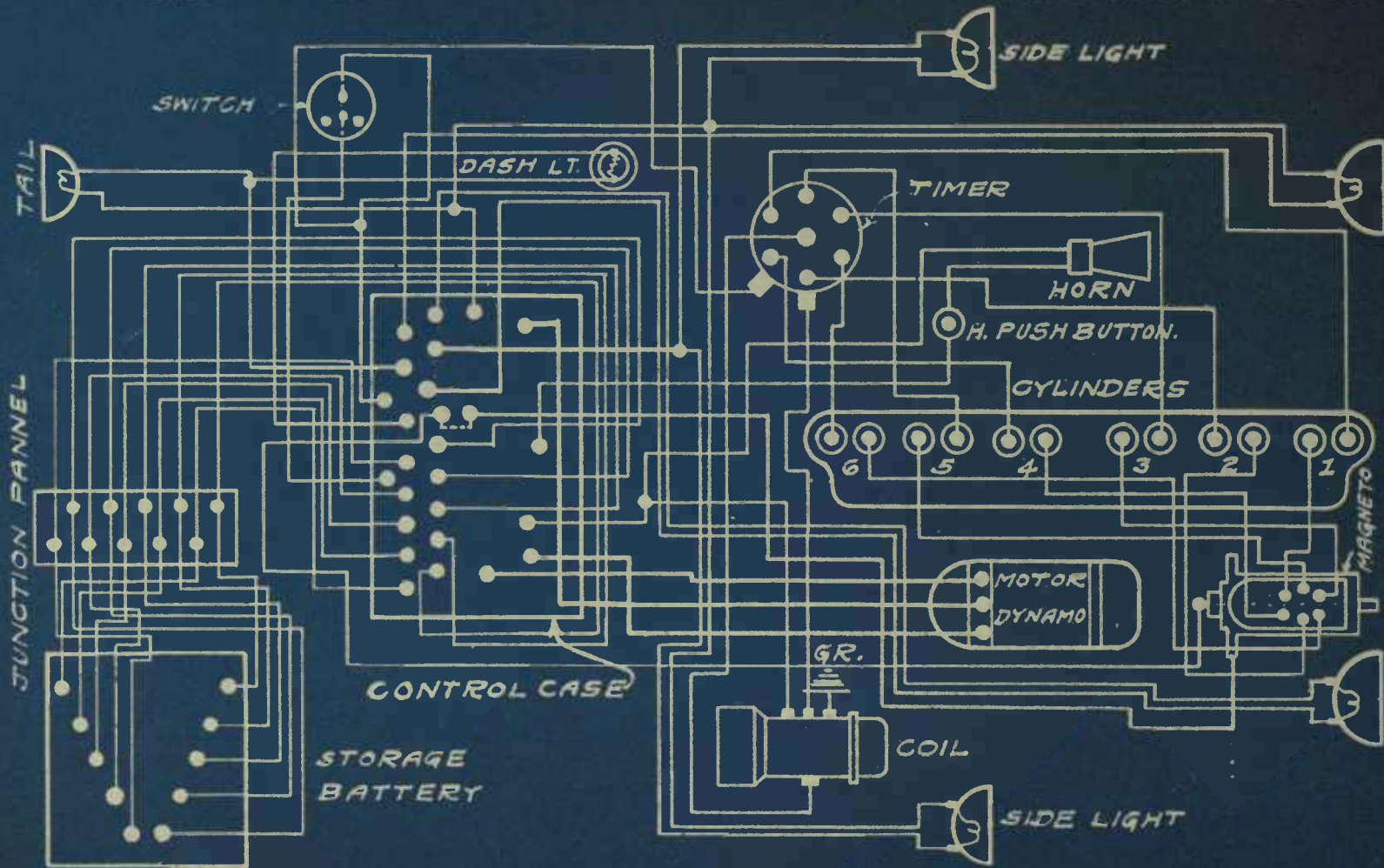


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INTER STATE 1913-14 45

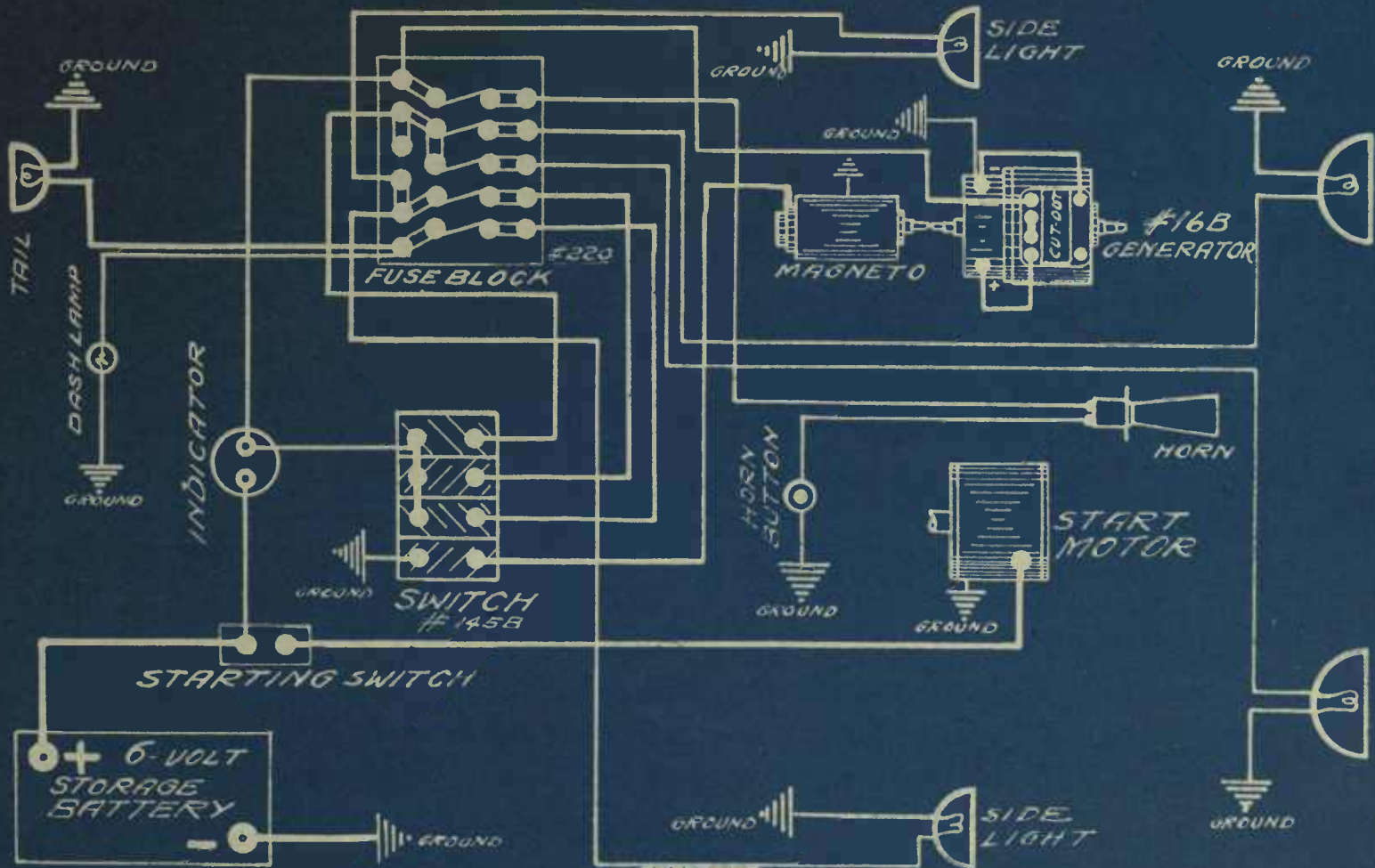
APELCO SYSTEM

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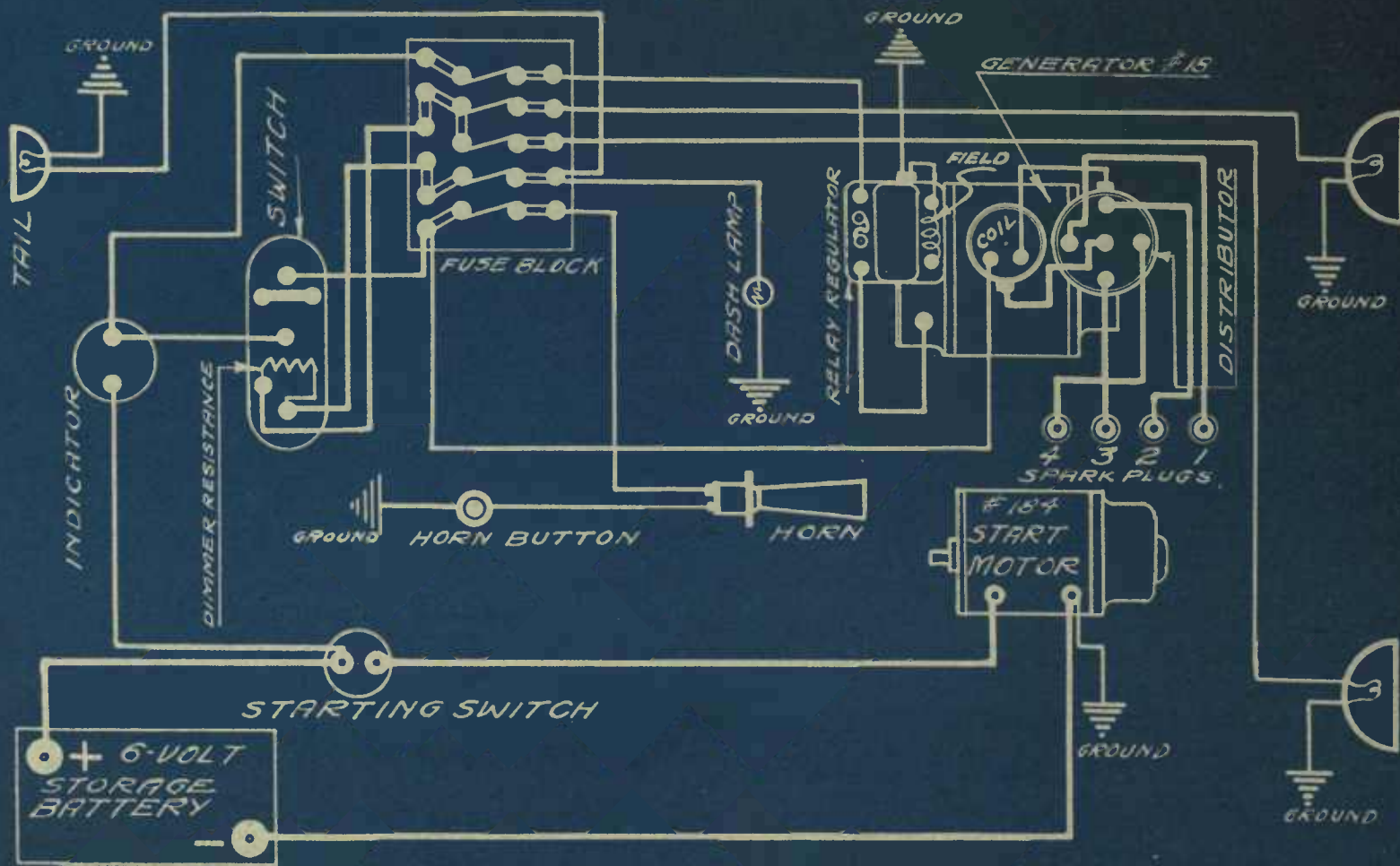
INTER-STATE 1915-16-17-18 MODEL "TF" FROM REMY INST. BK.
REMY SYSTEM



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INTER-STATE 1915-16-17-18 MODELS T & TR
REMY SYSTEM

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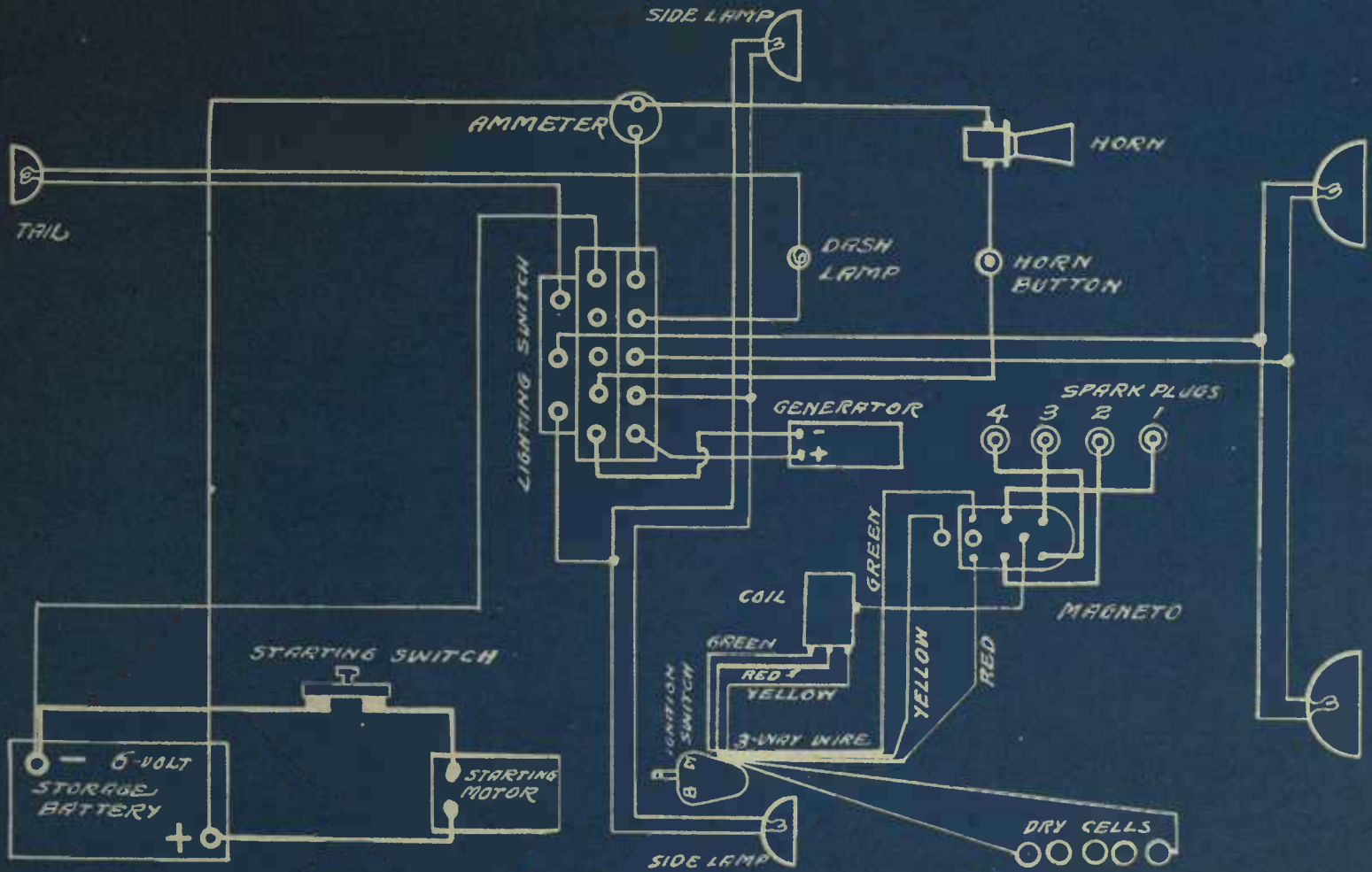


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JACKSON 1913 MODEL 43 AUTOLITE SYSTEM

FROM MFRS BP. 40076

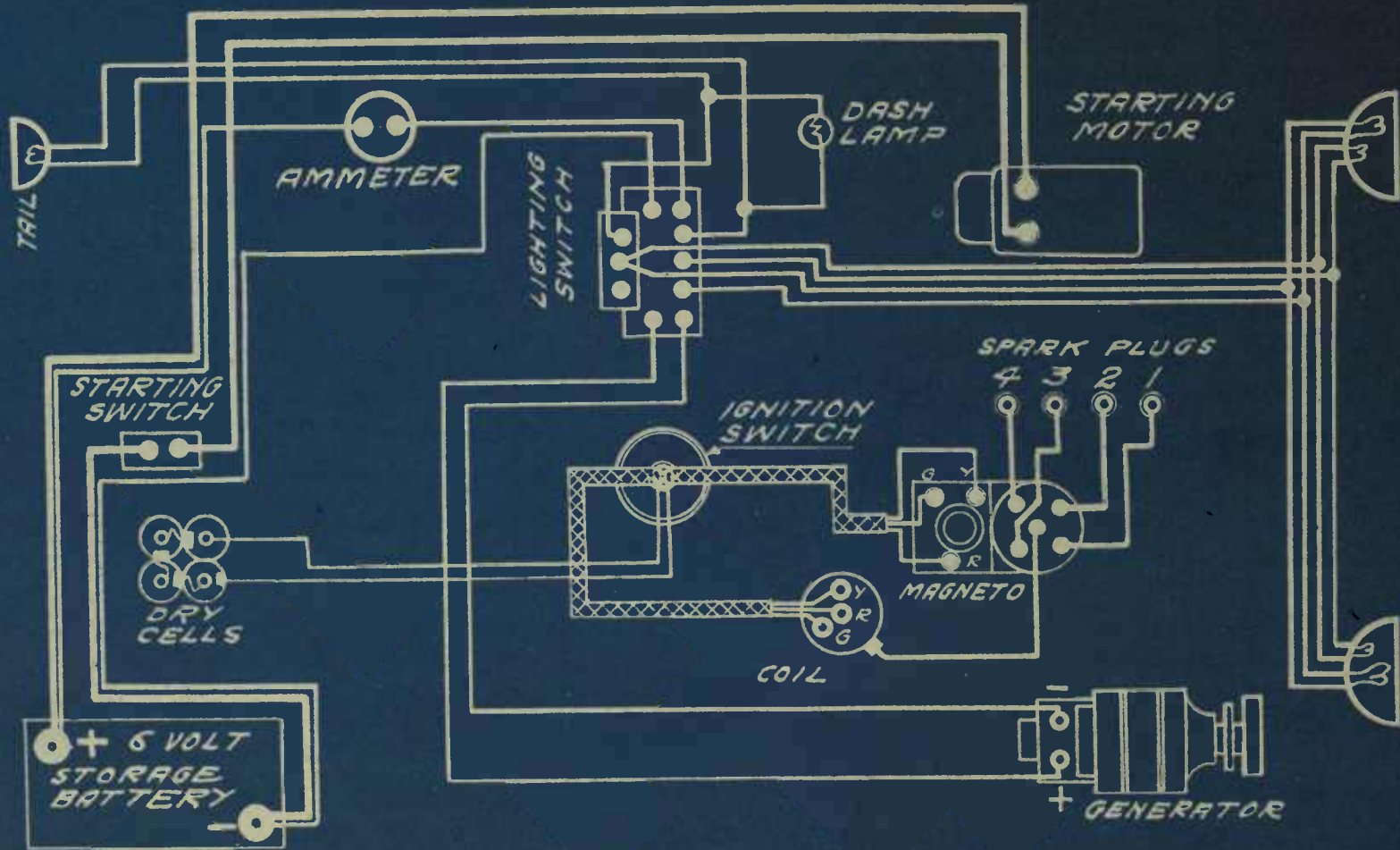
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JACKSON 1914-1915 46

NORTH-EAST SYSTEM

FROM MFRS. BP

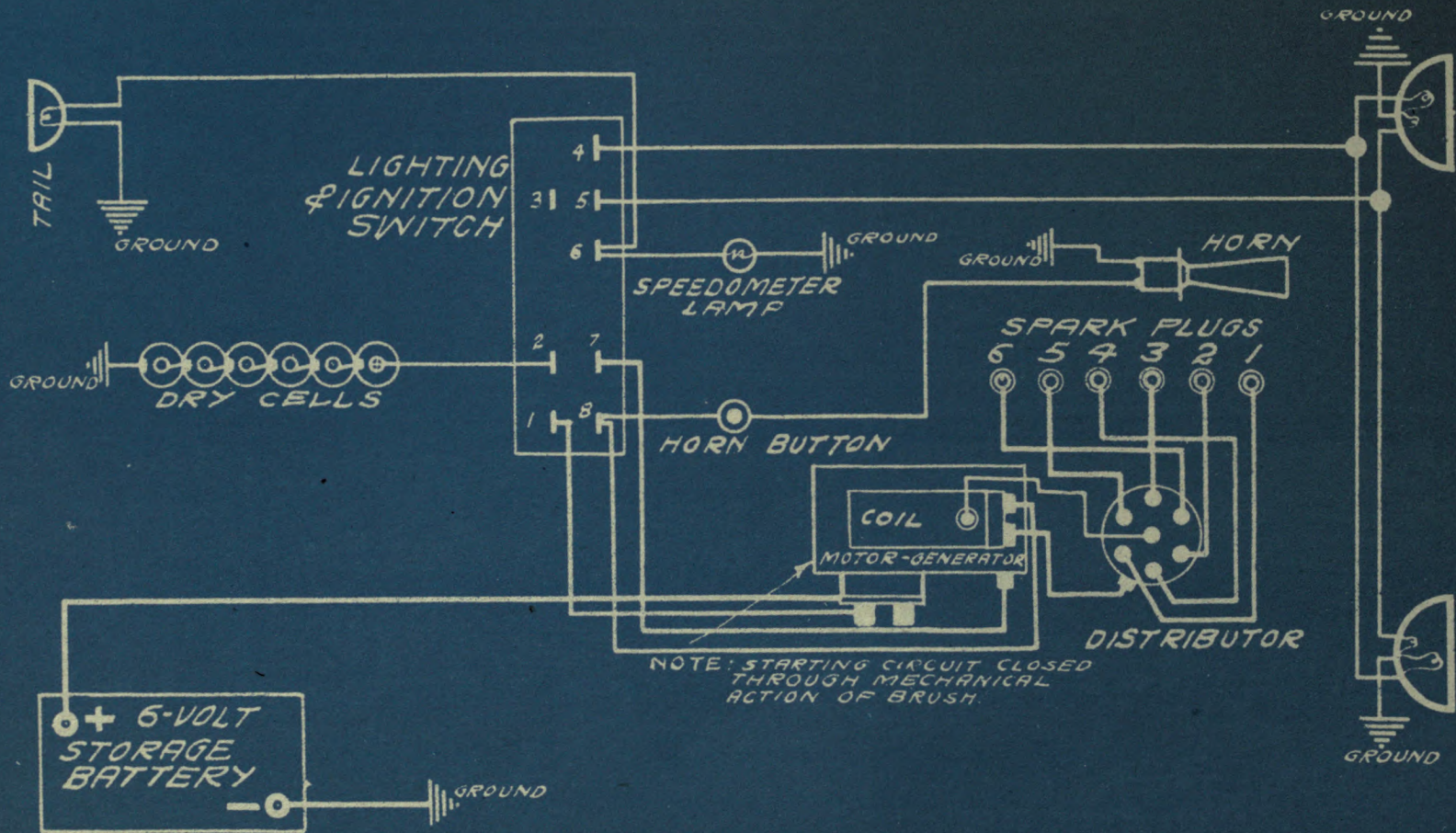


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JACKSON 1915 48 & 6-40

DELCO SYSTEM

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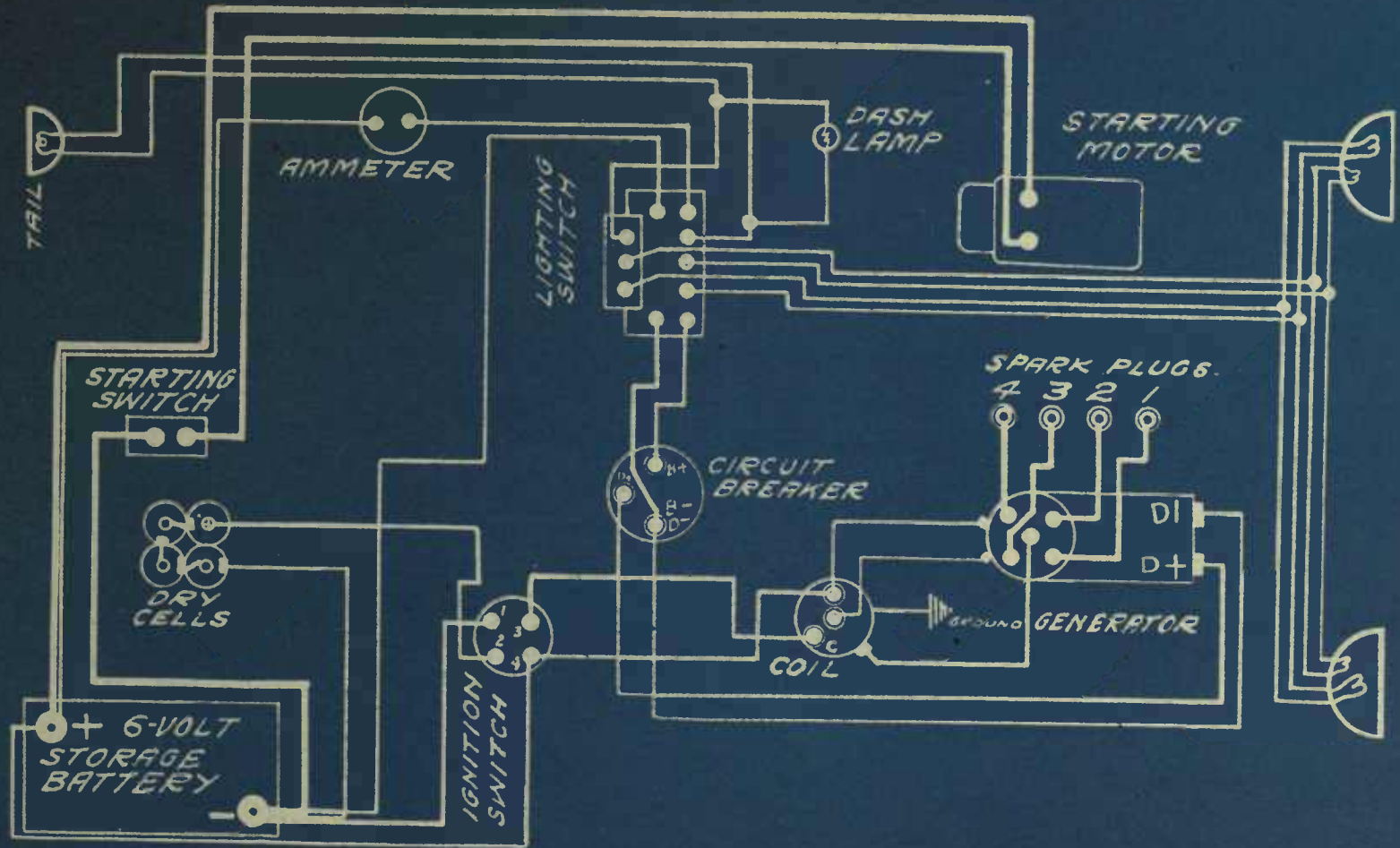


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JACKSON 1915-1916 44

NORTH-EAST SYSTEM

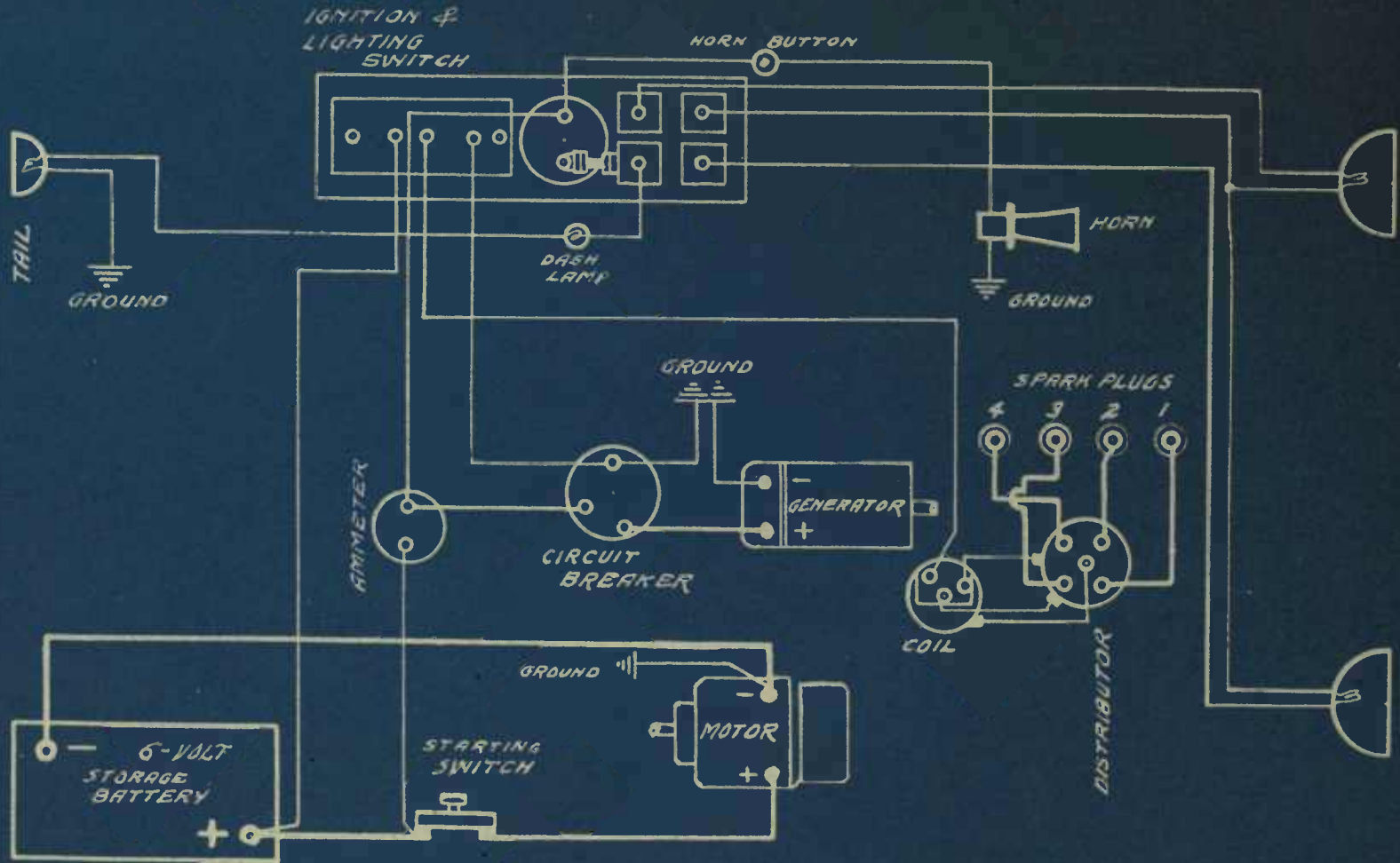
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JACKSON 1916 MODEL 34 AUTOLITE SYSTEM

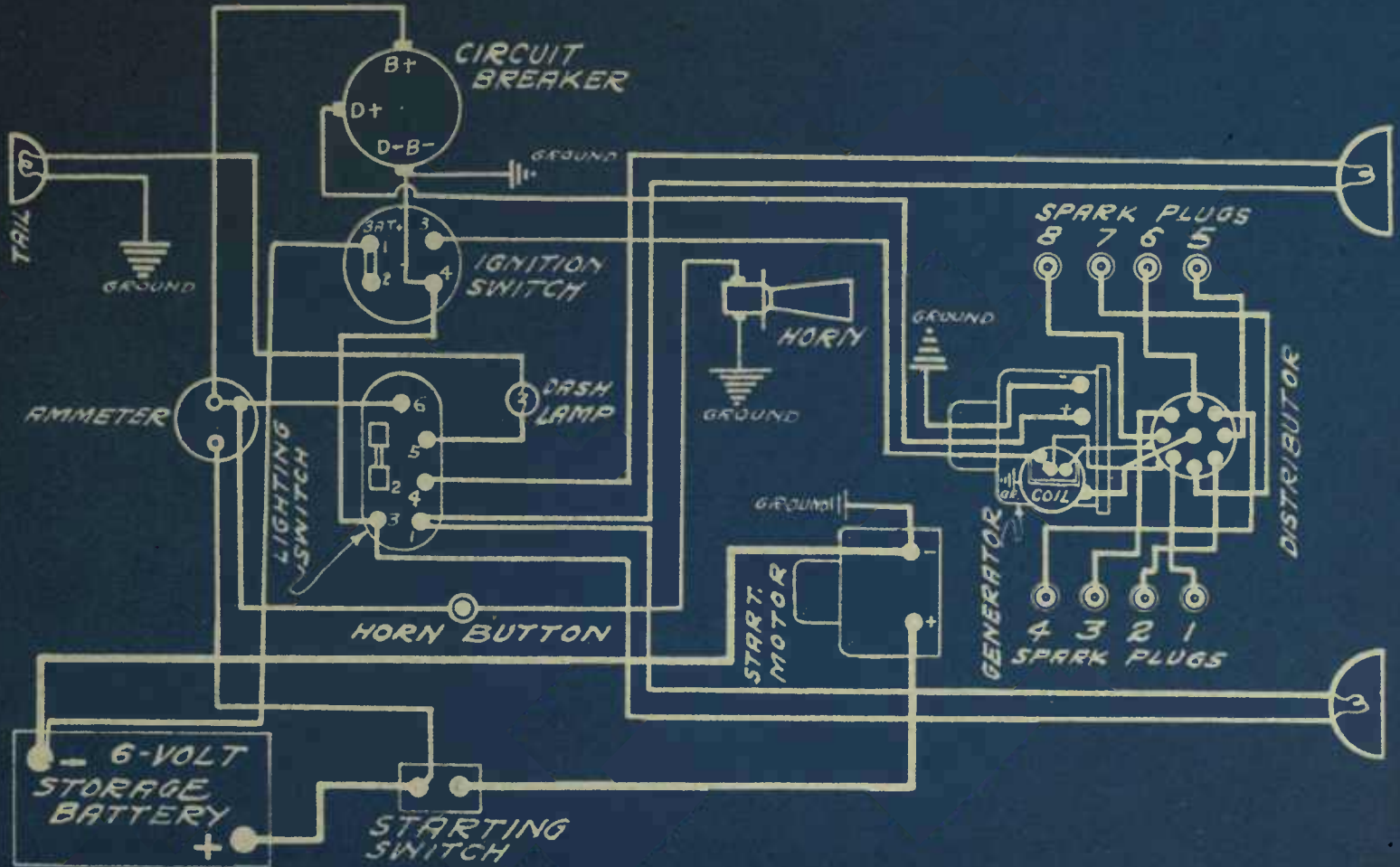
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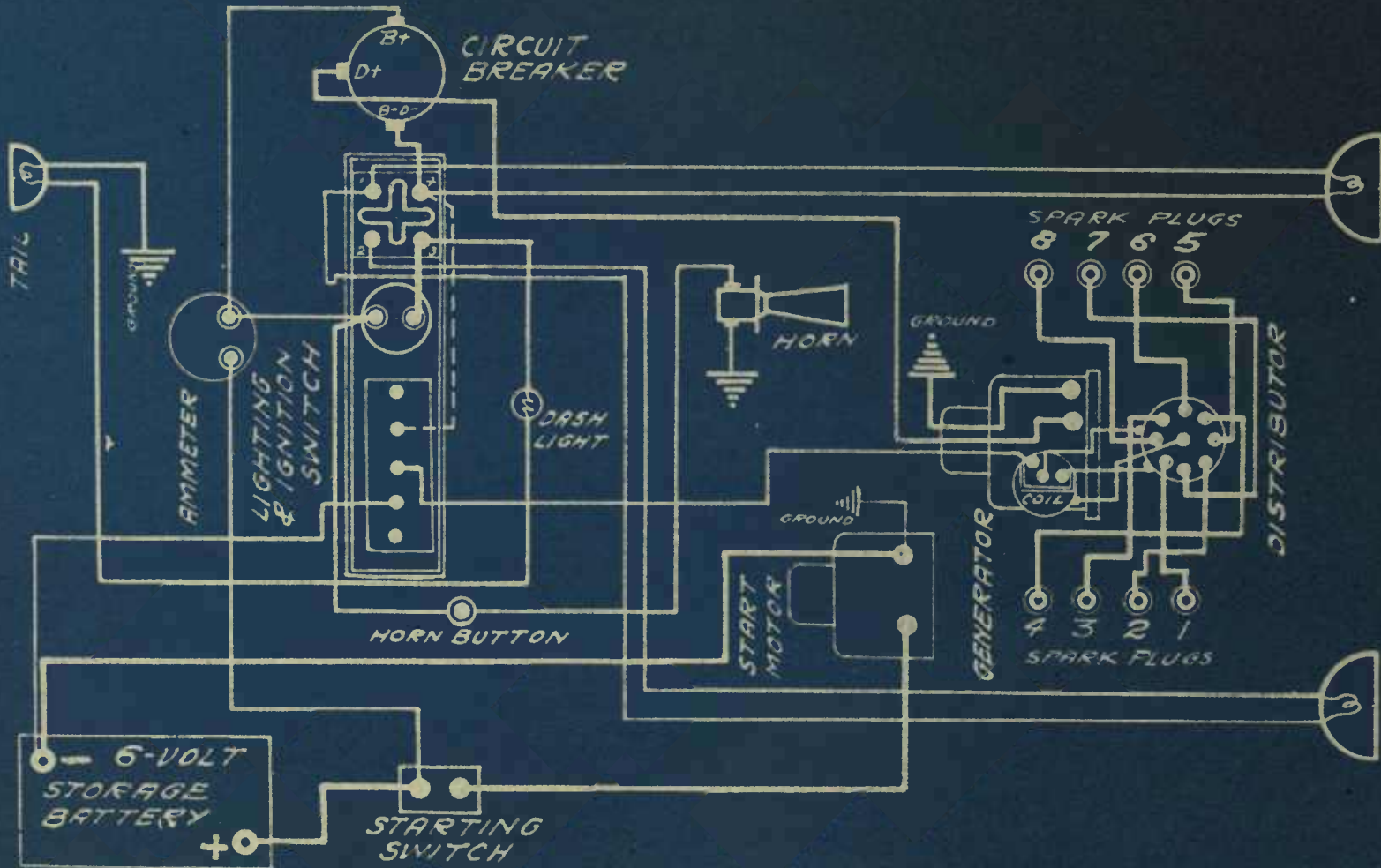
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JACKSON 1916 348
 AUTOLITE SYSTEM

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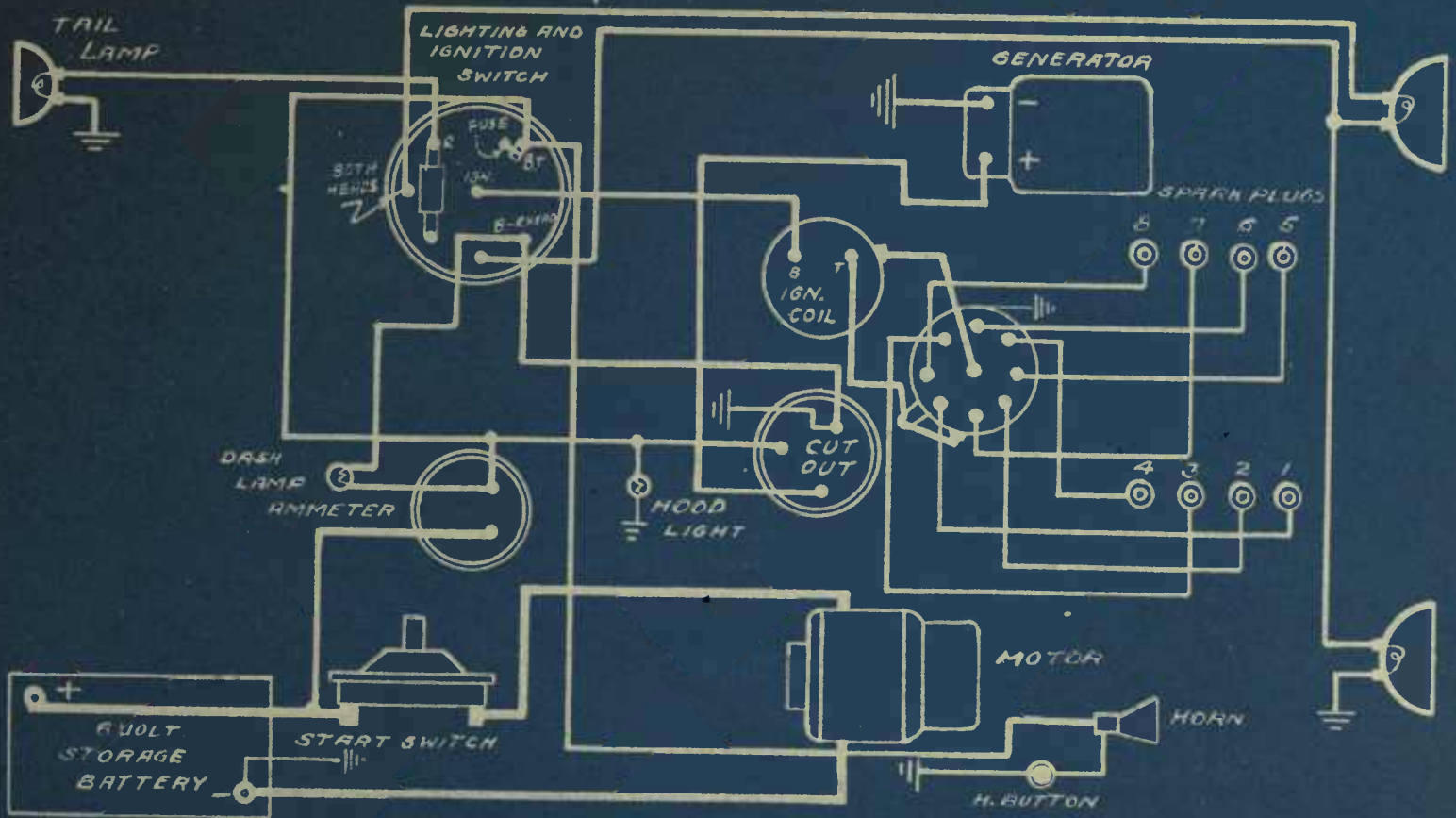


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JACKSON 1917-18 MODEL 349

AUTOLITE SYSTEM. CONN. 15N.

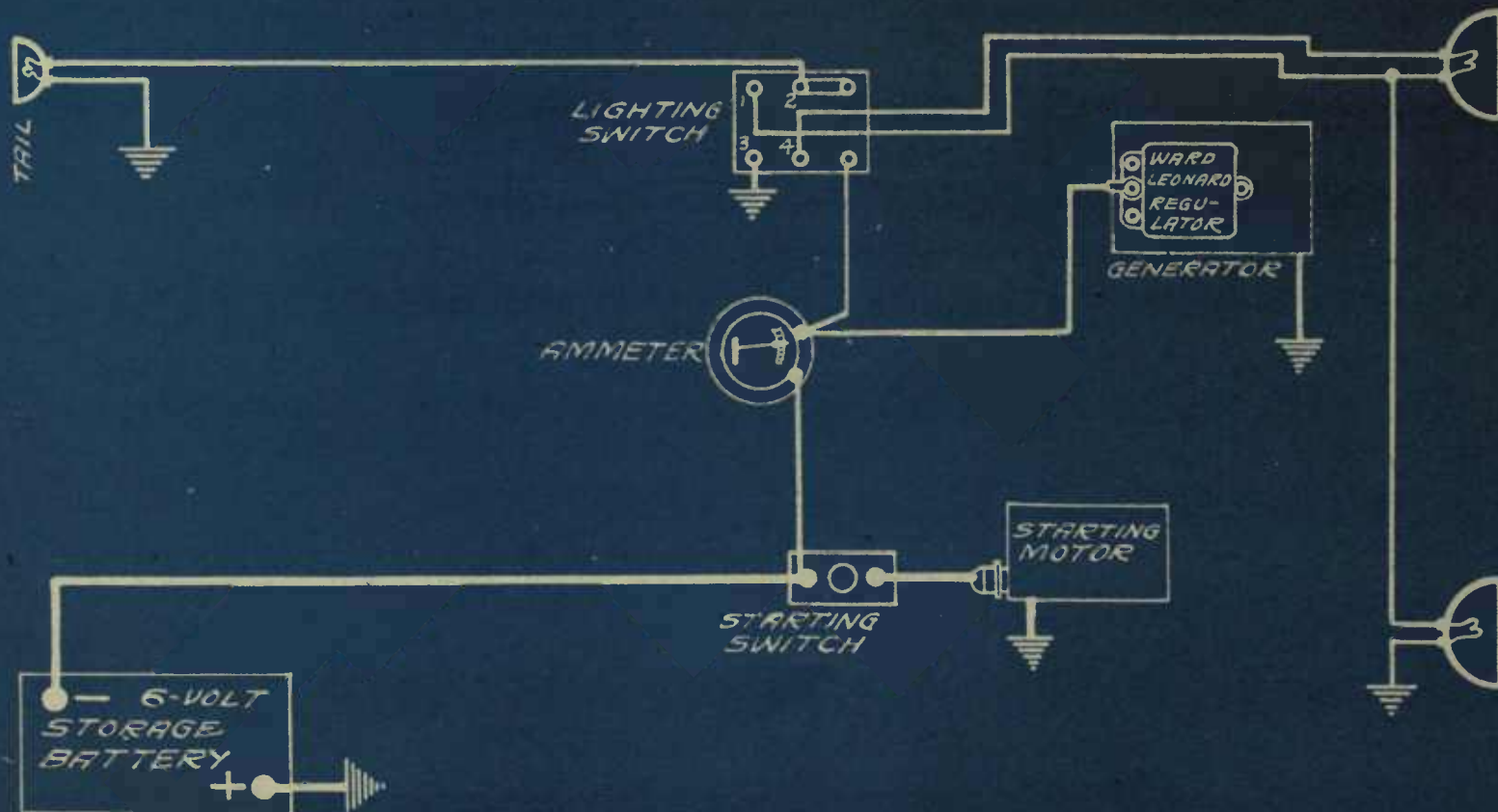
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FORD

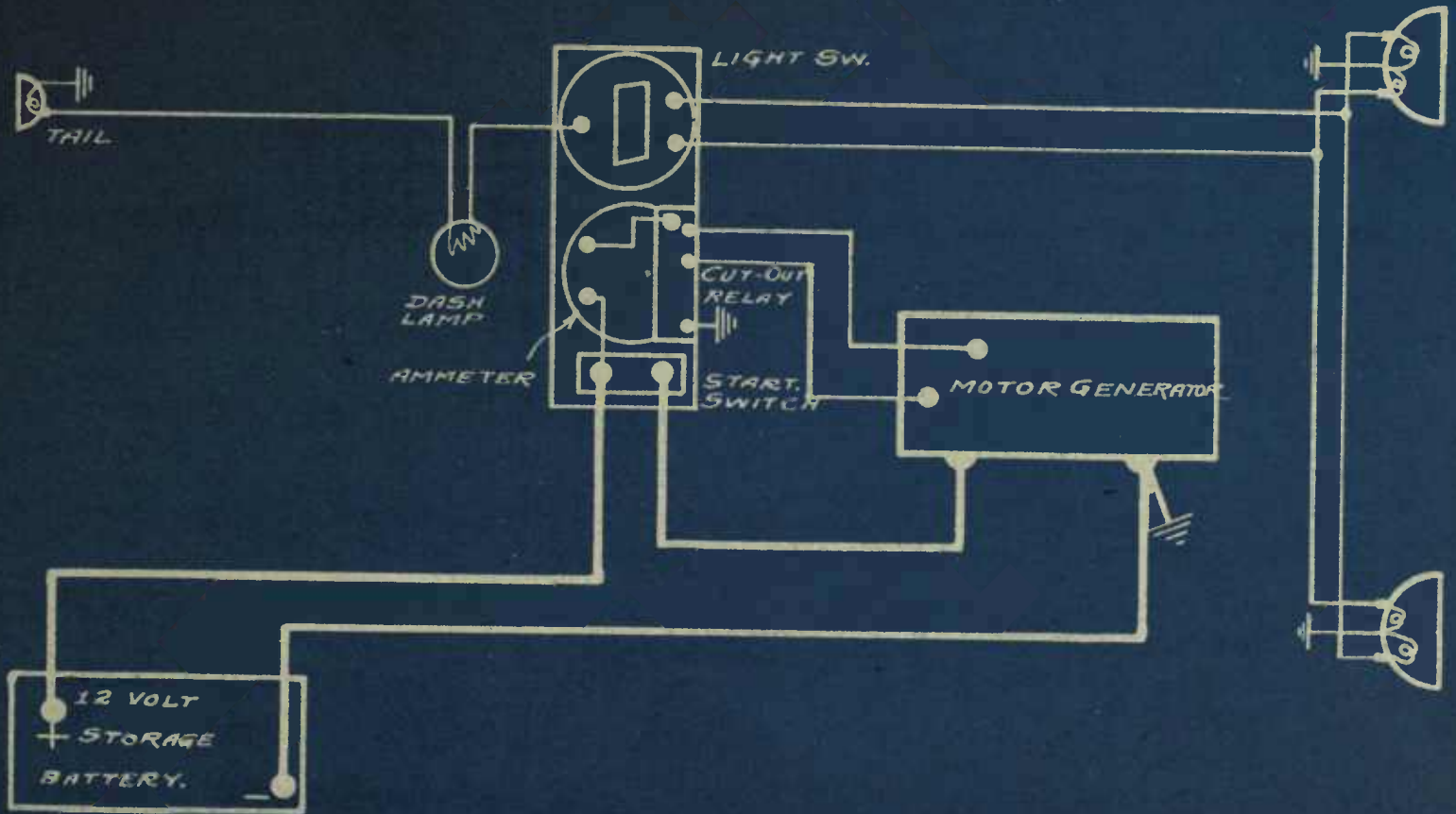
A-B-C SYSTEM EQUIPPED WITH ROBBINS & MEYERS STARTING MOTOR, WESTINGHOUSE GENERATOR AND WARD LEONARD CONTROLLER



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FORD
FISHER SYSTEM

FROM A.J.P. SKETCH

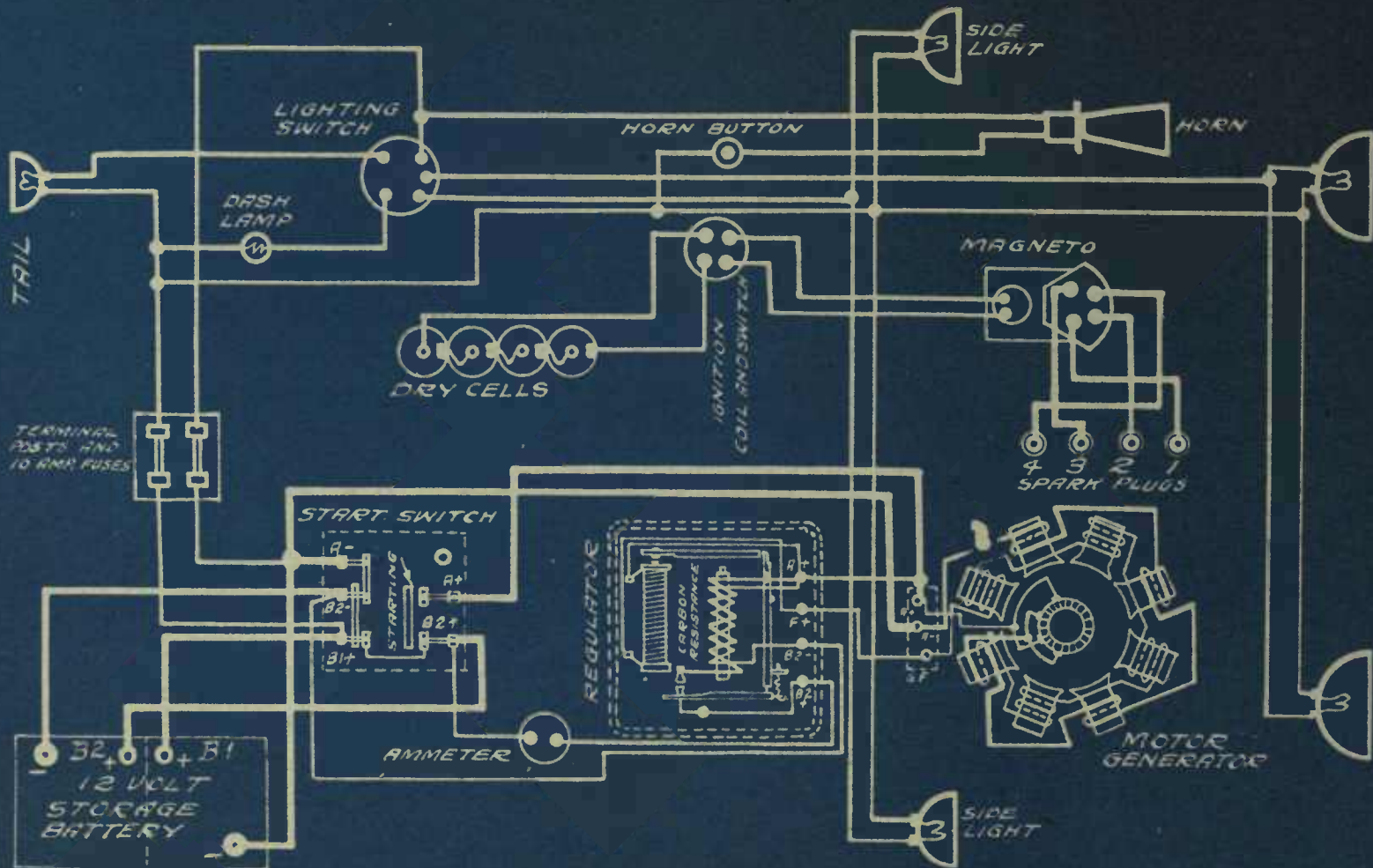


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JEFFERY 1915 FOUR

U.S.L. SYSTEM

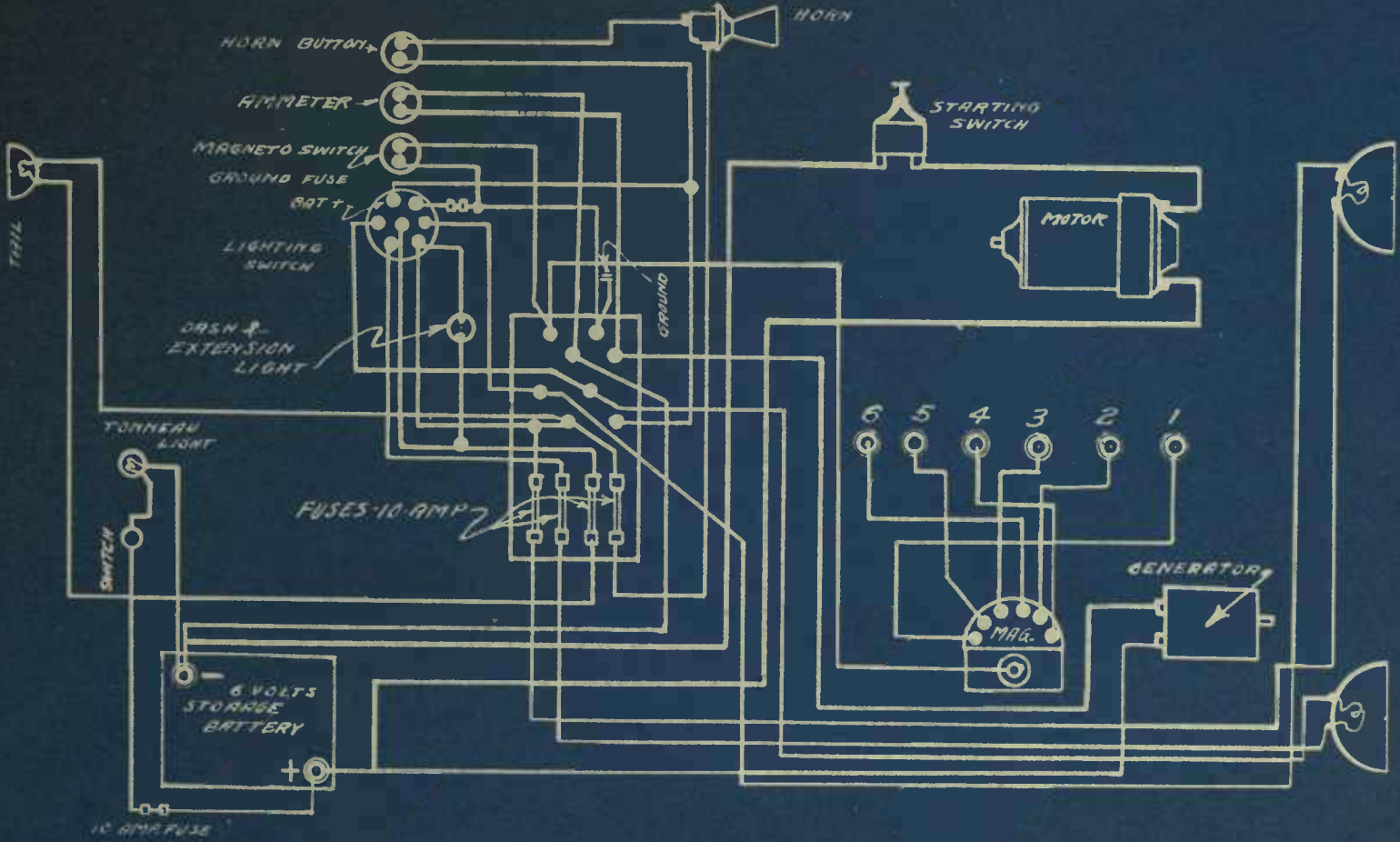
FROM JEFFERY INST BK.



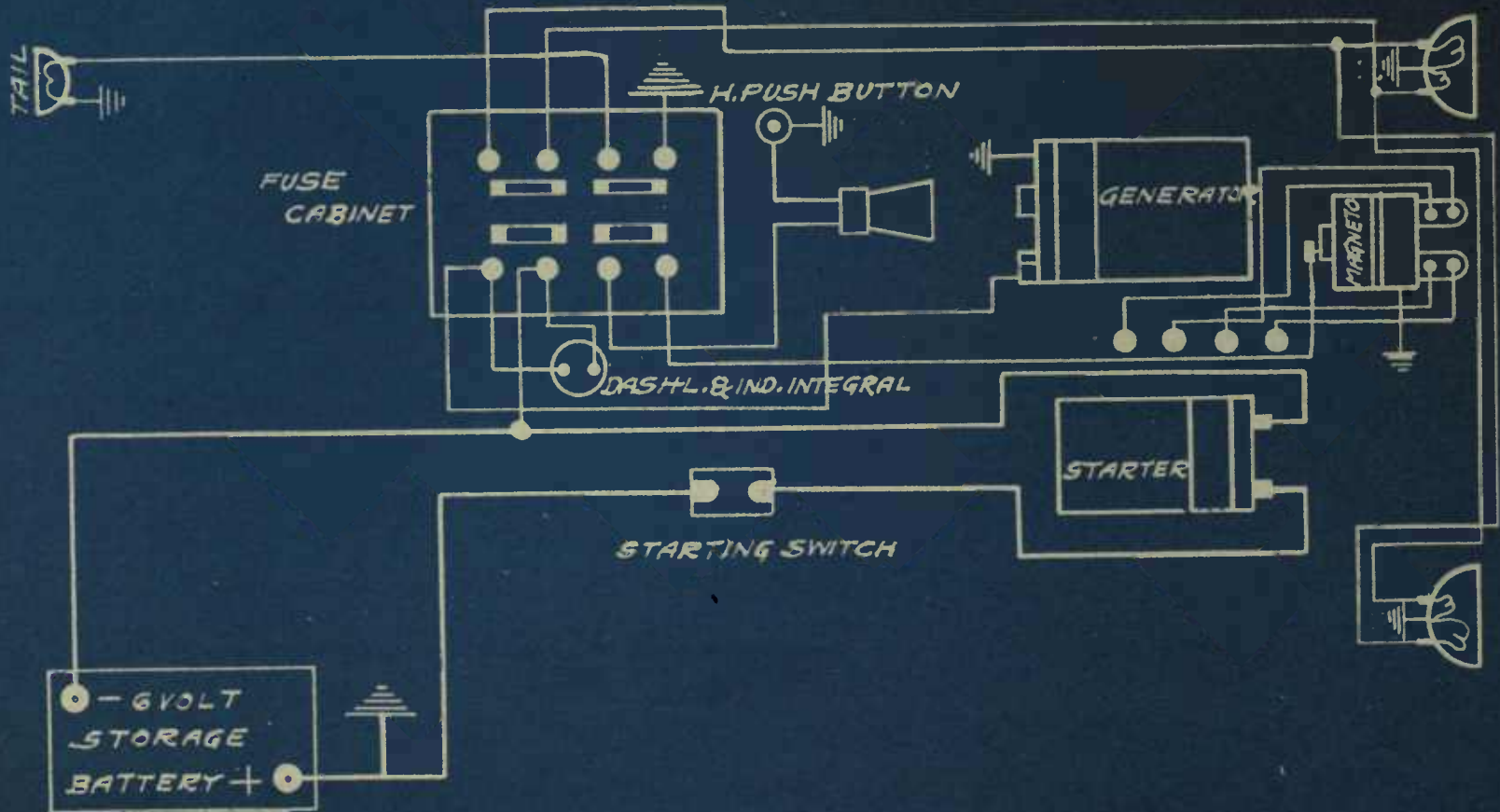
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JEFFERY 1915 CHESTERFIELD 6
BIJUR SYSTEM

FROM BR C-607^R



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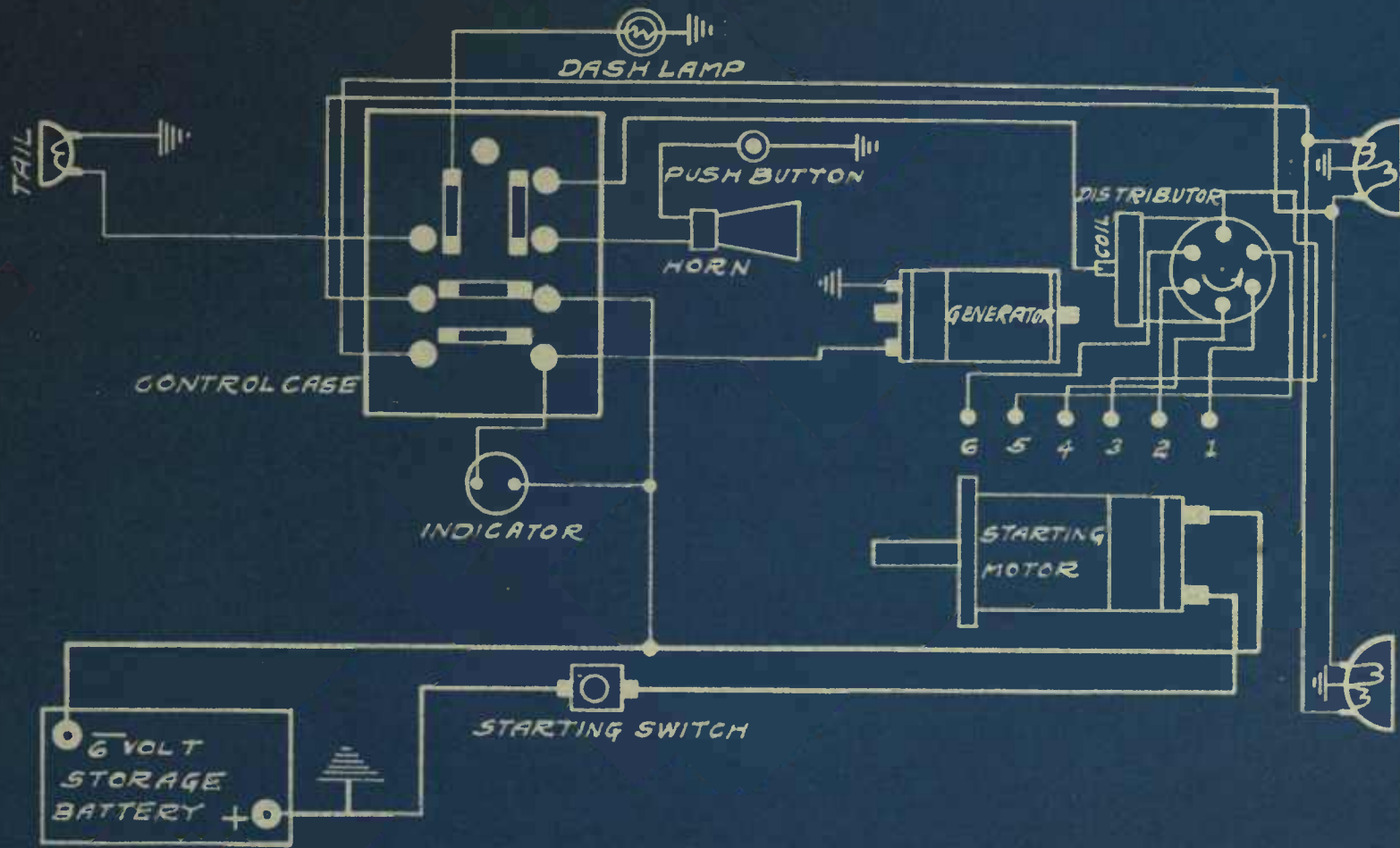


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JEFFERY 1917 671

BIJUR SYSTEM

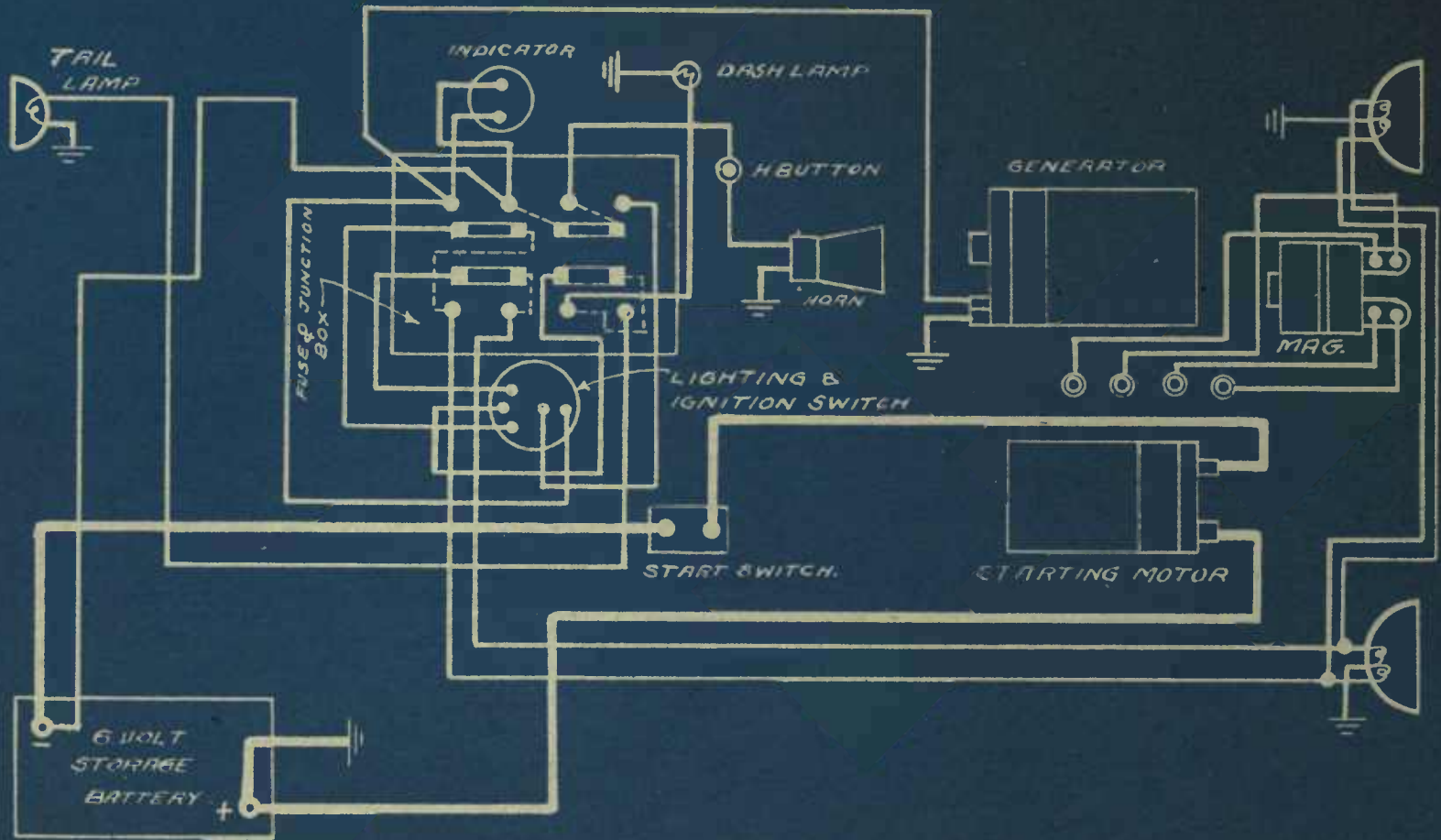
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JEFFERY RAPID SERVICE TRUCK
BIJUR SYSTEM.

MODEL 1016.
FROM MERS. B. R.

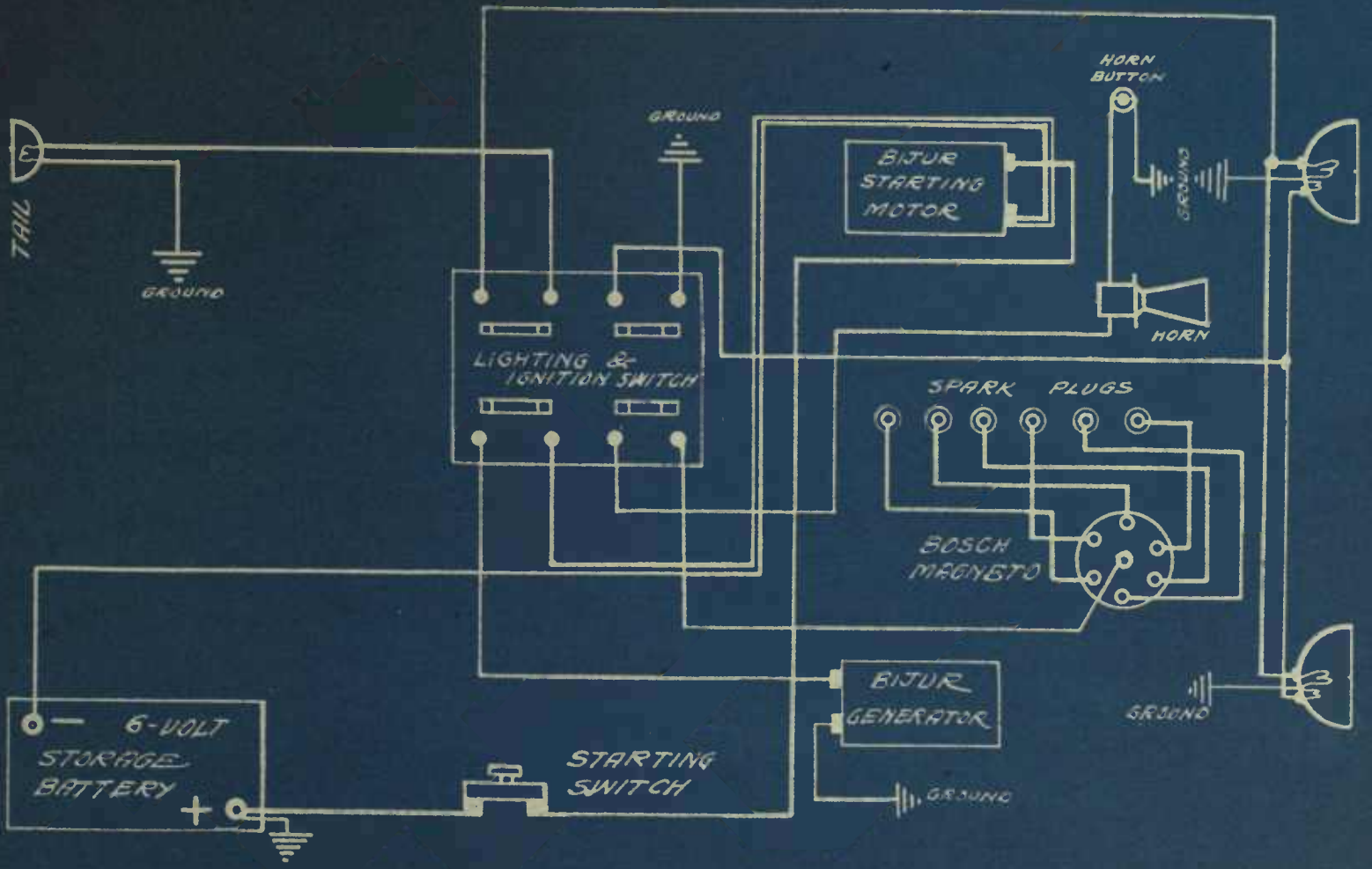


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JORDAN 1917 "B" & 1916 "60" BITUR SYSTEM

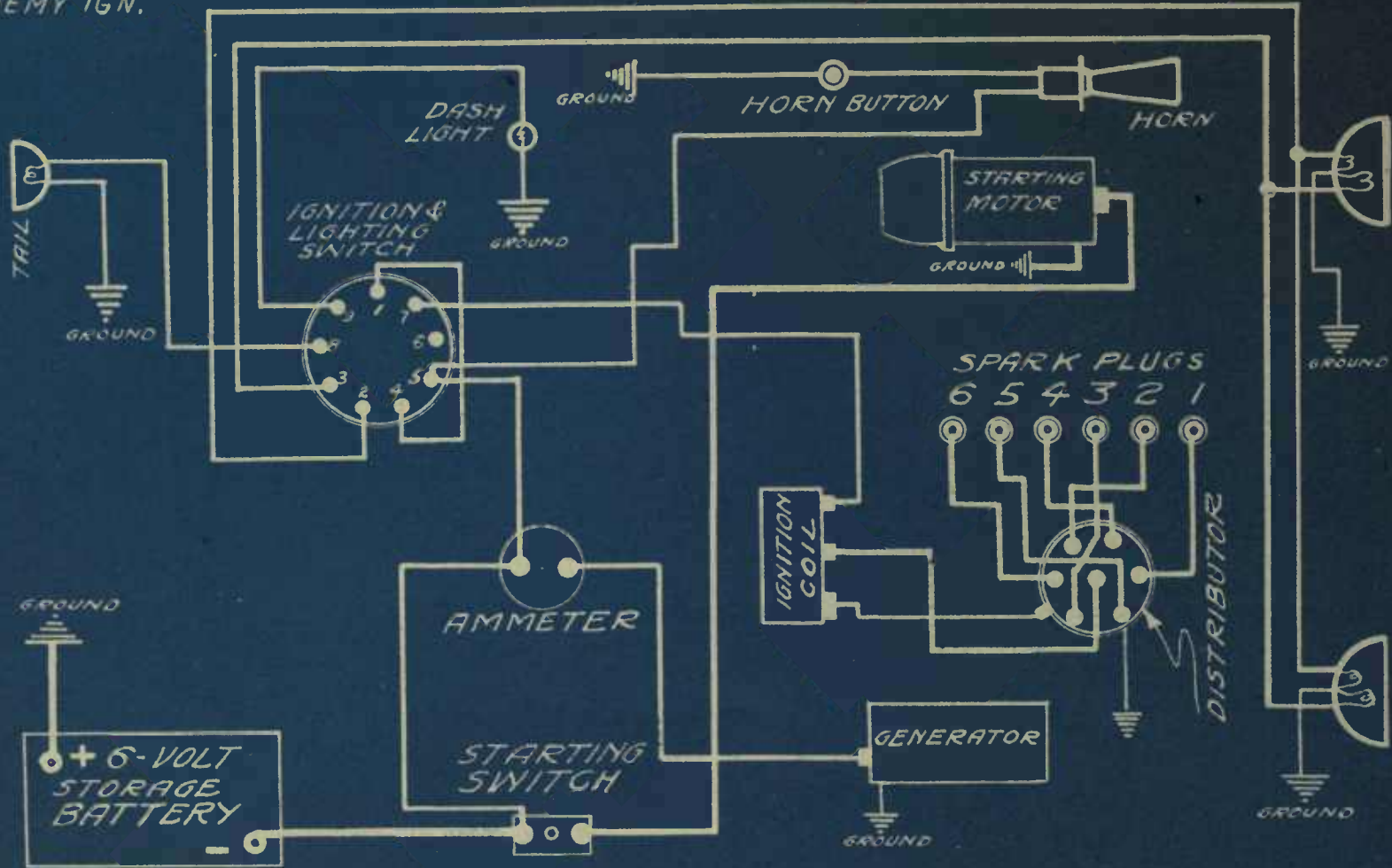
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JORDAN 1918 "60"
BIJUR SYSTEM 1919
REMY IGN.

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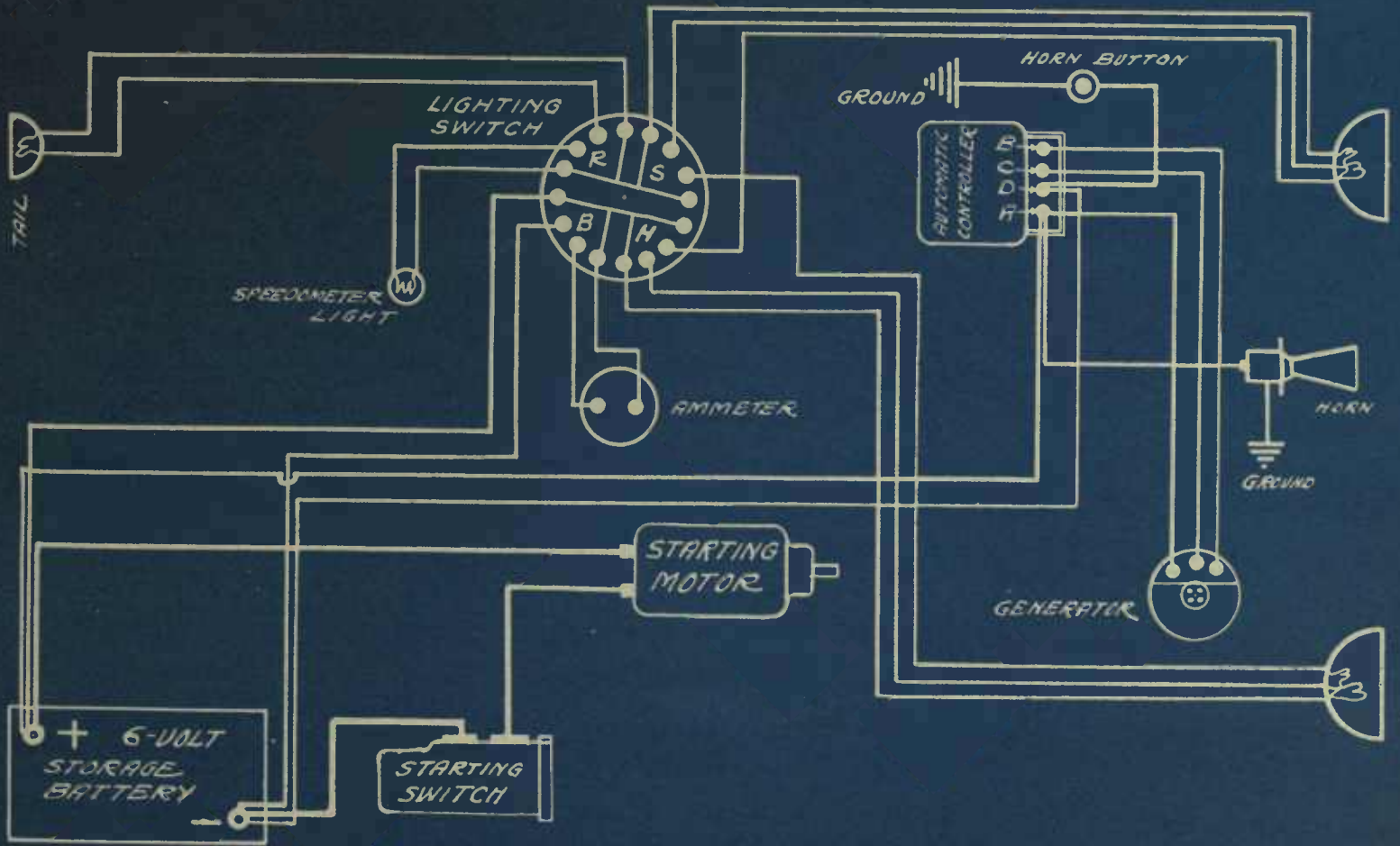


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KING
WARD-LEONARD SYSTEM

1915 C-4

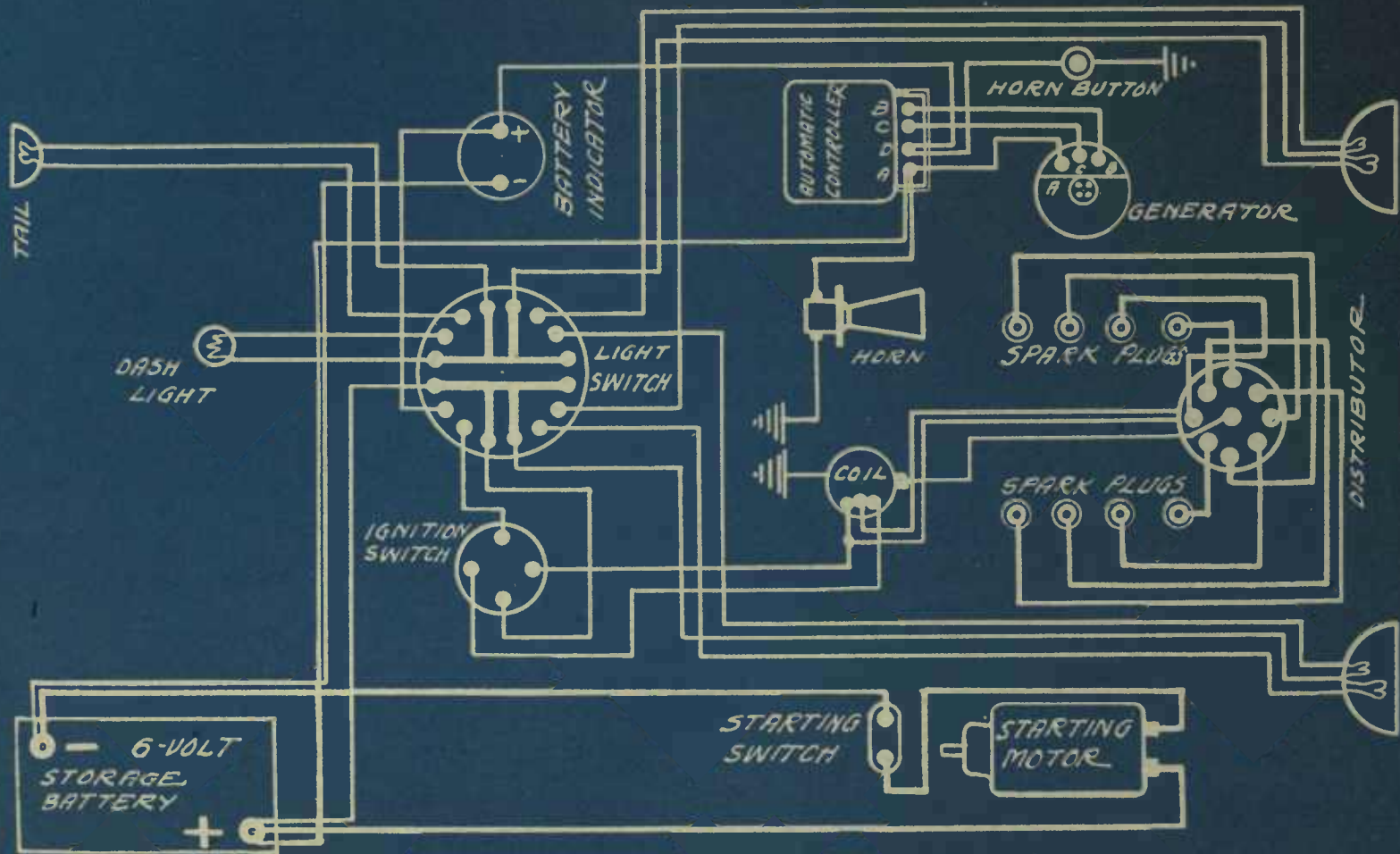
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KING 1915 "8"
WARD-LEONARD SYSTEM

FROM MFRS. B.P. E-4-197

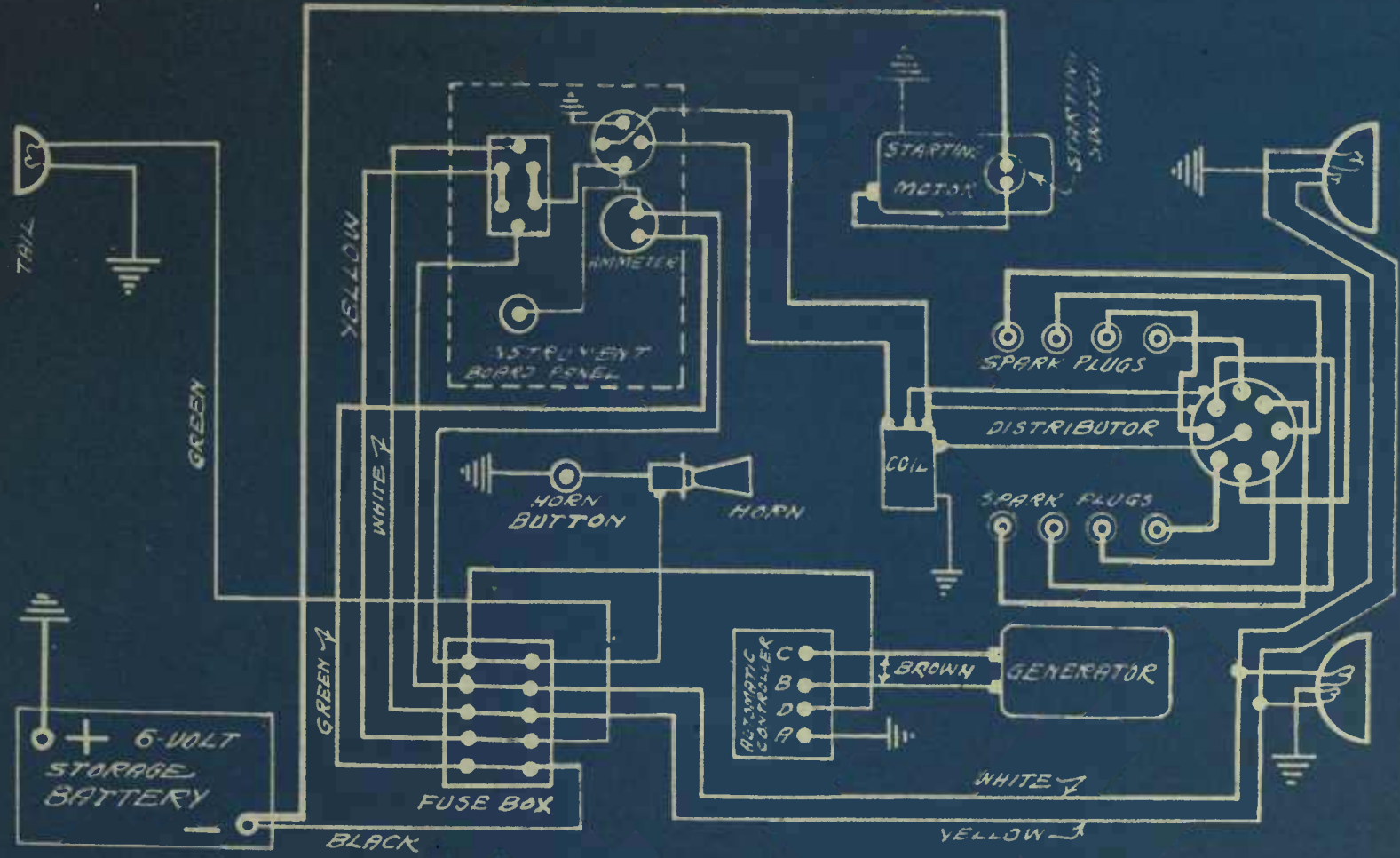


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KING 1916 "E"
WARD-LEONARD SYSTEM

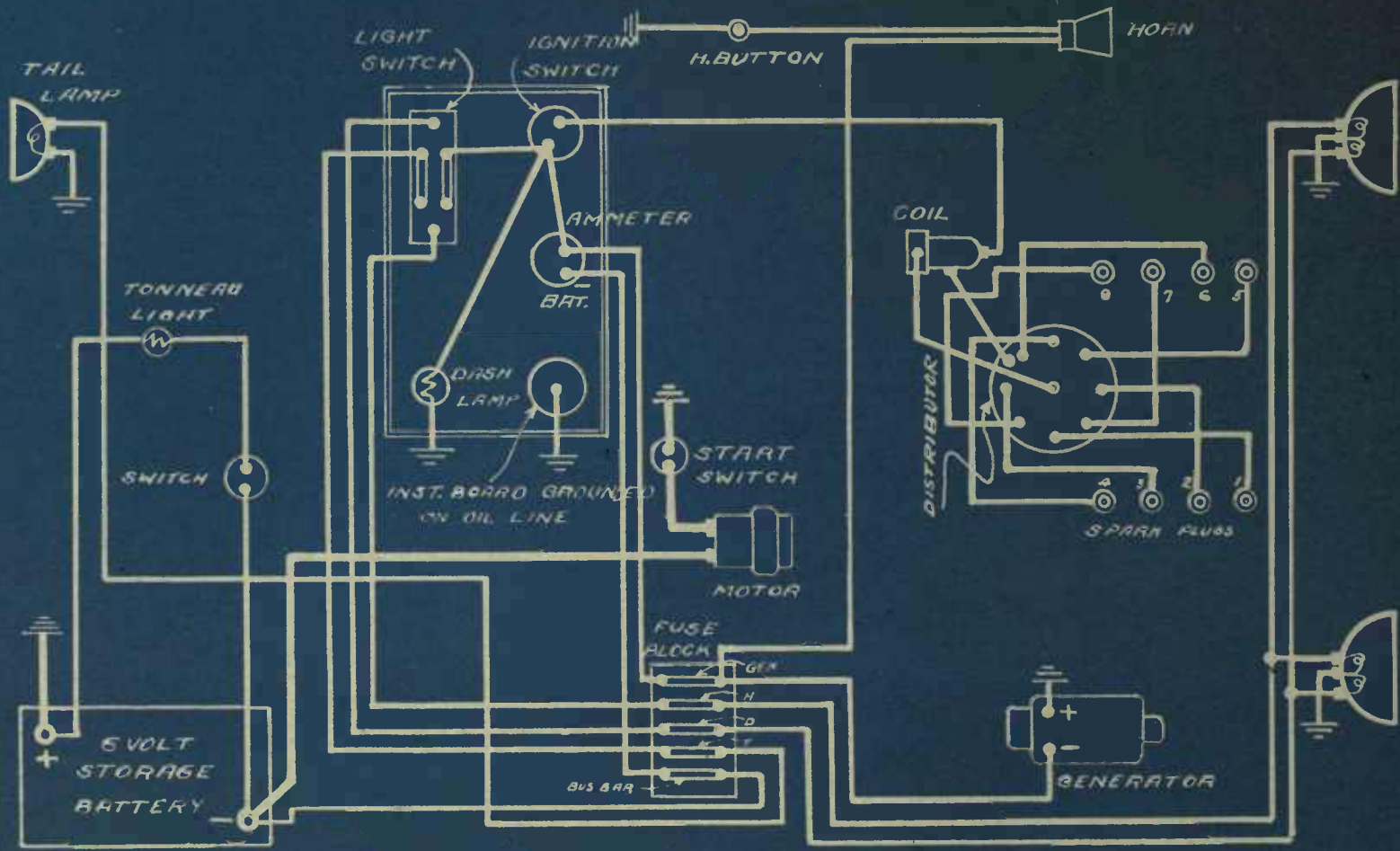
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KING MODEL EE 1917-1918 MODEL G-1919
 WARD LEONARD SYSTEM ATWATER KENT IGN.

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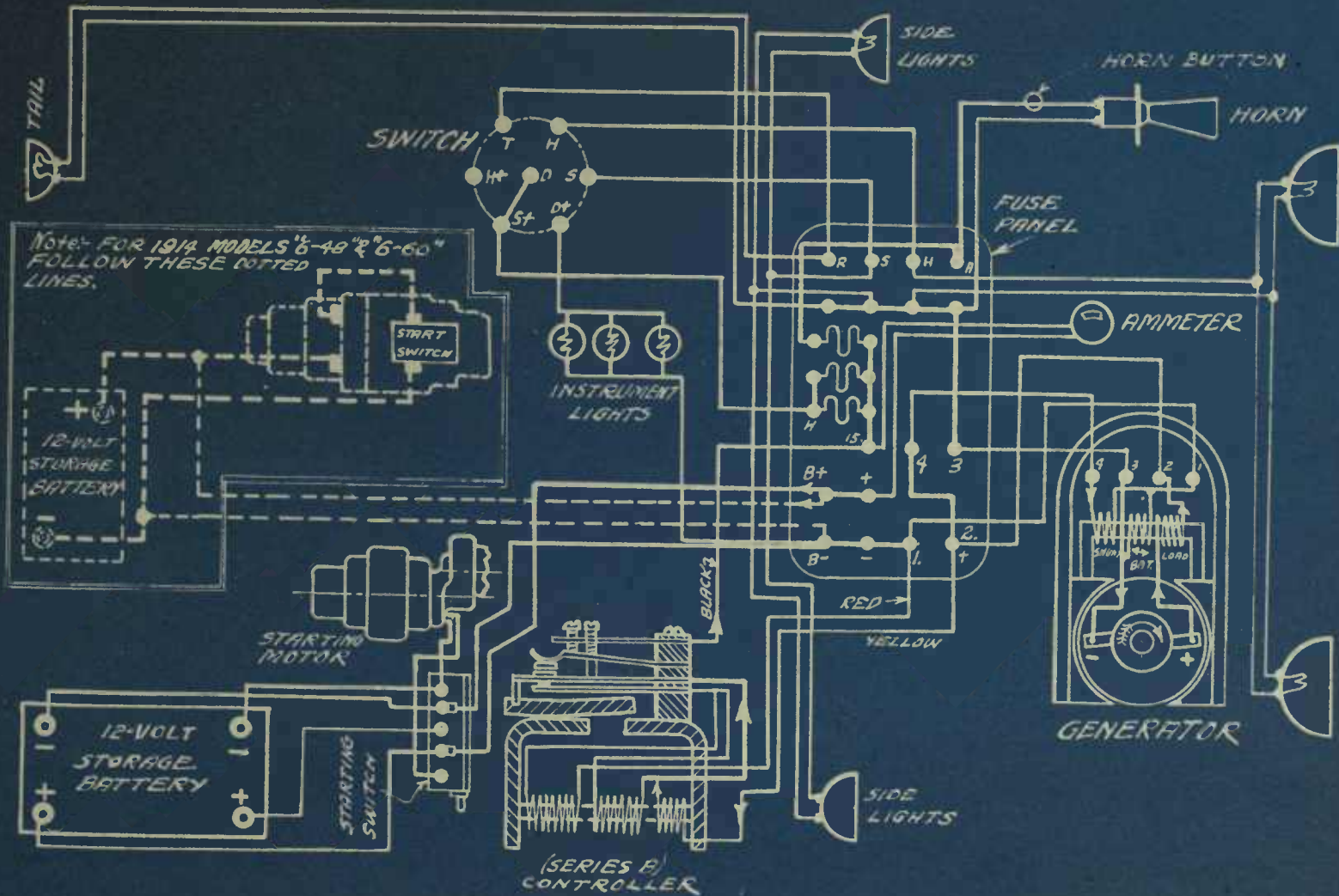


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KISSEL 1913-4-40 & 1914-6-48 & 6-60

ESTERLINE SYSTEM

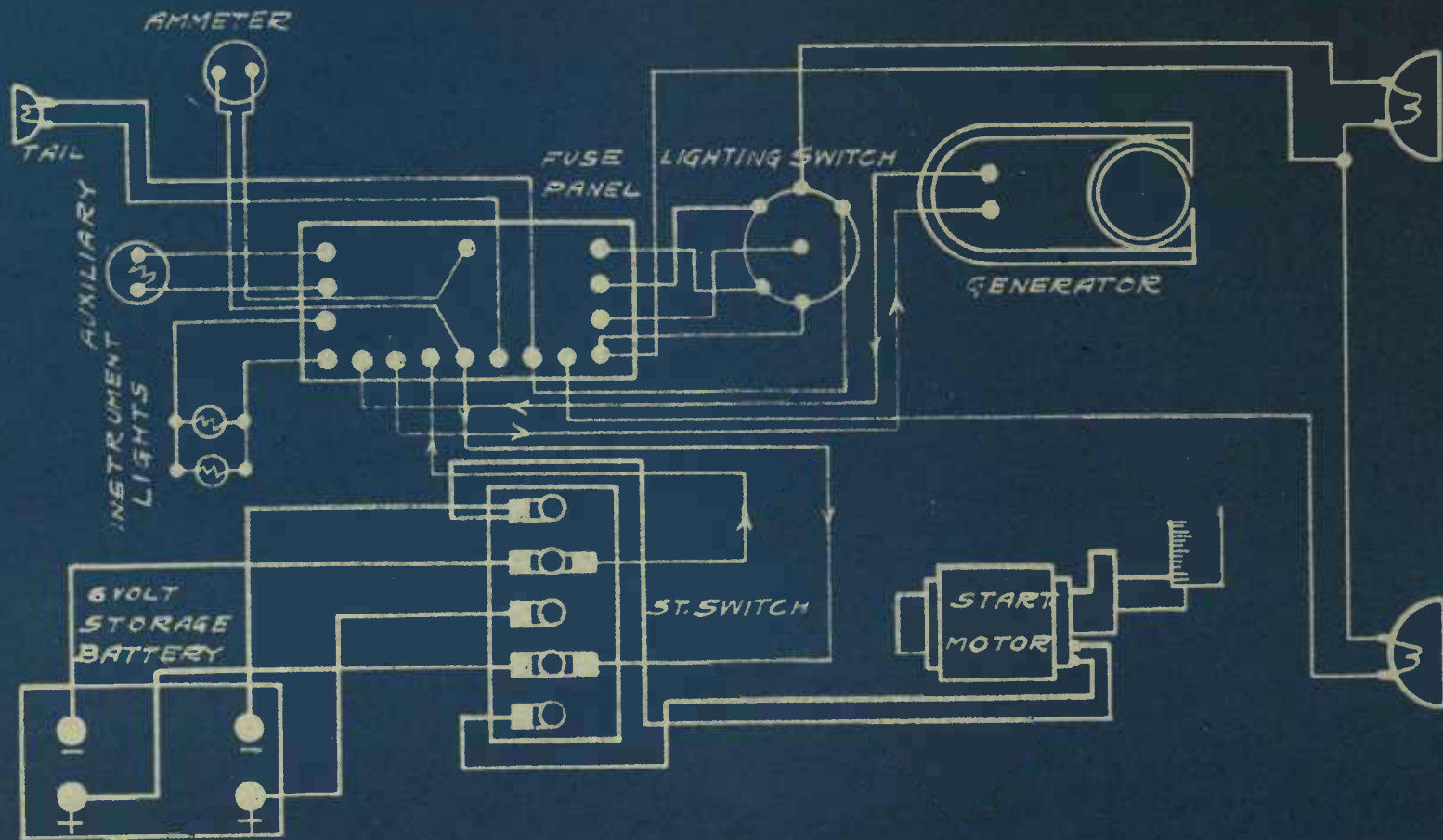
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KISSEL KAR 1914 4-40
ESTERLINE SYSTEM

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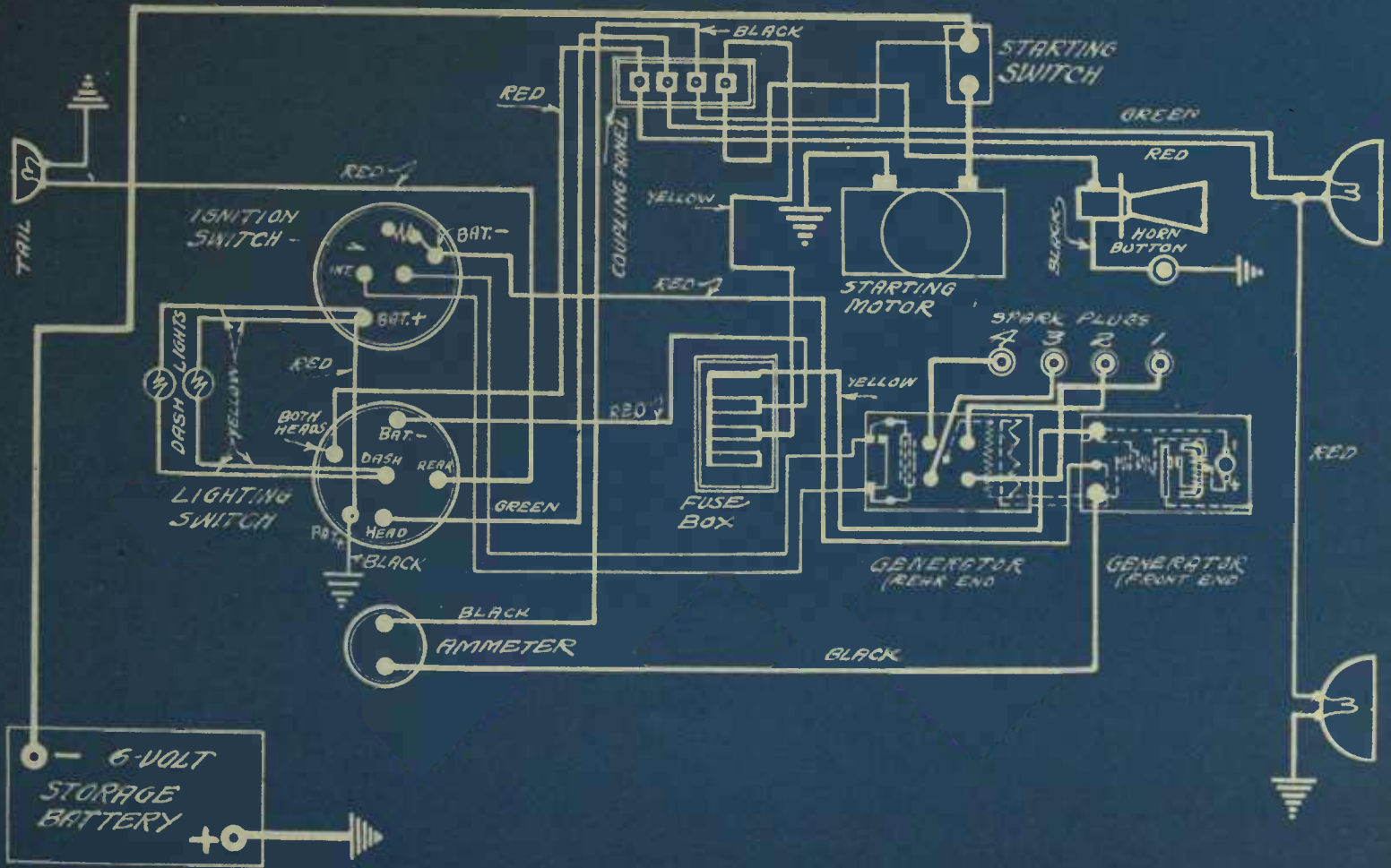


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KISSEL KAR 1915
WESTINGHOUSE SYSTEM

4-36

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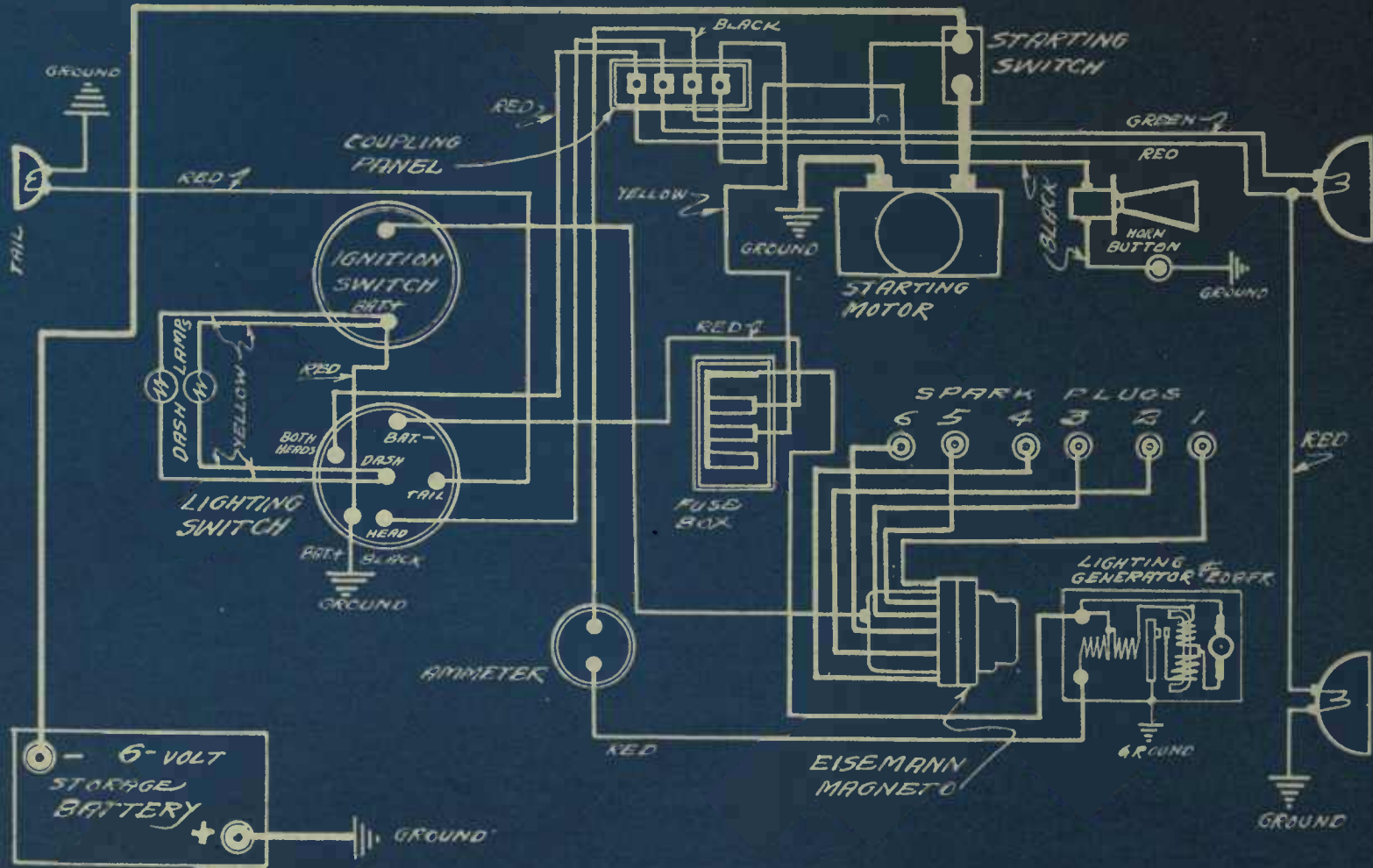
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KISSEL KAR 1915-1916-1917

WESTINGHOUSE SYSTEM

6-42

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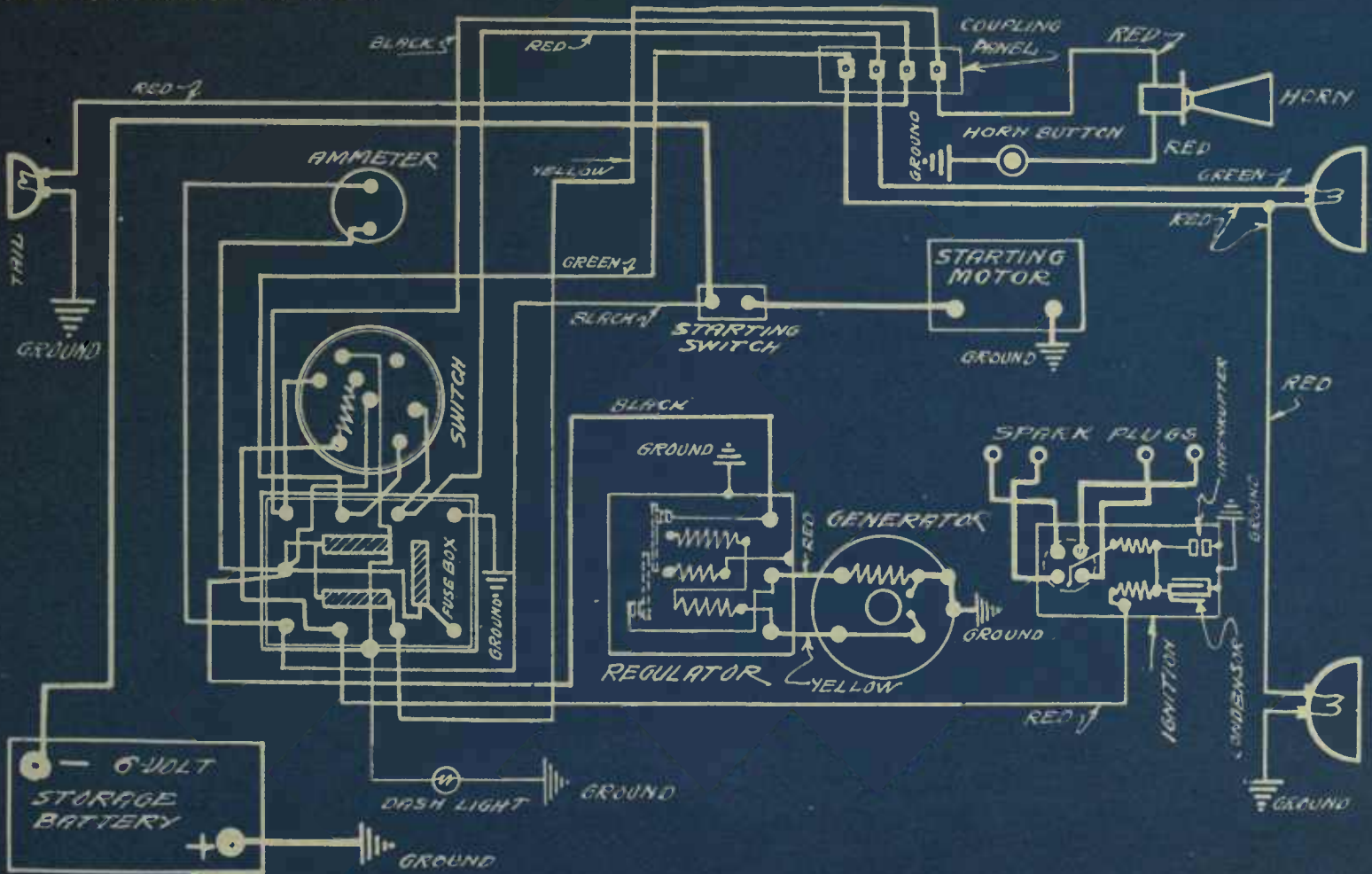


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MISSEL KAR 1916 4-32 & 4-36

WESTINGHOUSE SYSTEM

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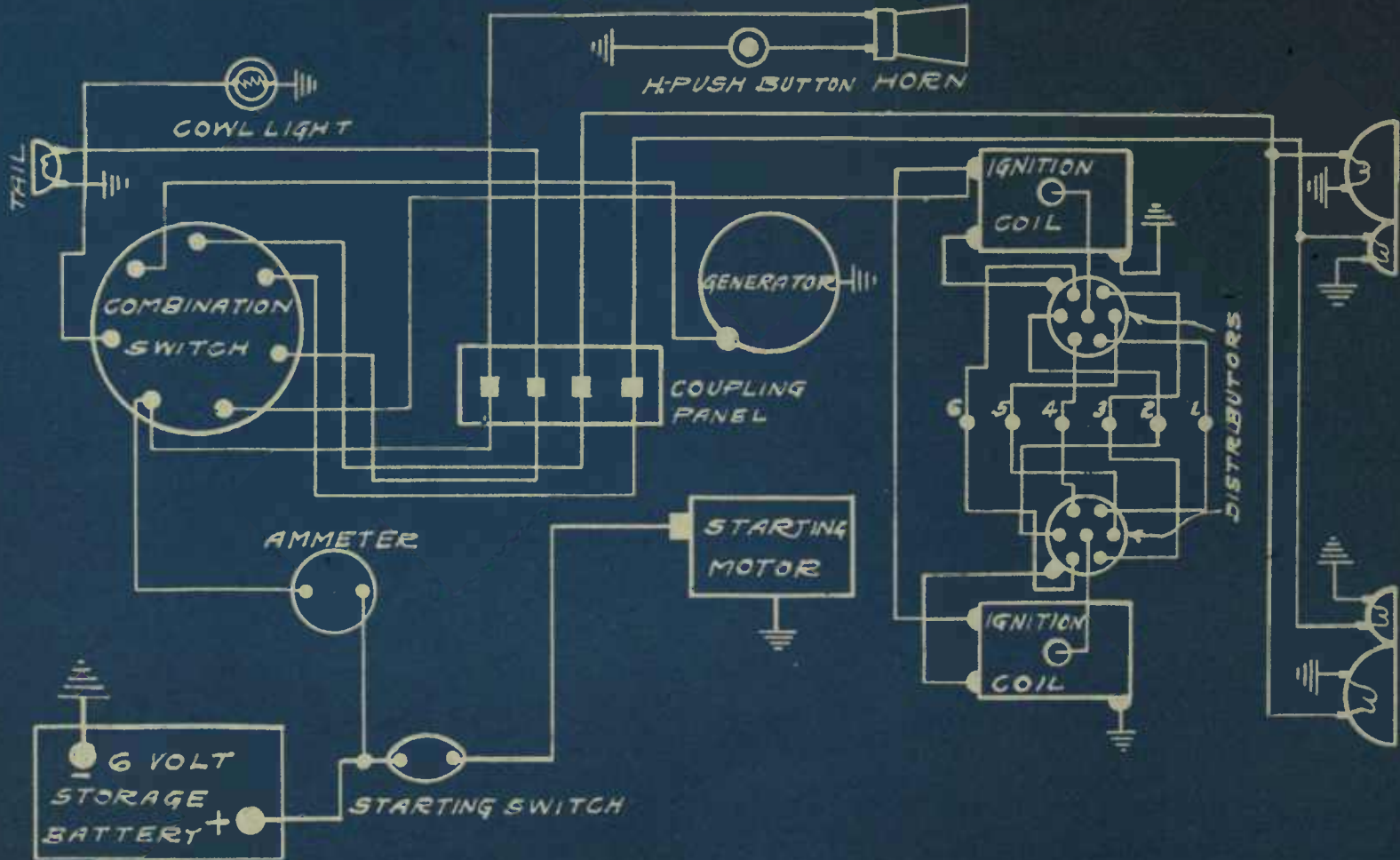


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KISSEL KAR 1917-18 DOUBLE SIX

WESTINGHOUSE SYSTEM

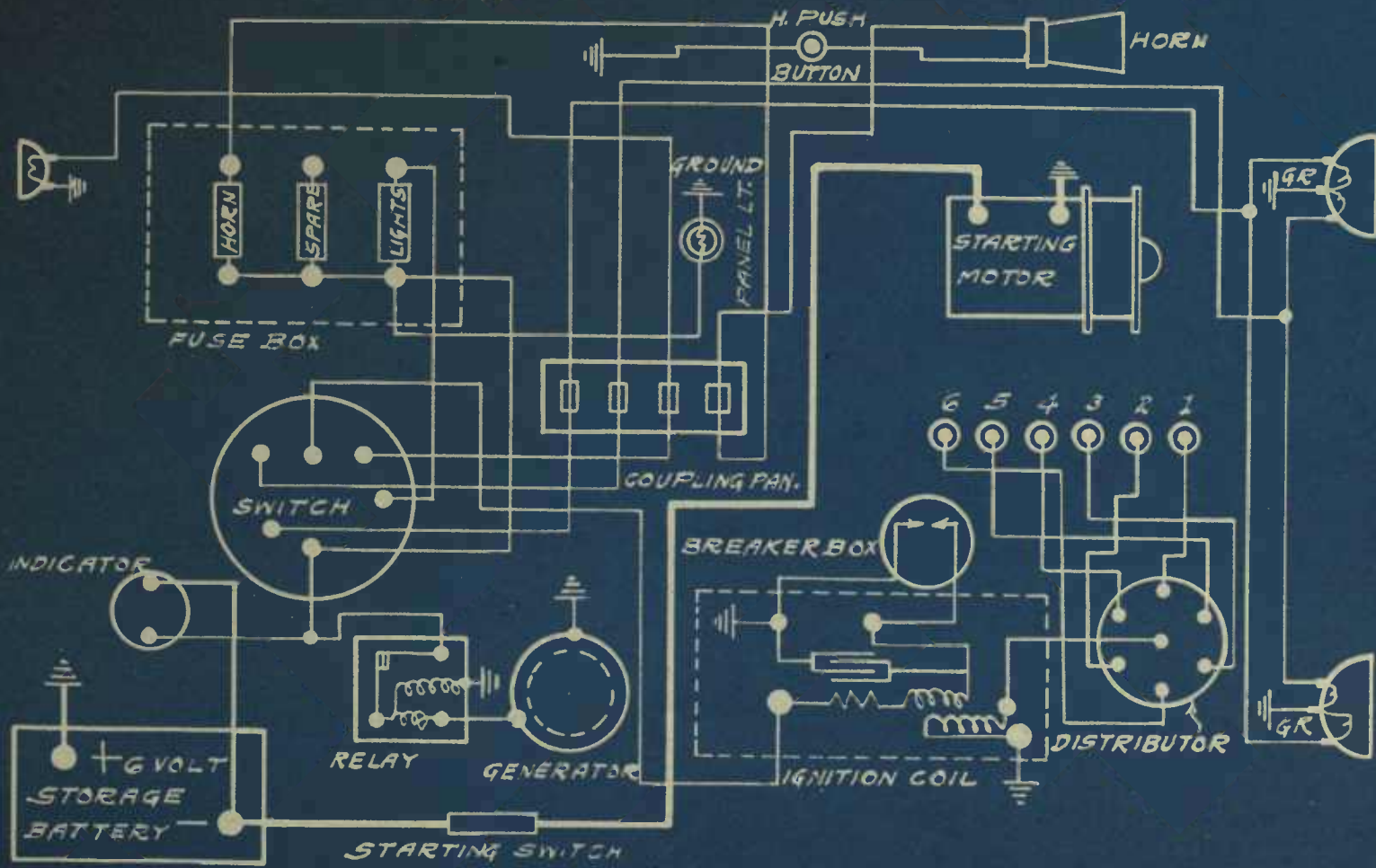
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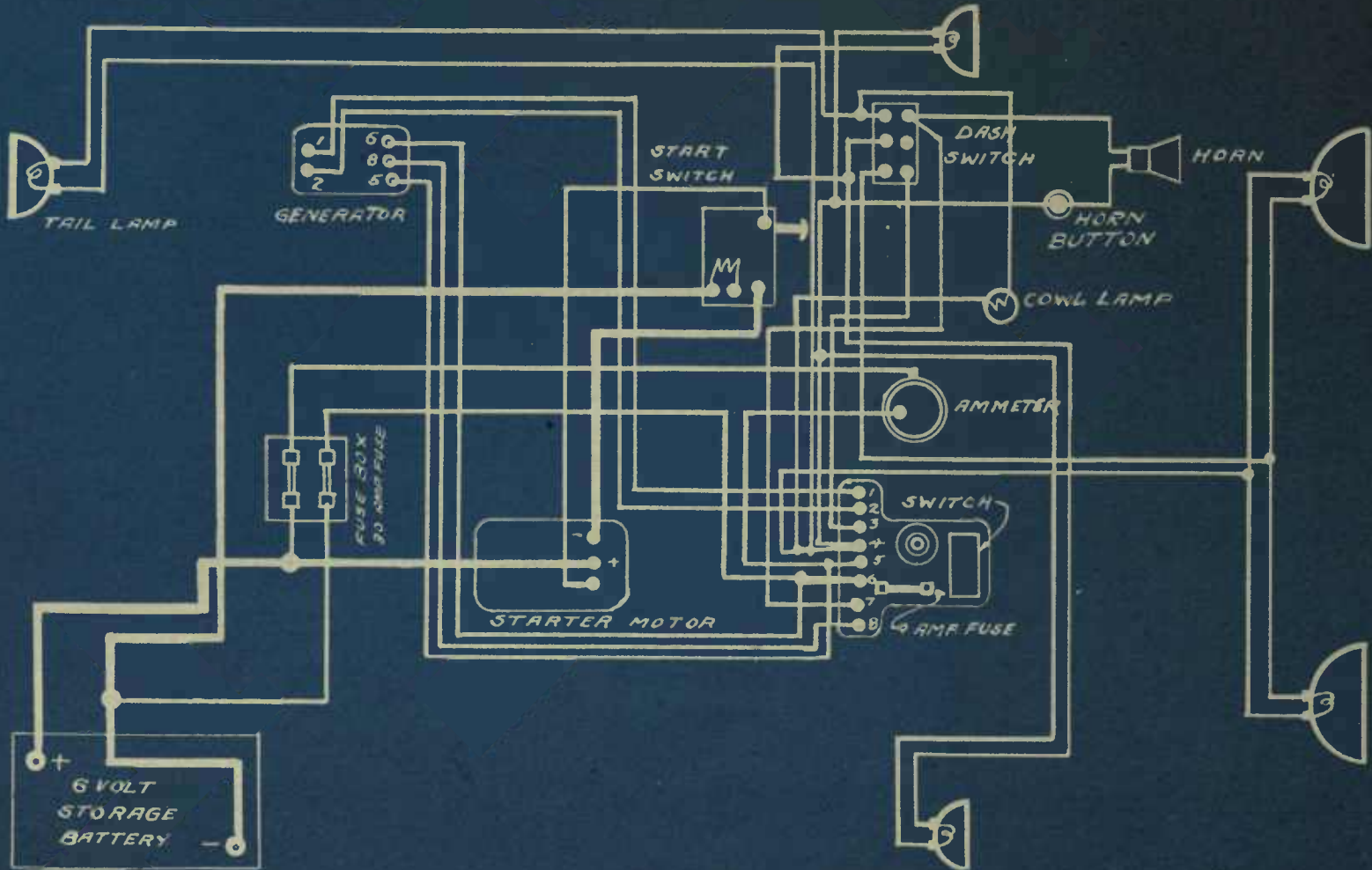
KISSEL KAR 1918 HUNDRED POINT SIX
REMY SYSTEM 1919

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KLINE KAR MODEL B440, 6-50 6-60 C4-30 1913-1914
 RUSHMORE SYSTEM FROM MFRS. B.P.

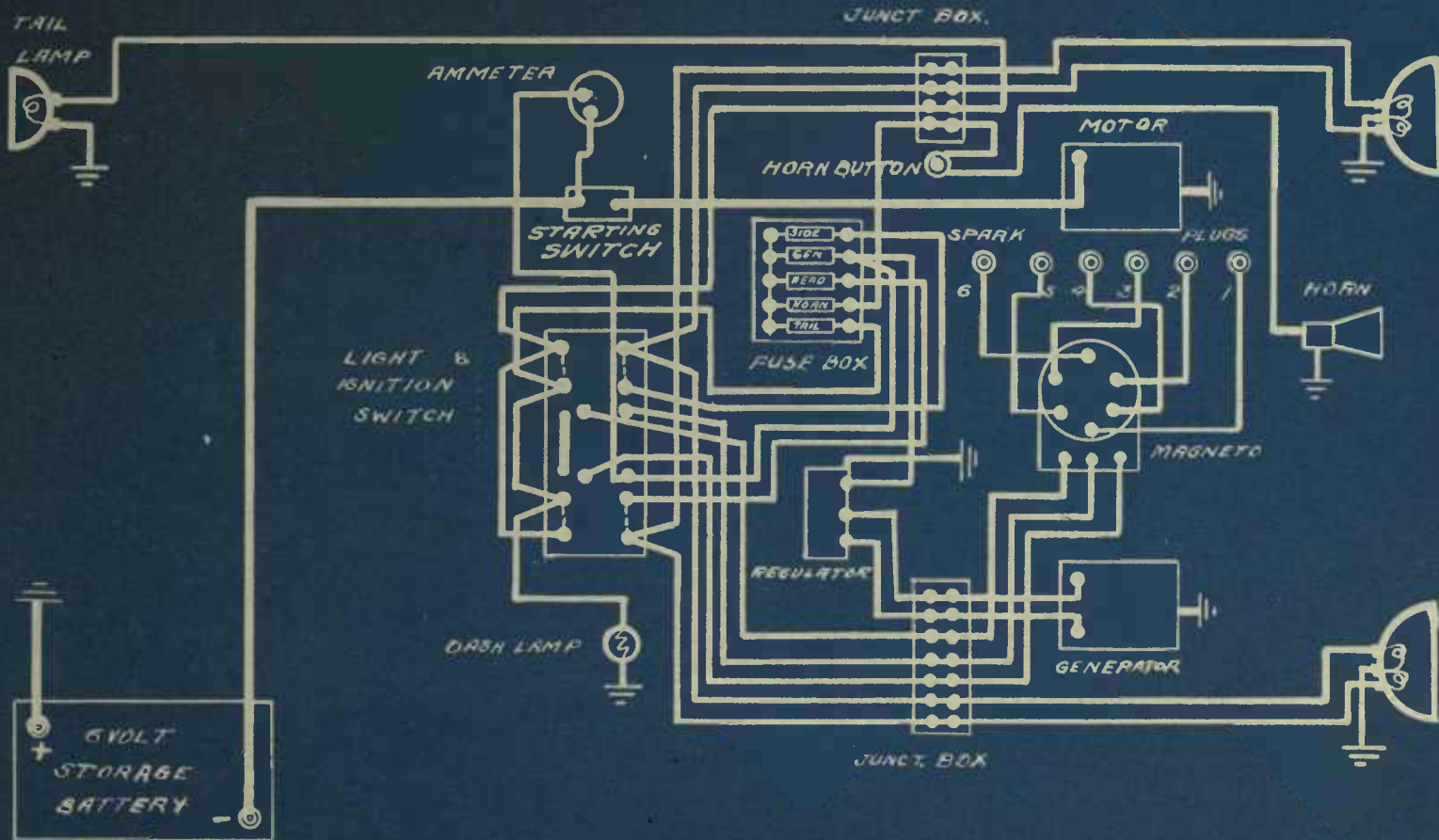


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KLINE-KAR MODEL 6-36 1916-1917-1918

WESTINGHOUSE SYSTEM

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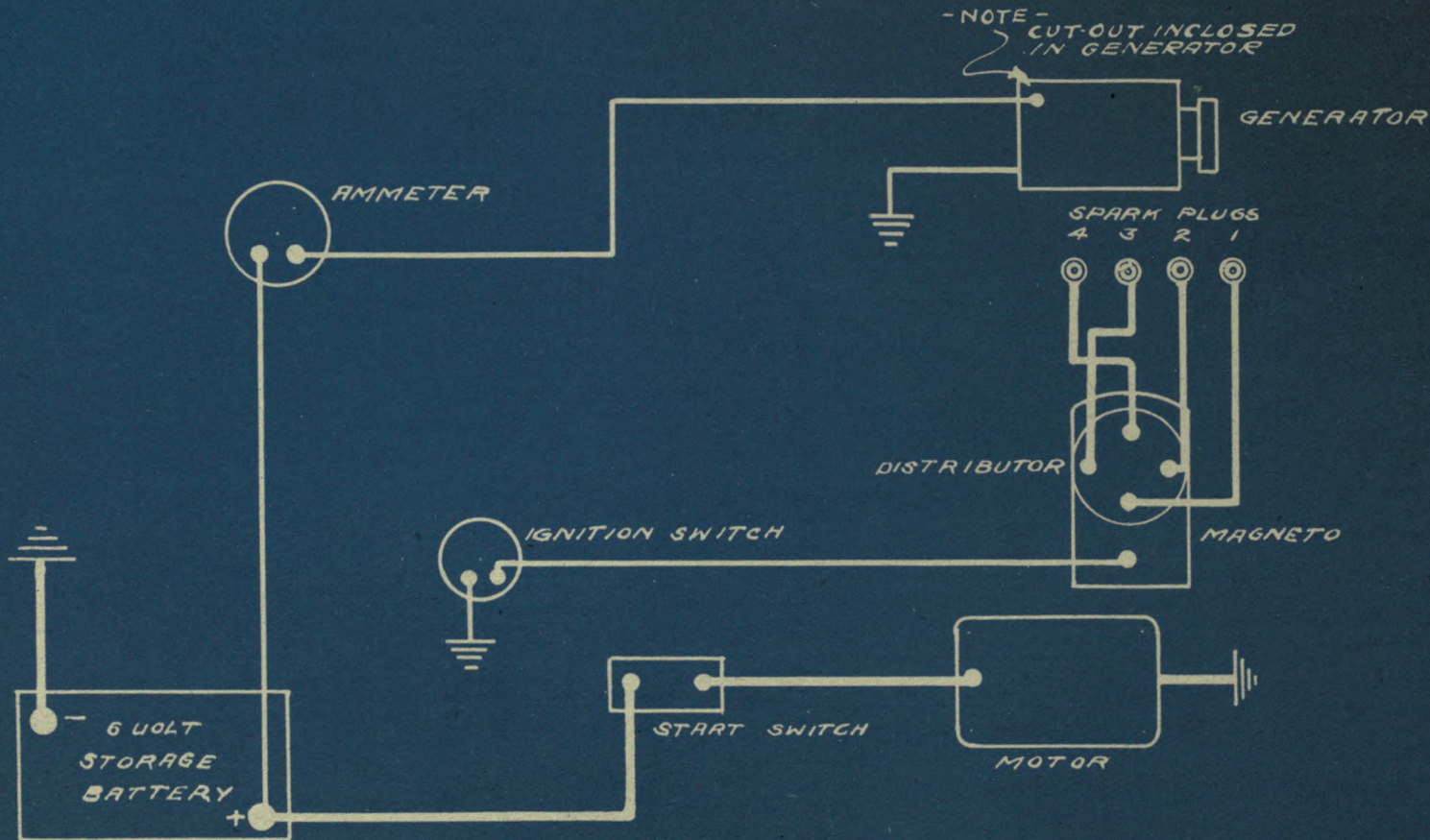


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KNOX TRUCK
BIJUR SYSTEM

MODEL 35 AND 36

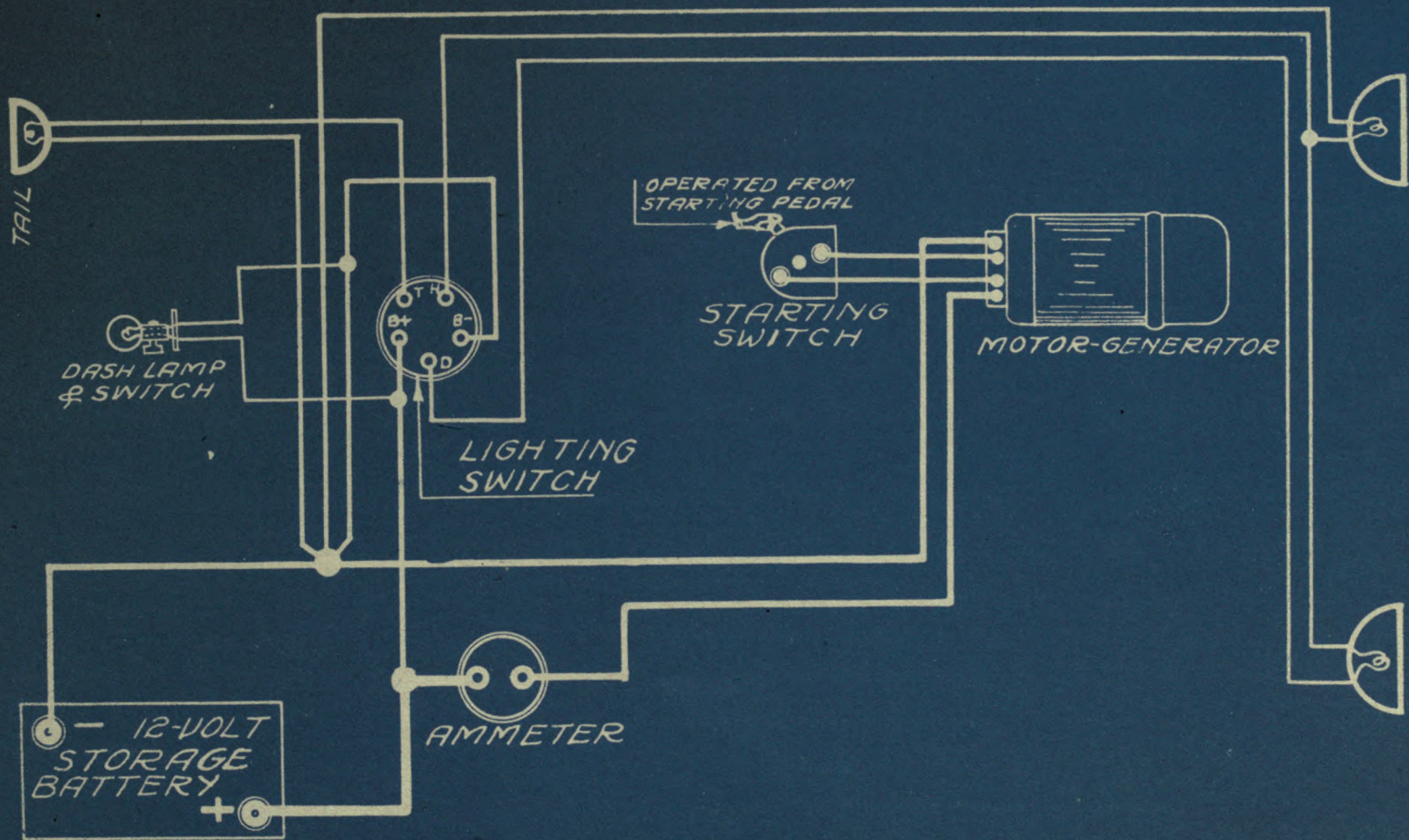
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KRIT 1915 NORTH-EAST SYSTEM

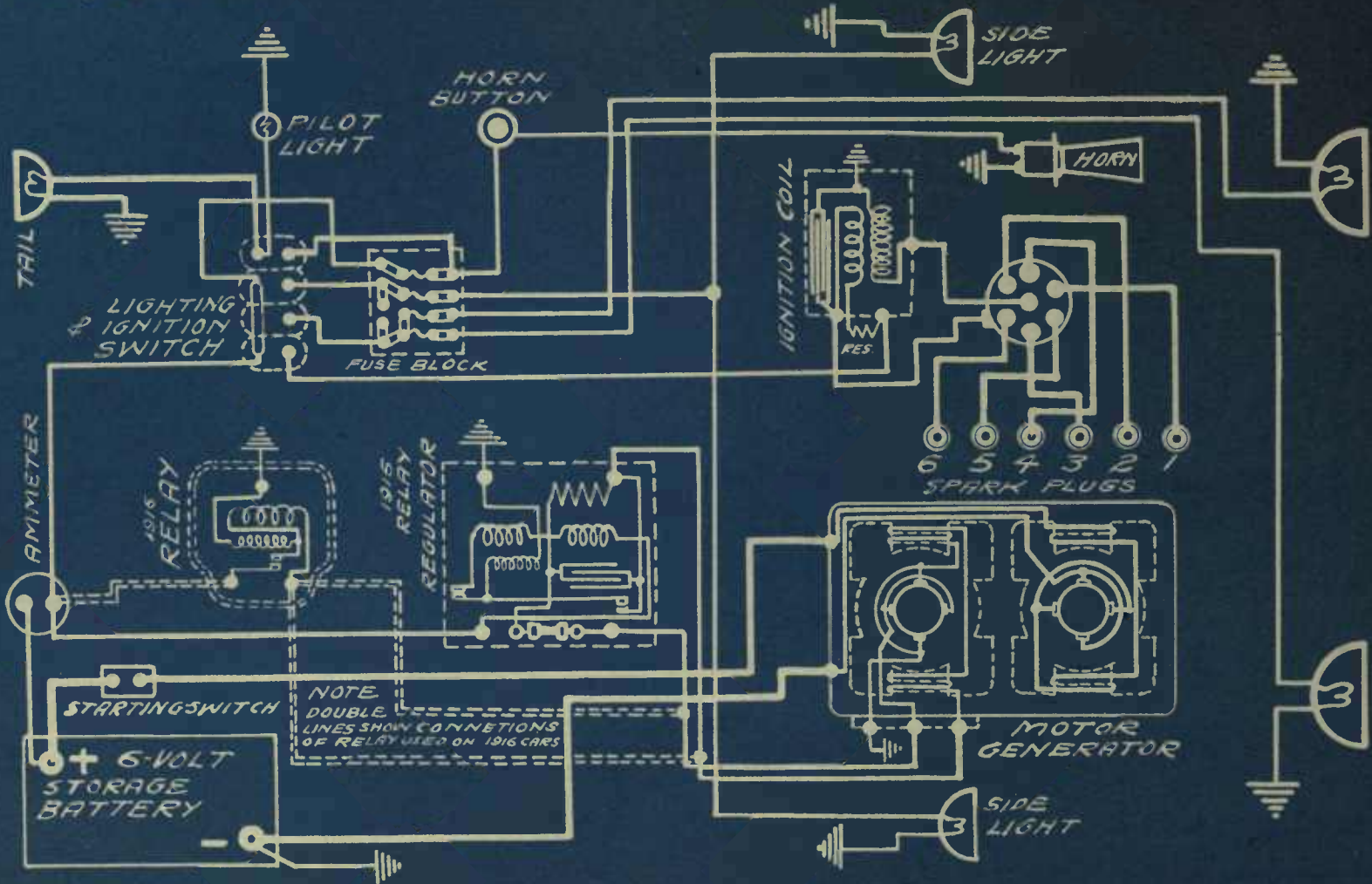
FROM NORTH-EAST PLATE 400



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L.P.C. 1915-1916
REMY SYSTEM

FROM REMY MANUAL



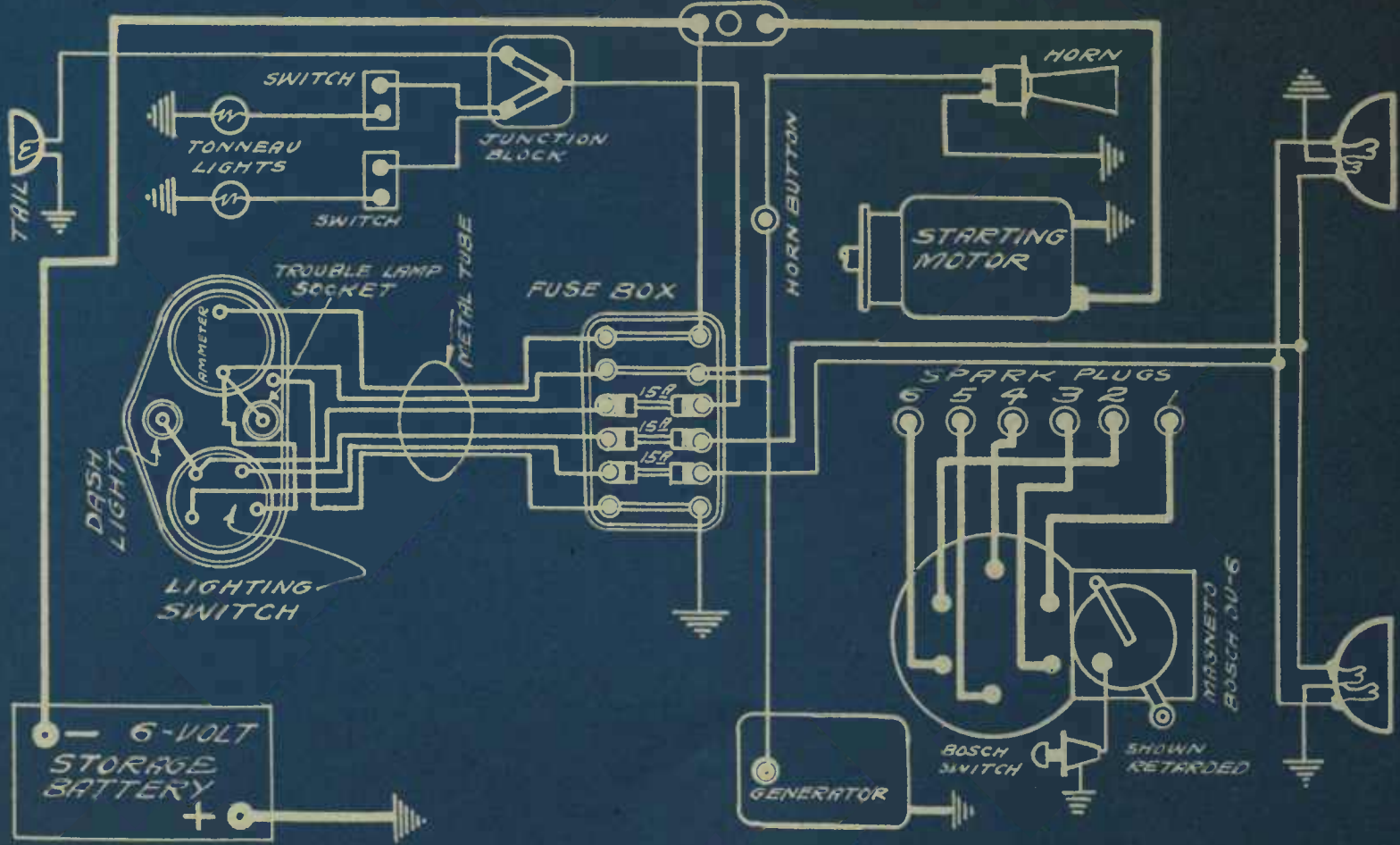
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LEXINGTON 1916 6-N

WESTINGHOUSE SYSTEM

FROM MFRS. BP. I-110

STARTING SWITCH

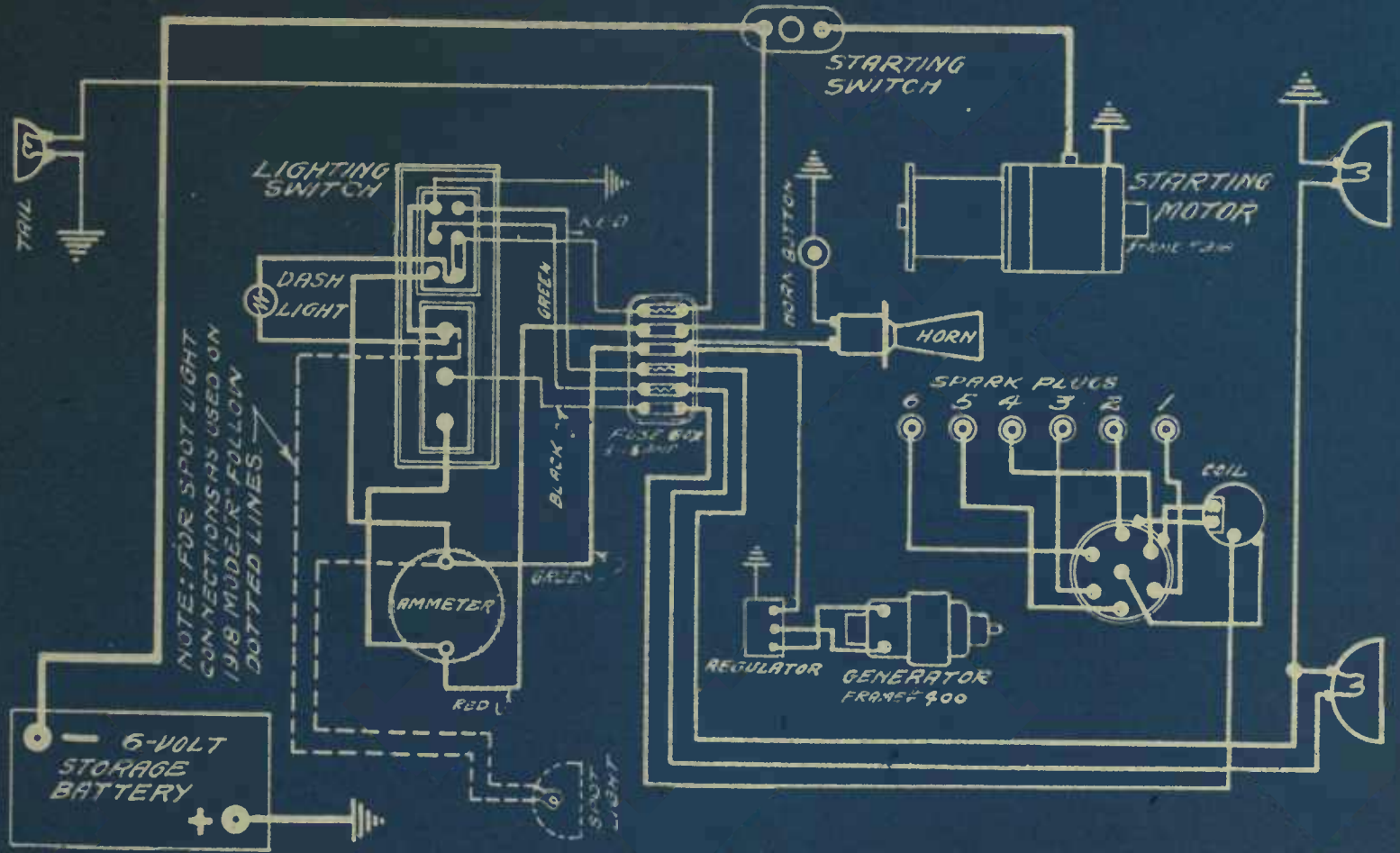


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LEXINGTON 1916-17 "O"
 WESTINGHOUSE SYSTEM CONN. IGN. & SWITCH

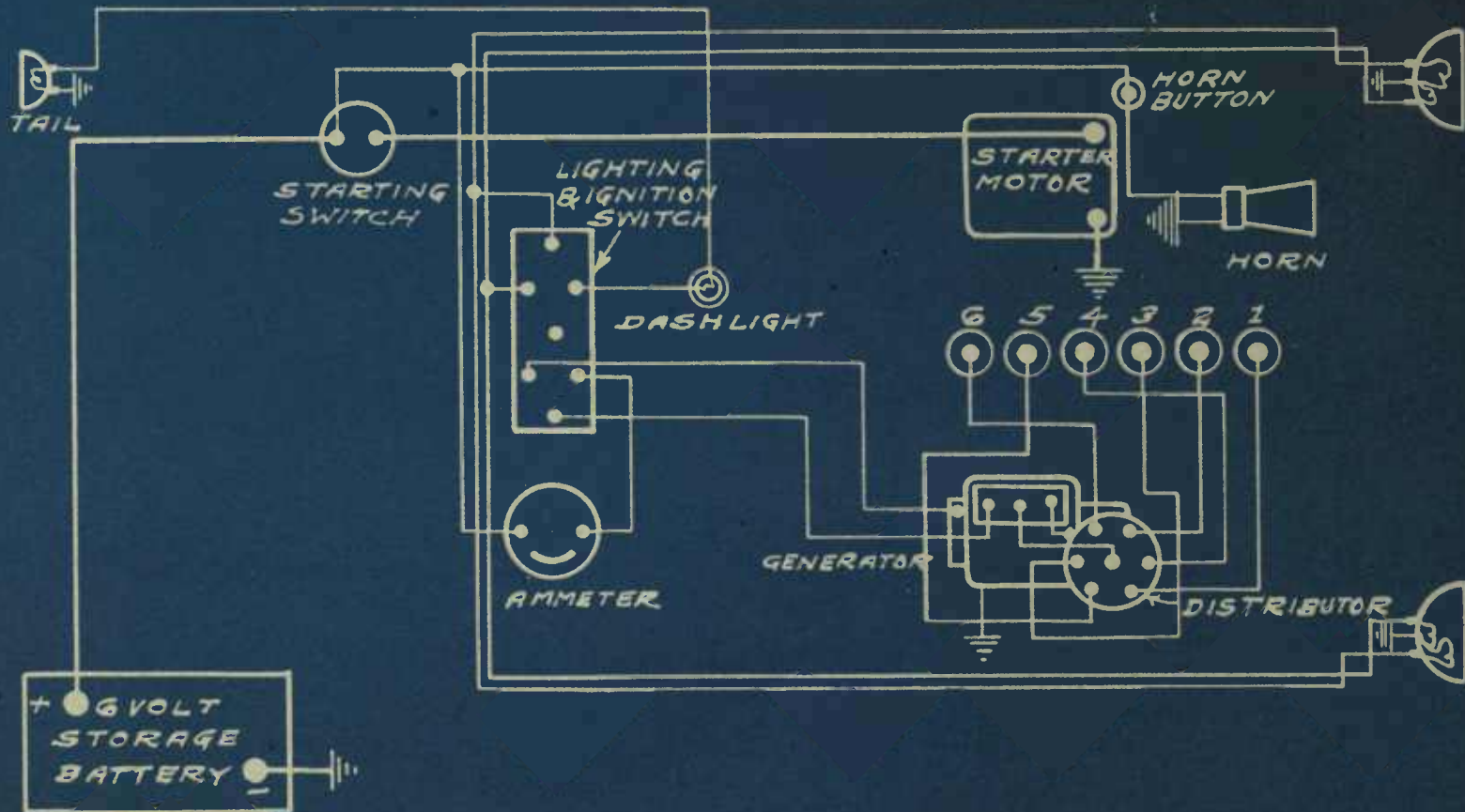
1918 "R" 1919
 FROM MFRS. BP I-131

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LIBERTY 1917-18 10-A-B
DELCO SYSTEM

FROM B/P K-245

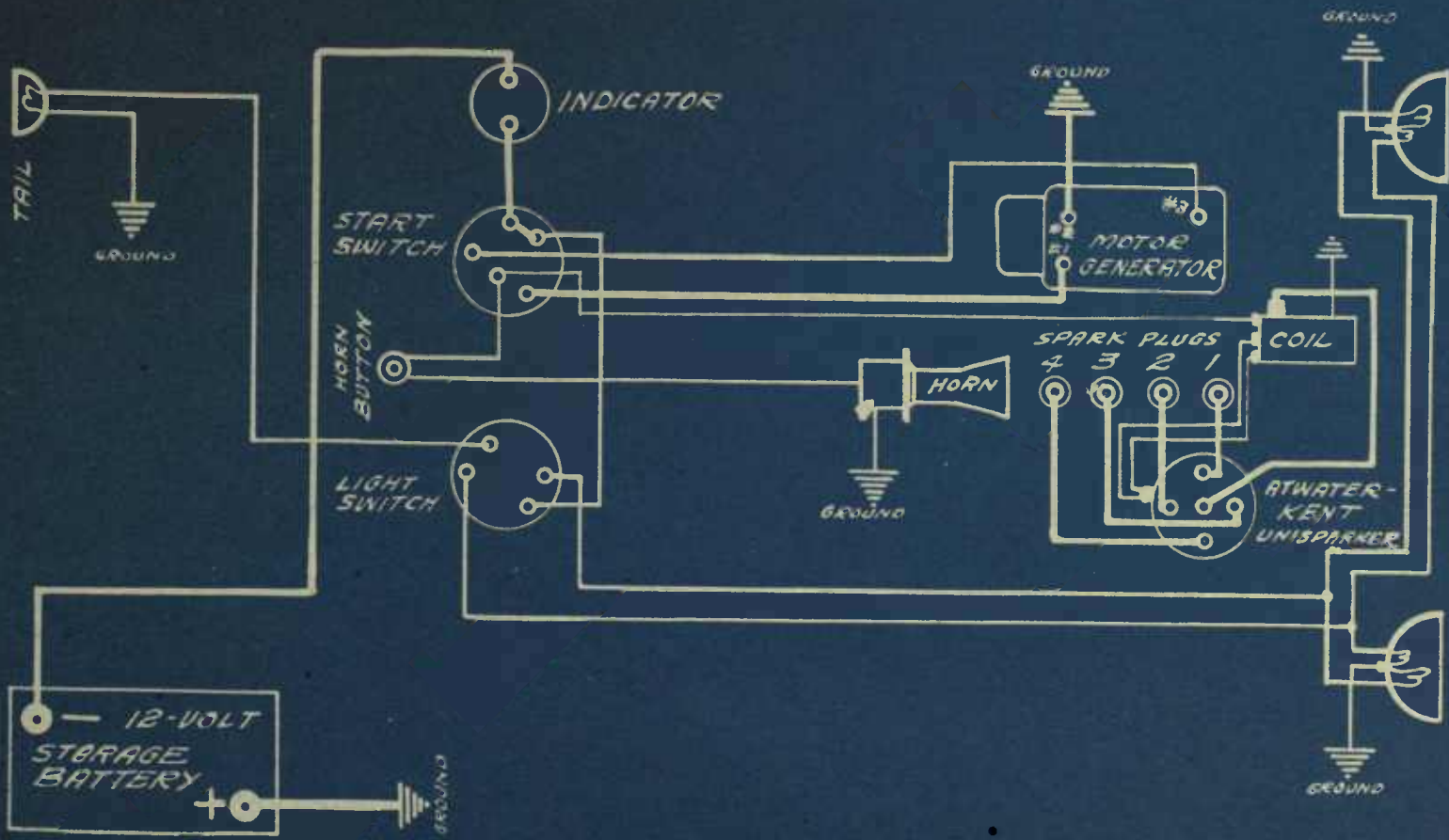


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LIPPARD-STEWART TRUCK 1916 "M" DYNETO SYSTEM

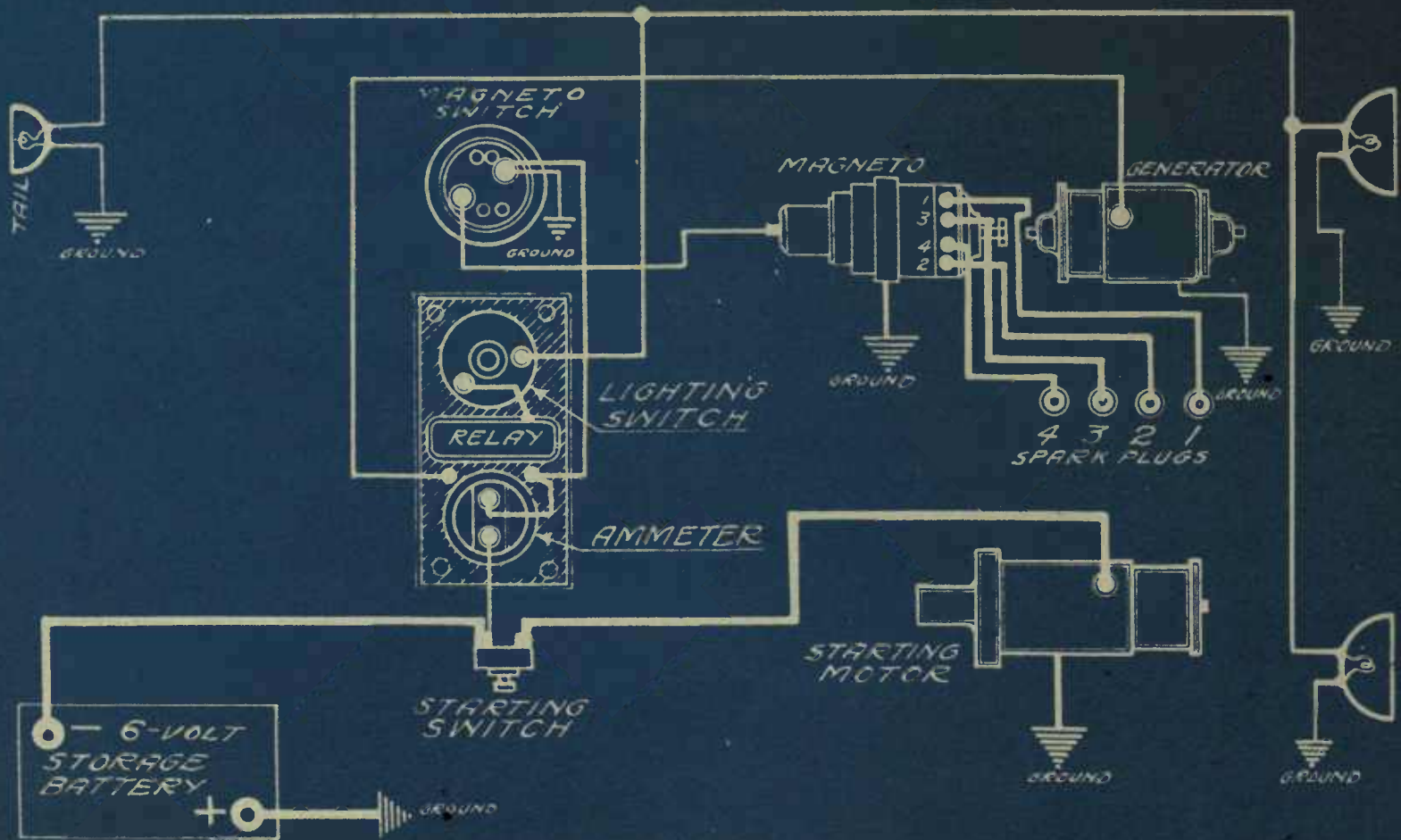
FROM L.S. BR 8350

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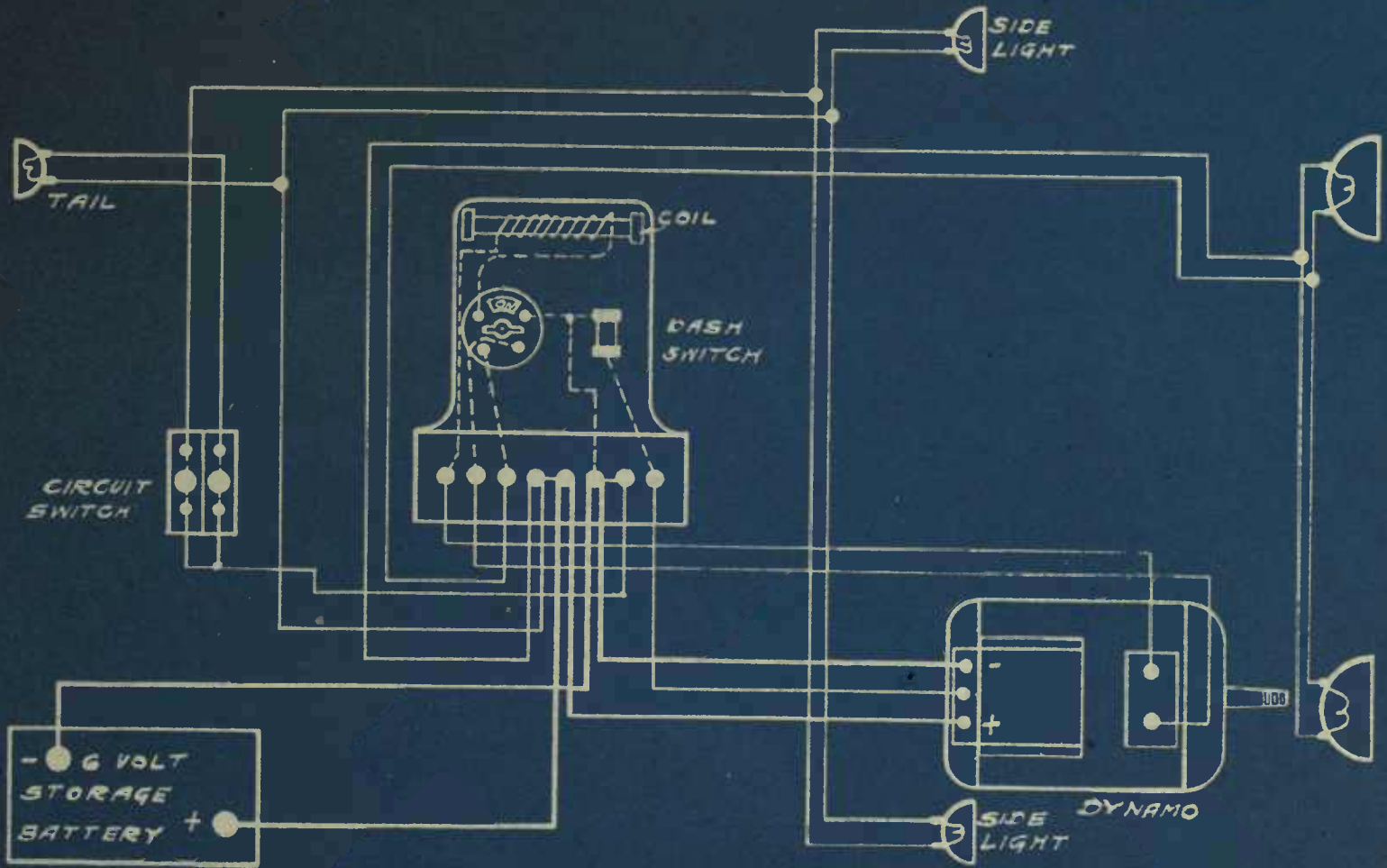
LIPPARD-STEWART TRUCK 1917 "M-2" REMY SYSTEM

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 RUSHMORE SYSTEM FROM LOCO. INST. BOOK

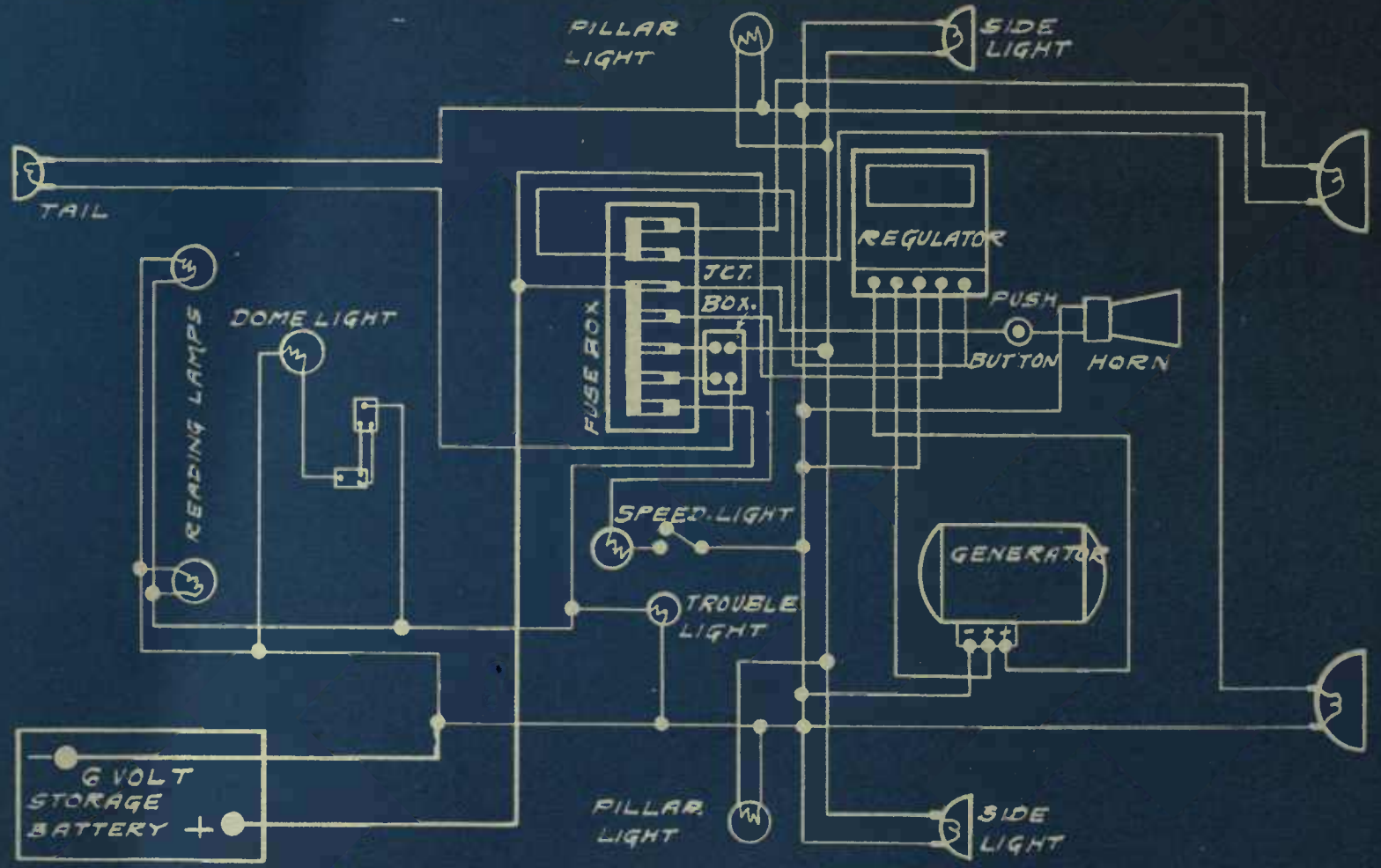


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LOCOMOBILE 1913

ADLAKE SYSTEM

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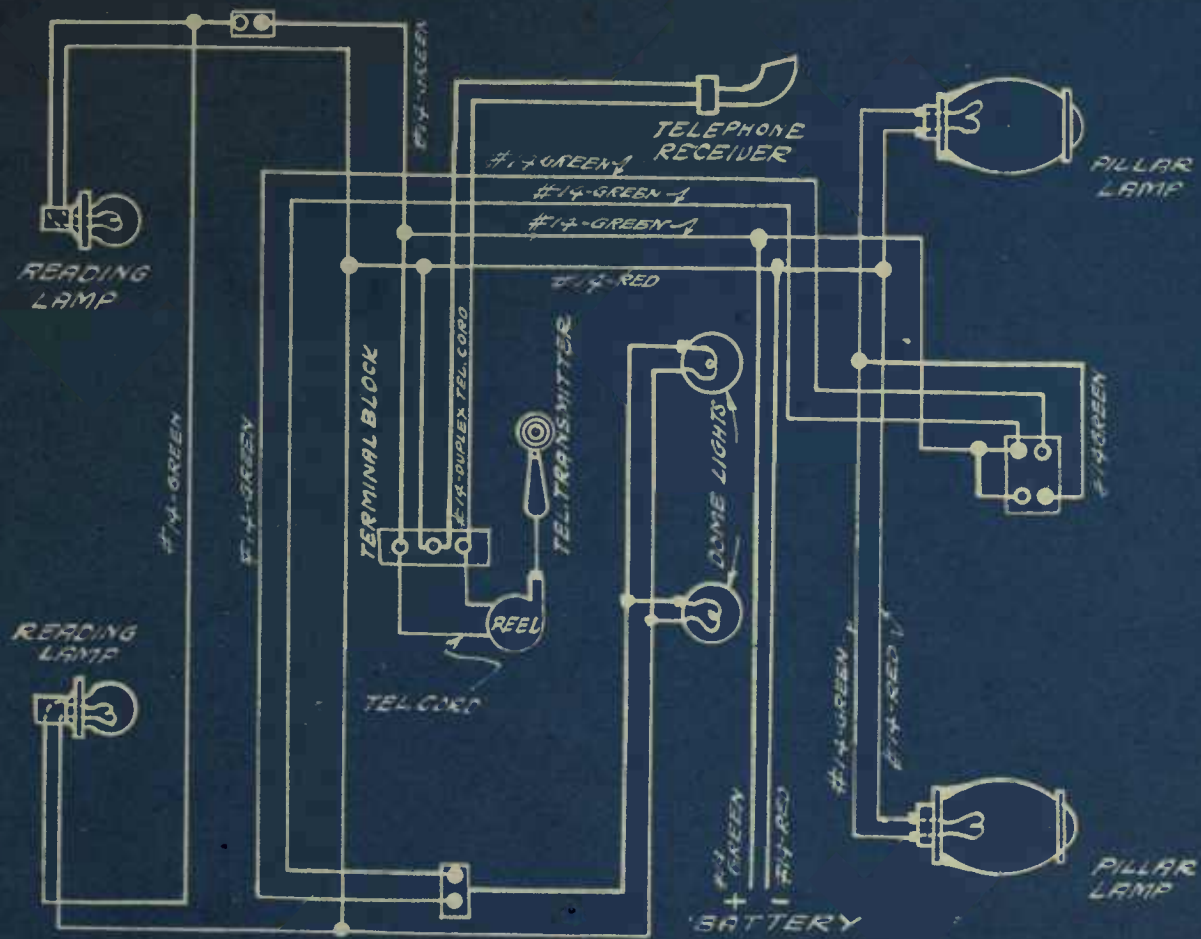


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LOCOMOBILE - 1915-6

WESTINGHOUSE SYSTEM BODY WIRING - CLOSED CARS

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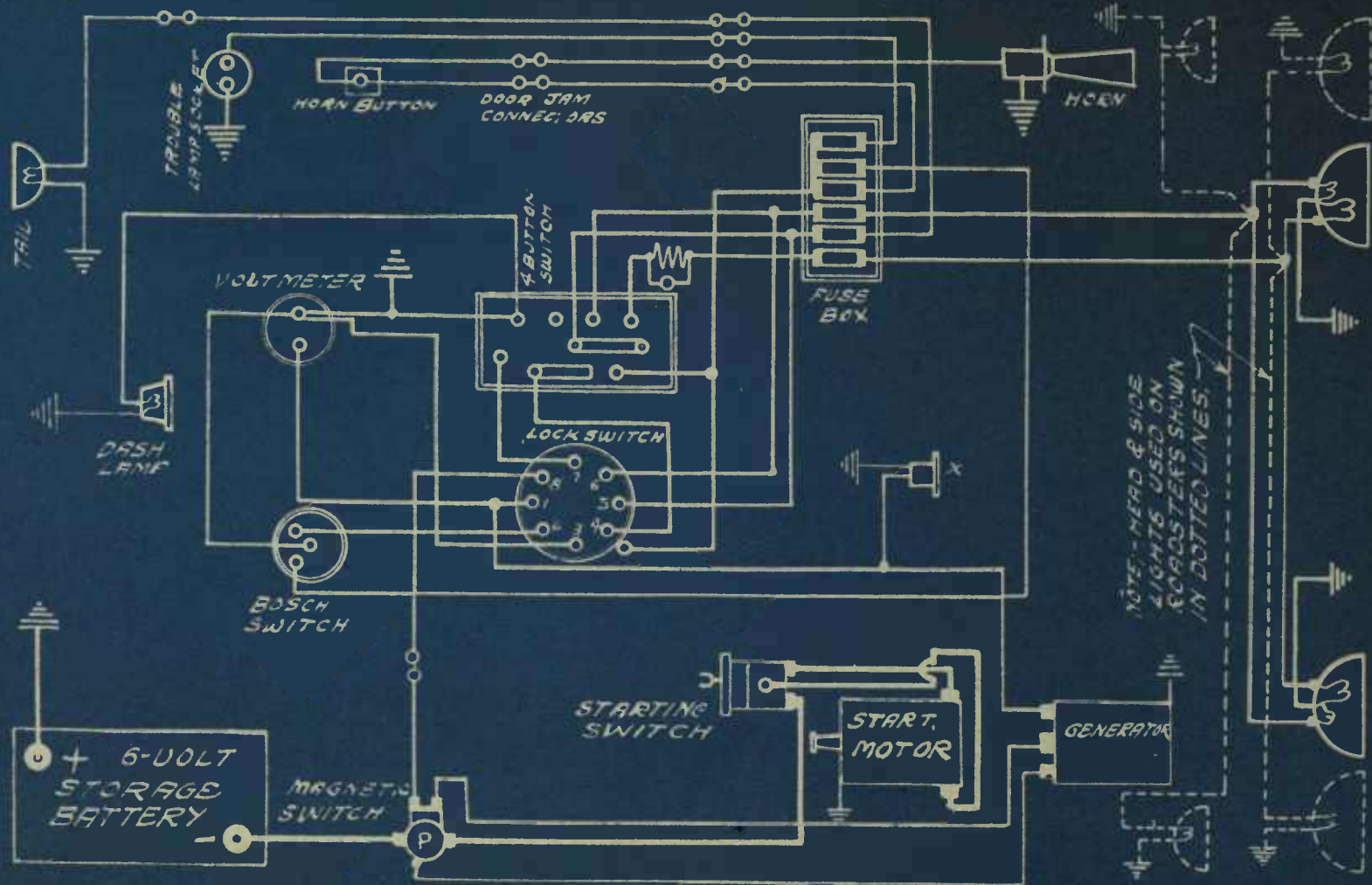


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LOCOMOBILE 1915-16 38 & 48

WESTINGHOUSE SYSTEM

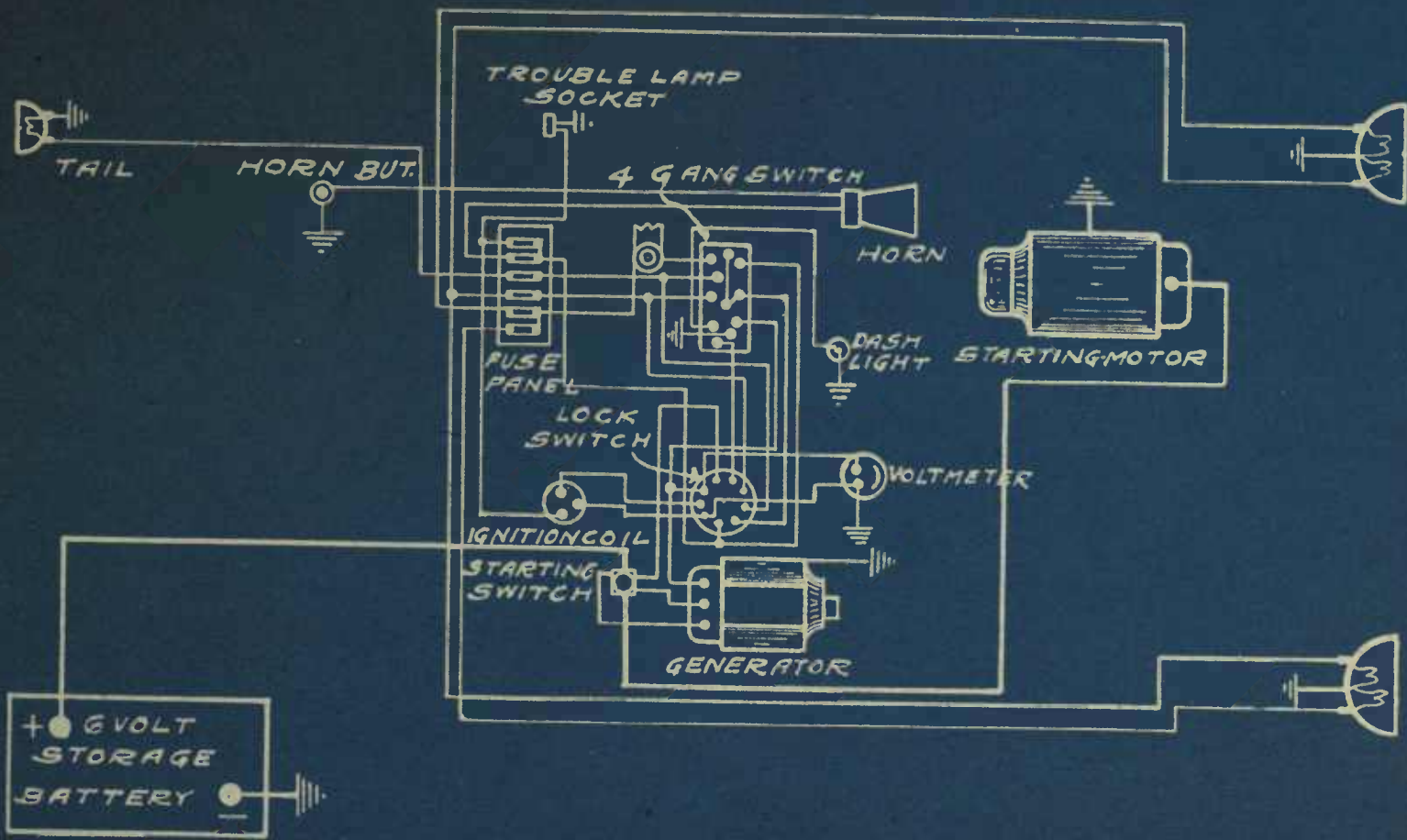
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LOCOMOBILE 1917-18 38&48
WESTINGHOUSE SYSTEM

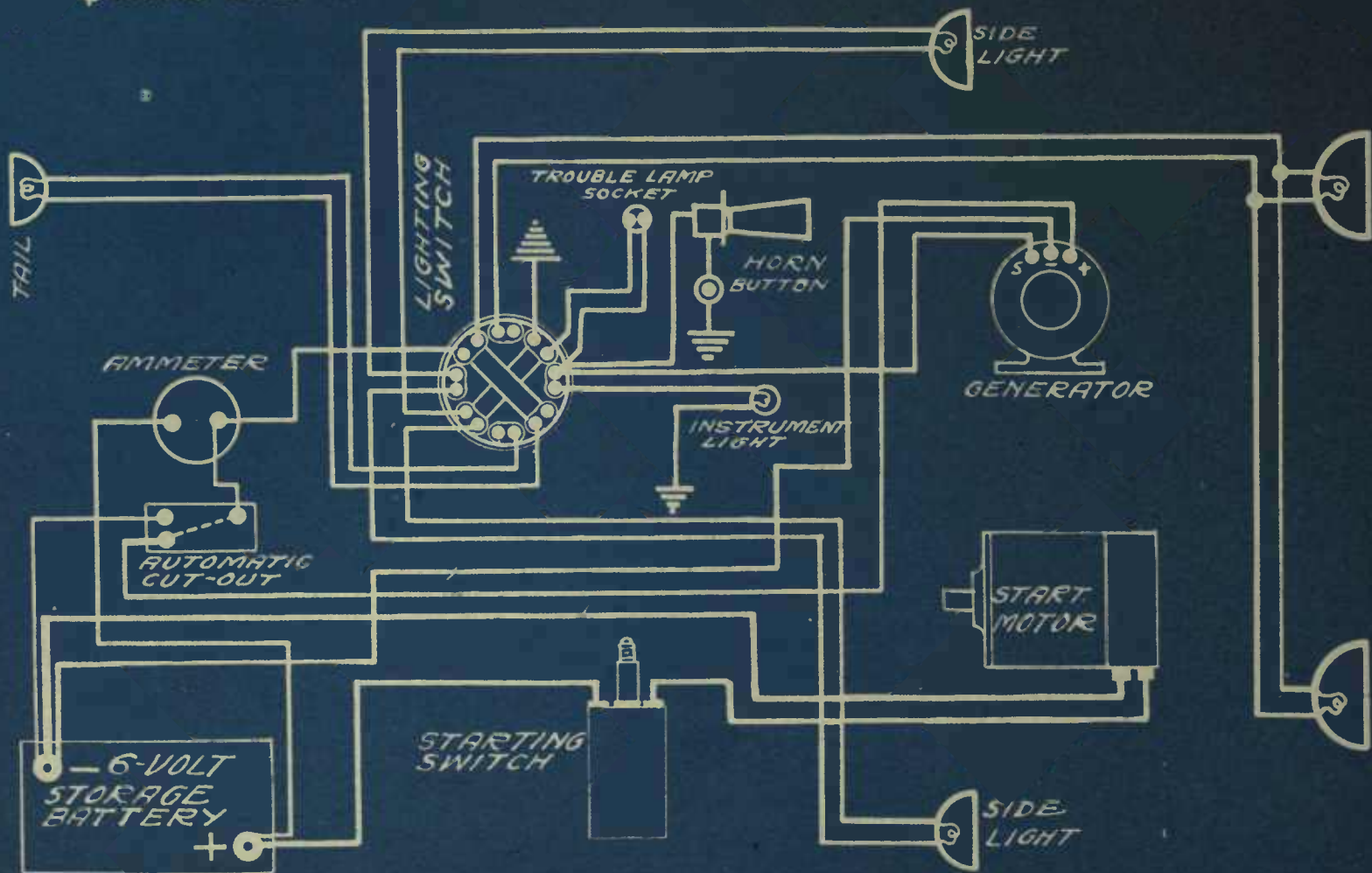
1919 "4-48"
FROM LOCO. INST. BOOK



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LOZIER 1913-1914 "77"
GRAY & DAVIS SYSTEM

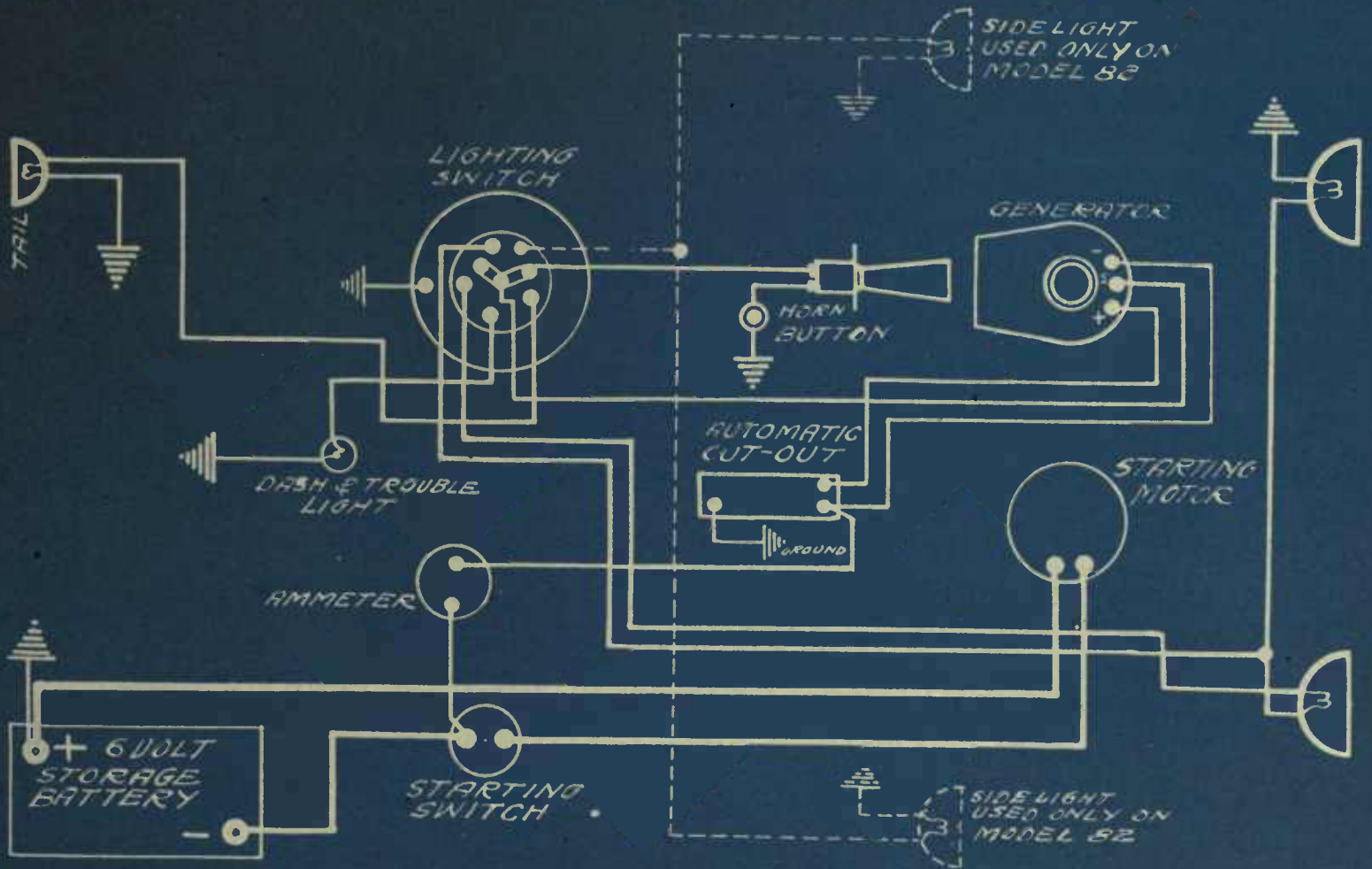
FROM MFRS. PLATE



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LOZIER 1915-16-17 TYPES 82 & 84
GRAY & DAVIS SYSTEM

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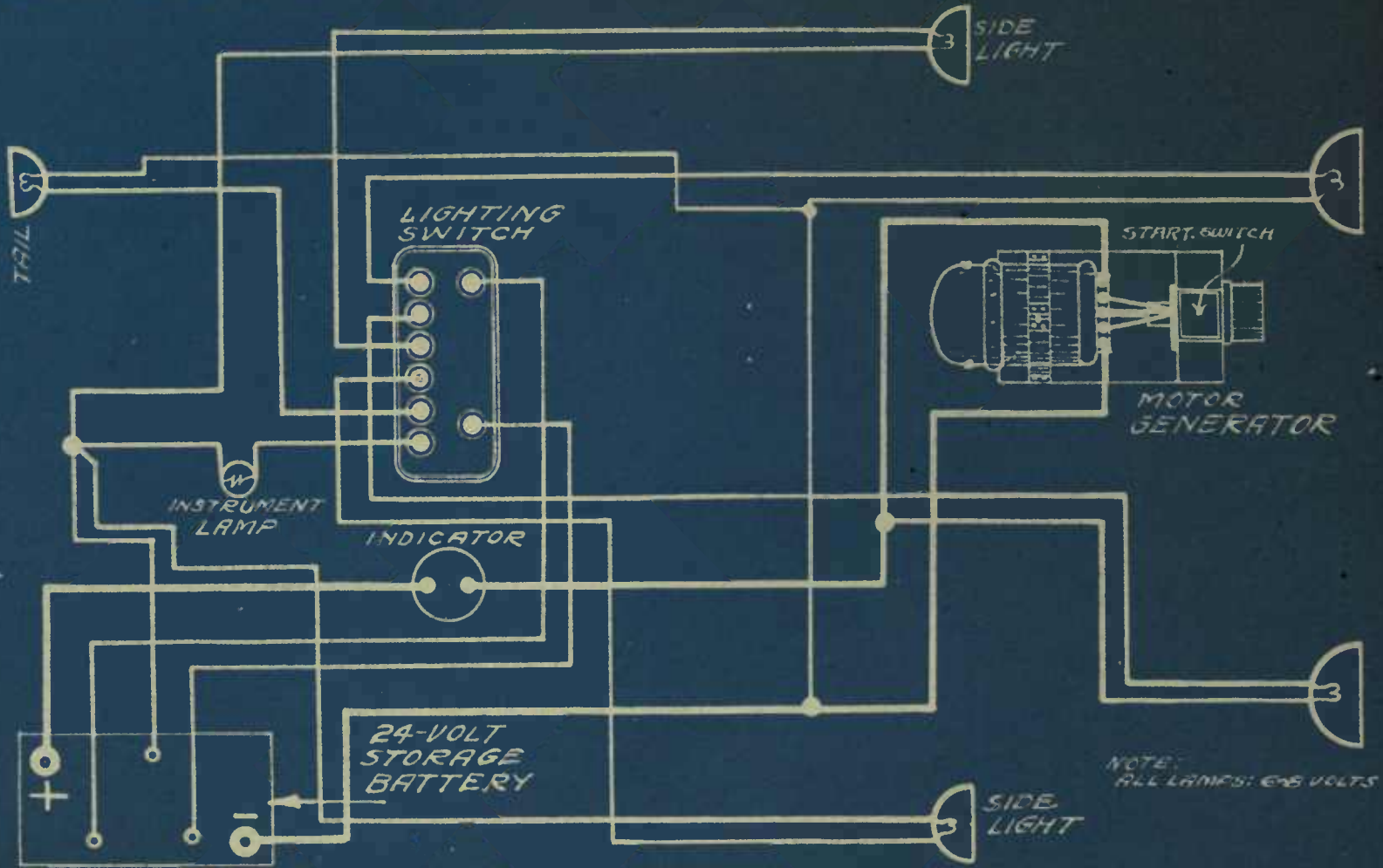


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LYONS-KNIGHT 1914

NORTH-EAST SYSTEM

FROM N.-E. PLATE 330

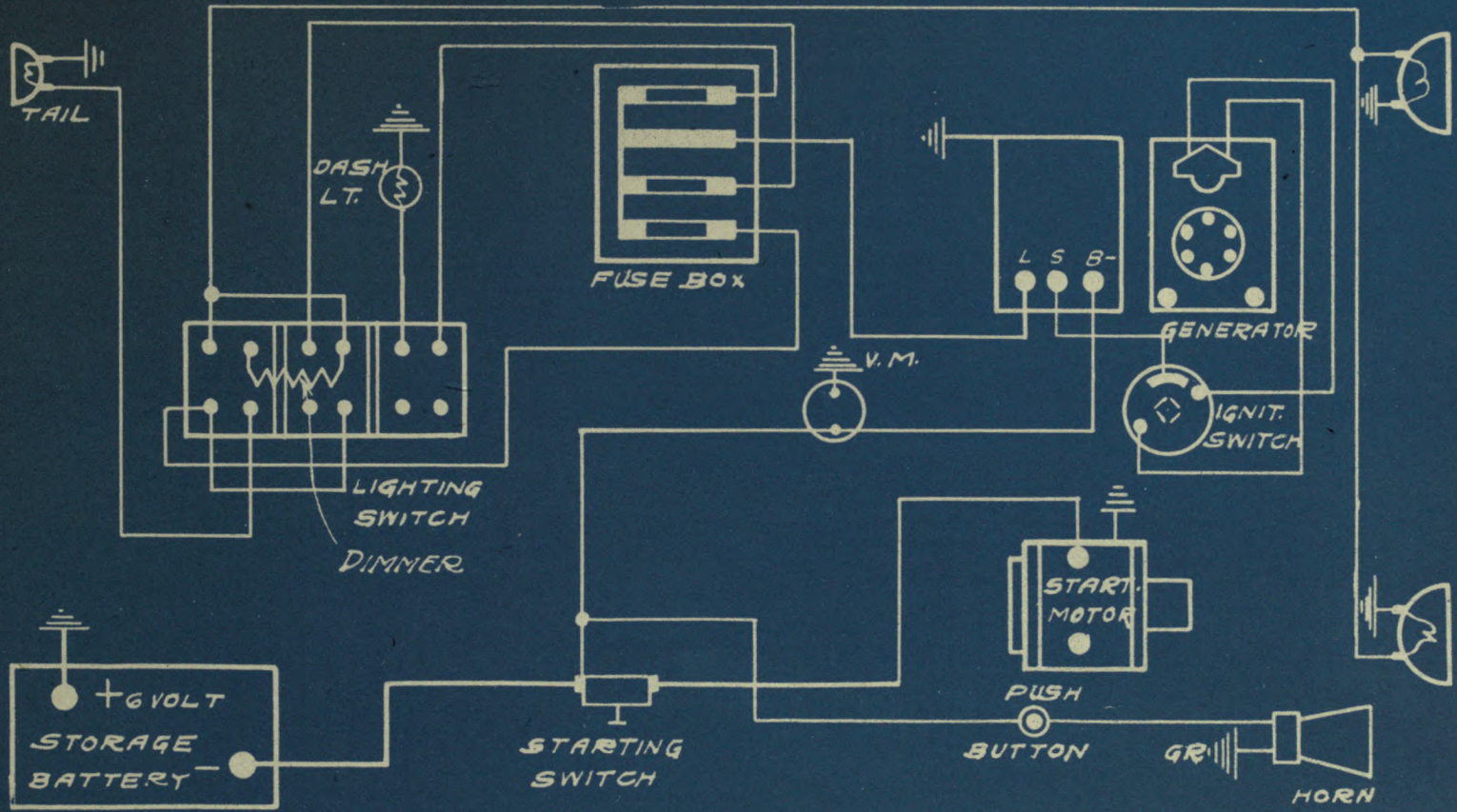


NOTE: ALL LAMPS: 6.5 VOLTS

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*McFARLAN 1915
WESTINGHOUSE SYSTEM*

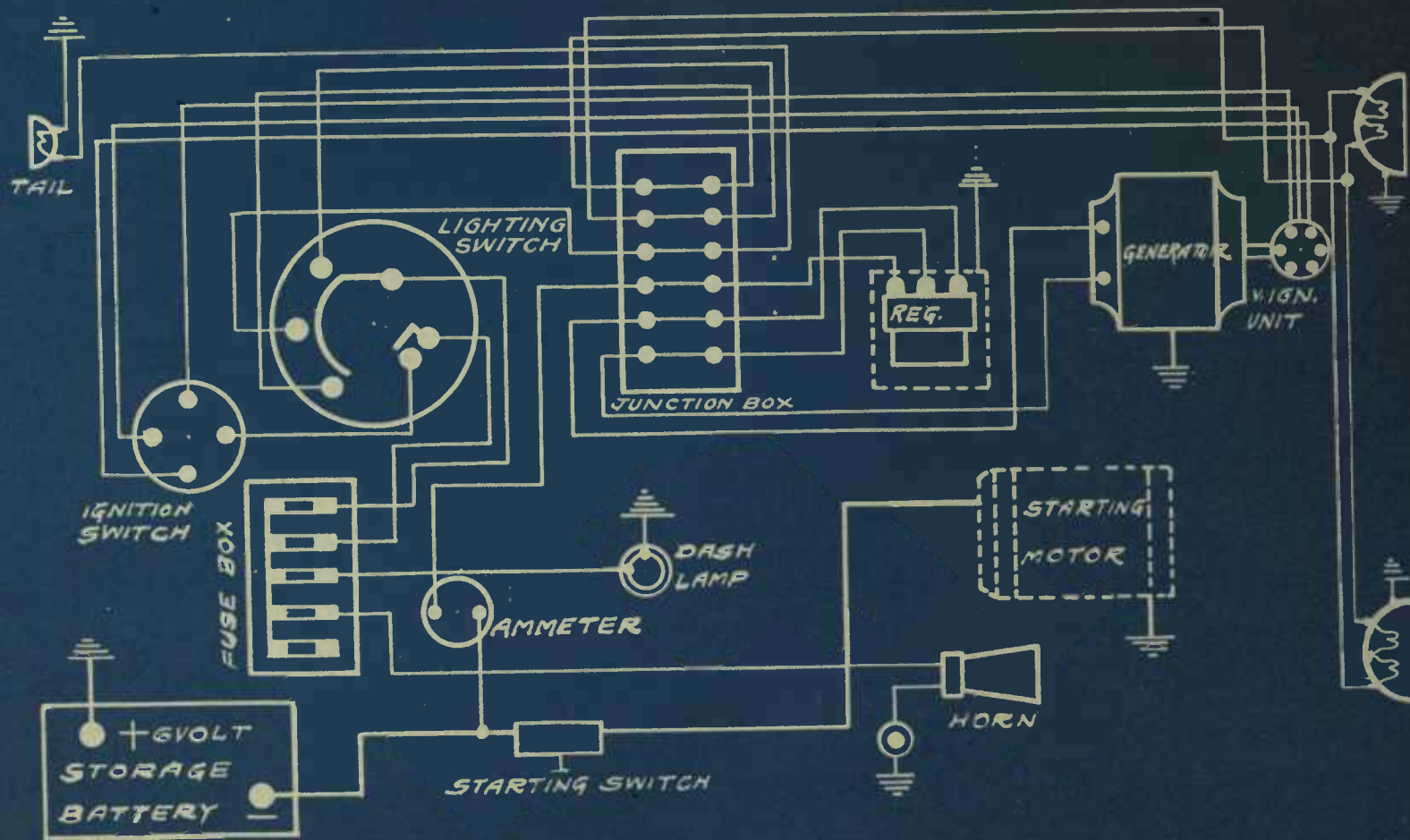
FROM WEST. PLATE 81



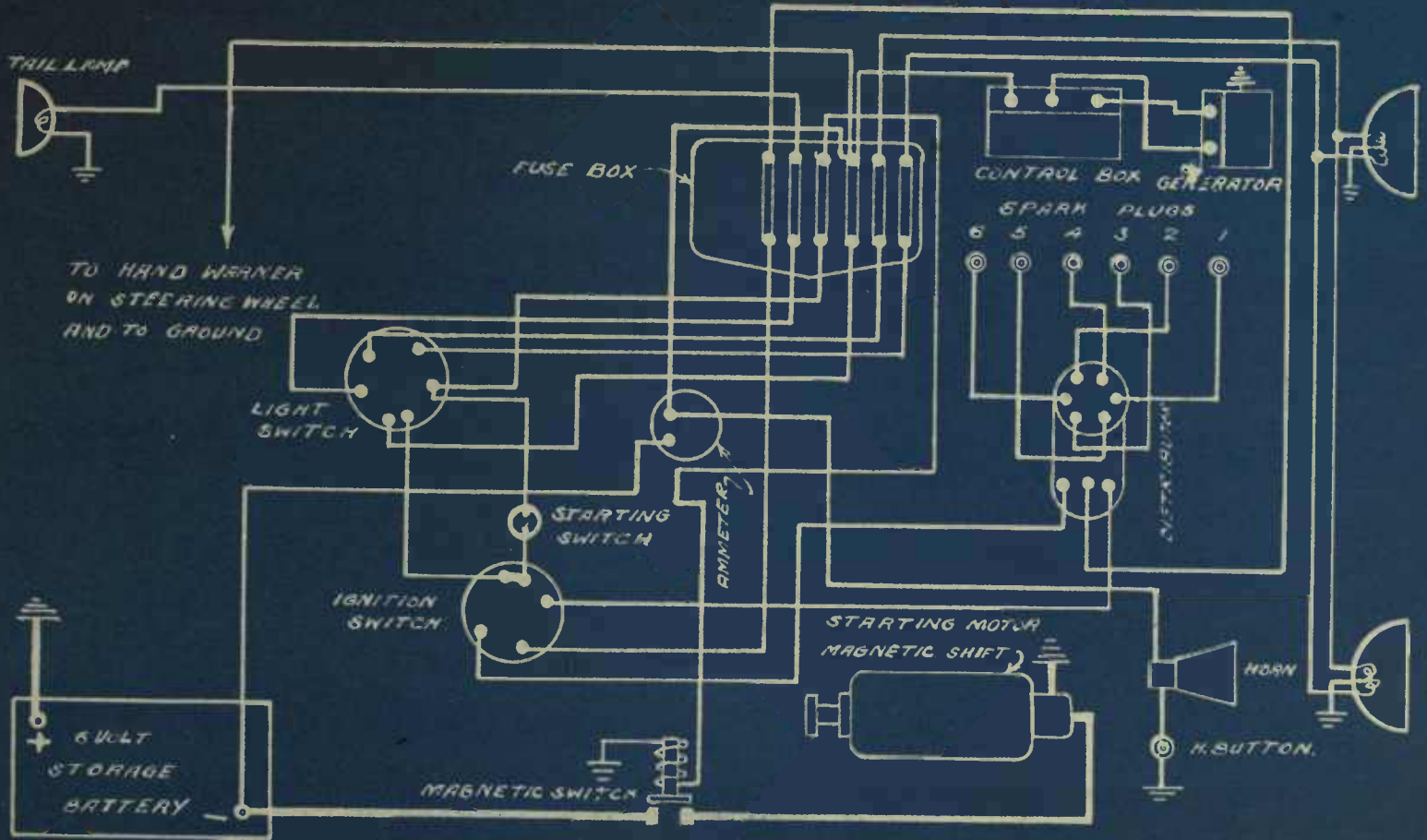
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Mc FARLAN 1916 WESTINGHOUSE SYSTEM

FROM WEST. PLATE 82



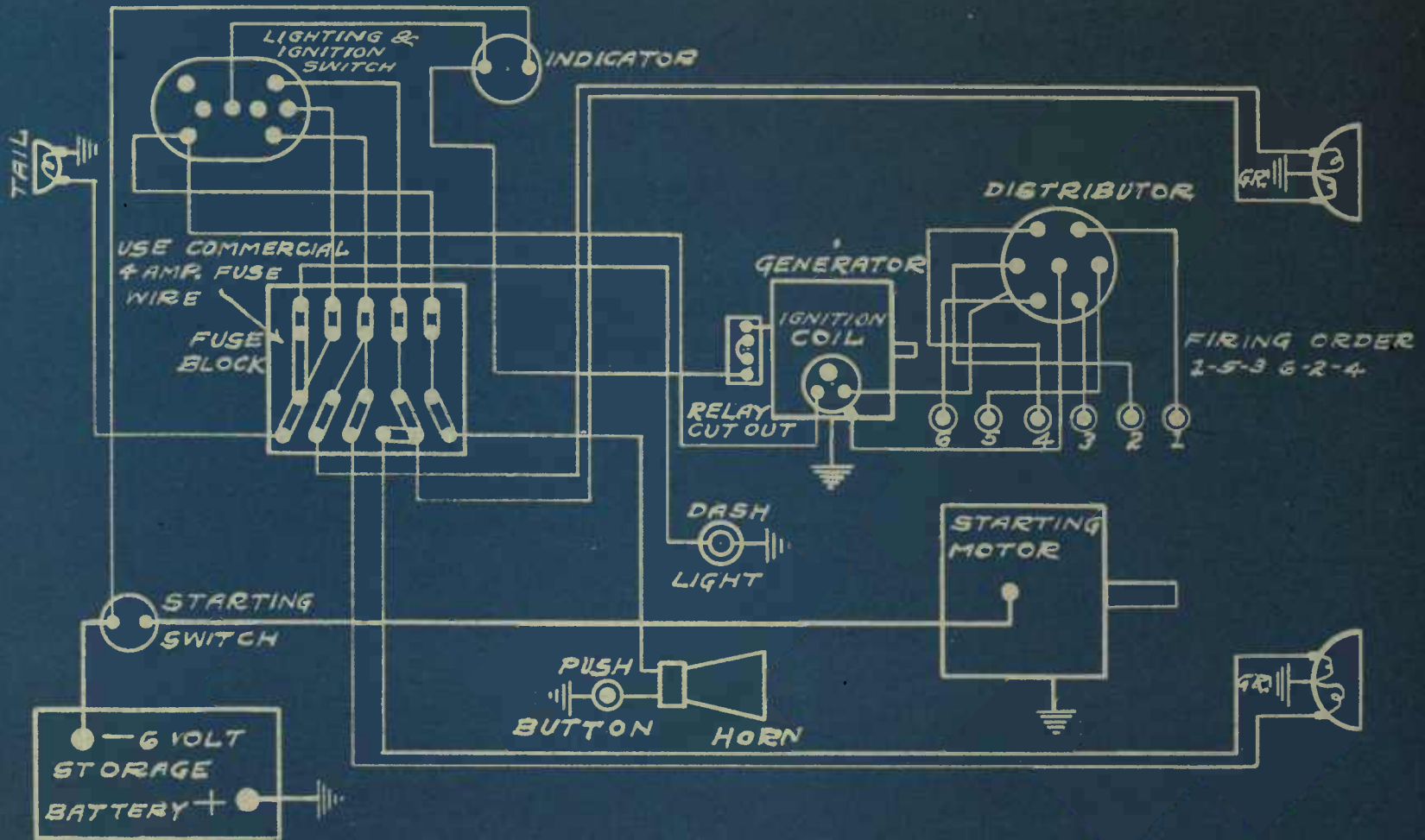
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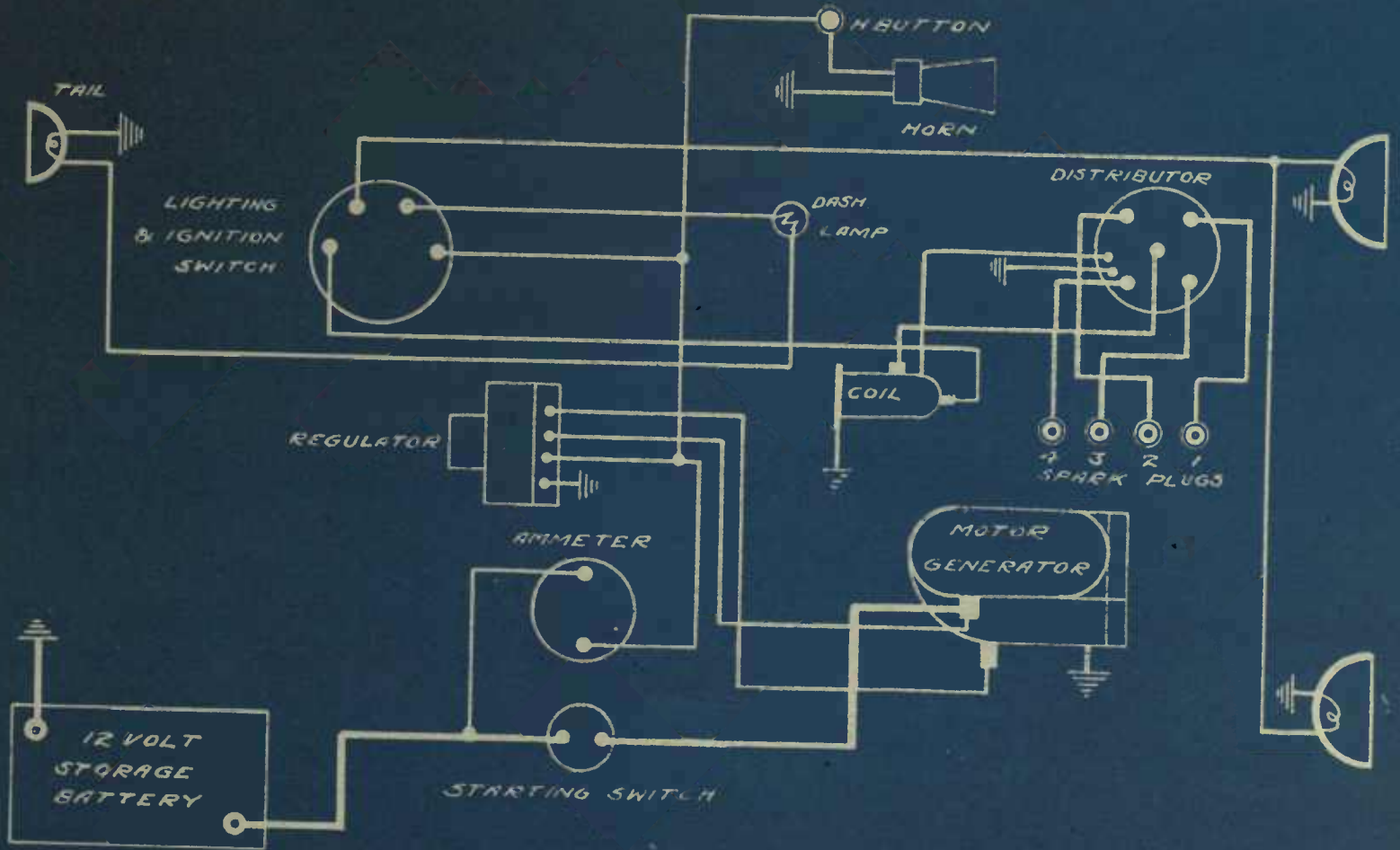
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MADISON 1916-17-18

REMY SYSTEM USED ON 6 & 8 CYLINDER CARS FROM MFRS B/P 494-B



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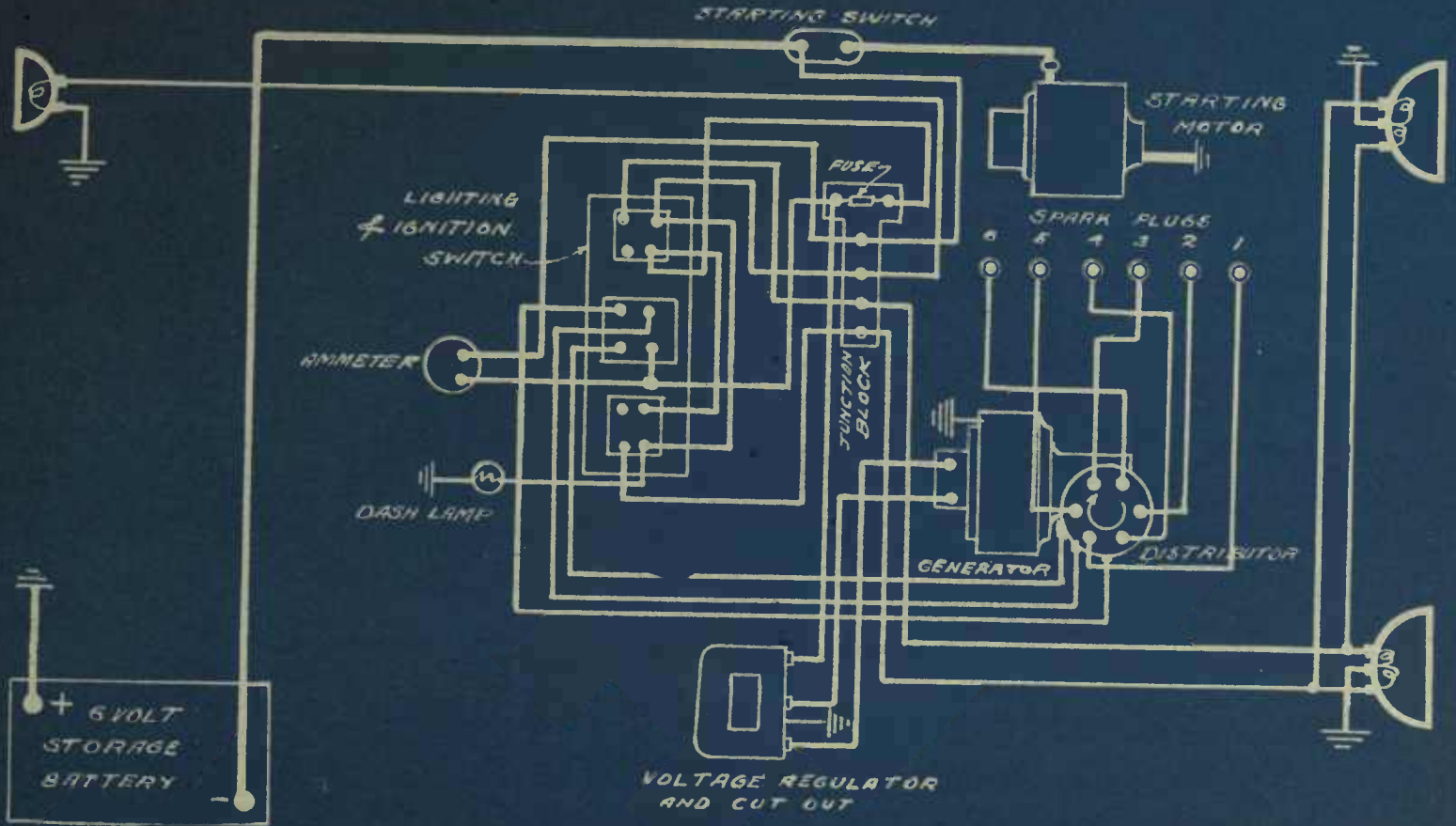


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MARION-HANDLEY 1916-K - 1917 A-B

WESTINGHOUSE SYSTEM

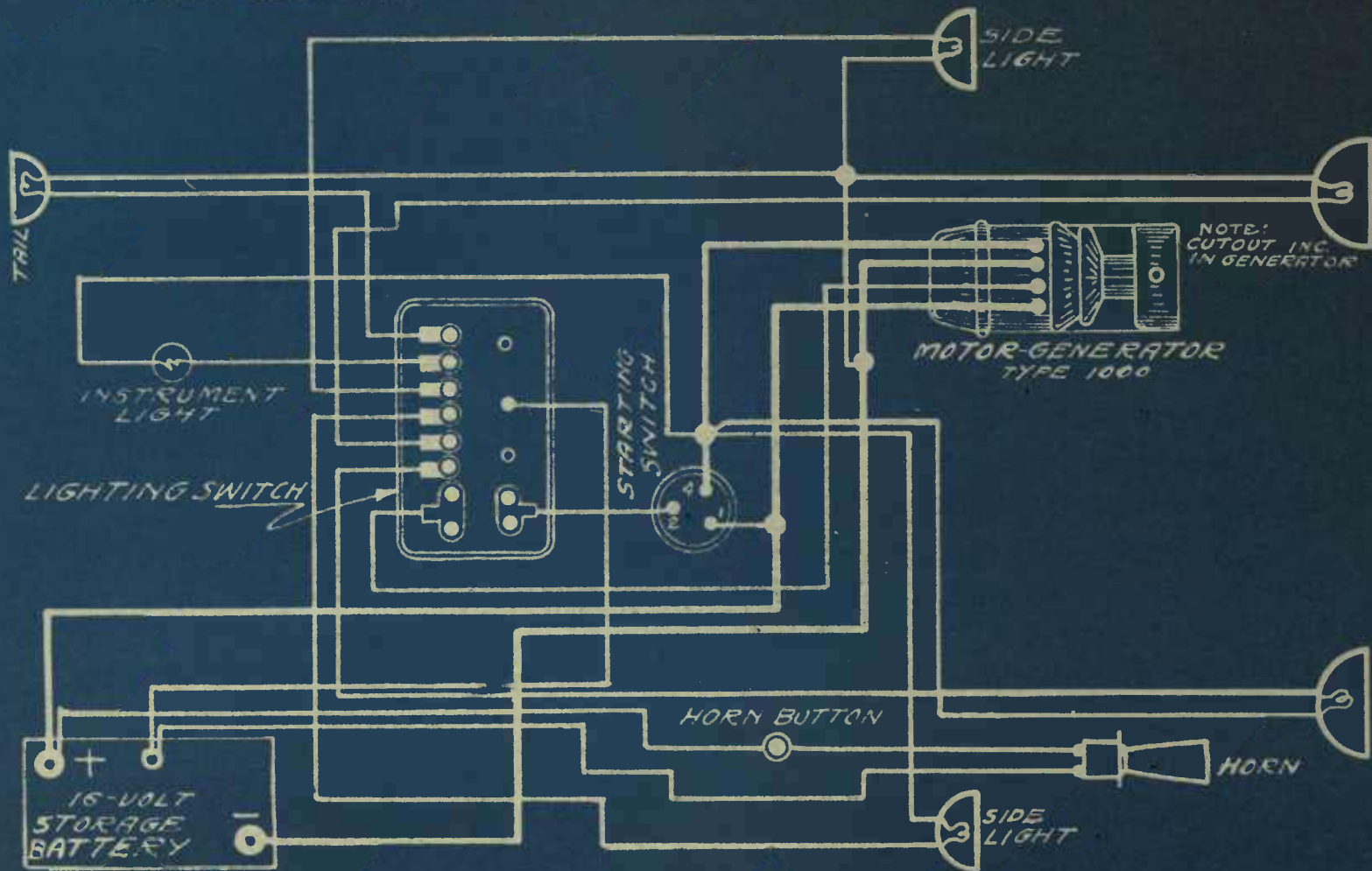
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MARMON 1913 "32-4"
NORTH-EAST SYSTEM

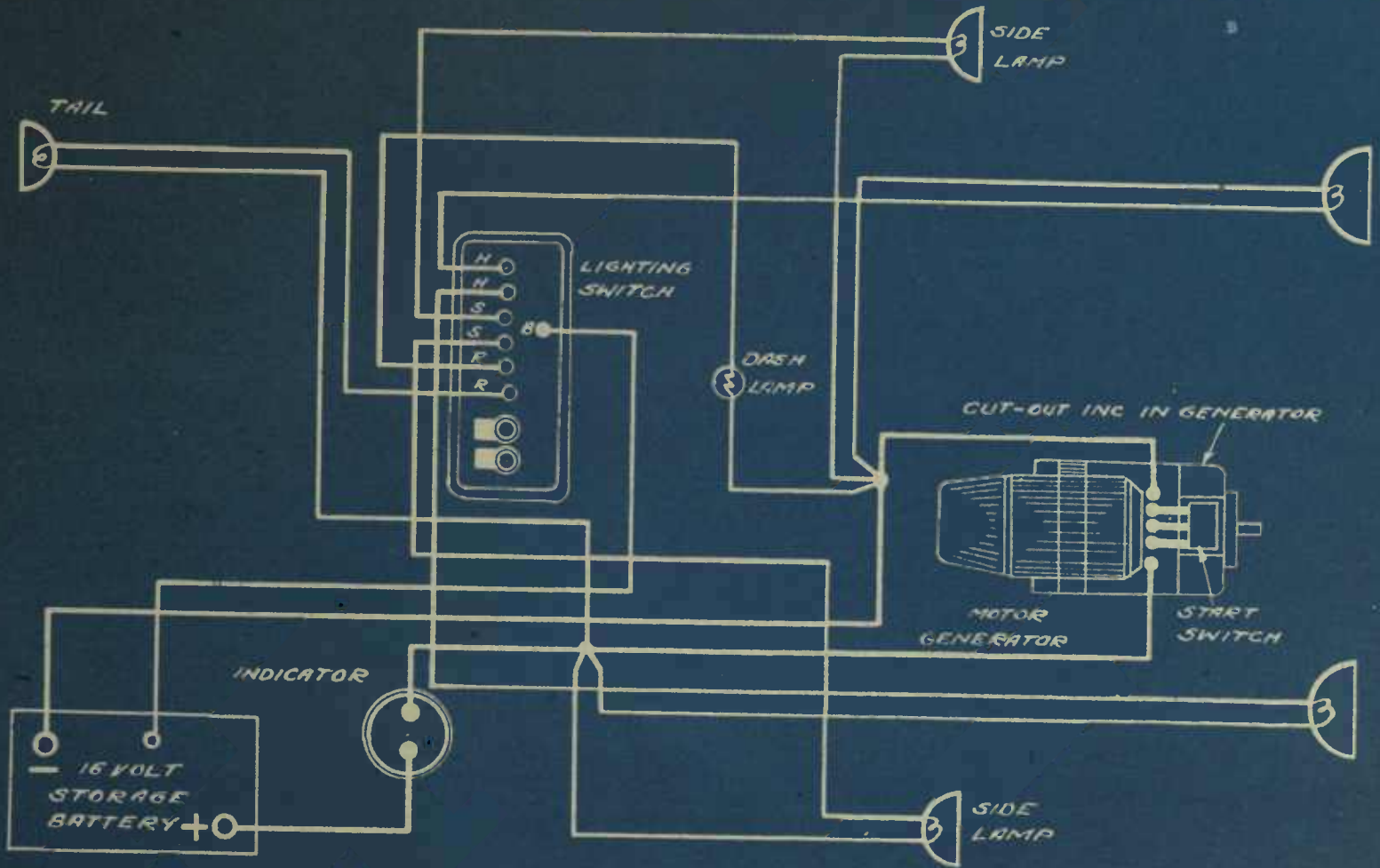
FROM MFRS. PLATE 110



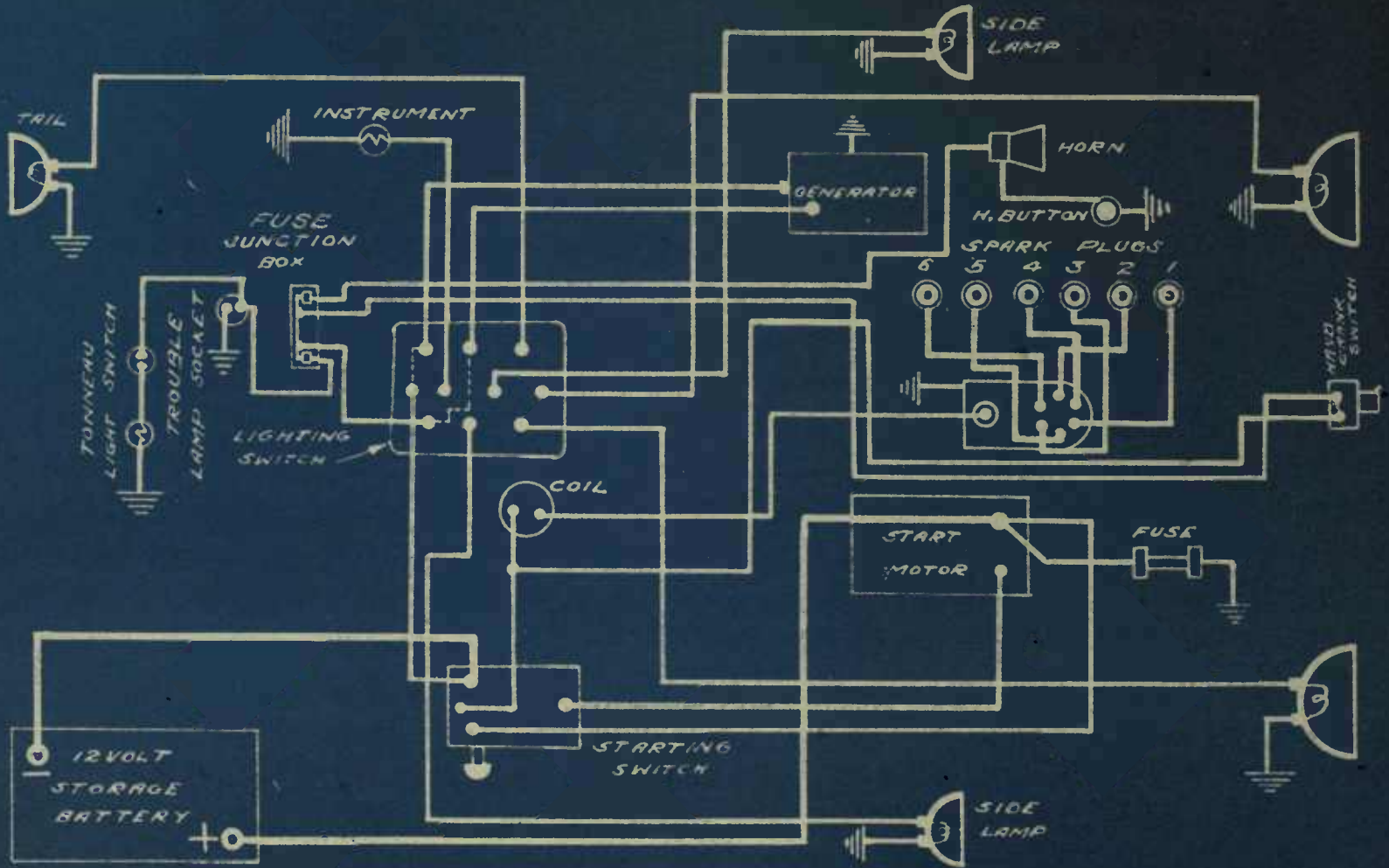
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MARMON 1913 48 1914 41 & 48
NORTH-EAST SYSTEM

FROM N.-E. PLATES 250-260



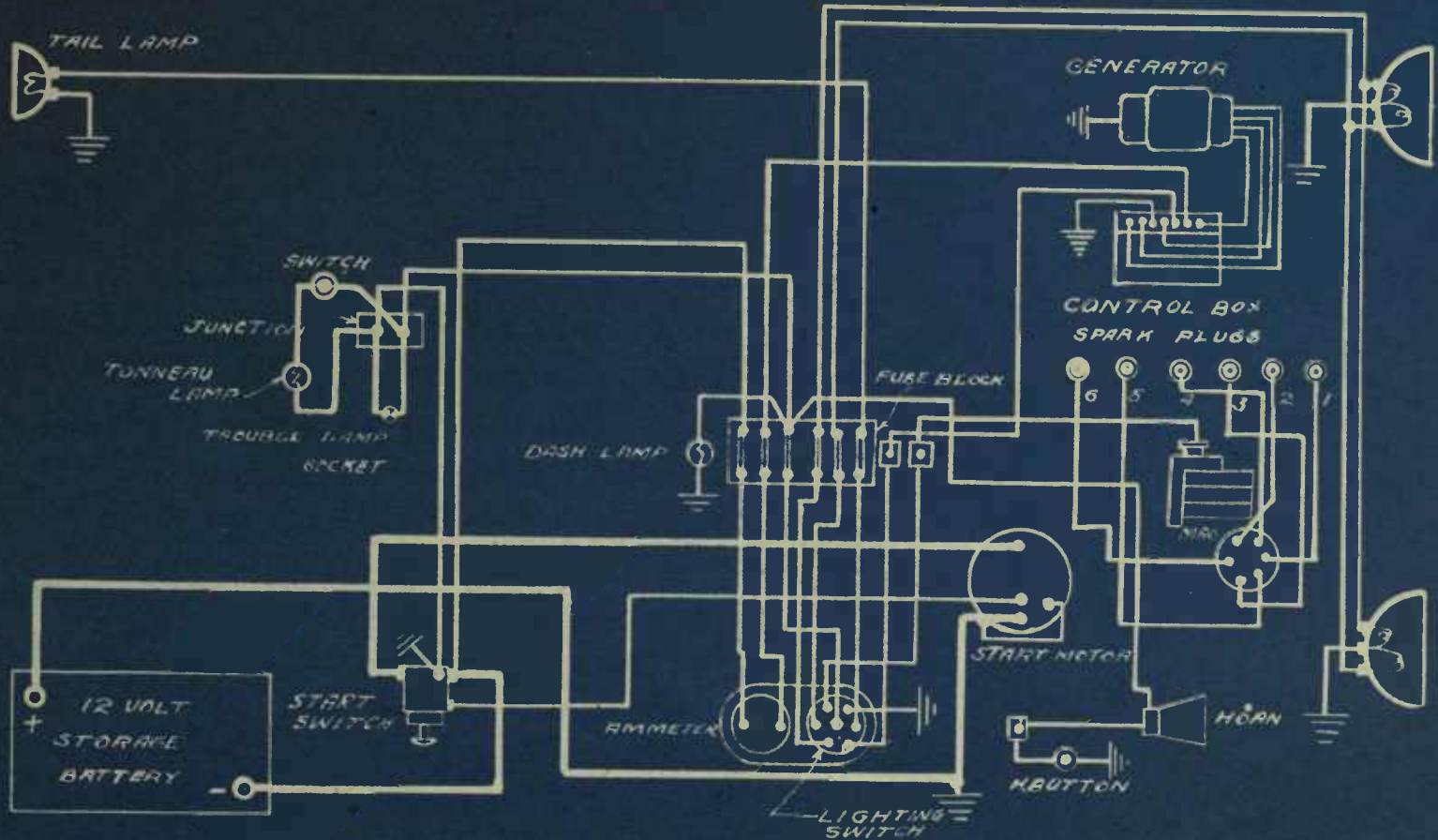
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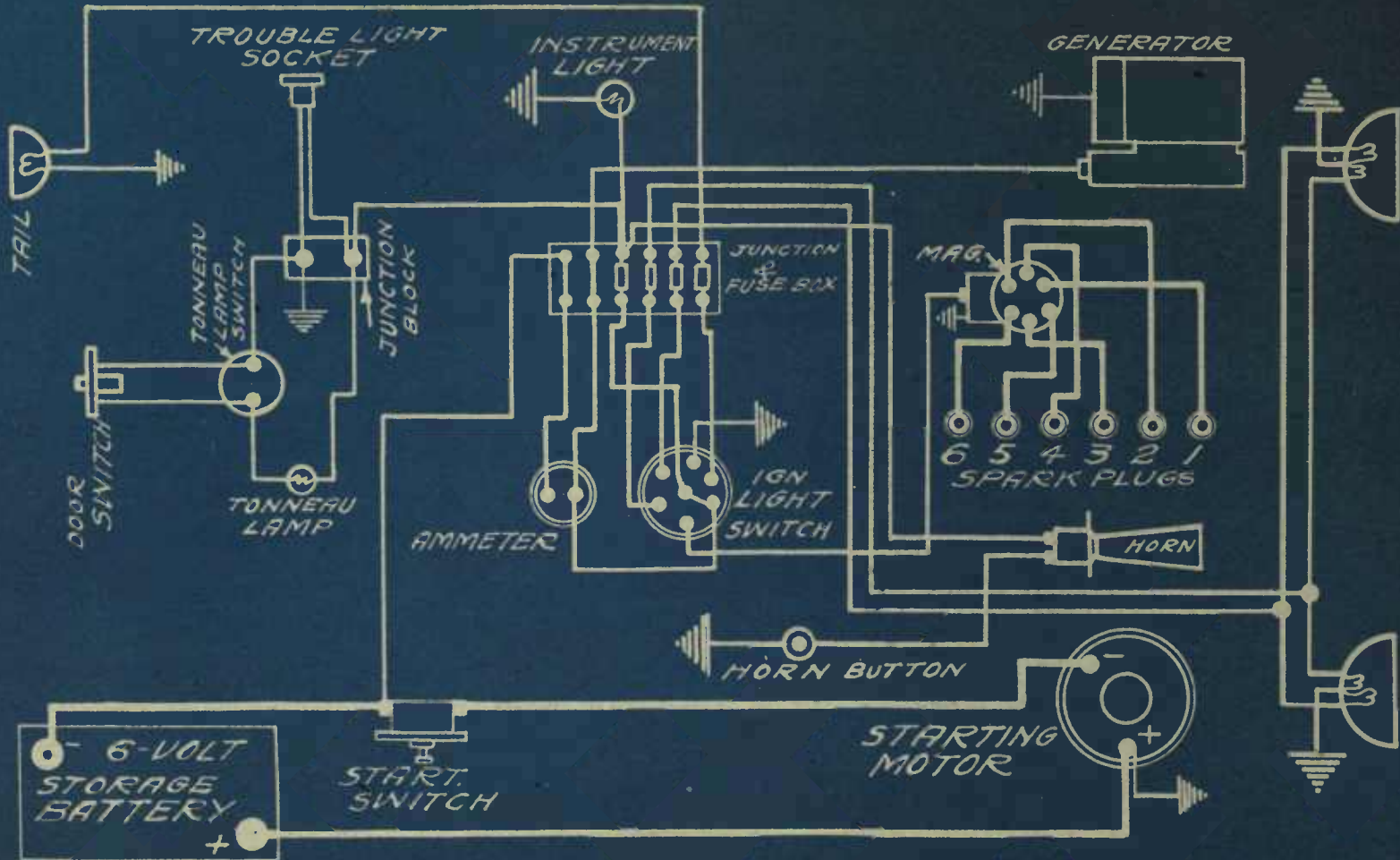
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MARMON 34 1916-1917
BOSCH SYSTEM

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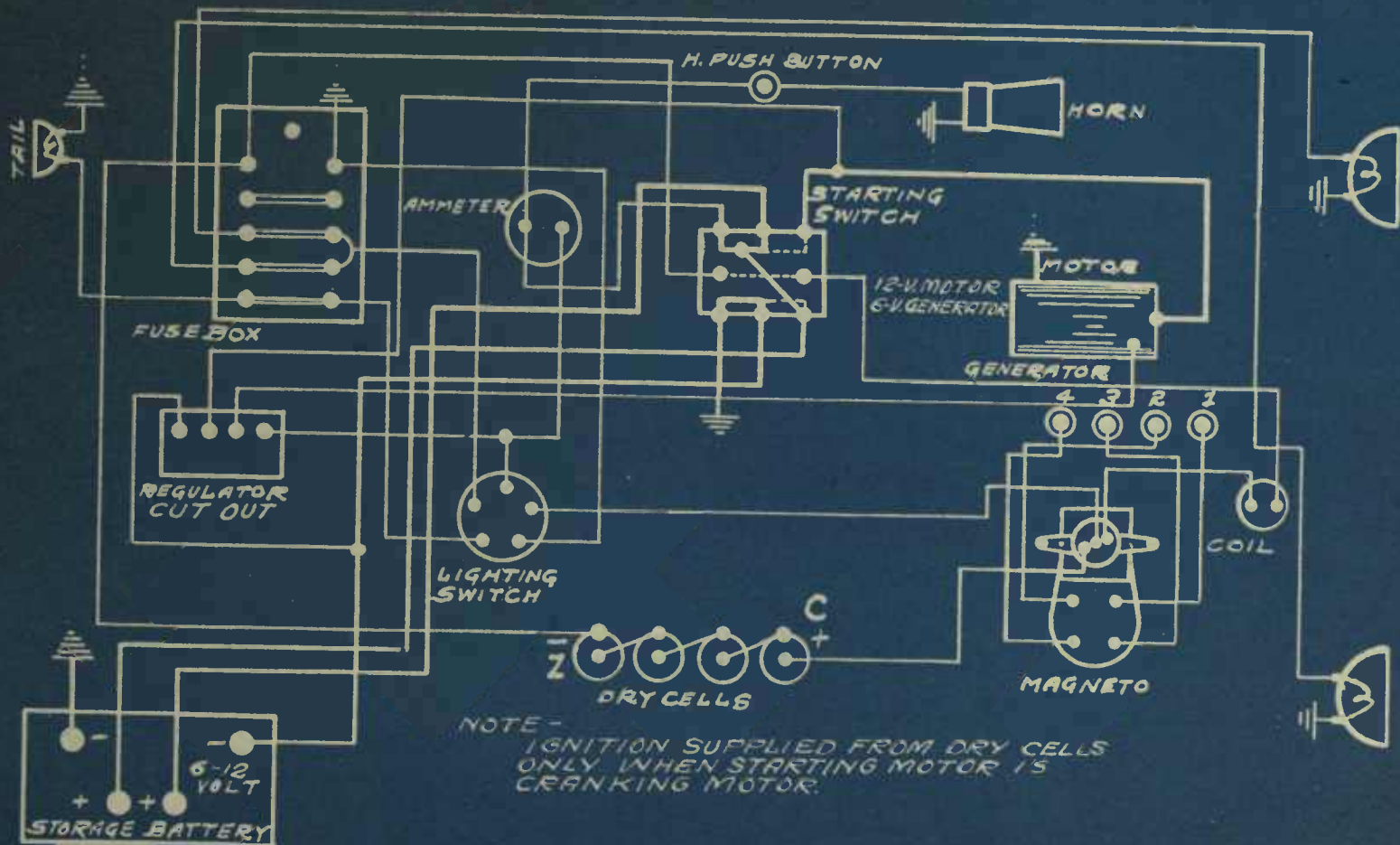


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MAXWELL 1914-15

SIMMS-HUFF SYSTEM

FROM SIMMS H.T. MAG. BULLETIN

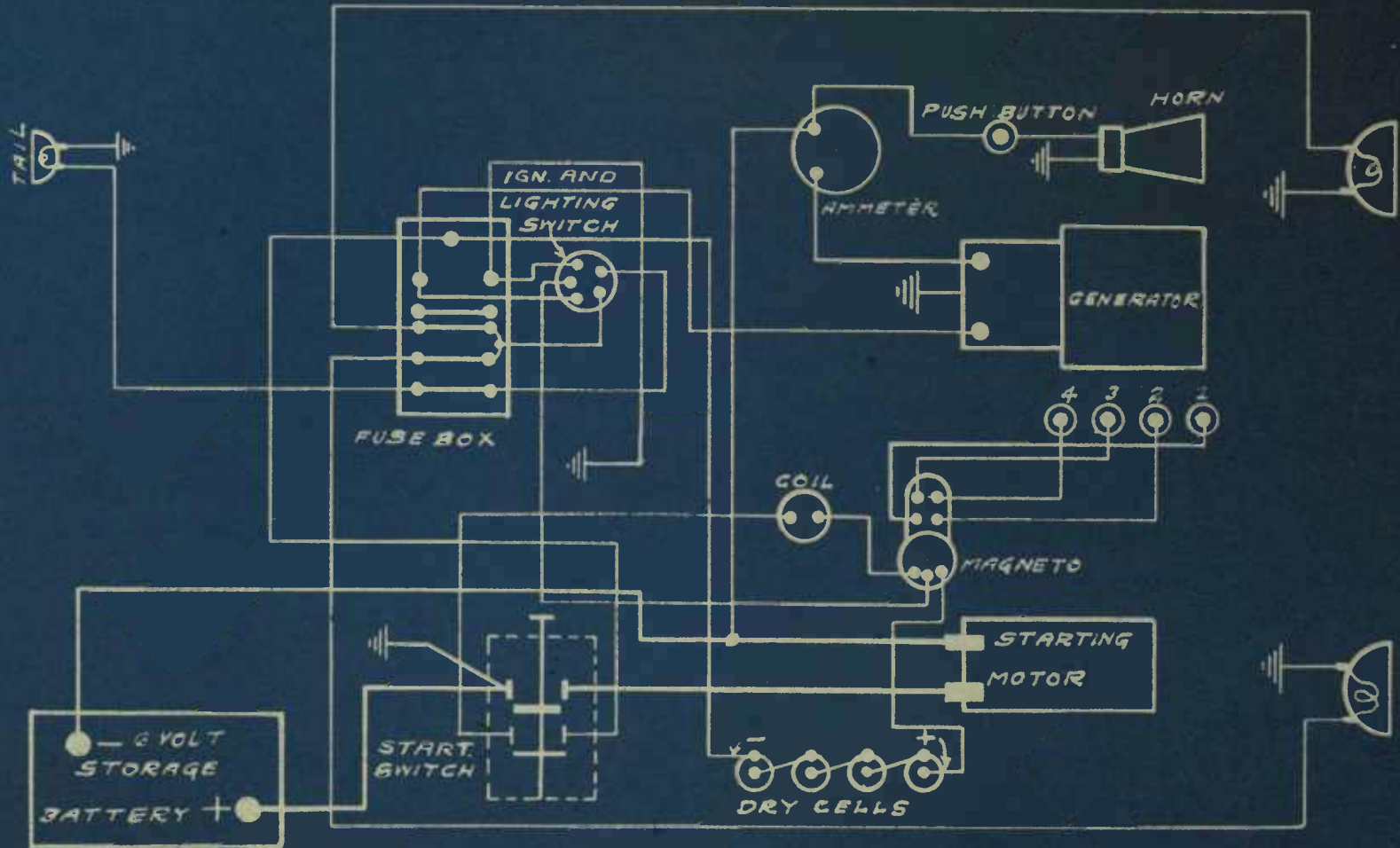


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MAXWELL 1915

GRAY & DAVIS SYSTEM

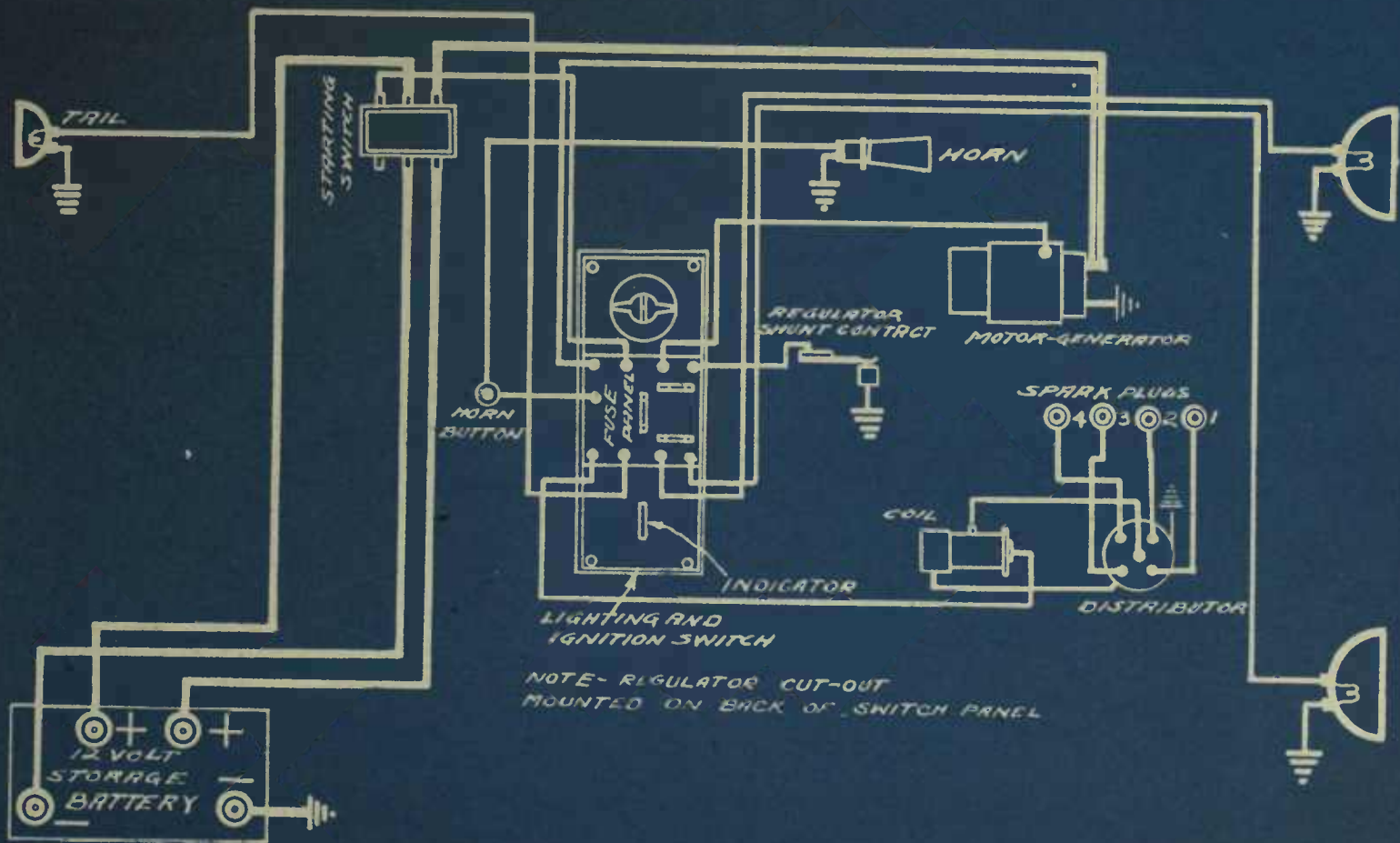
FROM G&D INSTRUCTION BOOK



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MAXWELL 1917 MODEL 25
SIMMS-HUFF SYSTEM

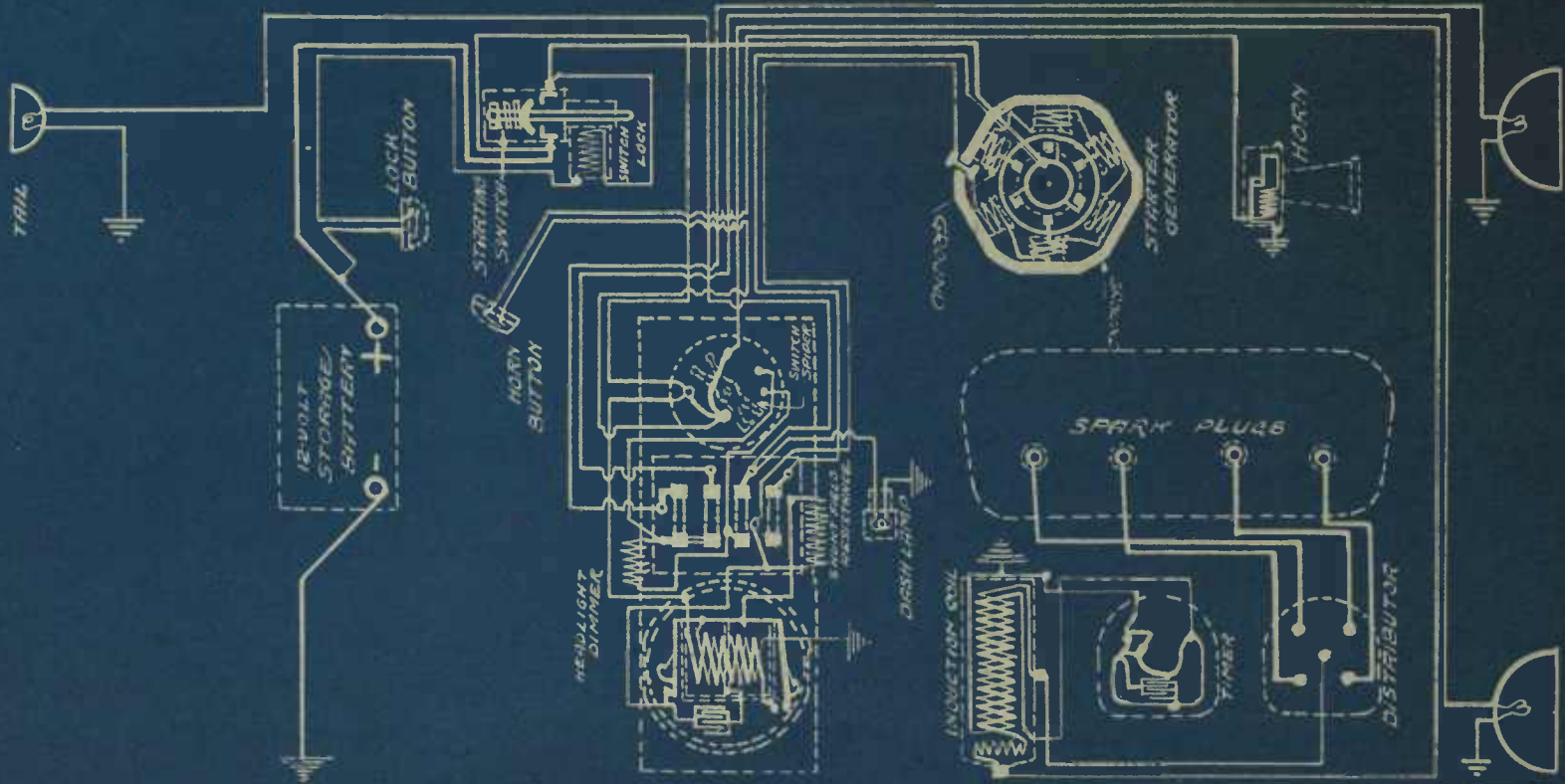
FROM S-H. PLATE



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MAXWELL 1918 MODEL 25 1919
SIMMS-HUFF SYSTEM SIMMS MAGN. IGN.

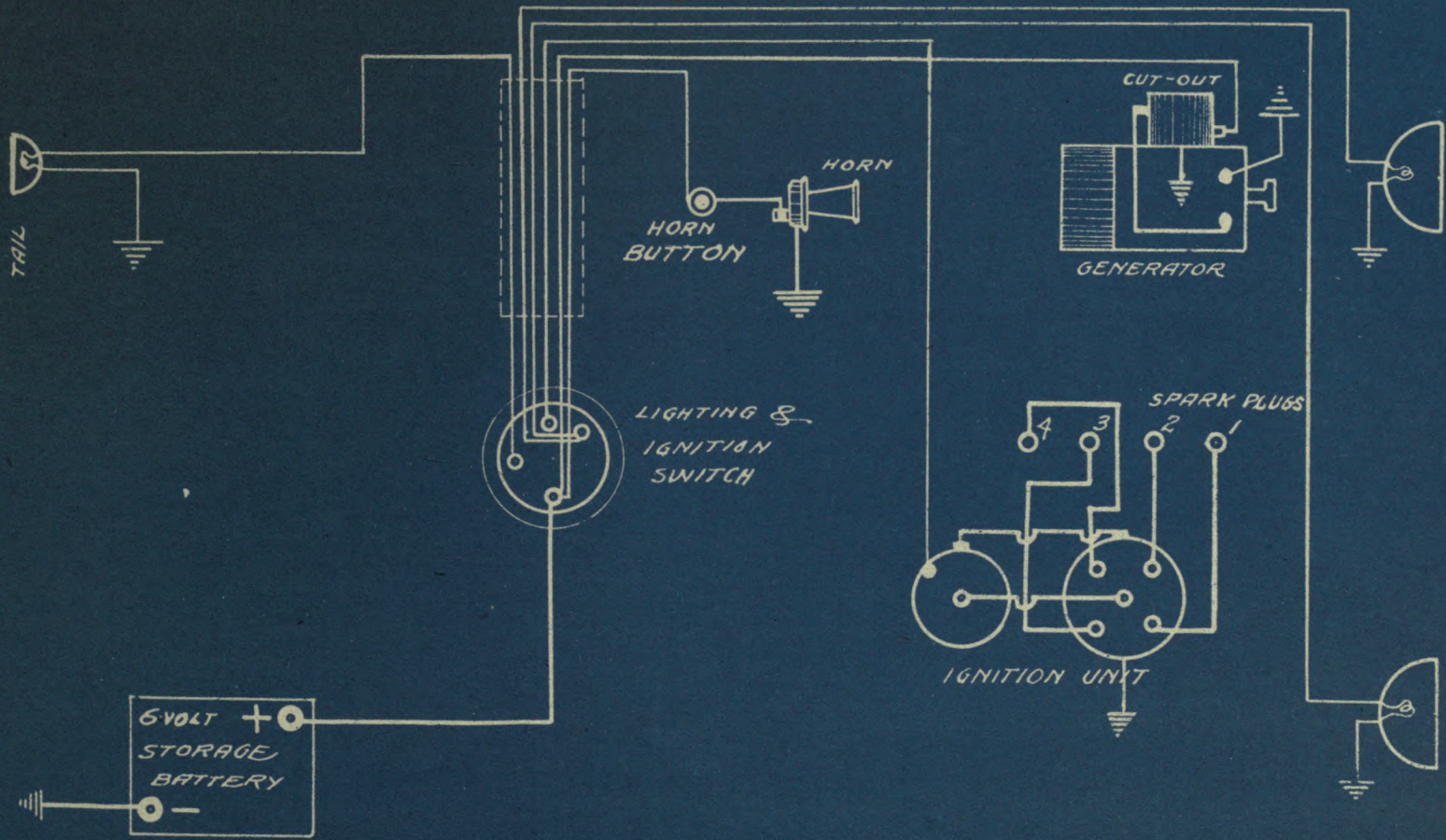
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MAXWELL ONE-TON TRUCK AUTOLITE SYSTEM

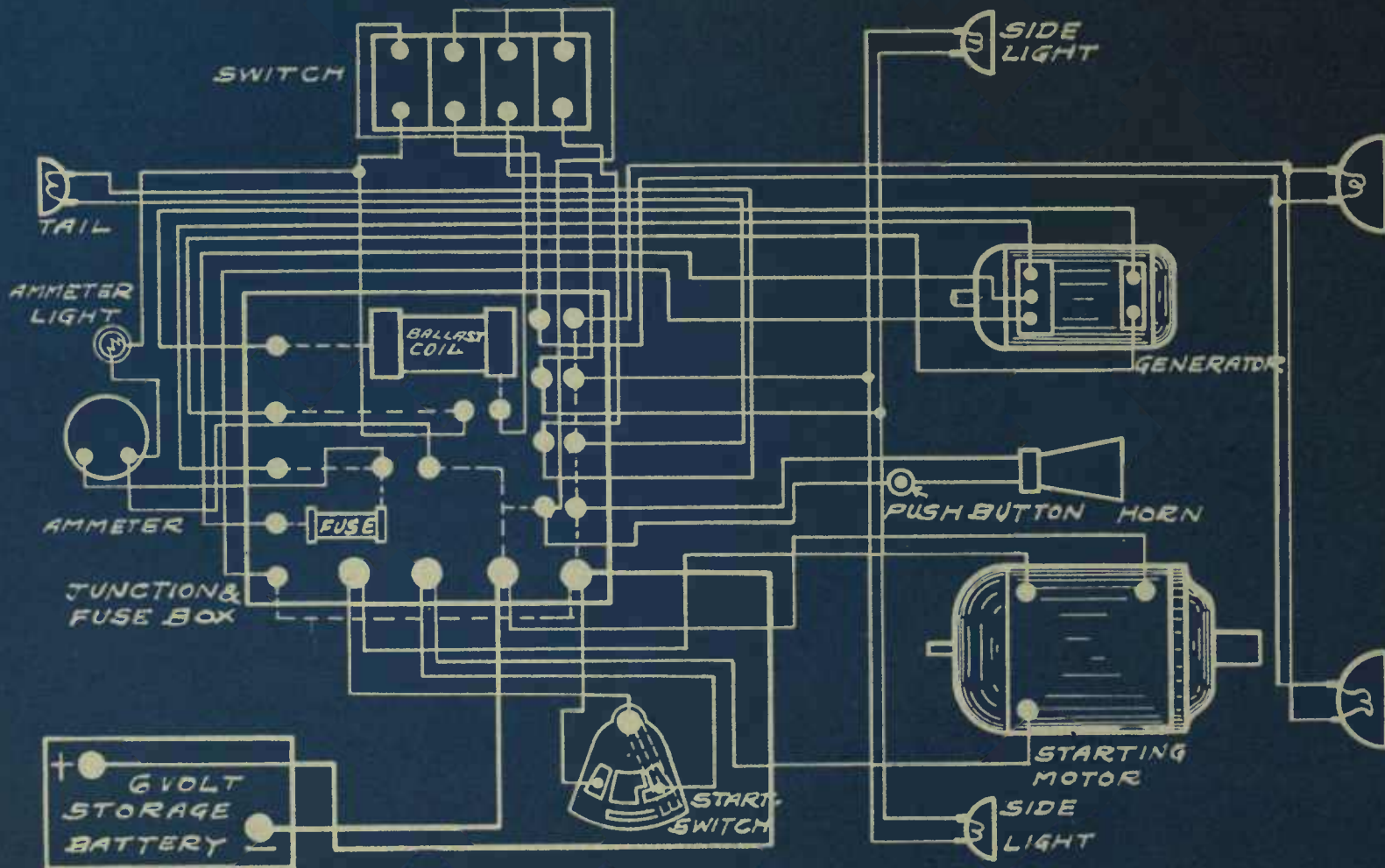
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MERCER 1914 "35" RUSHMORE SYSTEM

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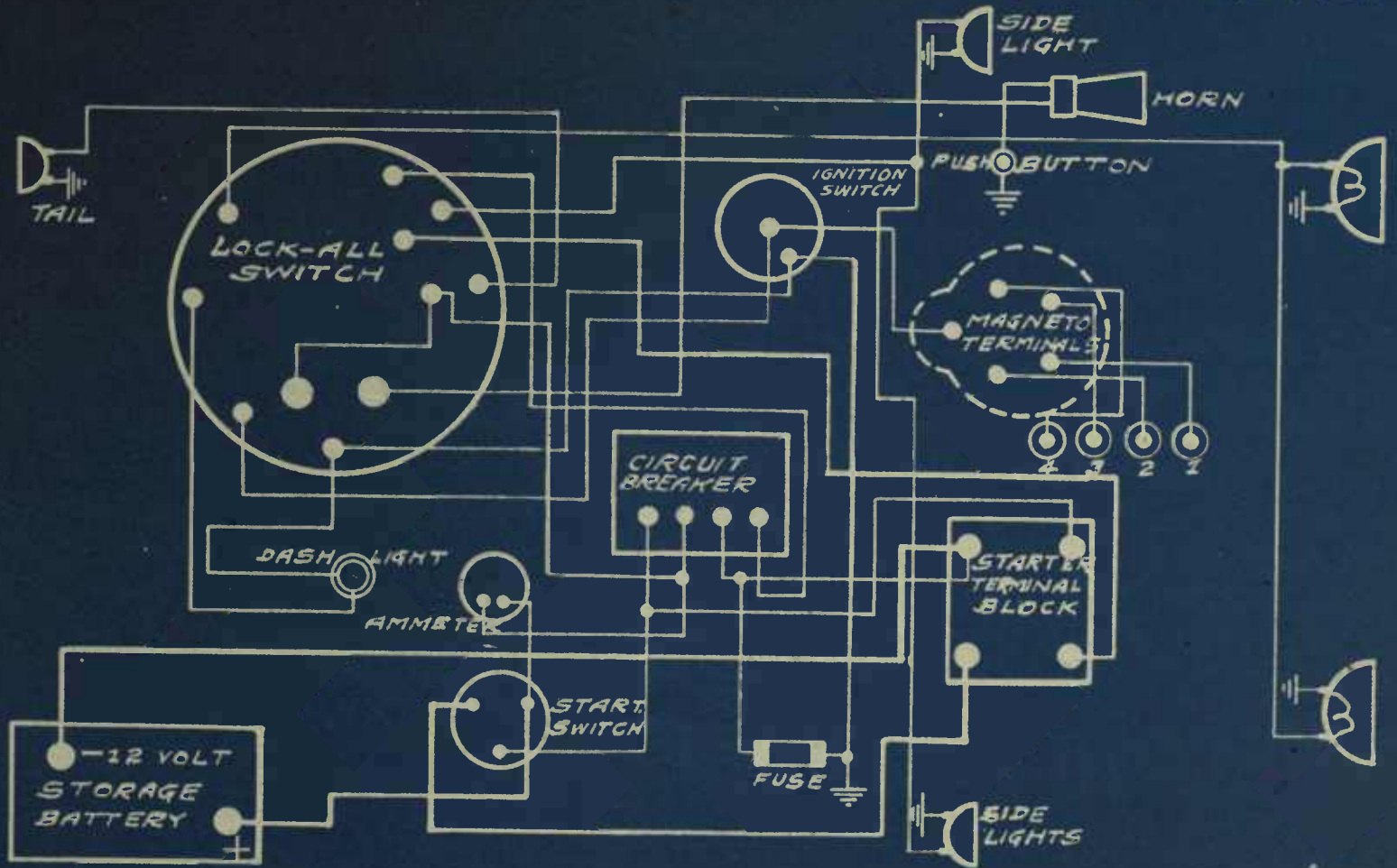


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MERCER 1915 22-70

U.S.L. SYSTEM

FROM MFR 6. S/P 20252

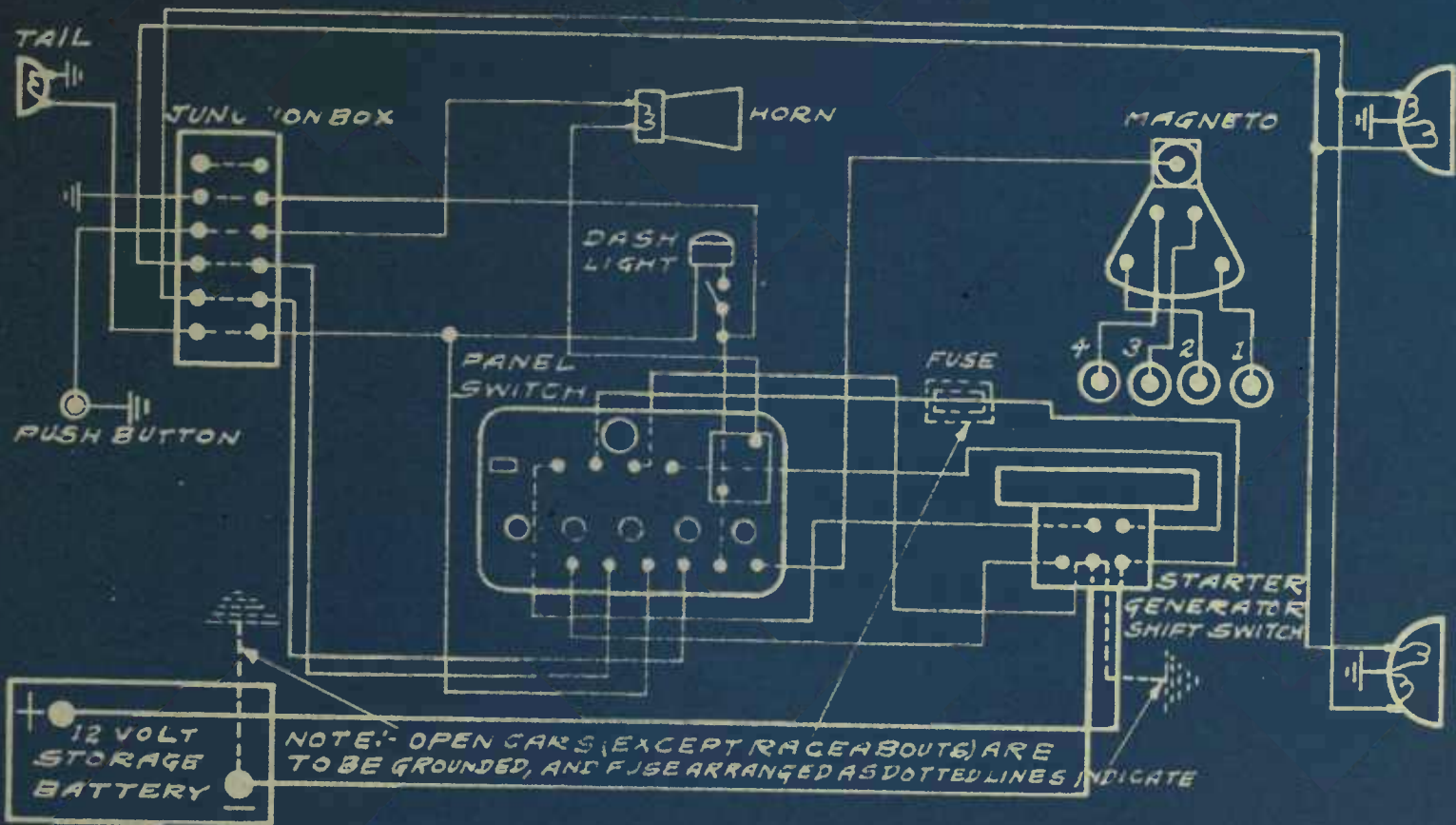


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MERCER 1917-18 22-73

U.S.L. SYSTEM

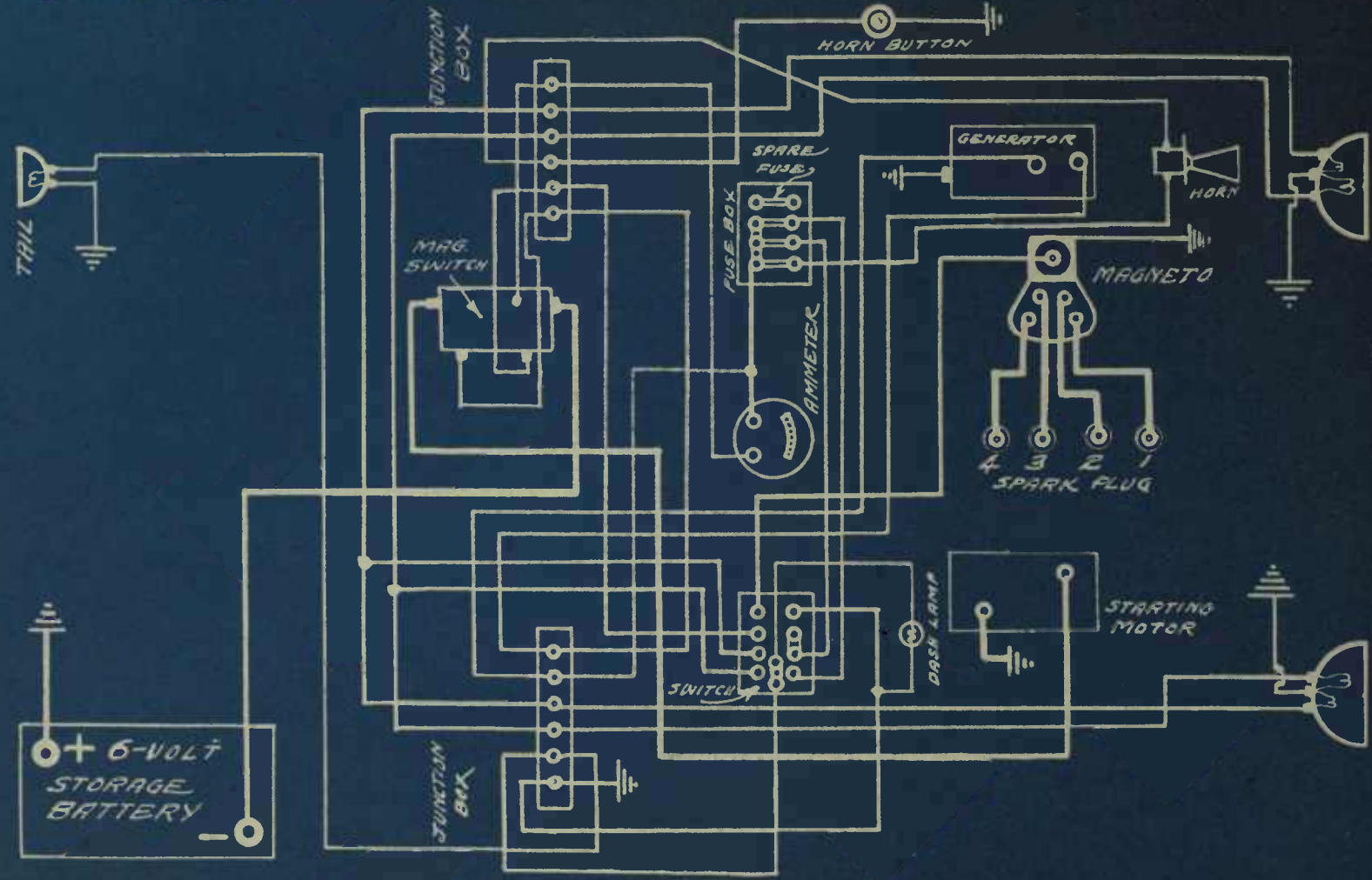
FROM MFRS. B/P DI-3 & DI-4



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MERCER 1918 MODEL 22 & 74 1919
 WESTINGHOUSE SYSTEM

FROM MFRS. BP. 20858



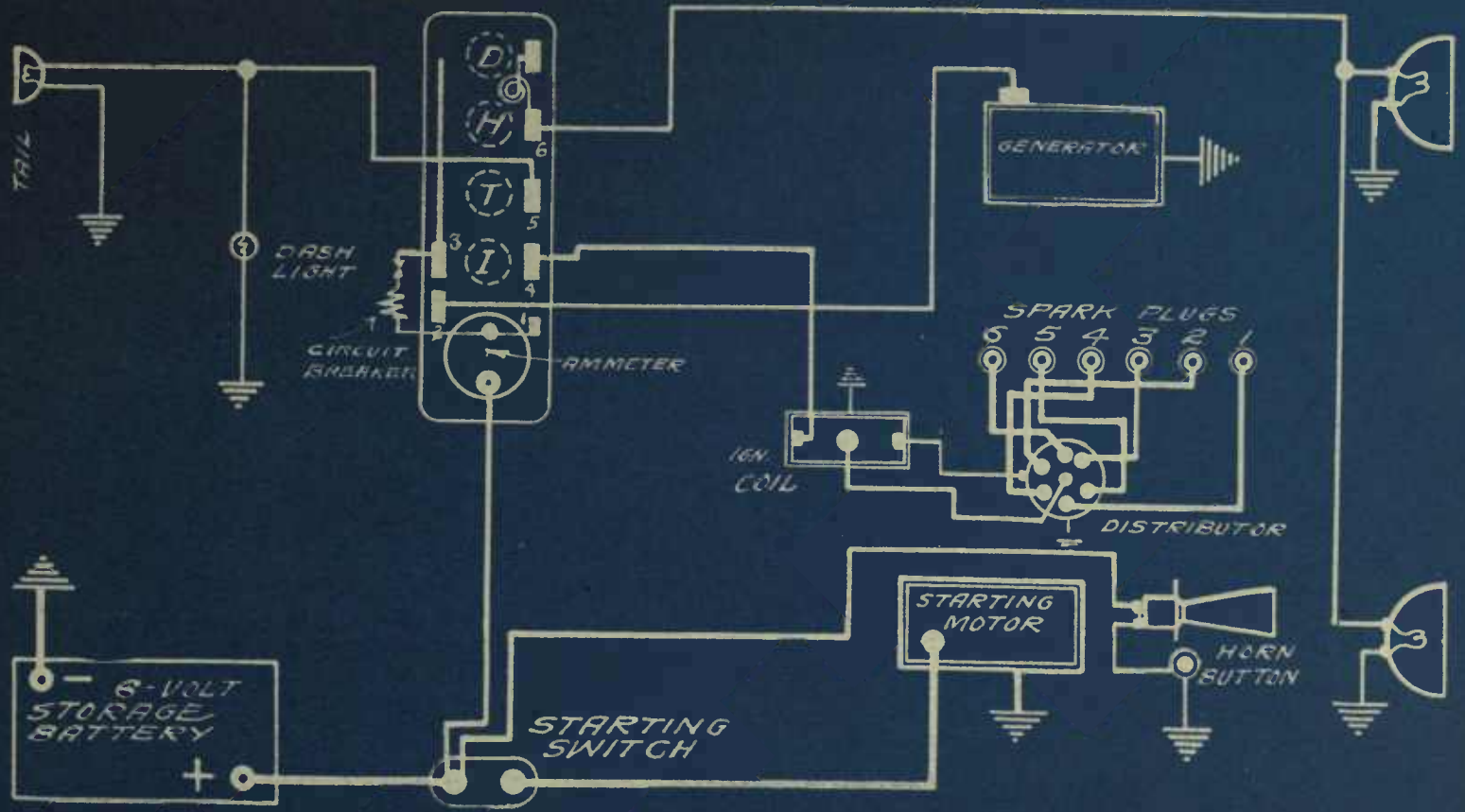
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METEOR 1917 75-80
 DELCO SYSTEM

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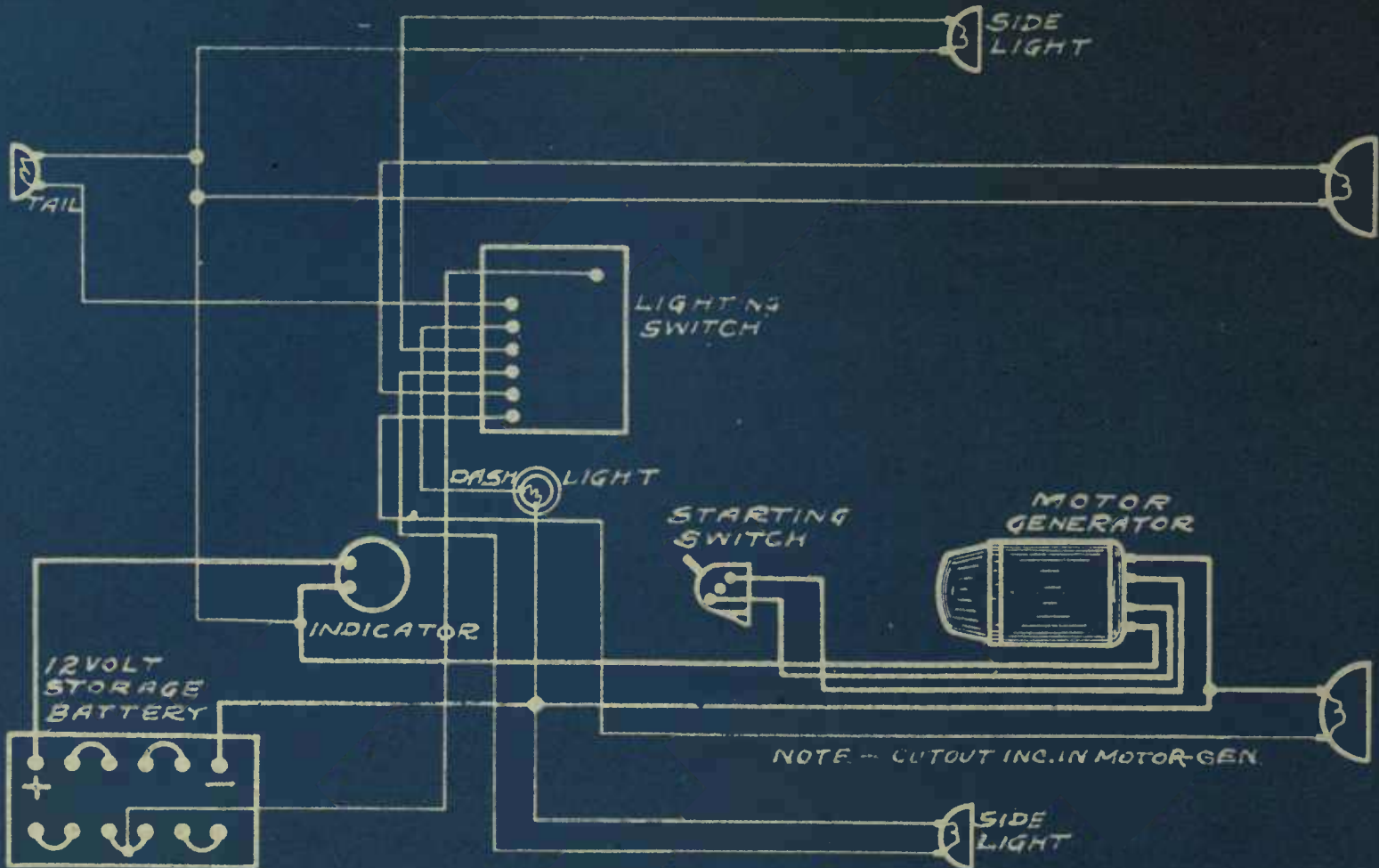
LIGHTING &
 IGNITION
 SWITCH



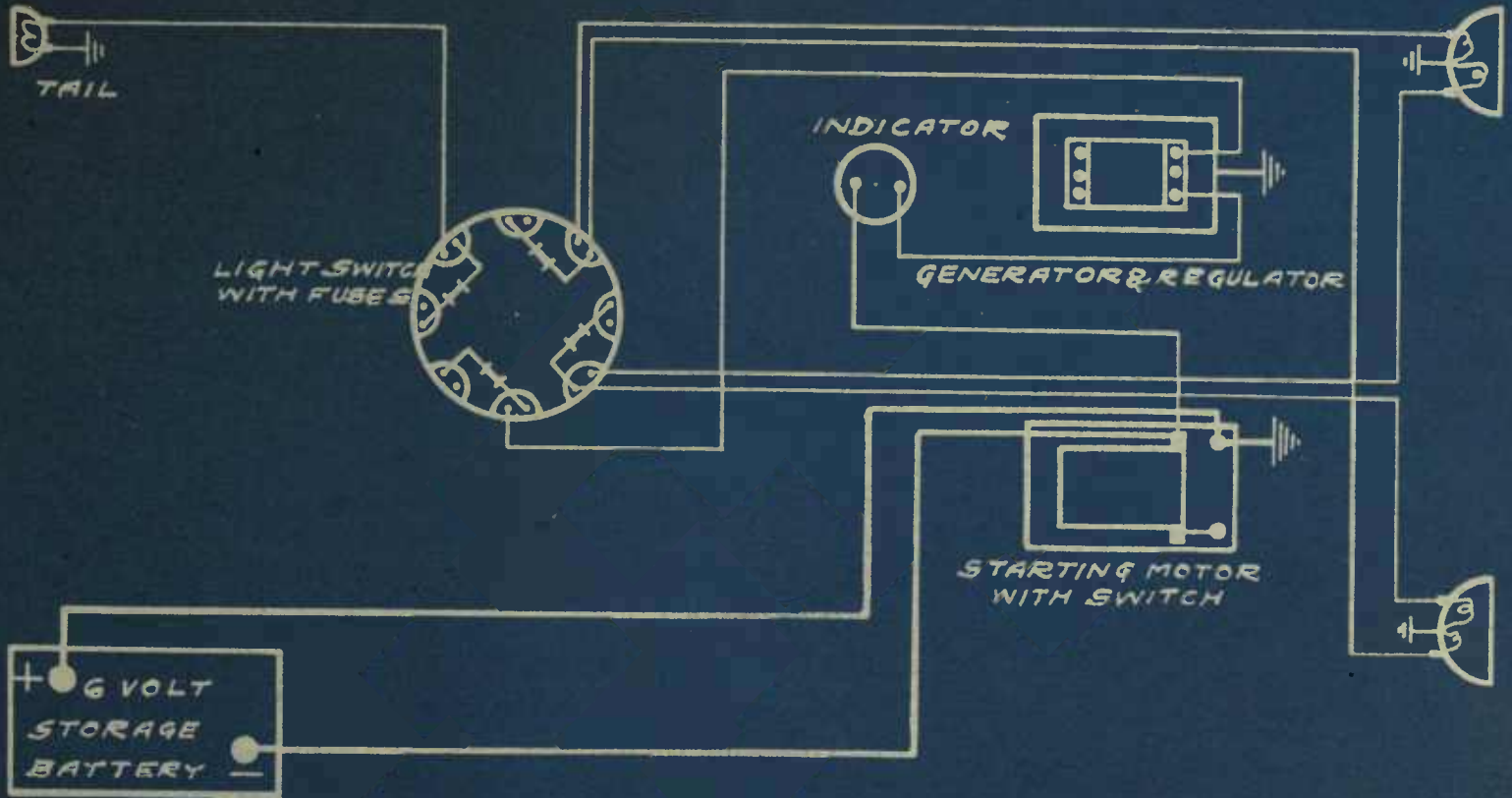
METZ 1914 "22"

NORTHEAST SYSTEM

FROM N.E. PLATE 390



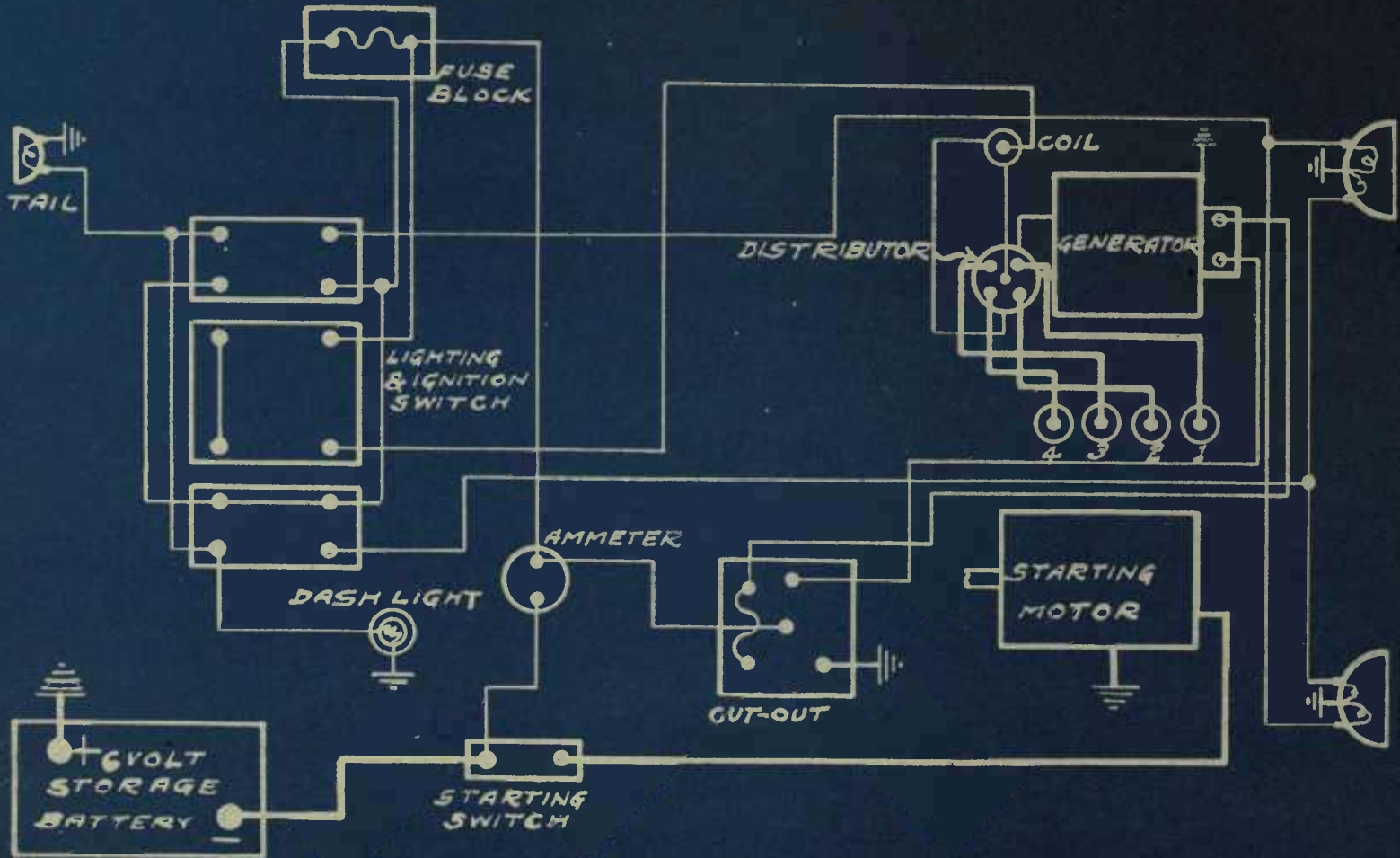
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METZ 1917-18 "G" WESTINGHOUSE SYSTEM

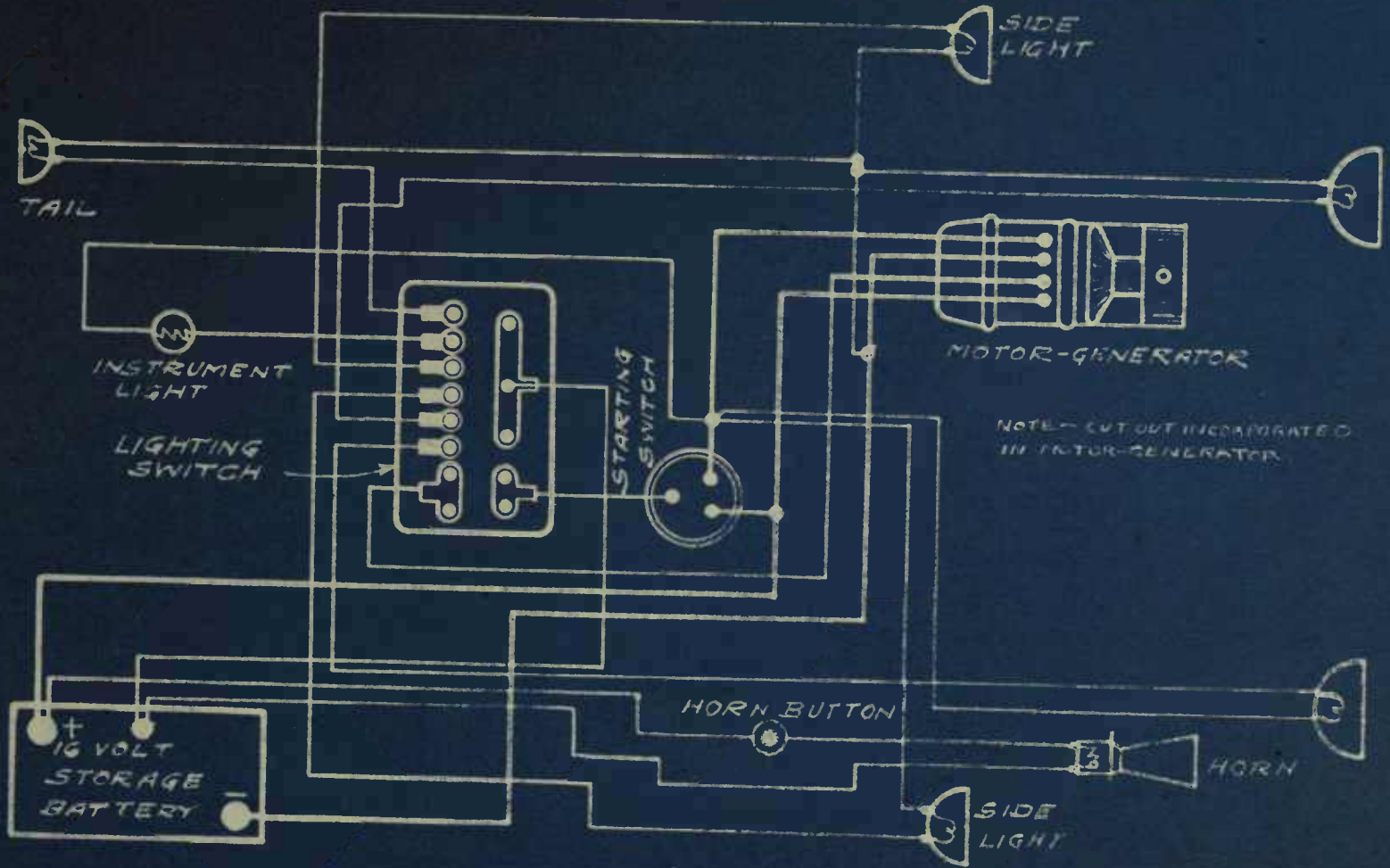
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MICHIGAN 1913 NORTHEAST SYSTEM

FROM N-E PLATE 120

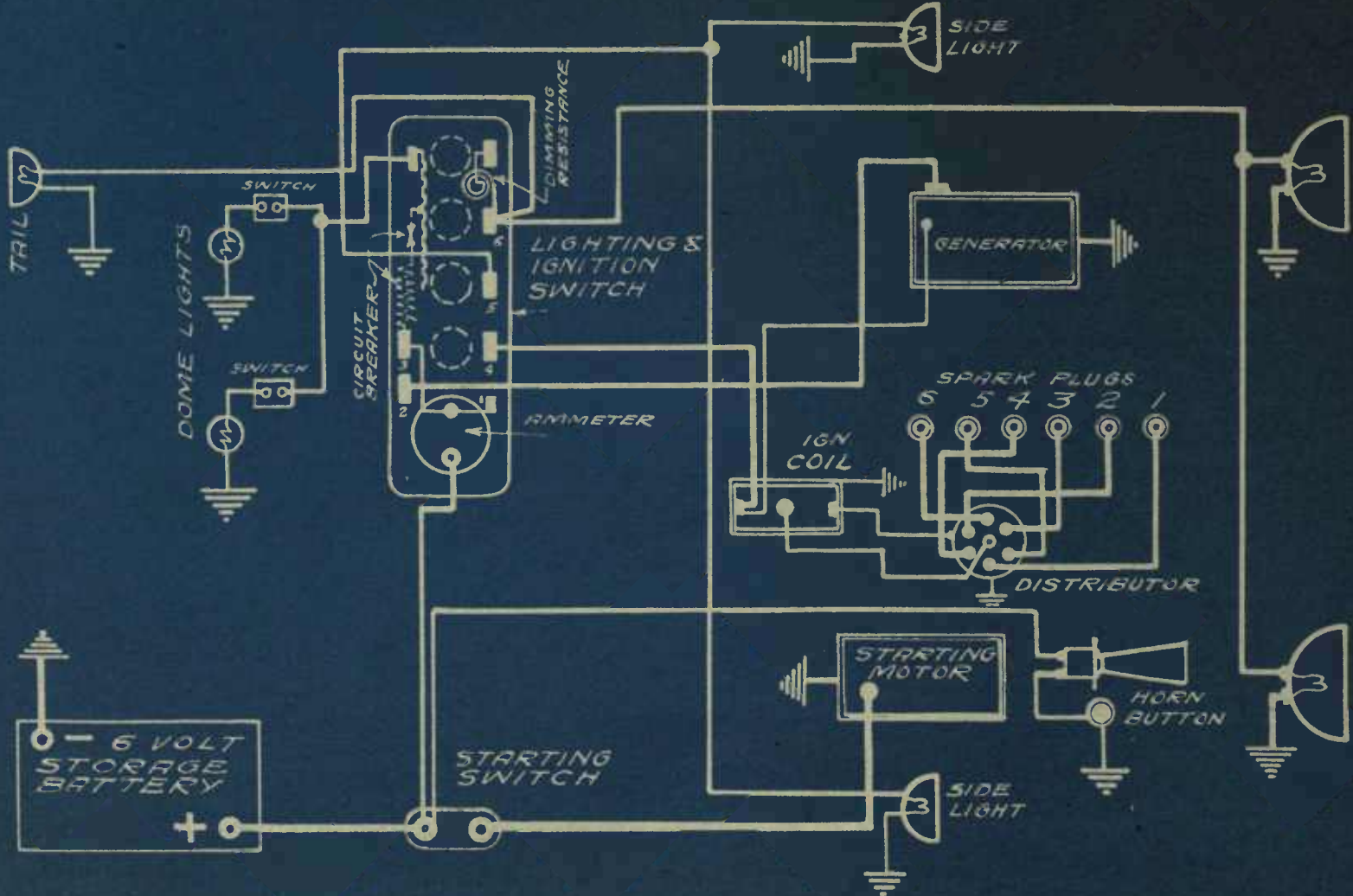


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MICHIGAN HEARSE AND MOTORS COMPANY 1917

DELCO SYSTEM

FROM DELCO MANUAL

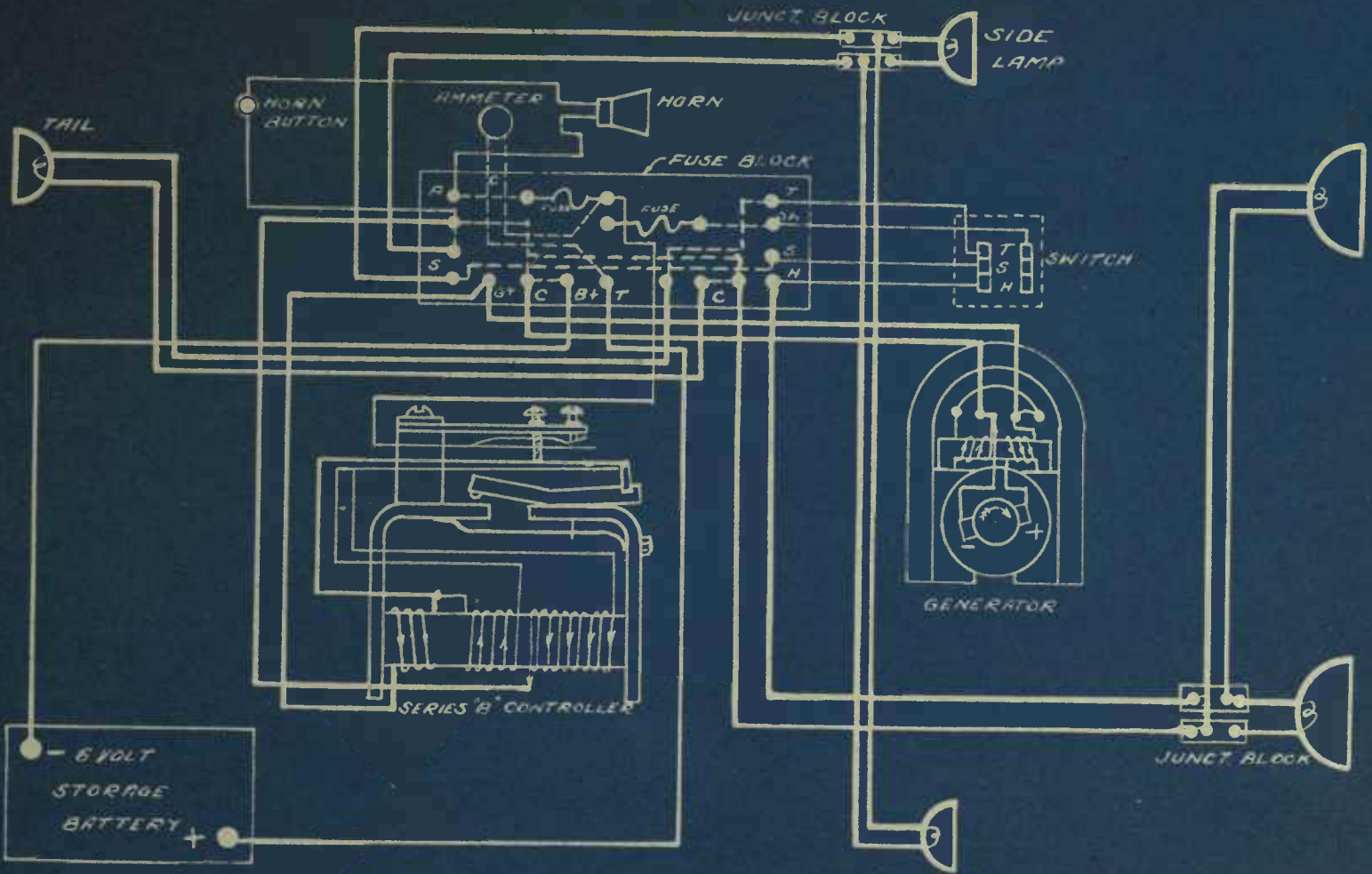


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MITCHELL 1913

ESTERLINE SYSTEM

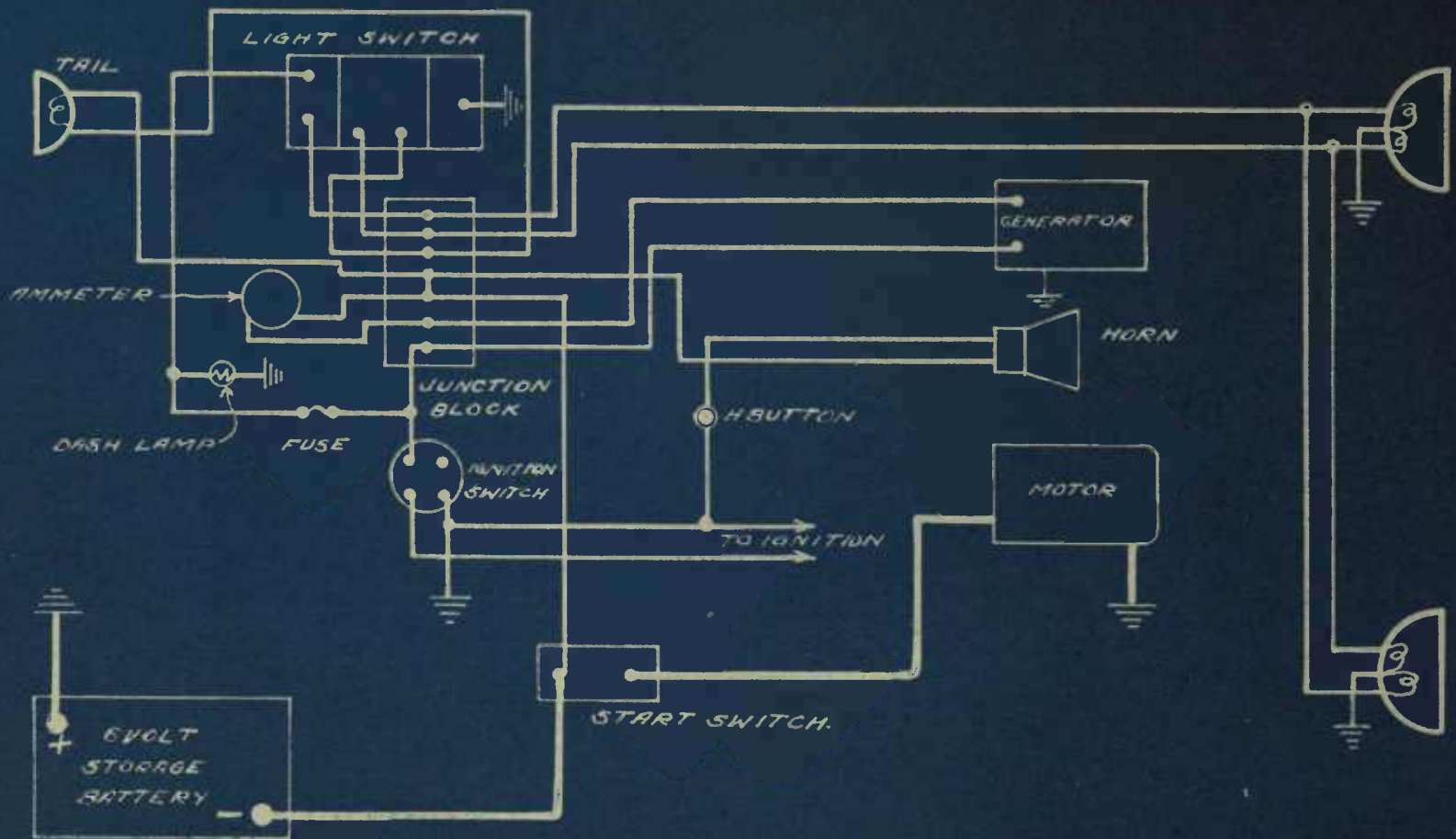
FROM ESTERLINE S.P. 1129



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MITCHELL 1916 "8" WESTINGHOUSE SYSTEM

FROM WEST. PLATE 85.

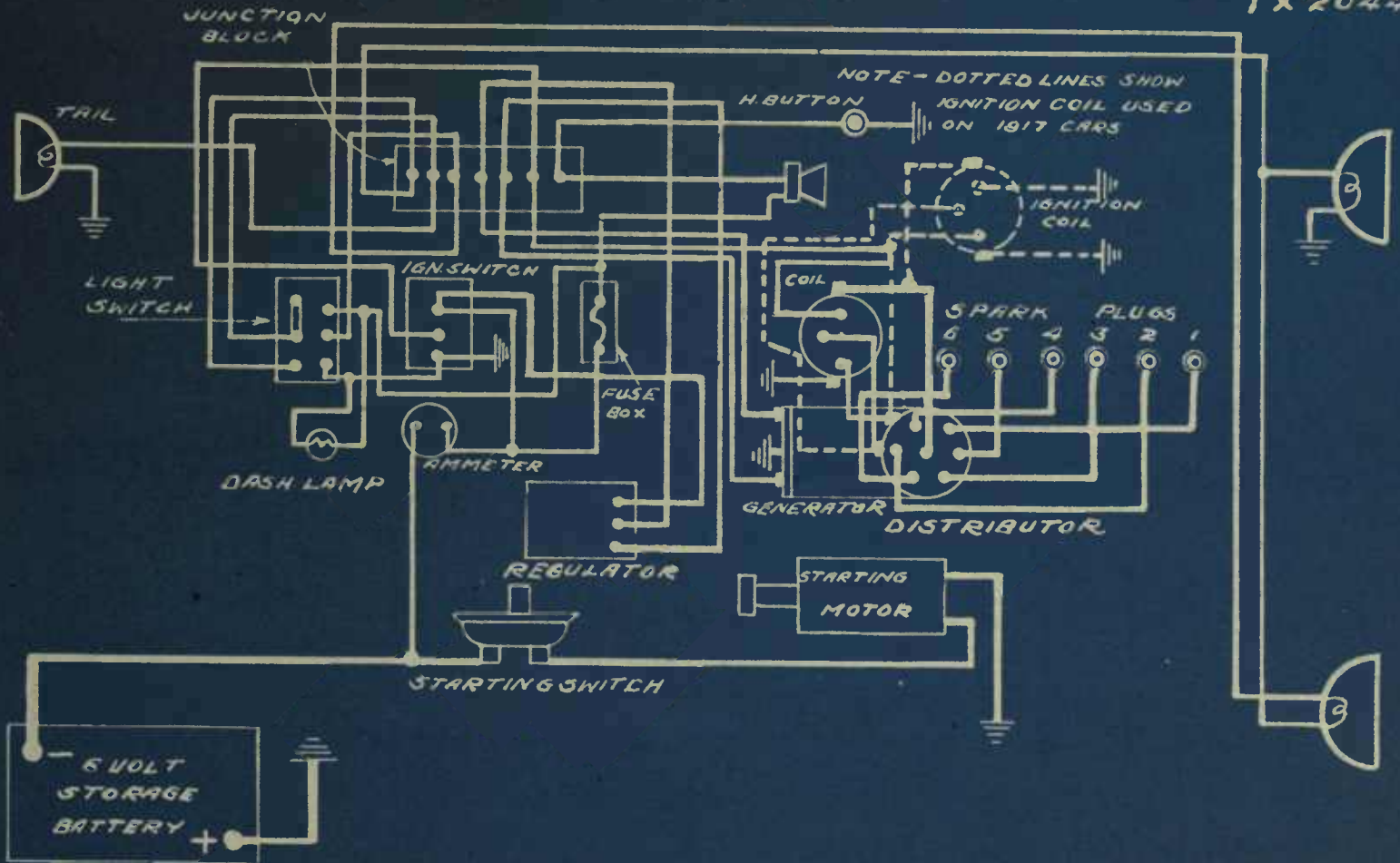


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MITCHELL 1917-1918 C42

WESTINGHOUSE SYSTEM

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TX 2044

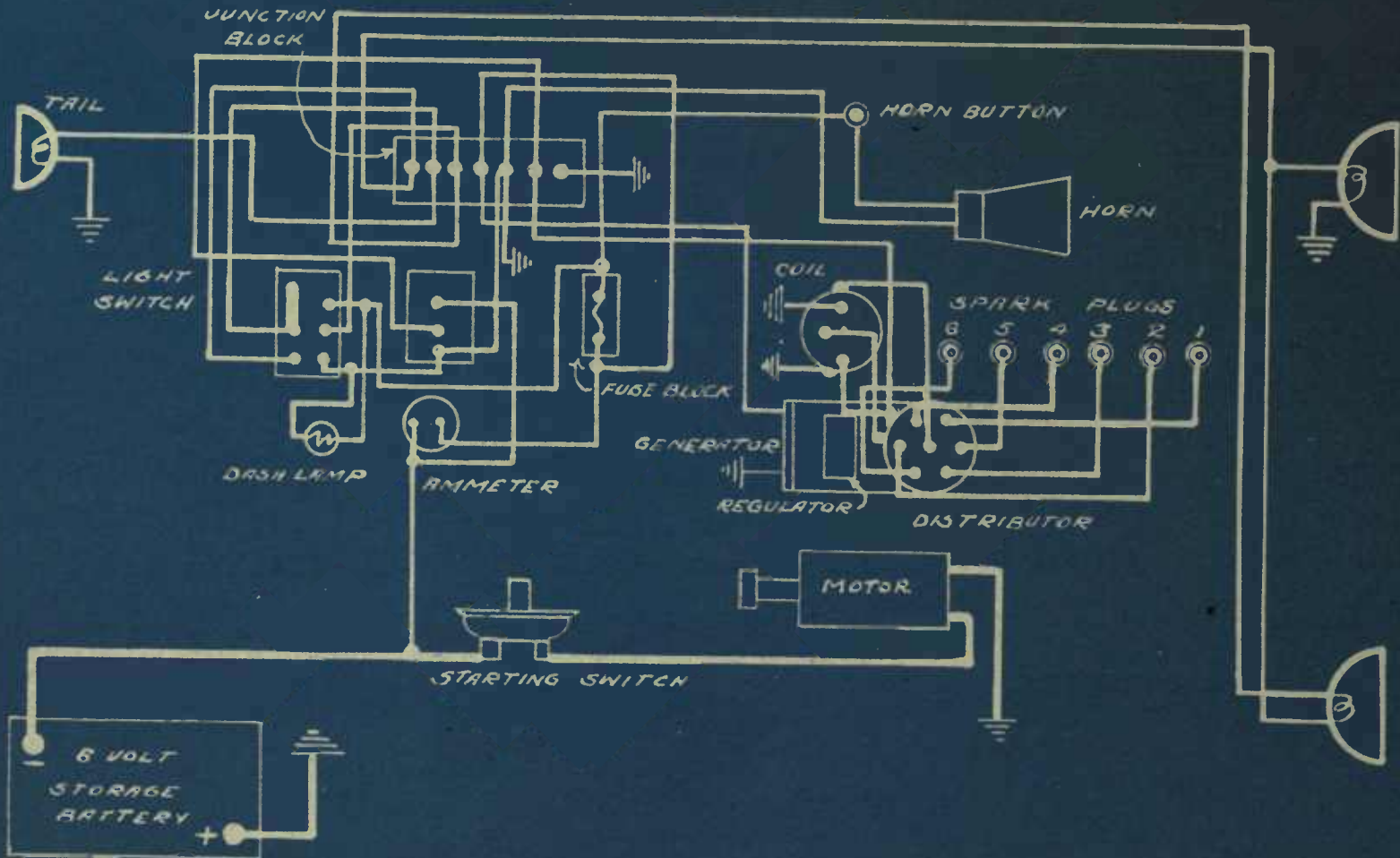


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MITCHELL MODEL D-40
SPLITCORE SYSTEM. CONN. 16N.

1917-18-19

FROM MEMO B.R. T.X. 2066

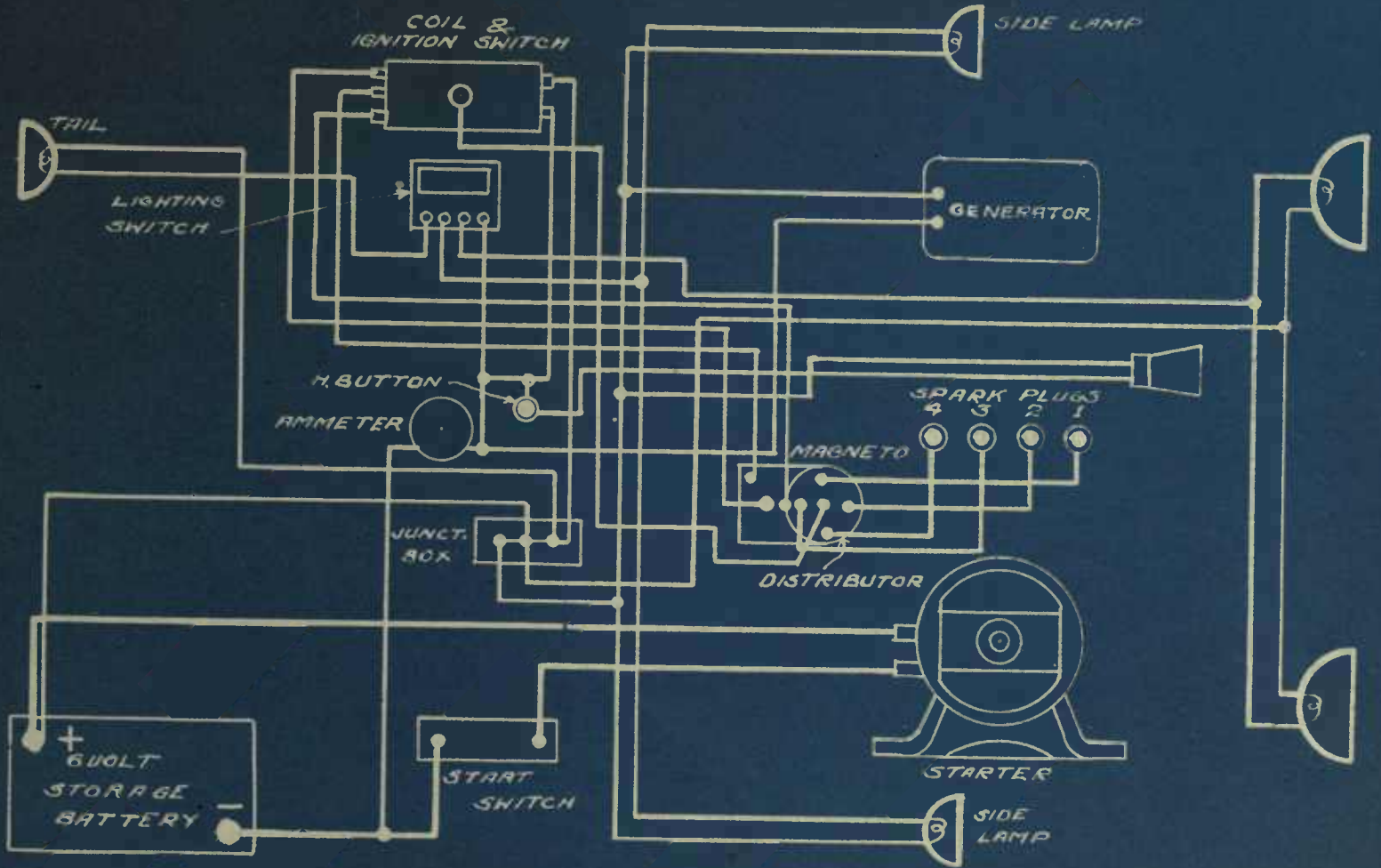


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MITCHELL-LEWIS 1914

REMY SYSTEM

FROM REMY RL. 52.



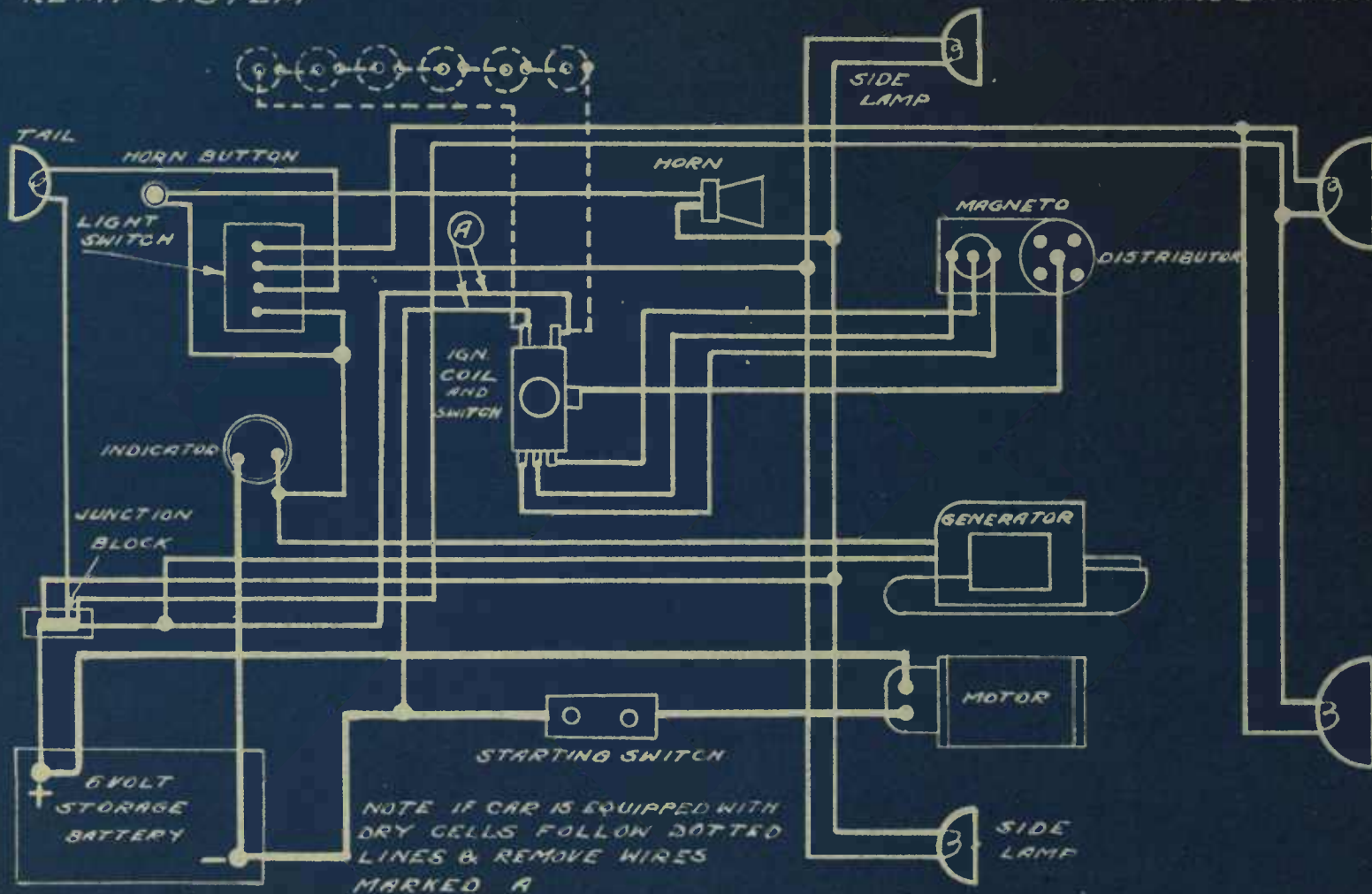
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MITCHEL-LEWIS 1914

REMY SYSTEM

A-40-50-70

FROM MFRS BR T-X-18 & 33

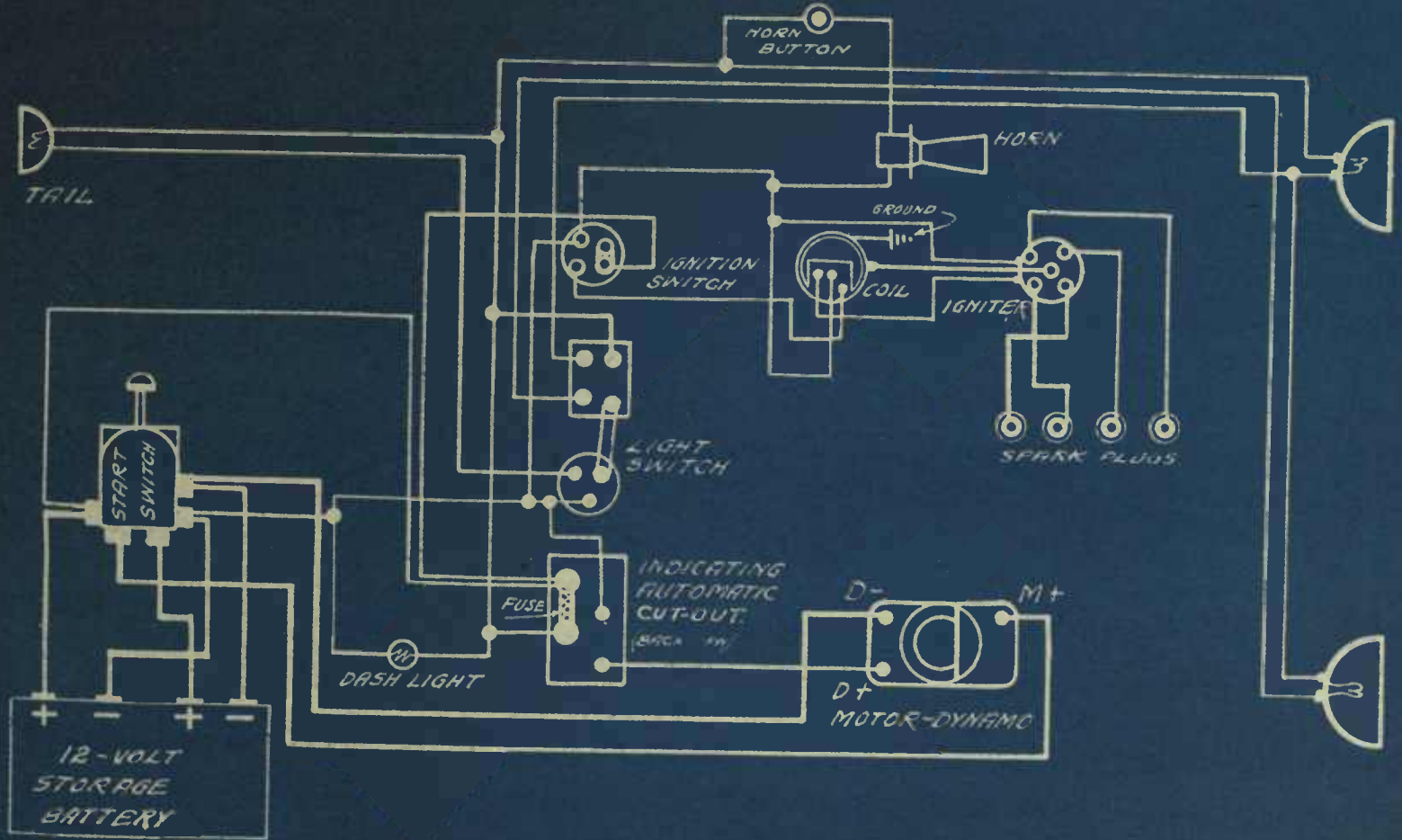


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SPLITDORF-APELCO SYSTEM

1915 "4"
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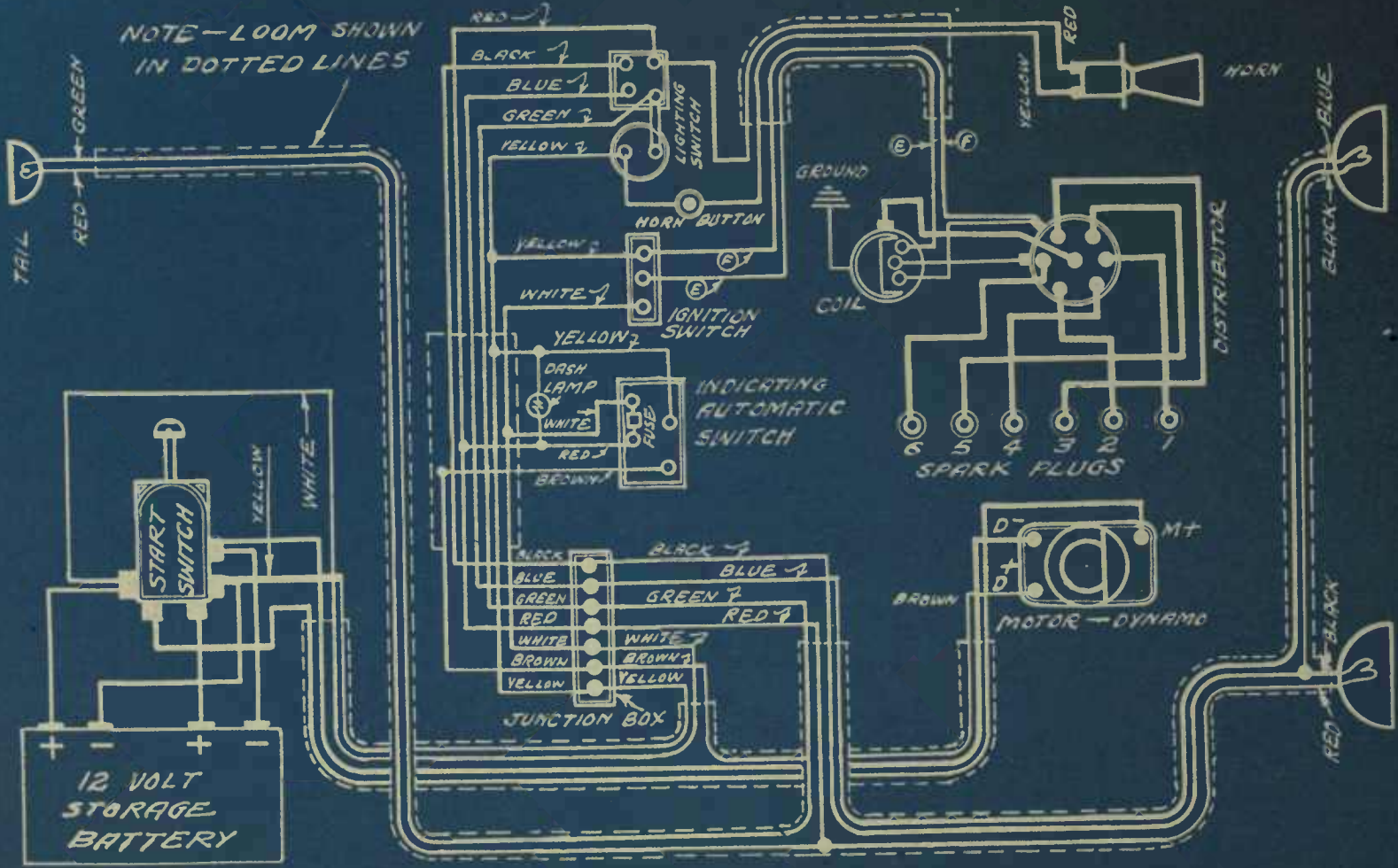
MITCHELL-LEWIS 1916

SPLITDORF-APELCO SYSTEM

CONN. IGN.

FROM SPLIT-APELCO MANUAL

NOTE—LOOM SHOWN
IN DOTTED LINES



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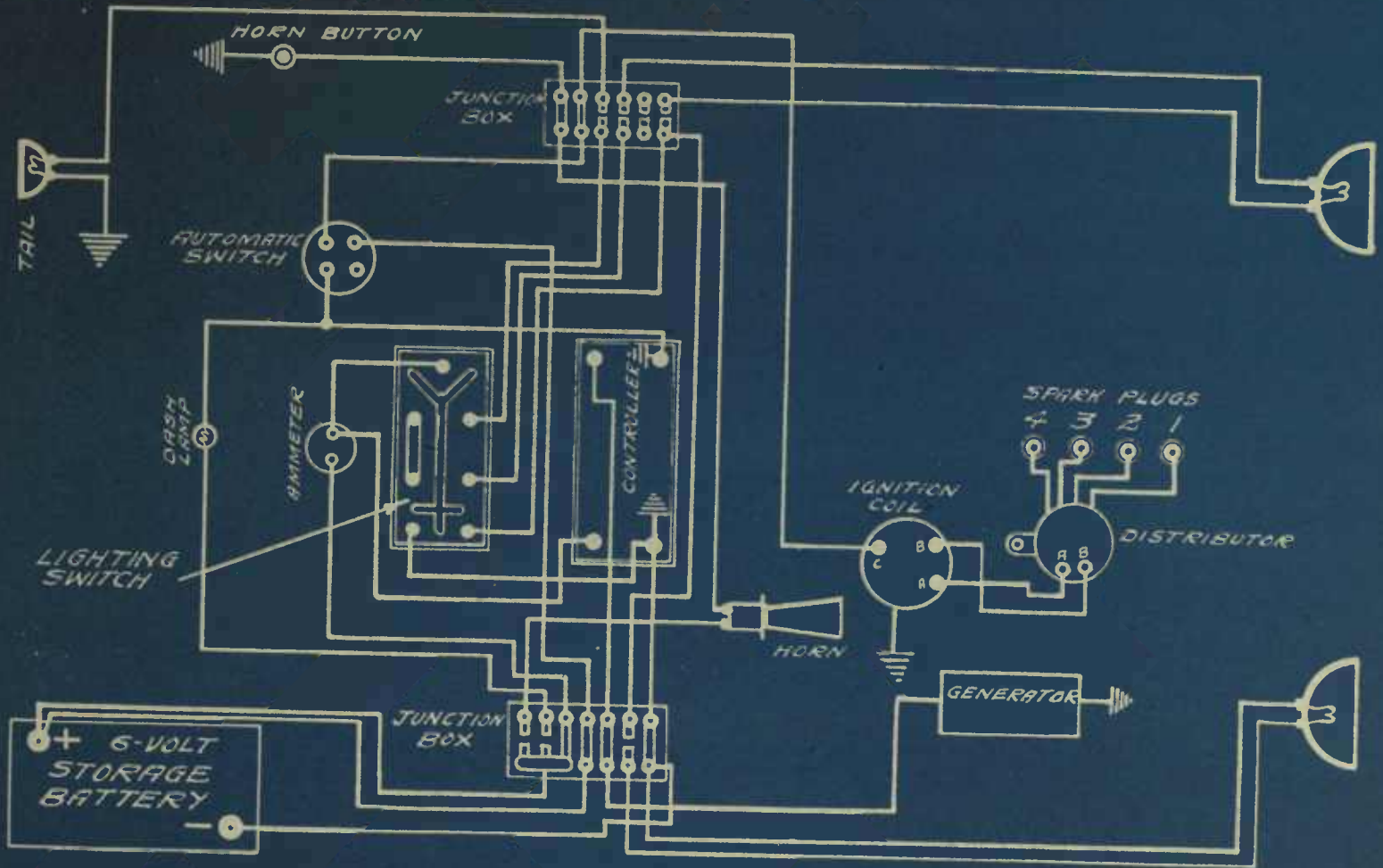
MOLINE-KNIGHT
WARD-LEONARD SYSTEM

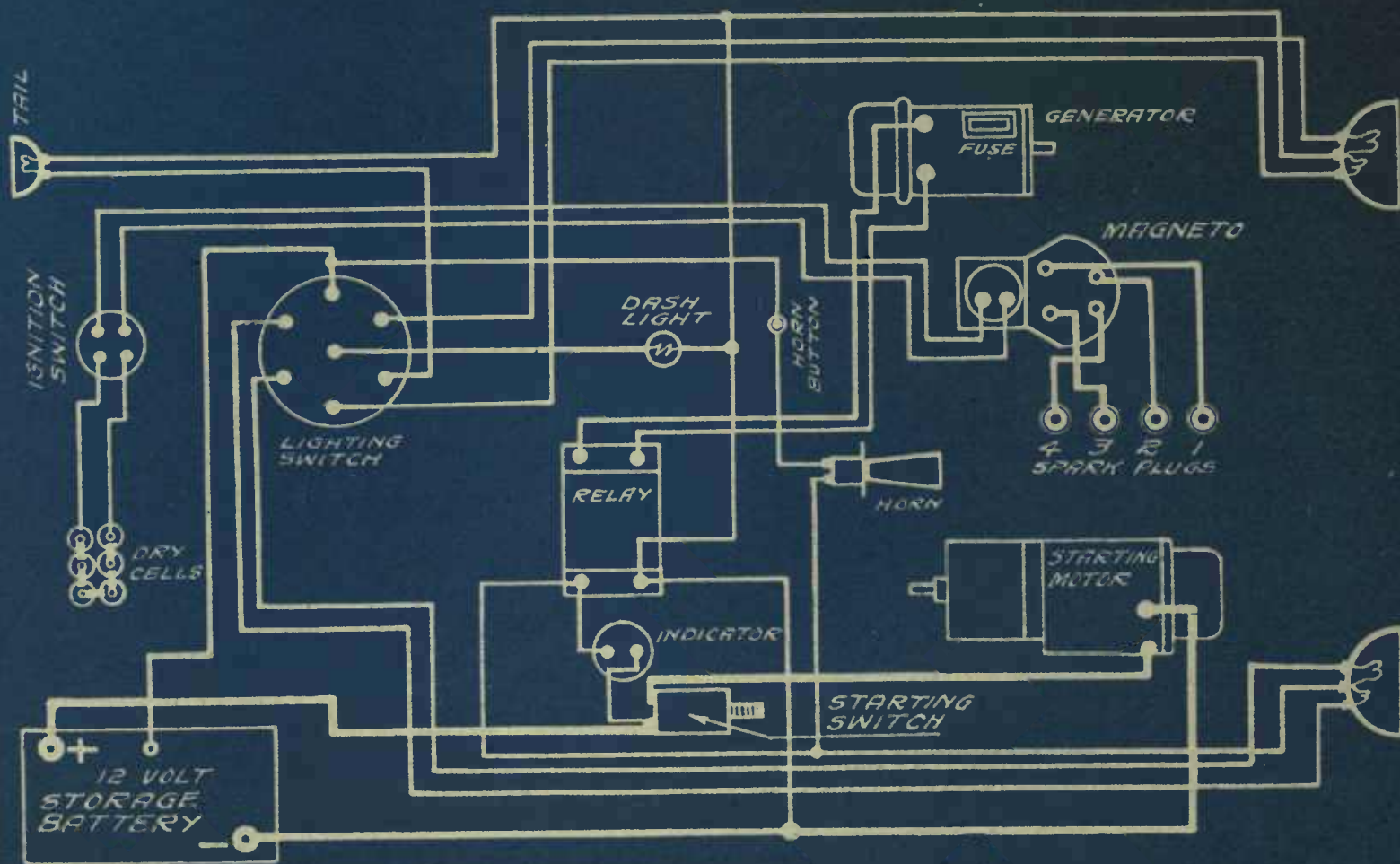
1912-13-14

M-K 40

FROM MFES BP C10-5

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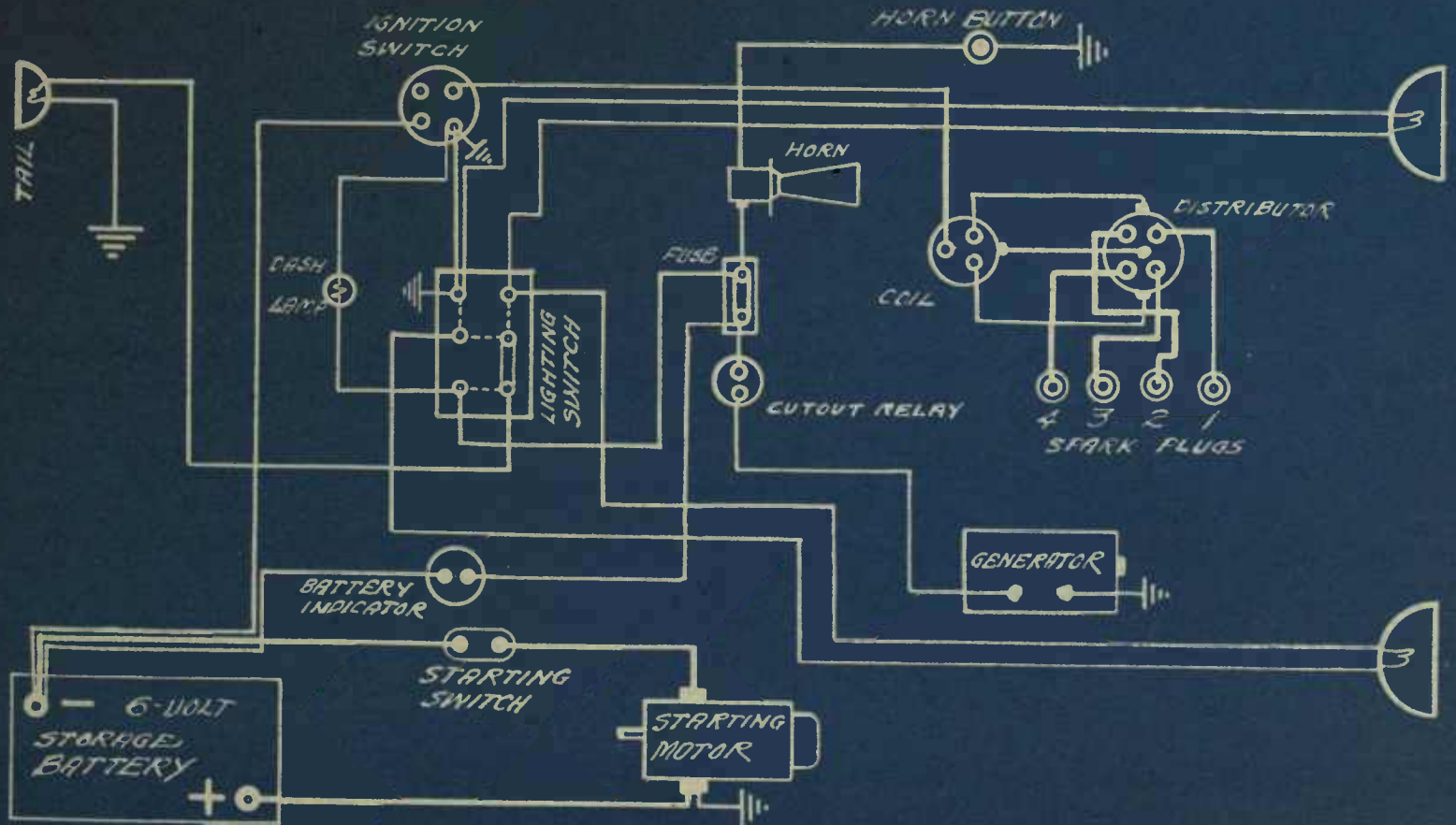


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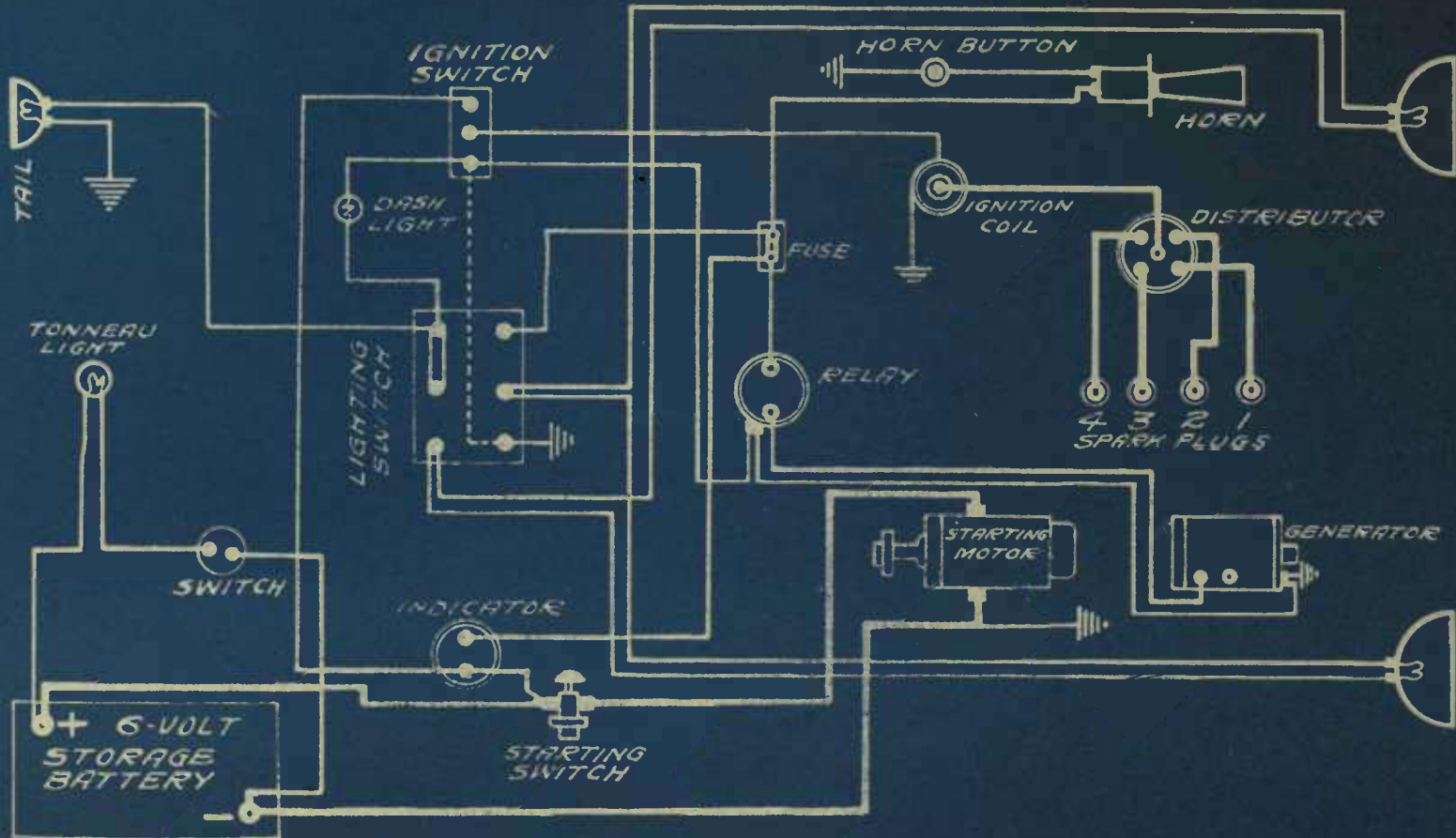
MOLINE-KNIGHT MK-40-50 1916-17-18

WAGNER SYSTEM

FROM MFRS. BR C10-85



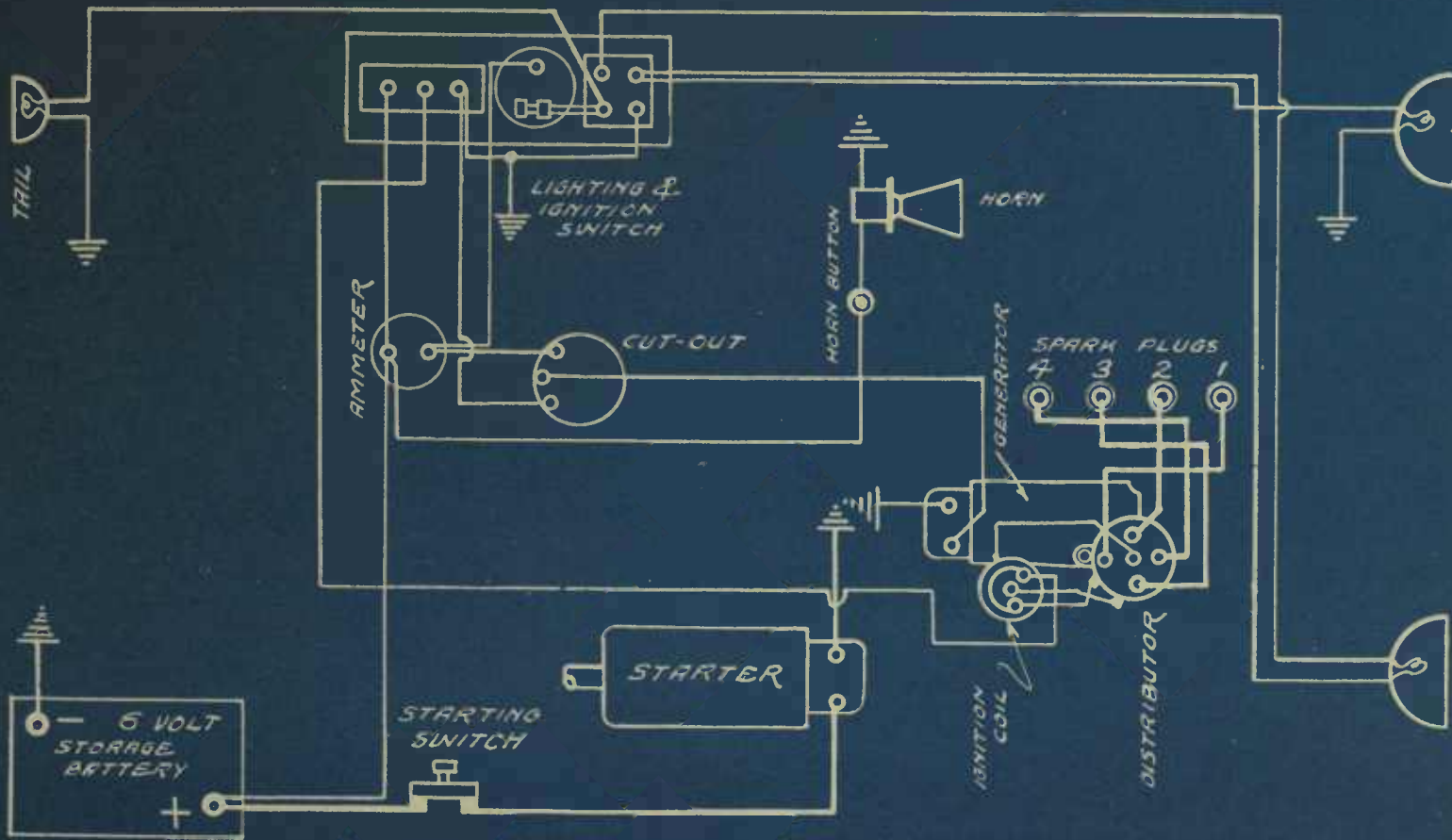
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MONROE 1915 M-2
AUTOLITE SYSTEM CONN. IGN.

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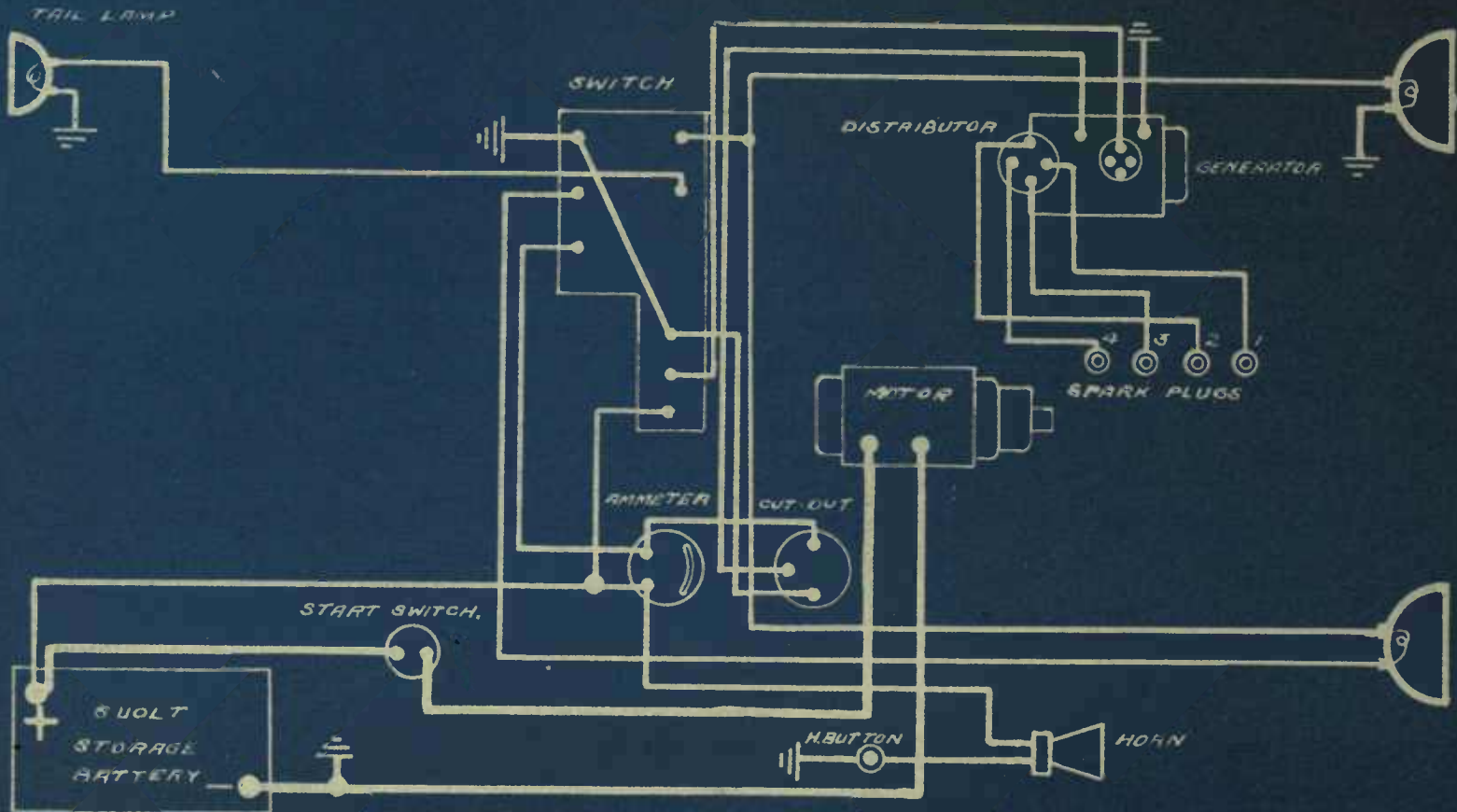


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MONROE MODEL 3 1917

AUTOLITE SYSTEM

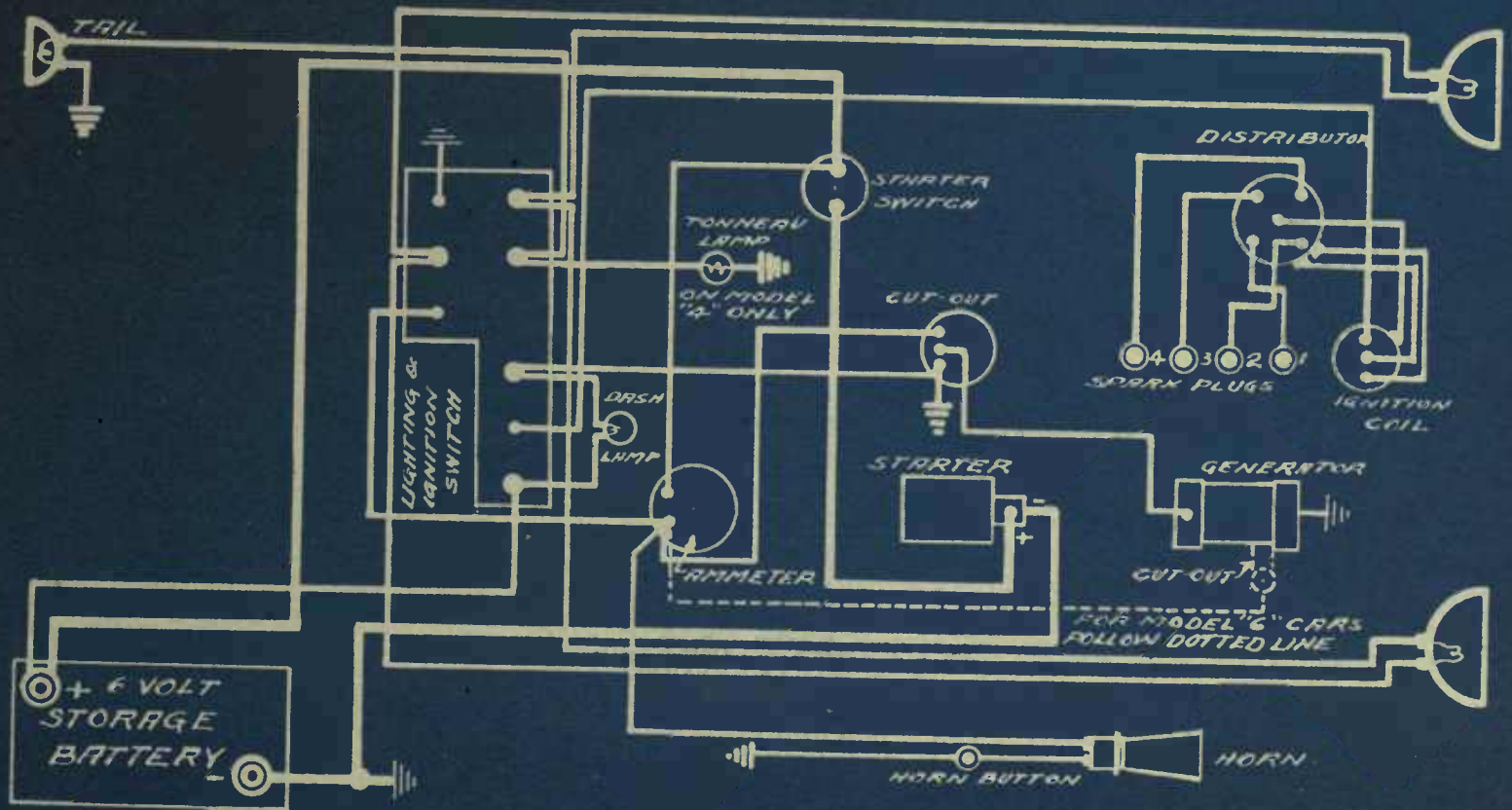
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MONROE 1917-18 MODELS 4-5 & 6
 AUTOLITE SYSTEM CONN. IGN.

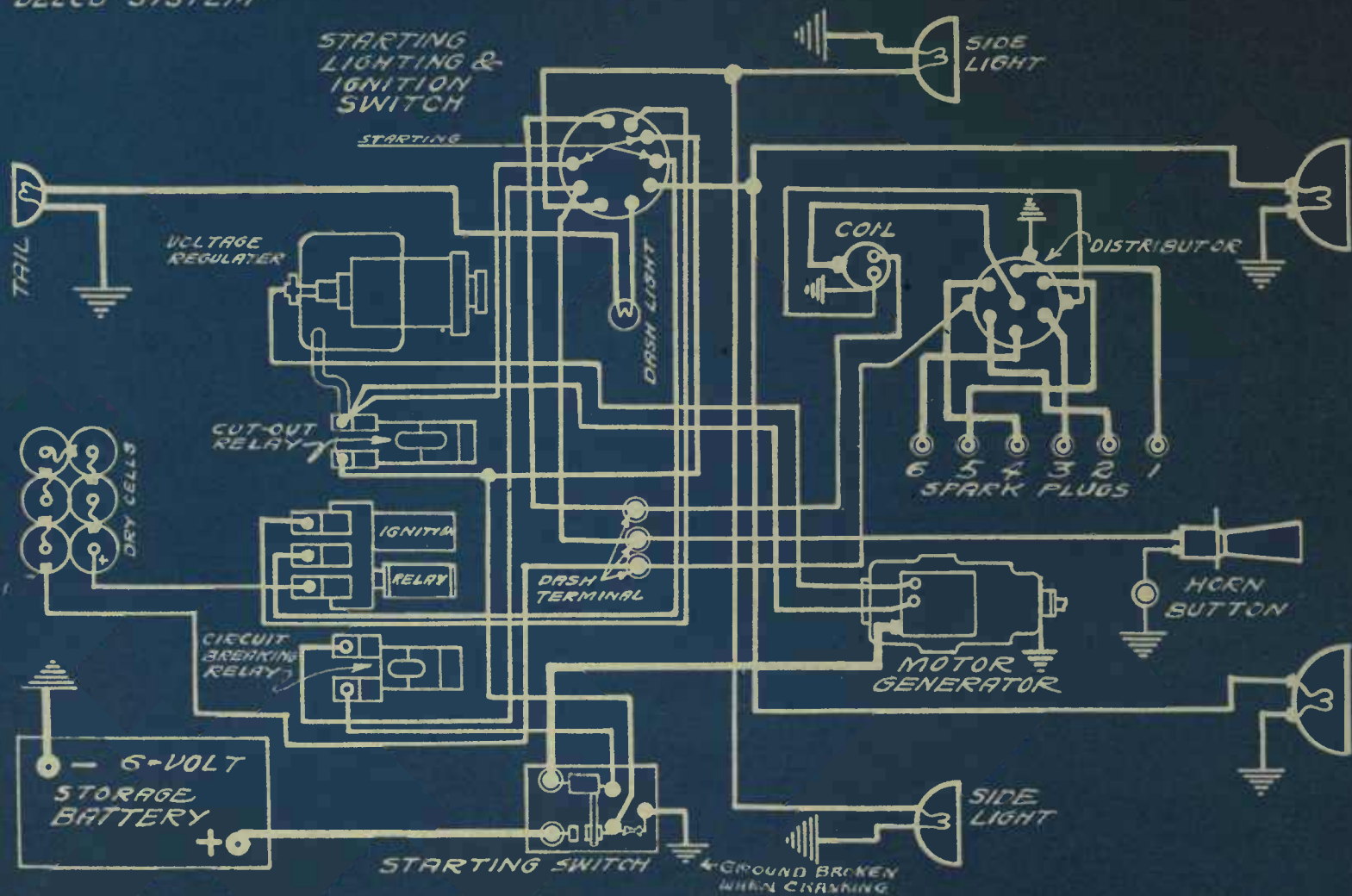
FROM FACTORY B. P. 956 & 1801



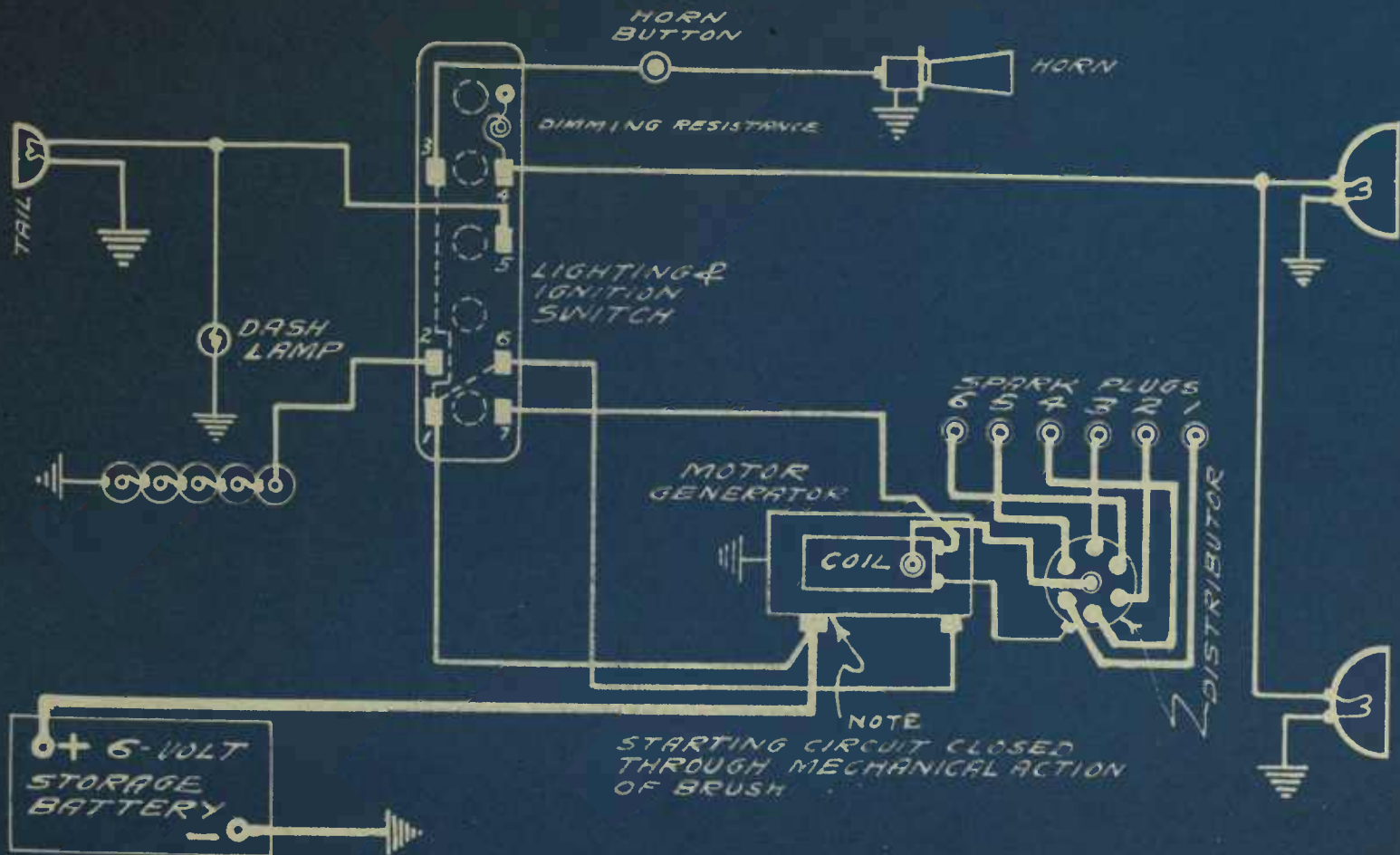
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MOON 1914 "42" "6-50"
DELCO SYSTEM

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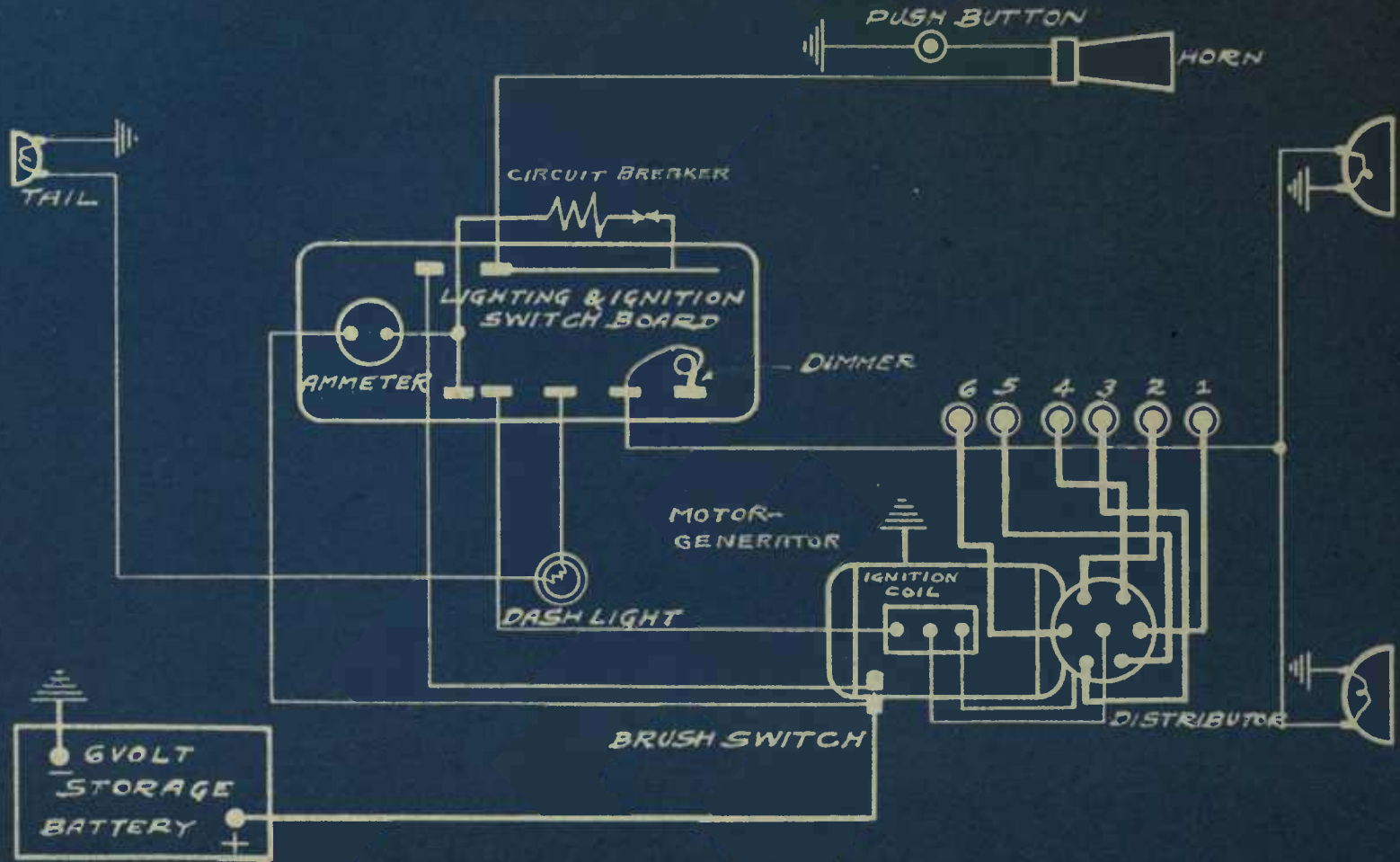


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MOON 1916
DELCO SYSTEM

6-30+6-40
CONN. IGN.

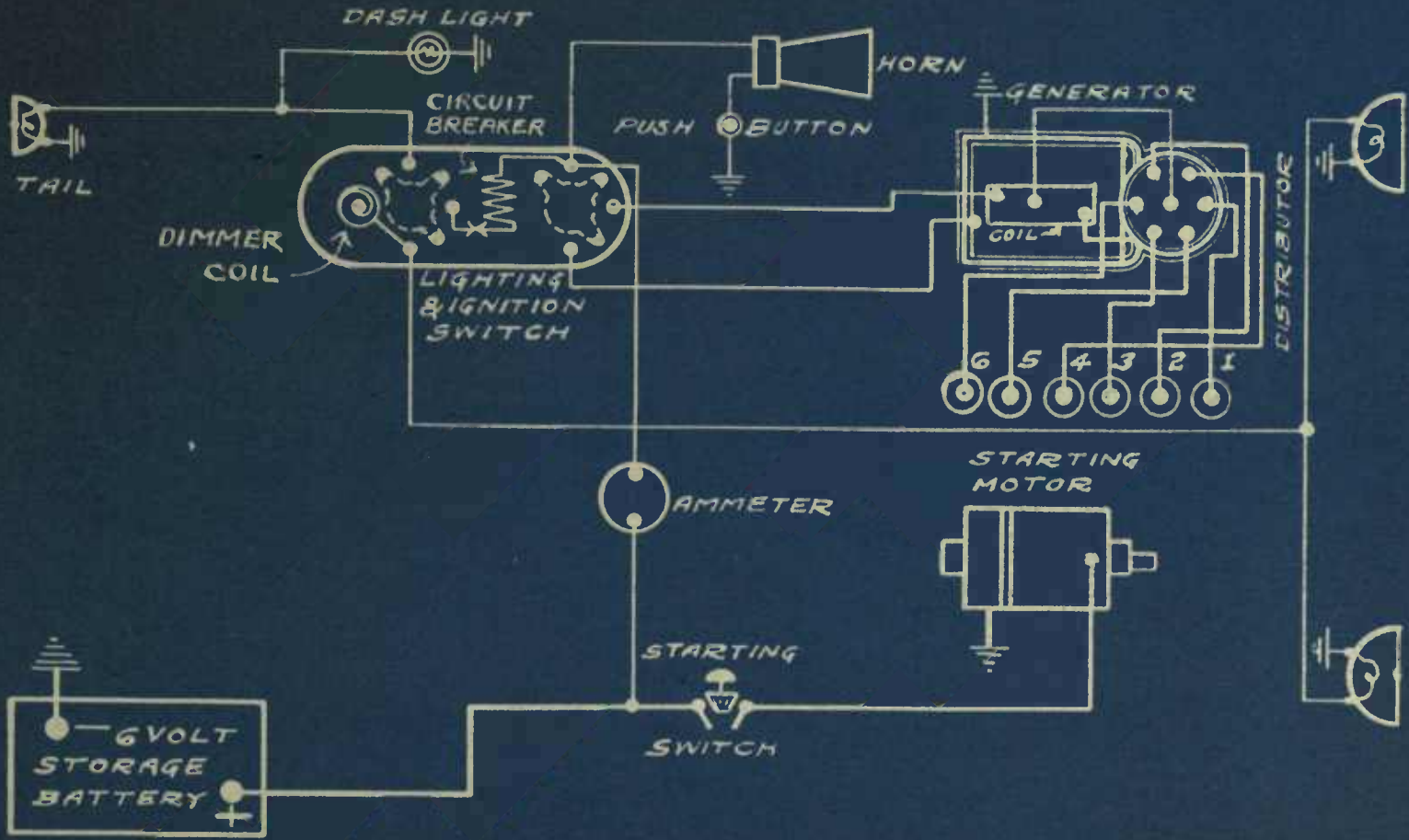
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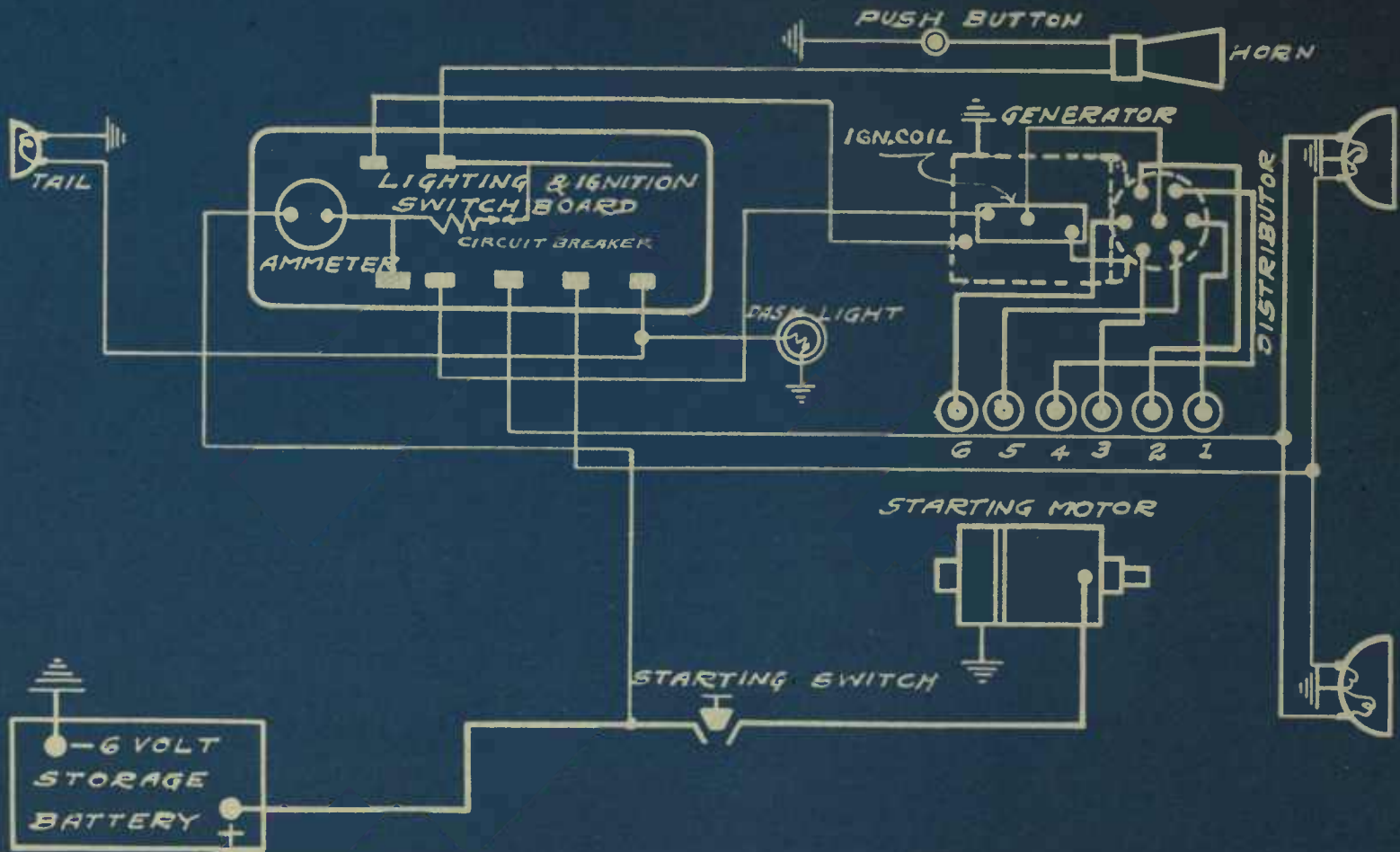
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MOON 1917-18 6-43
DELCO SYSTEM

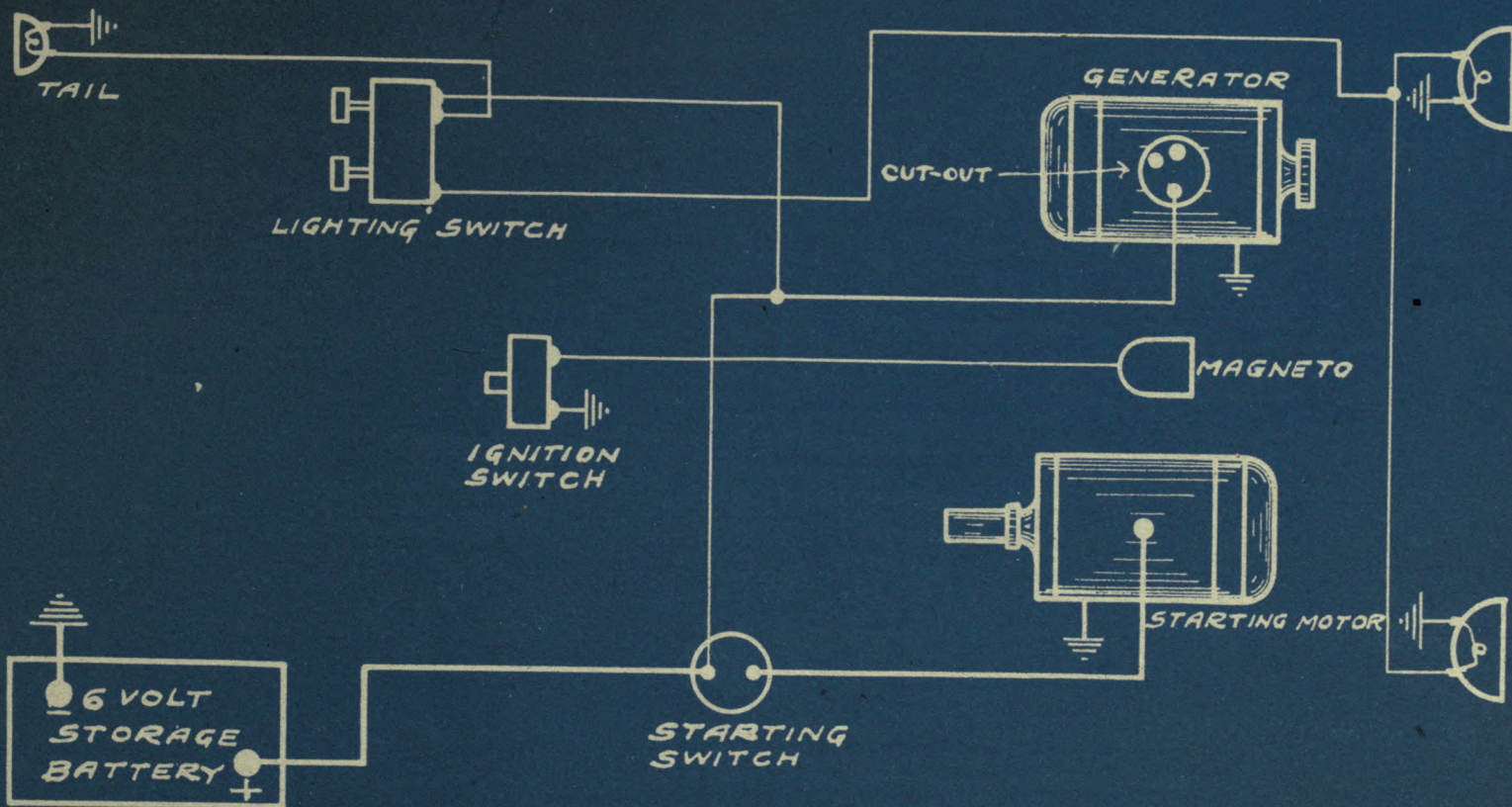
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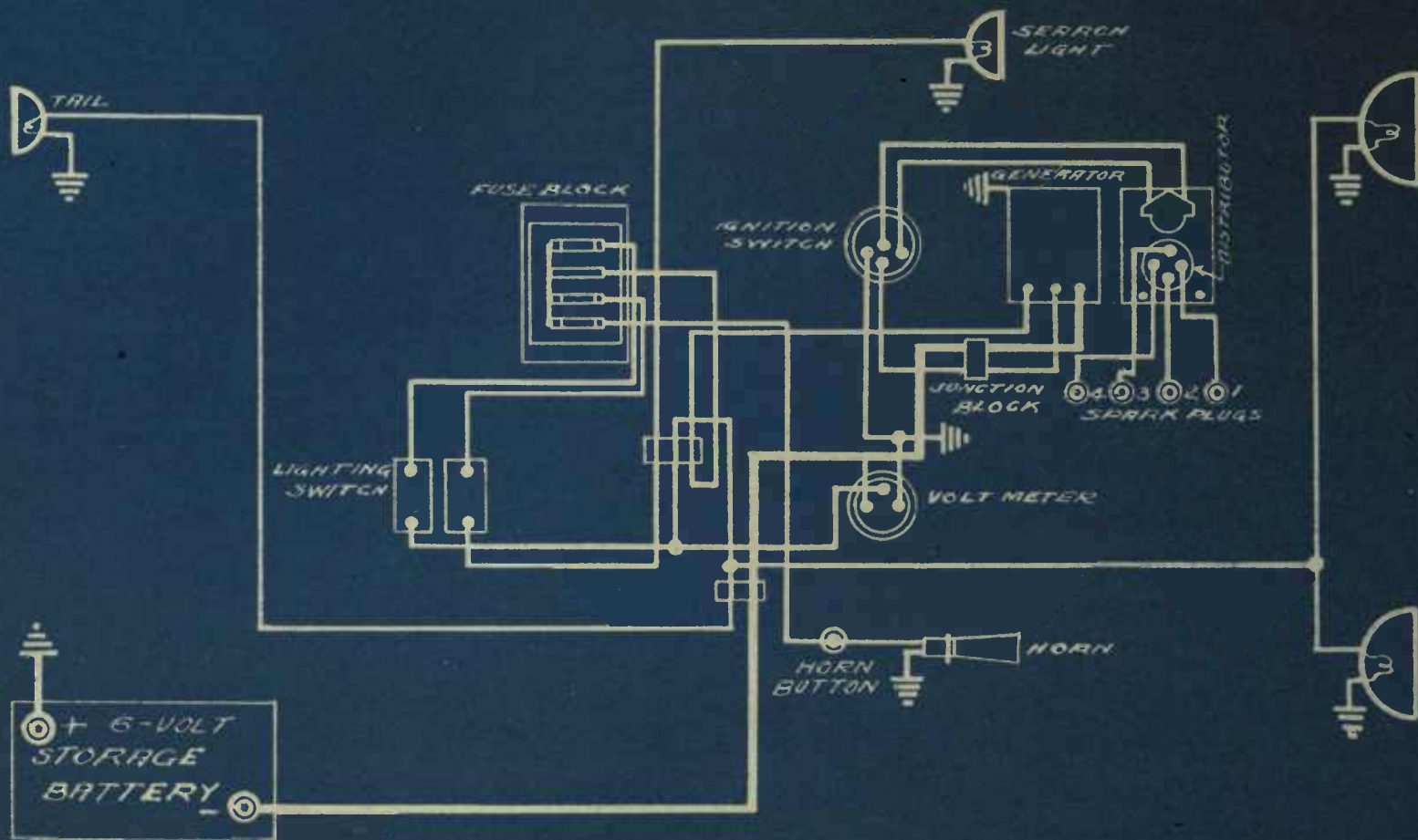
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*MORELAND TRUCK 1½-2½ & 3 TON
WESTINGHOUSE SYSTEM*

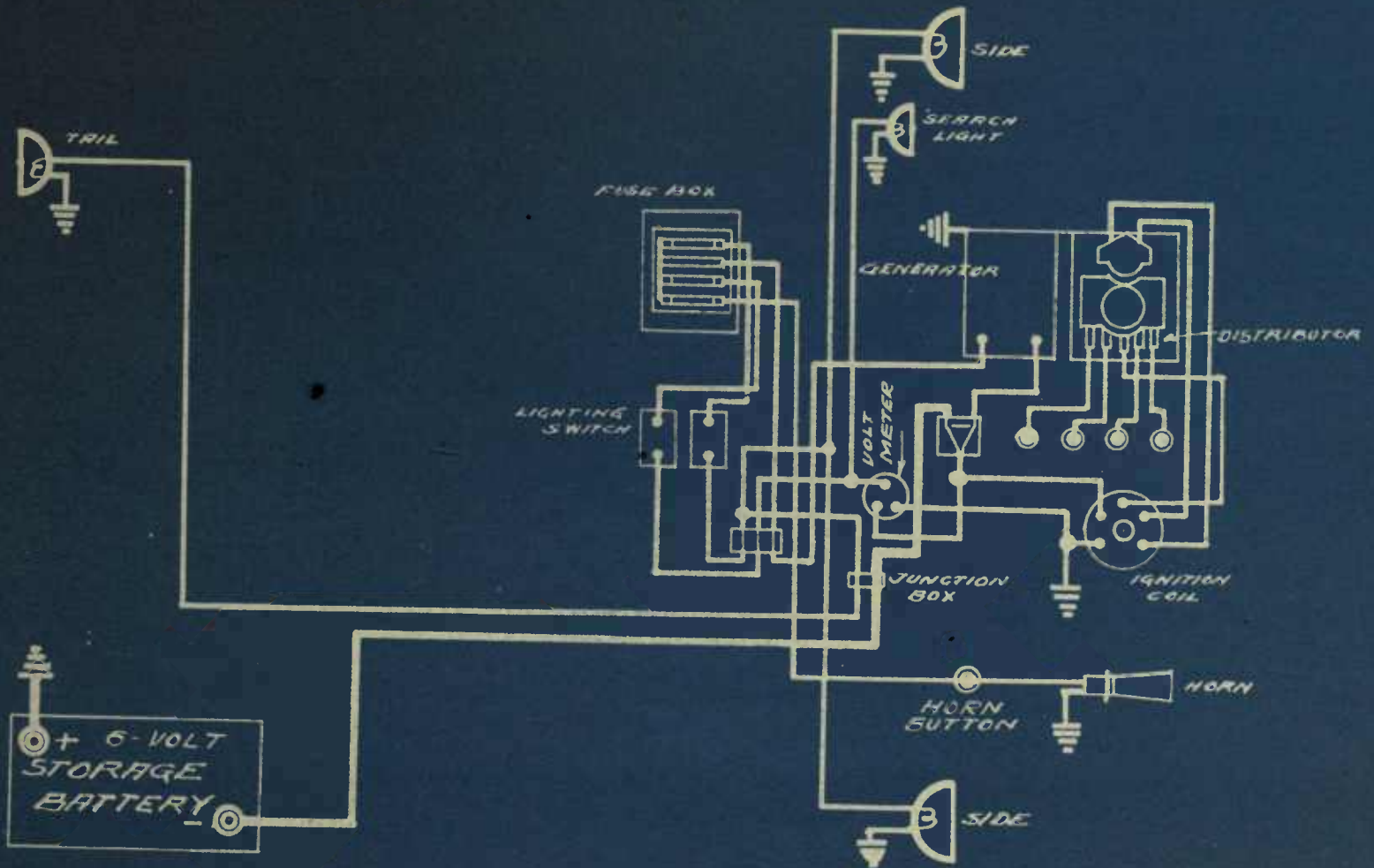
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MORELAND TRUCK MODELS 2X & 5X WESTINGHOUSE SYSTEM

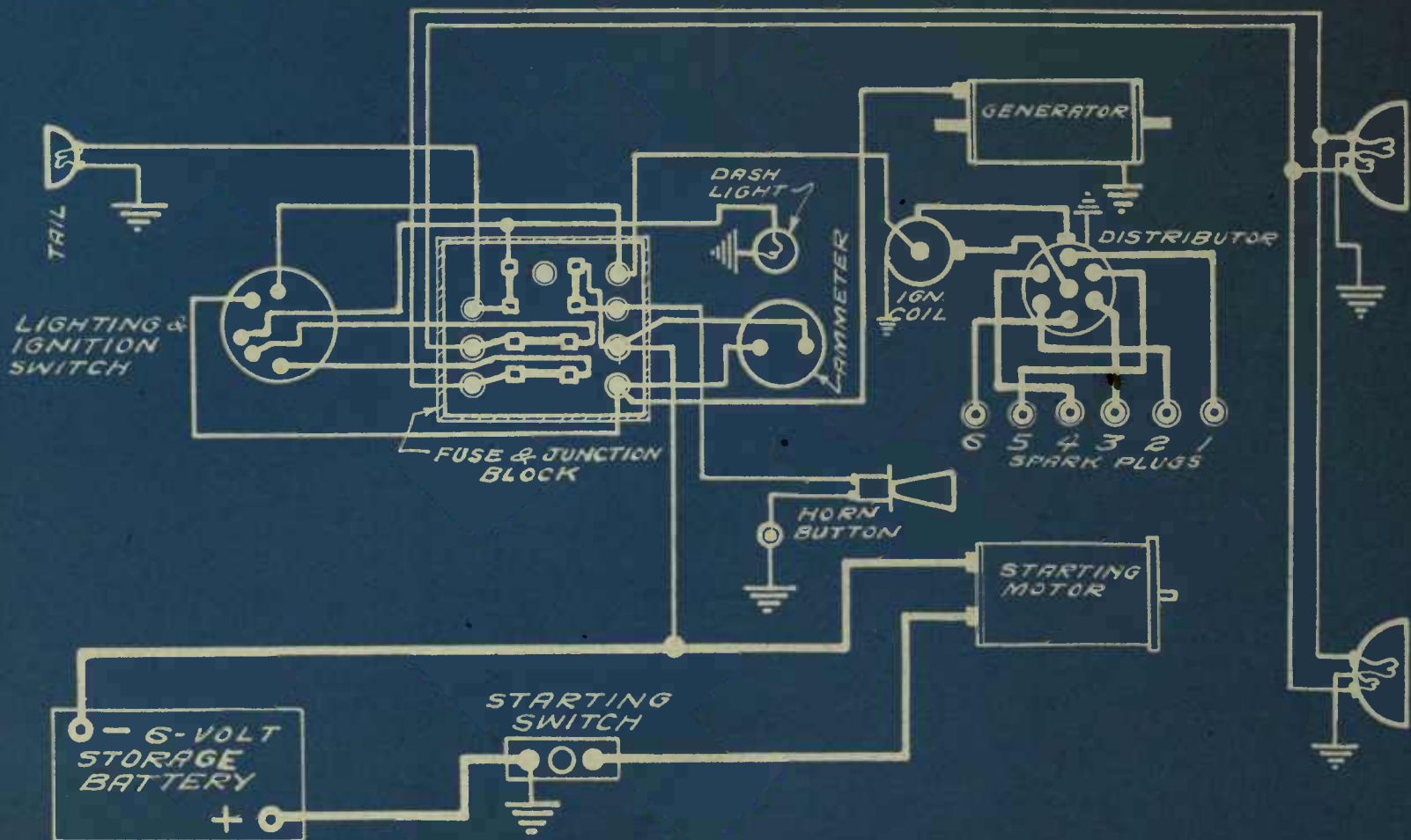
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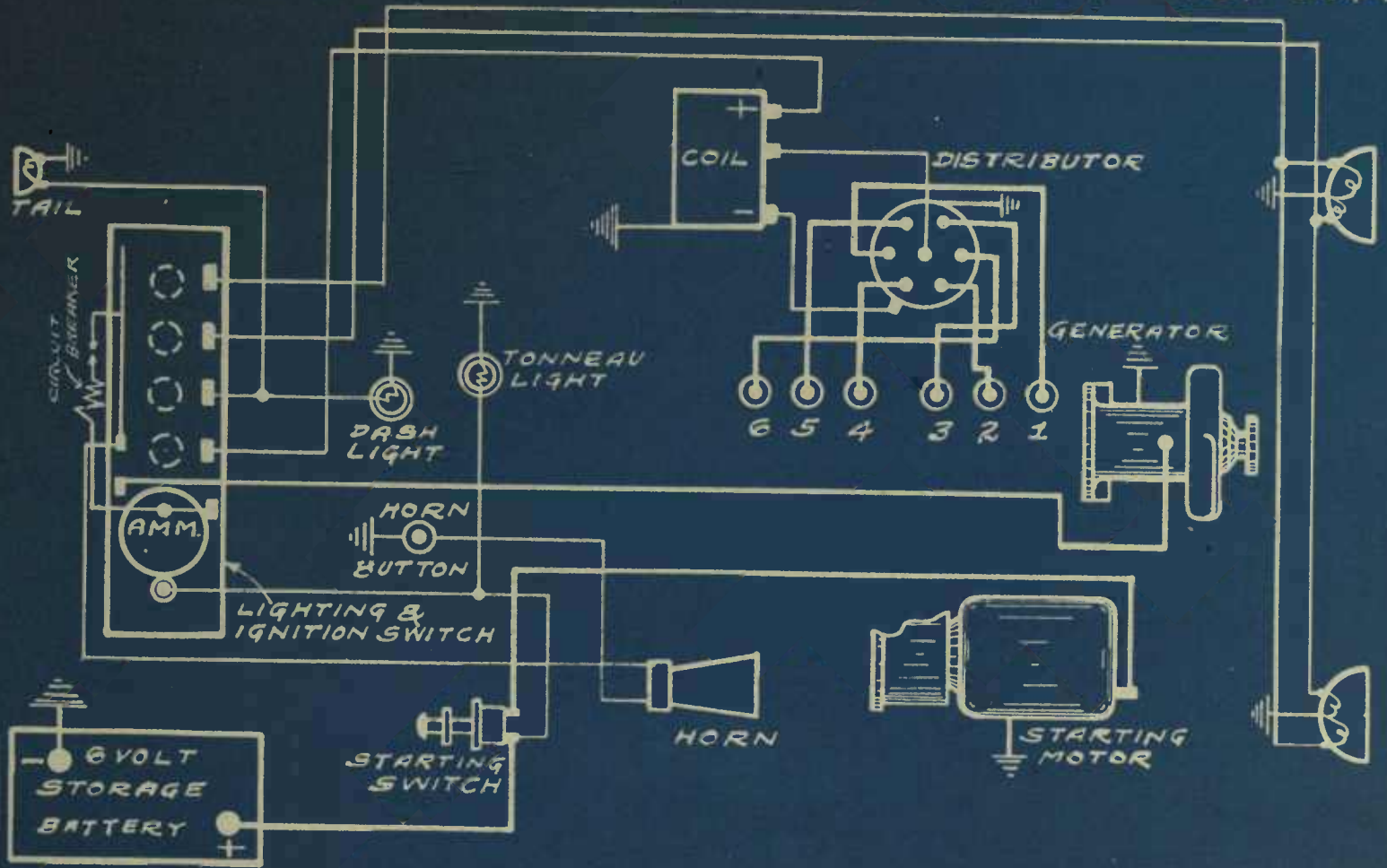
NASH 1917 "671"
BIJUR SYSTEM
DELCO IGNITION

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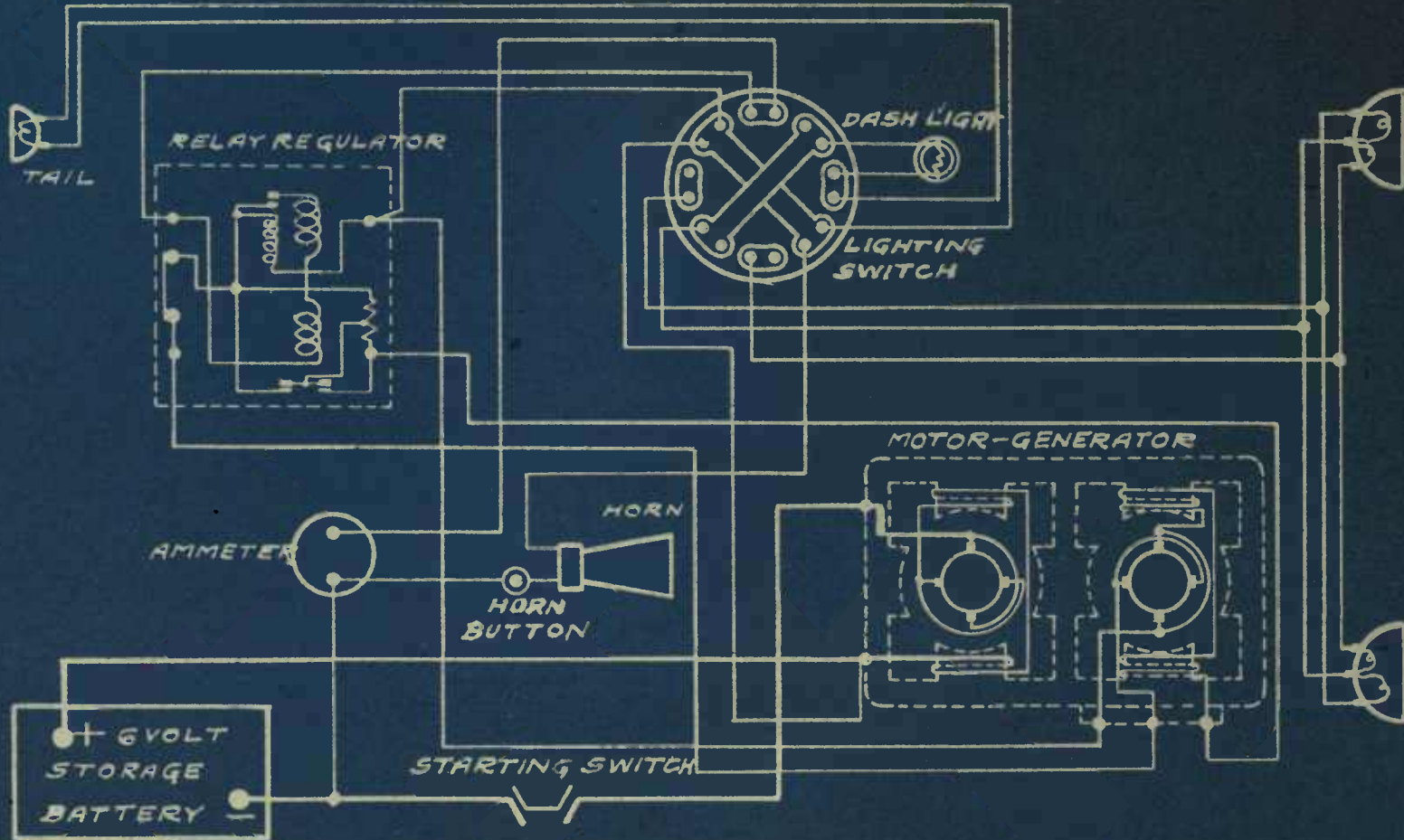
NASH 1917-18 "681-2-3-4" EARLY 1919
 DELCO SYSTEM
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NATIONAL 1914 "SIX" REMY SYSTEM

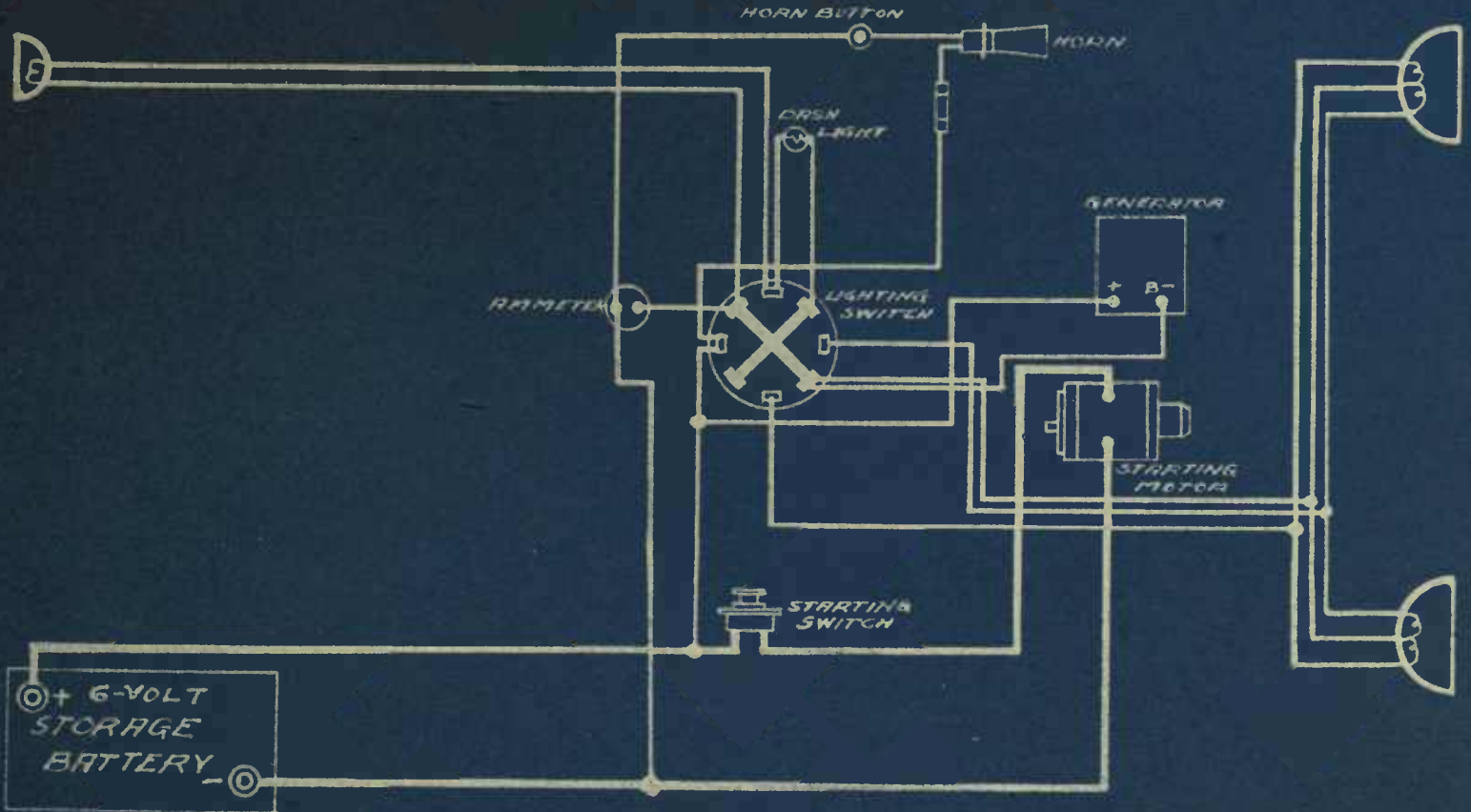
FROM REMY MANUAL



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NATIONAL 1915
WESTINGHOUSE SYSTEM

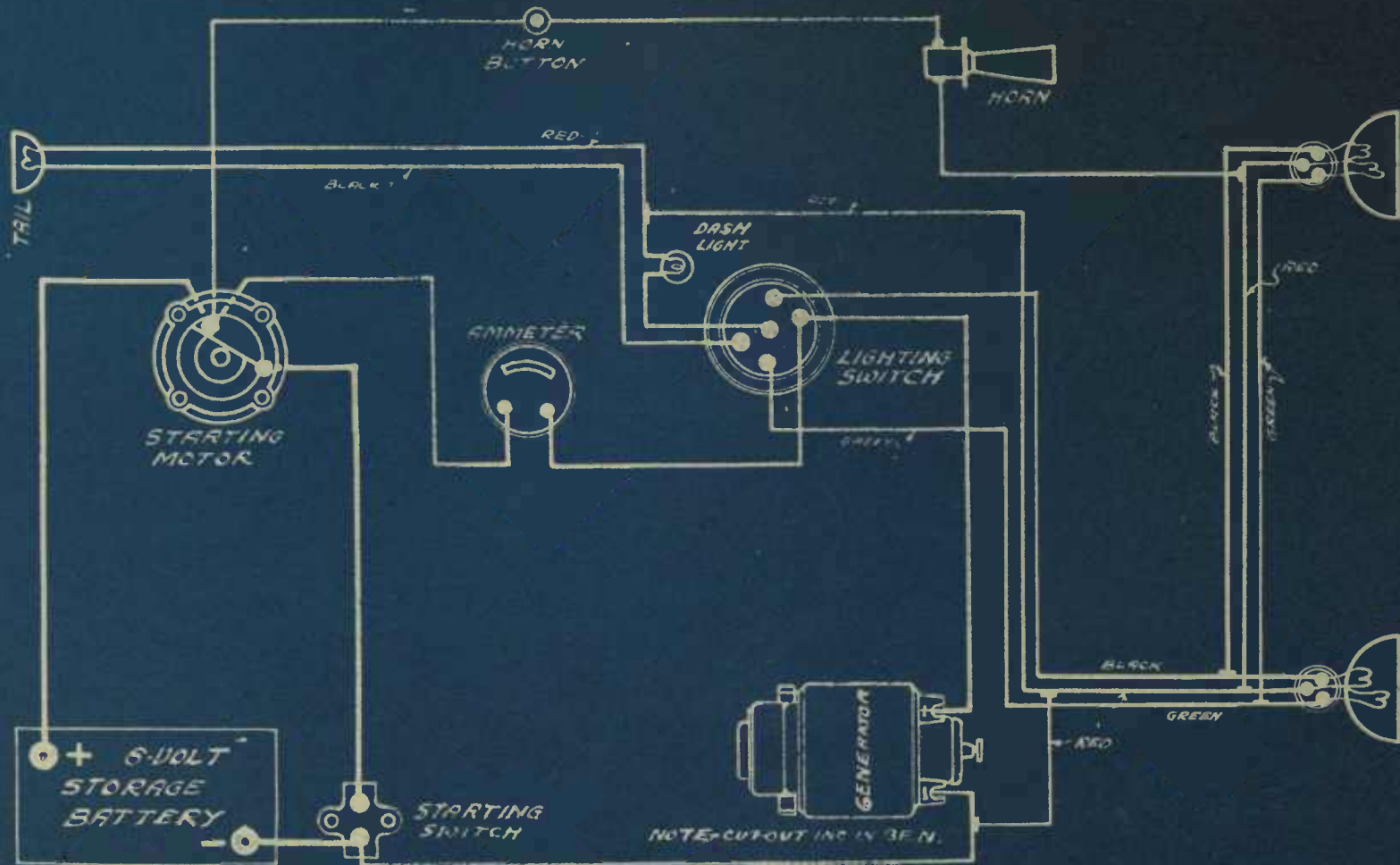
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NATIONAL 1916 "HIGHWAY SIX" WESTINGHOUSE SYSTEM (SERIES-AC)

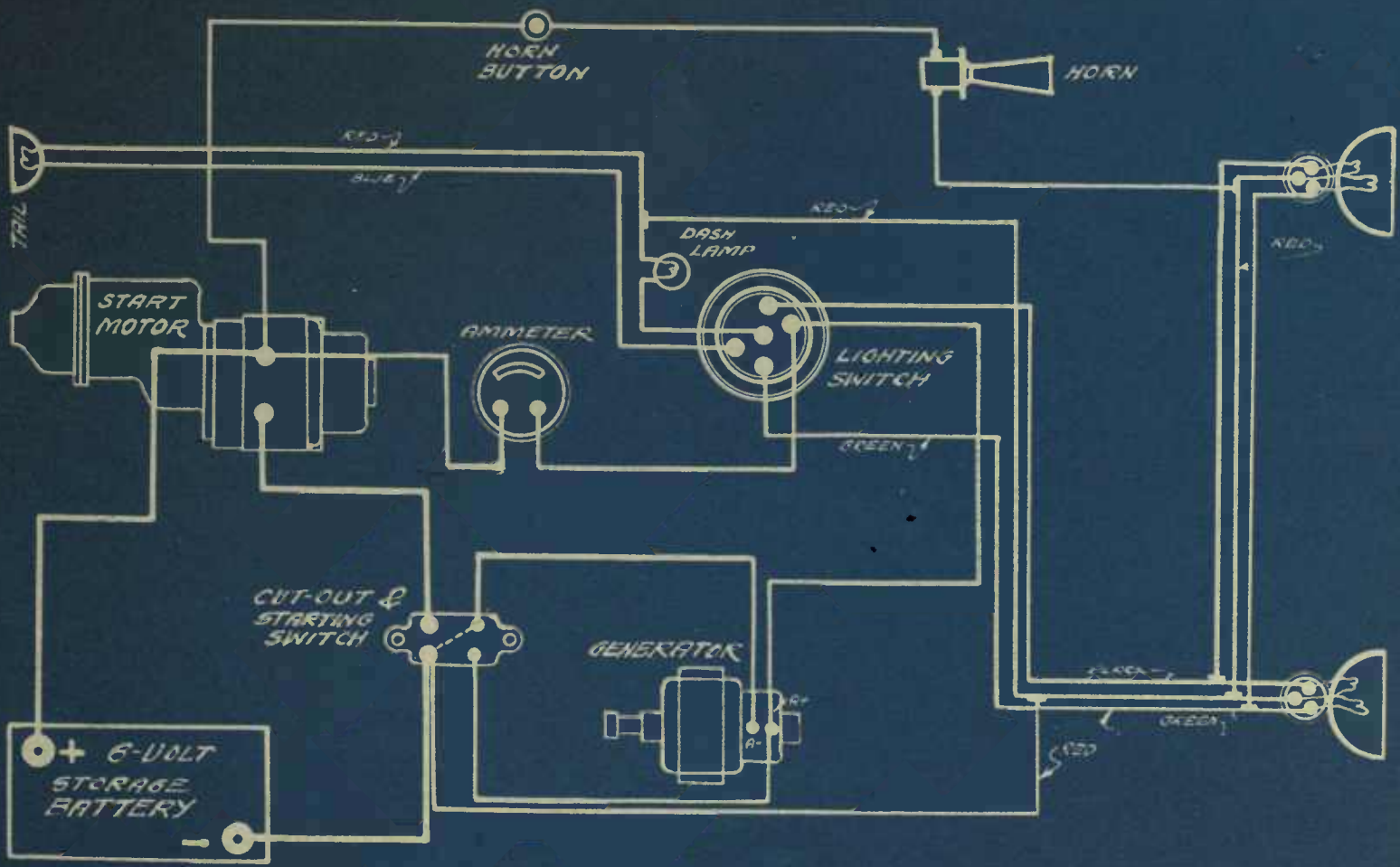
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NATIONAL 1916 "HIGHWAY TWELVE" WESTINGHOUSE SYSTEM

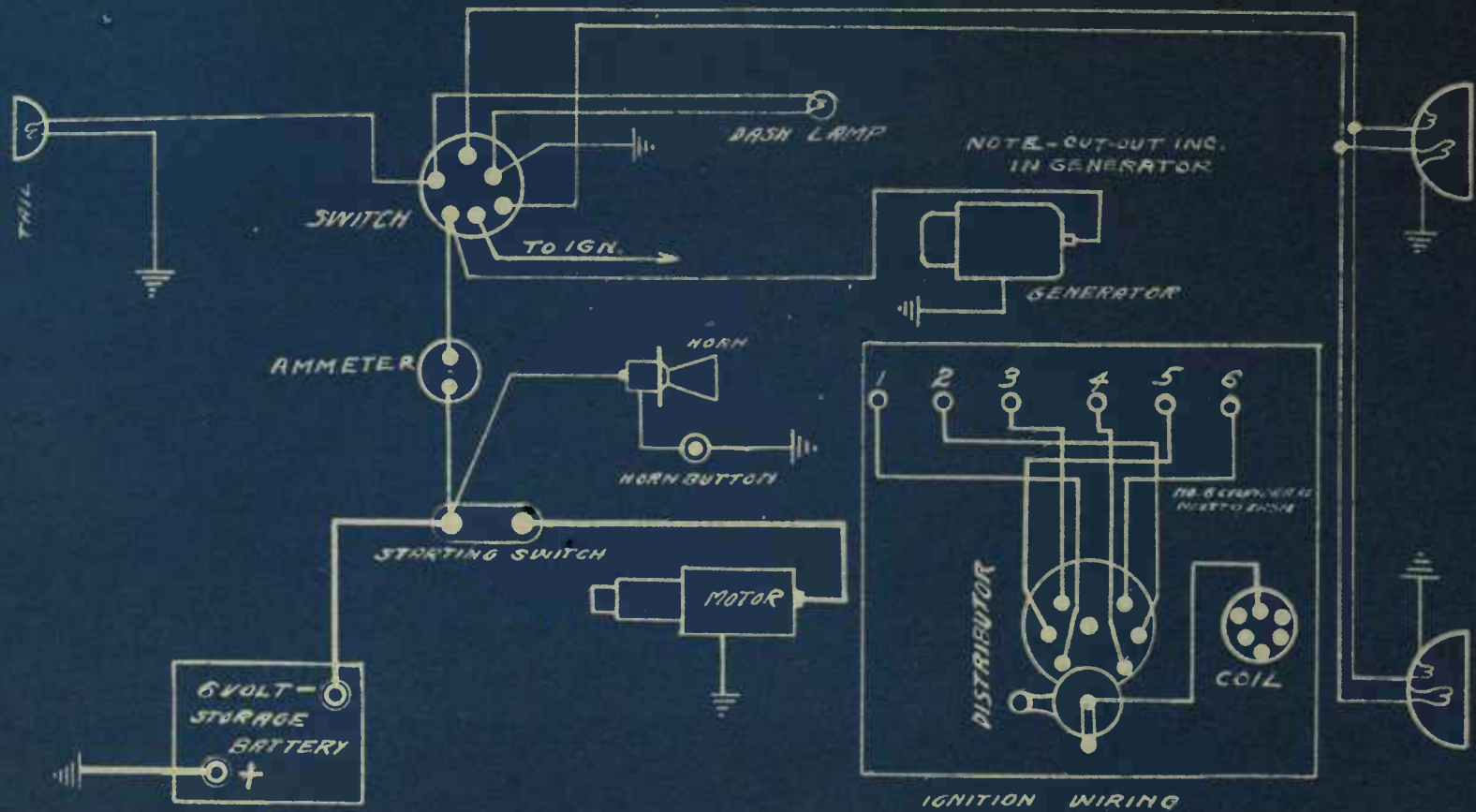
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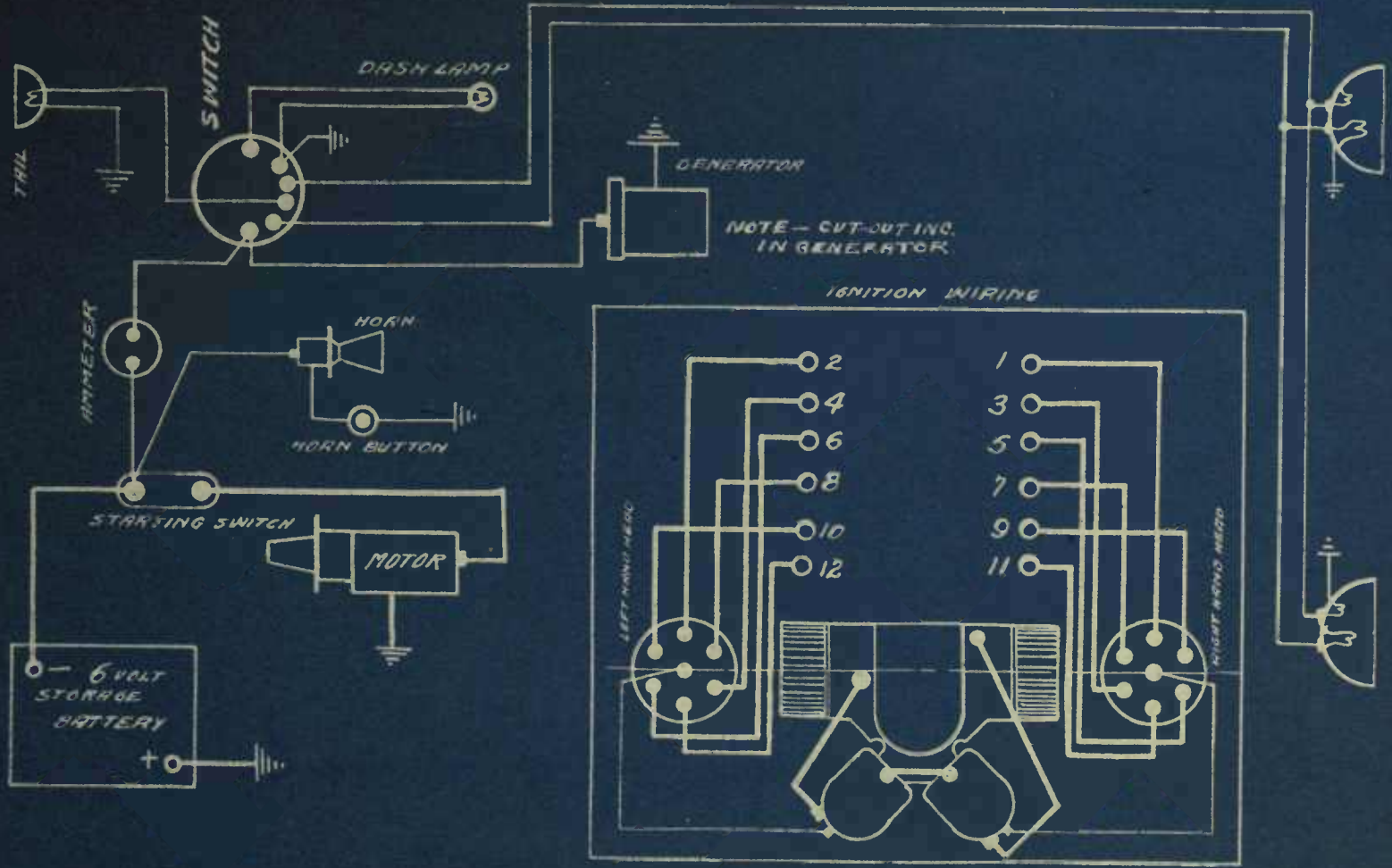
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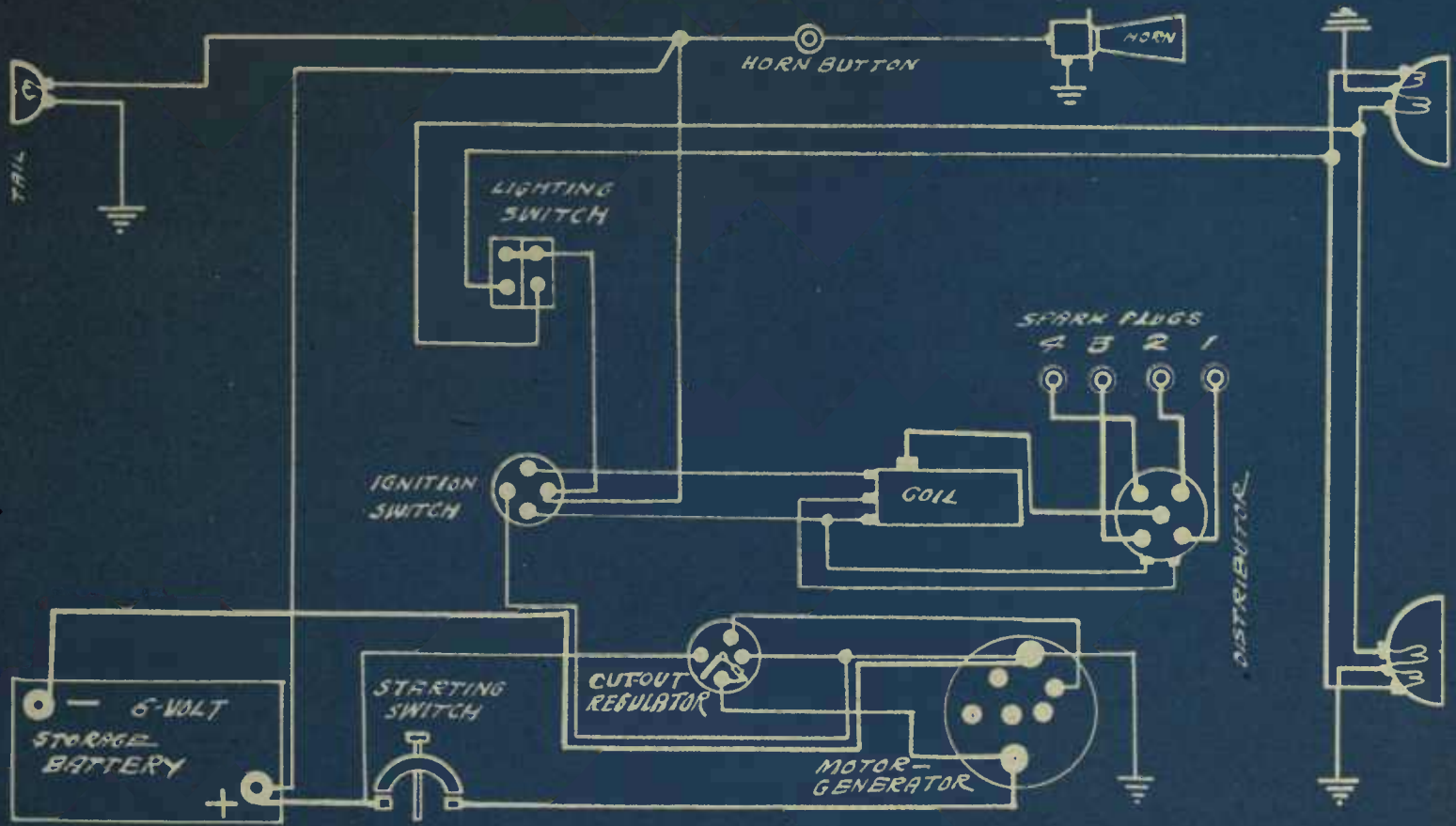
BITUR SYSTEM

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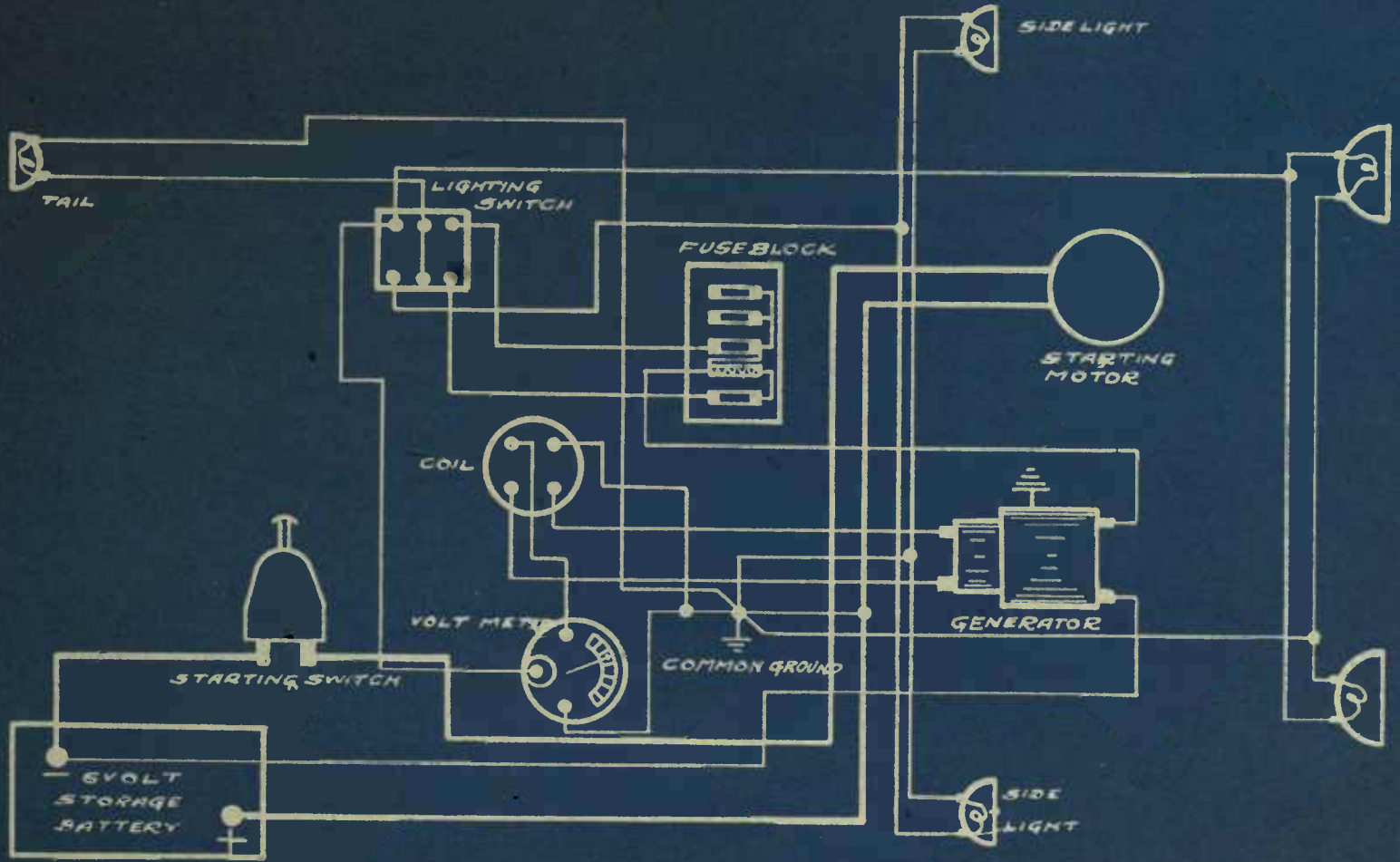


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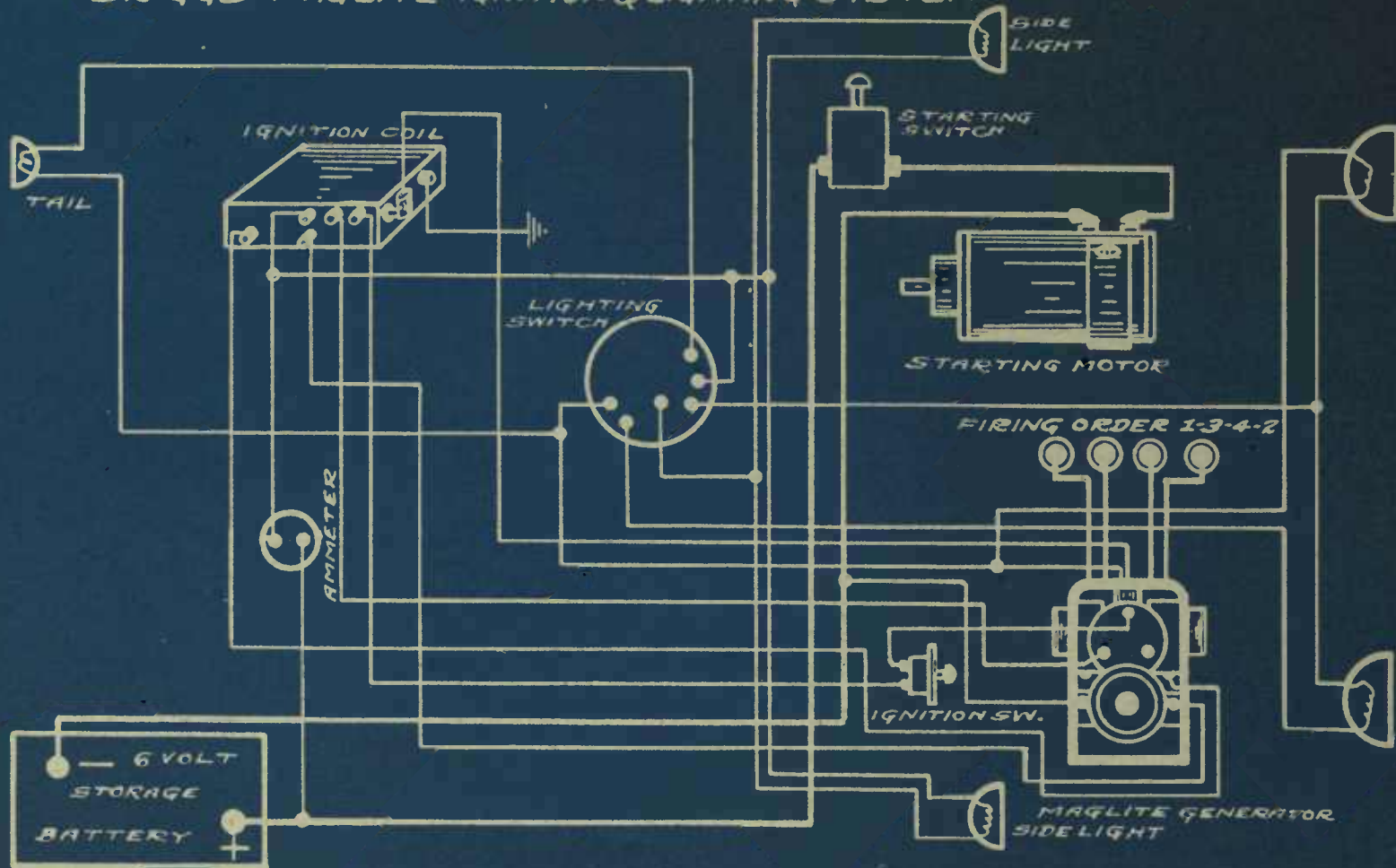
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OAKLAND 1913 "35" SPECIAL

DEACO STARTING SYSTEM

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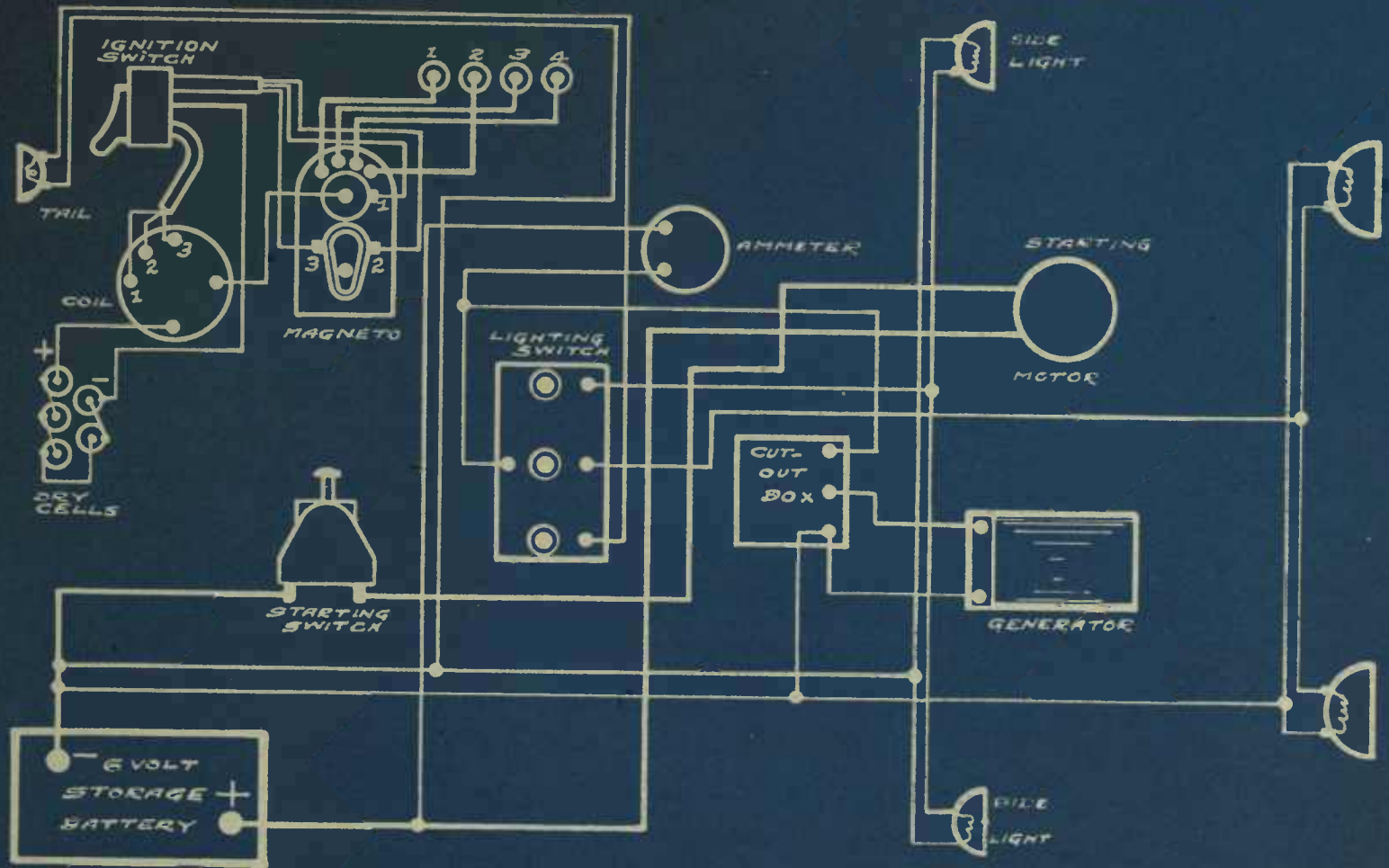
BRIGGS-MAGLITE IGNITION & LIGHTING SYSTEM



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OAKLAND 1913 "358,42" DEACO SYSTEM

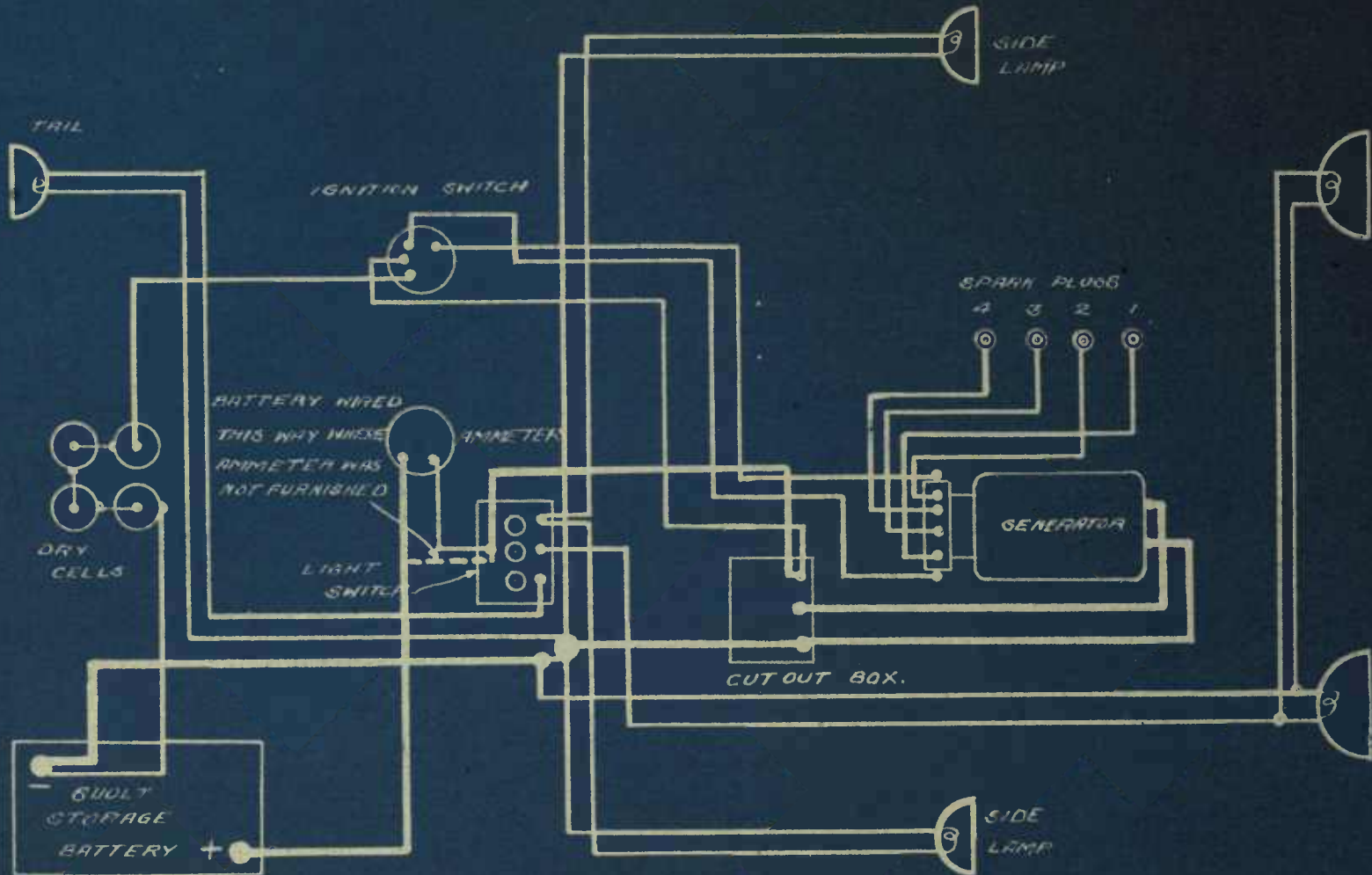
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OAKLAND MODEL "42" 1913
DARCO SYSTEM

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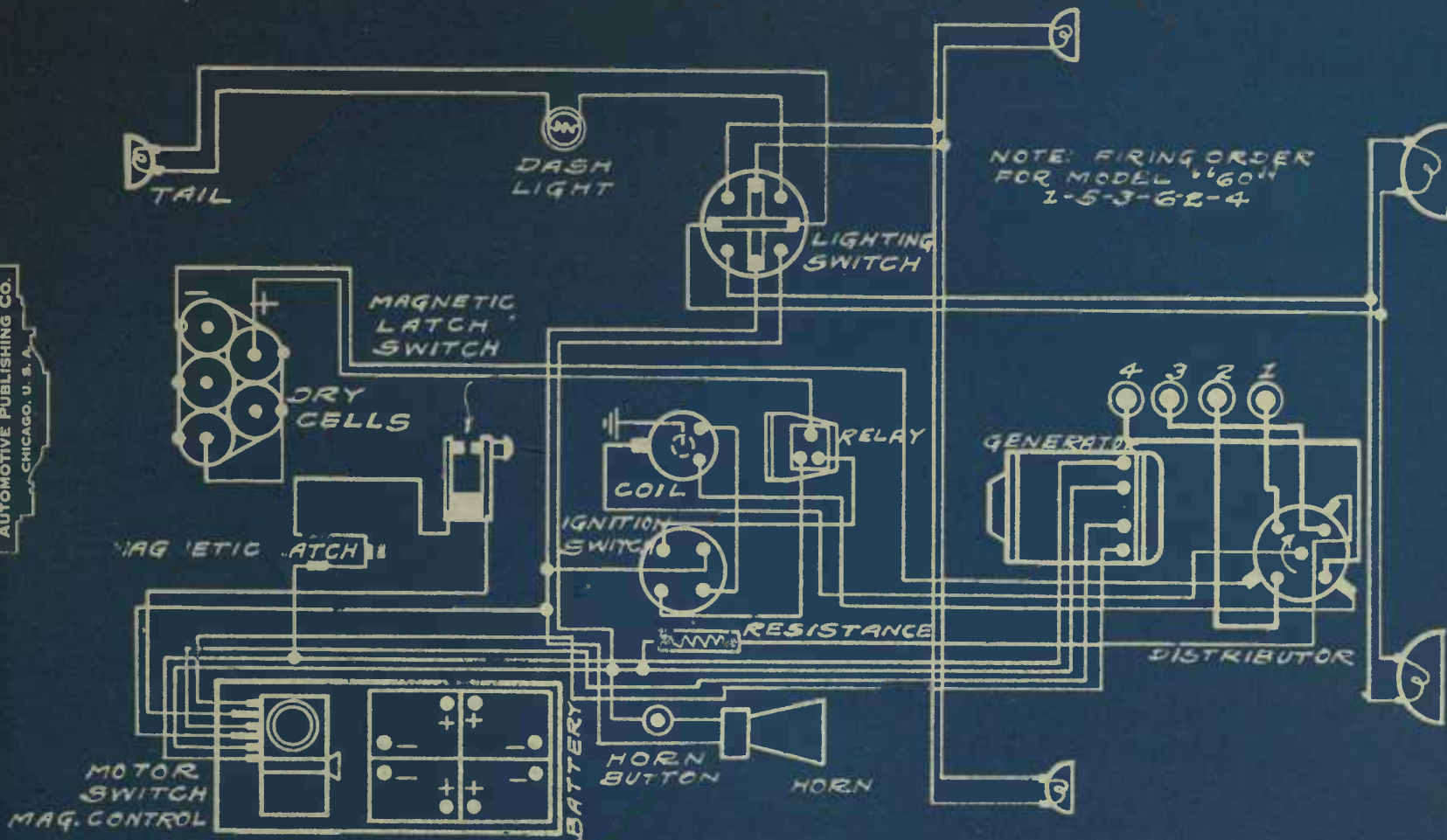


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OAKLAND 1913 42&60

DELCO SYSTEM

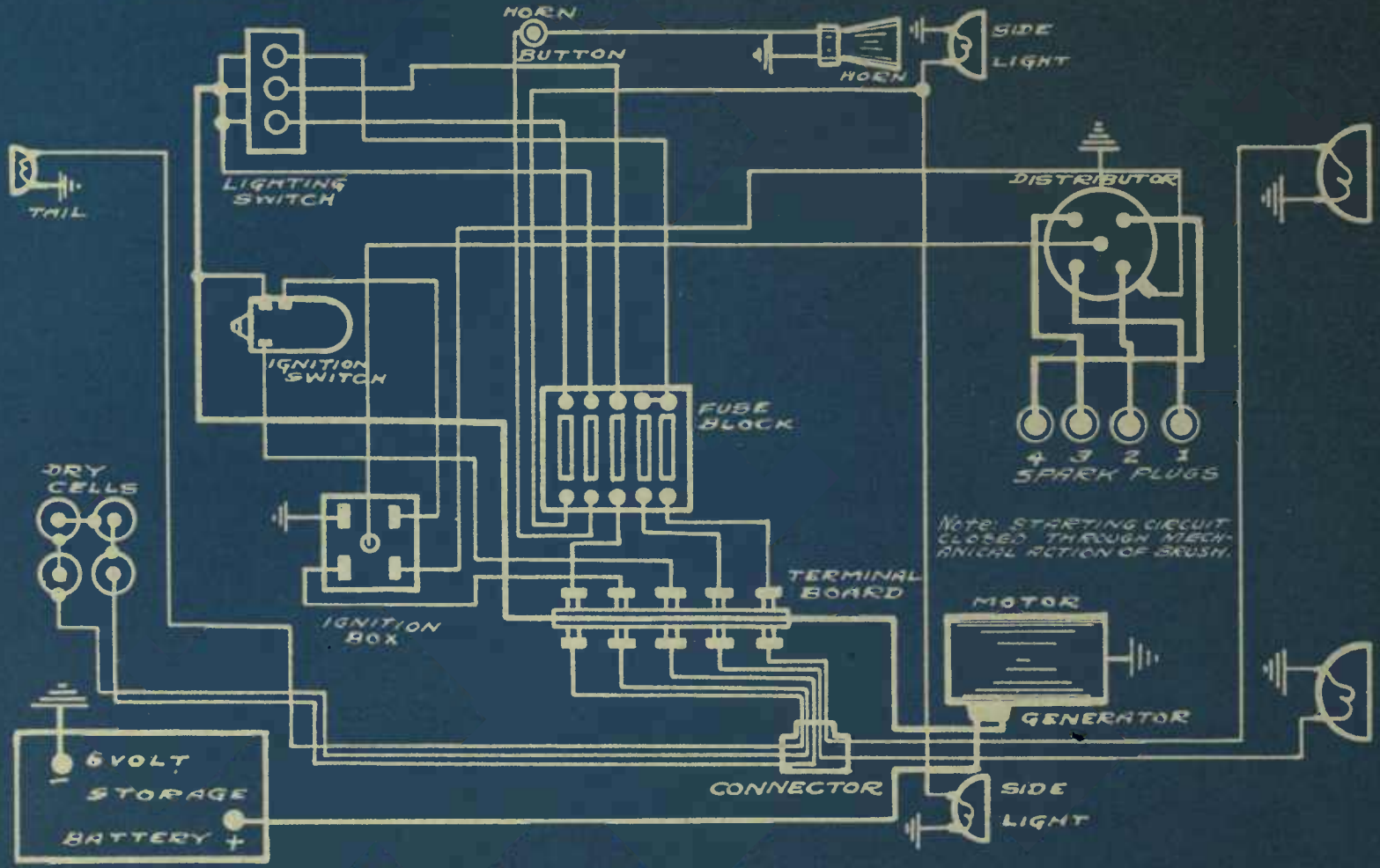
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DELCO SYSTEM

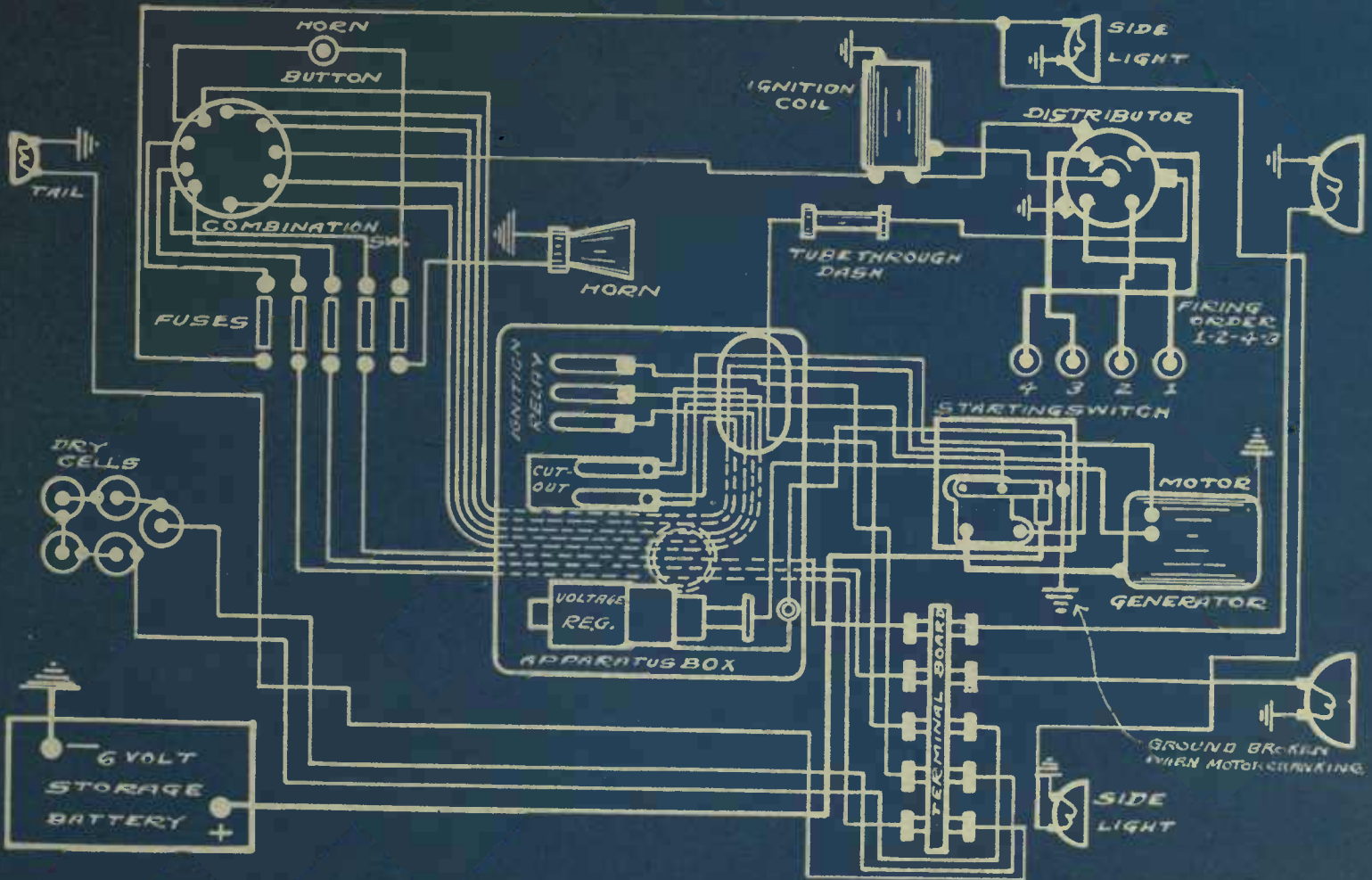
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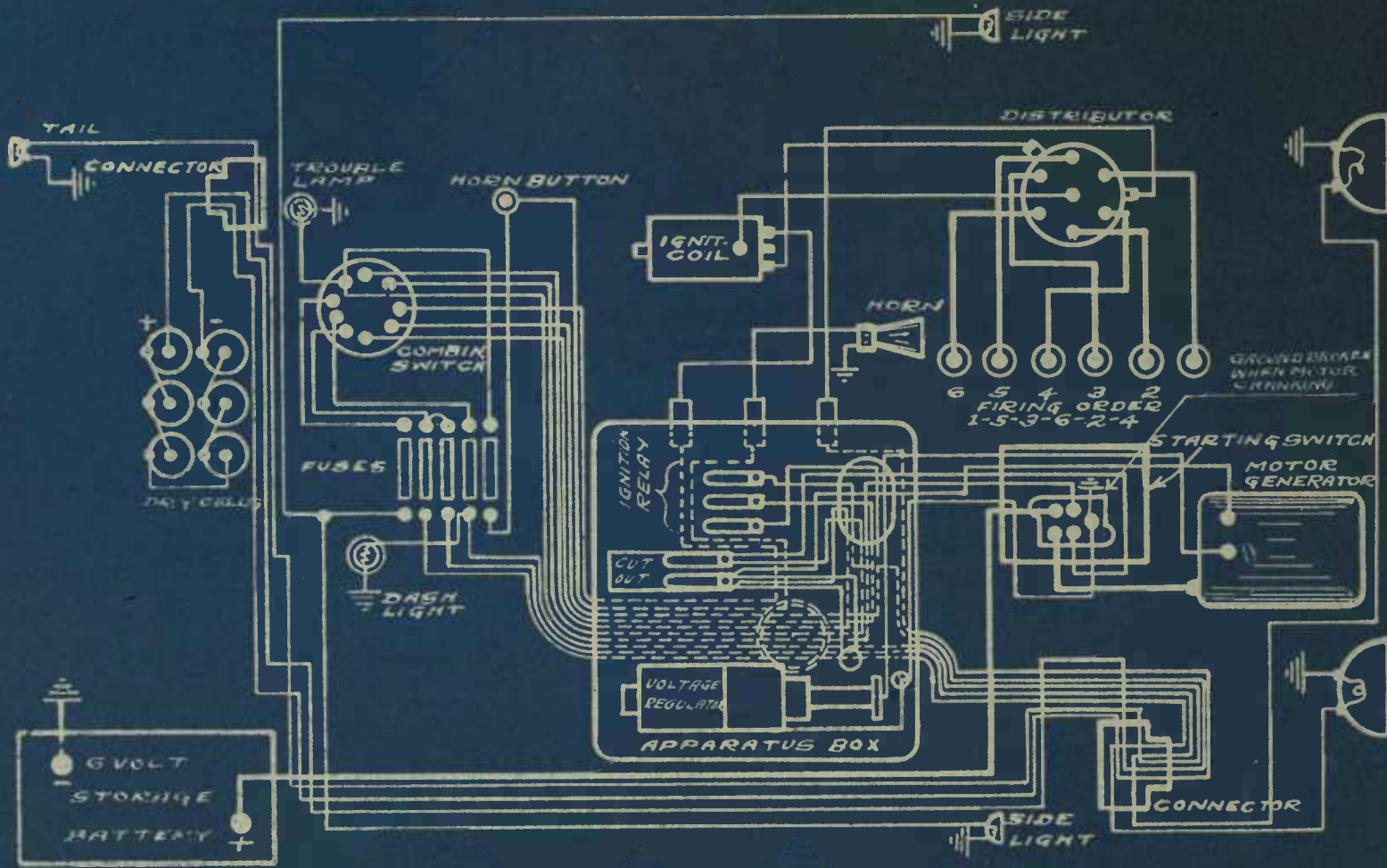
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DELCO SYSTEM

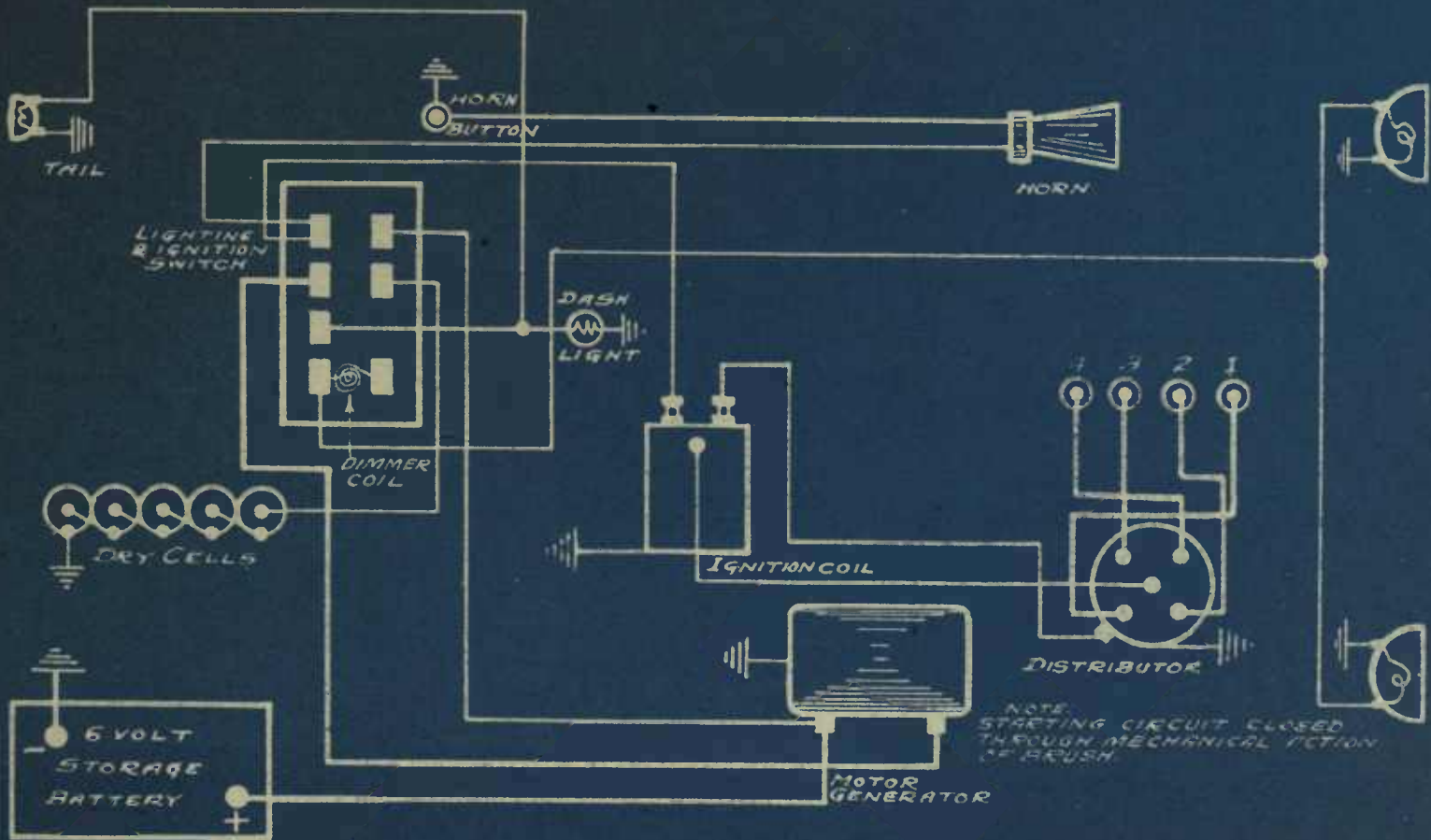
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OAKLAND 1915 "37" DELCO SYSTEM

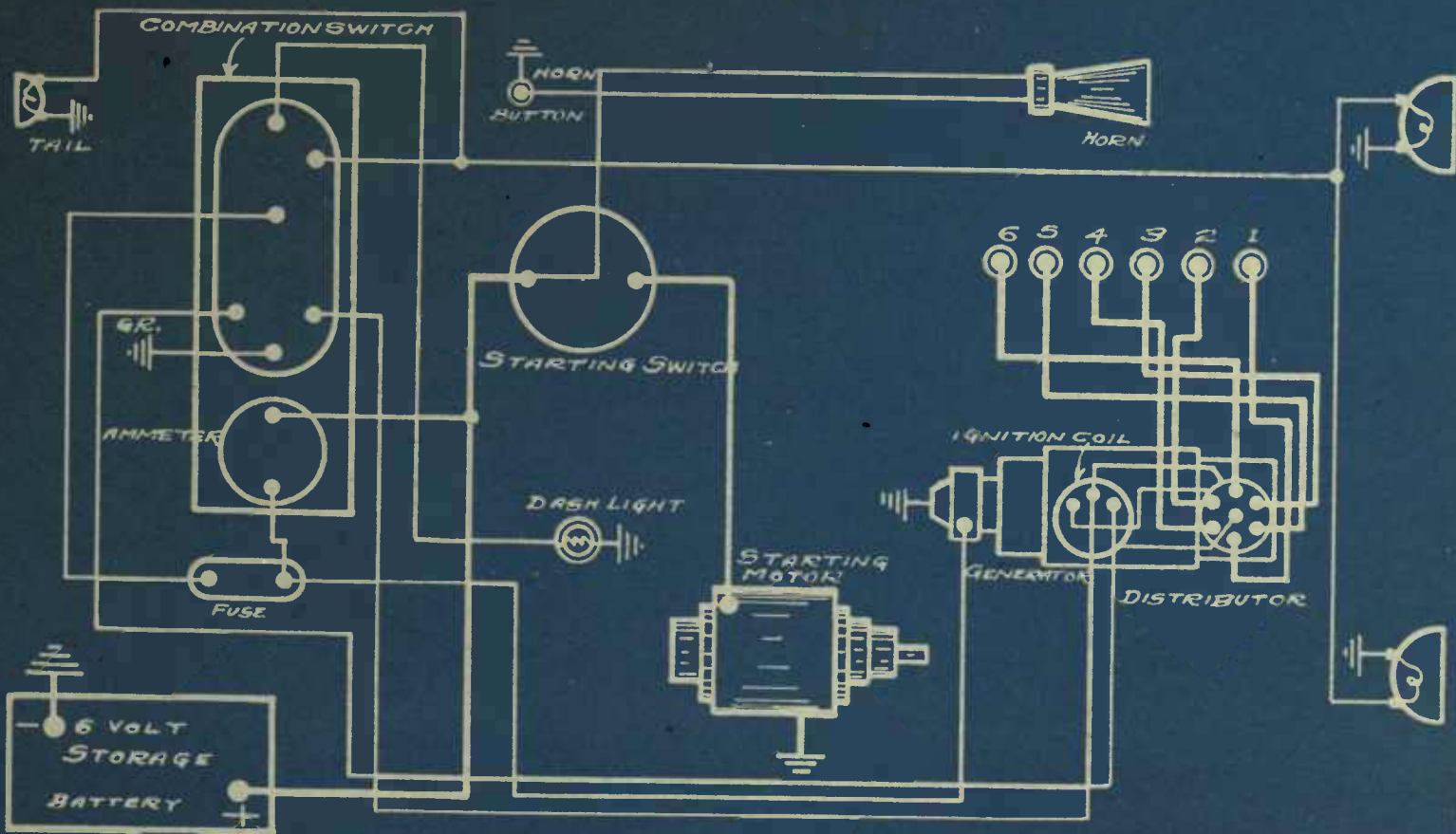
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OAKLAND 1916 "32-B" REMY SYSTEM

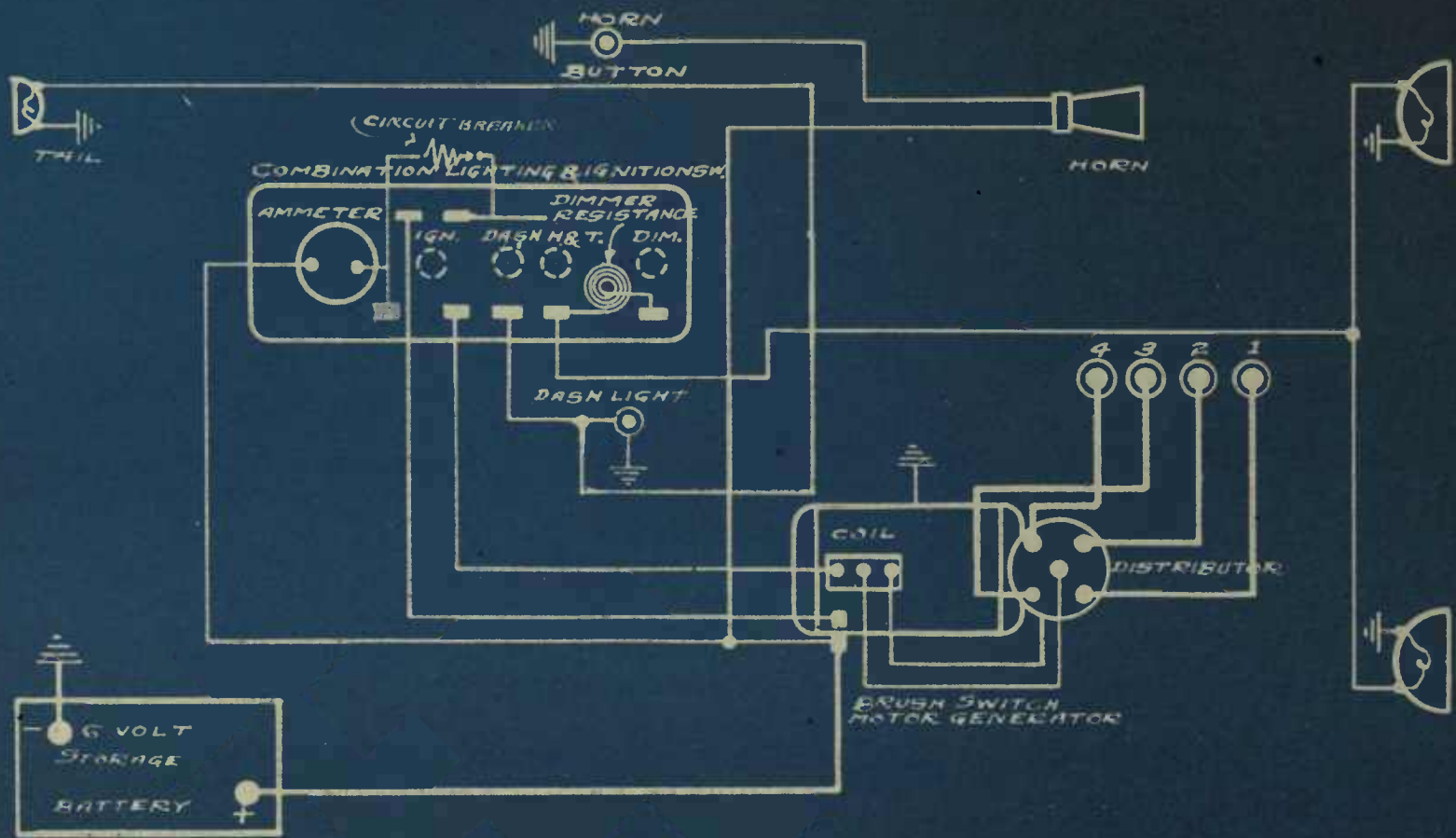
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OAKLAND 1916 '38"
DELCO SYSTEM

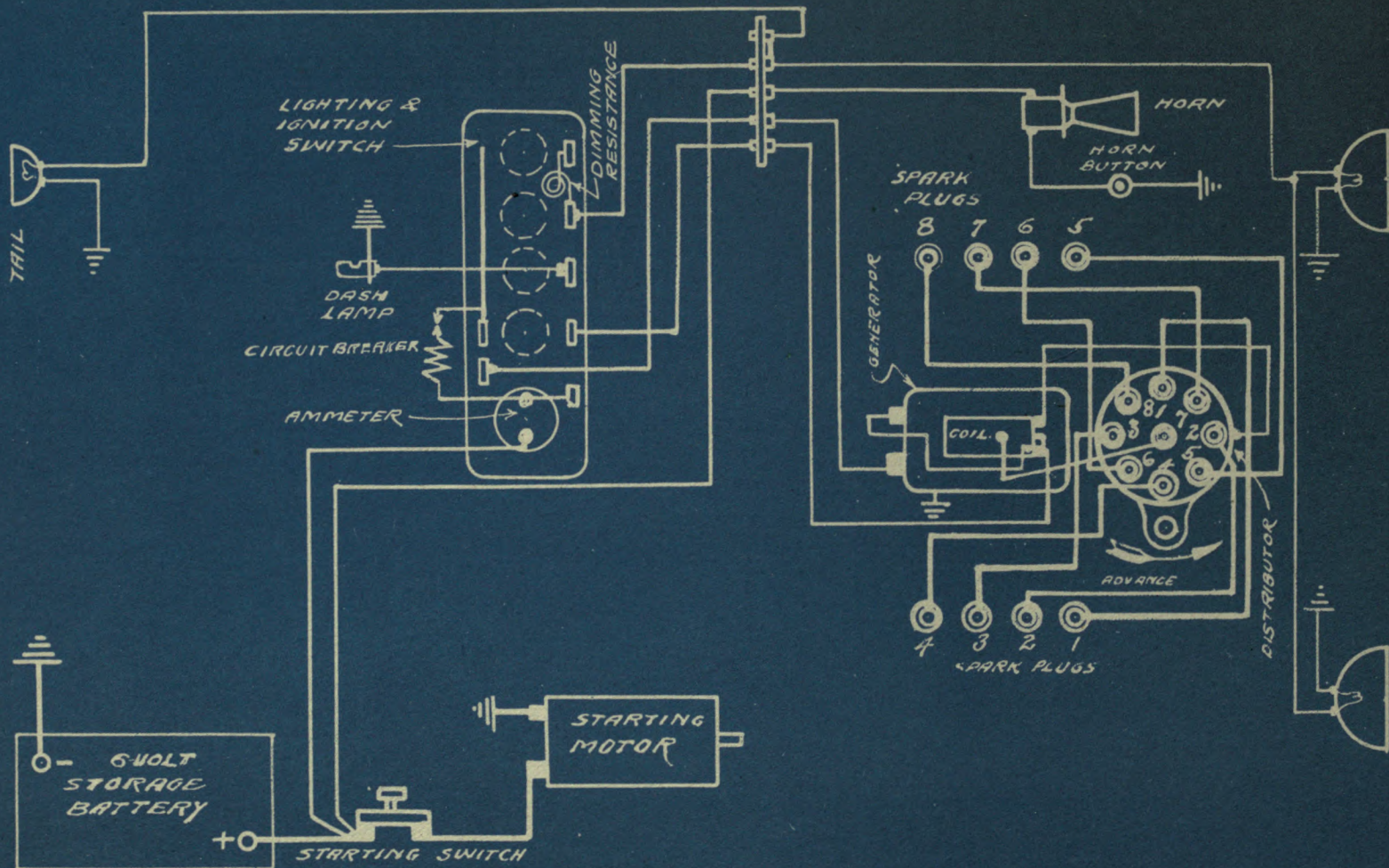
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DELCO SYSTEM

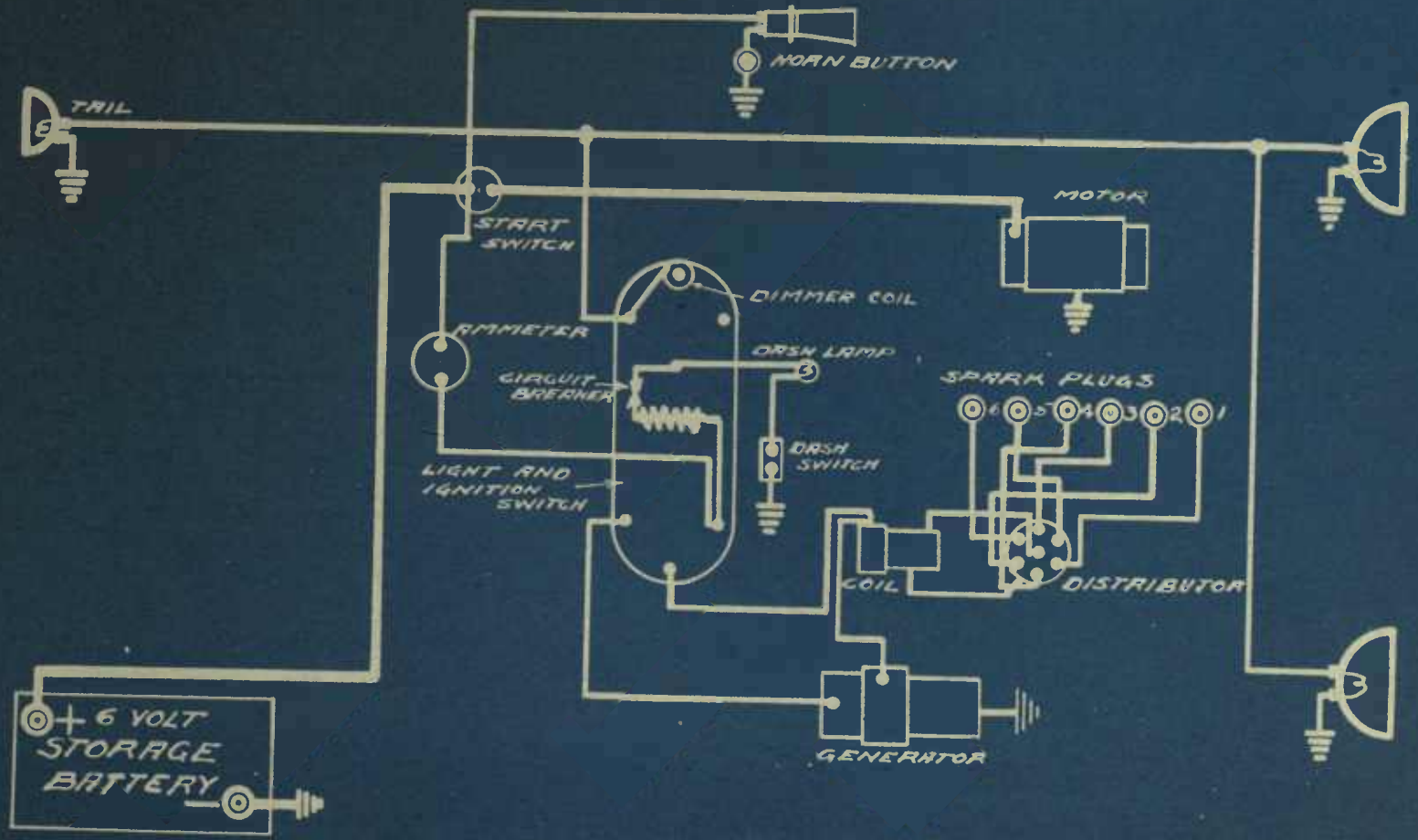
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ORLAND 1917 MODEL 34
DELCO SYSTEM

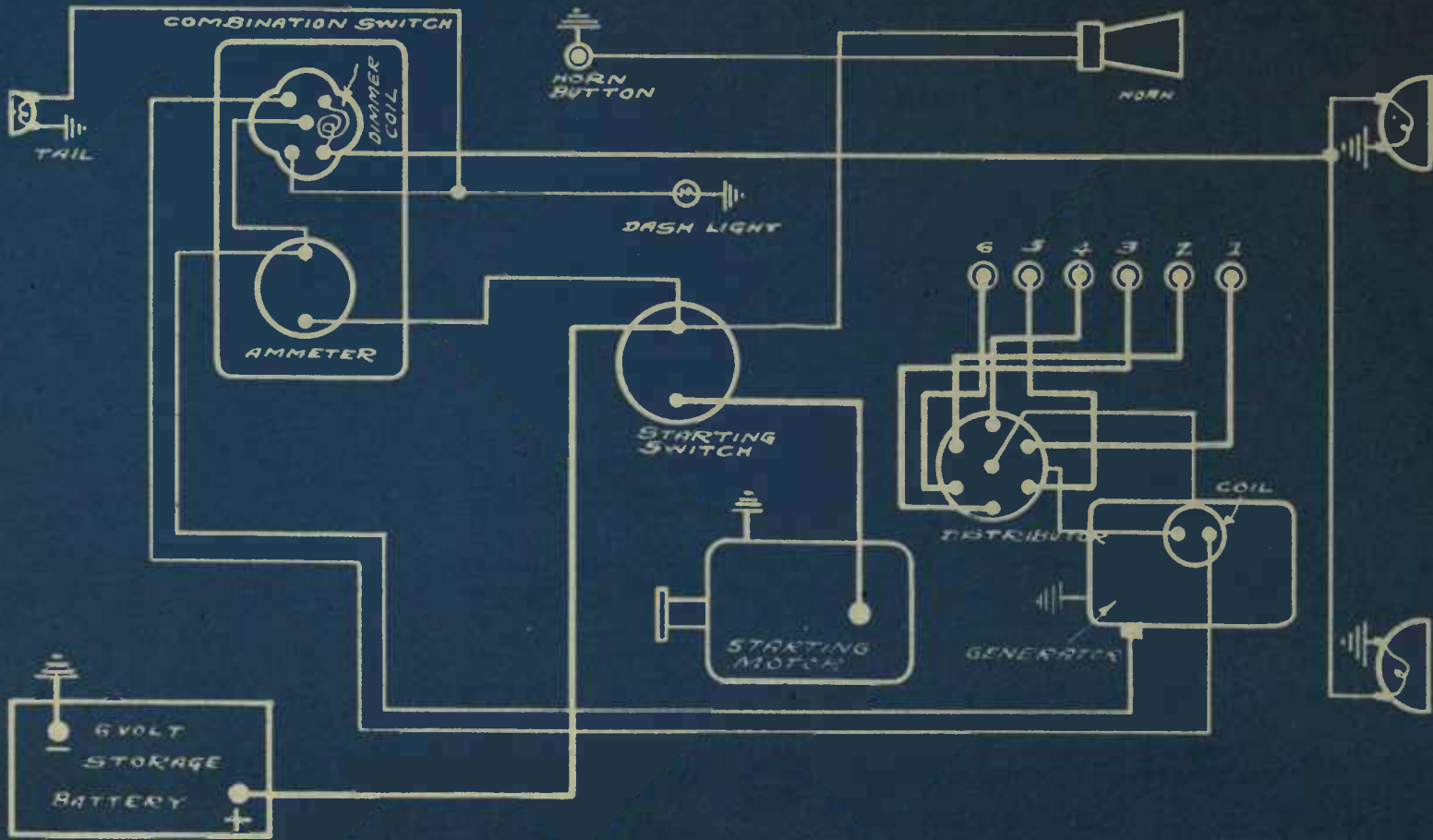
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OAKLAND 1918-19 34-B
DELCO SYSTEM

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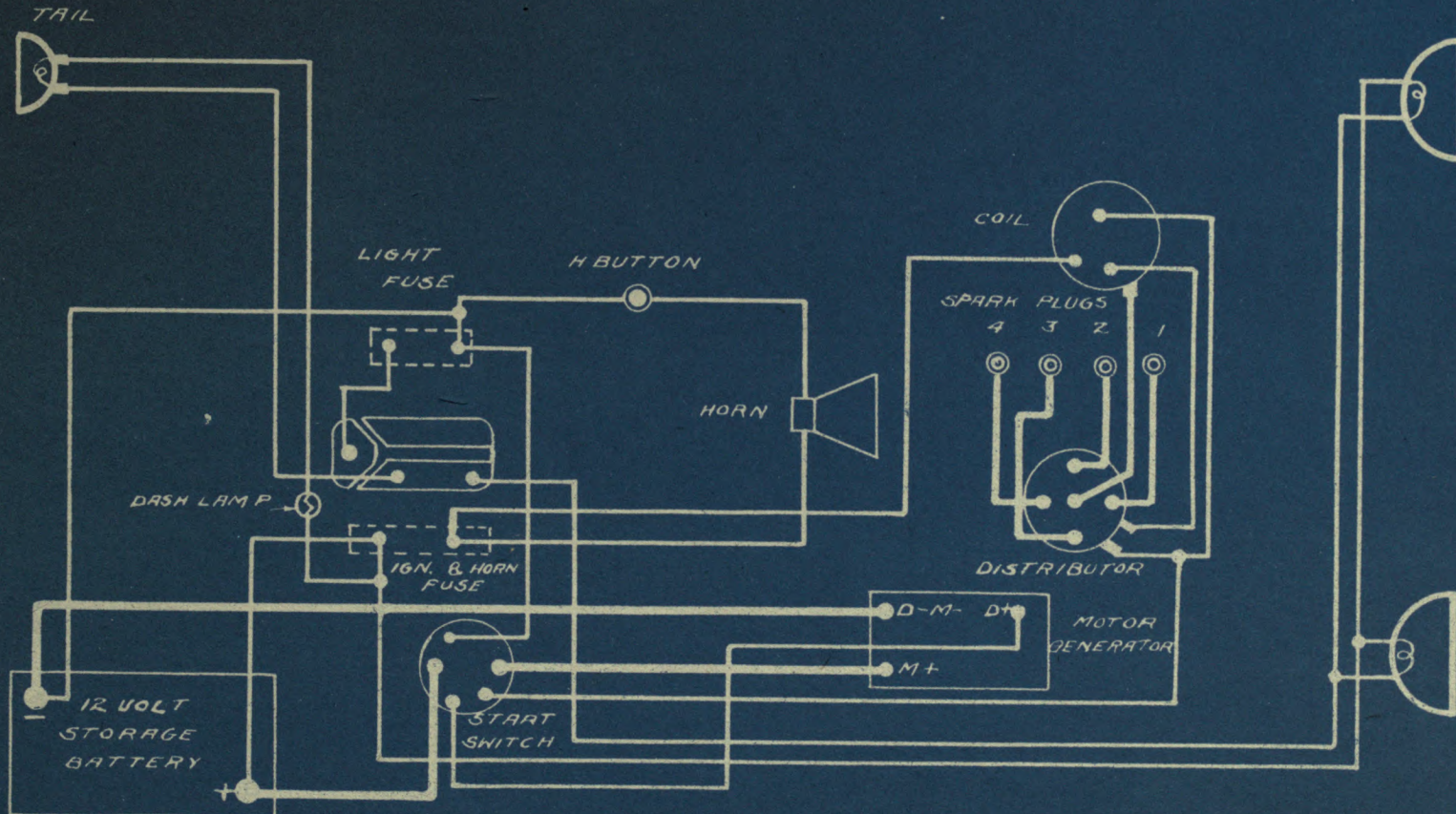


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OLD HICKORY TRUCK 1916-1917-1918

DYNETO SYSTEM

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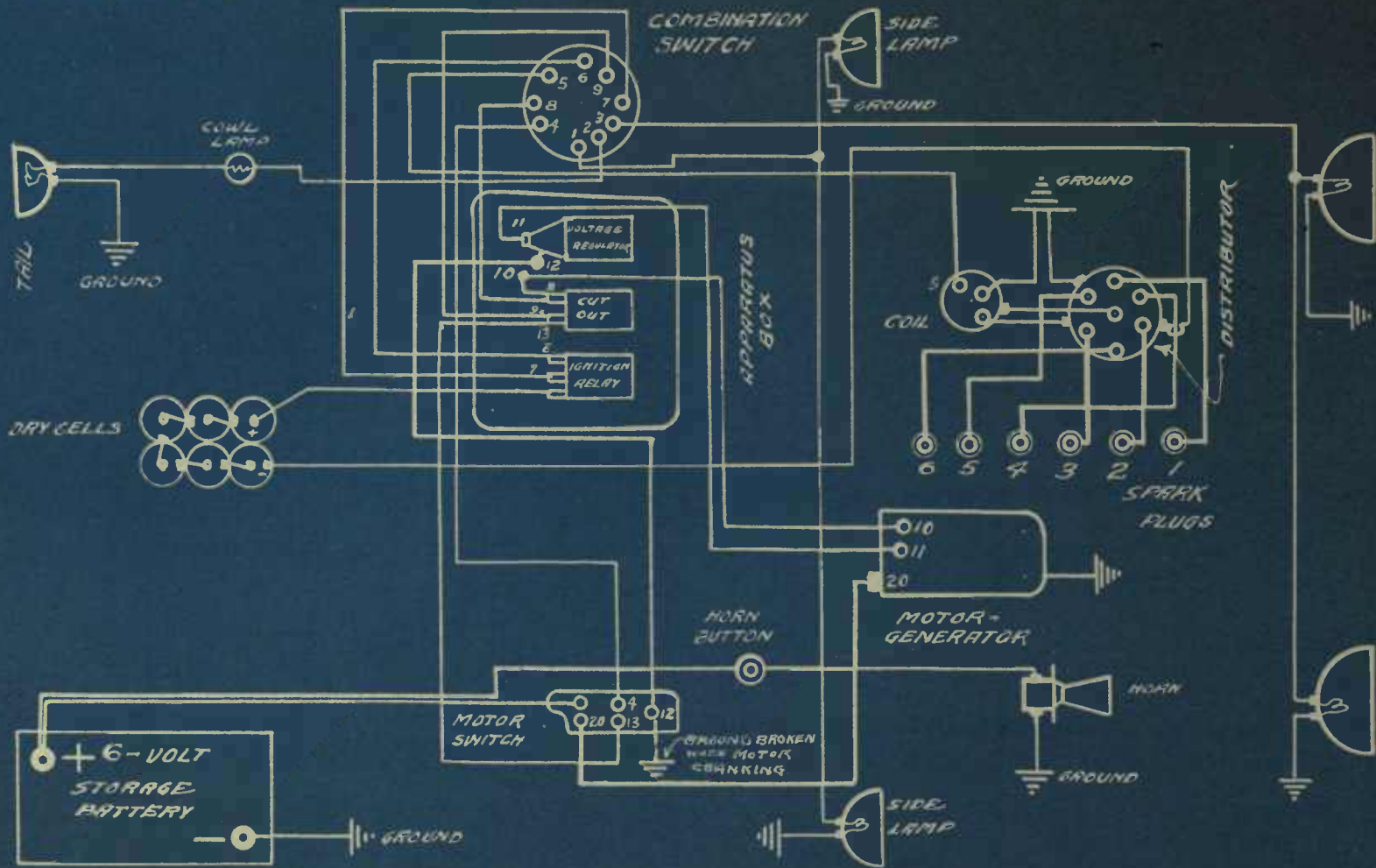


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OLDSMOBILE
DELCO SYSTEM

1914 54

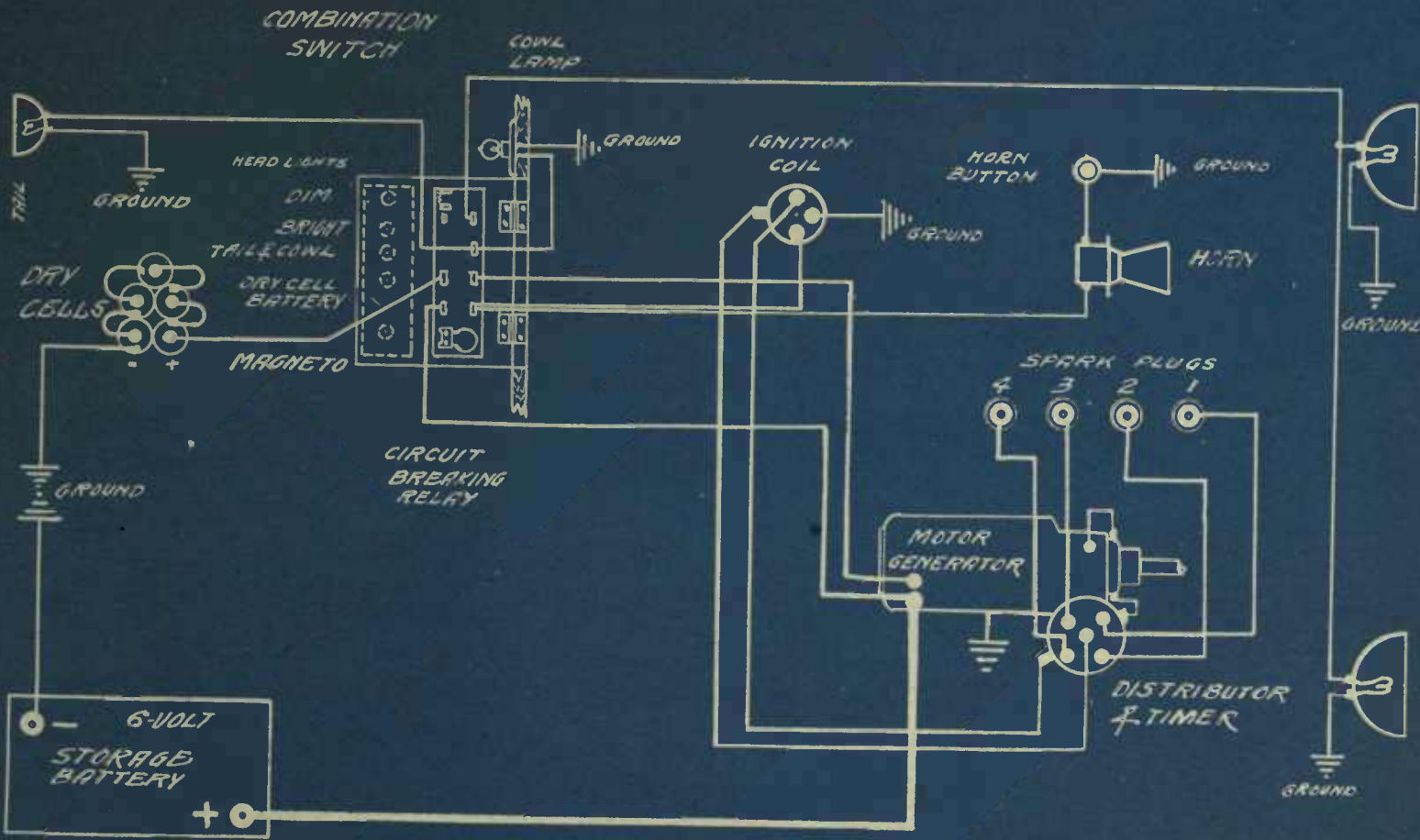
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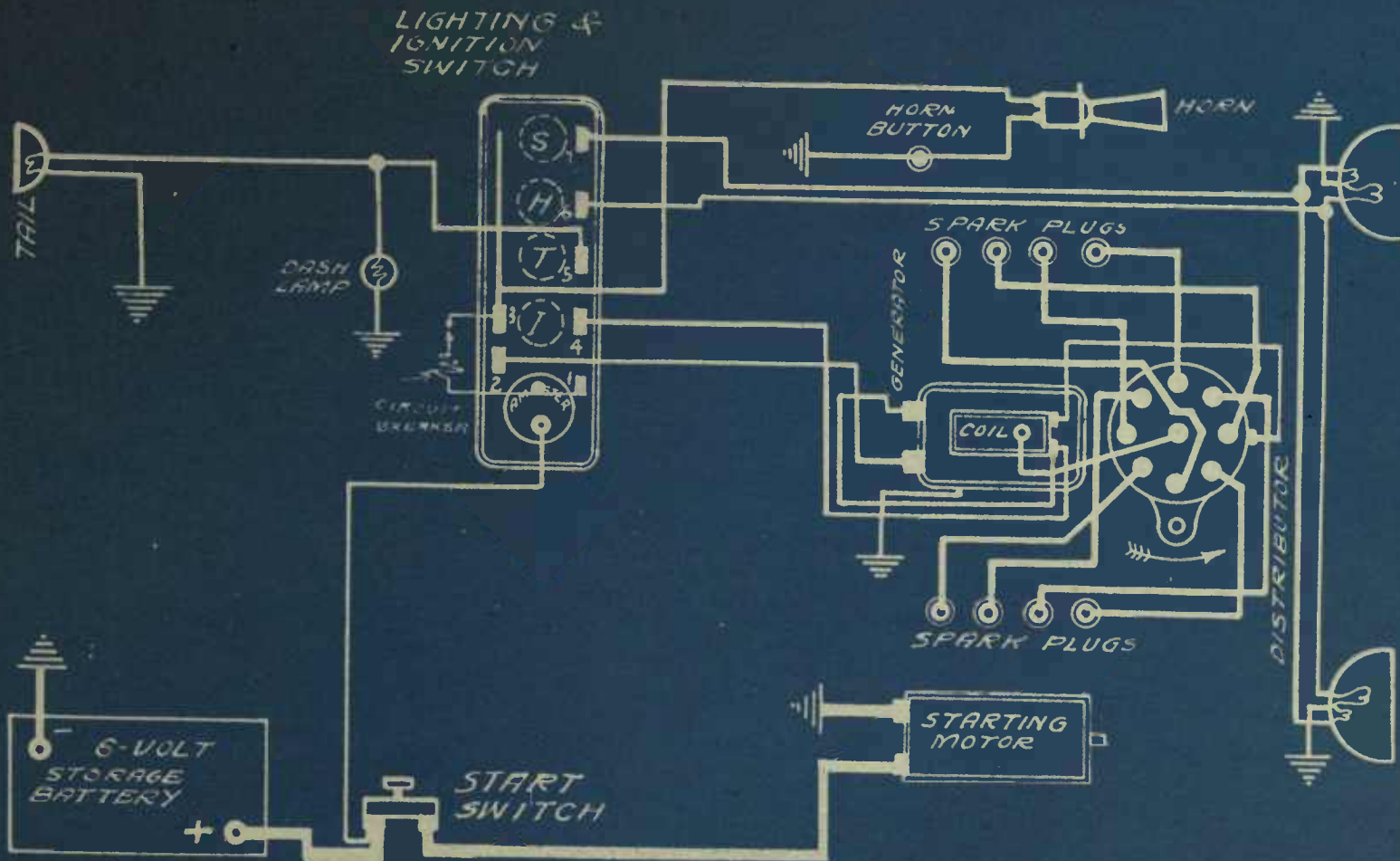
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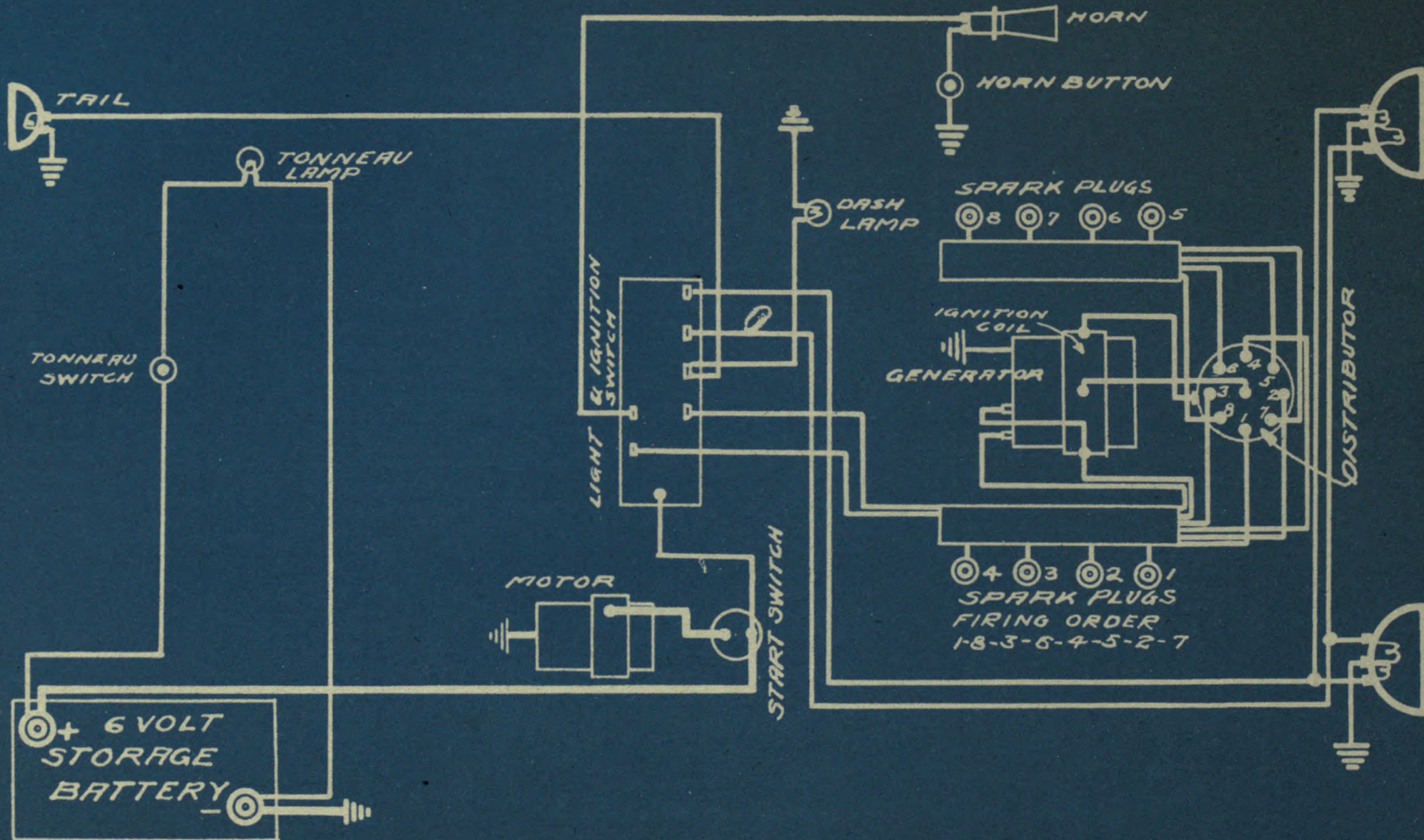
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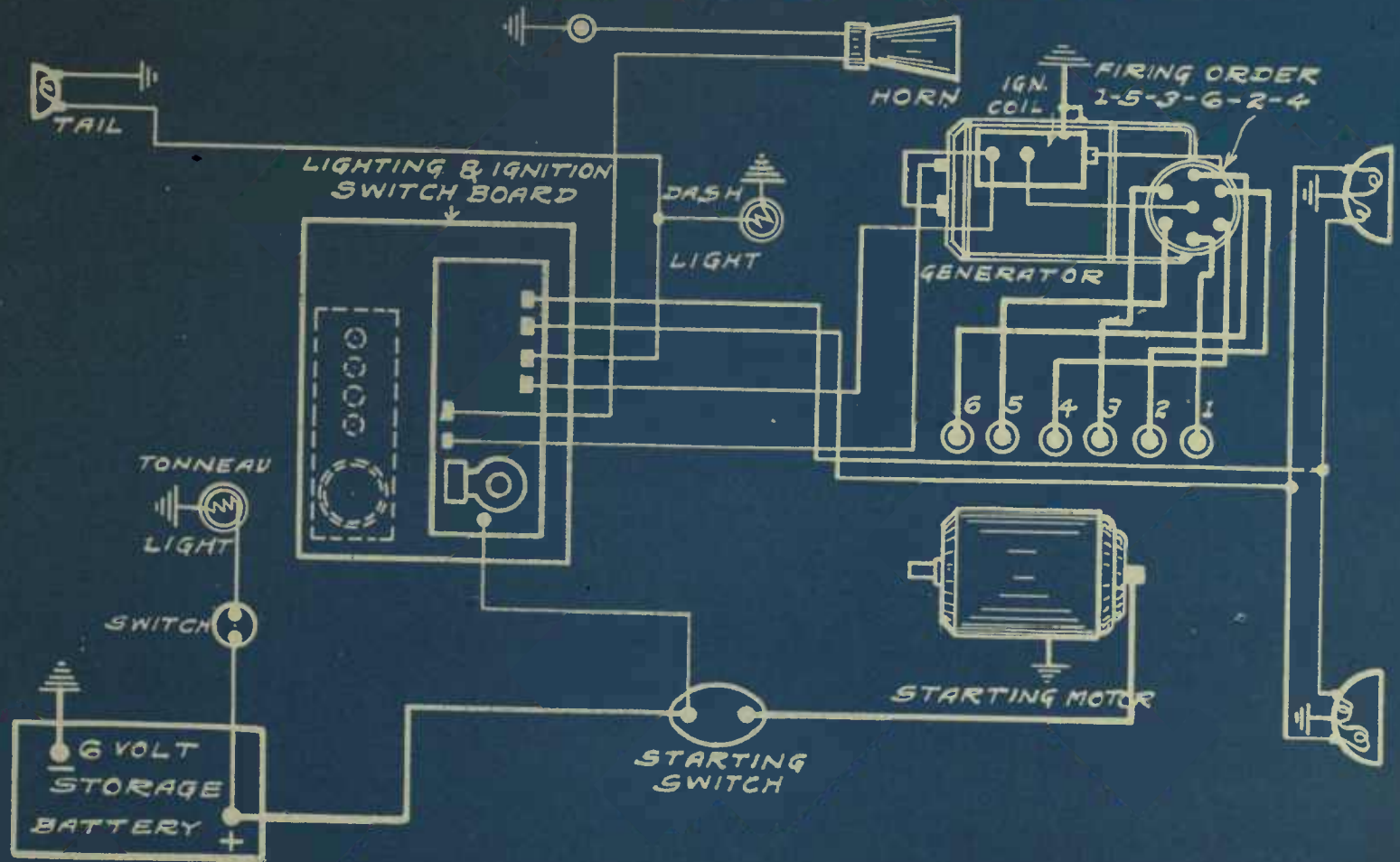
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DELCO SYSTEM

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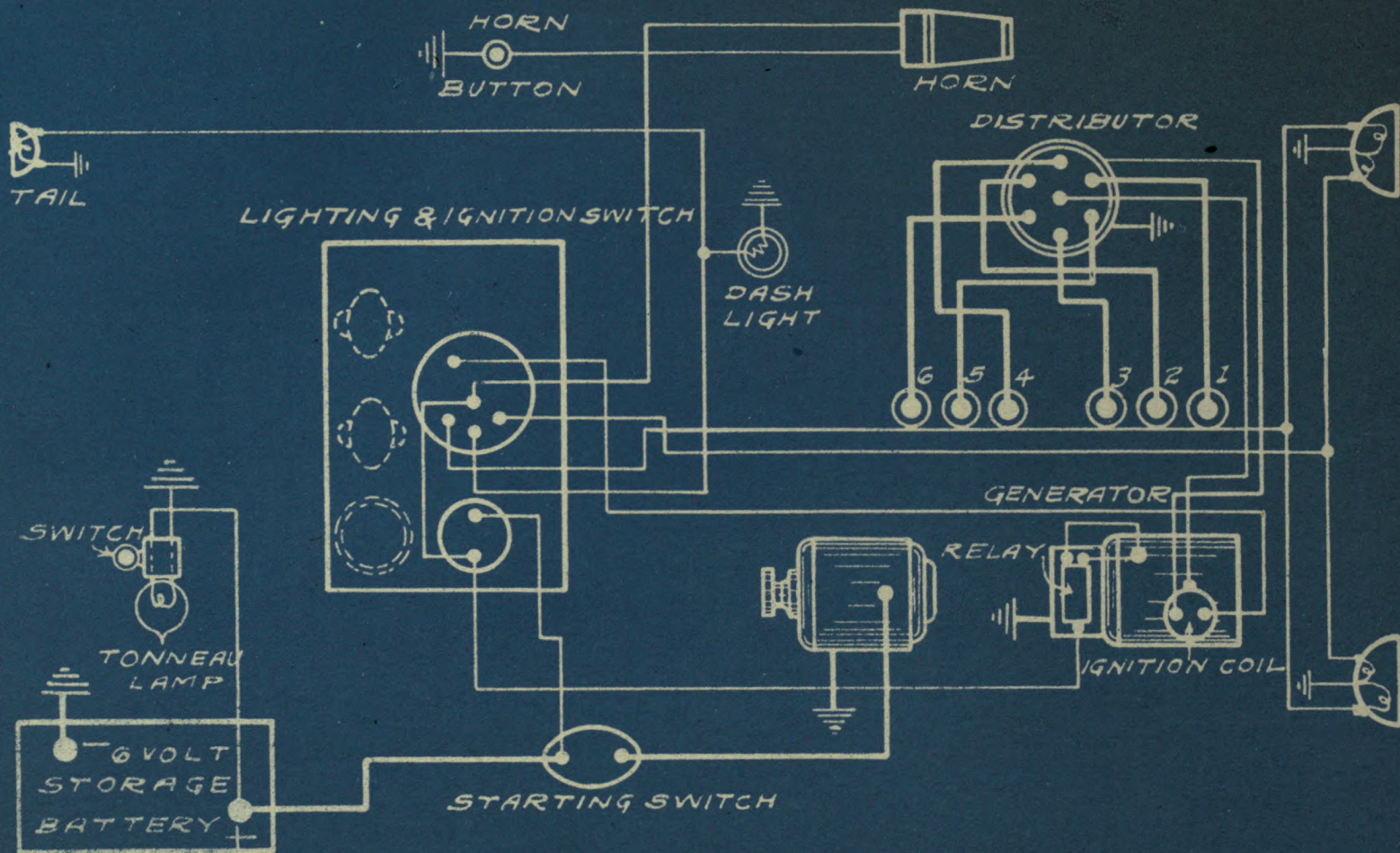


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REMY SYSTEM

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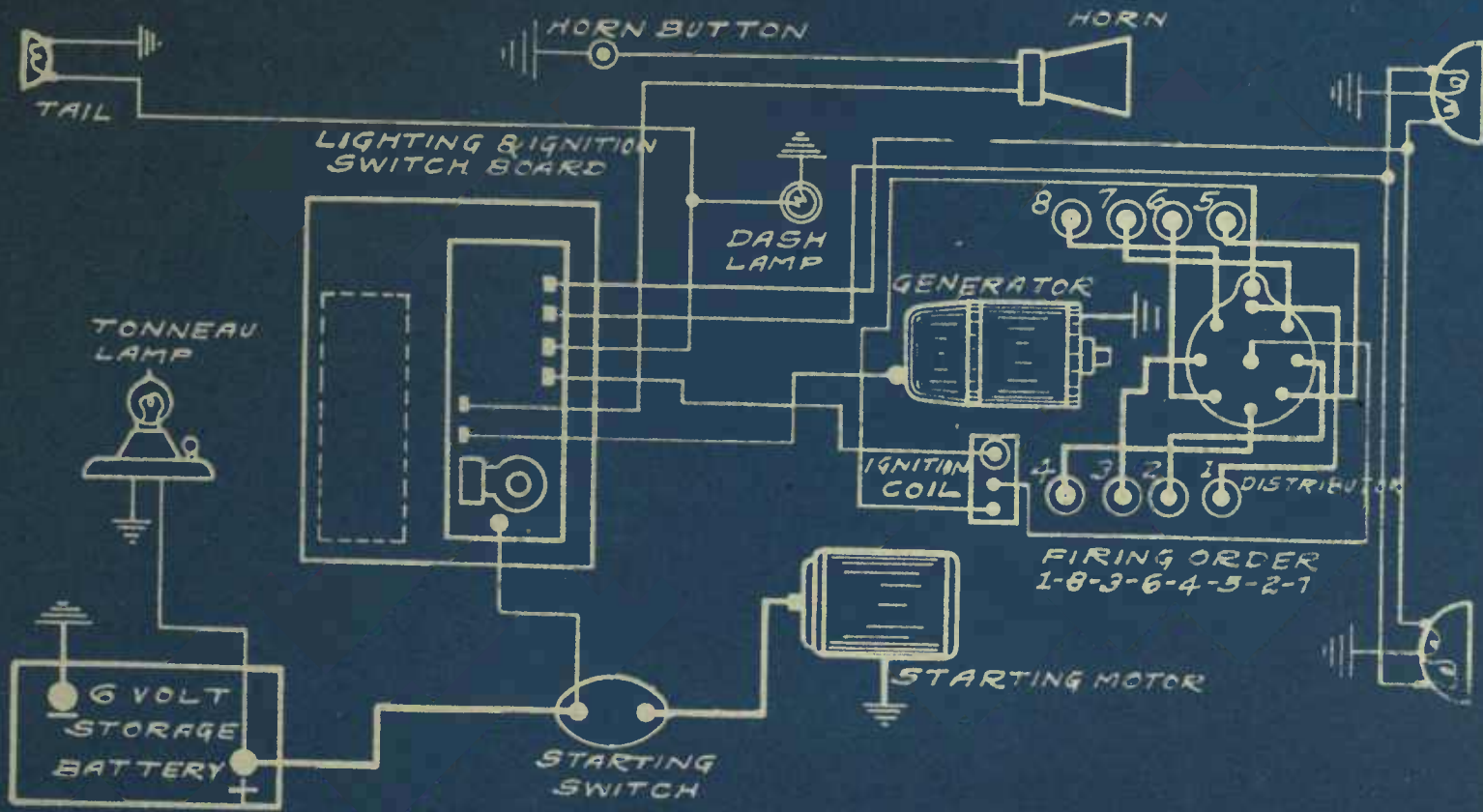
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DELCO SYSTEM

45-A EARLY 1919

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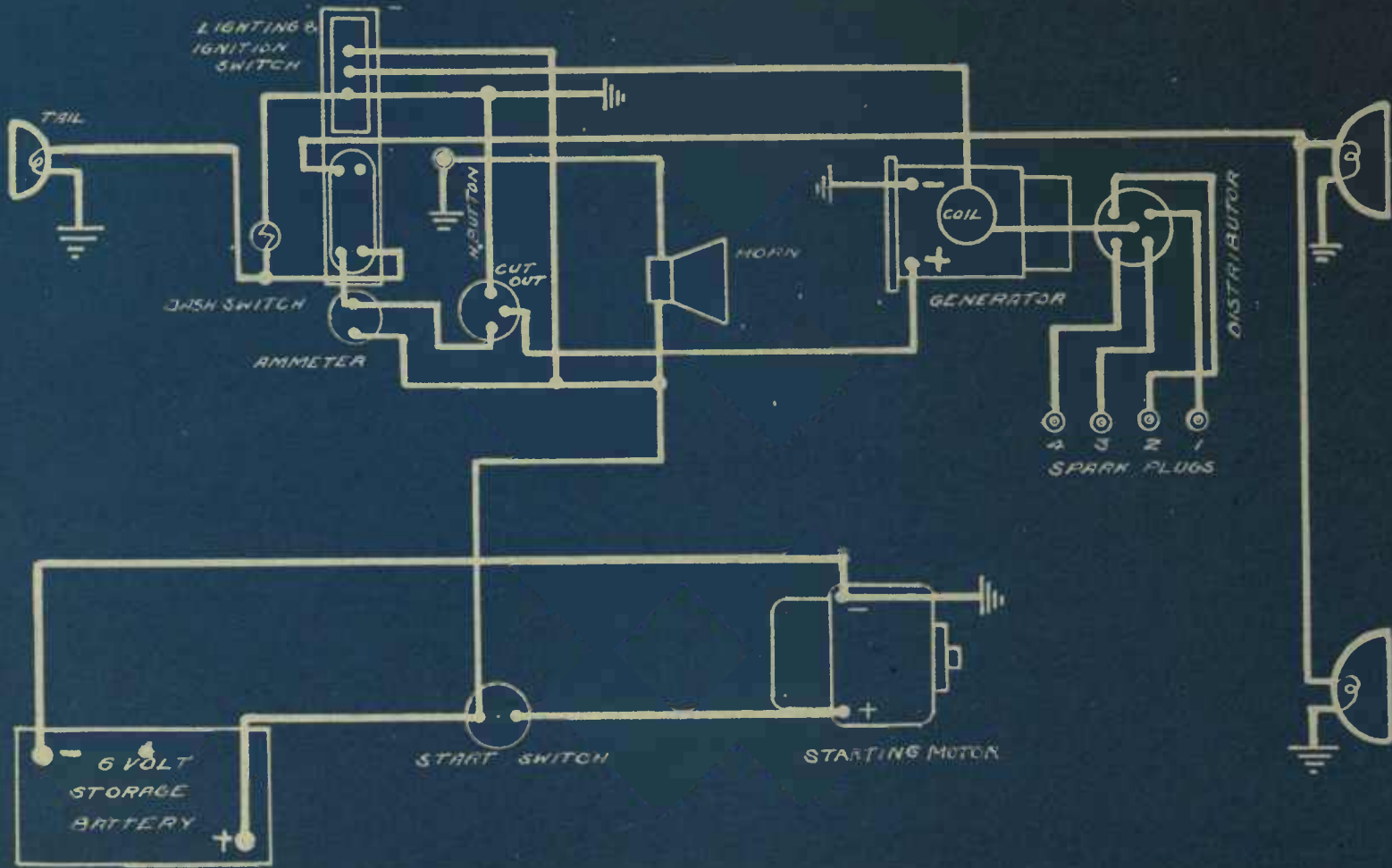


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OLYMPIAN MODEL 35 1917

AUTOLITE SYSTEM

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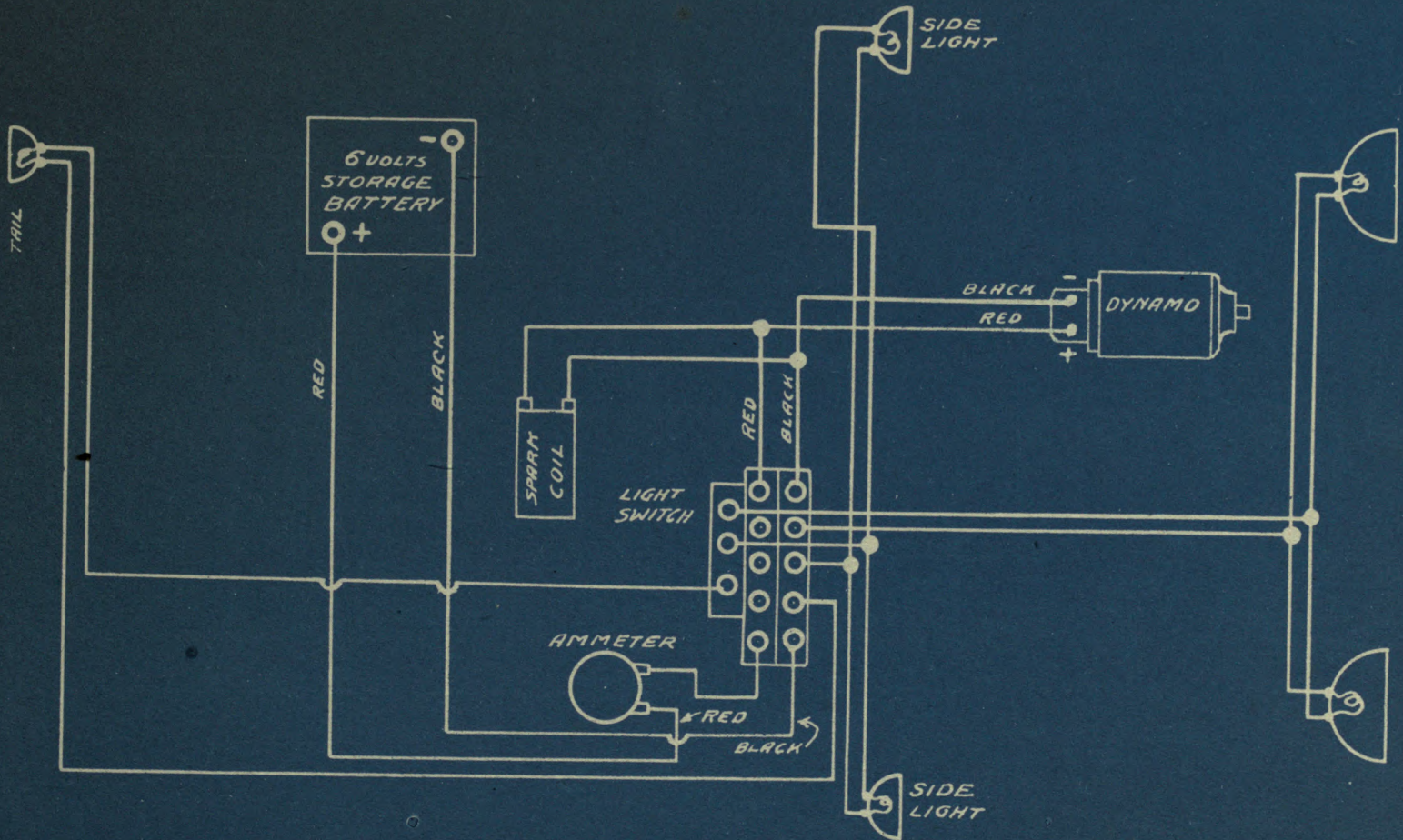


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OVERLAND 1913
AUTOLITE SYSTEM

69 & 71

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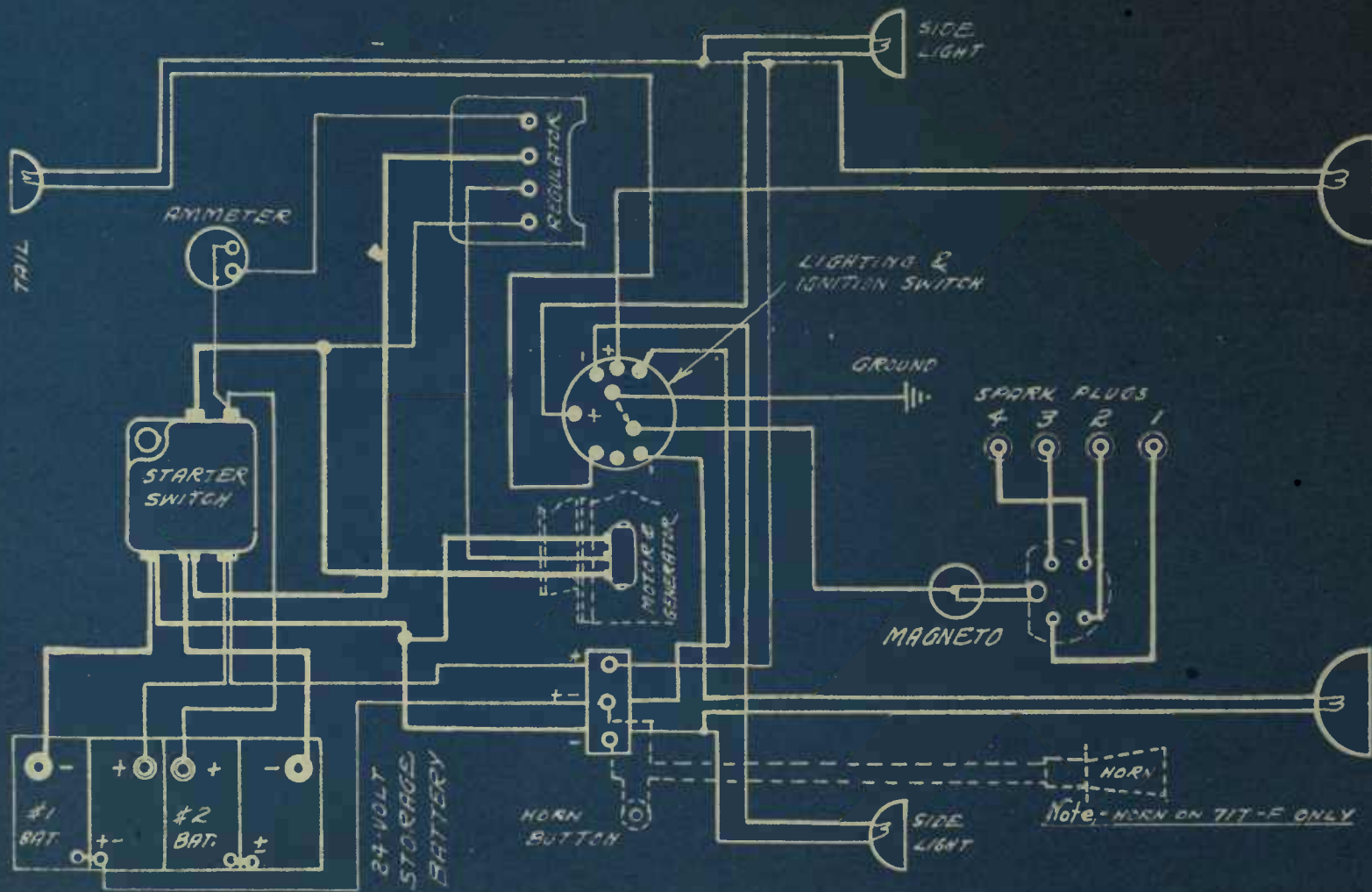


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OVERLAND 1913 69 & 71

U.S.L. SYSTEM

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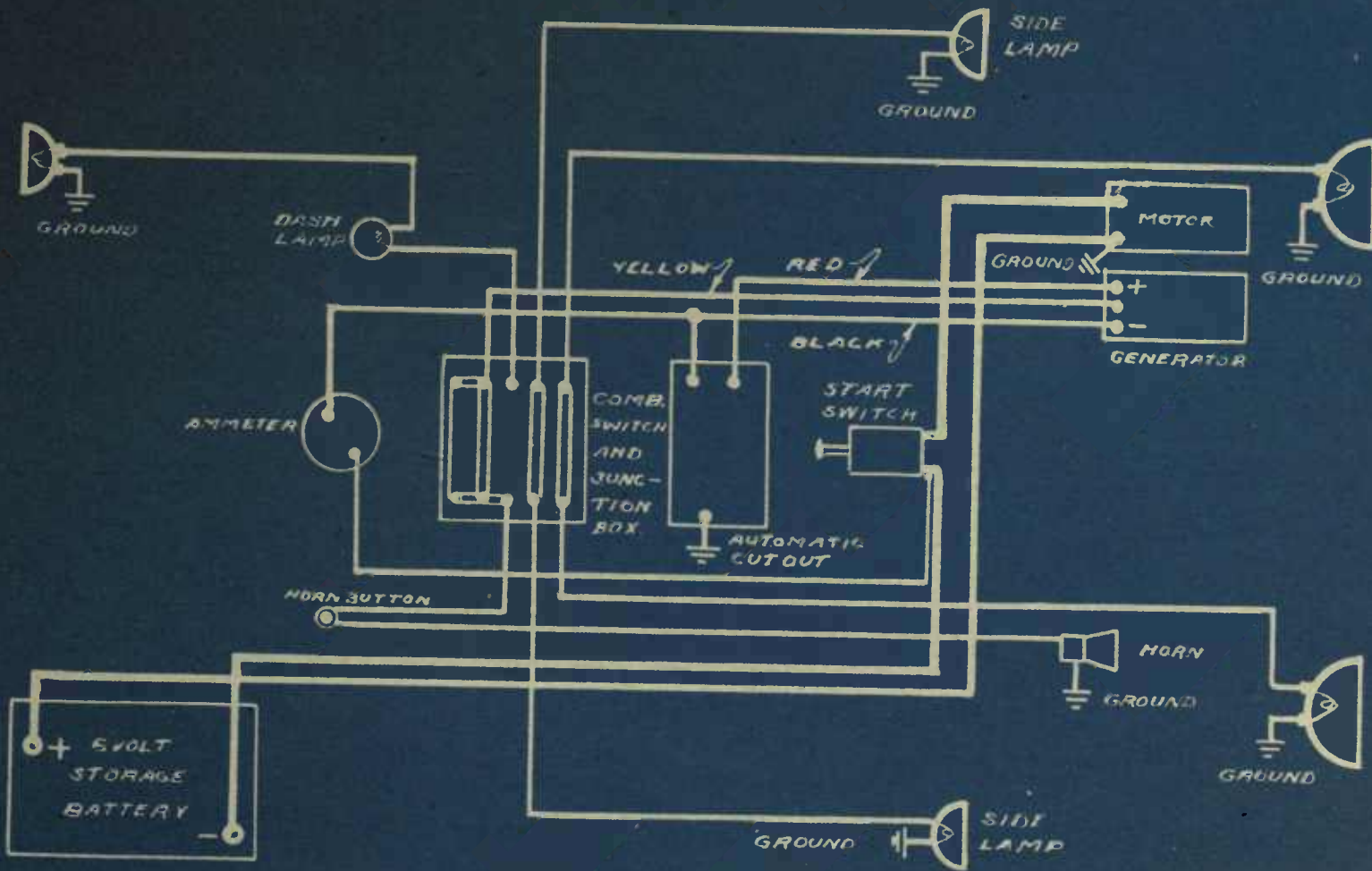


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OVERLAND 1914 79-B

GRAY AND JAVIS SYSTEM

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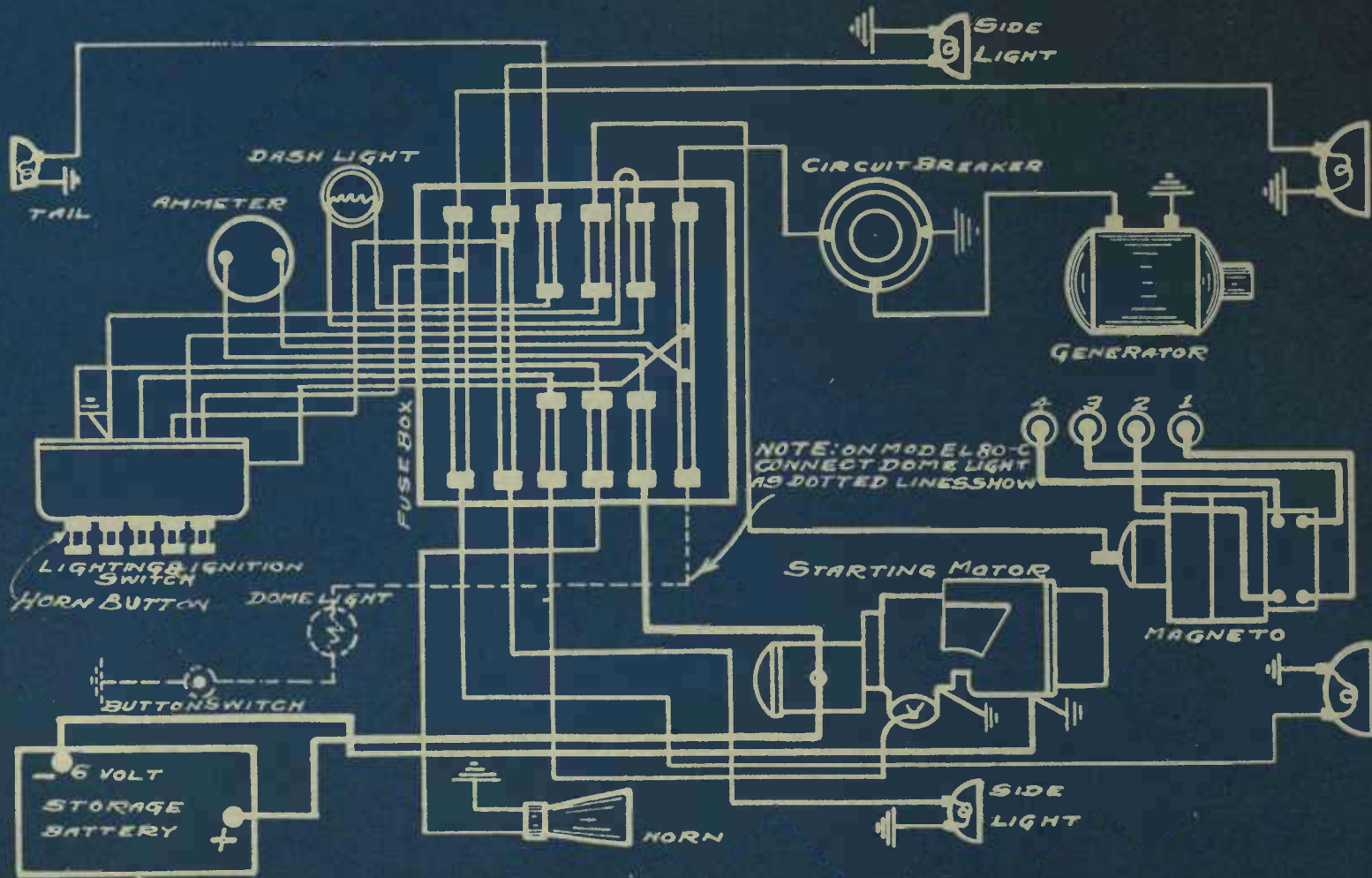


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OVERLAND 1915 80-C & 80-T&R

AUTOLITE SYSTEM

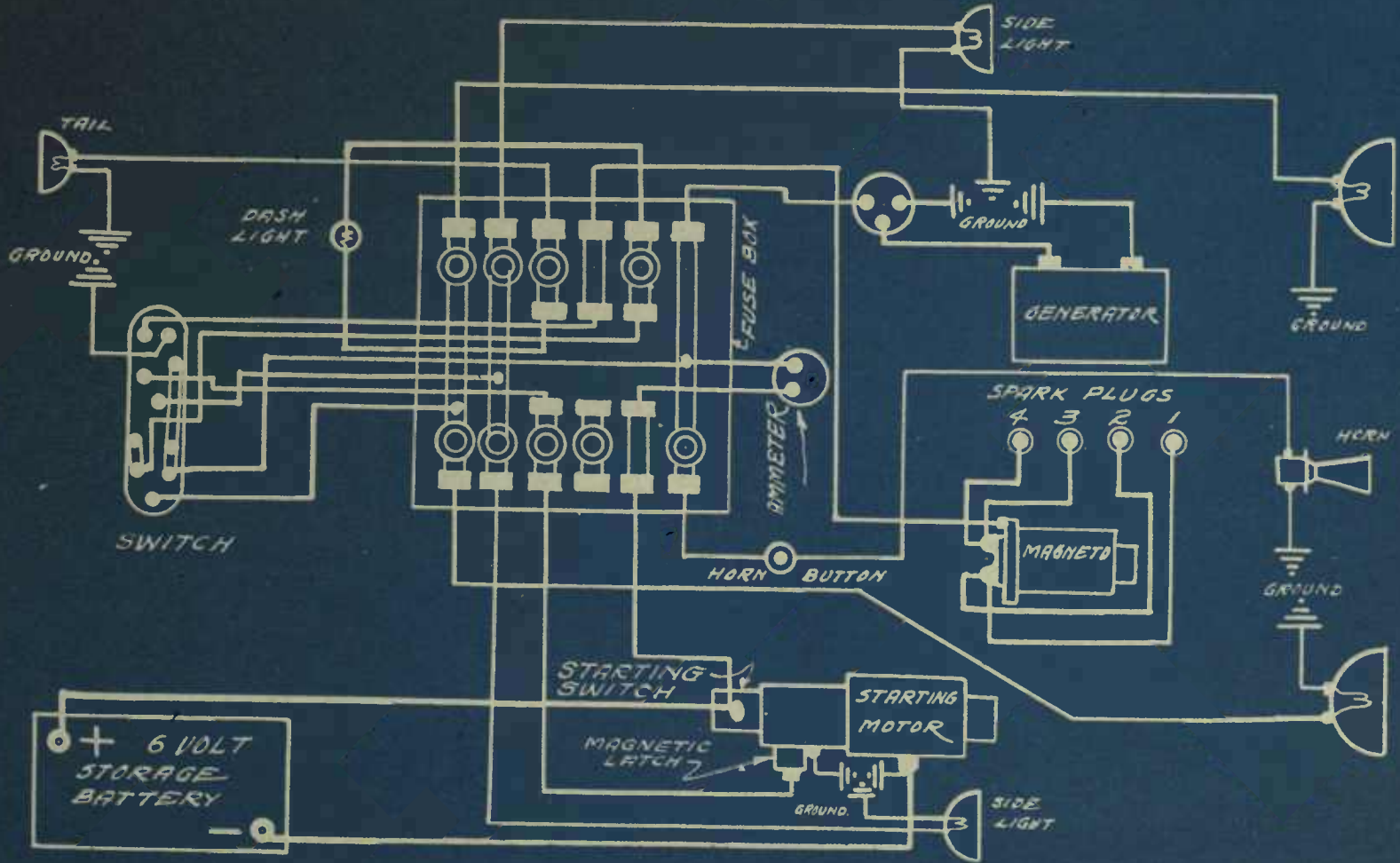
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AUTOLITE SYSTEM

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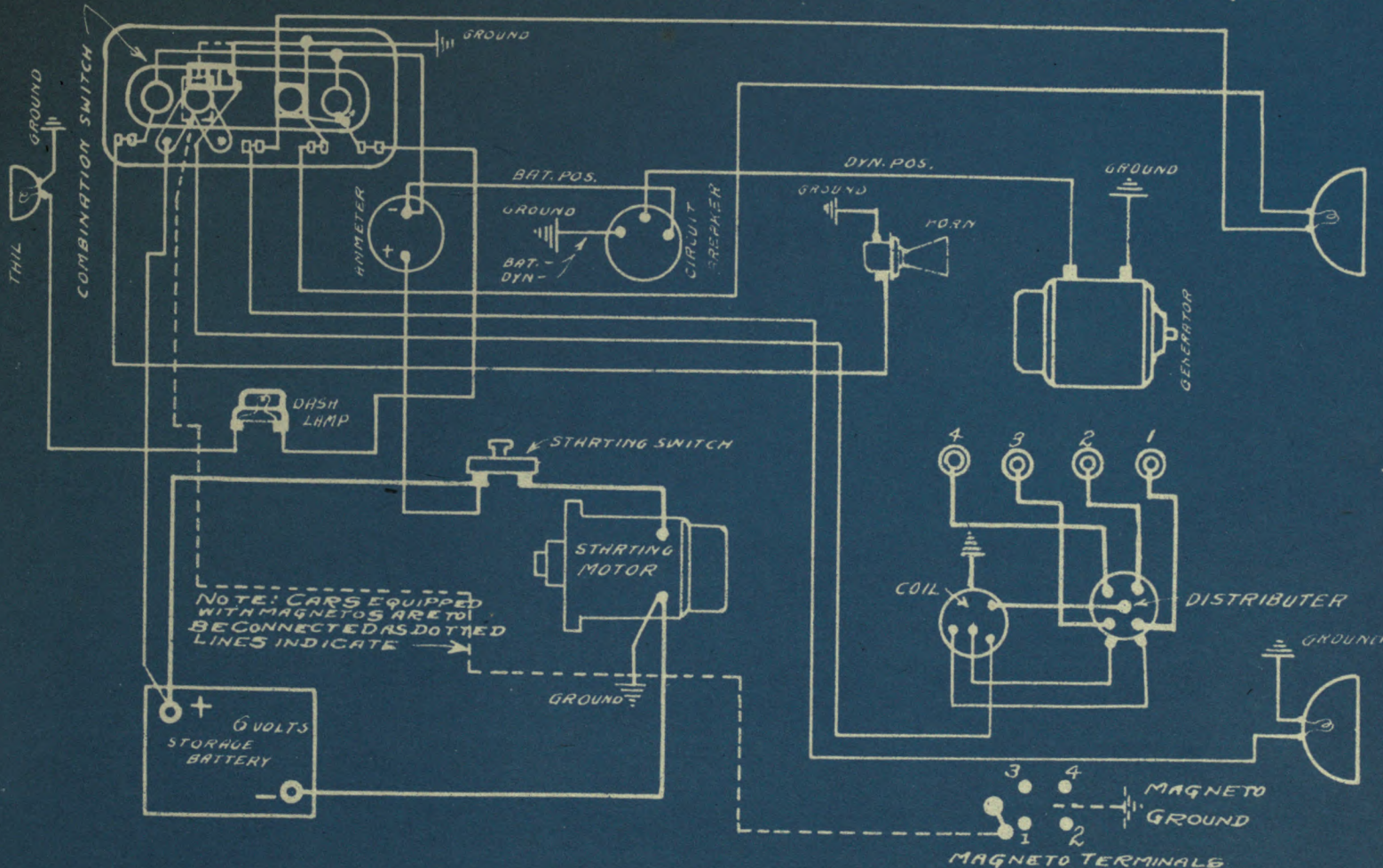
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OVERLAND 1916 75T & 75 LD

AUTO LITE SYSTEM

-CARS 33850 TO 55000-

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17590-15491 & 18926



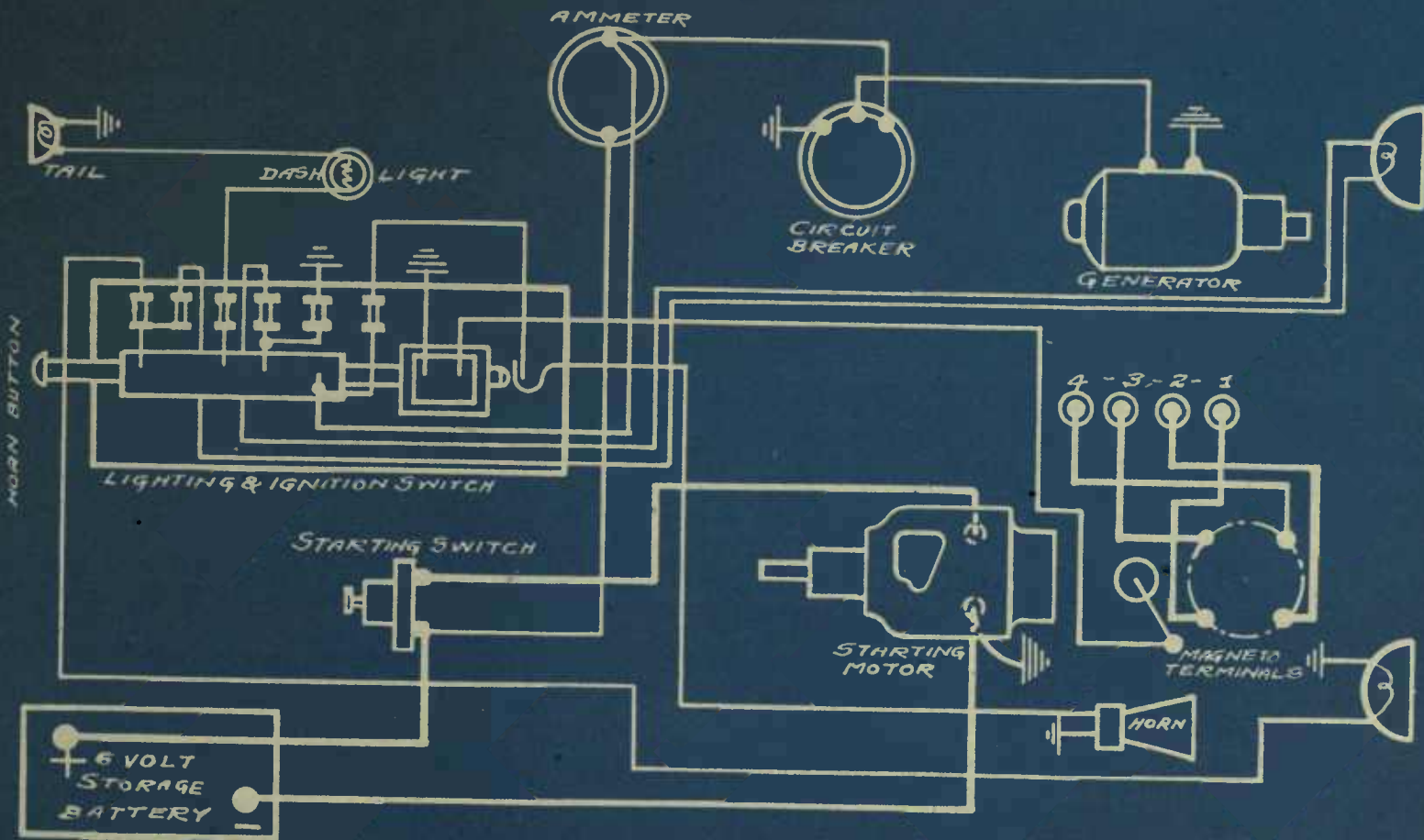
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OVERLAND 1916 83-LD-EX-T-R

AUTOLITE SYSTEM

FROM MFR 6.8-P-15277-14500 & 14630

USED ON EARLY CARS

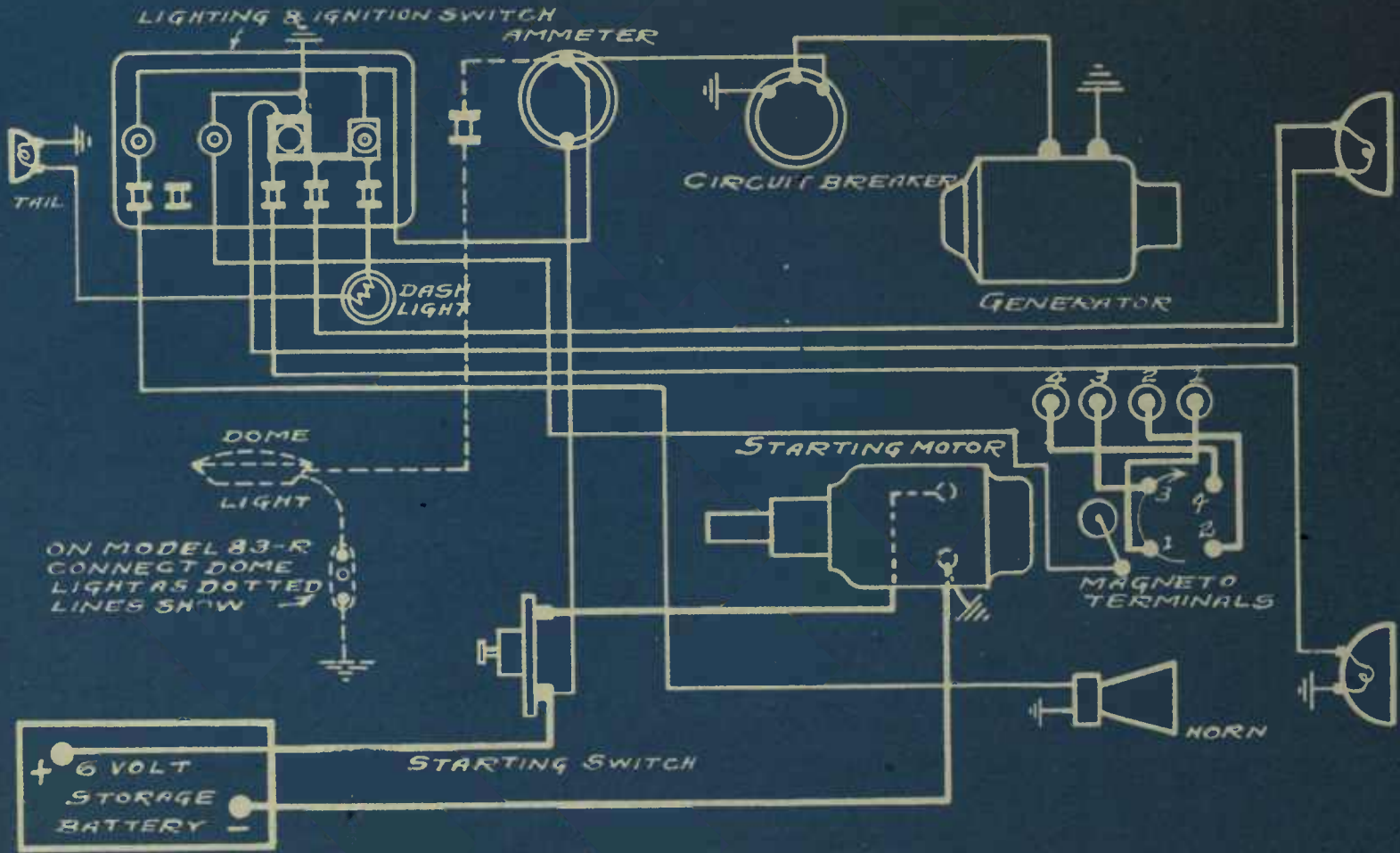


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OVERLAND 1916 AUTOLITE SYSTEM

83-T-EX-LD-B-D-E&R.
FROM MFRS. B-P5. 16006-16004-16003-15987R19466
USED ON LATE MODELS



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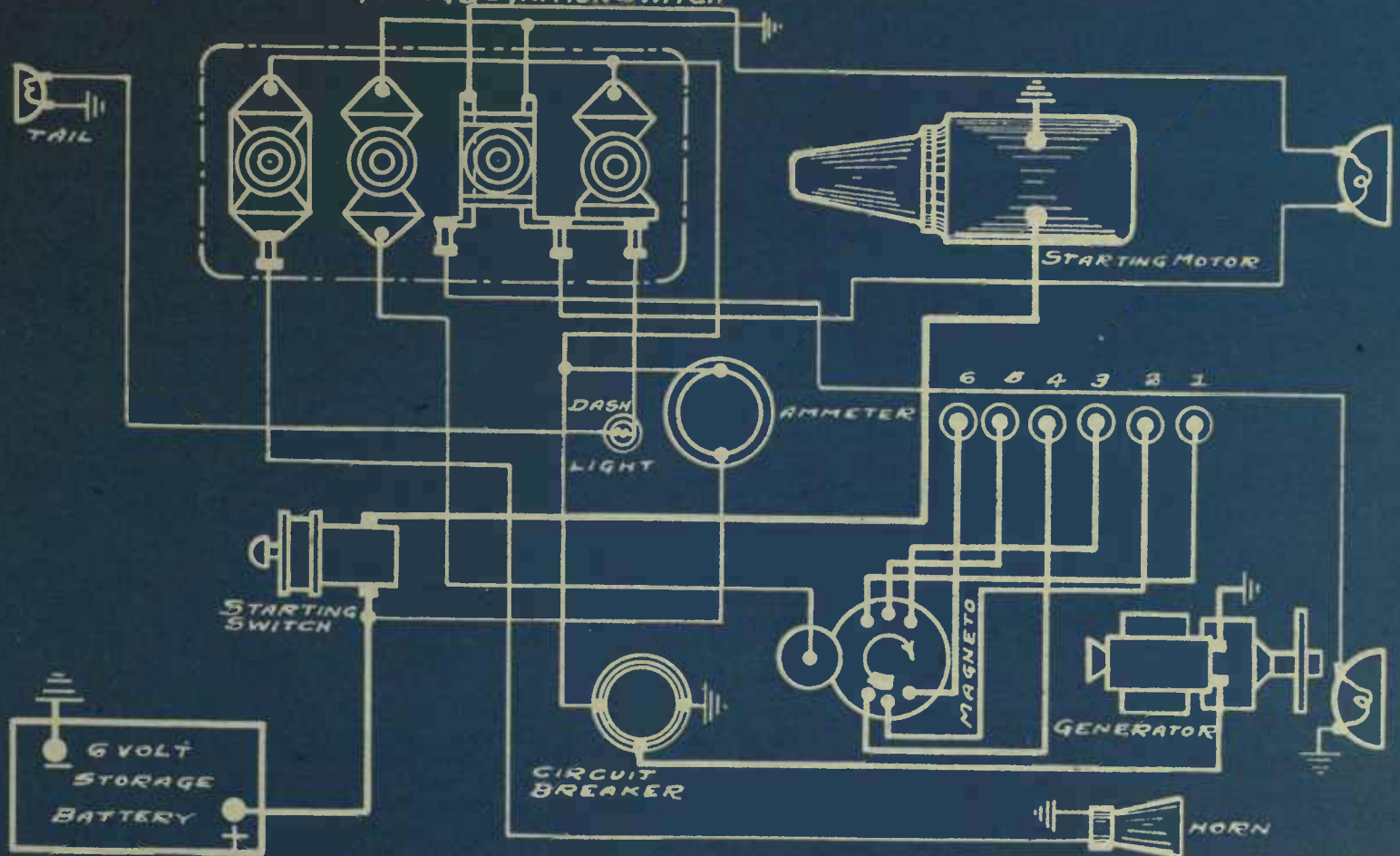
OVERLAND 1916 86

AUTOLITE SYSTEM

USED AFTER FIRST 2150 CARS

LIGHTING & IGNITION SWITCH

FROM MFRS. B/P 15843

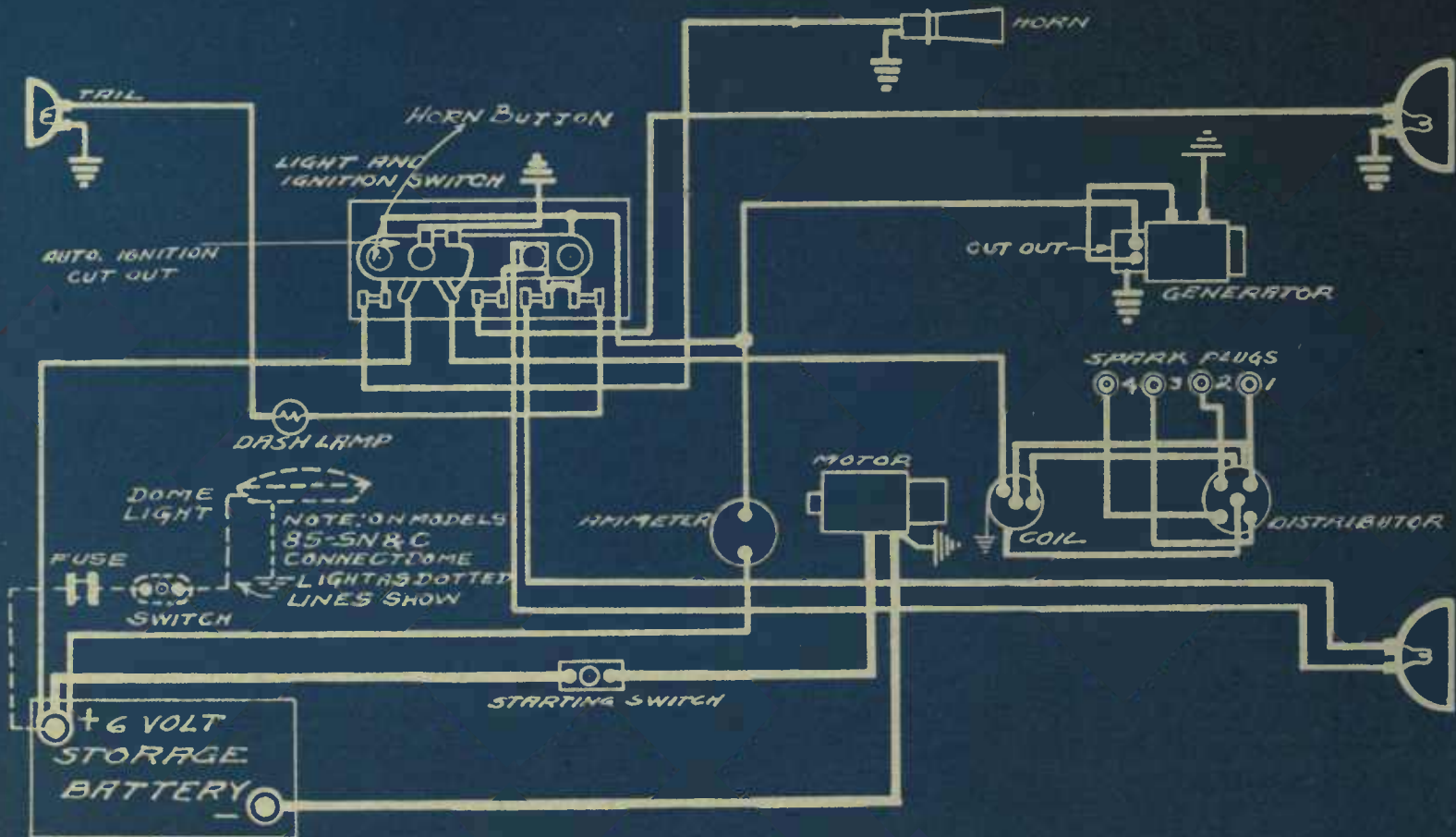


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OVERLAND 1917 MODEL 85-4--T-R-C&5N

AUTOLITE SYSTEM

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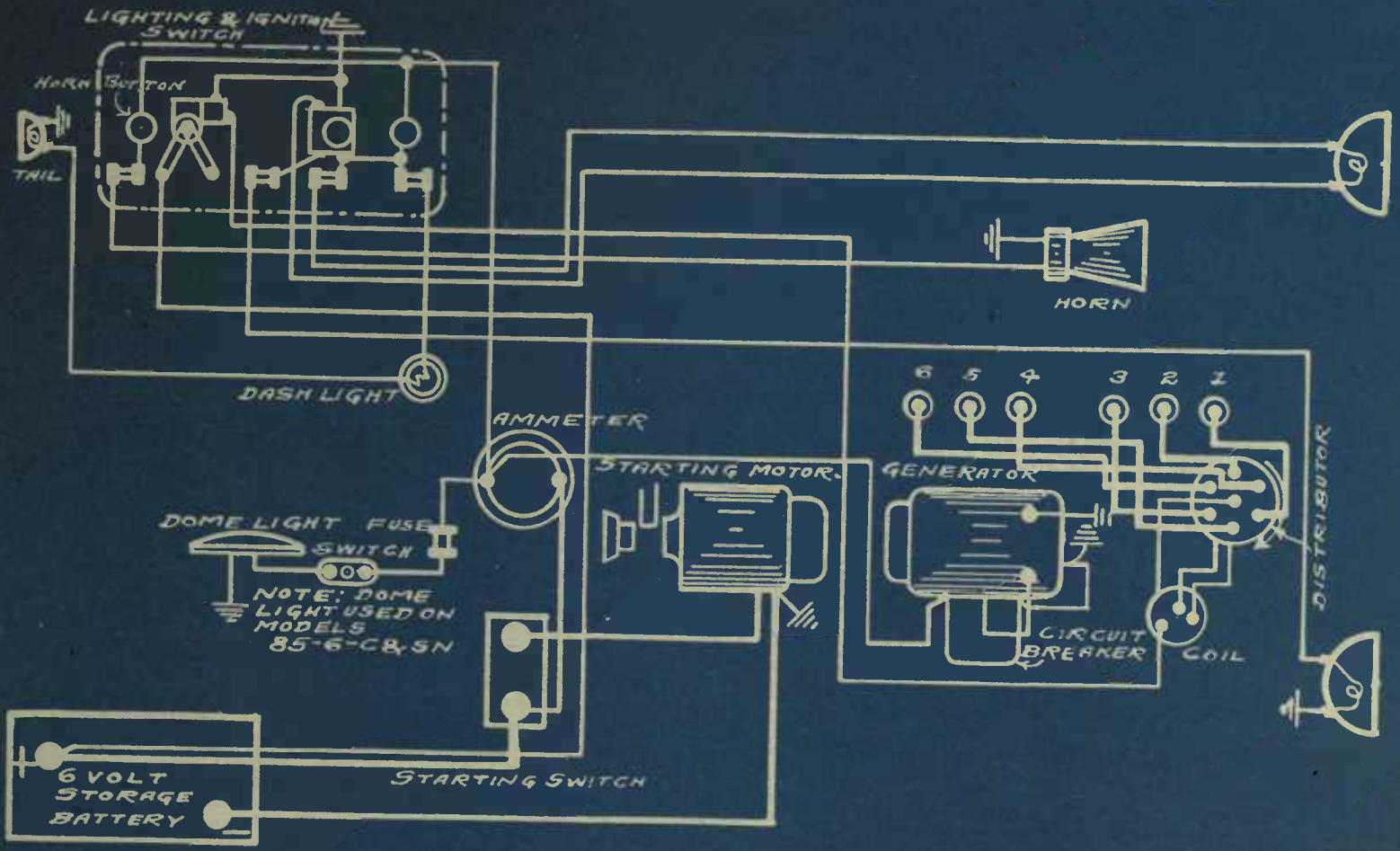


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AUTOLITE SYSTEM

85-6-C-SN-T-R

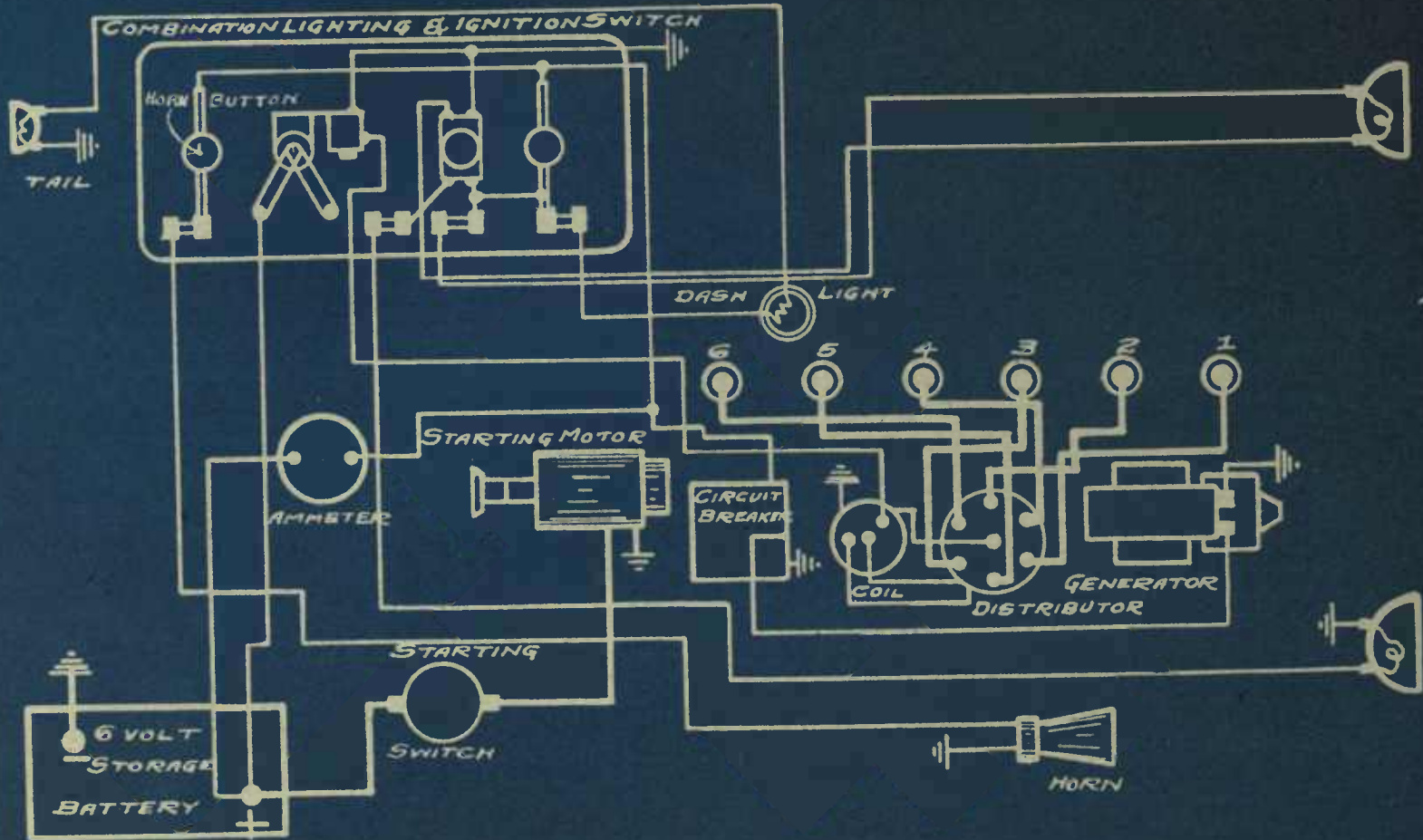
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OVERLAND 1917 86-B AUTO-LITE SYSTEM

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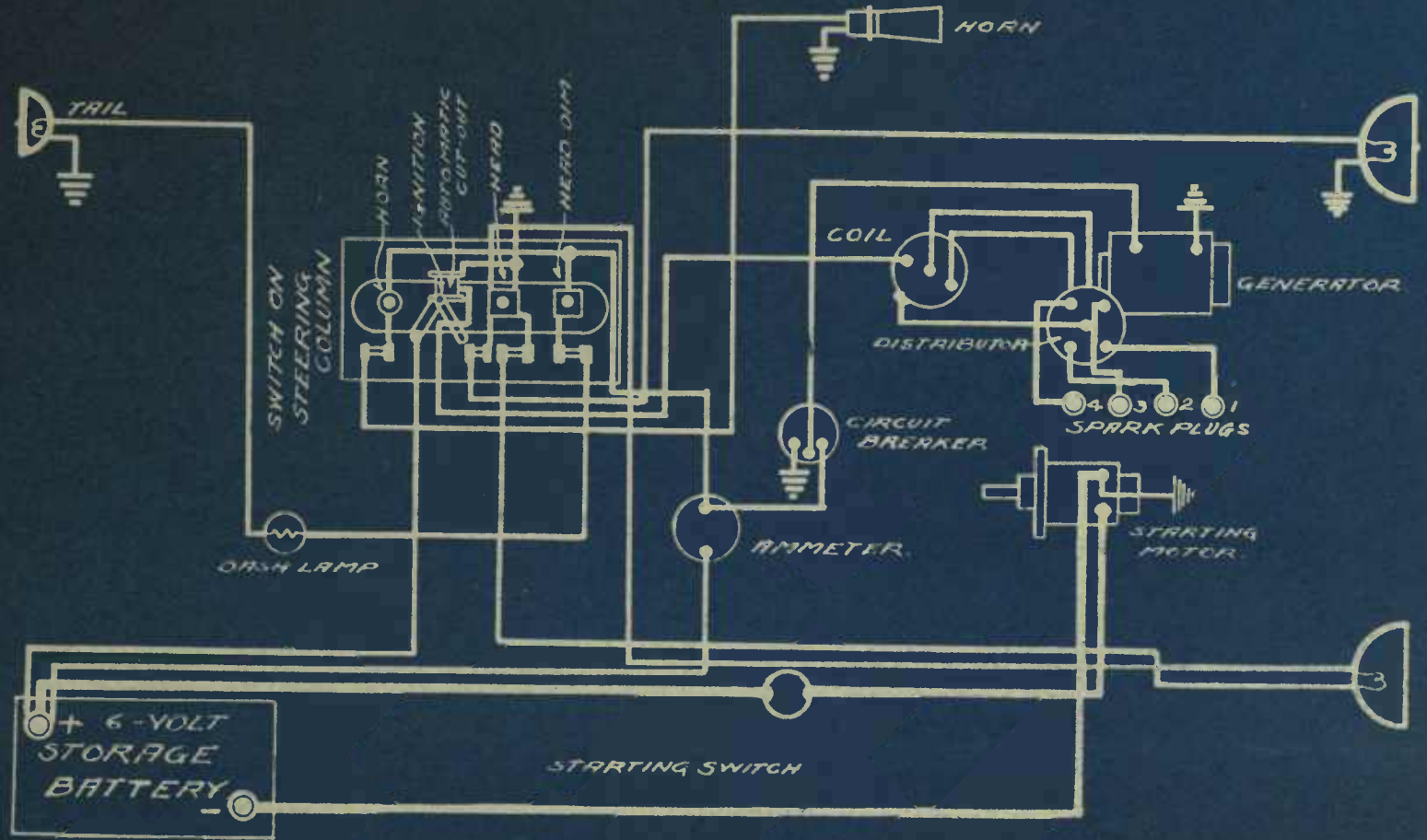


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OVERLAND 1917 MODEL 90-T & 90-CL-R AUTOLITE SYSTEM

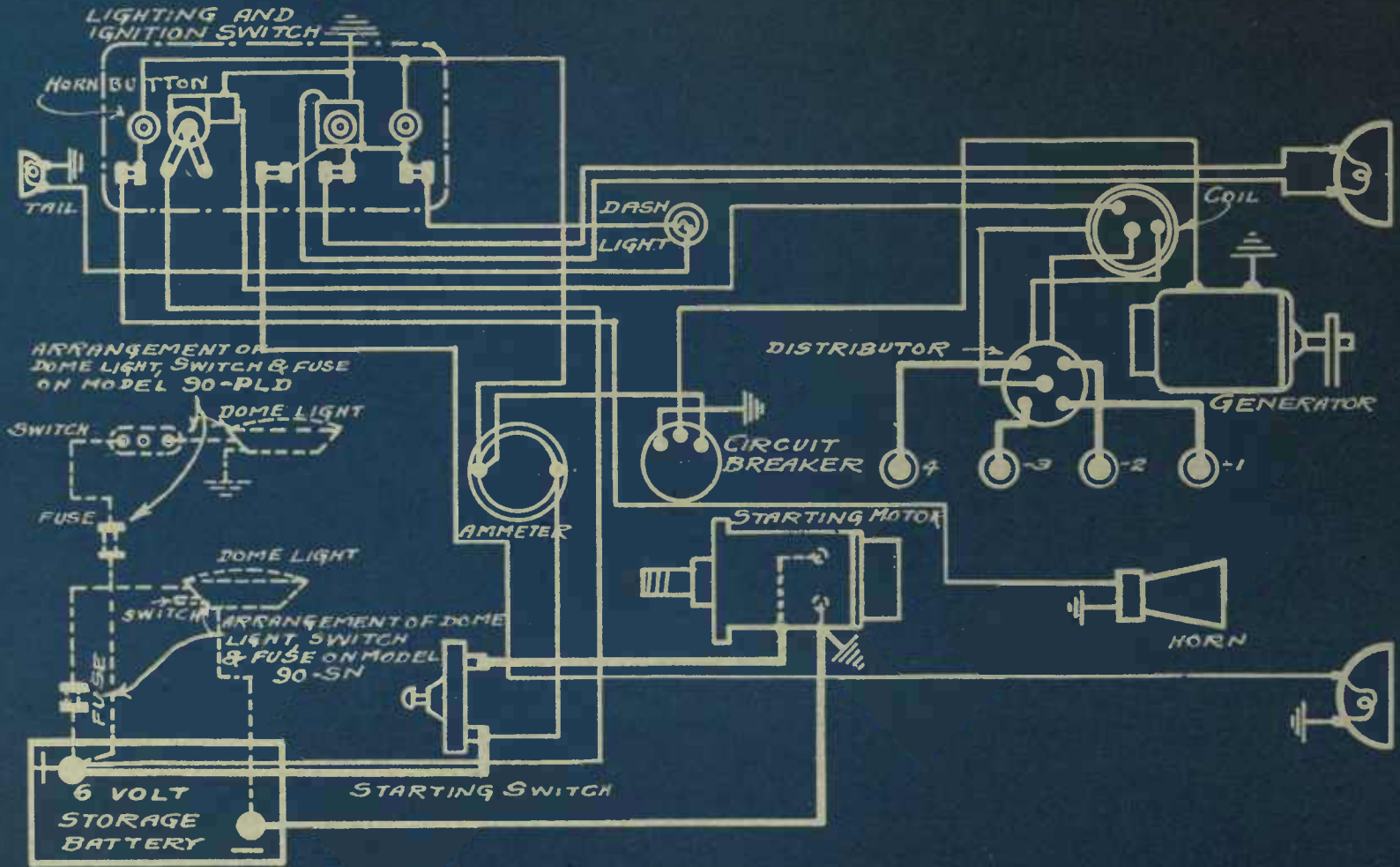
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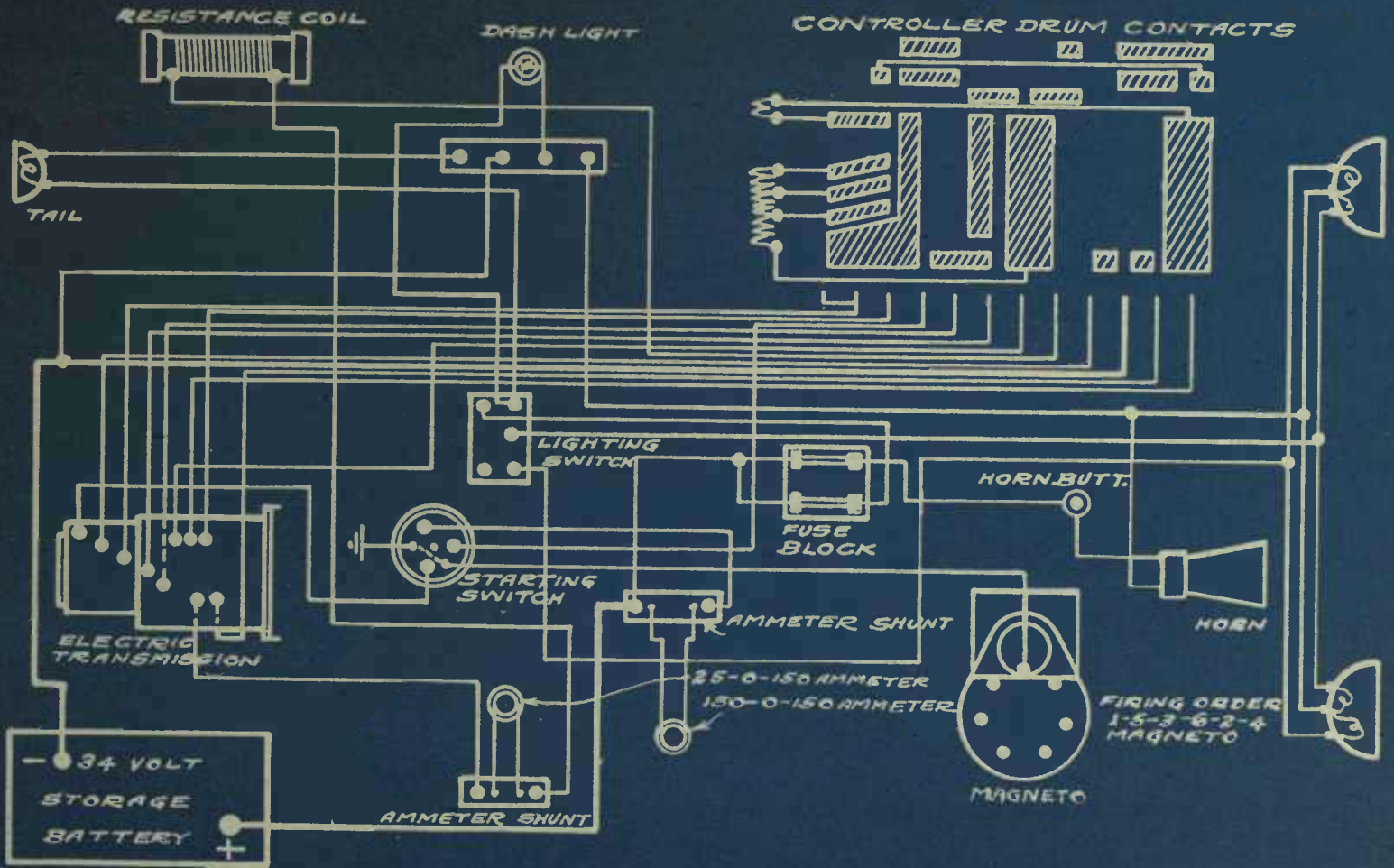


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OWEN MAGNETIC-0-36-1917

OWEN SYSTEM

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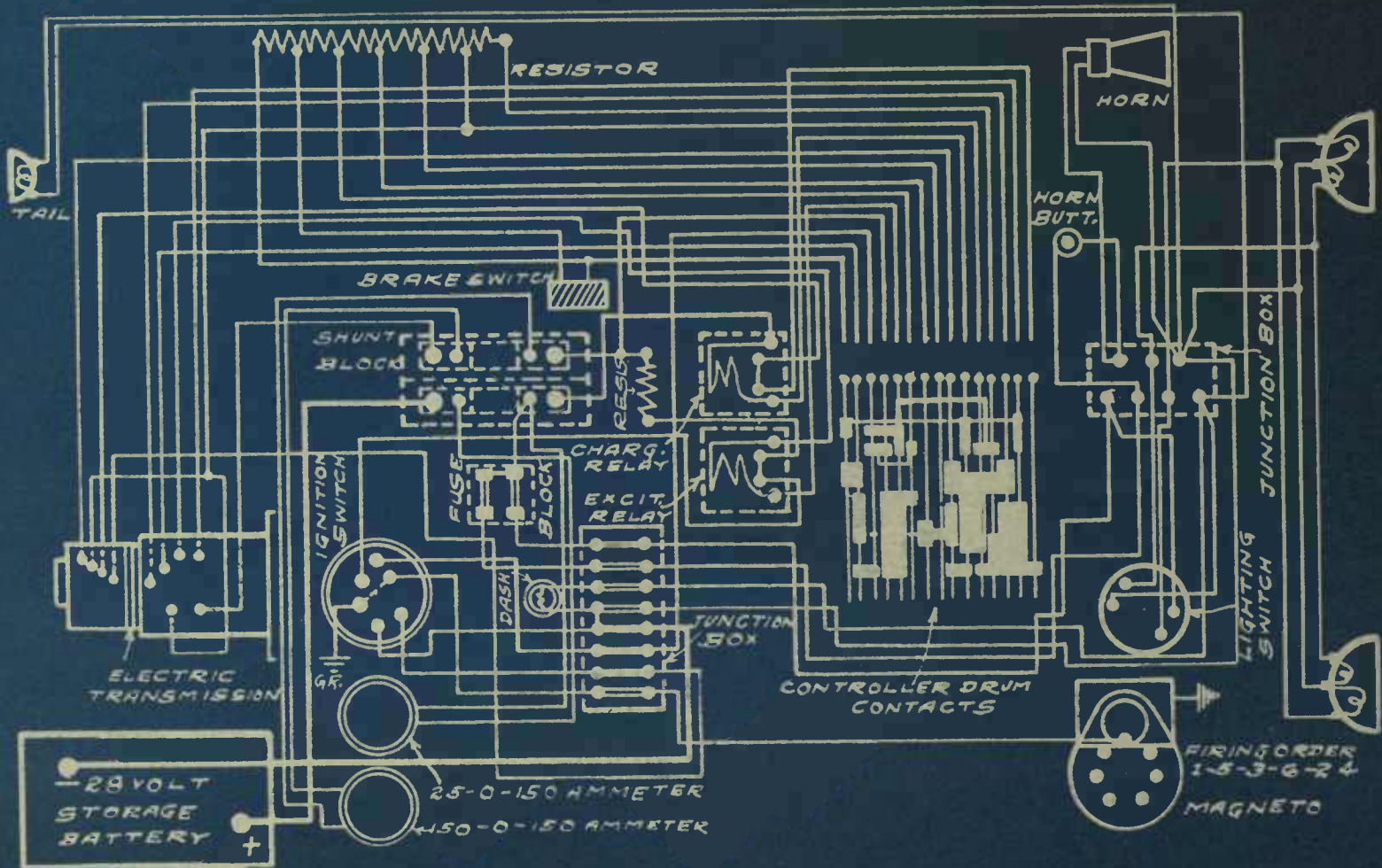


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OWEN MAGNETIC 1918-19 "42"

OWEN SYSTEM

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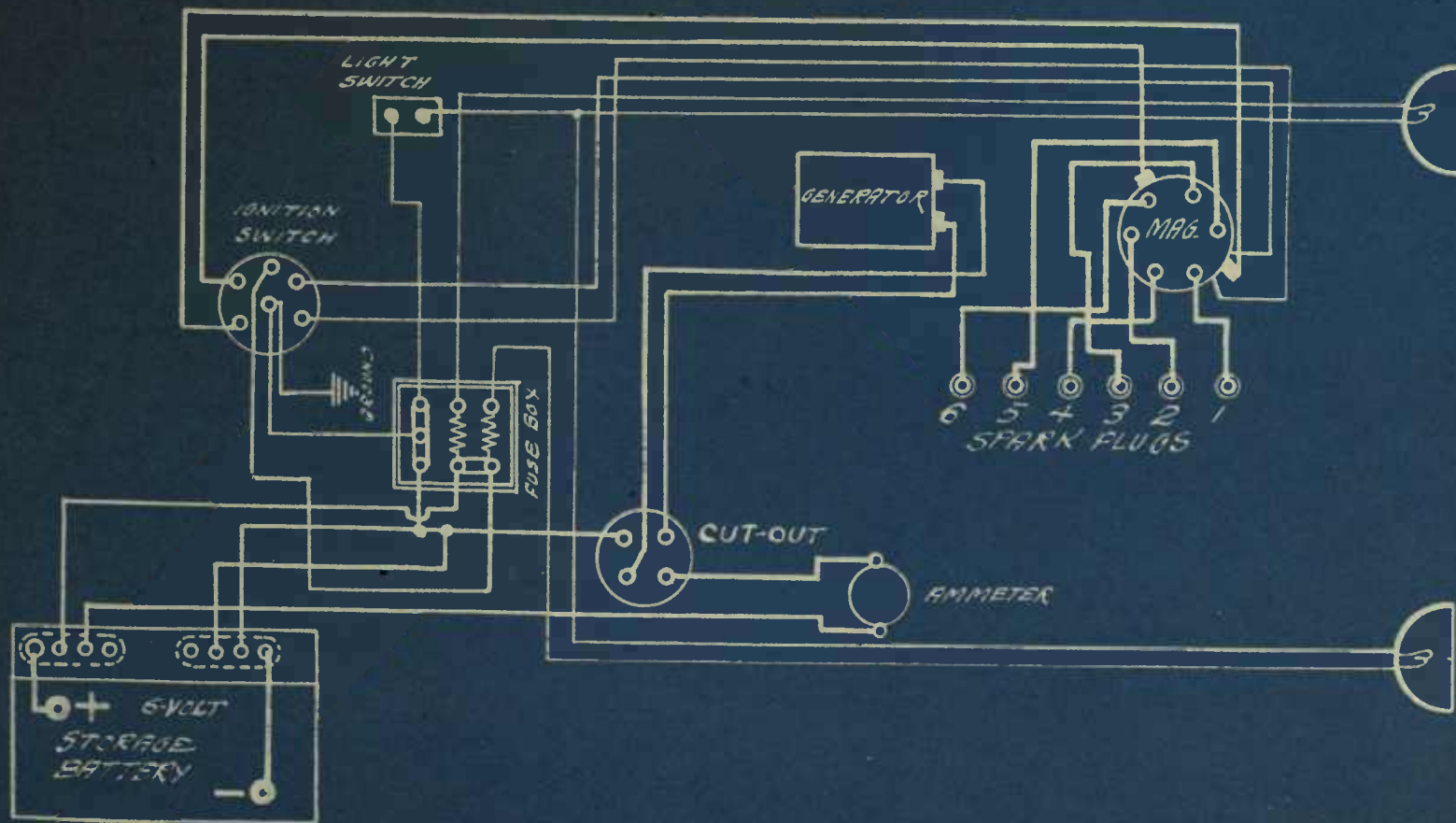


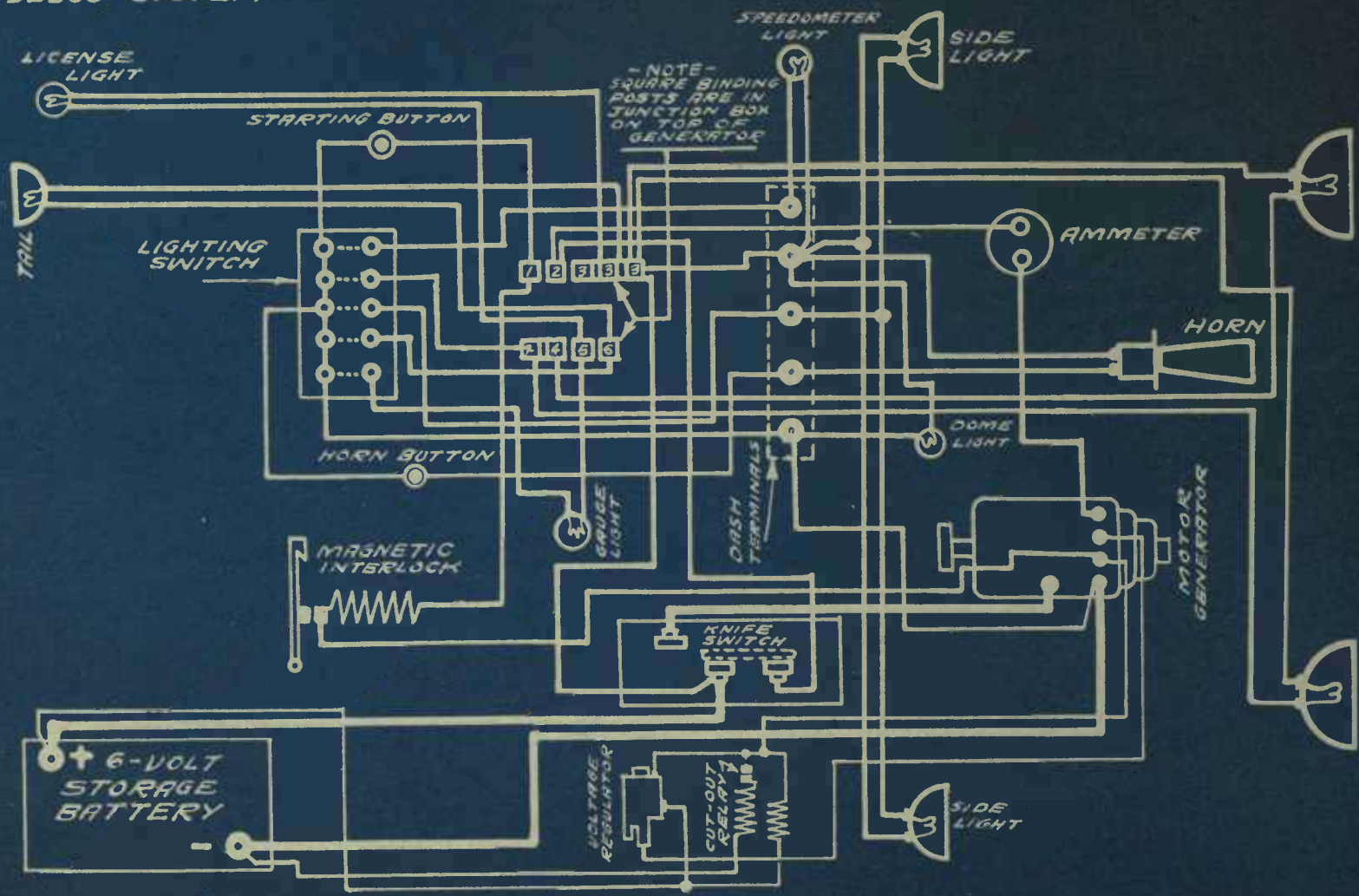
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BIJUR SYSTEM

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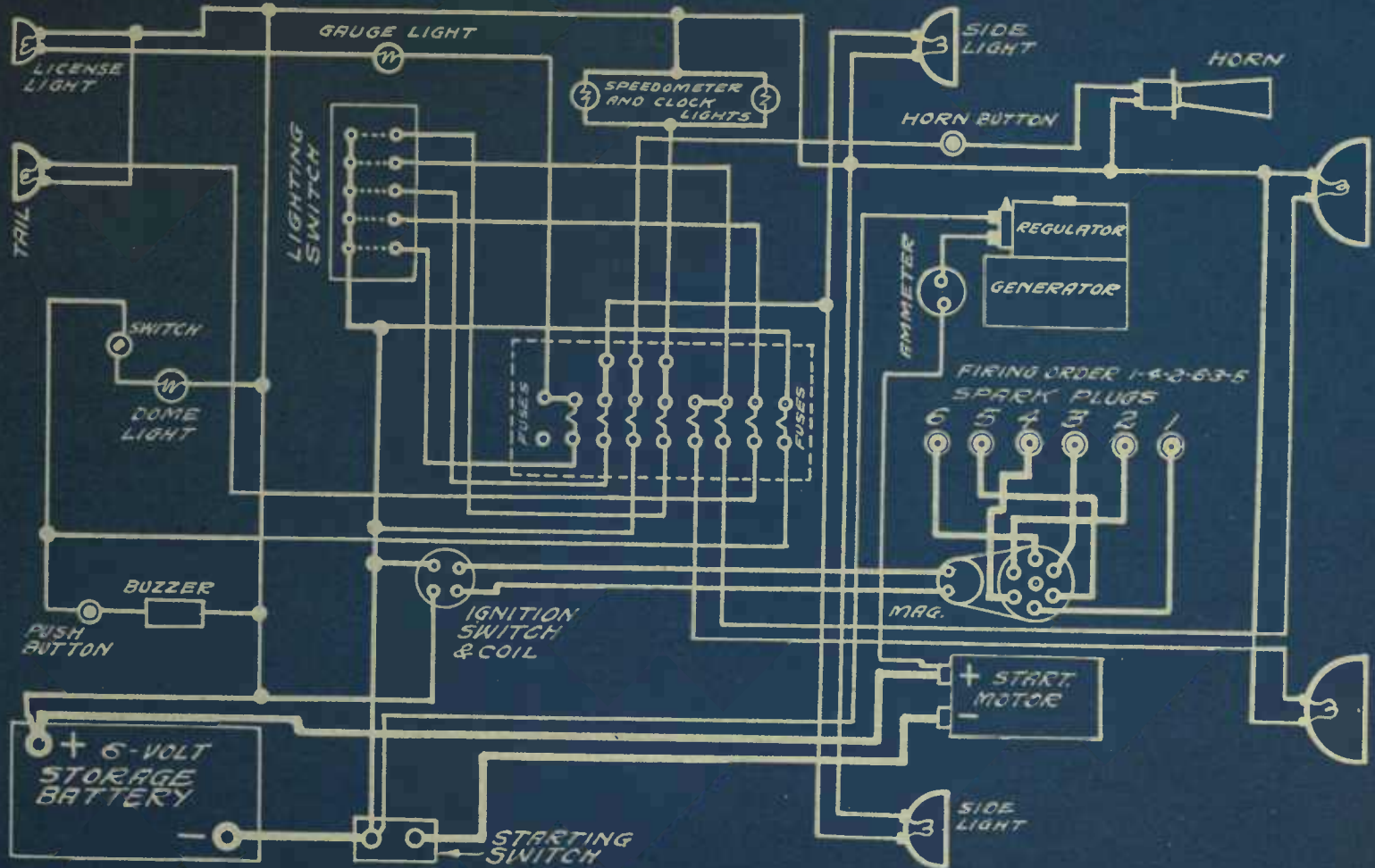
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BITUR SYSTEM

1914

2-38 & 4-48

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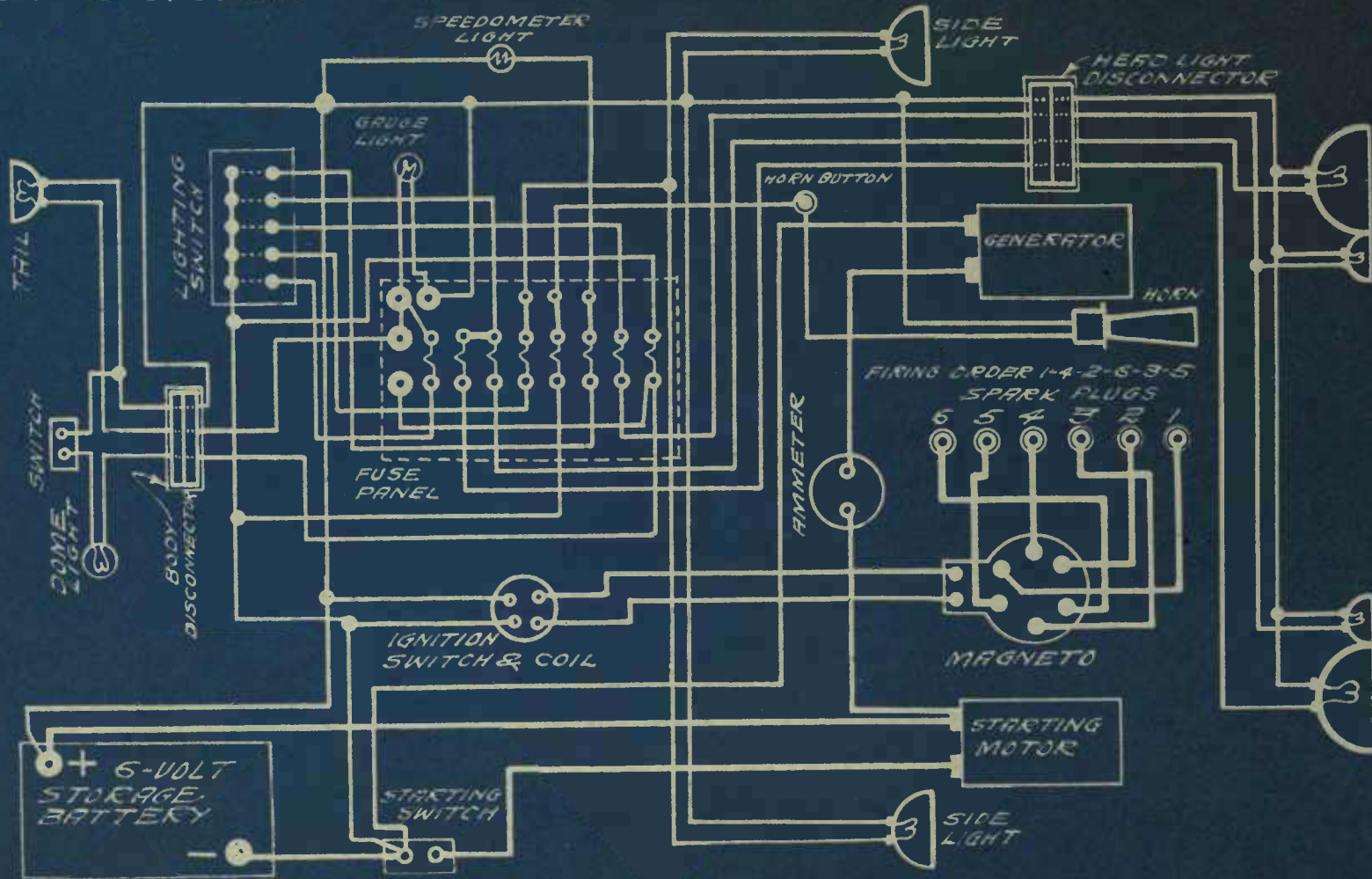
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BIJUR SYSTEM

1915

3-38 & 5-48

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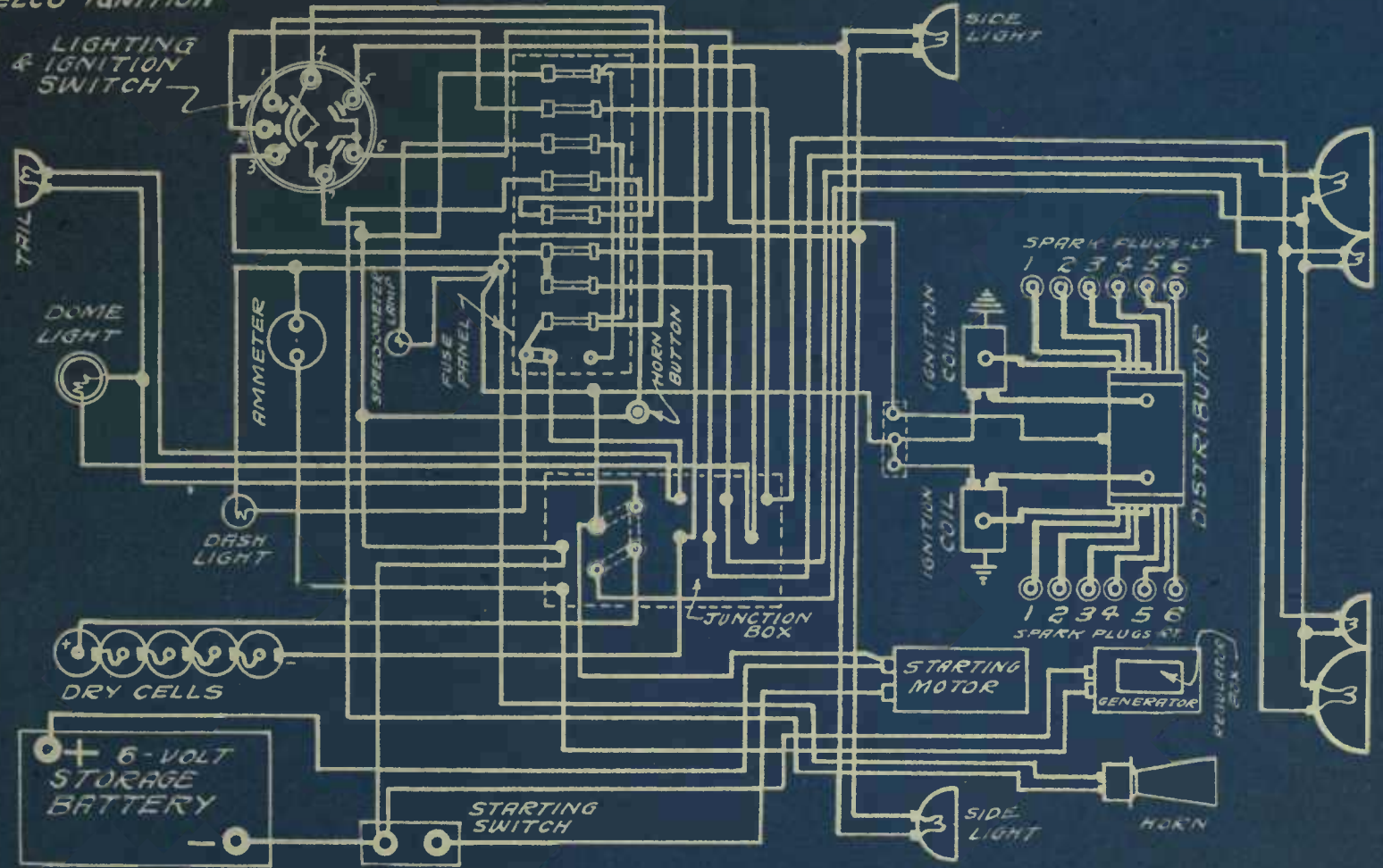


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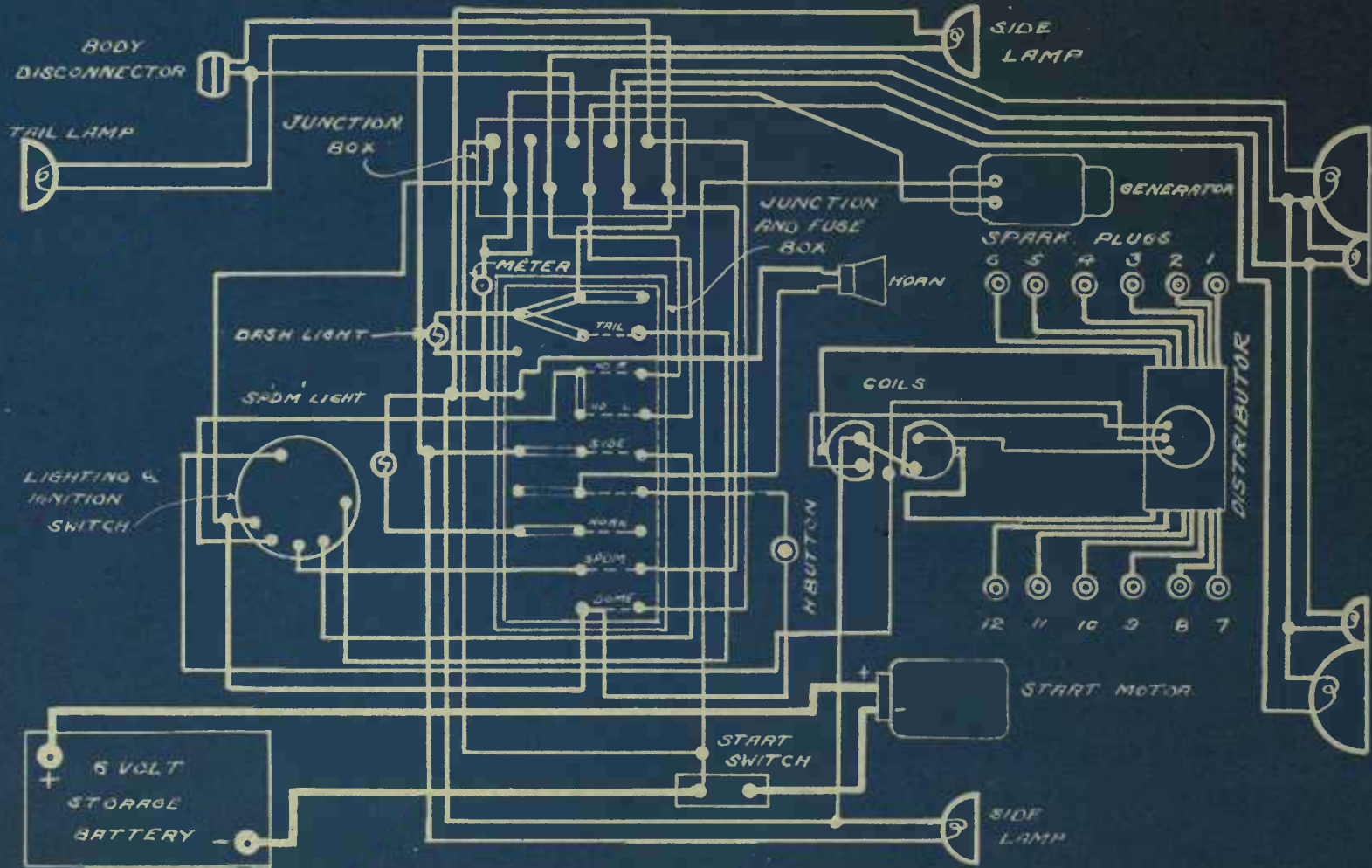
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BITUR SYSTEM
DELCO IGNITION

1916 125 & 135

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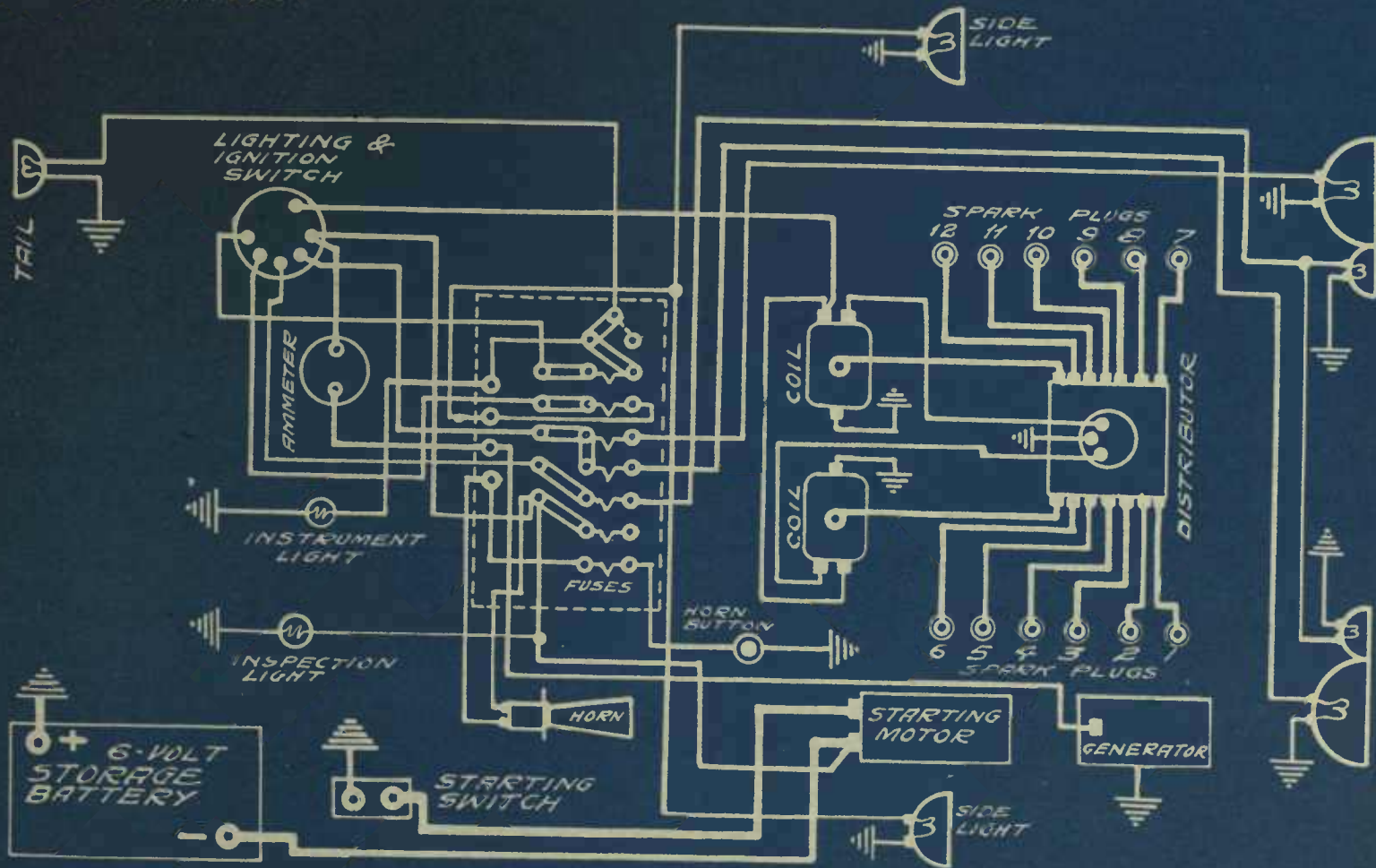


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PACKARD
BITUR SYSTEM
DELCO IGNITION

1918-19 3-25 & 3-35

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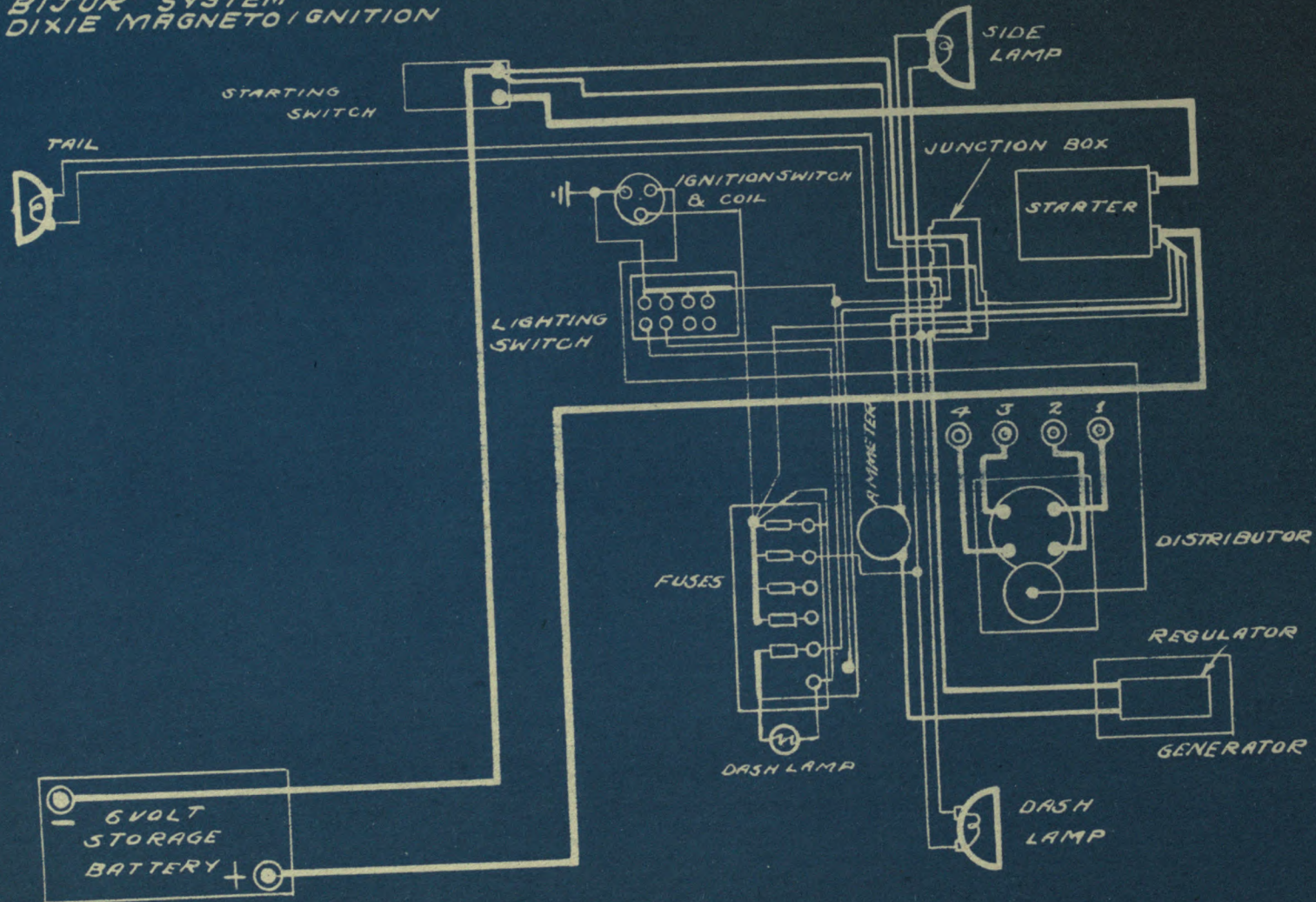
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PACKARD TRUCK

1918 E

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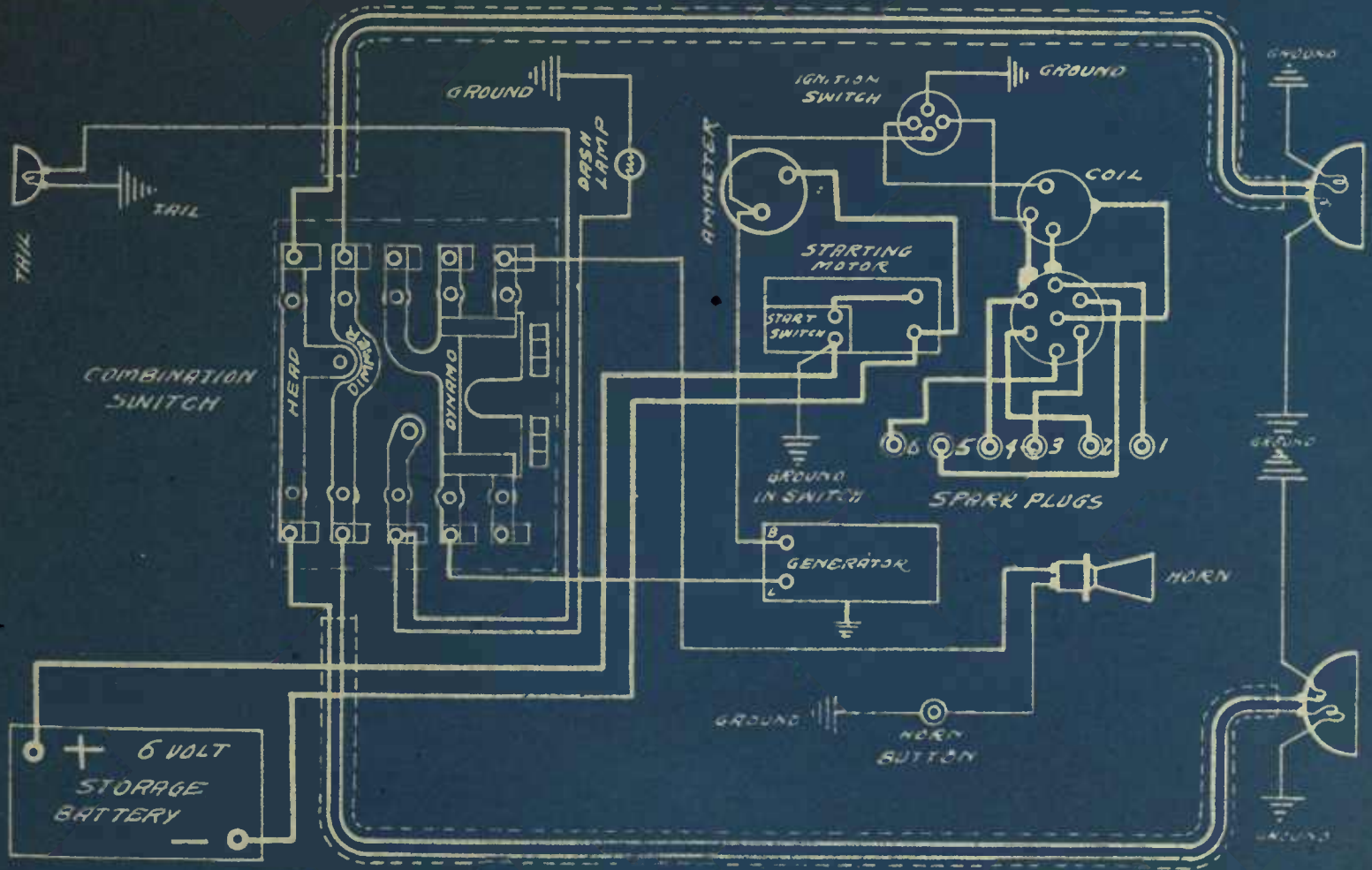
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PAIGE 1916 G-6 & H-6
GRAY & DAVIS SYSTEM

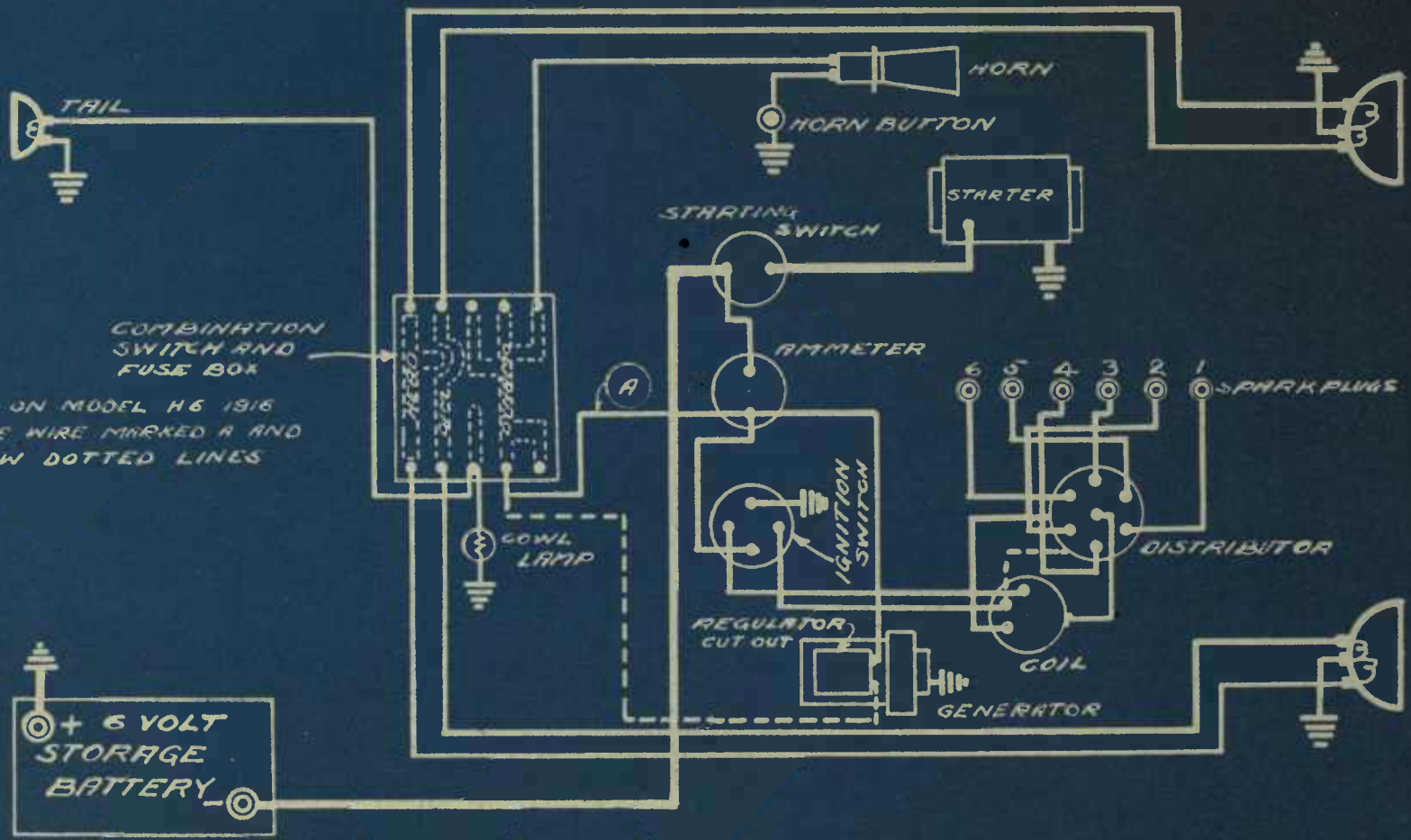
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PRIGE 1916-1917 6-46 6-38 H-6
 GRAY & DAVIS SYSTEM

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NOTE - ON MODEL H6 1916
 MOVE WIRE MARKED A AND
 FOLLOW DOTTED LINES

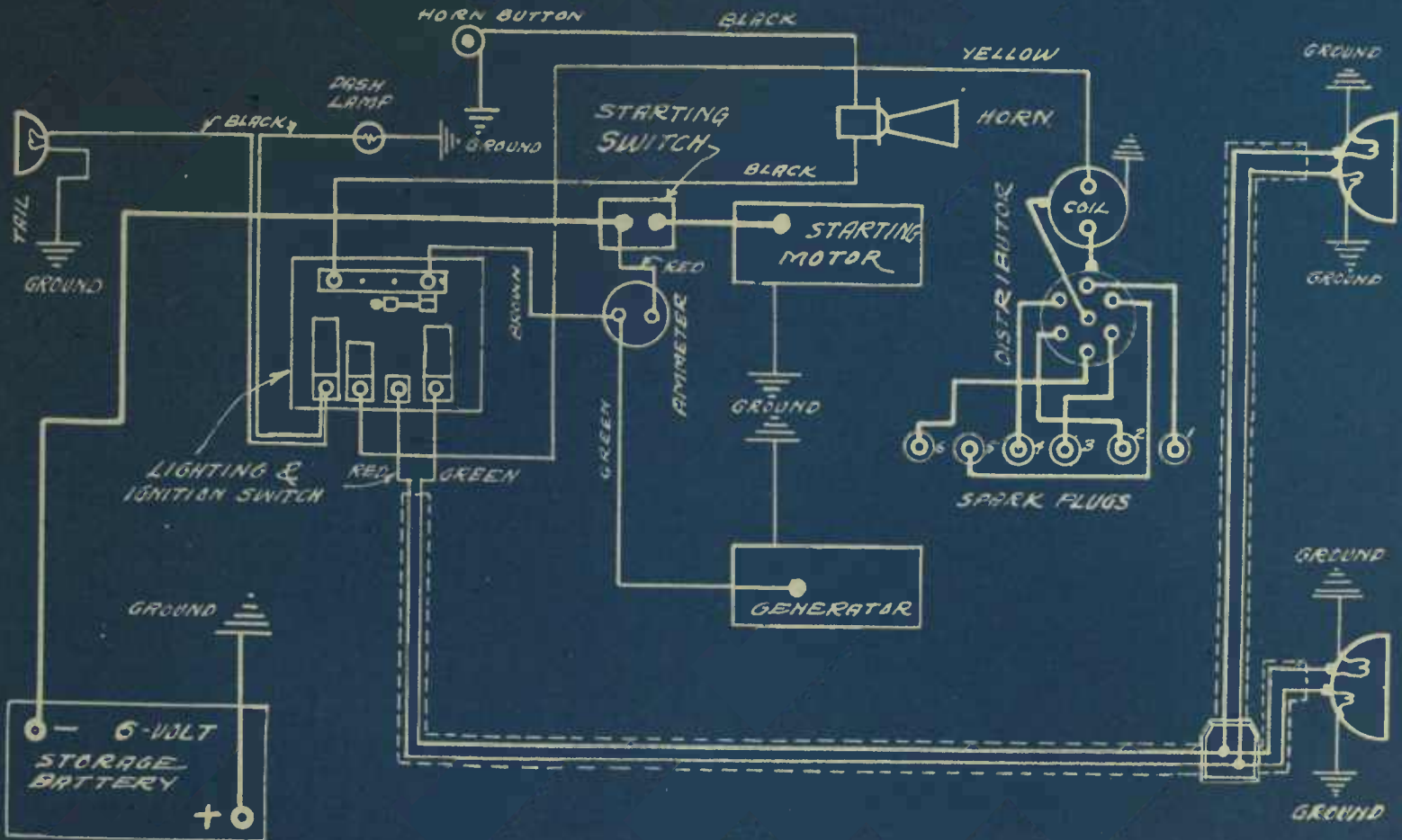
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PRIGE 1918-19.

6-39 & 6-55

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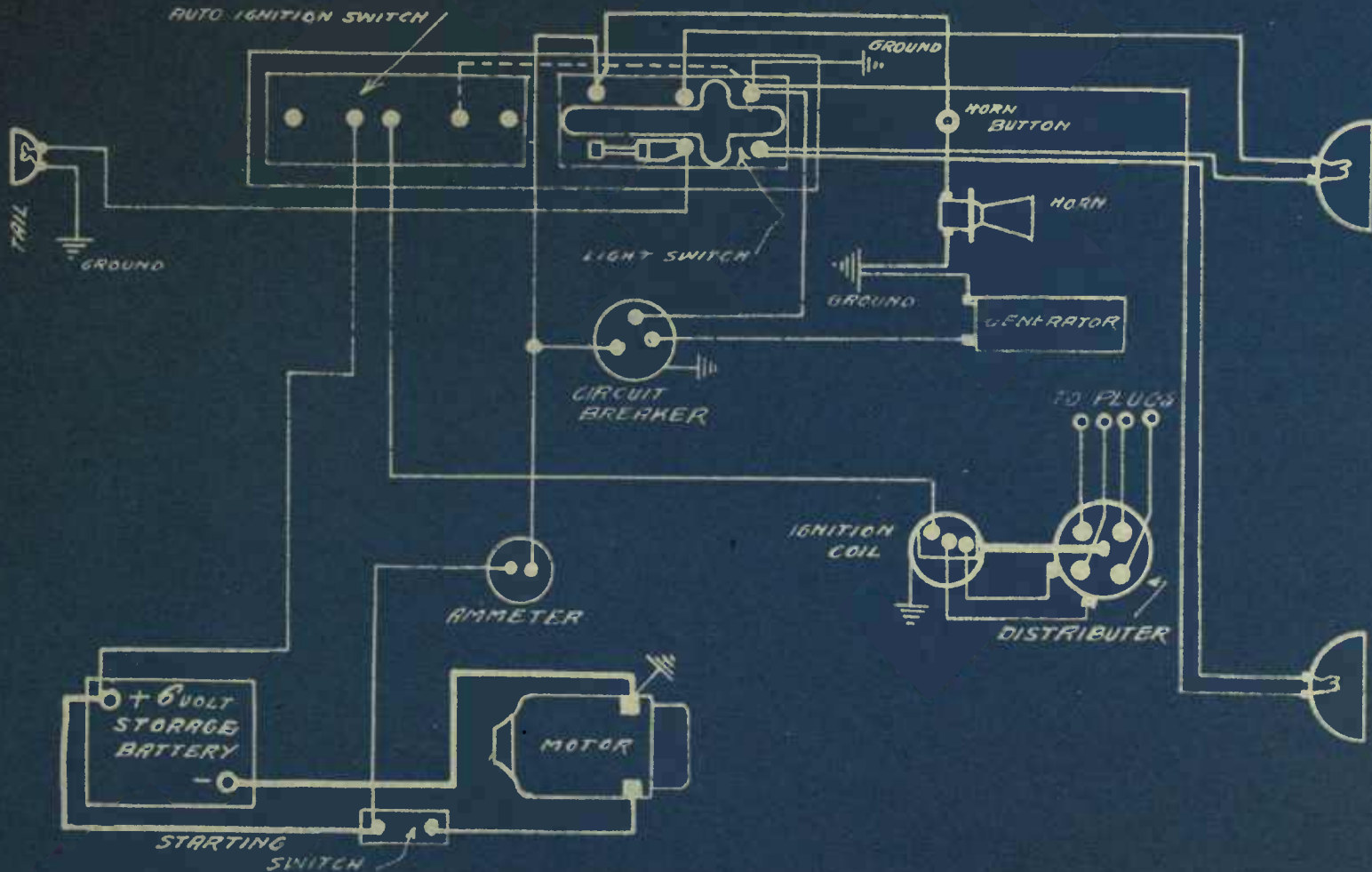
GRAY & DAVIS STARTING & LIGHTING SYSTEM WITH REMY IGNITION SYSTEM ON MODEL 6-39 CARS
REMY SYSTEM ON MODEL 6-55 AND 1919 MODELS.



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PANHARD TRUCKS MODELS "A"-"B" 1918
AUTOLITE SYSTEM

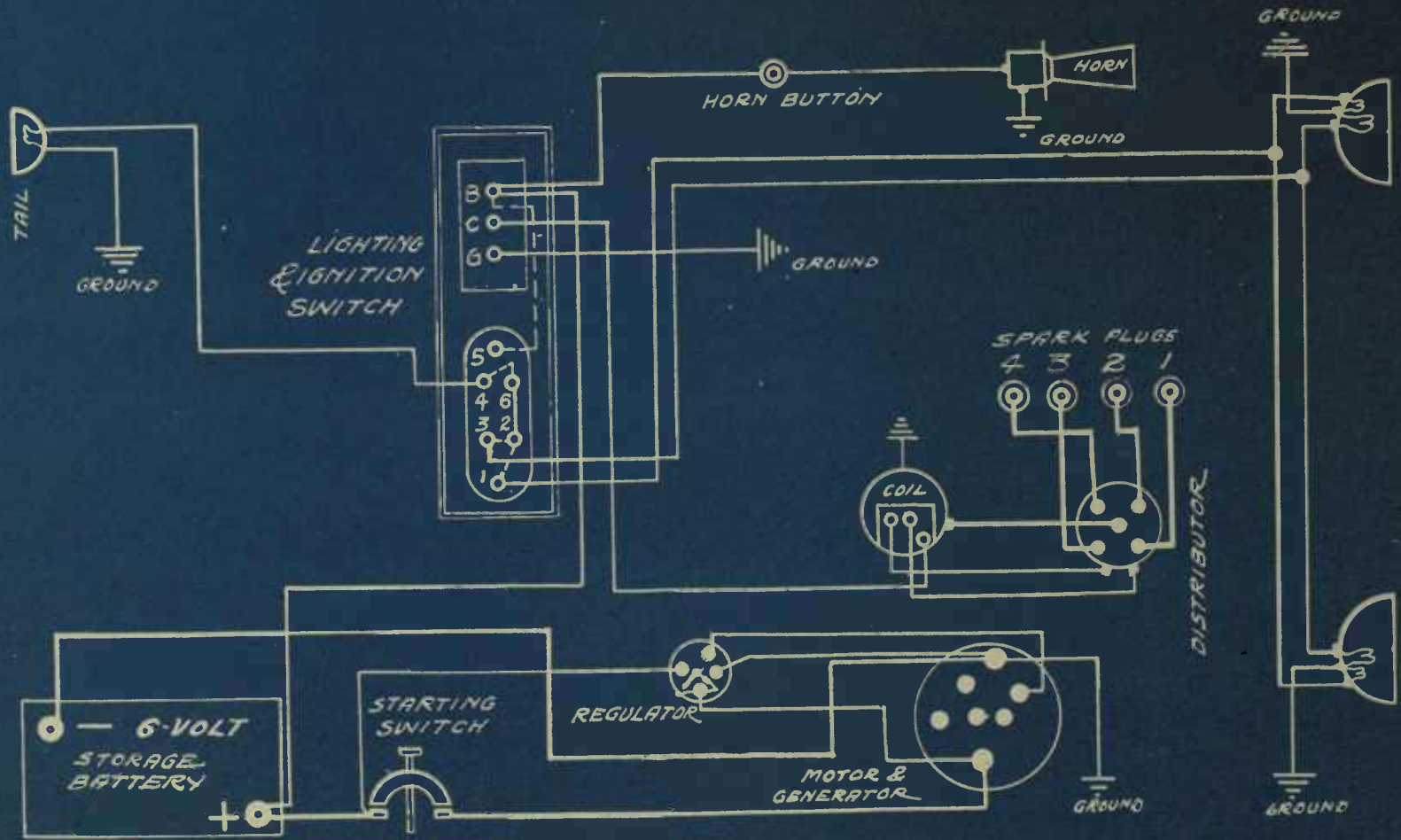
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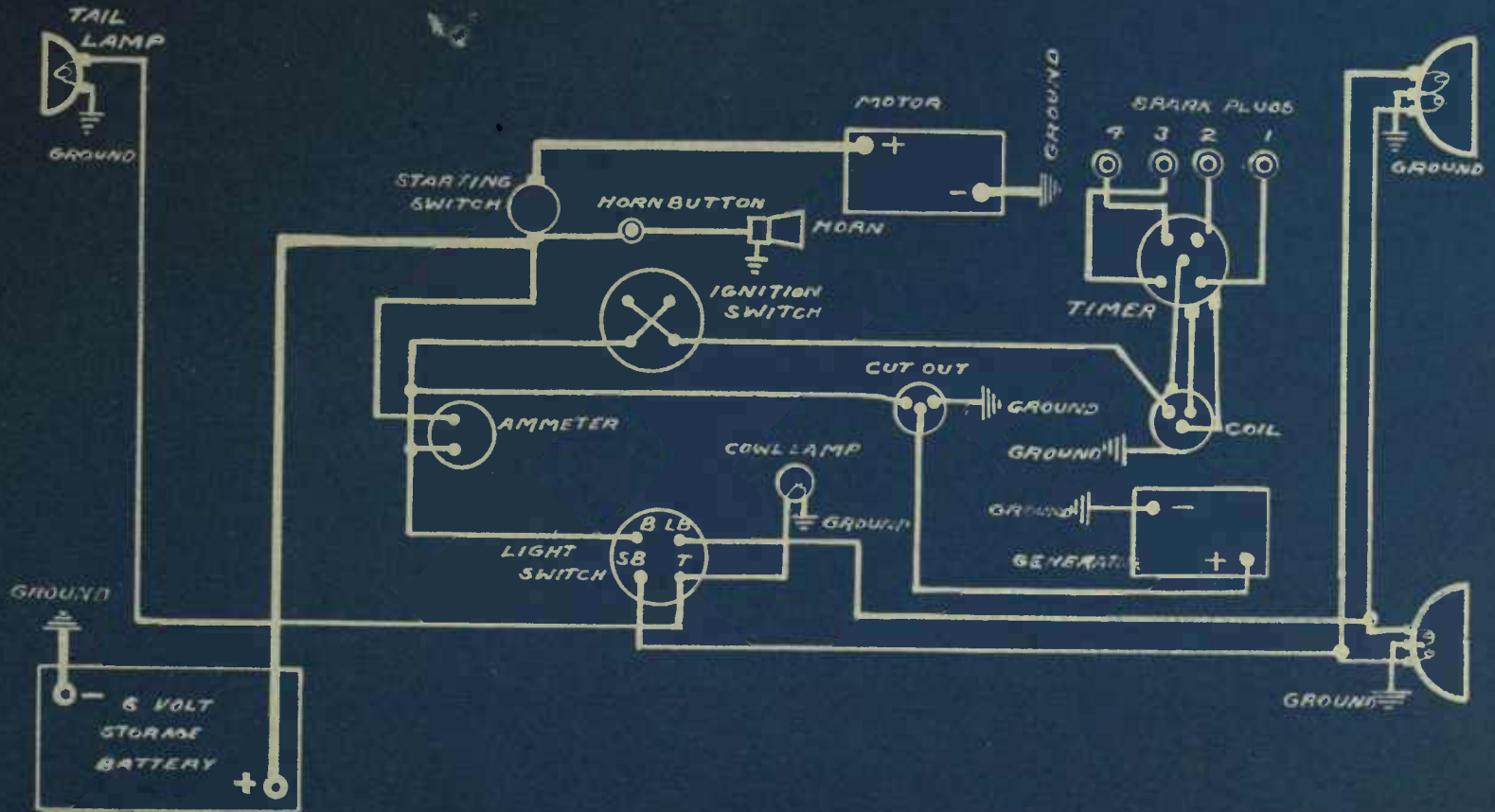
PARTIN-PALMER 1915 "38"
ALLIS-CHALMERS SYSTEM

FROM A.C. B.P. X-515

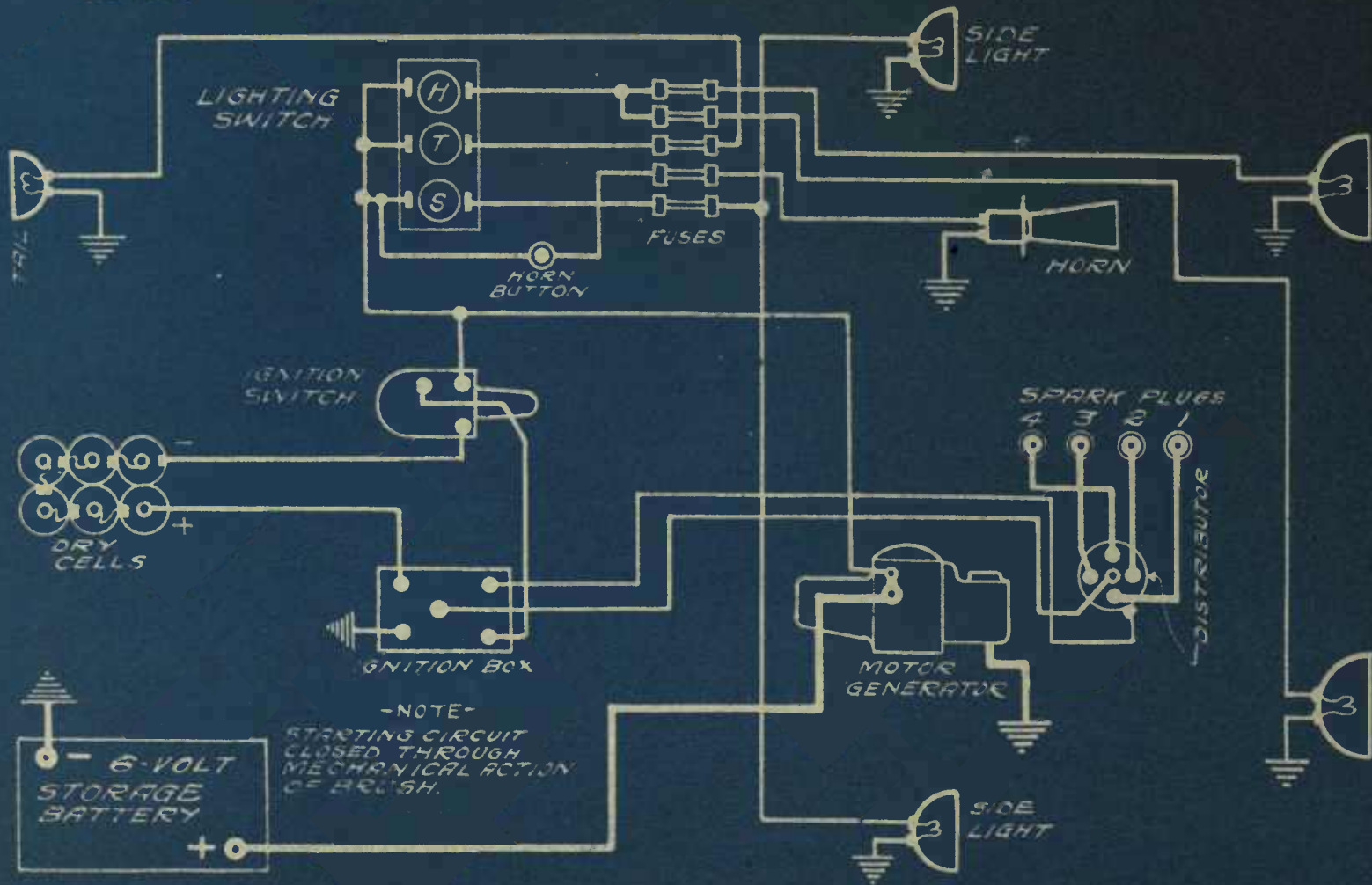


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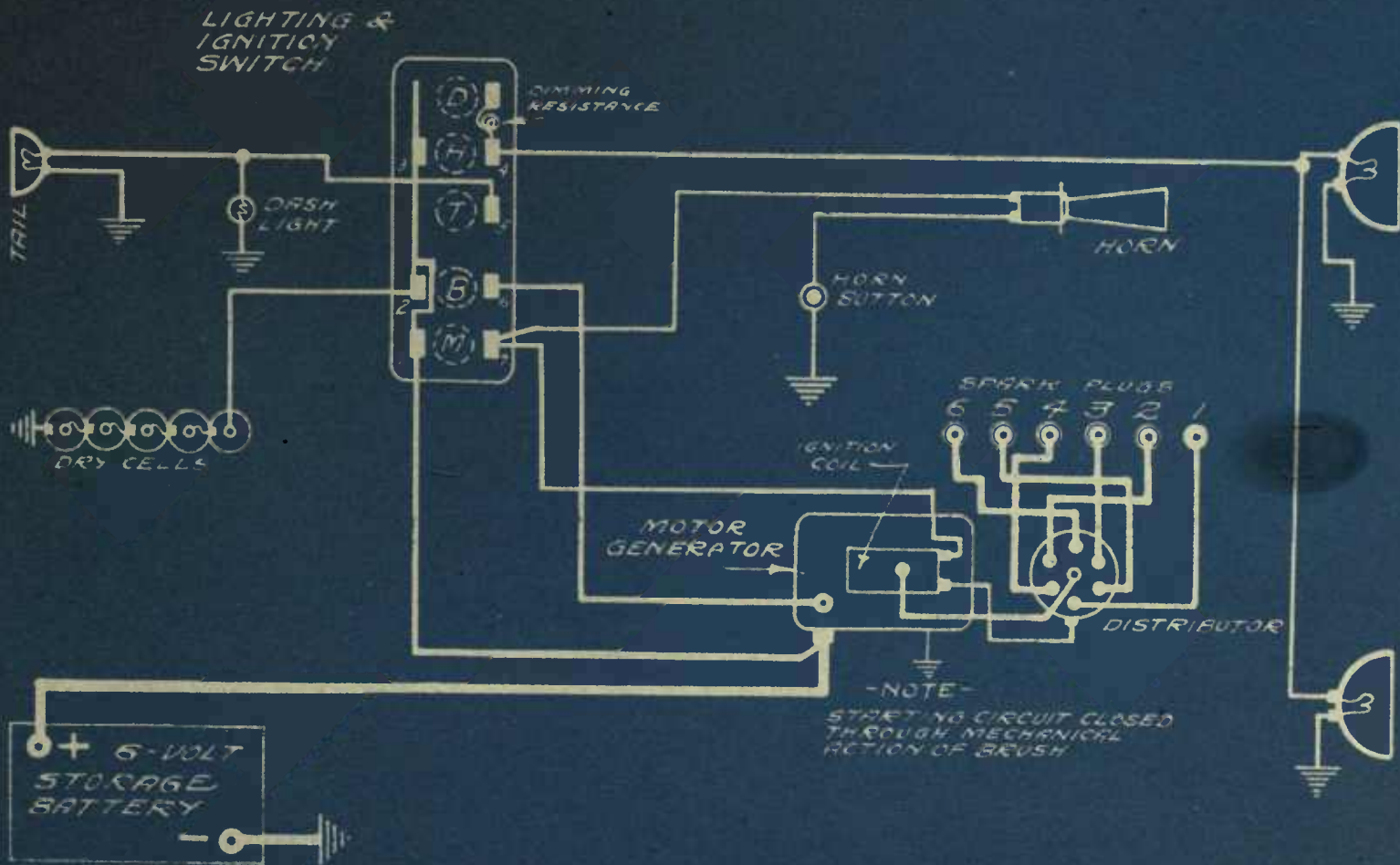
PARTIN-PALMER 1917 "32" AND 1918 "ULTRA 4-FORTY"
 DISCO SYSTEM FROM MFRS. R.P. 32345.



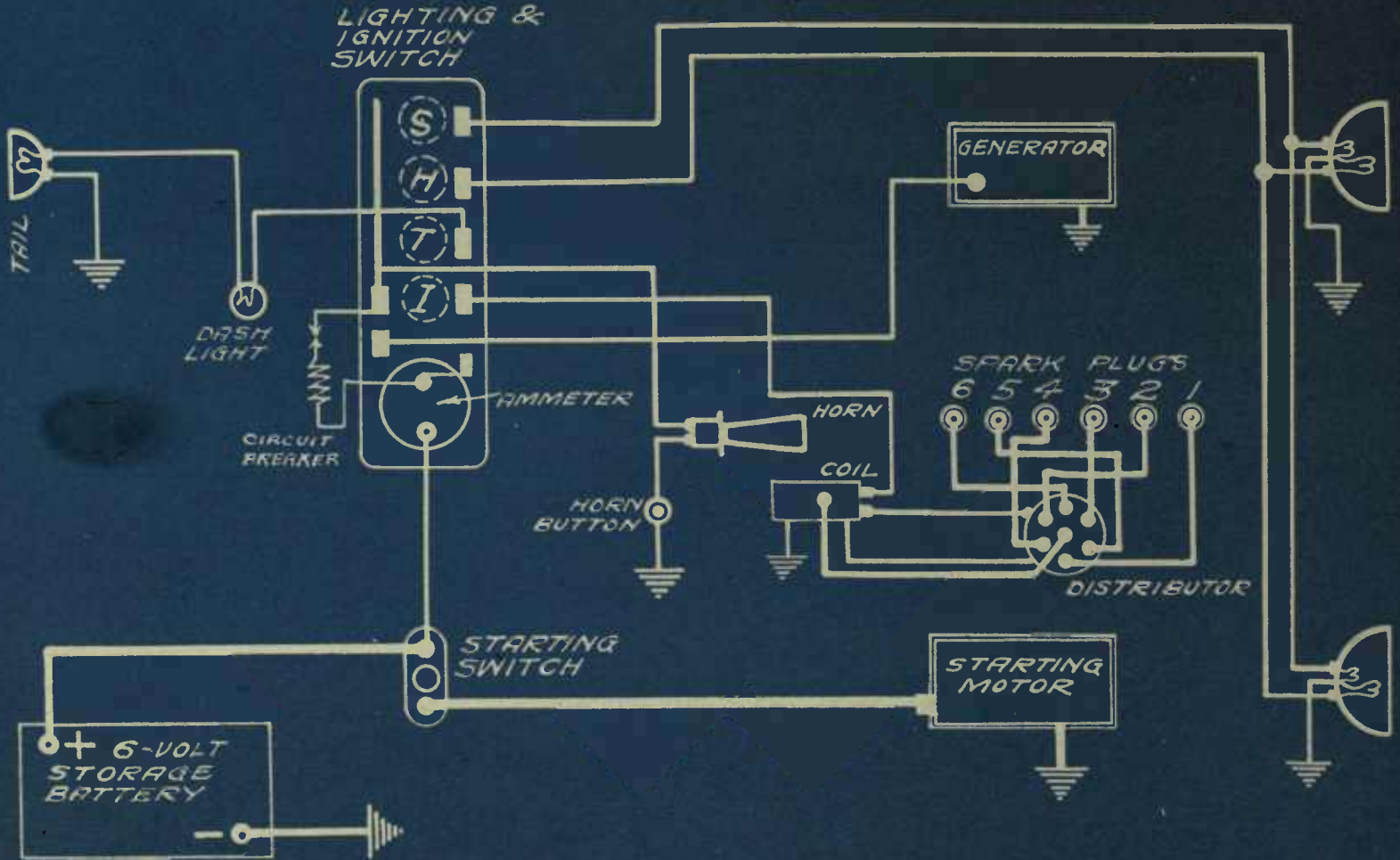
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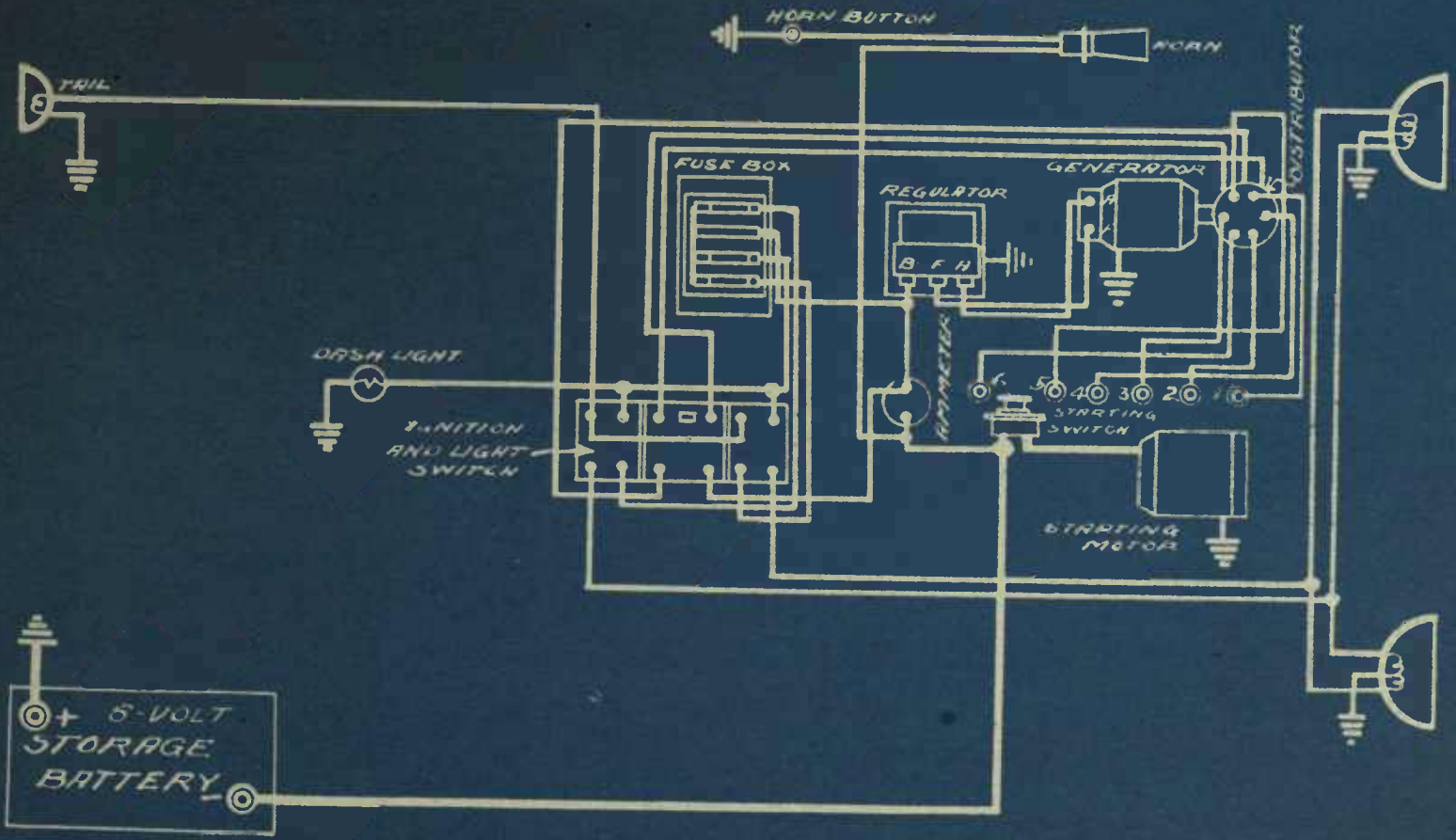
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PATHFINDER 1916 WESTINGHOUSE SYSTEM

FROM WEST. MANUAL

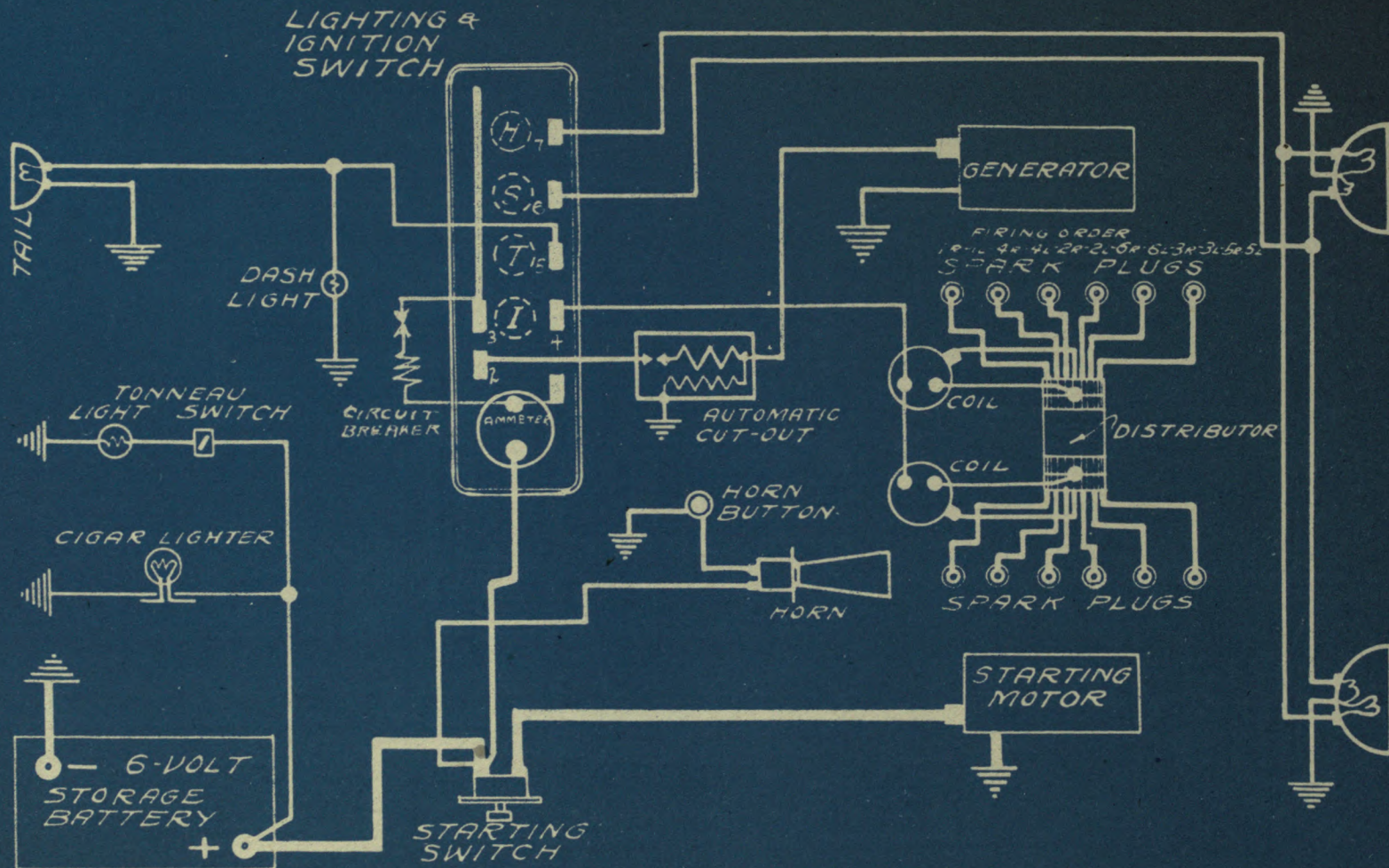


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PATHFINDER 1916 "ONE-B"

DELCO SYSTEM

FROM DELCO MANUAL

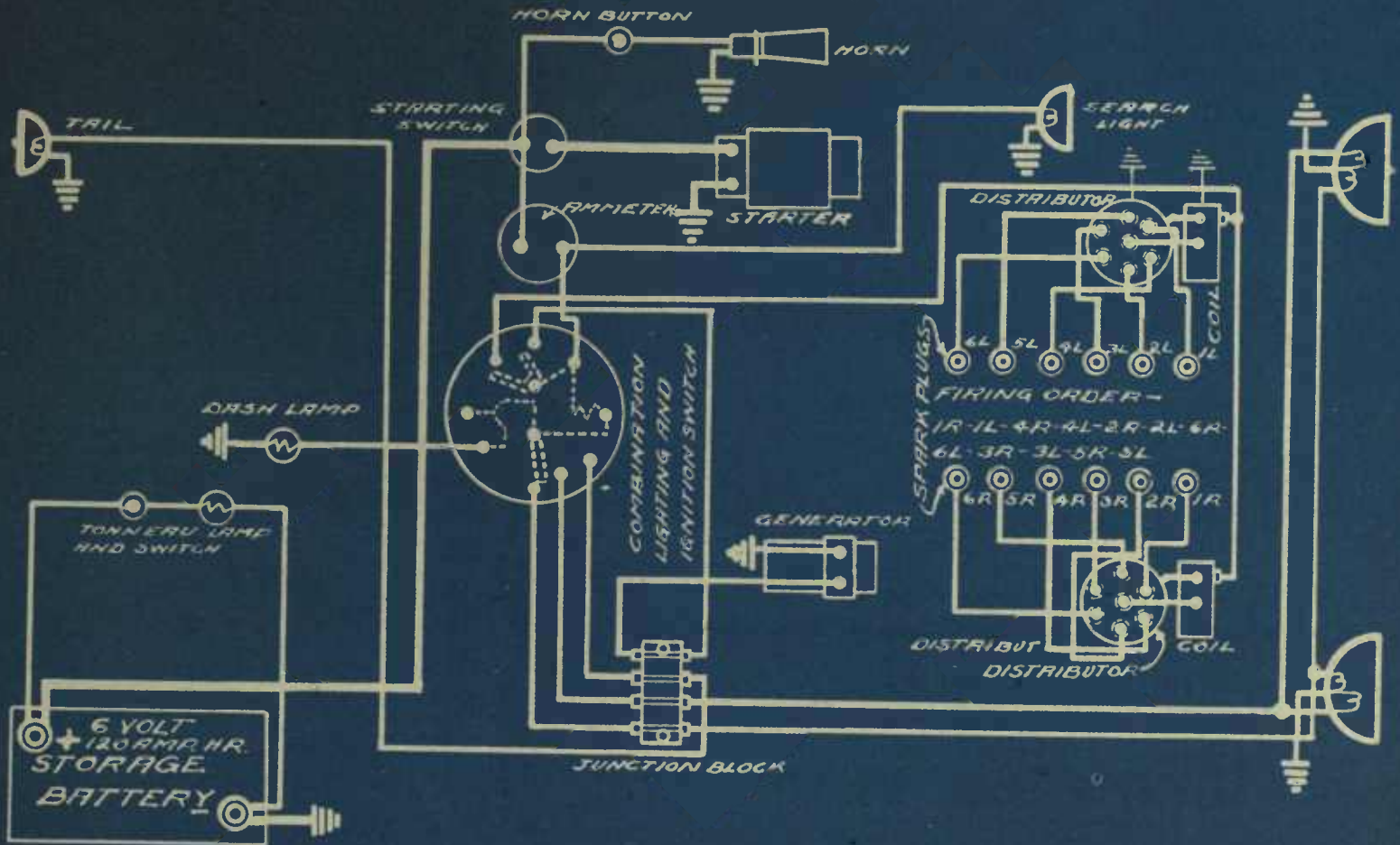


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PATHFINDER 1917 "12"

DELCO SYSTEM

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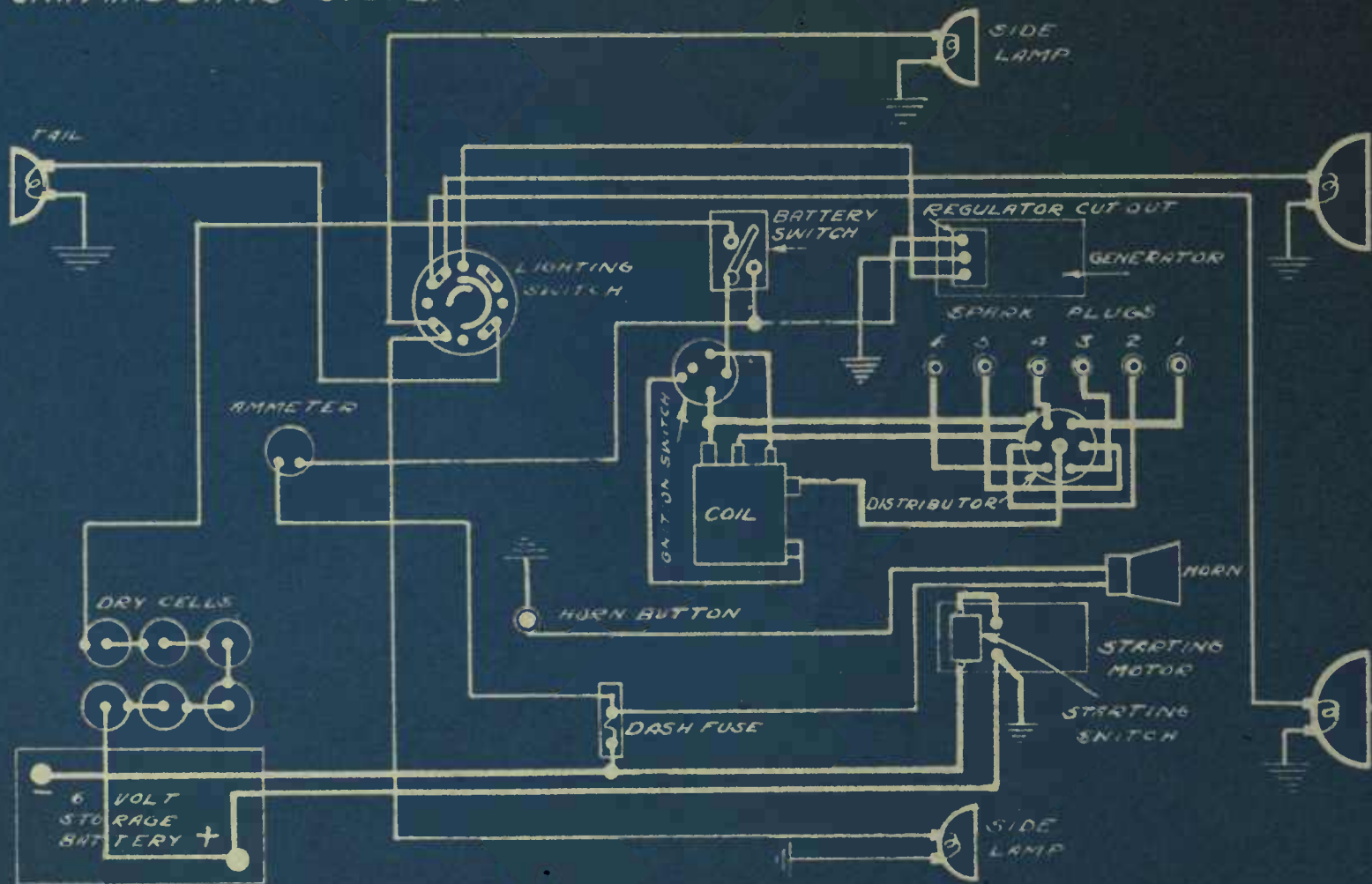


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PEERLESS 1915 55

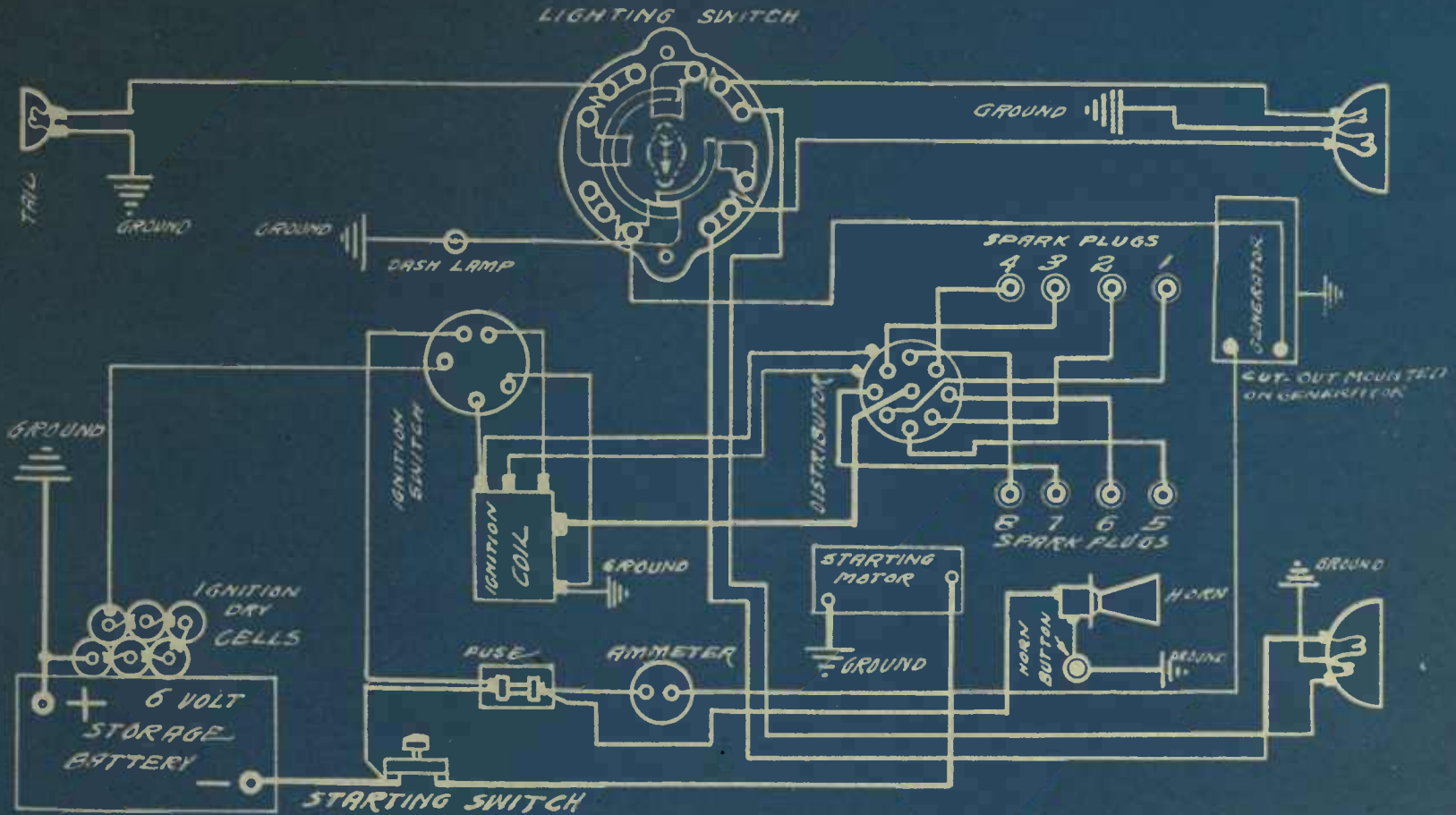
GRAY AND DAVIS SYSTEM

FROM MERS BRU-0940



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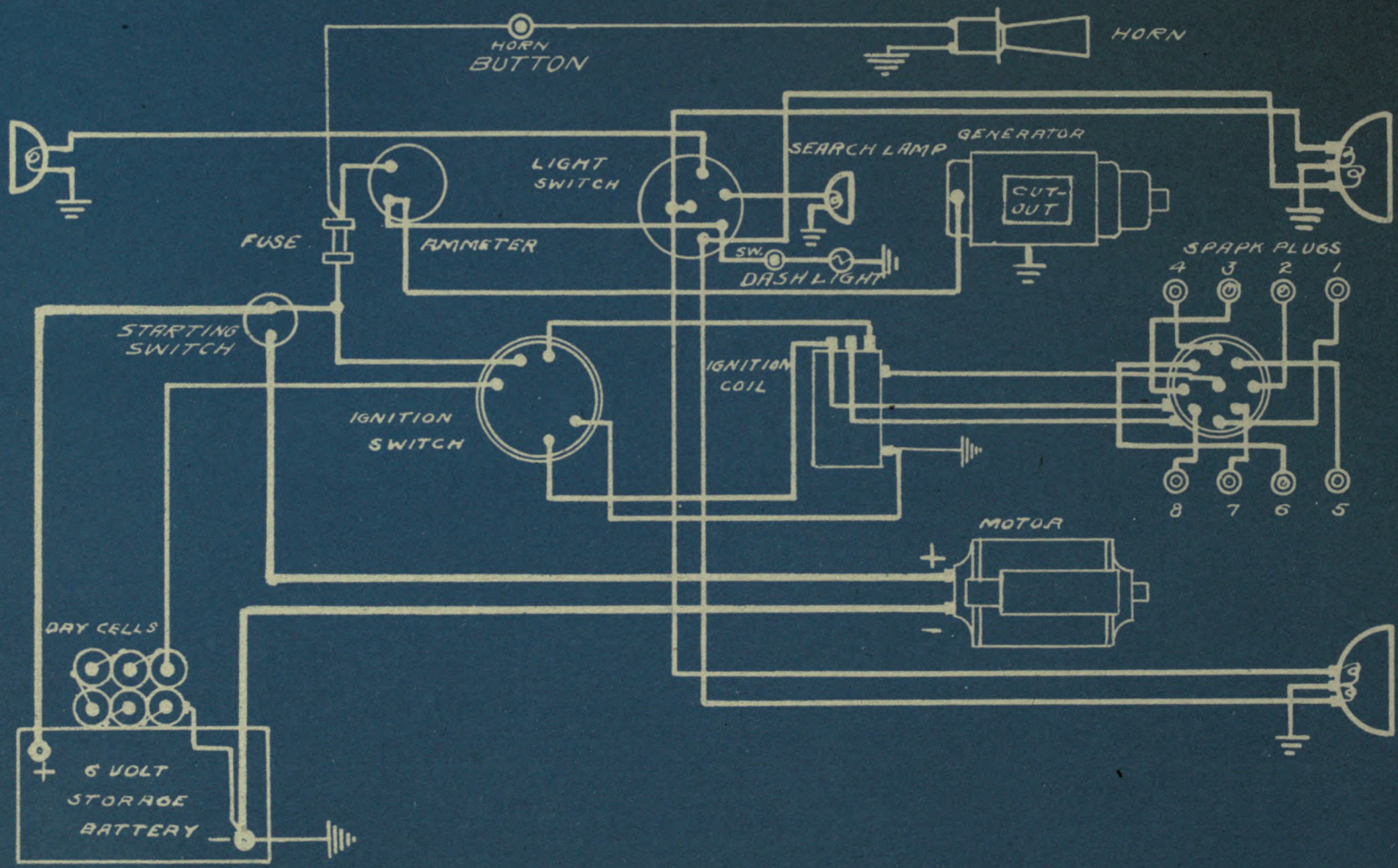
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PEERLESS MODEL 56-2FF 1917-1918-19.

AUTOLITE SYSTEM
ATWATER KENT IGN.

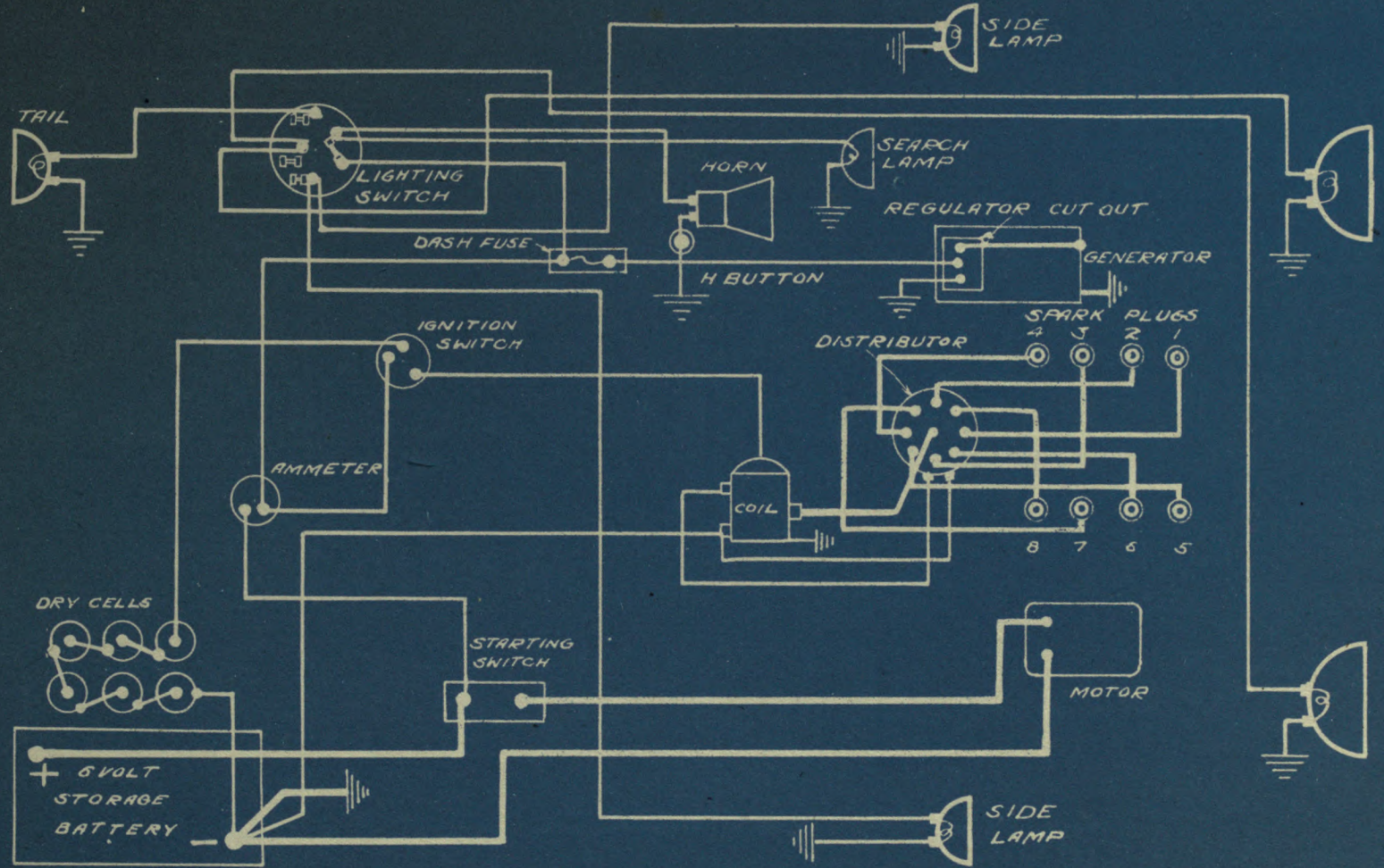
FROM AUTOLITE PLATE



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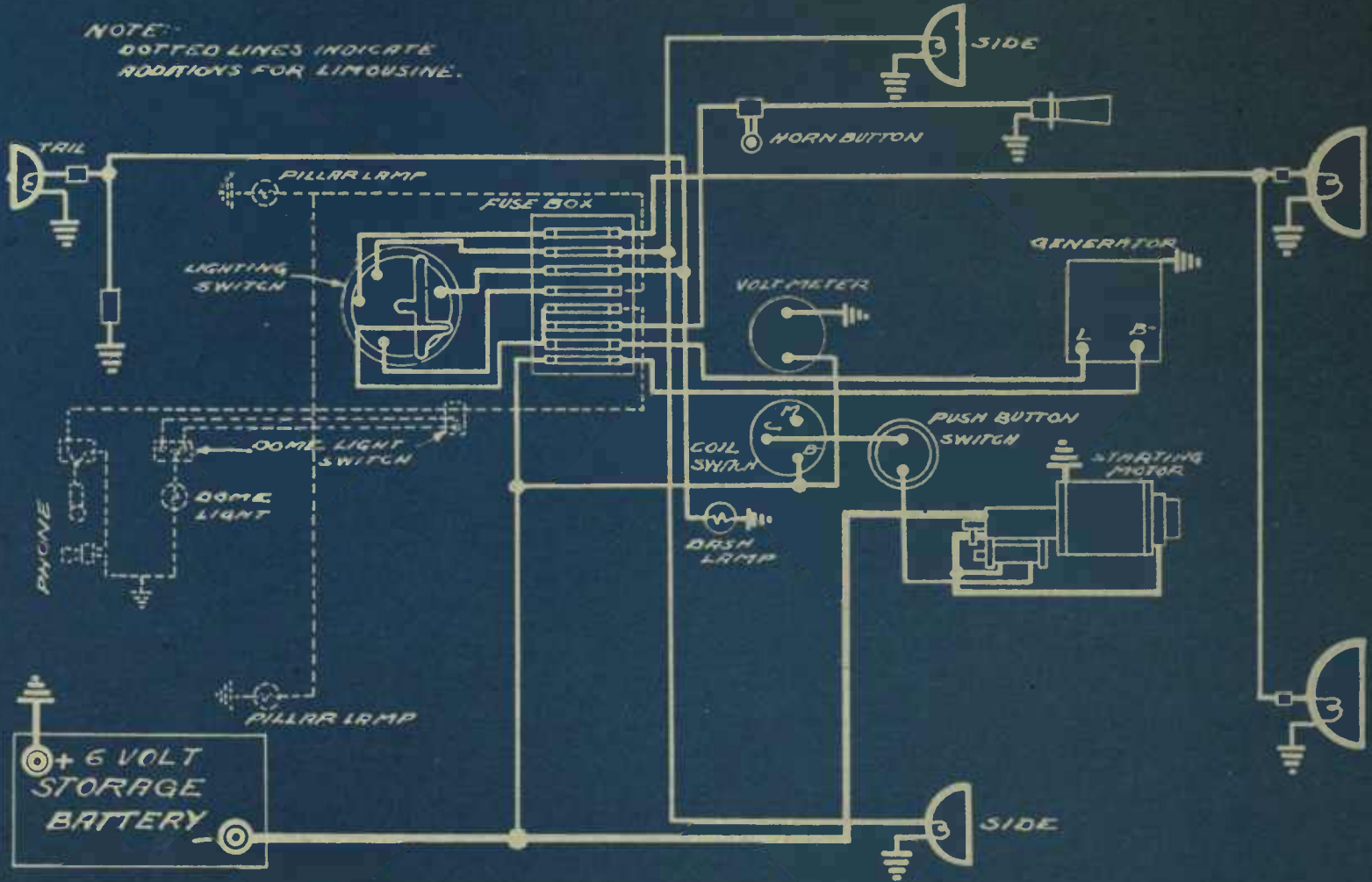
PEERLESS 1918-19 56 AUTOLITE SYSTEM

FROM MFRS BR 3959

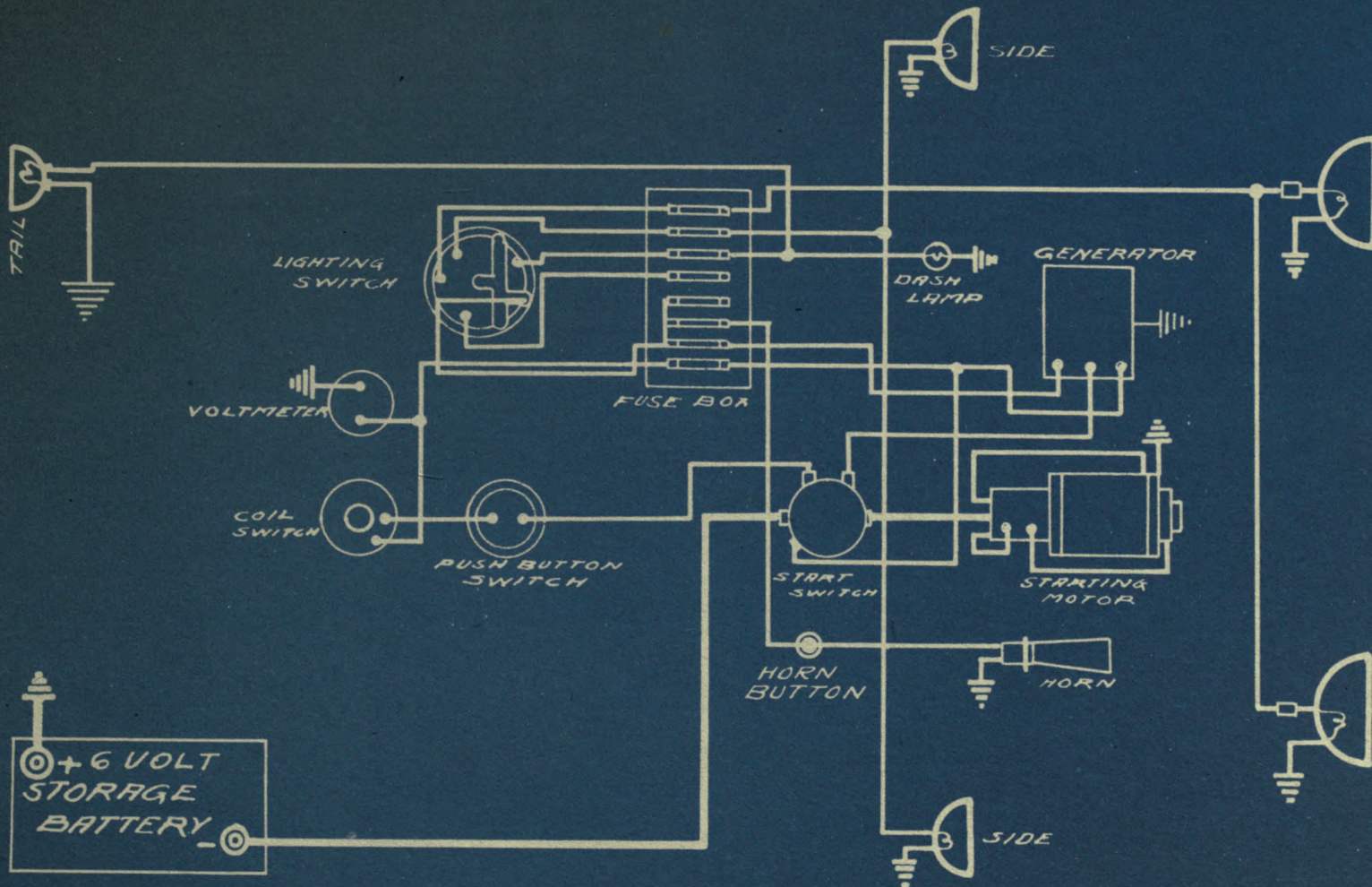


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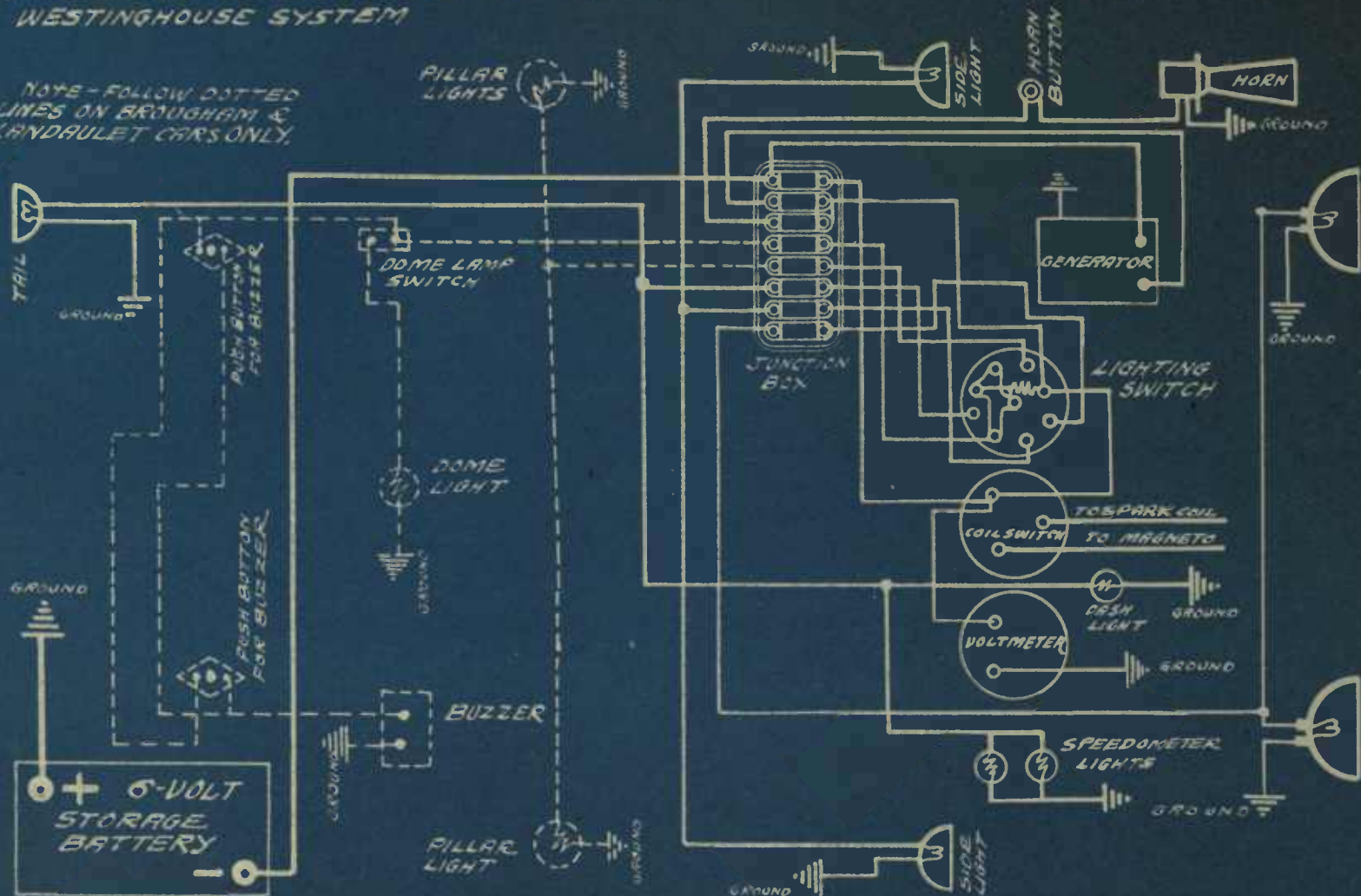
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PIERCE-ARROW 1915 "38-C"

WESTINGHOUSE SYSTEM

FROM P.A. MANUAL

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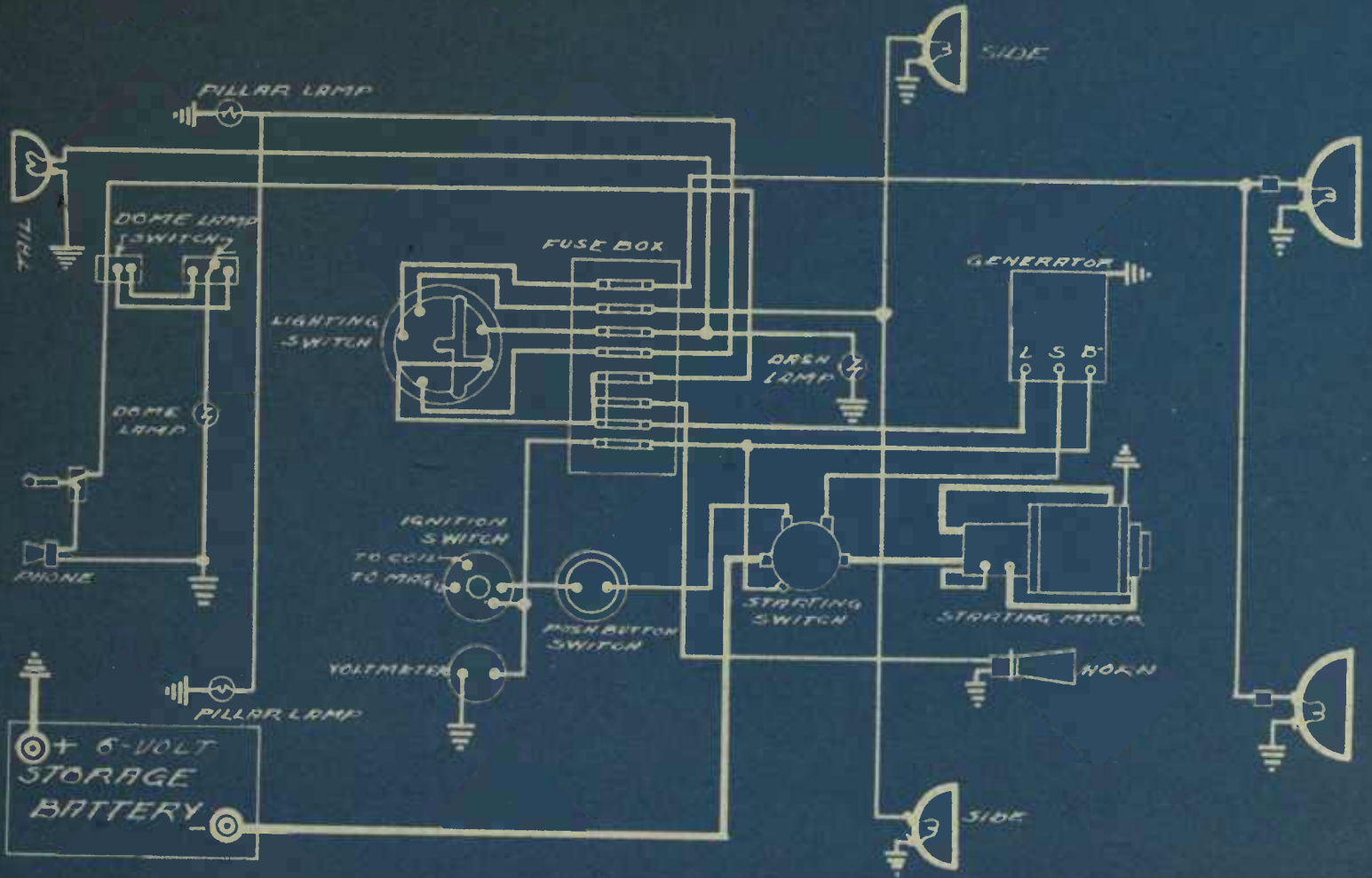


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PIERCE-ARROW 1915
WESTINGHOUSE SYSTEM

48-B-3

FROM WEST MANUAL



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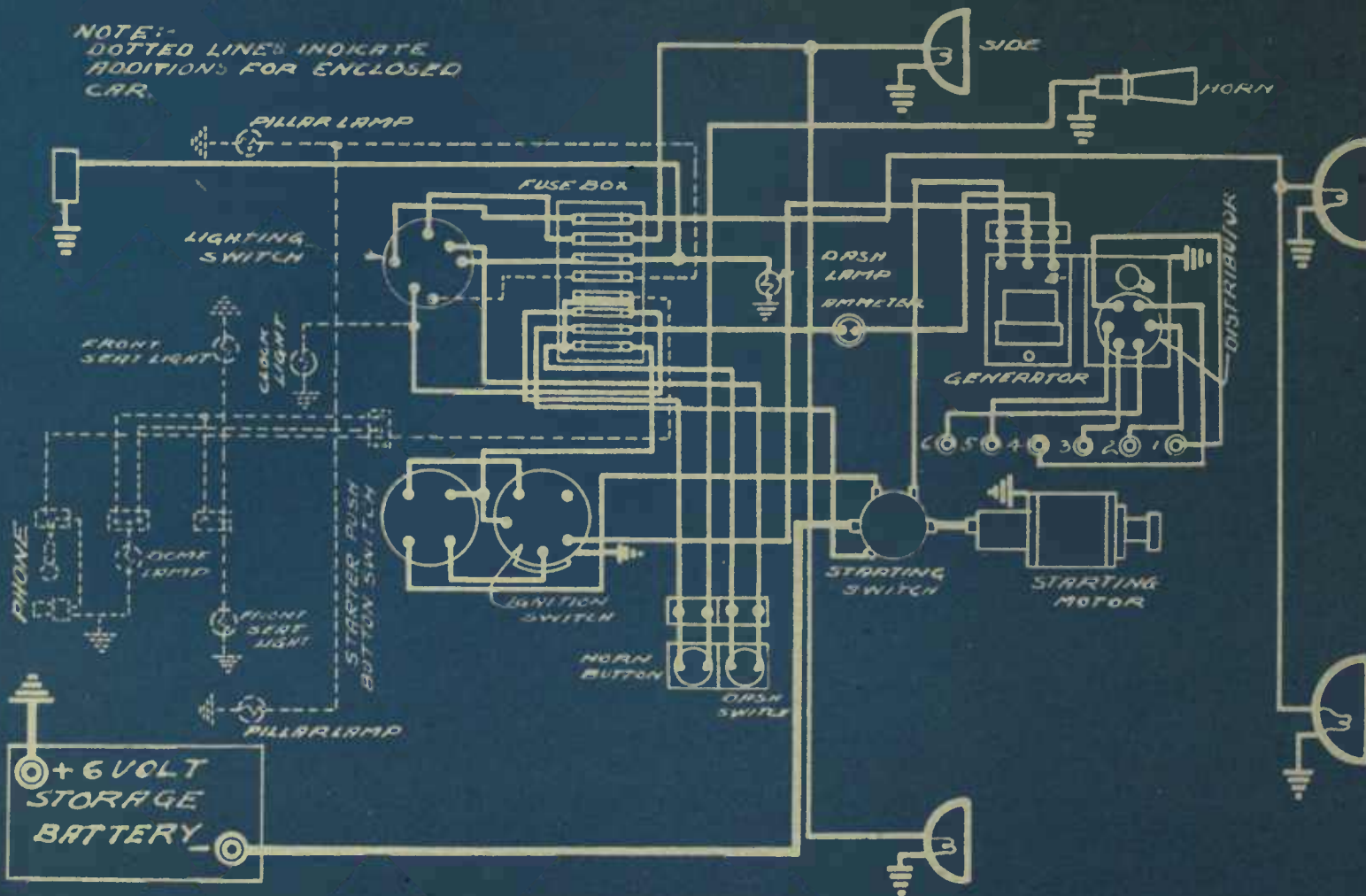
PIERCE-ARROW WESTINGHOUSE SYSTEM

1916

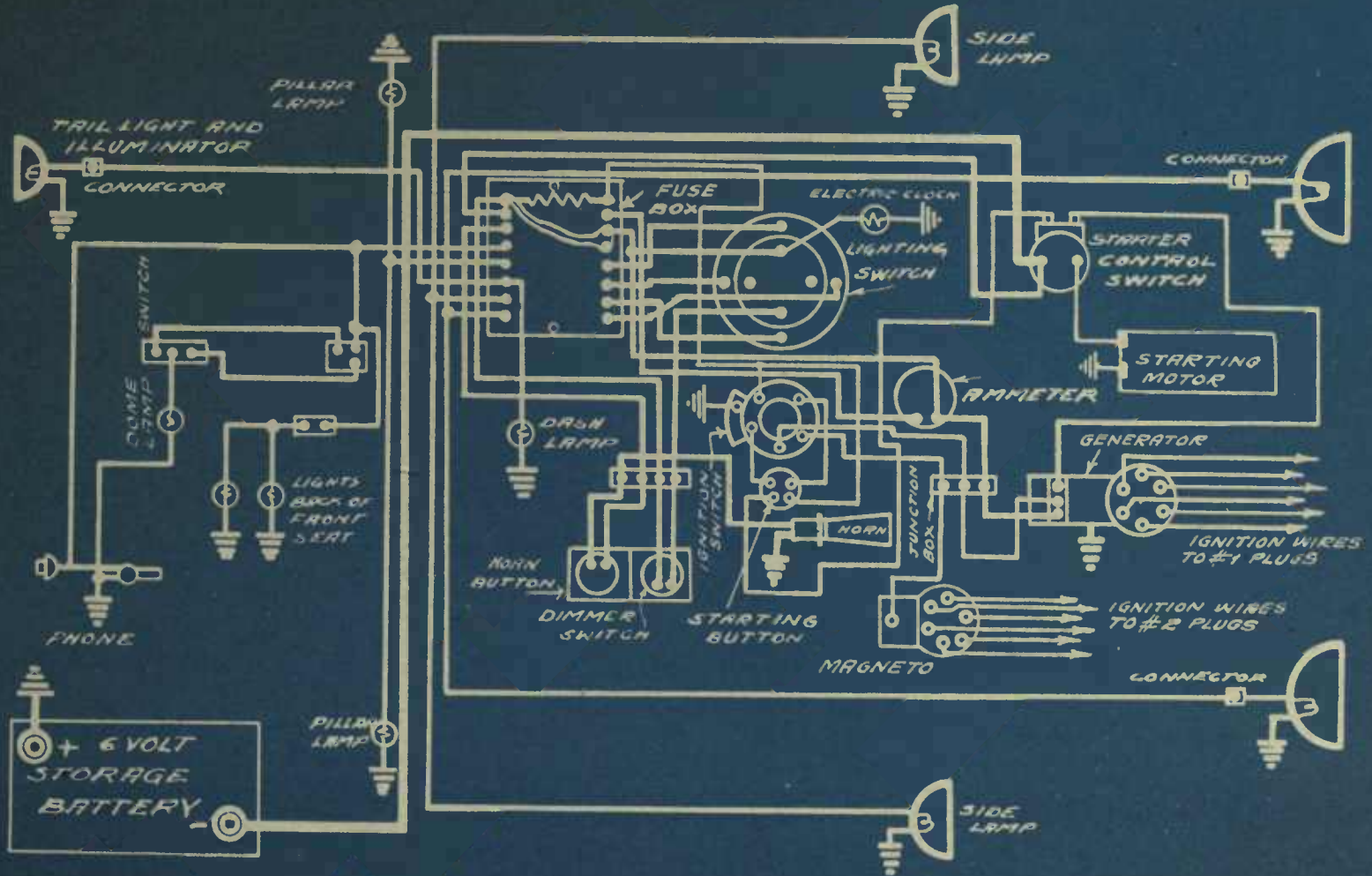
FROM WEST PLATES 97-98

TOURING AND ENCLOSED CARS

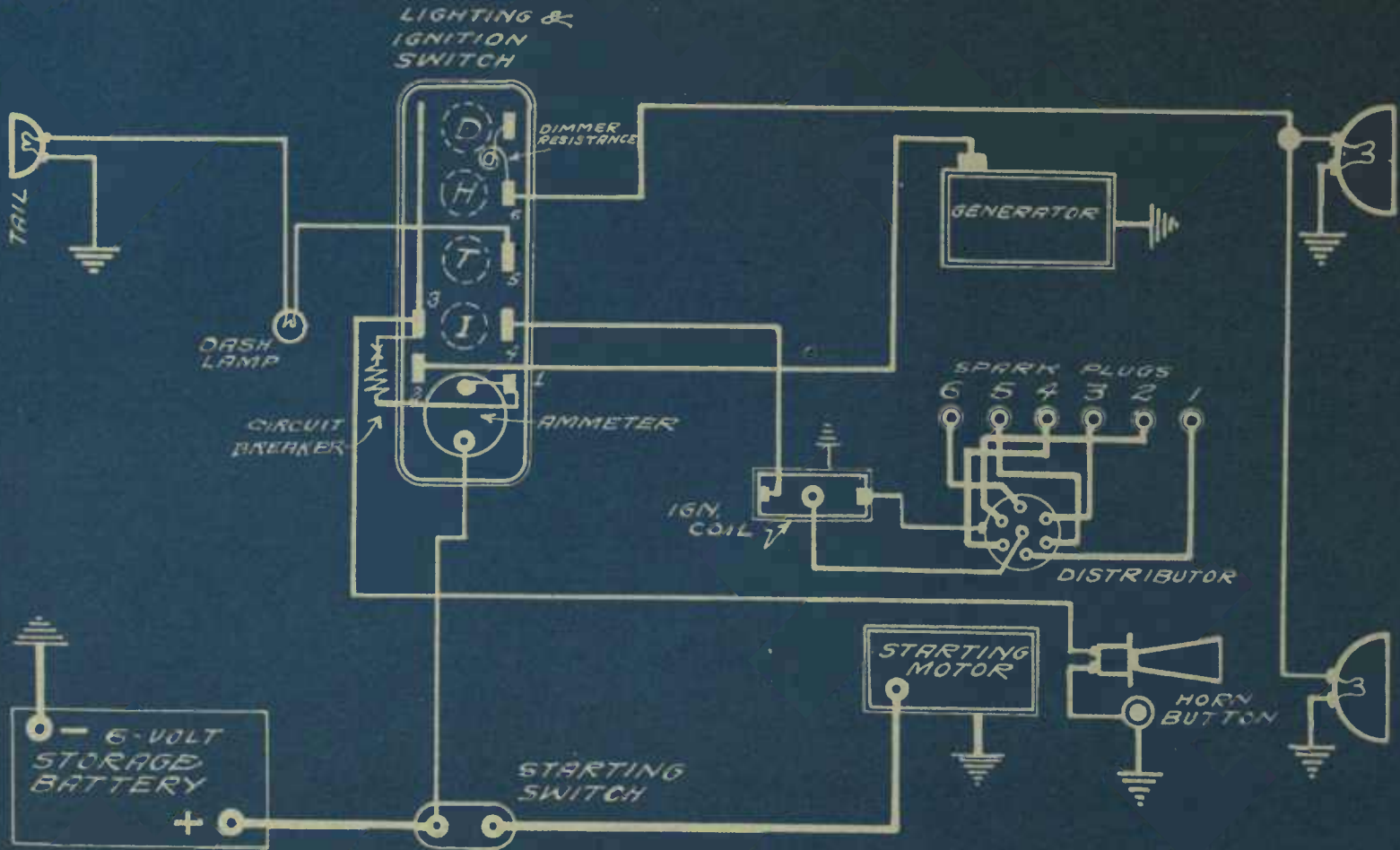
NOTE:-
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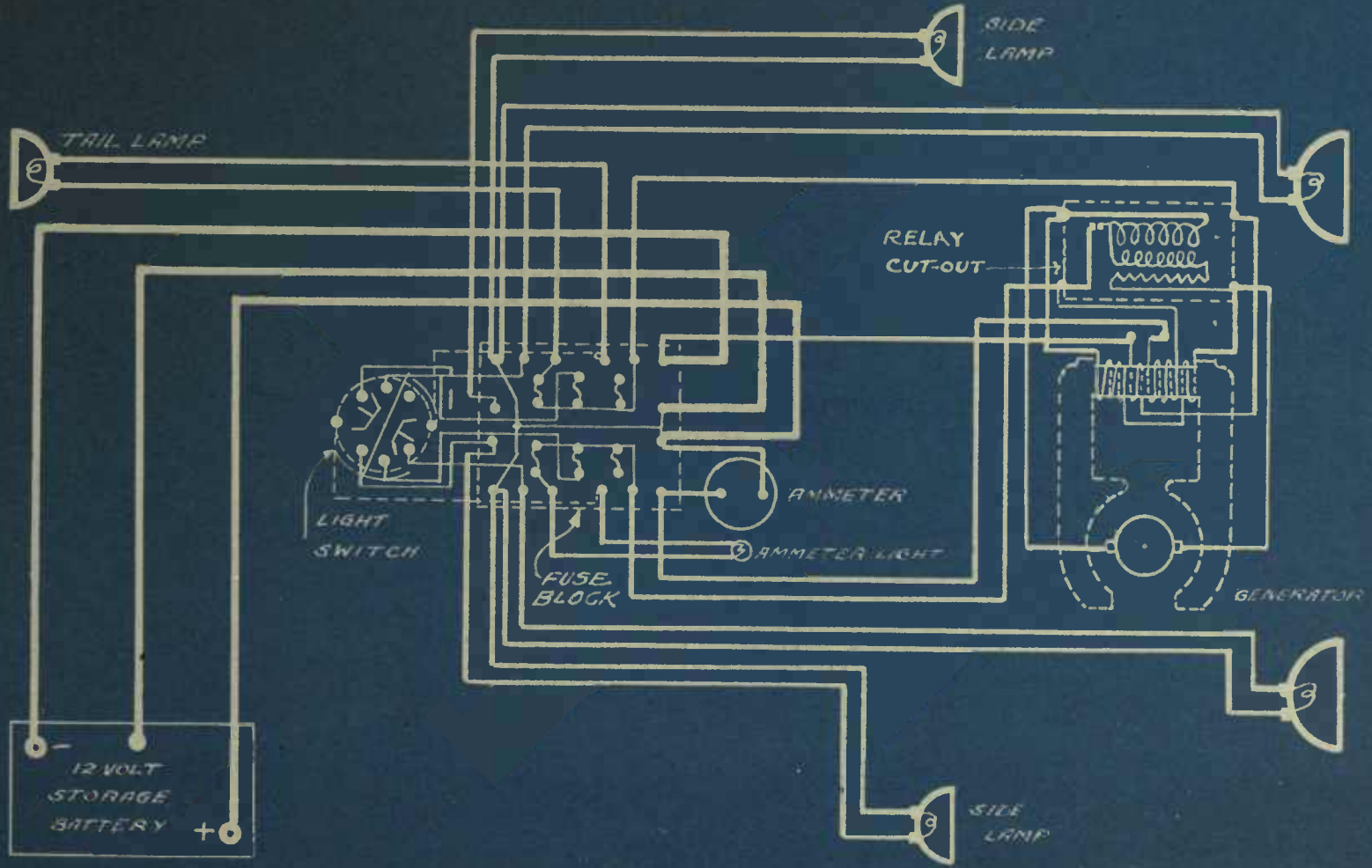
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REMY SYSTEM

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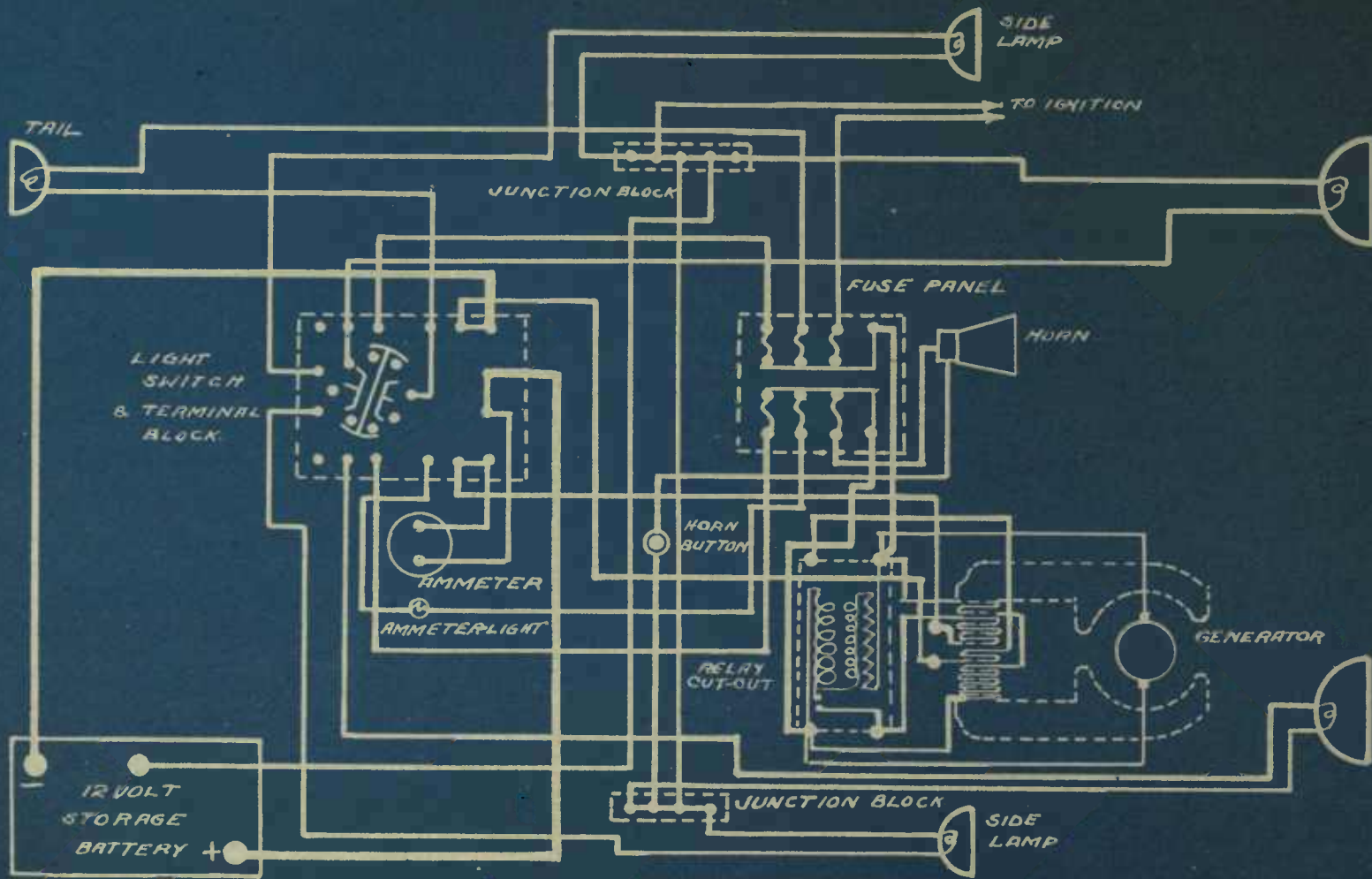
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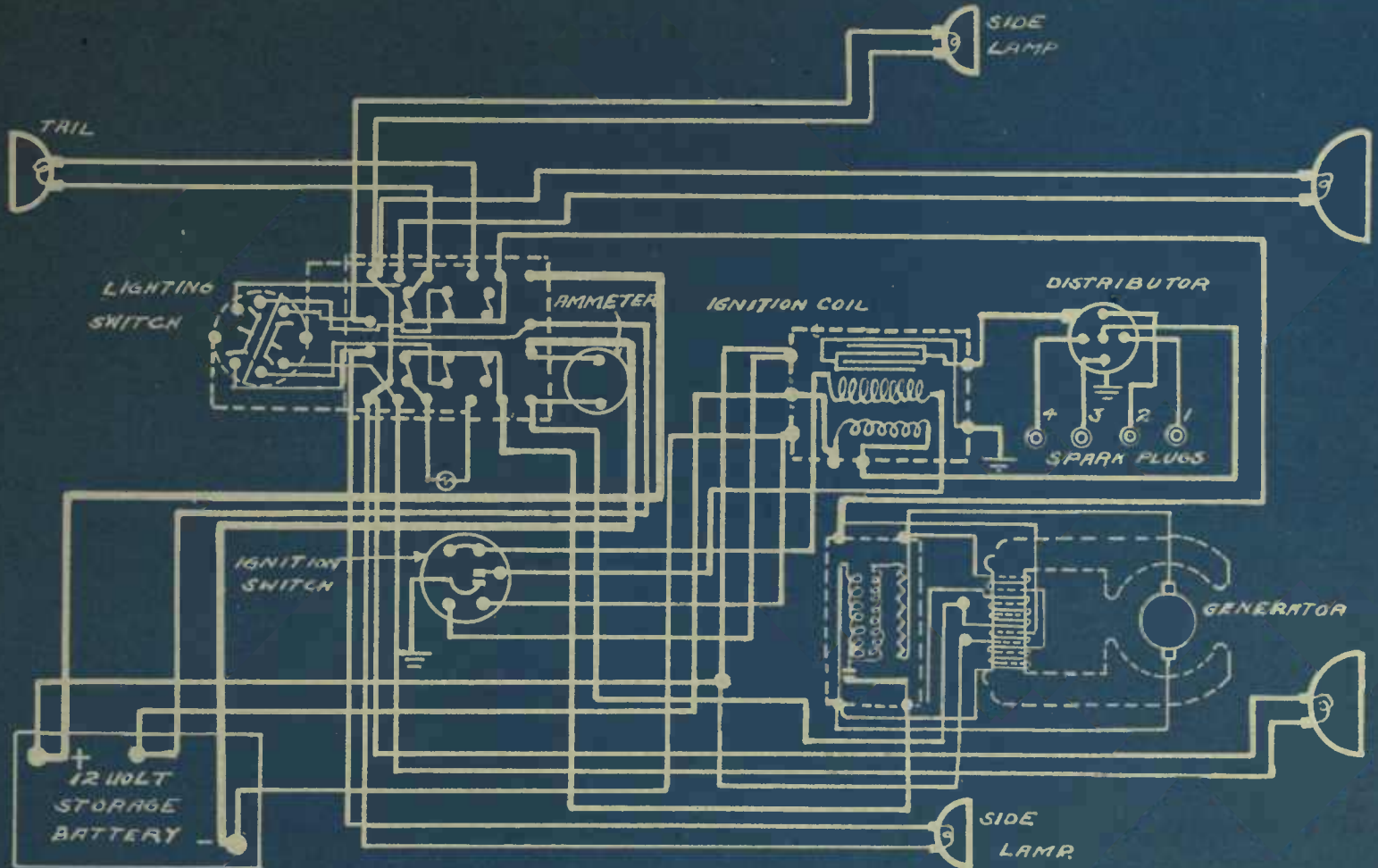
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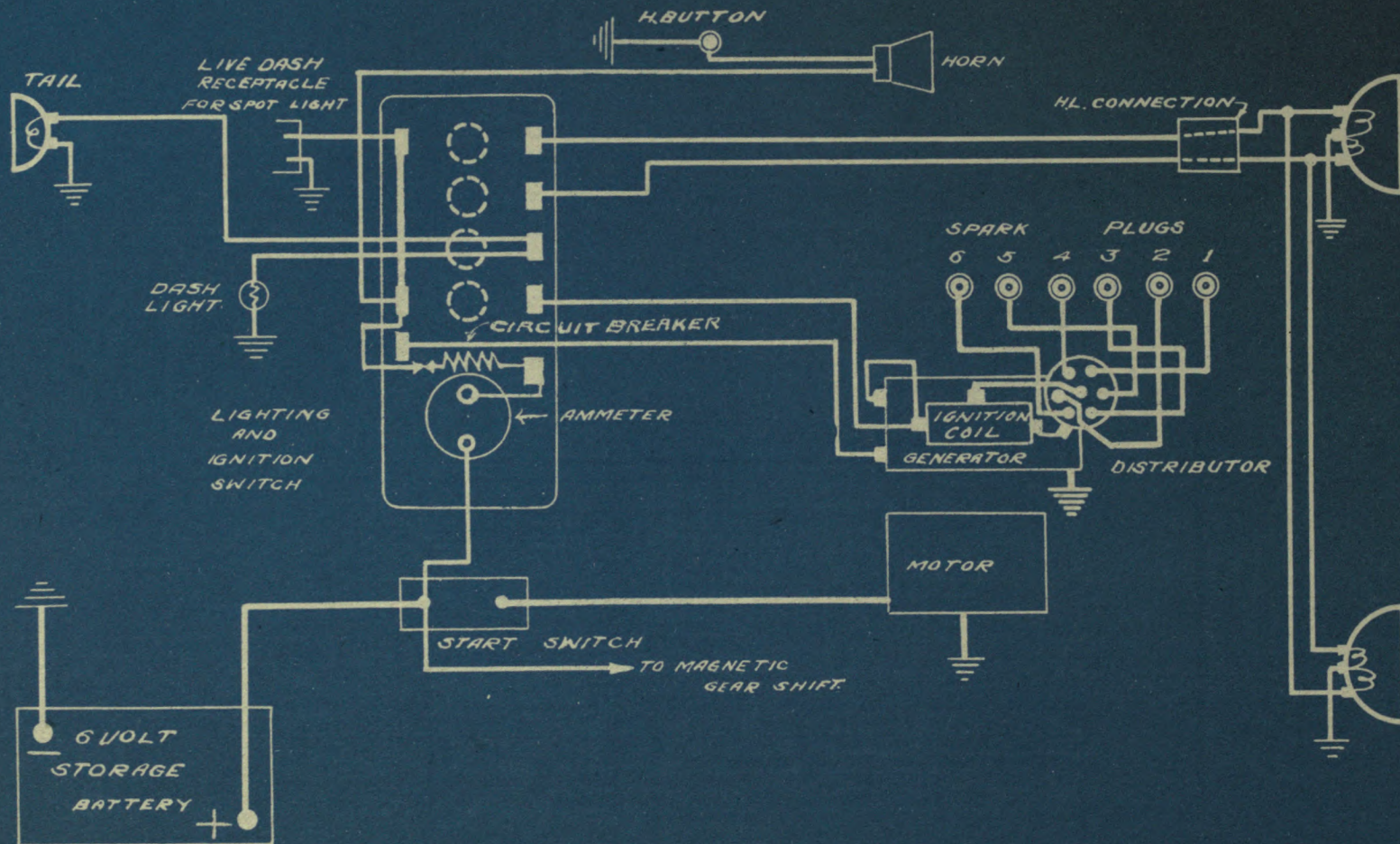


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PREMIER 1917-18-19. 6-B & 6-C

DELCO SYSTEM

FROM MFRS. BR. C-1685

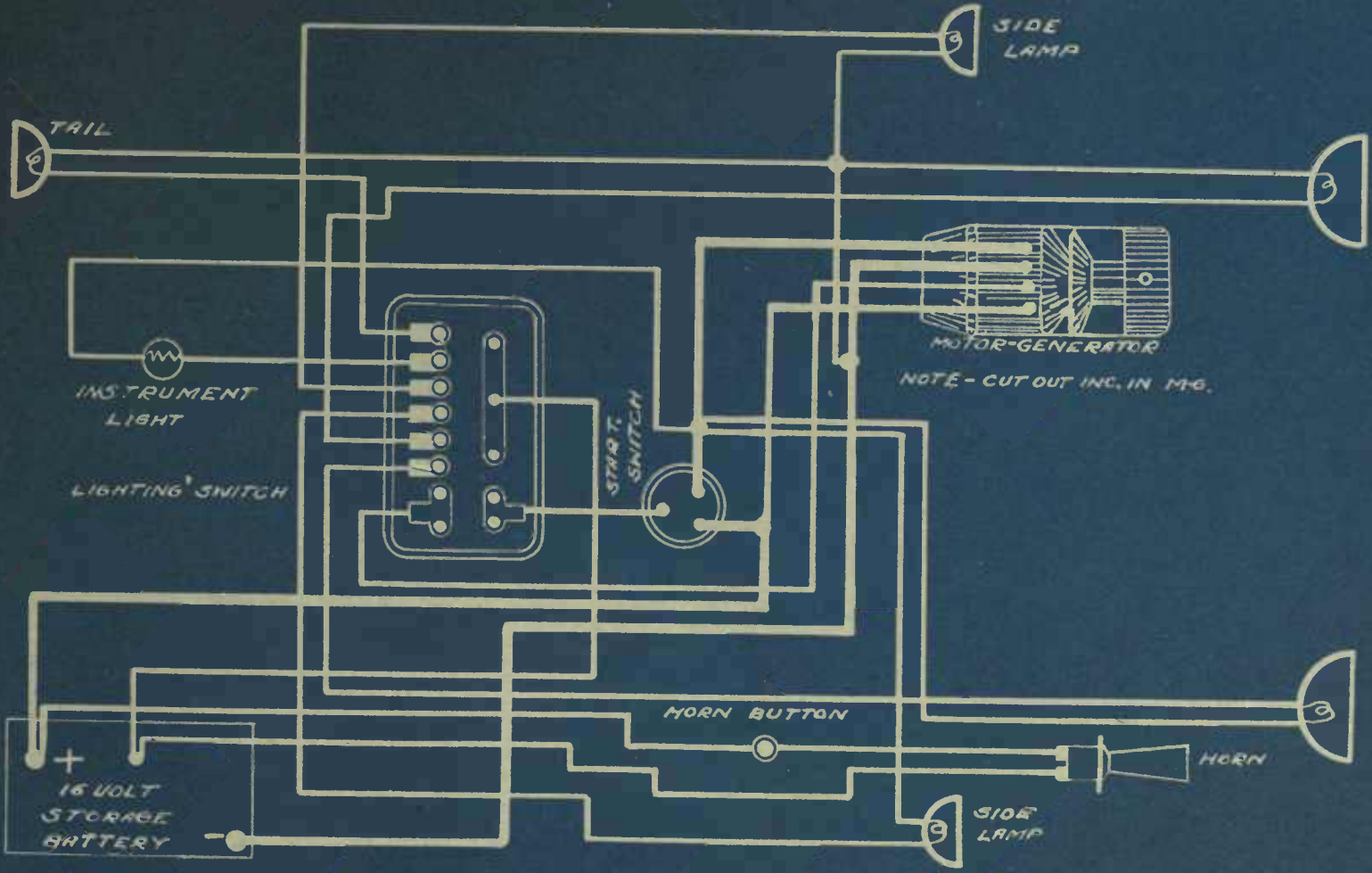


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PULLMAN 1913

NORTH EAST SYSTEM

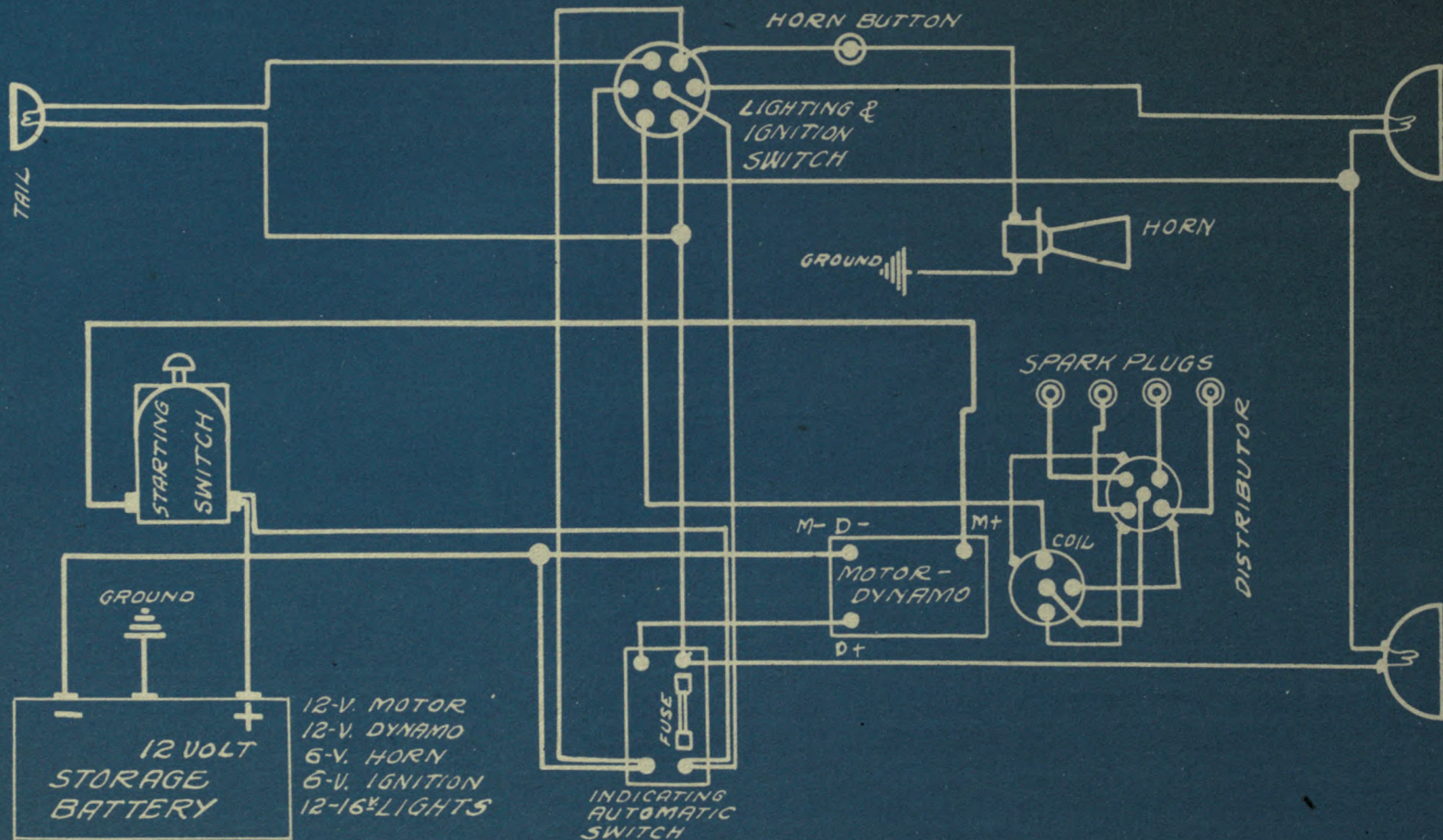
FROM NE PLATE 130



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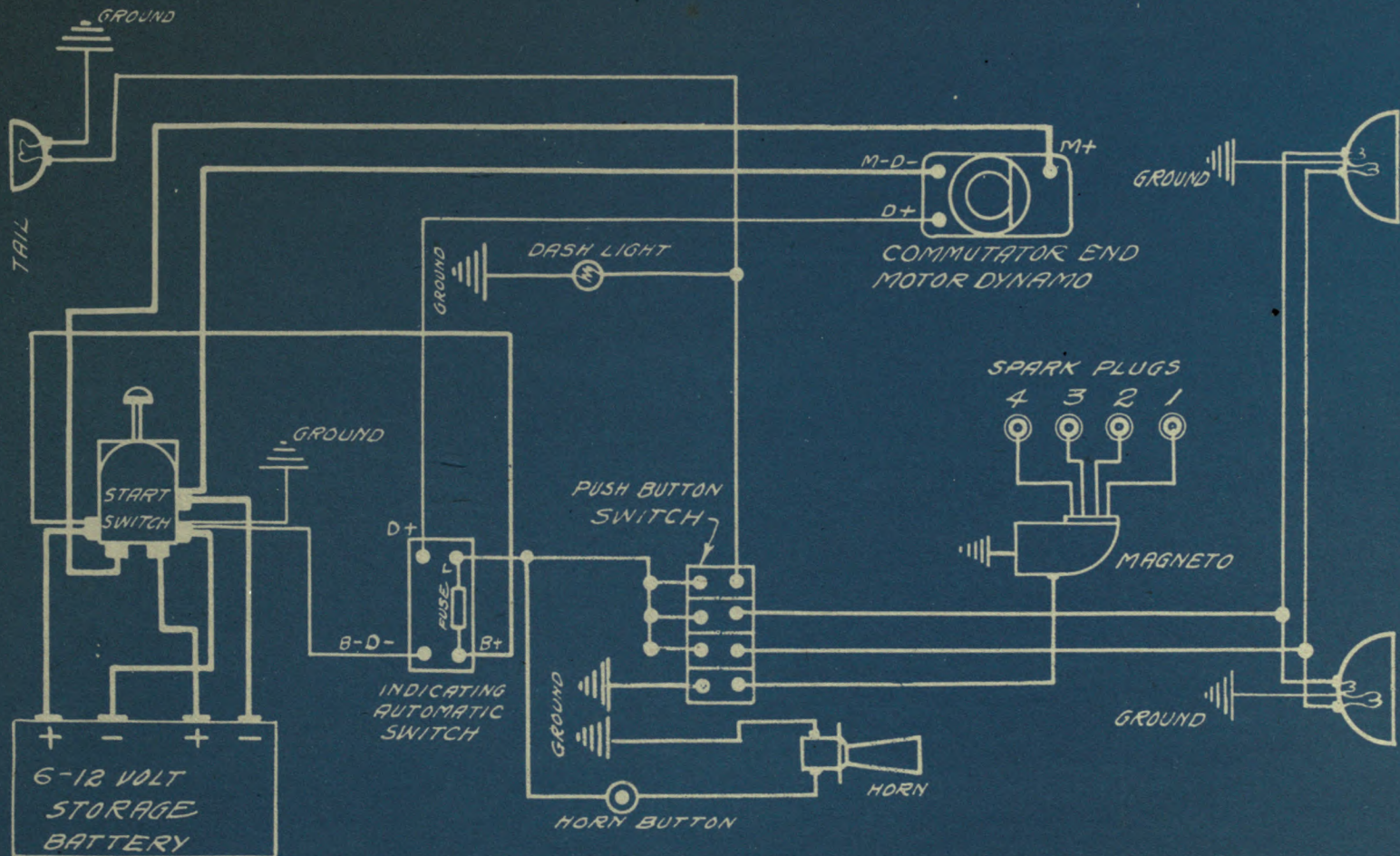


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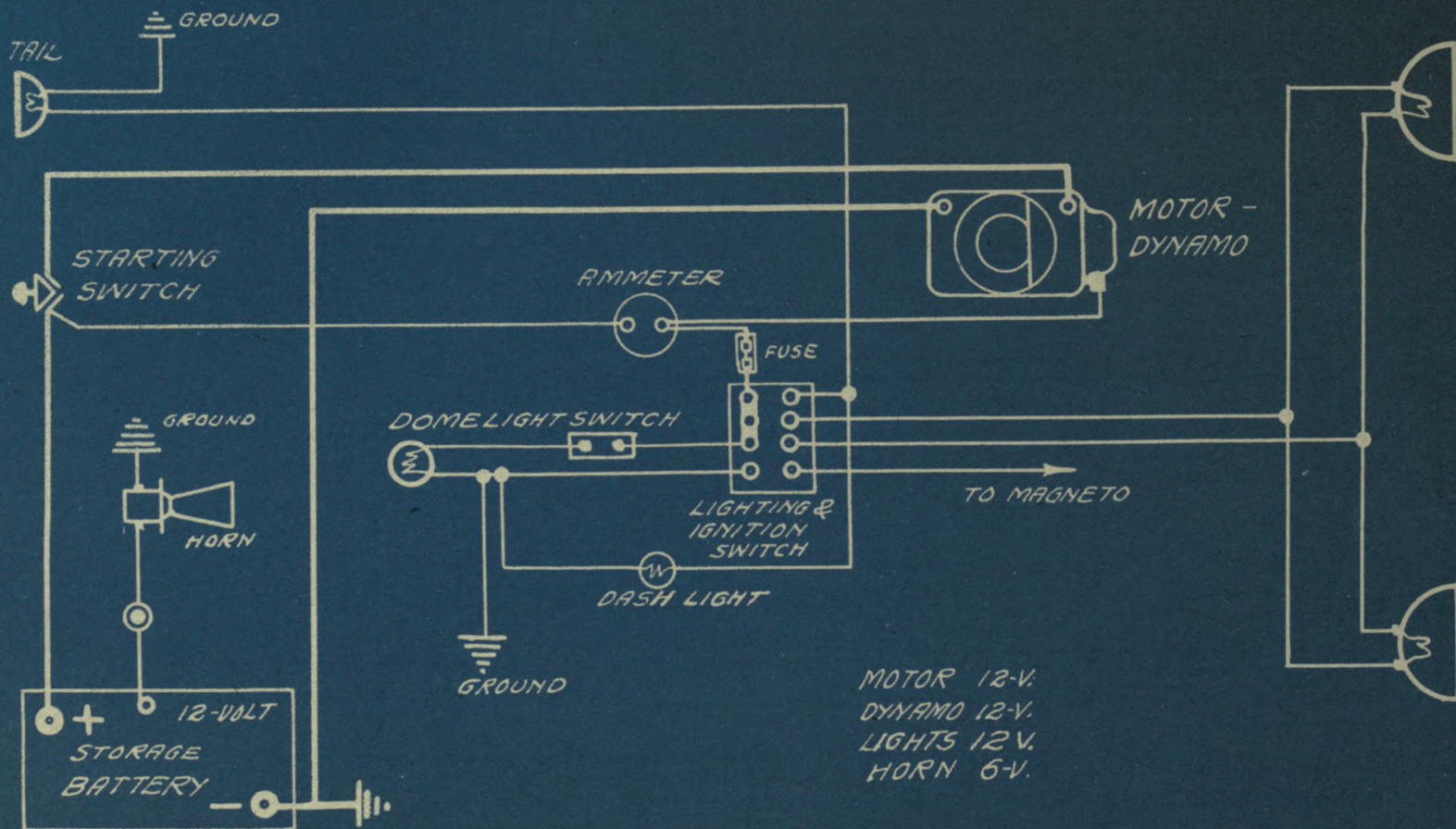
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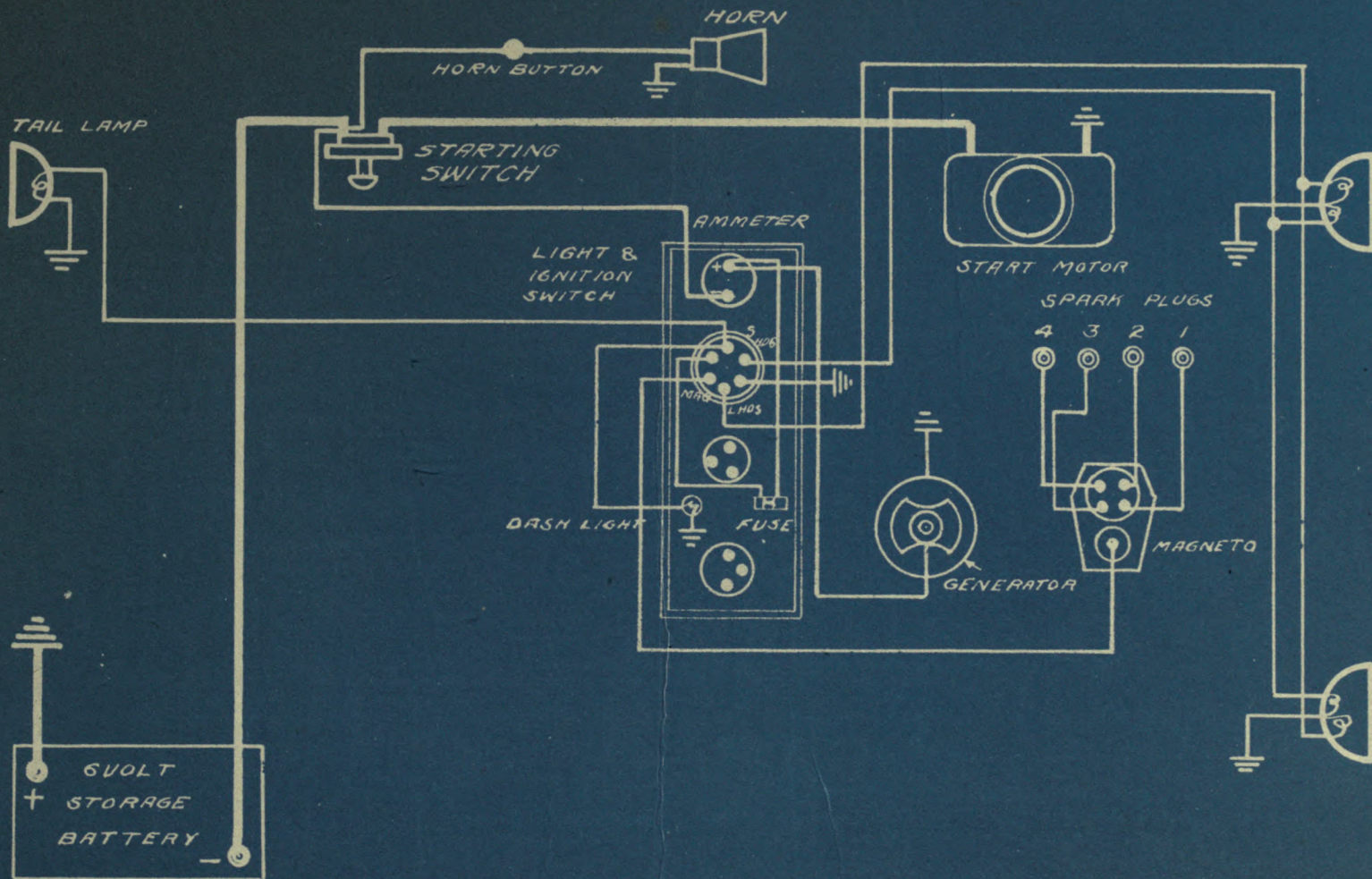


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PULLMAN MODEL-434 1917

SPLITDORF SYSTEM

FROM PULLMAN PLATE

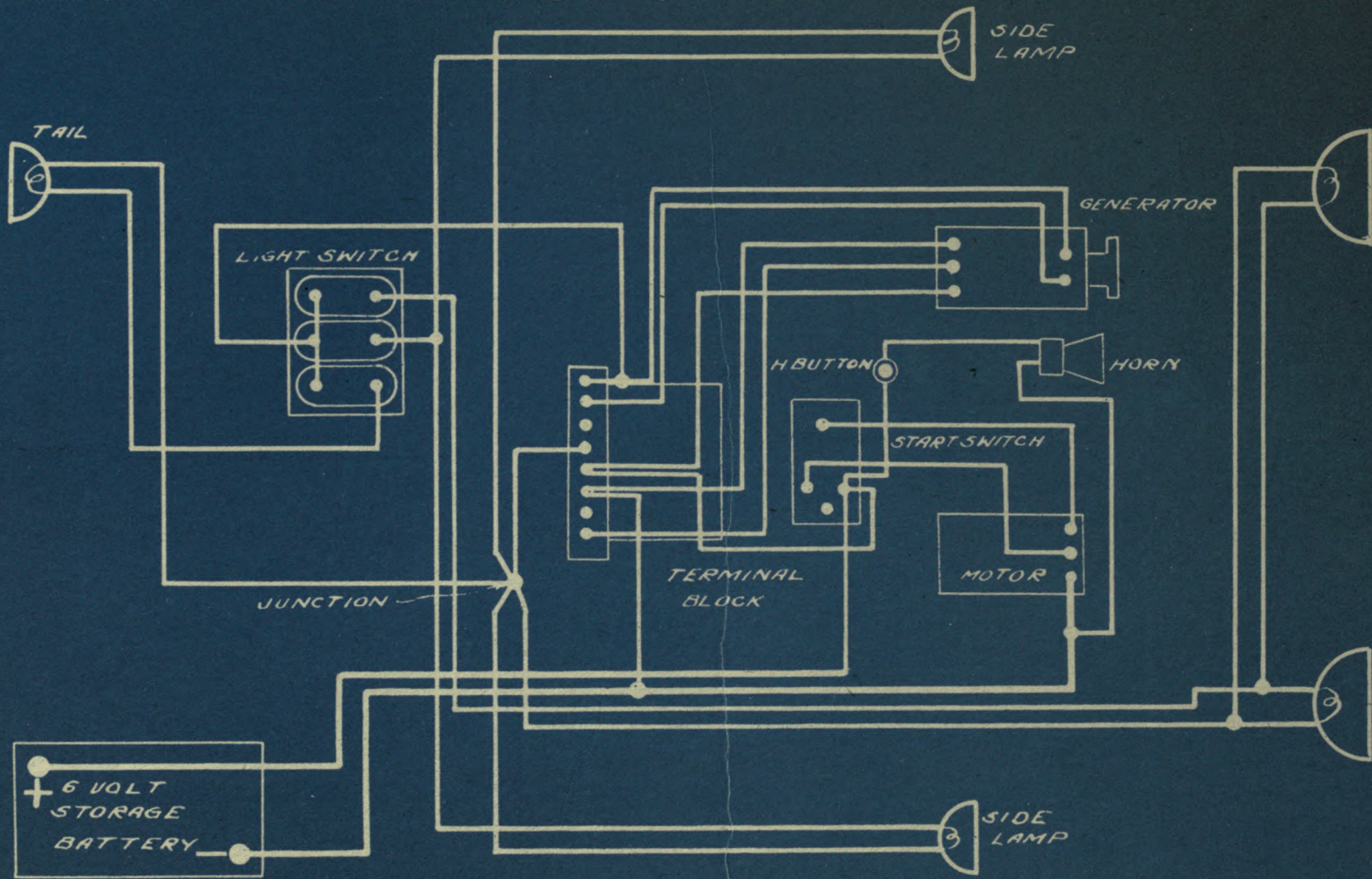


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REGAL 1913-14
RUSHMORE SYSTEM

"N"
UNDERSLUNG ROADSTER

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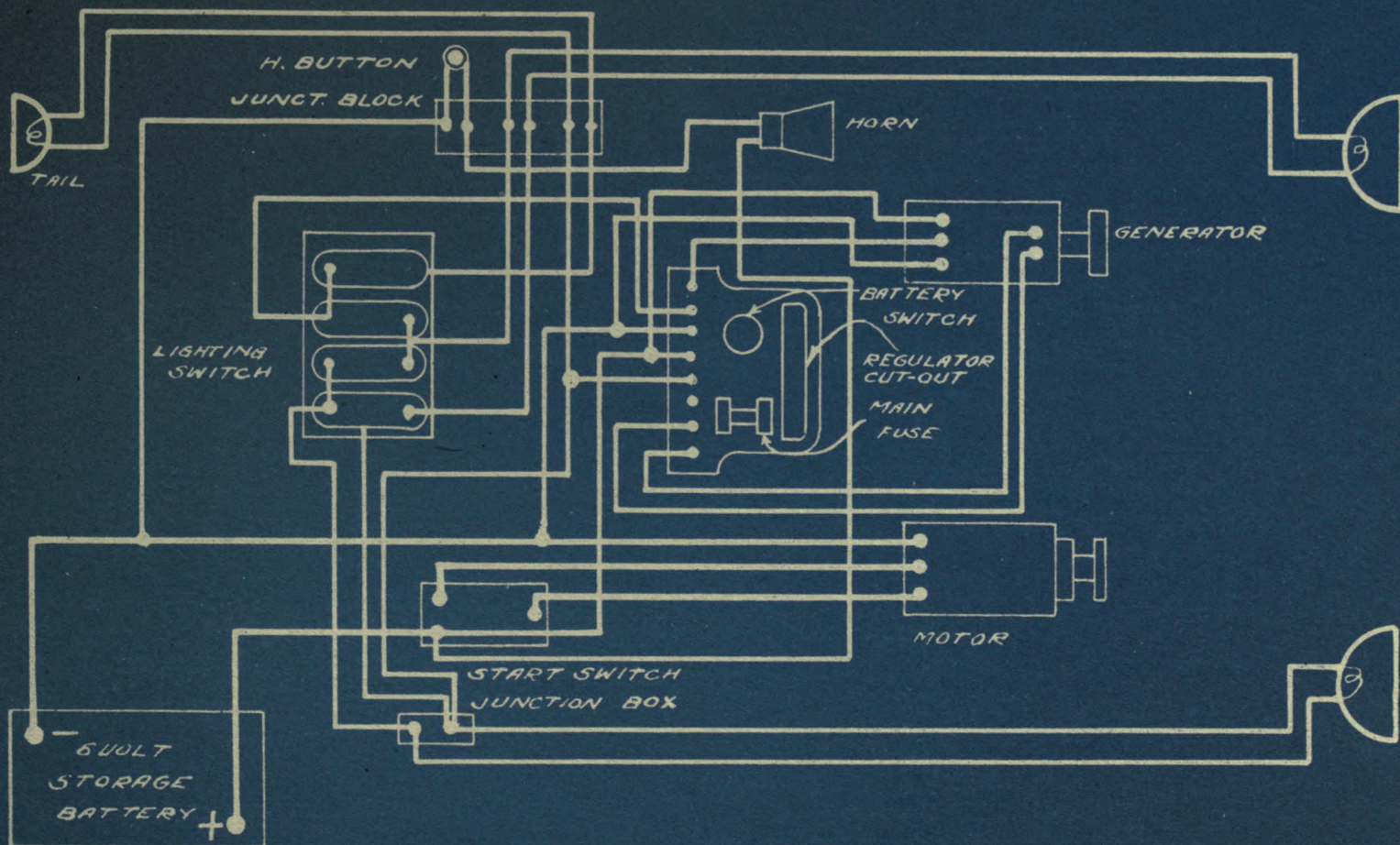


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REGAL 1914 MODEL "C"

RUSHMORE SYSTEM

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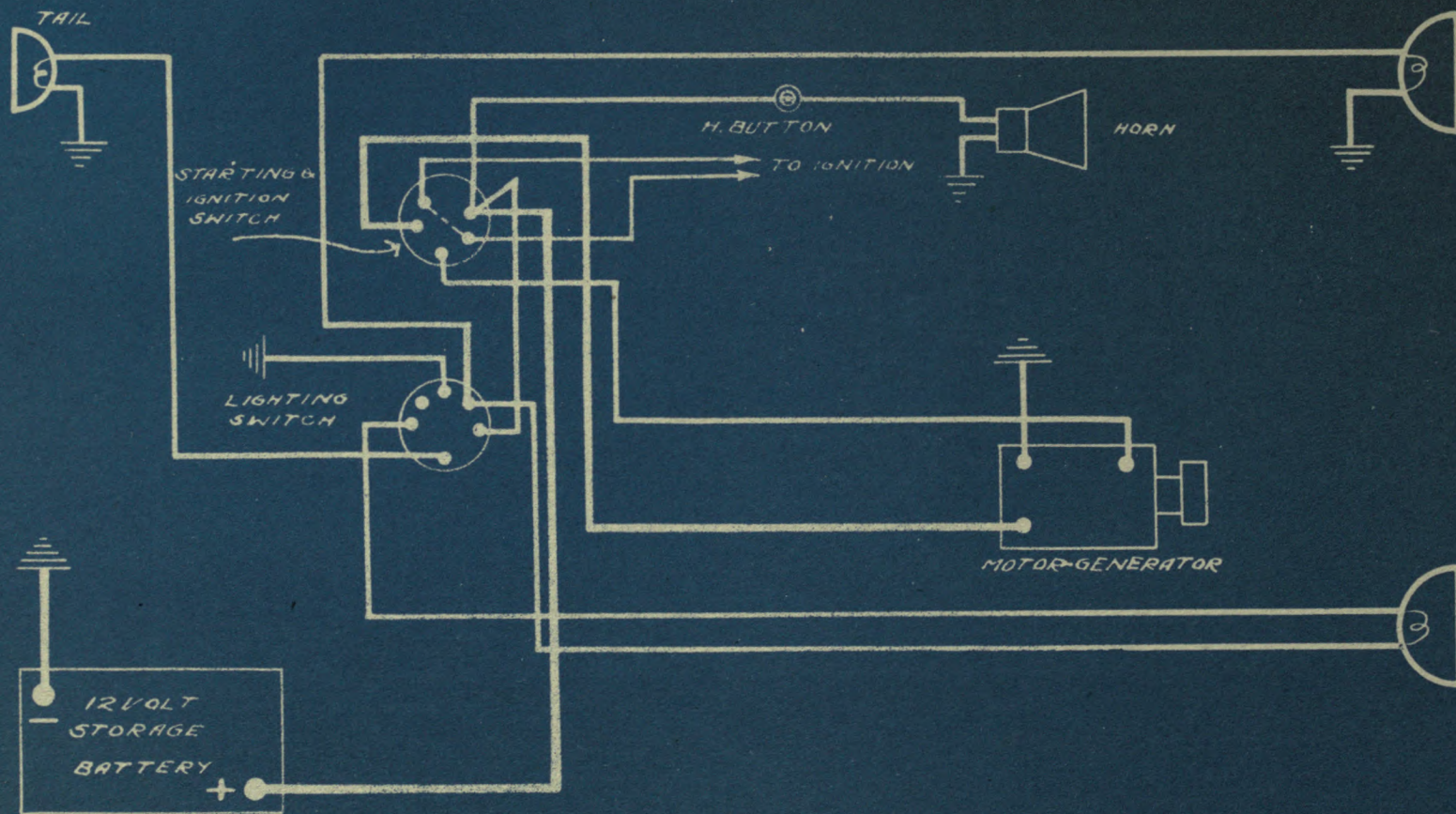


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REGAL 1915-16
DYNETO SYSTEM

"E"

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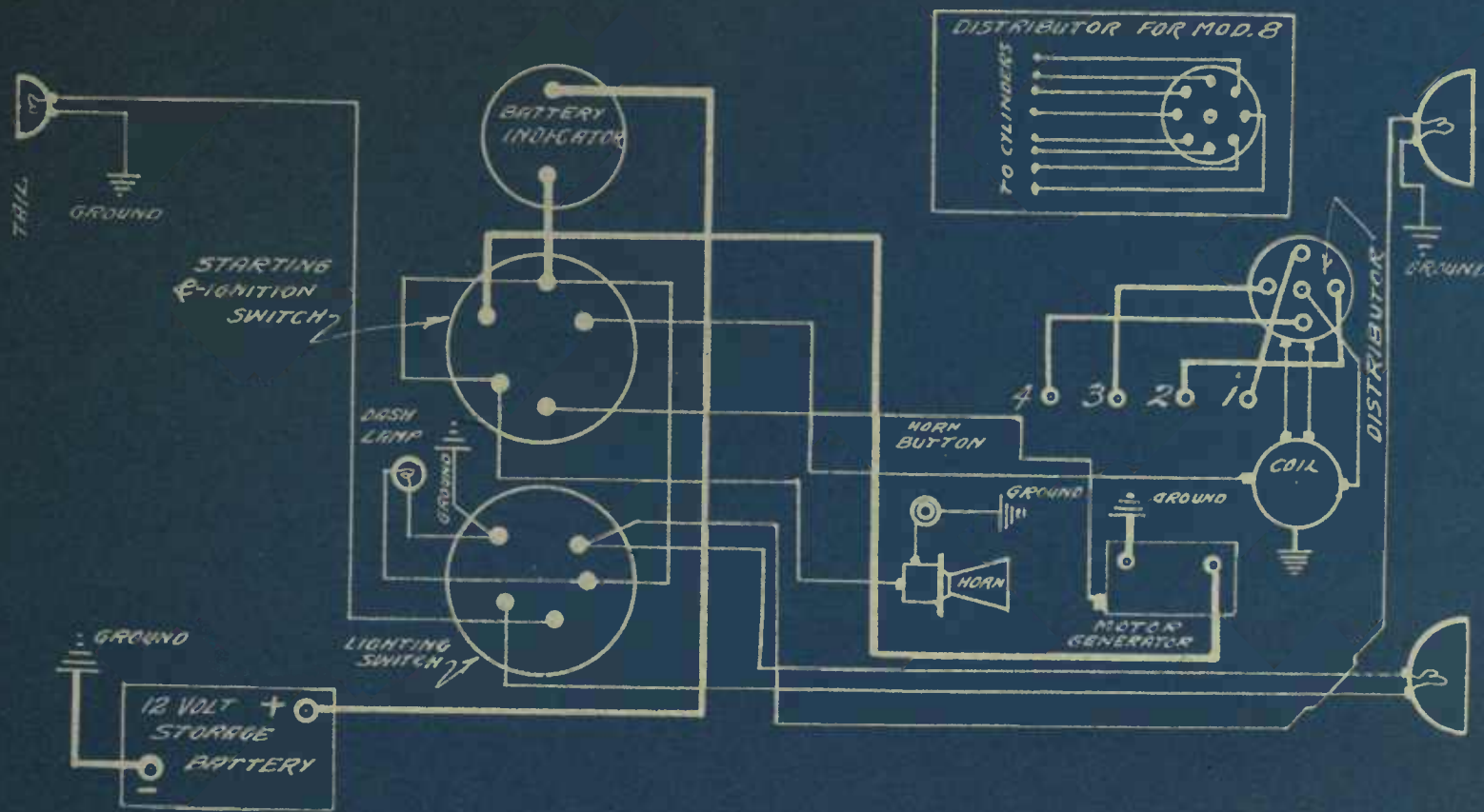


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REGAL - 1915-1916-1917 4 & 8
 DYNETO & CONNECTICUT SYSTEMS COMBINED

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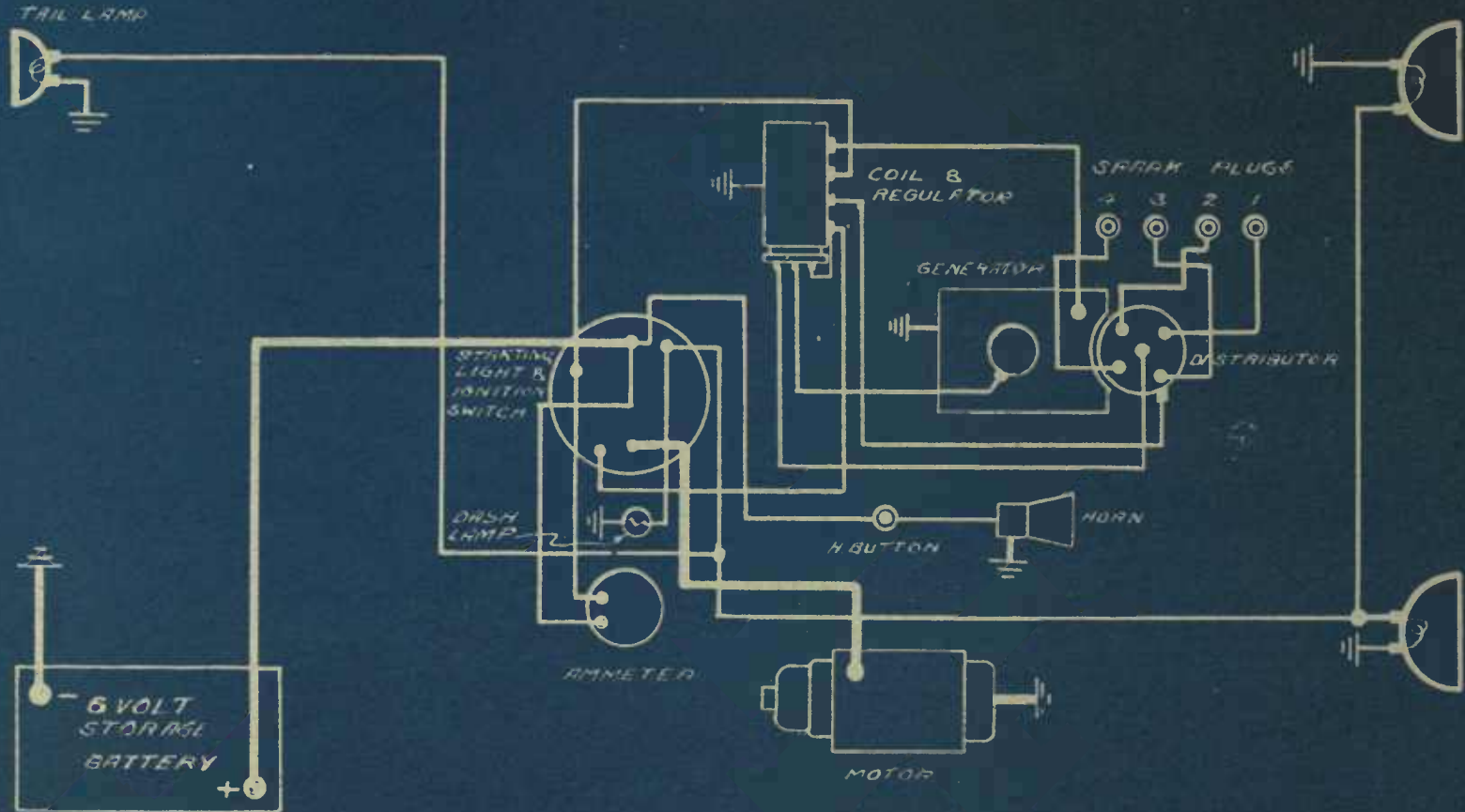
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REGAL MODEL "J" 1917

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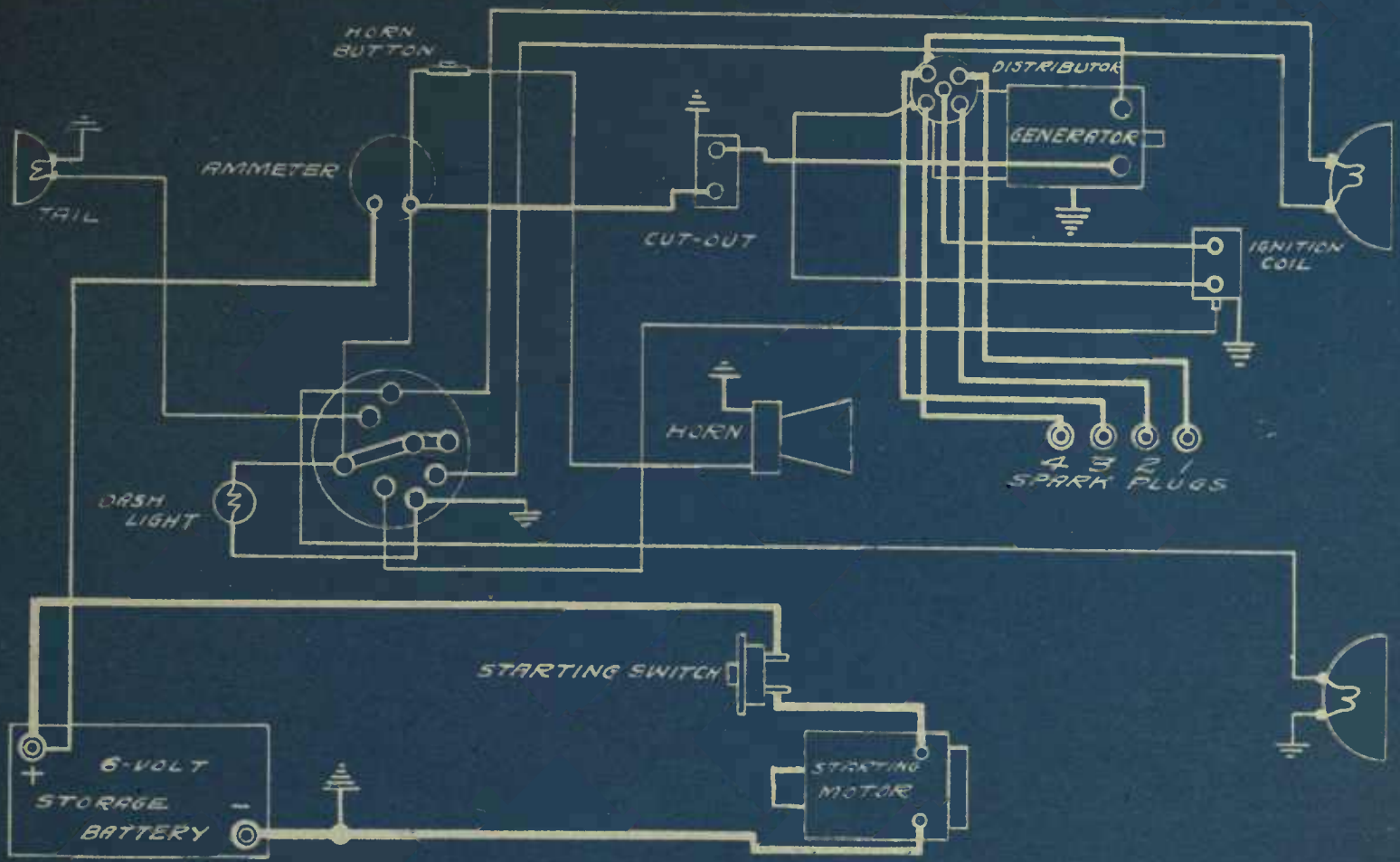
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REGAL 1917-18

AUTOLITE SYSTEM
ATWATER-KENT IGNITION

-J-

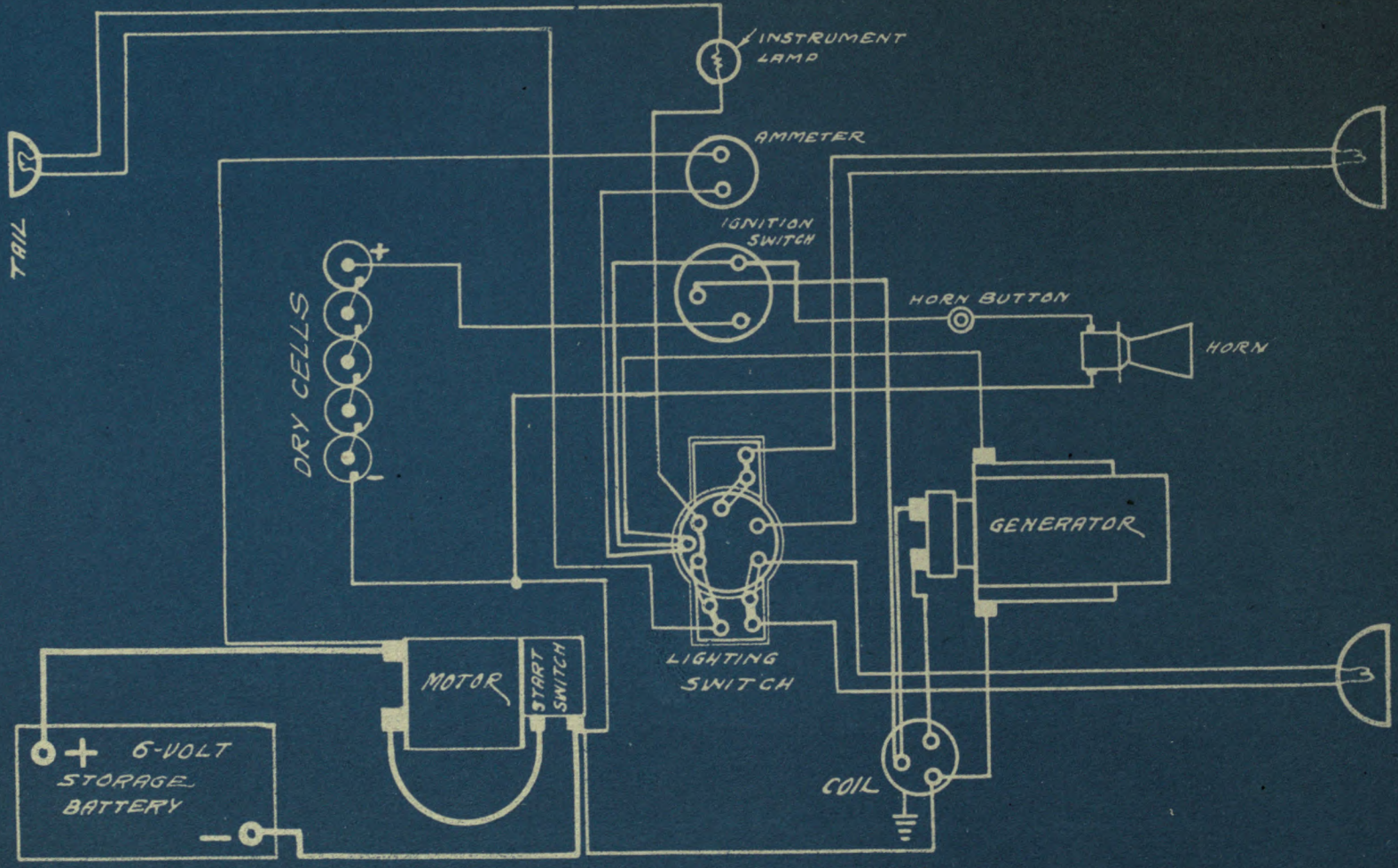
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REO MODEL "R" 1914
REMY SYSTEM

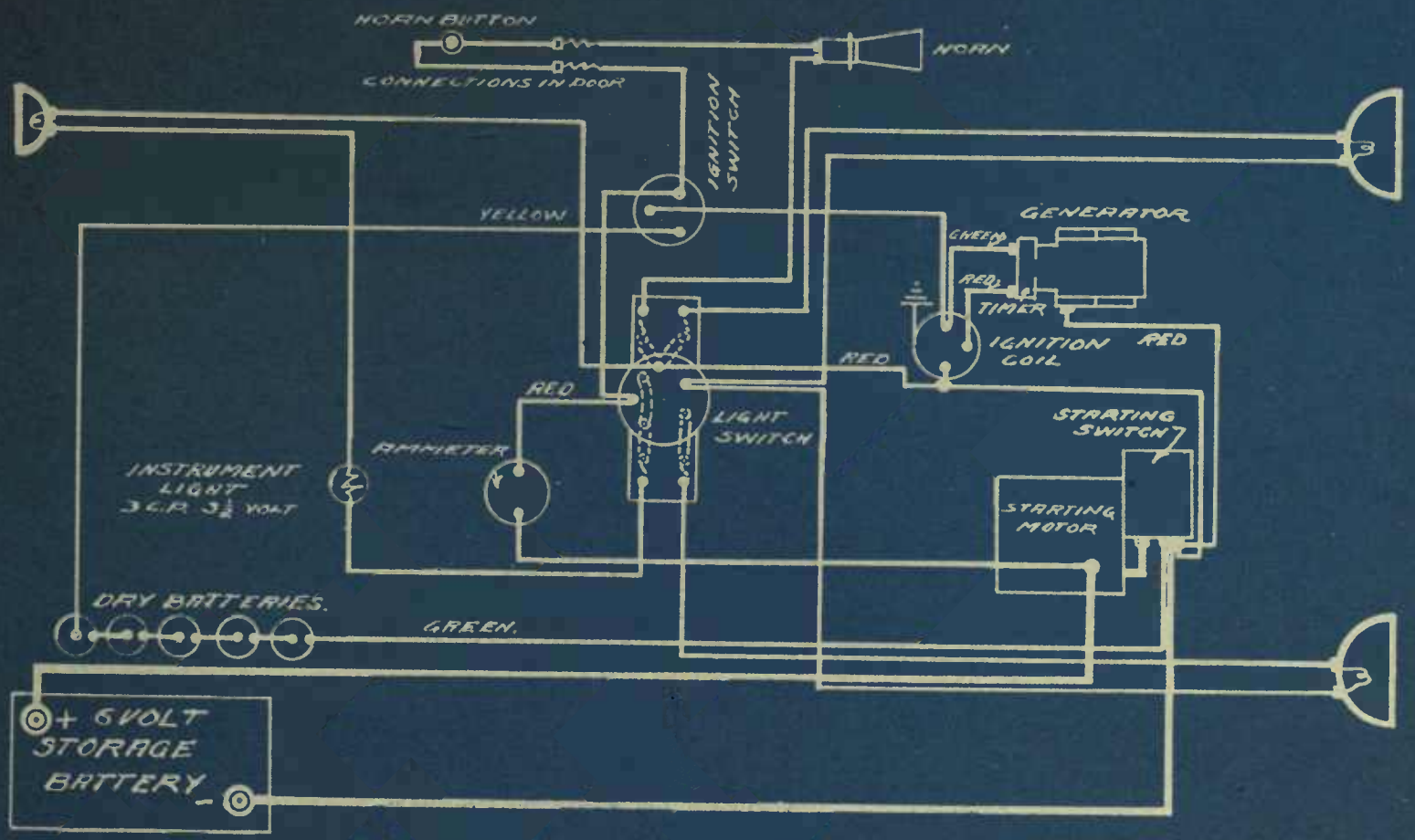
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REO 1915 MODELS R & M REMY SYSTEM

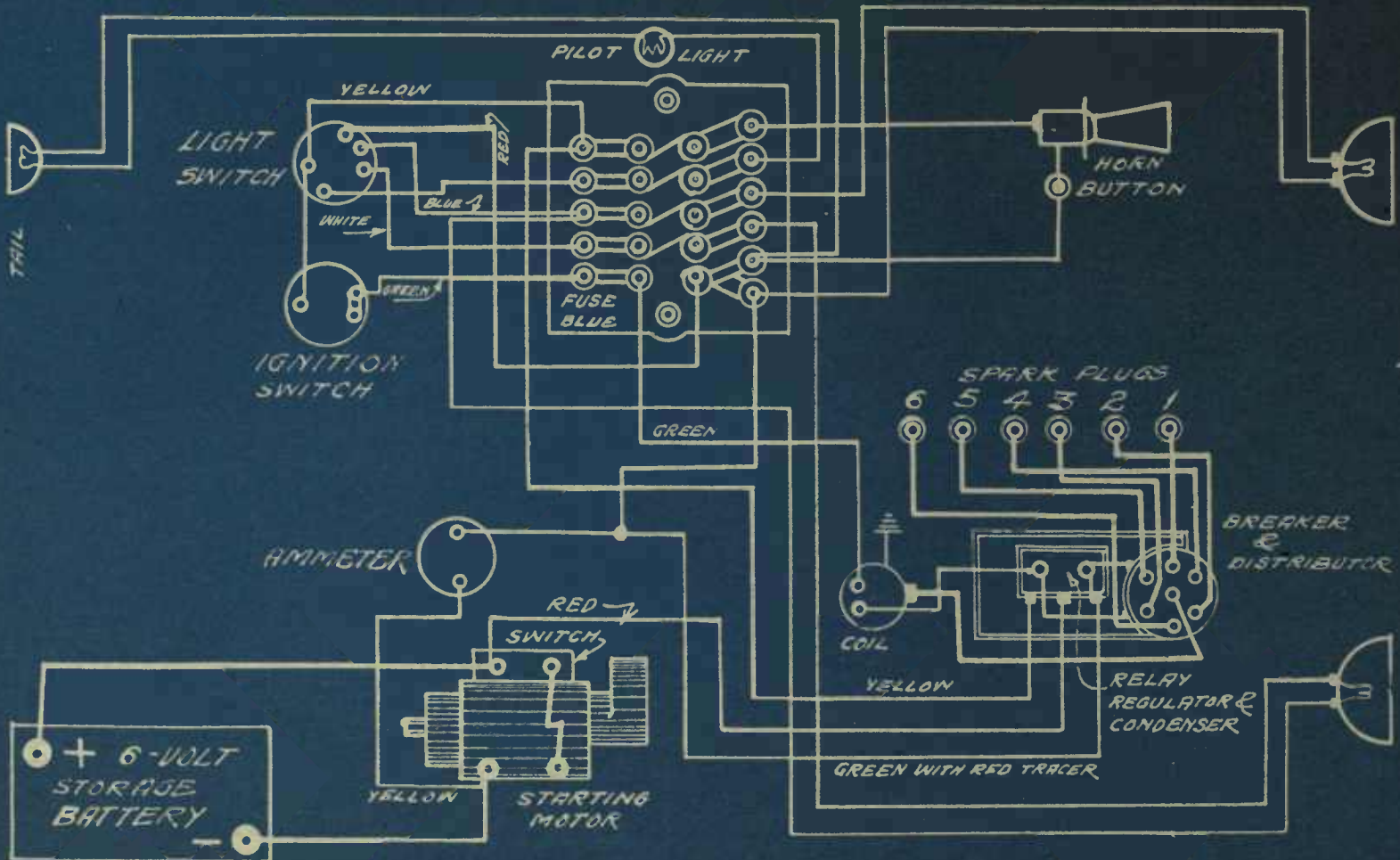
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REMY SYSTEM

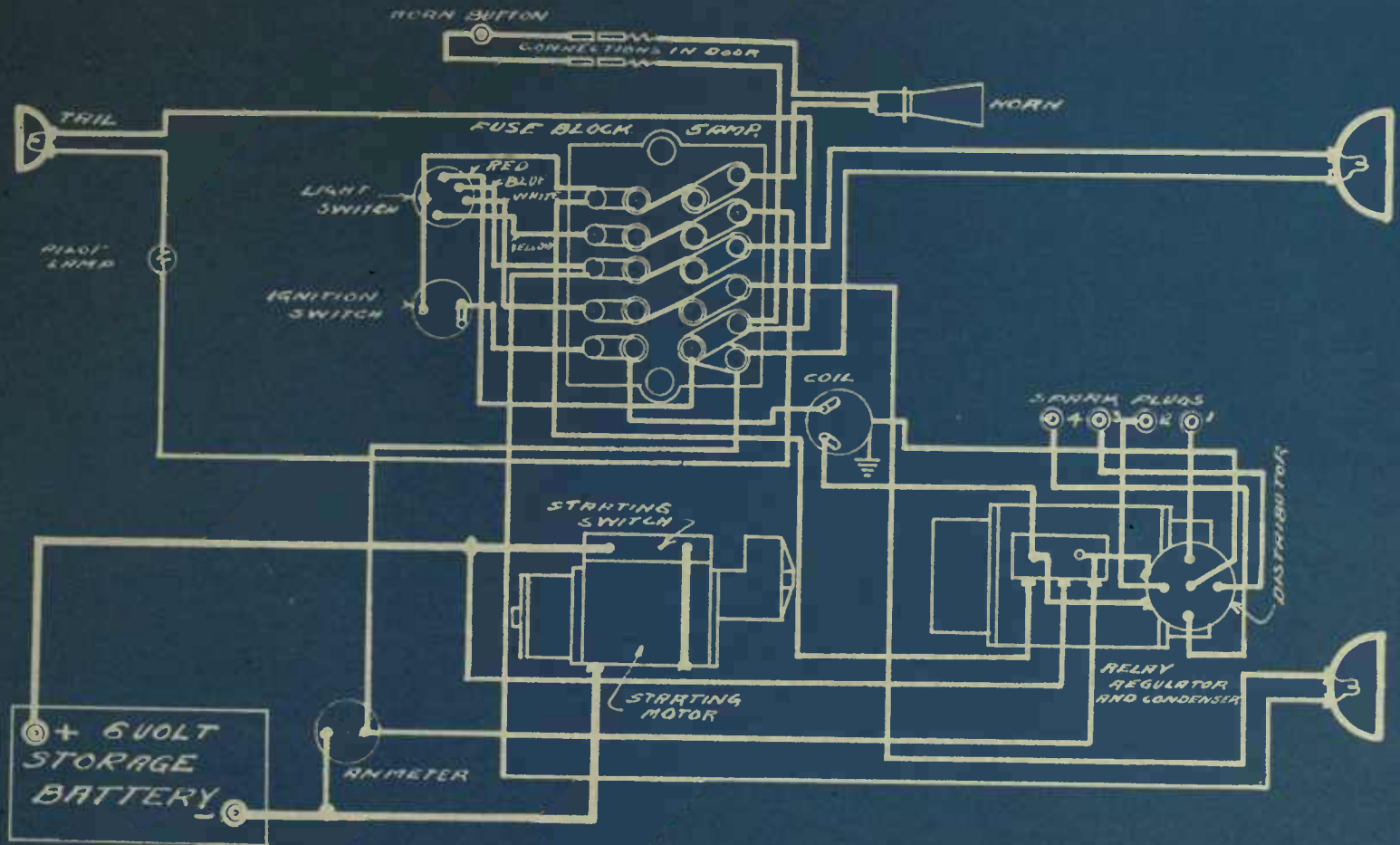
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REMY SYSTEM

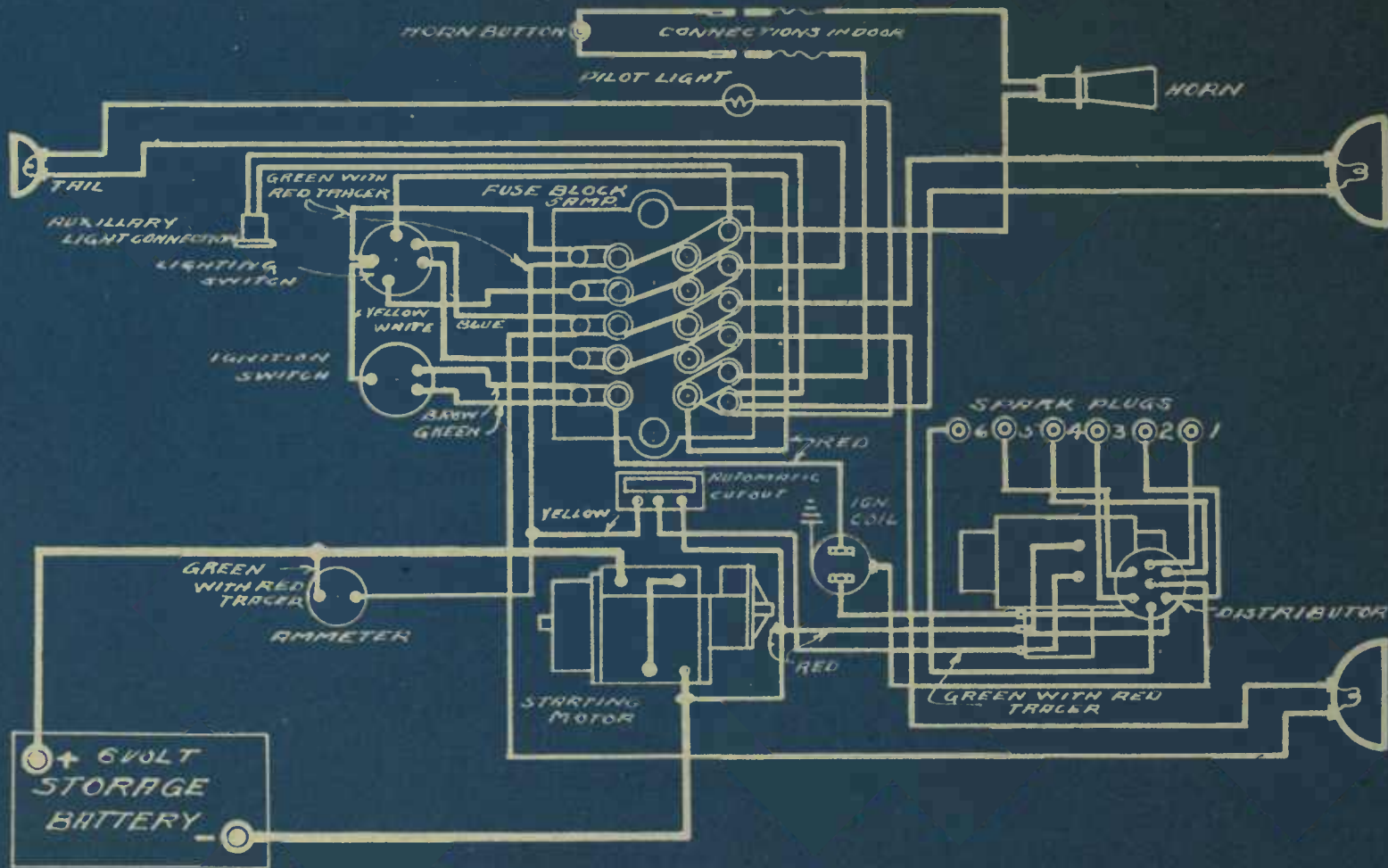
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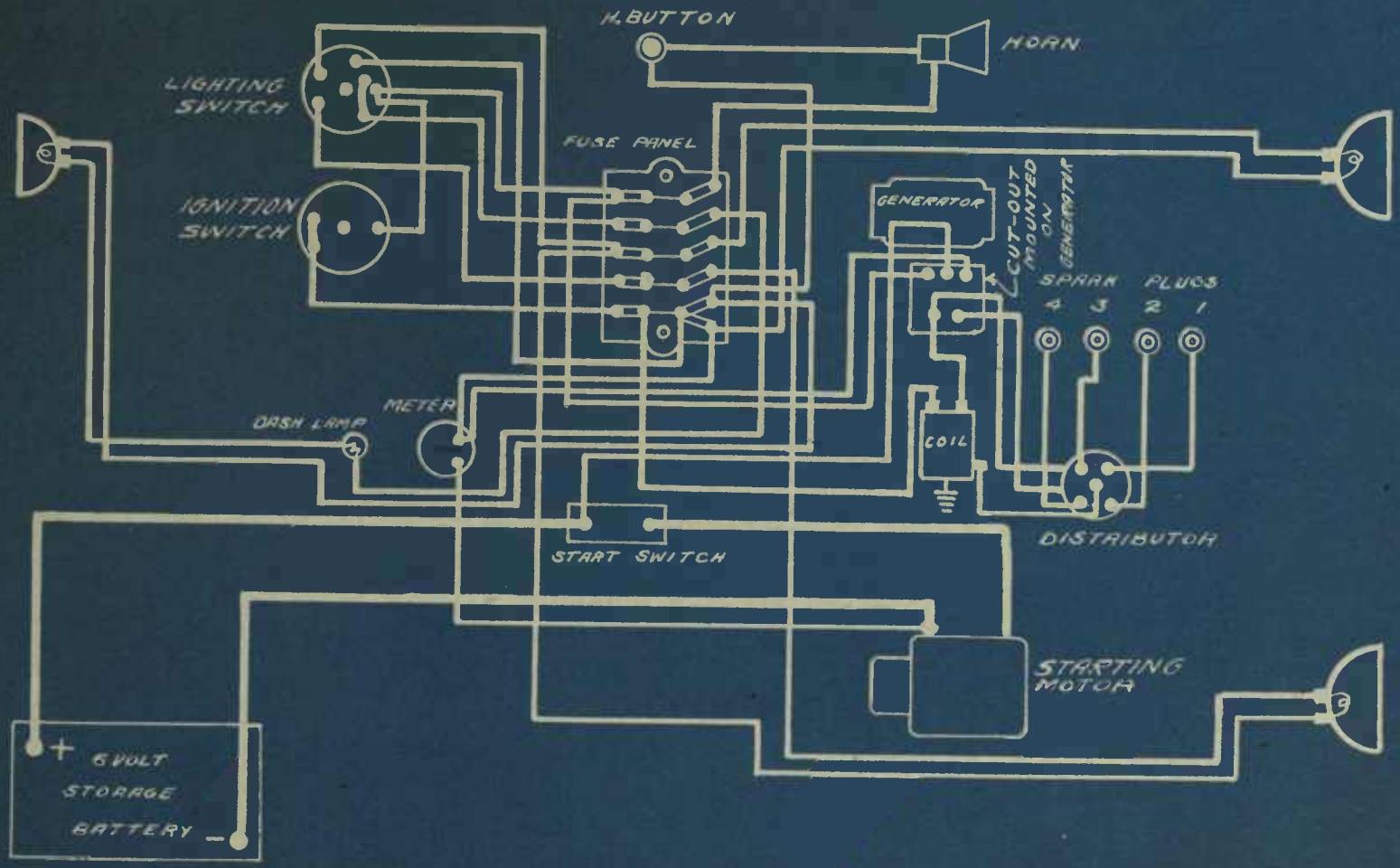


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REO R-4 1917

REMY SYSTEM

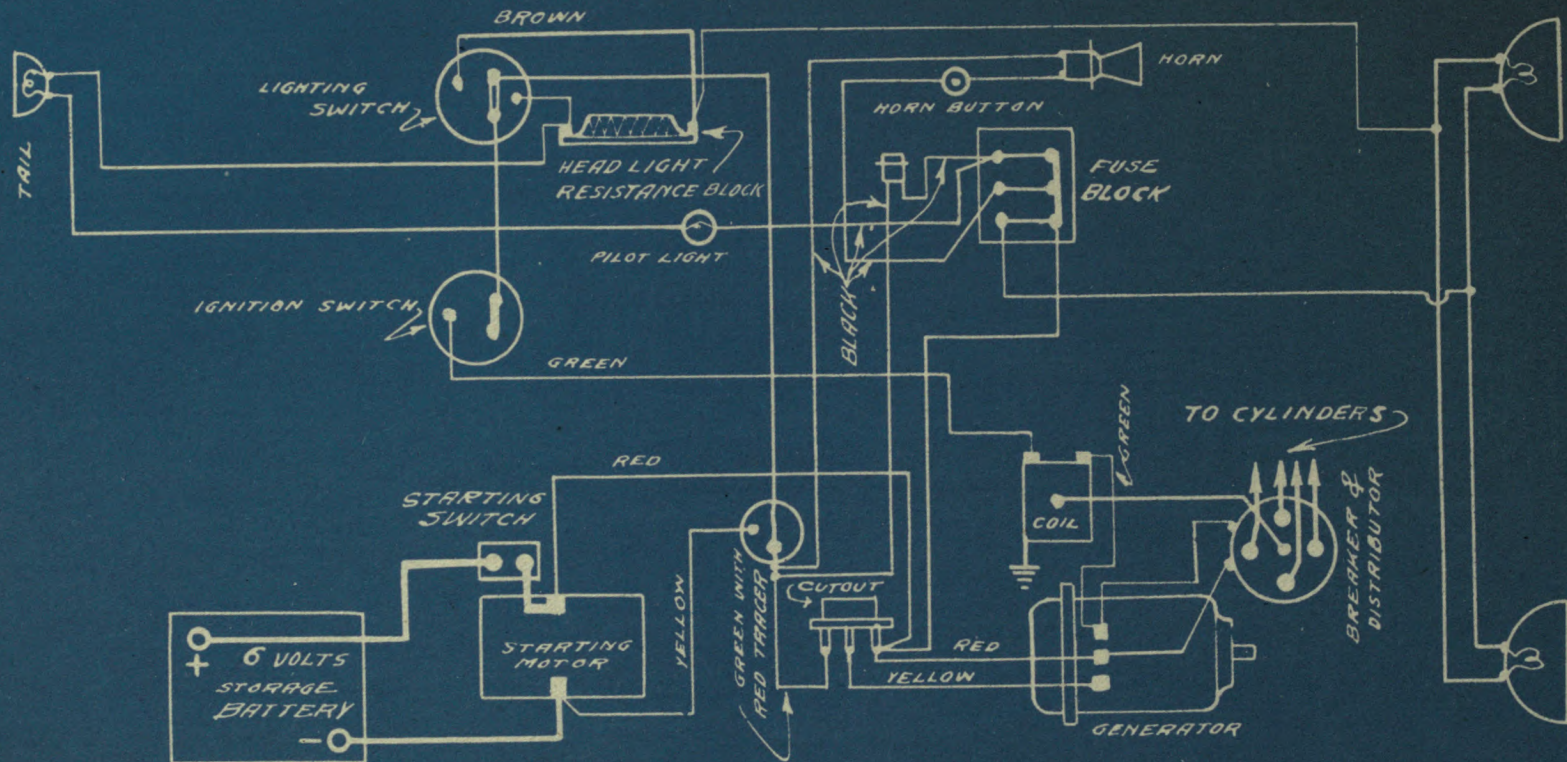
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 REMY SYSTEM

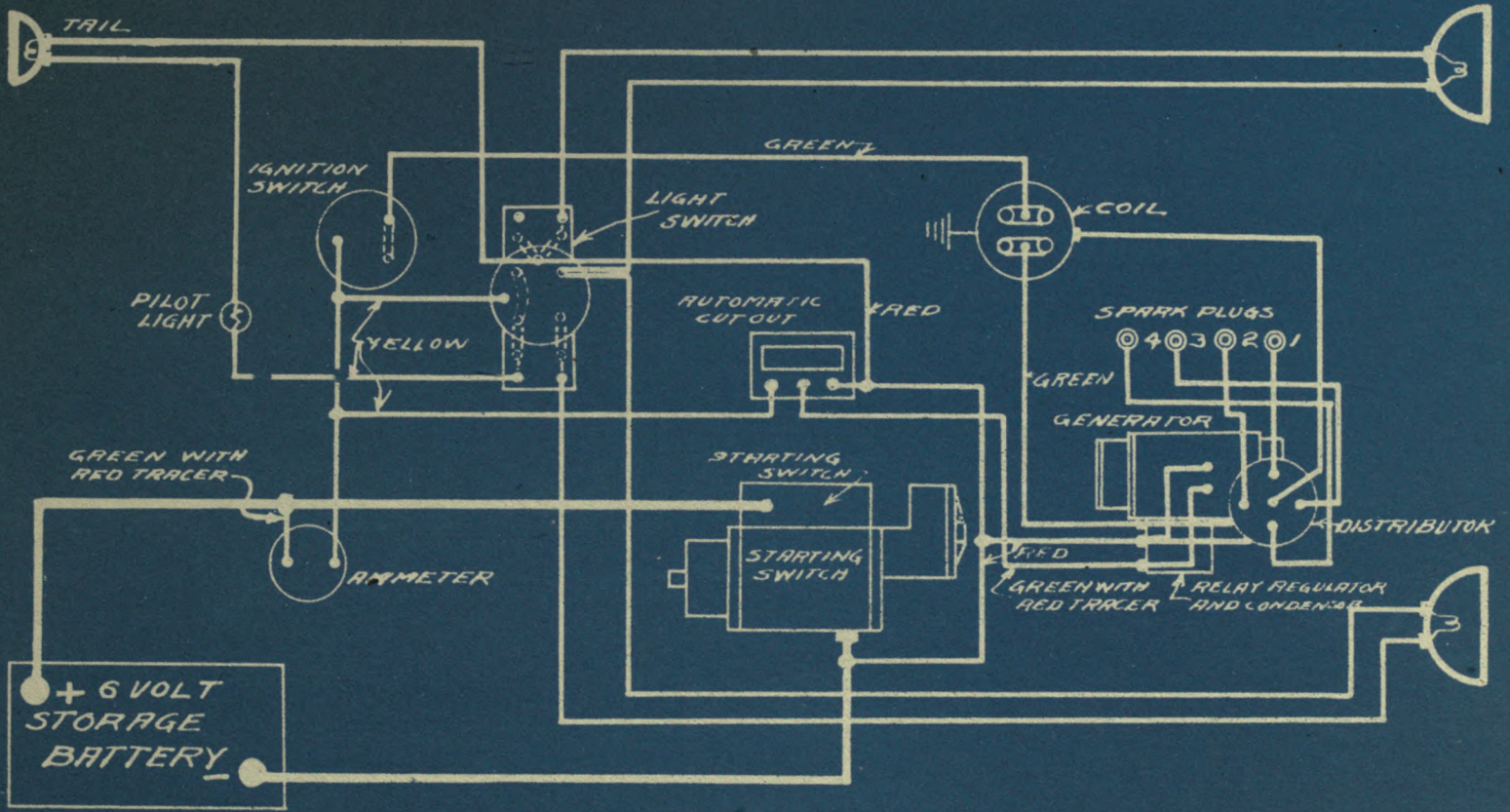
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REO TRUCK 1917
REMY SYSTEM

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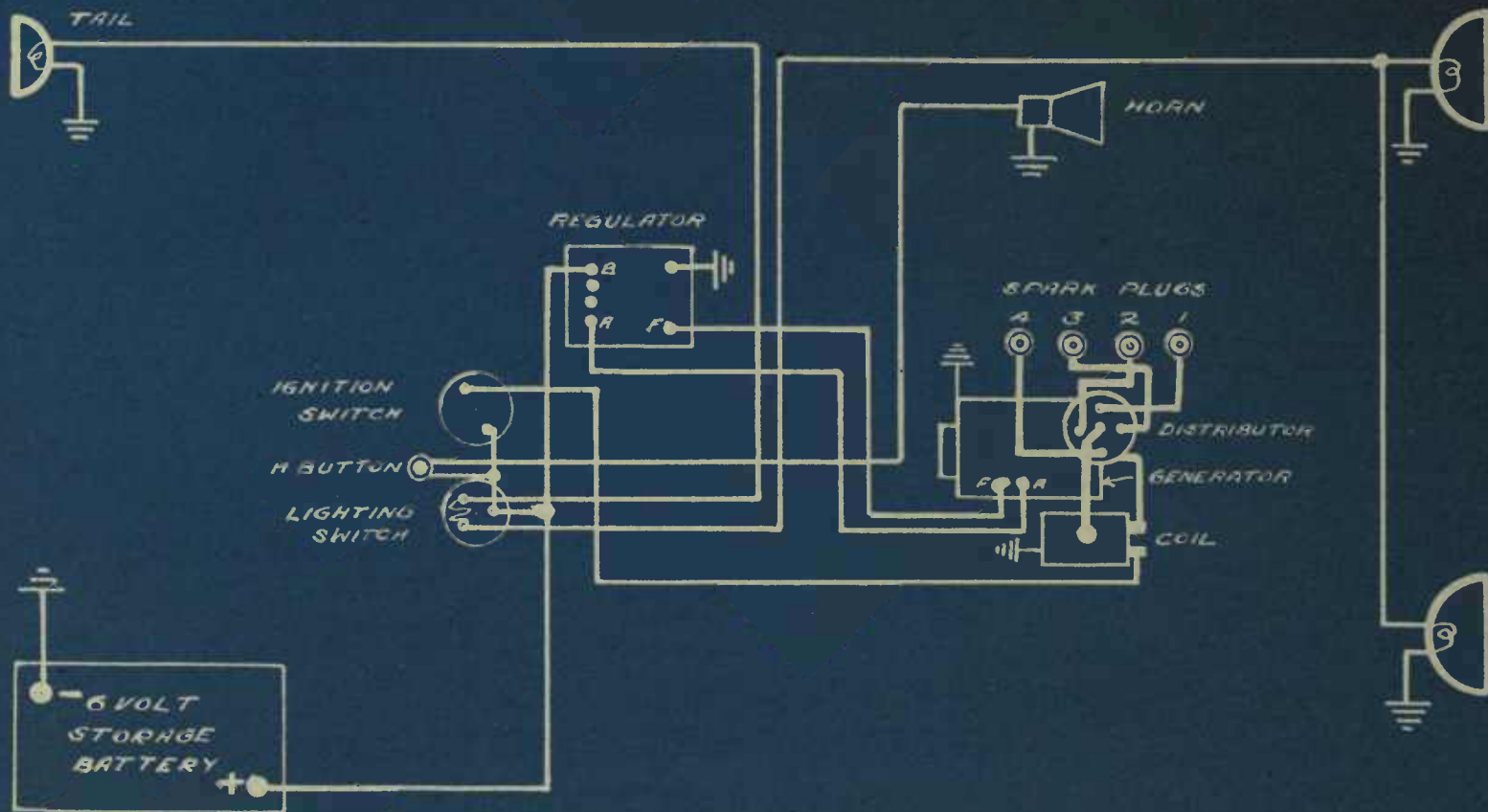


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REPUBLIC TRUCK—MODELS 8 & 9.

REMY IGNITION & LIGHTING SYSTEM

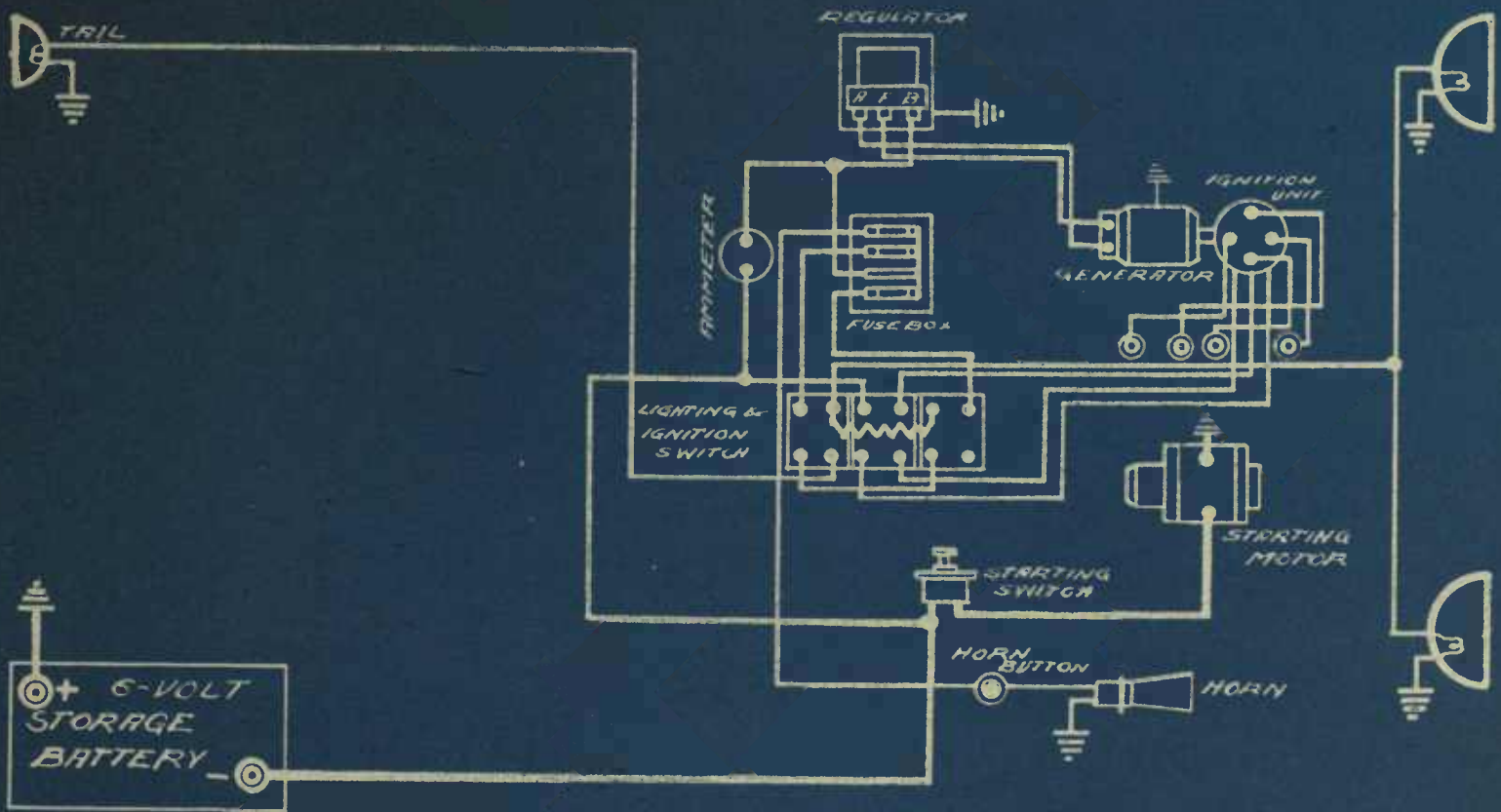
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REPUBLIC TRUCK
WESTINGHOUSE SYSTEM

FROM WEST. M. MANUAL

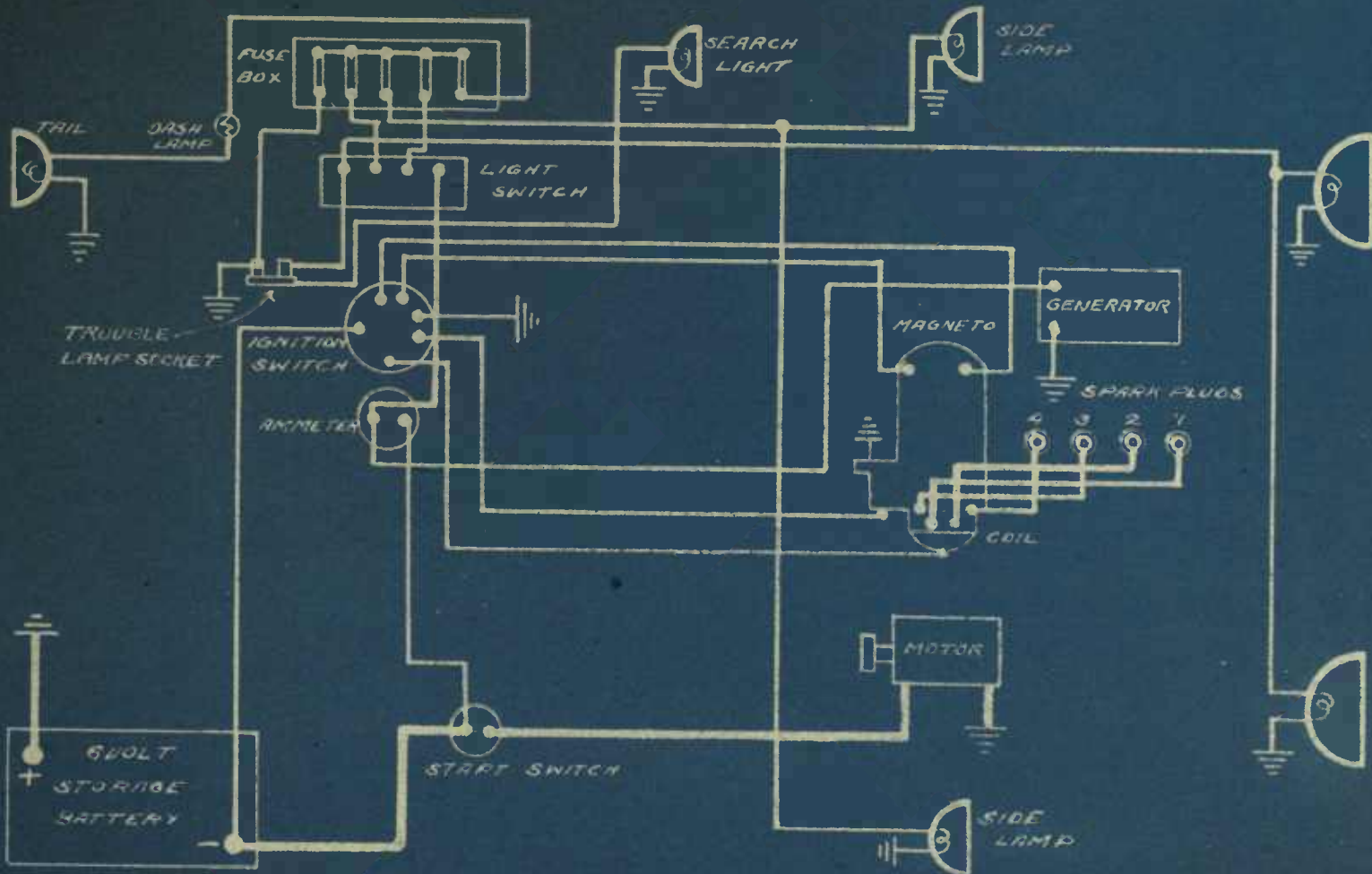


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RIKER TRUCK 1918

WESTINGHOUSE SYSTEM

FROM RIKER INST. BOOK

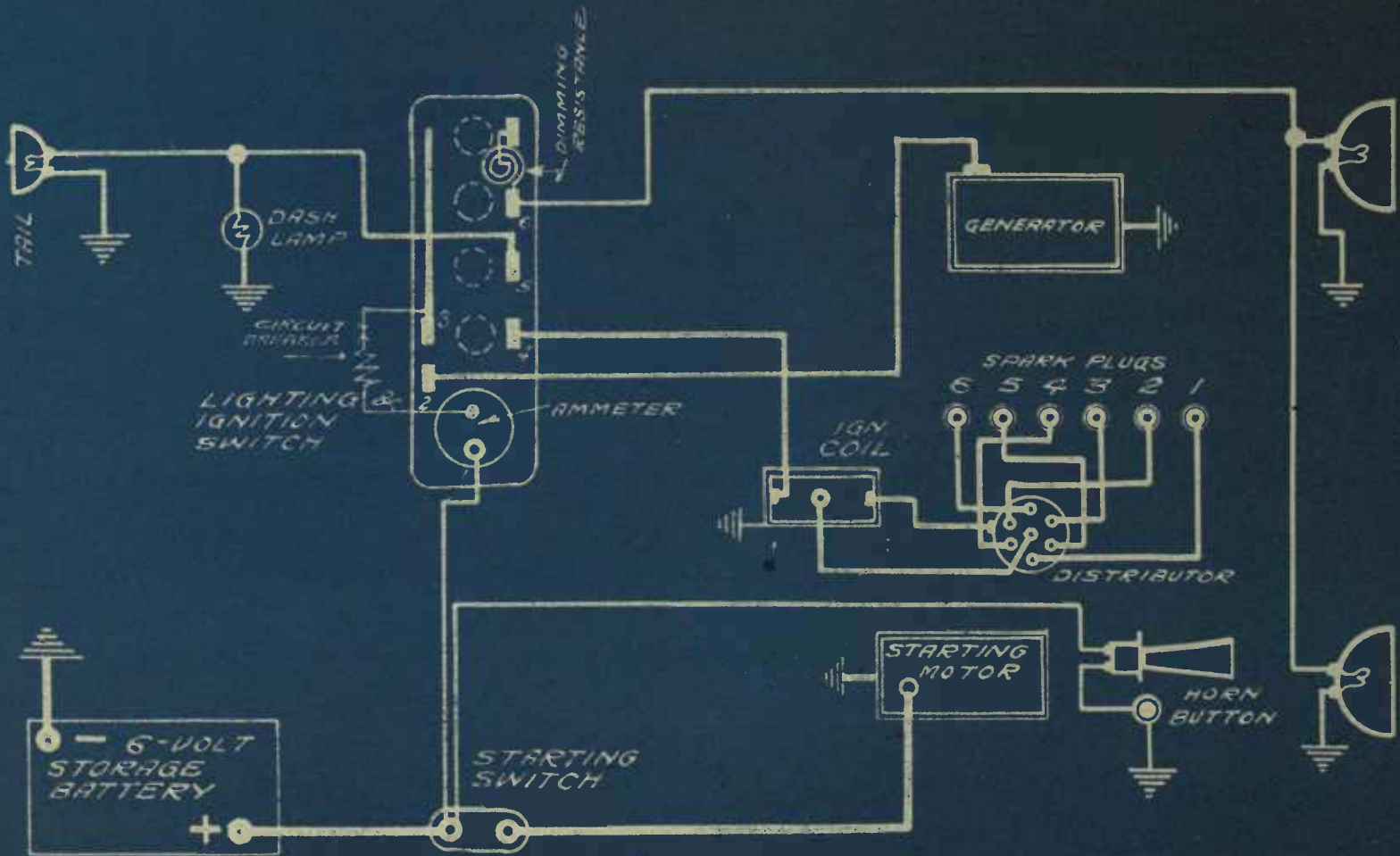


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RIDDLE COACH & HEARSE COMPANY, 1917

DELCO SYSTEM

FROM DELCO MANUAL

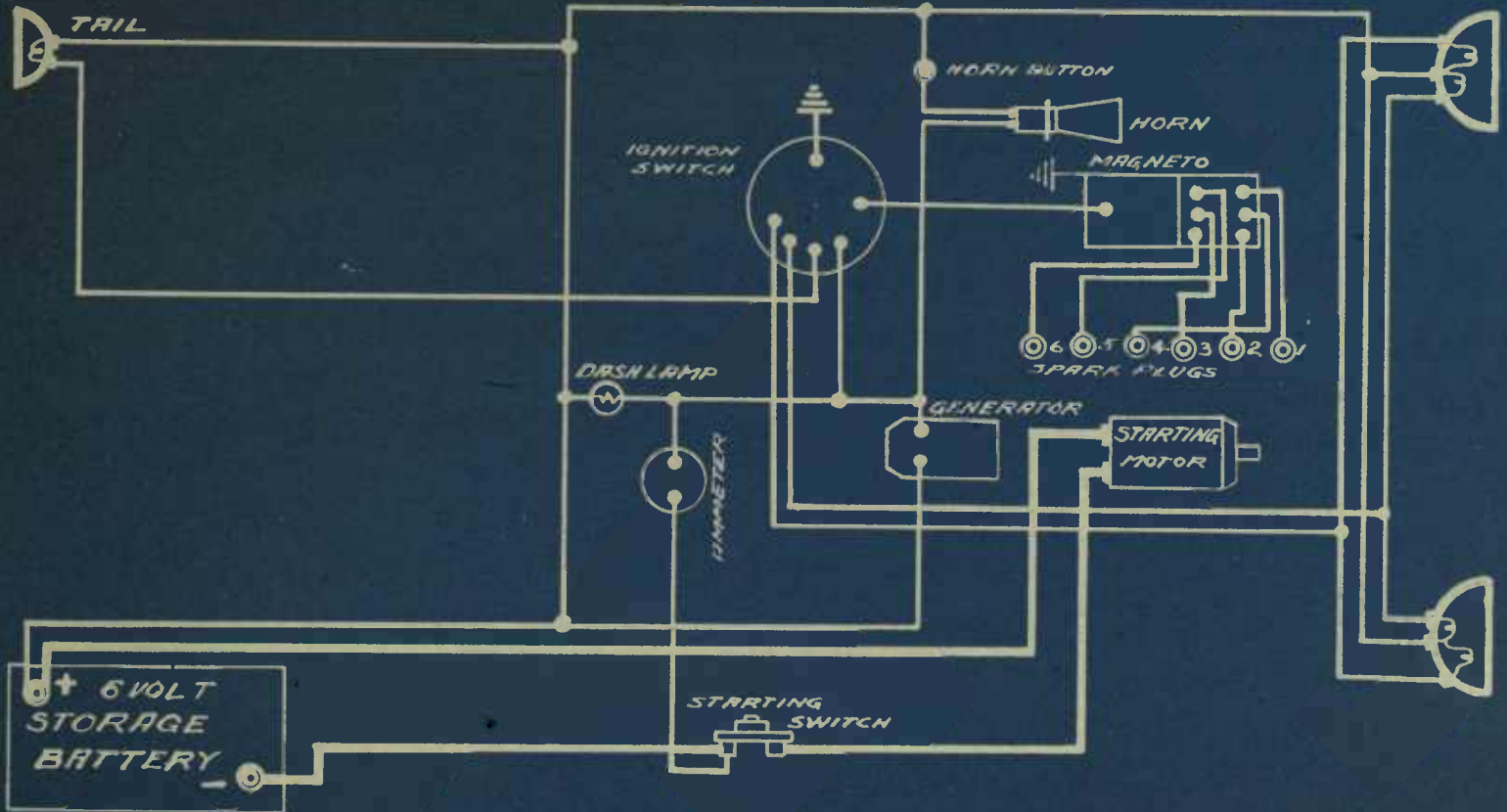


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ROAMER 1916
BIJUR SYSTEM
BOSCH IGNITION

FROM MFRS. B.P.A.

USED ON CARS ONE TO 13126

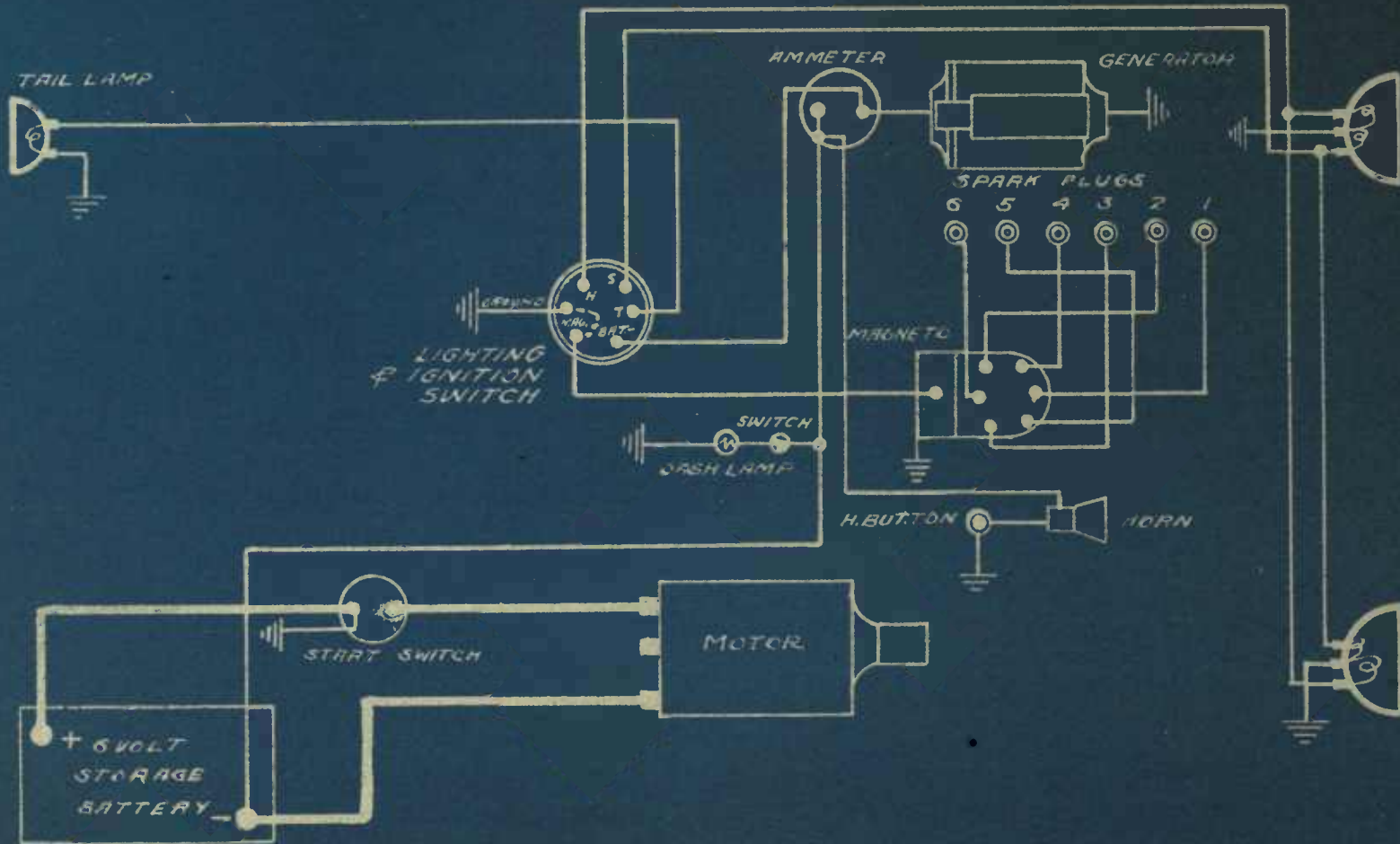


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ROAMER
BIJUR SYSTEM

MODEL R-A 1917
FOR CARS # 13127 TO 13869 INC.

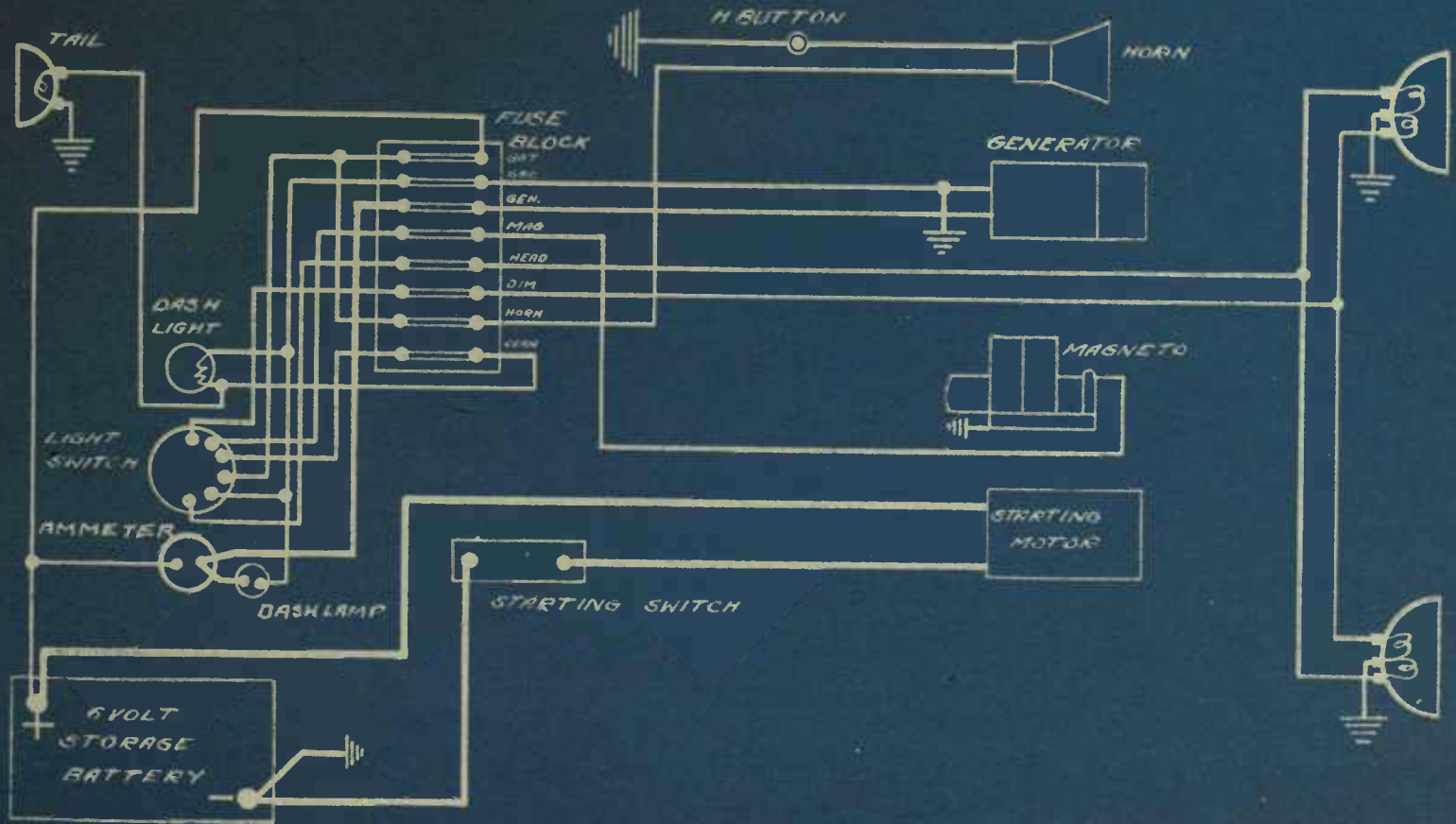
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ROAMER 1918-19, D-4-75 & C-6-54
BITUR SYSTEM
BOSCH IGNITION

FROM MFRS. BP & B

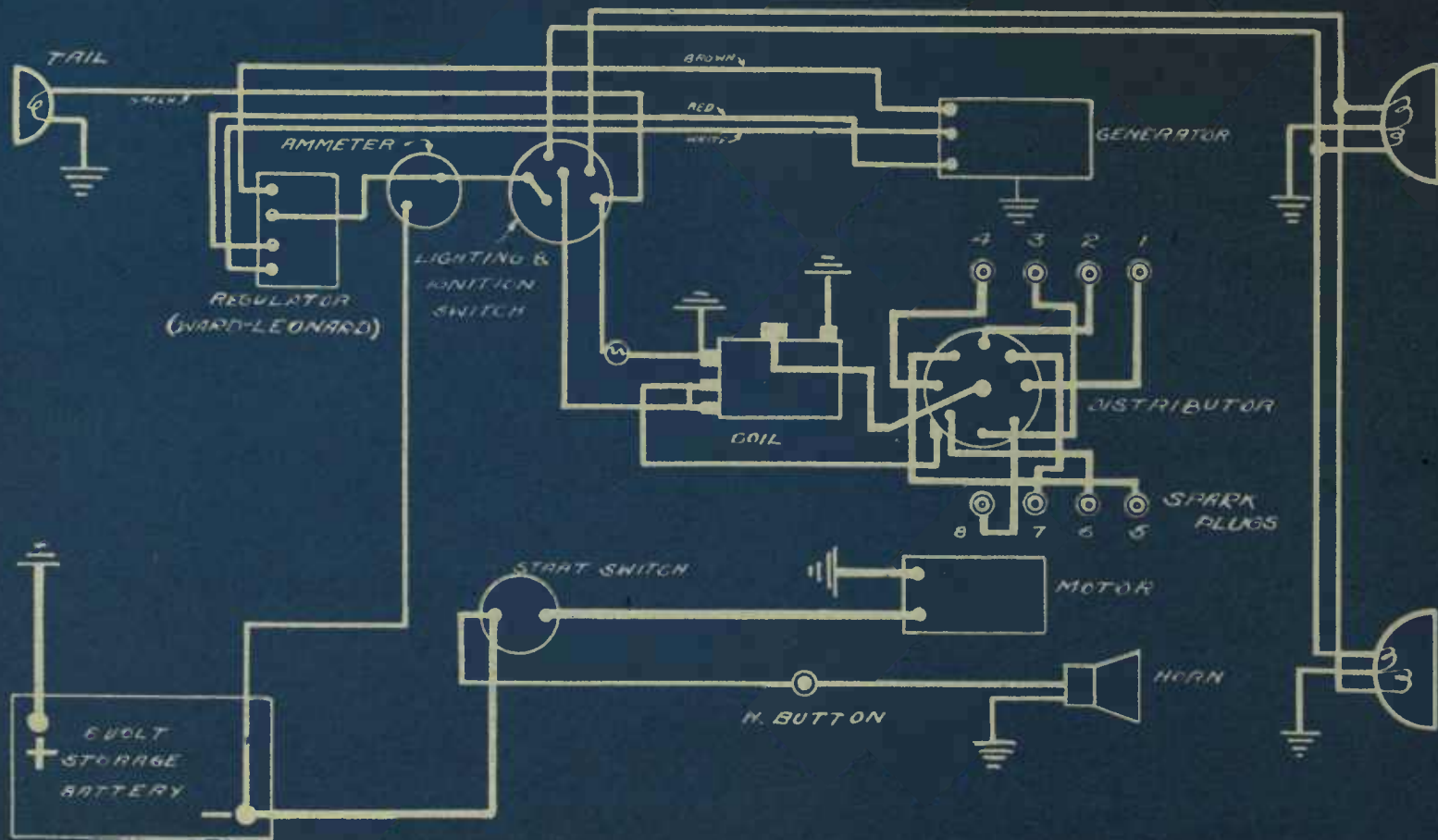


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ROSS 1916-1917
ROBBINS & MEYER SYSTEM
ATWATER KENT IGNITION

MODEL "8"

FROM ROSS INST. BOOK.

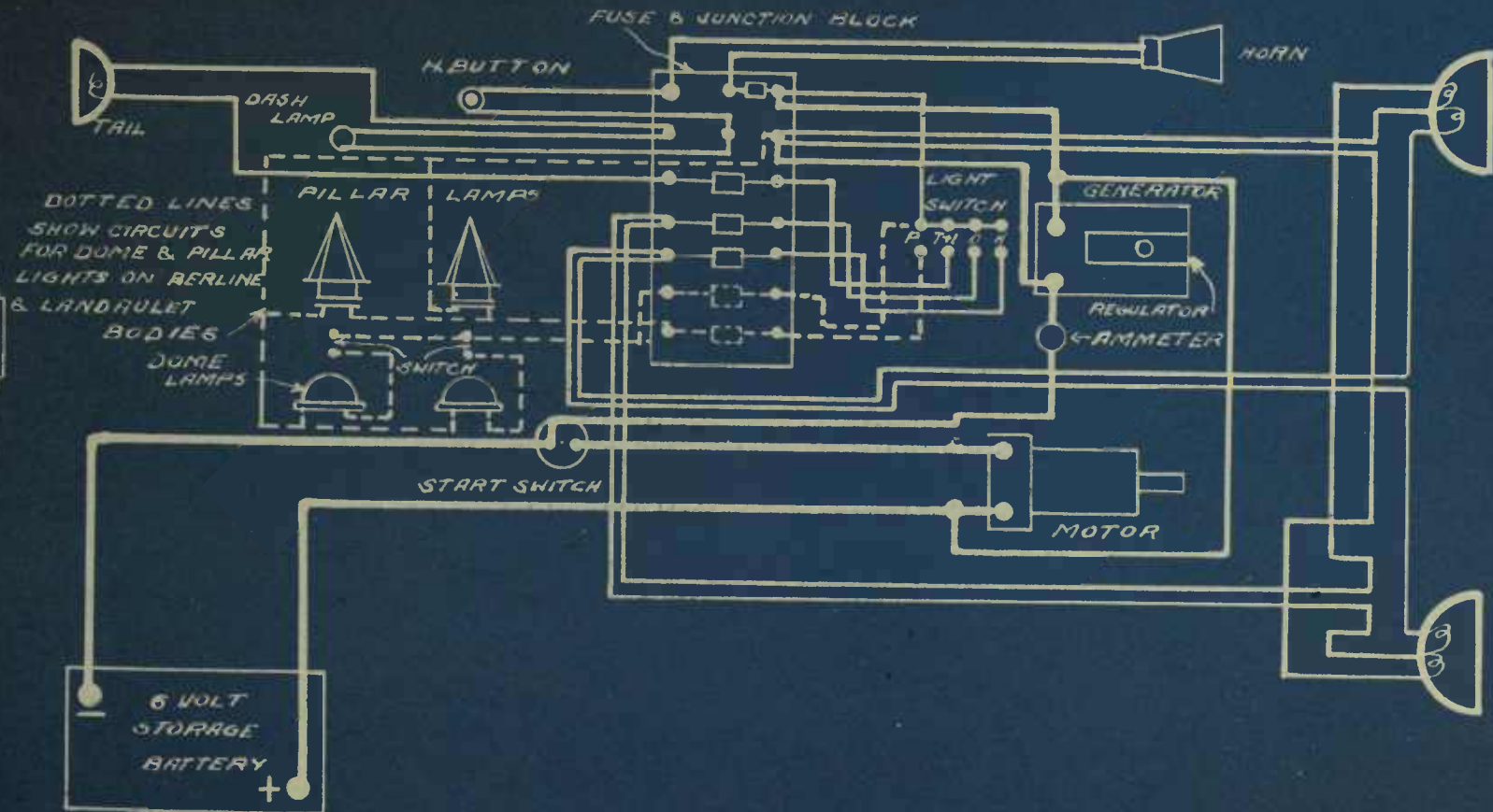


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RUSSELL MODELS 32 & 48

BIJUR SYSTEM

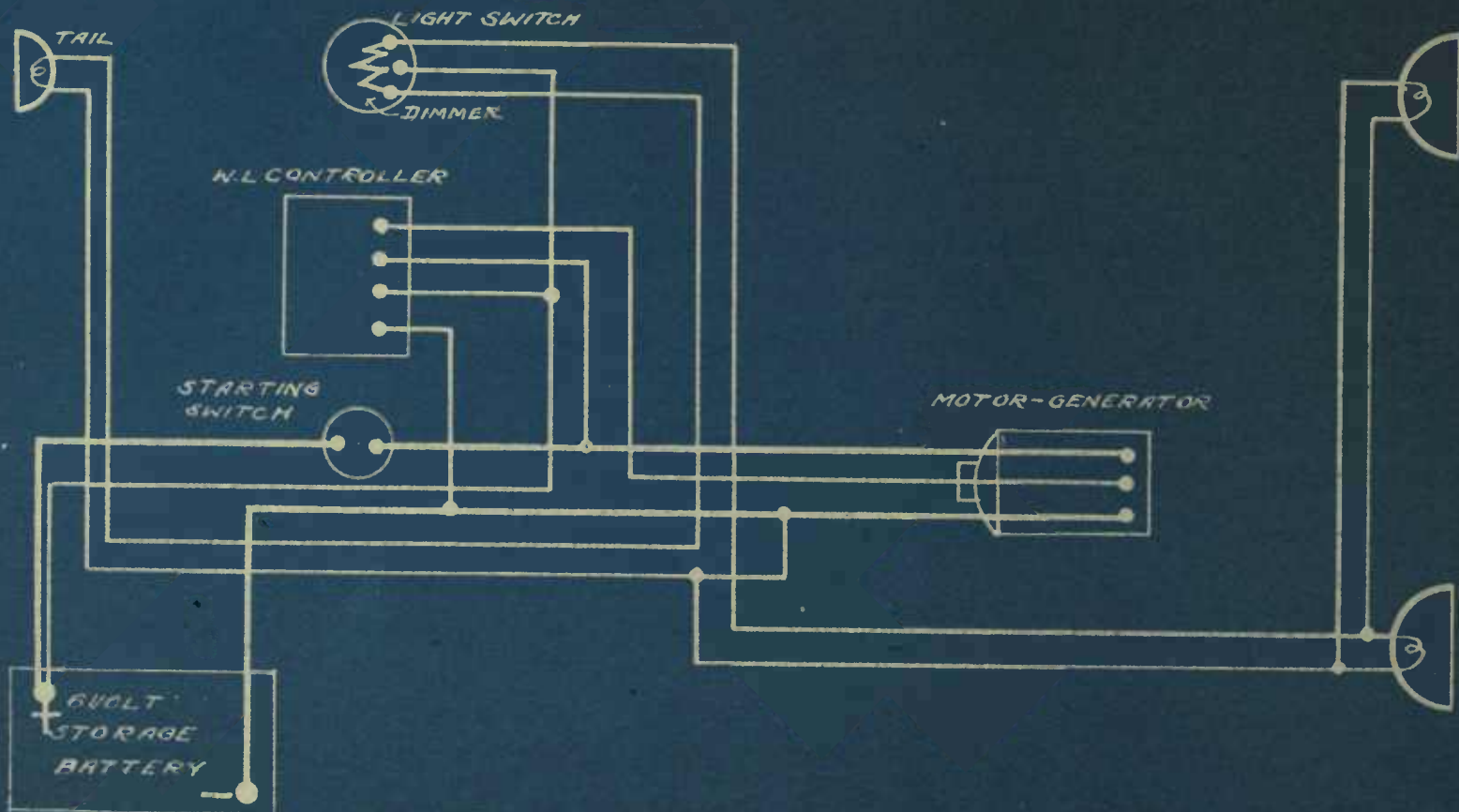
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SAXON 1915
WARD LEONARD SYSTEM

FOUR

FROM W. L. INST. SK.

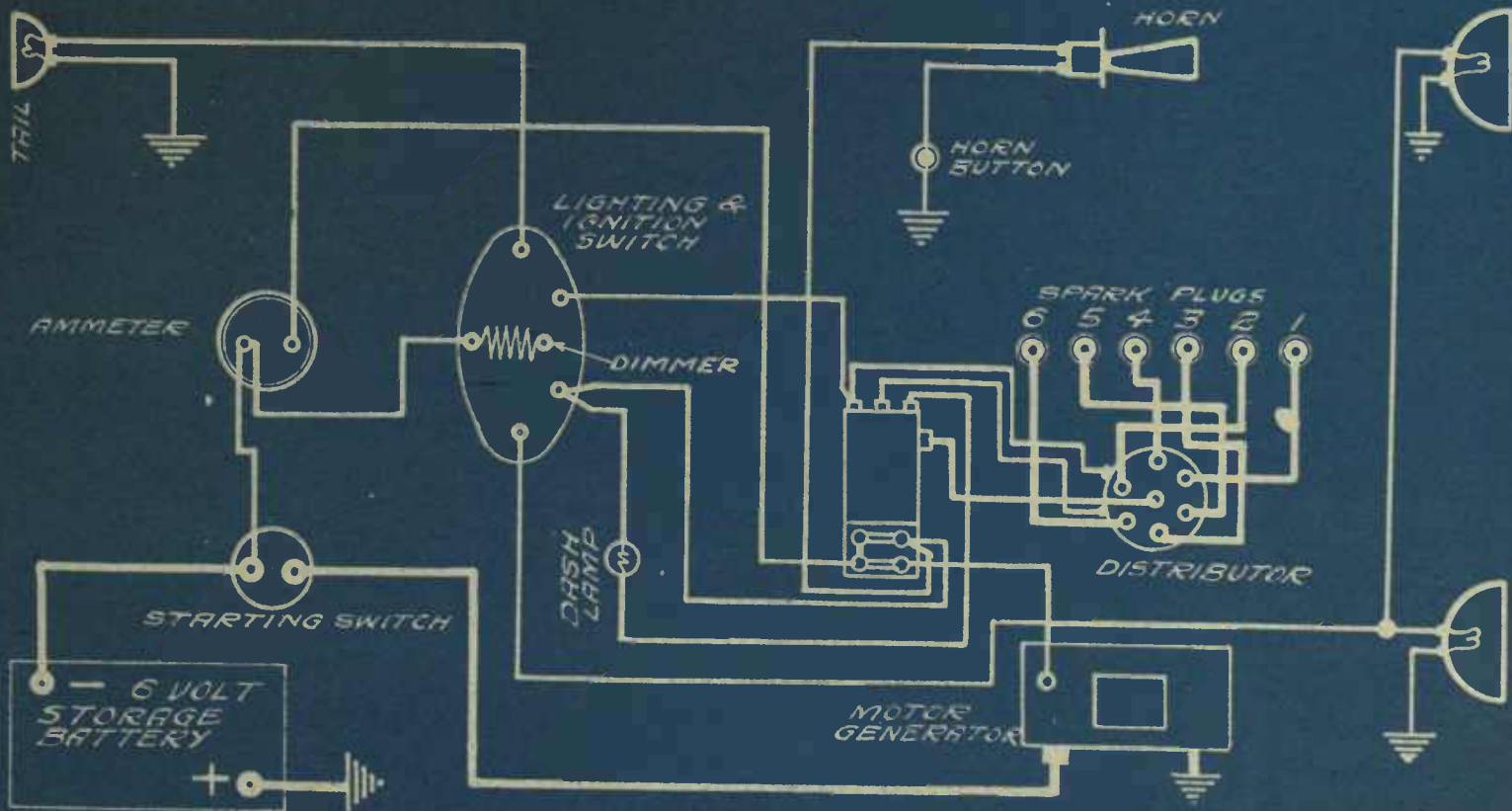


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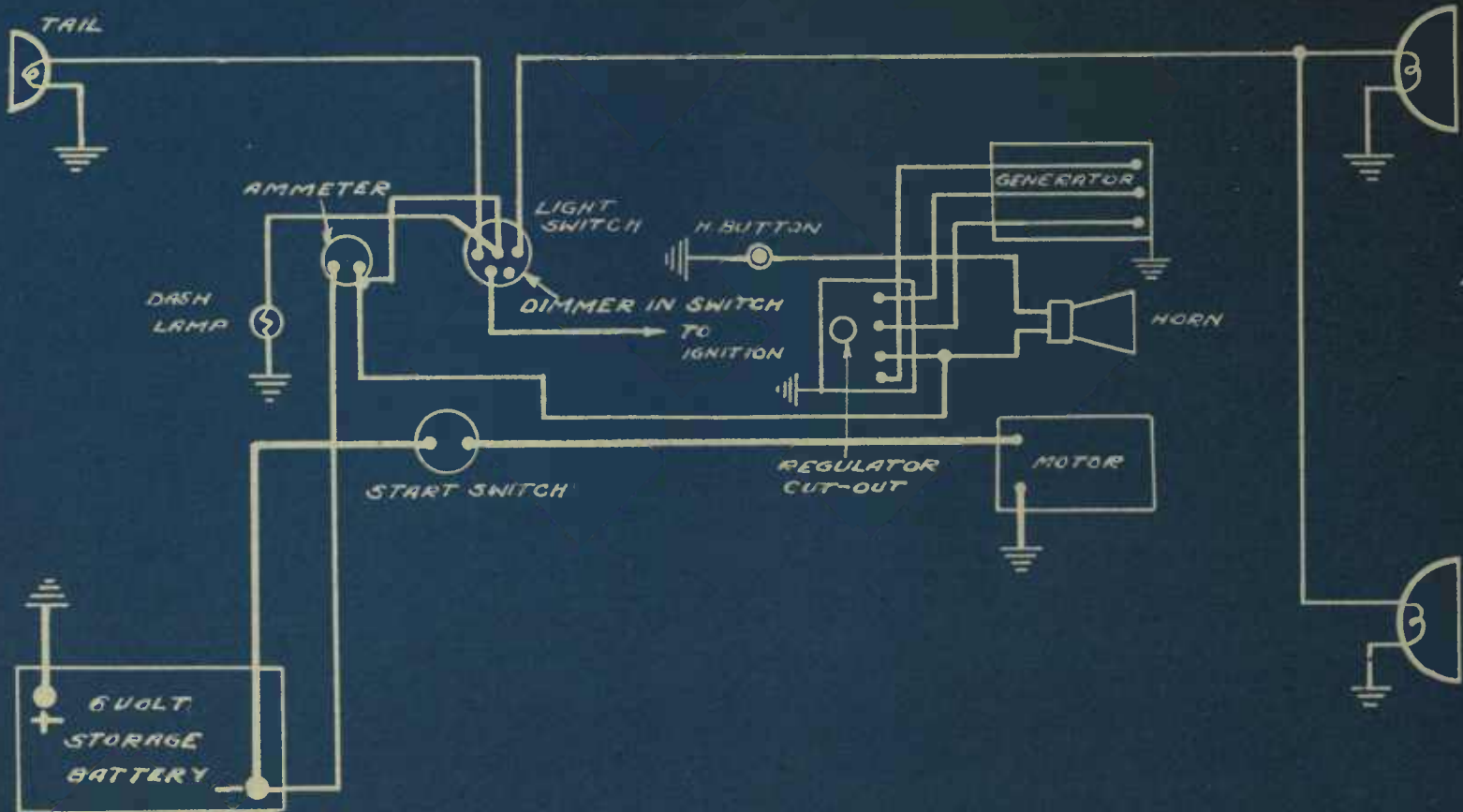
SAXON 1915-16
GRAY AND DAVIS SYSTEM

SIX

FROM MFRS. SKETCH



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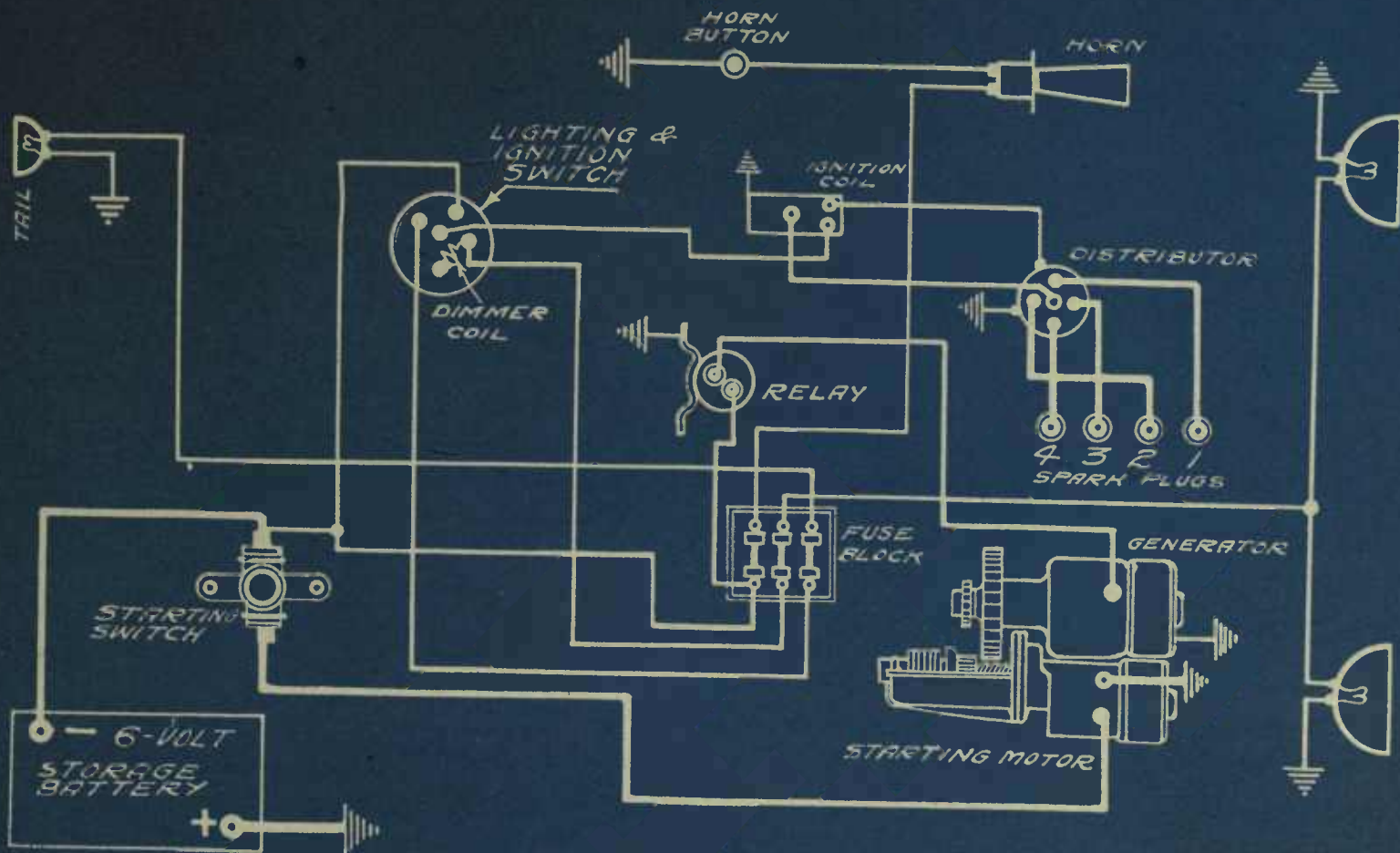


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SAXON 1917
WAGNER SYSTEM

B-5-R

FROM WAGNER INST. BK.



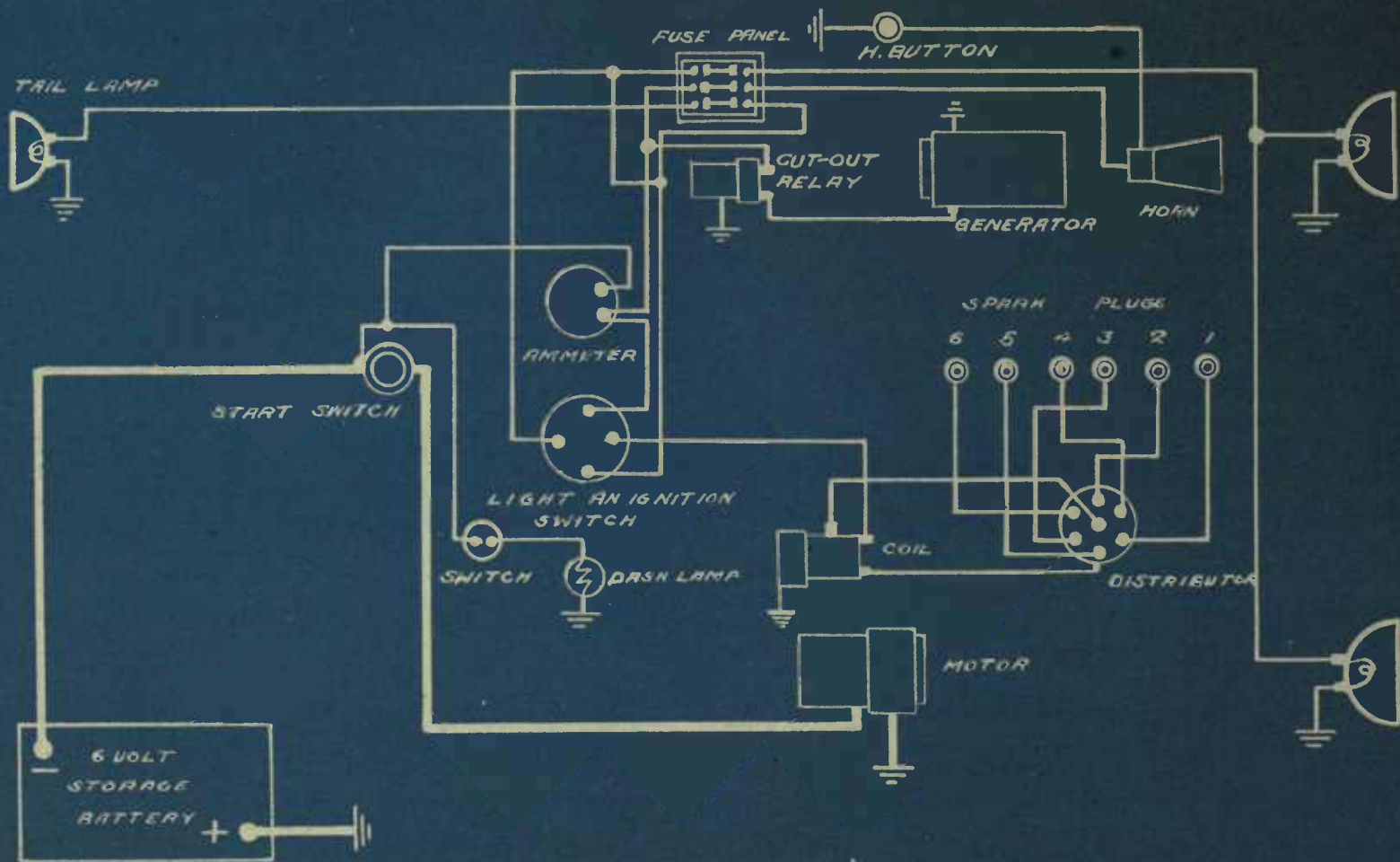
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SAXON 1917 S4 1918 Y-18 - 1919 FY-18

WAGNER SYSTEM

REMY IGN.

FROM MFRS. B.P. 1-5-162



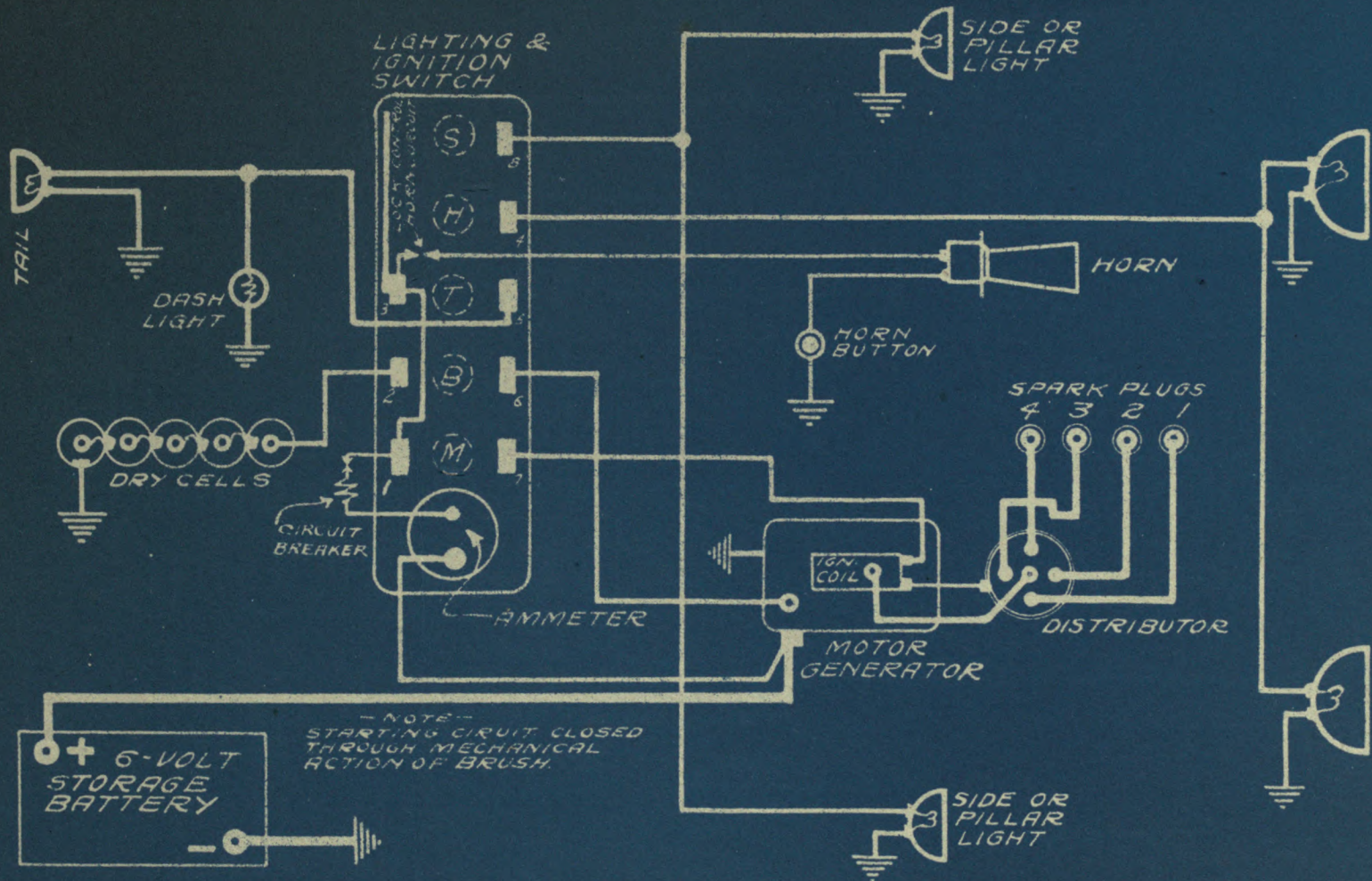
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SAYERS AND SCOVILL 1916

DELCO SYSTEM

"4"

FROM DELCO MANUAL

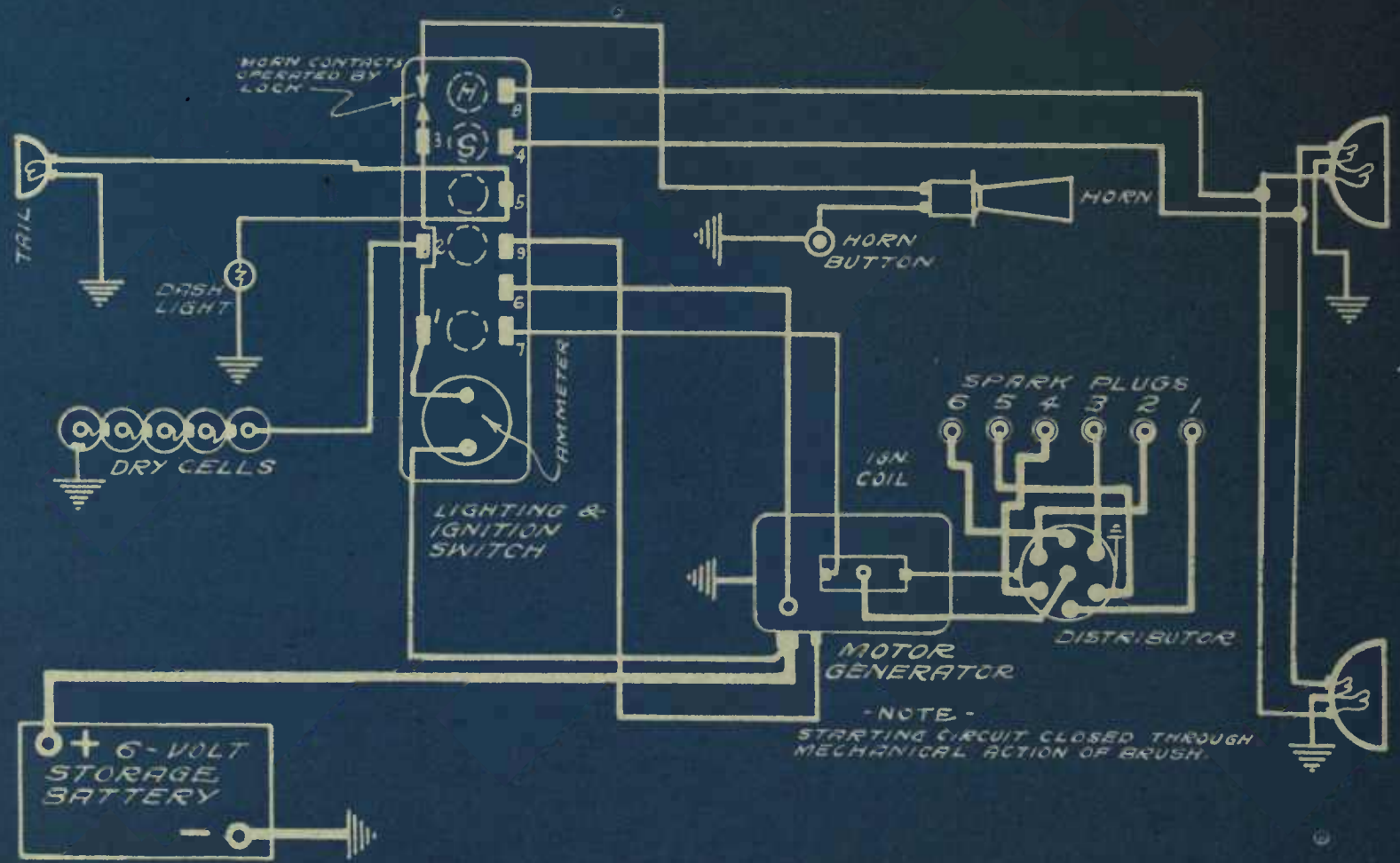


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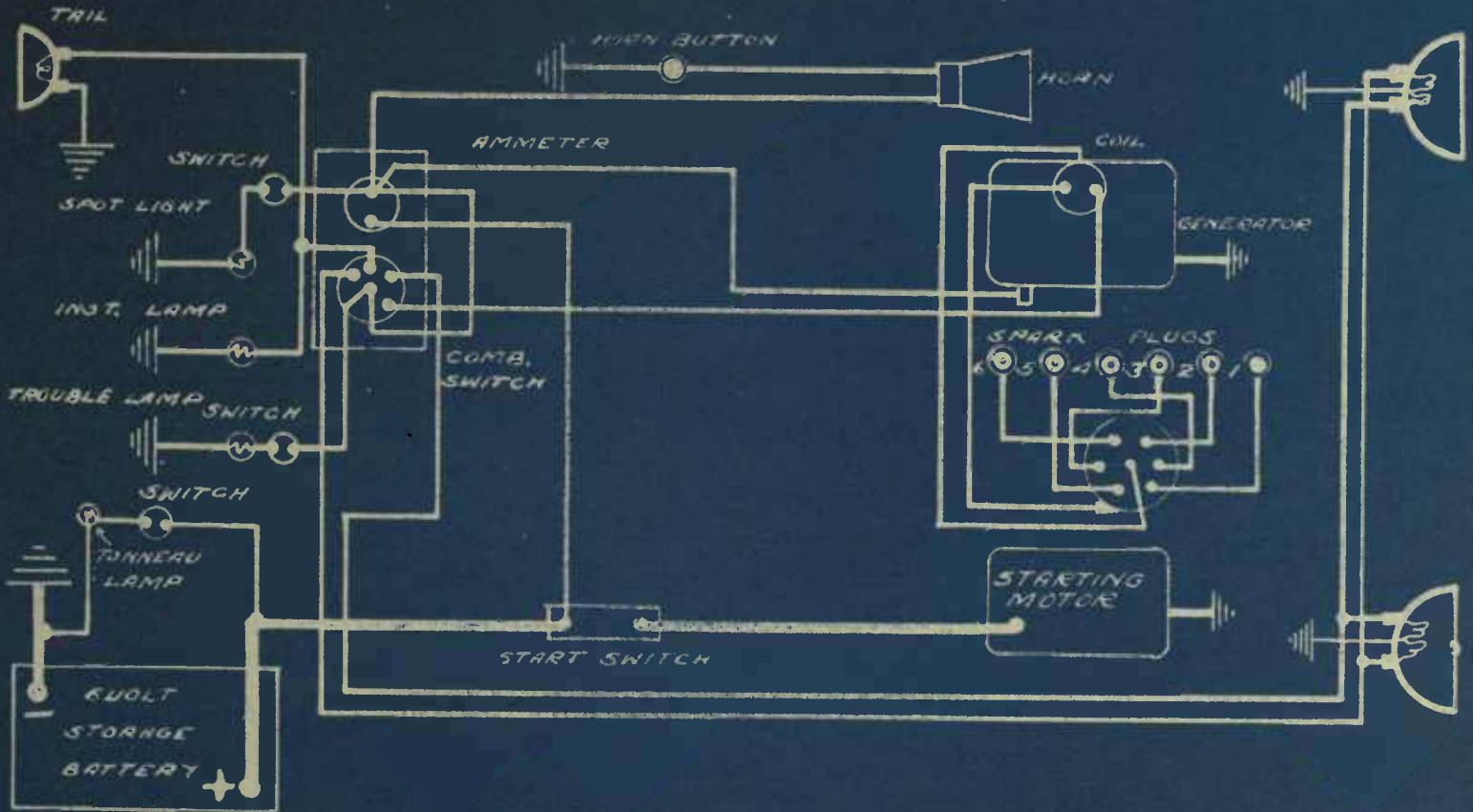
SAYERS AND SCOVILL 1916 "6"

DELCO SYSTEM

FROM DELCO MANUAL

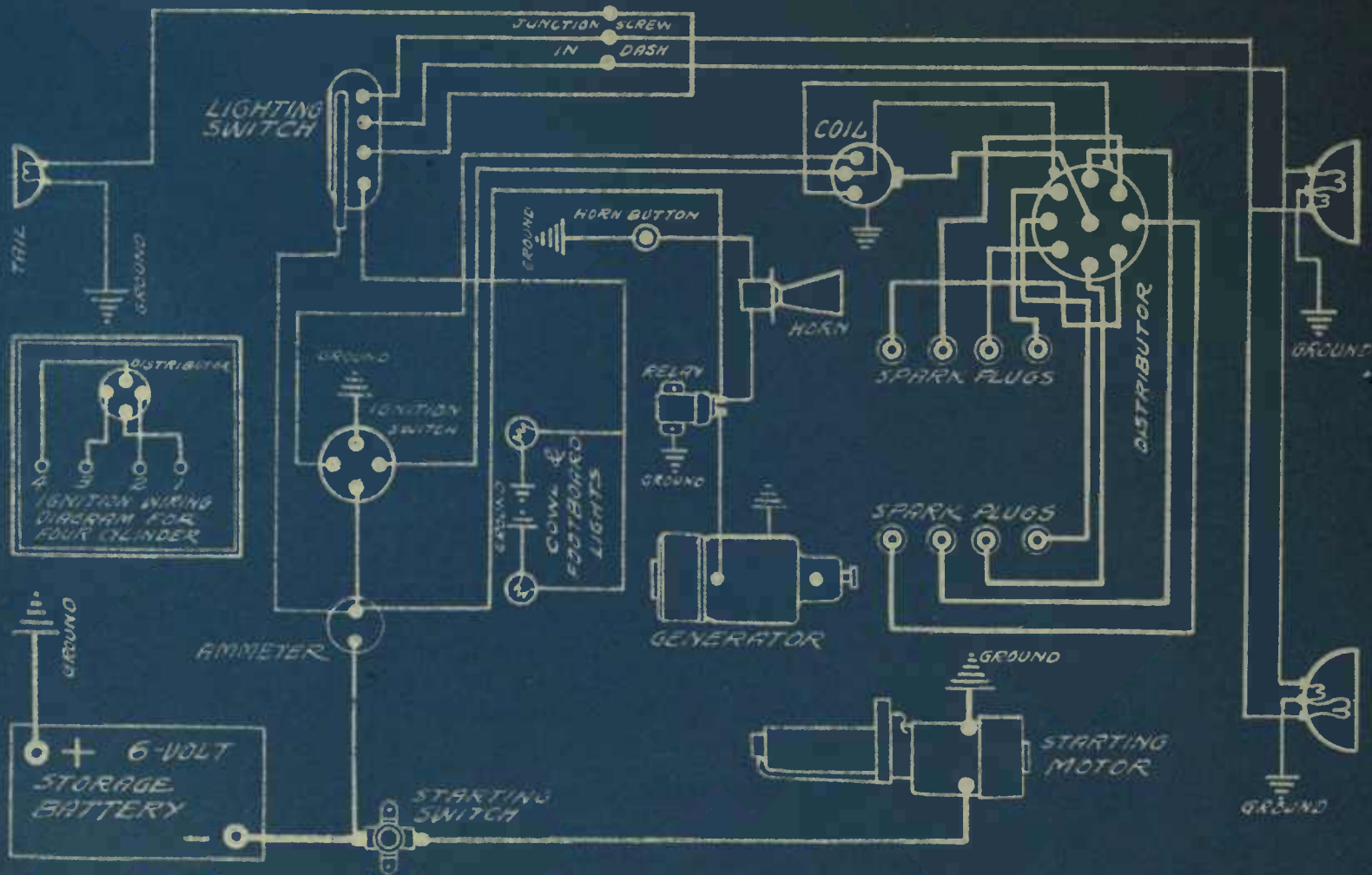


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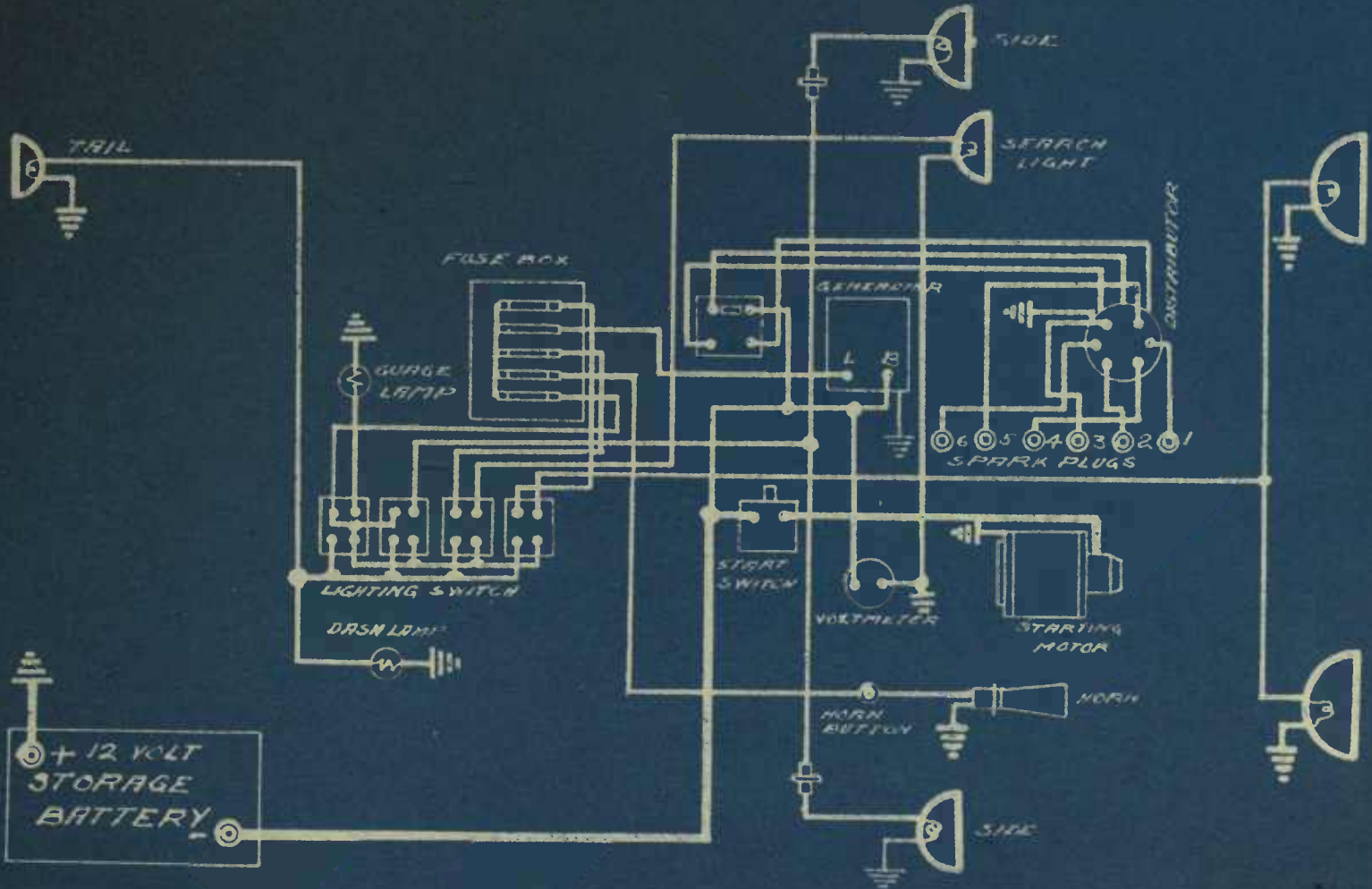
SCRIPPS-BOOTH 1916-7-8 "C4"-D8"-H" FROM WAG. MANUAL
 WAGNER SYSTEM



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SEAGRAVE 1916 6- WESTINGHOUSE SYSTEM

FROM WEST. MANUAL

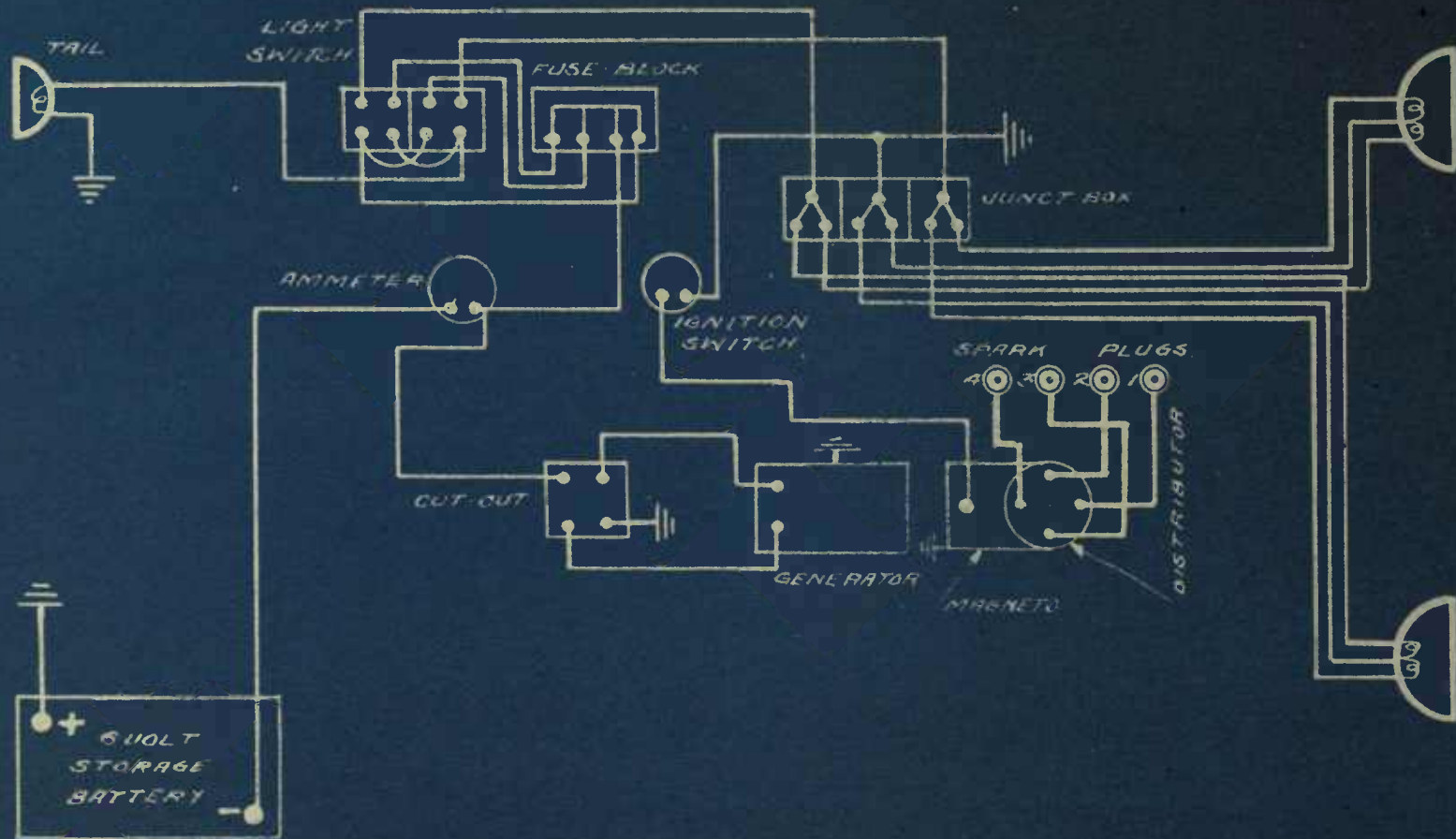


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SERVICE TRUCKS

WESTINGHOUSE SYSTEM WITH GENERATOR 450

FROM SERVICE BULLETIN

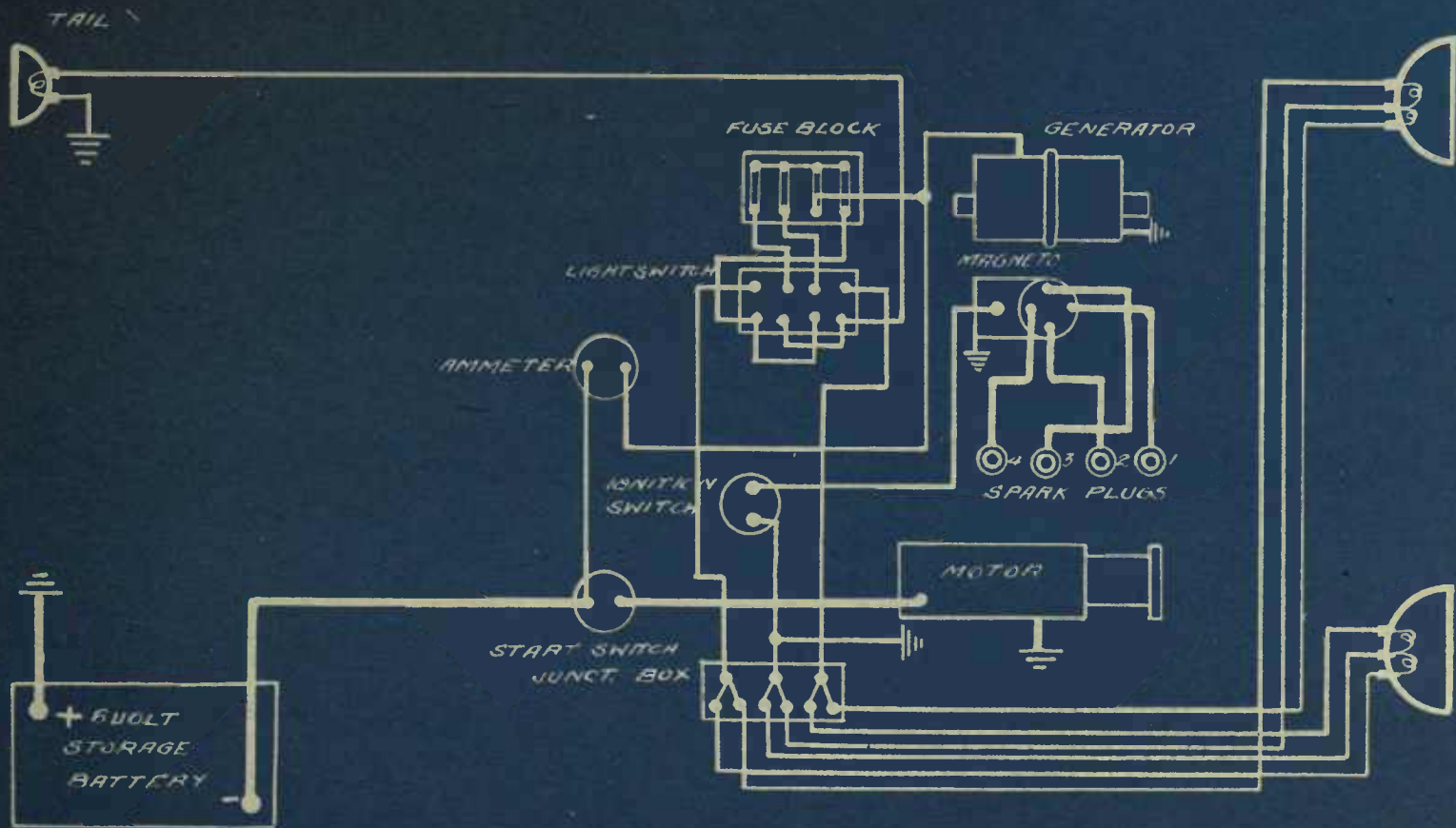


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SERVICE TRUCKS

WESTINGHOUSE SYSTEM WITH GENERATOR 760

FORM SERVICE BULLETIN

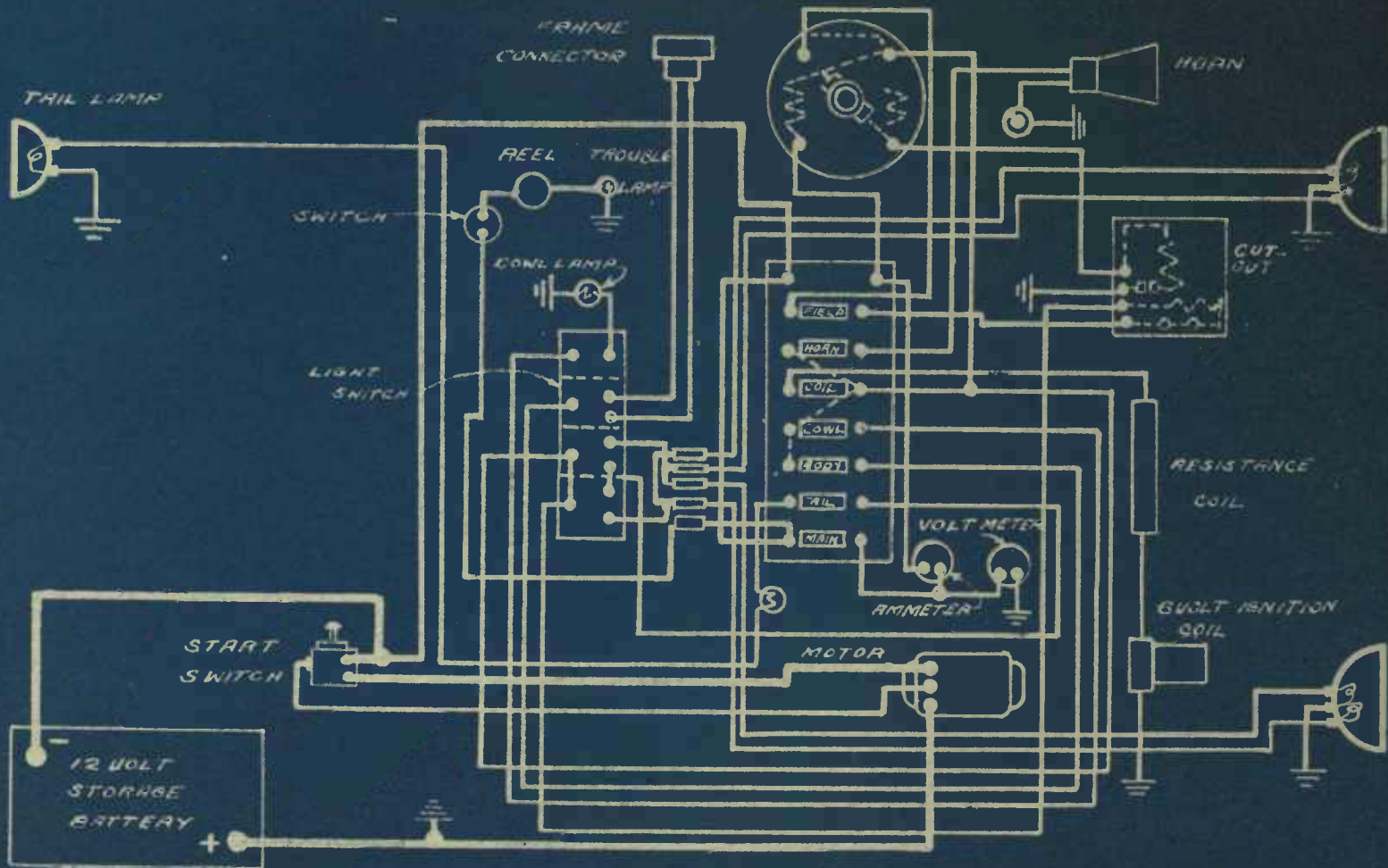


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SIMPLEX MODEL 5 1917

BOSCH SYSTEM

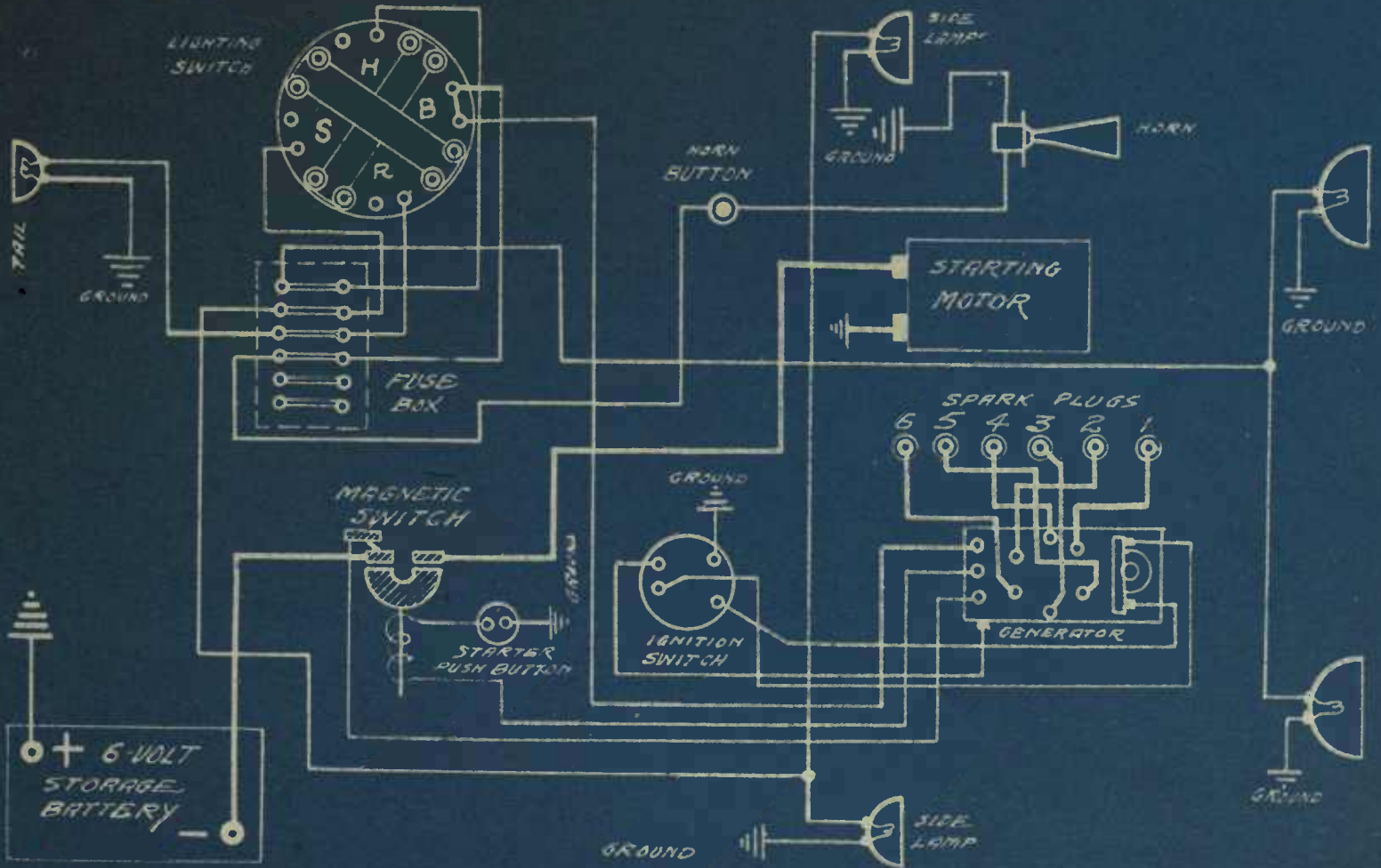
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SPEEDWELL 1914 & 1915
WESTINGHOUSE SYSTEM

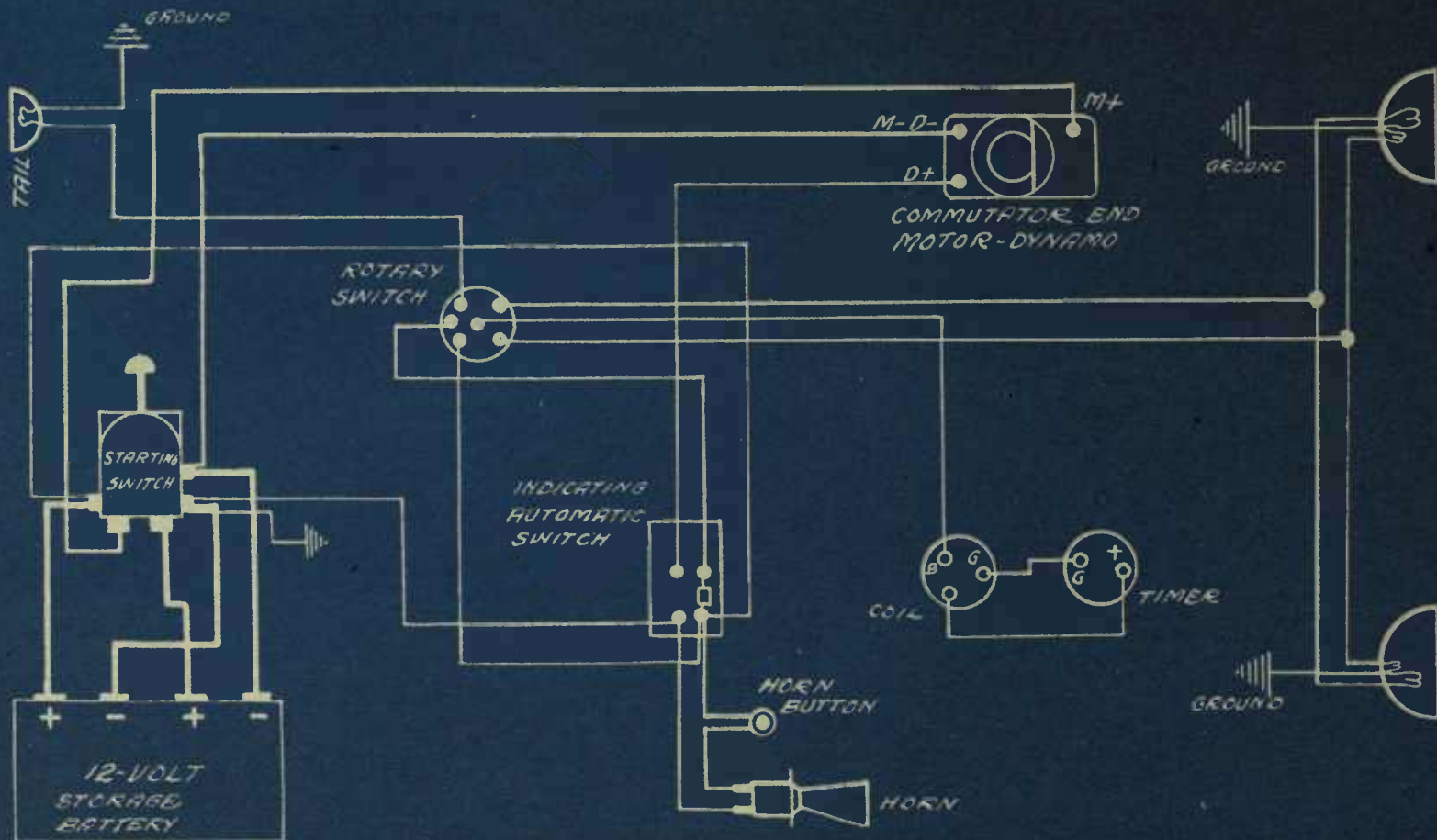
FROM WEST. BR.-E.D. SK. 35147



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*SPHINX 1915-1916
SPLITDORF-APELCO SYSTEM*

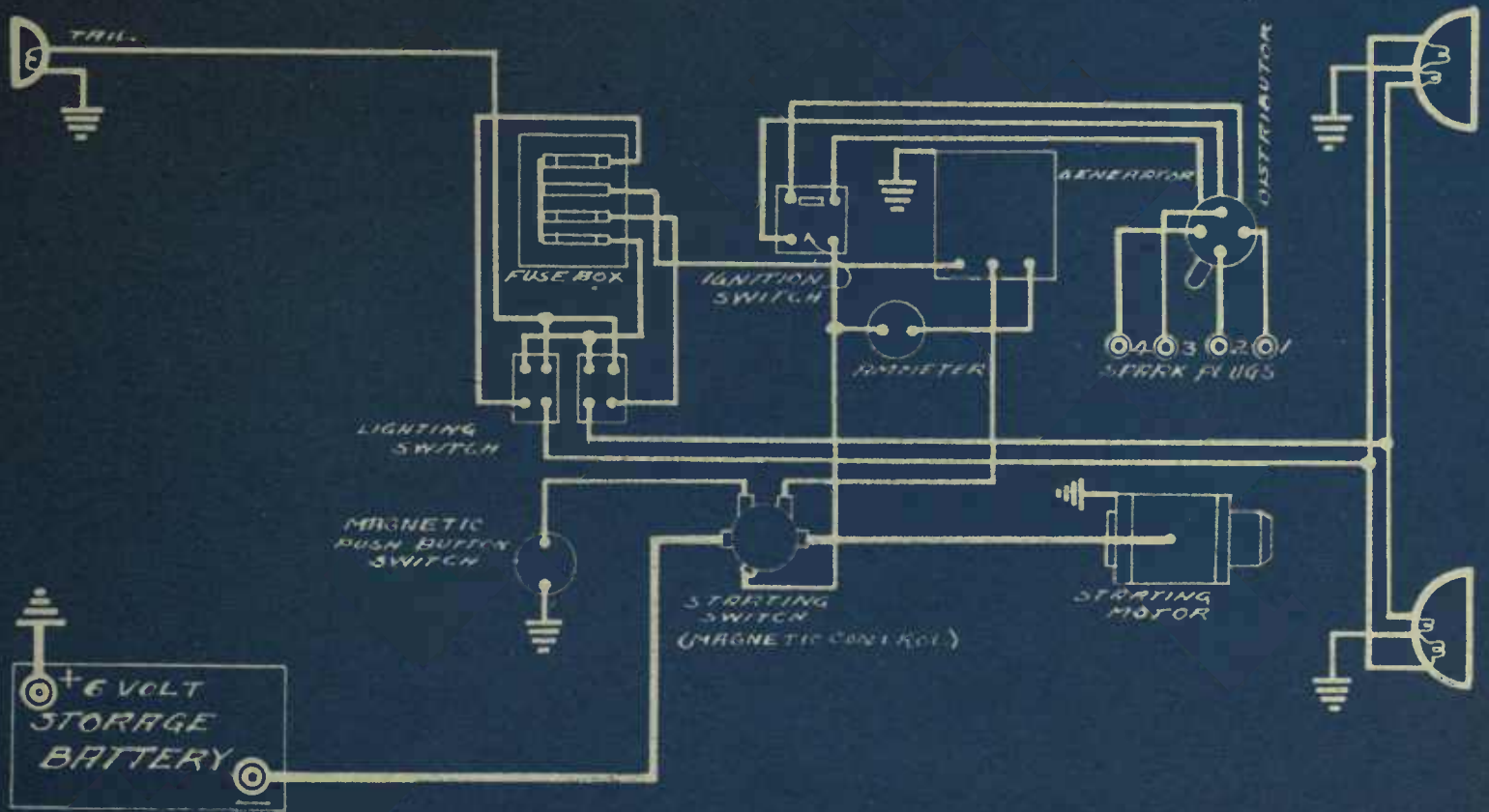
FROM SPLIT-ARMANUAL



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STANDARD 1915 - 4 -
WESTINGHOUSE SYSTEM

FROM WEST. MANUAL



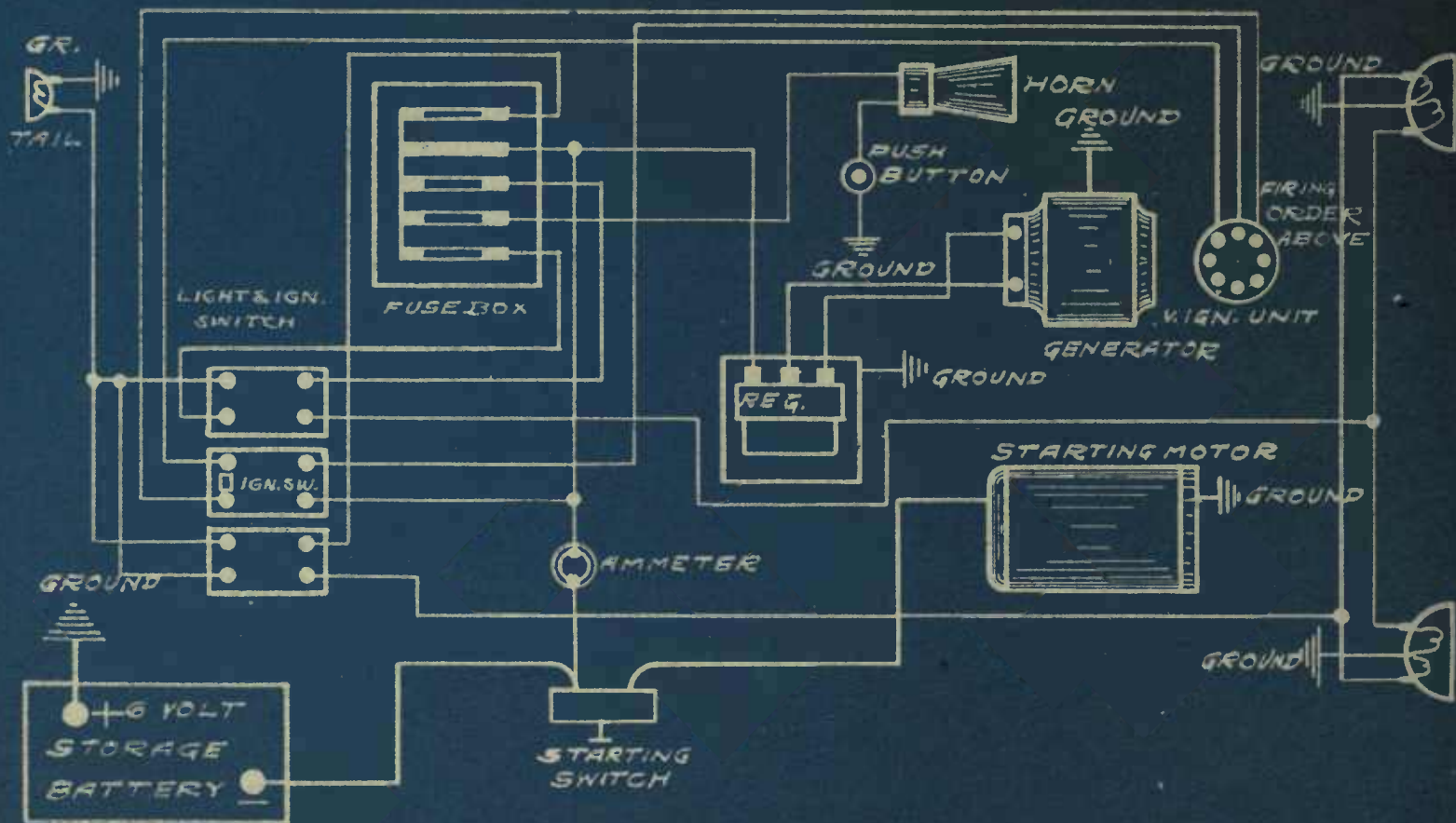
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STANDARD 1916 "8"

WESTINGHOUSE SYSTEM

FROM WEST. PLATE 104

FIRING ORDER 1R-1L-3R-3-L-4R-4L-2R-2L.

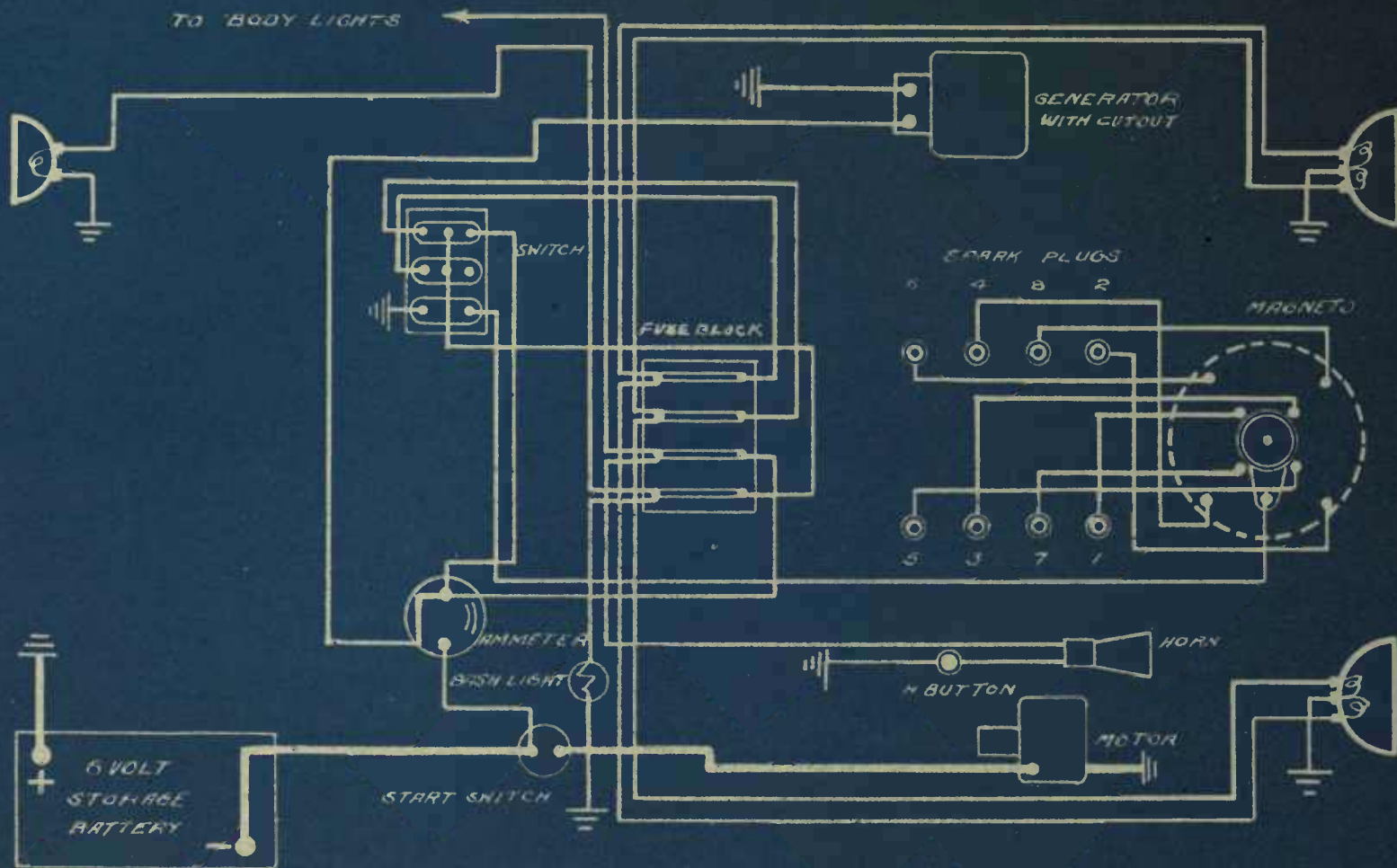


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STANDARD
APELCO SYSTEM

MODEL "F" 1917
DIXIE MAG. IGN.

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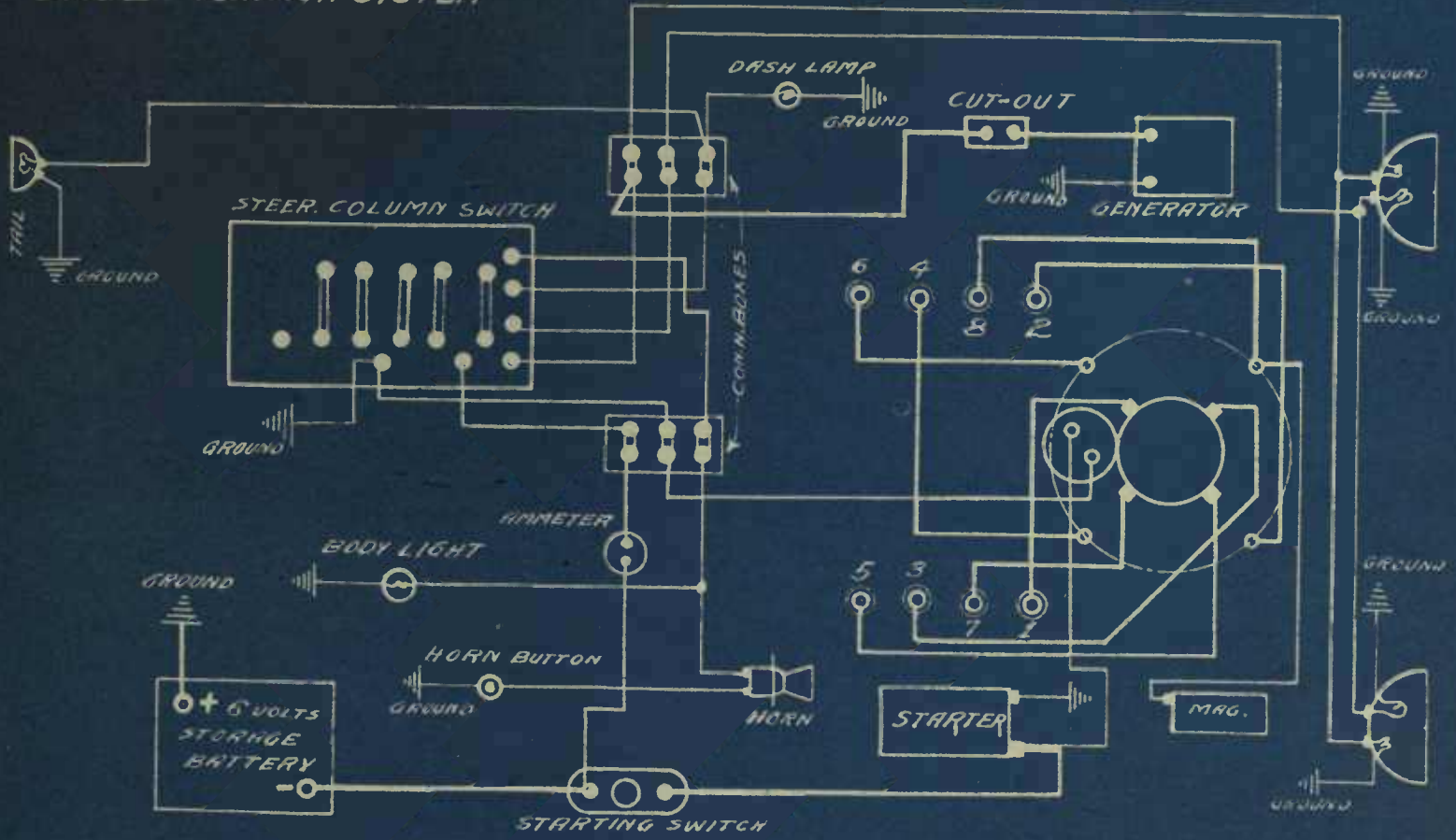


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STANDARD 1918 MODEL "G" 1919
 WESTINGHOUSE STARTING & LIGHTING SYSTEM
 DIXIE IGNITION SYSTEM

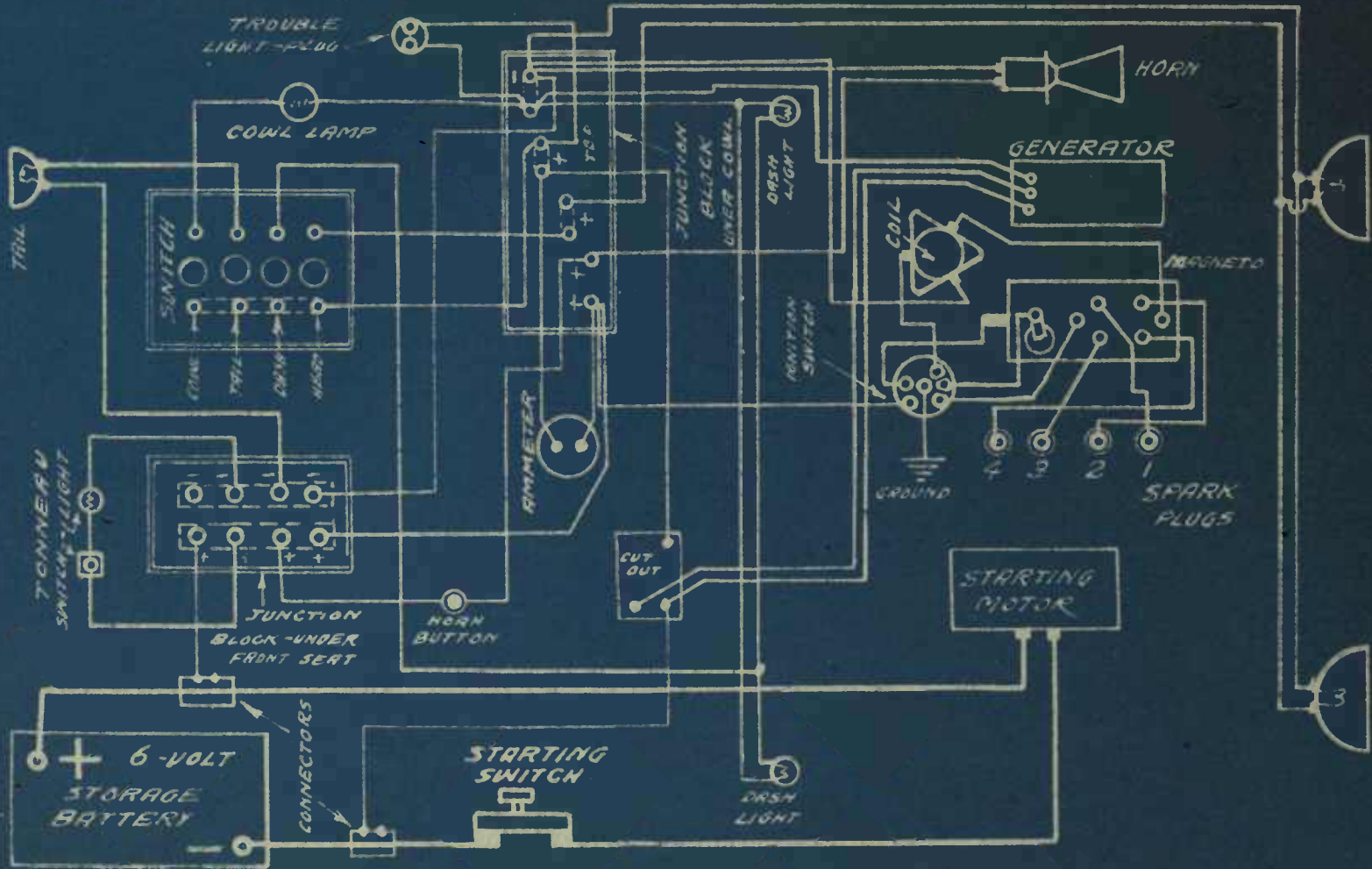
FROM FACTORY BR A-2726

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STEARNS 1913 "4" & "6"
 GRAY & DAVIS SYSTEM

FROM MFRS B.P.0487

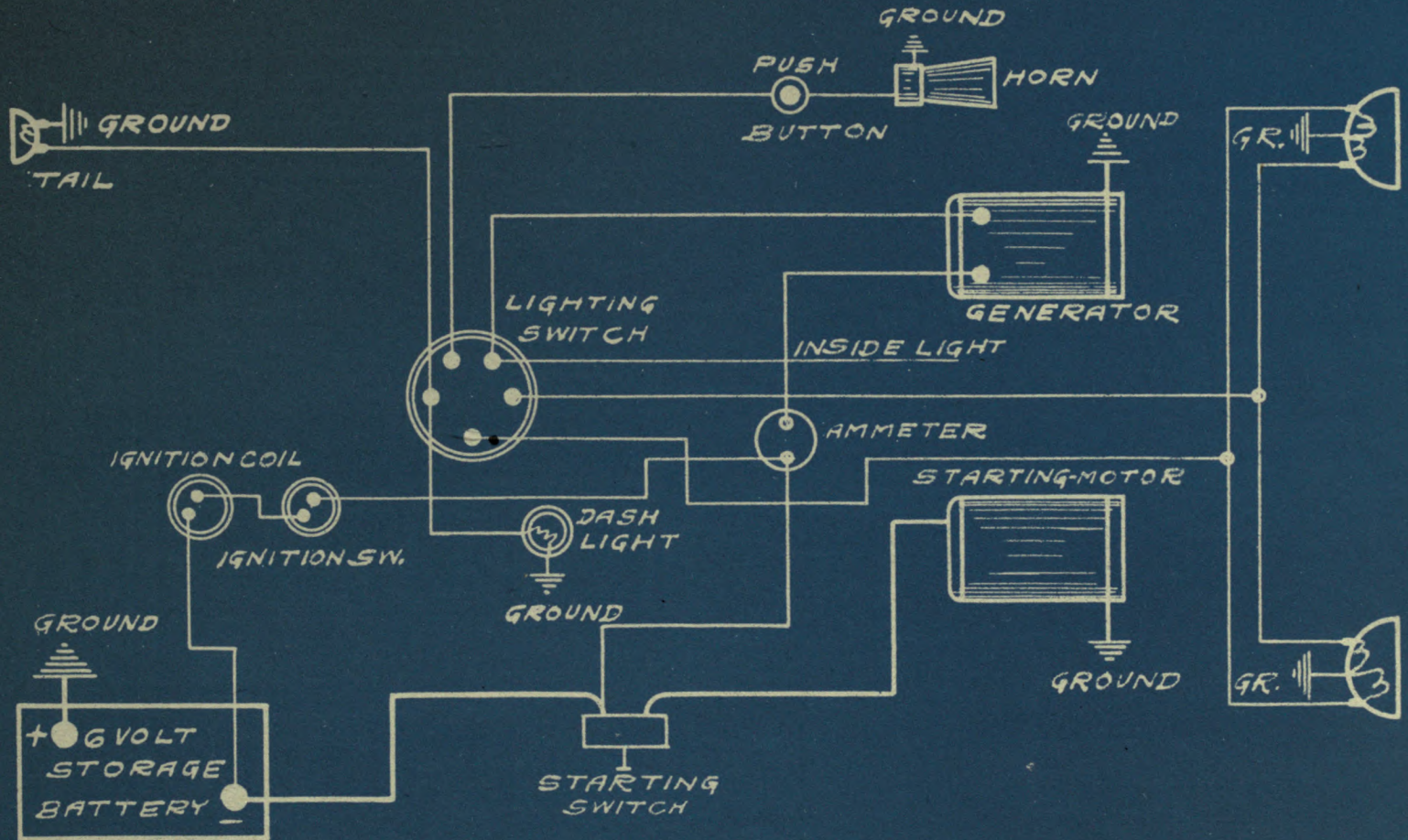


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STEARNS-KNIGHT 1914 "4"

WESTINGHOUSE SYSTEM

FROM WEST. PLATE 105

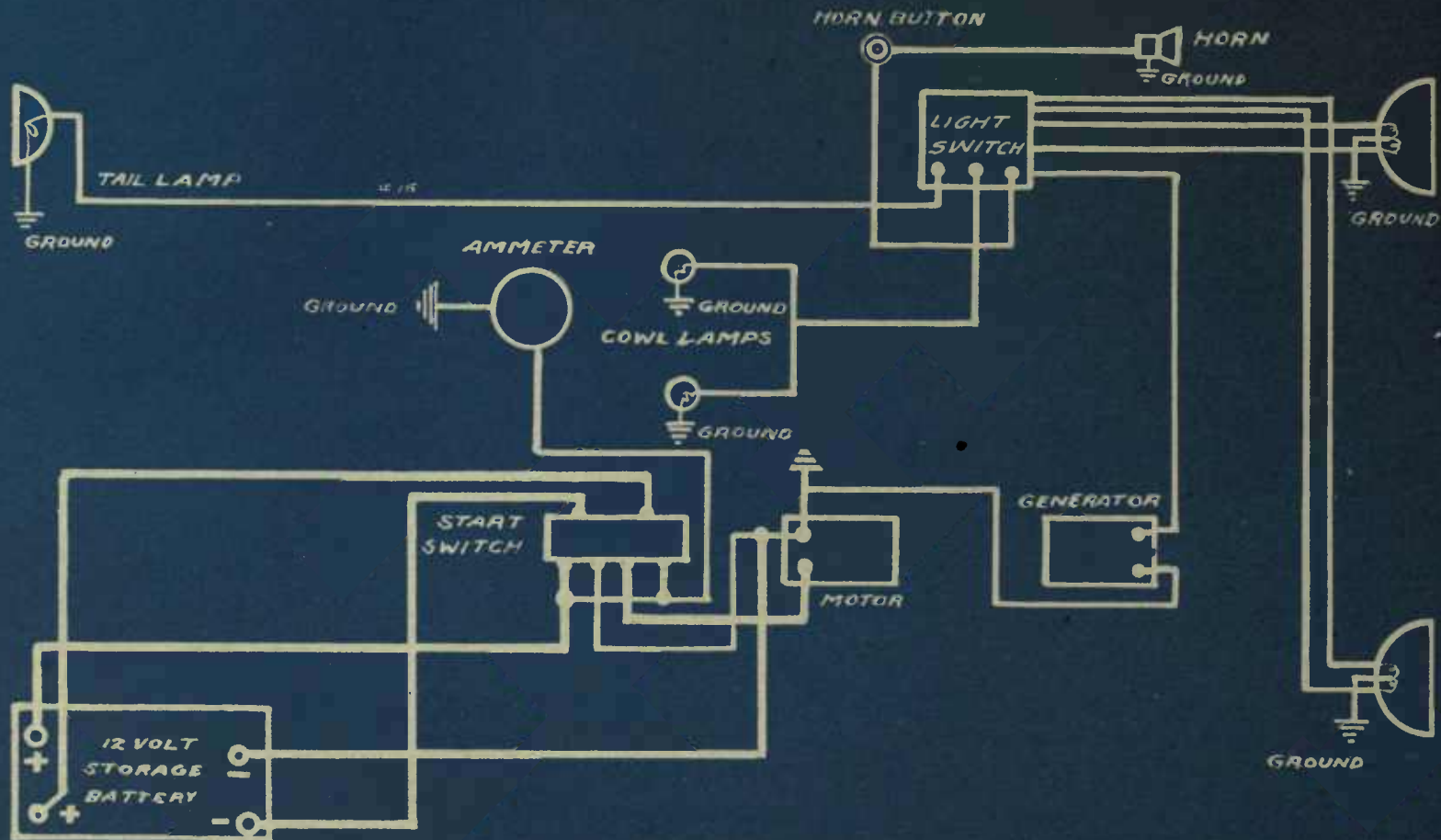


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STEARNS-KNIGHT "LIGHT FOUR" 1915

GRAY AND DAVIS SYSTEM

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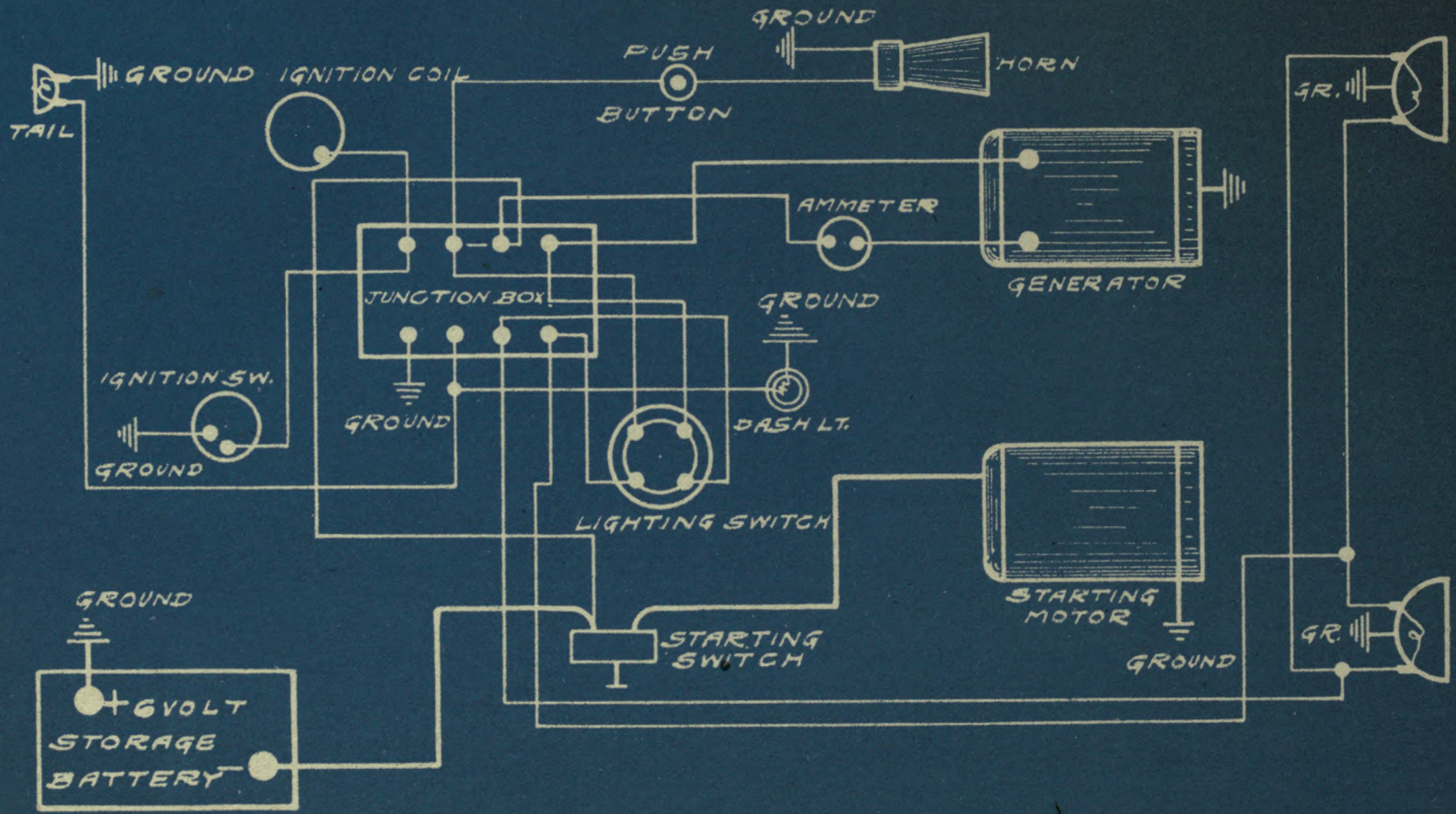


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STEARNS-KNIGHT
WESTINGHOUSE SYSTEM

1916 "8"

FROM WEST PLATE 106

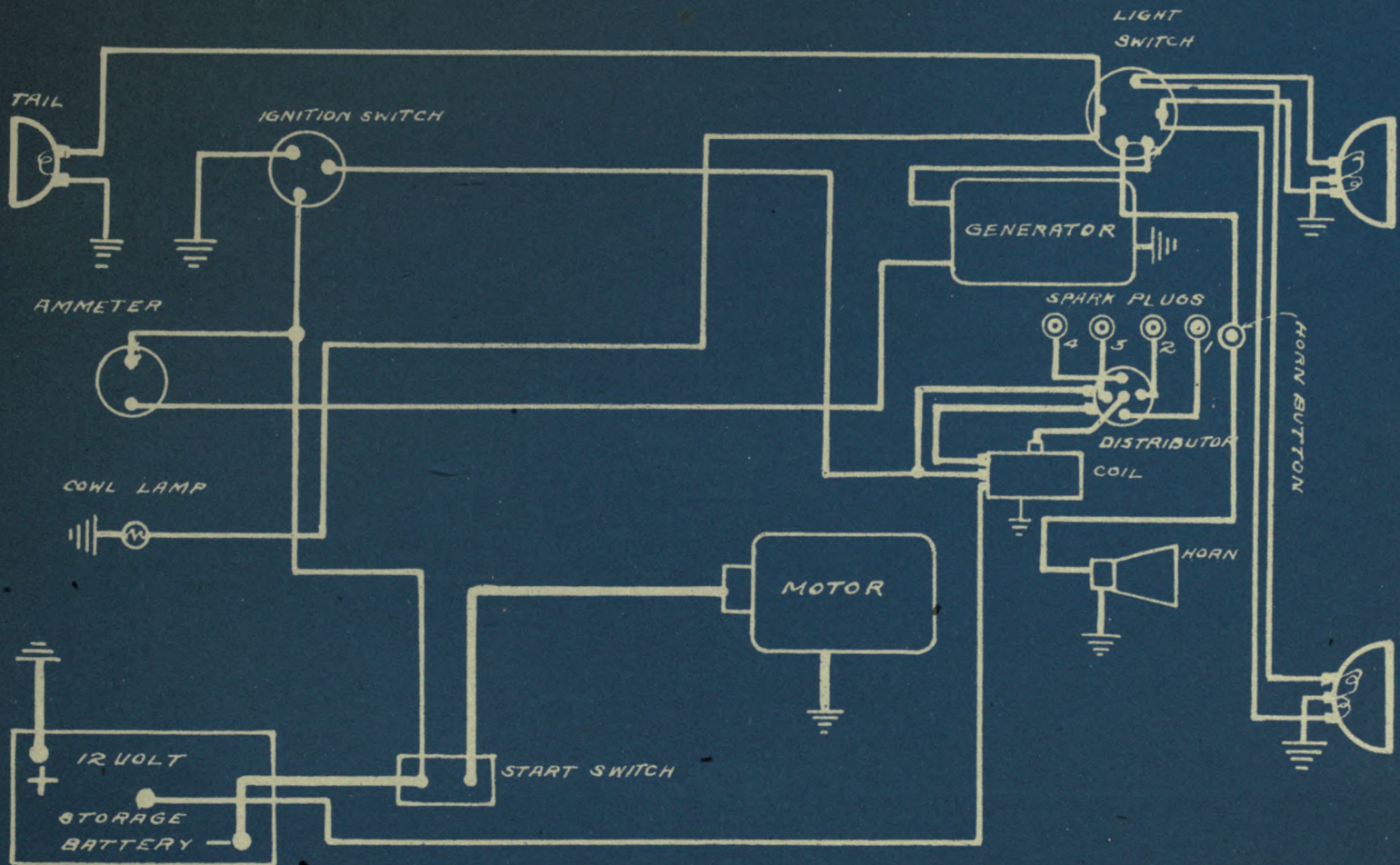


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STEARNS-KNIGHT MODEL SKL-4 1916-1917

WESTINGHOUSE LIGHTING & STARTING SYSTEM
REMY IGNITION SYSTEM

FROM MFRS 13-2 2-12-16

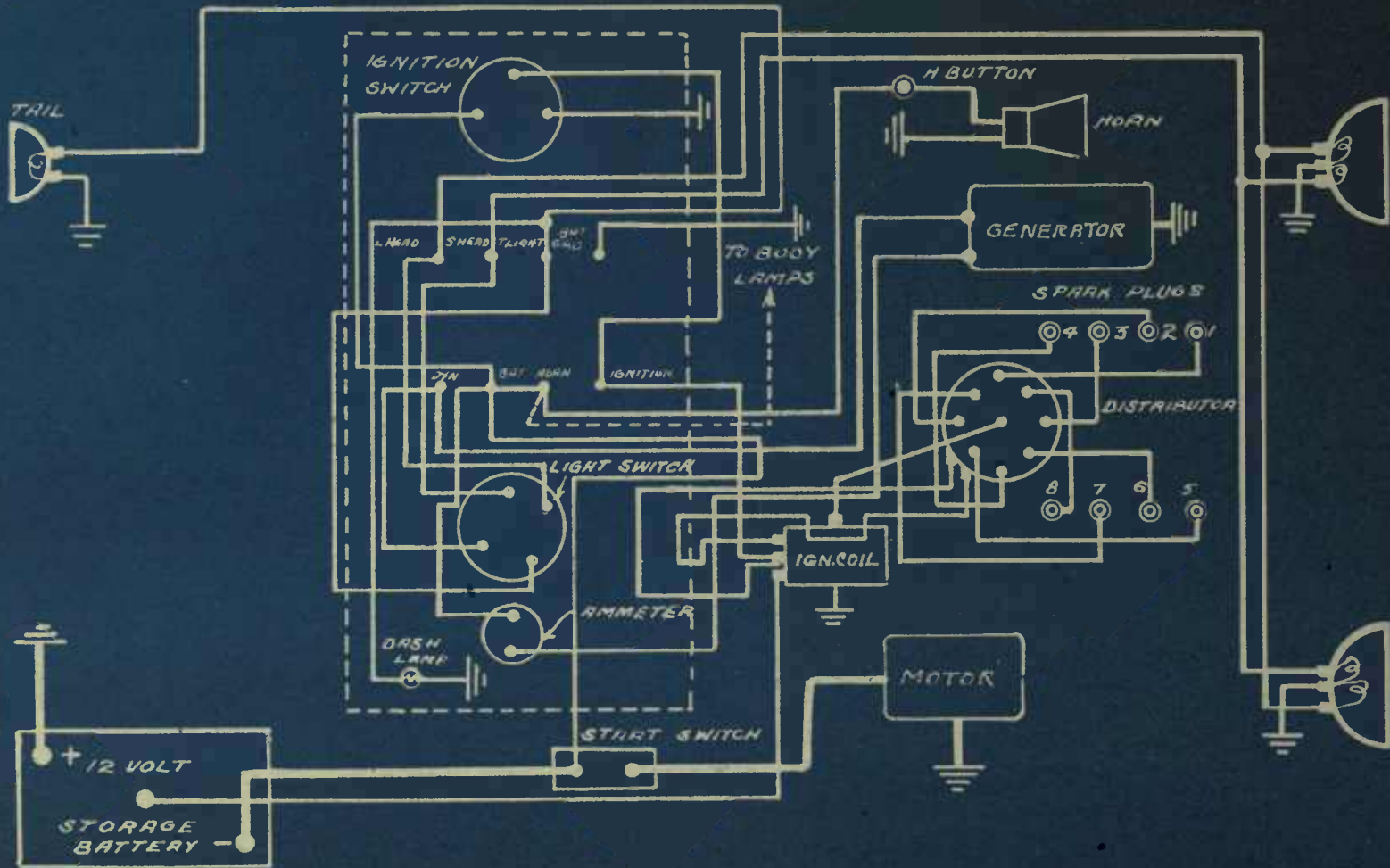


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STEARNS-KNIGHT 1916-1917-1918 MODEL S-K-8

WESTINGHOUSE LIGHTING & STARTING SYSTEM, 1919
REMY IGNITION SYSTEM

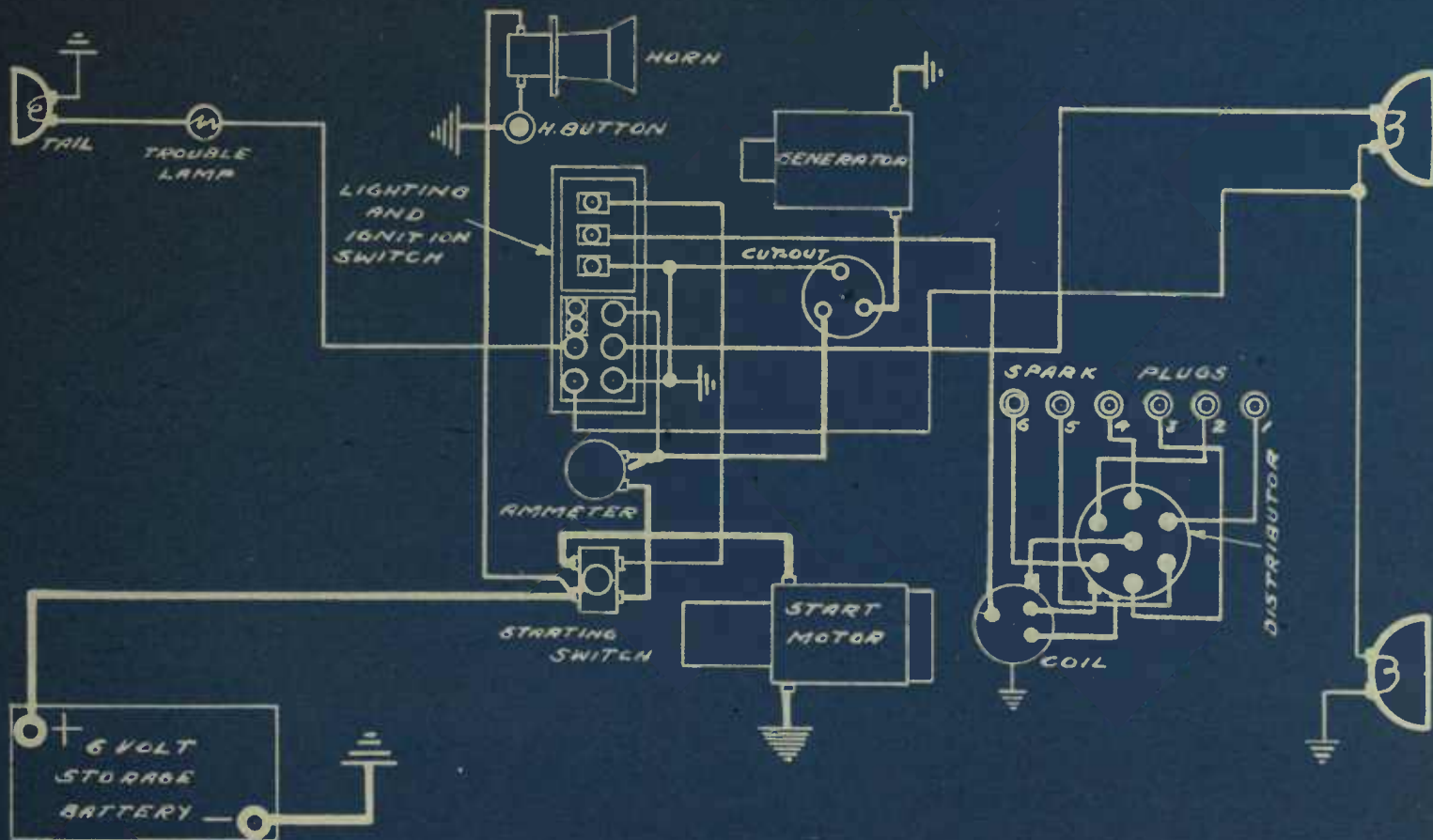
FROM M.F.S., B.R. 2-14-16



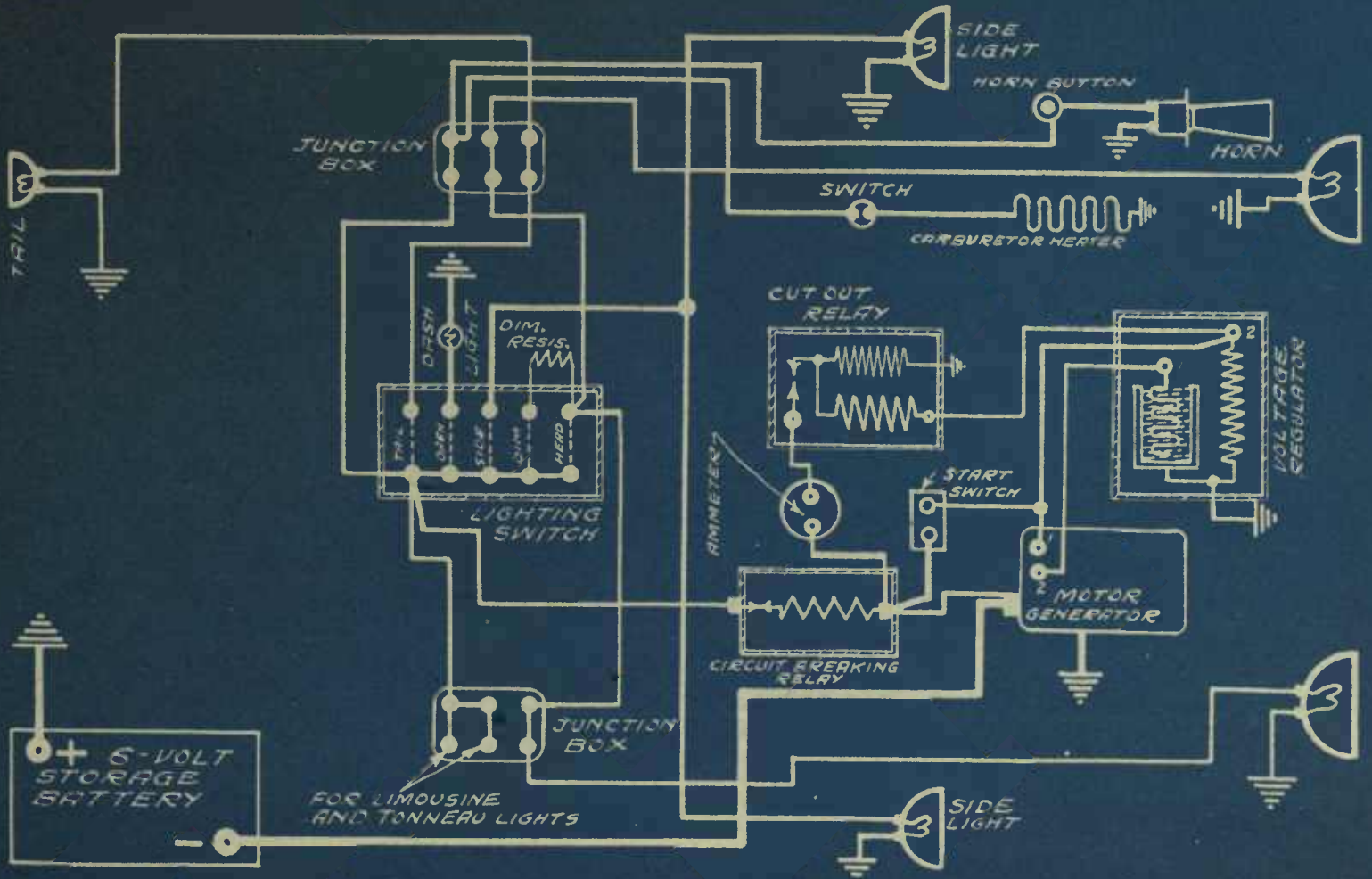
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STEPHENS 1917 "65" RUTOLITE SYSTEM

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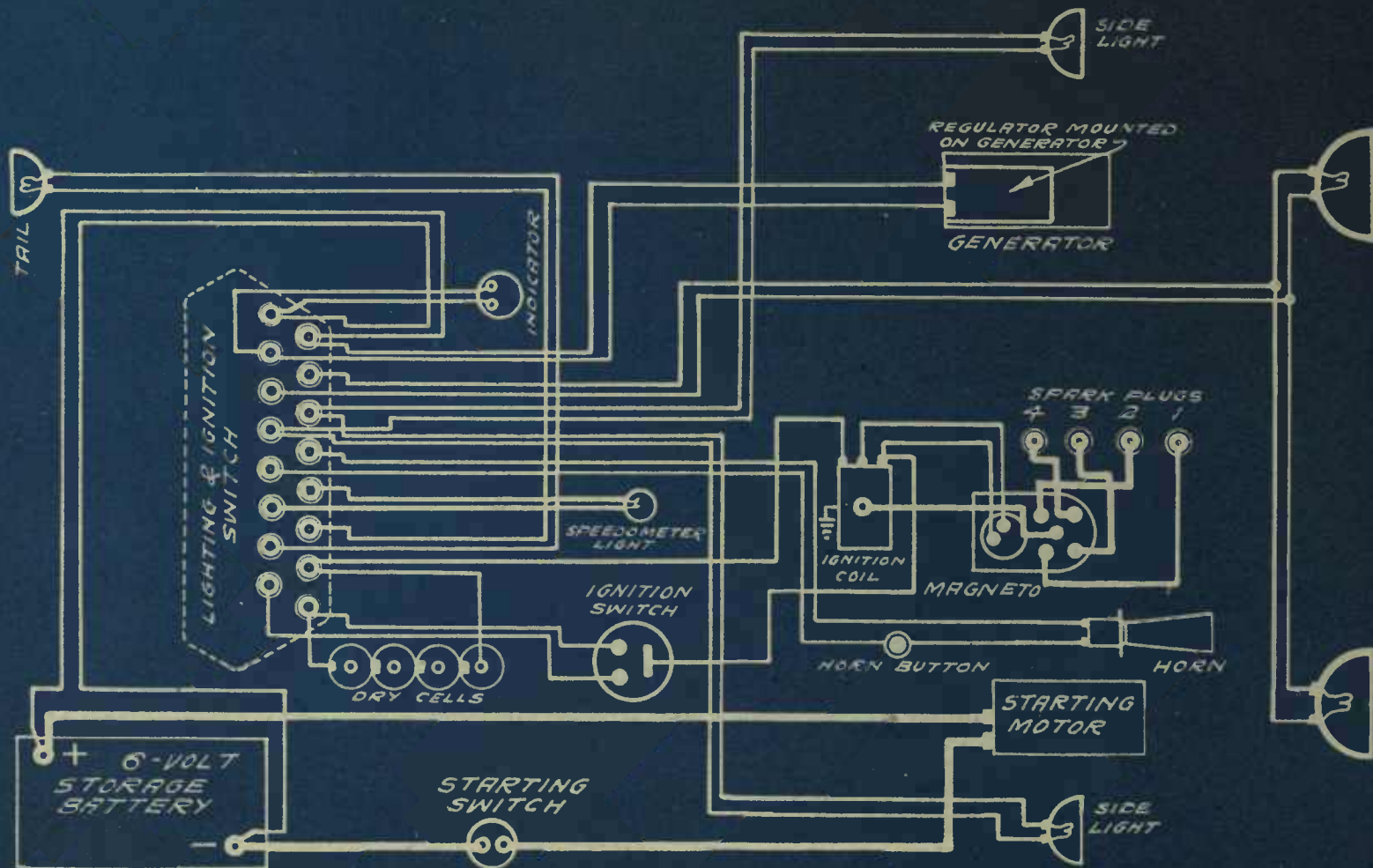


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STUDEBAKER
WAGNER SYSTEM

1914 FOUR

FROM MFRS. BLUE PRINTS
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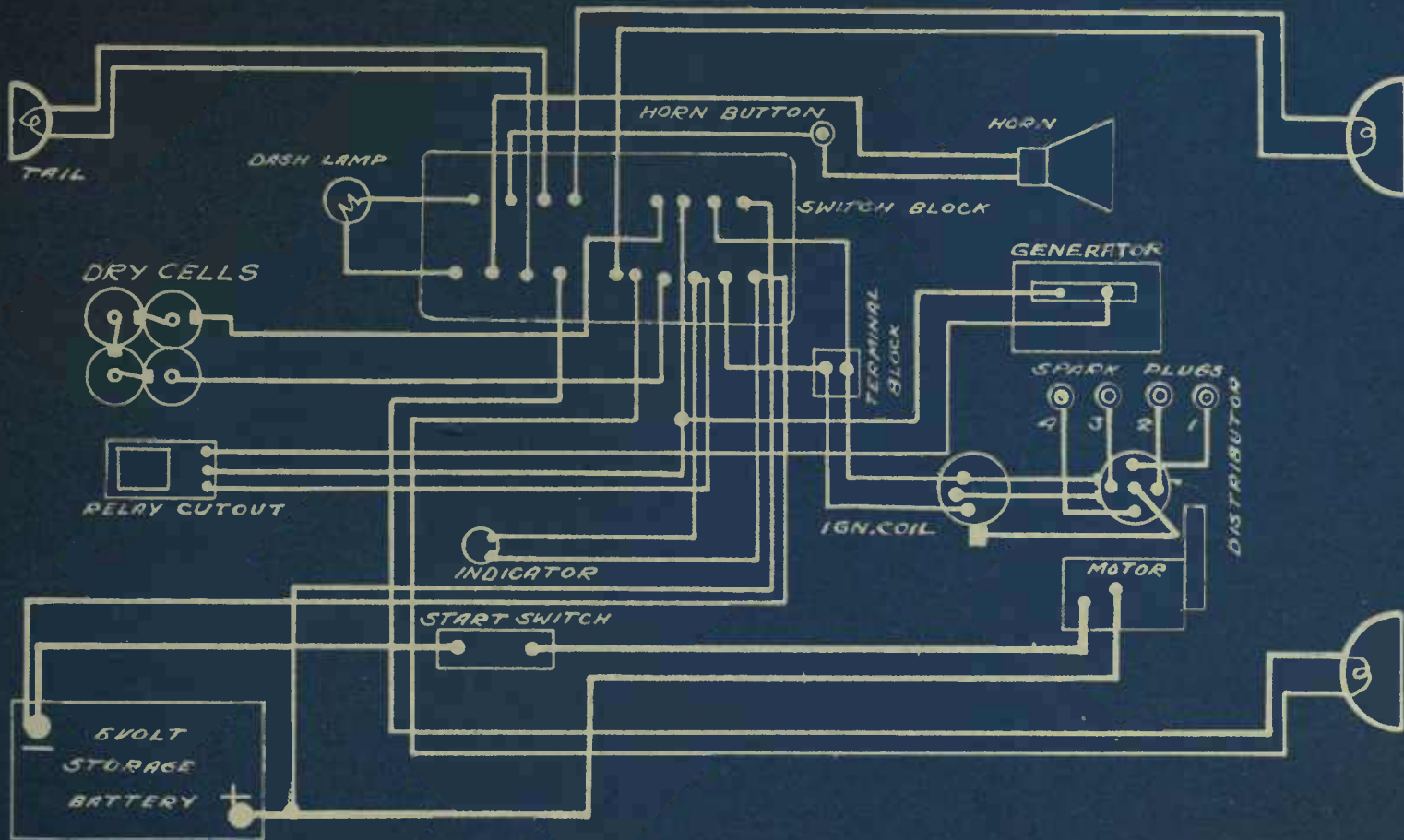


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STUDEBAKER 1915 EC-SD-5

WAGNER SYSTEM - REMY IGN.

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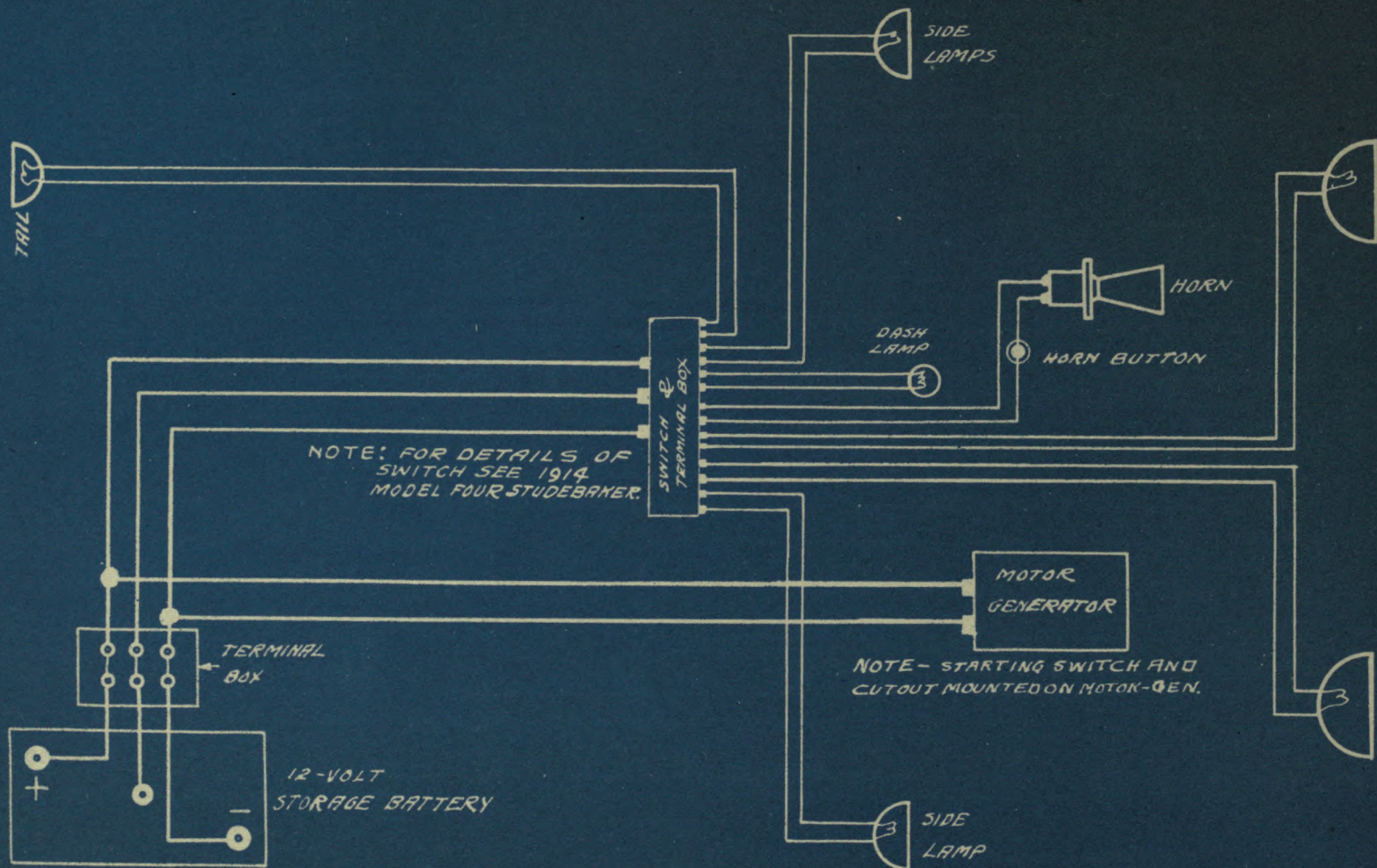


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STUDEBAKER 1915 MODEL 35-EG

WAGNER SYSTEM

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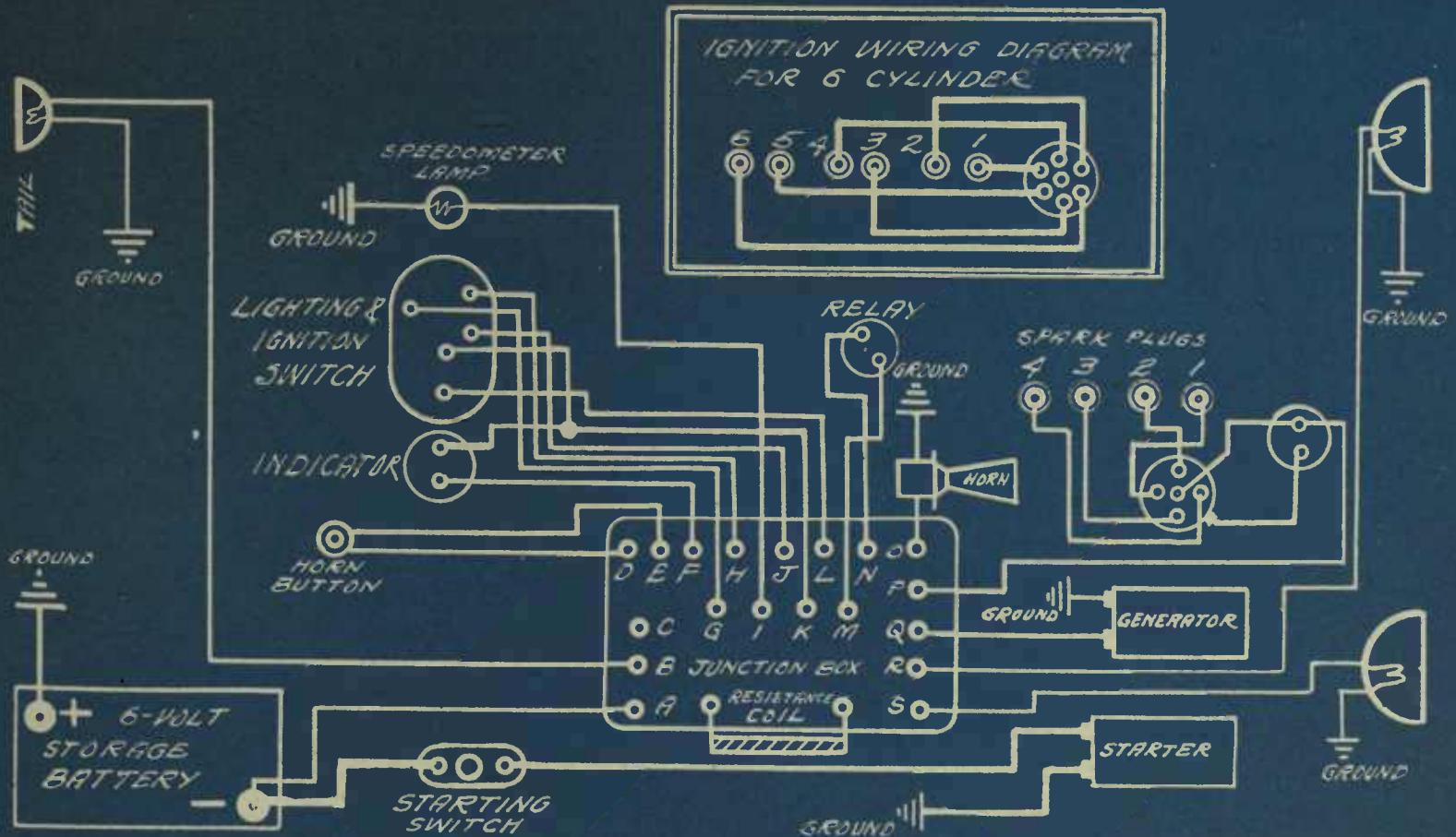
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STUDEBAKER 1916-17 "SERIES 17 & 18"

WAGNER SYSTEM - REMY IGN.

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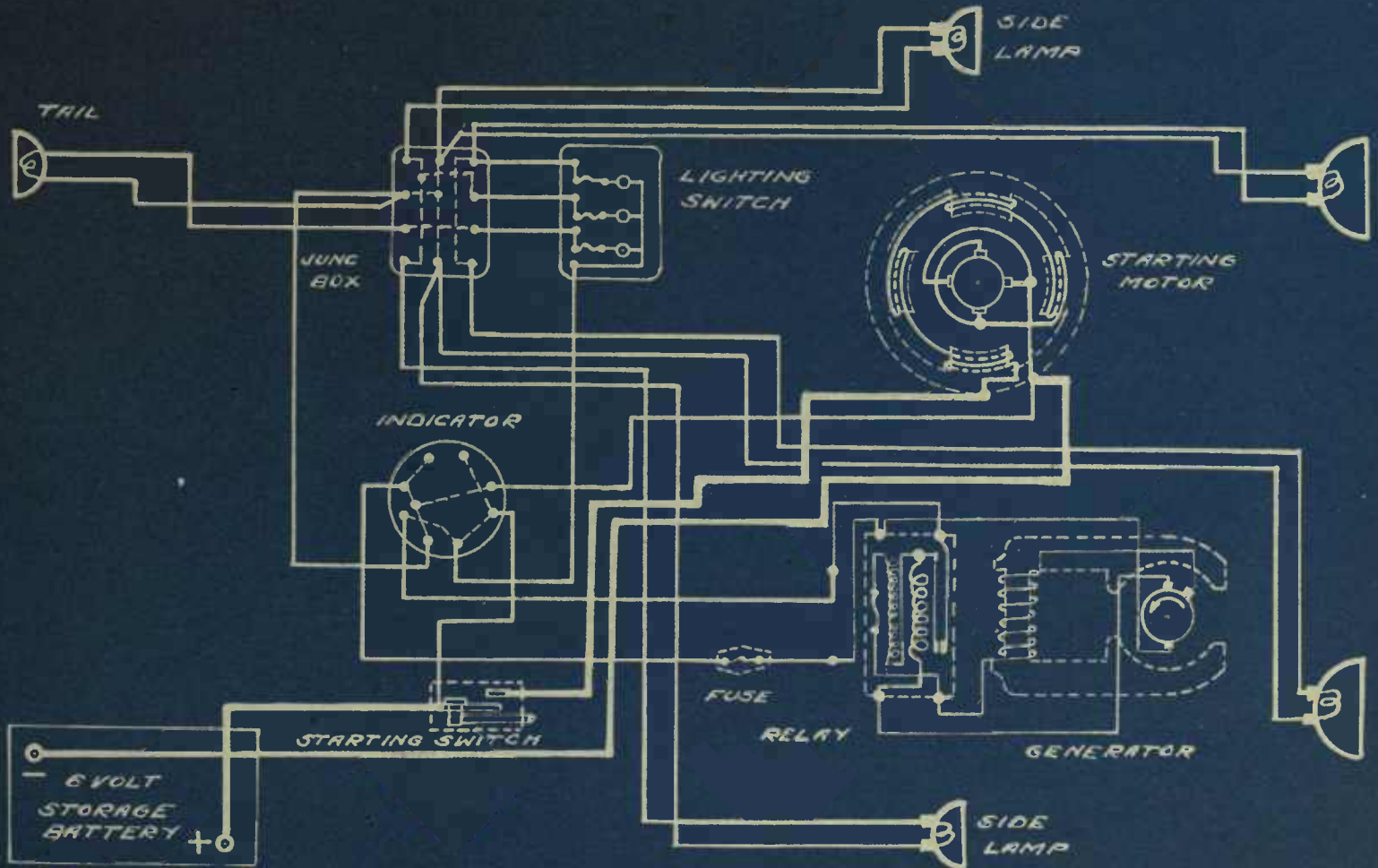
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STUTZ 1914-1915

REMY SYSTEM

FROM REMY MANUAL

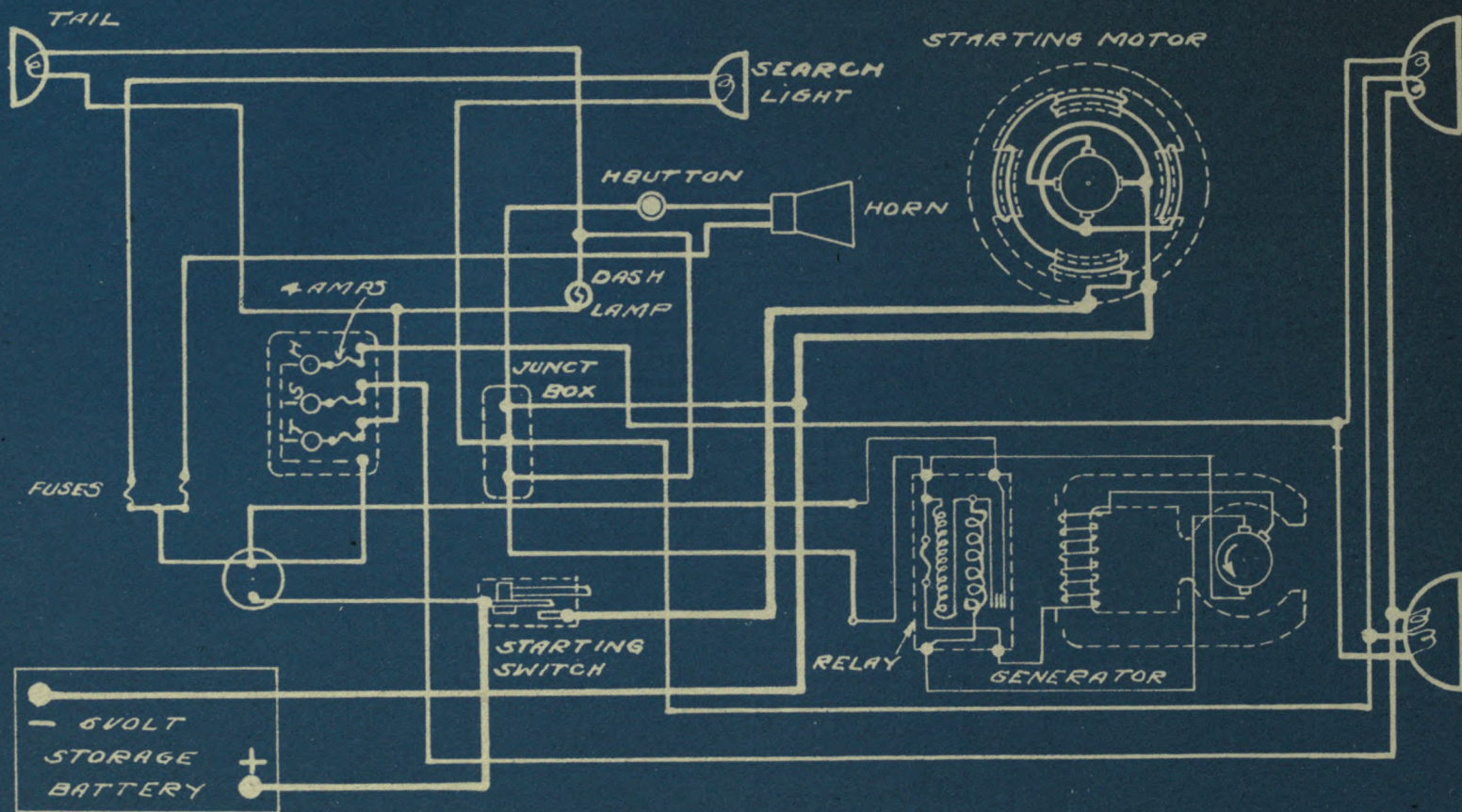


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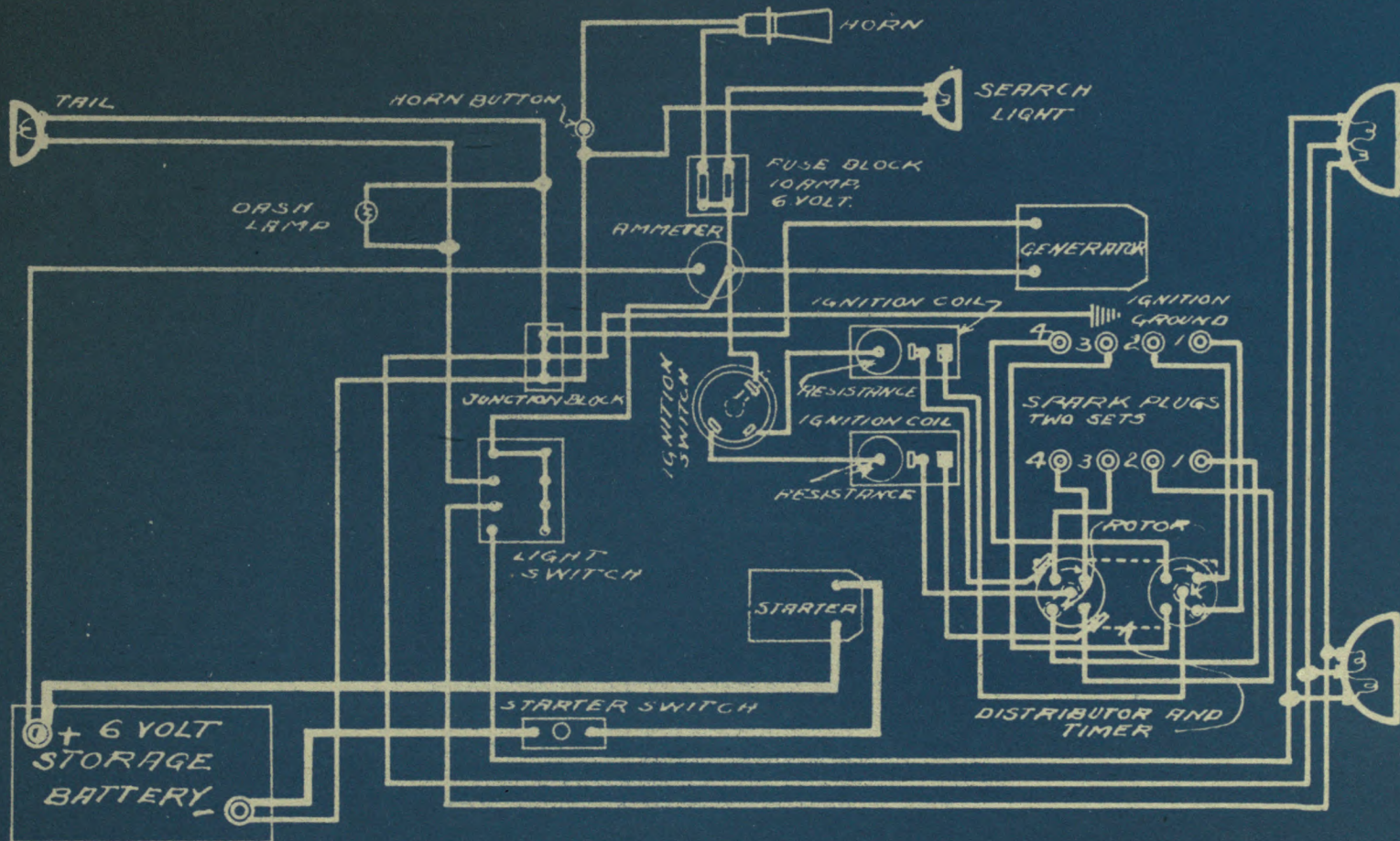
FROM REMY MANUAL



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STUTZ 1918-19
REMY SYSTEM
DELCO IGNITION

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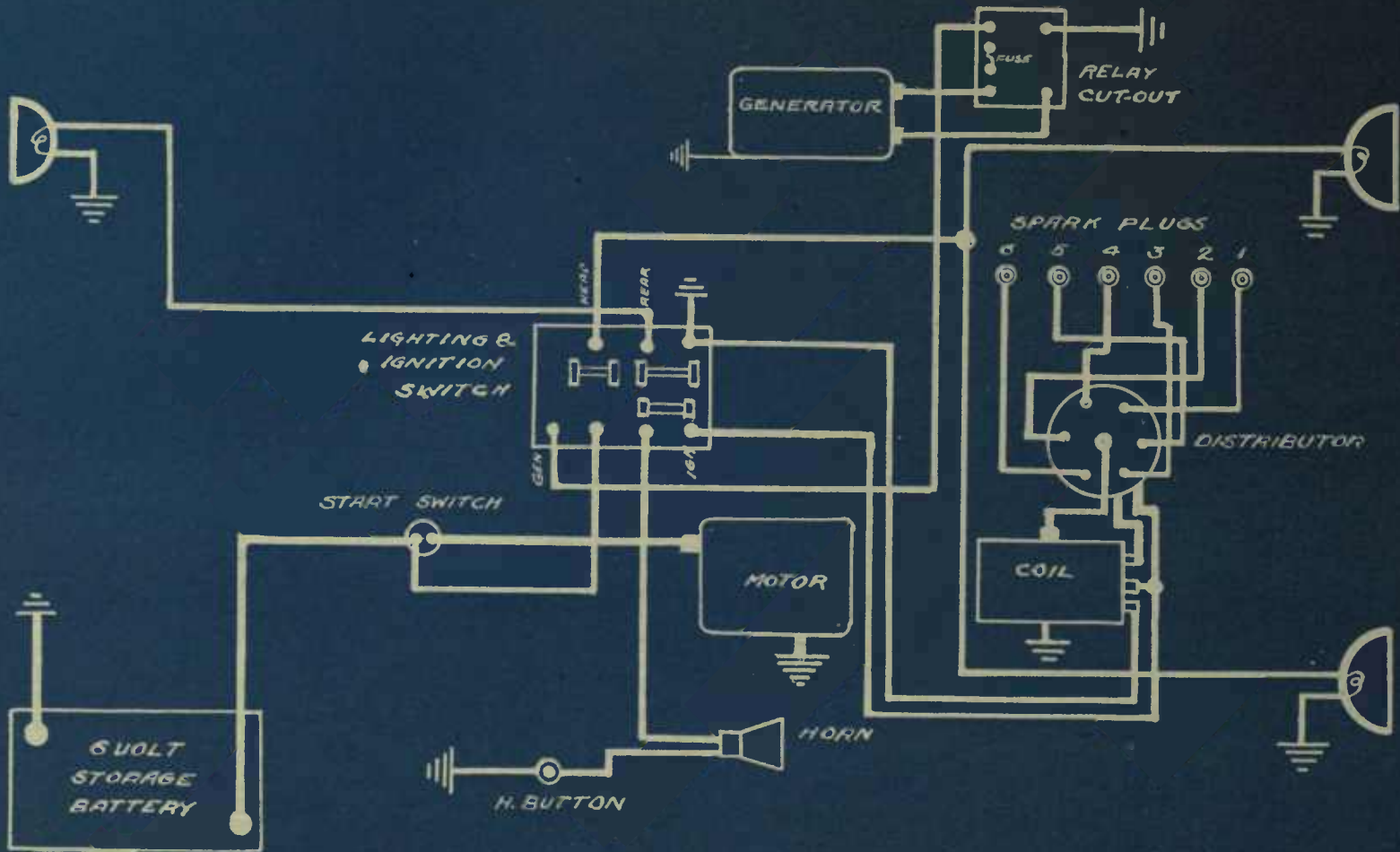


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SUN "LIGHT SIX"-1917.

REMY SYSTEM

FROM REMY INST. BOOK

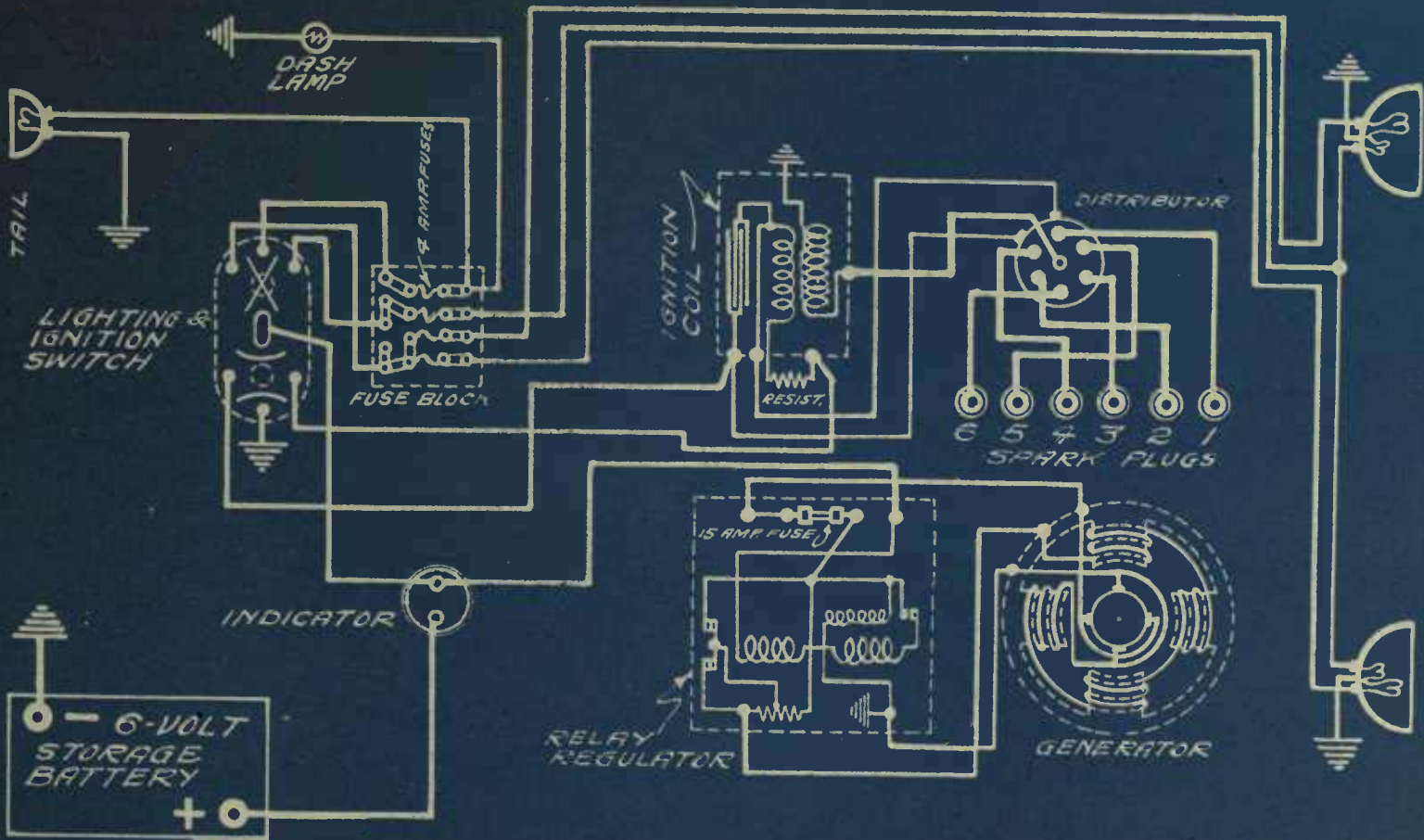


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SWEENEY TRACTOR 1916-17

REMY SYSTEM

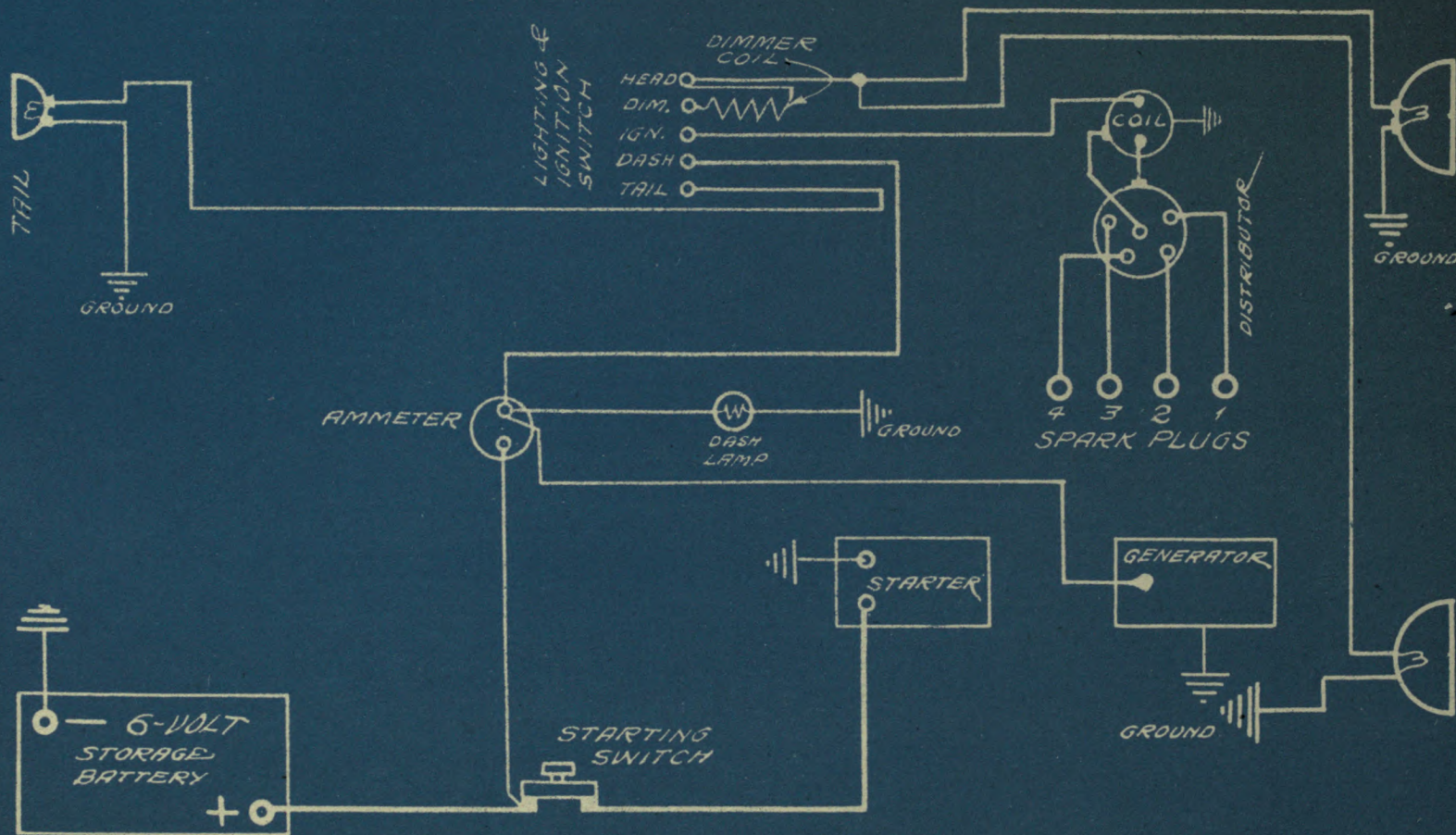
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TEMPLAR 1918 "445" 1919 REMY SYSTEM

FROM MFRS. BP 20049

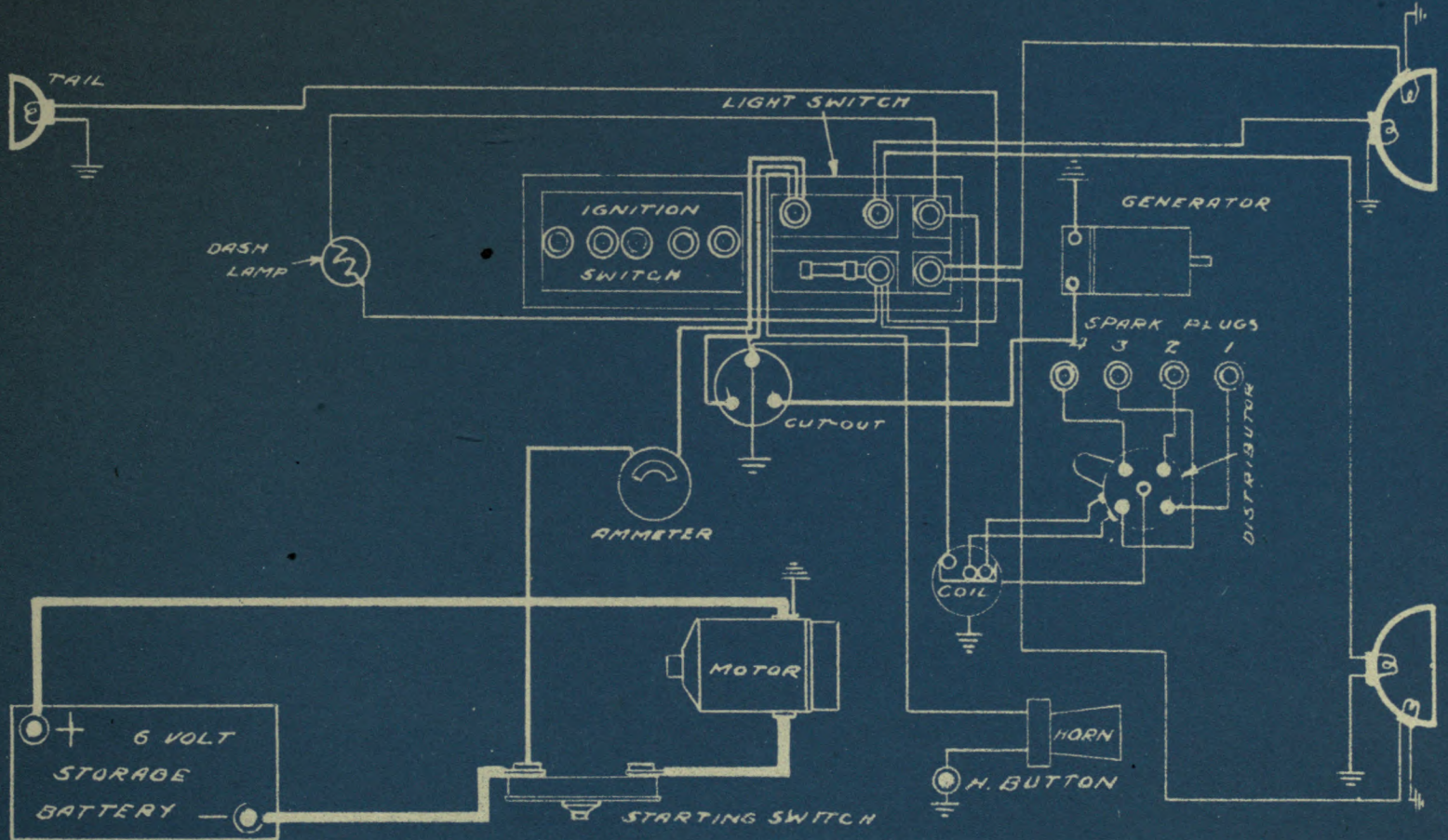


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UNION MOTOR TRUCK 1916-1917

AUTOLITE SYSTEM CONN. IGN.

FROM AUTOLITE BP.

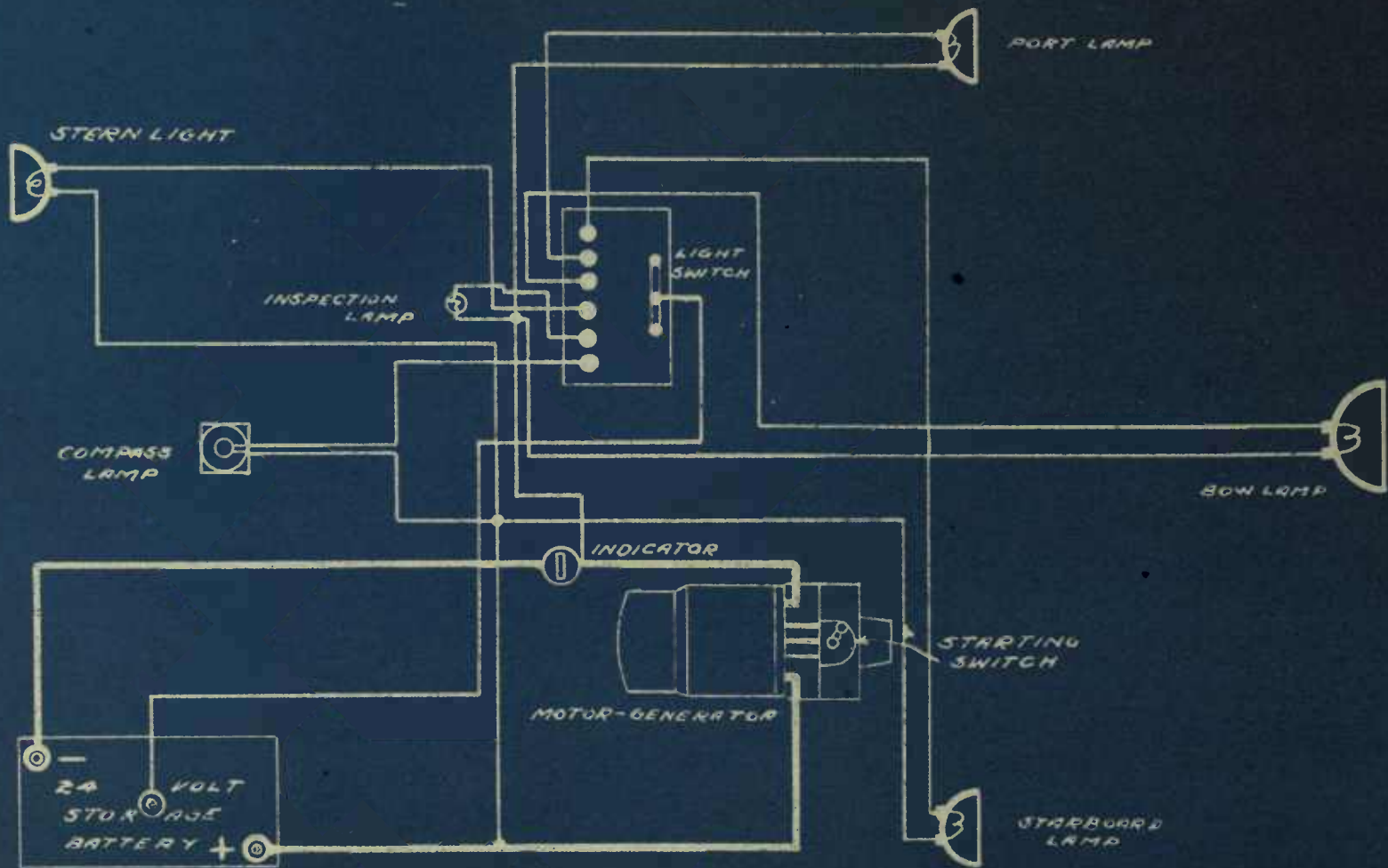


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VAN BLERCK MARINE ENGINE

NORTH EAST SYSTEM

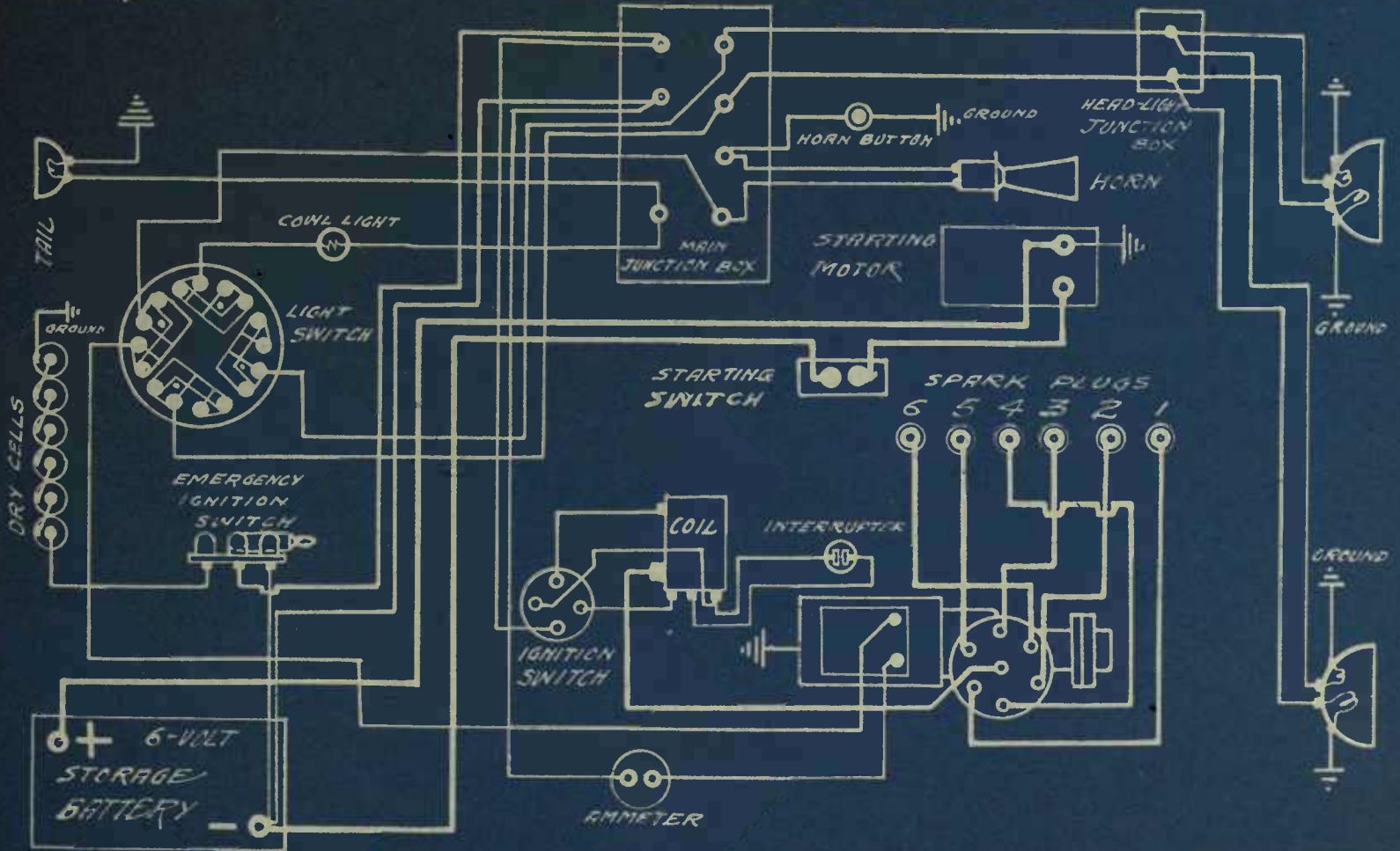
FROM N.E. PLATE 310



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VELIE 1915-1916 "15"
 GRAY & DAVIS SYSTEM

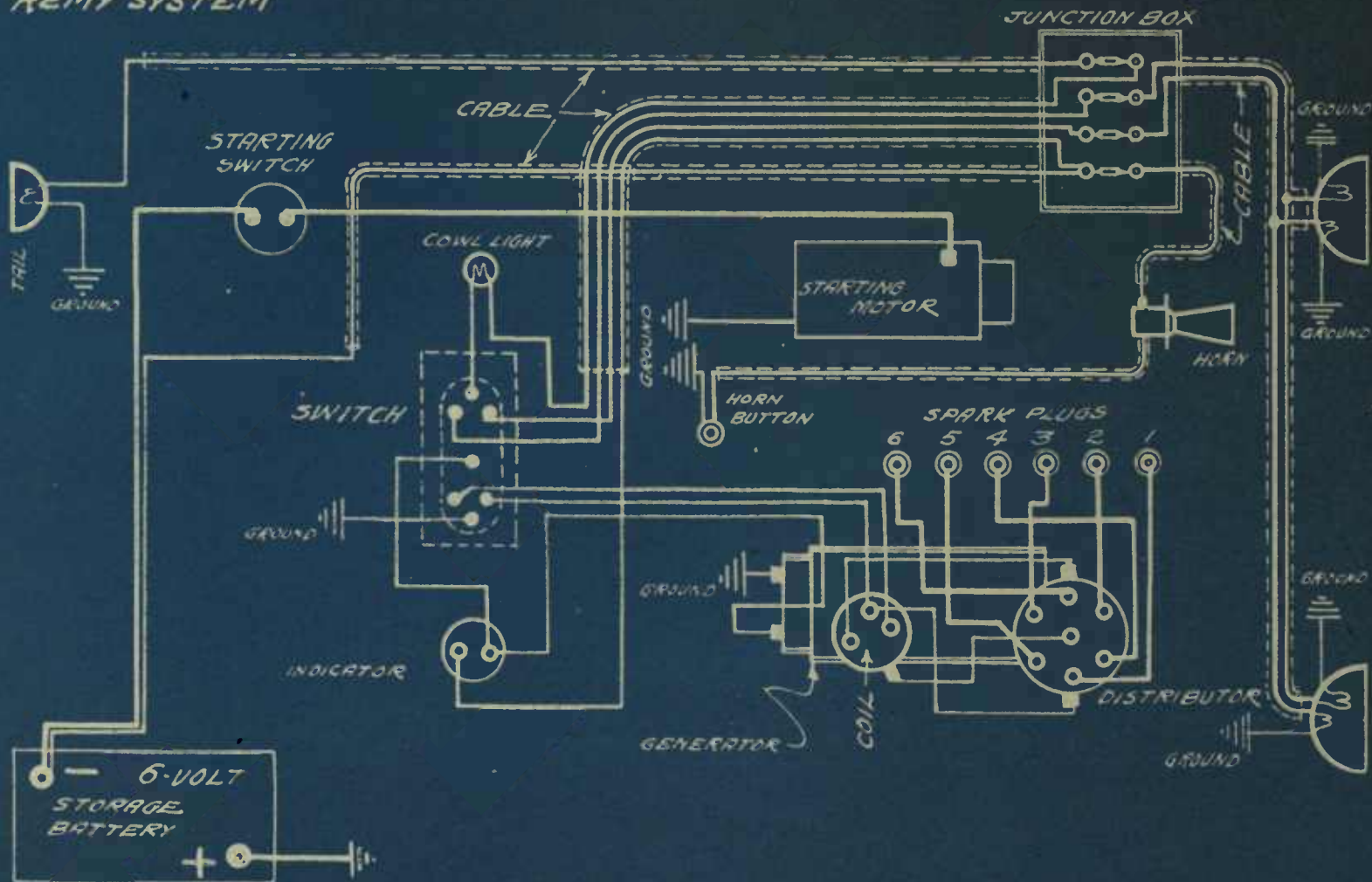
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VELIE 1916 MODEL "22" REMY SYSTEM

FROM MFRS BA. 22-J-202

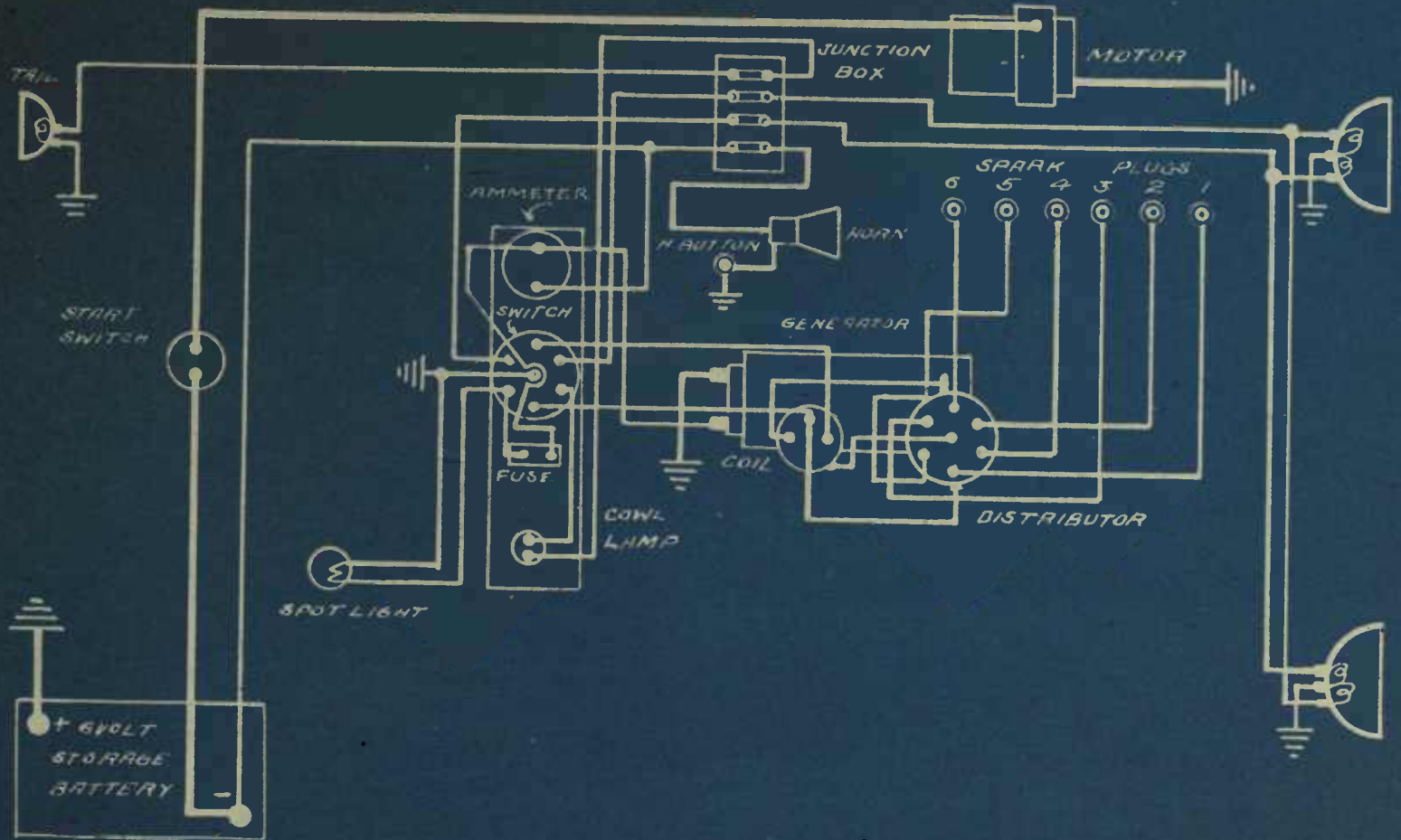


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VELIE MODEL 27 1917

REMY SYSTEM

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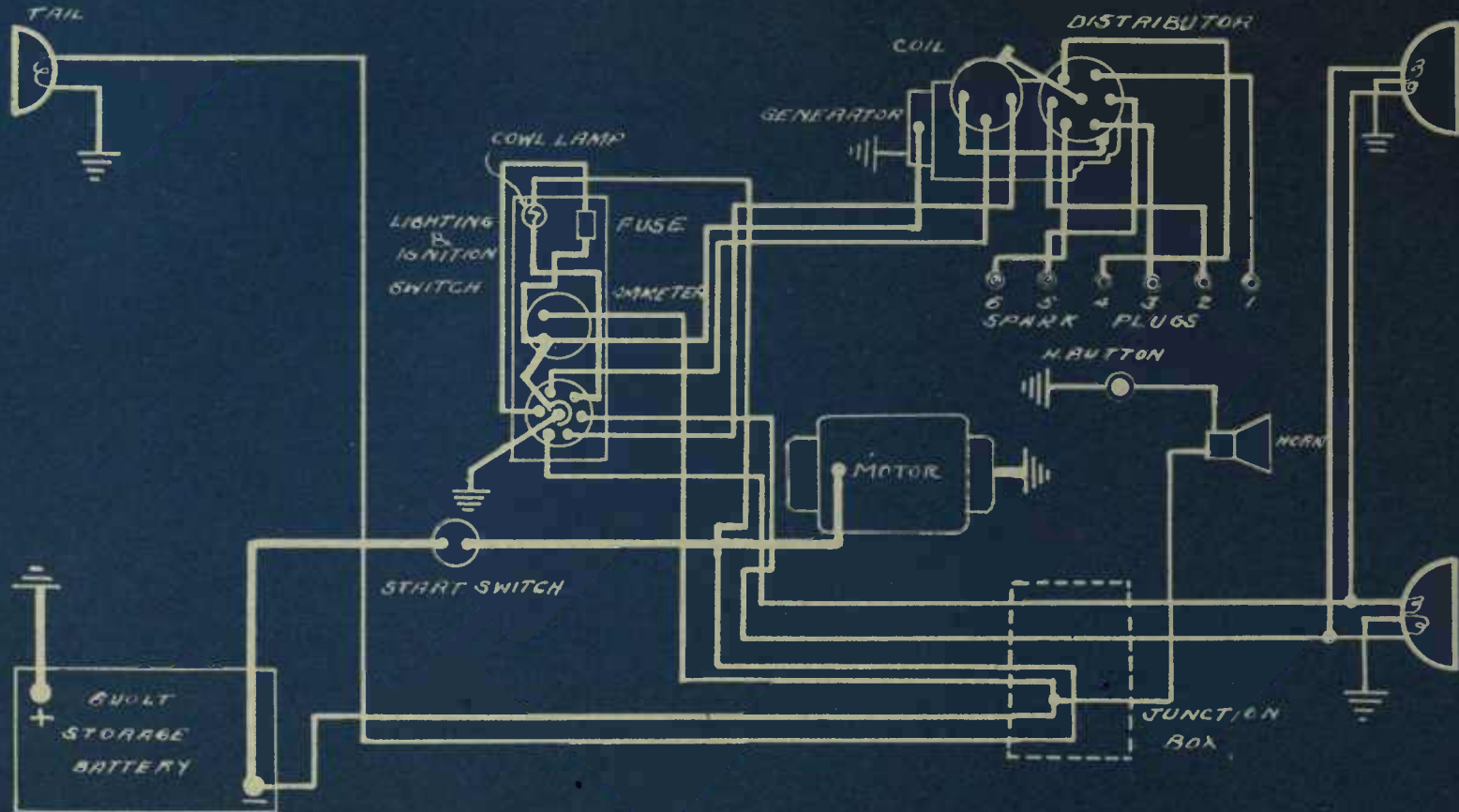


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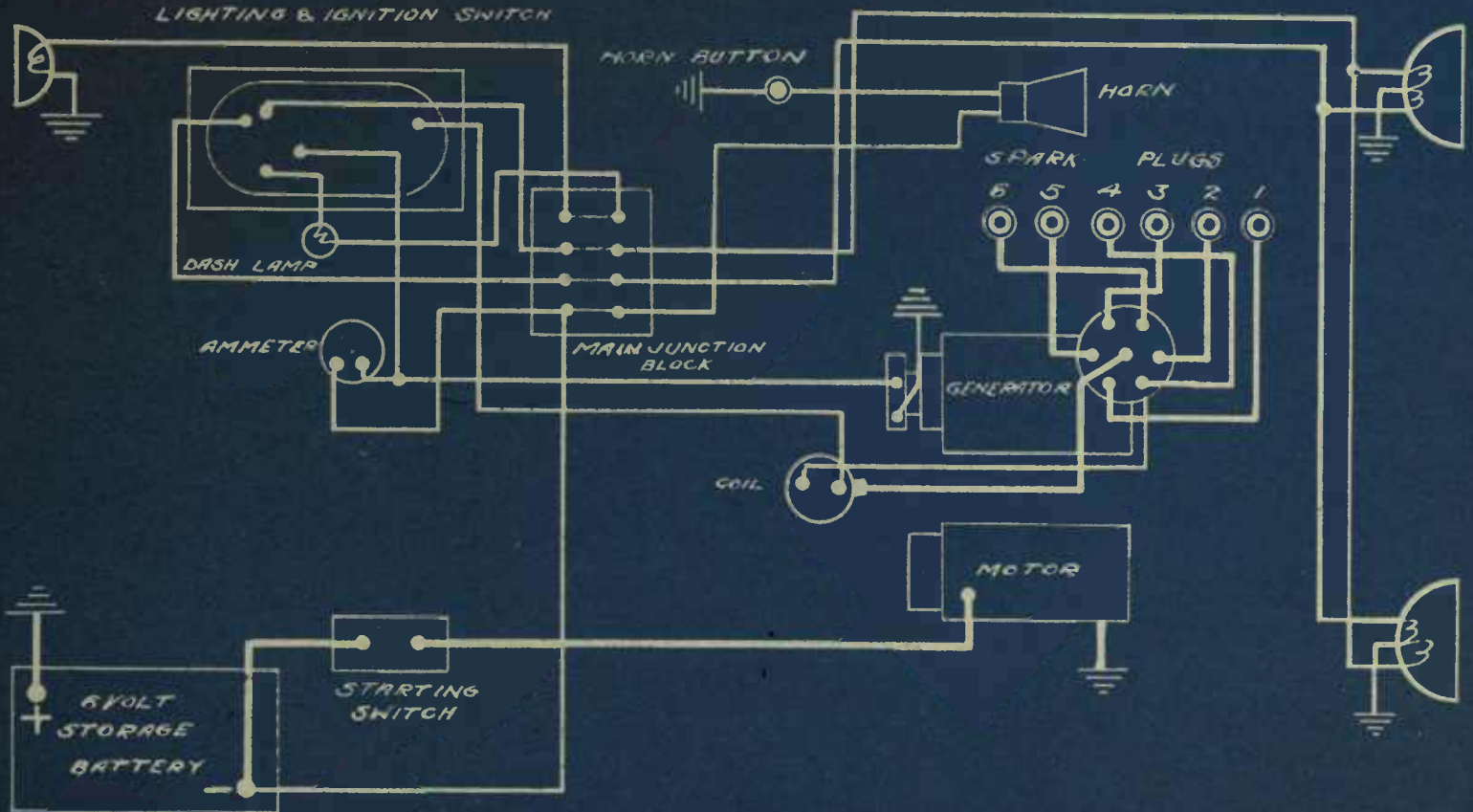
VELIE MODEL 28 1917

REMY SYSTEM

FROM MFAS B.P. 22-J-1262



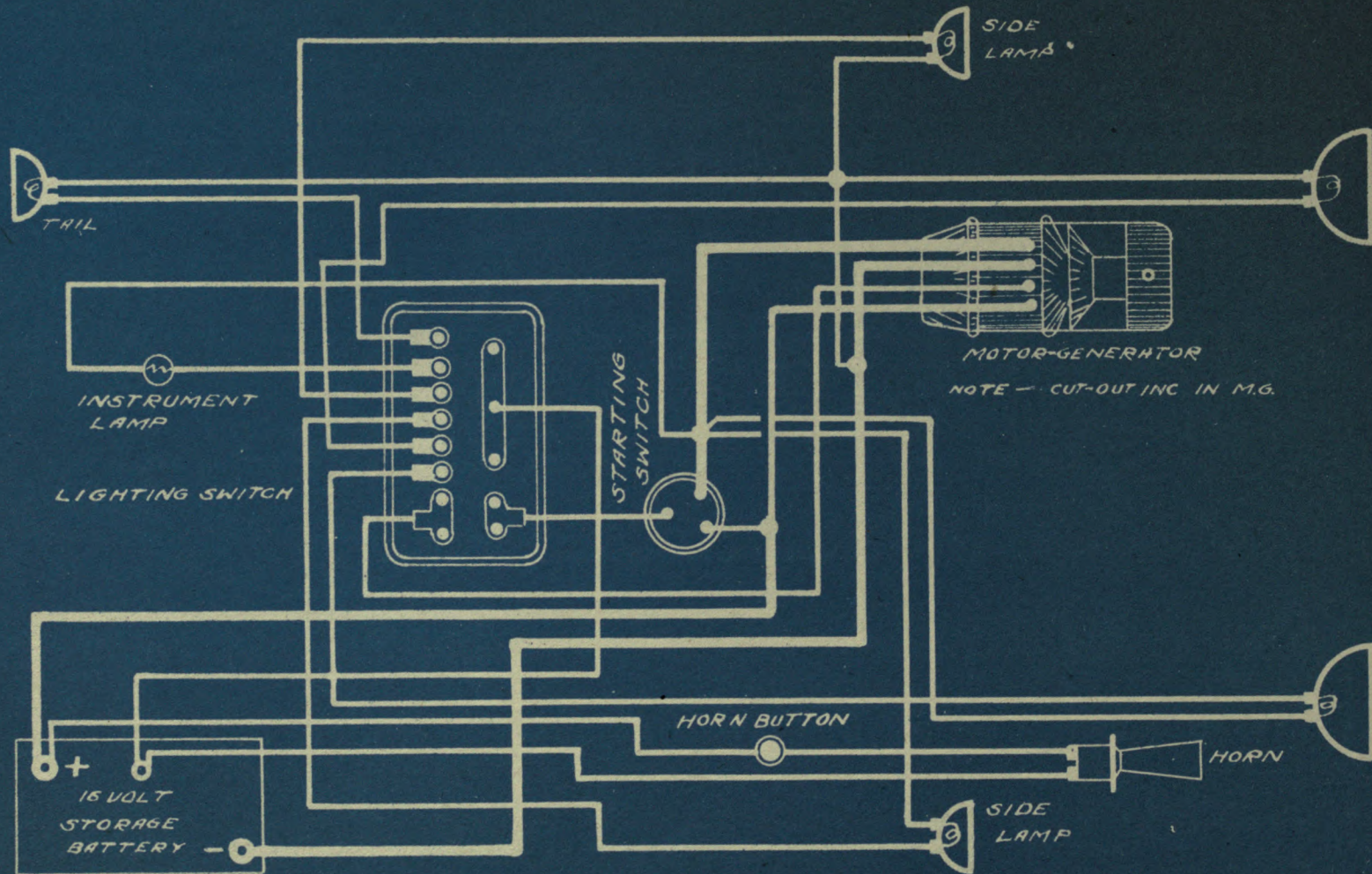
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WARREN 1913-1914
NORTH EAST SYSTEM

FROM NE PLATE 170



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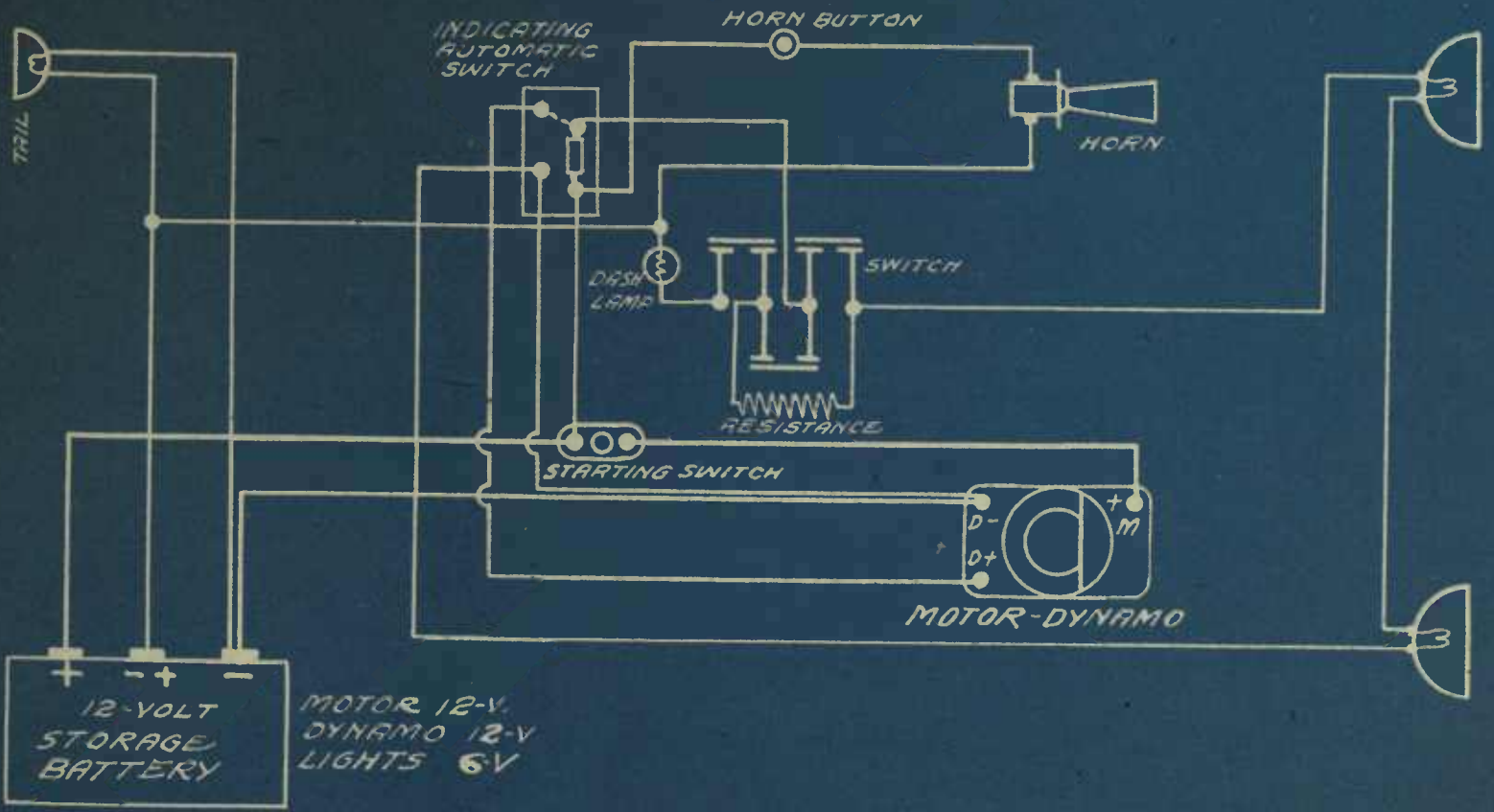
WAYNE 1915

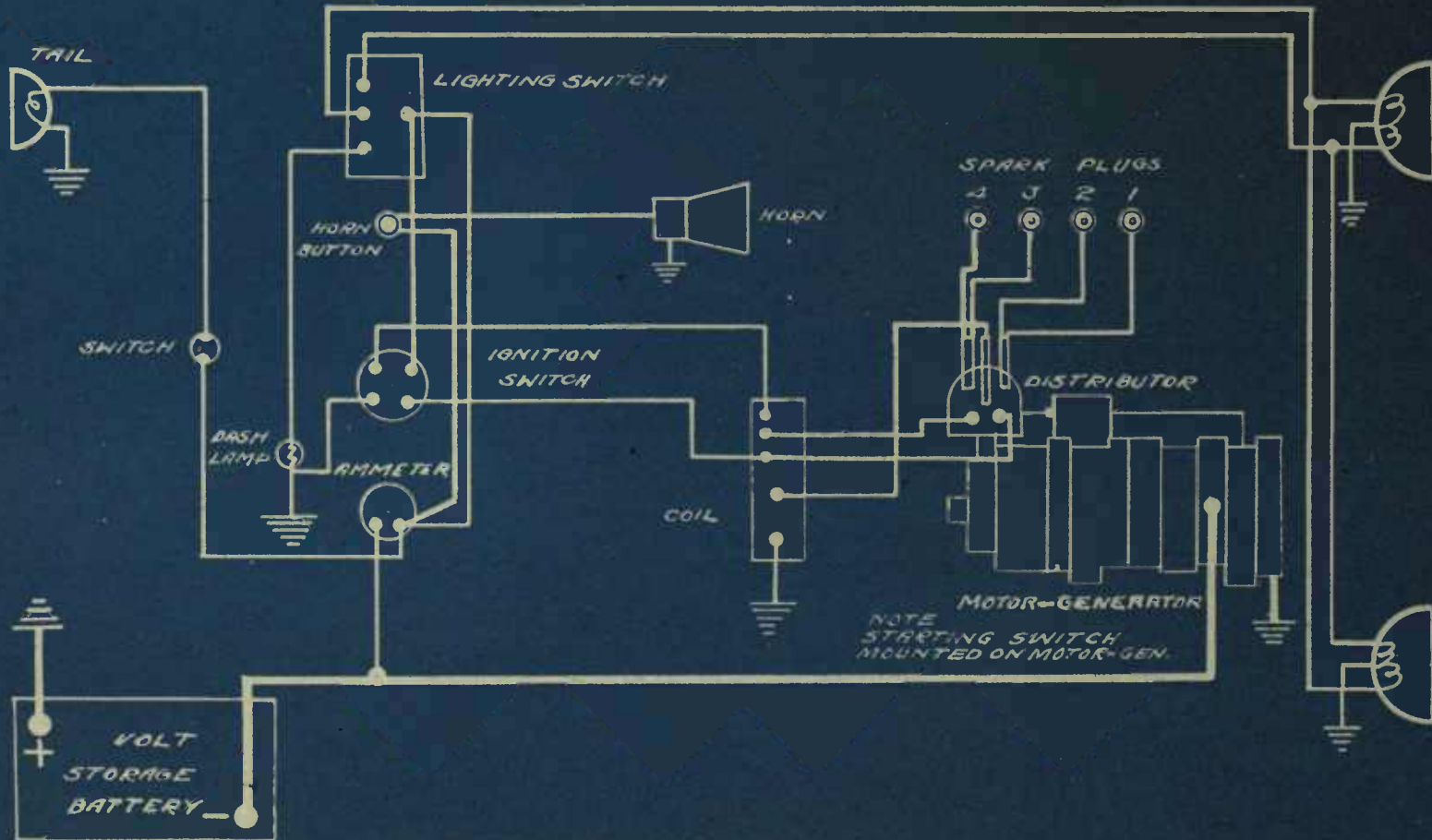
SPLITDORF-APELCO SYSTEM

FROM SPLIT-AP MANUAL

Note: PLUG ACTS AS TAIL LIGHT SWITCH.

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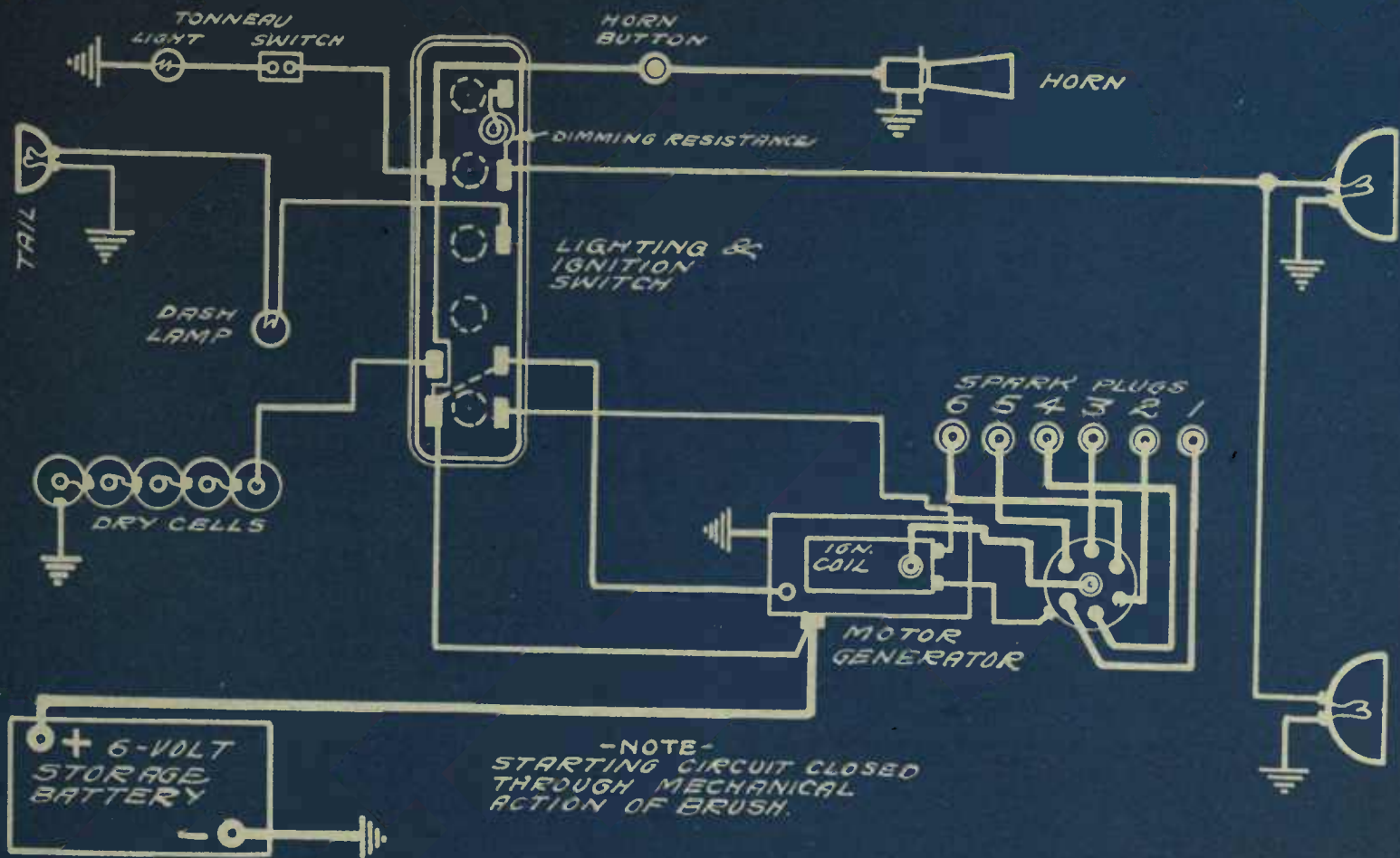


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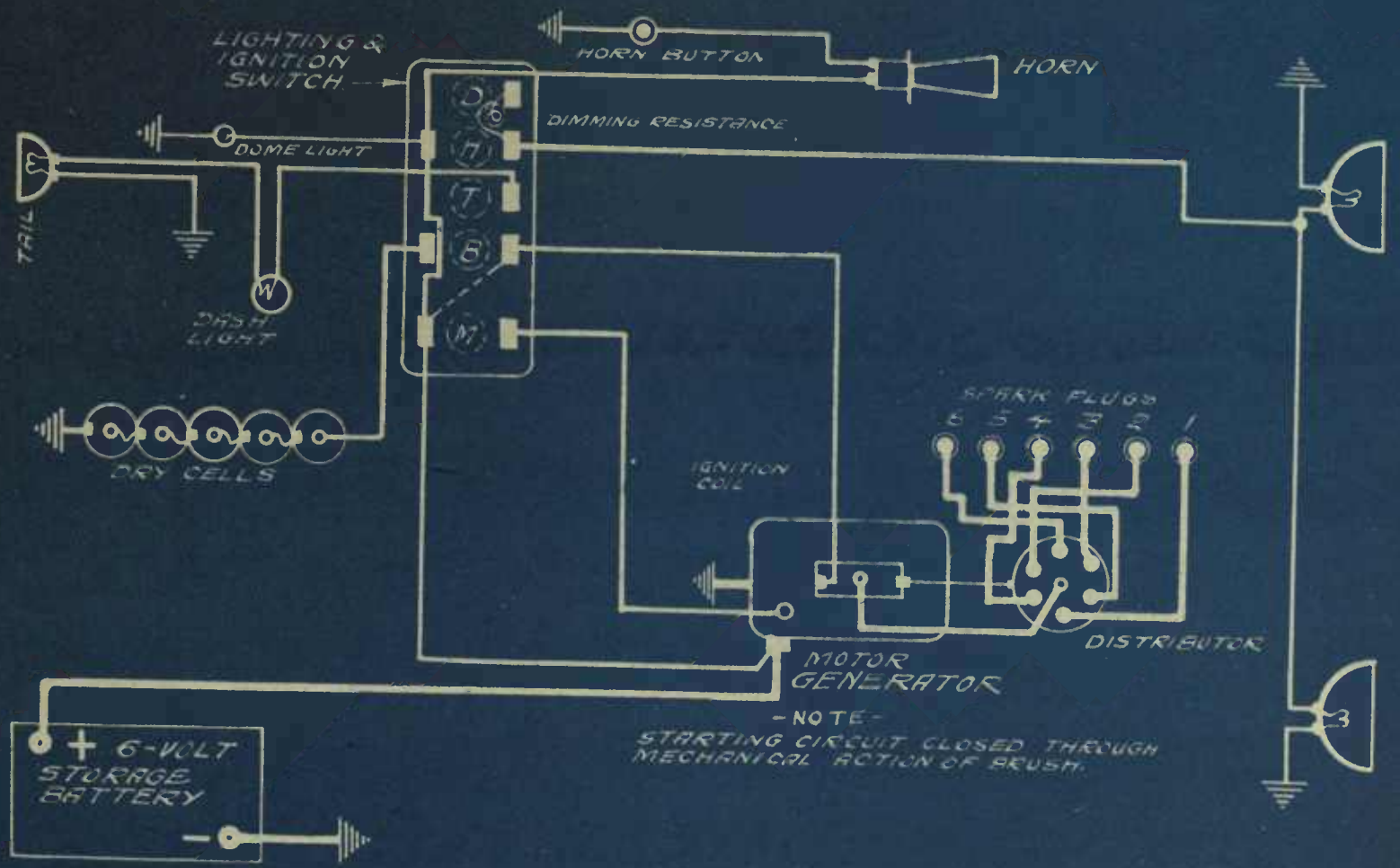
WESTCOTT 1915 DELCO SYSTEM

U-6 & 0-35

FROM DELCO MANUAL



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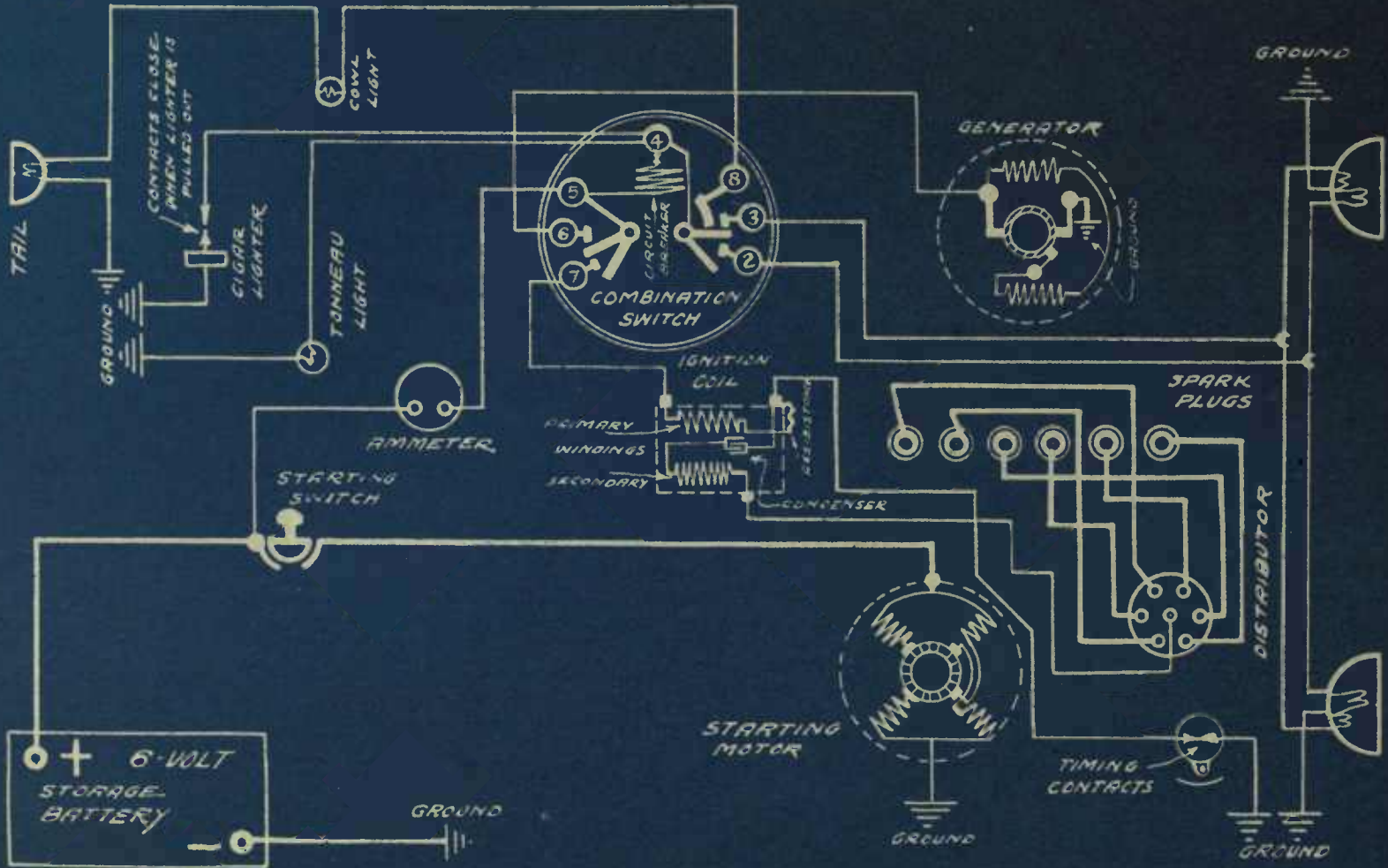


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- NOTE -
STARTING CIRCUIT CLOSED THROUGH
MECHANICAL ACTION OF BRUSH.

WESTCOTT 1917-1918-19
DELCO SYSTEM

FROM WESTCOTT INST. BK.

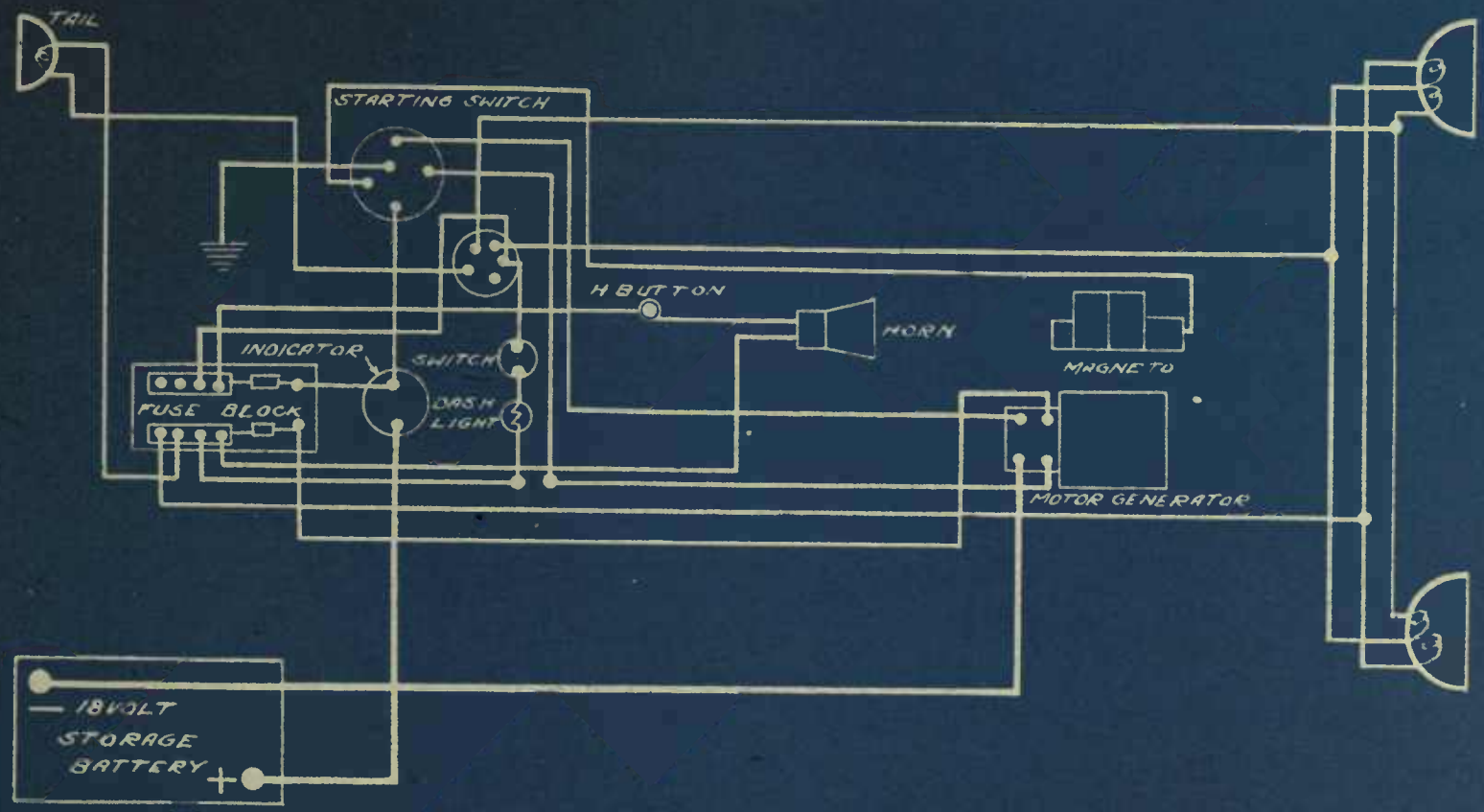


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WHITE 1913 ENTZ SYSTEM

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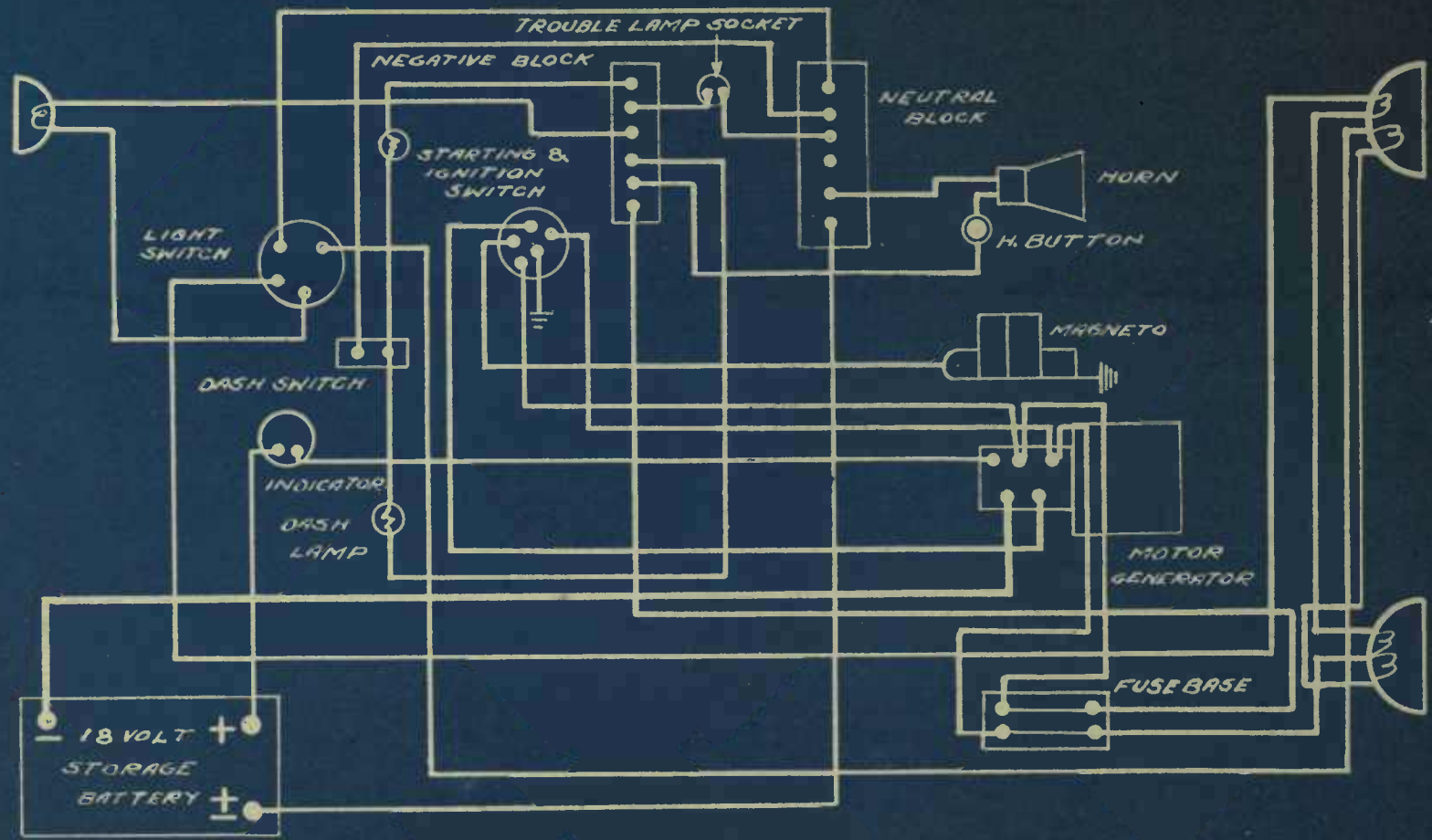
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WHITE 1914 GAG

WHITE-ENTZ SYSTEM

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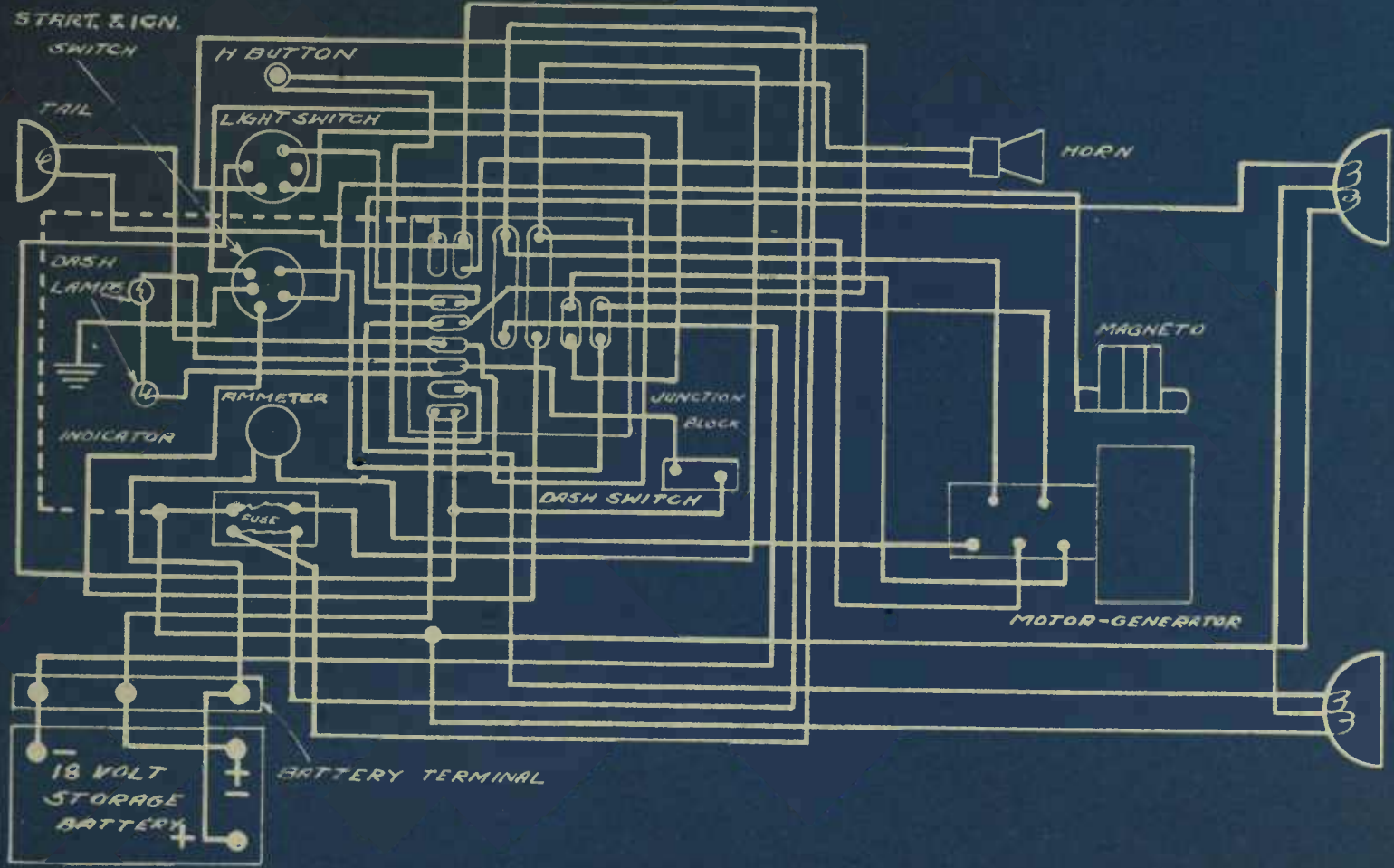
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WHITE 1914
WHITE-ENTZ SYSTEM

GAGR

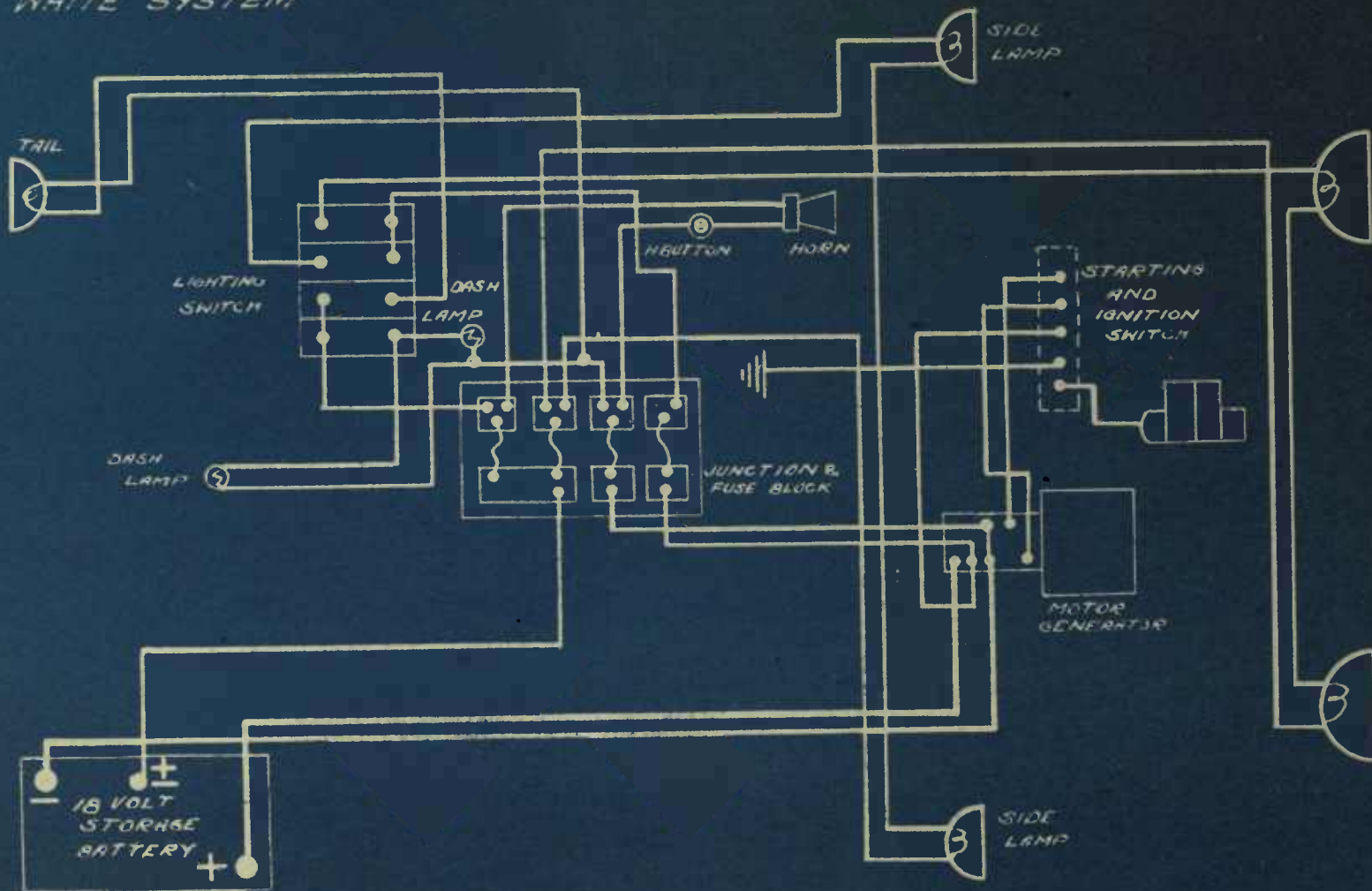
FROM MERS. 52

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WHITE 1916-17 WHITE SYSTEM

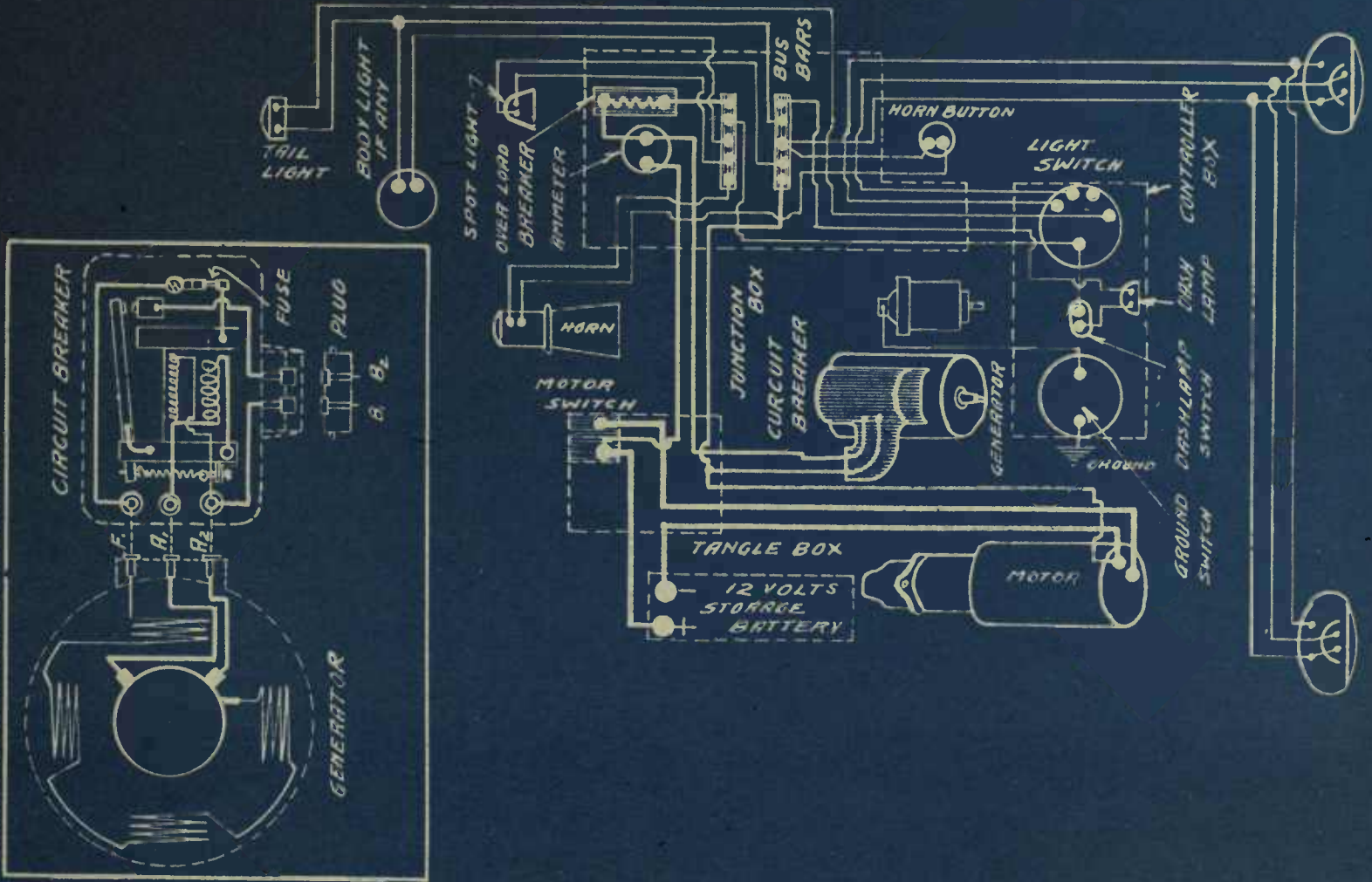
FROM WHITE INST. BK.



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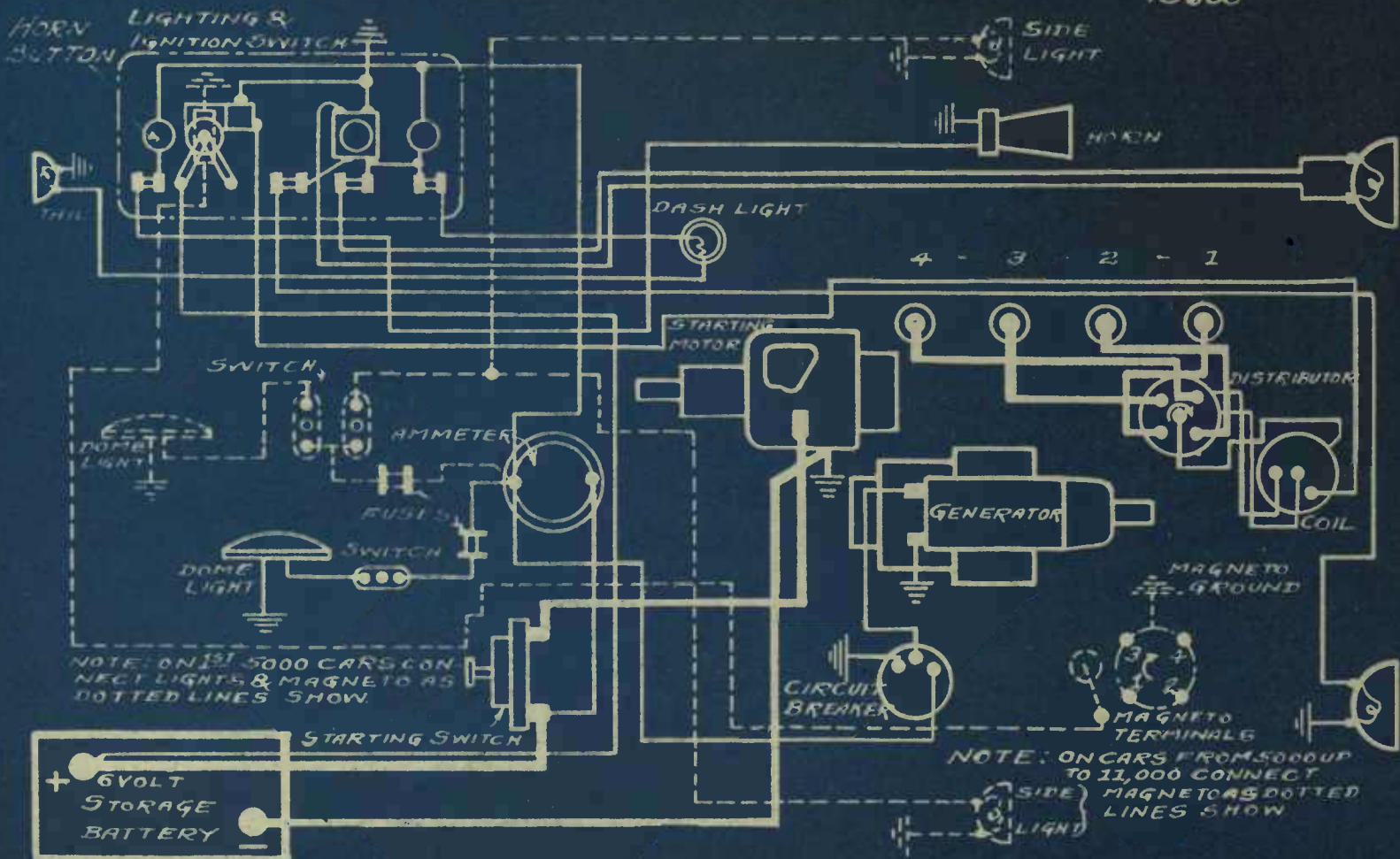
GENERATOR & CIRCUIT BREAKER CIRCUITS



WILLYS-KNIGHT 1916 84-C

AUTOLITE SYSTEM

FROM MFRS. B-P 19864-16809 & 15600

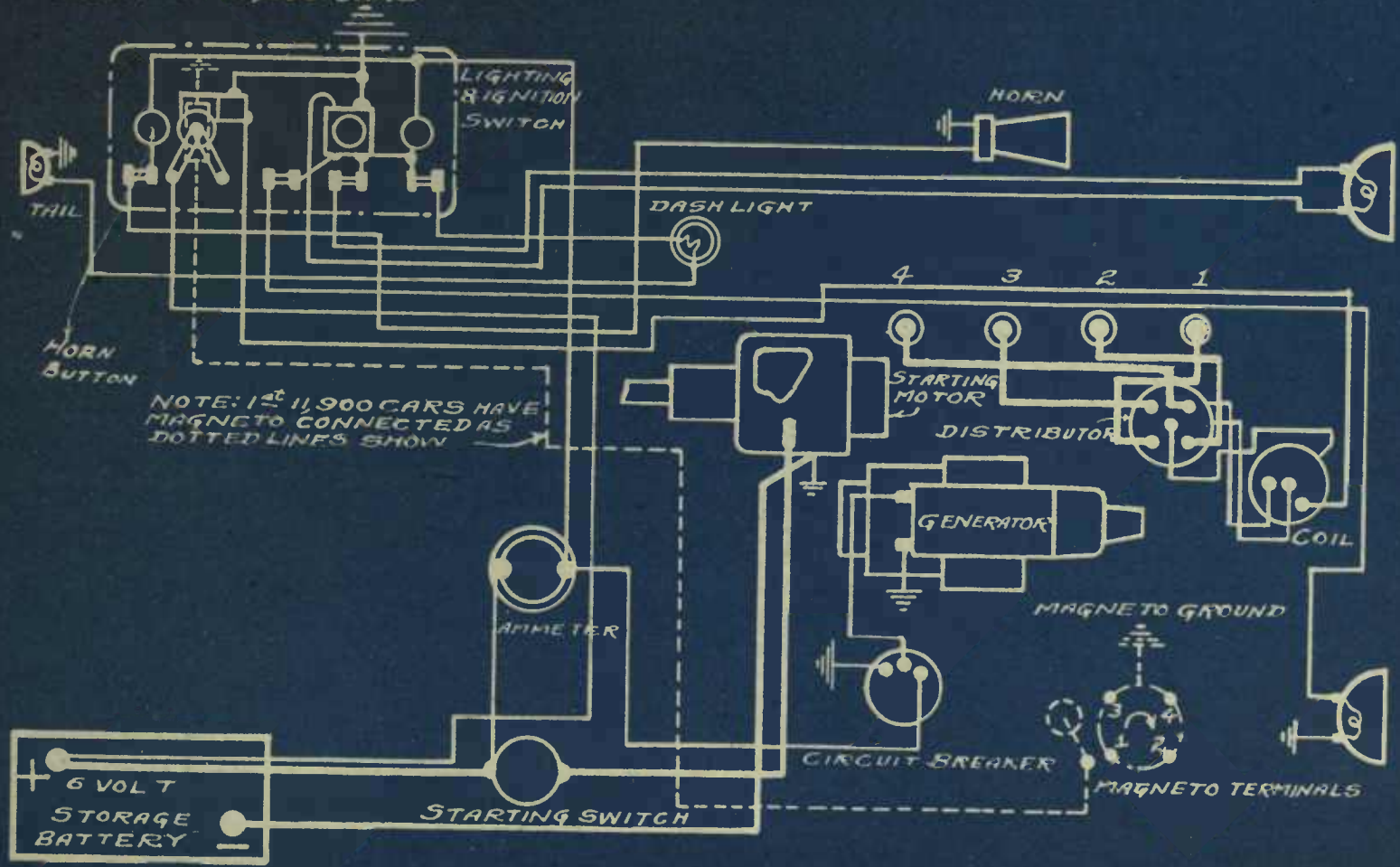


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WILLYS-KNIGHT 1916 84-R

AUTOLITE SYSTEM
USE AFTER 11,900 CARS

FROM MFRS. B-P 19820 & 15772

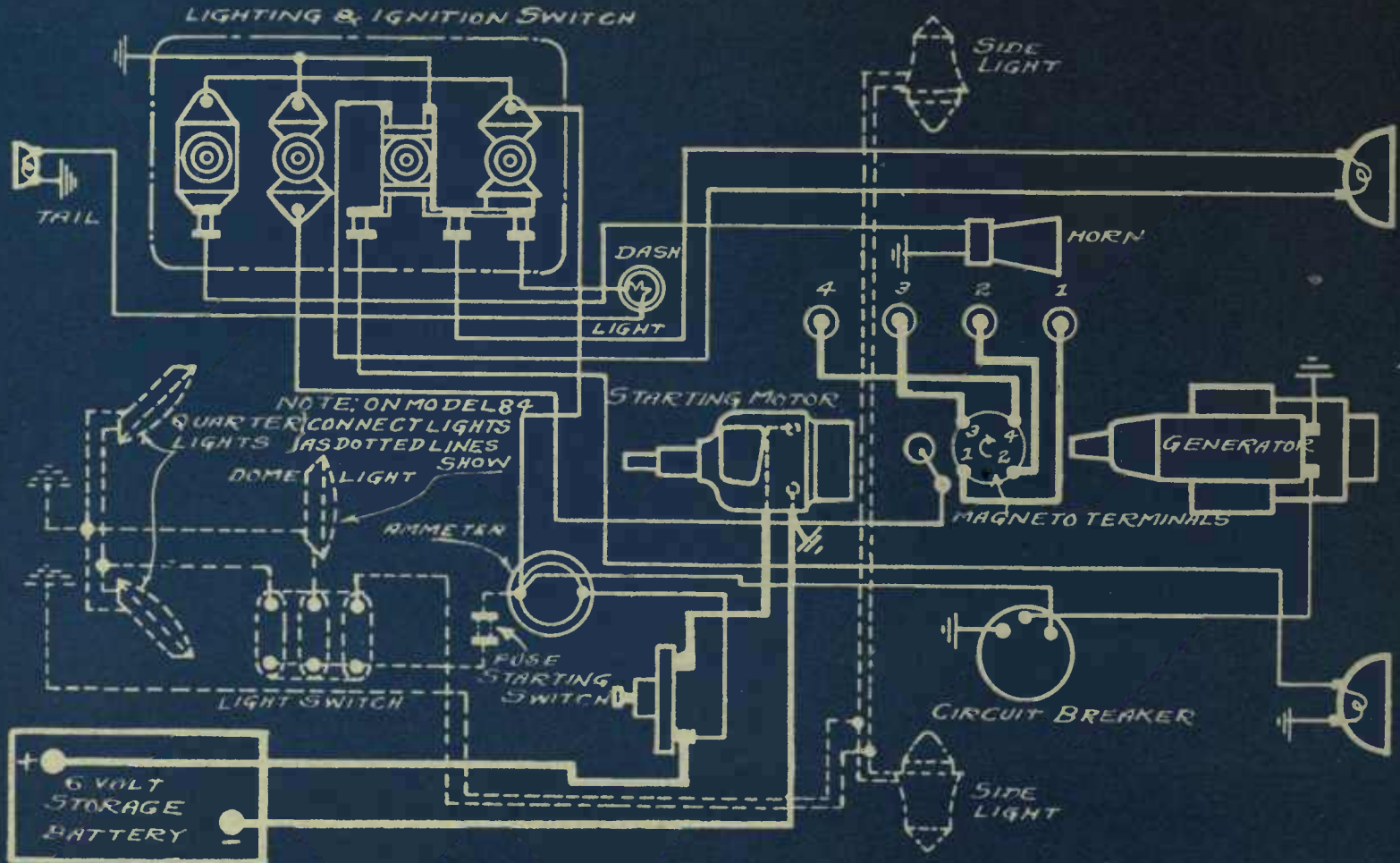


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WILLYS-KNIGHT 1916 84&84-T

AUTOLITE SYSTEM

FROM MFRS. B-P 15325 & 16300

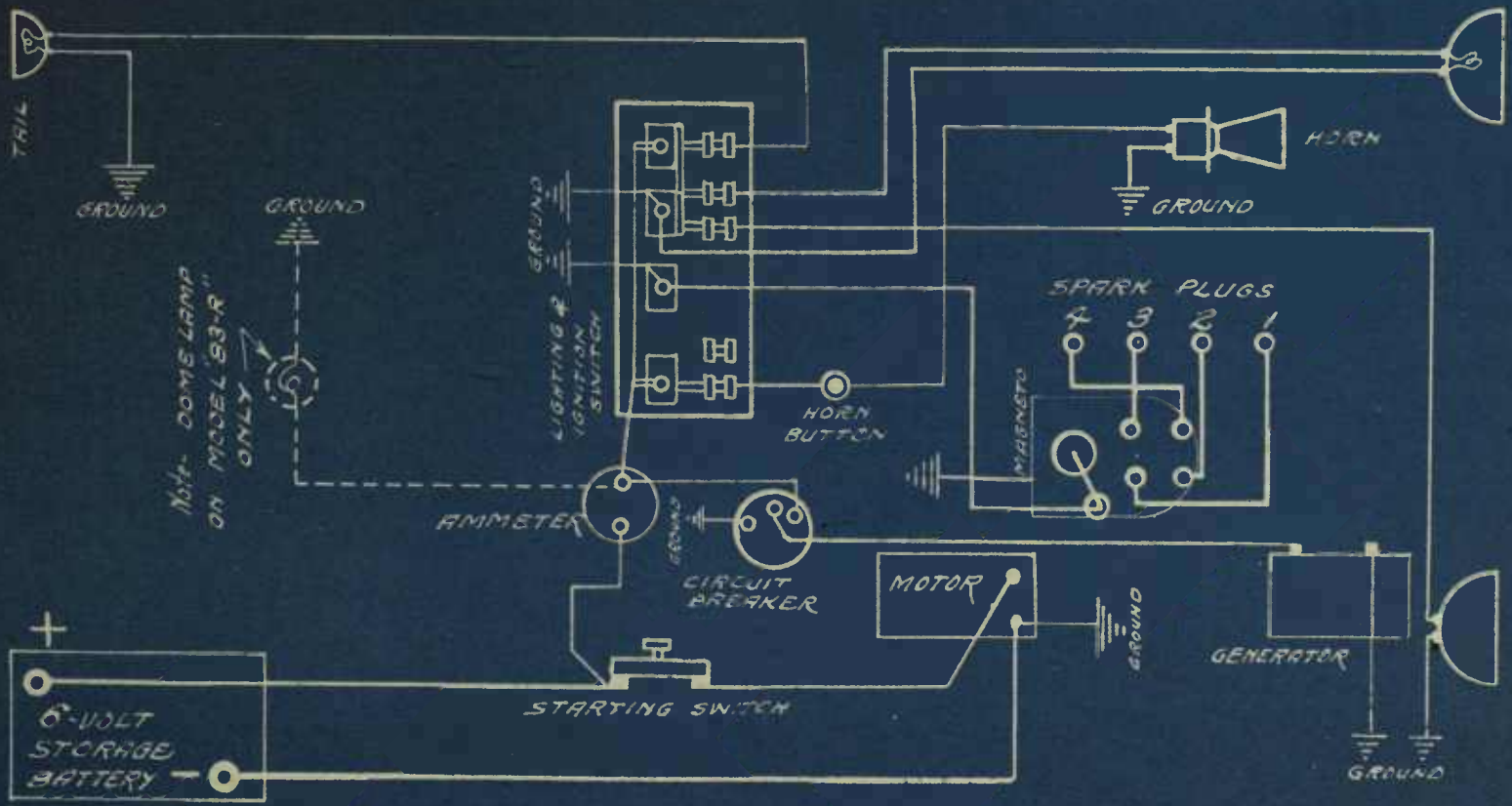


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WILLYS-KNIGHT "84T" "84BT" "83R" 1916
 AUTOLITE SYSTEM

FROM MNFRS. BP. 15006 & 15325

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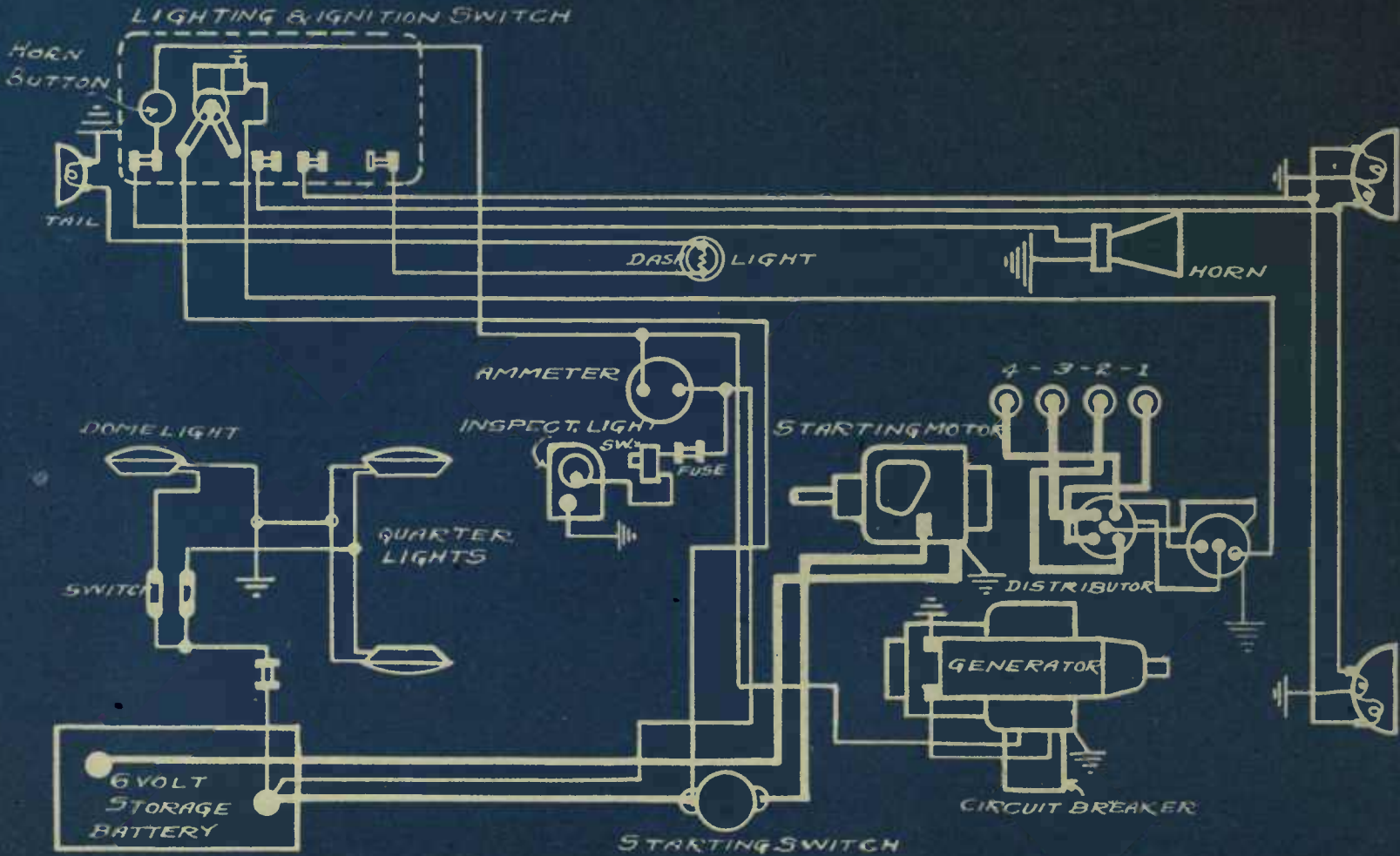


WILLYS-KNIGHT 1917&18

AUTOLITE SYSTEM

88-4-C

FROM MFRS. B.P. 103910



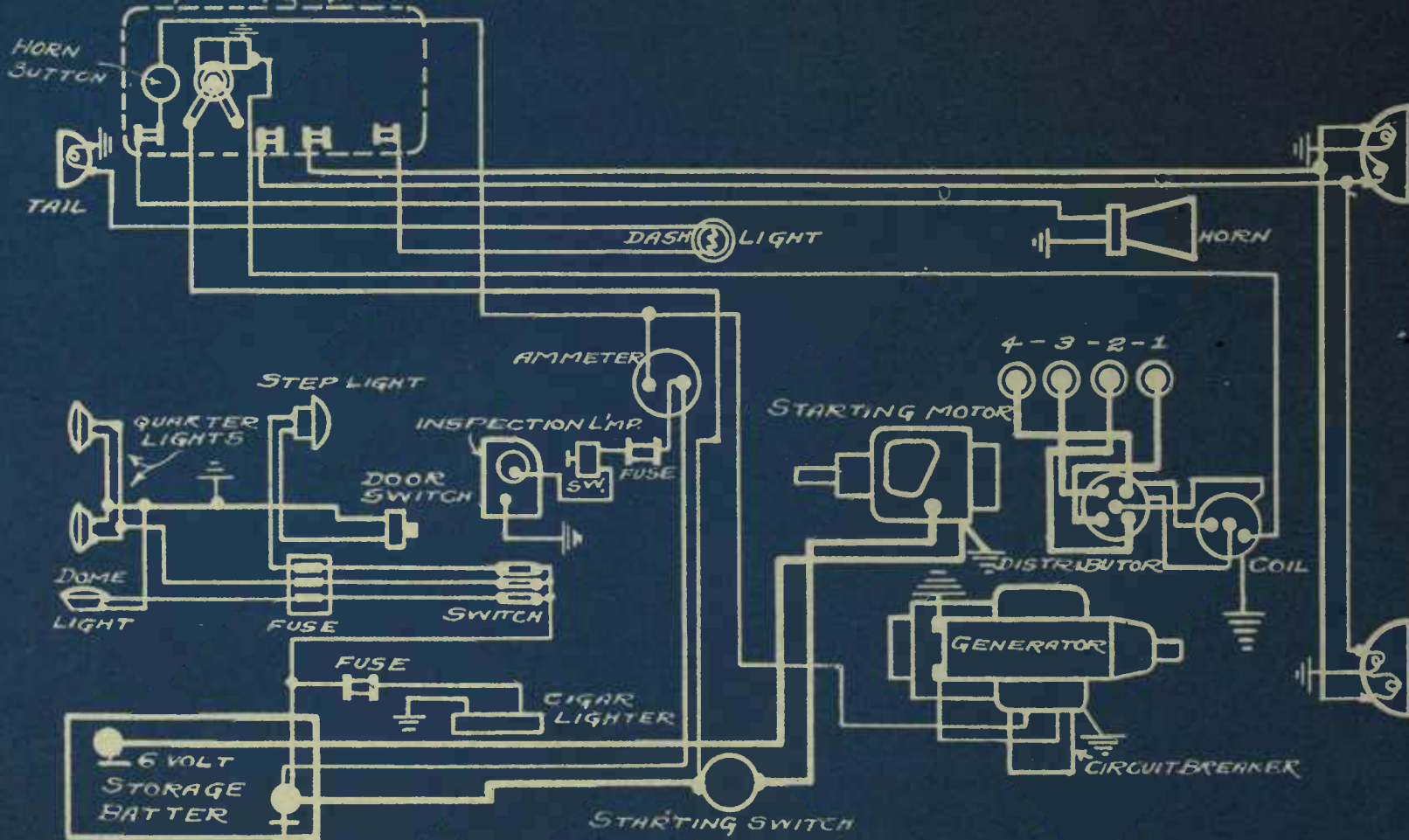
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WILLYS-KNIGHT 1917&18 88-4-5N

AUTOLITE SYSTEM
USE AFTER FIRST 200 CARS

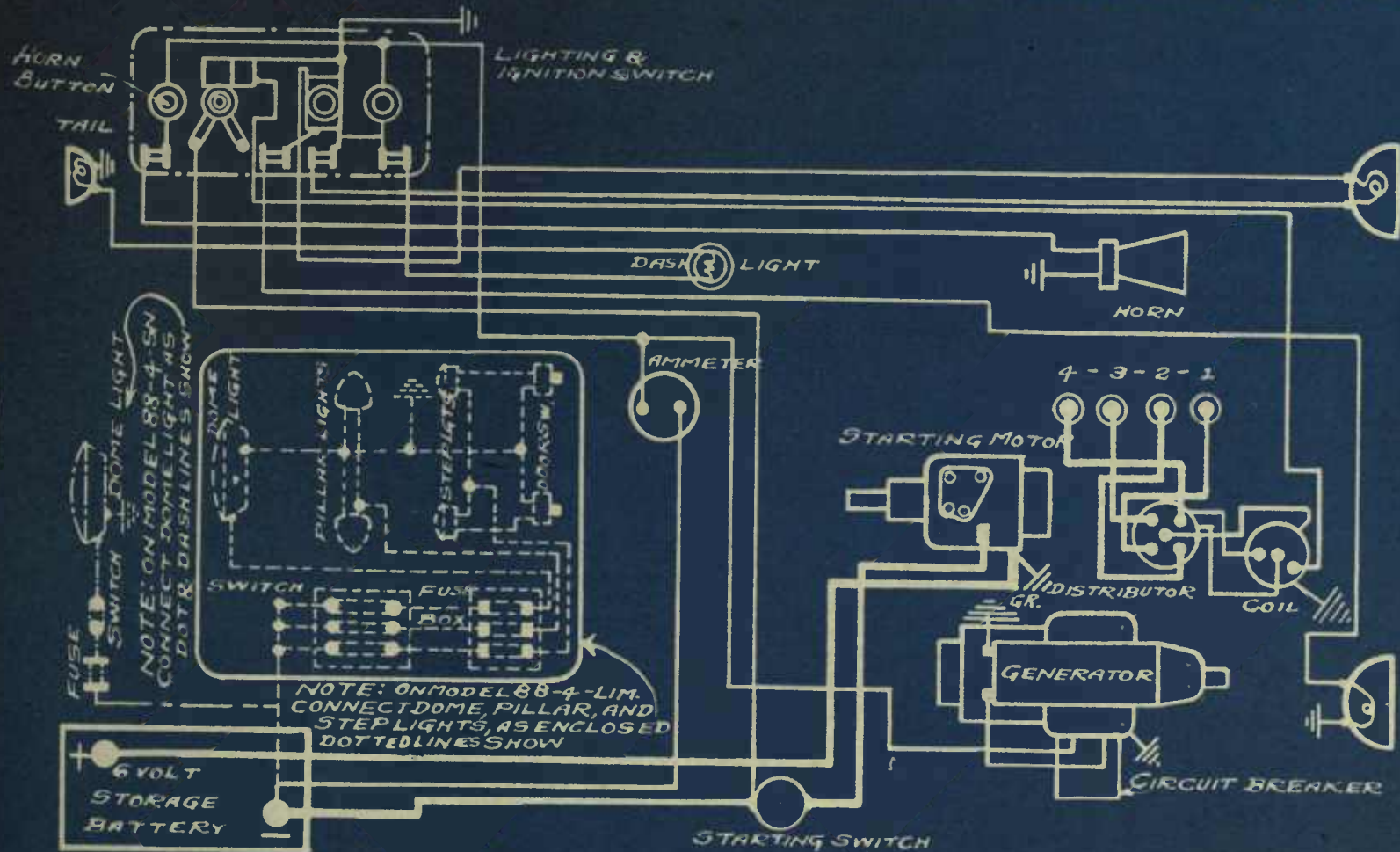
FROM MFRS. B/P 104287

LIGHTING & IGNITION SWITCH



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WILLYS-KNIGHT 1917&18 88-4T 88-4-LIM. & 88-4-SN.
 AUTOLITE SYSTEM FROM MFRS. B/P 100284-19114 & 100509

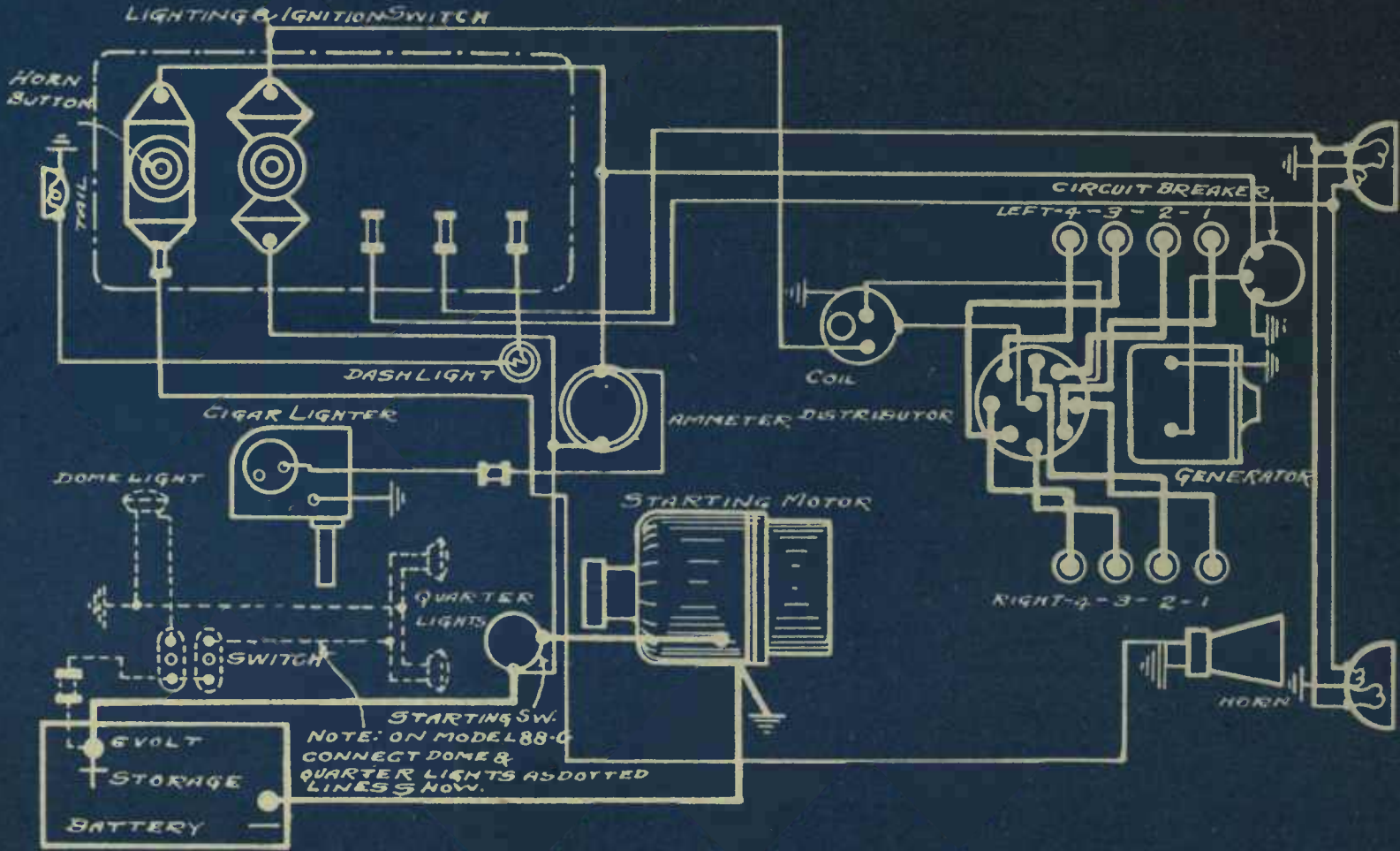


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WILLYS-KNIGHT 1917-18
AUTOLITE SYSTEM

88-8-C&R

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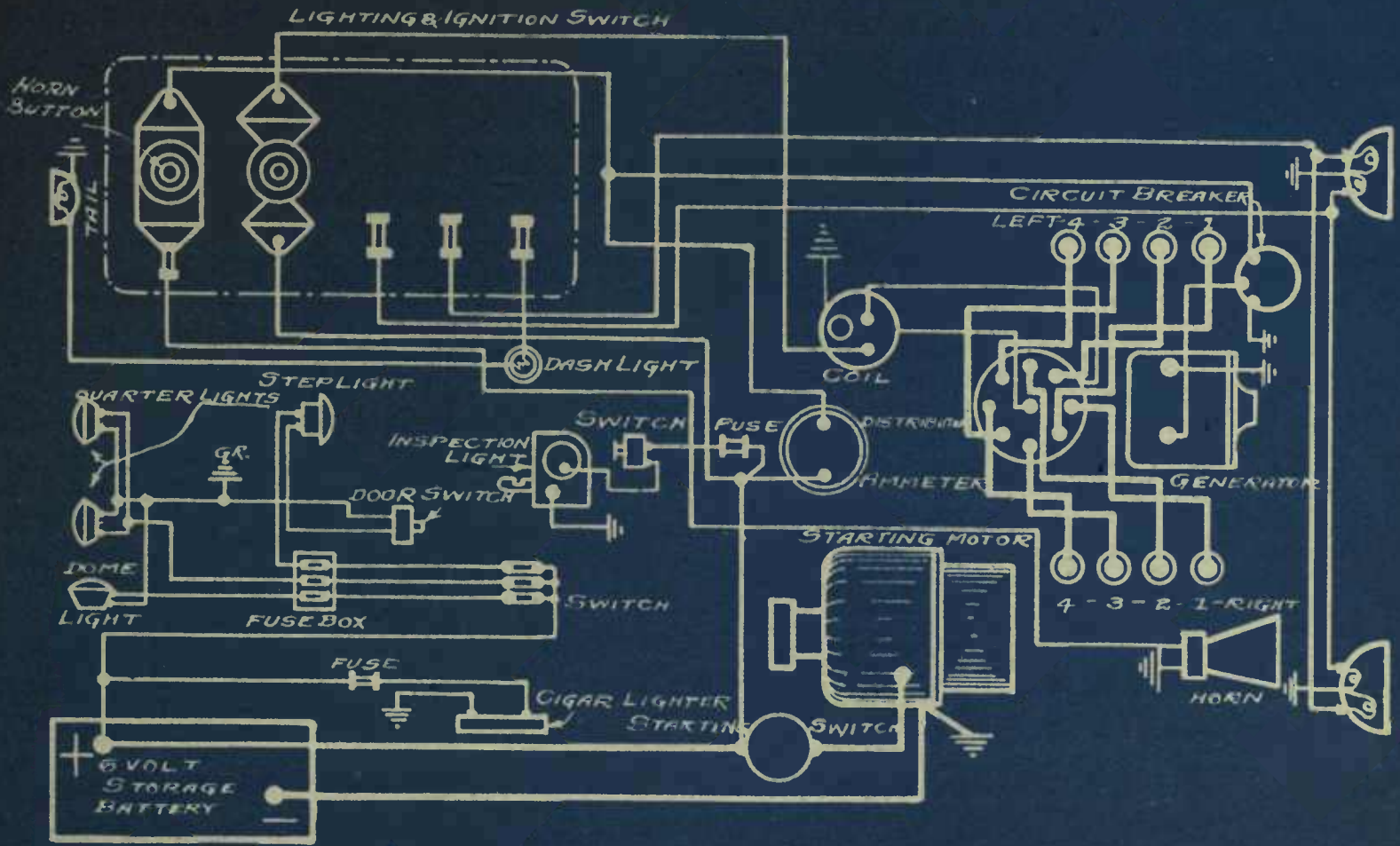


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WILLYS-KNIGHT 1917&18 "88-85N"
 AUTOLITE SYSTEM

FROM MFRS. B/P 100894

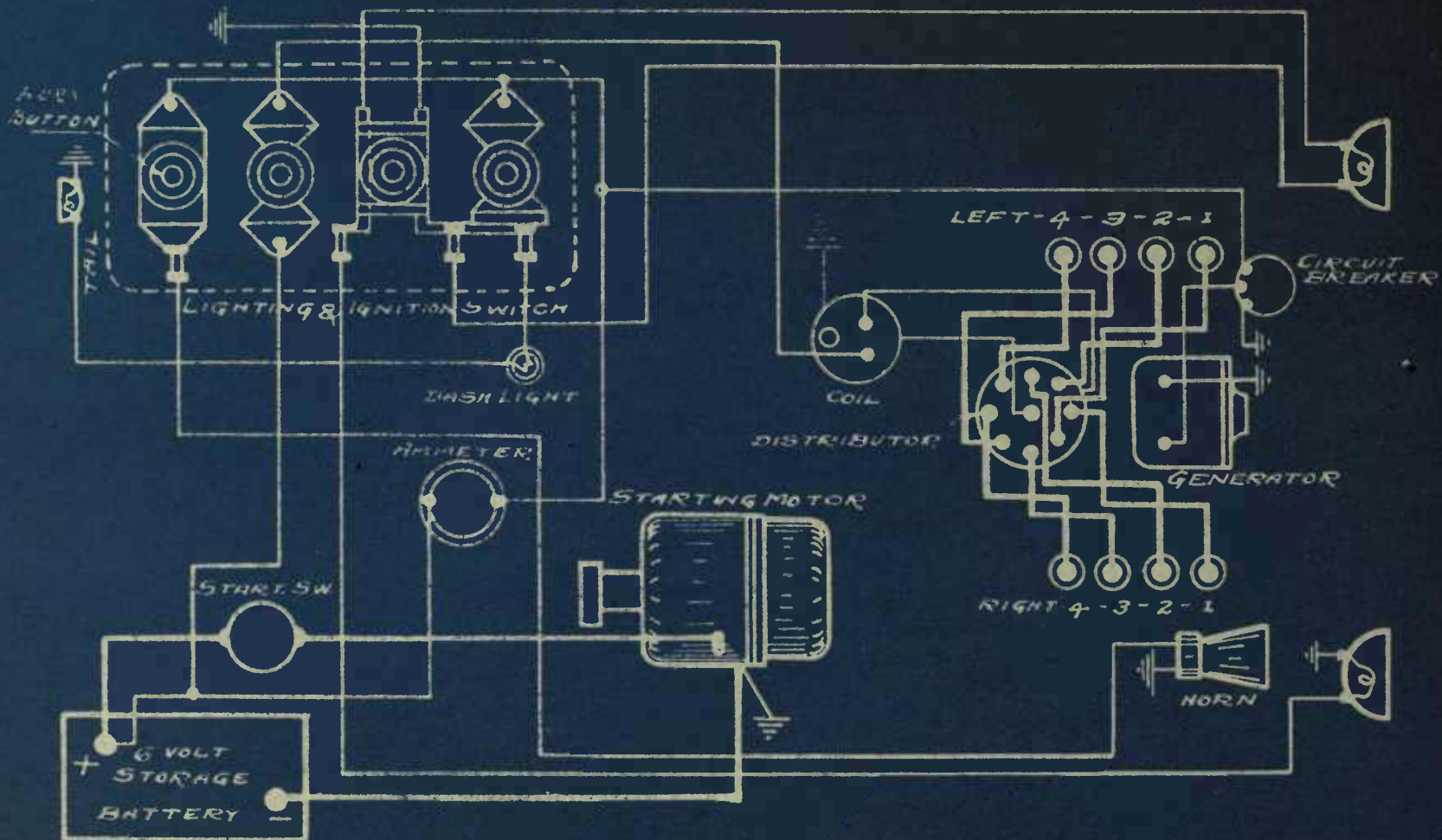
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WILLYS-KNIGHT 1917 88-8T 1918

AUTOLITE SYSTEM

FROM MFRS. B/P 100572

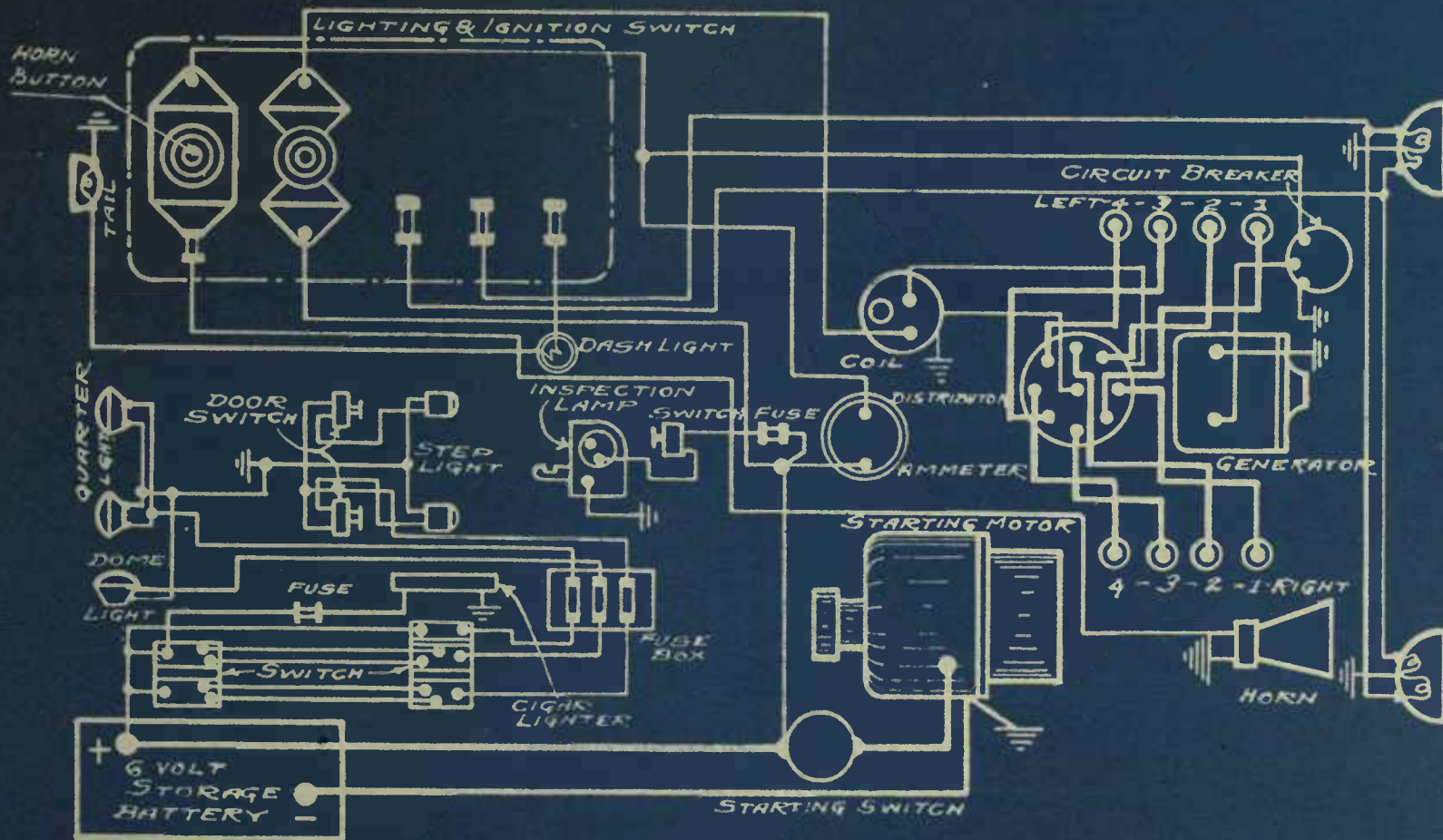


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AUTOLITE SYSTEM

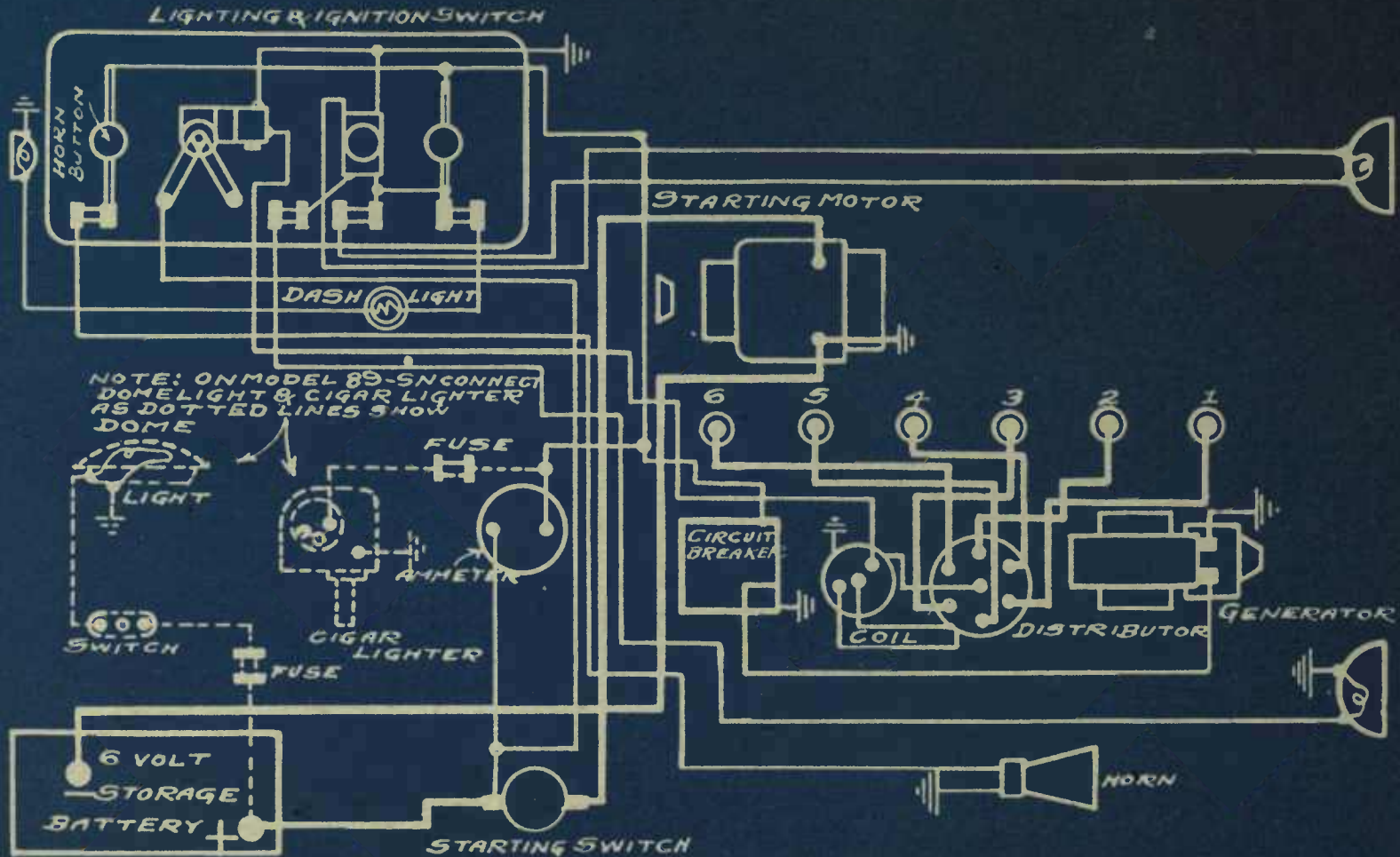
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AUTOLITE SYSTEM CONN. IGN.

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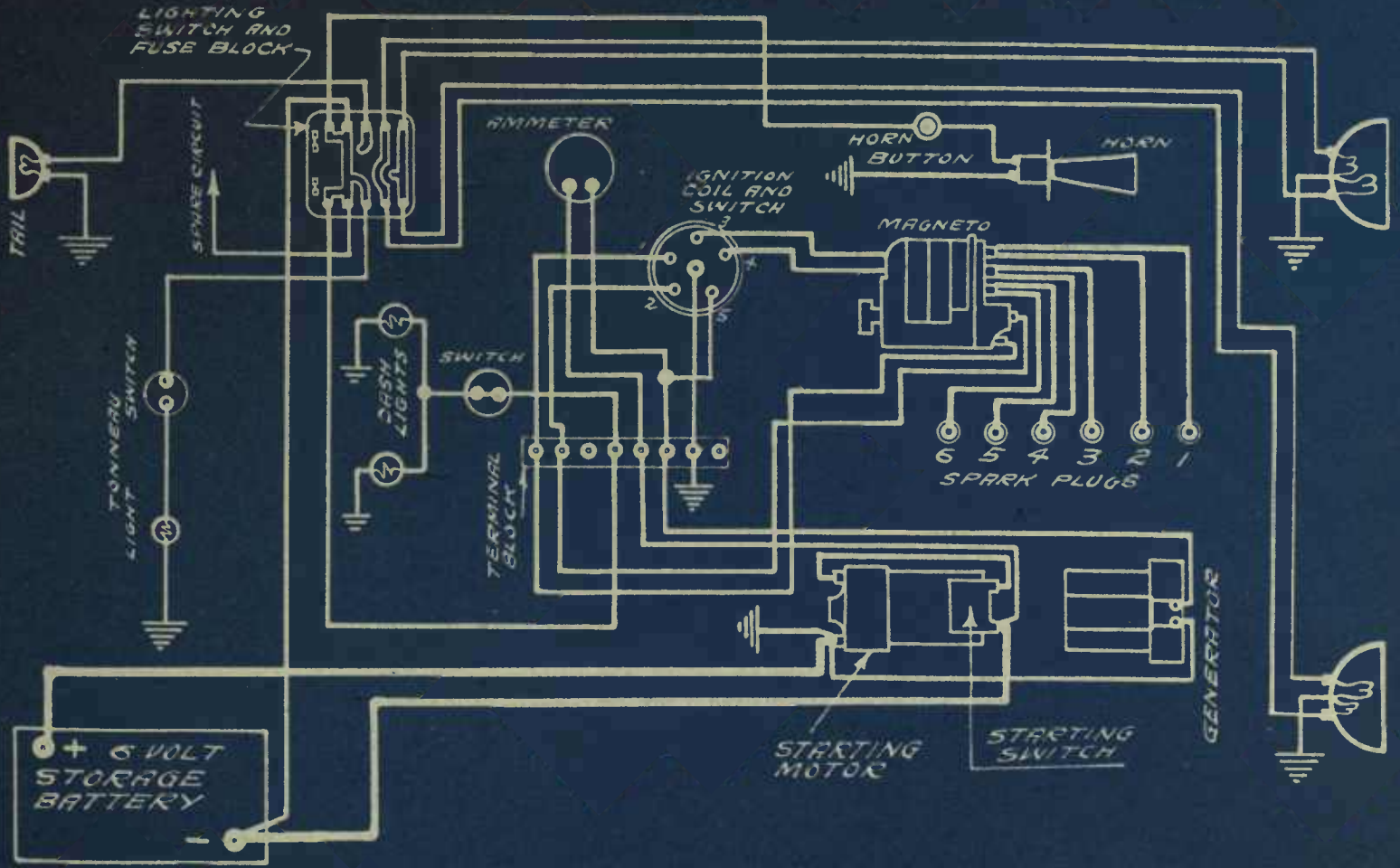


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WINTON 1915 "21" BITUR SYSTEM

1915 "21"

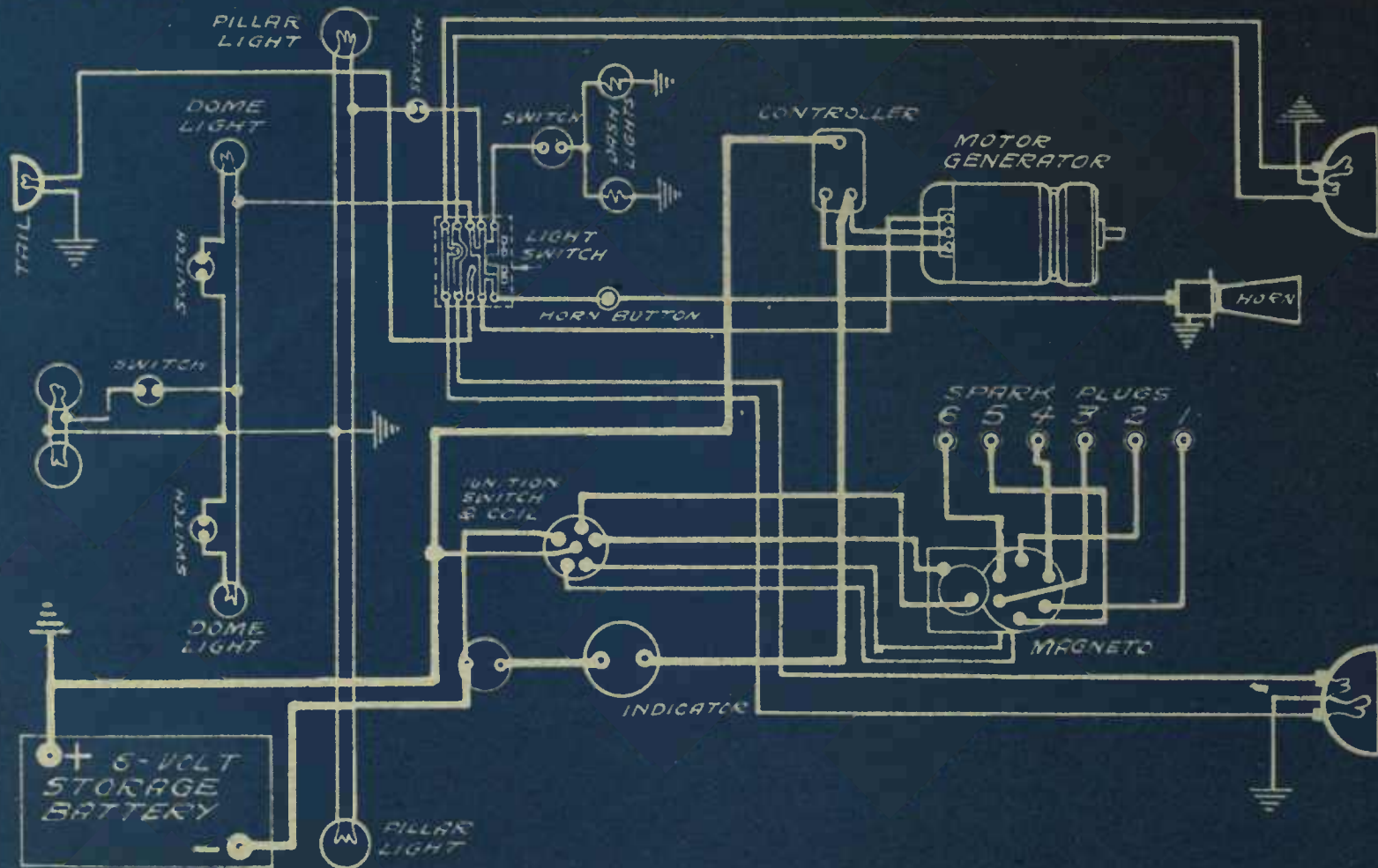
FROM MFRS SKETCH C-564-R



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WINTON 1915 "21"
 GRAY AND DAVIS SYSTEM

FROM MFRS. SKETCH

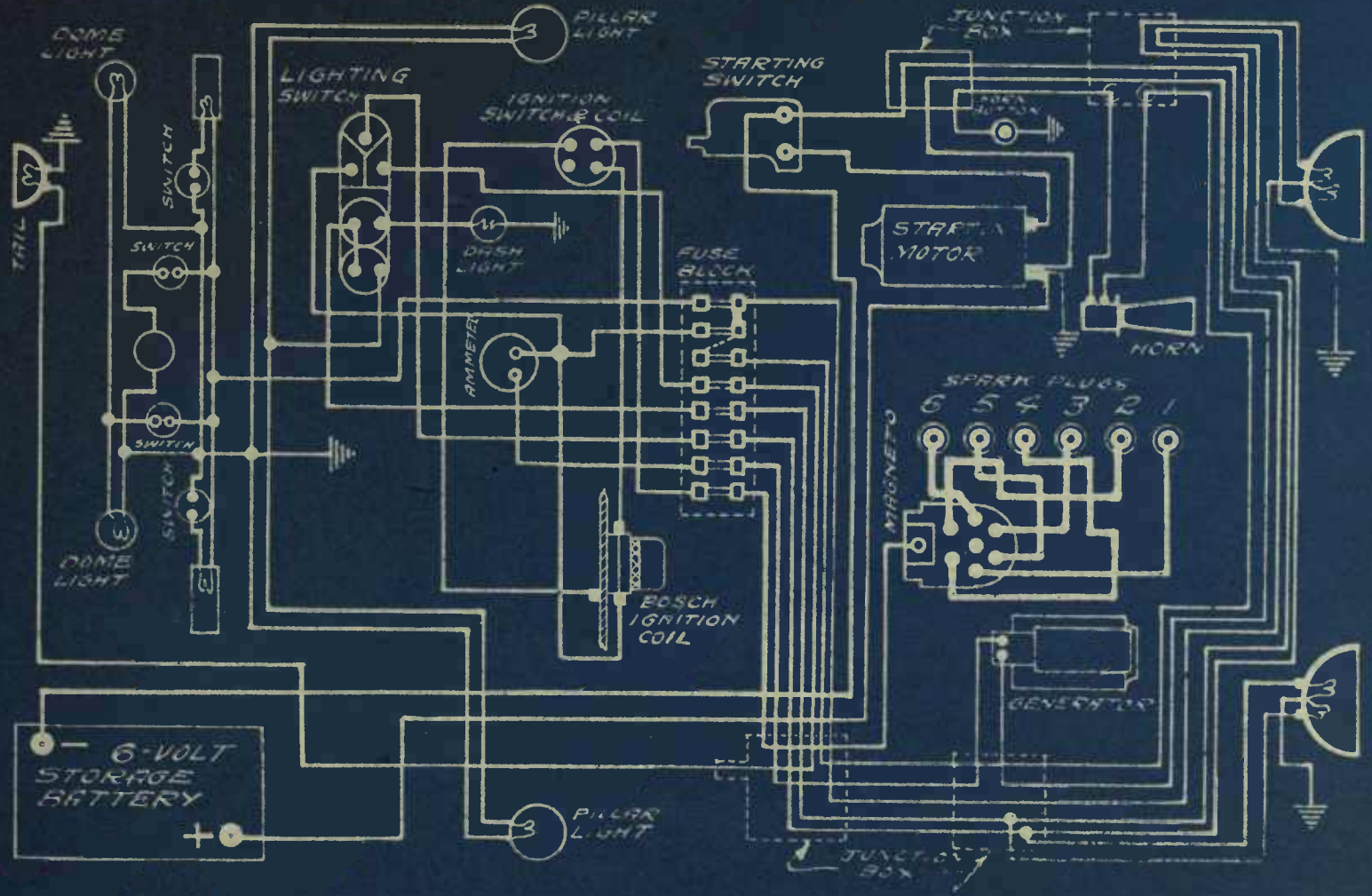


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WINTON 1915 "21-A"

BITUR SYSTEM

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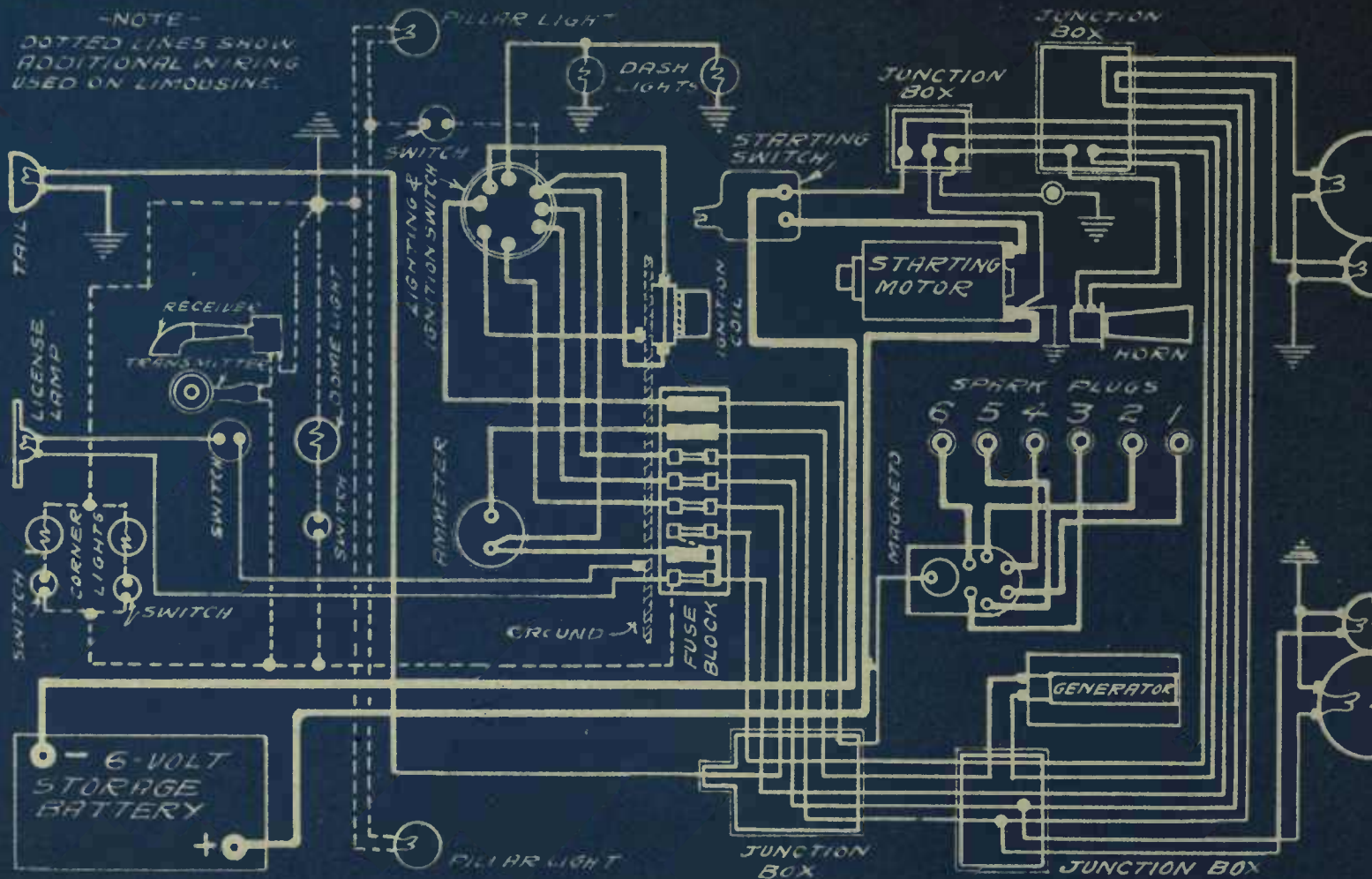


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WINTON 1916 "22" BIJUR SYSTEM

FROM WINTON INST. BK.

-NOTE-
 DOTTED LINES SHOW
 ADDITIONAL WIRING
 USED ON LIMOUSINE.

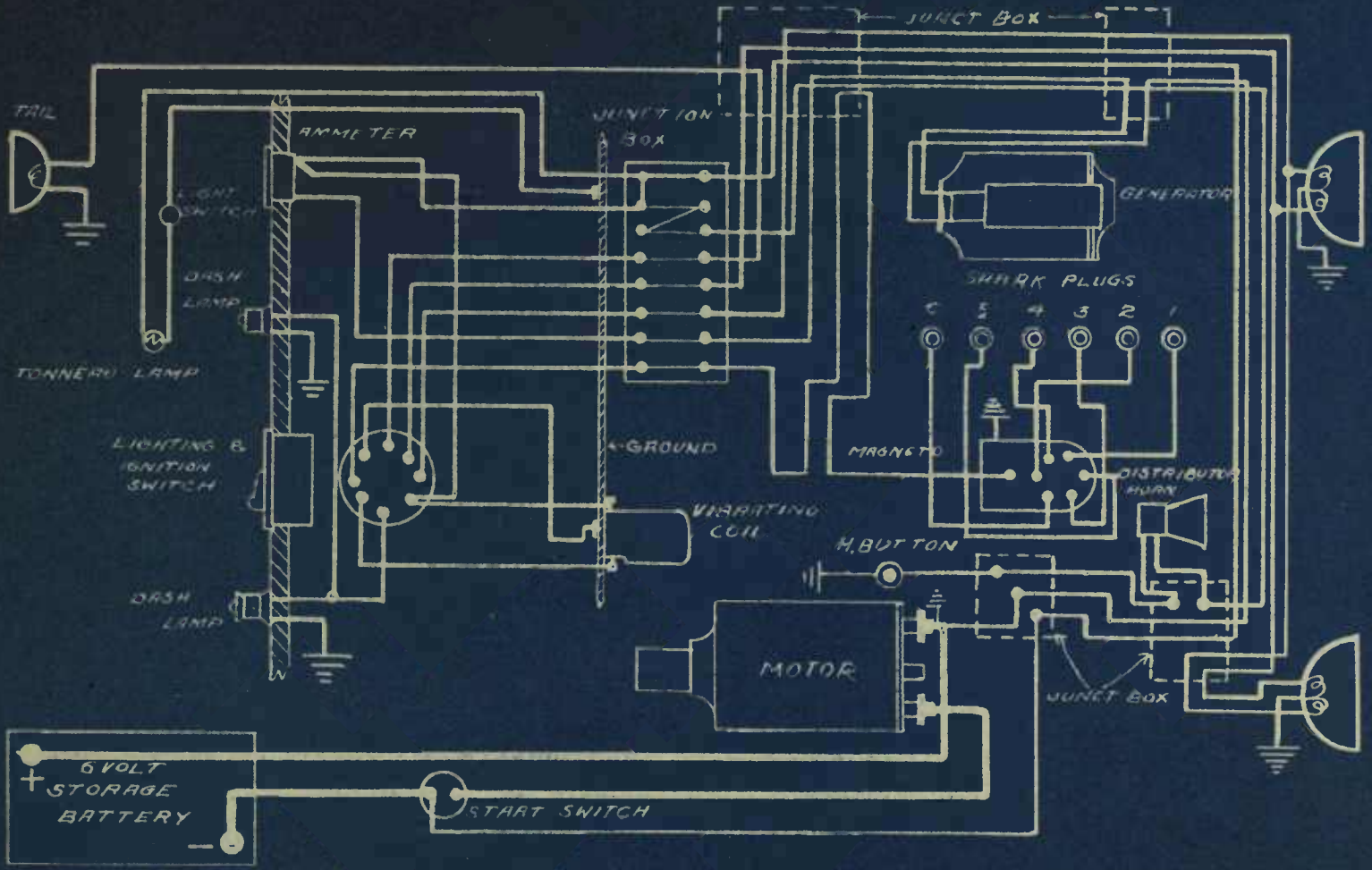


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WINTON MODEL 22 1917-1918

BIAUR SYSTEM

FROM MFG. B.R. 22A-2701.

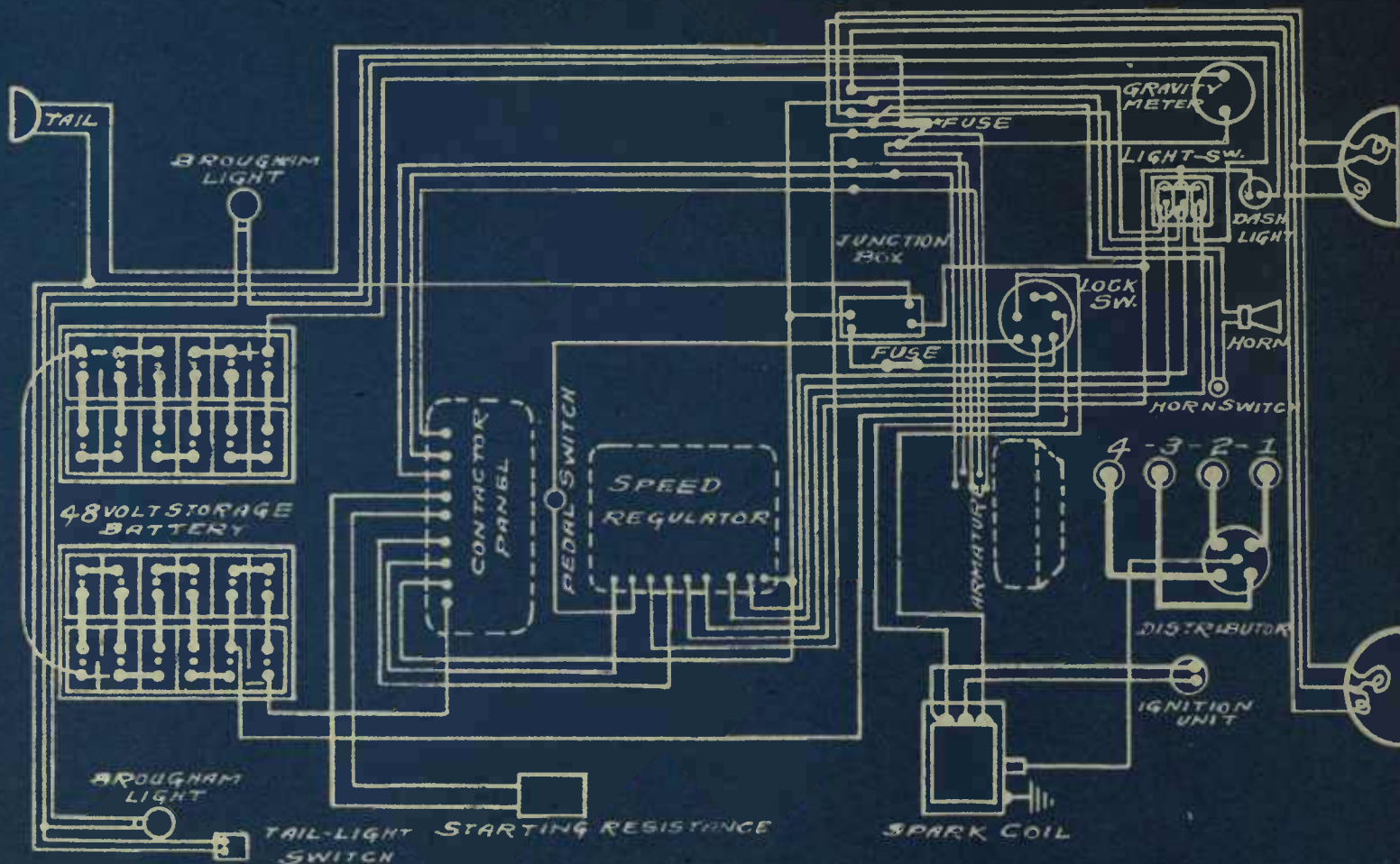


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WOODS DUAL-POWER 1917 - MODEL 1600

WOODS SYSTEM

FROM MFRS. B-P.

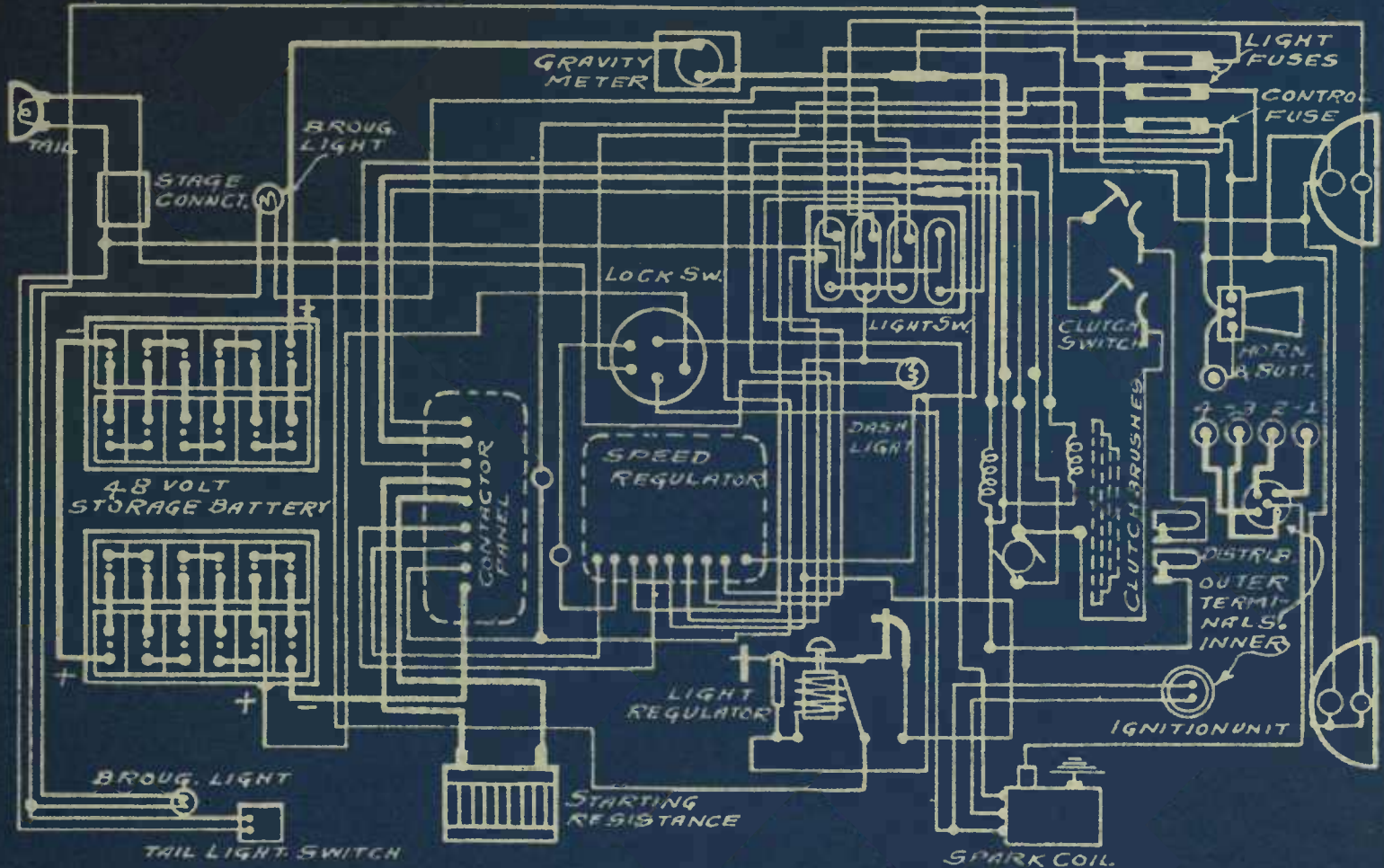


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WOODS DUAL-POWER 1918 "1700"

WOODS SYSTEM

FROM MFRS. B-P B2930

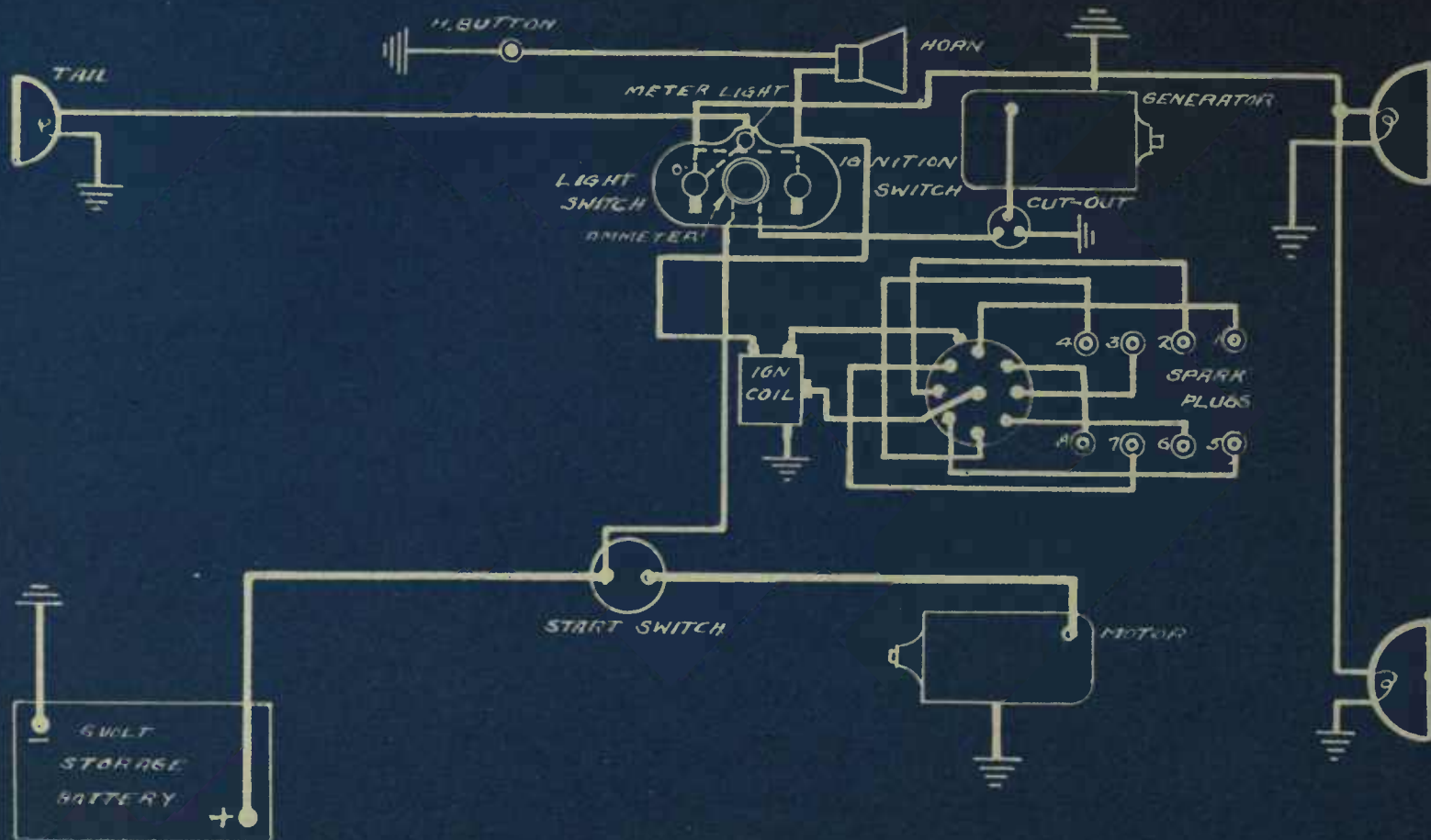


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YALE MODEL K-8 1917

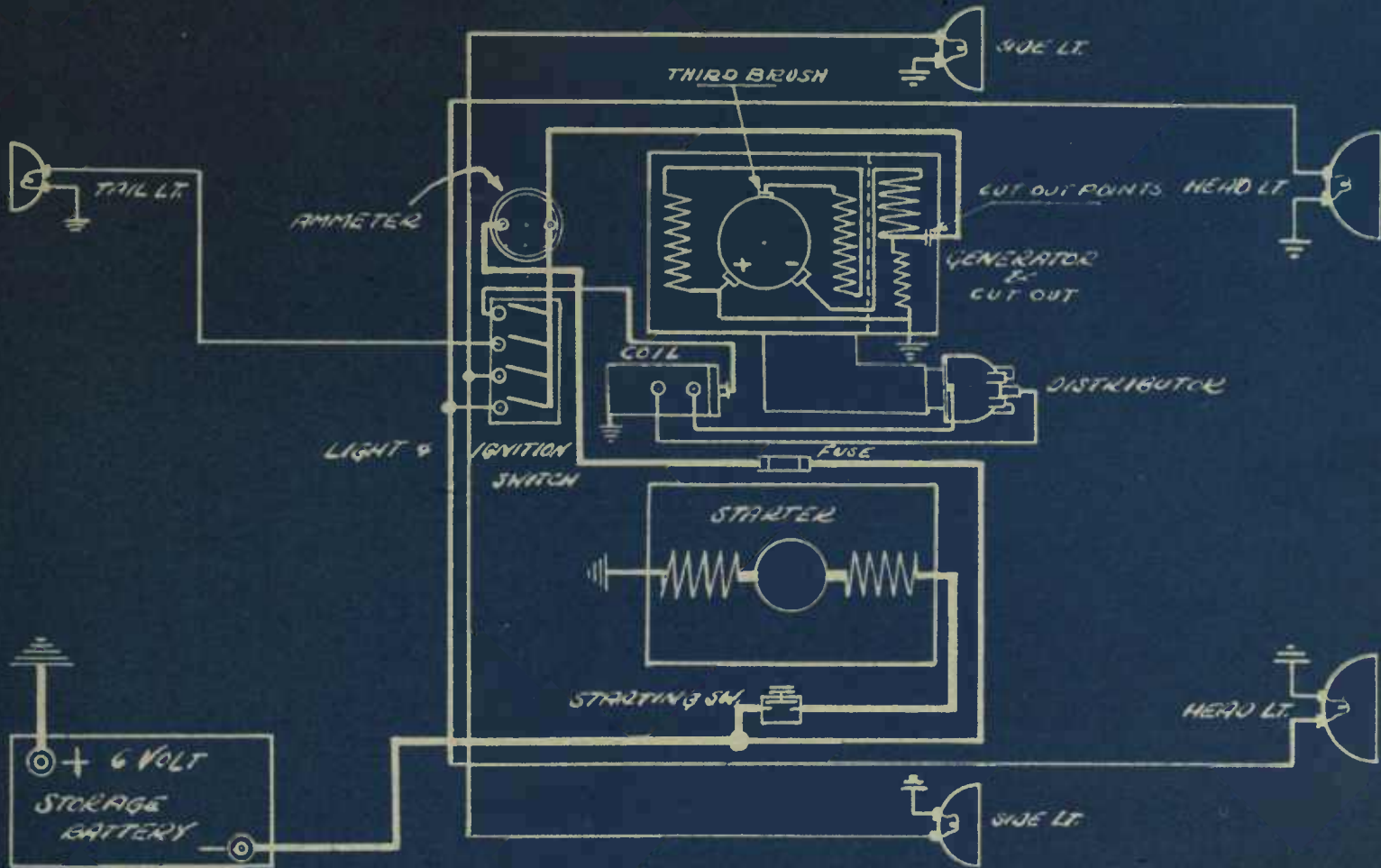
DISCO SYSTEM

FROM MFRS. S.P. M379



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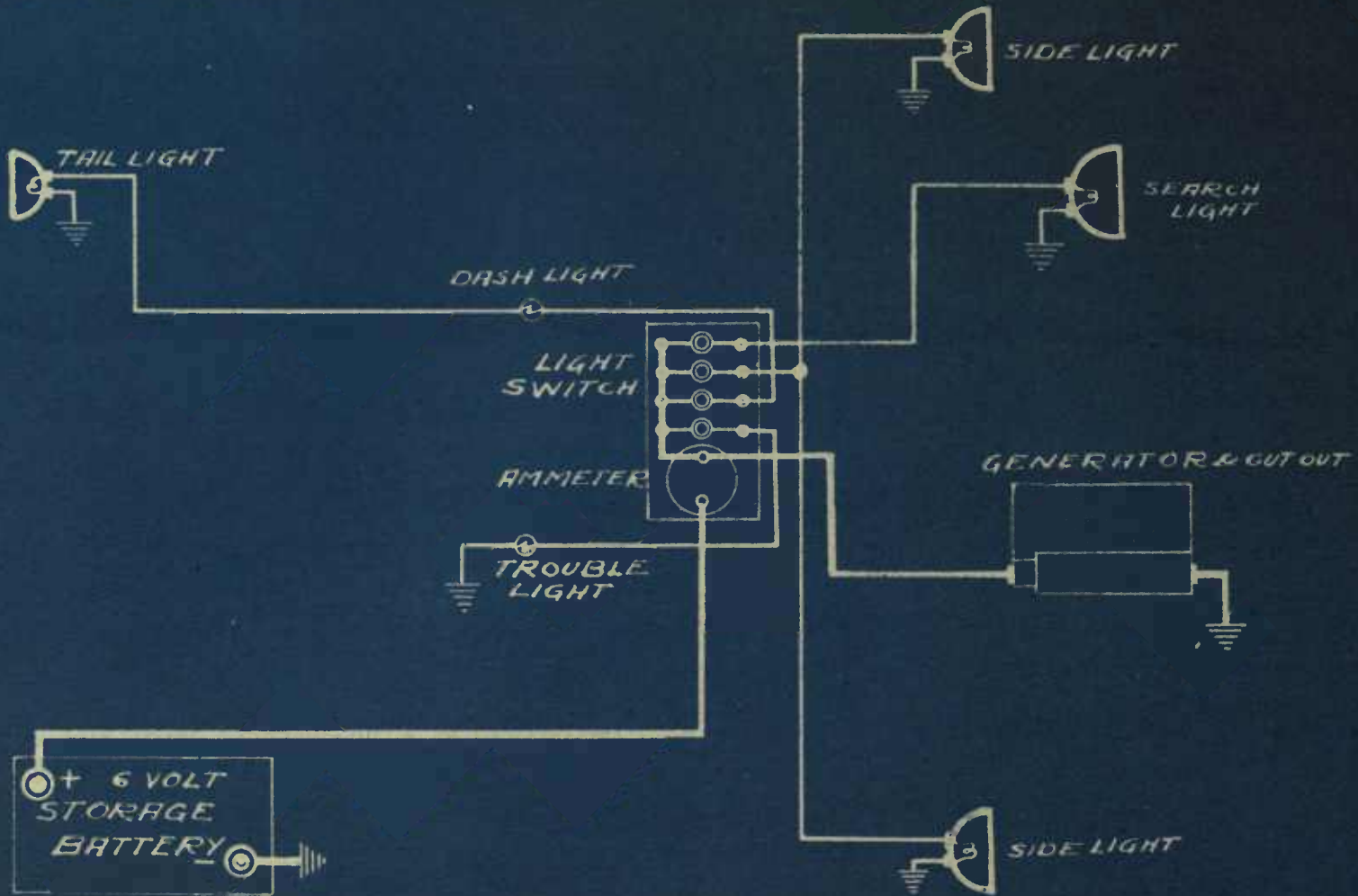
BETHLEHEM TRUCKS—MODELS D-1, E-1, F-1, —1918. MFG'S BLUEPRINT SD 141
 GRAY & DAVIS SYSTEM



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NASH TWO-TON TRUCK BIJUR SYSTEM

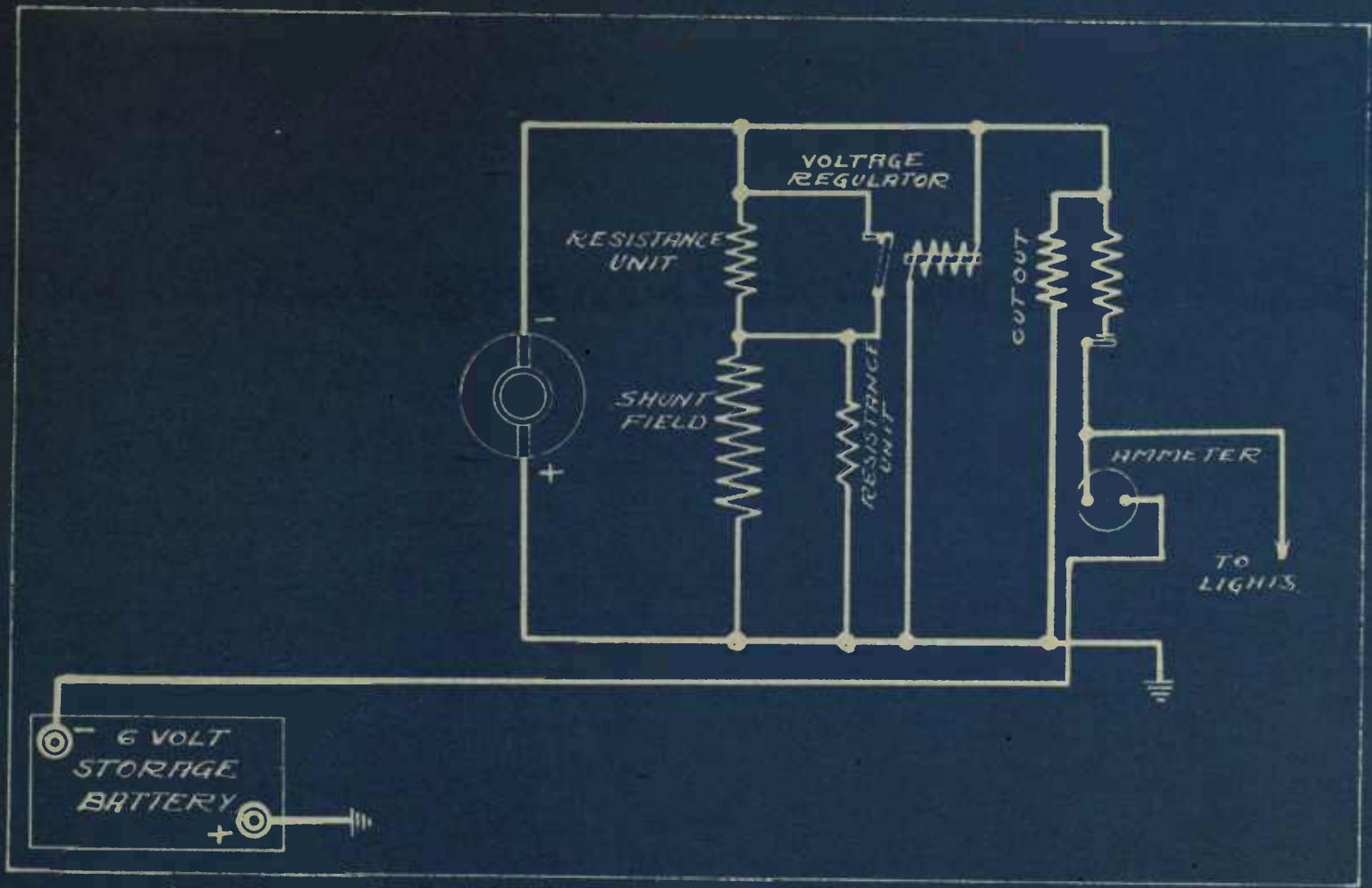
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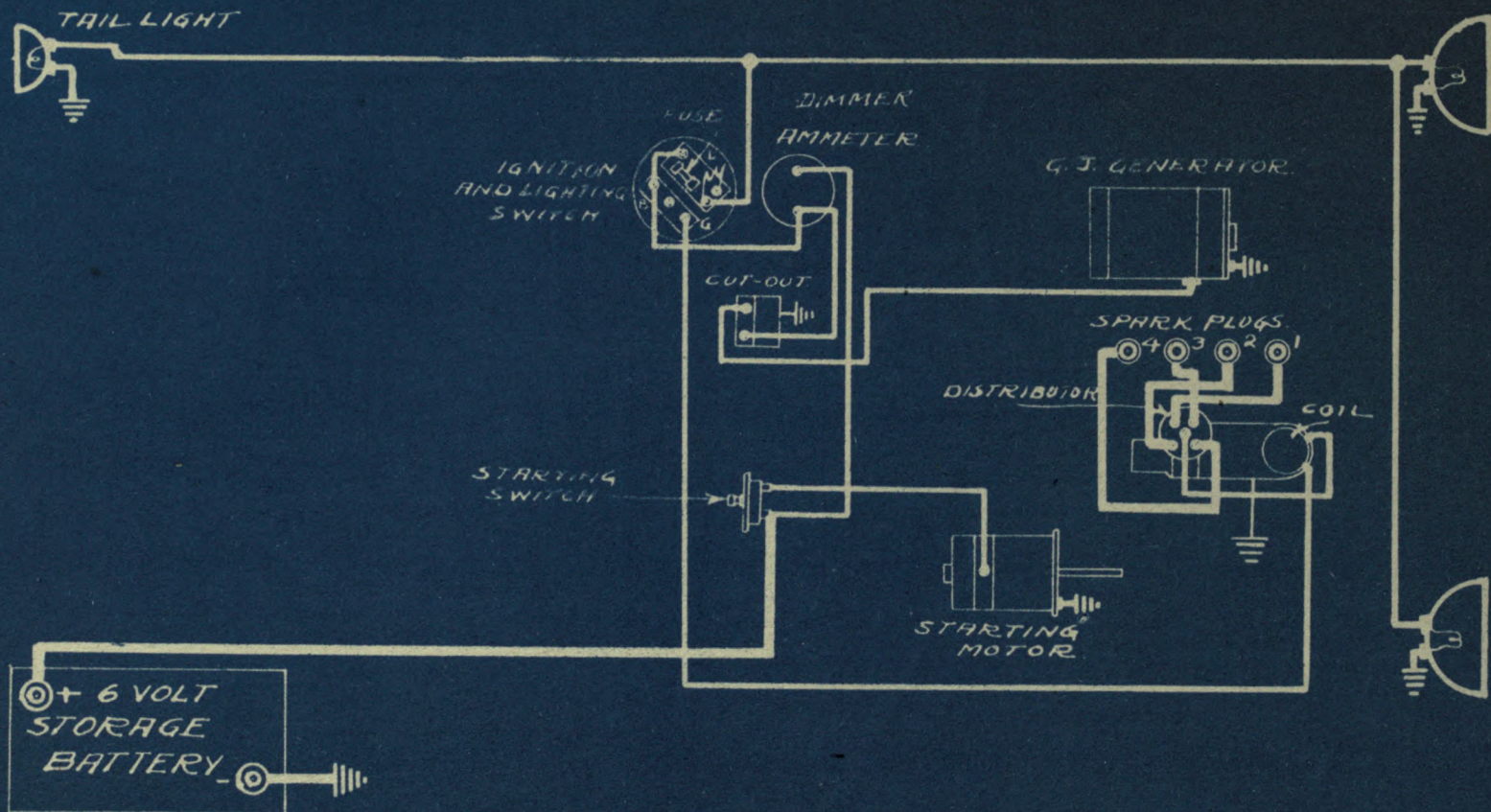
NASH TWO-TON TRUCK MODEL 4017-A FROM MFGR. HANDBOOK
BIJUR SYSTEM INTERNAL CIRCUITS

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NASH 1918 4 CYLINDER TRUCK
AUTO-LITE STARTING & LIGHTING SYSTEM.
CONNECTICUT IGNITION

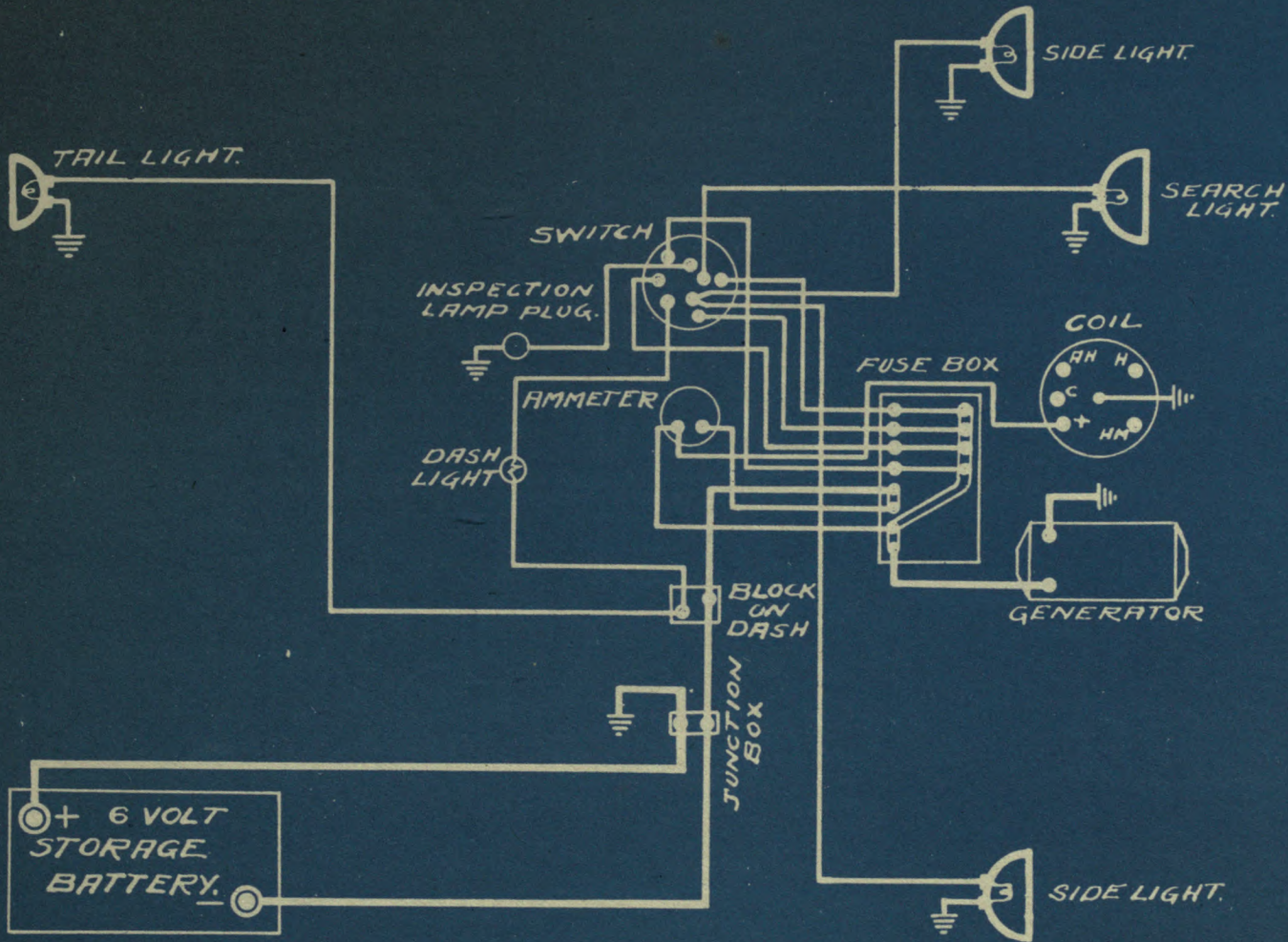
FROM AUTO-LITE INST. BOOK.



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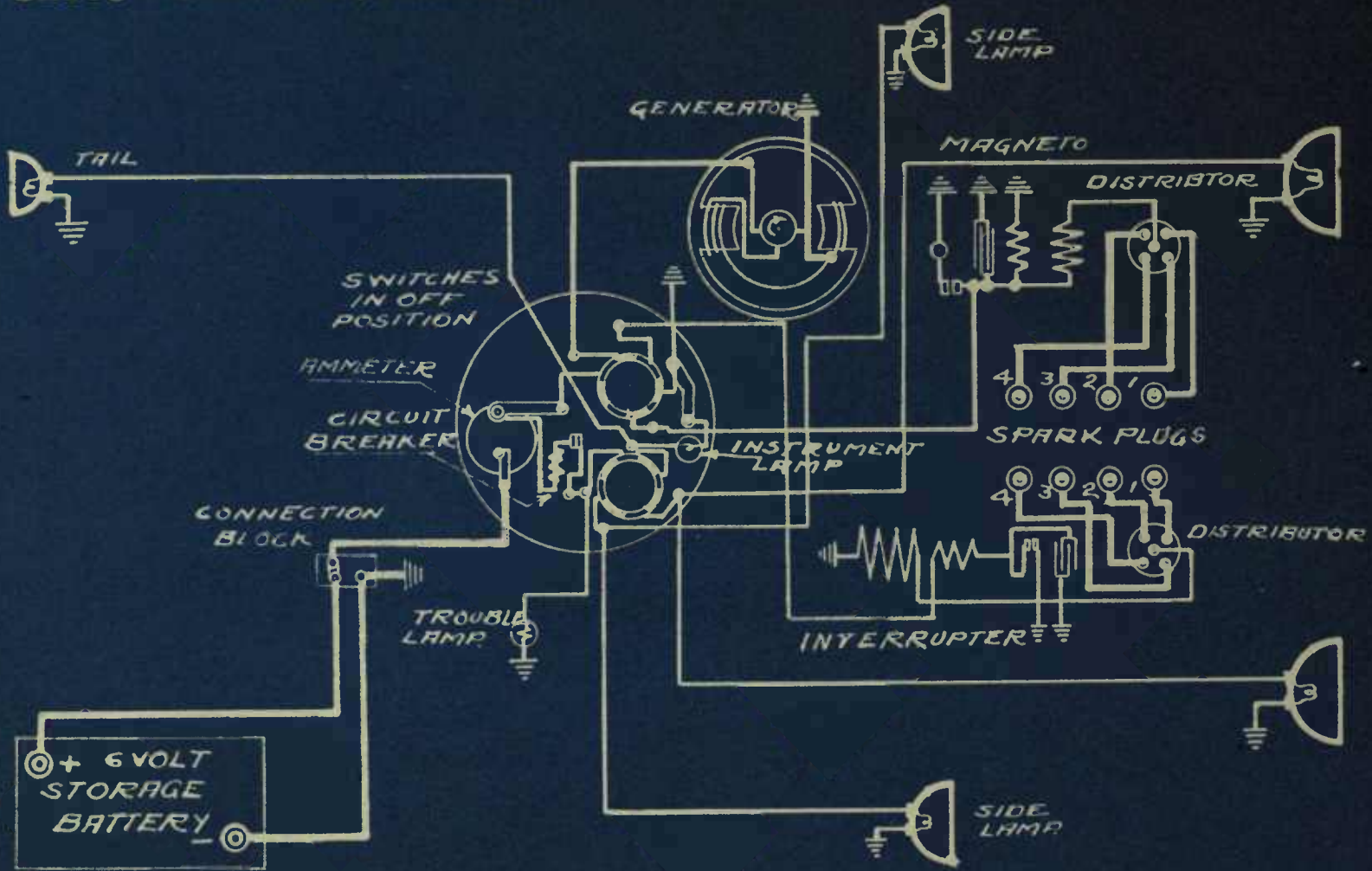
PIERCE-ARROW TWO-TON TRUCK WESTINGHOUSE SYSTEM.

FROM MFGR. HANDBOOK.



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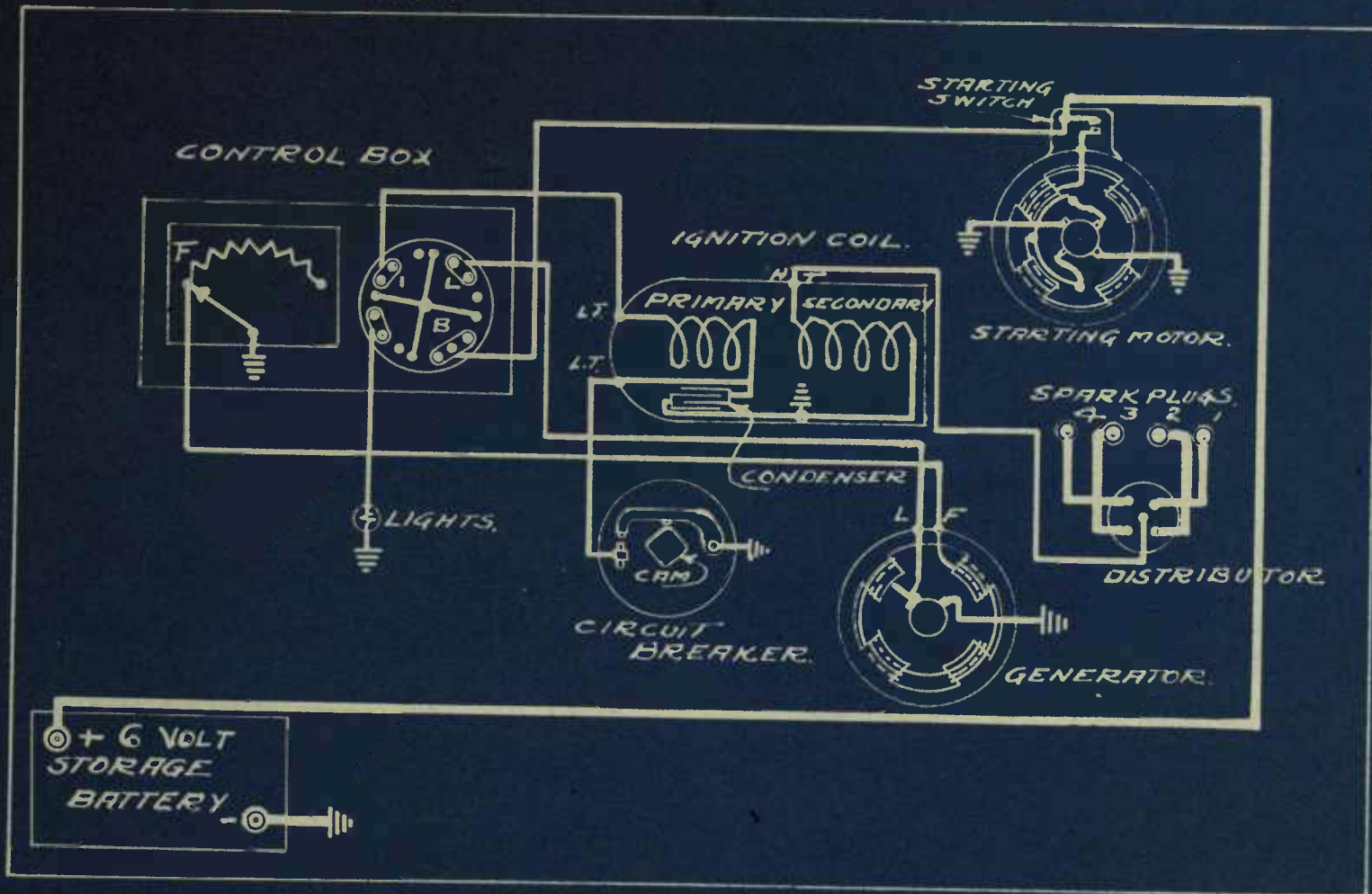
STANDARDIZED MILITARY TRUCK - CLASS B FROM MFGR. HANDBOOK
 DELCO - EISEMANN MAGNETO



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UNIVERSAL TRACTOR MOLINE PLOW CO.
REMY SYSTEM.
GOVERNOR GENERATOR

FROM REMY ENGR. DATA.

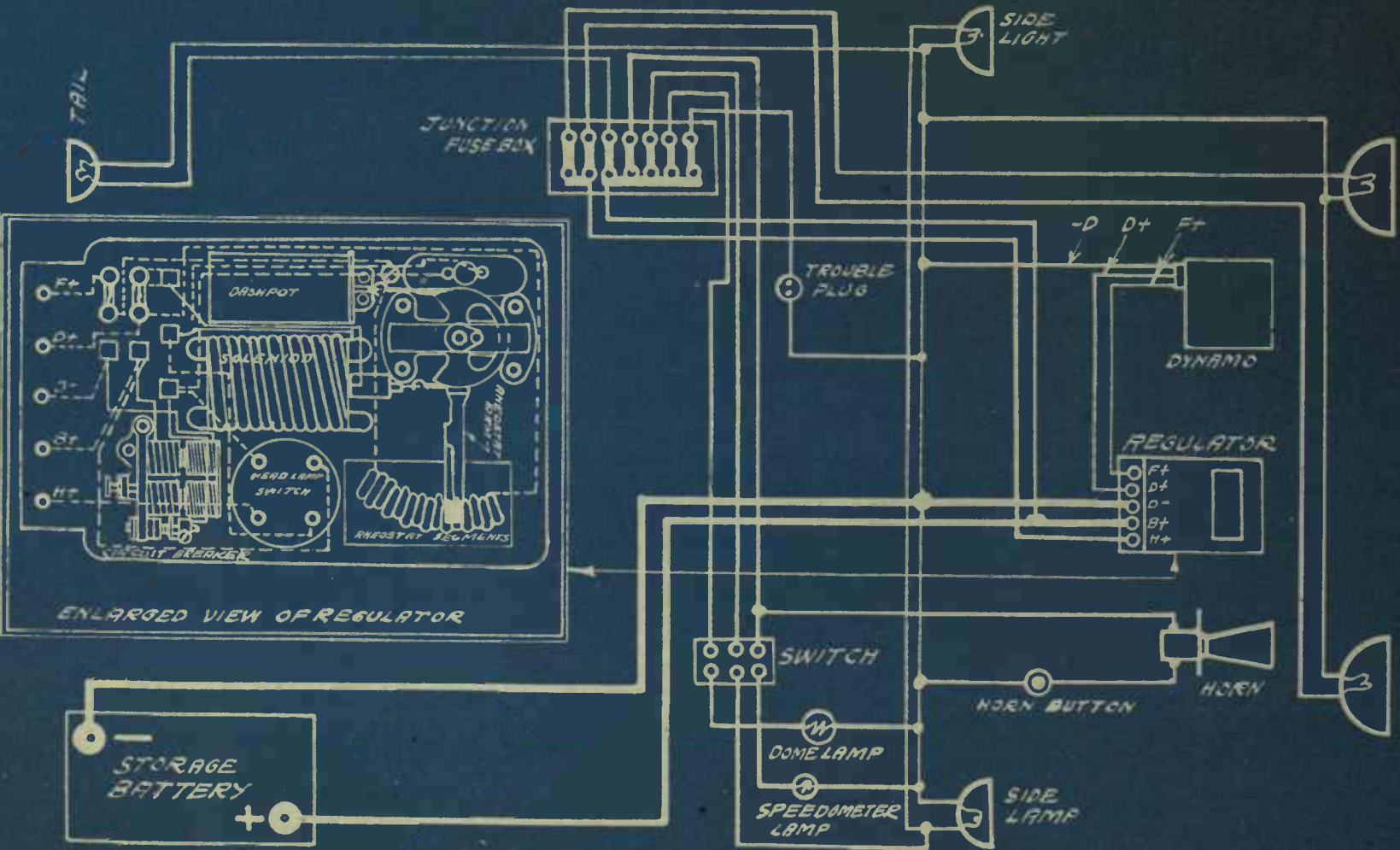


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ADLAKE STANDARD WIRING SYSTEM

SHOWING JUNCTION FUSE BOX IN LIGHTING CIRCUITS.

FROM ADLAKE BULLETIN

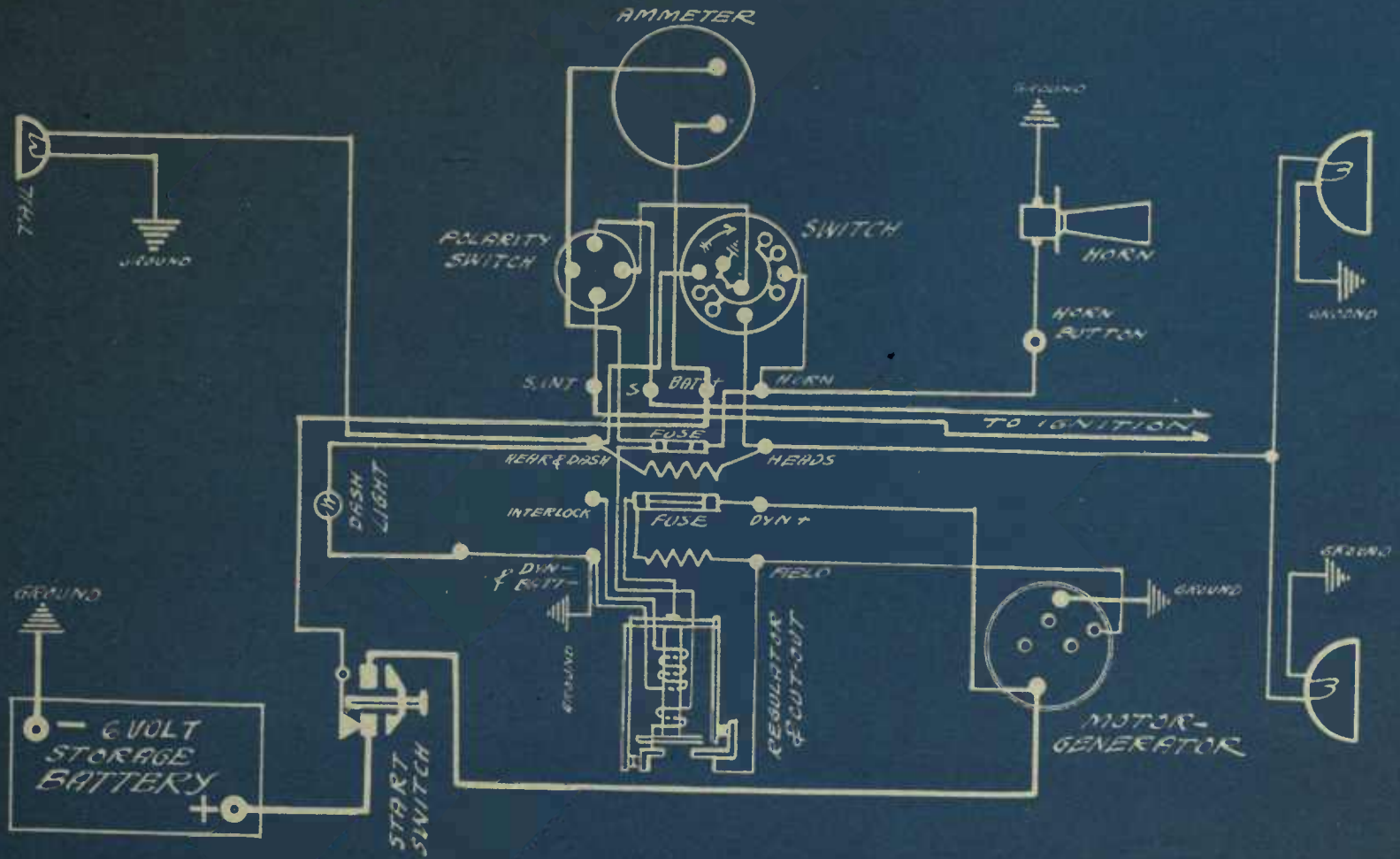


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ALLIS-CHALMERS STANDARD WIRING

SINGLE UNIT SYSTEM WITH B.S. INSTRUMENT PANEL

FROM R.C. BP. SK-10659

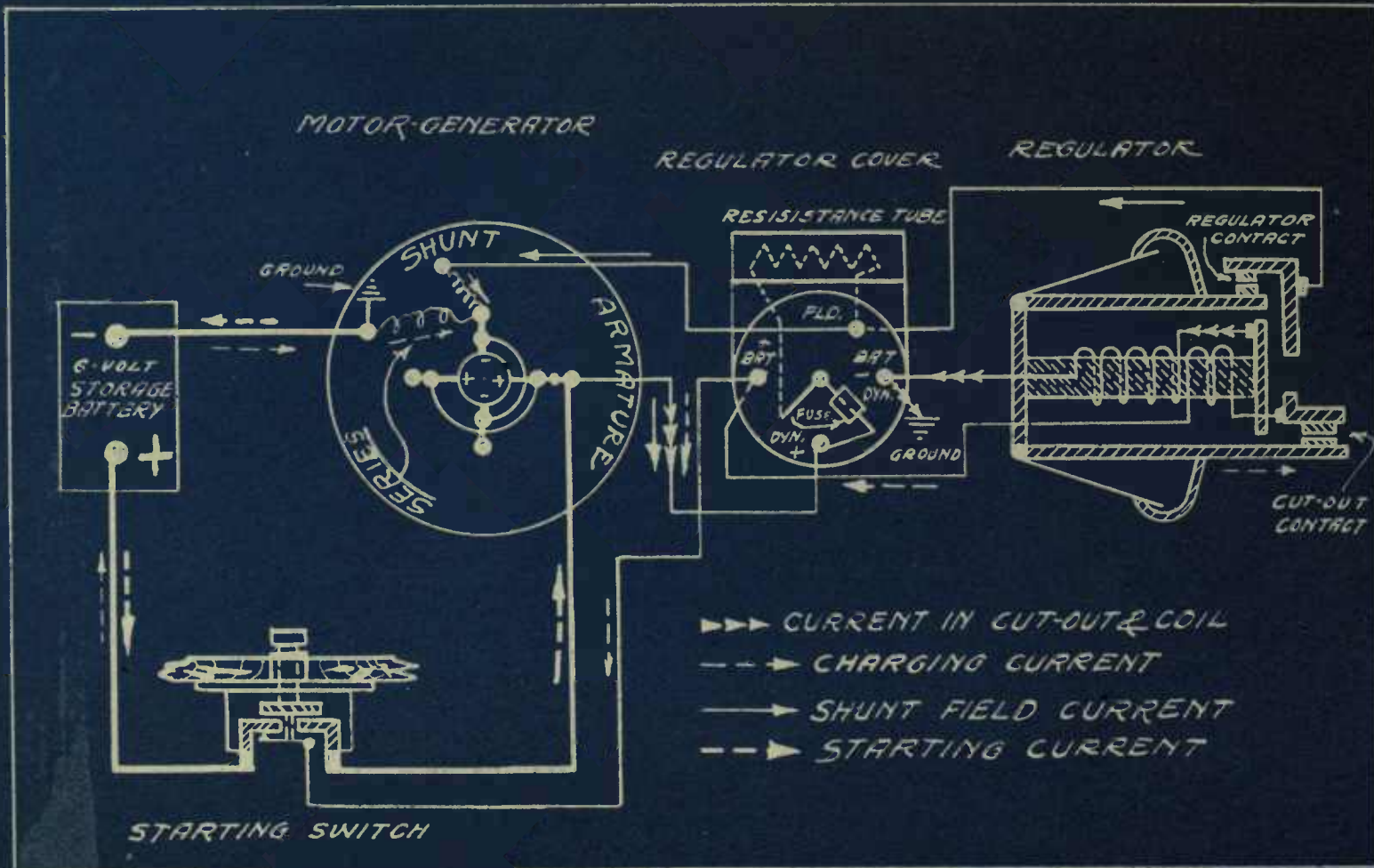


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ALLIS-CHALMERS-SINGLE UNIT-INTERNAL WIRING

EARLY MODEL WITH EXTERNAL REGULATION

FROM A.-C. BP. 10674

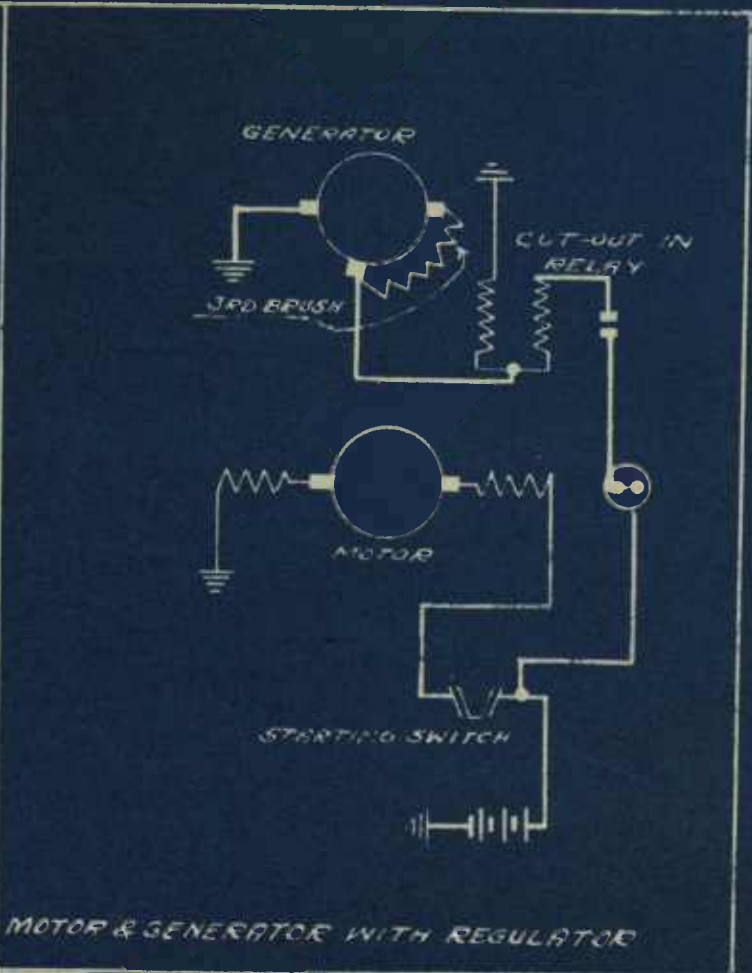
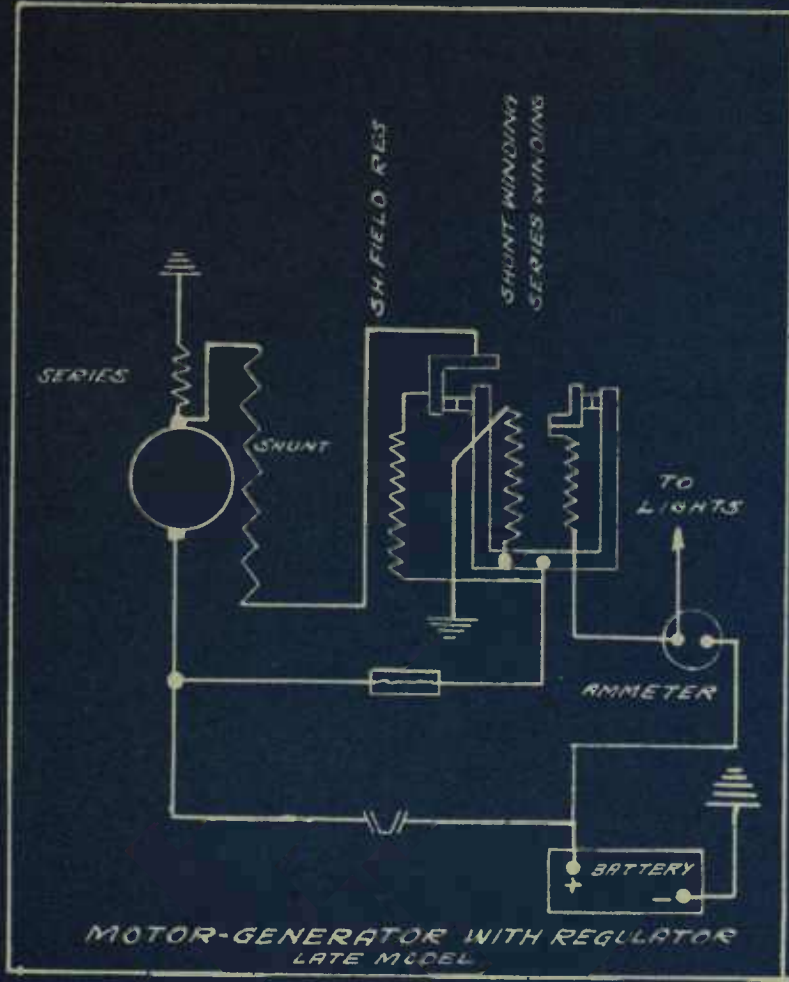


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ALLIS-CHALMERS INTERNAL CIRCUITS

WAGNER INTERNAL CIRCUITS

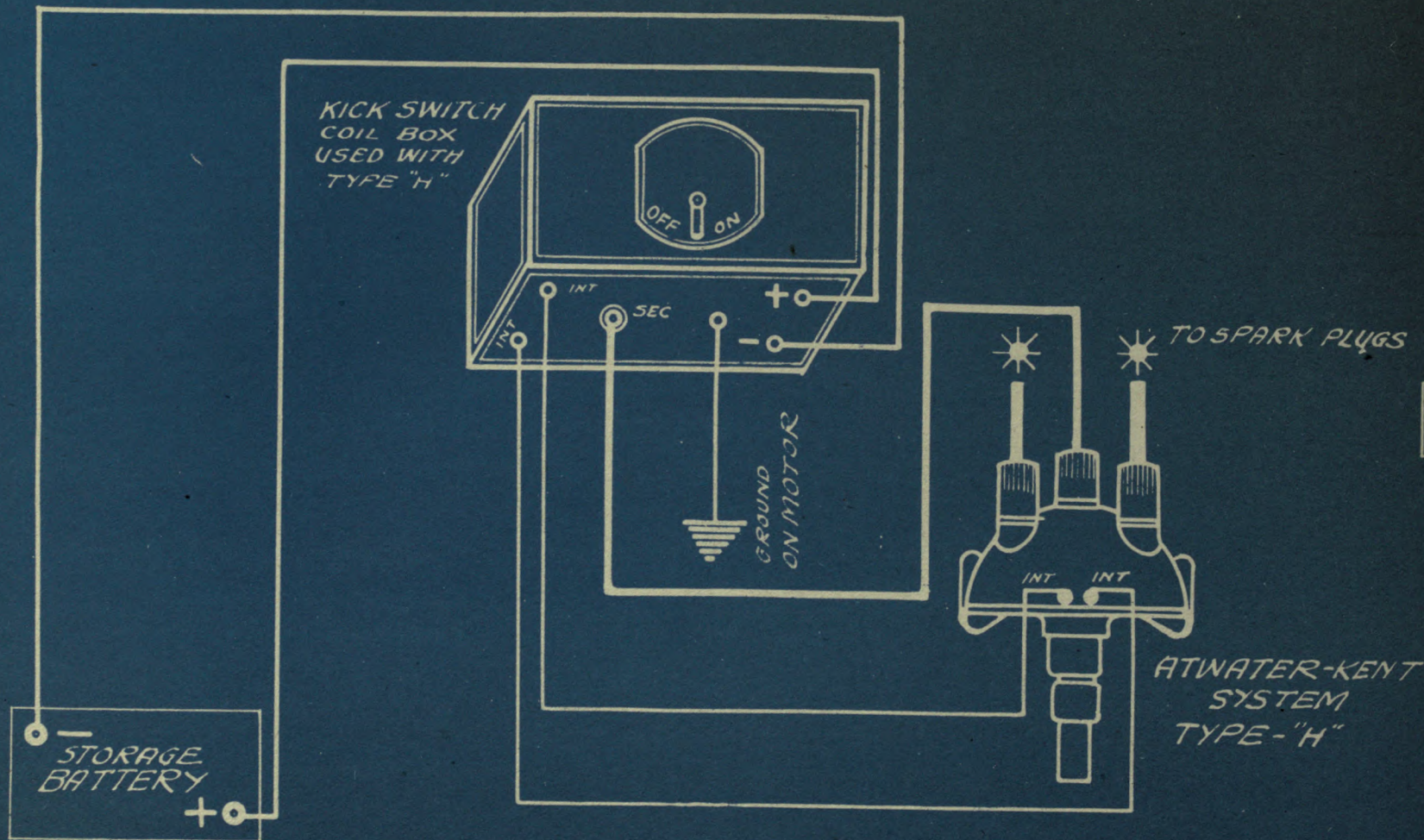
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ATWATER-KENT IGNITION SYSTEM

SHOWING KICK SWITCH COIL BOX & TYPE "H" DISTRIBUTOR

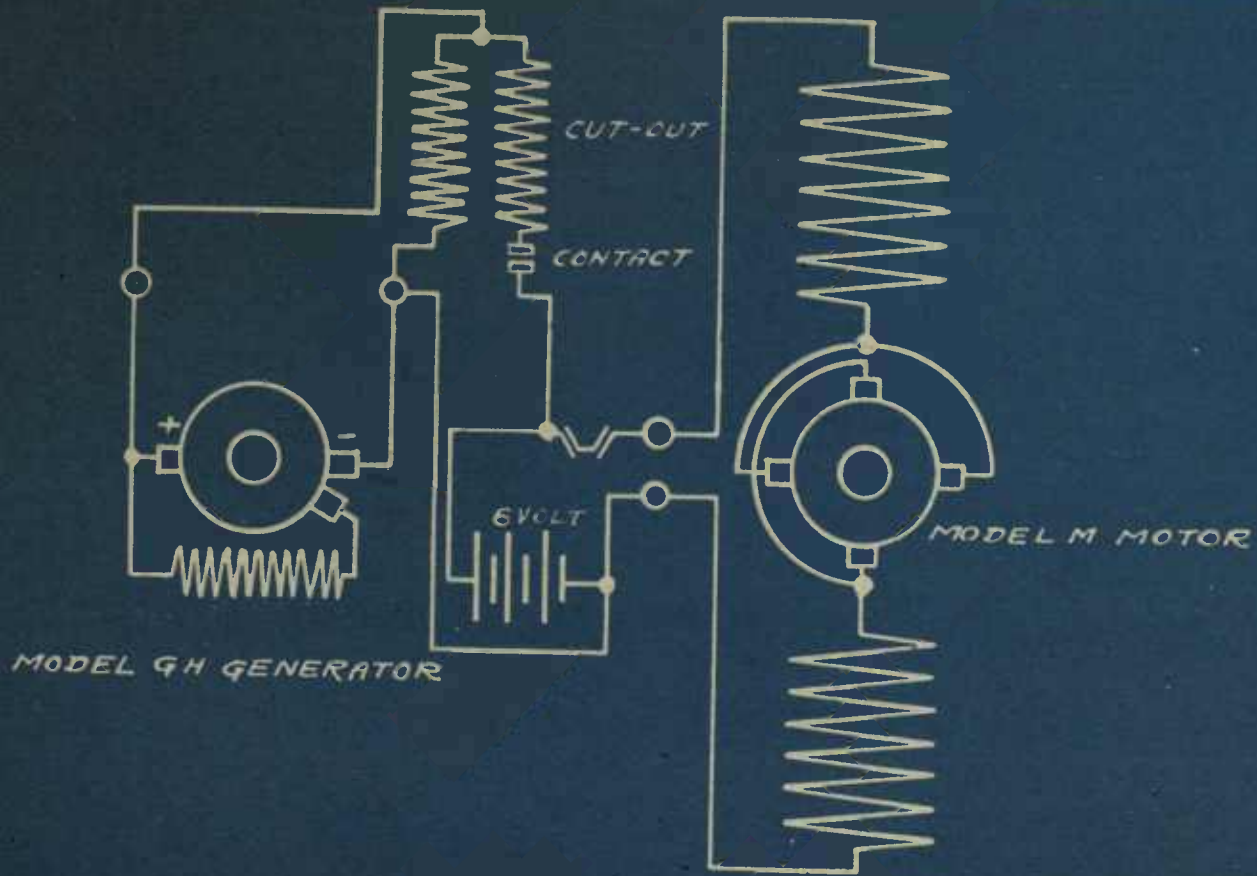
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AUTOLITE INTERNAL CIRCUITS

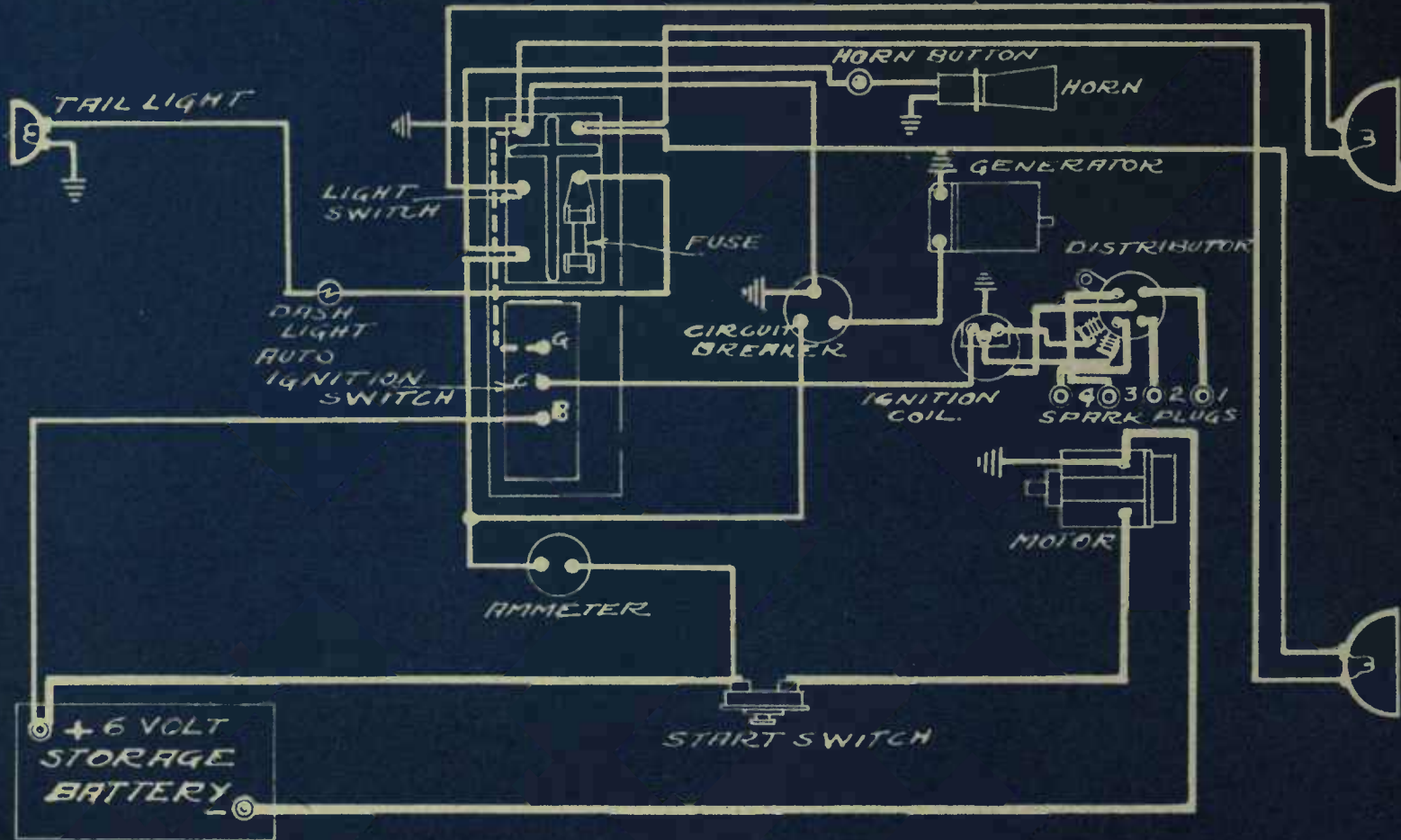
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AUTO-LITE STANDARD WIRING
SERIES DIMMER - GROUNDING SYSTEM
CONNECTICUT IGNITION - TYPE H & N-D SWITCH

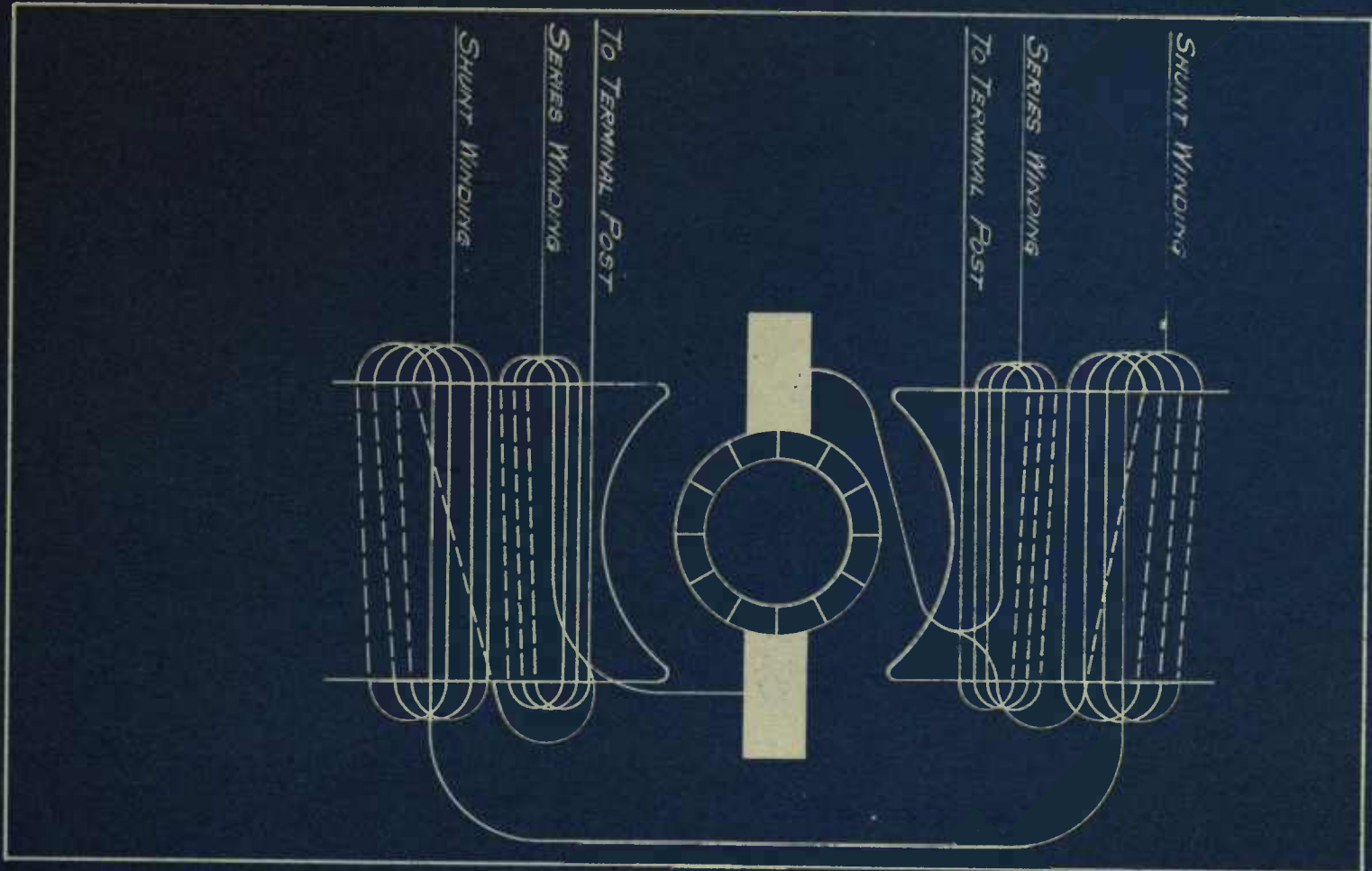
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AUTO LITE GB GENERATOR FIELD WINDING INTERNALS

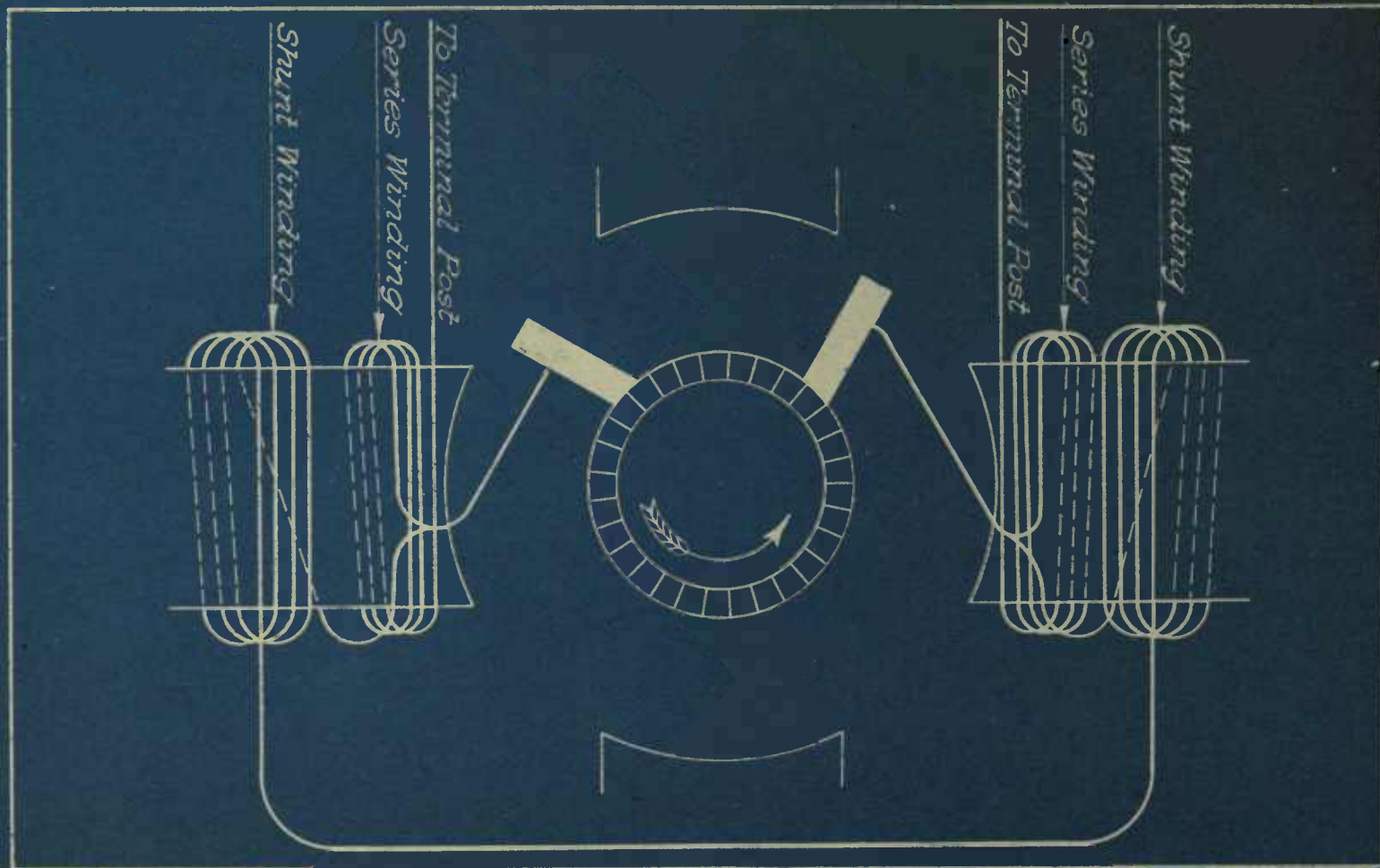
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*AUTO LITE G.C. G.D. GENERATORS
FIELD WINDING INTERNALS*

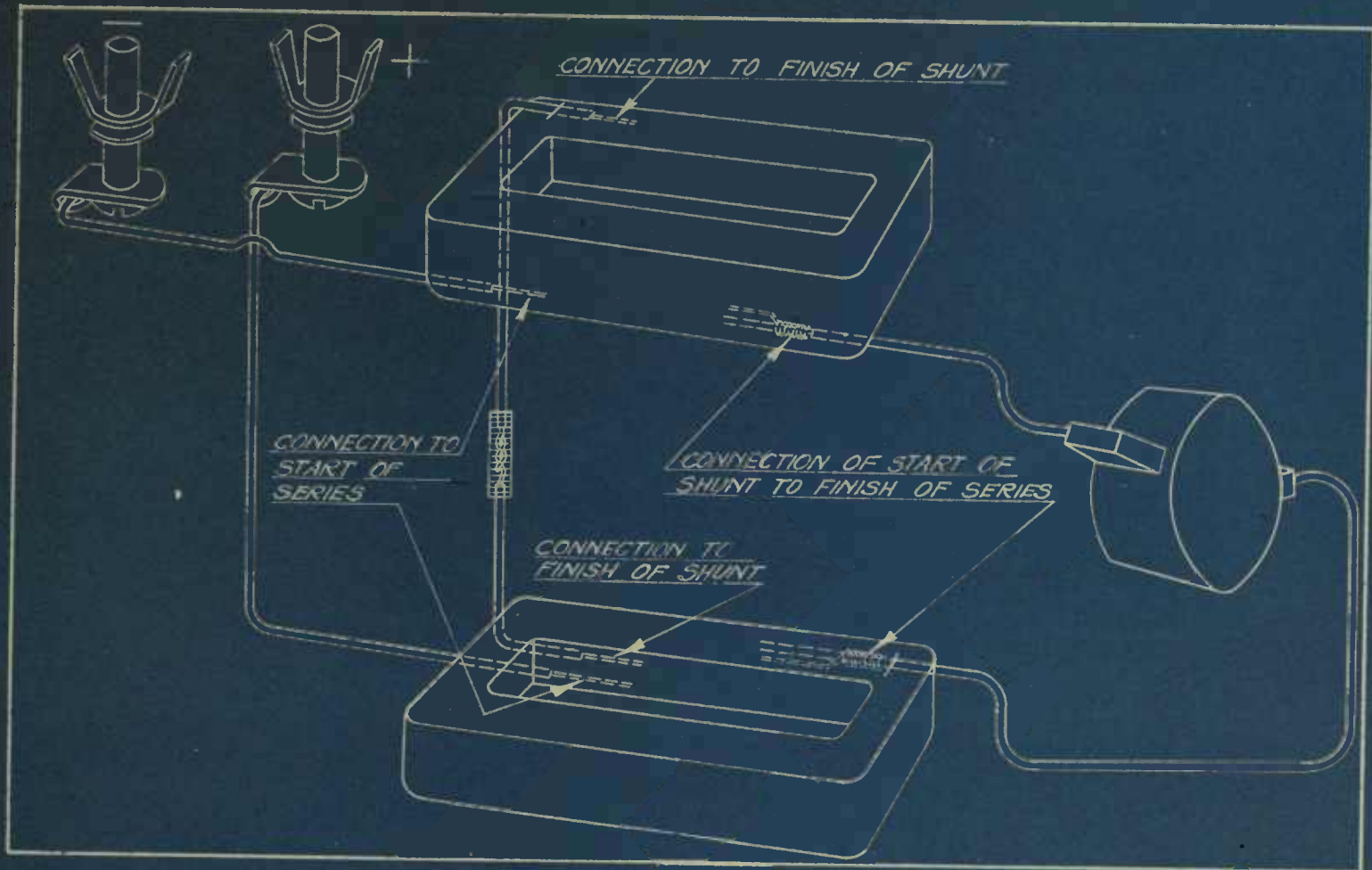
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AUTOLITE GG GENERATOR INTERNAL CONNECTIONS.

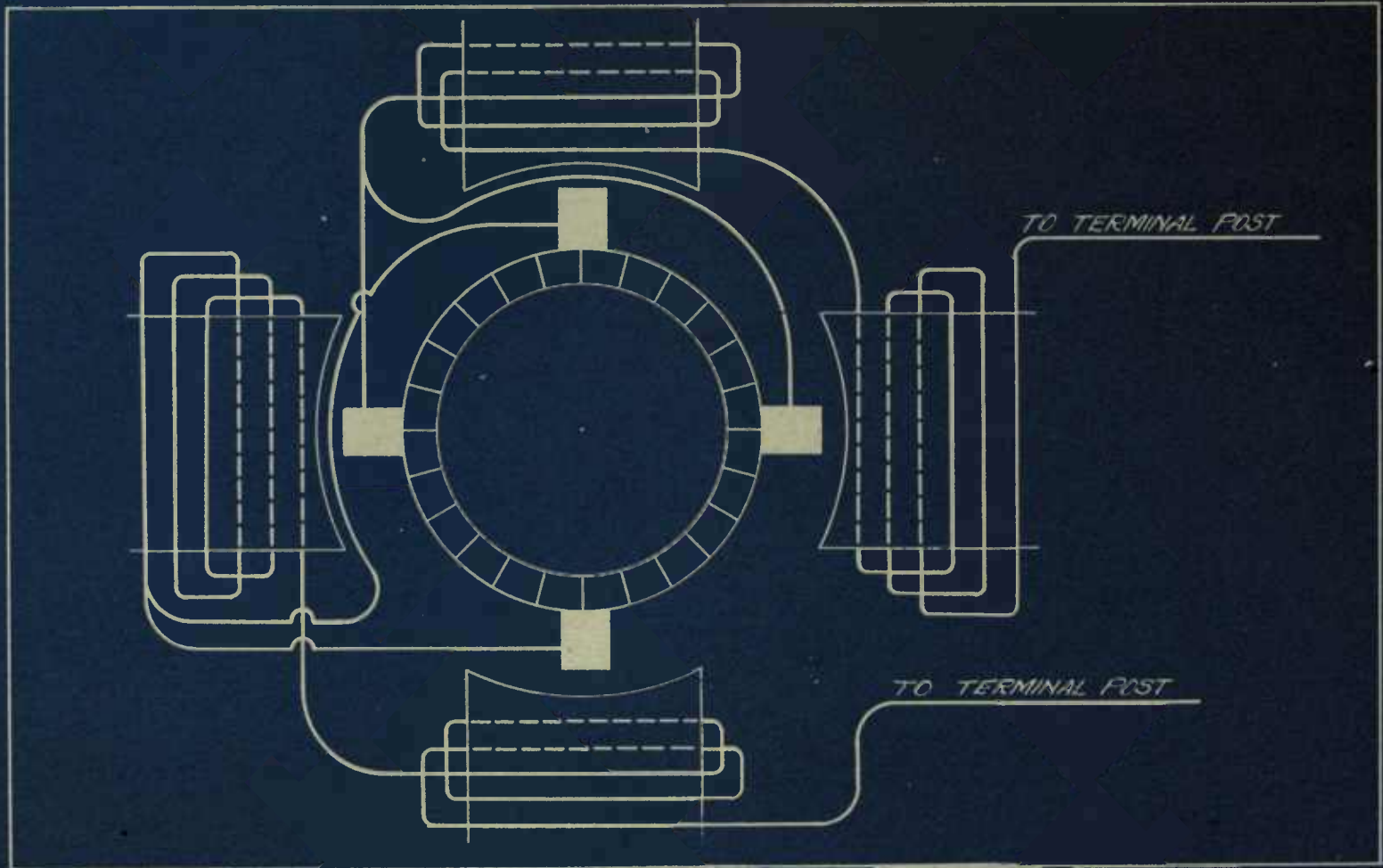
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*AUTO LITE MD MC MF MOTORS
INTERNAL CIRCUITS.*

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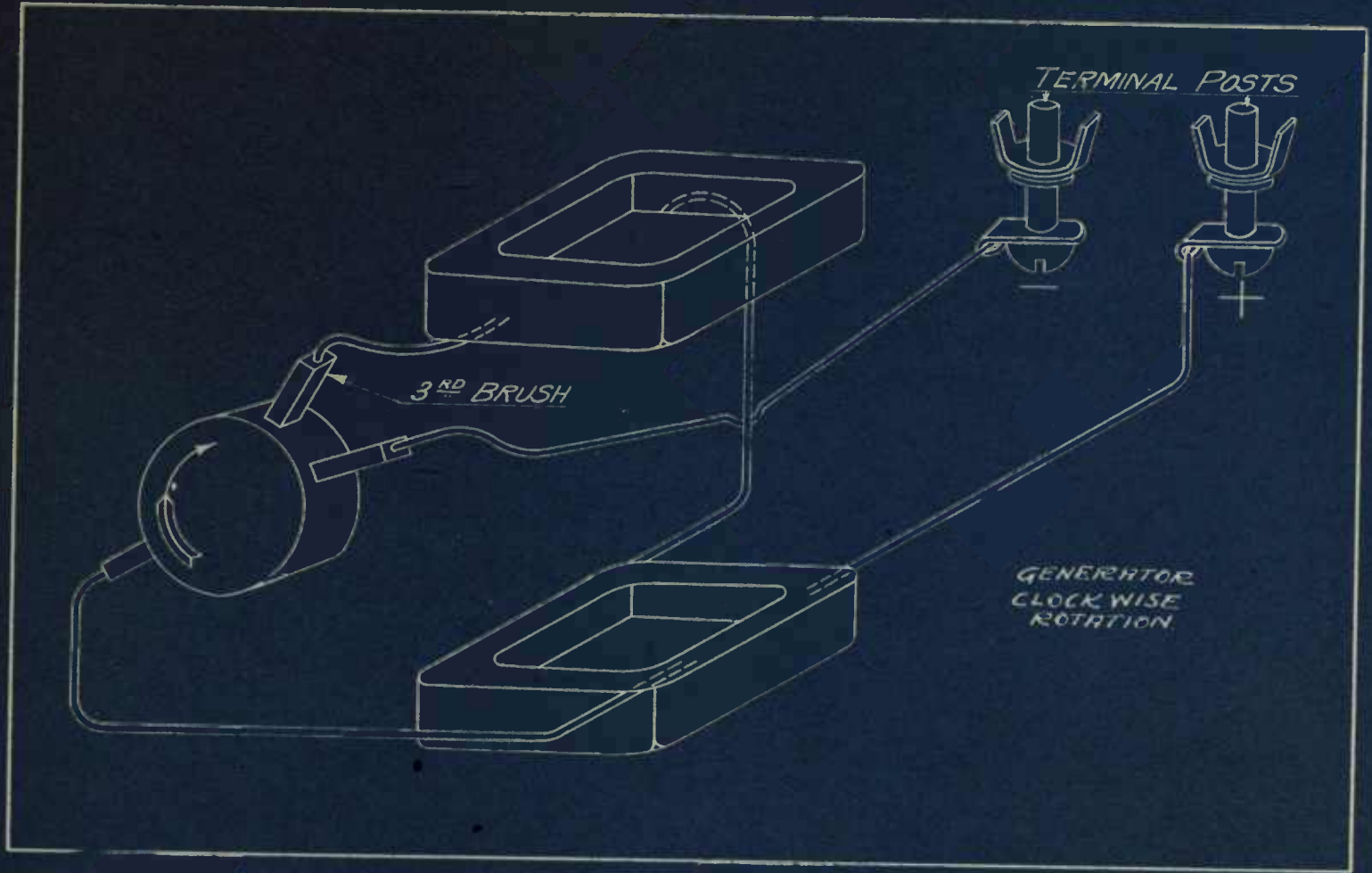


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AUTOLITE G.H. GENERATOR INTERNAL CONNECTIONS

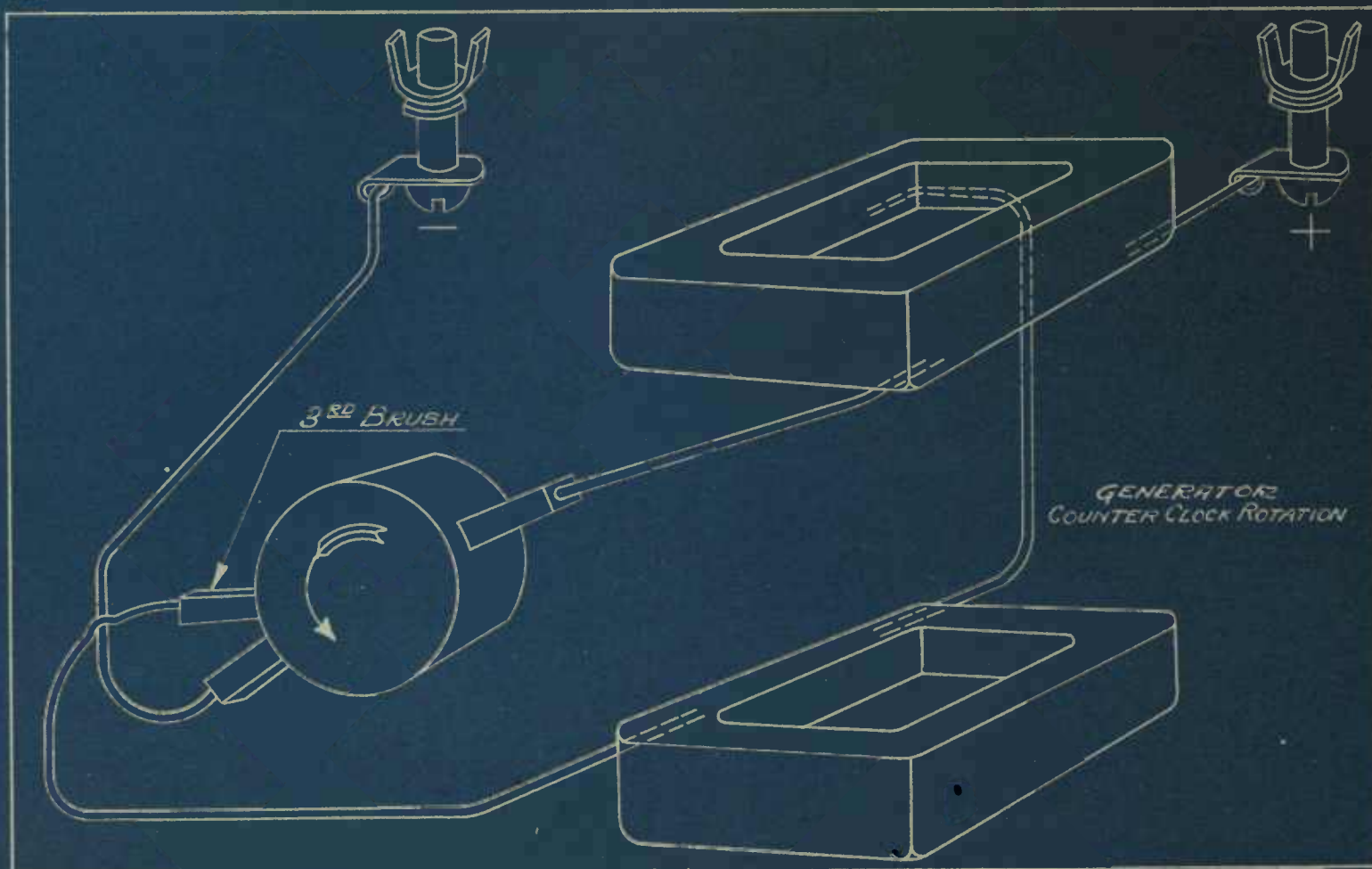
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*AUTO LITE G.H. GENERATOR
INTERNAL CONNECTIONS.*

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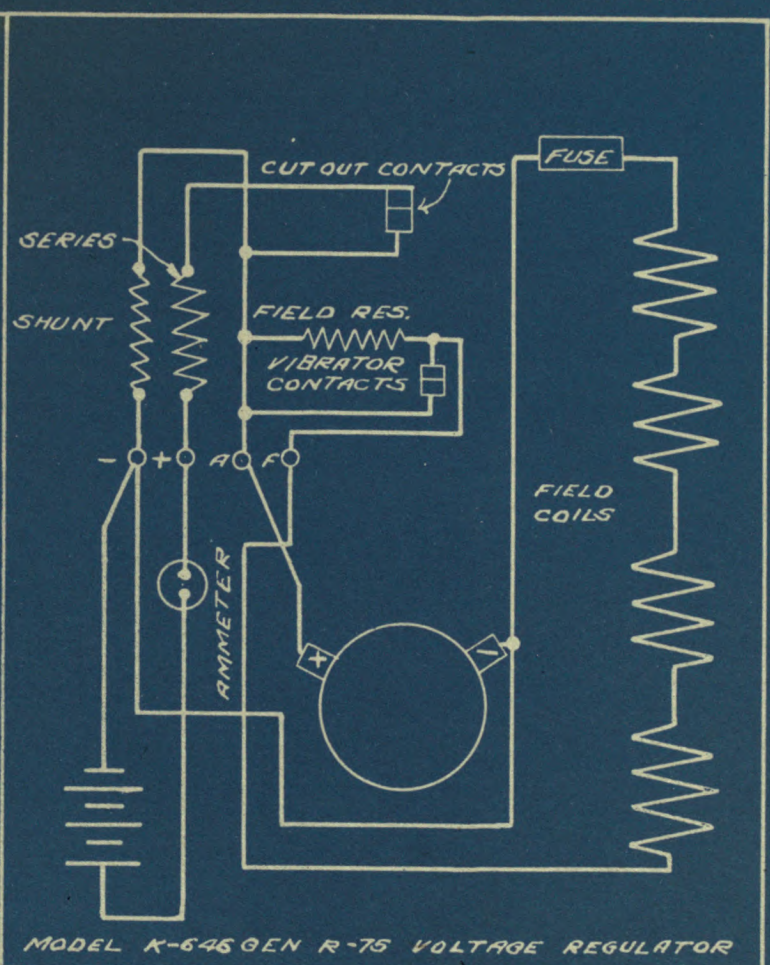
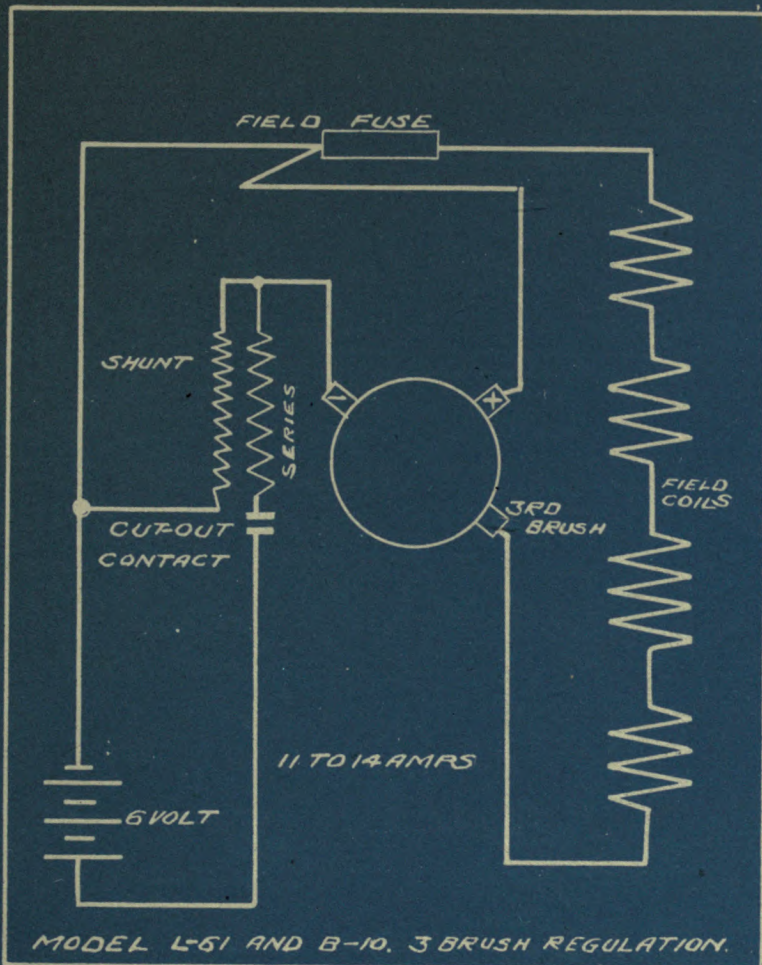


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BIJUR INTERNAL CIRCUITS

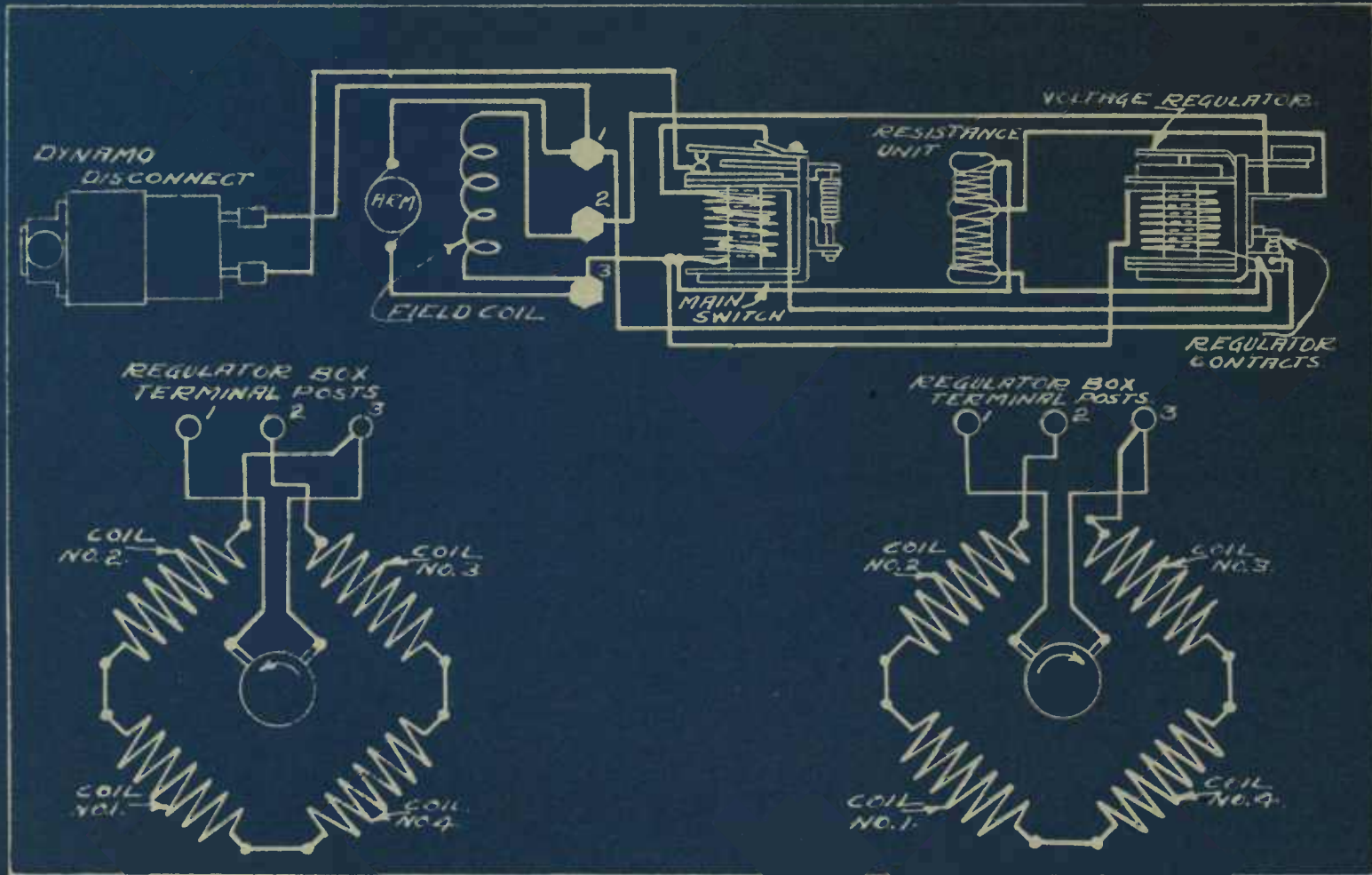
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BIJUR GENERATOR WITH REGULATOR
INTERNAL CIRCUITS STANDARD CONNECTIONS.

BIJUR B/P SER.53.

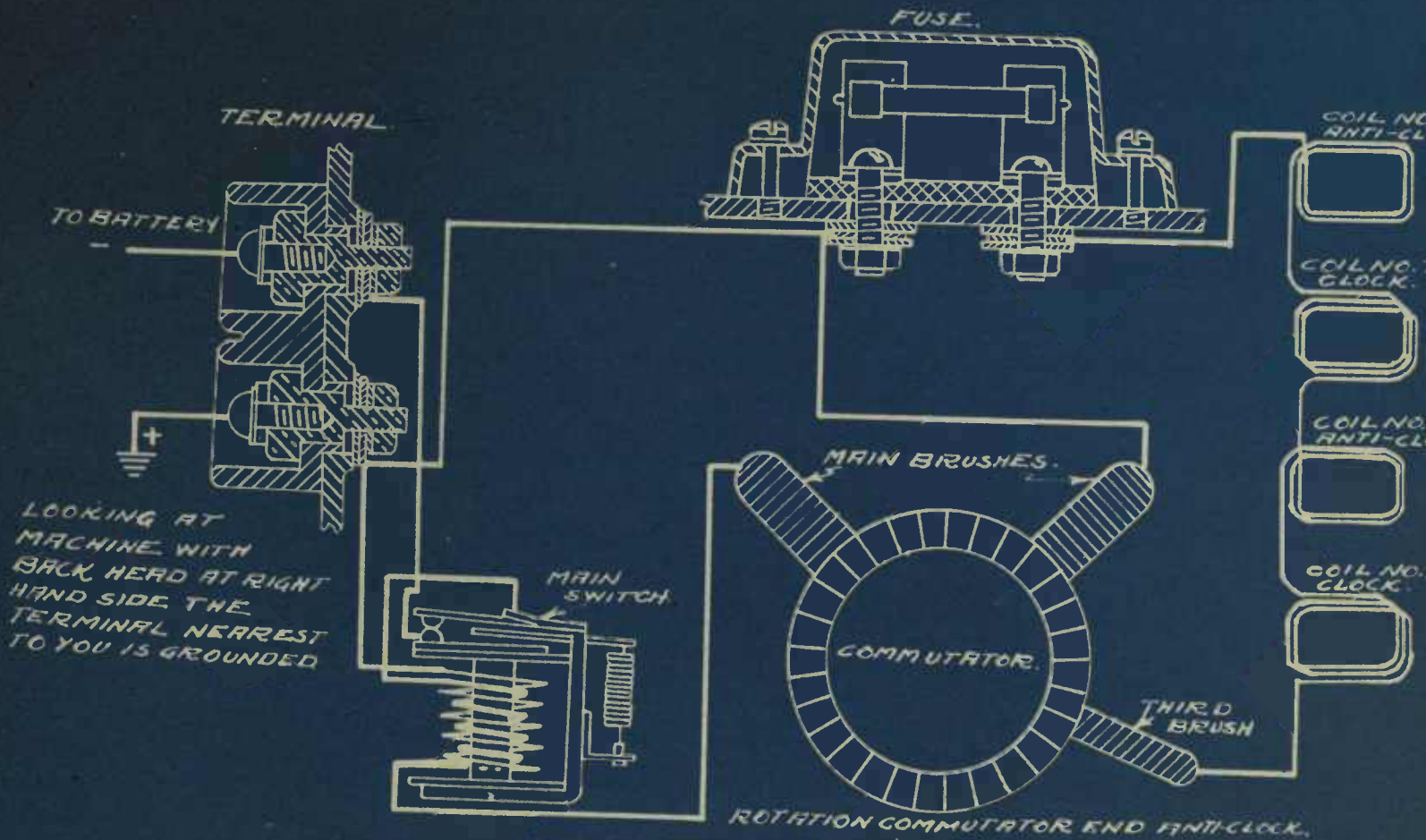


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BIJUR TWO TERMINAL TYPE L 61 GENERATOR INTERNAL CIRCUITS

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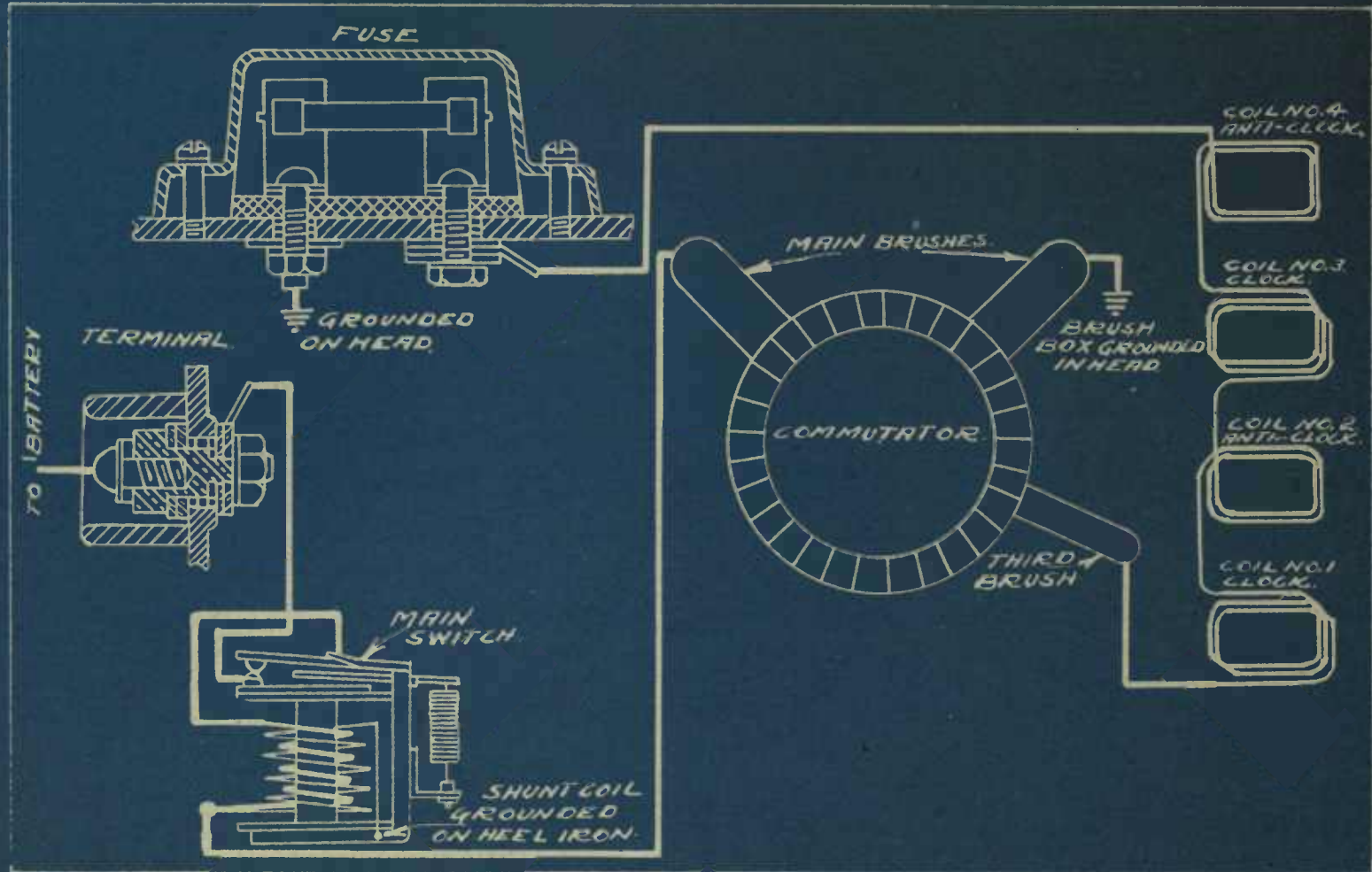


LOOKING AT MACHINE WITH BACK HEAD AT RIGHT HAND SIDE THE TERMINAL NEAREST TO YOU IS GROUNDED

ROTATION COMMUTATOR END ANTI-CLOCK.

*BIJUR SINGLE TERMINAL TYPE L61 GENERATOR
INTERNAL CIRCUITS GROUNDED SYSTEM.*

BIJUR B/P SER. 114.

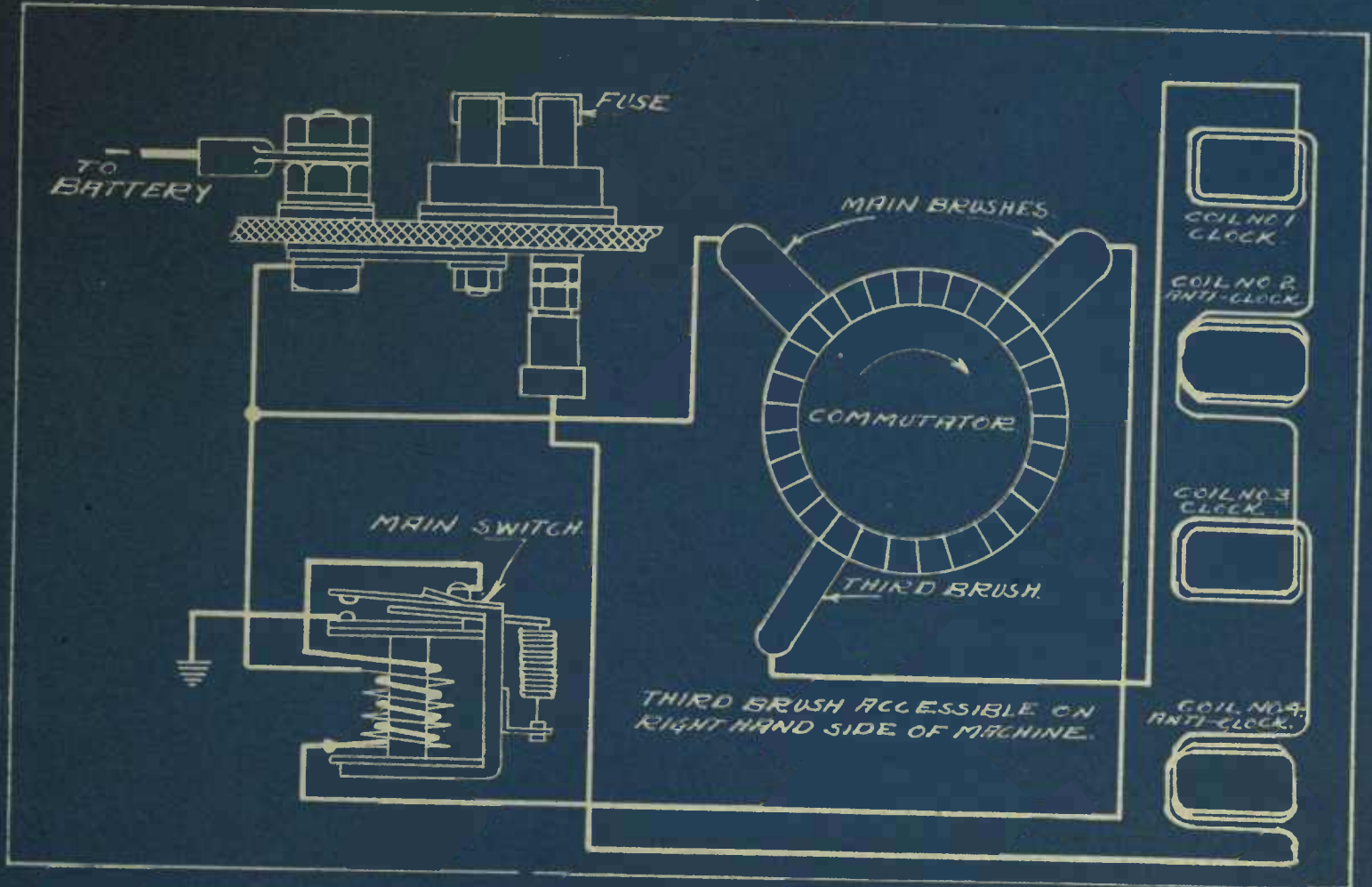


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BIJUR FRONTHEAD TYPE L61 GENERATOR

INTERNAL CIRCUITS GROUNDED SYSTEM.

BIJUR B/P SER. 165

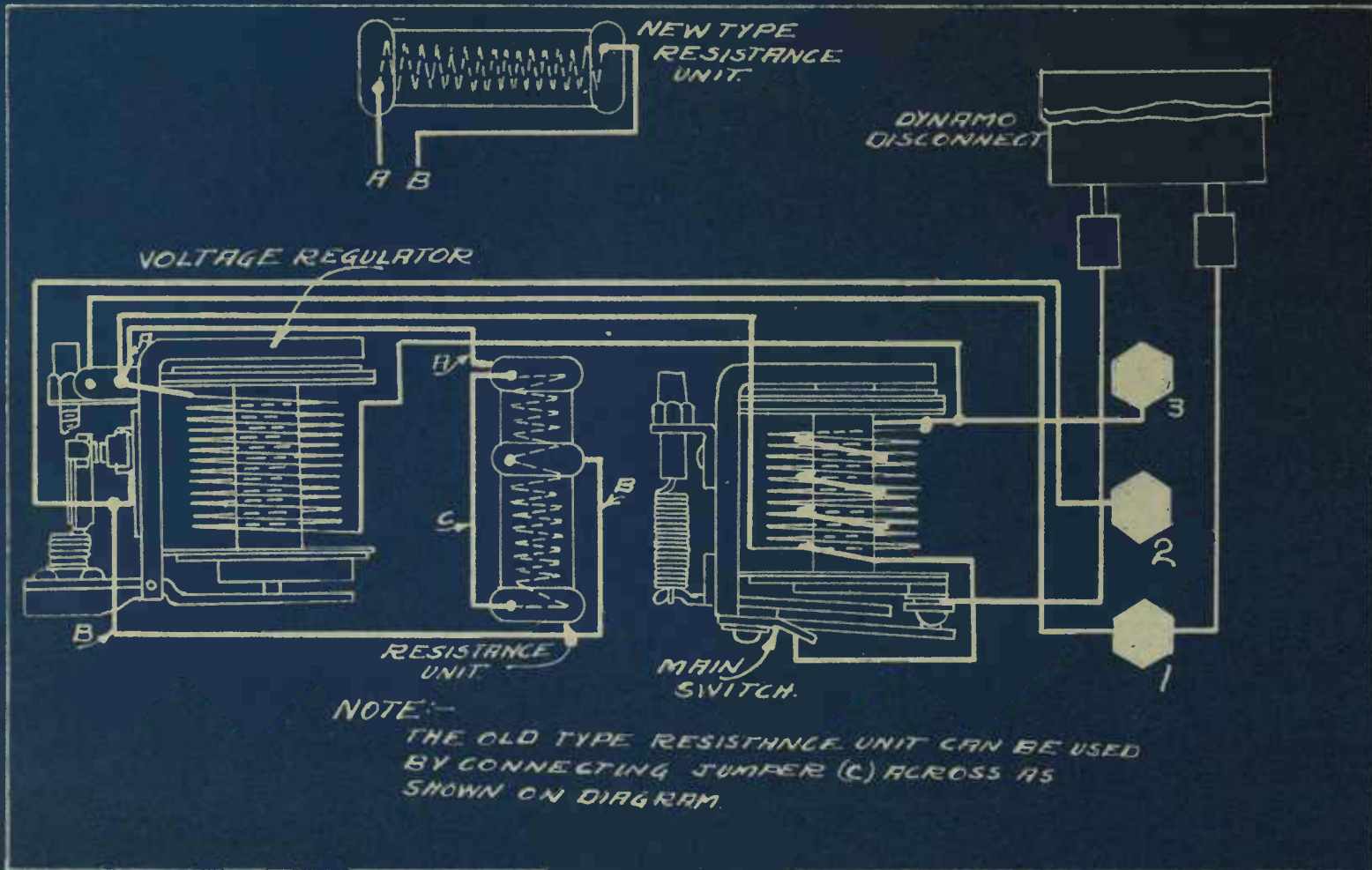


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BIJUR 1918 DEMOUNTABLE TYPE VOLTAGE REGULATOR

INTERNAL CIRCUITS.

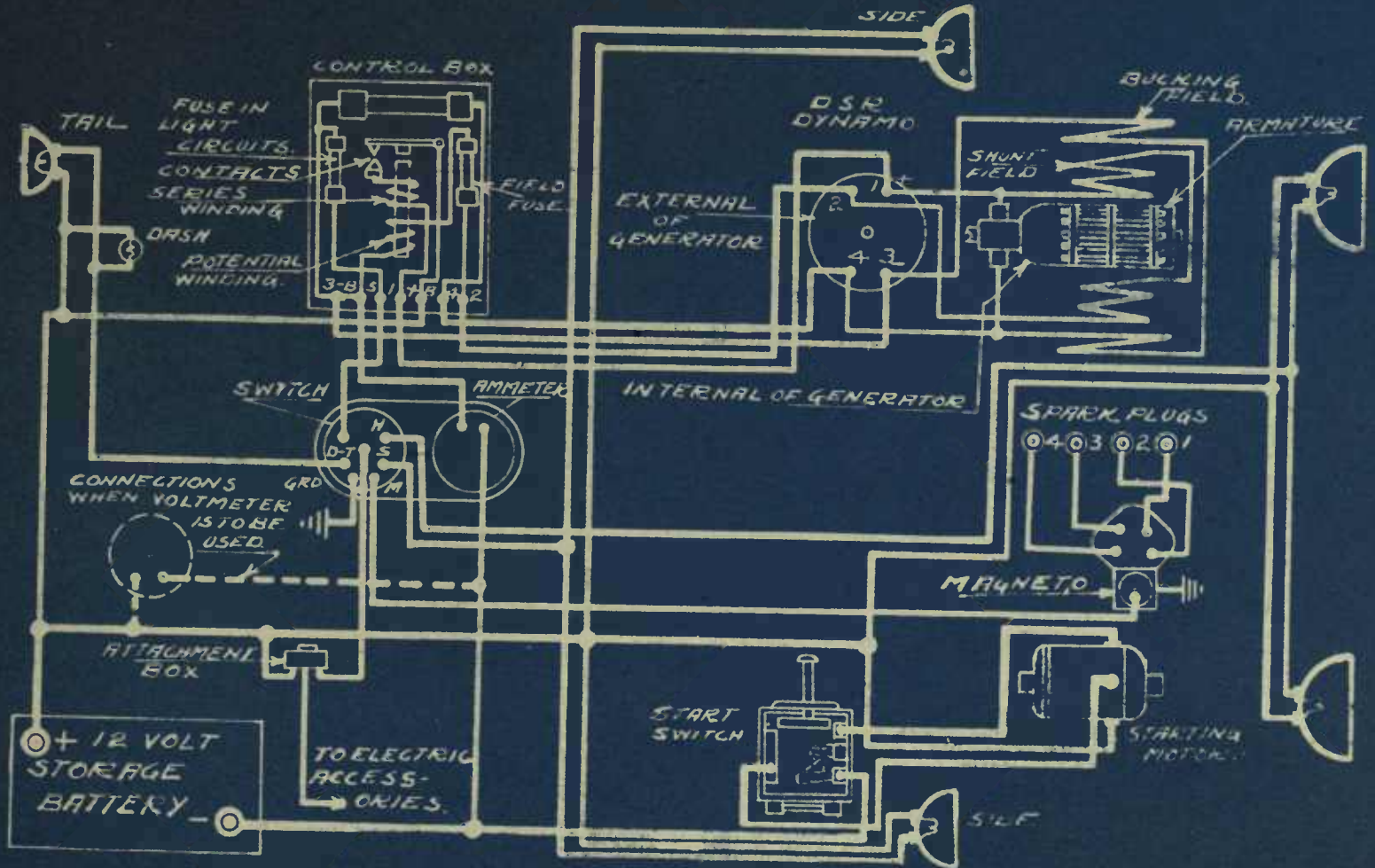
BIJUR B/P SER. 163.



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BOSCH STANDARD LIGHTING SYSTEM

FROM BOSCH B/P FD744B



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BOSCH-RUSHMORE INTERNAL CIRCUITS

FROM BOSCH-RUSH. INST. BK 5.



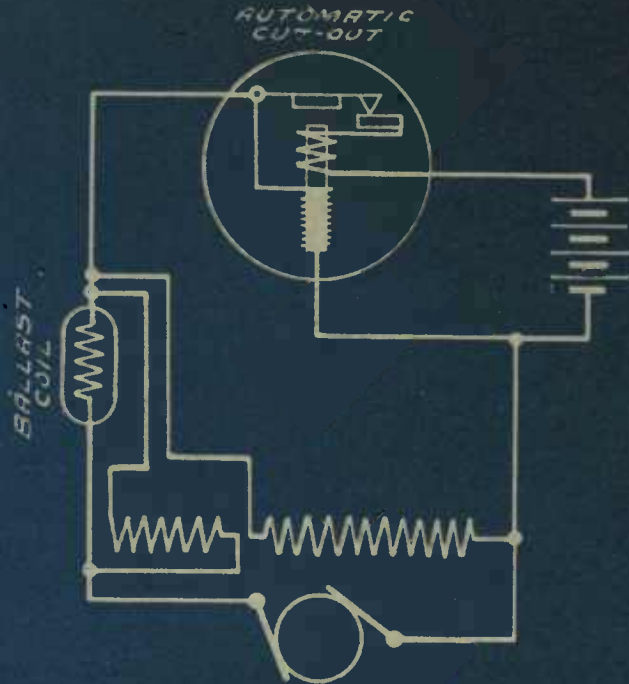
RESISTANCE USED FOR ENGAGING PINION IN FLY WHEEL GEAR.

ELECTRICAL CIRCUIT DURING FIRST PART OF DOWNWARD MOVEMENT OF SWITCH PEDAL



RESISTANCE USED FOR ENGAGING PINION IN FLY WHEEL GEAR.

ELECTRICAL CIRCUIT ESTABLISHED WHEN SWITCH PEDAL HAS COMPLETED ITS DOWNWARD MOVEMENT.



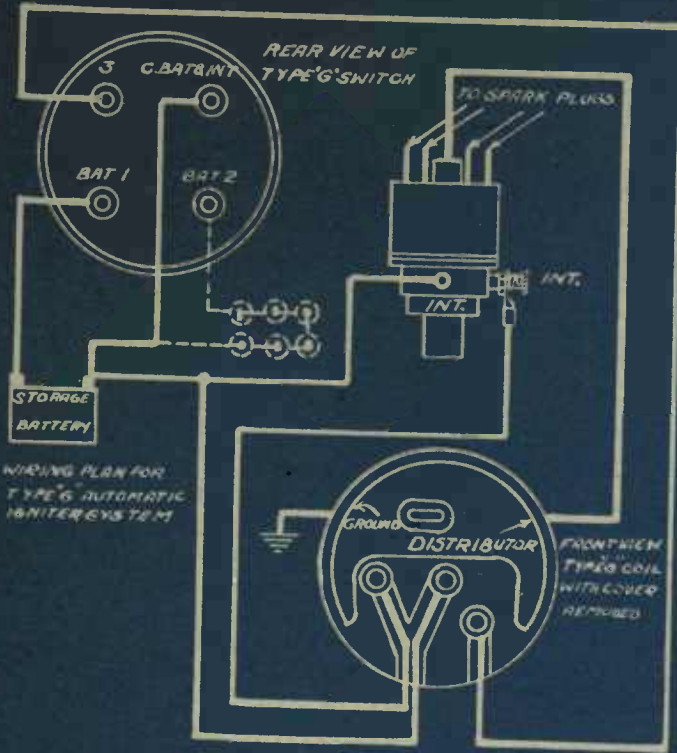
BOSCH-RUSHMORE GENERATOR
- BALLAST CONTROL -

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CONNECTICUT IGNITER SYSTEM.

FROM CONNECTICUT BOOKLET

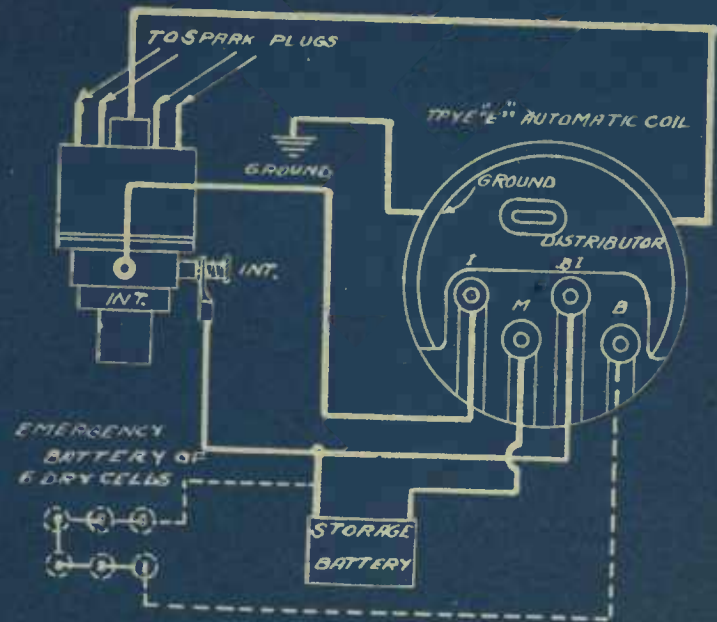
WIRING PLAN FOR TYPE "G" OR "GU" SYSTEM



WIRING PLAN FOR TYPE "G" AUTOMATIC IGNITER SYSTEM

FOLLOW DOTTED LINES WHEN DRY CELLS ARE USED.

WIRING PLAN FOR TYPE "E" OR "EJ" SYSTEMS

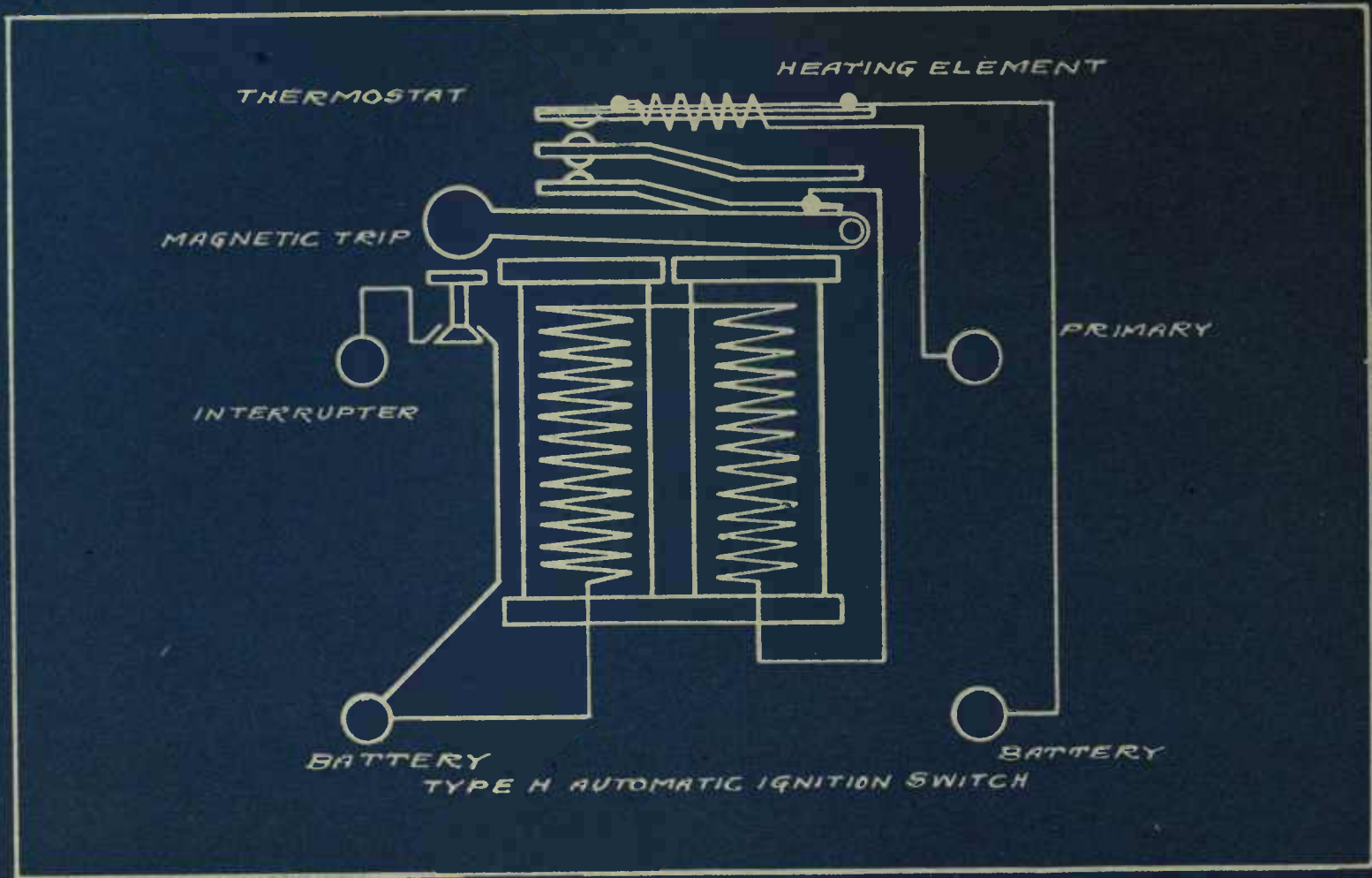


FOLLOW DOTTED LINES WHEN DRY CELLS ARE USED.

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CONNECTICUT INTERNAL CIRCUITS

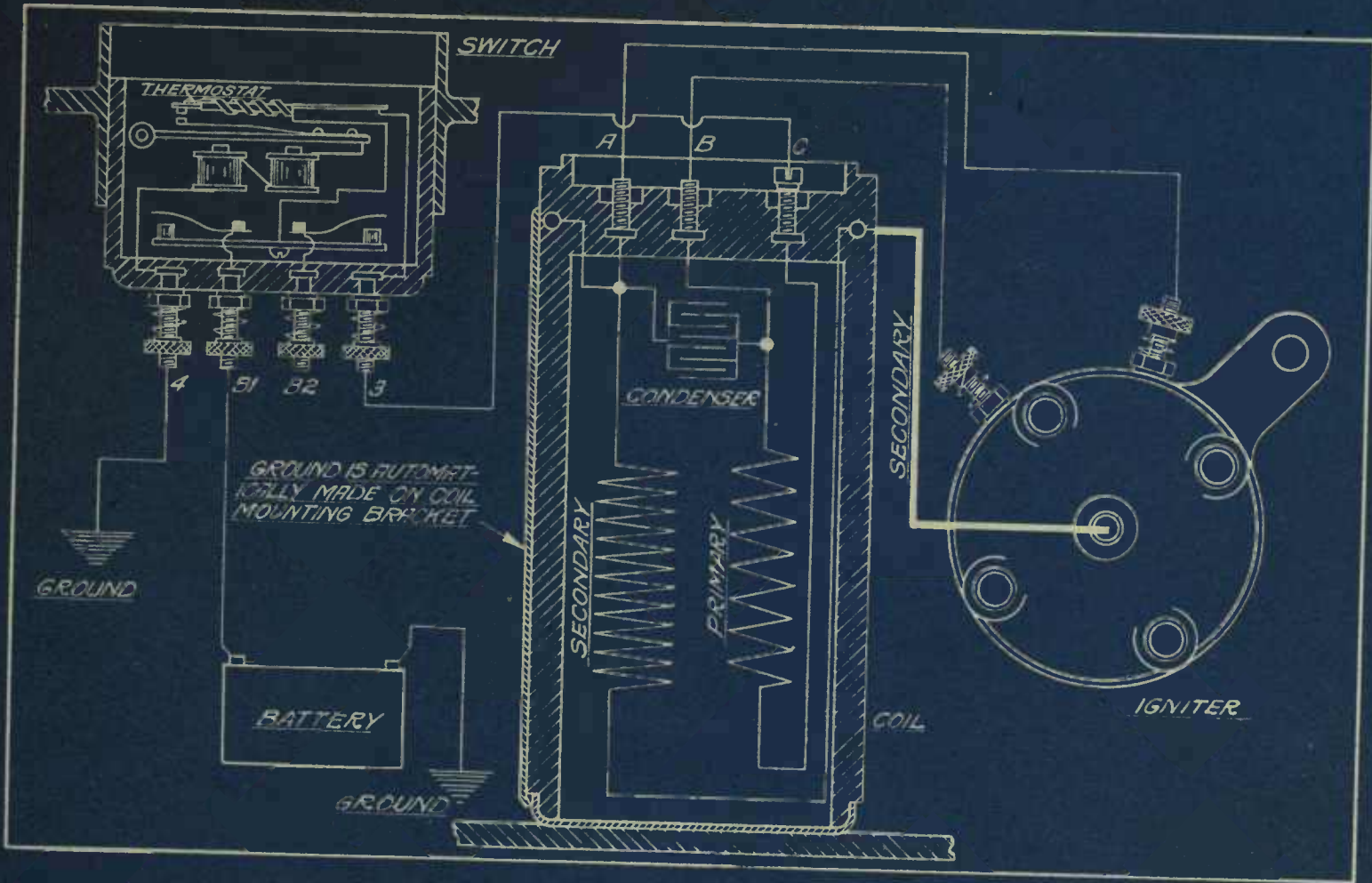
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CONNECTICUT AUTOMATIC IGNITION SYSTEM.

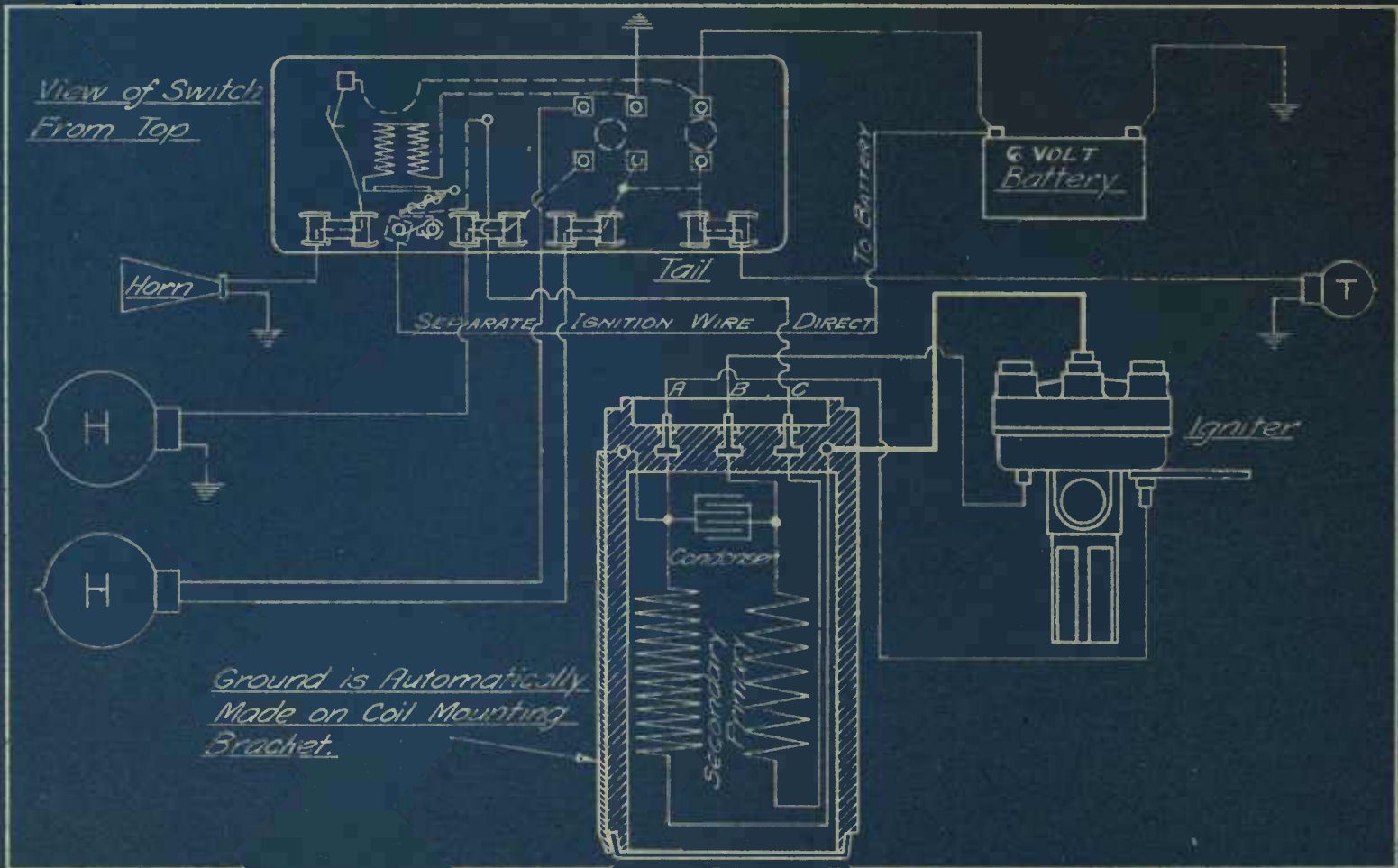
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CONNECTICUT IGNITION. INTERNAL CIRCUITS.
 TYPE O SWITCH, GA COIL AND NO. 16 IGNITER.

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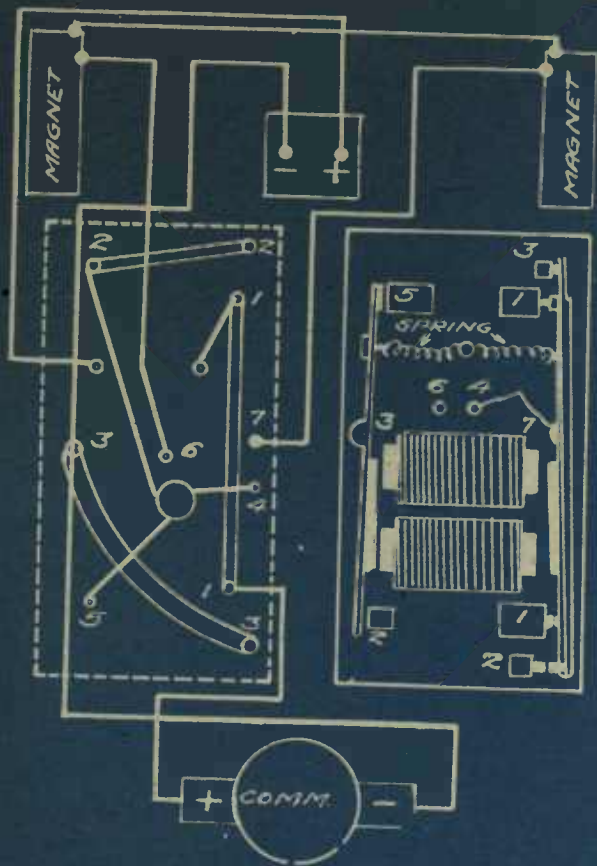


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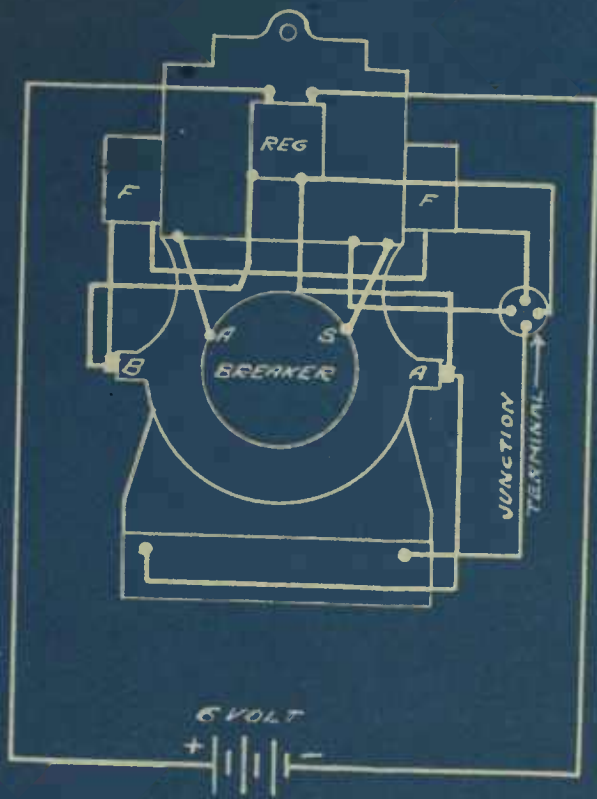
DEACO INTERNAL CIRCUITS

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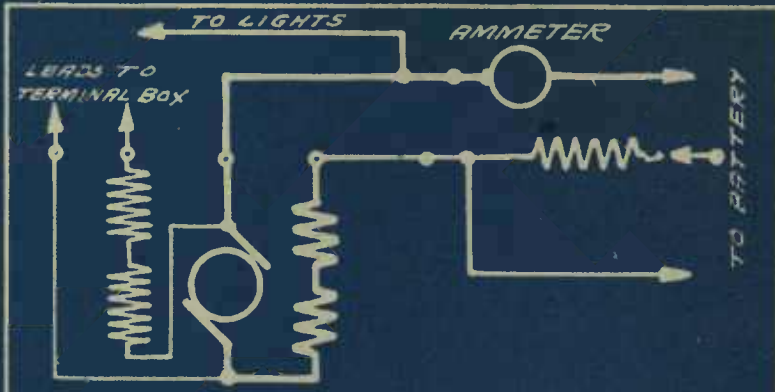
VOLTAGE REGULATOR



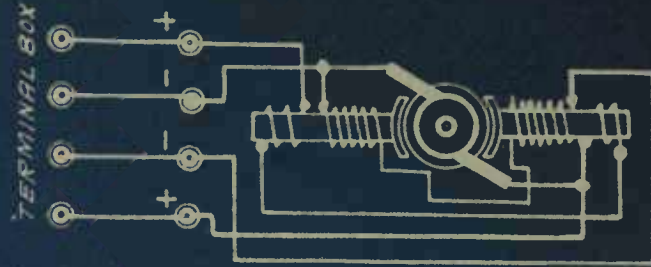
GENERATOR

DELCO INTERNAL CIRCUITS

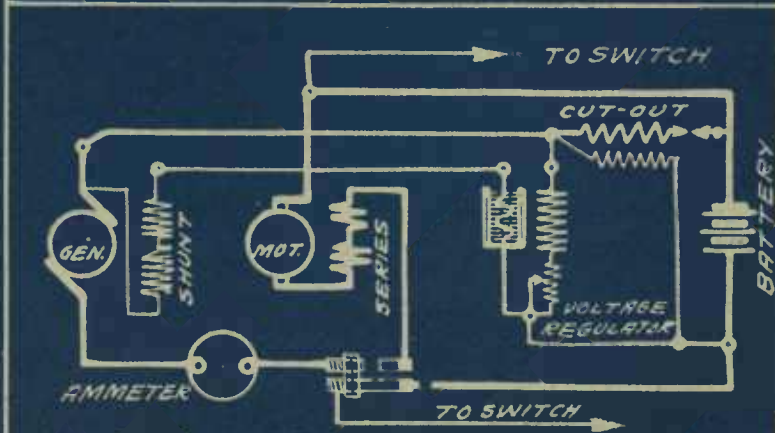
FROM DELCO MANUAL



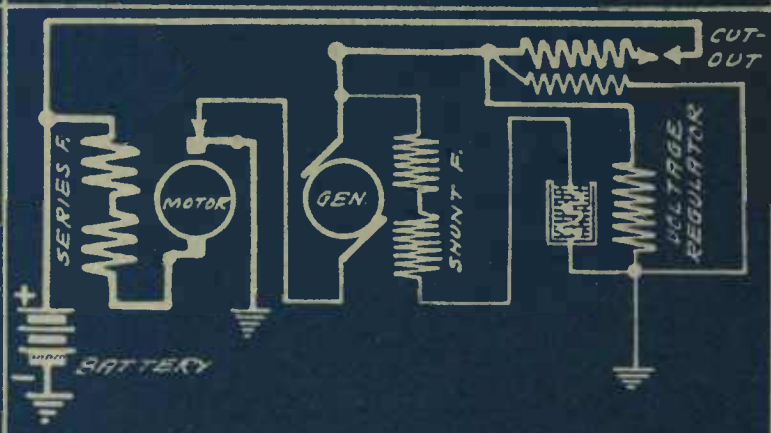
MOTOR-GENERATOR NO. 1



MOTOR-GENERATOR 2-8-12-15



MOTOR-GENERATOR NO. 4



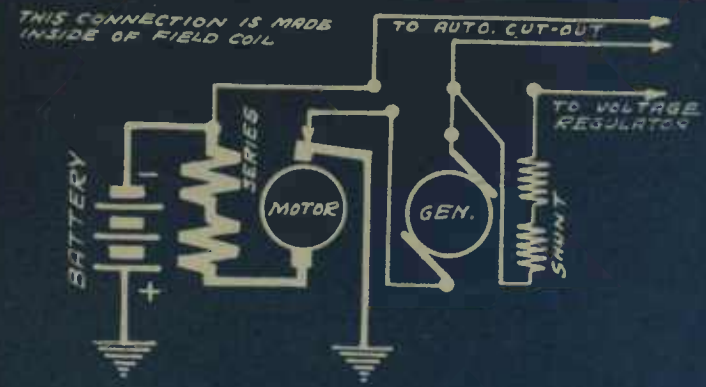
MOTOR-GENERATOR NO. 20

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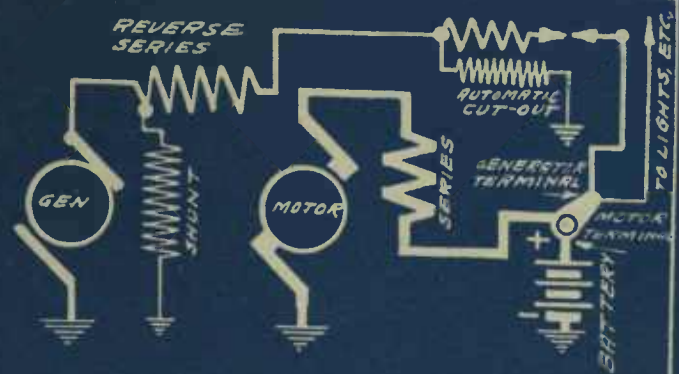
DELCO INTERNAL CIRCUITS

FROM DELCO MANUAL

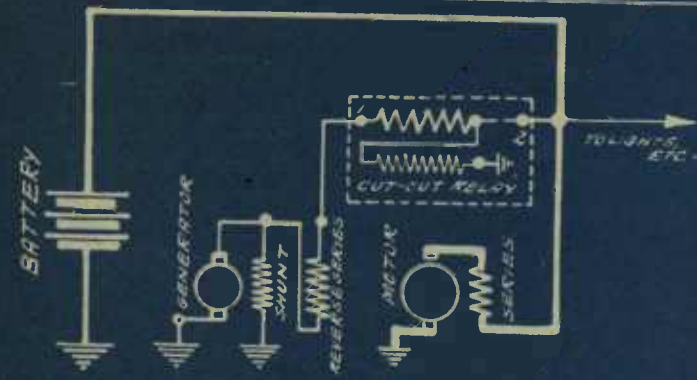
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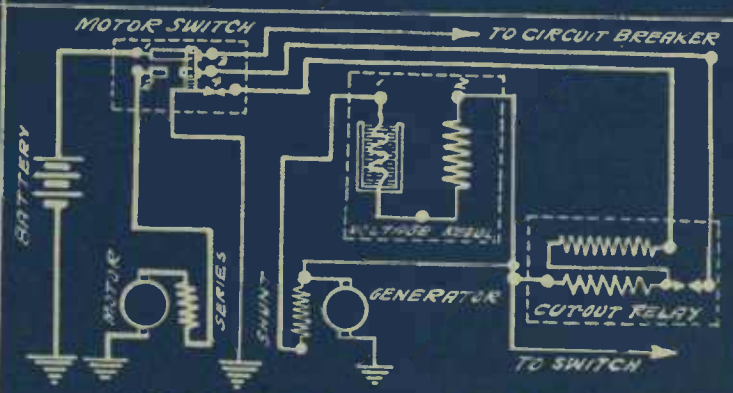
MOTOR-GENERATOR No 24.



MOTOR-GENERATOR Nos 26-40.



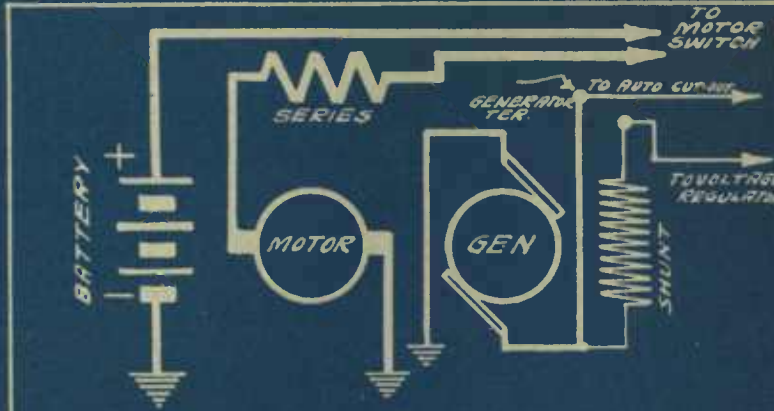
MOTOR-GENERATOR Nos 30-33-41-42.



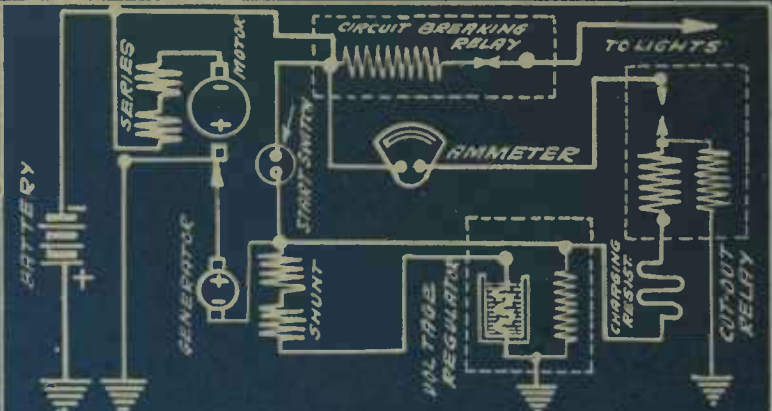
MOTOR-GENERATOR Nos. 28, 28-B, 32, 39, 39E.

DELCO INTERNAL CIRCUITS

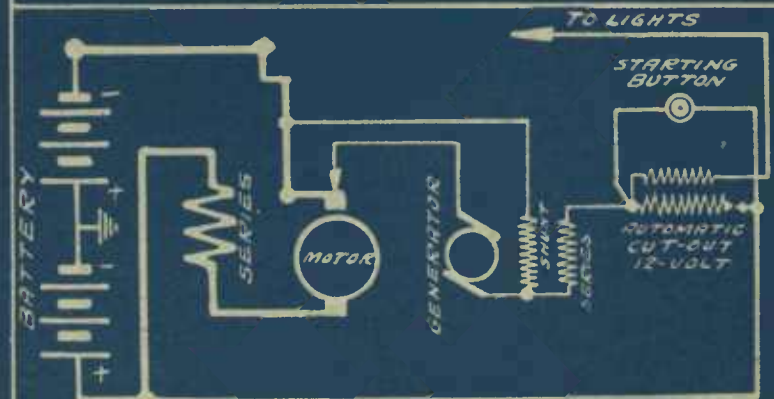
FROM DELCO MANUAL



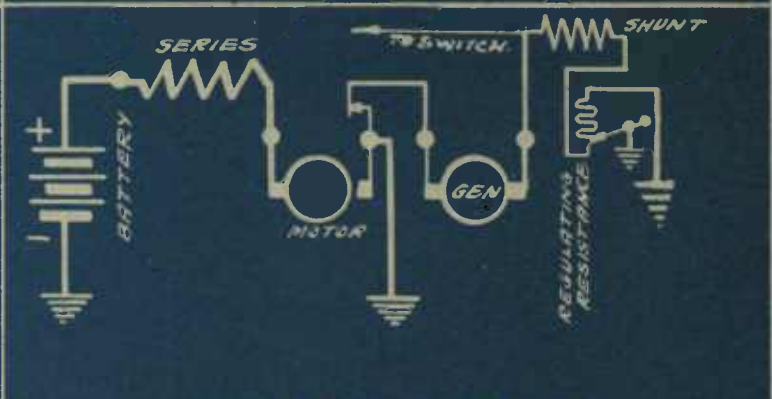
MOTOR-GENERATOR 27, 27B, 37, 37B.



MOTOR-GENERATOR 35



MOTOR-GENERATOR 43

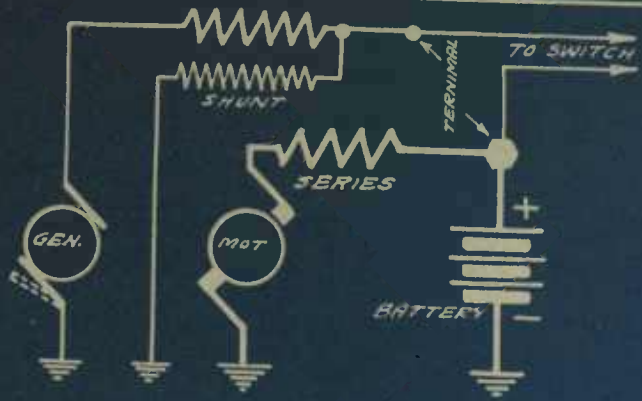


MOTOR-GENERATOR 44-45-49-50-51-52-55-57-58-59-64-66

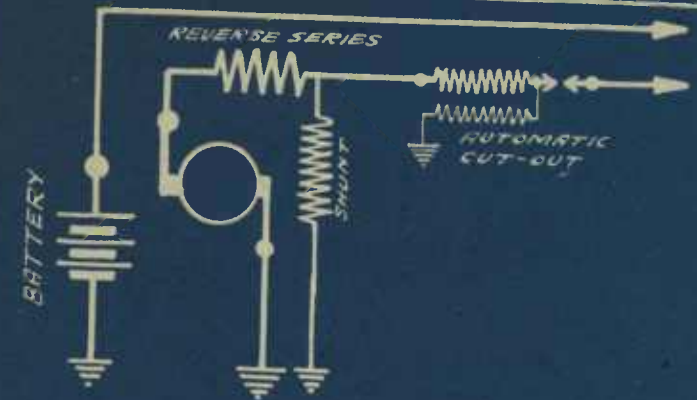
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DELCO INTERNAL CIRCUITS

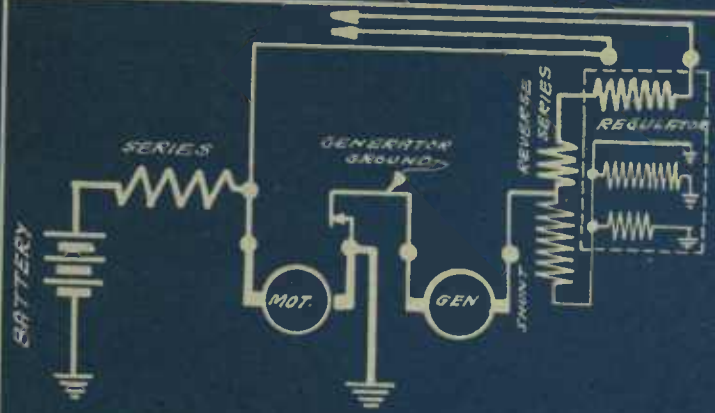
FROM DELCO MANUAL



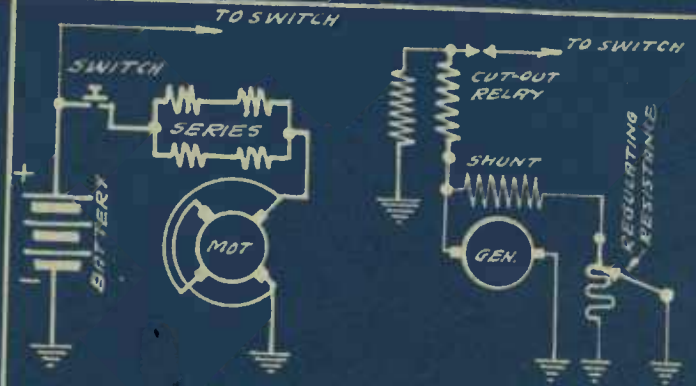
MOTOR-GENERATOR NOS. 53-56-74



MOTOR-GENERATORS NO. 61-71



MOTOR-GENERATOR NOS. 65-77

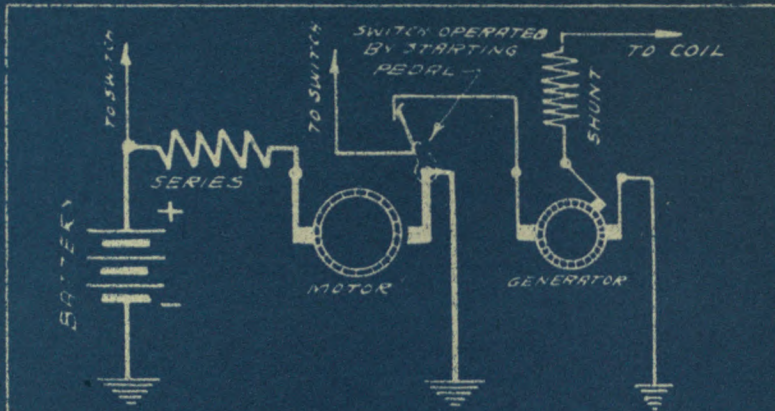


MOTOR-GENERATOR NO. 68

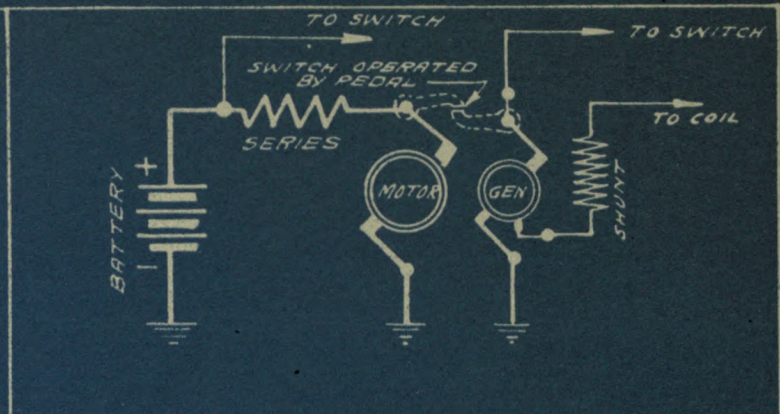
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DELCO INTERNAL CIRCUITS

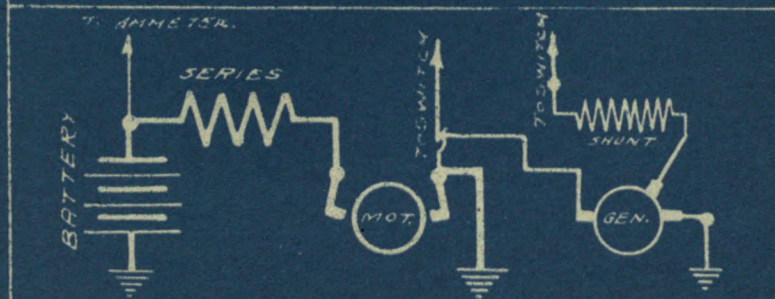
FROM DELCO MANUAL



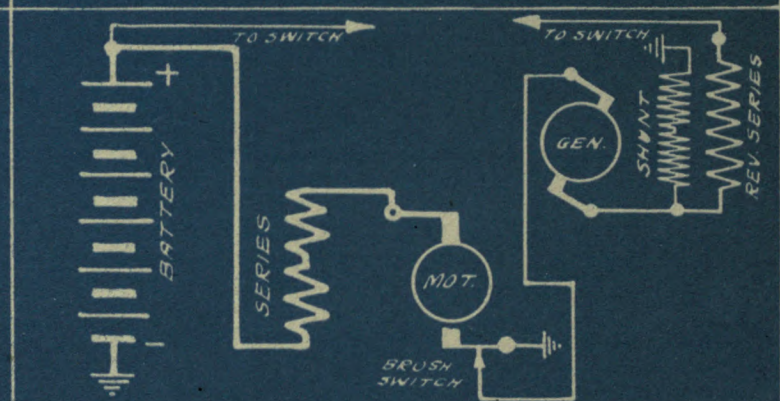
MOTOR-GENERATOR Nos.
68-69-73-75-76-81-83-93.



MOTOR-GENERATOR Nos. 70-94-115.



MOTOR-GENERATOR Nos. 78-98

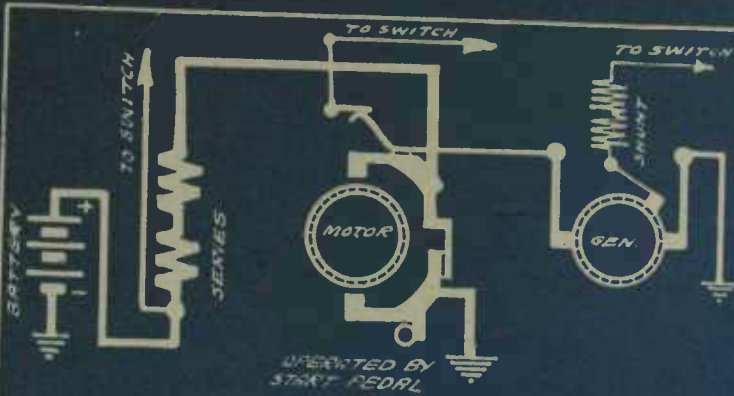


MOTOR-GENERATOR No. 79

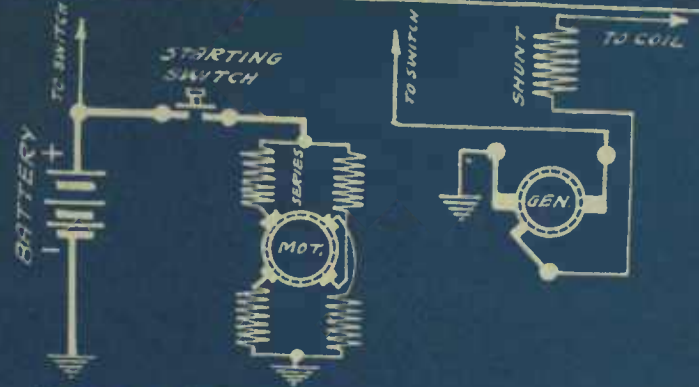
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DELCO INTERNAL CIRCUITS

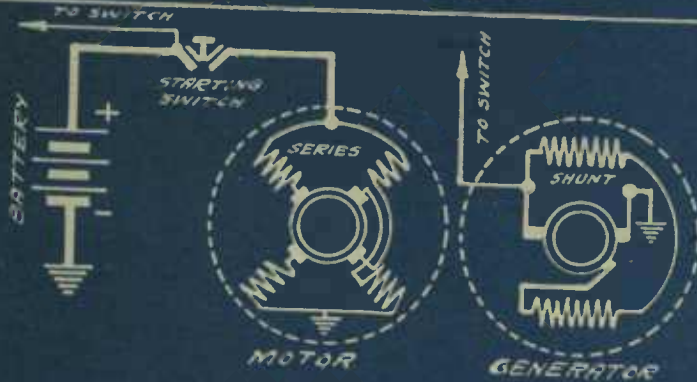
FROM DELCO MANUAL



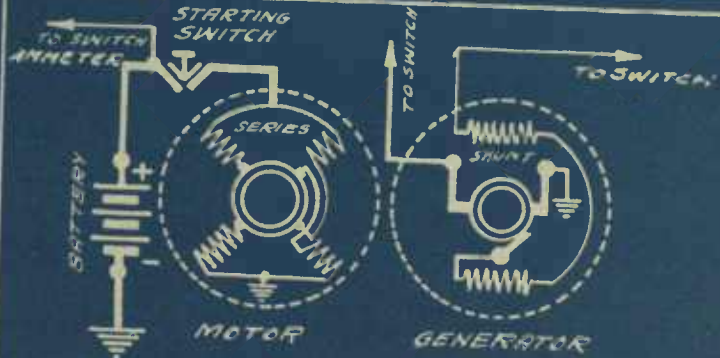
MOTOR-GENERATOR 88-112



MOTOR NO. 72
GENERATOR NO. 91



MOTOR NOS. 85-86-96-100-102-104-106-107
GENERATOR-84-87-89-95-101-103-105-111-114



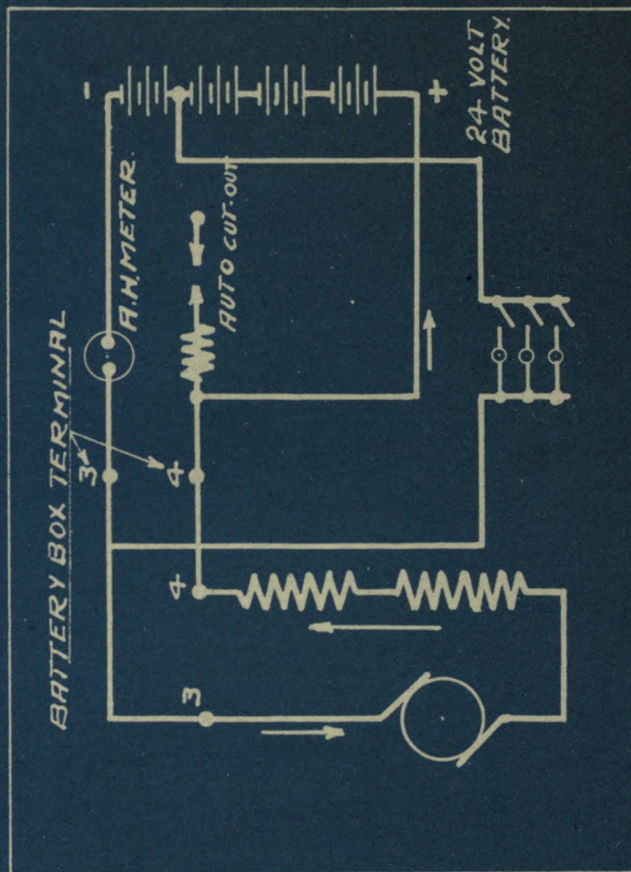
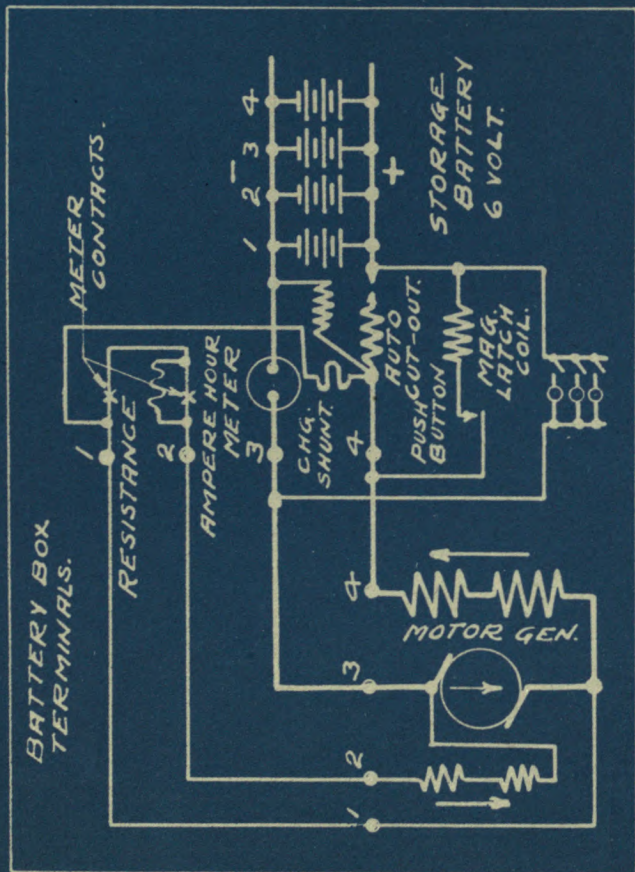
GENERATORS 109-113-118
MOTOR 672 & 110

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DELCO 1912-13 6-24 VOLT SYSTEM

INTERNAL MOTOR AND GENERATOR CONTROL

A.J. PIERSON.

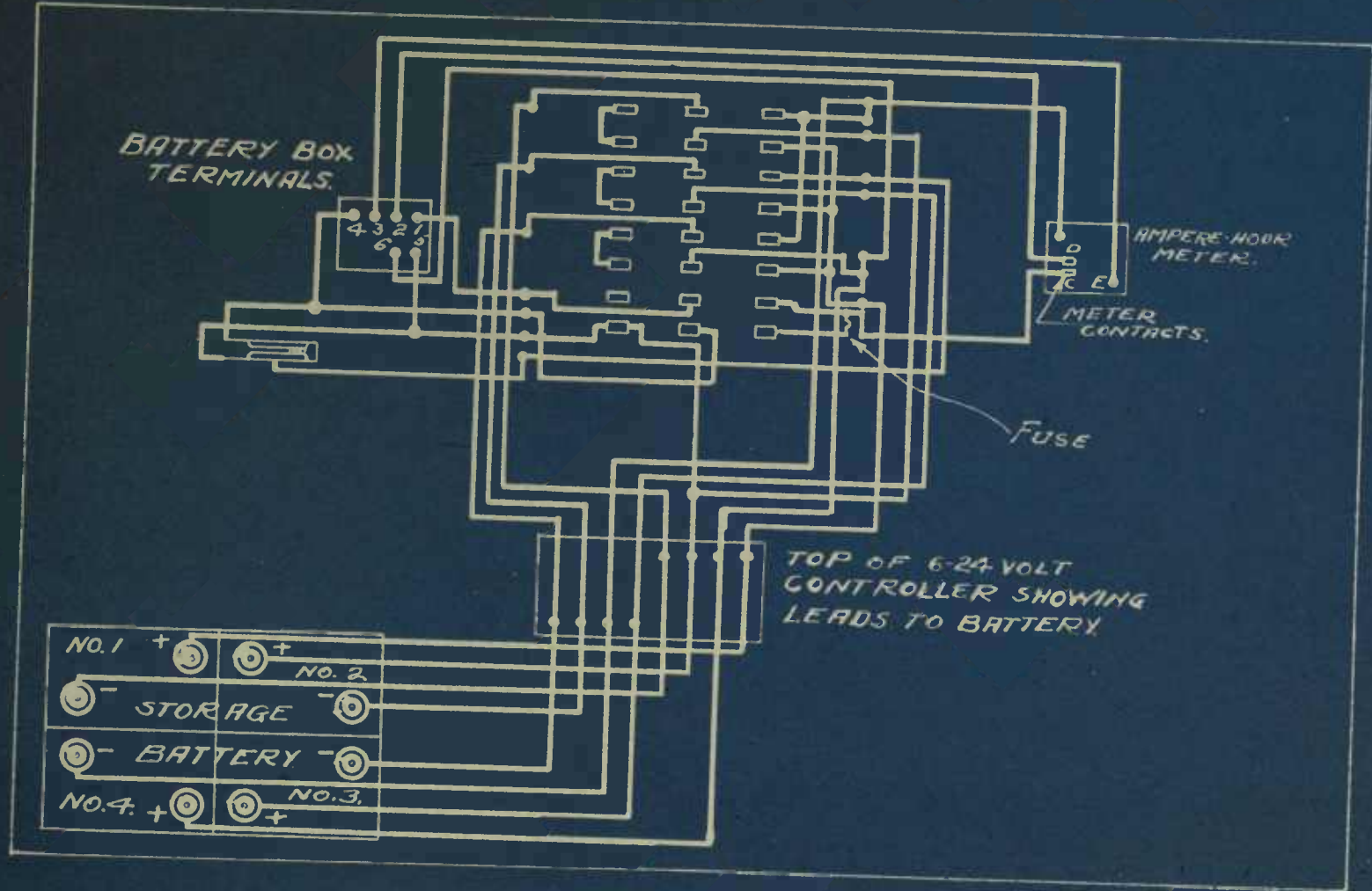


DELCO CONTROL PANEL

6-24 VOLT SYSTEM

FROM DELCO MANUAL

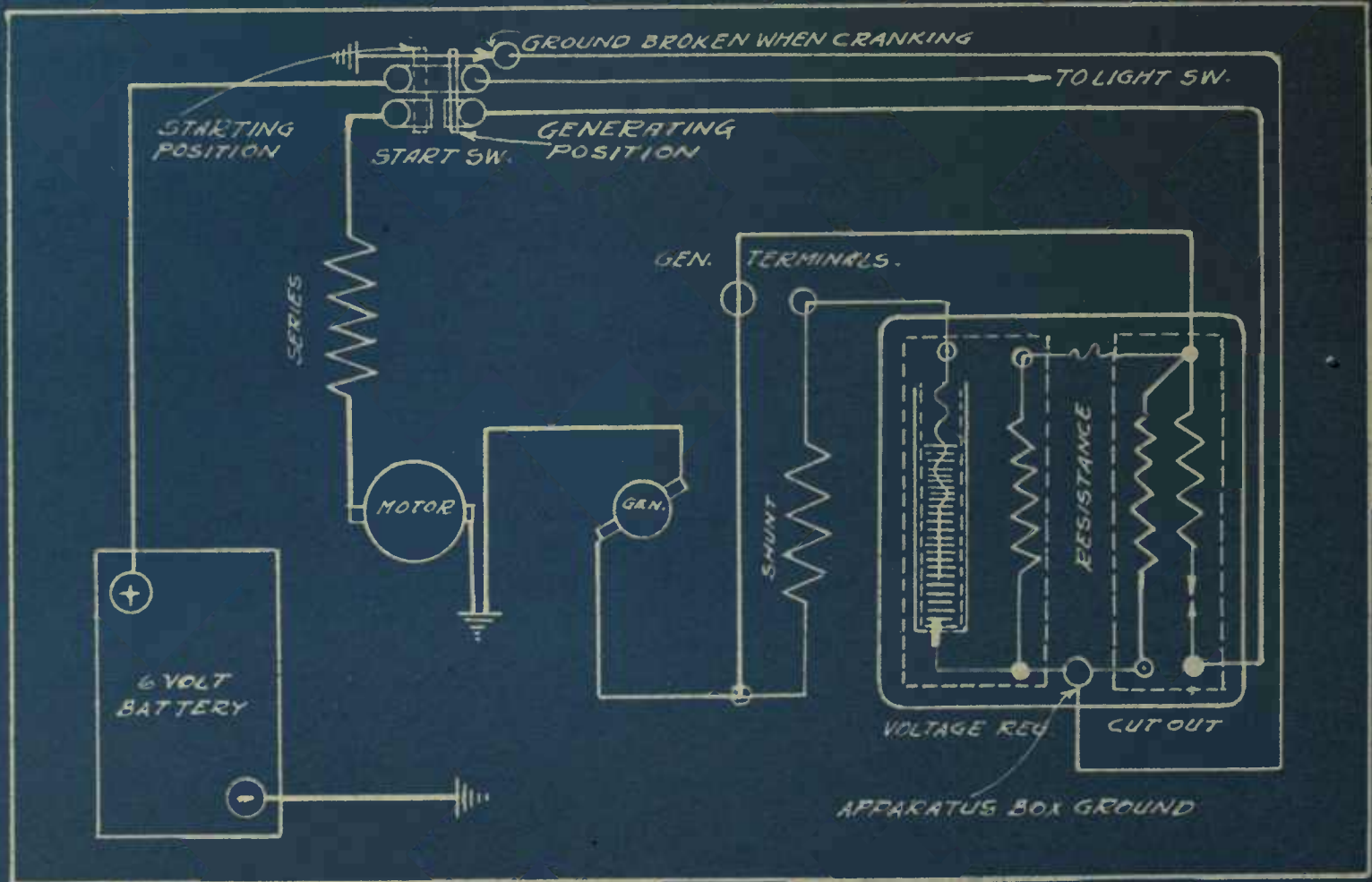
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DELCO VOLTAGE REGULATOR

INTERNAL CIRCUITS

DELCO MANUAL



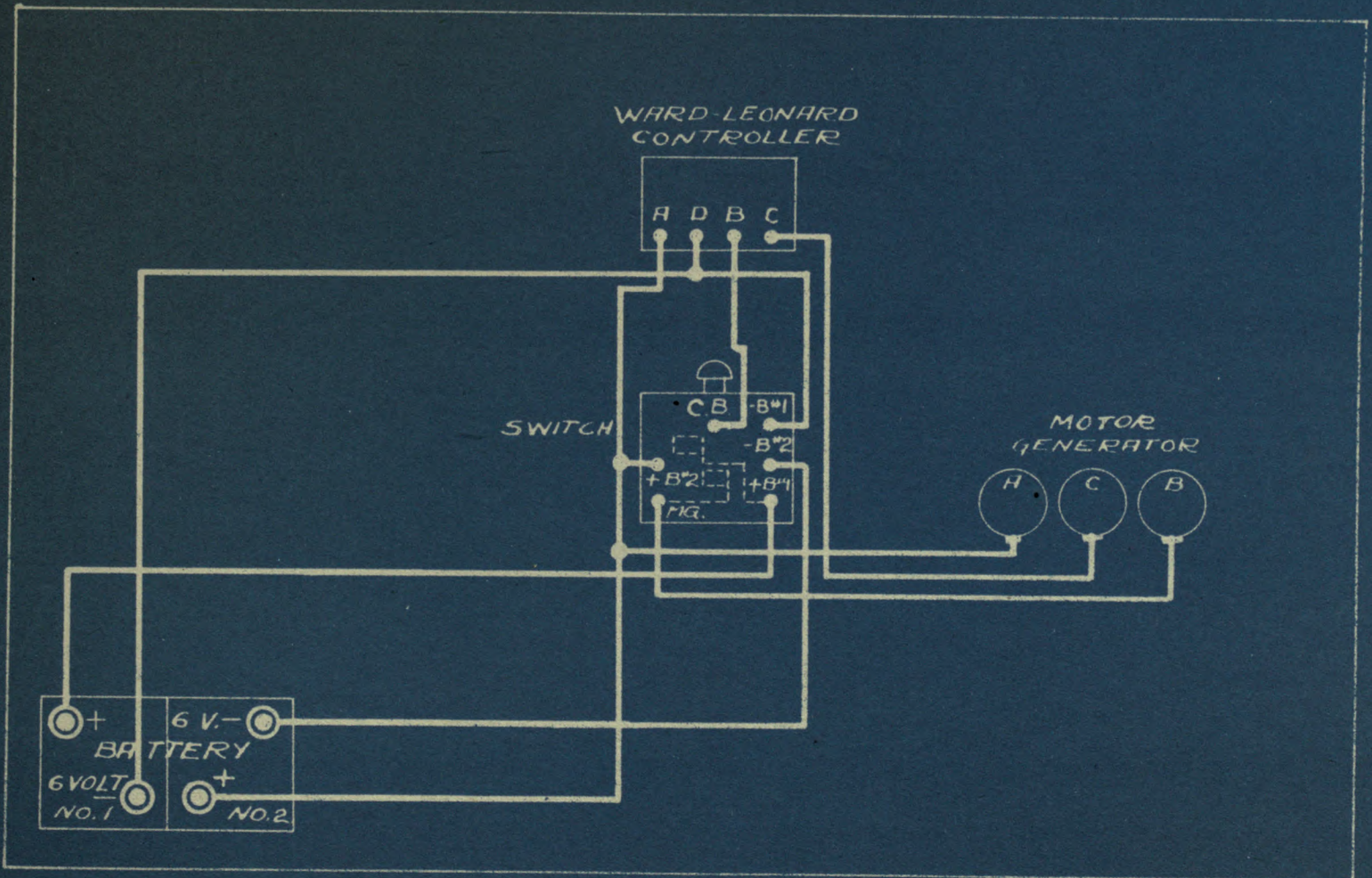
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DETROIT R-S MOTOR-GENERATOR

INSTALLATION FOR CARS NOT
ORIGINALLY EQUIPPED.

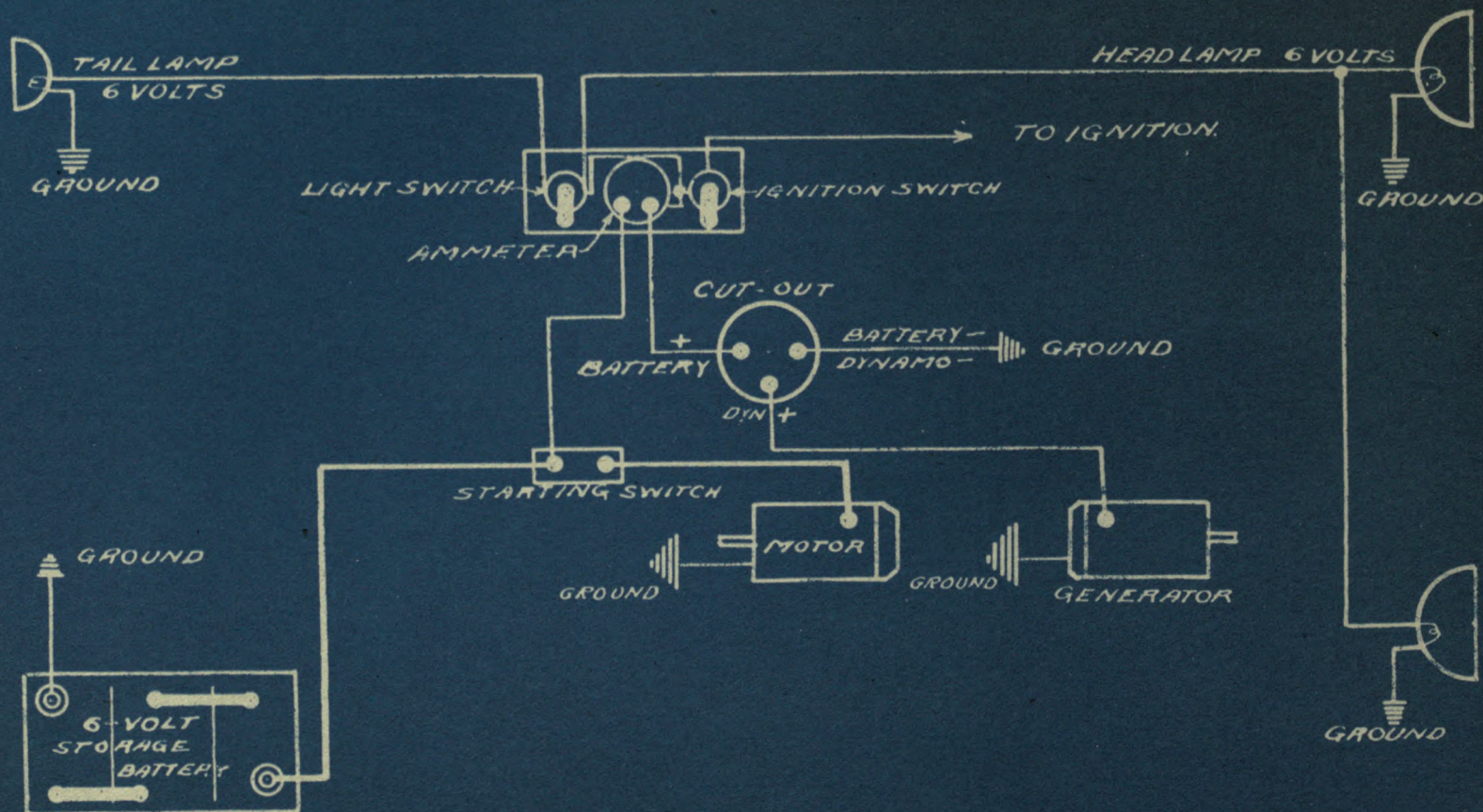
A J P

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DISCO TWO UNIT STANDARD
DIAGRAM MODELS 30 TO 39

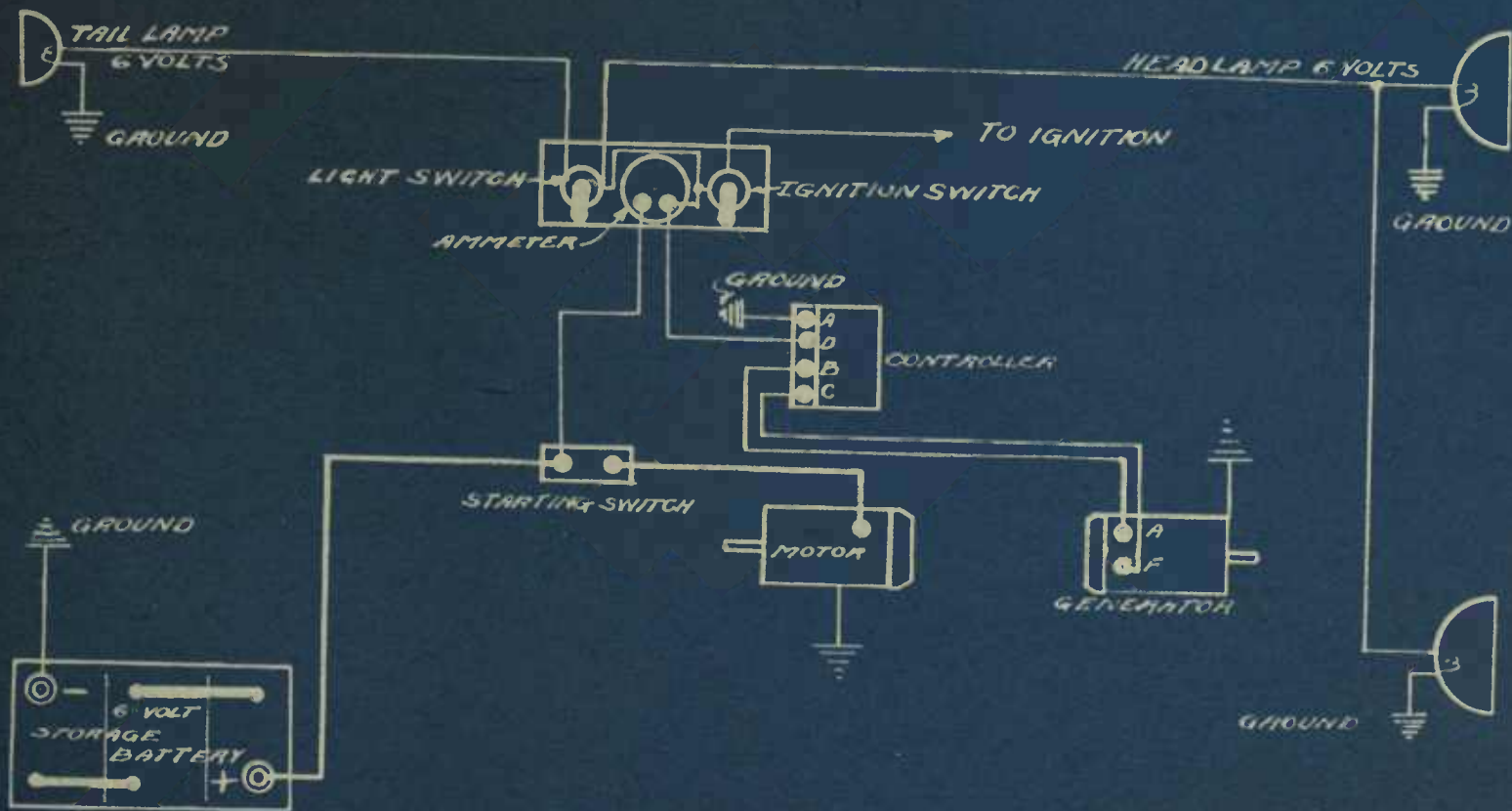
FROM DISCO BULLETIN



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DISCO TWO UNIT STANDARD
DIAGRAM MODELS 40 TO 49

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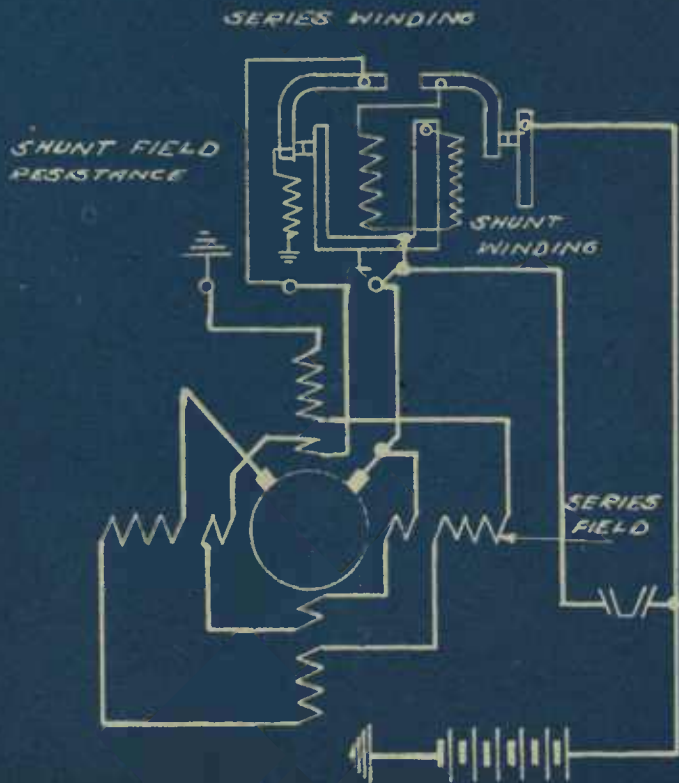
DISCO INTERNAL CIRCUITS

FROM SKETCH BY A.J.P.

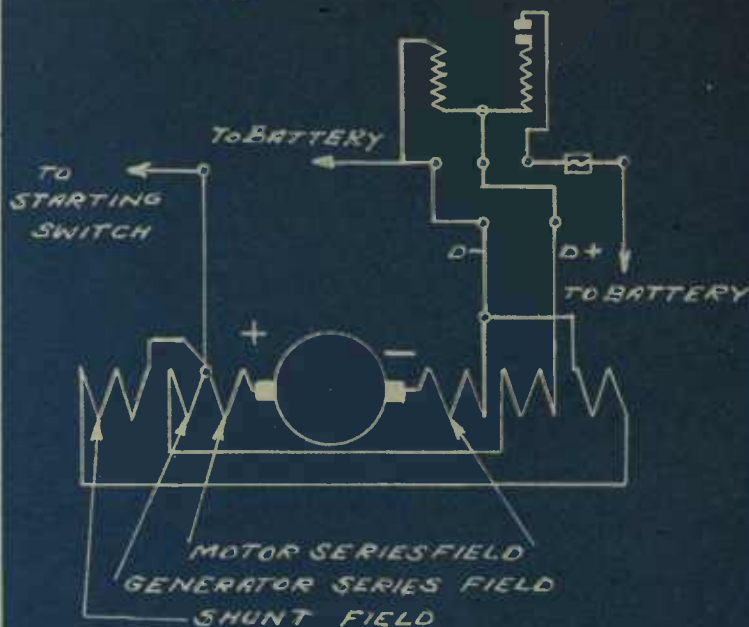
SPLITDORF-APELCO INTERNAL CIRCUITS

FROM SKETCH BY A.J.P.

12-VOLT MOTOR-GENERATOR WITH REGULATOR



12-VOLT MOTOR-GENERATOR WITH CUT-OUT

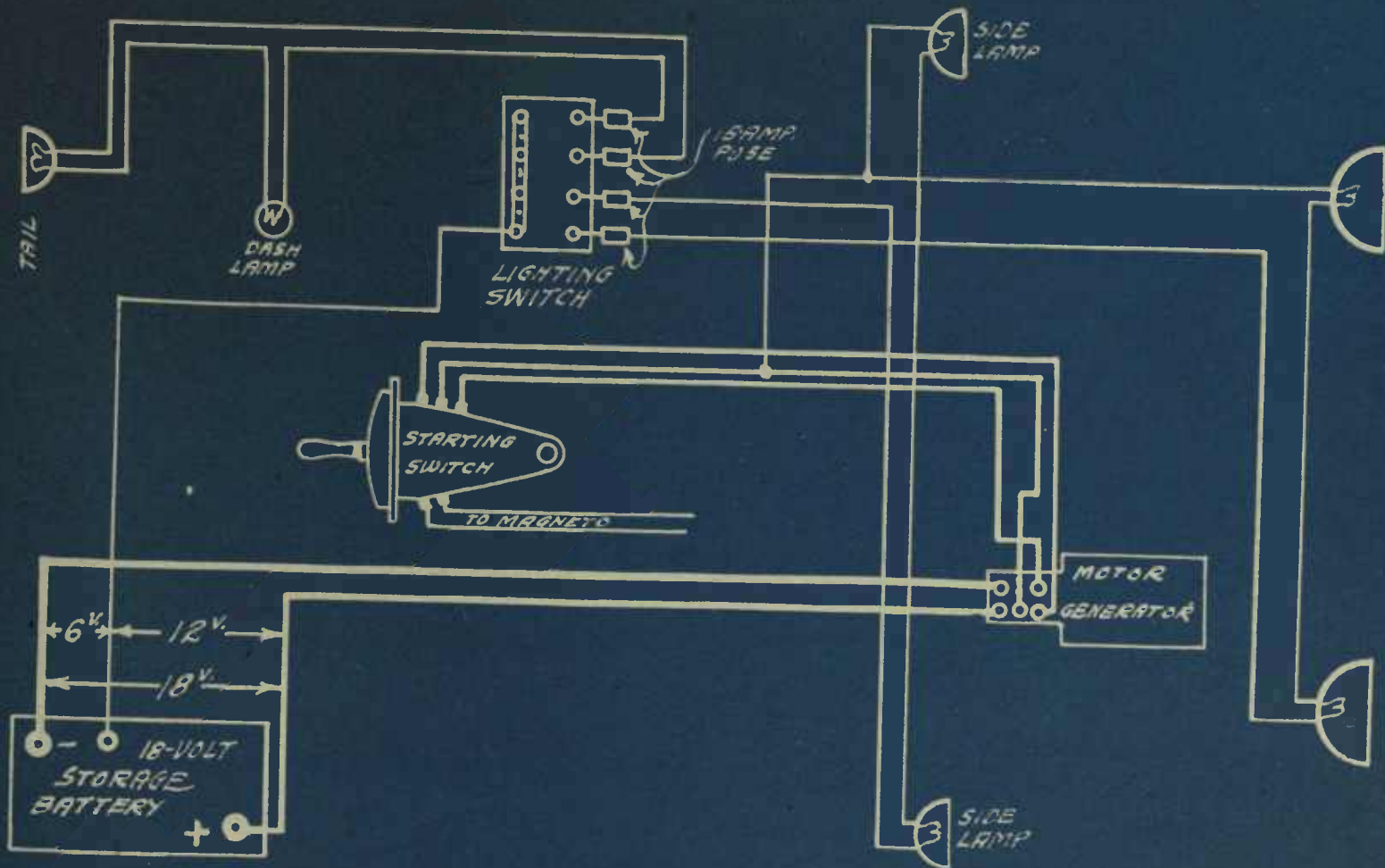


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DYNETO STANDARD WIRING

DIAGRAM FOR ENTZ STARTING & LIGHTING SYSTEM

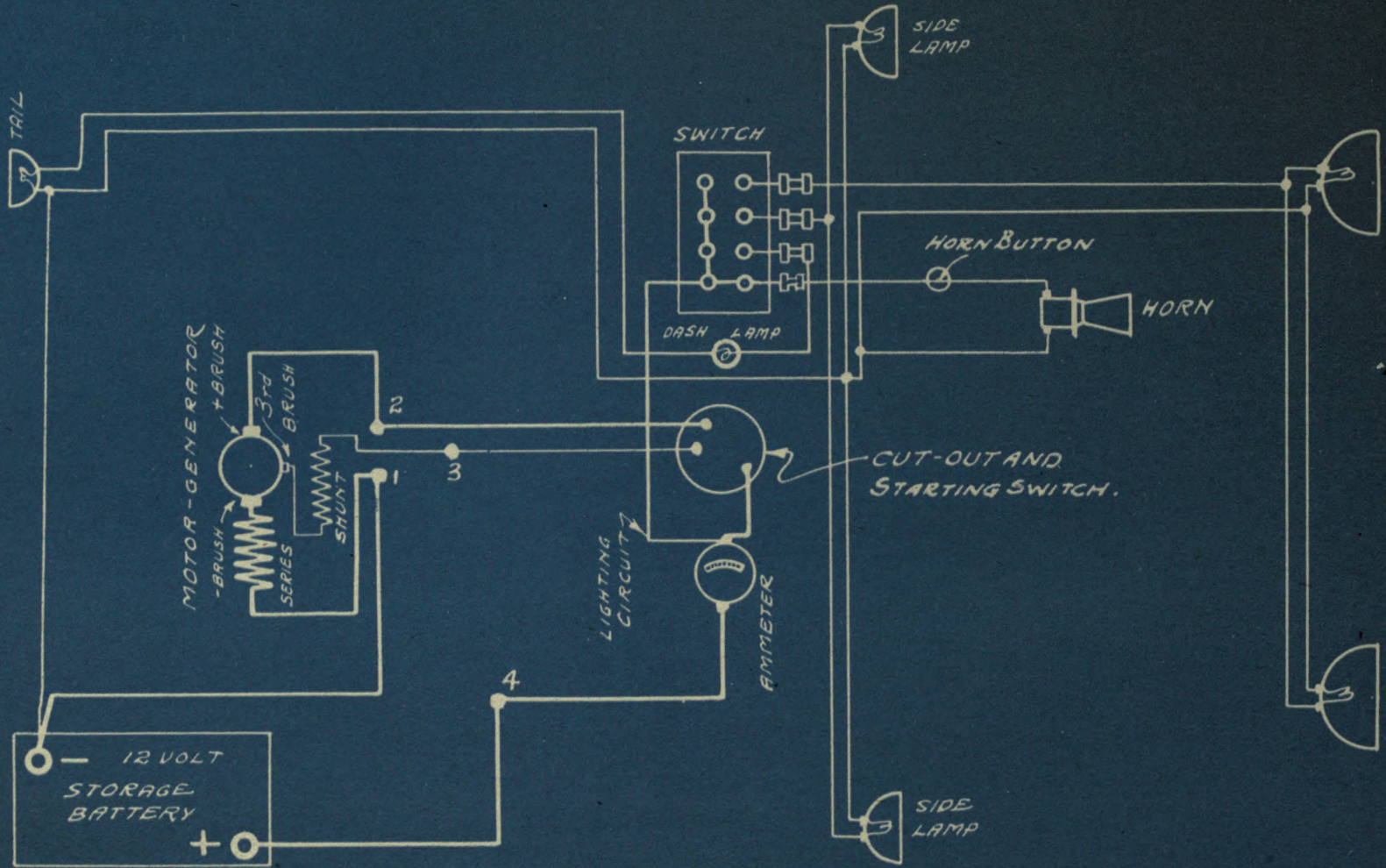
FROM DYN.BP.X-1003



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DYNETO SINGLE UNIT WIRING DIAGRAM CONNECTION FOR 4 TERMINAL UNIT MODEL A & B

FROM DYNETO BULLETIN



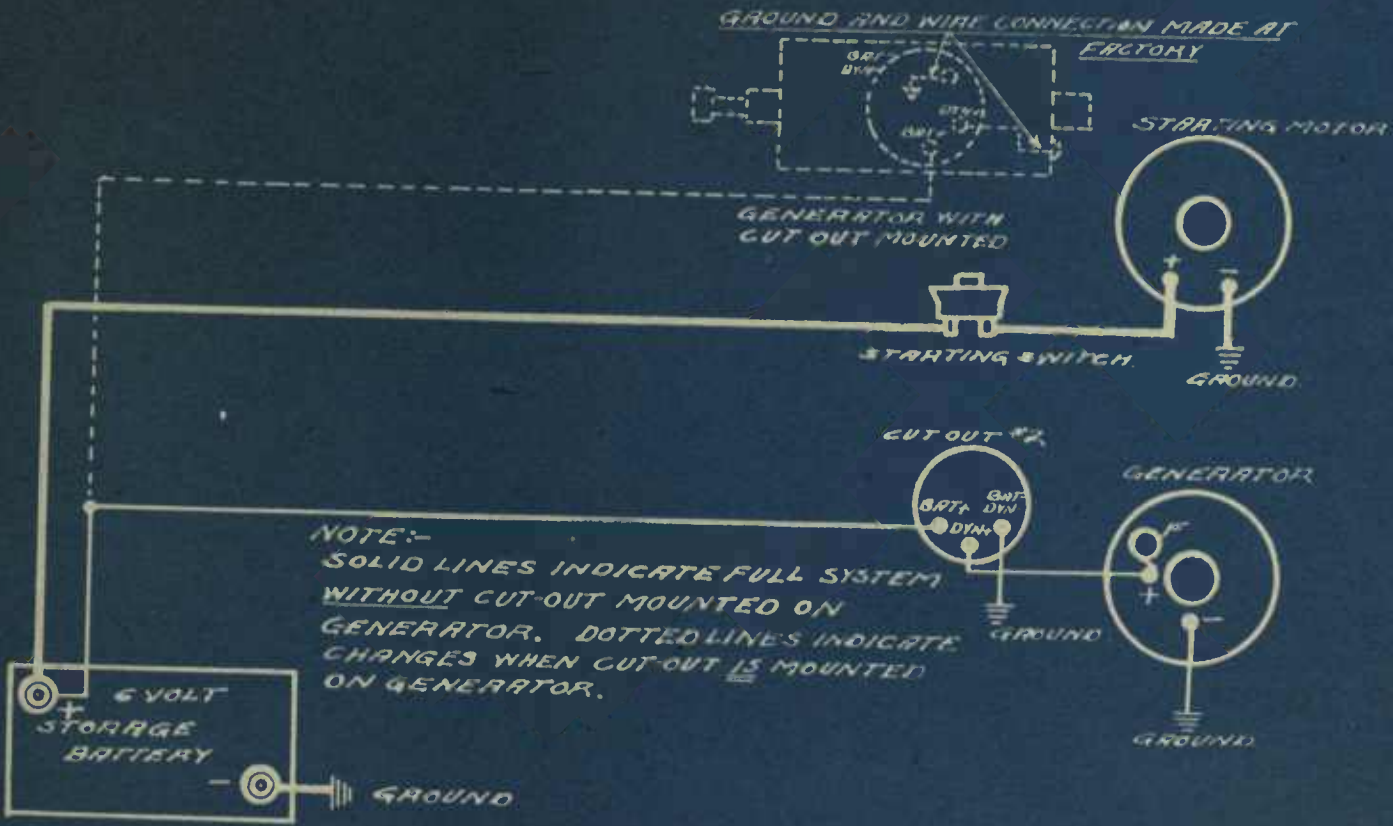
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DYNETO TWO UNIT STARTING SYSTEM

FROM DYNETO DRAWINGS

CONNECTIONS FOR SINGLE WIRE SYSTEM WITH STYLE "DR" MOTOR AND "GR" GENERATOR

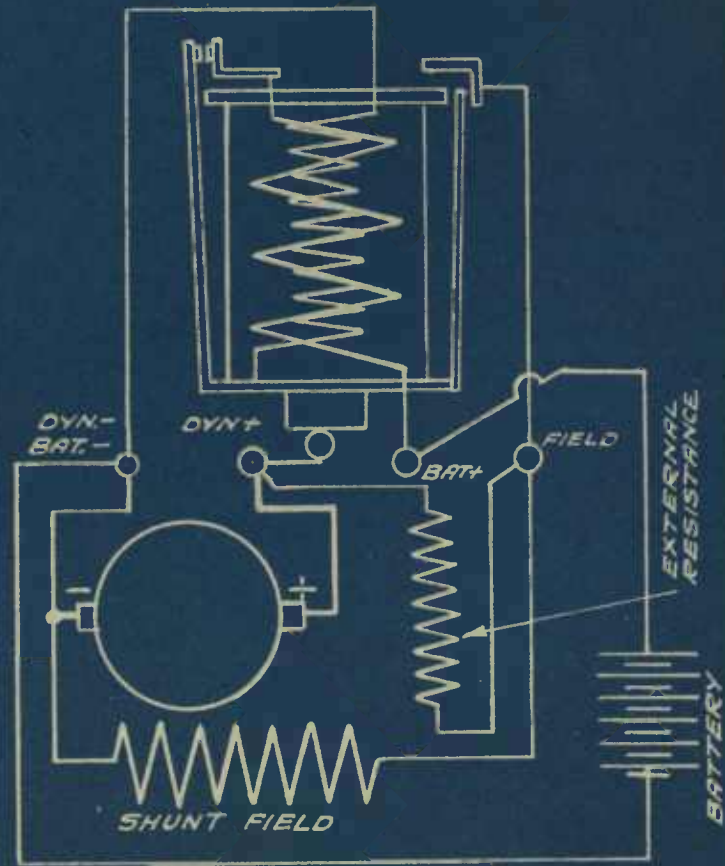
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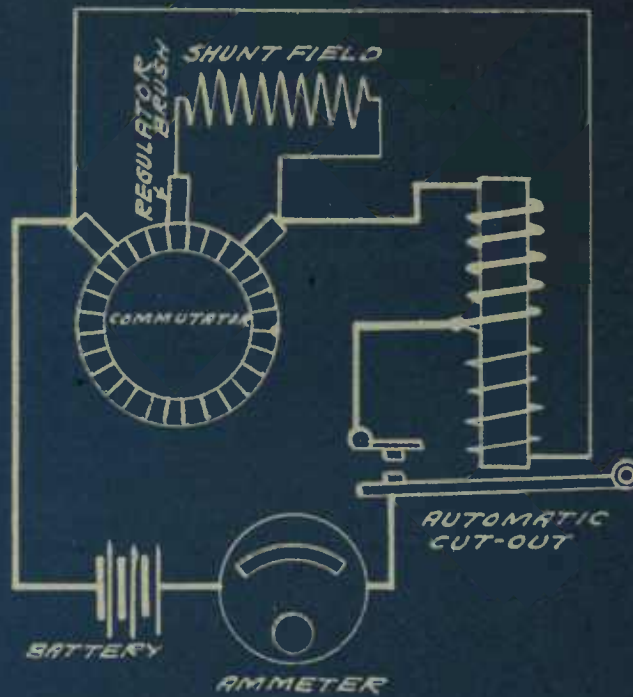
DYNETO INTERNAL CIRCUITS

FROM DYNETO SERVICE MANUAL

GENERATOR AND CONTROLLER



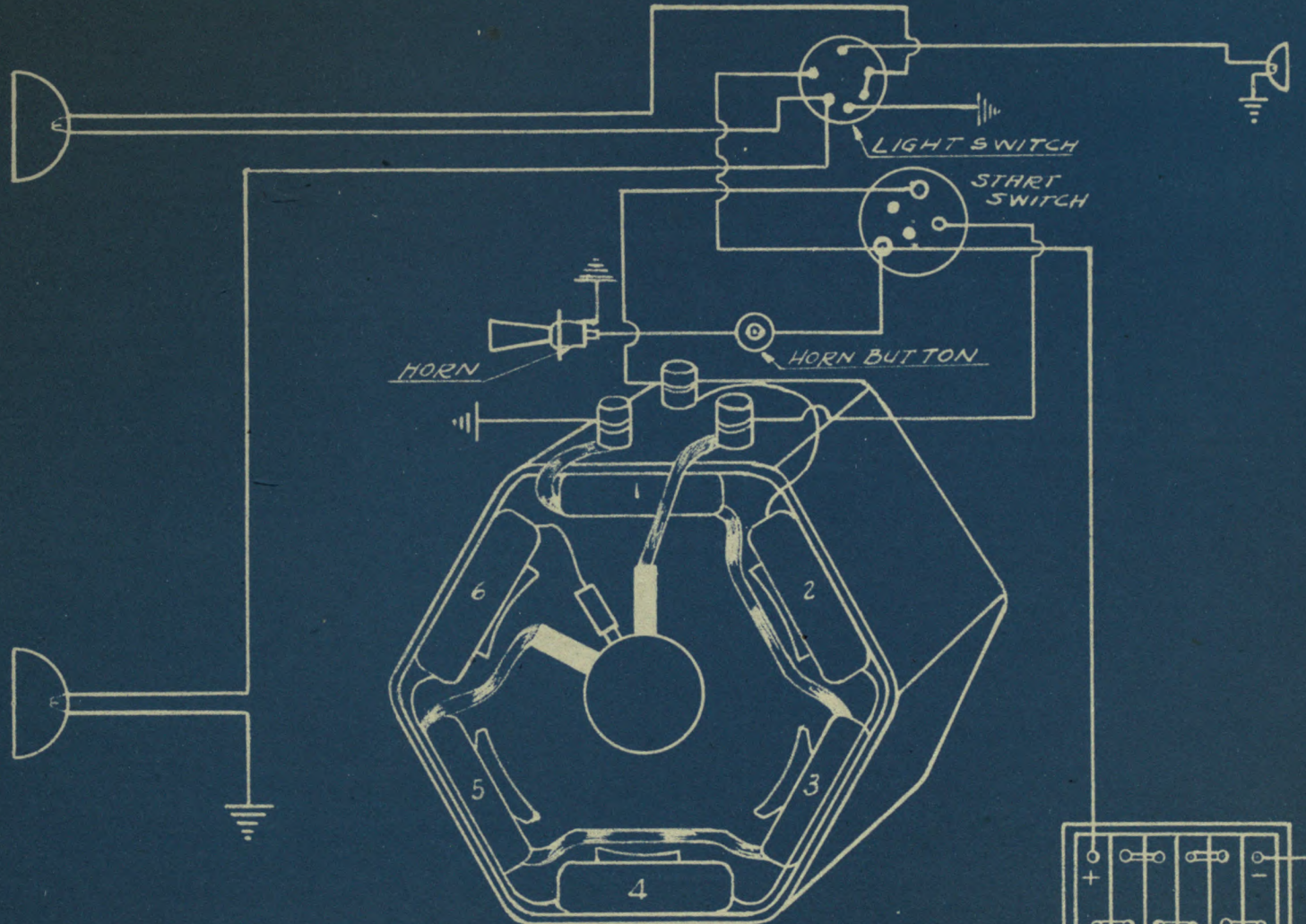
DYNETO TYPE C-A GENERATOR THIRD BRUSH REGULATION



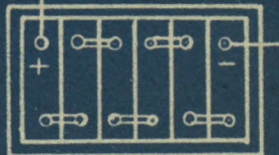
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DYNETO MOTOR-GENERATOR INTERNAL CONNECTIONS

FROM DYNETO B. P. D-11476.



COMMUTATOR END OF MOTOR GENERATOR
SERIES (BUCKING) COILS 1-3-5 SHUNT COILS 2-4-6



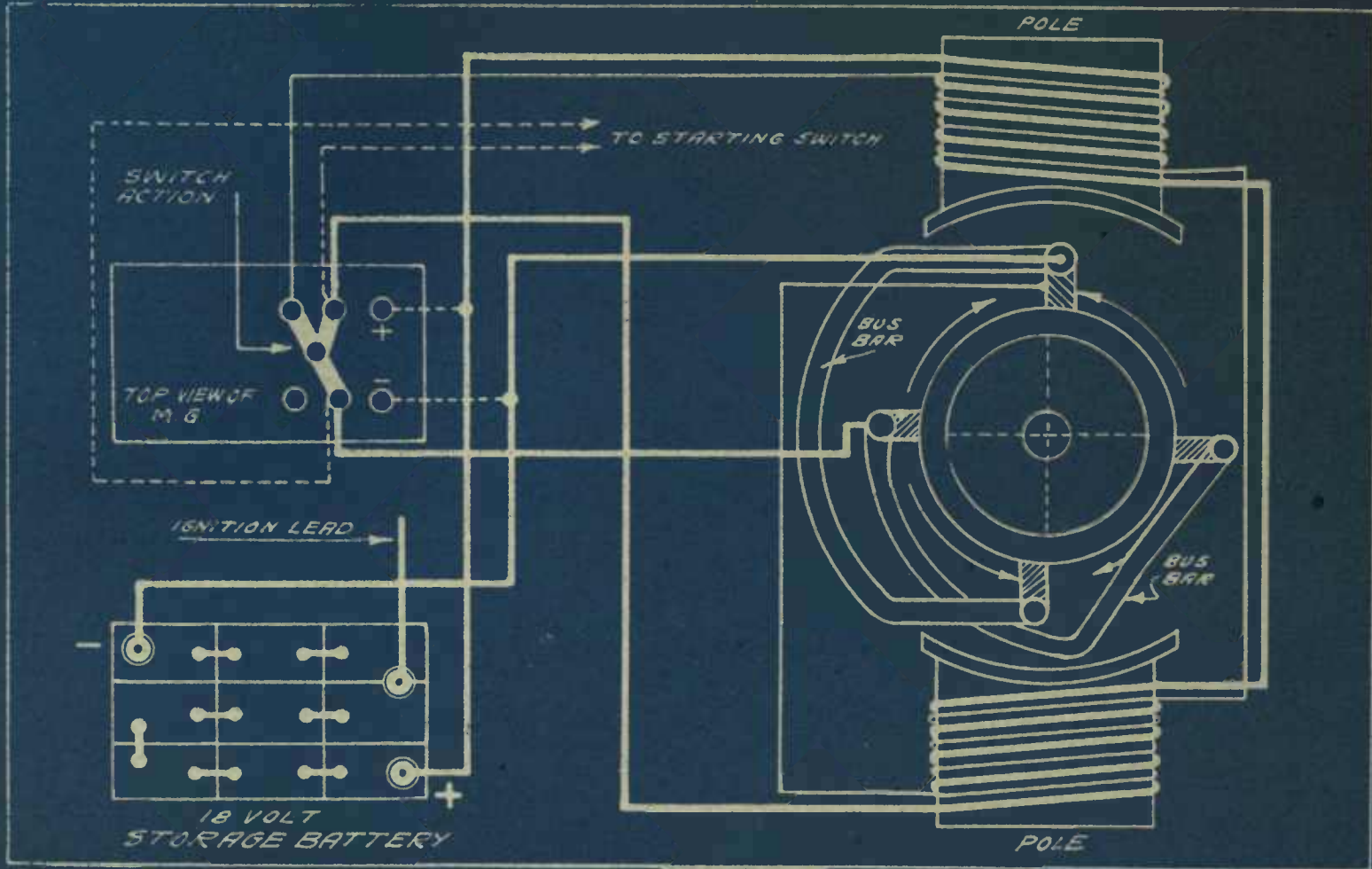
12 VOLT BATTERY

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DYNETO-ENTZ INTERNAL CIRCUITS

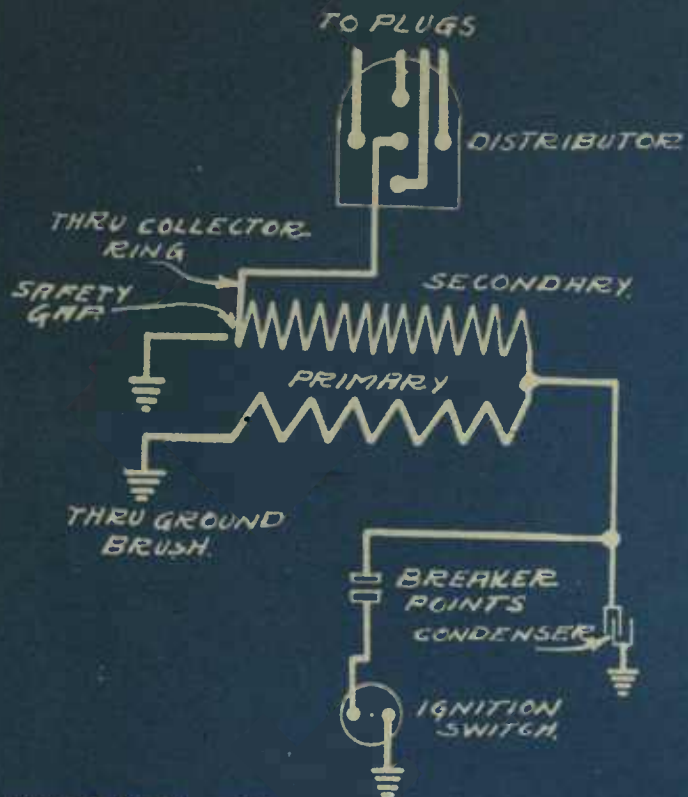
CHALMERS AND WHITE INSTALLATION.

FROM SKETCH BY A.J.P.

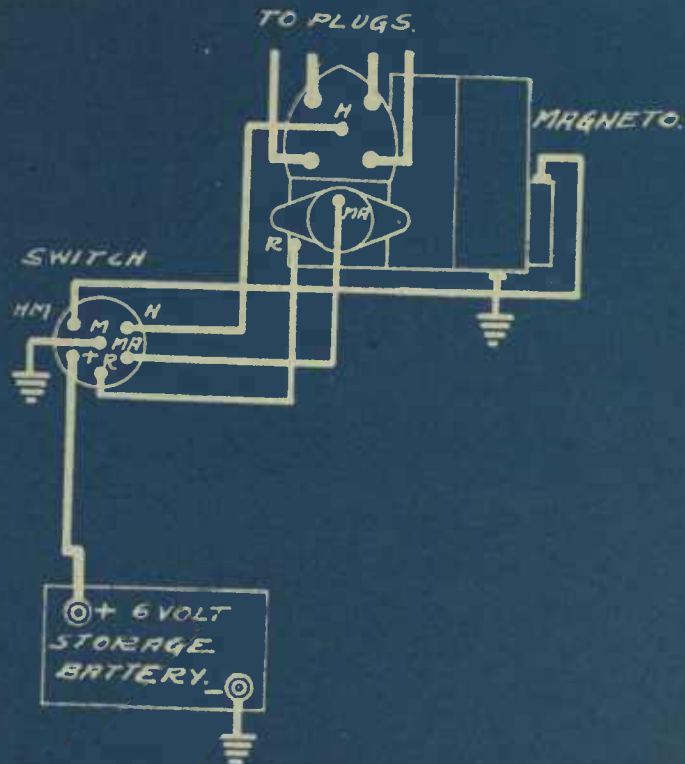


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EISEMANN MAGNETOS



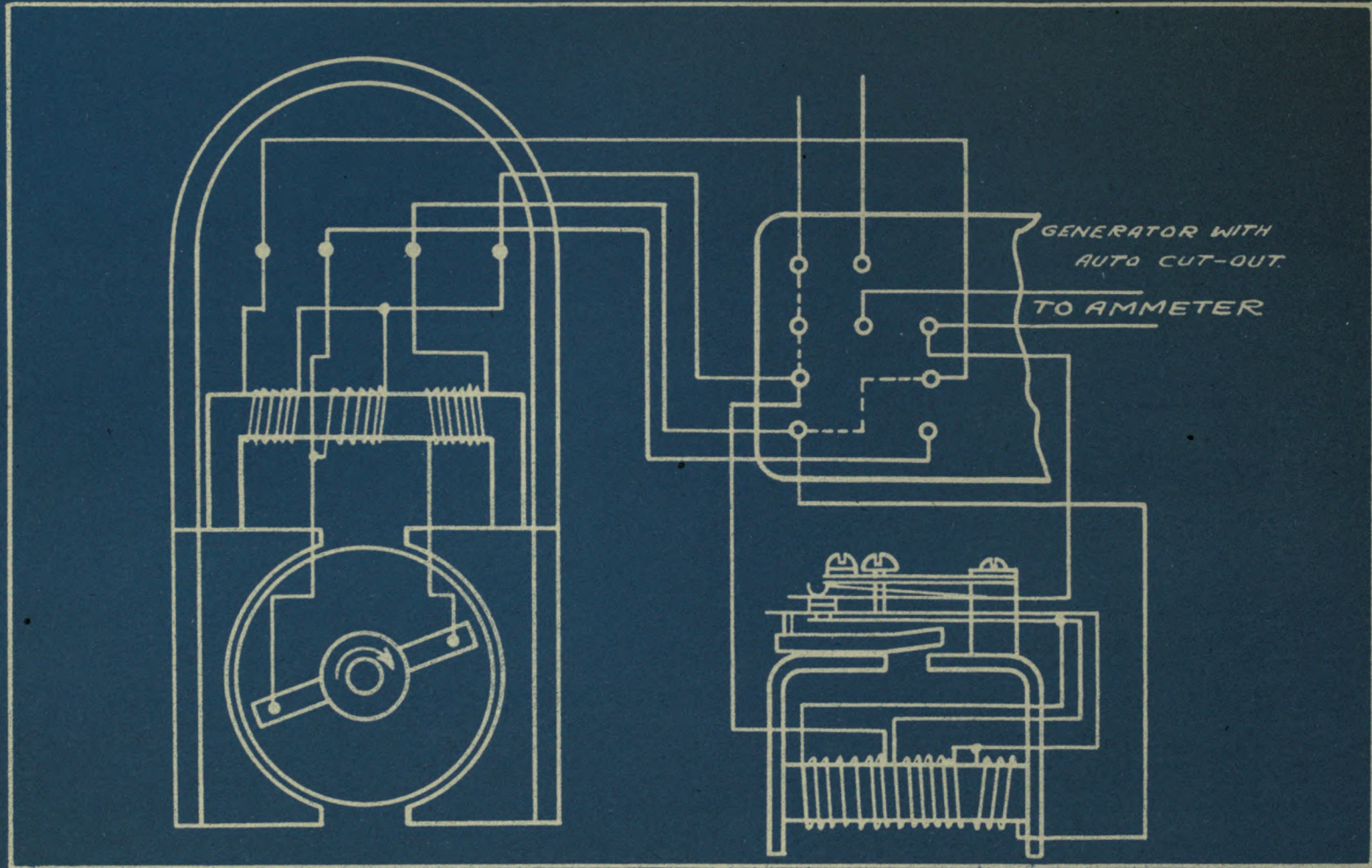
INTERNAL CIRCUITS EISEMANN
Q4 MAGNETO.
FROM ENGINEER'S SKETCH.



EXTERNAL CIRCUITS EISEMANN
EM MAGNETO. DUAL IGNITION.
FROM EISEMANN INSTR. BK.

ESTERLINE INTERNAL CIRCUITS

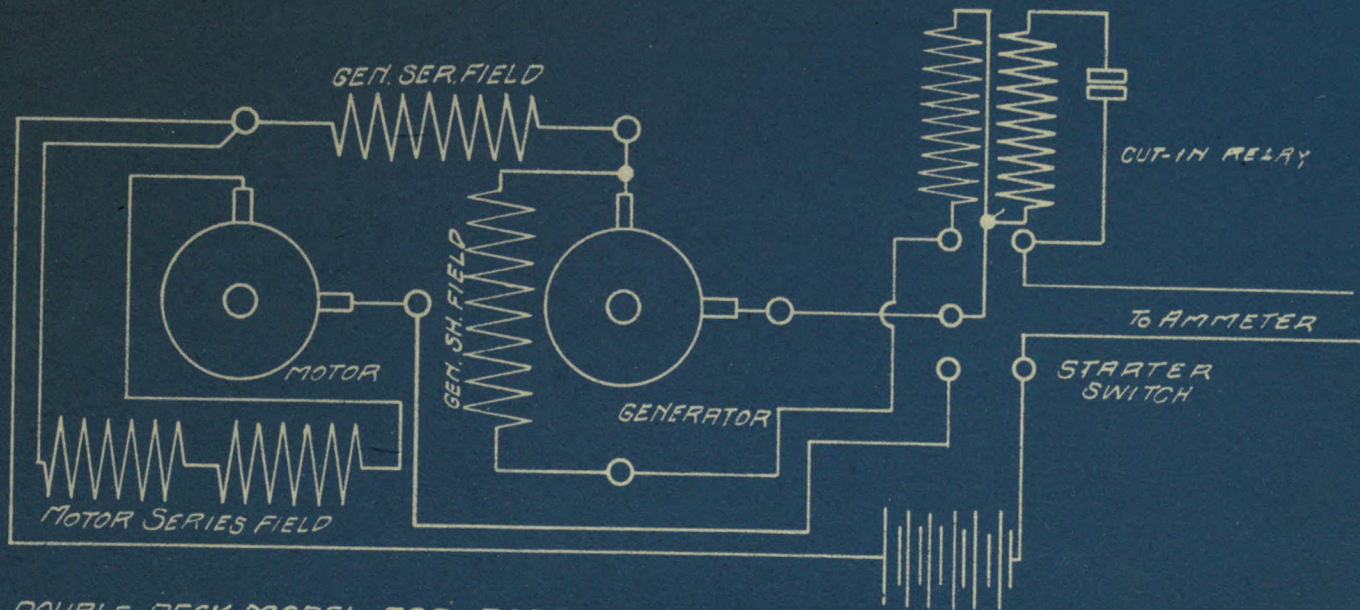
FROM MFRS. B.-P. 834



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FISCHER INTERNAL CIRCUITS

PERSONAL RECORDS - D.M.P.

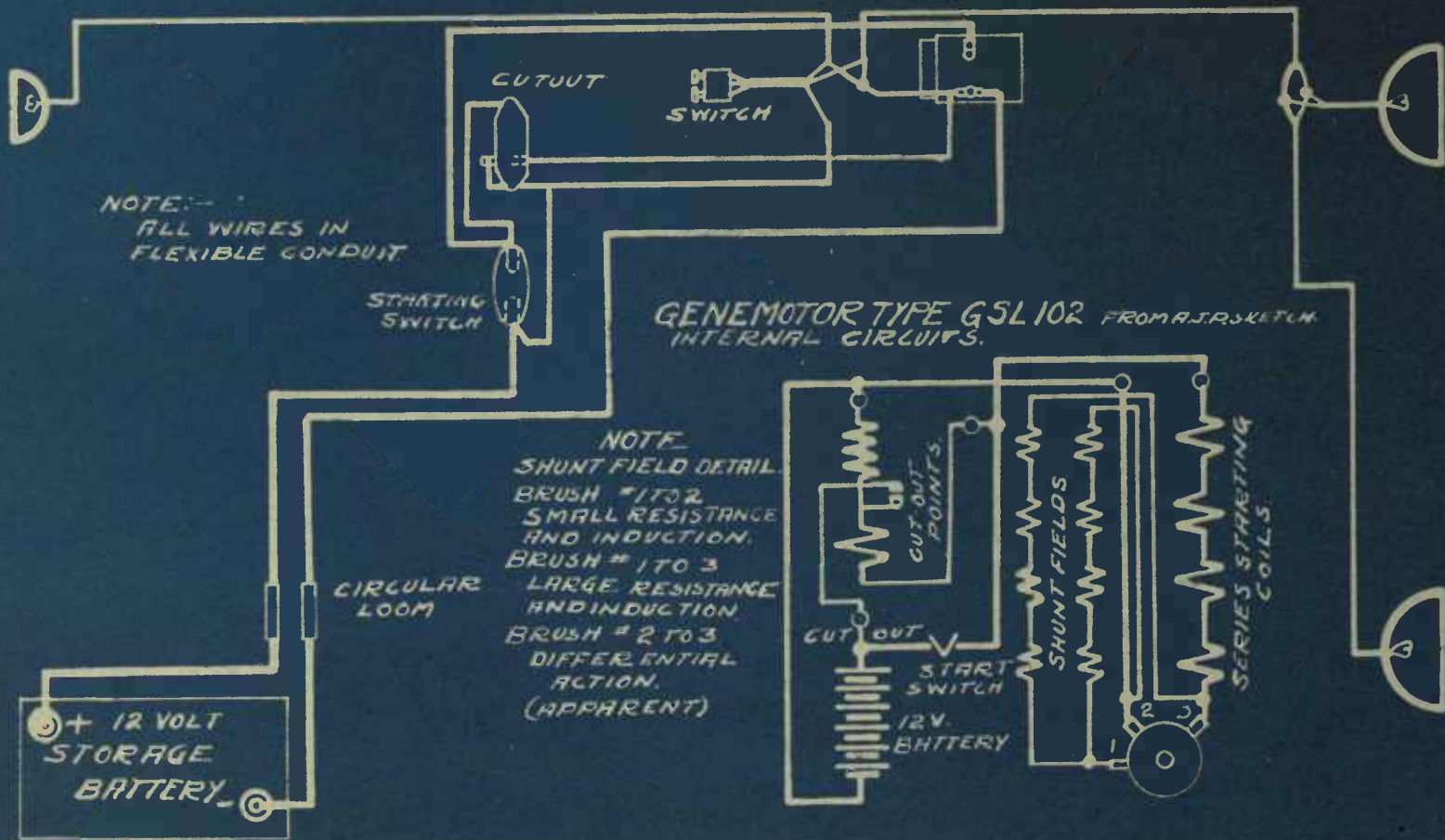


DOUBLE DECK MODEL FOR FORDS

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GENEMOTOR TYPE GSL102 WIRING AND INTERNAL CIRCUITS

FROM GSL 102 INSTR. BK.

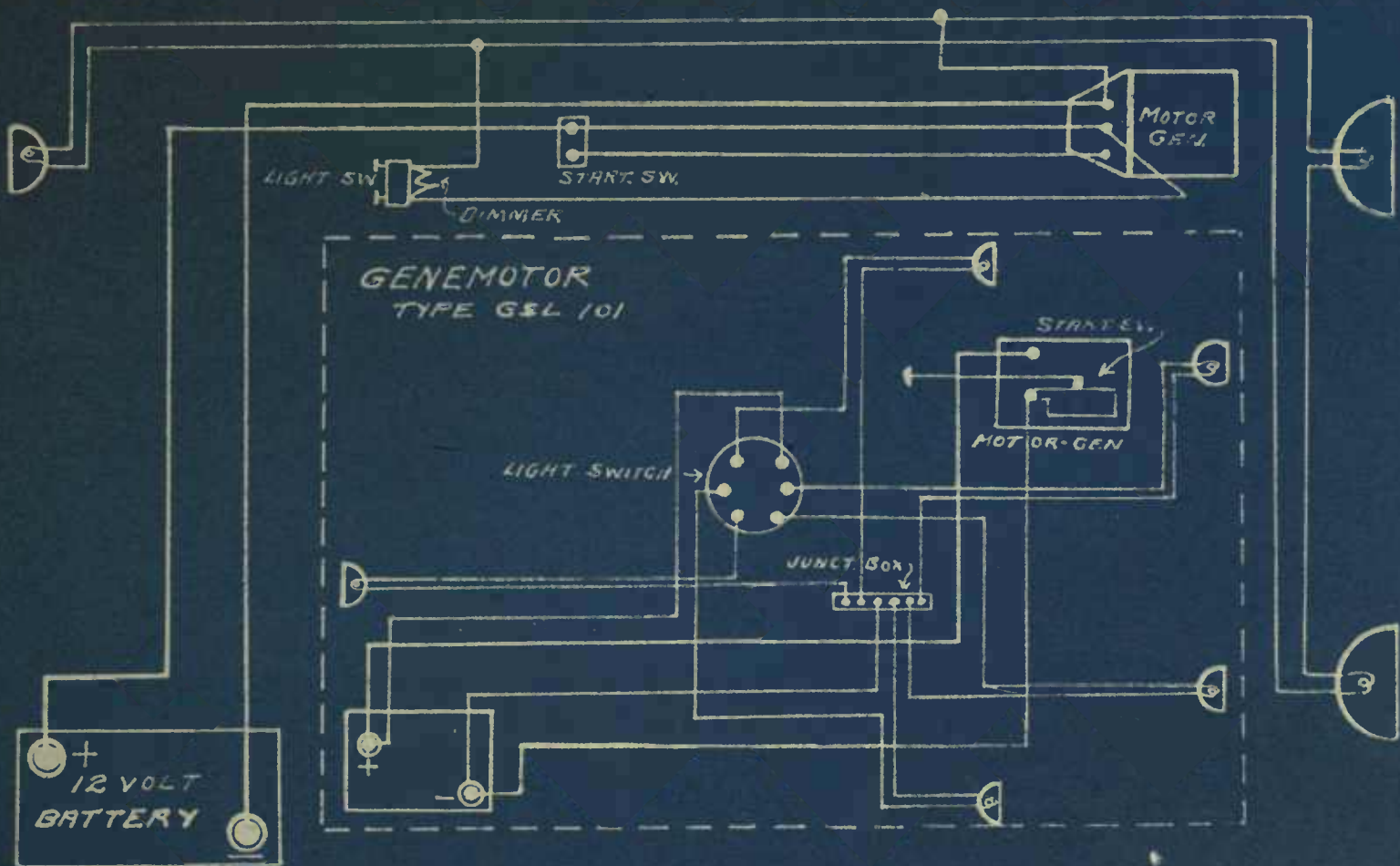


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FORD

GENEMOTOR SYSTEM TYPE G5L 103

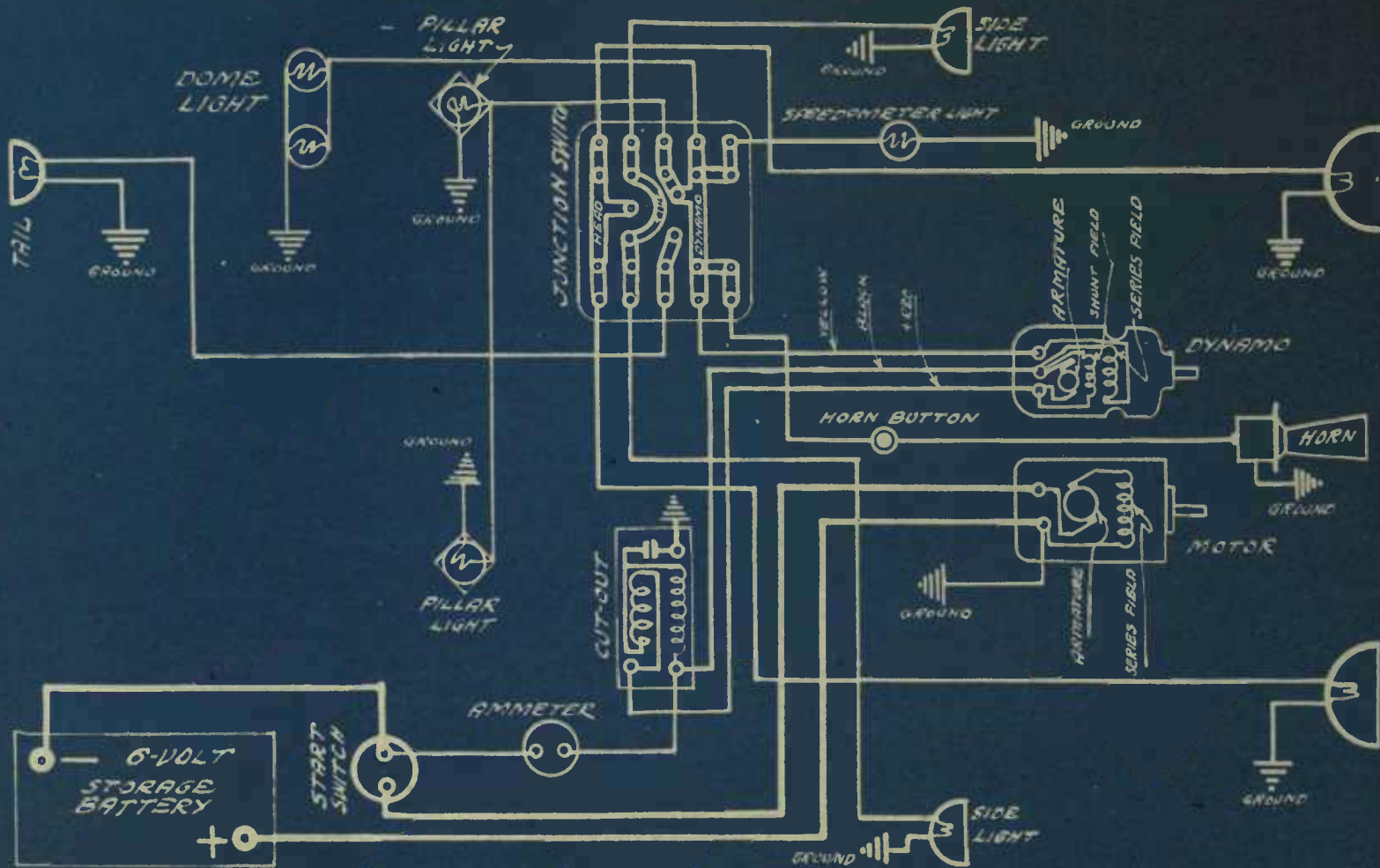
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GRAY & DAVIS STANDARD GROUNDED SYSTEM 1913-1914

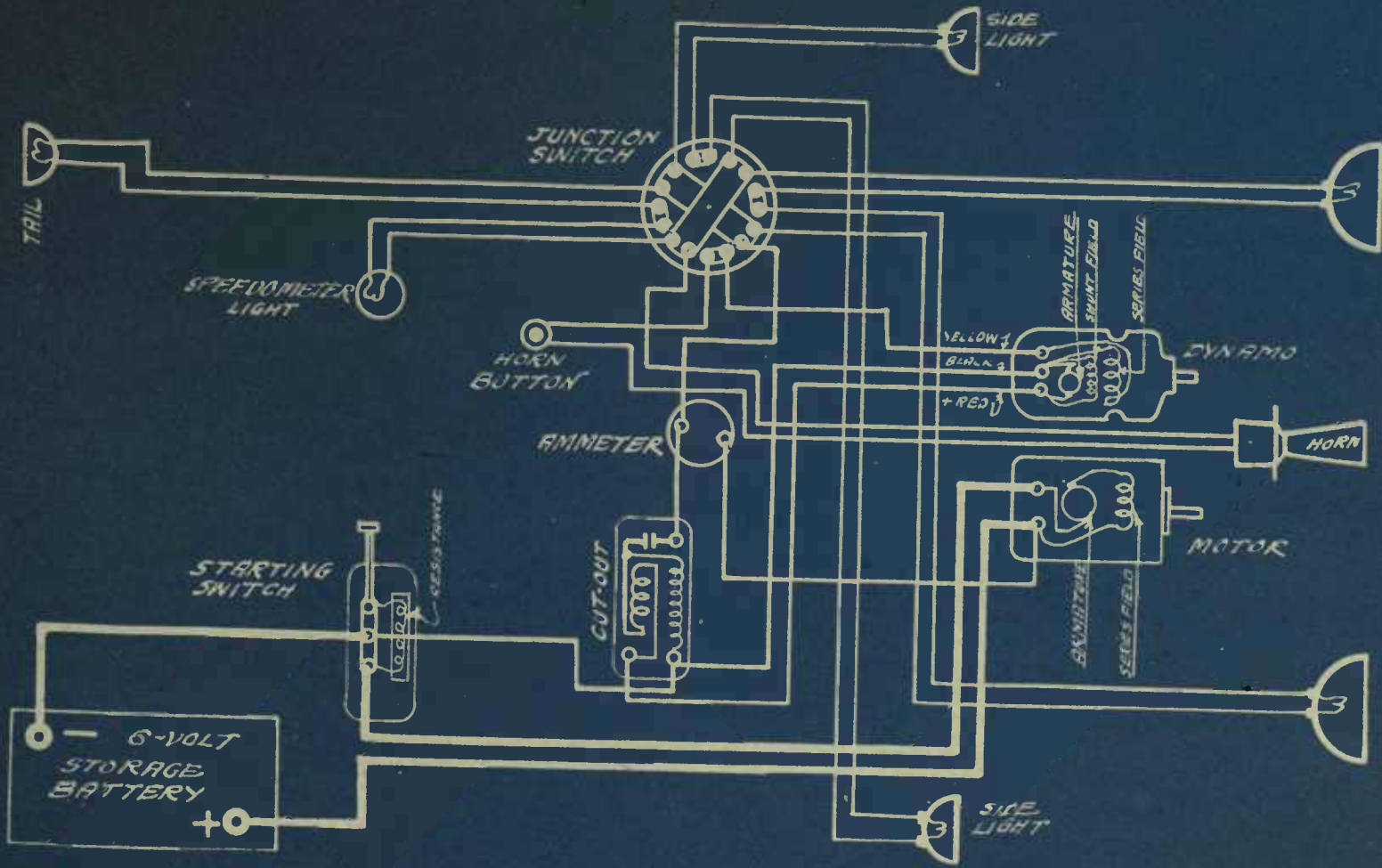
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GRAY & DAVIS STANDARD 2 WIRE SYSTEM 1913-1914

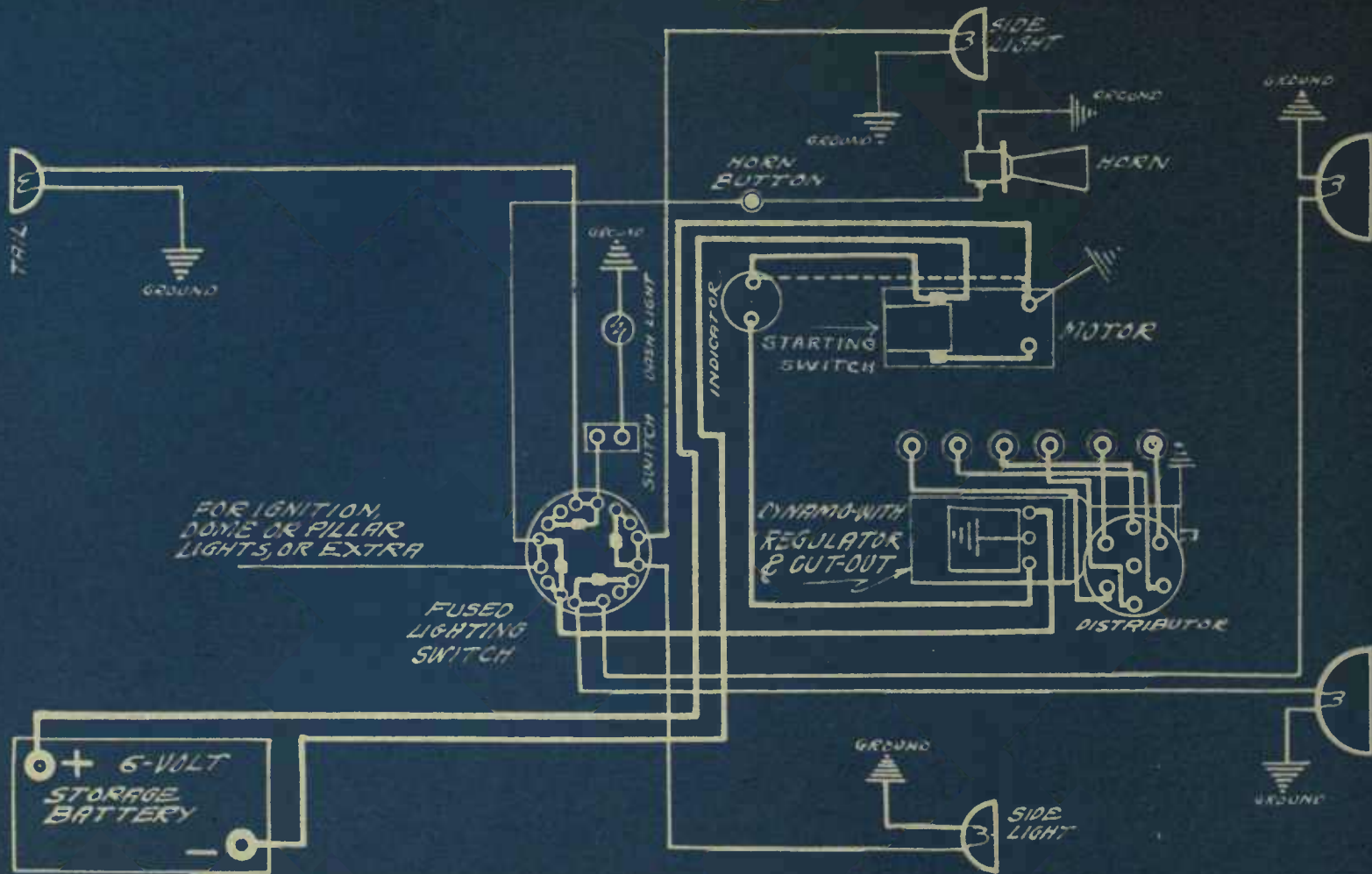
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GRAY & DAVIS STANDARD GROUNDED SYSTEM 1915

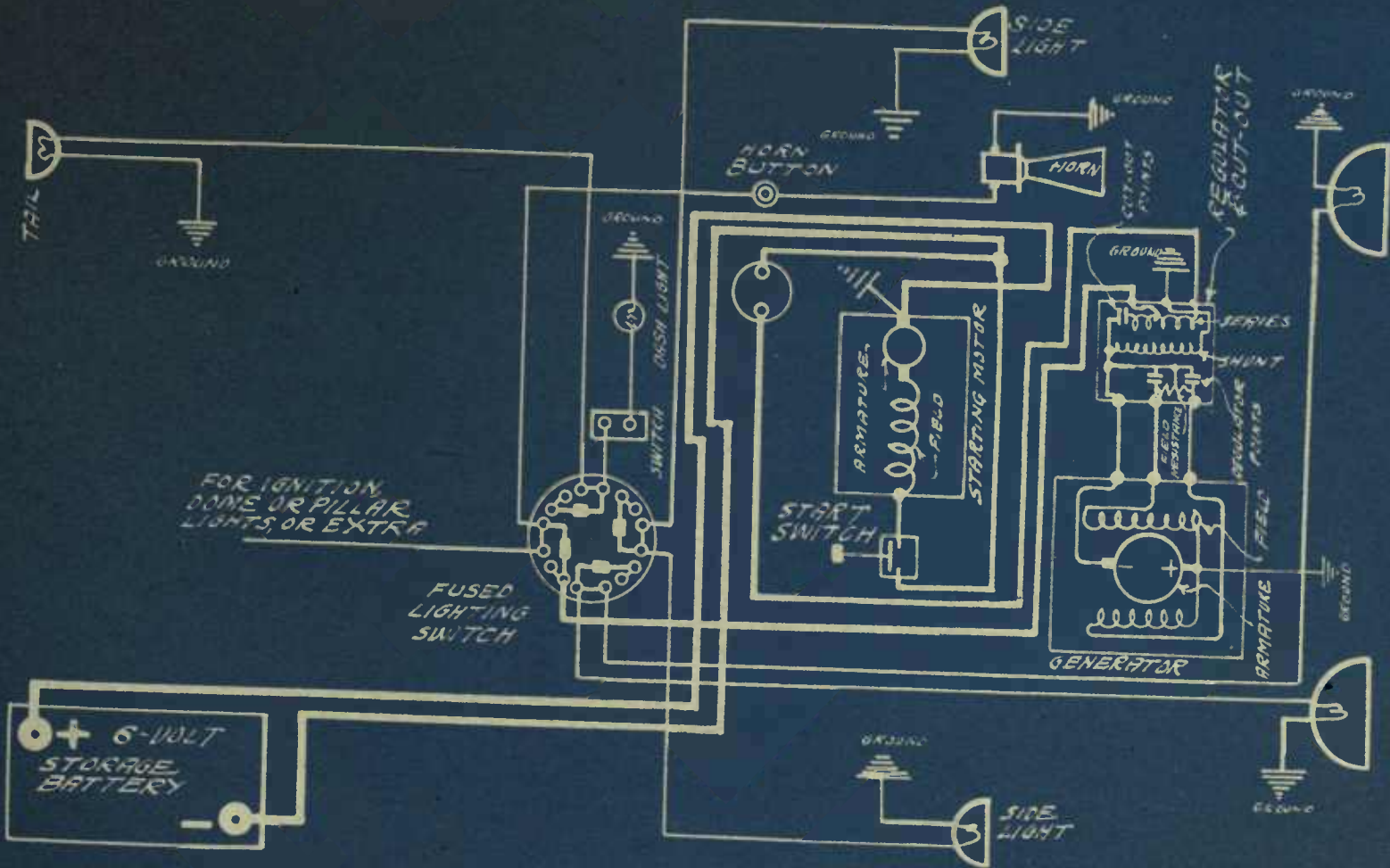
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GRAY & DAVIS STANDARD GROUNDED SYSTEM 1915 INTERNAL WIRING

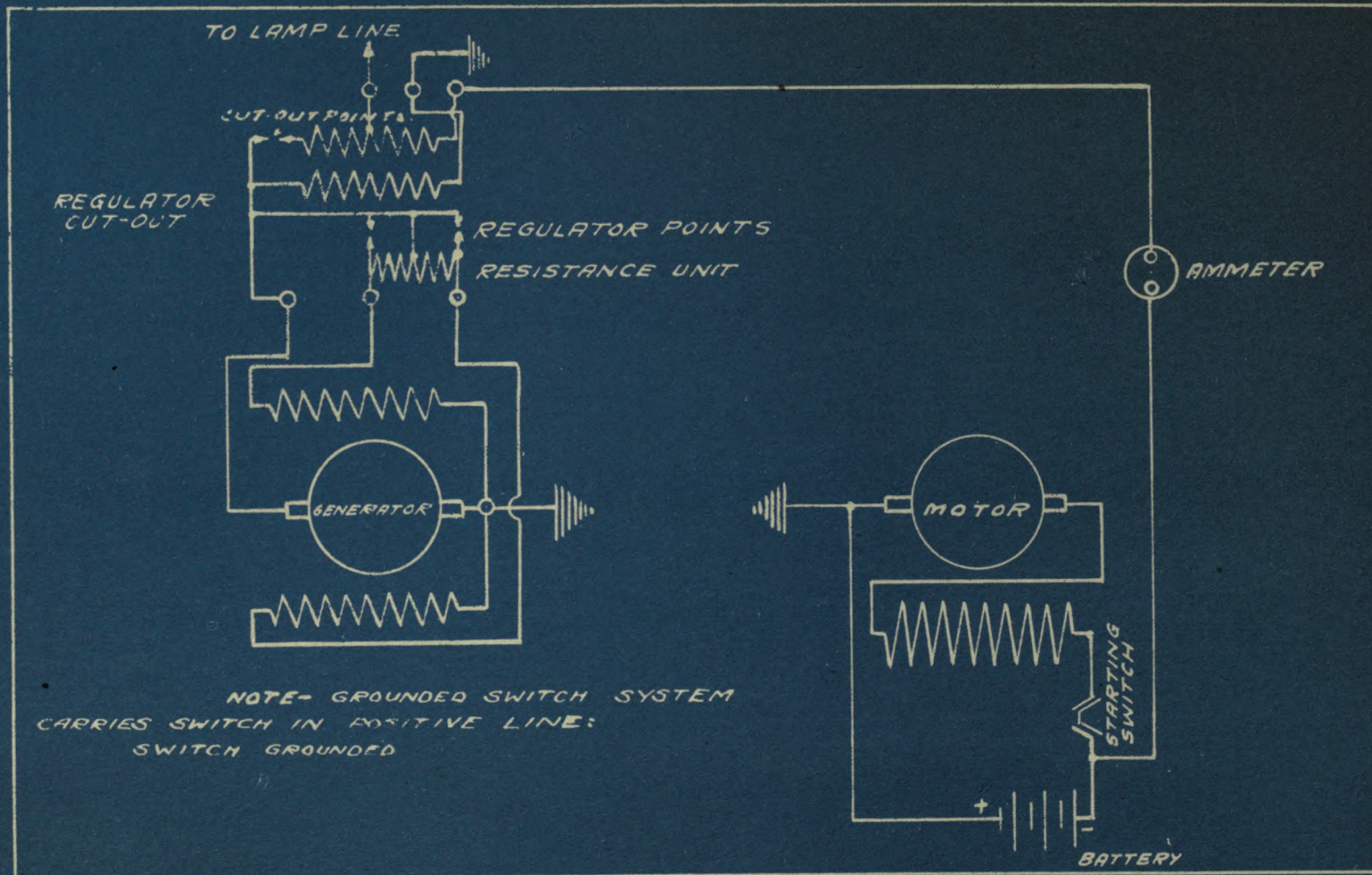
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GRAY & DAVIS TWO UNIT INTERNAL CIRCUITS

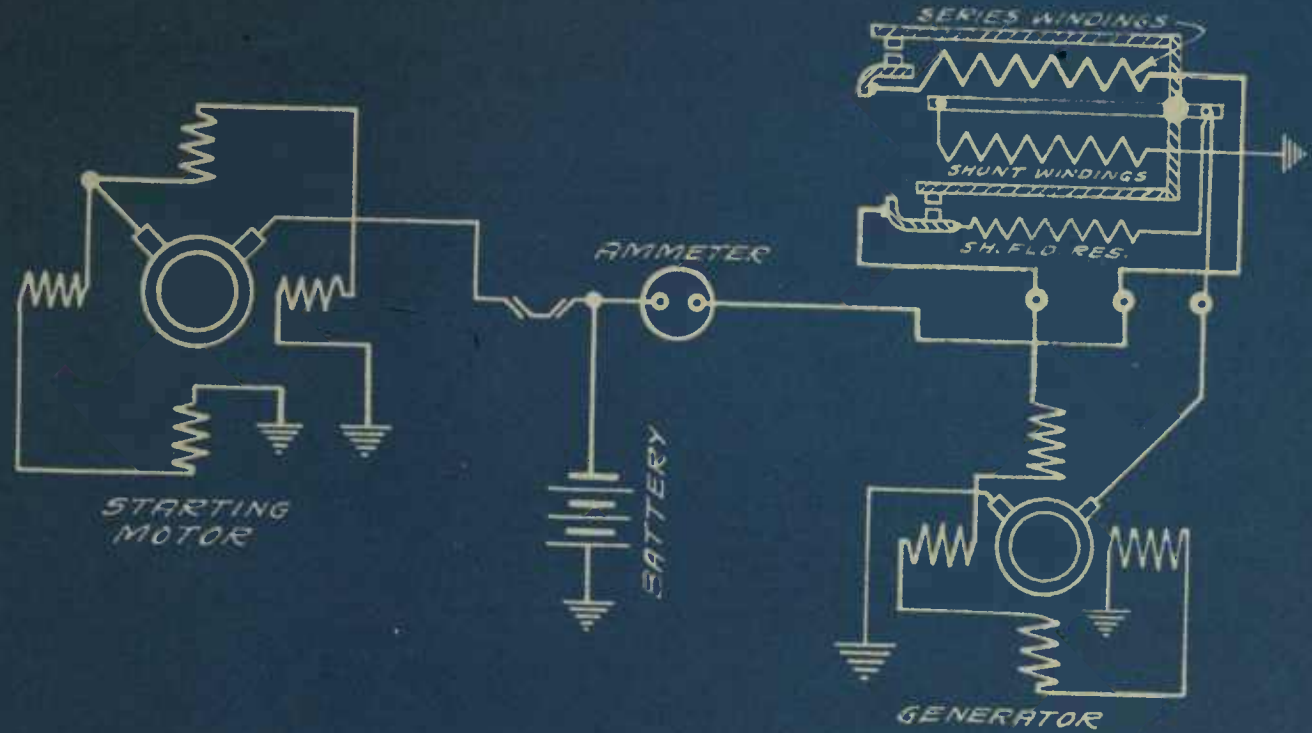
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HEINZE-SPRINGFIELD INTERNAL CIRCUITS TWO UNIT SYSTEM

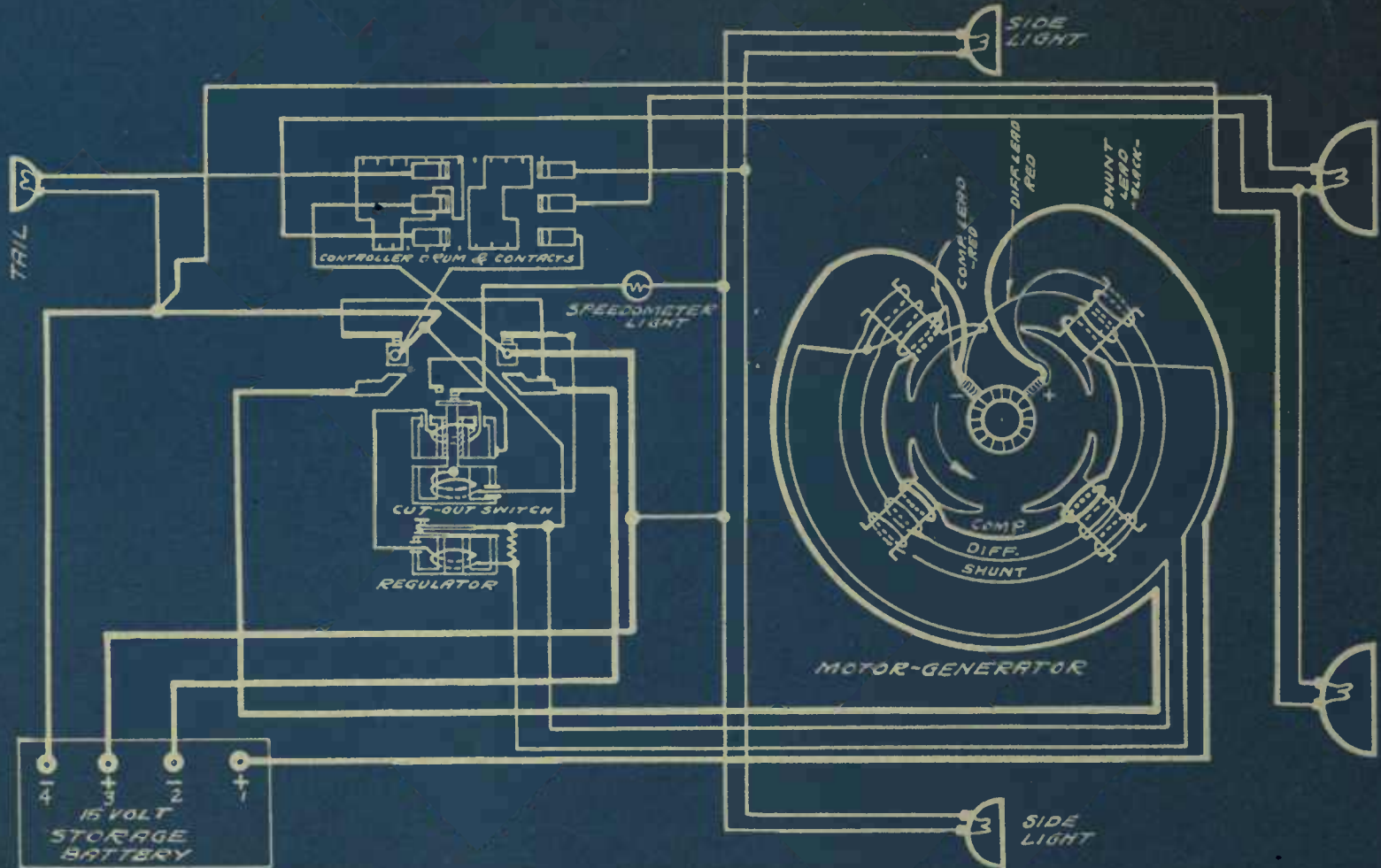
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JESCO INTERNAL CIRCUITS

FROM JESCO DIAGRAM M-774

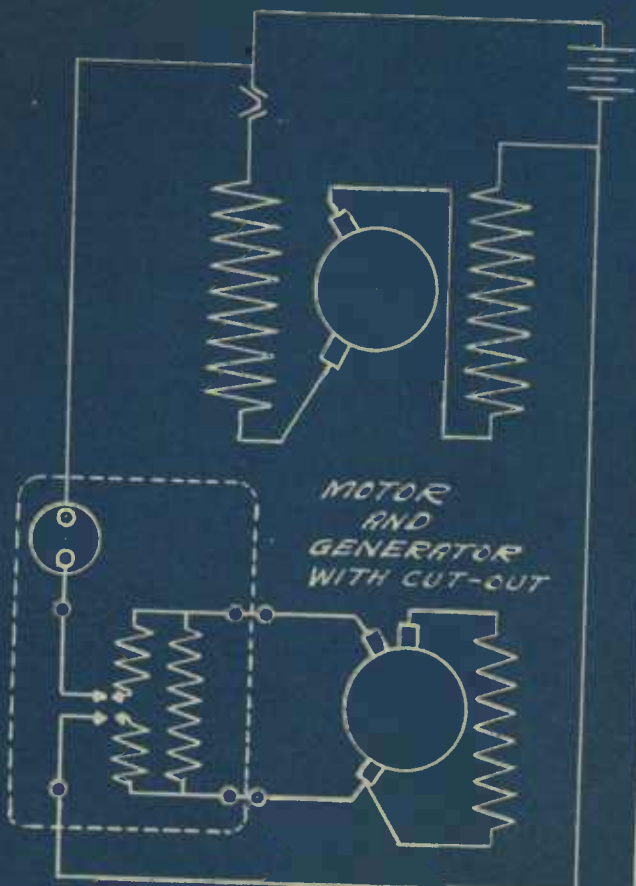
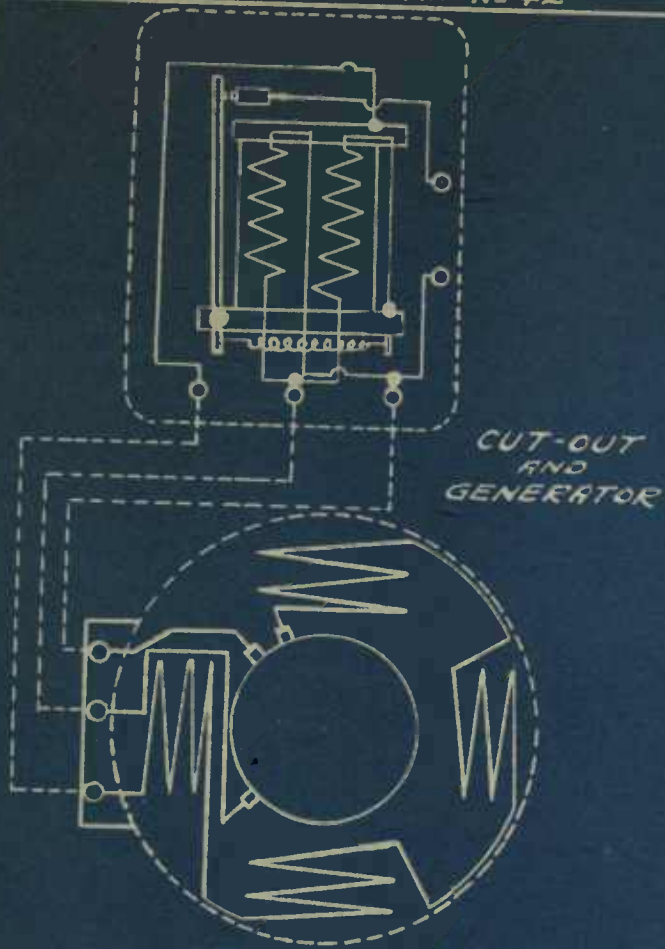


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LEECE-NEVILLE INTERNAL CIRCUITS

FROM L.-N. BULLETIN No 42

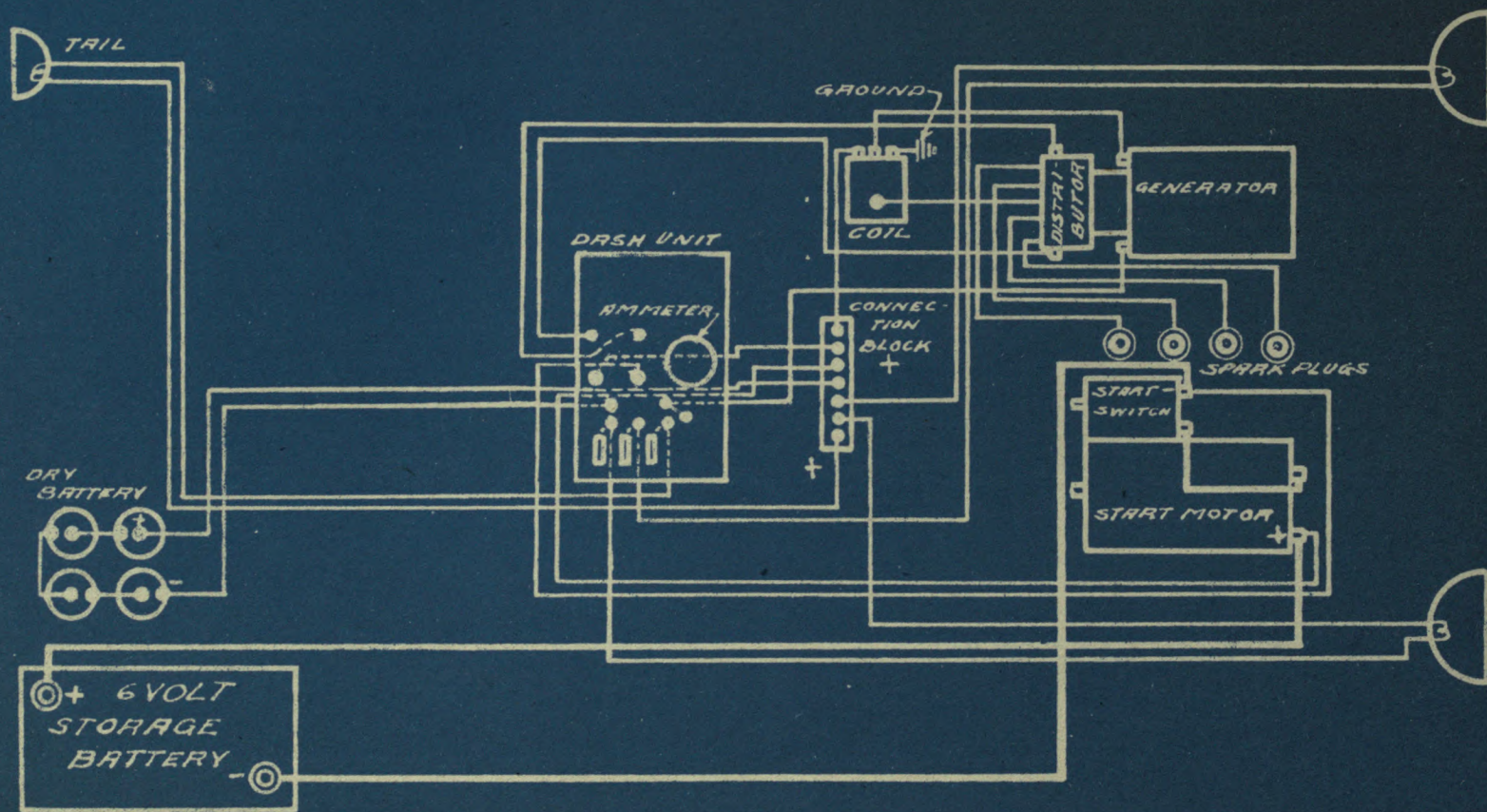
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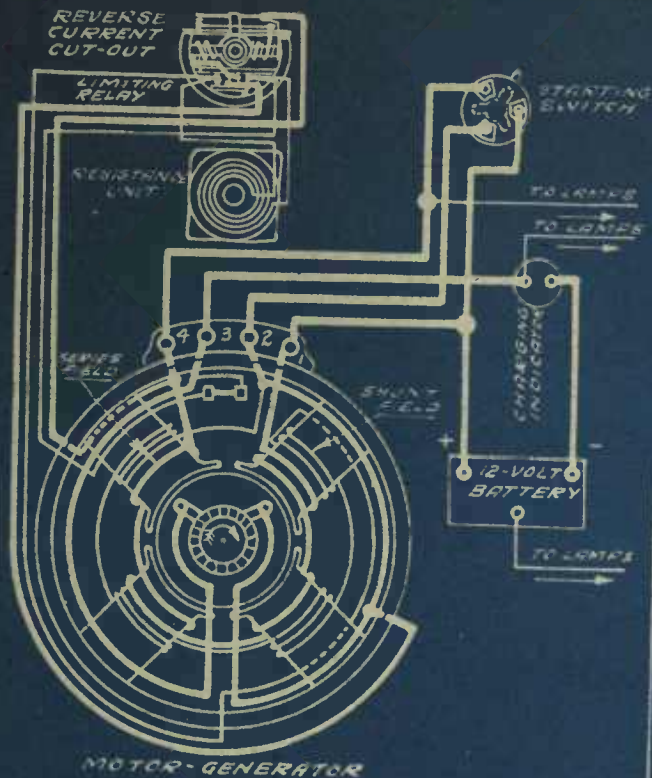
NATIONAL WIRING SYSTEM STANDARD DIAGRAM

FROM NATIONAL DIAGRAM

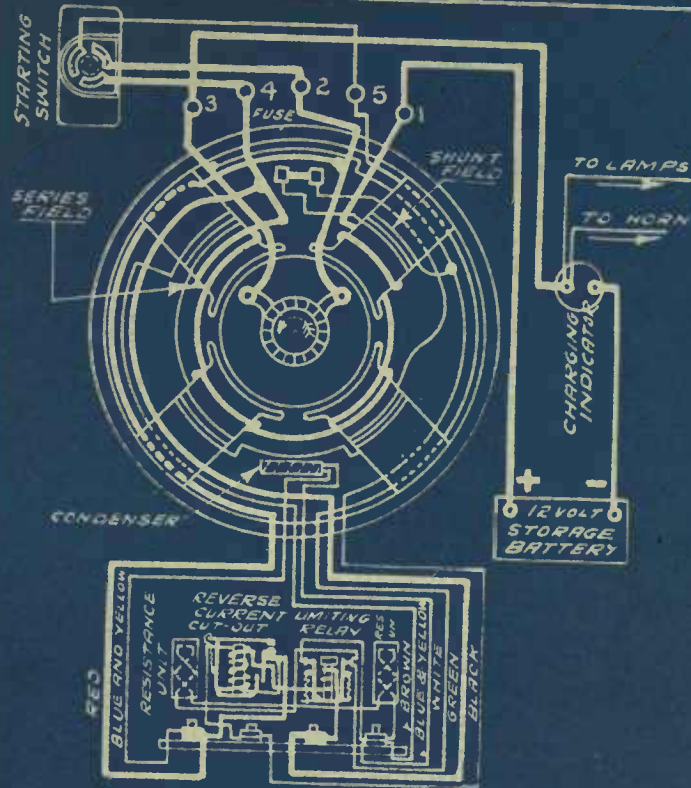


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NORTH EAST INTERNAL CIRCUITS



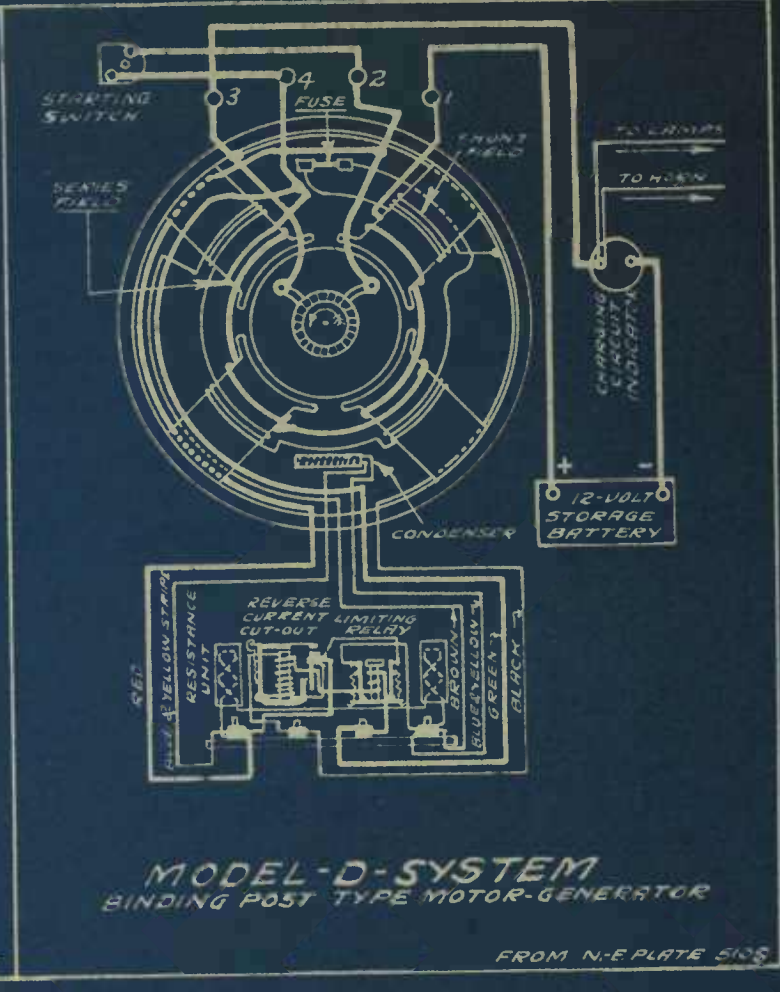
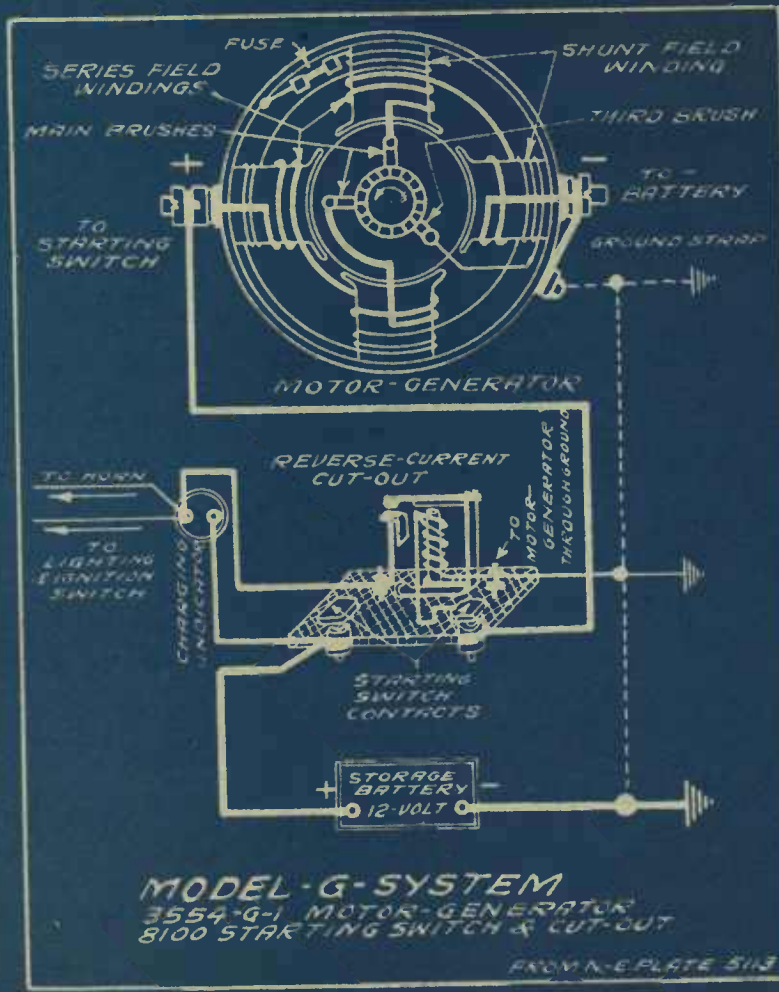
MODEL-A-SYSTEM
POLARIZED RELAY TYPE MOTOR-GENERATOR



MODEL-B-SYSTEM

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NORTH EAST INTERNAL CIRCUITS

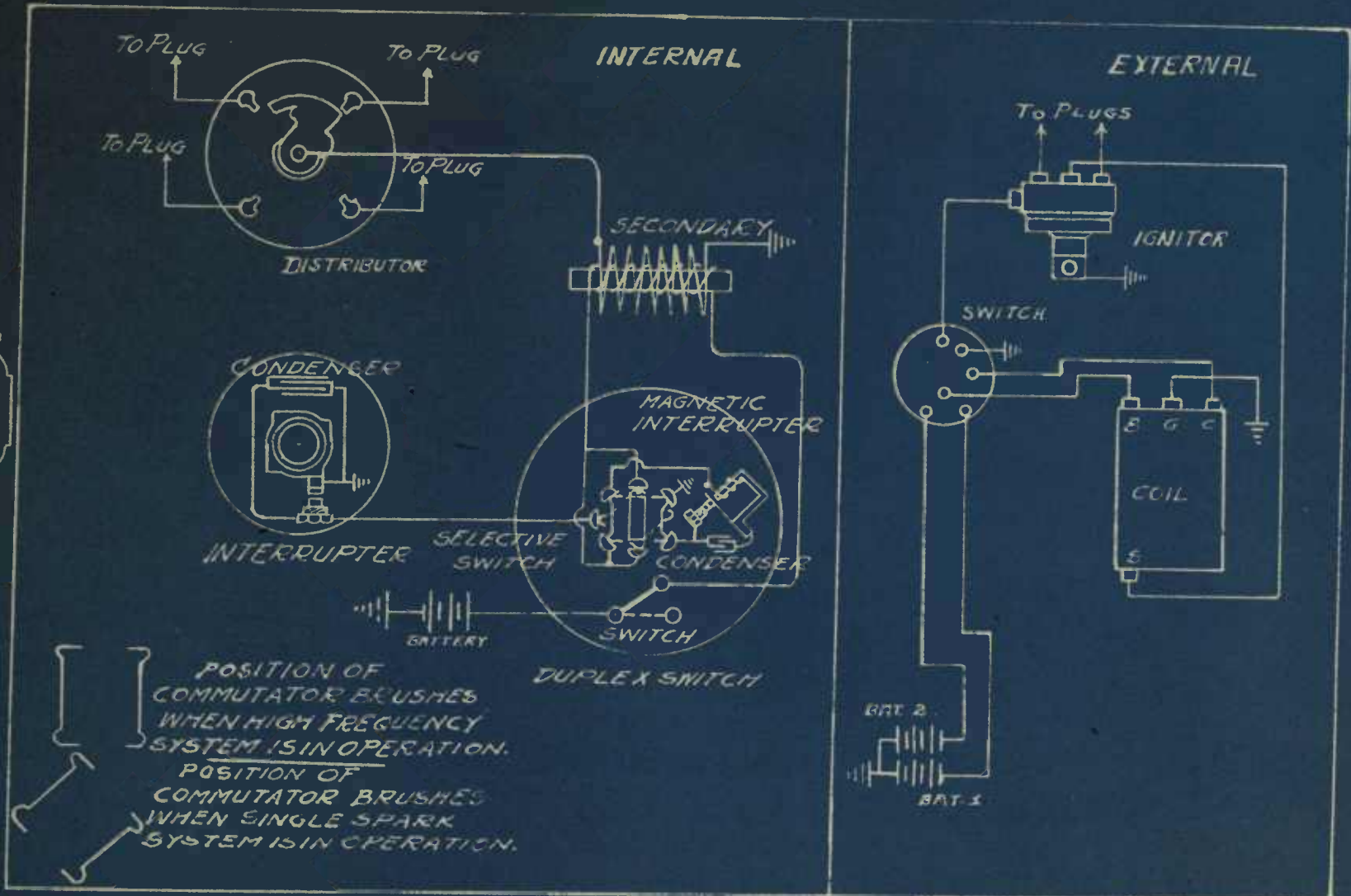


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PHILBRIN DUPLEX IGNITION SYSTEM

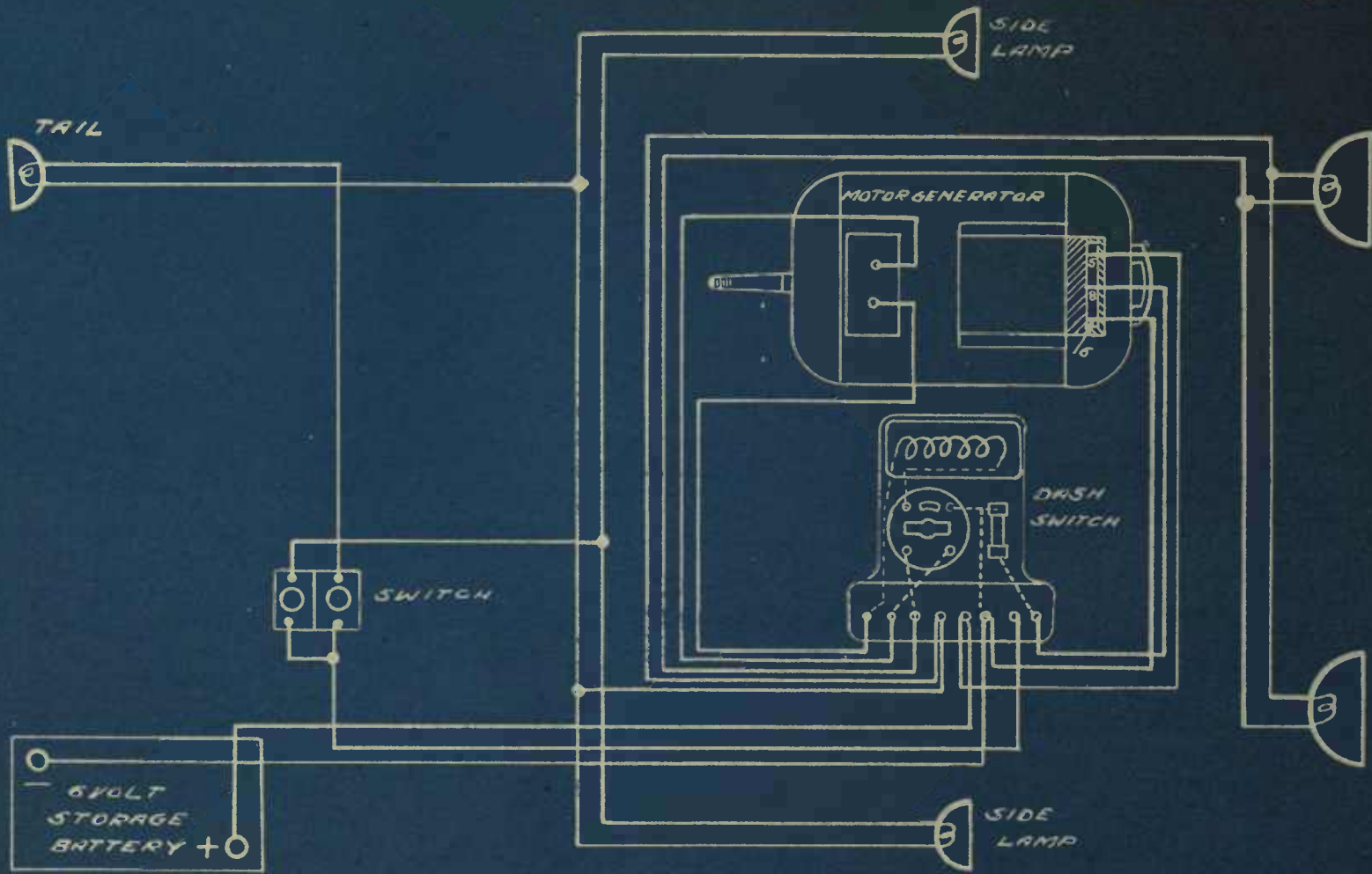
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RUSHMORE STANDARD WIRING

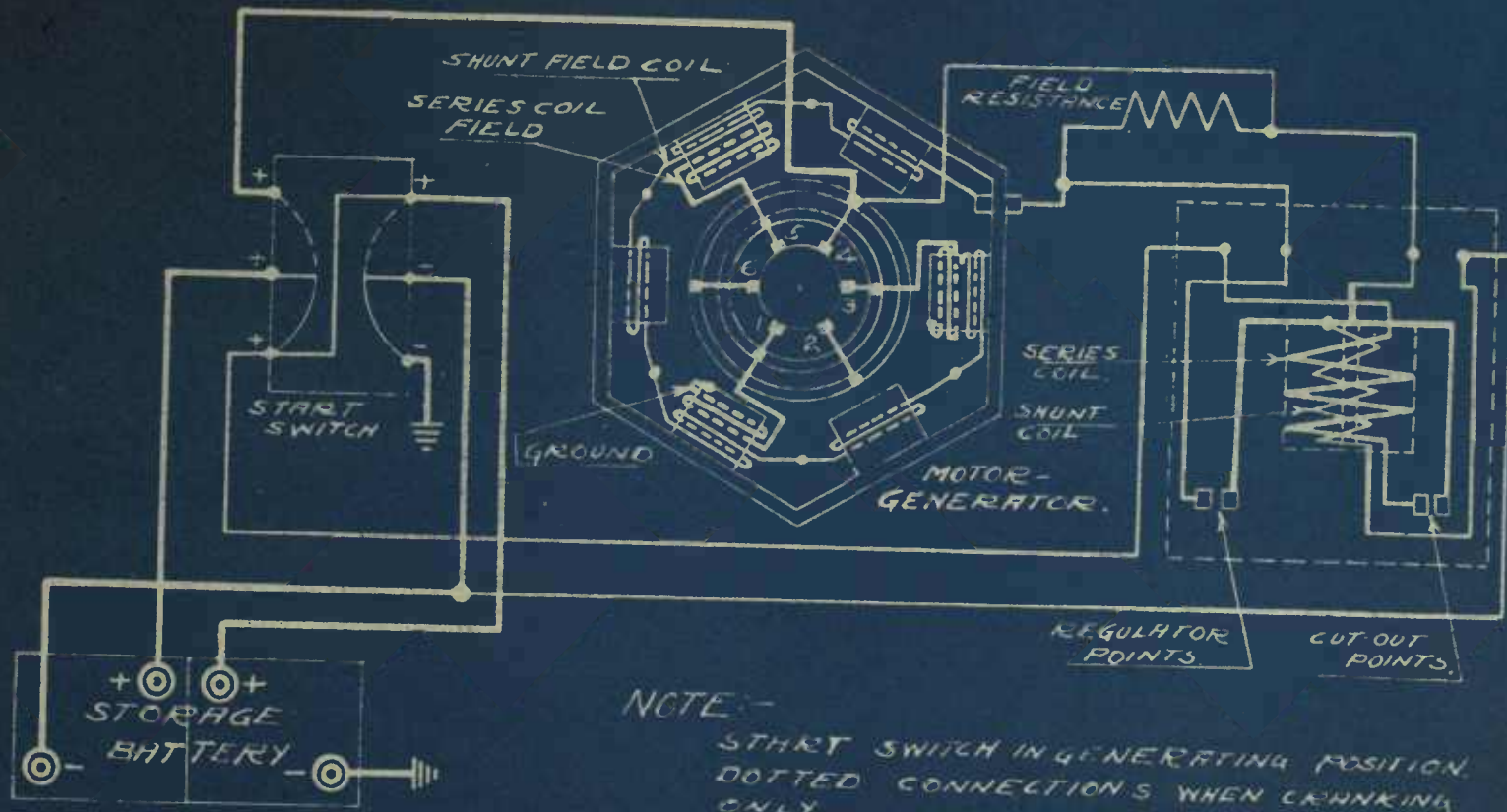
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SIMMS-HUFF INTERNAL CIRCUITS

FROM ENGINEER'S SKETCH

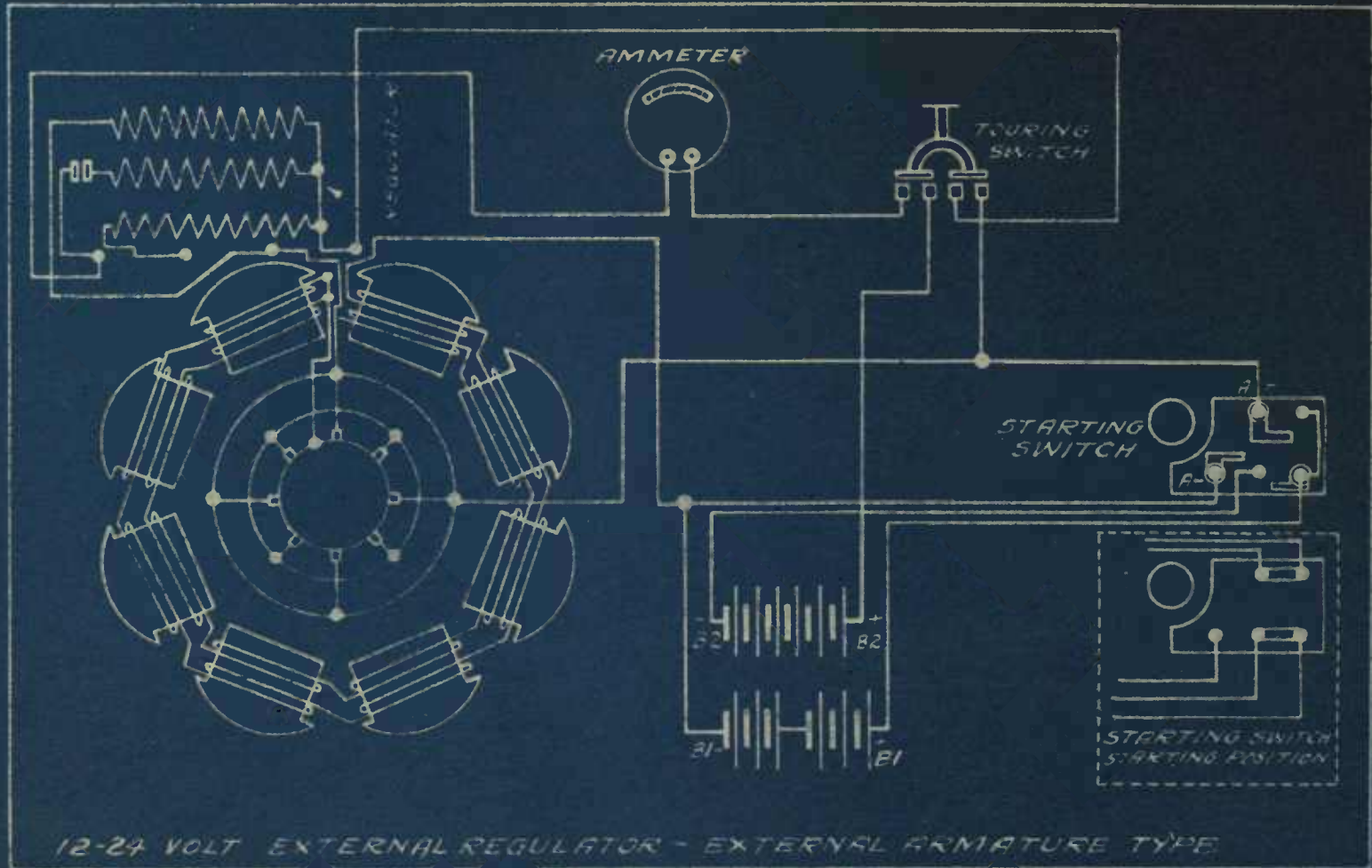


NOTE:-
START SWITCH IN GENERATING POSITION.
DOTTED CONNECTIONS WHEN CRANKING ONLY.

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U.S.L. INTERNAL CIRCUITS

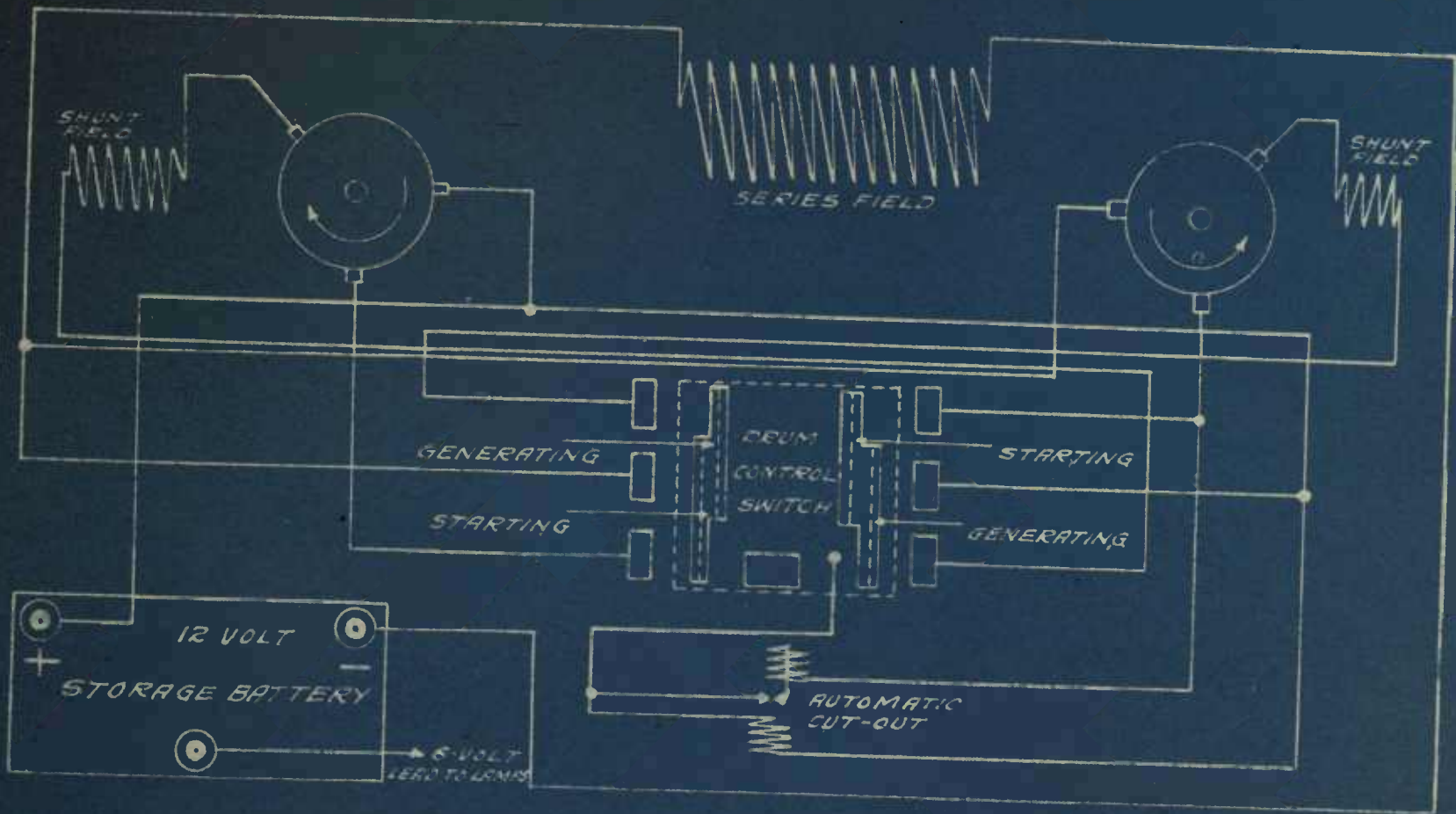
FROM SKETCH BY DMP



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WAGNER INTERNAL CIRCUITS

12 VOLT SINGLE UNIT MOTOR-GENERATOR-EARLY MODELS
FROM SKETCH BY A.T.P.



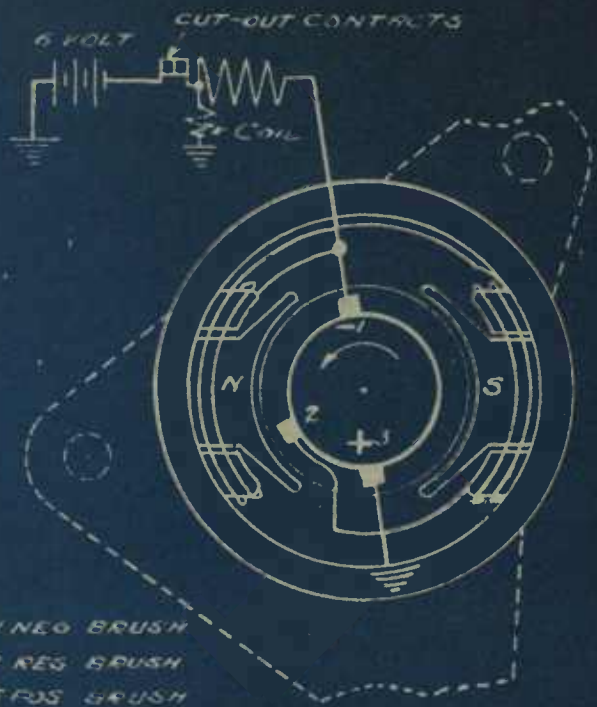
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WAGNER INTERNAL CIRCUITS

FROM MFRS. BPS. 3367-3368



MODEL 36-T MOTOR



1 NEG BRUSH
2 RES BRUSH
3 POS BRUSH

MODEL 45-T GENERATOR

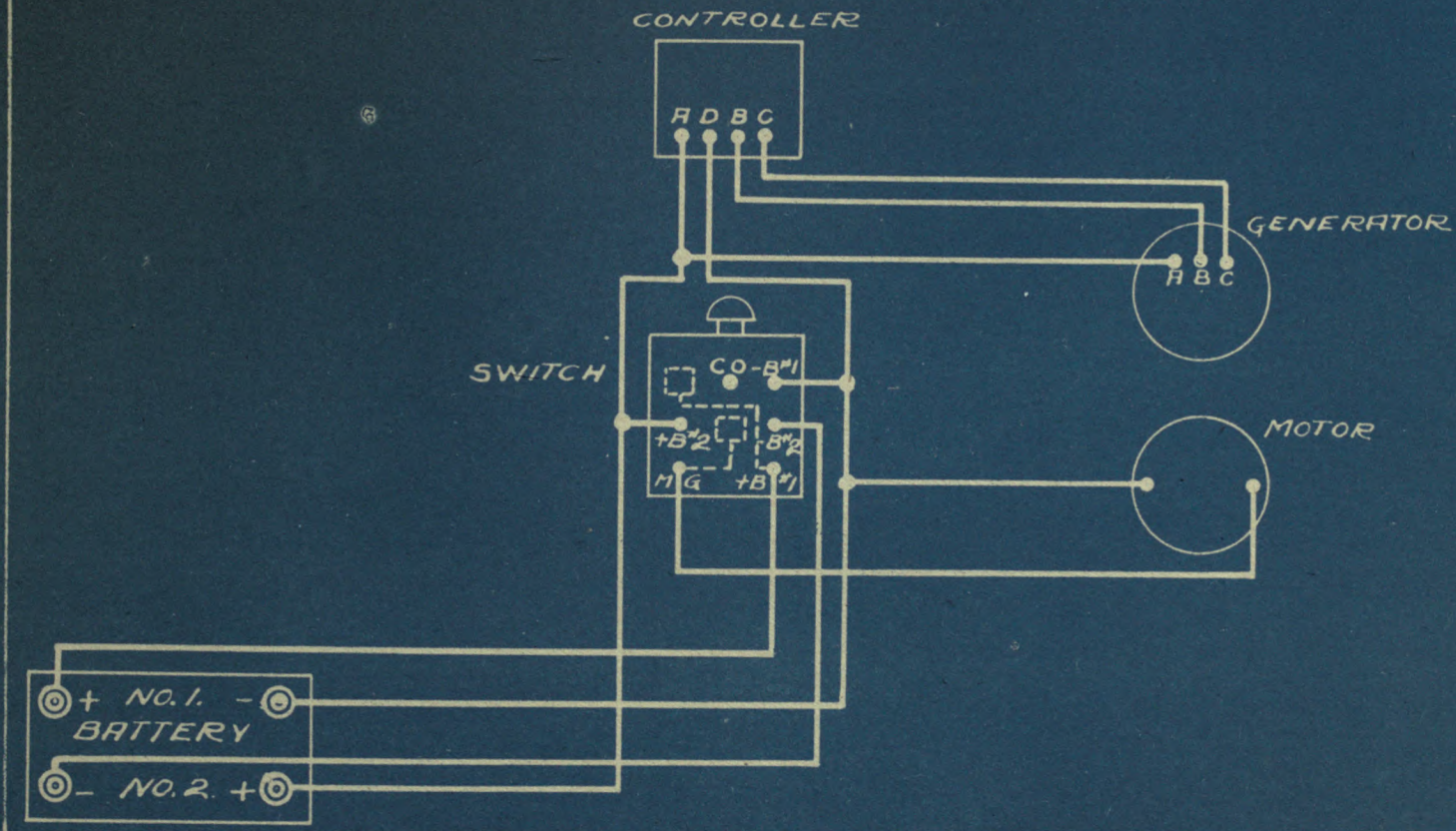
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WAGNER WARD-LEONARD

STARTING SYSTEM TWO UNIT 6-12 VOLT.

FROM MFGR. B.P.

AS INSTALLED ON VARIOUS
MOTOR CARS AND TRUCKS
NOT ORIGINALLY EQUIPPED.

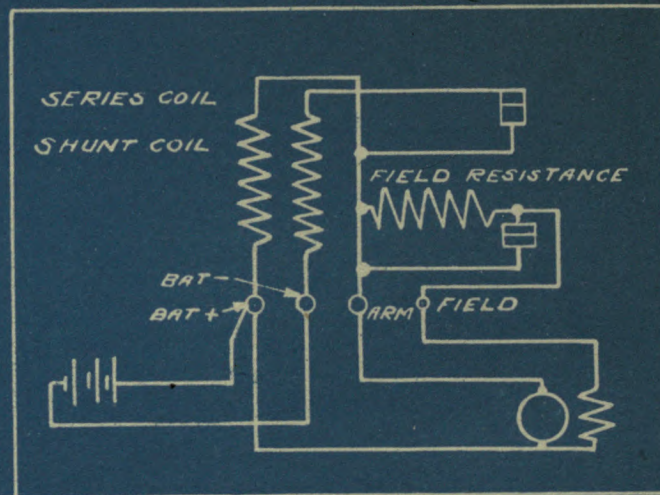
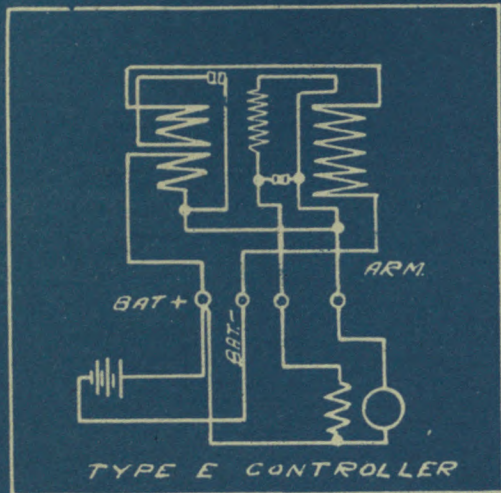


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WARD-LEONARD INTERNAL CIRCUITS

FROM WARD-LEONARD INST. BOOK

VOLTAGE REGULATORS

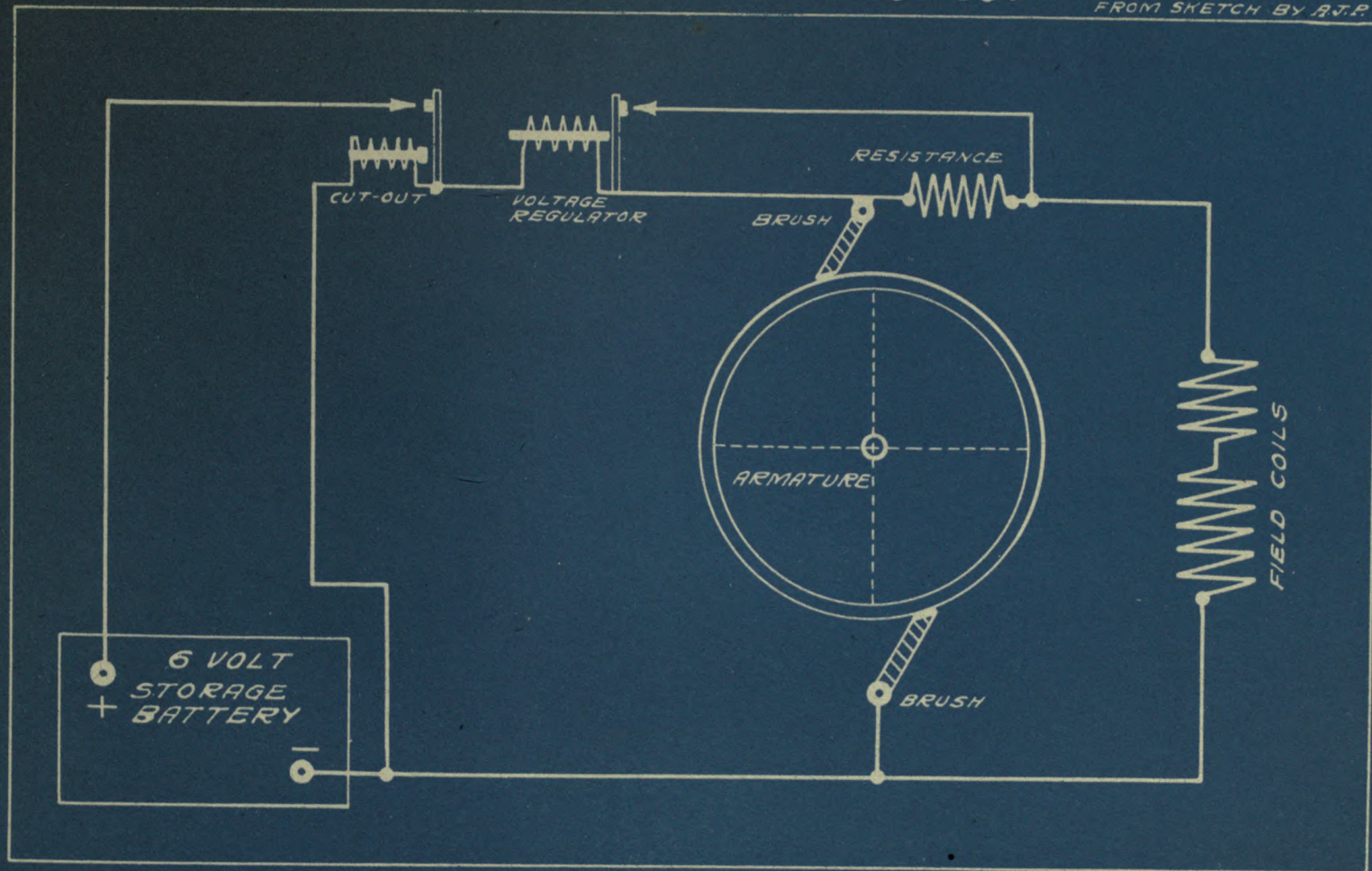


INTERNAL CIRCUITS OF TYPE CD CONTROLLER SAME AS TYPE CC
WITH RESISTANCE UNIT MOUNTED ON TOP

WARD-LEONARD INTERNAL CIRCUITS

GENERATOR WITH REGULATOR CUT-OUT

FROM SKETCH BY A.T.P.

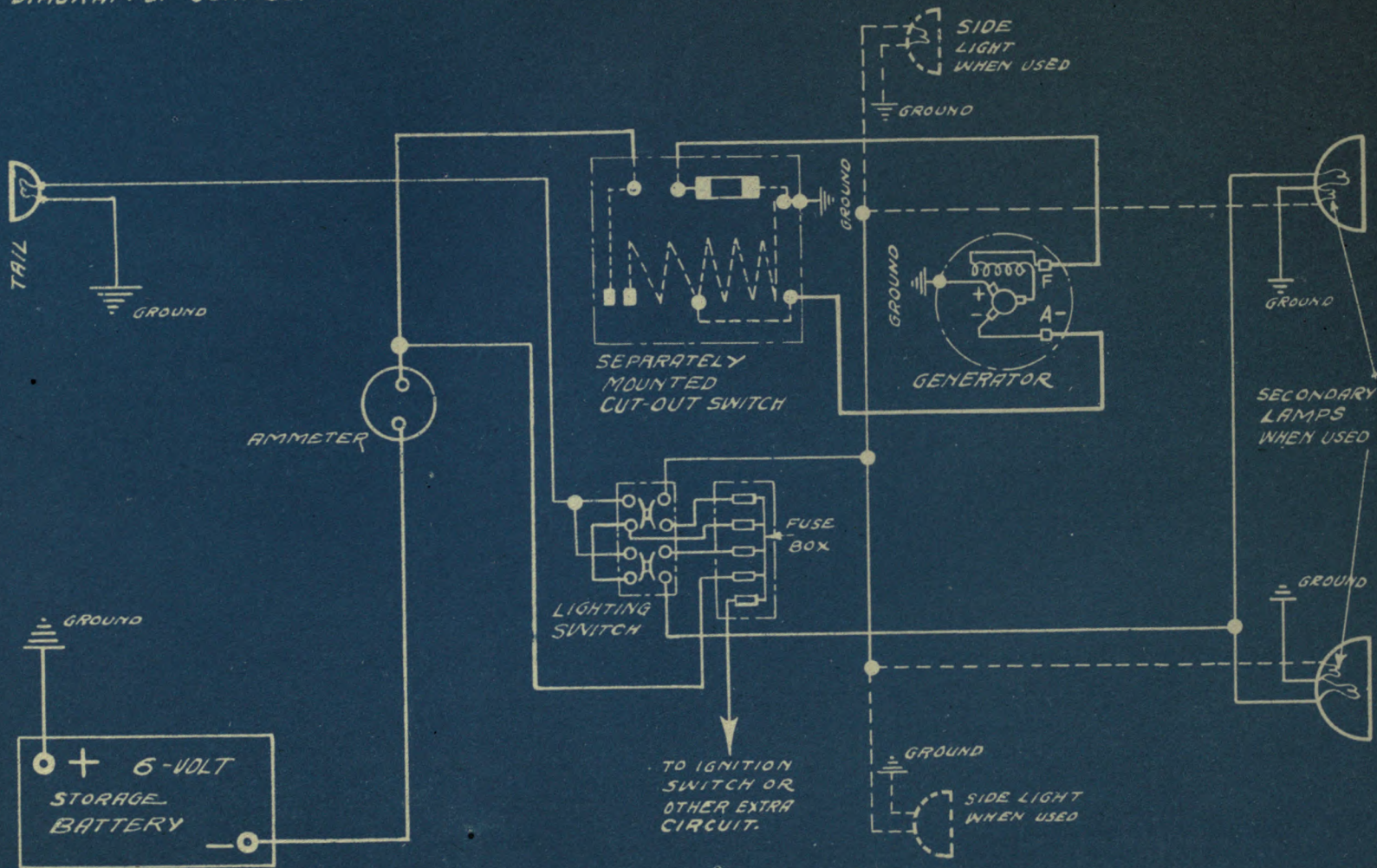


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WESTINGHOUSE STANDARD WIRING

FROM WEST. INST. BK. 5166

DIAGRAM OF CONNECTIONS OF COMPLETE SYSTEM WITH SEPARATELY MOUNTED REGULATOR.

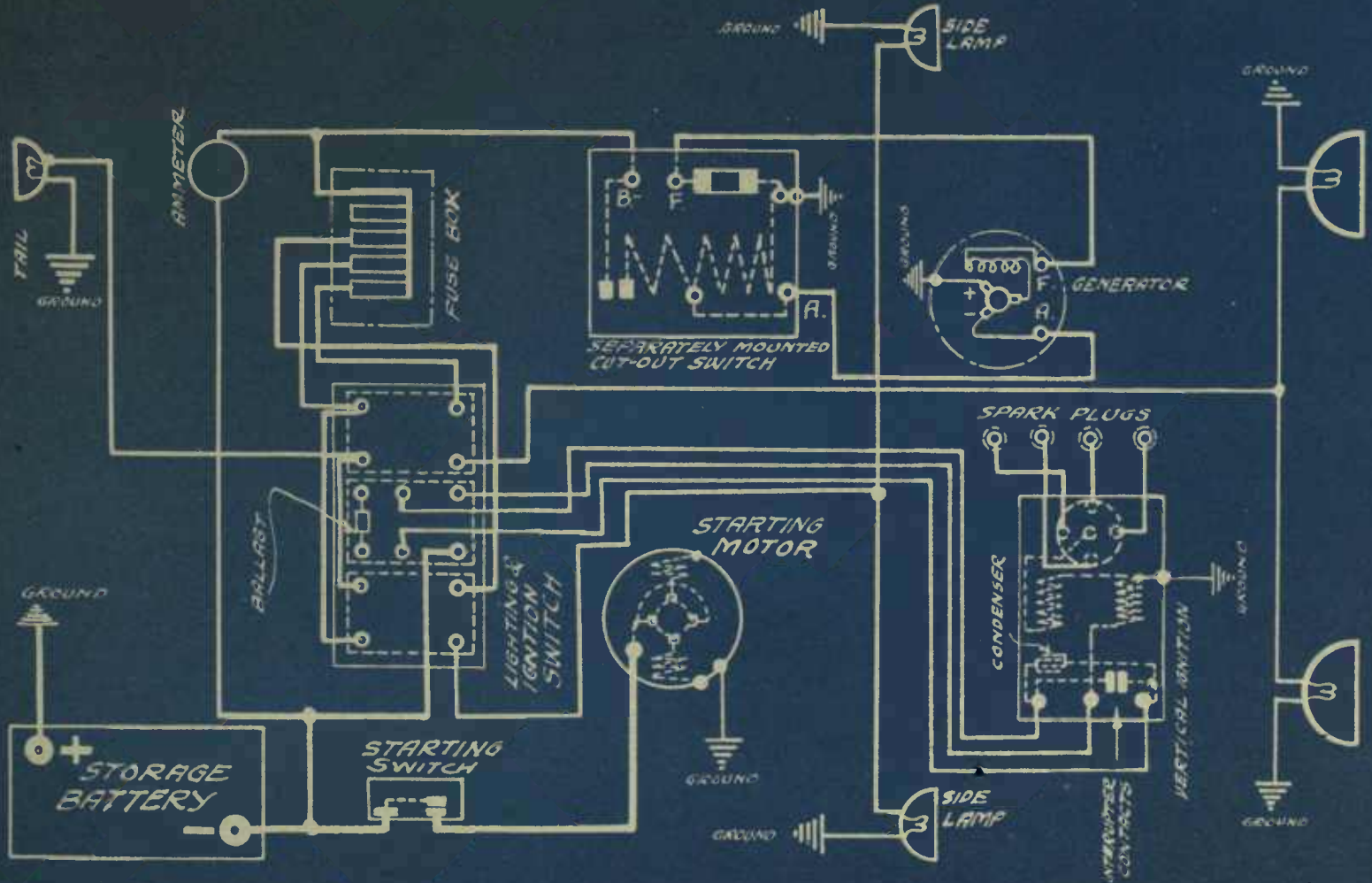


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WESTINGHOUSE STANDARD WIRING

SHOWING SINGLE REDUCTION MOTOR & VERTICAL IGNITION SYSTEM.

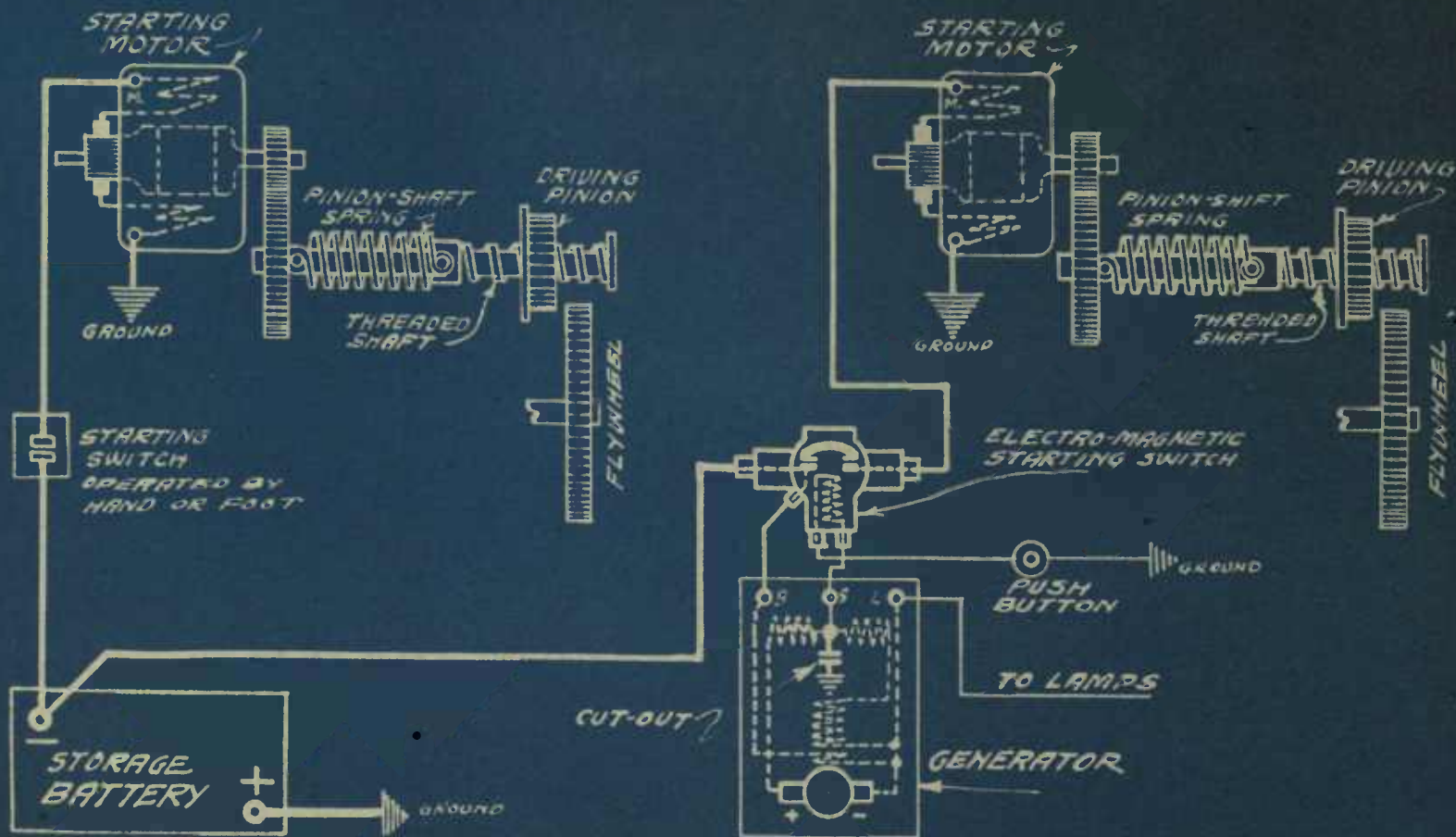
FROM WEST. BR. 320507



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WESTINGHOUSE - INTERNAL WIRING AND MECHANICAL CONNECTIONS OF DOUBLE-REDUCTION MOTORS AND SWITCH FOR AUTOMATIC SCREW PINION SHIFT.

FROM WEST. INST. BK. 5143

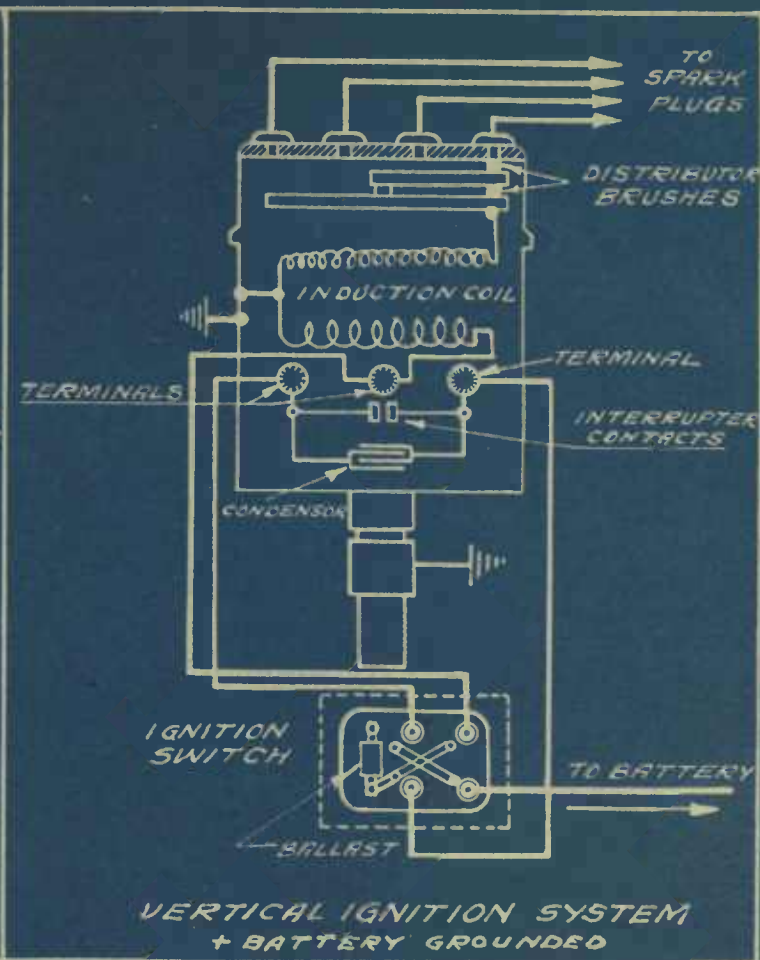
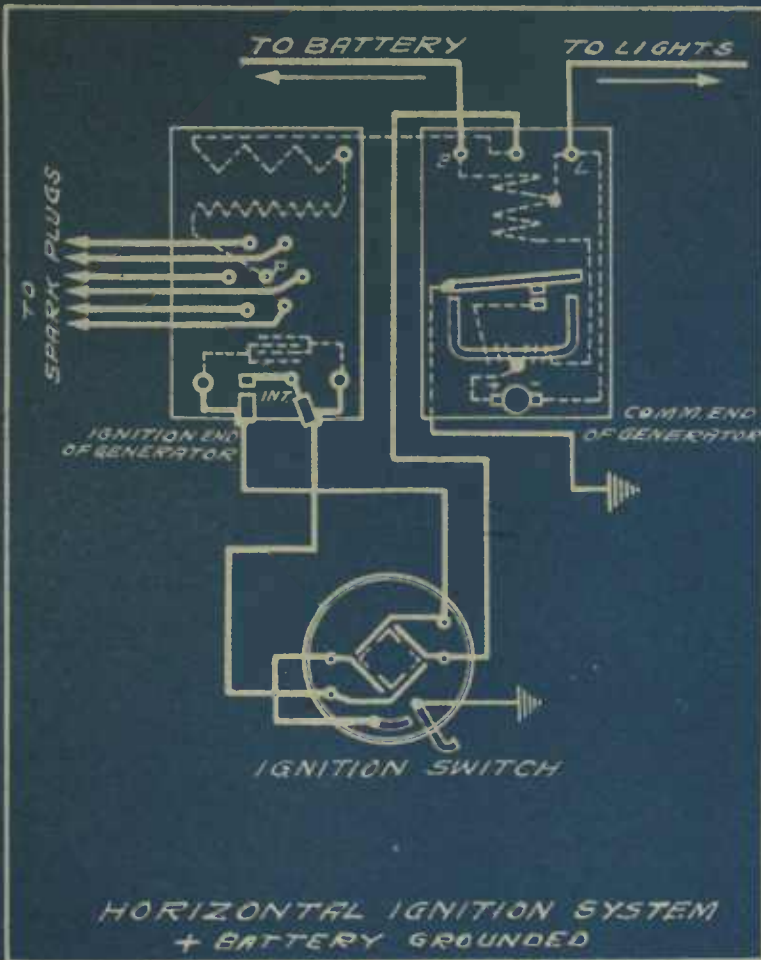


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WESTINGHOUSE INTERNAL IGNITION CIRCUITS

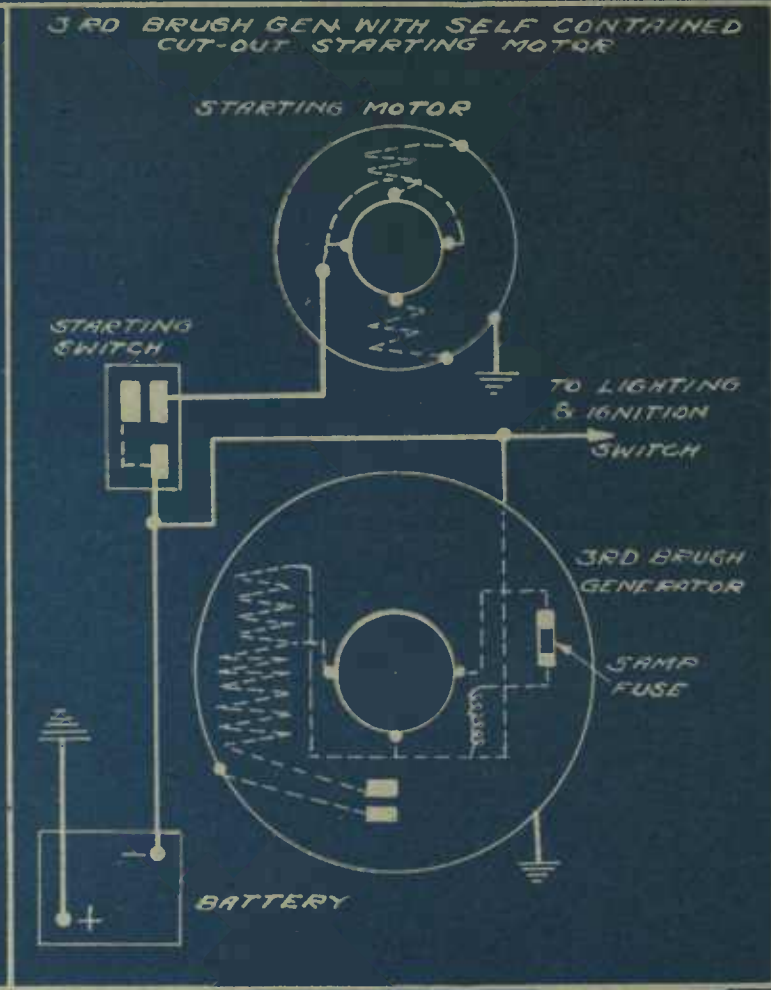
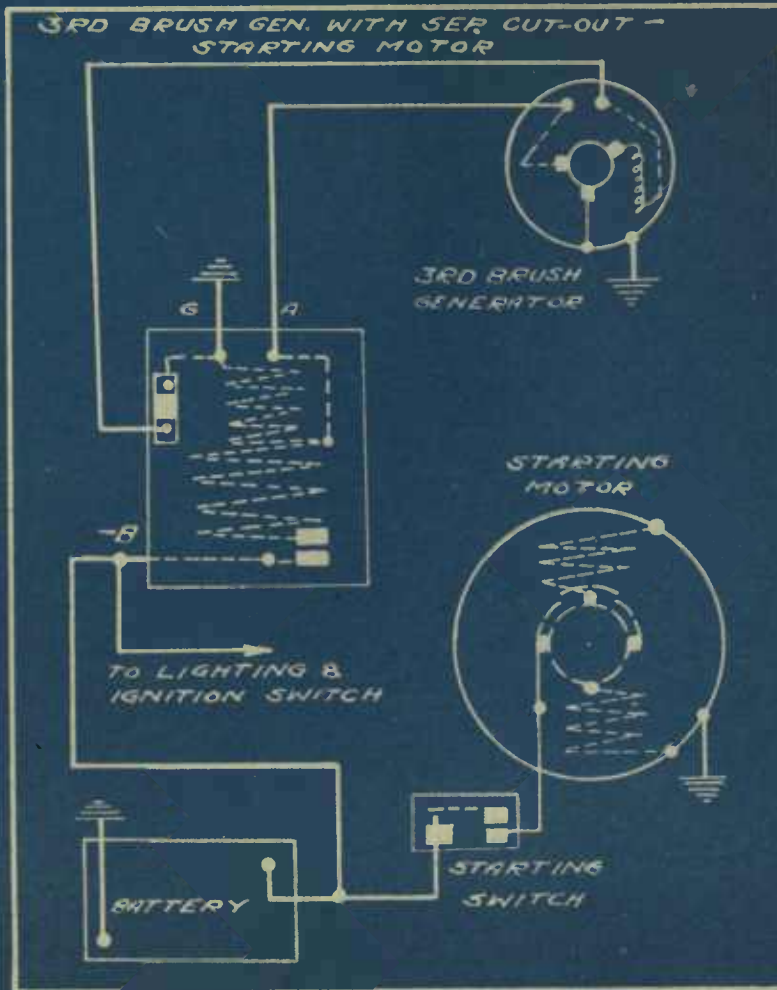
FROM WEST. INST. BKS. 5160-A & 5140C

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WESTINGHOUSE INTERNAL CIRCUITS

FROM SKETCH BY A.J.P.



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WESTINGHOUSE INTERNAL CIRCUITS

GENERATOR FRAME NOS. 150 & 750

(R.H. ROTATION)

FROM SKETCH BY A.T.P.

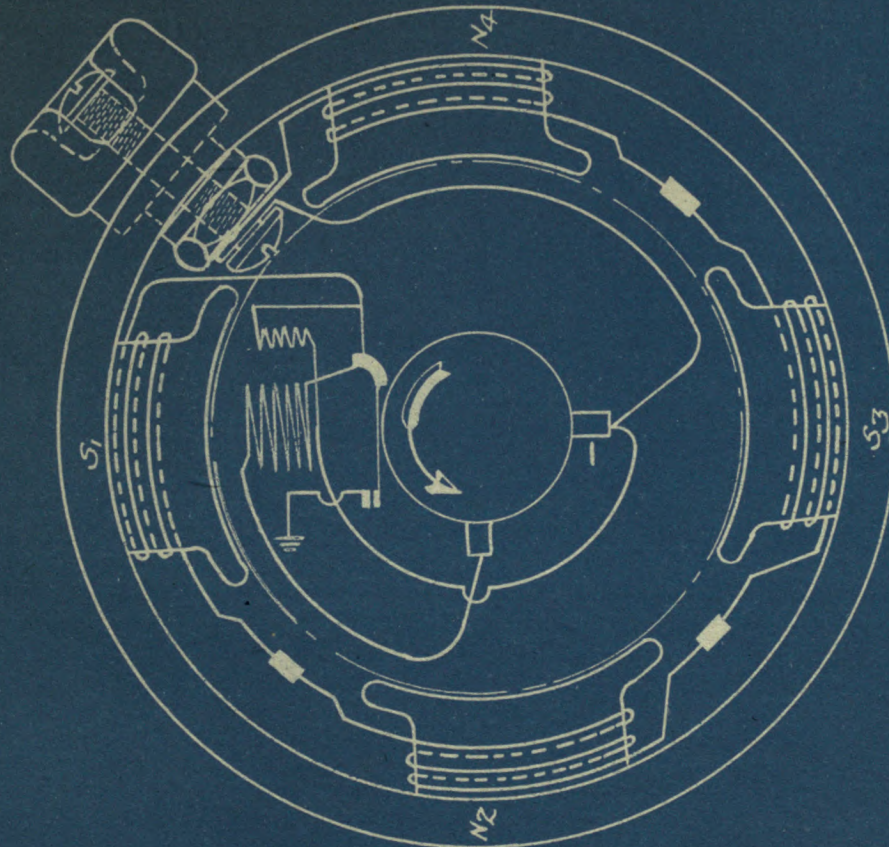
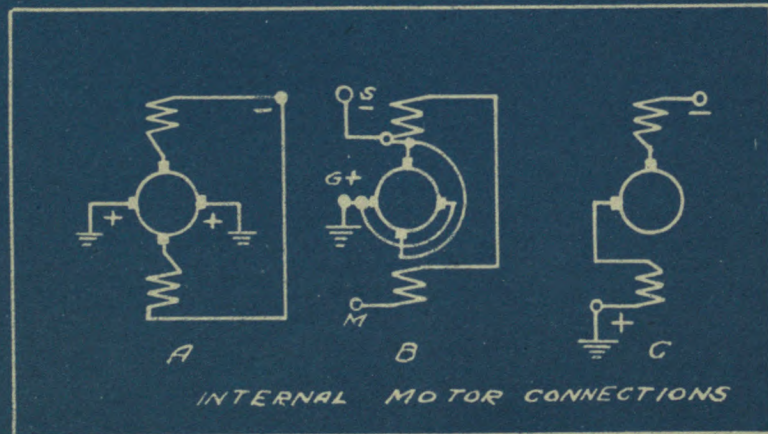
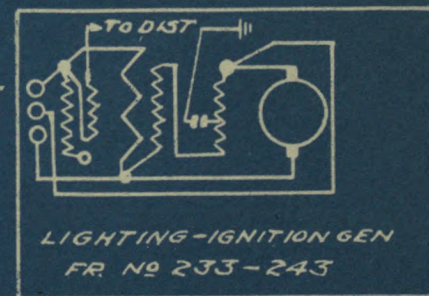
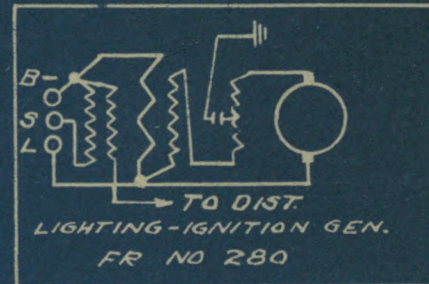
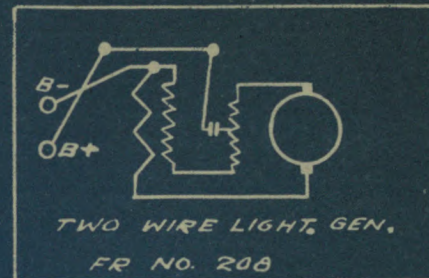
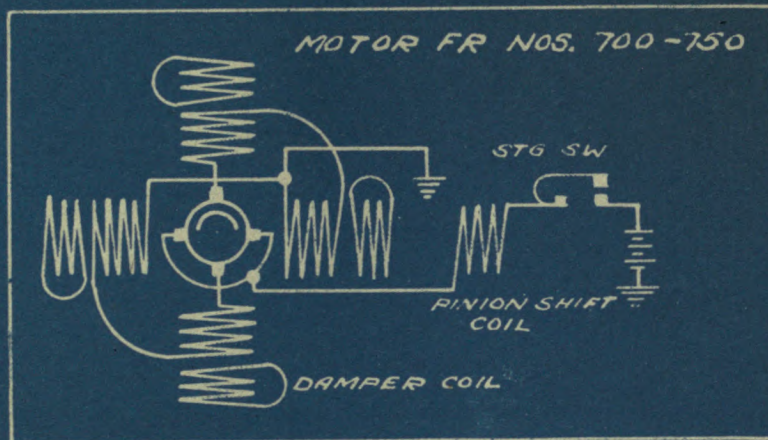


DIAGRAM OF CONNECTIONS FOR COUNTER-
CLOCKWISE ROTATION FACING COMM. END
WITH CAM TYPE MOTOR.

WESTINGHOUSE INTERNAL CIRCUITS

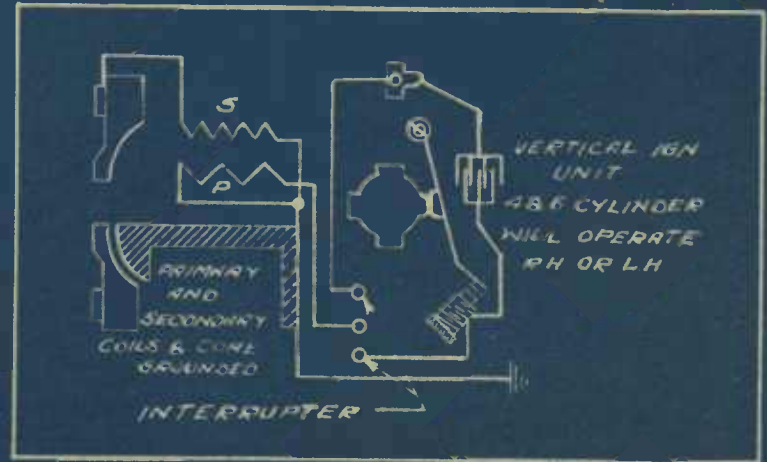
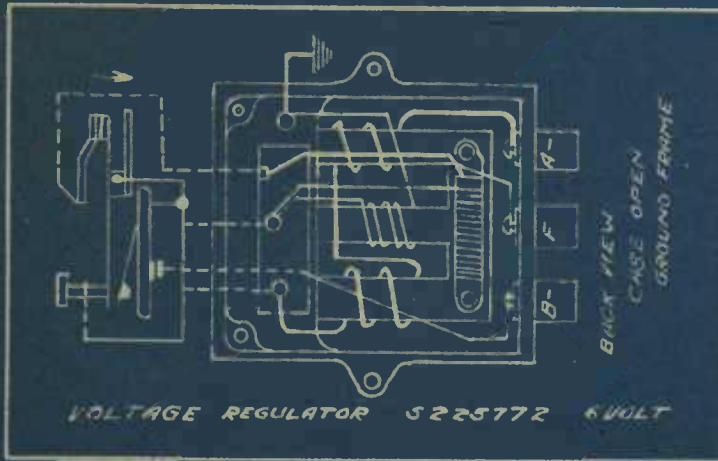
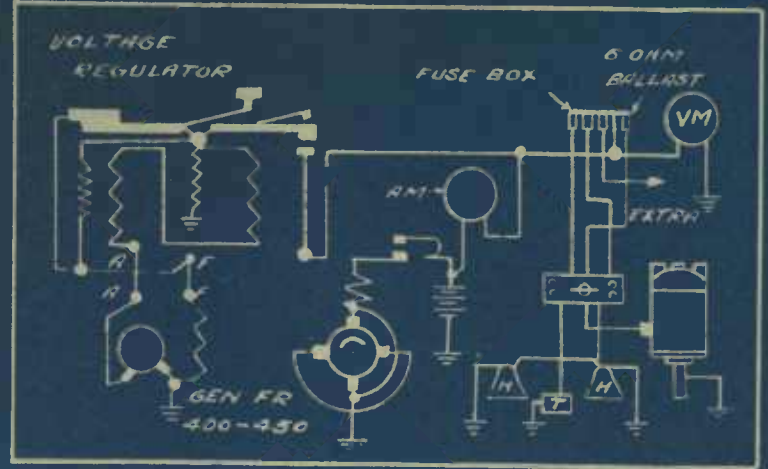
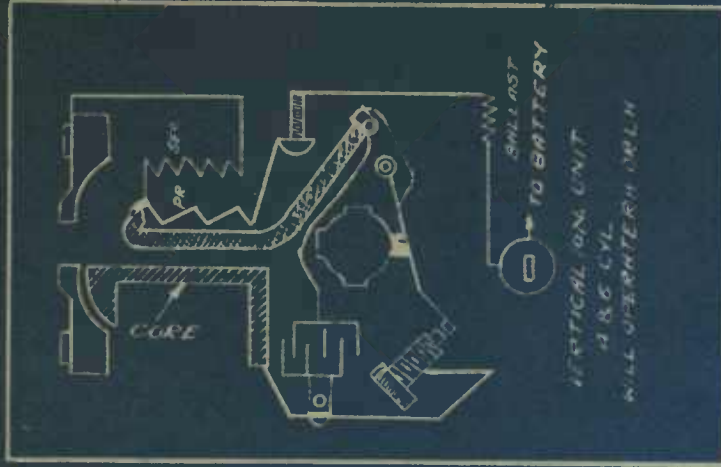
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WESTINGHOUSE INTERNAL CIRCUITS

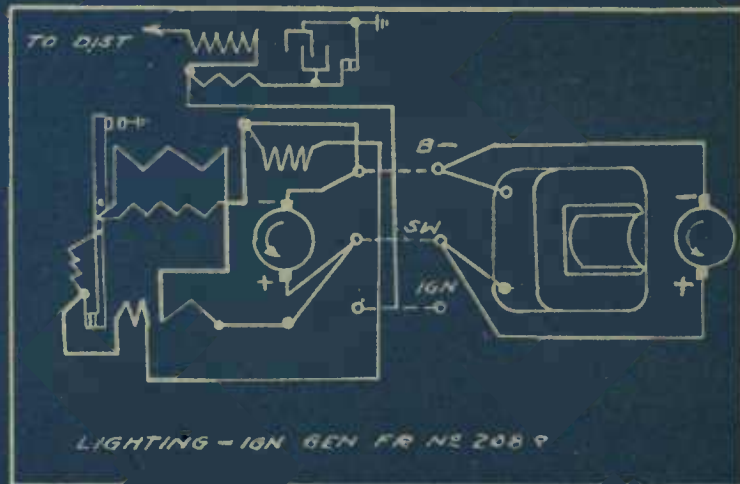
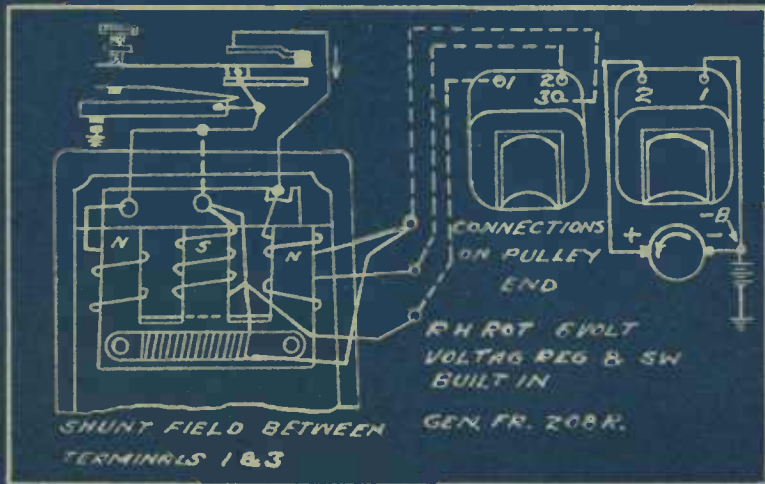
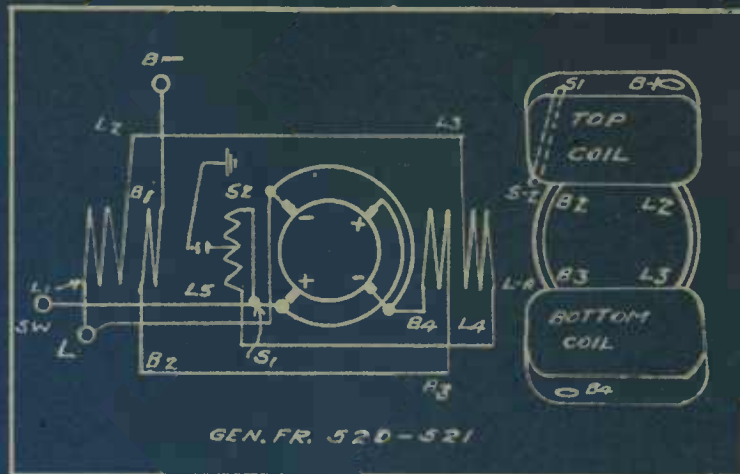
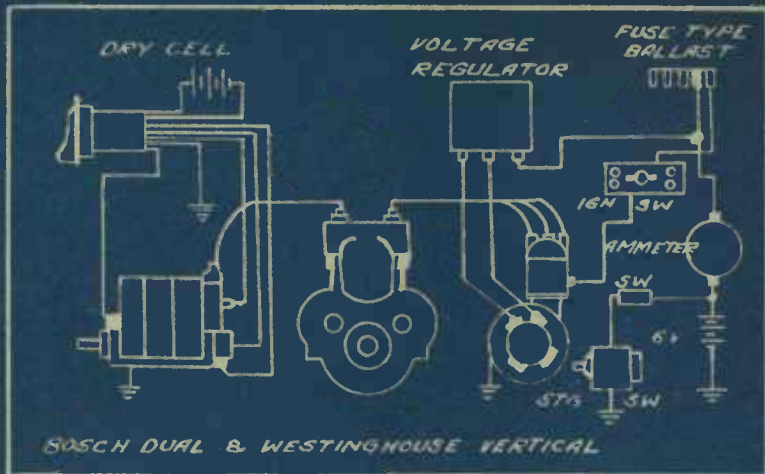
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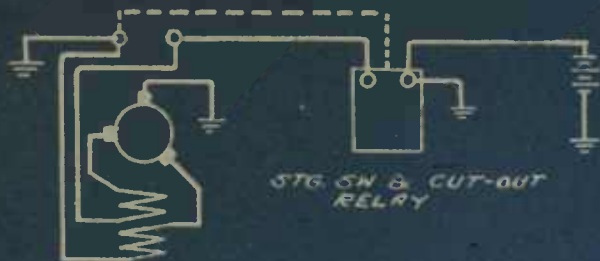
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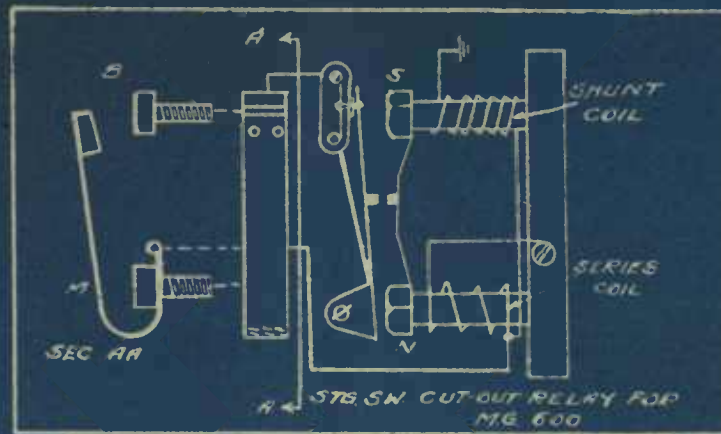
WESTINGHOUSE INTERNAL CIRCUITS

FROM WEST. MANUAL

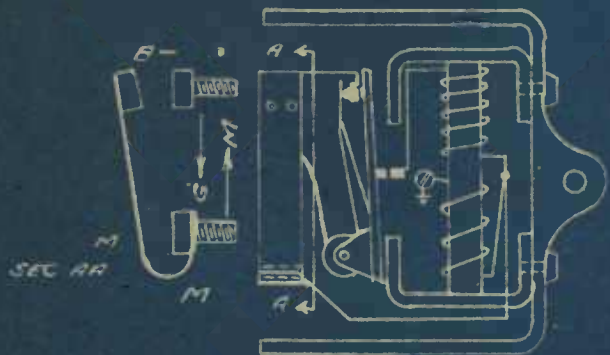


STG. SW. & CUT-OUT RELAY

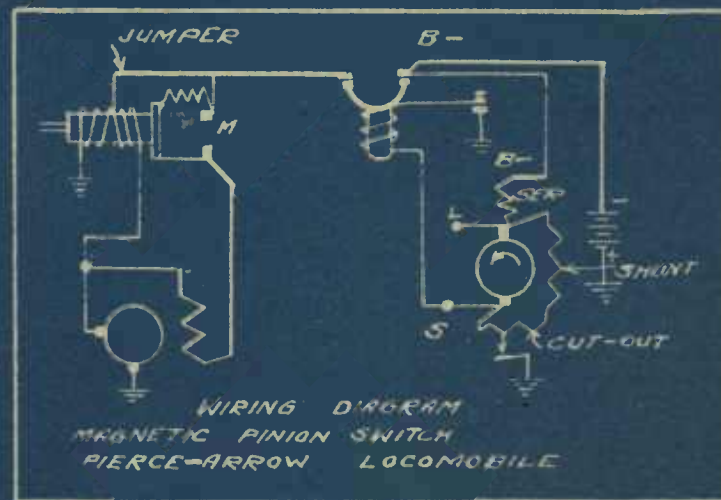
MOTOR-GEN. FR. NO. 600



STG. SW. CUT-OUT RELAY FOR M.G. 600



CASE TO BE GROUNDED STG. SW. & CUT-OUT RELAY M.G. 600

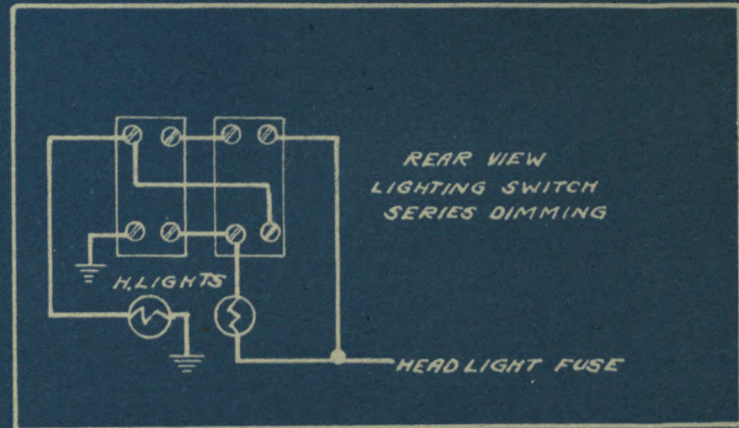
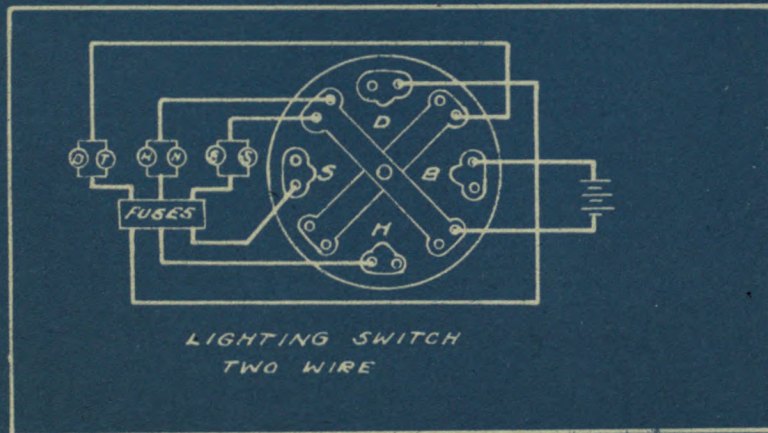
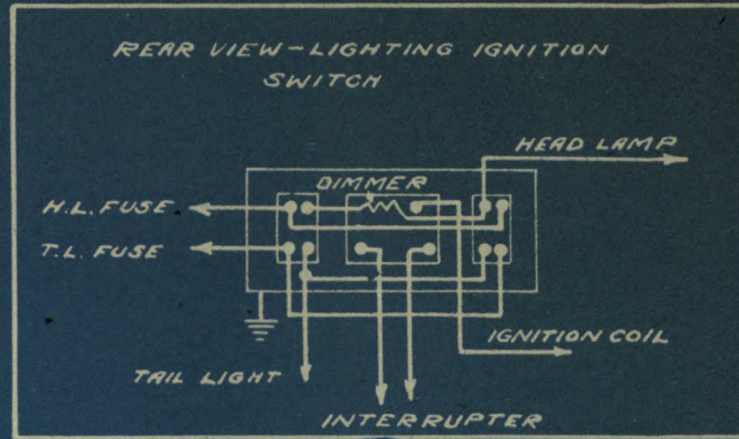
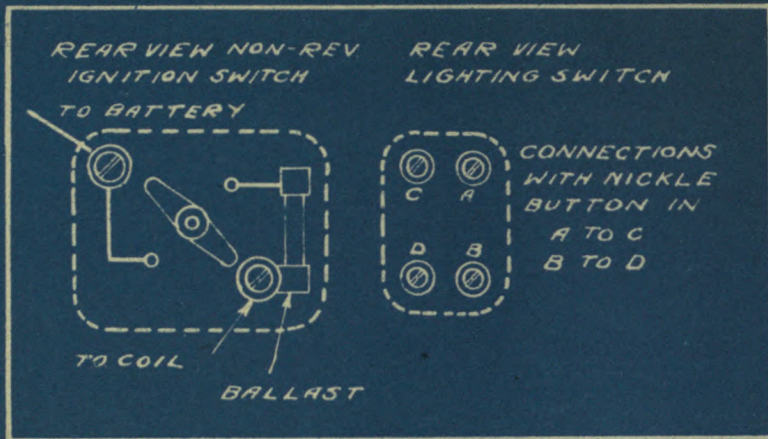


WIRING DIAGRAM
MAGNETIC PINION SWITCH
PIERCE-ARROW LOCOMOBILE

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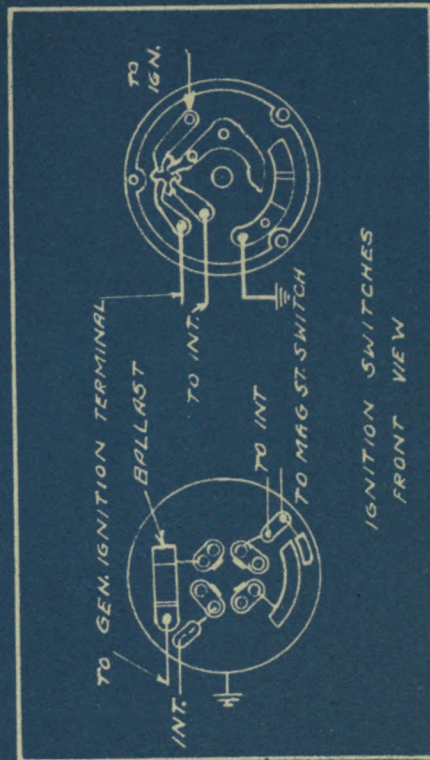
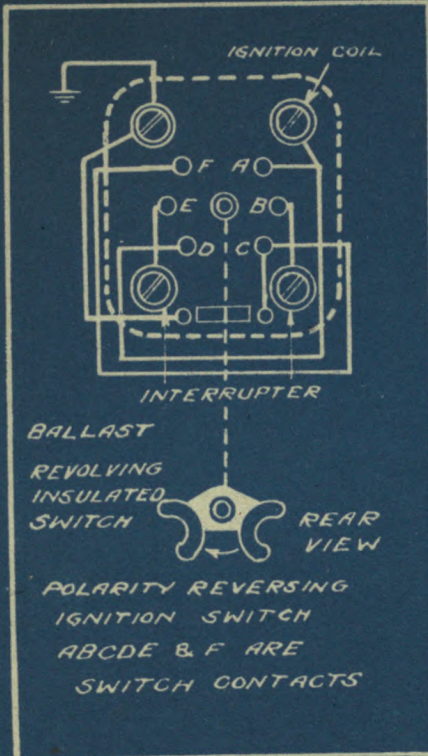
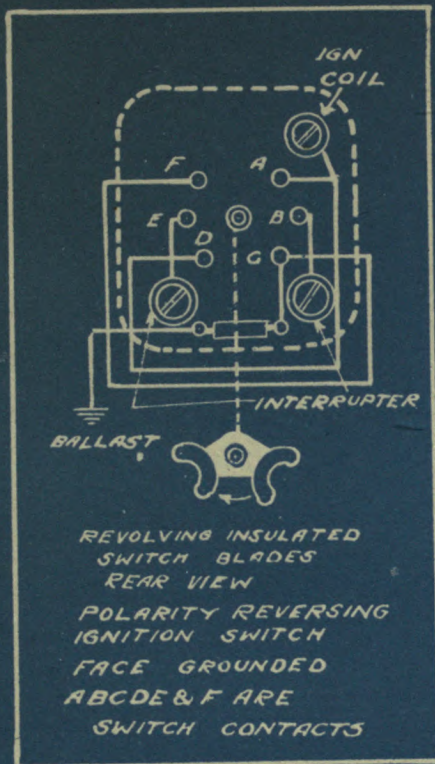
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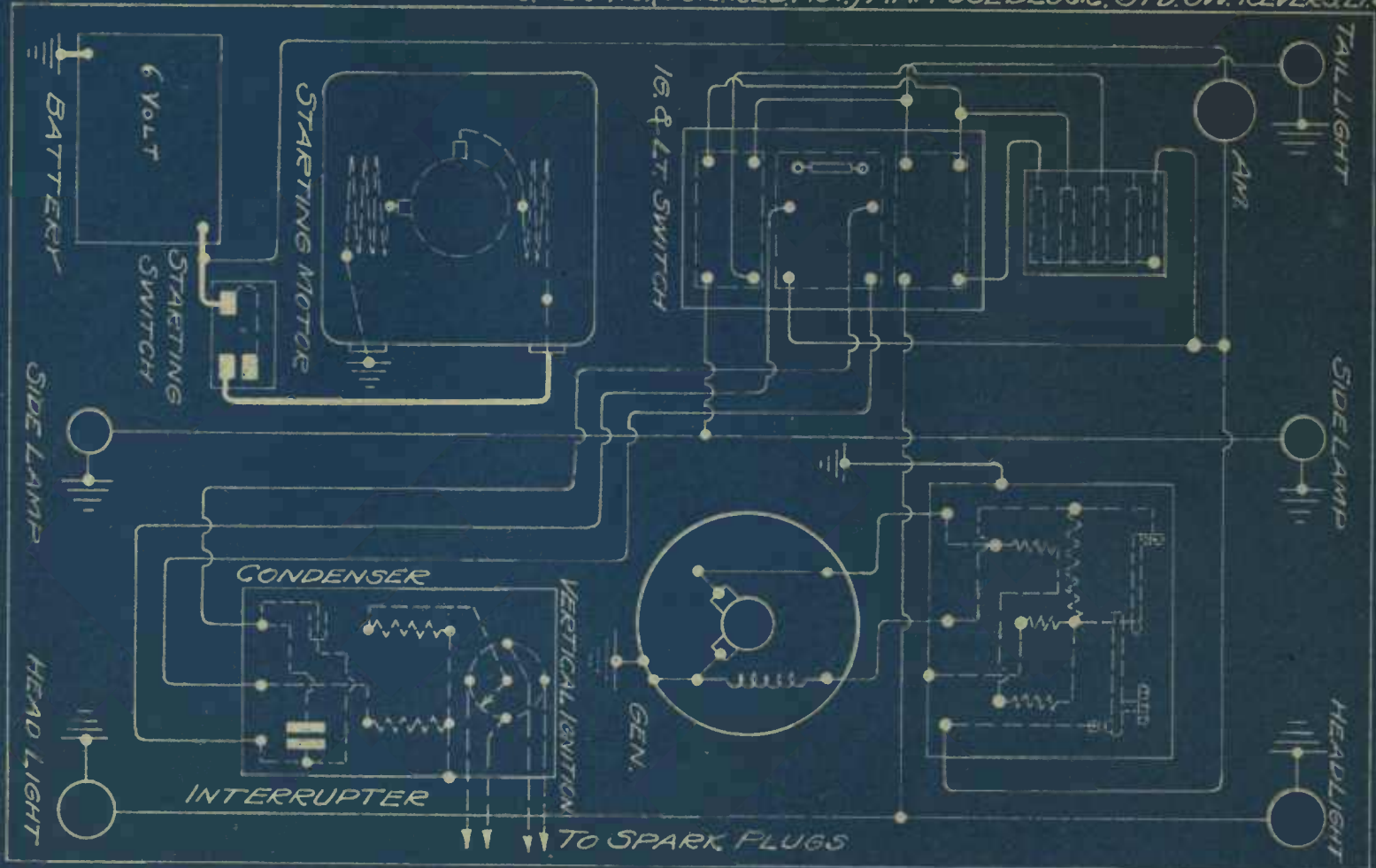


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WESTINGHOUSE INTERNAL CIRCUITS

FROM MFRS B/P 320084

CONNECTION FOR RD. GEN. WITH SEP. REG. VERT. 16. (56L. RED. MOT.) AM. FUSE BLOCK, STD. SW. REVERS. LT. & 16. SW.

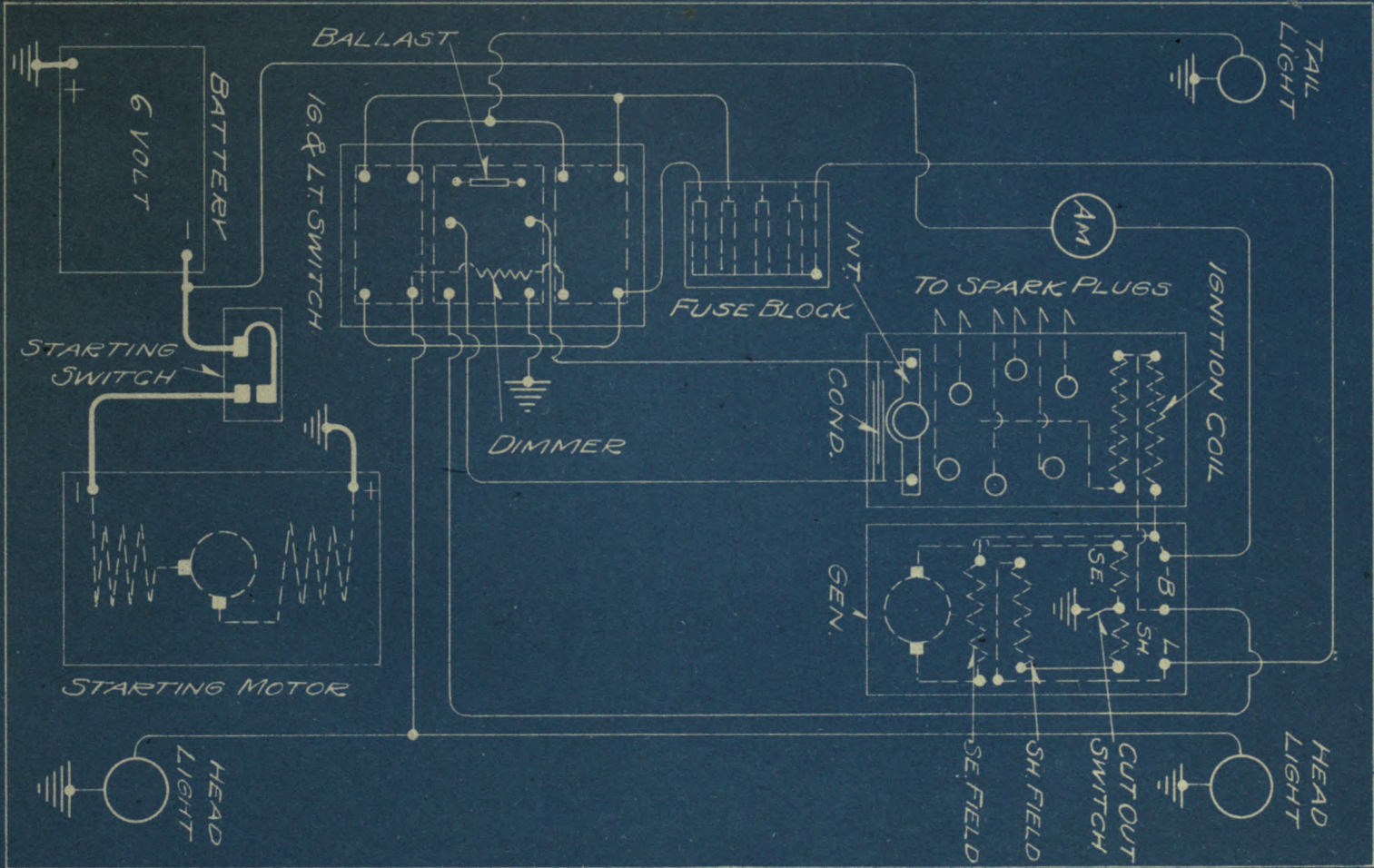


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WESTINGHOUSE INTERNAL CIRCUITS

FROM MFRS. B/F 318283

CONNECTION FOR STD. MOTOR, LT. & 16. GEN. 2 GANG LT. & 16. SWITCH-AM. - & FUSE BLOCK

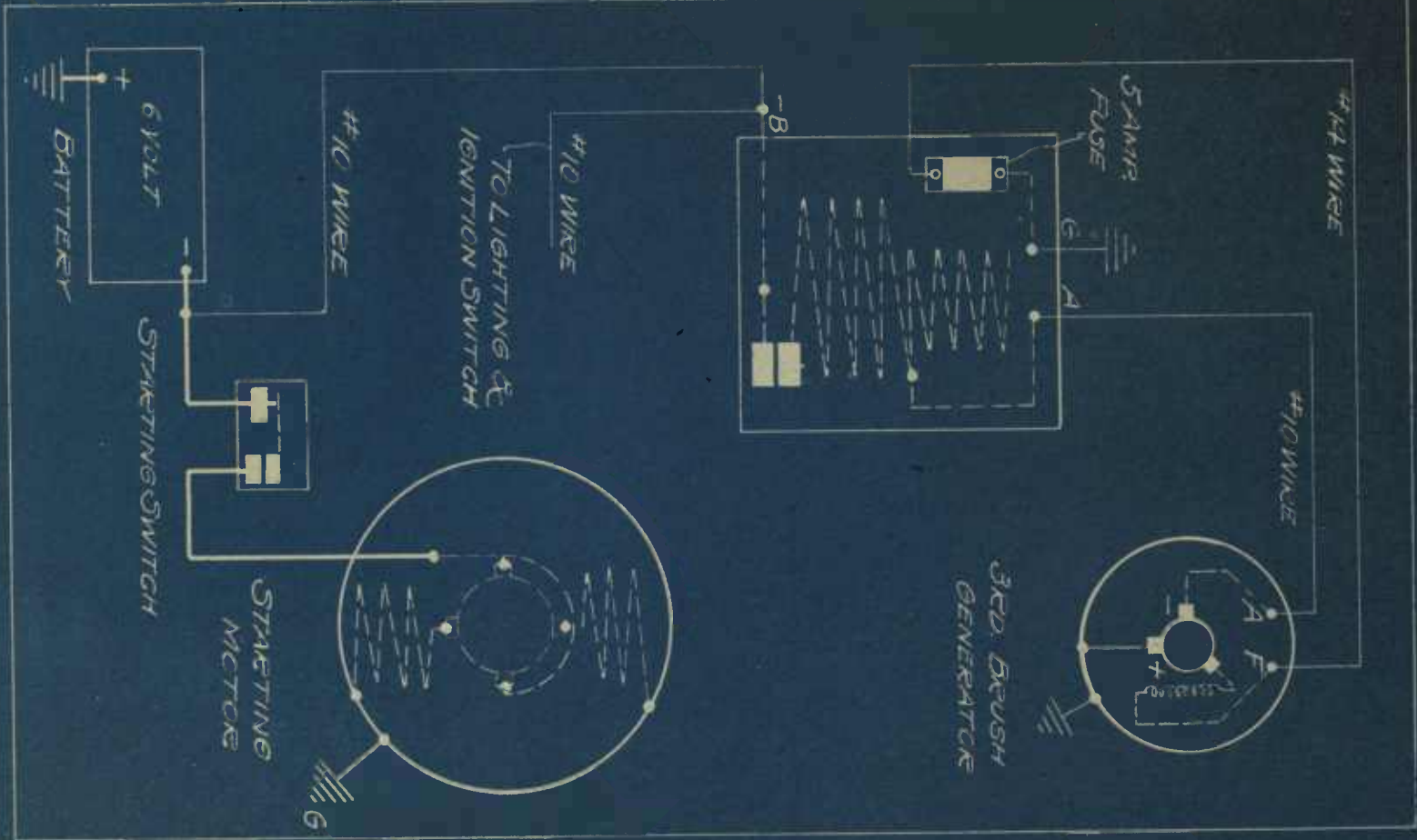


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WESTINGHOUSE INTERNAL CIRCUITS

FROM MEKS B/P 338993

CONNECTIONS FOR 3RD BRUSH GEN.-SEP. CUT-OUT-STARTING MOTOR-STARTING SWITCH

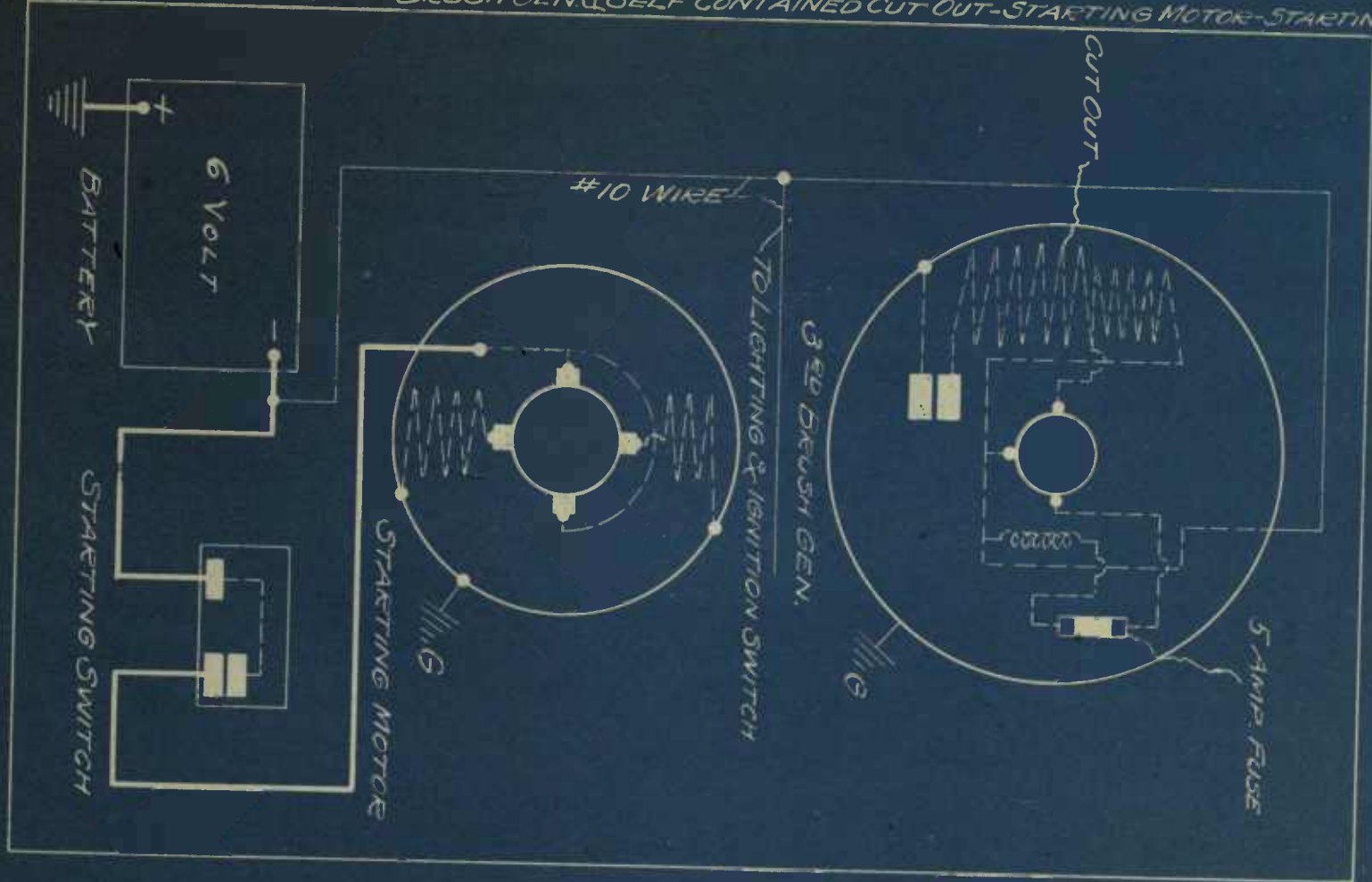


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FROM MFRS. B. 341358

CONNECTIONS FOR 3RD BRUSH GEN & SELF CONTAINED CUT OUT-STARTING MOTOR-STARTING SW.



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FROM MFRS. B/P 347023

AUTOMOBILE LIGHTING & IGNITION FRAME #760 - DIAGRAM OF CONNECTIONS - R.H. ROTATION

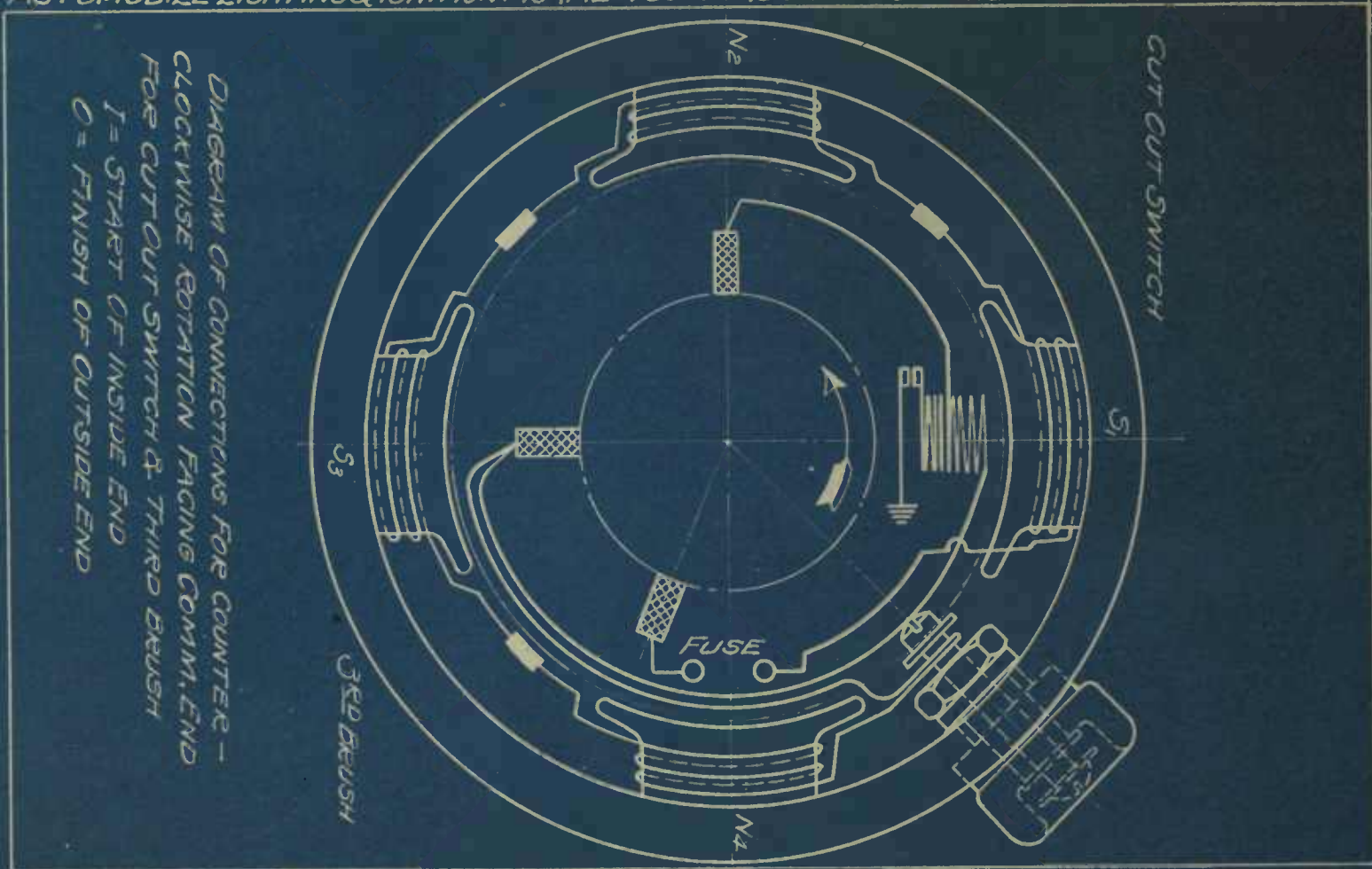


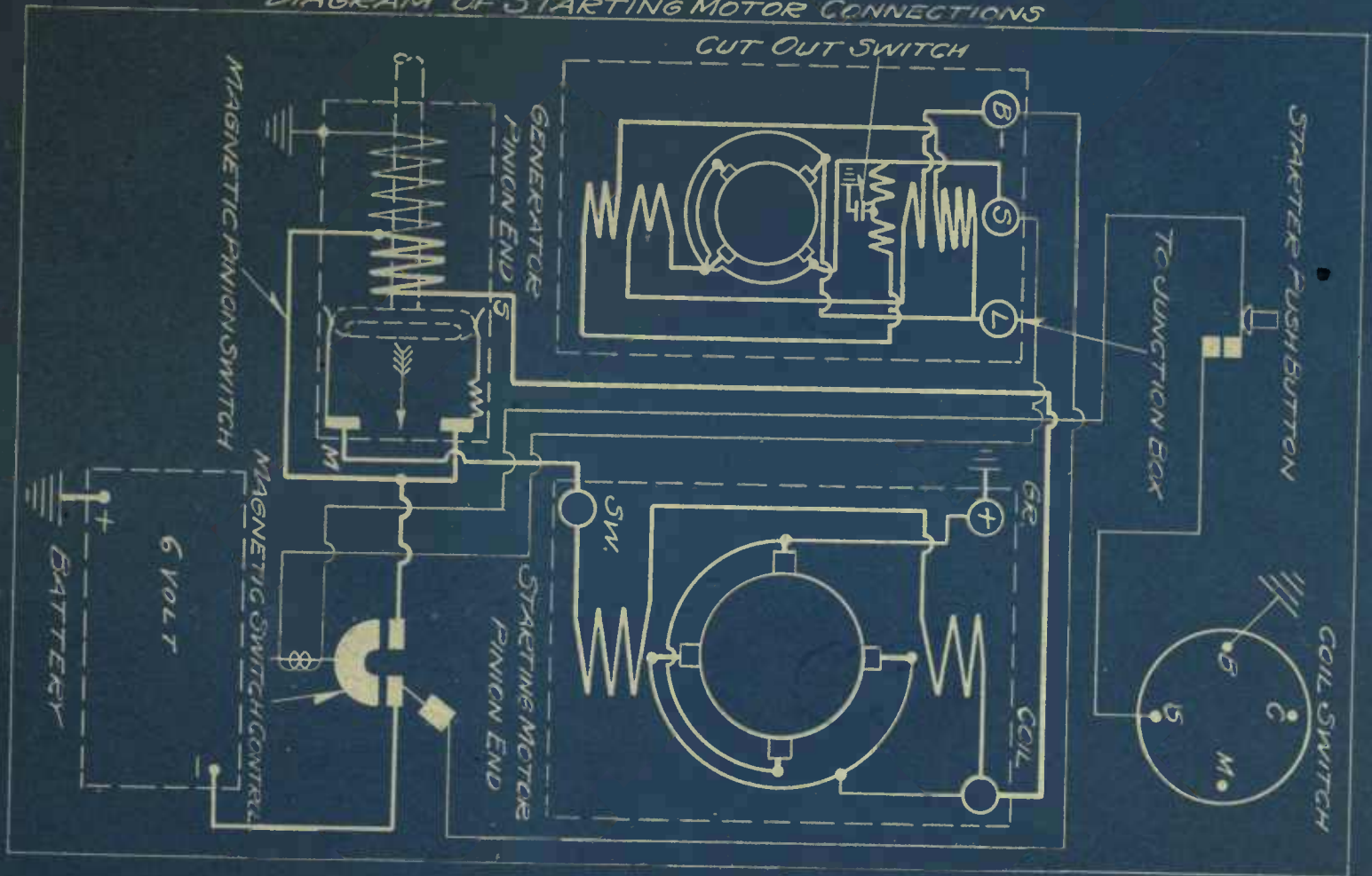
DIAGRAM OF CONNECTIONS FOR COUNTER -
CLOCKWISE ROTATION FACING COMM. END
FOR CUT OUT SWITCH & THIRD BRUSH
I = START OF INSIDE END
O = FINISH OF OUTSIDE END

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WESTINGHOUSE INTERNAL CIRCUITS

FROM MFRS. B/R ED. K 35886

DIAGRAM OF STARTING MOTOR CONNECTIONS

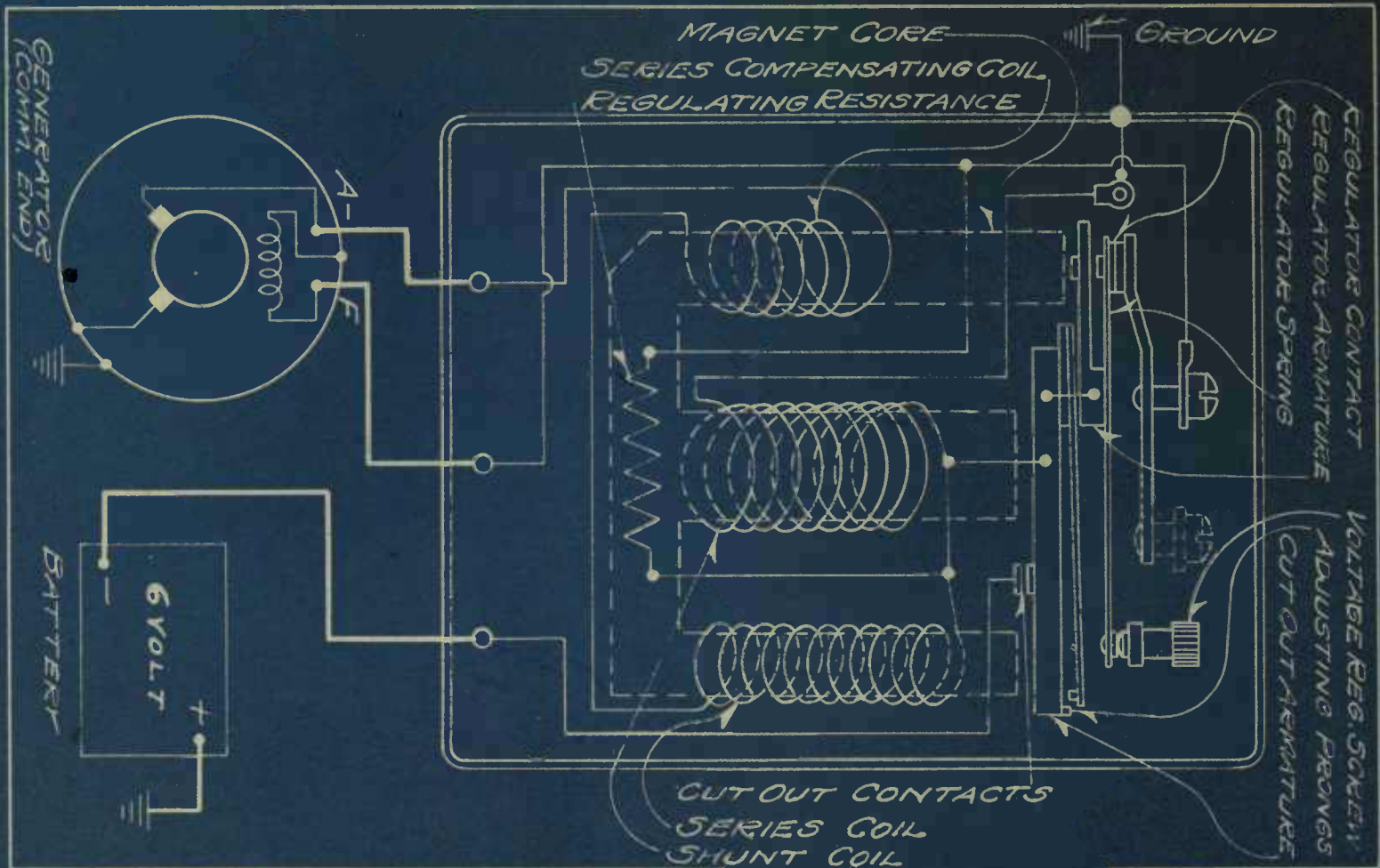


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WESTINGHOUSE INTERNAL CIRCUITS

FROM MERS B/P 313020

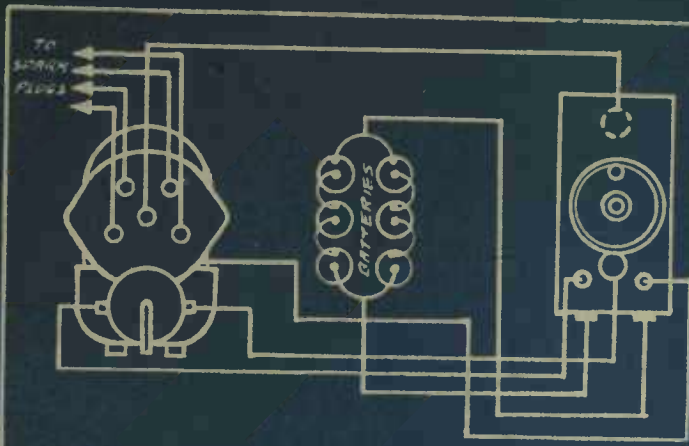
CONNECTIONS FOR SEPARATELY MOUNTED REGULATOR



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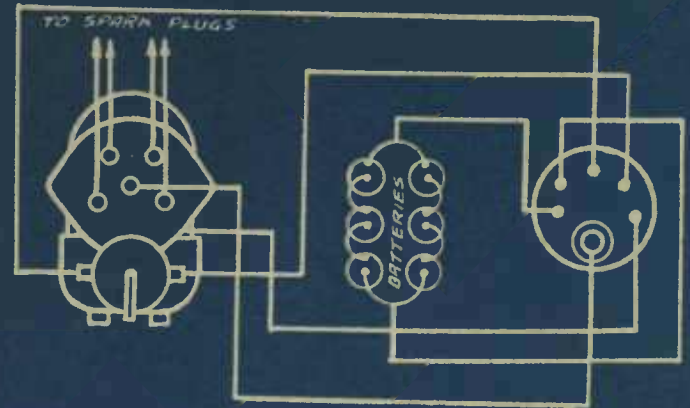
HEINZE MAGNETO CIRCUITS

FROM HEINZE INST. BK.



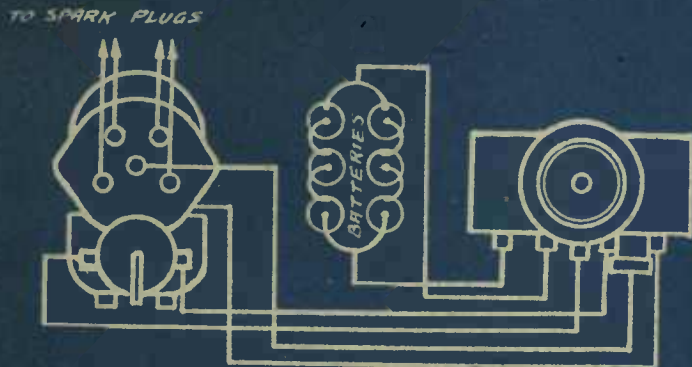
LT-4 MAGNETO

13-C COIL



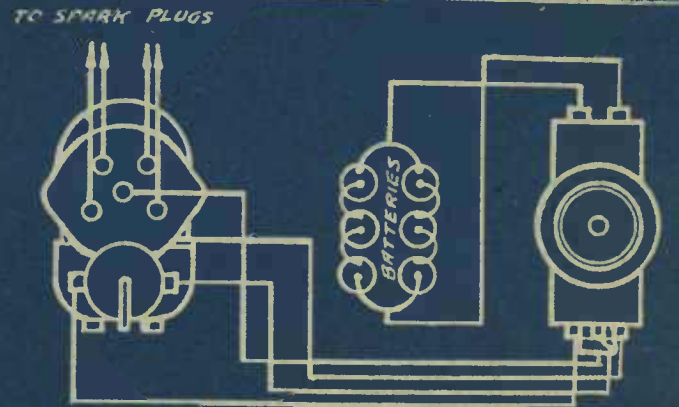
LT-4 MAGNETO

21-C COIL



LT-4 MAGNETO

17-C COIL



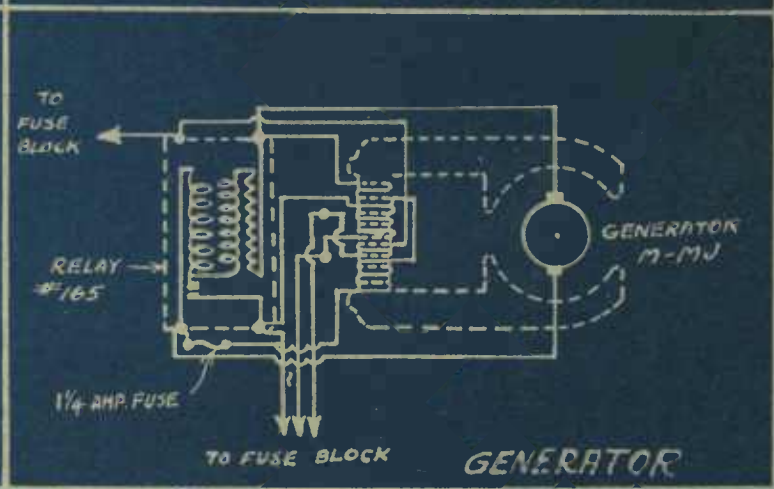
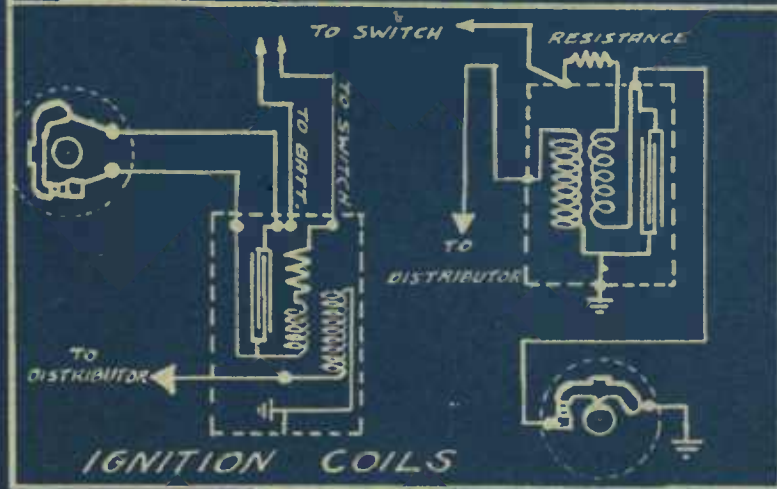
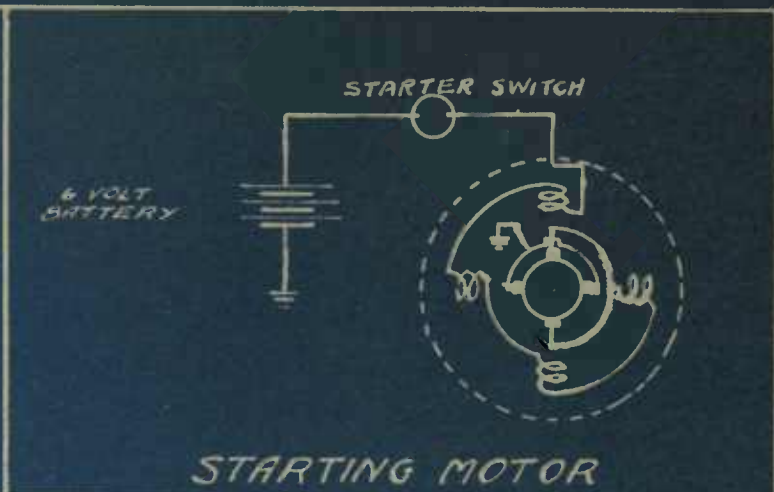
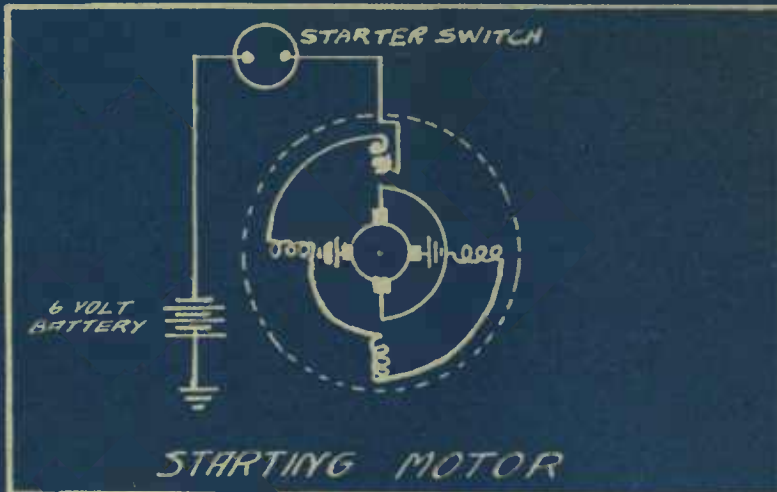
LT-4 MAGNETO

20-C COIL

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REMY INTERNAL CIRCUITS

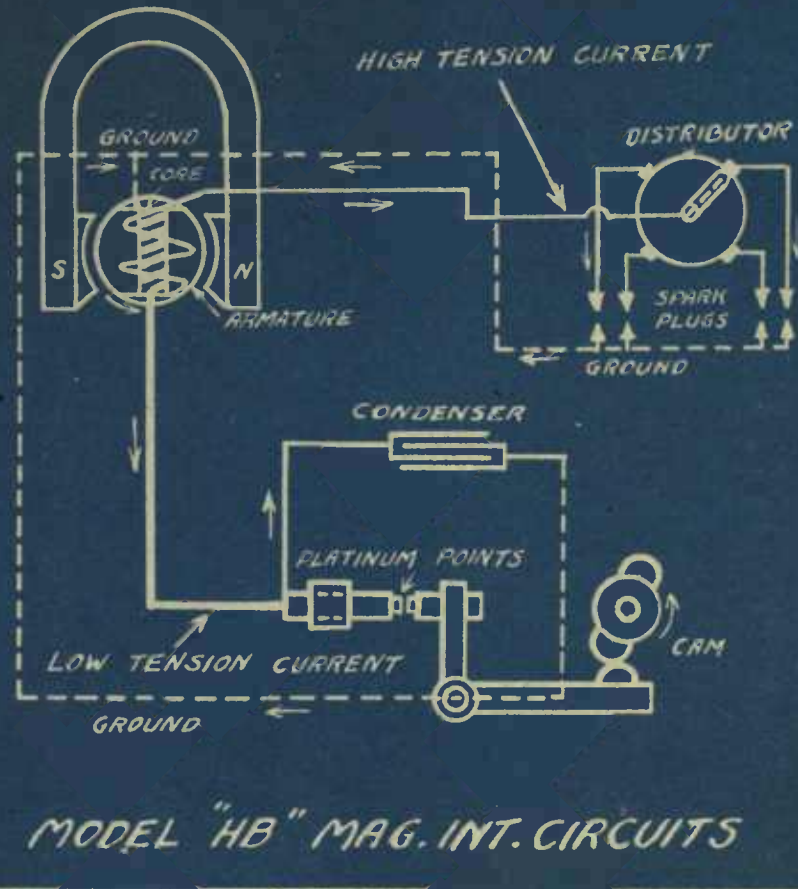
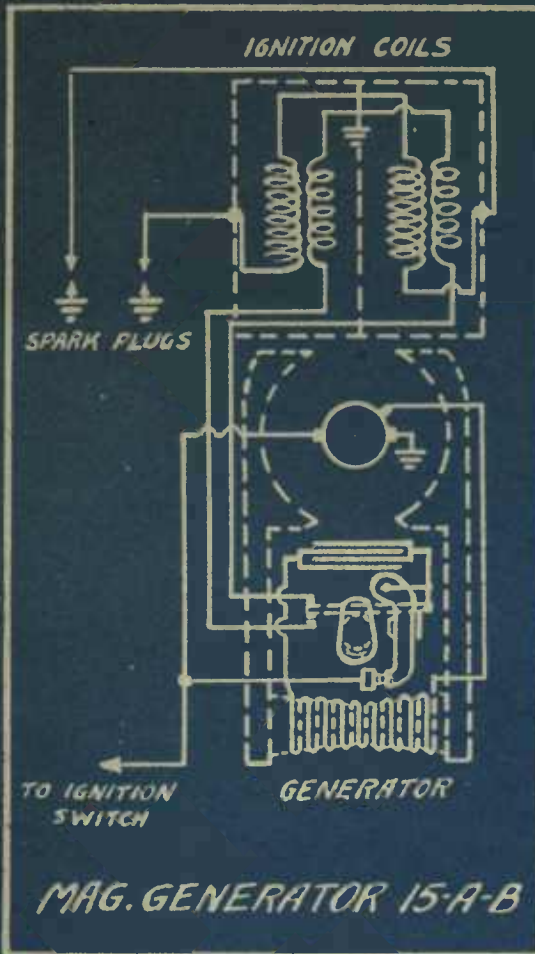
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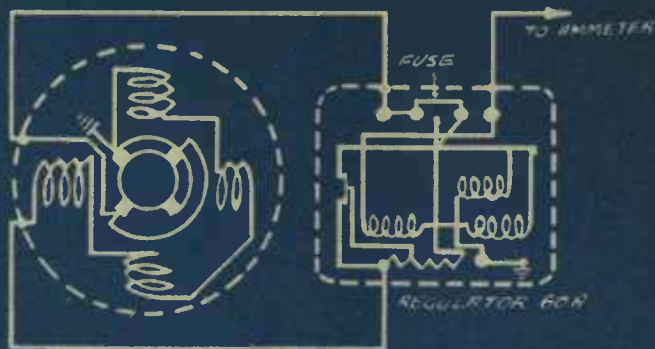
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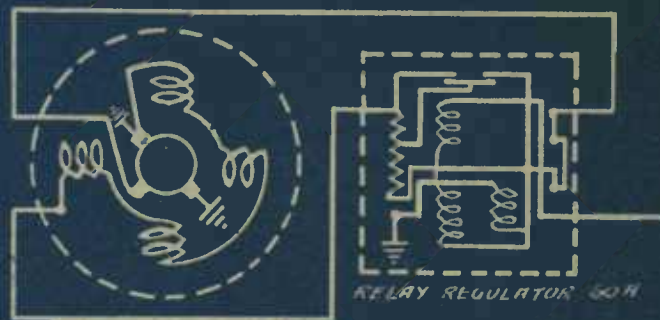
GENERATOR NO 168 E



GENERATOR NO 232 A



STARTING MOTOR NO 292 A

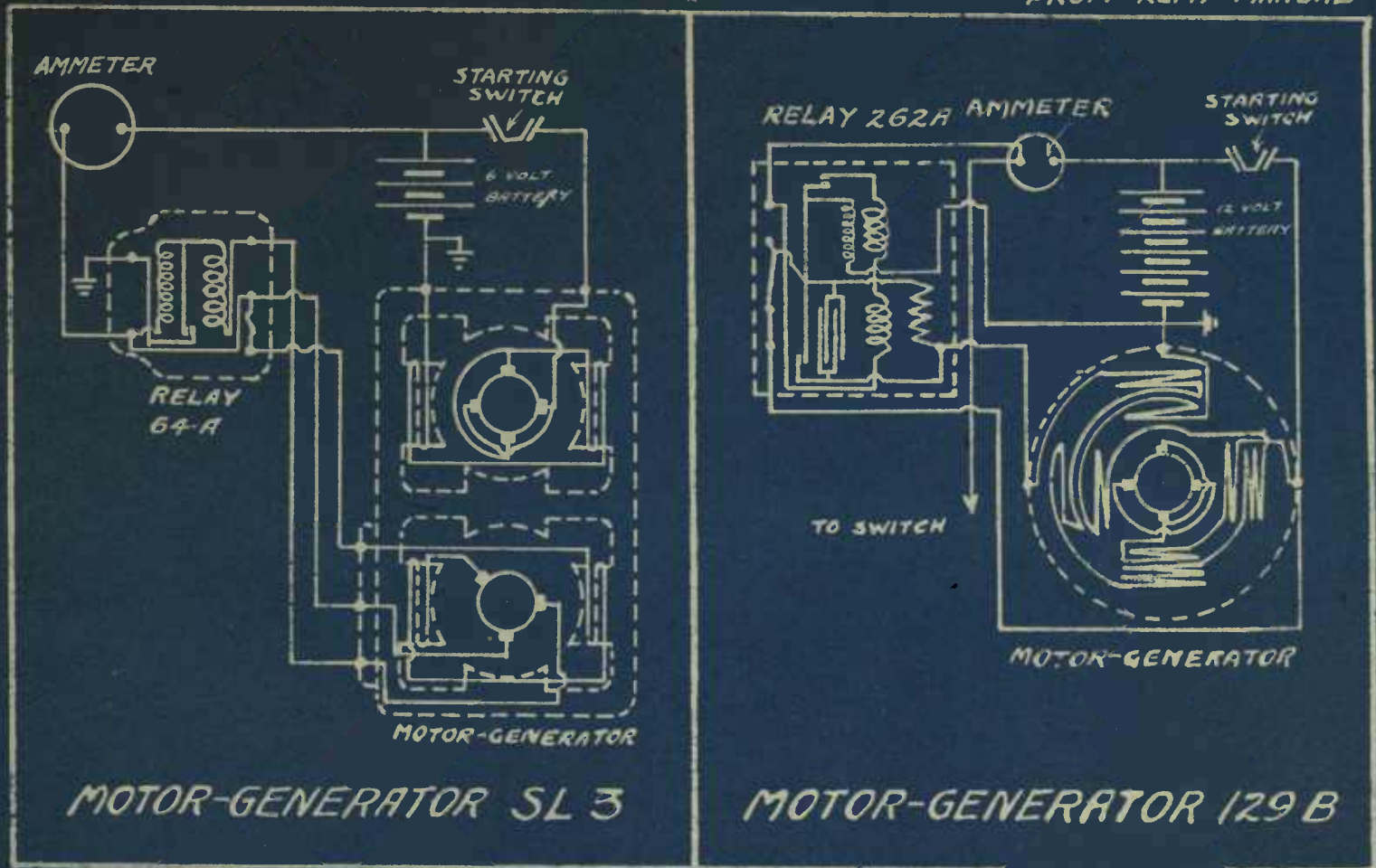


GENERATOR NO 245 B

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REMY INTERNAL CIRCUITS

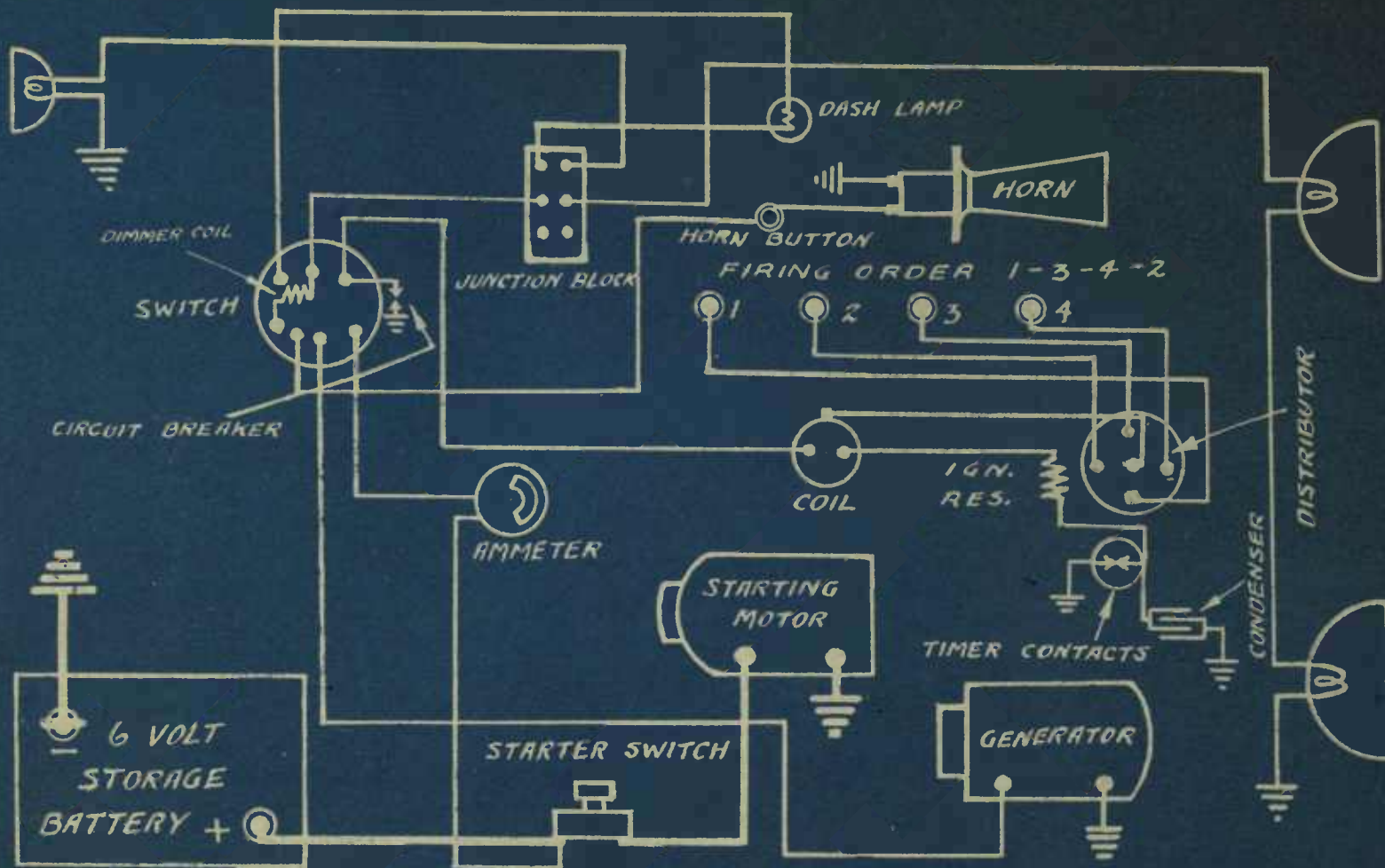
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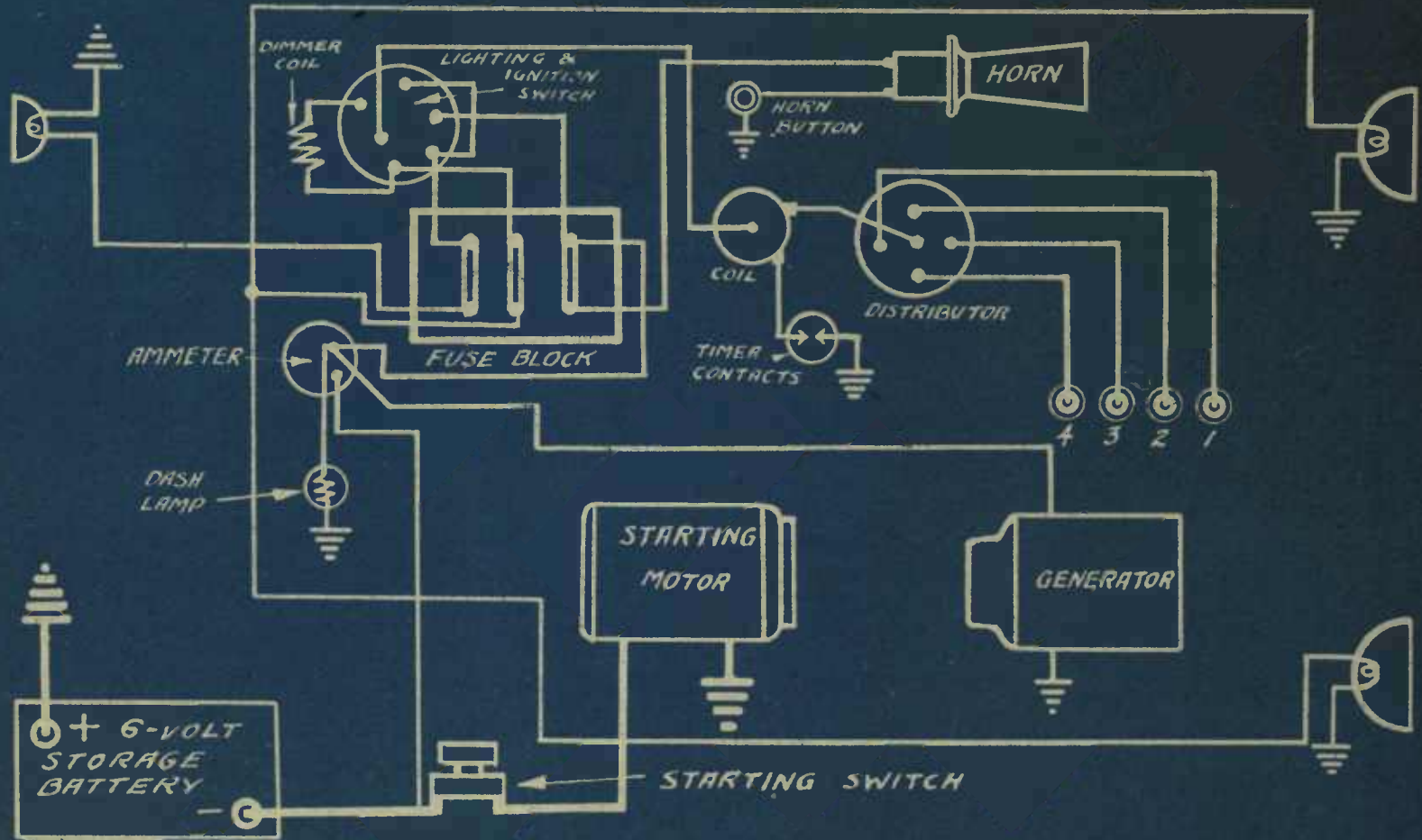
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REMY IGNITION

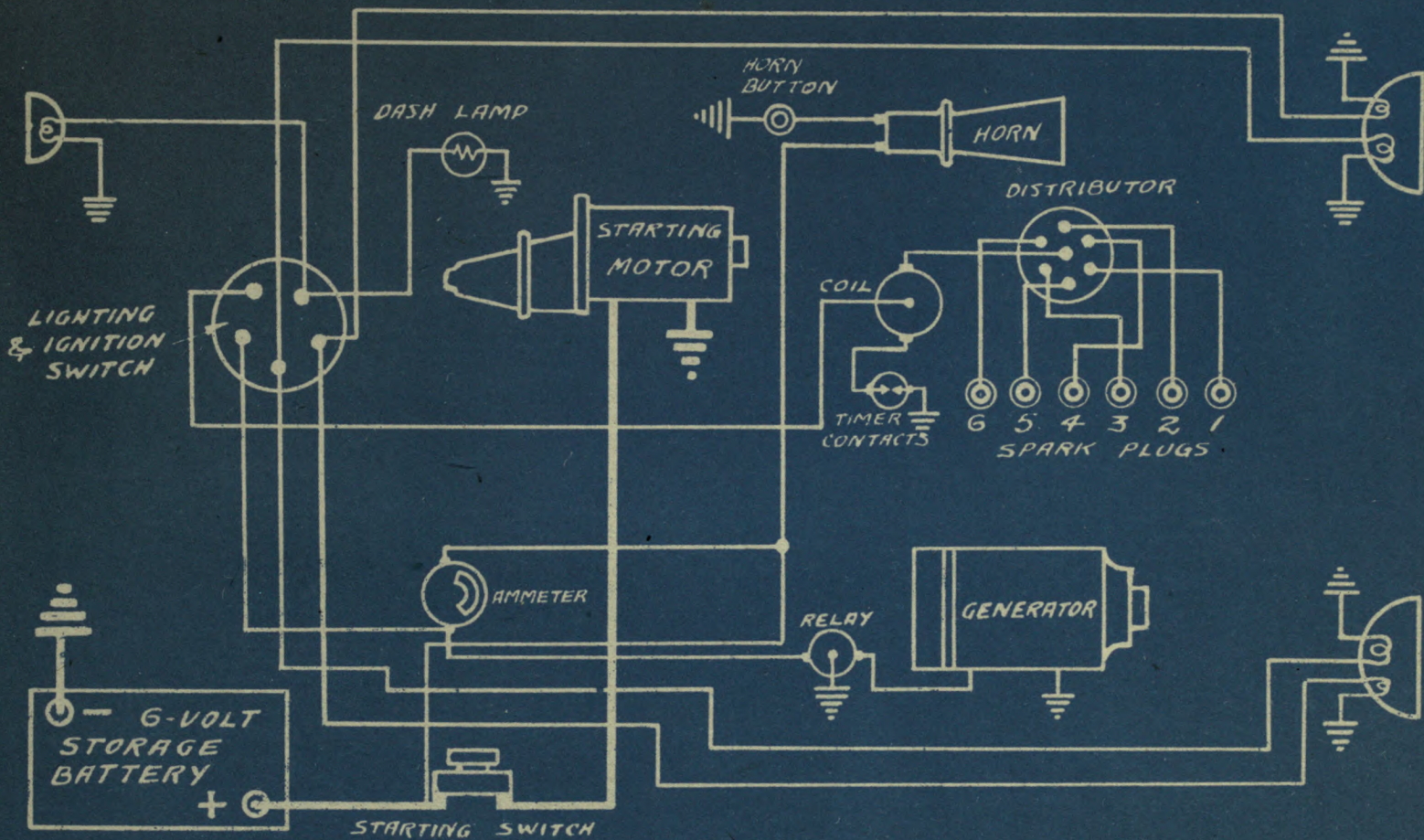
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