CONTROLS-AIR CONDITIONING

Cooling and heating equipment is controlled by The Vapor Company's No. AZ-43831-MDA automatic air conditioning control panel. See Figures 107, 108 and 109.

This panel differs from pre-war panels in that it is more fully automatic and requires a minimum operation by the car crew. Once the panel is set on any given setting, the car temperature is automatically controlled and shifts from heating to cooling or vice-versa with no attention.

BLOWER FAN SWITCH: A two position " OFF " and " NORMAL " No. 7122, Cat No. K-2172 is provided. This switch has two sets of contacts. It places the panel in operation and provides one speed operation of the blower fan. In the off position all contacts are open. With the blower fan relay de-energized, its contacts open circuits to cooling and overhead heat. Floor heat remains under control of the 50° layover thermo. In the " NORMAL " position, contacts close, energizing the blower fan relay and exhaust fan and fan runs at full speed.

TEMPERATURE SELECTOR SWITCH: A three position " NIGHT ", " COOLER ", and " WARMER " temperature selector switch is provided to allow temperature selectivity. The switch is divided into two circuits. One circuit operates to place one of three resistors in series with the overhead heat compensating tube heater windings This tube, without compensation, regulates at 76°. With the temperature switch set in the " NIGHT " position, a circuit is made through a 2550 AP resistor to the tube heater winding. This applies 11° of heat electrically to the tube and it operates at 65° ambient temperature. In the " COOLER " position a circuit is completed through a second 2550 AP resistor which also applies 11° of electrical heat and the tube again operates at 65°.

In the " WARMER " position a circuit is completed through a 2550 AG resistor which applies 2° of heat electrically and the tube operates at 74°.

Thus overhead heat is maintained at:

65° on the " NIGHT " setting 65° on " COOLER " setting, 74° on " WARMER " setting.

The other switch circuit operates in series with the heater winding of three compensating tubes. (See Figure 110) Cooling 76° Cooling Modulation 78° and Heating Interlock 74° tubes. These tube heater windings are in series and on any one setting of the temperature switch will have the same heat applied electrically (tube heater windings are of equal resistance 600 Ohm) but because of difference in uncompensated regulating point, they will regulate at different temperatures as follows:

Pos. of Switch	Elect. Heat Applied	Cooling Tube Reg. at	CM Tube Reg. at	Heating Interlock Reg. at
NIGHT	7	69°	71°	67°
COOLER	7	69°	71°	67°
WARMER	2	74°	76°	72°

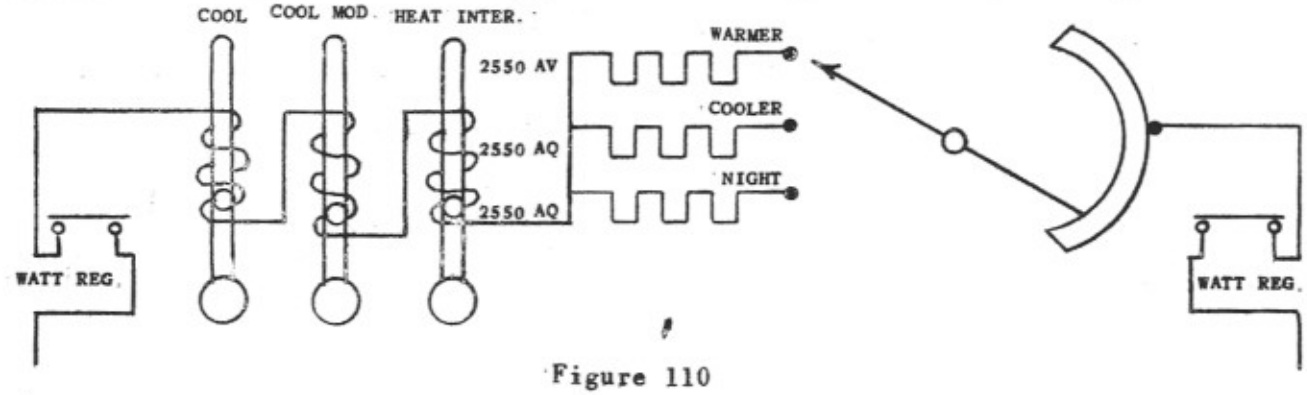


Figure 110

N.H.

WATTAGE REGULATOR: A wattage regulator is provided to supply a measured quantity of heat to compensating thermo tubes over a wide range of battery voltage.

The wattage regulator consists of a special 300° mercury tube, a shunt relay and necessary resistors. The wattage regulator functions as follows: (see Figure 111).

1. When blower fan switch is turned to the "Normal" position contact energizes the blower fan relay.

2. Blower fan relay contacts complete a circuit through two 1000 Ohm resistors to energize the coil of the wattage regulator relay. The 300° mercury tube is connected in parallel with the coil of the wattage regulator relay. This tube will be open since the tube is affected very little by ambient temperature but responds quickly to electrically applied heat.

3. Contacts of the wattage regulator relay close completing a circuit to all compensating thermo tube heater windings and to the heater winding of the 300° wattage regulator tube.

4. When voltage is below 56 volts the mercury in the wattage regulator tube will not rise far enough to complete this tube circuit and the full applied voltage passes to compensating tube heater winding circuits.

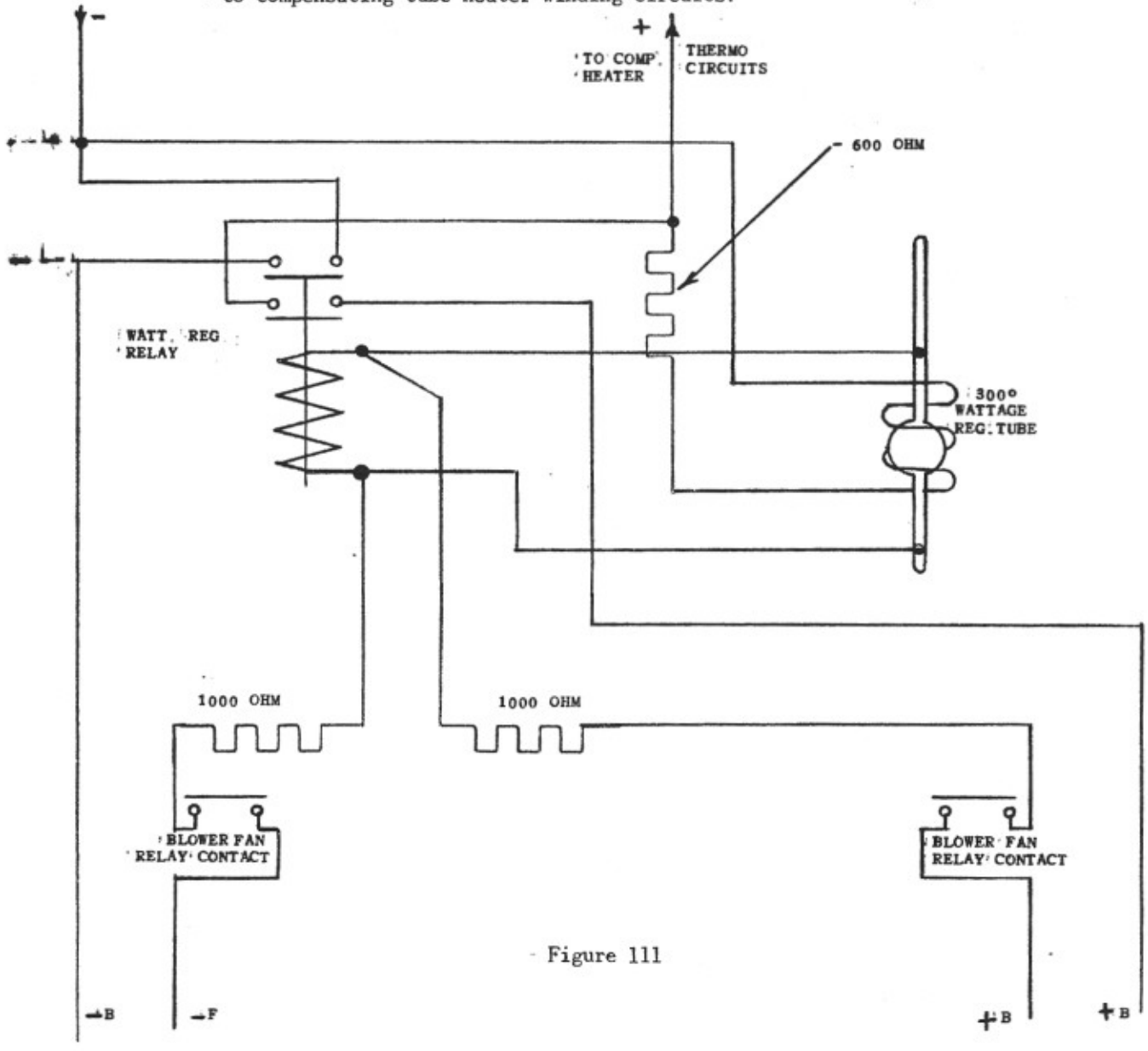
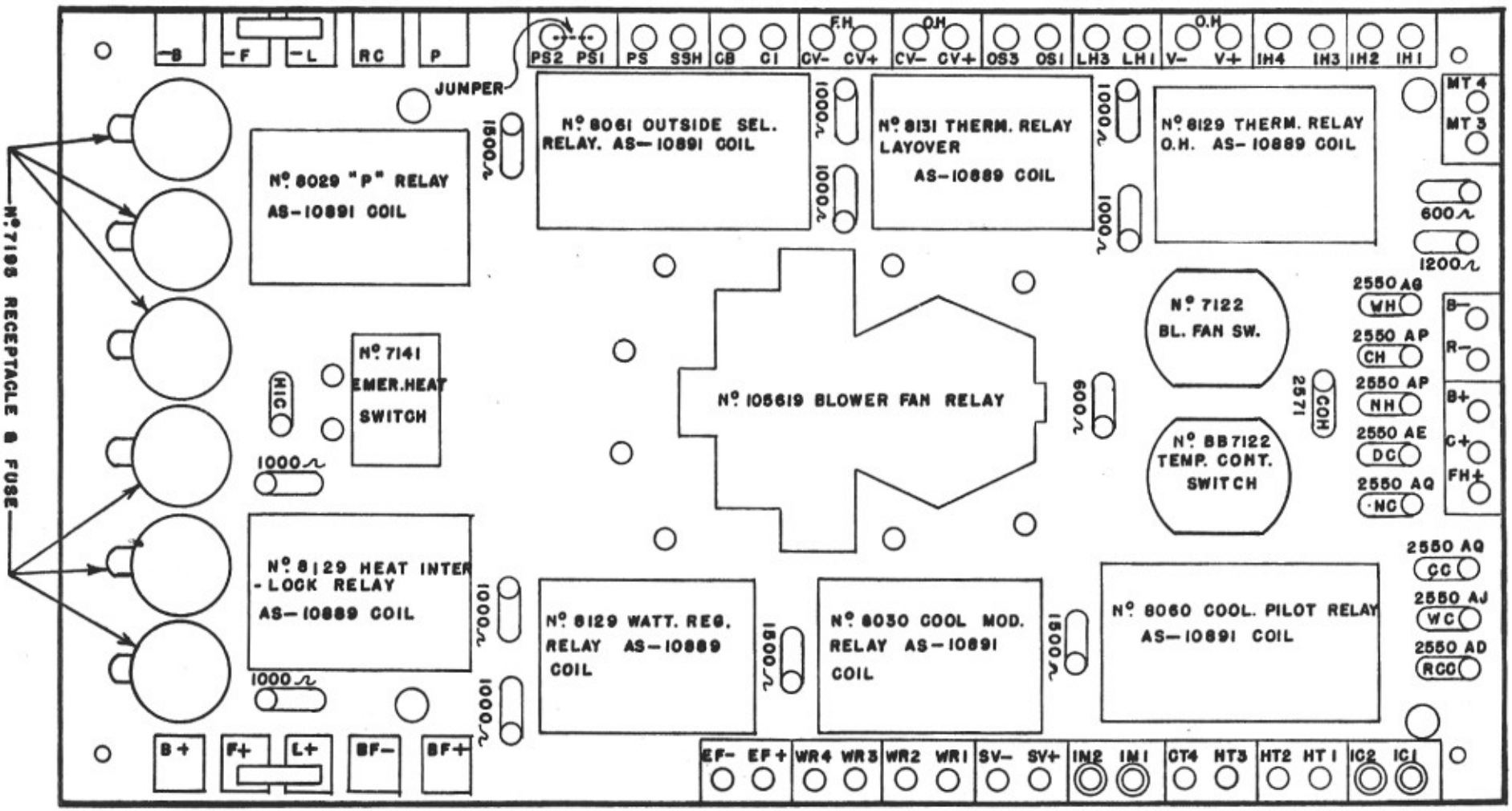


Figure 111

N.E.



Nº AZ - 43831 - MDA

AUTOMATIC AIR CONDITIONING CONTROL PANEL

FIGURE 109

5. When applied voltage exceeds 56 volts the mercury in the wattage regulator tube shorts the coil of the wattage regulator relay. The contacts of the regulator relay open and the voltage is removed from compensating thermo tube heater winding circuits and the heater circuit of the 300° wattage regulator tube.

6. When voltage is removed from the wattage regulator tube heater circuit, the mercury falls until this tube circuit is again open, allowing the coil of the wattage regulator relay to become energized, closing its contacts.

7. Thus with battery voltage above 56 volts the wattage regulator relay cycles its contacts open and closed, supplying voltage to maintain heating of compensating tubes equal to that given by a constant supply at 56 volts.

NOTE: It is important that the 600 Ohm resistor be maintained in series with the heater winding of the 300° wattage regulator tube. A change in this resistor will change the equivalent operating voltage of tube heater circuits.

OUTSIDE SELECTOR RELAY: The outside selector relay is controlled by a single 50° thermo located in the fresh air stream. This tube is in series with the coil of the outside selector relay. When the air being drawn into the car is above 50° the outside selector relay is energized.

With the relay energized its contacts make circuits to

CI lead of Compressor motor panel.
B to cooling and heat interlock circuits,
B to 60° layover tube (with emergency heat switch in normal position).

Thus with outside air temperature above 50° cooling is available dependent upon cooling tubes. Overhead heat is available governed by the overhead heat tube (located in the duct). The heating interlock tube (located on the bulk head will stop overhead heat when it is satisfied. Floor heat valves may come on governed by their individual tubes but steam is locked out of loops by the flow limit portion of the 955 regulators.

With outside air temperature below 50°, the outside selector tube opens and the outside selector relay is de-energized. Its contacts open with the following results. Cooling cannot operate regardless of cooling tubes calling. Heating interlocks relay is de-energized and overhead heat is controlled only by the overhead heat tube. The circuit to the layover heat tube is broken, layover heat is energized. Layover heat relay contacts open the circuit to flow limit valves, steam enters FH loops and floor heat is available governed by individual accomodation FH thermos.

COOLING RELAYS: The cooling pilot relay is controlled by the 76° cooling tube and (with outside temperatures above 50°) when this tube is up the cooling pilot relay is energized. Its contacts make the following circuits. See Figure 107.

B supplied to a (a) pressure switch circuit (b) "P" relay coil (with cooling modulating tube open) (c) B from load side of wattage regulator through a 2550 AV resistor to heater winding of overhead heat tube. This places 28° of heat on the overhead tube, locking it out and provides a period of ventilation after cooling is satisfied before overhead heat can come on, thus preventing rapid cycling from cooling to heating and back to cooling.

(d) B to cooling and heat interlock heater winding circuit through a 2550 AD resistor. This applies 1/4° of heat to these tubes when compressor is running to prevent reverse cycling.

The cooling modulating relay is controlled by the 78° cooling modulating tube. Although both cooling tubes are compensating type, the cooling modulating tube will always be satisfied at a temperature two degrees above the cooling tube. When this tube is up the cooling modulating relay is energized. One contact opens the circuit to the "P" relay and compressor runs full speed. The other contact makes a circuit to the freon solenoid valve energizing it open. Thus full cooling is obtained. When this tube opens, the "P" relay is energized and compressor slows to 60% of full speed and the freon solenoid valve is de-energized closed, cutting out 1/2 of the evaporator. Thus modulated cooling is obtained until the car temperature drops two additional degrees and the cooling tube is satisfied at which time the compressor stops.

N.H.

OPERATION: Assuming a condition of outside temperature above 50° and car temperature above 78° with light switch on, and blower fan switch on "Normal", pressing the reset button starts the compressor (if genemotor is running, the low voltage relay is automatically reset and the compressor will run when blower fan switch is turned on).

Assuming the temperature selector switch is set at the "Warmer" position, the car will cool at full speed until the temperature at the cooling tubes drops to 78°. At this time the compressor slows to 60% speed and the Freon solenoid valve closes giving modulating cooling.

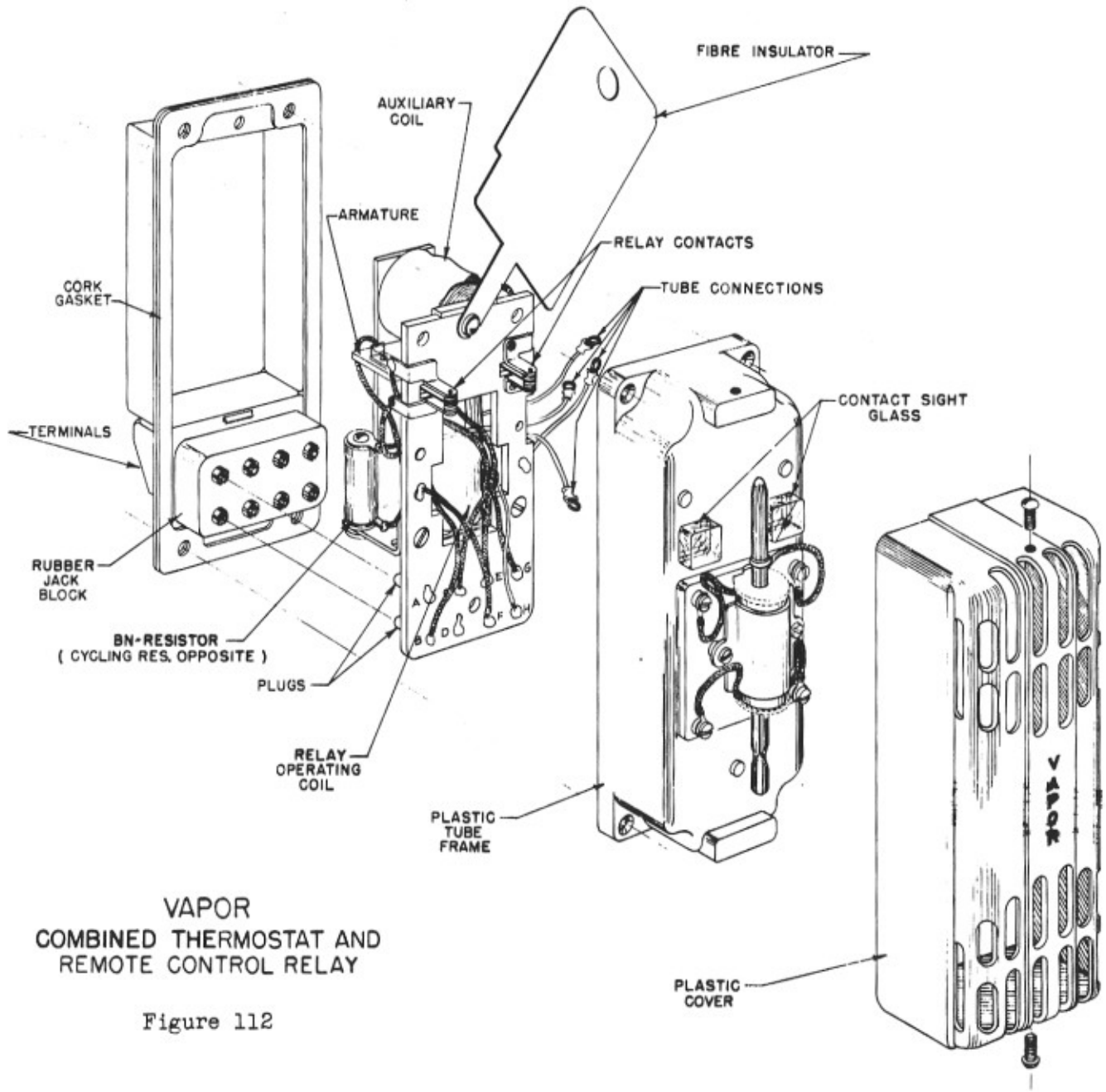
The car will continue to cool at modulated speed until car reaches 76° when cooling will stop. A heavy heat load may prevent car from reaching 76° and some cases car may warm up to 78°, at which time car will go back to full speed cooling.

If (due to a drop in outside temperature) the car temperature continues to drop, after cooling system has stopped, about 30 minutes of ventilating (while heat disipates from OH tube) is required so overhead heat is available when car temperature reaches 74°. Floor heat is locked out at flow limit portion of 955 regulators. The overhead heat is cycled off and on until the temperature at the heat interlock tube reaches 74° at which time overhead heat is off regardless of overhead heat tube calling. This is the condition as long as outside temperature remains above 50°. When the outside temperature drops below 60°, cooling is off, heat interlock feature is out, and car temperature is maintained; overhead heat by overhead heat tube at 74°, floor heat at setting of accomodation potentiometers through action of FH tubes and the No. MP-8726 remote control panels.

1. Figure 107 shows a schematic of the master control panel wiring.
2. Figure 108 shows a physical wiring diagram of the master control panel.
3. Figure 112 shows the remote control relay.

TESTING: To use the Vapor test meter proceed as follows:

1. Be sure meter is of proper voltage, then connect it at terminals MT3 - MT4. Note Polarity. Calibrate meter to 64 Volt line.
2. Remove 300° wattage regulator tube from its base (unplug).
3. Apply meter leads across heater windings of each compensating tube. Meter will read the number of degrees that the operating point of the tube has been lowered. For example when checking the 74° heating interlock tube, meter should read 2 with selector switch in "Warmer" position, 7° in "Cooler" position, and 7° on "Night" position. When the heat interlock relay cycles the meter should show a change of 1°.
4. Replace wattage regulator tube.



VAPOR
COMBINED THERMOSTAT AND
REMOTE CONTROL RELAY

Figure 112

An automatic compressor cut-out relay is located in the Electric locker adjacent to the Generator Control Panel. See Figure 113. This is a Struther Dunn Co.'s. No. CXA 2721 (Cat No. 13272) double contact relay, one set of contacts of which is normally closed, making circuit from C-1 on the Frigidaire compressor control panel, through above relay, to C-1 on Vapor Control panel. These contacts remain closed until trainline switch is closed, when relay energizes open and breaks circuit to Compressor panel. The purpose of this is to prevent draining of car batteries of adjoining car when trainlined. A second circuit is completed through interlock relay on the Generator control panel, which closes when generator reaches operating speed and thereby completes circuit to Compressor panel. This will insure compressor operation, *when generator is working*, regardless of position of trainline switch. It is important that trainline switches be left in the open position and connector not applied when not needed, as closing of switch in this car or in adjoining car with connector in position, will activate relays in each car.

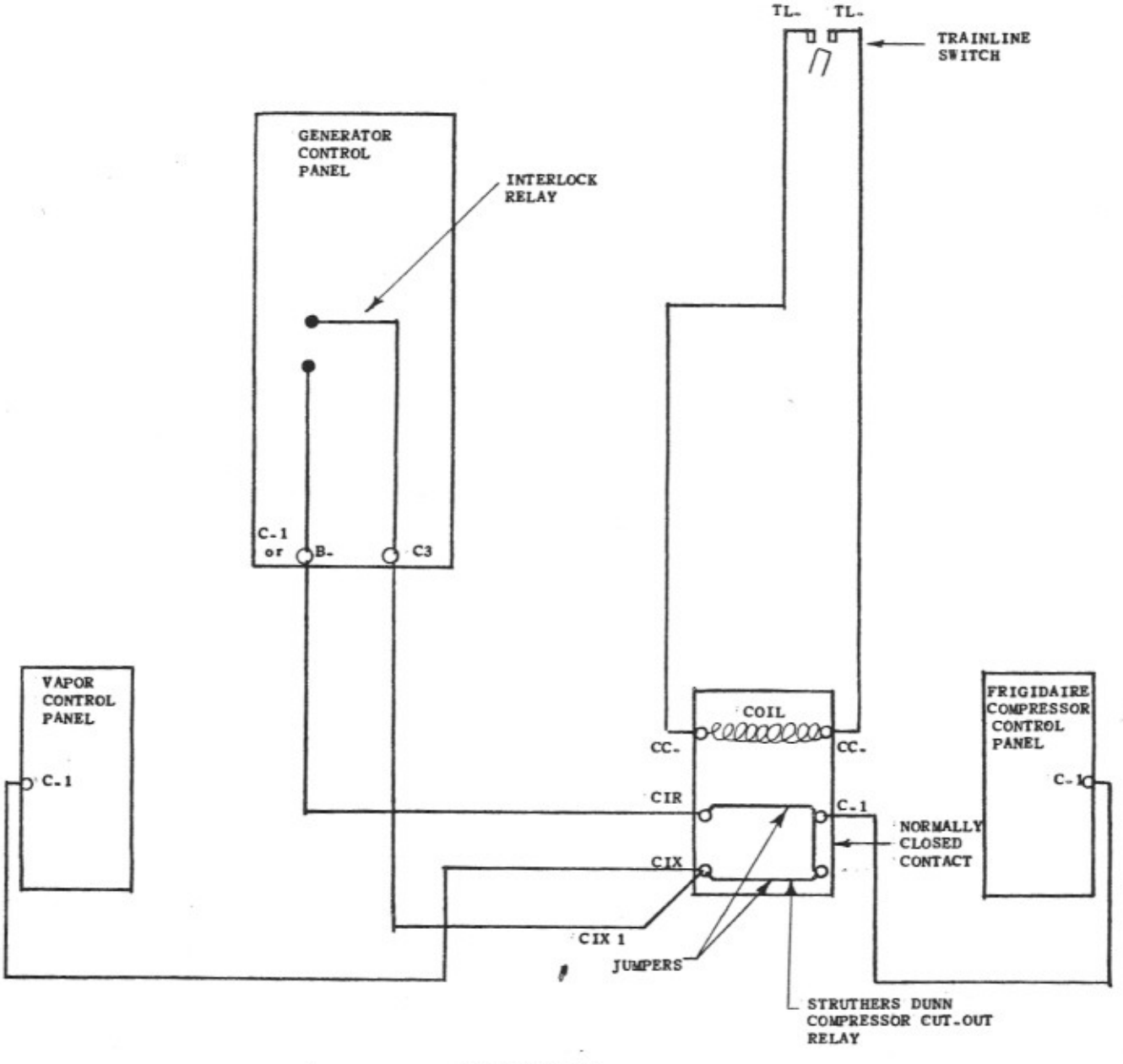


Figure 113

N.H.

NOTES

A combination of two systems is used for lighting.

The incandescent lights are 64 volts direct current supplied from battery and generator and regulated through Safety Co.'s S-1050-E lamp regulator. Marker light outlets are supplied with 32 volts direct current by reducing the 64 volt battery current through a bank of resistors.

BATTERIES: Batteries are Exide, EPTA 25 C, 64 volts, 32 cell, Monobloc, with a specific gravity of 1250, rated at 600 ampere hour capacity at the 8-hour rate. Batteries are arranged in two units of 32 volts each. Units are wired with a Double-pole, Double-throw disconnect switch to allow 64 volt charging with the units in series and 32 volt charging with the units in parallel. It is important that this switch be left in the 64 volt position after charging to avoid open batteries.

Flourescent lights use 110 volt alternating current supplied by a Safety Co.'s, type MG-24 Motor alternator No. 316630 (Cat. No. E-12162) rated at 3000 watt capacity. The motor alternator is regulated by Safety Co.'s step starting panel No. 313068 with No. 307072 fuse (125 amps) and is mounted on resilient mounting, Safety Co.'s No. 310520. Operation is as described in the Car Lighting Maintenance Manual on Pages 96 - 120.

The main switchboard is equipped with a single pole, single throw, knife switch in the battery circuit, and a double-pole, single-throw knife switch in the trainline circuit. Switches are rated at 200 amps. The main switch (Cat. No. E-8852) is the circuit breaker type rated at 100 amps. trip out. 20 amps. circuit breakers (Cat. No. E-7584) are used for branch circuits using direct current. Three pole circuit breakers are used in flourescent light circuits, the third pole being in the D.C. circuit to start the motor alternator.

Pilot lights, annunciator lights, exhaust fans, water cooler are protected by conventional fuse plugs.

The call bell system is similar to the type used on present lightweight cars, using four dry cells for power, with trainline features. Edwards Co. annunciator is used and it has two 6 watt 64 volt lamps controlled by a small relay known as a light relay. The light relay is composed of a blank drop operating against two spring contacts and is usually located at the lower right-hand corner of the annunciator. Re-setting the annunciator opens the relay contacts. Bell wiring diagram is shown in Figure 114.

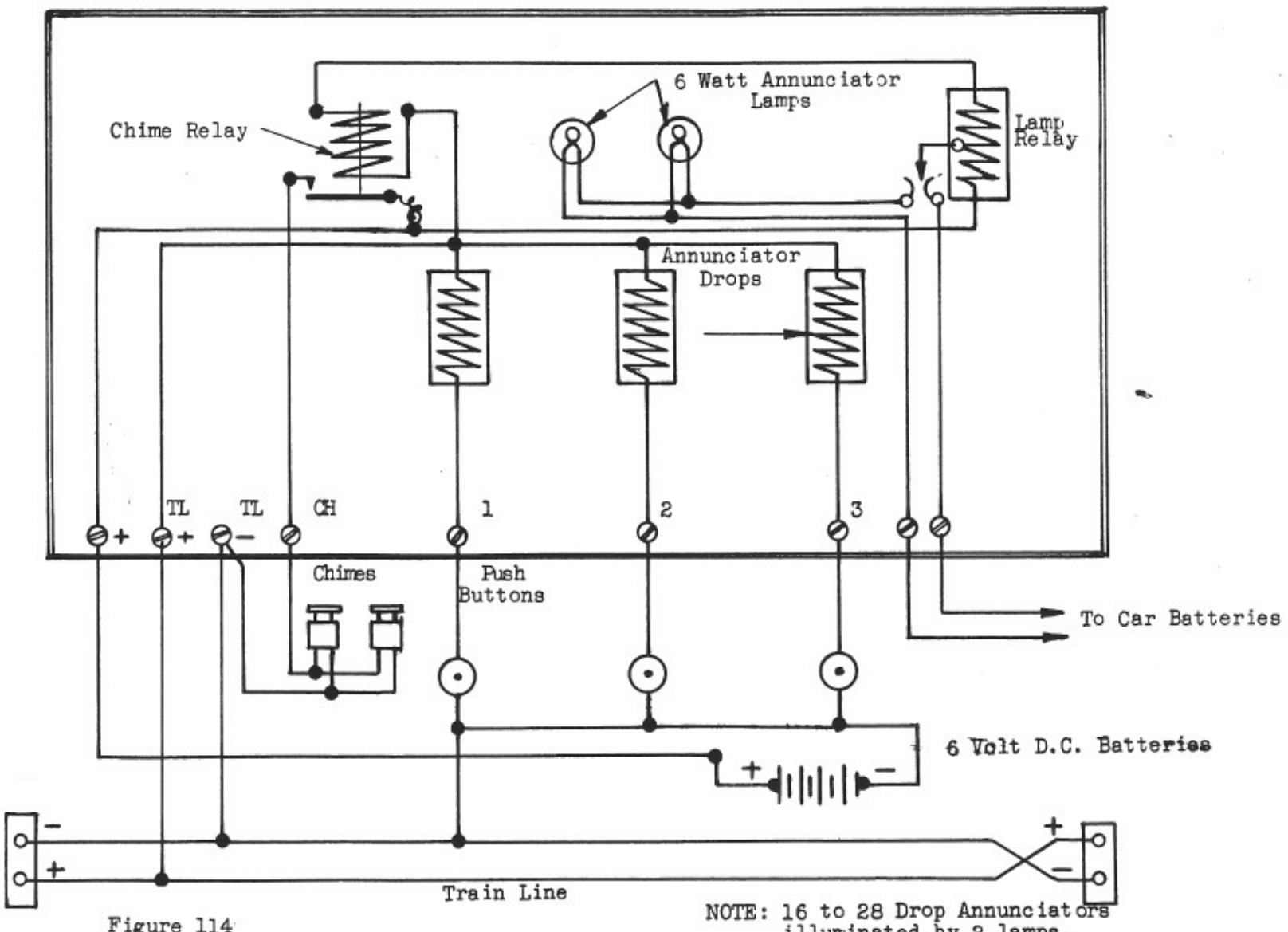


Figure 114

NOTE: 16 to 28 Drop Annunciators illuminated by 2 lamps.

CALL BELL CIRCUIT

FLUORESCENT LIGHTING

The average life of fluorescent type lamps depends upon the number of times the lamp is turned on. Under conditions where a lamp burns almost continuously the rated life of that lamp is more likely to be obtained than one that is turned off and on at short intervals.

In general, the characteristics of all fluorescent lamps are the same. See Pages 96 to 106 of your Car Lighting Maintenance Manual. The interior construction of the "bipin instant start" and "Slimline" lamps are identical with the bipin pre-heat (starter) type lamp. The bipin instant start has the pins short circuited inside end caps and will not operate on pre-heat ballast circuits. The Slimline has the filament coil supports connected together and form a single contact at each end of the lamp. With these arrangements the filaments cannot be pre-heated. Therefore, to compensate for the lack of pre-heating a much higher voltage is impressed across the terminals to force the electrons through the lamp. This high voltage produces a severe shock to the electron emitting surface of the filament cathode and some of the coating of the cathode flakes off. This is repeated for each start of the lamp until eventually the lamp will not burn.

A characteristic of instant start circuits is the difficulty of starting under conditions where the humidity is high. To insure starting under these conditions, a thin metallic starting stripe is painted on the outside and lengthwise of the lamp. This provides a path for the electrons to pass from cathode to cathode and produces a capacitive action which assures starting under all conditions.

The instant-start and Slimline lamps do not use starters, and do not blink on and off when the lamps fail to start; therefore, the section pertaining to starters and compensators does not apply. The behavior chart, which follows, applies particularly to starter type fluorescent lamps.

WATCHDOG-MANUAL RESET STARTERS: This starter uses the glow switch principle during normal starting the switch functions, as explained on page 100 of the Car Lighting Maintenance Manual. It has an added feature which consists of a wire coil heater element actuating a bimetallic strip which holds a second switch in a normally closed position. When lamp is defective or will not start for some reason, after making repeated attempts by blinking on and off, enough heat will be developed to trip the switch and open the circuit. This stops the blinking. When the lamp is replaced, the starter is reset by pushing the reset button down.

NOTE: Fluorescent lamps do not have a voltage rating marked on the lamp, but are governed instead by the length, diameter and wattage. This means then that a lamp of any given length, diameter and wattage can be used on a circuit of any voltage with the proper ballast.

It should be remembered that it is the function of the ballast to deliver to fluorescent lamps the proper lamp voltage and current required. The lamp voltage and current vary with the length, diameter and wattage.

It follows then that the ballast used must be of specifications to suit the circuit voltage and the design of the lamp.

INSPECTION PROCEDURE: will be as outlined in instructions from Superintendent of Yards Office, dated May 1st, 1949, covered by letter dated July 1st, 1949.

BEHAVIOR		POSSIBLE CAUSE	CORRECTIVE ACTION
ENDS REMAIN LIGHTED		1. Ends of lamp remain lighted; stater failure due to: Short-circuit condenser in starter or switch contacts welded together.	Replace starter.
		2. In new installation, may be circuit wiring or ground fault.	Check circuit wiring.
	1. Accompanied by shimmering effect during "lighted" period.	Normal failure; active material on electrodes exhausted; voltage needed for operation exceeds voltage supply.	Replace lamp.
	2. Blinking of relatively new lamp.	1. Possibly lamp at fault.	Replace lamp. Investigate further if successive lamps blink or flicker in same lamp holders.
BLINKING ON AND OFF		2. Starter defective, causing on - off blink or prolonged flashing at each start.	Replace starter.
		3. Low ballast rating.	Check ballast.
		4. Cold drafts hitting tube.	Enclose or protect lamp.
		5. Low circuit voltage (Decreased ease of starting; also 1% change in light output for each 1% change in voltage, with output of " lagging" lamp - in 2 lamp circuit - decreasing much faster than that of " leading" lamp.)	Check voltage and correct if possible.
		6. Loose circuit contact (likely at lamp holder) causing on-off blink.	Lamp holders rigidly mounted; lamp securely seated.
	3. With 2-lamp ballast: If one lamp starts, one end of the other may blink on and off without starting; occasionally, both lamps may start.	Individual starter leads from the two pairs of lamp holders may be criss-crossed. (If this is the case, one lamp will not make starting effort unless the other is in its lamp holders).	Rewire starter leads.

	BEHAVIOR	POSSIBLE CAUSE	CORRECTIVE ACTION
NORMAL END OF LAMP LIFE.	Lamp won't operate; or flashes momentarily then goes out; or blinks on and off.	Normal failure; active material on electrodes exhausted; voltage needed for operation exceeds voltage supply.	Replace lamp.
END BLACKENING	1. Dense blackening at one end or both, extending 2" - 3" from base.	Normal - End of Life.	Replace lamp.
	2. Blackening, generally within 1" of ends.	Mercury desposit, common especially with 1" lamps.	Should evaporate by itself as lamp is operated.
	3. Blackening early in life indicates active material from electrodes being spattered off to rapidly.	1. Starter defective, causing on-off blink or prolonged flashing at each start.	Replace starter.
		2. Ends of lamp remain lighted; starter failure due to: Short-circuit condenser in starter or switch contacts welded together.	Replace starter.
		3. No starting compensator in leading circuit of 2-lamp ballast.	Install compensator in series with starter in leading circuit. (None required for 100 watt lamps).
		4. Ballast improperly designed or outside specifications for lamp wattage or wrong ballast being used.	Use ballast of correct rating for lamp size.
		5. Too low or too high voltage.	Check voltage with range on ballast name plate.
		6. Loose circuit contact (likely at lamp holder) causing on-off blink.	Lamp holders rigidly mounted; lamp securely seated.
DARK STREAKS	Streaks lengthwise of tube.	Globules of mercury on lower (cooler) part.	Rotate tube 180° -Mercury may evaporate by increased warmth, though it may condense out again on cool side.
RINGS	Brownish rings at one end or both ends about 2'' from base.	Sometimes a natural development during life.	Has no effect on lamp performance.
DENSE SPOTS	Black, about 1/2" wide, extending about halfway around tube, centering about 1'' from base.	Normal - but if early in life indicates excessive starting or operating current.	Check for ballast off-rating or unusually high circuit voltage.

BEHAVIOR	POSSIBLE CAUSE	CORRECTIVE ACTION
NO STARTING EFFORT OR SLOW STARTING	1. Open circuit in electrodes, due to broken electrode, air leak, open weld, etc.	If open circuit is shown by test or inspection as in Item No. 9 (below) replace lamp.
	2. Burned-out electrode (might be caused by placing one end of lamp across 115 volts).	If open circuit is shown by test or inspection as in Item No. 9 (below) replace lamp.
	3. Air leak in lamp. In test with test lamp (See item No. 9) leak is indicated by absence of glow, through electrode lights up.	Replace lamp.
	4. Starter at end of life.	Replace starter.
	5. Starter sluggish.	Replace starter.
	6. No starting compensator in leading circuit of 2-lamp ballast.	Install compensator in series with starter in leading circuit. None required for 100 watt lamps.
	7. Low ballast rating.	Check ballast.
	8. Remote possibility of open-circuited ballast.	Check ballast.
	9. Burned-out lamp electrodes due to: Broken lamp holders. Lamp holders with attached starter sockets, surface-mounted on metal. One strand of conductor touching grounded fixture. Improper wiring. D.C. operation without necessary additional resistance. Ground from some other cause.	To determine necessity for replacing lamp, examine electrodes by viewing end of bulb against pin-hole of light. (Or test by connecting base pins in series with test lamp* on 115 v circuit. Fluorescent glow means intact electrodes and active electrons) * Correct Test Lamp Size. / Various for F Lamps 60 W / 14 w to 40 w 25 w / Small diameter or miniature. 200 w / 100 w
	10. Low circuit voltage (Decreased ease of starting, also 1% change in light output for each 1% change in voltage, with output of " lagging" lamp - in 2 lamp circuit - decreasing must faster than that of " leading" lamp)	Check voltage and correct if possible.

BEHAVIOR		POSSIBLE CAUSE	CORRECTIVE ACTION
NO STARTING EFFORT, OR SLOW STARTING (Cont'd).		11. Possible open circuit.	Test lamp in another circuit, being sure of proper contact in lamp holders. Check voltage from one lamp holder to the other. (Use vottmeter or 220 v. 100 w test lamp. Only one connection at each holder should be alive, hence 4 ways to check two live ones). If no voltage indication from lamp holders, check circuit leads to holders. If still no voltage, check circuit connection.
FLICKER (NOT STROBOSCOPIC EFFECT)	1. Pronounced, irregular flicker on looking directly at lamp (spiraling, swirling, snaking, etc.)	1. New lamp may flicker.	Flicker should clear up after lamp is operated or turned on and off a few times.
		2. Starter not performing properly to pre-heat electrodes.	Replace starter.
		3. No starting compensator in leading circuit to 2-lamp ballast.	Install compensator in series with starter in leading circuit. None required for 100 w lamps.
		4. Ballast improperly designed or outside specifications for lamp wattage, or wrong ballast being used.	Use ballasts of correct rating for lamp size.
		5. High voltage starting.	Check voltage.
	2. Flicker suddenly occurring.	May suddenly develop in any lamp in normal service.	Should clear up if turned off for a few seconds.
	3. Persistent tendency to flicker.	Possibly lamp at fault.	Replace lamp. Investigate further if successive lamps blink or flicker in same lamp holders.

BEHAVIOR		POSSIBLE CAUSE	CORRECTIVE ACTION
DECREASED LIGHT OUTPUT(Continued)		5. Dust or dirt on lamp, fixture, walls or ceiling.	Clean.
COLOR AND BRIGHTNESS DIFFERENCES.	1. Different Color appearance in different locations of same installation.	1. Actual slight differences (in white or daylight lamps) may be discernible; perhaps wrong color lamp used; possibly lamp outside limits of color standards, or apparent color difference may be only difference in brightness between old and new lamps.	Replace lamp, if objectionable.
		2. May be due to reflector finish, wall finish, other nearby light, room decorations, etc.	Interchange lamps before assuming color difference.
	2. Lamps operate at unequal brilliancy.	Low circuit voltage (Decreased ease of starting, also 1% change in light output for each 1% change in voltage, with output of " lagging" lamp - in 2 lamp circuit decreasing much faster than that of " leading'' lamp).	Check voltage and correct if possible.
NOISE	Humming sound, which may be steady, or may come and go.	1. Slight transformer hum inherent in ballast equipment; varies in different ballasts. Objectionable amount may be due to improper installation or improper ballast design.	Mount ballasts on soft rubber Celotex etc., to prevent transferring vibrations to supporting members, and to reduce hum to a minimum.
OVERHEATED BALLAST.		1. Short in ballast or capacitor.	Replace ballast or capacitor.
		2. Prolonged blinking tends to heat ballast, and heating is aggravated under high ambient temperature inside fixture housing.	See " BLINKING ON AND OFF" under BEHAVIOR and correct the cause.
		3. Short in wiring.	

BEHAVIOR	POSSIBLE CAUSE	CORRECTIVE ACTION
SHORT LIFE	1. Mortality laws; that is, for 4000-hr. rated life, some will fail at shorter life; others last much longer than rated hours. 4000-hr. life based on operating lamp 6 hrs. for each start.	
	2. Starter defective, causing on-off blink or prolonged flashing at each start.	Replace starter.
	3. Ends of lamp remain lighted; starter failure due to Short-circuit condenser in starter or Switch contacts welded together.	Replace starter.
	4. No starting compensator in leading circuit of 2-lamp ballast.	Install compensator in series with starter in leading circuit. None required for 100-watt lamps.
	5. Ballast improperly designed or outside specifications for lamp wattage, or wrong ballast being used.	Use ballasts of correct rating for lamp size.
	6. Too low or too high voltage.	Check voltage with range on ballast name plate.
	7. Loose circuit contact (likely at lamp holder) causing on-off blink.	Lamp holders rigidly mounted, lamp securely seated.
	8. Too many lamp starts.	Average life rating based on frequency of starts.
DECREASED LIGHT OUTPUT	1. Where heat is confined around lamp, light output is lower.	Letter ventilation of fixture.
	2. Cold drafts hitting tube.	Enclose or protect lamp.
	3. Low temperature operation (below 65° light loss is 1% or more per degree F.)	Enclose.
	4. Low circuit voltage (Decreased ease of starting; also 1% change in light output for each 1% change in voltage, with output of " lagging" lamp - in 2 lamp circuit - decreasing much faster than that of " leading'' lamp.)	Check voltage and correct if possible.

LAMPING SPECIFICATIONS
NY - NH & H RAILROAD

FIXTURE NO.	GLASS OR SHADE NO.	WHERE USED	LAMPS PER FIXTURE	SWITCH	STARTER	BALLAST
87135-S *E 10342*	89659 *E 12392*	Lower Berth Rooms A & C	1 - A-19, 25 W 1 - 6 W, Blue	85159 *E 10560*	-	-
87091-S *E 10353* *E 11959*	89659 89735 *E 12392* *E 12391*	Lower Berth Rooms B & D	1 - A-19, 25 W 1 - 6 W, Blue	85159 *E 10560*		
84295 *E 12044*	81572 *E 10600*	Vestibule	1 - A-19, 25 W			
84925-S *E 10588*	85404 *E 10587*	Bed Roomettes	1 - T 8 1/2, 25 W C-8 Fil. 1 - 6 W, Blue	80106		
87614 *E 11974*	87617 *E 11976*	Mirror Light, Roomettes	1 - T-8, 13 1/2 W Fluorescent 12" long		FS-2	83161 *E 11884*
85496-S *E 10579*	85404 *E 10587*	Upper Berth Light Bedrooms	1 - T-8 1/2, 25 W C-8 Fil. 1 - 6 W, Blue	80106		
81916 *E 11982*	81803 *E 11985*	Blind End Vestibule	1 - A-19, 25 W			
87093 *E 11945*	85812 *E 10605*	Ceiling Light All Roomettes	2-42" Slimline T-6 2-T-6, 15 W			59 G 565
87094 *E 11919*	85812 *E 10605*	Ceiling Light All Bedrooms	2-T-6, 25 W, 42" Slimline 2-T-6, 15 W			59 G 569
85037 *E-11980*	85133 *E-11929*	Hall and Passageway	1 - T-8, 18" Fluorescent 15 W. 1 - T-8, 15 W, 64 V		FS-2	85135
85533 *E 11989*	85133 *E 11929*	Passageway Ceiling Under AC Unit	2-T-8, 18" Fluorescent 15 W 2-T-6, 15 W, 64 V		FS-2	82136 *E 8858*
81535 *E 11925*	81528 *E 11939*	Ceiling Porters Section	1 - A-19, 25 W			

Note: Figures typed in Italics are Pullman Catalog Numbers.

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N.H.

LAMPING SPECIFICATIONS
NY. - NH & H RAILROAD

FIXTURE NO.	GLASS OR SHADE NO.	WHERE USED	LAMPS PER FIXTURE	SWITCH	STARTER	BALLAST
87034 *E 11977*	87097 *E 11979*	Over Mirror Bedroom Annexes	1 - T-12, 20 W, Fluorescent 24" Long 2 - T-6, 15 W		F S-2	83161 *E 11884*
87466-S *E 11917*	87029 *E 11920*	Mirror General Toilet	1 - T-8, 13 1/2 W Fluorescent 12" long		F S-2	
P.L.-27 Pull. Std. *E 2250*	Formica Number Plates	Car No. Signs	2 - T-8 1/2, 25 W Clear Two Contact Bayonet Base			
Pull. Std.		Annunciator	2 - S-6, 6 W, Clear			
659 D/3 Kirkland *E 11624*		Pilot Lights	1 - S-6, 6 W Clear, 120 V.			

Note: Figures typed in Italics are Pullman Catalog Numbers.

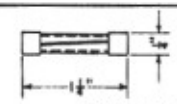
VARIOUS FUSES AND HOLDERS USED ON NEW LIGHTWEIGHT CA[illegible]

FUSE
E-3640
PLUG FUSE, ONE TIME BLOW
125 VOLTS

FUSETRON
E-5742
PLUG FUSETRON, ONE TIME BLOW
125 VOLTS

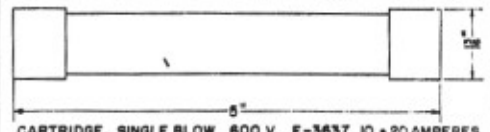
USED IN:—	110 V.	64 V.	32 V.
CONTROL CIRCUITS	5 AMPS	10 AMPS	10 & 15 A.
BRANCH LIGHT CIRCUITS	5 & 10 A.	15 & 20 A.	25 & 30 A.
PILOT LIGHT CIRCUITS	5 AMPS	5 AMPS	5 AMPS

USED IN:—	110 V.	64 V.	32 V.
MOTOR CIRCUITS ¼ & ½ H.P.		10 AMP.	15 AMP.
" " ¾ & 1 H.P.		15 AMP.	30 AMP.



GLASS CARTRIDGE FUSE
K-3284
SINGLE BLOW 5 A.
TYPE 3 MTH 250 VOLT or
TYPE 3 AGC 32 VOLT

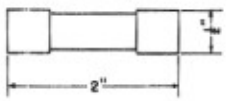
USED IN:—	110 V.	64 V.	32 V.
RAZOR CONVERTER		5 A.	5 A.
PILOT LIGHT CIRCUIT	5 A.	5 A.	5 A.



CARTRIDGE, SINGLE BLOW 600 V. E-3637 10 & 20 AMPERES

USED IN:—	110 V.	64 V.	32 V.
G.E. GENERATOR FIELD	20 A.	20 A.	
G.E. GENERATOR CONTROLS		10 A.	

FUSE
E-3637
CARTRIDGE, ONE TIME BLOW
250 VOLTS



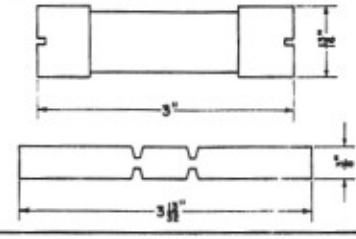
FUSETRON
E-7969
CARTRIDGE, ONE TIME BLOW
250 VOLTS

FUSES

USED IN:—	110 V.	64 V.	32 V.
CONTROL CIRCUITS	6 A.	15 A.	15 A.
GENERATOR FIELD	15 A.	15 A.	15 A.
BRANCH LIGHT CIRCUIT	6 A.	15 A.	20 A.

FUSETRONS

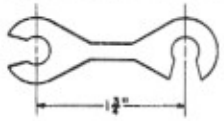
USED IN:—	220 V.	110 V.	64 V.	32 V.
MOTORS ¼ & ½ H.P.	5 A.	5 A.	10 A.	20 A.
MOTORS ¾ & 1 H.P.	5 A.	10 A.	20 A.	30 A.



FUSE CARTRIDGE E-7774, 250 VOLTS

FUSE LINK E-2237, SUPERLAG 250 VOLTS

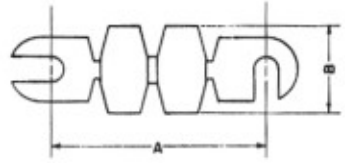
USED IN:—	110 V.	64 V.	32 V.
WAUK. ICE ENG. CRANKING CRT.		40 A.	60 A.
CONDENSER FAN CIRCUITS		40 A.	60 A.
EVAPORATIVE CONDENSERS		40 A.	60 A.
BUFFET APPLIANCES CRTS.		30 A.	60 A.



FUSE LINK K-6512
250 VOLTS

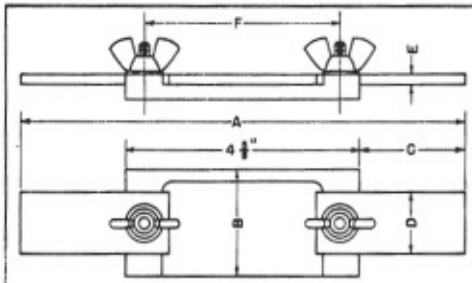
USED IN CIRCUITS FOR:—	110 V.	64 V.	32 V.
COLD WATER PUMPS		10 A.	20 A.
CONDENSER PUMPS		35 A.	65 A.
AIR CIRCULATING FANS		15 A.	30 A.
CONDENSER FANS		50 A.	90 A.

FUSE LINKS E-7606, 250 VOLTS, USED WITH CARTRIDGE E-2236 AND OPEN HOLDERS E-1022 & E-5877



USED IN:—	110 V.	64 V.	32 V.
1.2 KVA ALTERNATOR		40 A.*	70 A.
2 KVA ALTERNATOR		70 A.	100 A.
2.2 KVA INVERTER			100 A.
6.2 KVA INVERTER (AMP)	100 A.	200 A.	
8.0 KVA INVERTER (AMP)	125 A.		
MAIN BATTERY SWITCH		150 A.	300 A.
TRAIN LINES		100 A.@	200 A.
MAIN LIGHT SWITCH		100 A.	200 A.
WAUK. GEN. CRANKING		100 A.	150 A.
GENERATORS 7½ KW.	70 A.	125 A.	250 A.
" 10 KW.	100 A.	150 A.	300 A.
" 15 KW.	150 A.	250 A.	450 A.
" 20 KW.	200 A.	300 A.	600 A.
" 25 KW.	250 A.	400 A.	700 A.
" 30 KW.	300 A.	450 A.	800 A.
COMPRESSOR MOTORS	125 A.	200 A.	350 A.

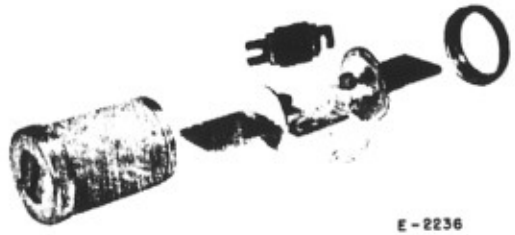
OPEN FUSE LINK HOLDER



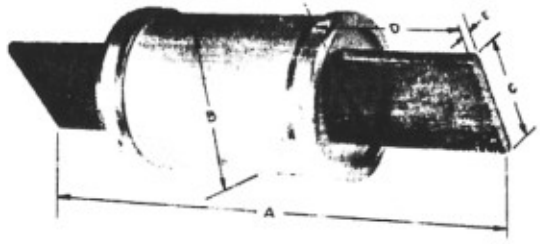
FUSE AMP FOR VARIOUS HOLDERS	CAT. No.	HOLDER DIMENSIONS A	B	C	D	E	F
70 & 100	E-1022	6"	2½"	¾"	1⅛"	¾"	2½"
125, 150 & 200							2½"
225,300,350 & 400	E-5877	8½"	2½"	1⅝"	1⅛"	½"	2½"
450 & 600	E-5877	8½"	2½"	1⅝"	1⅛"	½"	2½"
700							

LINK FUSE CAPACITY	LINK DIMENSIONS A	B
70 & 100	2½"	¾"
125, 150 & 200	2½"	1"
225, 300, 350 & 400	2½"	1½"
450 & 600	2½"	1½"
700	2½"	1½"

@ NEED FUSE CLIP ADAPTERS TO CHANGE FROM 200 AMPERES.
* NEED FUSE CLIP ADAPTERS TO USE E-7774 CARTRIGE.



E-2236



E-2236 CARTRIDGE
250 VOLTS

FUSE AMPERAGE FOR VARIOUS CARTRIGES	CARTRIDGE DIMENSIONS A	B	C	D	E
70 & 100	5⅞"	1"	¾"	1"	¾"
125, 150 & 200	7⅛"	1½"	½"	1⅛"	¾"
225, 300, 350 & 400	8½"	2"	1½"	1½"	¾"
450 & 600	8½"	2½"	2"	2½"	¾"
700	10½"	2½"	2"	2½"	¾"