

SERVICE MANUAL

TYPE "TW" MULTI-CONTROL TRANSFORMER

Type "TW" Multi-Control Transformer, first built in 1953, is designed for use with 110-125 volt, 60-cycle power lines and is rated at 175 watts. This transformer is designed specifically for use with one-train layouts having a considerable quantity of auxiliary equipment.

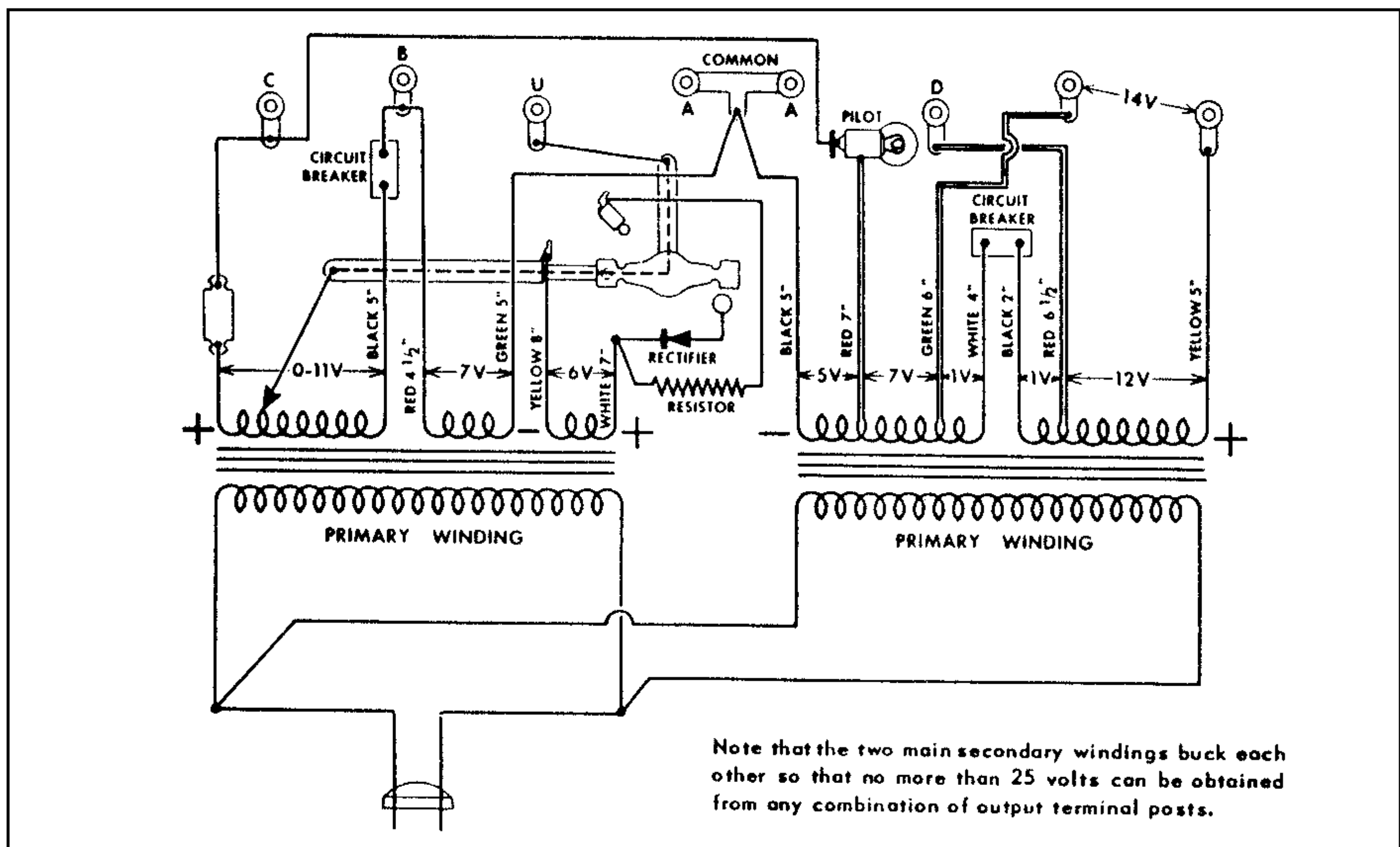
As can be seen from its schematic diagram, below, the "TW" transformer is in reality a double transformer consisting of two independent coil and laminations assemblies with their primary windings connected in parallel and with secondary windings joined at terminal "A" to provide a common ground. Note that the secondary windings of the two transformers are arranged to buck each other in order to limit any possible output voltage to the maximum specified for toy transformers by the Underwriters Laboratories.

Because of this construction the two coils of this transformer can be loaded independently of each other. Also, because of this feature, no more than 60 watts, or $4\frac{1}{2}$ to 5 amperes of current at the normal operating voltage, should be drawn continuously from either coil, to avoid overloading the coils.

For best power utilization, current for the track should be drawn from the variable voltage coil with post "A" being connected to the outside rails. This will permit current for 022 switches and other track components or accessories having a common ground with the track to be drawn from the "D" post. Current for lights or independently operated accessories should be taken from the 14-volt circuit of the fixed voltage coil through the pair of unlettered terminals.

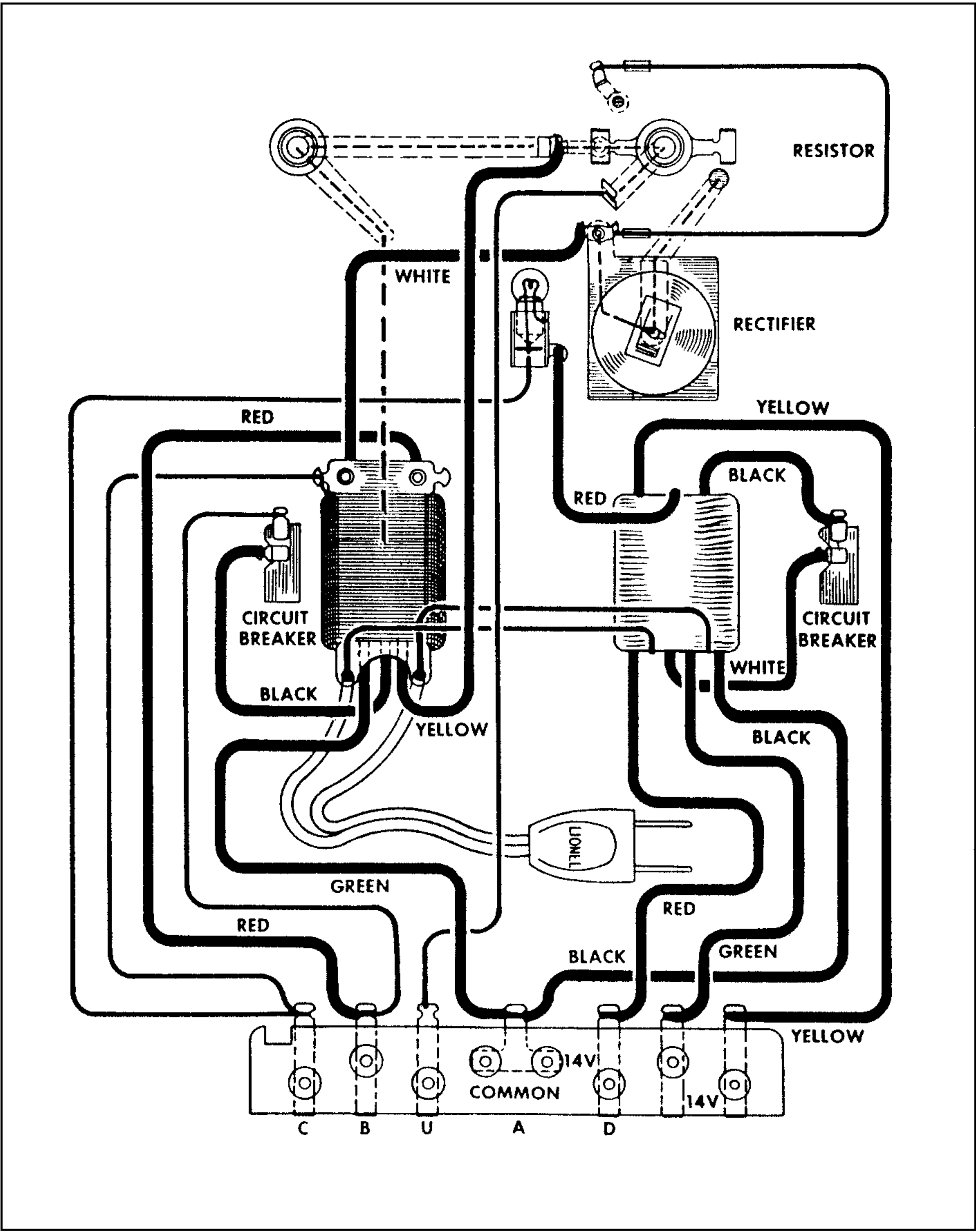
The variable voltage coil of the "TW" transformer is equipped with a standard whistle control circuit described on Page 3, Section PS, but each of the coils is equipped with its own circuit breaker so that an overload of one coil will not affect the output of the other. The pilot light, however, is common to both coil circuits and is so connected that the lamp voltage will change when either circuit breaker operates, causing the lamp brightness to vary. Normal lamp voltage is 13-14 volts, dropping to 4-5 volts when the short is in the track circuit (posts A-U), and rising to 17-18 volts if the short is in the independent 14-volt circuit, however, the voltage variation on the lamp is too small to affect its brightness.

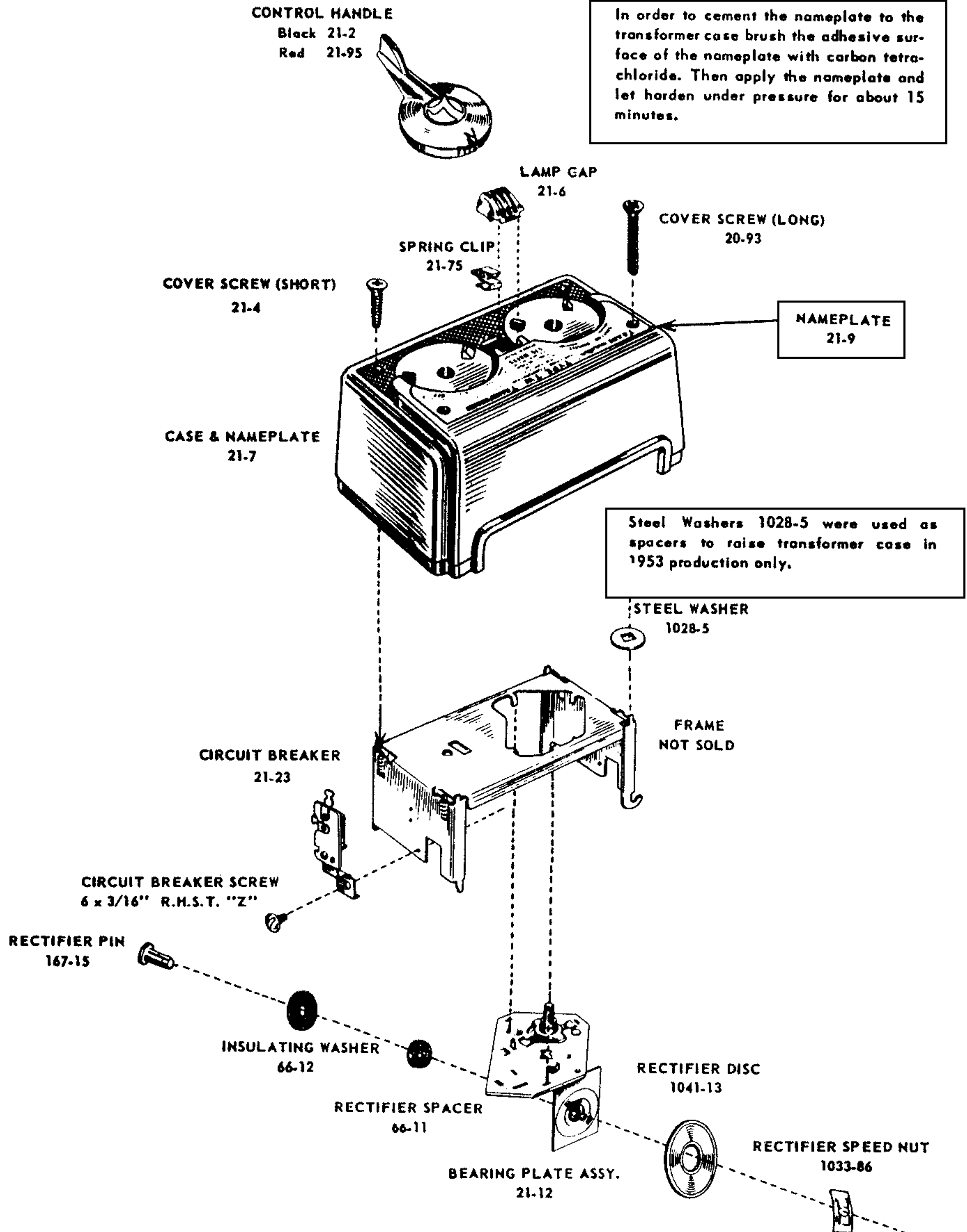
Schematic Wiring Diagram of Type "TW" Transformer



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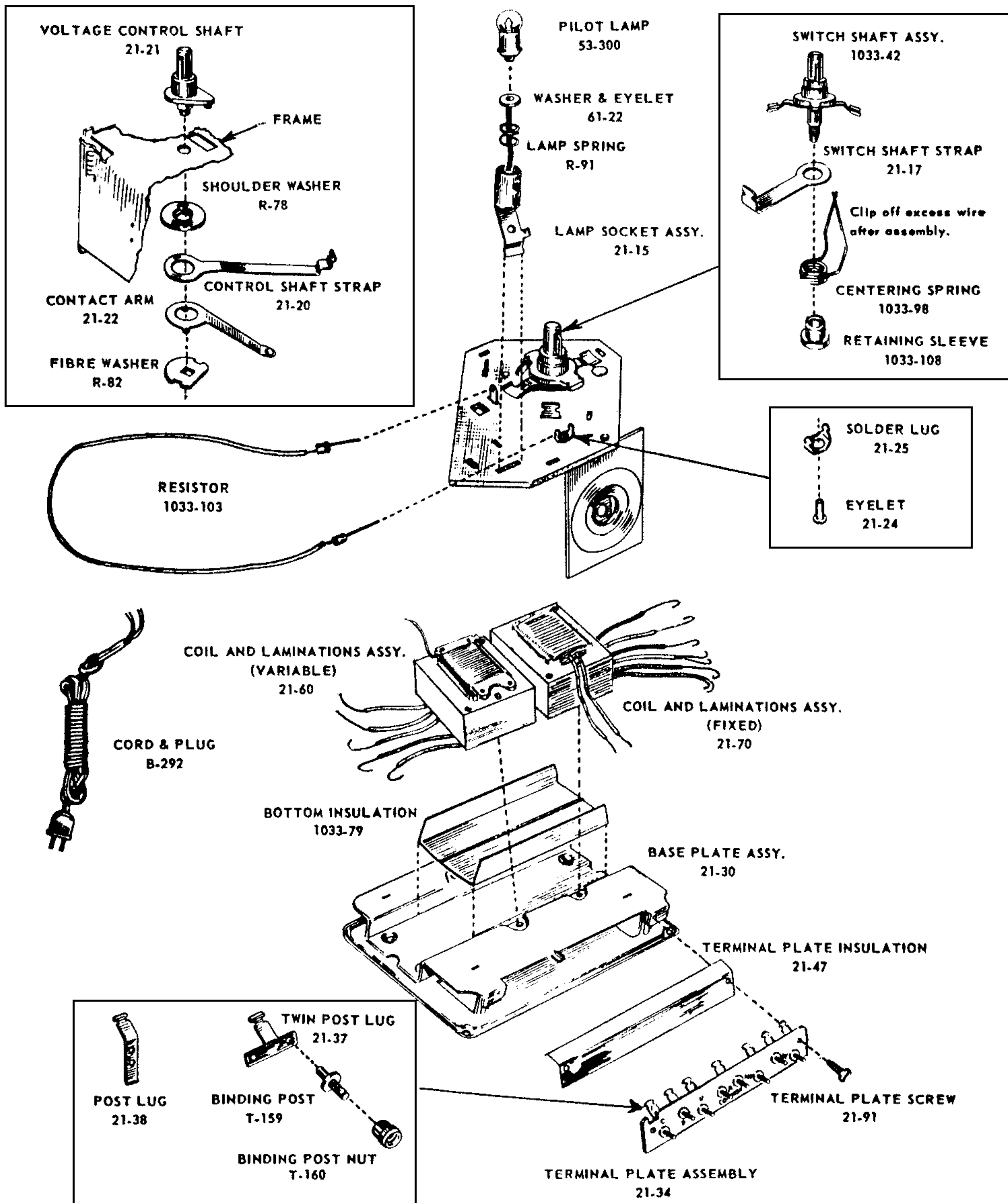
PICTORIAL WIRING DIAGRAM OF TYPE "TW" TRANSFORMER





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REPLACEMENT PARTS FOR TYPE "TW" TRANSFORMER

Part No.	Part Name	List Price
20-93	Cover Screw (long)	\$.05
21-2	Control Handle (black)	.60
21-4	Cover Screw (short)	.05
21-6	Lamp Cap	.20
21-7	Case & Nameplate	4.00
21-9	Nameplate	.75
21-12	Bearing Plate Assy.	1.50
21-15	Lamp Socket Assy.	.20
21-17	Switch Shaft Strap	.10
21-20	Control Shaft Strap	.10
21-21	Voltage Control Shaft	.30
21-22	Contact Arm	.25
21-30	Base Plate Assy.	1.50
21-23	Circuit Breaker	1.00
21-24	Eyelet	.02
21-25	Solder Lug	.05
21-34	Terminal Plate Assy.	1.00
21-37	Twin Post Lug	.05
21-38	Post Lug	.05
21-47	Terminal Plate Insulation	.10
21-60	Coil & Laminations (Variable)	5.25
21-70	Coil & Laminations (Fixed)	5.25
21-75	Spring Clip	.05
21-91	Terminal Plate Screw	.02
21-95	Control Handle (Red)	.60
53-300	Pilot Lamp	.20
61-22	Eyelet & Washer	.02
66-11	Rectifier Spacer	.05
66-12	Insulating Washer	.02
167-15	Rectifier Pin	.05
1028-5	Steel Washer	.05
1033-42	Switch Shaft Assy.	.60
1033-79	Bottom Insulation	.10
1033-86	Rectifier Speed Nut	.05
1033-98	Centering Spring	.15
1033-103	Resistor	.15
1033-108	Retaining Sleeve	.05
1041-13	Rectifier Disc	.50
B-292	Cord & Plug	.60
R-38	Steel Washer	.05
R-78	Shoulder Washer	.05
R-82	Fibre Washer	.05
R-91	Lamp Spring	.05
T-159	Binding Post	.05
T-160	Binding Post Nut	.05
6 x 3/16"	R.H.S.T. 'Z' Circuit Breaker Sc.	.02
No. 11	Insulating Tubing (Specify Color) per foot	.10

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<u>Part Number</u>	<u>Location</u>	<u>Unit Price</u>	<u>Min. Quan.</u>	<u>Description</u>
20-93	O-95	.05	12	Cover Screw (Long)
21-2	H-44	.75	4	Control Handle (Black)
21-4	J-73	.05	12	Cover Screw (Short)
21-6	J-63	.25	2	Lamp Cap
21-7	I-45	4.00		Case W/Nameplate
21-9	J-53	.75		Nameplate
21-12	J-83	2.00		Bearing Plate Assem.
21-15	J-63	.35		Lamp Socket Assem.
21-17	J-63	.10	6	Switch Shaft Assem.
21-20	J-63	.15	6	Control Shaft Strap
21-21	J-63	.30		Voltage Control Shaft
21-22	J-63	.30		Contact Arm
21-23	J-63	1.50	2	Circuit Breaker
21-24	J-63	.02	25	Eyelet (Frame)
21-25	J-73	.05	12	Solder Lug (Frame)
21-30	G-32	1.50		Baseplate Assem.
21-37	J-73	.05	12	Twin Post Lug
21-38	J-73	.05	12	Post Lug
21-47		.10	6	Terminal Plate Insulation
21-60	O-22	6.25		Coil W/Laminations (Variable)
21-70	Q-11	6.25		Coil W/Laminations (Fixed)
21-91	J-73	.02	12	Terminal Plate Screw
21-95	I-44	.75		Control Handle (Red)
21-101	J-73	1.25		Terminal Plate Assem.
21-107	J-54	.02	25	Rivet (Spring Clip)
21-110	U-70	.05	12	Spring Clip (Cover)
53-300	LC	.20	10	Lamp
61-22	A-61	.05	25	Lamp Contact
66-11	H-97	.05	12	Rectifier Spacer
66-12	H-97	.02	12	Insulating Washer (Rectifier Pin)
167-15	J-91	.05	10	Rectifier Pin
1028-5	N-71	.05	12	Steel Washer (Frame)
1033-42	N-62	.75	6	Switch Shaft Assem.
1033-79	N-58	.10	6	Bottom Insulation
1033-86	O-99	.05	12	Speednut (Rectifier)
1033-98	N-71	.20	12	Centering Spring (Switch Shaft)
1033-103	N-58	.25		Resistor
1033-108	N-82	.10	12	Retaining Sleeve
1041-13	N-73	.75	6	Rectifier Disc
B-292	N-44	1.00		Cord W/Plug

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<u>Part Number</u>	<u>Location</u>	<u>Unit Price</u>	<u>Min. Quan.</u>	<u>Description</u>
R-38	N-84	.05	12	Steel Washer
R-78	N-78	.05	12	Shoulder Washer
R-82	N-95	.05	12	Fibre Washer (Control Shaft)
R-91	N-55	.05	12	Lamp Spring
T-159	N-98	.10	6	Binding Post
T-160	N-98	.10	6	Binding Post Nut
6 x 3/16"		.02	25	RHST "Z" Circuit Breaker Screw