UNCLASSIFIED

TECHNICAL MANUAL

for

RELAY PANEL

MODEL AR176

THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, ONTARIO

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NOTICE

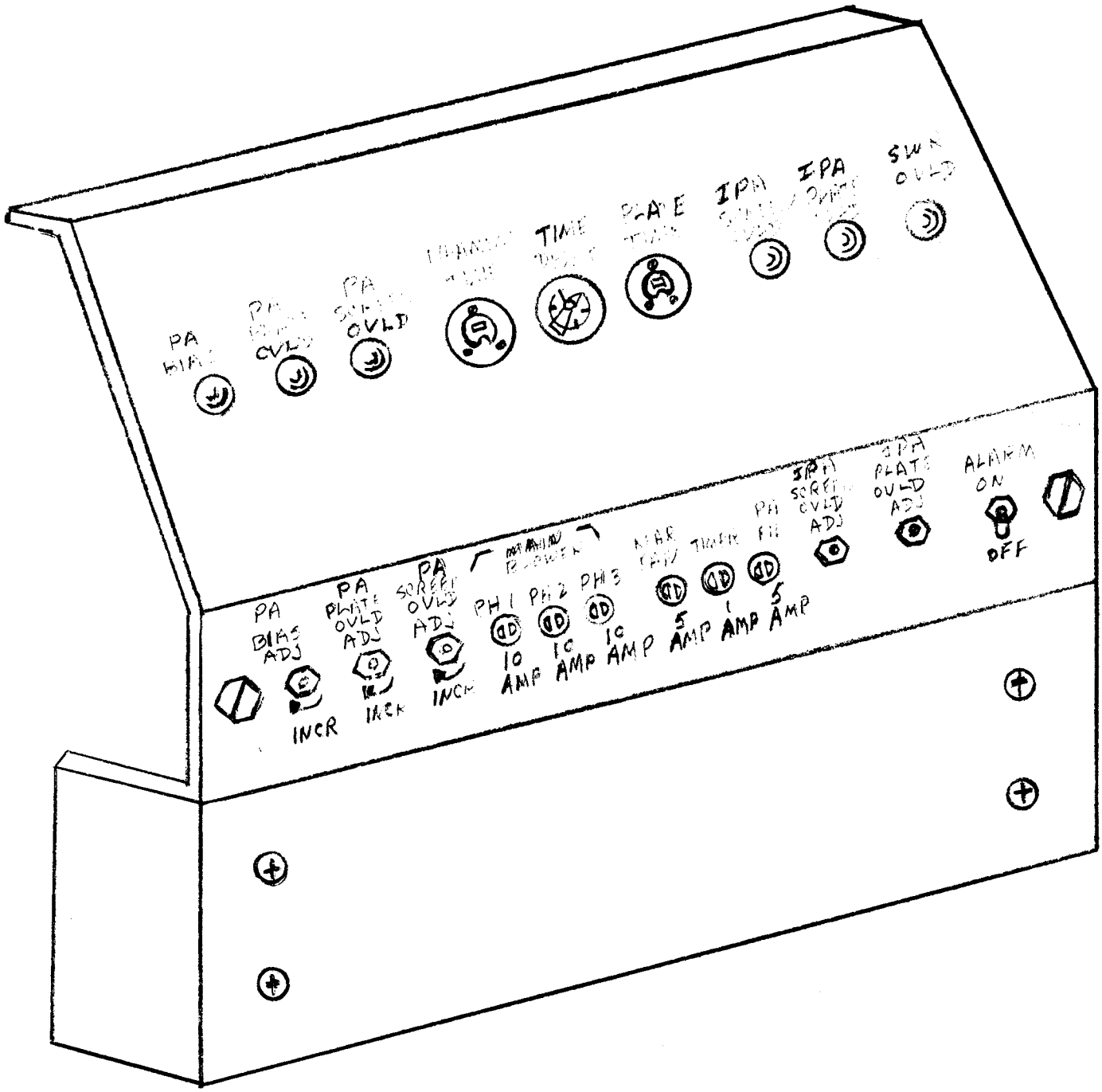

Figure 1-1. Relay Panel, Model AR-176

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

Relay Panel, Model AR-176, (figure 1-1) contains nine relays which can function to control and protect external transmitter power amplifier circuits. The protective relays sample the currents and voltages in the external transmitter circuits. When any of these currents is excessive, or if a voltage is deficient, the associated protective relay operates and removes the high voltage. The relays and their associated terminal boards are mounted under a front panel cover plate for quick accessibility. All overload adjustments are located on the front panel for ease of adjustment. The upper portion of the relay panel contains filament and plate time meters, an automatic reset timer, and overload indicator lamps.

1-2. TECHNICAL SPECIFICATIONS.

Table 1-1 lists the technical specifications of the AR176.

TABLE 1-1. TECHNICAL SPECIFICATIONS

Number of relays	Nine.
Dimensions	28-3/4" wide x 13-1/2" high x 2-15/16" deep (approx.)
Weight	Approximately 20 pounds.

TABLE 1-1. TECHNICAL SPECIFICATIONS (CONT)

PA Plate Ovld Relay:	
Coils	Latch relay (Reset), 1100 ohms ±10%. Unlatch relay (Ovld), 0.93 ohms ±10%.
Contacts	Silver cadmium; rated @ 25 amps 125 volts ac; resistive.
Adjustment	Latch relay operates with 220 volts ac, 60 cycles, or less. Unlatch relay with current of 1 ampere; non-operative @ 0.980 amperes.
IPA Plate Ovld Relays:	
Coils	Latch relay (Reset), 1100 ohms ±10%. Trip relay (Ovld), 43 ohms ±10%.
Contacts	Silver Cadmium; rated @ 20 amperes 125 volts ac; resistive.
Adjustment	Latch relay operates with 220 volts ac, 60 cycles, or less. Trip relay operates with current of 0.155 amperes; non-operative @ 0.140 amperes.
PA Screen On-Off Relay:	
Coil	1800 ohms ±10%.
Contacts	Silver Cadmium, rated @ 25 amperes.
Adjustment	Operate 220 volts ac, 50/60 cycles.
PA Screen Ovld Relay:	
Coil	Latch relay (Reset), 1100 ohms ±10%. Unlatch relay (Ovld), 1500 ohms ±10%.
Contacts	Silver, rated @ 20 amperes 125 volts, resistive.
Adjustment	Latch relay operates with 220 volts ac, 60 cycles, or less. Unlatch relay operates with 0.025 amperes; non-operative @ 0.023 amperes.

TABLE 1-1. TECHNICAL SPECIFICATIONS (CONT)

IPA Screen Overload Relay:	
Coils	Latch relay (Reset), 1100 ohms ±10% Unlatch relay (Ovld), 10,000 ohms ±10%
Contacts	Silver, rated 25 amperes with non-inductive load.
Adjustment	Latch relay operates with 220 volts ac, 60 cycles, or less. Unlatch relay operates with 0.011 amperes or less.
PA Bias Relay:	
Coil	11,000 ohm ±10%.
Contacts	Silver cadmium oxite, rated @ 10 amperes @ 125 volts ac, resistive.
Adjustment	Operate @ 0.0100 amperes; non-operative @ 0.009 amperes.
IPA Bias Relay:	
Coil	11,000 ohms ±10%.
Contacts	Silver Cadmium oxite; rated @ 10 amperes 125 volts; resistive.
Adjustment	Operates @ 0.010 amperes; non-operative @ 0.009 amperes.
Tune Operate Relay:	
Coil	1800 ohms ±10%.
Contacts	Silver cadmium; rated @ 25 amperes 125 volts ac; resistive.
Adjustment	Operates @ 220 volts, 50 to 60 cycles.

SECTION 2

INSTALLATION

2-1. INITIAL INSPECTION.

The AR176 is calibrated and tested at the factory prior to shipment. When it arrives at the operating site, inspect the packing case and contents for possible damage. Inspect all packing material for parts that may have been shipped as "loose items". With respect to damage to the equipment for which the carrier is liable, The Technical Materiel Corporation will assist in describing methods of repair and the furnishing of parts.

2-2. INSTALLATION.

When installing the AR176 ensure that there is sufficient space for servicing and sufficient clearance in back for access to rear panel connections. The AR176 is equipped with a 28-3/4 inch panel and is approximately 13-1/2 inches high and 2-15/16 inches deep. All external connections are made to jacks J700 and J701 located at the rear of the AR176 (see figure 2-1).

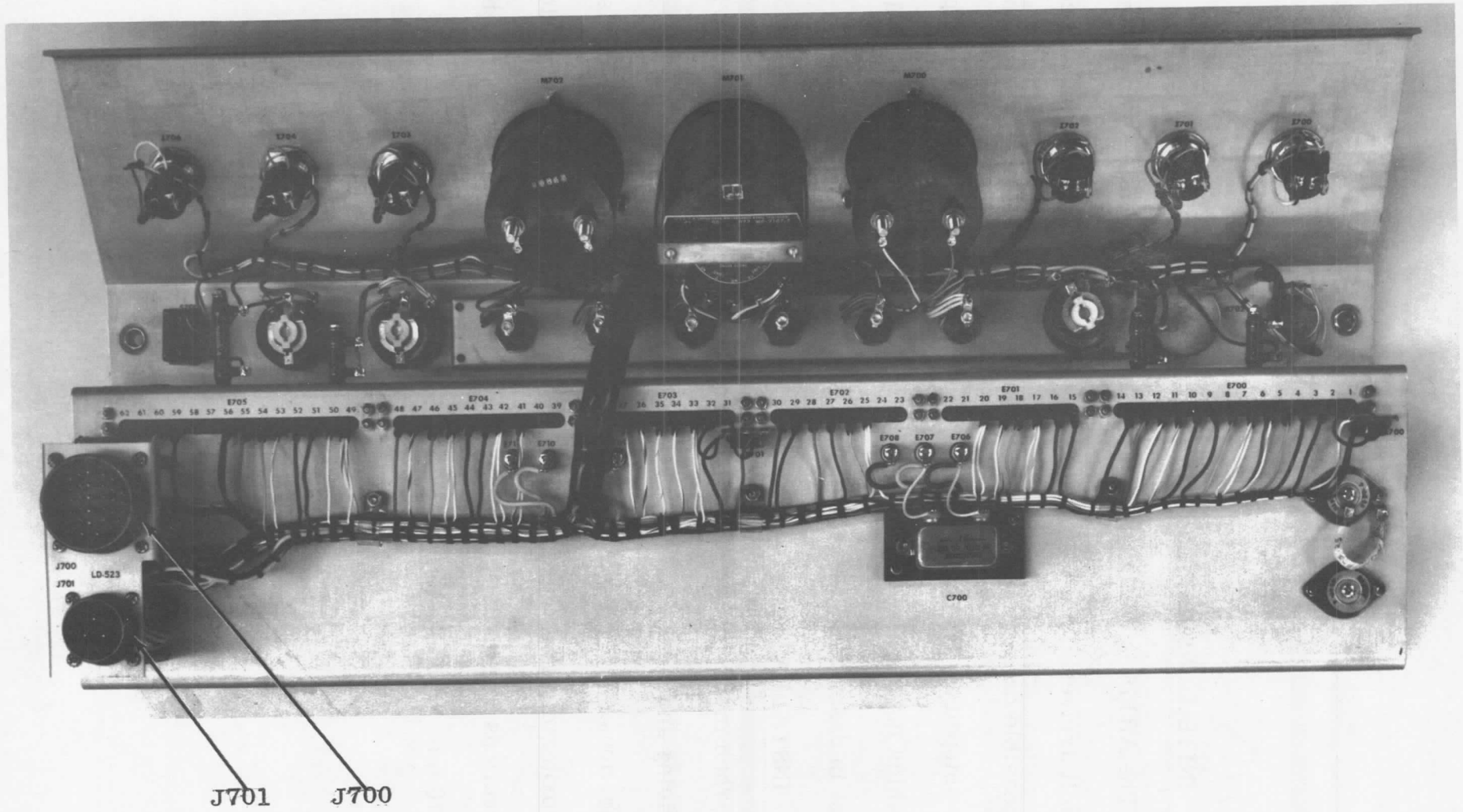

Figure 2-1. AR176 Relay Panel, Rear View

SECTION 3

OPERATOR'S SECTION

3-1. CONTROLS AND INDICATORS.

The controls and indicators for the AR176 are listed in table 3-1 and illustrated in figure 3-1.

TABLE 3-1. CONTROLS AND INDICATORS

REFERENCE DESIGNATION (Figure 3-1)	PANEL DESIGNATION	FUNCTION
6	PLATE TIME meter	Indicates total operating time of high voltage rectifier.
1	PA BIAS lamp	When lit, indicates that no bias voltage is applied to an external power amplifier.
2	PA PLATE OVLD lamp	When lit, indicates that overload occurred in plate circuit of external power amplifier.
3	PA SCREEN OVLD lamp	When lit, indicates that overload has occurred in screen circuit of external power amplifier.
7	IPA SCREEN OVLD lamp	When lit, indicates that overload has occurred in screen circuit of external IPA.
8	IPA PLATE OVLD lamp	When lit, indicates that overload has occurred in plate circuit of external IPA amplifier.
9	SWR OVLD lamp	When lit, indicates that overload has occurred as a result of excessive SWR.
19	PA BIAS ADJ control	Sets amplitude of bias voltage applied to external power amplifier.
18	PA PLATE OVLD ADJ control	Controls dc level at which PA PLATE OVLD relay K701 is energized.
17	PA SCREEN OVLD ADJ control	Controls dc level at which PA SCREEN OVLD relay K702 is energized.
12	IPA SCREEN OVLD ADJ control	Controls dc level at which IPA SCREEN OVLD relay K706 is energized.

TABLE 3-1. CONTROLS AND INDICATORS (contd)

REFERENCE DESIGNATION (Figure 3-1)	PANEL DESIGNATION	FUNCTION
11	IPA PLATE OVLD ADJ control	Controls dc level at which IPA PLATE OVLD relay K707 is energized.
10	ALARM switch	When set to ON position, energizes an audible alarm until high voltage is applied to the external power amplifier.
4	FILAMENT TIME meter	Indicates total operating time of filament circuit of 10-kw amplifier.
5	TIME DELAY timer	Delays application of high a-c voltage to high voltage rectifier so that filaments may heat.
13	PA FIL 5 AMP fuse	Protects filament circuit of PA V900. Fuseholder is an indicating type.
14	TIMER 1 AMP fuse	Protects Timer M701. Fuseholder is an indicating type.
15	REAR FAN 5 AMP fuse	Protects Rear Fan B3000 and B3001. Fuseholder is an indicating type.
16	MAIN BLOWER PH 1, PH 2, PH 3, 10 AMP fuses	Protects Main Blower B800. Fuseholders are indicating type.

3-2. OPERATOR'S MAINTENANCE.

The operator should observe that the relay panel controls, indicator lamps, and meters are functioning properly. Noticeable irregularities should be immediately referred to maintenance personnel.

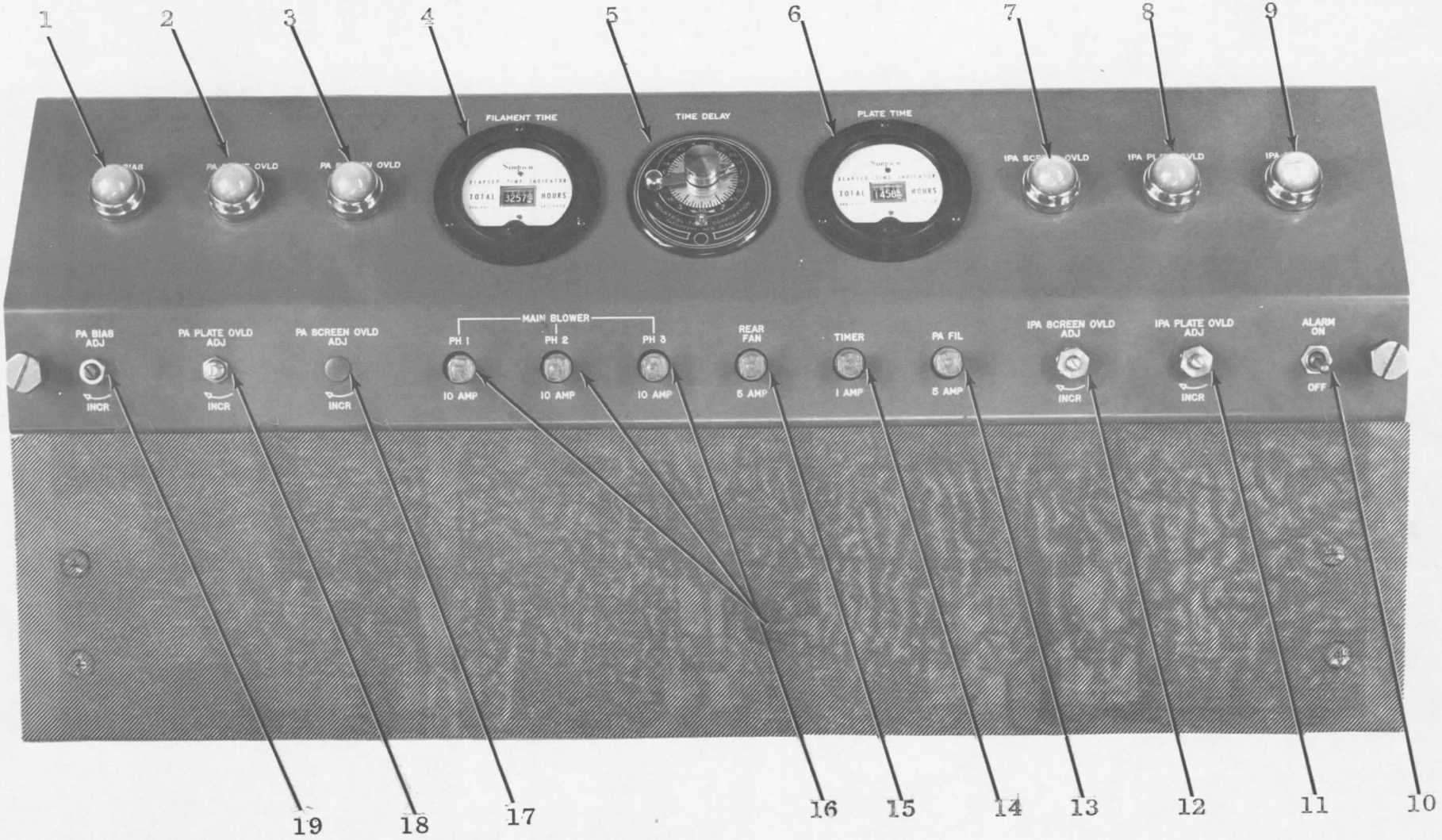

Figure 3-1. AR176, Front Panel Controls and Indicators

SECTION 4

PRINCIPLES OF OPERATION

To be supplied.

SECTION 5

MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

The AR176 has been designed to provide long-term, trouble-free operation under continuous duty conditions. However, in order to prevent failure of the equipment due to corrosion, dust, or other destructive elements, it is suggested that a schedule of preventive maintenance be set up and adhered to.

At periodic intervals, the equipment should be removed from its mounting for cleaning and inspection. All accessible covers should be removed and the wiring and all components inspected for dirt, corrosion, charring, discoloring or grease. Remove dust with a soft brush or vacuum cleaner. Remove dirt or grease from other parts with any suitable cleaning solvent. Use of carbon tetrachloride should be avoided due to its highly toxic effects. Trichlorethylene or methyl chloroform may be used, providing the necessary precautions are observed.

NOTE

When using toxic solvents, make certain that adequate ventilation exists. Avoid prolonged or repeated breathing of the vapor. Avoid prolonged or repeated contact with skin. Flammable solvents shall not be used on energized equipment or near any equipment from which a spark may be received. Smoking, "hot work", etc. is prohibited in the immediate area.

CAUTION

When using trichlorethylene, avoid contact with painted surfaces due to its paint removing effects.

5-2. TROUBLESHOOTING.

Section 4 of this manual should be read and thoroughly understood before attempting to troubleshoot the AR176 relay panel. When trouble has been sectionalized to a particular circuit in the relay panel, use the resistance data of table 5-1 along with schematic diagrams 7-1 and 7-2 to isolate the trouble to a particular component. Refer to figure 5-1 for parts location.

TABLE 5-1. RELAY COIL RESISTANCES

RELAY	TERMINAL BOARD	TERMINALS	RESISTANCE (OHMS)
K700	E700	1, 2	11,000
K701	E700	11, 12	1,100
	E700	13, 14	1
K702	E701	19, 20	1,100
	E706-E707		1,500
K703	E702	25, 26	1,800
K704	E703	31, 32	
K705	E703	33, 34	1,800
K706	E704	41, 42	1,100
	E704	47, 48	10,000
K707	E705	49, 50	1,100
	E705	55, 56	43
K708	E705	61, 62	11,000

5-3. REPLACEMENT OF FUSES.

All fuses are located on the front panel. The fuses are illustrated in figure 3-1 and listed in table 3-1.

CAUTION

Never replace a fuse with one of higher rating. If a fuse burns out immediately after replacement, do not replace it a second time until the trouble has been located and corrected.

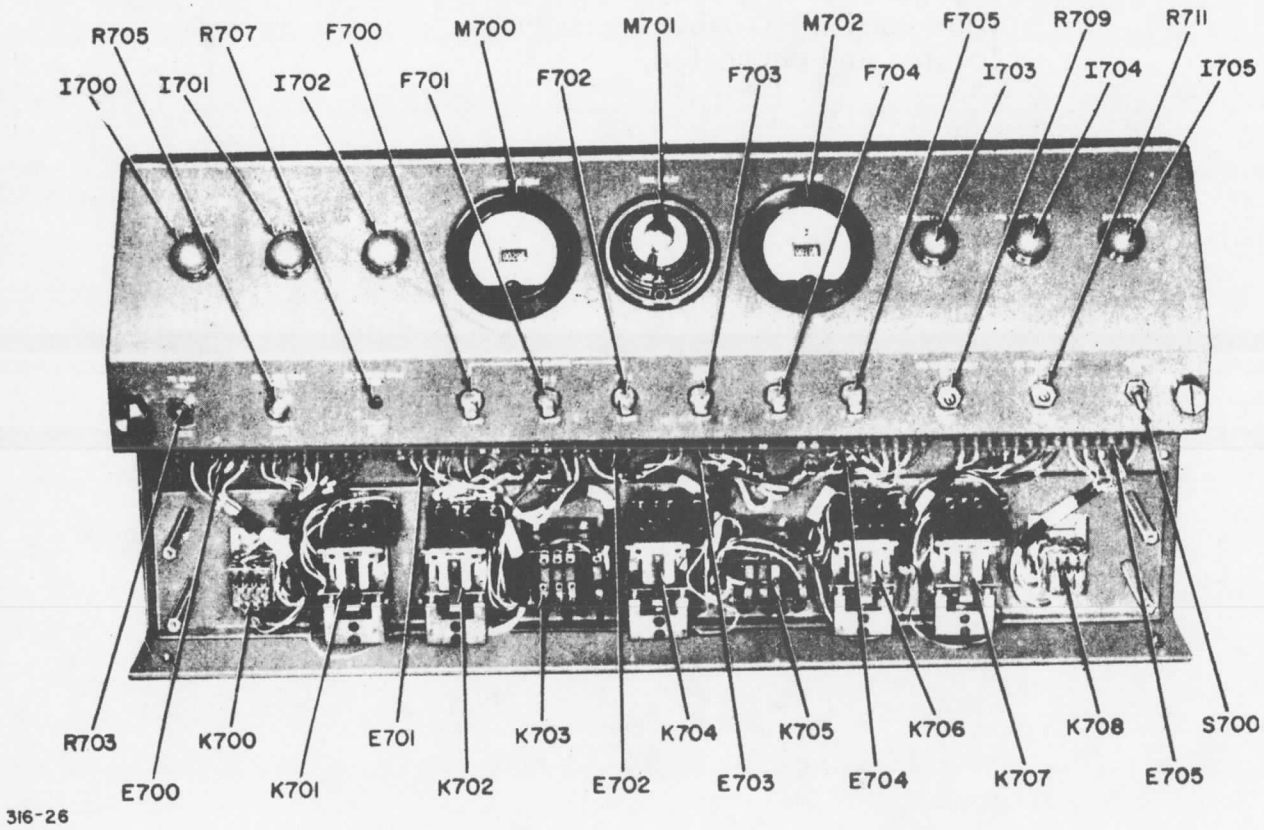

Figure 5-1. AR176 Relay Panel Front View

SECTION 6

PARTS LIST

To be supplied.

SECTION 7

SCHEMATIC DIAGRAMS

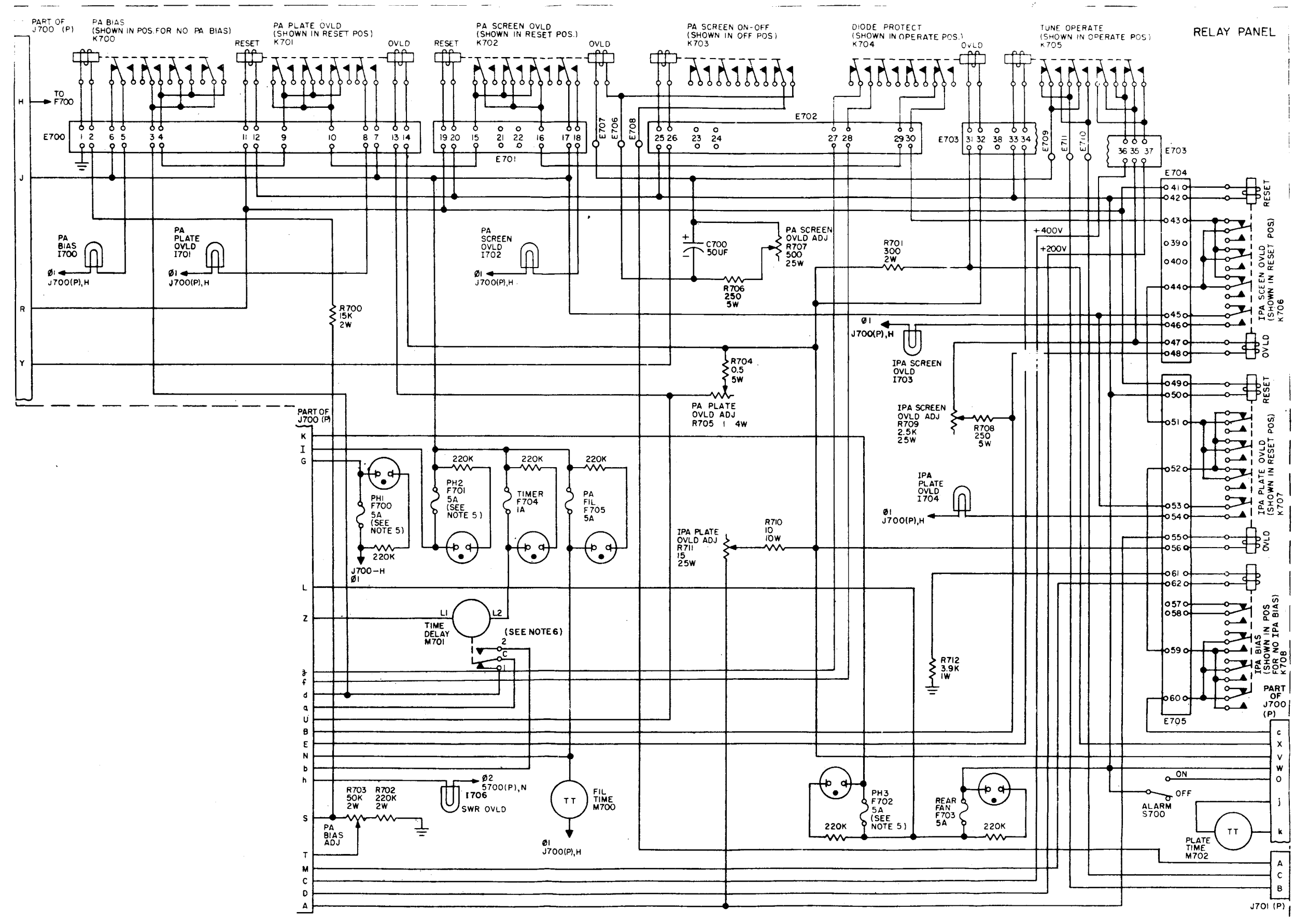

Figure 7-1 AR176 Relay Panel, Schematic Diagram