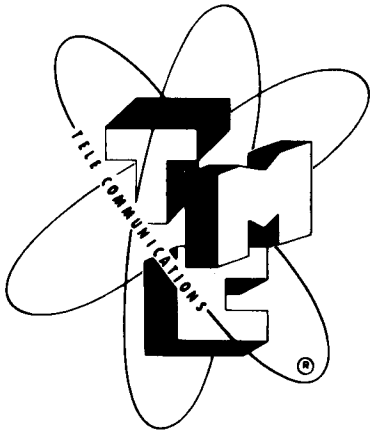
VOLUME I

TECHNICAL MANUAL

for

TRANSMITTING SET, RADIO, MODEL GPT-10K



THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N. Y. OTTAWA, CANADA

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Supplement No. 1

for

Technical Manual for Transmitting Set, Radio, Model GPT-10K

(AN/FRT-39D)

This manual consists of two volumes as follows:

Volume I: Technical Manual for Transmitting Set, Radio, Model GPT-10K, dated 1 January 1962.

Volume II: Technical Manual for Sideband Generator, Models SBG-1 and SBG-2, dated 1 March 1962.

Volume I deals with the equipment on GPT-10K's second frame; Volume II, with the equipment on the first (or synthesized exciter) frame.

Both Volume I and II are written according to TMC's commercial specifications. TMC's commercial nomenclature is employed throughout these volumes. Accordingly, the following table is submitted to provide the military people with a cross reference of commercial nomenclature versus military nomenclature.

TMC MODEL NO.	NOMENCLATURE	DESCRIPTION
GPT-10K-R5	AN/FRT-39D	Transmitting Set
CBE-1	O-714/UR	Oscillator, Radio Frequency
CPO-1A	AN/URA-31A	Oscillator, Power Supply Group
TIS-3	TH-39A/UGT	Terminal, Telegraph
APP-3	SB-1225/UR	Panel, Power Distribution
RFC-1	AM-2103A/URT	Amplifier, Radio Frequency
AX-357	CY-3712/FRT-39D	Cabinet-Power Supply
AX-104	PP-3362/FRT	Power Supply
AX-103	PP-3363/FRT	Power Supply
CSS-1A	O-715A/URA-31	Oscillator, Radio Frequency
CMO-1	O-716/URA-31	Oscillator, Radio Frequency
CLL-1	O-717/URA-31	Oscillator, Audio Frequency
CHG-2	AM-2505A/URA-31	Amplifier, Radio Frequency
CHL-1	CV-928/URA-31	Frequency Divider
CPP-5	PP-2561A/URA-31	Power Supply
CPP-2	PP-2562/URA-31	Power Supply

FOREWORD

Technical Materiel Corporation's general purpose transmitter (ten kilowatt, PEP) Model GPT-10K is a two-frame assembly that falls into two broad categories, namely, equipments with conventional exciter and test units (see following figure 1-1-a) and equipments with synthesized exciter and test units (see following figure 1-1-b). The difference between these two classes of equipments may be ascertained by comparison of the following literature.

GPT-10K Equipped With Conventional Exciter and Test Equipment:

Volume I, Technical Manual for Transmitting Set Radio, Model GPT-10K, 1 January 1962.

Volume II, Technical Manual for Transmitting Set Radio, Model GPT-10K.

Volume III, Technical Manual for Transmitting Set Radio, Model GPT-10K.

GPT-10K Equipped With Synthesized Exciter and Test Equipment:

Volume I, Technical Manual for Transmitting Set Radio, Model GPT-10K, 1 January 1962.

Technical Manual for Sideband Generator, Models SBG-1 and SBG-2.

Parts List for Synthesized Transmitting Set Radio, Model GPT-10K.

It should be noted that the Manual entitled "Volume I, Technical Manual for Transmitting Set Radio, Model GPT-10K", is common to both classes of equipments. This means that the larger frame of the two-frame assembly is identical for both classes of equipments.

The smaller frame of the two-frame assembly is considerably different in these two cases. In the first case, the exciter and test frame is loaded with conventional-type exciters, oscillators, and auxiliary equipment. In the second case, the exciter frame is loaded with frequency-translation units synthesized from a precision 1-mc standard.

Within a given class of equipments, minor differences occur as dictated by customer needs. For example, a conventional GPT-10K(T) has two variable frequency oscillators and no frequency shift exciter whereas a conventional GPT-10K(A) has one variable frequency oscillator and one frequency shift exciter. Similarly, synthesized GPT-10K's differ among themselves depending on the units stacked in the exciter frame.

Figure numbers on drawings are given in three parameters such as I-1-1 to indicate volume of manual, section of manual, serial number of drawing. In the text, reference is made only to the last two parameters unless the referenced drawing is in other volumes.

The following table presents a compilation of equipment units by TMC versus Military Designations for three basic GPT-10Ks (together with TMC's colloquial designation).

TABLE OF EQUIPMENT UNITS OR ASSEMBLIES OF TRANSMITTING SET, RADIO, GPT-10K

AN/FRT-39 (TMC vs Military Designations)	AN/FRT-39A (TMC vs Military Designations)	TMC COLLOQUIAL DESIGNATION
AUXILIARY FRAME CHASSIS (Conventional exciter and test equipments)		
Sideband Level Monitor Model SLM-1	Sideband Level Monitor Model SLM-2	SLM
Frequency Spectrum Analyzer Model FSA vs Spectrum Analyzer Group AN/URM-116	Frequency Spectrum Analyzer Model FSA vs Spectrum Analyzer Group AN/URM-116	FSA
a. Analyzer Model SA-1 vs Analyzer Spectrum TS-1236/URM-116	a. Analyzer Model SA-1 vs Analyzer Spectrum TS-1236/URM-116	a. SA
b. Power Supply Model PS-12 vs Power Supply PP-2206/URM-116	b. Power Supply Model PS-12 vs Power Supply PP-2206/URM-116	b. PS-12
Transmitting Mode Selector Model SBE-2 vs Modulator-Power Supply Group AN/URA-23	Transmitting Mode Selector Model SBE-3 vs Modulator Power Supply Group AN/URA-28	SBE
a. Exciter Unit Model A-1516 vs Oscillator, Radio Frequency 0-503/URA-23	a. Exciter Unit Model AO-101 vs Oscillator, Radio Frequency 0-672/URA-28	a. SBE
b. Power Supply Model A-1397 vs Power Supply PP-1769/URA-23	b. Power Supply Model A-1397 vs Power Supply PP-1769/URA-23	b. SBE
Monitor Control Panel Model MCP-1 vs Control Panel SB-971/FRT-39	Monitor Control Panel Model MCP-2 vs Control Panel SB-971A/FRT-39	MCP
———	Isolation Keyer Model AK-100	ISK
Variable Frequency Oscillator Model VOX-2 vs Oscillator, Radio Frequency 0-330/FR	Variable Frequency Oscillator, Model VOX-5 vs Oscillator, Radio Frequency 0-330 (B)/ FR	VOX
Frequency Shift Exciter Model XFK vs Control, Electrical Frequency C-2749/URT	Frequency Shift Exciter Model XFK vs Control, Electrical Frequency C-2749/URT	XFK
Two-Tone Generator Model TTG vs Generator, Signal 0-579/URT	Two-Tone Generator Model TTG vs Generator, Signal 0-579/URT	TTG
Auxiliary Power Panel Model APP-1	Auxiliary Power Panel Model APP-1	APP

TABLE OF EQUIPMENT UNITS OR ASSEMBLIES OF TRANSMITTING SET, RADIO, GPT-10K (Cont.)

AUXILIARY FRAME CHASSIS (Synthesized exciter and test equipments)	
AN/FRT-39B (TMC vs MILITARY DESIGNATIONS)	TMC COLLOQUIAL DESIGNATION
Sideband Exciter Model CBE-1 (0-714/UR) or CBE-2 (no military designation)	CBE
Controlled Precision Oscillator Model CPO-1 (AN/URA-31) consisting of	CPO
(i) Frequency Amplifier Model CHG-1 (AM-2505/URA-31) or CHG-2 (no military designation)	CHG
(ii) Power Supply Model CPP-1 (PP-2561/URA-31)	CPP-1
(iii) Controlled Master Oscillator Model CMO-1 (0-716/URA-31) or CMO-2 (no military designation)	CMO
(iv) Primary Standard Model CSS-1 (0-715/URA-31)	CSS
(v) Divider Chain Model CHL-1 (CV-928/URA-31)	CHL
(vi) Controlled Oscillator Model CLL-1 (0-717/URA-31)	CLL
(vii) Power Supply Model CPP-2 (PP-2562/URA-31)	CPP-2
Tone Intelligence Unit Model TIS-3 (TH-39A/UGT)	TIS

AN/FRT-39, -39A (TMC vs Military Designations)	AN/FRT-39B (TMC vs Military Designations)	TMC COLLOQUIAL DESIGNATION
MAIN FRAME CHASSIS		
RF Amplifier Model vs Amplifier, Radio Frequency AM-2103A/URT	RF Amplifier Model vs Amplifier, Radio Frequency AM-2103A/URT	IPA
a. RF Amplifier Model RFC-1	a. RF Amplifier Model RFC-1	a. IPA
b. Power Supply Model AX-104	b. Power Supply Model AX-104	b. AX-104
Power Amplifier Section Model T1-102	Power Amplifier Section Model T1-102	PA
Main Power Supply Section a. High-Voltage Coil and Blower Compartment	Main Power Supply Section a. High-Voltage Coil and Blower Compartment	Main Power supply a. Coil/blower units or compartment
b. High-Voltage Resistor/Capacitor Compartment	b. High-Voltage Resistor/Capacitor Compartment	b. Resistor/capacitor units or compartment
c. Main Power Transformer Compartment	c. Main Power Transformer Compartment	c. Main power transformer

TABLE OF EQUIPMENT UNITS OR ASSEMBLIES OF TRANSMITTING SET, RADIO, GPT-10K (Cont.)

AN/FRT-39, -39A (TMC vs Military Designations)	AN/FRT-39B (TMC vs Military Designations)	TMC COLLOQUIAL DESIGNATION
MAIN FRAME CHASSIS		
High-Voltage Rectifier Section Model T1-104	High-Voltage Rectifier Section Model T1-104	T1-104
Relay Panel Assembly Model T1-106	Relay Panel Assembly Model T1-106	Relay control panel
Indicator Control Panel	Indicator Control Panel	Indicator control panel
PA TUNE/PA LOAD Panel Assembly	PA TUNE/PA LOAD Panel Assembly	PA tuning/loading panel or units
Main Power Panel Assembly	Main Power Panel Assembly	Main power control panel
Meter Panel Assembly	Meter Panel Assembly	Meter panel

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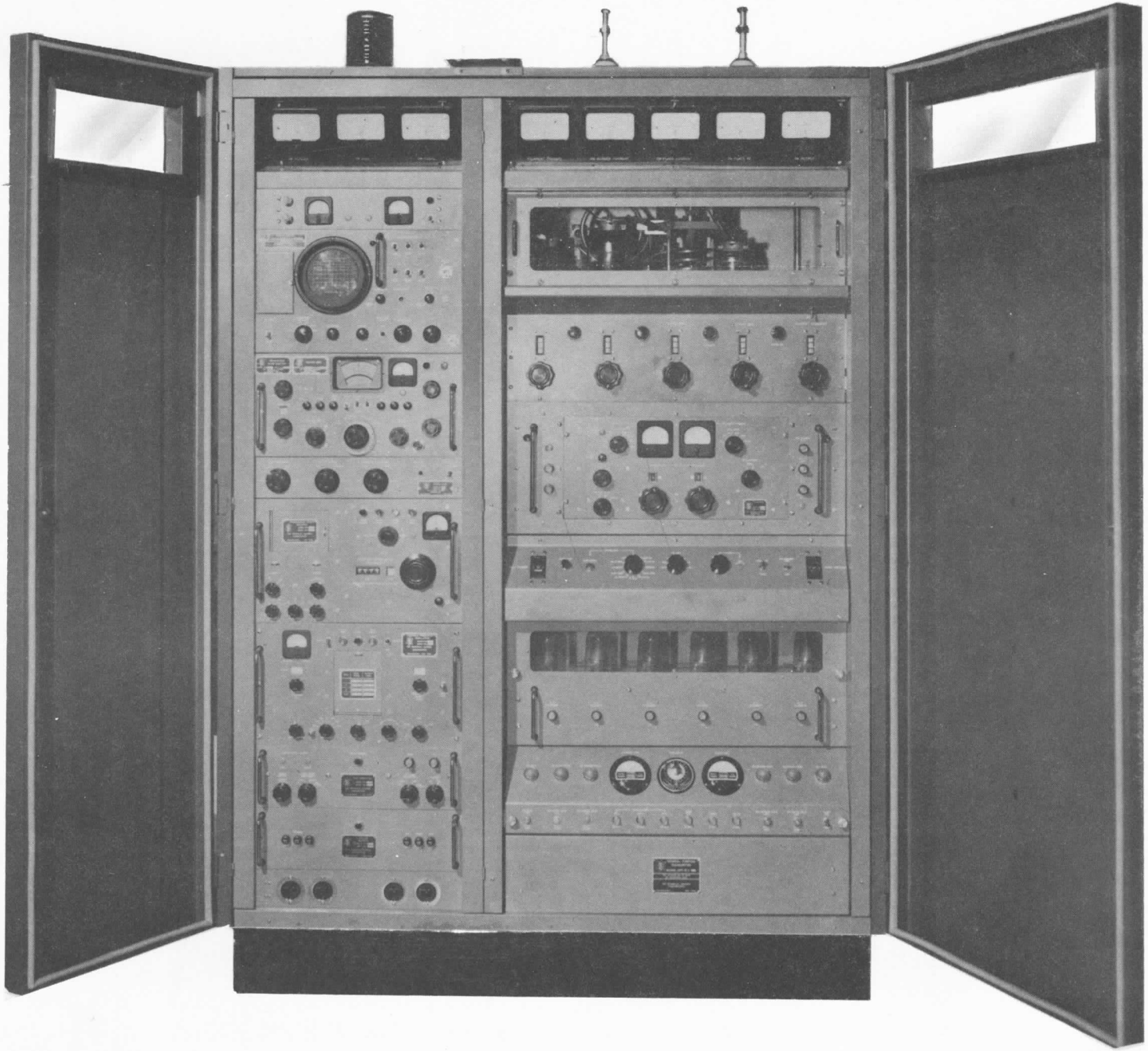


Figure I-1-1-a. Front View, Model GPT-10K (Non-Synthesized)

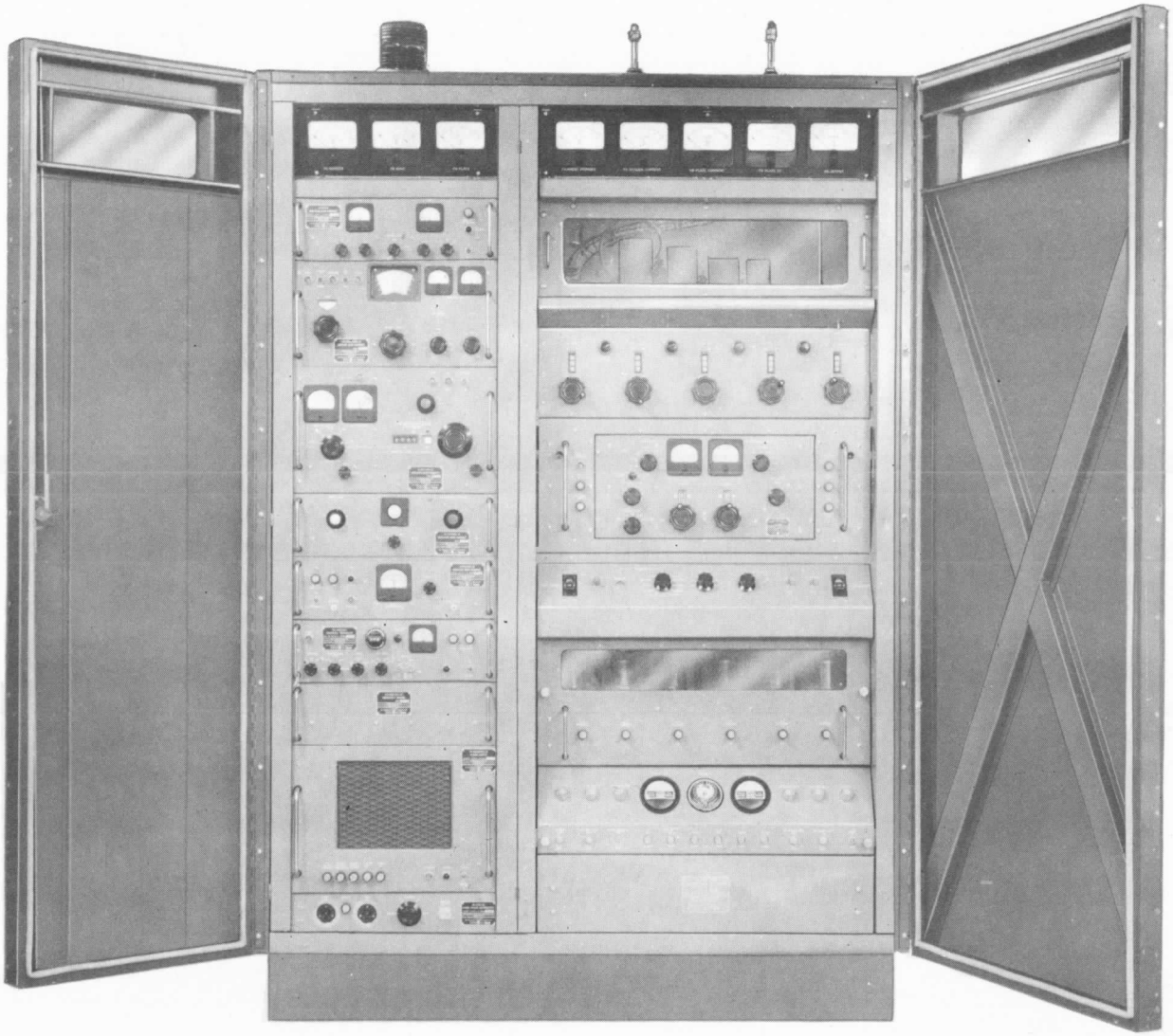


Figure I-1-1-b. Front View, Model GPT-10K (Synthesized)

SECTION 1
GENERAL DESCRIPTION

1-1. INTRODUCTION.

Figures 1-1-a and 1-1-b show Technical Materiel Corporation's Transmitting Set, Radio, ModelGPT-10K. The GPT-10K is a conservatively-rated, general purpose equipment capable of providing 10,000-watt peak envelope power (PEP) output throughout the 2- to 28-mc range.

a. The principal function of the equipment is to effect communication with reliability and precision from shore-to-ship or point-to-point. The GPT-10K is designed as a means of transmitting intelligence over long and difficult circuts by single sideband operation primarily. It may be used for many types of transmission. For example:

(1) CW (keyed carrier)

(2) Frequency-Shift Telegraphy

(3) Single-Sideband Suppressed Carrier

(4) Double-Sideband Suppressed Carrier

(5) Independent Sideband (separate intelligence)

(6) Single- or Double-Sideband (with carrier)

The unit arrangements of the GPT-10K are shown in figures 1-3-a and 1-3-b.

b. Single sideband service is obtained by the use of the SBE (non-synthesized GPT-10K) or the CPO in combination with the CBE (synthesized GPT-10K). These exciters will accept either one or two voice channels and heterodyne them to one or two radio channels of desired frequency. Thereafter, the linear and power amplifier units in the right section (main frame) of the GPT-10K raise the power level to 10 kw. In these units, automatic load and drive control (ALDC) and inverse feedback are used to improve the linearity and to suppress unwanted transmission products. All the IPA amplifier units are provided with bandswitching to accommodate frequency changing in a minimum of time.

c. In telegraphy, intelligence may be super-imposed on a carrier wave in one of two ways: on-off keying (CW), or frequency-shift keying (FSK). The GPT-10K provides these services with the XFK and AK-100 units (non-synthesized GPT-10K) or the TIS-3 in combination with the CPO and CBE (synthesized GPT-10K).

d. The non-synthesized GPT-10K is provided with test equipment located in the auxiliary frame. The synthesized GPT-10K requires the addition of TMC's PTE-3 unit (portable test equipment) to obtain comparable end results. With these test equipments, operators can conduct all operational tests without probing inside the transmitter.

e. Protection for operating and maintenance personnel, as well as protection against equipment damage caused by overloads or other equipment faults, is furnished through the use of interlock switches and overload relays.

f. TMC's highly efficient modular-type construction, shown in figures 1-2-a, and 1-2-b, is used throughout the GPT-10K, and sectional design permits shipping in 13 reasonably small wooden cases.

1-2. ADVANTAGES OF SINGLE SIDEBAND CARRIER SUPPRESSED VERSUS CONVENTIONAL AM OPERATION; RATING SUPPRESSED CARRIER TRANSMITTERS.

a. The advantages of single sideband, working for point-to-point long-distance radio telegraph communication circuits at high frequency, as compared with ordinary carrier frequency shift (FSK), are in economy in equipment and antennas, greater simplicity in operation, spectrum conservation, and power gain. This type of transmission will enable the industry to increase traffic at the same time that frequency occupancy is reduced. The following paragraphs describe these advantages in greater detail.

(1) The RF spectrum is more efficiently utilized because in SSB operation the residual carrier and a single sideband is transmitted in one-half the bandwidth required in AM operation by the carrier and both sidebands.

(2) The smaller RF power and narrower band (less noise) of a single sideband signal compared with a conventional AM signal of equal effectiveness result in an overall theoretical advantage of 9 db in favor of a single sideband operation.

(3) The narrower bandwidths of transmission and reception, in SSB as compared with AM operation, provide better signal-to-noise ratio and minimize possibilities of interference. The effects of selective fading and phase distortion are greatly reduced.

b. In conventional AM operation, transmitter power capabilities are usually expressed in terms of carrier power. In suppressed carrier operation, transmitter capabilities are generally expressed in terms of PEP which can be handled without excessive distortion. In single sideband two-tone carrier suppressed

operation, PEP is twice the average power. For example, on balanced output operation into a 600-ohm antenna, three amperes of radio frequency in each leg of the rhombic indicates a PEP of 2 x 3 x 3 x 600 = 10,800 watts.

1-3. FUNCTIONAL DESCRIPTION.

Inasmuch as all equipment located on the auxiliary frame is described in the second volume of this manual, this paragraph is limited to a brief functional description of the equipment located on the main frame.

a. GENERAL. - The theory underlying each unit with supporting simplified schematic diagrams is contained in Section 4 of Volume I of the manual.

b. RF AMPLIFIER (RFC-1) AND POWER SUPPLY (See figure 1-4.) - This unit consists of an inside removable compartment (removable by unfastening four screws) within a pull-out drawer. The removable compartment contains RF amplifier components that include a blower, and interlock switch; the outer housing contains the power supply components for the amplifier. The overall panel mounts meters, fuses, switches, tuning and loading controls, and a drawer interlock indicator lamp. Physical and electrical characteristics and reference data for the unit are given in tables 1-1, 1-4, and 1-6.

c. POWER AMPLIFIER SECTION (PA). (See figures 1-5-a and 1-5-b.) - The components of this unit are permanently mounted on the main frame chassis and comprise the power amplifier tube and associated components (the larger ones being those operating in the PA output circuit). Figures 1-5-a and 1-5-b show, for example, the PA tube (whose socket and several of its smaller components are contained in a metal case), the PA output tuning/loading coils and capacitors, and gear trains and switches to vary the parameters of these elements). The front panel of the PA compartment contains five meters, a screened window, and a PA tuning/loading panel. Physical and electrical characteristics and reference data for the unit are given in tables 1-1, 1-4, and 1-6.

d. RELAY AND INDICATOR CONTROL PANELS. (See figure 1-6.) - Closely associated with the PA functionally are the relay and indicator control panels. A GPT-10K must be "cutoff" when serious abnormal conditions occur. The relay control circuits, for example, shut down the GPT-10K when PA screen or plate current becomes excessive. The indicator control circuits contain time metering instruments, indicators, and fuses. The function of the indicators is to indicate faults. When off, they indicate no faults insofar as their functions are concerned. Figure 1-6 shows nine relays and six terminal strips comprising the relay control panel; three meters, six fuses, four potentiometers, a switch, and six indicator lamps comprising the indicator control panel.

e. MAIN POWER SUPPLY SECTION AND HIGH-VOLTAGE RECTIFIER SECTION T1-104. (See figures 1-7-a, 1-7-b, 1-7-c, and 1-8.) - With the exception of T1-104, the equipments comprising this part of the GPT-10K are permanently mounted on the main frame chassis. As figures 1-7-a, 1-7-b and 1-7-c show, the coil and blower compartment is located in the middle rear compartment of the main frame chassis of the GPT-10K; the resistor and capacitor compartment is located in the bottom rear compartment of the main frame chassis of the GPT-10K; the main power transformer compartment is located in the bottom front compartment of the main frame chassis of the GPT-10K. The high voltage rectifier deck, as figure 1-8 shows, is removable. It is located just above the main power transformer compartment. Physical and electrical characteristics and reference data for the unit are given in tables 1-1, 1-4, and 1-6.

f. CONTROL PANELS ON MAIN FRAME CHASSIS. - The main frame chassis contains four control panels: PA tuning and loading, relay and indicator, main power, and meter.

(1) The PA tuning and loading panel is shown in figure 1-1. Its tuning/loading knobs actuate, through a gear train, five variable tuning/loading units: PA TUNE capacitor, PA LOAD capacitor, PA BAND SW, OUTPUT BAL capacitor, and OUTPUT LOADING inductor. The functions of these elements are conventional.

(2) The relay and indicator control panels are shown in figure 1-6 and briefly described in paragraph 1-4d above.

(3) The main power control panel is shown in figure 1-9. It controls GPT-10K operation via two circuit breakers, six control switches, one potentiometer, and an indicator lamp. Section 3 of the manual gives the functions of these controls.

(4) The meter panel is shown on figure 1-1. It contains the following five meters:

(a) FILAMENT PRIMARY, AC voltmeter, range 0 to 300.

(b) PA SCREEN CURRENT, DC milliammeter, range 0 to 100.

(c) PA PLATE CURRENT, DC ammeter, range 0 to 3.

(d) PA PLATE RF, RF kilovoltmeter, range 0 to 10.

(e) PA OUTPUT, RF ammeter, range 0 to 10.

g. CONTROL PANELS ON AUXILIARY FRAME CHASSIS. - The auxiliary frame chassis contains three control panels: meter, monitor control (MCP-2, non-synthesized GPT-10K only), and auxiliary power (APP).

(1) The meter panel is shown as the top panel (left-hand section) in figure 1-1. It contains the following three meters:

(a) PA SCREEN, DC voltmeter, range 0 to 1500.

(b) PA BIAS, DC voltmeter, range 0 to 400 (negative).

(c) PA PLATE, DC kilovoltmeter, range 0 to 10.

(2) The APP is shown as the bottom panel in figure 1-1. It contains four power supply plugs.

NOTE

These four plugs provide an emergency 115-volt, 60-cycle supply from an external power source for the auxiliary frame chassis.

A fifth plug is located on the rear of the panel. These five plugs are unwired. This supply panel is not used since 115-volt power is derived from 230-volt power via a regulating transformer. In an emergency, however, the units on the auxiliary frame chassis may be supplied with 115-volt external power. Under this arrangement, the stability of the FSA, in particular, will be relatively poor. For reliability of the power supply to the GPT-10K, do not interconnect the five plugs (normally unwired) to the GPT-10K's 115-volt regulating transformer output, which should be reserved solely for power supply to the units on the auxiliary frame chassis.

(3) The MCP-2 (in non-synthesized GPT-10K only) is shown in figure 1-10. Its controls provide the means of channeling numerous outputs to various transmitter units. For example, the VOX RF OUTPUT selector switch channels the oscillator output to the SBE, ANALYZER, XFK, or EXT circuit. Similarly, the SBE VMO INPUT selector switch provides means for supplying the SBE medium-frequency oscillator supply from (EXT), the SBE's own crystals, VOX, or XFK. When the SBE supplies its own medium frequency, the SBE VMO INPUT selector switch should be in OFF. The ANALYZER MONITOR selector switch provides means for monitoring voltages from a test source (TEST), SBE, DRIVER, or FINAL stage. CHANNEL 1 may be supplied with tones or audio from LINE 1 INPUT and CHANNEL 2 may also be supplied with tones or audio from LINE 2 INPUT. The MODE selector switch in the MCP-2 channels single sideband and CW intelligence to the SBE; CW, radio teletype (RTTY), and FAX intelligence to the XFK. CW and RTTY intelligence pass through the ISK enroute to the SBE and XFK units. As pointed out in paragraph 1-2, this unit is thoroughly described in Volume II of the manual.

1-4. REFERENCE DATA.

Refer to tables 1-1 through 1-7.

TABLE 1-1. EQUIPMENT SUPPLIED AND PHYSICAL CHARACTERISTICS

UNIT	DESIGNATION		QUANTITY PER GPT-10K	APPROXIMATE INSTALLATION DIMENSIONS*			VOLUME*	WEIGHT*
	COMMERCIAL	MILITARY		LENGTH	HEIGHT	DEPTH		
Main Frame Chassis	A/P**	None	1	33	72	38	52	500
Auxiliary Frame Chassis	A/P**	None	1	21	72	38	33	366
Base Mount and RF Base Shield	MS-1458-1 MS-2175	None None	1 1	54	7	38	8.5	152
Sides for Frames	MS-2116-1, 2117-1	None	2	38	72	27	43	384
Top for Frames	MS-1699-1	None	1					
Doors for Main Frame Chassis	MS-1647-1, 2118-1	None	2					
Doors for Auxiliary Frame Chassis	MS-1648-1, 2119-1	None	2					
Trim strips	MS-1633, 1634, 1635, 1636, 1637, 1669, 1670, 1671, 1672 (2), 1920	None	11 pieces					
Main Power Transformer	TF-203	None	1	22	15-1/2	21	4.5	452
Sideband Exciter (S/X)	CBE-1 or CBE-2	0-714/UR None	1	19	5-1/4	10-7/8	0.6	17
Controlled Precision Oscillator (S/X)	CPO-1	AN/URA-31	-	-	-	-	-	-

*Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

**A/P means assembly of parts. No specific designation.

(S/X) signifies synthesized transmitter.

TABLE 1-1. EQUIPMENT SUPPLIED AND PHYSICAL CHARACTERISTICS (Cont.)

UNIT	DESIGNATION		QUANTITY PER GPT-10K	APPROXIMATE INSTALLATION DIMENSIONS*			VOLUME*	WEIGHT*
	COMMERCIAL	MILITARY		LENGTH	HEIGHT	DEPTH		
a. Frequency Amplifier	CHG-1 or CHG-2	AM-2505/URA-31 or none	1	19	10-1/2	19-1/4	2.2	40
b. Power Supply	CPP-1	PP-2561/URA-31	1	19	5-1/4	16-1/2	0.9	41
c. Controlled Master Oscillator	CMO-1 or CMO-2	0-716/URA-31 or none	1	19	10-1/2	16-1/4	1.8	45
d. Primary Standard	CSS-1	0-715/URA-31	1	19	5-1/4	14-3/4	0.8	16
e. Divider Chain	CHL-1	CV-928/URA-31	1	19	5-1/4	15	0.8	9
f. Controlled Oscillator	CLL-1	0-717/URA-31	1	19	5-1/4	19	1.1	25
g. Power Supply (S/X)	CPP-2	PP-2562/URA-31	1	19	12-1/4	16	2.1	67
Tone Intelligence Unit (S/X)	TIS-3	TN-39A/UGT	1	19	5-1/4	14-1/8	0.8	26
Transmitting Mode Selector	SBE-3	AN/URA-28	-	-	-	-	-	-
	SBE-2	AN/URA-23	-	-	-	-	-	-
RF Oscillator	AO-101	0-672/URA-28	1	19	8-3/4***	15	1.5	41
	A-1516	0-503A/URA-23	1	19	8-3/4***	15	1.5	41
Power Supply (N/S/X)	A-1397	PP-1769/URA-23	1	19	5-1/4***	15	0.9	38
	A-1397	PP-1769/URA-23	1	19	5-1/4***	15	0.9	38

*Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.
**A/P means assembly of parts. No specific designation.
***Rack mounted space required.
(N/S/X) signifies non-synthesized transmitter.
(S/X) signifies synthesized transmitter.

TABLE 1-1. EQUIPMENT SUPPLIED AND PHYSICAL CHARACTERISTICS (Cont.)

UNIT	DESIGNATION		QUANTITY PER GPT-10K	APPROXIMATE INSTALLATION DIMENSIONS*			VOLUME*	WEIGHT*
	COMMERCIAL	MILITARY		LENGTH	HEIGHT	DEPTH		
Frequency Shift Exciter (N/S/X)	XFK	C-2749/URT	1	19	10-1/2***	16	1.8	48
Variable Frequency Oscillator (N/S/X)	VOX-5	0-330(B)/FR	1	19	10-1/2***	16	1.8	70
Frequency Spectrum Analyzer	FSA	AN/URM-116		-	-	-	-	-
Analyzer (N/S/X)	SA-1	TS-1236/URM-116	1	19	10-1/2***	16	1.8	36
Power Supply for SA-1 (N/S/X)	PS-12	PP-2206/URM-116	1	19	8-3/4***	9	0.9	32
Two Tone Generator (N/S/X)	TTG	0-579/URT	1	19	5-1/4***	13	0.8	19
RF Amplifier with Power Supply	RFC-1 AX-104	None	1	28-3/4	11-3/4***	18	3.4	100
Isolation Keyer (N/S/X)	AK-100	None	1	19	5-1/4***	10-1/2	0.6	10
High Voltage Rectifier	TI-104	None	1	28-3/4	10-3/4***	15	2.7	80
Tube for PA	4CX5000A	-	1	5 dia	-	9	0.1	8
Tubes for High Voltage Rectifier	872A	-	6	2-1.4 dia	-	8	-	-
Tube for IPA	PL-172	-	1	4 dia	-	5	-	-

* Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.
***Rack mounted space required.
(N/S/X) signifies non-synthesized transmitter.
(S/X) signifies synthesized transmitter.

TABLE 1-1. EQUIPMENT SUPPLIED AND PHYSICAL CHARACTERISTICS (Cont.)

UNIT	DESIGNATION		QUANTITY PER GPT-10K	APPROXIMATE INSTALLATION DIMENSIONS*			VOLUME*	WEIGHT*
	COMMERCIAL	MILITARY		LENGTH	HEIGHT	DEPTH		
High Voltage Light and Socket Assembly	AX-124	-	1	-	-	-	-	-
Insulator Bowl Assembly with Hardware	AX-159	-	1	-	-	-	-	-
Lamp, Incandescent	BI-106-1	-	1	-	-	-	-	-
Connector, Plug, QDS	PL-149	-	1	-	-	-	-	-
8 Bags of Installation Hardware and Plug Buttons	-	-	1 carton	-	-	-	-	-
19 Glass Resistors	-	-	1 carton	-	-	-	-	-
Grounding straps; Door latch plates and brackets; plate covers and adapters; connecting cables	-	-	Loose items	-	-	-	-	-
Test Sheet	-	-	1	-	-	-	-	-
Instruction Manuals (3 volumes each)	-	-	2	-	-	-	-	-

TABLE 1-2. EQUIPMENT NOT SUPPLIED.

QUANTITY PER EQUIPMENT	TYPE	CHARACTERISTICS	USE
1	230-volt power line	3 phase 50 to 60 cps (At least 13.4 kw)	Operation of GPT-10K

NOTE

See table 1-7 for power requirement of individual units.

*Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

TABLE 1-3A. SHIPPING DATA (NON-SYNTHESIZED GPT-10K)

CASE NO.	PART	DESIGNATION		DIMENSIONS*			VOLUME*	WEIGHT*
		COMMERCIAL	MILITARY	LENGTH	WIDTH	HEIGHT		
1	Main Frame Chassis	None	None	42-1/2	35-1/4	79-1/4	68.7	1083
2	Auxiliary Frame Chassis	None	None	42-1/2	24-1/4	76-1/4	45.5	543
3**	One Base Mount and Two RF Shields	MS-1458-1 MS-2175 (2)	None	57	8-1/4	40-3/4	11.1	175
4	Two Sides and Top of Main Frame Doors for Main Frame Chassis Doors for Auxiliary Frame Chassis 11 Pieces of Trim Strip	MS-2116-1, 2117-1, 1699-1 MS-2037, 2120-1 MS-1648-1, 2119-1 MS-1633, 1634, 1635, 1636, 1637, 1669, 1670, 1671, 1672 (2), 1920	None	76-1/2	27-1/4	43	54.3	593
5	Main Power Transformer	TF-203	None	28-1/4	19	24	7.5	507
6	Transmitting Mode Selector RF Oscillator Frequency Shift Exciter Variable Frequency Oscillator	SBE-3 or SBE-2 AO-101 or A-1516 XFK VOX-5	AN/URA-28 AN/URA-23 0-672/URA-28 0-503A/URA-23 C-2749/URT 0-330(B)/FR	27 27 27 27 24 24	22-1/4 22-1/4 22-1/4 22-1/4 13-3/4 13-3/4	13-3/4 13-3/4 13-3/4 13-3/4 23-1/4 23-1/4	4.8 4.8 4.8 4.8 4.4 4.4	87 87 87 87 91 115

* Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

** When the GPT-10K is to be shock mounted, the base mount in case 3 is replaced by nine shock mounts and three heavy support bars for mounting the shock mounts. (See figure 2-2.) In addition, case 13 contains two stabilizers which are sometimes called shock mounts.

TABLE 1-3A. SHIPPING DATA (NON-SYNTHESIZED GPT-10K) (Cont.)

CASE NO.	PART	DESIGNATION		DIMENSIONS*			VOLUME*	WEIGHT*
		COMMERCIAL	MILITARY	LENGTH	WIDTH	HEIGHT		
7	Power Supply for: SBE-3 SBE-2 Isolation Keyer	 A-1397 A-1397 AK-100	 PP-1769/URA-23 PP-1769/URA-23 -	 24-3/4 24-3/4 24	 10 10 13	 15-1/4 15-1/4 20-1/2	 2.2 2.2 3.7	 62 62 24
8	Analyzer	SA-1	TS-1236/URM-116	29	23-1/2	19	7.5	81
9	Power Supply for SA-1	PS-12	PP-2206/URM-116	23-3/4	16-1/2	13-1/2	3.1	55
10	Two-Tone Generator	TTG	0-579/URT	23-3/4	21-3/4	9-1/2	2.8	50
11	RF Amplifier with Power Supply	RFC-1 AX-104	AM-2103A/URT	35-1/2	26	16	8.5	176
12	High-Voltage Rectifier with One Set (2 pieces) of Ground Straps	TI-104	-	35-1/2	26	16	8.5	156
13	Refer to Table 1-3B for contents of Case No. 13.							

* Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

TABLE 1-3B. SHIPPING DATA

Crate 13 (Non-Synthesized GPT-10K)
Crate 12 (Synthesized GPT-10K)
Assorted Items List

1. Tube, Electron, 1 each, Ref./Symbol XV900, TMC P/N 4CX5000A, removed from Main Frame, Power Amplifier Section.
2. Tube, Electron, 6 each, Ref./Symbols V600 thru V605, TMC P/N 872-A, removed from High-Voltage Rectifier Section.
3. Manuals, Technical, 2 each, TMC P/N IN-202, supplied as a loose item.
4. Test Data, 1 each, supplied as a loose item.
5. Strap, Grounding, 1 each, TMC P/N MS-1753-2-18, supplied as a loose item.
6. Strap, Grounding, 1 each, TMC P/N MS-1753-2-30, supplied as a loose item.
7. Lamp Socket Assembly, High-Voltage, 1 each, TMC P/N AX-124, removed from Auxiliary Frame Top.
8. Lamp, Incandescent, Frosted, 1 each, Ref./Symbol I-1007, TMC P/N BI-106-2, removed from Main Frame, Power Amplifier Section.
9. Insulating Rods, 2 each, TMC P/N A-1403 removed from Main Frame Top.
10. Resistor, Fixed, 9 each, Ref./Symbol R801 thru R809, TMC P/N RW-118F-183, removed from Main Frame.
11. Resistor, Fixed, 4 each, Ref./Symbol R800, 816, 819, 820, TMC P/N RW-118F-502, removed from Main Frame.
12. Resistor, Fixed, 2 each, Ref./Symbol R812, 813, TMC P/N RW-1196-181, removed from Main Frame.
13. Resistor, Fixed, 2 each, Ref./Symbol R814, 815, TMC P/N RW-122-3-604.
14. Resistor, Fixed, 2 each, Ref./Symbol R810, 811, TMC P/N RW-122-1-405.
15. Door Latch Plate, bottom front and rear, 2 each, TMC P/N MS-2122, P/O exterior covers.
16. Door Latch Plate, top front and rear, 2 each, TMC P/N MS-1660, P/O exterior covers.
17. Door Latch Bracket, top front and rear, 2 each, TMC P/N MS-1661, P/O exterior covers.
18. Door Latch Bracket, bottom front and rear, 2 each TMC P/N MS-2123, P/O exterior covers.
19. Plug, Electrical, 1 each, TMC P/N PL-149, supplied as a loose item.
20. Equipment Mounting Hardware Kit, 1 each, consisting of:
    40 each, Screw, binderhead, TMC P/N SCBS1032BN8
    40 each, Washer, fiber, TMC P/N WA-101-11
21. Assembly Kit, Transmitter Top, 1 each, consisting of:
    9 each, Screw, hexagon head, TMC P/N SCHH2520SS24
    9 each, Washer, flat, TMC P/N FW25MBN
    9 each, Washer, split, TMC P/N LW331MBN
22. Assembly Kit, Auxiliary and Main Frame, 1 each, consisting of:
    9 each, Screw, hexagon head, TMC P/N SCHH3118BN16
    9 each, Washer, flat, TMC P/N FW31HBN
    9 each, Washer, split, TMC P/N LW331MBN

TABLE 1-3B. SHIPPING DATA (Cont.)

23. Mounting Kit, Trim Strip, 1 each, consisting of:
    12 each, Screw, binderhead, TMC P/N SCBS0632BN6
    22 each, Screw, binderhead, TMC P/N SCBS0832BN6
    12 each, Nut, speed, TMC P/N NT-108-1

24. Mounting Kit, Exterior Covers to Frame, 1 each, consisting of:
    20 each, Screw, hexagon head, TMC P/N SCHH3118SS24
    20 each, Washer, flat, TMC P/N FW31HBN
    20 each, Washer, split, TMC P/N LWS31MBN

25. Mounting Kit, Door Latch Brackets, 1 each, consisting of:
    8 each, Screw, binderhead, TMC P/N SCBS1032BN10
    8 each, Screw, flathead, TMC P/N SCFS1032BN8
    16 each, Washer, flat, TMC P/N FW10MRN
    16 each, Washer, Split, TMC P/N LWS10MRN
    8 each, Nut, threaded, TMC P/N NTH1032BN12

26. Mounting Kit, Main Power Transformer, 1 each, consisting of:
    4 each, Screw, hexagon head, TMC P/N SCHH5020SN48
    4 each, Washer, flat, TMC P/N FW50HBN
    4 each, Washer, split, TMC P/N LWS50MRN

27. Mounting Kit, Grounding Strap, 1 each, consisting of:
    1 each, Screw, hexagon head, TMC P/N SCHH6211SN24
    9 each, Washer, flat, TMC P/N FW62HBN
    4 each, Washer, split, TMC P/N LWS62MBN
    3 each, Nut, threaded, TMC P/N NTH6211BN30

28. Plug, Button, 1/23 inch, 8 each, TMC P/N HB-101-6, supplied as a loose item.

29. Plug, Button, 7/8 inch, 32 each, TMC P/N HB-101-3, supplied as a loose item.

30. Cover, Plate, 1 each, TMC P/N MS-2442

31. Strap, Grounding, 1 each, TMC P/N MS-202-19-13. 12. (Balanced XTMRS ONLY)

32. Cable, Connecting, 1 each, TMC P/N CA-412-8-2. (Balanced XTMRS ONLY)

33. Plate, Cover, 1 each, TMC P/N 2338.

34. Plate, Adapter, 1 each, TMC P/N MS-1666.

35. Sola Voltage Regulator Manual, 1 each.

36. Warranty Claim for 4CX5000A, 1 each.

37. Plate, Cover, 1 each, TMC P/N MS-1665. (Unbalanced XTMRS only)

38. Insulator Bowl Ass'y, 2 each, TMC P/N AX-159. (Unbalanced XTMRS only)

39. Cable Output, 2 each, TMC P/N CA-412-20-90. (Unbalanced XTMRS only)

TABLE 1-3C. SHIPPING DATA (SYNTHESIZED GPT-10K)

CASE NO.	PART	DESIGNATION		DIMENSIONS*			VOLUME*	WEIGHT*
		COMMERCIAL	MILITARY	LENGTH	WIDTH	HEIGHT		
1	Main Frame Chassis	None	None	42-1/2	35-1/4	79-1/4	68.7	1083
2	Auxiliary Frame Chassis	None	None	42-1/2	24-1/4	76-1/4	45.5	543
3**	One Base Mount and Two RF Shields	MS-1458-1 MS-2175 (2)	None	57	8-1/4	40-3/4	11.1	175
4	Two Sides and Top of Main Frame Doors for Main Frame Chassis Doors for Auxiliary Frame Chassis 11 Pieces of Trim Strip	MS-2116-1, 2117-1, 1699-1 MS-1647-1, 2118-1 MS-1648-1, 2119-1 MS-1633, 1634, 1635, 1636, 1637, 1669, 1670, 1671, 1672 (2), 1920	None	76-1/2	27-1/4	43	54.3	593
5	Main Power Transformer	TF-203	None	28-1/4	19	24	7.5	507
6	Power Supply Frequency Divider Primary Standard	CPP-1 CHL-1 CSS-1	PP-2561/URA-31 CV-928/URA-31 0-715/URA-31	28-3/4	23-1/4	26-1/2	10.2	165
7	Controlled Oscillator Tone Intelligence Unit Sideband Exciter	CLL-1 TIS-3 CBE-1 or -2	0-717/URA-31 TH-39A/UGT 0-714/URA-31	32-1/2	23-1/8	27	11.6	194
8	Controlled Master Oscillator Frequency Amplifier	CMO-1 or -2 CHG-1 or -2	0-716/URA-31 AM-2505/URA-31	32-1/2	23-1/8	27	11.6	204
9	Power Supply	CPP-2	PP-2562/URA-31	27-1/4	21-1/2	17-1/4	5.8	125

* Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

** When the GPT-10K is to be shock mounted, the base mount in case 3 is replaced by nine shock mounts and three heavy support bars for mounting the shock mounts. (See figure 2-2.) In addition, case 13 contains two stabilizers which are sometimes called shock mounts.

TABLE 1-3C. SHIPPING DATA (SYNTHESIZED GPT-10K) (Cont.)

CASE NO.	PART	DESIGNATION		DIMENSIONS*			VOLUME*	WEIGHT*
		COMMERCIAL	MILITARY	LENGTH	WIDTH	HEIGHT		
10	RF Amplifier	RFC-1	AM-2103A/URT	35-1/2	26	16	8.5	176
11	High Voltage Rectifier With one Set (2 Pieces) of Ground Straps	TI-104	None	35-1/2	26	16	8.5	156
12	Refer to Table 1-3B for contents of Case No. 12.							

* Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.

TABLE 1-4A. ELECTRON TUBE COMPLEMENT

1 PA	2 IPA	3 P.S. for Item 2	4 AX-103	5 SBE	6 P.S. for Item 5	7 VOX	8 XFK	9 TTG	10 SLM	11 FSA	12 PS-12	13 ISK	Tube	Total
1													4CX5000A	1
	1			2									6CL6	3
	1			1									6146	2
	1												PL172	1
		1			1								5R4	2
		1					1	1	1				6X4	4
		2			1	1			SLM-1=1				OA2	6
									SLM-2=1				OB2	1
			6										872A	6
				4									6AB4	4
				2						4			6U8	6
				3				2		1		1	12AT7	7
				3		3	3	4		4		1	12AU7	18
				3						1			6AH6	4
				1									6AL5	1
						1							5V4G	1
						1							6BE6	1
						6							6AQ5	6
						1							6C4	1
						1							6AB4	1
							1						6J6	1
							2			1			6BE6	3
							1						2E26	1
							1						5U4G	1
							2						OB2	2
									2				6U8A	2
										1			12BE26	1
										2			6BH6	2
										1			12AL5	1

TABLE 1-4A. ELECTRON TUBE COMPLEMENT (Cont.)

1 PA	2 IPA	3 P.S. for Item 2	4 AX-103	5 SBE	6 P.S. for Item 5	7 VOX	8 XFK	9 TTG	10 SLM	11 FSA	12 PS-12	13 ISK	Tube	Total
										2			6AU6	2
										1			5ADP7	1
										1	1		5651	2
											1		5Y3GT	1
											1		6AS7G	1
											1		12AX7	1

TABLE 1-4B. ELECTRON TUBE COMPLEMENT

1 PA	2 IPA	3 P.S. for Item 2	4 AX-103	5 CBE	6 CHG -1	7 CHG -2	8 CPP -1	9 CMO	10 CSS	11 CHL	12 CLL	13 CPP -2	Tube	Total
1													4CX5000A	1
	1				1	1		1					6CL6	4
	1				1	1							6146	3
	1												PL172	1
		1											5R4	1
		1		1									6X4	2
		2		1		1							OA2	4
												1	OC2	1
			6										872A	6
											1		6AB4	1
					2	2				1	5		6U8	10
				2	1	1					1		12AT7	5
				1				2					12AU7	3
					13	11		4				1	6AH6	29
					1			1					6BE6	2
			4										6C4	4
					1	1		1					6AB4	3

TABLE 1-4B. ELECTRON TUBE COMPLEMENT (Cont.)

1 PA	2 IPA	3 P.S. for Item 2	4 AX-103	5 CBE	6 CHG -1	7 CHG -2	8 CPP -1	9 CMO	10 CSS	11 CHL	12 CLL	13 CPP	Tube	Total
				4									6C4	4
					1	1		1					6AB4	3
						1							6BE6	1
												1	5U4G	1
					1	5		1			1		6AU6	8
												2	6080	2
					1	1							6J4	2
					1	1		1			3		6BA7	6
					1	1		1					6CS6	3
									3				2N1224	3
										3			5814	3
										4			5725	4
											1		1EP1	1
											1		6AU7	1

TABLE 1-5. CHARACTERISTICS OF GPT-10K EQUIPMENT (NON-SYNTHESIZED) INPUT/OUTPUT CIRCUITS FOR TEST AND INTERCONNECTION PURPOSES

UNIT		INPUT CIRCUIT			OUTPUT CIRCUIT		
		FREQUENCY CHARACTERISTIC	IMPEDANCE	POWER LEVEL	FREQUENCY CHARACTERISTIC	TYPE LOAD	POWER LEVEL
Sideband Level Monitor Model SLM-2		250 kc	1 k potentiometer to ground		250kc	Built-in VU meter (1 vu max)	
Sideband Level Monitor Model SLM-1		17 kc	0.1 uf 220 k unbalanced		17 kc	Built-in VU meter (3vu max)	
Frequency Spectrum Analyzer Model FSA	Signal	RF(V) Note b.	180 ohms unbalanced	Max 3 uv 60 db	RF	Built-in oscilloscope with vertical and horizontal deflection plates output monitor jack	
	Master Oscillator	Signal Frequency 500 kc	50 ohms unbalanced	0.1 volt			
Transmitting Mode Selector Model SBE	Audio	Audio	600 ohms balanced	0 vu (max)	2 to 32 mc	Nominal 72 ohms RF circuit Note c.	SBE-3 1 watt PEP (max) SBE-2 3 watts PEP (max)
	FSK	2 to 4 mc	70 ohms unbalanced	1.5 volts			
	Key	DC	Cathode unbalanced	Note d.			
	VMO	2 to 4 mc	70 ohms unbalanced	1.5 volts			
Variable Frequency Oscillator Model VOX-5	HFO				2 to 64 mc	0.001 uf +75 ohms circuit unbalanced	6 to 12 volts Note e.
	IFO				3.2 to 3.9 mc	75 ohms circuit unbalanced	2 volts
	MFO				2 to 4 mc	1000 ohms in cathode unbalanced	1.2 volts
	BFO				300 to 1000 kc	75 ohms circuit unbalanced	6 volts

TABLE 1-5. CHARACTERISTICS OF GPT-10K EQUIPMENT (NON-SYNTHESIZED) INPUT/OUTPUT CIRCUITS FOR TEST AND INTERCONNECTION PURPOSES (Cont.)

UNIT		INPUT CIRCUIT			OUTPUT CIRCUIT		
		FREQUENCY CHARAC-TERISTIC	IMPEDANCE	POWER LEVEL	FREQUENCY CHARAC-TERISTIC	TYPE LOAD	POWER LEVEL
Frequency Shift Exciter Model XFK	Neutral	DC	100 k	Space 0 volts Mark + 150 volts	Injection Frequency 200 kc ±425 cps Note f.	50 to 70 ohms circuit unbalanced	Adjust-able 3 watts max
	Polar	DC	100 k	Space - 25 volts Mark +25 volts			
	Contact	Open/ ground	Grid	Space open Mark ground			
	External MF Supply	1 to 6.9 mc (exter-nal supply	70 ohms unbalanced	6 to 8 volts			
Two-Tone Generator Model TTG					935 cps 2805 cps	600 ohms circuit unbalanced Note g.	0 to 0.5 volt 0 to 0.5 volt
					1999 kc 2001 kc	70 ohms circuit unbalanced Note h.	1.0 volt 1.0 volt

NOTE

a. When a unit without a blocking capacitor in its output circuit is to be connected to a unit without a blocking capacitor in its input circuit, an external blocking capacitor of suitable capacitance may be required if DC flows between the two units.
b. RF(V) indicates variable RF. For use with the GPT-10K, up to 32 mc; for general use, up to 200 or 300 mc.
c. The SBE output circuit contains a 0.001-uf blocking capacitor between output jack and final tube (RF OUTPUT AMP).
d. When hand keying the SBE, and isolation keying relay with a dry contact circuit to ground must be connected between the conventional DC keying line and terminal 3 of terminal strip E101 of the SBE.
e. HFO output is 2 watts (2 to 4 mc) or 0.5 watt (4 to 64 mc).
f. Injection frequency ranges from 1 to 6.9 mc.
g. Output circuits contain isolating transformers, filters and T pad.
h. Output circuits contain 220-uuf blocking capacitors.

TABLE 1-6. TECHNICAL SPECIFICATION, GPT-10K

FREQUENCY RANGE	4 to 28 mc, bandswitched
OUTPUT POWER	10,000 watts, two-tone PEP, 35 db 3rd order 5000 watts, two-tone PEP, 40 bd 3rd order 5000 watts, CW or FS
OPERATING MODES	CW, MCW, SSB, ISB, DSB, FSK
TUNING	All tuning and bandswitching controls are on the front panels. (No plug-in components)
OUTPUT IMPEDANCE	72 ohms unbalanced, 600 ohms balanced: pi-L network.

TABLE 1-6. TECHNICAL SPECIFICATION, GPT-10K (Cont.)

FREQUENCY CONTROL	a. Built-up high-stability master oscillator in the VOX for CW and FSK operation. b. 10 oven-controlled crystal positions plus external oscillator position in the SBE-3. c. 3 additional oven-controlled crystal positions in the XFK.
DISTORTION PRODUCTS	Better than 40 db down relative to PEP output, including 3rd order. (Refer to OUTPUT POWER.)
UNWANTED SIDEBAND REJECTION	1000-cycle single tone, 60 db down.
HARMONIC SUPPRESSION	Second harmonic at least 50 db from PEP output, third harmonic at least 65 db from PEP output.
CARRIER INSERTION	-55 db full output.
ALDC	An automatic load and drive control is provided to limit distortion during high drive peaks or load changes.
AUDIO INPUTS	600 ohms balanced, -20 to +10 db continuously adjustable for full RF output.
AUDIO RESPONSE (Each Sideband)	a. Flat within ±1.5 db, 350 to 3300 cycles.* b. Flat within ±1.5 db, 350 to 7500 cycles.*
VOX OPERATION	Voice control with anti-trip features. Adjustable gain and squelch.
METERING	Large size illuminated meters accurately indicate operation of all circuits.
DISTORTION MEASURING	Built-in analyzer.
PRIMARY POWER REQUIREMENTS	208 and 230 volts AC, 50 and 60 cycles, 3 phase. Approximately 13,000 watts.
SAFETY FEATURES	Overload and bias protection with automatic recycling and alarm. Safety interlocks at all high-voltage points.
COOLING	Filtered, forced air cooling. Semi-pressurized cabinet.
TEMPERATURE AND HUMIDITY	Designed to operate in any ambient temperature between the limits of 0°C and 50°C for any value of humidity up to 90%.
TUBE COMPLEMENT	See table 1-4.
* Depending upon filter ordered with SBE.	

TABLE 1-7. POWER REQUIREMENTS, GPT-10K

UNIT	POWER REQUIREMENT
GPT-10K including exciters and test equipment	230 volts, 36 amps, 50 and 60 cps, 3 phase
GPT-10K excluding exciters and test equipment	230 volts, 34 amps, 50 and 60 cps, 3 phase
Transmitting Mode Selector Model SBE-3	115 volts, 1.3 amps, 50 and 60 cps, 1 phase
Frequency Shift Exciter Model XFK	115 volts, 1.6 amps, 50 and 60 cps, 1 phase
Variable Frequency Oscillator Model VOX-5	115 volts, 2.2 amps, 50 and 60 cps, 1 phase

TABLE 1-7. POWER REQUIREMENTS, GPT-10K (Cont.)

UNIT	POWER REQUIREMENT
Frequency Spectrum Analyzer Model FSA	115 volts, 1.6 amp, 50 and 60 cps, 1 phase
Two Tone Generator Model TTG	115 volts, 0.3 amp, 50 and 60 cps, 1 phase

NOTE

Single-phase, 115-volt power is derived from three-phase power via regulating transformer in the GPT-10K.

BASIC TRANSMITTER COMPONENTS
GPT-10K

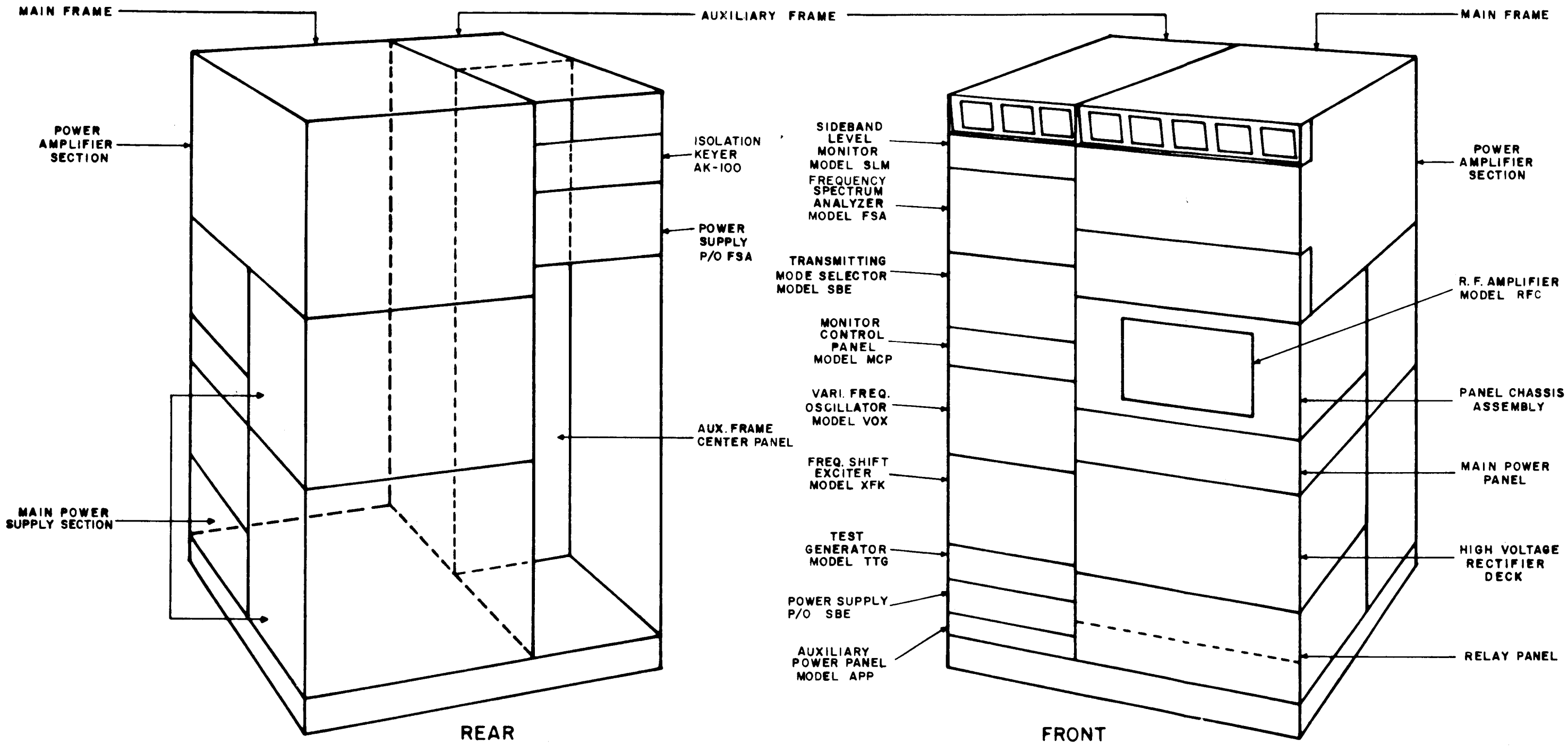
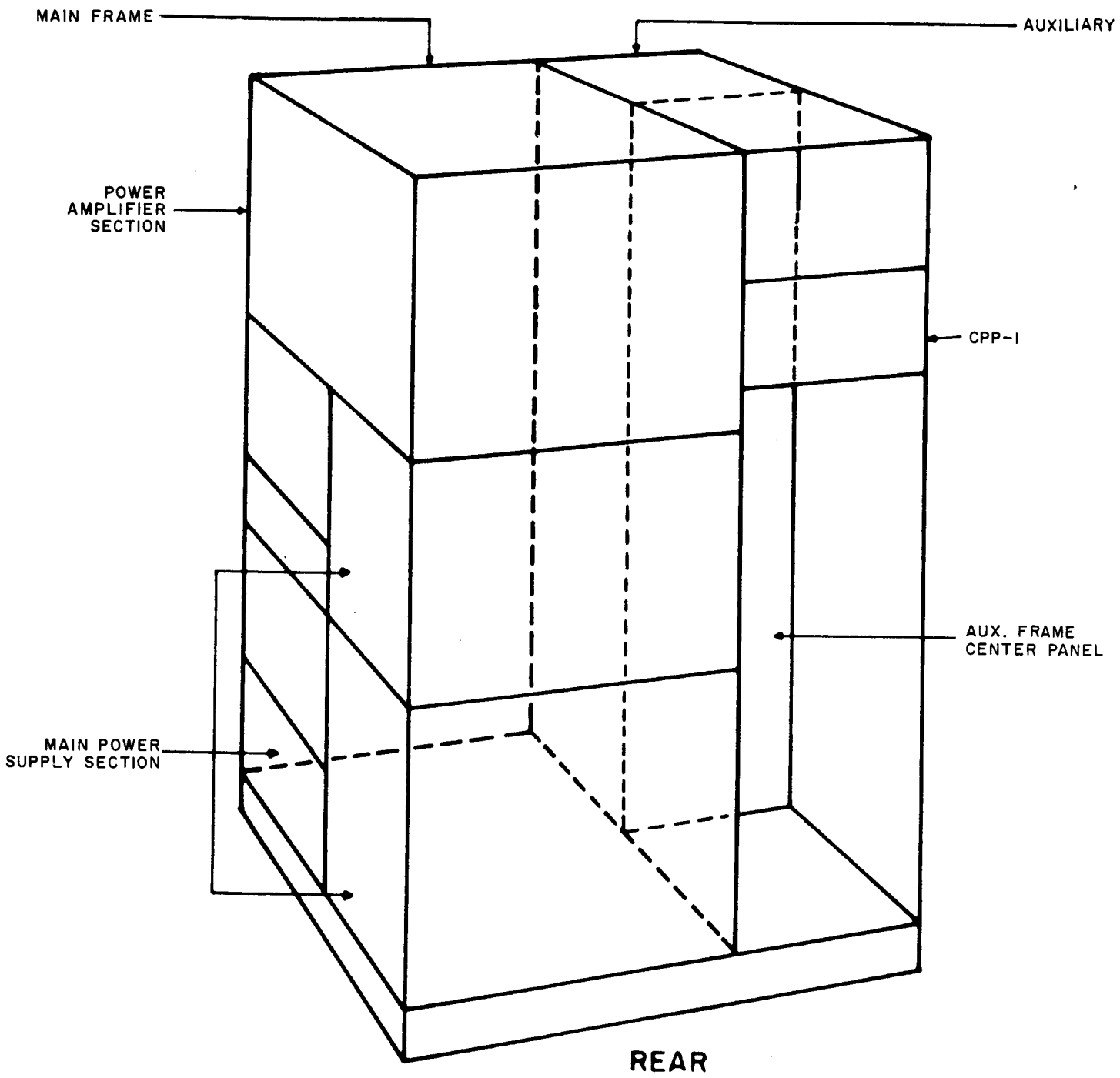


Figure I-1-2-a. Isometric Diagram, Model GPT-10K (Non Synthesized)

BASIC TRANSMITTER COMPONENTS
GPT-10K



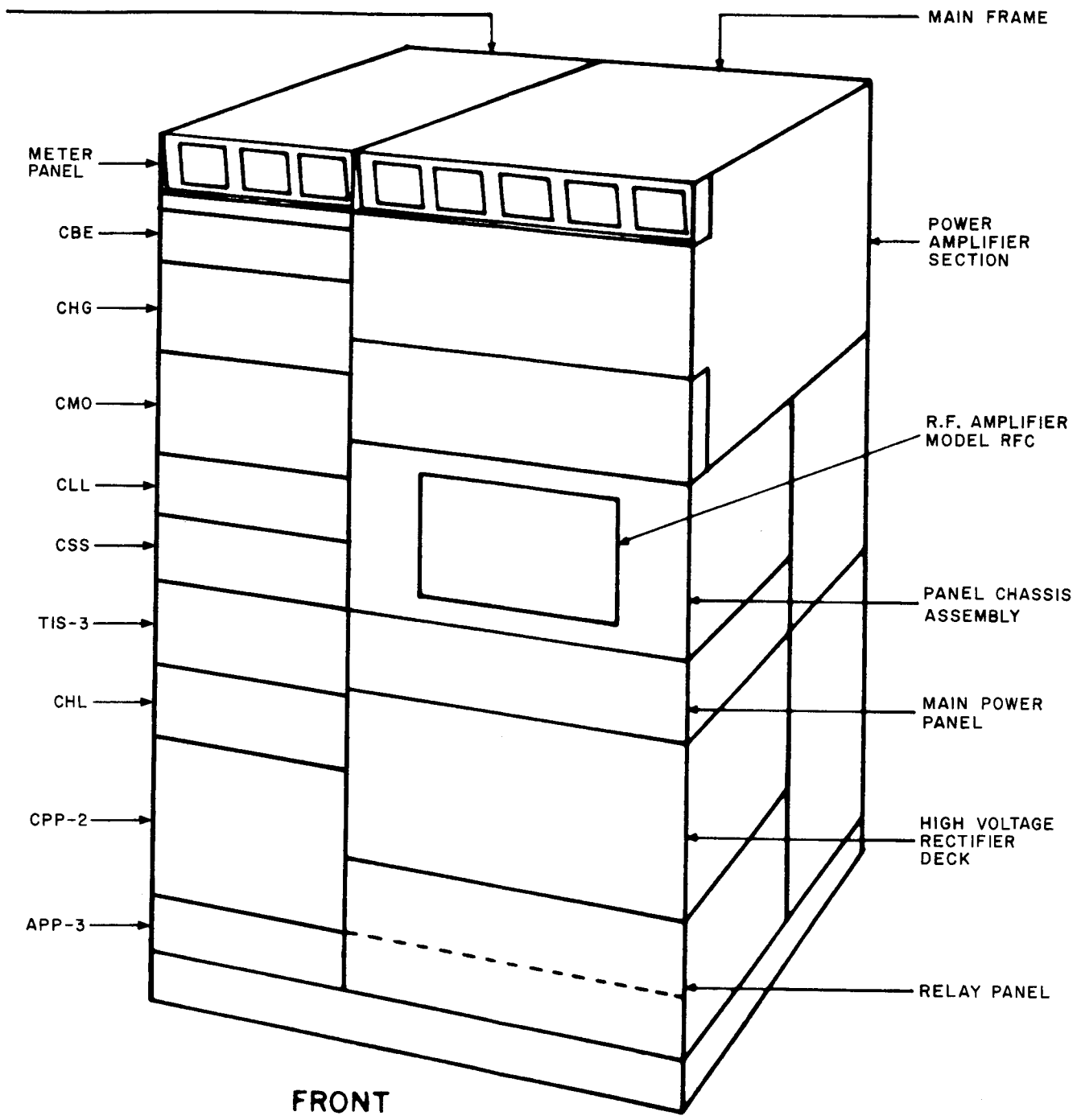


Figure I-1-2-b. Isometric Diagram, Model GPT-10K (Synthesized)

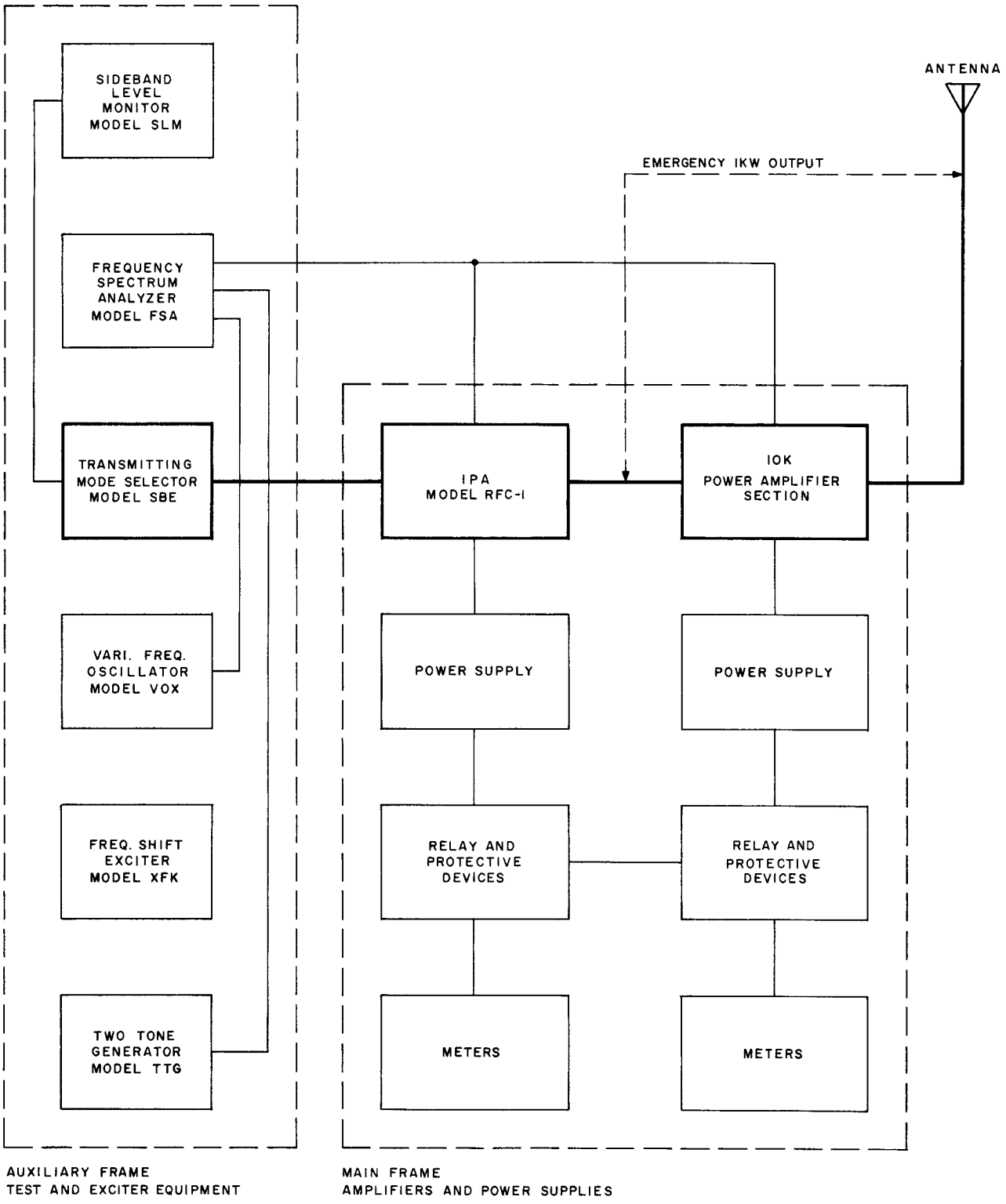


Figure I-1-3-a. Block Diagram, Model GPT-10K (Non Synthesized)

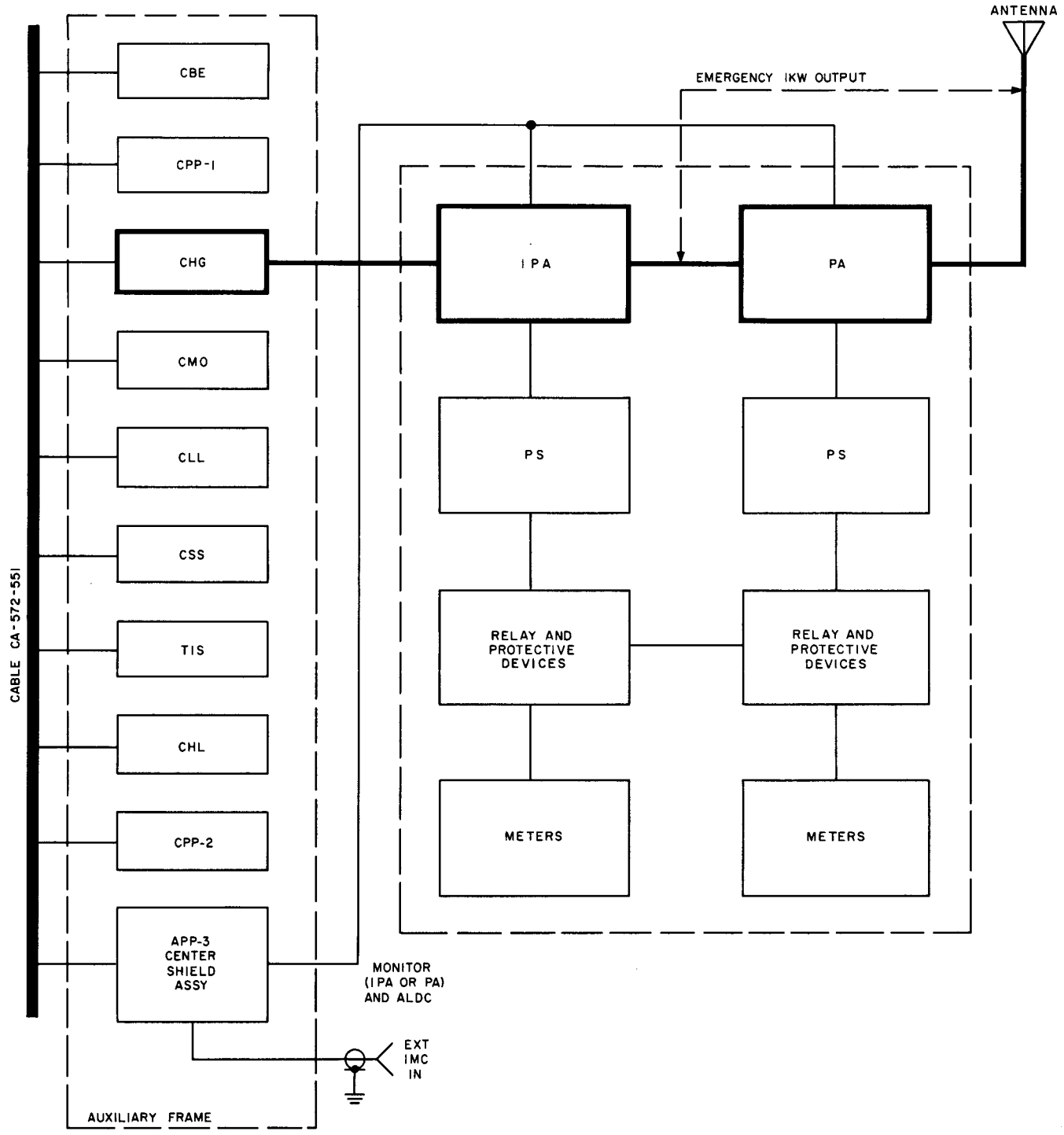


Figure I-1-3-b. Block Diagram, Model GPT-10K (Synthesized)

Figure I-1-4. Front View, RFC-1

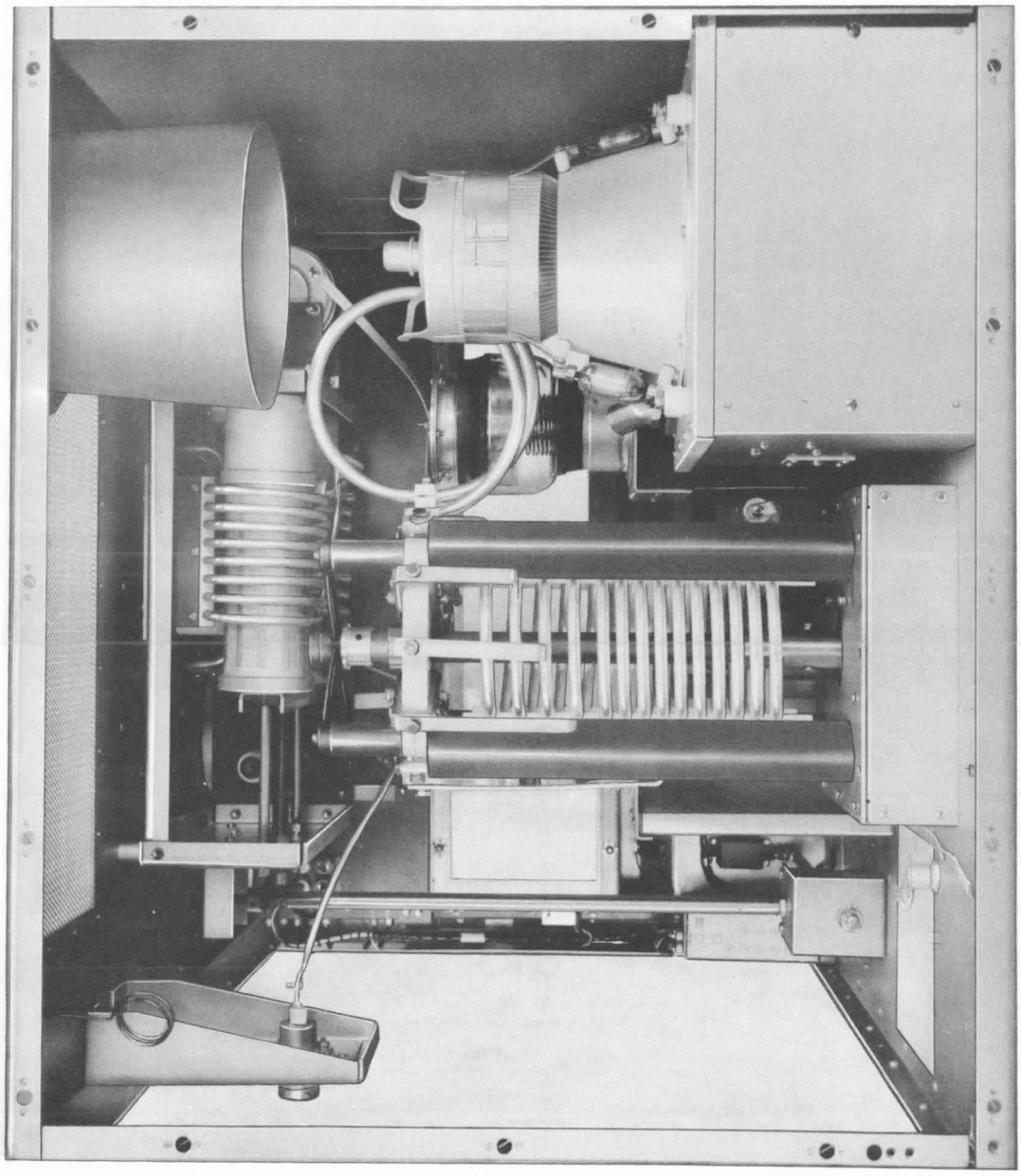


Figure I-1-5-a. Rear View, PA

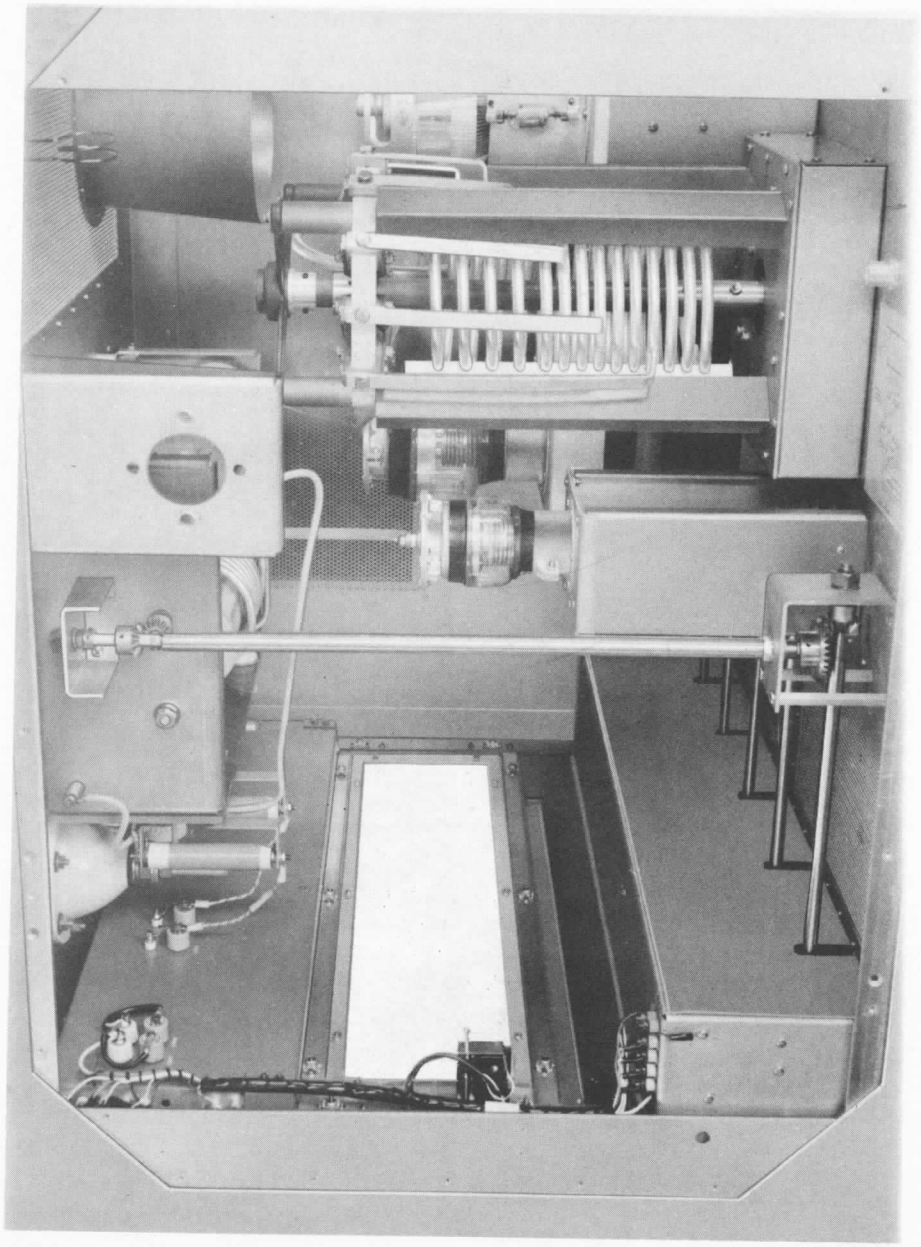


Figure I-1-5-b. Side View, PA

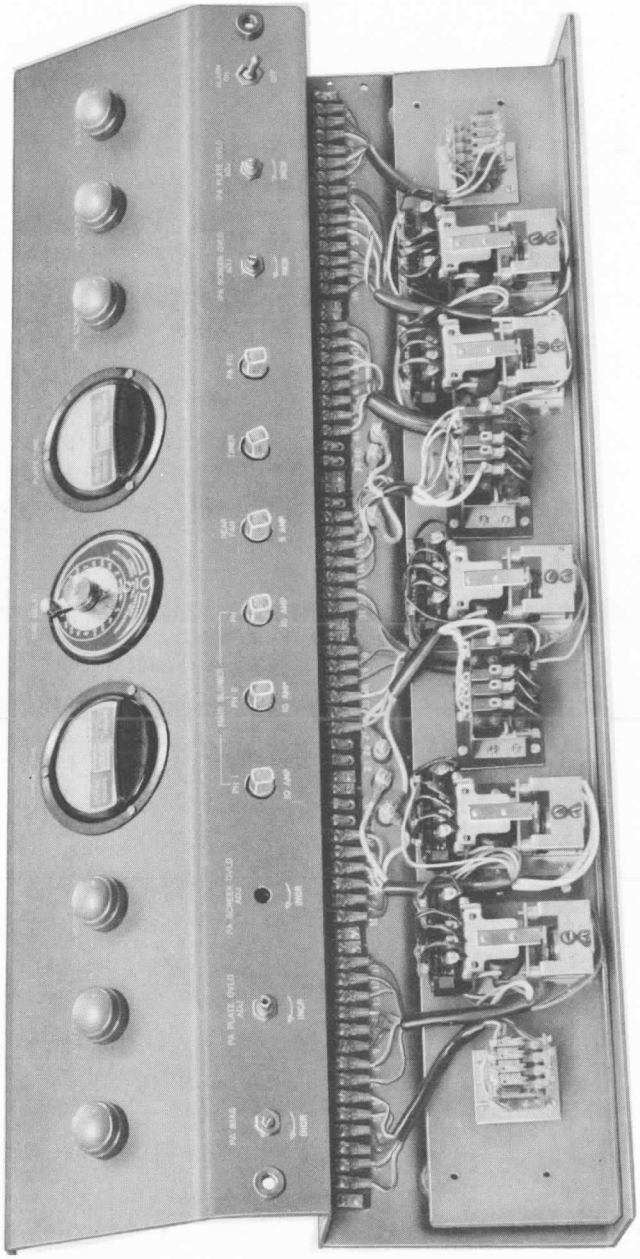


Figure I-1-6. Front View, Relay and Indicator Control Panels

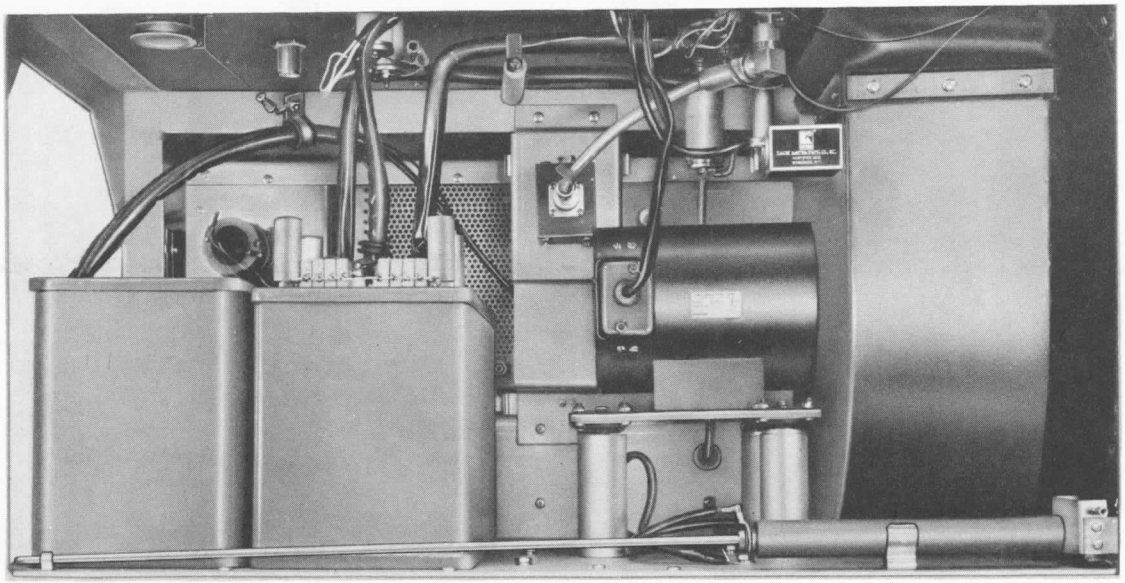


Figure I-1-7-a. Middle Compartment, Main Power Supply (Rear of Main Frame Chassis)

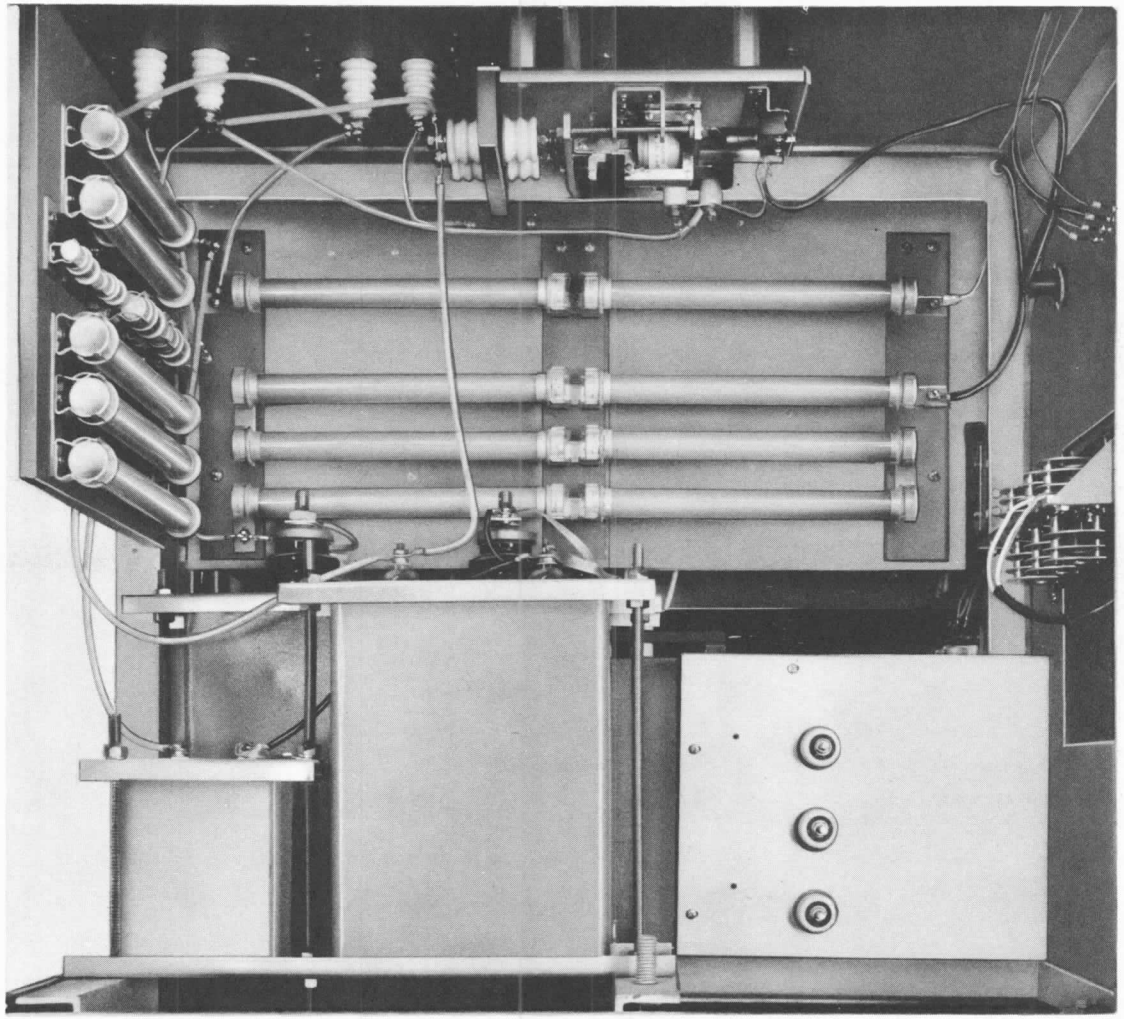


Figure I-1-7-b. Bottom Compartment, Main Power Supply (Rear of Main Frame Chassis)

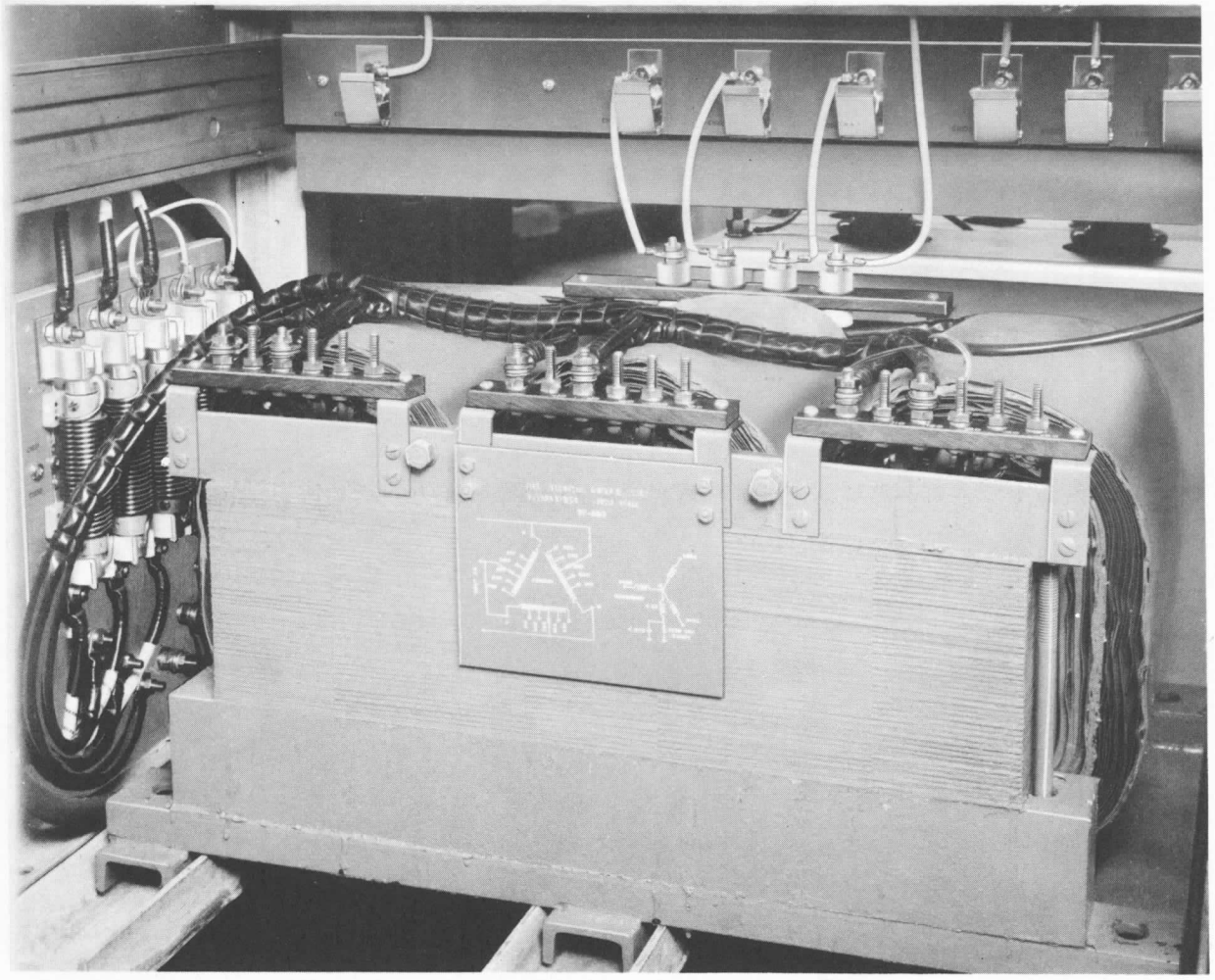


Figure I-1-7-c. Bottom Compartment, Main Power Supply (Front of Main Frame Chassis)

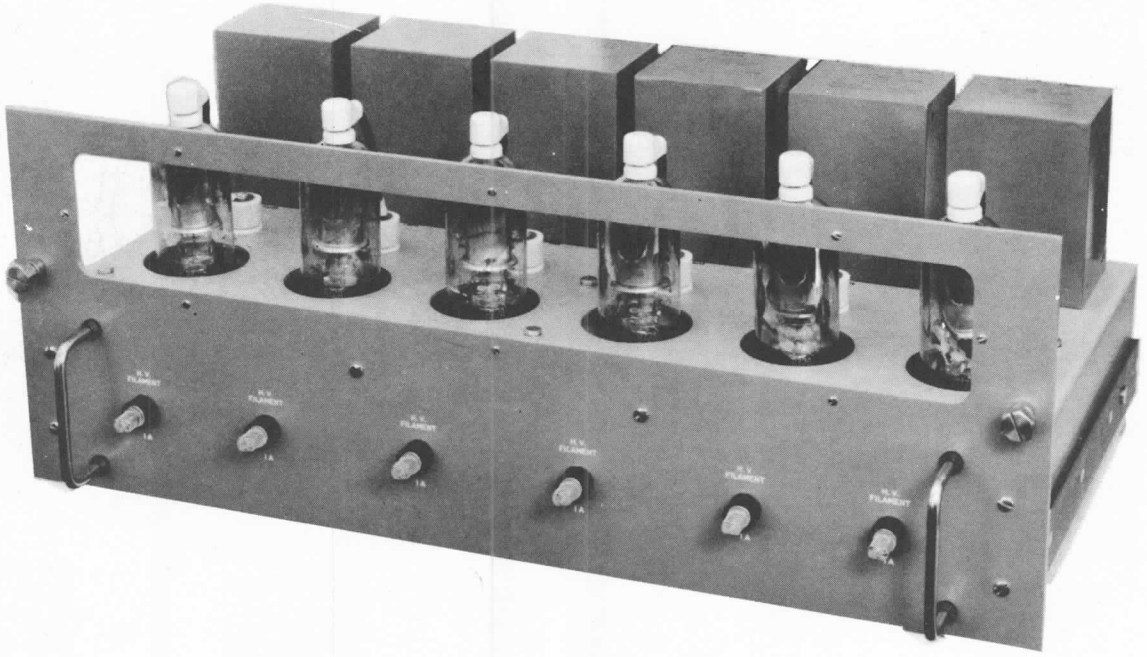


Figure I-1-8. Front View, T1-104

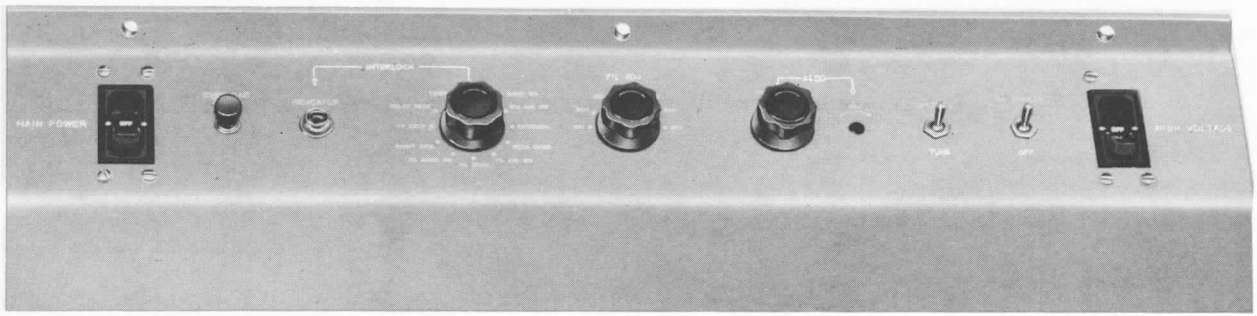


Figure I-1-9. Front View, Main Power Control Panel

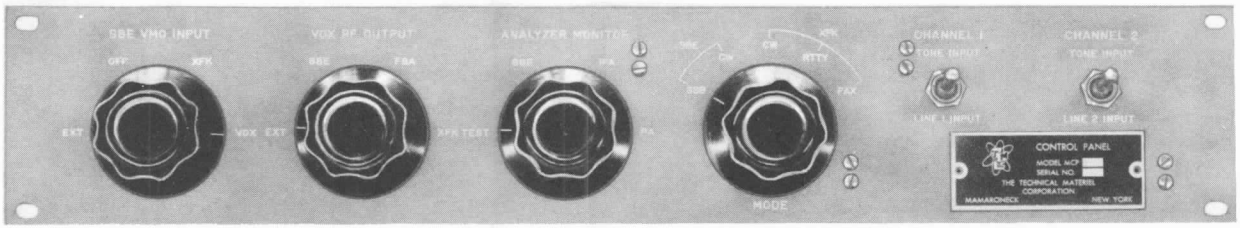


Figure I-1-10. Front View, MCP-2

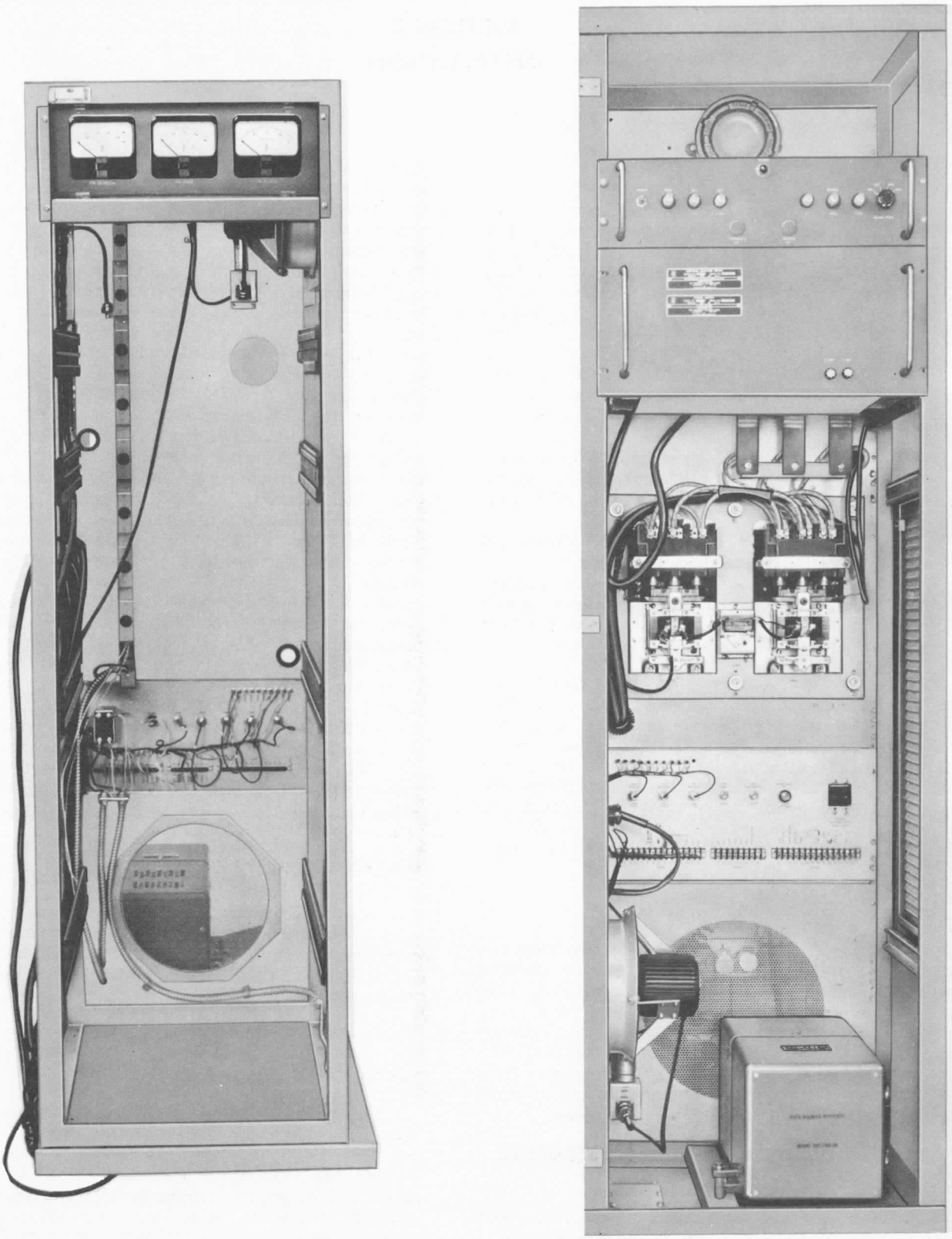


Figure I-1-11. Front and Rear Views, Equipment Mounted on Auxiliary Frame Chassis of Non-Synthesized GPT-10KW

SECTION 2
INSTALLATION

2–1. GENERAL.

a. As shown in table 1-3A, the non-synthesized GPT-10K is shipped in 13 wooden cases; as shown in table 1-3C, the synthesized GPT-10K is shipped in 12 wooden cases. On arrival, uncrate each and carefully inspect for damage. If any damage is found, notify the carrier or supply department immediately. Inspect all packing material for parts shipped as loose items. Loose items are packaged in case 12 or 13, each package being designated by the name of the assembly using its contents (top, main frame, auxiliary frame, frame to base, front/rear trim strip, transformer mounting, door latch stops, skins to frame, etc.). Case 12 or 13 also contains two complete instruction manuals which should be read and understood for proper installation and maintenance of the GPT-10K.

b. The contents of the 12 or 13 cases are packaged according to military specifications. The units are wrapped to avoid being scratched, placed in cartons, cushioned against shock, and wrapped and sealed with waterproof material within which the units are kept dry with a desiccant.

c. Figure 2-1 (two sheets) presents exploded views of GPT-10K assemblies. As shown, the assemblies consist of two frames (main and auxiliary), a number of shields (top, sides, bottom, including front and back doors), and miscellaneous parts such as trim, door latches, insulators, a warning light, etc. These are stamped with an identifying number which serves as a callout in the following description. Generally, the parts are drilled and shaped so that they fit correctly in one position only.

2–2. PRODUCTION LINE CHECKOUT.

Before any GPT-10K is shipped, it has been assembled on the test floor and thoroughly checked against the manufacturer's test specifications. This procedure eliminates assembly line errors and guarantees that a GPT-10K shall fully satisfy all design requirements. After this thorough checkout, the GPT-10K is disassembled and packed for customer use. The packaging operation, in turn, is such as to minimize troubles that may develop in transit.

2–3. LOCATION OF MAIN FRAME ASSEMBLIES OF GPT–10K.

After unpacking and inspecting the equipment and before assembling the GPT-10K in its operating location, select a location that will provide a minimum clearance of 3 feet at the sides, 4 feet in the rear, 4-1/2 feet in the front, and 1 foot overhead. The reason for this is shown in figures 2-1 and 2-2, which also show floor plan details. The overhead clearance is the clearance above the highest component on top of the GPT-10K proper; that is, the insulators or transmission line or warning lamp or RF meters (balanced transmission) whichever is the highest. The first step in the assembly of the GPT-10K is to place its base assembly properly, laying it level and bolted to the floor. In order to power the GPT-10K conveniently, the base assembly should also be placed over the conduit raceway. Figure 2-2 (sheets 1 and 2) illustrates access holes for incoming and outgoing power and signal conductors. Sheets 3 and 4 of figure 2-2 show details of the base RF shield and base framework, respectively, of later model GPT-10K's. The four small holes designated A are used to hold the base shield to the base framework during the initial process of assembling the remaining cabinet framework parts and accessories. The 24 holes designated B accommodate studs that anchor the cabinet framework and the base shield either to the base framework or to shock mounts. When the base framework is used, only 10 studs are used; 3 along the left side, 3 along the right side, and 4 along the center channel (brace). These 10 studs bolt into 10 nuts welded into the base framework. When shock mounts are used, 24 studs are used; these are bolted into 24 nuts welded into the shock mounts. The four holes designated C afford clearance for bolts that anchor the main power transformer to the base framework. The nine holes designated D afford clearance for bolts that attach to shock mounts. Holes designated E affix cover plates to access holes in the base shield. The following paragraphs detail the complete GPT-10K assembly procedure.

2–4. ASSEMBLY OF GPT–10K.

Assembly of the GPT-10K is limited to serial numbers 197 and on, mainly because earlier serial numbers have already been assembled in the field. Figures 2-1 and 2-2, however, cover assembly details of both the later and the earlier models.

a. Before bolting the base framework, base shield, and cabinet framework together, pull power, signal, and ground leads into place as follows:

(1) The bolt designated X (figure 2-2, sheet 4 of 5) is connected to the main transmitter station ground. One ground strap interconnects X to the auxiliary frame chassis via the cutout designated Y on sheet 3 of figure 2-2; a second ground strap interconnects the auxiliary frame to the main frame chassis via the cutouts designated Y and Z on sheet 3 of figure 2-2.

(2) The access hole designated W on sheet 3 of figure 2-2 accommodates three incoming 230-volt, three-phase power conductors via a raceway beneath

the GPT-10K. However, two optional access holes are provided and may be used if desired. These are designated P and Q on sheet 4 of figure 2-2. Hole P is on the main frame chassis side of the base framework toward the rear of the GPT-10K; hole Q is on the auxiliary frame chassis rear of the base framework.

(3) Access holes P, Q, and W provide outlets for test and exciter equipments mounted on the auxiliary frame chassis to supply points throughout the transmitter station.

b. The following detailed assembly description applies in the case where a GPT-10K is mounted on its base assembly rather than on shock mounts. In the latter case, the base assembly is replaced by three channels. These channels have 24 holes that align themselves with 24 shock mount holes in the RF shields and on the main and auxiliary frame chassis. When a GPT-10K is shock mounted, it may have nine shock mounts at its base, or nine on the base and two stabilizers at its top. The nine shock mounts at its base lie in a horizontal plane; the two stabilizers at the top lie in a vertical plane. Refer to table 1-3.

Step	Description
1	Place base assembly as stated above.
2	Pull power, signal, and ground leads through access holes in base RF shield as stated above, and attach base shield to base framework by means of four studs that pass through four small holes designated A on sheets 3 and 4 of figure 2-2.
3	Disengage two hexagonal bolts that fasten relay and indicator control panels (at the bottom of the main frame chassis) to the main frame chassis. Note that the two large connectors at the extreme right of the panel are already disengaged. This operation is to facilitate the next steps of assembly. Remove the relay panel.
4	Set the main frame chassis in place but do not bolt to base assembly at this time. Check that the six holes in main frame chassis base align with six holes in the RF shield. Figure 2-3 shows two appearances of main frame chassis: Half-way assembled, and fully assembled and ready for packaging.
5	Set the auxiliary frame chassis in place but do not bolt to base assembly at this time. Check that the six holes in auxiliary frame chassis base align with six holes in the RF shield. Figure 2-3 shows three appearances of auxiliary frame chassis: initial appearance, half-way assembled, and fully assembled and ready for packaging.
6	Bolt main and auxiliary frame chassis together. This operation uses 10 bolts (packaged in a case designated main frame) as follows: 3 along front angles, 3 along rear angles, 2 along top angles, and 2 along bottom angles. See sheet 5 of figure 2-2.
7	Bolt main and auxiliary frame chassis to base assembly. Use bolts in package designated "frame to base." Check that GPT-10K is level and its sides are vertical.
8	Connect grounding strips to main and auxiliary frame chassis. Points of connection are as follows: on main frame chassis near bottom, bolt into nut welded to Z-member near high-voltage capacitor location; on auxiliary frame chassis near bottom, bolt into nut welded to U-member near regulator location. Use flat and lockwasher with each bolt.
9	Put three-phase power transformer in place. The three channels on transformer slide inside three larger channels on main frame chassis. Fasten transformer to chassis using four bolts provided for this purpose. (Refer to package designated "transformer mounting.")
10	Connect transformer as shown in figure 2-4. Low-voltage primary side (delta connected) requires three jumpers and three 230-volt line conductors. Three 230-volt line conductors emerge from line terminal board at left of transformer. Three jumpers are factory installed. All conductors are equipped with "soldered-on" lugs for connection to transformer. High-voltage secondary side (wye connected) is connected to four violet-colored wires; three are fastened to spring contacts (high-voltage rectifier) and fourth (B+) to stud in bakelite panel (longest of four violet-colored wires). Four wires go to high-voltage transformer terminals successively from left to right. At right of transformer is small four-conductor cable containing two small black, one red, and one white wires. Connect two black wires to terminal 0 of phase of transformer physically furthest to right; connect other two wires to terminal 220 of same phase. These wires connect to PLATE TIME meter on indicator control panel.

NOTE

In connecting transformer, use taps (210, 220, 230, etc.) that best accommodate the incoming supply line voltage. It is important that transformer shall not be energized at this time. Circuit must be open between transformer primary and supply line voltage.

Step | Description

WARNING

Final connection in assembly must be to supply line voltage. (Refer to step 24.)

11 Replace relay and indicator control panels. (Refer to step 3.) Assembly is now complete so far as transformer compartment is concerned.

12 High-voltage rectifier (located in case 12) may now be placed in its compartment. Six each, type 872A vacuum tubes (located in case 12 or 13), may now be inserted into sockets of rectifier. This completes assembly of high-voltage rectifier compartment.

13 Continuing upward along main frame chassis is main power control panel. This comes installed with all wiring complete.

14 RF amplifier and its power supply is next unit for assembly. It comprises a pull-out drawer with a removable compartment. Removable RF amplifier compartment contains a 35-conductor plug connector which permits interconnection between it and a 35-conductor socket connector in power supply drawer. Make this interconnection. Other connections to removable RF amplifier compartment comprise the following: a spring connector on rear (RF output),a small coaxial connector on rear (RF input from SBE or CHG unit), a high-voltage coaxial connector on rear for plate power supply, and a coaxial connector on rear (RF output direct to antenna). The pullout drawer containing the power supply has a 35-conductor plug connector which is connected to a 35-conductor socket connector attached to an external cable. Laced together at the rear right side are the forementioned 35-conductor cable to power supply drawer, the small coaxial cable from SBE or CHG unit to the RF amplifier compartment, and high-voltage plate power supply cable to RF amplifier compartment. Interconnection of these cables plus that of 35-conductor cable between RF amplifier compartment and its power supply drawer completes assembly of this unit, since all cables internal to power supply drawer are preassembled at factory.

15 PA amplifier compartment comes preassembled so far as the customer is concerned, except for final amplifier tube, Eimac-type 4X5000A(TMC type 4CX5000A), contained in case 12 or 13, and loose parts comprising antenna feedthrough insulator rods and warning lamp, contained in case 12 or 13. These parts may be assembled most easily by removing RF shields MS-1592 and -1830 (components of MS-1456), side panel MS-2116 (the two cover plates bolted to MS-2116 are

Step | Description

15 (cont) removed from MS-2116 only when a GPT-10K forms part of a GPT-40K), rear RF shield MS-1594 (a part of MS-1456), and the screen on the front of amplifier compartment.

16 Assembly of 4CX5000A tube includes placing tube in its socket (working it solidly in place by gentle but firm rocking motions) and securing with clamping strap (which should be tightened with two short hexagonal bolts). Two vacuum capacitors are now secured, each with one terminal on the clamping strap and the other terminal on an associated standoff terminal. (See figure 5-7.)

NOTE

Capacitors are secured when clamping strap is tightened, since one terminal is factory soldered to standoff insulator and other terminal hangs over clamping strap. High voltage should not be supplied to tube until it is ascertained that PA blower produces adequate air flow through PA tube. (Refer to step 23.)

17 After installing final amplifier tube and antenna feed through insulator rods, install top RF shield MS-1699, replace shields temporarily removed in step 15, install antenna terminals, and install warning light on top of GPT-10K. Necessary hardware for these operations is contained in case 12 or 13 in suitably labeled packages.

NOTE

Normal antenna connections are for balanced 600-ohm output operation. Where unbalanced 70-ohm output operation is to be used, a kit is provided and instructions are given at end of this section.

18 Attention is now directed to installation of equipment units on auxiliary frame chassis. These practices consist of two general directives:

(1) Insert pullout units in their respective places.

(2) Cable up these units as shown in figure 1-2 (2 sheets) and wiring diagram, figure 2-5 (5 sheets). Fixed panels are factory wired.

19 Remaining assemblage now constitutes trim strips, front and rear doors, and connection of 230-volt, 3-phase, 60-cycle power to power input box.

20 As figure 2-1 shows, trim strip MS-1920 covers front left side of auxiliary frame chassis and should be attached to left side of

Step	Description
20 (cont)	auxiliary frame panel MS-2117 with three hinges. Right side of auxiliary trim (hinged) MS-1637 and left side main trim (hinged) MS-1634 cover the juncture of auxiliary and main frame chassis assemblies. Attachment to main frame chassis is made by three clips welded into main frame upright angle. Right side main trim MS-1633 covers front right side of main frame chassis. Attachment is made by three clips welded into main frame upright angle. Front top trim MS-1635 covers top of main and auxiliary frame chassis assemblies. Attachment to the frames is made by three clips welded to main and auxiliary frames. Eleven screws each on the left and right auxiliary and main frame panels MS-2117 and MS-2116 accommodate and mount front doors MS-2119 and MS-2118, respectively. Doors are latched by two parts designated MS-1660 and MS-1661. At top, door latch stop (MS-1660) and door latch mounting bracket (MS-1661) are fastened to top skin; at bottom, door latch stop (MS-1660) and door latch mounting bracket (MS-2122) are fastened to bottom frame angle (MS-2123). Attachments span juncture of main and auxiliary frame uprights. Hardware to implement these operations is contained in suitably designated packages.
21	As figure 2-1 shows, trim strip MS-1670 covers rear left side of auxiliary frame assembly and should be attached to left side of auxiliary frame panel MS-2117 via three tapped holes in upright angle. Rear center trim MS-1669 covers juncture of auxiliary and main frame chassis assemblies. Attachment to auxiliary and main frame upright angles is via three tapped holes in each angle. Right side main trim MS-1671 covers rear right side of main frame chassis and should be attached to right side of main frame panel MS-2116 via three tapped holes in upright angle. Rear top and bottom trim MS-1672 is attached to top and bottom main and auxiliary frame chassis assemblies by three tapped holes in main and auxiliary framework. Rear doors MS-1647 and MS-1648 are hung on side panels MS-2116 and MS-2117 by three hinges and are latched by two parts designated MS-1660 and MS-1661. Hardware to implement these operations is contained in suitably designated packages in case 13.
22	Final assembly operation is to complete electrical connections between station's 230-volt, 3-phase, 60-cycle power supply mains and power input box. Figure 2-4 shows a wiring diagram of circuit. Input power goes through power input box to transformer via line filter assembly (terminal board), circuit breaker CB1000, contactors, and back to terminal board. Since main and auxiliary frames are in separate cases, eight conductors as shown in diagram must be connected to input box's terminal board.

NOTE

Last connection to be made is connection between power input box and customer's 230-volt, 3-phase power supply mains. It is strongly recommended that this connection be made through an external circuit breaker or disconnect switch in order to avoid connecting hot leads to power input box's terminals.

Step	Description
23	Check main three-phase blower's (B800) rotation as follows: Remove blower's filter located on auxiliary frame chassis. Blades of blower are now visible. Proper rotation is clockwise looking toward blades through auxiliary frame chassis. Throw main power circuit breaker CB1000 and note direction of rotation. If counterclockwise, reverse two incoming 230-volt phase wires. Check once more for proper rotation. With proper rotation, a considerable volume of air will be forced through cooling ducts of PA tube; with improper rotation, volume of air is relatively small. Another check for proper rotation is position of air vane (rotation switch) associated with blower's air stream. Movable arm should be pointed upward at about a 45-degree angle.

2-5. SUPPLEMENTARY INSTRUCTIONS FOR INSTALLATION OF UNBALANCED 50-OHM OR 70-OHM OUTPUT CONNECTION.

NOTE

Whether the call out for an unbalanced antenna specifies 50 ohms or 70 ohms is of small practical importance, since impedance components of such antennas in practice vary with frequency. In the factory, a transmitter is tuned up on a 72-ohm resistance load. This means 8.4 amperes (load) for a 10-KW PEP output (10,000 watts equals 2 x 72 ohms x 8.4 amperes squared).

a. As pointed out in step 17 in the preceding tabulation, normal connections are for balanced 600-ohm output operation. When unbalanced 70-ohm output connections are desired, use is made of parts contained in one of three kits (as ordered), as described below.

b. The results to be obtained, electrically speaking, are shown in figure 2-6. Connect jumper, normally between terminals E900 and E901, to terminals E900 and E902. Connect jumpers between terminals E901 and E903, and between terminals E903 and E904. In 70-ohm output operation, the thermocouple TC900 is placed in service, and PA OUTPUT meter M1004 also comes into use. Remove the ground on the (DC) terminal of TC900.

c. Figure 2-7 shows the assembly procedure for a 1-5/8-inch heliax cable (sketch 3), a quick disconnect connector Model JJ-137 (sketch 1), and a threaded-type connector Model JJ-178 (sketch 2). Referring to sketch 3, connector PO-172, bracket MS-1605, plate MS-1665, and inner shield MS-1592 are bolted to coaxial plug adapter PM-564 by means of four 1/4-20 hexagonal head screw bolts. The remaining four screw holes in the adapter are used to bolt mitered right-angle elbow PO-171, side panel MS-2116, and outer shield MS-1830 to coaxial plug adapter PM-564 by means of four 5/16-18 hexagonal head screw bolts. The 1-5/8-inch Andrew heliax cable to the antenna is normally directed downward as shown in the figure. Sketches 1 and 2 show how adapter plate MS-1864 is used to affix MS-1605 to JJ-137 and JJ-178, respectively.

2-6. SUPPLEMENTARY INSTRUCTIONS FOR INSTALLATION USING 50-CYCLE POWER SUPPLY.

a. The Sola constant current regulator transformer, T3000, is provided with terminals that enable it to supply regulated 115-volt single-phase power to all the exciter and test equipments mounted on the auxiliary frame chassis on either a 50- or 60-cycle power supply basis. The main power supply circuit requires no adjustment for 50-cycle versus 60-cycle power supply.

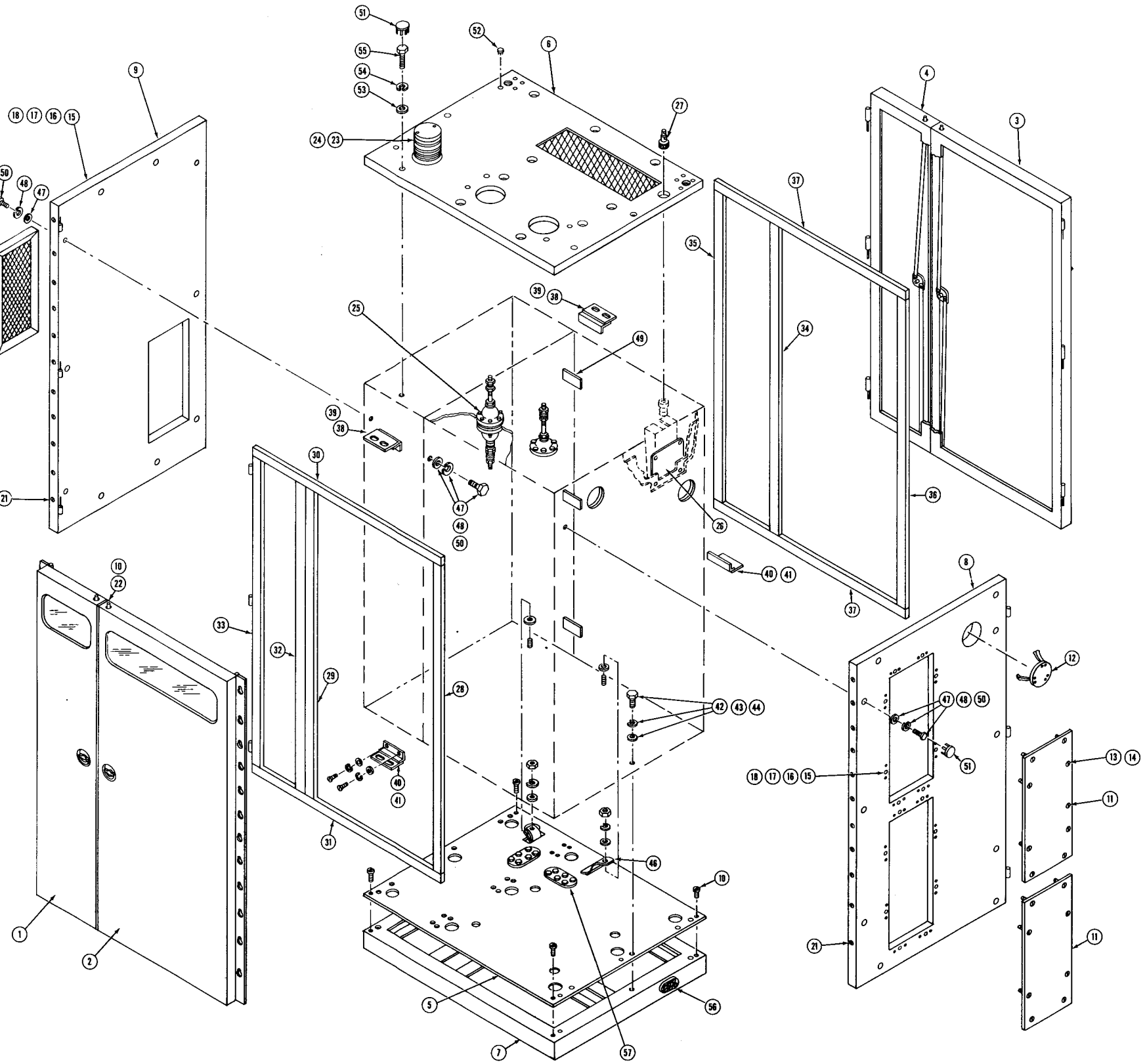
b. Sketch 1 of figure 2-8 is a simplified schematic of the Sola transformer. Terminals H1 and H2 are used for 190- to 260-volt incoming power, either 50 or 60 cycles, single-phase. If the supply is 60 cycles, the 118-volt regulated secondary is taken from one set of C and 60 terminals as shown; and the jumper is connected between the other set of C and 60 terminals as shown. If the supply is 50 cycles, the 118-volt regulated secondary is taken from one set of C and 50 terminals are shown; and the jumper is connected between the other C and 50 terminals as shown. Sketch 2 of figure 2-8 shows the connections at the transformer's terminal board.

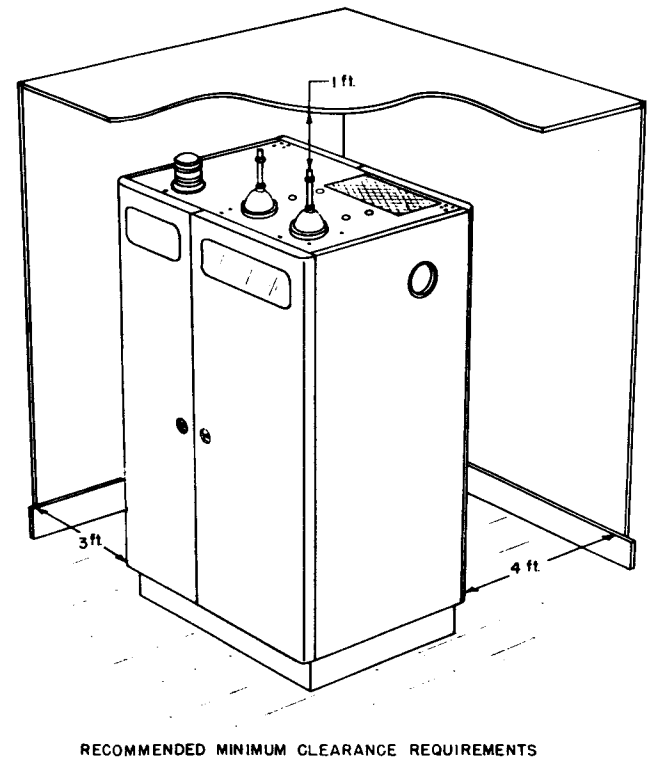
2-7. EMERGENCY 1-KW (PEP) TRANSMITTER OUTPUT.

Refer to Section 3-10 for details.

2-8. INITIAL ADJUSTMENTS AND CHECKOUT.

As stated in paragraph 2-2, the GPT-10K has been adjusted, thoroughly tested, and checked out on the manufacturer's test floor just prior to shipment. Barring rough handling during shipment and installation, initial adjustments and checkout agree with the operating procedures given in Section 3.





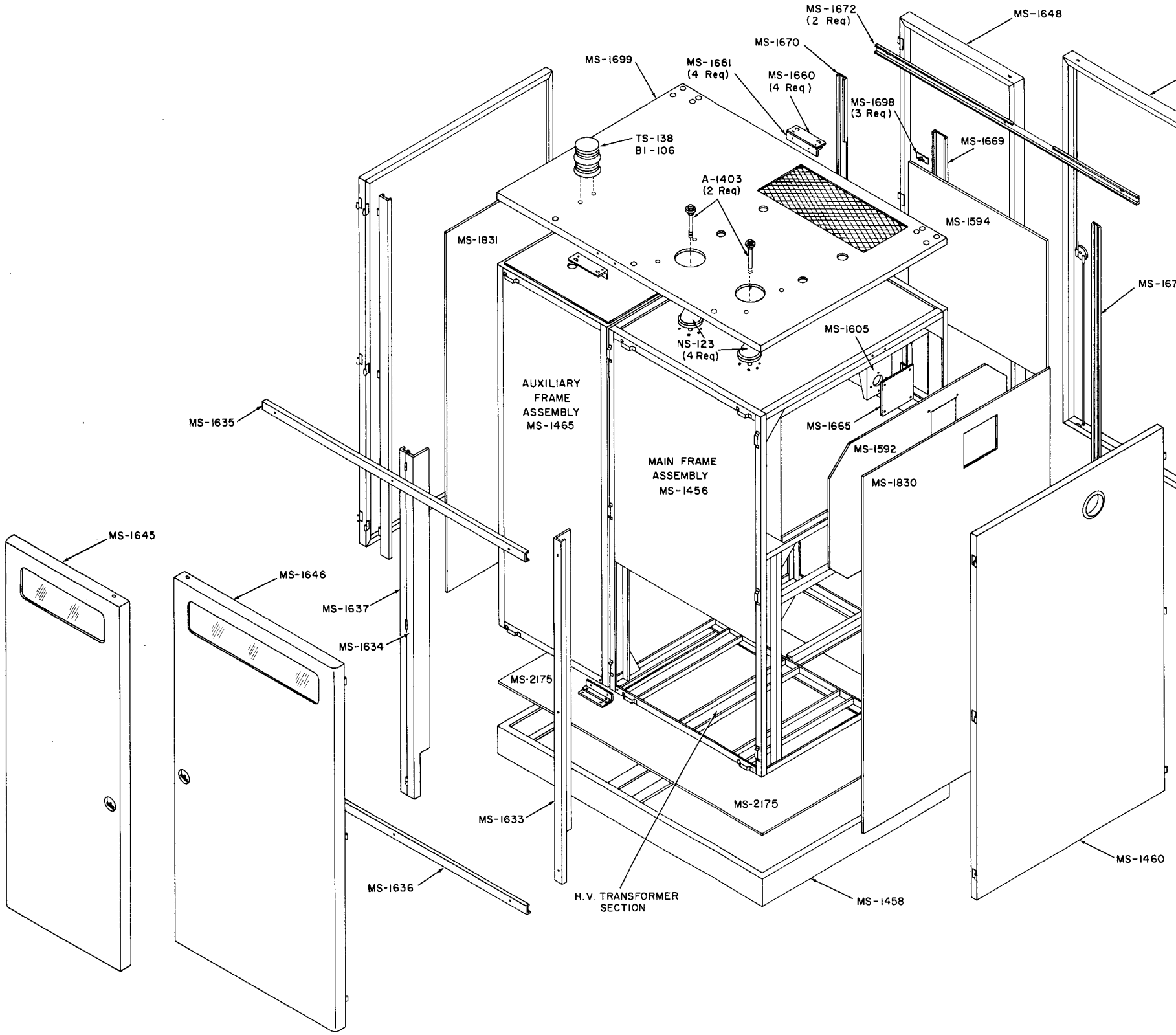
RECOMMENDED MINIMUM CLEARANCE REQUIREMENTS

2	57	MS-1850-A	PLATE, ACCESS, ALUMINUM
2	56	MS-1850-S	PLATE, ACCESS, STEEL
12	55	FW25HBN	WASHER, FLAT
12	54	LWS25MRN	LOCKWASHER, SPLIT
12	53	SCHH2520BN10	BOLT, HEX HEAD 1/4-20
8	52	HB-101-3	PLUG, BUTTON 1/2"
36	51	HB-101-6	PLUG, BUTTON 7/8"
30	50	FW31HBN	WASHER, FLAT
3	49	MS-1698	BRACKET, TRIM STRIP
30	48	LWS31MSN	LOCKWASHER, SPLIT 5/16
30	47	SCHH3118N16	BOLT, HEX HEAD 5/16-18X1" LG
1	46	MS-1753-2-30	GROUND STRAP 30" LG
1	45	MS-1753-2-18	GROUND STRAP 18" LG
10	44	FW37HSN	WASHER, FLAT 3/8
10	43	LWS37MSN	LOCKWASHER, SPLIT 3/8
10	42	SCHH37I6SN24	BOLT, HEX HEAD 3/8-16 X 1-1/2 LG
2	41	MS-2123	DOOR LATCH MTG. BRACKET
2	40	MS-2122	DOOR LATCH STOP, BOTTOM
2	39	MS-1661	DOOR LATCH MTG. BRACKET, TOP
2	38	MS-1660	DOOR LATCH STOP, TOP
2	37	MS-1672	TRIM, REAR, TOP AND BOTTOM
1	36	MS-1671	TRIM, REAR, MAIN FRAME
1	35	MS-1670	TRIM, REAR, AUX FRAME
1	34	MS-1669	TRIM, REAR, CENTER
1	33	MS-1920	TRIM, HINGED, LEFT, AUX.
1	32	MS-1637	TRIM, HINGED, RIGHT SIDE AUX.
1	31	MS-1636	TRIM, FRONT, BOTTOM
1	30	MS-1635	TRIM, FRONT, TOP
1	29	MS-1634	TRIM, FRONT, LEFT SIDE, MAIN
1	28	MS-1633	TRIM, FRONT, RIGHT SIDE, MAIN
1	27	PL-149	CONNECTOR, PLUG, QDS
1	26	MS-1665	PLATE, BLANK, UNBAL. OUTPUT
2	25	AX-159	INSULATOR BOWL ASSEMBLY
1	24	BI-106	LAMP, INCANDESCENT
1	23	AX-124	H.V. LAMP SOCKET ASSEMBLY
2	22	MS-2257	SPACER, DOOR
22	21	SCBSI032BN8	SCREW, MACHINE
1	20	AD-103-1	FILTER, AIR
1	19	MS-2255	COVER, FILTER, PERFORATED
48	18	NTH0348BN6	NUT, HEX
48	17	LWS03MRN	LOCKWASHER, SPLIT
48	16	SCFS0348BN6	SCREW, MACHINE
24	15	FS-102-1	SPRING, "S" TYPE
24	14	FS-110-1	STUD, SLOTTED HEAD
24	13	FS-109-3	RING, STUD RETAINING
1	12	MS-2258	COVER, UNBAL. OUTPUT
2	11	MS-2256	COVER, FILTER, BLANK
26	10	SCFSI032BN6	SCREW, MACHINE, F.H, 10-32 X 3/8 LG
1	9	MS-2117	PANEL, LEFT SIDE, AUX. FRAME
1	8	MS-2116	PANEL, RIGHT SIDE, MAIN FRAME
1	7	MS-1458	BASE
1	6	MS-1699	PANEL, TOP
1	5	MS-2175	SHIELD, BASE
1	4	MS-1648	DOOR, REAR, AUX. FRAME
1	3	MS-1647	DOOR, REAR, MAIN FRAME
1	2	MS-2118	DOOR, FRONT, MAIN FRAME
1	1	MS-2119	DOOR, FRONT, AUX. FRAME

NOTE:
SERIALS BEYOND 196.

Figure I-2-1. Assembly Drawing, GPT-10K
(Sheet 1 of 2)

NOTE
1. FOR INSTALLATION DETAILS SEE FIGURE 2-2.
2. IN ASSEMBLING TRANSMITTER SIDE PANELS MS-1460 AND MS-1465, RAISE THESE PANELS AS MUCH AS POSSIBLE BEFORE TIGHTENING SECURELY. OTHERWISE FRONT DOORS (MS-1645 AND MS-1646) AND REAR DOORS (MS-1647 AND MS-1648) WILL NOT FIT PROPERLY INTO LATCHES.
3. SERIAL NO. 123 THROUGH 196.



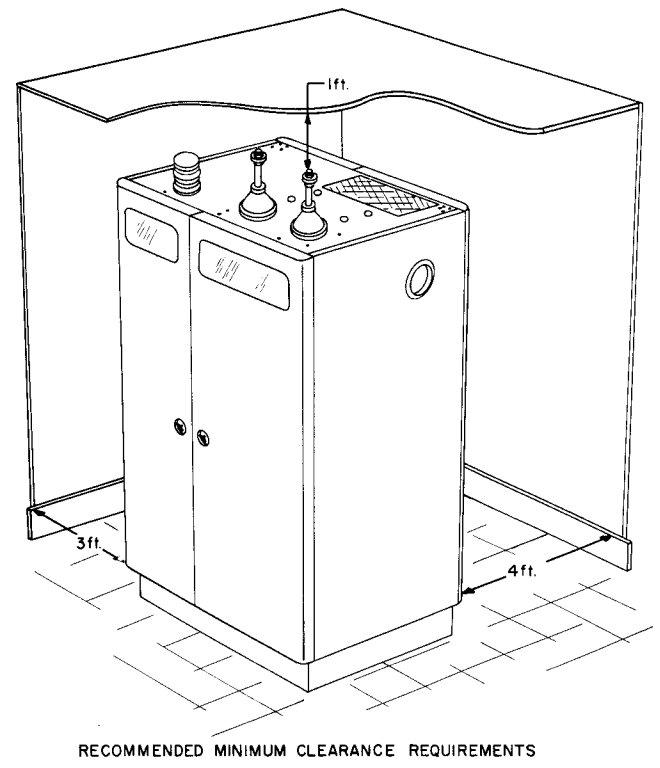
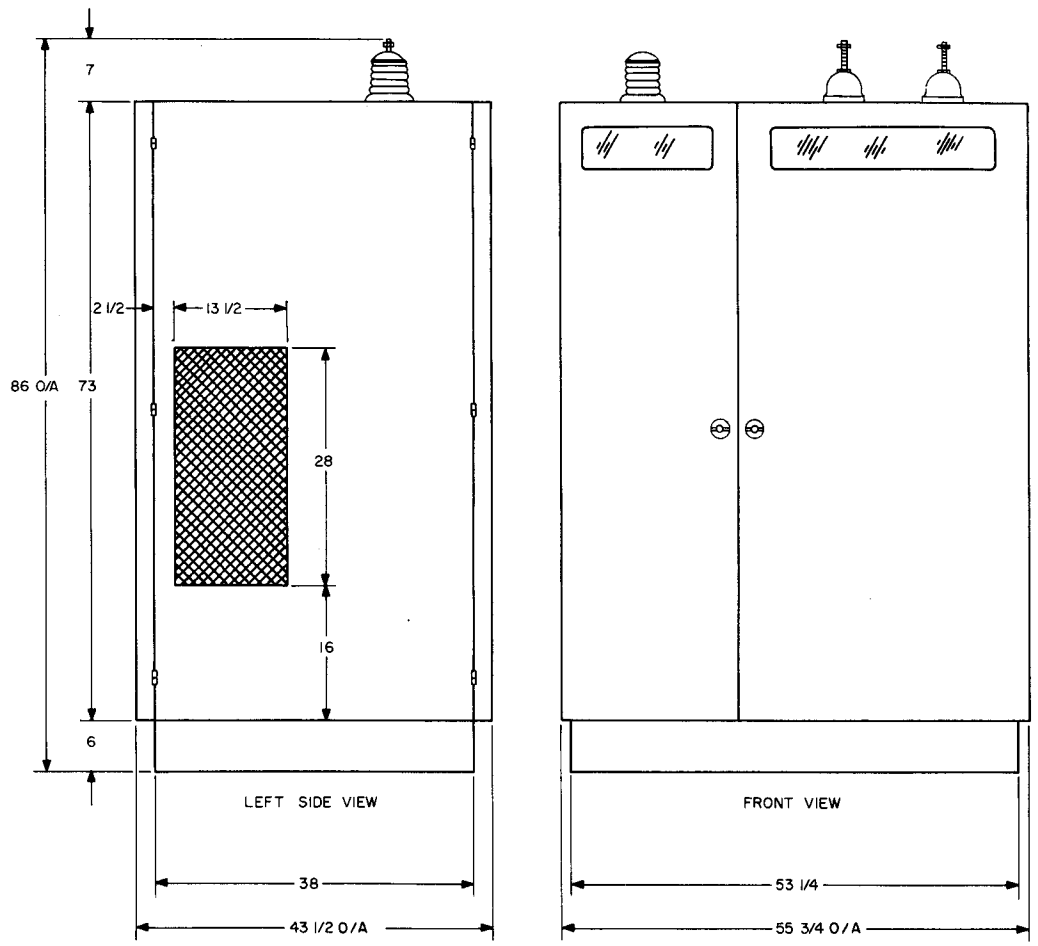
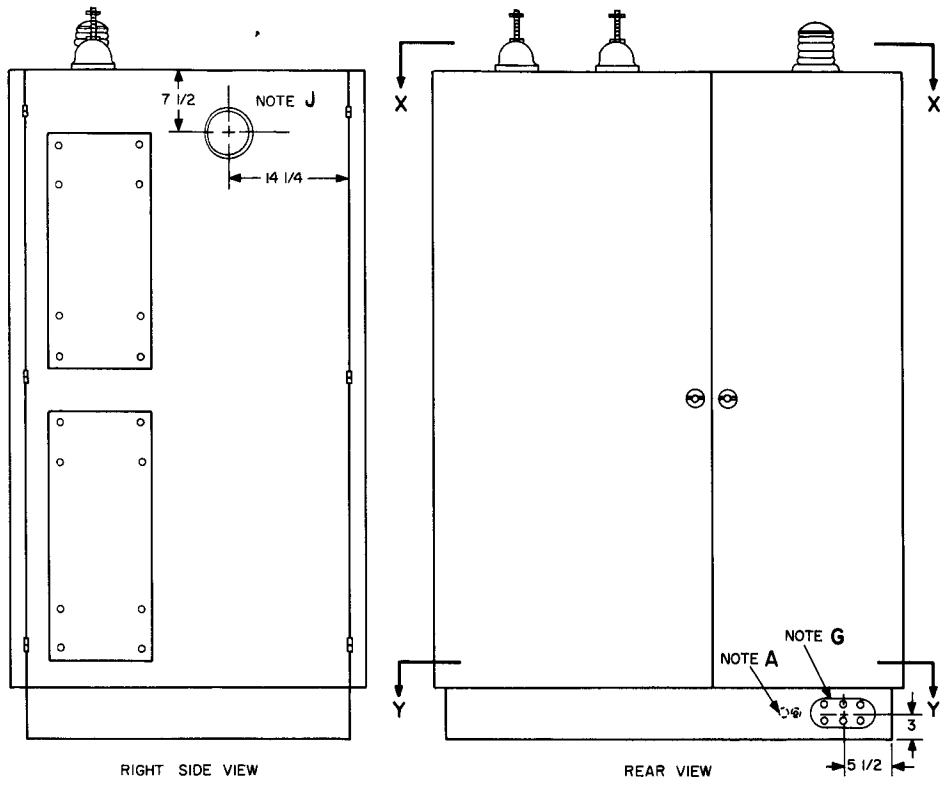


Figure I-2-1. Assembly Drawing, GPT-10K (Sheet 2 of 2)





NOTES:

A- BOLT FOR TRANSMITTER GROUND.

B- ACCESS HOLE FOR GROUND LEAD TO MAIN FRAME CHASSIS.

C- ACCESS HOLE FOR GROUND LEAD TO AUXILIARY FRAME CHASSIS.

D- ACCESS HOLE FOR 220V 3-PHASE 60 CYCLE POWER INPUT TO MAIN FRAME.

E- ACCESS HOLE FOR SIGNAL CONDUCTORS INTERCONNECTING TEST EQUIPMENT ON AUXILIARY FRAME TO CIRCUITS EXTERNAL TO TRANSMITTER.

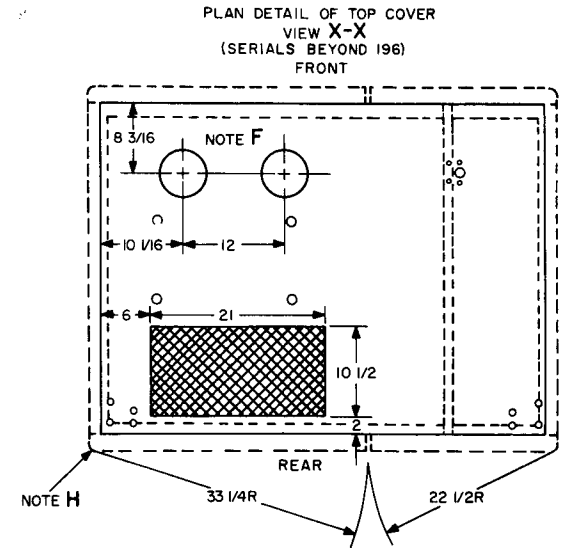
F- ACCESS HOLES FOR INSULATORS FOR BALANCED ANTENNA.

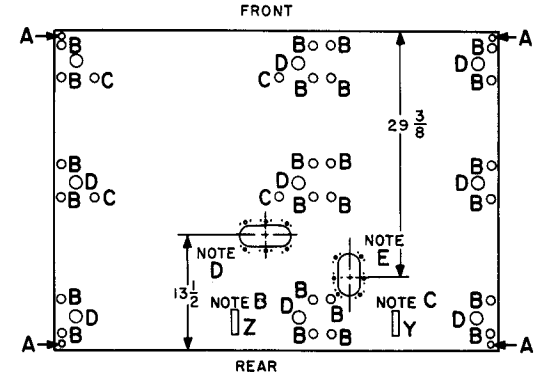
G- ACCESS HOLE AUXILIARY TO D AND E.

H- FRONT AND REAR DOOR SWINGS ARE IDENTICAL.

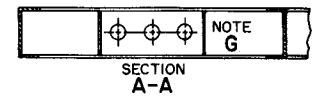
I- FOR APPROXIMATE LOCATION ON THE DRAWING USE 3/32=1 INCH.

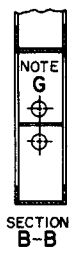
J ACCESS HOLE FOR CONNECTIONS BETWEEN UNBALANCED OUTPUT CONNECTOR (OR OUTPUT CIRCUIT OF TRANSMITTER) TO 70-OHM ANTENNA.

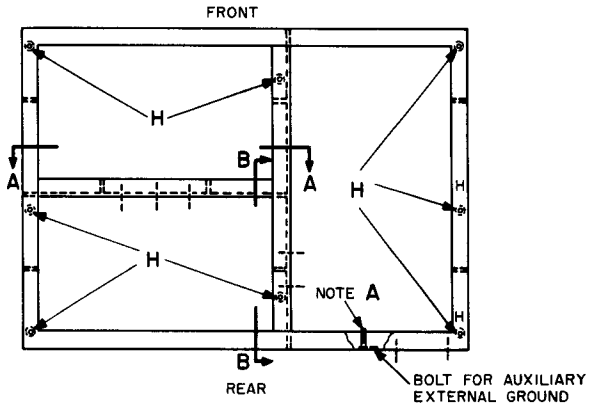




PLAN DETAIL OF BASE SHIELDS
(SERIALS BEYOND 196)

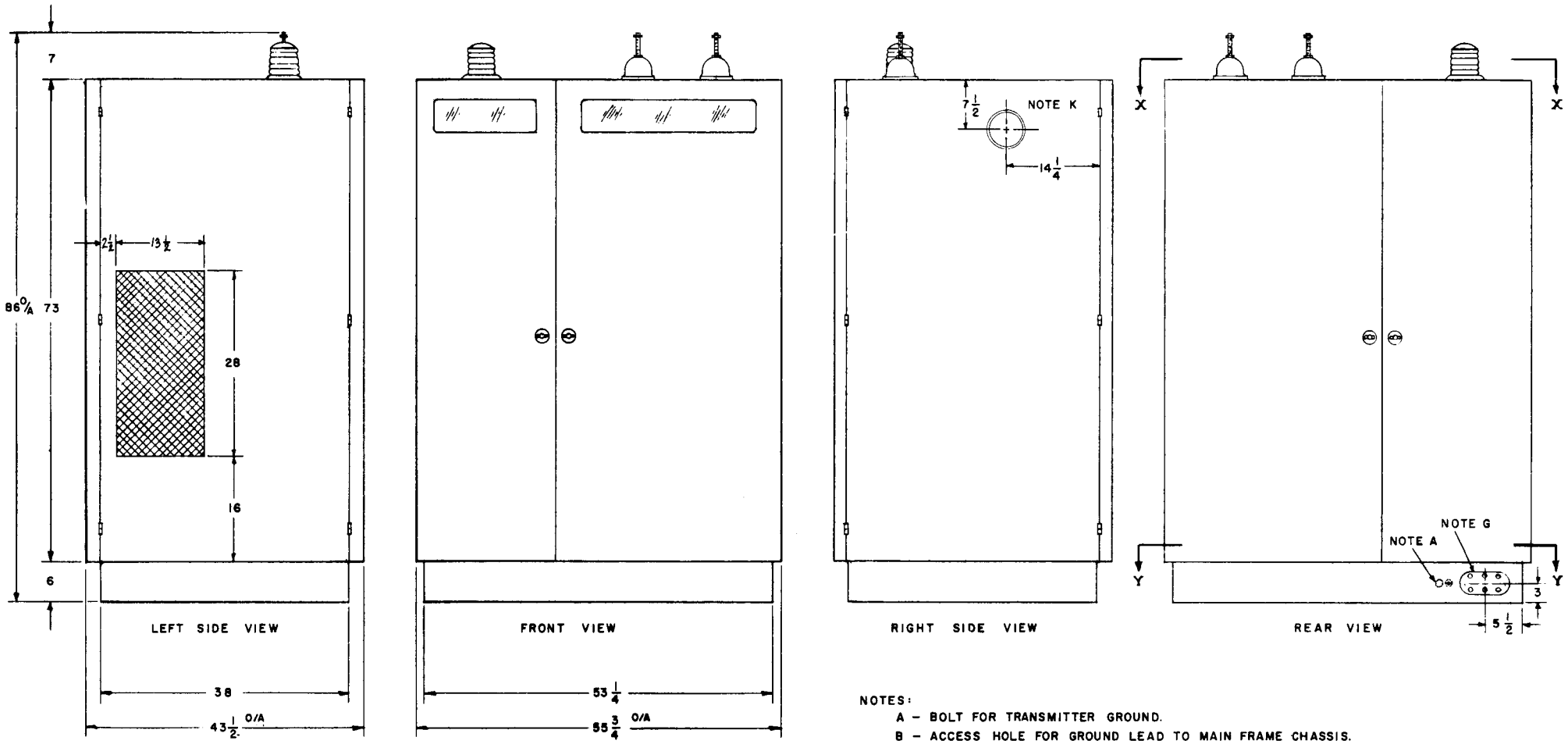






PLAN DETAIL OF BASE
VIEW Y-Y
(SERIALS BEYOND 196)

Figure I-2-2. Installation Diagram, GPT-10K (Sheet 1 of 5)



NOTES:

A – BOLT FOR TRANSMITTER GROUND.
B – ACCESS HOLE FOR GROUND LEAD TO MAIN FRAME CHASSIS.
C – ACCESS HOLE FOR GROUND LEAD TO AUXILIARY FRAME CHASSIS.
D – ACCESS HOLE FOR 220V 3-PHASE 60 CYCLE POWER INPUT TO MAIN FRAME.
E – ACCESS HOLE FOR SIGNAL CONDUCTORS INTERCONNECTING TEST EQUIPMENT ON AUXILIARY FRAME TO CIRCUITS EXTERNAL TO TRANSMITTER.
F – ACCESS HOLES FOR INSULATORS FOR BALANCED ANTENNA.
G – ACCESS HOLE AUXILIARY TO D AND E.
H – CLEARANCE HOLES TO PERMIT FRAMES TO BE BOLTED TO BASE.
I – CLEARANCE HOLES FOR SHOCK MOUNTS TO BE BOLTED TO FRAME.
J – CLEARANCE HOLES TO PERMIT TRANSFORMER TO BE BOLTED TO FRAME.
K – ACCESS HOLE FOR CONNECTIONS BETWEEN UNBALANCED OUTPUT CONNECTOR (OR OUTPUT CIRCUIT OF TRANSMITTER) TO 70-OHM ANTENNA.
L – FRONT AND REAR DOOR SWINGS ARE IDENTICAL.
M – FOR APPROXIMATE LOCATION ON THIS DRAWING USE 3/32 = 1 INCH.

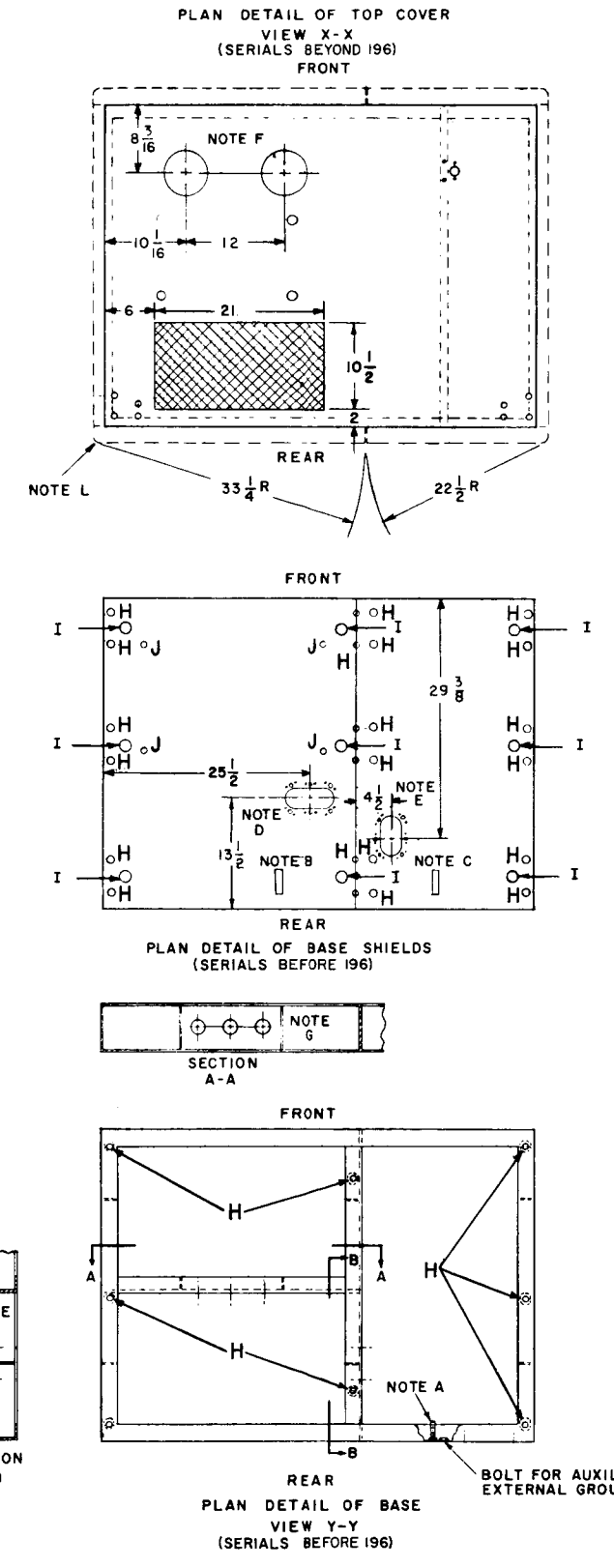


Figure I-2-2. Installation Diagram, GPT-10K
(Sheet 2 of 5)

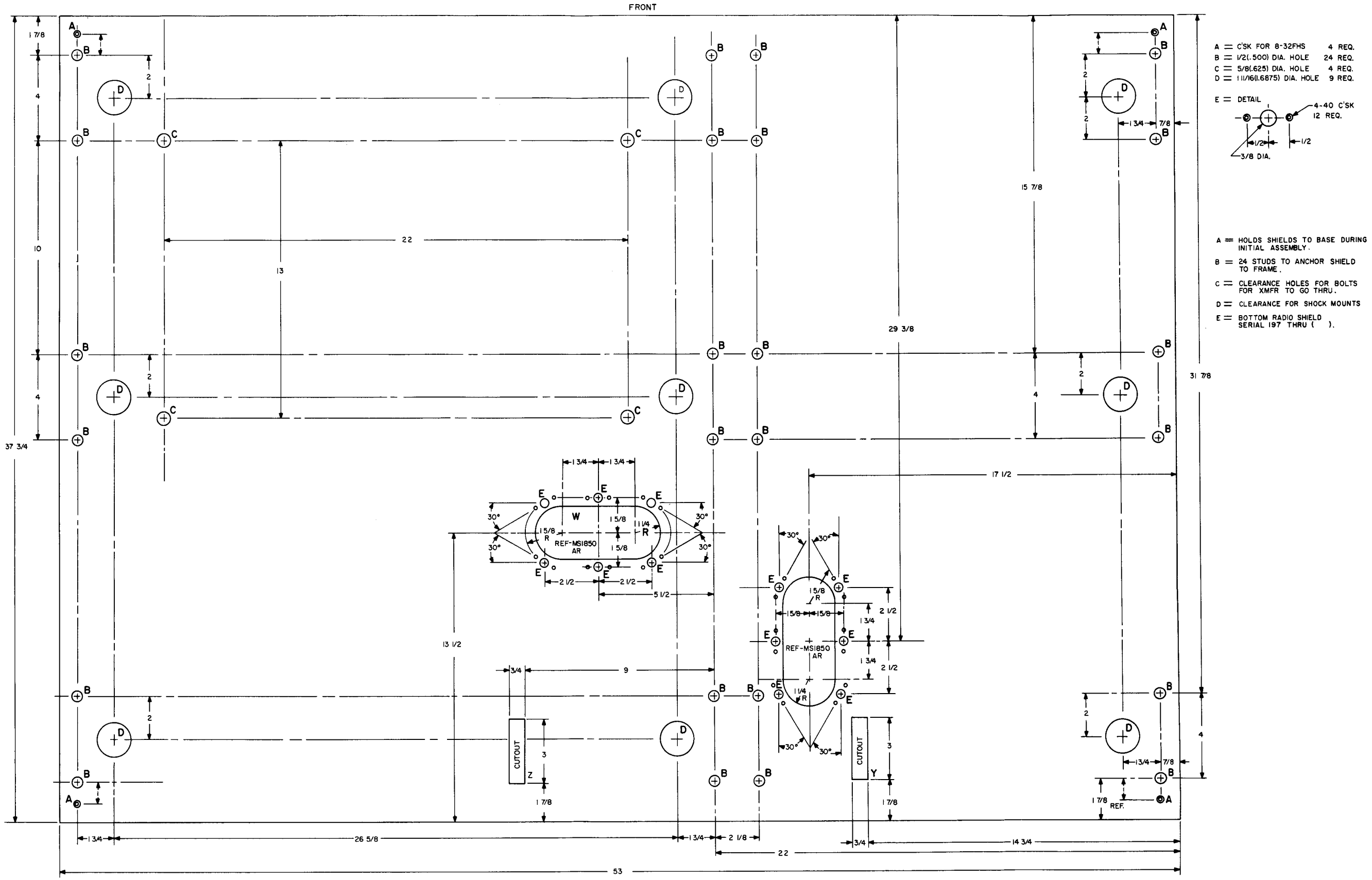
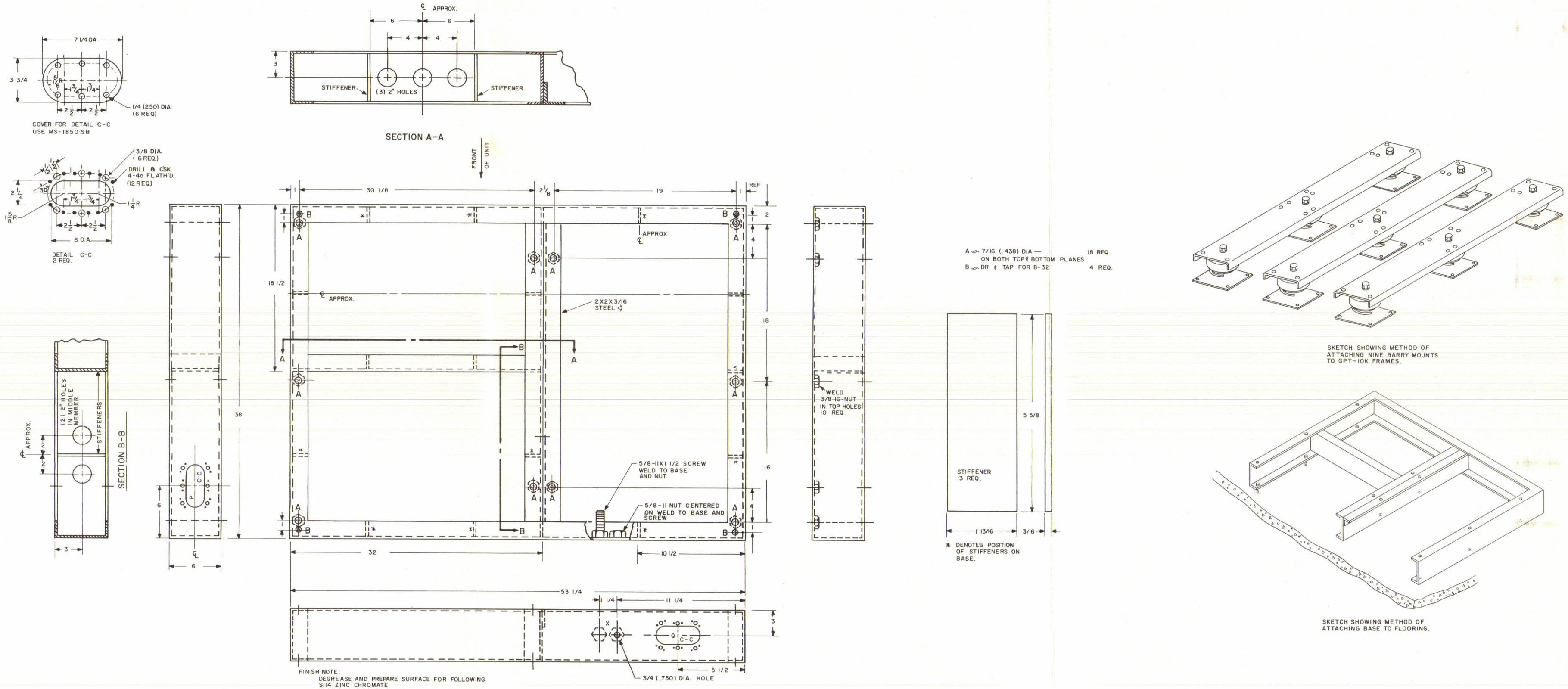


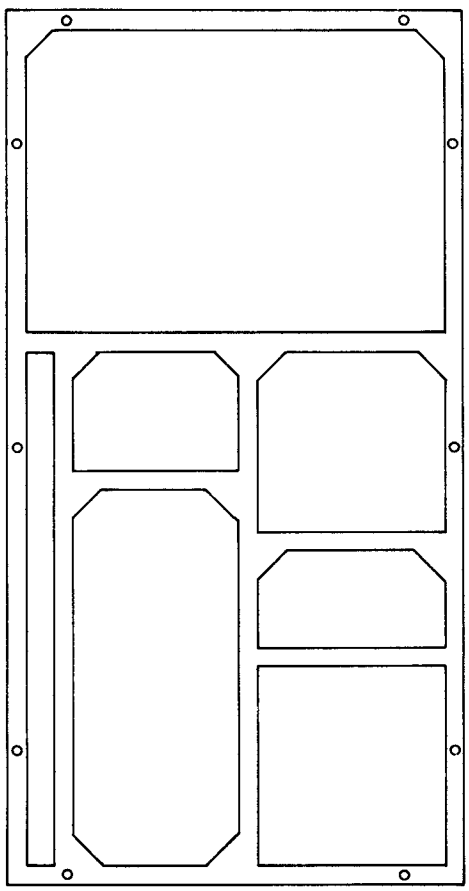
Figure I-2-2. Installation Diagram, GPT-10K (Sheet 3 of 5)



SKETCH SHOWING METHOD OF ATTACHING NINE BARRY MOUNTS TO GPT-10K FRAMES.

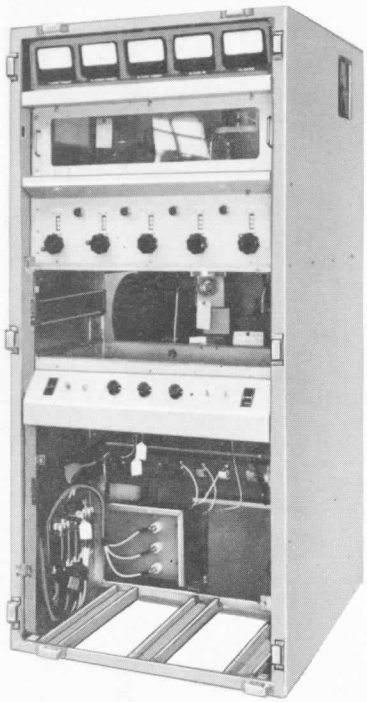
SKETCH SHOWING METHOD OF ATTACHING BASE TO FLOORING.

Figure I-2-2. Installation Diagram, GPT-10K (Sheet 4 of 5)

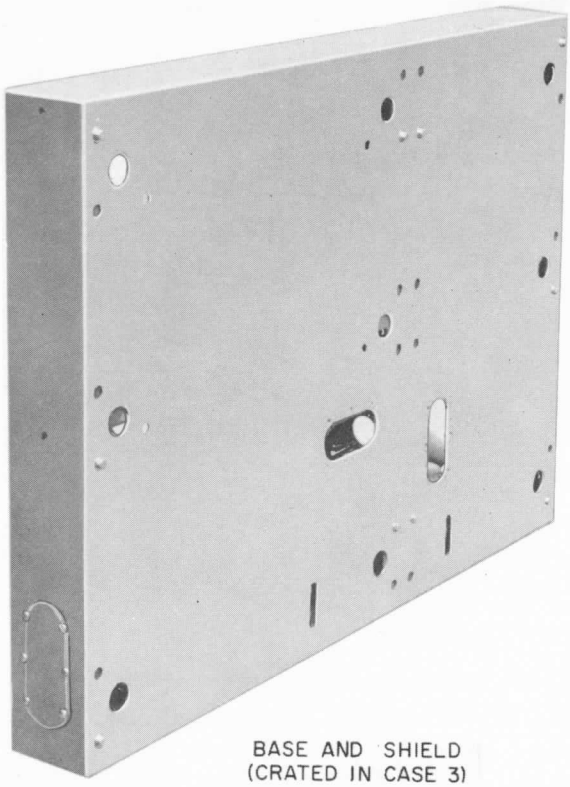


NOTE:
REFER TO STEP 6 OF
PARAGRAPH 2-4
ASSEMBLY OF GPT-10K

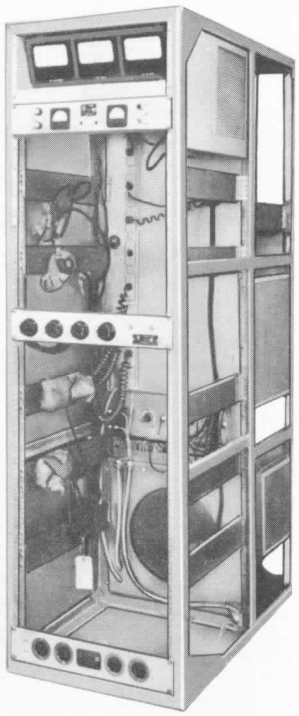
Figure I-2-2. Installation Diagram, GPT-10K (Sheet 5 of 5)



MAIN FRAME–FULLY
ASSEMBLED FOR SHIPPING
(CRATED IN CASE 1)



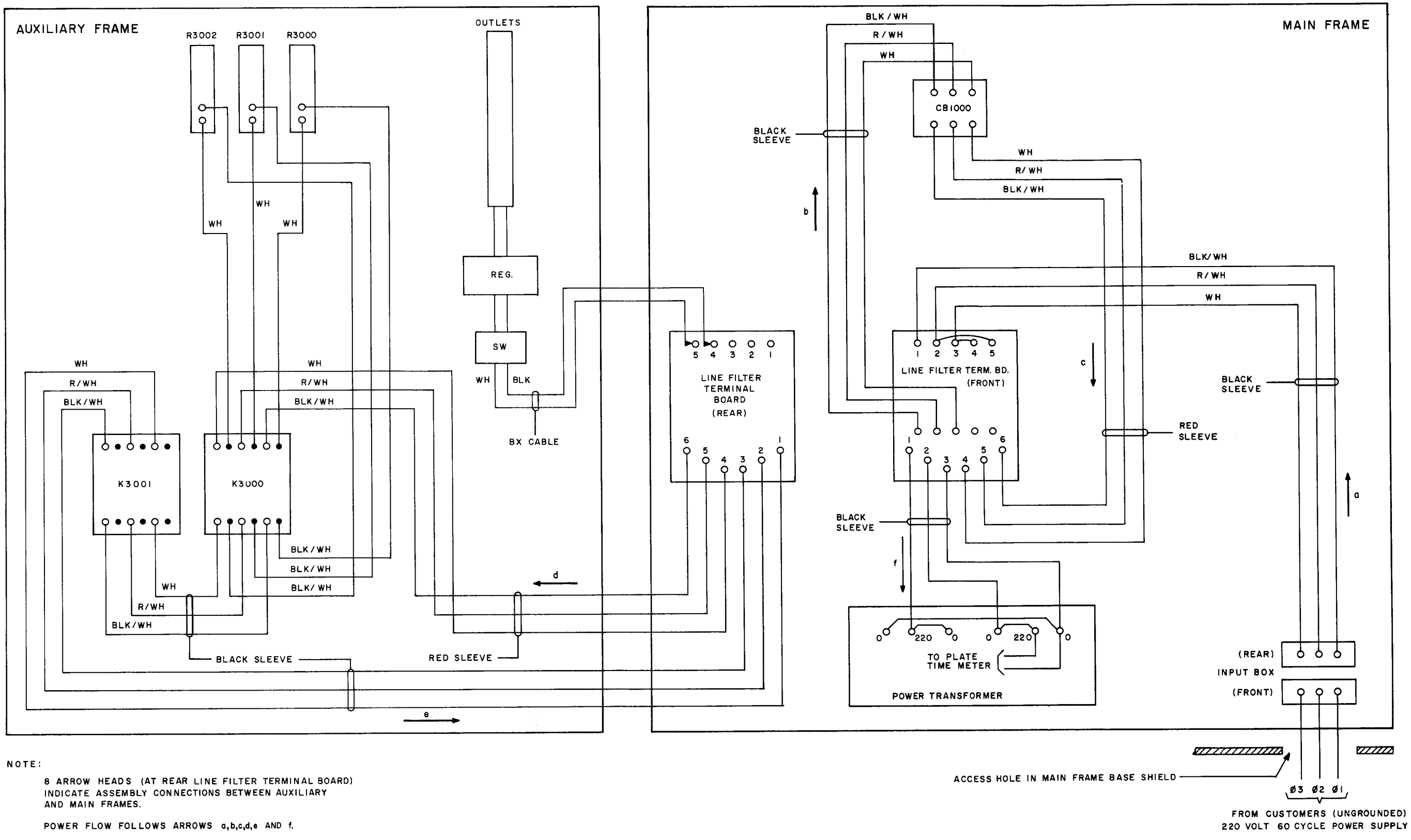
BASE AND SHIELD
(CRATED IN CASE 3)



AUXILIARY FRAME–FULLY
ASSEMBLED FOR SHIPPING
(CRATED IN CASE 2)

DOORS, SIDE PANEL STRIPS
AND TRIM STRIPS
(CRATED IN CASE 4)

Figure I-2-3. Assembly Details of Main and
Auxiliary Frame Chassis Preliminary to Shipment



NOTE:

8 ARROW HEADS (AT REAR LINE FILTER TERMINAL BOARD) INDICATE ASSEMBLY CONNECTIONS BETWEEN AUXILIARY AND MAIN FRAMES.

POWER FLOW FOLLOWS ARROWS a,b,c,d,e AND f.

Figure I-2-4. Wiring Diagram, GPT-10K's Power Circuit from Input Box to Main Power Transformer

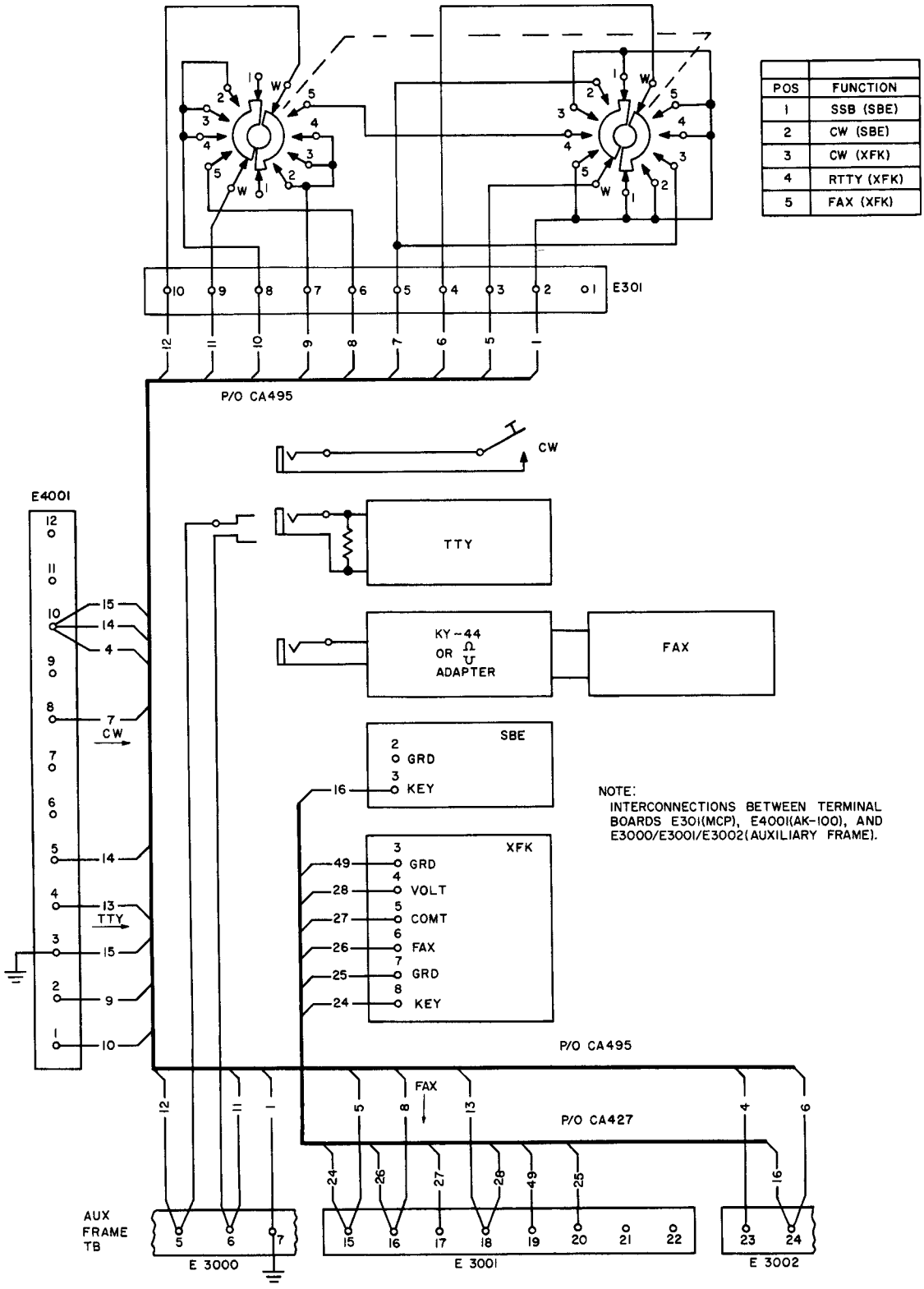


Figure I-2-5. Partial Wiring Diagram, Auxiliary Frame Chassis for Non-Synthesized GPT-10K (Sheet 1 of 4)

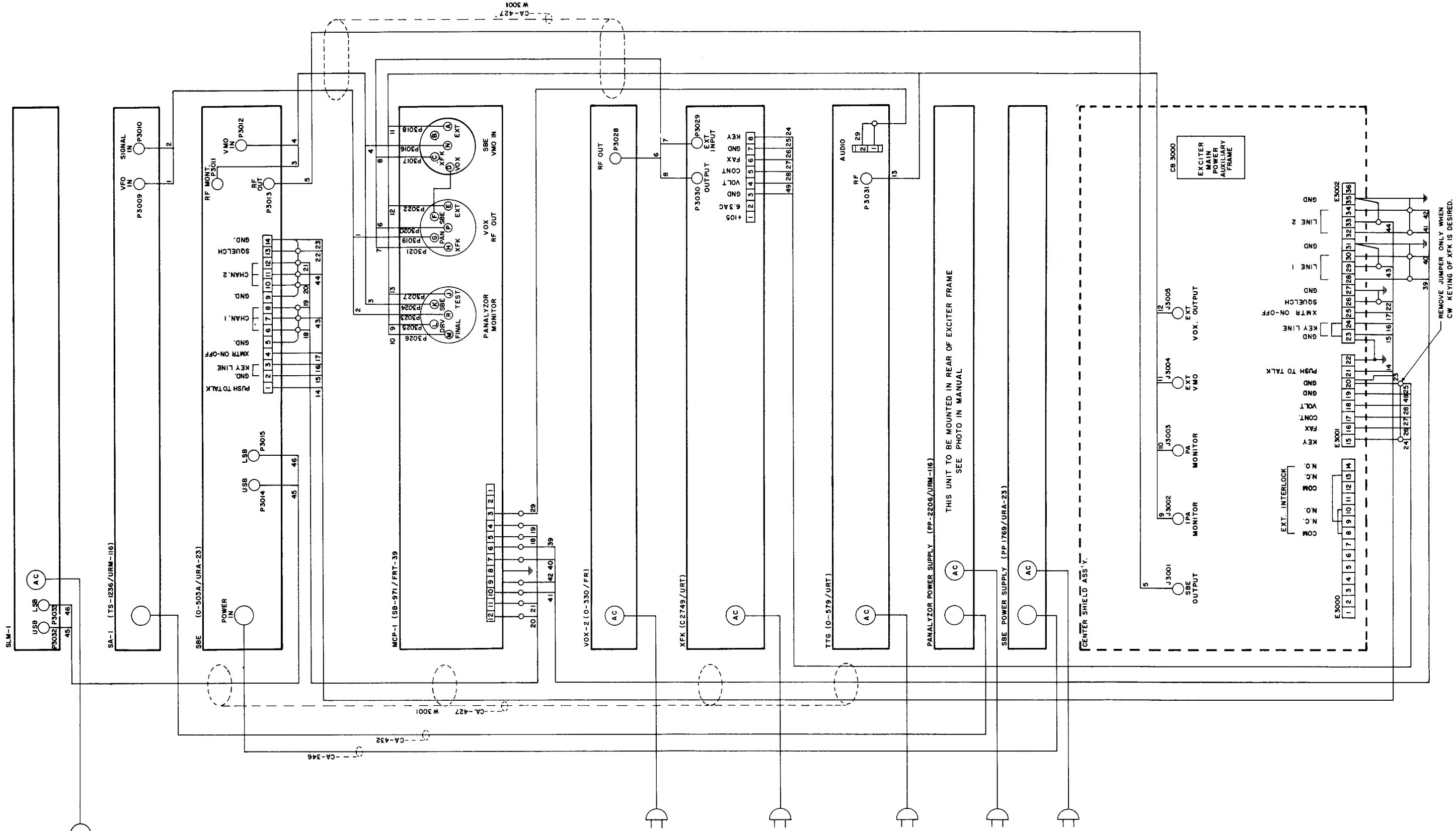


Figure I-2-5. Wiring Diagram, Auxiliary Frame Chassis for Non-Synthesized GPT-10K Equipped with MCP-1 unit (Sheet 2 of 4)

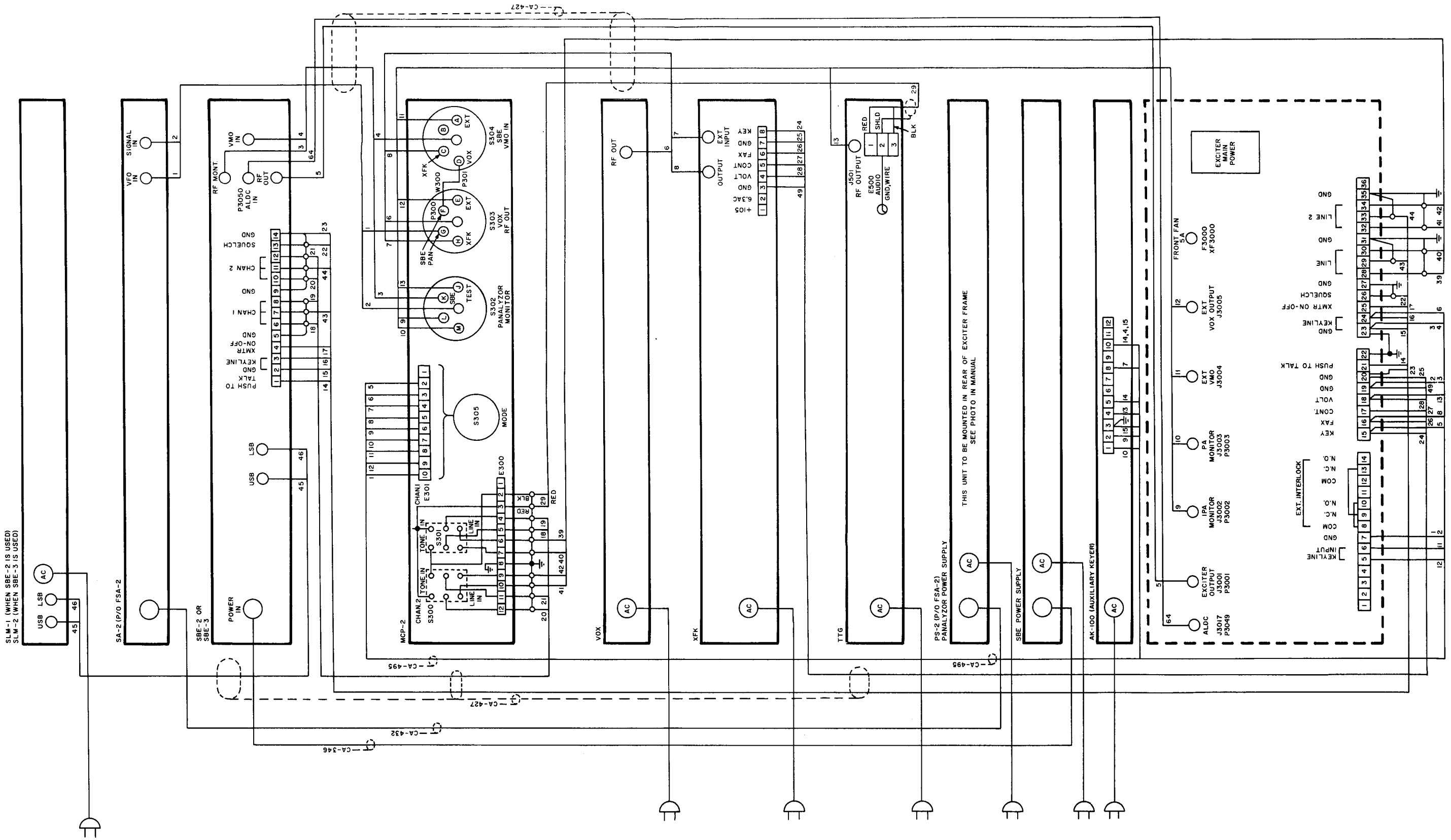


Figure I-2-5. Wiring Diagram, Auxiliary Frame Chassis for Non-Synthesized GPT-10K Equipped with MCP-2 unit (Sheet 3 of 4)

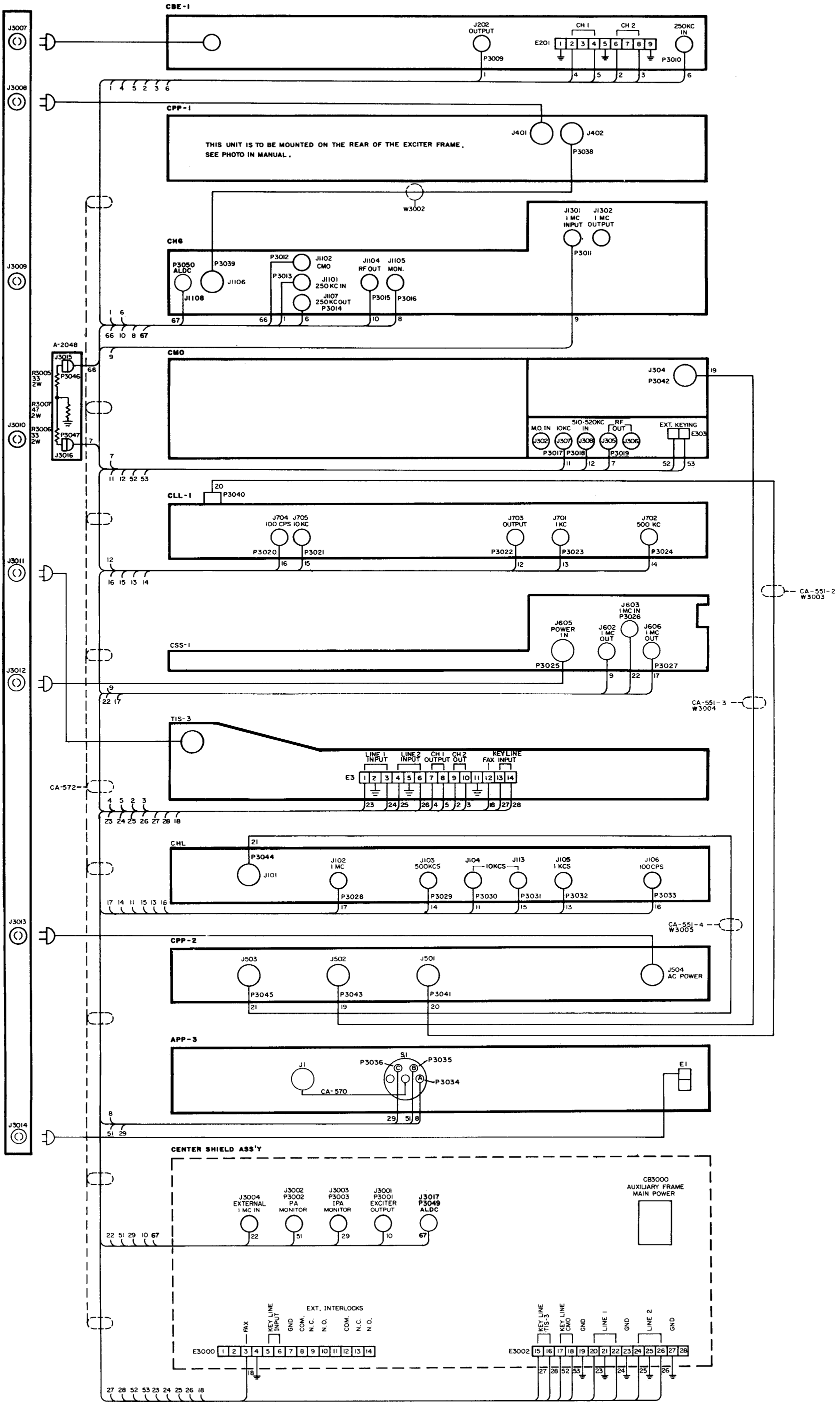
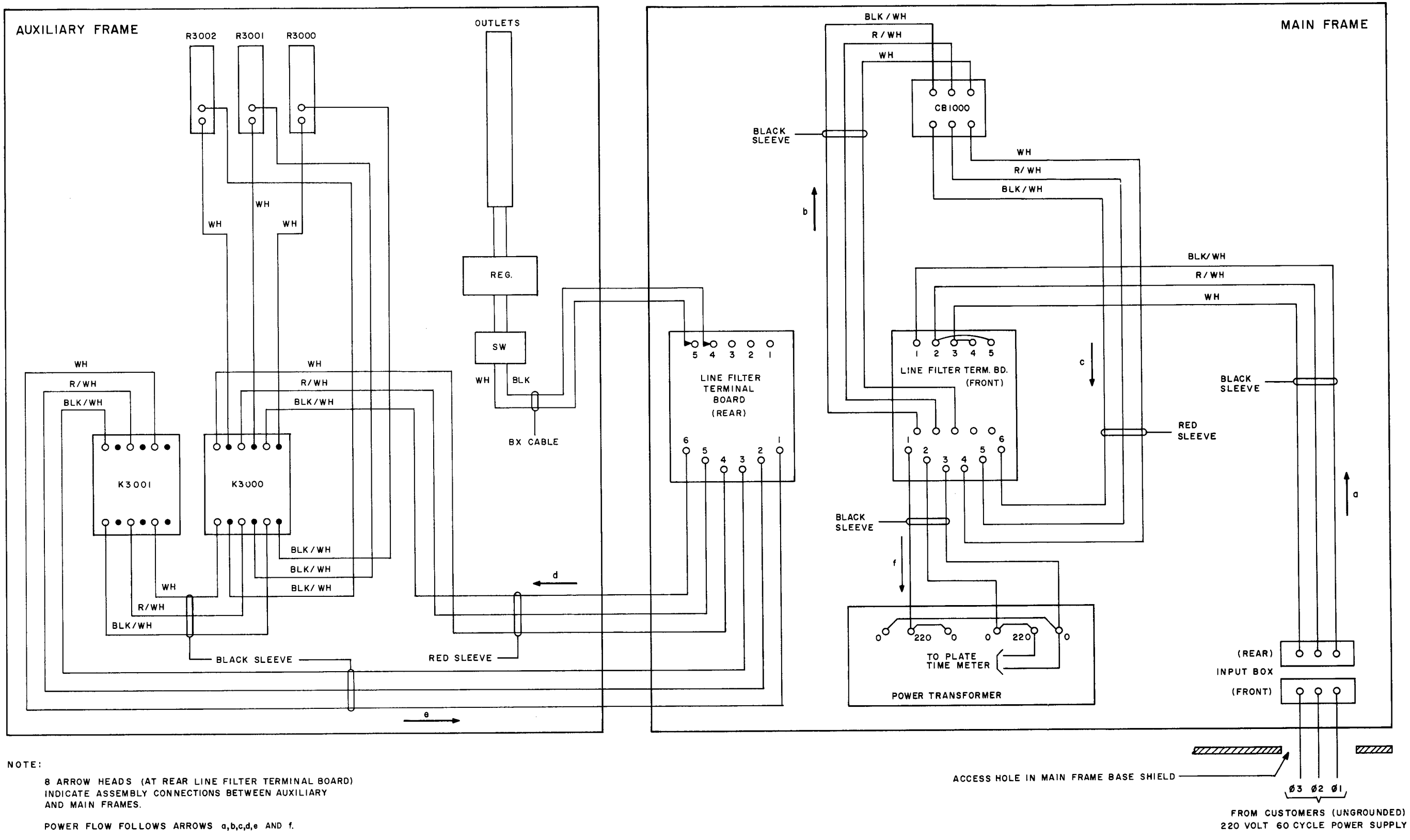


Figure I-2-5. Wiring Diagram, Auxiliary Frame Chassis for Synthesized GPT-10K (Sheet 4 of 4)



NOTE:

8 ARROW HEADS (AT REAR LINE FILTER TERMINAL BOARD) INDICATE ASSEMBLY CONNECTIONS BETWEEN AUXILIARY AND MAIN FRAMES.

POWER FLOW FOLLOWS ARROWS a,b,c,d,e AND f.

Figure I-2-4. Wiring Diagram, GPT-10K's Power Circuit from Input Box to Main Power Transformer

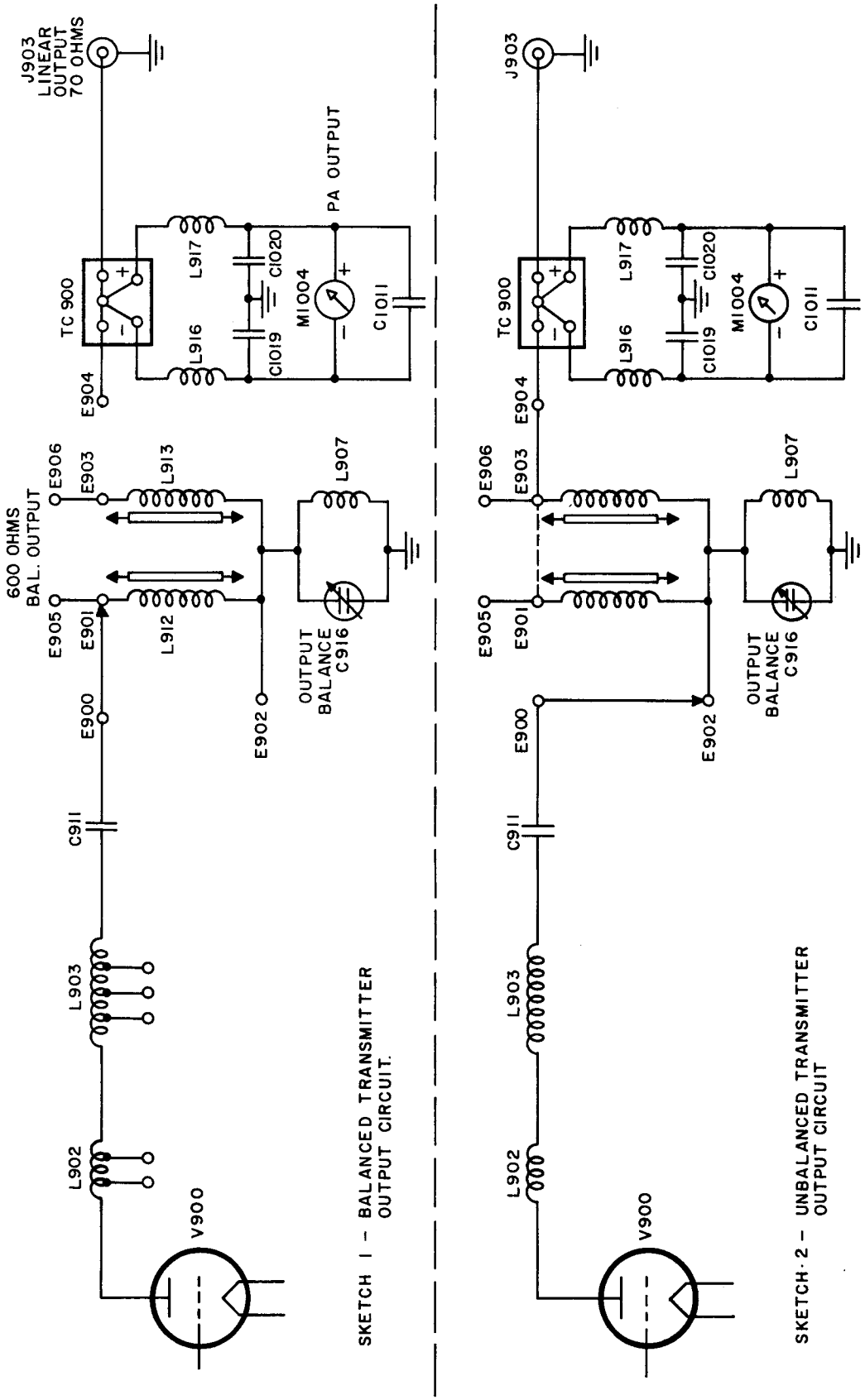
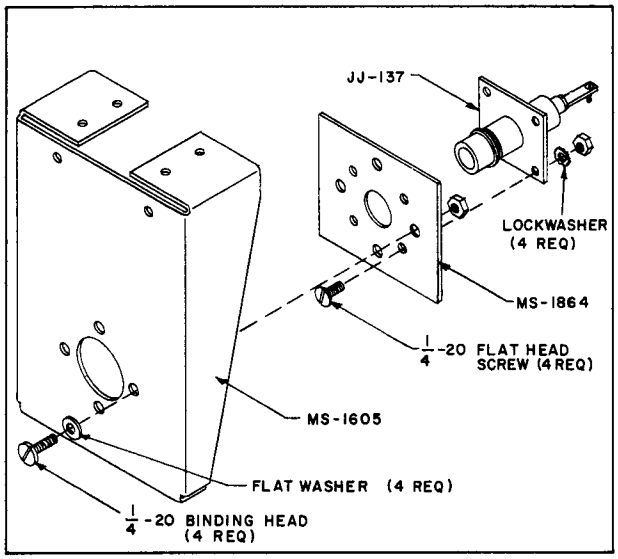
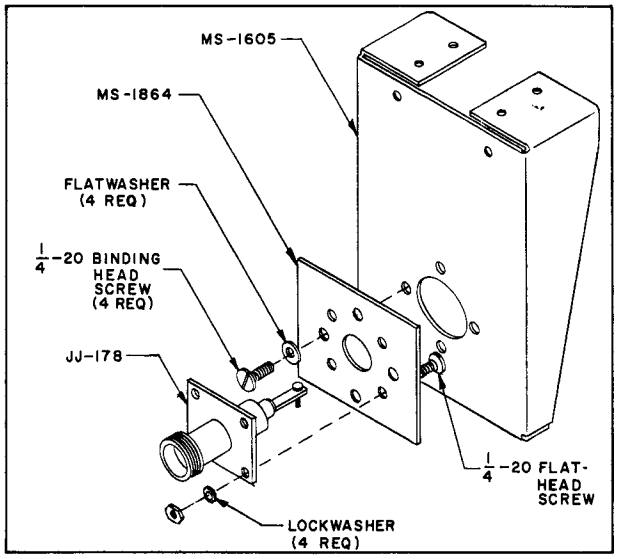


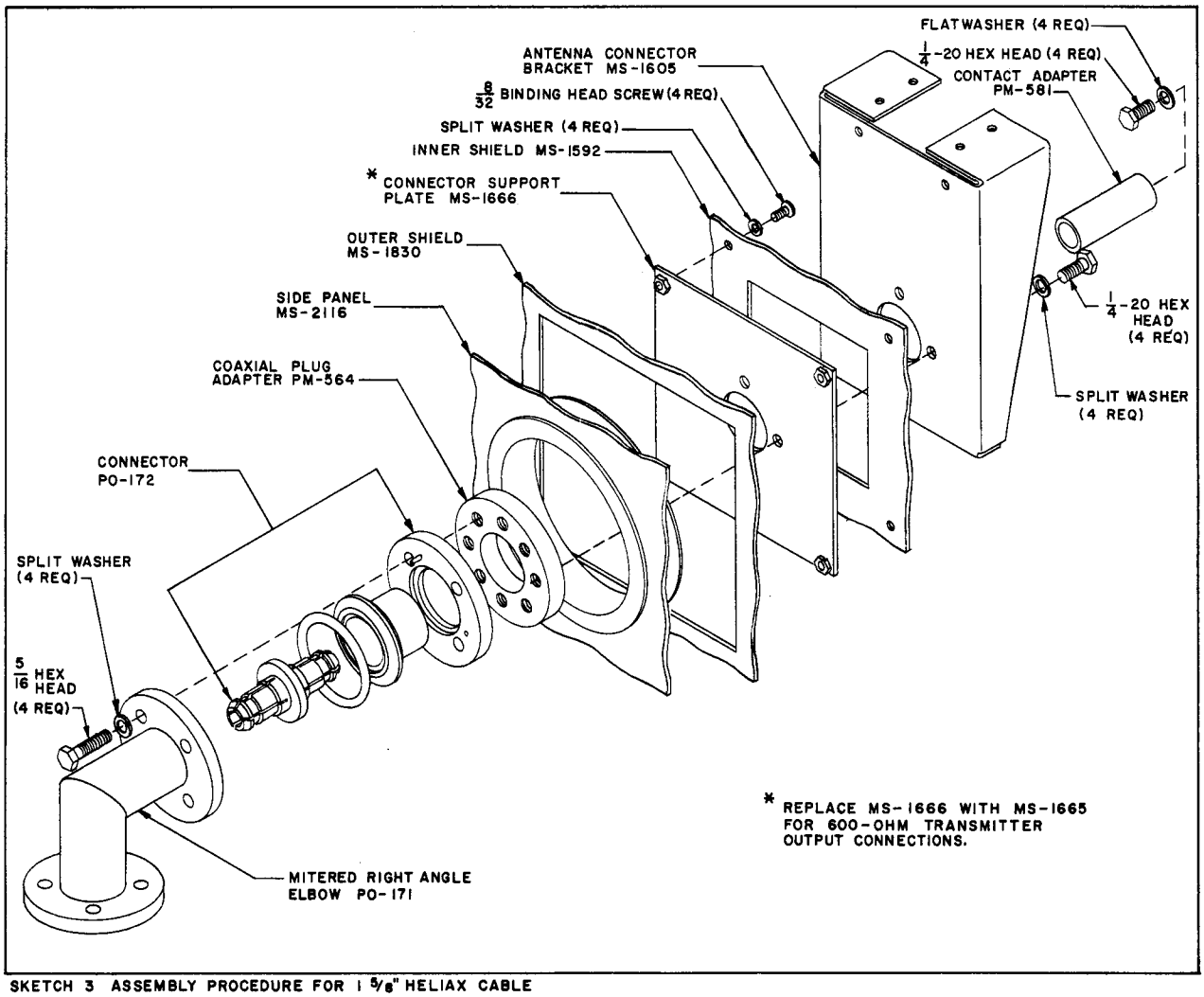
Figure 1-2-6. Simplified Diagram Showing Circuit Difference between Balanced (600 Ohms) and Unbalanced (70 Ohms) Output Circuits



SKETCH 1 ASSEMBLY PROCEDURE FOR QDL FEED THRU RECEPTACLE CONNECTOR, MODEL JJ-137



SKETCH 2 ASSEMBLY PROCEDURE FOR LARGE LC FEED THRU RECEPTACLE CONNECTOR, MODEL JJ-178



SKETCH 3 ASSEMBLY PROCEDURE FOR 1 5/8" HELIAX CABLE

Figure I-2-7. Assembly Procedure for Installing 70-Ohm Transmitter Output Connections

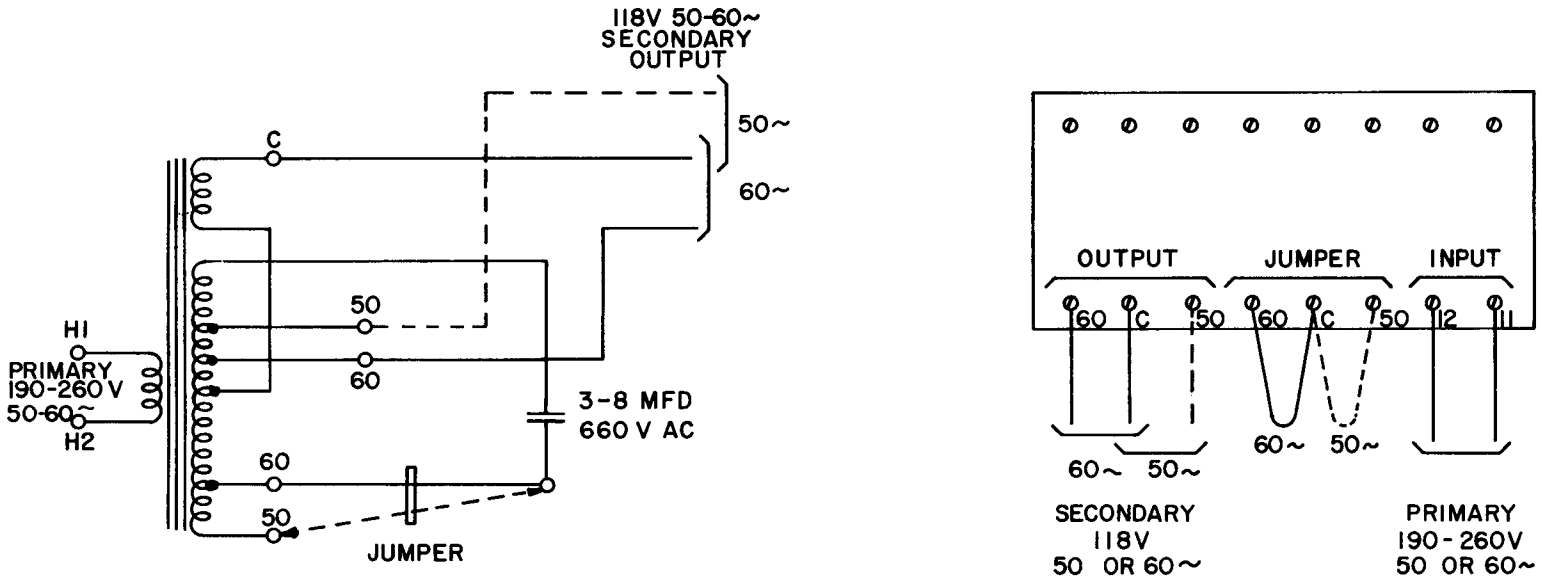


Figure I-2-8. Diagrams Showing 60-Cycle and 50-Cycle Connections of Sola Constant Circuit Transformer (Auxiliary Frame Chassis)

SECTION 3
OPERATOR'S SECTION

3-1. GENERAL.

a. This section assumes that all units are in proper working condition and are capable of performing their normal functions.

b. Appraisal of tuning/loading operations in the GPT-10K may be made without difficulty (a) in the non-synthesized GPT-10K by means of the built-in test equipment located on the auxiliary frame chassis together with meters and/or indicators located on the many GPT-10K panels and (b) in the synthesized GPT-10K by means of TMC's portable test equipment (Model PTE) together with meters and/or indicators located on the many GPT-10K panels. By locating the GPT-10K's RF excitation and test equipment on the auxiliary frame chassis and/or a portable test assembly and the remaining units on the main frame chassis, it is practical to simplify operating procedure as follows:

(1) Present detailed operating procedures of GPT-10K units on the main frame chassis in this section.

(2) Present detailed operating procedures of GPT-10K units on the auxiliary frame chassis and/or portable test assembly in Volume II of the manual.

(3) Where desirable, in order to coordinate the operations between the two chassis, present abridged operating directives of GPT-10K units on the auxiliary frame chassis and/or portable test assembly in this section.

c. The arrangement described in the preceding paragraph is practicable because the more important GPT-10K controls are all located on the main frame chassis and the controls on the auxiliary frame chassis and/or portable test assembly merely control RF excitation or the operation of test equipment. The amount of simplification obtained by dealing only with the controls on the main frame chassis and assuming proper operation of the secondary controls on the auxiliary frame chassis and/or portable test assembly may be better understood (a) in the non-synthesized GPT-10K by referring to figure 3-1(A, B), which is a composite diagram of all operating controls on the GPT-10K and (b) in the synthesized GPT-10K by referring to figure 3-1(C) which shows all operating controls on the synthesized GPT-10K's auxiliary frame chassis. Omitting fuses, operating controls of GPT-10K units on the auxiliary frame chassis total approximately 100; controls on the main frame chassis total approximately 55.

d. In any given case of GPT-10K tuneup, the method used by an operator depends, among other things, upon the experience of the operator and upon the existence of tuning charts applicable to the GPT-10K and its associated antenna. These charts show the approximate position of each tuning/loading control at the desired RF signal frequency.

CAUTION

It is highly important to tune up a high-powered GPT-10K on a careful, precise, step-by-step basis. Furthermore, to avoid damage to the GPT-10K, it is important to operate it within rated loads. Operating the GPT-10K beyond its rated capacities is not recommended because it is hazardous to the equipment and may cause excessive distortion. It is good operating practice to allow a GPT-10K at least a 1/4-hour warm-up period. A longer period (1/2 to 1 hour) is recommended to vaporize the mercury in the T1-104, in cases where the GPT-10K has been idle for a long period of time, especially after shipment.

e. The GPT-10K is equipped with screen overload relays, plate overload relays, circuit breakers, and the TUNE/OPERATE switch in order to provide a high degree of protection to the GPT-10K during tuneup. The latter permits tuning the IPA and the PA plate tank circuits on half (TUNE position) or full (OPERATE position) screen voltage. Loading these stages, however, is done with the switch in OPERATE. The heavy duty vacuum tubes in these stages receive maximum protection by tuning the IPA and PA plate tank circuits with the TUNE/OPERATE switch in the TUNE position and then loading/retuning the circuits with the TUNE/OPERATE switch in OPERATE. Tuning and loading a GPT-10K with the TUNE/OPERATE switch in the OPERATE position only is reserved solely for the skilled operator using a GPT-10K and its associated antenna for which there is an accurate tuning chart.

f. The operating procedures presented in this section are arranged as follows:

Paragraph	Subject
3-2	Preliminary Considerations: Auxiliary Equipment
3-3	Transmitter Tuning/Loading On Carrier
3-4	Single Sideband Suppressed Carrier Operation
3-5	Independent Sideband Suppressed Carrier Operation

3-2. PRELIMINARY CONSIDERATIONS: AUXILIARY EQUIPMENT.

a. As stated in preceding paragraphs 1-2 and 3-1, detailed operating procedures of the GPT-10K units located on the auxiliary frame chassis are given in Section 3 of Volume II of this manual. However, in order to see how they are used in conjunction with the units located on the main frame chassis, an abridged statement of their purpose and functions in GPT-10K operation is presented below.

NON-SYNTHESIZED GPT-10K

b. The VOX has three primary purposes in the GPT-10K setup:

(1) As the VMO in the SBE when crystals are unavailable or otherwise not desired.

(2) As an external heterodyning oscillator to place RF test signals on the screen of the FSA.

(3) As a medium frequency (2 to 4 mc) to the XFK when using frequency shift keying.

Its output is fed to either the SBE, the FSA, or the XFK via selector switches on the MCP. In order to gain maximum flexibility in testing or operating GPT-10Ks, the VOX should be used as per items (2) and (3) and the SBE should use crystals for its VMO.

c. The TTG has two primary purposes in the GPT-10K setup:

(1) Its audio tones of 935 and 2805 cps provide a means of checking GPT-10K distortion.

(2) Its radio frequency tones of 1.999 and 2.001 mc provide a means of calibrating and checking distortion arising within the FSA. Its outputs are fed to the SBE and/or the FSA via switches on the MCP.

d. The SLM-2 and SLM-1 have two VTVMs that monitor the sideband levels at the 250-kc point in the SBE-3 and at the 17-kc point in the SBE-2, respectively. The primary purpose of the VTVMs is to guard against excessive distortion arising within the SBE's 250- or 17-kc balanced modulator units. The SBE has a db meter that monitors the sideband levels at the audio input point. This is done via the METER SW selector switch. It should be pointed out that the audio and 250- or 17-kc sideband levels differ slightly. The difference is of little practical importance and, to minimize confusion among operators, is zeroed by adjusting the SLM's potentiometers to make the SBE and SLM levels read alike.

e. The SBE-2 and SBE-3 may be arranged for the seven modes of operation listed in the tabulation given in preceding paragraph 3-1f. In single sideband operation, the exciter is the relatively low powered highly stable precision device that produces the required modulated RF signal of desired frequency. The primary function of the following linear and power amplifier stages, including the antenna tuning section, is merely to amplify this signal with minimum distortion and with rated output power. This is accomplished by a combination of optimum tuning and loading of all GPT-10K sections, including the antenna tuning section.

f. The principal purpose of the FSA in GPT-10K operation is to check that the GPT-10K's distortion on the TTG test is within limits. After GPT-10K's tuneup and loading, the FSA's CRT is viewed to determine the amount of distortion.

SYNTHESIZED GPT-10K

g. The counterpart of the SBE in the synthesized GPT-10K is the CBE and its associated frequency-translation units. The statements contained in preceding paragraph e are as appropriate to the CBE and its associated units as to the SBE.

h. The counterpart of the FSA (with its associated VOX and TTG) in the synthesized GPT-10K is TMC's portable test equipment model PTE-3 which consists of the FSA, VOX, and TTG.

3-3. TRANSMITTER TUNING/LOADING ON CARRIER.

a. GENERAL. - Regardless of the mode of operation desired of the GPT-10K, it is recommended that the units located in the main frame chassis be initially tuned and loaded on carrier. Afterwards, the initial adjustments may be refined, according to the mode of operation desired, in order to meet rated power output and distortion requirements.

NON-SYNTHESIZED GPT-10K

The SBE is now arranged for GPT-10K tuning/loading on carrier. If details are required, refer to Section 3 of Volume II of this manual. Otherwise, proceed as follows:

(1) Turn the LSB/USB switches to OFF.

(2) Turn the MF XTAL SW to the correct MF crystal.

(3) Turn the BAND MCS switch for the correct output frequency on its dial scale.

(4) Turn the CARRIER INSERT control fully clockwise; turn METER SW to MF.

(5) Turn the OUTPUT TUNING switch as follows:

(a) Black knob (coarse setting) for proper band.

(b) Large disc (vernier setting) for a setting slightly below the desired output frequency.

(6) Turn the MF TUNING knob to maximize the SBE's meter reading (METER SW switch to MF). Decrease the CARRIER INSERT as necessary to avoid an off-scale reading. The indication on the single-scale dial above the OUTPUT TUNING knob should agree with the frequency of the MF crystal.

(7) Turn the METER SW to RF.

(8) Now turn the OUTPUT TUNING vernier switch slightly to peak the indication on the SBE's meter.

NOTE

Several peaks, due to modulation products, are possible. The correct (lower sideband) peak is the first one encountered as the vernier switch is slightly advanced.

(9) Operation of the OUTPUT knob will control the magnitude of the RF output. The SBE is now tuned. Turn the OUTPUT knob fully counterclockwise until the SBE's RF excitation is needed for GPT-10K tuneup.

For example, for an RF output of 11 mc, an SBE-3's MF XTAL SW should select a (2.000 x 7 - 11.000+ 0.250 or) 3.250-mc crystal. The BAND MCS switch should be turned to position 7. The OUTPUT TUNING knob is turned to the 8-16MC position (coarse setting) and its vernier is turned to a dial reading slightly below the desired 11-mc output frequency. With METER SW in the MF position, perform (6) above. With the METER SW in the RF position, perform (8) and (9) above.

NOTE

In the GPT-10K tuneup procedure that follows, in order to decrease the sensitivity of the OUTPUT knob, the carrier insertion may be decreased.

SYNTHESIZED GPT-10K

The CBE is now arranged for GPT-10K tuning/loading on carrier. If details are required, refer to Section 3, Operator's Section, of Technical Manual for Sideband Generator SBG-1 or SBG-2.

b. TUNING/LOADING THE IPA AND PA. - In the tabulation that follows, the panel serial designations are explained in table 3-1. Two tuning charts, one for balanced and one for unbalanced output operation, are presented in the tuning chart tables, 3-2 and 3-3, respectively.

Step	Panel Serial Desig.	Operation	Purpose
1	15, 16, 17, 18, 19, 23, 24, 25, 26, 27, 28, 30	Set these 12 tuning devices as per tuning chart to the desired RF output frequency.	To tune first amplifier, second amplifier, IPA, and PA approximately for desired RF output frequency.
2	40, 41	Set PA SCREEN ON/OFF switch (40) and HIGH VOLTAGE circuit breaker (41) to OFF.	To make PA inoperative.
3	37, 39	Set TUNE/OPERATE switch to TUNE and ALDC switch to OFF.	To prepare for step 13.
4		Ensure that GPT-10K is connected to an antenna or a dummy load.	To prepare for step 19.
5	32, 6	Set MAIN POWER circuit breaker (32) to ON. Check that AC POWER indicator (6) goes on.	To energize linear amplifiers.
6	22	Turn MULTIMETER switch to RF 1ST AMPL X1.	To measure plate RF voltage.
7	20, 24	Turn the SBE OUTPUT switch (97) or CBE's CARRIER LEVEL switch (59) clockwise as necessary to tune 1ST AMPL plate tank circuit to resonance.	To maximize indication on MULTIMETER (20). (If off scale, reduce exciter's output.)
8	22	Turn MULTIMETER switch to RF IPA EG X1.	To measure grid RF voltage.
9	20, 23	Tune to resonance.	To maximize indication on MULTIMETER (20). (If off scale, reduce exciter's output.)

Step	Panel Serial Desig.	Operation	Purpose
10		Turn the SBE OUTPUT switch (97) or CBE's CARRIER LEVEL switch (59) fully counterclockwise.	To prepare for steps 11 and 12.
11	33	Depress OVERLOAD RESET push-button (33) to place the relays in the relay panel in RESET.	The timer should, by now, have operated to close the interlock circuit.
12a	34, 35, 41	Check that HIGH VOLTAGE circuit breaker (41) is in OFF. Turn INTERLOCK switch (35) to NORMAL. INDICATOR (34) should go on if all interlock circuits are closed.	To check condition of the interlock circuits.
12b	34, 35, 41	If INDICATOR (34) does not go on, turn the INTERLOCK switch counterclockwise to the last position in which the lamp is not on.	To locate position of the switch which causes the interlock circuit to be open.
12c	34, 35, 41	Close the switch which causes the interlock circuit to open. Repeat operations 12a and 12b until INDICATOR (34) goes on when INTERLOCK switch is turned to NORMAL.	To check normalcy of the interlock circuits. The GPT-10K is now ready for high voltage power supply.
13	41, 9	With the PA SCREEN (40) in the OFF position and the TUNE/OPERATE switch (39) in the TUNE position, turn the GPT-10K HIGH VOLTAGE circuit breaker (41) to ON. The PLATE ON indicator (9) and the indicator on the top of the GPT-10K should go on dimly at first but full brightness a second or two later.	The IPA and PA amplifiers now receive full plate voltage, and the IPA amplifier receives half screen voltage (200).
14	21	Turn the SBE OUTPUT switch (97) or CBE's CARRIER LEVEL switch (59) clockwise until some increase is observed on the IPA PLATE CURRENT ammeter (21).	To prepare for step 15.
15	28, 21	Tune the IPA plate tank to resonance by turning IPA TUNING control (28).	To obtain dip on the IPA PLATE CURRENT ammeter (21) indication.
16		Turn the SBE OUTPUT switch (97) counterclockwise.	To prepare for step 18.
17	40	Set PA SCREEN switch (40) to ON.	To prepare for step 19.

NOTE

Note that transitory effects will operate the PA screen overload relay unless switches 39 (TUNE/OPERATE), 40 (PA SCREEN ON/OFF) and 41 (HIGH VOLTAGE) are thrown in proper sequence. For example: (1) With HIGH VOLTAGE circuit breaker in ON and the PA SCREEN switch in OFF, the TUNE/OPERATE switch may be placed in either position. (2) With HIGH VOLTAGE circuit breaker in ON and TUNE/OPERATE switch in TUNE, PA SCREEN switch may be placed in ON. (3) With HIGH VOLTAGE circuit breaker in ON and TUNE/OPERATE switch in OPERATE, PA SCREEN switch should not be thrown to ON. To place PA SCREEN switch in ON, throw switches 39, 40, and 41 in the following sequence: HIGH VOLTAGE circuit breaker (41) to ON, TUNE/OPERATE switch (39) to TUNE, PA SCREEN switch (40) to ON, TUNE/OPERATE switch (39) to OPERATE.

Step	Panel Serial Desig.	Operation	Purpose
18	3	Turn the SBE OUTPUT switch (97) or CBE's CARRIER LEVEL switch (59) clockwise until an increase is observed in the PA PLATE CURRENT meter.	To prepare for step 19.
19	3, 15	Tune the PA plate tank to resonance by turning the PA TUNE knob (15).	To obtain a dip on the PA PLATE CURRENT meter (3) indication.
20		Turn the SBE OUTPUT switch (97) or CBE's CARRIER LEVEL switch (59) fully counterclockwise.	To prepare for loading and retuning the GPT-10K.

NOTE

The tuneup with the TUNE/OPERATE switch in the TUNE position and the tuneup with this switch in the OPERATE position will differ slightly because the plate tank circuit impedances vary somewhat with screen voltages. At this point, the GPT-10K's tuning controls are closely positioned but the loading controls may require appreciable adjustment. Loading requires that (1) TUNE/OPERATE switch (39) be in OPERATE, (2) a retuning of the IPA and PA because of item (1), and (3) a careful step-by-step adjustment of the loading controls simultaneously which meet the limits specified below:

Quantity	Limits
SBE or CBE OUTPUT	The SBE or CBE has more than sufficient drive to properly tune/load the GPT-10K. Keep the RF output low enough to satisfy the following limits.
PA PLATE DC	0.5 to 1.0 amp. (start of loading operation). 1.5 to 1.75 amp. (end of loading operation).
PA SCREEN DC	25 to 35 mils.
IPA PLATE DC	300 to 400 mils.
IPA GRID RF	40 to 50 volts.
PA PLATE RF	5 kv
ALDC	Should be off on tuning/loading on carrier. Should be on when GPT-10K is operating on voice inputs since on sustained peaks GPT-10K operation benefits by ALDC in the on position.

Step	Panel Serial Desig.	Operation	Purpose
21	39, 40, 41	Check that HIGH VOLTAGE circuit breaker (41) is ON, PA SCREEN switch (40) is ON, and set TUNE/OPERATE switch (39) to OPERATE.	The IPA tube is now energized with 400 (screen) and 3000 (plate) voltages. The PA tube is now energized with 1200 (screen) and 7500 (plate) voltages.
22		Repeat operations 6 and 7.	1st amplifier is retuned.
23		Repeat operations 8 and 9.	2nd amplifier is retuned.
24		Repeat operation 15.	IPA is retuned.
25	27, 28, 30, 21 and SBE or CBE output	Load the IPA to approximately 275 ma on IPA PLATE CURRENT (21). Use IPA LOADING switch (27), IPA LOADING knob (30), and SBE or CBE output as necessary. Simultaneously maintain resonance in the plate tank circuit. (Refer to step 24.) This loading will subsequently be increased as the following RF circuits (step 26a) are tuned to load the antenna.	As IPA LOADING knob (30) is moved in small steps, IPA TUNING knob (28) is moved to dip the IPA PLATE CURRENT meter (21) indication. Hence, the IPA is gradually loaded concurrently with plate tank circuit resonance. Concurrently maintain the IPA grid RF within the limits specified above (40 to 50 volts).

Step	Panel Serial Desig.	Operation	Purpose
26a	3, 15, 16, 18, 19	The general objective of this step is to load the PA stage to obtain the desired power output, using PA LOAD knob (16), OUTPUT BAL knob (18), and OUTPUT LOADING knob (19) while concurrently maintaining resonance with PA TUNE control knob (15). Power output is indicated by PA output current (in either one of the two antenna meters on top of the GPT-10K), squared, times the output impedance (600 ohms) and is doubled for a PEP reading.	Step 26a assumes balanced GPT-10K operation. For more details see note below. In balanced GPT-10K operation, knobs 18 and 19 control the "L" section impedance, as explained in paragraph 4-4b.

NOTE

Step 26a is complex because of the mutual reactions of its controls, 15, 16, 18, and 19. Starting with controls 16, 18, and 19 momentarily fixed, control 15 may be adjusted to tune the PA tank circuit. (Refer to preceding step 19.) However, impedance mismatch between the tank, output circuit, and antenna will prevent the GPT-10K from loading. To improve this situation, PA LOAD knob (16) is turned slightly clockwise (to load GPT-10K). In loading a GPT-10K, it is preferable to have the GPT-10K slightly underloaded as this condition results in more positive meter responses. However, if the GPT-10K is slightly overloaded, turn control 16 slightly counterclockwise. At this point, the procedure is one of trial and error whereby tuning/loading are made, in short steps, consistent with improving meter responses. These operations will determine how to increase the RF current to the antenna as well as the PA PLATE RF voltage with reasonable SBE or CBE and IPA GRID RF drive, IPA plate DC mils, and PA plate/screen DC currents. Concurrently, this procedure will require retuning the IPA and the PA as well as some adjustment of the IPA LOADING before its effectiveness can be fully appraised. Now while maintaining all meters within limits, the SBE or CBE drive may be increased somewhat to ascertain what further tuning/loading operations are desirable. For example, if the PA screen current is relatively large compared with desirable values while the PA plate current is relatively small compared with desirable values, further PA loading may be desirable. If the PA screen current is negligible but the plate current is large, some PA unloading may be desirable. If the antenna currents are unbalanced, turn OUTPUT BAL knob (18) until the two antenna meters dip in opposite directions. This establishes an approximate setting for control 18. Now, move control 18 slightly, just enough to minimize the unbalance in the two antenna meter indications. During this operation, OUTPUT LOADING knob (19) need not be moved at all, provided it is in the following approximate positions (based on factory tests made with a dummy antenna).

Frequency	Approximate Setting
4 mc	Upper range
8 mc	Mid range
15 mc	Lower range
28 mc	Zero inductance

When the antenna currents are large enough to warrant, and have been adjusted for, their balance, tuning/loading reverts to minor adjustments of controls 15, 16, 28 and 30 in which reloading adjustments must be accompanied by retuning adjustments. The general objective is maximum output power to the antenna with minimum DC IPA and PA tube currents.

Step	Panel Serial Desig.	Operation	Purpose
26b	3, 5, 15, 16, 18, 19	The general objective of this step is to load the PA stage to obtain the desired power output, using PA LOAD knob (16), OUTPUT BAL knob (18) and OUTPUT LOADING knob (19) while concurrently maintaining resonances with PA TUNE control knob (15). Power output is indicated by PA OUTPUT meter (5), squared, times the output impedance (72 ohms).	Step 26b assumes unbalanced GPT-10K operation. For more details see note below. In unbalanced GPT-10K operation, knobs 18 and 19 control "L" section impedance as explained in paragraph 4-4b.

NOTE

Step 26a is complex because of the mutual reactions of its controls, 15, 16, 18, and 19. Starting with controls 16, 18, and 19 momentarily fixed, control 15 may be adjusted to tune the PA tank circuit. (Refer to preceding step 19.) However, impedance mismatch between the tank, output circuit, and antenna will prevent the GPT-10K from loading. This case differs from that of step 26a as follows: Approximate setting for OUTPUT LOADING (19); refer to preceding NOTE. Approximate setting for OUTPUT BAL (18); 375 at all frequencies. This leaves tuning/loading controls 15, 16, 28, and 30 to be adjusted in a manner comparable to the 600-ohm balanced antenna case.

Step	Panel Serial Desig.	Operation	Purpose
27a		Power output in kw equals the product of the current in one antenna meter (on top of GPT-10K), squared, and multiplied by 0.600 (600-ohm rhombic antenna). This means approximately 3 amp for 5 kw (average) or 10 kw (PEP).	Balanced operation of GPT-10K. An actual antenna at a given frequency may have a resistance value greater or less than 600 ohms.
27b		Power output in kw equals the current in PA OUTPUT meter (5), squared, and multiplied by 0.072 (72-ohm antenna). This means approximately 8 amp for 5 kw (average) or 10 kw (PEP).	Unbalanced operation of GPT-10K. An actual antenna at a given frequency may have a resistance value greater or less than 72 ohms.

During the entire tuning/loading procedure, check at all times that PA SCREEN CURRENT meter (2) indication never exceeds about 35 ma, PA PLATE CURRENT meter (3) indication never exceeds about 1.5 amp (approximately 0.75 amp at start of loading procedure), PA PLATE RF meter (4) indication never exceeds about 5 kv, IPA PLATE CURRENT meter (21) never exceeds about 400 ma (approximately 275 ma at start of loading procedure), and IPA SCREEN current is generally less than 15 ma. A careful tuneup under these limiting conditions plus the protective features of the GPT-10K as stated in paragraph 3-1 will provide the GPT-10K with necessary protection.

3-4. SINGLE SIDEBAND SUPPRESSED CARRIER OPERATION.

NON-SYNTHESIZED GPT-10K

a. GENERAL. - Arrange the SBE for GPT-10K tuning and loading for single sideband suppressed carrier operation. Arrange the TTG audio output for two tones. If details are required, refer to Section 3 of Volume II of this manual. Otherwise, proceed as follows:

(1) The GPT-10K has been tuned/loaded on carrier. (Refer to paragraph 3-3.) Reduce SBE's drive

pending need for resumption during tuning/loading adjustments to meet distortion requirements on SSB suppressed carrier GPT-10K emission.

(2) The CARRIER INSERT switch on the SBE's panel is in position 0. Subsequently, the switch may be turned to meet requirements for either the -10 db or -20 db insertion generally used in practice to facilitate receiver operation.

(3) The POWER switch on the TTG is in the ON position.

(4) The TTG RF TONE SELECTOR switch is in the TWO TONE position and the AUDIO OUTPUT control is in mid position.

(5) The toggle switch CHANNEL 1 (or CHANNEL 2) on the MCP is in the TONE INPUT position. Check, also, that the MCP's SBE VMO INPUT switch is turned to OFF.

(6) The LSB (or USB) selector switch on the SBE's panel is in the CH1 (or CH2) position. Turn the METER SW to LSB (or USB) and adjust the two tone input to -6 db on the SBE's db meter; use GAIN control on SBE and/or AUDIO OUTPUT control on TTG as necessary to obtain this level.

(7) The SBE's METER SW is returned to the RF position and the RF output as indicated on the SBE's db meter is raised to meet rated GPT-10K output and about 300 to 350 ma of IPA plate current drive.

In single sideband suppressed carrier operation, the sideband frequencies differ from the carrier frequency by the heterodyning audio frequencies. This should not affect carrier tuning/loading appreciably.

b. OPERATION OF FSA. - Arrange the FSA for reception of PA output signals and the VOX to supply proper injection frequency to the FSA. If details are required, refer to Section 3 of Volume II of this manual. Otherwise, proceed as follows:

(1) The ANALYZER MONITOR switch on the MCP is turned to FINAL.

(2) The VOX RF OUTPUT switch on the MCP is turned to ANALYZER.

(3) The MASTER OSCILLATOR FREQUENCY knob on the VOX is turned to the proper injection frequency (f_x) in the FSA where

$$f_x = \frac{f_0 + 500.}{N}$$

f_0 = GPT-10K's output frequency in kc.

N = 1, 2, 4, 8, or 16, depending on the setting of BAND-MCS switch. For example

if f_0 is 6 mc, f_x is $\frac{6500}{2} = 3250$;

if f_0 is 11 mc, f_x is $\frac{11500}{4} = 2875$;

if f_0 is 19 mc, f_x is $\frac{19500}{8} = 2437.5$

(4) On the VOX:

BAND-MCS switch is set to the correct band.

XTAL FREQ switch is set to any position (not in circuit).

XTAL switch is set to VMO.

TUNING switch tunes VOX.

OUTPUT switch is set to mid position.

(5) On the FSA:

IF ATTEN switch is set to 20 DB.

SWEEP WIDTH SELECTOR switch is turned to 10KC.

AMPLITUDE SCALE switch is set to LOG.

INPUT ATTENUATOR, GAIN, and CENTER FREQ switches center the picture from top to bottom of the scale.

c. TUNING/LOADING ADJUSTMENTS TO MEET DISTORTION REQUIREMENTS.

Step	Panel Serial Desig.	Operation	Purpose
1		GPT-10K's output as per paragraph 3-4a(7) and FSA's picture on CRT as per paragraph 3-4b(5).	
2		Observe distortion on FSA.	Signal/distortion requirement of 35 db.

NOTE

If A is TTG's 935-cycle heterodyned, RF frequency and B is TTG's 2805-cycle heterodyned RF frequency, the principle third order modulation product within range of FSA's 10KC scale is carrier +4675. The principle fifth order modulation product within range of FSA's 10kc scale is carrier +6545. If VOX's frequency is set to center TTG's tones on FSA's center frequency ordinate, the third order modulation product will be seen at the $4675-\frac{2805+935}{2}$ or 2.8 kc ordinate and the fifth order modulation product will be seen at the $6545-\frac{2805+935}{2}$ or 4.7 kc ordinate.

The above statements apply to a TTG test. If any appreciable carrier is present, the modulation products will be different because the GPT-10K now receives three tones, two from the TTG and the unsuppressed carrier.

At this point, the GPT-10K has been tuned/loaded on carrier (paragraph 3-3); it has not been retuned/reloaded for SSB carrier-suppressed emission (paragraph 3-4a); its tuning/loading controls may require slight adjustments for SSB emission and the distortion may be too great. The first step is to retune/reload the GPT-10K for SSB emission in line with procedures set forth in paragraph 3-3; as each stage is retuned, and/or reloaded, note the effect on the signal distortion and compromise a bit between optimum tuning/loading and signal distortion. For example, unloading the IPA slightly may decrease distortion appreciably. A slight detuning in the PA stage may decrease distortion considerably without seriously affecting the GPT-10K's output. Likewise, a slight unloading or overloading in the PA stage may improve the general situation. The SBE's drive should be kept as low as possible below the limiting values stated in paragraph 3-3. Experience in tuning/loading GPT-10K will enable the operator to make the most effective minor adjustments quickly, being guided by meter indications and results expected by increasing or decreasing an indication on any specific meter.

Step	Panel Serial Desig.	Operation	Purpose
3		Turn CARRIER INSERT switch on SBE's panel clockwise from position 0 until FSA shows required amount of carrier power.	In practice, SSB GPT-10K's are generally operated with -10 db or -20 db carrier insertion to facilitate receiver operation.

NOTE

This completes the GPT-10K tuneup on carrier and, in addition, on TTG supply to minimize distortion.

Step	Panel Serial Desig.	Operation	Purpose
4	37, 38	Turn ALDC switch knob (37) to on.	Adjust ALDC ADJ (38) as stated in note below. The GPT-10K is now ready for speech inputs; the ALDC circuit protects the GPT-10K against over-drive due to speech peaks of appreciable duration.

NOTE

Assume 10-kw (PEP) GPT-10K output: Turn ALDC switch fully counterclockwise; then turn switch to on. Slowly advance switch in a clockwise direction until GPT-10K's power just begins to drop. At this point, ALDC is holding the GPT-10K's TTG peaks to 10 kw (PEP). To check that ALDC is effective, increase SBE's drive slightly and observe that ALDC holds GPT-10K's power output constant. If, however, the output increases, turn the ALDC switch slightly further clockwise to drop the GPT-10K's power further. Continue this operation until ALDC holds the GPT-10K to a maximum output of 10 kw (PEP). If the GPT-10K is to operate at 5 kw (PEP), the preceding can be repeated. Naturally, ALDC switch positions will differ with different GPT-10K frequencies and powers.

SYNTHESIZED GPT-10K

The counterpart of the FSA (with its associated VOX and TTG) in the synthesized GPT-10K is TMC's portable test equipment, model PTE-3, which consists of the FSA, VOX, and TTG. The PTE-3 samples the synthesized GPT-10K's output via APP-3's MONITOR OUTPUT coaxial jack (122) with MONITOR selector (121) in position PA.

A considerable part of preceding instructions in paragraphs 3-4 a (1) through (7) apply to the synthesized GPT-10K because GPT-10K's portable test equipment, model PTE-3, consists of the FSA, VOX, and TTG. For example:

Step	Synthesized GPT-10K Action
(1)	See Para. 3-4a(1) except substitute CBE for SBE.
(2)	See Para. 3-4a(2) except substitute CBE for SBE.
(3)	See Para. 3-4a(3).
(4)	See Para. 3-4a(4).
(5)	Not applicable.
(6)	Follow Para. 3-4a(6); set CBE selector switch LSB(63) or USB(67) for sideband desired; set GAIN switches USB(64) or USB(68) as desired.
(7)	See Para. 3-4a(7) except substitute CBE for SBE.

The general instructions given in Para. 3-4b and 3-4c apply equally well to both the non-synthesized and synthesized GPT-10Ks.

3-5. INDEPENDENT SIDEBAND SUPPRESSED CARRIER OPERATION.

NON-SYNTHESIZED GPT-10K

a. GENERAL. - Arrange the SBE for GPT-10K tuning and loading for independent sideband suppressed carrier operation. Arrange the TTG audio output for two tones. If details are required, refer to Section 3 of Volume II of this manual. Otherwise, proceed as follows:

(1) The GPT-10K has been tuned/loaded on carrier. (Refer to preceding paragraph 3-3.) Reduce SBE's drive pending need for resumption during tuning/loading adjustments to meet distortion requirements on ISB suppressed carrier GPT-10K emission.

(2) The CARRIER INSERT switch on the SBE's panel is in position 0. Subsequently, the switch may be turned to meet requirements for either the -10 db or -20 db carrier insertion generally used in practice to facilitate receiver operation.

(3) The POWER switch on the TTG is in the ON position.

(4) The TTG RF TONE SELECTOR switch is in the TWO TONE position and the AUDIO OUTPUT control is in mid position.

(5) The toggle switch CHANNEL 1 (or CHANNEL 2) on the MCP is in the TONE INPUT position. Check, also, that the MCP's SBE VMO INPUT switch is turned to OFF.

(6) The LSB (or USB) selector switch on the SBE's panel is in the CH1 (or CH2) position. Turn the METER SW to LSB (or USB) and adjust the two tone input to -9 db on the SBE's db meter; use GAIN control on SBE and/or AUDIO OUTPUT on TTG as necessary to obtain this level.

(7) The SBE's METER SW is returned to the RF position and the RF output as indicated on the SBE's db meter is raised to meet rated GPT-10K output and about 300 to 400 ma of IPA plate current drive.

In independent sideband suppressed carrier operation, the sideband frequencies differ from the carrier frequency by the heterodyning audio frequencies. This should not affect carrier tuning/loading appreciably.

b. OPERATION OF FSA. - Note that paragraph 3-4a and 3-5a are alike except that in paragraph 3-5a the two tone input to the SBE's db meter is -9 whereas in paragraph 3-4a the level is -6. This compensates for two-channel operation in paragraph 3-5 versus one-channel operation in paragraph 3-4.

In independent sideband suppressed carrier operation, distortion on the FSA is observed by first testing channel 1 with channel 2 off, then testing channel 2

with channel 1 off. If channels 1 and 2 are both turned on simultaneously, four tones will appear on FSA's screen. In this case, GPT-10K's two tone distortion requirement of -35 db will not apply.

Refer to paragraph 3-4b.

c. TUNING/LOADING ADJUSTMENTS TO MEET DISTORTION REQUIREMENTS. - Refer to paragraph 3-4c.

SYNTHESIZED GPT-10K

d. The same remarks given in preceding Para. 3-5d, pertaining to differences in operational procedure between the non-synthesized and the synthesized GPT-10Ks, apply to the current case.

3-6. DOUBLE SIDEBAND SUPPRESSED CARRIER OPERATION.

Since TTG has only one set of two tones, the upper and lower two tone sidebands for independent and double sideband suppressed carrier operation are identical. This means that the GPT-10K's operational procedures for a single two tone audio input, paragraphs 3-5 and 3-6, are also identical.

3-7. SINGLE OR DOUBLE SIDEBAND UNSUPPRESSED CARRIER OPERATION.

Initially, tuning and loading the GPT-10K for single sideband unsuppressed carrier operations is identical with paragraph 3-5. Next, the second and final stage consists of reducing the height of the two tone peaks on FSA's screen by 50 percent (6 db) and turning on the SBE's or CBE's CARRIER INSERT to make the height of the carrier on FSA's screen equal to the height of the reduced two tone peaks. The initial stage of GPT-10K tuning/loading for double sideband unsuppressed carrier operation is identical with paragraph 3-5. The final stage consists of reducing the height of the four tone peaks on FSA's screen by 75 percent (12 db) and turning on the SBE's CARRIER INSERT to make the height of the carrier on FSA's screen equal to twice the height of the reduced four tone peaks.

3-8. FREQUENCY SHIFT TELEGRAPHY.

NON-SYNTHESIZED GPT-10K

a. GENERAL. - In frequency-shift keying GPT-10K operation, a GPT-10K may be driven as follows: (See figure 3-2.)

(1) By an SBE which, in turn, may be excited by XFK and VOX units, or

(2) By a VOX in combination with an XFK.

In case (1) the SBE provides the desired RF signals which have frequencies shifted 850 cps between associated "mark" and "space" teletype signals. In this case, the XFK accepts incoming teletype signals consisting of "marks" and "spaces" and heterodynes them with a 200-kc oscillator equipped with a reactance tube. The XFK also accepts an MF (2 to 4 mc) carrier from the VOX and modulates the 200-kc ±425 cps output of the reactance tube oscillator with this MF carrier in the mixer. The resulting frequency-shift carrier is fed to the SBE in which it replaces the normal MF crystal-controlled supply. The frequency-shift carrier is fed to SBE's MF balanced modulator, along with a 250-kc supply, and the output of this modulator is modulated once with the SBE's HF oscillator supply. Thus, the SBE provides the desired RF signals which have frequencies shifted 850 cps between associated "mark" and "space" teletype signals. Note that in frequency-shift keying GPT-10K operation, the VOX's frequency, for use with the XFK, must be 200 kc lower than the frequency of the crystal normally used in the SBE under single sideband operation.

In case (2), the XFK accepts incoming teletype signals consisting of "mark" and "space" and heterodynes them with a 200-kc oscillator equipped with a reactance tube. The XFK also accepts an MF (2 to 4 mc) carrier from a coaxial connector plug (P303) on the rear panel of the VOX and modulates the 200 kc ±425 cps output of the reactance tube oscillator with this MF carrier in the mixer. This requires an external coaxial connection between P303 of the VOX and J15 of the XFK. The resulting modulated frequency-shift carrier is fed back to a coaxial connector jack (J203) on the rear panel of the VOX. This requires an external coaxial connection between J203 of the VOX and XFK's coaxial output jack J1. The VOX multiplies this frequency-shift carrier in its HFO stages. As shown in figure 3-2 case (b), the output of the VOX reaches the GPT-10K via selector switch VOX RF OUTPUT (EXT position) and a short coaxial jumper between coaxial connectors J3005 and P3001 on the central shield panel assembly of the GPT-10K. Note in this case that the XFK's multiplication ratio network comes into use since the VOX multiplies the frequency-shift MF (2 to 4 mc) carrier from the output circuit of the XFK. In case (a), the multiplication ratio is unity since the SBE raises the input 2- to 4-mc carrier by modulation rather than by multiplication.

Figure 3-2 case (c) illustrates a frequency-shift keying arrangement in which the transmitter involved (AN/FRT-24) increases frequency by multipliers rather than by modulation.

b. GPT-10K's TUNING/LOADING ADJUSTMENTS.- The GPT-10K's tuning/loading on carrier (paragraph 3-3) is sufficient since the 850 cps carrier shift is too small to require adjustments.

c. ARRANGEMENTS OF AUXILIARY EQUIPMENT.

In case (a) above (paragraph 3-8a):

(1) The ovens in the XFK have reached a stable condition (warm-up period of at least 60 minutes).

(2) Set XFK controls as follows:

TEST - LINE

XTAL - EXT

FREQUENCY SHIFT CPS - 850 or otherwise if required.

BAND CHANGE - Band 2

FREQUENCY - 0

OUTPUT TUNING MC - Tune PA output to dip meter indication.

PA PLATE CURRENT - 50 ma on meter

(3) Set VOX controls as follows:

MASTER OSCILLATOR FREQUENCY - If f_{vox} is VOX's frequency, N is SBE-3's modulator band, and f_{xmtr} is RF output frequency of GPT-10K: $f_{vox} = 200N - f_{xmtr} + 250\text{-}200$ kc $= 2000N - f_{xmtr} + 50$ kc; where N = 4 to 17 depending on modulator band as indicated by SBE's BAND-MCS control. For example, if f_{xmtr} is 14,000 kc, N = 8 and f_{vox} becomes 2050 kc.

XTAL - VMO

XTAL FREQ - Not in circuit

BAND-MCS - 2-4

TUNING - Tune output to peak meter indication.

OUTPUT - Mid position

(4) Set MCP controls as follows:

SBE VMO INPUT - XFK

VOX RF OUTPUT - XFK

(5) The SBE's METER SW switch is returned to RF position and the RF output, as indicated on the SBE's db meter, is raised to meet rated GPT-10K output with about 300 to 350 ma of IPA plate current drive.

(6) Set SBE controls as follows:

USB/LSB - OFF

MF XTAL SW - VMO

BAND MCS - N = 4 to 17 (refer to example in paragraph 3-8c(3)).

CARRIER INSERT - 10

OUTPUT TUNING - Preset by GPT-10K's tuning/loading adjustments (refer to paragraph 3-8b).

MF TUNING - Out of circuit with VMO input.

In case (b) above (paragraph 3-8a):

(1) The ovens in the XFK have reached a stable condition (warm-up period of at least 60 minutes).

(2) Set XFK controls as follows:

TEST - LINE

XTAL - EXT

FREQUENCY SHIFT CPS - 850 or otherwise if required

BAND CHANGE - Band 2

FREQUENCY - 0

OUTPUT TUNING MC - Tune PA output to dip meter indication.

PA PLATE CURRENT - 50 ma on meter

(3) Set VOX controls as follows:

MASTER OSCILLATOR FREQUENCY - If f_{vox} is VOX's frequency, N is VOX's multiplier, and f_{xmtr} is RF output of GPT-10K $f_{vox} = \frac{f_{xmtr}}{N} - 200$ in which N (1, 2, 4, or 8) is chosen to bring f_{vox} between 2 and 4 mc. For example, if f_{xmtr} is 14,000 kc, N becomes 4 so that f_{vox} = 3300 kc.

XTAL - VMO

XTAL FREQ - Not in circuit

BAND-MCS - 2-4

TUNING - Tune output to peak meter indication

OUTPUT - Mid position

SYNTHESIZED GPT-10K

d. Tone Intelligence Unit, Model TIS-3

As explained in the Technical Manual for Sideband Generator SBG-1 or SBG-2, Part IV, the tone intelligence unit model TIS-3 receives FSK, FAX, or CW signals and converts them into audio signals whose center frequencies correspond to 1900, 2000, 2500, spare, CPS. The manual details operating procedures for these audio outputs.

Routing these audio outputs to channel 1 and/or 2 of the CBE will enable the synthesized GPT-10K to produce RF FSK, FAX, or CW signals.

3-9. CW (KEYED CARRIER).

NON-SYNTHESIZED GPT-10K

a. In CW keying GPT-10K operation, a GPT-10K may be driven as shown in cases (a) and (b) of figure 3-2. The procedures in paragraph 3-8 apply equally well in this paragraph.

b. Terminal 3 of E101 of the SBE is a CW keying input terminal when the jumper between terminals 2 and 3 is removed. Contact-type keying, however, is required since terminal 3 connects to the cathode of SBE's HF oscillator amplifier V118. Hence, a "wet" keying circuit (one operating between 0 and x volts) must be equipped with a keying relay in order to provide the SBE with a "dry" keying relay circuit (one operating grounded or open without voltage supply).

SYNTHESIZED GPT-10K

c. CW (Keyed Carrier).

See Par. 3-8d.

3-10. EMERGENCY 1-KW (PEP) TRANSMITTER OUTPUT.

a. GENERAL - The nominal output of a GPT-10K transmitter is 10KW (PEP) output to either a balanced 600-ohm rhombic antenna or to an unbalanced 50/70-ohm antenna. To switch from the balanced to the unbalanced antenna, or vice versa, requires installation changes as described in Section 2 of the Manual.

Recently the GPT-10K transmitter has been provided with a ready means of switching from the nominal 10-KW to an emergency 1-KW output. This ready switch is possible under two conditions (a) transmitter arranged for a balanced antenna, when output is switched from 10 KW to 1 KW or vice versa and (b) transmitter arranged for an unbalanced antenna, when output is switched from 10 KW to 1 KW or vice versa. To make the double switch from balanced antenna 1-KW output to unbalanced antenna 1-KW output or vice versa requires the installation changes as described in Section 2 of the Manual in addition to those mentioned in items (a) and (b) above.

For 10-KW output, the output of the Power Amplifier tube V-900 in GPT-10K is fed to the antenna. For 1-KW output, the output of the Intermediate Power Amplifier tube V-203 is fed to the antenna, and the Power Amplifier tube is bypassed by installing the emergency hook-up wiring for 1KW.

b. PHYSICAL ARRANGEMENTS TO OBTAIN NOMINAL 10-KW OR EMERGENCY 1-KW OUTPUTS

Figure 3-3 illustrates the four physical arrangements possible to provide:

A. GPT-10K 10-KW(PEP) output to balanced 600-ohm antenna

B. GPT-10K 10-KW(PEP) output to unbalanced 50/70-ohm antenna

C. GPT-10K 1-KW(PEP) output to balanced 600-ohm antenna

D. GPT-10K 1-KW(PEP) output to unbalanced 50/70-ohm antenna

The terminal board of the antenna tuner, Sketches a and b, is located behind the meter panel in the Power Amplifier Section and the arrangement of straps on the board indicate whether the antenna installation is balanced (Sketch a) or unbalanced (Sketch b).

The rear view of the Power Amplifier, Sketch c, shows the changes necessary to convert from 10-KW normal operation (dotted lines) to 1-KW emergency operation (solid lines).

c. ELECTRICAL ARRANGEMENTS TO OBTAIN NOMINAL 10-KW OR EMERGENCY 1-KW OUTPUTS

Figure 3-4 illustrates the simplified schematic circuits resulting from the four physical arrangements possible in GPT-10K described in paragraph 2 above. Arrangements A, B, C and D above are shown schematically in sketches a, b, c and d, respectively.

d. INSTALLATION DETAILS OF EMERGENCY HOOK-UP FOR 1KW OUTPUT

Perform the following three operations (see Figure 3-3):

Unstrap strapping MS-202-22-7.50 between C911 and C928.

Connect CA-582-1 (loose part, shipping case 13) between CP900 and C911.

Switch cable CA-437 from C901 to CP900.

After installation of emergency hook-up, retune GPT-10K output by adjusting OUTPUT BALANCE and OUTPUT LOAD controls on front panel of PA. PA TUNE and PA LOAD controls will be inoperative for tuning purposes.

TABLE 3-1. TABLE OF EQUIVALENT CONTROL DESIGNATIONS

SERIAL DESIGNATION (SEE FIGURE 3-1)	PANEL DESIGNATION (SEE FIGURE 3-1)	COMPONENT DESIGNATION ON OVERALL SCHEMATIC DIAGRAM (SEE FIGURE 7-12)
	METER PANEL ASSEMBLY	
1	FILAMENT PRIMARY	Meter M100
2	PA SCREEN CURRENT	Meter M1001
3	PA PLATE CURRENT	Meter M1002
4	PA PLATE RF	Meter M1003
5	PA OUTPUT	Meter M1004
	POWER AMPLIFIER SECTION (PA)	
6	AC POWER	Indicator I1000
7	TUNE	Indicator I1001
8	OPERATE	Indicator I1002
9	PLATE ON	Indicator I1003
10	PA TUNE	Counter, hardware
11	PA LOAD	Counter, hardware
12	BAND SW	Counter, hardware
13	OUTPUT BAL	Counter, hardware
14	OUTPUT LOADING	Counter, hardware
15	PA TUNE	Knob C927
16	PA LOAD	Knob C928
17	BAND SW	Knob S900
18	OUTPUT BAL	Knob C916
19	OUTPUT LOADING	Knob L912 and L913
	RF AMPLIFIER MODEL RFC-1	
57	DRAWER INTERLOCK	Indicator I2000
20	MULTIMETER	Meter M202
21	IPA PLATE CURRENT	Meter M201
22	MULTIMETER	Knob (8-position) selector switch S204
23	IPA GRID TUNING	Capacitor C231
24	1ST AMPL TUNING	Capacitor C203 and C232
25	DRIVER BAND	Knob (4-position) selector switch S201
26	IPA BAND	Knob (6-position) selector switch S202
27	IPA LOADING	Knob (2-position) selector switch S203
28	IPA TUNING	Knob C254
29	IPA TUNING	Counter, hardware
30	IPA LOADING	Knob C269
31	IPA LOADING	Counter, hardware
	MAIN POWER PANEL ASSEMBLY	
32	MAIN POWER	Circuit breaker CB1000
33	OVERLOAD RESET	Pushbutton switch S1000
34	INTERLOCK INDICATOR	Indicator I1004
35	INTERLOCK	Knob (12-position) selector switch S1001
36	FIL ADJ	Knob (7-position) selector switch S1002
37	ADLC	Knob (2-position) selector switch S1003
38	ALDC ADJ	Potentiometer R1004
39	OPERATE/TUNE	Toggle switch S1004
40	PA SCREEN ON/OFF	Toggle switch S1005
41	HIGH VOLTAGE	Circuit breaker CB1001

TABLE 3-1. TABLE OF EQUIVALENT CONTROL DESIGNATIONS (Cont.)

SERIAL DESIGNATION (SEE FIGURE 3-1)	PANEL DESIGNATION (SEE FIGURE 3-1)	COMPONENT DESIGNATION ON OVERALL SCHEMATIC DIAGRAM (SEE FIGURE 7-12)
	INDICATOR CONTROL PANEL	
42	FILAMENT TIME	Meter M700
43	TIME DELAY	Relay M701
44	PLATE TIME	Meter M702
45	PA BIAS	Indicator I700
46	PA PLATE OVLD	Indicator I701
47	PA SCREEN OVLD	Indicator I702
48	IPA SCREEN OVLD	Indicator I703
49	IPA PLATE OVLD	Indicator I704
50	IPA BIAS	Indicator I705
51	PA BIAS ADJ	Potentiometer R703
52	PA PLATE OVLD ADJ	Potentiometer R705
53	PA SCREEN OVLD ADJ	Potentiometer R707
54	IPA SCREEN OVLD ADJ	Potentiometer R709
55	IPA PLATE OVLD ADJ	Potentiometer R711
56	ALARM ON/OFF	Toggle switch S700

TABLE 3-2. TUNING CHART FOR GPT-10K, BALANCED ANTENNA OPERATION

	NON-SYNTHESIZED		SYNTHESIZED**	IPA TUNING											PA TUNING												
FREQ MC	SBE BAND	VOX SETTING	CBE CPO	IPA BAND	DRIVER BAND	1ST AMPL TUNING	IPA GRID TUNING	IPA TUNING	IPA LOADING	IPA LOAD	1ST AMPL (RF)	IPA EG (RF)	IPA EP (RF)	PA EG (RF)	IPA PLATE CURRENT	BAND SW	PA TUNE	PA LOAD	OUTPUT BAL	OUTPUT LOADING	10 KW LOAD OUTPUT (RF)	10 KW S/D DB	LOAD CUR 5 KW (RF)	LOAD CUR 5 KW S/D	DC PLATE CURRENT	DC SCREEN VOLTS	DC SCREEN CURRENT	% OF UNBAL	PA PLATE RF
				*26	*25	*24	*23	*28	*30	*27	*22	*22	*22	*22	*21	*17	*15	*16	*18	*19					*3	-	*2	-	*4
2	2-4	2500		2-2.5	2-4	0	1	018	067	1					360	2-3	392	511	430	923	2.8	35	2.1	40	1.4		40		2
2.5	2-4	3000		2-2.5	2-4	3	5	056	096	2					350	2-3	236	338	413	923	2.8	35	2.1	40	1.4		40		2.5
2.5	2-4	3000		2.5-3	2-4	3	5	043	006	2					350	2-3	236	238	413	923	2.8	35	2.1	40	1.4		40		2.5
3	2-4	3500		2.5-3	2-4	5	6	065	119	2					350	3-4	240	365	402	923	2.8	37	2.1	42	1.4		42		3
3	2-4	3500		3-4	2-4	5	6	057	097	2					360	3-4	240	365	402	923	2.8	37	2.1	42	1.4		42		3
4	2-4	2250		4-6	2-4	9	10	079	052	2					360	4-6	228	334	374	670	2.8	35	2.1	40	1.4		48		4.5
4	2-4	2250		4-6	4-8	0	1	079	052	2					360	4-6	228	334	374	670	2.8	35	2.1	40	1.4		48		4.5
4	4-8	2250		4-6	4-8	0	0	122	000	2	12	50	850	300	300	4-6	256	571	361	Max	3	38	2.1	40	1.3	1100	30	0	3.2
6	4-8	3250		4-6	4-8	5	6	200	048	2	19	36	1700	270	225	4-6	111	288	349	894	3	37	2.1	40	1.4	1100	30	0	4
6	4-8	3250		6-8	4-8	5	6	135	003	2	10	40	900	230	250	6-8	183	412	343	615	3	36	2.1	40	1.4	1100	22	0	3.5
8	4-8	2125		6-8	4-8	9	8	183	074	2	11	39	900	250	250	6-8	099	283	343	615	3	35	2.1	40	1.25	1100	18	0	4
8	4-8	2125		8-12	8-16	0	0	140	030	1	12	37	850	230	260	8-11	170	566	364	463	3	37	2.1	40	1.15	1100	34	0	4.5
11	8-16	2875		8-12	8-16	4	6	191	079	2	12	30	1000	220	240	8-11	093	356	364	006	3	40	2.1	42	1.35	1100	16	0	5.0
11	8-16	2875		8-12	8-16	4	6	191	079	2	12	30	1000	220	240	11-15	135	467	364	006	3	40	2.1	42	1.3	1100	18	0	5.0
12	8-16	3125		8-12	8-16	5	6	203	079	2	13	26	1100	200	225	11-15	115	395	356	006	3	40	2.1	42	1.35	1100	18	0	5.0
12	8-16	3125		12-16	8-16	6	6	176	031	2	13	26	1100	200	225	11-15	115	395	356	006	3	40	2.1	42	1.3	1100	16	0	5.0
15	8-16	3875		12-16	8-16	8	8	205	046	2	15	25	1200	170	185	11-15	068	256	340	006	3	40	2.1	40	1.3	1100	20	0	5.0
15	8-16	3875		12-16	8-16	8	8	205	046	2	15	25	1200	160	185	15-19	118	338	341	006	3	36	2.1	42	1.3	1100	10	0	4.5
16	8-16	2062.5		12-16	8-16	9	8	230	046	2	16	23	1200	150	200	15-19	105	296	326	006	3	40	2.1	40	1.3	1100	10	0	4.2
16	16-32	2062.5		16-20	16-20	5	7	180	030	2	9	21	700	110	210	15-19	105	296	317	006	3	37	2.1	42	1.3	1100	12	0	4.5
19	16-32	2437.5		16-20	16-20	8	8	199	076	2	10	30	700	120	250	15-19	066	248	317	006	3	40	2.1	44	1	1100	24	5	5.5
19	16-32	2437.5		16-20	16-20	8	8	199	074	2	11	40	650	110	275	19-24	119	283	323	006	3	35	2.1	40	1.35	1100	8	5	4
20	16-32	2562.5		16-20	16-20	9	8	207	062	2	12	30	800	115	240	19-24	107	270	327	006	3	40	2.1	42	1.25	1100	14	5	4
20	16-32	2562.5		20-28	16-20	4	5	168	032	2	11	36	600	110	200	19-24	107	270	327	006	3	42	2.1	47	1.15	1100	8	5	4.5
24	16-32	3062.5		20-28	20-28	6	6	192	033	2	16	35	900	100	250	19-24	077	186	259	006	3	40	2.1	42	1.35	1100	8	5	3.7
24	16-32	3062.5		20-28	20-28	6	6	192	033	2	14	32	800	90	250	24-28	144	282	314	006	3	38	2.1	40	1.3	1100	10	0	4.5
28	16-32	3562.5		20-28	20-28	9	8	220	048	2	20	30	1200	90	225	24-28	118	211	297	006	3	35	2.1	40	1.35	1100	20	0	5

*Refer to table 3-1 for control designations.
**To be set for desired frequency.

Load - 600 (balanced)

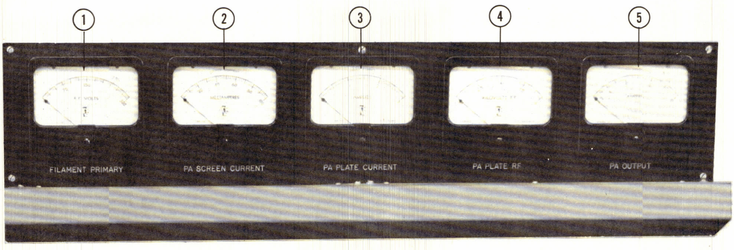
TABLE 3-3. TUNING CHART FOR GPT-10K, UNBALANCED ANTENNA OPERATION

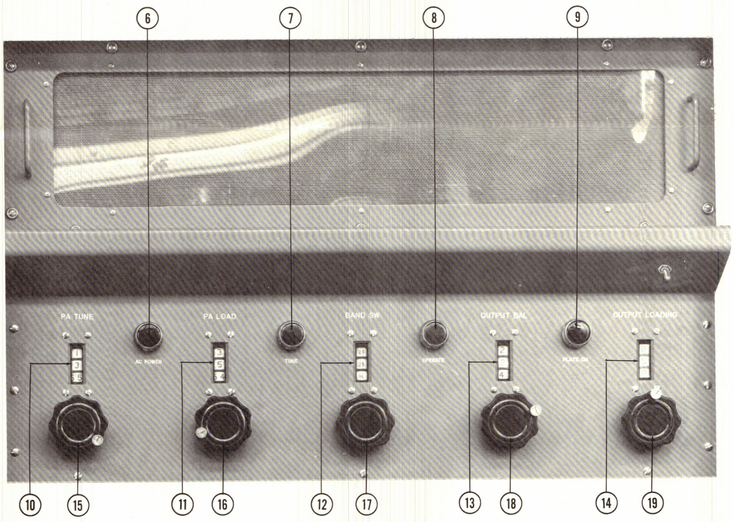
	NON-SYNTHESIZED		SYNTHESIZED**	IPA TUNING											PA TUNING												
FREQ MC	SBE BAND	VOX SETTING	CBE CPO	IPA BAND	DRIVER BAND	1ST AMPL TUNING	IPA GRID TUNING	IPA TUNING	IPA LOADING	IPA LOAD	1ST AMPL (RF)	IPA EG (RF)	PA EG (RF)	IPA PLATE CURRENT	BAND SW	PA TUNE	PA LOAD	OUTPUT BAL	OUTPUT LOADING	10 KW LOAD OUTPUT	10 KW S/D DB	LOAD 5 KW	CUR 5 KW S/D	DC PLATE CURRENT	DC SCREEN VOLTS	DC SCREEN CURRENT	% OF UNBAL	PA PLATE RF
				*26	*25	*24	*23	*28	*30	*27	*22	*22	*22	*21	*17	*15	*16	*18	X19	*5	-	*5	-	*3	-	*2	-	*4
														310	2-3	364	421	370	853	8.2	37	6.0	42	1.2		38		2
2	2-4	2500		2-2.5	2-4	0	3	020	091	1				300	2-3	203	421	370	853	8.2	37	6.0	42	1.2		20		2.5
2.5	2-4	3000		2-2.5	2-4	3	5	056	094	2				320	2-3	203	421	370	853	8.2	37	6.0	42	1.2		20		2.5
2.5	2-4	3000		2.5-3	2-4	3	5	044	019	2				280	3-4	215	676	370	853	8.2	40	6.0	45	1.3		20		2.5
3	2-4	3500		2.5-3	2-4	5	6	067	077	2				340	3-4	205	676	370	853	8.2	40	6.0	45	1.3		20		2.5
3	2-4	3500		3-4	2-4	5	6	059	014	2				300	4-6	210	537	370	853	8.2	40	6.0	44	1.3		20		3.5
4	2-4	2250		4-6	2-4	10	8	079	043	2				300	4-6	210	537	370	853	8.2	40	6.0	44	1.3		20		3.5
4	2-4	2250		4-6	4-8	0	2	079	043	2				300	4-6	396	309	518	237	8.4	35	6.0	40	1.3	1100	20	100	3.0
4	4-8	2250		4-6	4-8	0	0	127	034	1				310	4-6	173	289	388	052	8.4	38	6.0	45	1.3	1100	15	100	3.5
6	4-8	3250		4-6	4-8	5	8	191	076	2				300	6-8	234	418	328	847	8.4	38	6.0	45	1.3	1100	20	100	4.5
6	4-8	3250		6-8	4-8	5	6	134	999	1				300	6-8	159	232	328	865	8.4	38	6.0	40	1.3	1100	18	100	4.5
8	4-8	2125		6-8	4-8	9	8	177	051	2				300	8-11	224	415	313	640	8.4	35	6.0	45	1.3	1100	10	100	4.5
8	4-8	2125		8-12	8-16	0	0	139	035	2				250	8-11	128	296	407	000	8.4	40	6.0	47	1.3	1100	6	100	4.5
11	8-16	2875		8-12	8-16	4	6	187	101	2				280	11-15	174	400	124	000	8.4	35	6.0	47	1.4	1100	10	100	4.8
11	8-16	2875		8-12	8-16	4	6	187	101	2				280	11-15	156	325	122	000	8.4	35	6.0	45	1.5	1100	22	100	4.5
12	8-16	3125		8-12	8-16	5	7	198	131	2				280	11-15	156	325	122	000	8.4	45	6.0	50	1.3	1100	5	100	4.0
12	8-16	3125		12-16	8-16	5	8	170	015	2				320	11-15	171	196	318	000	8.4	43	6.0	50	1.5	1100	5	100	2.6
15	8-16	3875		12-16	8-16	8	9	197	064	2				310	15-19	170	256	327	000	8.4	45	6.0	50	1.4	1100	2	100	3.0
15	8-16	3875		12-16	8-16	8	9	197	064	2				250	15-19	153	237	308	000	8.4	35	6.0	50	1.4	1100	6	100	3.5
16	8-16	2062.5		12-16	8-16	9	10	221	040	2				300	15-19	153	240	325	000	8.4	45	6.0	50	1.4	1100	6	100	3.5
16	16-32	2062.5		16-20	16-20	4	7	172	999	2				300	15-19	116	194	325	000	8.4	45	6.0	50	1.3	1100	6	100	3.5
19	16-32	2437.5		16-20	16-20	7	9	192	095	2				280	19-24	155	266	324	000	8.4	45	6.0	50	1.1	1100	9	100	3.5
19	16-32	2437.5		16-20	16-20	7	9	192	025	2				300	19-24	149	229	325	000	8.4	45	6.0	50	1.5	1100	7	100	3.5
20	16-32	2562.5		16-20	16-20	7	9	199	021	2				250	19-24	143	256	325	000	8.4	45	6.0	50	1.0	1100	6	100	4.5
20	16-32	2562.5		20-28	16-20	4	6	200	014	2				370	19-24	099	224	325	000	8.4	36	6.0	40	1.1	1100	16	100	4.0
24	16-32	3062.5		20-28	20-28	6	8	183	026	2				390	24-28	168	322	402	000	8.4	35	6.0	50	1.2	1100	10	100	4.0
24	16-32	3062.5		20-28	20-28	6	7	183	026	2				310	24-28	123	419	417	000	8.4	40	6.0	50	0.9	1100	11	100	4.0
28	16-32	3562.5		20-28	20-28	9	8	199	063	2																		

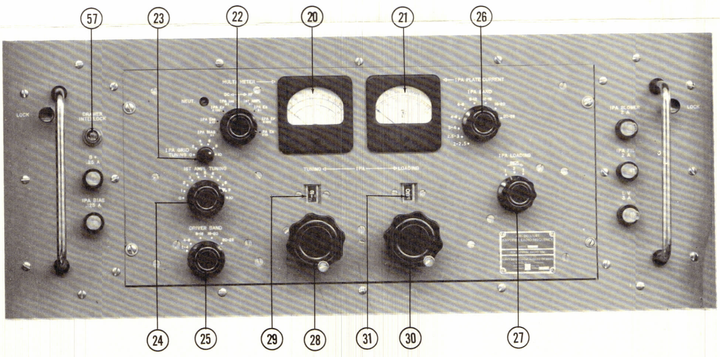
NO READINGS TAKEN

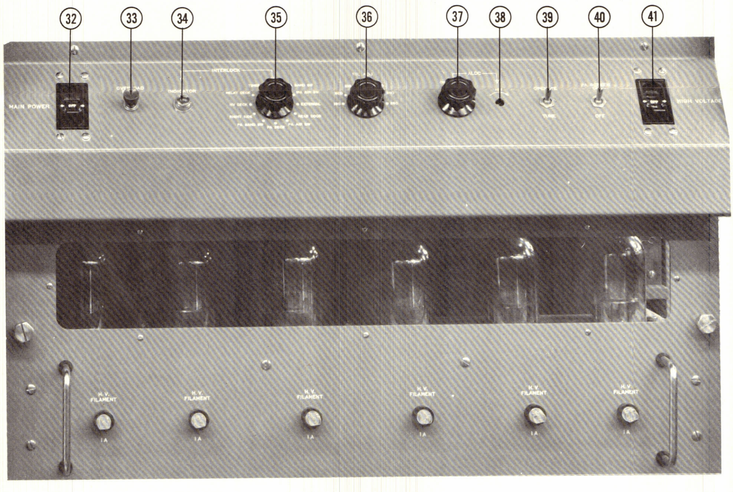
*Refer to table 3-1 for control designations.
**To be set for desired frequency.

Load - 72 (unbalanced)









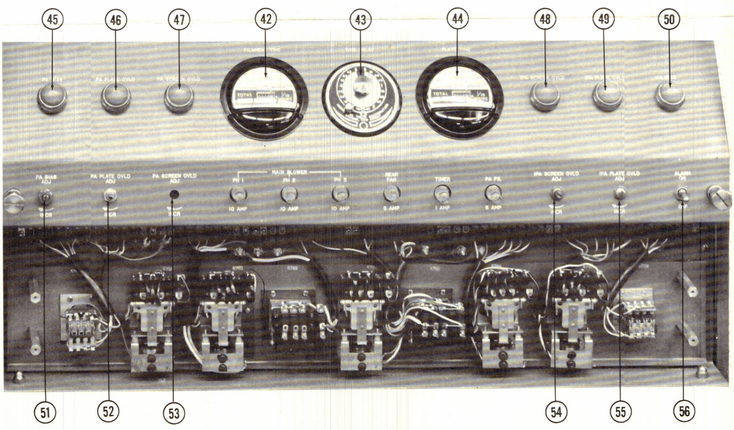


Figure I-3-1-3. Main Frame Operating Controls

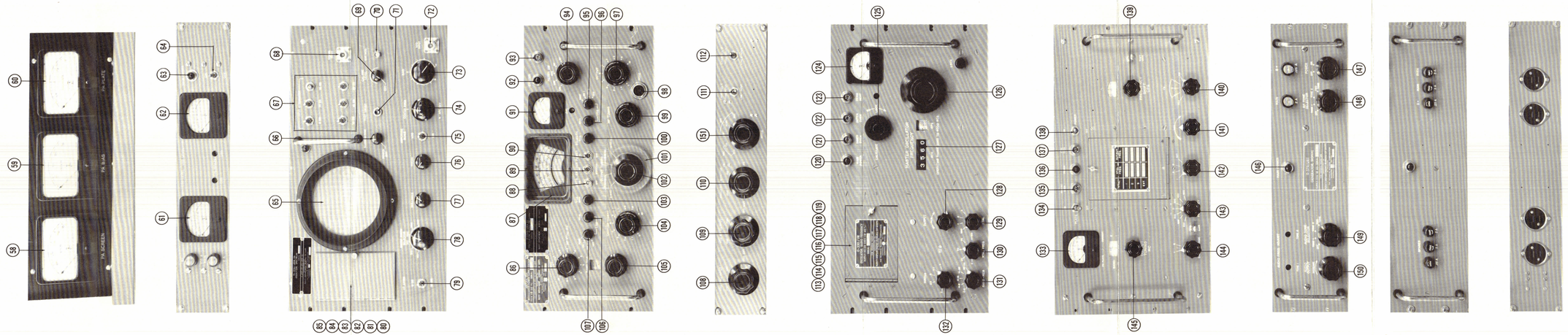


Figure 1-3-1-b. Non-Synthesized Auxiliary Frame Operating Controls

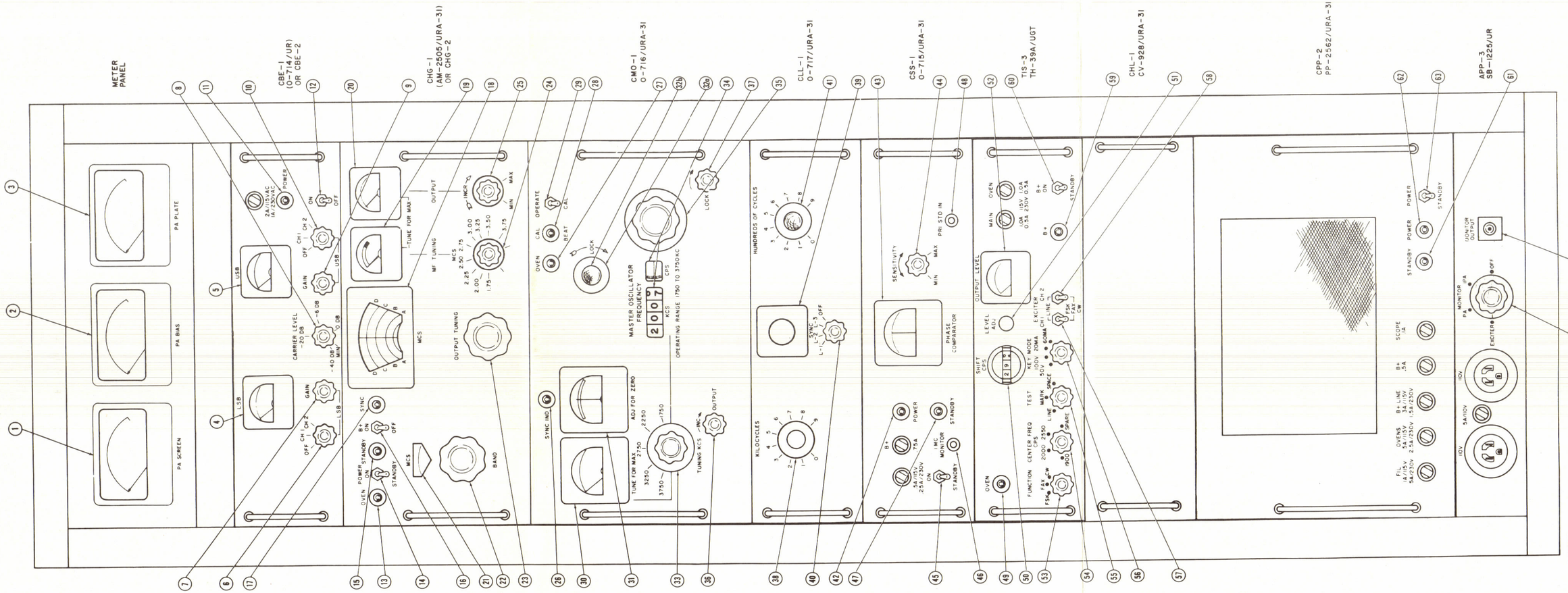


Figure I-3-1-c. Synthesized Auxiliary Frame Operating Controls

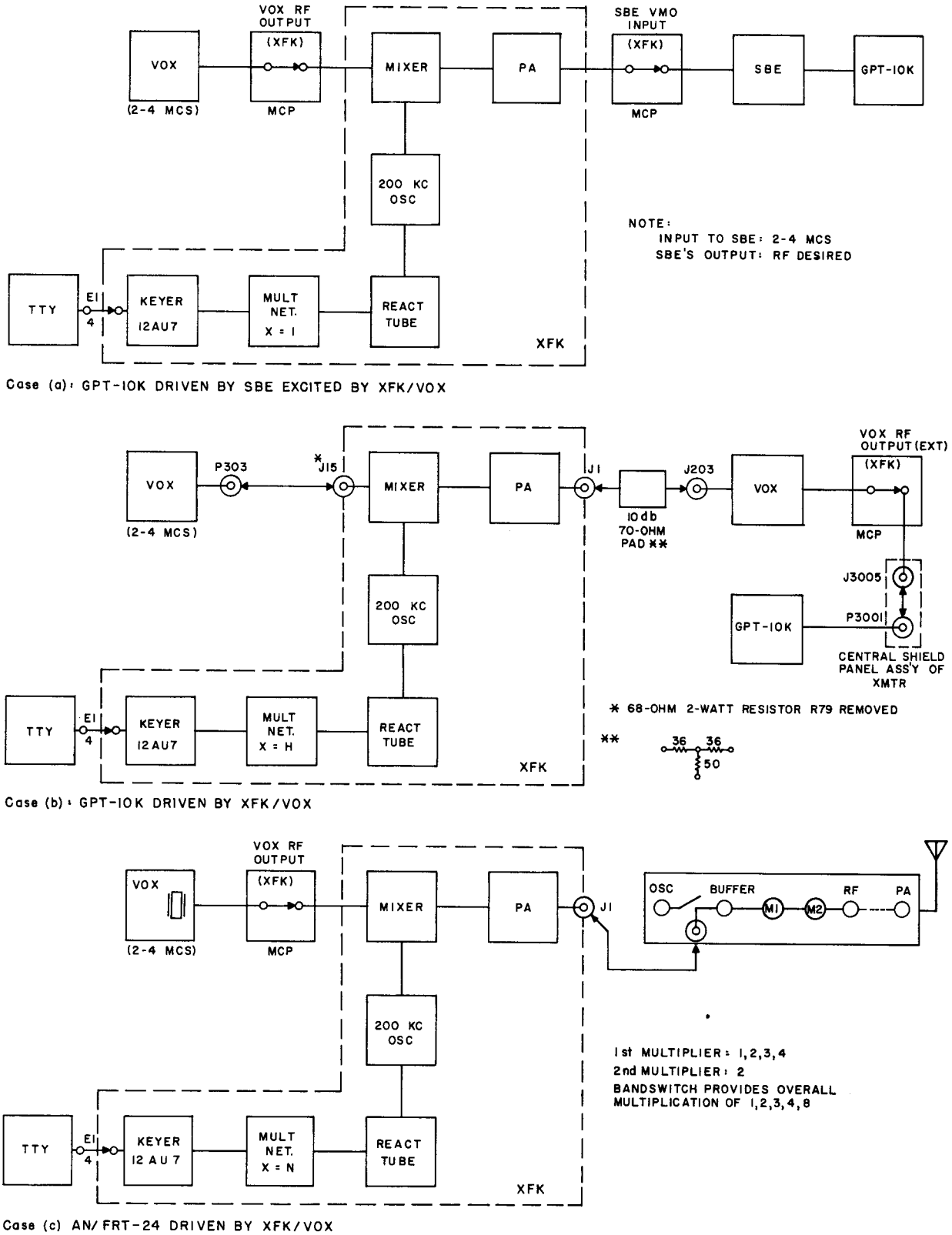


Figure I-3-2. Block Diagram Illustrating Frequency Shift Keying Procedures Applicable to SSB and Frequency Multiplying Transmitters

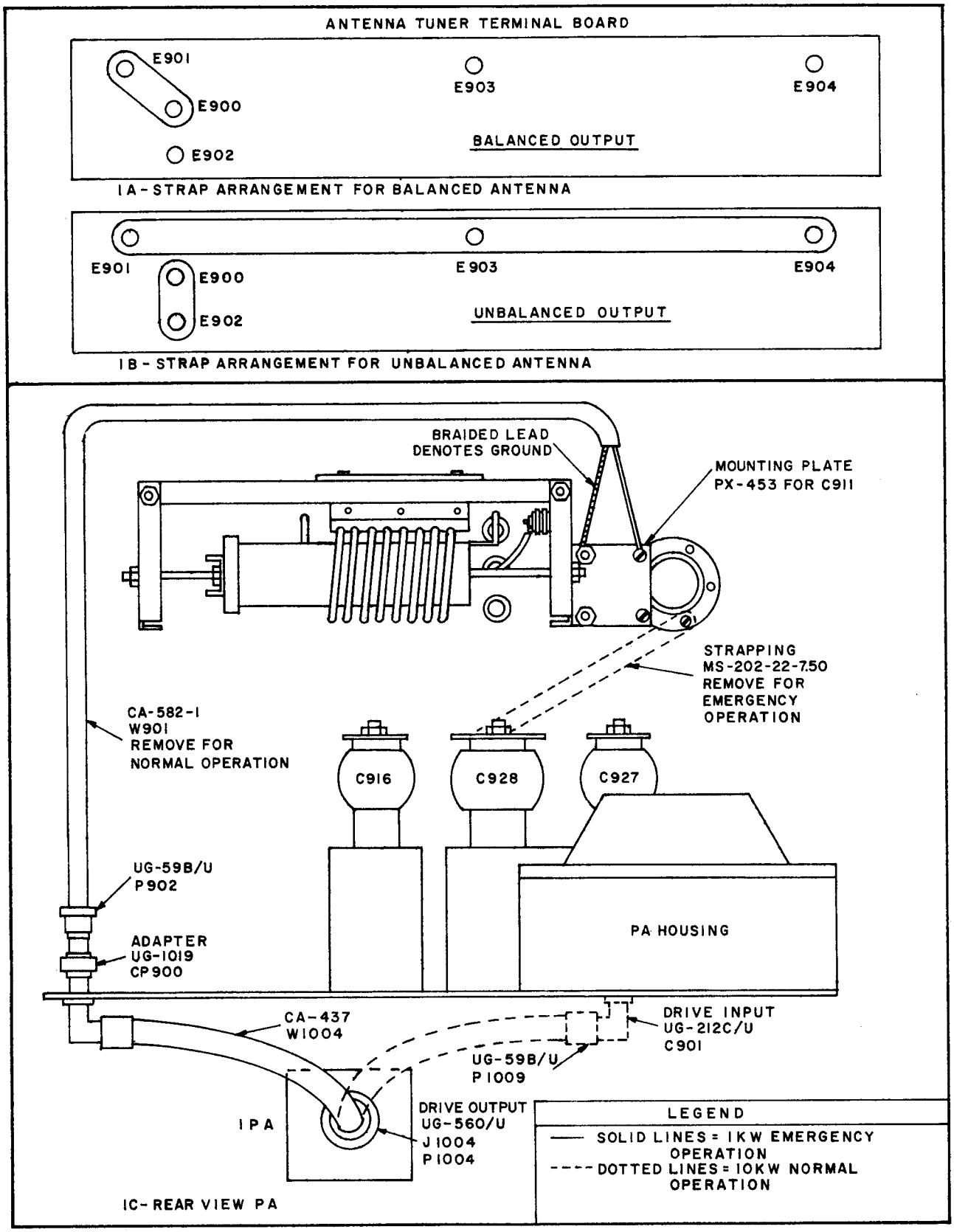


Figure I-3-3. Physical Arrangements for 10KW and 1KW, Balanced and Unbalanced Antenna Operation

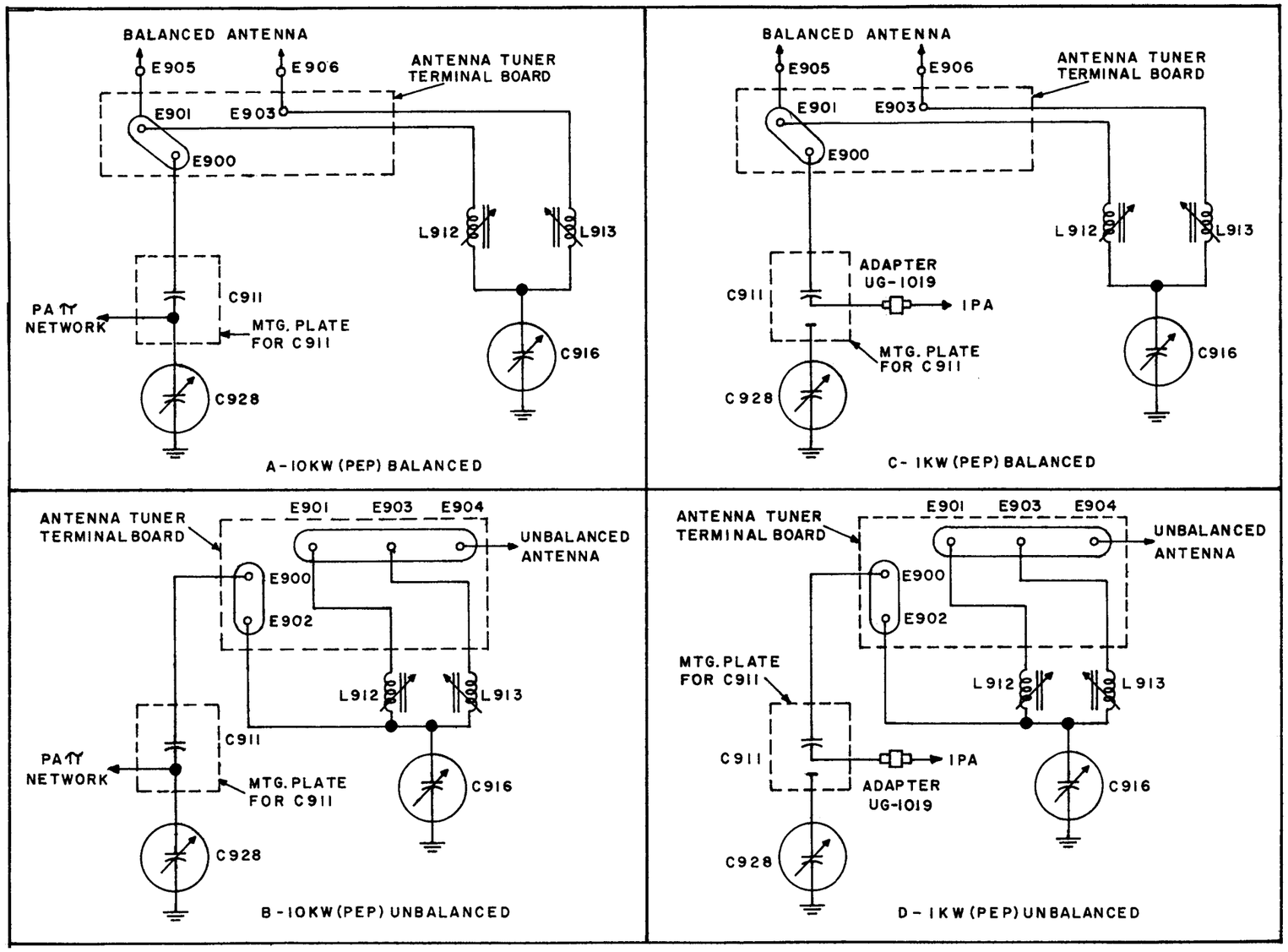


Figure I-3-4. Electrical Arrangement for 10KW and 1KW, Balanced and Unbalanced Antenna Operation

SECTION 4
PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

As explained in Section 1, the modular-type construction of the GPT-10K makes it convenient to describe the principles of operation of the main frame chassis units in this section and those of the auxiliary frame chassis units in Section 4 of Volume II. This means that this section is restricted as just stated, except in those cases where a better understanding results by some coordination between the main frame and the auxiliary frame chassis units. In these cases, the auxiliary frame chassis units are covered functionally only.

a. Figure 4-1 is a block and interconnection diagram of the GPT-10K and illustrates how the units perform functionally as one. Cables W1000 and W3000 interconnect assemblies on the two frame chassis. For the non-synthesized GPT-10K cables W1006 and W1007 permit the FSA to monitor IPA and PA voltages. Cables W1005 and W1002 feed the exciter's output to the IPA. For the synthesized GPT-10K, PTE-3's FSA unit is supplied via APP-3's selector switch.

b. The heavy boxes in the right section denote readily removable assemblies. The IPA, including its power supply, may be pulled out from the main frame chassis. If desired, the basic amplifier only may be removed, leaving the power supply within the main frame chassis. Cables W201, W1001, and W1003 interconnect the amplifier to various subassemblies. The amplifier elements are designated by 200-symbols and the power supply elements by 2000-symbols on schematic drawings.

c. The high voltage rectifier section may also be pulled out from the main frame chassis. It interconnects to various subassemblies via spring contactors. Its elements are designated by 600-symbols on schematic drawings.

d. The relay and indicator control panel may be removed from the main frame chassis by disengaging two large hexagonal bolts. Their elements are designated by 700-symbols on schematic drawings.

e. The remaining equipments on the main frame chassis are permanently attached and comprise the PA (located in the top compartment running from front to rear), the main control panel (located on the front of the GPT-10K immediately below the IPA and comprising switches, circuit breakers, and miscellaneous electronic components), and various assemblies of the main power supply (located in the middle rear, bottom rear, and bottom front compartment). These elements are designated by 800- and 1000-symbols on schematic drawings.

f. Figures 4-1-a and 4-1-b indicate a signal flow from the exciter to the antenna via the IPA and the PA, each having various power supplies and control circuits. The various test equipments on the auxiliary frame chassis provide means to operate and maintain the GPT-10K efficiently.

4-2. RF AMPLIFIER MODEL RFC-1.

a. GENERAL. - This amplifier, which consists of a first amplifier stage (class A), a second amplifier stage (class A), and an intermediate power amplifier stage (class AB1), is commonly called the IPA. Its input is supplied by a sideband exciter operating in the 2- to 28-mc frequency range. As explained in paragraph 4-1, the exciter is located on the auxiliary frame chassis and consequently is explained in detail in Volume II of this manual. Figure 7-1 is the overall schematic for the IPA.

b. FIRST AMPLIFIER STAGE. (See figure 4-2.) - As indicated by the heavy solid lines, signal flow is from J201 to the grid of V201, thence from the plate of V201 to the tuning elements of driver bandswitch S201A, and to the grid of following tube V202. The heavy dotted lines show automatic load and drive control, ALDC, which provides DC bias (obtained from rectified RF on the plate circuit of the IPA or PA) to the grid of this stage.

The plate tank circuit of V201 is tuned by C203 and trimmer C202 in conjunction with L201 or L202 or L209 or L210 or L211. The slug tuning of the inductances is preset at the factory to cover the various bands. Bandswitching in this stage is accomplished by two wafer sections of S201A. Figure 4-3 indicates details for each of the five bands: 2-4, 4-8, 8-16, 16-20, and 20-28 mc.

Figure 4-2 also shows voltage supplies to the elements of V201 together with the circuits to confine the RF signals to their proper paths.

c. SECOND AMPLIFIER STAGE. (See figure 4-4.) - As indicated by the heavy solid lines, signal flow is from S201A to the grid of V202, thence from the plate of V202 to the tuning elements of driver bandswitch S201B and to the grid of following tube V203.

The plate tank circuit of V202 is tuned by C232 and trimmer C231 in conjunction with L219 or L220 or L223 or L224 or L225. The slug tuning of the inductances is preset at the factory to cover the various bands. Bandswitching in this stage is accomplished by two wafer sections of S201B. Figure 4-5 indicates details for each of the five bands: 2-4, 4-8, 8-16, 16-20 and 20-28 mc.

Figure 4-4 also shows voltage supplies to the elements of V202 together with the circuits to confine the RF signals to their proper paths.

d. INTERMEDIATE POWER AMPLIFIER STAGE. (See figure 4-6.) - As indicated by the heavy solid lines, signal flow is from S201B to the grid of V203, thence from the plate of V203 to antenna output jack J202 or to contactor element E203 (which feeds signals to the following power amplifier). The heavy dotted lines show an RF feedback path to reduce distortion products. V203 is neutralized with C255.

A Pi network in the output of V203 is utilized for tuning and loading. This consists of L245, L246, C254, C269, C259, C272, C274, and IPA bandswitch S202. (See figure 4-7.) Bandswitching in this stage is accomplished by switches physically located close to coils L245 and L246. Figure 4-7 indicates details for each of the nine bands: 2.0-2.5, 2.5-3.0, 3-4, 4-6, 6-8, 8-12, 12-16, 16-20, and 20-28 mc. It will be noted that the unused portion of the coils is short-circuited. This is to reduce the possibility of parasitic resonances likely with stray capacities acting in conjunction with open portions of the coils.

e. PANEL METERS AND CONTROLS. (See figure 4-8.) - The IPA is equipped with multimeter M202 and its associated switch S204 whose purpose is to read DC and RF voltages and currents directly on the front of the panel (with the exception of the IPA plate current, which is read on milliammeter M201, also mounted on the front of the panel). The IPA panel also contains the following controls:

(1) IPA BAND switch S202
(2) IPA GRID TUNING capacitor C231
(3) 1ST AMPL TUNING capacitor C203 and C232
(4) DRIVER BAND switch S201
(5) IPA LOADING switch S203
(6) IPA TUNING capacitor C254
(7) IPA TUNING indicator
(8) IPA LOADING capacitor C269
(9) IPA LOADING indicator
(10) Screwdriver neutralizing adjustment capacitor C255.

f. AUTOMATIC LOAD AND DRIVE CONTROL. (See figure 4-6.) - When operating the IPA independently into an antenna, the ALDC is connected from V203 to the grid of V201 by using jumpers on E201, as indicated in figure 4-8.

g. VENTILATION AND INTERLOCK CIRCUITS. (See figure 4-9.) - Blower B201 provides ventilation for the IPA. Air interlock switch S206 will open the high voltage interlock circuit if the blower motor fails to operate. Again, bandswitch interlock S205 opens the high voltage interlock circuit when IPA bandswitch S202 is turned from one position to another. For further details, refer to paragraph 4-4c.

4-3. RF AMPLIFIER POWER SUPPLY MODEL AX-104.

a. GENERAL. - As pointed out in paragraph 4-1, the IPA, including its power supply AX-104, may be pulled out from the main frame chassis. It is located in the front compartment immediately below the PA. As shown by figure 1-8, the RFC-1, described in preceding paragraph 4-2, is located in a removable compartment within the complete IPA unit; the AX-104 is located on both sides of the RFC-1. Figure 4-10 is the overall schematic of the AX-104.

b. POWER SUPPLY MODEL AX-104. (See figure 4-10.) - The AX-104 consists of a high voltage rectifier and a bias rectifier. The high voltage rectifier V2000, is a full-wave rectifier using a 5R4 tube. The high voltage rectifier supplies unregulated plate voltage for V201 and V202, both normally +400 volts DC at terminal H on J2001. It also supplies +400 volts unregulated for the screen of V203 at terminal J on J2002. The +200 volts unregulated screen supply for V201, V202, and V203 appears at terminal E of J2001.

The bias rectifier, V2001, is a half-wave rectifier using a 6X4 tube. It supplies -300 volts bias at terminal E on J2002 for PA grid V900 and PA BIAS relay K700. It also supplies bias of -150 volts at terminal M of J2001 for V201 and V202 and IPA BIAS relay K708. Voltage dividers reduce the grid bias on V201 to approximately -5 volts and on V202 to approximately -38 volts. Bias voltage of -100 volts is provided at terminal I of J2001 for V203. Transformer T2000 provides the plate and filament voltages for both the high voltage rectifier and the bias rectifier. Its input winding is connected for 220-volt operation. Transformer T2001 provides two windings on the secondary. One winding between terminals 6 and 7 provides 6 volts at 12 amp for V203; the other winding, between terminals 5 and 7, provides 6.3 volts for V201 and V202. The input to transformer T2001 is also connected for 220-volt operation.

The IPA blower-starter capacitor, C2021, is contained in the AX-104. It connects to B201 via terminals F, L of J2001(S) and P201(P). The IPA grid bias adjustment potentiometer, R2009, is also contained in the AX-104 chassis and has a screwdriver adjustment accessible within the unit. The drawer interlock indicator, I2000, is also contained in the AX-104 chassis and appears on the IPA front panel.

The IPA contains the following:

(1) DRAWER INTERLOCK indicator I2000
(2) Five fuses, F2000 (B +, .25A), F2001 (IPA BIAS, .125A), F2002 (IPA BLOWER, 2A), F2003 (IPA FIL, 2A), F2004 (LV, 3A)

4-4. POWER AMPLIFIER SECTION PA.

a. GENERAL. - As pointed out in paragraph 4-1, this section consists of elements permanently attached to the top compartment, running from front to back of the right section of GPT-10K. The PA uses a 4CX5000A tube (V900) operating as a class AB1 amplifier; V900 is a grounded-grid amplifier, since the IPA input from V203 is applied to the cathode via J901. Figure 7-2 is the overall schematic for this unit.

b. POWER AMPLIFIER V900. (See figure 4-11.) - As indicated by the heavy solid lines, signal flow is

from the IPA via J901 to the cathode of V900, thence from the plate of V900 to the antenna via E905 and E906 (balanced output) or J903 (unbalanced output). Enroute to the antenna the signals traverse a Pi-L network. Tuning and loading of the output network is accomplished with PA TUNE capacitor C927, PA LOAD capacitor C928, tapped inductance coils L902 and L903, OUTPUT BAL capacitor C916, and OUTPUT LOADING inductors L912 and L913 which are tuned by ferrite slugs. PA bandswitching is accomplished by BAND SW switch S900 which progressively shorts out sections of L903 and L902. Either balanced or unbalanced output is available with the use of jumpers on L912 and L913. When using an unbalanced output, thermocouple TC900 provides the load current reading on PA OUTPUT meter M1004. When using balanced output, two RF meters must be connected between the entrance insulators on the top of the GPT-10K and the balanced GPT-10K line. Approximately 10 db of feedback is provided via capacitor C929 (heavy dotted line).

The antenna tuning section for the balanced output connection consists of a Pi plus a T network that produces 180-degree phase displacement between the two currents to the rhombic when properly loaded. Designations of C916 (OUTPUT BALANCE) and L912 and L913 (OUTPUT LOADING) reflect the T network function. The antenna tuning section for the unbalanced output connection consists of a Pi network in series with an L network. The range of capacitances of C928 and C916 is such that the antenna may be properly loaded in this case by fixing C916 at mid range and L912 and L913 at given points depending on frequency. (Refer to Section 3 for more detailed information.)

V900's CR900RF rectifier network passes the rectified RF to ALDC switch S1003. This switch, in turn, routes the rectified RF to (a) associated SBE unit (non synthesized GPT-10K), (b) associated CHG-2 unit via center shield assembly connector J3017/P3049 ALDC (synthesized GPT-10K), or to neither (a) or (b) (ALDC switch in OFF).

A PA monitor signal is provided through C909 to J900 for checking distortion with the FSA (paragraph 1-4i) or for carrier frequency measurements. An IPA monitor signal is provided through J902.

V900 is supplied filament voltage at 7.5 volts, 75 amps, through filament transformer T801, which has a filament adjust switch on the primary to adjust for various primary voltages. The filament transformer center tap is connected to B- (ground) through PA PLATE CURRENT meter M1002 and the plate overload relay. In this instance, see figure 7-2 for details.

A number of elements associated with the PA appear, as follows:

ON METER PANEL AT TOP OF GPT-10K

(1) FILAMENT PRIMARY meter M1000
(2) PA SCREEN CURRENT meter M1001
(3) PA PLATE CURRENT meter M1002
(4) PA PLATE RF meter M1003
(5) PA OUTPUT meter M1004
(6) PA SCREEN voltmeter M3000
(7) PA BIAS (Grid) voltmeter M3001
(8) PA PLATE voltmeter M3002

ON PA

(1) PA TUNE knob control C927 and counter
(2) PA LOAD knob control C928 and counter
(3) BAND SW knob control S900 and counter
(4) OUTPUT BAL knob control C916 and counter
(5) OUTPUT LOADING knob control L912 and L913 and counter
(6) AC POWER indicator I1000
(7) TUNE indicator I1001
(8) OPERATE indicator I1002
(9) PLATE ON indicator I1003

c. INTERLOCK SWITCH CIRCUITS. (See figure 4-12.) - Many interlock switch circuits are located throughout the GPT-10K. For example, when the IPA air switch fails to close because of inadequate "air-vane" pressure, the GPT-10K will not operate. Likewise, when the "rear door" (actually rear RF shield) switch does not close, or when the PA deck switch is not closed, or when the high voltage deck switch is not closed, etc., the GPT-10K does not operate. There are 10 such interlock switches located throughout the GPT-10K. The 11th interlock switch position monitors the overload relay circuits while the 12th position monitors the overall condition of the GPT-10K for readiness to go on the air. It is obvious, then, that some form of simple test is required to determine which of the many interlock switches is open, should a GPT-10K remain inoperative when it should operate. The interlock switch circuits on figure 4-12 fulfill these requirements. This switch and certain associated elements are contained on the rear of the main power control panel. Figures 4-13 and 4-14 show how the circuits perform.

Referring to figure 4-13, turn switch S1001 to position 1. Note that 60-cycle phase-1 terminal voltage reaches the wiper of switch S1001 via INTERLOCK INDICATOR I1004. Note now that if the IPA BAND switch S202 is in a "non-change" position, 60-cycle phase-2 terminal voltage reaches wiper W via contacts C and 1 of switch S205 and contact 1 of switch S1001. Consequently, when switch S1001 is turned to position 1, the lighting of INTERLOCK INDICATOR I1004 indicates that IPA BAND switch S202 is not responsible for an inoperative GPT-10K.

Now place switch S1001 in position 2. Once more note that 60-cycle phase-2 terminal voltage normally reaches wiper W via contacts C and 1 of switch S205, contacts C and 1 of switch S206, and contact 2 of switch S1001. When switch S1001 is in position 2, the lighting of INTERLOCK INDICATOR I1004 indicates that the IPA air switch S206 is not responsible for an inoperative GPT-10K.

Now place switch S1001 in position 3. Again, note that 60-cycle phase-2 terminal voltage normally reaches wiper W via contacts C and 1 of switch S205; C and 1 of switch S206, contacts J and K closed (normal), and contact 3 of switch S1001. When switch

S1001 is in position 3, the lighting of INTERLOCK INDICATOR I1004 indicates that the EXT jumper is not responsible for an inoperative GPT-10K.

The legend in figure 4-13 shows how other interlock switch positions may be readily checked. As stated previously, this relatively simple circuit arrangement is a substantial aid toward spotting which of many interlock switches may be responsible for an inoperative GPT-10K.

Referring to figure 4-14, turn switch S1001 to position 12. Assume that the GPT-10K is operating normally. Current flow is as follows:

(1) X to Y to Z to W to CB1001 to U to V.

The magnitude of current that flows keep contactors K3000 and K3001 operative but does not trip solenoid circuit breaker CB1001.

(2) X to Y to Z to d to 11 (S1001) to 12 (S1001) to wiper (S1001) to I1004 to U to V. I1004 goes on.

(3) X to Y to Z to d to L802 to U to V. The contacts of L802 remain closed.

Assume now that the PA AIR VANE operates due to a sudden deficiency of air pressure. Current flow is as follows:

(1) X to C to 2 (S800) to R1000/R1001 to CB1001 to U to V. The magnitude of current that flows trips solenoid circuit breaker CB1001. Now item (1) of preceding case is open and contactors K3000 and K3001 open up the main power supply.

(2) Indicator I1004 goes off. Refer to item (2) of preceding case.

(3) The contacts of L802 release. Refer to item (3) of preceding case.

A number of elements associated with the interlock switch circuits appear, as follows:

ON MAIN POWER CONTROL PANEL

(1) INTERLOCK switch S1001
(2) INTERLOCK INDICATOR I1004
(3) HIGH VOLTAGE current breaker CB1001

4-5. RELAY AND INDICATOR CONTROL PANELS.

a. GENERAL. - As may be seen from the front view of the GPT-10K, the relay control panel is located at the bottom of the main frame chassis and the indicator control panel is located just above the relay control panel. The components of the relay control panel comprise nine relays (K700 thru K708) and six terminal strips (E700 thru E705). The components of the indicator control panel comprise six indicator lamps (I700 to I705), five potentiometers (R703, R705, R707, R709, and R711), six fuses (F700 through F705), FILAMENT TIME meter M700, TIME DELAY relay M701, PLATE TIME meter M702, and ALARM ON/OFF switch S700. (See figure 4-15.) The function of M700, M701, and M702, however, briefly is as follows:

The FILAMENT TIME meter meters the time that the filament in the PA tube has been activated. The PLATE TIME meter meters the time that the plate in the PA tube has been activated. This information is important from both an operating and maintenance standpoint. For example, it indicates the expended life of a tube and expected future life. The TIME DELAY relay is a slow acting relay that initially permits a plate voltage on the PA tube of 5 kv and, eventually, a voltage of 7.5 kv.

b. RELAY AND INDICATOR CONTROL PANELS CIRCUITS. (See figures 4-15 and 4-16.) - These panels are equipped with control circuits, as shown in figure 4-15 and as detailed in figure 4-16, because the GPT-10K must be "cutoff" when serious "abnormal" conditions prevail. For example, the GPT-10K should not be powered if any interlock switch is open. Again, the GPT-10K should not be kept on should any of its elements receive overvoltages.

The interlock circuit, described briefly in paragraph 4-4c, provides arrangements to monitor "mechanical interlocks" in positions 1 to 10. Positions 11 and 12 supplement these monitors as explained briefly below.

(1) CIRCUITS OF IPA BIAS RELAY K708. (See figure 4-16, sketch 1.) - IPA BIAS relay monitors the IPA GRID BIAS (V203). If this bias is within limits, indicator I705 will go off and three sets of contacts in parallel close in order to provide continuity of the "series contact circuit" to adjacent relay K707. If this bias is subnormal (e.g., no IPA bias), the circuit to INTERLOCK INDICATOR I1004 opens and two things occur: the GPT-10K is shut down by the K3000 and K3001 circuit breaker relays associated with TIMER M3003 and the interlock switch circuit (paragraph 4-4c) indicates an open in the "series contact circuit" on position 11 of INTERLOCK switch S1001. Position 12 is reserved as an overall monitor for position 1 through 11.

(2) CIRCUITS OF IPA PLATE OVLD RELAY K707. (See figure 4-16, sketch 2.) - This circuit contains two relay windings: a reset and an overload (OVLD). Under normal conditions, the reset winding places the relay contacts as shown. However, should the IPA PLATE CURRENT (V203) become excessive, the overload (OVLD) winding "opens up" the relay contacts. Three things happen: the GPT-10K shuts down because the continuity of the "series contact circuit" is broken, indicator I704 goes on, and the interlock switch circuit (paragraph 4-4c) indicates an open in the "series contact circuit" on position 11 of INTERLOCK switch S1001. Position 12 is reserved as an overall monitor for positions 1 through 11.

(3) CIRCUITS OF IPA SCREEN OVLD RELAY K706. (See figure 4-16, sketch 3.) - This circuit contains two relay windings: a reset and an overload (OVLD). Under normal conditions the reset winding places the relay contacts as shown. However, should

the IPA SCREEN VOLTAGE (V203) become excessive, the overload (OVLD) winding "opens up" the relay contacts. Three things happen: the GPT-10K shuts down because the continuity of the "series contact circuit" is broken, indicator I703 goes on, and the interlock switch circuit (paragraph 4-4c) indicates an open in the "series contact circuit" on position 11 of INTERLOCK switch S1001. As before, position 12 is reserved as an overall monitor for positions 1 through 11.

(4) CIRCUITS OF OPERATE/TUNE RELAY K705. (See figure 4-16, sketch 4.) - The circuits reflect two assumed conditions: switch S1004 in OPERATE position and switch S1005 in OFF position; switch S1004 in TUNE position and switch S1005 in ON position. Under the first condition, the following requirements are fulfilled: indicator I1002 goes on, relay K705 contacts are as shown, the OVLD winding of IPA SCREEN OVLD relay K706 is supplied from 400-volt unregulated rectifier V2000 via terminals 35 and 36 of K705, the OVLD winding of PA SCREEN OVLD relay K702 is supplied from 1200-volt terminal of CR800 via terminals E709 and E711, and the OVLD winding of PA SCREEN OVLD relay K702 is connected to a contact of PA SCREEN ON/OFF relay K703 (shown open under conditions specified in sketch 4), but does not reach the screen of V900.

If switch S1004 is in TUNE position and switch S1005 is in ON position, the following requirements are fulfilled: indicator I1001 is on, relay K705 contacts are opposite to those shown, the OVLD windings of K706 is supplied from 200-volt unregulated rectifier V2000, the OVLD winding of K702 is supplied from 600-volt terminal of CR800, and the OVLD winding of K702 reaches the grid of V900.

(5) CIRCUITS OF DIODE PROTECT RELAY K704. (See figure 4-16, sketch 5.) - The OVLD winding ensures that the potential at terminal 3 of CR800 is within limits, the "series contact circuits" between IPA SCREEN OVLD relay K706 and PA SCREEN OVLD relay K702 are made continuous under normal conditions, and the reset feature of relay K704 is provided to establish the circuits shown.

(6) CIRCUITS OF PA SCREEN ON/OFF RELAY K703. (See figure 4-16, sketch 6.) - These circuits are auxiliary to those shown in sketches 4 and 7. They show how the ON position of the PA SCREEN ON/OFF switch places +600 or +1200 volts on the screen of V900 via the OVLD winding of PA SCREEN OVLD relay K702.

(7) CIRCUITS OF PA SCREEN OVLD RELAY K702. (See figure 4-16, sketch 7.) - These circuits fulfill four conditions: overload reset, continuity or discontinuity of "series circuit contacts" between DIODE PROTECT relay K704 and PA PLATE OVLD relay K701, indicator I702 is off under "normal" conditions, and OVLD samples normalcy of PA screen voltage under 600- or 1200-volt excitation. As previously explained, the GPT-10K is "shut down" if abnormal conditions exist. The presence of these conditions may be detected by INTERLOCK switch S1001 in position 11. As before, position 12 is reserved as an overall monitor for positions 1 through 11.

(8) CIRCUITS OF PA PLATE OVLD RELAY K701. (See figure 4-16, sketch 8.) - These circuits fulfill four conditions: overload reset closed, continuity or discontinuity of "series circuit contact" between PA SCREEN OVLD relay K702 and PA BIAS relay K700, indicator I701 is off under "normal" conditions, and OVLD samples the normalcy of PA plate voltage. As previously explained, the GPT-10K is "shut down" if abnormal conditions exist. The presence of these conditions may be detected by INTERLOCK switch S1001 in position 11. As before, position 12 is reserved as an overall monitor for positions 1 through 11.

(9) CIRCUITS OF PA BIAS RELAY K700. (See figure 4-16, sketch 9.) - These circuits deal essentially with conditions of regulated rectifier V2001 which supplies bias to the grid of the PA, V900. Three conditions are fulfilled: continuity or discontinuity of "series circuit contacts" to adjacent relay K701 (PA PLATE OVLD), indicator I700 is off under "normal" conditions, and relay K700 winding samples the normalcy of PA grid (V900) bias. As previously explained, the GPT-10K is "shut down" if abnormal conditions exist. The presence of these conditions may be detected by INTERLOCK switch S1001 in position 11. As before, position 12 is reserved as an overall monitor for positions 1 through 11.

(10) ALARM CIRCUIT. (See figure 4-16, sketch 10.) - This circuit samples the condition of relay K3000 which is associated with the main circuit breaker. If the GPT-10K is on, the buzzer circuit is open; if the GPT-10K shuts down, the buzzer circuit is closed, provided ALARM ON/OFF switch S700 is ON.

A number of elements associated with the relay and indicator control panel circuits appear on the main power control panel and PA. These are as follows:

(a) OVERLOAD RESET switch S1000
(b) OPERATE/TUNE switch S1004
(c) PA SCREEN ON/OFF switch S1005
(d) TUNE indicator I1001 (S1004 in TUNE position)
(e) OPERATE indicator, I1002 (S1004 in OPERATE position)

4-6. HIGH-VOLTAGE RECTIFIER SECTION MODEL T1-104

a. GENERAL. - The power supply for the main frame chassis of the GPT-10K consists of two parts: (1) unregulated +400 and +200 voltages and regulated -300 and -150 voltages; (2) +7500, +3000, +1200, +600 unregulated voltages.

Item (1) is described in paragraph 4-3b. The T1-104 for item (2) is described in the following paragraphs.

b. POWER SUPPLY CIRCUITS. (See figure 4-17.) - The major components of these circuits comprise circuit breakers, control equipment, 50- and 60-cycle

power transformers, high-voltage rectifiers, a filament transformer, choke coils, high voltage capacitors, blower motors, and miscellaneous auxiliary equipment components. The principal components are distributed among four compartments of the main frame chassis as follows:

(1) Middle rear compartment: blower motor, choke coils (L800 and L801), and high voltage rectifier filament transformer (T801).

(2) Bottom rear compartment: high-voltage capacitors (C800, C801, and C802).

(3) Bottom front compartment: main 3-phase 16 kva 220- to 5000-volts, 50- or 60-cycle power transformer. The front panels of this compartment contain relay and control equipment, and line filter assembly.

(4) Front compartment immediately above the relay and indicator control panels: high voltage rectifiers.

Starting at the 220-volt, 3-phase ungrounded power input (at the customer's mains), as shown in the upper right portion of figure 4-19, the power supply circuit comprises circuit breaker, control, and other equipments as indicated on detailed figure 4-18. The next link in the supply circuit is the main 3-phase delta-wye power transformer that supplies 5 kv between phases. A full-wave 3-phase rectifier with a filament supply of 75 amp at 7.5 volts is utilized to provide 7.5 kv DC at terminal B+. Details of the rectifier are shown in figure 4-19. The output of the rectifier is filtered by L800 (2 henrys) and C800 (4 uf).

The DC requirements at the rectifier output are roughly 1.5 amp at 7500 volts. This is well within the capacity of the rectifier considering the elements used and the phasing between filament and plate voltages. The current and voltage conditions in the various transformer-rectifier circuits are a complex function of the parameters and the phasing between the rectifier AC filament and plate voltages. When the circuits are connected as shown for IPA plate and PA screen voltages, the circuit supply voltages are as previously stated:

IPA PLATE, +3000
PA SCREEN, +1200 (OPERATE); +600 (TUNE)
PA PLATE, +7500

The main power control panel contains four components, intimately associated with the power supply:

(1) MAIN POWER circuit breaker CB1000
(2) AC POWER indicator I1000
(3) PLATE ON indicator I1003
(4) HV ON indicator (pilot light atop GPT-10K) I3000

4-7. GPT-10K CONTROLS.

A review of paragraphs 4-3 through 4-6 shows many GPT-10K controls. Their functions should be apparent from the circuit description given for each basic unit. Considerable additional information on this subject is given in Section 3 dealing with GPT-10K operation. The paragraphs on interlock switch circuits (paragraph 4-4c) and on the relay and indicator control panels (paragraph 4-5) show considerable effort devoted to GPT-10K control, protection, and ease of operation.

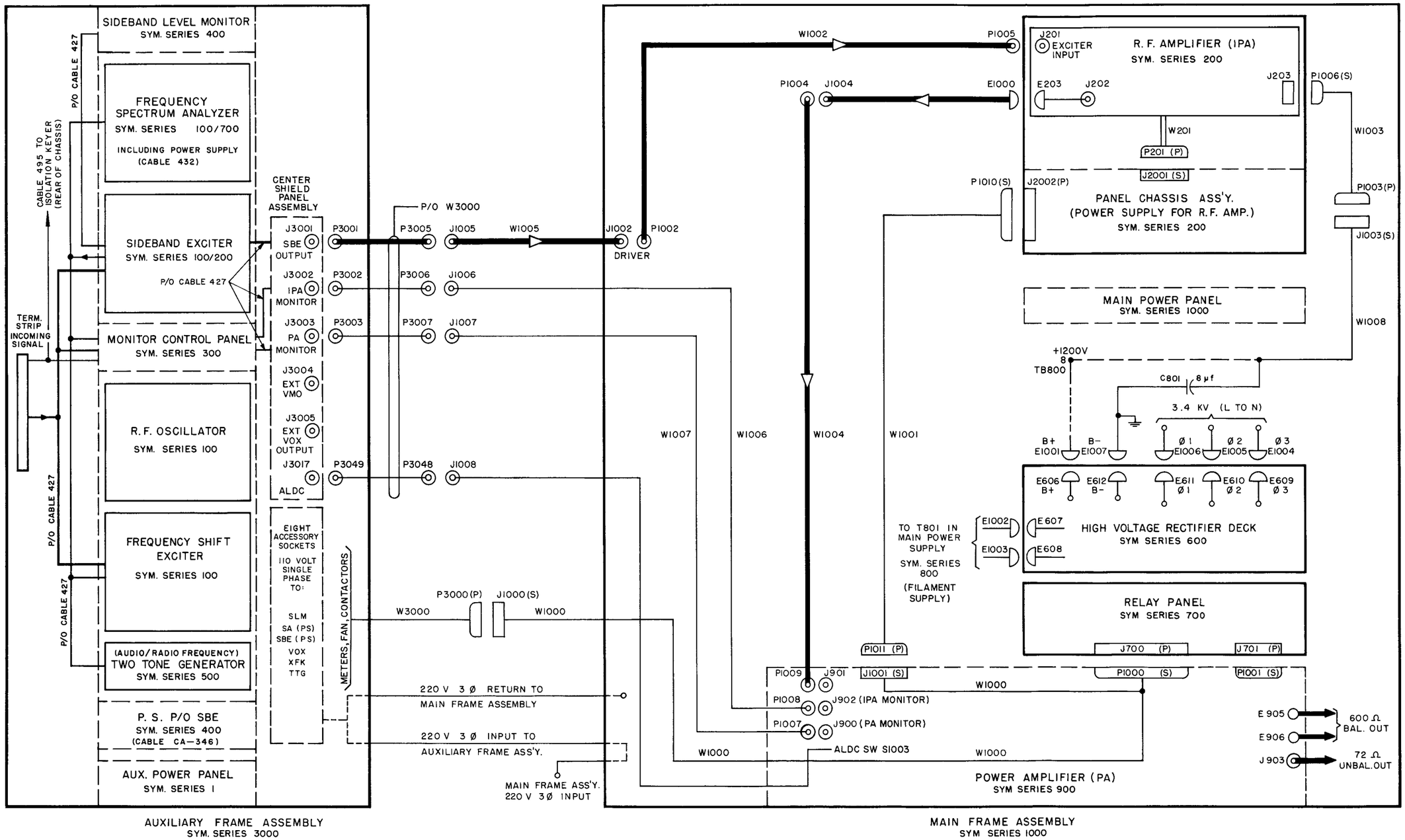


Figure I-4-1-a. Simplified Block and Interconnection Diagram, GPT-10K (Non-Synthesized)

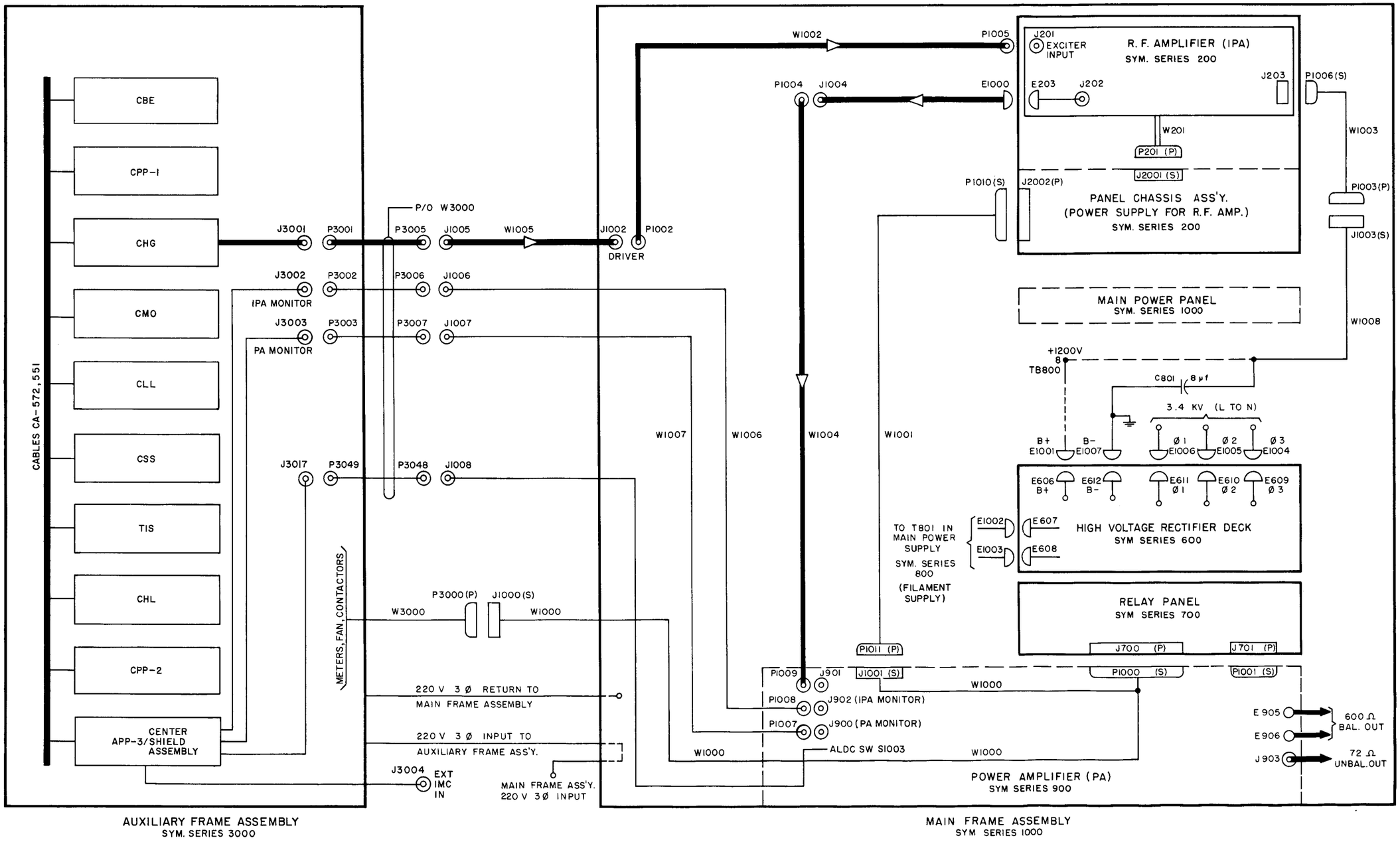


Figure I-4-1-b. Simplified Block and Interconnection Diagram, GPT-10K (Synthesized)

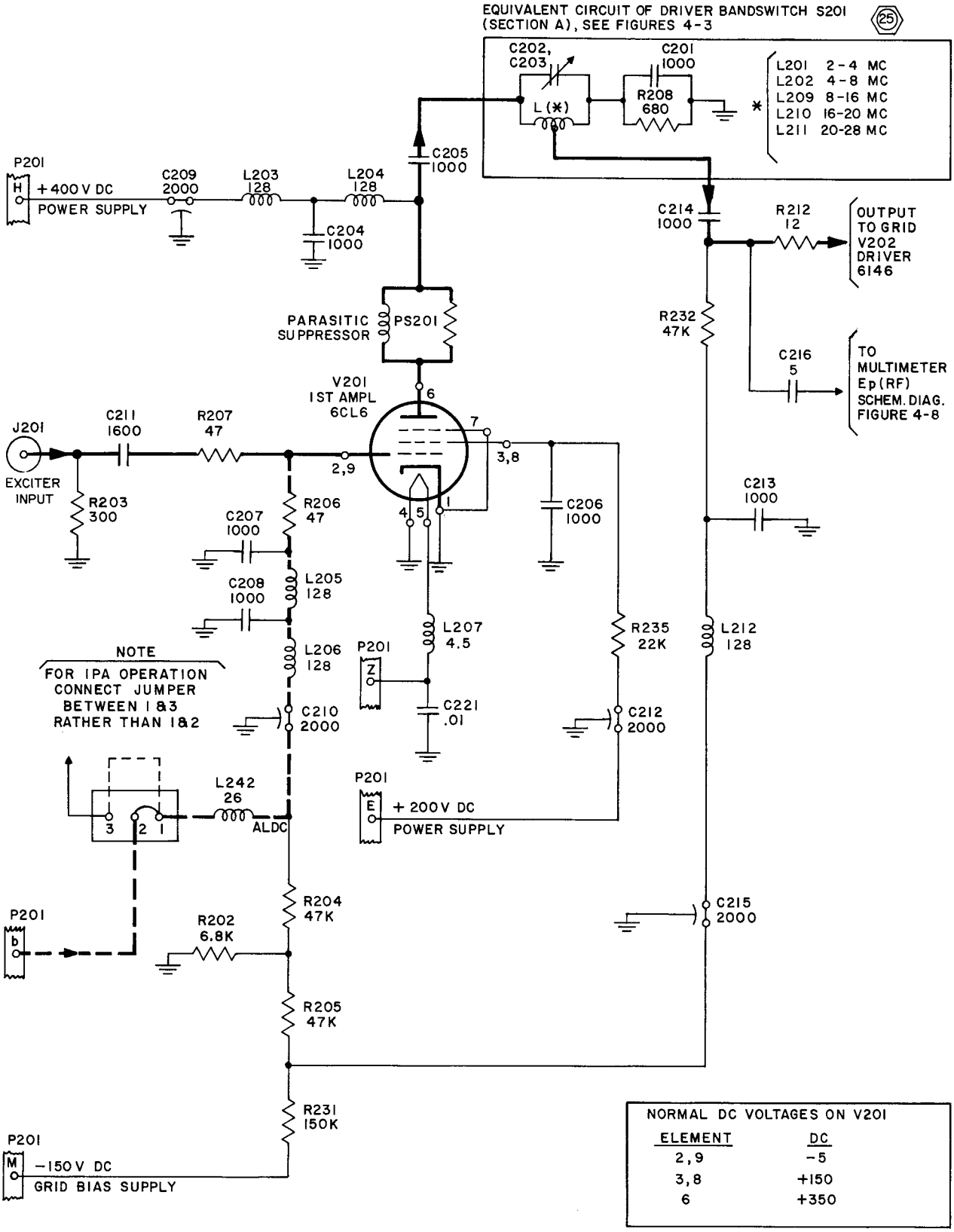
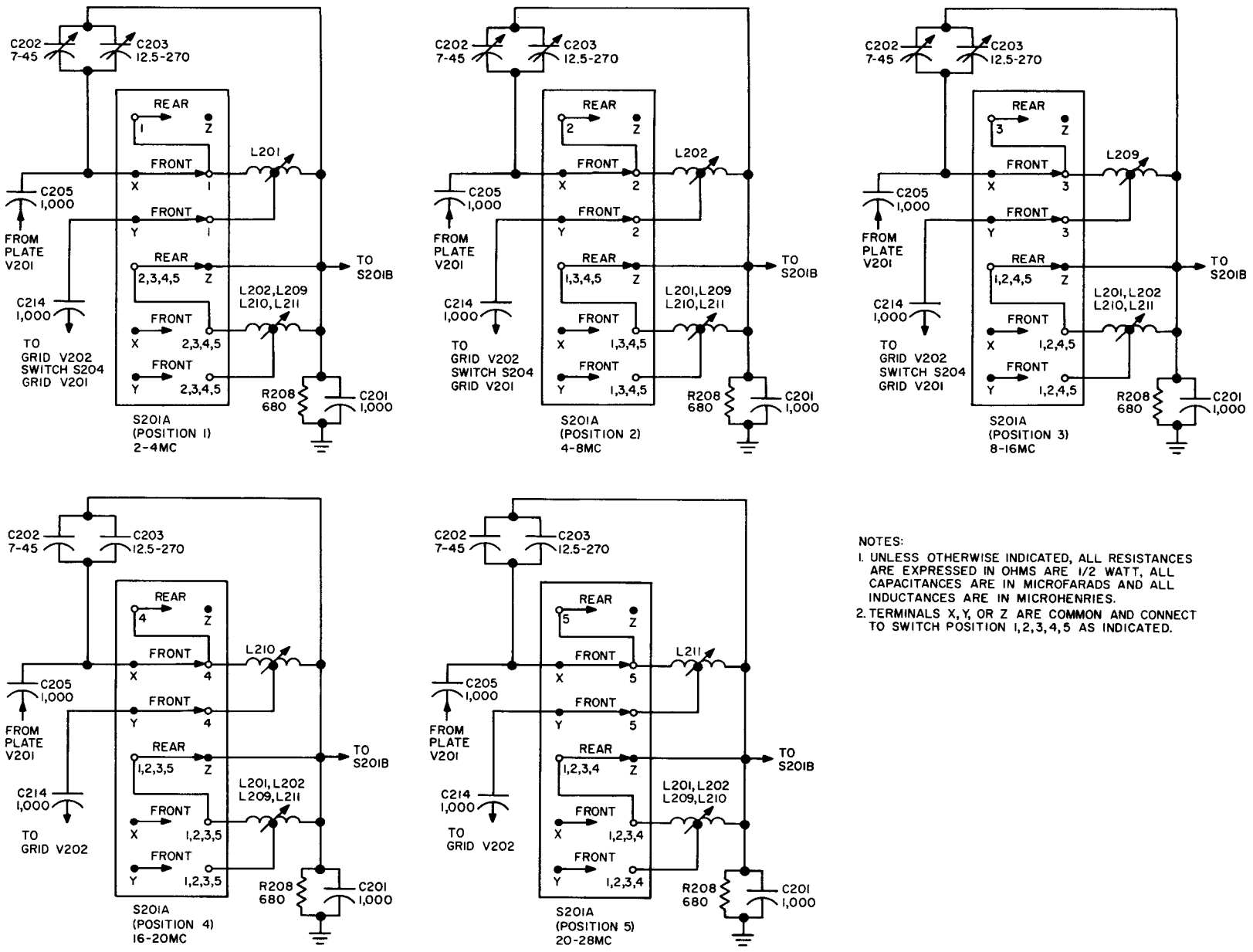


Figure I-4-2. Simplified Schematic Diagram, 1st Amplifier Stage, RFC-1



NOTES:

1. UNLESS OTHERWISE INDICATED, ALL RESISTANCES ARE EXPRESSED IN OHMS ARE 1/2 WATT, ALL CAPACITANCES ARE IN MICROFARADS AND ALL INDUCTANCES ARE IN MICROHENRIES.
2. TERMINALS X, Y, OR Z ARE COMMON AND CONNECT TO SWITCH POSITION 1, 2, 3, 4, 5 AS INDICATED.

Figure I-4-3. Simplified Schematic Diagram, DRIVER BAND Switch S201A, Positions 1, 2, 3, 4, and 5, RFC-1

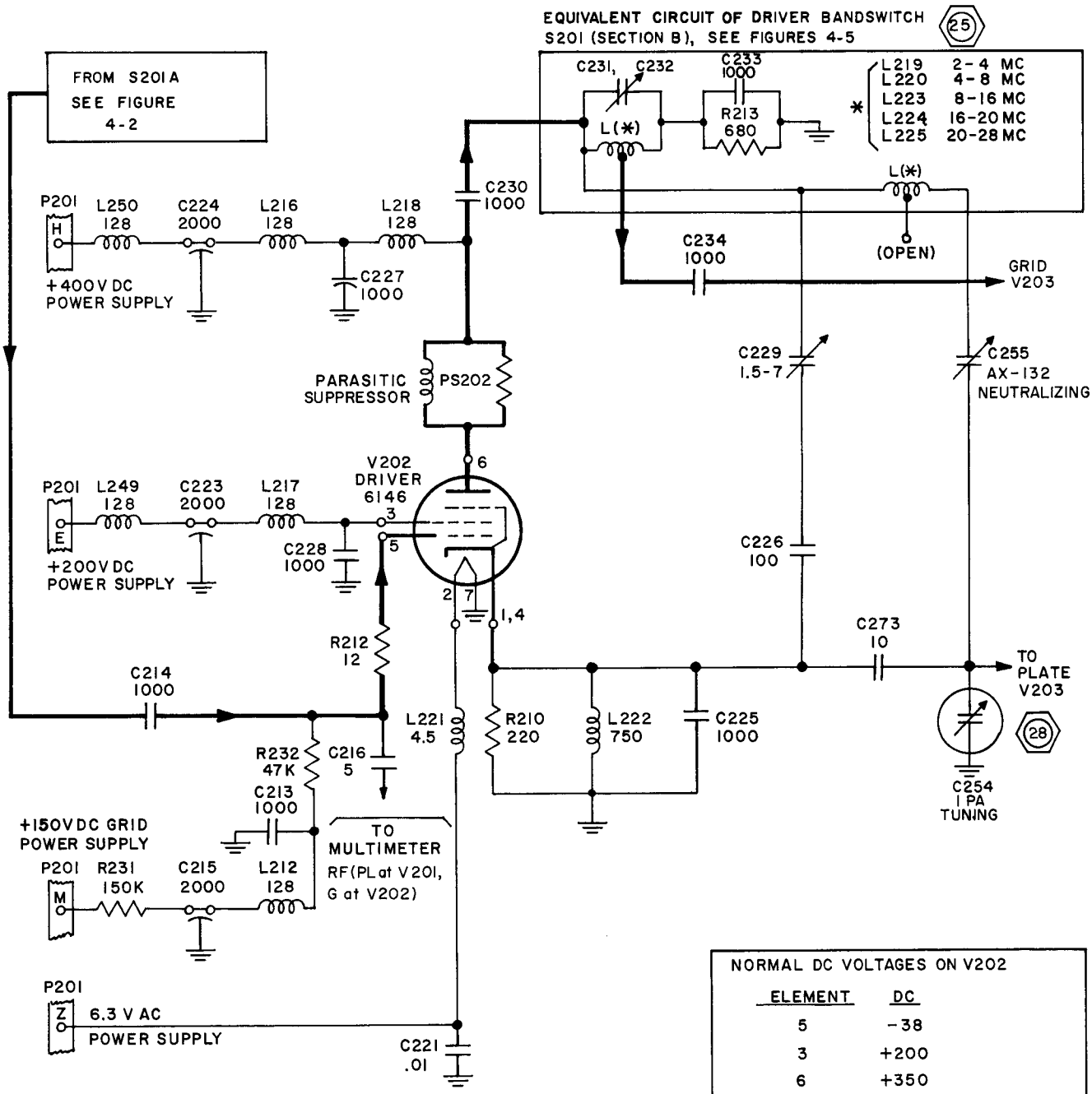
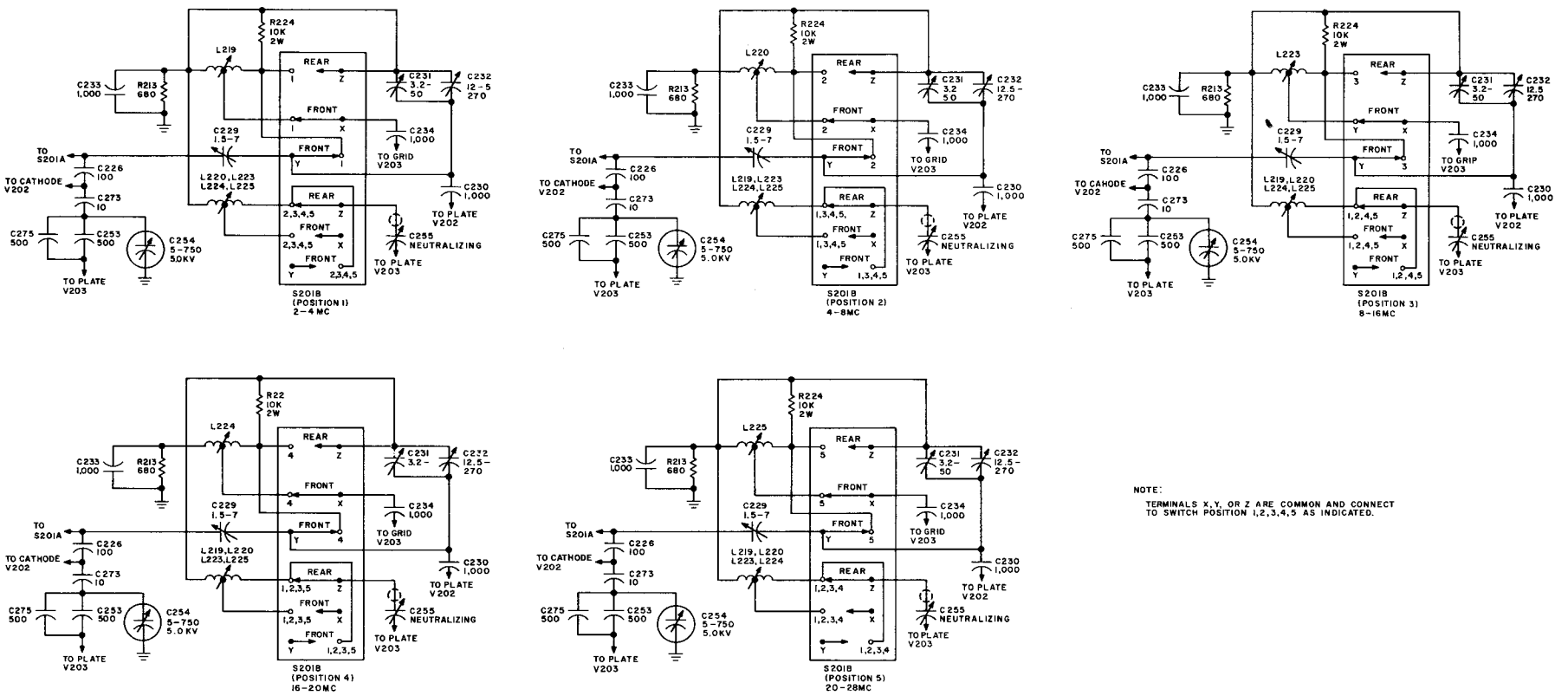


Figure I-4-4. Simplified Schematic Diagram, 2nd Amplifier Stage, RFC-1



NOTE:

TERMINALS X, Y, OR Z ARE COMMON AND CONNECT TO SWITCH POSITION 1,2,3,4,5 AS INDICATED.

Figure I-4-5. Simplified Schematic Diagram, DRIVER BAND Switch S201B, Positions 1, 2, 3, 4, and 5, RFC-1

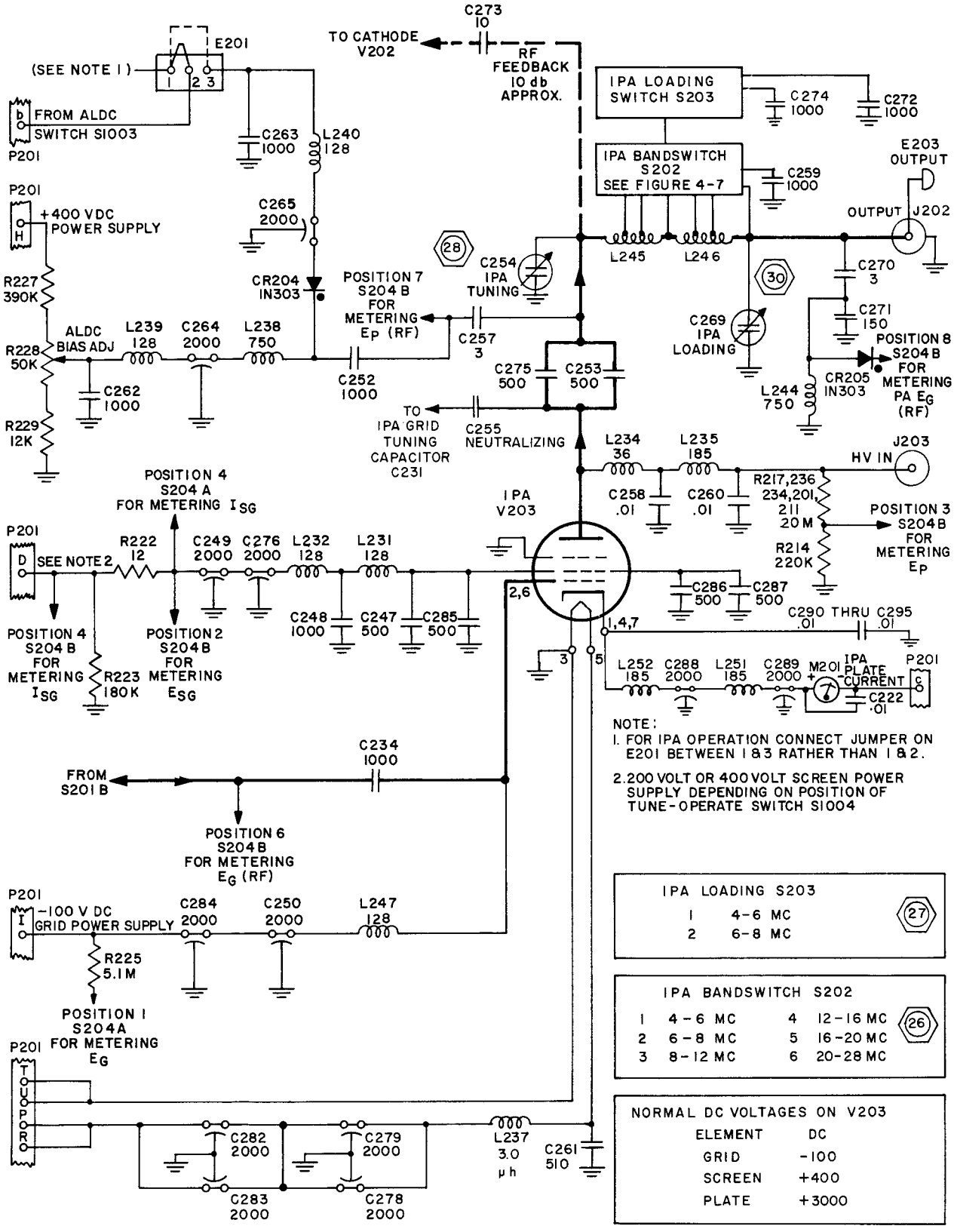


Figure I-4-6. Simplified Schematic Diagram, IPA Stage, RFC-1

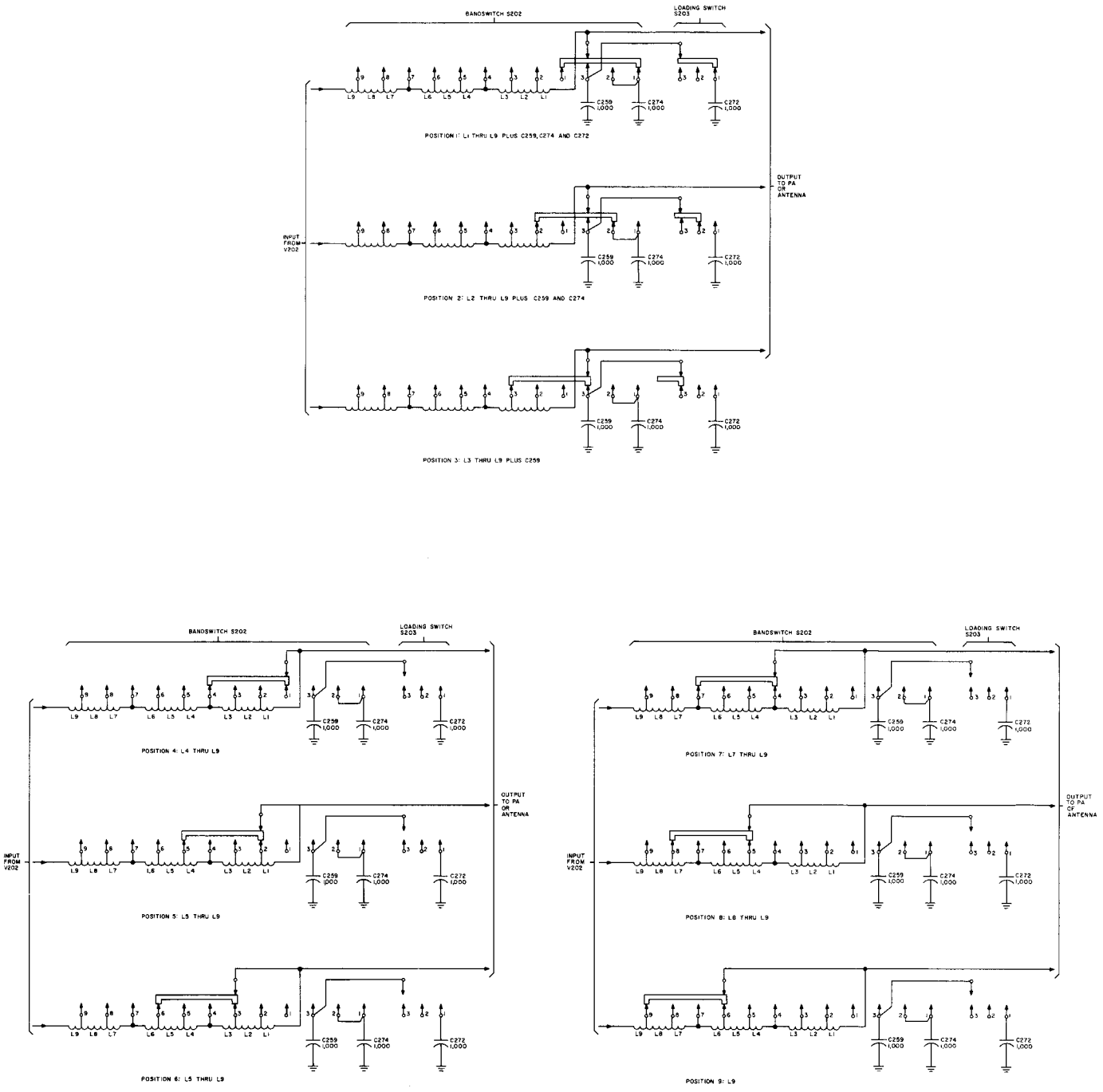


Figure I-4-7. Simplified Schematic Diagram, IPA BAND and IPA LOADING Switches, S202 and S203, RFC-1

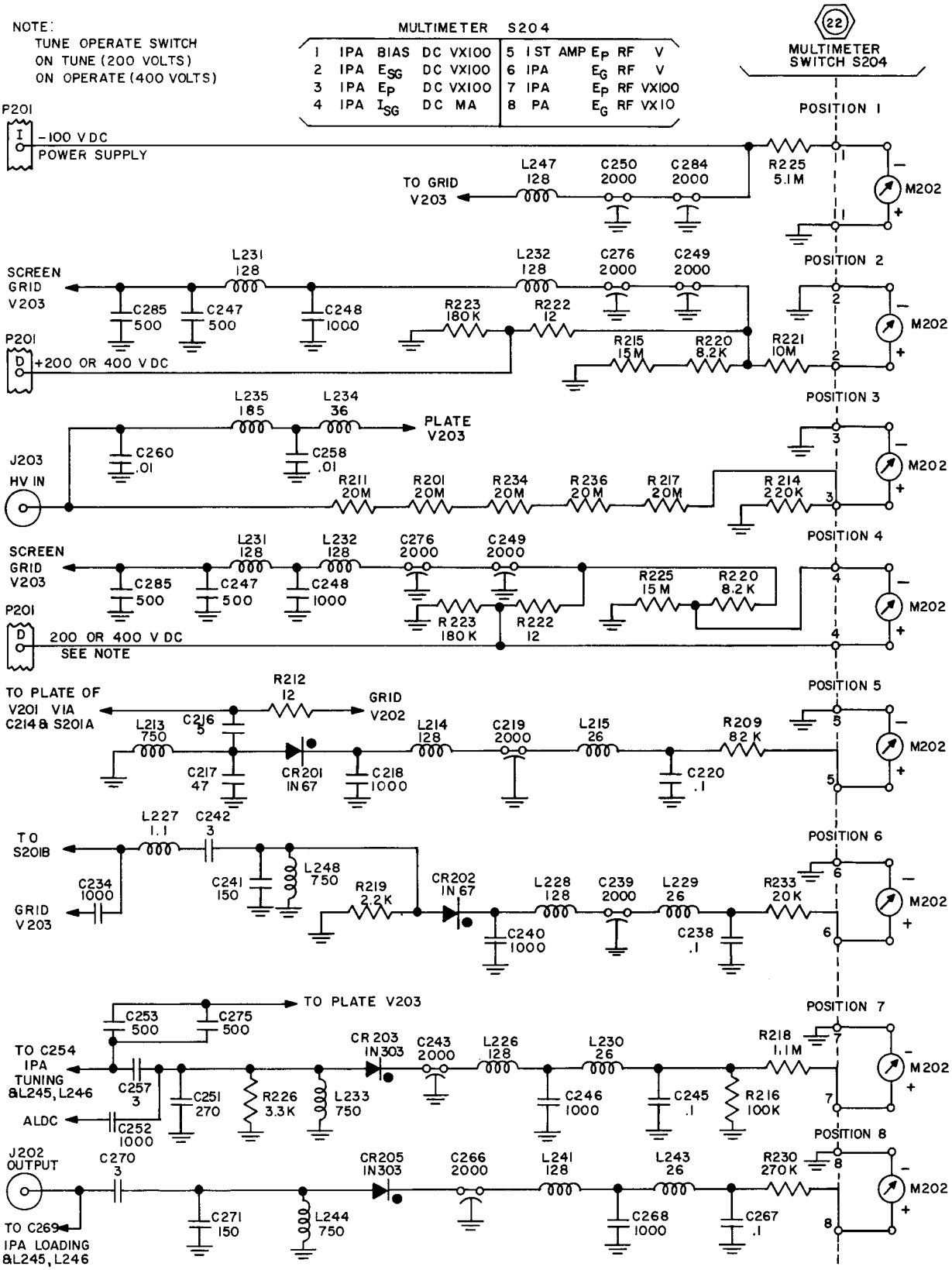
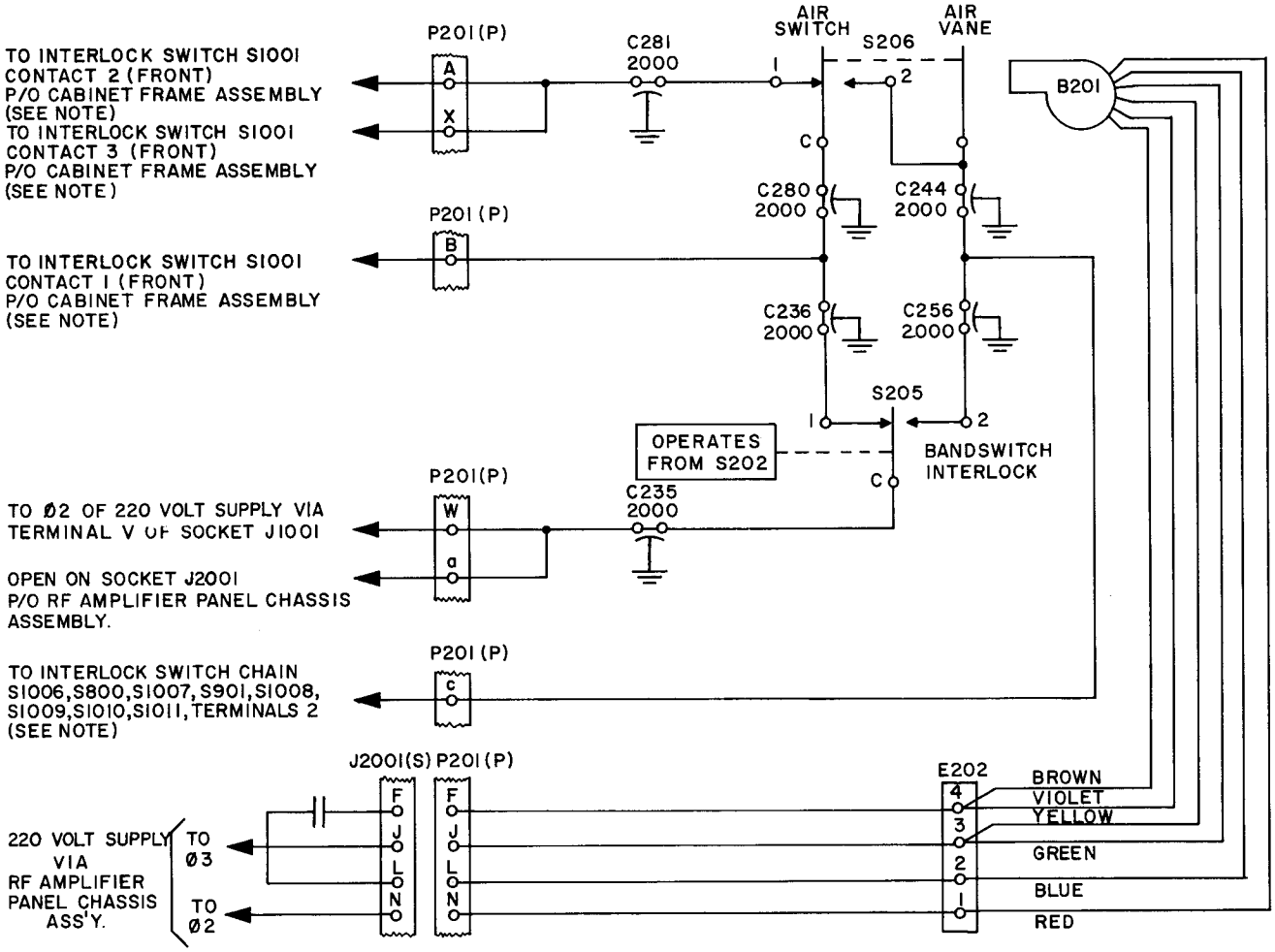


Figure I-4-8. Simplified Schematic Diagram, MULTIMETER Switch (S204) Circuits, RFC-1



NOTE: FOR MORE DETAIL SEE FIGURE 4-12
AND PARAGRAPH 4-4C OF MANUAL.

Figure I-4-9. Simplified Schematic Diagram, INTERLOCK Switches S205 and S206, RFC-1

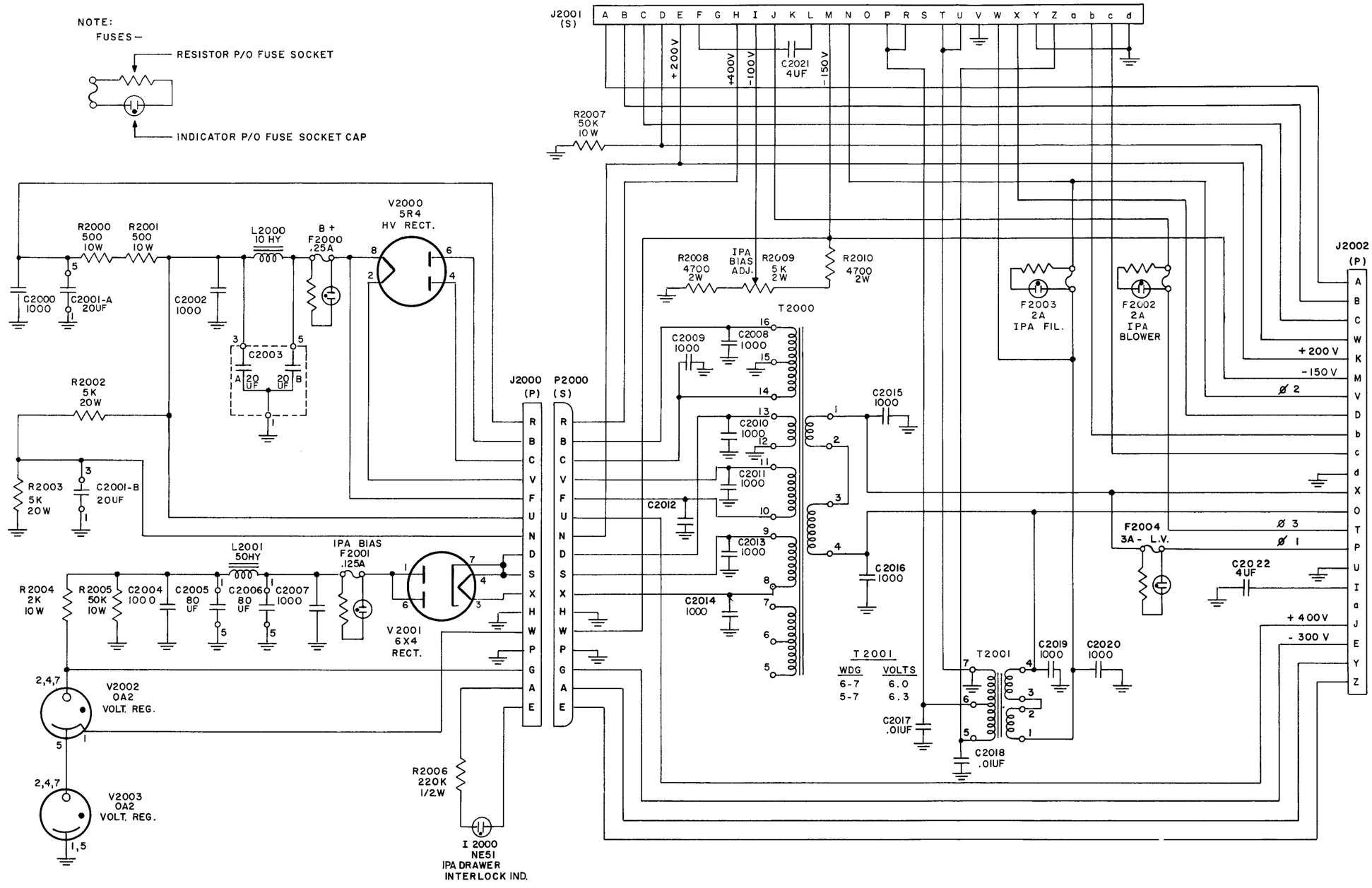


Figure I-4-10. Simplified Schematic Diagram, Power Chassis Assembly, RFC-1

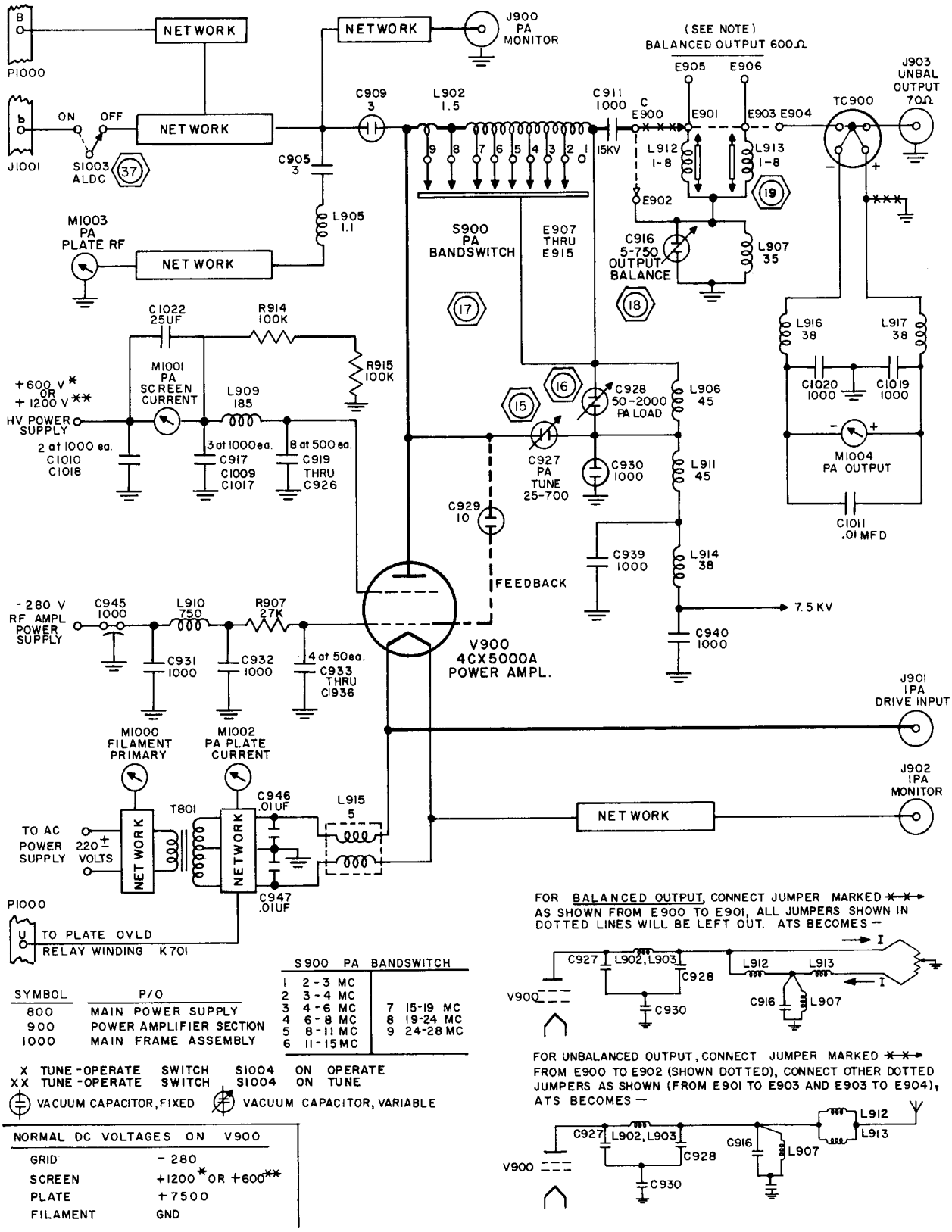
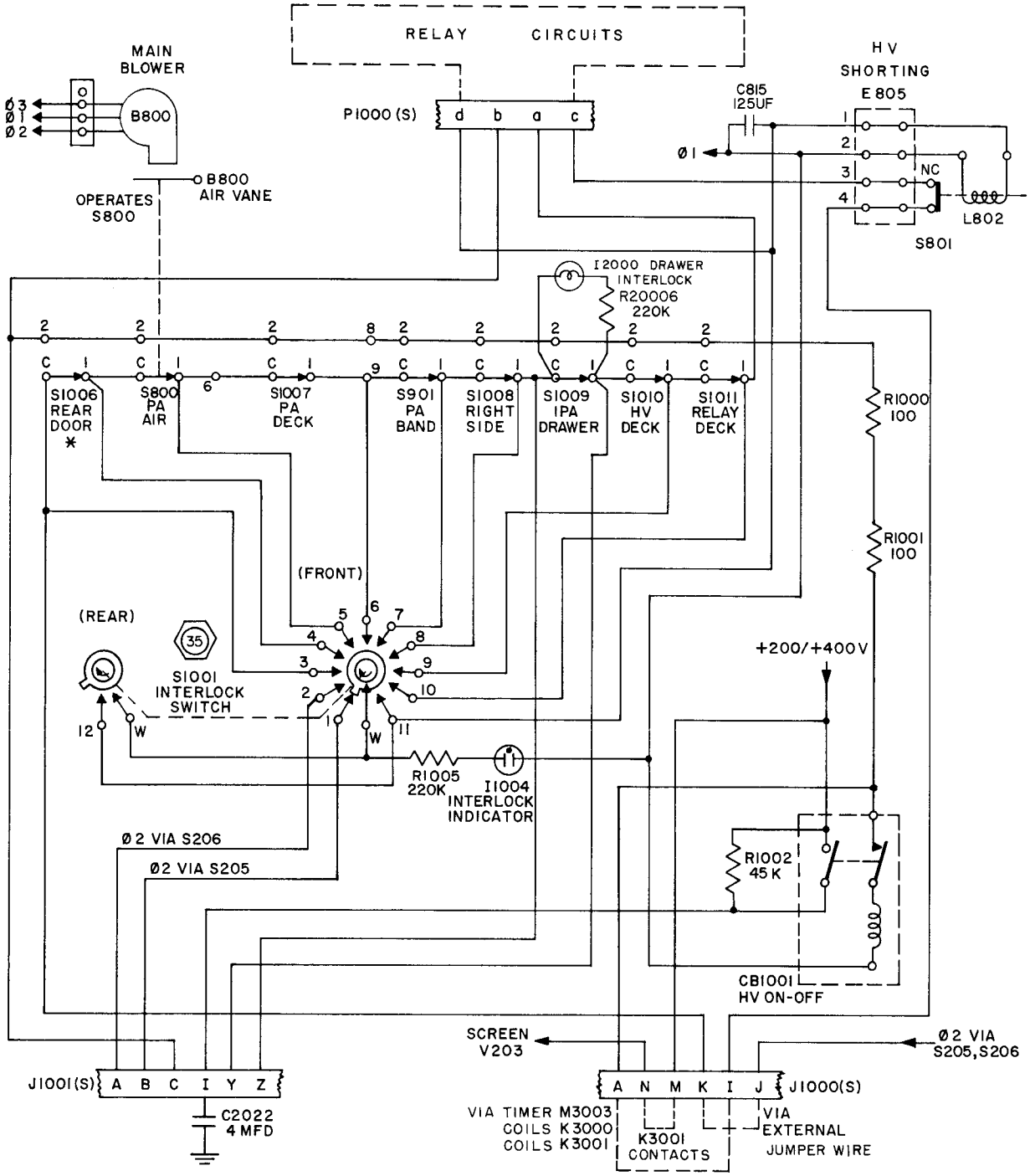


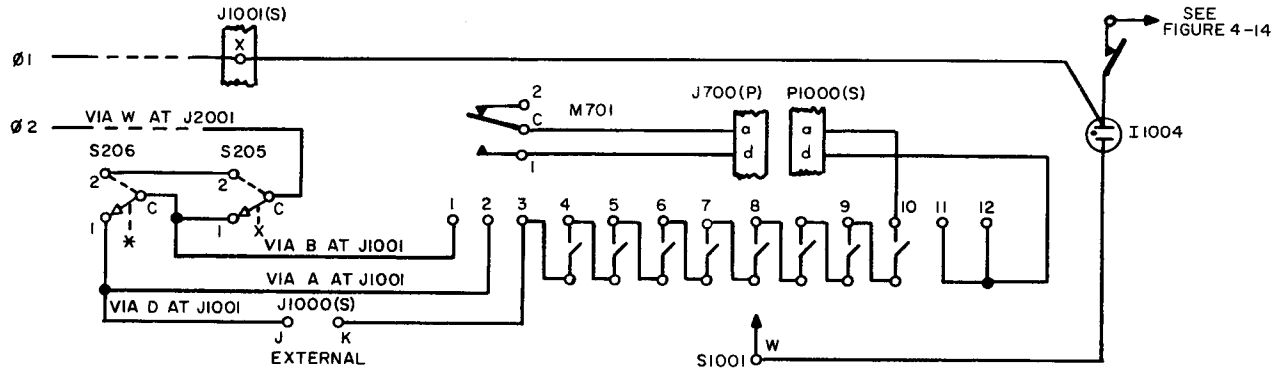
Figure I-4-11. Simplified Schematic Diagram, Power Amplifier Stage, GPT-10K



NOTE:
TERMINAL NO. 1 DESIGNATES SWITCH TERMINAL MARKED "NO".
TERMINAL NO. 2 DESIGNATES SWITCH TERMINAL MARKED "NC".
TERMINAL NO. C DESIGNATES SWITCH TERMINAL MARKED "C".
ALL SWITCHES SHOWN IN NORMALLY OPERATED POSITION.

* ACTUALLY REAR RF SHIELD.

Figure I-4-12. Simplified Schematic Diagram, INTERLOCK Switch (S1001) Circuits, GPT-10K



GENERAL: IN ALL 10 FOLLOWING CASES, Ø1 REACHES WIPER OF SWITCH 1001

CASE	CONDITION	CIRCUIT
1	BANDSWITH INTERLOCK S205 CLOSED	Ø2 REACHES WIPER W VIA C, OF S205; 1 OF S1001
2	AIR SWITCH S206 CLOSED	Ø2 REACHES WIPER W VIA C, OF S205; C, 1 OF S206; 2 OF S1001.
3	EXTERNAL CLOSED	Ø2 REACHES WIPER W VIA C, OF S205; C, 1 OF S206; J, K CLOSED; 3 OF S1001
4	REAR DOOR S1006	SEE CASE 3 EXCEPT 4 OF S1001 CLOSED.
5	PA AIR SWITCH S800	SEE CASE 4 EXCEPT 5 OF S1001 CLOSED.
6	PA DECK SWITCH S1007	SEE CASE 5 EXCEPT 6 OF S1001 CLOSED.
7	PA BANDSWITCH S901	SEE CASE 6 EXCEPT 7 OF S1001 CLOSED.
8	RIGHT SIDE SWITCH S1008 IPA DRAWER SWITCH S1009	SEE CASE 7 EXCEPT 8 OF S1001 CLOSED. NOT CONNECTED TO S1001, SEE SECTION 4-3b
9	HV DECK SWITCH S1010	SEE CASE 8 EXCEPT 9 OF S1001 CLOSED.
10	RELAY DECK S1011	SEE CASE 9 EXCEPT 10 OF S1001 CLOSED.
11	TIMER SWITCH M901	SEE FIGURE 4-14
12	NORMAL	

* S205 PLACEMENT CONTROLLED BY BANDSWITCH S202
* S206 PLACEMENT CONTROLLED BY AIR VANE SWITCH S206

Figure I-4-13. Simplified Schematic Diagram, INTERLOCK Switch (S1001) Circuits vs Switch Positions 1 through 10, GPT-10K

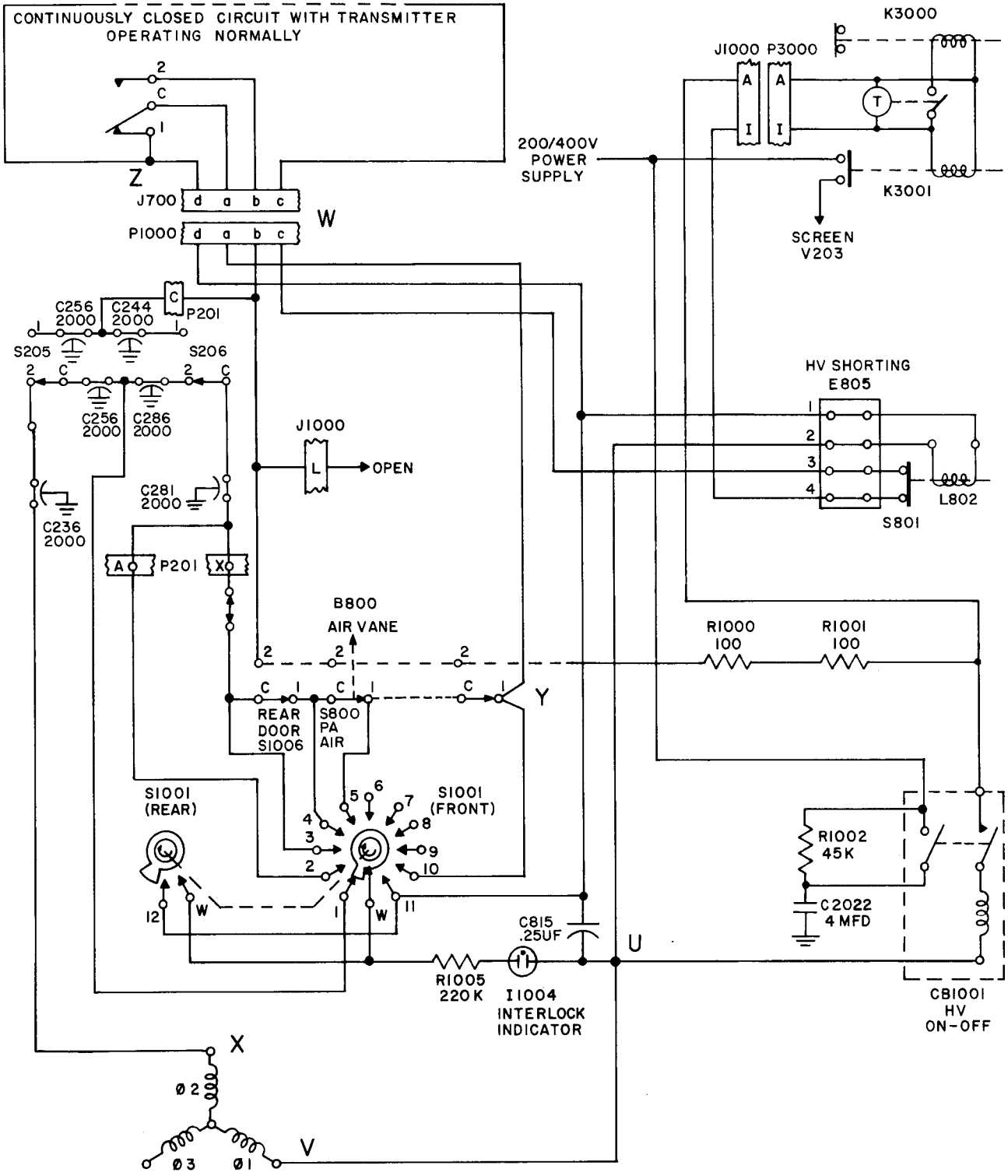
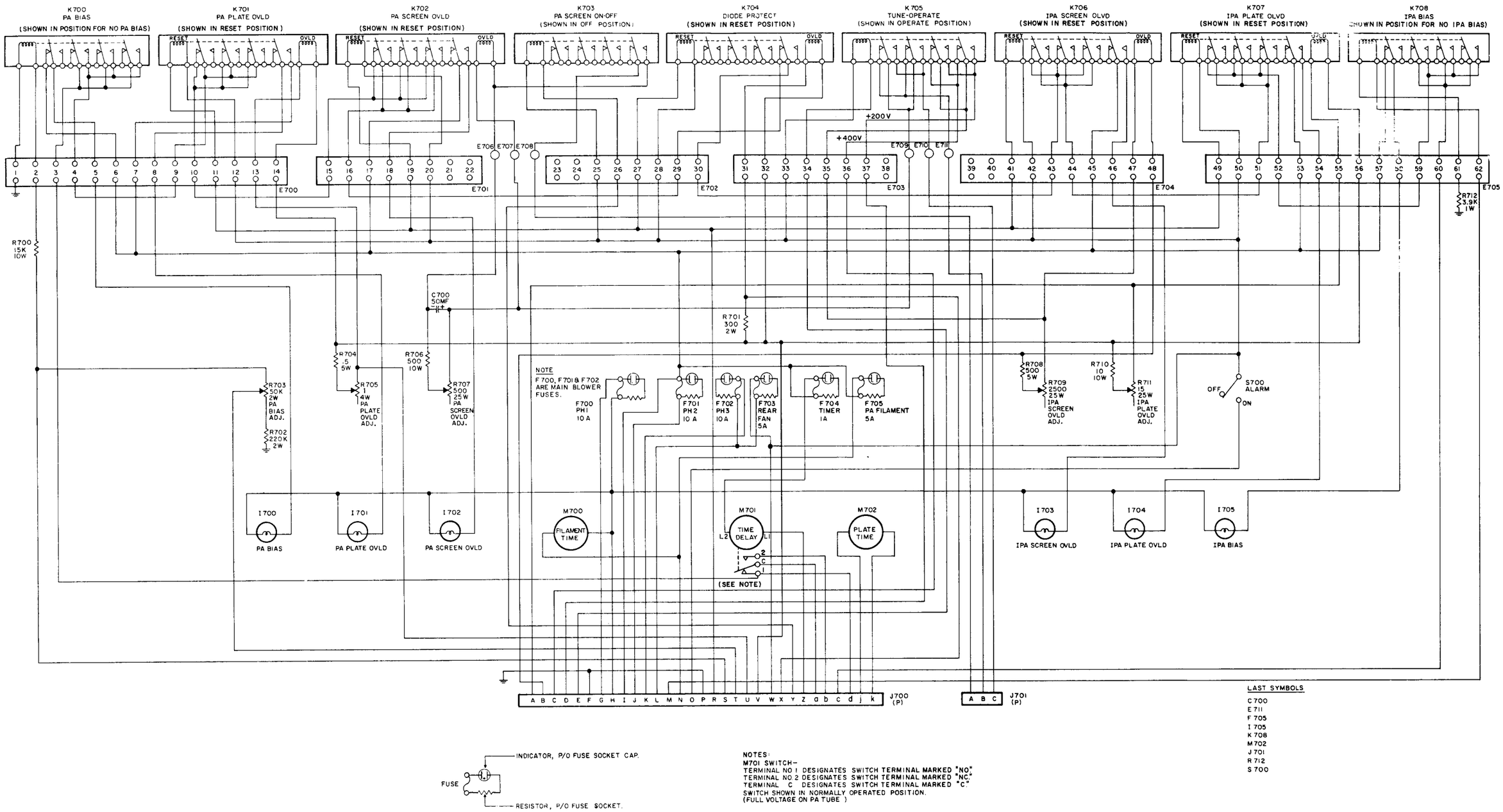


Figure I-4-14. Simplified Schematic Diagram, INTERLOCK Switch (S1001) Circuits vs Switch Positions 11 and 12, GPT-10K

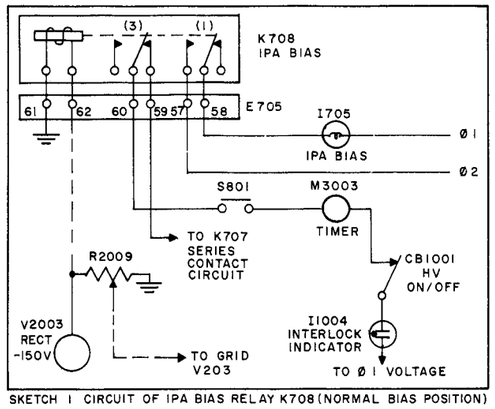


INDICATOR, P/O FUSE SOCKET CAP.
FUSE
RESISTOR, P/O FUSE SOCKET.

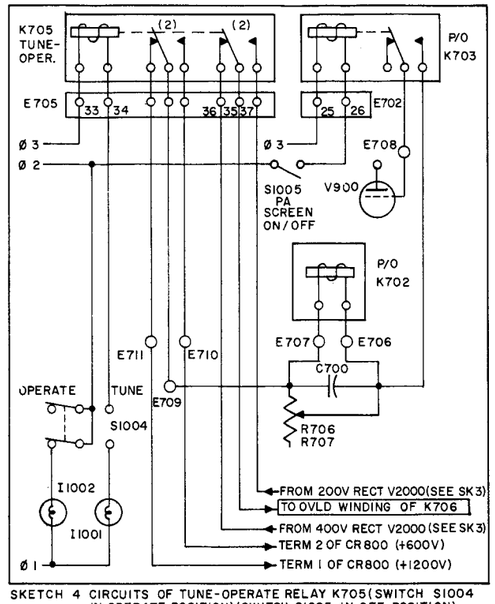
NOTES:
M701 SWITCH—
TERMINAL NO 1 DESIGNATES SWITCH TERMINAL MARKED "NO."
TERMINAL NO.2 DESIGNATES SWITCH TERMINAL MARKED "NC."
TERMINAL C DESIGNATES SWITCH TERMINAL MARKED "C."
SWITCH SHOWN IN NORMALLY OPERATED POSITION.
(FULL VOLTAGE ON PA TUBE)

LAST SYMBOLS
C 700
E 711
F 705
I 705
K 708
M 702
J 701
R 712
S 700

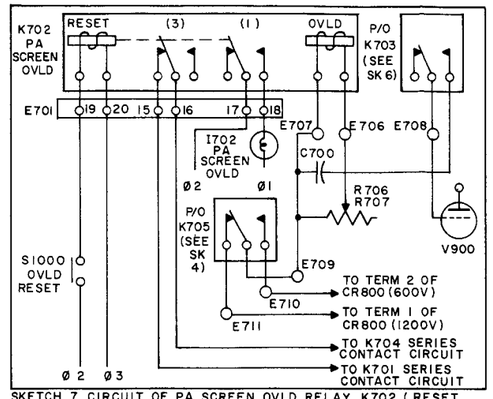
Figure I-4-15. Simplified Schematic Diagram, Relay and Indicator Control Panel Circuits, GPT-10K



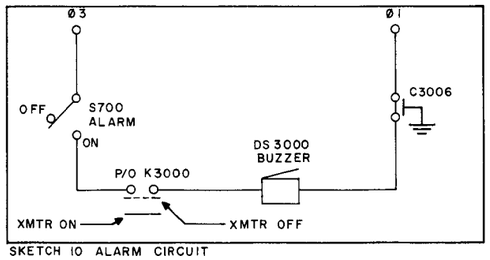
SKETCH 1 CIRCUIT OF IPA BIAS RELAY K708 (NORMAL BIAS POSITION)



SKETCH 4 CIRCUITS OF TUNE-OPERATE RELAY K705 (SWITCH S1004 IN OPERATE POSITION) (SWITCH S1005 IN OFF POSITION)

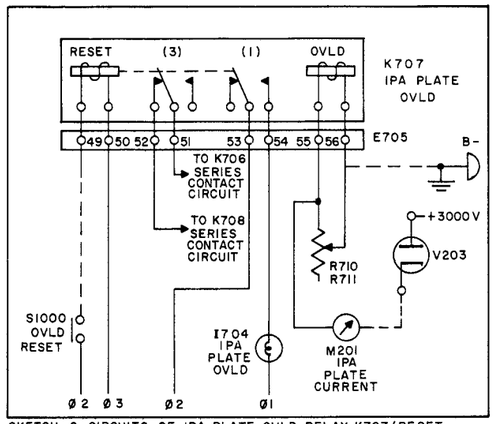


SKETCH 7 CIRCUIT OF PA SCREEN OVLD RELAY K702 (RESET POSITION)

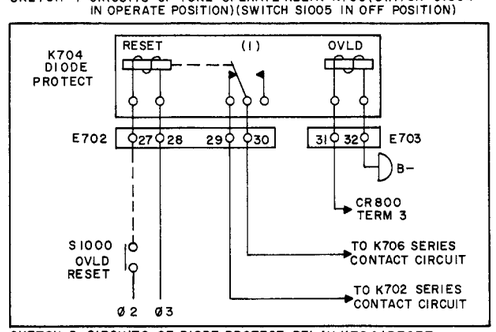


SKETCH 10 ALARM CIRCUIT

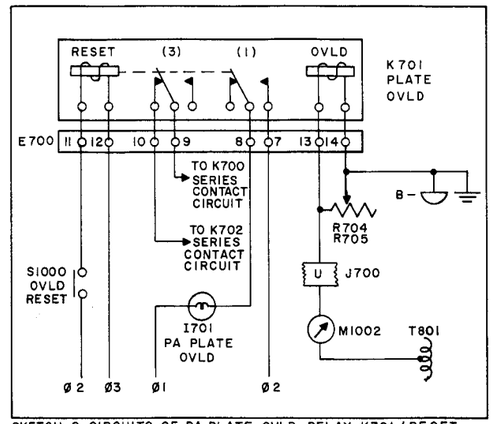
NOTE:
FIGURES IN PARENTHESIS INDICATE NUMBER OF CONTACTS IN PARALLEL.



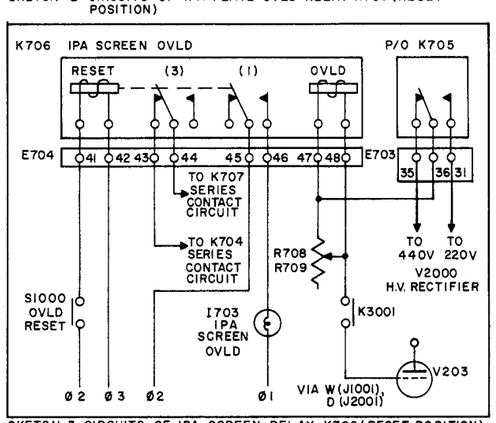
SKETCH 2 CIRCUITS OF IPA PLATE OVLD RELAY K707 (RESET POSITION)



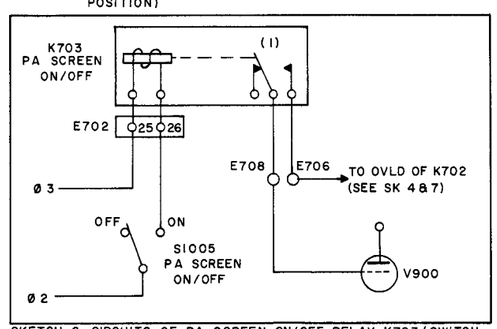
SKETCH 5 CIRCUITS OF DIODE PROTECT RELAY K704 (RESET POSITION)



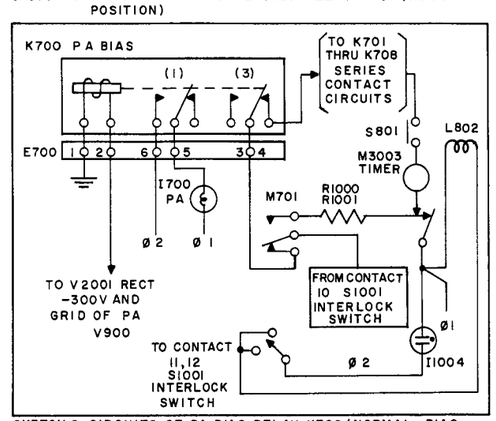
SKETCH 8 CIRCUITS OF PA PLATE OVLD RELAY K701 (RESET POSITION)



SKETCH 3 CIRCUITS OF IPA SCREEN RELAY K706 (RESET POSITION)



SKETCH 6 CIRCUITS OF PA SCREEN ON/OFF RELAY K703 (SWITCH S1005 IN OFF POSITION)



SKETCH 9 CIRCUITS OF PA BIAS RELAY K700 (NORMAL BIAS POSITION)

Figure I-4-16. Simplified Schematic Diagrams of Relay Control Panel Circuits, GPT-10K

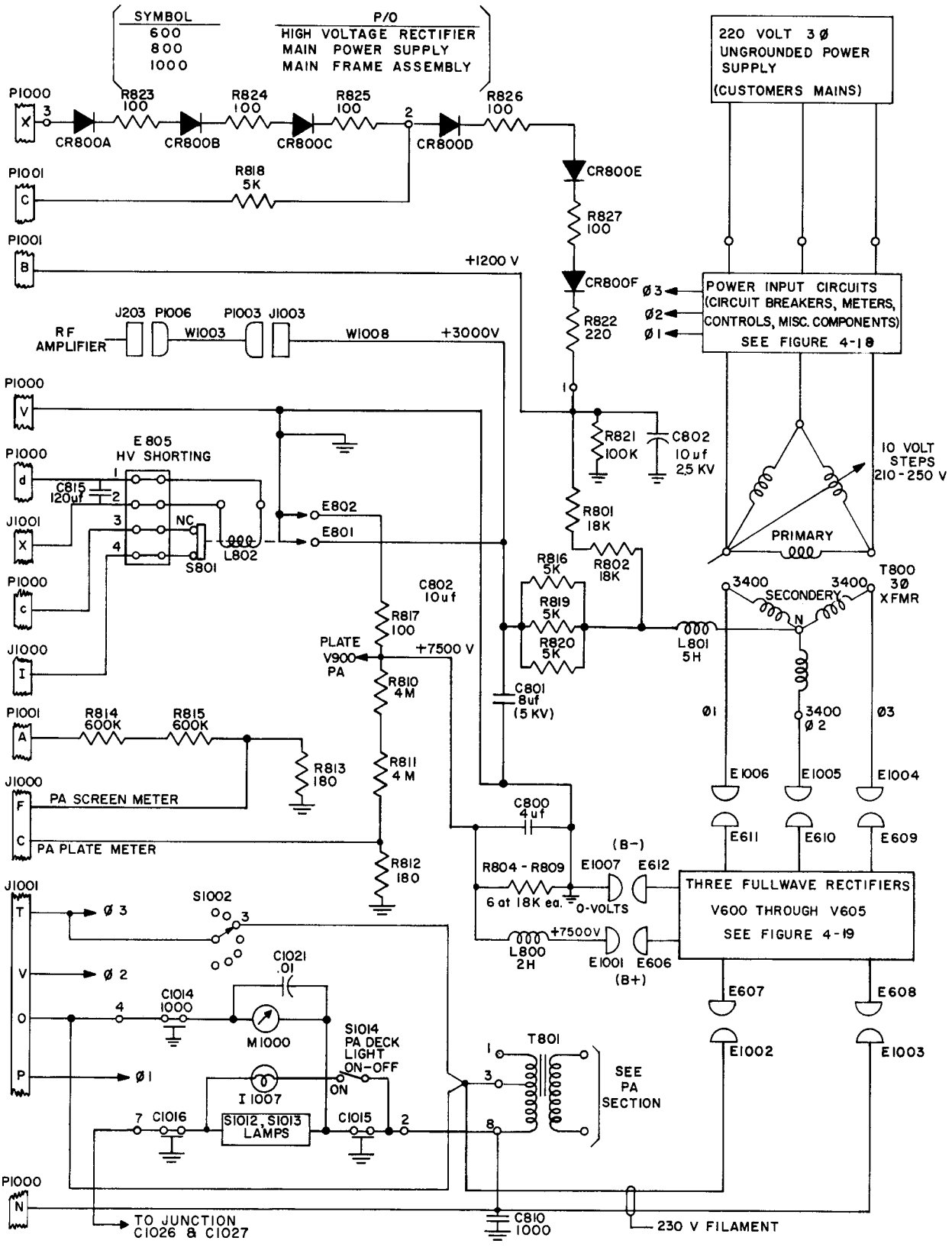


Figure I-4-17. Simplified Schematic Diagram, Main Power Supply and T-104 Circuits, GPT-10K

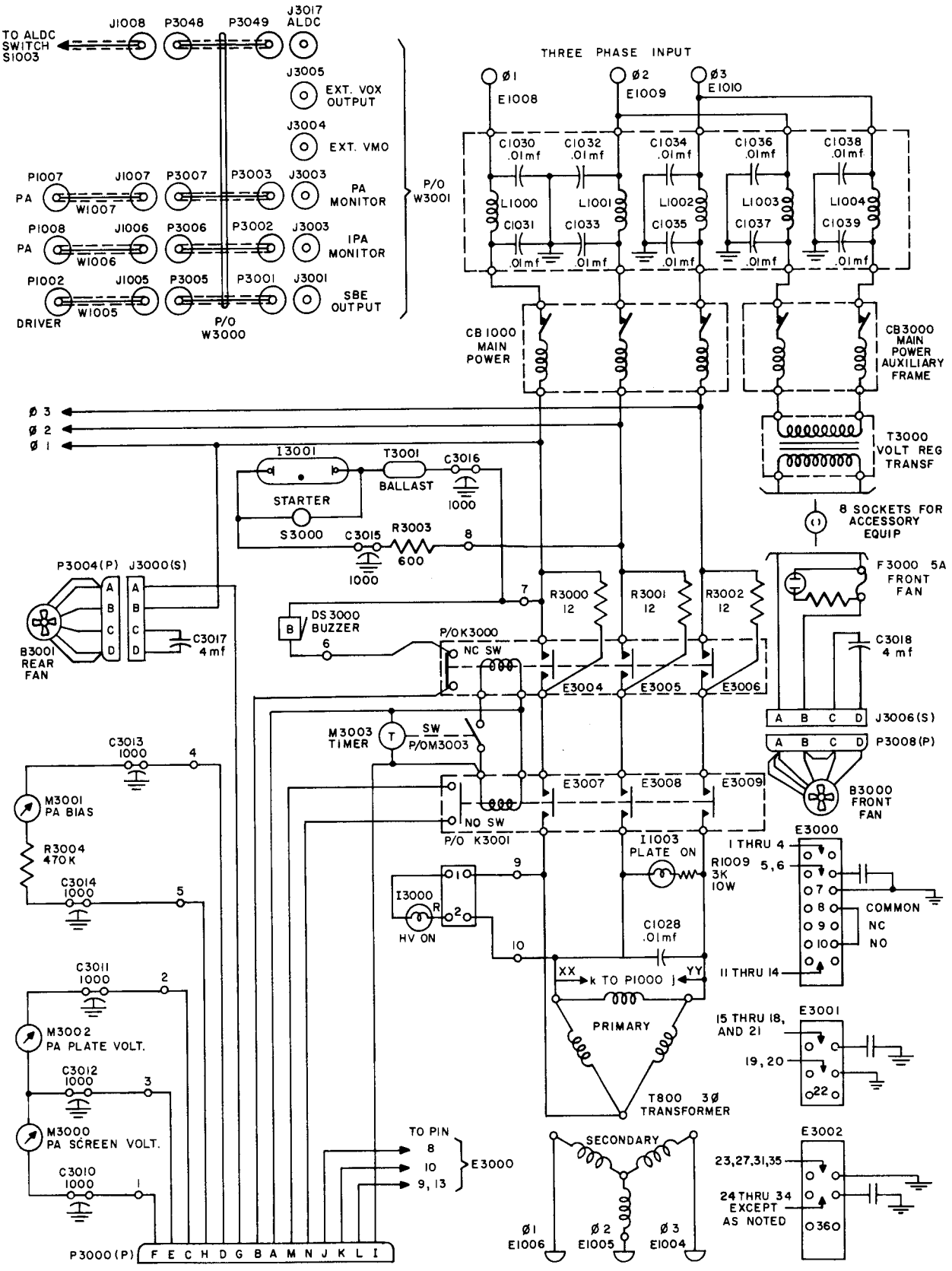


Figure I-4-18. Simplified Schematic Diagram, Main Power Supply, Power Input Circuit Details, GPT-10K

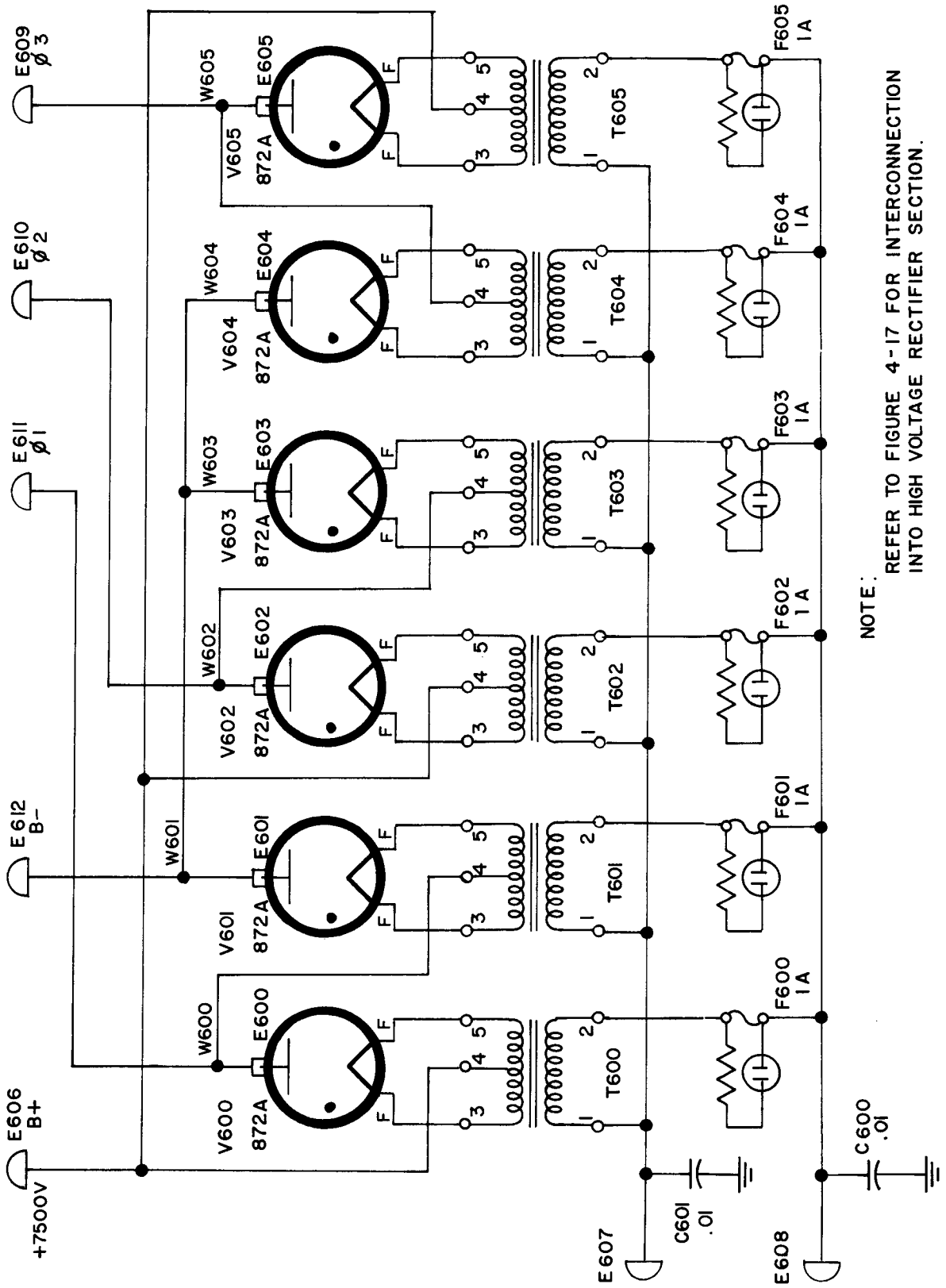


Figure I-4-19. Simplified Schematic Diagram, Main Power Supply, T1-104 Details, GPT-10K

SECTION 5
TROUBLE SHOOTING

5-1. GENERAL.

Trouble-shooting is the art of locating and diagnosing equipment troubles and maladjustments; the information necessary to remedy the equipment troubles and maladjustments is reserved for Section 6 of the manual under the heading "Maintenance."

Trouble-shooting tools may, for convenience, be divided into the following six categories:

a. Accurate schematic diagrams

b. Tables of voltage and resistance; waveform data

c. Location data (photographs with callouts of the major electronic equipment elements)

d. Trouble-shooting techniques

e. Trouble-shooting charts based on operating procedures

f. Trouble-shooting procedures based on circuit sectionalization

Trouble-shooting techniques are about the same for all types of electronic equipment and are covered briefly in the following paragraphs.

5-2. TROUBLE-SHOOTING TECHNIQUES.

a. GENERAL CONSIDERATIONS. - When a piece of equipment has been working satisfactorily and suddenly fails, the cause of failure may be apparent either because of circumstances occurring at the time of failure or because of symptoms analogous to past failures. In this case, it is unnecessary to follow a lengthy and orderly course of trouble-shooting in order to localize and isolate the faulty part.

A second short cut in trouble-shooting is to ascertain that all tubes and fuses are in proper working order; also that the equipment receives proper supply voltages. Many times this will eliminate further investigation.

A third short cut is to examine the equipment, section by section, for burned out elements, charring, corrosion, arcing, excessive heat, dirt, dampness, etc.

It is important to recognize that defective elements may have become defective due to their own weakness or to some contributing cause beyond their control.

b. TROUBLE-SHOOTING CHARTS BASED ON OPERATING PROCEDURES. - The general purpose of these charts is to narrow the area of trouble to one or more sections of the equipment in order to minimize the labor of locating the source of trouble. These charts present a prescribed order "to turn on" the equipment, indicate what to expect as each step is taken, and give clues as to possible "troubled areas" when some expectation is not realized.

Table 5-1 is based on the operating chart presented as part of paragraph 3-3b. As each of the chart's 27 steps is undertaken in sequence, the tabulations in table 5-1 show normal indications and prescribe remedies where abnormal indications occur. This procedure is more practical than testing GPT-10K's units individually because of (1) high voltages, high frequencies, built-in test equipments, and safety features used in operating the GPT-10K and (2) the close relationships of the GPT-10K's units.

c. TABLES OF VOLTAGE AND RESISTANCE; WAVEFORM DATA. - These tables give nominal values of voltage-to-frame and resistance-to-frame, generally at tube elements and sometimes at connectors and terminal board elements. Large deviations from the nominal values should be carefully investigated. During this process, accurate schematic diagrams and location data are highly essential. Schematic diagrams of all equipments will be found in Section 7, Volumes I and II of the manual.

A good oscilloscope is a good trouble-shooting tool. It may be connected to a number of critical points along a circuit to detect extraneous voltages, distorted waveforms, and other symptoms of trouble.

d. TROUBLE-SHOOTING PROCEDURES BASED ON CIRCUIT SECTIONALIZATION. - Equipments usually consist of a number of subassemblies or sections. It is frequently helpful to treat these subassemblies or sections as independent entities. In so doing, however, they must be properly powered. Observations may then be made with VTVMs, CROs, or other test equipment at selected points under given types and magnitudes of injection voltages. Again, the subassemblies or sections may be examined for rated performance, according to specification, for the presence of extraneous grounds, for opens, or unusual voltages.

5-3. RF AMPLIFIER MODEL RFC-1 AND POWER SUPPLY MODEL AX-104.

a. RESISTANCE TO FRAME. - Table 5-2 shows values of resistance to frame of the IPA and AX-104

tube pins. Table 5-3 shows values of resistance to frame of IPA and AX-104 plug and jack pin terminals.

b. DC VOLTAGE TO FRAME. - Table 5-4 shows values of DC voltages to frame of IPA and AX-104 tube pins.

c. LOCATION DATA. - Figures 5-1, 5-2, and 5-3 are photographs with callouts of the major electronic components of the IPA and AX-104.

d. CABLING DIAGRAMS. - Figures 5-4, 5-5, and 5-6 are cabling diagrams for the IPA and AX-104. Details shown comprise color of conductors, wire size, and cabling terminal callouts.

5-4. POWER AMPLIFIER SECTION (PA).

a. RESISTANCE TO FRAME. - Table 5-5 shows values of resistance to frame of PA tube pins. Table 5-6 shows values of resistance to frame of PA plug and jack pin terminals.

b. DC VOLTAGE TO FRAME. - Table 5-7 shows value of DC voltages to frame of PA tube pins.

c. LOCATION DATA. - Figures 5-7, 5-8, 5-9, and 5-10 are photographs with callouts of the major electronic components of the PA.

d. CABLING DIAGRAMS. - Figure 5-11 is a cabling diagram for both the PA and main power supply. Details shown comprise color of wires, wire size, and cabling terminal callouts.

5-5. MAIN POWER SUPPLY.

a. RESISTANCE TO FRAME. - Table 5-8 shows values of resistance to frame of the main power supply plug and jack pin terminals.

b. LOCATION DATA. - Figures 5-12 through 5-17 are photographs with callouts of the major electronic components of the main power supply.

c. CABLING DIAGRAMS. - Figure 5-11 is a cabling diagram for both the PA and main power supply. Details shown comprise color of wires, wire size, and cabling terminal callouts.

5-6. HIGH VOLTAGE RECTIFIER SECTION MODEL T1-104.

Figures 5-18 and 5-19 are photographs with callouts of the major electronic components of the T1-104.

5-7. RELAY AND INDICATOR CONTROL PANELS.

a. RESISTANCE TO FRAME. - Table 5-9 shows values of resistance to frame of the relay and indicator control panels.

b. LOCATION DATA. - Figures 5-20 and 5-21 are photographs with callouts of the major electronic components comprising the relay and indicator control panels.

c. TROUBLE-SHOOTING CHART, RELAY AND INDICATOR CONTROL PANELS. - Table 5-10 is a trouble-shooting chart that relates indications on GPT-10K's main frame chassis panels with probable causes.

d. CABLING DIAGRAMS SHOWING WIRING DETAILS OF CONDUCTORS LEAVING J700(P) AND J701(P) AND RELAY TERMINALS. - Figures 5-22 and 5-23 are cabling diagrams showing wiring details of conductors leaving relay control panel jacks and terminals. Figures 5-24-a and 5-24-b present details concerning the locations of all interlock switches.

5-8. MAIN POWER CONTROL PANEL AND PA TUNING/LOADING PANEL.

Figure 1-15 shows the front view of the main power control panel; figure 5-25 shows the rear view of the assembly together with callouts of the major components.

Figure 1-1-a shows the front view of the PA tuning/loading panel (panel below window of PA compartment); figure 1-11-b shows the five gear trains associated with the assembly's knob controls.

5-9. AUXILIARY FRAME CHASSIS.

Figures 5-26 and 5-27 are photographs with callouts of the major components mounted on the auxiliary frame chassis. Figure 2-5 shows wiring diagrams of the auxiliary frame chassis.

5-10. POWER CONTROL SCHEMATIC DIAGRAM.

The manner in which power throughout the GPT-10K is controlled is shown in figure 5-28.

The GPT-10K is supplied by ungrounded 3-phase, 50- or 60-cycle, 230-volt power. As shown in the lower left corner of figure 5-28, incoming power is supplied to the main frame chassis via MAIN POWER circuit breaker CB1000. Single-phase power is supplied to the auxiliary frame chassis via circuit breaker CB3000 and provides energy for front fan B3000 and eight 115-volt convenience outlets. The latter supplies regulated 115 volts AC to the auxiliary frame chassis test and exciter units.

Main frame chassis 3-phase power supplies main power transformer T800 via two sets of contactors. Three 12-ohm, 1250-watt resistors lower the voltage at the main power transformer until timer M3003 causes the first set of contactors to short out the resistors. Operation of the timer (trace leads designated E and F) is controlled by HIGH VOLTAGE circuit breaker CB1001 being in closed position and a closed interlock circuit, which includes relays K700 through K708. If the GPT-10K is clear of trouble, CB1001 will remain closed when set to ON. When M3003 operates to short out the three 12-ohm resistors, I3000 (HV ON) and I1003 (PL ON) will go on brilliantly.

Figure 5-28 also shows fusing arrangements which should help pinpoint trouble when fuses blow. Figure 5-28 also shows that when PA SCREEN switch S1005 is thrown, relay K703 closes its ON contacts. The screen of V900 (PA) connects to the swinger of relay K705 and receives either +600-volt or +1200-volt supply voltage depending on whether relay K705 is in the TUNE or OPERATE position. Simultaneously, the screen or V203 (IPA) connects via relay K706 to a second swinger of relay K705 and receives either +200-volt or +400-volt supply voltage depending on whether relay K705 is in the TUNE or OPERATE position.

5-11. SYSTEM TESTS.

a. FSA DATA. - After a GPT-10K has been tuned and loaded to rated capacity, it is important to ascertain the magnitude of its third and fifth order modulation products under a two tone test. Refer to Section 3.

Figure 5-29 is presented to illustrate the method of evaluation. The top picture of the FSA's oscilloscope shows the two tones when GPT-10K's output is 10 kw (PEP). The 935-cycle tone appears at 935 cycles above the carrier f_c; the 2805-cycle tone appears at 2805 cycles above the carrier f_c. The FSA is arranged to show a 10-kc bandwidth with the carrier f_c at the horizontal scale's midpoint. This is obtained by setting the VOX's heterodyning frequency at f_c +500 kc. The two tone peaks appear at 40 db on the vertical scale by FSA's attenuator setting of A db. The third and fifth order modulation products are too small to be discernible. To evaluate them, increase the VOX's heterodyning frequency to f_c +500 kc +1870 cycles. The resulting picture appears in the second picture down. Note that the screen's edges now are f_c -3130 and f_c +6870 instead of f_c -5000 and f_c +5000 as in the top picture. Again, the third and fifth order modulation products are too small to be discernible. Now decrease FSA's attenuator by 20 db. See the third picture. The two tone peaks rise 20 db and their tops are off scale. This is of no importance because the base line distortions are now of interest. The third order modulation product is of frequency f_c +4675 and the fifth order modulation product is of frequency f_c +6545. These are now discernible and, as shown, are well below 40 db from the off-scale tops of the two tone peaks. Since the fifth order product is close to being off scale, a further increase in VOX's heterodyning frequency to f_c +2805 will bring the product closer to the scale's center. See the fourth picture.

The four pictures indicate the presence of a small amount of carrier f_c. This can be corrected by SBE adjustment.

b. FACTORY TESTS. - In order to conserve time on the test floor, all units of the GPT-10K are checked out before being incorporated in the overall transmitter. The checkout tests comprise resistance to ground measurements, continuity tests, color code observations on cable terminations, relay and switch performance, polarity observations on meters, quality of workmanship (electrical and mechanical), and the like. Following this unit by unit checkout, the GPT-10K is assembled and powered for test floor tuning and loading on both a balanced and unbalanced antenna. The tuning and loading tests are made at about 26 frequency and bandswitch settings as indicated by tables 3-2 and 3-3. During this stage, faults are located and cleared as explained in the earlier paragraphs of this section.

This final test stage consists of performing the qualifying runs. Table 3-2 is a tabulation of readings taken on a qualifying run made on a particular transmitter for shipment to a customer. This figure shows parameters for GPT-10K output frequencies from 2 to 28 mc. Take, for example, the 11-mc case. For an SBE output of 11 mc, the output band is 8-16. The crystal frequency to be used in the SBE is 3.25 mc, the VOX frequency to be used with the FSA is 2.875 mc $\left(\frac{11.000 + 0.500}{4}\right)$.

The IPA BAND switch (26) is turned to 8-12 and the DRIVER BAND switch (25) is turned to 8-16. When tuned for rated output and acceptable distortion, the following values are observed on the IPA controls and meters:

Item	Control	Reading
1ST AMPL TUNING	24 (C203, C232)	Position 4
IPA GRID TUNING	23 (C231)	Position 6
IPA TUNING	28 (C254)	191
IPA LOADING	30 (C269)	079
IPA LOADING	27 (S203)	Position 2
MULTIMETER	22 (S204, position 5); 20 (M202)	12 volts RF
MULTIMETER	22 (S204, position 6); 20 (M202)	30 volts RF
MULTIMETER	22 (S204, position 7); 20 (M202)	1000 volts RF
MULTIMETER	22 (S204, position 8); 20 (M202)	220 volts RF
IPA PLATE CURRENT	21 (M201); 20 (M202)	240 mils

Again, when tuned for rated output and acceptable distortion, the following values are observed on the PA controls and meters:

Item	Control	Reading
BAND SW	12, 17 (S900)	8-11
PA TUNE	10, 15 (C927)	093
PA LOAD	11, 16 (C928)	356
OUTPUT BAL	13, 18 (C916)	364
OUTPUT LOADING	14, 19 (L912 and L913)	006

The last category of results shows values as follows: The 10-kw load output is 3.0 amp per meter in the antenna load which shows 2x600x3, 03x3 w (10,800). Signal to distortion level at this load is 40 db. The 5-kw load output is 2.1 amp per meter in the antenna load which shows 2x600x2.1x2.1 w (5292). Signal to distortion level at this load is 42 db. DC meter indications are: plate current, 135 amp; screen volts, 1100 volts; screen current, 16 mils. The percent unbalance between the two meters in the antenna load is zero. Finally, the RF plate voltage is 5 kv.

TABLE 5-1. TROUBLE-SHOOTING CHART FOR GPT-10K

STEP	CONTROL OPERATED	NORMAL INDICATION	REMEDY
1	15, 16, 17, 18, 19, 23, 24, 25, 26, 27, 28, 30 (Refer to table 3-1 for control designations.) Set these tuning controls as per tuning chart (tables 3-2 and 3-3) for desired RF output frequency.	Approximately tunes IPA, and PA for desired output frequency. Sets PA in inoperative condition.	
2	Set PA SCREEN (40) and HIGH VOLTAGE (41) switches to OFF.		
3	Set TUNE/OPERATE switch (39) to TUNE. ALDC switch (37) to OFF. Check that GPT-10K is connected to an antenna or a dummy load.		
4	Energize single sideband exciter according to instructions in paragraph 3-3a.		
5	Set MAIN POWER switch (32) to ON. Check that AC POWER indicator (6) goes on. Linear amplifiers should now be energized.	If power circuit is normal, fluorescent indicator lamps located in meter panel should light eight meters at top of GPT-10K, and on rear of meter panel an indicator lamp will light PA compartment. (Refer to symbol I1007 on schematic diagram, figure 7-12.) FILAMENT PRIMARY meter (1) will indicate voltage impressed on filament	If linear amplifiers do not receive RF excitation, repeat steps 1, 2, 3, 4, and 5 of this table. In event of a malfunction, trace power circuit with a volt-ohmmeter set for AC operation.

TABLE 5-1. TROUBLE-SHOOTING CHART FOR GPT-10K (Cont.)

STEP	CONTROL OPERATED	NORMAL INDICATION	REMEDY
5 (Cont.)		transformer. Linear amplifiers that follow should now receive RF excitation. (Refer to step 7.)	
6	Turn MULTIMETER (22) to position 1 (IPA BIAS DC) and observe DC bias on grid of IPA tube via MULTIMETER (20).	Magnitude of DC bias should be approximately -100 volts.	If considerably out of line, AX-104 should be checked for proper output voltages in accordance with paragraph 5-3.
7	Turn MULTIMETER switch (22) to position 5 (1ST AMPL RF) and observe RF on plate of 1st amplifier tube via MULTIMETER (20). Tune to resonance in accordance with steps 6 and 7 of paragraph 3-3b.	Magnitude of RF excitation on plate of 1st amplifier tube, as shown in 11th column of tuning chart (refer to tables 3-2, and 3-3) is obtained when DC power supplies on all tubes are normal, all GPT-10K stages are approximately tuned, and exciter's RF output is nominal.	If RF excitation is deficient for amount of drive employed and difficulty is experienced in obtaining plate tank resonance, IPA should be circuit traced in accordance with paragraph 5-3.
8	Turn MULTIMETER switch (22) to position 6 IPA EG RF and observe RF excitation on grid of IPA tube via MULTIMETER (20). Tune to resonance as per steps 8, 9, and 10 of paragraph 3-3b.	Magnitude of RF excitation on grid of IPA tube PL-172 as shown in 12th column of tuning chart (refer to tables 3-2, and 3-3) is obtained when DC power supplies on all tubes are normal, all GPT-10K stages are approximately tuned, and exciter's RF output is nominal. Linear amplifiers are now tuned to point where they may load IPA when its plate is energized. However, behavior of INTERLOCK switch (35) circuits should be observed at this time.	If RF excitation is deficient for amount of drive employed, IPA should be circuit traced in accordance with paragraph 5-3.
9	Perform steps 11, 12a, 12b, and 12c of paragraph 3-3b.	Timer should now have operated to close interlock circuit.	If wiring of interlock switch circuits is incorrect, steps 12a, 12b, and 12c of paragraph 3-3b, will check wiring associated with interlocks. If objectives of interlock switch circuits are not obtained, correct difficulty by tracing out circuit with a volt-ohmmeter. (See figures 5-22, 5-23, and 5-24.)

TABLE 5-1. TROUBLE-SHOOTING CHART FOR GPT-10K (Cont.)

STEP	CONTROL OPERATED	NORMAL INDICATION	REMEDY
10	Tune IPA plate tank circuit to resonance as per steps 13, 14, and 15 of paragraph 3-3b. Retune linear amplifier stages to resonance.	IPA and PA amplifiers now receive full plate voltage, and IPA receives half screen voltages (200). Magnitude of RF excitation on plate of IPA tube PL-172, as shown in 13th column of tuning chart (refer to tables 3-2 and 3-3) is obtained when DC power supplies on all tubes are normal, all GPT-10K stages are approximately tuned, and SBE's RF output is nominal.	If RF excitation is deficient for amount of drive employed, RF amplifier should be circuit traced in accordance with paragraph 5-3.
11	In preparation for PA tuneup, perform steps 16, 17, 18, and 19 of paragraph 3-3b.	Obtain dip on PA PLATE CURRENT meter (3) indication with PA TUNE control (15).	If dip on PA PLATE CURRENT meter (3) cannot be obtained, repeat steps 16 through 19 of paragraph 3-3b.
12	Turn SBE's OUTPUT control clockwise until increase is observed on PA PLATE CURRENT METER.		
13	In preparation for PA loading, perform steps 20 through 25 of paragraph 3-3b.		GPT-10K's tunings differ from TUNE/OPERATE switch in TUNE and OPERATE positions.
14	Final operation by tuning/loading a GPT-10K should be performed as indicated by steps 25, 26 and 27 of paragraph 3-3b.	If GPT-10K fails to give dated output, trouble lies either in PA or ATS circuits or in poor tuning/loading technique.	If GPT-10K continuously "kicks off" the air, a close observance of meters, indicators, fuses, breakers, and relay operations should be helpful in localizing the trouble.

TABLE 5–2. RESISTANCE TO FRAME OF IPA AND AX–104 TUBE PINS

TUBE	NOMINAL RESISTANCE TO PIN										
	1	2	3	4	5	6	7	8	9	SCREEN	CAP
V201	0/0	58 k/55 k	NC	0/0	0/0	460/10	0/0	Inf./27 k	NC	-	-
V202	NC	0/0	Inf./5 k	16/16	105 k/92 k	NC	3/3	0/0	-	-	450 k/10 k
V203	Inf./Inf.	Inf./10 k	0/0	Inf./Inf.	0/0	Inf./10 k	Inf./Inf.	-	-	180 k/4 k	Inf./Inf.
V2000	NC	10 k	NC	35	NC	35	NC	10 k	-	-	-
V2001	50 k	NC	180	180	NC	50 k	180	-	-	-	-
V2002	15 k	50 k	NC	NC	15 k	NC	NC	-	-	-	-
V2003	NC	15 k	NC	NC	0	NC	NC	-	-	-	-

Conditions: a. Jumper on E201 removed.

b. Values to left of slash are for RF unit alone. Values to right of slash for RF unit connected to power supply.

c. IPA and AX-104 isolated from remainder of GPT-10K.

d. NC indicates no connection.

TABLE 5-3. RESISTANCE TO FRAME OF IPA AND AX-104 PLUG AND JACK PIN TERMINALS

PIN	PLUG/JACK DESIGNATION				
	P201(P) (35 CONTACTS)	J2001(S) (35 CONTACTS)	J2000(P) (22 CONTACTS)	P2000(S) (22 CONTACTS)	J2002(P) (35 CONTACTS)
A	Inf.	Inf.	Inf.	Inf.	Inf.
B	Inf.	Inf.	Inf.	O+	Inf.
C	Inf.	Inf.	Inf.	O+	Inf.
D	180 k	50 k	Inf.	O+	Inf.
E	Inf.	Inf.	Inf.	Inf.	Inf.
F	Inf.	Inf.	10 k	Inf.	N/U
G	N/U	N/U	52 k	Inf.	N/U
H	450 k	Inf.	O	O	N/U
I	5 meg	4.7 k(+POT)	N/U	N/UV	Inf.
J	Inf.	Inf.	N/U	N/U	Inf.
K	N/U	N/U	N/u	N/U	Inf.
L	Inf.	Inf.	N/U	N/U	N/U
M	205 k	14.4 k	N/U	N/U	14.4 k
N	Inf.	Inf.	5 k	Inf.	N/U
O	N/U	N/U	N/U	N/U	Inf.
P	O+	O+	O+	O+	Inf.
R	O+	O+	11 k	Inf.	N/U
S	N/U	N/U	Inf.	Inf.	N/U
T	O	O+	N/U	N/U	Inf.
U	O	O+	10 k	Inf.	O
V	N/U	O	10 k	Inf.	Inf.
W	Inf.	Inf.	Inf.	14.4 k	50 k
X	Inf.	Inf.	Inf.	Inf..	Inf.
Y	O	O	-	-	Inf.
Z	O+	O+	-	-	Inf.
a	N/U	N/U	-	-	N/U
b	55 k	Inf.	-	-	Inf.
c	Inf.	Inf.	-	-	Inf.
d	O	O	-	-	O
e	N/U	N/U	-	-	N/U
f	N/U	N/U	-	-	N/U
g	N/U	N/U	-	-	N/U
h	N/U	N/U	-	-	N/U
j	N/U	N/U	-	-	N/U
k	N/U	N/U	-	-	N/U

Conditions:
a. MULTIMETER switch S204 in position 1.
b. Jumper between terminals 1 and 2 of E201 in place.
c. P201 disconnected from J2001; J2002 disconnected from P1010; P2000 disconnected from J2000.
d. All values are nominal. Actual values may deviate ±10% or more. Infinite values usually mean in upper meg range; in no case less than 1 meg.
e. N/U indicates not used.

TABLE 5–4. DC VOLTAGES TO FRAME OF IPA AND AX–104 TUBE PINS

TUBE	NOMINAL DC VOLTAGES ON PIN										
	1	2	3	4	5	6	7	8	9	SCREEN	CAP
V201	0	-5	+150	0	AC	+350	0	+150	-5	-	-
V202	NC	AC	+200	0	-38	NC	0	-	-	-	+350
V203	0	-100	0	0	AC	-100	0	-	-	+300/+150	+300
V2000	NC	+400	NC	AC	NC	AC	NC	+400	-	-	-
V2001	-300	NC	AC	AC	NC	-300	AC	-	-	-	-
V2002	-150	-300	NC	NC	-150	NC	NC	-	-	-	-
V2003	0	-150	NC	NC	0	NC	NC	-	-	-	-

All values given are nominal values.

Conditions: a. Values to left of slash are with OPERATE/TUNE switch S1004 in OPERATE.

b. Values to right of slash are S1004 in TUNE.

TABLE 5-5. RESISTANCE TO FRAME OF PA TUBE PINS

TUBE	NOMINAL RESISTANCE ON TERMINAL OR RING			
	FILAMENT	GRID	SCREEN	PLATE
V900	1.0	65k Variable with R703	50 k/22 k	110 k

Conditions: a. Values to left of slash are with high voltage shorting switch S801 open.

b. Values to right of slash are with switch S801 closed.

TABLE 5-6. RESISTANCE OF COAXIAL CONNECTOR PINS OF PA PLUG AND JACK TERMINALS

PIN	PLUG/JACK DESIGNATION			PIN	PLUG/JACK DESIGNATION		
	P1000(S) (35 CONTACTS)	J1001(S) (35 CONTACTS)	J1000(S) (14 CONTACTS)		P1000(S) (35 CONTACTS)	J1001(S) (35 CONTACTS)	J1000(S) (14 CONTACTS)
A	Inf.	Inf.	Inf.	T	Inf.	Inf.	
B	500 k	Inf.	Inf.	U	Inf.	Inf.	
C	Inf.	Inf.	180	V	0	Inf.	
D	Inf.	Inf.	Inf.	W	Inf.	Inf.	
E	Inf.	Inf.	0	X	Inf.	Inf.	
F	Inf.	N/U	180	Y	Inf.	Inf.	
G	Inf.	N/U	Inf.	Z	(2 meg)	Inf.	
H	Inf.	N/U	Inf.				
I	Inf.	500 k	Inf.	a	Inf.	N/U	
J	Inf.	Inf.	Inf.	b	Inf.	Inf.	
K	Inf.	Inf.	Inf.	c	Inf.	Inf.	
L	Inf.	N/U	Inf.	d	Inf.	Inf.	
M	Inf.	Inf.	500 k	e	N/U	N/U	
N	Inf.	N/U	Inf.	f	N/U	N/U	
O	Inf.	Inf.		g	N/U	N/U	
P	Inf.	Inf.		h	N/U	N/U	
R	Inf.	N/U		j	Inf.	N/U	
S	Inf.	N/U		k	Inf.	N/U	

Conditions: a. High voltage shorting switch S801 closed.

b. INTERLOCK switch S1001 in position 12.

c. ALDC off.

d. J700 disconnected from P1000; J1001 disconnected from P1011; J1000 disconnected from P3000.

e. N/U indicates not used.

TABLE 5–7. DC VOLTAGES TO FRAME OF PA TUBE PINS

TUBE	FILAMENT	GRID	SCREEN	PLATE
V900	7. 5 volts AC	-280 volts DC	+1200/+600 volts DC	+7500 volts DC

All values given are nominal values

Conditions: a. Values to left of slash are with OPERATE/TUNE switch S1004 in OPERATE.

b. Values to right of slash are with S1004 in TUNE.

TABLE 5–8. RESISTANCE TO FRAME OF MAIN POWER PLUG AND JACK TERMINALS

PIN	PLUG/JACK DESIGNATION			
	J3000(S) (4 CONTACTS)	P3004(P) (4 CONTACTS)	P1001(S) (3 CONTACTS)	P3000(P) (14 CONTACTS)
A		Inf.	1200 k	Inf.
B		Inf.	23 k	3 meg
C	Inf.	Inf.	Inf.	Inf.
D	Inf.	Inf.	---	Inf.
E	---	---	---	Inf.
F	---	---	---	Inf.
G	---	---	---	3 meg
H	---	---	---	Inf.
I	---	---	---	Inf.
J	---	---	---	Inf.
K	---	---	---	Inf.
L	---	---	---	Inf.
M	---	---	---	Inf.
N	---	---	---	Inf.

Conditions: a. High voltage interlock switch S801 closed.

b. INTERLOCK switch S1001 in position 12.

c. ALDC off.

d. J700 disconnected from P1000; J1001 disconnected from P1011; J1000 disconnected from P3000.

TABLE 5-9. RESISTANCE TO FRAME OF RELAY AND INDICATOR CONTROL PANELS PLUG AND JACK PIN TERMINALS

PIN	PLUG/JACK DESIGNATION	
	J700(P) (35 CONTACTS)	J701(P) (3 CONTACTS)
A	Inf.	Inf.
B	Inf.	Inf.
C	Inf.	Inf.
D	Inf.	---
E	Inf.	---
F	0	---
G	Inf.	---
H	Inf.	---
I	Inf.	---
J	Inf.	---
K	Inf.	---
L	Inf.	---
M	15 k	---
N	Inf.	---
O	Inf.	---
P	0	---
R	Inf.	---
S	25 k	---

PIN	PLUG/JACK DESIGNATION	
	J700(P) (35 CONTACTS)	J701(P) (3 CONTACTS)
T	25 k (+Pot)	---
U	Inf.	---
V	Inf.	---
W	Inf.	---
X	Inf.	---
Y	Inf.	---
Z	Inf.	---
a	Inf.	---
b	Inf.	---
c	Inf.	---
d	Inf.	---
e	N/U	---
f	N/U	---
g	N/U	---
h	N/U	---
j	Inf.	---
k	Inf.	---

Conditions: a. High voltage interlock switch S801 closed.

b. INTERLOCK switch S1001 in position 12.

c. ALDC off.

d. J700 disconnected from P1000;
J1001 disconnected from P1011;
J1000 disconnected from P3000.

e. N/U indicates not used.

TABLE 5–10. TROUBLE-SHOOTING CHART, RELAY AND INDICATOR CONTROL PANELS AND INDICATOR LIGHTS ON PA TUNING/LOADING PANEL

STEP	CONTROL OPERATED	NORMAL INDICATION	REMEDY
1	Set MAIN POWER circuit breaker (32) on main power panel to ON.	During warmup period (Approximately 1 minute, indicators 45, 46, 47, 48, 49, and 50 should go on. After warmup period, all lights should go off.	Indicators 45 and 50 will go off if PA and IPA bias voltage exists. If indicators 46, 47, 48, and 49 fail to go off, depress OVERLOAD RESET (33) pushbutton; second, check mechanical condition of associated overload relays.
		Neon lights on meter panel should go on and remain on.	Starter trouble.
		AC POWER (6) indication in PA tuning/loading panel should go on and remain on.	
		TUNE (7) or OPERATE (8) indicator will remain on depending upon position of OPERATE/TUNE (39) toggle switch on main power panel.	
2	Set HIGH VOLTAGE circuit breaker (41) on main power panel to ON.	This circuit breaker remains closed following warmup period of step 1 if GPT-10K is not in trouble.	Check interlock circuits and meters for overloads.
		PLATE ON (9) indicator should go on and remain on.	
		Light on top of GPT-10K will first go on dimly then go on brightly. Transition occurs simultaneously with operation of GPT-10K's and contactor's circuit breaker.	
3	Six fuses on indicator control panel, six fuses on T1-104, and five fuses on AX-104.	Off.	Lighted tip indicator burned out fuse. Trouble-shoot associated circuit.

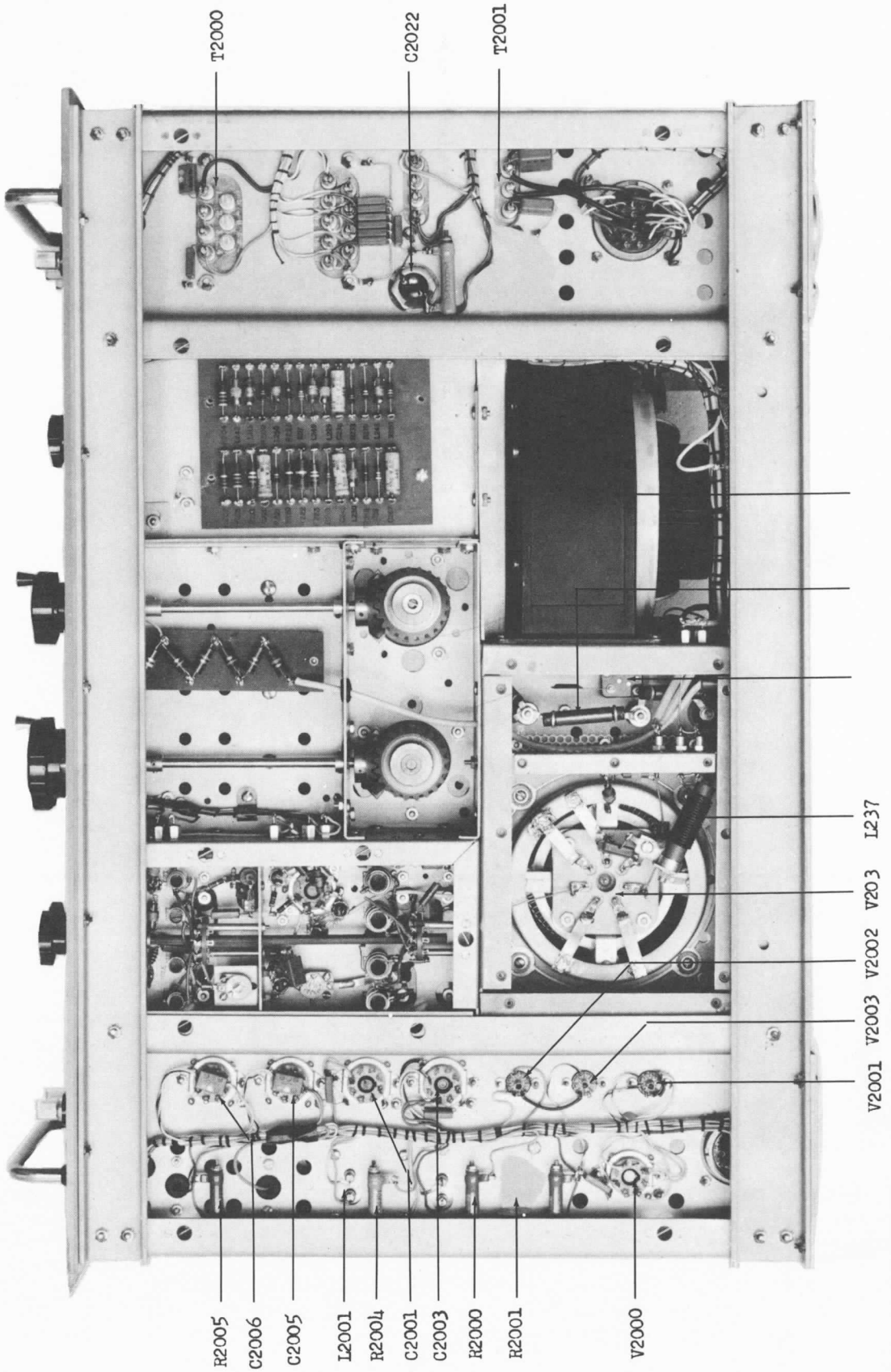


Figure I-5-1. Bottom View, RFC-1 and AX-104

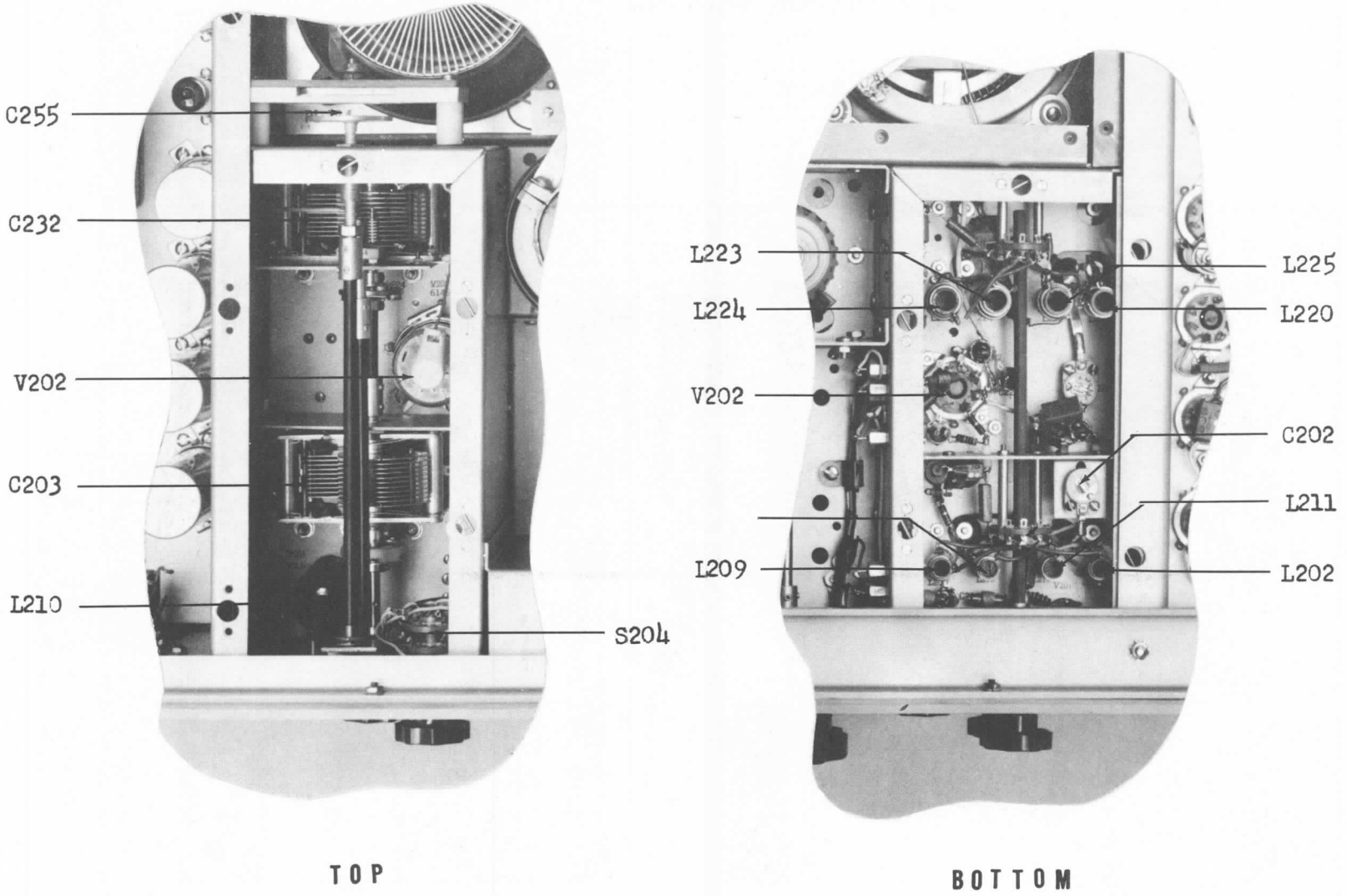


Figure I-5-2. Details of Stages V201 and V202, RFC-1

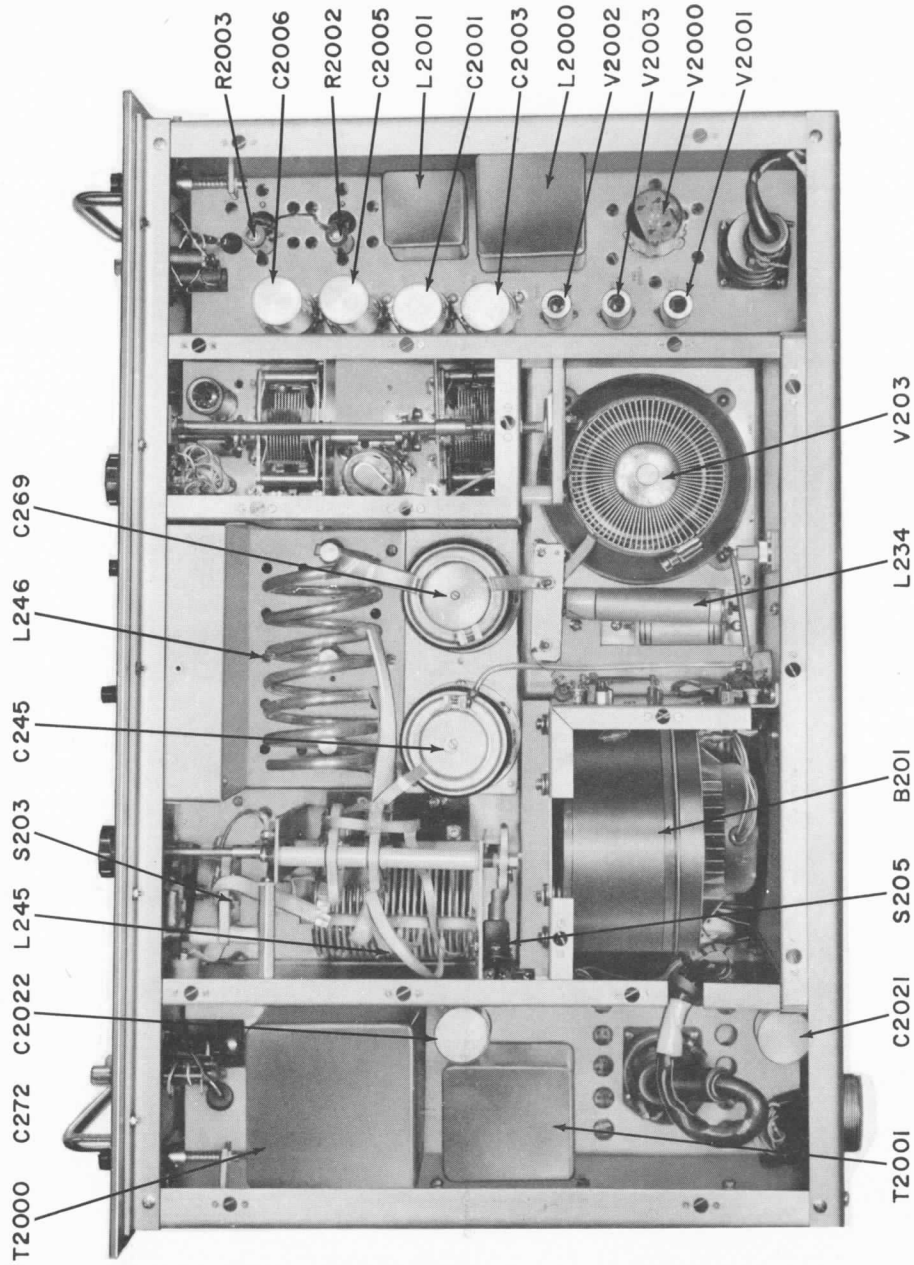
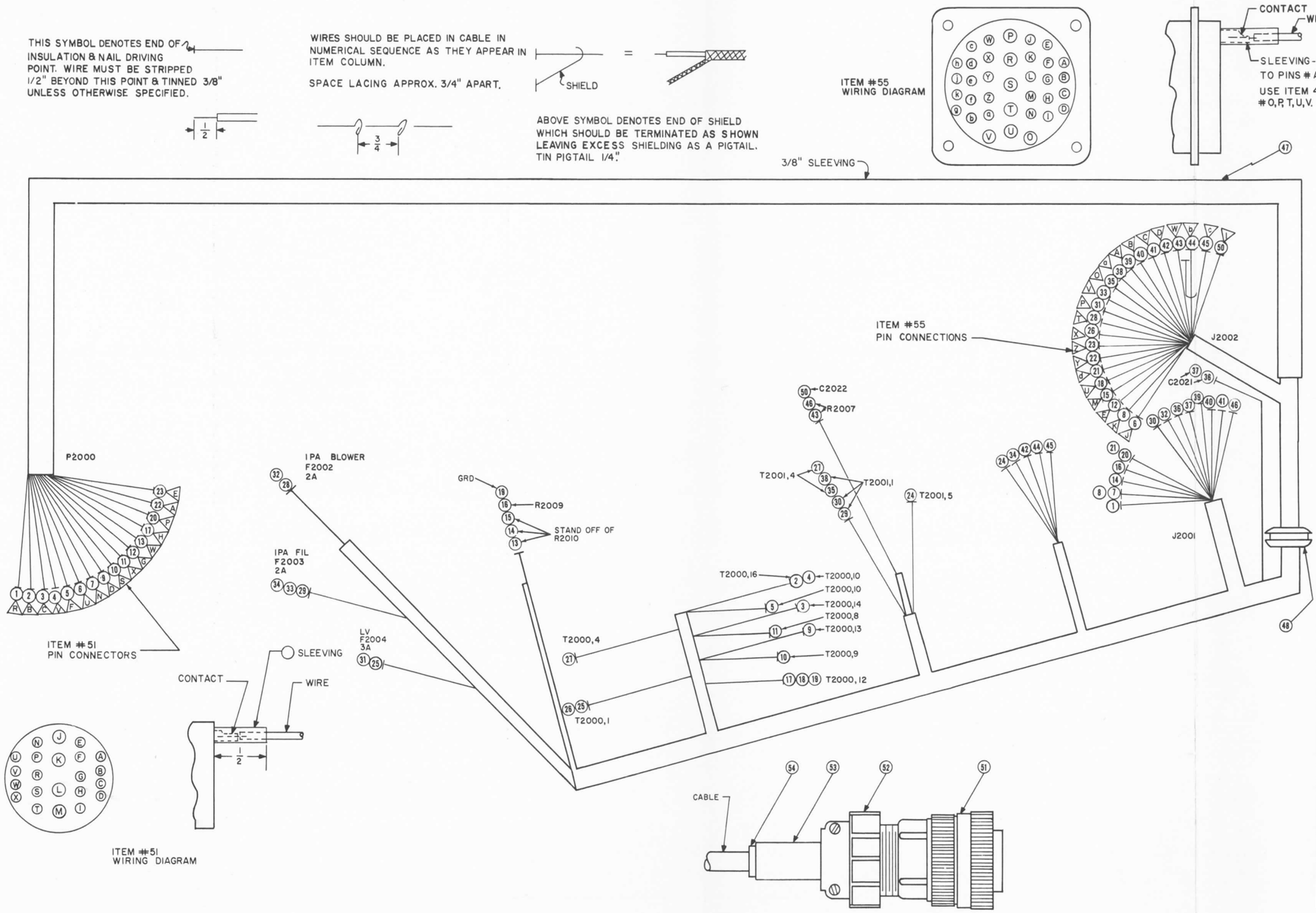
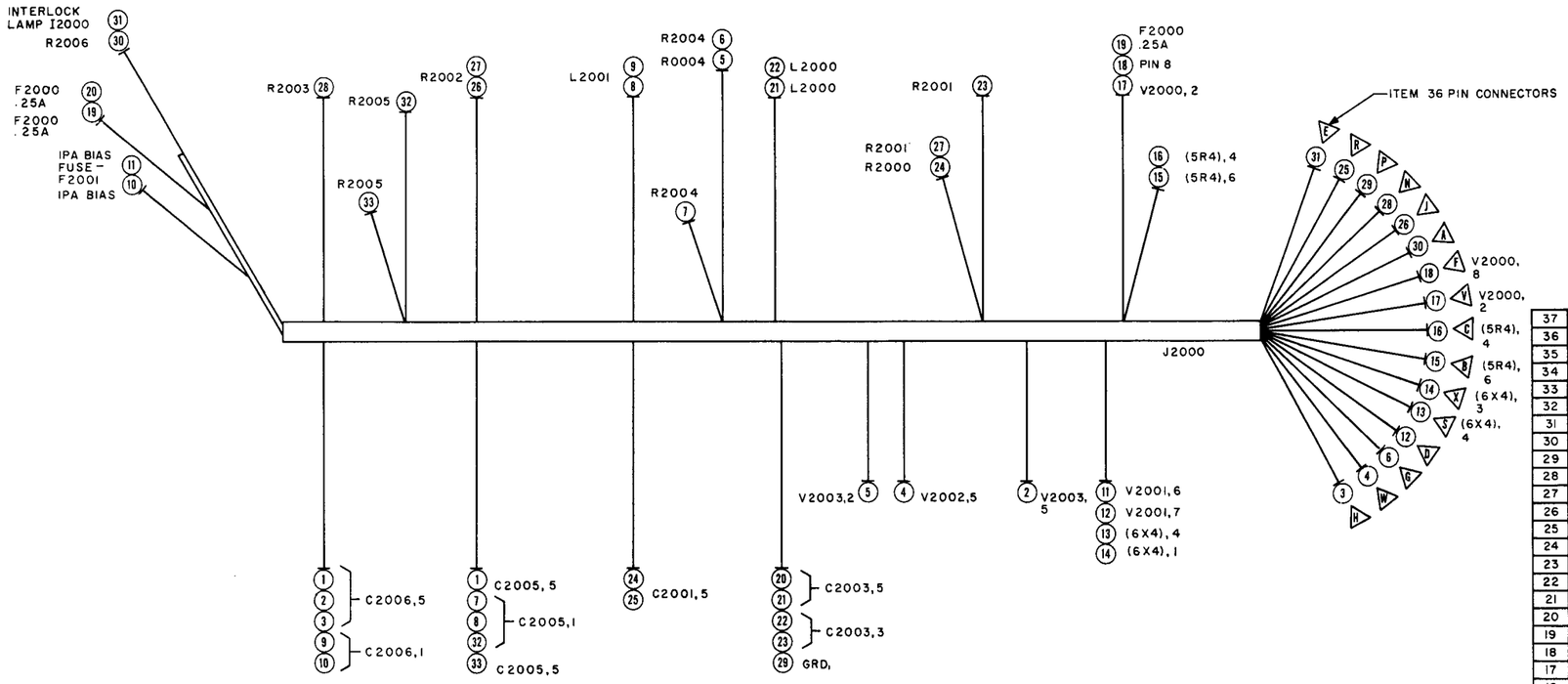


Figure I-5-3. Top View, RFC-1 and AX-104

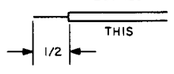


	60			
	59			
	58			
	57			
	56			
1	55	MS 3102A327P	CONNECTOR	J2002
1	54	MS 3420-12A	BUSHING	
1	53	MS 3420-16A	BUSHING	
1	52	MS 3057-16	CLAMP	
1	51	MS 3106B-28-11S	CONNECTOR	P2000
	50	MWC 22 (7) 92		WH/RED
	49	CD101-1-MW	LACING	
	48	EY 102-17	GROMMET	
	47	PX100-1-375	SLEEVING	
18	46	MWC 22 (7)		LIGHT RED
17 1/4	45	MWC 18 (7) U96		WH/BLUE
18 1/4	44	MWC 22 (7) S		RED/SHIELD
22 1/4	43	MWC 22 (7)		LIGHT RED
17	42	MWC 20 (7) U97		WH/VIOLET
15	41	MWC 22 (7) U91		WH/BROWN
14	40	MWC 22 (7) PINK		PINK
14 1/4	39	MWC 22 (7) U98		WH/GREY
21	38	MWC 22 (7) U1		BROWN
10 3/4	37	MWC 22 (7) U94		WH/YELLOW
10 3/4	36	MWC 22 (7) U4		YELLOW
21 3/8	35	MWC 20 (7) U4		YELLOW
22 1/2	34	MWC 18 (7) U7		VIOLET
31 3/4	33	MWC 18 (7) U7		VIOLET
27 1/4	32	MWC 18 (7) U98		WH/GREY
29 1/2	31	MWC 18 (7) U9		WHITE
15 1/8	30	MWC 18 (7) U1		BROWN
19 1/4	29	MWC 18 (7) U1		BROWN
32 1/4	28	MWC 18 (7) U8		GREY
14 3/4	27	MWC 18 (7) U8		GREY
25 1/2	26	MWC 18 (7) U90		WH/BLACK
13 1/4	25	MWC 18 (7) U90		WH/BLACK
12	24	MWC 20 (7) U5		GREEN
41 1/4	23	MWC 22 (7) U93		WH/ORANGE
42 1/2	22	MWC 22 (7) U		LIGHT BLUE
15	21	MWC 16 (7) U1		BLACK
46 1/2	20	MWC 16 (7) U1		BLACK
13	19	MWC 22 (7) U90		WH/BLACK
23 3/4	18	MWC 22 (7) U90		WH/BLACK
58 5/8	17	MWC 22 (7) U90		WH/BLACK
15 3/4	16	MWC 22 (7) U9		WHITE
20 3/4	15	MWC 22 (7) U3		ORANGE
17	14	MWC 22 (7) U3		ORANGE
53 1/2	13	MWC 22 (7) U3		ORANGE
43 1/4	12	MWC 22 (7) U94		WH/YELLOW
57 1/8	11	MWC 20 (7) U91		WH/BROWN
57	10	MWC 20 (7) U91		WH/BROWN
59	9	MWC 22 (7) U9		WHITE
13 3/4	8	MWC 22 (7) U2		RED
46 1/4	7	MWC 22 (7) U2		RED
43 1/2	6	MWC 22 (7) U92		WH/RED
58	5	MWC 20 (7) U4		YELLOW
58 1/2	4	MWC 20 (7) U4		YELLOW
59 3/8	3	MWC 22 (7) U96		WH/BLUE
60 1/4	2	MWC 22 (7) U96		WH/BLUE
46 1/2	1	MWC 22 (7) U6		BLUE

Figure I-5-4. Cabling Diagram, Cable W2002 (CA-422), Part of AX-104.

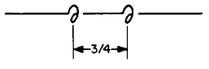


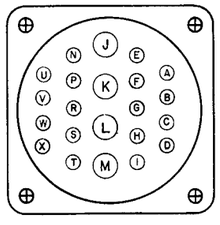
THIS SYMBOL DENOTES END OF INSULATION AND NAIL DRIVING POINT WIRE MUST BE STRIPPED 1/2" BEYOND THIS POINT AND THINNED 3/8" UNLESS OTHERWISE SPECIFIED

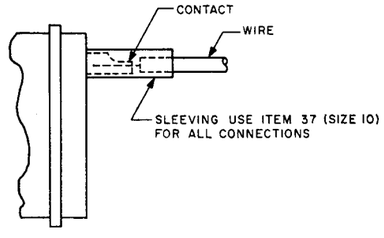


WIRES SHOULD BE PLACED IN CABLE NUMERICAL SEQUENCE AS THEY APPEAR IN ITEM COLUMN

SPACE LACING APPROX. 3/4" APART

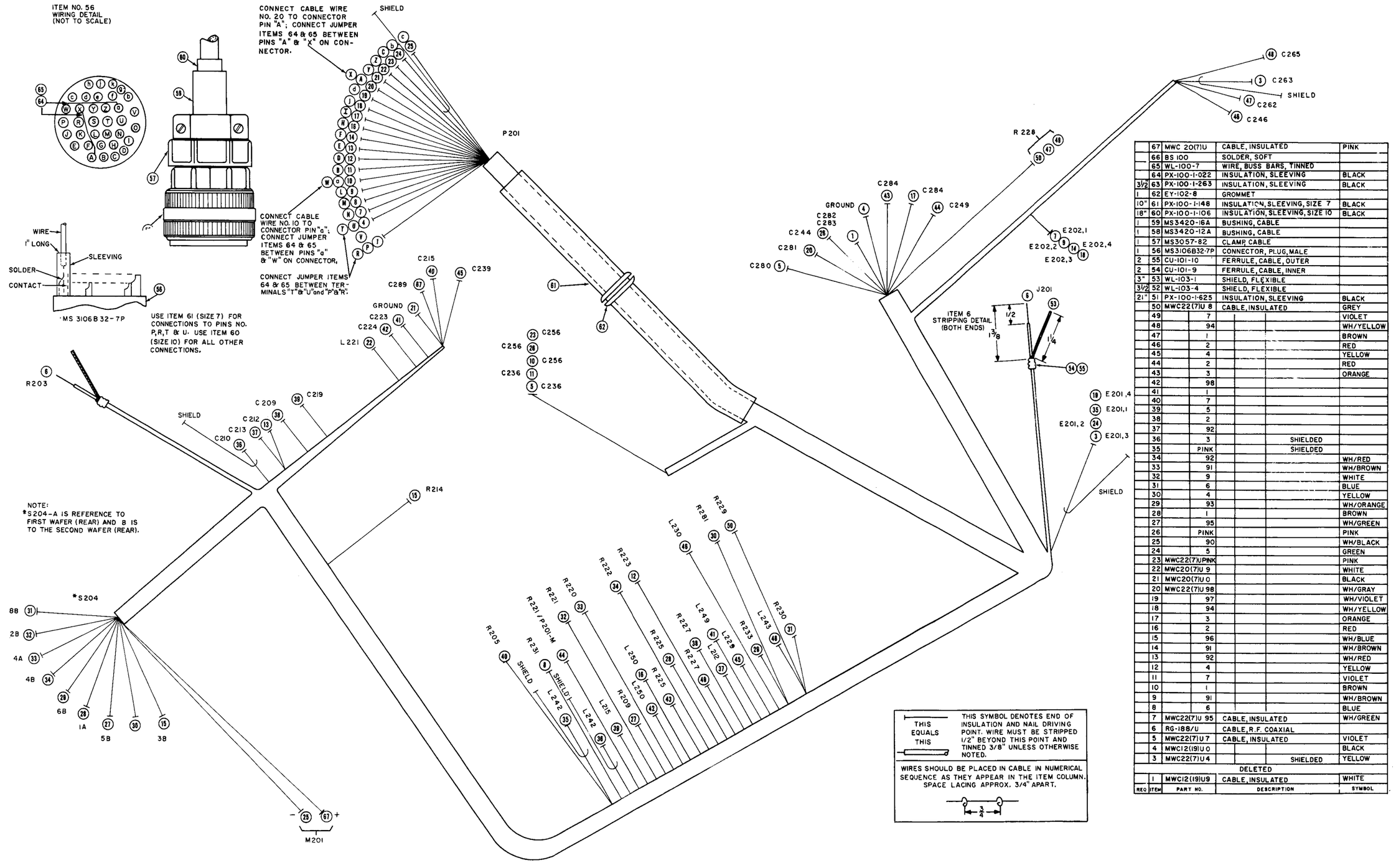






ITEM	PART NO.	DESCRIPTION	
37	PX-100-1-.106	INSULATION, SLEEVING SIZE #10	
36	MS-3102A28-11P	CONNECTOR, PLUG, MALE	
35	BS-100	SOLDER SOFT	
34	CD-101-1MW	CORD LACING	
33	MWC 22 (7) U90		WH/BLACK
32	MWC 22 (7) U3		ORANGE
31	MWC 22 (7) U93		WH/ORANGE
30	MWC 22 (7) U9		LIGHT BLUE
29	MWC 16 (7) U0		BLACK
28	MWC 22 (7) U2		RED
27	MWC 22 (7) U92		WH/RED
26	MWC 22 (7) U92		WH/RED
25	MWC 22 (7) U6		BLUE
24	MWC 22 (7) U6		BLUE
23	MWC 22 (7) U2		RED
22	MWC 22 (7) U2		RED
21	MWC 22 (7) U92		WH/RED
20	MWC 22 (7) U92		WH/RED
19	MWC 22 (7) U94		WH/YELLOW
18	MWC 20 (7) U4		YELLOW
17	MWC 20 (7) U4		YELLOW
16	MWC 22 (7) U96		WH/BLUE
15	MWC 22 (7) U91		WH/BLUE
14	MWC 20 (7) U91		WH/BROWN
13	MWC 20 (7) U91		WH/BROWN
12	MWC 22 (7) U9		WHITE
11	MWC 22 (7) U3		ORANGE
10	MWC 22 (7) U93		WH/ORANGE
9	MWC 22 (7) U93		WH/ORANGE
8	MWC 22 (7) U3		ORANGE
7	MWC 22 (7) U3		ORANGE
6	MWC 22 (7) U94		WH/YELLOW
5	MWC 22 (7) U94		WH/YELLOW
4	MWC 22 (7) U3		ORANGE
3	MWC 22 (7) U90		WH/BLACK
2	MWC 22 (7) U90		WH/BLACK
1	MWC 22 (7) U90		WH/BLACK

Figure I-5-5. Cabling Diagram, Cable W2001 (CA-420), Part of AX-104



REQ	ITEM	PART NO.	DESCRIPTION	SYMBOL
	67	MWC 20(7)U	CABLE, INSULATED	PINK
	66	BS 100	SOLDER, SOFT	
	65	WL-100-7	WIRE, BUSS BARS, TINNED	
	64	PX-100-1-022	INSULATION, SLEEVING	BLACK
3½	63	PX-100-1-263	INSULATION, SLEEVING	BLACK
1	62	EY-102-8	GROMMET	
10"	61	PX-100-1-148	INSULATION, SLEEVING, SIZE 7	BLACK
18"	60	PX-100-1-106	INSULATION, SLEEVING, SIZE 10	BLACK
1	59	MS3420-16A	BUSHING, CABLE	
1	58	MS3420-12A	BUSHING, CABLE	
1	57	MS3057-82	CLAMP, CABLE	
1	56	MS3106B32-7P	CONNECTOR, PLUG, MALE	
2	55	CU-101-10	FERRULE, CABLE, OUTER	
2	54	CU-101-9	FERRULE, CABLE, INNER	
3"	53	WL-103-1	SHIELD, FLEXIBLE	
3½	52	WL-103-4	SHIELD, FLEXIBLE	
21"	51	PX-100-1-625	INSULATION, SLEEVING	BLACK
	50	MWC22(7)U 8	CABLE, INSULATED	GREY
	49	7		VIOLET
	48	94		WH/YELLOW
	47	1		BROWN
	46	2		RED
	45	4		YELLOW
	44	2		RED
	43	3		ORANGE
	42	98		
	41	1		
	40	7		
	39	5		
	38	2		
	37	92		
	36	3	SHIELDED	
	35	PINK	SHIELDED	
	34	92		WH/RED
	33	91		WH/BROWN
	32	9		WHITE
	31	6		BLUE
	30	4		YELLOW
	29	93		WH/ORANGE
	28	1		BROWN
	27	95		WH/GREEN
	26	PINK		PINK
	25	90		WH/BLACK
	24	5		GREEN
	23	MWC22(7)U	PINK	PINK
	22	MWC20(7)U 9		WHITE
	21	MWC20(7)U 0		BLACK
	20	MWC22(7)U 98		WH/GRAY
	19	97		WH/VIOLET
	18	94		WH/YELLOW
	17	3		ORANGE
	16	2		RED
	15	96		WH/BLUE
	14	91		WH/BROWN
	13	92		WH/RED
	12	4		YELLOW
	11	7		VIOLET
	10	1		BROWN
	9	91		WH/BROWN
	8	6		BLUE
	7	MWC22(7)U 95	CABLE, INSULATED	WH/GREEN
	6	RG-188/U	CABLE, R.F. COAXIAL	
	5	MWC22(7)U 7	CABLE, INSULATED	VIOLET
	4	MWC12(19)U 0		BLACK
	3	MWC22(7)U 4	SHIELDED	YELLOW
		DELETED		
	1	MWC12(19)U9	CABLE, INSULATED	WHITE

Figure I-5-6. Cabling Diagram, Cable W201 (CA-419), Main IPA Cable, RFC-1.

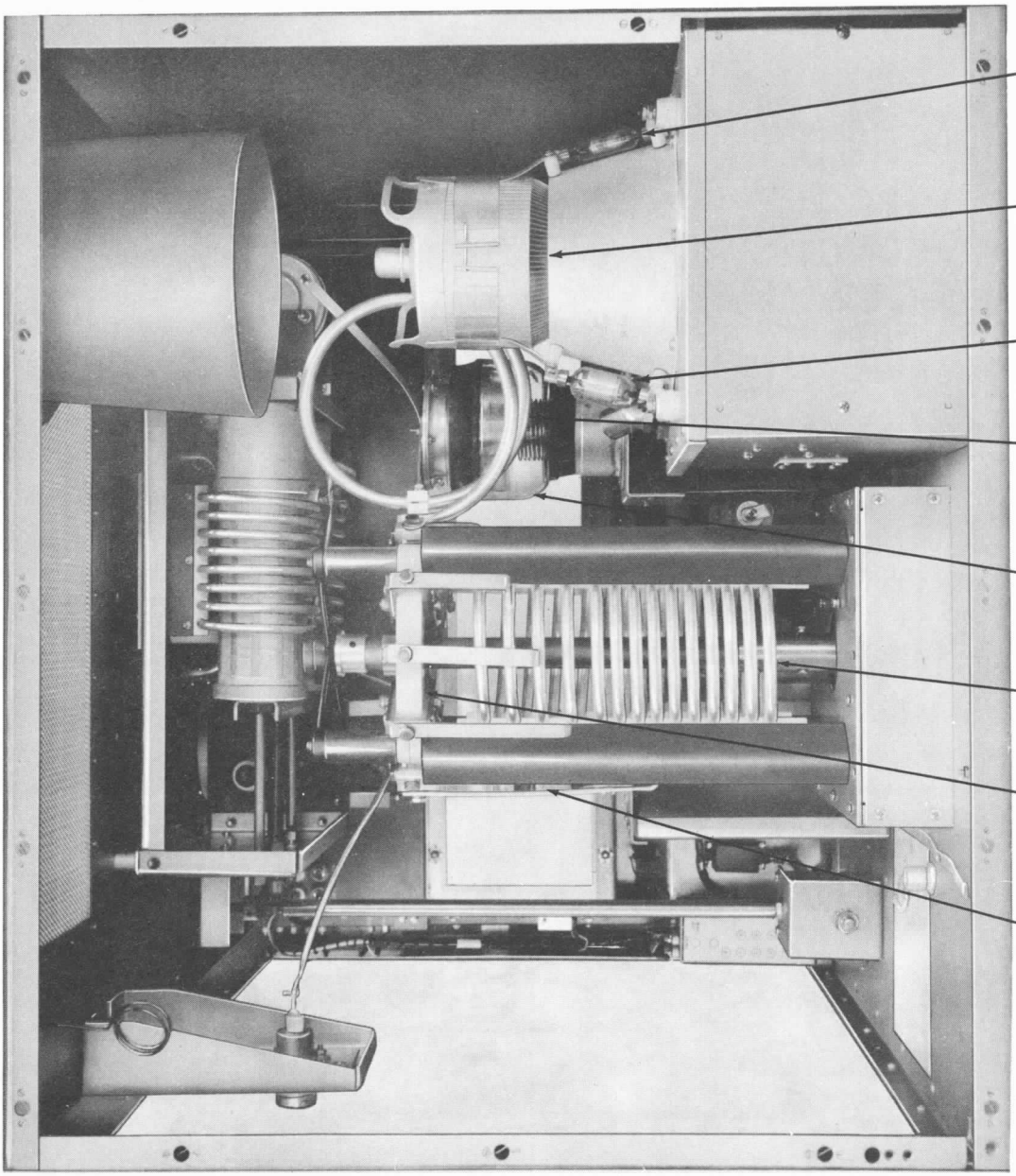


Figure I-5-7. Rear View, PA

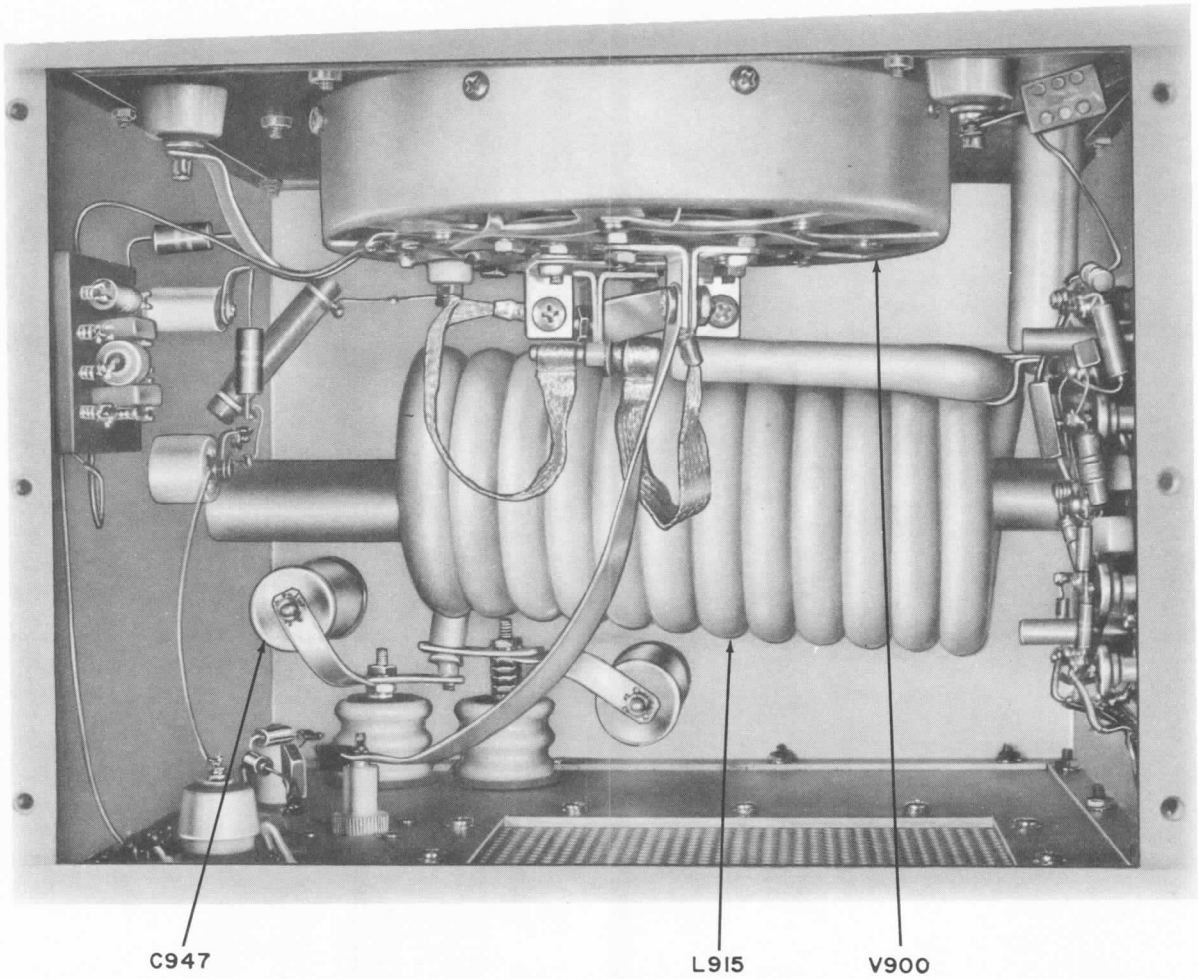


Figure I-5-8. Details of Stage V900, PA

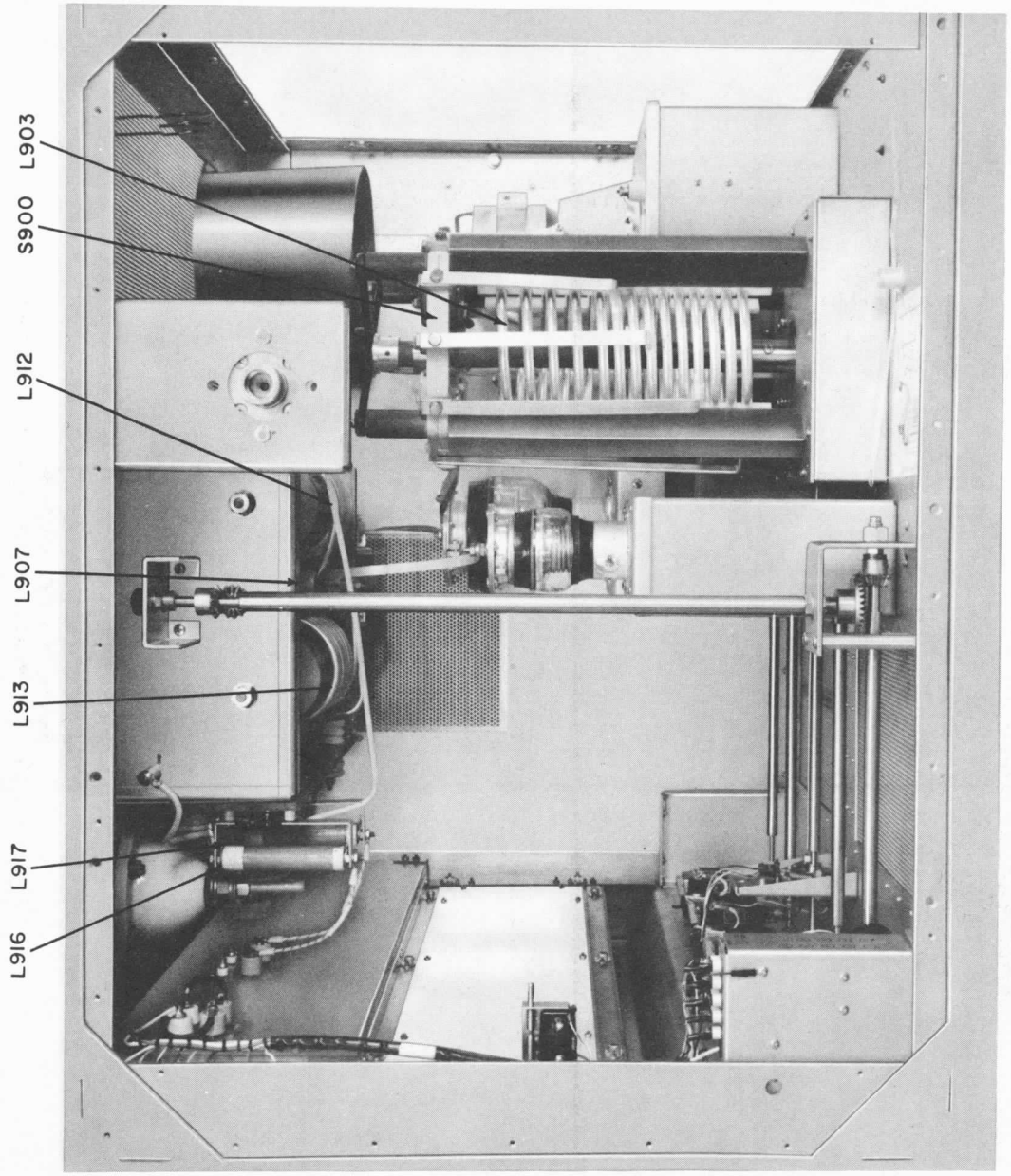


Figure I-5-9. Three-quarter View toward Rear, PA

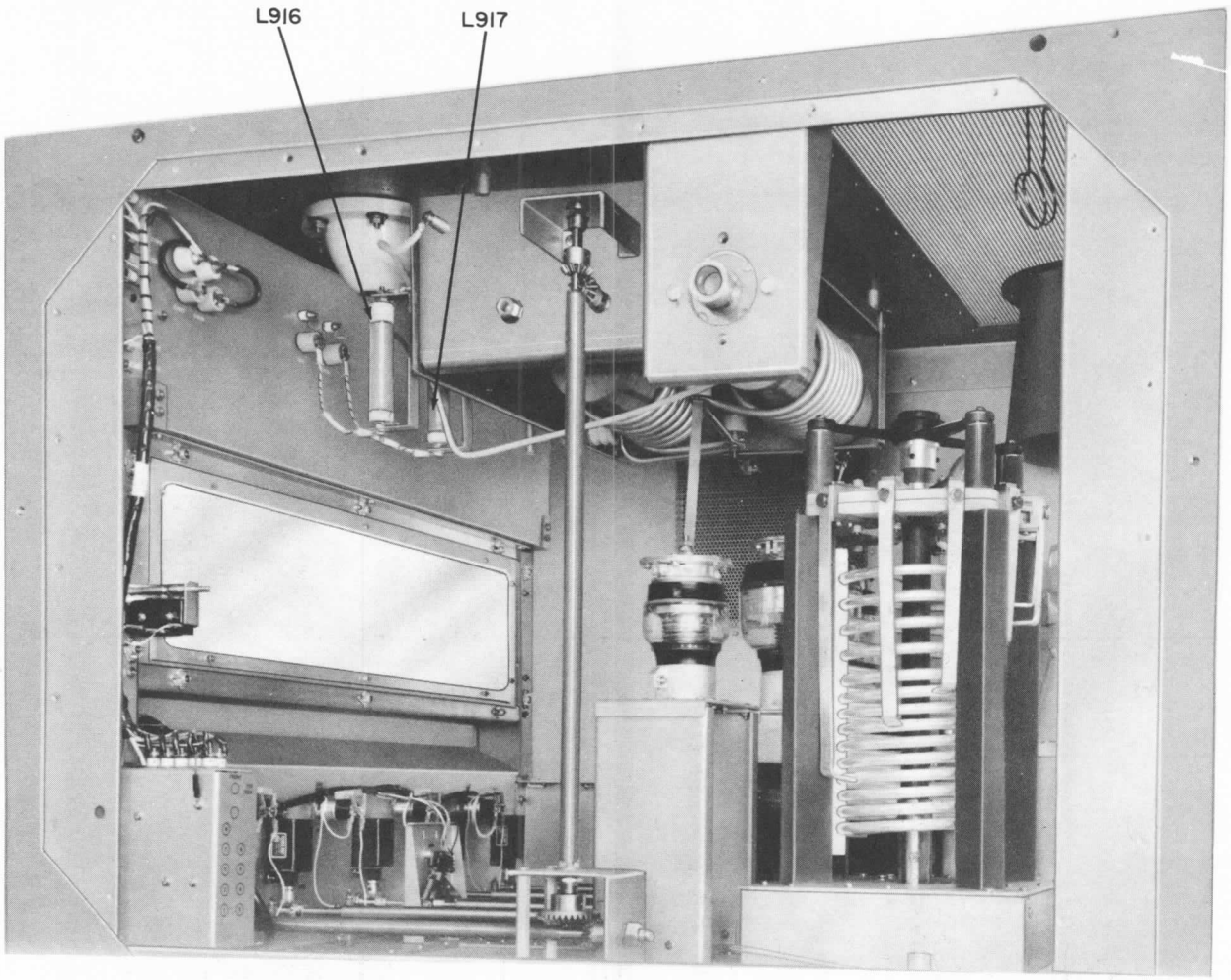


Figure I-5-10. Three-quarter View toward Front, PA

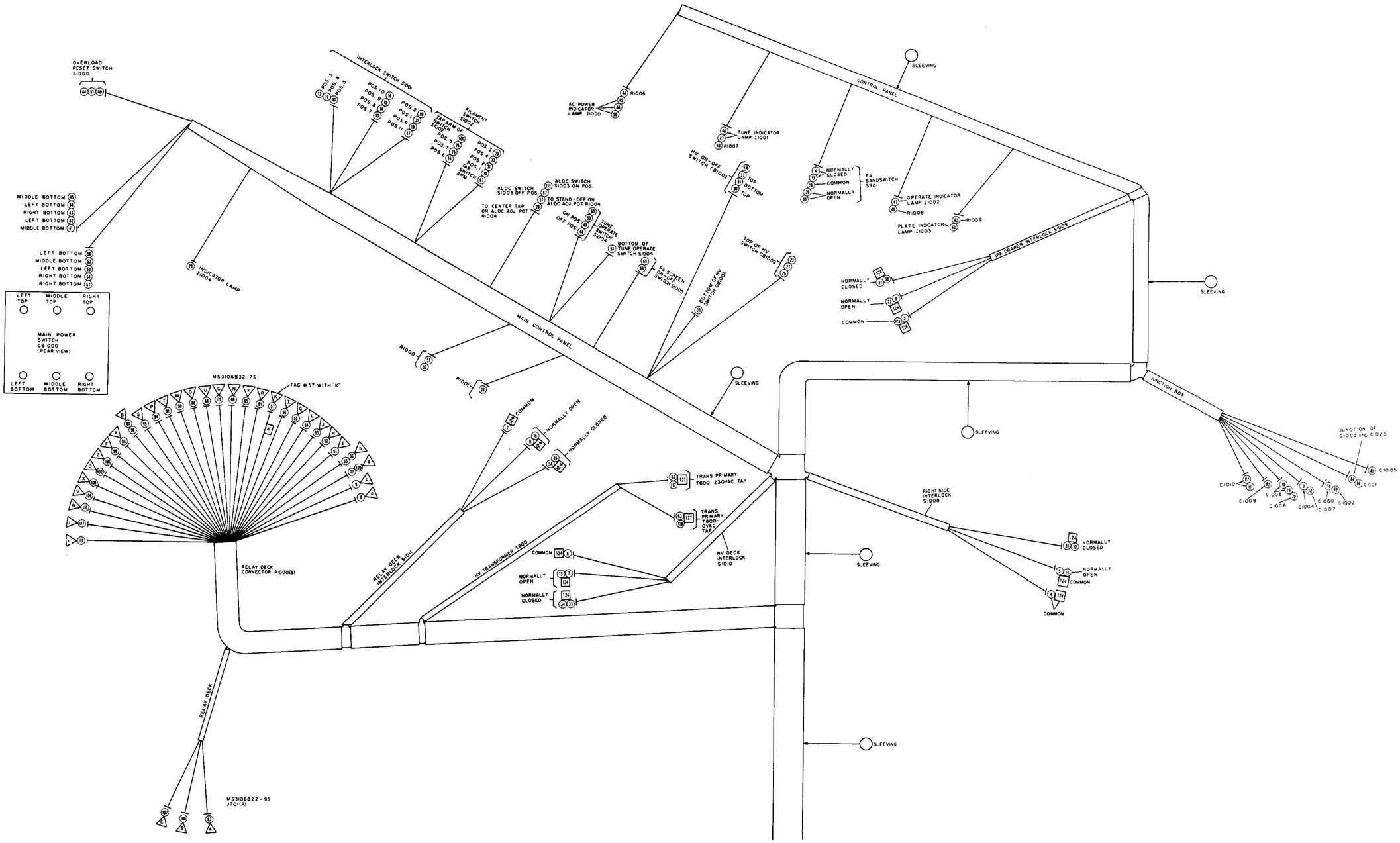
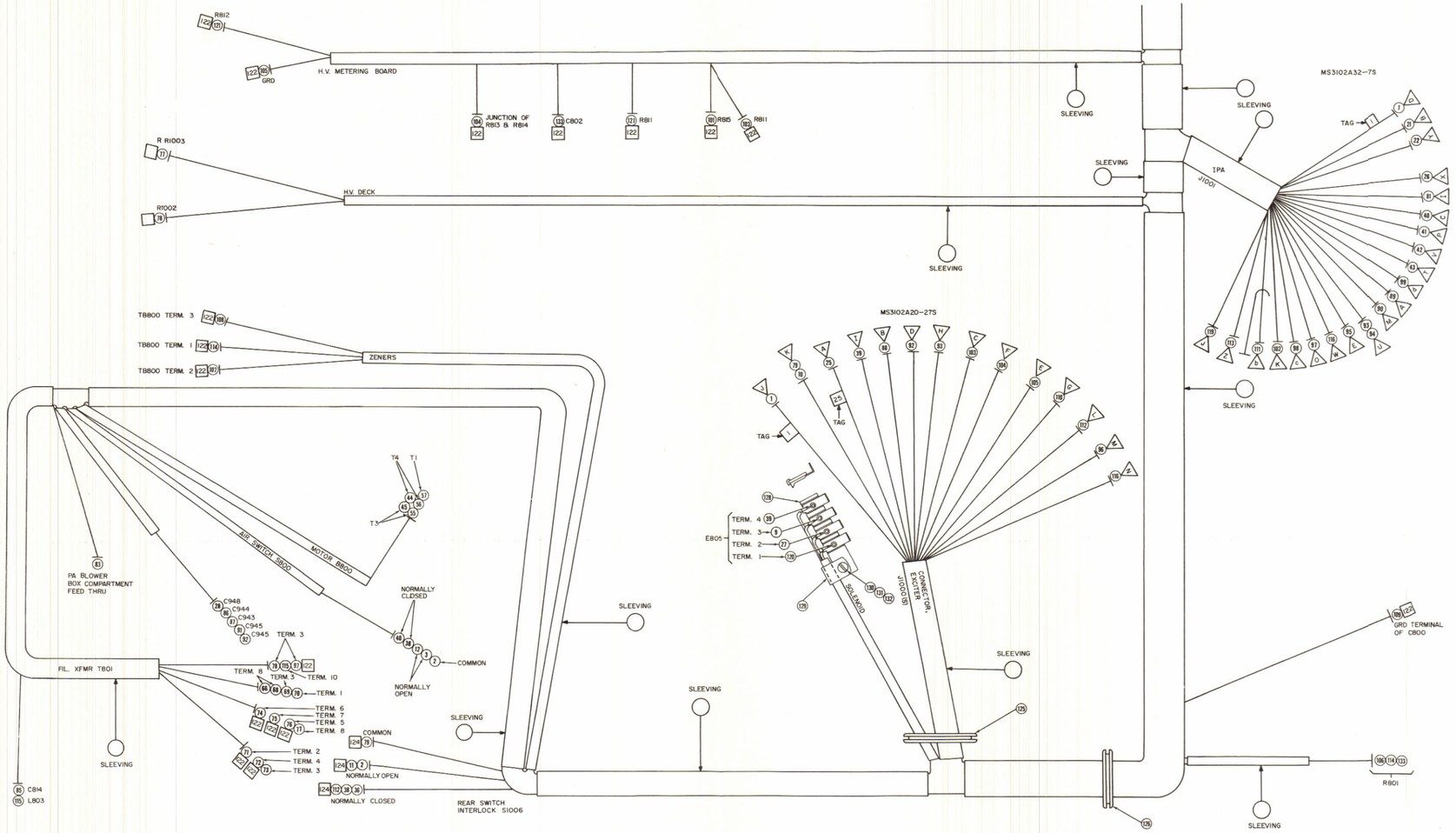


Figure I-5-11. Cabling Diagram (CA-425), PA and Main Power Supply (Sheet 1 of 2)



ITEM	REQ	PART NO.	DESCRIPTION	SYMBOL
1		MWC 2007U5	PHASE I INTERLOCK FUSE	GREEN
2		U95	INTERLOCK REAR DOOR	WH/GRN
3		U94	INTERLOCK PA AIR SWITCH	WH/YELLOW
4		U3	PA BANDSWITCH	ORANGE
5		U93	INTERLOCK SIDE DOOR	WH/ORANGE
6		U6	RFB-I INTERLOCK INDICATOR	BLUE
7		U96	INTERLOCK HIGH VOLTAGE DECK	WH/BLUE
8		U5	INTERLOCK RELAY DECK	GREEN
9		MWC 2007U96	TO DECK INTERLOCK RELAY	WH/BLUE
10		MWC 2027U4	EXTERNAL INTERLOCK INDICATOR	YELLOW
11		U95	REAR DOOR INTERLOCK INDICATOR	WH/GREEN
12		U94	PA AIR SWITCH INDICATOR	WH/YELLOW
13		U3	PA BANDSWITCH INDICATOR	ORANGE
14		U93	RT SIDE INDICATOR	WH/ORANGE
15		U96	H.V. DECK INDICATOR	WH/BLUE
16		U5	RELAY DECK INDICATOR	GREEN
17		MWC 2027U1	TIMER INDICATOR	BROWN
18		MWC 2007U0	R.F. DECK INTERLOCK	BLACK
19		MWC 2027U0	R.F. DECK INDICATOR	BLACK
20			DELETED	
21		MWC 2027U7	RFB-I AIR SWITCH INDICATOR	VIOLET
22		MWC 2027U6	RFB-I BANDSWITCH INDICATOR	BLUE
23		MWC 2027U97	INTERLOCK INDICATOR	WH/VIOLET
24		MWC 2007U2	H.V. PROTECT	RED
25		MWC 2007U92	H.V. RELAY	WH/RED
26		MWC 2007U97	RFB TO ON-OFF SW. PHASE I	WH/VIOLET
27		MWC 2027U97	TO POWER SUPPLY SHORTING RELAY	WH/VIOLET
28		U95	A. L. D. C.	WH/GREEN
29		U91	H.V. PROTECT RESISTOR	WH/BROWN
30				
31				
32				
33				
34				
35				
36		U91	H.V. PROTECT RESISTOR	WH/BROWN
37		U92	A. L. D. C. RFB PLUG	WH/RED
38		U91	H.V. PROTECT RESISTOR	WH/BROWN
39		U91	H.V. PROTECT RESISTOR	WH/BROWN
40		MWC 2027U91	H.V. PROTECT RESISTOR	WH/BROWN
41		MWC 1609U9	PHASE I RFB	WHITE
42		MWC 1609U7	PHASE 2 RFB	VIOLET
43		MWC 1609U8	PHASE 3 RFB	GREY
44		MWC 2027U4	AC ON LIGHT	YELLOW
45		U90	AC ON LIGHT	WH/BLACK
46		U9	TUNE OPERATE LIGHT	WHITE
47		U9	TUNE OPERATE LIGHT	WHITE
48		U5	TUNE LIGHT	GREEN
49		U4	OPERATE LIGHT	YELLOW
50		U7	TUNE OPERATE SWITCH	VIOLET
51		MWC 2027U97	TUNE OPERATE SWITCH	WH/VIOLET
52		MWC 1609U9		WHITE
53		U7	TUNE TO RELAY PANEL TO BLOWER FUSE	VIOLET
54		U8		GREY
55		MWC 1609U90	BLOWER TO BLOWER FUSE	WH/BLACK
56		MWC 1609U4	BLOWER TO BLOWER FUSE	YELLOW
57		MWC 1609U8	BLOWER TO BLOWER FUSE	GREY
58		MWC 2027U9	METER LIGHTS	WHITE
59				
60		MWC 2027U7	TO OVERLOAD RESET	VIOLET
61		U2	TO RELAY PANEL RESET	RED
62		U2	H.V. ON LIGHT TO TRANS. PRIMARY	RED
63		U0	H.V. ON LIGHT TO TRANS. PRIMARY	BLACK
64		U7	TO SCREEN ON-OFF SWITCH	VIOLET
65		MWC 2027U4	TO SCREEN ON-OFF RELAY	YELLOW
66		MWC 1609U97	TO PA FILAMENT TRANS. COMMON	WH/VIOLET
67		MWC 1609U8	TO ARM TAP SWITCH	GREY
68		MWC 2027U7	AC METER	VIOLET
69		MWC 2027U4	AC METER COMMON	YELLOW
70		MWC 1609U6	TAP SWITCH TO FIL. TRANS.	BLUE

ITEM	REQ	PART NO.	DESCRIPTION	SYMBOL
71		MWC 1609U2	TAP SWITCH TO FIL. TRANS.	RED
72		U3		ORANGE
73		U4		YELLOW
74		U1		BROWN
75		U5		GREEN
76		MWC 1609U0	TAP SWITCH TO FIL. TRANS.	BLACK
77		MWC 2007U7	TO H.V. RECTIFIER FIL. TRANS.	VIOLET
78		MWC 2007U4	TO H.V. RECTIFIER FIL. TRANS.	YELLOW
79		MWC 2027U4	EXTERNAL INTERLOCK INDICATOR	YELLOW
80		MWC 2027U92	RFB SCREEN RELAY TO MICRO SW.	WH/RED
81		MWC 2027U92	RFB SCREEN MICRO SW. TO SCR. CON.	WH/RED
82		HWC 1601U2	RELAY PANEL TO PA SCREEN METER	RED/WH. WIRE
83		HWC 1609U9	METER TO BLOWER COMPARTMENT	WH/WH. WIRE
84		MWC 1609U3	PA PLATE CUR. TO RELAY PANEL	ORANGE
85		MWC 1609U94	PA PLATE CUR. TO FIL. TRANS. CT	WH/YELLOW
86		MWC 2027U 59	R.F. VOLTS	WH/SHIELD
87		S2	A. L. D. C.	RED/SHIELD
88		U98	ALARM	WH/GREY
89		U98	RFB-I BANDSWITCH	WH/GREY
90		U3	RFB-I BIAS	ORANGE
91		U93	FINAL BIAS	WH/ORANGE
92		U93	BIAS METER	WH/ORANGE
93		U90	NEGATIVE BIAS RETURN	WH/BLACK
94		U90	BIAS RETURN TO RELAY PANEL	WH/BLACK
95		U94	TO BIAS ADJUST AND RELAY PA	WH/YELLOW
96		MWC 2027U92	RFB SCREEN RELAY TO EXCITER PLG.	WH/RED
97		MWC 2007U4	FILAMENT RFB TAP SWITCH	YELLOW
98		MWC 1601U9	RFB PLATE OVERLOAD RELAY	BLUE
99		MWC 1601U0	GROUND	BLACK
100		MWC 2027U8	TIMER MOTOR AC	GREY
101		HWC 1601U2	PA SCREEN CONDENSOR	RED/WH.WIRE
102		MWC 2027U95	RFB TUNE (SCREEN)	WH/GREEN
103		MWC 2027U96	PLATE VOLT METER	WH/BLUE
104		MWC 2027U94	SCREEN VOLT METER	WH/YELLOW
105		MWC 2027U0	METER GROUND	BLACK
106		HWC 1601U9	SCREEN PA OPERATE	WH/WH.WIRE
107		HWC 1601U4	SCREEN PA TUNE TO ZENERS	YELLOW
108		MWC 2027U7	SCREEN OVERLOAD PROTECT	VIOLET
109		MWC 1601U1	GROUND LUG OF C800	BLACK/WH
110		MWC 2027U6	REAR FANS	BLUE
111		MWC 2027U2	A. L. D. C.	RED SHIELD
112		MWC 2027U91	H.V. PROTECT	BROWN
113		MWC 2027U93	DRAWER IND.	WH/ORANGE
114		HWC 1601U9	RESISTOR TO ZENERS	WH/H.V.
115		MWC 2027U94	FIL. XFMR. CT TO CHOKE	WH/YELLOW
116		MWC 2027U2	RFB (SCREEN) CONN TO EXCIT. CONT	RED
117		MWC 1601U2	H.V. XFMR. TO RELAY PLUG	WH/RED
118		MWC 2027U0	H.V. XFMR. TO RELAY PLUG	BLACK
119		MWC 2027U5	SCREEN OPERATE (RFB)	GREEN
120		MWC 2027U1	RELAY PLUG TO SOLENOID	BROWN
121		MWC 2027U6	RESISTOR JUMPER	BLUE
122		TE-155-32915	LUG, TERMINAL	
123		TE-156-34148	LUG, TERMINAL	
124		TE-120-2	LUG, SPADE	
125		EY-102-17	GROMMET	
126		EY-102-18	GROMMET	
127		TE-156-32953	LUG,	
128	1	TM-105-4AL	FANNING STRIP	
129	1	CU-102-2	CLAMP	
130	1	SCB6063SB96	SCREW	
131	1	LWE6S4MRN	LOCKWASHER	
132	1	NTH0632BN8	NUT	
133	X	HWC 1601U9	C802 TO R801	WHITE
134	1	TE-155-34853	LUG (#8) YELL	
135				
136				
137				
138				
139				
140				

Figure I-5-11. Cabling Diagram (CA-425), PA and Main Power Supply (Sheet 2 of 2)

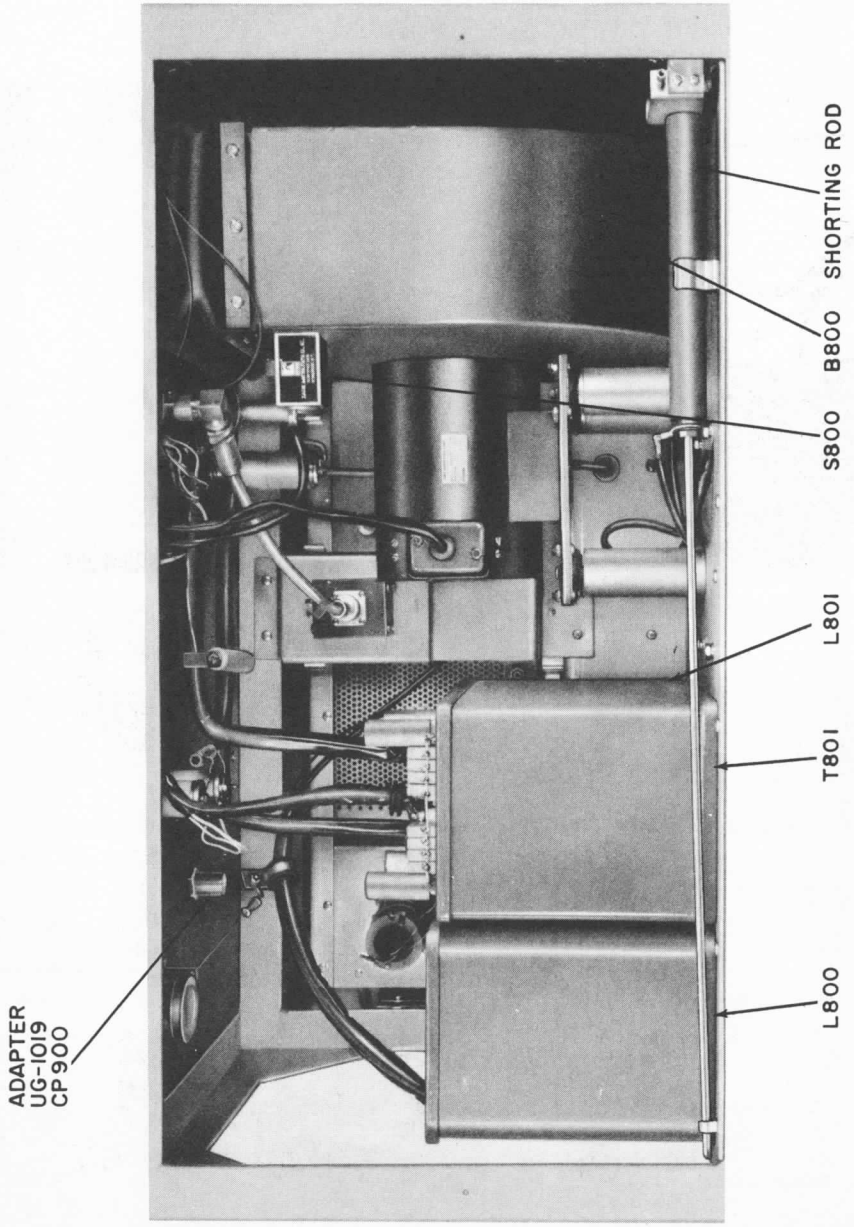


Figure I-5-12. Rear View, Coil/Blower Compartment, Main Power Supply

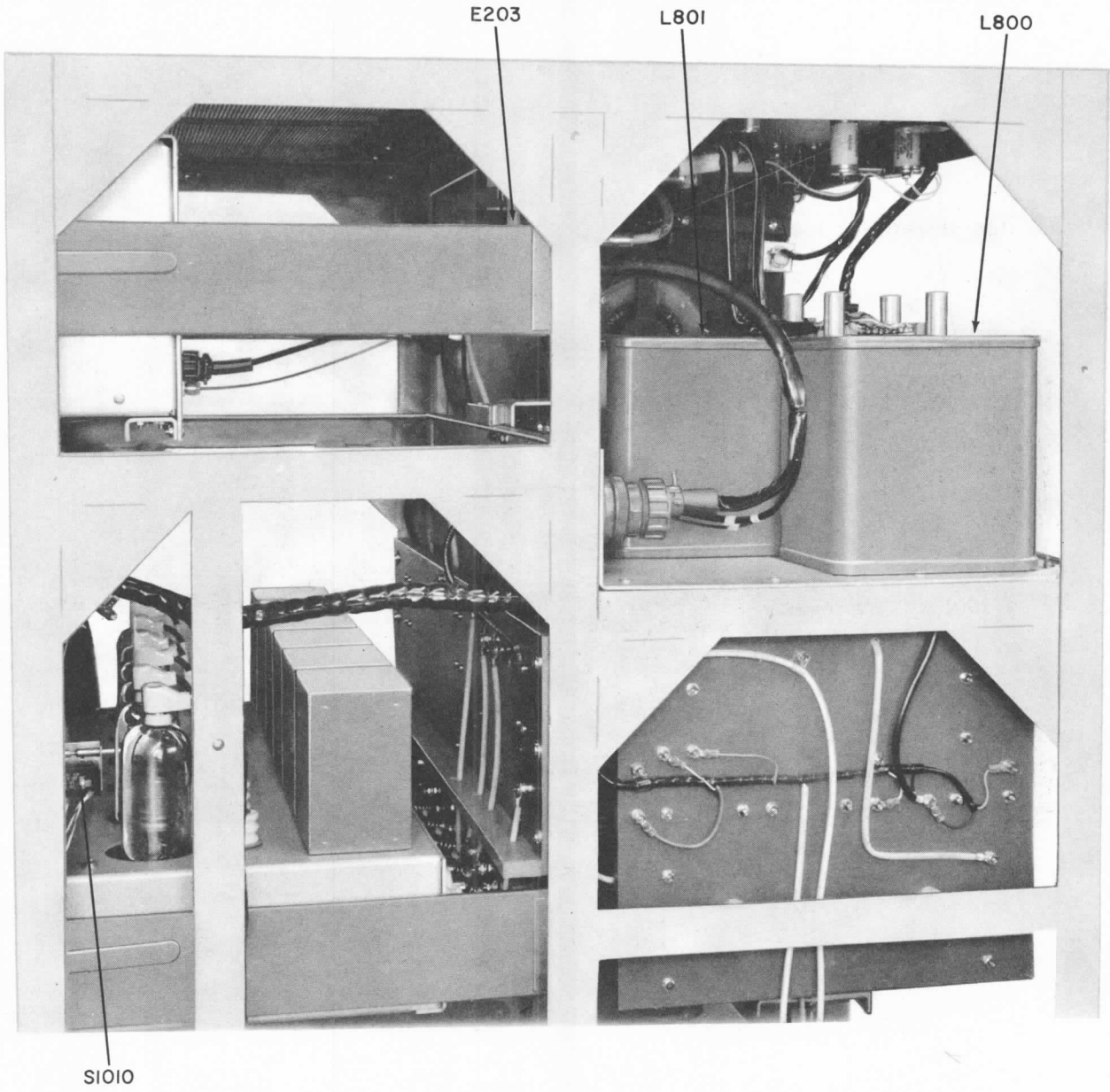


Figure I-5-13. Side View, Coil/Blower Compartment, Main Power Supply

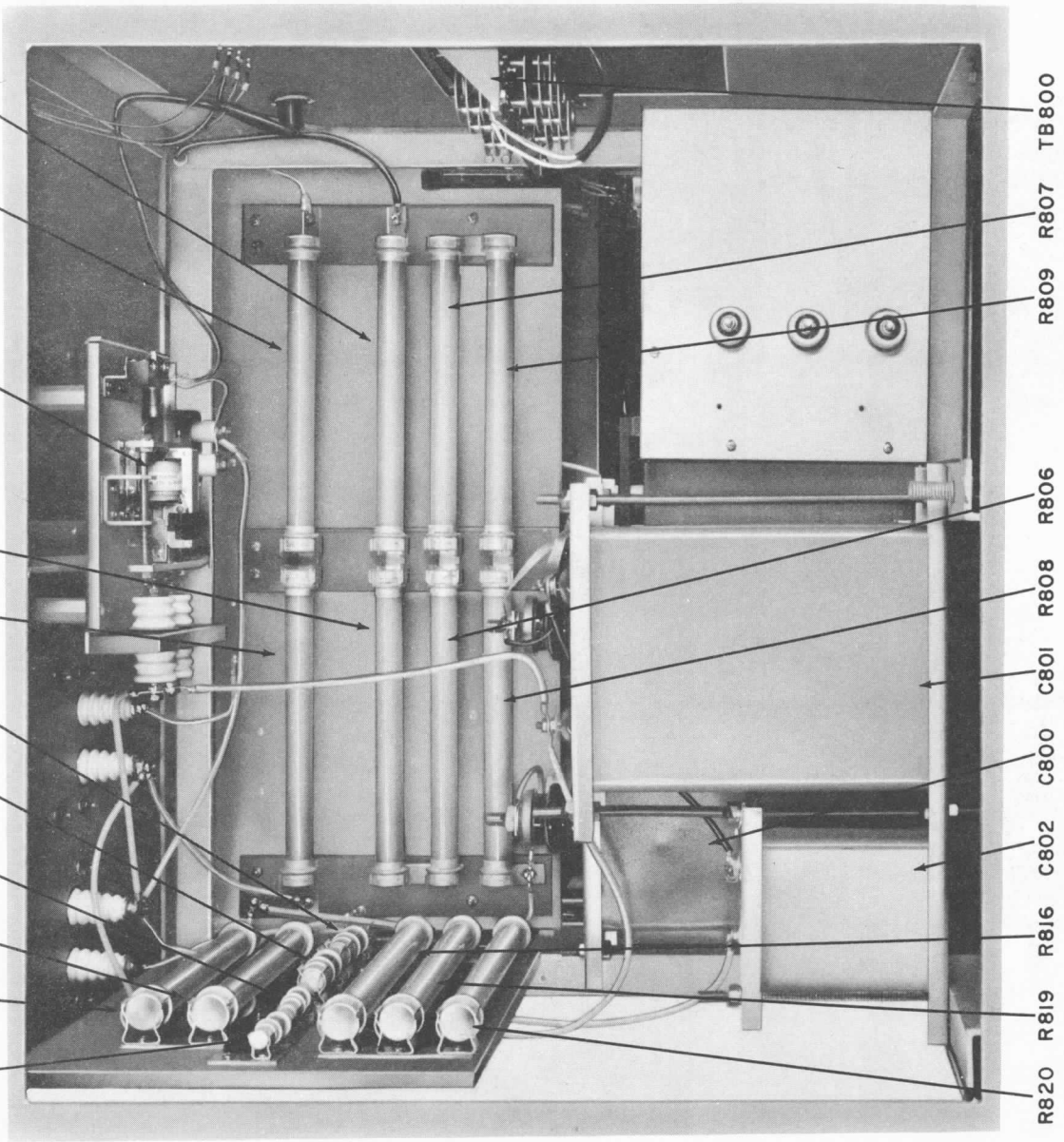


Figure I-5-14. Rear View, Resistor/Capacitor Compartment, Main Power Supply

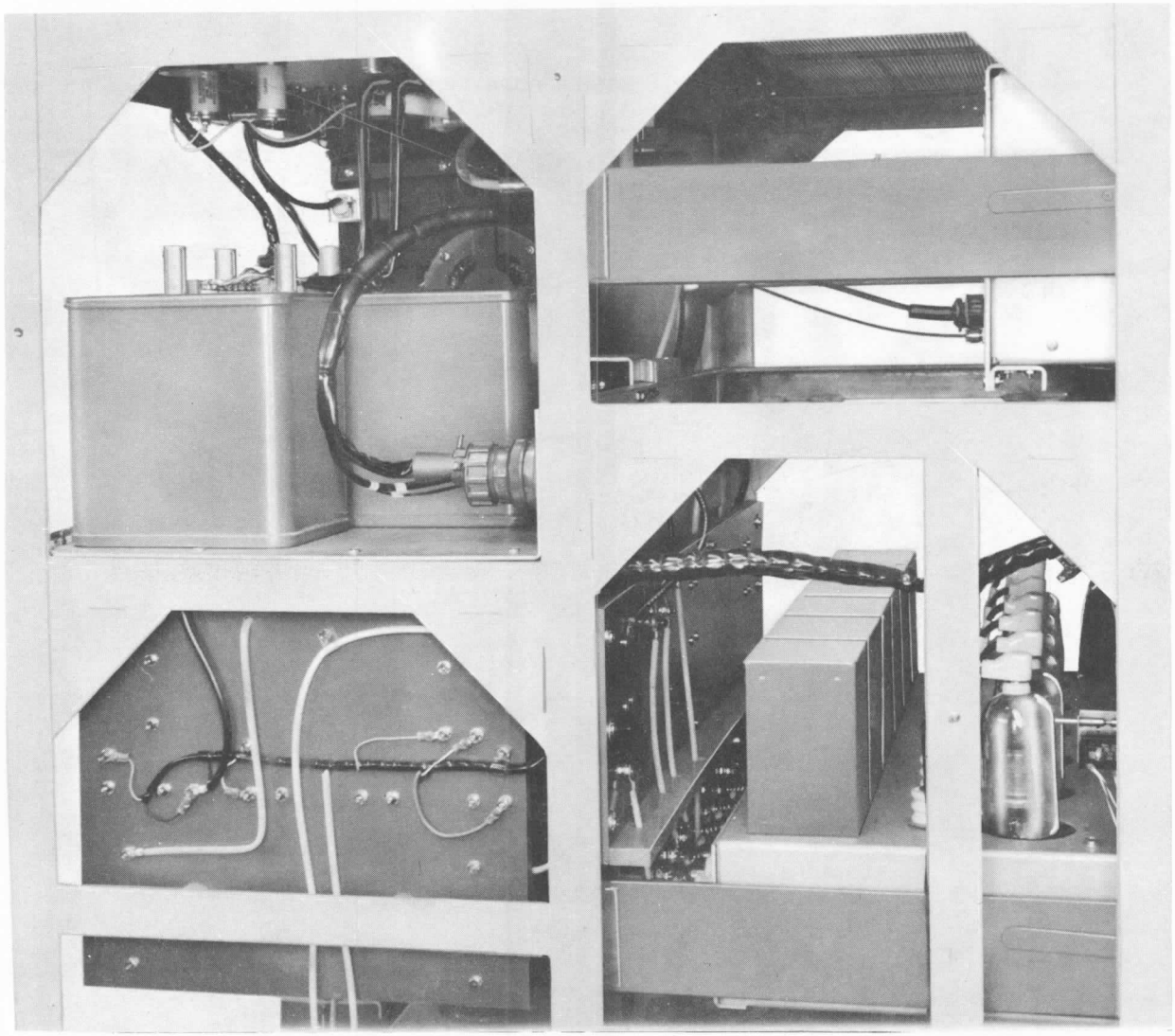


Figure I-5-15. Side View, Resistor/Capacitor Compartment, Main Power Supply

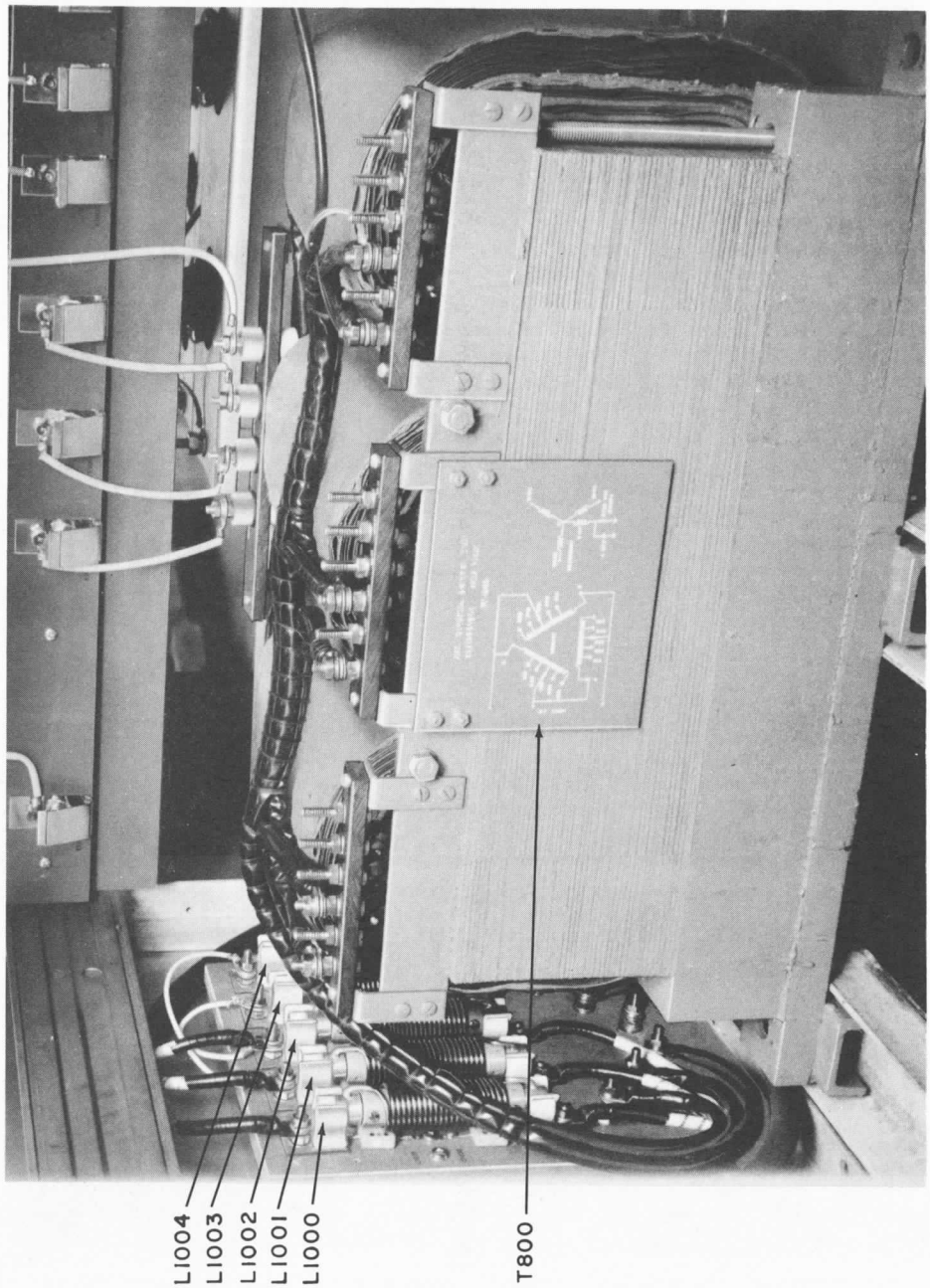
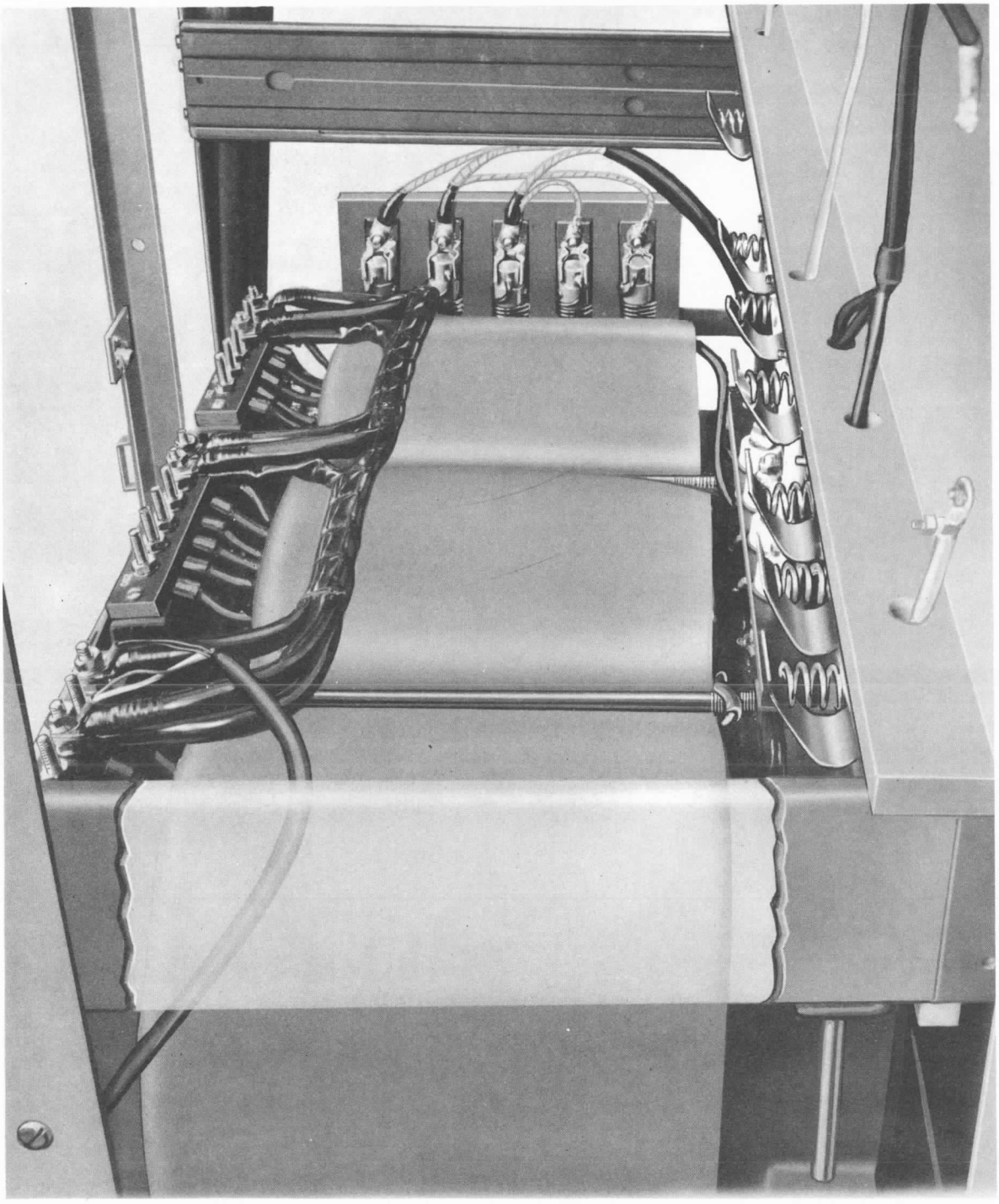


Figure I-5-16. Front View, Main Transformer, Main Power Supply



(SEE FIGURE I-5-16 FOR THE THREE CHANNEL MOUNTS OF THE TRANSFORMER WITHIN THREE CHANNELS MOUNTED ON FRAME.)

Figure I-5-17. Side View, Main Transformer, Main Power Supply

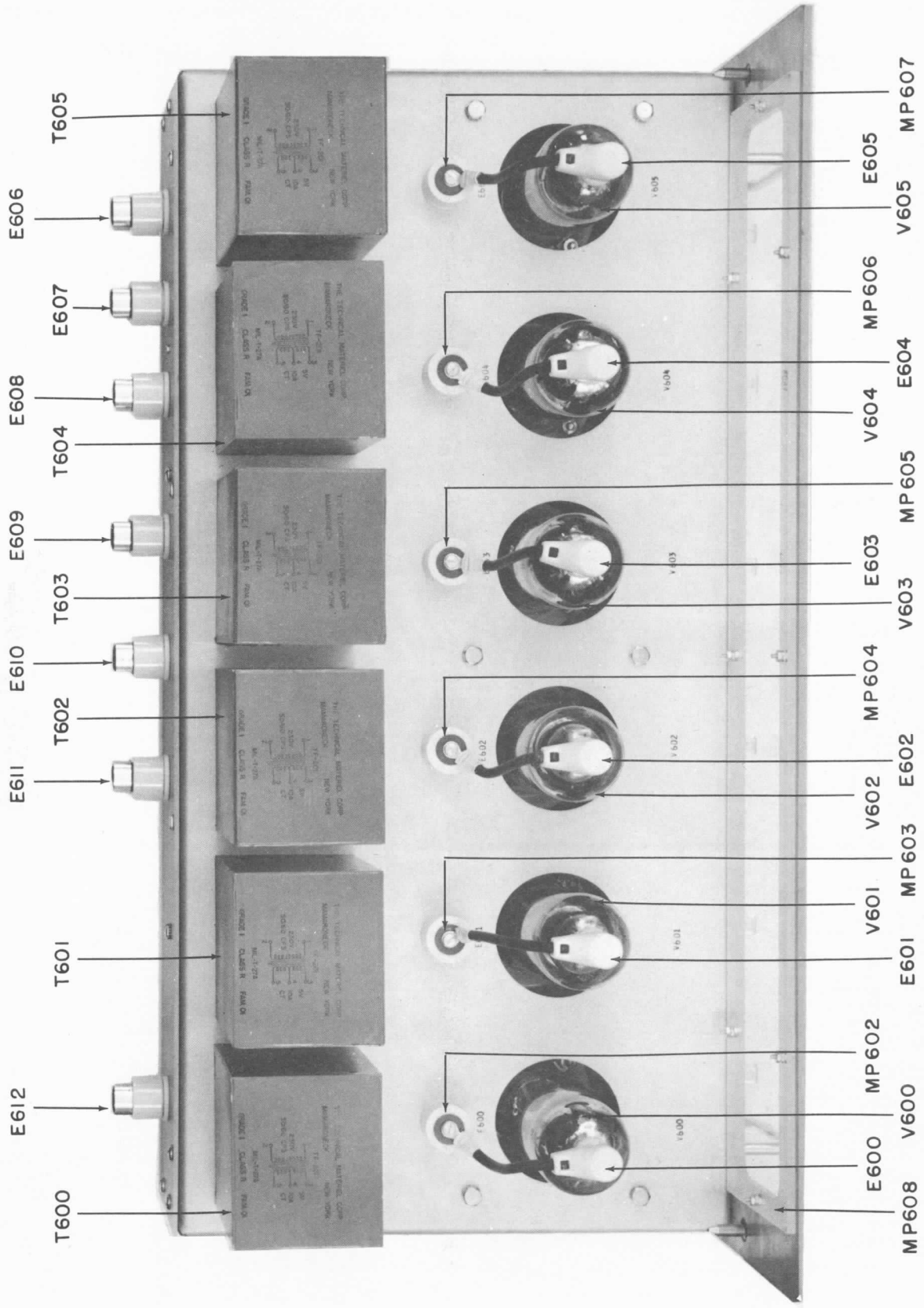


Figure I-5-18. Top View, T1-104

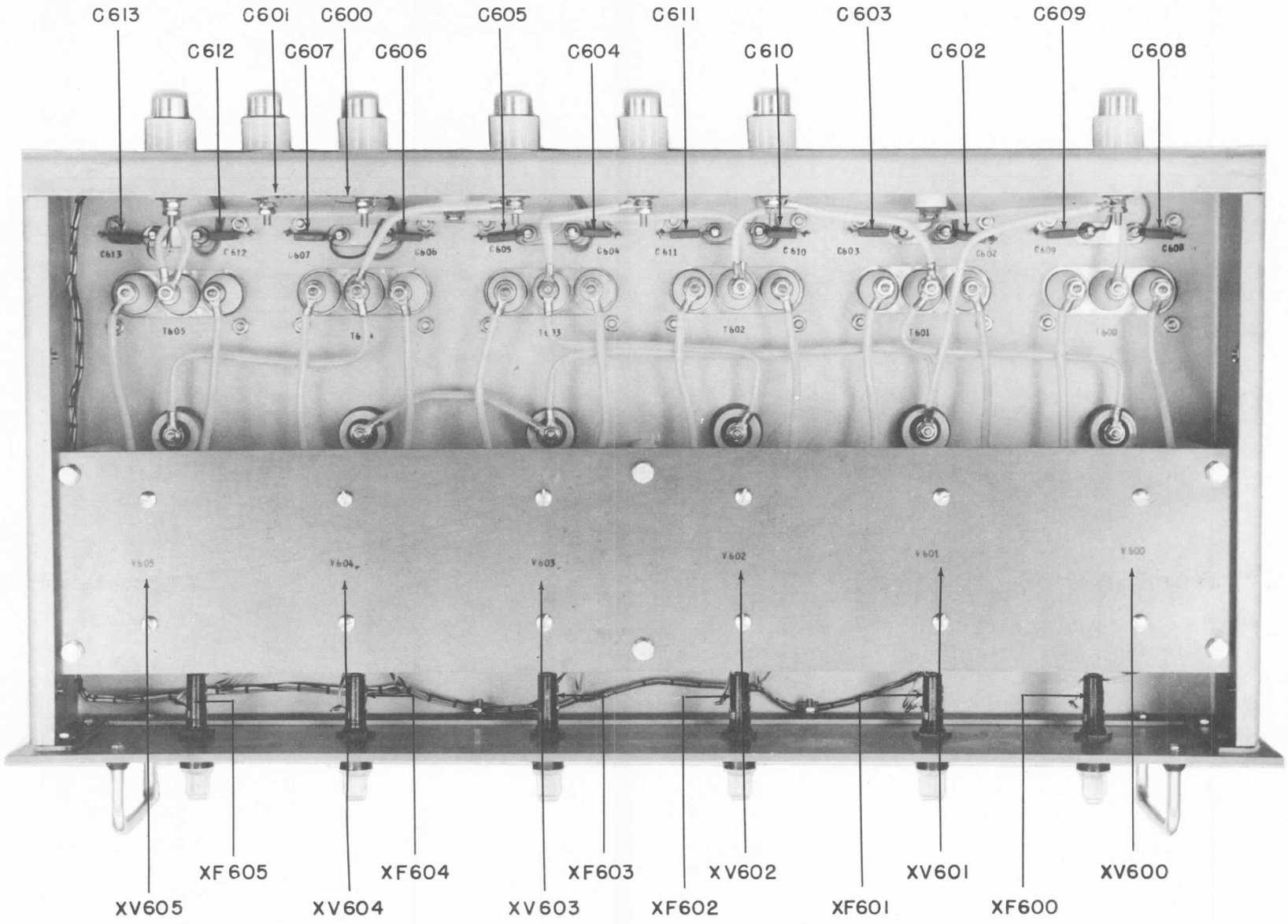


Figure I-5-19. Bottom View, T1-104

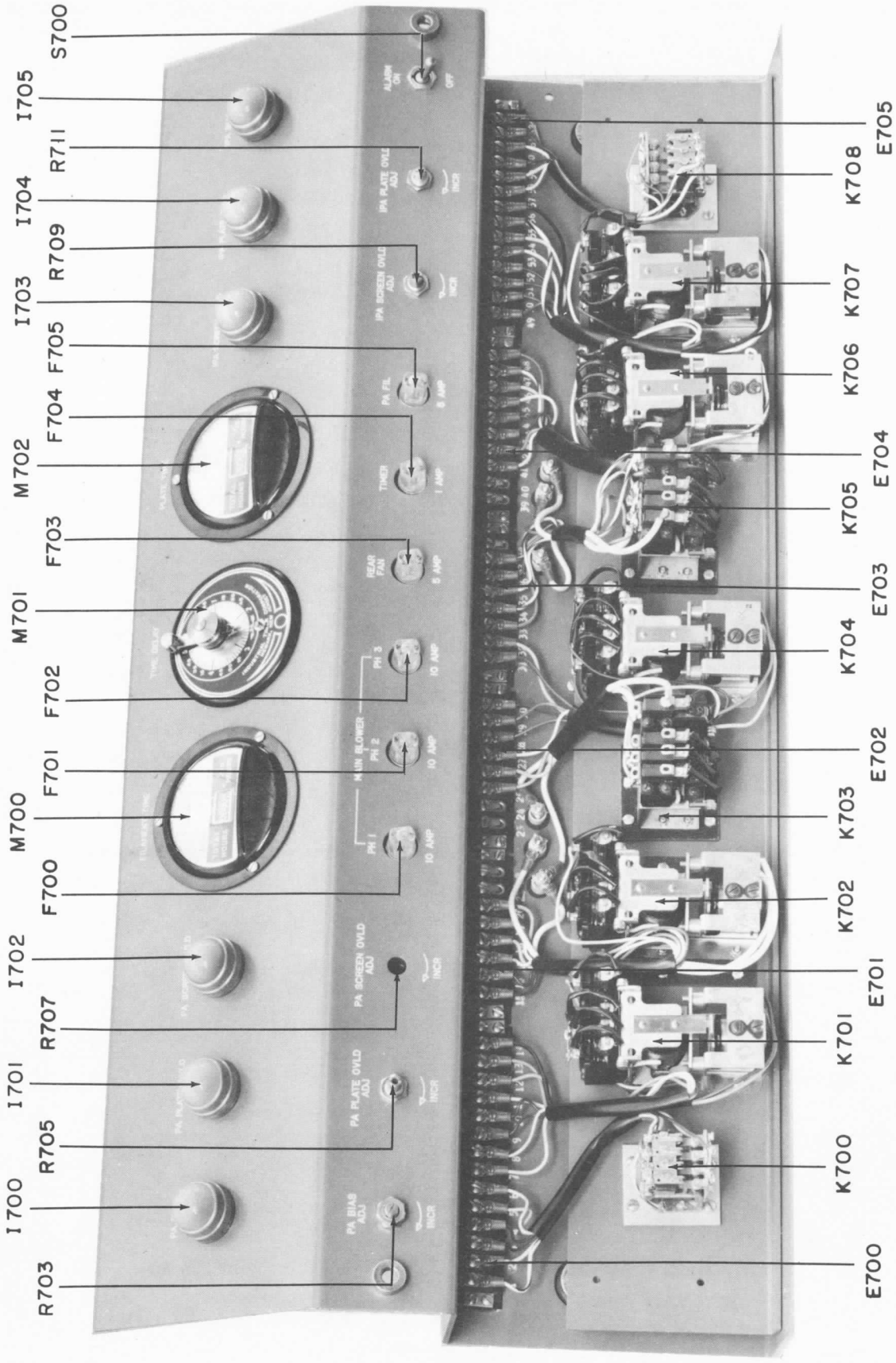


Figure I-5-20. Front View, Relay and Indicator Control Panels

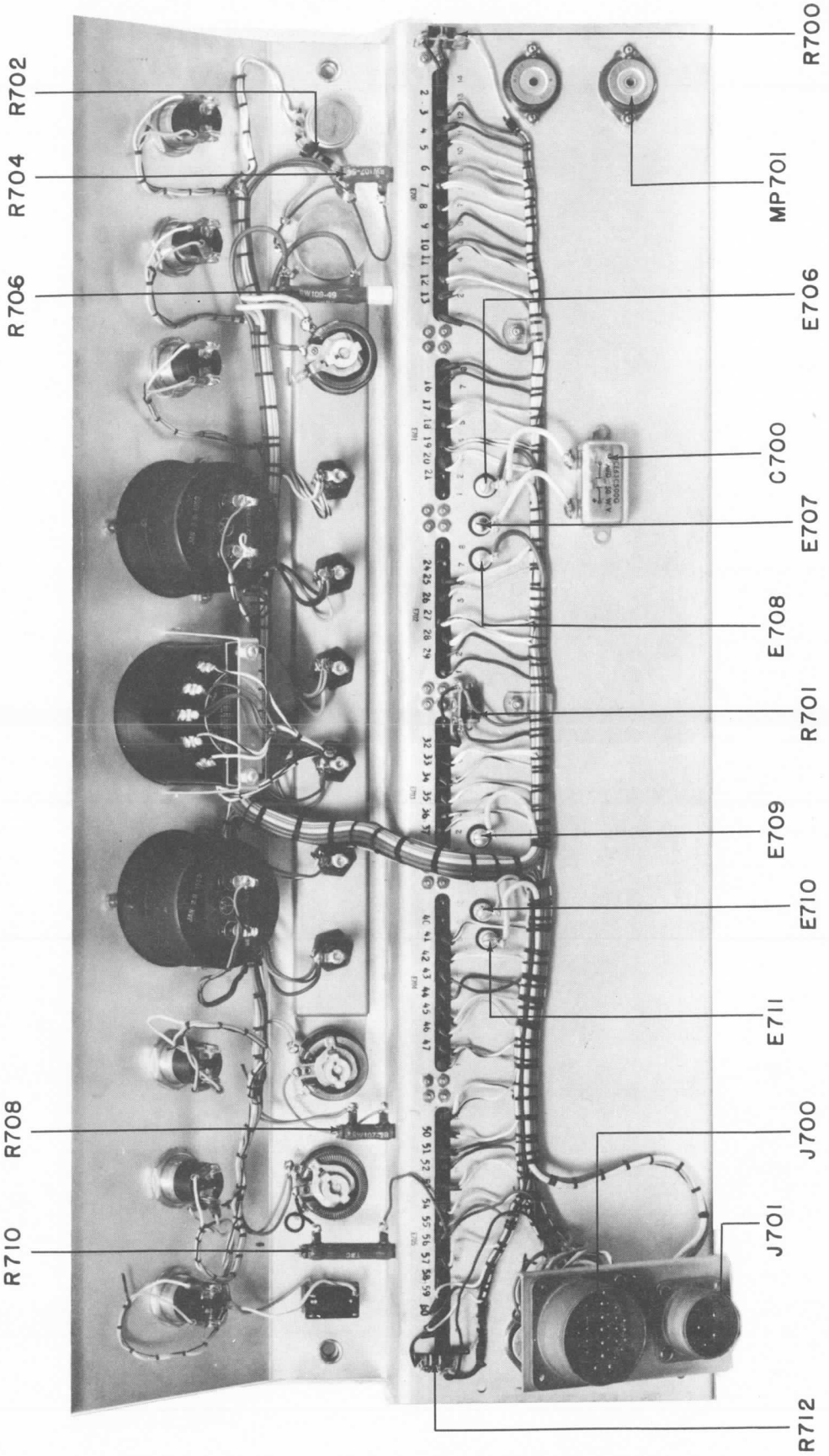


Figure I-5-21. Rear View, Relay and Indicator Control Panels

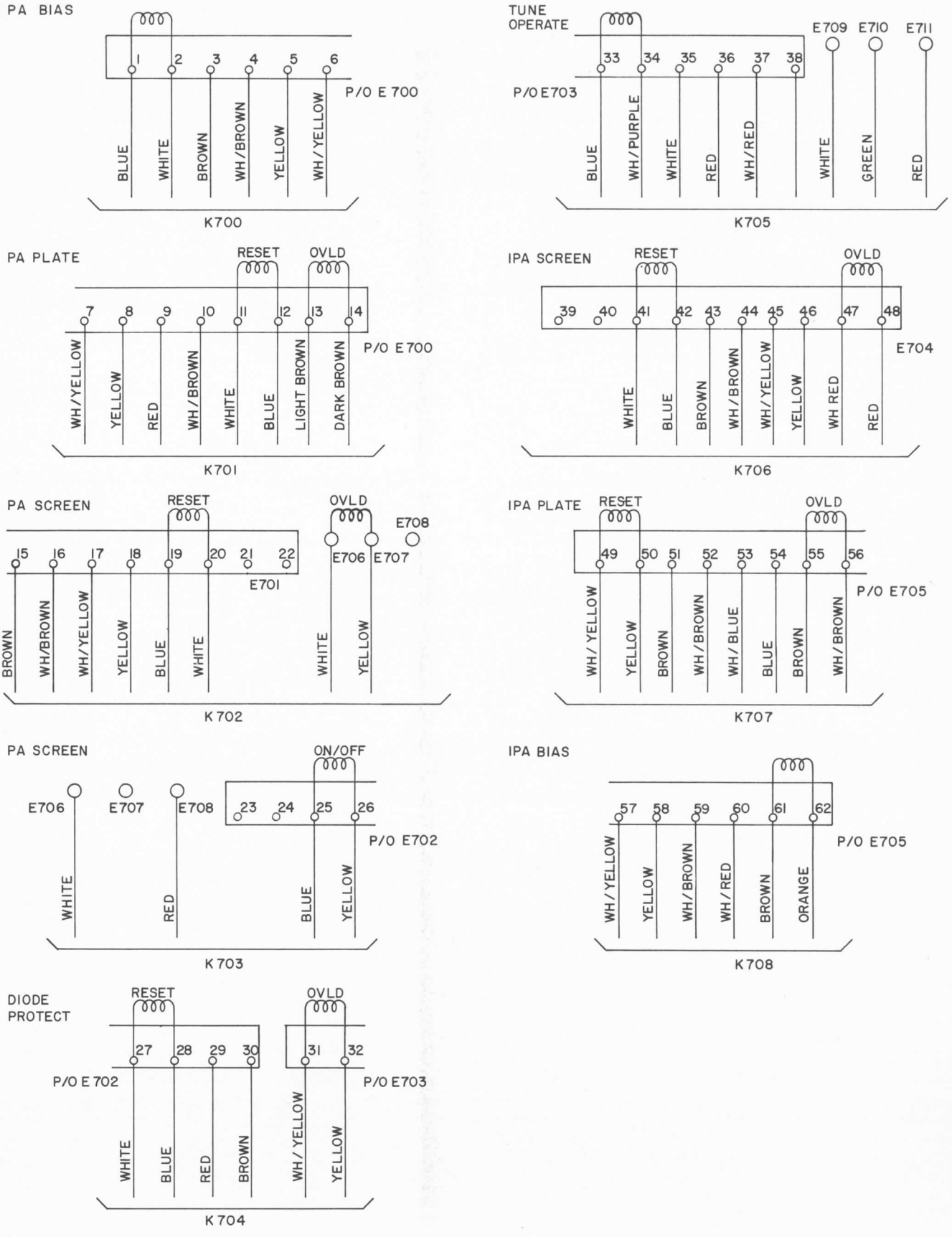


Figure I-5-22. Wiring of Relays, Relay Control Panel

NOTE:

NUMBERS AND LETTERS SHOWN INDICATE CONNECTION POINT AT FAR END OF WIRE. IN EVENT OF DUPLICATE NUMBERS OR LETTERS, COMPONENT DESIGNATION IS ALSO SHOWN.

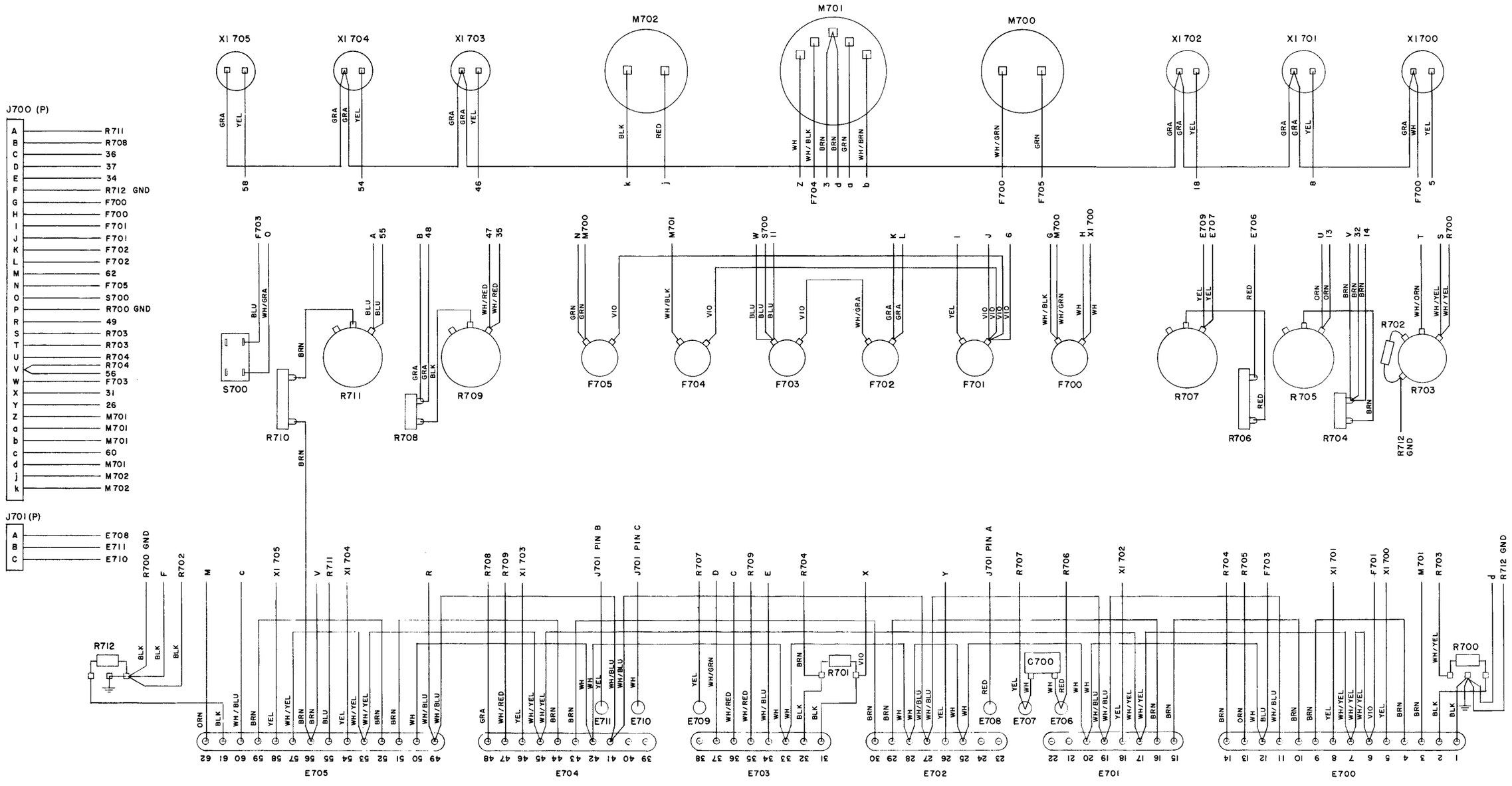
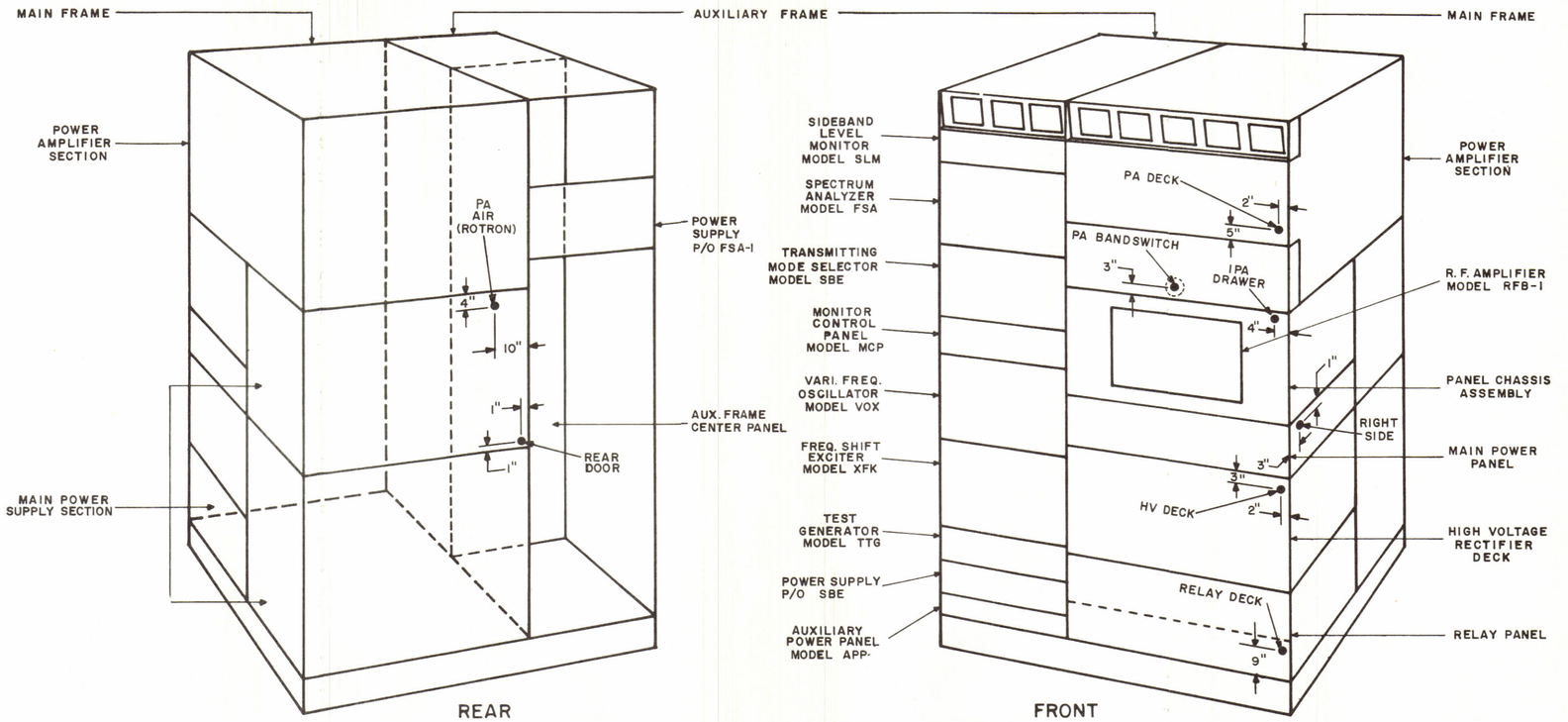


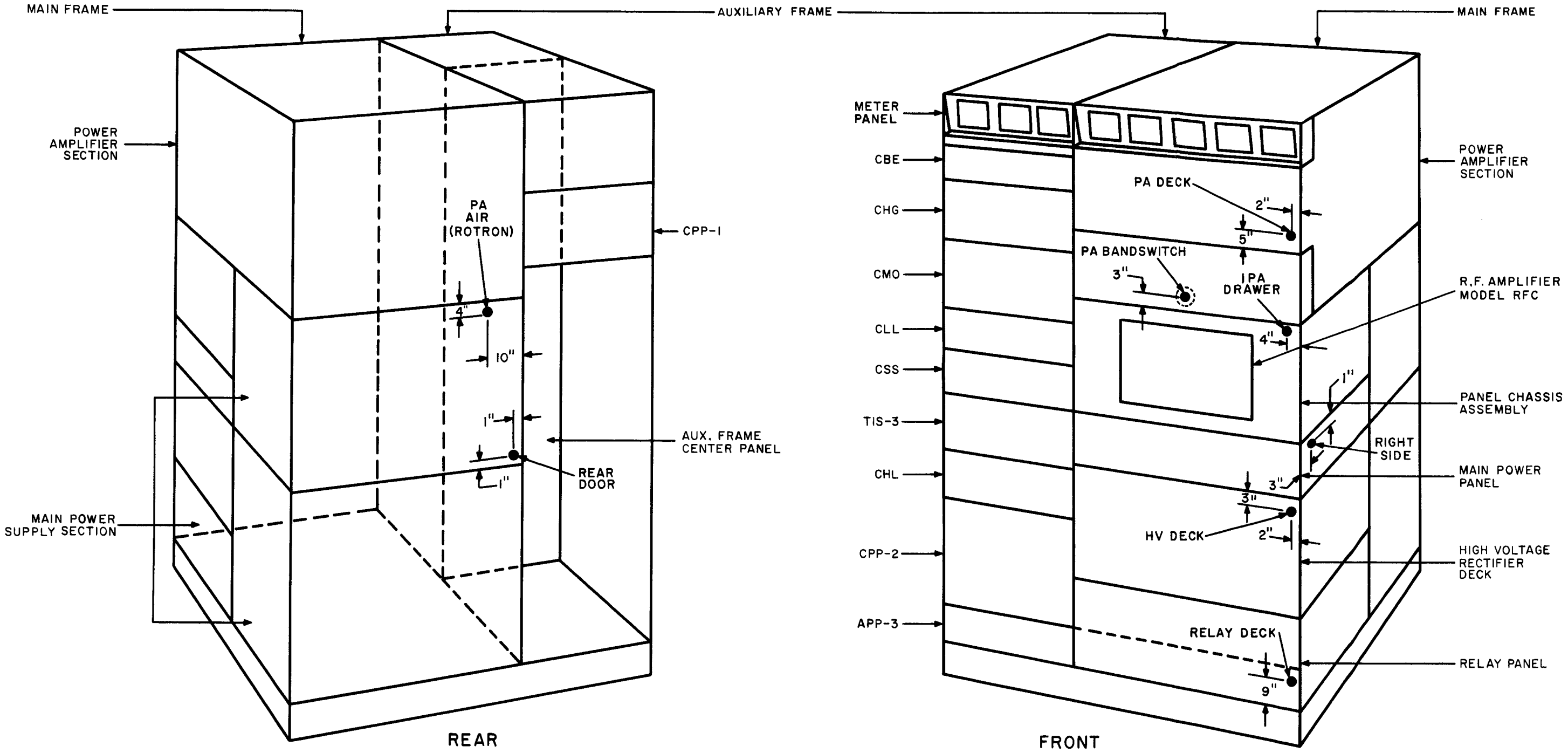
Figure I-5-23. Wiring Diagram, Indicator Control Panel

S1001 INTERLOCK SWITCH DESIGNATION Sw. Pos.		TERMINAL DESIGNATION ON SWITCH	NO. & COLOR OF WIRES
1	IPA Band Switch (See Note)	C NC NO	1 Brown 1 Purple 1 Pink
2	IPA Air (See Note)	C NC NO	1 Red 1 Black 1 Yellow
3	External (See Note)		
4	Rear Door	C NC NO	1 Yellow 3 White/Brown 2 White/Green
5	PA Air (See Note)	C NC NO	2 White/Yellow 2 White/Brown 1 White/Green
6	PA Deck	C NO NC	1 White/Yellow 1 Black 1 White/Brown
7	PA Band Switch (See Note)	C NO NC	2 Orange 1 Black 2 White/Brown
8	Right Side	C NO NC	1 Orange 2 White/Orange 2 White/Brown
Bet. 8 & 9	IPA Drawer	C NO NC	2 White/Orange 2 Blue 2 White/Brown
9	HV Deck	C NO NC	1 Blue 2 White/Blue 2 White/Brown
10	Relay Deck	C NO NC	1 White/Blue 2 Green 2 White/Brown



NOTES:
PA AIR (ROTRON) MOUNTED ON AIR DUCT TO PA TUBE.
PA BANDSWITCH MOUNTED ON GEAR TRAIN TO L902/L903.
IPA AIRSWITCH MOUNTED NEAR BOTTOM OF PL-172 TUBE LOCATED IN RF AMPLIFIER.*
IPA BANDSWITCH MOUNTED ON SWITCH AXLE NEAR BANDSWITCH L245/L246 LOCATED IN RF AMPLIFIER.*
EXTERNAL, SEE JUMPER ON E3000 BETWEEN TERMINALS 8 AND 10 LOCATED ON AUXILIARY FRAME.*
* NOT SHOWN ON DRAWING.

Figure I-5-24-a. Location of Interlock Switches on GPT-10K (Non-Synthesized)



NOTES:

PA AIR (ROTRON) MOUNTED ON AIR DUCT TO PA TUBE.
PA BANDSWITCH MOUNTED ON GEAR TRAIN TO L902/L903.
IPA AIRSWITCH MOUNTED NEAR BOTTOM OF PL-172 TUBE LOCATED IN RF AMPLIFIER.*
IPA BANDSWITCH MOUNTED ON SWITCH AXLE NEAR BANDSWITCH L245/L246 LOCATED IN RF AMPLIFIER.*
EXTERNAL, SEE JUMPER ON E3000 BETWEEN TERMINALS 8 AND 10 LOCATED ON AUXILIARY FRAME.*
*NOT SHOWN ON DRAWING.

Figure I-5-24-b. Location of Interlock Switches on GPT-10K (Synthesized)

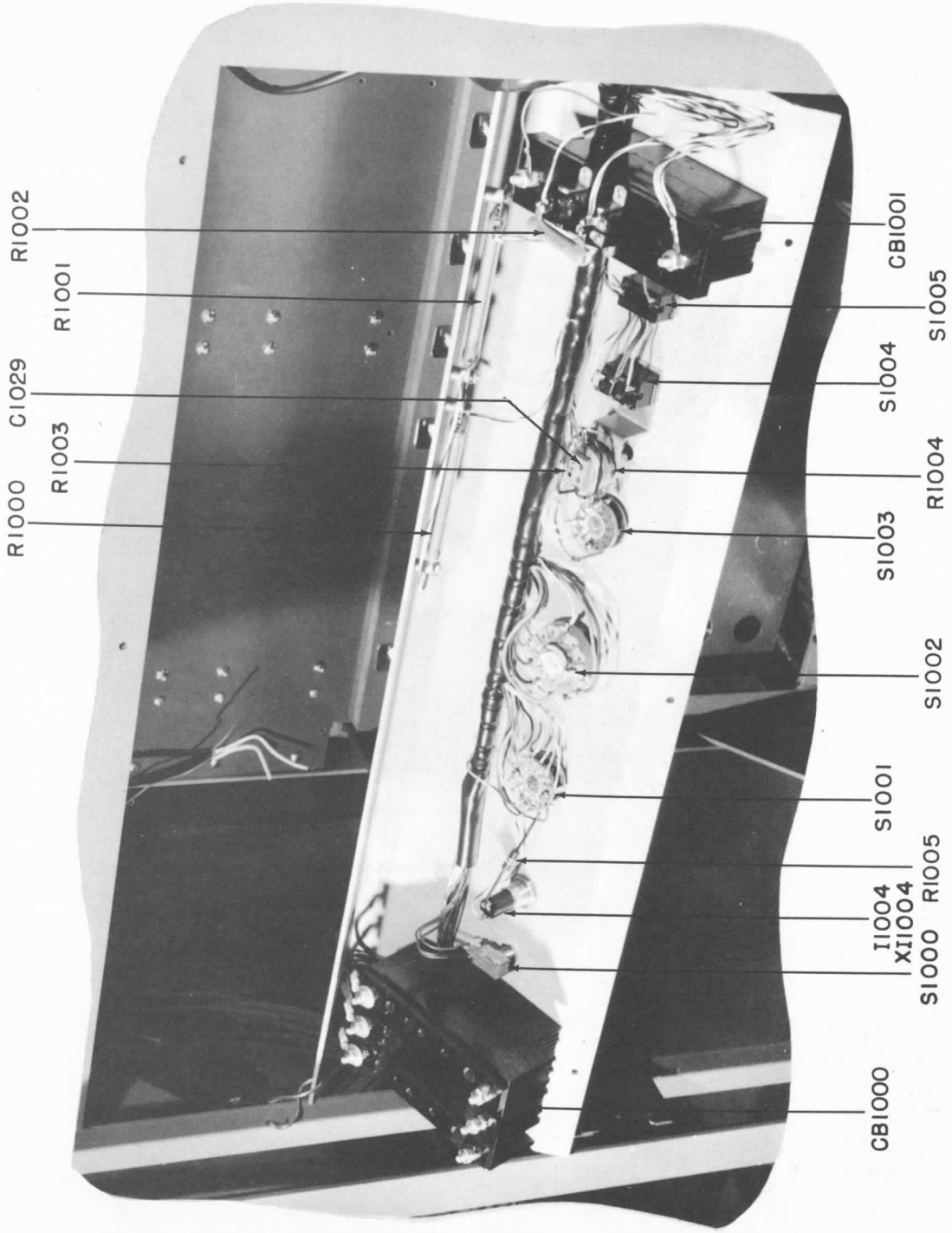


Figure I-5-25. Rear View, Main Power Control Panel

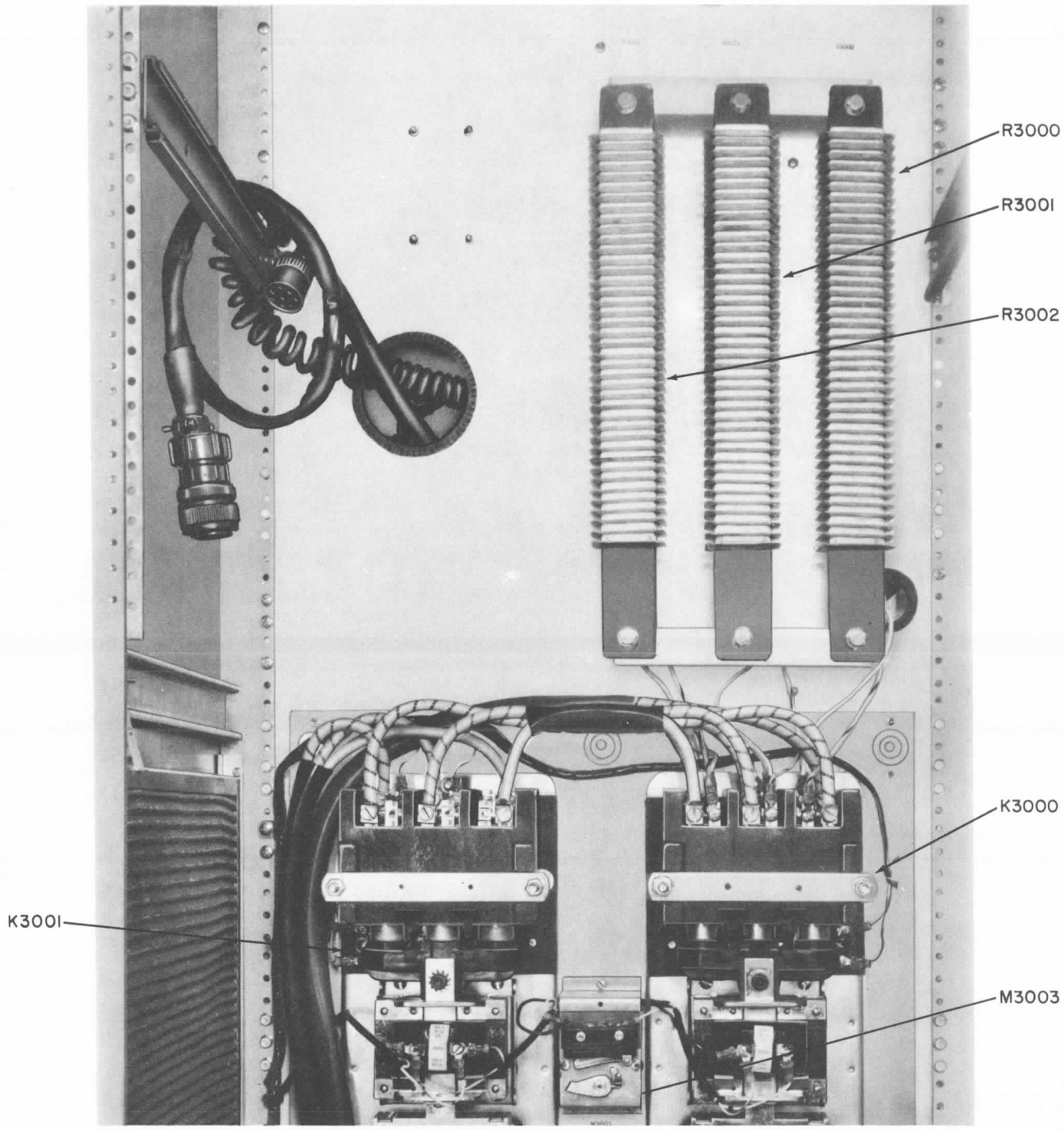


Figure I-5-26. Rear View, Upper Half, Auxiliary Frame Chassis

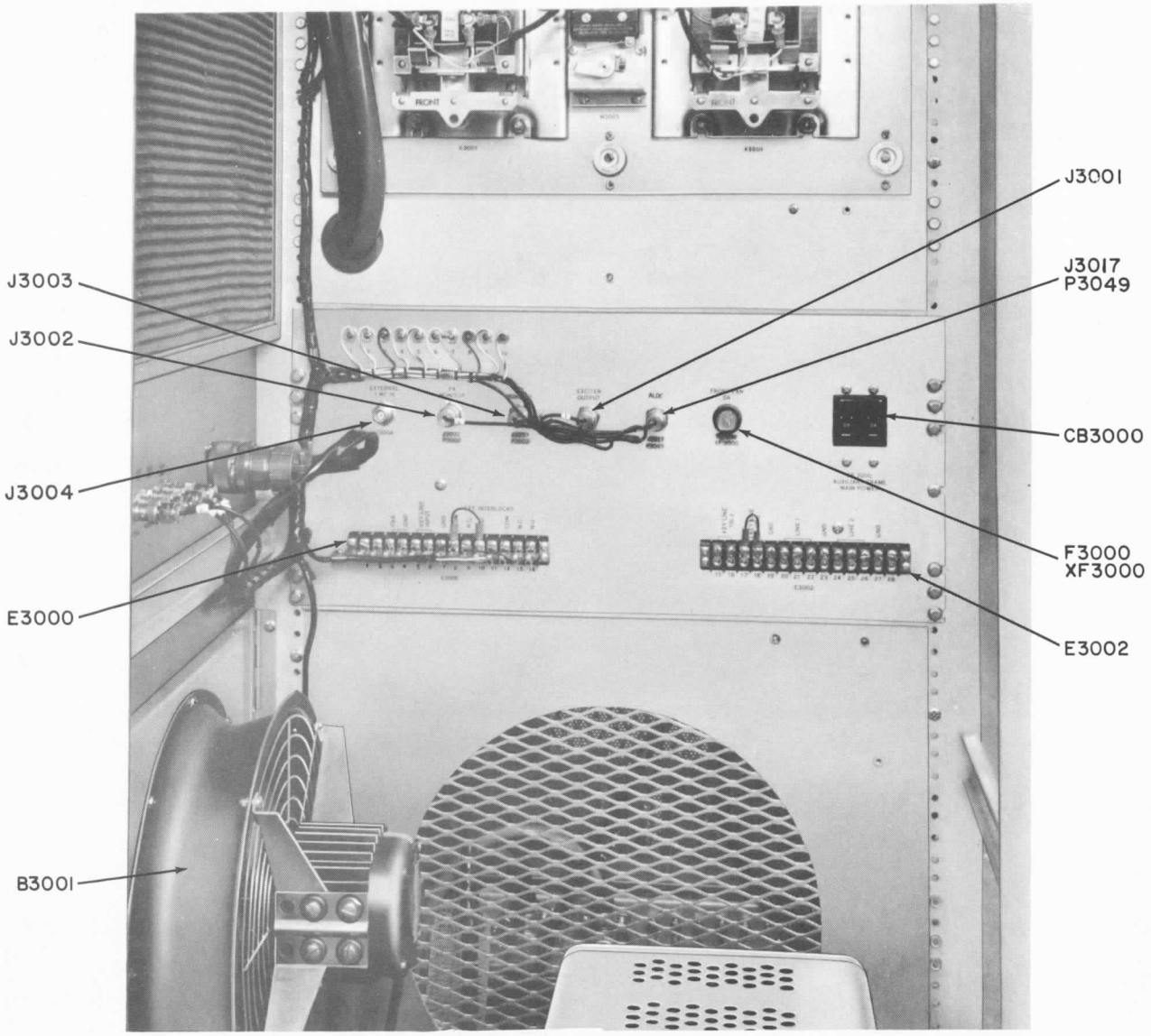


Figure I-5-27. Rear View, Lower Half, Auxiliary Frame Chassis

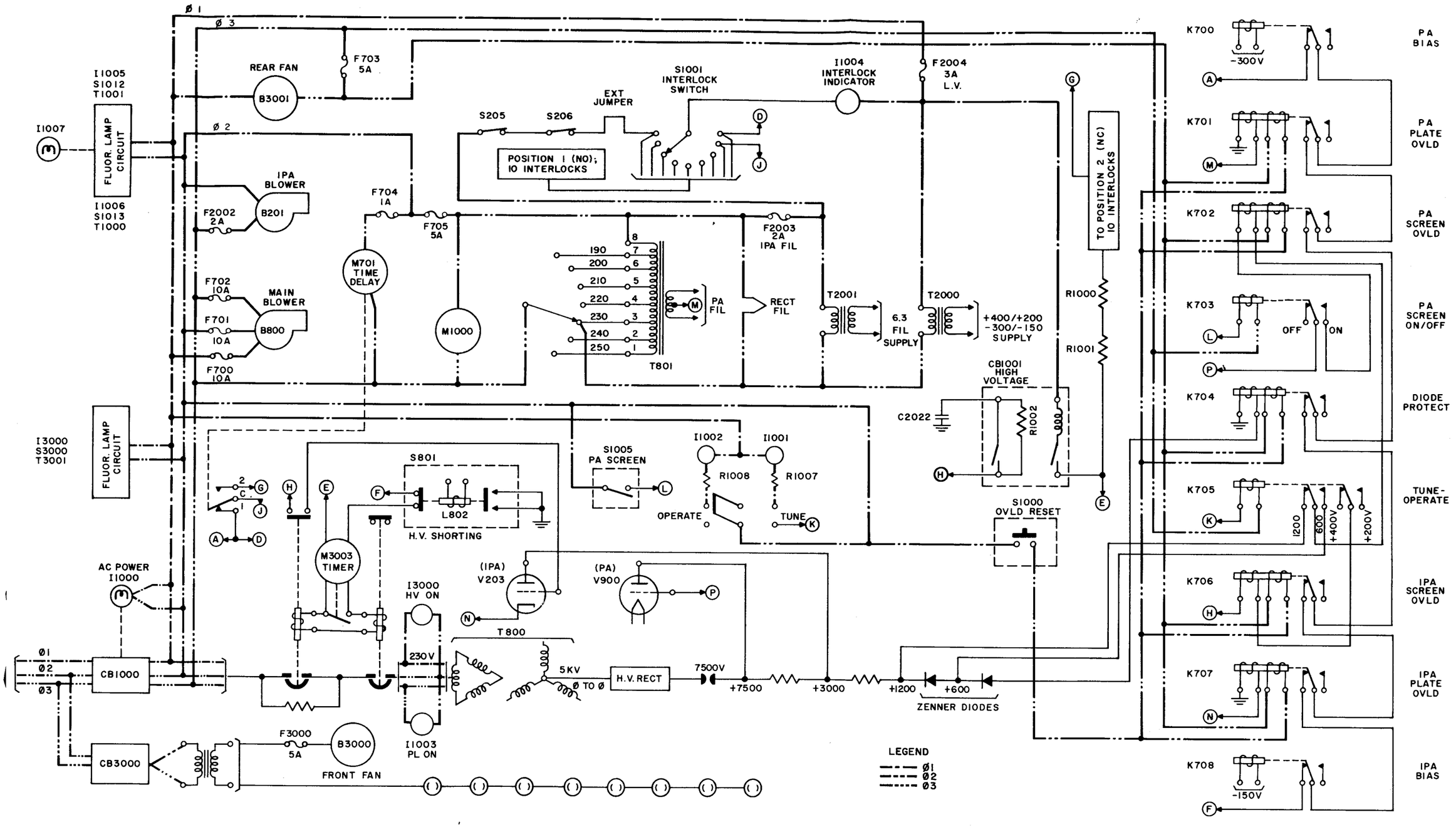


Figure I-5-28. Schematic Diagram, Power Control Circuits, GPT-10K

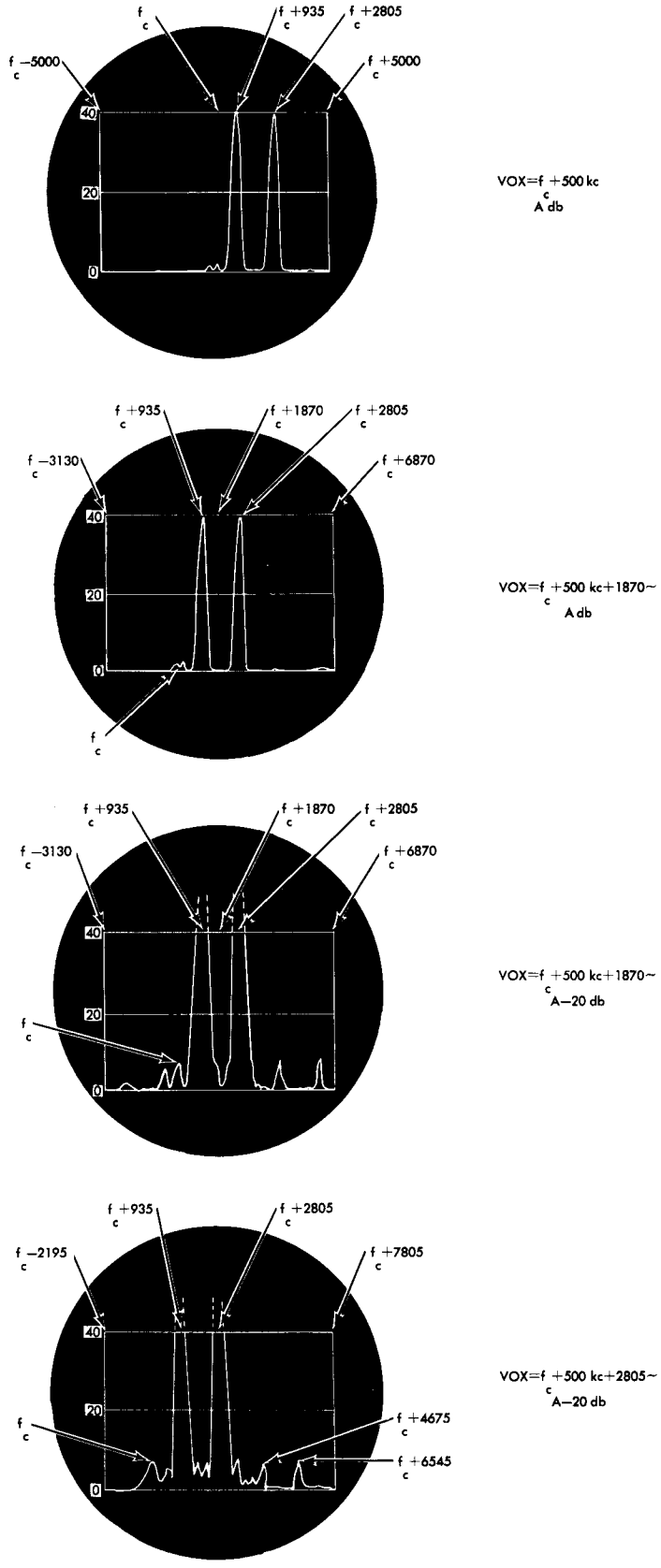


Figure I-5-29. FSA Diagrams Showing 3rd and 5th Order Distortion Products in GPT-10K Output

SECTION 6
MAINTENANCE

6–1. GENERAL.

The GPT-10K is an assembly of many electrical and mechanical parts which may be maintained adequately by conventional preventive and corrective maintenance techniques as outlined in the following paragraphs. Long life and continual reliable operation of moving parts require especially good maintenance. When a component fails in a highly precise frequency-sensitive assembly, it is generally more practical to replace the entire assembly than to attempt to repair it. Such assemblies may then be returned to the factory for repair and adjustment. The same is true of complicated mechanical assemblies. Fabrication of parts peculiar without suitable tools make the replacement of the entire assembly more practical than disassembly, fabrication, and reassembly. Pieces of GPT-10K equipment that fall into this category are band and load switches, blowers, contactors, relays, the high voltage shorting switch, the interlock switch, etc. The gear trains are sturdy stainless steel mechanisms whose life, with good maintenance, should equal that of the GPT-10K. For reasons stated above, this section is limited to maintenance.

6–2. OPERATOR'S MAINTENANCE.

Operator's maintenance consists in not only maintaining optimum GPT-10K performance at all times but also keeping a detailed record of the GPT-10K readings specified in the tuning chart (refer to tables 3-2 and 3-3) as well as a log of events and happenings, including climatic conditions, pertinent to GPT-10K operation. (Refer to table 6-1.)

6–3. PREVENTIVE MAINTENANCE.

Preventive maintenance is maintenance that detects and corrects trouble producing items before they become serious enough to affect equipment operation adversely. Some trouble producing items are dirt and grime, contact erosion, improper contact pressure, lack of proper lubrication, improper relay adjustment, dirty air filters, overheating, unstable power supplies, vacuum tubes with poor emission, loose parts (due to vibration), etc.

It may appear contradictory to state that good preventive maintenance means that one should not constantly poke around and tinker with an equipment that is performing excellently. Overzealous maintenance can readily cause more, rather than less, potential trouble. Good preventive maintenance requires constant vigilance and good judgment of when, what, and how to apply remedial measures.

a. ONCE EACH SHIFT DURING AN "ON THE AIR" PERIOD. - Check the operator's GPT-10K performance record for irregularities and possible sources of future trouble. Make minor adjustments of tuning controls to verify proper tuning. Observe all electrical quantities measurable with built-in meters and compare observations with established standards for irregularities. Observe indicator lights and rectifier tubes for abnormal color and signs of internal flashing.

b. DAILY DURING AN "OFF THE AIR" PERIOD. - Visually and manually inspect all parts in the GPT-10K for overheating and damage. Inspect all sliding or moving coil contacts. Feel blower motors for overheating and observe rotating parts for wear. Note deposits of dust and dirt. Inspect condition of relay contacts. Check operation of all door interlocks.

c. MONTHLY DURING "OFF THE AIR" PERIODS. - Recondition rotary and switch contacts as necessary. Use crocus cloth and trichlorethylene or ethylene-dichloride for cleaning. Inspect and rid the GPT-10K of dust and dirt. Check the condition of the air filters; replace or clean dirty filters. Inspect the GPT-10K for loose solder connections or screws especially in those cases experiencing appreciable vibration in service. Note the condition of gear trains; those showing signs of becoming dry should be lubricated with a drop or two of any high quality, light machine lubricant. Check the condition of all tubes.

6–4. CORRECTIVE MAINTENANCE.

Corrective maintenance is an aftermath of trouble-shooting as discussed in Section 5, or preventive maintenance as discussed in the preceding paragraph. With the exception of those cases when components suddenly fail for no apparent good reason or under extenuating circumstances, an intelligent program of preventive maintenance should produce minimum GPT-10K outage.

After a defective part has been localized and isolated by the trouble-shooting technique presented in Section 5, replacement generally presents no major problem, particularly in the case of failure of non-complex electrical and mechanical components.

a. ADJUSTMENTS FOR RELAYS ON RELAY PANEL. - Table 6-2 presents maintenance data requirements of relays K700 through K708. Relays K700 and K708, for example, are single-winding relays that should be adjusted to operate on a minimum of 10 mils DC. Relays K703 and K705 are also single-winding relays that operate on 60 cps; adjustments on

these AC relays are not critical. Relays K701, K702, K706, and K707 are two-winding relays; they should be adjusted to operate on minimum currents through their overload windings as follows:

Relay	Operate
K701	1 amp DC
K702	25 mils DC
K706	11 mils DC
K707	255 mils DC

Figure 5-22 shows the color code of the wiring between the relay elements and the relay terminal strips.

b. ADJUSTMENTS FOR HIGH VOLTAGE SHORTING SWITCH. - This is a solenoid type switch requiring no adjustment because of its strong positive action.

c. ADJUSTMENT OF NEUTRALIZATION. - In the GPT-10K, IPA tube PL-172's neutralizing capacitor C225 should always be set for minimum capacitance. In general, adjustment of a neutralizing capacitor at a given frequency F is briefly as follows: With RF drive at frequency F, tune the grid and plate circuits of the tube being neutralized. Now disconnect plate voltage supply, connect a VTVM to the plate, and drive the grid as before. The neutralizing capacitor is now adjusted for minimum VTVM reading.

d. ALIGNMENT OF RF TUNED CIRCUITS IN RFC-1.

(1) 2- TO 4-MC BAND:

(a) With power applied to GPT-10K, turn the DRIVER BAND control switch (25) to position 1, 2-4 (mc band), on RFC-1.

(b) Connect an RF signal generator input lead to input jack J201.

(c) Set RF signal generator to 2.0 mc, set signal generator POWER ON/OFF switch to ON, and adjust output of signal generator for 1.0 VRF.

(d) Adjust trimmer capacitor C202 to approximately one-half capacitance.

(e) Turn 1ST AMPL TUNING CONTROL (24) to 0.5.

(f) Turn MULTIMETER control switch (22) to position 5, and tune coil L201 for maximum meter deflection.

(g) Turn MULTIMETER control switch (22) to position 6, turn IPA GRID TUNING control (23) to setting 1, and tune coil L219 for maximum meter deflection on MULTIMETER (20). Return MULTIMETER control switch (22) to position 5.

(h) Set RF signal generator to 4.0 mc and position 1ST AMPL TUNING control (24) to number 9. Adjust trimmer capacitor C202 for maximum meter deflection on MULTIMETER (20).

(i) Turn MULTIMETER control switch (22) to position 6 and tune IPA GRID TUNING control (23) for maximum meter deflection on MULTIMETER (20). IPA GRID TUNING control (23) knob should be positioned at setting 9.

(j) If IPA GRID TUNING control (23) does not fall at setting 9 as indicated in step (i), repeat steps (h) and (i). In event IPA GRID TUNING control (23) does not fall at setting 9, repeat this procedure using slightly different positions than indicated in steps (a) through (g).

(2) 4- TO 8-MC BAND:

(a) Adjust neutralizing capacitor C229 to approximately one-quarter capacitance.

(b) Turn DRIVER BAND control switch (25) to position 2, 4-8 (mc band), on RFC-1.

(c) Turn 1ST AMPL TUNING control (24) to 0.5. Set IPA GRID TUNING control (23) to 0.5.

(d) Turn MULTIMETER control switch (22) to position 5 and tune coil L202 for maximum meter deflection on MULTIMETER (20).

(e) Turn MULTIMETER control switch (22) to position 6 and tune coil L220 for maximum meter deflection on MULTIMETER (20).

(f) Set RF signal generator to 8.0 mc. Turn 1ST AMPL TUNING control (24) to its upper position of control range. Tune for peak deflection on MULTIMETER (20). 1ST AMPL TUNING control (24) setting should be in vicinity of number 9 of its range.

(g) Tune IPA GRID TUNING control (23) for peak indication on MULTIMETER (20). IPA GRID TUNING control (23) should be in vicinity of number 9 of its range.

(h) Both controls as indicated in steps (f) and (g), should indicate approximately a reading of 9. If not, this procedure should be repeated using slightly different positions than those indicated in step (c).

(3) 8- TO 16-MC BAND:

(a) Turn DRIVER BAND control switches (25) to position 3, 8-16 (mc band) on RFC-1.

(b) Turn 1ST AMPL TUNING control (24) to 0.5, turn MULTIMETER control switch (22) to position 5, and tune coil L209 for maximum meter deflection on MULTIMETER (20).

(c) Turn IPA GRID TUNING control to 0.5, turn MULTIMETER control switch (22) to position 6 and tune coil L223 for maximum meter deflection on MULTIMETER (20).

(d) Set RF signal generator to 16.0 mc. Tune 1ST AMPL TUNING control (24) to its upper position

of control range. Tune for peak deflection on MULTIMETER (20). 1ST AMPL TUNING control (24) setting should be in vicinity of setting number 8 of its range.

(e) Tune IPA GRID TUNING CONTROL (23) for peak indication on MULTIMETER (20). IPA GRID TUNING control (23) should be in vicinity of setting number 8.

(f) Both controls, as indicated in steps (d) and (e), should indicate an approximate reading of 8. If not, this procedure should be repeated using slightly different positions than those indicated in steps (b) and (c).

(4) 16- TO 20-MC BAND:

(a) Turn DRIVER BAND control switch (25) to position 4, 16-20 (mc band), on RFC-1.

(b) Turn 1ST AMPL TUNING control (24) to 4.

(c) Turn MULTIMETER control switch (22) to position 5 and tune coil L210 for maximum meter deflection on MULTIMETER (20).

(d) Turn IPA GRID TUNING control (23) to 8. Turn MULTIMETER control switch (22) to position 6, and tune coil L224 for maximum meter deflection on MULTIMETER (20).

(e) Set RF signal generator to 20.0 mc. Tune 1ST AMPL TUNING control (24) to upper position of its control range. Tune for maximum meter deflection on MULTIMETER (20). Approximate setting of 1ST AMPL TUNING control (24) should be in vicinity of number 8.

(f) Turn IPA GRID TUNING control (23) for maximum meter deflection on MULTIMETER (20). At maximum meter deflection, approximate setting of this control should be at number 8. Both controls should indicate number 8. If not, procedure should be repeated using slightly different positions than those indicated in steps (b) through (d).

(5) 20- TO 28-MC BAND:

(a) Turn DRIVER BAND control switch (25) to position 5, 20-28 (mc band), on RFC-1.

(b) Turn 1ST AMPL TUNING control (24) to 4.

(c) Turn MULTIMETER control switch (22) to position 5 and tune coil L211 for maximum meter deflection on MULTIMETER (20).

(d) Turn IPA GRID TUNING control (23) to 7. Turn MULTIMETER control switch (22) to position 6, and tune coil L225 for maximum meter deflection on MULTIMETER (20).

(e) Set RF signal generator to 28.0 mc. Tune 1ST AMPL TUNING control (24) to upper position of its control range. Tune for maximum meter deflection on MULTIMETER (20). Approximate setting of 1ST AMPL TUNING control (24) should be in vicinity of number 8.

(f) Turn IPA GRID TUNING control (23) for maximum meter deflection on MULTIMETER (20). At maximum meter deflection, approximate setting of this control should be at number 8. Both controls should indicate number 8. If not, procedure should be repeated using slightly different positions than those indicated in steps (b) through (d).

TABLE 6-1. OPERATOR'S MAINTENANCE, CHECKOFF LIST

ITEM	WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
1	Information from previous operator.	Verbal instructions and log book.	Verify reported abnormal conditions.
2	Observe all meters.	Observe and record all meter indications. Observe and record temperature readings.	Be alert for abnormal indications. Be alert for erratic or jumpy meter readings.
3	GPT-10K tuning.	Study meter indications. Make minor adjustments of tuning controls to verify proper tuning.	Be familiar with tuning procedure. IPA and PA tuning must be correct to prevent tube damage.
4	Operating frequency of GPT-10K.	Use a frequency meter or other stable monitoring device.	Frequencies must not drift.
5	Tubes.	Visually inspect for flashover in high voltage rectifier tubes 872A.	
6	Filament voltages.	Observe GPT-10K meters.	If GPT-10K is to remain off air for more than 2 hours, shut down main frame chassis units completely. But keep power on auxiliary frame chassis units to maintain frequency stability.

TABLE 6-1. OPERATOR'S MAINTENANCE, CHECKOFF LIST (Cont.)

ITEM	WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
7	Temperatures of components and cabinets.	Immediately after each shutdown, inspect all units for evidence of overheating.	**WARNING** Normal operating temperatures of some components are high enough to produce severe burns.
8	Relays.	Remove relay covers and observe operating of relays.	Report any relays which have excessive sparking or operate sluggishly.
9	Main circuit breaker.	Check to see if main breaker is operating properly.	Report immediately if circuit breaker cycles several times before closing.
10	Main switch contacts.	Observe stability of meter indications as meters are switched to various circuits.	Report any dirty contacts or intermittent operation.
11	Sliding or moving coil contacts.	Visually and manually inspect.	Report any contacts that are dirty, worn, bent, or broken.
12	Indicator lamps, fuses, etc.	Check for proper installation.	
13	Maintaining GPT-10K.	Use monitor or communication receiver.	Make certain receiver is tuned and adjusted properly.

TABLE 6–2. MAINTENANCE DATA FOR RELAYS K700 THROUGH K708

RELAY	TERMINALS	RESISTANCE	PILEUP	CONTACTS	60 CPS or DC ADJUSTMENT	
					OPERATE	NONOPERATE
K700	E700 1-2	11,000 ohms ±10%	4PDT	3/16 inch Silver Cadmium Oxide 10 amp, 125 volts DC	10 mils DC	9 mils DC
K701	E700 11-12	1100 ohms ±10%	4PDT	Code 15, 1/4 inch, Silver Cadmium 25 amp, 125 volts DC	220 volts 60 cps or less	---
	E700 13-14	0.93 ohms ±10%		Code 15, 1/4 inch, Silver Cadmium 25 amp, 125 volts DC	1 amp DC	0.98 amp DC
K702	E701 19-20	1100 ohms ±10%	4PDT	Code 14, 1/4 inch, Silver Cadmium 20 amp, 125 volts DC	220 volts 60 cps or less	---
	E706, 707	1500 ohms ±10%		Code 14, 1/4 inch, Silver Cadmium 20 amp, 125 volts DC	25 mils DC	23 mils DC
K703	E702 25-26	1800 ohms ±10%	4PDT	Code 15, 1/4 inch, Silver Cadmium 25 amp, 125 volts DC	220 volts 60 cps or less	---
K704	E702 27-28	1100 ohms ±10%	4PDT	1/4 inch Silver 20 amp, 125 volts DC	220 volts 60 cps or less	---
	E703	170 ohms ±10%		1/4 inch Silver 20 amp, 125 volts DC	80 mils DC or less	---
K705	E703 33-34	11,000 ohms ±10%	4PDT	3/16 inch, Silver Cadmium Oxide 10 amp, 125 volts AC	220 volts 60 cps or less	---
K706	E704 41-42	1000 ohms ±10%	4PDT	1/4 inch Silver 20 amp, 125 volts AC	220 volts 60 cps or less	---
	E704 47-48	10,000 ohms ±10%	4PDT	1/4 inch Silver 20 amp, 125 volts AC	11 mils DC or less	---

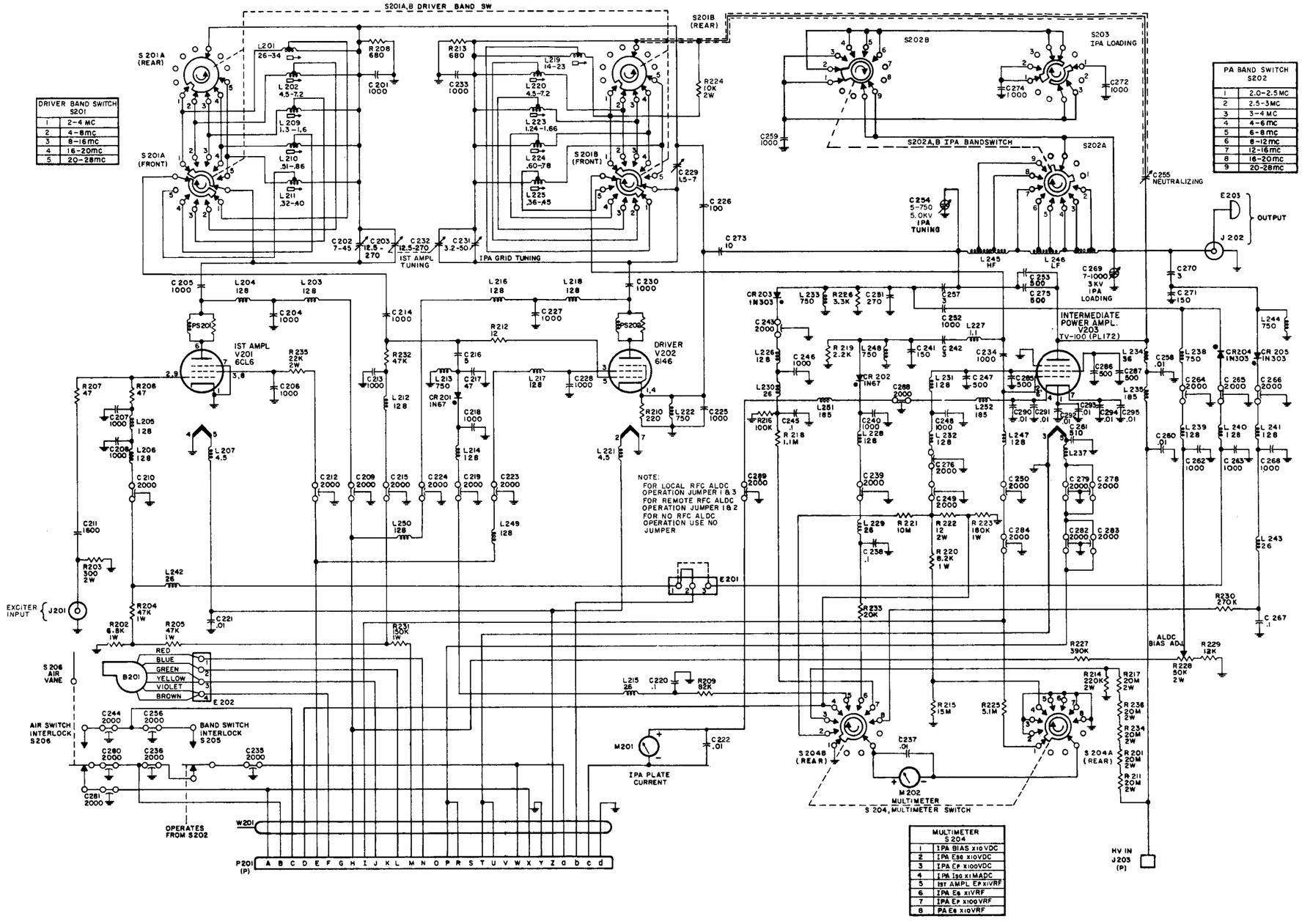
TABLE 6–2. MAINTENANCE DATA FOR RELAYS K700 THROUGH K708 (Cont.)

RELAY	TERMINALS	RESISTANCE	PILEUP	CONTACTS	60 CPS or DC ADJUSTMENT	
					OPERATE	NONOPERATE
K707	E705 49-50	11,000 ohms ±10%	4PDT	Code 14, 1/4 inch Silver Cadmium 20 amp, 125 volts AC	220 volts 60 cps DC or less	---
	E705 55-56	43 ohms ±10%		Code 14, 1/4 inch Silver Cadmium 20 amp, 125 volts AC	155 mils DC	140 mils DC
K708	E705 61-62	11,000 ohms ±10%	4PDT	3/16 inch Silver Cadmium Oxide 10 amp, 125 volts AC	10 mils DC	9 mils DC

SECTION 7
SCHEMATICS, WIRING DIAGRAMS, AND INTERCONNECTING DIAGRAMS

(Main Frame Equipments Only)

(Refer to Section 7 of Volume II of Manual for Schematics, Wiring Diagrams, and Interconnecting Diagrams of Equipments located on Auxiliary Frame).



DRIVER BAND SWITCH S201	
1	2-4 MC
2	4-8mc
3	8-16mc
4	16-20mc
5	20-28mc

PA BAND SWITCH S202	
1	2.0-2.5 MC
2	2.5-3MC
3	3-4 MC
4	4-6 mc
5	6-8 mc
6	8-12 mc
7	12-16 mc
8	16-20 mc
9	20-28 mc

MULTIMETER S 204	
1	IPA BIAS x10 VDC
2	IPA Eg6 x10 VDC
3	IPA Ep x100 VDC
4	IPA Ig6 x1 MADC
5	1st AMPL Ep x1 VRF
6	IPA Eg x1 VRF
7	IPA Ep x100 VRF
8	PA Eg x10 VRF

NOTES-

1-ALL CAPACITORS SPECIFIED IN DECIMALS ARE IN uf. ALL OTHERS ARE IN uuf.

2-ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED.

Figure I-7-1. Schematic Diagram, GPT-10K's IPA and Power Supply (Sheet 1 of 2)

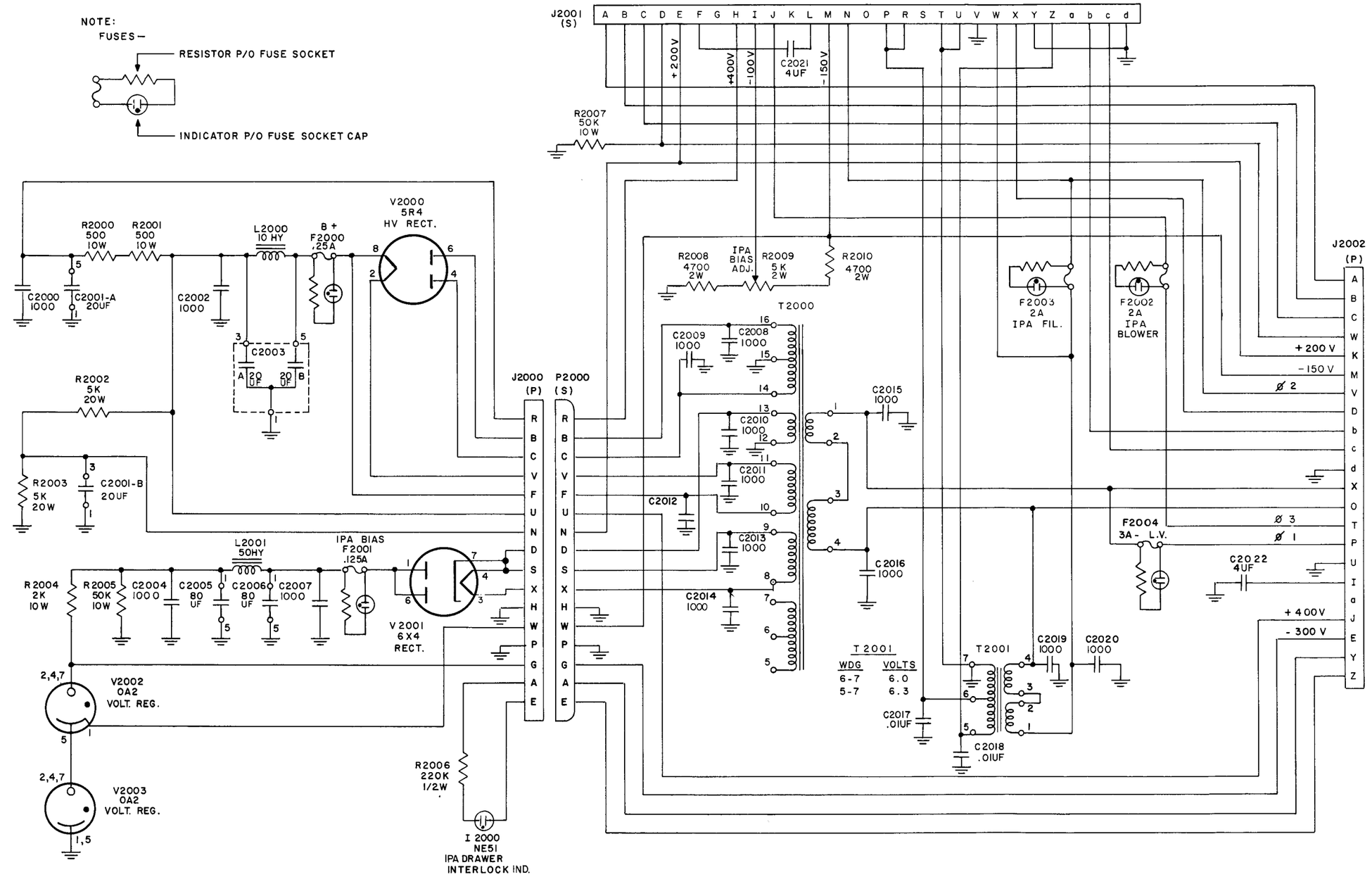
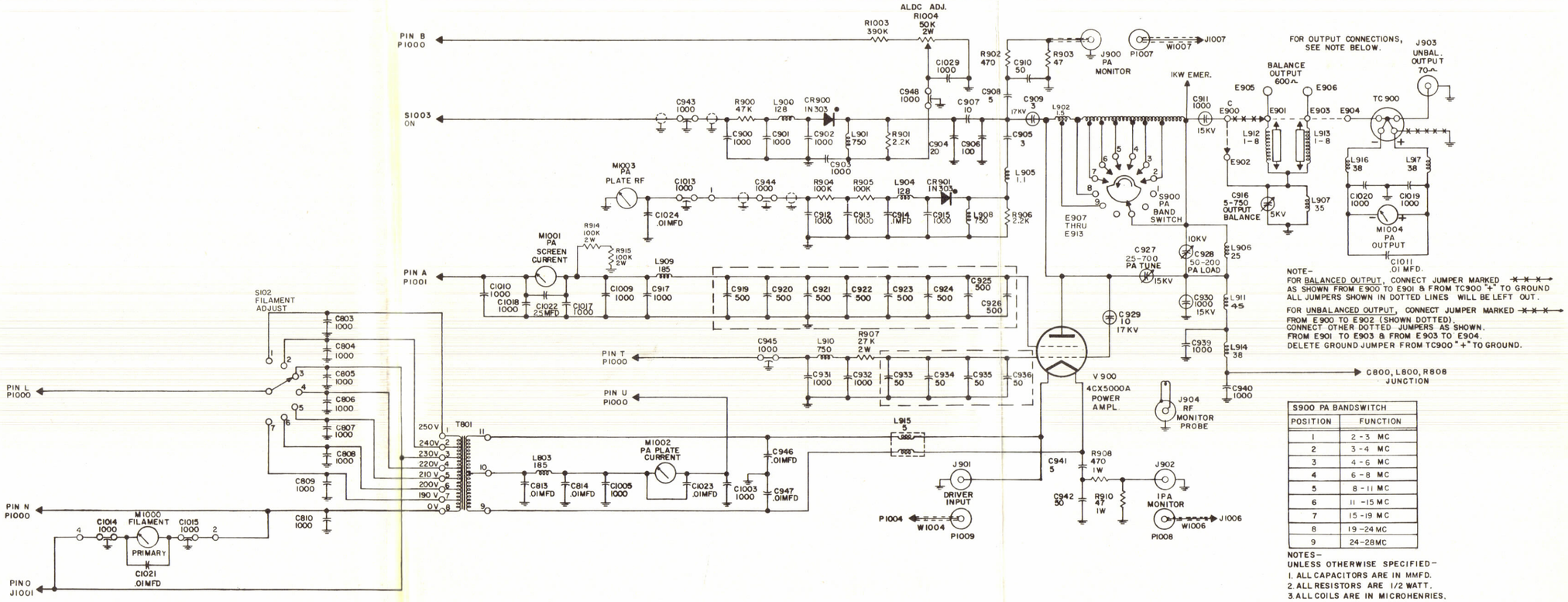


Figure I-7-1. Schematic Diagram, GPT-10K's IPA and Power Supply (Sheet 2 of 2)



S900 PA BANDSWITCH	
POSITION	FUNCTION
1	2 - 3 MC
2	3 - 4 MC
3	4 - 6 MC
4	6 - 8 MC
5	8 - 11 MC
6	11 - 15 MC
7	15 - 19 MC
8	19 - 24 MC
9	24 - 28MC

NOTES-
UNLESS OTHERWISE SPECIFIED-
1. ALL CAPACITORS ARE IN MMFD.
2. ALL RESISTORS ARE 1/2 WATT.
3. ALL COILS ARE IN MICROHENRIES.

Figure I-7-2. Schematic Diagram, GPT-10K's PA Section

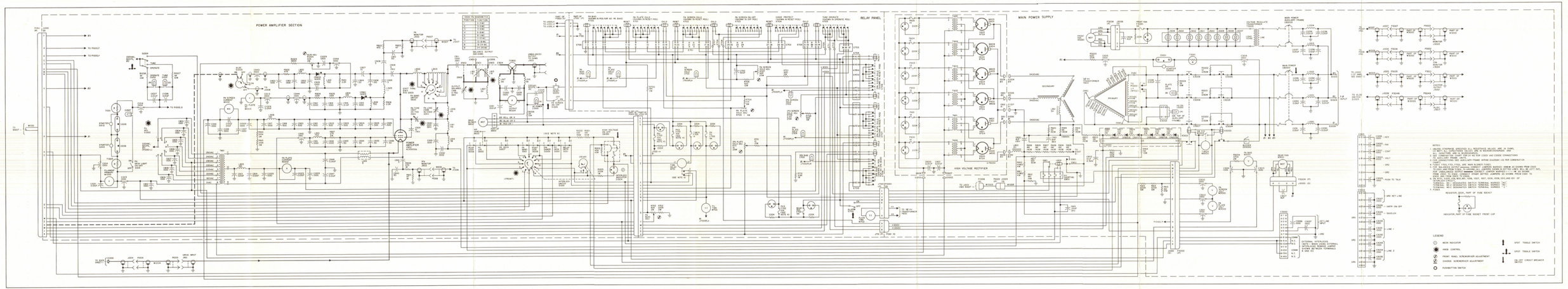


Figure 1-7-4. Schematic Diagram, GPT-10K (Sheet 2 of 2)

ADDENDUM

PART 8

PARTS LISTING

FOR

TRANSMITTING SET, RADIO, MODEL GPT-10K
(MAIN FRAME ONLY)

B201	BLOWER, motor & fan: 115/230 v, 50/60 cps, single phase; 3200 RPM; 4 ufd capacitance; clockwise rotation from shaft end of motor.	Final Cooling	BL-103
C201	CAPACITOR, fixed: mica; button type; 1000 uufd, ±10%, 300 wvdc, char. W.	Tank Elevating	CB21QW102K
C202	CAPACITOR, variable: ceramic; 7-45 uufd, char. C.	Tuning Trimmer	CV11C450
C203	CAPACITOR, variable: air dielectric; 12.5-270 uufd; one section.	Main Tuning	CB-139-1
C204	Same as C201.	Plate Bypass	
C205	CAPACITOR, fixed: mica; 1000 uufd, ±5%, char. C, 500 wvdc.	Coupling Plate	CM20C102J
C206	Same as C201.	Screen Bypass	
C207	Same as C201.	Bias Filter	
C208	Same as C201.	Bias Filter	
C209	CAPACITOR, fixed: ceramic; feed-thru type; 2000 uufd, ±20%, char. A, 500 wvdc.	Plate Bypass	CK70A202M
C210	Same as C209.	Bias Bypass	
C211	CAPACITOR, fixed: mica; 1600 uufd, ±5% char. C, 500 wvdc.	Input Coupling	CM20C162J
C212	Same as C209.	Screen Bypass	
C213	Same as C201.	Bias Filter	
C214	Same as C205.	Coupling	
C215	Same as C209.	Bias Filter	

C216	CAPACITOR, fixed: mica; 5 uufd, ±10%, char. C, 300 wvdc.	Metering Divider	CM15C050K
C217	CAPACITOR, fixed: mica; 47 uufd, ±10%, char. B, 300 wvdc.	Metering Divider	CM15B470K
C218	Same as C201.	Metering Divider	
C219	Same as C209.	Metering Divider	
C220	CAPACITOR, fixed: mylar; .1 ufd, ±5%, 200 wvdc.	Metering Divider	CN108C1003J
C221	CAPACITOR, fixed: mica; 10,000 uufd, ±10%, 300 wvdc, char. B.	Filament Filter	CM35B103K
C222	Same as C221.	Meter Bypass	
C223	Same as C209..	Screen Bypass	
C224	Same as C209.	Plate Bypass	
C225	Same as C201.	Cathode Bypass	
C226	CAPACITOR, fixed: mica; 100 uufd, ±10%, char. C, 500 wvdc.	Neutralizing	CM20C101K
C227	Same as C201.	Plate Bypass	
C228	Same as C201.	Screen Bypass	
C229	CAPACITOR, variable: ceramic; 1.5-7 uuf, char. A.	Neutralizing	CV11A070
C230	Same as C205	Coupling	
C231	CAPACITOR, variable: air dielectric; 3.2 - 50 uufd, 1 section, 14 plates; 500 wvdc.	Tuning Trimmer	CT-104-1
C232	CAPACITOR, variable: air dielectric; 12.5 to 270 uuf; single section.	Main Tuning	CB-139-3

C233	Same as C201.	Tank Elevating	
C234	Same as C205.	Coupling	
C235	Same as C209.	Interlock Bypass	
C236	Same as C209.	Interlock Bypass	
C237	Same as C221.	Meter Bypass	
C238	Same as C220.	Metering Filter	
C239	Same as C209.	Metering Filter	
C240	Same as C201.	Metering Filter	
C241	CAPACITOR, fixed: mica; button type; 150 uufd, ±10%, 300 wvdc, char. W.	Metering Divider	CB21QW151K
C242	CAPACITOR, fixed: ceramic; 3 uufd, ±0.25 uufd, char. SL, 500 wvdc.	Metering Divider	CC21SL030C
C243	Same as C209.	Metering Filter	
C244	Same as C209.	Interlock Filter	
C245	Same as C220	Metering Filter	
C246	Same as C201.	Metering Filter	
C247	CAPACITOR, fixed: ceramic; 500 uuf, ±20%, 5000 wvdc, 6-32 tapped studs each end. Part of XV203.	Screen Bypass	CC-109-36
C248	Same as C201.	Screen Bypass	
C249	Same as C209.	Screen Bypass	
C250	Same as C209.	Bias Filtering	
C251	CAPACITOR, fixed: mica; button type; 270 uufd, ±10%, char. W, 300 wvdc.	Metering Divider	CB21QW271K
C252	Same as C205.	Metering Coupling	

C253	CAPACITOR, fixed: trylar; 500 ufd, ±10%, 8000 wvdc.	Coupling	CX102K501P
C254	CAPACITOR ASSEMBLY, vacuum: variable; 5-750 uuf, 42 amps RMS, with bevel gear.	Tuning	AM-111
C255	KIT, capacitor: replacement; consisting of 1 each - stator plate assy., and rotor assy.	Neutralizing	AC-113
C256	Same as C209.	Interlock Filter	
C257	CAPACITOR, fixed: ceramic; 3 uufd, ±10%, 5000 wvdc.	Metering Divider	CC-109-1
C258	CAPACITOR, fixed: trylar; .01 ufd, ±5%, 4000 wvdc.	Plate Bypass	CX102J103M
C259	CAPACITOR, fixed: ceramic; 1000 uuf, ±10%, 5000 wvdc.	Plate Bypass	CC-109-38
C260	Same as C258.	Plate Bypass	
C261	CAPACITOR, fixed: mica; 510 uufd, ±10%, 500 wvdc, char. B.	Filament Filter	CM35B511K
C262	Same as C201.	ALDC Filtering	
C263	Same as C201.	ALDC Filtering	
C264	Same as C209.	ALDC Bias Filtering	
C265	Same as C209.	ALDC Filtering	
C266	Same as C209.	Metering Filter	
C267	Same as C220.	Metering Filter	
C268	Same as C201.	Metering Filter	
C269	CAPACITOR ASSEMBLY, vacuum: variable; 7-1000 uufd, w/bevel gear.	IPA Loading	AM-100

C270	Same as C257.	Metering Divider	
C271	Same as C241.	Metering Divider	
C272	Same as C259.	Loading	
C273	CAPACITOR, fixed: ceramic; 10 uufd, ±10%, 5000 wvdc.	Feedback	CC-109-8
C274	Same as C259.	Loading	
C275	Same as C253.	Coupling	
C276	Same as C209.	Bypass	
C277	DELETED		
C278	Same as C209.	Fil. Bypass V203	
C279	Same as C209.	Fil. Bypass V203	
C280	Same as C209.	Bypass S206	
C281	Same as C209.	Bypass S206	
C282	Same as C209.	Fil. Bypass V203	
C283	Same as C209.	Fil. Bypass V203	
C284	Same as C209.	Grid Bypass V203	
C285	Same as C247, part of XV203.	Screen Bypass	
C286	Same as C247, part of XV203.	Screen Bypass	
C287	Same as C247, part of XV203.	Screen Bypass	
C288	Same as C209.	R.F. Bypass	
C289	Same as C209.	R.F. Bypass	
C290	CAPACITOR, fixed: mica; .01 ufd, ±5%, char. C, 300 wvdc.	Cathode Bypass	CM35C103J
C291	Same as C290.	Cathode Bypass	

C292	Same as C290.	Cathode Bypass	
C293	Same as C290.	Cathode Bypass	
C294	Same as C290.	Cathode Bypass	
C295	Same as C290.	Cathode Bypass	
CR201	DIODE, germanium: .140 dia x .350 lg; 1" lg. wire leads.	Grid Metering Diode, V202	IN67
CR202	Same as CR201.	Grid Metering Diode, V203	
CR203	DIODE, bonded silicon: .265 x .155 x .255 o/a; 1" lg wire leads.	Plate Metering Diode, V203	IN303
CR204	Same as CR203.	ALDC Diode	
CR205	Same as CR203.	Output Metering Diode	
E201	TERMINAL STRIP, barrier lug type; 3 terminals, 6-32 screws on front, solder lugs in rear; black phenolic body.	ALDC Term. Bd.	TM-100-3
E202	TERMINAL STRIP, barrier lug type: four terminals, 6-32 screws on front, solder lugs in rear; black phenolic body.	Blower Term. Bd.	TM-100-4
E203	CONTACT, electrical: consists of one brass, nickel plated button contact with 10-32 threaded rod; two ceramic insulators: one teflon gland; two fiber washers; one neoprene washer; one flat washer; one lock-washer; and one hex nut.	Feed-thru	AX-241

J201	CONNECTOR, receptacle: series UHF, teflon dielectric.	Input Jack	SO-239A
J202	CONNECTOR, receptacle: female; teflon insulation.	Output Jack	UG-560/U
J203	CONNECTOR, receptacle: male; pin type.	HV Jack	MS3102A-18-16P
J204	DELETED		
L201	COIL, R.F.: tuned; 2-4 mc, Q = 60 at 2.5 mc.	2-4 Mc Tuning	CL-181
L202	COIL, R.F.: tuned; 4-8 mc, 4.5 to 7.5 uhy.	4-8 Mc Tuning	CL-150
L203	COIL, R.F.: fixed; 128 uhy, ±10%, Q = 100.	Plate Filter	CL-177
L204	Same as L203.	Plate Filter	
L205	Same as L203.	Bias Filter	
L206	Same as L203.	Bias Filter	
L207	COIL, R.F.: fixed; 4.5 uhy.	Filament Filter	CL-134-1
L208	NOT USED		
L209	COIL, R.F.: tuned; 8-16 mc; 1.3 to 1.6 uhy.	8-16 Mc Tuning	CL-175
L210	COIL, R.F.: tuned; 16-20 mc.	16-20 Mc Tuning	CL-145
L211	COIL, R.F.: tuned; 20-28 mc; .32 to .45 uhy.	20-28 Mc Tuning	CL-144
L212	Same as L203.	Bias Filter	
L213	COIL, R.F.: 750 uhy; 750 microhenries, ±20%, 100 ma max. current; DC res. approx. 17 ohms, bakelite body.	Metering Compensation	CL-100-5

L214	Same as L203.	Metering Filter	
L215	COIL, R.F.L fixed; 26 uhy.	Metering Filter	CL-180
L216	Same as L203.	Plate Filter	
L217	Same as L203.	Screen Filter	
L218	Same as L203.	Plate Filter	
L219	COIL, R.F.: tuned; 2-4 mc; L = 10 uhy, Q = 40.	2-4 Mc Tuning	CL-173
L220	COIL, R.F.: tuned; 4-8 mc.	4-8 Mc Tuning	CL-159
L221	Same as L207.	Filament Filter	
L222	Same as L213.	Cathode Choke	
L223	COIL, R.F.: tuned; 8-16 mc.	8-16 Mc Tuning	CL-146
L224	COIL, R.F.: tuned; 16-20 mc.	16-20 Mc Tuning	CL-147
L225	COIL, R.F.: tuned; 20-28 mc.	20-28 Mc Tuning	CL-148
L226	Same as L203.	Metering Filter	
L227	COIL, R.F.: fixed; 1.1 uhy.	Metering Compensation	CL-139
L228	Same as L203.	Metering Filter	
L229	Same as L215.	Metering Filter	
L230	Same as L215.	Metering Filter	
L231	Same as L203.	Screen Filter	
L232	Same as L203.	Screen Filter	
L233	Same as L213.	Metering Compensation	

L234	COIL, R.F.: fixed; 36 uhy.	Plate Filter	CL-152
L235	COIL, R.F.: fixed; 185 uhy.	Plate Filter	CL-178
L236	DELETED		
L237	COIL, filament: fixed; L-Nom. 3.0 (2.9-3.1), Q greater than 35; F - 2 mc.	Filament Filter	CL-171
L238	Same as L213.	ALDC Bias Filter	
L239	Same as L203.	ALDC Bias Filter	
L240	Same as L203.	ALDC Filter	
L241	Same as L203.	Metering Filter	
L242	Same as L215.	ALDC Filter	
L243	Same as L215.	Metering Filter	
L244	Same as L213.	Metering Compensation	
L245	COIL, R.F.: IPA tank, 12-28 mc.	LF Tuning	CL-143
L246	COIL, L.F.: IPA tank, single layer, wound type, 23 turns CW.	HF Tuning	CL-174
L247	Same as L203.	IPA Grid Choke	
L248	Same as L213.	Metering Compensation	
L249	Same as L203.	Screen Filter	
L250	Same as L203.	Plate Filter	
L251	Same as L235.	RF Choke	
L252	Same as L235.	RF Choke	
M201	METER, DC: 0-750 milliamps.	Plate Current	MR-110-750-S

M202	METER, DC: 0-5, 0-25; -20 +30 ma scales.	Multimeter	MR-124
P201	CONNECTOR, receptacle: male.	Power Plug	MS3106B-32-7P
PS201	SUPPRESSOR, parasitic.	Plate Parasitic Suppressor	AX-163
PS202	SUPPRESSOR, parasitic.	Plate Parasitic Suppressor	AX-164
R201	RESISTOR, fixed: composition; 20 megohms, ±5%, 2 watts.	HV Metering	RC42GF206J
R202	RESISTOR, fixed: composition; 6800 ohms, ±10%, 1 watt.	Bias Divider	RC32GF682K
R203	RESISTOR, fixed: composition; 300 ohms, ±5%, 2 watts.	Input	RC42GF301J
R204	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1 watt.	Bias Divider	RC32GF473K
R205	Same as R204.	Bias Divider	
R206	RESISTOR, fixed: composition; 47 ohms, ±10%, 1/2 watt.	Input Divider	RC20GF470K
R207	Same as R206.	Input Divider	
R208	RESISTOR, fixed: composition, 680 ohms, ±10%, 1/2 watt.	Tank Elevating	RC20GF681K
R209	RESISTOR, fixed: composition; 82,000 ohms, ±5%, 1/2 watt.	Metering Calibration	RC20GF823J
R210	RESISTOR, fixed: composition; 220 ohms, ±10%, 1/2 watt.	Cathode Bias	RC20GF221K

R211	Same as R201.	HV Series Metering	
R212	RESISTOR, fixed: composition; 12 ohms, ±10%, 1/2 watt.	Grid Bias	RC20GF120K
R213	Same as R208.	Tank Elevating	
R214	RESISTOR, fixed: composition; 220,000 ohms, ±10%, 2 watts.	HV Shunt Metering	RC42GF224K
R215	RESISTOR, fixed: composition; 15 megs, ±10%, 1/2 watt.	Screen Current Metering	RC20GF156K
R216	RESISTOR, fixed: composition; 100,000 ohms, ±10%, 1/2 w.	Metering Load	RC20GF104K
R217	Same as R201.	HV Series Metering	
R218	RESISTOR, fixed: composition; 1.1 megs, ±5%, 1/2 watt.	Metering Calibration	RC20GF115J
R219	RESISTOR, fixed: composition; 2200 ohms, ±10%, 1/2 watt.	Metering Compensation	RC20GF222K
R220	RESISTOR, fixed: composition; 8200 ohms, ±10%, 1 watt.	Screen Current Metering	RC32GF822K
R221	RESISTOR, fixed: composition; 10 megs, ±10%, 1/2 watt.	Screen Metering	RC20GF106K
R222	RESISTOR, fixed: composition; 12 ohms, ±10%, 2 watts.	Screen Current Metering	RC42GF120K
R223	RESISTOR, fixed: composition; 180,000 ohms, ±10%, 1 watt.	Screen Load	RC32GF184K
R224	RESISTOR, fixed: composition; 10,000 ohms, ±10%, 2 watts.	Plate Load, V202	RC42GF103K

R225	RESISTOR, fixed: composition; 5.1 megs, ±5%, 1/2 watt.	Bias Metering	RC20GF515J
R226	RESISTOR, fixed: composition; 3300 ohms, ±10%, 1/2 watt.	Metering Compensation	RC20GF332K
R227	RESISTOR, fixed: composition; 390,000 ohms, ±10%, 1/2 w.	ALDC Bias Divider	RC20GF394K
R228	RESISTOR, variable: composition; 50,000 ohms, ±10%, 2 watts, with locking bushing.	ALDC Bias Divider	RV4ATXA503A
R229	RESISTOR, fixed: composition; 12,000 ohms, ±10%, 1/2 w.	ALDC Bias Divider	RC20GF123K
R230	RESISTOR, fixed: composition; 270,000 ohms, ±10%, 1/2 w.	Metering Calibration	RC20GF274K
R231	RESISTOR, fixed: composition; 150,000 ohms, ±10%, 1 watt.	Bias Dividing	RC32GF154K
R232	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1/2 w.	Grid Bias	RC20GF473K
R233	RESISTOR, fixed: composition; 20,000 ohms, ±5%, 1/2 watt.	Metering Calibration	RC20GF203J
R234	Same as R201.	HV Series Metering	
R235	RESISTOR, fixed: composition; 22,000 ohms, ±10%, 2 watts.	Screen Dropping V201	RC42GF223K
R236	Same as R201.	HV Series Metering	

S201A B,C,D	SWITCH, rotary: 2 sections, 5 positions: 30° angle of throw; micalex insulation, silver plated contacts.	Driver Band Selection	SW-258
S202	SWITCH ASSEMBLY, rotary: dual section; 9 positions, 1 pole each section, steatite insulation, nickel silver shaft.	IPA Band Switch	AS-118
S203	SWITCH, rotary: 8 contacts, 30° angle of throw, steatite insulation, nickel silver shaft.	Loading Switch	AS-101
S204	SWITCH, rotary: 2 sections; 8 positions, 30° angle of throw, micalex insulation, silver plated contacts.	Metering Switch	SW-245
S205	SWITCH, push button: momentary contact, NC, SPST; 15 amp at 125, 250 or 460 VAC; 1/2 amp at 125 VDC, 1/4 amp at 250 VDC.	Band Interlock	SW-169
S206	SWITCH, rotary: low torque micro switch; counter-clockwise direction of rotation; SPDT, 5 amp, 125 or 250 VAC.	Interlock Air	SW-252
V201	TUBE, electron: power pentode; miniature 9 pin.	1st Amplifier	6CL6
V202	TUBE, electron: beam power pentode; octal.	2nd Amplifier	6146
V203	TUBE, electron: power tetrode.	Power Amplifier	TV-100
XV201	SOCKET, tube; miniature 9 pin.	Socket, V201.	TS103P01
XV202	SOCKET, tube; octal.	Socket, V202	TS101P01

XV203	SOCKET: consists of C247 285,286,287 built in.	Socket, V203	TS-142
MP201	CLIP, electrical: white ceramic; phosphor bronze spring clip to fit a 3/8" dia. tube cap; 1-1/8" lg x 5/8" o.d. x 9/16" high o/a.		HB-102-2
MP202	NOT USED		
MP203	GEAR, miter: 600" pitch dia., 20 pitch, 12 teeth; for 1/4" shaft, steel.		GR-116
MP204	Same as MP203.		
MP205	GEAR, miter: 600" pitch dia., 20 pitch, 12 teeth; for 1/8" shaft, steel.		GR-139
MP206	Same as MP205.		
MP207	NOT USED		
MP208	GEAR, bevel: 1.750" pitch dia., 12 pitch, 21 teeth; for 1/2" shaft, steel.		GR-140
MP209	Same as MP208.		
MP210	COUPLING, fixed: 7/16" dia. x 3/4" lg; for 1/4" shaft; four 6-32 Allen head screws, brass.		MC-102
MP211	Same as MP210.		
MP212	Same as MP210.		
MP213	Same as MP210.		
MP214	COUPLING, flexible: non-insulated; 1-1/4" dia. x 13/16" lg.; for 1/4" shaft; four 6-32 x 3/16" lg. Allen head screws.		MC-124

MP215	Same as MP214.		
MP216	Same as MP214.		
MP217	INSULATOR, pillar type, round: white glazed steatite.		NS3W0206
MP218	Same as MP217.		
MP219	Same as MP217.		
MP220	Same as MP217.		
MP221	Same as MP217.		
MP222	NOT USED		
MP223	NOT USED		
MP224	NOT USED		
MP225	INSULATOR, pillar type, round; white glazed steatite.	Coil Mtg., L245	NS3W0306
MP226	Same as MP225.		
MP227	Same as MP225.		
MP228	NOT USED		
MP229	NOT USED		
MP230	NOT USED		
MP231	NOT USED		
MP232	NOT USED		
MP233	INSULATOR, pillar type, round; white glazed steatite.		NS3W0312

C600	CAPACITOR, fixed: mica; .01 ufd, ±10%, 300 wvdc, char. B.	Bypass, Line Input, E608	CM35B103K
C601	Same as C600	Bypass, Line Input, E607	
C602	NOT USED		
C603	NOT USED		
C604	NOT USED		
C605	NOT USED		
C606	NOT USED		
C607	NOT USED		
C608	NOT USED		
C609	NOT USED		
C610	NOT USED		
C611	NOT USED		
C612	NOT USED		
C613	NOT USED		
E600	Not a replaceable item, see W600.		
E601	Not a replaceable item, see W601.		
E602	Not a replaceable item, see W602.		
E603	Not a replaceable item, see W603.		
E604	Not a replaceable item, see W604.		
E605	Not a replaceable item, see W605.		

E606	CONTACT ASSY., brass, nickel plate; 7/8 inch dia. x 1/2 inch long button; w/threaded shaft, 1/4-20 thds.	HV DC Output Terminal	AX-172
E607	Same as E606.	230 v AC Input Terminal	
E608	Same as E606.	230 v AC Input Terminal	
E609	Same as E606.	HV AC Input Terminal	
E610	Same as E606.	HV AC Input Terminal	
E611	Same as E606	HV AC Input Terminal	
E612	Same as E606.	Negative Return Terminal	
F600	FUSE, cartridge: time lag; 1 amp.	Fil. Fuse V600	FU-102-1
F601	Same as F600.	Fil. Fuse V601	
F602	Same as F600.	Fil. Fuse V602	
F603	Same as F600.	Fil. Fuse V603	
F604	Same as F600.	Fil. Fuse V604	
F605	Same as F600.	Fil. Fuse V605	
MP600	INSULATOR, pillar type: round; white glazed steatite; 1 inch long x 3/4 inch dia.; tapped 10-32 x 3/8 inch deep each end.		NS3W0308
MP601	Same as MP600.		

MP602 Thru MP607	INSULATOR, pillar type: round; white glazed steatite; 2 inch long x 1 inch dia; tapped 1/4-20 x 1/2 inch deep each end.		NS3W0432
T600	TRANSFORMER, power: step down; primary - 230 v, 50/60 cps, single phase: secdy - 5 v, 10A, CT: insulated for 2500 V primary and 15 Kv secondary; hermetically sealed rectangular steel case.	Filament Transformer V600	TF-201
T601	Same as T600.	Fil. Transf. V601	
T602	Same as T600.	Fil. Transf. V602	
T603	Same as T600.	Fil. Transf. V603	
T604	Same as T600.	Fil. Transf. V604	
T605	Same as T600.	Fil. Transf. V605	
V600	TUBE, electron: mercury vapor, half wave rectifier; 4 pin base.	HV Rectifier	872A
V601	Same as V600.	HV Rectifier	
V602	Same as V600.	HV Rectifier	
V603	Same as V600.	HV Rectifier	
V604	Same as V600.	HV Rectifier	
V605	Same as V600.	HV Rectifier	
W600	CABLE ASSEMBLY, consists of plate cap on one end, terminal lug on other end. #18 stranded single conductor, rubber insulation.	Plate Cap Assy. V600	CA-409-15-4.75
W601	Same as W600.	Plate Cap Assy. V601	

W602	Same as W600.	Plate Cap Assy. V602	
W603	Same as W600.	Plate Cap Assy. V603	
W604	Same as W600.	Plate Cap Assy. V604	
W605	Same as W600.	Plate Cap Assy. V605	
XF600	FUSE HOLDER, bayonet base: 100/250 v, neon lamp, clear knob, black plastic, 13/16 x 2-13/16 o/a.	Holder, F600	FH-104-3
XF601	Same as XF600.	Holder, F601	
XF602	Same as XF600.	Holder, F602	
XF603	Same as XF600.	Holder, F603	
XF604	Same as XF600.	Holder, F604	
XF605	Same as XF600.	Holder, F605	
XV600	SOCKET, tube: 4 pin base; twist lock.	Socket V600	TS-123-211-100
XV601	Same as XV600.	Socket V601	
XV602	Same as XV600.	Socket V602	
XV603	Same as XV600.	Socket V603	
XV604	Same as XV600.	Socket V604	
XV605	Same as XV600.	Socket V605	

C700	CAPACITOR, fixed: electrolytic; 50 ufd, ±2%, char. C.	Surge Protection	CE63C500G
E700	TERMINAL STRIP, barrier type; 14 6-32 binding head machine screws, phenolic body.	Terminal Strip	TM-100-14
E701	TERMINAL STRIP, barrier type: 8 6-32 binding head machine screws, phenolic body.	Terminal Strip	TM-100-8
E702	Same as E701.	Terminal Strip	
E703	Same as E701.	Terminal Strip	
E704	TERMINAL STRIP, barrier type: 10 6-32 binding head machine screws, phenolic body.	Terminal Strip	TM-100-10
E705	Same as E700.	Terminal Strip	
E706	CONNECTOR, feed-thru, 3/8" dia. x 1-1/8" long, ceramic body, 6-32 threads.	Feed-thru	TE-175
E707	Same as E706.	Feed-thru	
E708	Same as E706.	Feed-thru	
E709	Same as E706.	Feed-thru	
E710	Same as E706.	Feed-thru	
E711	Same as E706.	Feed-thru	
F700	FUSE, cartridge type: time delay; 10 amps.	Phase Fuse	FU-102-10
F701	Same as F700.	Phase Fuse, 2	
F702	Same as F700.	Phase Fuse, 3	
F703	FUSE, cartridge type: time delay; 5 amps.	Rear Fan Fuse	FU-102-5

F704	FUSE, cartridge type: time delay; 1 amp.	Timer Fuse	FU-102-1
F705	Same as F703.		
I700	LAMP, neon: double candlebra; 110 volts, 1/4 watt; T-4-1/2 clear bulb; bayonet base.	PA Bias Lamp	BI-103-2
I701	Same as I700.	PA Plate Lamp Ovld.	
I702	Same as I700.	PA Screen Lamp Ovld.	
I703	Same as I700.	IPA Screen Lamp Ovld.	
I704	Same as I700.	IPA Plate Lamp Ovld.	
I705	Same as I700.	IPA Bias Lamp	
J700	CONNECTOR, receptacle: male; 35 contacts.	Connector Male	MS3102A-32-7P
J701	CONNECTOR, receptacle: male; 3 contacts.	Connector Male	MS3102A-22-9P
K700	RELAY ASSEMBLY, P.A. Bias: consists of armature relay with cabling. Coil - 11,000 ohms, ±10%, four form pile up: contacts - silver cadmium rated at 10 amps 125 VAC resistive: operate .010 amps, non-operate .009 amps.	P. A. Bias	AR-105
K701	RELAY ASSEMBLY, P.A. Plate Overload: consists of armature relay with cabling. Contacts - silver cadmium rated at 25 amps, 125 VAC resistive: latch relay - 1100 ohms, ±10%; unlatch relay 0-93 ohms, latch operate 220 v, 60 cps AC or less.	P.A. Plate Overload	AR-100

K702	RELAY ASSEMBLY, P.A. Screen Overload; consists of armature relay with cabling. Contacts - silver cadmium rated at 25 amps, 125 VAC resistive: latch relay - 1100 ohms, ±10%; unlatch relay 1500 ohms, ±10%: latch operate - 220 v. 60 cps AC or less.	P.A. Screen Overload	AR-108
K703	RELAY ASSEMBLY, P.A. Screen ON-OFF; consists of armature relay with cabling. Contacts - silver cadmium rated at 25 amps; coil - 1800 ohms, ±10%; operate 220 v, 50/60 cps.	P.A. Screen ON-OFF	AR-102
K704	RELAY ASSEMBLY, Diode Protect; consists of armature relay with cabling. Coil - latch 1100 ohms, ±10%; trip - 170 ohms, ±10%; 4 PDT; contacts - silver rated at 20 amps non-inductive: operate latch - 200 v, 60 cps or less.	Diode Protect	AR-104
K705	RELAY ASSEMBLY, Tune-Operate; consists of armature relay with cabling. Contacts - silver cadmium rated at 25 amps; coil - 1800 ohms, ±10%; operate 220 v, 50/60 cps.	Tune-Operate	AR-103
K706	RELAY ASSEMBLY, IPA Screen Overload; consists of armature relay with cabling. Coil - latch 1100 ohms, ±10%; trip-10,000 ohms, ±10%; 4 PDT; contacts - silver rated at 25 amps non-inductive load: latch operate 220 v, 60 cps AC or less.	IPA Screen Ovld.	AR-107

K707	RELAY ASSEMBLY, IPA Plate Overload; consists of armature relay with cabling. Coil - latch relay - 1100 ohms, ±10%, unlatch relay 43 ohms, ±10%; 4 PDT; contacts - silver cadmium rated at 20 amps, 125 VAC resistive; latch operate 220 v, 60 cps or less.	IPA Plate Ovld.	AR-101
K708	RELAY ASSEMBLY, IPA Bias; consists of armature relay with cabling. Coil - 11,000 ohms, ±10%, four form pile up; contacts - silver cadmium rated at 10 amps 125 VAC resistive: operate .010 amps, non-operate .009 amps.	IPA Bias	AR-106
M700	METER, elapsed time: 120 volts, 50/60 cps: std. ASA/MIL 3-1/2" (MR-36) mounting.	Fil. Time Meter	MR-125-2
M701	TIMER, time delay: 3" dia. panel mtg. bakelite case: contacts rated at 10 amps: time cycle - 5 min.: dial division - 5 seconds.	Time Delay Meter	TI-101-4
M702	Same as M700.	Plate Time Meter	
R700	RESISTOR, fixed: composition: 15,000 ohms, ±10%, 2 watts.	Dropping	RC42GF153K
R701	RESISTOR, fixed: composition; 300 ohms, ±10%, 2 watts.	Dropping	RC42GF301K
R702	RESISTOR, fixed: composition; 220,000 ohms, ±10%, 2 watts.	Dropping	RC42GF224K
R703	RESISTOR, variable: composition; 50,000 ohms, ±10%, 2 w.	PA Bias Adj.	RV4ATXA503A

R704	RESISTOR, fixed: wire wound; 0.5 ohms, 5 watts.	Limiting	RW-107-54
R705	RESISTOR, adjustable: wire wound; 1 ohm, 4 watts, linear taper.	PA Plate Ovld. Adj.	RA107TXA1ROA
R706	RESISTOR, fixed: wire wound; 500 ohms, 142 ma, 10 watts.	Limiting	RW-109-19
R707	RESISTOR, variable: wire wound; 500 ohms, ±10%, 25 watts, linear taper.	PA Screen Ovld. Adj.	RA75ASA501AK25
R708	RESISTOR, fixed: wire wound; 500 ohms, 100 ma dc, 5 watts.	Limiting	RW-107-28
R709	RESISTOR, variable: wire wound; 2500 ohms, ±10%, 25 watts, linear taper.	IPA Screen Ovld. Adj.	RA75AXC252AK25
R710	RESISTOR, fixed: wire wound; 10 ohms, 1000 ma dc, 10 watts.	Limiting	RW-109-4
R711	RESISTOR, variable: wire wound; 15 ohms, ±10%, 25 watts, linear taper.	IPA Plate Ovld. Adj.	RA75AXA150AK25
R712	RESISTOR, fixed: composition; 3900 ohms, ±10%, 1 watt.	Dropping	RC30GF392K
S700	SWITCH, toggle: DPST; 2 amp at 250 v, bat type toggle.	Alarm Switch ON-OFF	ST-22K
XF700	HOLDER, fuse: cartridge type: 100/250 volts: neon lamp, clear knob, black phenolic body.	Fuse Holder Phase 1	FH-104-3
XF701	Same as XF700.	Fuse Holder Phase 2	
XF702	Same as XF700.	Fuse Holder Phase 3	

XF703	Same as XF700.	Fuse Holder Rear Fan	
XF704	Same as XF700.	Fuse Holder Timer	
XF705	Same as XF700.	Fuse Holder RA Filament	
XI700	HOLDER, lamp: bayonet base; 105/125 volts, w/white frosted lens.	Lamp Holder PA Bias	TS-137-7FB4
XI701	Same as XI700.	Lamp Holder, PA Plate, Ovld.	
XI702	Same as XI700.	Lamp Holder, PA Screen Ovld.	
XI703	Same as XI700.	Lamp Holder, IPA Screen Ovld.	
XI704	Same as XI700.	Lamp Holder, IPA Plate Ovld.	
XI705	Same as XI700.	Lamp Holder, IPA Bias	

B800	BLOWER/FAN: 220 volts, 50/60 cps, 3 phase; ccw rotation; 3250 RPM nom,; 2320 watts full load; 6.1 line amps.	Main Blower	BL-111
C800	CAPACITOR, fixed: paper; 4 mf, +10%, 10,000 wvdc; 16" high x 13-1/2 in. wide x 5-1/8 in. thk. o/a.	PA HV Filter	CP-103
C801	CAPACITOR, fixed: paper; 8 mf, +10%, 5000 wvdc; 12-3/4 in. high x 8 in. wide x 4-1/16 in. thk. o/a.	PA HV Filter	CP-104
C802	CAPACITOR, fixed: paper; 10 mf, +10%, 2500 wvdc; 6-7/8" high x 4-9/16" wide x 3-3/4" thk. o/a.	PA Screen Filter	CP-105
C803	CAPACITOR, fixed: mica; 1000 mmf, ±10%, 500 wvdc.	Primary Bypass T801	CM30B102K
C804	Same as C803.	Primary Bypass T801	
C805	Same as C803.	Primary Bypass T801	
C806	Same as C803.	Primary Bypass T801	
C807	Same as C803.	Primary Bypass T801	
C808	Same as C803.	Primary Bypass T801	
C809	Same as C803.	Primary Bypass T801	
C810	Same as C803.	Primary Bypass T801	
C811	DELETED		
C812	DELETED		
C813	CAPACITOR, fixed: plastic; .01 mf, +5%, 4000 wvdc; 1-1/8 inch dia. x 2-7/8 in. lg. o/a.	PA Fil. Bypass	CX102J103M

C814	Same as C813.	PA. Fil. Bypass	
C815	CAPACITOR, fixed: paper dielectric; 0.25 uf +10%, 3000 wvdc, hermetically sealed metal case.	Shorting Relay Coil Capacitor	CP70E1FL254K
CR800 A,B,C D,E,F	SEMICONDUCTOR DEVICES: Not replaceable, part of TB800, TMC p/n AX-126.		
E800	DELETED		
E801	BUSHING, feed-thru: steatite insulators, neoprene gland, not tinned brass stud, 1/4-20 threads, 1-1/8" dia. x 3" lg. o/a.	HV Shorting Contacts	AX-150
E802	Same as E801.	HV Shorting Contacts	
E803	DELETED		
E804	DELETED		
E805	TERMINAL STRIP, barrier type: plastic; 4 terminals.	HV Shorting Term. Bd.	TM-102-4
L800	REACTOR, filter: 2 henry at 1.6 amps; 10 in. high x 7-7/16" wide x 5-31/32 deep o/a.	Filter Choke	TF-200
L801	REACTOR, filter: 5 henry at 1 amp; 10 in. high x 7-1/16" wide x 5-31/32" deep o/a.	Filter Choke	TF-199
L802	SOLENOID, relay: w/plunger; 230 v, 60 cps, 0.2 amps; continuous duty cycle.	HV Shorting Relay	SZ-100
L803	COIL, R.F.: fixed; 185 microhenries.	Filter	CL-178
R800	DELETED		
R801	DELETED		

R802	RESISTOR, fixed: wire wound; 18,000 ohms, 140 watts, char. F.	HV Bleeder	RW-118-F-183
R803	Same as R802.	HV Bleeder	
R804	Same as R802.	HV Bleeder	
R805	Same as R802.	HV Bleeder	
R806	Same as R802.	HV Bleeder	
R807	Same as R802.	HV Bleeder	
R808	Same as R802.	HV Bleeder	
R809	Same as R802.	HV Bleeder	
R810	RESISTOR, fixed: 4 megohms, ±0.5%, wire wound.	HV Bleeder	RW-122-1-405
R811	Same as R810.	HV Bleeder	
R812	RESISTOR, fixed: wire wound; 180 ohms, ±0.5%, 40 watts, char. G.	HV Bleeder	RW-119-G-181
R813	Same as R812.	PA Screen Metering	
R814	RESISTOR, fixed: wire wound; 600,000 ohms, ±0.5%, 6 watts.	PA Screen Metering	RW-122-3-604
R815	Same as R814.	PA Screen Metering	
R816	RESISTOR, fixed: wire wound; 5000 ohms, 140 watts, char. F.	PA Screen Bleeder	RW-118-F-502
R817	DELETED		
R818	RESISTOR, fixed: wire wound; 5000 ohms, ±5%, 10 watts. Also part of semiconductor device set, TB800, TMC Part No. AX-126.	PA Screen Dropping	RW-109-32

R819	Same as R816.	PA SC Bleeder	
R820	Same as R816.	PA SC Bleeder	
R821	RESISTOR, fixed: wire wound; 20 watts, resistance 100,000 ohms (rated at 7 watts), 8.5 ma current. Also part of Semiconductor Device Set, TMC Part No. AX-126.	HV Bleeder	RW-110-43
R822	RESISTOR, fixed: composition; 220 ohms, ±10%, 2 watts. Also part of Semiconductor Device Set, TB800, TMC Part No. AX-126.	Diode Protector	RC42GF221K
R823	Same as R822. Also part of Semiconductor Device Set, TB800, TMC Part No. AX-126.	Diode Protector	
R824	Same as R822. Also part of Semiconductor Device Set, TB800, TMC Part No. AX-126.	Diode Protector	
R825	Same as R822. Also part of Semiconductor Device Set, TB800, TMC Part No. AX-126.	Diode Protector	
R826	Same as R822. Also part of Semiconductor Device Set, TB800, TMC Part No. AX-126.	Diode Protector	
R827	Same as R822. Also part of Semiconductor Device Set, TB800, TMC Part No. AX-126.	Diode Protector	
S800	SWITCH, air.	Main Blower Air Switch Interlock	SW-243

S801	SWITCH, push button: momentary contact; SPST, 15 amps at 125,250,460 VAC, 1/2 watt, at 125 VDC, 1/4 amp at 250 VDC.	HV Shorting	SW-169
T800	TRANSFORMER, main power: 210,220,230,250 v, 50/60 cps ac, three phase delta primary; 3400 VAC each; 1.6 amp wye secondary; 26" long x 116" wide x 16" high o/a.	PA High Voltage Transformer	TF-203
T801	TRANSFORMER, filament: 230 volt w/taps primary; 8.5 volts, 7.5 amp CT secondary; 8-3/4" high x 6-1/8" wide x 5-5/16" deep o/a.	PA Filament	TF-197
TB800	SEMICONDUCTOR DEVICE SET: consisting of CR800A,B,C, D,E,F, R818,R821,R822,R823, R824,R825,R826,R827.	PA Screen Voltage Reg.	AX-126

A901	ASSEMBLY, tuning slug.	Antenna Tuning Slug	AX-120
A902	Same as A901.	Antenna Tuning Slug	
A903	FINAL COIL/SWITCH ASSEMBLY.	PA Tuning	AS-119
C900	CAPACITOR, fixed: mica; button, 1000 uuf, ±5%, 300 wvdc.	ALDC Bypass	CB21PD102J
C901	Same as C900.	ALDC Bypass	
C902	Same as C900.	ALDC Bypass	
C903	Same as C900.	ALDC Bypass	
C904	CAPACITOR, fixed: mica; 20 uuf, ±2%, 500 wvdc.	ALDC Filter	CM20C200G
C905	CAPACITOR, fixed: ceramic; 3 uuf, ±.25 uuf, 500 wvdc.	PA Plate RF Meter Coupling	CC21SL030C
C906	CAPACITOR, fixed: mica; 100 uuf, ±5%, 500 wvdc, char. C.	ALDC Filter	CM20C101J
C907	CAPACITOR, fixed: ceramic; 10 uuf, ±.5 uuf, 500 wvdc.	ALDC Coupling	CC21SL100D
C908	CAPACITOR, fixed: mica; 5 uuf, ±20%, 500 wvdc.	PA Monitor Coupling	CM20C050M
C909	CAPACITOR, fixed: vacuum; 3 uuf, 17,000 volts peak; 7 amp current rating; 1-1/16" dia. x 3-1/4" lg.	PA Monitor Coupling	CO-102-3
C910	CAPACITOR, fixed: mica; 50 uuf, ±5%, 300 wvdc.	Voltage Divider	CM15C500J
C911	CAPACITOR, fixed: vacuum; 1000 uuf, 15,000 wvdc.	PA Plate DC Blocking	CO-101-1000-15C
C912	Same as C900.	M1003 Bypass	
C913	Same as C900.	M1003 Bypass	

C914	CAPACITOR, fixed: mylar; .1 uf, ±5%, 700 wvdc.	M1003 Bypass	CN108C1003J
C915	Same as C900.	M1003 Bypass	
C916	CAPACITOR ASSEMBLY, variable: vacuum; 5-750 uuf, 5000 volts peak; clockwise rotation decreases capacity; 3-1/4" dia. x 7-3/4" lg o/a, with bevel gear.	Output Balance	AM-103
C917	CAPACITOR, fixed: ceramic; 1000 uuf, +20%, 5000 wvdc; 6-32 tapped studs each end; 13/16" dia. x 7/8" lg o/a.	PA Screen Bypass	CC-109-38
C918	NOT USED		
C919	CAPACITOR, fixed: ceramic; 500 uuf, +20%, 5000 wvdc, 6-32 tapped studs each end, 13/16" d x 7/8" lg o/a. Part of XV900.	PA Screen Bypass	CC-109-36
C920	Same as C919. Part of XV900.	PA Screen Bypass	
C921	Same as C919. Part of XV900.	PA Screen Bypass	
C922	Same as C919. Part of XV900.	PA Screen Bypass	
C923	Same as C919. Part of XV900.	PA Screen Bypass	
C924	Same as C919. Part of XV900.	PA Screen Bypass	
C925	Same as C919. Part of XV900.	PA Screen Bypass	
C926	Same as C919. Part of XV900.	PA Screen Bypass	

C927	CAPACITOR ASSEMBLY, variable: vacuum; 25-700 uuf, 15,000 volts peak; clockwise rotation decreases capacity: 3-3/4" dia. x 16-1/2" lg o/a, with bevel gear.	PA Tuning	AM-113
C928	CAPACITOR ASSEMBLY, variable: vacuum; 50-2000 uuf, 10,000 volts peak; clockwise rotation decreases capacity; 5-1/8" dia. x 16-1/2" lg o/a, with bevel gear.	PA Load	AM-114
C929	CAPACITOR, fixed: vacuum; 10 uuf, 17,000 volts peak; 1-1/16" dia. x 3-1/8" lg o/a.	PA Inverse Feedback	CO-104-2
C930	Same as C911.	PA Plate, DC Blocking	
C931	CAPACITOR, fixed: mica; 1000 uuf, ±10%, 500 wvdc, char. C.	Grid Bypass	CM20C102K
C932	Same as C931.	Grid Bypass	
C933	CAPACITOR, fixed: ceramic; 50 uuf, ±10%, 7500 wvdc, 6-32 tapped studs each end, 13/16" dia. x 7/8" lg o/a. Part of XV900.	Grid Bypass	
C934	Same as C933. Part of XV900.	Grid Bypass	
C935	Same as C933. Part of XV900.	Grid Bypass	
C936	Same as C933. Part of XV900.	Grid Bypass	
C937	NOT USED		
C938	NOT USED		

C939	CAPACITOR, fixed: trylar; 1000 uuf, ±10%, 14,000 wvdc.	PA Plate Bypass	CX102K102T
C940	Same as C939.	PA Plate Bypass	
C941	CAPACITOR, fixed: mica; 5 uuf, ±20%, 300 wvdc.	IPA Monitor Volt. Divider	CM15C050M
C942	CAPACITOR, fixed: mica; 50 uuf, ±5%, 500 wvdc.	IPA Monitor Volt. Divider	CM20B500J
C943	CAPACITOR, feed-thru: 1000 uuf, ±20%, 500 wvdc.	Feed-thru Bypass	CK70A102M
C944	Same as C943.	RF Bypass, M1003	
C945	Same as C943.	PA Grid Bias Bypass	
C946	CAPACITOR, fixed: trylar; 10,000 uuf, ±10%, 4000 wvdc.	PA Filament Bypass	CX102J103M
C947	Same as C946.	PA Filament Bypass	
C948	Same as C943.	ALDC Bypass	
CP900	ADAPTER, connector.	Adapter for P902	UG-1091/U
CP901	ADAPTER, connector, angle.	Adapter for CP900	UG-212C/U
CR900	DIODE, germanium	ALDC Rectifier	IN303
CR901	Same as CR900.	PA Plate, RF Rectifier	
E900	FEED THRU, insulated.	Output Switching Terminal	AX-152
E901	Same as E900.	Output Switching Terminal	
E902	Same as E900.	Output Switching Terminal	
E903	Same as E900.	Output Switching Terminal	

E904	Same as E900.	Output Switching Terminal	
E905	INSULATOR BOWL ASSEMBLY.	Bal. Output Terminal	AX-159
E906	Same as E905.	Bal. Output Terminal	
E907	CONTACT ASSEMBLY, short.	p/o RF Band-switch	AX-129
E908	Same as E907.	p/o RF Band-switch	
E909	Same as E907.	p/o RF Band-switch	
E910	Same as E907.	p/o RF Band-switch	
E911	Same as E907.	p/o RF Band-switch	
E912	CONTACT ASSEMBLY, long.	p/o RF Band-switch	AX-128
E913	Same as E907.	p/o RF Band-switch	
E914	Same as E907.	p/o RF Band-switch	
E915	Same as E907.	p/o RF Band-switch	
J900	CONNECTOR, receptacle: electrical; 1 female contact; 52 ohms, BNC type.	PA Monitor	UG-625/U
J901	CONNECTOR, receptacle: female; teflon insulated; mtg. dim. four 1/8" holes on 29/32" mtg. centers.	Driver Input	UG-560/U
J902	Same as J900.	IPA Monitor Unbal. Output	

J903	CONNECTOR, receptacle: NOTE: this symbol represents connector as requested by customers.	Unbal. Output	Cust. Request
J904	RF CONNECTOR PROBE ASSEMBLY.	RF Monitor	AJ-100
L900	CHOKE, R.F.: 128 microhenries, ±10%, Q = 100.	ALDC Choke	CL-177
L901	COIL, R.F.: 750 microhenries, ±20%, 100 ma max. current, approx. 17 ohms dc resistance.	ALDC Choke	CL-100-5
L902	COIL, H.F.: L - 1.5 uh; Q = 200 at 2.5 mc.	PA Pi Network	CL-170
L903	FINAL COIL: not a replaceable item, part of A903.	PA Pi Network	
L904	Same as L900.	M1003 Choke	
L905	COIL, R.F.: 1.1 microhenry; Q less than 70 at 7.9 mc; 3/16" dia. x 5/8" lg body.	M1003 Choke	CL-139
L906	COIL, R.F.: fixed; plate decoupling, L - .3 millihenries Q = 35 or greater; F - 790 kc test frequency.	PA Plate Choke	CL-154
L907	CHOKE, static: 1 - 35 uhy; Q greater than 180, F - 2.5 mc.	Static Choke	CL-166
L908	Same as L901.	M1003 Choke	
L909	COIL, R.F.: fixed; 185 microhenries, +10 microhenries, Q - 50.	PA Screen Choke	CL-178
L910	Same as L901.	PA Grid Choke	

L911	Same as L906.	PA Plate Choke	
L912	COIL, antenna tuning.	Antenna Tuning	AC-102
L913	Same as L912.	Antenna Tuning	
L914	CHOKE, R.F.: fixed; 38 microhenries, ±5% Q = 160.	PA Plate Choke	CL-179
L915	COIL, PA, filament: 5 microhenry each coil; inside coil completely insulated from outside coil; 3-1/4" o.d. x 6-1/2" lg.	PA Filament Choke	CL-160
L916	Same as L914.	M1004 Choke	
L917	Same as L914.	M1004 Choke	
MP900	COUNTER, rotating: 3 wheel, 0 to 9 each wheel.	Tune Indicator	CY-105
MP901	Same as MP900.	Load Indicator	
MP902	Same as MP900.	Output Balance Indicator	
MP903	Same as MP900.	Output Loading Indicator	
MP904	COUNTER, bandswitch: rotating; 3 wheel, 2 to 28 mc, plain bearing type, non-reset; black figures white wheels, rotation is clockwise; 9 positions.	Bandswitch Indicator	AC-124
P902	CONNECTOR, plug: coaxial; HN type; 50 ohms, 5000 volts peak. Part of W901.	p/o W901	UG-59B/U
R900	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1/2 watt.	ALDC Decoupling	RC20GF473K
R901	RESISTOR, fixed: composition; 2200 ohms, ±10%, 1/2 watt.	ALDC Divider	RC20GF222K

R902	RESISTOR, fixed: composition; 470 ohms, ±10%, 1/2 watt.	PA Monitor Volt. Divider	RC20GF471K
R903	RESISTOR, fixed: composition; 47 ohms, ±10%, 1/2 watt.	PA Monitor Volt. Divider	RC20GF470K
R904	RESISTOR, fixed: composition; 100,000 ohms, ±10%, 1/2 watt.	M1003 Decoupling	RC20GF104K
R905	Same as R904.	M1003 Decoupling	
R906	Same as R901.	M1003 Voltage Divider	
R907	RESISTOR, fixed: composition; 27,000 ohms, ±10%, 2 watts.	PA Grid Bias	RC42GF273K
R908	RESISTOR, fixed: composition; 470 ohms, ±10%, 1 watt.	IPA Monitor Divider	RC32GF471K
R909	NOT USED		
R910	RESISTOR, fixed: composition; 47 ohms, ±10%, 1 watt.	IPA Monitor Volt. Divider	RC32GF470K
R911	NOT USED		
R912	NOT USED		
R913	NOT USED		
R914	RESISTOR, fixed: composition; 100,000 ohms, ±10%, 2 watts.	PA Screen	RC42GF104K
R915	Same as R914.	PA Screen	
S900	Not a replaceable item, part of A903, TMC p/n AS-119.	PA Bandswitch	

S901	SWITCH, micro: plug; 10 amp at 125/250 VAC; 1/2 amp at 125 VDC.	PA Bandswitch Interlock	SW-189
TC900	THERMOCOUPLE, used with 0-20 meter movement; 2-1/8" lg x 1" wide x 1" high o/a.	Ant. Current Thermocouple	TH-100-20
V900	TUBE, power amplifier: ceramic tetrode.	Power Amplifier	4CX5000A
W901	CABLE, R.F.: RG-165/U, 1 Kw, emergency output. Consists of P902. Supplied as Loose Item.	Emergency Aux. Service Cable	CA-582-1
XV900	SOCKET, tube: consists of socket and capacitors C919 thru C926 and C933 thru C936.	Socket for V900	AX-130

C1000	DELETED		
C1001	DELETED		
C1002	DELETED		
C1003	CAPACITOR, fixed: 1000 uuf, ±20%, 5000 wvdc.	PA Plate Current Bypass	CC-109-38
C1004	DELETED		
C1005	Same as C1003.	PA Plate Mtr. Current Bypass	
C1006	DELETED		
C1007	DELETED		
C1008	DELETED		
C1009	Same as C1003.	PA Screen Bypass	
C1010	Same as C1003.	PA Screen Bypass	
C1011	CAPACITOR, fixed: mica; .01 uf, ±10%, 500 wvdc, char. B.	M1004 Bypass	CM35B103K
C1012	NOT USED		
C1013	CAPACITOR, feed-thru type; 1000 uuf; ±20%, 500 wvdc.	PA Plate RF Bypass	CK70A102M
C1014	Same as C1013.	M1000 Bypass	
C1015	Same as C1013.	M1000 Bypass	
C1016	Same as C1013.	I1005 Bypass	
C1017	Same as C1003.	PA Screen Bypass	
C1018	Same as C1003.	PA Screen Bypass	
C1019	Same as C1003.	M1004 Bypass	
C1020	Same as C1003.	M1004 Bypass	
C1021	Same as C1011.	M1000 Bypass	

C1022	CAPACITOR, fixed: electrolytic; 25 uuf, 50 wvdc.	M1001 Bypass	CE-105-25-50
C1023	Same as C1011.	M1002 Bypass	
C1024	Same as C1011.	PA Plate RF Meter Bypass	
C1025	Same as C1011.	I1000 Bypass	
C1026	Same as C1011.	I1001 Bypass	
C1027	Same as C1011.	I1002 Bypass	
C1028	Same as C1011.	I1003 Bypass	
C1029	CAPACITOR, fixed: mica; 1000 uufd, ±10%, 500 wvdc, char. B.	ALDC Adjust Bypass	CM20B102K
C1030	Same as C1011.	Primary Power Bypass	
C1031	Same as C1011.	Primary Power Bypass	
C1032	Same as C1011.	Primary Power Bypass	
C1033	Same as C1011.	Primary Power Bypass	
C1034	Same as C1011.	Primary Power Bypass	
C1035	Same as C1011.	Primary Power Bypass	
C1036	Same as C1011.	Primary Power Bypass	
C1037	Same as C1011.	Primary Power Bypass	
C1038	Same as C1011.	Primary Power Bypass	
C1039	Same as C1011.	Primary Power Bypass	

CB1000	BREAKER, circuit: 230 VAC; 50 amp, 3 pole.	Main Power ON/OFF	SW-240
CB1001	BREAKER, circuit: 230 VAC; 350 ma, 1 pole.	High Voltage ON/OFF	SW-241
E1000	CONTACT, spring loaded: silver plated beryllium copper; 3/4 x 1-1/8 x 3/4" o/a.	IPA RF Output	AX-154
E1001	CONTACT, spring loaded: nickel plated beryllium copper; 2-1/4 x 1-1/4 x 1" o/a.	HV Contact	AX-153
E1002	Same as E1001.	HV Contact	
E1003	Same as E1001.	HV Contact	
E1004	Same as E1001.	HV Contact	
E1005	Same as E1001.	HV Contact	
E1006	Same as E1001.	HV Contact	
E1007	Same as E1001.	HV Contact	
E1008	INSULATOR, FEEDTHRU: consists of two ribbed steatite insulators; one brass, nickel plated 1/4-20 threaded rod, 4" lg.; two neoprene gaskets; two fiber washers; two flat washers; two hex nuts; and two external tooth lockwashers; 1-1/4 in. dia. by 4 in. long over-all.	AC Line Input	AX-261
E1009	Same as E1008.	AC Line Input	
E1010	Same as E1008.	AC Line Input	

I1000	LAMP, incandescent: screw type base; 230 volts, 10 watts.	AC Power	BI-105-1
I1001	Same as I1000.	Tune Indicator	
I1002	Same as I1000.	Operate Ind.	
I1003	Same as I1000.	Plate ON	
I1004	LAMP, neon: miniature; 110 v, 1/25 watt; type T-3-1/4 clear bulb, bayonet base.	Interlock Ind.	BI-100-51
I1005	LAMP, fluorescent: standard cool white; 1/2 in, dia. x 11-1/4 in. long.	Meter Illum.	BI-107
I1006	Same as I1005.	Meter Illum.	
I1007	LAMP, incandescent: frosted; 230-250 volts, 25 watts; standard screw base; 4" x 1-7/8" o/a.	PA Compartment Illumination	BI-106-2
J1000	CONNECTOR, receptacle: female; AN pin type.	Power Connector	MS3102A-20-27S
J1001	CONNECTOR, receptacle: female; 35 contacts.	Power Connector	MS3102A-32-7S
J1002	JACK, bulkhead.	SBE Output	JJ-172
J1003	CONNECTOR, receptacle: AN socket type, one contact.	HV Connector	MS3102A-18-16S
J1004	CONNECTOR, receptacle: female; teflon insulated.	IPA Output	UG-560/U
J1005	Same as J1002.	SBE Output Connector	
J1006	Same as J1002.	IPA Monitor Connector	

J1007	Same as J1002.	PA Monitor	
J1008	Same as J1002.	ALDC	
L1000	COIL, line filter: L - nominal 177 uh (175-179) Q greater than 10; F - 2 mc.	Primary Power Filter	CL-155
L1001	Same as L1000.	Primary Power Filter	
L1002	Same as L1000.	Primary Power Filter	
L1003	Same as L1000.	Primary Power Filter	
L1004	Same as L1000.	Primary Power Filter	
M1000	METER, filament primary: AC voltmeter, 0-300 volts, red marker at 230 v; 4-1/2" square case.	Filament Primary Meter	MR-118
M1001	METER, P.A. screen current: 0-100 milliamps, D.C., 4-1/2 in. square case.	PA Screen Current Meter	MR-116
M1002	METER, P.A. plate current: 0 - 3 amps, D.C., 4-1/2" square case.	PA Plate Current Meter	MR-117
M1003	METER, P.A. plate R.F.: 0 - 10 Kv R.F. scale, 200 micro amps D.C. movement, 4-1/2" square case.	PA Plate R.F. Meter	MR-120
M1004	METER, P.A. output.	PA Output Meter	MR-126
MP1000	DELETED		
MP1001	DELETED		
MP1002	DELETED		

MP1003	DELETED		
MP1004	DELETED		
MP1005	KNOB, instrument type: no skirt; 3/4 x 2-3/8 inches o/a.		MP-110
MP1006	Same as MP1005.		
MP1007	KNOB, instrument, slip type.		MP-113
MP1008	Same as MP1007.		
MP1009	Same as MP1007.		
P1000	CONNECTOR, receptacle, male, socket type.	Relay Panel	MS3106B-32-7S
P1001	CONNECTOR, receptacle, AN socket type.	Relay Panel HV	MS3106B-22-9S
P1002	CONNECTOR, coaxial.	SBE Input	PL-169
P1003	CONNECTOR, plug: AN pin type; 1 contact.	HV Input	MS3106B-18-16P
P1004	CONNECTOR, plug: coaxial; HN type; 50 ohms, 5000 volts peak.	Drive Output	UG-59B/U
P1005	Same as P1002.	SBE Input	
P1006	CONNECTOR, plug: socket type; 1 contact.	HV Input	MS3106B-18-16S
P1007	Same as P1002.	PA Monitor	
P1008	Same as P1002.	IPA Monitor	
P1009	Same as P1004.	Drive Input	
P1010	Same as P1000.	Driver Drawer Connector	
P1011	CONNECTOR, receptacle, male, pin type.	Driver Drawer	MS3106B-32-7P

R1000	RESISTOR, fixed: wire wound; 100 ohms, 55 watts.	Interlock Ckt. Dropping	RW-115-101-55
R1001	Same as R1000.	Interlock Ckt. Dropping	
R1002	RESISTOR, fixed: wire wound; 45,000 ohms, 10 watts.	CR1001 Dropping	RW-109-42
R1003	RESISTOR, fixed: composition; 390,000 ohms, ±5%, 1/2 watt.	ALDC Decoupling	RC20GF394J
R1004	RESISTOR, variable: composition; 50,000 ohms, ±20%, linear taper, 7/8" slotted shaft.	ALDC Adjust	RV4ATSD503B
R1005	RESISTOR, fixed: composition; 220,000 ohms, ±5%, 1 watt.	Interlock Ind. Ckt. Decoup.	RC30GF224J
R1006	RESISTOR, fixed: wire wound; 3000 ohms, ±5%, 10 watts.	Lamp Dropping	RW-109-30
R1007	Same as R1006.	Lamp Dropping	
R1008	Same as R1006.	Lamp Dropping	
R1009	Same as R1006.	Lamp Dropping	
S1000	SWITCH, push button: SPST; momentary contact; 1 amp 250 v, 3 amps, 125 v; solder type lugs.	Overload Reset	SW-168-SPST-2-NOBR
S1001	SWITCH, rotary: 1 section; 12 positions, 30° angle of throw.	Interlock Switch	SW-250
S1002	SWITCH, rotary tap: 7 taps, 180° total rotation; 10 amps, 150 vac.	Filament Adjust	SW-167-7

S1003	SWITCH, rotary: 1 section, 2 positions, 30° angle of throw; shorting contacts; silver plated brass contacts; mycalex insulation.	ALDC ON/OFF	SW-255
S1004	SWITCH, toggle: DPDT; 6 amps, 125 VAC; 28° angle of throw, solder lug terminals.	TUNE/OPERATE	ST-22N
S1005	SWITCH, toggle: SPST; 6 amps, 125 VAC; 28° angle of throw, solder lug terminals.	PA Screen ON/OFF	ST-12A
S1006	SWITCH, interlock: push to operate; total travel app. 0.312 in.; 15 amp, 120, 250 VAC; 2 amps resistive at 250 VDC.	Rear Door Interlock	SW-230
S1007	Same as S1006.	PA Deck Interlock	
S1008	Same as S1006.	Right Side Interlock	
S1009	Same as S1006.	IPA Drawer	
S1010	Same as S1006.	HV Deck Interlock	
S1011	Same as S1006.	Relay Deck Interlock	
S1012	STARTER, fluorescent lamp: 8 watt; 13/16 in. dia. x 1-1/2" long.	I1005 Starter	PO-170
S1013	Same as S1012	I1006 Starter	
S1014	Same as S1005.	Light Switch	
T1000	BALLAST, fluorescent lamp: 8 watt, 118 volts, 0.17 amp, 60 cps.	I1005 Ballast	PO-169
T1001	Same as T1000.	I1005 Ballast	

XI1000	SOCKET, lamp: w/frosted amber lens; screw type socket.	Socket I1000	TS-136-3FS
XI1001	SOCKET, lamp: w/frosted green lens; screw type socket.	Socket I1001	TS-136-2FS
XI1002	SOCKET, lamp: w/frosted red lens; screw type socket.	Socket I1002	TS-136-1FS
XI1003	SOCKET, lamp: w/frosted blue lens; screw type socket.	Socket I1003	TS-136-4FS
XI1004	SOCKET, lamp: w/clear lens; for miniature bayonet base type T-3-1/4 bulb.	Socket I1004	TS-106-2
XI1005 A & B	SOCKET, fluorescent lamp: 75 watts, 250 volts.	Socket I1005	TS-141
XI1006 A & B	Same as XI1005.	Socket I1006	
XI1007	SOCKET, lamp: screw type socket.	Socket I1007	TS-143
XS1012	SOCKET, starter: fluorescent: 60 watt, 250 volt.	Socket S1012	TS-140
XS1013	Same as XS1012.	Socket S1013	

C2000	CAPACITOR, fixed: mica; .001 ufd; ±10%; 500 wvdc, char. B.	Bypass	CM20B102K
C2001 A & B	CAPACITOR, fixed: dry electrolytic; 2 sections, 20 ufd, 450 wvdc each section.	Filter	CE52F200R
C2002	Same as C2000.	Bypass	
C2003 A & B	Same as C2001.	Filter	
C2004	Same as C2000.	Bypass	
C2005	CAPACITOR, fixed: dry electrolytic; polarized; 80 ufd, 450 wvdc.	Filter	CE51F800R
C2006	Same as C2005.	Filter	
C2007	Same as C2000.	Bypass	
C2008	Same as C2000.	Bypass	
C2009	Same as C2000.	Bypass	
C2010	Same as C2000.	Bypass	
C2011	Same as C2000.	Bypass	
C2012	Same as C2000.	Bypass	
C2013	Same as C2000.	Bypass	
C2014	Same as C2000.	Bypass	
C2015	Same as C2000.	Bypass	
C2016	Same as C2000.	Bypass	
C2017	CAPACITOR, fixed: mica; .01 ufd, ±5%, 300 wvdc, char. C.	Bypass	CM35C103J
C2018	Same as C2017.	Bypass	
C2019	Same as C2000.	Bypass	

C2020	Same as C2000.	Bypass	
C2021	CAPACITOR, fixed: paper; 4 ufd; +10%, char. F; 600 wvdc.	IPA Blower Motor	CP41B1FF405K
C2022	Same as C2021.	Bypass, Audio	
F2000	FUSE, cartridge type: 1/4 amp; time delay.	B+	FU-102-.250
F2001	FUSE, cartridge type: 1/8 amp; time delay.	IPA Bias	FU-102-.125
F2002	FUSE, cartridge type: 2 amp; time delay.	IPA Blower	FU-102-2
F2003	Same as F2002.	IPA Filament	
F2004	FUSE, cartridge type: 3 amp; time delay.	L V	FU-102-3
I2000	LAMP, neon: 110 v; 1/25 watt, T-3-1/4 clear bulb; bayonet base.	Drawer Interlock Indicator	BI-100-51
J2000	CONNECTOR, receptacle: male; 22 contacts.	Male Connector	MS3102A-28-11P
J2001	CONNECTOR, receptacle: female; 35 contacts.	Female Connector	MS3102A-32-7S
J2002	CONNECTOR, receptacle: male; 35 contacts.	Male Connector	MS3102A-32-7P
L2000	REACTOR, filter: 10 henries, 125 ma DC, 1000 volts RMS test.	Filter Reactor	TF-5001
L2001	REACTOR, filter: 50 henries, 30 ma DC, approx. 800 ohms DC resistance; 1500 volts RMS test.	Filter Reactor	TF-166
p2000	CONNECTOR, receptacle: female; 22 contacts.	Female Connector	MS3106B-28-11S

R2000	RESISTOR, fixed: wire wound; 500 ohms, ±5%, 10 watts.	Dropping	RW-109-19
R2001	Same as R2000.	Dropping	
R2002	RESISTOR, fixed: wire wound; 5000 ohms, ±5%, 20 watts.	Screen Bias	RW-110-30
R2003	Same as R2002.	Screen Bias	
R2004	RESISTOR, fixed: wire wound; 2000 ohms, ±5%, 10 watts.	Dropping	RW-109-28
R2005	RESISTOR, fixed: wire wound; 50,000 ohms, ±5%, 10 watts.	Bleeder	RW-109-43
R2006	RESISTOR, fixed: composition; 220,000 ohms, ±10%, 1/2 watt.	Dropping	RC20GF224K
R2007	Same as R2005.	Screen Bias	
R2008	RESISTOR, fixed: composition; 4700 ohms, ±10%, 2 watts.	IPA Bias	RC42GF472K
R2009	RESISTOR, variable: composition; 5,000 ohms, ±10%, 2 watts.	IPA Bias Adj.	RV4ATXA502A
R2010	Same as R2008.	Dropping	
T2000	TRANSFORMER, power: step up and step down; primary - 115/230 v, 50/60 cps, single phase; section 1 - 350 v at 200 ma CT, section 2 - 375 v at 50 ma; section 3 - 5 v at 2 amps; section 4 - 6.3 v at 1.2 amps; section 5 - 6.3 v at 3 amps CT; hermetically sealed rectangular steel case.	Power Transf.	TF-198

T2001	TRANSFORMER, power, step down: primary - 115/230 vac, 50/60 cps, single phase; secondary - 6.3 v at 2 amps and 6 v at 14 amps; hermetically sealed rectangular steel case.	Filament Transformer	TF-202
V2000	TUBE, electron: duo-diode rectifier, octal.	HV Rectifier	5R4
V2001	TUBE, electron: full wave rectifier, 7 pin miniature.	HV Rectifier	6X4
V2002	TUBE, electron: voltage regulator, 7 pin miniature.	Voltage Reg.	0A2
V2003	Same as V2002.	Voltage Reg.	
XC2001	SOCKET, tube: octal; high crown.	C2001 Socket	TS101P01/A
XC2003	Same as XC2001.	C2003 Socket	
XC2005	Same as XC2001.	C2005 Socket	
XC2006	Same as XC2001.	C2006 Socket	
XI2000	SOCKET, 1 amp: w/clear white lens, for T-3-1/4 bulb.	Socket Drawer Interlock	TS-106-2
XF2000	FUSE HOLDER, bayonet base; 110/250 v., neon lamp, clear knob, black plastic body, 13/16" x 2-13/16" o/a.	B+ Fuse Holder	FH-104-3
XF2001	Same as XF2000.	Fuse Holder	
XF2002	Same as XF2000.	Fuse Holder	
XF2003	Same as XF2000.	Fuse Holder	
XF2004	Same as XF2000.	Fuse Holder	

XV2000	Same as XC2001.	HV Rect.	
XV2001	SOCKET, tube: 7 pin miniature.	HV Rect.	TS102P01
XV2002	Same as XV2001.	Volt. Reg.	
XV2003	Same as XV2001.	Volt. Reg.	

B3000	FAN, axial (CCW): single phase; 115/230 v, 50/60 cps; capacitance 4 uf; nominal RPM 3400; insulation class B; 100 watts full load.	Air Circulator	BL-105
B3001	Same as B3000.	Air Circulator	
C3000 thru C3009	NOT USED		
C3010	CAPACITOR, fixed: ceramic; feed-thru; 1000 uuf, ± 20%, 500 wvdc.	Feed-thru Bypass PA Screen Volt.	CK70A102M
C3011	Same as C3010.	Feed-thru Bypass PA Screen Volt.	
C3012	Same as C3010.	Feed-thru Bypass PA Plate Volt.	
C3013	Same as C3010.	Feed-thru Bypass PA Bias	
C3014	Same as C3010.	Feed-thru Bypass PA Bias	
C3015	Same as C3010.	Feed-thru Bypass Alarm	
C3016	Same as C3010.	Feed-thru Bypass Alarm	
C3017	CAPACITOR, fixed: paper; 4 uf, ±10%, 600 wvdc.	Starter, B3001	CP41B1FF405K
C3018	Same as C3017.	Starter, B3000	
C3019	NOT USED		
C3020	NOT USED		
C3021	NOT USED		
C3022	NOT USED		
C3023	NOT USED		

C3024	NOT USED		
C3025	CAPACITOR, fixed: mica; 1000 uuf, ±10%, 500 wvdc, char. B.	Key Line Input Bypass	CM20B102K
C3026	NOT USED		
C3027	Same as C3025.	Key Line Input Bypass	
C3028	Same as C3025.	Key Line Input Bypass	
C3029	Same as C3025.	Key Line Input Bypass	
C3030	Same as C3025.	Line 1 Bypass	
C3031	Same as C3025.	Line 1 Bypass	
C3032	Same as C3025.	Line 1 Bypass	
C3033	Same as C3025.	Line 2 Bypass	
C3034	Same as C3025.	Line 2 Bypass	
C3035	Same as C3025.	Line 2 Bypass	
C3036	Same as C3025.	Key Line Input Bypass	
C3037	Same as C3025.	Key Line Input Bypass	
CB3000	BREAKER, circuit: 110/230 VAC, 10 amps, double pole.	Main Power Breaker	SW-251
DS3000	BUZZER, 230 VAC; 5-1/2" mtg. centers.	HV Plate Off Alarm	BZ-100
E3000	TERMINAL STRIP, barrier type: plastic; 14 terminals, screw w/feed-thru solder lug type.	Ext. Interlock Term. Bd.	TM-100-14
E3001	NOT USED		
E3002	Same as E3000.	Line 1 and 2 Term. Bd.	

E3003	TERMINAL STRIP, barrier type, 2 terminals, black bakelite.	I3000 Term. Bd.	TM-102-2
E3004	CONTACT SET, relay: for K3000, TMC Part Number RL-130; consisting of 3 each moveable contacts, 3 each line contacts, 3 each load contacts.	Contact	AX-176
E3005	Same as E3004.	Contact	
E3006	Same as E3004.	Contact	
E3007	Same as E3004.	Contact	
E3008	Same as E3004.	Contact	
E3009	Same as E3004.	Contact	
E3010	TERMINAL, feed-thru, insulated: brass silver plated terminal; terminals mounted in 1/4" dia., breakdown voltages at 60 RMS.	Feed-thru	TE-114-2
E3011	Same as E3010.	Feed-thru	
E3012	Same as E3010.	Feed-thru	
E3013	Same as E3010.	Feed-thru	
E3014	Same as E3010.	Feed-thru	
E3015	Same as E3010.	Feed-thru	
E3016	Same as E3010.	Feed-thru	
E3017	Same as E3010.	Feed-thru	
E3018	Same as E3010.	Feed-thru	
E3019	Same as E3010.	Feed-thru	
F3000	FUSE, cartridge: 5 amp; time lag.	B3000 Fuse	FU-102-5

I3000	LAMP, incandescent: clear; 230/250 volts, 40 watts; standard screw base; 4" x 1-7/8" o/a.	Warning HV ON	BI-106-1
I3001	LAMP, fluorescent: standard, cool white; 1/2 in. dia. x 11-1/4 in. lg.	Meter Illum.	BI-107
J3000	CONNECTOR, receptacle: female, 4 contacts. J3000 used on Cable, W3000.	B3001 Input	MS-3102A-14S-2S
J3001	JACK, bulkhead. J3001 used on Cable, W3001.	Exciter Output	JJ-172
J3002	Same as J3001. J3002 used on Cable, W3001.	PA Monitor	
J3003	Same as J3001. J3003 used on Cable, W3001.	IPA Monitor	
J3004	Same as J3001. J3004 used on Cable, W3001.	Ext. 1 Mc Input	
J3005	NOT USED		
J3006	Same as J3000.	B3000 Input Jack	
J3007	RECEPTACLE, twistlock; female; brown bakelite.	110 VAC Outlet	JJ-170
J3008	Same as J3007.	110 VAC Outlet	
J3009	Same as J3007.	110 VAC Outlet	
J3010	Same as J3007.	110 VAC Outlet	
J3011	Same as J3007.	110 VAC Outlet	
J3012	Same as J3007.	110 VAC Outlet	
J3013	Same as J3007.	110 VAC Outlet	
J3014	Same as J3007.	110 VAC Outlet	
J3015	CONNECTOR, receptacle: electrical; 1 female contact; 52 ohms; BNC type.	10 db Pad Jack	UG-625/U

J3016	Same as J3015.	10 db Pad Jack	
J3017	Same as J3001. J3017 used on Cable, W3001.	ALDC	
K3000	CONTACTOR, relay: 220 v, 60 cps coil; auxiliary switch mounted on right side of panel; normally closed contacts.	Primary Contactor HV Rectifier	RL-130-1
K3001	CONTACTOR, relay: 220 v, 60 cps coil; auxiliary switch mounted on left side of panel; normally open contacts.	Primary Contactor HV Rectifier	RL-130-2
M3000	METER, PA screen: 0-1500 volt scale; 1 milliamp dc scale; 4-1/2 in. square case.	PS Screen Volt. Meter	MR-119
M3001	METER, PA bias: 0-400 meg. volt. scale; 1 milliamp dc movement; 4-1/2 in. square case.	PA Bias Volt. Meter	MR-122
M3002	METER, PA plate: 0-10 kilovolt scale; 1 milliamp dc movement; 4-1/2 in. square case.	PA Plate Volt. Meter	MR-121
M3003	TIME DELAY: 20 seconds; quick make, quick break, 250 v. 5 amp, switches.	Time Delay Relay HV Rectifier	TI-100
MP3000	FILTER, air: single pad; 16" lg. x 16" wide x 1/2" thk.	Air Filter	AD-103-4
MP3001	FILTER, air: single pad; 11-3/8" lb x 10-1/8" wide x 1/2" thk.	Air Filter	AD-103-2
MP3002	Same as MP3001.	Air Filter	

MP3003	RETRACTOR, cable: stainless steel spring; torque - .75 lbs. per inch; cable load - 1 lb.; base material is 1/4" black bakelite.	Cable Retaining	SP-137-1
MP3004	Same as MP3003.	Cable Retaining	
	DELETED		
	DELETED		
	DELETED		
P3000	CONNECTOR, plug: male; AN pin type. P3000 used on Cable, W3000.	Aux. to Main Frame Interconnect	MS3106B-20-27P
P3001	CONNECTOR, coaxial. P3001 used on Cable, W3000.	Exciter Output	PL-169
P3002	Same as P3001. P3002 used on Cable, W3000.	PA Monitor	
P3003	Same as P3001. P3003 used on Cable, W3000.	IPA Monitor	
P3004	CONNECTOR, receptacle: male.	B3001 Input Plug	MS3106A-14S-2P
P3005	Same as P3001. P3005 used on Cable, W3000.	Exciter Output	
P3006	Same as P3001. P3006 used on Cable, W3000.	PA Monitor	
P3007	Same as P3001. P3007 used on Cable, W3000.	IPA Monitor	
P3008	Same as P3004.	B3000 Input Plug	
P3009	Same as P3001. P3009 used on Cable, W3001.	CBE Output	
P3010	Same as P3001. P3010 used on Cable, W3001.	CBE 250 kc In	

P3011	Same as P3001. P3011 used on Cable, W3001.	CHG-1 Mc In
P3012	Same as P3001. P3012 used on Cable, W3001.	CHG, CMO In
P3013	Same as P3001. P3013 used on Cable, W3001.	CHG 250 Kc In
P3014	Same as P3001. P3014 used on Cable, W3001.	CHG 250 Kc Out
P3015	Same as P3001. P3015 used on Cable, W3001.	CHG RF Out
P3016	Same as P3001. P3016 used on Cable, W3001.	CHG Mon.
P3017	Same as P3001. P3017 used on Cable, W3001.	CMO 10 Kc
P3018	Same as P3001. P3018 used on Cable, W3001.	CMO 510-520 Kc In
P3019	Same as P3001. P3019 used on Cable, W3001.	CMO RF Out
P3020	Same as P3001. P3020 used on Cable, W3001.	CLL 100 cps
P3021	Same as P3001. P3021 used on Cable, W3001.	CLL 10 Kc
P3022	Same as P3001. P3022 used on Cable, W3001.	CLL Output
P3023	Same as P3001. P3023 used on Cable, W3001.	CLL 1 Kc
P3024	Same as P3001. P3024 used on Cable, W3001.	CLL 500 Kc
P3025	Same as P3001. P3025 used on Cable, W3001.	CSS 1 Mc Out
P3026	Same as P3001. P3026 used on Cable, W3001.	CSS 1 Mc In

P3027	Same as P3001. P3027 used on Cable, W3001.	CSS 1 Mc Out	
P3028	Same as P3001. P3028 used on Cable, W3001.	CHL 1 Mc	
P3029	Same as P3001. P3029 used on Cable, W3001.	CHL 500 Kc	
P3030	Same as P3001. P3030 used on Cable, W3001.	CHL 10 Kc	
P3031	Same as P3001. P3031 used on Cable, W3001.	CHL 10 Kc	
P3032	Same as P3001. P3032 used on Cable, W3001.	CHL 1 Kc	
P3033	Same as P3001. P3033 used on Cable, W3001.	CHL 100 cps	
P3034	Same as P3001. P3034 used on Cable, W3001.	APP-3 Coax. Sw.	
P3035	Same as P3001. P3035 used on Cable, W3001.	APP-3 Coax. Sw.	
P3036	Same as P3001. P3036 used on Cable, W3001.	APP-3 Coax. Sw.	
P3037	NOT USED		
P3038	Same as P3000. P3038 used on Cable, W3002.	CPP-1 Power Output	
P3039	CONNECTOR, plug: female: angle type; 16 contacts, brass silver plated. P3039 used on Cable, W3002.	CHG-1 Power Input	PL-186
P3040	Same as P3039. P3040 used on Cable, W3003.	CLL-1 Power Input	
P3041	CONNECTOR, plug: male; angle type, 16 contacts, brass silver plated. P3041 used on Cable, W3003.	CPP-2 Power Output	PL-187

P3042	Same as P3039. P3042 used on Cable, W3004.	CMO Power Input	
P3043	Same as P3041. P3043 used on Cable, W3004.	CPP-2 Power Output	
P3044	Same as P3039. P3044 used on Cable, W3005.	CHL-1 Power Input	
P3045	Same as P3041. P3045 used on Cable, W3005.	CPP-2 Power Output	
P3046	Same as P3001. P3046 used on Cable, W3001.	10 db Pad Connector	
P3047	Same as P3001. P3047 used on Cable, W3001.	10 db Pad Connector	
P3048	Same as P3001. P3048 used on Cable, W3000.	ALDC	
P3049	Same as P3001. P3049 used on Cable, W3000.	ALDC	
P3050	Same as P3001. P3050 used on Cable, W3001.	ALDC	
R3000	RESISTOR, fixed: finstrip; 12 ohms, 1250 watts; 15-1/4" lg x 2" wide x 1-3/8" high o/a.	Power Dropping HV Rect.	RR-127-1
R3001	Same as R3000.	Power Dropping HV Rect.	
R3002	Same as R3000.	Power Dropping HV Rect.	
R3003	RESISTOR, fixed: wire wound; 600 ohms, 25 watts; mtg brackets mount on 2-5/8" centers.	I3001 Dropping	RW-102
R3004	RESISTOR, fixed: composition; 470 K ohms, ±10%, 2 watts.	Metering	RC42GF474K

R3005	RESISTOR, fixed: composition; 33 ohms, ±10%, 2 watts.	10 db Pad	RC42GF330K
R3006	Same as R3005.	10 db Pad	
R3007	RESISTOR, fixed: composition; 47 ohms, ±10%, 2 watts.	10 db Pad	RC42GF470K
S3000	STARTER, fluorescent lamp: 8 watts; 3/16" dia. x 1-1/2" lg. o/a.	Starter, J3001	PO-170
T3000	TRANSFORMER, voltage regulator: primary 190-260 VAC, 50/60 cps; sec. - 118v/1 KVA, voltage regulation ±1% over primary range.	Volt. Reg. Aux. Frame	TF-208
T3001	BALLAST, fluorescent lamp: 8 watts; 118 volts, .17 amps 60 cps; 1-1/8" wide x 7/8" high x 5-15/16" lg o/a: 5-1/2" leads.	Ballast for J3001	PO-169
W3000	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL, BRANCHED: consists of various MIL type RG-174/U and MWC wire; 10 connectors, symbols J3000, P3000,3001,3002,3003,3005, 3006,3007,3048,3049 and various terminal lugs.	Main Frame to Center Panel Interconnect	CA-571
W3001	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL, BRANCHES: consists of various MIL type RG-174/U and MWC wire, 36 connectors, symbols J3001, 3002,3003,3004,3017,P3009, 3010,3011,3012,3013,3014, 3015,3016,3017,3018,3019, 3020,3021,3022,3023,3024, 3025,3026,3027,3028,3029, 3030,3031,3032,3033,3034,	Main Cable	CA-572

W3001 (Cont.)	3035,3036,3046,3047,3050 and various terminal lugs.		
W3002	CABLE ASSEMBLY, POWER, ELECTRICAL: 13 conductors, length 6 feet. Consists of P3038, P3039.	CPP-1 to CHG-1 Interconnect	CA-576-6-0
W3003	CABLE ASSEMBLY, POWER, ELECTRICAL: 16 conductors, length 7' 10". Consists of P3040,3041.	CPP-2 to CLL-1 Interconnect	CA-551-2
W3004	CABLE ASSEMBLY, POWER ELECTRICAL: 16 conductors, length 6' 10". Consists of P3042,3043.	CPP-2 to CMO-1 Interconnect	CA-551-3
W3005	CABLE ASSEMBLY, POWER ELECTRICAL: 16 conductors, length 6' 5". Consists of P3044,3045.	CPP-2 to CHL-1 Interconnect	CA-551-4
XF3000	HOLDER, fuse: 100-250 volt, 20 amp, neon bulb indicator, 220 K ohm resistor.	Holder for F3000	FH-104-3
XI3000	SOCKET, lamp: with red lens.	HV ON Light Socket I3000	AX-124
XI3001 A	SOCKET, fluorescent lamp: 75 watts, 250 volts; 1-1/32" high x 5/8" wide x 5/16" thk o/a; 6 in. leads.	Socket for I3001	TS-141
XI3001 B	Same as XI3001A.	Socket for I3001	
XS3000	SOCKET, starter: fluorescent; 660 watts, 250 volts; 1-13/16" lg x 1-11/16" wide x 7/16" deep o/a; 8-3/4" leads.	Socket for S3000	TS-140