2-16. After the slides have been firmly attached to the rack rails, connect the provided cables to their corresponding connectors at the rear of the chassis. Carefully slide the chassis into the rack observing that all cables have clearance and are not pinched or damaged. The two slots at each end of the panel on the VHF exciter and the UHF exciter allow for entry of hold-down screws into the rack.

2-17. INPUT POWER CONNECTIONS.

2-18. The transmitting sets are shipped from the factory with their input power connectors strapped for 120 vac. To utilize an input voltage of 105, 210, or 240 volts it is necessary to change the strapping arrangement on the exciter power supply, the power amplifier power supply control grid/thermal control/ac control, and the power amplifier high voltage power supply.

CAUTION

Observe strapping arrangement on back of cover and verify that input power transformers are correctly strapped for the specific installation voltage. Figure 2-4 illustrates strapping arrangement. The ac line must always be connected to pins 1 and 5. This is a factory connection. DO NOT CHANGE.

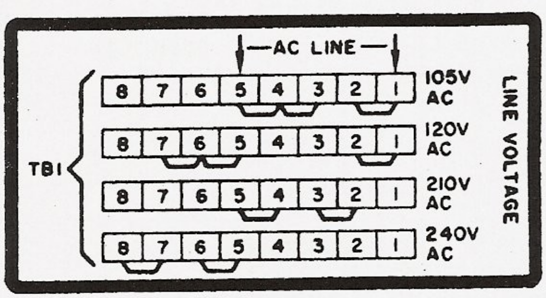


Figure 2-4. Strapping Arrangement

2-19. EXCITER STRAPPING. Remove top cover by loosening eleven 6-32 flat Phillips head captive screws. On the power supply module remove the four Phillips head screws from the fibreglass cover, lift cover off providing access to the strapping arrangement terminal board. After completing strapping procedure replace fibreglass cover and print strapping voltage in space provided. Replace top cover.

2-20. POWER AMPLIFIER STRAPPING. Remove top cover by loosening four 6-32 flat Phillips head captive screws. On the high voltage power supply, lift up metal cover providing access to the strapping arrangement terminal board. On the power supply control grid/thermal control/ac control, lift off fibreglass cover held in place by snap fasteners providing access to the strapping arrangement terminal board. After completing strapping procedure on both power supplies replace covers and print strapping voltage in space provided. Replace top cover.

2-21. REMOTE INPUT CONNECTIONS.

2-22. Connector J5 on the rear panel of the exciter unit contains all lines for remote use, including:

a. Audio input lines and remote keying lines.

b. Battery connections for emergency or dc operation.

c. Wide band modulation input.

d. Wide band modulation control line.

e. Dc output for control of T/R relay or audio muting or for other desired T/R functions.

f. Special keying lines when used with optional module A3 (Keyer KY-668/GRT) audio input and keying lines.

2-23. AUDIO INPUT AND REMOTE KEYING. The audio input and keying lines are J5 pins J, G, H and F. Pins J and G are inputs for a 150 ohm audio line. Keying is accomplished by grounding pin G or H on the respective inputs, thus two separate remote audio inputs can be used, and keying can be accomplished at both sources. A 600 ohm single audio input can be obtained by jumping pins G and H, with the audio input on pins J and F. Keying is accomplished by grounding any of the audio lines; however, dc currents through the input should be kept below 5 ma to prevent distortion in the input audio transformer. Keying is best accomplished by grounding pins G or H which are the center taps of the input audio transformer when jumpered together. See figure 6-21 for details of the audio input circuit. A diagram of a recommended connection for remote audio input and keying circuit is shown in figure 2-5. Use of any of the optional module keying modes can also key the transmitter.

2-24. BATTERY CONNECTION. A battery input can be connected to J5 on pin D with ground return to pin A. This battery, when connected will provide emergency operation in the event of a power failure on the ac input. Switchover is accomplished automatically. A battery of 100 ampere hour capacity will give a minimum operating time of 15 minutes. A battery charging circuit is built into the system which provides a nominal 300 ma charging current to the battery when the ac power is on and operating.

2-25. WIDE BAND MODULATION. A wide band modulation input signal level of 0 dbm at 600 ohms is

Table 3-2. VHF/UHF Power Amplifier Controls and Indicators

CONTROL OR INDICATOR	REF DES	FUNCTION
POWER		
ON-OFF		
Toggle Switch	S1	When placed in ON position, provides primary power to the power amplifier.
Indicator Lamp	DS1	Illuminates when POWER ON-OFF switch is in the ON position.
Fuse (left)	F1	One 3 ampere slow blow fuse in 105-120 VAC line. One 1.0 ampere slow blow fuse in 210-240 VAC line. Indicating fuse holder glows when fuse is blown.
Fuse (right)	F2	One 15 ampere slow blow fuse in 105-120 VAC line. One 10 ampere slow blow fuse in 210-240 VAC line. Indicating fuse holder glows when fuse is blown.
HV		
FUSE	F3	One 10 ampere slow blow fuse 105-120 VAC line. One 10 ampere slow blow fuse 210-240 VAC line. Indicating fuse holder glows when fuse is blown.
Indicator Lamp	DS2	Illuminates when time delay has elapsed after placing POWER ON-OFF switch to ON position allowing filament of power amplifier tube to heat and when HV ON-OFF switch is in ON position.
ON-OFF		
Toggle Switch	S4	When placed to ON position, provides primary power to high voltage power supply.
TUNE-OPERATE		
Toggle Switch	S3	When in TUNE position provides reduced excitation to power amplifier for tuning purposes.
TEST		
Meter	M1	Provides indications per function switch positions.
Function Switch	A5S1	
EXCTR		Indicates exciter connected and on.
KEY		Meter indicates 20 with exciter keyed.
FWD		Indicates forward power to antenna.

Table 3-2. VHF/UHF Power Amplifier Controls and Indicators (Cont.)

CONTROL OR INDICATOR	REF DES	FUNCTION
RVS		Indicates reflected power to amplifier.
V-PLATE		Indicates plate supply voltage.
CUR-PLATE		Indicates plate current.
V-SCREEN		Indicates screen supply voltage.
V-GRID		Indicates control grid voltage.
V-HTR		Indicates filament supply voltage.
V-LPA		Indicates high voltage conditions at power amplifier.
FAN		Samples cooling fan supply voltage.
OVER TEMP		Monitors over-temperature sensing circuit.
INPUT COUPLING		
Locking Dial	C1	Adjusts coupling between exciter output and power amplifier input for optimum energy transfer.
INPUT TUNING		
Locking Dial	C2	Tunes power amplifier input circuit to match exciter output.
Digital Indicator		Indicates approximate power amplifier operating frequency.
OUTPUT TUNING		
Locking Dial		Tunes power amplifier output circuit to resonate at operating frequency.
OUTPUT COUPLING		
Locking Dial	C13	Adjusts coupling between power amplifier output circuit and antenna for optimum energy transfer.

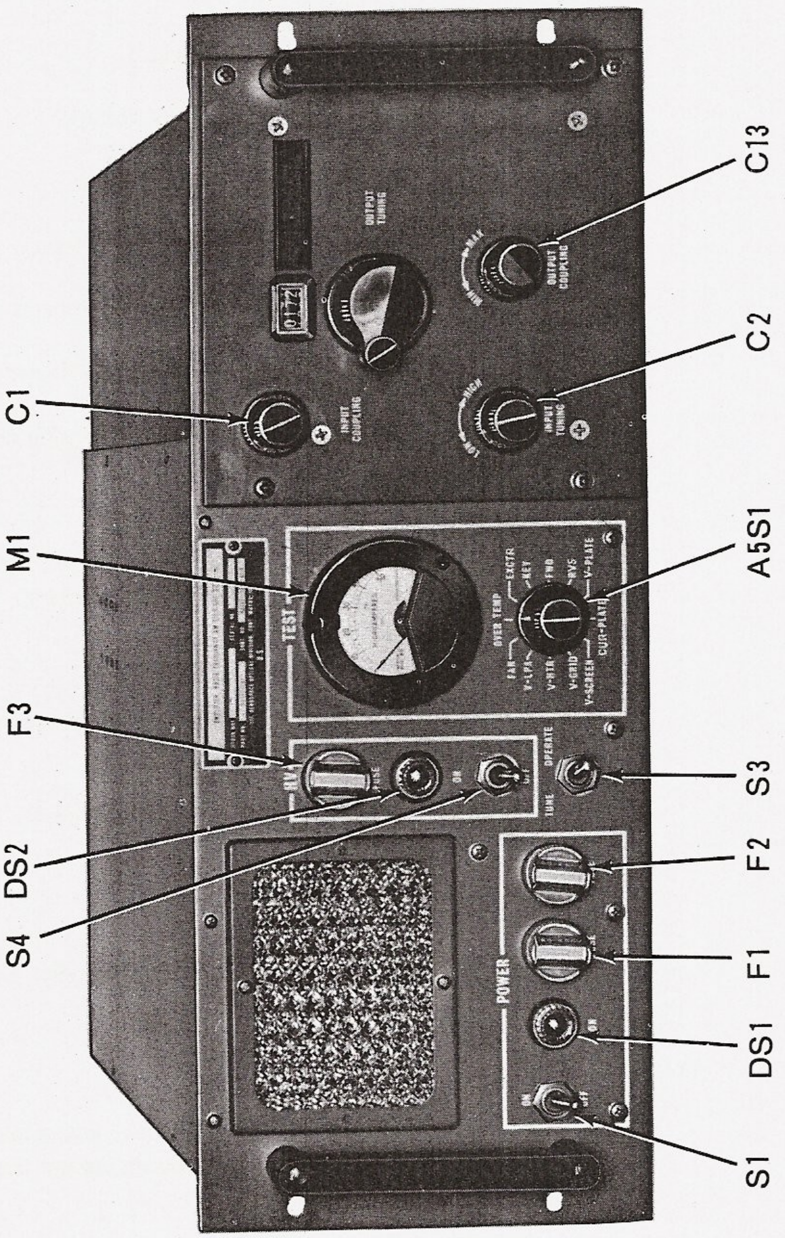


Figure 3-2. VHF Power Amplifier and UHF Power Amplifier Controls and Indicators

3-10. POWER AMPLIFIER STARTING PROCEDURE.

CAUTION

Before any starting procedure is initiated for either the VHF power amplifier or the UHF power amplifier make sure that the proper straps are connected for the primary input voltage to the power transformers. See figure 2-4. Also be sure that the power amplifier is connected to a properly tuned exciter and antenna and also that the TUNE-OPERATE switch is in the TUNE position.

3-11. Place the POWER ON-OFF switch to the ON position. Place the HV switch to the ON position. The following sequence will be initiated.

a. The POWER indicator lamp will illuminate.

b. After approximately 1 minute the time delay relay will activate and enable the high voltage and the HV ON indicator will light. The power amplifier is ready for operation providing the tuning procedure has been completed for the same frequency as the exciter operating frequency and the TUNE-OPERATE switch is placed in the OPERATE position.

c. To assure correlation of power output with front panel FWD and RVS indications, it is necessary to confirm that meter is properly zeroed. If meter does not read 0 ± 1 division in FWD and RVS positions the following preadjustment procedure should be performed.

1. Place HV ON-OFF switch to ON.
2. Remove power amplifier cover.
3. Set power amplifier TUNE-OPERATE switch to OPERATE.
4. Place exciter PUSH TO TALK-CARRIER TEST switch to PUSH TO TALK.
5. Set power amplifier TEST switch to the FWD position.
6. Adjust R7 on printed circuit card A5 to obtain meter zero.
7. Set power amplifier TEST switch to the RVS position.
8. Adjust R9 on printed circuit card A5 to obtain meter zero. (Negative reading is normal and not adjustable when power amplifier is in TUNE mode.)
9. Replace cover.

3-12. POWER AMPLIFIER TUNING PROCEDURE.

NOTE

Before starting any tuning procedure on the power amplifier, be sure the power amplifier is properly connected to the exciter and that the exciter has been properly tuned for a 10-watt output on the desired frequency and also that the proper cavity (UHF or VHF) is installed in the power amplifier.

a. Perform power amplifier starting procec (paragraph 3-10).

b. Place exciter PUSH TO TALK-CARRIER TI switch to PUSH TO TALK.

c. Place exciter REMOTE-LOCAL switch LOCAL.

d. Place power amplifier TUNE-OPERATE sw to TUNE.

e. Place TEST meter function switch to CUR-PLATE position and note that meter reads 7 meter does not indicate at least 7, adjust PLA CURRENT ADJUST control (screwdriver slot) access through top cover of power amplifier to obtain this va

NOTE

The following step is to assure that power amplifier output power is less than 50 watts in the tune mode and that no damage will occur due to excessive tune mode power. Perform step f only if the buffer amplifier/multiplier, electrical instrument printed circuit board is replaced or if meter reading obtained at step k exceeds 40.

f. Place exciter test function Switch 1 to the F position and adjust artificial FWD PWR Adjust (on cover of power amplifier) for a meter reading of 30 on exciter meter.

g. Place the exciter TEST function SWITCH 1 the RVS position. Verify that OUTPUT COUPLING power amplifier cavity is not more than 50 turns fı maximum CCW position before starting power ampli tuning operation.

h. Place exciter PUSH TO TALK-CARRIER TI switch to CARRIER TEST.

i. On the power amplifier tune the INP TUNING control for minimum reflected power observed on the EXCITER TEST meter.

j. Alternately tune INPUT COUPLING and INP TUNING controls for minimum reflected power observed on EXCITER TEST meter (below 5 on met

CAUTION

Do not turn OUTPUT TUNING control to exceed 174 as read on the digital indicator in either UHF or VHF operation. Do not turn OUTPUT TUNING control to indicate below 0 in VHF operation or below 8 in UHF operation as read on the digital indicator. Damage to the tuning mechanism will result if these minimums and maximums are exceeded.

Tuning procedure will only work if a directional coupler is installed in the amplifier. Otherwise an RF watt meter must be installed between the amplifier RF output and the antenna, Tune for highest P_{out}.

k. Place power amplifier TEST meter function switch to the FWD position and tune the OUTPUT TUNING control for maximum power output as indicated on the power amplifier TEST meter. (See figure 3-5 for approximate digital readings. Dashed line of figure 3-5 is for VHF, solid line for UHF.) If meter reading exceeds 40, or if no indication can be obtained, return to step f.

l. Place power amplifier TUNE-OPERATE switch to OPERATE.

NOTE

The OUTPUT COUPLING is vernier-type tuning; a large number of turns covers a small range. Care should be taken not to miss the dip in the plate current when tuning OUTPUT TUNING control in the following steps.

m. Place power amplifier TEST meter switch to CUR-PLATE position.

n. For VHF transmitters alternately dip FWD exciter reading with OUTPUT TUNING and set CUR-PLATE reading with OUTPUT COUPLING until CUR-PLATE reading is 16 and FWD exciter reading is at minimum null (dip). For UHF transmitters alternately dip FWD exciter reading with OUTPUT TUNING and adjust OUTPUT COUPLING until the exciter FWD indication is 35 at minimum null, but do not allow power amplifier CUR-PLATE reading to exceed 18. If the CUR-PLATE reading is above 18, adjust OUTPUT COUPLING and OUTPUT TUNING until CUR-PLATE reads 18. When properly tuned CUR-PLATE reading must always be between 12 and 18.

o. To lower CUR-PLATE reading, increase OUTPUT COUPLING by turning toward MAX and dip CUR-PLATE reading with OUTPUT TUNING control; alternate until reading is approximately as indicated by figure 3-6.

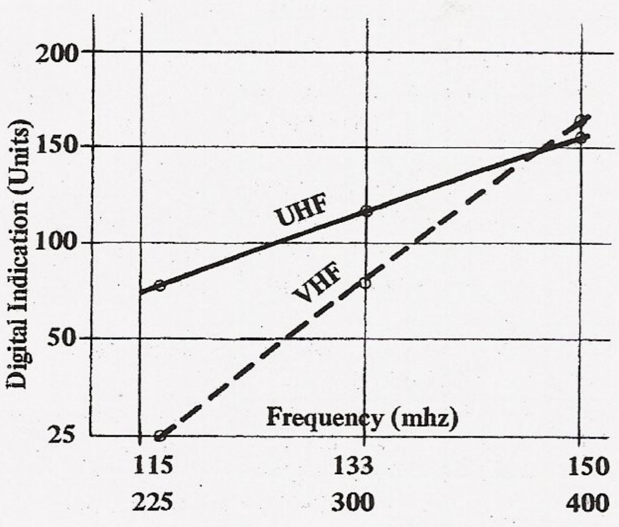
p. To increase CUR-PLATE reading, decrease OUTPUT COUPLING by turning toward MIN and dip CUR-PLATE reading with OUTPUT TUNING control; alternate until reading is approximately as indicated by figure 3-6.

q. Observe 50 watts on FWD position of power amplifier TEST meter (see Figure 3-7).

r. Lock power amplifier tuning knobs.

s. Place PUSH TO TALK-CARRIER TEST switch to PUSH TO TALK.

t. This completes the tuning procedure for the power amplifier.



Frequency	Indicator Units
115	23
133	80
150	160
225	70
300	120
400	150

Figure 3-5. Frequency Vs. Digital Units

3-13. STOPPING PROCEDURE.

3-14. POWER AMPLIFIER STOPPING PROCEDURE. To turn off the power amplifier place the power ON-OFF switch on the front panel to the OFF position. This completely deactivates the power amplifier.

NOTE

Shutting off the power amplifier automatically changes over the antenna from the output of the power amplifier to the output of the exciter allowing operation at reduced power.

3-15. EXCITER STOPPING PROCEDURE. To turn off the exciter, place the AC POWER ON-OFF switch to the OFF position. This completely deactivates the exciter.

increases the current through Q3 and R17 thereby increasing the base current drive to Q4. Increasing the base current drive of Q4 further increases collector current required through Q4 thus reducing the input to Q3 even further. This loop action provides saturation of Q4 thus bringing the collector near ground potential. CR11, connected to the regulated circuit at the divider point between resistor R22 and R28 serves as a ground for the feedback correction circuit and thus reduces the +20 volt regulated output voltage to 0 volts. The only way to reset this circuit is to turn off the ac input power and allow the voltage to restore itself to normal condition, then turn it back on again. If the overcurrent is sensed again, the circuit will turn off the regulated B+ output. C9 serves as a ripple filter for the base of Q3. R9 and R16 serve as current limiting resistors for monitoring the unregulated dc input at the exciter front panel when the test switch on the front panel is in the UNRGLTD position.

4-80. BATTERY CHARGING CIRCUIT. The battery charging circuit consists of a constant current drive source which is Q1 on PS1A1, and its associated drive circuitry on PS1A2. The unregulated dc voltage is applied to R3 and R4 and is coupled out through pin 12 of PS1A2 to pin 2 of TB2 on PS1A1. This connects the input to the emitter of Q1. The collector of Q1 is connected to pin 3 of TB2, with the base connected to pin 1 of TB2. R3 and R4 on PS1A2 serve as constant current source resistors when a fixed base voltage is applied to regulating transistor Q1. The fixed base voltage is derived from the network consisting of CR7, CR8 and CR9 in series with resistor R5 to ground. The voltage at the cathode of CR7 is approximately 2.1 volts less than the unregulated input voltage which is applied to the emitter of Q1. This causes Q1 to conduct allowing diode CR6 to be forward biased and allows voltage to be applied through pin 14 to the battery circuit. Diode CR6 serves as a reverse protection in the event of a battery hook-up in the reverse polarity. Q2, with bias resistors R1 and R2, serves as a transistor protect circuit in the event of connecting the battery in the reverse mode or in the event of a short circuit at a battery charging terminal. In either case, Q2 conducts heavily, which shorts the potential derived from CR7, CR8 and CR9 and returns the base voltage of Q1 to the same potential as the unregulated input, which turns off current flow through Q1 and protects the battery charging circuit.

4-81. On PS1A2, R15 serves as a multiplier resistor for a monitor test point on the exciter front panel associated with the regulated voltage output. When the test switch is in the REG +20 position, a reading of 20 on the meter should be obtained when the regulated output voltage is +20 volts. A battery monitoring point provides a dc input from the external battery to pin 10 of PS1A2, which is divided through R6 and R7 which serve as current limiting resistors for the metering test point associated with the battery monitoring position on the front panel of the exciter. When the test switch is in the BAT position, the battery voltage will be monitored and should be read directly in volts on the test meter. The battery voltage should be monitored with the ac power ON-OFF switch OFF, so that a monitor of the battery charging voltage is not read on this position. C6 serves as an output ripple filter capacitor on the +20 volt line.

4-82. POWER AMPLIFIER.

4-83. GENERAL. The power amplifier is a self-contained unit which amplifies the 10-watt exciter output to 50 watts. See figure 6-24. The power amplifier utilizes a 350 watt plate dissipation beam power tetrode vacuum tube in a tuned cavity configuration. The amplifier operates Class AB_1 linear. The 50-watt output is maintained by means of a closed-loop automatic power control action which is coupled back into the exciter. A TEST meter and meter function switches provide metering indications of the various modules' performance under operating conditions. The tetrode vacuum tube amplifier is cooled by forced air. The power supplies required for filament grid, and plate voltages for the power amplifier vacuum tube are contained within the unit.

4-84. TUNED CAVITY A7.

4-85. GENERAL. The tuned cavity is a separate self-contained module that plugs into the power amplifier chassis through the front panel. It is held in place by four screws. The tuned cavity module contains input and output tuning circuitry, a low pass filter and a power sensor. To change the VHF tuned cavity to UHF operation it is necessary to change the input tuning cavity, the plate high voltage cable assembly, the vacuum tube socket, the low pass filter and the power sensor. A plunger located in the front of the cavity and behind the front panel changes the output tuning cavity from VHF to UHF depending on its position. For VHF operation the plunger should be out. For UHF operation the plunger should be in. A snap lock holds the plunger in place when all the way in or all the way out.

4-86. TUNED CAVITY (VHF). The rf output from the exciter is fed through a coax line to P4 on the cavity module. See figure 6-25. From P4 the rf is fed to J1 on the input cavity and to the impedance matching network consisting of C2, C1, R1, and coupling capacitor C3. This network serves as a 50-ohm matching network to the grid of V1. Grid bias enters at P1E from the control grid power supply through L1 and L2 serving as rf chokes, with C22 and C4 serving as decoupling capacitors to remove any rf that might be on the grid input lead. Filament voltage enters at P1B from the filament supply and is connected to the tube filaments through filter decoupling capacitors C10 and C11. The filament return is ground. The cathode of V1 is grounded through R2, R3, R4 and R5 in parallel which maintains a constant rf gain at V1. Screen grid voltage for V1 is brought in at P1K with C12 serving as a feedthrough and decoupling capacitor along with C17, C18, C19 and C20. The screen grid operating voltage is a nominal +390 volts dc. An additional decoupling capacitor is built into the tube socket. The arc suppressor E1 prevents damage to screen grid circuitry when short duration flash over or internal shorts exist within the vacuum tube.

4-87. The rf output from V1 is taken from its plate and coupled to the output tuning cavity through coupling capacitors C15 and C21. This cavity is plunger-tuned. The rf output is coupled through C13 at the output of the cavity. The B+ voltage for the plate of V1 is supplied from P2 through feedthrough filter FL1. The proper operating voltage for the plate of V1 is a nominal +2000 volts dc. The rf output from J2 of the cavity is coupled through P9 to low pass filter FL2. FL2 passes the frequencies of 116 to 149.95 mhz and suppresses unwanted harmonics above the desired frequency. The output from FL2 is on P8 which connects to P7 of power sensor DC1. The power sensor detects forward and reverse power and is used in closed-loop operation similar to power detector DC1 in the exciter unit; however, when the exciter is driving the power amplifier, power sensor DC1 takes control of loop operation and output power reference is controlled from this power sensor. In the event of a vswr greater than 3 to 1, the system switches from power amplifier operation to exciter operation to protect the output of the cavity amplifier. The rf output from the power sensor is on P6 which connects to P3 on the rear of the cavity module. This output couples through the rear panel of the power amplifier chassis and is connected back to the exciter coaxial relay. Pins F and H of P1 provide an interlock to prevent the high voltage power supply from turning on in the event that the cavity is not plugged into the unit. Amplifier tube V1 requires forced air cooling to remove the heat, and an air flow path exists through the mechanical structure of this cavity with a thermal sensing element in the exhaust air flow duct. The thermal sensor unit provides the detection action required to determine if an over-temperature condition exists. The blower must always be operating whenever the power amplifier is operating.

4-88. TUNED CAVITY (UHF). The UHF tuned cavity operates essentially the same as the VHF tuned cavity. To properly tune the higher frequencies the cavity sizes are different from the UHF; filter frequency requirements are different and component values are changed. The plunger behind the front panel must be locked in the "in" position for UHF operation. The rf output from the exciter is fed through a coax line to P4 on the cavity module. See figure 6-26. From P4 the rf is fed to J1 on the input cavity and to the impedance matching network consisting of C2, C1 and coupling capacitor C3. This network serves as a 50-ohm matching network to the grid of V1. Grid bias enters at P1E from the control grid power supply through L1 and L2 serving as rf chokes, with C4 serving as a decoupling capacitor to remove any rf that might be on the grid input lead. Filament voltage enters at P1B from the filament supply and is connected to the tube filaments through filter decoupling capacitor C10 and C11. The filament return is grounded. The cathode of V1 is grounded. Screen grid voltage for V1 is brought in at P1-K and C12 serving as a feedthrough and decoupling capacitor and rf choke L3 to the screen grid of V1. The screen grid operating voltage is a nominal +390 volts dc. An additional decoupling capacitor is built into the tube socket. The arc suppressor E1 prevents damage to screen grid circuitry when short duration flash over or internal shorts exist within the vacuum tube.

4-89. The rf output from V1 is taken from the plate and coupled to the output tuning cavity through coupling capacitor C15. This cavity is plunger-tuned. The rf output is coupled through C13 at the output of the cavity. The B+ voltage for the plate of V1 is supplied from P2 through feedthrough filter FL1. The proper operating voltage for the plate of V1 is a nominal +2000 volts dc. The rf output from J2 of the cavity is coupled through P9 to low pass filter FL2. FL2 passes the frequencies of 225 to 399.95 mhz and suppresses unwanted harmonics above the desired frequency. The output from FL2 on P8 connects to P7 of power sensor DC1. The power sensor detects forward and reverse power and is used in closed-loop operation similar to power detector DC1 in the exciter unit; however, when the exciter is driving the power amplifier, power sensor DC1 takes control of loop operation and output power reference is controlled from this power sensor. In the event of a vswr greater than 3 to 1, the system switches from power amplifier operation to exciter operation to protect the output of the cavity amplifier. The rf output from the power sensor is on P5 which connects to P3 on the rear of the cavity module. This output couples through the rear panel of the power amplifier chassis and is connected back to the exciter coaxial relay. Pins F and H of P1 provide an interlock to prevent the high voltage power supply from turning on in the event that the cavity is not plugged into the unit. Amplifier tube V1 requires forced air cooling to remove the heat, and an air flow path exists through the mechanical structure of this cavity with a thermal sensing element in the exhaust air flow duct. The thermal sensor unit provides the detection action required to determine if an over-temperature condition exists. The blower must always be operating whenever the power amplifier is operating.

4-90. POWER SUPPLY CONTROL GRID/THERMAL CONTROL/AC CONTROL A3. This module contains the filament supply, the grid voltage supply, the thermal control detector circuits, the blower failure sensor circuits and the ac control circuits. See figure 6-27. The operation of each of these will be described separately.

4-91. AC CONTROL. Figure 6-28 shows the ac control circuits. Included are the power supply control grid/thermal control, the high voltage power supply, the cavity interlocks, and the interlock on top of the chassis, as well as the chassis wiring, switches and lamps on the front panel. S1 is the POWER ON-OFF switch on the front panel of the power amplifier. The ac line goes in to module A3, the power supply control grid/thermal control through fuses F1 and F2 and into pins 15 and 16 of P1. These pins tie to TB1 which requires strapping for various primary source voltages. The strapping arrangement for this terminal board is shown on the insulated cover of the module. When the straps are inserted properly for the source voltage, pins 1 and 7 will maintain a 120 volts ac and the POWER ON lamp is across pins 14 and 15 of P1 and DS1 illuminates, giving an indication of ac power to this chassis. The ac input also goes through F3 on one side of the line to the high voltage power supply module A4 to TB1 which, in addition, requires the proper strapping for the various primary source voltages. The strapping arrangement for this terminal board is identical to the strapping arrangement for TB1 in module A3. The ac return comes through the relay logic circuits and ac control circuits which will be defined as follows: When the ac is turned on, pin 1 and 7 of TB1 in module A3 will provide 120 volts to relay K3, a 60-second time delay relay. In 60 seconds the contact associated with the relay coil is closed allowing current to flow through the printed circuit board containing relay K1 through pins E6 and E7 to relay K2 through pin 11 of P1 through chassis wiring to the cavity interlock wire shown on the drawing as C7 and C8 and returns to pin 14 of module A3 providing an energizing path for K2. When K2 energizes the switch contact A2 contacts A1 which provides a continuous or holding input into K2 from P1 pin 15 side of the ac line, thus holding K2 energized.

4-92. Time delay relay K3 returns to the normal position and is unused until turn-on of the ac input again. Relay K2 current path is through K1 in module A2 and through the cavity interlock. In the event that the cavity is not plugged into the power amplifier chassis, no current can flow through K2 and thus K2 will not be energized. In addition, K1 shown above K2 and associated with the thermal sensing circuits and blower failure sensing circuits when energized also breaks the line to de-energizing it. Energizing K2 closes contact B2 to B1, which applies the ac line associated with pin 15 P1 through the cover interlock out through P1, pin 10 through the high voltage switch S4 to the high voltage power supply, to pin 1 TB1 thus completing the ac to the high voltage power supply transformer input energizing the high voltage power supply. Thus, the high voltage power supply is not turned on until the time delay relay period of 60 seconds has elapsed or in the event of any of the interlocks being opened to relay K2. If the cover interlock is open, or the HV ON-OFF switch on the front panel is OFF no high voltage will be available from the high voltage power supply. The latter two switches, however, can be turned on and high voltage will be regained immediately. In the case of the interlocks associated with relay K2, the elapsed time of 60 seconds must complete before the high voltage power supply will be energized. Lamp DS2 on the front panel will turn on by 120 volts ac rms applied from pins 1 and 7 of TB1, the terminal board in the high voltage power supply. This lamp indicates the presence of high voltage.

4-93. FILAMENT SUPPLY. Transformer T1 supplies the filament voltage on pins 8 and 7 with pin 7 being the ground for the system. See figure 6-27. It is necessary to have the proper straps in place on TB1 in order to obtain the proper output voltages from T1.

4-94. GRID SUPPLY. The grid supply provides a negative dc voltage to the control grid of the cavity amplifier tube. The voltage is obtained from the rectifier circuit shown in figure 6-27. The output of T1, pins 9 and 10 is applied to the bridge rectifier consisting of diode CR5, CR6, CR7 and CR8 with the positive side of this bridge connected to ground. The negative side feeds through a filter consisting of C1, R12 and zener diode VR1 which provides a –100 volt dc output to the resistive divider network consisting of R14, R16 and potentiometer R15. This dc output is further filtered by C2. The output can be adjusted from 66 to 95 volts. R17 and R18 provide current limiting and divider action for metering the output voltage through E11 to pin 4 of P1 which is connected to the front panel TEST meter V-GRD position.

4-95. THERMAL CONTROL CIRCUITS. The thermal control circuits provide power amplifier turn-off if the thermal sensor in the exhaust heat duct indicates excessive temperature or if a blower failure occurs. The thermal sensing circuit has a thermistor in the air flow exhaust which operates in a voltage divider line consisting of resistors R8, R9, and the thermistor as connected to pin 9 of P1. Plus 20 volts is necessary for the operation of these circuits which is obtained on P1, pin 6. The voltage source is from the exciter 20-volt power supply. In the event of an excessive temperature at the thermistor, its resistance decreases and the voltage at the base of Q3 decreases, increasing the voltage of Q3. The voltage increased at the collector of Q3 is applied through R6 to the base of Q2. The increase of voltage on the base of Q2 decreases the collector voltage energizing relay K1. This disables the primary voltage to relay K2 in the high voltage power supply ac line, and turns off the 2 kv dc power supply. A detected dc voltage from the blower is brought into the input connector P1, pin 7 through R1 to the base of Q1. If this voltage decreases due to a failure of the fan voltage, the voltage on the collector of Q1 increases coupling the voltage increase through R4 to the base of Q2. An increase at this point decreases the output on the collector of Q2, thus energizing relay K1 which disables the high voltage power supply. CR2, CR3 and CR4 provide a fixed emitter voltage of approximately +2 volts for the emitters of Q1, Q2 and Q3. CR1 serves as a transient protector across K1 to protect the transistor from the coil inductance of K1. R4 and R6 serve as summing resistors to the base of transistor Q2. R11 is a current limiting resistor for voltage to the TEST meter on the power amplifier front panel. This current is coupled out through P1, pin 8 to the power amplifier front panel TEST meter when the switch is in the OVER TEMP position.

4-96. AC TO AC CONVERTER SOURCE VOLTAGE. In addition pins 11 and 12 of the transformer provide 13.5 volts rms to the AC-AC converter, which drives the blower motor.

4-97. POWER SUPPLY PLATE/SCREEN GRID A4.

4-98. See figure 6-29. The ac input to this module comes in to connector P1, pins B and C, to terminal board TB1 which requires the proper straps for the proper line voltage input. T1 is the power supply transformer. The secondary output is fed to pins E2 and E4 to a bridge rectifier consisting of CR1, CR2, CR3 and CR4. The dc output from the bridge rectifier connects to E3 to a pi section filter consisting of C1A, C1B and L1. The dc output is connected to E1 on the printed circuit board and is a nominal +2000 v. Terminal E1 is the tie point for the high voltage output wire feeding the plate of the cavity amplifier tube. R4, R5, R6, R7 and R8 serve as a resistor-divider to divide down the voltage for metering at the front panel of the power amplifier TEST meter V-PLATE position. The negative side of the bridge is tied to ground through R1 and R2 in parallel and the voltage drop across these resistors provides the monitor of the current required by the high voltage power supply. R3 is a current limiting resistor to the TEST meter on the power amplifier front panel which is coupled out on connector P1, pin L, to the meter position CUR-PLATE. The screen voltage is derived from the 2 kv power supply by dropping dc voltage across R12 and R15 to a zener regulated output consisting of VR1, VR2 and VR3 in series. C3 serves as a ripple filter for the screen voltage. The output voltage available from pin E22 is +390 volts dc.

4-99. The screen voltage is at the operating +390 volt condition at all times. R24 is a current limiting resistor to the TEST meter on the front of the power amplifier and is coupled out through P1, pin E, to the test switch KEY position, which gives a direct reading of the keying voltage. The screen voltage is fed to the power amplifier vacuum tube V1, through R22 to P1, pin F. R19, R20 and R21 serve as a voltage divider for the screen voltage and, in addition, serve as a current limiting resistor network for monitoring the screen voltage and, in addition, serve as a current limiting resistor network for monitoring the screen grid voltage on the power amplifier front panel when the test switch is in the V-SCREEN position. A voltage divider network consisting of R16, R17, R18 and R26 provides a voltage at P1 pin H, which is a sample of the screen voltage for the logic circuit in the exciter unit. When the screen voltage is at +390 volts, the output voltage on pin H of connector P1 is a nominal +35 volts dc. R23 is a current limiting resistor for monitoring the V-LPA test voltage point on the power amplifier front panel when the test switch is in the V-LPA position.

4-100. CONVERTER AC TO AC A2.

4-101. The ac to ac converter converts the input line frequency to a 400 hz output to drive the blower for cooling the tuned cavity. See figure 6-30. The ac input is a nominal 13.5 volts rms at a frequency of from 47 hz to 420 hz. The output ac to drive the blower is a nominal 115 volts rms at 400 hz. The ac to ac conversion is obtained by rectifying the ac input and using the dc to drive a 400 hz oscillator. The output from the 400 hz oscillator is amplified and drives the blower through an output step-up transformer. The 13.5 volts rms input comes to connector P1, pins 2 and 3. The ac input is rectified by a bridge rectifier consisting of CR5, CR6, CR7 and CR8. The negative side is grounded and the positive output is a nominal +15 volts dc. C9 serves as a filter capacitor for the dc output of the rectifier circuit. Q2 is a basic RC phase-shift oscillator with the output from its collector shifted in phase by the phase shifting network consisting of R4, R5, R6, C2, C3 and C4. The output from the phase shifting network is connected to the base of transistor Q1 which is an emitter-follower presenting a high impedance load to the phase shifting network. R1 is the emitter-follower output resistor. C1 serves as the ac coupling capacitor of the phase shifted signal to the base of Q2. The phase shifted feedback is of such a phase as to support oscillations in Q2. R2 serves as a dc biasing resistor for Q2. This phase-shift oscillator circuit provides a 400 hz output to the base of Q3 and can be observed at TP1. Q3 is an emitter follower acting as an isolation stage to prevent loading of the oscillator circuit. The output is taken from the emitter of Q3, with R7 serving as the emitter resistor.

4-102. The output signal is coupled to the base of Q4 through coupling capacitor C5, with resistors R9 and R10 serving as bias resistors for Q4. Q4 is an amplifier stage with the output from its collector driving the base of emitter follower Q5. R11 serves as a load resistor for Q4 and R15 serves as a gain controlling resistor to stabilize the output level from Q4. Q5 operates as an emitter follower, driving the primary of T1. The emitter of Q5 drives pin 3 of T1 with pin 4 grounded. The output from the secondary of T1 is a nominal 115 volts, 400 hz. One side of the output is grounded, the other side drives the blower through J1, pin 6, with the blower return on J1, pin 4, to ground through resistor R14. C6 across the secondary of T1, serves as a resonating capacitor at 400 hz and maintains a sinusoidal 400-hz output from the secondary. CR3 rectifies a sample of T1 secondary output with R12 and R13 serving as a voltage divider network and current limiting resistors to provide the proper dc level output to the front panel TEST meter. When the meter test switch is in the FAN position, a reading of the detected secondary voltage is indicated on the meter. CR4, in conjunction with filter capacitor C8 rectifies a sampling of the return ac from the blower to ground across R14. This sampled voltage is indicative of blower operation and in the event that no voltage is detected at this point, an indication of a blower failure results. The nominal sensing voltage from the output of CR4 on pin E7 is +3 volts dc and is connected to the blower current sensing circuit through connector P1, pin 7. In the event of a blower failure, the thermal control blower sensing circuit senses the fault and disables the high voltage power supply.

4-103. BLOWER B1.

4-104. The blower is a centrifugal type which cools the vacuum tube and associated circuitry in the power amplifier. See figure 6-24. The blower has long life bearings and low acoustical noise output. It operates from 115 volts, 400 hz, single phase, with an external phasing capacitor for a split phase winding. The external starting capacitor is mounted on the blower frame. The ac input to the blower comes from J1, pins 4 and 6, of the ac to ac converter.

4-105. BUFFER AMPLIFIER/MULTIPLIER, ELECTRICAL INSTRUMENT A5.

4-106. The buffer amplifier/multiplier, electrical instrument module contains circuits for a buffer amplifier between the detectors from the power sensor and the rf control unit in the exciter chassis. See figure 6-31. These circuits are similar to the circuits for the forward and reverse power lines in the rf control/modulator in the exciter unit. In addition, this module contains various metering multiplier resistors, current limiting resistors, and a meter-protect circuit for controlling the metering functions on the front panel of the power amplifier. The meter selector switch is wired to this module.

4-107. BUFFER AMPLIFIER. The inputs to the buffer amplifiers come from power sensor forward and reverse detector outputs, with the forward power detected output coming to connector P1, pin 2 and the reverse power detected output coming to connector P1, pin 3. In the forward power line, the input is connected through terminating resistor R3 and R26 to the emitter of Q1. R26 is a potentiometer for adjusting the forward power output to 50 watts cw when the LPA OPERATE-TUNE switch is in the OPERATE position. R22 is a potentiometer for adjusting the forward power meter reading on the test meter when in the FWD position, so that a reading of 40 on the meter corresponds to 50 watts rf output. This transistor operates as a grounded-base amplifier, with the output from the collector. The nominal gain of this amplifier is approximately 0.6. R6 and R7 serve as biasing resistors to set the output dc level to the proper starting dc voltage. The collector load of Q1 consists of R12 and R13, and frequency compensation network R27 and C3. The output from Q1 collector is coupled to the base of Q3, which is an emitter follower. The output from the emitter of Q3 is connected through E12 on P1, pin 6 and from there to the rf control in the exciter unit and serves the same function as the forward power line in the exciter unit; however, when the power amplifier unit is operating, this line takes control of the rf control loop. The detected reverse power line is connected into terminating resistor R4 to the emitter of Q2, R8 and R9 serve as biasing resistors for this stage. The output from Q2 is coupled from its collector to the base of emitter follower Q4. The output from the emitter of Q4 is connected through pin E13 to connector P1, pin 7 and from there to the rf control in the exciter unit. The rf control in the exciter unit determines and acts on any vswr present in the power amplifier unit. A vswr greater than 3 to 1 returns control to the exciter unit. R22, associated with the forward power output, serves as a meter multiplying resistor and connects to the front panel test switch and TEST meter. When the test switch on the front panel of the power amplifier is in the FWD position and the transmitter is unkeyed, the meter should be zeroed by adjusting potentiometer R7 at the emitter circuit of Q1. The return path of the meter is to E2 and to divider resistors R19 and R20. The division voltage at the junction of these divider resistors serves as the reference voltage for both the forward and reverse power returns when in the unkeyed condition. The reverse power line is zeroed in the same way when the test switch on the front panel is in the RVS position and the dc return from the meter connects to pin E4 through R21 to the divider network of R19 and R20. R9 is adjusted such that a zero meter reading is obtained when the transmitter is in an unkeyed condition.

4-108. The front panel TEST meter is connected to P1, pins 9 and 19. R17 serves as a multiplier resistor for the meter with all test functions to the meter coupled through this resistor. CR4 serves as an overcurrent protect diode for the meter in the forward direction and in the event of an excessive current, damage to the meter will not occur since current will then flow through CR4. CR6 serves to protect the meter from negative voltages or transients. Both sides of the meter input circuit are connected to switch S1A and S1B, which serve as the switch arms for the two-layer multi-position test switch on the front panel below the meter. Various monitored voltages associated with the switch are connected into P1 and are seen as grid voltage on pin 14, plate current on pin 12, fan voltage on pin 15, V-LPA, or sample voltage, on pin 16, screen voltage on pin 13, plate voltage on pin 10, transmitter keyed +20 volts to pin 17, over-temperature indication on pin 18, and the heater voltage on pin 8. These inputs are all connected to the switch and the various switch positions indicate the operation of each of these functions. A +20 volts dc is required for operation of the circuits in this module and the +20 volts is obtained from the exciter unit. Thus, the buffer circuits will not operate when the exciter is not turned on. C2 serves as a B+ filtering capacitor in this module for the +20-volt input. R11 and potentiometer R2 serve as power amplifier tune-function controls with adjustment of R2 controlling the power output obtainable from the power amplifier when in the TUNE position. R2 should be adjusted such that the power output does not exceed approximately 30 watts when tuned to a maximum rf output in the TUNE position. The dc output from this network is connected through P1 pin 5 to the TUNE-OPERATE function switch. Shielding on several of the wires coming from the cavity amplifier sections is required since a strong rf field exists in this module and shielding is required to prevent radiation of the rf to other circuits associated with the buffer amplifier and metered functions.

4-109. TUNE-OPERATE CONTROL.

4-110. The TUNE-OPERATE switch in the power amplifier provides an artificial tune voltage to the logic circuit in the exciter so that the exciter will continue to drive the power amplifier when no forward power is being sensed at the power amplifier output. See figure 6-24. Otherwise, the rf control relay circuit would switch back to exciter output, indicating a fault in the power amplifier. A +20 volts is applied from the dc input through TUNE-OPERATE switch S3 through R1 to the inter-chassis connector, J7, pin G, which is the reverse power line to the exciter. The reverse power is raised to a high positive voltage indicating to the logic circuit in the exciter unit that a power amplifier forward power exists at the differential amplifier input. The other half of the double-pole, double-throw switch S3 delivers the voltage and current associated with potentiometer R2 in the buffer amplifier to the rf control forward power detector circuit which cuts down the rf power in the exciter loop to a nominal 2.5 to 3.0 watts so that a maximum 30-watt output can be obtained from the power amplifier in the TUNE position. When operating in the TUNE position, the loop through the power amplifier is not used and the basic forward power loop in the exciter only is used and the power amplifier is merely serving as a final amplifier with no relation to controlling the rf loop. When switched to the OPERATE position, the forward power functions return to normal and must be delivered from the power amplifier power sensor or a power amplifier fault will be detected and rf control returned to the exciter 10-watt output.

4-111. HIGH VOLTAGE SWITCH.

4-112. A high voltage switch on the front panel of the power amplifier allows disabling of the high voltage. It allows enabling of the high voltage without having to wait for the time delay relay to enable. High voltage will not come on until time delay has completed after initial ac turn-on. This switch is used when tuning the exciter and the power amplifier is to be disabled.

SECTION III

FUNCTIONAL OPERATION OF MECHANICAL ASSEMBLIES

(Not Applicable)

Exciter 1-2 FWD, 1-4 APC, and 1-7 PWR AMPL.

EXC 2-6 % MOD: See figure 5-5 for interpretation of meter reading in percent.

LPA 1 EXCTR: Indicates that exciter is connected and on. Will indicate in both keyed and unkeyed condition.

LPA 2 KEY: Indicates only when exciter is keyed.

LPA 3 FWD: Power amplifier driver power is decreased with the power amplifier TUNE-OPERATE switch in TUNE position (see EXC 1-4, APC). See figure 5-7 for interpretation of meter reading in watts.

LPA 4 RVS: Reverse power meter readings are interpreted in watts reflected power in figure 5-8.

LPA 5 V-PLATE: Unregulated plate voltage for the power amplifier tube varies with input AC line typically as shown, and with the transmitter unkeyed and unloaded, supply rises to the high value shown. Readings may be interpreted directly in volts by multiplying by 100; i.e., a meter reading of 19 equals 1900 volts dc.

LPA 6 CUR-PLATE: Power amplifier tube plate current may be directly interpreted from the meter readings by multiplying by 10; i.e., a reading of 15 equals 150 milliamperes.

LPA 7 V-SCREEN: Power amplifier tube screen voltage may be directly read by multiplying the meter reading by 10; i.e., a reading of 39 equals 390 volts dc.

LPA 8 V-GRID: Power amplifier tube control grid bias may be directly read by multiplying the meter reading by –2; i.e., a reading of 42 equals a control grid bias voltage of –84 volts dc.

LPA 9 V-HTR: Power amplifier tube heater voltage may be directly read by dividing the meter reading by 4; i.e., a reading of 24 equals 6.0 volts ac.

LPA 10 V-LPA: A voltage level generated within the power amplifier, derived from the high voltage and screen dc voltage supply, when this voltage is less than 26 volts it signals the existence of an abnormal power amplifier voltage condition and causes the exciter to energize the EL relay, putting the transmitter in 10-watt mode. With the EL relay energized in a normal exciter the V-LPA function reads 20 on the meter.

LPA 11 FAN: Derived from unregulated voltage, the fan voltage test point varies as shown with changing line and load conditions.

LPA 12 OVER TEMP: Meter normally reads zero. In over temp mode, meter reads midscale, disables the high voltage and transfers to exciter mode output.

Table 5-3. Normal Test Position Readings, Exciter and Power Amplifier, 50-Watt Mode of Operation

(Exciter readings below will differ from the Exciter Only readings Table 5-2. Refer to Table 5-2 for all other Exciter readings.)

SWITCH POSITION			MODULE	METER READINGS UNKEYED	METER READINGS KEYED AND MODULATED
EXC	1-1	E-L RLY	A7	0 (1)	0 to 2 (1)
EXC	1-2	FWD	A6	0	20 to 40 (2)
EXC	1-3	RVS	A6	0	0 to 7 (3)
EXC	1-4	APC	A6	0	10 to 30
EXC	1-6	VSWR-LPA	LPA LOAD	20	0 to 4
EXC	1-7	PWR AMPL	A10	0	10 to 45
EXC	2-4	+20 CUR	EXCITER LOAD CUR	0.5 to 2	12 to 20
EXC	2-6	% MOD	EXC A7	0 (negative indication)	0 to 40 (4)
LPA	1	EXCTR	EXC +20	18 to 22	18 to 22
LPA	2	KEY	EXC A2	0	18 to 22
LPA	3	FWD	LPA A5	0	40 to 45 (5)
LPA	4	RVS	LPA A5	0 (11)	0 to 10 (5) (11)
LPA	5	V-PLATE	LPA A4	22 to 28	17 to 22 (6)
LPA	6	CUR-PLATE	LPA A4	0 to 5 to 6 to 8	10 to 20 (7)
LPA	7	V-SCREEN	LPA A4	37 to 45	37 to 45 (8)
LPA	8	V-GRID	LPA A3	38 to 42	38 to 42 (9)
LPA	9	V-HTR	LPA A3	23 to 26	23 to 26
LPA	10	V-LPA	LPA A4	24 to 35	24 to 45
LPA	11	FAN	LPA A2	23 to 27	23 to 27
LPA	12	OVER-TEMP	LPA A3	0	0 (10)

NOTES:

(1) When power amp is not operating, reading will be 15 to 40 indicating exciter mode of operation.

(2) Indication of forward power required to produce 50 watt output from power amplifier. (See figure 5-3.)

(3) Power amplifier cavity input tuned for minimum reading on exciter reverse.

(4) Reading varies with percent modulation.

(5) See curves figures 5-7 and 5-8.

(6) Multiply meter reading by 100 to obtain true plate voltage.

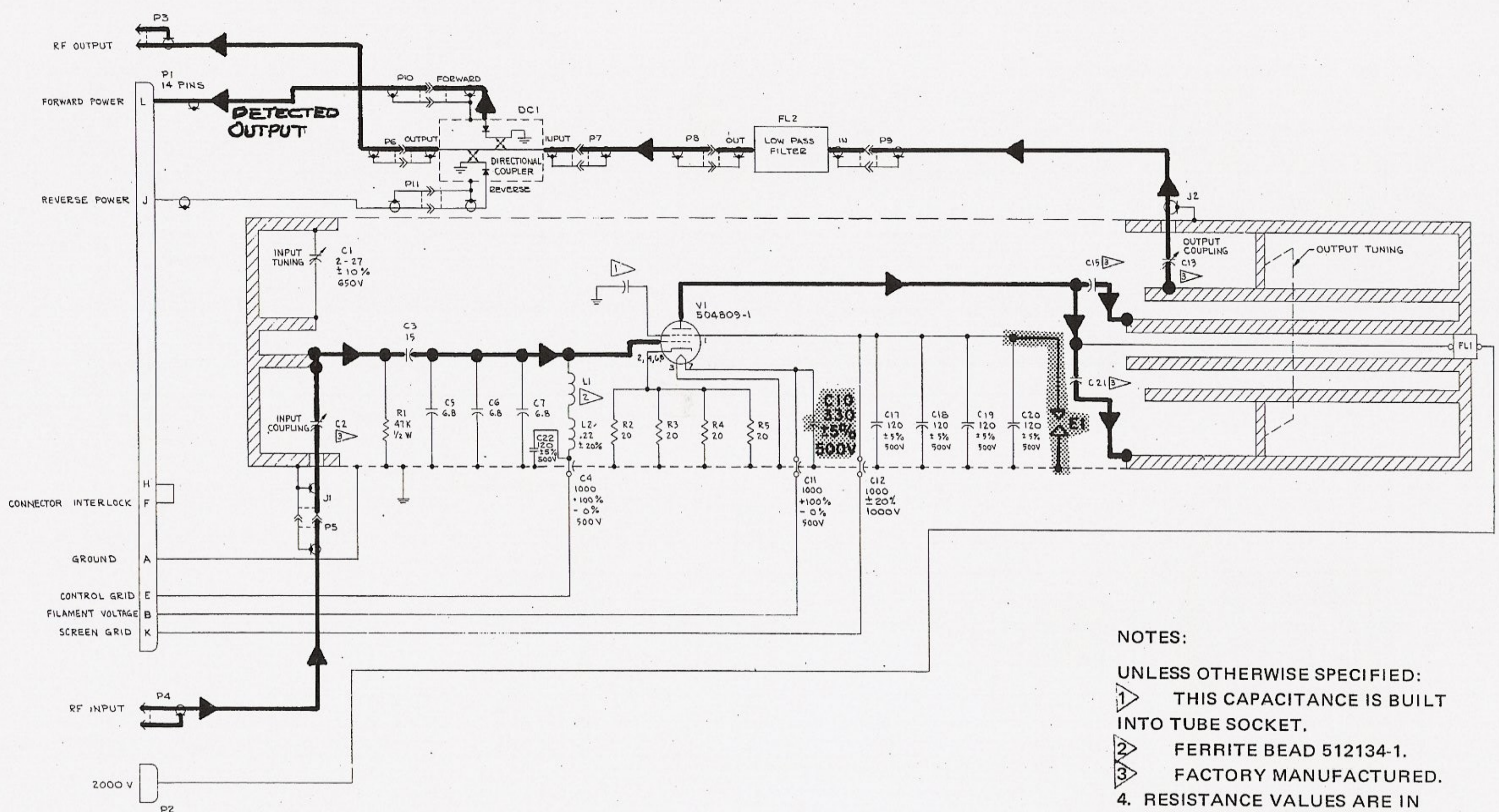
(7) Multiply meter reading by 10 to obtain current in milliamperes.

(8) Multiply meter reading by 10 to obtain true screen voltage.

(9) Multiply meter reading by −2 to obtain true grid voltage.

(10) Any indication on this position indicates an overtemperature condition, and system will switch to exciter operation only.

(11) Negative indication exists when power amplifier is in the tune mode.

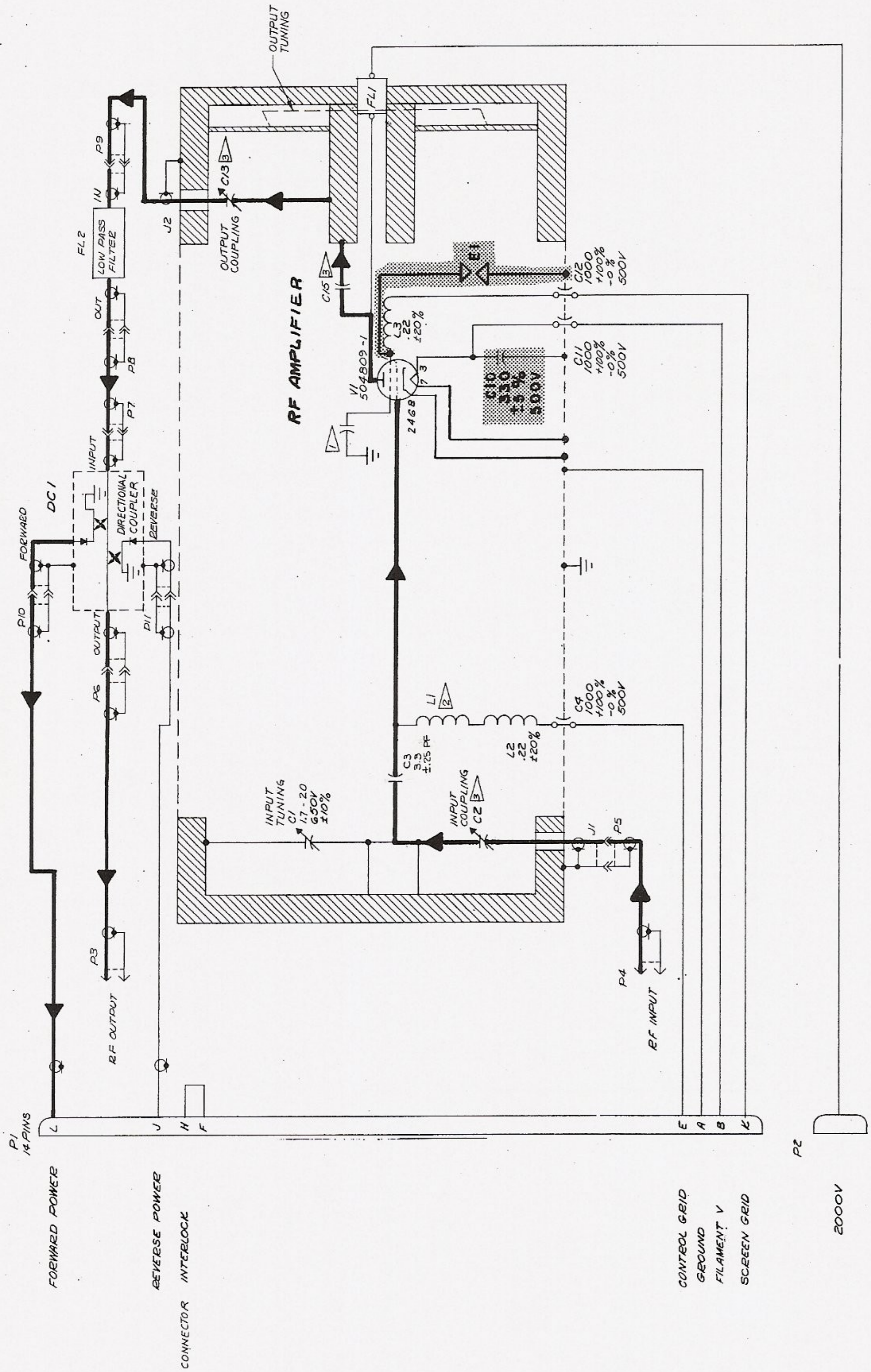


NOTES:

UNLESS OTHERWISE SPECIFIED:

1. THIS CAPACITANCE IS BUILT INTO TUBE SOCKET.
2. FERRITE BEAD 512134-1.
3. FACTORY MANUFACTURED.
4. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/4 WATT.
5. CAPACITANCE VALUES ARE IN PICOFARADS, ± 10%, 1000 V.
6. INDUCTANCE VALUES ARE 1.0 MICROHENRIES ± 10%.
7. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH

Figure 6-25. Tuned Cavity VHF A7, Schematic Diagram



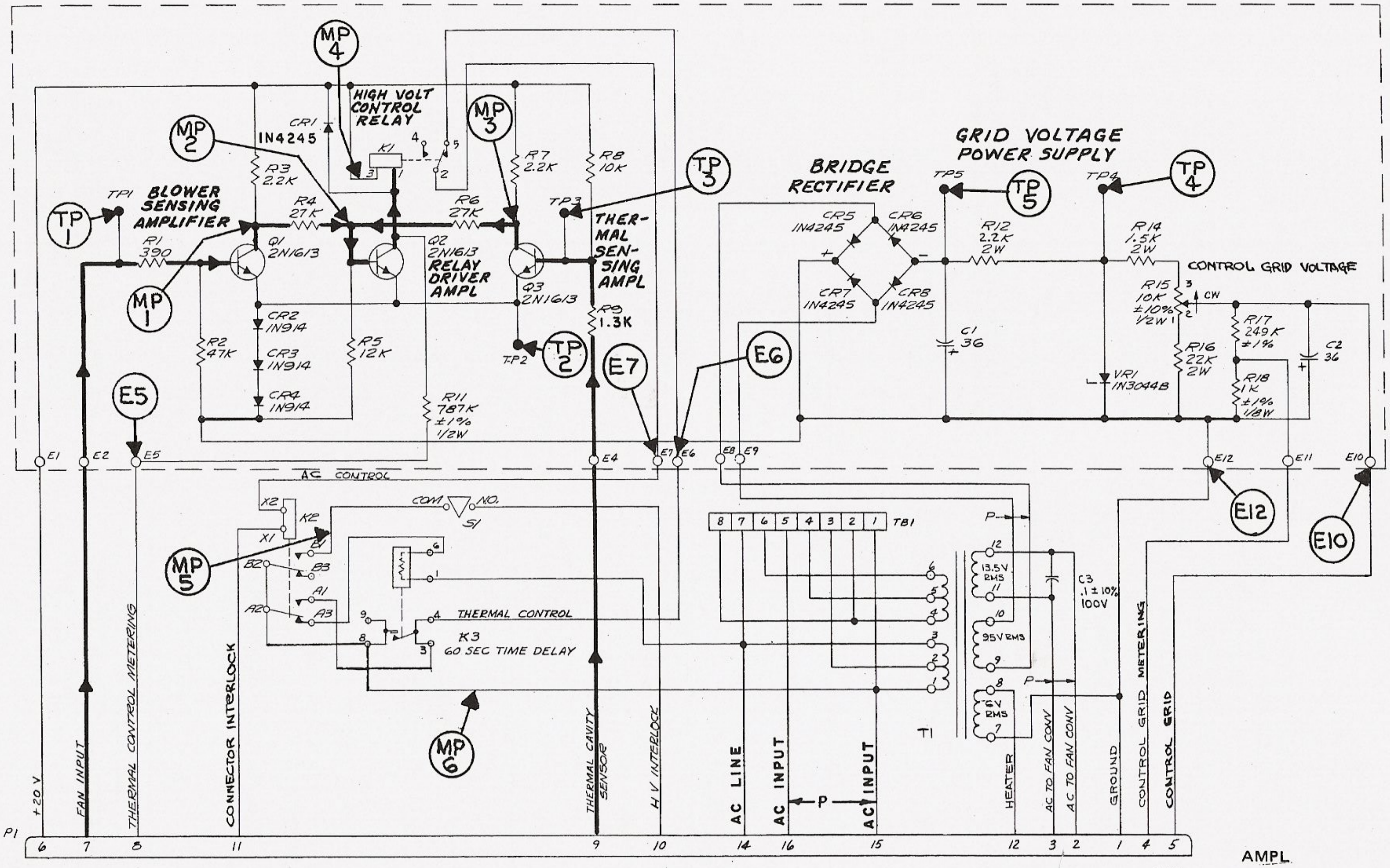
NOTES:

UNLESS OTHERWISE SPECIFIED:

1. CAPACITANCE IS BUILT INTO TUBE SOCKET.
2. FERRITE BEAD 512134-1 FACTORY MANUFACTURED.
3. ...

4. CAPACITANCE VALUES ARE IN PICOFARADS, ± 10%, 1000 V.
5. INDUCTANCE VALUES ARE IN MICROHENRIES.
6. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH

Figure 6-26. Tuned Cavity UHF A7, Schematic Diagram

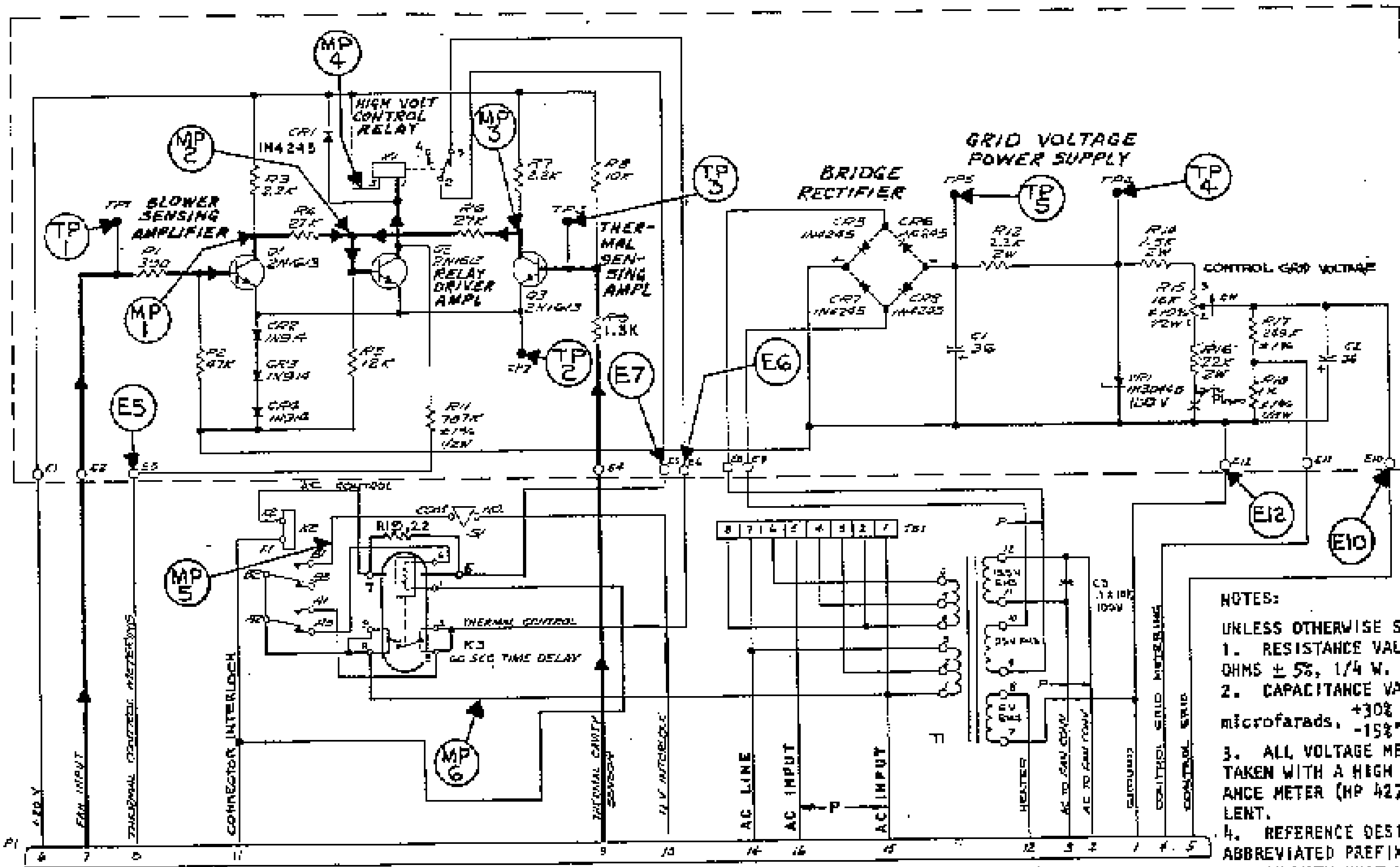


NOTES:

UNLESS OTHERWISE SPECIFIED:
1. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/4 W.
2. CAPACITANCE VALUES ARE IN MICROFARADS, $^{+30\%}_{-15\%}$, 150 V.
3. ALL VOLTAGE MEASUREMENTS TAKEN WITH A HIGH INPUT IMPEDANCE METER (HP 427) OR EQUIVALENT.
4. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.

	NORMAL	AMPL THERMAL CUT OUT	BLOWER INOPERATIVE
TP1	3.5 VDC	3.5 VDC	0 VDC
TP2	3.0 VDC	3.0 VDC	3.0 VDC
TP3	3.5 VDC	2.0 VDC	3.5 VDC
	UNKEYED	KEYED	
TP4	−100 VDC	−100 VDC	
TP5	−130 VDC	−130 VDC	

Figure 6-27. Power Supply, Control Grid/Thermal Control/AC Control A3, Schematic Diagram



NOTES:

UNLESS OTHERWISE SPECIFIED:

1. RESISTANCE VALUES ARE IN OHMS ± 5%, 1/4 W.
2. CAPACITANCE VALUES ARE IN microfarads, +30% -15%, 150 V.
3. ALL VOLTAGE MEASUREMENTS TAKEN WITH A HIGH INPUT IMPEDANCE METER (HP 427) OR EQUIVALENT.
4. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.

R17 lifted from ground to provide stand by bias; ground for transmit.

6.4

	NORMAL	AMPL THERMAL CUT OUT	BLOWER INOPERATIVE
TP1	3.5 VDC	3.5 VDC	0 VDC
TP2	3.0 VDC	3.0 VDC	3.0 VDC
TP3	3.5 VDC	2.0 VDC	3.5 VDC
	UNKEYED	KEYED	
TP4	-100 VDC	-100 VDC	
TP5	-130 VDC	-130 VDC	

CONFIGURATION CHANGES

ADDED LEAD FROM K3-3 TO K3-4, AND FROM K3-8 TO K3-9.

REMOVE WIRE FROM K3-1 TO JUNCTION OF TB1-7 AND P1-14. PLACE WIRE FROM K3-1 TO P1-11.

R19 ADDED

Figure 6-27. Power Supply, Control Grid/Thermal Control/AC Control A3, Schematic Diagram

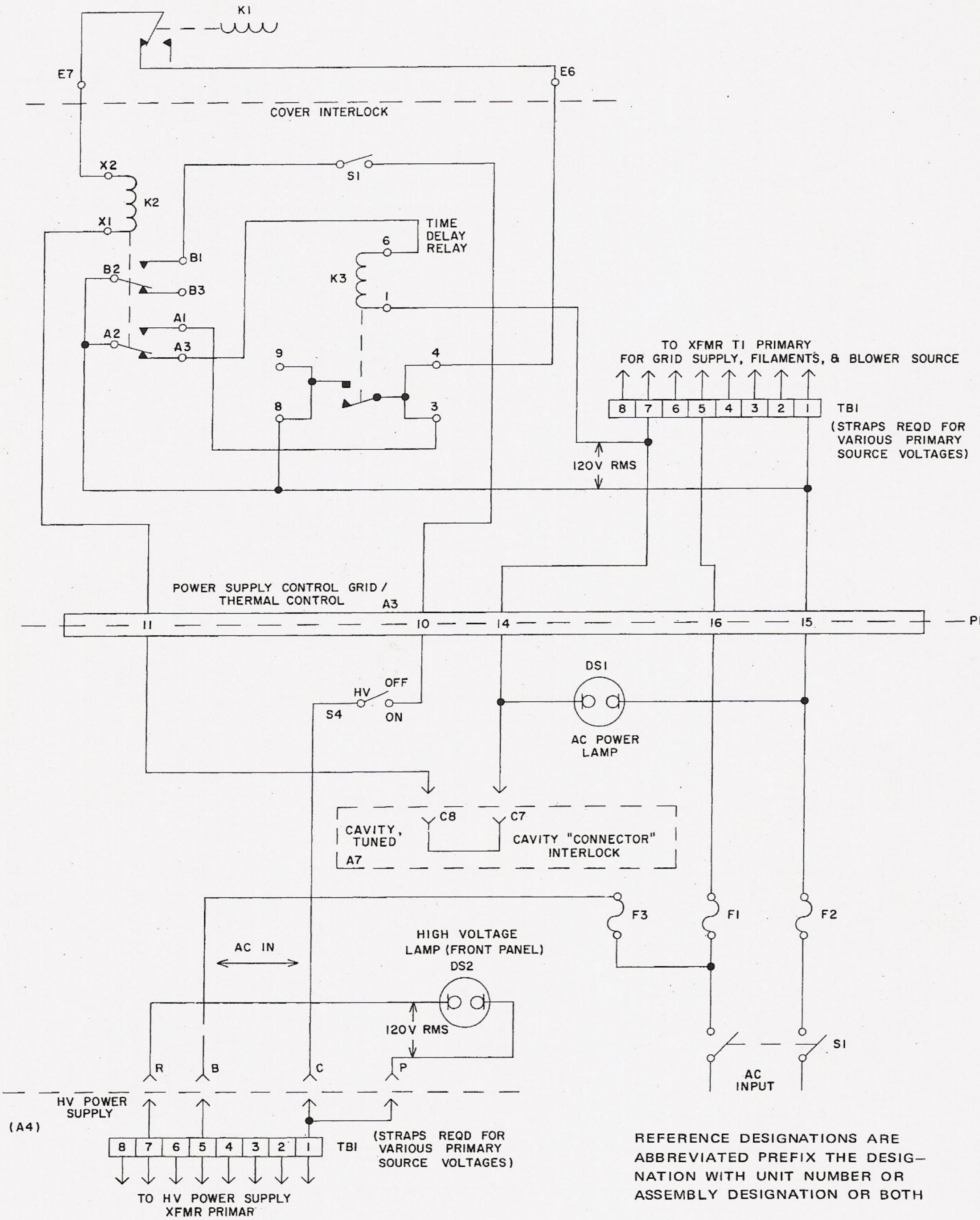


Figure 6-28. AC Control Circuits, Schematic Diagram

	UNKEYED	KEYED
TP1	550 VDC	380 VDC
TP2	19 VDC	−1.0 VDC
TP3	NOT USED	
TP4	390 VDC	390 VDC
TP5	110 VDC	160 VDC
TP6	34 VDC	48 VDC

NOTES:

UNLESS OTHERWISE SPECIFIED:
1. RESISTANCE VALUES ARE IN OHMS, ± 5%.
2. ALL VOLTAGE MEASUREMENTS TAKEN WITH A HIGH INPUT IMPEDANCE METER (HP 427) OR EQUIVALENT.
3. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.

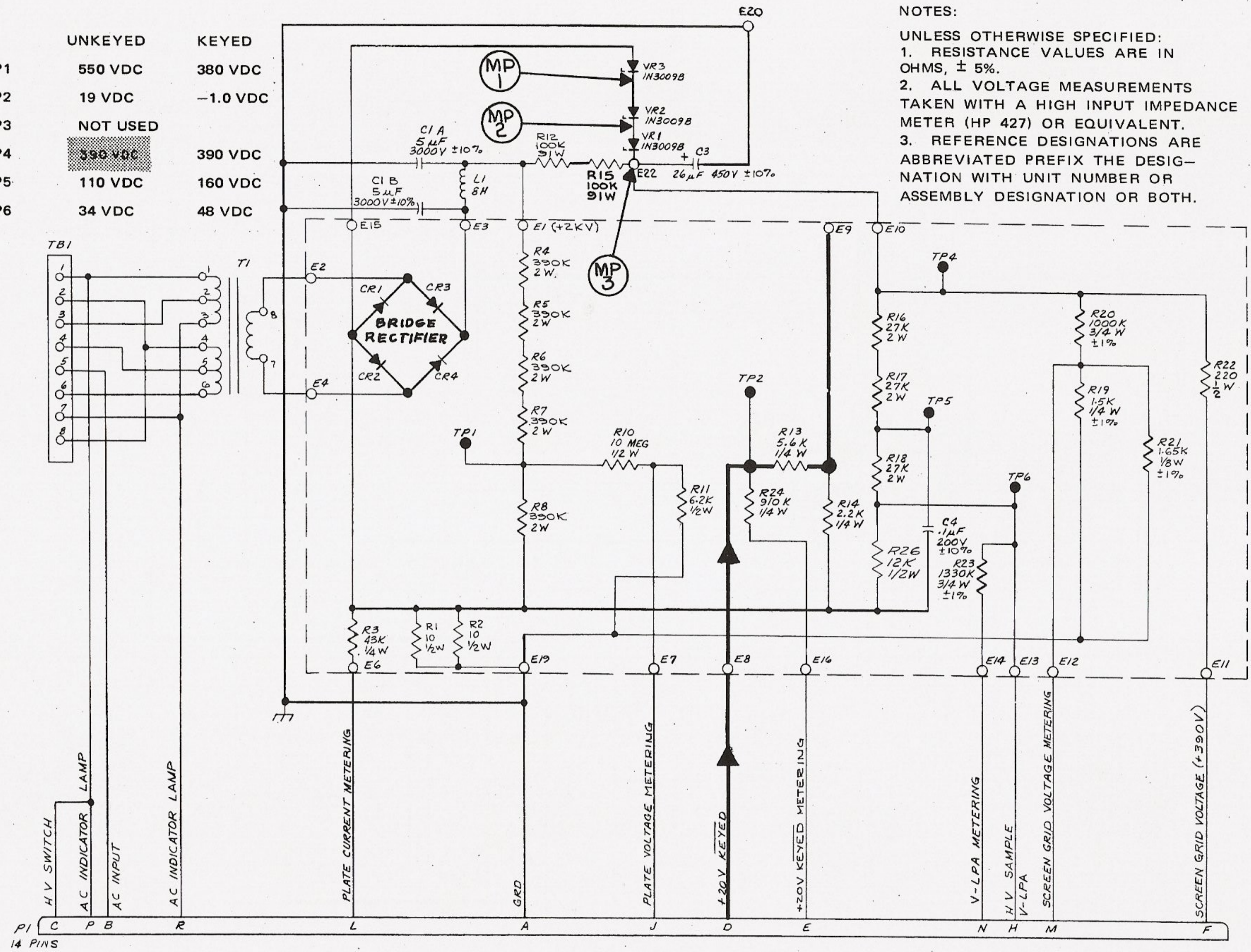
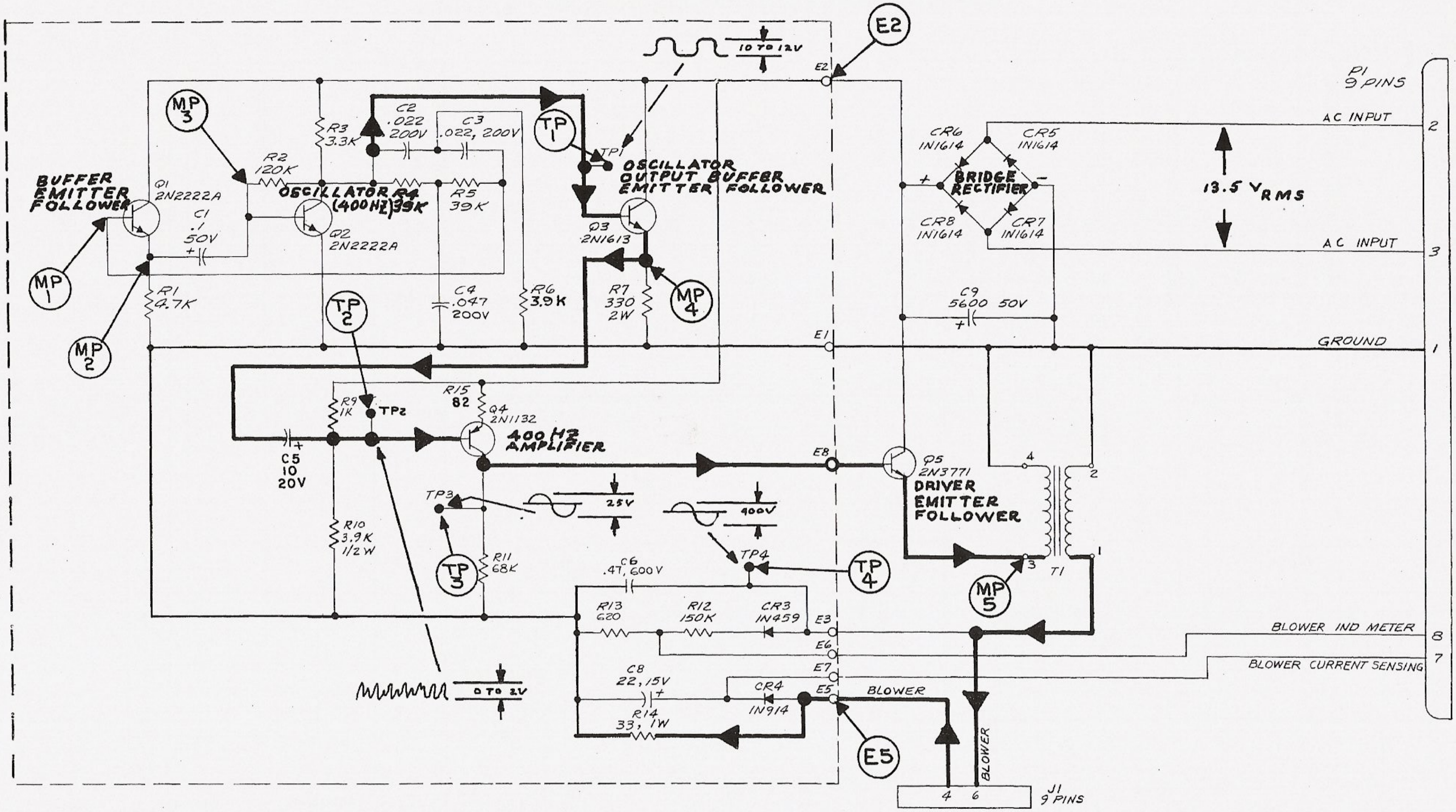


Figure 6-29. Power Supply, Plate/Screen Grid A4, Schematic Diagram



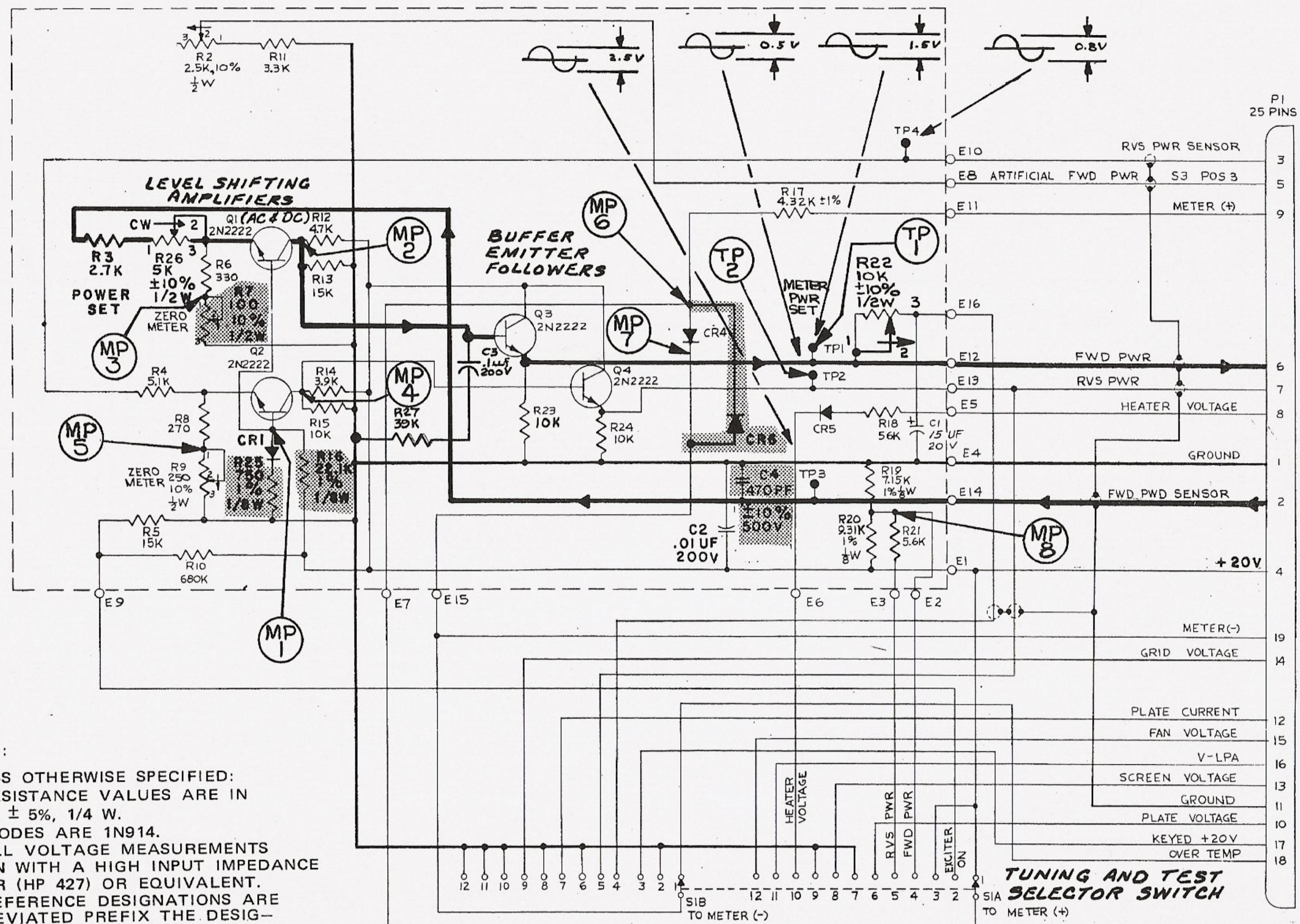
	UNKEYED	KEYED
TP1	8.0 VDC	8.0 VDC
TP2	14 VDC	14 VDC
TP3	0.8 VDC	0.8 VDC
TP4	0 VDC	0 VDC

Waveforms: 400 hz with 60 hz Ripple

NOTES:

UNLESS OTHERWISE SPECIFIED:
1. RESISTANCE VALUES ARE IN OHMS, ± 5%, 1/4 WATT.
2. CAPACITANCE VALUES ARE IN MICROFARADS, ± 10%.
3. ALL VOLTAGE MEASUREMENTS TAKEN WITH A HIGH INPUT IMPEDANCE METER (HP 427 OR EQUIVALENT).
4. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.

Figure 6-30. Converter AC to AC A2, Schematic Diagram



NOTES:

UNLESS OTHERWISE SPECIFIED:
1. RESISTANCE VALUES ARE IN OHMS, ± 5%, 1/4 W.
2. DIODES ARE 1N914.
3. ALL VOLTAGE MEASUREMENTS TAKEN WITH A HIGH INPUT IMPEDANCE METER (HP 427) OR EQUIVALENT.
4. REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX THE DESIGNATION WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH

Waveforms: at 1 Khz Remote Modulation input at 0 dbm

	UNKEYED	KEYED
TP1	8.4 VDC	7.6 VDC
TP2	8.4 VDC	8.3 VDC
TP3	0 VDC	0 VDC
TP4	0 VDC	−0.3 VDC

Figure 6-31. Buffer Amplifier/Multiplier, Electrical Instrument A5, Schematic Diagram