MAINTENANCE INSTRUCTIONS

for

GENERAL PURPOSE TRANSMITTER

MODEL GPT-10KRL

WORLD WIDE SUPPLIERS OF ELECTRONIC COMMUNICATIONS EQUIPMENT

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, CANADA

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NOTICE

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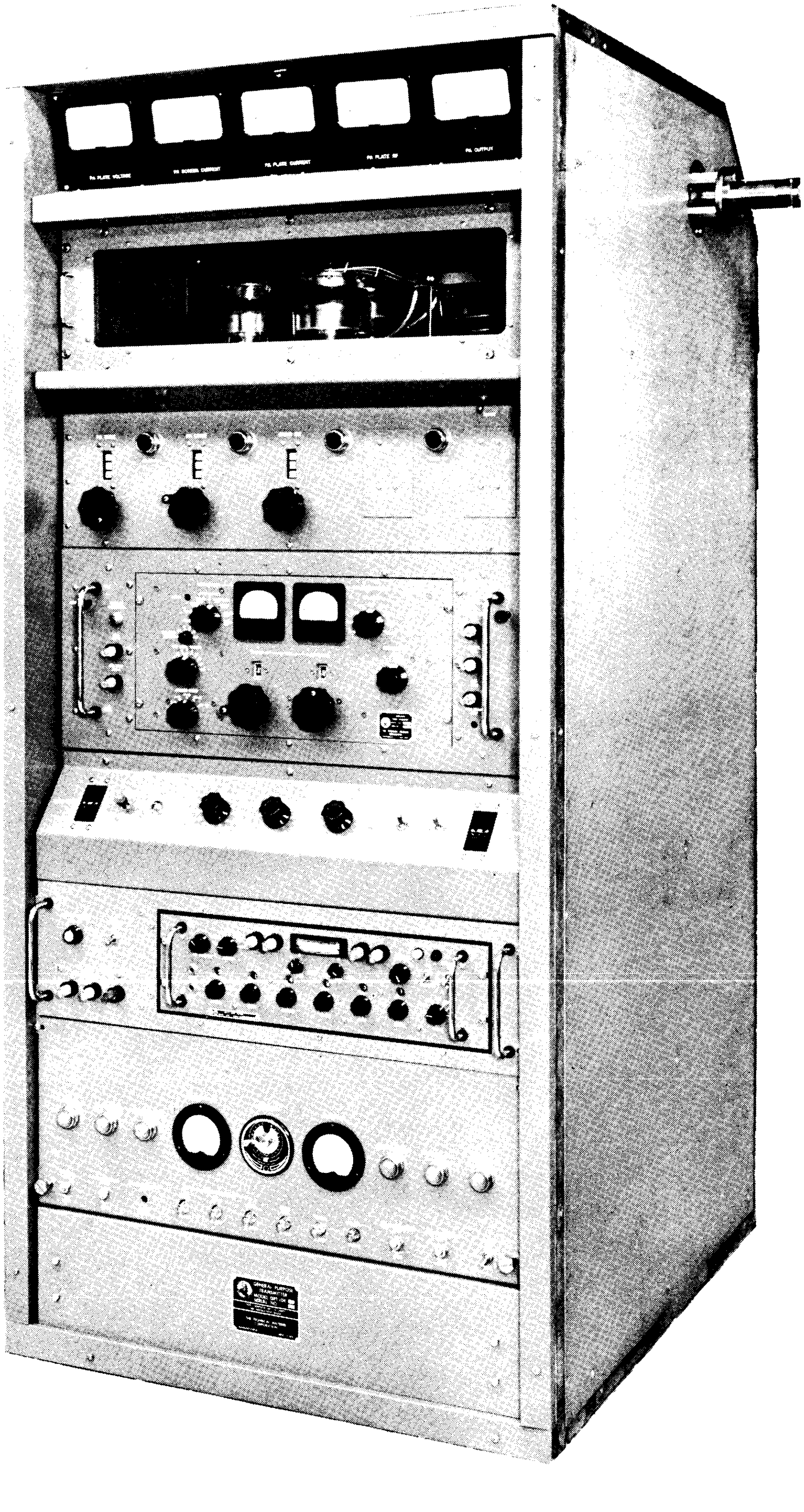


Figure 1-1. GPT-10KRL Transmitter, Overall View

SECTION 1
GENERAL INFORMATION

1-1. PURPOSE OF EQUIPMENT.

The GPT-10K Transmitter (figure 1-1) is a conservatively-rated general purpose transmitter which delivers 10,000 watts peak envelope power (PEP), or 5,000 watts average power throughout the 2- to 30-mc range. The transmitter provides many types of operating modes, as follows:

(1) Single sideband (SSB) with suppressed or any degree of carrier.

(2) AM operation,AME on SSB with suppressed or any degree of carrier.

(3) Independent sideband (ISB) (separate intelligence on each sideband) with suppressed or any degree of carrier.

(4) Frequency-shift telegraphy (FSK).

(5) CW keying (telegraphy).

(6) Facsimile (FAX).

1-2. EQUIPMENT MAKE-UP.

Table 1-1 lists the major components of the transmitter (less the exciter unit). Where assigned, corresponding military designations are also indicated.

TABLE 1-1. MAJOR COMPONENTS

TMC DESIGNATION	MILITARY DESIGNATION
Main Frame Sub-Assembly AX-557	
Main Meter Panel AM-122	
Power Amplifier Section AX-694	
RF Amplifier RFC-1C with Power Supply AX-104	AM-2103A/URT
Main Power Panel AX-504	
Relay Panel AR-161-2	
Main Power Supply AX-695	

1-3. DESCRIPTION OF EQUIPMENT.

a. GENERAL. - As shown in figure 1-1, the transmitter consists of a single frame housing all the components of the transmitter. Primary power connections are made through the base assembly. For unbalanced antenna operation, a connector is mounted in the opening located on the right side of the transmitter. The transmitter frame houses an exciter drawer, a two-stage rf voltage amplifier, a 1-kw Intermediate Power Amplifier, a 10-kw Power Amplifier, and associated power supply and power control circuits. The rf components are distributed through the upper portion of the frame; heavy power supply components are bolted to the base channels of the frame.

(1) The Exciter Drawer houses the exciter unit and also contains overload and control circuitry for the associated transmitter.

(2) Main Meter Panel AM-122. - The main meter panel, factory mounted at the top of the main frame, contains five meters. These monitor the PA PLATE voltage, PA SCREEN grid voltage, PA PLATE current, RF PLATE voltage, and PA OUTPUT. The PA OUTPUT meter is calibrated in kilowatts (PEP) and contains a second scale for measuring SWR.

(3) Power Amplifier Section AX-694. - The power amplifier section is factory mounted below the main meter panel. It contains the PA tube and its associated circuits. A blower motor, which provides forced-air cooling of the 10-kw power amplifier tube, is mounted directly under the power amplifier tube. The front panel of the power amplifier contains the power amplifier tun--ing and loading controls and their associated counter-type dials, and indicator lamps.

(4) RF Amplifier RFC-1C and Power Supply AX-104. - The rf amplifier and power supply (consisting of two sections) is slide-mounted below the 10-kw power amplifier and serves as the intermediate (1-kw) power amplifier between the exciter and the power amplifier. The inner section of the unit contains all r-f amplifier

parts; the outer section houses the power supply components. The final tube (1-kw amplifier) of the 3- stage amplifier is air-cooled by a self-contained blower in the rf section. The front panel of the inner r-f section contains tuning and loading controls for the 1-kw amplifier, band-switches to cover the 2- to 30-mc r-f range, and a meter and associated meter switch that monitors all major dc and r-f voltages in the r-f amplifier.

(5) Main Power Panel AX-504. - The main power panel, a factory-mounted unit, controls the application of plate, screen grid, and filament voltages to the 10-kw power amplifier and monitors all interlock circuits contained in the main frame. This panel also controls the primary ac power input to the main frame. Other front panel controls include a reset pushbutton associated with the protective relays in the main frame, an automatic load and drive control switch and level adjustment and an SWR switch associated with the dual purpose PA OUTPUT and SWR meter.

(6) High Voltage Rectifiers. - The high voltage rectifier contains the high-voltage diode rectifier circuits associated with the main power supply. This portion generates 7500vdc for the plate of the 10-kw power amplifier tube.

(7) Relay Panel AR-161-2. - The relay panel is rack-mounted at the bottom of the frame. This panel contains nine relays which protect the transmitter circuits against overloads. The relays and their associated terminal boards are mounted under a front panel cover plate for quick accessibility. The upper portion of the relay panel contains filament and plate time meters, an automatic reset timer, and overload indicator lamps. All 1-kw and 10-kw amplifier overload adjustments are also located on the relay panel for ease of adjustment.

1-4. TECHNICAL CHARACTERISTICS.

Frequency range	2-to 30-mc, bandswitched
Output power	10,000 watts PEP, 5,000 watts average 3rd order distortion products down at least 35 db from either tone of a standard 2-tone test at full PEP.

Operating modes	SSB, ISB, AME, FSK, FAX, CW, and AM
Output impedance	
Unbalanced	50 or 70 ohms
Harmonic suppression	Second harmonic down at least 50 db from PEP; third harmonic down at least 65 db from PEP.
Primary power requirements (including exciter)	3-phase, 190-250 volts, 50-60 cps, 50 amperes per leg.
Safety features	Mechanical and electrical interlocks.
Cooling	Forced air.
Operating temperature	Between 0°C (32°F) and 50°C (112°F) for humdiity as high as 90%.

1-5. ELECTRON TUBE, DIODE, AND FUSE COMPLEMENT.

The electron tubes, diodes, and fuses contained in the transmitter are listed in tables 1-2 through 1-4, respectively.

TABLE 1-2. ELECTRON TUBE COMPLEMENT

REFERENCE SYMBOL	TYPE	FUNCTION
V101	12AT7	DC amplifier
V201	6CL6	RF amplifier
V202	6146	RF amplifier
V203	PL172	Power amplifier
V900	4CX5000A	Power amplifier
V2000	5R4	High voltage rectifier
V2001	6X4	Bias rectifier
V2002, V2003	OA2	Voltage regulator

TABLE 1-3. DIODE COMPLEMENT

REFERENCE SYMBOL	TYPE
CR101	
CR102, CR103	
CR201, CR202	1N67
CR203, CR204, CR205 CR900 and CR901	1N303
CR801A thru CR801F	DD128-1

TABLE 1-4. FUSE COMPLEMENT

REFERENCE SYMBOL	TYPE
F101, F103. F704	MDL 1
F102	MDL 1/8
F700-F702	MDL 10
F703, F705, F3000	MDL 5
F2000	MDL 1/4
F2002, F2003	MDL 2
F2004	MDL 3

SECTION 2
PRINCIPLES OF OPERATION

2-1. OVERALL BLOCK DIAGRAM ANALYSIS. (See figure 2-1).

An rf signal from the exciter circuits in the exciter drawer is applied to the input of RF Amplifier RFC, the IPA. The rf input signal must be within the frequency range of 2 to 30 mc and may be modulated or unmodulated. The rf amplifier circuits accommodate single sideband, double sideband, independent sideband, frequency shift, facsimile, or cw signals. The linear stages of the RFC raise the level of the input signals as high as 1-kw PEP. This signal is applied to the 10-kw power amplifier in Power Amplifier Section AX-694.

The 10-kw linear power amplifier, operating class AB1, raises the rf level to 10-kw PEP. Unblanced (50 or 70 ohms) rf output may be used by the customer, be sure that the proper antenna is used. A portion of the high level rf output is rectified and applied to an automatic load and drive control (ALDC) circuit. When this circuit is switched on, a control voltage is applied to the exciter whenever any preset rf signal level is exceeded. This control circuit limits high drive peaks which can be developed during multiple signal transmission and suppressed unwanted transmission products.

High Voltage Rectifier circuit functions together with Main Power Panel AX-504 and Main Power Supply AX-695 to produce the high dc voltages required by the 1-kw IPA and 10-kw PA.

Relay Panel AR-161 contains overload coils that open interlocks cutting off high voltages to the 1-kw PA and 10-kw PA stages when preset overload levels are exceeded. The protective circuits sample the IPA and PA plate screen currents, bias supply voltages, and the current in a voltage regulating diode assembly in the main power supply. When any of these currents is excessive, or if a voltage is deficient, the associated protective relay operates and removes high voltage.

An interlock circuit is provided in the transmitter for personnel and equipment

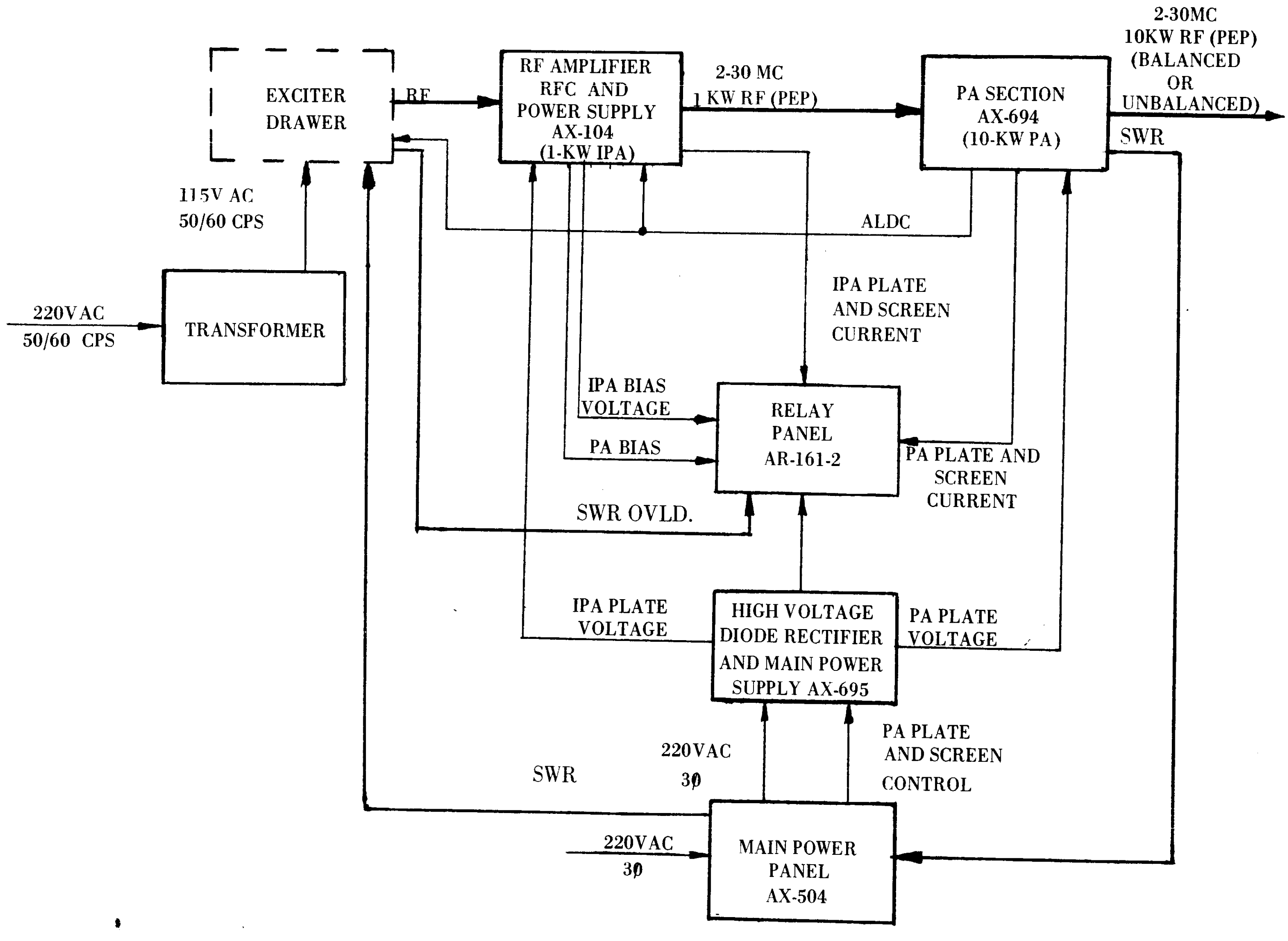


Figure 2-1. GPT-10KRL Transmitter, Block Diagram.

safety. When one of these interlocks opens, power is removed from the transmitter, interlocks are opened, HV switch is turned off automatically and deadman solenoid shorts out high voltage capacitors. Interlock circuits are provided for drawers in which voltages greater than 500 volts are present. Important cooling air ducts are also interlocked for equipment safety.

2-2. RF AMPLIFIER RFC AND POWER SUPPLY AX-104, BLOCK DIAGRAM ANALYSIS. (see figure 2-2).

The RFC is capable of amplifying rf signals within the frequency range of 2 to 30 mc with a bandwidth of 20 kc. It contains three amplifier stages: V201, V202, and V203. A modulated rf or cw signal is applied to rf amplifier V201, which operates class A. The amplified output of V201 is coupled to driver V202 through wafer A of DRIVER BAND switch S201. This switch selects a tuned circuit in accordance with the signal frequency. Five tuned circuits are available to cover the frequency range of 2 to 30 mc.

Driver V202, which also operates class A, further amplifies the modulated rf or cw signal and its output is coupled to intermediate power amplifier V203 through wafer B of DRIVER BAND switch S201. This switch wafer selects the tuned circuit at the output of V202.

Intermediate power amplifier V203 operates class AB1, and produces a 1-kw output signal. IPA BAND switch S202 connects a tuned circuit in the V203 output circuit in accordance with the signal frequency. This switch covers the 2 to 30 mc range in nine steps. IPA LOADING switch S203 connects additional capacitance to the V203 output circuit when the signal frequency is between 2 and 6 mc. The output signal from V203 is coupled to the 10-kw power amplifier for further amplification.

A portion of the V203 output signal is fed back to driver V202. In V202,this feedback signal is opposite in phase to the input signal, thus providing degenerative (negative) feedback. This negative feedback signal ensures linear amplification of stages V202 and V203.

Except for intermediate power amplifier V203 plate supply voltage, Power Supply

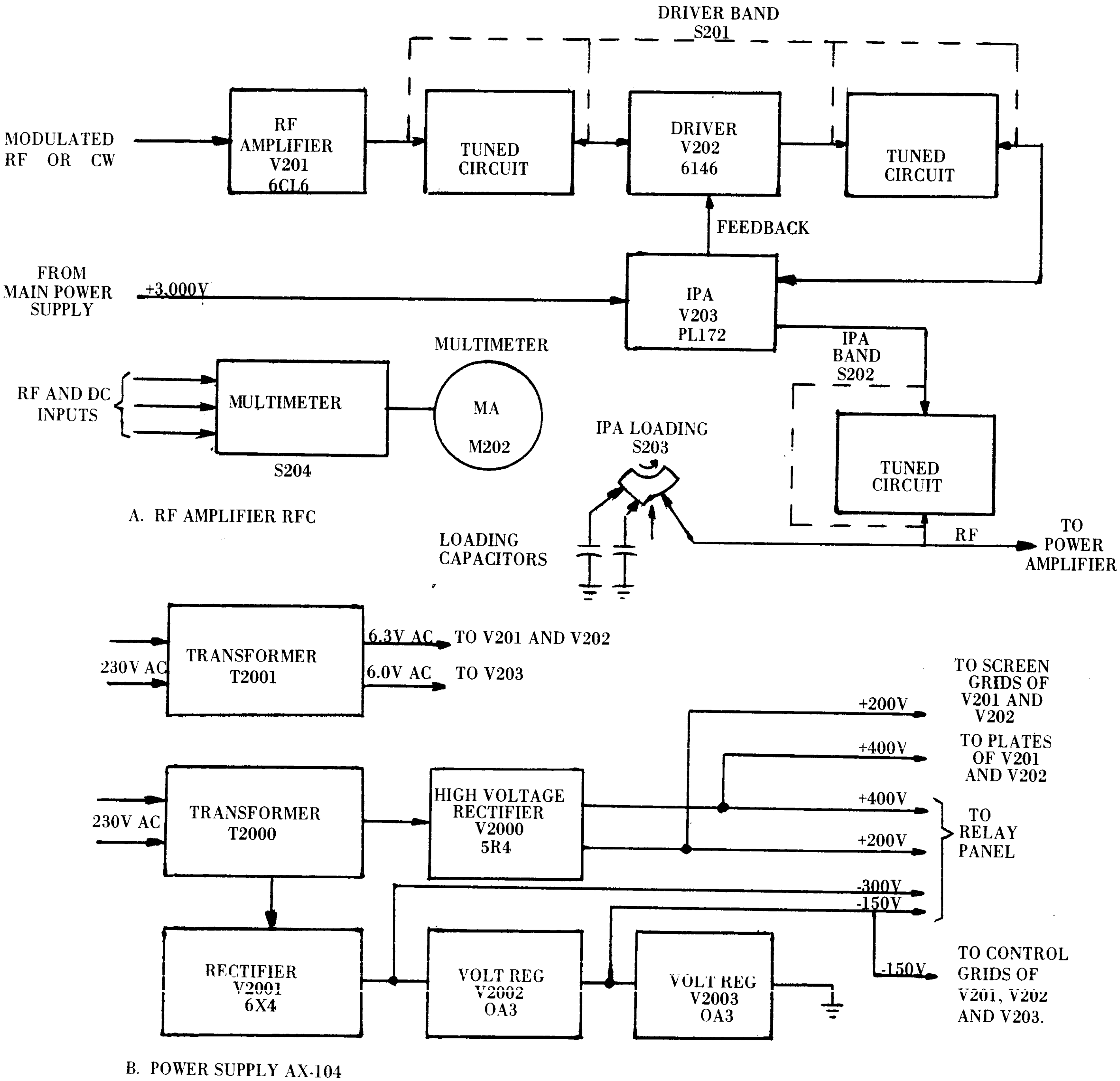


Figure 2-2. RF Amplifier RFC and Power Supply AX-104, Block Diagram

AX-104 furnishes all ac and dc voltages required for operation of the RFC. Transformer T2001 in the power supply provides the filament supply voltage. The transformer receives 230 volts ac and produces a 6.0- and a 6.3-volt ac output. The 6.3-volt output is applied to the filaments of V201 and V202. The 6.0-volt output is applied to the filament of V203.

The plate of V203 receives +3,000 volts dc from Main Power Supply AX-695. Two rectifiers in the AX-104 provide the remaining dc voltages required by the RFC. High-voltage rectifier V2000 produces output of +400 and +200 volts which are used as the plate and screen supply voltages, respectively, for V201 and V202. Rectifier V2001 in conjunction with voltage regulators V2002 and V2003 produces outputs of -300 and -150 volts. The -150-volt output provides the bias voltage for the three amplifier stages. Transformer T2000, which receivers 230 volts ac, furnishes the ac operating voltages for the two rectifiers.

The four dc output voltages of the AX-104 are also applied to Relay Panel AR-161. In the relay panel, the two negative voltages are fed to two protective relay circuits K700 and K708. The -300-volt dc output of the power supply is also applied to a voltage divider in the relay panel, the output of which is supplied as a bias supply voltage to the 10-kw power amplifier.

Another relay (K705) in the relay panel returns either the +200- or +400-volt dc output of the AX-104 to the screen of V203. The +200 volts is used as the screeen supply voltage.

MULTIMETER meter M202, is conjunction with MULTIMETER switch S204, provides the means for measuring dc and rf voltages throughout the RFC and AX-104.

2-3. RFC DETAILED CIRCUIT ANALYSIS

a. RF AMPLIFIER V201. (See figure 6-1 sh1)

The rf signal supplied at input jack J201 is developed across input resistor R203 and is coupled to the grid of first amplifier V201 through capacitor C211 and resistor R207. Bias for V201 is obtained from a voltage divider across the 150-

volt dc output of the AX-104. The bias voltage developed across R202 is applied to the grid of V201 through decoupling filter elements R204 and C210, rf filter elements L206, L205, C208, and C207, and resistor R206. The bias divider is permanently grounded at terminal board E3001. An additional bias,called automatic load and drive control (aldc), can be supplied to V201 through rf choke L242. In the GPT-10KRL transmitter,the aldc voltage is derived from the power amplifier section. When the 1-Kw output of the RFC is fed directly to an antenna,the aldc voltage can be supplied from intermediate power amplifier V203. A jumper wire on terminal block E201 normally connects L242 to the aldc circuit in the power amplifier section.

Screen voltage for amplifier V201 is furnished by +200-volt dc output of the AX-104 through feed-through capacitor C212 and screen dropping resistor R235. Resistor R235 and capacitor C206 form a decoupling filter which bypasses rf signals from screen to ground. Filament voltage is obtained from the 6.3-volt ac line. RF choke L207 and capacitor C221 isolates the 6.3-volt ac line from rf voltages.

Plate voltage is applied to amplifier V201 from the +400 volt dc output of the AX-104.

Capacitor C205 couples the amplified rf signal from the plate of V201 to DRIVER BAND switch S201.

Wafer Y of DRIVER BAND switch S201A (figure 6-1 sh 1) connects the rf signal from V201 to a parallel resonant circuit consisting of variable capacitors C202 and C203, connected in parallel, and one of five inductors: L201, L202, L209, L210, or L211. The inductor selected by S201A depends upon the frequency of the rf signal: L201 is selected for frequencies from 2 to 4 mc (position 1), L202 for 4 to 8 mc (position 2), L208 for 8 to 16 mc (position 3), L210 for 16 to 20 mc (position 4), and L211 for 20 to 30 mc (position 5). The rear portion of DRIVER BAND switch S201A shorts out the four inductors not in use. Capacitor C201 and resistor R208, connected in parallel between the parallel resonant circuit and ground, provide a low impedance which is used in the neutralization circuit of driver V202.

Capacitor C203, which is ganged with capacitor C232 is driver stage V202, is geared to the 1ST AMPL TUNING knob on the front panel and provides means for tuning V201. Capacitor C202 is a trimmer for capacitor C203.

Wafer X of switch S201A connects the rf signal from a tap on the selected inductor to capacitor C214. Capacitor C214 couples the rf signal to the grid of driver V202.

b. DRIVER V202. (see figure 6-1 sh 1).

As previously described, the rf signal from the tap on the selected inductor is coupled to the grid of driver V202 figure through capacitor C214 and parastic suppressor resistor R212. Bias for V202 is obtained from a voltage divider across the 150-volt dc output of the AX-104. The bias voltage is developed across series-connected resistors R202 and R205, and is applied to the grid of V202 through feed-through capacitor C215, rf filter L212 and C213, and grid resistor R232. The rf signal input is also applied to a meter circuit through capacitor C216.

Screen voltage for driver V202 is furnished by the +200-volt dc output of the AX-104 through inductors L249 and L217. Filament voltage for V202, filtered by C221 and L221, is obtained from the 6.3-volt ac line.

Plate voltage is applied to driver V202 from the +400-volt dc output of the AX-104 through inductors L250, and L218 and parastic suppressor PS202. Inductors L250 and L216 function together with capacitors C224 and C227 to isolate the +400-volt bus from the rf voltages present in the plate load impedance for V202.

The rf signal at the plate of V202 is coupled through parasitic suppressor PS20 and capacitor C230 to DRIVER BAND switch S201B and through variable capacitor C229 to the grid circuit of driver V202. The rf voltage applied through C229 is developed across resistor R208 and capacitor C201, and coupled to the grid through the tap on the selected inductor. Capacitor C229 is adjusted so that the rf voltage developed across R208 and C201 cancels the rf voltage fed back to the grid through the plate-to-grid capacitance. This circuit is included to suppres parasitics.

Wafer Y of DRIVER BAND switch S201B figure 6-1 connects the signal from the plate of V202 to a parallel resonant circuit consisting of variable capacitors C231 and C232, connected in parallel, and one of five inductors: L219, L220, L223, L224, or L225. The inductor selected by switch S201B depends upon the signal frequency: L219 is selected for frequencies from 2 to 4 mc (position 1), L220 for 4 to 8 mc (position 2), L223 for 8 to 16 mc (position 3), L224 for 16 to 20 ma (position 4), and L225 for 20 to 30 mc (position 5). The rear portion of switch S201B shorts out the four inductors not in use. Capacitors C233 and resistor R213, connected in parallel between the resonant circuit and ground, provide a low impedance which is used in the neutralization circuit of intermediate power amplifier V203. Resistor R224 shunts inductor L219, to provide the required bandwidth at 2 to 4 mc.

Capacitor C232 is ganged with capacitor C203 in the rf amplifier stage, and is geared to the 1ST AMPL TUNING knob on the front panel. Thus, when rf amplifier stage V201 is tuned, driver stage V202 is also tuned. Capacitor C231, which is geared to the IPA GRID TUNING knob on the front panel, provides fine tuning.

Wafer X of switch S201B connects the rf signal from the tap on the selected inductor to the grid of intermediate power amplifier V203 through capacitor C234. Two signals are returned from the plate of V203; one signal is coupled through neutralizing capacitor C255 to the parallel-connected circuit elements R213 and C233; the other signal is coupled through capacitor C273 to the cathode of driver V202 figure 6-1. This latter signal provides degenerative (negative) feedback from V203 to V202. The feedback signal for V202 appears across capacitor C225, inductor L222, and resistor R219. Capacitor C226, connected between the driver neutralizing circuit and the driver cathode, provides grid-to-cathode neutralization.

c. 1-KW INTERMEDIATE POWER AMPLIFIER V203. (See figure 6-1.)

Intermediate power amplifier V203 uses, type PL172 pentode, operates class AB1 to amplify the output from driver V202. The 1000 watt (PEP) output of V203 can be applied directly to an antenna for emergency operation, or as in the GPT-10K, can be supplied to a power amplifier for additional power gain.

The rf signal from the tap on the selected inductor in the plate circuit of V202 is applied to the grid of V203 through capacitor C234, and also to (position 6) on MULTIMETER switch S204 through a rectifier circuit. When MULTIMETER switch S204 is placed in its RF IPA EG X1 position (position 6), MULTIMETER M202 indicates the amplitude of the rf signal supplied to the grid of V203.

The -100-volt dc output of the AX-104 furnishes the bias voltage for V203. This voltage is also routed to position 1 on MULTIMETER switch S204 through resistor R225.

The cathode of V203 is maintained at rf ground by capacitors C290 through C295 connected in parallel between the cathode and ground. Inductors L252 and L251 and IPA PLATE CURRENT meter M201 provide a dc path from the cathode to pin c of P201 and J2001. From this pin, the cathode is connected to ground through a protective relay circuit in the relay panel. Capacitors C288 and C289, together with inductors L252 and L251 isolate the protective relay circuit and the meter from rf voltages. IPA PLATE CURRENT meter M201 measures V203 plate current.

The protective relay circuit consists of IPA PLATE OVLD relay K707 which is paralleled by resistor R710 in series with IPA PLATE OVLD ADJ control R711. The overload coil of relay K707 samples the V203 cathode current. When the current exceeds the operating limit, the relay is energized, causing the high voltage rectifier to shut down. IPA PLATE OVLD ADJ control R711 sets the operating limits of this protective relay circuit.

Screen voltage for V203 is supplied by the +200- or +400-volt dc output of the AX-104. The +400-volt dc output is the normal operating supply voltage. The +200-volt dc output is used when the GPT-10K is being tuned. Thus, when the cathode current increases during tune-up of the electrical equipment cabinet, the overload circuit does not operate because of the reduced cathode current.

The screen supply voltage appears across resistor R223 and is applied to the screen through resistors R222 and indictors L232 and L231. Capacitors C249, C276 C248, C247, C285, C286, and C287 provide screen bypassing. The dc screen current is measured by MULTIMETER meter M202 when MULTIMETER switch S204 is in its DC IPA ISG X1 position (position 4). The voltage drop across resistor R222 is used for this purpose. The dc voltage applied to the screen is measured when switch S204 is in position 2.

Plate voltage for 1-kw amplifier V203 is obtained from the +3,000-volt output of the main power supply and is applied to the plate through jack J203 and inductors L234 and L235. Inductor L235 and capacitors C258 and C260 form a pi filter which isolates the main power supply from the rf signal appearing across plate load L234. A voltage divider consisting of resistors R217, R236, R234, R201, R211, and R214, all connected in series, provides means for measuring the plate supply voltage. The voltage across R214 is connected to switch S204B (position 3). When the switch is in this position, MULTIMETER meter M202 indicates the amplitude of this supply voltage.

The rf signal at the plate of V203 is coupled back through NEUT capacitor C255 to R213 and C233 in the return of the input tank circuit. Adjustment of capacitor C255 is performed at the front panel of the RFC.

The output signal from V203 is coupled through parallel capacitors C275 and C253 to a pi bandpass filter and to the cathode of driver V202 through capacitor C273. Although the signal fed back to the cathode of V202 causes the gain of stages V302 and V203 to decrease, it ensures an approximate equal signal output at the plate of V203 for all frequencies from 2 to 30 mc.

IPA BAND switch S202 and IPA LOADING switch S203 select the inductors and capacitors which comprise the pi tuning network in the V203 output circuit. IPA BAND switch S202 has nine positions: (1) 2.0-2.5 mc, (2) 2.5-3 mc, (3) 3-4 mc, (4) 4-6 mc, (5) 6-8 mc, (6) 8-12 mc, (7) 12-16 mc, (8) 16-20 mc, and (9) 20-30 mc.

When switch S202 is in position 1 (figure 6-1 sh 1)the pi tuning network in the V203 output circuit consists of IPA TUNING capacitor C254, inductors L245 and L246 connected in series, and IPA LOADING capacitor C269 paralleled by capacitor C259. Capacitor C259 is connected in parallel with capacitor C269 by wafer B of switch S202 in positions 1 through 4 (2 to 6 mc). When switch S202 is in positions 1 through 7 (2 to 16 mc), IPA LOADING switch S203 can connect capacitors C274 and C272 in parallel with capacitor C269. When switch S203 is in (position 1), both capacitors are connected. In (position 2), switch S203 connects only capacitor C274 in parallel with capacitor C269. Both capacitors are disconnected from the output circuit when S203 is in position 3. When switch S202 is in positions 8 or 9, switch S203 is disconnected and therefore performs no function.

Wafer A of IPA BAND switch S202, in positions 2 through 6, shorts out successively larger portions of inductor L246; in position 7, all of inductor L246 is shorted out. In the remaining two positions, this wafer shorts out inductor L246 as well as successively larger portions of inductor L245. The output signal of V203 is connected from the wiper of switch S202, wafer A, to jack J202 and connector E203. Jack J202 may be used to connect the output of the driver to an antenna; connector E203 connects the output of the driver to the 10-kw power amplifier.

The rf signal at both ends of the pi tuning network can be monitored (See figure 6-1). The signal from the plate end is coupled through capacitor C257 and a rectifier circuit to position 7 of switch S204. When the switch is in the RF IPA EP X100 position (position 7), MULTIMETER meter M202 indicates the rf signal at the plate. When the switch is in the RF PA EG X10 position (position 8), the meter indicates the amplitude of the signal at the output end of the bandpass filter. This signal is coupled to the switch through capacitor voltage divider C270 and C27; and a rectifier circuit including diode CR205 and inductor L244.

In addition to amplifying the rf signal, intermediate power amplifier V203 may be used to develop an automatic load and drive control (aldc) voltage. Diode CR204 is used for this purpose. Back bias for diode CR204 is taken from the arm of potentiometer R228. This potentiometer is connected in series with resistors R227 and R229 all of which are across the +400-volt dc output of the power supply. The back bias voltage is applied to the diode cathode through inductors L239 and L238. Rf voltage is coupled to inductor L238 from the plate of V203 through capacitors C253, C275, C257, and C252. When the negative portion of the rf signal at the junction of inductor L238 and diode CR204 exceeds in amplitude the back bias of the diode, the diode conducts and a negative dc voltage proportional to the rf voltage peak amplitude is developed at terminal 3 of terminal block E201. This negative dc voltage is filtered by a pi filter consisting of inductor L240 and capacitors C263 and C265. When the output of V203 is fed to an antenna, terminals 1 and 3 on E201 are strapped together and this aldc voltage is applied to rf amplifier V201. In the GPT-10K, terminal 3 of E201 is open ended and the aldc voltage from diode CR204 is not used. Instead, the aldc voltage from the 10-kw power amplifier is connected to V201 through ALDC switch S1015 by a jumper strapped between terminals 1 and 2 of E201.

d. METER SWITCHING. (See figure 6-1 sh 1.)

MULTIMETER M202,; functioning together with MULTIMETER switch S204, provides the means for monitoring various dc and rf voltages and one dc current in the RFC and the AX-104. This facility aids in troubleshooting and is also used for tuning the RFC.

Figure 6-1 sh 1 shows the eight circuits that can be monitored on MULTIMETER M202 and indicates how MULTIMETER switch S204 connects the multimeter to the circuit in each position. When switch S204 is in position 1, the positive terminal of M202 is connected to ground and the negative terminal is connected to the -100-volt dc output of the AX-104 through multiplier resistor R225. Since this voltage is derived from a voltage divider across the -150-volt dc output of the power supply, if the voltage monitored with switch S204 in position 1 is normal, it can be assumed that the -150-volt dc output of the AX-104 is also normal. The -100 volts dc is applied to the grid of intermediate power amplifier V203 through feed-through capacitors C250 and C284 and inductor L247.

The dc voltage applied to the screen grid of V203 is measured when switch S204 is in position 2. This voltage is derived from the +200- or +400-volt output of the AX-104 as determined by the setting of TUNE-OPERATE switch S1004. The supply voltage is developed across resistor R223 and is applied to the screen grid through resistor R222 and inductors L232 and L231. The supply voltage is coupled to the meter through multiplier resistor R221.

With switch S204 in position 3, MULTIMETER M202 indicates the amplitude of the V203 dc plate voltage. The voltage at jack J203 is applied to the meter through a voltage divider network. Resistor R214 shunts the meter. The dc voltage is applied to the V203 plate through inductors L235 and L234.

The V203 screen current is measured when MULTIMETER switch S204 is turned to position 4. Except for the omission of resistor R221 and the addition of resistor R225, the same parts are used for measuring V203 screen current as are used for measuring V203 screen voltage. In this position, the screen supply voltage (+200- or +400-volts dc) is connected to the positive terminal of MULTIMETER M202 and the voltage at the junction of resistors R220 and R225 is connected to the negative terminal of the meter.

The remaining four positions of switch S204 are used when monitoring rf signals. In each of these positions, the rf voltage to be monitored is rectified and filtered before being applied to the meter. The rf signal at the output of V201 (or the input of V202) is coupled to its rectifier circuit through a capacitive voltage divider consisting of capacitors C216 and C217 (position 5, figure 6-1). During the positive half cycle, diode CR201 conducts, charging capacitor C240. The dc voltage is filtered by the double pi network and is applied to meter M202 through resistor R209.

MULTIMETER M202 indicates the amplitude of the rf voltage at the input of V203 when switch S204 is turned to position 6. This voltage is coupled to its rectifier circuit through inductor L227 and capacitor C242, and is developed across parallel connected capacitor C241, inductor L248, and resistor R219. Diode CR202 rectifies this voltage, and the rectified output voltage is filtered and applied to meter M202 through resistor R233.

The rf voltage at the plate of power amplifier V203 is monitored when MULTIMETER switch S204 is set in position 7. From the V203 plate, rf voltage passes through parallel-connected capacitors C253, and C275 and through capacitor C257 to a parallel network consisting of capacitor C251, inductor L233, and resistor R226. Diode CR203 rectifies the voltage developed across this network and the rectified voltage is filtered and applied to meter M202 through resistor R218.

A dc current proportional to the rf signal amplitude at the output of the RFC flows through MULTIMETER M202 when switch S204 is in position 8. The rf signal at the output of the power amplifier pi filter is voltage divided across capacitor C271, rectified by diode CR205, filtered, and applied to meter M202 through resistor R230.

2-4. AX-104, DETAILED CIRCUIT ANALYSIS. (See figure 6-1 sh 2).

Except for the high voltage supplied to the plate of 1-kw power amplifier V203, A self-contained power supply in the AX-104 furnishes all ac and dc voltages required for operation of the RFC amplifier stages. The AX-104 contains two rectifier tubes: a type 5R4 used as a full-wave rectifier for the plate and screen supply voltages, and a type 6X4 used as a half-wave rectifier for bias supply voltages. Two type OA2 tubes are connected in series at the output of the half-wave rectifier circuit. These tubes regulate the bias voltages. A transformer steps down the input ac voltage to supply voltages required by the filaments of the amplifier stages. The AX-104 also contains miscellaneous components which function with circuit external to the power supply.

a. HALF-WAVE RECTIFIER CIRCUIT.

(1) Three-phase 230 volts ac is applied to the AX-104. The phase 1 to phase 3 voltage is applied to the primary of transformer T2000 through LV 3A fuse F2004.

Capacitors C2015 and C2016, connected at each end of the T2000 primary are rf bypass elements. High-voltage ac is connected from terminal 13 of transformer T2000 to the cathode of V2001. Rectifier V2001 converts this ac voltage into a negative pulsating dc voltage. IPA BIAS fuse F2001, in the plate circuit of V2001, protects the tube and transformer from an overload.

(2) The negative pulsating dc voltage at the plates of V2001 is filtered by an LC pi filter. Resistor R2005 functions as a bleeder resistor. Resistor R2004 and voltage regulators V2002 and V2003 form a voltage divider across resistor R2005. The voltage developed across V2003, -150 volts dc regulated, is used as the bias supply for rf amplifiers V201 and V202. In addition, the regulated -150 volts dc is applied across a voltage divider consisting of resistors R2008 and R2010 and IPA BIAS ADJ control R2009. The control is adjusted so that -100 volts dc is applied as the bias supply for 1-kw power amplifier V203.

(3) The voltage available at the junction of resistor R2004 and the cathode of V2002, -300 volts dc regulated, is used in the 10-kw power amplifier bias circuit.

b. FULL-WAVE RECTIFIER CIRCUIT.

(1) Filament voltage for full-wave rectifier V2000 is supplied by terminals 10 and 11 of transformer T2000. Plate voltage for V2000 is supplied by the high-voltage secondary winding at terminals 14 and 16 of T2000. The center tap of this winding, terminal 15, is grounded. Rectifier V2000 converts this ac voltage into a positive pulsating dc voltage. B+ fuse F2000 protects this tube and the associated windings of transformer T2000 from an overload.

(2) The 400-volt dc output of V2000 is filtered by an LC pi filter, then coupled out of the power supply through pin U of connectors J2000 and P2000 and pin J of J2002. The dc voltage at the output of the pi filter is also fed to another filter and to a voltage divider. The voltage divider consists of resistors R2002 and R2003, with +200 volts dc developed across resistor R2003. This voltage is filtered by capacitor C2001B, and is routed to the screen circuits of V201 and V202 through pin N of J2000 and P2000 and pin E of J2001. The +200 volts is also routed

to the relay panel through pin K of J2002.

(3) As previously described, the output of the pi filter is applied to another filter consisting of resistors R2000 and R2001 and capacitors C2000 and C2001A. The voltage across the capacitors, +400-volts dc, is applied to the plate circuits of amplifier stages V201 and V202 through pin R of connectors J2000 and P2000 and pin H of J2001.

c. FILAMENT CIRCUIT.

(1) Transformer T2001 steps down the input ac voltage to the voltages required by the filaments of the amplifier tubes. The phase 2 to phase 3 voltage is applied to the primary of T2001 through IPA FIL fuse F2003.

(2) High-frequency components which may be present in the ac input of T2001 are bypassed to ground by capacitors C2019 and C2020. Transformer T2001 provides two output voltages: 6.0 and 6.3-volts ac. The 6.0-volt output is developed between terminals 6 and 7 and coupled to the filament of V203 through pins P and R of J2001. Capacitor C2017 bypasses this winding.

(3) The 6.3-volt output of T2001 is coupled to the filaments of V2001 and V202 through pin Z of J2001. This voltage is developed between terminals 5 and 7 of transformer T2001. Capacitor C2018 bypasses this winding.

2-5. 10-KW POWER AMPLIFIER.

a. GENERAL.

Power amplifier V900 uses a type 4CX5000A tetrode, operating class AB1, to amplify the output of RF Amplifier RFC. The input to V900 is approximately 1,000 watts; the output is 10,000 watts (PEP). The output is matched to a 50- or 70-ohm unbalanced transmission line.

b. DETAILED CIRCUIT ANALYSIS. (See figure 6-1 sh 3).

The signal to be amplified by power amplifier V900 is applied to its cathode via DRIVE INPUT jack J901. MONITOR jack J902 provides means for monitoring this signal. The signal is coupled to jack J902 through an RC voltage-divider network consisting of capacitors C941 and C942 and resistors R908 and R910.

Filament power at 7.5-volts, 75 amperes, is supplied to V900 through transformer T801. FIL ADJ switch S1002 in the primary circuit of T801 provides means for adjusting the filament voltage. This voltage is applied to the tube through terminals 9 and 11 of T801 and rf choke L915. Rf choke L915 is the load impedance for the rf input signal applied to V900. Capacitors C946 and C947 maintain the return ends of L915 at rf ground potential. The dc path from cathode to ground is through L915, the secondary of T801, PA PLATE CURRENT meter M1002, a meter rf filter network, and a relay-protective circuit. PA PLATE OVLD relay K701, paralleled by resistor R704 in series with PA PLATE OVLD ADJ control R705, comprises the relay protective circuit. Relay K701 samples the V900 cathode current. When the current tends to exceed the operating limits, the relay is energized causing high voltage to be removed from the transmitter. Control R705 sets the sensitivity of the relay.

Bias for V900 is obtained from Power Supply AX-104. This supply voltage, -300-volts dc, is applied across a voltage divider and a protective relay circuit which includes relay K700 and resistor R700. The relay removes high voltage from the transmitter when the -300-volt dc level is not present. The voltage divider consists of resistor R702 in series with PA BIAS ADJ control R703. The control is adjusted so that 0.5 amperes of plate current flows through V900 with no input signal applied (approximately -240-volts at the grid).

The plate output circuit for V900 is a pi network consisting of inductors L902 and L903, PA BAND switch S900, and variable capacitors C927 and C928. Switch S900 has nine positions which successively short out larger portions of the two inductors as the signal frequency is increased. PA TUNE capacitor C927 in the input side of the pi network and PA LOAD capacitor C928 in the output side of the pi network provide fine tuning and loading, respectively, for the power amplifier output circuit.

Plate voltage for V900 is provided by High Voltage Diode Rectifier. The high voltage rectifier supplies 7.5-kw to the plate of V900 through inductors L914, L911, L906, L903, and L902. Capacitors C930, C939, and C940 are rf bypass capacitors.

Negative feedback is provided from the plate to grid of V900. Capacitor C929, in series with capacitors C933 through C936, forms an rf voltage divider for this feedback. The negative feedback circuit ensures more linear amplification by power amplifier V900.

The rf voltage developed at the plate of V900 is coupled through capacitor C909 to three circuits: a monitor circuit, a plate rf meter circuit, and an automatic load and drive control (aldc) circuit. The aldc circuit receives a sample of the V900 output signal through a capacitive voltage divider consisting of C909 and C906, with the voltage across C906 and C904. The rf voltage developed across C904 is applied to the cathode of diode CR900. The diode is biased by a positive dc voltage taken from the wiper arm of ALDC ADJ control R1004. Control R1004 is connected in series with resistor R1003 across the 400-volt dc bus.

When the amplitude of the negative portion of the rf signal applied to diode CR900 exceeds the bias voltage of the diode, the diode conducts. The diode output, a negative voltage proportional to the amplitude of the rf signal peaks, is filtered by a two-section pi filter and is coupled to ALDC switch S1003. When switch S1003 is in its ON position, this negative dc voltage can be used as an addition bias in rf amplifier V201 in the RFC. Switch S1003 also coupled this negative voltage through J1008 to the exciter which supplies the input signal to the RFC. When switch S1003 is in the OFF position, the output voltage of diode CR900 is open ended.

The plate monitor circuit consists of two successive voltage dividers with the output of the second voltage divider coupled to PA MONITOR jack J900. The rf signal at the plate of V900 is applied through capacitor C909 to a voltage divider consisting of capacitors C908 and C910. The voltage across C910 is also developed across series-connected resistors R902 and R903. Resistor R903 develops the rf signal to be monitored at PA MONITOR jack J900.

Screen voltage is supplied to V900 from the 600- or 1,200-volt bus. The 600-

volt bus is used when the TUNE-OPERATE switch on the main power panel is in the TUNE position. When the switch is in the OPERATE position, the 1,200-volt bus is used. The selected voltage is applied to the screen of V900 through PA SCREEN CURRENT meter M1001 and inductor L909. Inductor L909 and its associated capacitors isolate the meter and selected bus from any rf voltages present in the V900 screen. Capacitor C1022 bypasses meter M1001. Resistors R914 and R915, connected in series, form a bleeder circuit which discharges the capacitors in this screen circuit.

Provisions are included to match the output of the pi network in the plate circuit of V900 to a 50-ohm unbalanced transmission line. The output of the pi network is fed through capacitor C911 to an L network (figure 6-1 sh 3). One leg of the L network consists of OUTPUT BAL capacitor C916 paralleled with inductor L907, and the **other leg consists of inductors L912 and L913 now connected in parallel. The output signal is then coupled** through directional coupler DC900 to jack J903. Directional coupler DC900 provides the means for measuring the output power of the transmitter and SWR of the transmission line on meter M1006. Forward power from DC900 is rectified by diode CR902, filtered by pi-filter elements C1040, L1005, and C1041, and normally applied through spring-loaded contacts of SWR switch S1017 to meter M1006. The meter provides an indication of transmitter output power in kilowatts PEP. Reflected power from DC900 is rectified by diode CR904, filtered by pi-filter elements C1042, L1006, and C1043, and is normally applied through contacts on SWR meter S1017 to an SWR protective circuit. (Refer to paragraph 2-9.) When the switch is depressed, input to the protective circuit is opened and meter M1006 reads SWR.

Primary power is applied to transformer T801 through FIL ADJ switch S1002. This switch has seven contacts each of which connects to a different tap on the primary of T801 with a bypass capacitor (C803 through C809) connected from each tap to ground. Input voltages from 190 to 250 volts, in increments of 10 volts, can be selected in this manner. The capacitor connected by switch S1002 and capacitor

C810 bypass to ground any high-frequency components present in the transformer primary. The primary of transformer T801 also functions as an autotransformer to produce an output of 230 volts which is applied to Power Supply AX-104, and to the high voltage rectifier.

The amplitude of rf voltage developed at the plate of V900 is measured by PA PLATE RF meter M1002. RF voltage is coupled from the plate of V900 by capacitor C902 to a rectifier circuit, the dc output of which is applied to the meter. From capacitor C909, the rf signal passes through capacitor C905 and inductor L905 and is applied to the cathode of diode CR901. The dc output of the diode is filtered and applied to meter M1002 which provides a reading of power amplifier rf plate voltage.

2-6. EMERGENCY POWER AMPLIFIER OPERATION. (See figure 2-3).

Although the nominal output of the GPT-10K transmitter is 10-kw PEP, it can be readily adapted for emergency 1-kw PEP operation. Figure 2-3 compares the unbalanced connections for normal and emergency operation. The connections from the output pi filter are removed, and the output cable from the 1-kw amplifier V203 in the RFC is connected to C911. In this case, the 1-kw PEP output of V203 is coupled to the unbalanced output circuit, again bypassing the 10-kw power amplifier.

Since the GPT-10K is normally set up for unbalanced output operation (B, figure 2-3) to emergency unbalanced operation (D, figure 2-3) are 0.

2-7. RELAY PANEL PROTECTIVE RELAY CIRCUITS. (See figure 6-1 sh 3).

Seven relays in Relay Panel AR-161 sample five currents and two voltages in the GPT-10K Transmitter. During normal operation, contacts on these seven relays form a series circuit, as shown in figure 6-1 sh 3. This series circuit permits a contactor to be energized. This contactor K1000 controls the application of power to the high voltage rectifier. When one of these seven relays senses an excessive current or a deficient voltage, the relay operates and opens the series circuit. This action deenrgizes the contactor which then removes power from the high voltage rectifier. (Power control circuits are described in later paragraphs.)

Relay K700 is energized when the -300-volt dc output from Power Supply AX-104 is present. (See figure 6-1 sh 3). Since this voltage is used to supply bias for power amplifier V900, this relay is called the PA BIAS relay. The relay coil is connected in series with resistor R700 across the -300-volt level which enters the relay panel at pin S of J700. The relay has four sets of contacts, three of which are connected in parallel. When the relay is energized, the three parallel sets of contacts form part of the series circuit which energizes the contactor. At this time, the fourth set of contacts are open.

If the -300-volt output of the AX-104 should fail, relay K700 is deenergized. This action opens the three parallel sets of contacts, deenergizing the two contactors. The fourth set of contacts (connected to terminals 5 and 6 of E700) now connects ac voltage to PA BIAS indicator lamp I700, which lights to indicate that the power amplifier bias supply circuit is faulty.

PA PLATE OVLD relay K701 also has four sets of contacts, three of which are connected in parallel and form part of the series circuit which energizes contactor K1000. (See figure 6-1 sh 3). The fourth set of contacts on relay K701 (connected to terminals 7 and 8 of E700) controls PA PLATE OVLD indicator I701.

Relay K701 has two coils; an overload coil and a reset coil. As previously described, the cathode current in power amplifier V900 divides between the overload coil of relay K701 and the series circuit consisting of resistor R704 and PA PLATE OVLD ADJ control R705. Setting the control determines the relative amount of current in the coil and therefore the sensitivity of the circuit. When the cathode current is normal, the relay is in the reset state. At this time, its three parallel sets of contacts are closed and its fourth set of contacts are open.

When the PA cathode current in power amplifier V900 exceeds its normal operating limit, relay K701 switches to its overload state. In this state, the three parallel sets of contacts open, breaking the series circuit (figure 6-1) and contactor K1000 is deenergized. The fourth set of contacts in relay K701 close, connecting voltage to PA PLATE OVLD indicator lamp I701. This indicates that a plate current overload has occurred in the 10-kw PA. (Although the cathode current is the sum of the plate and screen currents, PA SCREEN OVLD indicator I702 would go on if only the screen current was excessive. Therefore, this cathode overload circuit is called the plate overload circuit.)

To return relay K701 to its reset state after an overload has occurred, OVERLOAD RESET pushbutton switch S1000 on the main power panel must be operated. This action causes ac voltage to be applied across the relay reset coil. The relay then switches to its reset state and remains in this state after the pushbutton switch is released until another overload condition is detected.

Except for the sampling current and the associated indicator lamp, PA SCREEN OVLD relay K702 functions in the same manner as PA PLATE OVLD relay K701 (See figure 6-1 sh 3). PA SCREEN OVLD indicator lamp I702 lights when relay K702 detects excessive screen current in power amplifier V900.

The screen current of power amplifier V900 enters the Relay Panel at pin A of J701. This current passes through E708 and a set of contacts of relay K703 to E706. From E706, this current divides into two paths. One path is through the overload coil of relay K702; the other path is through resistor R706 in series with PA SCREEN OVLD ADJ control R707. This control determines the relative division of screen current in these two paths. The screen current returns to either the 1,200-volt or 600-volt dc output of the main power supply through relay K705. (Relays K703 and K705 are described in later paragraphs).

Current flow in the screen voltage regulator of the main power supply is sampled by the overload coil of ZENER DIODE PROTECT relay K704. (See figure 6-1 sh 3). The relay coil is paralleled by R701 in the ground return path of this supply voltage. When excessive current flows in this regulator circuit, due to one or more diodes short circuiting, relay K704 switches to its overload state and a set of contacts in the series energizing circuit of contactor, K1000 opens. This relay has four sets of contacts, but the remaining three sets of contacts are not used. After the relay is in the overload state, it is necessary to operate the OVERLOAD RESET pushbutton switch on the main power panel to return the relay to its reset state. The reset coil of relay K704 is connected in parallel with the reset coils of relays K701, K702, K706 and K707. When OVERLOAD RESET pushbutton switch S1000 is operated, all these relays remain in or return to the reset state.

IPA SCREEN OVLD relay K706 and IPA PLATE OVLD relay K707 function in a similar manner to that described for PA PLATE OVLD relay K701. The current sampling circuit of IPA PLATE OVLD relay K707 is described in paragraph 2-3c. When relay K707 detects an overload, contacts on this relay apply ac voltage to IPA PLATE OVLD indicator lamp I704. (See figure 6-1 sh 3).

The screen current of 1-kw power amplifier V203 enters the relay panel at pin B of J700. (See figure 6-1). In the relay panel, the screen current divides between the overload coil of relay K706 and the series combination of resistor R708 and IPA SCREEN OVLD ADJ control R709. This control determines the relative division of screen current in these two paths. The total screen current is then applied to contacts on TUNE-OPERATE relay K705. Relay K705 connects the screen current to the +400- or +200-volt output of Power Supply AX-104.

Relay K706 switches to its overload state when the screen current of intermediate power amplifier V203 rises above 30 ma. When the relay is in the overload state, its three parallel sets of contacts open the series-energizing path for contactors K3000 and K3001 and the fourth set of contacts connects ac voltage to IPA SCREEN OVLD indicator lamp I703.

The coil of IPA BIAS relay K708 is connected in series with resistor R712 across the -150-volt dc regulated output of the AX-104 applied at pin M of connector J700. (See figure 6-1 sh 3). When the -150-volt input is present, relay K708 is energized and three of its four sets of contacts form part of the series circuit which energizes contactors K1000. The fourth set of contacts opens when the relay is energized. When the -150-volt input is not present, relay K708 is de-energized. The three sets of contacts now open the energizing circuit of the contactor, causing the high voltage rectifier to shut down.

2-8. CONTROL RELAY CIRCUITS. (See figure 6-1 sh 3).

Two control relays are included in the relay panel. Relay K703 controls the application of voltage to the screen circuit of 10-kw power amplifier V900, and relay K705 determines the amplitude of the dc voltage supplied to this screen circuit and to the screen circuit of 1-kw power amplifier V203.

To apply voltage to the screen of power amplifier V900, PA SCREEN switch S1005 must be set to ON. This switch then connects the ac phase 2 voltage to one end of the coil of PA SCREEN ON-OFF relay K703. The other end of the coil connects to the phase 3 voltage through REAR FAN 5 AMP fuse F703. This phase 2 to phase 3 ac voltage energizes relay K703, and its single set of operative contacts close, completing the dc path between the V900 screen and its supply voltage. (The REAR FAN fuse is included in this circuit as further protection for the 10-kw power amplifier screen, since the rear fan normally cools the screen regulating diode assembly on TB800. If the fuse opens, relay K705 is deenergized and screen voltage from V900).

Either the +1,200- or the +600-volt output of the main power supply is used as the screen supply voltage for V900, and either the +400- or the +200-volt output of Power Supply AX-104 is used as the screen supply voltage for 1-kw power amplifier V203. The voltage connected to each of these screens is determined by TUNE-OPERATE relay K705, the status of which is controlled by TUNE-OPERATE switch S1004.

The lower voltages are supplied to these screen circuits when switch S1004 is set to TUNE. In this position, the switch connects the phase 2 voltage to one side of TUNE indicator lamp I1001 through Resistor R1007, and to one end of the relay K705 coil through pin E of connectors P1000 and J700. The other end of the relay coil connects to the phase 3 voltage through REAR FAN fuse F703. With relay K705 energized, its normally open contacts connect the screen circuits of V203 and V900 to the lower dc voltages. When switch S1004 is turned to OPERATE, the phase 2 voltage is connected to OPERATE lamp I1002 through resistor R1008 and is removed from TUNE lamp I1001 and relay K705. With relay K705 deenergized, its normally closed contacts connect the higher voltages to the screen circuit of V203 and V900.

For purposes of completeness, the complete screen supply circuits for power amplifiers V203 and V900 are shown in figure 6-1. Note that for V900, the selected screen voltage (either 1200 volts or 600 volts) from the main power supply is routed through contacts on K705, through PA SCREEN OVLD relay K702, contacts on K703, and PA SCREEN CURRENT meter M1001 to the screen grid circuit of V900.

For 1-kw amplifier V203, the selected screen voltage (either 400 volts or 200 volts) from Power Supply AX-104 is routed thrcugh contacts on relay K705, through IPA SCREEN OVLD relay K706 to the screen grid circuit of V203. It should be noted that screen voltage can be applied to V203 only after high voltage is applied to the transmitter. If high voltage is automatically removed as a result of an overload in any of the protective circuits screen voltage is simultaneously removed from 1-kw power amplifier V203.

2-9. SWR PROTECTIVE RELAY CIRCUIT.

As shown (see figure 6-1 sh 3), reflected power on the unbalanced transmission line of the transmitter is coupled from directional coupler DC900 to diode CR904 and a pi filter consisting of C1042, L1006, and C1043. The resulting rectified positive filtered output voltage is applied through connectors J1009, P1015 to the input connector P1016 located on the Exciter drawer. This voltage is routed to pi filter elements C220, L201 and C221 to the coil of relay K202. This relay becomes energized at aldc current of 50 microamperes. Switch S201 permits relay K202 to become energized at either a 2 to 1 or 3 to 1 SWR by switching in appropriate series circuits.

When power switch S200 is placed in the on position phase 1 and 2 voltage is applied through the switch to plug P200 supplying primary power to the exciter unit, and also to transformer T200. Transformer T200 supplies the operating voltage for full wave bridge rectifier diode assembly CR201. The negative 28vdc developed flows through dropping resistor R200 where it takes two paths. One path goes through resistor R201 to contacts of K204 relay, through J201 to the Remote H.V. indicator.

The other path goes through resistor R201 to contacts 1 and 4 of overload reset relay K201 and the coil of HV ON-OFF relay K200 through contacts 10 and 9 of K203 through jack J201 to remote HV ON-OFF switch. The negative dc voltage passes through diode CR203 and resistor R203 where it is regulated by zener diode CR202. This regulated DC voltage is then applied to the emitter base circuit of transistor Q200 reverse biasing the transistor keeping it from conducting.

When the SWR exceeds the selected ratio an overload condition occurs. The overload trips SWR relay K202 closing contacts 9 and 4. With contacts 9 and 4 closed the emitter base circuit of Q200 becomes forward biased causing relay K203 to go to the overload condition. The transmitter will remain in the overload condition until the reset button is pushed. When the overload reset is activated phase 3 passes through the coil of OVLD RESET relay K201, which allows the 28 vdc supply voltage to pass through contacts 1 and 3 to the reset coil of relay K203 returning the relay to the normal operation position.

2-10. HIGH VOLTAGE DIODE RECTIFIER AND MAIN POWER SUPPLY AX-695.

The high voltage rectifier and main power supply function together to produce dc output voltages of +7,500, +3,000, +1,200, and +600 volts. The latter two voltages are regulated.

a. POWER INPUT CIRCUITS.

Three-phase ac power enters the main frame of the GPT-10K transmitter at terminals E1008, E1009 and E1010. (See figure 6-1 sh 4). After being filtered by a pi line rf filter in each of the three lines, the three-phase power is applied to MAIN POWER circuit breaker CB1000. The phase 2 and phase 3 input voltages are also applied through similar pi line filters.

After passing through MAIN POWER circuit breaker CB1000, the primary three-phase power is distributed throughout the frame. The three-phase primary power is applied to the primary of three-phase transformer T800 through contactor K1000. The contactor has five pairs of contacts, three of which are connected in series with the primary power lines

The coil of contactor K1000 is connected between the phase 1 and phase 2 lines. The phase 1 line is connected to one end of the K1000 coil through HIGH VOLTAGE circuit breaker CB1001, and the phase 2 line is connected to the other side of the coil through the interlock and protective relay circuits. As long as all interlock and protective relay circuits are closed and MAIN POWER circuit breaker CB1000 and HIGH VOLTAGE circuit breaker CB1001 are ON. The fourth contact pair in this contactor then completes the path for intermediate power amplifier V203 screen current, as previously described. The fifth pair of contacts in contactor K1000 is used in an alarm circuit. If ALARM switch S700 is set to ON, an audible alarm is energized through these contacts whenever high voltage is removed from the main power supply.

When contactor K1000 is energized, primary power is applied to three-phase transformer T800. Buzzer DS1000 is connected across two of the primary windings of T800. When K1000 is energized, this buzzer sounds. PLATE TIME meter M702 comes on at this time and records total time that high voltage is applied.

Each primary winding of T800 has five taps which match the windings to input voltages from 210 to 250 volts in increments of 10 volts. The high-voltage secondary of three-phase, delta-wye transformer T800 connects to the high voltage rectifier through pressure terminals E1004 through E1006.

b. HIGH VOLTAGE RECTIFIER CIRCUIT.

The high voltage diode rectifier uses six diodes to produce an output of +7,500 volts dc. This output voltage is filtered by the main power supply which also uses this high voltage to develop outputs of +3,000, +1,200, and +600 volts.

Three-phase ac voltage is supplied to the high voltage rectifier from the secondary of transformer T800. This voltage enters the high voltage rectifier at terminals mounted on CR801 and applied to diode rectifier which form a three-phase bridge rectifier circuit. (See figure 6-1 sh 4).

The dc output of the full-wave bridge circuit is developed across filter capacitor C800 through filter choke L800, external to the high voltage rectifier circuit. (See figure 6-1 sh 4). The +7,500-volt output across C800 is supplied to the plate circuit of power amplifier V900. Series resistors R804 through R809, connected across capacitor C800, function as a bleeder. Also connected across C800 are series resistors R810, R811, and R812. These three resistors form a voltage divider with the voltage across R812 applied to PA PLATE meter M1000.

Capacitor C801 in the main power supply is effectively connected between the neutral of the T800 secondary and rectifiers CR801A through CR801E, in a half-wave bridge configuration. The +3,000-volt output developed across capacitor C801, is routed to the plate circuit of power amplifier V203.

A voltage divider (resistors R802 and R803 and diode assembly CR800) across the +3,000-volt output provides regulated output voltages of +1,200 and +600 volts. The +1,200-volt output is developed across the diode assmebly which consists of six six diodes, CR800A through CR800F, and six current-limiting resistors, R802 through R827. Capacitor C802 filters the +1,200-volt output and resistor R821 is a bleeder for this capacitor. Diode CR800A returns to ground through pin X of P1000 and a previously described protective relay circuit in the relay panel.

The +1,200- and the +600-volt outputs of the main power supply also are connected to the relay panel as described in previous paragraphs. The +600-volts is applied to the relay panel through resistor R818 and pin C of P1001; the +1,200-volts is applied to the relay panel through pin B of P1001.

A high voltage shorting circuit is included in the frame for personnel safety. The +3000-volt line is connected to terminal E802 and the +7,500-volt line is connected to terminal E801 through resistor R817 for this purpose. When the high voltage is off, high voltage shorting coil L802 is deenergized and a shorting bar controlled by L802 shorts terminals E801 and E802 to ground. During normal operation, L802 is energized and the short is removed. High voltage shorting coil L802 also operates switch S801. This switch, in the energizing path for contactor K1000, is described in connection with the interlock circuits in latter paragraphs.

2-11. INTERLOCK CIRCUITS. (See figure 6-1).

Ten interlock switch circuits are distributed throughout the GPT-10K transmitter for the safety of both equipment and personnel. The interlock switch circuits function together with the protective relay circuits for this purpose. When any of the interlock switch or protective circuits are open, power cannot be supplied to the high voltage rectifier. The interlock switch in the right side is included primarily for personnel safety.

As shown in figure 6-1 sh 3, the ten interlock switches are connected in series. Two of these switches, pa air switch S800 and air switch S206, ensure that blower B201 in the RFC and main blower B800 in the main power supply, respectively, are functioning. The other eight interlock switches check that bandswitches, and equipment are in their normal operating positions. For example, bandswitch interlock S205 and S901 are operated by the detents on IPA BAND switch S202 and PA BAND switch S900, respectively, and ensure that these switches are in operating positions and not between positions.

The interlock switch circuits and the protective circuits provide a series circuit which connects phase 2 voltage to one end of high-voltage shorting coil L802. The control path is through switches S202 and S206, external interlock jumper E1000-8 and E1000-10, switches S1006, S800, S1007. S1008, S1009, S1010, and S1011 to the relay panel through pin a of P1000. In the relay panel, the switch on TIME DELAY meter M701 connects this ac voltage to pin d of connector P1000. One end of coil L802 connects to this pin through terminal 1 in terminal block E805. The other end of L802 connects to the phase 1 voltage through terminal 2 of E805. This phase 1 to phase 2 voltage energizes L802.

With L802 energized, switch S801 is closed. The phase 2 voltage at pin J of J700 is then coupled through series contacts of protective relays K700, K701, K702, K704, K706, K707, and K708 in the relay panel, then to one end of the coils of contactor K1000 through now-closed switch S801. The other end of the coil of contactor K1000 connects to the phase 1 voltage through pin A of J1000 and HIGH VOLTAGE circuit breaker CB1002.

When the interlock switches and the switch on TIME DELAY meter M701 are in their normal operating positions, INTERLOCK INDICATOR lamp L1004 lights. The phase 1 voltage is applied directly to the lamp, while the phase 2 voltage at pin d of P1000 connects to the lamp through terminals 12 and W of INTERLOCK switch S1001 (rear) and resistor R1005.

When one of the interlock switches is not in its normal operating position, the phase 2 voltage path to contactor K1000 coil L802, and INTERLOCK INDICATOR lamp I1004 is open. At this time, the lamp is off and the contactor and coil are deenergized. When high-voltage shorting coil L802 is deenergized, two contacts operated by L802 short the +7,500- and +3,000-volt dc line in the main power supply to ground. This action discharges the filter capacitors in the +7,500- and +3,000-volt dc lines, providing a personnel safety feature. In addition, the phase 2 voltage is applied to HIGH VOLTAGE circuit breaker CB1002 through the normally open contact of the open interlock switch and resistors R1000 and R1001, tripping the circuit breaker.

The phase 1 to phase 2 voltage is also applied to circuit breaker CB1002 during the warm-up time provided by meter M701. During this time, the phase 2 voltage is connected to the circuit breaker through contacts C and 2 of M701, contacts 2 on the interlock switches, and resistors R1000 and R1001. If circuit breaker CB1002 is set to ON during this warm-up time, this voltage causes the circuit breaker to trip. This feature prevents the premature application of high voltage to the GPT-10K transmitter.

When the GPT-10K is shut down becuase of the operation of an interlock switch, INTERLOCK switch S1001 and INTERLOCK INDICATOR lamp I1004 can be used to rapidly localize the trouble to a particular interlock switch circuit. When switch S1001 is rotated clockwise from the NORMAL position, indicator I1004 lights for all positions up to the open circuit and is off for all other positions. For example, assume BAND SW switch S900 is not in a normal operating position (between positions). This causes contacts C and 1 of pa band switch S901 to open and contacts c and 2 to close. With INTERLOCK switch S1001 in the IPA BAND SW position (position 1), the phase 2 voltage is applied to the indicator through switch S205, contacts 1 and W of the front section of S1001 and resistor R1005. When switch S1001 is in the IPA AIR SW position, the phase 2 voltage is connected to the indicator through switches S205 and S206, contacts 2 and W of S1001, and resistor R1005. In the EXTERNAL position (position 3), the jumper between terminals 8 and 10 of terminal block TB1002 is added to the switches to complete the lamp circuit. Similiarly, in the PA AIR SW and PA DECK positions, switches S800 and S1007 are successively added in series with the previously mentioned switches. However, when switch S1001 is turned to the PA BAND SW position (position 7), the indicator lamp does not light because switch S901 interrupts the lamp circuit. The lamp does not light for the succeeding positions of S1001 for the same reason.

Another interlock indicator, DRAWER INTERLOCK Indicator lamp I2000, is located on the front panel of Power Supply AX-104. This lamp lights when IPA DRAWER interlock switch S1009 is not in its normal operating position. This lamp is included because switches S1009 and S1010 are both added to the series circuit for INTERLOCK INDICATOR lamp I1004 when switch S1001 is turned from the RIGHT SIDE position (position 8) to the HV DECK position (position 9). Thus, if lamp I1004 goes on with switch S1001 in the RIGHT SIDE position and goes off with S1001 in the HV DECK position, either interlock switch S1009 or S1010 could be open. However, if DRAWER INTERLOCK lamp I2002 is now on, switch S1009 is open; if lamp I2002 is now off, switch S1010 is open.

During unbalanced output operation, relay K201 is energized when SWR becomes excessive. As a result, phase 2 voltage is applied to HIGH VOLTAGE circuit breaker CB1002, through resistor R1000 and R1001, tripping it. This action automatically turns off the transmitter when a predetermined degree of SWR is exceeded.

2-12. AC POWER DISTRIBUTION. (See figure 6-1 sh 4).

Three-phase power is supplied to the GPT-10K Transmitter at terminals E1003, E1004 and E1005 in the frame. An rf line filter connects the three phase power to MAIN POWER circuit breaker CB1000; phase 2 and phase 3 lines are routed to cuit breaker CB1000 through another filter. Transformer T200 (Located in the Exciter Drawer) is a self-regulating transformer which produces an output of 110-volts ac.

Except for voltage supplied to transformer T800, the three-phase voltage is distributed throughout the frame when MAIN POWER circuit breaker CB1000 is closed. The three-phase voltage from CB1000 is applied to main blower B800 through separately fused lines. AC POWER indicator lamp I1000 is connected in series with resistor R1006 between the phase 1 and phase 2 lines. The phase 1 and phase 3 voltages are also supplied to blower B3001 through REAR FAN fuse F703. Phase 2 voltage is fed to transformer T801, FILAMENT PRIMARY meter M1000, fluorescent lamps I1005 and I1006 and their associated circuit, and LIGHT switch S1014 and lamp I1007. The lamp circuits also connect to the phase 1 voltage at pin G of P1000. The phase 3 voltage is supplied to transformer T801 through FIL ADJ switch S1002. This switch provides means for matching the phase 2 to phase 3 voltage to the primary of transformer T801. When this switch is in the proper position, PLATE VOLTAGE meter M1000 indicates 230 volts (red line).

The 230 volts across meter M1000 is supplied to the high voltage rectifier. The phase 3 voltage at the 230-volt tap of T801 is applied to transformer T2000 and T2001 in Power Supply AX-104. Transformer T2001 supplies filament voltage for V201, V202 and V203. The phase 2 voltage at the primary of T2001 is also coupled to blower B201 which also receives the phase 3 voltage.

Transformer T2000 receives the phase 1 voltage from CB1000. The output of transformer T2000 is applied to the +400-, +200-, -300- and -150-volt power supplies in the AX-104.

As previously described, the 230 volts across FILAMENT PRIMARY meter M1000 is applied to the high voltage rectifier through terminals E1003 and E1002 which mate with terminals E608 and E607, respectively. Since the high voltage rectifier provides plate and screen voltage for power amplifier V900, TIME DELAY meter M701 provides a warm-up time for that stage. Filament voltage is supplied to 10-kw Amplifier V900 by T801.

TIME DELAY meter M701 receives the phase 2 to phase 3 voltage from MAIN POWER circuit breaker CB1000. When the preset time expires, the switch on TIMER meter M701 closes, completing the energizing path for high-voltage shorting coil L802. Coil L802 is energized by the phase 1 to phase 2 voltage as previously described through the closed contacts of the interlock switches. Since one of the conditions for applying voltage to transformer T800 is the closing of switch S801 which is operated by L802, voltage is not supplied to T800 if fuse F2003, F2204, or one of the 10 interlock switches is open.

Another condition for applying voltage to transformer T800 is the closing of HIGH VOLTAGE circuit breaker CB1001. With both circuit breaker CB1001 and switch

S801 closed, contactor K1000 is energized by the phase 1 to phase 2se 2 voltage. The phase 3 voltage at the switch of M701 is coupled to K1000 and M3003 through contacts of seven protective relays, K700, K701, K702, K704, K706, K707 and K708, pin c of J700 and P1000, switch S801 and pin P of J1000 to K1000.

With contactor K1000 energized, its contacts couple the three-phase voltage from MAIN POWER circuit breaker CB1000 to transformer T800. These three contacts of CB100 apply the three-phase voltage to T800 and to the high voltage rectifier. At this time, the output voltage of the rectifier circuit is approximately +2,500 volts.

It should be noted that the interlock switches and jumper and fuses F2003 and F2004 and the protective relay contacts form a series circuit which, when open, de-energizes contactor K1000 thereby removing voltage from transformer T800 and also removing power from high voltage rectifier. HV PLATE on indicator DS1003 lights when voltage is supplied to transformer T800. PLATE TIME meter M702 is also energized at this time. This meter indicates the total time plate voltage has been supplied to 10-kw power amplifier V900.

2-13. DC POWER DISTRIBUTION. (See figure 6-1 sh 2).

Power Supply AX-104 supplies four dc output voltages at J2000 which are used as bias and plate and screen supply voltages in the RFC and as bias voltage for power amplifier V900. The high voltage rectifier and the main power supply function together to produce four high dc voltages. One of two of these voltages is used as the V900 screen supply voltage. Two voltages are used because the screen voltage is reduced when tuning the transmitter. Another output voltage is used for the plate of final amplifier stage V203 in the RFC. The remaining output voltage is supplied to the plate of power amplifier V900. In addition, the dc voltages are supplied to monitor meters and to protective relay circuits which cause the transmitter to shut down when one of these relay circuits detects an abnormal voltage or current.

SECTION 3

TROUBLESHOOTING

3-1. INTRODUCTION.

This section contains detailed troubleshooting techniques and reference data which should be used to quickly locate malfunctions in the transmitter. A preliminary inspection procedure, table 3-1, is included as a visual aid to determine obvious conditions which may have caused equipment breakdown. This is followed by an equipment performance check, table 3-2 and a system troubleshooting chart, table 3-3. An overall short circuit test procedure is included in table 3-4. The combined data of tables 3-1 through 3-4 will permit sectionalization of troubles to specific drawers in the transmitter and in many instances, to specific stages and parts.

NOTE

It is assumed in this section that, for the trouble symptoms listed, the troubles are produced by a malfunction rather than by improper operating procedures. Thus, if an overload lamp lights, it is assumed that the operator cannot clear the trouble by normal operating procedure such as reducing the drive, retuning, and reloading. Also, the results of defective front-panel indicator lamps and meters, and the remedial measures concerned are obvious and are not covered in this section.

3-2. EQUIPMENT PERFORMANCE CHECK.

Table 3-2 is a procedure with systematically checks equipment performance in terms of actual operating procedures. Perform each step in the order given.

NOTE

Parenthesized numerical designations identify locations of operating controls and indicators. Refer to transmitter operating instructions manual for front panel location diagram.

3-3. SYSTEM TROUBLESHOOTING.

Table 3-3 provides additional troubleshooting data based on specific transmitter trouble symptoms. When a trouble has been sectionalized to a specific unit or circuit, refer to the applicable paragraph in this section which applies to that unit for additional troubleshooting data.

3-4. SHORT CIRCUIT TEST.

Table 3-4 provides the means to quickly check the transmitter power input circuits and high voltage circuits for the presence of short circuits. Perform this test when a short circuit is suspected. Prepare for this test as follows:

a. Disconnect the following plugs from their mating jacks:

P1012 from J1000
P1000 from J700
P1001 from J701
P1010 from J2002
P1019 from J203
P1004 from J1004

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

When system troubleshooting (tables 3-2 and 3-3) indicates that a trouble exists in the RFC or its associated AX-104, use table 3-5 to isolate the trouble to a specific stage or part in these units. Make all checks with the RFC and AX-104 installed and connected in the transmitter. When trouble has been isolated to a stage, use the voltage and resistance data in table 3-6 in conjunction with the overall schematic diagram in Section 6 to locate the defective part. For wire routing information for the internal cable harnesses in these units, refer to tables 3-7 through 3-9. Parts location is shown in figure 3-1.

TABLE 3-1. PRELIMINARY INSPECTION PROCEDURE

WHAT TO INSPECT	DEFECTS TO LOOK FOR	REMEDY
All electrical connections at rear of the frame.	Open connections, dirt, frayed cables.	Tighten, replace or clean as necessary.
Antenna connection at the side of the frame.	Loose connections, dirt, frayed cables.	Tighten, replace or clean as necessary.
Knobs, screws, connectors.	Loose or missing hardware.	Tighten or replace.
Wiring	Loose or frayed wires.	Resolder or rewire.
Resistors	Cracks, chipping, blistering, discoloration, and other signs of overheating.	Replace as necessary.
Capacitors	Leaks, bulges, discoloration.	Replace as necessary.
Tubes	Poor seating.	Secure firmly in place.
Meters	Bent needle, cracked case, broken glass.	Replace as necessary.

TABLE 3-2. EQUIPMENT PERFORMANCE CHECK

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
1	Connect antenna or dummy load to transmitter and check that all doors, covers, and components are secured.		
2	Set EXCITER POWER switch to ON.	Blower motor starts. Power lamp on exciter unit lights when the associated switches are turned on.	If exciter unit is powered, but blower unit fails to operate, PA Compartment FAN fuse is open or blower is defective. If the exciter unit cannot be powered, it is defective. (Refer to appropriate modular-unit manual for maintenance data.)
3	Remove P1018 from J1005 and connect terminal J1005 with a 50-ohm load. Tune up exciter unit at some carrier frequency within the 2- to 30-mc range.	Normal rf output (up to 150 milliwatt PEP) is obtained at EXCITER OUTPUT.	Defective circuit in exciter. Refer to appropriate volume for maintenance data on the exciter.

TABLE 3-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
		NOTE	
	At conclusion of step 3, set rf output of exciter to minimum remove 50-ohm load, and reconnectP1018 to J1005		
4	Set all tuning controls to positions specified in transmitter tuning chart, then set switches as follows: PA SCREEN (36) OFF TUNE-OPERATE (35) TUNE HIGH VOLTAGE (37) OFF ALDC (33) OFF INTERLOCK (31) NORMAL		
5	Set TIME DELAY control (42) to 5 minutes, then set MAIN POWER circuit breaker (28) to ON.	Blower motor B800 operates.	Open MAIN BLOWER fuse on relay panel or defective blower unit.
		TUNE lamp (7) lights.	Open resistor Rl007.
		PA BIAS lamp (38) lights. After a few seconds, it goes off.	Defective circuit in Power Supply AX-104.
		After 5 minutes, INTERLOCK INDICATOR lamp (30) lights.	Open interlock circuit.
6	Set MULTIMETER switch (18) to DC IPA BIAS'	MULTIMETER (15) reads 100 volts.	Incorrect setting of IPA BIAS ADJ control on Power Supply AX-104.
7	Set MULTIMETER switch (18) to RF 1ST AMPL EP position. Turn up rf drive slightly then tune 1ST AMPL TUNING control (19) for peak on MULTIMETER (15).	A peak is obtained.	Defective rf amplifier V201 in RF Amplifier RFC; defective rectifier V2000 in AX-104.

TABLE 3-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
8	Set MULTIMETER switch (18) to RF IPA EG position and tune IPA GRID TUNING control (19) for peak on MULTIMETER (15).	A peak is obtained.	Defective rf amplifier V202 in RFC.
	NOTE At conclusion of step 8, return rf drive to minimum.		
9	Depress OVERLOAD RESET pushbutton (29) then set HIGH VOLTAGE circuit breaker (37) to ON position.	PLATE ON lamp (9) lights.	
		PA PLATE meter (3) indicates plate voltage.	Defective main power supply.
10	Set MULTIMETER switch (18) to DC IPA ISG position.	MULTIMETER (15) reads 200 volts dc.	Defective switch on contactor K1000.
11	Increase drive slightly, then adjust IPA TUNING control (24) for dip on IPA PLATE CURRENT meter (17).	A dip is obtained.	Defective amplifier V203 in RFC.
	NOTE At conclusion of step 11, return rf drive to minimum.		
12	Set PA SCREEN switch (36) to ON.	PA SCREEN meter (1) indicates screen voltage.	Defective relay K703 or K705 in relay panel.
13	Turn up rf drive slightly until some increase is noted on PA PLATE CURRENT meter (2), then tune PA TUNE control (13) for dip on PA PLATE CURRENT meter (2).	A dip is obtained.	Defect in power amplifier V900.

TABLE 3-2. EQUIPMENT PERFORMANCE CHECK (CONT)

STEP	OPERATION	NORMAL INDICATION	PROBABLE CAUSE OF ABNORMAL INDICATION
14	Reduce rf drive to minimum, then set TUNE-OPERATE switch (35) to OPERATE position.	PA PLATE CURRENT meter (3) reads approximately 500 ma.	Defect in power amplifier V900.
		IPA PLATE CURRENT meter (17) reads approximately 200 ma.	Defect in amplifier V203 in RFC.
15	Tune and load amplifiers V203 and V900 until full PEP is obtained.	Full PEP is obtained.	Improper tuning and/or loading or defect in PA circuit.

TABLE 3-3. SYSTEM TROUBLESHOOTING

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
1	FRONT FAN fuse F3000 opens continously.	Blower motor B3000 is defective.	Check B3000 and associated wiring.
1	MAIN POWER circuit breaker (28) trips continually.	Short circuit in 220-volt ac input circuit.	Disconnect P1000 from J700 and P1010 from J2002. If circuit breaker still trips, check for overload in ac input circuit and main power supply. If circuit breaker can now be set ON, connect P1010 to J2002. If the circuit breaker trips, check the RFC and AX-104 for shorts. If the circuit breaker remains on, check for a short in the relay panel.
2	With MAIN POWER circuit breaker (28) set to ON and HIGH VOLTAGE circuit breaker (37) set to OFF, all lamps on main frame are off and FILAMENT TIME meter (41) does not record elapsed time.	220-volt ac input circuit is defective.	Check circuit breaker CB1000 and associated wiring.
3	The fluorescent lamp in the main frame does not light but FILAMENT TIME meter (41) on relay panel records elapsed time.	Fluorescent lamp circuit in main frame is defective.	Check lamps I1005 and I1006 and associated starters and ballasts.

TABLE 3-3. SYSTEM TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
4	MAIN BLOWER fuse on relay panel opens continously.	Blower motor B800 is defective.	Check for short circuit in blower motor B800 and associated wiring.
5	Blower motor in main frame does not operate, but FILAMENT TIME meter (41) on relay panel records elapsed time.	Blower motor B800 is defective.	Check for open circuit in blower motor B800 and associated wiring.
6	TIMER fuse on relay panel opens continually.	TIME DELAY meter M701 is defective.	Check for short circuit in TIME DELAY meter and associated wiring.
7	PA FIL fuse on relay panel open continually.	Filament transformer T801 is defective.	Check for short circuit T801.
		Short in filament circuit of V900.	Check for short circuit in V900.
		FILAMENT TIME meter M700 is defective.	Check for short circuit in FILAMENT TIME meter M700 and associated wiring.
8	FILAMENT TIME meter (41) does not record elapsed time but FILAMENT PRIMARY meter indicates 230 volts (red line).	FILAMENT TIME meter M700 is defective.	Check M700 and associated wiring.
9	TIME DELAY meter (42) does not operate but FILAMENT TIME meter (41) records elapsed time.	TIME DELAY meter M701 is defective.	Check M701 and associated wiring.
10	On Power Supply AX-104, B+ fuse, IPA BIAS fuse, IPA BLOWER fuse, IPA FIL fuse, or LV fuse opens continually.	Power Supply AX-104 is defective.	Refer to table 3-5.
		RF Amplifier RFC is defective.	Refer to table 3-5.
11	Blower motor B201 in RFC does not operate.	B201 is defective.	Check B201 and associated wiring.
12	PA BIAS lamp (38) remains on after MAIN POWER circuit breaker (28) is turned on.	Bias rectifier circuit in AX-104 is defective.	Refer to table 3-5.

TABLE 3-3. SYSTEM TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
13	PA BIAS lamp (38) is on and incorrect reading appears on PA BIAS meter (2).	The bias rectifier circuit in AX-104 is defective.	Refer to table 3-5.
14	PA BIAS lamp (38) is on but a correct indication is obtained on PA BIAS meter (2).	Relay panel AR-161 is defective.	Check PA BIAS relay K700, R700 and associated wiring.
15	On RFC, an incorrect indication is obtained on MULTIMETER (15) when MULTIMETER switch (18) is set to IPA BIAS.	RFC or AX-104 is defective.	Refer to table 3-5.
16	Transmitter remains on although VSWR meter reading is excessive.	SWCU is defective.	Refer to table 3-14.
17	With INTERLOCK switch (31) set to NORMAL, INTERLOCK INDICATOR lamp (30) does not light although the time delay provided by TIME DELAY meter (42) has expired.	A panel or component is improperly positioned.	Check that all panels and components are firmly secured in position.
		Defective interlock switch circuit.	Rotate INTERLOCK switch clockwise from the IPA BAND SW position. The INTERLOCK INDICATOR lamp will go out when the switch is turned to the position corresponding to the open interlock. If this occurs, check switches as follows:

Interlock Switch Position	Check Interlock Switch (figure 3-7)
IPA BAND SW	S205 (operates from S202 in RFC)
IPA AIR SW	S206 (operates from blower B201 in RFC)
EXTERNAL	Jumper between terminals J and K, J201
REAR DOOR	S1006
PA AIR SW	S800 (operates from main blower B800)
PA DECK	S1007
PA BAND SW	S901 (operates from S900)

TABLE 3-3. SYSTEM TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES	
17			Interlock Switch Position	Check Interlock Switch (figure 3-8)
			RIGHT SIDE	S1008
			HV DECK	If DRAWER INTERLOCK lamp is lit, check ipa drawer switch S1009. If lamp is off, check hv dec interlock switch S1010.
			RELAY DECK	S1011
			TIMER	Switch on TIME DELAY meter M701.
18	HIGH VOLTAGE circuit breaker (37) trips continually.	An interlock switch is open.	Refer to item 26 above.	
		Contactor K1000 or K200 is defective.	Check for a short circuit in K1000, DS1000, or K200.	
19	With HIGH VOLTAGE circuit breaker (37) set to ON, PLATE ON lamp (9) does not light, but the six lamps on the relay panel are all off.	DIODE PROTECT relay K704 has detected an overload.	On the relay panel, measure ac voltage between terminals 29 and 30 of E702. If no voltage, relay K704 did not detect an overload. If 230 volts ac is measured, check relay K704 and R701. If necessary, check the +3000-volt circuit.	
		High voltage shorting coil L802 is defective.	Check L802 and associated wiring.	
		AC power input circuit is defective.	Check contactors K1000 and K200, and DS1000.	
20	PA PLATE OVLD lamp (39) lights, but a correct indication appears on PA BIAS meter (2).	Relay panel is misaligned or defective.	Adjust PA PLATE OVLD ADJ control R705. Check relay K701, potentiometer R705, and R704.	
		Power amplifier is is defective.	Check 10-kw PA V900.	
		Rf amplifier RFC is defective.	Check for shorted or leaky capacitors C253 and C275.	

TABLE 3-3. SYSTEM TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
21	PA SCREEN OVLD lamp (40 lights).	Relay panel is misaligned or defective.	Adjust PA SCREEN OVLD ADJ control R707. Check relay K702, PA SCREEN OVLD ADJ control R707, and R706.
		Power amplifier is defective.	Check 10-kw PA V900.
22	IPA SCREEN OVLD lamp (44) lights.	Relay panel is misaligned or defective.	Adjust IPA SCREEN OVLD ADJ control R709. Check relay K706, IPA SCREEN OVLD ADJ control R709, and R708.
		RFC is defective.	Check V203 and check for short in screen circuit of V203.
23	IPA PLATE OVLD lamp (45) lights.	Relay panel is misaligned or defective.	Adjust IPA PLATE OVLD ADJ control R711. Check relay K707, IPA PLATE OVLD ADJ control R711, and R710.
		RFC is defective.	Check amplifier V203.
24	SWR OVLD lamp (46) lights.	Circuit in exciter is misaligned or defective.	Adjust SWR OVLD ADJ control.
25	PLATE ON lamp (9) is on, but PLATE TIME meter (52) does not record elapsed time.	Meter is defective.	Check meter M702.
26	A correct reading appears on PA PLATE meter (3), but improper readings are obtained on PA SCREEN CURRENT meter (2).	Relay K703 is defective.	Check relay K703.
		Main power supply is defective.	Check the 1200-and 600-volt circuit in the main power supply.
		PA SCREEN switch (140) is defective.	Check switch S1005.
27	PA SCREEN CURRENT meter reading (3) is abnormal.	10-kw PA is defective.	Check screen circuit of PA V900.

TABLE 3-3. SYSTEM TROUBLESHOOTING (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURES
28	Correct readings are obtained on PA PLATE CURRENT and PA OUTPUT meter (3) and (5), but reading on PA PLATE RF meter (4) is abnormal.	Meter rectifier circuit is defective.	Check the meter rectifier circuit associated with the PA PLATE RF meter.
29	With ALDC switch (33) set to ON, output power of transmitter does not decrease as ALDC control is rotated clockwise.	ALDC circuit assoicated with 10-kw PA is defective.	Check ALDC rectifier circuit elements.
		ALDC switch (33) is defective.	Check ALDC switch and associated wiring.
30	With SWR switch (34) depressed and transmitter connected into unbalanced antenna, no indication appears on PA OUTPUT meter SWR IND (5).	Reflected power output circuit element (CR904, C1042, L1006, C1043, or S1017) is defective.	Check circuit elements in reflected power output channel of DC900.

TABLE 3-4. SHORT CIRCUIT TEST

POINT OF MEASUREMENT	NORMAL INDICATION	ISOLATING PROCEDURE
From either terminal of Coil L1000 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the phase 1 input wiring. Check for a shorted buzzer DS1000, and short-circuited wiring from the phase 1 input line to ground.
From either terminal of Coil L1001 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the phase 2 input wiring. Check for short-circuited wiring in the phase 2 input line.

TABLE 3-4. SHORT CIRCUIT TEST (CONT)

POINT OF MEASUREMENT	NORMAL INDICATION	ISOLATING PROCEDURE
From either terminal of resistor R3002 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the phase 3 input wiring. Check for a shorted or leaky bypass capacitor (C803 through C810. C1014. or C1015) and for short-circuited wiring in the phase 3 input wiring.
From pin G of P1000 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the phase 1 wiring. Check for a shorted or leaky bypass capacitor C1016, a short circuit in blower motor B800, and for short-circuited wiring in the phase 1 line.
From terminal E1005 to ground.	Resistance reading of approximately 1, 700 ohms.	If resistance is low. check for short circuit to ground in transformer T800 or associated wiring. If resistance is high, check for an open resistor (R820. R819. and R816). an open choke L801. and an open contact from E802 on the high-voltage shorting coil to ground.
From plate of V900 to ground.	Resistance reading of approximately 100 ohms.	If resistance is low. check for a shorted capacitor (C940. C939. C930. and C911) and for short-circuited wiring in the V900 plate circuit. If resistance is high. check for an open inductor (L902. L903. L906. L911. or L914). and an open circuit from the E801 contact to ground.
From screen of V900 to ground.	Resistance reading of approximately 170, 000 ohms.	If resistance is low, check for a shorted or leaky capacitor (C1009, C1010, C1018. C1017. C1009. C917. or C919 through C926) and for short-circuited wiring in the V900 screen circuit. If resistance is high, check for an open circuit in resistors R914 or R915. R813, R814. R815. or inductor L909.
From control grid of V900 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the V900 grid circuit. Check for a shorted or leaky capacitor, (C931 through C935 and C945) and for short-circuited wiring in the V900 grid circuit.
From pin U of P1000 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the V900 filament circuit. Check for a shorted or leaky capacitor. (C813. C814, C1005. C1003, C946. C947. or C941), a short circuit to ground in the secondary of transformer T801. and for short-circuited wiring in the V900 filament circuit.

NOTE

Disconnect the high-voltage shorting contact from E801 and E802 on the high-voltage shorting coil for the next two measurements.

TABLE 3-4. SHORT CIRCUIT TEST (CONT)

POINT OF MEASUREMENT	NORMAL INDICATION	ISOLATING PROCEDURE
From E801 to ground.	Resistance reading of approximately 8 megohms.	If resistance is low, check for a shorted or leaky capacitor, (C800, C940, C939, C930, or C911), and for short-circuited wiring in the +7, 500-volt dc line. If resistance is high, check for an open resistor (R810, R811, or R812).
From E802 to ground.	Resistance reading of approximately 138, 000 ohms.	If resistance is low, check for a shorted or leaky capacitor, C801 or C802, and for short-circuited wiring in the +3, 000-volt or the +1, 200-volt dc lines.
	NOTE Make the following short-circuit tests on the High Voltage Rectifier.	
From E600 to ground.	Infinite resistance.	If finite resistance indicates a short circuit in transformer T601 secondary or in the phase 1 wiring.
From E610 to ground.	Infinite resistance.	If finite resistance indicates a short circuit in transformer T603 secondary or in the phase 2 wiring.
From E609 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in transformer T604 secondary or in the phase 3 wiring.
From E606 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the B+ output circuit of the High Voltage Rectifier. Check for a short circuit in the secondaries of transformers T600, T602, and T605, and for short-circuited wiring in the B+ output circuit.
From E607 to ground.	Infinite resistance.	A finite resistance indicates a short circuit in the filament circuit. Check for a shorted or leaky bypass capacitor (C600 and C601) a short circuit to ground in the primaries of transformers T600 through T605, and for short-circuited wiring in these transformer circuits.

3-6. POWER AMPLIFIER SECTION AX-694.

Troubleshooting procedures for the power amplifier aer included in tables 3-2 and 3-3. Use the PA meter on the main frame meter panel to take voltage and current measurements; compare voltage readings with those shown in table 3-10. If voltage readings are abnormal, take resistance readings to isolate open and short circuits. Use the overall schematic diagram in Section 6 in conjunction with the parts location photographs, figures 3-2 and 3-3, to circuit trace the power amplifier.

WARNING

Voltages as high as 7,500 are present in the transmitter. Before making resistance measurements, make sure that the HIGH VOLTAGE and MAIN POWER circuit breakers on the main power panel are OFF and use the shorting rod to discharge all filter capacitors in the main power supply. When taking voltage readings, make sure hands are dry, use test prods insulated for at least 10,000 volts and take care to keep free hand and body away from electrical ground and clear of equipment.

3-7. RELAY PANEL AR-161.

Troubleshooting procedures for the relay panel are included in tables 3-2 and 3-3. When trouble has been sectionalized to a particular circuit in the relay panel, use the resistance data of table 3-11 in conjunction with the overall schematic diagram (figure 6-1) to isolate the trouble to a part. Parts location is shown in figure 3-4.

3-8. HIGH VOLTAGE DIODE RECTIFIER AND MAIN POWER SUPPLY AX-695.

Troubleshooting procedures for the high voltage rectifier and main power supply are included in tables 3-2 and 3-3. Short circuit testing is given in table 3-4. When troubles have been sectionalized to a particular circuit, use the resistance data in table 3-12 in conjunction with the overall schematic diagram (figure 6-1) to isolate the trouble to a part. Parts location is shown in figures 3-5, 3-6, and 3-7. SEE WARNING, PARAGRAPH 3-3.

3-9. MAIN FRAME AND MAIN POWER PANEL.

Troubleshooting procedures for the main frame circuits are included in tables 3-2 and 3-3. Use the overall schematic in section 6 to circuit trace and isolate the faulty part.

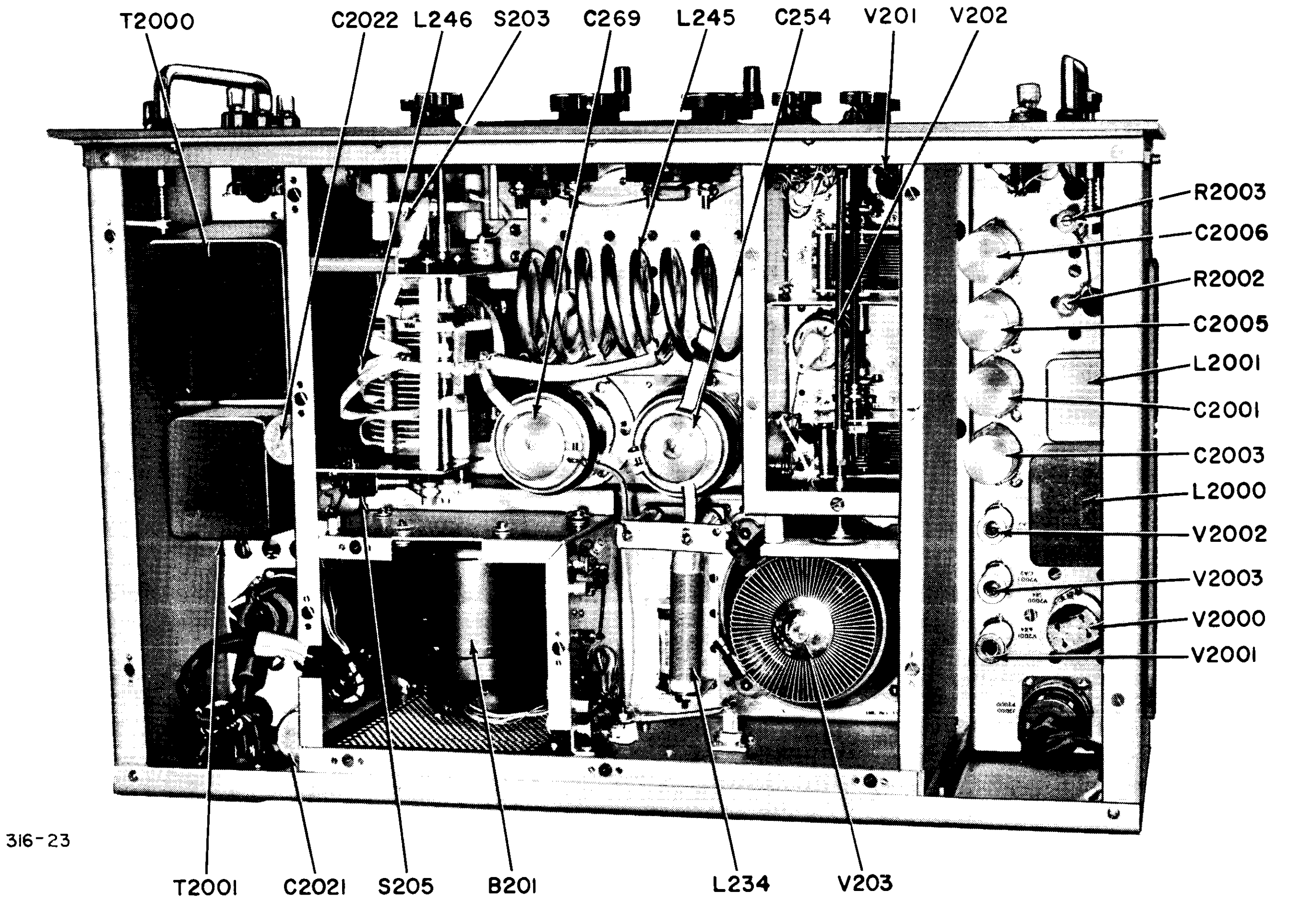


Figure 3-1. RF Amplifier RFC and Power Supply AX-104, Top View

TABLE 3-5. TROUBLESHOOTING, RFC AND AX-104

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURE
1	Filaments of the rf amplifiers do not glow in RFC.	Defective transformer T2001.	Check transformer T2001.
		IPA FIL fuse F2003 open.	Check fuse F2003.
2	Filaments of V2000 and V2001 do not glow.	LV fuse F2004 open.	Check fuse F2004.
		Defective transformer T2000.	Check transformer T2000.
3	Filament of V2000 or V2001 only does not glow.	Defective transformer T2000.	Check transformer T2000.
		Defective rectifier tube.	Check tube.
4	On relay panel, the PA BIAS and IPA BIAS indicator lamps light. (38 and 46, respectively)	Rectifier V2001 defective.	Check tube V2001.
		IPA BIAS fuse F2001 open.	Check fuse F2001.
		Filter circuit defective.	Check inductor L2001, capacitors C2004 through C2007, and resistor R2004.
		Transformer T2000 defective.	Check transformer T2000.
		Short in -300-volt circuit.	Check for short.
5	On relay panel, only the IPA BIAS indicator lamp (46) lights.	Defective voltage regulator tube V2002 or V2003.	Check tubes V2002 and V2003.
		Short in -150-volt circuit.	Check for short circuit.
6	With MULTIMETER switch (18) set to DC IPA BIAS, a subnormal indication is observed on the MULTIMETER (15). Indication on IPA PLATE CURRENT meter (17) is excessive.	Bias rectifier circuit defective.	Refer to itsm 4 and 5 above.
		Defective voltage divider.	Check resistors R2008 and R2010 and potentiometer R2009.
		Shorted or leaky bypass capacitors.	Check capacitors C284 and C250.
		Defective amplifier.	Check amplifier V203.
7	With MULTIMETER switch (18) set to DC IPA BIAS, an incorrect indication is observed on the MULTIMETER (15). Indication on IPA PLATE CURRENT meter (17) is normal.	Defective rectifier V2000.	Check resistor R225.

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURE
8	Correct indications are obtained on MULTIMETER (15) when MULTIMETER switch (18) is set to DC IPA BIAS or DC IPA Ep. but incorrect indications are obtained for all other settings of the MULTIMETER switch.	Defective rectifier V2000.	Check tube V2000.
		Short in +400-volt circuit.	Check for short circuit.
		B+ fuse F2000 open.	Check fuse F2000.
		Filter circuit defective.	Check inductor L2000, capacitors C2002, C2003A, C2003B, C2001A and C2000; and resistor R2000 and R2001.
		Transformer T2000 defective.	Check transformer T2000.
9	With MULTIMETER switch (18) set to DC IPA ESG, an incorrect indication is observed on the MULTIMETER (15) when the TUNE-OPERATE switch (35) on the main power panel is set to TUNE but a correct indication is obtained when the TUNE-OPERATE switch is set to OPERATE.	Defective voltage divider or filter capacitor.	Check resistors R2002 and R2003 and capacitor C2001B.
		Short in +200-volt circuit.	Check for short circuit.
10	With multimeter switch set (18) to DC IPA ESG, an incorrect indication is observed on MULTIMETER (15) but a correct indication is obtained when the MULTIMETER switch is set to RF 1ST AMPL Ep.	Defective resistor R221 or R222.	Check resistors R221 and R222.
11	With MULTIMETER switch (18) set to DC IPA Ep an incorrect indication is observed on MULTIMETER (15). Indication on IPA PLATE CURRENT motor is abnormal.	Short in V203 plate circuit.	Check for short circuit.
		Defective amplifier tube.	Check V203.
12	With MULTIMETER switch (18) set to DC IPA Ep, an incorrect indication is observed on MULTIMETER (15). Indication on IPA PLATE CURRENT meter (17) is normal.	Defective voltage divider.	Check resistors R211, R201, R234, R236, R217 and R214.
13	B+ fuse opens continually.	Short in +400- or +200-volt circuit.	Check for short circuit.
14	IPA BIAS fuse opens continually.	Short in -300- or -150-volt circuit.	Check for short circuit.

TABLE 3-5. TROUBLESHOOTING, RFC AND AX-104 (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURE
21	With MULTIMETER switch (18) set to RF IPA E_G, incorrect indications are observed on MULTIMETER (15) when operating within one frequency band.	DRIVER BAND switch S201B defective.	Check continuity of DRIVER BAND switch S201B.
		Tuned circuit defective.	Check tuned circuit associated with nonoperative frequency band.
		Variable inductor associated with inoperative frequency band misaligned.	Realign inductor.
22	With MULTIMETER switch (18) set to RF IPA E_p, incorrect indications are observed on MULTIMETER when operating any frequency.	Intermediate power amplifier stage defective.	Check tube V203. Make voltage and resistance checks.
		Meter filter circuit defective.	Check filter components associated with MULTIMETER switch position.
23	With MULTIMETER switch (18) set to RF PA E_G, incorrect indications are observed on MULTIMETER (15) when operating at any frequency.	IPA BAND switch S202 defective.	Check continuity of IPA BAND switch S202.
		IPA LOADING switch S203 defective.	Check continuity of IPA LOADING switch S203.
		IPA TUNING and IPA LOADING circuit defection.	Check components of IPA TUNING and IPA LOADING circuit.
		NEUT capacitor C255 misaligned.	Realign C255.
		Meter filter circuit defective.	Check filter components associated with MULTIMETER switch position.
24	With MULTIMETER switch (18) set to RF PA E_g. incorrect indications are observed on the MULTIMETER (15) when operating within one frequency band.	IPA BAND switch S202 defective.	Check continuity of IPA BAND switch S202.
		IPA LOADING switch S203 defective.	Check continuity of IPA LOADING switch S203.
		Rf Amplifier RFC misaligned.	Realign RFC.
25	No reading on MULTIMETER (15) in only one position of MULTIMETER switch (18).	MULTIMETER switch defective.	Check continuity of MULTIMETER switch S204.
		Meter filter circuit associated with particular position of MULTIMETER switch defective.	Check filter elements associated with particular position of MULTIMETER switch.
26	No indication is observed on MULTIMETER meter (15) with MULTIMETER switch (18) in any position. Indication on IPA PLATE CURRENT meter (17) is correct.	MULTIMETER switch S204 defective.	Check continuity of MULTIMETER switch S204.
		MULTIMETER M202 defective.	Check MULTIMETER M202.
		Meter bypass capacitor C237 shorted or leaky.	Check capacitor C237.

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURE
15	IPA BLOWER fuse opens continually.	Shorted blower motor.	Check blower motor B201.
		Shorted or leaky capacitor C2021.	Check capacitor C2021.
16	IPA FIL fuse opens continually.	Shorted transformer T2001.	Check transformer T2001.
		Shorted bypass capacitor.	Check bypass capacitors C2017 and C2018.
		Short in RF Amplifier RFC filament circuits.	Check for short circuit.
17	LV fuse opens continually.	Shorted transformer T2000.	Check transformer T2000.
		Defective tube.	Check tubes V2000 and V2001 by substitution.
18	With MULTIMETER switch (18) set to RF 1ST AMPL Ep, incorrect indications are observed on MULTIMETER (15) when operating at any frequency.	DRIVER BAND switch S201A defective.	Check continuity of DRIVER BAND switch S201A.
		Rf amplifier stage defective.	Check tube V201 by substitution.
		Meter filter circuit defective.	Check meter filter circuit elements.
		Capacitor C202 misaligned.	Realign unit.
19	With MULTIMETER switch (18) set to RF 1ST AMPL Ep, incorrect indications are observed on MULTIMETER (15) when operating within one frequency band.	DRIVER BAND switch S201 defective.	Check continuity of DRIVER BAND switch S201.
		Tuned circuit defective.	Check tuned circuit associated with nonoperative frequency band.
		Variable inductor associated with inoperative frequency band misaligned.	Realign inductor associated with inoperative band.
20	With MULTIMETER switch (18) set to RF IPA E_G, incorrect indications are observed on the MULTIMETER (15) when operating at any frequency.	DRIVER BAND S201B defective.	Check continuity of DRIVER BAND switch S201B.
		Driver stage defective.	Check tube V202 by substitution.
		Meter filter circuit defective.	Check filter components associated with switch position.
		Capacitor C231 misaligned.	Realign unit.

TABLE 3-5. TROUBLESHOOTING, RFC AND AX-104 (CONT)

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURE
27	No indication is observed on IPA PLATE CURRENT meter (17) MULTIMETER indications are correct for every position of MULTIMETER switch (18).	IPA PLATE CURRENT meter defective.	Check PA PLATE CURRENT meter M201.
		Meter bypass capacitor C222 shorted or leaky.	Check capacitor C222.
28	Blower motor B201 does not operate but all tube filaments light.	Blower motor defective.	Check blower motor.
		IPA BLOWER fuse F2003 open.	Check fuse F2003.
		Capacitor C2021 defective.	Check capacitor C2021.
29	INTERLOCK INDICATOR lamp (30) on the main power panel goes off when INTERLOCK switch (31) is set to IPA BAND SW.	Bandswitch interlock switch S205 defective.	Check switch S205.
		IPA BAND switch not properly set in detent.	Set IPA BAND switch in detent.
30	DRAWER INTERLOCK indicator lamp (16) does not light when RFC is extended from the rack.	Defective indicator lamp.	Check indicator lamp I2000 by substitution.
		Defective resistor R2006.	Check resistor R2006.

TABLE 3-6. VOLTAGE AND RESISTANCE MEASUREMENTS, RFC AND AX-104

DC VOLTAGES (MAIN POWER ON AND TUNE-OPERATE SWITCH IN OPERATE)

TUBE	PIN NO.										
	1	2	3	4	5	6	7	8	9	PLATE	SC. GRID
V201	0	-5	150	FIL	FIL	400	0	150	-5	-	-
V202	0	FIL	200	-	-38	-	FIL	-	-	400	-
V203	0	-100	FIL	0	FIL	-100	0	-	-	3000	400
V2000	-	(400) FIL	-	375VAC	-	375VAC	-	(400) FIL	-	-	-
V2001	-300	-	(-300) FIL	(-300) FIL	-	-300	275VAC	-	-	-	-
V2002	-150	-300	-	-300	-150	-	-300	-	-	-	-
V2003	0	-150	-	-150	0	-	-150	-	-	-	-

TABLE 3-6. VOLTAGE AND RESISTANCE MEASUREMENTS, RFC AND AX-104 (CONT)

RESISTANCES (MAIN POWER OFF)

TUBE	PIN										
	1	2	3	4	5	6	7	8	9	PLATE	SC. GRID
V201	0	55K	27K	0	0.5	11K	0	27K	55K	-	-
V202	16	0.5	5K	-	92K	-	0	-	-	11K	-
V203	INF	10K	0	INF	0.5	10K	INF	-	-	INF	50K
V2000	-	10K	-	40	-	40	-	10K	-	-	-
V2001	50K	-	200	200	-	50K	180	-	-	-	-
V2002	15K	50K	-	50K	15K	-	50K	-	-	-	-
V2003	0	15K	-	15K	0	-	15K	-	-	-	-

TABLE 3-7. WIRE RUNNING LIST, CABLE W2002 (CA-422), PART OF AX-104

FROM	TO	COLOR
P2000-R	J2001-H	BLUE
P2000-B	T2000-16	WH BLUE
P2000-C	T2000-14	WH BLUE
P2000-V	T2000-10	YELLOW
P2000-F	T2000-10	YELLOW
P2000-U	J2002-J	WH/RED
P2000-N	J2001-E	RED
P2000-D	T2000-13	WHITE
P2000-S	T2000-9	WH BROWN
P2000-X	T2000-8	WH BROWN
P2000-G	J2002-E	WH YELLOW
P2000-W	R2010	ORANGE
P2000-H	T2000-12	WH/BLACK
P2000-P	J2001-d	BLACK
P2000-A	J2002-Y	LIGHT BLUE
P2000-E	J2002-Z	WH ORANGE
R2010	J2001-M	ORANGE
R2010	J2002-M	ORANGE
R2009	J2001-I	WHITE
T2000-12	J2002-U	WH/BLACK
T2000-12	GRD	WH BLACK
J2001-Y	J2002-d	BLACK
T2001-5	C2018	GREEN
J2001-h	J2002-h	(COAX)

FROM	TO	COLOR
T2000-1	F2004	WH/BLACK
T2000-1	J2002-X	WH/BLACK
T2000-4	T2001-4	GREY
J2002-T	F2002	GREY
T2001-1	F2003	BROWN
T2001-1	J2001-W	BROWN
F2004	J2002-P	WHITE
J2001-J	F2002	WH/GREY
F2003	J2002-V	VIOLET
F2003	C2020	VIOLET
T2001-4	J2002-O	YELLOW
J2001-F	C2021	YELLOW
J2001-L	C2021	WH/YELLOW
T2001-1	J2002-a	BROWN
J2002-A	J2001-A	WH/GREY
J2002-B	J2001-B	PINK
J2002-C	J2001-C	WH BROWN
J2002-D	J2001-X	WH VIOLET
J2002-W	R2007	LIGHT RED
J2002-b	J2001-b	RED/SHIELD
J2002-c	J2001-c	WH/BLUE
R2007	J2001-D	LIGHT RED
C2022	J2002-I	WH/RED

TABLE 3-8. WIRE RUNNING LIST, CABLE W2001 (CA-420), PART OF AX-104

FROM	TO	COLOR
C2006-5	C2005-5	WH BLACK
C2006-5	V299305	WH BLACK
C2006-5	J2000-H	WH/BLACK
J2000-W	V2002-5	ORANGE
V2003-2	R2004	WH/YELLOW
R2004	J2000-G	WH YELLOW
C2005-1	L2001	ORANGE
L2001	C2006-1	WH/ORANGE
C2006-1	F2001	WH/ORANGE
F2001	V2001-6	ORANGE
J2000-D	V2001-7	WHITE
V2001-4	J2000-3	WH/BROWN
J2000-X	V2001-3	WH/BROWN
J2000-B	V2000-6	WH/BLUE
J2000-C	V2000-4	WH/BLUE
J2000-V	V2000-2	YELLOW

FROM	TO	COLOR
J2000-F	V2000-8	YELLOW
F2000	V2000-8	WH YELLOW
C2003-5	F2000	WH RED
L2000	C2000-3	WH RED
L2000	C2003-3	RED
R2001	C2003-3	RED
R2000	C2001-5	BLUE
C2001-5	L2000	BLUE
J2000-I	R2002	WH/RED
R2002	R2001	WH/RED
J2000-N	R2003	RED
J2000-P	GRD	BLACK
J2000-A	R2006	LIGHT BLUE
I2000	J2000-E	WH/ORANGE
R2005	C2005-1	ORANGE
R2005	C2005-5	WH/BLACK

TABLE 3-9. WIRE RUNNING LIST, CABLE W201 (CA-419), PART OF RFC

FROM	TO	COLOR
P201-P, R	C282, C283	WHITE
C263	E201-3	YELLOW
P201-T, U	GRD	BLACK
C280	C236	VIOLET
R203	J201	(COAX)
P201-N	E201-1	WH/GREEN
P201-M	P231	BLUE
P201-L	E202-2	WH/BR
P201-a, w	C256	BROWN
P201-B	C236	VIOLET
P201-D	R223	YELLOW
P201-E	C212	WH/RED
P201-F	E202-4	WH/DR
S204-3B	R215	WH/BLUE
P201-H	L250	RED
P201-I	C284	ORANGE
P201-j	E202-3	WH/YELLOW
P201-d	E201-4	WH/VIOLET
P201-A, X	C281	WH/GRAY
P201-4	GRD	BLACK
P201-2	L221	WHITE
P201-C	C256	PINK
P201-b	E201-2	GREEN
P201-c	M201	WH/BLACK
C244	C256	PINK
P201-h	R202	(COAX)

FROM	TO	COLOR
S204-5B	R209	WH/GREEN
S204-1A	R225	BROWN
S204-6B	R233	WH/ORANGE
S204-7B	R218	YELLOW
S204-8B	R230	BLUE
S204-2B	R221	WHITE
S204-4A	R220	WH/BROWN
S204-4B	R222	WH/RED
L242	E201-1	SHIELDED
L242	C210	SHIELDED
L312	C213	--
C209	R227	--
C219	L215	--
C215	R205	--
C223	L249	--
C224	L250	--
R225	C284	ORANGE
C249	R221/P201-M	RED
L229	C239	YELLOW
L230	C246	RED
R228	C262	BROWN
L243	C265	WH/YELLOW
R227	R228	VIOLET
R229	R228	GREY
M201 (+)	C289	PINK

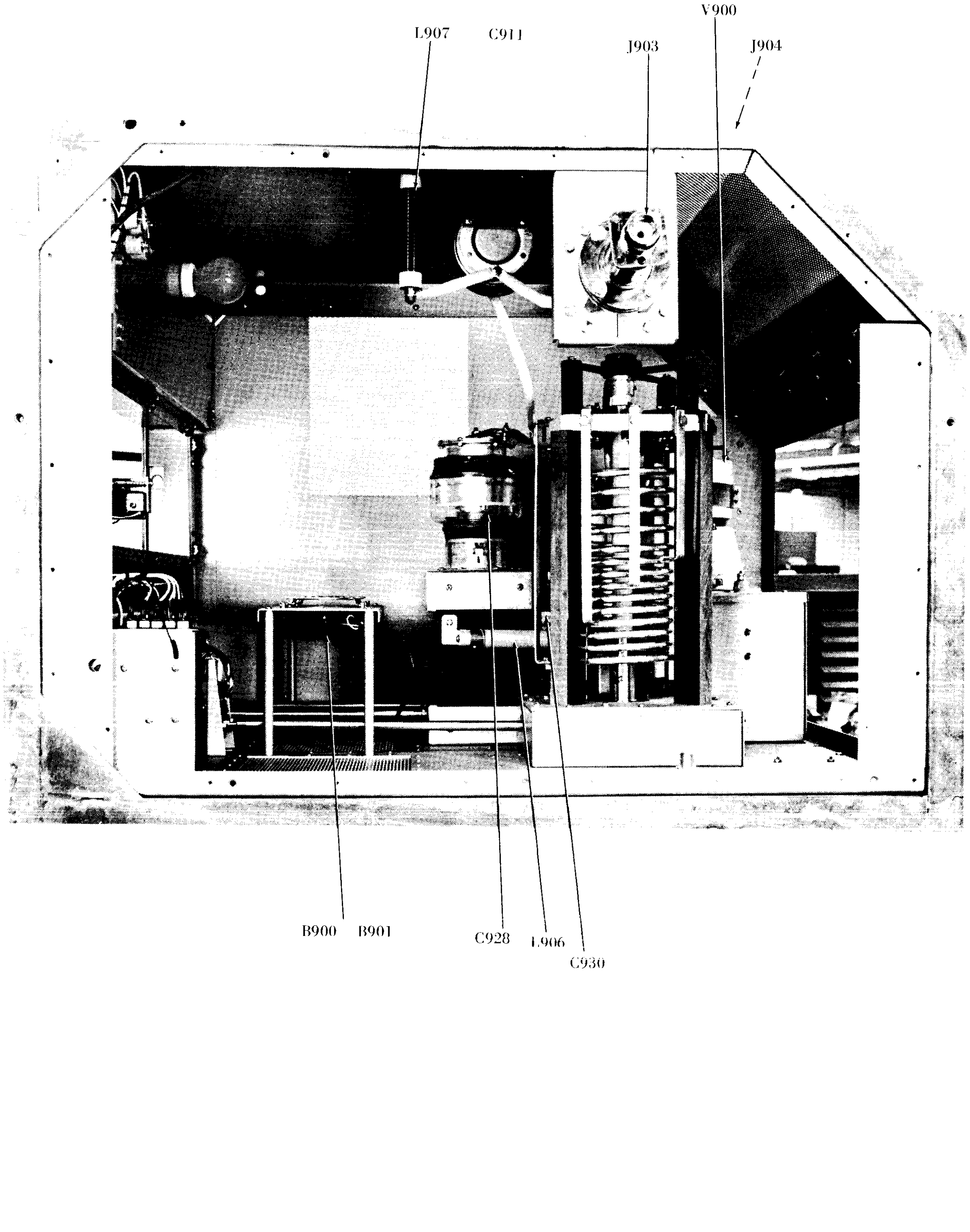


Figure 3-2. Power Amplifier Section AX-694, Side View

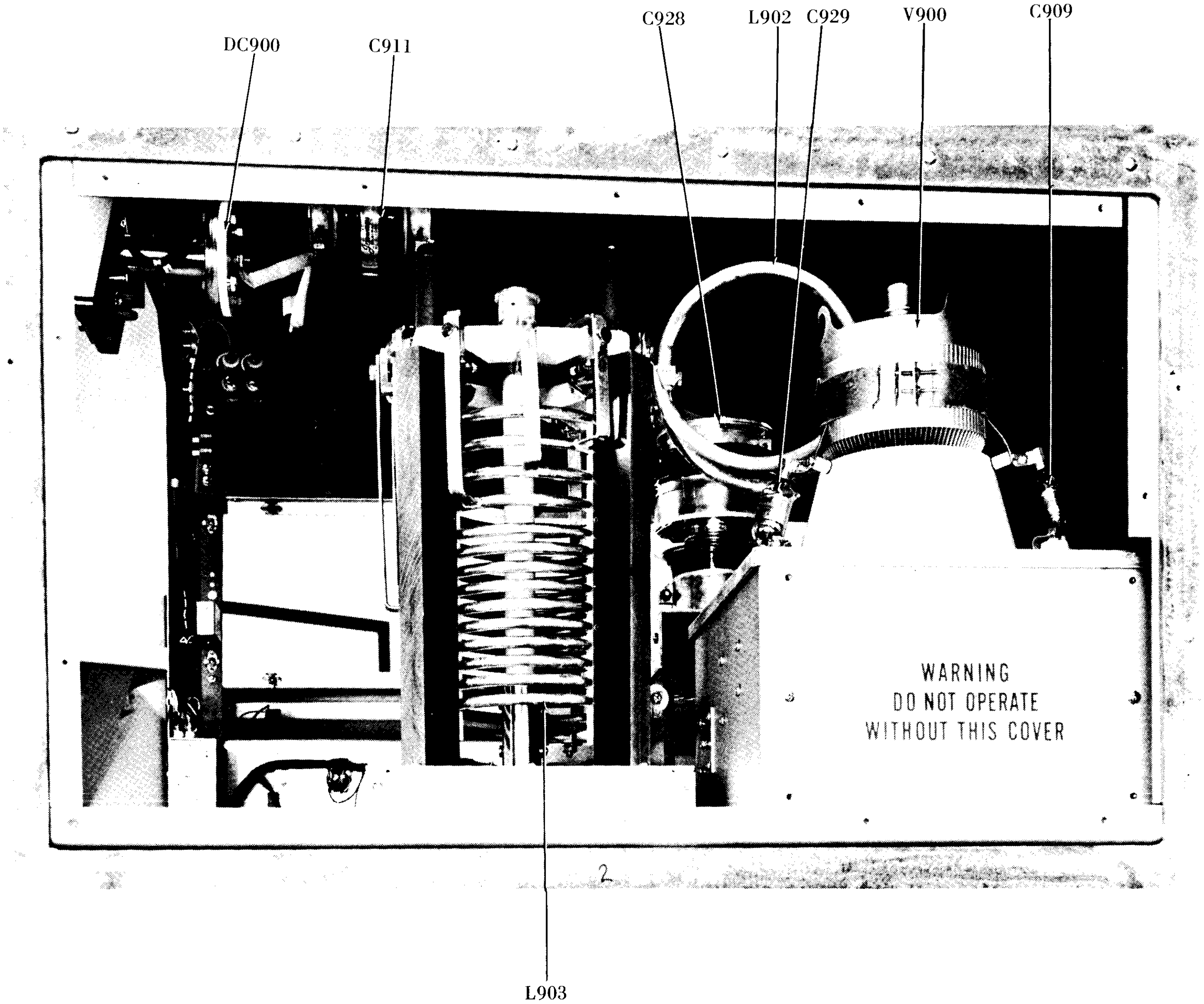


Figure 3-3. Power Amplifier Section AX-694, Rear View

TABLE 3-10. POWER AMPLIFIER V900, VOLTAGE AND RESISTANCE MEASUREMENTS

TUBE ELEMENT	VOLTAGE	RESISTANCE
Plate	+7500	100
Screen grid	+1200*	170K
Control grid	-300**	250K**
Filament	7.5 AC***	1***

*TUNE-OPERATE switch set to OPERATE position.
**Varies with setting of PA BIAS ADJ control.
***Measured across both filaments.

TABLE 3-11. RELAY COIL RESISTANCES

RELAY	TERMINAL	RESISTANCE
K700	1-2	11,000
K701	11-12	1,100
	13-14	1
K702	19-20	1,100
	E706-E707	11,500
K703	25-26	1,800
K704	27-28	1,100
	31-32	200
K705	33-34	11,000
K706	41-42	1,100
	47-48	10,000
K707	49-50	11,000
	55-56	43
K708	61-62	11,000

TABLE 3-12. HIGH VOLTAGE RECTIFIER AND MAIN POWER SUPPLY TRANSFORMER AND COIL RESISTANCES

TRANSFORMER OR COIL	TERMINALS	RESISTANCE
T600 through T605	1-2	8
	3-4	Less than 1
	4-5	Less than 1
T800-------------	Primary	5
	Secondary	15
T801-------------	1-2	Less than 1
	2-3	Less than 1
	3-4	Less than 1
	4-5	Less than 1
	5-6	Less than 1
	6-7	Less than 1
	7-8	6
	9-10	Less than 1
	10-11	Less than 1
L800-------------	---------	9
L801-------------	---------	23
L802-------------	---------	80
L803-------------	---------	Less than 1

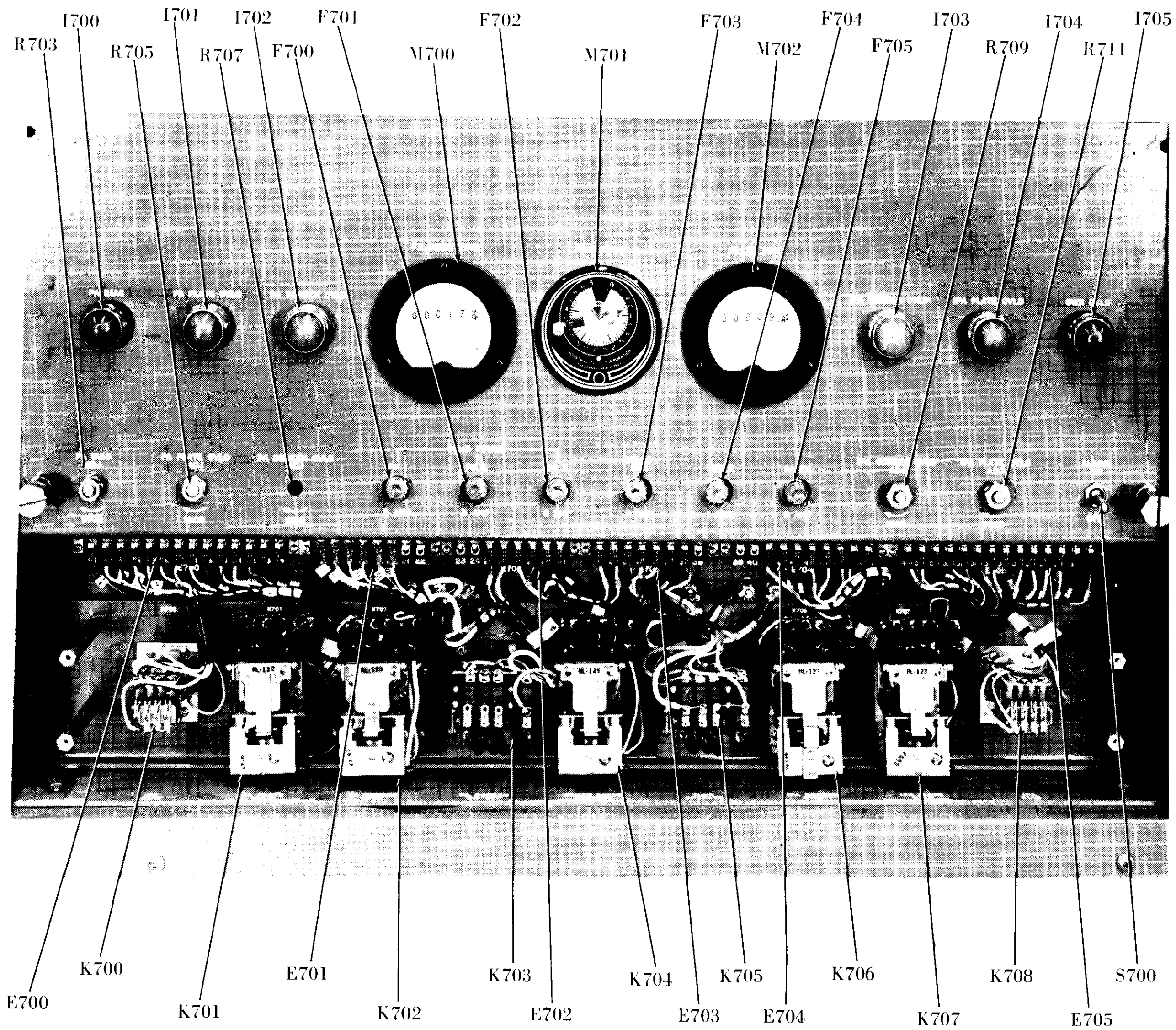


Figure 3-4. Relay Panel AR-161-2, Front View

TABLE 3-13. STANDING WAVE CONTROL CIRCUITRY, TROUBLESHOOTING

ITEM	INDICATION	PROBABLE TROUBLE	PROCEDURE
1	AC fuses F200, F201 opened continually.	Short in power transformer T200.	Check T200 for short.
2	B+ fuse F202 opens continually.	Short in B- line.	Check filter capacitors C218 and C219 for shorts or associated circuitry.
3	Overload relay K203 trips at incorrect SWR level.	Relay K202 or associated current limiting circuits are defective.	Check K202, Q200 and R204, R205, R206, R207, R208, as applicable.
4	Overload relay K203 trips with no PA power output.	SWR OVLD ADJ control circuitry is mis-adjusted.	Refer to paragraph 4-6.
		DC amplifier Q200 is defective or associated circuits are defective.	Check Q200.
5	Overload relay K203 does not trip at any SWR level.	SWR OVLD ADJ control circuitry is mis-adjusted.	Refer to paragraph 4-6.
		Power supply element is open.	Check rectifiers CR201 and CR202 and CR203, and filter capacitors C218 and C219 for open circuits.
		Relay K202 or associated current limiting resistor is open.	Check K202 as applicable, for open circuit.
		Overload relay K203 is defective.	Check K203 for open overload coil.

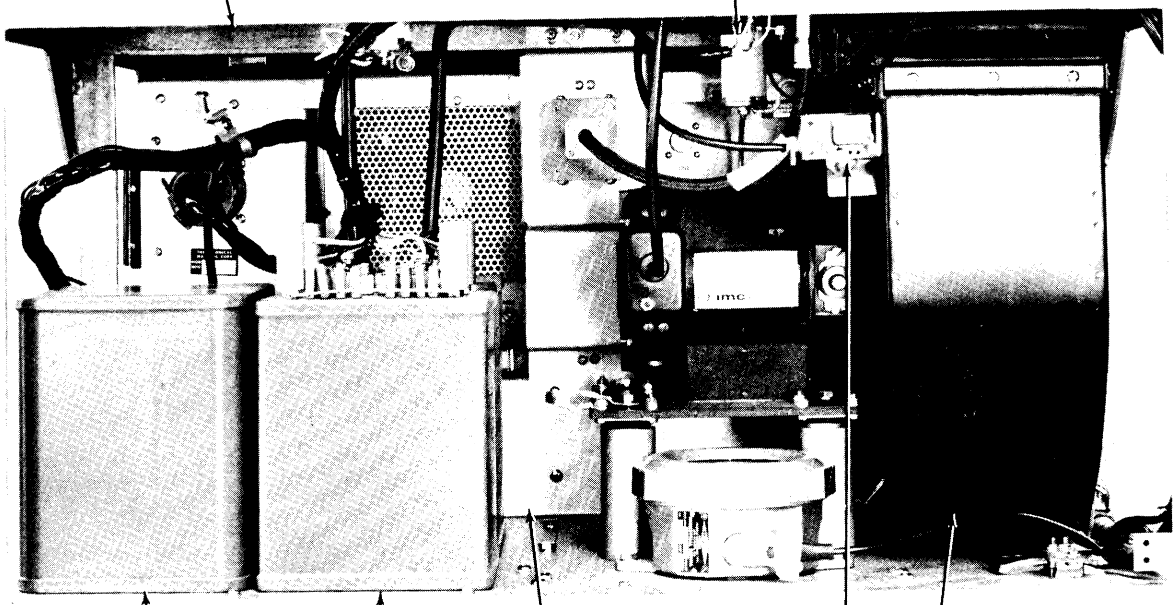


Figure 3-5. Main Power Supply AX-695, Upper Shelf

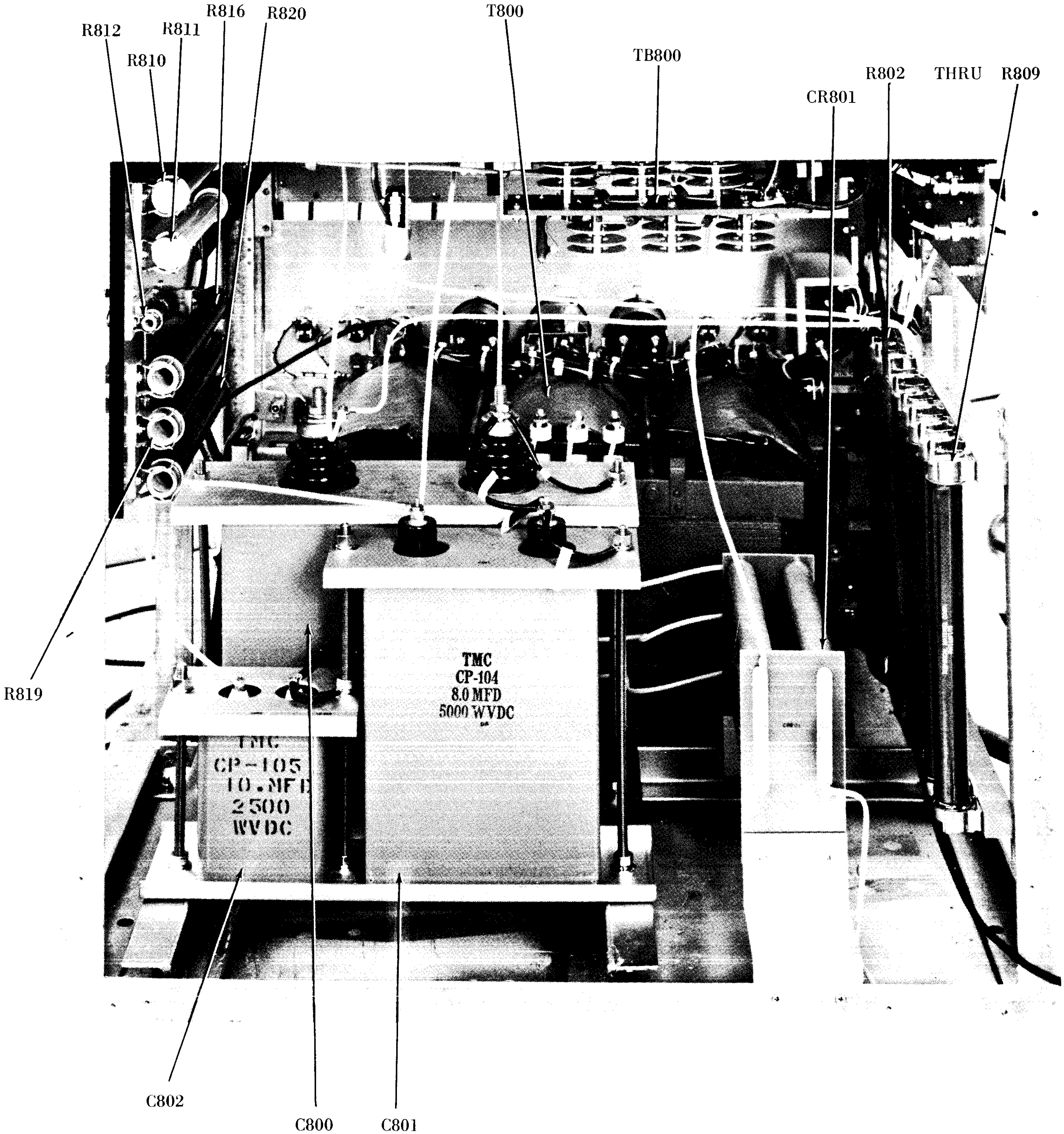


Figure 3-6. Main Power Supply AX-695, Lower Shelf

T O B E S U P P L I E D

Figure 3-7 Location of Interlock Switches

SECTION 4
MAINTENANCE

4-1. GENERAL.

Maintenance is divided into three categories: operator's maintenance, preventive maintenance, and corrective maintenance. The operator's maintenance, normally performed by the operator as he works with the equipment, is confined to visual inspection, cleaning, and fuse replacement. Operator's maintenance for the GPT-10K transmitter is included in the associated operating manual. Preventive and corrective maintenance procedures are given in this section.

4-2. PREVENTIVE MAINTENANCE.

Preventive maintenance is maintenance that detects and corrects trouble-producing conditions before they become serious enough to affect equipment operation. Some trouble-producing conditions are dirt and grime, contact erosion, improper contact pressure, lack of proper lubrication, improper relay adjustment, dirty air filters, overheating, unstable power supplies, and loose parts (due to vibration). Recommended schedules for preventive maintenance are presented below.

a. ONCE EACH SHIFT DURING AN "ON THE AIR" PERIOD. Check the operator's performance record for irregularities and possible sources of future trouble. Make minor adjustments of tuning controls to verify proper tuning. Observe all elctrical 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 transmitter for overheating and damage. Inspect all sliding or moving coil contacts. Feel blower and fan motors for overheating and observe rotating parts for wear. No 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 trichlorenthylene or ethylene-dichloride for cleaning. Inspect and clean the transmitter. Check the condition of the air filters. Replace or clean dirty filters. Inspect the equipment for loose solder connections or screws, especially in those areas in which appreciable vibration occurs. 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.

4-3. CORRECTIVE MAINTENANCE.

The corrective maintenance procedures are essentially factory alignment procedures modified for use in the field. Alignment procedures are presented in the following paragraphs.

4-4. ALIGNMENT OF RF AMPLIFIER RFC. (See figure 4-1.)

a. PRELIMINARY PROCEDURE.

(1) Pull RF Amplifier RFC and Power Supply AX-104 out on its slides, then remove top and bottom covers. Set PA SCREEN switch (36) on main power panel to OFF, and disable IPA drawer interlock switch S1009.

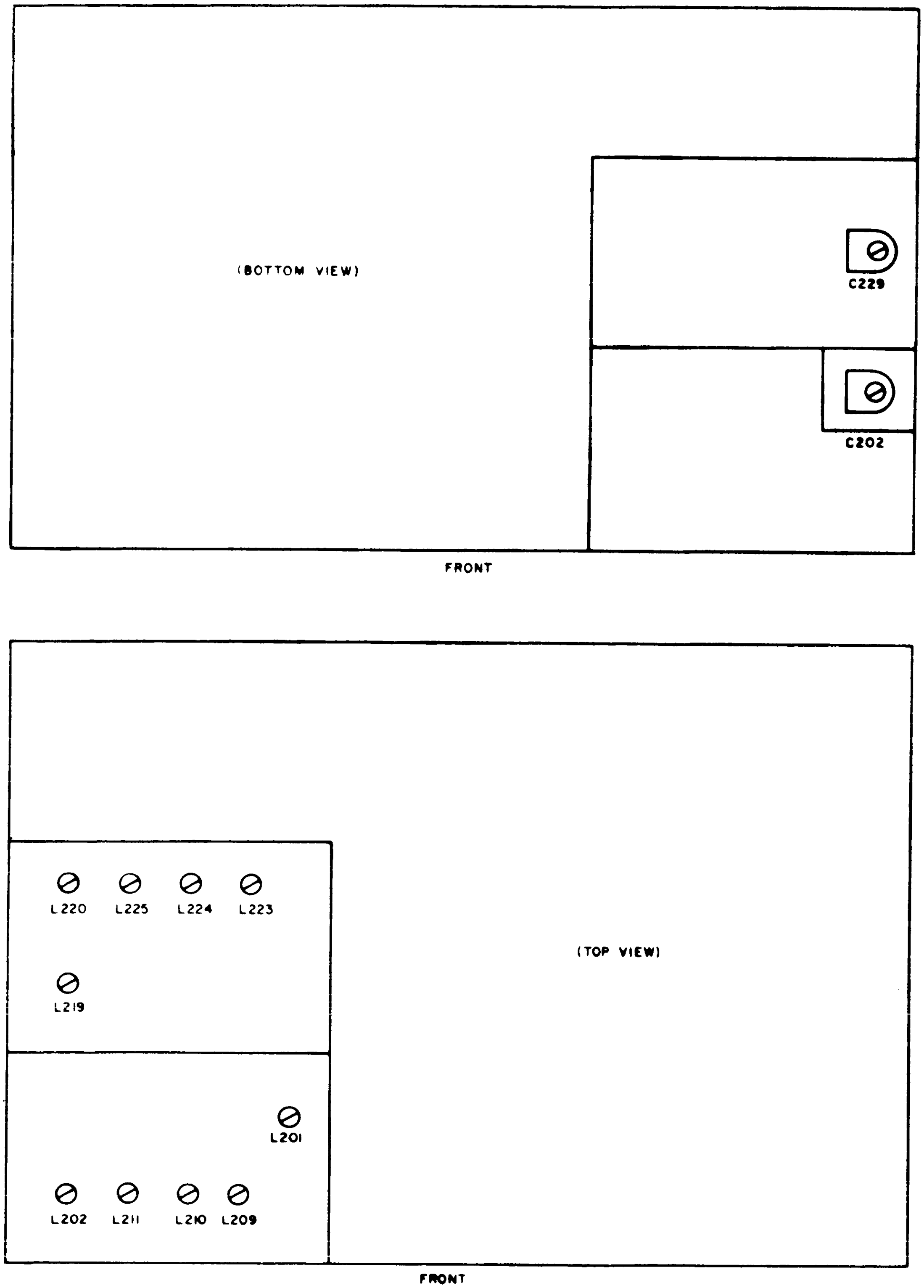
(2) Apply power and tune exciter to 2 mc at an rf output level of 1 volt.

(3) Preset tuning controls on RFC to 2 mc, as indicated on transmitter tuning chart.

(4) Apply primary power to main frame, then set MULTIMETER SWITCH (18) to IPA BIAS and adjust IPA BIAS AJD control for an indication of 100 volts on MULTIMETER (15).

(5) Set MULTIMETER switch to RF 1ST AMPL EP and tune 1ST AMPL TUNING control (20) for a peak reading on MULTIMETER.

(6) Set MULTIMETER switch to RF IPA EG and tune IPA GRID TUNING control (19) for a peak reading on MULTIMETER. Replace top and bottom covers and close the RTC and AX-104 drawer.



316-33

Figure 4-1. RF Amplifier RFC, Alignment Controls

(7) Reduce rf drive to minimum, then apply high voltage to transmitter.

(8) Adjust output level of the exciter for a reading of 220 milliamperes on IPA PLATE CURRENT meter (17).

(9) Tune IPA TUNING control for a pronounced dip on IPA PLATE CURRENT meter.

(10) Adjust IPA LOADING control until the reading on IPA PLATE CURRENT meter rises.

(11) Set the HIGH VOLTAGE circuit breaker on main power panel to OFF.

b. ALIGNMENT OF 2- TO 4-MC FREQUENCY BAND.

(1) Check that exciter is tuned to 2-mc.

(2) Set DRIVER BAND switch (21) to 2-4 and adjust capacitor C202 to approximately one-half capacity.

(3) Position 1ST AMPL TUNING control (20) to 0.5.

(4) Set MULTIMETER switch (18) to RF 1ST AMPL and adjust the OUTPUT control on the exciter for an indication of 7 on MULTIMETER (15).

(5) Tune inductor L301 for maximum deflection on MULTIMETER.

(6) Turn the MULTIMETER switch to the RF IPA EG position and set the IPA GRID TUNING control (19) to 1.

(7) Tune inductor L219 for maximum deflection of MULTIMETER. Return MULTIMETER switch to the RF 1ST AMPL EP position.

(8) Retune exciter to 4-mc. Position the 1ST AMPL TUNING control to 9, and tune capacitor C202 for maximum deflection on MULTIMETER.

(9) Set the MULTIMETER switch to the RF IPA EG position, and tune IPA GRID TUNING capacitor C231 for maximum deflection of the MULTIMETER.

(10) The control knob of the IPA GRID TUNING control should now point to 9. If the IPA GRID TUNING control does not point to 9, return to (1) above and retune the 2-mc band using a slightly different setting for the 1ST AMPL TUNING control, (3) above.

(11) Check high end of band again, and if it is not yet satisfactory, repeat all the above steps until the 2- to 4-mc frequency band is tracking correctly.

c. ALIGNMENT OF 4- TO 8-MC FREQUENCY BAND.

(1) Tune the exciter to 4-mc.

(2) Set the DRIVER BAND switch to the 4-8 position and adjust neutralizing capacitor C229 to approximately one-quarter capacity.

(3) Position the 1ST AMPL TUNING control to 0.5, and set the MULTIMETER switch to the RF 1ST AMPL EP position; adjust the OUTPUT control of the exciter for an indication of 7 on the MULTIMETER.

(4) Tune inductor L202 for maximum deflection on the MULTIMETER.

(5) Turn the MULTIMETER switch to the RF IPA EG position and set the IPA GRID TUNING control to 0.5; tune inductor L220 for maximum deflection on the MULTIMETER. Return the MULTIMETER switch to the RF 1ST AMPL EP position.

(6) Set the output frequency of the exciter to 8-mc, and tune the 1ST AMPL TUNING control for maximum deflection of the MULTIMETER.

(7) Set the MULTIMETER switch to the RF IPA EG position, and tune the IPA GRID TUNING control for maximum deflection of the MULTIMETER.

(8) The control knobs of both of the 1ST AMPL TUNING capacitor and the IPA GRID TUNING capacitor should now point to 9. If they both do not point to 9, return to (1) above and retune the 4-mc band using a slightly different setting of the 1ST AMPL TUNING control (3) above.

(9) Check the high end of the band again; if it is not yet satisfactory, repeat all of the above steps until the 4-8-mc frequency band is tracking correctly.

d. ALIGNMENT OF 8- TO 16-MC FREQUENCY BAND.

(1) Tune exciter to 8-mc.

(2) Set the DRIVER BAND switch to the 8-16 position.

(3) Position the 1ST AMPL TUNING control to 0.5, and set the MULTIMETER switch to the RF 1ST AMPL EP position; adjust the OUTPUT control to the exciter for an indication of 7 on the MULTIMETER.

(4) Tune inductor L209 for maximum deflection on the MULTIMETER.

(5) Turn the MULTIMETER switch to the RF IPA EG position and set the PA GRID TUNING control to 0.5; tune inductor L233 for maximum deflection on the MULTIMETER. Return the MULTIMETER switch to the RF 1ST AMPL EP position.

(6) Set the output frequency of the exciter to 16-mc, and tune the 1ST AMPL TUNING control for maximum deflection of the MULTIMETER.

(7) Set the MULTIMETER switch to the RF IPA EG position, and tune the IPA GRID TUNING control for maximum deflection of the MULTIMETER.

(8) The control knobs of both the 1ST AMPL TUNING capacitor and the IPA GRID TUNING capacitor should now point to 8. If they both do not point to 8, return to (1) above and retune the 8-mc band using a slightly different setting of the 1ST AMPL TUNING control, (3) above.

(9) Check the high end of the band again; if it is not yet satisfactory, repeat all of the above steps until 8-16-mc frequency band is tracking correctly.

e. ALIGNMENT OF 16- TO 20-MC FREQUENCY BAND.

(1) Tune exciter to 16-mc.

(2) Set the DRIVER BAND switch to the 16-20 position.

(3) Position the 1ST AMPL TUNING control to 4, and set the MULTIMETER switch to the RF 1ST AMPL EP position; adjust the OUTPUT control of the exciter for an indication of 7 on the MULTIMETER.

(4) Tune inductor L210 for maximum deflection of the MULTIMETER.

(5) Turn the MULTIMETER switch to the RF IPA EG position and set the IPA GRID TUNING control to 3; tune inductor L224 for maximum deflection on the MULTIMETER. Return the MULTIMETER switch to the RF 1ST AMPL EP position.

(6) Set the output frequency of the exciter to 20-mc,and tune the 1ST AMPL TUNING control for maximum deflection of the MULTIMETER.

(7) Set the MULTIMETER switch to the RF IPA EG position, and tune the IPA GRID TUNING control for maximum deflection of the MULTIMETER.

(8) The control knobs of both the 1ST AMPL TUNING capacitor and the PA GRID TUNING capacitor should now point to 8. If they both do not point to 8, return to (1) above and retune the 16-mc band using a slightly different setting of the 1ST AMPL TUNING control, (3) above.

(9) Check the high end of the band again; if it is not yet satisfactory, repeat all of the above steps until the 16-20-mc frequency band is tracking correctly.

f. ALIGNMENT OF 20- TO 28-MC FREQUENCY BAND.

(1) Tune the exciter to 20-mc.

(2) Set the DRIVER BAND switch to the 20-28 position.

(3) Position the 1ST AMPL TUNING control to 4, and set the MULTIMETER switch to the RF 1ST AMPL EP position; adjust the OUTPUT control of the exciter for an indication of 7 on the MULTIMETER.

(4) Tune inductor L211 for maximum deflection of the MULTIMETER.

(5) Turn the MULTIMETER switch to the RF IPA EG position and set the IPA GRID TUNING control to 7; tune inductor L225 for maximum deflection on the MULTIMETER. Return the MULTIMETER switch to the RF 1ST AMPL EP position.

(6) Set the output frequency of the exciter to 28-mc, and tune the 1ST AMPL TUNING control for maximum deflection of the MULTIMETER.

(7) Set the MULTIMETER switch to the RF IPA EG position, and tune the IPA GRID TUNING control for maximum deflection of the MULTIMETER.

(8) The control knobs of both the 1ST AMPL TUNING capacitor and the PA GRID TUNING capacitor should now point to 8. If they both do not point to 8, return to (1) above and retune the 22-mc band using a slightly different setting of the 1ST AMPL TUNING control, (3) above.

(9) Check the high end of the band again; if it is not yet satisfactory, repeat all of the above steps until the 20-28-mc frequency band it tracking correctly.

g. NEUTRALIZATION.

(1) Set DRIVER BAND switch to 8-16 position and the IPA BAND switch to 8-12 position.

(2) Tune the exciter to 8-mc.

(3) Position MULTIMETER switch to RF 1ST AMPL EP, and adjust the OUTPUT control of the exciter for an indication of 1.4 on the MULTIMETER.

(4) Rotate 1ST AMPL TUNING control until peak reading is obtained on the MULTIMETER.

(5) Set MULTIMETER switch to the RF IPA EG position, and rotate IPA GRID TUNING control unti a peak reading is obtained on the MULTIMETER.

(6) Reduce the output level of the exciter to zero.

(7) Set the IPA TUNING control, the IPA LOADING control, and the IPA LOADING switch to 8-mc as indicated in the equipment tuning chart.

(8) Set the HIGH VOLTAGE circuit breaker (37) on the main power panel to ON.

(9) Slowly increase the output level of the exciter until the reading on the IPA PLATE CURRENT meter is approximately 220 milliamperes.

(10) Rotate the IPA TUNING control until a maximum reading is produced on the IPA PLATE CURRENT meter.

(11) Increase the setting of the IPA LOADING control until the reading on the IPA PLATE CURRENT meter rises.

(12) Repeat (10) and (11) above increasing the excitation until the reading on the IPA PLATE CURRENT meter is approximately 300 millamperes.

(13) Set MULTIMETER switch to RF PA EG position and note the indication on the MULTIMETER.

(14) Set the HIGH VOLTAGE circuit breaker on the main power panel to OFF.

(15) Adjust NEUT control for a minimum reading on the MULTIMETER.

(16) Set the output frequency of the exciter to 28-mc and repeat (3), (4), (5), and (8) through (15) above using the following control and switch positions.

CONTROL OR SWITCH	POSITION
DRIVER BAND	20-28
IPA BAND	20-28
IPA LOADING	(See tuning chart for 28-mc setting.)
IPA LOADING	(See tuning chart for 28-mc setting.)
IPA TUNING	(See tuning chart for 28-mc setting.)

(17) If the setting of the NEUT control is not the same for the 8-mc and the 28-mc frequencies, return to (15) above and readjust the NEUT control in both frequency ranges until a compromise setting, which will keep the MULTIMETER meter indication at a minimum for both frequencies, is reached.

h. AUTOMATIC LOAD AND DRIVE CONTROL (ALDC) ALIGNMENT. To adjust the aldc circuit in the rf amplifier, proceed as follows:

(1) Connect a jumper between terminals 1 and 3 of E201.

(2) Set the front panel switches and controls and listed below:

CONTROL OR SWITCH	POSITION
DRIVER BAND	2-4
IPA BAND	2-2.5
IPA LOADING	(See tuning chart for 2-mc setting.)
MULTIMETER	RF 1ST AMPL EP
IPA LOADING	(See tuning chart for 2-mc setting.)
IPA TUNING	(See tuning chart for 2-mc setting.)
ALDC	Fully counterclockwise.

(3) Set potentiometer R228 on the rear of the rf amplifier fully counterclockwise.

(4) Set output frequency of the exciter to 2 mc, and adjust output level for an indication of 1.4 on the MULTIMETER.

(5) Rotate the 1ST AMPL TUNING control until a peak reading is obtained on the MULTIMETER.

(6) Set the MULTIMETER switch to the RF PA EG position. Rotate the IPA GRID TUNING control until a peak reading is obtained on the MULTIMETER.

(7) Rotate the OUTPUT control on the exciter to its maximum counter-cloclockwise position.

(8) Set the HIGH VOLTAGE circuit breaker on the main power panel to ON.

(9) Slowly increase the setting of the OUTPUT control on the exciter until the reading on the IPA PLATE CURRENT meter is approximately 220 milliamperes.

(10) Rotate the IPA TUNING control until a minimum reading is produced on the IPA PLATE CURRENT meter.

(11) Adjust the setting of the IPA LOADING control until the reading on the IPA PLATE CURRENT meter rises.

(12) Readjust the setting of the OUTPUT control on the exciter until the reading on the IPA PLATE CURRENT meter is restored to 220 milliamperes.

(13) Set the MULTIMETER switch to the RF PA EG position and note the level of rf output.

(14) Repeat(10) through(13) above, increasing the excitation until the desired power output is obtained. Full-rated power output should be obtained with approximately 300 milliamperes of plate current.

(15) Turn potentiometer R228 clockwise until the MULTIMETER indicates a slight decrease in voltage.

4-5. ALIGNMENT OF OVERLOAD RELAYS IN RELAY PANEL.

The plate and screen overload relays for intermediate power amplifier V203 and power amplifier V900 may be aligned with the relay panel in place in the main frame. In each case, the pertinnet OVLD ADJ control is adjusted so that the associated rpotective relay operates at the designated plate or screen current level of the amplifier.

a. ALIGNMENT OF IPA PLATE OVLD RELAY K707.

(1) Set IPA PLATE OVLD ADJ control (51) to fully clockwise position.

(2) Tune exciter and IPA to any carrier frequency.

(3) Tune and load IPA until IPA PLATE CURRENT meter (17) reads 300 to 400 ma.

(4) Detune IPA TUNING control (25) until IPA PLATE CURRENT meter (17) reads 600 ma, then turn IPA PLATE OVLD ADJ control (51) counter-clockwise until overload circuit is energized (IPA PLATE OVLD lamp (45) lights.

b. ALIGNMENT OF IPA SCREEN OVLD RELAY K707.

(1) Set IPA SCREEN OVLD ADJ control (50) to fully clockwise position.

(2) Tune exciter and IPA to any carrier frequency.

(3) Set MULTIMETER switch (18) to DC IPA SG position. With IPA tuned and loaded, MULTIMETER (15) should read approximately 15 ma.

(4) Unload IPA until MULTIMETER reads 30 ma, then turn IPA SCREEN OVLD ADJ control counterclockwise until overload circuit is energized. (IPA SCREEN OVLD lamp (44) lights.)

c. ALIGNMENT OF PA PLATE OVLD RELAY K701.

(1) Set PA PLATE OVLD ADJ control (48) to fully clockwise position.

(2) Tune transmitter to full PEP at any carrier frequency.

(3) Detune PA TUNE control (13) until PA PLATE CURRENT meter (3) reads 2 amperes, then turn PA PLATE OVDL ADJ control counterclockwise until overload circuit is energized (PA PLATE OVLD lamp (39) lights).

d. ALIGNMENT OF PA SCREEN OVLD RELAY K702.

(1) Set PA SCREEN OVLD ADJ control (49) to fully clockwise position.

(2) Tune transmitter to full PEP at any carrier frequency.

(3) Unload PA until PA SCREEN CURRENT meter (2) reads 80 ma, then turn PA SCREEN OVLD ADJ control counterclockwise until overload circuit is energized (PA SCREEN OVLD lamp (40) lights).

4-6. ALIGNMENT OF SWR OVERLOAD RELAY.

a. Plate ratio switch S102 on SWR chassis in 2:1 position.

b. Rotate reflected power diode CR904 at reflected power output terminal of directional coupler DC900 so that it reads forward power. (Arrow on diode should point to load.)

c. With transmitter terminated in 50-ohm load, apply power to transmitter and tune output to any frequency.

d. Hold SWR switch (34) in depressed position and increase drive until lower (SWR) scale of PA OUTPUT meter (5) reads 2. This corresponds to an rf output of 540 watts.

e. Remove power from transmitter, then restore reflected power diode CR904 to its normal (reflected) position.

4-7. BLOWER AND FAN MOTOR BEARING REPLACEMENT.

The following procedures are presented to facilitate replacement of motor bearings on the blowers and fans used in the transmitter.

a. REPLACING BEARINGS ON RFC BLOWER MOTOR (B201). (See figure 4-2).

(1) Remove four screws (91-10-10) from inlet ring (67-508-2N-1) on blower housing. These screws hold motor mounting brackets to blower housing.

(2) Loosen two setscrews (91-2-1) on blower wheel hub and remove blower wheel (68-2-14) with inlet ring.

(3) Remove four washers (92-6) and four nuts (94-2-1) from four through bolts (91-10-17) on motor.

(4) Remove front end cap (3102B101).

(5) Remove rotor assembly (4102B167-1) from motor housing.

NOTE

If any shim washers should adhere to rear bearing, be sure to put them back into rear end cap (3102B105-1). All shim washers and loading springs (83-10) must be positioned in their original order when reassembling motor.

(6) Press off old bearings from shaft (one at a time) by supporting bearings and applying pressure to shaft centers. Take care not to damage shaft. Discard old bearings.

(7) Press two new bearings (47-3-31) on shaft by applying pressure to inner race of bearing only, keeping bearing square with shaft. DO NOT APPLY PRESSURE TO OUTER RACES.

(8) Replace rotor assembly (4102B167-1) in rear end cap (3102B105-1), checking that shim washers and loading spring are in their original order.

(9) Attach front end cap (3102B101) and secure in place with four bolts (91-10-12), four washers (92-6), and four nuts (94-2-1).

(10) Place inlet ring (67-508-2N-1) on shaft, then slide blower wheel (68-2-14) on shaft. The two setscrews (91-12-1) should line up with flats on shaft to prevent raising a burr which would interfere with future disassembly.

(11) Insert blower wheel in blower housing (67-508-2C-4). Line up inlet ring and motor mounting brackets with proper holes in blower housing. Secure using four screws (91-10-10) and four washers (92-6).

(12) Center blower wheel (68-2-14) in blower housing and tighten two setscrews (91-12-1).

c. REPLACING BEARINGS ON MAIN FRAME BLOWER MOTOR (B800). (See figure 4-4.)

(1) Remove six screws (91-18-18) and six washers (92-8), then remove inlet ring (67-729-IN-2).

(2) Loosen two setscrews (91-91-1) on blower wheel (68-3-45) and slide off shaft.

(3) Remove four screws (91-83-2) and four washers (92-26) holding blower housing (67-729-1CC-1) to motor with air retainer (64-30-7).

(4) Remove air retained (64-30-7) from front end cap and remove four nuts (94-1), four washers (92-3), and four screws (69-60-1).

(5) Remove front end cap (3645B7-1) from motor.

(6) Remove rotor assembly (4145B5-1) from motor.

NOTE

If any shim washers should adhere to rear bearing, be sure to put them back into rear bearing bore of the end cap. All shim washers and loading springs (83-48) must be positioned in their original order when reassembling motor.

(7) Press off old bearings from shaft (one at a time), by supporting bearings and applying pressure to centers in shaft end. Take care not to damage shaft. Discard old bearings.

(8) Press new bearing (47-41-1) on shaft by applying pressure to inner race only, keeping bearings square with shaft. DO NOT APPLY PRESSURE TO OUTER RACE OF BEARINGS.

(9) Replace rotor assembly (4145B6-1) in motor housing. Replace front end cap (3645B7-1) and secure in place with four washers (92-3), four nuts (94-1), and four screws (69-60-1).

(10) Replace air retainer (64-30-7) to front end cap and attach motor to blower housing (67-729-1CC-1) with four screws (91-83-2) and four washers (92-26).

(11) Slide blower wheel (68-3-45) on shaft. The two setscrews (91-91-1) should line up with flats on shaft to prevent raising burr on shaft which would interfere with future disassembly. Tighten setscrews.

(12) Attach inlet ring (67-720-IN-2) to blower housing using four screws (91-18-18) and six washers (92-8).

SECTION 5
PARTS LIST

5-1. INTRODUCTION

The parts list presented in this section is a cross-reference list of parts identified by a reference designation and TMC part number. In most cases, parts appearing on schematic diagrams are assigned reference designations in accordance with MIL-STD-16. Wherever practicable, the reference designation is marked on the equipment, close to the part it identifies. In most cases, mechanical and electro-mechanical parts have TMC part numbers stamped on them.

To expedite delivery when ordering any part, specify the following:

a. Reference symbol.

b. Description as indicated in parts list.

c. TMC part number.

d. Model and serial numbers of the equipment containing the part being replaced; this can be obtained from the equipment nameplate.

For replacement parts not covered by warranty (refer to warranty sheet in front of manual), address all purchase orders to:

The Technical Materiel Corporation
Attention: Sales Department
700 Fenimore Road
Mamaroneck, New York

AX 694
PA SECTION

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A903	Final Coil/Switch Assembly	AS119
B900	Fan, Ventilating; 115 VAC, 50/60Hz, 1 Phase 14 Watts	BL106-2
B901	Same as B900	
C900	Capacitor, Fixed, Mica 1000PF, ±5%, 300 WVDC	CB21PD102J
C901	Same as C900	
C902	Same as C900	
C903	Same as C900	
C904	Capacitor, Fixed, Mica 20 PF ±2%, 500 WVDC CHAR C	CM15C200G0311
C905	Capacitor, Fixed; Ceramic; 3 PF ± 0.25 UUF Char. SL. 500 WVDC	CC21SL030C
C906	Capcitor, Fixed; MICA 100 PF ±2%, 500 WVDC	CM1SF101G03
C907	Capacitor, Fixed; Ceramic 10 PF, 5 PF 500 WVDC, Char SL	CC21SL100D
C908	Capacitor, Fixed Mica; 5 PF, ±5% Char C 500 WVDC	CM15C050J03YY
C909	Capacitor, Fixed, Vacuum 3 PF Rating	C0102-3
C911	Capacitor, Fixed, Vacuum; 1000 PF, 15,000 WVDC	C0101-1000-15C
C912	Same as C900Same as C900	
C913	Same as C900	
C914	Capacitor, Fixed, M -1 LAR; 1 PF ± 5%, 700 WVDC	CN108C1003J
C915	Same as C900	
C917	Capacitor, Fixed; Ceramic; 1000 PF ± 20%, 5000 WVDC	CC109-38
C919	Capacitor, Fixed; Ceramic; 500 PF, ± 20%, 5000 WVDC	CC109-36
C920	Same as C919	
C921	Same as C919	
C922	Same as C919	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C923	Same as C919	
C924	Same as C919	
C925	Same as C919	
C926	Same as C919	
C927	Capacitor Variable Vacuum; 25 - 700 UUF, 15,000 Volts Peak	AM113
C928	Capacitor Variable Vacuum; 50 - 2000 UUF, 10,000 Volts Peak	AM113
C929	Capacitor Variable Vacuum; 10 UUF, 17,000 Volts Peak	C0104-2
C930	Same as C911	
C931	Capacitor Fixed, MICA 1000 UUF, ±2% 500 WVDC	CM20F102G03
C932	Same as C931	
C933	Capacitor, Fixed, Ceramic; 50 UUF, ±10% 7500 WVDC	CC109-19
C934	Same as C933	
C935	Same as C933	
C936	Same as C933	
C939	Capacitor, Fixed Plastic 1000 UF, ±10%, 14,000 WVDC	CX102K102T
C940	Same as C939	
C941	Same as C908	
C942	Capacitor, Fixed, MICA 50 UUF, ±5% 500 WVDC	CM15C500J03
C943	Capacitor, Fixed Ceramic 1000 UUF, ± 20%, 500 WVDC	CK70A102M
C944	Same as C943	
C945	Same as C943	
C945	Same as C943	
C946	Capacitor, Fixed; Plastic 10,000 UUF,	CX102J103M

AX 694 (cont)

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C947	Same as C946	
C948	Same as C943	
C954	Capacitor, Fixed, MICA, 20 UUF, ± 5%, 500 WVDC CHAR C	CM15C200J03
C1003	Same as C917	
C1005	Same as C917	
C1009	Same as C917	
C1010	Same as C917	
C1025	Capacitor, Fixed; MICA; .01 UF, ± 5% 500 WVDC	CM35F103F03
C1026	Same as C1025	
C1027	Same as C1025	
C1028	Same as C1025	
CP900	Adapter, Connector	UG1019/U
CR900	Semiconductor Device, Diode; Germanium	IN303
CR901	Same as CR900	
CR904	Detecting Element Directional Coupler; 2 - 30 MHz 1 KW Full Scale; Calibrated to be with in ± 5% at 500 Watts	DD109-2
CR905	Detecting Element Directional Coupler Frequency Range 2-30MHz 10KW Full Scale; Calibrated to be with in ± 5% at 5 KW	DD109-1
DC900	Coupler, Directional; 50 Ohm Impedance; Forward Power, 10KW Frequency, 2-30 MHz	DC104
E900	Terminal Strip; Barrier Type; 4 Terminals	TM102-4
I1000	Lamp, Incandescent; 230V, 10 Watts	BI105-1
I1001	Same as I1000	
I1002	Same as I1000	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
I1003	Same as I1000	
J900	Connector, Coaxial; Female Contact BNC Type	UG625/U
J901	Connector, Receptacle; Female Teflon Insulated	UG560/U
J902	Same as J900	
J904	Connector, R.F. Probe; QDL Series	AJ100
L900	Choke, R.F.: 128 Microhenries $\pm$ 10% Q = 100	CL177
L901	Coil, R.F.; 750 Microhenries, $\pm$ 20%, 100 MA MAX, Current, Approx 17 Ohms dc Resistance	CL100-5
L902	Coil, High Frequency; L - 1.5 uh; Q-200 at 2.5 mc	CL170
L904	Same as L900	
L905	Coil, R.F. 1.1 Microhenry; Q Less than 70 at 7.9 MC	CL139
L906	Coil, R.F.; Fixed, L-45 Microhenries, Q-35 or Greater F-790 KC	CL154
L907	Choke, Static; L-35-uh; Q Greater than 180, F-2.5 MC	CL166
L908	Same as L901	
L909	Coil, R.F.; Fixed; 185 Microhenries $\pm$ 10% Microhenries Q=50	CL178
L910	Same as L901	
L911	Same as L906	
L914	Coil, Thermocoupler Isolation; L-38 UH (NOM); Q-150 at 2 MC	CL179
L915	Coil, PA, Filament 5 Microhenries Each Coil	CL160
MP900	Meter, Filament Primary; AC Voltmenter 0-300 Volts, Red Market at 230V	CY105
MP901	Same as M900	
MP904	Counter; bandswitch; Rotating 3 Wheel, 2-28 MHz	AC124-2

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
P902	Connector, Plug, Electrical; Coaxial; HN Type; 50 Ohms, 5000 Volts Peak	PL222
P903	Plug, Angle Type	PL192
P904	Same as P903	
R900	Resistor, Fixed; Composition 47,000 Ohms ± 5% 1/2 Watt	RC20GF473J
R901	Resistor, Fixed; Composition 220 Ohms, ± 5% 1/2 Watt	RC20GF222J
R902	Resistor, Fixed; Composition 470 Ohms, ± 5% 1 Watt	RC32GF471J
R904	Resistor, Fixed; Composition 100,000 Ohms, ± 5% 1/2 Watt	RC20GF104J
R905	Same as R904	
R906	Same as R901	
R907	Resistor, Fixed; Composition 27,000 Ohms ± 5% 2 Watt	RC42GF273J
R908	Same as R902	
R910	Resistor, Fixed; Composition 47 Ohms ± 5% 1 Watt	RC32GF470J
R914	Resistor, Fixed; Composition 100,000 Ohms, ± 5% 2 Watt	RC42GF104J
R915	Same as R914	
R917	Resistor, Fixed; Composition 120 Ohms ± 5% 1/2 Watt	RC20GF121J
R1006	Resistor, Fixed; Wire Wound 3000 Ohms, ± 5%, 10 Watts	RW109-30
R1007	Same as R1006	
R1008	Same as R1006	
R1009	Same as R1006	
S901	Switch; Micro; 10 Amp at 125/250 VAC; 1/2 Amp at 125 VDC	SW189
S1014	Switch, Toggle, SPST 3 Amp. 250 Volts	ST12A
W901	Cable, Radio Frequency RG-165/U, 1 KW	CA582-1

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
W902	Wiring Harness, Branched; Consists of 2 Connectors - 60" MWL Cables, Two 80" Lengths RC-58/U	CA829
X11000	Socket, Lamp; W/Frosted Amber Lens	TS136-3FS
X11001	Socket, Lamp; W/Frosted Green Lens	TS136-2FS
X11002	Socket, Lamp; W/Frosted Red Lens	TS136-1FS
X11003	Socket Lamp, W/Frosted Blue Lens	TS136-4FS
XV900	Socket, Tube; Consists of Socket and Capacitors C919 Thru C926 and C933 thru C936	AX130
V900	Tube, Power Amplifier; Ceramic Tetrode	4CX5000A

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
CR801A	Rectifier, Semi-Conductor Device; Average Rectifier Current 2.8A Forward Volt Drop 14.4V Max Peak Rev Volt 12,000V	DD128-2
DS1000	Buzzer, 230 VAC	BZ100
E801	Busking, Feed Thru; Steatite Insulators, Neoprene Gland	AX150
E802	Same as E801	
E805	Terminal Strip; Barrier Type; 4 Terminals	TM102-4
E1000	Contact, Electrical; Spring Loaded; Silver Plated, Beryllium Copper	AX154
E1002	Terminal Board; Barrier Type 10 Terminals	TM100-10
E1006	Terminal Board; Barrier Type; 3 Terminals	TM102-3
J1004	Connector, Receptacle; Female; Teflon Insulation	UG560/U
K1000	Contactor, Relay; 220V, 60 Hz Coil; Auxiliary Switch Mounted on Left & Right Side of Panel. Left Side to be Normally open Contacts & Right Side to be Normally Closed Contacts	RL130-3
L801, L800	Reactor 1.7 Hy at 1.3 ADC; Nominal DC Resistance 18 Ohms 5000 WVDC	TF5029
L802	Solenoid, Relay; W/Plunger; 230V, 60 Kh, 0.2 Amps Continous Duty Cycle	SZ100
L802	Solendoi, Relay; W/Plunger; 230V, 50 Kh 0.2 Amps Continous duty cycles	SZ100-50
L803	Coil, R.F. Fixed; 185 uh	CL178
R802	Resistor, Fixed; Wire Wound; 18.000 Ohms 140 Watts Char F	RW118F183
R803	Same as R802	
R804	Same as R802	
R805	Same as R802	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R806	Same as R802	
R807	Same as R802	
R808	Same as R802	
R809	Same as R802	
R810	Resistor, Fixed; Wire Wound; 4 Mego, ± 0.5	RW122-1-405
R811	Same as R810	
R812	Resistor, Fixed; Wire Wound; 180 Ohms, ± 0.5%, 40 Watts, Char G	RW119G181
R816	Resistor, Fixed; Wire Wound; 5000 Ohms, 140 Watts	RW118F502
R818	Resistor, Fixed; Wire Wound; 5000 Ohms, ± 5%, 10 Watts. Also Part of Semi-Conductor Device Set, TB800, TMC P/N AX 126	RW109-32
R819	Same as R816	
R820	Same as R816	
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, TB800, TMC P/N at 126	RW100-43
R822	Resistor, Fixed; Composition; 220 Ohms ± 5% 2 Watts.	RC42GF221J
R823	Resistor, Fixed; Composition, 100 Ohms ± 5%, 2 Watts	RC42GF101J
R824	Same as R823	
R825	Same as R823	
R826	Same as R823	
R827	Same as R823	
S800	Switch Air	SW243-1
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	

AX 695

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
B800	Blower/Fan; 220V, 50/60 Hz, 3 Phase	BL111
C800	Capacitor, Fixed; Paper; 4 MF, ±10%, 10,000 WVDC	CP103
C801	Capacitor, Fixed; Paper; 8 MF, ± 10%, 5000 WVDC	CP104
C802	Capacitor, Fixed; Paper; 10 MF, ± 10%, 2500 WVDC	CP105
C803	Capacitor, Fixed; MICA: 1000 MMF, ± 2%, 500 WVDC	CM30F102G03
C804	Same as C803	
C805	Same as C803	
C806	Same as C803	
C807	Same as C803	
C808	Same as C803	
C809	Same as C803	
C810	Same as C803	
C813	Capacitor, Fixed; Plastic; .01 MF, ± 5%, 4000 WVDC	CX102J103M
C814	Same as C813	
C815	Capacitor, Fixed; Paper Dielectric; 0.25 UF, ± 10%, 3000 WVDC	CP70E1FL25KK
C1000	Capacitor, Fixed; Mica 1000 MMF, ± 1%, 500 WVDC	CM30F102F03
C1001	Same as C1000	
C1002	Same as C1000	
C1004	Same as C1000	
C1006	Same as C1000	
C1007	Same as C1000	
CR800A,B, C,D,E,F	Semi-Conductor Devices; Not Replaceable, Part of TB800, TMC P/N AX 126	VR100 5/6-1150S

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T800	Transformer, Main Power; 210, 220, 230 250, V, 50/60 Kh AC 3 Phase	TF203
T801	Transformer, Filament; 230 Volt, W/Taps Primary; 8.5 Volts 7.5 Amp GT Secondary	TF197
TB	Semi-Conductor Device Set; Consisting of CR 800A, B, C, D, E, F, R818, R821, R822, R823, R824, R825, R826, R827	AX126

AX 694
PA SECTION

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A903	Final Coil/Switch Assembly	AS119
B900	Fan, Ventilating; 115 VAC, 50/60Hz, 1 Phase 14 Watts	BL106-2
B901	Same as B900	
C900	Capacitor, Fixed, Mica 1000PF, ±5%, 300 WVDC	CB21PD102J
C901	Same as C900	
C902	Same as C900	
C903	Same as C900	
C904	Capacitor, Fixed, Mica 20 PF ±2%, 500 WVDC CHAR C	CM15C200G03
C905	Capacitor, Fixed; Ceramic; 3 PF ± 0.25 UUF Char. SL. 500 WVDC	CC21SL030C
C906	Capcitor, Fixed; MICA 100 PF ±2%, 500 WVDC	CM1SF101G03
C907	Capacitor, Fixed; Ceramic 10 PF, 5 PF 500 WVDC, Char SL	CC21SL100D
C908	Capacitor, Fixed Mica; 5 PF, ±5% Char C 500 WVDC	CM15C050J03YY
C909	Capacitor, Fixed, Vacuum 3 PF Rating	CO102-3
C911	Capacitor, Fixed, Vacuum; 1000 PF, 15,000 WVDC	CO101-1000-15C
C912	Same as C900Same as C900	
C913	Same as C900	
C914	Capacitor, Fixed, M -1 LAR; 1 PF ± 5%, 700 WVDC	CN108C1003J
C915	Same as C900	
C917	Capacitor, Fixed; Ceramic; 1000 PF ± 20%, 5000 WVDC	CC109-38
C919	Capacitor, Fixed; Ceramic; 500 PF, ± 20%, 5000 WVDC	CC109-36
C920	Same as C919	
C921	Same as C919	
C922	Same as C919	

AX 5017
MAIN FRAME FINAL ASSEMBLY

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1030	Capacitor, Fixed; Ceramic; 1000 PF ±10%, 5000 WVDC	CC109-38
C1031	Same as C1030	
C1032	Same as C1030	
C1033	Same as C1030	
C1034	Same as C1030	
C1035	Same as C1030	
C1036	Same as C1030	
C1037	Same as C1030	
C1038	Same as C1030	
C1039	Same as C1030	
E1001	Terminal Board, Barrier 6 Terminals	TM102-6
E1008	Insulator, FeedThru; Consists of 2 Ribbed Steatite	AX261
E1009	Same as E1008	
E1010	Same as E1008	
J1000	Connector, Receptacle, Electrical; Female; AN Pin Type	MS3102A20-29S
J1001	Connector, Receptacle, Electrical; Female; 35 Contacts	MS3102A32-7S
J1002	Connector, Receptacle, Electrical; 1 round female contact	JJ172
J1003	Connector, Receptacle, Electrical; Socket, Type	MS3102A18-16S
J1005	Same as J1002	
J1006	Same as J1002	
J1007	Same as J1002	
J1008	Same as J1002	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
J1009	Same as J1002	
J1010	Connector, Receptacle, Electrical; Female	MS3102A2027S
J1011	Same as J1000	
J1012	Same as J1010	
J1013	Connector, Receptacle, Electrical; Female	MS3102A168-1S
L1000	Coil, Radio Frequency, Line Filter; L-Nominal 177 uh (176-179) Q Greater Than 10; F-2 MC	CL155
L1001	Same as L1000	
L1002	Same as L1000	
L1003	Same as L1000	
L1004	Same as L000	
P1000	Connector, Receptacle, Electrical; Male	MS3106B32-7S
P1002	Connector, Plug, Electrical, RF, BNC	PL244-1
P1003	Connector, Plug, Electrical, Pin Type 1 Contact	MS3106B18-16P
P1004	Connector, Plug, Electrical; Coaxial, HN Type 50 Ohms, 5000 Volts Peak	PL222
P1005	Same as P1002	
P1006	Connector, Plug, Electrical; Socket Type; 1 Contact	MS3106B18-16S
P1007	Same as P1002	
P1008	Same as P1002	
P1009	Same as P1004	
P1010	Same as P1000	
P1011	Connector, Receptacle, Electrical; Male Pin Electrical; Male Pin	MS3106B32-7P
P1012	Connector, Receptacle; Male	MS3106B20-29P

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
P1014	Same as P1002	
P1015	Same as P1002	
P1016	Connector, Plug, Electrical; 14 Number, 16 Female Contacts; Straight Type	MS3106B2027$
P1017	Connector, Plug, Female	
S1006	Switch, Roller Lever, SODT 15 Amp 125 VAC	SW260
S1007	Switch, Interlock, SPDT; 15 Amps AT 120, 250 VAC	SW230
S1008	Same as S1007	
S1009	Same as S1007	
S1010	Same as S1007	
S1011	Same as S1007	
W1001	Cable Assemnly, Power, Electrical; Consists of 2 Connectors	CA431
W1002	Cable Assembly, Radio, Frequency; Consists of 42" of RF Cable 2 Connectors	CA480-3-4200
W1003	Cable Assembly, Power Electrical; Consists of 39-1/4" High Voltage Cable; 2 Connectors	CA460
W1004	Cable Assembly, Radio Frequency; Consists of 15.25" of RF Cable, RG 165/U; and 2 Connectors	CA480-105.15.25
W1006	Cable Assembly, Radio Frequency; Consist of 2 RF Cables, RG 174/U; one 39", one 42" 2 Connectors	CA462
W1007	Same as W1006	
W1008	Cable Assembly, Power Electrical; Consists Of 10-1/2" of AWG Cable 1 Connector	CA466-2
W1009	Wiring Harness, Branched; Consists of Various Lenghts and Colors of MWC, HWC, and RG Mil Type Connectors 8 Connectors	CA1040

AM-122-2
MAIN MTR BOX

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C1011	Capacitor, Fixed; MICA; .01 UFD, ±1%, 300 WVDC CHAR F	CM35F103F03
C1013	Capacitor, Fixed; Ceramic Feed-Thru Type: 1000UUF; ±20%, 500 WVDC	CK70A102M
C1014	Same as C1013	
C1015	Smae as C1013	
C1016	Same as C1013	
C1017	Capacitor, Fixed; Ceramic 1000 UUF, ±20%, 5000 WVDC	CC109-38
C1018	Same as C1017	
C1021	Same as C1011	
C1022	Capacitor, Fixed, Electrolytic; 25 UUF, 50 WVDC	CE105-25-50
C1023	Same as C1011	
C1024	Same as C1011	
I1005	Lamp, Floutescent	B1107
I1006	Same as I1005	
I1007	Lamp, Incandescent, Frosted; 230-250 Volts, 25 Watts	BI106-2
M1000	Volt Meter; PA Plate; 0-10 Kilovolt Scale; 1 MA DC Movement	MR121
M1001	Ammeter; P.A. Screen Current 0-100 MA, DC	MR116
M1002	Ammeter; P.A. Plate Current; 0-3 Amps, DC	MR117
M1003	Volt Meter: P.A. Plate; R.F.; 0-10 Kv R.F. Scale 200 Micro-Amps DC	MR120
M1006	Meter, SWR, Kilowatts; 0-10/0-5 KW Scale, 0-100 Microamps, ±2% dc	MR170
T1000	Ballast Fluorescent Lamp; 8 Watt, 118 Volts, 0.17 Amp, 60 Hz	PO169
S1012	Starter Fluorescent Lamp 8 Watts	PO170

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
S1013	Same as S1012	
X11005A & B	Socket, Fluorescent Lamp; 75 Watts, 250 Volts	TS141
X11006A & B	Same as X11005 A & B	
X11007	Socket, Lamp; Screw Type Socket	TS143

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C700	Capacitor, Fixed, Electrolytic; 50 UFD, ±2%	CE63F500G
C701	Same as C700	
C702	Capacitor, Fixed, Ceramic 10,000 UUF, GMV; 500 WVDC	CC100-16
C703	Same as C700	
E700	Terminal Board; Barrier Type 14	TM100-14
E701	Terminal Board; Barrier Type 8	TM100-8
E702	Same as E701	
E703	Same as E701	
E704	Terminal Board, Barrier Type 10	TM100-10
E705	Same as E700	
F700	Fuse, Cartridge, Time Lag, 10 Amps	FU102-10
F701	Same as F700	
F702	Same as F700	
F703	Fuse, Cartridge; Time Lag; 5 Amps	FU102-5
F704	Fuse, Cartridge; Time Lag 1 Amps	FU102-1
F705	Fuse, Cartridge; Time Lag 15 Amps	FU102-15
J700	Connector Receptacle; Male; 35 Contacts	MS3102A32-7P
J701	Connector, Receptacle; Electrical; Male; 3 Contacts	MS3102A22-9P
K700	Relay Armature 11,000 Ohms ± 10% 4 PDT - 125 VAC	RL126
K701	Relay Armature, Latch 11,000 Ohms ± 10% 25 Amps, 190 VAC	RL122
K702	Relay Armature, Latch 11,000 Ohms ± 10% 20 Amps 190 VAC	RL128
K703	Relay Armature, 1150 Ohms ± 10% 25 Amps, 220 VAC	RL124
K704	Relay Armature 1100 Ohms, ± 10% 20 Amps	RL125

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
K705	Same as K703	
K706	Relay Armature 1,100 Ohms, ±10% 25 Amps	RL127
K707	Relay Armature 1,100 Ohms ± 10%, 20 Amps, 190 VAC	RL123
K708	Same as K706	RL127
M700	Meter; Elapsed Time, 240 Volts, 60 CPS	MR125-2
M700	Meter; Elapsed Time, 240 Volts, 50 CPS	MR125-2-50
M701	Timer, Interval; Time Delay 50 Cycle Rated at 10 Amps	T1 101-5-50
M702	Meter, Elapsed Time, 240 Volts, 60 CPS	MR125-2
M702	Meter, Elapsed Time, Delay 240 Volts, 50 CPS	MR125-2-50
R700	Resistor, Fixed, Composition; 1500 Ohms ±5% 2 Watts	RC42GF753J
R701	Resistor, Fixed, Composition; 300 Ohms ± 5%, 2 Watt	RC42GF301J
R702	Resistor, Fixed; Composition, 220,00 Ohms ± 5% 2 Watt	RC42GF224J
R703	Resistor, Variable, Composition; 5000 Ohms, ±10%, 2 Watts	RV4LAYSA503A
R704	Resistor, Fixed; Wire Wound; 0.5 Ohms, 5 Watts	RW107-54
R705	Resistor, Variable; Wire Wound; 1.5 Ohms, 4 Watts	RA107TXA1R0A
R706	Resistor, Fixed; Wire Wound; 500 Ohms, 10 Watts	RW109-19
R707	Resistor, Variable; Wire Wound; 500 Ohms, ±10%, 25 Watts	RA75ASA501AK25
R709	Resistor, Variable, Composition; 15,000 Ohms ± 10% 2 Watts	RV4LA-1SA153A
R710	Resistor, Fixed; Wire Wound; 10 Ohms, 1000 MA dc, 10 Watts	RW109-4
R711	Resistor, Variable; Composition; 100 Ohms, ± 10% 25 Watts	RA75AXA101AK25
R712	Resistor, Variable, Composition; 50,000 Ohms ± 10% 2 Watts	RVLA-1.SA503A

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
X1700	Light Indicator; Lamp; Bayonet Base; 105/125 Volts W/White Frosted Lens	TS137-7FB4
X1701	Same as X1700	
X1702	Same as X1700	
X1703	Same as X1700	
X1704	Same as X1700	
X1705	Same as X1700	

RELAY PANEL

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C700	Capacitor, Fixed, Electrolytic; 50 VFD, ± 2%	CE63C500G
E700	Terminal Board; Barrier Type; 14	TM100-14
E701	Terminal Board; Barrier Type; 8	TM100-8
E702	Same as E701	
E703	Same as E701	
E704	Terminal Board; Barrier Type; 10	TM 100-10
E705	Same as E700	
E706	Connector, Feed Thru; Ceramic Body	TE175
E707	Same as E706	
E708	Same as E706	
E709	Same as E706	
E710	Same as E706	
E711	Same as E706	
F700	Fuse Cartridge; Time Delay 5 Amps	FU102-5
F701	Same as F700	
F702	Same as F700	
F703	Same as F700	
F704	Fuse Cartridge; Time Delay; 1 Amp	FU102-1
F705	Same as F700	
I700	Lamp Glow; Neon Double Candlebra; 110 Volts, 1/4 Watt	B1103-2
I701	Same as I700	
I702	Same as I700	
I703	Same as I700	
I704	Same as I700	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
I705	Same as I700	
J700	Connector, Receptacle, Electrical; Male 35 Contacts	MS3102A32-7P
J701	Connector, Receptacle, Electrical; Male 9 Contacts	MS3102A22-9P
K700	Relay Assembly, P.A. 11,000 ohms ±10%; 10 Amps 125VAC	AR105
K701	Relay Assembly, P.A. 1100 Ohms, ±10% 25 Amps, 125VAL	AR100
K702	Relay Assembly, P.A. 1100 Ohms, ±10%, 1500 Ohms ±10% 25 Amps, 125 VAC	AR1C8
K703	Relay Assembly, P.A. 25 Amps. 1800 Ohms, ±10%	AR102
K704	Relay Assembly 1100 Ohms, ±10%, 170 Ohms, ± 10%, 4 PDT	AR 104
K705	Relay Assembly, 25 Amps, 1800 Ohms, ±10%	AR103
K706	Relay Assembly, 1100 Ohms ±10%, 10,000 Ohms, ± 10%, 4 PDT, 25 Amps	AR107
K707	Relay Assembly, 1100 Ohms, ±10%, 43 Ohms	AR101
K708	Relay Assembly, 1100 Ohms, ±10%, 10 Amps, 125-VAC	AR106
M700	Meter, Elapsed Time, 240 Volts, 60 HZ	MR-125-2
M701	Timer Interval, Time Delay 10 Amps, Time Cycle - 5 Min. Dial Division - 5 Seconds	TI101-5
M702	Same as M700	
R700	Resistor, Fixed, Composition; 15,000 Ohms, ± 5% 2 Watts	RC42GF153J
R701	Resistor, Fixed, Composition; 300 Ohms, ± 5%, 2 Watts	RC42GF301J
R702	Resistor, Fixed, Composition, 220,000 Ohms, ± 5%, 2 Watts	RC42GF224S
R703	Resistor, Variable, Composition; 50,000 Ohms, ±10%, 2 Watts	RV4LAY5A503A
R704	Resistor, Fixed; Wire Wound; 0.5 Ohms, 5 Watts	

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R705	Resistor, Variable, Wire Wound; 1 Ohm, 4 Watts,	RA107TX1R0A
R706	Resistor, Fixed, Wire Wound; 500 ohms, 142 MA, 10 Watts	RW109-19
R707	Resistor, Variable, Wire Wound: 500 Ohms, ±10% 25 Watts	RA75ASA501AK25
R708	Resistor, Fixed, Wire Wound: 500 Ohms, 100 MA dc, 5 Watts	RW107-28
R709	Resistor, Variable, Wire Wound: 2500 Ohms, ±10%, 25 Watts	RA75AXC25AK25
R710	Resistor, Fixed, Wire Wound: 10 Ohms, 1000 MA dc, 10 Watts	RW109-4
R711	Resistor, Variable, Wire Wound; 15 Ohms, ±10%, 25 Watts	RA75AXA150AK25
R712	Resistor, Fixed, Composition; 3900 Ohms, 5%, 1 Watt	RC32GF392K
X1700	Light, Indicator, Lamp; 105/125 Volts, W/White Frosted Lens	TS132-7FB4
X1701	Same as X1700	
X1702	Same as X1700	
X1703	Same as X1700	
X1704	Same as X1700	
X1705	Same as X1700	
XF700	Fuse Holder; Cartridge Type; 100 1250V	FH104-3
XF701	Same as XF700	
XF702	Same as XF700	
XF703	Same as XF700	
XF704	Same as XF700	
XF705	Same as XF700	

SYM	DESCRIPTION	TMC PART NO.
L212	Same as L203	
L213	COIL, R.F.: 750 uhy, ±20%, 100 ma max. current; DC res. approx. 17 ohms, bakelite body	CL100-5
L214	Same as L203	
L215	COIL, R.F.: fixed; 26 uhy	CL180
L216 thru L218	Same as L203	
L219	COIL, R.F.: tuned; 2-4 mc; L = 10 uhy, Q = 40	CL173
L220	COIL, R.F.: tuned; 4-8 mc	CL159
L221	Same as L207	
L222	Same as L213	
L223	COIL, R.F.: tuned; 8-16 mc	CL146
L224	COIL, R.F.: tuned; 16-20 mc	CL147
L225	COIL, R.F.: tuned; 20-30 mc	CL260-2
L226	Same as L203	
L227	COIL, R.F.: fixed; 1.1 uhy	CL139
L228	Same as L203	
L229	Same as L215	
L230	Same as L215	
L231	Same as L203	
L232	Same as L203	
L233	Same as L213	
L234	COIL, R.F.: fixed; 36 uhy	CL152
L235	COIL, R.F.: fixed; 165 uhy	CL178
L236	Deleted	
L237	COIL, filament: fixed; L-Nom. 3.0 (2.9-3.1), Q greater than 35; F - 2 mc	CL171
L238	Same as L213	
L239 thru L241	Same as L203	
L242	Same as L215	
L243	Same as L215	

PARTS LIST (CONT)

SYM	DESCRIPTION	TMC PART NO.
L212	Same as L203	
L213	COIL, R.F.: 750 uhy, ±20%, 100 ma max. current; DC res. approx. 17 ohms, bakelite body	CL100-5
L214	Same as L203	
L215	COIL, R.F.: fixed; 26 uhy	CL180
L216 thru L218	Same as L203	
L219	COIL, R.F.: tuned; 2-4 mc; L = 10 uhy, Q = 40	CL173
L220	COIL, R.F.: tuned; 4-8 mc	CL159
L221	Same as L207	
L222	Same as L213	
L223	COIL, R.F.: tuned; 8-16 mc	CL146
L224	COIL, R.F.: tuned; 16-20 mc	CL147
L225	COIL, R.F.: tuned; 20-30 mc	CL260-2
L226	Same as L203	
L227	COIL, R.F.: fixed; 1.1 uhy	CL139
L228	Same as L203	
L229	Same as L215	
L230	Same as L215	
L231	Same as L203	
L232	Same as L203	
L233	Same as L213	
L234	COIL, R.F.: fixed; 36 uhy	CL152
L235	COIL, R.F.: fixed; 185 uhy	CL178
L236	Deleted	
L237	COIL, filament: fixed; L-Nom. 3.0 (2.9-3.1), Q greater than 35; F - 2 mc	CL171
L238	Same as L213	
L239 thru L241	Same as L203	
L242	Same as L215	
L243	Same as L215	

PARTS LIST (CONT)

RF AMPLIFIER POWER SUPPLY ASSEMBLY

SYM	DESCRIPTION	TMC PART NO.
V2001	TUBE, electron: full wave rectifier, 7 pin miniature	6X4
V2002	TUBE, electron: voltage regulator, 7 pin miniature	OA2
V2003	Same as V2002	
W2001	CABLE ASSEMBLY	CA420
W2002	CABLE ASSEMBLY, INTERCONNECT	CA422
XC2001	SOCKET, tube: octal; high crown	TS101P01
XC2002	Not Used	
XC2003	Same as XC2001	
XC2004	Not Used	
XC2005	Same as XC2001	
XC2006	Same as XC2001	
XF2000	FUSE HOLDER, bayonet base; 90/300 V, neon lamp, clear knob, black plastic body, 13/16" x 2-13/16" o/a	FH104-3
XF2001 thru XF2004	Same as XF2000	
XI2000	LIGHT, INDICATOR: w/clear white lens, for T-3-1/4 bulb.	TS106-2
XV2000	Same as XC2001	
XV2001	SOCKET, tube: 7 pin miniature	TS102P01
XV2002	Same as XV2001	
XV2003	Same as XV2001	

SYM	DESCRIPTION	TMC PART NO.
R216	RESISTOR, fixed: composition; 100,000 ohms, ±10%, 1/2 watt	RC20GF104K
R217	Same as R201	
R218	RESISTOR, fixed: composition; 1.1 megs, ±5%, 1/2 watt	RC20GF115J
R219	RESISTOR, fixed: composition; 2200 ohms, ±10%, 1/2 watt	RC20GF222K
R220	RESISTOR, fixed: composition; 8200 ohms, ±10%, 1 watt	RC32GF822K
R221	RESISTOR, fixed: composition; 10 megs, ±10%, 1/2 watt	RC20GF106K
R222	RESISTOR, fixed: composition; 12 ohms, ±10%, 2 watts	RC42GF120K
R223	RESISTOR, fixed: composition; 180,000 ohms, ±10%, 1 watt	RC32GF184K
R224	RESISTOR, fixed: composition; 10,000 ohms, ±10%, 2 watts	RC42GF103K
R225	RESISTOR, fixed: composition; 5.1 megs, ±5%, 1/2 watt	RC20GF515J
R226	RESISTOR, fixed: composition; 3300 ohms, ±10%, 1/2 watt	RC20GF332K
R227	RESISTOR, fixed: composition; 390,000 ohms, ±10%, 1/2 watt	RC20GF394K
R228	RESISTOR, variable: composition; 50,000 ohms, ±10%, 2 watts, with locking bushing	RV4LAYSA503A
R229	RESISTOR, fixed: composition; 12,000 ohms, ±10%, 1/2 watt	RC20GF123K
R230	RESISTOR, fixed: composition; 270,000 ohms, ±10%, 1/2 watt	RC20GF274K
R231	RESISTOR, fixed: composition; 150,000 ohms, ±10%, 1 watt	RC32GF154K
R232	RESISTOR, fixed: composition; 47,000 ohms, ±10%, 1/2 watt	RC20GF473K
R233	RESISTOR, fixed: composition; 39,000 ohms, ±5%, 1/2 watt	RC20GF393J
R234	Same as R201	
R235	RESISTOR, fixed: composition; 22,000 ohms, ±10%, 2 watts	RC42GF223K
R236	Same as R201	
S201A, B, C, D	SWITCH, rotary: 2 sections, 5 positions; 30° angle of throw; micalex insulation, silver plated contacts	SW258
S202	SWITCH ASSEMBLY, rotary: dual section; 9 positions, 1 pole each section, steatite insulation, nickel silver shaft	AS118

RF AMPLIFIER

SYM	DESCRIPTION	TMC PART NO.
S203	SWITCH, rotary: 8 contacts, 30° angle of throw, steatite insulation, nickel silver shaft	AS101
S204	SWITCH, rotary: 2 sections; 8 positions, 30° angle of throw, micalex insulation, silver plated contacts	SW245
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	SW169
S206	SWITCH, rotary: low torque microswitch; counterclockwise direction of rotation; SPDT, 5 amp, 125 or 250 VAC	SW252
V201	TUBE, electron: power pentode; miniature 9 pin	6CL6
V202	TUBE, electron: beam power pentode; octal	6146
V203	TUBE, electron: power tetrode	TV100
XV201	SOCKET, tube; miniature 9 pin	TS103P01
XV202	SOCKET, tube; octal	TS101P01
XV203	SOCKET: consists of C247, 285, 286, 287 built in	TS142
MP201	CLIP, electrical: white ceramic; phosphór 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	HB102-2
MP202	Not Used	
MP203	GEAR, miter: 600" pitch dia., 20 pitch, 12 teeth; for 1/4" shaft, steel	GR116
MP204	Same as MP203	
MP205	GEAR, miter: 600" pitch dia., 20 pitch, 12 teeth; for 1/8" shaft, steel	GR139
MP206	Same as MP205	
MP207	Not Used	
MP208	GEAR, bevel: 1.750" pitch dia., 12 pitch, 21 teeth; for 1/2" shaft, steel	GR140
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	MC102
MP211 thru 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	MC124
MP215	Same as MP214	
MP216	Same as MP214	

RF AMPLIFIER POWER SUPPLY ASSEMBLY

SYM	DESCRIPTION	TMC PART NO.
F2000	FUSE, cartridge type: 1/4 amp; time delay	FU102-.250
F2001	FUSE, cartridge type: 1/8 amp; time delay	FU102-.125
F2002	FUSE, cartridge type: 2 amp; time delay	FU102-2
F2003	Same as F2002	
F2004	FUSE, cartridge type: 1-1/2 amp; time delay	FU102-1.5
I2000	LAMP, neon: 110 v; 1/25 watt, T-3-1/4 clear bulb; bayonet base	BI100-51
J2000	CONNECTOR, receptacle: male; 22 contacts	MS3102A28-11P
J2001	CONNECTOR, receptacle: female; 35 contacts	MS3102A32-7S
J2002	CONNECTOR, receptacle: male; 35 contacts	MS3102A32-7P
L2000	REACTOR, filter: 10 henries, 125 ma DC, 1000 volts RMS test	TF5001
L2001	REACTOR, filter: 50 henries, 30 ma DC, approx. 800 ohms DC resistance; 1500 volts RMS test	TF166
P2000	CONNECTOR, receptacle: female; 22 contacts	MS3106B28-11S
R2000	RESISTOR, fixed: wire wound; 500 ohms, ±5%, 10 watts	RW109-19
R2001	Same as R2000	
R2002	RESISTOR, fixed: wire wound; 5000 ohms, ±5%, 20 watts	RW110-30
R2003	Same as R2002	
R2004	RESISTOR, fixed: wire wound; 2000 ohms, ±5% 10 watts	RW109-28
R2005	RESISTOR, fixed: wire wound; 50,000 ohms, ±5%, 10 watts	RW109-43
R2006	RESISTOR, fixed: composition; 220,000 ohms, ±10%, 1/2 watt	RC20GF224K
R2007	Same as R2005	
R2008	RESISTOR, fixed: composition; 4700 ohms, ±10%, 2 watts	RC42GF472K
R2009	RESISTOR, variable: composition; 5000 ohms, ±10%, 2 watts	RV4LAYSA502A
R2010	Same as R2008	
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	TF198
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	TF202
V2000	TUBE, electron: duo-diode rectifier, octal	5R4

SYM	DESCRIPTION	TMC PART NO.
C2000	CAPACITOR, fixed: mica; .001 ufd; ±2%, 500 wvdc, char. F	CM20F102G
C2001 A & B	CAPACITOR, fixed: dry electrolytic; 2 sections, 20 ufd, 450 wvdc each section	CE52C200R
C2002	Same as C2000	
C2003 A & B	Same as C2001 A, B	
C2004	Same as C2000	
C2005	CAPACITOR, fixed: dry electrolytic; polarized; 80 ufd, 450 wvdc	CE51C800R
C2006	Same as C2005	
C2007 thru C2014	DELETED	
C2015	Same as C2000	
C2016	Same as C2000	
C2017	CAPACITOR, fixed: mica; .01 ufd, ±1%, 300 wvdc, char. F	CM35F103F
C2018	Same as C2017	
C2019	Same as C2000	
C2020	Same as C2000	
C2021	CAPACITOR, fixed: paper; 4 ufd; ±10%, char. F; 600 wvdc	CP41B1FF405K
C2022	Same as C2021	

RF AMPLIFIER

SYM	DESCRIPTION	TMC PART NO.
B201	BLOWER, motor and fan: 115/230v, 50/60 cps, single phase; 3200 RPM; 4 ufd capacitance; clockwise rotation from shaft end of motor	BL103
C201	CAPACITOR, fixed: mica; button type; 1000 uufd, ±10%, 300 wvdc, char. W	CB21QW102K
C202	CAPACITOR, variable: ceramic; 7-45 uufd, char. C	CV11C450
C203	CAPACITOR, variable: air dielectric; 12.5-270 uufd; one section	CB139-1
C204	Same as C201	
C205	CAPACITOR, fixed: mica; 1000 uufd, ±5%, char. C, 500 wvdc	CM20C102J
C206 thru C208	Same as C201	
C209	CAPACITOR, fixed: ceramic; feedthru type; 2000 uufd, ±20%, char. A, 500 wvdc	CK70AW202M
C210	Same as C209	
C211	CAPACITOR, fixed: mica; 1600 uufd, ±5%, char. C, 500 wvdc	CM20C162J
C212	Same as C209	
C213	Same as C201	
C214	Same as C205	
C215	Same as C209	
C216	CAPACITOR, fixed: mica; 5 uufd, ±10%, char. C, 300 wvdc	CM15C050K
C217	CAPACITOR, fixed: mica; 47 uufd, ±10%, char. B, 300 wvdc	CM15B470K
C218	Same as C201	
C219	Same as C209	
C220	CAPACITOR, fixed: mylar; .1 ufd, ±5%, 200 wvdc	CN108C1003J
C221	CAPACITOR, fixed: mica; 10,000 uufd, ±10%, 300 wvdc, char. B	CM35B103K
C222	Same as C221	
C223	Same as C209	
C224	Same as C209	
C225	Same as C201	
C226	CAPACITOR, fixed: mica; 100 uufd, ±10%, char. C, 500 wvdc	CM20C101K

RF AMPLIFIFR

SYM	DESCRIPTION	TMC PART NO.
C227	CAPACITOR, fixed, mica dielectric: 1,000 uuf, ±5%, 500 wvdc, char. B	CM45B102J
C228	Same as C201	
C229	CAPACITOR, variable: ceramic; 1.5-7 uuf, char. A	CV11A070
C230	Same as C205	
C231	CAPACITOR, variable: air dielectric; 3.2-50 uufd, 1 section, 14 plates; 500 wvdc	CT104-1
C232	CAPACITOR, variable: air dielectric; 12.5-270 uuf; single section	CB139-3
C233	Same as C201	
C234	Same as C205	
C235	Deleted	
C236	Deleted	
C237	Same as C221	
C238	Same as C220	
C239	Same as C209	
C240	Same as C201	
C241	CAPACITOR, fixed: mica; button type; 150 uufd, ±10%, 300 wvdc, char. W	CB21QW151K
C242	CAPACITOR, fixed: ceramic; 3 uufd, ±0.25 uufd, char. SL, 500 wvdc	CC21SL030C
C243	Same as C209	
C244	Deleted	
C245	Same as C220	
C246	Same as C201	
C247	CAPACITOR, fixed: ceramic; 500 uuf, ±20%, 5,000 wvdc, 6-32 tapped studs each end. Part of XV203	CC109-36
C248	Same as C201	
C249	Same as C209	
C250	Same as C209	
C251	CAPACITOR, fixed: mica; button type; 270 uufd, ±10%, char. W, 300 wvdc	CB21QW271K
C252	Same as C205	
C253	CAPACITOR, fixed: trylar; 500 ufd, ±10%, 8000 wvdc	CX102K501P

PARTS LIST (CONT)

RF AMPLIFIER

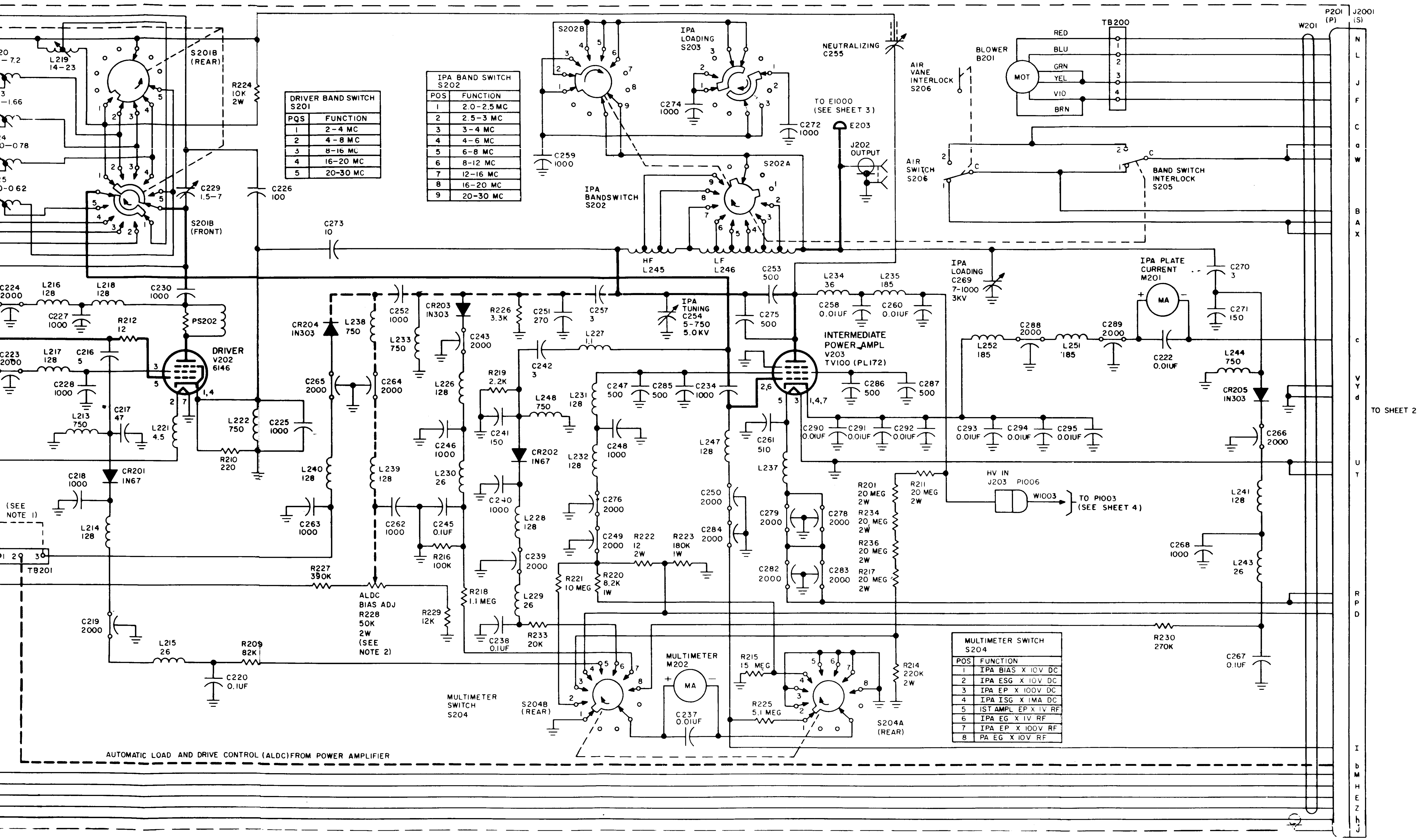
SYM	DESCRIPTION	TMC PART NO.
C254	CAPACITOR ASSEMBLY, vacuum: variable; 5-750 uuf, 42 amps RMS, with bevel gear	AM111
C255	KIT, capacitor: replacement; consisting of 1 each - stator plate assy., and rotor assy	AC113
C256	Deleted	
C257	CAPACITOR, fixed: ceramic; 3 uufd, ±10%, 5000 wvdc	CC109-1
C258	CAPACITOR, fixed: trylar; .01 ufd, ±5%, 4000 wvdc	CX102J103M
C259	CAPACITOR, fixed: ceramic; 1000 uuf, ±10%, 5000 wvdc	CC109-38
C260	Same as C258	
C261	CAPACITOR, fixed: mica; 510 uufd, ±10%, 500 wvdc, char. B	CM35B511K
C262	Same as C201	
C263	Same as C201	
C264 thru C266	Same as C209	
C267	Same as C220	
C268	Same as C201	
C269	CAPACITOR ASSEMBLY, vacuum: variable; 7-1000 uufd, w/bevel gear	AM100
C270	Same as C257	
C271	Same as C241	
C272	Same as C259	
C273	CAPACITOR, fixed: ceramic; 10 uufd, ±10%, 5000 wvdc	CC109-8
C274	Same as C259	
C275	Same as C253	
C276	Same as C209	
C277	Deleted	
C278	Same as C209	
C279	Same as C209	
C280	Deleted	
C281	Deleted	
C282 thru C284	Same as C209	
C285 thru C287	Same as C247, part of XV203	

RF AMPLIFIER

SYM	DESCRIPTION	TMC PART NO.
C288	Same as C209	
C289	Same as C209	
C290	CAPACITOR, fixed: mica; .01 ufd, ±5%, char. C, 300 wvdc	CM35C103J
C291 thru C295	Same as C290	
CR201	DIODE, germanium: .140 dia. x .350 lg; 1" lg. wire leads	1N67
CR202	Same as CR201	
CR203	DIODE, bonded silicon: .265 x .155 x .255 o/a; 1" lg. wire leads	1N303
CR204	Same as CR203	
CR205	Same as CR203	
E201	TERMINAL STRIP, barrier lug type: 3 terminals, 6-32 screws on front, solder lugs in rear; black phenolic body	TM100-3
E202	TERMINAL STRIP, barrier lug type: 4 terminals, 6-32 screws on front, solder lugs in rear; black phenolic body	TM100-4
E203	CONTACT, electrical: consists of 1 brass nickel plated button contact with 10-32 threaded rod; 2 ceramic insulators; 1 teflon gland; 2 fiber washers; 1 neoprene washer; 1 flat washer; 1 lockwasher; and 1 hex nut	AX241
J201	CONNECTOR, receptacle: series UHF, teflon dielectric	SO239A-TEF
J202	CONNECTOR, receptacle: female; teflon insulation	UG560*/U
J203	CONNECTOR, receptacle: male; pin type	MS3102A18-16P
J204	Deleted	
L201	COIL, R.F.: tuned; 2-4 mc, Q = 60 at 2.5 mc	CL181
L202	COIL, R.F.: tuned; 4-8 mc, 4.5 to 7.5 uhy	CL150
L203	COIL, R.F.: fixed; 128 uhy, ±10%, Q = 100	CL177
L204	Same as L203	
L205	Same as L203	
L206	Same as L203	
L207	COIL, R.F.: fixed; 4.5 uhy	CL134-1
L208	Not used	
L209	COIL, R.F.: tuned; 8-16 mc; 1.3 to 1.6 uhy	CL175
L210	COIL, R.F.: tuned; 16-20 mc	CL145
L211	COIL, R.F.: tuned; 20-30; .20 to .28 uhy	CL257

SECTION 6

SCHEMATIC DIAGRAMS

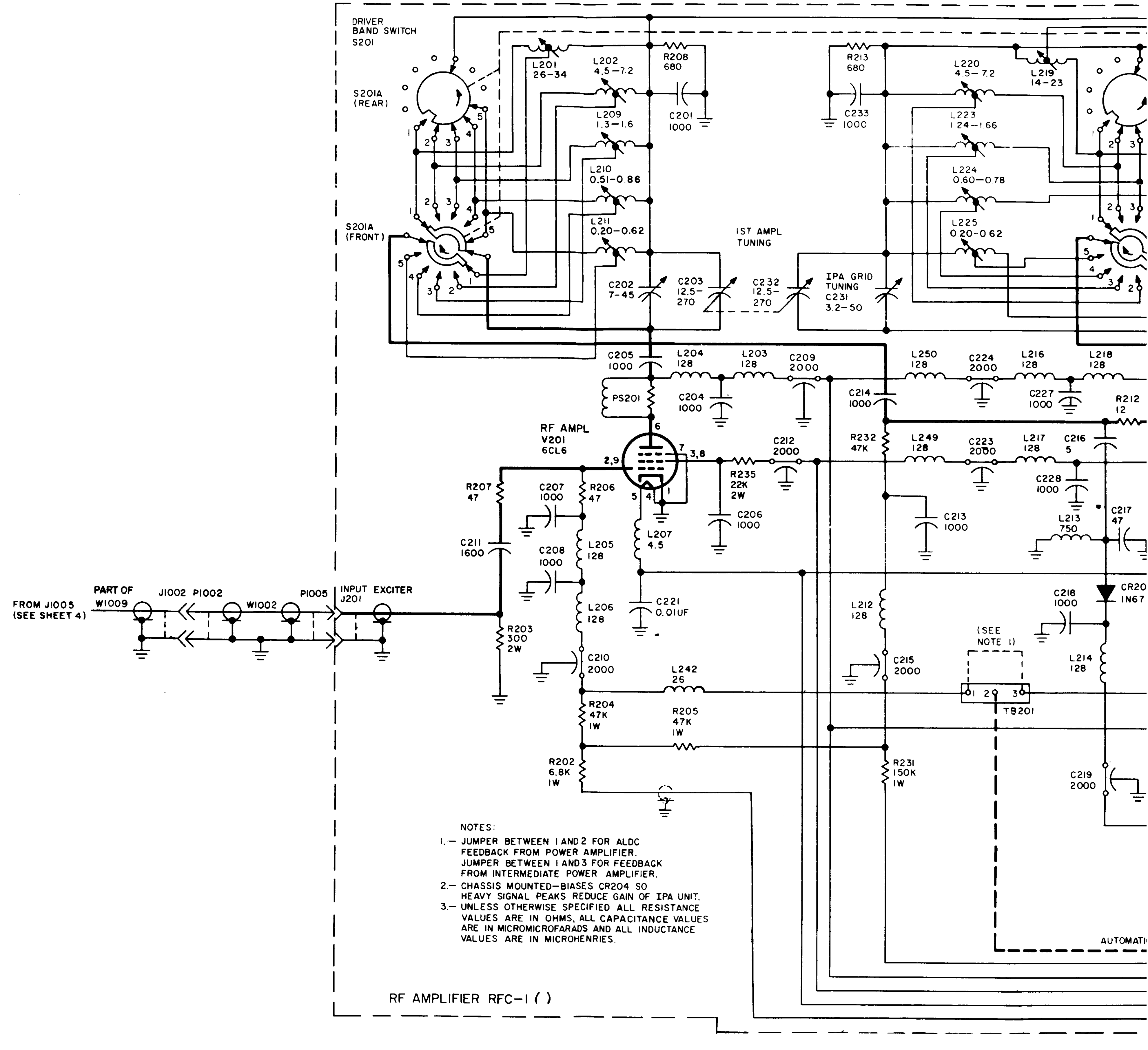


DRIVER BAND SWITCH S201	
POS	FUNCTION
1	2-4 MC
2	4-8 MC
3	8-16 MC
4	16-20 MC
5	20-30 MC

IPA BAND SWITCH S202	
POS	FUNCTION
1	2.0-2.5 MC
2	2.5-3 MC
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	20-30 MC

MULTIMETER SWITCH S204	
POS	FUNCTION
1	IPA BIAS X 10V DC
2	IPA ESG X 10V DC
3	IPA EP X 100V DC
4	IPA ISG X 1MA DC
5	1ST AMPL EP X 1V RF
6	IPA EG X 1V RF
7	IPA EP X 100V RF
8	PA EG X 10V RF

Figure 6-1. Overall Schematic Diagram (Sheet 1 of 4)



RF AMPLIFIER RFC-1 ( )

005681024/RL

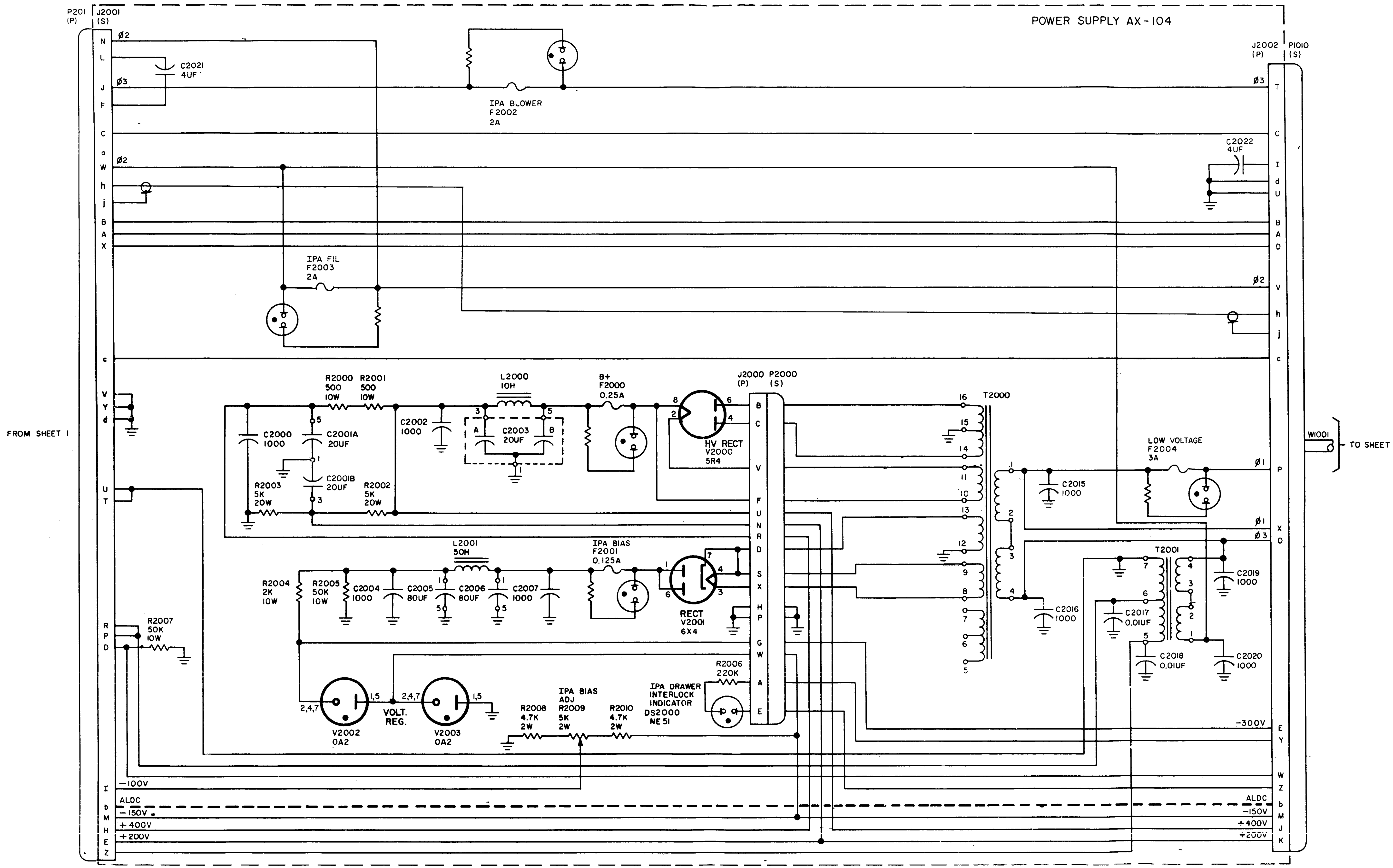
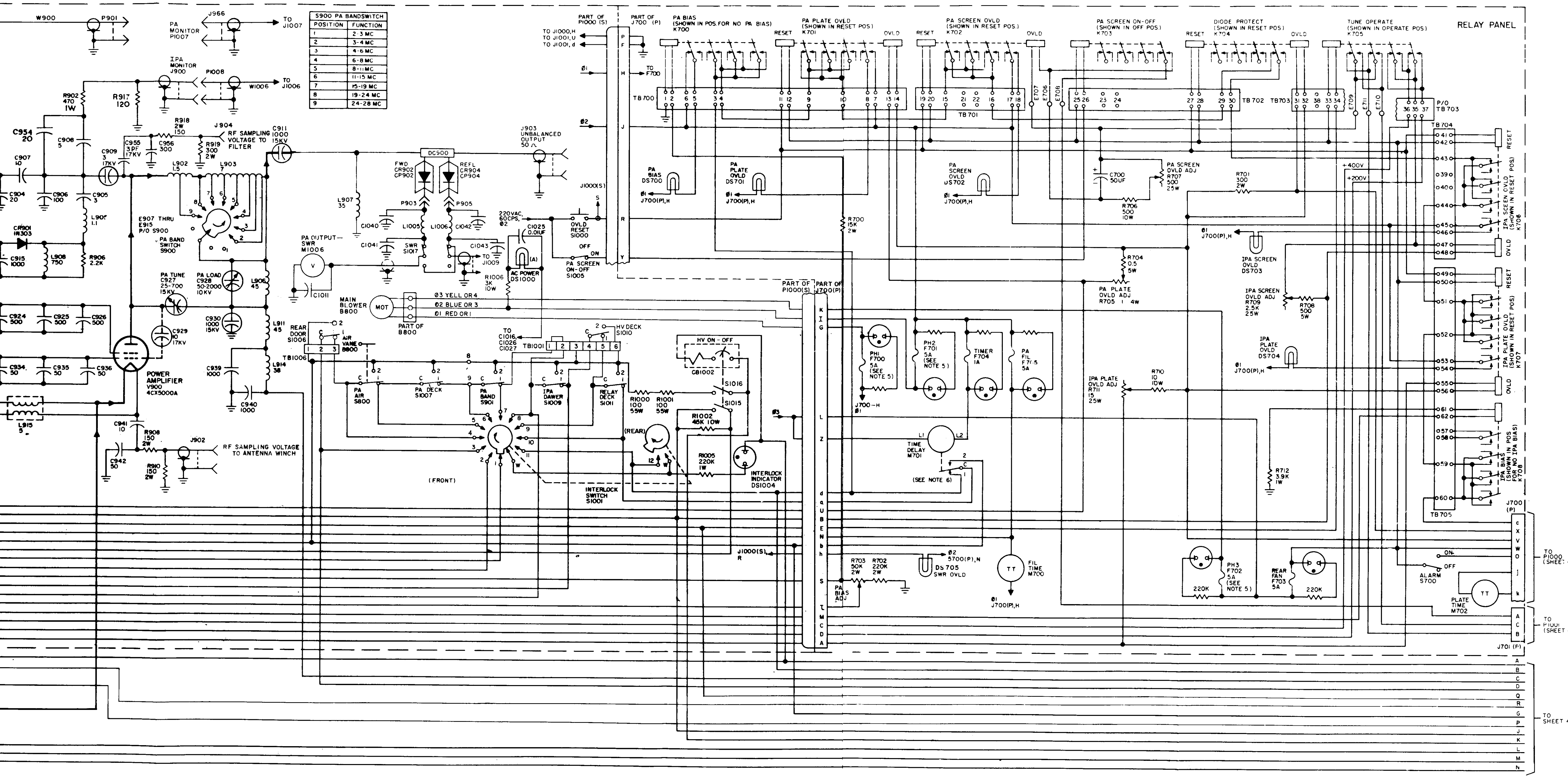
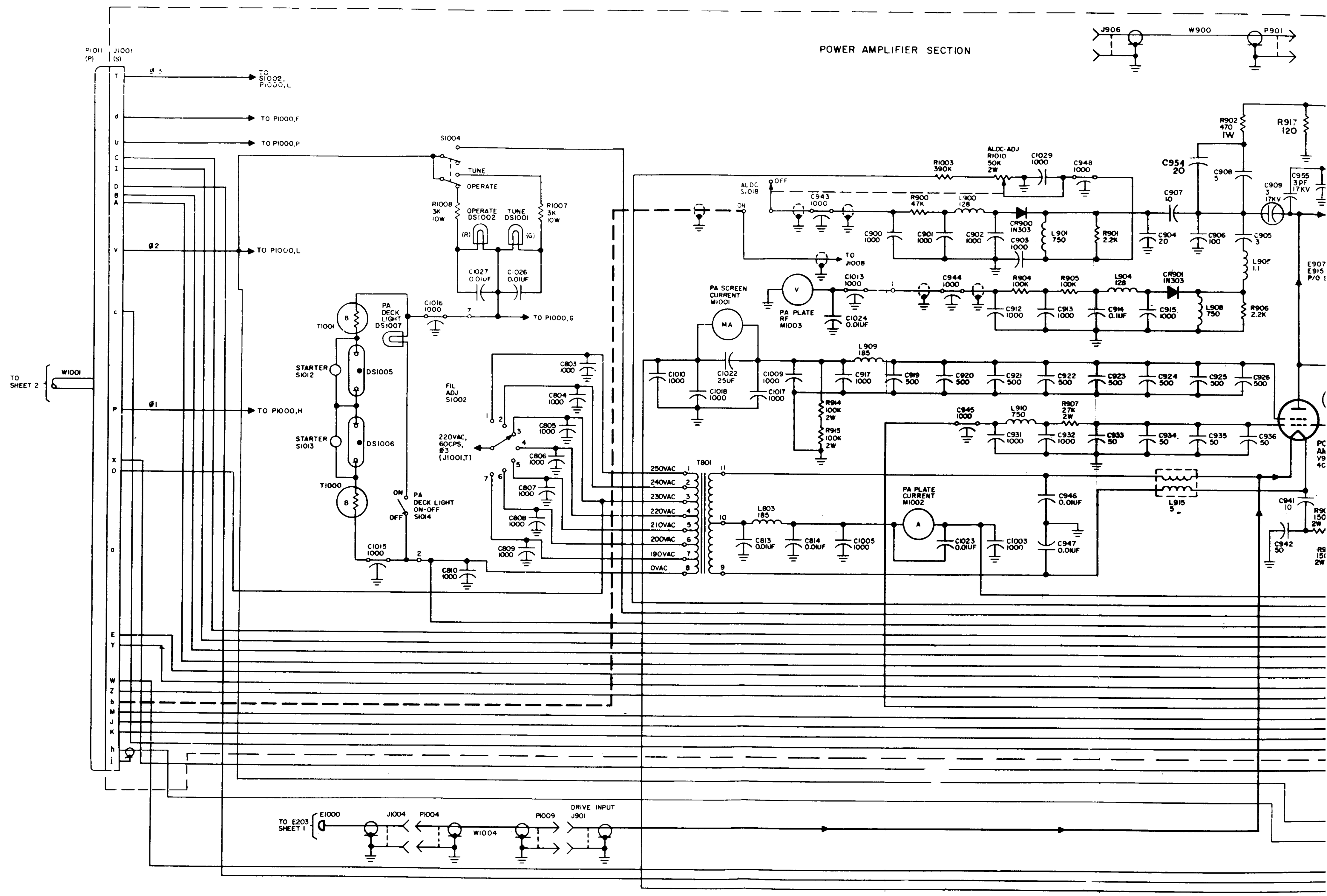


Figure 6-1. Overall Schematic Diagram (Sheet 2 of 4).



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	24-28 MC

Figure 6-1. Overall Schematic Diagram (Sheet 3 of 4).



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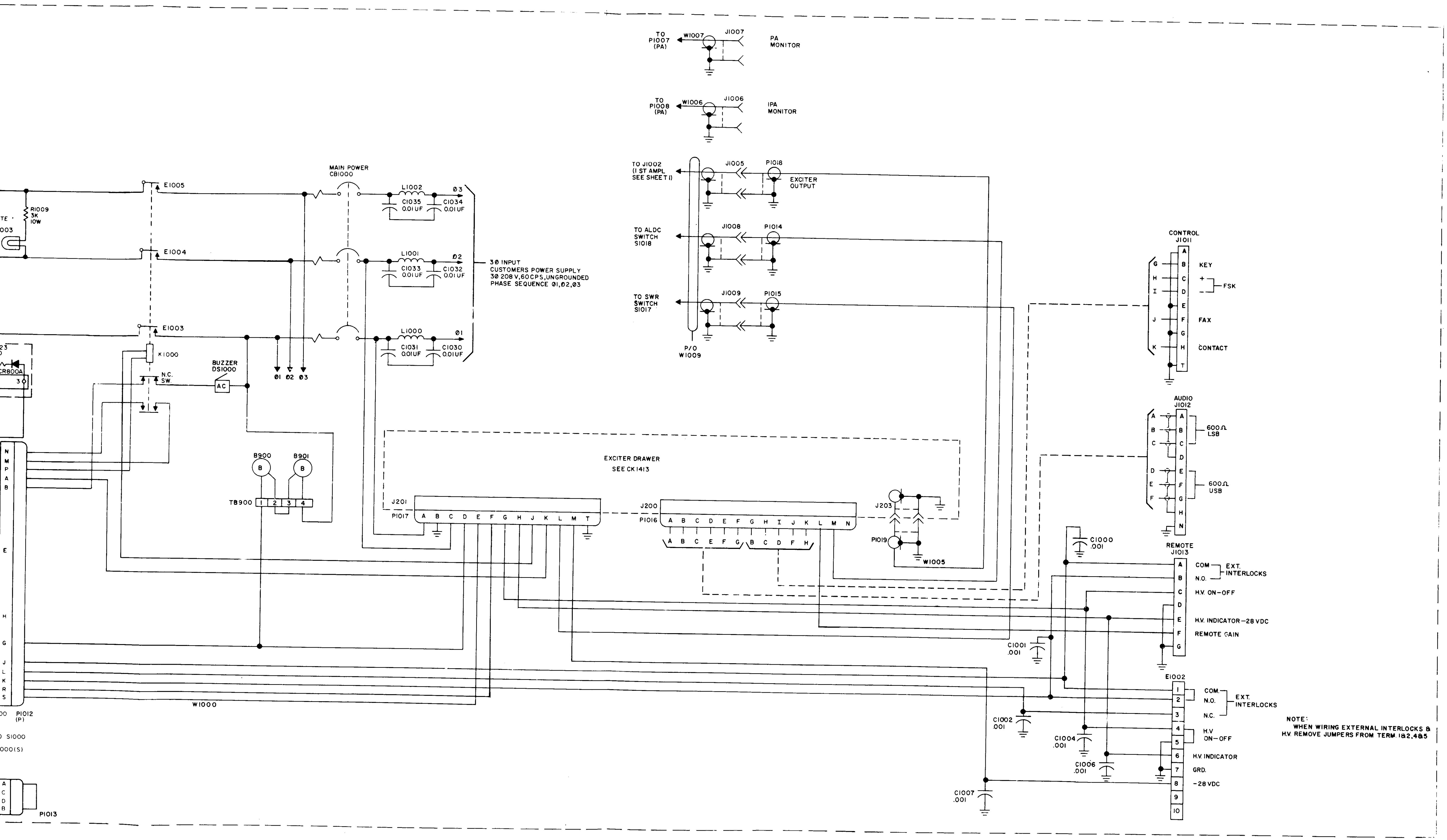
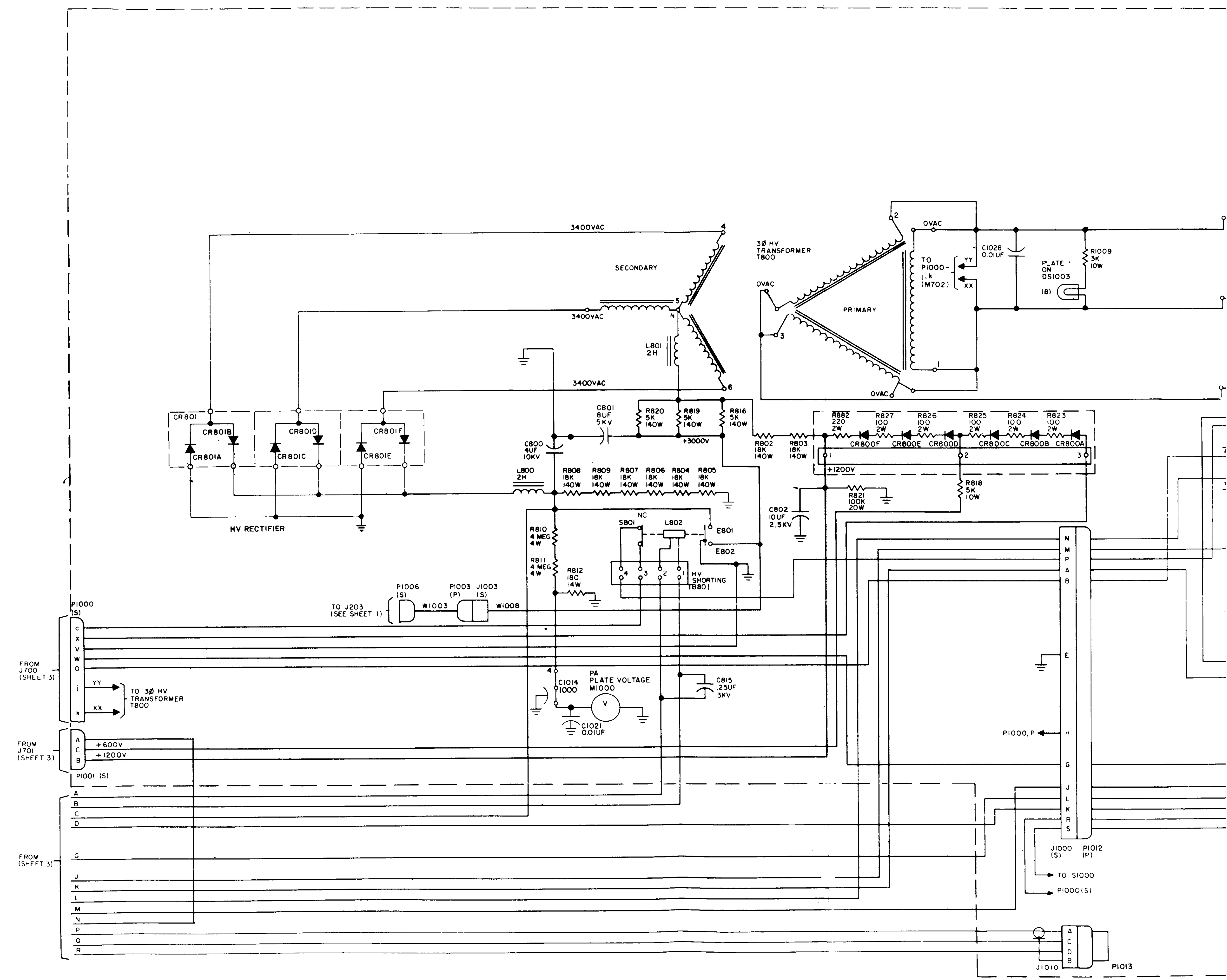


Figure 6-1. Overall Schematic Diagram (Sheet 4 of 4).



005681024/RL